SUBARU

IMPREZA

2005 Model Year

PDF Service Manual

GENERAL INFORMATION SECTION (Pub.No. G1880GE1)

ENGINE SECTION 1 (Pub.No. G1880GE2)

ENGINE SECTION 2 (Pub.No. G1880GE3)

TRANSMISSION SECTION (Pub.No. G1880GE4)

CHASSIS SECTION (Pub.No. G1880GE5)

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This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

FUJI HEAVY INDUSTRIES LTD. G1880GE1

FOREWORD

FW

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1. Foreword

A: FOREWORD

These manuals are used when performing maintenance, repair, or diagnosis of the Subaru IMPREZA.

Applied model:
GD*****, GG***** from 2005MY

The manuals contain the latest information at the time of publication. Changes in specifications, methods, etc. may be made without notice.

HOW TO USE THIS MANUALS

HU

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1. How to Use This Manuals

A: HOW TO USE THIS MANUALS

1. STRUCTURE

Each section consists of SCT that are broken down into SC that are divided into sections for each component. The specification, maintenance and other information for the components are included, and diagnosis information has also been added where necessary.

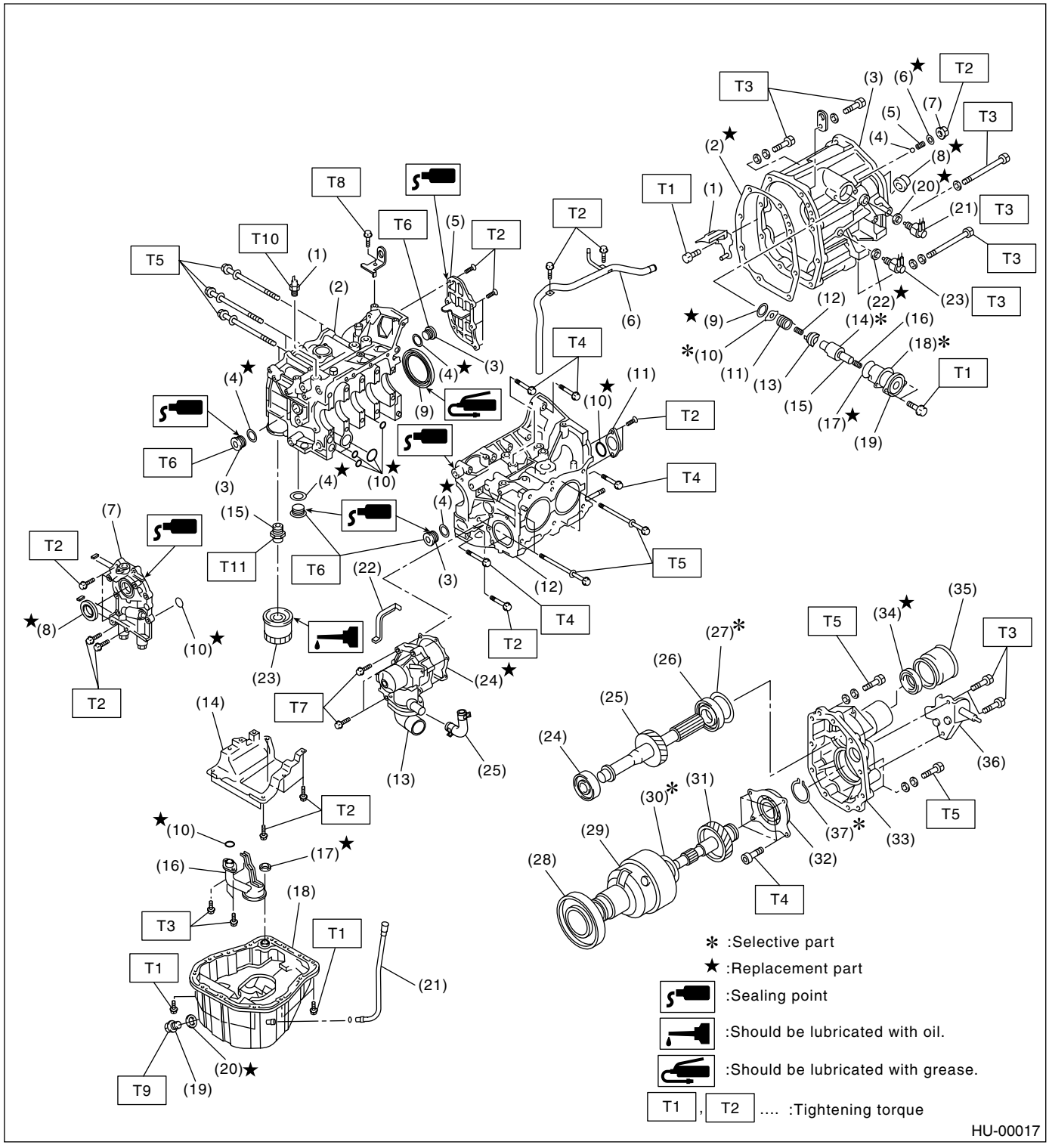
2. INDEX

The first page has an index with tabs.

3. COMPONENTS

Illustrations are listed for each component. The information necessary for repair work (tightening torque, grease up points, etc.) is described on these illustrations. Information is described using symbol. To order the parts, refer to parts catalogue.

Example:


T1
T2
T3
T4
T5
T6
T7
T8
T9
T10
T11
(1)
(2)
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(34)
(35)
(36)
(37)
✻ :Selective part
★ :Replacement part
:Sealing point
:Should be lubricated with oil.
:Should be lubricated with grease.
T1 , T2 .... :Tightening torque
HU-00017

4. SPECIFICATIONS

If necessary, specifications are also included.

5. INSPECTION

Inspections are included to be carried out before and after maintenance.

6. MAINTENANCE

• Maintenance instructions for serviceable parts describes work area and detailed steps with illustration. It also describes the use of special tool, tightening torque, cautions for each procedure.
• If many serviceable parts are included in one service procedure, appropriate reference are provided for each part.

Example:

15.Main Shaft Assembly for Single-Range (A)

A: REMOVAL (B)

1) Remove the manual transmission assembly from vehicie. <Ref. to MT-33, REMOVAL, Manual Transmission Assembly.> (C)

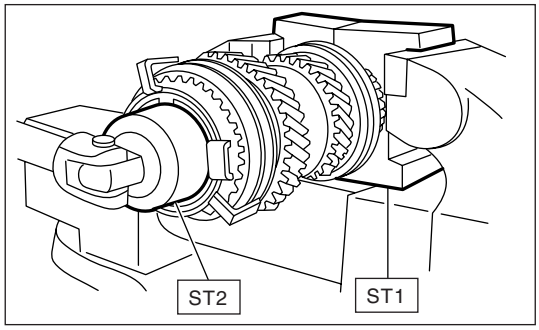
---

11) Tighten the lock nuts to the specified torque using ST1 and ST2.

NOTE: (D)
Secure the lock nuts in two Places affer tightening.

ST1 498937000 TRANSMISSION HOLDER
ST2 499987003 (E) SOCKET WRENCH (35) (F)

Tightening torque:
118 N·m (12.0 kgf-m, 86.8 ft-lb) (G)



(H)

HU-00020

(A) Component
(B) Process
(C) Reference
(D) Caution
(E) Tool number of special tool
(F) Name of special tool
(G) Tightening torque
(H) Illustration

7. DIAGNOSIS

Tables showing a step-by-step process make it easy to conduct diagnosis.

8. SI UNITS

Measurements in these manuals are according to the SI units. Metric and yard/pound measurements are also included.

Example:

Tightening torque:
44 N·m (4.5 kgf-m, 33 ft-lb)

Item	SI Units	Conventional unit	Remarks
Force	N (Newton)	kgf	1 kgf = 9.80655 N
Mass (Weight)	kg, g	kg, g	
Capacity	ℓ, mℓ or cm^3	ℓ or cc	1 cc = 1 cm^3 = 1 mℓ
Torque	N·m	kgf-m, kgf-cm	1 kgf-m = 9.80655 N·m
Rotating speed	rpm	rpm	
Pressure	kPa (kilopascal)	kgf/cm^2	1 kgf/cm^2 = 98.0655 kPa
		mmHg	1 mmHg = 0.133322 kPa
Power	W	PS	1 PS = 0.735499 kW
Calorie	W·h	cal	1 kcal = 1.16279 W·h
Fuel consumption rate	g/kw·h	g/PS·h	1 g/PS·h = 1.3596 g/kW·h

The figure used in this manuals are described in the SI units and conventional units are described in ( ).

9. EXPLANATION OF TERMINOLOGY

- **List**

AAI	:	Air Assist Injection
A/B	:	Airbag
ABS	:	Antilock Brake System
A/C	:	Air conditioner
ACC	:	Accesory
A/F	:	Air Fuel Ratio
ALT	:	Generator
ASSY	:	Assembly
AT	:	Automatic transmission
ATF	:	Automatic transmission fluid
AVCS	:	Active Valve Control System
AWD	:	All Wheel Drive
BATT	:	Battery
CAN	:	Controller Area Network
CD-R/RW	:	CD Recordable/ReWritable
COMPL	:	Complete
CPU	:	Central Processing Unit
DCCD	:	Driver's Control Center Defferential
DOHC	:	Double Overhead Camshaft
DTC	:	Diagnosis Trouble Code
DOJ	:	Double Offset Joint
DVD	:	Digital Versatile Disc or Digital Video Disc
EBD	:	Electric Brake Distribution
ECM	:	Engine Control Module
EGI	:	Electronic Gasoline Injection
E/G	:	Engine
EGR	:	Exhaust Gas Recirculation
ELR	:	Emergency Locking Retractor
EX	:	Exhaust
ETC	:	Electric Thrrotle Control
F/B	:	Fuse & Joint Box
FL	:	Fusible Link
FWD	:	Front Wheel Drive
GPS	:	Grobal Positioning System
HID	:	High-Intensity Discharge
H/U	:	Hydraulic Unit
IG	:	Ignition
IN	:	Intake
INT	:	Intermittent
I/O	:	Input / Output
ISC	:	Idle Speed Control
LED	:	Light Emitting Diode
LH	:	LH (Left Hand)
LSD	:	Limited Slip Differential
M/B	:	Main Fuse & Relay Box
MD	:	Mini Disc
MPi	:	Multi Point injection
MP-T	:	Multi-Plate Transfer
MT	:	Manual transmission
Non-turbo	:	Natural Aspiration
NC	:	Normal Close (Relay)
NO	:	Normal Open (Relay)
OP	:	Option Parts
OBD	:	On-Board Diagnosis
P/S	:	Power Steering
P/W	:	Power Window
PCD	:	Pitch Circle Diameter
PCV	:	Positive Crankcase Ventilation
PID	:	Parameter Identification
RAM	:	Random Access Memory
RH	:	RH (Right Hand)
ROM	:	Read Only Memory
rpm	:	Revolution Per Minute
SOHC	:	Single Overhead Camshaft
SRS	:	Supplemental Restraint System
SSM	:	Subaru Select Monitor
ST	:	Special Tool
STD	:	Standard
SW	:	Switch
T/B	:	Tarbo charger
TGV	:	Tumble generated valve
T/M	:	Transmission
UV	:	Ultraviolet
VIN	:	Vehicle Identification Number
ViS-C	:	Viscous Coupling
VSV	:	Vacuum Switching Valve
VTD	:	Variable Torque Distribution
W/H	:	Wiring harness
Pr	:	Primary
2ndr	:	Secondary

SPECIFICATIONS

SPC

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1. Impreza

A: DIMENSION

Model			Sedan	Wagon	OUTBACK	STi
Overall length		mm (in)	4,415 (173.8)			
Overall width		mm (in)	1,740 (68.5)	1,695 (66.7)	1,710 (67.3)	1,740 (68.5)
Overall height (at C.W.)		mm (in)	1,440 (56.7)	1,465 (57.7), 1,485 (58.5)★2	1,475 (58.1), 1,495 (58.9)★2	1,440 (56.7)
Compartment	Length	mm (in)	1,890 (74.4)	1,845 (72.6)		1,890 (74.4)
	Width	mm (in)	1,380 (54.3)			
	Height	mm (in)	1,180 (46.5), 1,125 (44.3)★3	1,200 (47.2), 1,150 (45.3)★3	1,200 (47.2), 1,150 (45.3)★3	1,180 (46.5)
Wheelbase		mm (in)	2,525 (99.4)			2,540 (100.0)
Tread	Front	mm (in)	1,485 (58.5)	1,465 (57.7)	1,460 (57.5)	1,490 (58.7)
	Rear	mm (in)	1,475 (58.1), 1,480 (58.3)★1	1,455 (57.3)	1,455 (57.3)	1,495 (58.9)
Minimum road clearance	Without catalytic converter	mm (in)	150 (5.9), 155 (6.1)★1	150 (5.9), 155 (6.1)★1	160 (6.3)	—
	With catalytic converter	mm (in)	150 (5.9), 155 (6.1)★1	150 (5.9), 155 (6.1)★1	160 (6.3)	155 (6.1)

★1: 2.0 L Turbo
★2: With roof rail
★3: With sun roof

B: ENGINE

Model	1.6 L	Non-turbo 2.0 L	Turbo 2.0 L	2.5 L	STi
Engine type	Horizontally opposed, liquid cooled, 4-cylinder, 4-stroke gasoline engine				
Valve arrangement	Overhead camshaft type				
Bore × Stroke mm (in)	87.9 × 65.8 (3.461 × 2.591)	92 × 75 (3.62 × 2.95)		99.5 × 79 (3.92 × 3.11)	92 × 75 (3.62 × 2.95)
Displacement cm^3 (cu in)	1,597 (97.45)	1,994 (121.67)		2,457 (149.9)	1,994 (121.67)
Compression ratio	10.0±0.2		8.0±0.2	10.0±0.2	8.0±0.2
Firing order	1 — 3 — 2 — 4				
Idle speed at Park/Neutral position rpm	650±100★2 700±100★1	650±100★2 700±100★1	700±100★4 750±100	650±100	700±100
Maximum output kW (PS)/rpm	70 (95)/5,200	92 (125)/5,600	160 (218)/5,600 168 (229)/6,000★3 165 (225)/5,600★4	112 (152)/5,600	195 (265)/6,000
Maximum torque N·m (kgf-m, ft-lb)/rpm	143 (14.6, 105.5)/3,600	184 (18.8, 136.0)/3,600	292 (29.8, 215.4) /3,600 300 (30.6, 221.3)/3,600★3, 4,000★4	223 (22.7, 164.5)/3,600	343 (35.0, 253.0)/4,000

★1: Without OBD
★2: With OBD
★3: Australia model
★4: Europe model

C: ELECTRICAL

<table>
<tr><td colspan="3">Model</td><td>1.6 L</td><td>Non-turbo 2.0 L</td><td>Turbo 2.0 L</td><td>2.5 L</td><td>STi</td></tr>
<tr><td colspan="3">Ignition timing at idling BTDC</td><td>5°±10°</td><td>10°±10°</td><td>12°±10°</td><td>MT: 10°±10°
AT: 15°±10°</td><td>12°±10°</td></tr>
<tr><td rowspan="3">Spark plug</td><td rowspan="3">Type and manufacturer</td><td>Without OBD</td><td>NGK: BKR6E (without catalyst)
CHAMPION: RC8YC4 (with catalyst)
NGK: BKR6E-11 (with catalyst)</td><td>NGK: BKR6E (without catalyst)
CHAMPION: RC10YC4 (with catalyst)
NGK: BKR5E-11 (with catalyst)</td><td>—</td><td>CHAMPION: RC10YC4
NGK: BKR5E-11</td><td>—</td></tr>
<tr><td rowspan="2">With OBD</td><td>CHAMPION: RC8YC4</td><td>CHAMPION: RC10YC4</td><td rowspan="2">NGK: PFR6G</td><td rowspan="2">—</td><td rowspan="2">NGK: PFR6G</td></tr>
<tr><td>Alternate
NGK: BKR6E-11</td><td>Alternate
NGK: BKR5E-11</td></tr>
<tr><td colspan="3">Generator</td><td colspan="5">12V — 75A, 12V — 90A★1</td></tr>
<tr><td rowspan="3">Battery</td><td rowspan="3">Type and capacity (5HR)</td><td>For Europe and South America</td><td>12V — 48AH (55D23L)</td><td colspan="2">MT: 12V — 48AH (55D23L)
AT: 12V — 52AH (65D23L)</td><td>—</td><td rowspan="2">12V — 48AH (55D23L)</td></tr>
<tr><td>For Australia</td><td>—</td><td>12V — 27AH (34B19L)</td><td>12V — 48AH (55D23L)</td><td>12V — 27AH (34B19L)</td></tr>
<tr><td>Others</td><td>12V — 48AH (55D23L)</td><td colspan="3">12V — 27AH (34B19L)</td><td>—</td></tr>
</table>

★1: 2.0 L EC, EK, E2, ER model

D: TRANSMISSION

Model			1.6 L		Non-turbo 2.0 L		Turbo 2.0 L		2.5 L		STi
Transmission type			5MT	4AT	5MT	4AT	5MT	4AT	5MT	4AT	6MT
Clutch type			DSPD	TCC	DSPD	TCC	DSPD	TCC	DSPD	TCC	DSPD
Gear ratio		1st	3.454	2.785	3.454	2.785	3.454, 3.166★1	2.785	3.454	2.785	3.636
		2nd	2.062	1.545	2.062	1.545	1.947, 1.882★1	1.545	2.062	1.545	2.375
		3rd	1.448	1.000	1.448	1.000	1.366, 1.296★1	1.000	1.448	1.000	1.761
		4th	1.088	0.694	1.088	0.694	0.972	0.694	1.088	0.694	1.346
		5th	0.825	—	0.825	—	0.738	—	0.780	—	0.971, 1.062★1
		6th	—	—	—	—	—	—	—	—	0.756, 0.842★1
		Reverse	3.333	2.272	3.333	2.272	3.333	2.272	3.333	2.272	3.545
		Dual range	1.447	—	1.447	—	—	—	—	—	—
Reduction gear (Front drive)	1st reduction	Type of gear	—	Helical	—	Helical	—	Helical	—	Helical	—
		Gear ratio	—	1.000	—	1.000	—	1.000	—	1.000	—
	Final reduction	Type of gear	Hypoid	Hypoid	Hypoid	Hypoid	Hypoid	Hypoid	Hypoid	Hypoid	Hypoid
		Gear ratio	4.111	4.444	3.900	4.111	3.900, 4.444★1	4.444	4.111	4.111	3.900
Reduction gear (Rear drive) (AWD model)	Transfer reduction	Type of gear	Helical	—	Helical	—	Helical	—	Helical	—	Helical
		Gear ratio	1.000	—	1.000	—	1.100, 1.000★1	—	1.000	—	1.100, 1.000★1
	Final reduction	Type of gear	Hypoid	Hypoid	Hypoid	Hypoid	Hypoid	Hypoid	Hypoid	Hypoid	Hypoid
		Gear ratio	4.111	4.444	3.900	4.111	3.545, 4.444★1	4.444	4.111	4.111	3.545, 3.900★1

5MT: 5-forward speeds with synchromesh and 1-reverse
4AT: Electronically controlled fully-automatic, 4-forward speeds and 1-reverse
6MT: 6-forward speeds with synchromesh and 1-reverse
DSPD: Dry Single Plate Diaphragm
TCC: Torque Converter Clutch
★1: Australia spec vehicle

E: STEERING

Model		Turbo 2.0 L	OUTBACK	2.5L	2.0 L NA, 1.6 L	STi
Type		Rack and Pinion				
Turns, lock to lock		2.69	3.02	2.69	3.22	2.66
Minimum turning circle m (ft)	Curb to curb	11 (36.1)	11 (36.1)	11 (36.1)	10.4 (34.1)	11.6 (38.1)
	Wall to wall	12.0 (39.4)	11.6 (38.1)	12.0 (39.4)	11.2 (36.7)	12.6 (41.3)

F: SUSPENSION

Front	Macpherson strut type, Independent, Coil spring
Rear	Dual-link type, Independent, Coil spring

G: BRAKE

Model	1.6 L	Non-turbo 2.0 L, 2.5 L	Turbo 2.0 L, STi
Service brake system	Dual circuit hydraulic with vacuum suspended power unit		
Front	Ventilated disc brake		
Rear	Drum brake	Disc brake	Ventilated disc brake
Parking brake	Mechanical on rear brakes		

H: TIRE

Model	BASE, TS	GX, TS	GX, RS, WRX	OUTBACK	WRX	STi
Rim size	14 × 5 1/2JJ	15 × 6JJ	16 × 6 1/2JJ	16 × 6 1/2JJ	17 × 7JJ	17 × 8JJ
Tire size	185/70R14 88H	195/60R15 88H	205/50R16 87V	P205/55R16 89V	215/45R17 87W	225/45R17 90W
Type	Steel belted radial, Tubeless					

I: CAPACITY

Model		1.6 L FWD		1.6 L AWD		Non-turbo 2.0 L		Turbo 2.0 L		2.5 L		STi
		5MT	4AT	5MT	4AT	5MT	4AT	5MT	4AT	5MT	4AT	6MT
Fuel tank ℓ (US gal, Imp gal)		50 (13.2, 11.0)						60 (15.9, 13.2)				
Engine oil ℓ (US qt, Imp qt)	Total capacity (at overhaul)	4.5 (4.8, 4.0)						5.0 (5.3, 4.4)		4.5 (4.8, 4.0)		5.0 (5.3, 4.4)
	When replacing engine oil and oil filter	4.2 (4.4, 3.7)						4.3 (4.5, 4.8)		4.2 (4.4, 3.7)		4.3 (4.8, 4.0)
	When replacing engine oil only	4.0 (4.2, 3.5)										
Transmission gear oil ℓ (US qt, Imp qt)		3.3 (3.5, 2.9)	—	3.5 (3.7, 3.1), 4.0 (4.2, 3.5)★1	—	3.5 (3.7, 3.1), 4.0 (4.2, 3.5)★1	—	3.5 (3.7, 3.1)	—	3.5 (3.7, 3.1)	—	4.1 (4.3, 3.6)
ATF ℓ (US qt, Imp qt)		—	8.0 (8.5, 7.0)	—	8.4 (8.9, 7.4)	—	8.4 (8.9, 7.4)	—	9.3 (9.8, 8.2)	—	9.3 (9.8, 8.2)	—
Front differential gear oil ℓ (US qt, Imp qt)		—	1.2 (1.3, 1.1)	—	1.2 (1.3, 1.1)	—	1.2 (1.3, 1.1)	—	1.2 (1.3, 1.1)	—	1.2 (1.3, 1.1)	—
Rear differential gear oil ℓ (US qt, Imp qt)		—		0.7 — 0.9 (0.7 — 1.0, 0.6 — 0.8)								0.9 — 1.1 (1.0 — 1.2, 0.8 — 1.0)
Power steering fluid ℓ (US qt, Imp qt)		0.7 (0.7, 0.6)										
Engine coolant ℓ (US qt, Imp qt)		7.4 (7.8, 6.5)	7.3 (7.7, 6.4)	7.4 (7.8, 6.5)	7.3 (7.7, 6.4)	7.0 (7.4, 6.2)	6.9 (7.3, 6.1) 7.3 (7.7, 6.4)★2	7.7 (8.1, 6.8)	7.6 (8.0, 6.7)	7.0 (7.4, 6.2)	6.9 (7.3, 6.1)	7.7 (8.1, 6.8)

★1: Dual range
★2: With ATF cooler (warmer function)

J: WEIGHT

1. LHD MODEL

Sedan

Option code★1			E2			EC		K0	K4	KS
Model			1.6 L							
			FWD			AWD				
			Base			TS				
			5MT	4AT		5MT				
Curb weight (C.W.)	Front	kg (lb)	720 (1,587)	765 (1,687)	770 (1,698)	735 (1,620)	755 (1,664)	750 (1,654)	750 (1,654)	740 (1,631)
	Rear	kg (lb)	470 (1,036)	470 (1,036)	470 (1,036)	520 (1,146)	520 (1,146)	520 (1,146)	520 (1,146)	535 (1,179)
	Total	kg (lb)	1,190 (2,624)	1,235 (2,723)	1,240 (2,734)	1,255 (2,756)	1,275 (2,810)	1,270 (2,800)	1,270 (2,800)	1,275 (2,810)
Maximum permissible axle weight (M.P.A.W.)	Front	kg (lb)	890 (1,962)	890 (1,962)	890 (1,962)	890 (1,962)	890 (1,962)	890 (1,962)	890 (1,962)	890 (1,962)
	Rear	kg (lb)	890 (1,962)	890 (1,962)	890 (1,962)	890 (1,962)	890 (1,962)	890 (1,962)	890 (1,962)	890 (1,962)
Maximum permissible weight (M.P.W.)	Total	kg (lb)	1,660 (3,660)	1,660 (3,660)	1,660 (3,660)	1,700 (3,748)	1,700 (3,748)	1,700 (3,748)	1,700 (3,748)	1,700 (3,748)
Option	Air conditioner		❍	❍	❍	—	❍	❍	❍	❍
	ABS		—	—	❍	❍	❍	—	—	—
	Side airbag		—	—	—	—	—	—	—	—
	Sunroof		—	—	—	—	—	—	—	—
	Aluminium wheel		—	—	—	—	—	❍	—	—
	Audio		—	—	—	—	—	—	—	—
	Seat in pure hide		—	—	—	—	—	—	—	—
	Rear spoiler		—	—	—	—	—	—	—	—
	Navigation system		—	—	—	—	—	—	—	—
	Driver's control center differential (Auto)		—	—	—	—	—	—	—	—

★1: For option code, refer to ID section. <Ref. to ID-7, Option code.>

Option code★1		EC		K0	K4	KS	EC		
Model		1.6 L					2.0 L		
		AWD							
		TS					GX		
		4AT					5MT		
Curb weight (C.W.)	Front kg (lb)	755 (1,644)	775 (1,709)	770 (1,698)	770 (1,698)	760 (1,676)	750 (1,654)	770 (1,698)	770 (1,698)
	Rear kg (lb)	520 (1,146)	520 (1,146)	520 (1,146)	520 (1,146)	535 (1,179)	535 (1,179)	535 (1,179)	540 (1,191)
	Total kg (lb)	1,275 (2,810)	1,295 (2,855)	1,290 (2,844)	1,290 (2,844)	1,295 (2,855)	1,285 (2,833)	1,305 (2,877)	1,310 (2,889)
Maximum permissible axle weight (M.P.A.W.)	Front kg (lb)	890 (1,962)	890 (1,962)	890 (1,962)	890 (1,962)	890 (1,962)	950 (2,094)	950 (2,094)	950 (2,094)
	Rear kg (lb)	890 (1,962)	890 (1,962)	890 (1,962)	890 (1,962)	890 (1,962)	910 (2,006)	910 (2,066)	910 (2,066)
Maximum permissible weight (M.P.W.)	Total kg (lb)	1,700 (3,748)	1,700 (3,748)	1,700 (3,748)	1,700 (3,748)	1,700 (3,748)	1,760 (3,880)	1,760 (3,880)	1,760 (3,880)
Option	Air conditioner	—	❍	❍	❍	❍	—	❍	❍
	ABS	❍	❍	—	—	—	❍	❍	❍
	Side airbag	—	—	—	—	—	—	—	❍
	Sunroof	—	—	—	—	—	—	—	—
	Aluminium wheel	—	—	❍	—	—	❍	❍	❍
	Audio	—	—	—	—	—	—	—	—
	Seat in pure hide	—	—	—	—	—	—	—	—
	Rear spoiler	—	—	—	—	—	—	—	—
	Navigation system	—	—	—	—	—	—	—	—
	Driver's control center differential (Auto)	—	—	—	—	—	—	—	—

★1: For option code, refer to ID section. <Ref. to ID-7, Option code.>

Option code★1		E2	K4		K0	KS	EC	
Model		2.0 L						
		AWD						
		GX						
		5MT					4AT	
Curb weight (C.W.)	Front kg (lb)	770 (1,698)	770 (1,698)	770 (1,698)	765 (1,687)	760 (1,676)	765 (1,687)	775 (1,709)	795 (1,753)
	Rear kg (lb)	535 (1,179)	540 (1,191)	535 (1,179)	530 (1,168)	525 (1,157)	560 (1,235)	530 (1,168)	530 (1,168)
	Total kg (lb)	1,305 (2,877)	1,310 (2,889)	1,305 (2,877)	1,295 (2,855)	1,285 (2,833)	1,325 (2,921)	1,305 (2,877)	1,325 (2,921)
Maximum permissible axle weight (M.P.A.W.)	Front kg (lb)	950 (2,094)	950 (2,094)	950 (2,094)	950 (2,094)	950 (2,094)	950 (2,094)	950 (2,094)	950 (2,094)
	Rear kg (lb)	910 (2,066)	910 (2,066)	910 (2,066)	910 (2,066)	910 (2,066)	910 (2,066)	910 (2,006)	910 (2,006)
Maximum permissible weight (M.P.W.)	Total kg (lb)	1,760 (3,880)	1,760 (3,880)	1,760 (3,880)	1,760 (3,880)	1,760 (3,880)	1,760 (3,880)	1,760 (3,880)	1,760 (3,880)
Option	Air conditioner	❍	❍	❍	❍	❍	❍	—	❍
	ABS	❍	❍	❍	❍	❍	❍	❍	❍
	Side airbag	—	❍	—	—	—	—	—	—
	Sunroof	—	—	—	—	—	❍	—	—
	Aluminium wheel	❍	❍	—	❍	—	❍	❍	❍
	Audio	—	—	—	—	—	—	—	—
	Seat in pure hide	—	—	—	—	—	—	—	—
	Rear spoiler	—	—	—	—	—	❍	—	—
	Navigation system	—	—	—	—	—	—	—	—
	Driver's control center differential (Auto)	—	—	—	—	—	—	—	—

★1: For option code, refer to ID section. <Ref. to ID-7, Option code.>

Option code★1		EC	E2		K4		K0	KS	EC
Model		2.0 L							2.0 L Turbo
		AWD							
		GX							WRX
		4AT							5MT
Curb weight (C.W.)	Front kg (lb)	795 (1,753)	795 (1,753)	795 (1,753)	795 (1,753)	790 (1,742)	790 (1,742)	790 (1,742)	835 (1,841)
	Rear kg (lb)	535 (1,179)	530 (1,168)	535 (1,179)	530 (1,168)	525 (1,157)	525 (1,157)	555 (1,224)	560 (1,235)
	Total kg (lb)	1,330 (2,933)	1,325 (2,921)	1,330 (2,933)	1,325 (2,921)	1,315 (2,899)	1,315 (2,899)	1,345 (2,965)	1,395 (3,075)
Maximum permissible axle weight (M.P.A.W.)	Front kg (lb)	950 (2,094)	950 (2,094)	950 (2,094)	950 (2,094)	950 (2,094)	950 (2,094)	950 (2,094)	990 (2,185)
	Rear kg (lb)	910 (2,006)	910 (2,006)	910 (2,006)	910 (2,006)	910 (2,006)	910 (2,006)	910 (2,006)	920 (2,028)
Maximum permissible weight (M.P.W.)	Total kg (lb)	1,760 (3,880)	1,760 (3,880)	1,760 (3,880)	1,760 (3,880)	1,760 (3,880)	1,760 (3,880)	1,760 (3,880)	1,850 (4,079)
Option	Air conditioner	❍	❍	❍	❍	❍	❍	❍	❍
	ABS	❍	❍	❍	❍	❍	❍	❍	❍
	Side airbag	❍	—	❍	—	—	—	—	—
	Sunroof	—	—	—	—	—	—	❍	—
	Aluminium wheel	❍	❍	❍	—	❍	—	❍	—
	Audio	—	—	—	—	—	—	—	❍
	Seat in pure hide	—	—	—	—	—	—	—	—
	Rear spoiler	—	—	—	—	—	—	❍	❍
	Navigation system	—	—	—	—	—	—	—	—
	Driver's control center differential (Auto)	—	—	—	—	—	—	—	—

★1: For option code, refer to ID section. <Ref. to ID-7, Option code.>

Option code★1			EC							K4
Model			2.0 Turbo							
			AWD							
			WRX							
			5MT							
Curb weight (C.W.)	Front	kg (lb)	835 (1,841)	835 (1,841)	835 (1,841)	840 (1,852)	840 (1,852)	840 (1,852)	835 (1,841)	835 (1,841)
	Rear	kg (lb)	555 (1,224)	560 (1,235)	565 (1,246)	570 (1,257)	570 (1,257)	575 (1,268)	555 (1,224)	560 (1,235)
	Total	kg (lb)	1,390 (3,065)	1,395 (3,075)	1,400 (3,087)	1,410 (3,109)	1,410 (3,109)	1,415 (3,120)	1,390 (3,065)	1,395 (3,075)
Maximum permissible axle weight (M.P.A.W.)	Front	kg (lb)	990 (2,183)	990 (2,183)	990 (2,183)	990 (2,183)	990 (2,183)	990 (2,183)	990 (2,183)	990 (2,183)
	Rear	kg (lb)	920 (2,028)	920 (2,028)	920 (2,028)	920 (2,028)	920 (2,028)	920 (2,028)	920 (2,028)	920 (2,028)
Maximum permissible weight (M.P.W.)	Total	kg (lb)	1,850 (4,079)	1,850 (4,079)	1,850 (4,079)	1,850 (4,079)	1,850 (4,079)	1,850 (4,079)	1,850 (4,079)	1,850 (4,079)
Option	Air conditioner		❍	❍	❍	❍	❍	❍	❍	❍
	ABS		❍	❍	❍	❍	❍	❍	❍	❍
	Side airbag		—	❍	❍	—	—	❍	—	—
	Sunroof		—	—	—	❍	❍	❍	—	—
	Aluminium wheel		—	—	—	—	—	—	—	—
	Audio		—	—	—	—	❍	❍	—	—
	Seat in pure hide		—	—	—	—	—	❍	—	—
	Rear spoiler		—	—	❍	❍	❍	❍	—	❍
	Navigation system		—	—	—	—	—	—	❍	—
	Driver's control center differential (Auto)		—	—	—	—	—	—	—	—

★1: For option code, refer to ID section. <Ref. to ID-7, Option code.>

Option code★1			K4		EH		EC				
Model			2.0 Turbo								
			AWD								
			WRX				STi				
			5MT								
Curb weight (C.W.)	Front	kg (lb)	840 (1,852)	840 (1,852)	840 (1,852)	840 (1,852)	880 (1,940)	860 (1,896)	880 (1,940)	880 (1,940)	880 (1,940)
	Rear	kg (lb)	575 (1,268)	575 (1,268)	570 (1,257)	575 (1,268)	595 (1,312)	595 (1,312)	595 (1,312)	595 (1,312)	595 (1,312)
	Total	kg (lb)	1,415 (3,120)	1,415 (3,120)	1,410 (3,109)	1,415 (3,120)	1,475 (3,252)	1,455 (3,208)	1,475 (3,252)	1,475 (3,252)	1,475 (3,252)
Maximum permissible axle weight (M.P.A.W.)	Front	kg (lb)	990 (2,183)	990 (2,183)	990 (2,183)	990 (2,183)	1,030 (2,271)	1,030 (2,271)	1,030 (2,271)	1,030 (2,271)	1,030 (2,271)
	Rear	kg (lb)	920 (2,028)	920 (2,028)	920 (2,028)	920 (2,028)	920 (2,028)	920 (2,028)	920 (2,028)	920 (2,028)	920 (2,028)
Maximum permissible weight (M.P.W.)	Total	kg (lb)	1,850 (4,079)	1,850 (4,079)	1,850 (4,079)	1,850 (4,079)	1,880 (4,145)	1,880 (4,145)	1,880 (4,145)	1,880 (4,145)	1,880 (4,145)
Option	Air conditioner		❍	❍	❍	❍	❍	—	❍	❍	❍
	ABS		❍	❍	❍	❍	❍	❍	❍	❍	❍
	Side airbag		❍	❍	—	❍	—	—	—	—	—
	Sunroof		❍	❍	❍	❍	—	—	—	—	—
	Aluminium wheel		—	—	—	—	—	—	—	—	—
	Audio		—	—	❍	❍	—	—	❍	—	❍
	Seat in pure hide		—	❍	—	❍	—	—	—	—	—
	Rear spoiler		❍	❍	❍	❍	—	—	—	—	—
	Navigation system		—	—	—	—	—	—	—	—	—
	Driver's control center differential (Auto)		—	—	—	—	—	—	—	❍	❍

★1: For option code, refer to ID section. <Ref. to ID-7, Option code.>

Wagon

Option code★1			EC			K0	K4	KS	EC	
Model			1.6 L							
			AWD							
			TS							
			5MT D/R						4AT	
Curb weight (C.W.)	Front	kg (lb)	740 (1,631)	760 (1,676)	760 (1,676)	755 (1,664)	755 (1,664)	745 (1,643)	755 (1,664)	775 (1,708)
	Rear	kg (lb)	545 (1,202)	550 (1,213)	545 (1,202)	545 (1,202)	545 (1,202)	560 (1,235)	545 (1,202)	550 (1,213)
	Total	kg (lb)	1,285 (2,833)	1,310 (2,889)	1,305 (2,877)	1,300 (2,866)	1,300 (2,866)	1,305 (2,877)	1,300 (2,866)	1,325 (2,921)
Maximum permissible axle weight (M.P.A.W.)	Front	kg (lb)	900 (1,984)	900 (1,984)	900 (1,984)	900 (1,984)	900 (1,984)	900 (1,984)	900 (1,984)	900 (1,984)
	Rear	kg (lb)	910 (2,006)	910 (2,006)	910 (2,006)	910 (2,006)	910 (2,006)	910 (2,006)	910 (2,006)	910 (2,006)
Maximum permissible weight (M.P.W.)	Total	kg (lb)	1,730 (1,609)	1,730 (1,609)	1,730 (1,609)	1,730 (1,609)	1,730 (1,609)	1,730 (1,609)	1,730 (1,609)	1,730 (1,609)
Option	Air conditioner		—	❍	❍	❍	❍	❍	—	❍
	ABS		❍	❍	❍	—	—	—	❍	❍
	Side airbag		—	❍	—	—	—	—	—	❍
	Sunroof		—	—	—	—	—	—	—	—
	Aluminium wheel		—	—	—	❍	—	—	—	—
	Audio		—	❍	—	—	—	—	—	❍
	Seat in pure hide		—	—	—	—	—	—	—	—
	Spoiler pack		—	—	—	—	—	—	—	—
	Navigation system		—	—	—	—	—	—	—	—

★1: For option code, refer to ID section. <Ref. to ID-7, Option code.>
D/R: Dual range

Option code★1		EC	K0	K4	KS	EC			
Model		1.6 L				2.0 L			
		AWD							
		TS				GX			
		4AT				5MT D/R			
Curb weight (C.W.)	Front kg (lb)	775 (1,709)	770 (1,698)	770 (1,698)	760 (1,676)	760 (1,676)	785 (1,731)	780 (1,720)	780 (1,720)
	Rear kg (lb)	545 (1,202)	545 (1,202)	545 (1,202)	560 (1,235)	570 (1,257)	585 (1,290)	570 (1,257)	575 (1,268)
	Total kg (lb)	1,320 (2,910)	1,315 (2,899)	1,315 (2,899)	1,320 (2,910)	1,330 (2,932)	1,370 (3,020)	1,350 (2,977)	1,355 (2,987)
Maximum permissible axle weight (M.P.A.W.)	Front kg (lb)	900 (1,984)	900 (1,984)	900 (1,984)	900 (1,984)	950 (2,094)	950 (2,094)	950 (2,094)	950 (2,094)
	Rear kg (lb)	910 (2,006)	910 (2,006)	910 (2,006)	910 (2,006)	960 (2,0116)	960 (2,116)	960 (2,116)	960 (2,116)
Maximum permissible weight (M.P.W.)	Total kg (lb)	1,730 (1,609)	1,730 (1,609)	1,730 (1,609)	1,730 (1,609)	1,800 (3,969)	1,800 (3,969)	1,800 (3,969)	1,800 (3,969)
Option	Air conditioner	❍	❍	❍	❍	—	❍	❍	❍
	ABS	❍	—	—	—	❍	❍	❍	❍
	Side airbag	—	—	—	—	—	❍	—	❍
	Sunroof	—	—	—	—	—	❍	—	—
	Aluminium wheel	—	❍	—	—	❍	❍	❍	❍
	Audio	—	—	—	—	—	❍	—	—
	Seat in pure hide	—	—	—	—	—	—	—	—
	Spoiler pack	—	—	—	—	—	—	—	—
	Navigation system	—	—	—	—	—	—	—	—

★1: For option code, refer to ID section. <Ref. to ID-7, Option code.>
D/R: Dual range

Option code★1			K0	K4		KS	EC			
Model			2.0 L							
			AWD							
			GX							
			5MT D/R				4AT			
Curb weight (C.W.)	Front	kg (lb)	780 (1,720)	780 (1,720)	775 (1,709)	770 (1,698)	775 (1,709	800 (1,764)	795 (1,753)	795 (1,753)
	Rear	kg (lb)	570 (1,257)	570 (1,257)	565 (1,246)	590 (1,300)	565 (1,246)	580 (1,279)	565 (1,246)	570 (1,257)
	Total	kg (lb)	1,350 (2,977)	1,350 (2,977)	1,340 (2,955)	1,360 (2,999)	1,340 (2,955)	1,380 (3,042)	1,360 (2,999)	1,365 (3,009)
Maximum permissible axle weight (M.P.A.W.)	Front	kg (lb)	950 (2,094)	950 (2,094)	950 (2,094)	950 (2,094)	950 (2,094)	950 (2,094)	950 (2,094)	950 (2,094)
	Rear	kg (lb)	960 (2,116)	960 (2,116)	960 (2,116)	960 (2,116)	960 (2,116)	960 (2,116)	960 (2,116)	960 (2,116)
Maximum permissible weight (M.P.W.)	Total	kg (lb)	1,800 (3,969)	1,800 (3,969)	1,800 (3,969)	1,800 (3,969)	1,800 (3,969)	1,800 (3,969)	1,800 (3,969)	1,800 (3,969)
Option	Air conditioner		❍	❍	❍	❍	—	❍	❍	❍
	ABS		❍	❍	❍	❍	❍	❍	❍	❍
	Side airbag		—	—	—	—	—	❍	—	❍
	Sunroof		—	—	—	❍	—	❍	—	—
	Aluminium wheel		❍	—	❍	❍	❍	❍	❍	❍
	Audio		—	—	—	—	—	❍	—	—
	Seat in pure hide		—	—	—	—	—	—	—	—
	Spoiler pack		—	—	—	—	—	—	—	—
	Navigation system		—	—	—	—	—	—	—	—

★1: For option code, refer to ID section. <Ref. to ID-7, Option code.>
D/R: Dual range

Option code★1			K0	K4		KS	EC			
Model			2.0 L				2.0 Turbo			
			AWD							
			GX				WRX			
			4AT				5MT			
Curb weight (C.W.)	Front	kg (lb)	795 (1,753)	795 (1,753)	795 (1,753)	790 (1,742)	825 (1,819)	830 (1,830)	830 (1,830)	825 (1,819)
	Rear	kg (lb)	565 (1,246)	565 (1,246)	565 (1,246)	580 (1,279)	585 (1,292)	600 (1,322)	600 (1,322)	585 (1,292)
	Total	kg (lb)	1,360 (2,999)	1,360 (2,999)	1,360 (2,999)	1,370 (3,020)	1,410 (3,109)	1,430 (3,153)	1,430 (3,153)	1,410 (3,109)
Maximum permissible axle weight (M.P.A.W.)	Front	kg (lb)	950 (2,094)	950 (2,094)	950 (2,094)	950 (2,094)	990 (2,183)	990 (2,183)	990 (2,183)	990 (2,183)
	Rear	kg (lb)	960 (2,116)	960 (2,116)	960 (2,116)	960 (2,116)	950 (2,094)	950 (2,094)	950 (2,094)	950 (2,094)
Maximum permissible weight (M.P.W.)	Total	kg (lb)	1,800 (3,969)	1,800 (3,969)	1,800 (3,969)	1,800 (3,969)	1,860 (4,101)	1,860 (4,101)	1,860 (4,101)	1,860 (4,101)
Option	Air conditioner		❍	❍	❍	❍	❍	❍	❍	❍
	ABS		❍	❍	❍	❍	❍	❍	❍	❍
	Side airbag		—	—	—	—	—	❍	❍	—
	Sunroof		—	—	—	❍	—	❍	❍	—
	Aluminium wheel		❍	❍	—	❍	—	—	—	—
	Audio		—	—	—	—	—	❍	❍	—
	Seat in pure hide		—	—	—	—	—	—	❍	—
	Spoiler pack		—	—	—	—	—	—	—	—
	Navigation system		—	—	—	—	—	—	—	❍

★1: For option code, refer to ID section. <Ref. to ID-7, Option code.>
D/R: Dual range

Option code★1			K4	EH	
Model			2.0 L Turbo		
			AWD		
			WRX		
			5MT		
Curb weight (C.W.)	Front	kg (lb)	830 (1,830)	830 (1,830)	830 (1,830)
	Rear	kg (lb)	595 (1,311)	600 (1,322)	600 (1,322)
	Total	kg (lb)	1,425 (3,142)	1,430 (3,153)	1,430 (3,153)
Maximum permissible axle weight (M.P.A.W.)	Front	kg (lb)	990 (2,183)	990 (2,183)	990 (2,183)
	Rear	kg (lb)	950 (2,094)	950 (2,094)	950 (2,094)
Maximum permissible weight (M.P.W.)	Total	kg (lb)	1,860 (4,101)	1,860 (4,101)	1,860 (4,101)
Option	Air conditioner		❍	❍	❍
	ABS		❍	❍	❍
	Side airbag		❍	❍	❍
	Sunroof		❍	❍	❍
	Aluminium wheel		—	—	—
	Audio		—	❍	❍
	Seat in pure hide		—	—	❍
	Spoiler pack		—	—	—
	Navigation system		—	—	—

★1: For option code, refer to ID section. <Ref. to ID-7, Option code.>
D/R: Dual range

2. RHD MODEL

Sedan

Option code★1			EK			ER			K1	
Model			1.6 L							
			AWD							
			TS							
			5MT		4AT	5MT		4AT	5MT	4AT
Curb weight (C.W.)	Front	kg (lb)	740 (1,631)	760 (1,676)	760 (1,676)	740 (1,631)	760 (1,676)	760 (1,676)	750 (1,654)	770 (1,698)
	Rear	kg (lb)	520 (1,146)	520 (1,146)	520 (1,146)	520 (1,146)	520 (1,146)	520 (1,146)	520 (1,146)	520 (1,146)
	Total	kg (lb)	1,260 (2,778)	1,280 (2,822)	1,280 (2,822)	1,260 (2,778)	1,280 (2,822)	1,280 (2,822)	1,270 (2,800)	1,290 (2,844)
Maximum permissible axle weight (M.P.A.W.)	Front	kg (lb)	890 (1,962)	890 (1,962)	890 (1,962)	890 (1,962)	890 (1,962)	890 (1,962)	890 (1,962)	890 (1,962)
	Rear	kg (lb)	890 (1,962)	890 (1,962)	890 (1,962)	890 (1,962)	890 (1,962)	890 (1,962)	890 (1,962)	890 (1,962)
Maximum permissible weight (M.P.W.)	Total	kg (lb)	1,700 (3,748)	1,700 (3,748)	1,700 (3,748)	1,700 (3,748)	1,700 (3,748)	1,700 (3,748)	1,700 (3,748)	1,700 (3,748)
Option	Air conditioner		—	❍	—	—	❍	—	❍	❍
	ABS		❍	❍	❍	❍	❍	❍	—	—
	Side airbag		—	—	—	—	—	—	—	—
	Sunroof		—	—	—	—	—	—	—	—
	Aluminium wheel		—	—	—	—	—	—	❍	❍
	Audio		—	—	—	—	—	—	—	—
	Seat in pure hide		—	—	—	—	—	—	—	—
	Rear spoiler		—	—	—	—	—	—	—	—
	Spoiler pack		—	—	—	—	—	—	—	—
	Navigation system		—	—	—	—	—	—	—	—
	Cruise control		—	—	—	—	—	—	—	—

★1: For option code, refer to ID section. <Ref. to ID-7, Option code.>

Option code★1			EK		K1		EK				
Model			2.0 L				2.0 Turbo				
			AWD								
			GX				WRX				
			5MT	4AT	5MT	4AT	5MT				
Curb weight (C.W.)	Front	kg (lb)	770 (1,698)	795 (1,753)	770 (1,698)	795 (1,753)	835 (1,841)	835 (1,841)	840 (1,852)	840 (1,852)	835 (1,841)
	Rear	kg (lb)	535 (1,179)	530 (1,168)	535 (1,179)	530 (1,168)	565 (1,246)	560 (1,235)	570 (1,257)	575 (1,268)	555 (1,234)
	Total	kg (lb)	1,305 (2,877)	1,325 (2,921)	1,305 (2,877)	1,325 (2,921)	1,400 (3,086)	1,395 (3,075)	1,410 (3,109)	1,415 (3,120)	1,390 (3,065)
Maximum permissible axle weight (M.P.A.W.)	Front	kg (lb)	950 (2,094)	950 (2,094)	950 (2,094)	950 (2,094)	990 (2,183)	990 (2,183)	990 (2,183)	990 (2,183)	990 (2,183)
	Rear	kg (lb)	910 (2,006)	910 (2,006)	910 (2,006)	910 (2,006)	920 (2,028)	920 (2,028)	920 (2,028)	920 (2,028)	920 (2,028)
Maximum permissible weight (M.P.W.)	Total	kg (lb)	1,760 (3,880)	1,760 (3,880)	1,760 (3,880)	1,760 (3,880)	1,850 (4,079)	1,850 (4,079)	1,850 (4,079)	1,850 (4,079)	1,850 (4,079)
Option	Air conditioner		❍	❍	❍	❍	❍	❍	❍	❍	❍
	ABS		❍	❍	❍	❍	❍	❍	❍	❍	❍
	Side airbag		—	—	—	—	❍	—	❍	❍	—
	Sunroof		—	—	—	—	—	—	❍	❍	—
	Aluminium wheel		❍	❍	❍	❍	—	—	—	—	—
	Audio		—	—	—	—	—	—	—	—	—
	Seat in pure hide		—	—	—	—	—	—	—	❍	—
	Rear spoiler		—	—	—	—	❍	❍	❍	❍	—
	Spoiler pack		—	—	—	—	—	—	—	—	—
	Navigation system		—	—	—	—	—	—	—	—	❍
	Cruise control		—	—	—	—	—	—	—	—	—

★1: For option code, refer to ID section. <Ref. to ID-7, Option code.>

Option code★1			EK		ER			
Model			2.0 L Turbo					
			AWD					
			STi		WRX		STi	
			6MT		5MT		6MT	
Curb weight (C.W.)	Front	kg (lb)	880 (1,940)	880 (1,940)	835 (1,841)	840 (1,852)	880 (1,940)	880 (1,940)
	Rear	kg (lb)	595 (1,312)	595 (1,312)	560 (1,235)	575 (1,268)	595 (1,312)	595 (1,312)
	Total	kg (lb)	1,475 (3,252)	1,475 (3,252)	1,395 (3,075)	1,415 (3,120)	1,475 (3,252)	1,475 (3,252)
Maximum permissible axle weight (M.P.A.W.)	Front	kg (lb)	1,030 (2,271)	1,030 (2,271)	990 (2,183)	990 (2,183)	1,030 (2,271)	1,030 (2,271)
	Rear	kg (lb)	920 (2,028)	920 (2,028)	920 (2,028)	920 (2,028)	920 (2,028)	920 (2,028)
Maximum permissible weight (M.P.W.)	Total	kg (lb)	1,880 (4,145)	1,880 (4,145)	1,850 (4,079)	1,850 (4,079)	1,880 (4,145)	1,880 (4,145)
Option	Air conditioner		❍	❍	❍	❍	❍	❍
	ABS		❍	❍	❍	❍	❍	❍
	Side airbag		—	—	—	❍	—	—
	Sunroof		—	—	—	❍	—	—
	Aluminium wheel		—	—	—	—	—	—
	Audio		—	—	—	—	—	—
	Seat in pure hide		—	—	—	❍	—	—
	Rear spoiler		—	—	❍	❍	—	—
	Spoiler pack		—	—	—	—	—	—
	Navigation system		—	—	—	—	—	—
	Cruise control		—	❍	—	—	—	❍

★1: For option code, refer to ID section. <Ref. to ID-7, Option code.>

Option code★1			KA					
Model			2.0 L		2.5 L		2.0 L Turbo	
			AWD					
			GX		RS		WRX	
			5MT	4AT	5MT	4AT	5MT	
Unladen mass (U.M.)	Front	kg (lb)	750 (1,654)	775 (1,709)	780 (1,720)	805 (1,775)	840 (1,852)	835 (1,841)
	Rear	kg (lb)	535 (1,179)	530 (1,168)	540 (1,191)	535 (1,179)	575 (1,268)	560 (1,235)
	Total	kg (lb)	1,285 (2,833)	1,305 (2,877)	1,320 (2,910)	1,340 (2,955)	1,415 (3,120)	1,395 (3,075)
Gross vehicle axle mass (G.V.A.M.)	Front	kg (lb)	950 (2,094)	950 (2,094)	950 (2,094)	950 (2,094)	990 (2,183)	990 (2,183)
	Rear	kg (lb)	910 (2,006)	910 (2,006)	910 (2,006)	910 (2,006)	920 (2,028)	920 (2,028)
Gross vehicle mass (G.V.M.)	Total	kg (lb)	1,760 (3,880)	1,760 (3,880)	1,780 (3,924)	1,780 (3,924)	1,850 (4,079)	1,850 (4,079)
Option	Air conditioner		—	—	❍	❍	❍	❍
	ABS		❍	❍	❍	❍	❍	❍
	Side airbag		—	—	—	—	❍	—
	Sunroof		—	—	—	—	❍	—
	Aluminium wheel		—	—	—	—	—	—
	Audio		—	—	—	—	—	—
	Seat in pure hide		—	—	—	—	❍	—
	Rear spoiler		—	—	❍	❍	❍	❍
	Spoiler pack		—	—	—	—	—	—
	Navigation system		—	—	—	—	—	—
	Cruise control		❍	❍	❍	❍	❍	❍
	Driver's control center differential		—	—	—	—	—	—

★1: For option code, refer to ID section. <Ref. to ID-7, Option code.>

Option code★1		KA			
Model		2.0 L Turbo			
		AWD			
		WRX		STi	
		4AT		6MT	
Unladen mass (U.M.)	Front kg (lb)	860 (1,896)	865 (1,907)	880 (1,940)	880 (1,940)
	Rear kg (lb)	555 (1,234)	570 (1,257)	595 (1,312)	595 (1,312)
	Total kg (lb)	1,415 (3,120)	1,435 (3,164)	1,475 (3,252)	1,475 (3,252)
Gross vehicle axle mass (G.V.A.M.)	Front kg (lb)	990 (2,183)	990 (2,183)	1,030 (2,271)	1,030 (2,271)
	Rear kg (lb)	920 (2,028)	920 (2,028)	920 (2,028)	920 (2,028)
Gross vehicle mass (G.V.M.)	Total kg (lb)	1,850 (4,079)	1,850 (4,079)	1,880 (4,145)	1,880 (4,145)
Option	Air conditioner	❍	❍	❍	❍
	ABS	❍	❍	❍	❍
	Side airbag	—	❍	—	—
	Sunroof	—	❍	—	—
	Aluminium wheel	—	—	—	—
	Audio	—	—	—	—
	Seat in pure hide	—	❍	—	—
	Rear spoiler	❍	❍	—	—
	Spoiler pack	—	—	—	—
	Navigation system	—	—	—	—
	Cruise control	❍	❍	❍	❍
	Driver's control center differential	—	—	—	❍

★1: For option code, refer to ID section. <Ref. to ID-7, Option code.>

Wagon

Option code★1			EK			K1		ER		
Model			1.6 L							
			AWD							
			TS							
			5MT D/R		4AT	5MT D/R	4AT	5MT D/R		4AT
Curb weight (C.W.)	Front	kg (lb)	745 (1,642)	765 (1,687)	760 (1,676)	755 (1,664)	770 (1,698)	745 (1,642)	765 (1,687)	760 (1,676)
	Rear	kg (lb)	545 (1,202)	545 (1,202)	545 (1,202)	545 (1,202)	545 (1,202)	545 (1,202)	545 (1,202)	545 (1,202)
	Total	kg (lb)	1,290 (2,844)	1,310 (2,888)	1,305 (2,877)	1,300 (2,866)	1,315 (2,899)	1,290 (2,844)	1,310 (2,888)	1,305 (2,877)
Maximum permissible axle weight (M.P.A.W.)	Front	kg (lb)	900 (1,984)	900 (1,984)	900 (1,984)	900 (1,984)	900 (1,984)	900 (1,984)	900 (1,984)	900 (1,984)
	Rear	kg (lb)	910 (2,006)	910 (2,006)	910 (2,006)	910 (2,006)	910 (2,006)	910 (2,006)	910 (2,006)	910 (2,006)
Maximum permissible weight (M.P.W.)	Total	kg (lb)	1,730 (1,609)	1,730 (1,609)	1,730 (1,609)	1,730 (1,609)	1,730 (1,609)	1,730 (1,609)	1,730 (1,609)	1,730 (1,609)
Option	Air conditioner		—	❍	—	❍	❍	—	❍	❍
	ABS		❍	❍	❍	—	—	❍	❍	❍
	Side airbag		—	—	—	—	—	—	—	—
	Sunroof		—	—	—	—	—	—	—	—
	Aluminium wheel		—	—	—	❍	❍	—	—	—
	Audio		—	—	—	—	—	—	—	—
	Seat in pure hide		—	—	—	—	—	—	—	—
	Spoiler pack		—	—	—	—	—	—	—	—
	Cruise control		—	—	—	—	—	—	—	—
	Navigation system		—	—	—	—	—	—	—	—

★1: For option code, refer to ID section. <Ref. to ID-7, Option code.>
D/R: Dual range

Option code★1			EK		K1		EK				
Model			2.0 L				2.0 Turbo				
			AWD								
			GX				WRX				
			5MT D/R	4AT	5MT D/R	4AT	5MT				
Curb weight (C.W.)	Front	kg (lb)	780 (1,720)	795 (1,753)	775 (1,709)	795 (1,753)	825 (1,819)	825 (1,819)	830 (1,830)	830 (1,830)	825 (1,819)
	Rear	kg (lb)	570 (1,257)	565 (1,246)	565 (1,246)	560 (1,235)	585 (1,830)	590 (1,301)	600 (1,323)	600 (1,323)	585 (1,830)
	Total	kg (lb)	1,350 (2,977)	1,360 (2,999)	1,340 (2,955)	1,355 (2,987)	1,410 (3,109)	1,415 (3,120)	1,430 (3,153)	1,430 (3,153)	1,410 (3,109)
Maximum permissible axle weight (M.P.A.W.)	Front	kg (lb)	950 (2,094)	950 (2,094)	950 (2,094)	950 (2,094)	990 (2,183)	990 (2,183)	990 (2,183)	990 (2,183)	990 (2,183)
	Rear	kg (lb)	960 (2,116)	960 (2,116)	960 (2,116)	960 (2,116)	950 (2,094)	950 (2,094)	950 (2,094)	950 (2,094)	950 (2,094)
Maximum permissible weight (M.P.W.)	Total	kg (lb)	1,800 (3,969)	1,800 (3,969)	1,800 (3,969)	1,800 (3,969)	1,860 (4,101)	1,860 (4,101)	1,860 (4,101)	1,860 (4,101)	1,860 (4,101)
Option	Air conditioner		❍	❍	❍	❍	❍	❍	❍	❍	❍
	ABS		❍	❍	❍	❍	❍	❍	❍	❍	❍
	Side airbag		—	—	—	—	—	❍	❍	❍	—
	Sunroof		—	—	—	—	—	—	❍	❍	—
	Aluminium wheel		❍	❍	❍	❍	—	—	—	—	—
	Audio		—	—	—	—	—	—	—	—	—
	Seat in pure hide		—	—	—	—	—	—	—	❍	—
	Spoiler pack		—	—	—	—	—	—	—	—	—
	Cruise control		—	—	—	—	—	—	—	—	—
	Navigation system		—	—	—	—	—	—	—	—	❍

★1: For option code, refer to ID section. <Ref. to ID-7, Option code.>
D/R: Dual range

Option code★1			KA							
Model			2.0 L				2.5 L		2.0 L Turbo	
			AWD							
			GX		OUTBACK		RS		WRX	
			5MT D/R	4AT	5MT D/R	4AT	5MT	4AT	5MT	4AT
Unladen mass (U.M.)	Front	kg (lb)	760 (1,676)	775 (1,709)	770 (1,698)	785 (1,731)	790 (1,742)	805 (1,775)	825 (1,819)	850 (1,874)
	Rear	kg (lb)	570 (1,257)	565 (1,246)	570 (1,257)	570 (1,257)	570 (1,257)	565 (1,246)	585 (1,830)	585 (1,830)
	Total	kg (lb)	1,330 (2,932)	1,340 (2,955)	1,340 (2,955)	1,355 (2,987)	1,360 (2,999)	1,370 (3,021)	1,410 (3,109)	1,435 (3,164)
Gross vehicle axle mass (G.V.A.M.)	Front	kg (lb)	950 (2,094)	950 (2,094)	950 (2,094)	950 (2,094)	950 (2,095)	950 (2,095)	990 (2,183)	990 (2,183)
	Rear	kg (lb)	960 (2,116)	960 (2,116)	960 (2,116)	960 (2,116)	960 (2,117)	960 (2,117)	950 (2,094)	950 (2,094)
Gross vehicle mass (G.V.M.)	Total	kg (lb)	1,800 (3,969)	1,800 (3,969)	1,800 (3,969)	1,800 (3,969)	1,800 (3,969)	1,800 (3,969)	1,860 (4,101)	1,860 (4,101)
Option	Air conditioner		—	—	❍	❍	❍	❍	❍	❍
	ABS		❍	❍	❍	❍	❍	❍	❍	❍
	Side airbag		—	—	—	—	—	—	—	—
	Sunroof		—	—	—	—	—	—	—	—
	Aluminium wheel		—	—	—	—	—	—	—	—
	Audio		—	—	—	—	—	—	—	—
	Seat in pure hide		—	—	—	—	—	—	—	—
	Spoiler pack		—	—	—	—	—	—	—	—
	Cruise control		❍	❍	❍	❍	❍	❍	❍	❍
	Navigation system		—	—	—	—	—	—	—	—

★1: For option code, refer to ID section. <Ref. to ID-7, Option code.>
D/R: Dual range

PRECAUTION

PC

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1. Precaution

A: CAUTION

The following precautions must be under stood and strictly adhered to avoid minor or serious injury to the person doing the work or people in the area, and to make an effort for environmental protection.

1. ABS

Handle the ABS as a total system. Do not disassemble or attempt to repair parts which are not instructed in this manual. Follow the instructions in this manual during performing the maintenance of ABSCM&H/U. To disassemble parts without instructions could prevent the ABS system from operating when needed or cause it to operate incorrectly and result in injury.

2. BRAKE FLUID

If brake fluid gets in your eyes or on your skin, do the following:

- Wash out your eyes and seek immediate medical attention.
- Wash your skin with soap and then rinse thoroughly with water.

3. RADIATOR FAN

The radiator fan may rotate without warning, even when the engine is not ON. Do not place your hand, cloth, tools or other items near the fan at any time.

4. ROAD TEST

Always conduct road tests in accordance with traffic rules and regulations to avoid bodily injury and interrupting traffic.

5. AIRBAG

To prevent bodily injury from unexpected deployment of airbags and unnecessary maintenance, follow the instructions in this manual when performing maintenance on the airbag components or nearby, around front of the vehicle (radiator panel, front wheel apron, front side frame, front bumper, front hood, front fender), around side of the vehicle (front door, rear door, center pillar, side sill), and the airbag wiring harnesses or nearby.

To prevent unexpected deployment, turn the ignition switch to OFF and disconnect the ground cable from battery, then wait at least 20 seconds before starting work.

6. AIRBAG MODULE AND SEAT BELT PRETENSIONER DISPOSAL

To prevent bodily injury from unexpected airbag deployment, do not dispose airbag modules and seat belt pretensioner in the same way as other refuse. Follow the special instructions for disposal in this manual. Follow all government regulations concerning disposal of refuse.

7. AIRBAG MODULE

Adhere to the following when handling and storing the airbag module to prevent bodily injury from unexpected deployment:

- Do not hold the harnesses or connectors to carry the module.
- Do not face the bag in the direction that it opens towards yourself or other people.
- Do not face the bag in the direction that it opens towards the floor or walls.

8. AIRBAG SPECIAL TOOL

To prevent unexpected deployment, only use special tools.

9. WINDOW

Always wear safety glasses when working around any glass to prevent glass fragments from damaging your eyes.

10.WINDOW ADHESIVE

Always use the recommended or equivalent adhesive when attaching glass to prevent it from coming falling, resulting in accidents and injury.

11.OIL

When handling oil, adhere to the following to prevent from unexpected accident.

- Prepare a container and cloth when performing work which oil possibly spills. If oil spills, wipe it off immediately to prevent from penetrating into floor or flowing out for environmental protection.
- Follow all government and local regulations concerning disposal of refuse when disposing.

12.FUEL

When handling and storing fuel, adhere to the following to prevent from unexpected accident.

- Be careful with fire.
- Prepare a container and cloth when performing work which fuel possibly spills to prevent from scatter. If fuel spills, wipe it off immediately to prevent from penetrating into floor or flowing out for environmental protection.
- Follow all government and local regulations concerning disposal of refuse when disposing.

13.ENGINE COOLANT

When handling engine coolant, adhere to the following to prevent from unexpected accident.

- Never remove the radiator cap since engine coolant may blow out when it is hot.
- Prepare a container and cloth when performing work which engine coolant possibly spills to prevent from scatter. If engine coolant spills, wipe it off immediately to prevent from penetrating into floor or flowing out for environmental protection.
- Follow all government and local regulations concerning disposal of refuse when disposing.

14.AIR CONDITIONER REFRIGERANT

- In order to prevent from global warming, avoid releasing air conditioner refrigerant into the atmosphere. Using a refrigerant recovery system, discharge and reuse it.

NOTE

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1. Note

A: NOTE

This is information that can improve efficiency of maintenance and assure sound work.

1. FASTENER NOTICE

Fasteners are used to prevent parts from damage and dislocation due to looseness. Fasteners must be tightened to the specified torque.
Do not apply paint, lubricant, rust retardant, or other substances to the surface around bolts, fasteners, etc. Doing so will make it difficult to obtain the correct torque and result in looseness and other problems.

2. STATIC ELECTRICITY DAMAGE

Do not touch the control unit, connectors, logic boards, and other such parts when there is a risk of static electricity. Always use a static electricity prevention cord or touch grounded metal before conducting work.

3. BATTERY

When removing the battery cables, always be sure to turn the ignition off to prevent electrical damage to the control unit from rush current.

4. SERVICE PARTS

Use authentic service parts for maximum performance and maintenance, when conducting repairs. Subaru/FHI will not be responsible for poor performance resulting from the use of parts not specified by a genuine dealer.

5. PROTECTING VEHICLE UNDER MAINTENANCE

Make sure to attach the fender cover, seat covers, etc. before work.

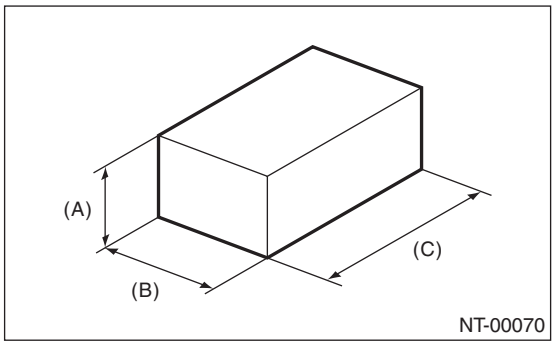
6. ENSURING SAFETY DURING WORK

When working in a group of two or more, perform the work with calling each other to ensure mutual safety.

7. LIFTS AND JACKS

When using a lift or shop jack to raise a vehicle, or using rigid rack to support a vehicle, always follow instructions concerning jack-up points and weight limits to prevent the vehicle from falling, which could result in injury. Be especially careful that the vehicle is balanced before raising it. Be sure to set the wheel stoppers when jacking-up only the front or rear side of the vehicle.

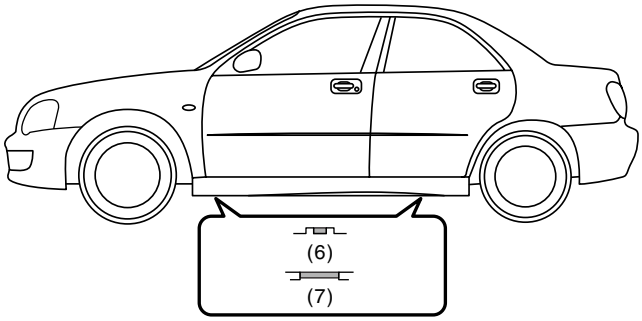
NOTE:
• When using a lift, follow its operation manual before work.
• Do not work or leave unattended while the vehicle is supported with jack, support it with rigid racks.
• Be sure to use the rigid racks with rubber attached to cradle to support the vehicle.
• When using a plate lift, use a rubber attachment. (STi model)



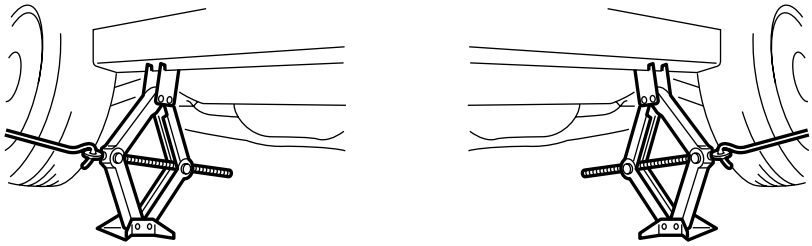
(A) 80 mm (3.1 in) or more
(B) 100 — 150 mm (3.94 — 5.91 in)
(C) 120 — 190 mm (4.72 — 7.48 in)

• Align the cushion rubber end of plate lift with the end of rubber attachment (portion b). Also, align the protrusion portion of the supporting locations with the end of attachment (portion a).
• Do not use the plate lift whose attachment does not reach the supporting locations.

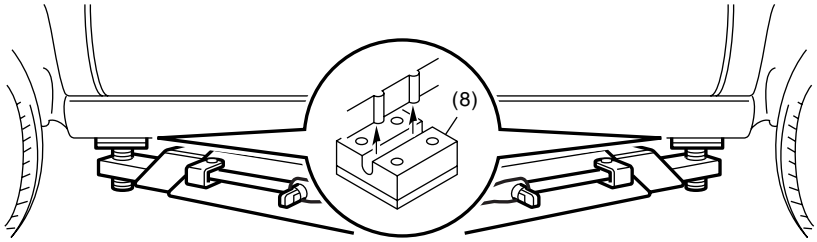
(1)



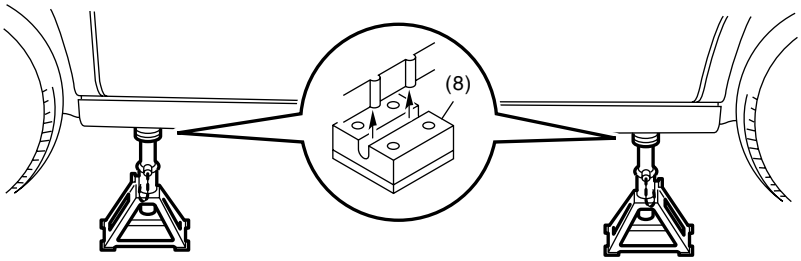
(2)



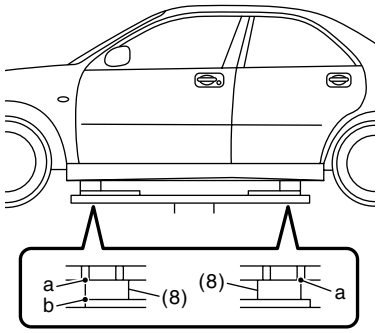
(3)



(4)

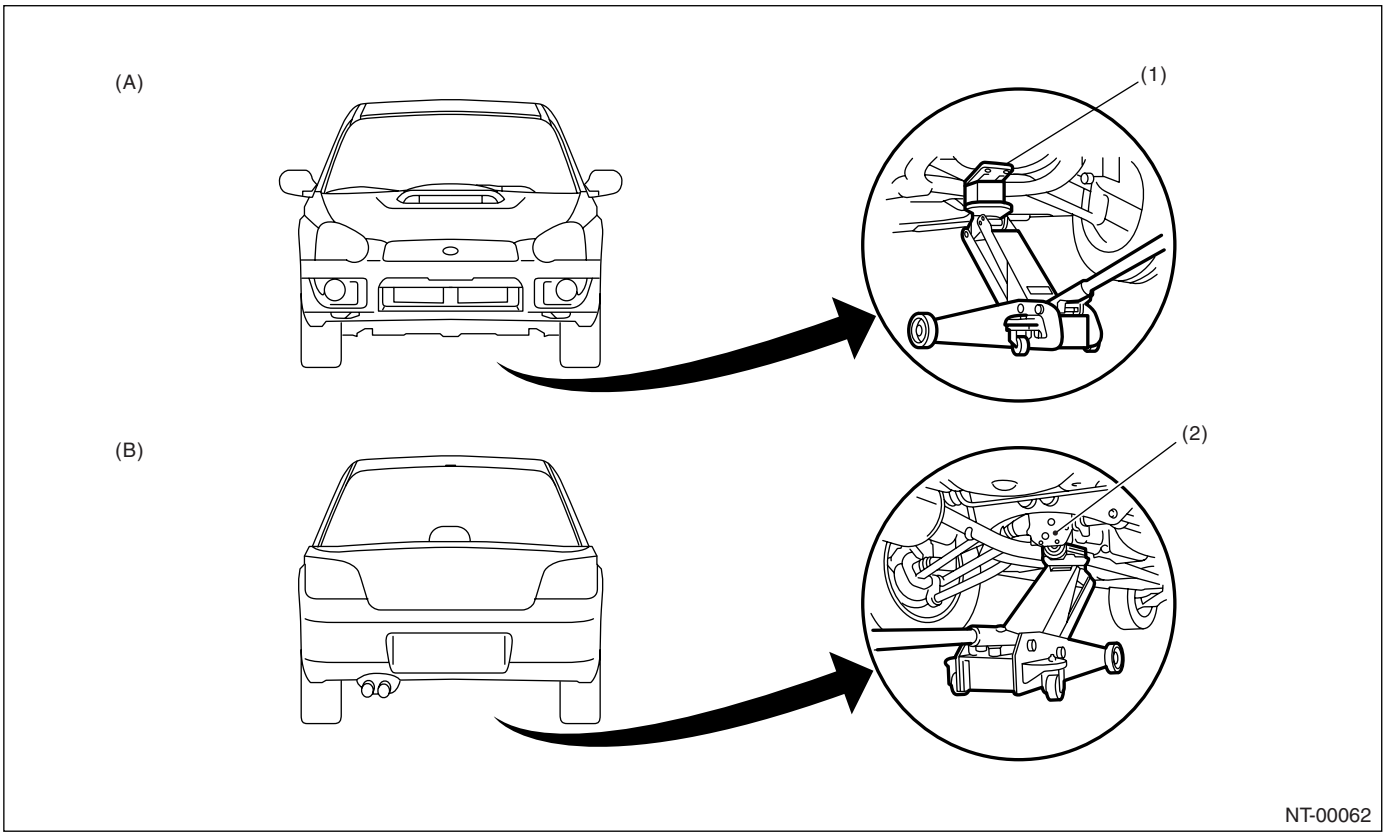


(5)



NT-00124

(1) Support locations
(2) Pantograph jack
(3) Lift
(4) Rigid rack
(5) Plate lift
(6) Without side sill cover
(7) With side sill cover
(8) Attachment

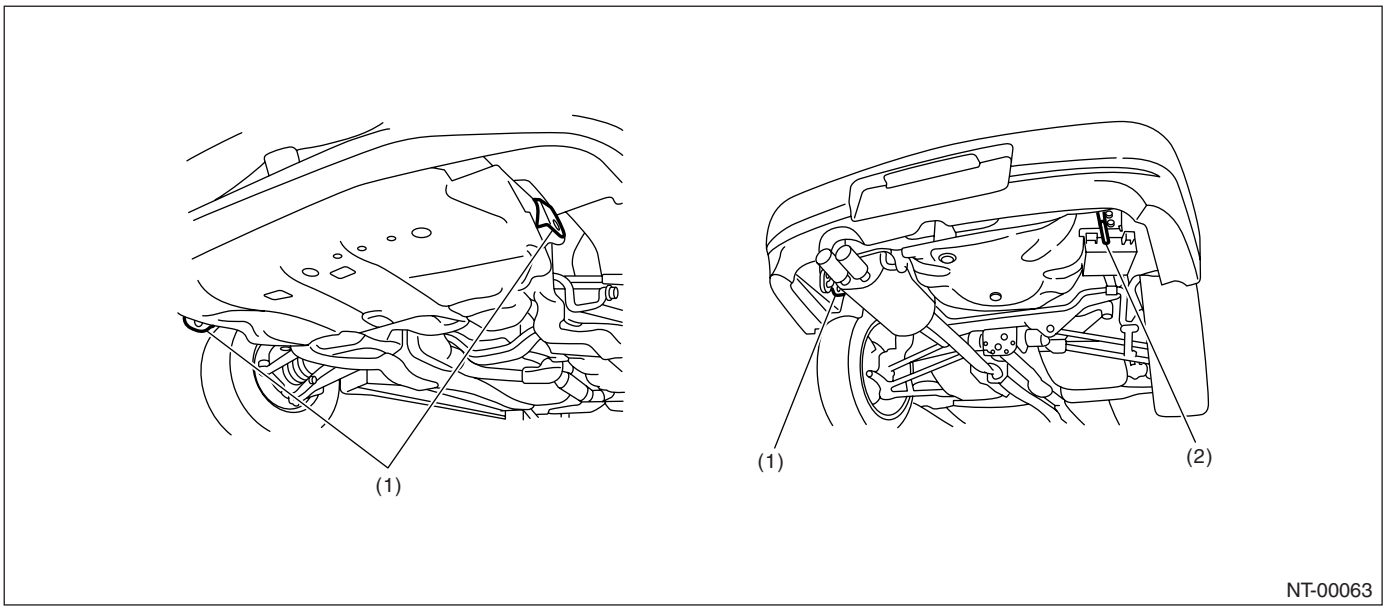


(A) Front
(B) Rear
(1) Front crossmember
(2) Rear differential

8. TIE-DOWNS

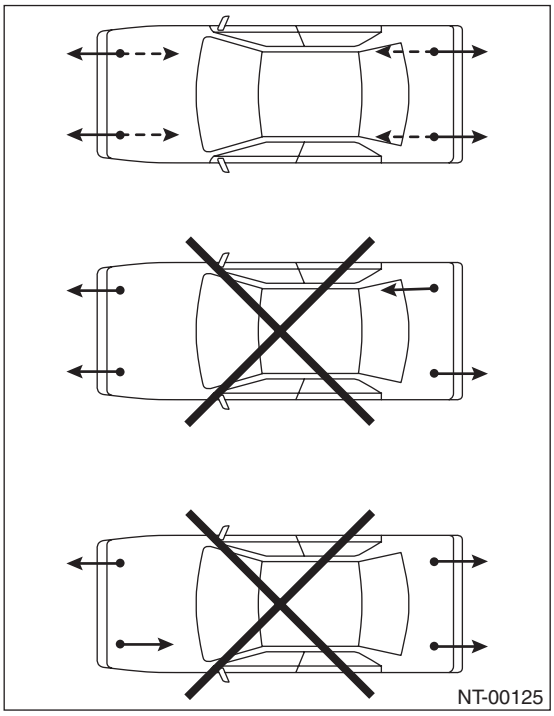
Tie downs are used when transporting vehicles and when using the chassis dynamo. Attach tie downs only to the specified points on the vehicle.

• Tie-down point

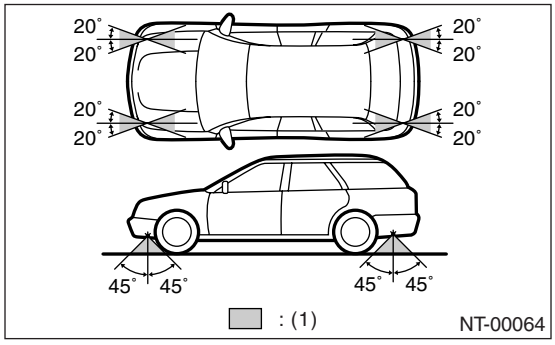


(1) Hook for tie-down
(2) Hook for towing and tie-down

• Chain direction at tie-down condition



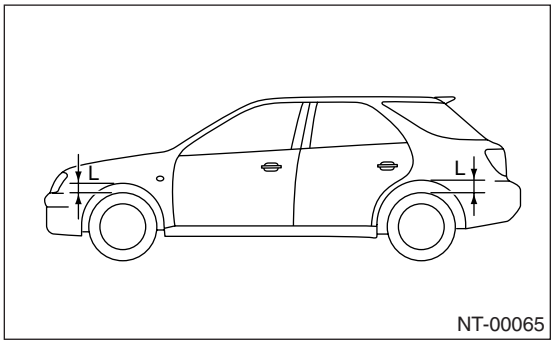
• Chain pulling range at tie-down condition



(1) Chain pulling range at tie-down condition

• Vehicle sinking volume at tie-down condition

Measure the distance L between tire highest point to arch highest point before tie-down and after tie-down. Difference of measurement value (drop height) shall be within 50.8 mm (1.97 in). Make sure to fix the vehicle securely.

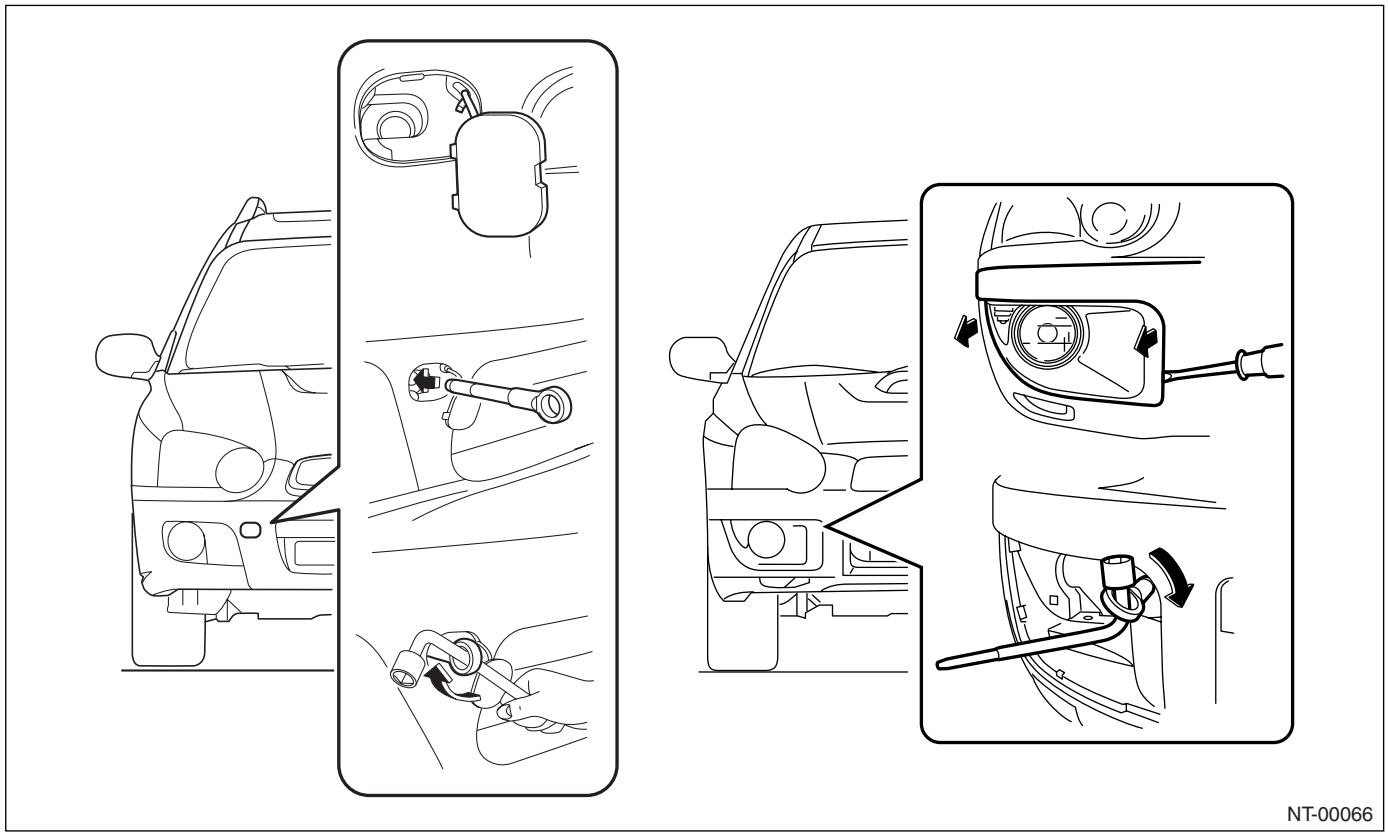


9. TOWING

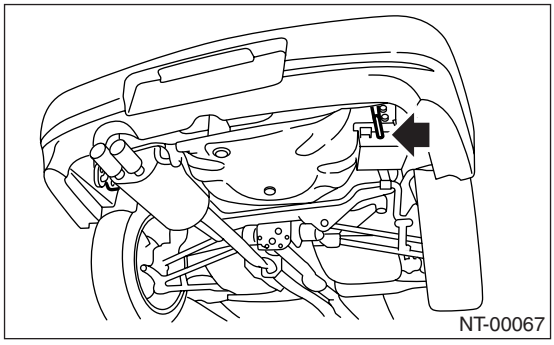
Avoid towing vehicles except when the vehicle cannot be driven. For models with AWD, AT, or VTD, use a loader instead of towing. When towing other vehicles, to prevent excessive weight from damaging the hook or vehicle:

- Do not tow other vehicles with a front hook for tie down.
- Make sure the vehicle towing is heavier that the vehicle being towed.

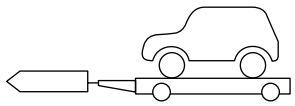
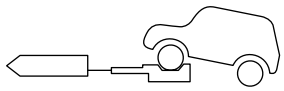
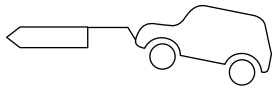
• Front



• Rear



• NOTES

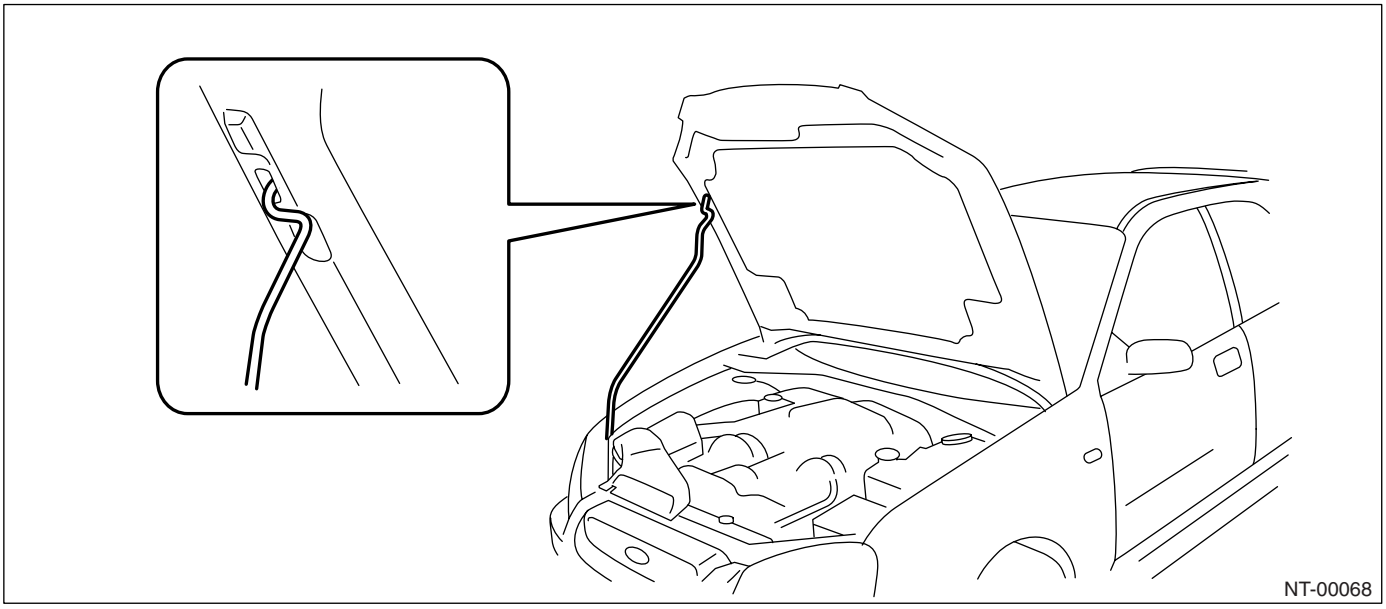
Towing	Notes	FWD		AWD	
		MT	AT	MT	AT
Lifting up four wheels (On a trailer)  NT-00023	Towing the vehicle after lifting up all four wheels is a basic rule for AWD model.	❍	❍	❍	❍
Rope NT-00024	• Check if both front and rear wheels are rotated normally. • AT model driving conditions: Allow driving speed less than 30 km/h (19 MPH). Allow driving distance less than 30 km (19 miles).	❍	▲	×	×
Raising the front wheels  NT-00025	Prohibited for full-time AWD model.	❍	❍	×	×
Lifting up the front wheels  NT-00026	• Prohibited, due to damage on bumper, front grille, etc. • Do not raise the vehicle with bumper.	×	×	×	×

Marked ❍: OK, Marked ×: Prohibited, Marked ▲: Conditionally OK.

CAUTION:
- **Check ATF, gear oil and rear differential oil before driving.**
- **Place the shift lever in "N" position during towing.**
- **Do not lift up the rear wheels to avoid unsteady rotation.**
- **Turn the ignition key to "ACC", then check the steering wheel moves freely.**
- **Release the parking brake to avoid tire dragging.**
- **Since the power steering does not work, be careful for the heavy steering effort (When engine is stopped)**
- **Since the servo brake does not work, be careful that the brake is not applied effectively. (When engine is stopped)**
- **In case of the malfunction of internal transmission or drive system, lift up four wheels (on a trailer) for towing.**

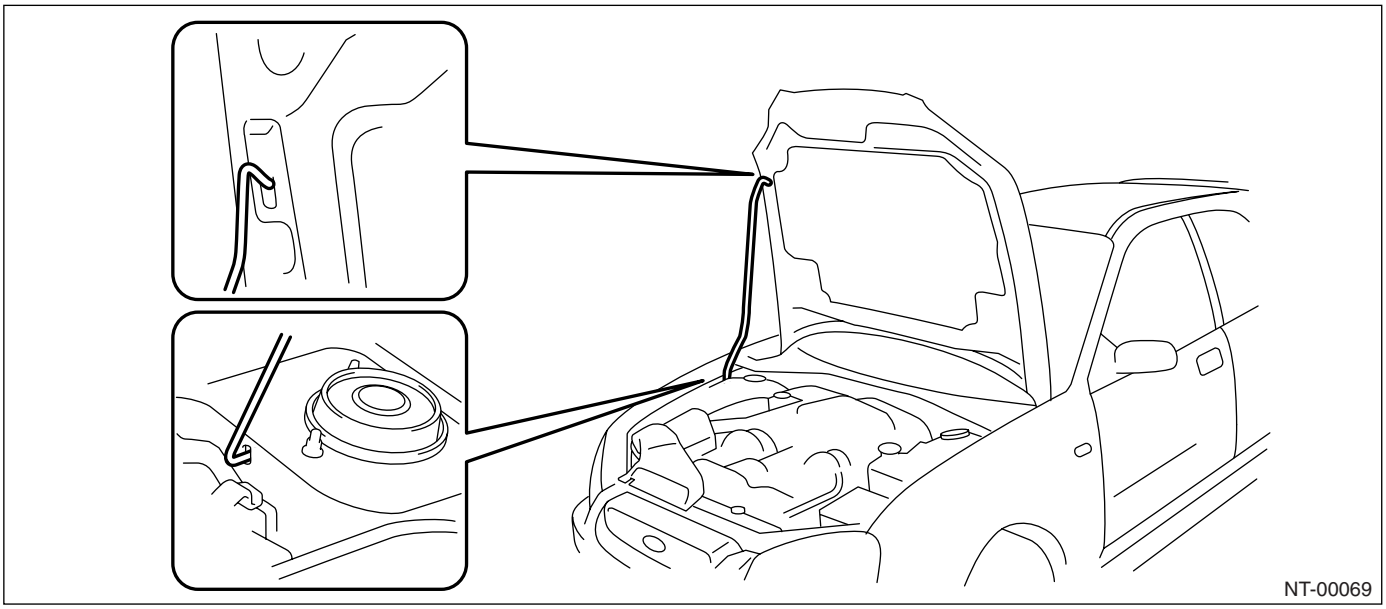
10.FRONT HOOD STAY INSTALLATION

• At the check and general maintenance



• When wider hood opening is necessary

Set stay into the hole of hood inner as shown in the figure below.



11.TRAINING

For information about training, contact a dealer or agent.

12.GENERAL SCAN TOOL

Using general scan tools will greatly improve efficiency of repairing engine electronic controls. The Subaru Select Monitor can be used to diagnose the engine, ABS, AT and other parts.

NOTE

IDENTIFICATION

ID

Page
1. Identification 2

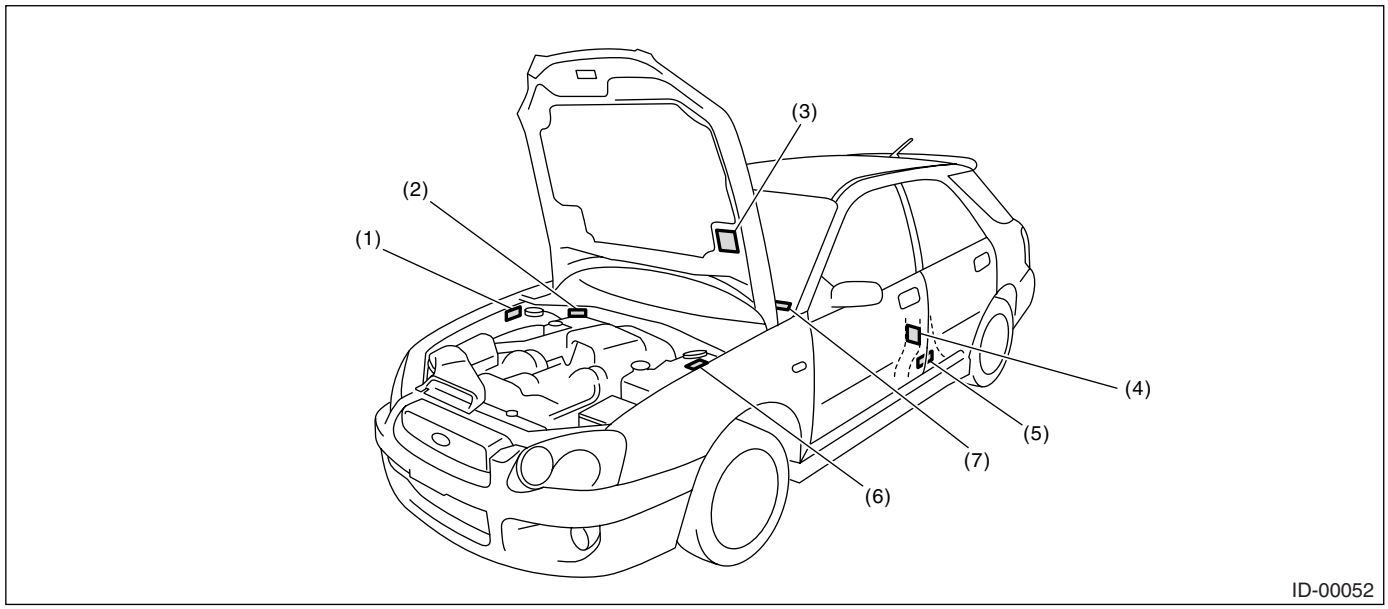
1. Identification

A: IDENTIFICATION

1. IDENTIFICATION NUMBER AND LABEL LOCATIONS

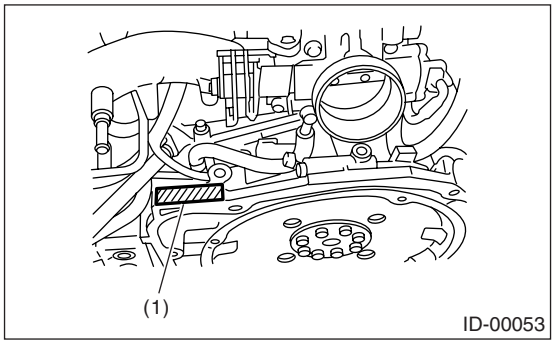
The VIN (Vehicle Identification Numbers) is used to classify the vehicle.

- **POSITIONING OF THE PLATE LABEL FOR IDENTIFICATION**



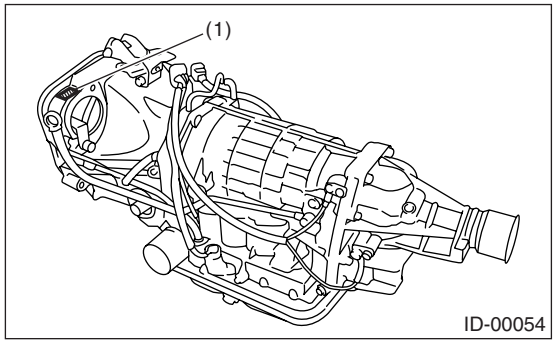
(1) ID plate (Europe model)
ADR compliance plate (Australia model)
(2) Vehicle identification number (VIN)
(3) Emission control label
(4) Tire inflation pressure label (Driver side) (Australia model)
Tire inflation pressure label (Driver side) (Except Australia model)
(5) Saudi Arabia plate (Saudi Arabia model)
Built date plate (Australia model)
(6) Model number plate
(7) Vehicle identification number (VIN) (Europe RHD model and Australia turbo model)

- **ENGINE**



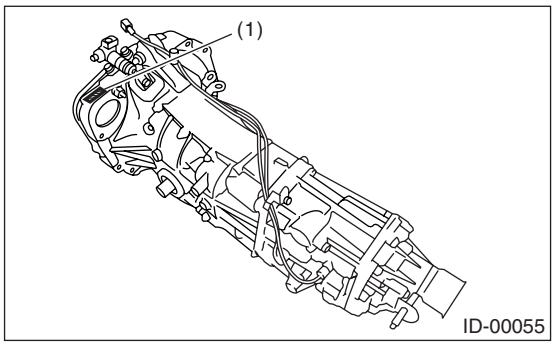
(1) Engine serial number

- **AUTOMATIC TRANSMISSION**



(1) Transmission serial number

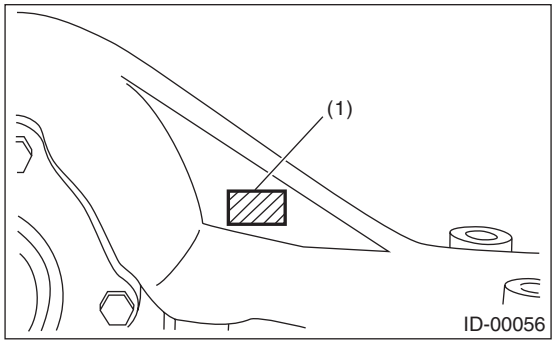
• MANUAL TRANSMISSION



(1) Transmission serial number

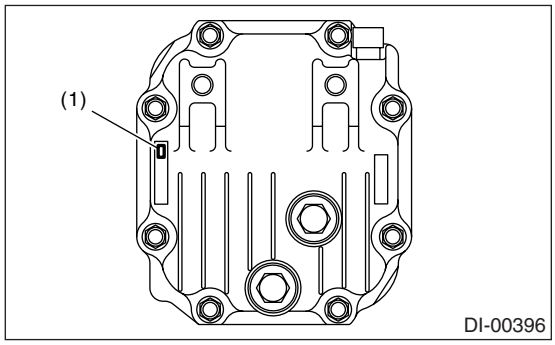
• REAR DIFFERENTIAL

• T-type



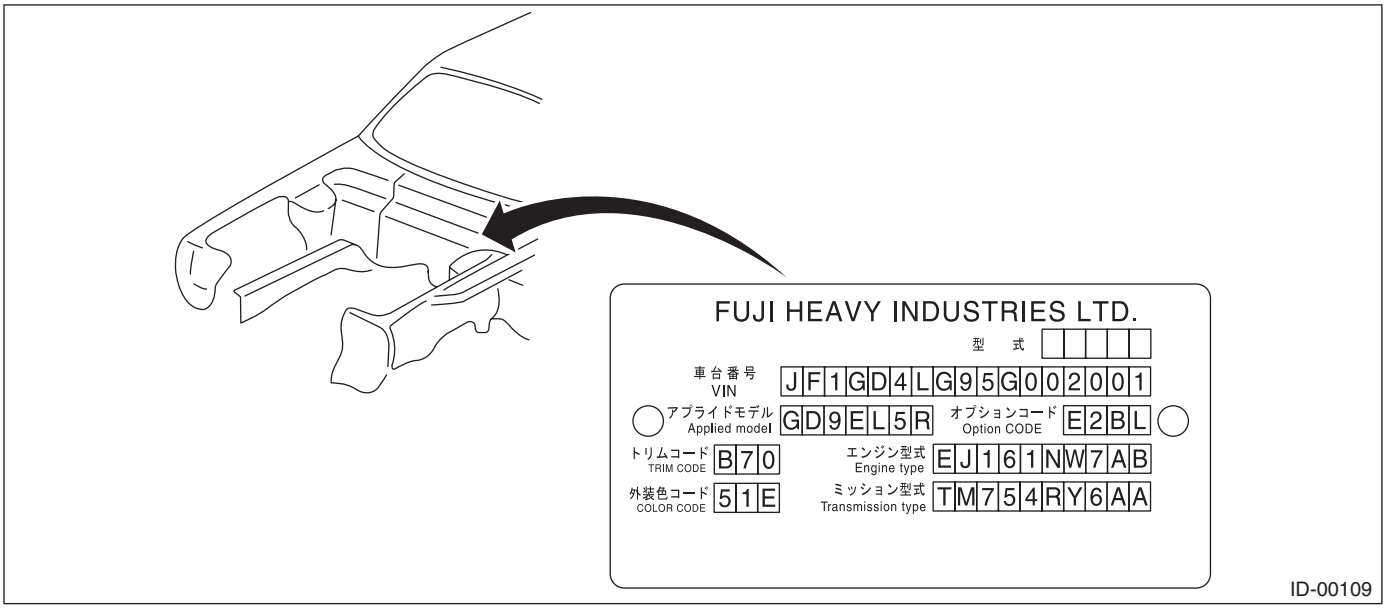
(1) Type (white paint)

• VA-type



(1) Type (label)

• MODEL NUMBER PLATE



2. MEANING OF V.I.N.

The meaning of the VIN is as follows:

• Europe, Australia and General (Except GCC)

]JF1GD4LG95G002001[

The starting and ending brackets ( ][ ) are stop marks.

Digits	Code	Meaning	Details
1 to 3	JF1	Manufacturer body area	JF1: Passenger car, FHI made
4	G	Car line	IMPREZA
5	D	Body type	D: 4 Door Sedan G: Wagon
6	4	Displacement	4: 1.6 L FWD 5: 1.6 L AWD 9: 2.0 L AWD A: 2.0 L AWD Turbo B: 2.0 L AWD High power turbo E: 2.5 L AWD
7	L	Steering position	K: RHD (Right-hand drive model) L: LHD (Left-hand drive model)
8	G	Engine & transmission	G: SOHC MPI 5-speed MT R: SOHC MPI 4-speed AT J: SOHC MPI Full-time AWD 5-speed MT K: SOHC MPI Full-time AWD 5-speed MT Dual range D: DOHC Turbo Full-time AWD 5-speed MT H: DOHC Turbo Full-time AWD 6-speed MT T: DOHC Turbo 4-speed AT Sport Shift
9	9	Drive type	3: Full-time AWD Single range 4: Full-time AWD Dual range 5: AWD AT 9: FWD
10	5	Model year	4: 2005MY
11	G	Factory location	G: FHI (Gunma)
12 to 17	002001	Serial number	—

• GCC countries (Saudi Arabia, etc.)

]JF1GD45MX5G002001[

The starting and ending brackets ( ][ ) are stop marks.

Digits	Code	Meaning	Details
1 to 3	JF1	Manufacturer body area	JF1: Passenger car, FHI made
4	G	Car line	IMPREZA
5	D	Body type	D: 4 Door Sedan G: Wagon
6	4	Displacement	4: 1.6 L AWD 8: 2.0 L AWD
7	5	Grade	5: TS 7: GX
8	M	Restraint	M: Manual belts, dual airbag
9	X	Check digit	0 to 9 & X
10	5	Model year	4: 2005MY
11	G	Transmission type	G: Full-time AWD 5-speed MT single range H: Full-time AWD 4-speed AT J: Full-time AWD 5-speed MT dual range
12 to 17	002001	Serial number	—

3. MODEL NUMBER PLATE

The model number plate indicates: the applied model, the option code, the trim code, the engine type, the transmission type, and the exterior color code. This information is helpful when placing orders for parts.

GD9EL5R

Digits	Code	Meaning	Details
1	G	Series	IMPREZA
2	D	Body style	D: 4 Door Sedan G: Wagon
3	9	Engine displacement Drive system Suspension system	4: 1.6 L FWD 5: 1.6 L AWD 9: 2.0 L AWD A: 2.0 L AWD Turbo B: 2.0 L AWD High power turbo E: 2.5 L AWD
4	E	Model year	E: 2005MY
5	L	Destination	K: Right-hand drive model market L: Left-hand drive model market
6	5	Grade	3: BASE 4: TS 5: GX 6: RS 7: OUTBACK 8: WRX E: STi
7	R	Transmission, fuel feed system	K: SOHC MPI Dual range 5-speed MT G: SOHC MPI 5-speed MT R: SOHC MPI 4-speed AT T: DOHC B MPI 4-speed AT Sport Shift J: SOHC MPI 5-speed MT AWD D: DOHC B MPI 5-speed MT AWD H: DOHC B MPI 6-speed MT AWD

The engine and transmission type are as follows:

• Engine

EJ161NW7AB

Digits	Code	Meaning	Details
1 and 2	EJ	Engine type	EJ: 4 cylinders
3 and 4	16	Displacement	16: 1.6 L 20: 2.0 L 25: 2.5 L
5	1	Fuel feed system	1: D-MPI SOHC-A 5: MPI Turbo 7: MPI High power turbo
6	N	Detailed specifications	Used when ordering parts. See the parts catalog for details.
7	W	Transmission	W: MT X: AT
8 to 10	7AB	Detailed specifications	Used when ordering parts. See the parts catalog for details.

• Transmission

TM754RY6AA

Digits	Code	Meaning	Details	
1	T	Transmission	T: Transmission	
2	M	Transmission type	Y: Full-time AWD MT center differential V: Full-time AWD AT center differential Z: Full-time AWD AT MPT M: FWD MT A: FWD AT	
3 and 4	75	Classification	75: 5MT 85: 6MT 1A: AT 1B: AT	
5	4	Series	MT	4: 5MT 6: 6MT
			AT	4: AT
6	R	Transmission specifications	A: FWD 4-speed AT R: FWD Single Range 5-speed MT V: Full-time AWD 5-speed MT with viscous coupling center differential single range W: Full-time AWD 6-speed MT with viscous coupling center differential single range or driver's control center differential single range X: Full-time AWD 5-speed MT with viscous coupling center differential dual range Z: Full-time AWD 4-speed AT with MPT Y: Full-time AWD 4-speed AT with VTD	
7	Y	Engine type	Y: 1.6 L SOHC R: 2.0 L SOHC N: 2.0 L DOHC Turbo F: 2.5 L SOHC	
8 to 10	6AA	Detailed specifications	Used when ordering parts. See the parts catalog for details.	

• Rear differential 1

VA-type

Code	Reduction gear ratio	LSD
XN	4.111	No
XP	4.444	No

• Rear differential 2

T-type

Code	Reduction gear ratio	LSD
EG	3.900	No
EM	4.444	SURETRAC®
EJ	4.111	Viscous
EF	3.545	Viscous
HJ	3.545	SURETRAC®
HG	3.900	SURETRAC®
HS	3.545	Mechanical
HW	3.900	Mechanical

• Option code

E2BL

Digits	Code	Meaning	Details
1 — 2	E2	Destination	EC: Europe model (LHD model) EK: Europe model (RHD model) ER: Ireland model (RHD model) EH: China model KS: Middle East model K4: Central and South America model KA: Australia model E2: Israel model K0: General model (LHD model) K1: General model (RHD model) Blank: Hong Kong model
3	B	Option equipment	A: Power window, Power door lock, ABS, Aluminum wheel B: Power window, Power door lock C: Power window, Power door lock, Cruise control, ABS, Aluminum wheel (Gold color), Driver's control center diffelential (Auto) D: Power window, Power door lock, Cruise control, ABS, Front LSD, Driver's control center differential (Auto) E: Power window, Power door lock, ABS F: Power window, Power door lock, Cruise control, ABS L: Power window, Power door lock, ABS, Roof rail, Aluminum wheel M: Power window, Power door lock, ABS, Roof rail N: Power window, Power door lock, Cruise control, ABS, Roof rail O: Power window, Power door lock, Cruise control, ABS, Roof rail, Aluminum wheel & 17 in tire P: Power window, Power door lock, Roof rail Q: Power window, Power door lock, Aluminum wheel R: Power window, Power door lock, Roof rail, Aluminum wheel T: Power window, Power door lock, Cruise control, ABS, Driver's control center diffelential (Auto), Aluminum wheel (Silver color) V: Power window, Power door lock, ABS, Cruise control Y: Power window, Power door lock, ABS, Cruise control, Driver's control center differential (Auto) 6: Special edition model

Digits	Code	Meaning	Details
4	L	Option equipment	B: A/C, Airbag, Side airbag, Premium package C: A/C, Airbag, Side airbag, Rear spoiler F: A/C, Airbag, Sunroof G: A/C, Airbag, Side airbag I: A/C, Airbag, Audio, Rear spoiler J: A/C, Airbag, Side airbag, Audio K: Airbag, Side airbag, A/C, Premium package L: A/C, Airbag M: Airbag O: A/C, Sunroof, Airbag, Side airbag, Leather seat & door trim decorative woodturning, Audio, Rear spoiler P: A/C, Sunroof, Airbag, Side airbag, Rear spoiler Q: A/C, Sunroof, Airbag, Audio, Rear spoiler R: A/C, Airbag, Rear spoiler S: A/C, Airbag, Audio T: A/C, Sunroof, Airbag, Side airbag, Leather seat & door trim decorative woodturning, Audio U: A/C, Sunroof, Airbag, Side airbag V: A/C, Sunroof, Airbag, Side airbag, Leather seat & door trim decorative woodturning W: A/C, Sunroof, Airbag, Rear spoiler Y: A/C, Sunroof, Airbag, Side airbag, Audio Z: A/C, Sunroof, Airbag, Side airbag, Leather seat & door trim decorative woodturning, Rear spoiler 1: Special edition model 2: Special edition model 3: Special edition model

RECOMMENDED MATERIALS

RM

Page
1. Recommended Materials 2

1. Recommended Materials

A: RECOMMENDED MATERIALS

1. GENERAL

To insure the best performance, always use the specified oil, gasoline, adhesive, sealant, etc. or a substitute of equivalent quality.

2. FUEL

Always use a gasoline of the same or higher octane value than specified in the owner's manual. Ignoring the specifications below will result in damage or poor operation of the engine and fuel injection system. Use the specified gasoline to correct performance.

• Unleaded gasoline

Use unleaded gasoline and not leaded gasoline on vehicles with catalytic converter installed to reduce air pollution. Using leaded gasoline will damage the catalytic converter.

Model	Petrol	RON
Non-turbo	Unleaded	More than 95 RON More than 90 RON*
Turbo	Unleaded	More than 98 RON

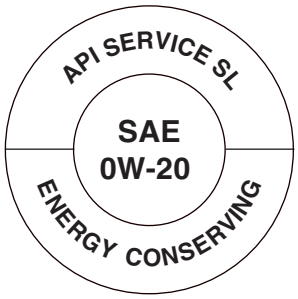
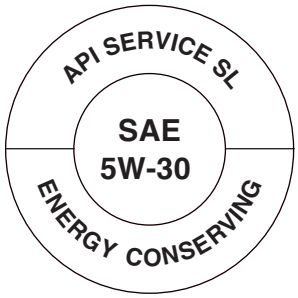
*: KA, KS model

• Leaded gasoline

On vehicles without catalytic converter, use leaded gasoline with an octane value of 90 RON or higher.

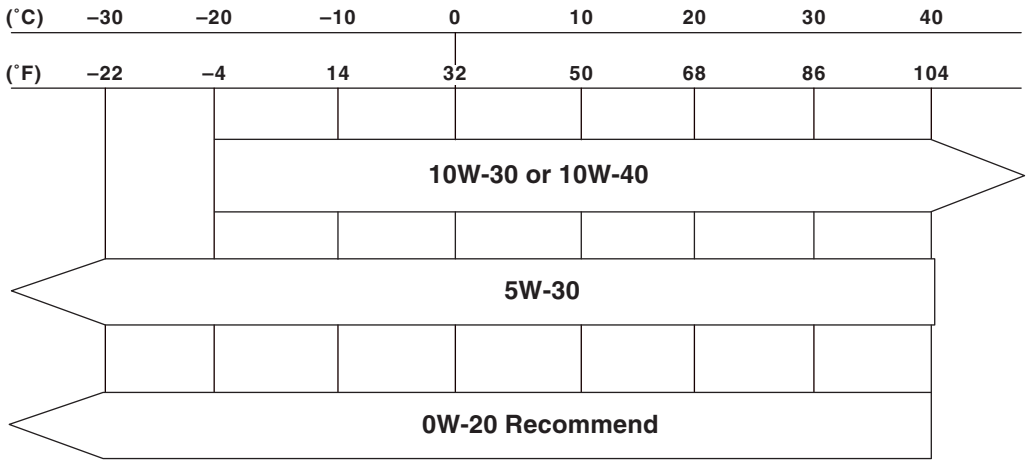
3. LUBRICANTS

Use either the lubricants in the table below or equivalent lubricants. See the table below to choose the correct SAE viscosity.

Lubricant	Recommended		Alternative
	API Standard or ILSAC Standard	ACEA Standard	API Standard
Engine oil	SL, SJ Grade “Energy conserving”  RM-00006  RM-00001 GF-3 (the one that the following mark has adhered) RM-00002		SH
Manual transmission oil	GL-5	—	—
AT front differential gear oil	GL-5	—	—
Rear differential gear oil	GL-5*	—	—

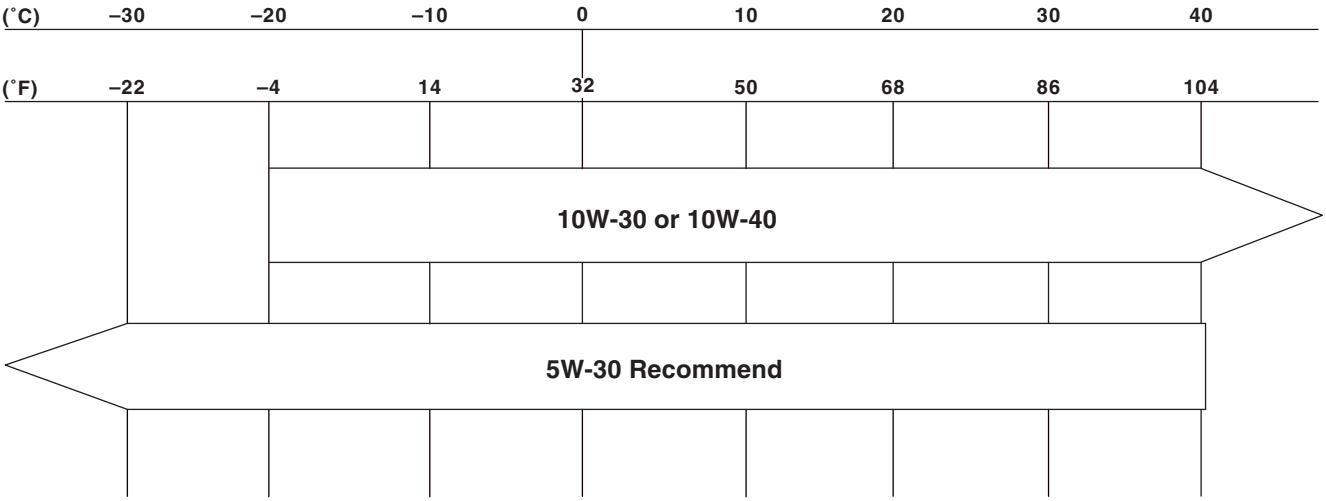
*: Use LSD oil for model with driver’s control center differential.

SAE viscosity No. and applicable temperature
Engine oil
Non-turbo model



RM-00007

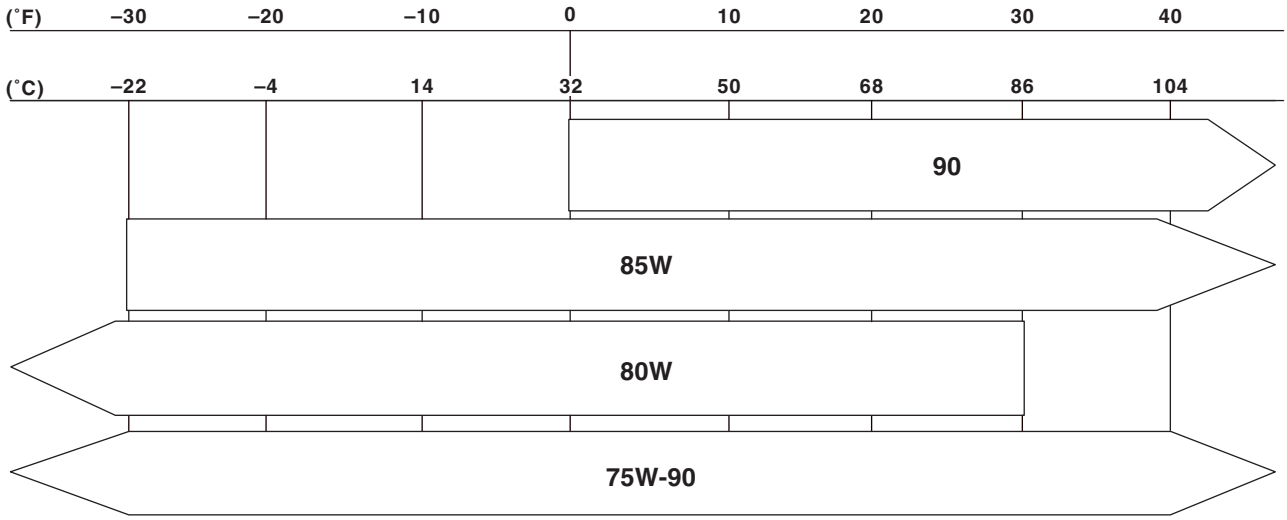
Turbo model



RM-00003

SAE viscosity No. and applicable temperature

Manual transmission oil, AT front differential gear oil and rear differential gear oil



RM-00004

4. FLUID

Use the fluids specified in the table below. Do not mix two different kinds or makes of fluid.

Fluid		Recommended	Item number	Alternative	Remarks
Automatic transmission fluid	*1	SUBARU ATF	K0410YO700	IDEMITSU: ATF-HP Castrol: Transmax J	If it is impossible to get recommended or alternative ATF, DEXRON III can be used.
	*2	SUBARU ATF	K0410YO700	IDEMITSU: ATF-HP Castrol: Transmax J DEXRON III	—
Power steering fluid		DEXRON III	—	—	—
Brake fluid		FMVSS No. 116 DOT3	—	—	—
Clutch fluid		FMVSS No. 116 DOT3	—	FMVSS No. 116 DOT4	—

*1: For EC, EK, E2, EH. Only 2.0 L SOHC engine (With ATF warmer, slip lock-up)
*2: Except EC, EK, E2, EH. Only 2.0 L SOHC engine (With ATF warmer, slip lock-up)

5. COOLANT

Use genuine coolant to protect the engine.

Coolant	Recommended	Item number	Alternative
Coolant	SUBARU coolant	000016218	None
Water for dilution	Distilled water	—	Tap water (Soft water)

6. REFRIGERANT

Standard air conditioners on Subaru vehicles use HFC134a refrigerant. Do not mix it with other refrigerants. Also, do not use any compressor oil except for DH-PR.

Air conditioner	Recommended	Item number	Alternative
Refrigerant	HFC134a	—	None
Compressor oil	DH-PR	—	None

7. GREASE

Use the grease and supplementary lubricants shown in the table below.

Grease	Application point	Recommended	Item number	Alternative
Supplementary lubricants	• O_2 sensor • Bolts, etc.	Spray type lubricant	—	—
Grease	MT main shaft	Clutch grease	K0879Y0501	—
	Clutch master cylinder push rod	Silicolube G-40M	004404003	—
	• Gear shift lever • Select lever • Clutch operating cylinder • Accelerator pedal • Clutch pedal • Brake pedal • Clutch bearing • Clutch release lever	SUNLIGHT2	003602010	—
	Select lever (lock plate)	Suncall grease	0029408040	—
	Steering gear box	Valiant grease M-2	003608001	One-Luber MO
	Disc brake	Niglube RX-2	K0779GA102	—
	• Drum brake • Brake shoe • Drum brake wheel cylinder	Molykote No. 7439	003602001	—
	Brake pad	Molykote AS-880N	K0777YA010	—
	Front axle PTJ	NSG301	28395AG020	—
	Front axle EBJ	NTG2218-M	28395AG010	—
	Front axle BJ		28395AG030	—
	• Rear axle EBJ • Rear axle BJ (STi model)		28395AG010	—
	Rear axle BJ (Except STi model)	NKG708	28495AE000	—
	• Front axle DOJ • Rear axle DOJ	NKG205	28495AG010	—
	Rear axle DOJ (Except STi model)	NKG205	28495AG000	—
	• Throttle cable end • Door latch • Door striker	Silicolube G-30M	004404002	—

8. ADHESIVES

Use the adhesives shown in the table below, or equivalent.

Adhesive	Application point	Recommended	Item number	Alternative
Adhesive	Windshield, rear window glass, rear quarter glass and body	Dow Automotive's Adhesive: Gurit-ESSEX Betaseal 1502 or equivalent Glass primer: Betawipe VP 04604, Betaprime 5001 Paint surface primer: Betaprime 5402	—	—
	Inner rearview mirror base	REPAIR KIT IN MR	65029FC000	—
	Soft vinyl	Cemedine 540	—	3M's EC-776, EC-847 or EC-1022 (Spray type)
	Momentary sealant	Cemedine 3000	—	Armstrong's Eastman 910

9. SEAL MATERIAL

Use seal material shown in the table below, or equivalent.

Seal material	Application point		Recommended	Item number	Alternative
Seal material	• Cylinder block • Torque converter clutch case • Transmission case • Transmission oil pan (6MT model)		Three Bond 1215	004403007	Dow Corning's No. 7038
	Transmission oil pan (AT model)		Three Bond 1217B	K0877YA020	—
	• Rear differential • Oil pressure switch		Three Bond 1324	004403042	—
	Rear differential		Three Bond 1105	004403010	Dow Corning's No. 7038
	Steering adjusting screw		Three Bond 1141	004403006	—
	Camshaft cap	Non-turbo model	Three Bond 1280B	K0877YA018	—
		Turbo model	Three Bond 1215	004403007	—
	• Front sealing cover • Rear sealing cover		3M Butyl tape 8626	—	—
	Engine oil pan		Three Bond 1207C	004403012	—

PRE-DELIVERY INSPECTION

PI

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1. Pre-delivery Inspection.....2

1. Pre-delivery Inspection

A: GENERAL DESCRIPTION

The purposes of the pre-delivery inspection (PDI) are as follows.
- Remove the additional parts used for ensuring the vehicle quality during transportation and restore the vehicle to its normal state.
- Check if the vehicle before delivery is in a normal state.
- Check for any damage to the vehicle or parts that may have taken place during transportation or storage.
- Check if the vehicle after repair is in a normal state.
- Make sure to provide a complete vehicle to the customer.

For the above reasons, all SUBARU dealers (dealerships) carry out the PDIs before delivering a vehicle.

B: PRE-DELIVERY INSPECTION (PDI) PROCEDURE

STATIC CHECKS JUST AFTER VEHICLE RECEIPT

PROCEDURE	Check point
1. Appearance check	(1) If the vehicle is covered with protective coating, visually check the vehicle body for damage and dents. If the protective coating has been removed, visually check the body paints for damage or stains in detail. (2) Visually check the glass and light lenses for any damage, cracks or excessive gaps to the body sheet metal. (3) Visually check the plated parts for any damage.
2. Tire check	(1) Check the tires for damage, abnormal conditions, and dents on the wheels. (2) Check the tire air pressure.
3. Fuse installation	If the vehicle is about to be delivered to the customer, attach a back-up fuse.
4. Air conditioner harness connection	If the vehicle is about to be delivered to the customer, connect air conditioner harness.
5. Check the doors for lock/unlock and open/close operations.	(1) Using the key, check if the trunk lid can be locked or unlocked normally. (2) Open and close all doors to see that there are no abnormal conditions. (3) Operate the power door lock switch to check that the door (rear gate) is locked and unlocked normally.
6. Double lock operation check	Check the double lock for normal operations.
7. Check the operation of child safety lock system	Check that the child safety lock system operates normally.
8. Check the trunk lid for open/close operations.	(1) Using the key, check that the trunk lid can be unlocked normally. (2) Operate the trunk lock release lever to check that the trunk opens normally. (3) Open and close the trunk lid to see that there are no abnormal conditions.
9. Check the rear gate for lock/unlock and open/close operations.	(1) Check if the rear gate can be unlocked normally through the emergency hole. (2) Open and close the rear gate to see that there are no abnormal conditions.
10. Operation check of fuel lid opener lock release lever	Operate the fuel lid opener to check that the fuel filler flap lid is unlocked normally.
11. Accessory check	Check that the following accessories are provided. • Owner's manual • Warranty booklet • Maintenance note • Spare key • Jack • Tool set • Spare tire • Immobilizer cover (EK model) • Immobilizer relay (EK model)
12. Operation check of front hood lock release system	Operate the front hood lock release lever to check that the front hood is unlocked normally.
13. Battery	Check the battery terminals for any abnormal conditions such as rust and trace of battery fluid leaks.
14. Brake fluid	Check that the fluid level is normal.

PROCEDURE	Check point
15. Engine oil	Check that the oil level is normal.
16. Transmission gear oil	Check that the transmission gear oil level is normal.
17. AT front differential oil	Check that the AT front differential oil level is normal.
18. Engine coolant	Check that the engine coolant level is normal.
19. Clutch fluid	Check that the clutch fluid level is normal.
20. Window washer fluid	Check that the window washer fluid level is normal.
21. Front hood latch check	Check that the hood is closed and latched securely.
22. Keyless entry system	Check that the keyless entry system operates normally.
23. Seat	(1) Check the seat surfaces for stain or dirt. (2) Check the seat installation conditions and functionality.
24. Seat belt	Check the seat belt installation conditions and functionality.
25. Wheel alignment	Check that the wheel alignments are properly adjusted.

CHECKS WITH ENGINE RUNNING

PROCEDURE	Check point
26. Test mode connector	Test mode connectors
27. Immobilizer system	(1) Check that the engine starts with all keys that are equipped on vehicle. (2) 60 seconds after turning ignition switch from ON to ACC or OFF, or immediately after removing key, check that the security indicator light blinking.
28. Starting condition	Start the engine and check that the engine starts smoothly.
29. Exhaust system	Check that the exhaust noise is normal and no leaks are found.
30. Indicator and warning lights	Check that all the indicator and warning lights are gone out.
31. Clock	Check that the clock operates normally.
32. Audio	Check the radio, CD and cassette player for normal operation.
33. Front accessory power supply socket	Check that the front accessory power socket operates normally.
34. Lighting system	Check that the lighting system operates normally.
35. Window washer	Check that the window washer system operates normally.
36. Wiper	Check that the wiper system operates normally.
37. Power window operation check	Check the power window for normal operations.
38. Sunroof	Check that the sunroof operates normally.
39. Outer mirror	Check that the outer mirror operates normally.

DYNAMIC TEST WITH VEHICLE RUNNING

PROCEDURE	Check point
40. Brake test	Check the foot brake for normal operations.
41. Parking brake	Check the parking brake for normal operations.
42. AT shift control	Check that the AT shift patterns are correct.
43. Heater & ventilation	Check that the heater & ventilation system operates normally.
44. Air conditioner	Check that the air conditioner operates normally.
45. Cruise control	Check that the cruise control system operates normally.

CHECKS AFTER DYNAMIC TEST

PROCEDURE	Check point
46. ATF level	Check that the ATF level is correct.
47. Power steering fluid level	Check that the power steering fluid level is normal.
48. Fluid leak check	Check for fluid/oil leaks.
49. Water leak test	Spray the vehicle with water and check for water leaks.
50. Appearance check 2	(1) Remove the protective coating (if any). (2) Check the body paints for damage and stain. (3) Check the plated parts for damage and rust.

1. APPEARANCE CHECK

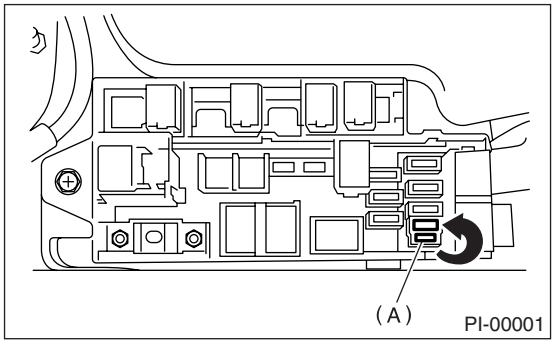
• If the vehicle is covered with protective coating, visually check the vehicle body for damage and dents.
• When the protective coating is removed, visually check the body paints for damage or stains in detail and repair as necessary.
• Visually check the windshield glass, door glasses and light lenses for any damage, cracks or excessive gaps to the body sheet metal and repair as necessary.
• Check the plated parts, such as the grilles and door knobs, for damage or loss of gloss and repair or replace the parts as necessary.

2. TIRE CHECK

• Check the tires for damage, abnormal conditions, and dents on the wheels.
• Check the tire size, spare tire and tire air pressure described on the tire air pressure label (driver's side).

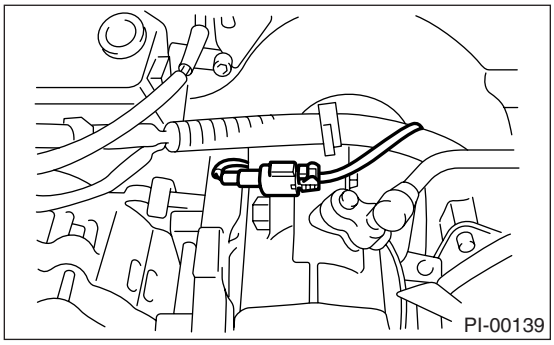
3. FUSE INSTALLATION

A vehicle just delivered has no fuse for the back-up circuit to prevent battery discharge. Attach a 20 A fuse (A) as shown in the figure.



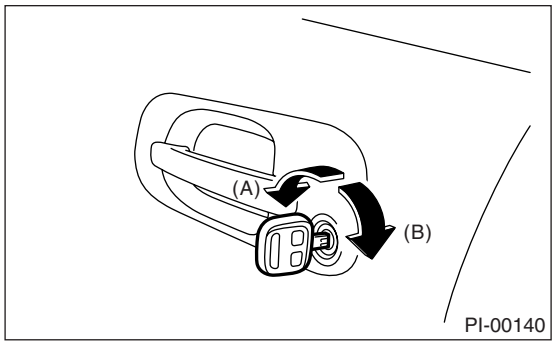
4. CONNECTION OF AIR CONDITIONER HARNESS

A vehicle just delivered has its air conditioner harness disconnected to protect the air conditioner compressor. Connect the harness as shown in the figure.



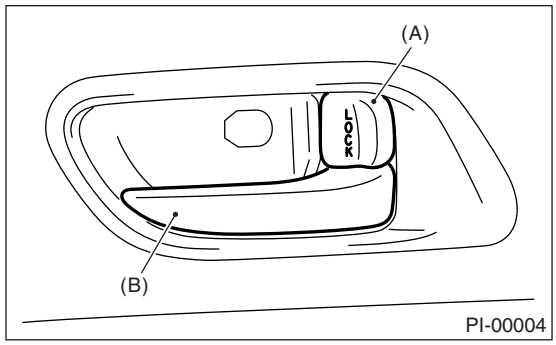
5. CHECK THE DOORS FOR LOCK/UNLOCK AND OPEN/CLOSE OPERATIONS

1) Using the key, lock and unlock the door several times to check for normal operation. Open and close the door several times for smooth movement.



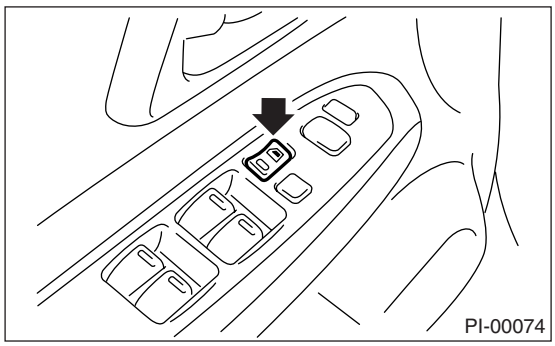
(A) Unlock
(B) Lock

2) Close the driver's door completely, and place the door lock knob (A) to the lock position. Then pull inner remotes (B) to ensure that doors will not open. For other doors, place the door lock knob (A) to the lock positions and then pull the inner remote to ensure that the doors will not open.

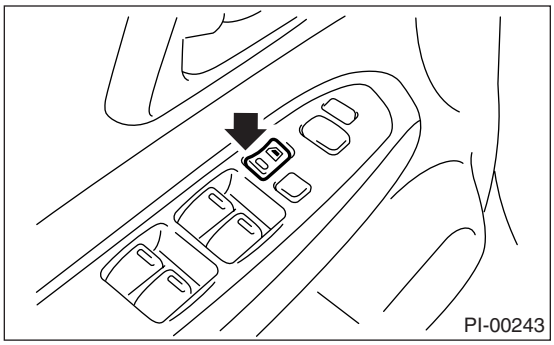


(A) Door lock knob
(B) Inner remote

3) Press the driver's side power door lock switch to lock side. Check that all doors including rear gate are locked.



4) Press the driver's side power door lock switch to unlock side. Check that all doors including rear gate are unlocked.

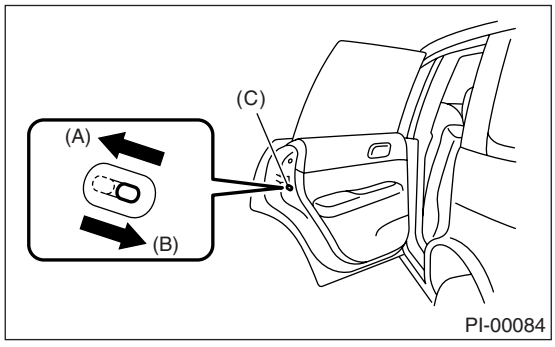


6. CHECK DOUBLE LOCK OPERATION

1) Fully open all the windows.
2) Remove the key.
3) Lock all the doors using the door key cylinder or keyless transmitter.
4) Verify that all the doors including rear gate are not unlocked when pressing power door lock switch to unlock side.
5) Verify that the door is not opened when operating door lock knob to unlock position and pulling inner remote. Perform the same check for other doors.
6) Check that all the doors are unlocked when door is unlocked using door key cylinder or keyless transmitter, and ignition switch is turned to ON.

7. CHECK THE OPERATION OF CHILD SAFETY LOCKS

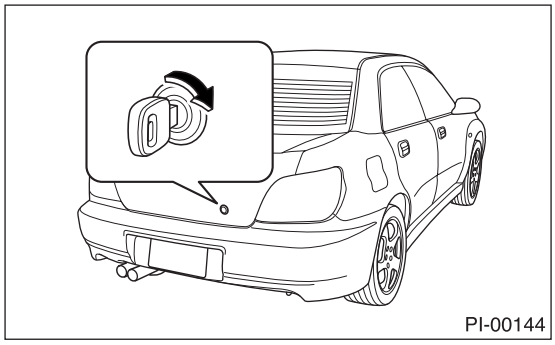
1) Set the child safety lock on both rear doors to the lock positions.
2) Close the rear doors completely.
3) Check that the lock levers of the rear doors are in the unlock positions. Then, pull the inner remotes of the rear doors to ensure that the doors will not open.
4) Next, pull the outside door handles of the rear doors to ensure that the doors will open.



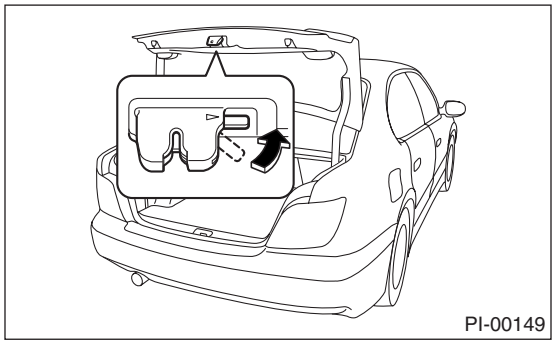
(A) Unlock
(B) Lock
(C) Child safety lock

8. CHECK THE TRUNK LID FOR OPEN/ CLOSE OPERATIONS

1) Operate the trunk lock release lever to check that the trunk lid opens normally.
2) Using the key, unlock the trunk lid several times to check for normal operation.
3) Open and close the trunk lid several times for smooth movement.

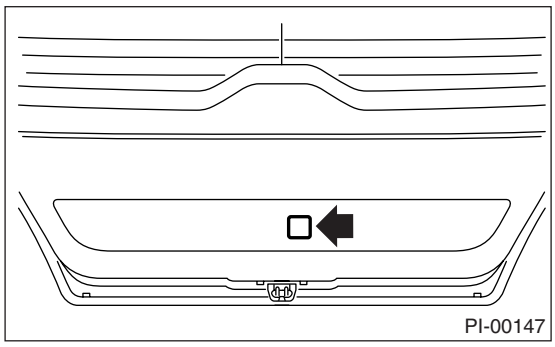


4) Set the trunk lid release lever to the cancel position, and check that the trunk lid can only be opened with the key.

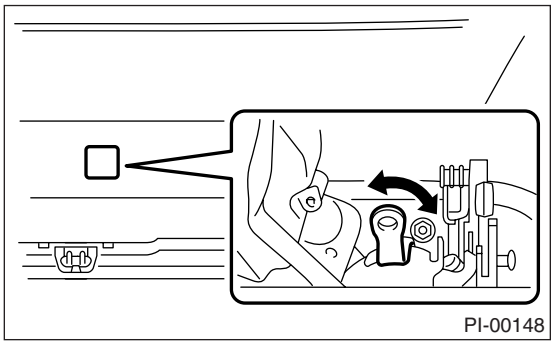


9. CHECK THE REAR GATE FOR LOCK/ UNLOCK AND OPEN/CLOSE OPERATIONS

1) Open and close the rear gate several times for smooth movement.
2) Operate the rear gate lever to check that the rear gate is locked and unlocked normally.
   (1) Remove the blind cover inside the rear gate.



(2) Check that the rear gate is locked correctly when lever is operated using a finger.


PI-00148

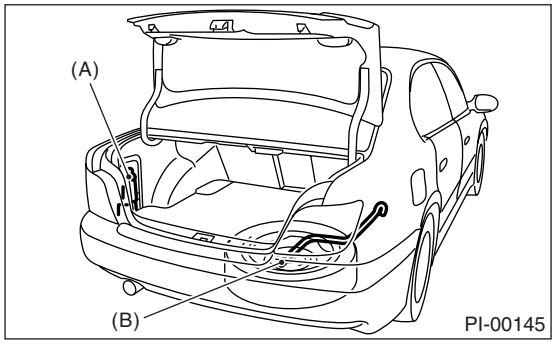
10.OPERATION CHECK OF FUEL LID OPENER LOCK RELEASE LEVER

Operate the fuel lid opener and verify that the fuel filler flap lid opens normally. Check that the filler cap is securely closed.

11.ACCESSORY CHECK

Check that the following accessories are provided in the luggage compartment or cargo area.

- Owner's manual
- Warranty booklet
- Service booklet
- Spare key
- Jack
- Tool set
- Spare tire
- Immobilizer cover (EK model)
- Immobilizer relay (EK model)



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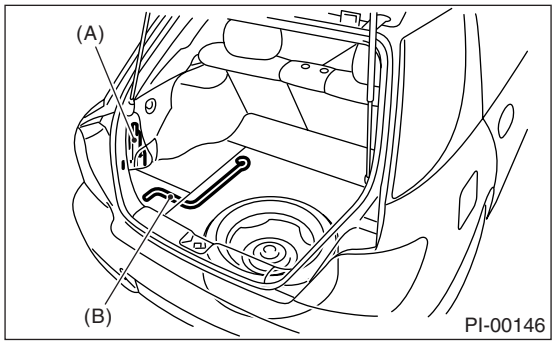
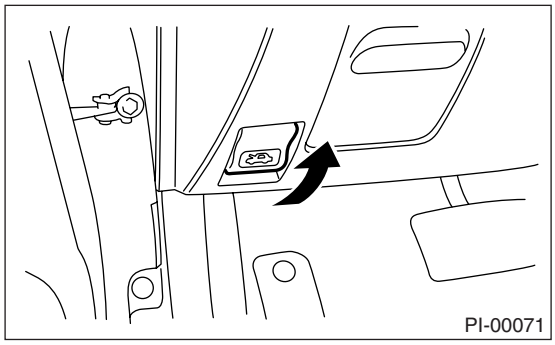


PI-00146

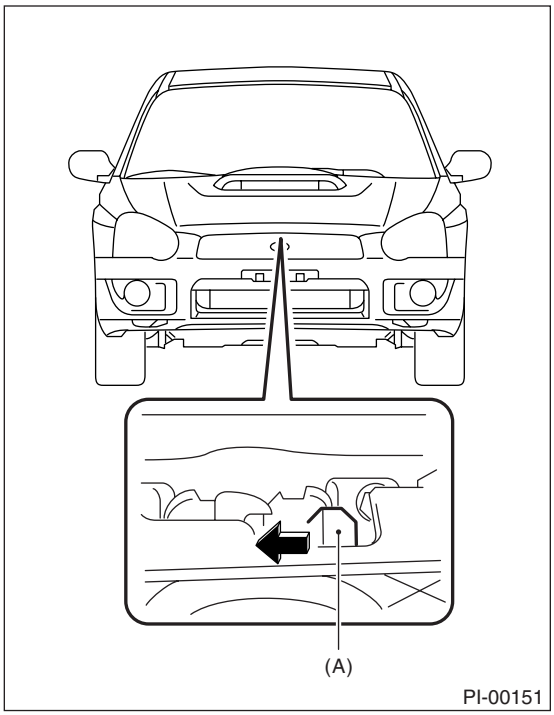
(A) Jack
(B) Jack handle

12.OPERATION CHECK OF HOOD LOCK RELEASE SYSTEM

Operate the hood release knob (A) and check that the hood is unlocked normally.

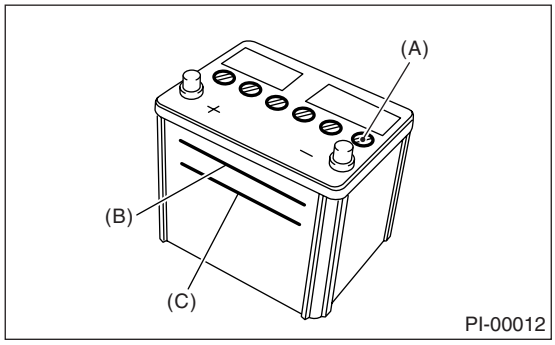

PI-00071

Operate the lever (A) and check that the hood is opened normally. Then support the hood with hood stay.



13.BATTERY

Check the battery terminals to make sure that no rust or corrosions due to fluid leaks are found. Check that the battery caps are securely tightened.



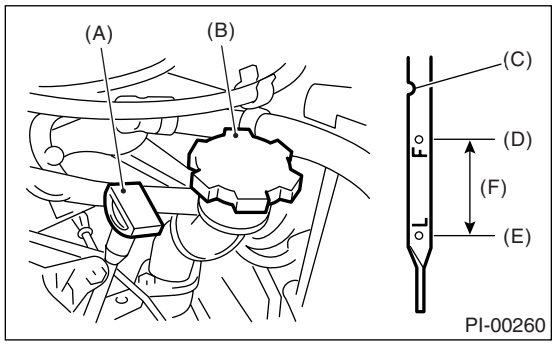
(A) Cap
(B) Upper level
(C) Lower level

14.BRAKE FLUID

Check the brake fluid amount. If the amount is insufficient, carry out a brake line test to identify brake fluid leaks and check the brake operation. After that, refill the brake fluid tank with the specified type of fluid.

15.ENGINE OIL

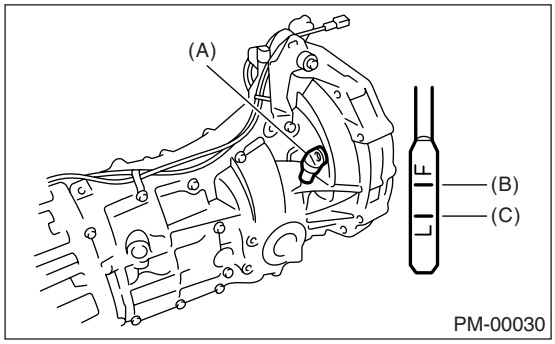
Check the engine oil amount. If the amount is insufficient, check that no leaks are found. Then, add the necessary amount of the specified engine oil.



(A) Oil level gauge
(B) Engine oil filler cap
(C) Notch mark
(D) Upper level
(E) Lower level
(F) Approx. 1.0 ℓ (1.1 US qt, 0.9 Imp qt)

16.TRANSMISSION GEAR OIL

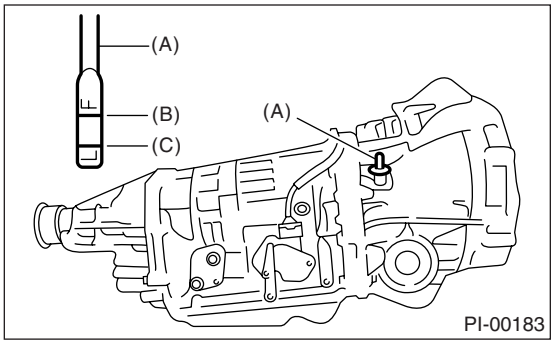
Check that the transmission gear oil level is normal. If the amount of oil is insufficient, check that no leaks are found. Then, add the necessary amount of the specified transmission gear oil.



(A) Oil level gauge
(B) Upper level
(C) Lower level

17.AT FRONT DIFFERENTIAL OIL

Check that the AT front differential oil level is normal. If the amount of oil is insufficient, check that no leaks are found. Then, add the necessary amount of the specified AT front differential oil.



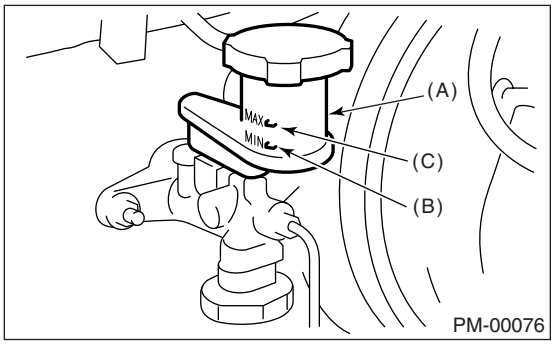
(A) Oil level gauge
(B) Upper level
(C) Lower level

18.COOLANT

Check the coolant amount on the reservoir. If the amount is insufficient, check that no leaks are found. Then, add the necessary amount of coolant with the specified concentration.

19.CLUTCH FLUID

Check the clutch fluid amount. If the amount is insufficient, check that no leaks are found. Then, add the necessary amount of the specified fluid.



(A) Reservoir tank
(B) MIN level
(C) MAX level

20.WINDOW WASHER FLUID

Check the window washer fluid amount. If the amount is insufficient, check that no leaks are found. Then, add the necessary amount of washer fluid commercially available.

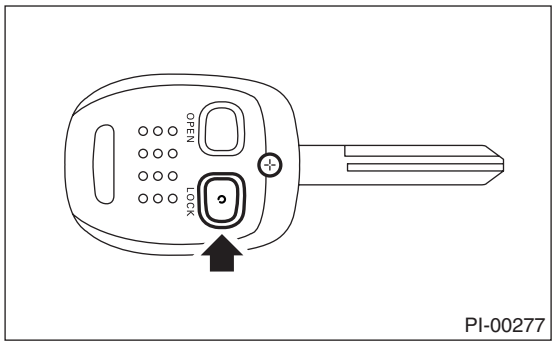
21.HOOD LATCH CHECK

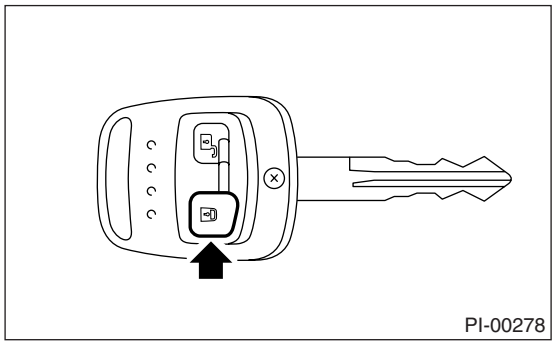
Retract the hood stay and close the hood. Check that the hood is securely latched.

22.KEYLESS ENTRY SYSTEM

Check the keyless entry system operations as follows.

• Remove the key from the ignition switch and close all the doors including rear gate (wagon model).
• Press the “LOCK” button on the keyless transmitter momentarily once and check that all the doors are locked and the hazard light flashes once.





• Press the “OPEN” button on the keyless transmitter momentarily once and check that all doors are unlocked, the hazard light flashes twice and the interior light illuminates.
• Close all doors and rear gate, press the “LOCK” button of the keyless transmitter. Press the “OPEN” button of the keyless transmitter and wait for 30 seconds. Check that all doors and the rear gate are automatically locked again.

23.SEAT

1) Check the seat surfaces for stains or dirt.
2) Check that each seat provides full functionality in sliding and reclining. Check all available functions of the rear seat such as a trunk-through center arm rest.

24.SEAT BELT

Pull out the seat belt and then release it. Check that the belt webbing retracts smoothly.

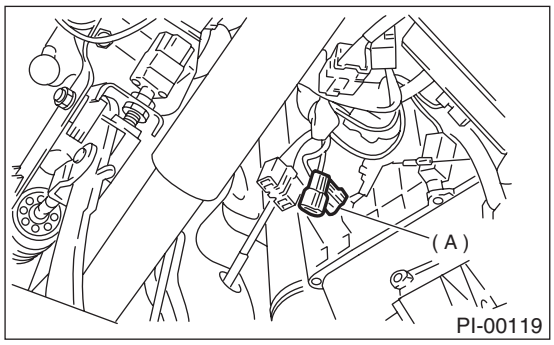
25.WHEEL ALIGNMENT

Check the wheel alignments. <Ref. to FS-7, Wheel Alignment.> and <Ref. to RS-9, Wheel Alignment.>

26.TEST MODE CONNECTOR

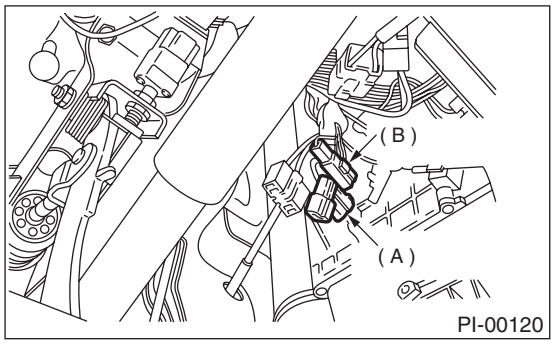
Turn the ignition switch to ON and check that the malfunction indicator light starts blinking. If the light blinks, return the ignition key to LOCK and disconnect the test mode connector. Then, turn the ignition key to ON again. If the malfunction indicator light blinks at that time in spite of the disconnected test mode connector, carry out an engine diagnosis.

- With OBD MODEL



(A) Test mode connector (Green)

- Without OBD MODEL



(A) Read memory connector (Black)
(B) Test mode connector (Green)

27.IMMOBILIZER SYSTEM

1) Check that the engine starts with all keys that are equipped on vehicle.
2) 60 seconds after turning the ignition switch from ON to ACC or OFF, or immediately after removing the key, check that the immobilizer indicator light blinking.

NOTE:
If malfunctions occur, refer to “IMMOBILIZER (DIAGNOSIS)”.

28.STARTING CONDITION

Start the engine and check that the engine starts smoothly. If any battery voltage problems are found, recharge or replace the battery. If any abnormal noises are observed, immediately stop the engine and check and repair the necessary components.

29.EXHAUST SYSTEM

Listen to the exhaust noise to see if no abnormal noises are observed. Check the exhaust leaks.

30.INDICATOR LIGHT

Check that all the indicator lights are off.

31.CLOCK

Check the clock for normal operations and enough accuracy.

32.AUDIO

Check if the radio for functions fully, speaker emitts sound normally and noise level is normal. Also check the CD, cassette player operations.

33.FRONT ACCESSORY POWER SUPPLY SOCKET

Check the front accessory power supply socket operations.

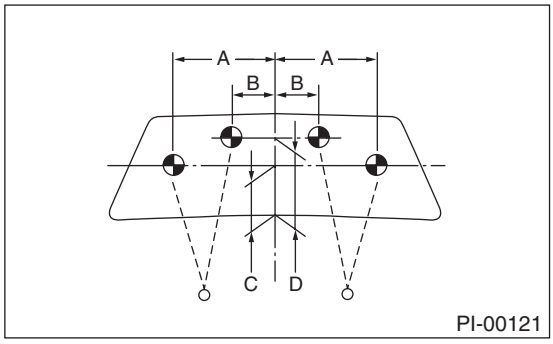
34.LIGHTING SYSTEM

- Check the headlight operations.
- Check the stop light operations.
- Check the other lights for normal operations.

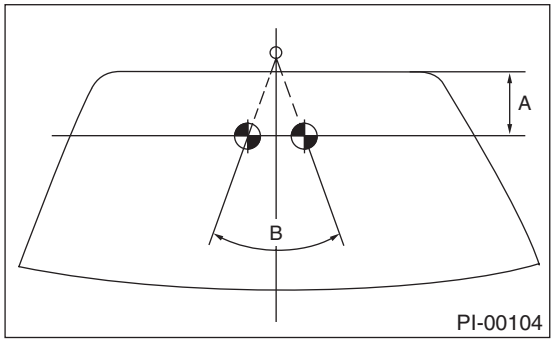
35.WINDOW WASHER

Check that the window washer system injects washer fluid to the specified area of windshield shown in the figure.

Front injection position:
A: 350 mm (13.78 in)
B: 162 mm (6.38 in)
C: 300 mm (11.81 in)
D: 500 mm (19.69 in)



Rear injection position:
A: 39 mm (1.54 in)
B: 72°



36.WIPER

Check the front and rear wipers for normal operations.

37.POWER WINDOW OPERATION CHECK

Manipulate the power window switches one by one to check that each of the power windows goes up and down with no abnormal noises.

38.SUNROOF

Check that the sunroof operates normally.

39.OUTER MIRROR

Check that the outer mirror operates normally.

40.BRAKE TEST

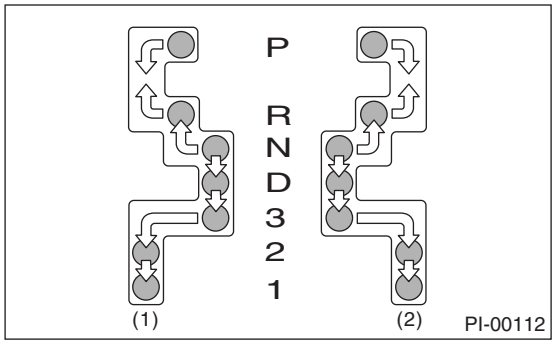
Check the foot brake for normal operations.

41.PARKING BRAKE

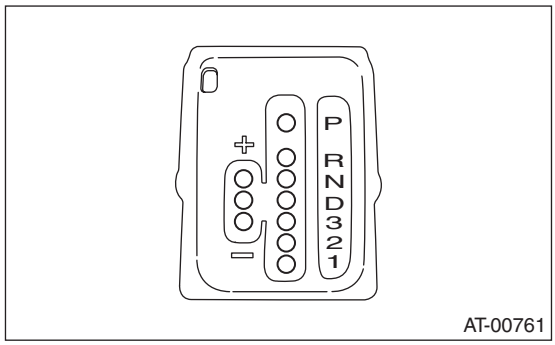
Check the parking brake for normal operations. When applying the parking brake with force of 196 N (20 kgf, 44 lbf), check that the lever stroke of parking brake lever is 7 to 8 notches.

42.AT SHIFT CONTROL

Set the AT select lever to each gear position and check the shifting while driving the vehicle.



(1) RHD model
(2) LHD model



Selector Position	Gear Position			
	1st	2nd	3rd	4th
D	Yes	Yes	Yes	Yes
3	Yes	Yes	Yes	—
2	Yes	Yes	—	—
1	Yes	—	—	—
Sports shift	Yes	Yes	Yes	Yes

43.HEATER & VENTILATION

Operate the heater and ventilation system to check for normal outlet selection, air inlet selection, airflow and heating capacity.

44.AIR CONDITIONER

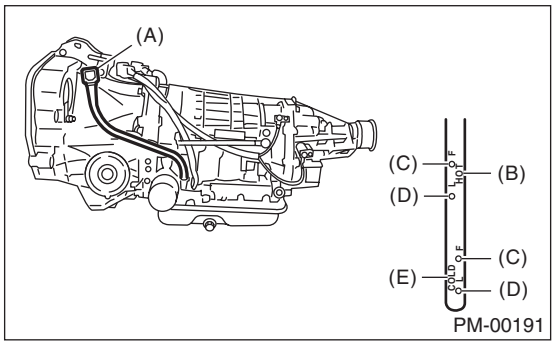
Operate the air conditioner. Check that the A/C compressor operates normally and enough cooling is provided.

45.CRUISE CONTROL

Operate the cruise control system. Check that the system is activated and deactivated correctly.

46.ATF LEVEL

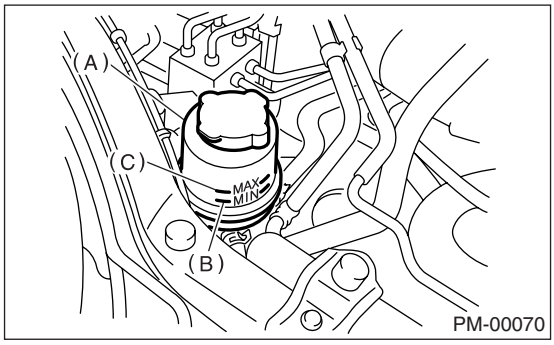
Check that the ATF level is normal when the engine at idle. If insufficient, check that no leaks are found. Then add the necessary amount of the specified ATF.



(A) Level gauge
(B) ATF level range when “HOT” [70 — 80°C (158 — 176°F)]
(C) Upper level
(D) Lower level
(E) ATF level range when “COLD” [20 — 30°C (68 — 86°F)]

47.POWER STEERING FLUID LEVEL

Check that the power steering fluid level is normal. If insufficient, check that no leaks are found. Then add the necessary amount of the specified power steering fluid.



(A) Reservoir tank
(B) MIN level
(C) MAX level

48.FLUID LEAK CHECK

Check the entire areas of the vehicle for any trace of coolant/oil/fluid leaks.

49.WATER LEAK TEST

Spray the vehicle with water and check that no water enters the passenger compartment.

- Before performing the water leakage test, remove anything that may obstruct the operation or which must be kept dry.
- Close all windows completely, and then close all doors tightly. Close the hood and trunk lid before starting the test.
- Connect a hose to a tap, and spray water on the vehicle. The rate of water discharge must be approx. 20 — 25 ℓ (5.3 — 6.6 US gal, 4.4 — 5.5 Imp gal) per minute.

When spraying water on areas adjacent to the floor and wheel house, increase the pressure. When directing water on areas other than the floor portion and wheel house, decrease the pressure. But the force of water must be made strong occasionally by pressing the end of the hose.

NOTE:
Be sure to keep the hose at least 10 cm (3.9 in) from the vehicle.

Check the following areas:

- Front window and body framework mating portion
- Door mating portions
- Glass mating portions
- Rear quarter window mating portions
- Rear window and body framework mating portion
- Around roof drips

If any dampness in the compartment is discovered after the water has been applied, carefully check all areas that may have possibly contributed to the leak.

50.APPEARANCE CHECK 2

1) Check the paint after removing the paint protective coating and washing the vehicle.

NOTE:

- Use of steam eases peeling off the warp guard.
- When performing on the vehicles left for a long time, or during low temperature period, sprinkle some water heated to 50 — 60°C (122 — 140°F) over the vehicle to raise its surface temperature before peeling off the wrap guard.

Do not use the water heated to over 60°C (140°F).

- If the adhesive remains on the coated surface, rub the portion with a flannel rag, etc. soaked with a coat of coating wax or a solvent, such as oil benzene and IPA, and then wipe it off.
- Avoid adhesion of the solvent to resin or rubber components. Do not use coating wax or a solvent while the component surface temperature is high due to hot weather, etc.

• If the coated surface is swollen out due to seams or moisture, expose the vehicle to the sun light for a few hours. Otherwise, heat the portion with seams or moisture using a dryer, etc.
• Dispose of the peeled wrap guard as burnable industrial garbage.

2) Check the whole vehicle body for stains, flaking, damage caused by transportation, rust, dirt, cracks, or blistering.

NOTE:
• It is better to determine an inspection pattern in order to avoid missing an area, since the total inspection area is wide.
• It is desirable not to make corrections to the body paint unless absolutely needed. However, if any corrections are required to remove scratches or rust, the area to be corrected must be limited as much as possible. Re-painting and spray painting must be avoided whenever possible.

3) Carefully check each window glass for scratches. Slight damage may be removed by polishing with cerium oxide. (Half-fill a cup with cerium oxide, and add warm water to it. Then agitate the content until it turn to wax. Apply this wax to a soft cloth, and polish the glass.)
4) Check each portion of the vehicle body and underside components for the formation of rust. If rust is discovered, remove it with #80 — #180 emery paper, and treat the surface with rust preventive. After this treatment is completed, flush the portion thoroughly, and prepare the surface for repair painting.
5) Check each portion of the body and all of the chrome parts for deformation or distortion. Also check each lamp lens for cracks.
6) Peel the protective tape, vinyl wrapping and identification seal attached to the following places.
• Seat
• Door trim
• Floor carpet
• Side sill
• Back of rear view mirror

PERIODIC MAINTENANCE SERVICES

PM

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1. General Description

A: GENERAL DESCRIPTION

Be sure to perform periodic maintenance in order to maintain vehicle performance and find problems before they become serious.

2. Schedule

A: MAINTENANCE SCHEDULE

1. FOR EUROPE AREA

For periodic maintenance of less than 120,000 km (75,000 miles) or 96 months, carry out inspection by referring to the following table. For a maintenance period gone beyond these tables, apply them repeatedly as a set of 120,000 km (75,000 miles) or 96 months.

			MAINTENANCE INTERVAL [Number of months or km (miles), whichever occurs first]										
	Month				12	24	36	48	60	72	84	96	Remarks
	× 1,000 km		1.6	5	15	30	45	60	75	90	105	120	
	× 1,000 miles		1	3	9	19	28	38	47	56	66	75	
1	Engine oil				R	R	R	R	R	R	R	R	
2	Engine oil filter				R	R	R	R	R	R	R	R	
3	Spark plugs	For Turbo									R		
		Others				R		R		R		R	
4	V-belt(s)				I	I	I	I	I	I	I	I	
5	Timing belt										R		
6	Fuel line					I		I		I		I	
7	Fuel filter						R			R			
8	Air cleaner element				I	R	I	R	I	R	I	R	Note (1)
9	Cooling system					I		I		I		I	
10	Engine coolant					R		R		R		R	
11	Clutch system					I		I		I		I	Adjust the clutch pedal free play every 1,600 km (1,000 miles)
12	Hill-holder system					I		I		I		I	
13	Transmission oil					I		R		I		R	
14	ATF					I		R		I		R	Note (2)
15	Front & rear differential oil					I		R		I		R	
16	Brake line					I		I		I		I	
17	Brake fluid					R		R		R		R	
18	Disk brake pads & discs				I	I	I	I	I	I	I	I	
19	Brake linings & drums					I		I		I		I	
20	Parking brake					I		I		I		I	
21	Suspension					I		I		I		I	
22	Wheel bearing											(I)	
23	Axle boot & joint				I	I	I	I	I	I	I	I	
24	Steering system					I		I		I		I	
25	Clutch cable										R		

Symbols used:
R: Replace
I: Inspection
(I): Recommended service for safe vehicle operation.

NOTE:
(1) When the vehicle is used in extremely dusty conditions, the air cleaner element should be replaced more often.
(2) ATF filter is a maintenance free part. ATF filter needs replacement, when it is physically damaged or ATF leaked.

2. EXCEPT EUROPE AREA

For periodic maintenance of less than 50,000 km (30,000 miles) or 48 months, carry out inspections by referring to the following tables. For a maintenance period gone beyond these tables, apply them repeatedly as a set of 50,000 km (30,000 miles) or 48 months.

		MAINTENANCE INTERVAL [Number of months or km (miles), whichever occurs first]					
	Months		12	24	36	48	Remarks
	× 1,000 km	5	12.5	25	37.5	50	
	× 1,000 miles	3	7.5	15	22.5	30	
1	Engine oil		R	R	R	R	
2	Engine oil filter		R	R	R	R	

For periodic maintenance of less than 100,000 km (60,000 miles) or 48 months, carry out inspections by referring to the following tables. For a maintenance period gone beyond these tables, apply them repeatedly as a set of 100,000 km (60,000 miles) or 48 months.

			MAINTENANCE INTERVAL [Number of months or km (miles), whichever occurs first]					
	Months			12	24	36	48	Remarks
	× 1,000 km		1.6	25	50	75	100	
	× 1,000 miles		1	15	30	45	60	
3	Spark plugs	For Turbo					R	
		Others		R	R	R	R	
4	V-belt(s)			I	I	I	I	
5	Timing belt						R	
6	Fuel line				I		I	
7	Fuel filter				R		R	
8	Air cleaner element			I	R	I	R	Note (1)
9	Cooling system				I		I	
10	Engine coolant				R		R	
11	Idle mixture		I	I	I	I	I	For models without catalyst converter
12	Clutch system			I	I	I	I	Adjust the clutch pedal free play every 1,600 km (1,000 miles)
13	Hill-holder system			I	I	I	I	
14	Transmission oil				R		R	
15	ATF				R		R	Note (2)
16	Front & rear differential oil				R		R	
17	Brake line				I		I	
18	Brake fluid				R		R	
19	Disc brake pads & discs			I	I	I	I	
20	Brake linings and drums				I		I	
21	Parking brake			I	I	I	I	
22	Suspension			I	I	I	I	
23	Wheel bearing						(I)	
24	Axle boots & joints			I	I	I	I	
25	Steering system (Power steering)			I	I	I	I	
26	Clutch cable						R	

Symbols used:
R: Replace
I: Inspection
(I): Recommended service for safe vehicle operation.

NOTE:
(1) When the vehicle is used in extremely dusty conditions, the air cleaner element should be replaced more often.
(2) ATF filter is a maintenance free part. ATF filter needs replacement, when it is physically damaged or ATF leaked.

B: PERIODIC REPLACEMENT PARTS

1. EUROPE AREA

Item	Every	Repeat short distance drive	Repeat rough/muddy road drive	Extremely cold weather area	Salt or other corrosive used or coastal area	High humidity or mountain area	Repeat towing trailer
Engine oil		Replace more frequently		Replace more frequently			Replace more frequently
Engine oil filter		Replace more frequently		Replace more frequently			Replace more frequently
Fuel line	12 months				I		
	15,000 km						
	9,000 miles						
Transmission oil							Replace more frequently
ATF							Replace more frequently
Front & rear differential oil							Replace more frequently
Brake line	12 months				I		
	15,000 km						
	9,000 miles						
Brake fluid	12 months					R	
	15,000 km						
	9,000 miles						
Brake pads	12 months	I	I		I		I
	15,000 km						
	9,000 miles						
Brake linings and drums	12 months	I	I		I		I
	15,000 km						
	9,000 miles						
Parking brake	12 months	I	I		I		I
	15,000 km						
	9,000 miles						
Suspension	12 months		I	I	I		
	15,000 km						
	9,000 miles						
Axle boots & joints	12 months	I	I		I		I
	15,000 km						
	9,000 miles						
Steering system (Power steering)	12 months		I	I	I		
	15,000 km						
	9,000 miles						

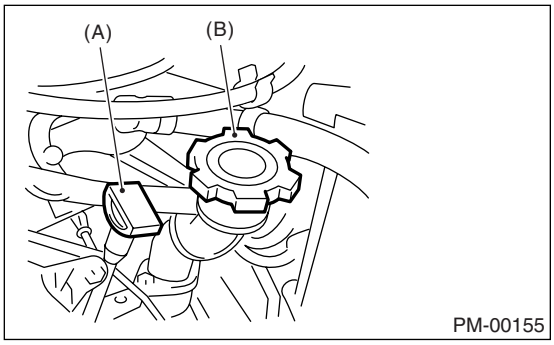
2. EXCEPT EUROPE AREA

Item	Every	Repeat short distance drive	Repeat rough/muddy road drive	Extremely cold weather area	Salt or other corrosive used or coastal area	High humidity or mountain area	Repeat towing trailer
Engine oil		Replace more frequently		Replace more frequently			Replace more frequently
Engine oil filter		Replace more frequently		Replace more frequently			Replace more frequently
Fuel line	6 months				I		
	12,500 km						
	7,500 miles						
Transmission oil							Replace more frequently
ATF							Replace more frequently
Front & rear differential oil							Replace more frequently
Brake line	6 months				I		
	12,500 km						
	7,500 miles						
Brake fluid	12 months					R	
	25,000 km						
	15,000 miles						
Brake pads	6 months	I	I		I		I
	12,500 km						
	7,500 miles						
Brake linings and drums	6 months	I	I		I		I
	12,500 km						
	7,500 miles						
Parking brake	6 months	I	I		I		I
	12,500 km						
	7,500 miles						
Suspension	6 months		I	I	I		
	12,500 km						
	7,500 miles						
Axle boots & joints	6 months	I	I		I		I
	12,500 km						
	7,500 miles						
Steering system (Power steering)	6 months		I	I	I		
	12,500 km						
	7,500 miles						

3. Engine Oil

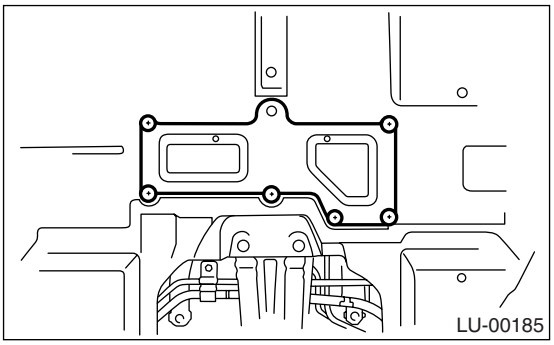
A: REPLACEMENT

1) Open the engine oil filler cap for quick draining of the engine oil.



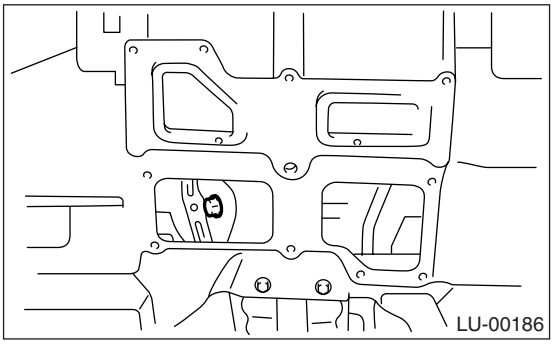
(A) Oil level gauge
(B) Oil filler cap

2) Remove the dip of service hole cover. (Turbo model)

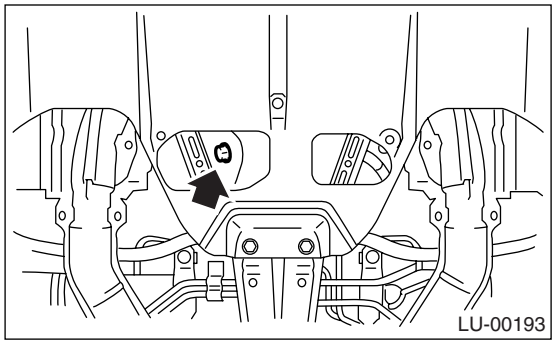


3) Drain the engine oil by loosening engine oil drain plug.

- TURBO MODEL



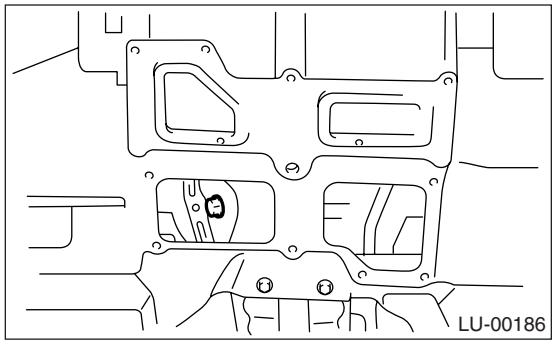
- NON-TURBO MODEL



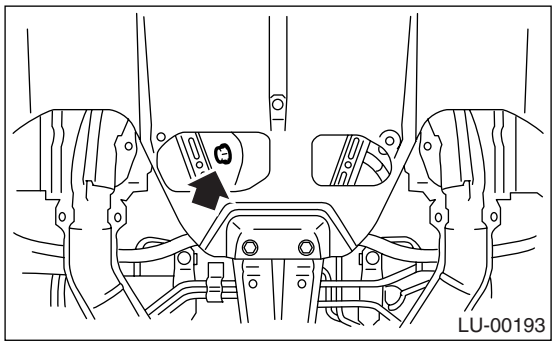
4) Replace the drain plug gasket.
5) Tighten the engine oil drain plug after draining engine oil.

Tightening torque:
44 N·m (4.5 kgf-m, 33 ft-lb)

- TURBO MODEL



- NON-TURBO MODEL



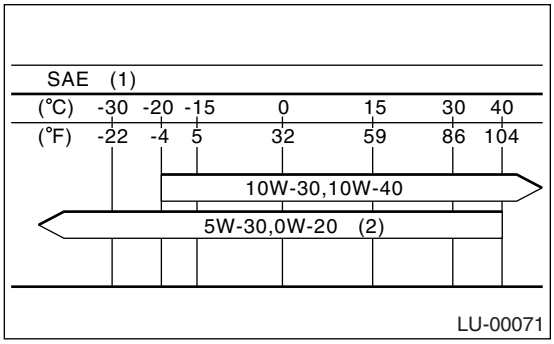
CAUTION:
If engine oil adheres to the exhaust pipe and under cover, wipe it off completely.

6) Fill engine oil through the filler pipe up to center between upper level and lower level. Make sure that the vehicle is placed level when checking oil level. Use engine oil of proper quality and viscosity, selected in accordance with the table in figure.

Recommended oil:
API standard: SL, SJ
"Energy Conserving" logo is printed. (If you cannot obtain the oil with SL, SJ grade, you may use SH grade oil) <Ref. to RM-2, Recommended Materials.>
ACEA standard: A3, A2 or A1
ILSAC standard: GF-3
Star burst mark label is on the container. <Ref. to RM-2, Recommended Materials.>

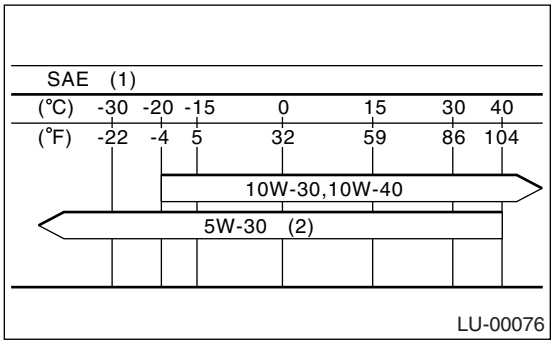
Engine oil capacity:
Upper level:
Approx. 4.0 ℓ (4.2 US qt, 3.5 Imp qt)
Lower level:
Approx. 3.0 ℓ (3.2 US qt, 2.6 Imp qt)

- NON-TURBO MODEL



(1) Viscosity No. and applicable temperature
(2) Preferred

- TURBO MODEL



(1) Viscosity No. and applicable temperature
(2) Preferred

The proper viscosity helps vehicle get good cold and hot starting by reducing viscous friction and thus increasing cranking speed.

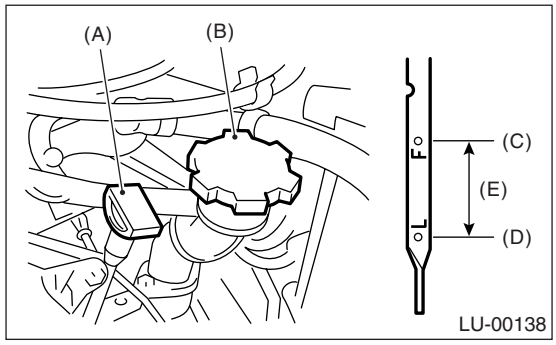
NOTE:
- When replenishing oil, it does not matter if the oil to be added is a different brand from that in the engine; however, use oil having the API classification and SAE viscosity No. designated by SUBARU.
- If vehicle is used in desert areas with very high temperatures or for other heavy duty applications, the following viscosity oils may be used:

API classification: SL or SJ.
SAE Viscosity No.: 30, 40, 10W-50, 20W-40, 20W-50

7) Close the engine oil filler cap.
8) Start the engine and warm it up for a time.
9) After the engine stops, recheck the oil level. <Ref. to PM-8, INSPECTION, Engine Oil.>

B: INSPECTION

1) Park the vehicle on a level surface.
2) Remove the oil level gauge and wipe it clean.
3) Reinsert the level gauge all the way. Be sure that the level gauge is correctly inserted and in the proper orientation.
4) Remove it again and note the reading. If the engine oil level is below the "L" line, add oil to bring the level up to the "F" line.



(A) Oil level gauge
(B) Oil filler cap
(C) Upper level
(D) Lower level
(E) Approx. 1 ℓ (1.1 Us qt, 0.9 Imp qt)

5) After turning off the engine, wait a few minutes for the oil to drain back into oil pan be fore checking the level.
6) Just after driving or while the engine is warm, engine oil level may show in the range between the "F" line and the notch mark. This is caused by thermal expansion of the engine oil.
7) To prevent overfilling the engine oil, do not add oil above the "F" line when the engine is cold.

4. Engine Oil Filter

A: REPLACEMENT

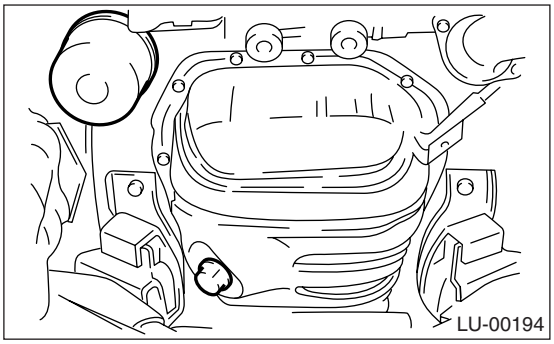
1) Remove the under cover.
2) Remove the oil filter with ST.

ST	498547000	OIL FILTER WRENCH (Outer diameter 80 mm (3.15 in))
ST	18332AA000	OIL FILTER WRENCH (Outer diameter 68 mm (2.68 in))
ST	18332AA010	OIL FILTER WRENCH (Outer diameter 65 mm (2.56 in))

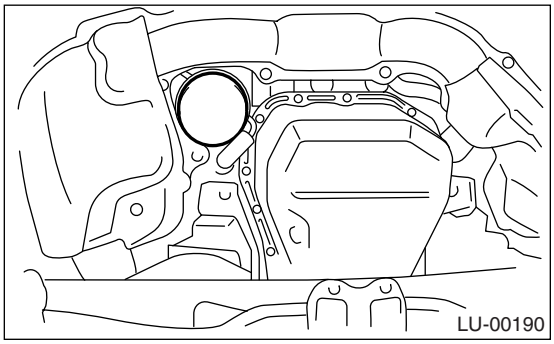
CAUTION:
If engine oil adheres to the exhaust pipe, wipe it off completely.

NOTE:
Standard oil filter is outer diameter of 68 mm (2.68 in). However, SUBARU genuine oil filter having outer diameter of 65 mm (2.56 in) or 80 mm (3.15 in) can also be used.

- NON-TURBO MODEL



- TURBO MODEL



3) Wipe clean the oil filter matching surface on cylinder block or oil cooler.
4) Get a new engine oil filter and apply a thin coat of engine oil to the seal rubber.
5) Install the oil filter by turning it by hand, being careful not to damage the seal rubber.
- Tighten the oil filter 68 mm (2.68 in) in diameter by approx. 1 rotation more after the seal rubber of oil filter comes in contact with cylinder block or oil cooler.
- Tighten the oil filter 80 mm (3.15 in) or 65 mm (2.56 in) in diameter by approx. 2/3 — 3/4 rotation more after the seal rubber of oil filter comes in contact with cylinder block or oil cooler.

CAUTION:
- **Do not tighten excessively, or oil may leak.**
- **If engine oil adheres to the exhaust pipe, wipe it off completely.**

6) After installing the oil filter, run the engine and make sure that no oil is leaking around seal rubber.

NOTE:
The filter element and filter case are permanently joined; therefore, interior cleaning is not necessary.

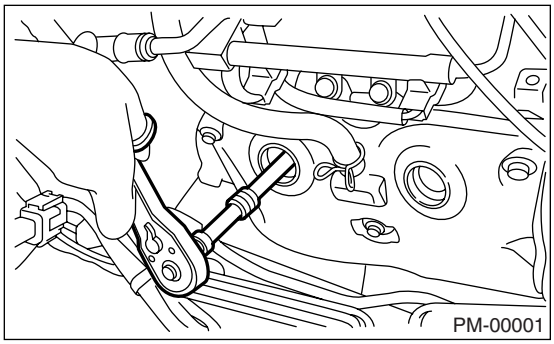
7) Check the engine oil level. <Ref. to PM-8, INSPECTION, Engine Oil.>

5. Spark Plug

A: REPLACEMENT

1. NON-TURBO MODEL

1) Remove the intake duct and intake chamber.
2) Remove the washer tank and put it aside.
3) Disconnect the spark plug cord.
4) Remove the spark plug with a plug-wrench.



5) Set the new spark plugs.

Recommended spark plug:

1.6 L model (with catalytic converter)
CHAMPION: RC8YC4
NGK: BKR6E-11 (Alternate)

1.6 L model (without catalytic converter)
NGK: BKR6E

2.0 and 2.5 L model (with catalytic converter)
CHAMPION: RC10YC4
NGK: BKR5E-11 (Alternate)

2.0 L model (without catalytic converter)
NGK: BKR6E

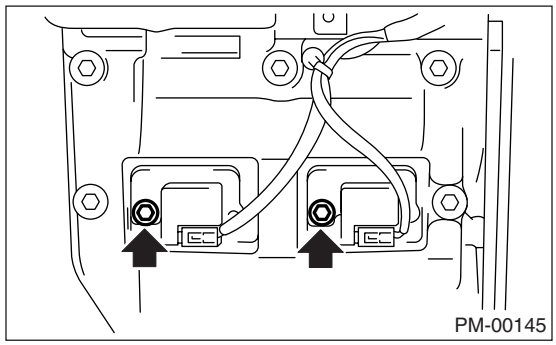
6) Tighten the spark plug lightly with hand, and then secure with a plug-wrench to the specified torque.

Tightening torque:
21 N·m (2.1 kgf-m, 15.2 ft-lb)

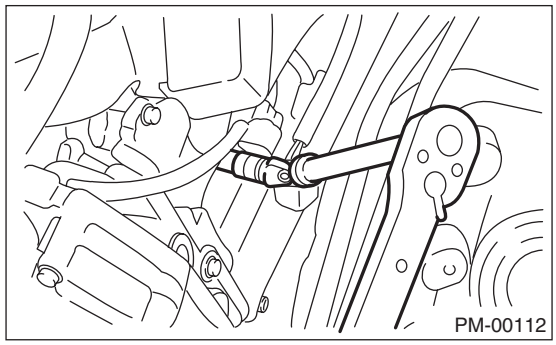
NOTE:
• Be sure to place the gasket between the cylinder head and spark plug.
• If a torque wrench is not available, tighten the spark plug until gasket contacts cylinder head; then tighten further 1/4 to 1/2 turns.

2. TURBO MODEL

1) Disconnect the battery cables, and then remove the battery and battery carrier.
2) Remove the washer tank and put it aside.
3) Remove the air cleaner lower case.
4) Disconnect the connector from ignition coil.
5) Remove the ignition coil.



6) Remove the spark plug with a spark plug-wrench.



7) Set the new spark plugs.

Recommended spark plug:
Turbo model
NGK: PFR6G

8) Tighten the spark plug lightly with hand, and then secure with a plug-wrench to the specified torque.

Tightening torque:
21 N·m (2.1 kgf-m, 15.2 ft-lb)

9) Tighten the ignition coil.

Tightening torque:
16 N·m (1.6 kgf-m, 11.7 ft-lb)

NOTE:
• Be sure to place the gasket between the cylinder head and spark plug.
• If a torque wrench is not available, tighten the spark plug until gasket contacts cylinder head: then tighten further 1/4 to 1/2 turns.

6. V-belt

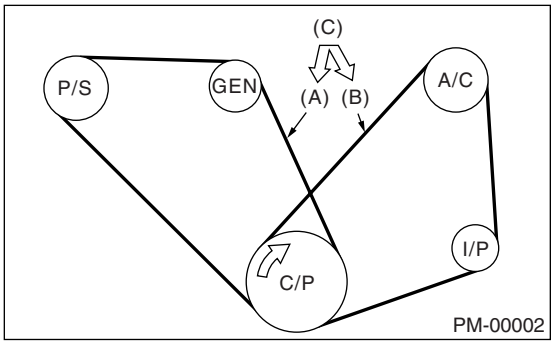
A: INSPECTION

1) Replace the belts, if cracks, fraying or wear is found.
2) Check the V-belt tension and adjust it if necessary by changing the generator installing position and/or idler pulley installing position. <Ref. to PM-11, REPLACEMENT, V-belt.>

Belt tension (without belt tension gauge)

(A)
When installing new one:
7 — 9 mm (0.276 — 0.354 in)
At inspection:
9 — 11 mm (0.354 — 0.433 in)

(B)
When installing new one:
7.5 — 8.5 mm (0.295 — 0.335 in)
At inspection:
9.0 — 10.0 mm (0.354 — 0.394 in)

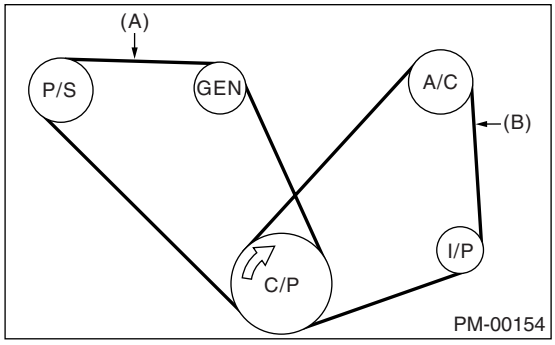


(A) Front side belt
(B) Rear side belt
(C) 98 N (10 kgf, 22 lbf)
C/P Crank pulley
GEN Generator
P/S Power steering oil pump pulley
A/C Air conditioning compressor pulley
I/P Idler pulley

Belt tension (with belt tension gauge)

(A)
When installing new one:
640 — 785 N (65.3 — 80.0 kgf, 144 — 176 lbf)
At inspection:
490 — 640 N (50 — 65 kgf, 110 — 144 lbf)

(B)
When installing new one:
620 — 760 N (63 — 77 kgf, 140 — 170 lbf)
At inspection:
350 — 450 N (36 — 46 kgf, 79 — 101 lbf)

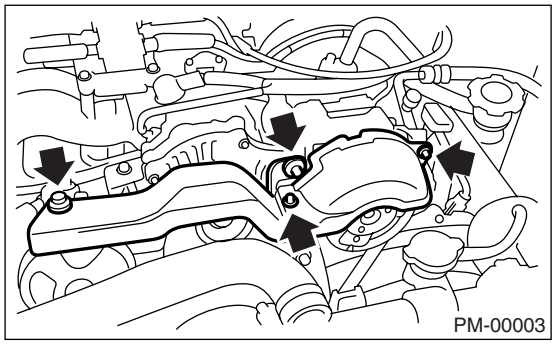


(A) Front side belt
(B) Rear side belt
C/P Crank pulley
GEN Generator
P/S Power steering oil pump pulley
A/C A/C compressor pulley
I/P Idler pulley

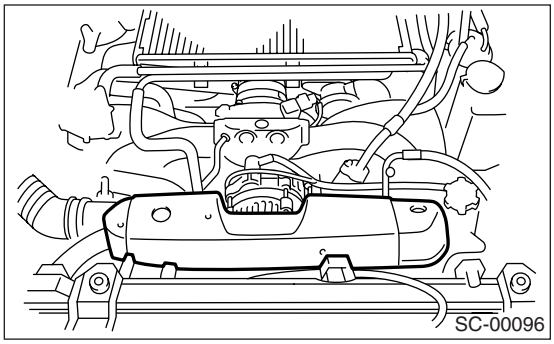
B: REPLACEMENT

1. FRONT SIDE BELT (DRIVING POWER STEERING OIL PUMP AND GENERATOR)

NOTE:
Wipe off any oil or water on the belt and pulley.
1) Remove the V-belt cover.
• NON-TURBO MODEL

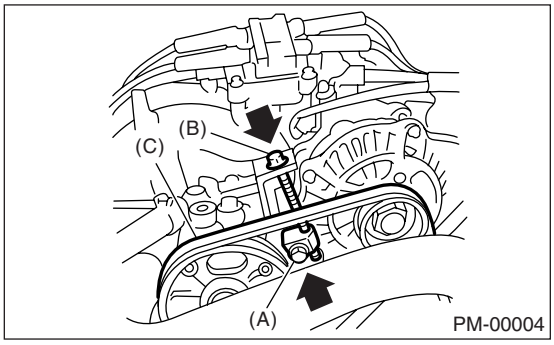


• TURBO MODEL



2) Loosen the lock bolt (A).
3) Loosen the slider bolt (B).
4) Remove the front side belt (C).
5) Install a new belt, and tighten the slider bolt so as to obtain the specified belt tension.
6) Tighten the lock bolt (A).
7) Tighten the slider bolt (B).

Tightening torque:
Lock bolt:
25 N·m (2.5 kgf-m, 18.1 ft-lb)
Slider bolt:
8 N·m (0.8 kgf-m, 5.8 ft-lb)

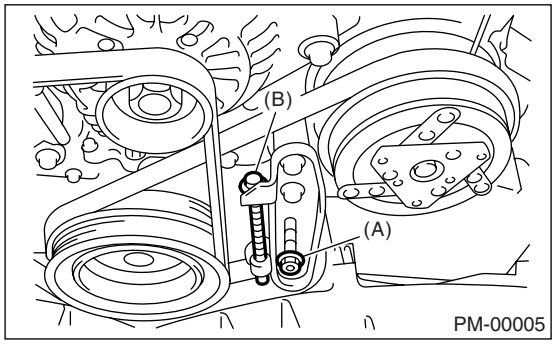


8) Idle the engine for approx. 5 min. to normalize the V-belt. (With using tension gauge)
9) Stop the engine, and then check the belt tension and adjust it. (With using tension gauge)
10) Idle the engine for approx. 1 min. to normalize the V-belt. (With using tension gauge)
11) Stop the engine, and then check the belt tension is within specified value. (With using tension gauge)
12) Adjust the belt tension until the value within specification. (With using tension gauge)

2. REAR SIDE BELT (DRIVING AIR CONDITIONER)

NOTE:
Wipe off any oil or water on the belt and pulley.
1) Remove the front side belt.
2) Loosen the lock nut (A).
3) Loosen the slider bolt (B).
4) Remove the rear side belt.
5) Install a new belt, and tighten the slider bolt so as to obtain the specified belt tension.
6) Tighten the lock nut (A).
7) Install the front side belt.
Non-turbo model
<Ref. to ME(H4SO)-41, FRONT SIDE BELT, INSTALLATION, V-belt.>
Turbo model
<Ref. to ME(H4DOTC)-53, FRONT SIDE BELT, INSTALLATION, V-belt.>

Tightening torque:
23 N·m (2.3 kgf-m, 17.0 ft-lb)



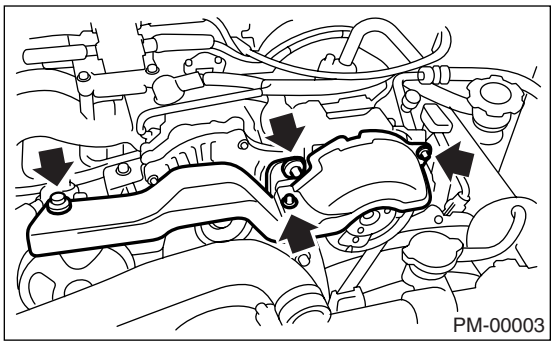
8) Idle the engine for approx. 5 min. to normalize the V-belt. (With using tension gauge)
9) Stop the engine, and then check the belt tension and adjust it. (With using tension gauge)
10) Idle the engine for approx. 1 min. to normalize the V-belt. (With using tension gauge)
11) Stop the engine, and then check the belt tension is within specified value. (With using tension gauge)
12) Adjust the belt tension until the value within specification. (With using tension gauge)

7. Timing Belt

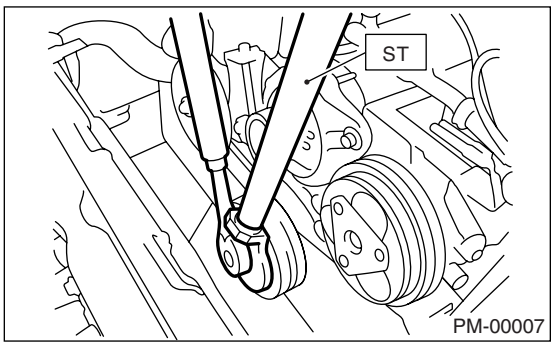
A: REPLACEMENT

1. NON-TURBO MODEL

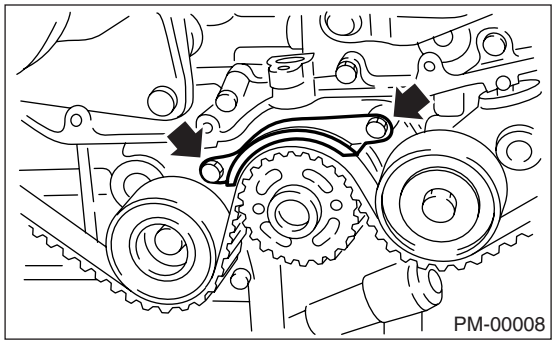
1) Remove the radiator fan and air conditioner fan. <Ref. to CO(H4SO)-26, Radiator Main Fan and Fan Motor.> , <Ref. to CO(H4SO)-28, Radiator Sub Fan and Fan Motor.>
2) Shield the radiator from any damage using cardboard and blanket.
3) Remove the V-belt cover.



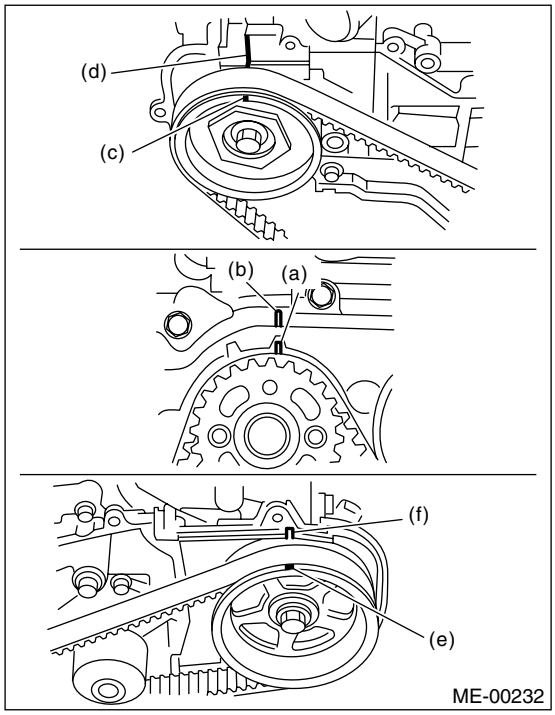
4) Remove the V-belts. <Ref. to ME(H4SO)-41, V-belt.>
5) Remove the air conditioning compressor drive belt tensioner.
6) To lock the crankshaft, use ST. Remove the pulley bolt.
2.5 L model:
ST 499977100 CRANK PULLEY WRENCH
Except 2.5 L model:
ST 499977400 CRANK PULLEY WRENCH



7) Remove the crank pulley.
8) Remove the left side belt cover.
9) Remove the front timing belt cover.
10) Remove the timing belt guide. (MT model)

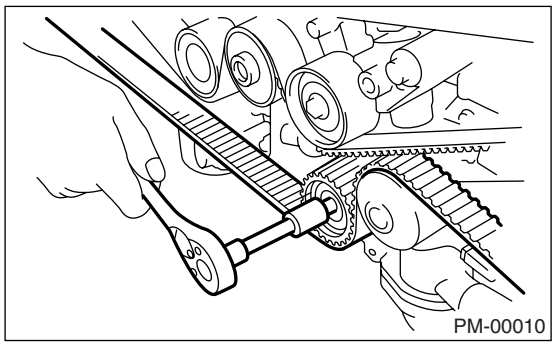


11) Turn the crankshaft and align alignment marks on crankshaft, and right and left cam sprockets with notches of belt cover and cylinder block.
ST 499987500 CRANKSHAFT SOCKET



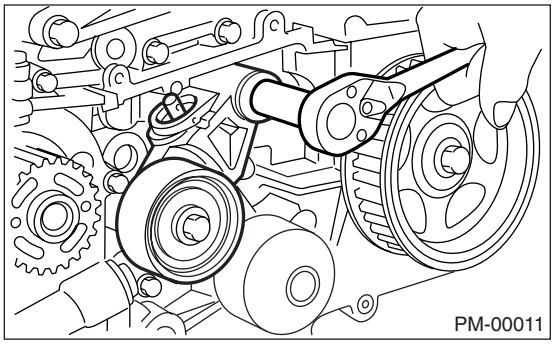
(a) (c) (e) Notch
(b) (d) (f) Alignment mark

12) Remove the belt idler.
13) Remove the belt idler (No. 2).



14) Remove the timing belt.

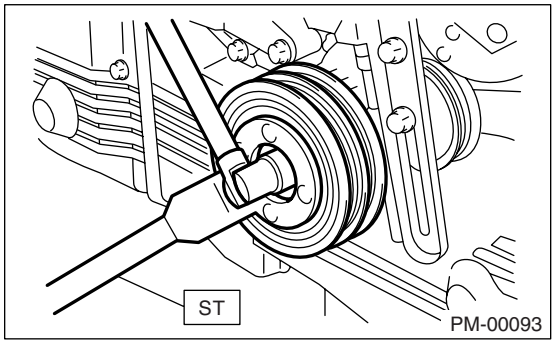
15) Remove the automatic belt tension adjuster assembly.



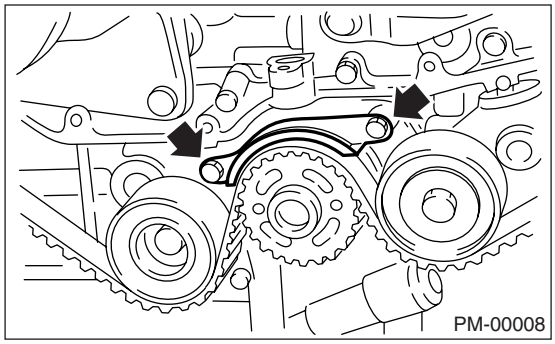
16) Install in the reverse order of removal. <Ref. to ME(H4SO)-47, INSTALLATION, Timing Belt.>

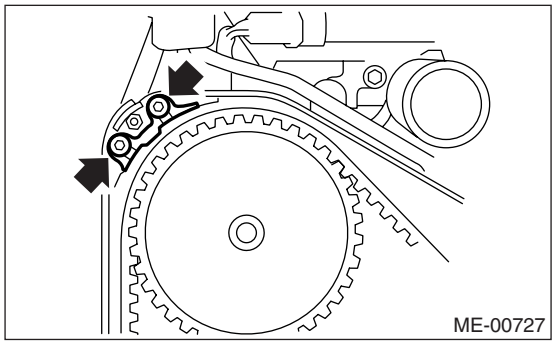
2. TURBO MODEL

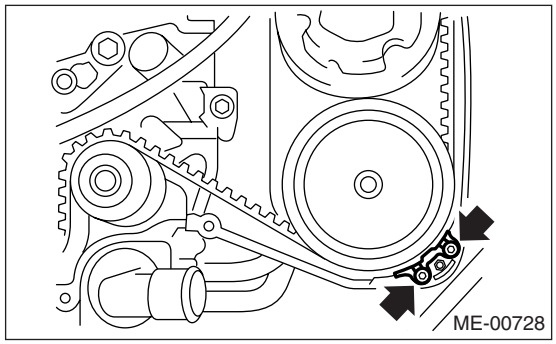
1) Remove the radiator fan and air conditioner fan. <Ref. to CO(H4DOTC)-28, Radiator Main Fan and Fan Motor.> , <Ref. to CO(H4DOTC)-30, Radiator Sub Fan and Fan Motor.>
2) Protect the radiator with cardboard and blanket.
3) Remove the V-belts. <Ref. to ME(H4DOTC)-53, V-belt.>
4) Remove the air conditioning compressor drive belt tensioner.
5) Remove the pulley bolt. To lock the crankshaft use ST.
Except STi model:
ST 499977300 CRANK PULLEY WRENCH
STi model:
ST 499977300 CRANK PULLEY WRENCH

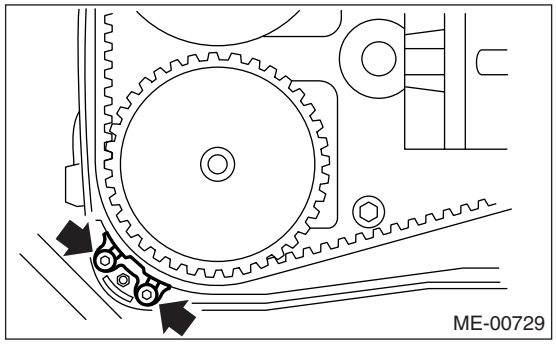


6) Remove the crank pulley.
7) Remove the air conditioning compressor drive belt tensioner.
8) Remove the belt cover (LH).
9) Remove the belt cover (RH).
10) Remove the front belt cover.
11) Remove the timing belt guide. (MT model)



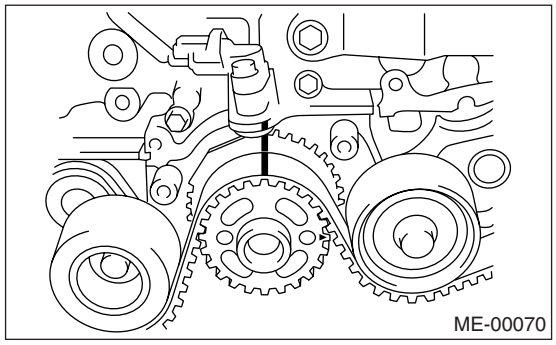


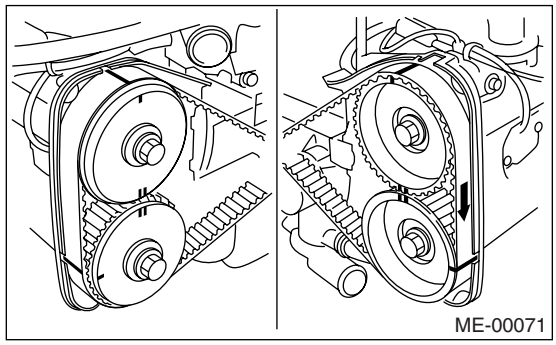




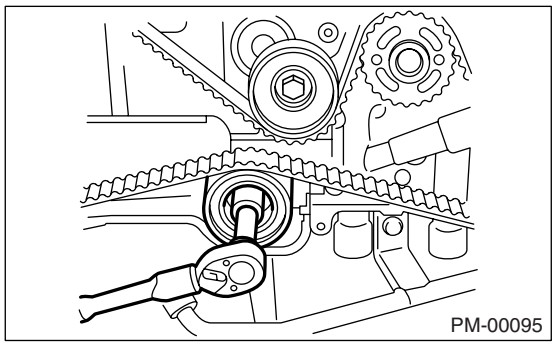
12) Turn the crankshaft and align alignment marks on crankshaft, and right and left cam sprockets with notches of belt cover and cylinder block. To turn the crankshaft, use ST.

ST 499987500 CRANKSHAFT SOCKET

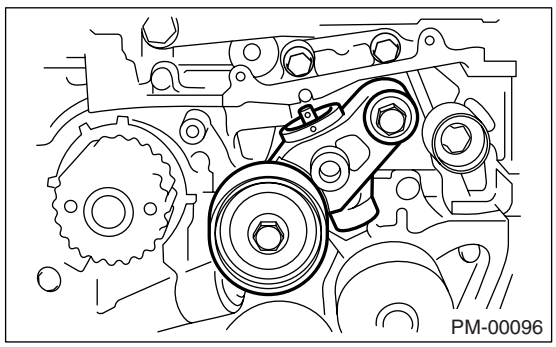




13) Remove the belt idler.



14) Remove the timing belt.
15) Remove the automatic belt tension adjuster assembly.



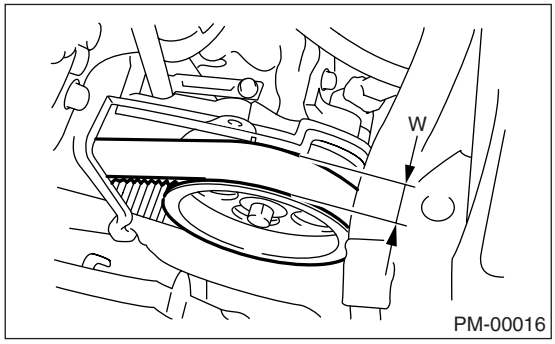
16) Install in the reverse order of removal. <Ref. to ME(H4DOTC)-58, Timing Belt.>

CAUTION:
When installing the timing belt, be sure to align all alignment marks on the belt with corresponding marks on the sprockets. If incorrectly installed, interference between pistons and valves may occur.

B: INSPECTION

1. NON-TURBO MODEL

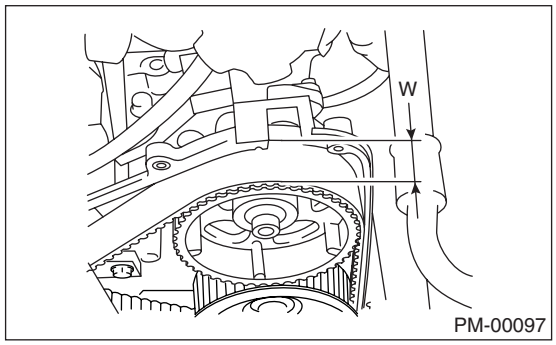
1) Remove the front timing belt cover and timing belt cover (LH).
2) While cranking the engine at least four rotations, check the timing belt back surface for cracks or damage. Replace the faulty timing belt as needed.
3) Measure the timing belt width W. If it is less than 27 mm (1.06 in), check idlers, tensioner, water pump pulley and cam sprocket to determine idler alignment (squareness). Replace the worn timing belt.



4) Install the front timing belt cover and timing belt cover (LH).

2. TURBO MODEL

1) Remove the timing belt cover (LH).
2) While cranking the engine at least four rotations, check the timing belt back surface for cracks or damage. Replace the faulty timing belt as needed.
3) Measure the timing belt width W. If it is less than 30 mm (1.18 in), check idlers, tensioner, water pump pulley and cam sprocket to determine idler alignment (squareness). Replace the worn timing belt.
4) Install the timing belt cover (LH).



8. Fuel Line

A: INSPECTION

The fuel line is located mostly internally, so check pipes, areas near pipes, and engine compartment piping for rust, hose damage, loose bands, etc. If faulty parts are found, repair or replace them.

- Non-turbo model

<Ref. to FU(H4SO)-63, Fuel Delivery, Return and Evaporation Lines.>

- Turbo model

<Ref. to FU(H4DOTC)-69, Fuel Delivery, Return and Evaporation Lines.>

9. Fuel Filter

A: REPLACEMENT

For fuel filter replacement procedures, refer to “FU” section.

- Non-turbo model

<Ref. to FU(H4SO)-60, Fuel Filter.>

- Turbo model

<Ref. to FU(H4DOTC)-66, Fuel Filter.>

B: INSPECTION

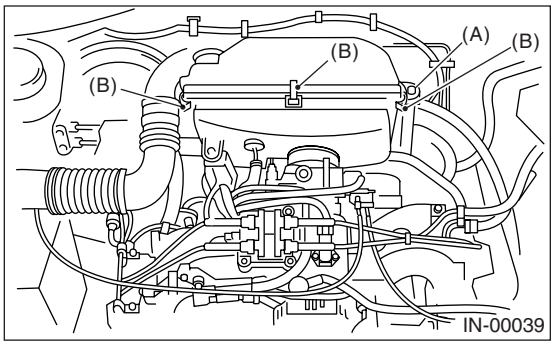
1) If it is clogged, or if replacement interval has been reached, replace it.
2) If water is found in it, shake and expel the water from inlet port.

10.Air Cleaner Element

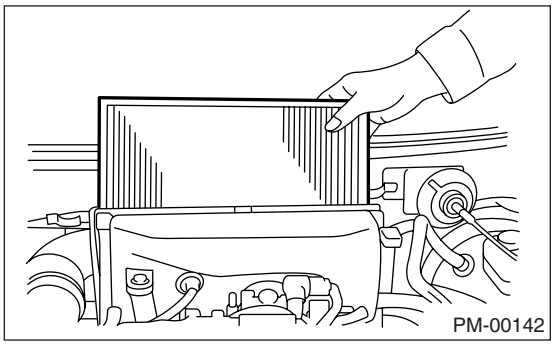
A: REPLACEMENT

1. NON-TURBO MODEL

1) Remove the air intake duct from air cleaner case.
2) Remove the bolt (A) which installs air cleaner case to stays.
3) Remove the clip (B) above the air cleaner case.



4) Remove the air cleaner element.

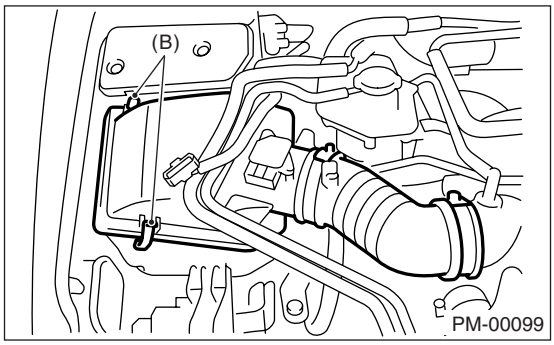


5) Install in the reverse order of removal.

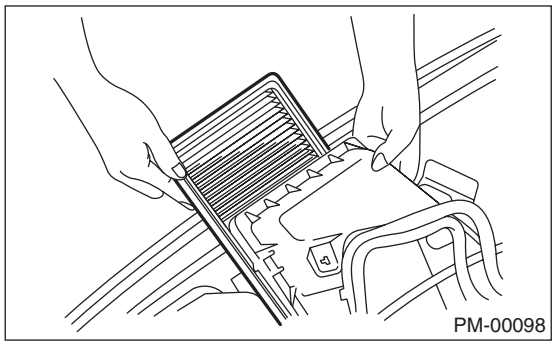
NOTE:
Fasten with a clip after inserting the lower tab of the case.

2. TURBO MODEL

1) Remove the clip (B) above the air cleaner case.

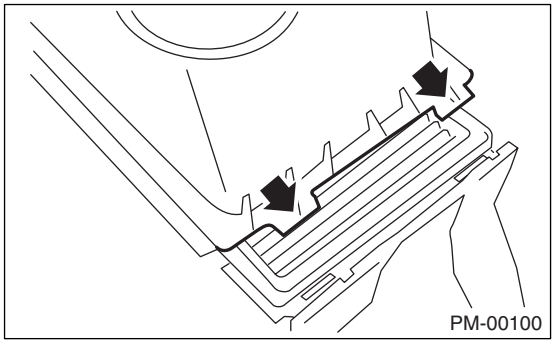


2) Remove the air cleaner element.



3) Install in the reverse order of removal.

NOTE:
Align the protruding portion of air cleaner upper cover with holes of air cleaner lower case, then secure upper cover to case.



11.Cooling System

A: INSPECTION

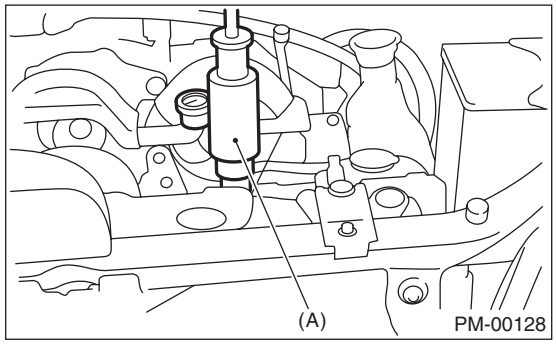
1) Check the radiator for leakage, filling it with coolant and attach the radiator cap tester (A) to filler neck. Then apply a pressure. Check the following points:

Non-turbo model
157 kPa (1.6 kgf/cm^2, 23 psi)

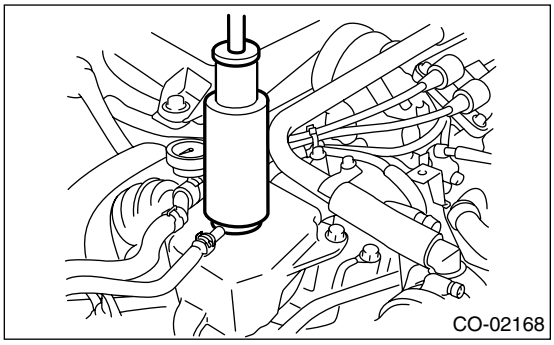
Turbo model
122 kPa (1.2 kgf/cm^2, 18 psi)

- Each portion of radiator for leakage
- Hose joints and other connections for leakage

NOTE:
- For turbo model, be sure to install the tester to filler tank side.
- When attaching or detaching tester and when operating tester, use special care not to deform radiator filler neck.
- NON-TURBO MODEL



- TURBO MODEL



- When performing this check, be sure to keep the engine stationary and fill the radiator with coolant.
- Wipe off check points before applying pressure.
- Use care not to spill coolant when detaching the tester from radiator.
- Do not remove the radiator side cap. (Turbo model)

2) Check the radiator cap valve open pressure using radiator cap tester.

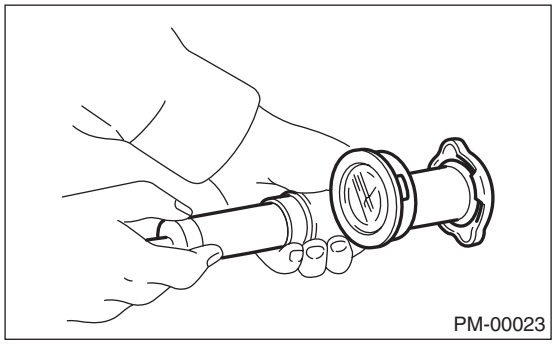
NOTE:
Rust or dirt on the cap may prevent the valve from functioning normally: be sure to clean the cap before testing.

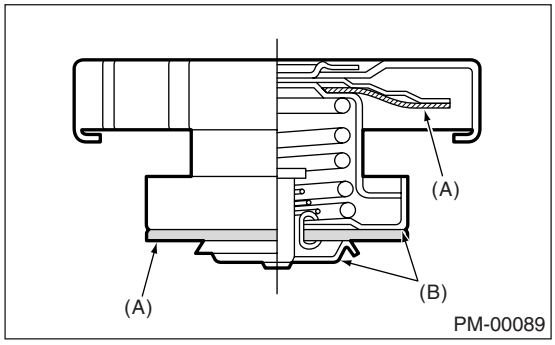
Raise the pressure until the needle of gauge stops and see if the pressure can be retained for 5 to 6 seconds. The radiator cap is normal if a pressure above the service limit value has been maintained for this period.

Radiator cap valve open pressure

Non-turbo model
Standard value:
93 — 123 kPa (0.95 — 1.25 kgf/cm^2, 14 — 18 psi)
Service limit:
83 kPa (0.85 kgf/cm^2, 12 psi)

Turbo model
Filler tank side:
Standard value:
93 — 123 kPa (0.95 — 1.25 kgf/cm^2, 14 — 18 psi)
Service limit:
83 kPa (0.85 kgf/cm^2, 12 psi)
Radiator side:
Standard value:
122 — 152 kPa (1.24 — 1.55 kgf/cm^2, 18 — 22 psi)
Service limit:
112 kPa (1.14 kgf/cm^2, 16 psi)





(A) Deformation
(B) Deformation, damage, rust

3) Start the engine, and then check it does not overheat or it is cooled excessively. If it overheats or it is cooled excessively, check the cooling system.
• Non-turbo model
<Ref. to CO(H4SO)-17, Water Pump.>
<Ref. to CO(H4SO)-20, Thermostat.>
<Ref. to CO(H4SO)-22, Radiator.>
<Ref. to CO(H4SO)-25, Radiator Cap.>
• Turbo model
<Ref. to CO(H4DOTC)-20, Water Pump.>
<Ref. to CO(H4DOTC)-22, Thermostat.>
<Ref. to CO(H4DOTC)-24, Radiator.>
<Ref. to CO(H4DOTC)-27, Radiator Cap.>
4) Check the electric fan operates using Subaru Select Monitor, when the coolant temperature exceeds 95°C (203°F). If not operate, check the electric fan system.
• Non-turbo model
<Ref. to CO(H4SO)-8, Radiator Main Fan System.>
<Ref. to CO(H4SO)-11, Radiator Sub Fan System.>
• Turbo model
<Ref. to CO(H4DOTC)-8, Radiator Main Fan System.>
<Ref. to CO(H4DOTC)-13, Radiator Sub Fan System.>

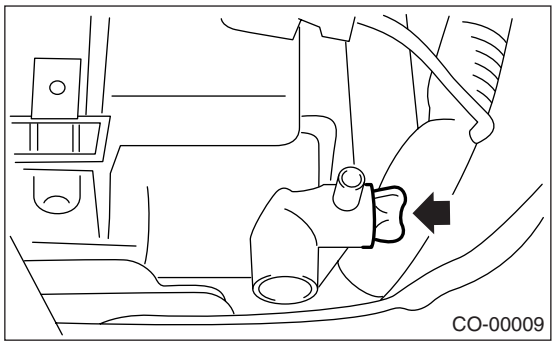
12.Engine Coolant

A: REPLACEMENT

1. REPLACEMENT OF COOLANT

WARNING:
The radiator is of the pressurized type. Do not attempt to open the radiator cap immediately after the engine has been stopped.

1) Lift-up the vehicle.
2) Remove the under cover.
3) Place a container under drain pipe.
4) Loosen and remove the drain cock to drain engine coolant into container.



5) For quick draining, open the radiator cap.

NOTE:
• In the case of turbo model, be sure to open the radiator cap of filler tank side.
• Be careful not to spill coolant on the floor.

6) Drain the coolant from reservoir tank.
7) Tighten the radiator drain cock securely after draining coolant.
8) Pour the engine coolant into the radiator (for turbo model, coolant filler tank) up to the filler neck position.
9) Fill engine coolant into the reservoir tank up to "FULL" level.

Coolant capacity (fill up to "FULL" level)
1.6 L AT model:
7.3 ℓ (7.7 US qt, 6.4 Imp qt)
1.6 L MT model:
7.4 ℓ (7.8 US qt, 6.5 Imp qt)
2.0 L Non-turbo AT model:
6.9 ℓ (7.3 US qt, 6.1 Imp qt)
2.0 L Non-turbo MT model:
7.0 ℓ (7.1 US qt, 6.2 Imp qt)
2.0 L Turbo AT model:
7.6 ℓ (8.0 US qt, 6.7 Imp qt)
2.0 L Turbo MT model:
7.7 ℓ (8.1 US qt, 6.8 Imp qt)
2.5 L AT model:
6.9 ℓ (7.3 US qt, 6.1 Imp qt)
2.5 L MT model:
7.0 ℓ (7.4 US qt, 6.2 Imp qt)

NOTE:
The SUBARU Genuine Coolant containing anti-freeze and anti-rust agents is especially made for SUBARU engine, which has an aluminum crankcase. Always use SUBARU Genuine Coolant, since other coolant may cause corrosion.

10) Close the radiator (for turbo model, coolant filler tank) cap to start the engine and race 5 to 6 times at less than 3,000 rpm, then stop the engine. (Complete this operation within 40 seconds.)
11) Wait for one minute after the engine stops, open the radiator (for turbo model, coolant filler tank) cap. If the engine coolant level drops, add engine coolant to the filler neck position of radiator (for turbo model, coolant filler tank).
12) Perform the procedures 10) and 11) again.
13) Attach the radiator (for turbo model, coolant filler tank) cap and reservoir tank cap properly.
14) Start the engine and operate the heater at maximum hot position and the blower speed setting to "LO".
15) Run the engine at 2,000 rpm or less until radiator fan starts and stops.

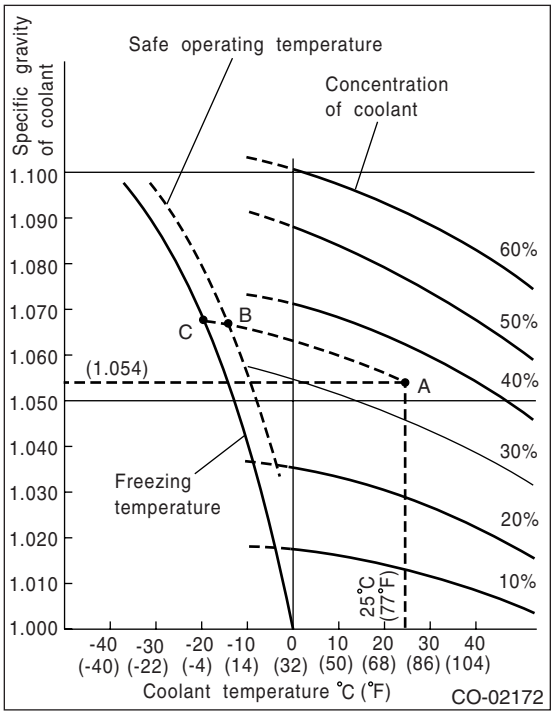
NOTE:
• Be careful with the engine coolant gauge to prevent overheating.
• If the radiator hose becomes to harden by the pressure of engine coolant, air bleeding operation seems to be almost completed.

16) Stop the engine and wait until engine coolant temperature lowers to 30°C (86°F) or less.
17) Open the radiator (for turbo model, coolant filler tank) cap. If the engine coolant level drops, add engine coolant to the filler neck position of radiator and the "FULL" level of reservoir tank.
18) Attach the radiator (for the turbo model, coolant filler tank) cap and reservoir tank cap properly.

19) Operate the heater at maximum hot position and the blower speed setting to “LO” and start the engine. Race at less than 3,000 rpm. If the flowing sound is heard, perform the procedures from 15) again.

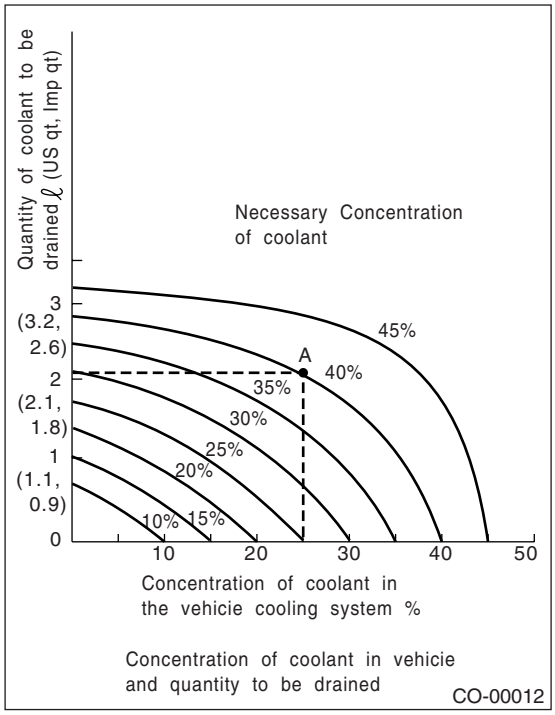
2. RELATIONSHIP OF SUBARU COOLANT CONCENTRATION AND FREEZING TEMPERATURE

The concentration and safe operating temperature of the SUBARU coolant is shown in the diagram. Measuring the temperature and specific gravity of the coolant will provide this information.
[Example]
If the coolant temperature is 25°C (77°F) and its specific gravity is 1.054 and the concentration is 35% (point A), the safe operating temperature is –14°C (7°F) (point B), and the freezing temperature is –20°C (–4°F) (point C).



3. PROCEDURE TO ADJUST THE CONCENTRATION OF THE COOLANT

To adjust the concentration of the coolant according to temperature, find the proper coolant concentration in the above diagram and replace the necessary amount of coolant with an undiluted solution of SUBARU genuine coolant (concentration 50%).
The amount of coolant that should be replaced can be determined using the diagram.
[Example]
Assume that the coolant concentration must be increased from 25% to 40%. Find point A, where the 25% line of coolant concentration intersects with the 40% curve of the necessary coolant concentration, and read the scale on the vertical axis of the graph at height A. The quantity of coolant to be drained is 2.1 ℓ (2.2 US qt, 1.8 Imp qt). Drain 2.1 ℓ (2.2 US qt, 1.8 Imp qt) of coolant from the cooling system and add 2.1 ℓ (2.2 US qt, 1.8 Imp qt) of the undiluted solution of SUBARU coolant.
If a coolant concentration of 50% is needed, drain all the coolant and refill with the undiluted solution only.



13.Idle Mixture

A: INSPECTION AND ADJUSTMENT

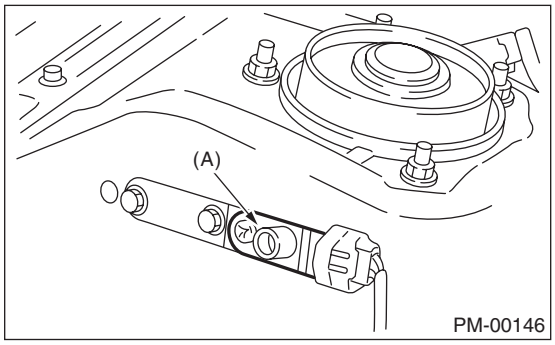
1. IDLE MIXTURE

Before measuring the idle mixture, make sure that the ignition timing and the engine idle speed are within specifications.
1) Set the gear position at “Neutral” for MT, or “N” or “P” for AT.
2) Warm up the engine sufficiently until cooling fan starts to operate.
3) Measure the idle mixture using CO meter.

Engine idle speed	CO
700±100 rpm	1.0±0.5%

4) If out of specification, adjust the idle mixture using CO adjusting screw of mass air flow sensor.
5) After adjusting the CO value, check and adjust the increment coefficient of CO resistor by using Select Monitor.
(1) Select “Current data display & Save” on the select monitor.
(2) If out of specified data, adjust the increment coefficient of CO resistor while rotating the CO adjusting screw (A).

Specified data:
0.28 — 4.22 V



NOTE:
If driving the vehicle on out of specified data, the “DTC 49” is indicated in many case.

14.Clutch System

A: INSPECTION AND ADJUSTMENT

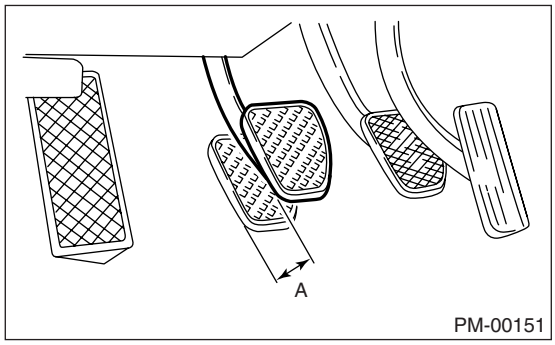
1. MECHANICAL CLUTCH TYPE

1) Inspect the free play of clutch pedal by operating pedal by hand.
If it is out of the specified value, adjust it by turning wing nut on engine side of clutch cable at release fork.

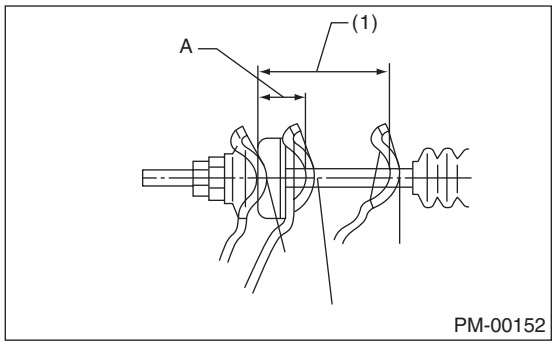
Tightening torque

(Adjusting nut on release fork):
4.4 — 7.4 N·m
(0.45 — 0.75 kgf-m, 3.3 — 5.4 ft-lb)

Standard free play A:
10 — 20 mm (0.39 — 0.79 in)



Fork lever free play allowance A:
2 — 4 mm (0.08 — 0.16 in)



(1) Full stroke: 25.5 mm (1 in)

2) Pedal-to-floor plate gap in disengaged position.
(1) With the engine idling, pull the parking brake lever completely.
(2) Slowly depress the clutch pedal while moving shift lever into reverse.
(3) Stop depressing the clutch pedal when gearshifting is complete. With the clutch pedal in this position, measure the distance between the upper side of pedal pad and the lower end of front panel (intersection of front panel with floor). Check that the measured value is within the specification.

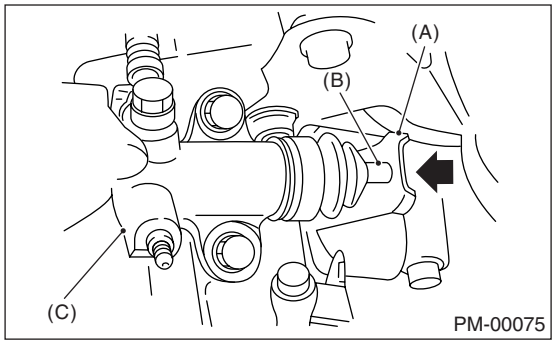
Standard:
80 mm (3.15 in) or more

3) Pedal height
Check that the clutch pedal pad surface is level with or higher than brake pedal pad surface.

2. HYDRAULIC CLUTCH TYPE

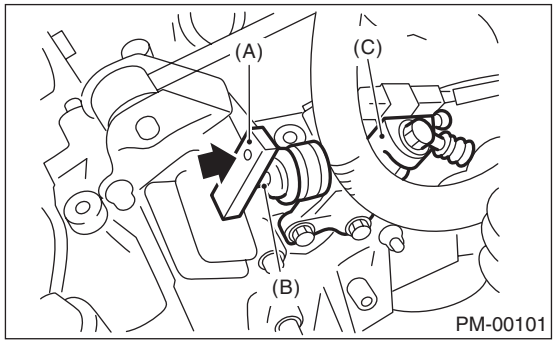
1) Push the release lever to retract the push rod of the operating cylinder and check if the fluid level in the clutch reservoir tank rises or not.

- NON-TURBO MODEL



(A) Release lever
(B) Push rod
(C) Operating cylinder

- TURBO MODEL



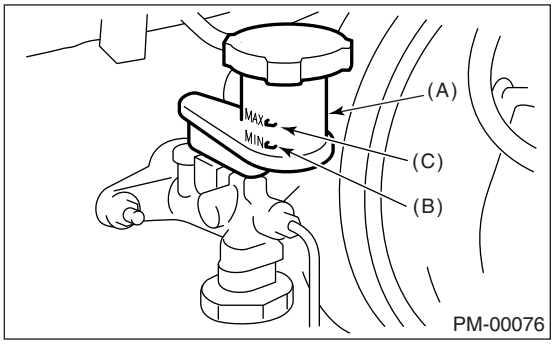
(A) Release lever
(B) Push rod
(C) Operating cylinder

2) If the fluid level rises, pedal free play is correct.
3) If the fluid level does not rise, or the push rod cannot be retracted, adjust the clutch pedal. <Ref. to CL-39, Clutch Pedal.>
4) Check the fluid level using the scale on the outside of the clutch master cylinder tank (A). If the level is below “MIN” (B), inspect the clutch master cylinder, operating cylinder and hydraulic line for fluid leaks. If fluid leaks are found, repair or replace. If fluid leaks are not found, add clutch fluid to bring it up to “MAX” (C) of clutch reservoir tank.

Recommended clutch fluid:
FMVSS No. 116, fresh DOT3 brake fluid

CAUTION:
Prevent the clutch fluid from being splashed over vehicle body. If the clutch fluid is splashed over vehicle body, flush it, and then wipe it up.

NOTE:
• Avoid mixing different brakes of brake fluid to prevent degradation of the fluid.
• Be careful not to allow dirt or dust to get into the reservoir tank.



(A) Reservoir tank
(B) MIN level
(C) MAX level

15.Transmission Gear Oil

A: REPLACEMENT

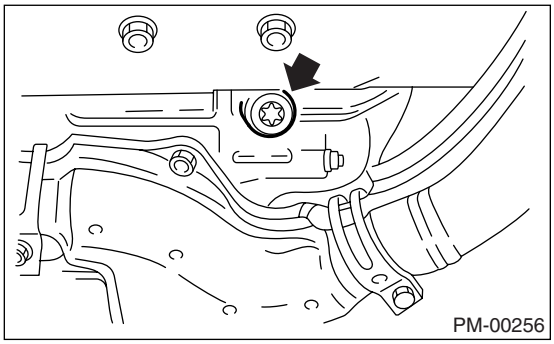
1. MANUAL TRANSMISSION

1) Drain the gear oil by removing drain plug.

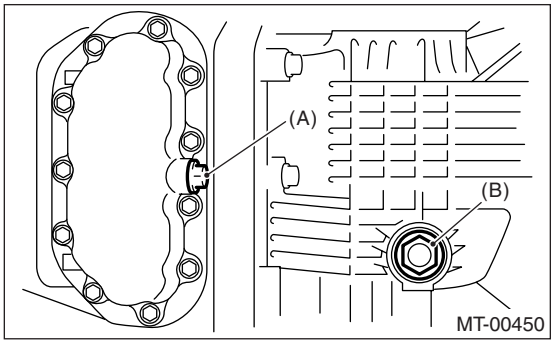
CAUTION:
If transmission gear oil adheres to the exhaust pipe, wipe it off completely.

NOTE:
• Before starting work, cool off the transmission gear oil well.
• Drain the gear oil by removing drain plug using TORX® BIT T70. (5MT model)

• 5MT model



• 6MT model



(A) Drain plug (Oil pan side)
(B) Drain plug (Clutch housing side)

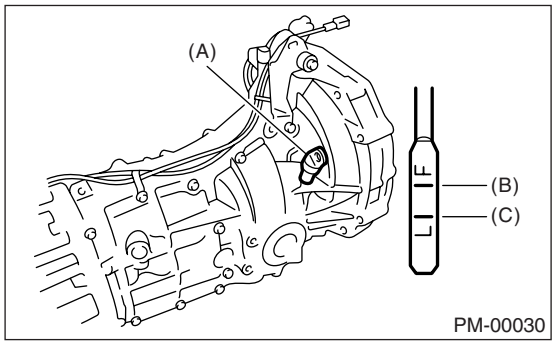
2) Replace the gasket with new one, and then tighten it to the specified torque.

Tightening torque:
5MT model
70 N·m (7.1 kgf-m, 51.6 ft-lb)
6MT model (Oil pan side):
44 N·m (4.5 kgf-m, 32.5ft-lb)
6MT model (Clutch housing side):
70 N·m (7.1 kgf-m, 51.6 ft-lb)

3) Fill transmission gear oil through the oil level gauge hole up to the upper point of level gauge.

NOTE:
Each oil manufacturer has its base oil and additives. Thus, do not mix two or more brands.

Gear oil capacity:
FWD model
3.3 L (3.5 US qt, 2.5 Imp qt)
AWD model (5MT single range model):
3.5 L (3.7 US qt, 3.1 Imp qt)
AWD model (5MT dual range model):
4.0 L (4.2 US qt, 3.5 Imp qt)
6MT model:
4.1 L (4.3 US qt, 3.6 Imp qt)



(A) Oil level gauge
(B) Upper level
(C) Lower level

16.Hill-holder System

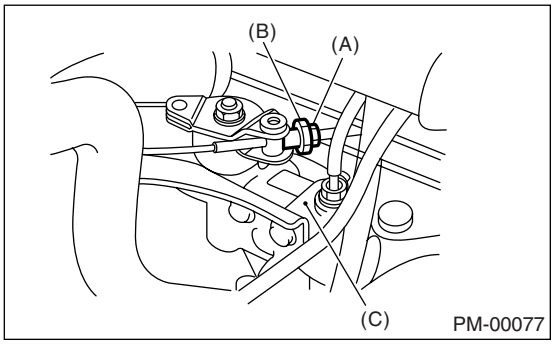
A: INSPECTION AND ADJUSTMENT

1) Confirm the stopping and starting performance by activating the hill-holder on an uphill road of 3° or higher inclination.

(1) When the vehicle does not stop;
Tighten the adjusting nut of PHV cable.

(2) When the vehicle does not start properly;
A; When the hill-holder is released later than engagement of clutch (engine tends to stall): Loosen the adjusting nut gradually until smooth starting is enabled.
B; When the hill-holder is released earlier than engagement to clutch (vehicle slips down slightly): Tighten the adjusting nut so that hill-holder is released later than engagement of clutch (status in A). Then make adjustment the same as in A.

NOTE:
• Whenever turning the adjusting nut, hold the inner cable with pliers to prevent it from turning.
• Replace the pressure hold valve (PHV) or PHV cable with a new one, if they are defective and/or damaged.



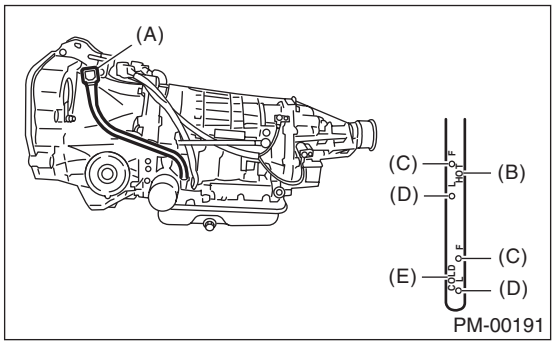
(A) Lock nut
(B) Adjusting nut
(C) Pressure hold valve

17.ATF

A: INSPECTION

CAUTION:
The level of ATF varies with fluid temperature. Pay attention to the fluid temperature when checking ATF level.

1) Raise the ATF temperature by driving a distance of 5 to 10 km (3 to 6 miles). Otherwise, idle the engine to raise ATF temperature to 70 — 80°C (158 — 176°F) on Subaru Select Monitor. <Ref. to 4AT(diag)-20, READ CURRENT DATA, OPERATION, Subaru Select Monitor.>
2) Make sure the vehicle is level.
3) After selecting all positions (P, R, N, D, 3, 2, 1), set the select lever in "P" range. Measure the ATF level with the engine idling for one or two minutes.



(A) Level gauge
(B) ATF level range at "HOT" [70 — 80°C (158 — 176°F)]
(C) Upper level
(D) Lower level
(E) ATF level range at "COLD" [20 — 30°C (68 — 86°F)]

4) Make sure that ATF level is the center of upper and lower level at "HOT" side.
If the ATF level is below lower level, check the transmission for leaks. If there are leaks, it is necessary to repair or replace gasket, oil seals, plugs or other parts.
5) If the ATF level is below the center between upper and lower level, add the recommended ATF until the ATF level is found above the center between upper and lower level.

CAUTION:
• Use care not to exceed the upper limit level.
• Addition of ATF to the upper level when the transmission is cold will result in overfilling of ATF, causing a transmission failure.

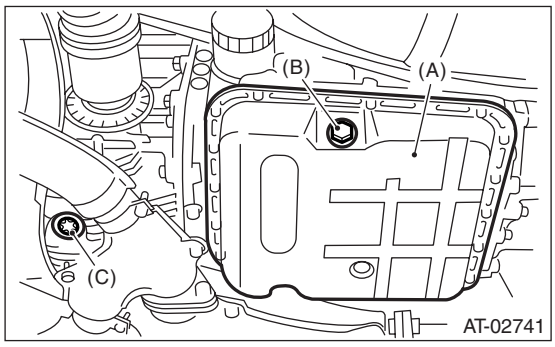
6) Check ATF level after raising ATF temperature to 70 — 80°C (158 —176°F) by running the vehicle or by idling the engine again.

B: REPLACEMENT

1. AUTOMATIC TRANSMISSION FLUID

1) Drain the ATF by removing drain plug.

NOTE:
• Before starting work, cool off the ATF well.
• Check the condition of ATF drained. <Ref. to 4AT-33, CONDITION CHECK, Automatic Transmission Fluid.>



(A) Oil pan
(B) ATF drain plug
(D) Differential gear oil drain

2) Replace the gasket with a new one, and then tighten the specified torque.

Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)

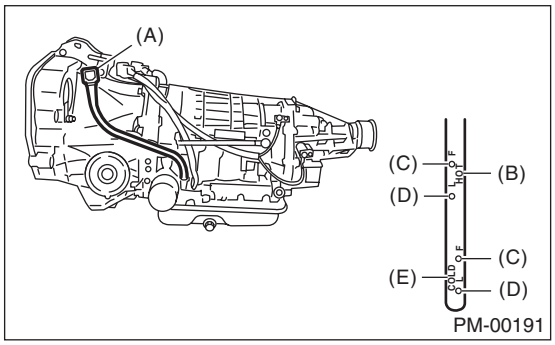
3) Pour ATF up to the middle of the "COLD" side on level gauge from oil charge pipe.

Recommended ATF:
Refer to "RM" section. <Ref. to RM-2, Recommended Materials.>

ATF capacity:
Fill the same amount drained from ATF drain plug hole.

CAUTION:
If ATF adheres to the exhaust pipe, wipe it off completely.

4) Check the ATF level. <Ref. to PM-28, INSPECTION, ATF.>



(A) Level gauge
(B) ATF level range at “HOT” [70 — 80°C (158 — 176°F)]
(C) Upper level
(D) Lower level
(E) ATF level range at “COLD” [20 — 30°C (68 — 86°F)]

2. ATF FILTER

NOTE:
ATF filter is a maintenance free part. ATF filter needs replacement, when it has physically damaged or ATF leaked.

For the replacement procedures of the ATF filter: <Ref. to 4AT-74, ATF Filter.>

18. Front & Rear Differential Gear Oil

A: REPLACEMENT

1. FRONT DIFFERENTIAL (MT MODEL)

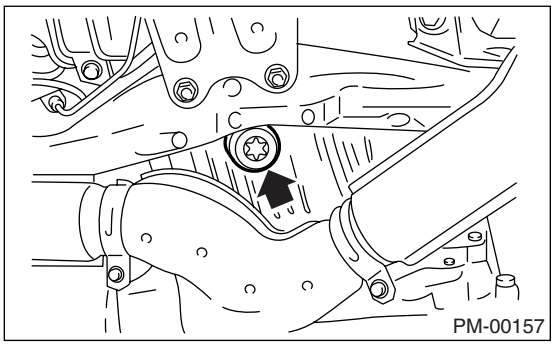
Differential gear oil works as manual transmission oil to lubricate differential. Refer to "Transmission Oil". <Ref. to PM-26, Transmission Gear Oil.>

2. FRONT DIFFERENTIAL (AT MODEL)

1) Drain the differential gear oil by removing drain plug using TORX® BIT T70.

CAUTION:
If differential gear oil adheres to the exhaust pipe, wipe it off completely.

NOTE:
Before starting work, cool off the differential gear oil well.



2) Replace the gasket with a new one, and then tighten the drain plug to specified torque.

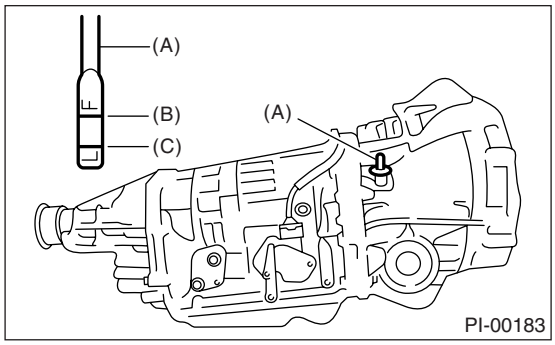
Tightening torque:
Copper gasket:
70 N·m (7.1 kgf-m, 51.6 ft-lb)
Aluminium gasket:
44 N·m (4.5 kgf-m, 32.5 ft-lb)

3) Fill differential gear oil through the oil level gauge hole up to the upper point of level gauge.

NOTE:
Each oil manufacturer has its base oil and additives. Thus, do not mix two or more brands to use.

Recommended gear oil:
GL-5 (75W-90) or equivalent

Differential gear oil capacity:
1.1 — 1.3 ℓ (1.2 — 1.4 US qt, 1.0 — 1.1 Imp qt)



(A) Oil level gauge
(B) Upper level
(C) Lower level

3. REAR DIFFERENTIAL

1) Drain the oil by removing drain plug.
2) Remove the filler plug or oil temperature switch for quick draining oil.
3) Install the drain plug after draining oil.

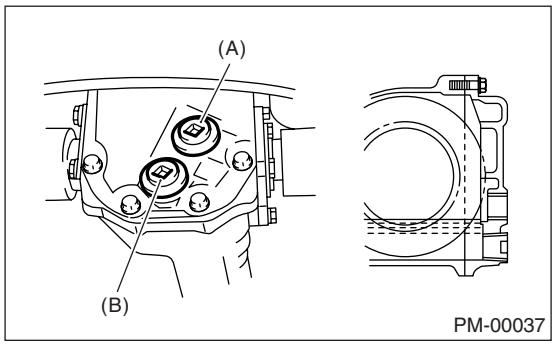
NOTE:
• Apply liquid gasket to the drain plug threads for T type.

Liquid gasket:
Three Bond 1105 (Part No. 004403010)

• Use a new aluminum gasket for VA type.

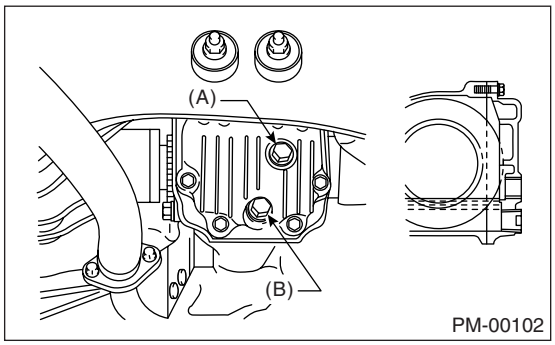
Tightening torque:
T type:
49 N·m (5.0 kgf-m, 36.2 ft-lb)
VA type:
34 N·m (3.5 kgf-m, 25.3 ft-lb)

4) After installing the drain plug onto rear differential gear case firmly, fill oil up fully to the mouth of filler plug.
T-TYPE



(A) Filler plug
(B) Drain plug

VA-TYPE



(A) Filler plug
(B) Drain plug

Recommended gear oil:
Except STi model with driver's control center differential
GL-5 (75W-90) or equivalent
STi model with driver's control center differential
GL-5 [LSD oil (90)] or equivalent

Oil capacity:
Except STi model:
0.8 ℓ (0.8 US qt, 0.7 Imp qt)
STi model:
0.9 — 1.1 ℓ (1.0 — 1.2 US qt, 0.8 — 1.0 Imp qt)

NOTE:
• Each oil manufacturer has its base oil and additives. Thus, do not mix two or more brands to use.
• For STi model with driver's control center differential, use mechanical LSD model.

5) Install the filler plug or oil temperature switch onto rear differential gear case firmly.

NOTE:
• Apply liquid gasket to the filler plug or oil temperature switch threads for T type.

Liquid gasket:
Three Bond 1105 (Part No. 004403010)

• Use a new aluminum gasket for VA type.

Tightening torque:
T type:
49 N·m (5.0 kgf-m, 36.2 ft-lb)
VA type:
34 N·m (3.5 kgf-m, 25.3 ft-lb)

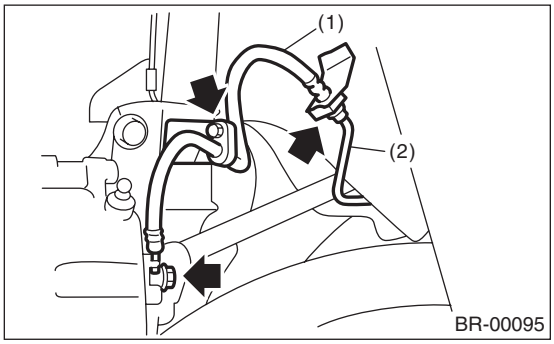
19.Brake Line

A: INSPECTION

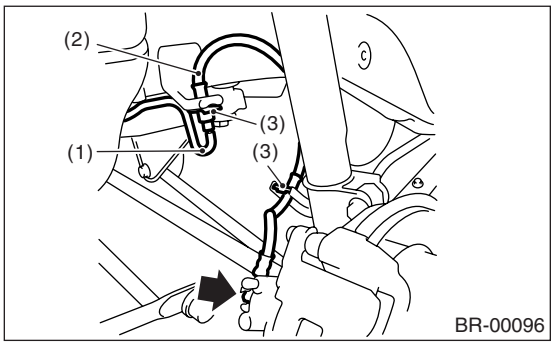
1. BRAKE LINE

1) Check scratches, swelling, corrosion, traces of fluid leakage on the brake hoses or pipe joints.
2) Check the possibility of adjacent parts interfering with brake pipes/hoses during driving, and loose connections/clamps.
3) Check any trace of fluid leakage, scratches, etc. on the master cylinder, wheel cylinder and pressure control valve.

NOTE:
• When the brake fluid level in the reservoir tank is lower than the specified limit, the brake fluid warning light on the combination meter will come on.
• Visually check the brake hose (using a mirror where it is difficult to see) for any damage.



(1) Front brake hose
(2) Front brake pipe

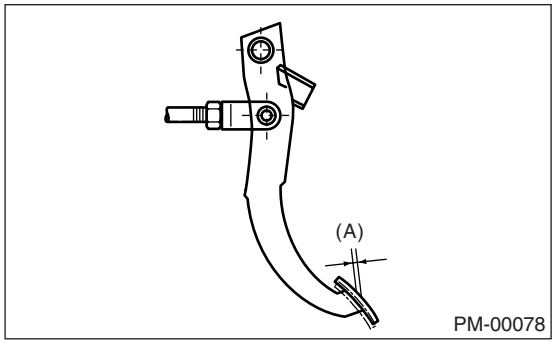


(1) Rear brake pipe
(2) Rear brake hose
(3) Clamp

2. SERVICE BRAKE

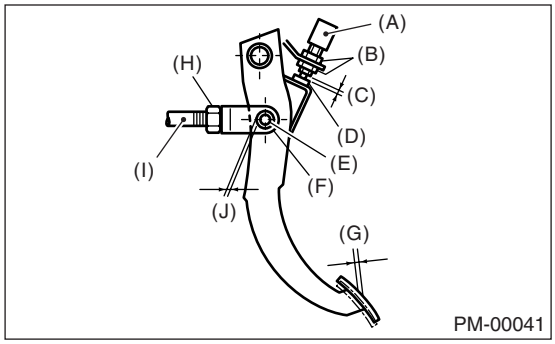
1) Check the free play of brake pedal with a force of less than 10 N (1 kgf, 2 lbf).

Brake pedal free play:
1 — 3 mm (0.04 — 0.12 in)



(A) Brake pedal free play

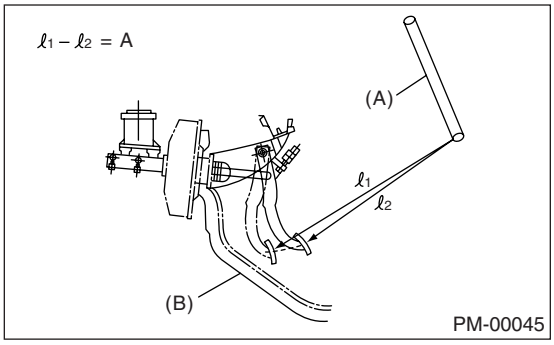
2) If the free play is out of specifications above, adjust the brake pedal as follows:
(1) Be sure the engine is off. (No vacuum is applied to brake booster.)
(2) There should be play between brake booster clevis and pin at brake pedal installing portion.
[Depress brake pedal pad with a force of less than 10 N (1 kgf, 2 lbf) to a stroke of 1 to 3 mm (0.04 to 0.12 in).]
(3) Depress the surface of brake pad by hand.
(4) If there is no free play between clevis pin and clevis, turn the brake switch adjusting nut until the clearance between stopper and screw of brake switch becomes 0.3 mm (0.012 in).



(A) Brake switch
(B) Adjusting nut
(C) 0.3 mm (0.012 in)
(D) Stopper
(E) Clevis pin
(F) Clevis
(G) Brake pedal free play
(H) Lock nut
(I) Brake booster operating rod
(J) Play at pin

3) Check the pedal stroke.
While the engine is idling, depress the brake pedal with a 490 N (50 kgf, 110 lbf) load and measure the distance between brake pedal and steering wheel. With the brake pedal released, measure the distance between pedal and steering wheel again. The difference between the two measurements must be less than specified value. If the distance is more than specified, there is possibility of air inside the hydraulic unit.

Brake pedal reserve distance A:
90 mm (3.54 in)/ 490 N (50 kgf, 110 lbf) or less

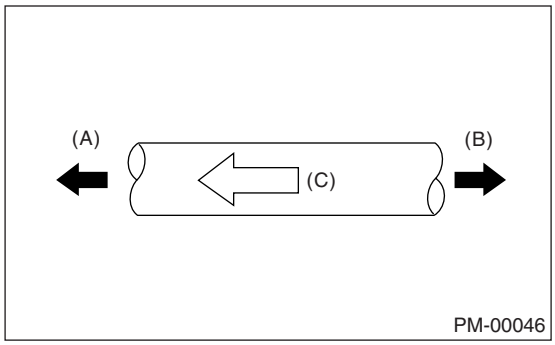


(A) Steering wheel
(B) Toe board

4) Check to see if air is in the hydraulic brake line by the feel of pedal operation. If air appears to exist in the line, bleed it from the system.
5) Check for even operation of all brakes, using a brake tester or by driving the vehicle for a short distance on a straight road.

3. BRAKE SERVO SYSTEM

1) With the engine off, depress the brake pedal several times applying the same pedal force: Make sure the travel distance should not change.
2) With the brake pedal depressed, start the engine: Make sure the pedal should move slightly toward the floor.
3) With the brake pedal depressed, stop the engine and keep the pedal depressed for 30 seconds: Make sure the pedal height should not change.
4) Check valve is built into the vacuum hose. Disconnect the vacuum hose to inspect function of check valve.
Blow air into the vacuum hose from its brake booster side end: Air must flow out of engine side end of hose. Next blow air into the hose from engine side: Air should not flow out of hose.
Replace both check valve and vacuum hose if the check valve is faulty. Engine side of vacuum hose is indicated by marking “ENG” as shown.



(A) Engine side
(B) Brake booster side
(C) ENG

5) Check the vacuum hose for cracks or other damage.

NOTE:
When installing the vacuum hose on the engine and brake booster, do not use soapy water or lubricating oil on their connections.

6) Check vacuum hose to make sure it is tight and secure.

20.Brake Fluid

A: REPLACEMENT

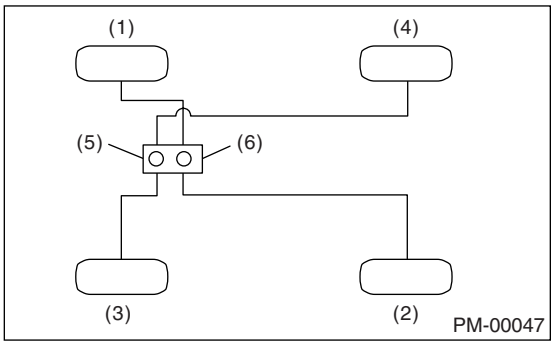
CAUTION:
When bleeding air of STi model, flush with brake cleaner or water after air bleeding as soon as possible because brake fluid leaks through the threads of air bleeder screw, and then painted area of caliper body may be washed away. Also wipe out brake fluid in air bleeder screw with cloth.

1) Either jack-up the vehicle and place a rigid rack under it, or lift-up the vehicle.
2) Remove both front and rear wheels.
3) Draw out the brake fluid from master cylinder with syringe.
4) Refill the reservoir tank with recommended brake fluid.

Recommended brake fluid:
FMVSS No. 116, fresh DOT3 brake fluid

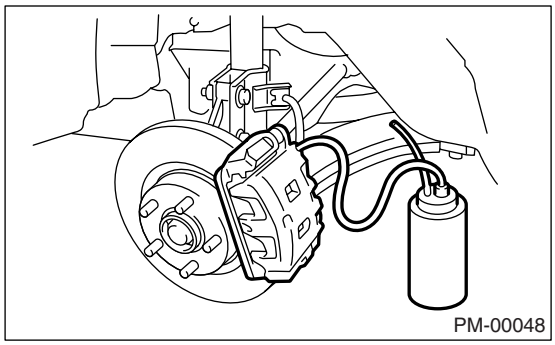
NOTE:
• Avoid mixing different brands of brake fluid to prevent degrading the quality of the fluid.
• Be careful not to allow dirt or dust to get into the reservoir tank.

Bleeding sequence (1) → (2) → (3) → (4)



(1) Front right
(2) Rear left
(3) Front left
(4) Rear right
(5) Secondary
(6) Primary

5) Install one end of a vinyl tube onto the air bleeder and insert the other end of the tube into a container to collect the brake fluid.



NOTE:
• Cover the bleeder with waste cloth, when loosening it, to prevent brake fluid from being splashed over surrounding parts.
• During the bleeding operation, keep the brake reservoir tank filled with brake fluid to eliminate entry of air.
• The brake pedal operating must be very slow.
• For convenience and safety, two people should do the work.
• The amount of brake fluid required is approx. 500 mℓ (16.9 US fl oz, 17.6 Imp fl oz) for total brake system.

6) Instruct your co-worker to depress the brake pedal slowly two or three times and then hold it depressed.
7) Loosen the bleeder screw approx. 1/4 turn until a small amount of brake fluid drains into container, and then quickly tighten the screw.
8) Repeat steps 6) and 7) above until there are no air bubbles in the drained brake fluid and new fluid flows through vinyl tube.

NOTE:
Add brake fluid as necessary while performing the air bleed operation, in order to prevent the tank from running short of brake fluid.

9) After completing the bleeding operation, hold brake pedal depressed and tighten the screw and install bleeder cap.

Tightening torque:
8 N·m (0.8 kgf-m, 5.8 ft-lb)

10) Bleed air from each wheel cylinder by following the previous 5 steps.
11) Depress the brake pedal with a force of approx. 294 N (30 kgf, 66 lbf) and hold it there for approx. 20 seconds. At this time check the pedal to see if it makes any unusual movement. Visually inspect the bleeder screws and brake pipe joints to make sure that there is no fluid leakage.

12) Install the wheels, and drive the vehicle for a short distance between 2 to 3 km (1 to 2 miles) to make sure that brakes are operating properly.

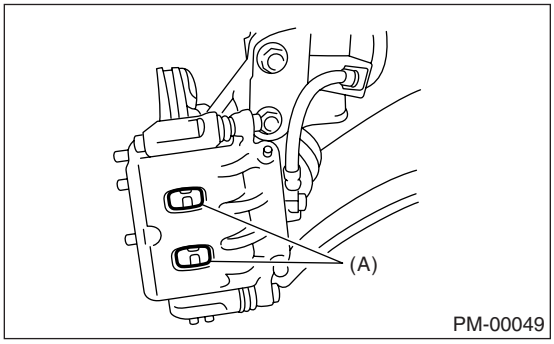
21.Disc Brake Pad and Disc

A: INSPECTION

1. DISC BRAKE PAD AND DISC

1) Jack-up the vehicle and support with rigid racks. Then remove the wheels.
2) Visually check the pad thickness through inspection hole of disc brake assembly. Replace the pad if necessary.

NOTE:
When replacing a pad, always replace the pads for both the right and left wheels at the same time. Also replace the pad clips if they are twisted or worn.



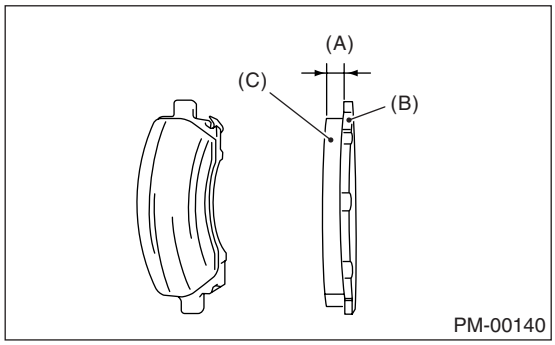
(A) Inspection hole

• Front

Pad thicknessmm (in)		
Standard	14, 15 inch	11 (0.43)
	16 inch	10 (0.39)
	17 inch	9.2 (0.362)
Service limit	14, 15 inch	1.5 (0.059)
	16 inch	1.5 (0.059)
	17 inch	1.2 (0.047)

• Rear

Pad thicknessmm (in)		
Standard	14 inch	9 (0.35)
	15 inch	11.5 (0.453)
	17 inch	9 (0.35)
Service limit	14 inch	1.5 (0.059)
	15 inch	1.5 (0.059)
	17 inch	1.2 (0.047)



(A) Thickness of pad
(B) Back metal
(C) Lining

3) Check the disc rotor, and correct or replace if it is damaged or worn.
• Front

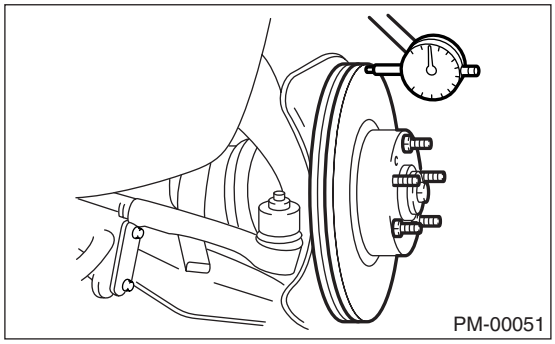
Disc rotor thicknessmm (in)		
Standard	14, 15, 16 inch	24 (0.94)
	17 inch	30 (1.18)
Service limit	14, 15, 16 inch	22 (0.87)
	17 inch	28 (1.10)

• Rear

Disc rotor thicknessmm (in)		
Standard	14 inch	10 (0.39)
	15 inch	18 (0.71)
	17 inch	20 (0.79)
Service limit	14 inch	8.5 (0.335)
	15 inch	16 (0.63)
	17 inch	18 (0.71)

4) Remove the caliper body. <Ref. to BR-31, Front Disc Brake Assembly.>, <Ref. to BR-42, Rear Disc Brake Assembly.>
5) Tighten the wheel nuts to secure disk rotor.
6) Set a dial gauge at a point less than 10 mm (0.39 in) from outer periphery of rotor, and then measure the disk rotor runout.

Disc rotor runout limit:
Front: 0.075 mm (0.0030 in)
Rear: 0.070 mm (0.0028 in)



22.Brake Lining and Drum

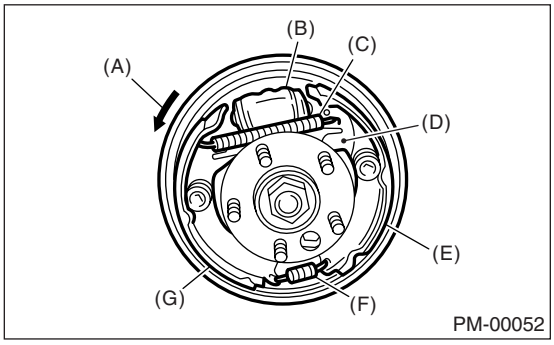
A: INSPECTION

1. REAR DRUM BRAKE

1) Remove the brake drum, and check that there is no fluid leakage from wheel cylinder.
If there is fluid leakage from wheel cylinder, inspect the wheel cylinder, and then repair or replace it.
2) Inspect the brake shoes for damage or deformities and check brake linings for wear.

NOTE:
• Always replace both leading and trailing brake shoes for the right and left wheels at the same time.
• When either the right and left brake assembly is replaced, always replace the leading shoe and trailing shoe of the other.

Thickness of lining (except back metal):
Standard value: 4.1 mm (0.161 in)
Service limit: 1.5 mm (0.059 in)

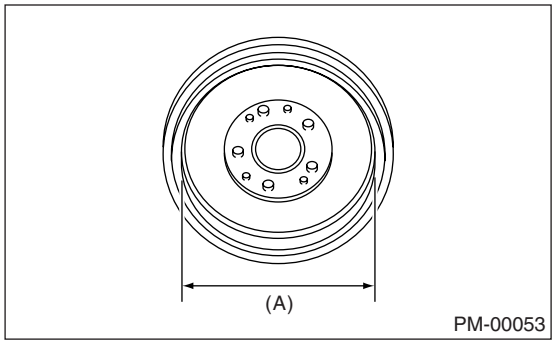


(A) Rotational direction of drum (Forward)
(B) Wheel cylinder
(C) Upper shoe return spring
(D) Adjusting lever
(E) Trailing shoe
(F) Lower shoe return spring
(G) Leading shoe

3) Check the brake drum for wear, dents or other damage.
If the inside surface of brake drum is streaked, correct the surface with emery cloth (#200 or more). If it is unevenly worn, tapered, or the outside surface of brake drum is damaged, correct or replace it.

Brake drum inner diameter:
Standard value: 228.6 mm (9.000 in)
Service limit: 230.6 mm (9.079 in)

If deformation or wear of back plate, shoe, etc. is noticeable, replace the affected parts.



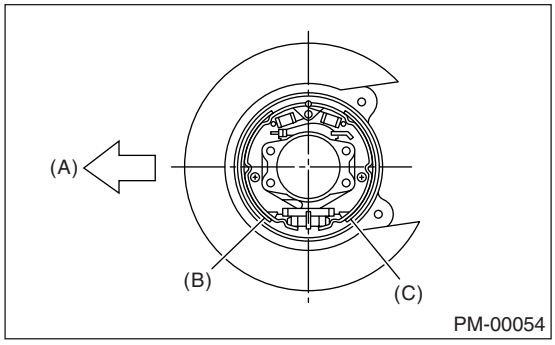
(A) Inside diameter

2. PARKING BRAKE (REAR DISC BRAKE)

Inspect the brake linings and drums of both sides of the rear brake at the same time by removing brake drums.
1) Inspect the brake shoes for damage or deformation and check brake linings for wear.

NOTE:
Always replace both primary and secondary brake shoes for the right and left wheels at the same time.

Brake lining thickness (except back metal):
Standard value: 3.2 mm (0.126 in)
Wear limit: 1.5 mm (0.059 in)



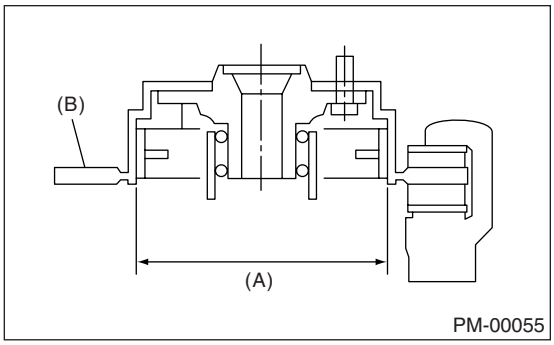
(A) Forward
(B) Brake shoe (Primary side)
(C) Brake shoe (Secondary side)

2) Check the disk rotor for wear, dents or other damage. If the inside surface of disk rotor is streaked, correct the surface with emery cloth (#200 or more). If it is unevenly worn or tapered, correct or replace it.

Brake drum inside diameter:

Except STi model:
Standard value: 170 mm (6.69 in)
Wear limit: 171 mm (6.73 in)

STi model:
Standard value: 190 mm (7.48 in)
Wear limit: 191 mm (7.52 in)



(A) Inside diameter
(B) Disk

3) If the deformation or wear of back plate, shoe, etc. is noticeable, replace them.
4) When the shoe return spring tension is excessively weakened, replace it.

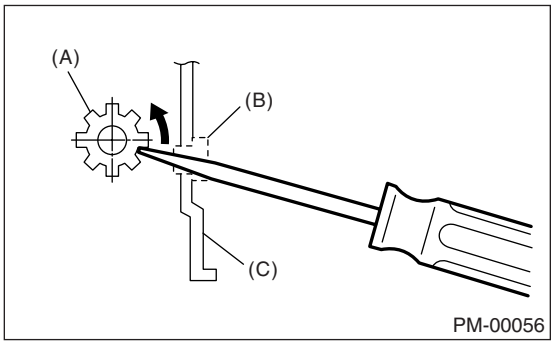
B: ADJUSTMENT

1. REAR DRUM BRAKE

The main brake is adjusted automatically, and so there is no need to adjust it.

2. PARKING BRAKE (REAR DISC BRAKE)

For rear disc brake, adjust the parking brake after bleeding air.
1) Remove the rear cover (rubber) installed at back plate.
2) Turn the adjuster toward arrow mark (upward) until it is locked slightly, by using a flat tip screwdriver as shown in illustration.



(A) Adjuster
(B) Cover (rubber)
(C) Back plate

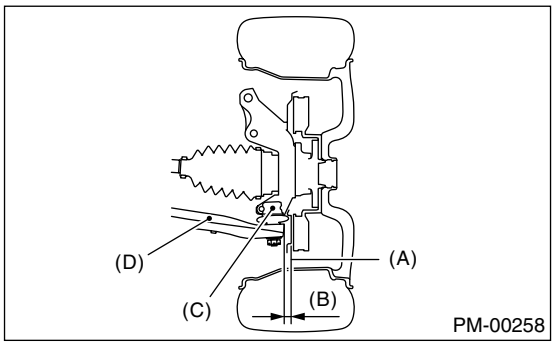
3) Turn back (downward) the adjuster 3 to 4 notches.
4) Install the cover (rubber) at original position correctly.

23.Suspension

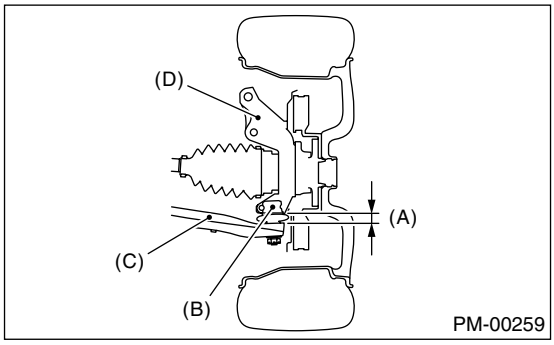
A: INSPECTION

1. SUSPENSION BALL JOINT

1) Jack-up the vehicle until tires are off ground.
2) Next, grasp the bottom of tire and move it in and out. If relative movement (B) is observed between the brake disc cover (A) and end of transverse link (D), ball joint (C) may be excessively worn.



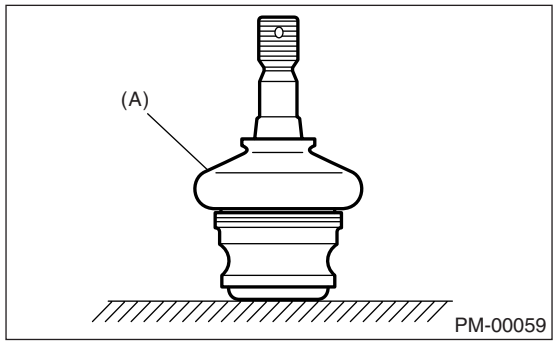
3) Next, grasp the end of transverse link and move it up and down. Relative movement (A) between the housing (D) and transverse link (C) boss indicates ball joint (B) may be excessively worn.



4) If relative movement is observed in the immediately preceding two steps, remove and inspect the ball joint. If free play exceeds standard, replace the ball joint. <Ref. to FS-18, Front Ball Joint.>
5) Damage of dust seal
Visually inspect the ball joint dust seal. If it is damaged, remove the transverse link. <Ref. to FS-15, Front Transverse Link.> And measure free play of ball joint. <Ref. to FS-18, Front Ball Joint.>

(1) When looseness exceeds standard value, replace the ball joint.
(2) If the dust seal is damaged, replace with the new ball joint.

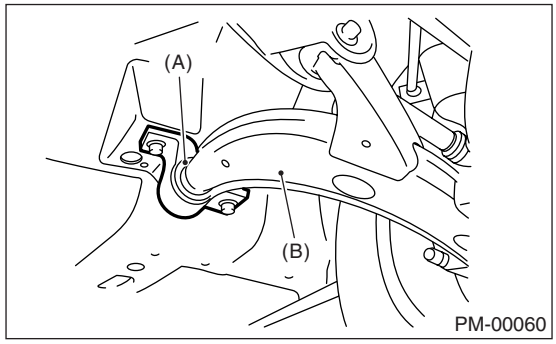
NOTE:
When the transverse link ball joint has been removed or replaced, check the toe-in of front wheel. If the front wheel toe-in is not at specified value, adjust the toe-in. <Ref. to FS-7, Wheel Alignment.>



(A) Dust seal

2. TRANSVERSE LINK'S REAR BUSHING

Check oil leaks at around liquid-filled bushing. If oil leaks, replace the bushing.



(A) Rear bushing
(B) Transverse link

3. WHEEL ARCH HEIGHT

1) Unload cargoes and set the vehicle in curb weight (empty) condition.
2) Then, check the wheel arch height of front and rear suspensions to ensure that they are within allowable values. <Ref. to FS-7, Wheel Alignment.>
3) When the wheel arch height is out of allowable value, visually inspect the following components and replace deformed parts.
• Suspension components [Front strut assembly and rear shock absorber assembly]
• Parts connecting between suspension and body.
4) When no components are deformed, adjust the wheel arch height by replacing coil spring in the suspension which wheel arch height is out of allowable value. <Ref. to FS-7, Wheel Alignment.> <Ref. to RS-9, Wheel Alignment.>

4. WHEEL ALIGNMENT OF FRONT SUSPENSION

1) Check the alignment of front suspension to ensure that following items conform to allowable values.
- Toe-in
- Camber angle
- Caster angle (Reference value)
- Steering angle

<Ref. to FS-7, Wheel Alignment.>
2) When the caster angle does not conform to reference, visually inspect the following components and replace deformed parts.
- Suspension components [Strut assembly, crossmember, transverse link, etc.]
- Body parts to which suspensions are installed.

3) When the toe-in and camber are out of allowable value, adjust them so that they conform to respective adjustment standard.
4) When the right-and-left turning angles of tire are out of allowable, adjust to adjustment value.

5. WHEEL ALIGNMENT OF REAR SUSPENSION

1) Check the alignment of rear suspension to ensure that following items are within allowable values.
- Toe-in
- Camber angle
- Thrust angle

<Ref. to RS-9, Wheel Alignment.>
2) When the camber angle is outside a permissible value, visually inspect parts listed below. If deformation is observed, replace the damaged parts.
- Suspension components [Shock absorber, link F, link R, link UPR, arm R, sub frame, etc.]
- Body parts to which suspensions are installed.

3) When the toe-in and thrust angle are out of allowable value, adjust them so that they conform to respective adjustment standard.

6. OIL LEAKAGE OF STRUT

Visually inspect the front strut and rear strut for oil leakage as instructed. Replace front strut and rear strut if oil leaks excessively.

7. TIGHTNESS OF BOLTS AND NUTS

Check the bolts and nuts shown in the figure for looseness. Retighten the bolts and nuts to specified torque. If the self-locking nuts and bolts are removed, replace them with new ones.
Front suspension: <Ref. to FS-2, General Description.>
Rear suspension: <Ref. to RS-2, General Description.>

8. DAMAGE TO SUSPENSION PARTS

1) Check the following parts and the fastening portion of the vehicle body for deformation or excessive rusting which impairs the suspension. If necessary, replace the damaged parts with new ones. If minor rust formation, pitting, etc. are noted, remove the rust and apply remedial anti-corrosion measures.
- Front suspension
  - Transverse link
  - Crossmember
  - Strut
- Rear suspension
  - Crossmember
  - Lateral links
  - Trailing link
  - Strut
- In the district where salt is sprayed to melt snow on a road in winter, check suspension parts for damage caused by rust every 12 months after lapse of 60 months. Take rust prevention measure as required.

24.Wheel Bearing

A: INSPECTION

1. FRONT WHEEL BEARING

NOTE:
Inspect the condition of front wheel bearing grease.

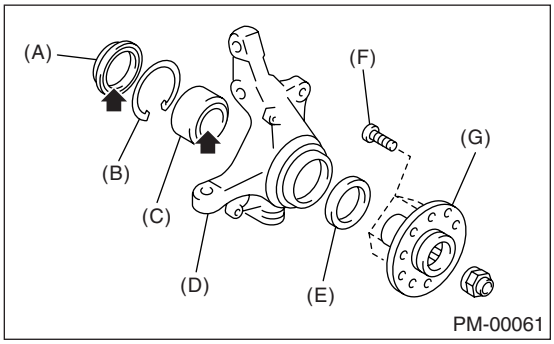
1) Jack-up the front of vehicle.
2) While holding the front wheel by hand, swing it in and out to check bearing free play.
3) Loosen the wheel nuts and remove front wheel.
4) If bearing free play exists in step 2) above, attach a dial gauge to the hub and measure axial displacement in axial direction.

Service limit:
Straight-ahead position within 0.05 mm (0.0020 in)

5) Remove the bolts and self-locking nuts, and extract transverse link from front crossmember.
6) Remove the PTJ or DOJ of front drive shaft from transmission. <Ref. to DS-20, Front Axle.>
7) While supporting the front drive shaft horizontally with one hand, turn the hub with the other to check for noise or binding.

- Except STi model

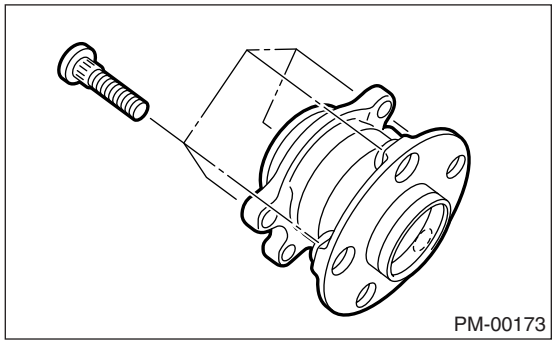
If the hub is noisy or binds, disassemble the front axle and check condition of oil seals, bearing, etc.



(A) Inner oil seal
(B) Snap ring
(C) Bearing
(D) Housing
(E) Outer oil seal
(F) Hub bolt
(G) Hub

- STi model

If the hub is noisy or binds, replace the front hub unit bearing.



2. REAR WHEEL BEARING

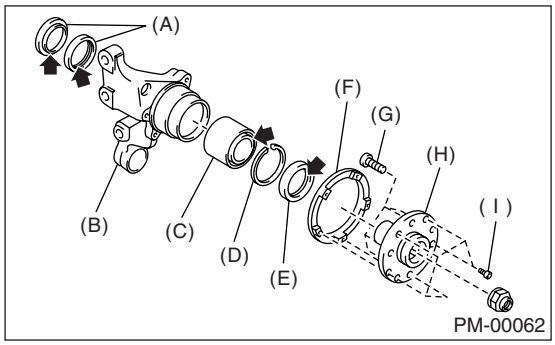
• AWD

1) Jack-up the rear of vehicle.
2) While holding the rear wheel by hand, swing it in and out to check bearing free play.
3) Loosen the wheel nuts and remove rear wheel.
4) If the bearing free play exists in step 2) above, attach a dial gauge to the hub COMPL and measure axial displacement in axial direction.

Service limit:
Straight-ahead position within 0.05 mm (0.0020 in)

5) Remove the DOJ of rear drive shaft from rear differential. <Ref. to DS-48, Rear Drive Shaft.>
6) While supporting the rear drive shaft horizontally with one hand, turn the hub with the other to check for noise or binding.

If the hub is noisy or binds, disassemble the rear axle and check condition of oil seals, bearings, etc.



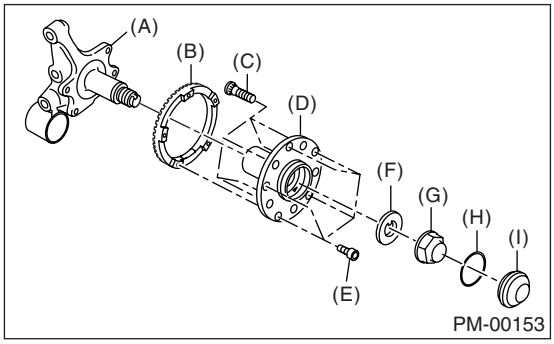
(A) Inner oil seal
(B) Rear housing
(C) Bearing
(D) Snap ring
(E) Outer oil seal
(F) Tone wheel
(G) Hub bolt
(H) Hub
(I) Socket bolt

• FWD

1) Jack-up the rear of vehicle.
2) While holding the rear wheel by hand, swing it in and out to check bearing free play.
3) Loosen the wheel nuts and remove rear wheel.
4) If the bearing free play exists in step 2) above, attach a dial gauge to the hub COMPL and measure axial displacement in axial direction.

Service limit:
Straight-ahead position within 0.05 mm (0.0020 in)

5) Turn the hub with hand to check for noise or binding.
If the hub is noisy or binds, replace the hub.



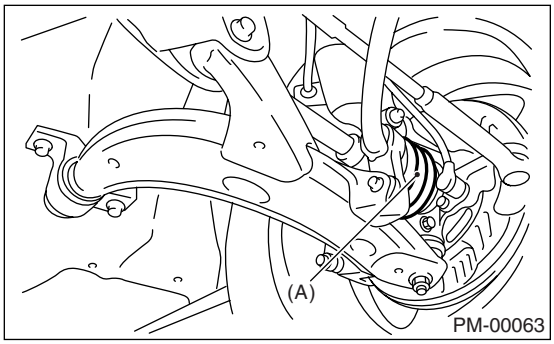
(A) Rear housing
(B) Tone wheel
(C) Hub bolt
(D) Hub
(E) Socket bolt
(F) Washer
(G) Hub nut
(H) O-ring
(I) Hub cap

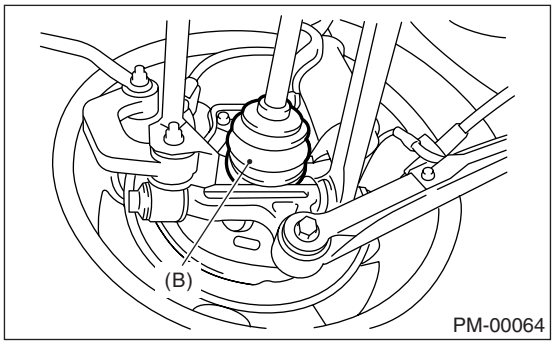
25.Axle Boots & Joints

A: INSPECTION

1. FRONT AND REAR AXLE BOOTS

Inspect the front axle boots (A) and rear axle boots (B) for deformation, damage or failure. If faulty, replace them with new ones. <Ref. to DS-40, Front Drive Shaft.> <Ref. to DS-48, Rear Drive Shaft.>





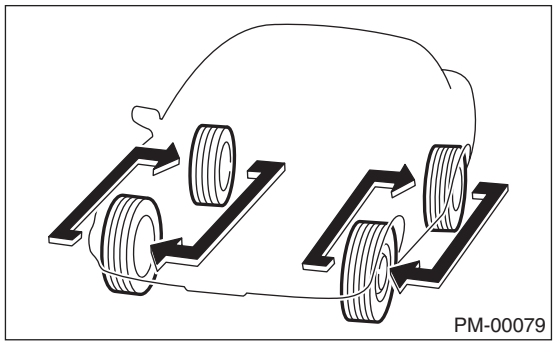
2. PROPELLER SHAFT

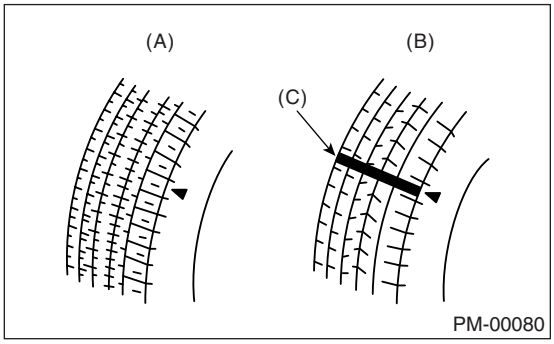
Inspect the propeller shaft for damage or failure. If faulty, replace with a new one. <Ref. to DS-17, Propeller Shaft.>

26.Tire Rotation

A: INSPECTION

1) When the tread has worn down to 1.6 mm (2/32 in) or the wear indicator appears across the tread, replace the tire. (It is recommended to replace both left and right tires as a set.)
2) If abnormal uneven wear is found on the tire, adjust the wheel alignment.
3) Also, tire rotations should be done by interchanging front and rear tires as shown to ensure even wear of the tires.


PM-00079



PM-00080

(A) New tread
(B) Worn tread
(C) Tread wear indicator

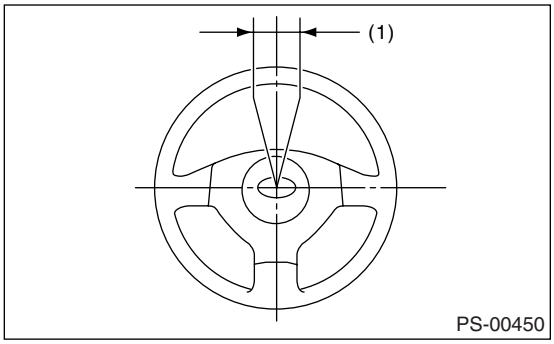
27.Steering System (Power Steering)

A: INSPECTION

1. STEERING WHEEL

1) Set the steering wheel in a straight-ahead position, and check the wheel spokes to make sure they are correctly set in their specified positions.
2) Lightly turn the steering wheel to the right and left to determine the point where front wheels start to move.
Measure the distance of the movement of steering wheel at the outer periphery of wheel.

Steering wheel free play:
0 — 17 mm (0 — 0.67 in)



(1) Steering wheel free play

Move the steering wheel vertically toward the shaft to ascertain if there is play in the direction.

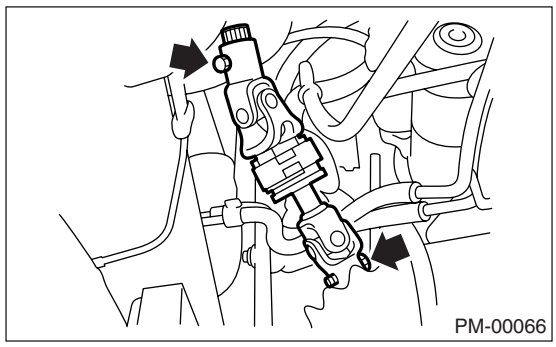
Maximum permissible play:
0.5 mm (0.020 in)

3) Drive the vehicle and check the following items during operation.
(1) Steering force:
The effort required for steering should be smooth and even at all points, and should not vary.
(2) Pull to one side:
Steering wheel should not be pulled to either side while driving on a level surface.
(3) Wheel runout:
Steering wheel should not be runout.
(4) Return factor:
Steering wheel should return to its original position after it has been turned and then released.

2. STEERING SHAFT JOINT

If the steering wheel free play exceeds allowable value, disconnect the universal joint of steering shaft and check it for any play and yawing torque (at the point of the crossing direction). Also inspect for any damage to sealing or worn serrations. If the joint is loose, retighten the mounting bolts to the specified torque.

Tightening torque:
24 N·m (2.4 kgf-m, 17.4 ft-lb)

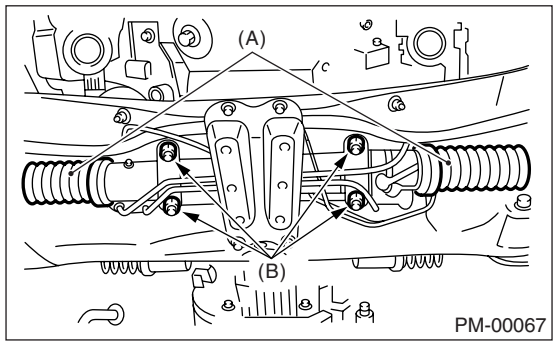


3. GEARBOX

• Non-turbo model

1) With vehicle placed on a level surface, turn the steering wheel 90° in both the right and left directions.
While the steering wheel is being rotated, reach under the vehicle and check for looseness in gearbox.

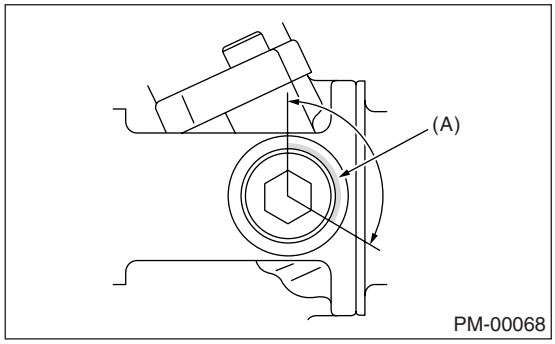
Tightening torque:
59 N·m (6.0 kgf-m, 43.4 ft-lb)



(A) Boot
(B) Gear box mounting bolt

2) Check the boot for damage, cracks or deterioration.
3) With the vehicle on a level surface, quickly turn the steering wheel to the right and left.
While the steering wheel is being rotated, check the gear backlash. If any unusual noise is noticed, adjust the gear backlash in the following manner.

(1) Apply liquid gasket to at least 1/3 of entire perimeter of entire perimeter of adjusting screw thread.



(A) Apply liquid gasket to at least 1/3 of entire perimeter

(2) Tighten the adjusting screw to 7.4 N·m (0.75 kgf-m, 5.4 ft-lb) and then loosen. Repeat this operation twice.
(3) Retighten the adjusting screw to 7.4 N·m (0.75 kgf-m, 5.4 ft-lb) and back off 25°.
(4) Install the lock nut. While holding the adjusting screw with a wrench, tighten the lock nut using ST.

ST 926230000 SPANNER

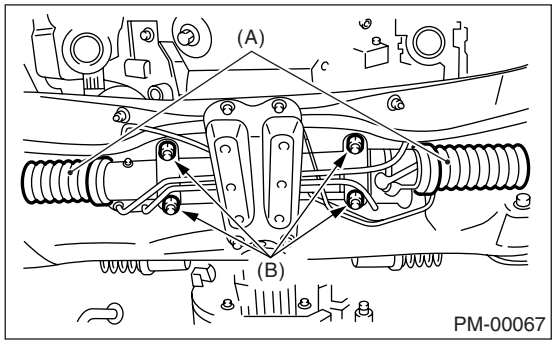
Tightening torque (Lock nut):
39 N·m (4.0 kgf-m, 29 ft-lb)

Hold the adjusting screw with a wrench to prevent it from turning, while tightening the lock nut.

• Turbo model

1) With vehicle placed on a level surface, turn the steering wheel 90° in both the right and left directions.
While the steering wheel is being rotated, reach under the vehicle and check for looseness in gearbox.

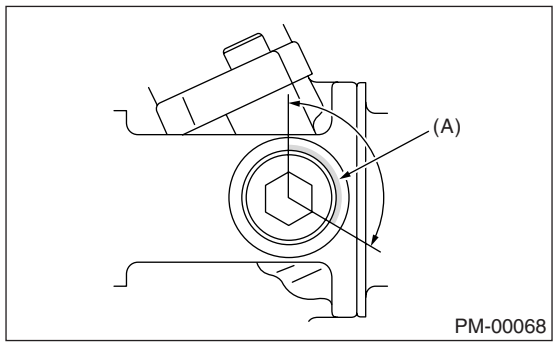
Tightening torque:
59 N·m (6.0 kgf-m, 43.4 ft-lb)



(A) Boot
(B) Gear box mounting bolt

2) Check the boot for damage, cracks or deterioration.

3) With the vehicle on a level surface, quickly turn the steering wheel to the right and left.
While the steering wheel is being rotated, check the gear backlash. If any unusual noise is noticed, adjust the gear backlash in the following manner.
(1) Apply liquid gasket to at least 1/3 of center of entire perimeter of adjusting screw thread.



(A) Apply liquid gasket to at least 1/3 of entire perimeter

(2) Tighten the adjusting screw to 9.8 N·m (1.0 kgf-m, 7.2 ft-lb) and then loosen.
(3) Retighten the adjusting screw to 4.9 N·m (0.5 kgf-m, 3.6 ft-lb) and then loosen.
(4) Retighten the adjusting screw to 4.9 N·m (0.5 kgf-m, 3.6 ft-lb) and back off 37° or less.
(5) Install the lock nut. While holding the adjusting screw with a wrench, tighten the lock nut using ST.

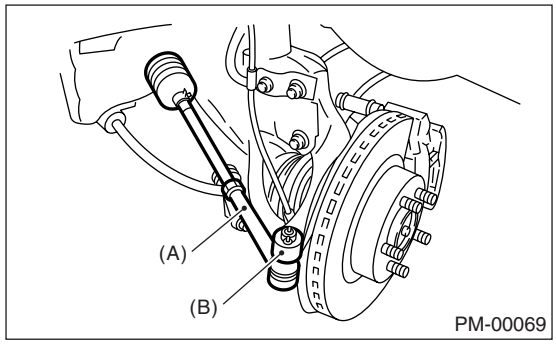
ST 926230000 SPANNER

Tightening torque (Lock nut):
39 N·m (4.0 kgf-m, 29 ft-lb)

Hold the adjusting screw with a wrench to prevent it from turning, while tightening the lock nut.

4. TIE-ROD

1) Check the tie-rod and tie-rod ends for bends, scratches or other damage.



(A) Tie-rod end
(B) Knuckle arm

2) Check the connections of knuckle ball joints for play, inspect for damage on dust seals, and check free play of ball studs. If the castle nut is loose, re-tighten it to the specified torque, then tighten within the range of 60° until the cotter pin hole is aligned.

Tightening torque:
27 N·m (2.75 kgf-m, 19.9 ft-lb)

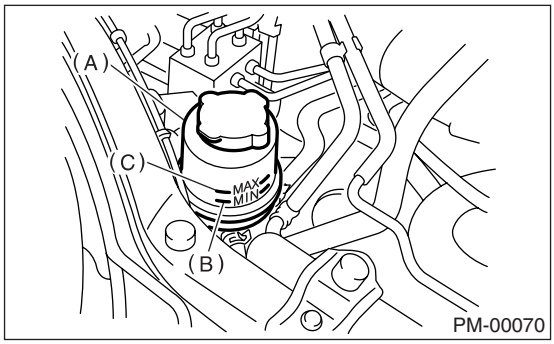
3) Check the lock nut on tie-rod end for tightness. If it is loose, retighten it to the specified torque.

Tightening torque:
83 N·m (8.5 kgf-m, 61.5 ft-lb)

5. POWER STEERING FLUID LEVEL

NOTE:
• Check at power steering fluid temperature 20°C (68°F); read the fluid level on the "COLD" side.
• Check at power steering fluid temperature 80°C (176°F); read the fluid level on the "HOT" side.

1) Place the vehicle with engine "OFF" on a flat and level surface.
2) Check the fluid level using the scale on the outside of reservoir tank (A). If the level is below "MIN" (B), add fluid to bring it up to "MAX" (C).



NOTE:
If the fluid level is at "MAX" (C) level or above, drain fluid to keep the level in specified range of indicator by using a syringe or the like.

Recommended fluid:
DEXRON III

Fluid capacity:
0.7 ℓ (0.7 US qt, 0.6 Imp qt)

6. POWER STEERING FLUID FOR LEAKS

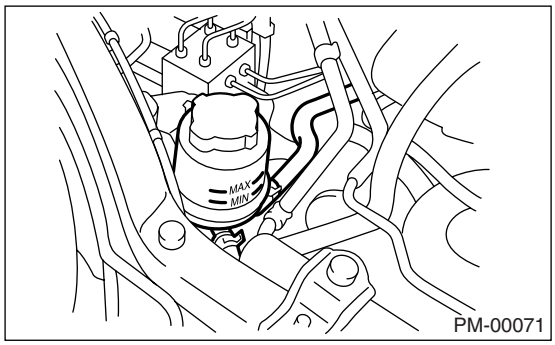
Inspect the underside of oil pump and gearbox for power steering system, hoses, piping and their couplings for fluid leaks.
If fluid leaks are found, correct them by retightening their fitting bolts (or nuts) and/or replacing their parts.

NOTE:
• Wipe the leakage fluid off after repairing fluid leaks, or a wrong diagnosis is taken later.
• Also pay attention to clearances between hoses (or pipings) and other parts when inspecting fluid leaks.

7. HOSES OF OIL PUMP FOR DAMAGES

Check the pressure hose and return hose of oil pump for crack, swell or damage. Replace the hose with a new one if necessary.

NOTE:
Prevent the hoses from revolving and/or turning when installing hoses.



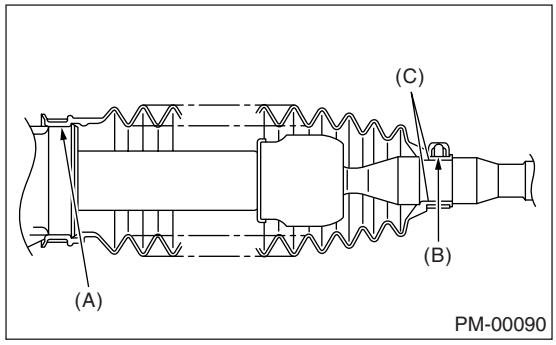
8. POWER STEERING PIPES FOR DAMAGE

Check the power steering pipes for corrosion and damage.
Replace the pipes with a new one if necessary.

9. GEARBOX BOOTS

Inspect both sides of gearbox boots as follows, and correct the defects if necessary.
1) (A) and (B) positions of gearbox boot are fitted correspondingly in (A) and (B) grooves of gearbox and the rod (C).
2) Clips are fitted outside of (A) and (B) positions of boot.
3) Boot does not have crack and hole.

NOTE:
Rotate (B) the position of gearbox boot against twist of it produced by adjustment of toe-in, etc.



10.FITTING BOLTS AND NUTS

Inspect the fitting bolts and nuts of oil pump and bracket for looseness, and retighten them if necessary.
Inspect and/or retighten them when engine is cold.

ENGINE SECTION 1

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

FUEL INJECTION (FUEL SYSTEMS)	FU(H4SO)
EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)	EC(H4SO)
INTAKE (INDUCTION)	IN(H4SO)
MECHANICAL	ME(H4SO)
EXHAUST	EX(H4SO)
COOLING	CO(H4SO)
LUBRICATION	LU(H4SO)
SPEED CONTROL SYSTEMS	SP(H4SO)
IGNITION	IG(H4SO)
STARTING/CHARGING SYSTEMS	SC(H4SO)
ENGINE (DIAGNOSTICS)	EN(H4SO)(diag)
FUEL INJECTION (FUEL SYSTEMS)	FU(H4SOw/oOBD)
EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)	EC(H4SOw/oOBD)
INTAKE (INDUCTION)	IN(H4SOw/oOBD)
MECHANICAL	ME(H4SOw/oOBD)
EXHAUST	EX(H4SOw/oOBD)
COOLING	CO(H4SOw/oOBD)

FUJI HEAVY INDUSTRIES LTD.

ENGINE SECTION 1

LUBRICATION	LU(H4SOw/oOBD)
SPEED CONTROL SYSTEMS	SP(H4SOw/oOBD)
IGNITION	IG(H4SOw/oOBD)
STARTING/CHARGING SYSTEMS	SC(H4SOw/oOBD)
ENGINE (DIAGNOSTICS)	EN(H4SOw/oOBD) (diag)

FUEL INJECTION (FUEL SYSTEMS)

FU(H4SO)

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1. General Description

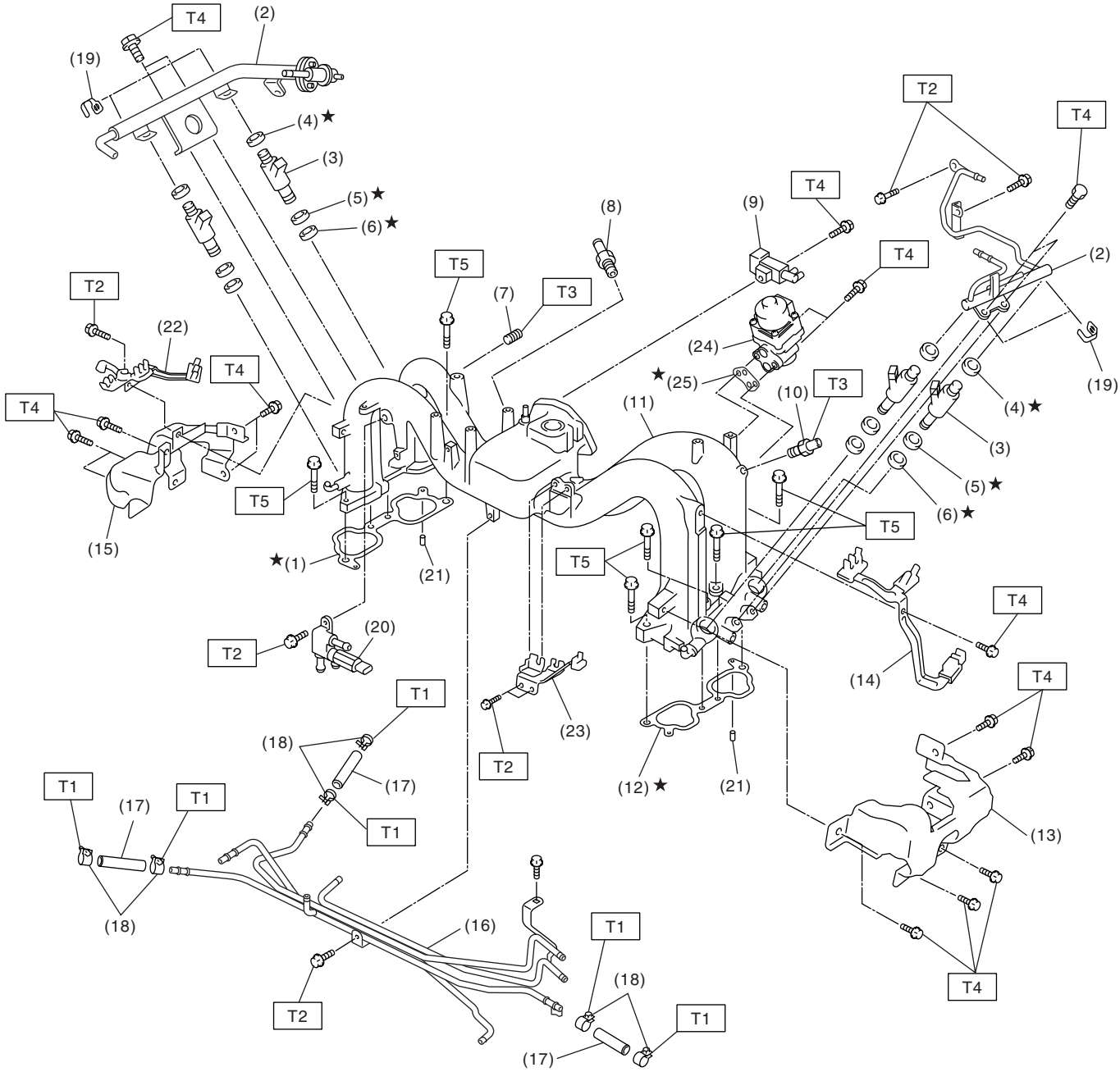
A: SPECIFICATION

Item		Specification
Fuel tank	Capacity	50 ℓ (13.2 US gal, 11.0 Imp gal)
	Location	Under rear seat
Fuel pump	Type	Impeller
	Shutoff discharge pressure	370 — 677 kPa (3.77 — 6.9 kgf/cm^2, 53.6 — 98 psi)
	Discharge flow	More than 65 ℓ (17.2 US gal, 14.3 Imp gal)/h [12 V at 300 kPa (3.06 kgf/cm^2, 43.5 psi)]
Fuel filter		Cartridge type

B: COMPONENT

1. INTAKE MANIFOLD

• 1.6 L MODEL

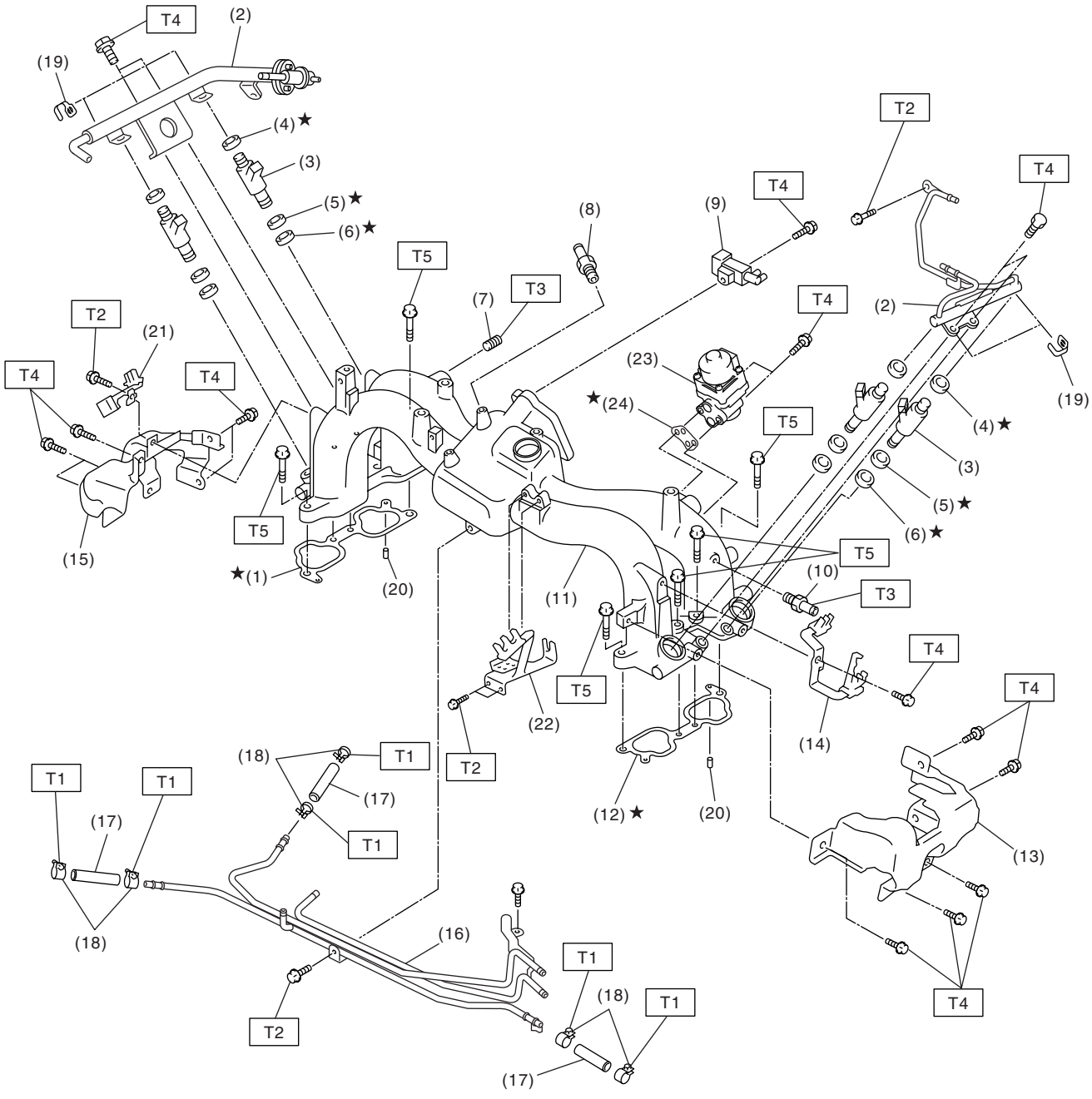


FU-02627

(1) Intake manifold gasket RH
(2) Fuel injector pipe
(3) Fuel injector
(4) O-ring
(5) O-ring
(6) O-ring
(7) Plug
(8) PCV valve
(9) Purge control solenoid valve
(10) Nipple
(11) Intake manifold
(12) Intake manifold gasket LH
(13) Fuel pipe protector LH
(14) Plug cord holder LH
(15) Fuel pipe protector RH
(16) Fuel pipe ASSY
(17) Fuel hose
(18) Clamp
(19) Clip
(20) Air assist injector solenoid valve
(21) Guide pin
(22) Plug cord holder RH
(23) Accelerator cable bracket
(24) EGR valve
(25) Gasket

Tightening torque: N·m (kgf-m, ft-lb)
T1: 1.25 (0.13, 0.94)
T2: 6.4 (0.65, 4.7)
T3: 17(1.7, 12.5)
T4: 19 (1.9, 14.0)
T5: 25 (2.5, 18.4)

• 2.0 L MODEL

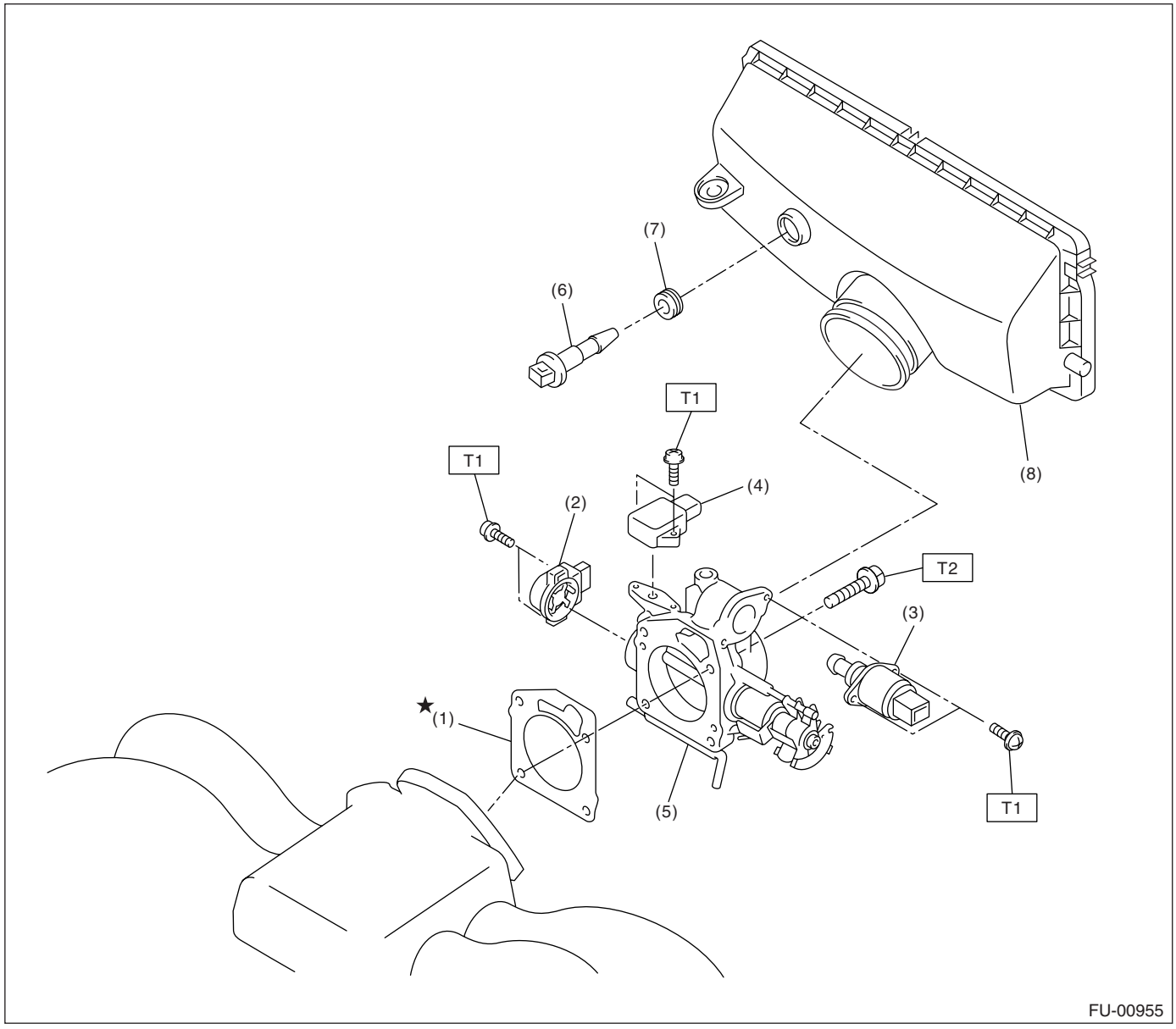


FU-02628

(1) Intake manifold gasket RH
(2) Fuel injector pipe
(3) Fuel injector
(4) O-ring
(5) O-ring
(6) O-ring
(7) Plug
(8) PCV valve
(9) Purge control solenoid valve
(10) Nipple
(11) Intake manifold
(12) Intake manifold gasket LH
(13) Fuel pipe protector LH
(14) Plug cord holder LH
(15) Fuel pipe protector RH
(16) Fuel pipe ASSY
(17) Fuel hose
(18) Clamp
(19) Clip
(20) Guide pin
(21) Plug cord holder RH
(22) Accelerator cable bracket
(23) EGR valve
(24) Gasket

Tightening torque: N·m (kgf-m, ft-lb)
T1: 1.25 (0.13, 0.94)
T2: 6.4 (0.65, 4.7)
T3: 17 (1.7, 12.5)
T4: 19 (1.9, 13.7)
T5: 25 (2.5, 18.1)

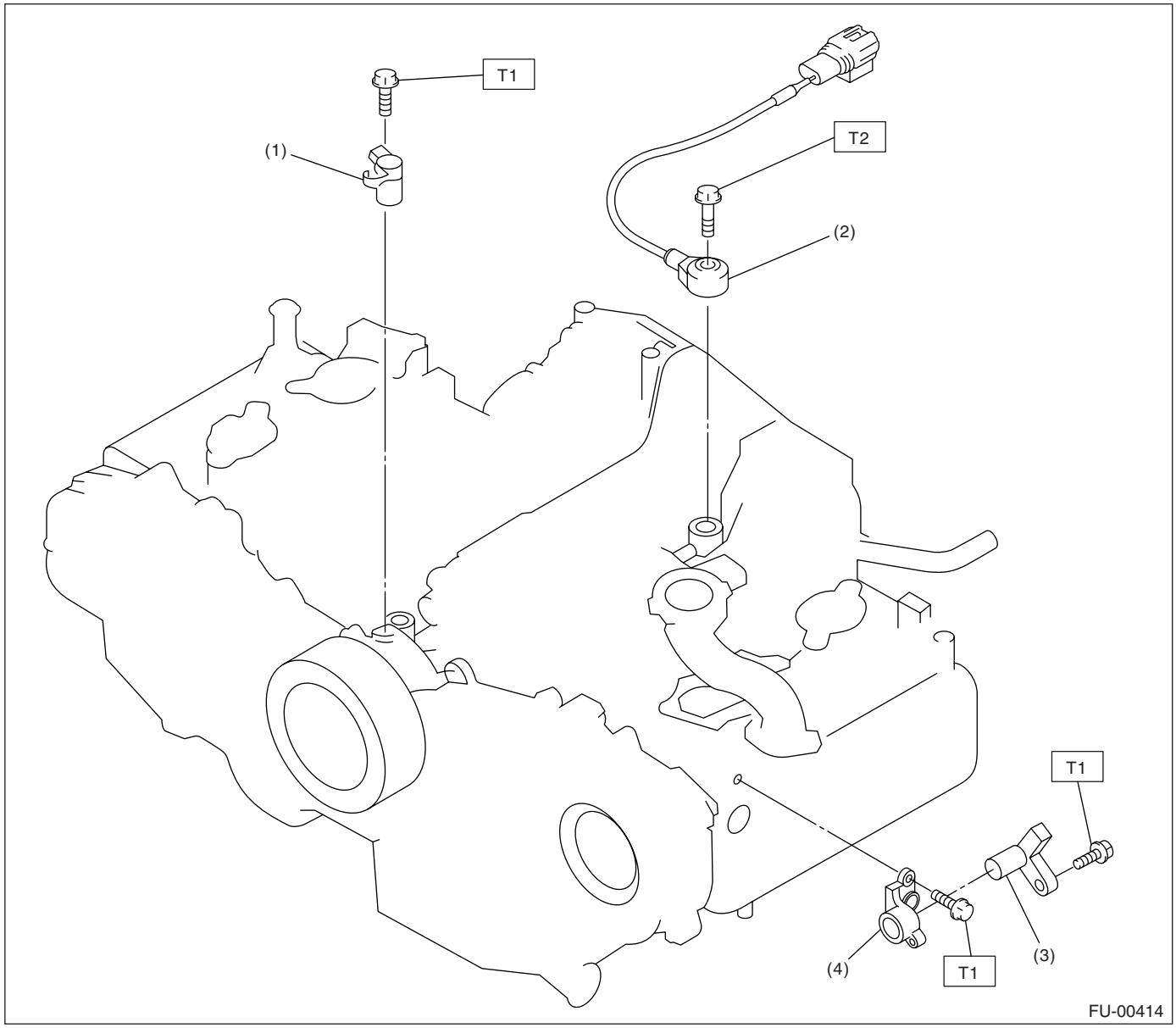
2. AIR INTAKE SYSTEM



(1) Gasket
(2) Throttle position sensor
(3) Idle air control solenoid valve
(4) Manifold absolute pressure sensor
(5) Throttle body
(6) Intake air temperature sensor
(7) Grommet
(8) Air cleaner case

Tightening torque: N·m (kgf-m, ft-lb)
T1: 1.6 (0.16, 1.2)
T2: 22 (2.2, 15.9)

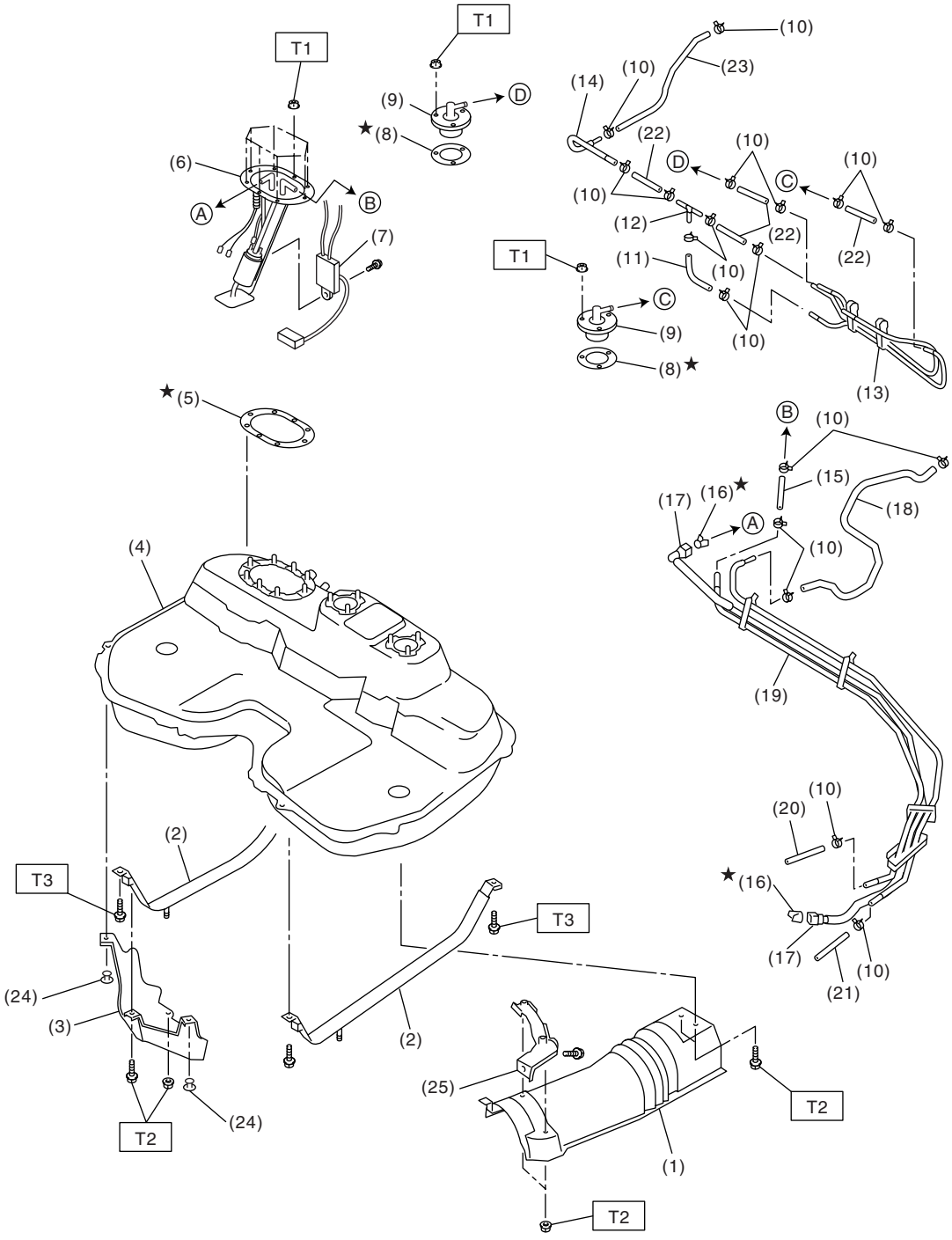
3. CRANKSHAFT POSITION, CAMSHAFT POSITION AND KNOCK SENSORS



(1) Crankshaft position sensor
(2) Knock sensor
(3) Camshaft position sensor
(4) Camshaft position sensor support

Tightening torque: N·m (kgf-m, ft-lb)
T1: 6.4 (0.65, 4.7)
T2: 24 (2.4, 17.4)

4. FUEL TANK

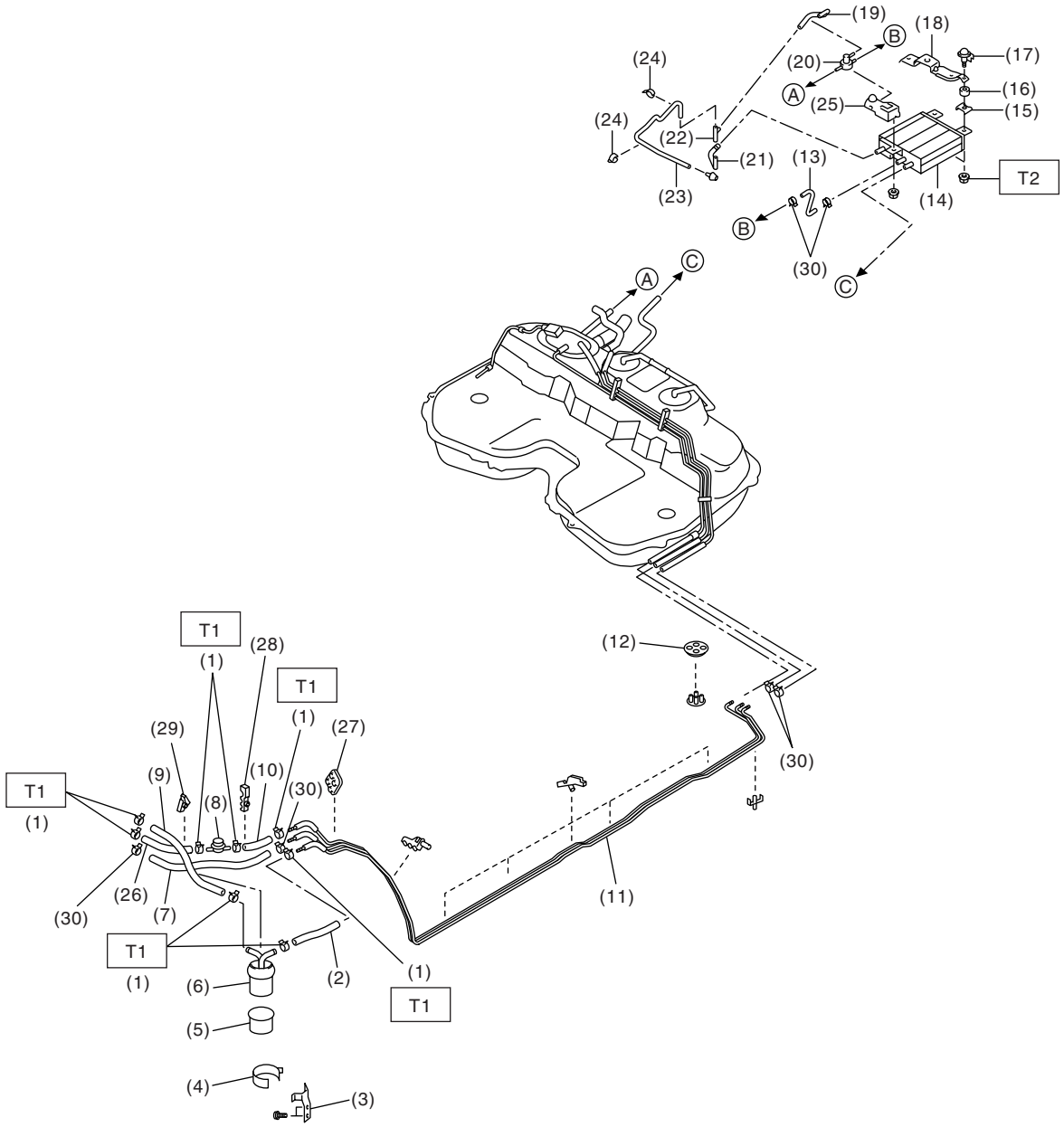


FU-02623

(1) Heat shield cover
(2) Fuel tank band
(3) Protector RH
(4) Fuel tank
(5) Fuel pump gasket
(6) Fuel pump ASSY
(7) Fuel level sensor
(8) Fuel cut valve gasket
(9) Fuel cut valve
(10) Clip
(11) Evaporation hose A
(12) Joint pipe
(13) Evaporation pipe ASSY
(14) Evaporation pipe
(15) Fuel return hose A
(16) Retainer
(17) Quick connector
(18) Evaporation hose B
(19) Fuel pipe ASSY
(20) Fuel return hose B
(21) Evaporation hose C
(22) Evaporation hose D
(23) Evaporation hose E
(24) Clip
(25) Cover bracket

Tightening torque: N·m (kgf-m, ft-lb)
T1: 4.4 (0.45, 3.3)
T2: 7.4 (0.75, 5.4)
T3: 33 (3.4, 24.3)

5. FUEL LINE

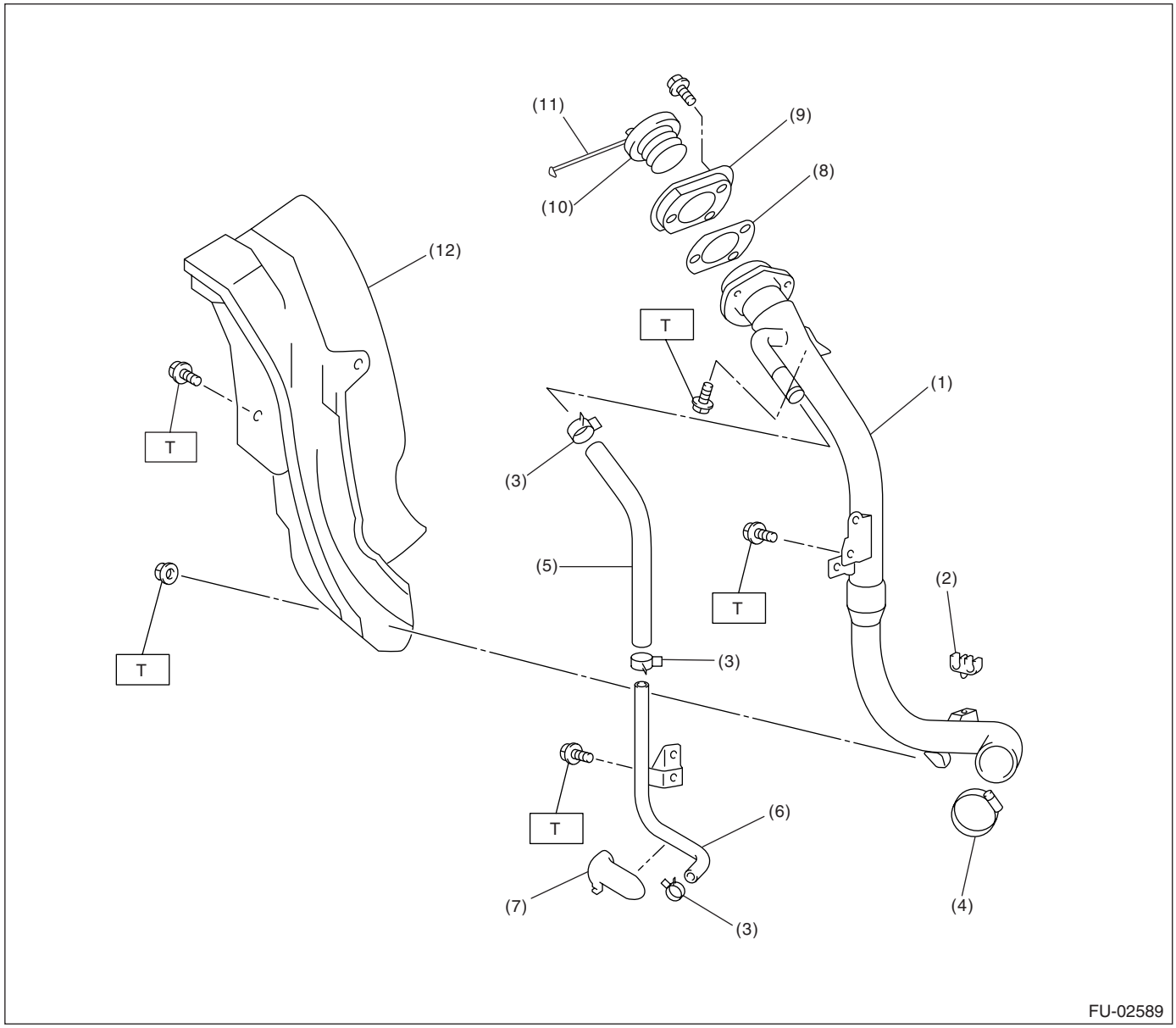


FU-02625

(1) Clamp
(2) Fuel delivery hose A
(3) Fuel filter bracket
(4) Fuel filter holder
(5) Fuel filter cup
(6) Fuel filter
(7) Evaporation hose
(8) Fuel damper
(9) Fuel delivery hose B
(10) Fuel return hose A
(11) Fuel pipe ASSY
(12) Grommet A
(13) Canister hose
(14) Canister
(15) Canister bracket plate
(16) Cushion
(17) Canister bracket spacer
(18) Rear canister bracket
(19) Two-way valve hose
(20) Two-way valve
(21) Canister drain hose
(22) Connector
(23) Drain hose
(24) Clamp
(25) Front canister bracket
(26) Fuel return hose B
(27) Grommet B
(28) Clip
(29) Clip
(30) Clip

Tightening torque: N·m (kgf-m, ft-lb)
T1: 1.25 (0.13, 0.94)
T2: 23 (2.3, 17.0)

6. FUEL FILLER PIPE



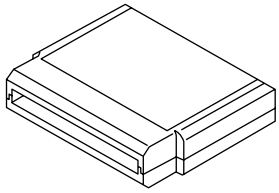
(1) Fuel filler pipe ASSY
(2) Evaporation hose holder
(3) Clip
(4) Clamp
(5) Air vent hose
(6) Air vent pipe
(7) Air vent pipe holder
(8) Filler pipe packing
(9) Filler ring
(10) Filler cap
(11) Filler cap tether
(12) Filler pipe protector

Tightening torque: N·m (kgf-m, ft-lb)
T: 7.4 (0.75, 5.4)

C: CAUTION

- Wear working clothing, including a cap, protective goggles and protective shoes during operation.
- Remove contamination including dirt and corrosion before removal, installation or disassembly.
- Keep the disassembled parts in order and protect them from dust or dirt.
- Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly, and replacement.
- Be careful not to burn, because each part on the vehicle is hot after running.
- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or rigid racks at the specified points.
- Before disconnecting electrical connectors of sensors or units, be sure to disconnect the ground cable from battery.
- Place “NO FIRE” signs near the working area.
- Be careful not to spill fuel on the floor.

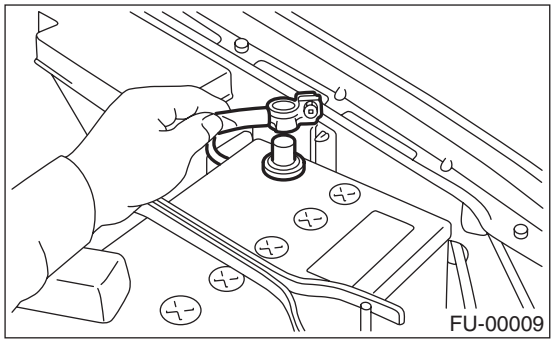
D: PREPARATION TOOL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18482AA000	18482AA000	CARTRIDGE	Troubleshooting for electrical system.
ST22771AA030	22771AA030	SUBARU SELECT MONITOR KIT	Troubleshooting for electrical systems. • English: 22771AA030 (Without printer) • German: 22771AA070 (Without printer) • French: 22771AA080 (Without printer) • Spanish: 22771AA090 (Without printer)

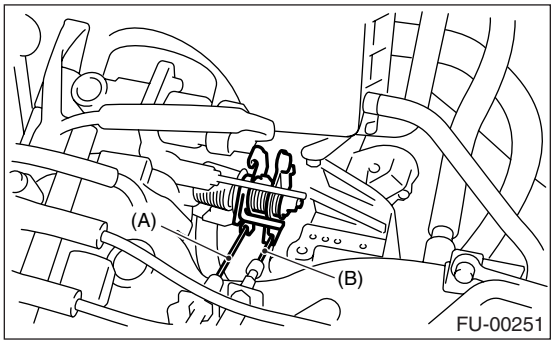
2. Throttle Body

A: REMOVAL

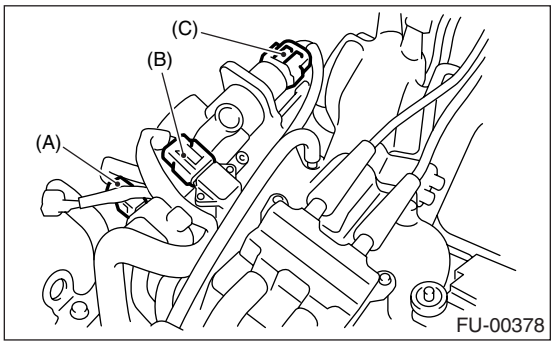
1) Disconnect the ground cable from battery.



2) Remove the air cleaner case. <Ref. to IN(H4SO)-5, REMOVAL, Air Cleaner Case.>
3) Disconnect the accelerator cable (A).
4) Disconnect the cruise control cable (B). (With cruise control model)

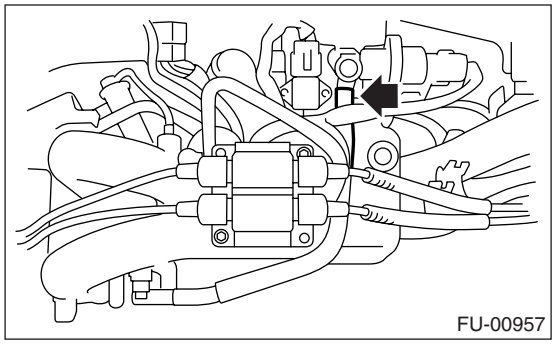


5) Disconnect the connectors from the idle air control solenoid valve, throttle position sensor and manifold absolute pressure sensor.

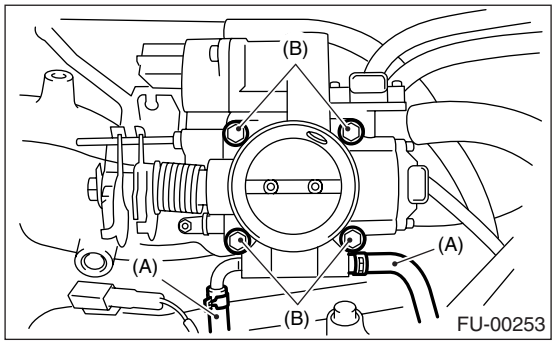


(A) Throttle position sensor
(B) Manifold absolute pressure sensor
(C) Idle air control solenoid valve

6) Disconnect the air by-pass hose from throttle body. (1.6 L model)



7) Disconnect the engine coolant hoses (A) from throttle body.
8) Remove the bolts (B) which install the throttle body to intake manifold.



B: INSTALLATION

1) Install in the reverse order of removal.

NOTE:
Use a new gasket.

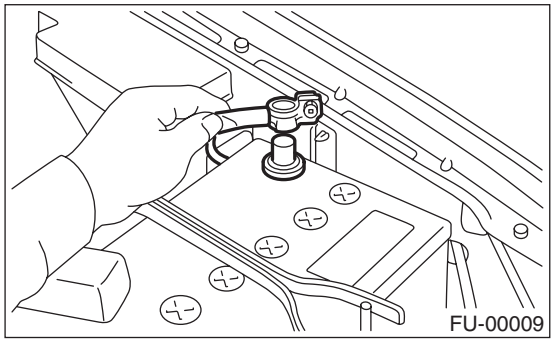
Tightening torque:
Throttle body
22 N·m (2.2 kgf-m, 15.9 ft-lb)

2) Adjust the accelerator cable play. <Ref. to SP(H4SO)-9, INSTALLATION, Accelerator Control Cable.>

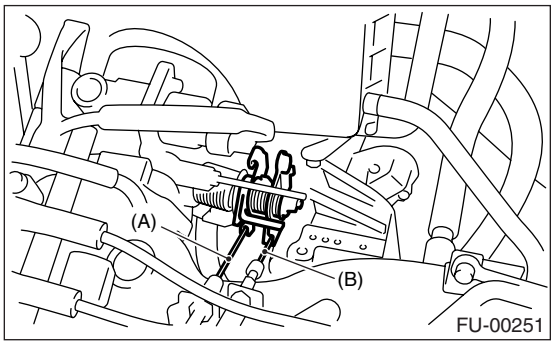
3. Intake Manifold

A: REMOVAL

1) Release the fuel pressure. <Ref. to FU(H4SO)-50, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
2) Open the fuel filler flap lid, and then remove the fuel filler cap.
3) Disconnect the ground cable from battery.

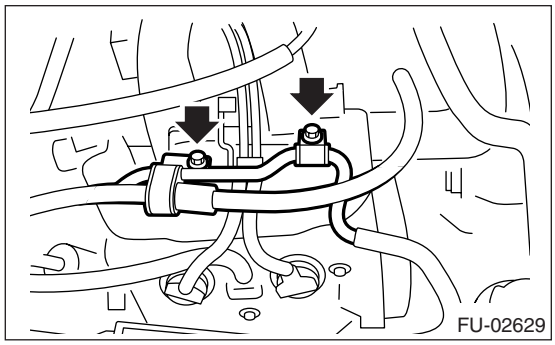


4) Remove the air intake duct and air cleaner case. <Ref. to IN(H4SO)-6, REMOVAL, Air Intake Duct.> and <Ref. to IN(H4SO)-5, REMOVAL, Air Cleaner Case.>
5) Disconnect the accelerator cable (A).
6) Disconnect the cruise control cable (B). (With cruise control model)

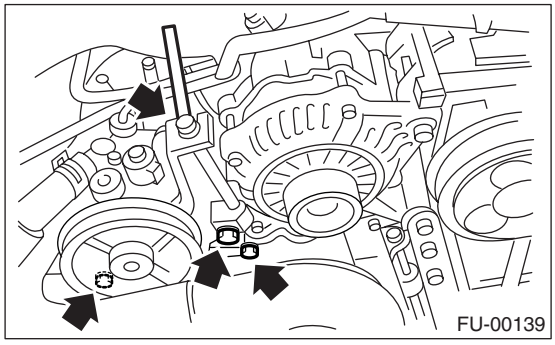


7) Remove the power steering pump and reservoir tank from bracket.
   (1) Remove the resonator chamber. <Ref. to IN(H4SO)-7, REMOVAL, Resonator Chamber.>
   (2) Remove the front side V-belt. <Ref. to ME(H4SO)-41, REMOVAL, V-belt.>
   (3) Remove the bolts which hold the power steering pipes onto intake manifold protector.

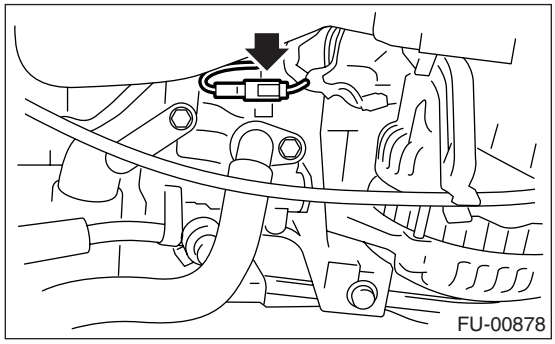
NOTE:
Do not disconnect the power steering hose.



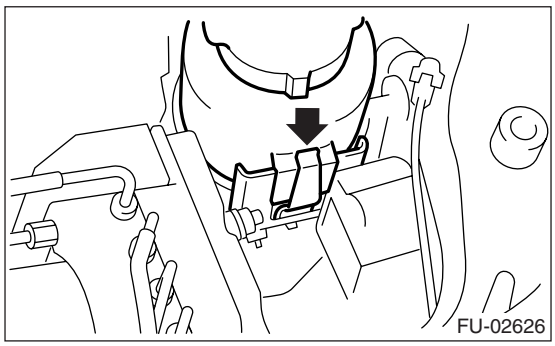
(4) Remove the bolts which install the power steering pump bracket.



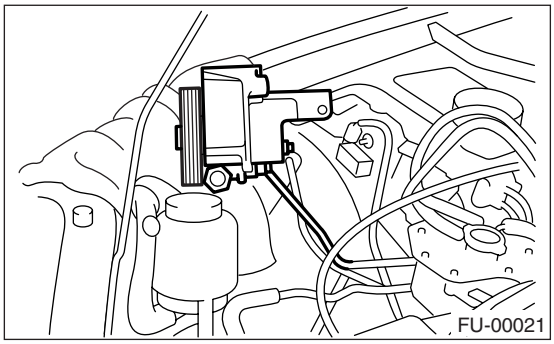
(5) Disconnect the connector from the power steering pump switch.



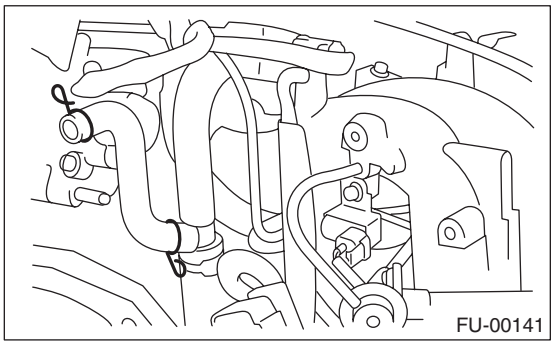
(6) Remove the power steering tank from the bracket by pulling it upwards.



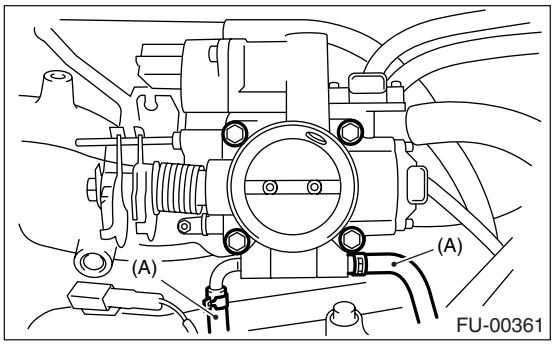
(7) Place the power steering pump on the right side wheel apron.



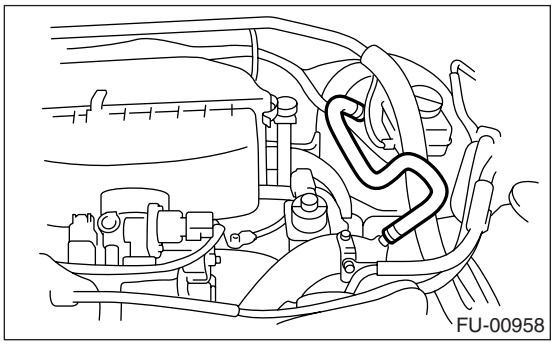
8) Disconnect the spark plug cords from spark plugs.
9) Disconnect the PCV hose from intake manifold.



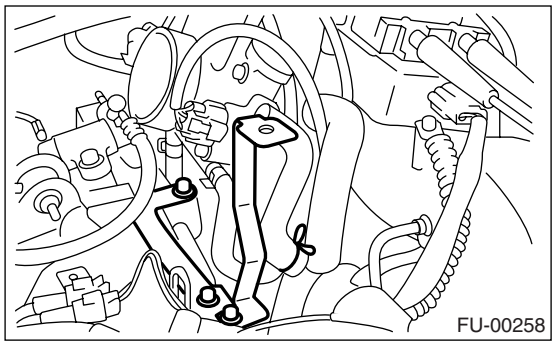
10) Disconnect the engine coolant hose (A) from throttle body.



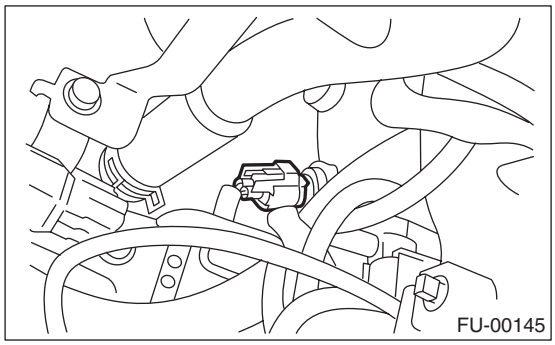
11) Disconnect the brake booster hose.



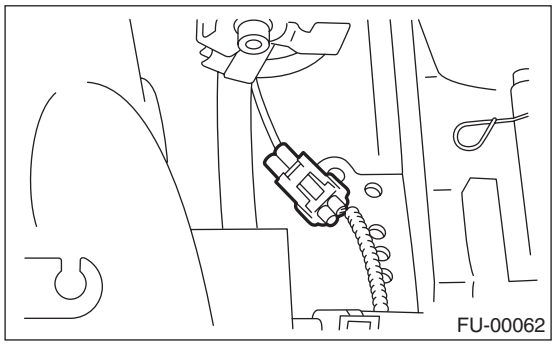
12) Remove the air cleaner case stay RH and engine harness bracket, and then disconnect the engine harness connectors from the bulkhead harness connectors.



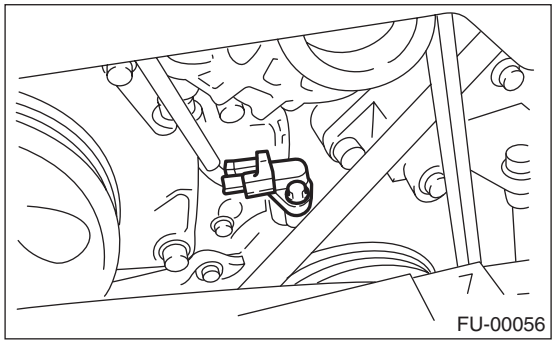
13) Disconnect the connectors from the engine coolant temperature sensor.



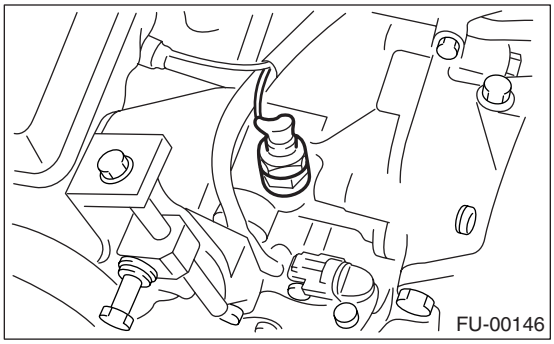
14) Disconnect the knock sensor connector.



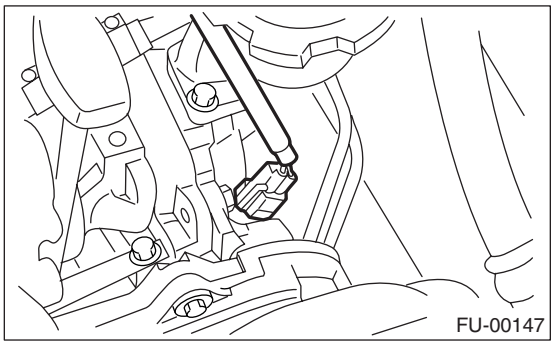
15) Disconnect the connector from the crankshaft position sensor.



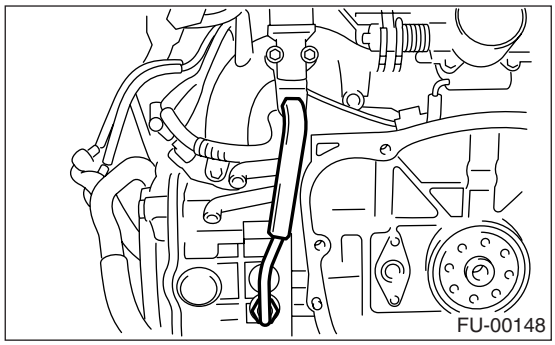
16) Disconnect the connector from the oil pressure switch.



17) Disconnect the connector from the camshaft position sensor.

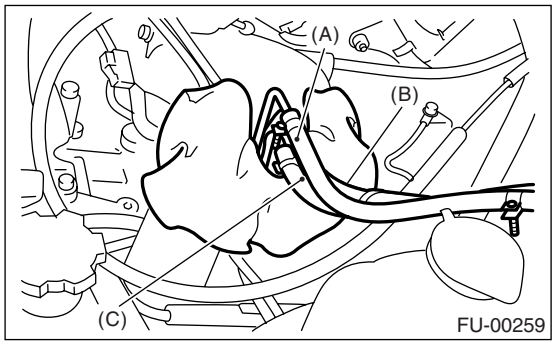


18) Remove the EGR pipe from intake manifold.



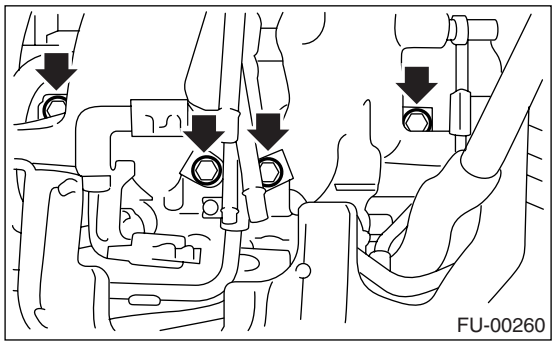
19) Disconnect the fuel hoses from fuel pipes.

WARNING:
- **Do not spill fuel.**
- **Catch fuel from hoses in a container or cloth.**



(A) Fuel delivery hose
(B) Return hose
(C) Evaporation hose

20) Remove the bolts which hold the intake manifold onto cylinder heads.



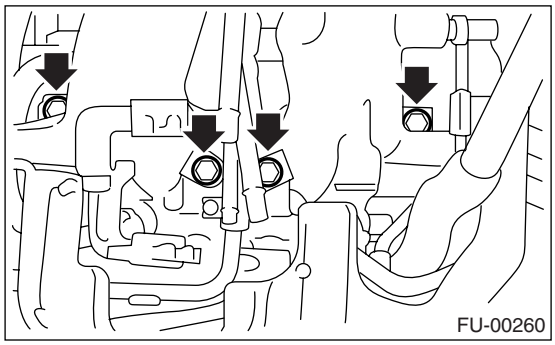
21) Remove the intake manifold.

B: INSTALLATION

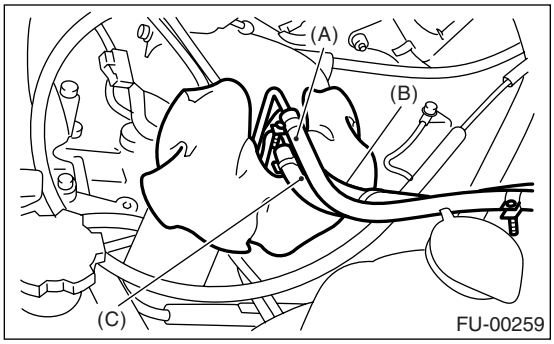
1) Install the intake manifold onto cylinder heads.

NOTE:
Use a new gasket.

Tightening torque:
25 N·m (2.5 kgf-m, 18.4 ft-lb)



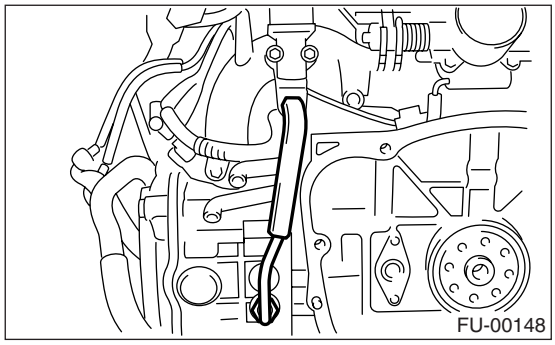
2) Connect the fuel hoses.



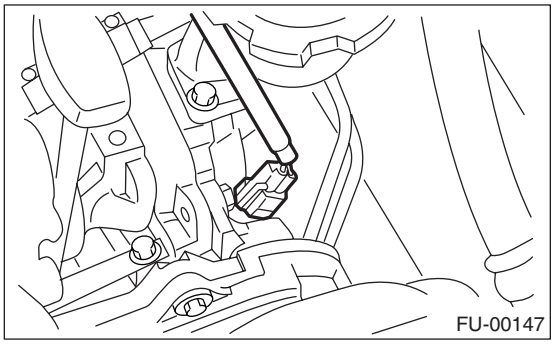
(A) Fuel delivery hose
(B) Return hose
(C) Evaporation hose

3) Connect the EGR pipe to intake manifold.

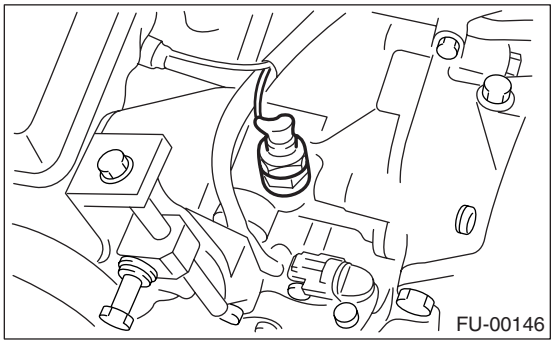
Tightening torque:
34 N·m (3.5 kgf-m, 25.1 ft-lb)



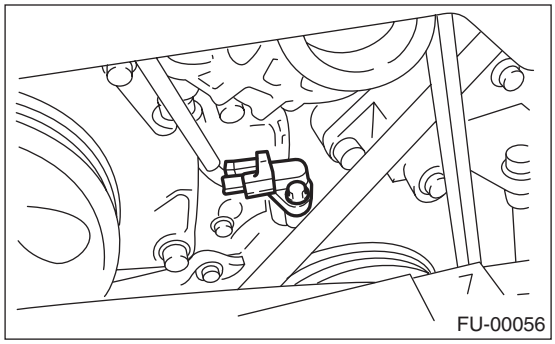
4) Connect the connector to the camshaft position sensor.



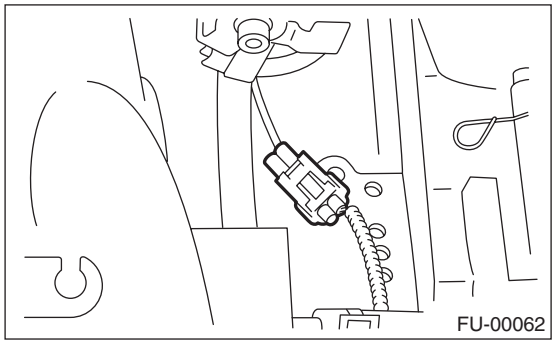
5) Connect the connector to the oil pressure switch.



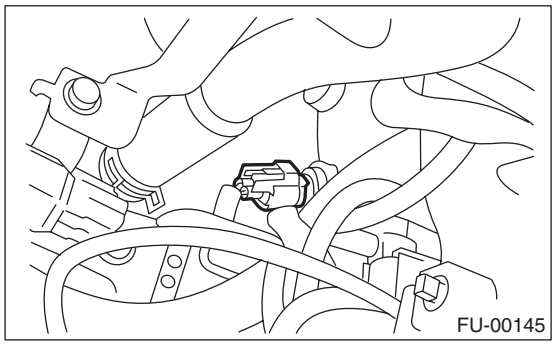
6) Connect the connector to the crankshaft position sensor.



7) Connect the knock sensor connector.

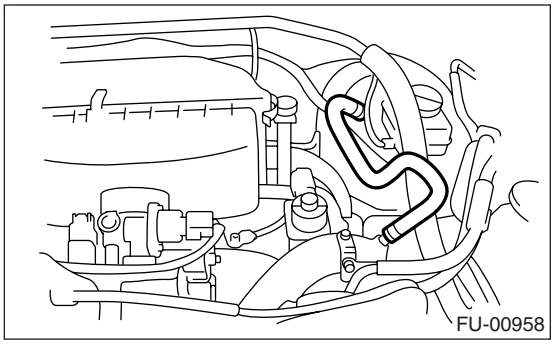


8) Connect the connectors to the engine coolant temperature sensor.

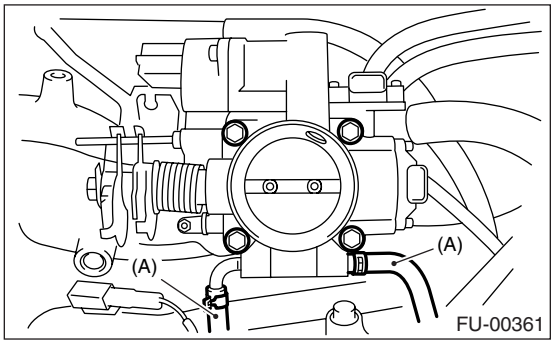


9) Install the air cleaner case stay RH and engine harness bracket, and connect the engine harness connectors to bulkhead connectors.

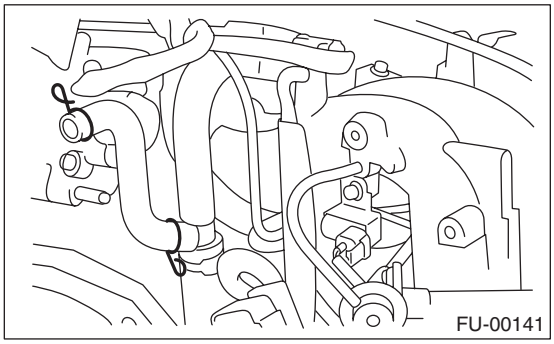
10) Connect the brake booster hose.



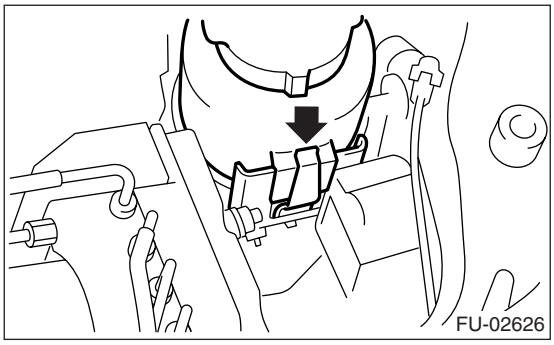
11) Connect the engine coolant hose (A) to throttle body.



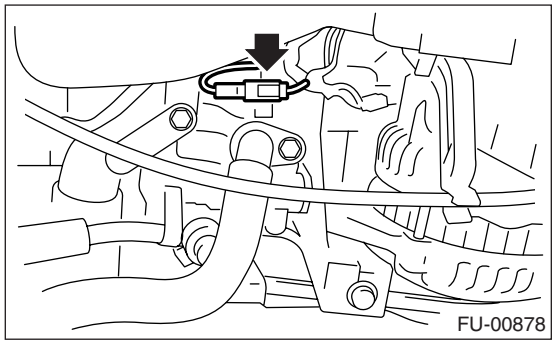
12) Connect the PCV hose to intake manifold.



13) Connect the spark plug cords to spark plugs.
14) Install the power steering pump and reservoir tank to bracket.
(1) Install the reservoir tank to bracket.

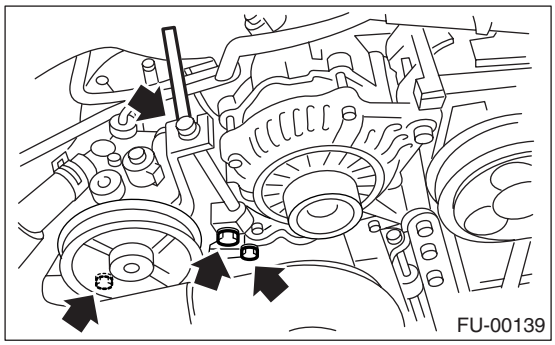


(2) Connect the connector to the power steering pump switch.

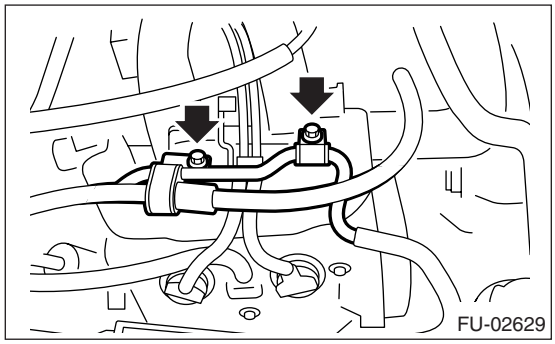


(3) Tighten the bolts which install the power steering pump bracket.

Tightening torque:
22 N·m (2.2 kgf-m, 15.9 ft-lb)

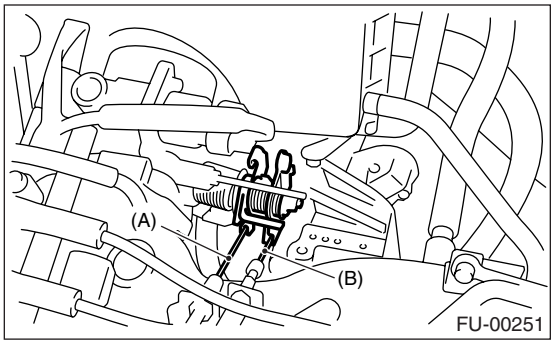


(4) Install the power steering pipes onto the right side intake manifold protector RH.

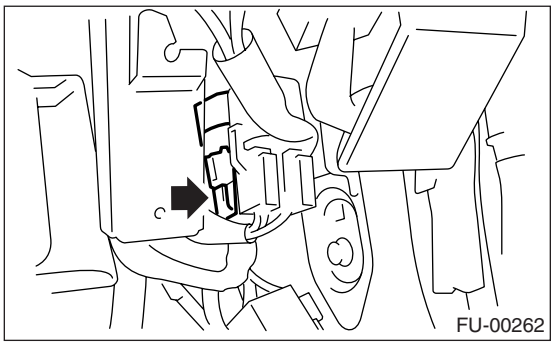


(5) Install the front side V-belt. <Ref. to ME(H4SO)-41, INSTALLATION, V-belt.>
(6) Install the resonator chamber. <Ref. to IN(H4SO)-7, INSTALLATION, Resonator Chamber.>
15) Connect the accelerator cable (A). <Ref. to SP(H4SO)-9, INSTALLATION, Accelerator Control Cable.>

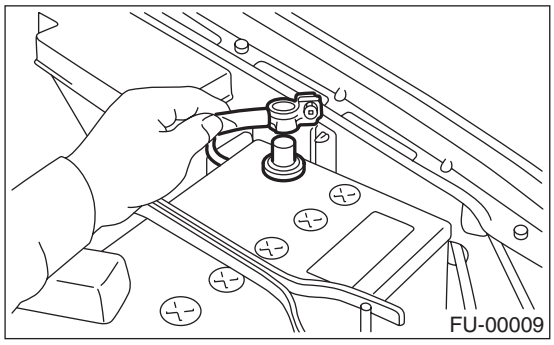
16) Connect the cruise control cable (B). (With cruise control model)



17) Install the air intake duct and air cleaner case. <Ref. to IN(H4SO)-6, INSTALLATION, Air Intake Duct.> and <Ref. to IN(H4SO)-5, INSTALLATION, Air Cleaner Case.>
18) Connect the connector to the fuel pump relay.

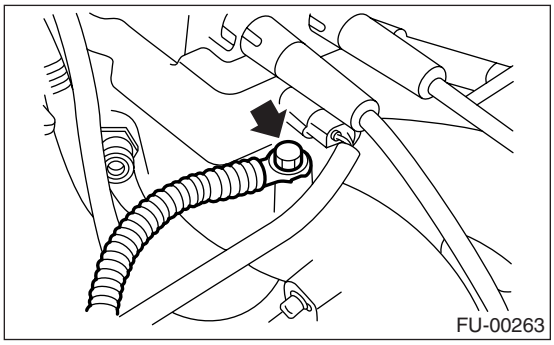


19) Connect the battery ground cable to battery.

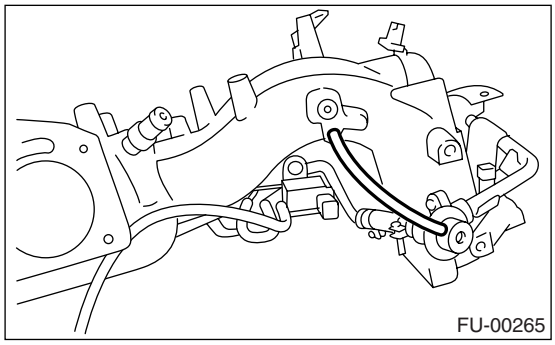


C: DISASSEMBLY

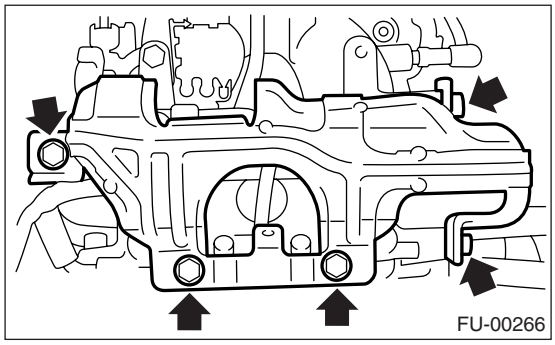
1) Disconnect the engine ground terminal from intake manifold.



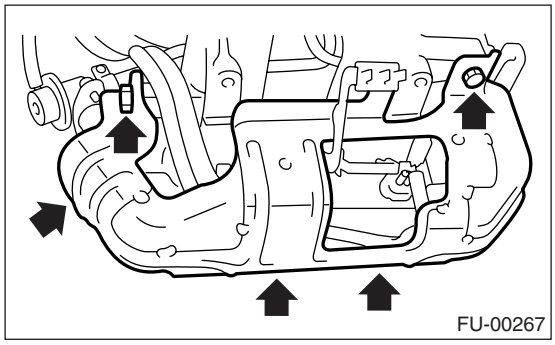
2) Disconnect the ignition coil and ignitor assembly. <Ref. to IG(H4SO)-8, REMOVAL, Ignition Coil and Ignitor Assembly.>
3) Remove the throttle body. <Ref. to FU(H4SO)-15, REMOVAL, Throttle Body.>
4) Remove the EGR valve. <Ref. to FU(H4SO)-36, REMOVAL, EGR Valve.>
5) Remove the air assist injector solenoid valve. (1.6 L model) <Ref. to FU(H4SO)-37, REMOVAL, Air Assist Injector Solenoid Valve.>
6) Disconnect the pressure regulator vacuum hose from intake manifold.



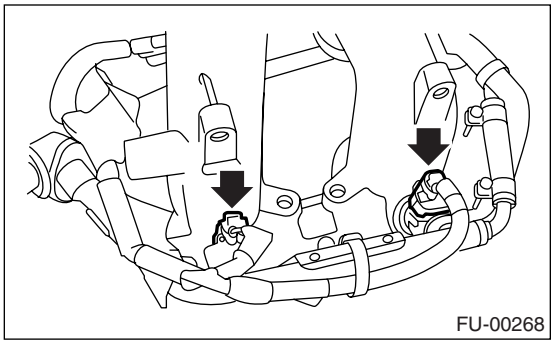
7) Remove the fuel pipe protector LH.



8) Remove the fuel pipe protector RH.

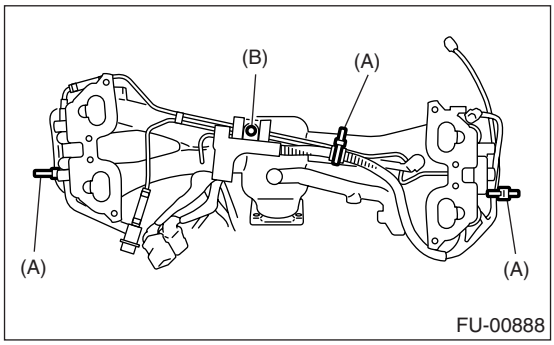


9) Disconnect the connectors from fuel injectors.



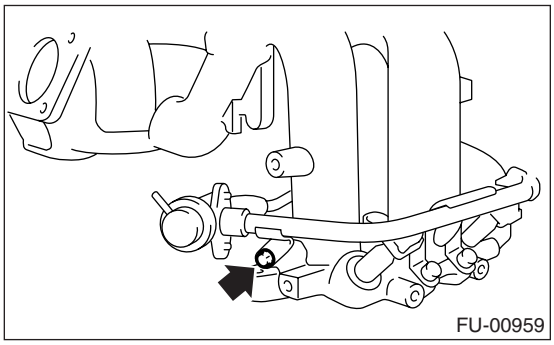
10) Disconnect the purge control solenoid valve. <Ref. to EC(H4SO)-7, REMOVAL, Purge Control Solenoid Valve.>

11) Remove the harness bands (A) and bolts (B) which hold the engine harness onto intake manifold.

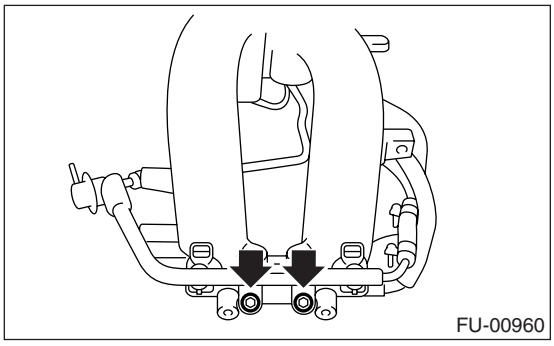


12) Remove the engine harness from the intake manifold.

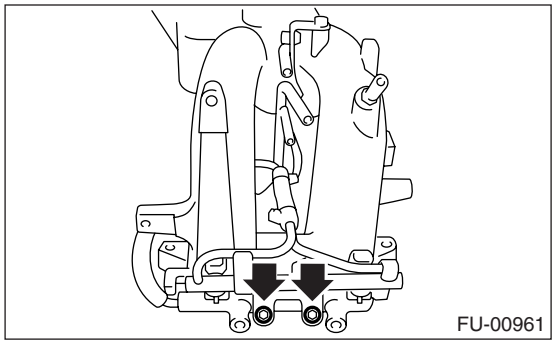
13) Remove the bolt which installs the fuel injector pipe on the intake manifold as shown in the figure.



- RH SIDE

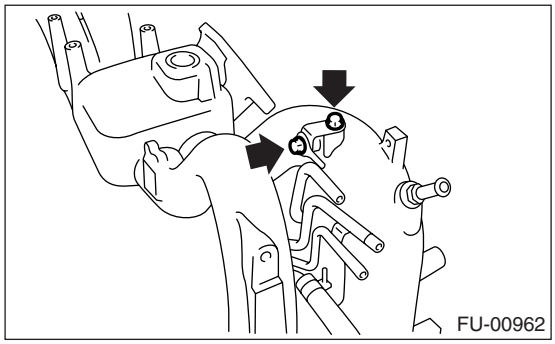


- LH SIDE

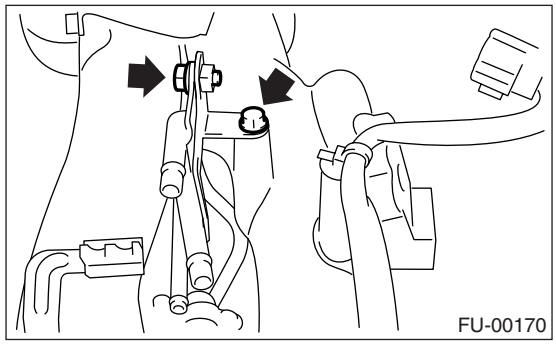


14) Remove the two bolts which hold the fuel pipes on intake manifold.

- 1.6 L MODEL

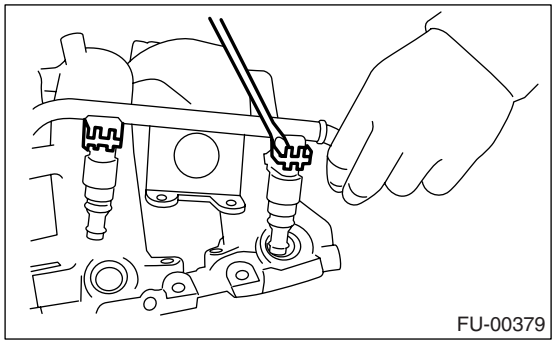


- 2.0 L MODEL

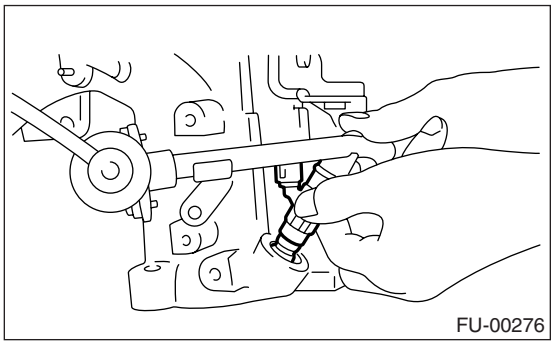


15) Remove the fuel injectors.

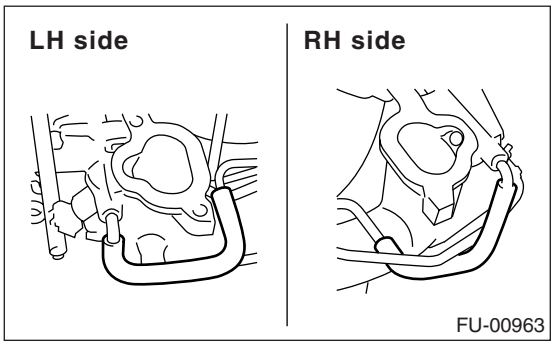
(1) Remove the fuel injector securing clip.



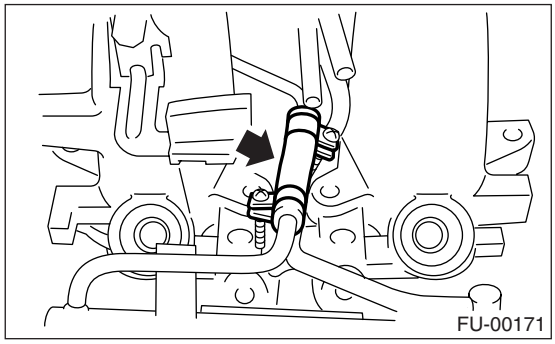
(2) Remove the fuel injector while lifting up the fuel injector pipe.



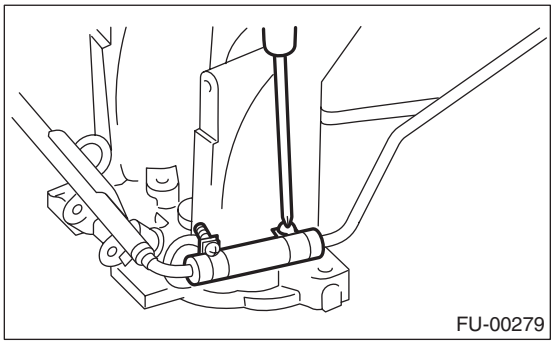
16) Disconnect the air by-pass hose from intake manifold. (1.6 L model)



17) Loosen the clamp which holds the fuel injector pipe LH to fuel hose, and then remove the pipe from fuel hose.

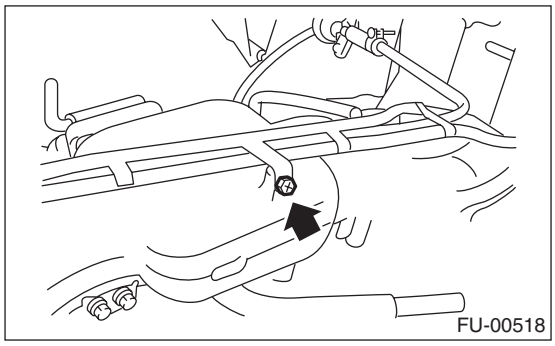


18) Loosen the clamp which holds the fuel injector pipe RH to fuel hose, and then remove the pipe from fuel hose.



19) Remove the fuel injector pipe.

20) Remove the bolt which installs the fuel pipes on intake manifold.

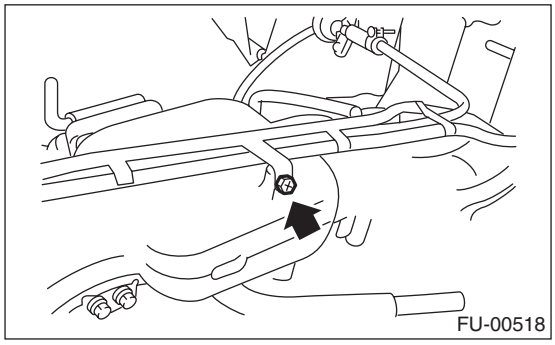


21) Remove the fuel pipe assembly and pressure regulator, from intake manifold.

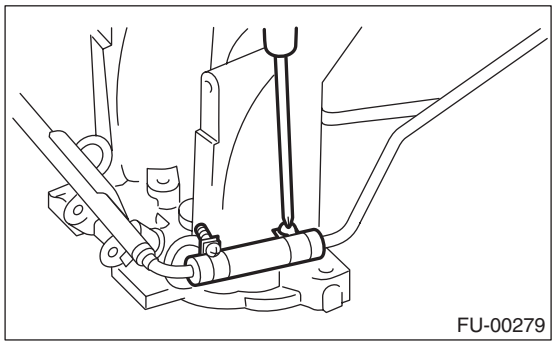
D: ASSEMBLY

1) Install the fuel pipe assembly and pressure regulator, etc. to intake manifold.
2) Tighten the bolt which installs the fuel pipes on intake manifold.

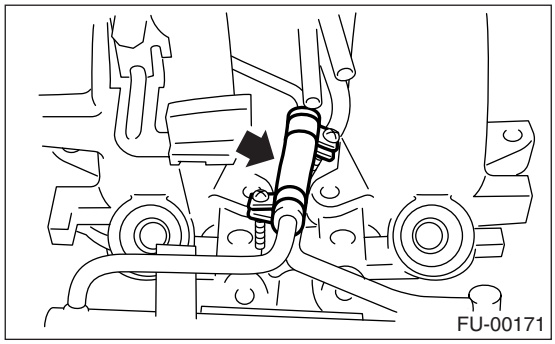
Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



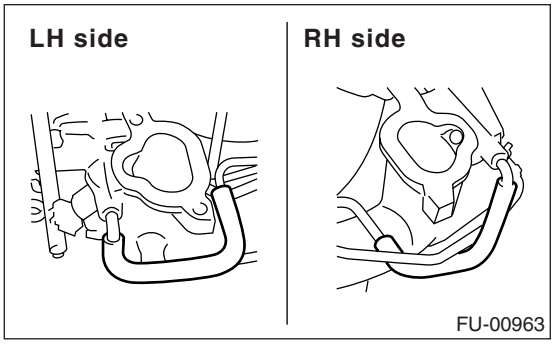
3) Connect the fuel injector pipe RH to fuel hose, and then tighten the clamp screw.



4) Connect the fuel injector pipe LH to fuel hose, and then tighten the clamp screw.

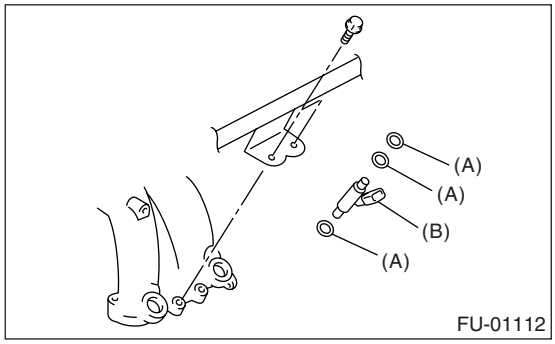


5) Connect the air by-pass hose. (1.6 L model)



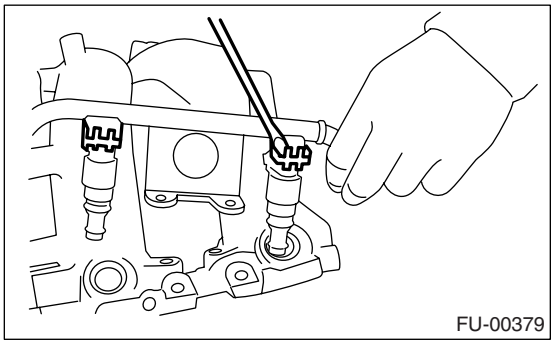
6) Install the fuel injectors.

NOTE:
Use new O-rings.



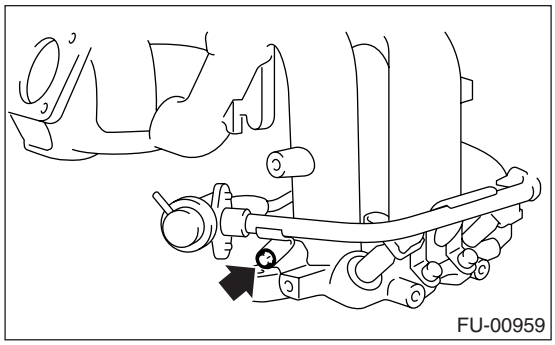
(A) O-ring
(B) Fuel injector

NOTE:
Do not forget to install the fuel injector securing clip.



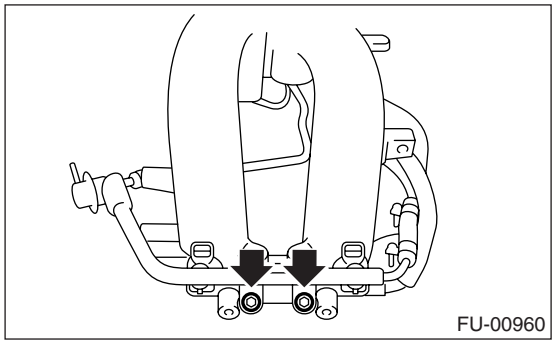
7) Tighten the bolt which installs the injector pipe on intake manifold.

Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)

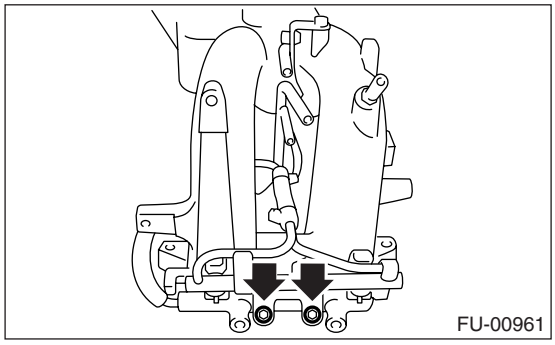


Tightening torque:
19 N·m (1.9 kgf-m, 14.0 ft-lb)

- RH SIDE



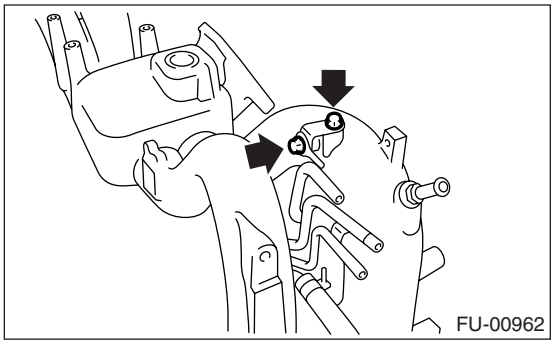
- LH SIDE



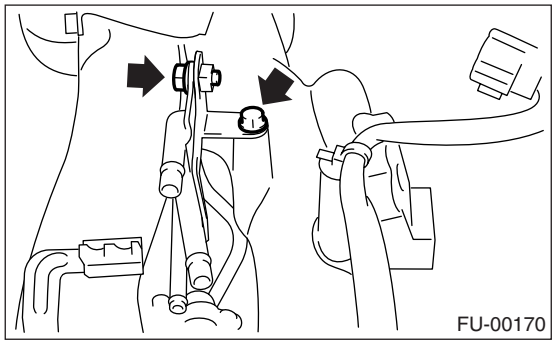
8) Tighten the two bolts which install the fuel pipes on intake manifold.

Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)

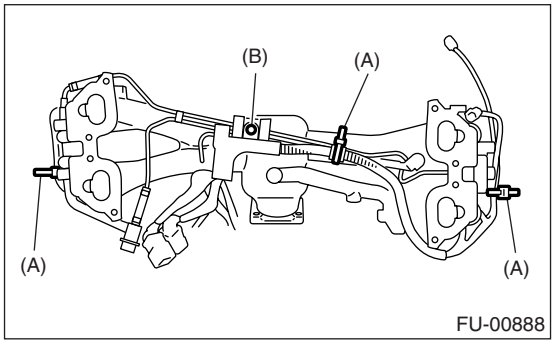
- 1.6 L MODEL



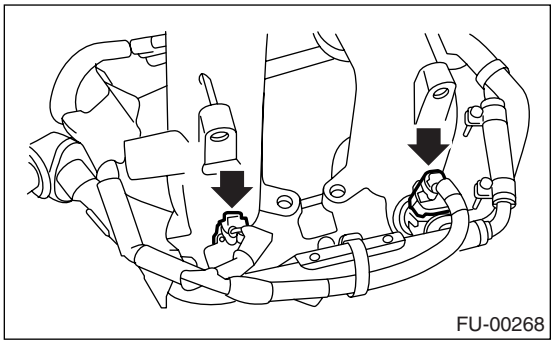
- 2.0 L MODEL



9) Install the engine harness onto intake manifold.
10) Hold the engine harness by harness bands (A) and bolts (B).

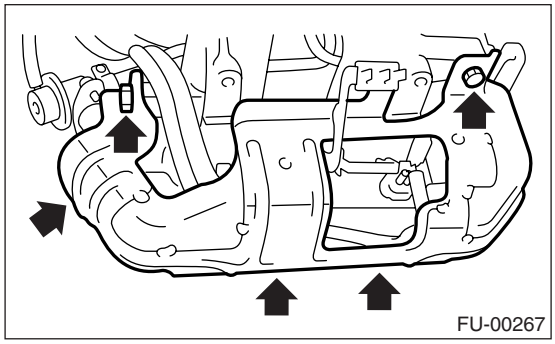


11) Connect the connector to fuel injector.



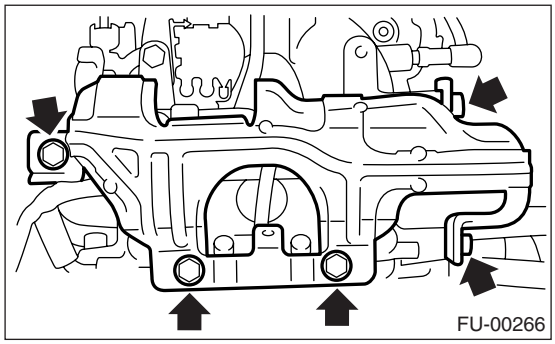
12) Install the fuel pipe protector RH.

Tightening torque:
19 N·m (1.9 kgf-m, 14.0 ft-lb)

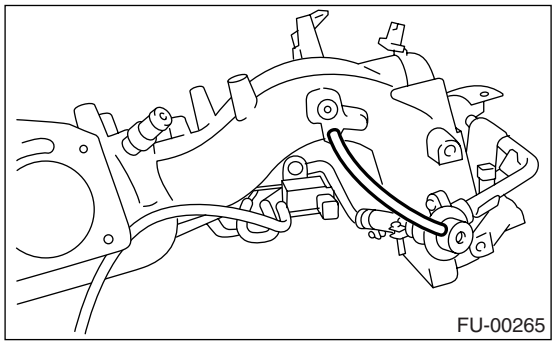


13) Install the fuel pipe protector LH.

Tightening torque:
19 N·m (1.9 kgf-m, 14.0 ft-lb)



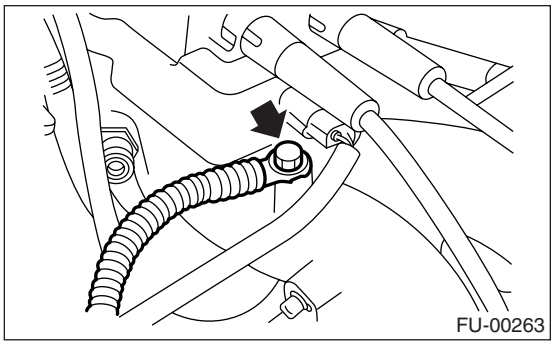
14) Install the purge control solenoid valve. <Ref. to EC(H4SO)-7, INSTALLATION, Purge Control Solenoid Valve.>
15) Connect the pressure regulator vacuum hose to intake manifold.



16) Install the air assist injector solenoid valve. (1.6 L model) <Ref. to FU(H4SO)-37, INSTALLATION, Air Assist Injector Solenoid Valve.>
17) Install the EGR valve. <Ref. to FU(H4SO)-36, INSTALLATION, EGR Valve.>
18) Install the throttle body to intake manifold. <Ref. to FU(H4SO)-15, INSTALLATION, Throttle Body.>
19) Install the ignition coil and ignitor assembly. <Ref. to IG(H4SO)-8, INSTALLATION, Ignition Coil and Ignitor Assembly.>

20) Install the engine ground terminal to intake manifold.

Tightening torque:
19 N·m (1.9 kgf-m, 14.0 ft-lb)



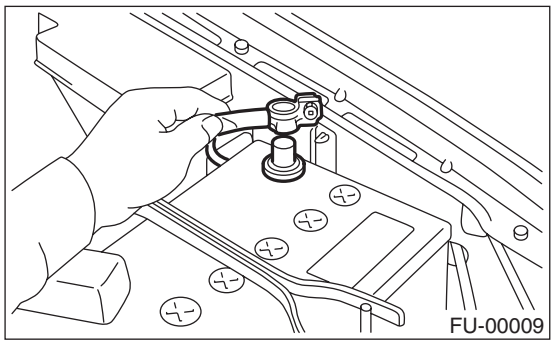
E: INSPECTION

Make sure the fuel pipe and fuel hoses are not cracked and the connections are tightened firmly.

4. Engine Coolant Temperature Sensor

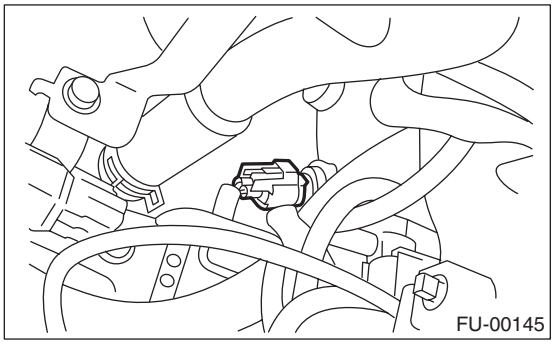
A: REMOVAL

1) Disconnect the ground cable from battery.



2) Remove the air intake duct and air cleaner case. <Ref. to IN(H4SO)-6, REMOVAL, Air Intake Duct.> and <Ref. to IN(H4SO)-5, REMOVAL, Air Cleaner Case.>

3) Disconnect the connector from the engine coolant temperature sensor.

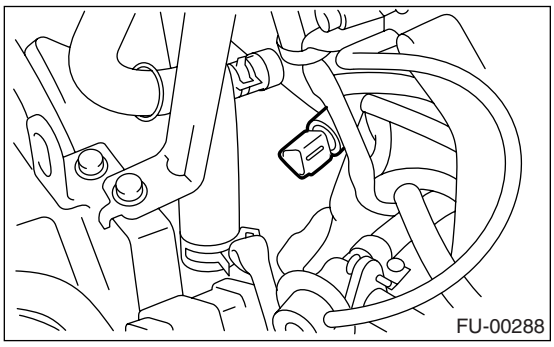


4) Remove the engine coolant temperature sensor.

B: INSTALLATION

Install in the reverse order of removal.

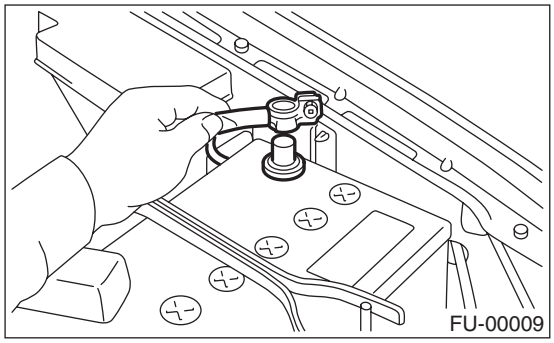
Tightening torque:
18 N·m (1.8 kgf-m, 13.0 ft-lb)



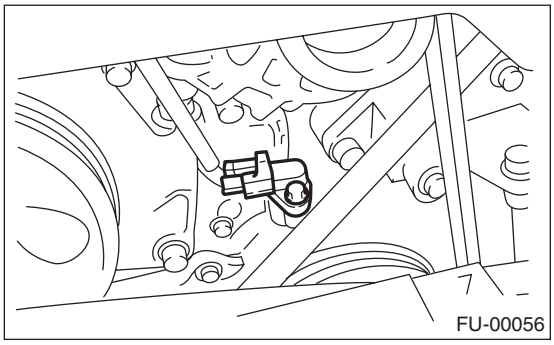
5. Crankshaft Position Sensor

A: REMOVAL

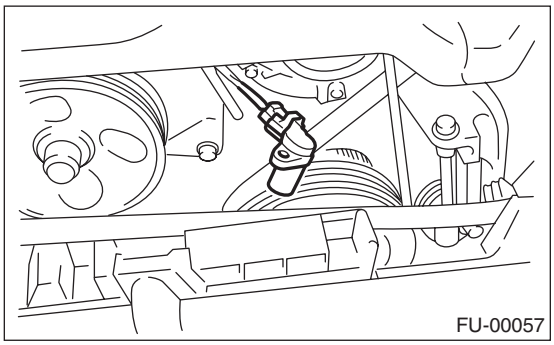
1) Disconnect the ground cable from battery.



2) Remove the bolt which installs the crankshaft position sensor to cylinder block.



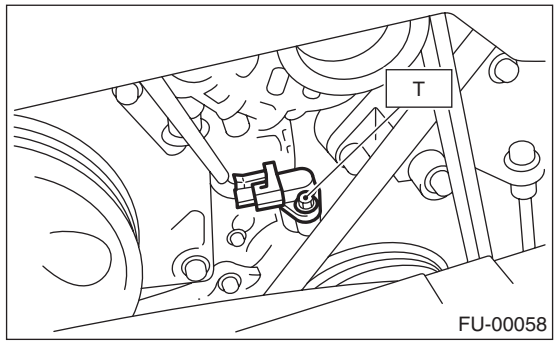
3) Remove the crankshaft position sensor, and then disconnect the connector from it.



B: INSTALLATION

Install in the reverse order of removal.

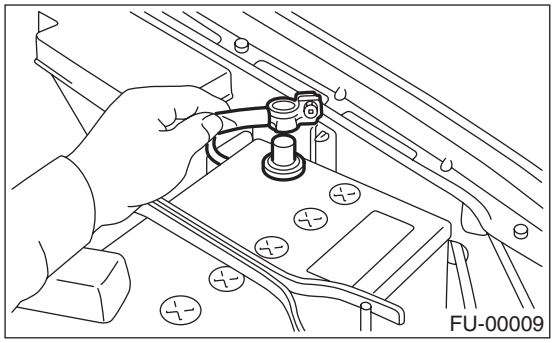
Tightening torque:
T: 6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



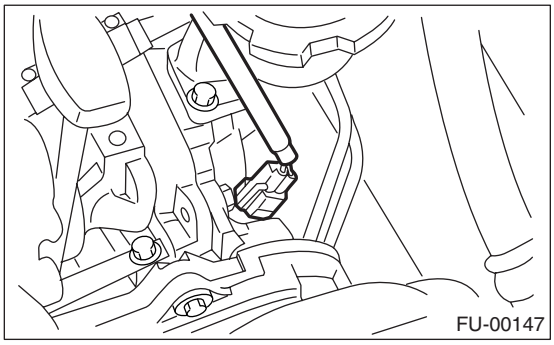
6. Camshaft Position Sensor

A: REMOVAL

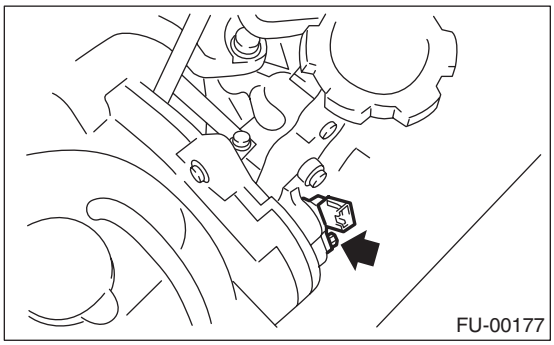
1) Disconnect the ground cable from battery.



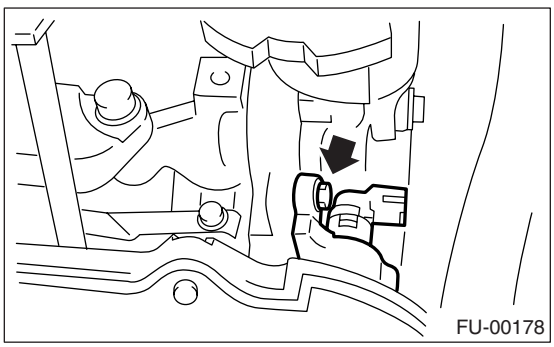
2) Disconnect the connector from the camshaft position sensor.



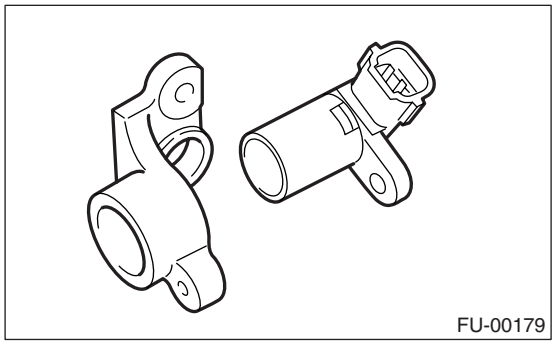
3) Remove the bolt which installs the camshaft position sensor to the camshaft position sensor support.



4) Remove the bolt which installs the camshaft position sensor support to the camshaft cap LH.



5) Remove the camshaft position sensor and camshaft position sensor support as a unit.
6) Remove the camshaft position sensor itself.



B: INSTALLATION

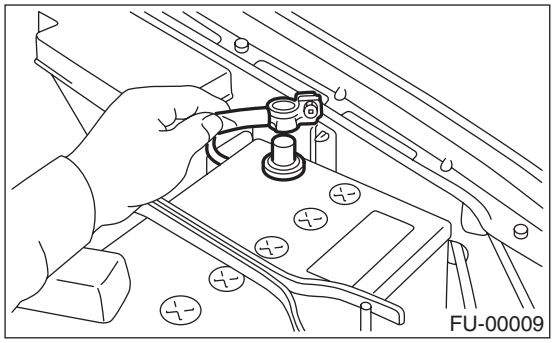
Install in the reverse order of removal.

Tightening torque:
Camshaft position sensor support
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)
Camshaft position sensor
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)

7. Knock Sensor

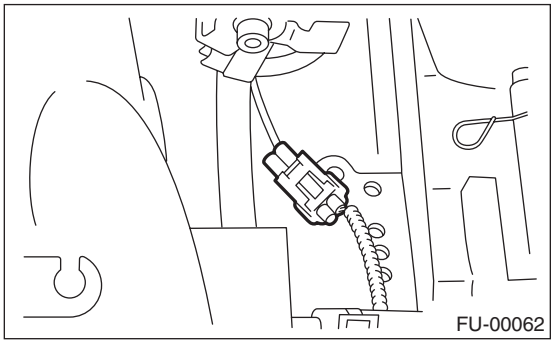
A: REMOVAL

1) Disconnect the ground cable from battery.

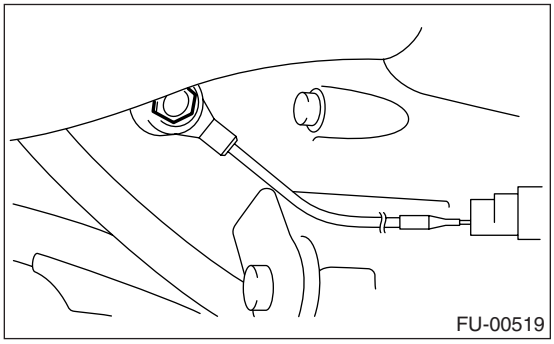


2) Remove the air cleaner case. <Ref. to IN(H4SO)-5, REMOVAL, Air Cleaner Case.>

3) Disconnect the knock sensor connector.



4) Remove the knock sensor from cylinder block.

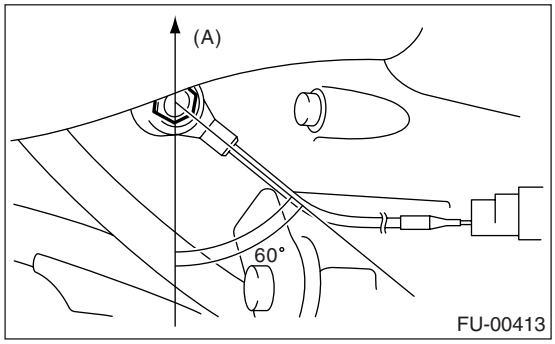


B: INSTALLATION

1) Install the knock sensor to cylinder block.

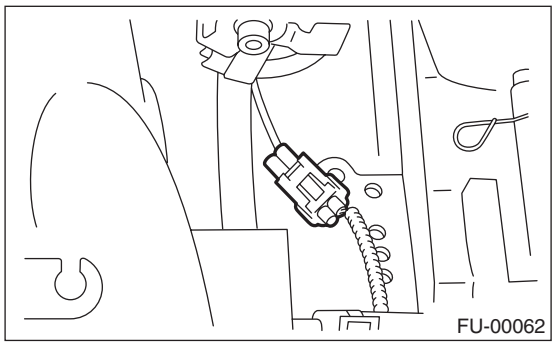
NOTE:
The extraction area of the knock sensor cord must be positioned at a 60° angle relative to engine rear.

Tightening torque:
Knock sensor
24 N·m (2.4 kgf-m, 17.4 ft-lb)



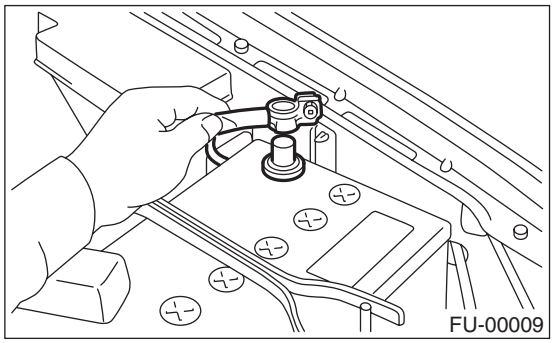
(A) Front side

2) Connect the knock sensor connector.



3) Install the air cleaner case.
<Ref. to IN(H4SO)-5, REMOVAL, Air Cleaner Case.>

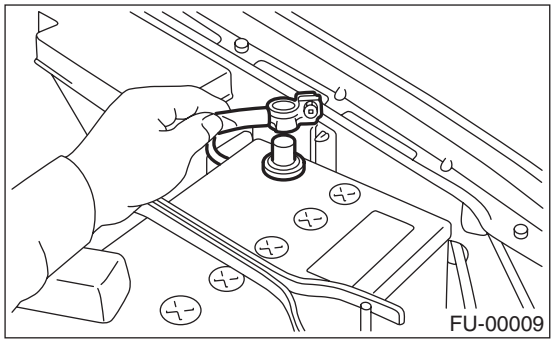
4) Connect the battery ground cable to battery.



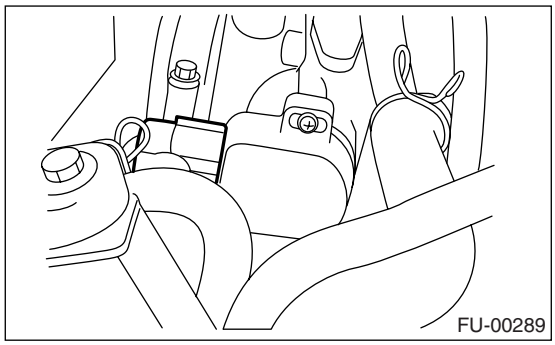
8. Throttle Position Sensor

A: REMOVAL

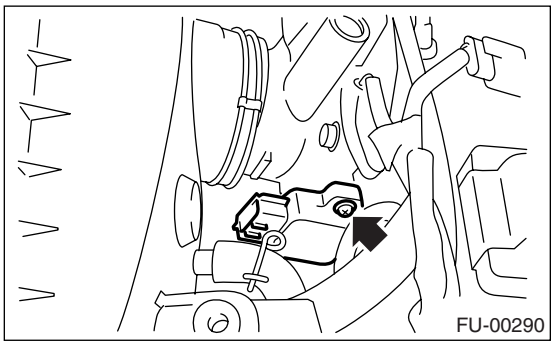
1) Disconnect the ground cable from battery.



2) Disconnect the connector from the throttle position sensor.



3) Remove the throttle position sensor holding screws, and then remove it.



B: INSTALLATION

Install in the reverse order of removal.

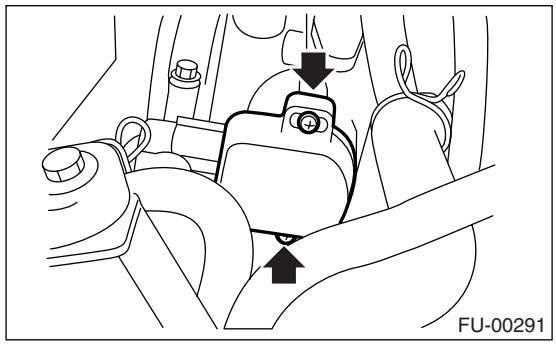
Tightening torque:
Throttle position sensor
1.6 N·m (0.16 kgf-m, 1.2 ft-lb)

CAUTION:
When installing the throttle position sensor, adjust to specified data.

C: ADJUSTMENT

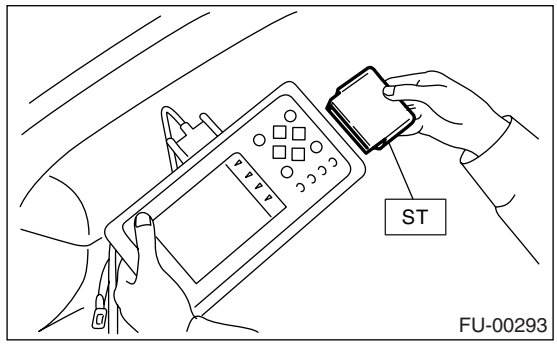
1. WHEN USING SUBARU SELECT MONITOR

1) Turn the ignition switch to OFF.
2) Loosen the throttle position sensor holding screws.

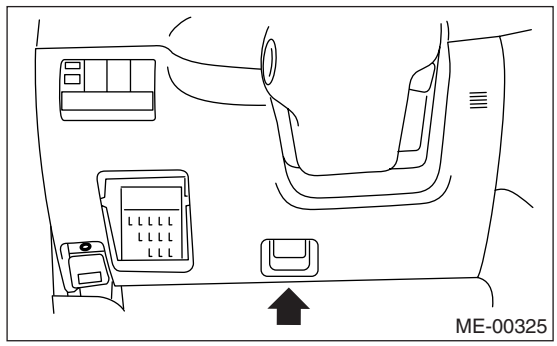


NOTE:
For detailed operation procedures, refer to the Subaru Select Monitor Operation Manual.

3) Insert the cartridge to the Subaru Select Monitor.



4) Connect the Subaru Select Monitor to the data link connector.



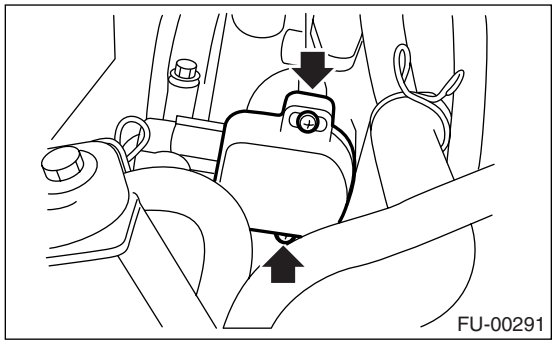
5) Turn the ignition switch to ON, and the Subaru Select Monitor power switch to ON.
6) Select the {2. Each System Check} in «Main Menu».
7) Select the {Engine Control System} in «Selection Menu».
8) Select the {1. Current Data Display & Save} in «Engine Control System Diagnosis».

9) Select the {1.12 Data Display} in «Data Display Menu».
10) Adjust the throttle position sensor to the proper position to match with following specifications.

Condition: Throttle fully closed
Throttle opening angle 0.00%
Throttle sensor voltage 0.50 V

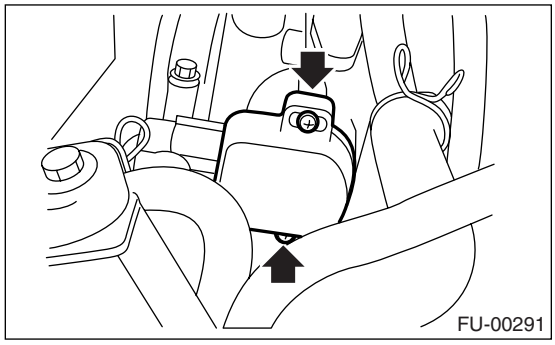
11) Tighten the throttle position sensor holding screws.

Tightening torque:
Throttle position sensor
1.6 N·m (0.16 kgf-m, 1.2 ft-lb)



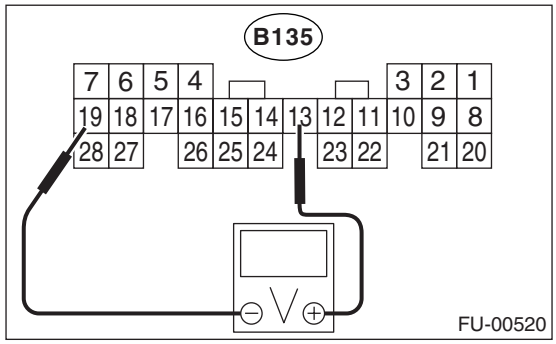
2. WHEN USING THE CIRCUIT TESTER

1) Turn the ignition switch to OFF.
2) Loosen the throttle position sensor holding screws.



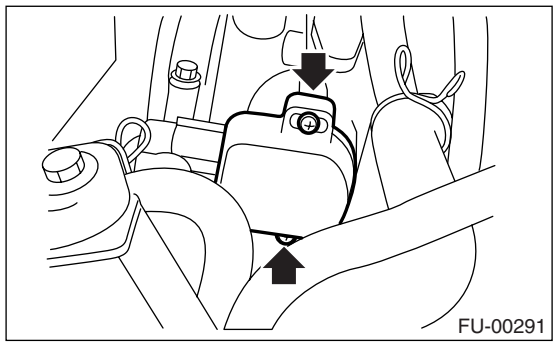
3) Take out the ECM.
4) Turn the ignition switch to ON.
5) Adjust the throttle position sensor to proper position to allow the voltage signal to ECM to be in specification.

Connector & terminal / Specified voltage
(B135) No. 13 (+) — (B135) No. 19 (–) / 0.45 — 0.55 V
[Fully closed.]



6) Tighten the throttle position sensor holding screws.

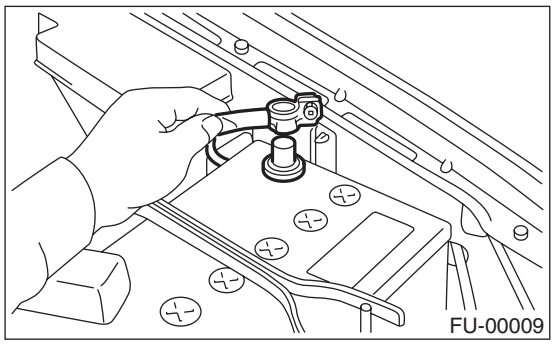
Tightening torque:
Throttle position sensor
1.6 N·m (0.16 kgf-m, 1.2 ft-lb)



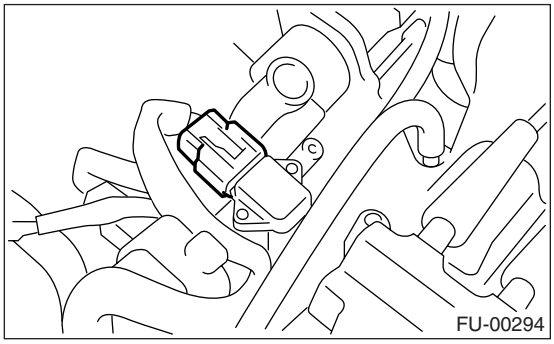
9. Manifold Absolute Pressure Sensor

A: REMOVAL

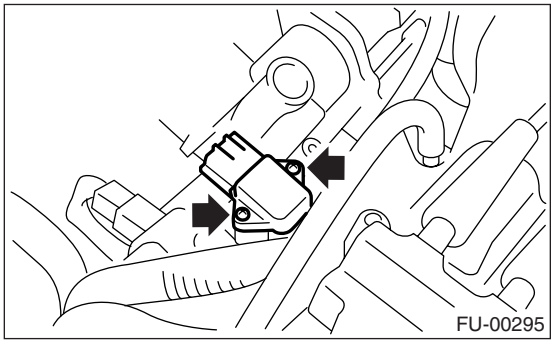
1) Disconnect the ground cable from battery.



2) Disconnect the connector from manifold absolute pressure sensor.



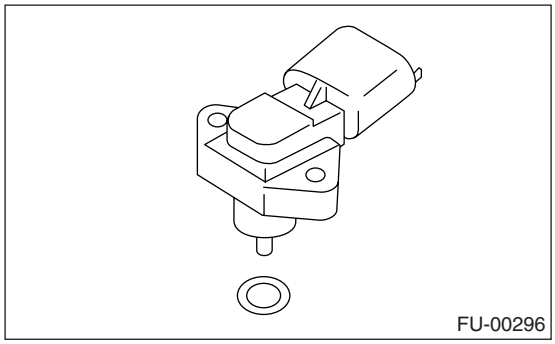
3) Remove the manifold absolute pressure sensor.



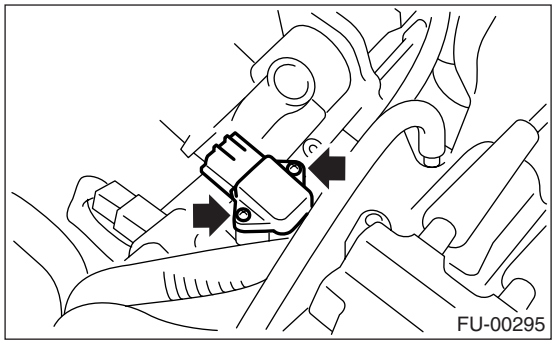
B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Use a new O-ring.



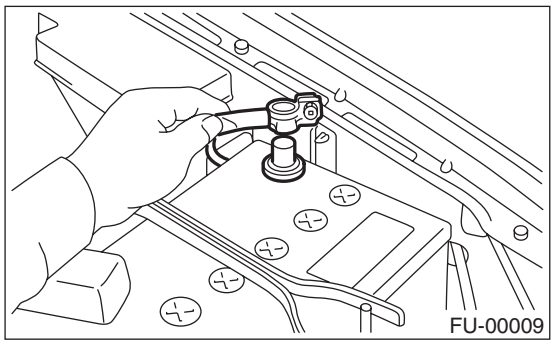
Tightening torque:
1.6 N·m (0.16 kgf-m, 1.2 ft-lb)



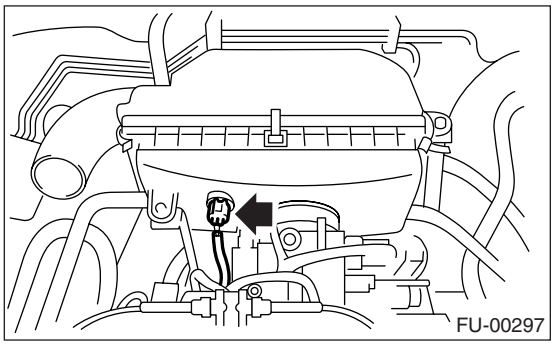
10.Intake Air Temperature Sensor

A: REMOVAL

1) Disconnect the ground cable from battery.



2) Disconnect the connector from the intake air temperature sensor.
3) Remove the intake air temperature sensor from the air cleaner case.



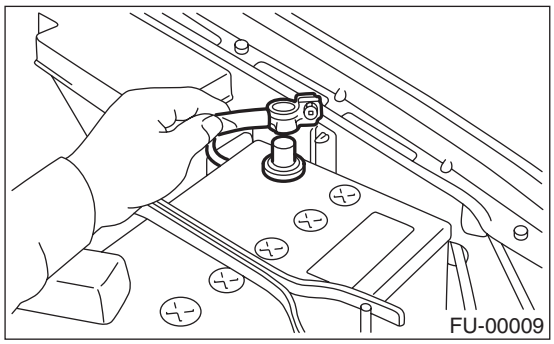
B: INSTALLATION

Install in the reverse order of removal.

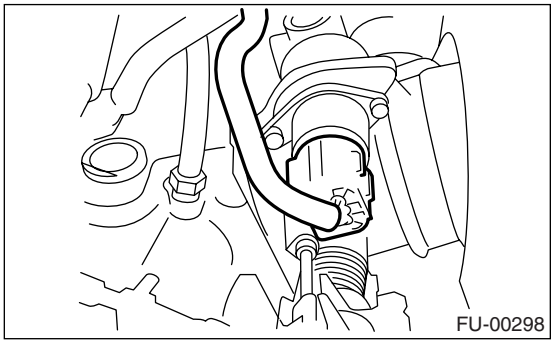
11.Idle Air Control Solenoid Valve

A: REMOVAL

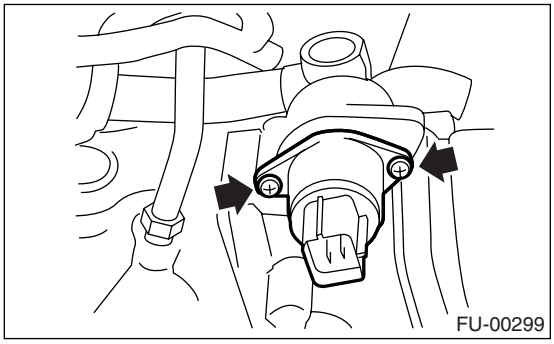
1) Disconnect the ground cable from battery.



2) Disconnect the connector from the idle air control solenoid valve.



3) Remove the idle air control solenoid valve from throttle body.



B: INSTALLATION

Install in the reverse order of removal.

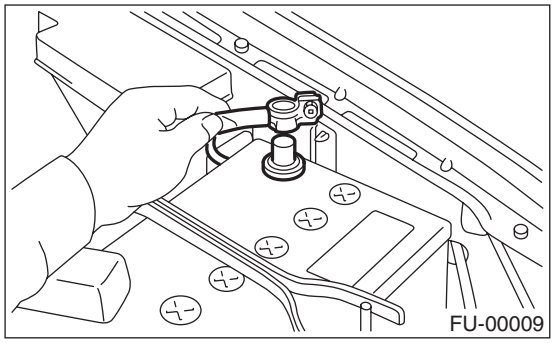
NOTE:
Use a new gasket.

Tightening torque:
Idle air control solenoid valve
1.6 N·m (0.16 kgf-m, 1.2 ft-lb)

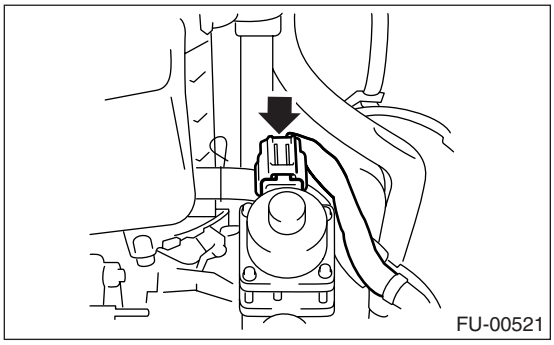
12.EGR Valve

A: REMOVAL

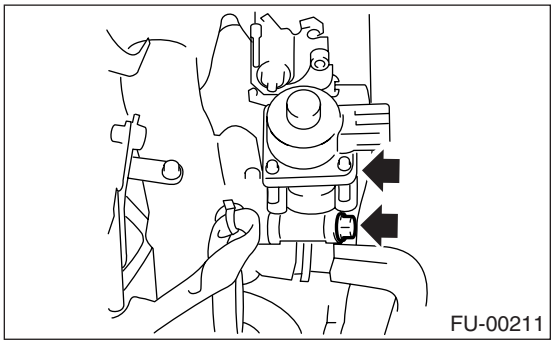
1) Disconnect the ground cable from battery.



2) Disconnect the connector from EGR valve.



3) Remove the EGR valve from intake manifold.



B: INSTALLATION

Install in the reverse order of removal.

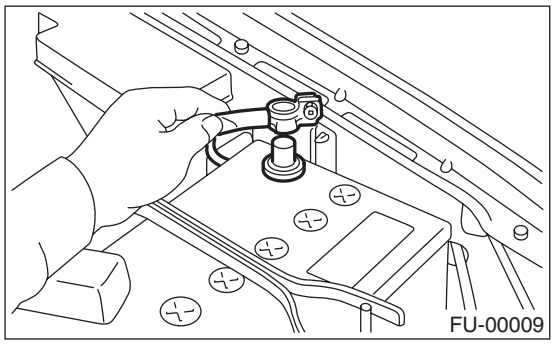
Tightening torque:
EGR valve
19 N·m (1.9 kgf-m, 14.0 ft-lb)

13. Air Assist Injector Solenoid Valve

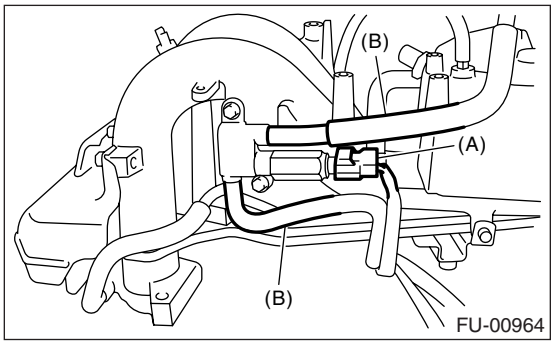
A: REMOVAL

NOTE:
Air assist injector solenoid valve is equipped in 1.6 L model only.

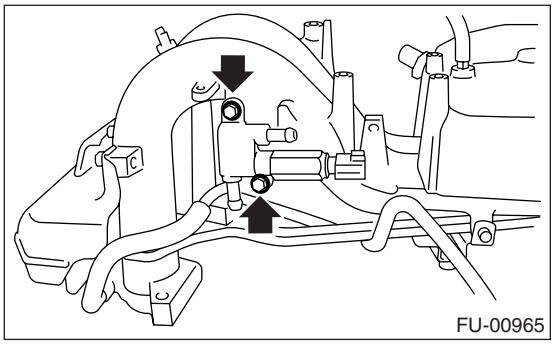
1) Disconnect the ground cable from battery.



2) Disconnect the connector (A) from the air assist injector solenoid valve, and then disconnect the air by-pass hoses (B).



3) Remove the air assist injector solenoid valve from intake manifold.



B: INSTALLATION

Install in the reverse order of removal.

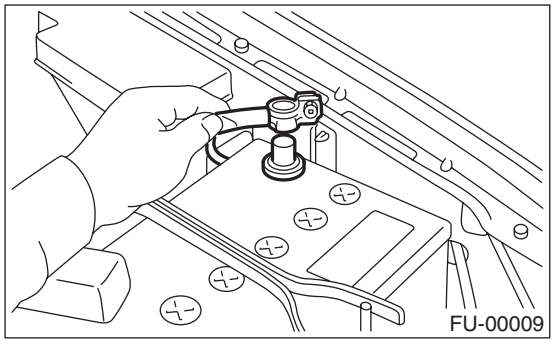
Tightening torque:
Air assist injector solenoid valve
19 N·m (1.9 kgf-m, 14.0 ft-lb)

14.Fuel Injector

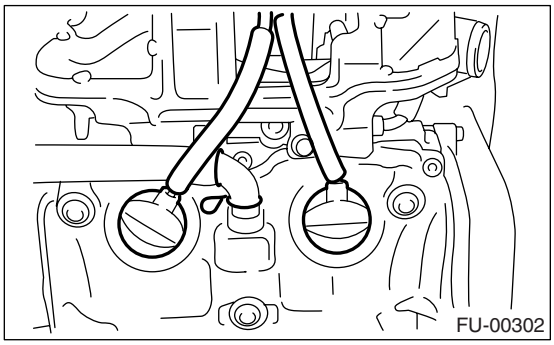
A: REMOVAL

1. RH SIDE

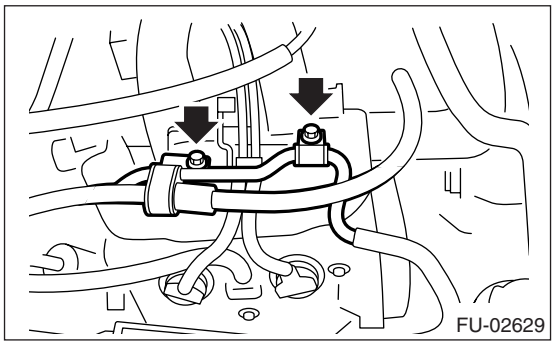
1) Release the fuel pressure.
<Ref. to FU(H4SO)-50, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
2) Open the fuel filler flap lid, and remove the fuel filler cap.
3) Disconnect the ground cable from battery.



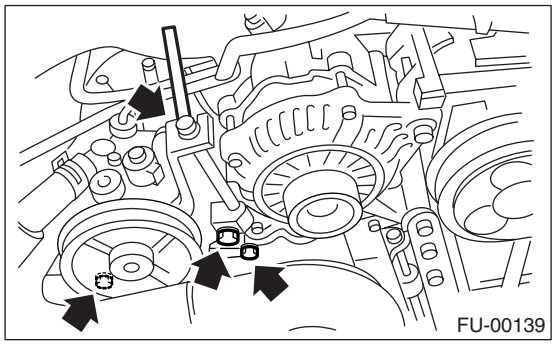
4) Remove the resonator chamber. <Ref. to IN(H4SO)-7, REMOVAL, Resonator Chamber.>
5) Remove the spark plug cords from spark plugs (#1 and #3 cylinders).



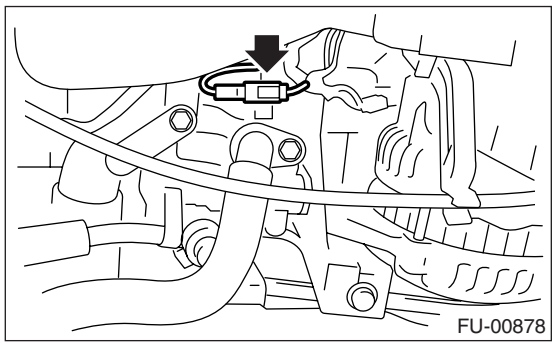
6) Remove the power steering pump and tank from brackets.
(1) Remove the front side V-belt. <Ref. to ME(H4SO)-41, REMOVAL, V-belt.>
(2) Remove the bolts which hold the power steering pipes onto the intake manifold protector.



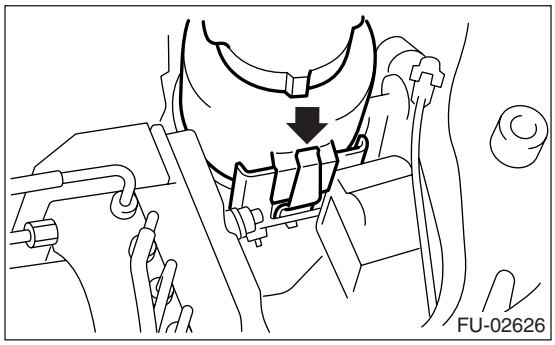
(3) Remove the bolts which install the power steering pump to bracket.



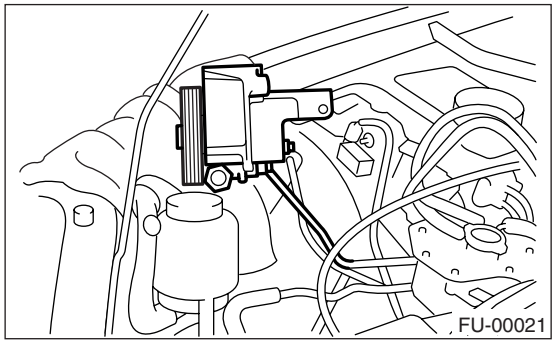
(4) Disconnect the connector from the power steering pump switch.



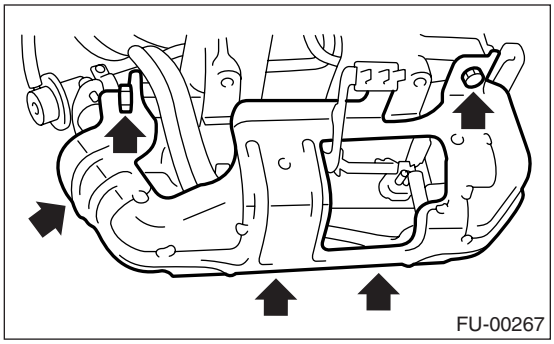
(5) Remove the power steering tank from the bracket by pulling it upwards.



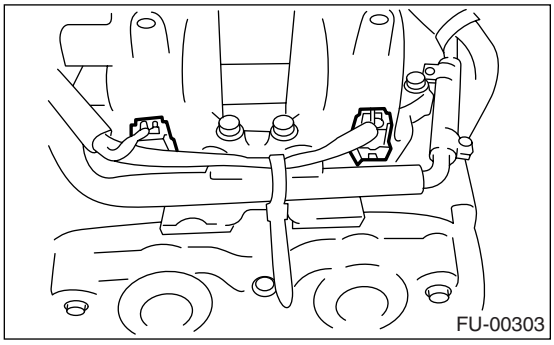
(6) Place the power steering pump and tank on the right side wheel apron.



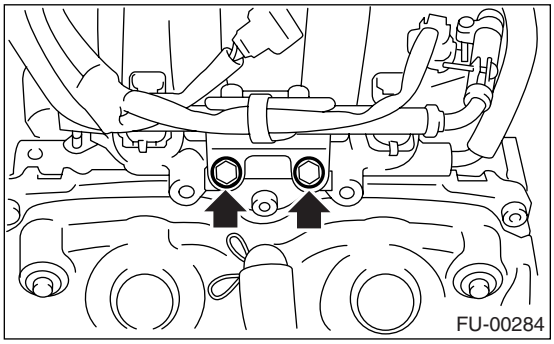
7) Remove the fuel pipe protector RH.

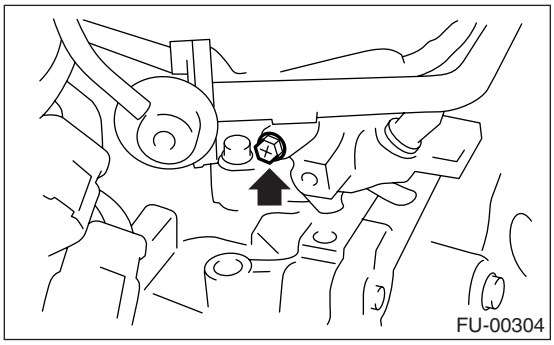


8) Disconnect the connector from fuel injector.

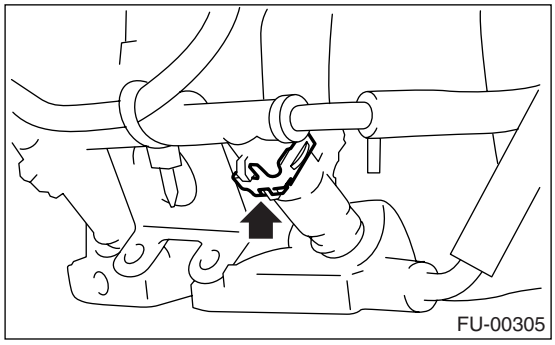


9) Remove the bolts which hold the fuel injector pipe to intake manifold.

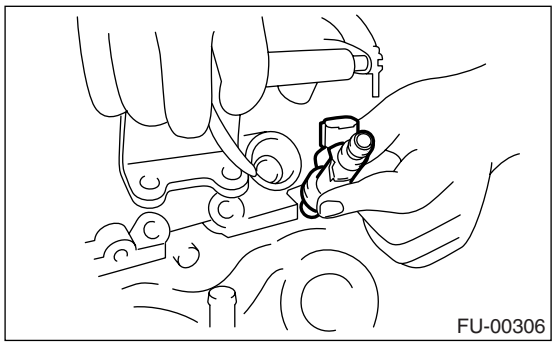




10) Remove the fuel injector from intake manifold.
(1) Remove the fuel injector securing clip.

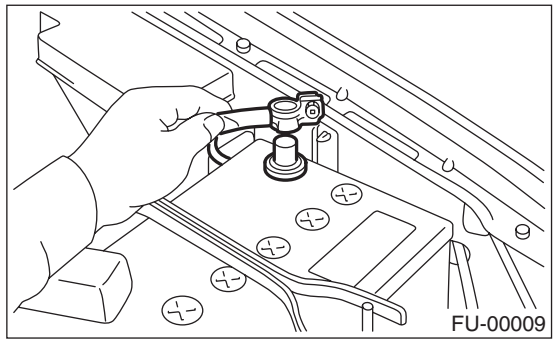


(2) Remove the fuel injector while lifting up the fuel injector pipe.

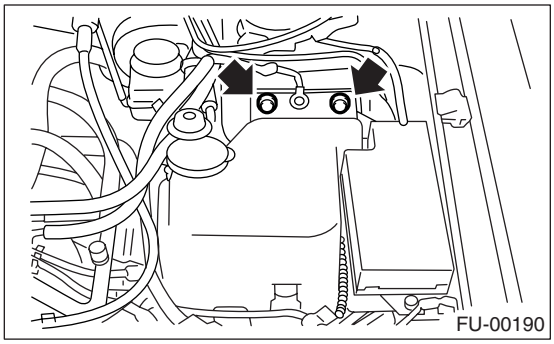


2. LH SIDE

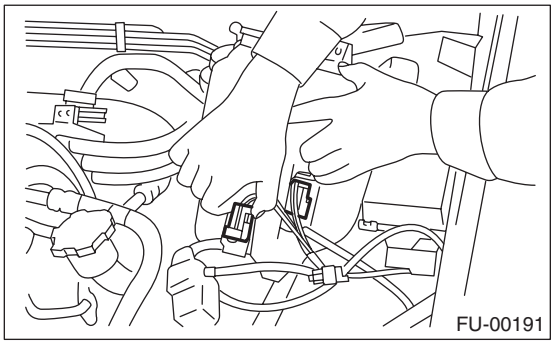
1) Release the fuel pressure. <Ref. to FU(H4SO)-50, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
2) Open the fuel filler flap lid, and then remove the fuel filler cap.
3) Disconnect the ground cable from battery.



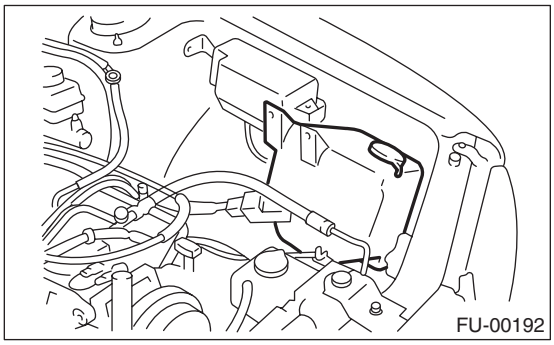
4) Remove the two bolts which install the washer tank on body.



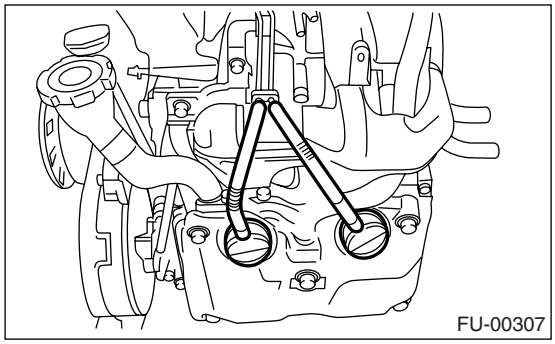
5) Disconnect the connector from the front window washer motor.
6) Disconnect the connector from the rear gate glass washer motor.



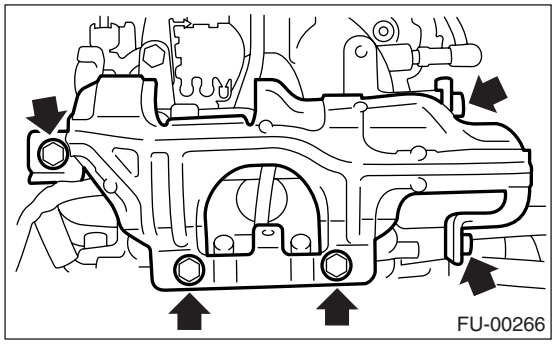
7) Disconnect the rear window glass washer hose from washer motor, and then plug the connection with a suitable cap.
8) Move the washer tank, and secure it away from working area.



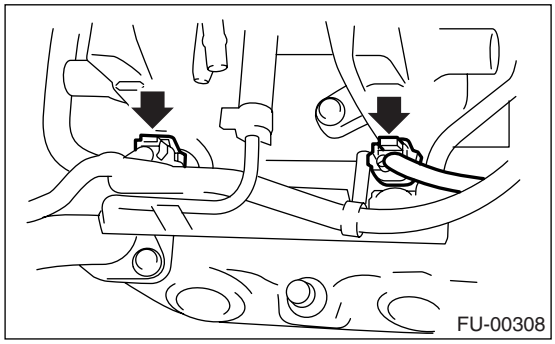
9) Remove the spark plug cords from spark plugs (#2 and #4 cylinders).



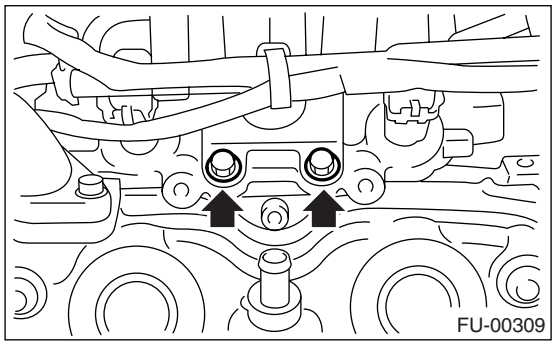
10) Remove the fuel pipe protector LH.



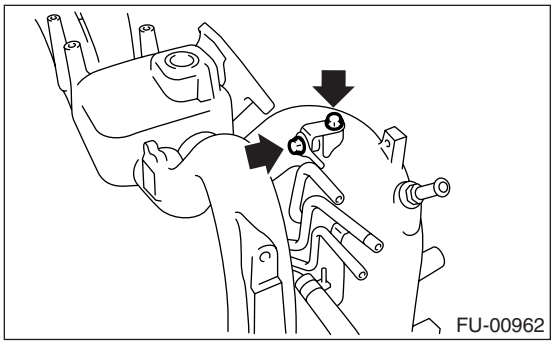
11) Disconnect the connector from fuel injector.



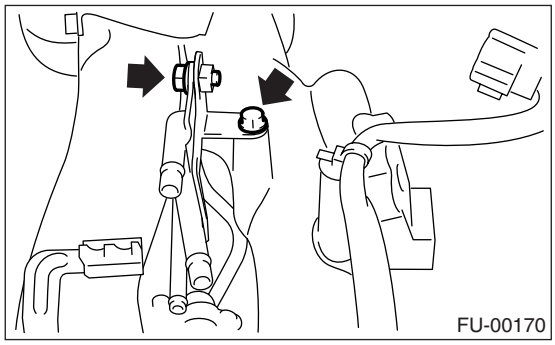
12) Remove the bolt which holds the fuel injector pipe to intake manifold.



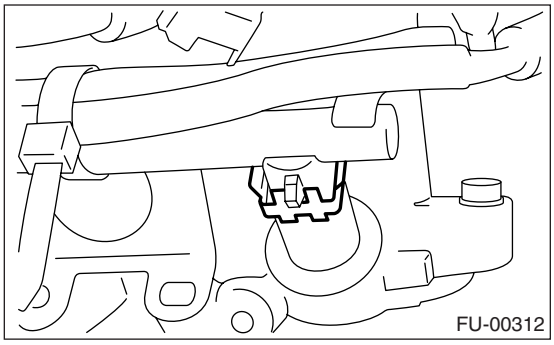
13) Remove the bolts which hold the fuel pipe on intake manifold.
- 1.6 L MODEL



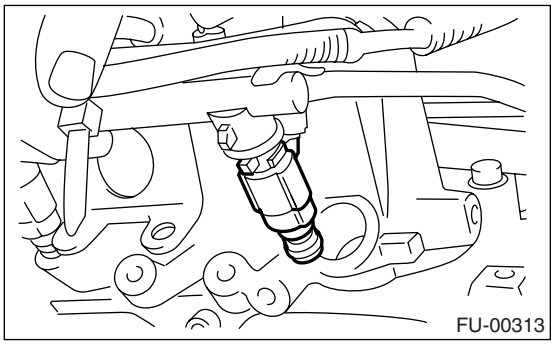
- 2.0 L MODEL



14) Remove the fuel injector from intake manifold.
(1) Remove the fuel injector securing clip.



(2) Remove the fuel injector while lifting up the fuel injector pipe.

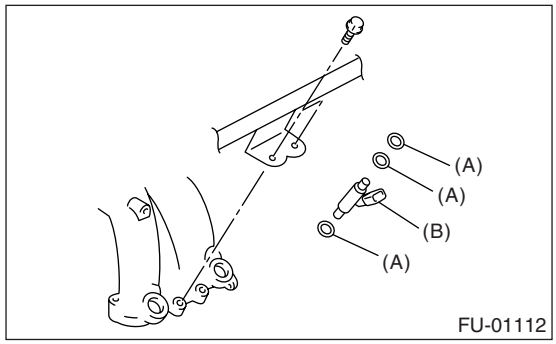


B: INSTALLATION

1. RH SIDE

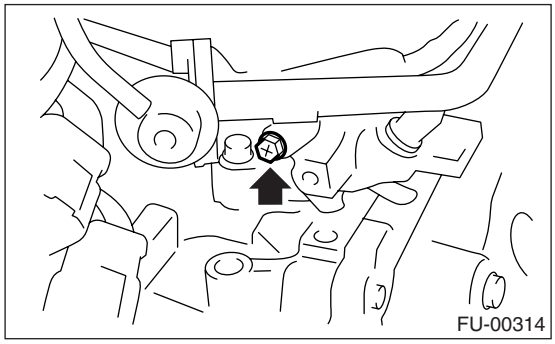
Install in the reverse order of removal.

NOTE:
Use new O-rings.

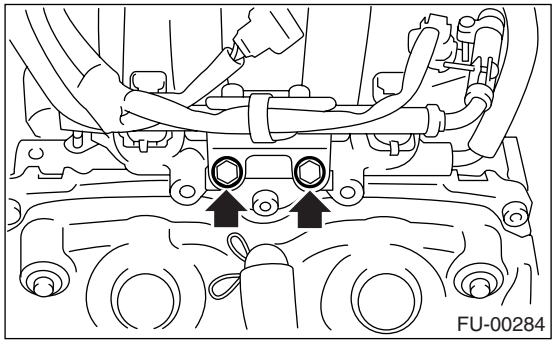


(A) O-ring
(B) Fuel injector

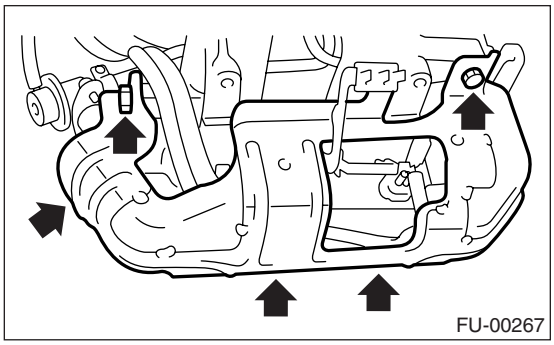
Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



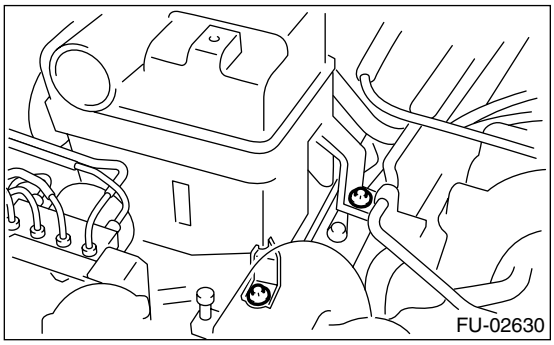
Tightening torque:
19 N·m (1.9 kgf-m, 14.0 ft-lb)



Tightening torque:
19 N·m (1.9 kgf-m, 14.0 ft-lb)



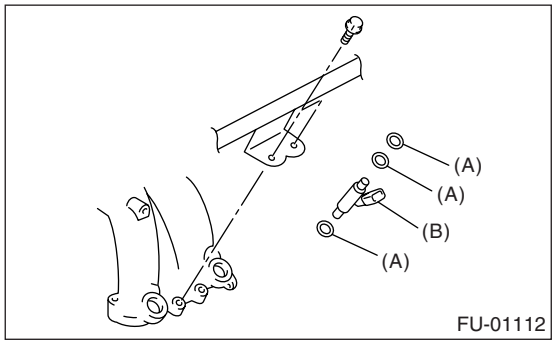
Tightening torque:
33 N·m (3.4 kgf-m, 24.3 ft-lb)



2. LH SIDE

Install in the reverse order of removal.

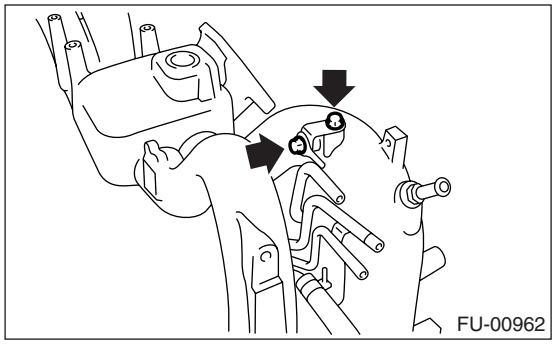
NOTE:
Use new O-rings.



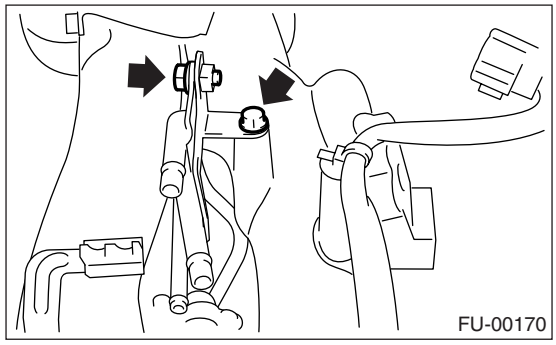
(A) O-ring
(B) Fuel injector

Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)

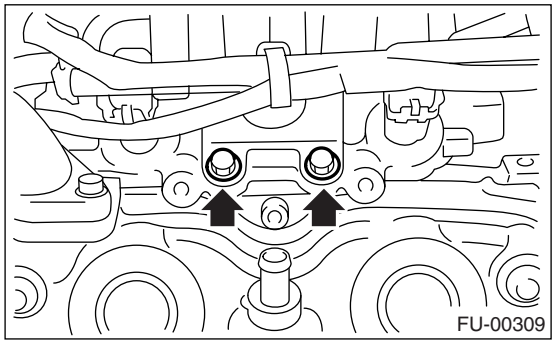
- 1.6 L MODEL



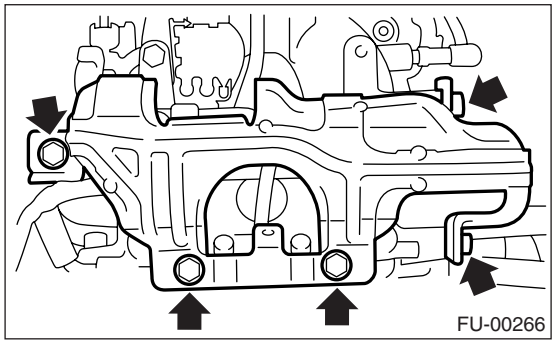
- 2.0 L MODEL



Tightening torque:
19 N·m (1.9 kgf-m, 14.0 ft-lb)



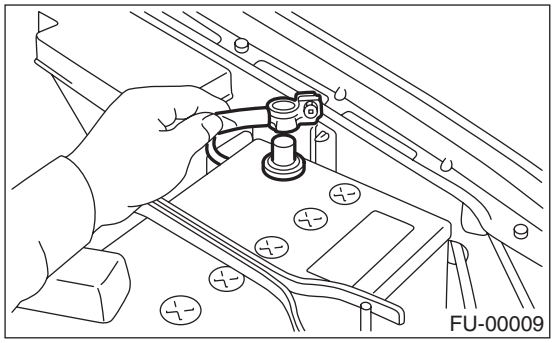
Tightening torque:
19 N·m (1.9 kgf-m, 14.0 ft-lb)



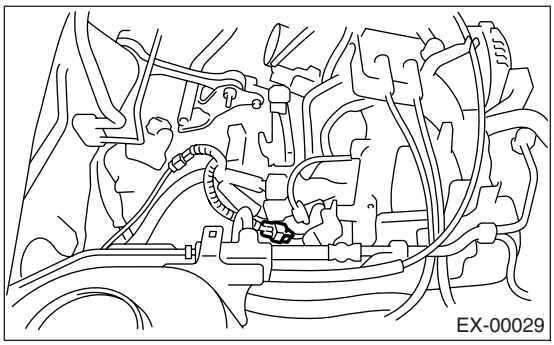
15.Front Oxygen (A/F) Sensor

A: REMOVAL

1) Disconnect the ground cable from battery.

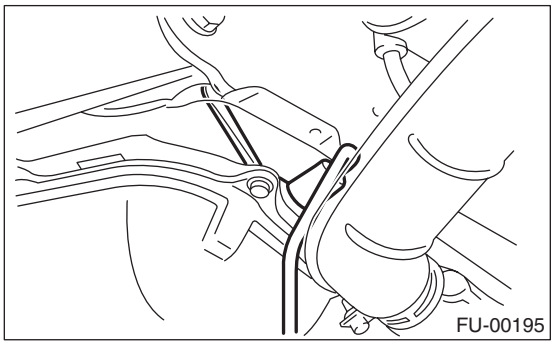


2) Disconnect the connector from engine hanger, and then disconnect the connector from front oxygen (A/F) sensor.



3) Lift-up the vehicle.
4) Apply spray type lubricant or its equivalent to the threaded portion of front oxygen (A/F) sensor, and leave it for one minute or more.
5) Remove the front oxygen (A/F) sensor.

CAUTION:
When removing the oxygen (A/F) sensor, wait until the exhaust pipe cools, otherwise it will damage the exhaust pipe.

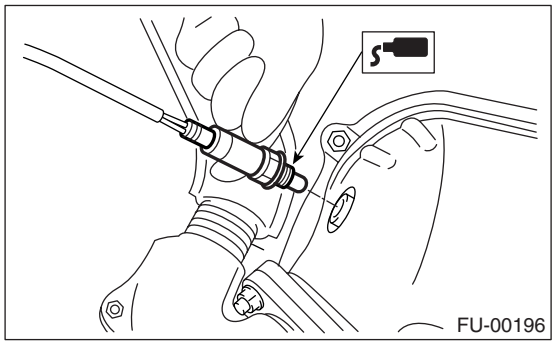


B: INSTALLATION

1) Before installing the front oxygen (A/F) sensor, apply anti-seize compound only to the threaded portion of front oxygen (A/F) sensor to make the next removal easier.

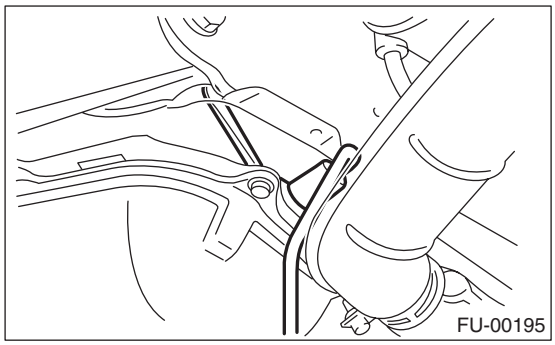
Anti-seize compound:
SS-30 by JET LUBE

CAUTION:
Never apply anti-seize compound to protector of the front oxygen (A/F) sensor.

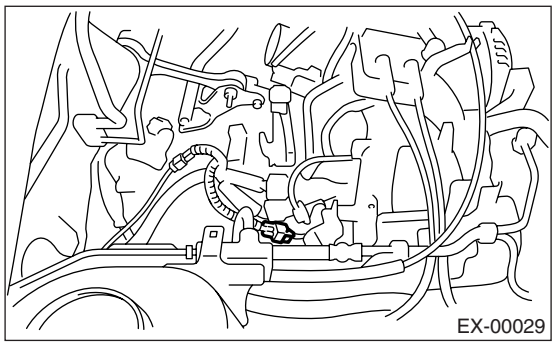


2) Install the front oxygen (A/F) sensor.

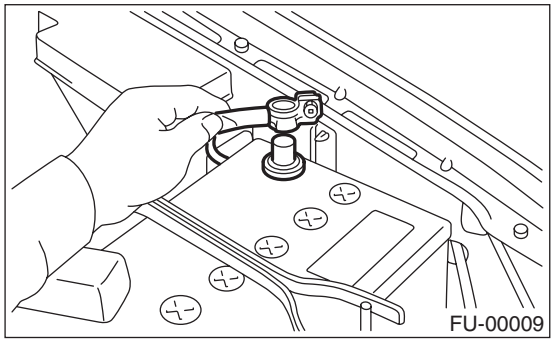
Tightening torque:
21 N·m (2.1 kgf-m, 15.2 ft-lb)



3) Lower the vehicle.
4) Connect the connector to front oxygen (A/F) sensor, and then connect the connector to engine hanger.



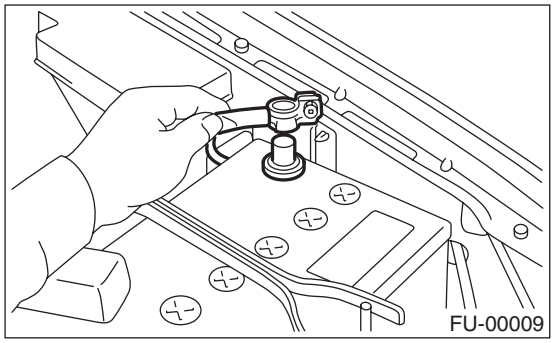
5) Connect the battery ground cable to battery.



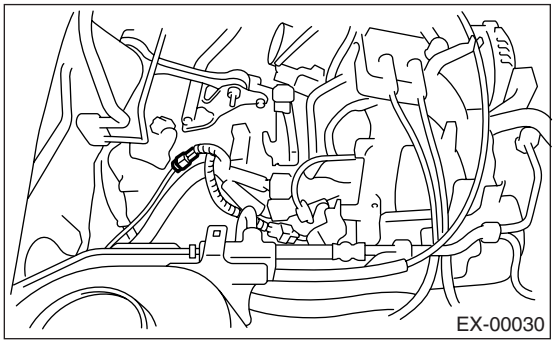
16.Rear Oxygen Sensor

A: REMOVAL

1) Disconnect the ground cable from battery.

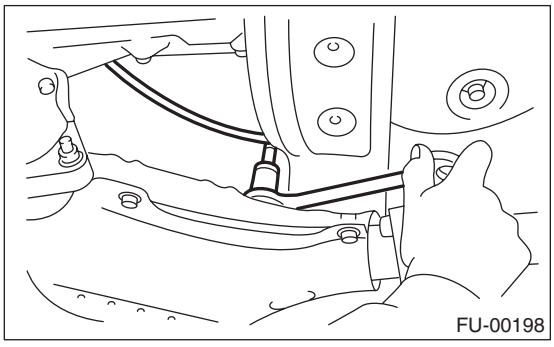


2) Lift-up the vehicle.
3) Disconnect the connector from the rear oxygen sensor.



4) Apply spray type lubricant or its equivalent to the threaded portion of rear oxygen sensor, and leave it for one minute or more.
5) Remove the rear oxygen sensor.

CAUTION:
When removing the oxygen sensor, wait until the exhaust pipe cools, otherwise it will damage the exhaust pipe.

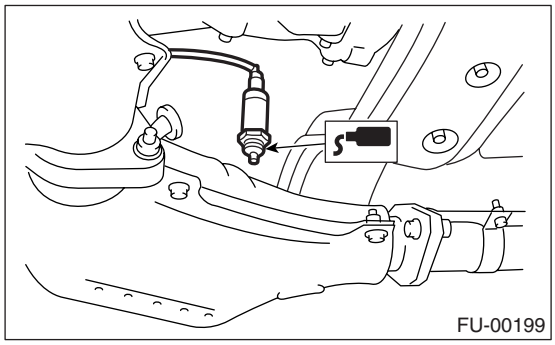


B: INSTALLATION

1) Before installing the rear oxygen sensor, apply the anti-seize compound only to the threaded portion of rear oxygen sensor to make the next removal easier.

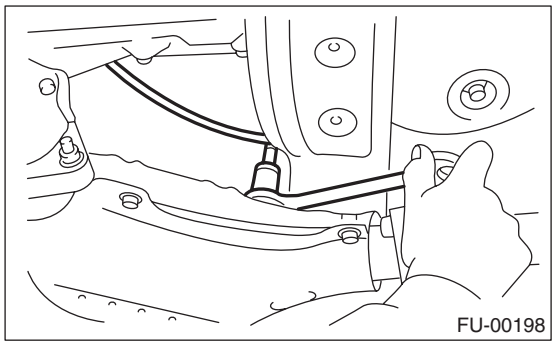
CAUTION:
Never apply anti-seize compound to protector of the rear oxygen sensor.

Anti-seize compound:
SS-30 by JET LUBE

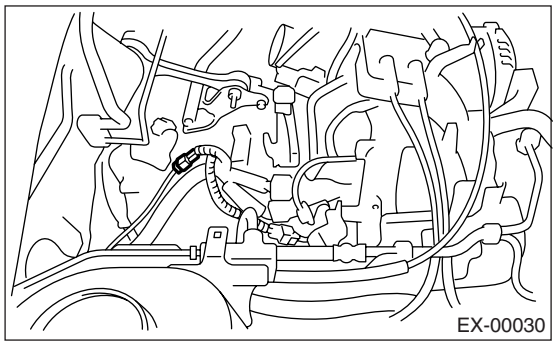


2) Install the rear oxygen sensor.

Tightening torque:
21 N·m (2.1 kgf-m, 15.2 ft-lb)

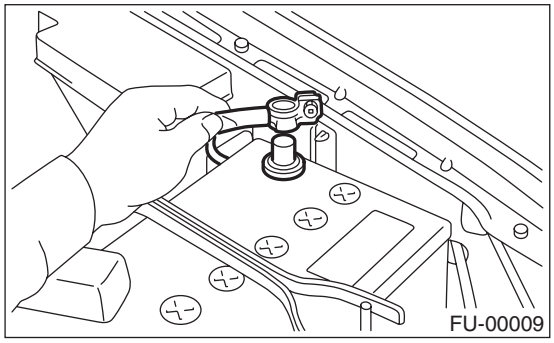


3) Connect the connector to the rear oxygen sensor.



4) Lower the vehicle.

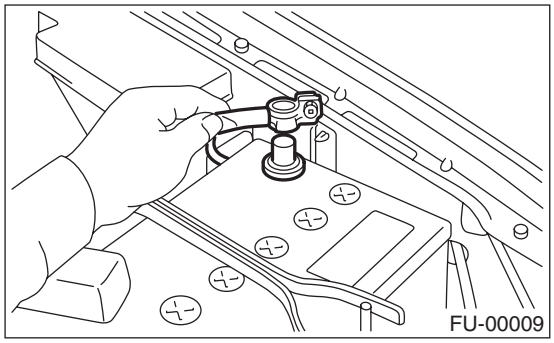
5) Connect the battery ground cable to battery.



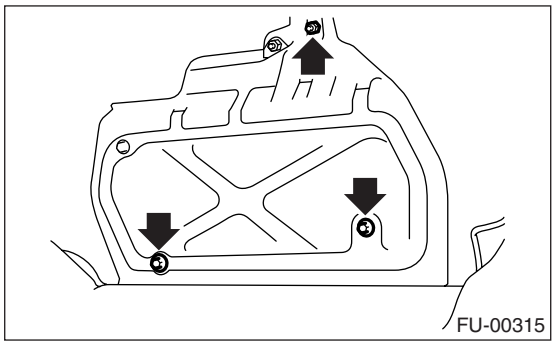
17.Engine Control Module (ECM)

A: REMOVAL

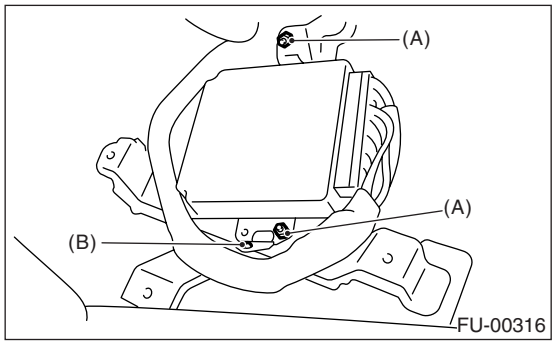
1) Disconnect the ground cable from battery.



2) Remove the lower inner trim of passenger side.
<Ref. to EI-50, REMOVAL, Lower Inner Trim.>
3) Detach the floor mat of front passenger seat.
4) Remove the protect cover.



5) Remove the nuts (A) which hold ECM to bracket.
6) Remove the clip (B) from bracket.



7) Disconnect the ECM connectors and take out the ECM.

B: INSTALLATION

Install in the reverse order of removal.

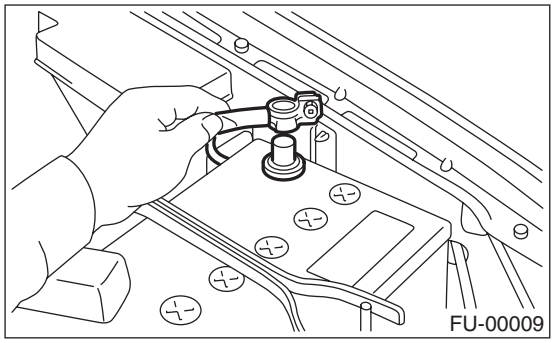
CAUTION:
When replacing ECM, be careful not to use the wrong spec. ECM to avoid any damage to the fuel injection system.

Tightening torque:
5 N·m (0.5 kgf-m, 3.7 ft-lb)

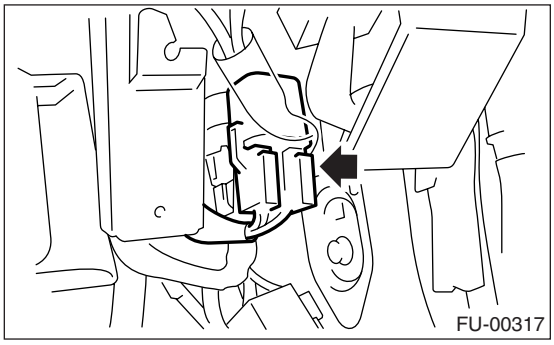
18.Main Relay

A: REMOVAL

1) Disconnect the ground cable from battery.



2) Remove the passenger's side front side sill cover.
3) Remove the bolt which holds the main bracket on body.
4) Disconnect the connectors from main relay.



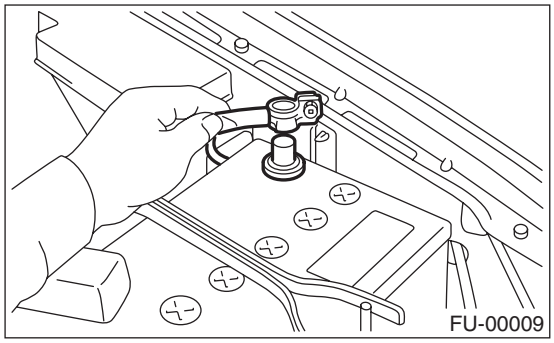
B: INSTALLATION

Install in the reverse order of removal.

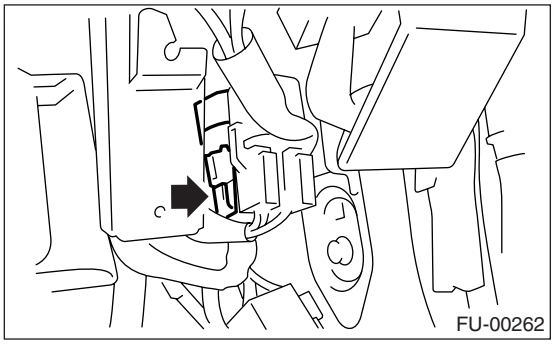
19.Fuel Pump Relay

A: REMOVAL

1) Disconnect the ground cable from battery.



2) Remove the passenger's side front side sill cover.
3) Remove the bolt which holds the fuel pump relay bracket on body.
4) Disconnect the connector from fuel pump.



5) Remove the fuel pump relay from mounting bracket.

B: INSTALLATION

Install in the reverse order of removal.

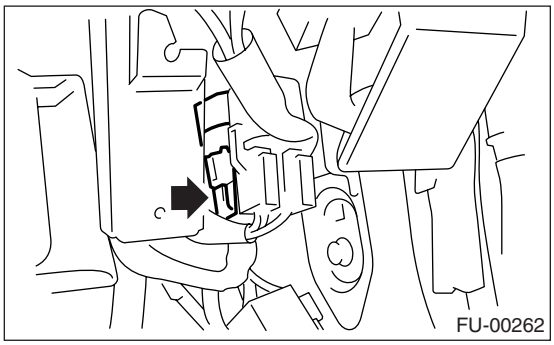
20.Fuel

A: PROCEDURE

1. RELEASING OF FUEL PRESSURE

WARNING:
- **Place “NO FIRE” signs near working area.**
- **Be careful not to spill fuel on the floor.**

1) Disconnect the connector from fuel pump relay.

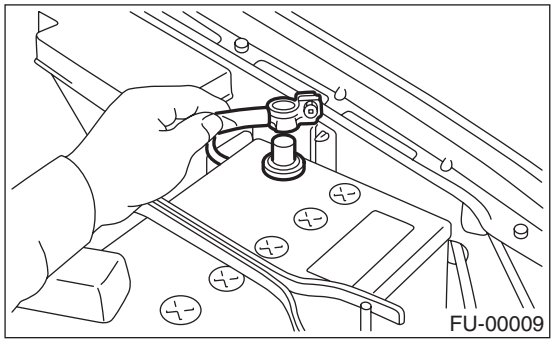


2) Start and run the engine until it stalls.
3) After the engine stalls, crank it for 5 more seconds.
4) Turn the ignition switch to OFF.

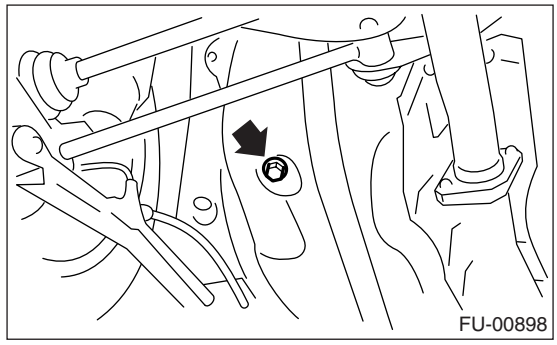
2. DRAINING FUEL

WARNING:
- **Place “NO FIRE” signs near working area.**
- **Be careful not to spill fuel on the floor.**

1) Set the vehicle on a lift.
2) Disconnect the ground cable from battery.



3) Open the fuel filler flap lid, and then remove the fuel filler cap.
4) Lift-up the vehicle.
5) Drain fuel from the fuel tank.
Set a container under the vehicle, and then remove the drain plug from fuel tank.



6) Tighten the fuel drain plug.

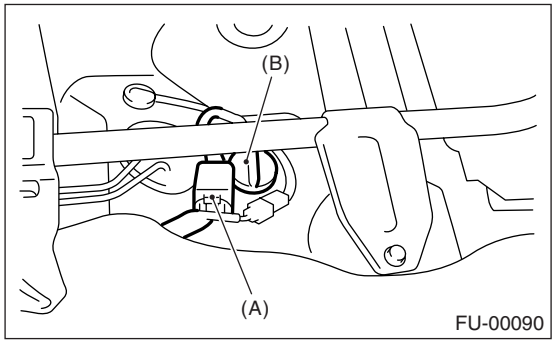
Tightening torque:
26 N·m (2.7 kgf-m, 19.2 ft-lb)

21.Fuel Tank

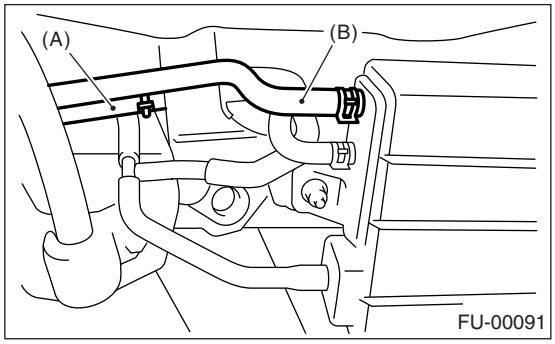
A: REMOVAL

WARNING:
- **Place “NO FIRE” signs near working area.**
- **Be careful not to spill fuel on the floor.**

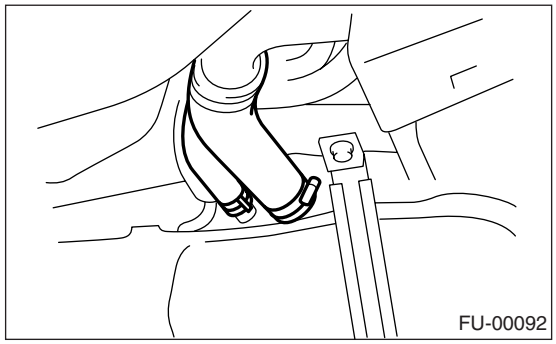
1) Set the vehicle on a lift.
2) Release the fuel pressure. <Ref. to FU(H4SO)-50, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
3) Drain fuel from fuel tank. <Ref. to FU(H4SO)-50, DRAINING FUEL, PROCEDURE, Fuel.>
4) Remove the rear seat.
5) Disconnect the connector (A) of fuel tank cord to rear harness.
6) Push the grommet (B) which holds the fuel tank cord on floor panel into under the body.



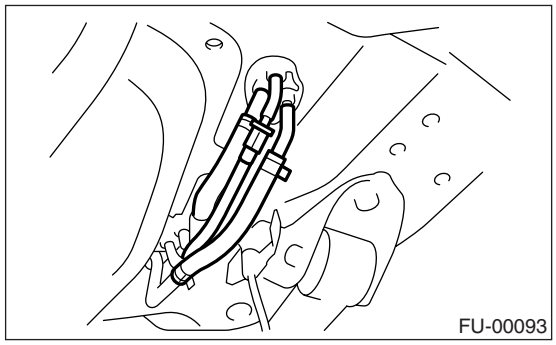
7) Remove the rear crossmember. <Ref. to RS-20, REMOVAL, Rear Crossmember.>
8) Disconnect the two-way valve hose (A) from two-way valve, and then disconnect the canister hose (B) from canister.



9) Loosen the clamp, and then disconnect the fuel filler hose and air vent hose from the fuel filler pipe.

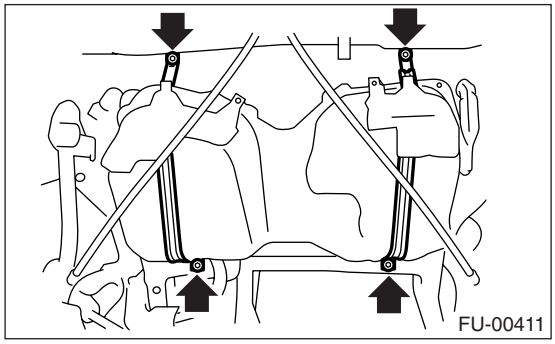


10) Move the clips, and then disconnect the quick connector. <Ref. to FU(H4SO)-63, REMOVAL, Fuel Delivery, Return and Evaporation Lines.>
11) Disconnect the fuel hoses.



12) Support the fuel tank with transmission jack, and then remove the bolts from bands and dismount the fuel tank from vehicle.

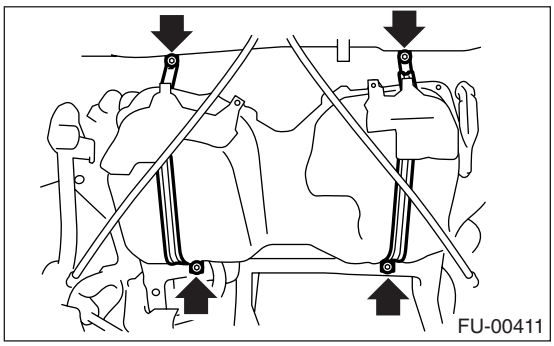
WARNING:
A helper is required to perform this work.



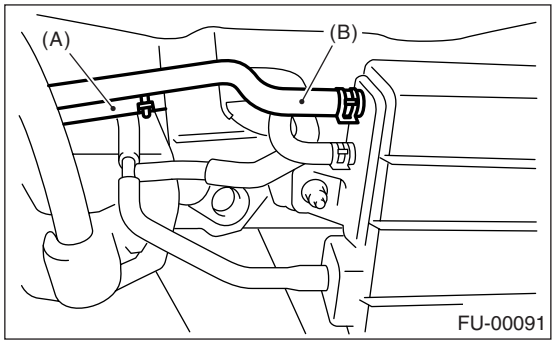
B: INSTALLATION

1) Support the fuel tank with transmission jack and push the fuel tank harness into access hole with grommet.
2) Set the fuel tank, and then temporarily tighten the bolts of fuel tank bands.

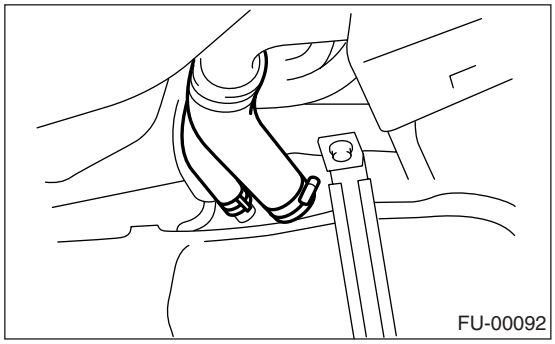
WARNING:
A helper is required to perform this work.



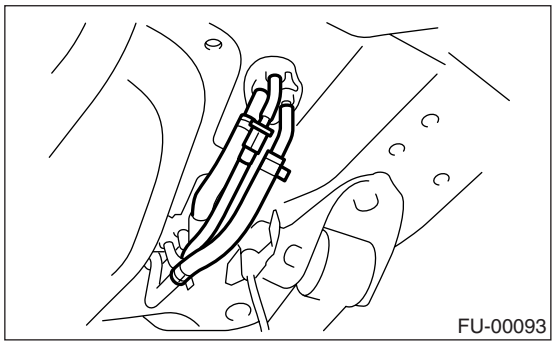
3) Connect the two-way valve hose (A) to two-way valve, and then connect the canister hose (B) to canister.



4) Connect the fuel filler hose and air vent hose.

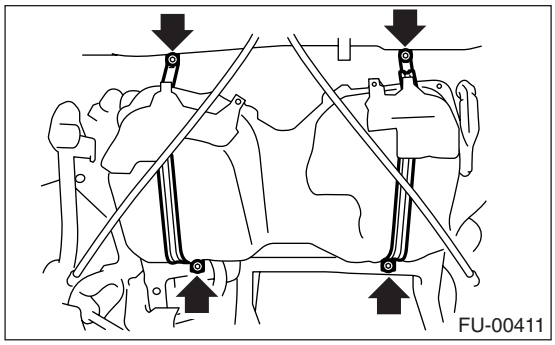


5) Connect the fuel hoses, and then secure them with clips and quick connector. <Ref. to FU(H4SO)-64, INSTALLATION, Fuel Delivery, Return and Evaporation Lines.>

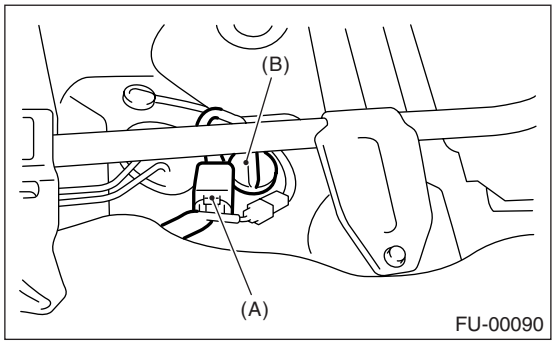


6) Tighten the band mounting bolts.

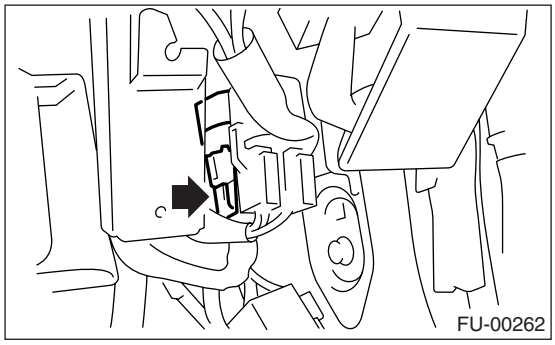
Tightening torque:
33 N·m (3.4 kgf-m, 24.3 ft-lb)



7) Install the rear crossmember. <Ref. to RS-20, INSTALLATION, Rear Crossmember.>
8) Connect the connector (A) to the fuel tank cord, and then plug the service hole with grommet (B).



9) Set the rear seat and floor mat.
10) Connect the connector to fuel pump relay.



C: INSPECTION

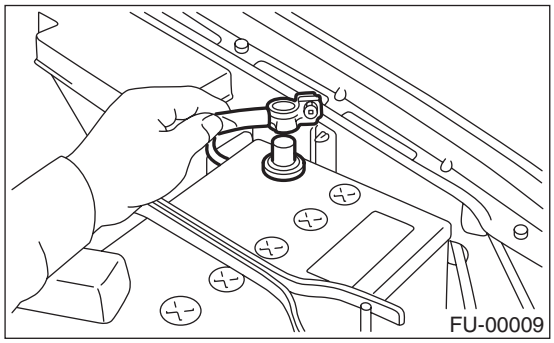
1) Make sure there are no cracks, holes, or other damage on fuel tank.
2) Make sure the fuel hoses and fuel pipes are not cracked and the connections are tightened firmly.

22.Fuel Filler Pipe

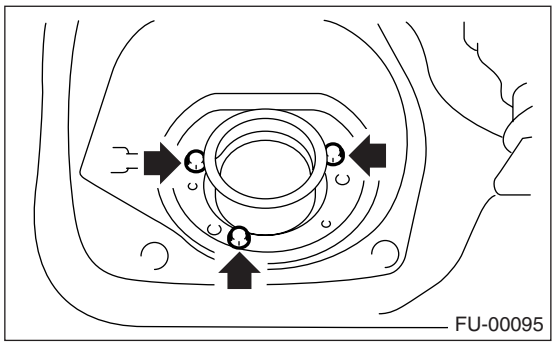
A: REMOVAL

WARNING:
- **Place “NO FIRE” signs near working area.**
- **Be careful not to spill fuel on the floor.**

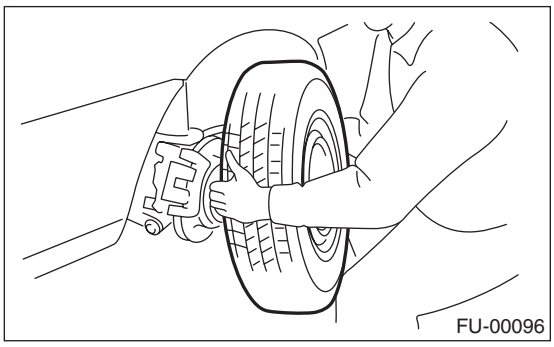
1) Set the vehicle on a lift.
2) Disconnect the ground cable from battery.



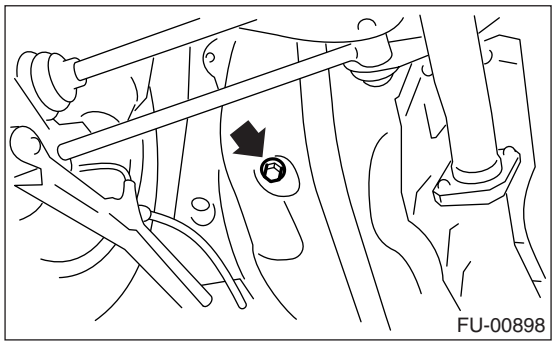
3) Open the fuel filler flap lid and remove the fuel filler cap.
4) Remove the screws holding packing in place.



5) Loosen the rear wheel nuts RH.
6) Lift-up the vehicle.
7) Remove the rear wheel RH.



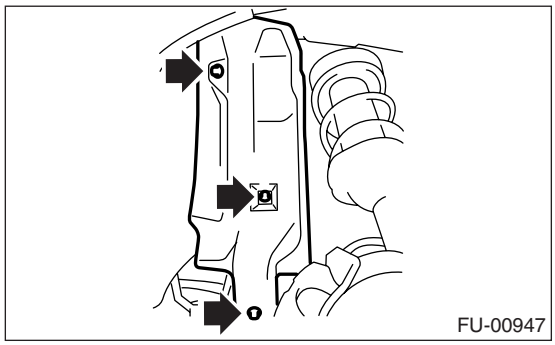
8) Drain fuel from the fuel tank. Set a container under the vehicle, and then remove the drain plug from fuel tank.



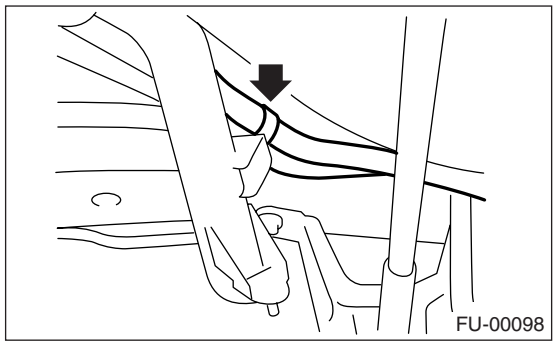
9) Tighten the fuel drain plug, and then install the front tank cover RH.

Tightening torque:
26 N·m (2.7 kgf-m, 19.2 ft-lb)

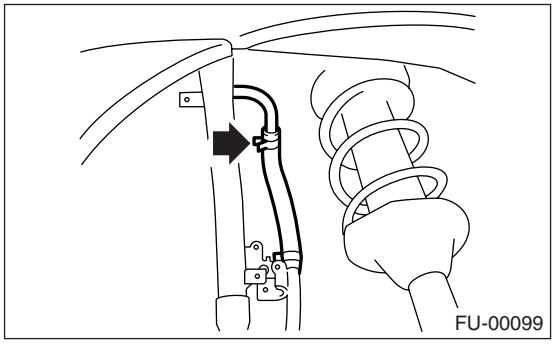
10) Remove the fuel filler pipe protector.



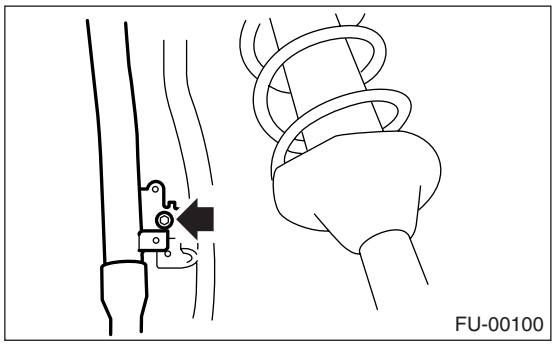
11) Separate the evaporation hoses from the clip of fuel filler pipe.



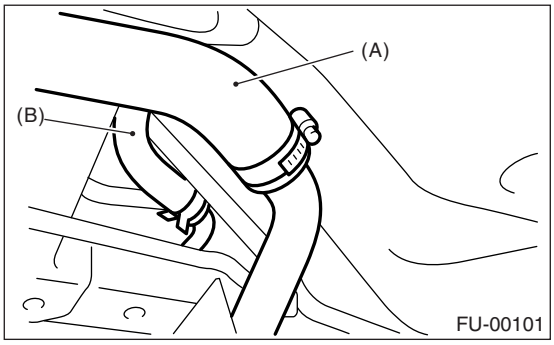
12) Disconnect the air vent hose from fuel filler pipe.



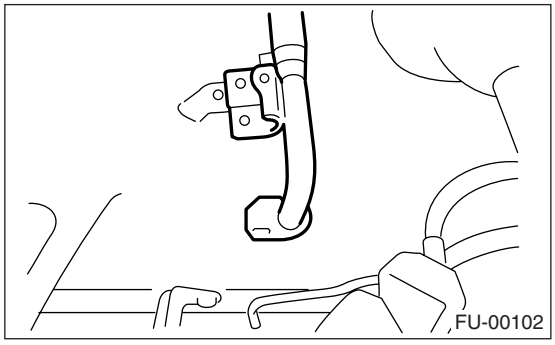
13) Remove the bolts which hold the fuel filler pipe bracket on body.



14) Loosen the clamp and separate the fuel filler hose (A) from fuel filler pipe.
15) Move the clip and separate the air vent hose (B).



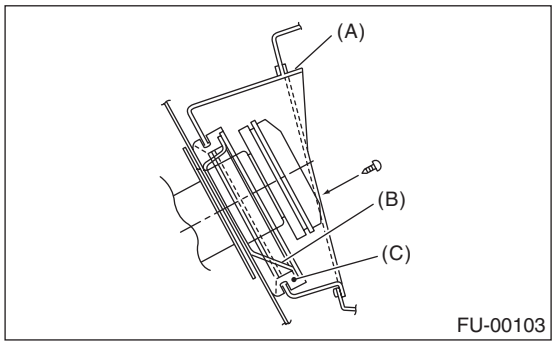
16) Remove the fuel filler pipe to the under side of vehicle.
17) Remove the air vent pipe together with clip from body.



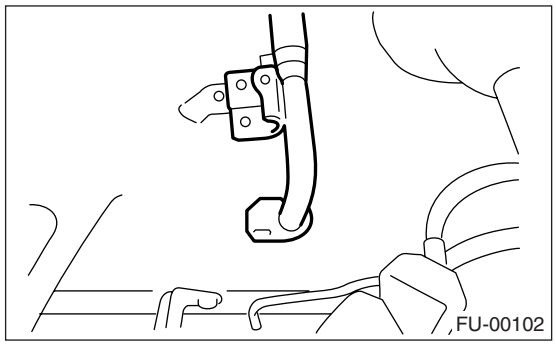
B: INSTALLATION

1) Hold the fuel filler flap open.
2) Set the fuel saucer (A) with rubber packing (C), and then insert the fuel filler pipe into hole from inner side of apron.
3) Align the holes in fuel filler pipe neck, and then set the cup (B) and tighten screws.

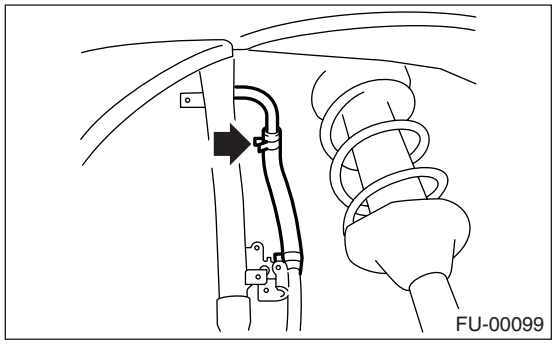
NOTE:
If the edges of rubber packing are folded toward inside, straighten it with a screwdriver.



4) Install the air vent pipe.

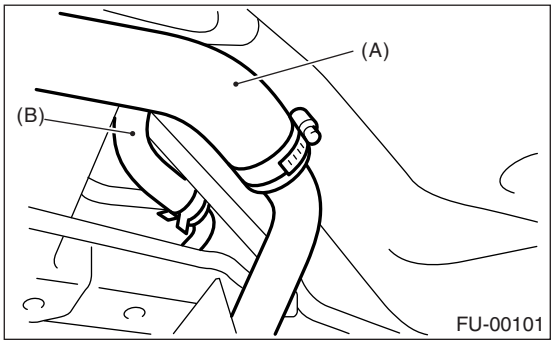


5) Connect the air vent hose to the fuel filler pipe.



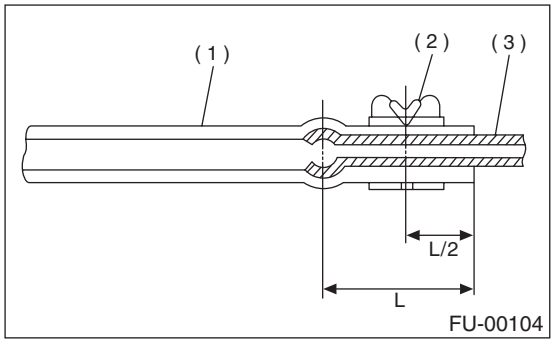
6) Insert the fuel filler hose (A) approx. 35 to 40 mm (1.38 to 1.57 in) over lower end of fuel filler pipe, and then tighten the clamp.

CAUTION:
Do not allow clips to touch the air vent hose (B) and rear suspension crossmember.



7) Insert the air vent hose approx. 25 to 30 mm (0.98 to 1.18 in) into the lower end of air vent pipe, and then hold the clip.

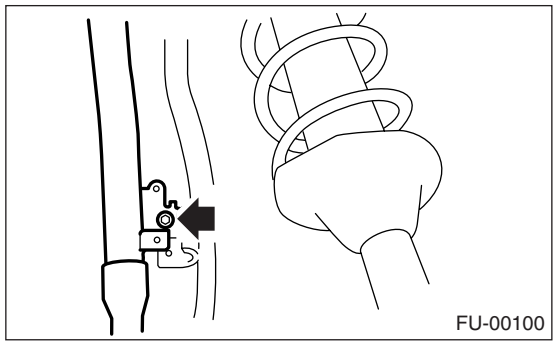
L = 27.5±2.5 mm (1.083±0.098 in)



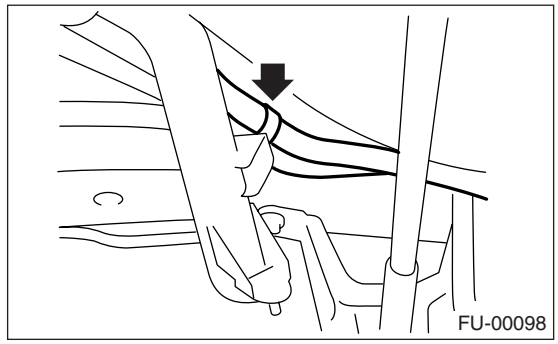
(1) Hose
(2) Clip
(3) Pipe

8) Tighten the bolt which holds the fuel filler pipe bracket on body.

Tightening torque:
7.4 N·m (0.75 kgf-m, 5.4 ft-lb)

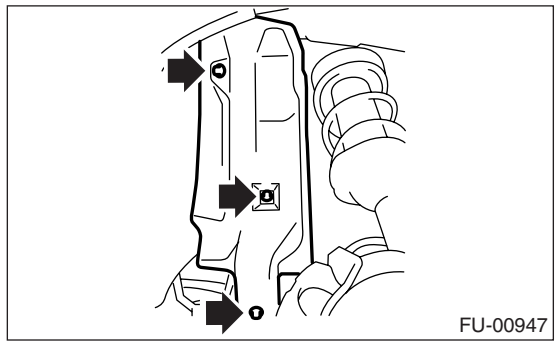


9) Hold the evaporation hoses onto clip of fuel filler pipe.

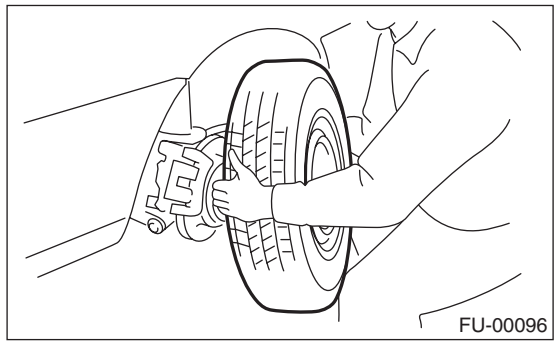


10) Install the fuel filler pipe protector.

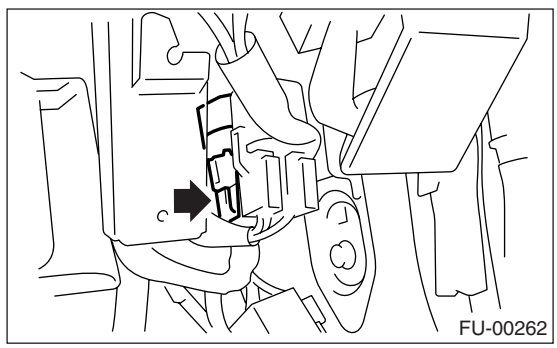
Tightening torque:
7.4 N·m (0.75 kgf-m, 5.4 ft-lb)



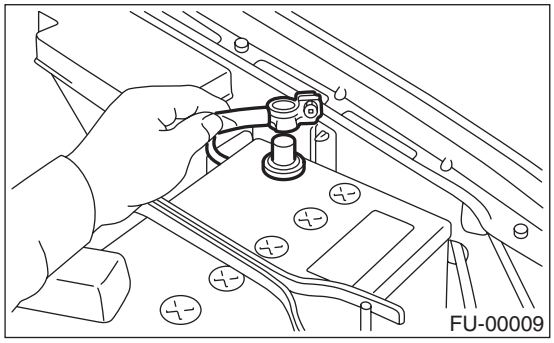
11) Install the rear wheel RH.



12) Lower the vehicle.
13) Tighten the wheel nuts.
14) Connect the connector to fuel pump relay.



15) Connect the battery ground cable to battery.



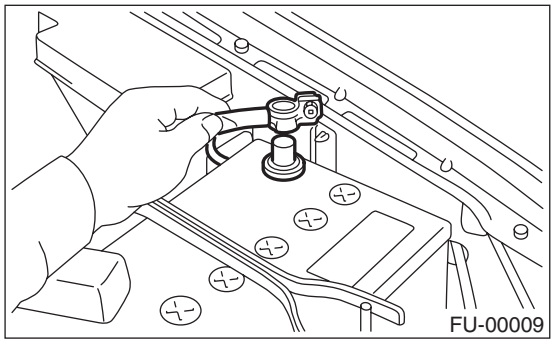
23.Fuel Pump

A: REMOVAL

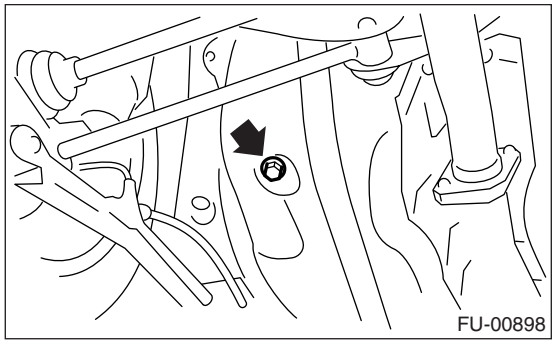
WARNING:
- **Place “NO FIRE” signs near working area.**
- **Be careful not to spill fuel on the floor.**

NOTE:
Fuel pump assembly consists of fuel pump and fuel level sensor.

1) Release the fuel pressure. <Ref. to FU(H4SO)-50, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
2) Open the fuel filler flap lid, and then remove the fuel filler cap.
3) Disconnect the ground cable from battery.


FU-00009

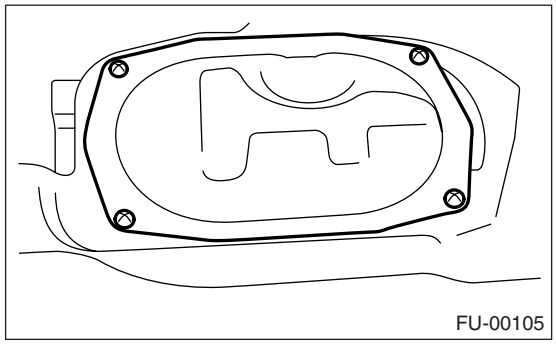
4) Lift-up the vehicle.
5) Drain fuel from the fuel tank. Set a container under the vehicle, and then remove the drain plug from fuel tank.


FU-00898

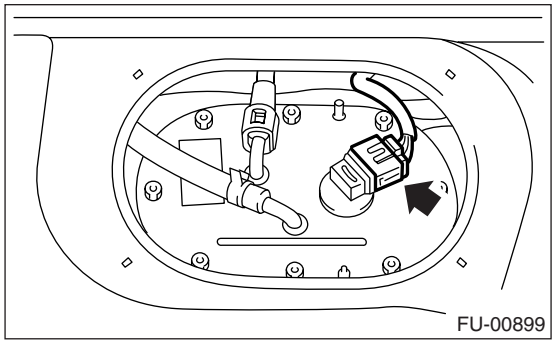
6) Tighten the fuel drain plug.

Tightening torque:
26 N·m (2.7 kgf-m, 19.2 ft-lb)

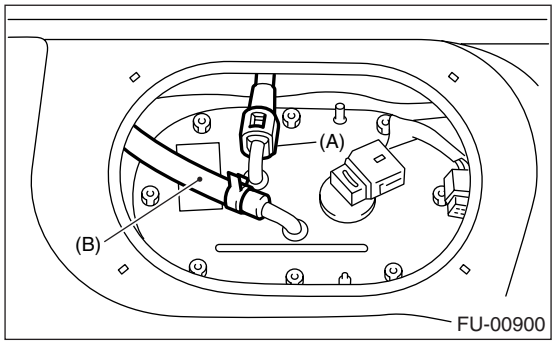
7) Raise the rear seat, and then turn the floor mat up.
8) Remove the access hole lid.


FU-00105

9) Disconnect the connector from fuel pump.

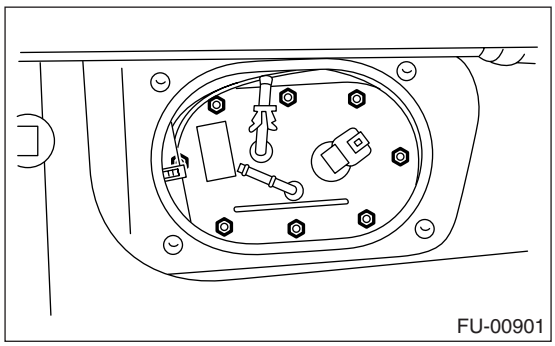

FU-00899

10) Disconnect the quick connector, and then disconnect the fuel delivery hose (A).
<Ref. to FU(H4SO)-63, REMOVAL, Fuel Delivery, Return and Evaporation Lines.>
11) Move the clip, and then disconnect the fuel return hose (B).



FU-00900

12) Remove the nuts which install the fuel pump assembly onto fuel tank.


FU-00901

13) Take off the fuel pump assembly from fuel tank.

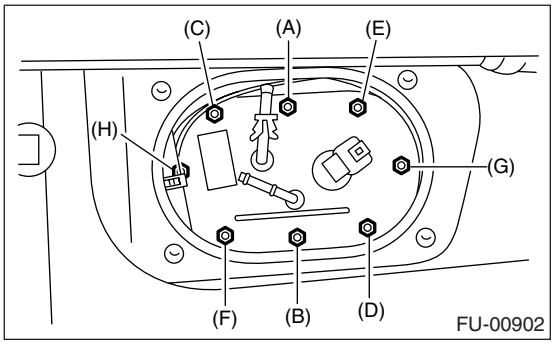
B: INSTALLATION

Install in the reverse order of removal. Do the following:

NOTE:
Use a new gasket.

(1) Ensure the sealing portion is free from fuel or foreign particles before installation.
(2) Tighten the nuts to specified torque in alphabetical sequence as shown in the figure.

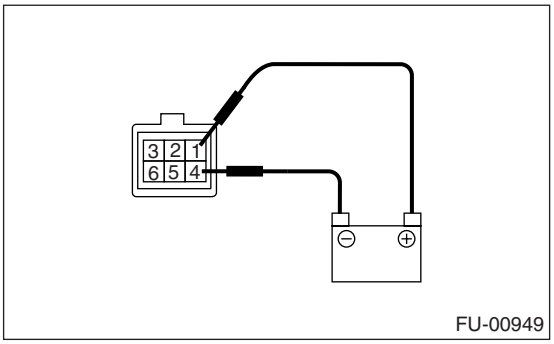
Tightening torque:
4.4 N·m (0.45 kgf-m, 3.3 ft-lb)



C: INSPECTION

Connect the lead harness to connector terminal of fuel pump, and then apply the battery power supply to check whether the pump operates.

WARNING:
• Wipe off the fuel completely.
• Keep the battery as far apart from fuel pump as possible.
• Be sure to turn the battery supply ON and OFF on battery side.
• Do not run the fuel pump for a long time under non-load condition.



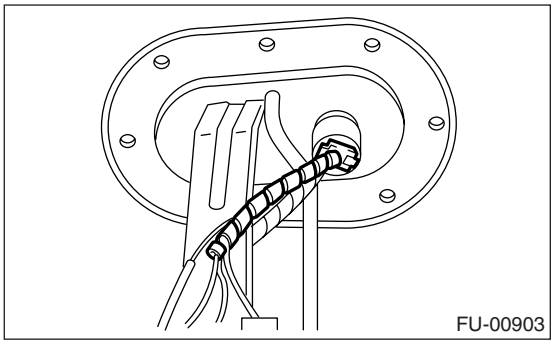
24.Fuel Level Sensor

A: REMOVAL

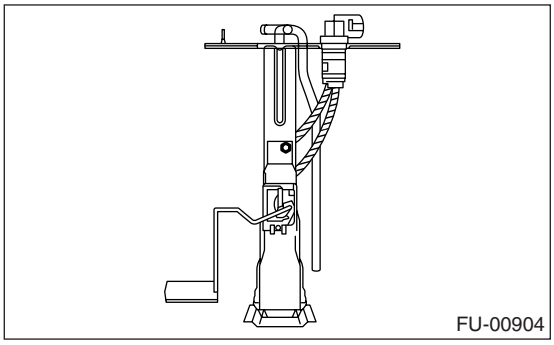
WARNING:
- **Place “NO FIRE” signs near working area.**
- **Be careful not to spill fuel on the floor.**

NOTE:
Fuel level sensor is built in the fuel pump assembly.

1) Remove the fuel pump assembly. <Ref. to FU(H4SO)-57, REMOVAL, Fuel Pump.>
2) Disconnect the connector from fuel pump bracket.



3) Remove the bolts which install the fuel level sensor on mounting bracket.



B: INSTALLATION

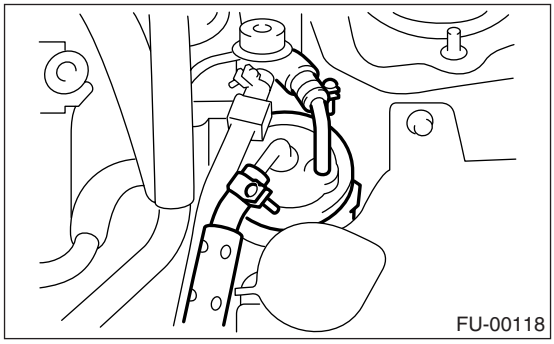
Install in the reverse order of removal.

25.Fuel Filter

A: REMOVAL

WARNING:
- **Place “NO FIRE” signs near working area.**
- **Be careful not to spill fuel on the floor.**

1) Release the fuel pressure. <Ref. to FU(H4SO)-50, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
2) Disconnect the fuel delivery hoses from fuel filter.



3) Remove the filter from holder.

B: INSTALLATION

CAUTION:
- **If the fuel hoses are damaged at connecting portion, replace them with new ones.**
- **If clamps are badly damaged, replace them with new ones.**

1) Install in the reverse order of removal.
2) Tighten the hose clamp screws.

Tightening torque:
1.25 N·m (0.13 kgf-m, 0.94 ft-lb)

C: INSPECTION

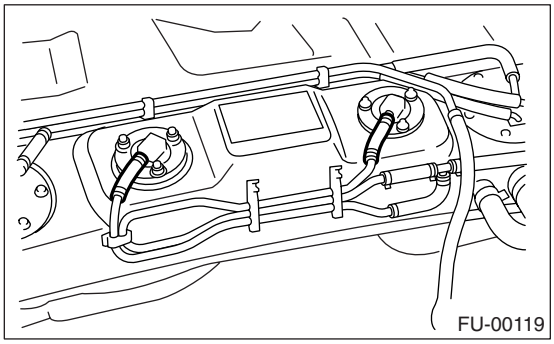
1) Check the inside of fuel filter for dirt and water sediment.
2) If it is clogged, or if replacement interval has been reached, replace it.
3) If water is found in it, shake and expel the water from inlet port.

26.Fuel Cut Valve

A: REMOVAL

WARNING:
- **Place “NO FIRE” signs near working area.**
- **Be careful not to spill fuel on the floor.**

1) Remove the fuel tank. <Ref. to FU(H4SO)-51, REMOVAL, Fuel Tank.>
2) Move the clip and disconnect the evaporation hose from fuel cut valve.



3) Remove the bolts which install the fuel cut valve.

B: INSTALLATION

Install in the reverse order of removal.

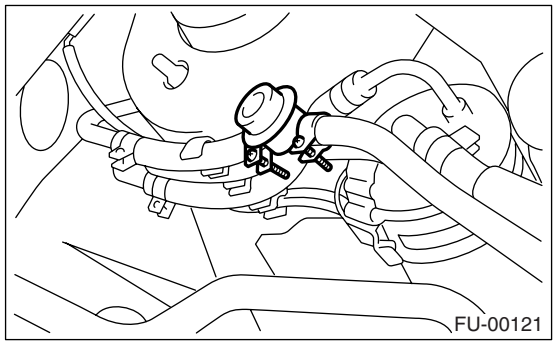
NOTE:
Use a new gasket.

Tightening torque:
Fuel cut valve
4.4 N·m (0.45 kgf-m, 3.3 ft-lb)

27.Fuel Damper Valve

A: REMOVAL

1) Release the fuel pressure. <Ref. to FU(H4SO)-50, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
2) Remove the fuel damper valve from the fuel return line.



B: INSTALLATION

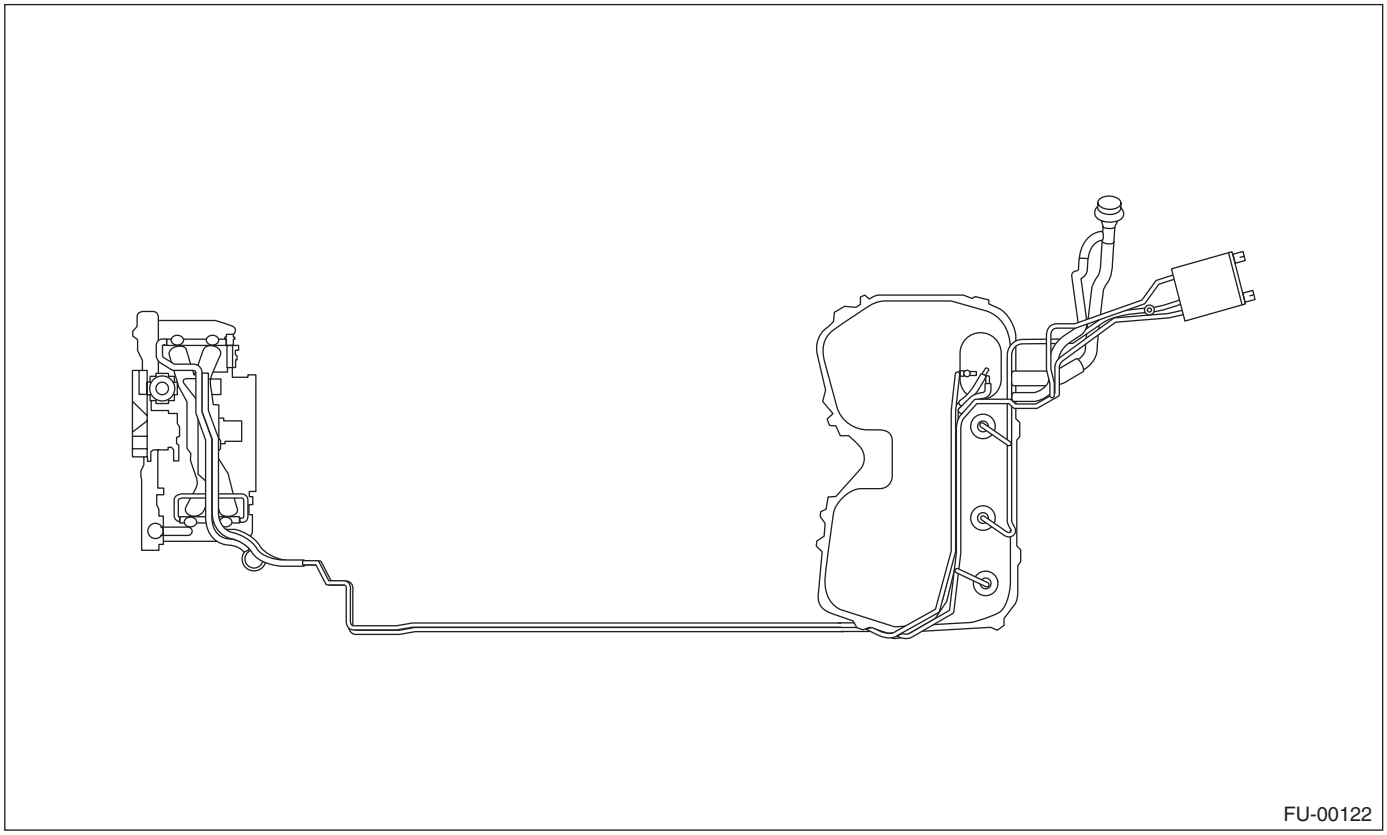
Install in the reverse order of removal.

Tightening torque:
Fuel damper valve
1.25 N·m (0.13 kgf-m, 0.94 ft-lb)

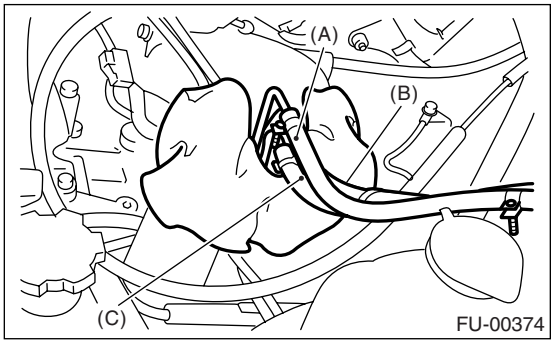
28.Fuel Delivery, Return and Evaporation Lines

A: REMOVAL

1) Set the vehicle on a lift.
2) Release the fuel pressure. <Ref. to FU(H4SO)-50, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
3) Open the fuel filler flap lid, and then remove the fuel filler cap.
4) Remove the floor mat. <Ref. to EI-58, REMOVAL, Floor Mat.>
5) Remove the fuel delivery pipes and hoses, fuel return pipes and hoses, evaporation pipes and hoses.


FU-00122

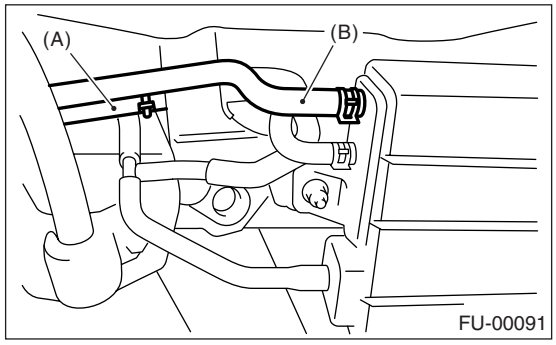
6) In the engine compartment, detach the fuel delivery hose (A), return hose (B) and evaporation hose (C).



FU-00374

7) Lift-up the vehicle.

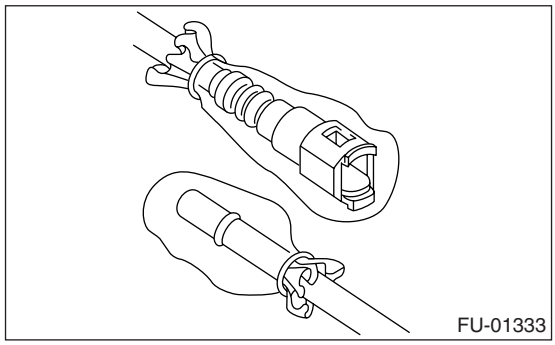
8) Disconnect the two-way valve hose (A) from two-way valve and disconnect the canister hose (B) from canister.



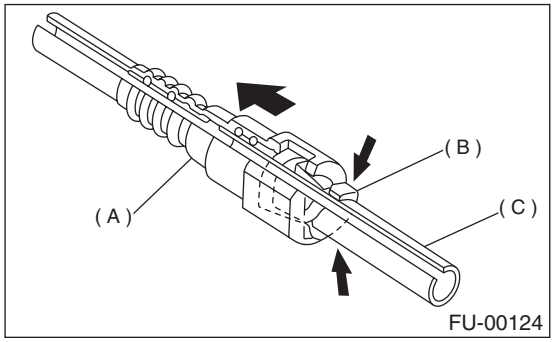
FU-00091

9) Separate the quick connector on fuel delivery line.
   (1) Clean the pipe and connector, if they are covered with dust.

(2) To prevent from damaging or entering foreign matter, wrap the pipes and connectors with plastic bag, etc.



(3) Hold the connector (A), and then push the retainer (B) down.
(4) Pull out the connector (A) from retainer (B).

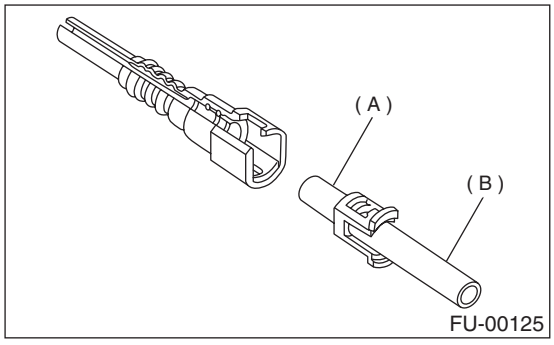


(A) Connector
(B) Retainer
(C) Pipe

B: INSTALLATION

1) Connect the quick connector on fuel delivery line.

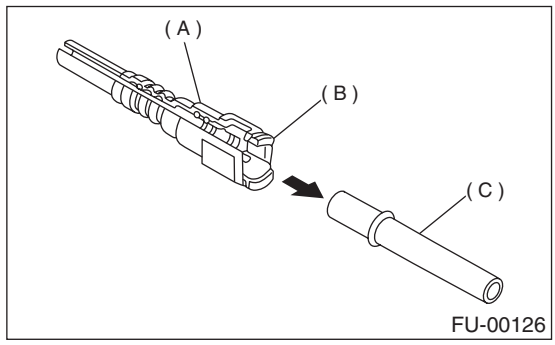
NOTE:
- Use a new retainer.
- Make sure that the connected portion is not damaged or has dust. If necessary, clean the seal surface of pipe.



(A) Seal surface
(B) Pipe

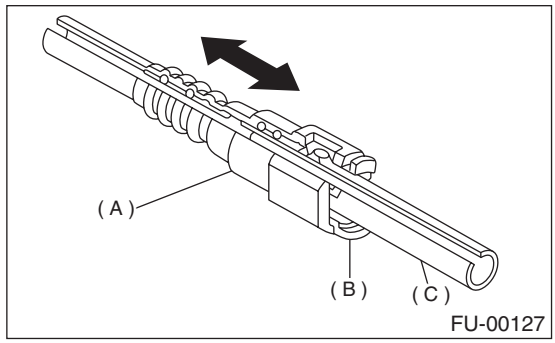
(1) Set the new retainer (B) to connector (A).
(2) Push the pipe into connector completely.

NOTE:
At this time, two clicking sounds are heard.



(A) Connector
(B) Retainer
(C) Pipe

CAUTION:
• Pull the connector to ensure it is connected securely.
• Ensure the two retainer pawls are engaged in their mating positions in connector.
• Be sure to inspect the hoses and their connections for any leakage of fuel.

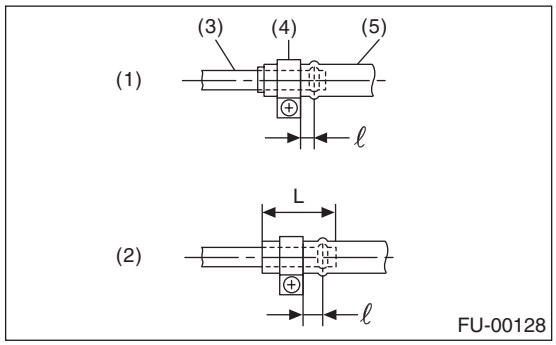


(A) Connector
(B) Retainer
(C) Pipe

2) Connect the fuel delivery hose to pipe with an overlap of 20 to 25 mm (0.79 to 0.98 in).
Type A: When the amount to be inserted is specified.
Type B: When the amount to be inserted is not specified.

ℓ : 2.5±1.5 mm (0.098±0.059 in)

L: 22.5±2.5 mm (0.886±0.098 in)

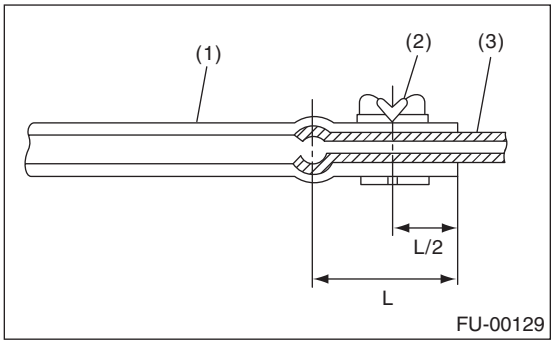


(1) Type A
(2) Type B
(3) Pipe
(4) Clamp
(5) Hose

3) Connect the evaporation hose to pipe by approx. 15 to 20 mm (0.59 to 0.79 in) from the hose end.

L = 17.5±2.5 mm (0.689±0.098 in)

CAUTION:
Be sure to inspect the hoses and their connections for fuel leakage.



(1) Hose
(2) Clip
(3) Pipe

C: INSPECTION

1) Make sure that there are no cracks on the fuel pipes and fuel hoses.
2) Make sure that the fuel pipe and fuel hose connections are tightened firmly.

29.Fuel System Trouble in General

A: INSPECTION

Trouble and possible cause		Corrective action
1. Insufficient fuel supply to the injector		
1)	Fuel pump will not operate.	
	❍ Defective terminal contact.	Inspect connections, especially ground, and tighten securely.
	❍ Trouble in electromagnetic or electronic circuit parts.	Replace the fuel pump.
2)	Lowering of fuel pump function.	Replace the fuel pump.
3)	Clogged dust or water in the fuel filter.	Replace the fuel filter, clean or replace fuel tank.
4)	Clogged or bent fuel pipe or hose.	Clean, correct or replace the fuel pipe or hose.
5)	Air is mixed in the fuel system.	Inspect or retighten each connection part.
6)	Clogged or bent breather tube or pipe.	Clean, correct or replace the air breather tube or pipe.
7)	Damaged diaphragm of pressure regulator.	Replace.
2. Leakage or blow out fuel		
1)	Loosened joints of the fuel pipe.	Retightening.
2)	Cracked fuel pipe, hose and fuel tank.	Replace.
3)	Defective welding part on the fuel tank.	Replace.
4)	Defective packing of the fuel tank.	Replace.
5)	Clogged or bent air breather tube or air vent tube.	Clean, correct or replace the air breather tube or air vent tube.
3. Gasoline smell inside of compartment		
1)	Loose joints at air breather tube, air vent tube and fuel filler pipe.	Retightening.
2)	Defective packing air tightness on the fuel saucer.	Correct or replace the packing.
3)	Inoperative fuel pump modulator or circuit.	Replace.
4. Defective fuel meter indicator		
1)	Defective operation of fuel level sensor.	Replace.
2)	Defective operation of fuel meter.	Replace.
5. Noise		
1)	Large operation noise or vibration of fuel pump.	Replace.

NOTE:
• When the vehicle is left unused for an extended period of time, water may accumulate in the fuel tank. Fill fuel fully to prevent those problem. And also drain the water condensation from fuel filter.
• In snow-covered areas, mountainous areas, skiing areas, etc. where ambient temperatures drop below 0°C (32°F) throughout the winter season, use water removing agent in the fuel system to prevent freezing fuel system and accumulating water. Fill the water removing agent each time the fuel is reduced to half to maintain the advantage.
• When water condensation is noticed in the fuel filter, drain the water from both the fuel filter and fuel tank or use water removing agent in the fuel tank.
• Before using water removing agent, follow the cautions noted on the bottle.

EMISSION CONTROL
(AUX. EMISSION CONTROL DEVICES)
EC(H4SO)

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2. Front Catalytic Converter 3
3. Rear Catalytic Converter 4
4. EGR Valve 5
5. Canister 6
6. Purge Control Solenoid Valve 7
7. Two-way Valve 8

1. General Description

A: CAUTION

• Wear working clothing, including a cap, protective goggles, and protective shoes during operation.
• Remove contamination including dirt and corrosion before removal, installation or disassembly.
• Keep the disassembled parts in order and protect them from dust or dirt.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly, and replacement.
• Be careful not to burn, because each part on the vehicle is hot after running.
• Be sure to tighten fasteners including bolts and nuts to the specified torque.
• Place shop jacks or rigid racks at the specified points.
• Before disconnecting electrical connectors of sensors or units, be sure to disconnect the ground cable from battery.

2. Front Catalytic Converter

A: REMOVAL

The front and rear catalytic converter and center exhaust pipe are integrated into one unit. Therefore, the removal procedures are the same as those for center exhaust pipe.
<Ref. to EX(H4SO)-9, REMOVAL, Center Exhaust Pipe.>

B: INSTALLATION

The front and rear catalytic converter and center exhaust pipe are integrated into one unit. Therefore, the installation procedures are the same as those for center exhaust pipe.
<Ref. to EX(H4SO)-9, INSTALLATION, Center Exhaust Pipe.>

C: INSPECTION

1) Make sure there are no exhaust leaks from connections and welds.
2) Make sure there are no holes or rusting.

3. Rear Catalytic Converter

A: REMOVAL

The front and rear catalytic converter and center exhaust pipe are integrated into one unit. Therefore, the removal procedures are the same as those for center exhaust pipe.
<Ref. to EX(H4SO)-9, REMOVAL, Center Exhaust Pipe.>

B: INSTALLATION

The front and rear catalytic converter and center exhaust pipe are integrated into one unit. Therefore, the installation procedures are the same as those for center exhaust pipe.
<Ref. to EX(H4SO)-9, INSTALLATION, Center Exhaust Pipe.>

C: INSPECTION

1) Make sure there are no exhaust leaks from connections and welds.
2) Make sure there are no holes or rusting.

4. EGR Valve

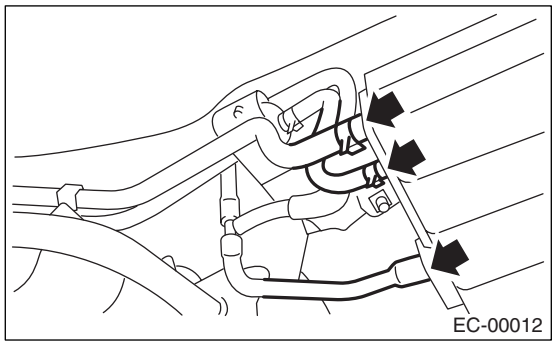
A: SPECIFICATION

For EGR valve removal and installation procedures, refer to FU section. <Ref. to FU(H4SO)-36, EGR Valve.>

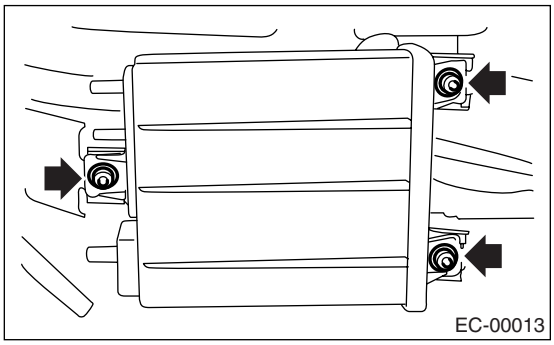
5. Canister

A: REMOVAL

1) Lift-up the vehicle.
2) Loosen the two clamps which hold the two canister hoses, and then disconnect the three evaporation hoses from canister.



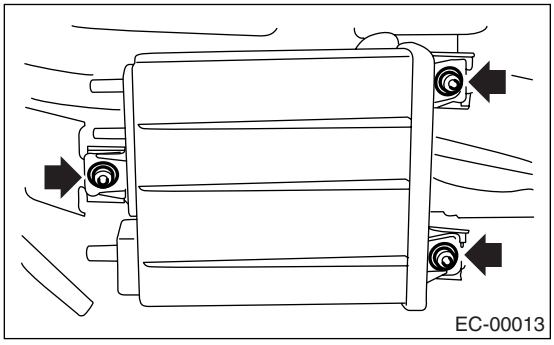
3) Remove the canister from body.



B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
23 N·m (2.3 kgf-m, 17 ft-lb)



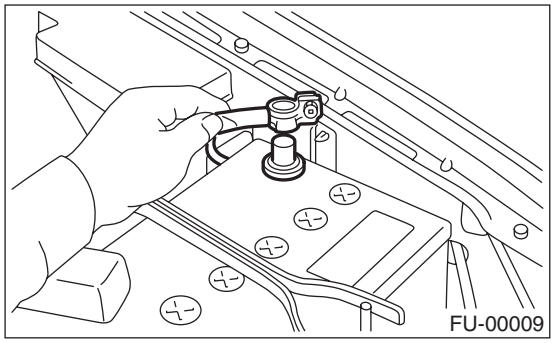
C: INSPECTION

Make sure the canister and canister hoses are not cracked or loose.

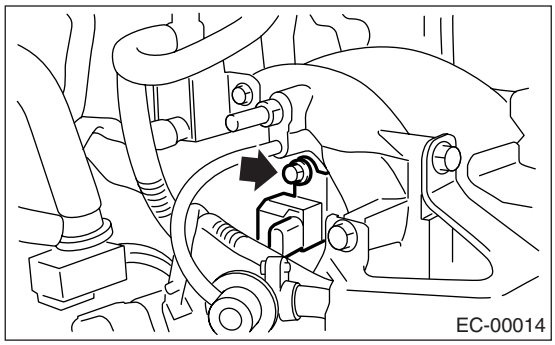
6. Purge Control Solenoid Valve

A: REMOVAL

1) Disconnect the ground cable from battery.



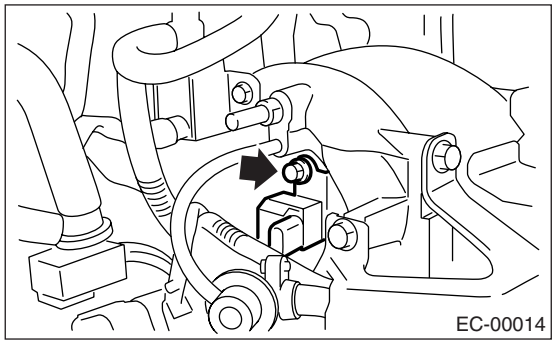
2) Disconnect the connector and hoses from the purge control solenoid valve, and then remove the purge control solenoid valve.



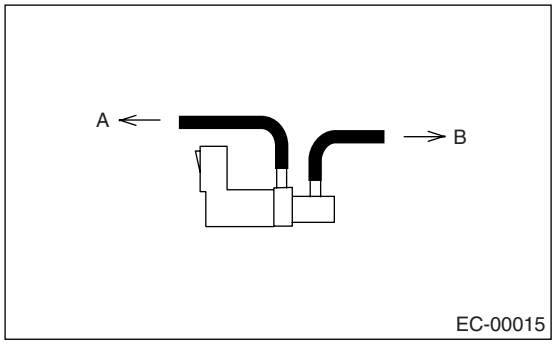
B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
19 N·m (1.9 kgf-m, 13.7 ft-lb)



NOTE:
Connect the evaporation hoses as shown in the figure.



(A) To fuel pipe
(B) To intake manifold

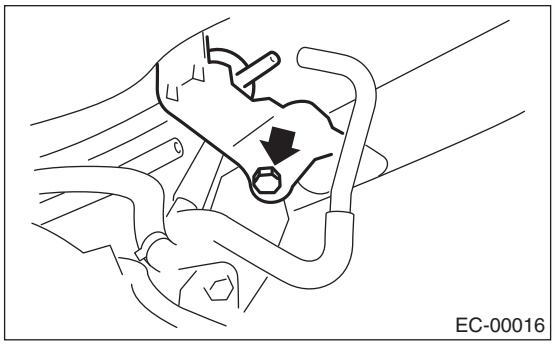
C: INSPECTION

Make sure hoses are not cracked or loose.

7. Two-way Valve

A: REMOVAL

1) Lift-up the vehicle.
2) Remove the canister from body. <Ref. to EC(H4SO)-6, REMOVAL, Canister.>
3) Remove the two-way valve with bracket as a single unit from body.



4) Remove the two-way valve from bracket.

B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

Make sure that the hoses are not cracked or loose.

INTAKE (INDUCTION)

IN(H4SO)

Page

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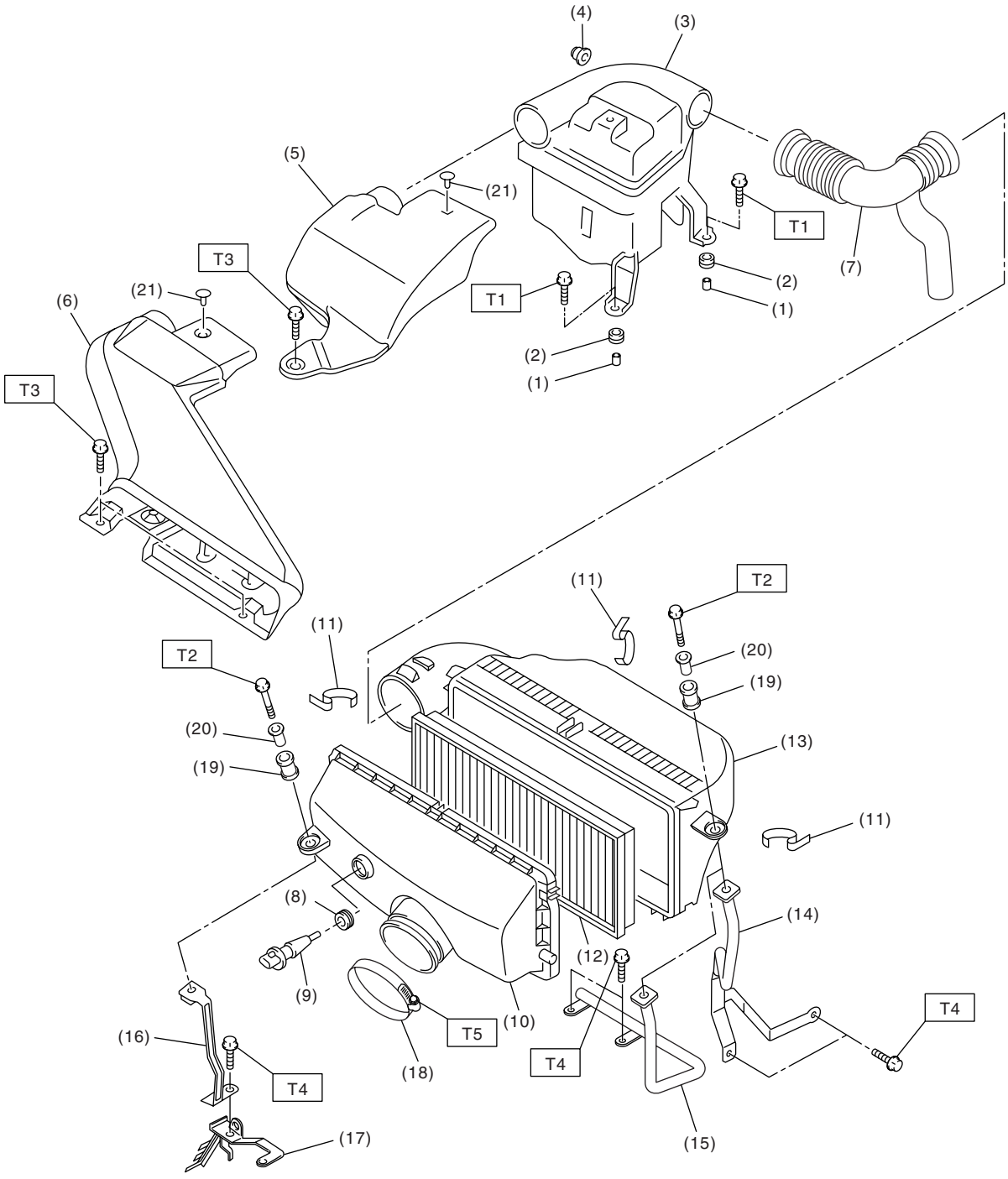
2. Air Cleaner Element 4
3. Air Cleaner Case 5
4. Air Intake Duct 6
5. Resonator Chamber 7

1. General Description

A: COMPONENT



IN-00178

(1) Spacer
(2) Bush
(3) Resonator chamber
(4) Cushion
(5) Air intake duct A (1.6 L and 2.0 L)
(6) Air intake duct A (2.5 L)
(7) Air intake duct B
(8) Bush
(9) Intake air temperature sensor
(10) Air cleaner case A
(11) Clip
(12) Air cleaner element
(13) Air cleaner case B
(14) Stay LH (MT model)
(15) Stay LH (AT model)
(16) Stay RH
(17) Engine harness bracket
(18) Clamp
(19) Bush
(20) Spacer
(21) Clip

Tightening torque: N·m (kgf-m, ft-lb)	
T1:	*33 (3.4, 24.6)*
T2:	*6.5 (0.66, 4.8)*
T3:	*7.5 (0.76, 5.5)*
T4:	*16 (1.6, 11.8)*
T5:	*3 (0.3, 2.2)*

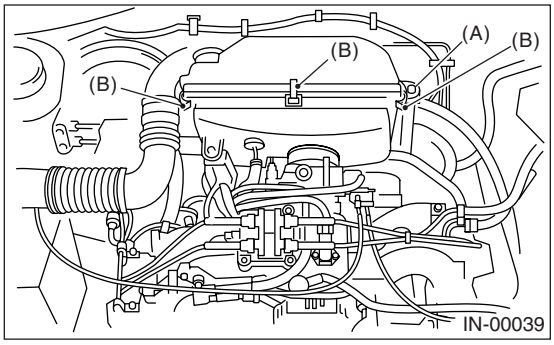
B: CAUTION

• Wear working clothing, including a cap, protective goggles, and protective shoes during operation.
• Remove contamination including dirt and corrosion before removal, installation or disassembly.
• Keep the disassembled parts in order and protect them from dust or dirt.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly, and replacement.
• Be careful not to burn, because each part on the vehicle is hot after running.
• Be sure to tighten fasteners including bolts and nuts to the specified torque.
• Place shop jacks or rigid racks at the specified points.
• Before disconnecting electrical connectors of sensor or units, be sure to disconnect the ground cable from battery.

2. Air Cleaner Element

A: REMOVAL

1) Remove the air intake duct from air cleaner case.
2) Remove the bolt (A) which secures the air cleaner case to stay.
3) Remove the clip (B) above the air cleaner case.



4) Remove the air cleaner element.

B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Fasten with a clip after inserting the lower tab of case.

Tightening torque:
6.5 N·m (0.66 kgf-m, 4.8 ft-lb)

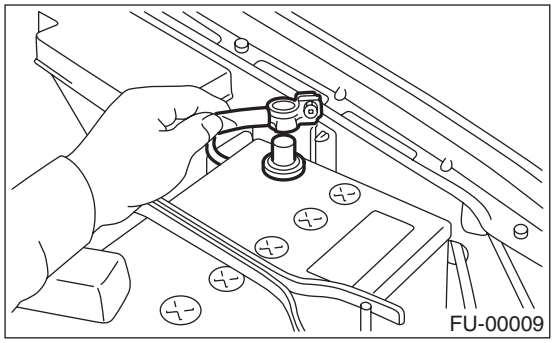
C: INSPECTION

Replace if excessively damaged or dirty.

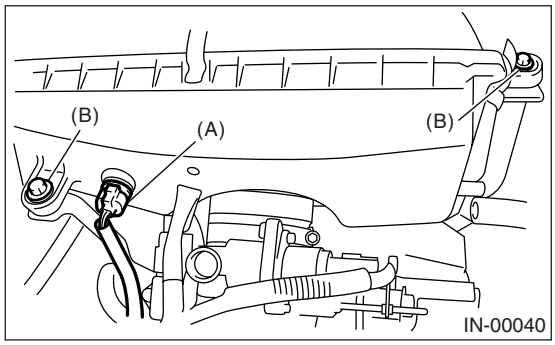
3. Air Cleaner Case

A: REMOVAL

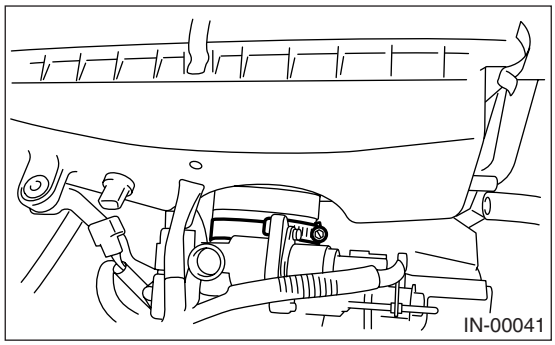
1) Disconnect the ground cable from battery.



2) Disconnect the connector (A) of intake air temperature sensor.
3) Remove the bolt (B) which installs the air cleaner case to the stay.



4) Disconnect the hoses and intake duct from the air cleaner case.
5) Loosen the clamp which connects the air cleaner case to throttle body.



6) Remove the air cleaner case.

B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
Air cleaner case
6.5 N·m (0.66 kgf-m, 4.8 ft-lb)
Clamp
3 N·m (0.3 kgf-m, 2.2 ft-lb)

C: INSPECTION

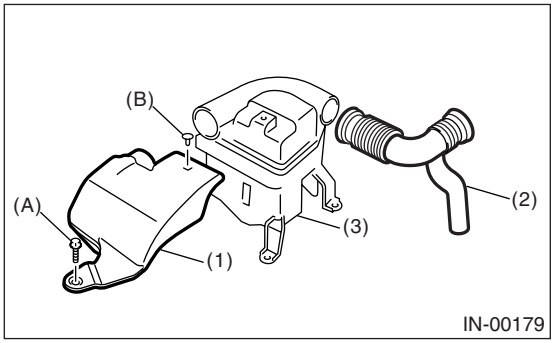
Inspect for cracks and loose connections.

4. Air Intake Duct

A: REMOVAL

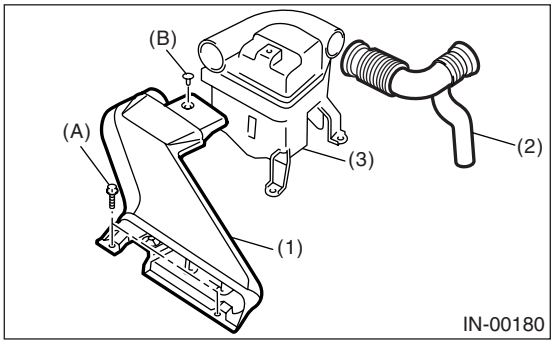
1) Remove the bolt (A) which installs the air intake duct A on front side of body.
2) Remove the clip (B) which connects the air intake duct A to resonator chamber.
3) Remove the air intake duct A.
4) Remove the air intake duct B from the resonator chamber and air cleaner case.

- 1.6 L and 2.0 L



(1) Air intake duct A
(2) Air intake duct B
(3) Resonator chamber

- 2.5 L



(1) Air intake duct A
(2) Air intake duct B
(3) Resonator chamber

B: INSTALLATION

Install in the reverse order of removal.

Tightening torque
7.5 N·m (0.76 kgf-m, 5.5 ft-lb)

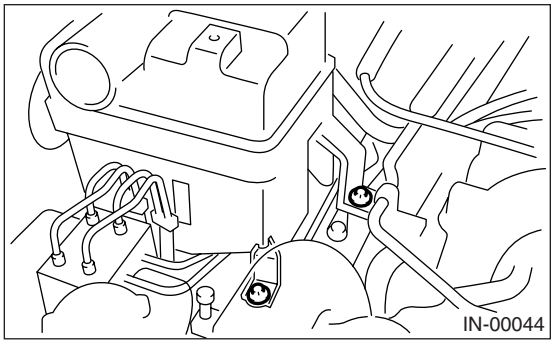
C: INSPECTION

1) Inspect for cracks and loose connections.
2) Inspect that no foreign objects are mixed in the air intake duct.

5. Resonator Chamber

A: REMOVAL

1) Remove the air intake duct. <Ref. to IN(H4SO)-6, REMOVAL, Air Intake Duct.>
2) Remove the resonator chamber.



B: INSTALLATION

Install in the reverse order of removal.

Tightening torque
33 N·m (3.4 kgf-m, 24.6 ft-lb)

C: INSPECTION

Inspect for cracks and loose connections.

MECHANICAL

ME(H4SO)

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1. General Description

A: SPECIFICATION

Engine	Model		1.6 L	2.0 L	2.5 L
	Type		Horizontally opposed, liquid cooled, 4-cylinder, 4-stroke gasoline engine		
	Valve arrangement		Belt driven, single over-head camshaft, 4-valve/cylinder		
	Bore × Stroke	mm (in)	87.9 × 65.8 (3.46 × 2.591)	92 × 75 (3.62 × 2.95)	99.5 × 79.0 (3.917 × 3.110)
	Displacement	cm^3 (cu in)	1,597 (97.45)	1,994 (121.67)	2,457 (150)
	Compression ratio		10.0		
	Compression pressure (at 350 rpm)	kPa (kgf/cm^2, psi)	1,020 — 1,275 (10.4 — 13.0, 148 — 185)		
	Number of piston rings		Pressure ring: 2, Oil ring: 1		
	Intake valve timing	Opening	10° BTDC	4° BTDC	1° BTDC
		Closing	46° ABDC	48° ABDC	51° ABDC
	Exhaust valve timing	Opening	42° BBDC	48° BBDC	50° BBDC
		Closing	10° ATDC	4° ATDC	6° ATDC
	Valve clearance	Intake mm (in)	0.20±0.04 (0.0079±0.0016)		
		Exhaust mm (in)	0.25±0.04 (0.0098±0.0016)		
	Idling speed [At neutral position on MT, or “P” or “N” position on AT]	rpm	With OBD: 650±100 (No load) 850±100 (A/C ON) Without OBD: 700±100 (No load) 850±100 (A/C ON)		650±100 (No load) 850±100 (A/C ON)
	Firing order		1 → 3 → 2 → 4		
	Ignition timing	BTDC/rpm	With OBD: 5°±10°/650 Without OBD: 5°±10°/700	With OBD: 10°±10°/650 Without OBD: 10°±10°/700	MT: 10°±10°/650 AT: 15°±10°/650

NOTE:
STD: Standard I.D.: Inner Diameter O.D.: Outer Diameter US: Undersize OS: Oversize

Belt tensioner adjuster	Protrusion of adjuster rod		5.2 — 6.2 mm (0.205 — 0.244 in)
Belt tensioner	Spacer O.D.		17.955 — 17.975 mm (0.7069 — 0.7077 in)
	Tensioner bush I.D.		18.00 — 18.08 mm (0.7087 — 0.7118 in)
	Clearance between spacer and bush	STD	0.025 — 0.125 mm (0.0010 — 0.0049 in)
		Limit	0.175 mm (0.0069 in)
	Side clearance of spacer	STD	0.20 — 0.55 mm (0.0079 — 0.0217 in)
		Limit	0.81 mm (0.0319 in)
Valve rocker arm	Clearance between shaft and arm	STD	0.020 — 0.054 mm (0.0008 — 0.0021 in)
		Limit	0.10 mm (0.0039 in)

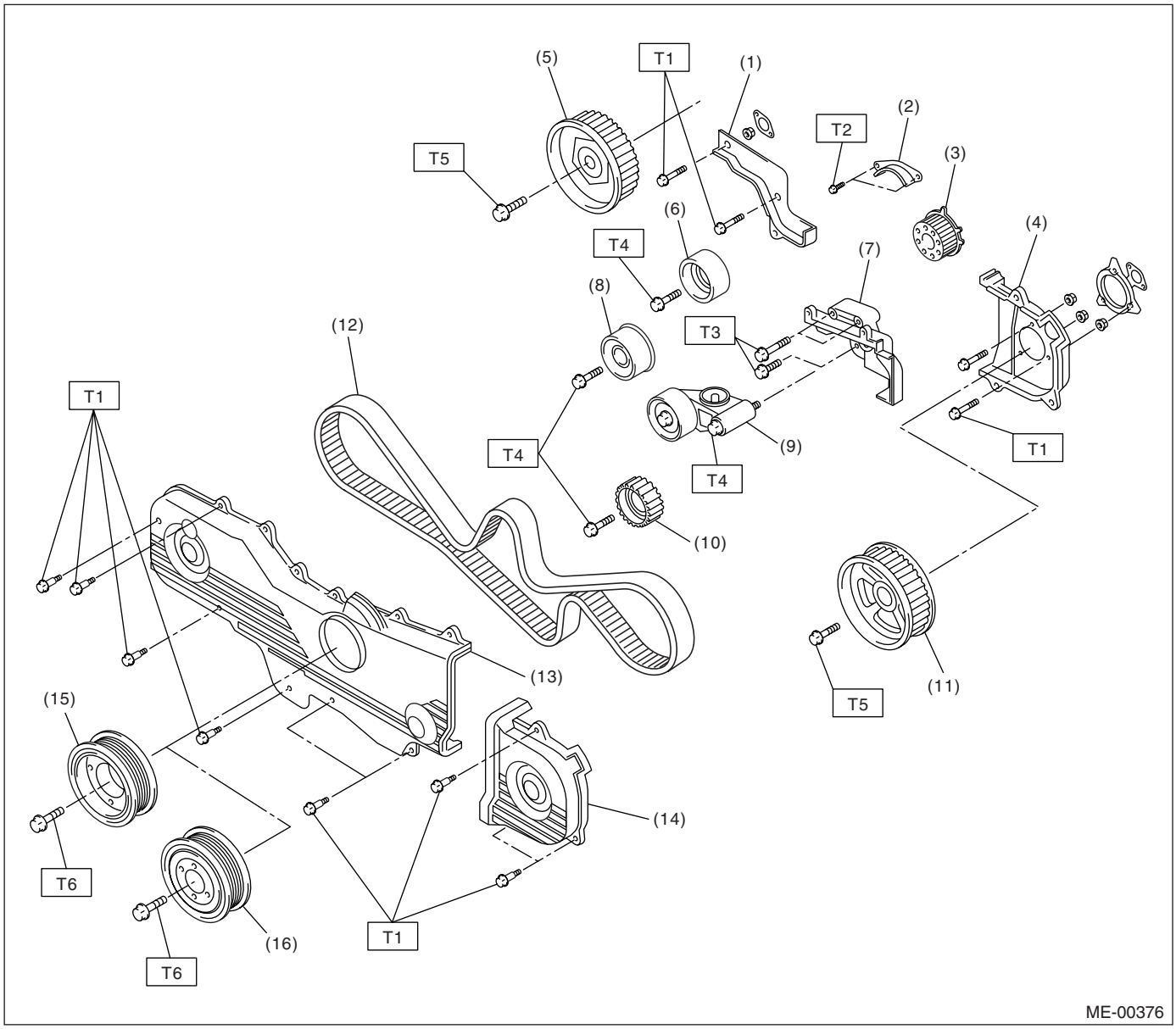
Camshaft	Bend limit				0.025 mm (0.0010 in)
	Thrust clearance			STD	0.030 — 0.090 mm (0.0012 — 0.0035 in)
				Limit	0.10 mm (0.0039 in)
	Cam lobe height	1.6 L	Intake	STD	39.378 — 39.478 mm (1.5503 — 1.5542 in)
				Limit	39.278 mm (1.5464 in)
			Exhaust	STD	39.567 — 39.667 mm (1.5578 — 1.5617 in)
				Limit	39.467 mm (1.5538 in)
		2.0 L	Intake	STD	38.732 — 38.832 mm (1.5249 — 1.5288 in)
				Limit	38.632 mm (1.5209 in)
			Exhaust	STD	39.259 — 39.359 mm (1.5456 — 1.5496 in)
				Limit	39.159 mm (1.5417 in)
		2.5 L	Intake	STD	39.485 — 39.585 mm (1.5545 — 1.5585 in)
				Limit	39.385 mm (1.5506 in)
			Exhaust	STD	39.259 — 39.359 mm (1.5456 — 1.5496 in)
				Limit	39.159 mm (1.5417 in)
	Camshaft journal O.D.				31.928 — 31.945 mm (1.2570 — 1.2577 in)
	Camshaft journal hole I.D.				32.000 — 32.018 mm (1.2598 — 1.2605 in)
	Oil clearance			STD	0.055 — 0.090 mm (0.0022 — 0.0035 in)
				Limit	0.10 mm (0.0039 in)
Cylinder head	Surface warpage limit (mating with cylinder block)				0.035 mm (0.0014 in)
	Surface grinding limit				0.1 mm (0.004 in)
	Standard height				97.5 mm (3.839 in)
Valve seat	Refacing angle				90°
	Contacting width		Intake	STD	0.8 — 1.4 mm (0.03 — 0.055 in)
				Limit	1.7 mm (0.067 in)
			Exhaust	STD	1.2 — 1.8 mm (0.047 — 0.071 in)
				Limit	2.2 mm (0.087 in)
Valve guide	Inner diameter				6.000 — 6.012 mm (0.2362 — 0.2367 in)
	Protrusion above head			Intake	20.0 — 21.0 mm (0.787 — 0.819 in)
				Exhaust	16.5 — 17.5 mm (0.650 — 0.683 in)
Valve	Head edge thickness		Intake	STD	0.8 — 1.2 mm (0.03 — 0.047 in)
				Limit	0.6 mm (0.024 in)
			Exhaust	STD	1.0 — 1.4 mm (0.039 — 0.055 in)
				Limit	0.6 mm (0.024 in)
	Stem diameter			Intake	5.950 — 5.965 mm (0.2343 — 0.2348 in)
				Exhaust	5.945 — 5.960 mm (0.2341 — 0.2346 in)
	Stem oil clearance		STD	Intake	0.035 — 0.062 mm (0.0014 — 0.0024 in)
				Exhaust	0.040 — 0.067 mm (0.0016 — 0.0026 in)
			Limit	—	0.15 mm (0.0059 in)
	Overall length			Intake	120.6 mm (4.75 in)
				Exhaust	121.7 mm (4.79 in)
Valve spring	Free length				54.30 mm (2.1378 in)
	Squareness				2.5°, 2.4 mm (0.094 in) or less
	Tension/spring height			Set	214 — 246 N (22 — 25 kgf, 48 — 55 lbf)/ 45.0 mm (1.772 in)
				Lift	526 — 582 N (54 — 59 kgf, 119 — 130 lbf)/ 34.7 mm (1.366 in)

Cylinder block	Surface warpage limit (mating with cylinder head)				0.025 mm (0.00098 in)
	Surface grinding limit				0.1 mm (0.004 in)
	Standard height				201.0 mm (7.91 in)
	Cylinder bore	1.6 L	STD	A	87.905 — 87.915 mm (3.4608 — 3.4612 in)
				B	87.895 — 87.905 mm (3.4604 — 3.4608 in)
		2.0 L	STD	A	92.005 — 92.015 mm (3.6222 — 3.6226 in)
				B	91.995 — 92.005 mm (3.6218 — 3.6222 in)
		2.5 L	STD	A	99.505 — 99.515 mm (3.9175 — 3.9179 in)
				B	99.495 — 99.505 mm (3.9171 — 3.9175 in)
	Cylindricity			STD	0.015 mm (0.0006 in)
				Limit	0.050 mm (0.0020 in)
	Out-of-roundness			STD	0.010 mm (0.0004 in)
				Limit	0.050 mm (0.0020 in)
	Piston clearance			STD	0.010 — 0.030 mm (0.0004 — 0.0012 in)
				Limit	0.050 mm (0.0020 in)
	Enlarging (boring) limit				0.5 mm (0.020 in)
Piston	Outer diameter	1.6 L	STD	A	87.885 — 87.895 mm (3.4600 — 3.4604 in)
				B	87.875 — 87.885 mm (3.4596 — 3.4600 in)
			0.25 mm (0.0098 in) OS		88.125 — 88.145 mm (3.4695 — 3.4702 in)
			0.50 mm (0.0197 in) OS		88.375 — 88.395 mm (3.4793 — 3.4801 in)
		2.0 L	STD	A	91.985 — 91.995 mm (3.6214 — 3.6218 in)
				B	91.975 — 91.985 mm (3.6211 — 3.6214 in)
			0.25 mm (0.0098 in) OS		92.225 — 92.245 mm (3.6309 — 3.6316 in)
			0.50 mm (0.0197 in) OS		92.475 — 92.495 mm (3.6407 — 3.6415 in)
		2.5 L	STD	A	99.485 — 99.495 mm (3.9167 — 3.9171 in)
				B	99.475 — 99.485 mm (3.9163 — 3.9167 in)
			0.25 mm (0.0098 in) OS		99.725 — 99.745 mm (3.9262 — 3.9269 in)
			0.50 mm (0.0197 in) OS		99.975 — 99.995 mm (3.9360 — 3.9368 in)
	Standard inner diameter of piston pin hole				23.000 — 23.006 mm (0.9055 — 0.9057 in)
Piston pin	Outer diameter				22.994 — 23.000 mm (0.9053 — 0.9055 in)
	Standard clearance between piston pin and hole in piston				0.004 — 0.008 mm (0.0002 — 0.0003 in)
	Degree of fit				Piston pin must be fitted into position with thumb at 20°C (68°F).
Piston ring	Piston ring gap	Top ring	STD		0.20 — 0.35 mm (0.0079 — 0.0138 in)
			Limit		1.0 mm (0.039 in)
		Second ring	STD	1.6 L	0.35 — 0.50 mm (0.0138 — 0.0197 in)
				2.0 L	0.40 — 0.50 mm (0.0157 — 0.0197 in)
				2.5 L	0.37 — 0.52 mm (0.0144 — 0.0203 in)
			Limit		1.0 mm (0.039 in)
		Oil ring	STD		0.20 — 0.50 mm (0.0079 — 0.0197 in)
			Limit		1.5 mm (0.059 in)
	Clearance between piston ring and piston ring groove	Top ring	STD		0.040 — 0.080 mm (0.0016 — 0.0031 in)
			Limit		0.15 mm (0.0059 in)
		Second ring	STD		0.030 — 0.070 mm (0.0012 — 0.0028 in)
			Limit		0.15 mm (0.0059 in)
Connecting rod	Bend twist per 100 mm (3.94 in) in length		Limit		0.10 mm (0.0039 in)
	Side clearance		STD		0.070 — 0.330 mm (0.0028 — 0.0130 in)
			Limit		0.4 mm (0.016 in)

Connecting rod bearing	Oil clearance		STD	0.016 — 0.044 mm (0.00063 — 0.0017 in)
			Limit	0.05 mm (0.0020 in)
	Thickness at center portion		STD	1.492 — 1.501 mm (0.0587 — 0.0591 in)
			0.03 mm (0.0012 in) US	1.510 — 1.513 mm (0.0594 — 0.0596 in)
			0.05 mm (0.0020 in) US	1.520 — 1.523 mm (0.0598 — 0.0600 in)
			0.25 mm (0.0098 in) US	1.620 — 1.623 mm (0.0638 — 0.0639 in)
Connecting rod bushing	Clearance between piston pin and bushing		STD	0 — 0.022 mm (0 — 0.0009 in)
			Limit	0.030 mm (0.0012 in)
Crankshaft	Bend limit			0.035 mm (0.0014 in)
	Crank pin	1.6 L	Out-of-roundness	0.005 mm (0.0002 in)
			Cylindricity	0.006 mm (0.0002 in)
			Surface grinding limit (dia.)	To 47.750 mm (1.8799 in)
		2.0 L	Out-of-roundness	0.005 mm (0.0002 in)
			Cylindricity	0.006 mm (0.0002 in)
			Surface grinding limit (dia.)	To 51.750 mm (2.0374 in)
		2.5 L	Out-of-roundness	0.003 mm (0.0001 in)
			Cylindricity	0.004 mm (0.0002 in)
			Surface grinding limit (dia.)	To 51.750 mm (2.0374 in)
	Crank journal		Out-of-roundness	0.005 mm (0.0002 in)
			Cylindricity	0.006 mm (0.0002 in)
			Surface grinding limit (dia.)	To 59.750 mm (2.3524 in)
	Crank pin outer diameter	1.6 L	STD	47.984 — 48.000 mm (1.8891 — 1.8898 in)
			0.03 mm (0.0012 in) US	47.954 — 47.970 mm (1.8879 — 1.8886 in)
			0.05 mm (0.0020 in) US	47.934 — 47.950 mm (1.8872 — 1.8878 in)
			0.25 mm (0.0098 in) US	47.734 — 47.750 mm (1.8793 — 1.8799 in)
		2.0 L 2.5 L	STD	51.984 — 52.000 mm (2.0466 — 2.0472 in)
			0.03 mm (0.0012 in) US	51.954 — 51.970 mm (2.0454 — 2.0461 in)
			0.05 mm (0.0020 in) US	51.934 — 51.950 mm (2.0446 — 2.0453 in)
			0.25 mm (0.0098 in) US	51.734 — 51.750 mm (2.0368 — 2.0374 in)
	Crank journal outer diameter		STD	59.992 — 60.008 mm (2.3619 — 2.3625 in)
			0.03 mm (0.0012 in) US	59.962 — 59.978 mm (2.3607 — 2.3613 in)
			0.05 mm (0.0020 in) US	59.942 — 59.958 mm (2.3599 — 2.3605 in)
			0.25 mm (0.0098 in) US	59.742 — 59.758 mm (2.3520 — 2.3527 in)
	Thrust clearance		STD	0.030 — 0.115 mm (0.0012 — 0.0045 in)
			Limit	0.25 mm (0.0098 in)
	Oil clearance		STD	0.010 — 0.030 mm (0.0004 — 0.0012 in)
			Limit	0.040 mm (0.0016 in)
Crankshaft bearing	Crankshaft bearing thickness	#1, #3	STD	1.998 — 2.011 mm (0.0787 — 0.0792 in)
			0.03 mm (0.0012 in) US	2.017 — 2.020 mm (0.0794 — 0.0795 in)
			0.05 mm (0.0020 in) US	2.027 — 2.030 mm (0.0798 — 0.0799 in)
			0.25 mm (0.0098 in) US	2.127 — 2.130 mm (0.0837 — 0.0839 in)
		#2, #4, #5	STD	2.000 — 2.013 mm (0.0787 — 0.0793 in)
			0.03 mm (0.0012 in) US	2.019 — 2.022 mm (0.0795 — 0.0796 in)
			0.05 mm (0.0020 in) US	2.029 — 2.032 mm (0.0799 — 0.0800 in)
			0.25 mm (0.0098 in) US	2.129 — 2.132 mm (0.0838 — 0.0839 in)

B: COMPONENT

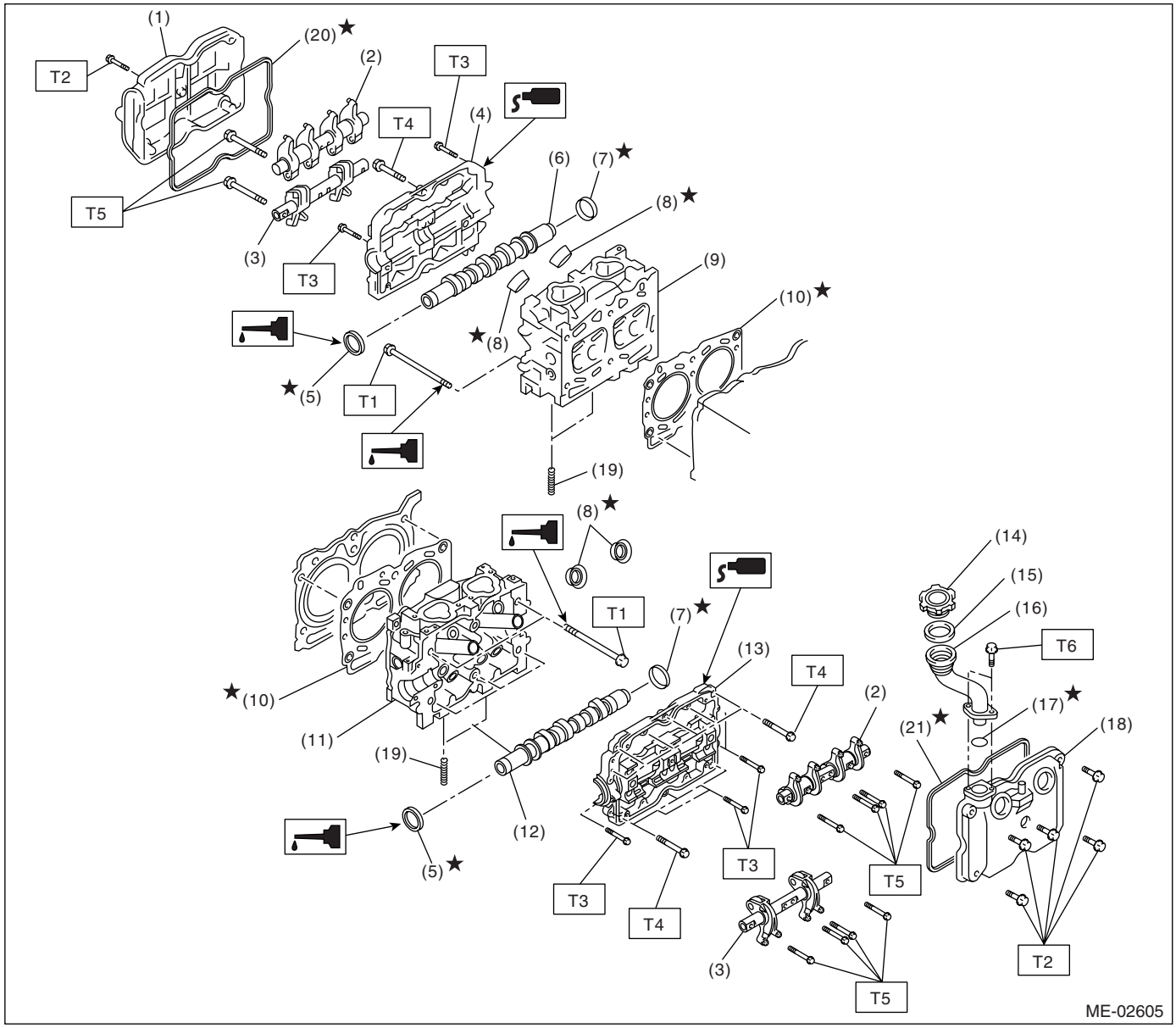
1. TIMING BELT



(1) Timing belt cover No. 2 (RH)
(2) Timing belt guide (MT model)
(3) Crank sprocket
(4) Timing belt cover No. 2 (LH)
(5) Cam sprocket No. 1
(6) Belt idler (No. 1)
(7) Tensioner bracket
(8) Belt idler (No. 2)
(9) Automatic belt tension adjuster ASSY
(10) Belt idler No. 2
(11) Cam sprocket No. 2
(12) Timing belt
(13) Front timing belt cover
(14) Timing belt cover (LH)
(15) Crank pulley (1.6 L and 2.0 L model)
(16) Crank pulley (2.5 L model)

Tightening torque: N·m (kgf-m, ft-lb)
T1: 5 (0.5, 3.6)
T2: 9.75 (1.0, 7.2)
T3: 24.5 (2.5, 18.1)
T4: 39 (4.0, 28.9)
T5: 78 (8.0, 57.9)
T6: <Ref. to ME(H4SO)-43, INSTALLATION, Crank Pulley.>

2. CYLINDER HEAD AND CAMSHAFT

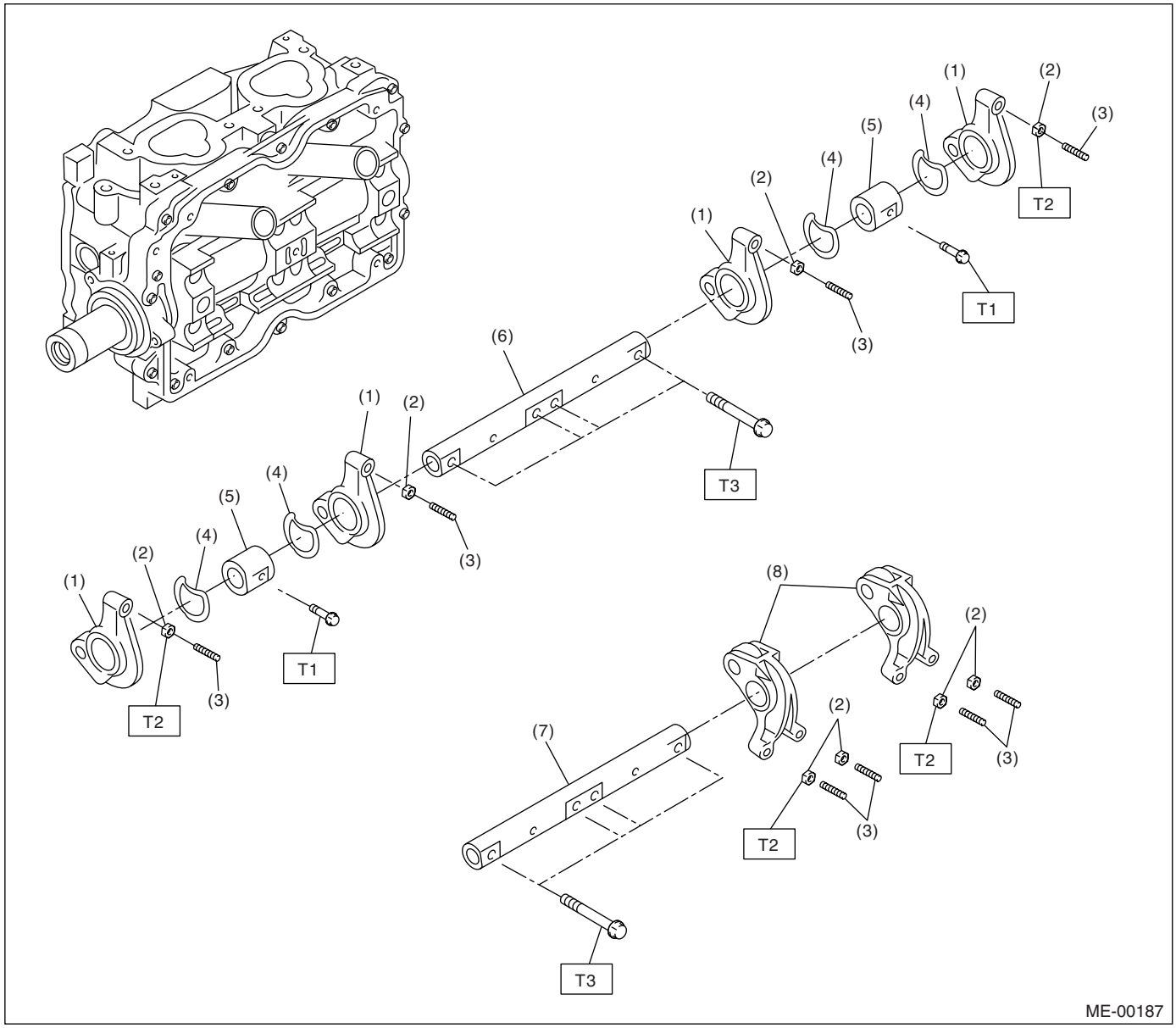


(1) Rocker cover (RH)
(2) Intake valve rocker ASSY
(3) Exhaust valve rocker ASSY
(4) Camshaft cap (RH)
(5) Oil seal
(6) Camshaft (RH)
(7) Plug
(8) Spark plug pipe gasket
(9) Cylinder head (RH)
(10) Cylinder head gasket
(11) Cylinder head (LH)
(12) Camshaft (LH)
(13) Camshaft cap (LH)
(14) Oil filler cap
(15) Gasket
(16) Oil filler duct
(17) O-ring
(18) Rocker cover (LH)
(19) Stud bolt
(20) Rocker cover gasket (RH)
(21) Rocker cover gasket (LH)

Tightening torque: N·m (kgf-m, ft-lb)

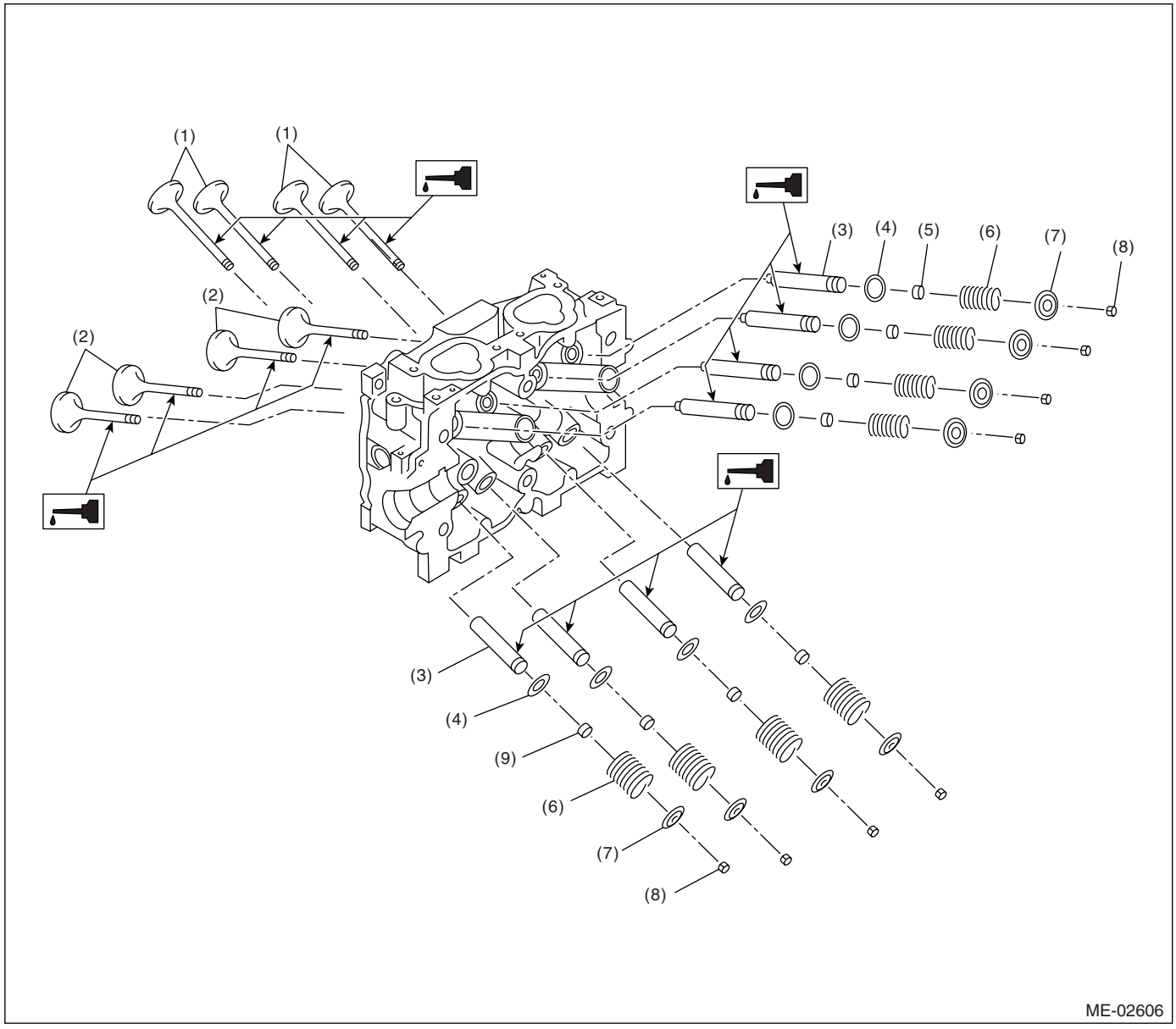
T1: ***<Ref. to ME(H4SO)-59, INSTALLATION, Cylinder Head.>***
T2: ***5 (0.5, 3.6)***
T3: ***9.75 (1.0, 7.2)***
T4: ***18 (1.8, 13.3)***
T5: ***25 (2.5, 18.1)***
T6: ***6.4 (0.65, 4.7)***

3. VALVE ROCKER ASSEMBLY



(1)	Intake valve rocker arm	(5)	Rocker shaft support	***Tightening torque: N·m (kgf-m, ft-lb)***
(2)	Valve rocker nut	(6)	Intake rocker shaft	***T1: 5 (0.5, 3.6)***
(3)	Valve rocker adjusting screw	(7)	Exhaust rocker shaft	***T2: 10 (1.0, 7.2)***
(4)	Spring	(8)	Exhaust valve rocker arm	***T3: 25 (2.5, 18.1)***

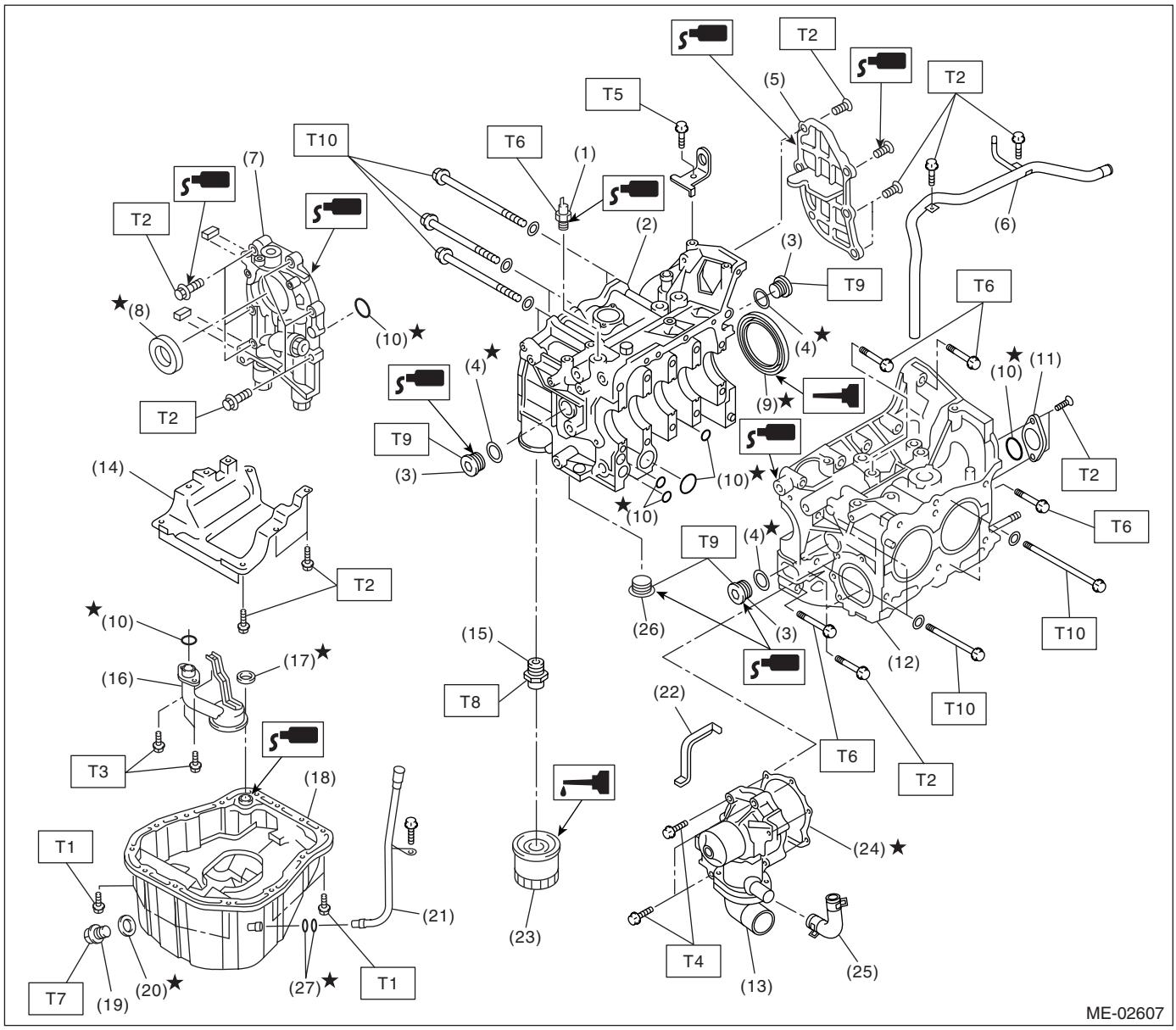
4. CYLINDER HEAD AND VALVE ASSEMBLY



(1) Exhaust valve
(2) Intake valve
(3) Valve guide
(4) Valve spring seat
(5) Intake valve oil seal
(6) Valve spring
(7) Retainer
(8) Retainer key
(9) Exhaust valve oil seal

5. CYLINDER BLOCK

- Model without ATF warmer

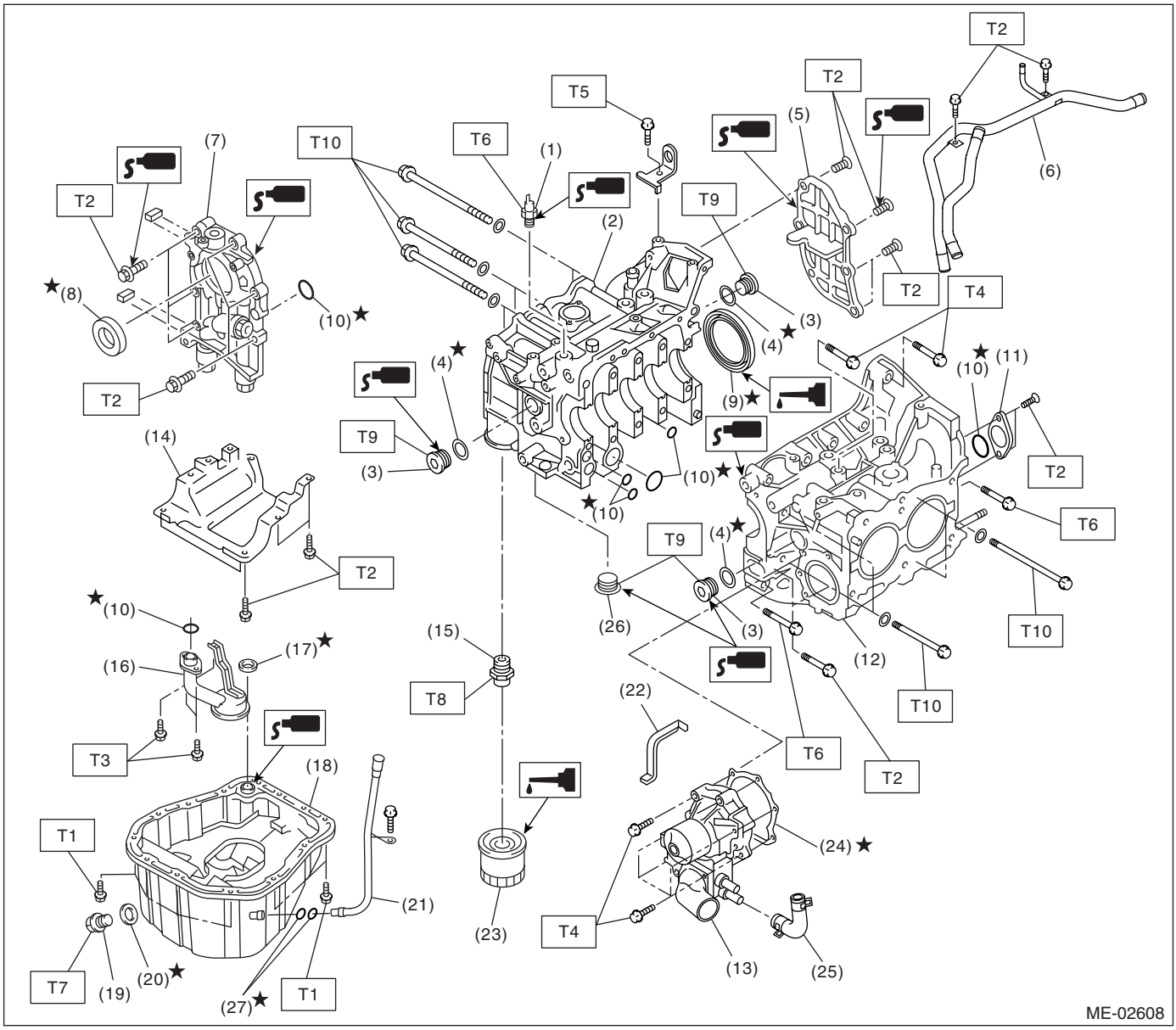


(1) Oil pressure switch
(2) Cylinder block (RH)
(3) Service hole plug
(4) Gasket
(5) Oil separator cover
(6) Water by-pass pipe
(7) Oil pump
(8) Front oil seal
(9) Rear oil seal
(10) O-ring
(11) Service hole cover
(12) Cylinder block (LH)
(13) Water pump
(14) Baffle plate
(15) Oil filter connector
(16) Oil strainer
(17) Gasket
(18) Oil pan
(19) Drain plug
(20) Metal gasket
(21) Oil level gauge guide
(22) Water pump sealing
(23) Oil filter
(24) Gasket
(25) Water pump hose
(26) Plug
(27) O-ring

Tightening torque: N·m (kgf-m, ft-lb)

T1: 5 (0.5, 3.6)
T2: 6.4 (0.65, 4.7)
T3: 10 (1.0, 7.2)
T4: First 12 (1.2, 8.7)
Second 12 (1.2, 8.7)
T5: 16 (1.6, 11.6)
T6: 25 (2.5, 18.1)
T7: 44 (4.5, 33)
T8: 45 (4.6, 33.3)
T9: 70 (7.1, 50.6)
T10: <Ref. to ME(H4SO)-70, INSTALLATION, Cylinder Block.>

- Model with ATF warmer

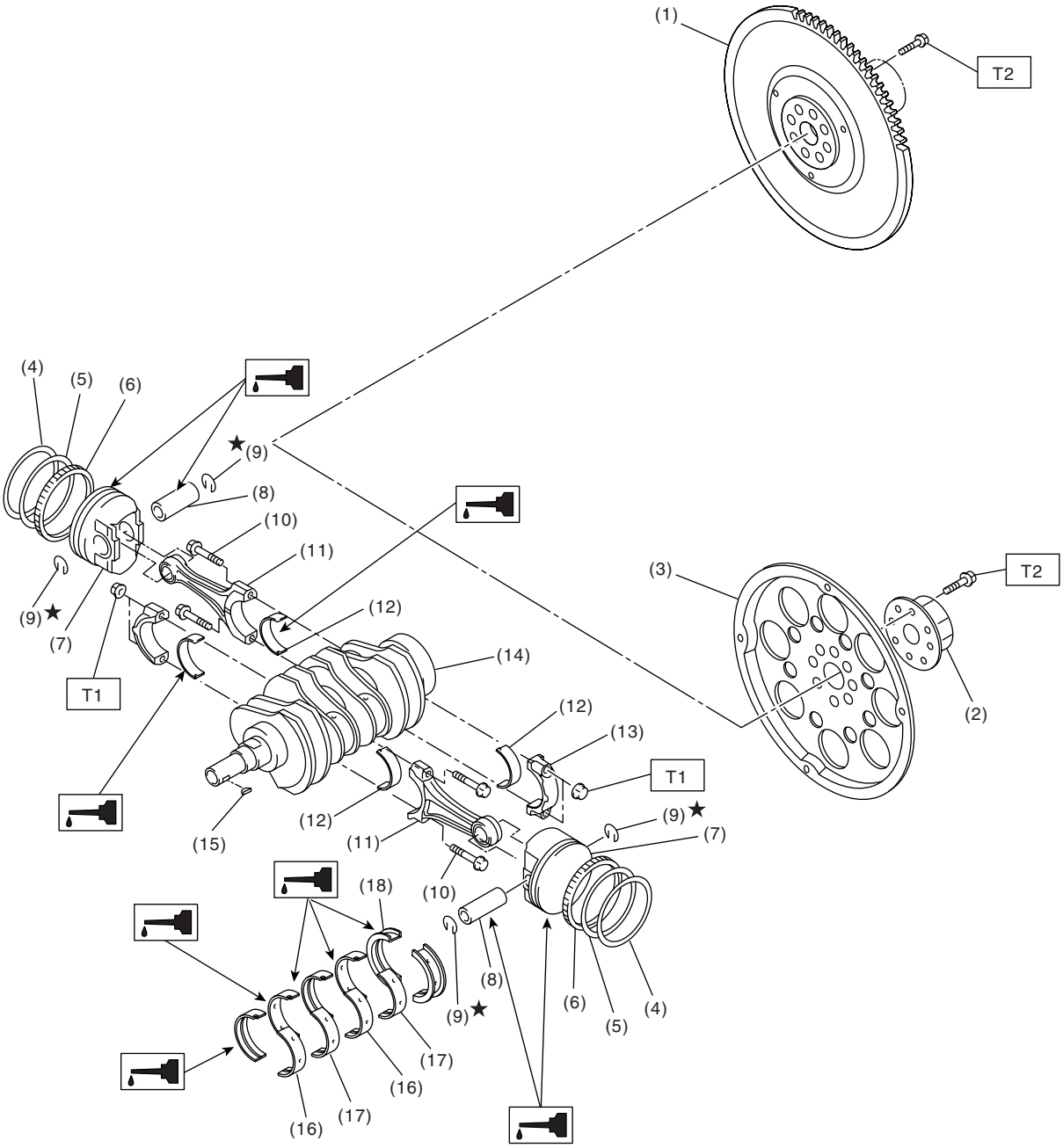


(1) Oil pressure switch
(2) Cylinder block (RH)
(3) Service hole plug
(4) Gasket
(5) Oil separator cover
(6) Water by-pass pipe
(7) Oil pump
(8) Front oil seal
(9) Rear oil seal
(10) O-ring
(11) Service hole cover
(12) Cylinder block (LH)
(13) Water pump
(14) Baffle plate
(15) Oil filter connector
(16) Oil strainer
(17) Gasket
(18) Oil pan
(19) Drain plug
(20) Metal gasket
(21) Oil level gauge guide
(22) Water pump sealing
(23) Oil filter
(24) Gasket
(25) Water pump hose
(26) Plug
(27) O-ring

Tightening torque: N·m (kgf-m, ft-lb)

T1: 5 (0.5, 3.6)
T2: 6.4 (0.65, 4.7)
T3: 10 (1.0, 7.2)
T4: First 12 (1.2, 8.7)
Second 12 (1.2, 8.7)
T5: 16 (1.6, 11.6)
T6: 25 (2.5, 18.1)
T7: 44 (4.5, 33)
T8: 45 (4.6, 33.3)
T9: 70 (7.1, 50.6)
T10: <Ref. to ME(H4SO)-70, INSTALLATION, Cylinder Block.>

6. CRANKSHAFT AND PISTON

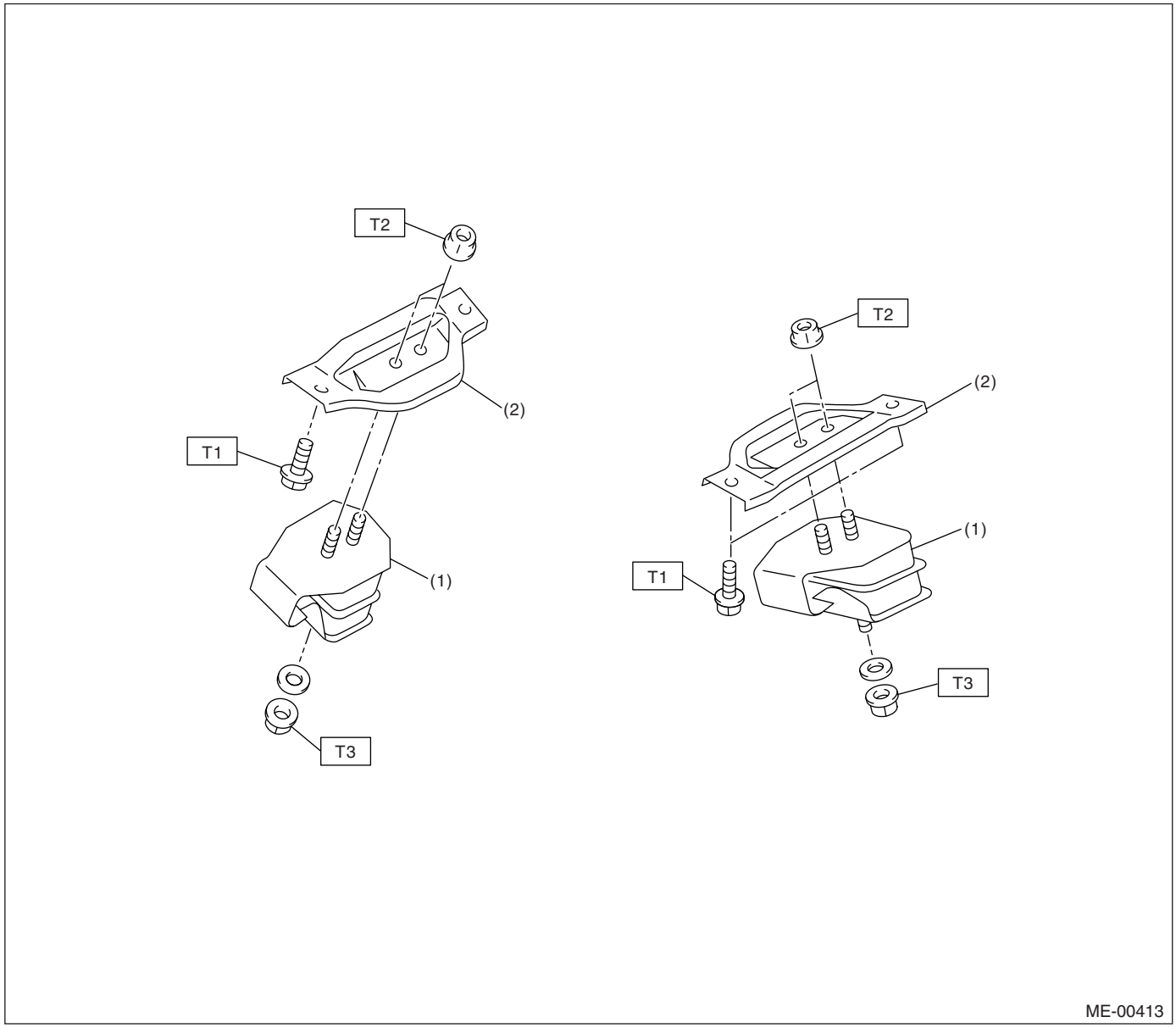


ME-02403

(1) Flywheel (MT model)
(2) Reinforcement (AT model)
(3) Drive plate (AT model)
(4) Top ring
(5) Second ring
(6) Oil ring
(7) Piston
(8) Piston pin
(9) Circlip
(10) Connecting rod bolt
(11) Connecting rod
(12) Connecting rod bearing
(13) Connecting rod cap
(14) Crankshaft
(15) Woodruff key
(16) Crankshaft bearing #1, #3
(17) Crankshaft bearing #2, #4
(18) Crankshaft bearing #5

Tightening torque: N·m (kgf-m, ft-lb)
T1: 45 (4.6, 33.3)
T2: 72 (7.3, 52.8)

7. ENGINE MOUNTING



(1) Front cushion rubber
(2) Front engine mounting bracket

Tightening torque: N·m (kgf-m, ft-lb)
T1: 35 (3.6, 25.8)
T2: 42 (4.3, 31.0)
T3: 85 (8.7, 63)

C: CAUTION

• Wear working clothing, including a cap, protective goggles and protective shoes during operation.
• Remove contamination including dirt and corrosion before removal, installation or disassembly.
• Keep the disassembled parts in order and protect them from dust or dirt.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly, and replacement.
• Be careful not to burn, because each part in the vehicle is hot after running.
• Be sure to tighten fasteners including bolts and nuts to the specified torque.
• Place shop jacks or rigid racks at the specified points.
• Before disconnecting electrical connectors of sensors or units, be sure to disconnect the ground cable from battery.
• All parts should be thoroughly cleaned, paying special attention to the engine oil passages, pistons and bearings.
• Rotating parts and sliding parts such as piston, bearing and gear should be coated with oil prior to assembly.
• Be careful not to let oil, grease or coolant contact the timing belt, clutch disc and flywheel.
• All removed parts, if to be reused, should be reinstalled in the original positions and directions.
• Bolts, nuts and washers should be replaced with new ones as required.
• Even if necessary inspections have been made in advance, proceed with assembly work while making rechecks.
• Remove or install engine in an area where chain hoists, lifting devices, etc. are available for ready use.
• Be sure not to damage coated surfaces of body panels with tools or stain seats and windows with coolant or oil. Place a cover over fenders, as required, for protection.
• Prior to starting work, prepare the following:
Service tools, clean cloth, containers to catch coolant and oil, wire ropes, chain hoist, transmission jacks, etc.
• Lift-up or lower the vehicle when necessary. Make sure to support the correct positions.

D: PREPARATION TOOL

1. SPECIAL TOOLS

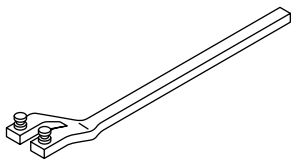
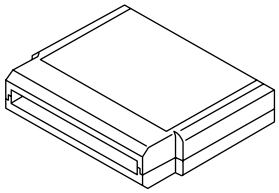
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18231AA010	18231AA010	CAM SPROCKET WRENCH	• Used for removing and installing cam sprocket. (LH side) • Also the CAM SPROCKET WRENCH (499207100) can be used.
 ST18482AA000	18482AA000	CARTRIDGE	Troubleshooting for electrical systems.

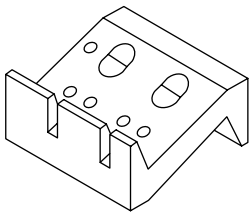
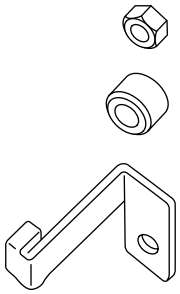
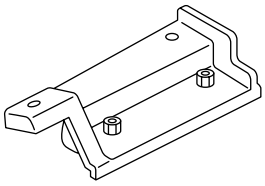
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
ST22771AA030	22771AA030	SUBARU SELECT MONITOR KIT	Troubleshooting for electrical systems. • English: 22771AA030 (Without printer) • German: 22771AA070 (Without printer) • French: 22771AA080 (Without printer) • Spanish: 22771AA090 (Without printer)
 ST-498267800	498267800	CYLINDER HEAD TABLE	• Used for replacing valve guides. • Used for removing and installing valve springs.
 ST-498277200	498277200	STOPPER SET	Used for installing automatic transmission assembly to engine.
 ST-498457000	498457000	ENGINE STAND ADAPTER RH	Used with ENGINE STAND (499817100).

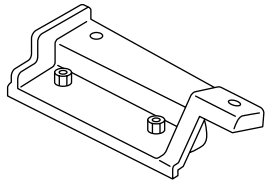
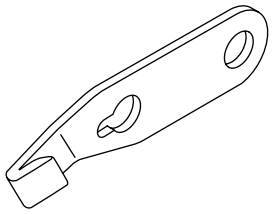
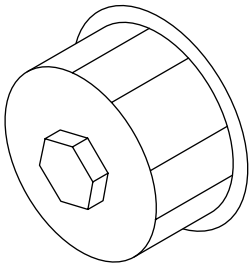
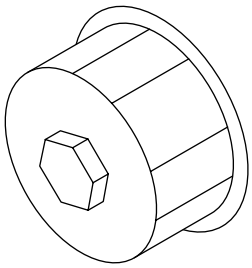
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498457100	498457100	ENGINE STAND ADAPTER LH	Used with ENGINE STAND (499817100).
 ST-498497100	498497100	CRANKSHAFT STOPPER	Used for stopping rotation of flywheel when loosening and tightening crank pulley bolt, etc.
 ST-498547000	498547000	OIL FILTER WRENCH	• Used for removing and installing oil filter. • For oil filter of outer diameter 80 mm (3.15 in).
 ST18332AA000	18332AA000	OIL FILTER WRENCH	• Used for removing and installing oil filter. • For oil filter of outer diameter 68 mm (2.68 in).

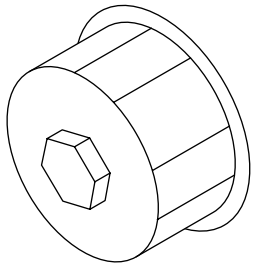
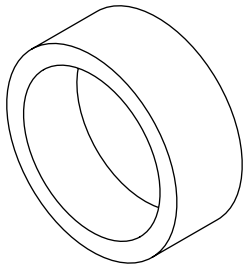
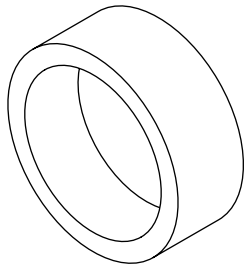
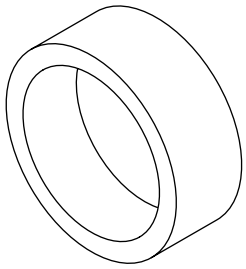
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18332AA010	18332AA010	OIL FILTER WRENCH	• Used for removing and installing oil filter. • For oil filter of outer diameter 65 mm (2.56 in).
 ST-498747000	498747000	PISTON GUIDE	Used for installing piston in cylinder. (1.6 L model)
 ST-398744300	398744300	PISTON GUIDE	Used for installing piston in cylinder. (2.0 L model)
 ST-498747300	498747300	PISTON GUIDE	Used for installing piston in cylinder. (2.5 L model)

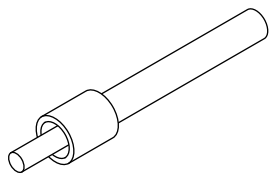
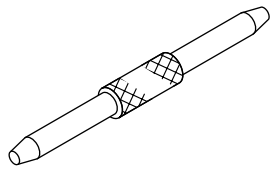
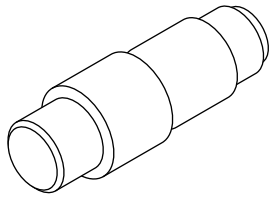
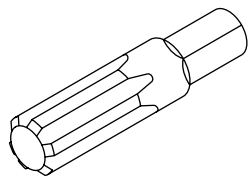
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498857100	498857100	VALVE OIL SEAL GUIDE	Used for press-fitting of intake and exhaust valve guide oil seals.
 ST-499017100	499017100	PISTON PIN GUIDE	Used for installing piston pin, piston and connecting rod.
 ST-499037100	499037100	CONNECTING ROD BUSHING REMOVER & INSTALLER	Used for removing and installing connecting rod bushing.
 ST-499057000	499057000	TORX PLUS®	Used for removing flywheel (Dual mass flywheel).

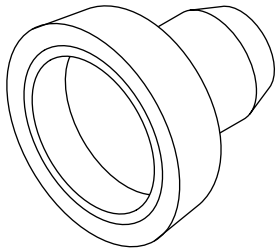
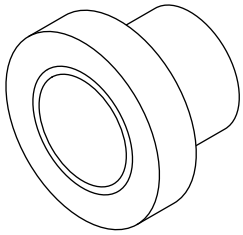
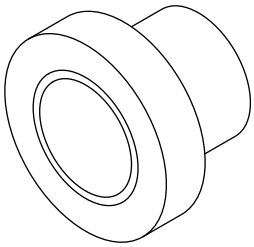
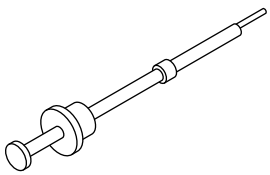
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499587200	499587200	CRANKSHAFT OIL SEAL INSTALLER	• Used for installing crankshaft oil seal. • Used with CRANKSHAFT OIL SEAL GUIDE (499597100).
 ST-499587500	499587500	OIL SEAL INSTALLER	• Used for installing camshaft oil seal. • Used with OIL SEAL GUIDE (499597000).
 ST-499587700	499587700	CAMSHAFT OIL SEAL INSTALLER	Used for installing cylinder head plug.
 ST-499097700	499097700	PISTON PIN REMOVER ASSY	Used for removing piston pin.

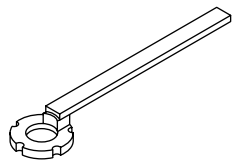
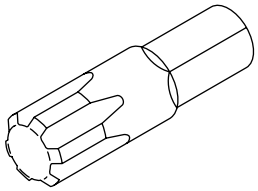
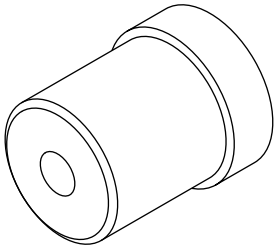
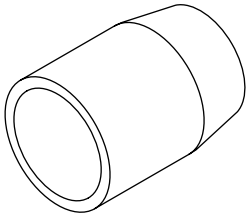
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499207400	499207400	CAM SPROCKET WRENCH	Used for removing and installing cam sprocket. (RH side)
 ST-499497000	499497000	TORX PLUS®	Used for removing and installing camshaft cap.
 ST-499587100	499587100	OIL SEAL INSTALLER	Used for installing oil pump oil seal.
 ST-499597000	499597000	OIL SEAL GUIDE	• Used for installing camshaft oil seal. • Used with OIL SEAL INSTALLER (499587500).

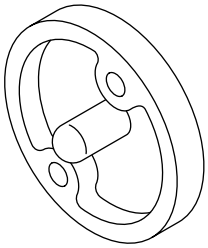
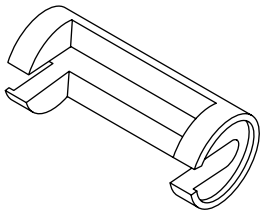
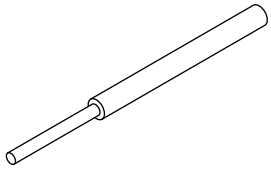
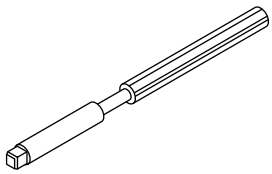
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499597100	499597100	CRANKSHAFT OIL SEAL GUIDE	• Used for installing crankshaft oil seal. • Used with CRANKSHAFT OIL SEAL INSTALLER (499587200).
 ST-499718000	499718000	VALVE SPRING REMOVER	Used for removing and installing valve spring.
 ST-499767200	499767200	VALVE GUIDE REMOVER	Used for removing valve guides.
 ST-499767400	499767400	VALVE GUIDE REAMER	Used for reaming valve guides.

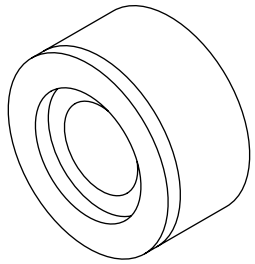
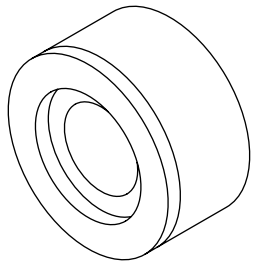
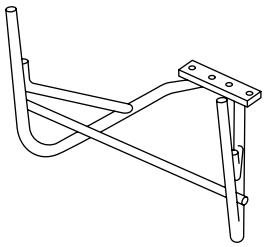
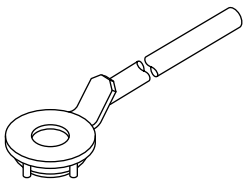
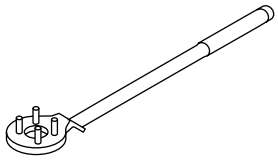
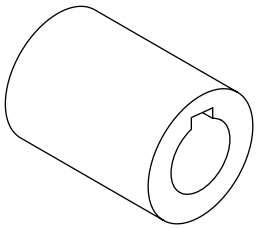
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499767700	499767700	VALVE GUIDE ADJUSTER	Used for installing valve guide. (Intake side)
 ST-499767700	499767800	VALVE GUIDE ADJUSTER	Used for installing valve guide. (Exhaust side)
 ST-499817100	499817100	ENGINE STAND	• Stand used for engine disassembly and assembly. • Used with ENGINE STAND ADAPTER RH (498457000) & LH (498457100).
 ST-499977400	499977400	CRANK PULLEY WRENCH	Used for stopping rotation of crank pulley when loosening and tightening crank pulley bolts. (1.6 L and 2.0 L model)

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499977100	499977100	CRANK PULLEY WRENCH	Used for stopping rotation of crank pulley when loosening and tightening crank pulley bolts. (2.5 L model)
 ST-499987500	499987500	CRANKSHAFT SOCKET	Used for rotating crankshaft.

2. GENERAL PURPOSE TOOLS

TOOL NAME	REMARKS
Compression Gauge	Used for measuring compression.
Tachometer (Secondary pick-up type)	Used for measuring idle speed.
Timing Light	Used for measuring ignition timing.

E: PROCEDURE

It is possible to conduct the following service procedures with engine on the vehicle, however, the procedures described in this section are based on the condition that the engine is removed from the vehicle.

- V-belt
- Timing Belt
- Valve Rocker Assembly
- Camshaft
- Cylinder Head

2. Compression

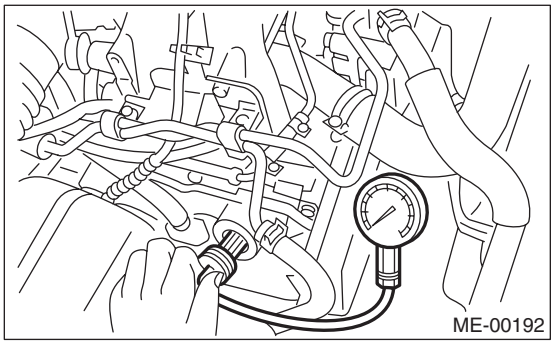
A: INSPECTION

CAUTION:
After warming up, engine becomes very hot. Be careful not to burn yourself during measurement.

1) After warming up the engine, turn the ignition switch to OFF.
2) Make sure that the battery is fully charged.
3) Lower the fuel pressure. <Ref. to FU(H4SO)-50, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.> or <Ref. to FU(H4SOw/oOBD)-45, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
4) Remove all the spark plugs. <Ref. to IG(H4SO)-5, REMOVAL, Spark Plug.>
5) Fully open the throttle valve.
6) Check the starter motor for satisfactory performance and operation.
7) Hold the compression gauge tight against spark plug hole.

NOTE:
When using a screw-in type compression gauge, the screw (put into cylinder head spark plug hole) should be less than 18 mm (0.71 in) long.

8) Crank the engine by means of starter motor, and then read the maximum value when the needle on the gauge is steady.



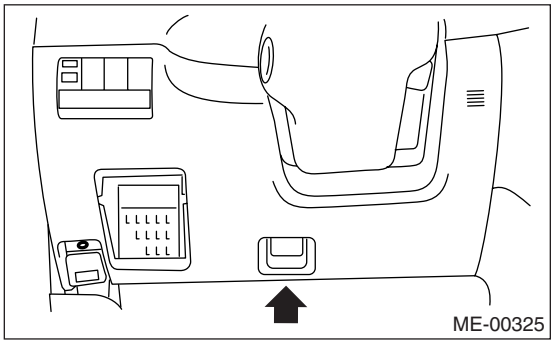
9) Perform at least two measurements per cylinder, and make sure that the values are correct.

Compression (350 rpm and fully open throttle):
Standard;
1,275 kPa (13.0 kgf/cm^2, 185 psi)
Limit;
1,020 kPa (10.4 kgf/cm^2, 148 psi)
Difference between cylinders;
49 kPa (0.5 kgf/cm^2, 7 psi), or less

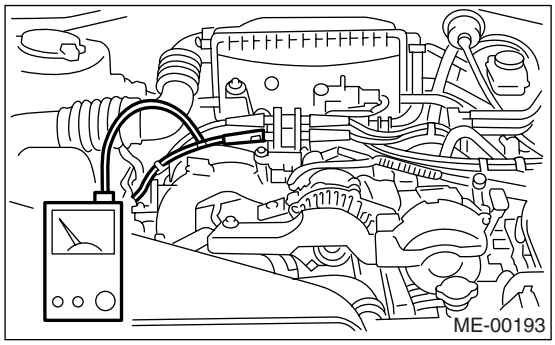
3. Idle Speed

A: INSPECTION

1) Before checking idle speed, check the following:
   (1) Ensure the air cleaner element is free from clogging, ignition timing is correct, spark plugs are in good condition, and the hoses are connected properly.
   (2) Ensure the malfunction indicator light does not illuminate.
2) Warm up the engine.
3) Stop the engine, and then turn the ignition switch to OFF.
4) When using the Subaru Select Monitor, refer to the following. <Ref. to ME(H4SO)-14, SPECIAL TOOLS, PREPARATION TOOL, General Description.>
   (1) Insert the cartridge to Subaru Select Monitor.
   (2) Connect the Subaru Select Monitor to data link connector.



   (3) Turn the ignition switch to ON, and Subaru Select Monitor power switch to ON.
   (4) Select the {2. Each System Check} in Main Menu.
   (5) Select the {Engine Control System} in Selection Menu.
   (6) Select the {1. Current Data Display & Save} in Engine Control System Diagnosis.
   (7) Select the {1.12 Data Display} in Data Display Menu.
   (8) Start the engine, and then read the engine idle speed.
5) When using the tachometer (Secondary pick-up type).
   (1) Attach the pick-up clip to No. 1 cylinder spark plug cord.
   (2) Start the engine, and then read the engine idle speed.



NOTE:
• When using the general scan tool, reference to operation manual.
• This ignition system provides simultaneous ignition for #1 and #2 plugs. It must be noted that some tachometers may register twice that of actual engine speed.

6) Check the idle speed when unloaded. (With headlights, heater fan, rear defroster, radiator fan, A/C, etc. OFF)

Idle speed [No load and gears in neutral (MT model), or N or P (AT model) range]:

1.6 L and 2.0 L model:
650±100 rpm (With OBD)
700±100 rpm (Without OBD)

2.5 L model:
650±100 rpm

7) Check the idle speed when loaded. (Turn the A/C switch to “ON” and operate the compressor for at least 1 minute before measurement.)

Idle speed [A/C “ON” and gears in neutral (MT model) or N or P (AT model) range]:
850±100 rpm

NOTE:
Idle speed can not be adjusted manually, because the idle speed is automatically adjusted.
If the specified idle speed can not be maintained, refer to General On-board Diagnosis Table under “Engine Control System”. <Ref. to EN(H4SO)(diag)-2, Basic Diagnostic Procedure.>

4. Ignition Timing

A: INSPECTION

CAUTION:
After warming up, engine becomes very hot. Be careful not to burn yourself during measurement.

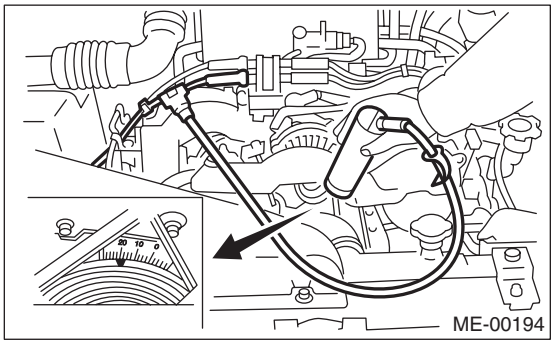
1) Warm up the engine.
2) To check the ignition timing, connect a timing light to #1 cylinder spark plug cord, and illuminate the timing mark with timing light.
3) Start the engine at idle speed and check the ignition timing.

Ignition timing [BTDC/rpm]:

1.6 L model:
With OBD: 5°±10°/650
Without OBD: 5°±10°/700

2.0 L model:
With OBD: 10°±10°/650
Without OBD: 10°±10°/700

2.5 L model:
MT: 10°±10°/650
AT: 15°±10°/650



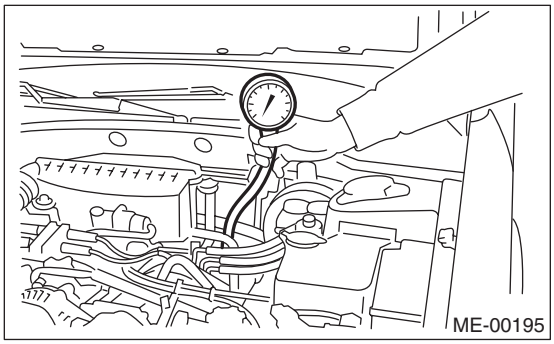
If the timing is not correct, check the ignition control system.
Refer to Engine Control System. <Ref. to EN(H4SO)(diag)-2, Basic Diagnostic Procedure.>

5. Intake Manifold Vacuum

A: INSPECTION

1) Warm up the engine.
2) Disconnect the brake vacuum hose, and then install the vacuum gauge to hose fitting on manifold.
3) Keep the engine at idle speed, and then read the vacuum gauge indication.

By observing the needle on the gauge movement, the internal condition of engine can be diagnosed as described below.



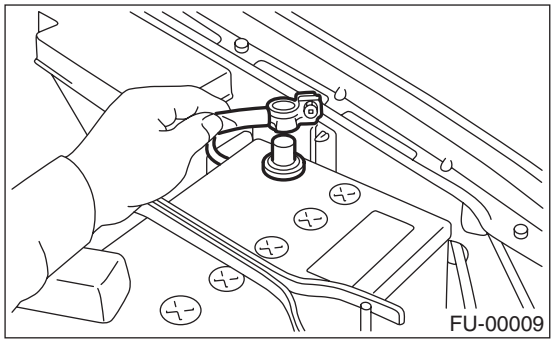
Vacuum pressure (at idling, A/C "OFF"):
Less than −60.0 kPa (−450 mmHg, −17.72 inHg)

Diagnosis of engine condition by measurement of manifold vacuum	
Vacuum gauge indication	Possible engine condition
1. Needle is steady but lower than normal position. This tendency becomes more evident as engine temperature rises.	Leakage around intake manifold gasket or disconnection or damaged vacuum hose
2. Needle intermittently drops to position lower than normal position.	Leakage around cylinder
3. Needle drops suddenly and intermittently from normal position.	Sticky valves
4. When engine speed is gradually increased, needle begins to vibrate rapidly at certain speed, and then vibration increases as engine speed increases.	Weak or broken valve springs
5. Needle vibrates above and below normal position in narrow range.	Defective ignition system

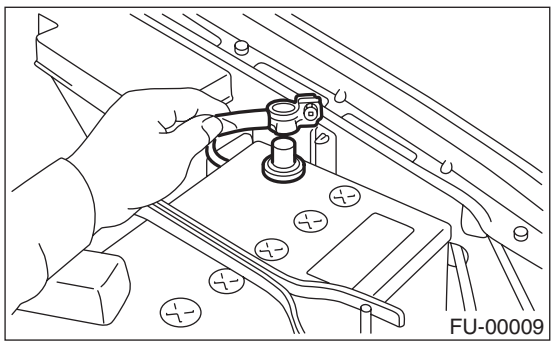
6. Engine Oil Pressure

A: INSPECTION

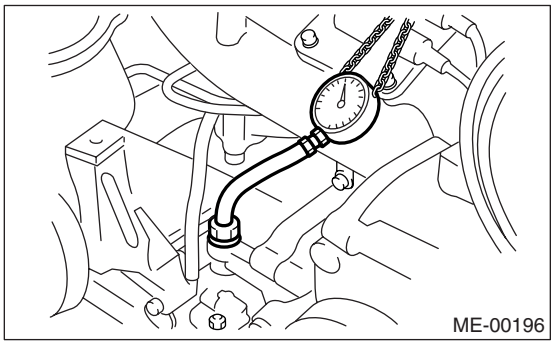
1) Disconnect the ground cable from battery.



2) Remove the generator from bracket. <Ref. to SC(H4SO)-14, REMOVAL, Generator.>
3) Disconnect the connector from oil pressure switch.
4) Remove the oil pressure switch from engine cylinder block. <Ref. to LU(H4SO)-20, REMOVAL, Oil Pressure Switch.>
5) Connect the oil pressure gauge hose to cylinder block.
6) Connect the battery ground cable to battery.



7) Start the engine, and then measure the oil pressure.



Oil pressure:
98 kPa (1.0 kgf/cm^2, 14 psi) or more at 600 rpm
294 kPa (3.0 kgf/cm^2, 43 psi) or more at 5,000 rpm

CAUTION:
• If the oil pressure is out of standard, check the oil pump, oil filter and lubrication line. <Ref. to LU(H4SO)-22, INSPECTION, Engine Lubrication System Trouble in General.>
• If the oil pressure warning light is turned ON and oil pressure is in standard, replace the oil pressure switch. <Ref. to LU(H4SO)-22, INSPECTION, Engine Lubrication System Trouble in General.>

NOTE:
The standard is based on an engine oil temperature of 80°C (176°F).

8) After measuring the oil pressure, install the oil pressure switch. <Ref. to LU(H4SO)-20, INSTALLATION, Oil Pressure Switch.>

Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)

9) Install the generator and V-belt in the reverse order of removal, and then adjust the V-belt deflection. <Ref. to ME(H4SO)-41, INSTALLATION, V-belt.>

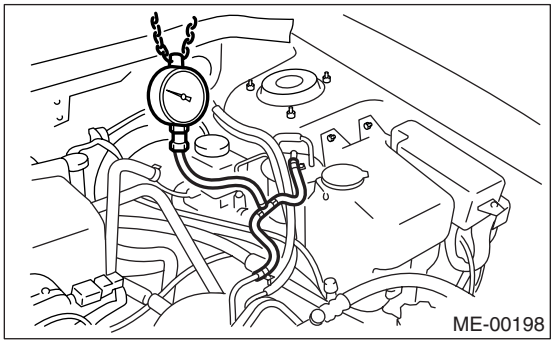
7. Fuel Pressure

A: INSPECTION

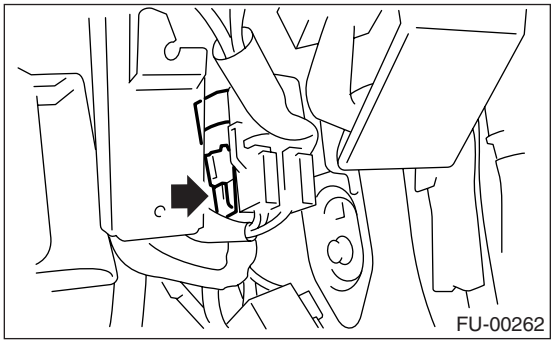
WARNING:
Before removing the fuel pressure gauge, lower the fuel pressure.

NOTE:
If out of standard, check or replace the pressure regulator and pressure regulator vacuum hose.

1) Release the fuel pressure. <Ref. to FU(H4SO)-50, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
2) Open the fuel filler flap lid, and then remove the fuel filler cap.
3) Disconnect the fuel delivery hoses from fuel damper, and then connect the fuel pressure gauge.



4) Connect the connector of fuel pump relay.



5) Start the engine.
6) Measure the fuel pressure while disconnecting the pressure regulator vacuum hose from intake manifold.

Fuel pressure:
Standard; 284 — 314 kPa (2.9 — 3.2 kgf/cm^2, 41 — 46 psi)

7) After connecting the pressure regulator vacuum hose, measure the fuel pressure.

Fuel pressure:
Standard; 206 — 235 kPa (2.1 — 2.4 kgf/cm^2, 30 — 34 psi)

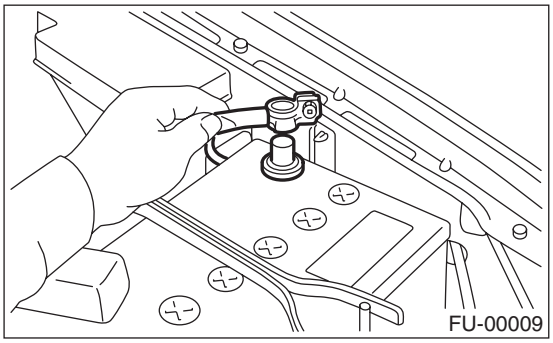
NOTE:
The fuel pressure gauge registers 10 to 20 kPa (0.1 to 0.2 kgf/cm^2, 1 to 3 psi) higher than standards during high-altitude operations.

8. Valve Clearance

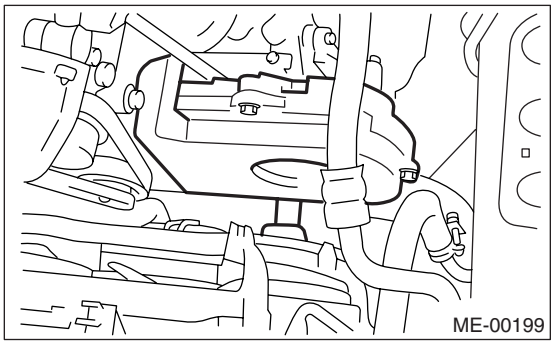
A: INSPECTION

NOTE:
Inspection and adjustment of the valve clearance should be performed while engine is cold.

1) Set the vehicle on a lift.
2) Lift-up the vehicle.
3) Remove the under cover.
4) Lower the vehicle.
5) Disconnect the ground cable from battery.

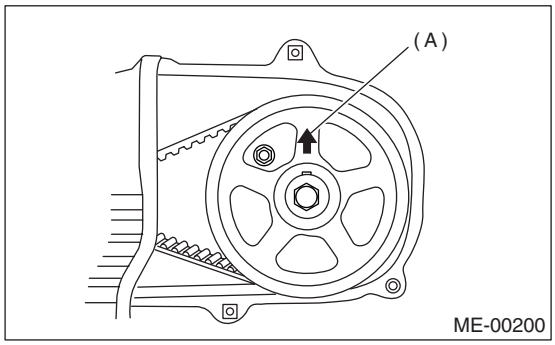


6) Remove the timing belt cover (LH).



7) When inspecting the #1 and #3 cylinders;
   (1) Disconnect the spark plug cords from spark plugs RH side. <Ref. to IG(H4SO)-5, RH SIDE, REMOVAL, Spark Plug.>
   (2) Disconnect the PCV hose from rocker cover (RH).
   (3) Remove the bolts, and then remove the rocker cover (RH).
8) When inspecting the #2 and #4 cylinders;
   (1) Disconnect the spark plug cords from spark plugs (LH Side). <Ref. to IG(H4SO)-5, LH SIDE, REMOVAL, Spark Plug.>
   (2) Disconnect the PCV hose from rocker cover (LH).
   (3) Remove the bolts, and then remove the rocker cover (LH).
9) Set the #1 cylinder piston to top dead center of compression stroke by rotating crank pulley clockwise using a socket wrench.

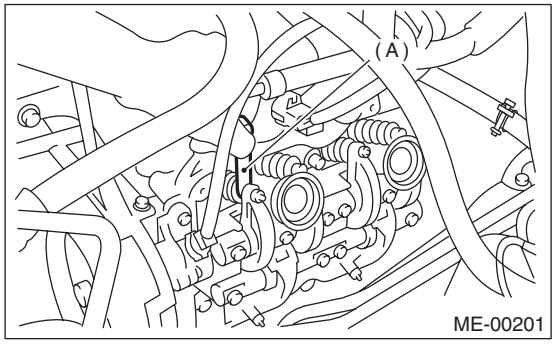
NOTE:
When arrow mark (A) on the cam sprocket (LH) comes exactly to the top, #1 cylinder piston is brought to the top dead center of compression stroke.



10) Measure the #1 cylinder valve clearance by using thickness gauge.

CAUTION:
• Insert the thickness gauge (A) in as horizontal a direction as possible with respect to the valve stem end face.
• Measure the exhaust valve clearances while lifting up the vehicle.

Valve clearance:
Intake;
0.20±0.04 mm (0.0079±0.0016 in)
Exhaust;
0.25±0.04 mm (0.0098±0.0016 in)



11) If necessary, adjust the valve clearance. <Ref. to ME(H4SO)-31, ADJUSTMENT, Valve Clearance.>
12) Similar to measurement procedures used for #1 cylinder, measure the cylinder valve clearances in the following sequence: #3, #2 and #4 cylinder.

NOTE:
• Be sure to set the cylinder pistons to their respective top dead centers on compression stroke before measuring valve clearances.

• To set each cylinder piston to its top dead center on compression stroke in the following sequence: #3, #2 and #4 cylinder, turn the crank pulley clockwise by every 180° at starting with #1 cylinder piston being on top dead center on compression stroke.

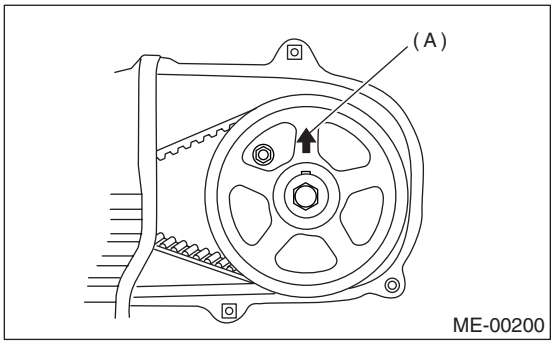
13) After inspection, install the related parts in the reverse order of removal.

B: ADJUSTMENT

NOTE:
Adjustment of the valve clearance should be performed while engine is cold.

1) Set the #1 cylinder piston to top dead center of compression stroke by rotating crank pulley clockwise using socket wrench.

NOTE:
When arrow mark (A) on the cam sprocket (LH) comes exactly to the top, #1 cylinder piston is brought to the top dead center of compression stroke.

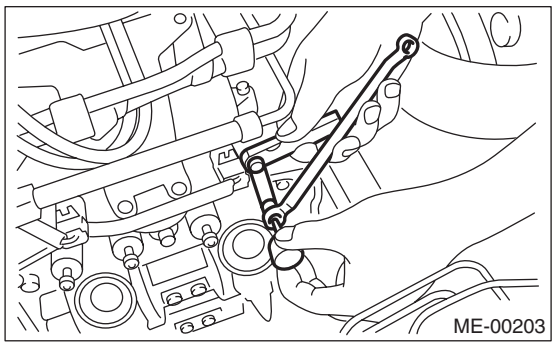


2) Adjust the #1 cylinder valve clearance.
(1) Loosen the valve rocker nut and screw.
(2) Place suitable thickness gauge.
(3) While noting the valve clearance, tighten the valve rocker adjusting screw.
(4) When specified valve clearance is obtained, tighten the valve rocker nut.

Tightening torque:
10 N·m (1.0 kgf-m, 7.2 ft-lb)

CAUTION:
• Insert the thickness gauge in as horizontal a direction as possible with respect to the valve stem end face.
• Adjust the exhaust valve clearances while lifting up the vehicle.

Valve clearance:
Intake;
0.20±0.04 mm (0.0079±0.0016 in)
Exhaust;
0.25±0.04 mm (0.0098±0.0016 in)



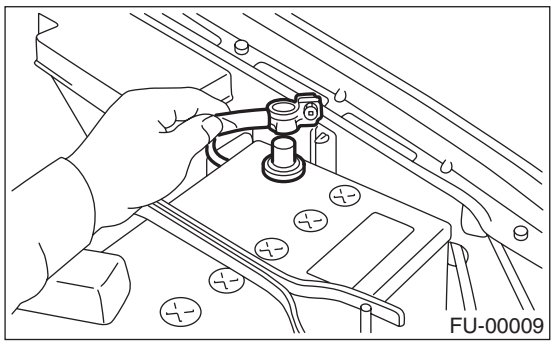
3) Ensure the valve clearances are within specifications.
4) Turn the crankshaft two complete rotations until #1 cylinder piston is again set to the top dead center on compression stroke.
5) Ensure the valve clearances are within specifications. If necessary, readjust the valve clearances.
6) Similar to adjustment procedures used for #1 cylinder, adjust the #2, #3 and #4 cylinder valve clearances.

NOTE:
• Be sure to set the cylinder pistons to their respective top dead centers on compression stroke before adjusting valve clearances.
• To set each cylinder piston to its top dead center on compression stroke in the following sequence: #3, #2 and #4 cylinder, turn the crank pulley clockwise by every 180° at starting with #1 cylinder piston being on top dead center on compression stroke.

9. Engine Assembly

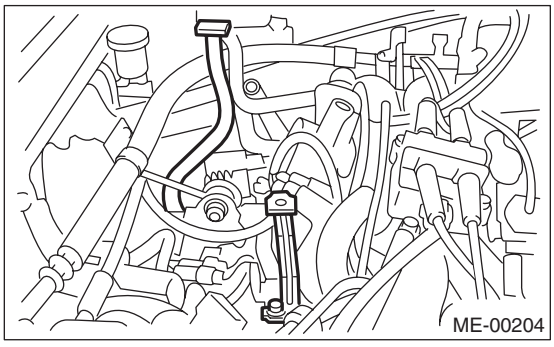
A: REMOVAL

1) Set the vehicle on a lift.
2) Open the front hood fully, and then support with the hood stay.
3) Using the refrigerant recovery system, discharge refrigerant. <Ref. to AC-21, PROCEDURE, Refrigerant Recovery Procedure.>
4) Release the fuel pressure. <Ref. to FU(H4SO)-50, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
5) Remove the fuel filler cap.
6) Disconnect the ground cable from battery.

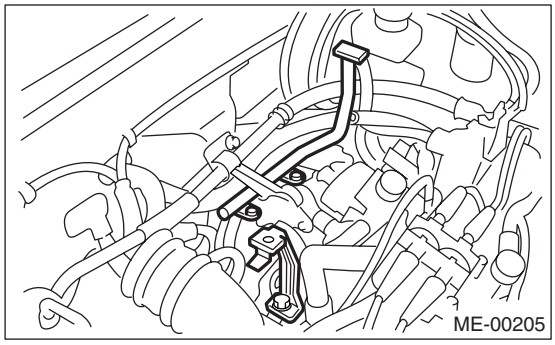

FU-00009

7) Remove the air intake duct and air cleaner case. <Ref. to IN(H4SO)-6, REMOVAL, Air Intake Duct.> and <Ref. to IN(H4SO)-5, REMOVAL, Air Cleaner Case.>
8) Remove the under cover.
9) Remove the radiator from vehicle. <Ref. to CO(H4SO)-22, REMOVAL, Radiator.>
10) Disconnect the A/C pressure hoses from A/C compressor.
11) Remove the air intake chamber stay.

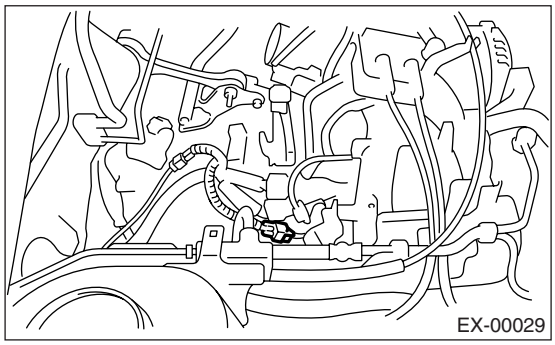
- MT model


ME-00204

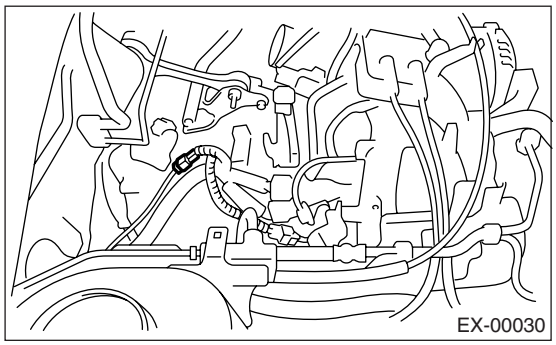
- AT model


ME-00205

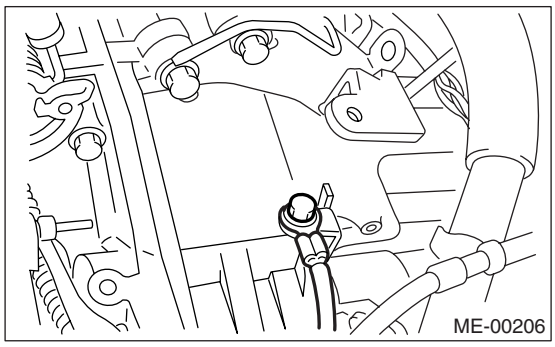
12) Disconnect the following connectors and cables.
(1) Front oxygen (A/F) sensor connector


EX-00029

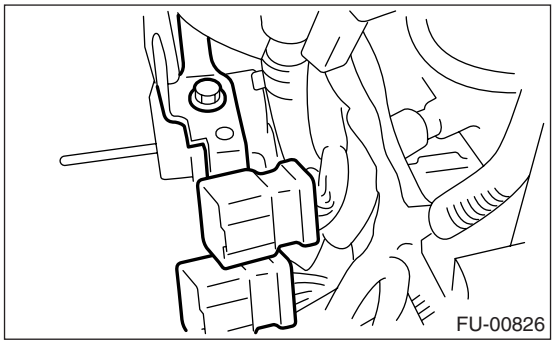
(2) Rear oxygen sensor connector


EX-00030

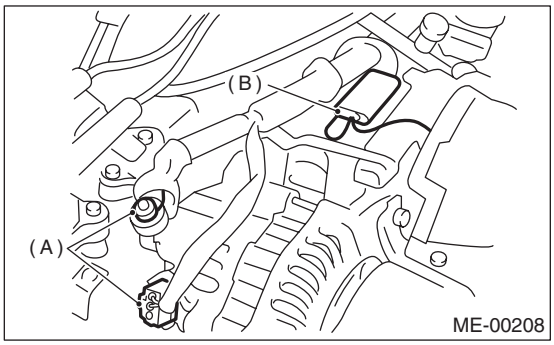
(3) Engine ground cable


ME-00206

(4) Engine harness connectors

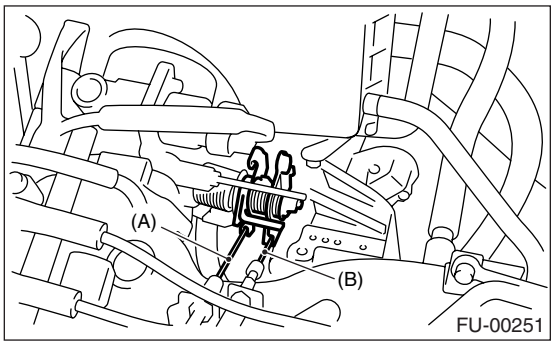


(5) Generator connector, terminal and A/C compressor connector

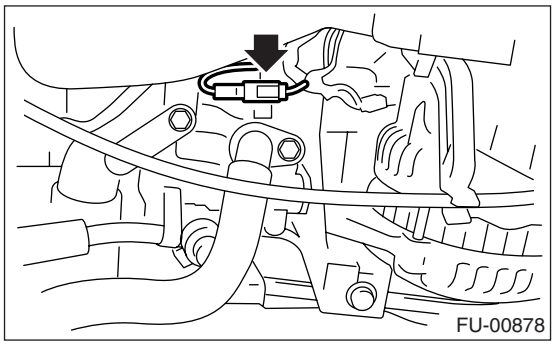


(A) Generator connector and terminal
(B) A/C compressor connector

(6) Accelerator cable (A) and cruise control cable (B) (Model with cruise control)

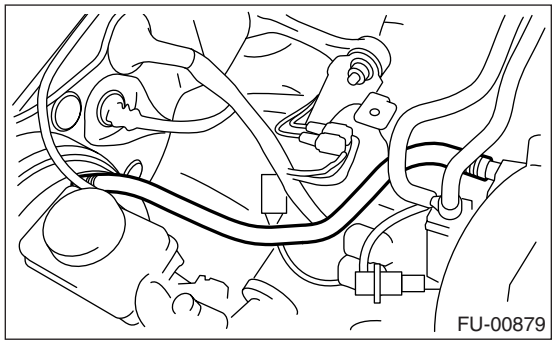


(7) Power steering switch connector

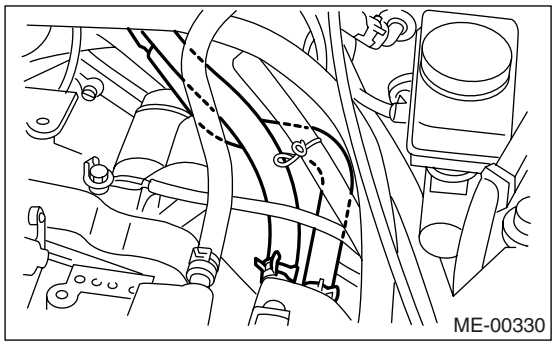


13) Disconnect the following hoses.

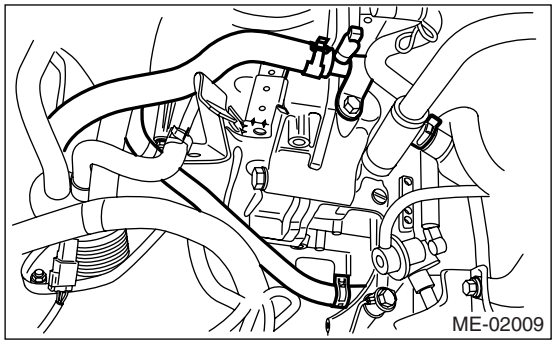
(1) Brake booster vacuum hose



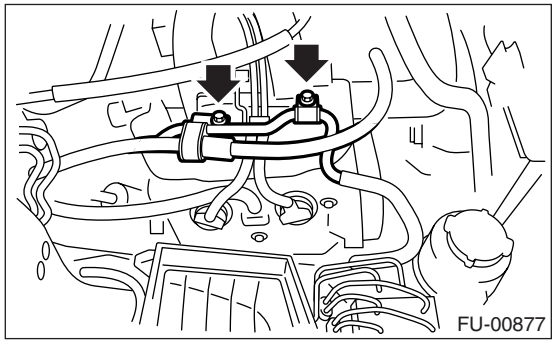
(2) Heater inlet outlet hose



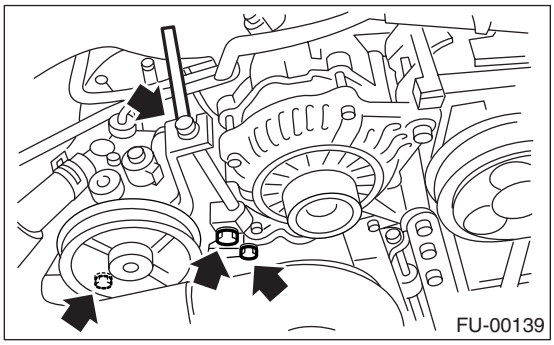
(3) Heater inlet and outlet hose (with ATF warmer model)



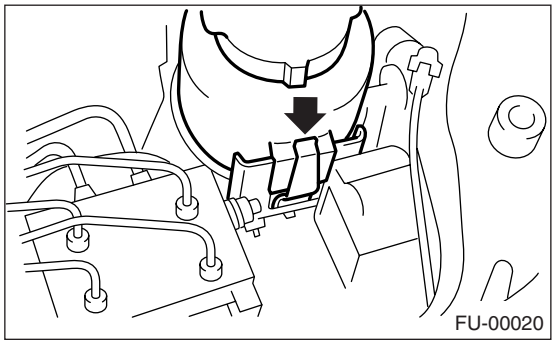
14) Remove the power steering pump.
(1) Remove the resonator chamber.
(2) Loosen the lock bolt and slider bolt, and then remove the front side V-belt. <Ref. to ME(H4SO)-41, FRONT SIDE BELT, REMOVAL, V-belt.>
(3) Remove the pipe with bracket.



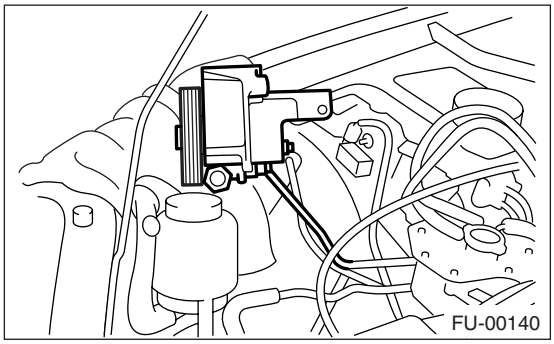
(4) Remove the bolts which install the power steering pump bracket.



(5) Remove the power steering tank from bracket by pulling it upward.

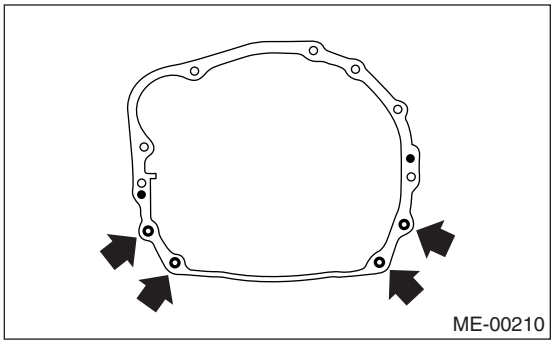


(6) Place the power steering pump on right side wheel apron.

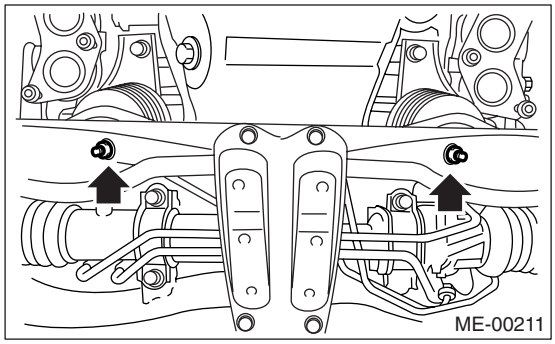


15) Remove the front and center exhaust pipe. <Ref. to EX(H4SO)-6, REMOVAL, Front Exhaust Pipe.>

16) Remove the bolts and nuts which hold the lower side of transmission to engine.



17) Remove the nuts which install the front cushion rubber onto front crossmember.



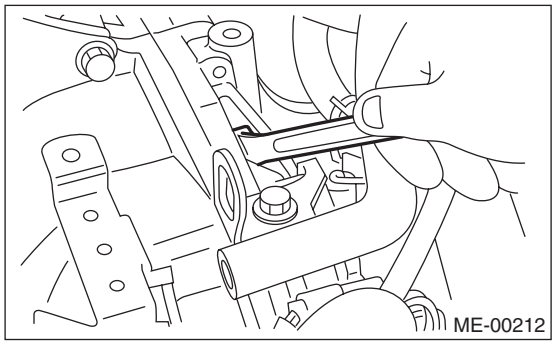
18) Separate the torque converter clutch from drive plate. (AT model)

(1) Lower the vehicle.

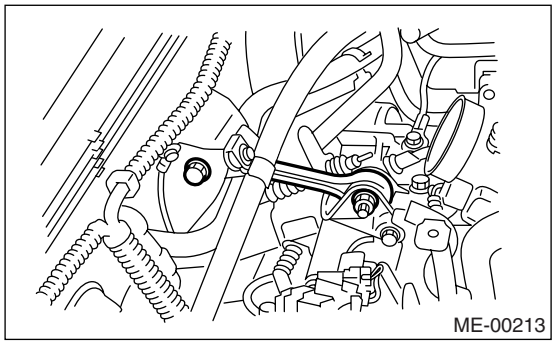
(2) Remove the service hole plug.

(3) Remove the bolts which hold the torque converter clutch to drive plate.

(4) Remove other bolts while rotating the engine using socket wrench.



19) Remove the pitching stopper.

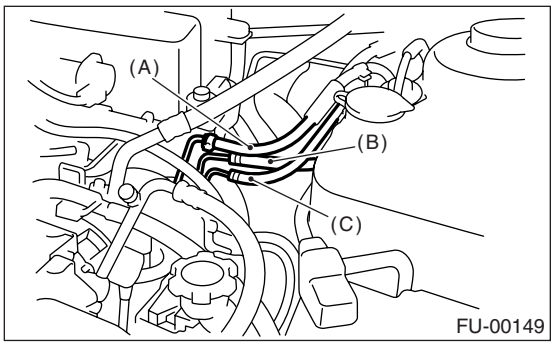


20) Disconnect the fuel delivery hose (A), return hose (B) and evaporation hose (C).

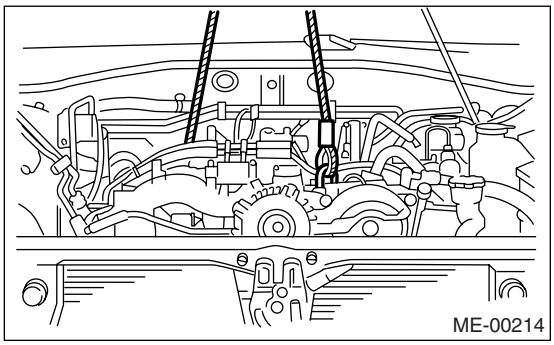
CAUTION:

• Disconnect the hose with its end wrapped with cloth to prevent fuel from splashing.

- **Catch fuel from the hose into container.**

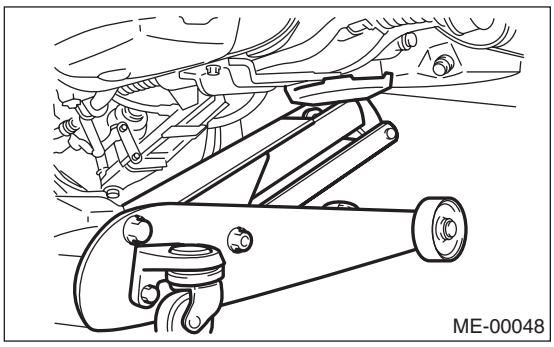


21) Support the engine with a lifting device and wire ropes.



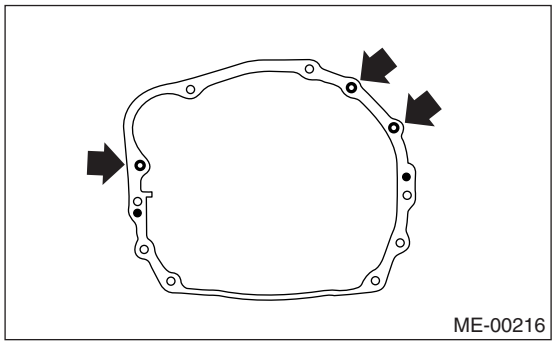
22) Support the transmission with a garage jack.

CAUTION:
Doing this is very important because the transmission lowers for its own weight. This work is also of great importance for facilitating reinstallation.

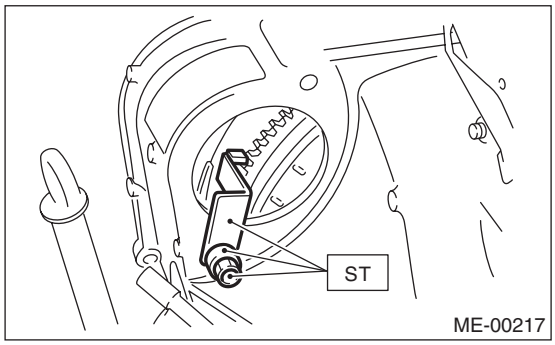


CAUTION:
Before removing the engine away from transmission, check to be sure no work has been overlooked.

23) Separation of the engine and transmission.
(1) Remove the starter. <Ref. to SC(H4SO)-8, REMOVAL, Starter.>
(2) Remove the bolts which hold the upper side of transmission to engine.

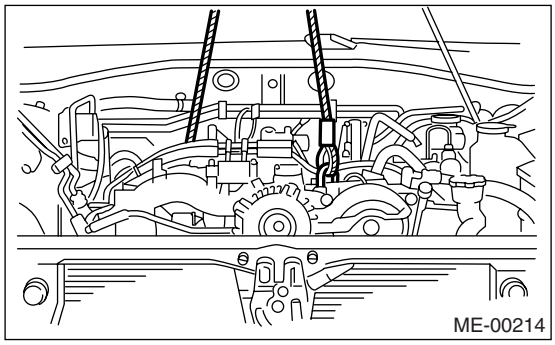


24) Install the ST to converter case. (AT model)
ST 498277200 STOPPER SET



25) Remove the engine from vehicle.
(1) Slightly raise the engine.
(2) Raise the transmission with garage jack.
(3) Move the engine horizontally until main shaft is withdrawn from clutch cover.
(4) Slowly move the engine away from engine compartment.

NOTE:
Be careful not to damage the adjacent parts or body panels with crank pulley, oil level gauge, etc.



26) Remove the front cushion rubbers.

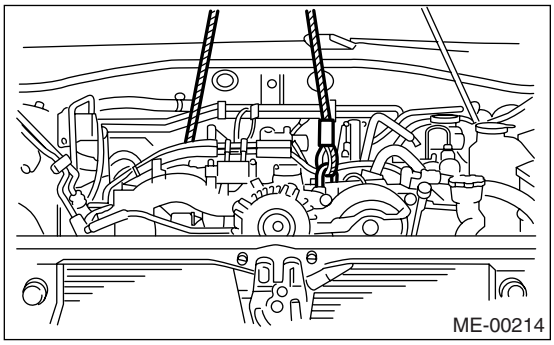
B: INSTALLATION

1) Install the front cushion rubbers.

Tightening torque:
34 N·m (3.5 kgf-m, 25.3 ft-lb)

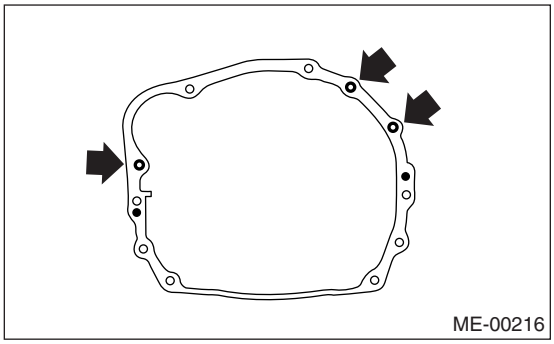
2) Position the engine in engine compartment and align it with transmission.

NOTE:
• Be careful not to damage the adjacent parts or body panels with crank pulley, oil level gauge, etc.
• Apply a small amount of grease to the spline of main shaft. (MT model)

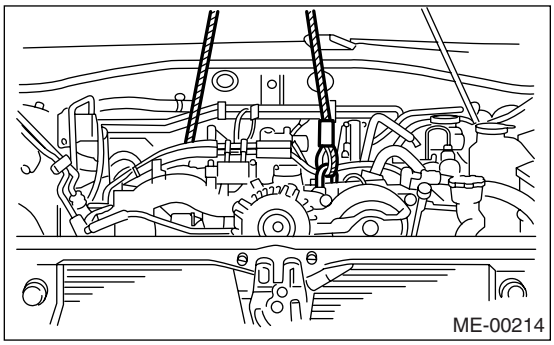


3) Tighten the bolts which hold the upper side of transmission to engine.

Tightening torque:
50 N·m (5.1 kgf-m, 36.9 ft-lb)



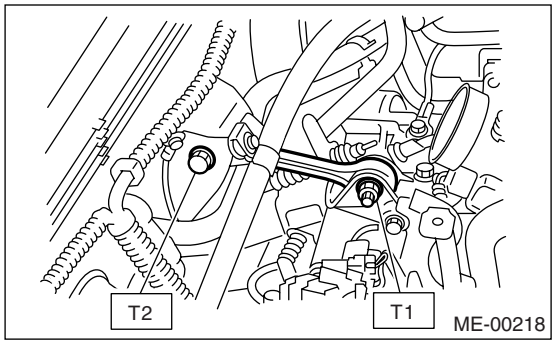
4) Remove the lifting device and wire ropes.



5) Remove the garage jack.

6) Install the pitching stopper.

Tightening torque:
T1: 50 N·m (5.1 kgf-m, 37 ft-lb)
T2: 58 N·m (5.9 kgf-m, 43 ft-lb)



7) Remove the ST from converter case. (AT model)

NOTE:
Be careful not to drop the ST into converter case when removing ST.

ST 498277200 STOPPER SET

8) Install the starter. <Ref. to SC(H4SO)-8, INSTALLATION, Starter.>

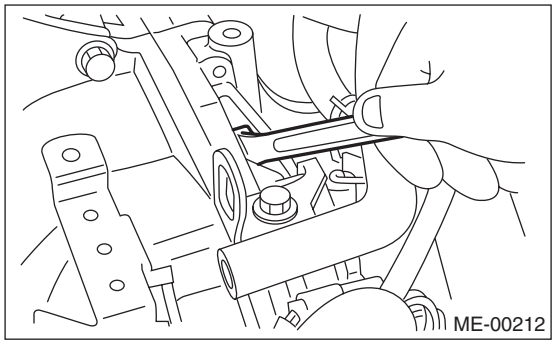
9) Install the torque converter clutch onto drive plate. (AT model)

(1) Tighten the bolts which hold the torque converter clutch to drive plate.

(2) Tighten other bolts while rotating the engine by using a socket wrench.

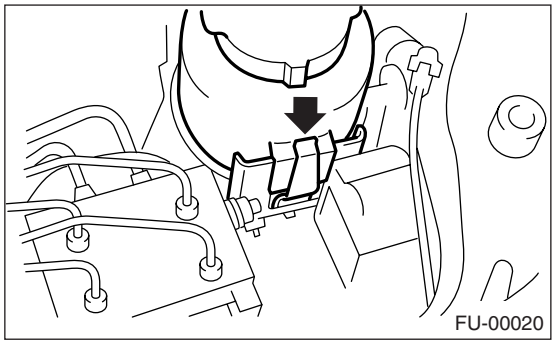
CAUTION:
Be careful not to drop the bolts into torque converter clutch housing.

Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)

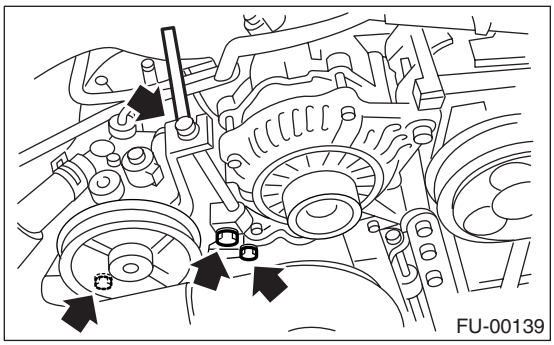


(3) Clog the plug onto service hole and prevent foreign matters from being mixed.

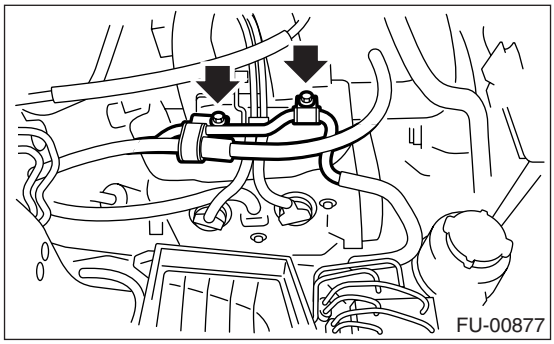
10) Install the power steering pump bracket.
(1) Install the power steering tank on bracket.



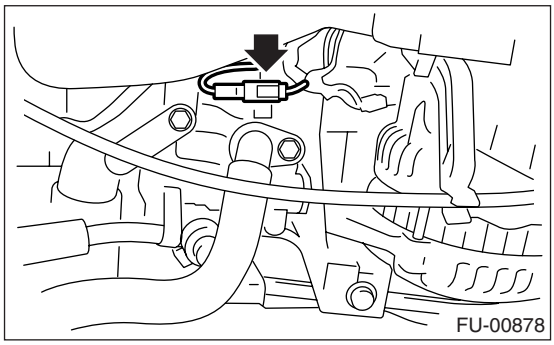
(2) Install the power steering pump. <Ref. to PS-94, INSTALLATION, Oil Pump.>



(3) Tighten the bolts which install the power steering pipe bracket, and then install the spark plug cords.



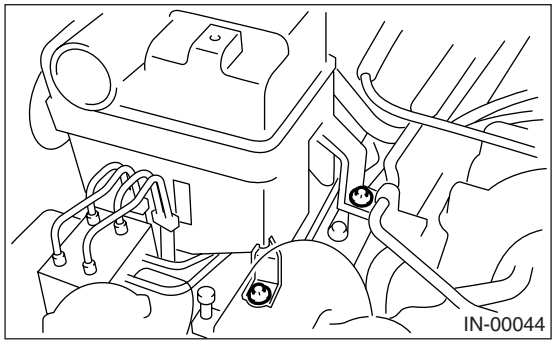
(4) Connect the power steering switch connector.



(5) Install the front side V-belt, and adjust it. <Ref. to ME(H4SO)-41, FRONT SIDE BELT, INSTALLATION, V-belt.>

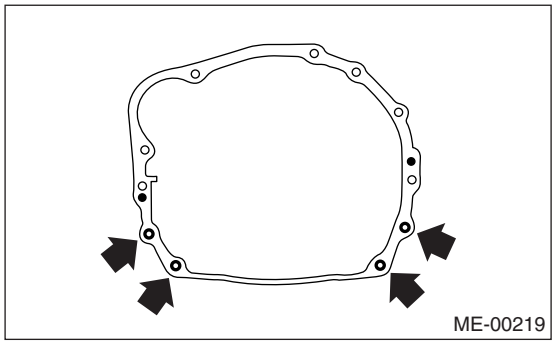
(6) Install the resonator chamber.

Tightening torque:
33 N·m (3.4 kgf-m, 24.6 ft-lb)



11) Tighten the bolts and nuts which hold the lower side of transmission to engine.

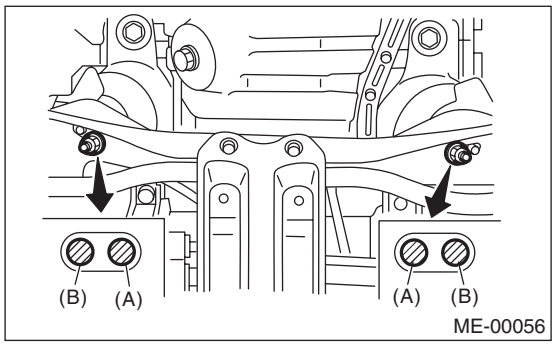
Tightening torque:
50 N·m (5.1 kgf-m, 36.9 ft-lb)



12) Tighten the nuts which install the front cushion rubber onto crossmember.

Tightening torque:
85 N·m (8.7 kgf-m, 63 ft-lb)

NOTE:
Make sure the front cushion rubber mounting bolts (A) and locator (B) are securely installed.



13) Install the front and center exhaust pipe. <Ref. to EX(H4SO)-7, INSTALLATION, Front Exhaust Pipe.>
14) Connect the following hoses.
(1) Fuel delivery hose, return hose and evaporation hose
(2) Heater inlet and outlet hoses

(3) Brake booster vacuum hose
15) Connect the following connectors.
(1) Engine ground cables

Tightening torque:
14 N·m (1.4 kgf-m, 10.1 ft-lb)

(2) Engine harness connectors
(3) Generator connector and terminal
(4) A/C compressor connectors
16) Connect the following cables.
(1) Accelerator cable
(2) Cruise control cable (Model with cruise control)
17) Adjust each connected cable.
18) Install the air cleaner case stay.

Tightening torque:
16 N·m (1.6 kgf-m, 11.6 ft-lb)

19) Install the A/C pressure hoses.
<Ref. to AC-38, INSTALLATION, Hose and Tube.>
20) Install the radiator to vehicle. <Ref. to CO(H4SO)-23, INSTALLATION, Radiator.>
21) Install the air intake duct and air cleaner case. <Ref. to IN(H4SO)-6, INSTALLATION, Air Intake Duct.> and <Ref. to IN(H4SO)-5, INSTALLATION, Air Cleaner Case.>
22) Install the under cover.
23) Install battery in the vehicle, and then connect the cables.
24) Fill engine coolant. <Ref. to CO(H4SO)-15, FILLING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>
25) Check the ATF level and correct if necessary. (AT model) <Ref. to 4AT-32, INSPECTION, Automatic Transmission Fluid.>
26) Charge the A/C system with refrigerant.
<Ref. to AC-22, PROCEDURE, Refrigerant Charging Procedure.>
27) Remove the front hood stay, and then close the front hood.
28) Take off the vehicle from lift arms.

C: INSPECTION

1) Check pipes and hoses are installed firmly.
2) Check engine coolant and ATF are at specified levels.

10.Engine Mounting

A: REMOVAL

1) Remove the engine assembly. <Ref. to ME(H4SO)-32, REMOVAL, Engine Assembly.>
2) Remove the engine mounting from engine assembly.

B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
Engine mounting;
35 N·m (3.6 kgf-m, 25.8 ft-lb)

C: INSPECTION

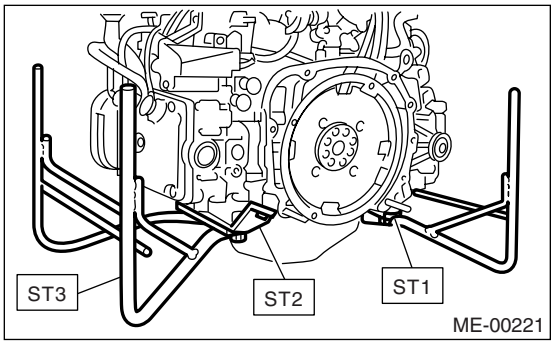
Make sure there are no cracks or other damage.

11.Preparation for Overhaul

A: PROCEDURE

1) After removing the engine from body, secure it in the ST shown below.

ST1	498457000	ENGINE STAND ADAPTER RH
ST2	498457100	ENGINE STAND ADAPTER LH
ST3	499817100	ENGINE STAND



2) In this section the procedures described under each index are all connected and stated in order. It will be the complete procedure for overhauling of the engine itself when you go through all steps in the process.
Therefore, in this section, to conduct the particular procedure within the flow of a section, you need to go back and conduct the procedure described previously in order to do that particular procedure.

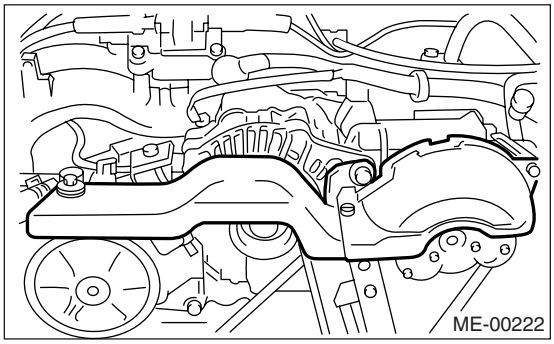
12.V-belt

A: REMOVAL

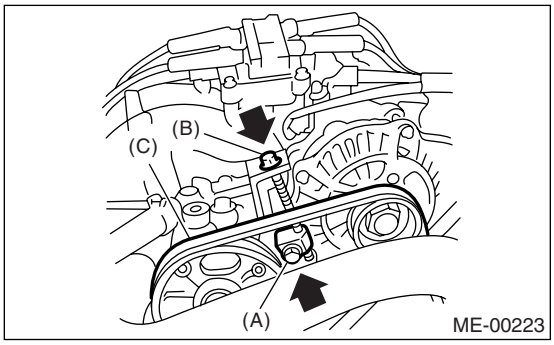
1. FRONT SIDE BELT

NOTE:
Perform the following procedures 1) to 4) with the engine installed to body.

1) Remove the V-belt cover.

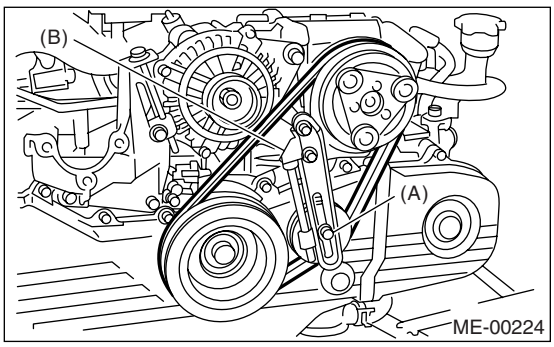


2) Loosen the lock bolt (A).
3) Loosen the slider bolt (B).
4) Remove the front side belt (C).

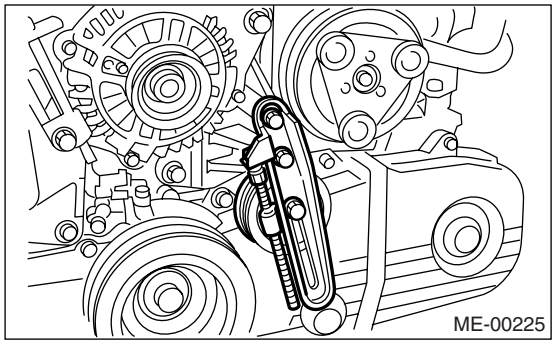


2. REAR SIDE BELT

1) Loosen the lock nut (A).
2) Loosen the slider bolt (B).



3) Remove the rear side belt.
4) Remove the belt tensioner.



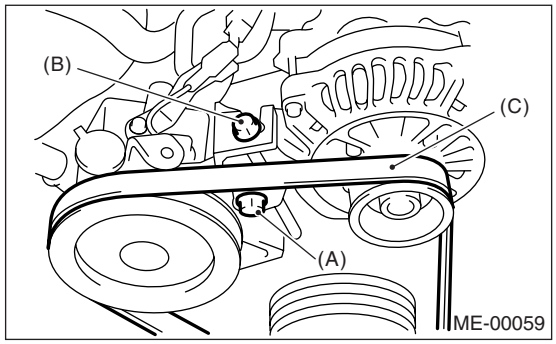
B: INSTALLATION

NOTE:
Wipe off any oil or water on the belt and pulley.

1. FRONT SIDE BELT

1) Install a V-belt (C), and tighten the slider bolt so as to obtain the specified belt tension. <Ref. to ME(H4SO)-42, INSPECTION, V-belt.>
2) Tighten the lock bolt (A).
3) Tighten the slider bolt (B).

Tightening torque:
Lock bolt (A):
25 N·m (2.5 kgf-m, 18.1 ft-lb)
Slider bolt (B):
8 N·m (0.8 kgf-m, 5.9 ft-lb)

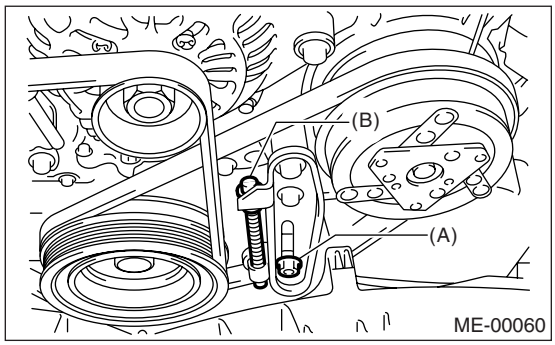


2. REAR SIDE BELT

1) Remove the A/C belt tensioner.
2) Install a V-belt, and tighten the slider bolt (B) so as to obtain the specified belt tension.
<Ref. to ME(H4SO)-42, INSPECTION, V-belt.>

3) Tighten the lock nut (A).

Tightening torque:
Lock nut (A):
22.6 N·m (2.3 kgf-m, 16.6 ft-lb)



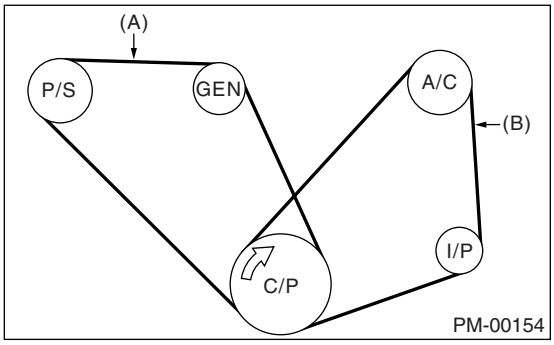
C: INSPECTION

1) Replace the belts, if cracks, fraying or wear is found.
2) Check the V-belt tension and adjust it if necessary by changing the generator installing position and idler pulley installing position.

Belt tension (with belt tension gauge)

(A)
When installing new parts:
618 — 755 N (63 — 77 kgf, 139 — 170 lbf)
At inspection:
490 — 640 N (50 — 65 kgf, 110 — 144 lbf)

(B)
When installing new parts:
740 — 880 N (75 — 90 kgf, 166 — 198 lbf)
At inspection:
350 — 450 N (36 — 46 kgf, 78 — 101 lbf)

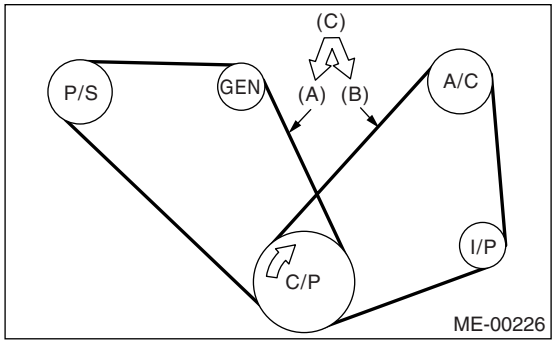


(A) Front side belt
(B) Rear side belt
C/P Crank pulley
GEN Generator
P/S Power steering oil pump pulley
A/C A/C compressor pulley
I/P Idler pulley

Belt tension (without belt tension gauge)

(A)
When installing new parts:
7 — 9 mm (0.276 — 0.354 in)
At inspection:
9 — 11 mm (0.354 — 0.433 in)

(B)
When installing new parts:
7.5 — 8.5 mm (0.295 — 0.335 in)
At inspection:
9.0 — 10.0 mm (0.354 — 0.394 in)



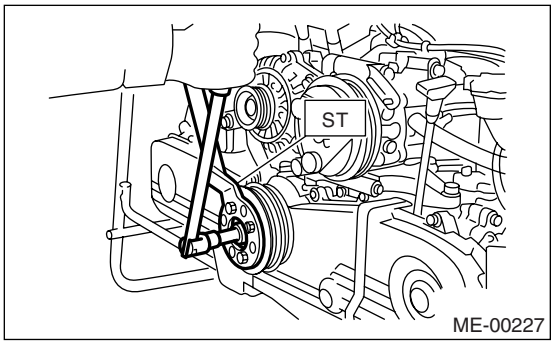
(A) Front side belt
(B) Rear side belt
(C) 98 N (10 kgf, 22 lbf)
C/P Crank pulley
GEN Generator
P/S Power steering oil pump pulley
A/C A/C compressor pulley
I/P Idler pulley

13.Crank Pulley

A: REMOVAL

1) Remove the V-belt. <Ref. to ME(H4SO)-41, REMOVAL, V-belt.>
2) Remove the crank pulley bolt. To lock the crankshaft, use ST.

ST 499977400 CRANK PULLEY WRENCH (1.6 L and 2.0 L model)
ST 499977100 CRANK PULLEY WRENCH (2.5 L model)



3) Remove the crank pulley.

B: INSTALLATION

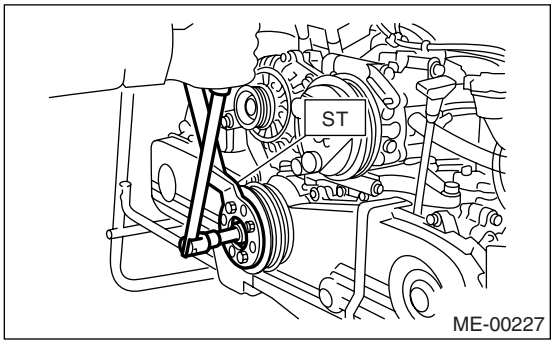
1. 1.6 L AND 2.0 L MODEL

1) Install the crank pulley.
2) Install the pulley bolt.
To lock the crankshaft, use ST.

ST 499977400 CRANK PULLEY WRENCH

(1) Clean the crank pulley thread using a compressed air.
(2) Apply engine oil to the crank pulley bolt seat and thread.
(3) Tighten the bolts temporarily with tightening torque of 44 N·m (4.5 kgf-m, 33 ft-lb).
(4) Tighten the crank pulley bolts.

Tightening torque:
130 N·m (13.3 kgf-m, 95.9 ft-lb)



3) Confirm that the tightening angle of crank pulley bolt is 45 degrees or more. If the tightening angle of crank pulley bolt is less than 45 degrees, conduct the following procedures.

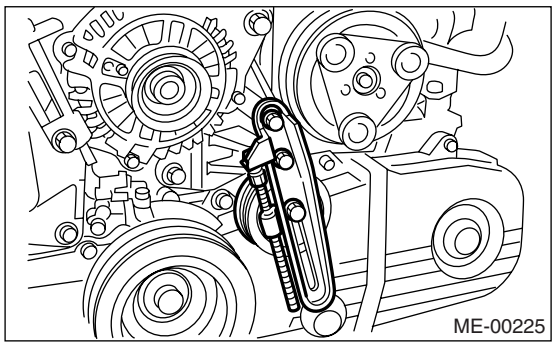
(1) Replace the crank pulley bolts and clean them.

Crank pulley bolt:
12369AA011

(2) Clean the crankshaft thread using a compressed air.
(3) Apply engine oil to the crank pulley bolt seal and thread.
(4) Tighten the bolts temporarily with tightening torque of 44 N·m (4.5 kgf-m, 33 ft-lb).
(5) Tighten the crank pulley bolts keeping them in an angle between 45 degrees and 60 degrees.

NOTE:
Conduct the tightening procedures by confirming the turning angle of crank pulley bolt referring to the gauge indicated on timing belt cover.

4) Install the belt tensioner.



5) Install the V-belt. <Ref. to ME(H4SO)-41, INSTALLATION, V-belt.>

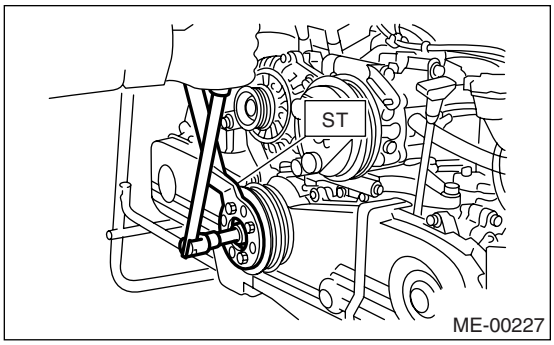
2. 2.5 L MODEL

1) Install the crank pulley.
2) Install the pulley bolt.
To lock the crankshaft, use ST.

ST 499977100 CRANK PULLEY WRENCH

(1) Clean the crank pulley thread using an compressed air.
(2) Apply engine oil to the crank pulley bolt seat and thread.
(3) Tighten the bolts temporarily with tightening torque of 44 N·m (4.5 kgf-m, 33 ft-lb).
(4) Tighten the crank pulley bolts.

Tightening torque:
180 N·m (18.4 kgf-m, 132.8 ft-lb)



3) Confirm that the tightening angle of crank pulley bolt is 65 degrees or more. If the tightening angle of crank pulley bolt is less than 65 degrees, conduct the following procedures.

(1) Replace the crank pulley bolts and clean them.

Crank pulley bolt:
12369AA011

(2) Clean the crankshaft thread using a compressed air.

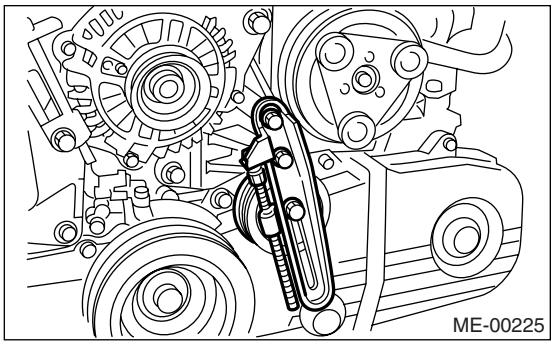
(3) Apply engine oil to the crank pulley bolt seal and thread.

(4) Tighten the bolts temporarily with tightening torque of 44 N·m (4.5 kgf-m, 33 ft-lb).

(5) Tighten the crank pulley bolts keeping them in an angle between 65 degrees and 75 degrees.

NOTE:
Conduct the tightening procedures by confirming the turning angle of crank pulley bolt referring to the gauge indicated on timing belt cover.

4) Install the A/C belt tensioner.



5) Install the V-belt. <Ref. to ME(H4SO)-41, INSTALLATION, V-belt.>

C: INSPECTION

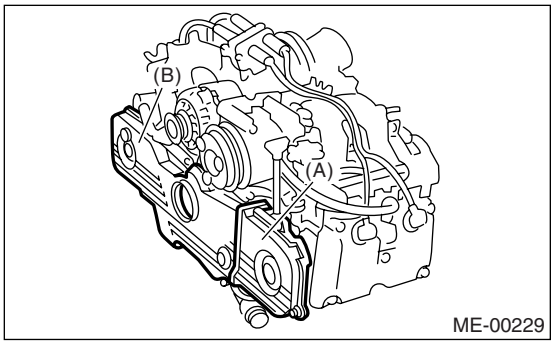
1) Make sure the V-belt is not worn or otherwise damaged.

2) Check the tension of the belt. <Ref. to ME(H4SO)-42, INSPECTION, V-belt.>

14.Timing Belt Cover

A: REMOVAL

1) Remove the V-belt. <Ref. to ME(H4SO)-41, REMOVAL, V-belt.>
2) Remove the crank pulley. <Ref. to ME(H4SO)-43, REMOVAL, Crank Pulley.>
3) Remove the timing belt cover (LH).
4) Remove the front timing belt cover.



(A) Timing belt cover (LH)
(B) Front timing belt cover

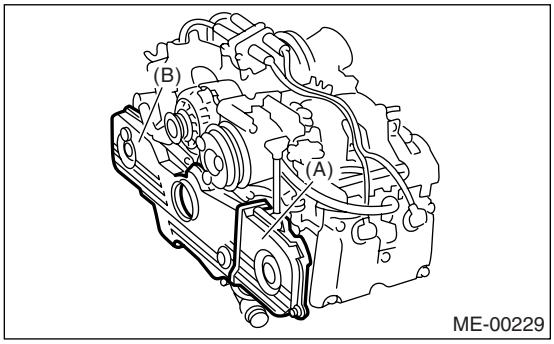
B: INSTALLATION

1) Install the front timing belt cover.

Tightening torque:
5 N·m (0.5 kgf-m, 3.6 ft-lb)

2) Install the timing belt cover (LH).

Tightening torque:
5 N·m (0.5 kgf-m, 3.6 ft-lb)



(A) Timing belt cover (LH)
(B) Front timing belt cover

3) Install the crank pulley. <Ref. to ME(H4SO)-43, INSTALLATION, Crank Pulley.>
4) Install the V-belt. <Ref. to ME(H4SO)-41, INSTALLATION, V-belt.>

C: INSPECTION

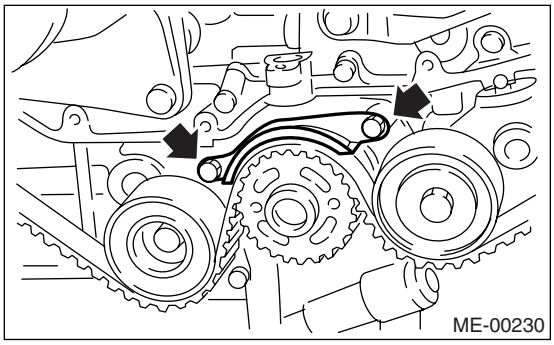
Make sure the cover is not damaged.

15.Timing Belt

A: REMOVAL

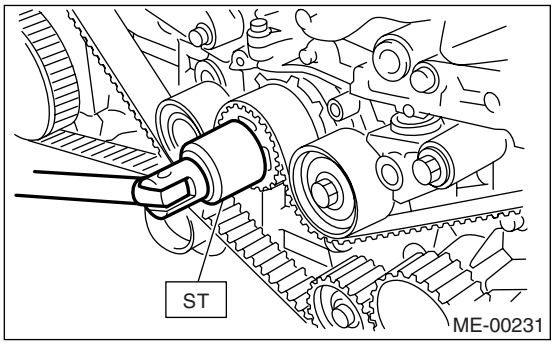
1. TIMING BELT

1) Remove the V-belt. <Ref. to ME(H4SO)-41, REMOVAL, V-belt.>
2) Remove the crank pulley. <Ref. to ME(H4SO)-43, REMOVAL, Crank Pulley.>
3) Remove the timing belt cover. <Ref. to ME(H4SO)-45, REMOVAL, Timing Belt Cover.>
4) Remove the timing belt guide. (MT model)

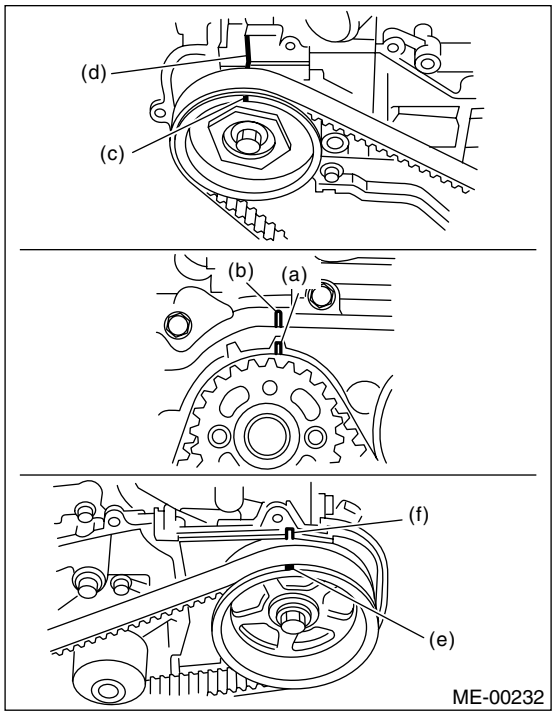

ME-00230

5) If the alignment mark (a) and/or arrow mark (which indicates rotation direction) on timing belt fade away, put new marks before removing the timing belt as shown in procedures below.
   (1) Turn the crankshaft using ST. Align the mark (a) of sprocket to cylinder block notch (b), ensure the right side cam sprocket mark (c) and cam cap and cylinder head matching surface (d), and left side cam sprocket mark (e) and timing belt cover notch (f) are properly adjusted.

ST 499987500 CRANKSHAFT SOCKET

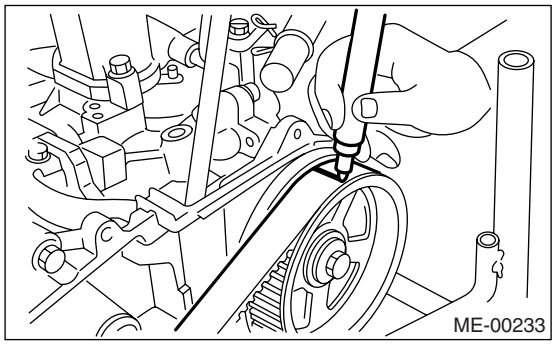


ME-00231

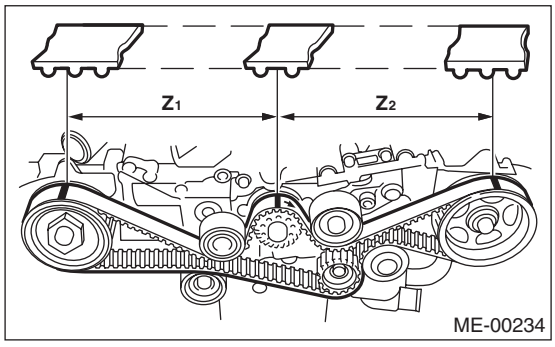


ME-00232

(2) Using white paint, put alignment and/or arrow marks on the timing belts in relation to crank sprocket and cam sprockets.


ME-00233

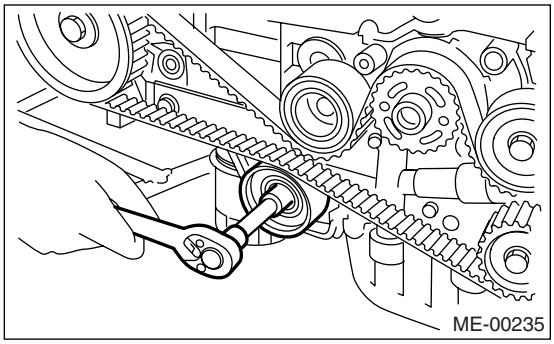
Specified data:
Z_1: 46.8 tooth length
Z_2: 43.7 tooth length



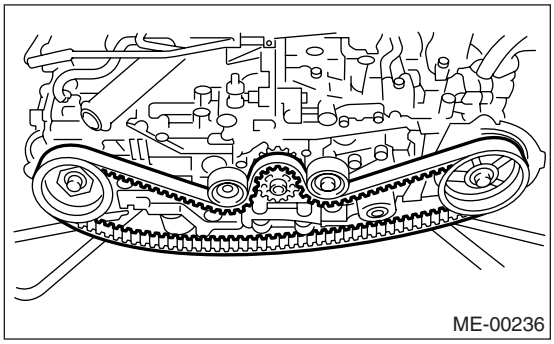
ME-00234

6) Remove the belt idler (No. 2).

7) Remove the belt idler No. 2.

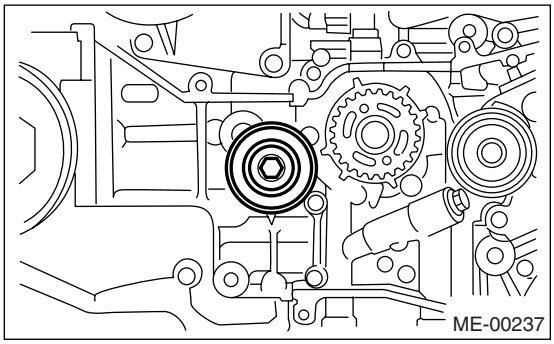


8) Remove the timing belt.

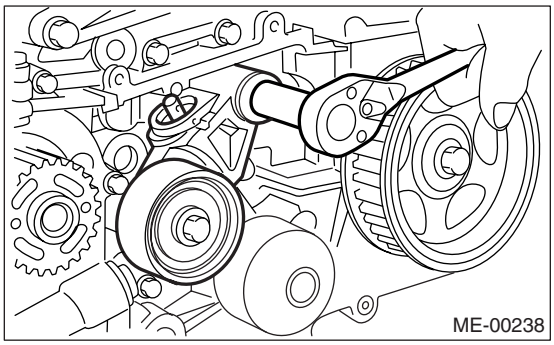


2. BELT IDLER AND AUTOMATIC BELT TENSION ADJUSTER ASSEMBLY

1) Remove the belt idler (No. 1).



2) Remove the automatic belt tension adjuster assembly.



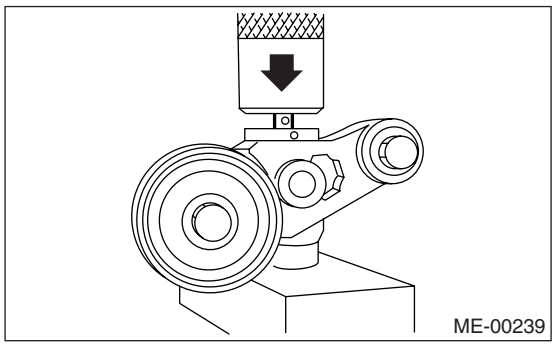
B: INSTALLATION

1. AUTOMATIC BELT TENSION ADJUSTER ASSEMBLY AND BELT IDLER

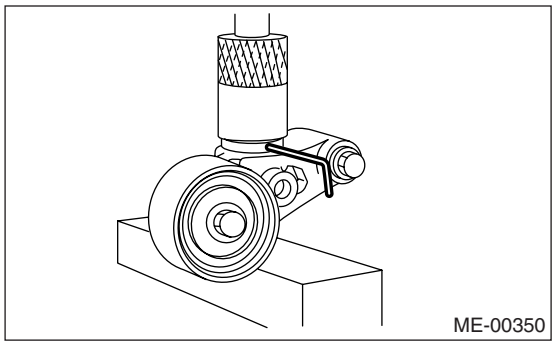
1) Preparation for installation of automatic belt tension adjuster assembly;

CAUTION:
• Always use a vertical type pressing tool to move the adjuster rod down.
• Do not use a lateral type vise.
• Push the adjuster rod vertically.
• Press-in the push adjuster rod gradually taking more than 3 minutes.
• Do not allow press pressure to exceed 9,807 N (1,000 kgf, 2,205 lbf).
• Press the adjuster rod as far as the end surface of cylinder. Do not press the adjuster rod into the cylinder. Doing so may damage the cylinder.
• Do not release the press pressure until stopper pin is completely inserted.

(1) Attach the automatic belt tension adjuster assembly to the vertical pressing tool.
(2) Slowly move the adjuster rod down with a pressure of more than 294 N (30 kgf, 66 lbf) until the adjuster rod is aligned with the stopper pin hole in the cylinder.

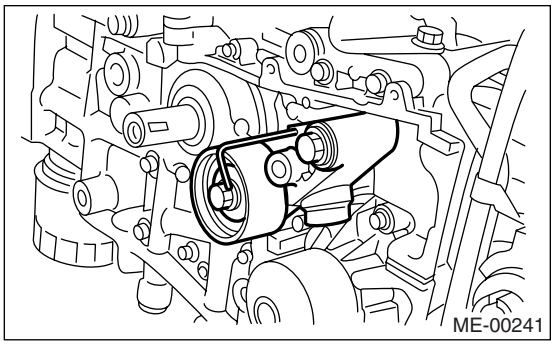


(3) With a 2 mm (0.08 in) dia. stopper pin or a 2 mm (0.08 in) (nominal) dia. hex bar wrench inserted into the stopper pin hole in the cylinder, secure the adjuster rod.



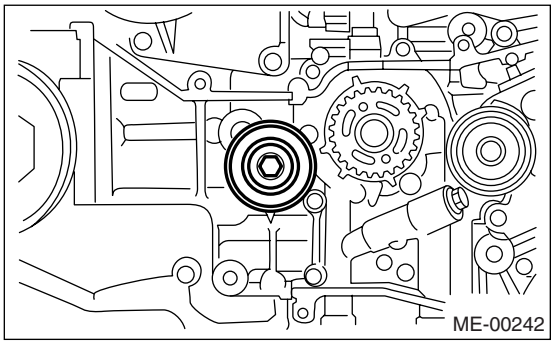
2) Install the automatic belt tension adjuster assembly.

Tightening torque:
39 N·m (4.0 kgf-m, 28.9 ft-lb)



3) Install the belt idler (No. 1).

Tightening torque:
39 N·m (4.0 kgf-m, 28.9 ft-lb)



2. TIMING BELT

1) Preparation for the installation of automatic belt tension adjuster assembly. <Ref. to ME(H4SO)-47, AUTOMATIC BELT TENSION ADJUSTER ASSEMBLY AND BELT IDLER, INSTALLATION, Timing Belt.>

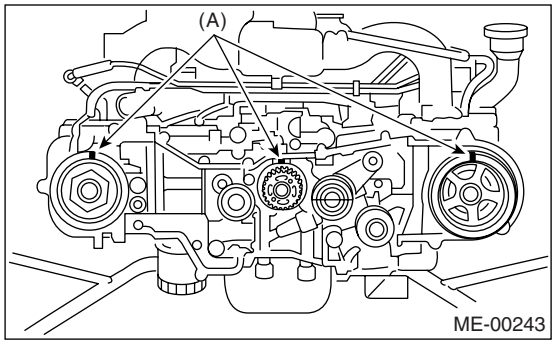
2) Installation of timing belt

(1) Turn the cam sprocket No. 2 using ST1, and then turn the cam sprocket No. 1 using ST2 so that their alignment marks (A) come to top positions.

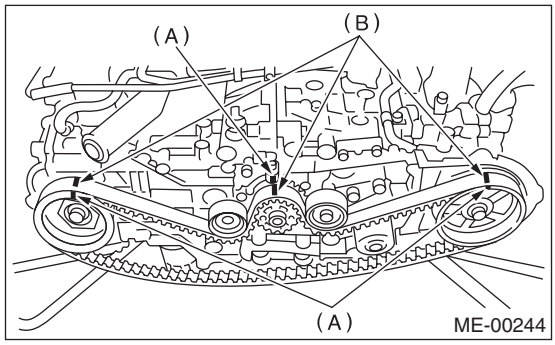
ST1 18231AA010 CAM SPROCKET WRENCH

NOTE:
Also the CAM SPROCKET WRENCH (499207100) can be used.

ST2 499207400 CAM SPROCKET WRENCH



(2) While aligning alignment marks (B) on the timing belt with marks (A) on sprockets, position the timing belt properly.

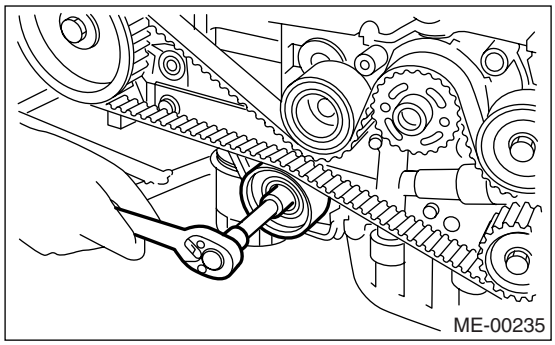


3) Install the belt idler No. 2.

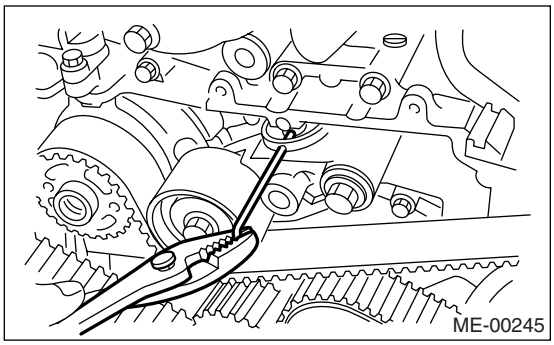
Tightening torque:
39 N·m (4.0 kgf-m, 28.9 ft-lb)

4) Install the belt idler (No. 2).

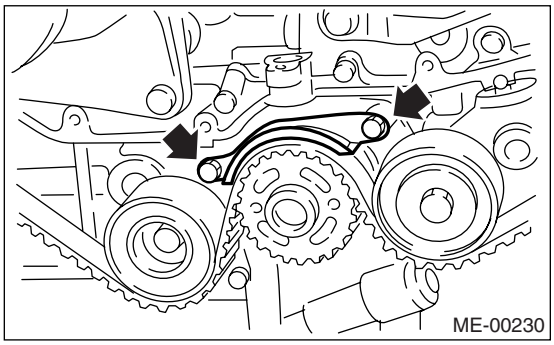
Tightening torque:
39 N·m (4.0 kgf-m, 28.9 ft-lb)



5) After ensuring that the marks on timing belt and cam sprockets are aligned, remove the stopper pin from belt tension adjuster.

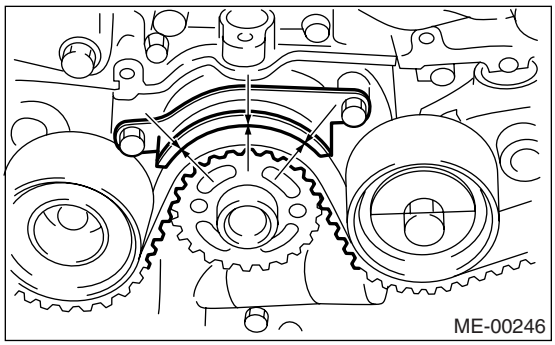


6) Install the timing belt guide. (MT model)
(1) Temporarily tighten the timing belt guide mounting bolts.



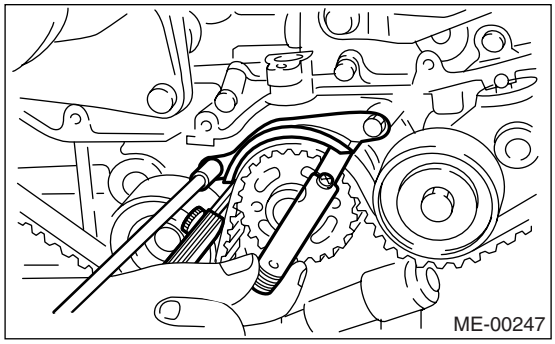
(2) Check and adjust the clearance between timing belt and timing belt guide by using thickness gauge.

Clearance:
1.0±0.5 mm (0.039±0.020 in)



(3) Tighten the timing belt guide mounting bolts.

Tightening torque:
9.75 N·m (1.0 kgf-m, 7.2 ft-lb)



7) Install the timing belt cover. <Ref. to ME(H4SO)-45, INSTALLATION, Timing Belt Cover.>
8) Install the crank pulley. <Ref. to ME(H4SO)-43, INSTALLATION, Crank Pulley.>
9) Install the V-belt. <Ref. to ME(H4SO)-41, INSTALLATION, V-belt.>

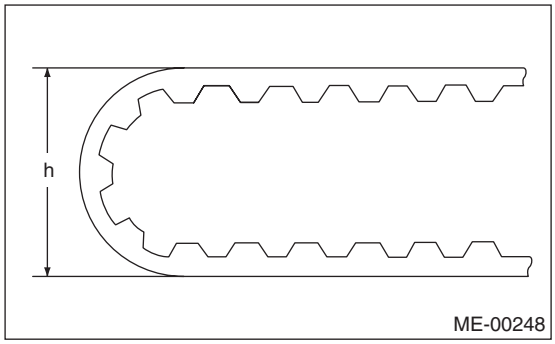
C: INSPECTION

1. TIMING BELT

1) Check the timing belt teeth for breaks, cracks, and wear. If any fault is found, replace the belt.
2) Check the condition of back side of belt; if any crack is found, replace the belt.

CAUTION:
• Be careful not to let oil, grease or coolant contact the belt. Remove quickly and thoroughly if this happens.
• Do not bend the belt sharply.

Bending radius h:
60 mm (2.36 in) or more



2. AUTOMATIC BELT TENSION ADJUSTER

1) Visually check oil seals for leaks, and rod ends for abnormal wear or scratches. If necessary, replace the automatic belt tension adjuster assembly.

NOTE:
Slight trace of oil at rod's oil seal does not indicate a problem.

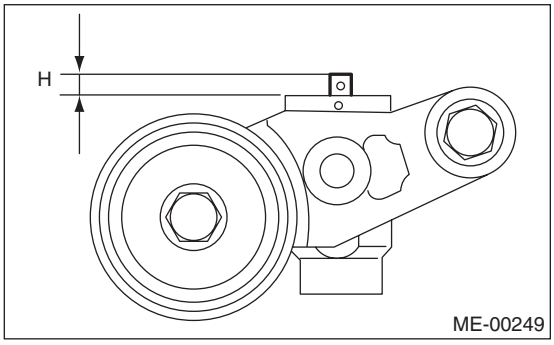
2) Check that the adjuster rod does not move when a pressure of 294 N (30 kgf, 66 lbf) is applied to it. This is to check adjuster rod stiffness.
3) If the adjuster rod is not stiff and moves freely when applying 294 N (30 kgf, 66 lbf), check it using the following procedures:

(1) Slowly press the adjuster rod down to the end surface of the cylinder. Repeat this motion 2 or 3 times.
(2) With the adjuster rod moved all the way up, apply a pressure of 294 N (30 kgf, 66 lbf) to it. Check adjuster rod stiffness.
(3) If the adjuster rod is not stiff and moves down, replace the automatic belt tension adjuster assembly with a new one.

CAUTION:
• Always use a vertical type pressing tool to move the adjuster rod down.
• Do not use a lateral type vise.
• Push the adjuster rod vertically.
• Press-in the adjuster rod gradually taking more than 3 minutes.
• Do not allow press pressure to exceed 9,807 N (1,000 kgf, 2,205 lbf).
• Press the adjuster rod as far as the end surface of the cylinder. Do not press the adjuster rod into the cylinder. Doing so may damage the cylinder.

4) Measure the extension of rod beyond the body. If it is not within specifications, replace with a new one.

Rod extension amount H:
5.7±0.5 mm (0.224±0.020 in)



3. BELT TENSION PULLEY

1) Check the mating surfaces of timing belt and contact point of adjuster rod for abnormal wear or scratches. Replace the automatic belt tension adjuster assembly if faulty.
2) Check the belt tension pulley for smooth rotation. Replace if noise or excessive play is noted.
3) Check the belt tension pulley for grease leakage.

4. BELT IDLER

1) Check the belt idler for smooth rotation. Replace if noise or excessive play is noted.
2) Check the belt outer contacting surfaces of idler pulley for abnormal wear and scratches.
3) Check the belt idler for grease leakage.

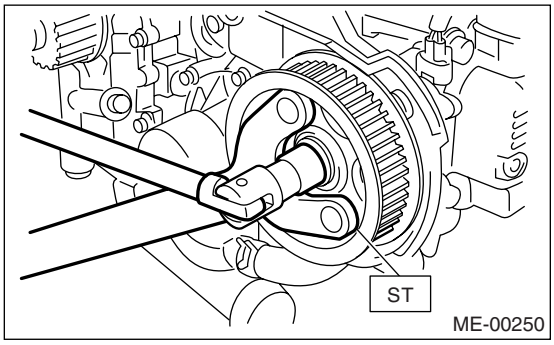
16.Cam Sprocket

A: REMOVAL

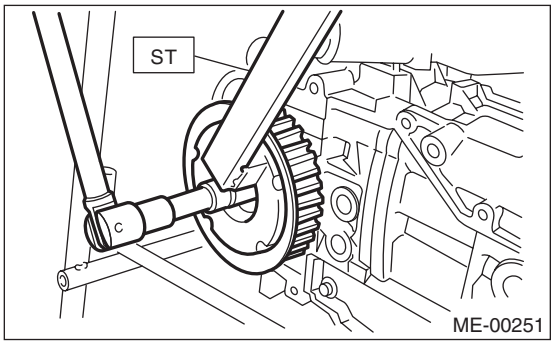
1. REMOVAL

1) Remove the V-belt. <Ref. to ME(H4SO)-41, REMOVAL, V-belt.>
2) Remove the crank pulley. <Ref. to ME(H4SO)-43, REMOVAL, Crank Pulley.>
3) Remove the timing belt cover. <Ref. to ME(H4SO)-45, REMOVAL, Timing Belt Cover.>
4) Remove the timing belt assembly. <Ref. to ME(H4SO)-46, REMOVAL, Timing Belt.>
5) Remove the camshaft position sensor. <Ref. to FU(H4SO)-29, REMOVAL, Camshaft Position Sensor.>
6) Remove the cam sprocket No. 2. To lock the camshaft, use ST.
ST 18231AA010 CAM SPROCKET WRENCH

NOTE:
Also the CAM SPROCKET WRENCH (499207100) can be used.



7) Remove the cam sprocket No. 1. To lock the camshaft, use ST.
ST 499207400 CAM SPROCKET WRENCH

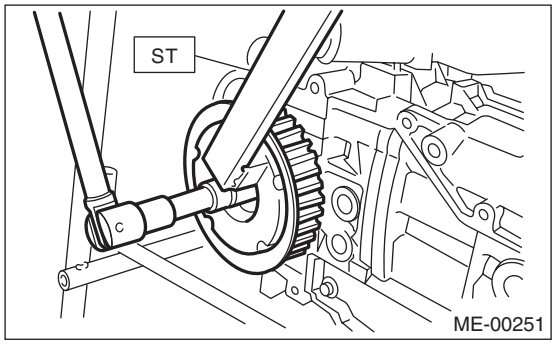


B: INSTALLATION

1) Install the cam sprocket No. 1. To lock the camshaft, use ST.
ST 499207400 CAM SPROCKET WRENCH

Tightening torque:
78 N·m (8.0 kgf-m, 57.9 ft-lb)

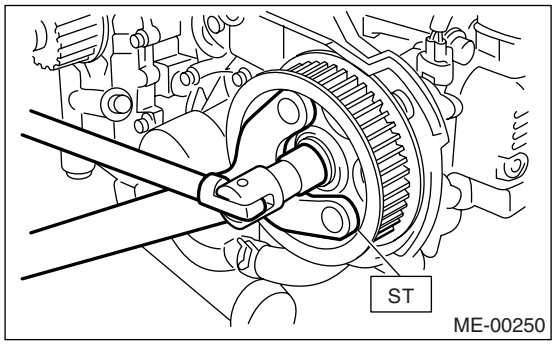
NOTE:
Do not confuse the right and left side cam sprockets during installation. The cam sprocket No. 2 is identified by a projection used to monitor camshaft position sensor.



2) Install the cam sprocket No. 2. To lock camshaft, use ST.
ST 18231AA010 CAM SPROCKET WRENCH

NOTE:
Also the CAM SPROCKET WRENCH (499207100) can be used.

Tightening torque:
78 N·m (8.0 kgf-m, 57.9 ft-lb)



3) Install the camshaft position sensor. <Ref. to FU(H4SO)-29, INSTALLATION, Camshaft Position Sensor.>
4) Install the timing belt assembly. <Ref. to ME(H4SO)-47, INSTALLATION, Timing Belt.>
5) Install the timing belt cover. <Ref. to ME(H4SO)-45, INSTALLATION, Timing Belt Cover.>
6) Install the crank pulley. <Ref. to ME(H4SO)-43, INSTALLATION, Crank Pulley.>
7) Install the V-belt. <Ref. to ME(H4SO)-41, INSTALLATION, V-belt.>

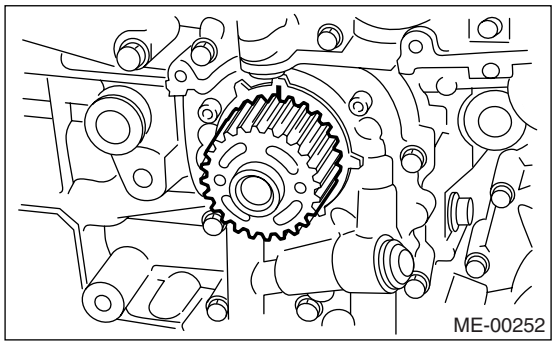
C: INSPECTION

1) Check the cam sprocket teeth for abnormal wear and scratches.
2) Make sure there is no free play between cam sprocket and key.
3) Check the cam sprocket notch for sensor for damage and contamination of foreign matter.

17.Crank Sprocket

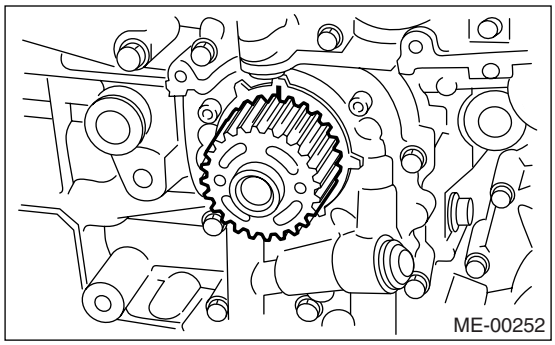
A: REMOVAL

1) Remove the V-belt. <Ref. to ME(H4SO)-41, REMOVAL, V-belt.>
2) Remove the crank pulley. <Ref. to ME(H4SO)-43, REMOVAL, Crank Pulley.>
3) Remove the timing belt cover. <Ref. to ME(H4SO)-45, REMOVAL, Timing Belt Cover.>
4) Remove the timing belt assembly. <Ref. to ME(H4SO)-46, REMOVAL, Timing Belt.>
5) Remove the cam sprocket. <Ref. to ME(H4SO)-51, REMOVAL, Cam Sprocket.>
6) Remove the crank sprocket.



B: INSTALLATION

1) Install the crank sprocket.



2) Install the cam sprocket. <Ref. to ME(H4SO)-51, INSTALLATION, Cam Sprocket.>
3) Install the timing belt assembly. <Ref. to ME(H4SO)-47, INSTALLATION, Timing Belt.>
4) Install the timing belt cover. <Ref. to ME(H4SO)-45, INSTALLATION, Timing Belt Cover.>
5) Install the crank pulley. <Ref. to ME(H4SO)-43, INSTALLATION, Crank Pulley.>
6) Install the V-belt. <Ref. to ME(H4SO)-41, INSTALLATION, V-belt.>

C: INSPECTION

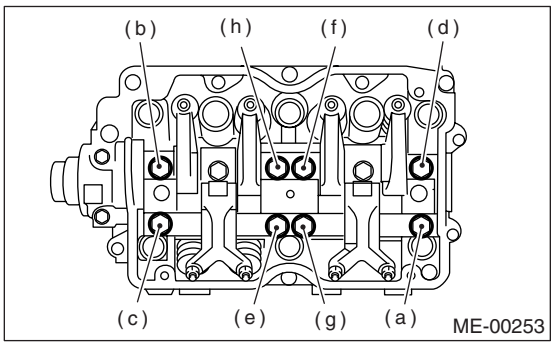
1) Check the crank sprocket teeth for abnormal wear and scratches.
2) Make sure there is no free play between crank sprocket and key.
3) Check the crank sprocket notch for sensor for damage and contamination of foreign matter.

18.Valve Rocker Assembly

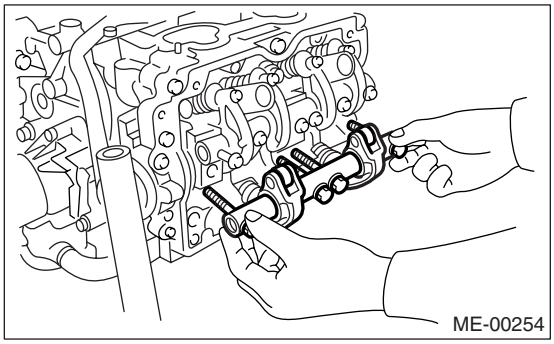
A: REMOVAL

1) Remove the V-belt. <Ref. to ME(H4SO)-41, REMOVAL, V-belt.>
2) Remove the crank pulley. <Ref. to ME(H4SO)-43, REMOVAL, Crank Pulley.>
3) Remove the timing belt cover. <Ref. to ME(H4SO)-45, REMOVAL, Timing Belt Cover.>
4) Remove the timing belt assembly. <Ref. to ME(H4SO)-46, REMOVAL, Timing Belt.>
5) Remove the cam sprocket. <Ref. to ME(H4SO)-51, REMOVAL, Cam Sprocket.>
6) Disconnect the PCV hose and remove rocker cover.
7) Removal of valve rocker assembly
   (1) Remove the bolts (a) through (h) in alphabetical sequence.

NOTE:
Leave two or three threads of bolts (g and h) engaged to retain the valve rocker assembly.



   (2) Remove the valve rocker assembly.



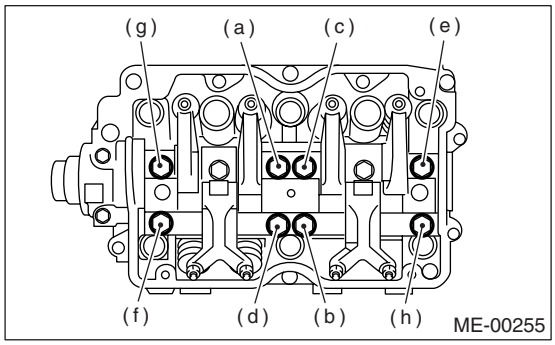
B: INSTALLATION

1) Installation of valve rocker assembly
   (1) Temporarily tighten the bolts (a) through (d) equally as shown in the figure.

NOTE:
Do not allow the valve rocker assembly to gouge knock pins.

   (2) Tighten the bolts (e) through (h) to specified torque.
   (3) Tighten the bolts (a) through (d) to specified torque.

Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)



2) Adjust the valve clearances. <Ref. to ME(H4SO)-31, ADJUSTMENT, Valve Clearance.>
3) Install the rocker cover and rocker cover gasket and then connect PCV hose.

NOTE:
Use a new rocker cover gasket.

4) Install the cam sprocket. <Ref. to ME(H4SO)-51, INSTALLATION, Cam Sprocket.>
5) Install the timing belt assembly. <Ref. to ME(H4SO)-47, INSTALLATION, Timing Belt.>
6) Install the timing belt cover. <Ref. to ME(H4SO)-45, INSTALLATION, Timing Belt Cover.>
7) Install the crank pulley. <Ref. to ME(H4SO)-43, INSTALLATION, Crank Pulley.>
8) Install the V-belt. <Ref. to ME(H4SO)-41, INSTALLATION, V-belt.>

C: DISASSEMBLY

1) Remove the bolts which secure the rocker shaft.
2) Extract the rocker shaft. Remove the valve rocker arms, springs and shaft supports from rocker shaft.

NOTE:
Arrange all removed parts in order so that they can be installed in their original positions.

3) Remove the nut and adjusting screw from valve rocker.

D: ASSEMBLY

1) Install the adjusting screw and nut to valve rocker.
2) Arrange the valve rocker arms, springs and shaft supports in assembly order and insert valve rocker shaft.

Tightening torque (Shaft supports installing bolts):
5 N·m (0.5 kgf-m, 3.6 ft-lb)

NOTE:
Valve rocker arms, rocker shaft and shaft supports have identification marks. Ensure the parts with same markings are properly assembled.

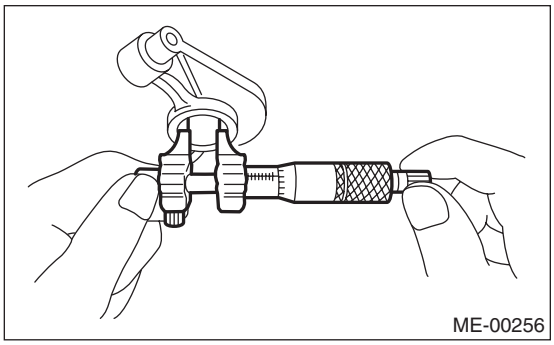
3) Install the valve rocker shaft securing bolts.

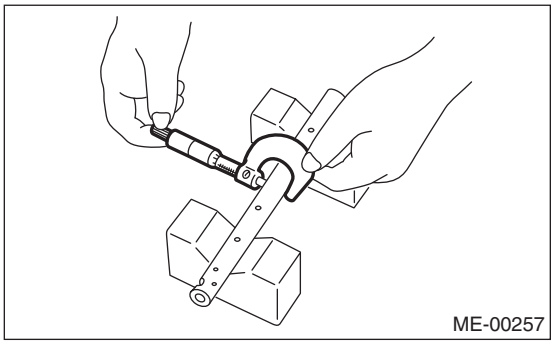
E: INSPECTION

1. VALVE ROCKER ARM AND ROCKER SHAFT

1) Measure the inside diameter of valve rocker arm and outer diameter of valve rocker shaft, and check the difference (oil clearance) between the two values.

Clearance between arm and shaft
Standard:
0.020 — 0.054 mm (0.0008 — 0.0021 in)
Limit:
0.10 mm (0.0039 in)


ME-00256


ME-00257

2) If oil clearance exceeds the limit, replace the valve rocker arm or shaft, whichever shows greater amount of wear.

Rocker arm inside diameter:
22.020 — 22.041 mm (0.8669 — 0.8678 in)

Rocker shaft diameter:
21.987 — 22.000 mm (0.8656 — 0.8661 in)

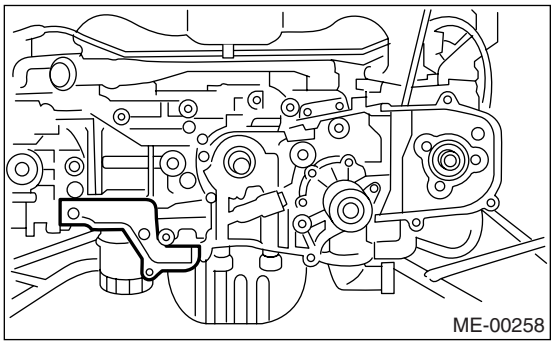
3) If cam or valve contact surface of valve rocker arm is worn or dented excessively, replace the valve rocker arm.
4) Check that the valve rocker arm roller rotates smoothly. If not, replace the valve rocker arm.

19.Camshaft

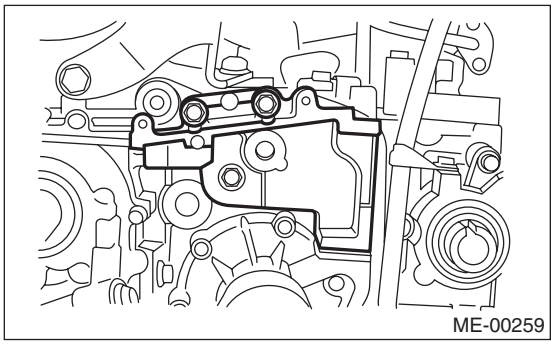
A: REMOVAL

1) Remove the V-belt. <Ref. to ME(H4SO)-41, REMOVAL, V-belt.>
2) Remove the crank pulley. <Ref. to ME(H4SO)-43, REMOVAL, Crank Pulley.>
3) Remove the timing belt cover. <Ref. to ME(H4SO)-45, REMOVAL, Timing Belt Cover.>
4) Remove the timing belt assembly. <Ref. to ME(H4SO)-46, REMOVAL, Timing Belt.>
5) Remove the cam sprocket. <Ref. to ME(H4SO)-51, REMOVAL, Cam Sprocket.>
6) Remove the crank sprocket. <Ref. to ME(H4SO)-52, REMOVAL, Crank Sprocket.>
7) Remove the timing belt cover No. 2 (LH).
8) Remove the timing belt cover No. 2 (RH).

NOTE:
Do not damage or lose the seal rubber when removing the timing belt covers.

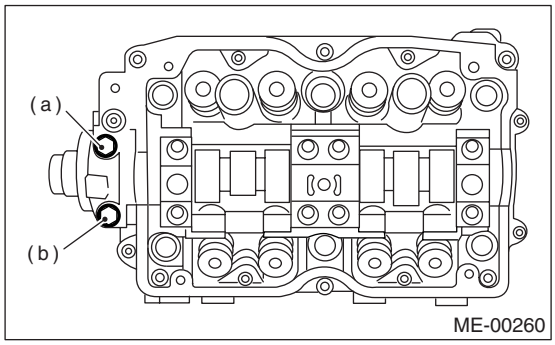

ME-00258

9) Remove the tensioner bracket.


ME-00259

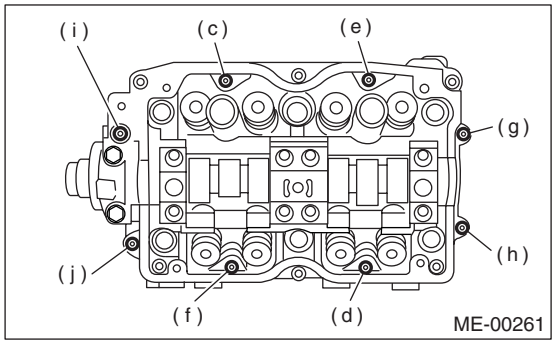
10) Remove the camshaft position sensor support. (LH side only)
11) Remove the oil level gauge guide. (LH side only)
12) Remove the valve rocker assembly. <Ref. to ME(H4SO)-53, REMOVAL, Valve Rocker Assembly.>
13) Remove the camshaft cap.

(1) Remove the bolts (a) and (b) in alphabetical sequence.



ME-00260

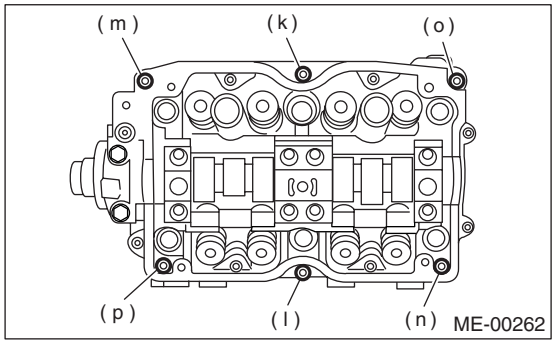
(2) Equally loosen the bolts (c) through (j) all the way in alphabetical sequence.



ME-00261

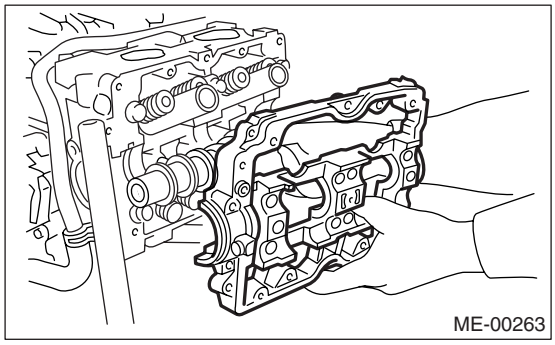
(3) Remove the bolts (k) through (p) in alphabetical sequence using ST.

ST 499497000 TORX PLUS®



ME-00262

(4) Remove the camshaft cap.


ME-00263

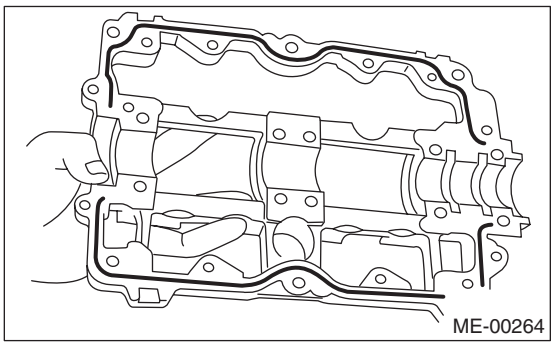
14) Remove the camshaft.
15) Remove the oil seal.
16) Remove the plug from rear side of camshaft.

CAUTION:
- **Do not remove the oil seal unless necessary.**
- **Do not scratch the journal surface when removing oil seal.**

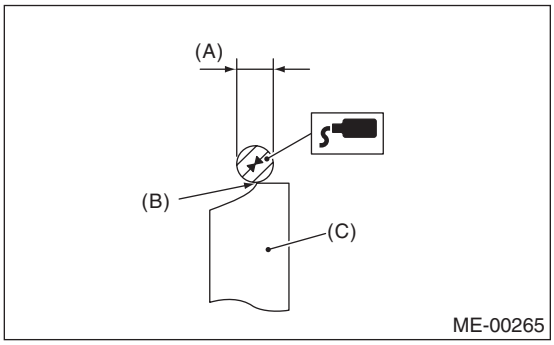
B: INSTALLATION

1) Apply a coat of engine oil to the camshaft journals, and then install the camshaft.
2) Install the camshaft cap.
   (1) Apply liquid gasket to the mating surfaces of camshaft cap.

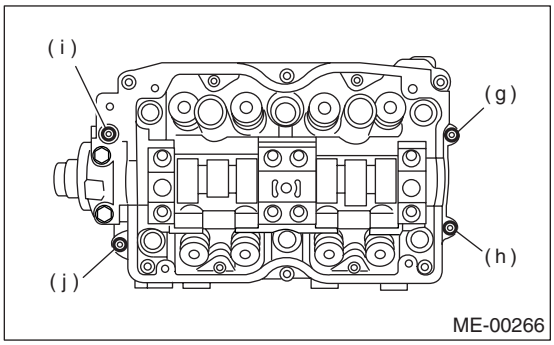
Liquid gasket:
THREE BOND 1280B (Part No. K0877YA018)



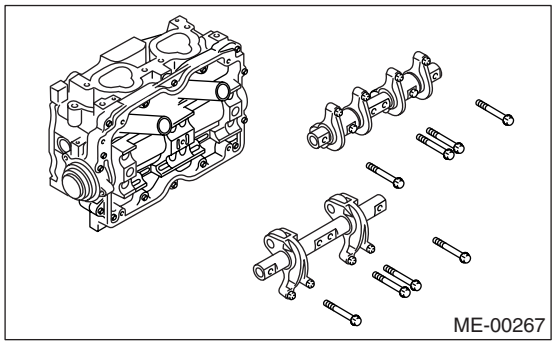
NOTE:
Apply a coat of 3 mm (0.12 in) dia. (A) liquid gasket along edge (B) of the camshaft cap (C) mating surface.



(2) Temporarily tighten the bolts (g) through (j) in alphabetical sequence.

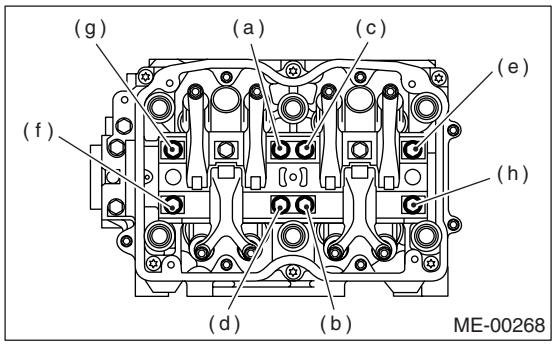


(3) Install the valve rocker assembly.



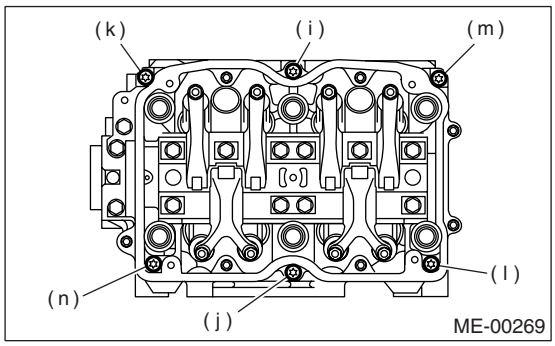
(4) Tighten the bolts (a) through (h) in alphabetical sequence.

Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)



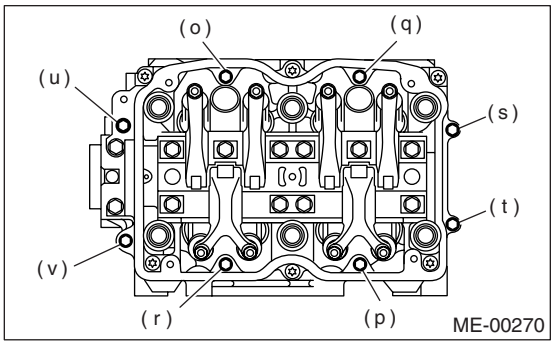
(5) Tighten the TORX® bolts (i) through (n) in alphabetical sequence using ST.
ST 499497000 TORX PLUS®

Tightening torque:
18 N·m (1.8 kgf-m, 13.3 ft-lb)



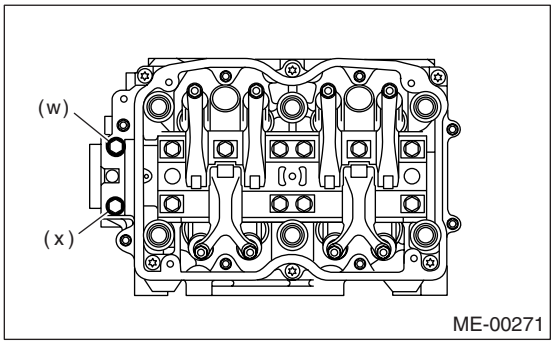
(6) Tighten the bolts (o) through (v) in alphabetical sequence.

Tightening torque:
10 N·m (1.0 kgf-m, 7.2 ft-lb)



(7) Tighten the bolts (w) through (x) in alphabetical sequence.

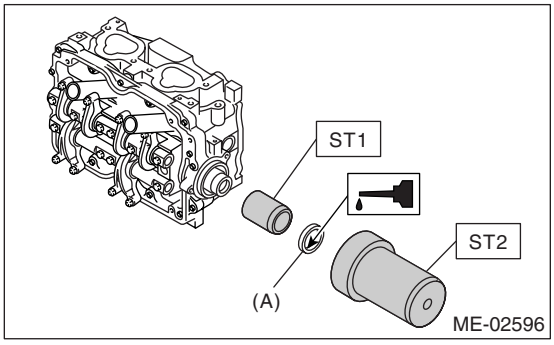
Tightening torque:
10 N·m (1.0 kgf-m, 7.2 ft-lb)



3) Apply a coat of engine oil to oil seal pressing-in portion, and then install the oil seal (A) on camshaft using ST1 and ST2.

NOTE:
Use a new oil seal.

ST1 499597000 OIL SEAL GUIDE
ST2 499587500 OIL SEAL INSTALLER



4) Install the plug using ST.

ST 499587700 CAMSHAFT OIL SEAL INSTALLER

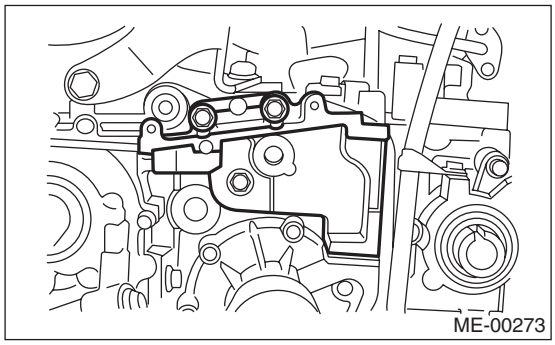
5) Adjust the valve clearance. <Ref. to ME(H4SO)-31, ADJUSTMENT, Valve Clearance.>

6) Install the rocker cover and rocker cover gasket, and then connect PCV hose.

NOTE:
Use a new rocker cover gasket.

7) Install the oil level gauge guide. (LH side only)
8) Install the camshaft position sensor support. (LH side only)
9) Install the tensioner bracket.

Tightening torque:
24.5 N·m (2.5 kgf-m, 18.1 ft-lb)

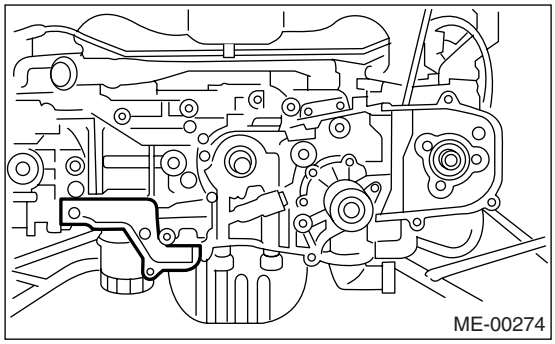


10) Install the timing belt cover No. 2 (RH).

Tightening torque:
5 N·m (0.5 kgf-m, 3.6 ft-lb)

11) Install the timing belt cover No. 2 (LH).

Tightening torque:
5 N·m (0.5 kgf-m, 3.6 ft-lb)



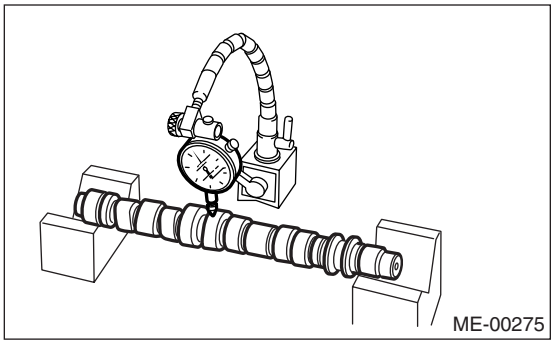
12) Install the crank sprocket. <Ref. to ME(H4SO)-52, INSTALLATION, Crank Sprocket.>
13) Install the cam sprocket. <Ref. to ME(H4SO)-51, INSTALLATION, Cam Sprocket.>
14) Install the timing belt assembly. <Ref. to ME(H4SO)-47, INSTALLATION, Timing Belt.>
15) Install the timing belt cover. <Ref. to ME(H4SO)-45, INSTALLATION, Timing Belt Cover.>
16) Install the crank pulley. <Ref. to ME(H4SO)-43, INSTALLATION, Crank Pulley.>
17) Install the V-belt. <Ref. to ME(H4SO)-41, INSTALLATION, V-belt.>

C: INSPECTION

1. CAMSHAFT

1) Measure the bend, and repair or replace if necessary.

Limit:
0.025 mm (0.0010 in)



2) Check the journal for damage and wear. Replace if faulty.
3) Measure the outer diameter of camshaft journal and inner diameter of cylinder head journal, and check the difference (oil clearance) between two values. If the oil clearance exceeds standard, replace the camshaft or cylinder head as necessary.

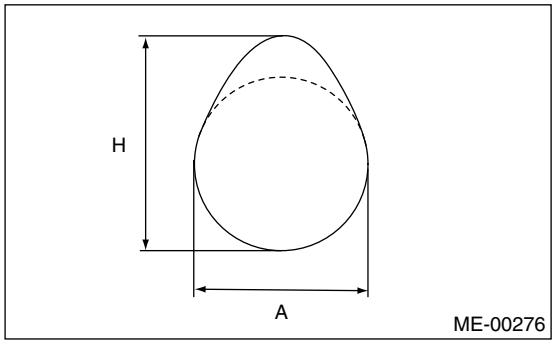
		Unit: mm (in)
Clearance at journal	Standard	0.055 — 0.090 (0.0022 — 0.0035)
	Limit	0.10 (0.0039)
Camshaft journal O.D.		31.928 — 31.945 (1.2570 — 1.2577)
Journal hole I.D.		32.000 — 32.018 (1.2598 — 1.2605)

4) Check the cam face condition; remove the minor faults by grinding with oil stone. Measure the cam height H; replace if the limit has been exceeded.

Cam height H:

Model	Item		Unit: mm (in)
1.6 L	Intake	STD	39.378 — 39.478 (1.5503 — 1.5542)
		Limit	39.278 (1.5464)
	Exhaust	STD	39.567 — 39.667 (1.5578 — 1.5617)
		Limit	39.467 (1.5538)
2.0 L	Intake	STD	38.732 — 38.832 (1.5249 — 1.5288)
		Limit	38.632 (1.5209)
	Exhaust	STD	39.259 — 39.359 (1.5456 — 1.5496)
		Limit	39.159 (1.5417)
2.5 L	Intake	STD	39.485 — 39.585 (1.5545 — 1.5585)
		Limit	39.385 (1.5506)
	Exhaust	STD	39.259 — 39.359 (1.5456 — 1.5496)
		Limit	39.159 (1.5417)

Cam base circle diameter A:
IN: 34.00 mm (1.3386 in)
EX: 34.00 mm (1.3386 in)



5) Measure the thrust clearance of camshaft with dial gauge. If the clearance exceeds the limit, replace the cap and cylinder head as a set. Replace the camshaft if necessary.

Standard:
0.030 — 0.090 mm (0.0012 — 0.0035 in)

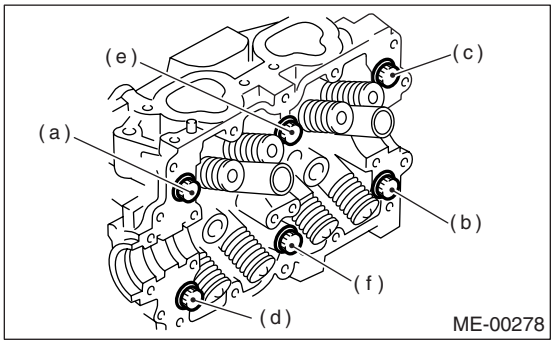
Limit:
0.10 mm (0.0039 in)

20.Cylinder Head

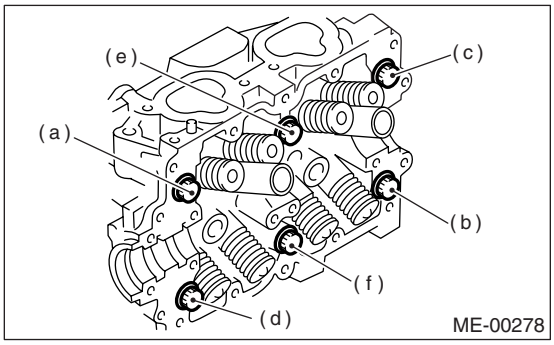
A: REMOVAL

1) Remove the V-belt. <Ref. to ME(H4SO)-41, REMOVAL, V-belt.>
2) Remove the crank pulley. <Ref. to ME(H4SO)-43, REMOVAL, Crank Pulley.>
3) Remove the timing belt cover. <Ref. to ME(H4SO)-45, REMOVAL, Timing Belt Cover.>
4) Remove the timing belt assembly. <Ref. to ME(H4SO)-46, REMOVAL, Timing Belt.>
5) Remove the cam sprocket. <Ref. to ME(H4SO)-51, REMOVAL, Cam Sprocket.>
6) Remove the intake manifold. <Ref. to FU(H4SO)-16, REMOVAL, Intake Manifold.> or <Ref. to FU(H4SOw/oOBD)-15, REMOVAL, Intake Manifold.>
7) Remove the bolt which installs the A/C compressor bracket on cylinder head.
8) Remove the valve rocker assembly. <Ref. to ME(H4SO)-53, REMOVAL, Valve Rocker Assembly.>
9) Remove the camshaft. <Ref. to ME(H4SO)-55, REMOVAL, Camshaft.>
10) Remove the cylinder head bolts in alphabetical sequence shown in the figure.

NOTE:
Leave the bolts (a) and (c) engaged by three or four threads to prevent cylinder head from falling.



11) While tapping the cylinder head with a plastic hammer, separate it from cylinder block.
12) Remove the bolts (a) and (c) to remove cylinder head.



13) Remove the cylinder head gasket.

CAUTION:
Do not scratch the mating surface of cylinder head and cylinder block.

14) Similarly, remove the right side cylinder head.

B: INSTALLATION

1) Install the cylinder head and gaskets on cylinder block.

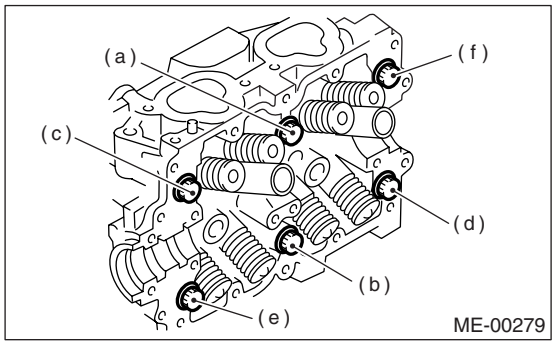
CAUTION:
- **Use new cylinder head gaskets.**
- **Be careful not to scratch the mating surface of cylinder block and cylinder head.**

2) Tighten the cylinder head bolts.
   (1) Apply a coat of engine oil to the washers and bolt threads.
   (2) Tighten all bolts to 29 N·m (3.0 kgf-m, 22 ft-lb) in alphabetical sequence.
   Then tighten all bolts to 69 N·m (7.0 kgf-m, 51 ft-lb) in alphabetical sequence.
   (3) Back off all bolts by 180° first; back them off by 180° again in reverse order of installation.
   (4) Tighten all bolts to 42 N·m (4.3 kgf-m, 31 ft-lb) in alphabetical sequence.
   (5) Tighten all bolts by 80° to 90° in alphabetical sequence.
   (6) Further tighten all bolts by 40° to 45° in alphabetical sequence shown in figure below.

NOTE:
Do not tighten bolts more than 45°.

   (7) Further tighten bolts (a) and (b) by 40° to 45°.

NOTE:
Ensure that the total “re-tightening angle” [in the former two steps], do not exceed 90°.



3) Install the camshaft. <Ref. to ME(H4SO)-56, INSTALLATION, Camshaft.>
4) Install the valve rocker assembly. <Ref. to ME(H4SO)-53, INSTALLATION, Valve Rocker Assembly.>
5) Install the A/C compressor bracket on cylinder head.

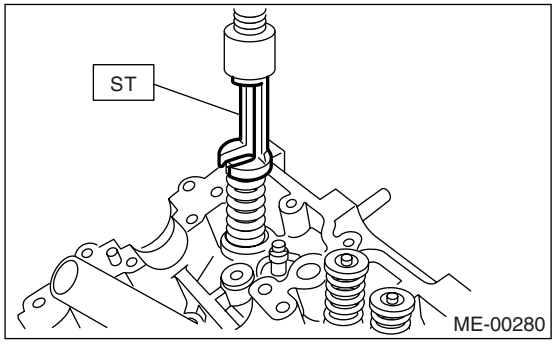
6) Install the intake manifold. <Ref. to FU(H4SO)-18, INSTALLATION, Intake Manifold.> or <Ref. to FU(H4SOw/oOBD)-17, INSTALLATION, Intake Manifold.>
7) Install the cam sprocket. <Ref. to ME(H4SO)-51, INSTALLATION, Cam Sprocket.>
8) Install the timing belt assembly. <Ref. to ME(H4SO)-47, INSTALLATION, Timing Belt.>
9) Install the timing belt cover. <Ref. to ME(H4SO)-45, INSTALLATION, Timing Belt Cover.>
10) Install the crank pulley. <Ref. to ME(H4SO)-43, INSTALLATION, Crank Pulley.>
11) Install the V-belt. <Ref. to ME(H4SO)-41, INSTALLATION, V-belt.>

C: DISASSEMBLY

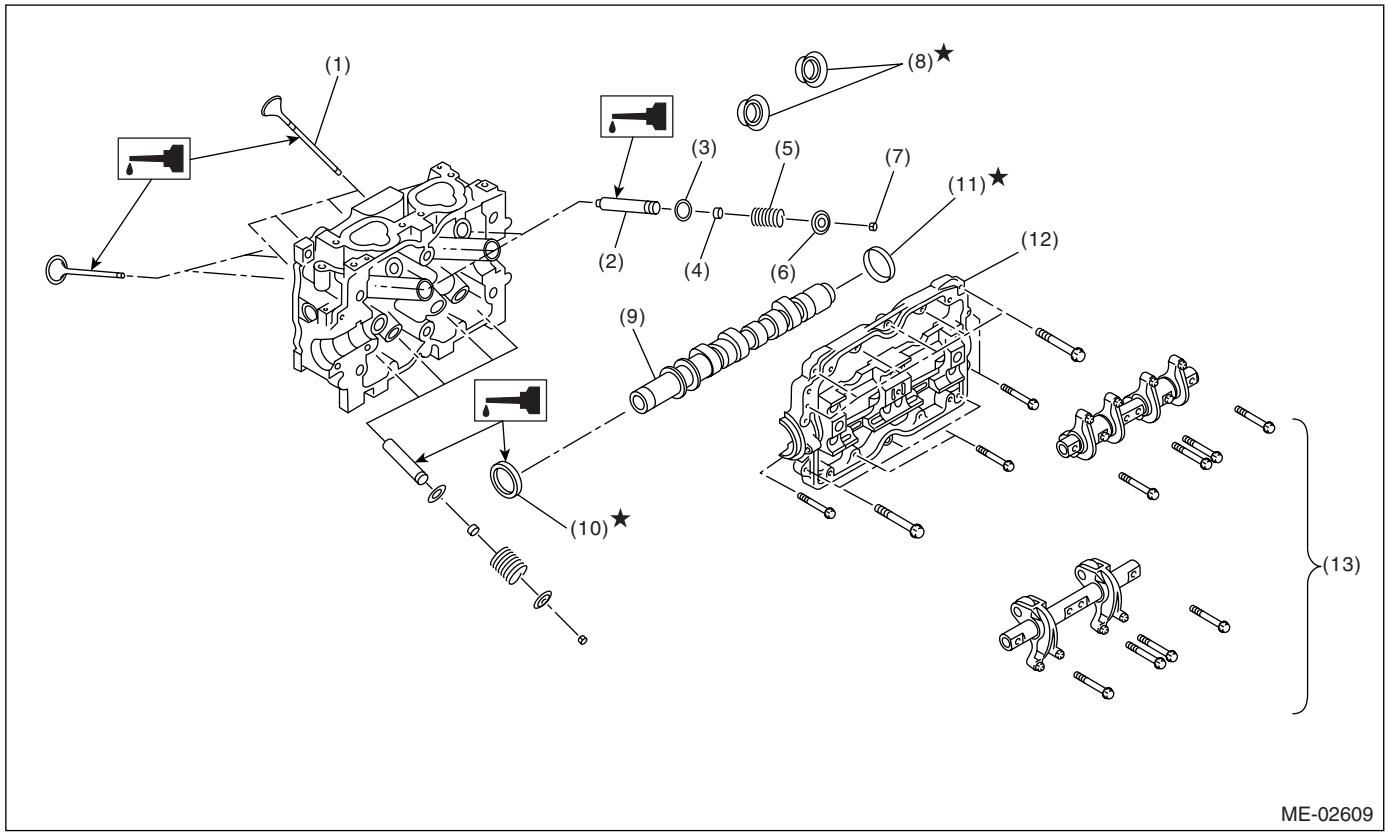
1) Place the cylinder head on ST.
ST 498267800 CYLINDER HEAD TABLE

2) Set the ST on valve spring. Compress the valve spring, and then remove the valve spring retainer key. Remove each valve and valve spring.
ST 499718000 VALVE SPRING REMOVER

CAUTION:
- **Mark each valve to prevent confusion.**
- **Use extreme care not to damage the lips of intake valve oil seals and exhaust valve oil seals.**



D: ASSEMBLY



(1) Valve
(2) Valve guide
(3) Valve spring seat
(4) Oil seal
(5) Valve spring
(6) Retainer
(7) Retainer key
(8) Spark plug gasket
(9) Camshaft
(10) Oil seal
(11) Plug
(12) Camshaft cap
(13) Valve rocker ASSY

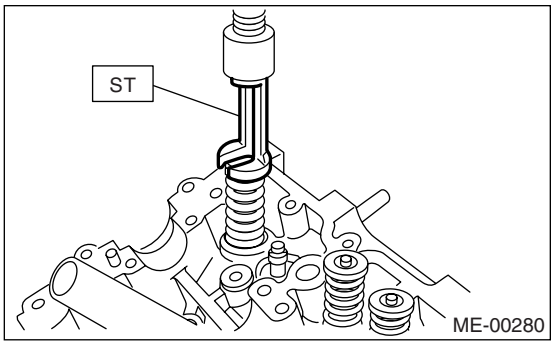
1) Installation of valve spring and valve
(1) Place the cylinder head on ST.
ST 498267800 CYLINDER HEAD TABLE
(2) Coat the stem of each valve with engine oil and insert valve into valve guide.

NOTE:
When inserting the valve into valve guide, use special care not to damage the oil seal lip.

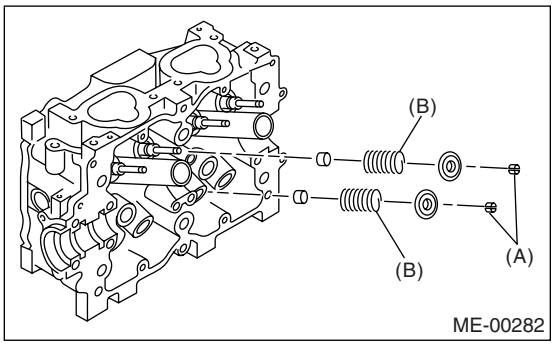
(3) Install the valve spring and retainer.

NOTE:
Be sure to install the valve springs with their close-coiled end facing the seat on the cylinder head.

(4) Set the ST on valve spring.
ST 499718000 VALVE SPRING REMOVER



(5) Compress the valve spring, and then fit the valve spring retainer key.



(A) Retainer key
(B) Valve spring

(6) After installing, tap the valve spring retainers lightly with plastic hammer for better seating.

E: INSPECTION

1. CYLINDER HEAD

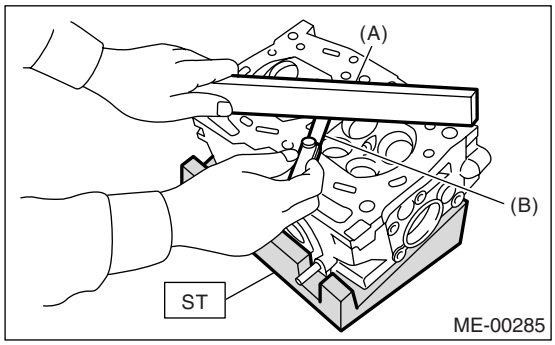
1) Make sure that no crack or other damage exists. In addition to visual inspection, inspect important areas by means of liquid penetrant tester.
Also make sure that gasket installing surface shows no trace of gas and water leaks.
2) Place the cylinder head on ST.
ST 498267800 CYLINDER HEAD TABLE
3) Measure the warping of the cylinder head surface that mates with crankcase using a straight edge and thickness gauge.
If it exceeds the warping limit, regrind the surface with a surface grinder.

Warping limit:
0.035 mm (0.0014 in)

Grinding limit:
0.1 mm (0.004 in)

Standard height of cylinder head:
97.5 mm (3.839 in)

NOTE:
Uneven torque for the cylinder head bolts can cause warping. When reassembling, pay special attention to the torque so as to tighten evenly.



(A) Straight edge
(B) Thickness gauge

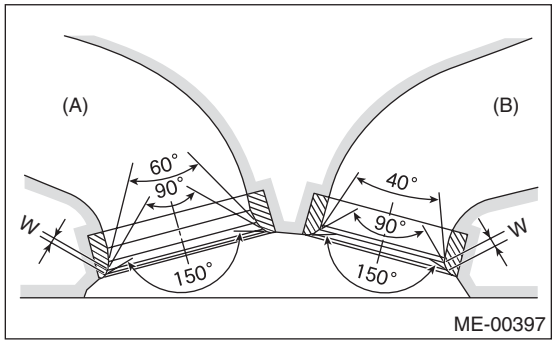
2. VALVE SEAT

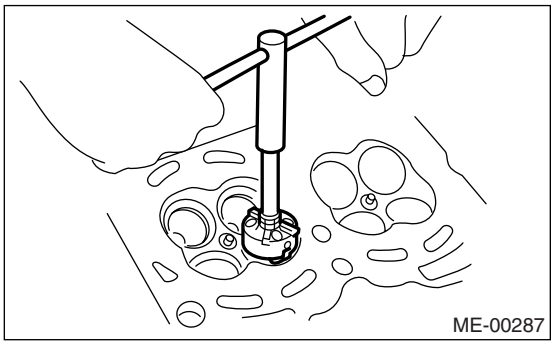
Inspect the intake and exhaust valve seats, and then correct the contact surfaces with valve seat cutter if they are defective or when valve guides are replaced.

Valve seat width W:

Intake (A)
Standard 0.8 — 1.4 mm (0.03 — 0.055 in)
Limit 1.7 mm (0.067 in)

Exhaust (B)
Standard 1.2 — 1.8 mm (0.049 — 0.071 in)
Limit 2.2 mm (0.087 in)





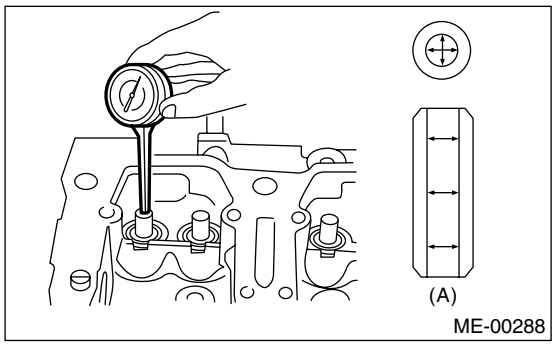
3. VALVE GUIDE

1) Check the clearance between valve guide and stem. The clearance can be checked by measuring the outside diameter of valve stem and the inside diameter of valve guide with outside and inside micrometers respectively.

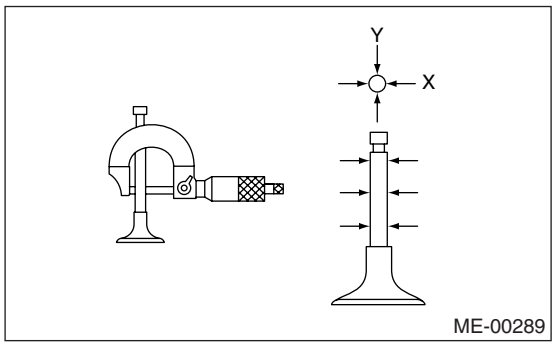
Clearance between the valve guide and valve stem:

Standard
Intake 0.035 — 0.062 mm (0.0014 — 0.0024 in)
Exhaust 0.040 — 0.067 mm (0.0016 — 0.0026 in)

Limit
0.15 mm (0.0059 in)



(A) Valve guide



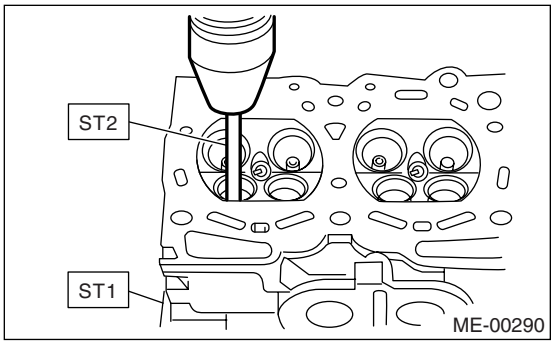
2) If the clearance between valve guide and stem exceeds the limit, replace the valve guide or valve itself whichever shows greater amount of wear. See the following procedure for valve guide replacement.

Valve guide inner diameter:
6.000 — 6.012 mm (0.2362 — 0.2367 in)

Valve stem outer diameters:
Intake
5.950 — 5.965 mm (0.2343 — 0.2348 in)
Exhaust
5.945 — 5.960 mm (0.2341 — 0.2346 in)

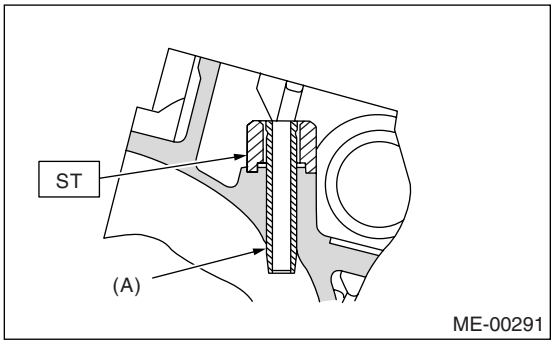
(1) Place the cylinder head on ST1 with the combustion chamber upward so that valve guides enter the holes in ST1.
(2) Insert the ST2 into valve guide and press it down to remove valve guide.

ST1 498267800 CYLINDER HEAD TABLE
ST2 499767200 VALVE GUIDE REMOVER



(3) Turn the cylinder head upside down and place ST as shown in the figure.

Intake side:
ST 499767700 VALVE GUIDE ADJUSTER
Exhaust side:
ST 499767800 VALVE GUIDE ADJUSTER

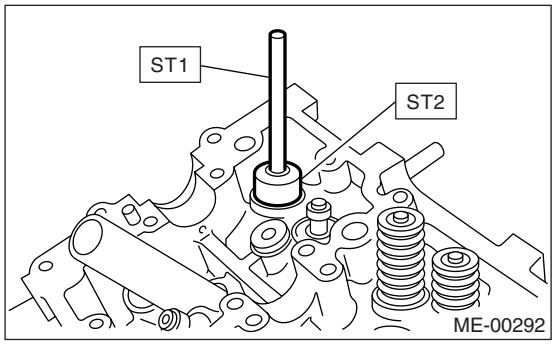


(A) Valve guide

(4) Before installing new oversize valve guide, make sure that neither scratches nor damages exist on the inside surface of valve guide holes in cylinder head.

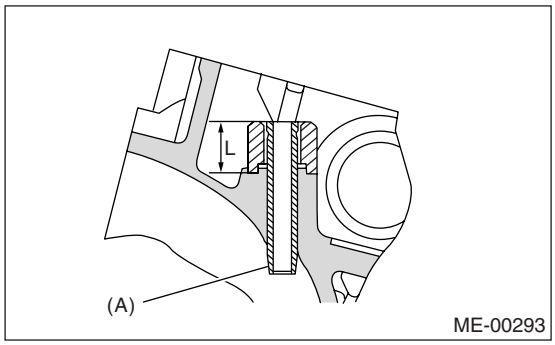
(5) Put new valve guide, coated with sufficient oil, in the cylinder, and then insert the ST1 into valve guide. Press in until the valve guide upper end is flush with the upper surface of ST2.

ST1 499767200 VALVE GUIDE REMOVER
Intake side:
ST2 499767700 VALVE GUIDE ADJUSTER
Exhaust side:
ST2 499767800 VALVE GUIDE ADJUSTER



(6) Check the valve guide protrusion.

Valve guide protrusion L:
Intake
20.0 — 21.0 mm (0.787 — 0.819 in)
Exhaust
16.5 — 17.5 mm (0.650 — 0.683 in)

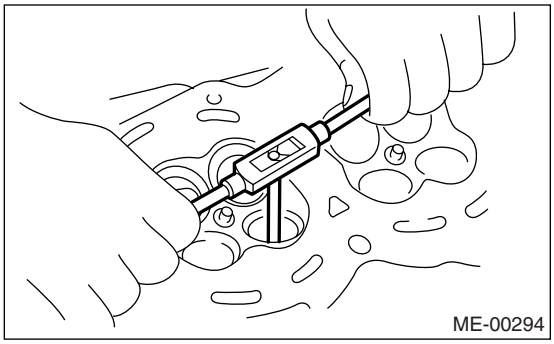


(A) Valve guide

(7) Ream the inside of valve guide with ST. Gently rotate the reamer clockwise while pressing it lightly into valve guide, and return it also rotating clockwise. After reaming, clean the valve guide to remove chips.

CAUTION:
• Apply engine oil to the reamer when reaming.
• If the inner surface of the valve guide is torn, the edge of the reamer should be slightly ground with an oil stone.
• If the inner surface of the valve guide becomes lustrous and the reamer does not chips, use a new reamer or remedy the reamer.

ST 499767400 VALVE GUIDE REAMER



(8) Recheck the contact condition between valve and valve seat after replacing valve guide.

4. INTAKE AND EXHAUST VALVE

1) Inspect the flange and stem of valve, and replace if damaged, worn, or deformed, or if "H" is less than the specified limit.

Head edge thickness H:

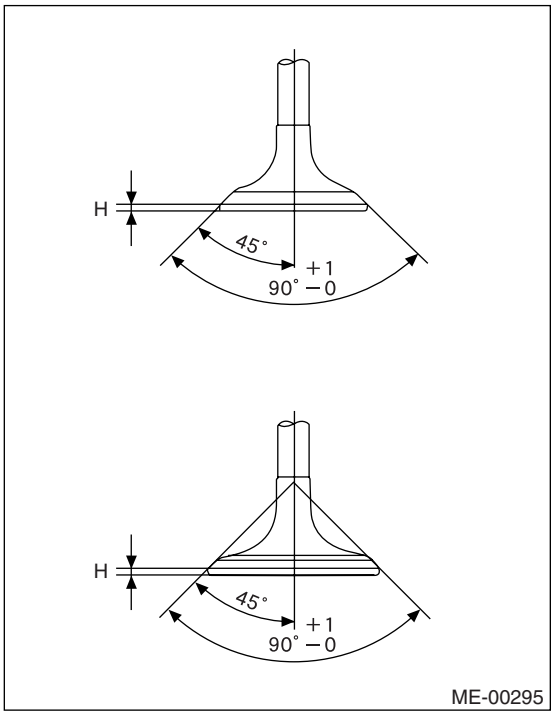
Intake
Standard 0.8 — 1.2 mm (0.03 — 0.047 in)
Limit 0.6 mm (0.024 in)

Exhaust
Standard 1.0 — 1.4 mm (0.039 — 0.055 in)
Limit 0.6 mm (0.024 in)

Valve overall length:

Intake
120.6 mm (4.75 in)

Exhaust
121.7 mm (4.79 in)

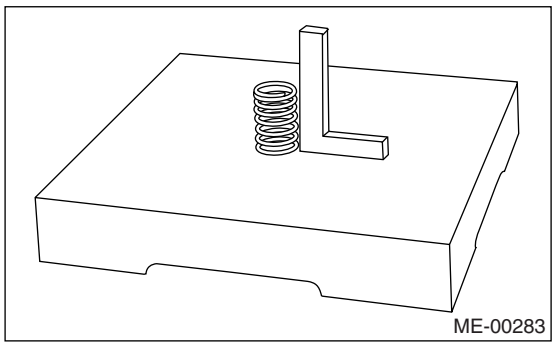


2) Put a small amount of grinding compound on the seat surface and lap the valve and seat surface. <Ref. to ME(H4SO)-61, VALVE SEAT, INSPECTION, Cylinder Head.> Install a new intake valve oil seal after lapping.

5. VALVE SPRING

1) Check the valve springs for damage, free length, and tension. Replace the valve spring if it is not within the standard presented in the table.
2) To measure the squareness of valve spring, stand the spring on a surface plate and measure its deflection at the top using a try square.

Free length		54.30 mm (2.1378 in)
Squareness		2.5°, 2.4 mm (0.094 in) or less
Tension/spring height	Set	214 — 246 N (22 — 25 kgf, 48 — 55 lbf)/ 45.0 mm (1.772 in)
	Lift	526 — 582 N (54 — 59 kgf, 119 — 130 lbf)/ 34.7 mm (1.366 in)



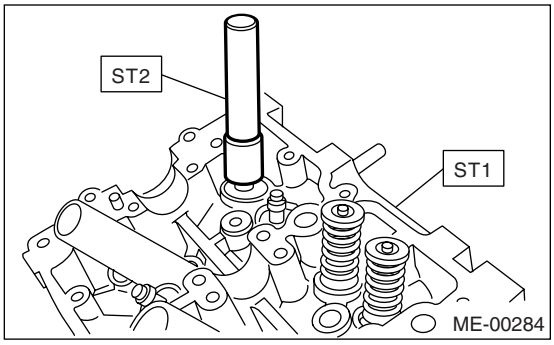
6. INTAKE AND EXHAUST VALVE OIL SEAL

Replace the oil seal with new one, if lip is damaged or spring out of place, or when the surfaces of intake valve and valve seat are reconditioned or intake valve guide is replaced. Use pliers to pinch and remove oil seal from valve.
1) Place the cylinder head on ST1.
2) Press-fit oil seal using ST2.

CAUTION:
• Apply engine oil to oil seal before press-fitting.
• When press-fitting oil seal, do not use hammer or strike in.
• Differentiate between intake valve oil seal and exhaust valve oil seal by noting their difference in color.

ST1 498267800 CYLINDER HEAD TABLE
ST2 498857100 VALVE OIL SEAL GUIDE

Color of rubber part:
Intake [Gray]
Exhaust [Green]



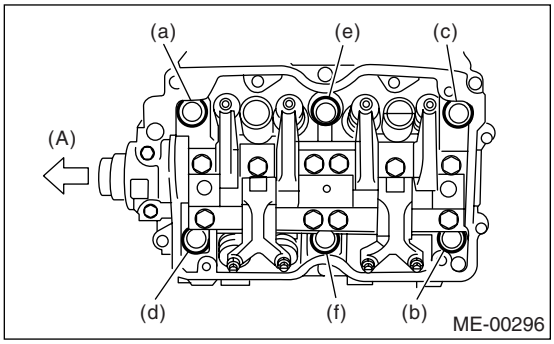
21.Cylinder Block

A: REMOVAL

NOTE:
Before conducting this procedure, drain the engine oil completely if applicable.

1) Remove the intake manifold. <Ref. to FU(H4SO)-16, REMOVAL, Intake Manifold.> or <Ref. to FU(H4SOw/oOBD)-15, REMOVAL, Intake Manifold.>
2) Remove the V-belt. <Ref. to ME(H4SO)-41, REMOVAL, V-belt.>
3) Remove the crank pulley. <Ref. to ME(H4SO)-43, REMOVAL, Crank Pulley.>
4) Remove the timing belt cover. <Ref. to ME(H4SO)-45, REMOVAL, Timing Belt Cover.>
5) Remove the timing belt assembly. <Ref. to ME(H4SO)-46, REMOVAL, Timing Belt.>
6) Remove the cam sprocket. <Ref. to ME(H4SO)-51, REMOVAL, Cam Sprocket.>
7) Remove the crank sprocket. <Ref. to ME(H4SO)-43, REMOVAL, Crank Pulley.>
8) Remove the generator and A/C compressor with their brackets.
9) Remove the rocker cover.
10) Remove the cylinder head bolts in alphabetical sequence shown in the figure.

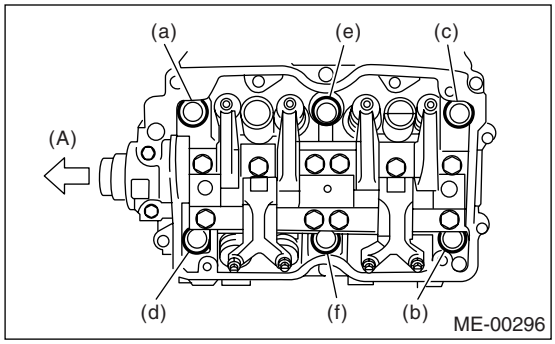
NOTE:
Leave bolts (a) and (c) engaged by three or four threads to prevent cylinder head from falling.



(A) Front

11) While tapping the cylinder head with a plastic hammer, separate it from cylinder block.

12) Remove the bolts (a) and (c) to remove cylinder head.



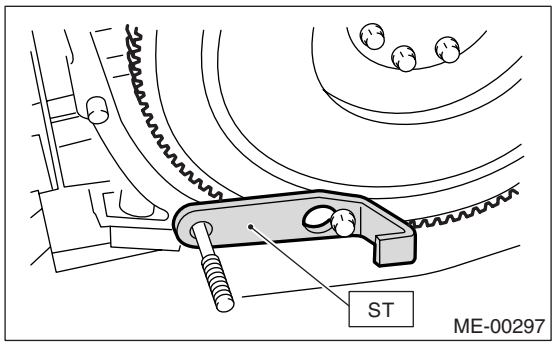
(A) Front

13) Remove the cylinder head gasket.

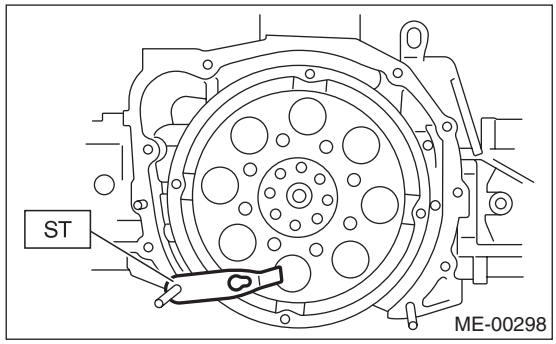
NOTE:
Do not scratch the mating surface of cylinder head and cylinder block.

14) Similarly, remove the right side cylinder head.
15) Remove the clutch housing cover. (MT model)
16) Remove the flywheel (MT model) or drive plate (AT model).
Using the ST, lock the crankshaft.
ST 498497100 CRANKSHAFT STOPPER

- MT model

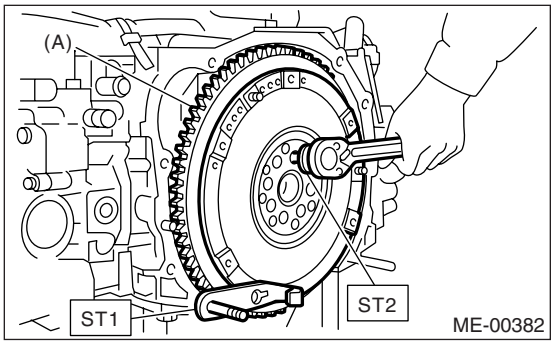


- AT model



NOTE:
Using STs, remove the flywheel. (2.5 L MT model)

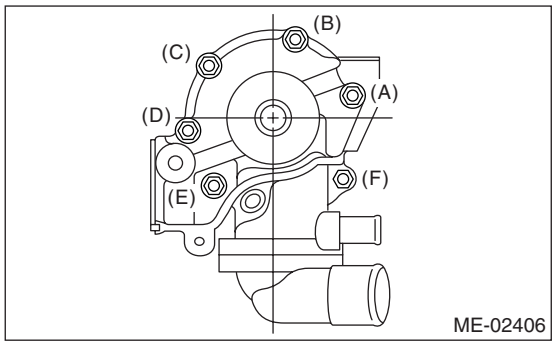
ST1 498497100 CRANKSHAFT STOPPER
ST2 499057000 TORX PLUS®



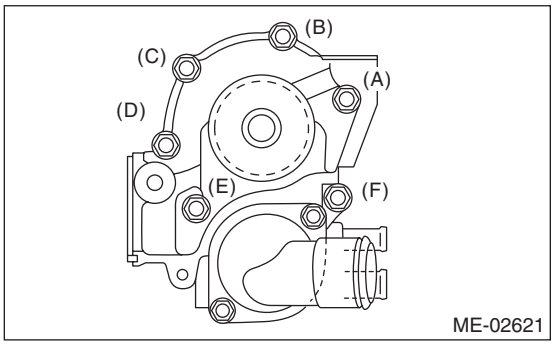
(A) Flywheel

17) Remove the oil separator cover.
18) Remove the water by-pass pipe for heater.
19) Loosen the bolts in alphabetical sequence as shown in the figure, and then remove the water pump.

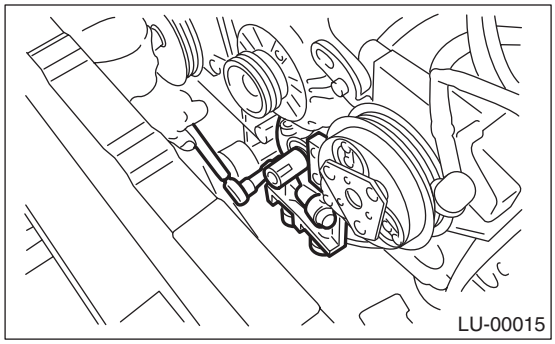
- Model without ATF warmer



- Model with ATF warmer

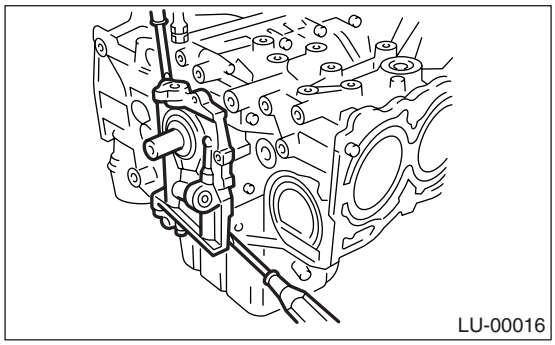


20) Remove the bolts which install the oil pump onto cylinder block.



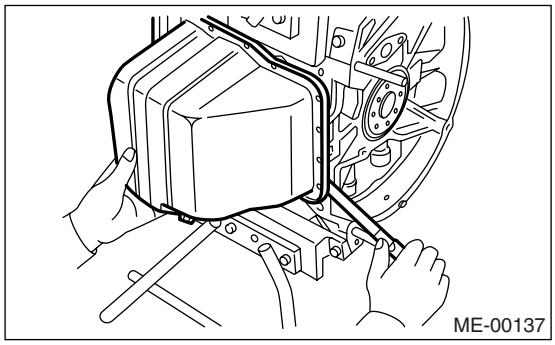
21) Remove the oil pump from cylinder block using the flat tip screwdriver.

CAUTION:
Be careful not to scratch the mating surface of cylinder block and oil pump.



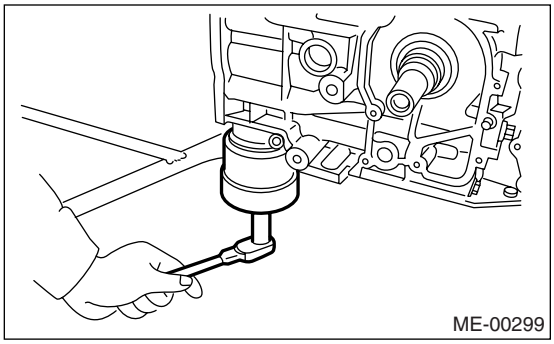
22) Removal of oil pan
(1) Turn the cylinder block to face the #2 and #4 piston sides upward.
(2) Remove the bolts which secure the oil pan to cylinder block.
(3) Remove the oil pump using the flat tip screwdriver.

NOTE:
Be careful not to scratch the mating surfaces of cylinder block and oil pump.

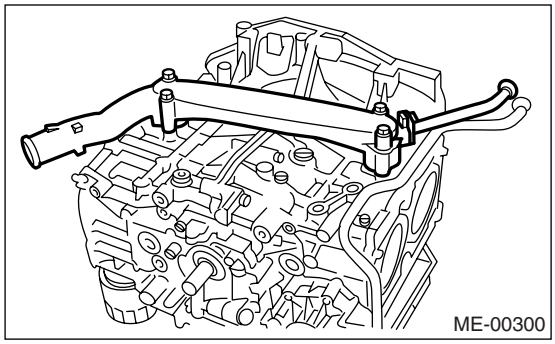


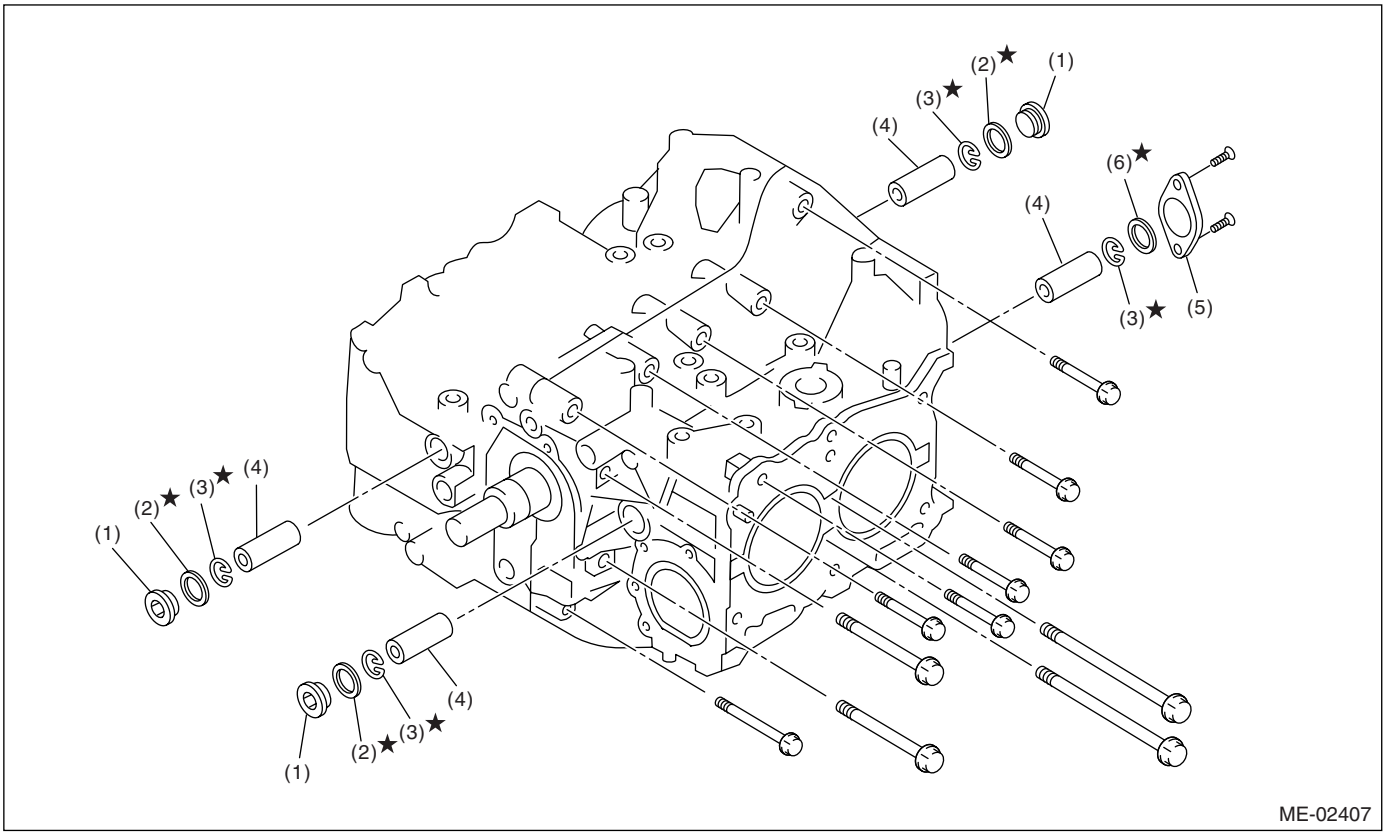
23) Remove the oil strainer stay.
24) Remove the oil strainer.
25) Remove the baffle plate.
26) Remove the oil filter using ST.

ST 498547000 OIL FILTER WRENCH



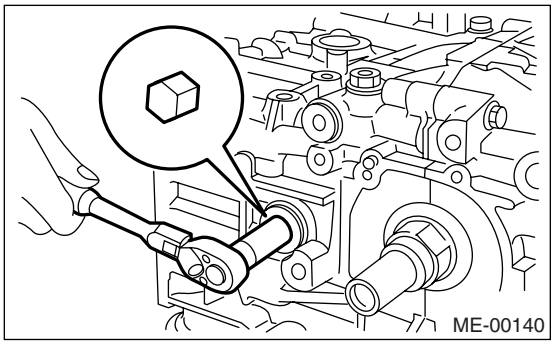
27) Remove the water pipe.



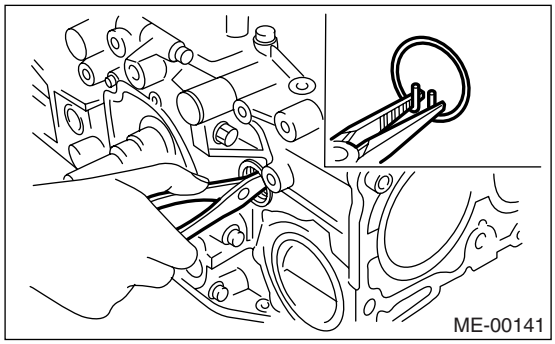


(1) Service hole plug
(2) Gasket
(3) Circlip
(4) Piston pin
(5) Service hole cover
(6) O-ring

28) Remove the service hole cover and service hole plugs using hexagon wrench [14 mm (0.55 in)].



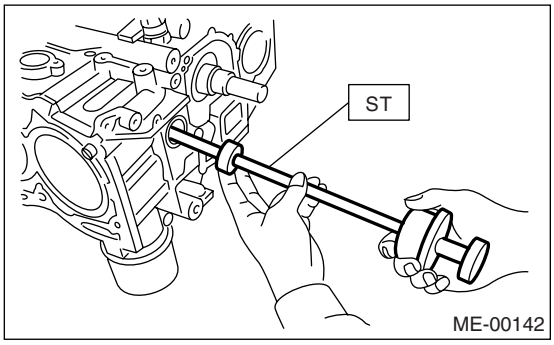
29) Rotate the crankshaft to bring #1 and #2 pistons to bottom dead center position, and then remove the piston circlip through service hole of #1 and #2 cylinders.



30) Draw out the piston pin from #1 and #2 pistons using ST.

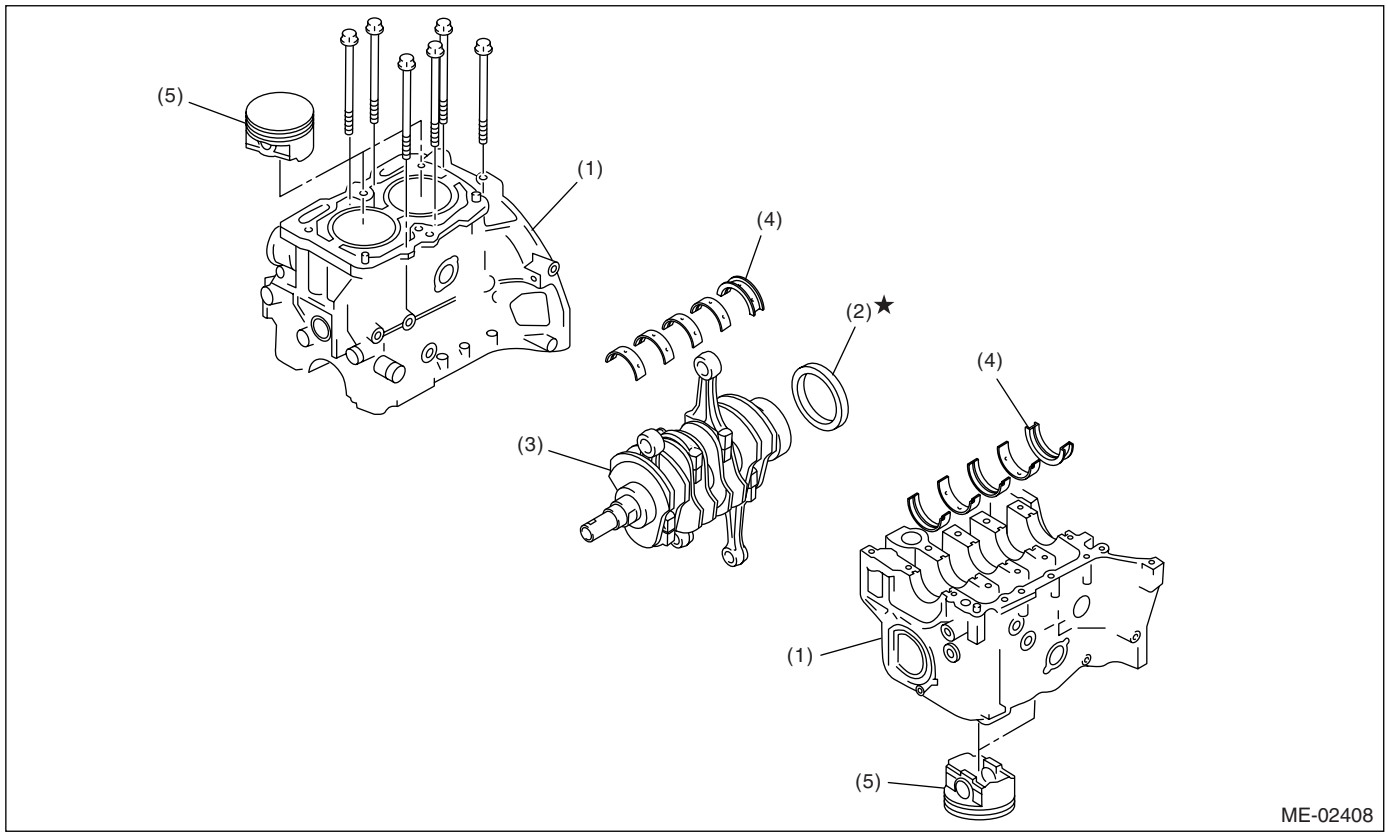
ST 499097700 PISTON PIN REMOVER ASSY

NOTE:
Be careful not to confuse the original combination of piston, piston pin and cylinder.



31) Similarly remove the piston pins from #3 and #4 pistons.
32) Remove the bolts which connect the cylinder block on the side of #2 and #4 cylinders.
33) Back off the bolts which connect the cylinder block on the side of #1 and #3 cylinders two or three turns.
34) Set up the cylinder block so that #1 and #3 cylinders are on the upper side, and then remove the cylinder block connecting bolts.
35) Separate the cylinder blocks (RH) and (LH).

NOTE:
When separating the cylinder block, do not allow the connecting rod to fall and damage the cylinder block.



(1) Cylinder block
(2) Rear oil seal
(3) Crankshaft
(4) Crankshaft bearing
(5) Piston

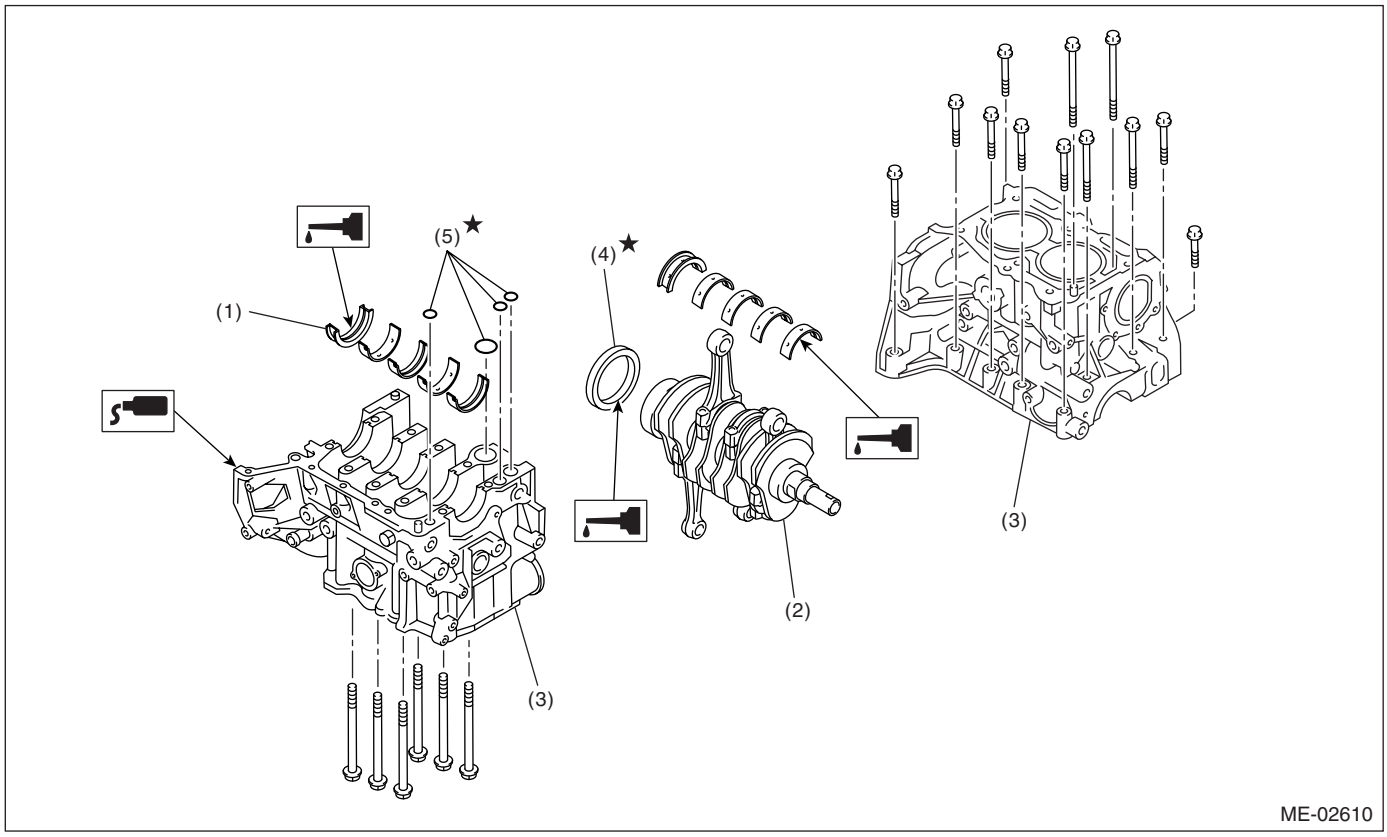
36) Remove the rear oil seal.
37) Remove the crankshaft together with connecting rod.
38) Remove the crankshaft bearings from cylinder block using hammer handle.

NOTE:
Be careful not to confuse the combination of crankshaft bearings. Press bearing at the end opposite to locking lip.

39) Draw out each piston from cylinder block using wooden bar or hammer handle.

NOTE:
Be careful not to confuse the combination of piston and cylinder.

B: INSTALLATION



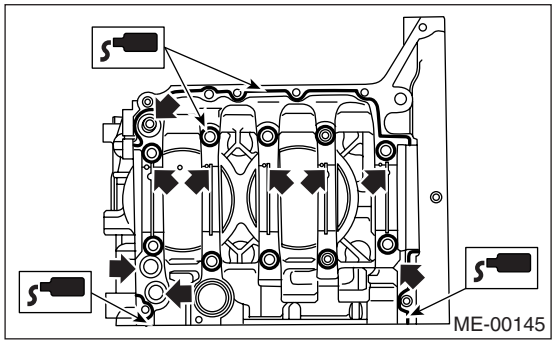
(1) Crankshaft bearing
(2) Crankshaft
(3) Cylinder block
(4) Rear oil seal
(5) O-ring

NOTE:
Remove oil in the mating surface of bearing and cylinder block before installation. Also apply a coat of engine oil to crankshaft pins.

1) Position the crankshaft on #2 and #4 cylinder block.
2) Apply liquid gasket to the mating surface of #1 and #3 cylinder block, and position it on #2 and #4 cylinder block.

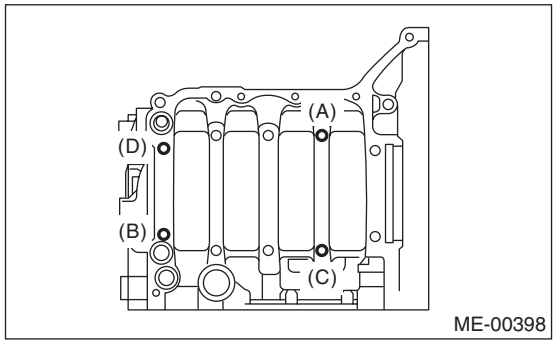
Liquid gasket:
THREE BOND 1215 (Part No. 004403007) or equivalent

NOTE:
Do not allow liquid gasket to jut into O-ring grooves, oil passages, bearing grooves, etc.



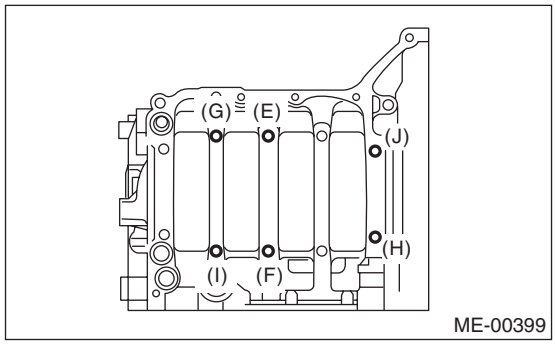
3) Tighten the 10 mm cylinder block connecting bolts in alphabetical sequence shown in the figure. (LH side)

Tightening torque:
10 N·m (1.0 kgf-m, 7.4 ft-lb)



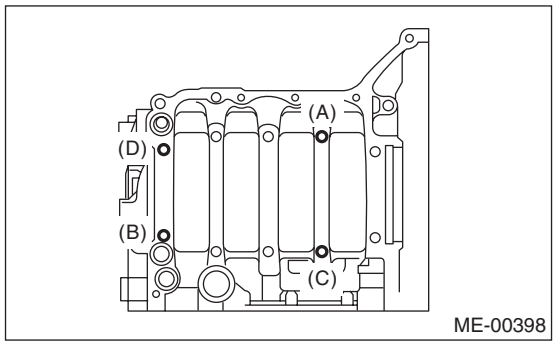
4) Tighten the 10 mm cylinder block connecting bolts on RH side (E — J) in alphabetical sequence.

Tightening torque:
10 N·m (1.0 kgf-m, 7.4 ft-lb)



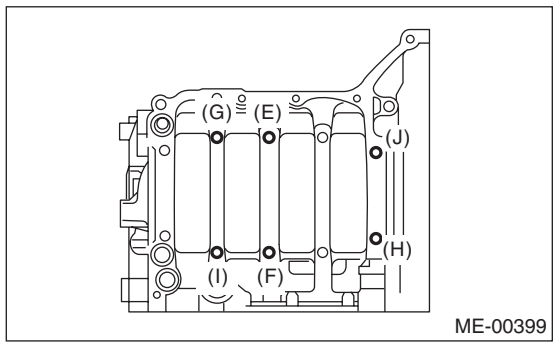
5) Further tighten the LH side bolts (A — D) in alphabetical sequence.

Tightening torque:
18 N·m (1.8 kgf-m, 13.3 ft-lb)

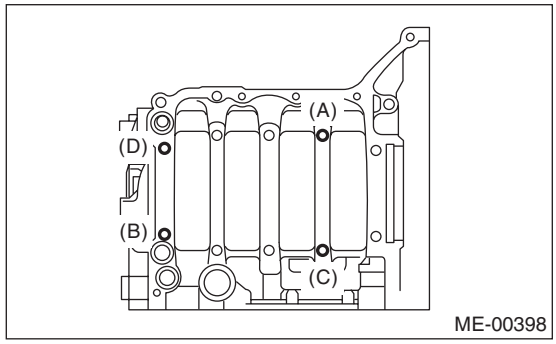


6) Further tighten the RH side bolts (E — J) in alphabetical sequence.

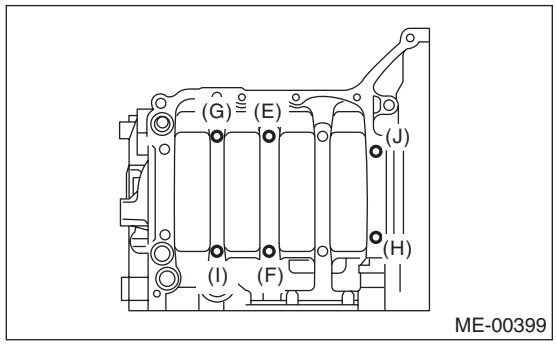
Tightening torque:
18 N·m (1.8 kgf-m, 13.3 ft-lb)



7) Further tighten the LH side bolts (A), (C) to 90°, (B), (D) 40 N·m (4.1 kgf-m, 29.5 ft-lb) in alphabetical sequence.

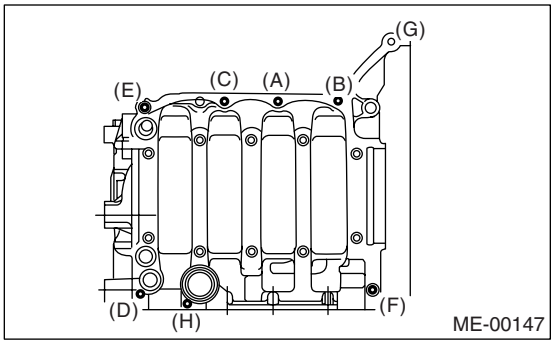


8) Further tighten the RH side bolts (E — J) to 90° in alphabetical sequence.



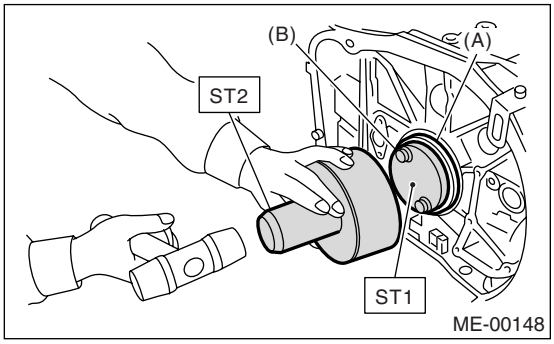
9) Tighten the 8 mm and 6 mm cylinder block connecting bolts in alphabetical sequence shown in the figure.

Tightening torque:
(A) — (G): 25 N·m (2.5 kgf-m, 18.1 ft-lb)
(H): 6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



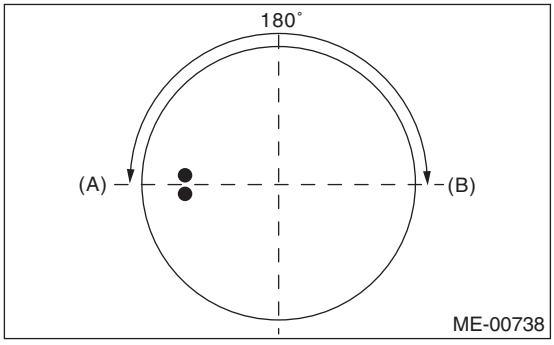
10) Install the rear oil seal using ST1 and ST2.

ST1	499597100	CRANK SHAFT OIL SEAL GUIDE
ST2	499587200	CRANK SHAFT OIL SEAL INSTALLER

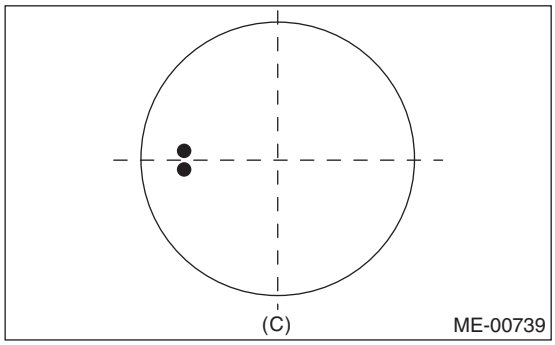


(A) Rear oil seal
(B) Flywheel attaching bolt

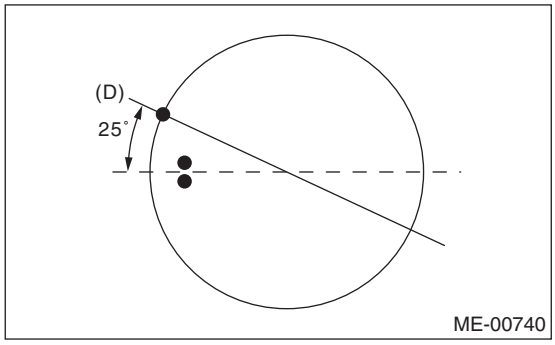
11) Position the top ring gap at (A) or (B) in the figure.
12) Position the second ring gap at 180° on the reverse side for top ring gap.



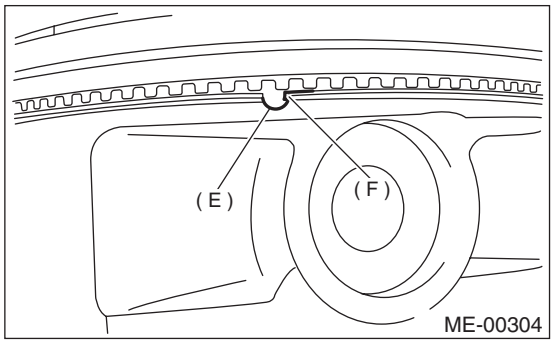
13) Position the expander gap at (C) in the figure.



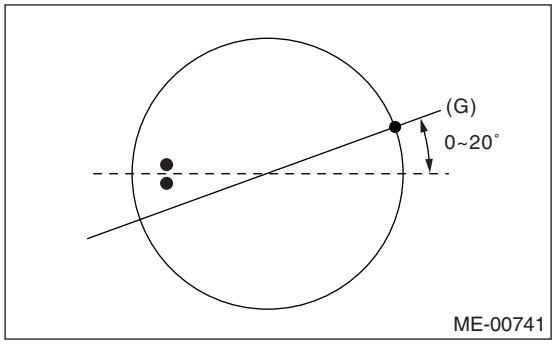
14) Position the lower rail gap at (D) in the figure.



NOTE:
Align the lower rail stopper (F) to the lateral hole (E) on the piston.



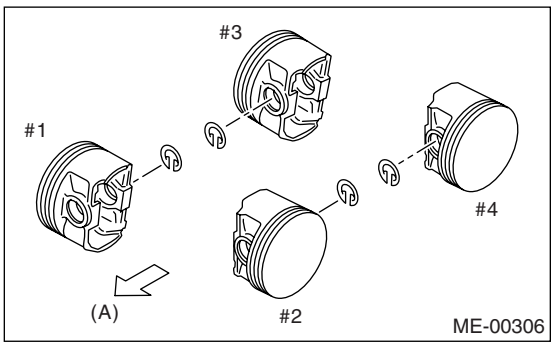
15) Position the upper rail gap at (G) in the figure.



CAUTION:
• Ensure ring gaps do not face the same direction.
• Ensure ring gaps are not within the piston skirt area.

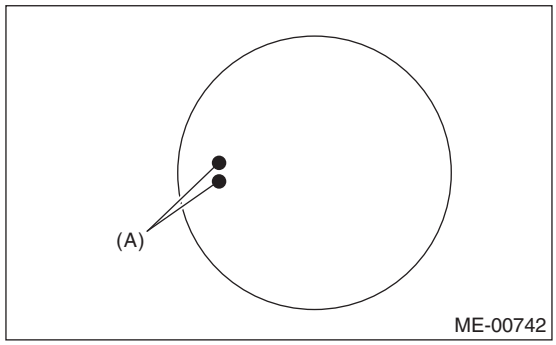
16) Install the circlip.
Install circlips in the piston holes located opposite service holes in cylinder block, when positioning all pistons in the corresponding cylinders.

NOTE:
Use new circlips.

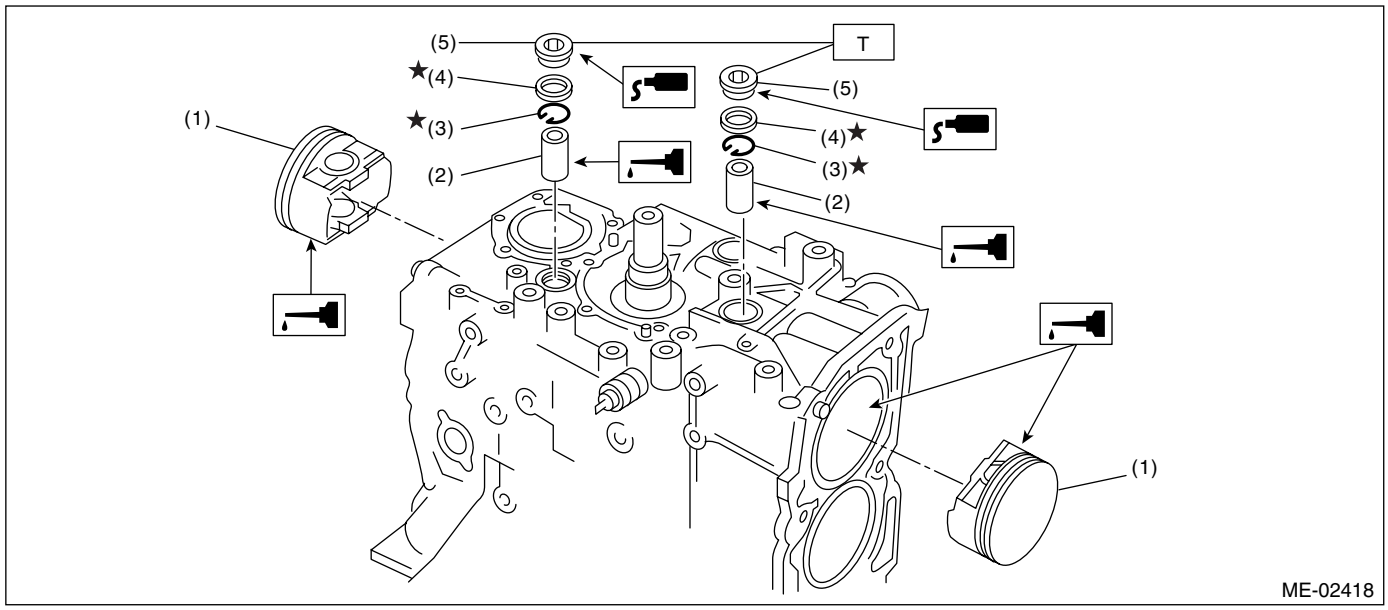


(A) Front side

CAUTION:
Piston front mark faces towards the front of the engine.



(A) Front mark



(1) Piston
(2) Piston pin
(3) Circlip
(4) Gasket
(5) Service hole plug

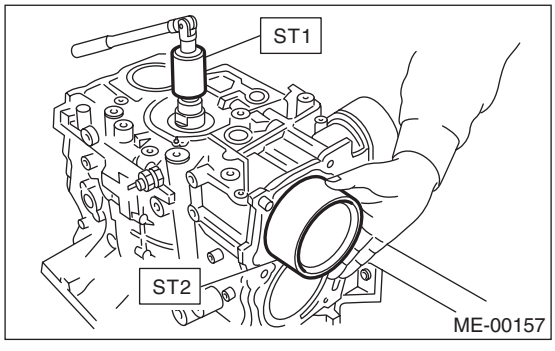
Tightening torque: N·m (kgf-m, ft-lb)
T: 70 (7.1, 50.6)

17) Installing piston
(1) Turn the cylinder block to face the #1 and #2 piston side upward.
(2) Using the ST1, turn the crankshaft so that #1 and #2 connecting rods are set at bottom dead center.

ST1 499987500 CRANKSHAFT SOCKET

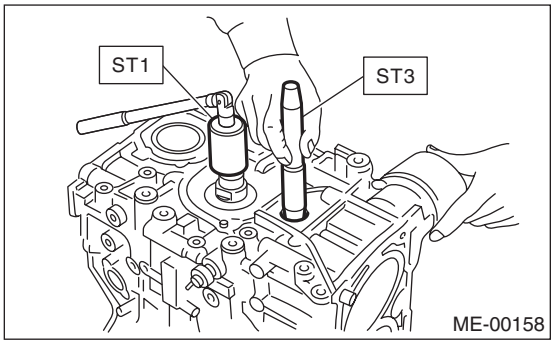
(3) Apply a coat of engine oil to pistons and cylinders, and then insert the pistons in their cylinders using ST2.

ST2 498747000 PISTON GUIDE (1.6 L model)
ST2 398744300 PISTON GUIDE (2.0 L model)
ST2 498747300 PISTON GUIDE (2.5 L model)



18) Installing piston pin
(1) Apply a coat of engine oil to the ST3 before insertion.
(2) Insert the ST3 into service hole to align piston pin hole with connecting rod small end.

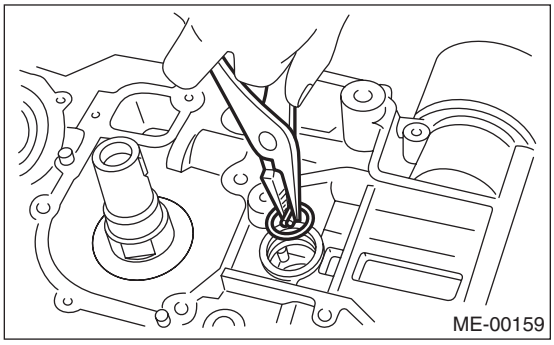
ST3 499017100 PISTON PIN GUIDE



(3) Apply a coat of engine oil to the piston pin, and then insert the piston pin into piston and connecting rod through service hole.
(4) Install the circlip.

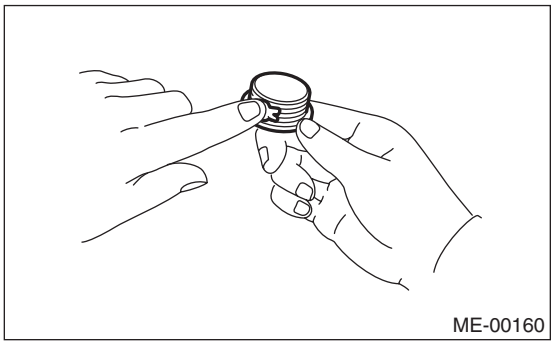
NOTE:
Use new circlips.

ST3 499897200 PISTON CIRCLIP PLIER



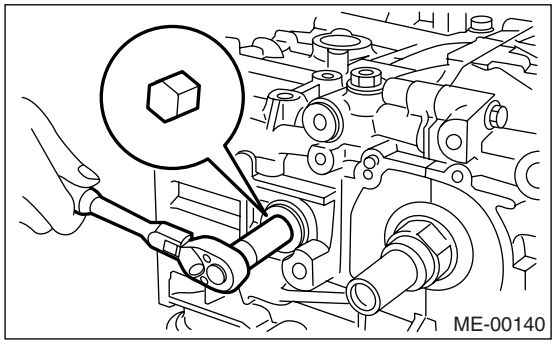
(5) Apply liquid gasket around the service hole plug.

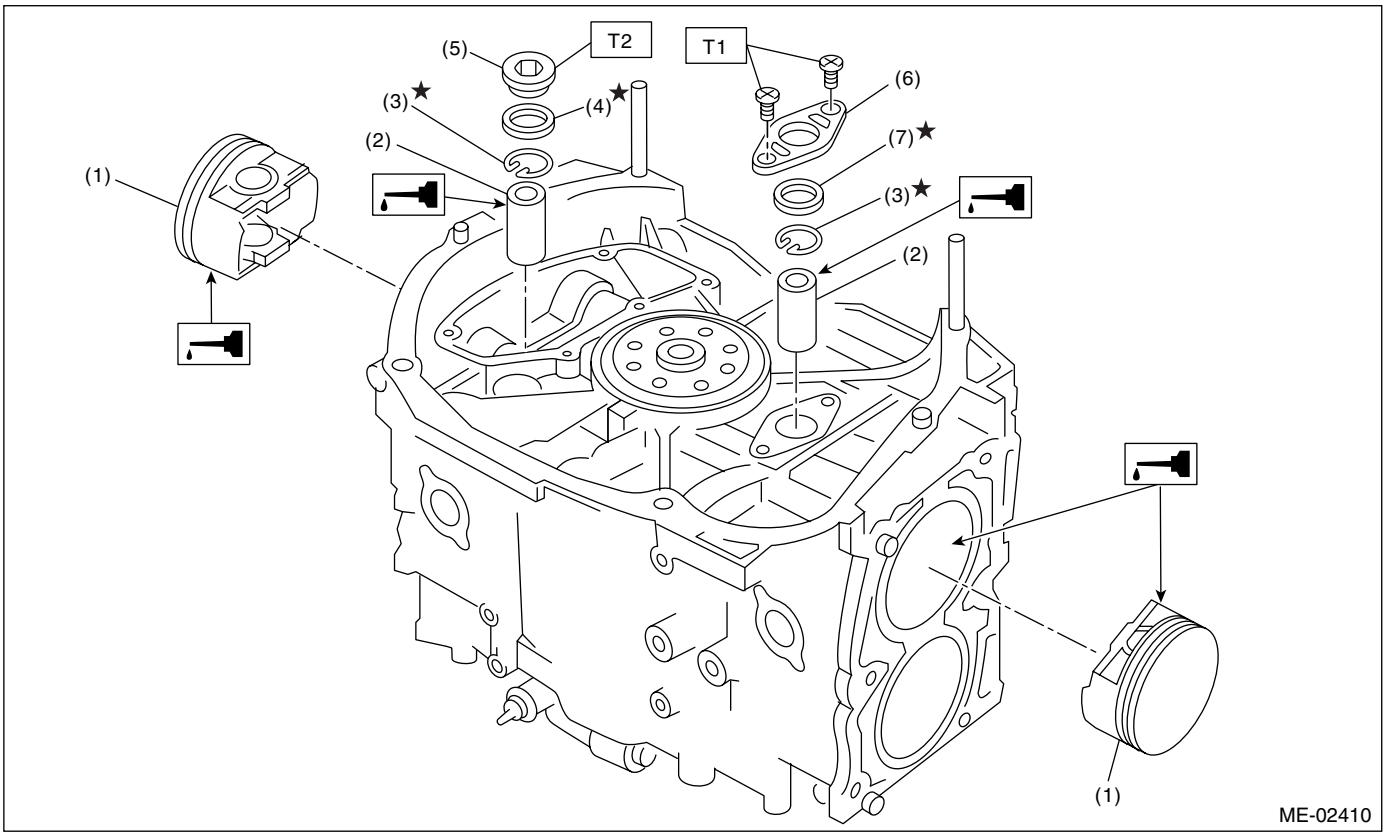
Liquid gasket:
THREE BOND 1215 (Part No. 004403007) or equivalent



(6) Install the service hole plug and gasket.

NOTE:
Use a new gasket.



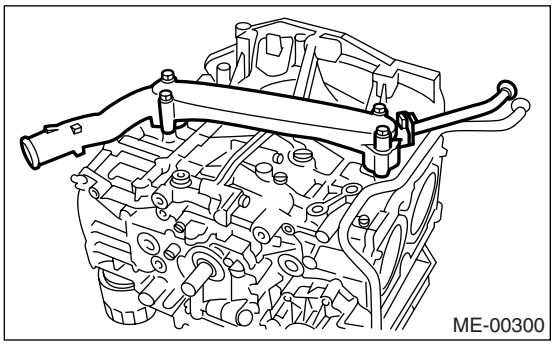


(1) Piston
(2) Piston pin
(3) Circlip
(4) Gasket
(5) Service hole plug
(6) Service hole cover
(7) O-ring

Tightening torque: N·m (kgf-m, ft-lb)
T1: 6.4 (0.65, 4.7)
T2: 70 (7.1, 50.6)

(7) Turn the cylinder block to face the #3 and #4 piston side upward. Using the same procedures as used for #1 and #2 cylinders, install the pistons and piston pins.

19) Install the water pipe.



20) Install the baffle plate.

Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)

21) Install the oil strainer and O-ring.

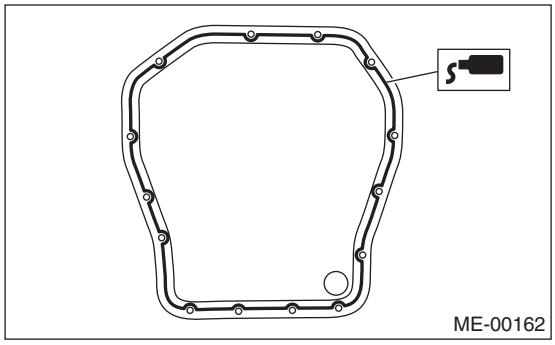
Tightening torque:
10 N·m (1.0 kgf-m, 7.2 ft-lb)

22) Install the oil strainer stay.

23) Apply liquid gasket to the matching surfaces, and then install the oil pan.

Liquid gasket:
THREE BOND 1207C (Part No. 004403012) or equivalent

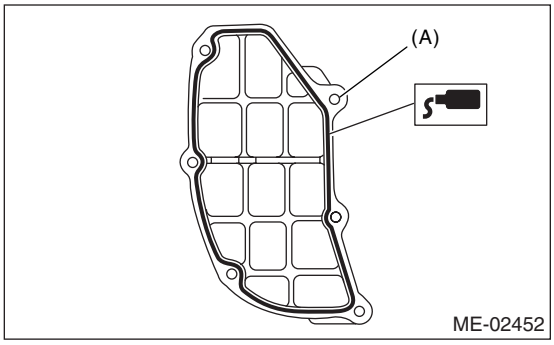
Tightening torque:
5 N·m (0.5 kgf-m, 3.6 ft-lb)



24) Apply liquid gasket to the mating surfaces and the threaded portion of a bolt (A) shown in the figure, and then install the oil separator cover.

Liquid gasket:
THREE BOND 1207C (Part No. 004403012) or equivalent

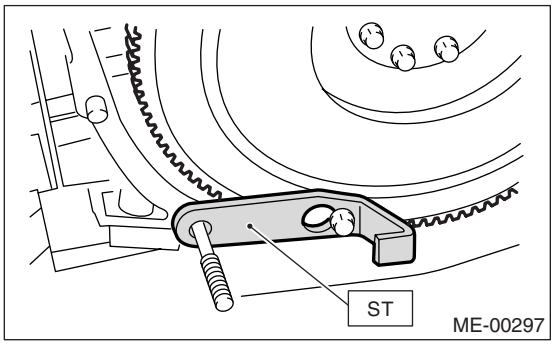
Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



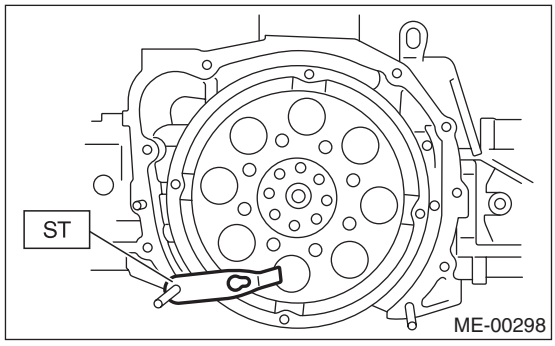
25) Install the flywheel or drive plate.
To lock the crankshaft, use ST.
ST 498497100 CRANKSHAFT STOPPER

Tightening torque:
72 N·m (7.3 kgf-m, 52.8 ft-lb)

- MT model

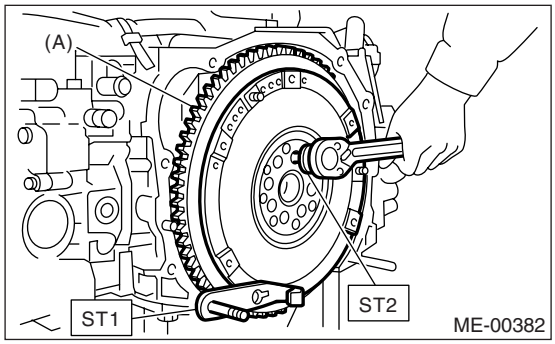


- AT model



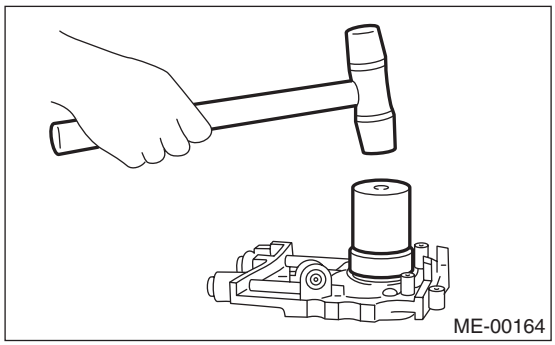
NOTE:
Using STs, remove the flywheel. (2.5 L MT model)

ST1 498497100 CRANKSHAFT STOPPER
ST2 499057000 TORX PLUS®



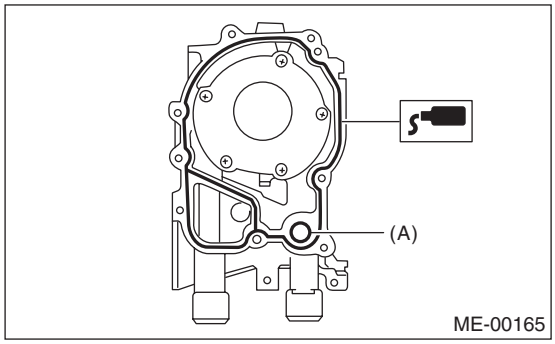
(A) Flywheel

26) Install the housing cover.
27) Installation of oil pump
(1) Discard the front oil seal after removal. Replace with a new one using the ST.
ST 499587100 OIL SEAL INSTALLER



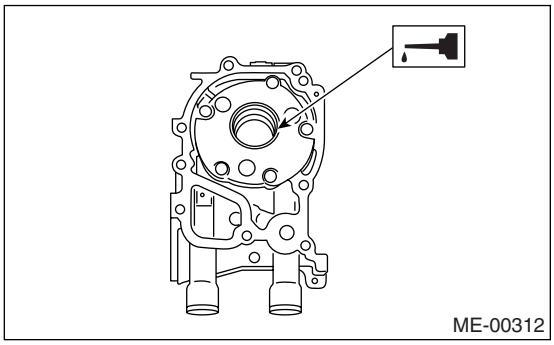
(2) Apply liquid gasket to the matching surface of oil pump.

Liquid gasket:
THREE BOND 1215 (Part No. 004403007) or equivalent



(A) O-ring

(3) Apply a coat of engine oil to the inside of oil seal.



(4) Install the oil pump on cylinder block. Be careful not to damage the oil seal during installation.

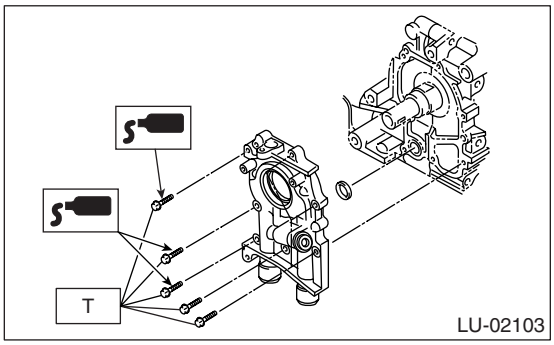
(5) Position the oil pump, aligning the notched area with crankshaft, and push the oil pump straight.

CAUTION:
• Make sure the oil seal lip is not folded.
• Do not forget to install the O-ring and seal when installing the oil pump.

(6) Apply liquid gasket to the threaded portion of three bolts. (If the bolts reusing)

Liquid gasket:
THREE BOND 1324 (Part No. 004403042) or equivalent

Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)

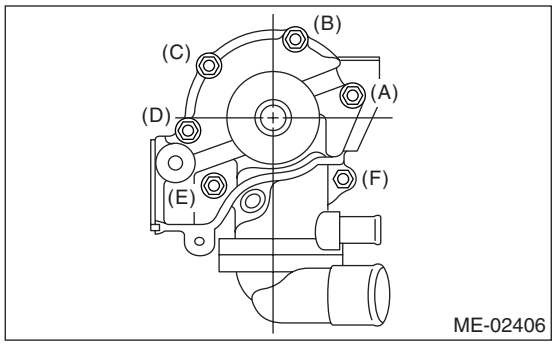


28) Install the water pump and gasket.

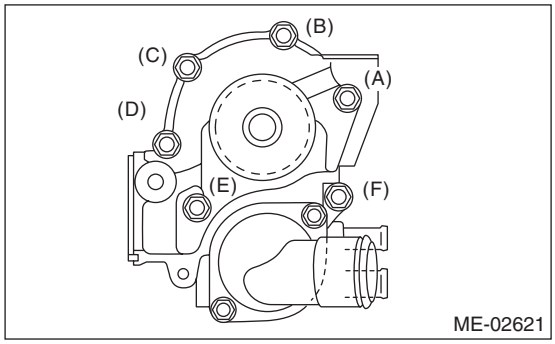
Tightening torque:
First; 12 N·m (1.2 kgf-m, 8.7 ft-lb)
Second; 12 N·m (1.2 kgf-m, 8.7 ft-lb)

CAUTION:
• Be sure to use a new gasket.
• When installing the water pump, tighten the bolts in two stages in alphabetical sequence as shown in the figure.

• Model without ATF warmer



• Model with ATF warmer



29) Install the water by-pass pipe for heater.
30) Install the oil filter using ST.

ST	498547000	OIL FILTER WRENCH (Outer diameter: 80 mm (3.15 in))
ST	18332AA000	OIL FILTER WRENCH (Outer diameter: 68 mm (2.68 in))
ST	18332AA010	OIL FILTER WRENCH (Outer diameter: 65 mm (2.56 in))

NOTE:
Standard oil filter is outer diameter of 80 mm (3.15 in). However, SUBARU genuine oil filter having outer diameter of 68 mm (2.68 in) or 65 mm (2.56 in) can also be used.

Install the oil filter turning it by hand, being careful not to damage the seal rubber.
Tighten more after the seal rubber contacts the cylinder block.
In case of oil filter in outer diameter 80 mm (3.15 in) and 65 mm (2.56 in), tighten by approx. 2/3 to 3/4 turn.
In case of oil filter in outer diameter 68 mm (2.68 in), tighten by approx. one turn.

CAUTION:
Over-tightening may cause oil leak.

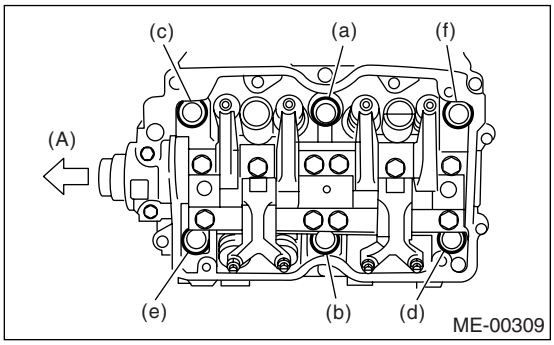
31) Tighten the cylinder head bolts.
(1) Apply a coat of engine oil to the washers and bolt threads.
(2) Tighten all bolts to 29 N·m (3.0 kgf-m, 22 ft-lb) in alphabetical sequence.
Then tighten all bolts to 69 N·m (7.0 kgf-m, 51 ft-lb) in alphabetical sequence.

(3) Back off all bolts by 180° first; back them off by 180° again.
(4) Tighten all bolts in alphabetical sequence to 42 N·m (4.3 kgf-m, 31 ft-lb).
(5) Tighten all bolts by 80° to 90° in alphabetial sequence.
(6) Further tighten all bolts by 40° to 45° in alphabetical sequence.

NOTE:
Do not tighten bolts more than 45°.

(7) Further tighten (a) and (b) bolts by 40° to 45°.

NOTE:
Ensure that the total “re-tightening angle” [in the former two steps], do not exceed 90°.



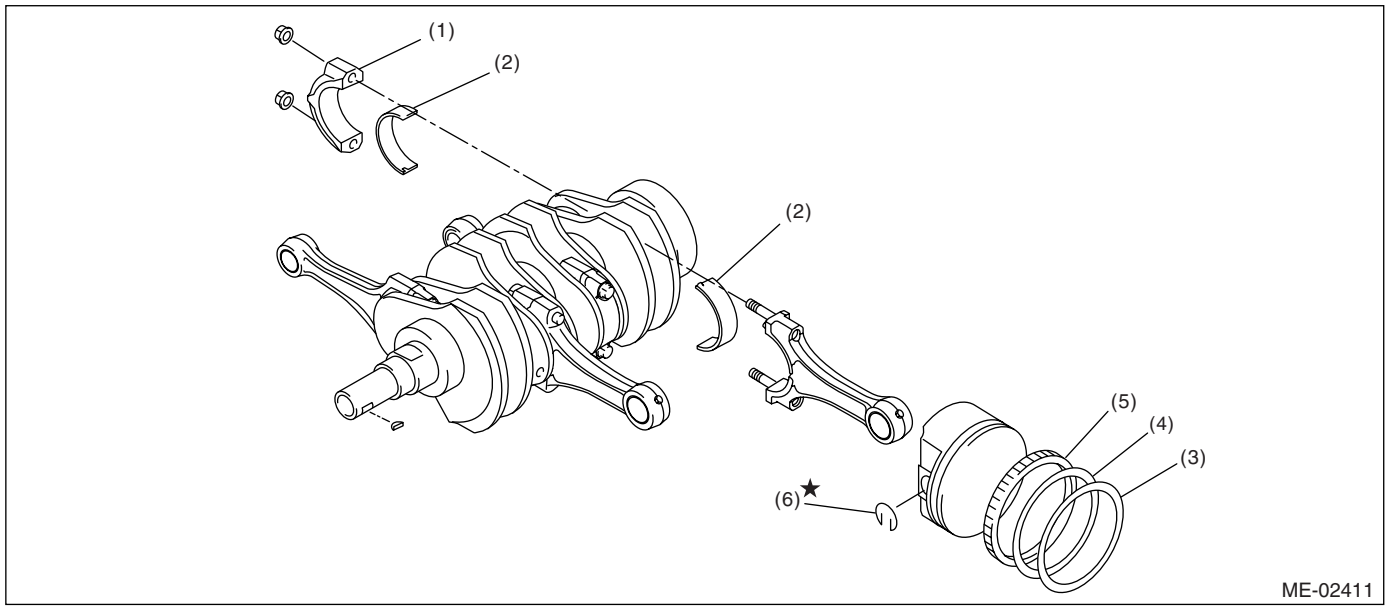
(A) Front

32) Install the oil level gauge guide, and then tighten the attaching bolt (left side only).
33) Install the rocker cover and rocker cover gasket.

NOTE:
Use a new rocker cover gasket.

34) Install the crank sprocket. <Ref. to ME(H4SO)-52, INSTALLATION, Crank Sprocket.>
35) Install the cam sprocket. <Ref. to ME(H4SO)-51, INSTALLATION, Cam Sprocket.>
36) Install the timing belt assembly. <Ref. to ME(H4SO)-47, INSTALLATION, Timing Belt.>
37) Install the timing belt cover. <Ref. to ME(H4SO)-45, INSTALLATION, Timing Belt Cover.>
38) Install the crank pulley. <Ref. to ME(H4SO)-43, INSTALLATION, Crank Pulley.>
39) Install the generator and A/C compressor brackets on cylinder head.
40) Install the V-belt. <Ref. to ME(H4SO)-41, INSTALLATION, V-belt.>
41) Install the intake manifold. <Ref. to FU(H4SO)-18, INSTALLATION, Intake Manifold.> or <Ref. to FU(H4SOw/oOBD)-17, INSTALLATION, Intake Manifold.>

C: DISASSEMBLY



(1) Connecting rod cap
(2) Connecting rod bearing
(3) Top ring
(4) Second ring
(5) Oil ring
(6) Circlip

1) Remove the connecting rod cap.
2) Remove the connecting rod bearing.

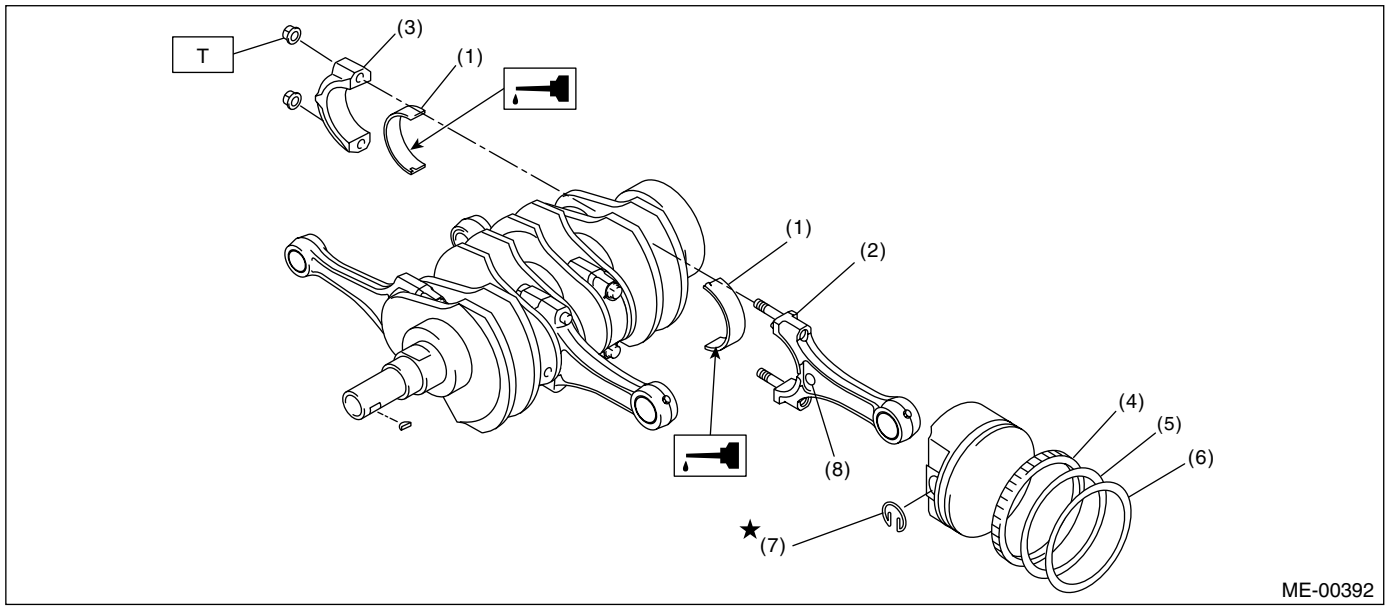
NOTE:
Arrange the removed connecting rod, connecting rod cap and bearing in order to prevent confusion.

3) Remove the piston rings using the piston ring expander.
4) Remove the oil ring by hand.

NOTE:
Arrange the removed piston rings in good order to prevent confusion.

5) Remove the circlip.

D: ASSEMBLY



(1) Connecting rod bearing
(2) Connecting rod
(3) Connecting rod cap
(4) Oil ring
(5) Second ring
(6) Top ring
(7) Circlip
(8) Side mark

Tightening torque: N·m (kgf-m, ft-lb)
T: 45 (4.6, 33)

1) Apply oil to the surfaces of the connecting rod bearings.
2) Install the connecting rod bearings on connecting rods and connecting rod caps.
3) Position each connecting rod with the marked side facing forward, and then install them.
4) Install the connecting rod cap with connecting rod nut.
Ensure the arrow on connecting rod cap faces the front during installation.

CAUTION:
• Each connecting rod has its own mating cap. Make sure that they are assembled correctly by checking their matching number.
• When tightening the connecting rod nuts, apply oil on the threads.

5) Install the expander, lower rail and upper rail in this order by hand. Then install the second ring and top ring using piston ring expander.

E: INSPECTION

1. CYLINDER BLOCK

1) Visually check for cracks and damage. Especially, inspect the important parts by means of liquid penetrant tester.
2) Check the oil passages for clogging.
3) Inspect the crankcase surface that mates with cylinder head for warping by using a straight edge, and correct by grinding if necessary.

Warping limit:
0.025 mm (0.00098 in)

Grinding limit:
0.1 mm (0.004 in)

Standard height of cylinder block:
201.0 mm (7.91 in)

2. CYLINDER AND PISTON

1) The cylinder bore size is stamped on cylinder block's front upper surface.

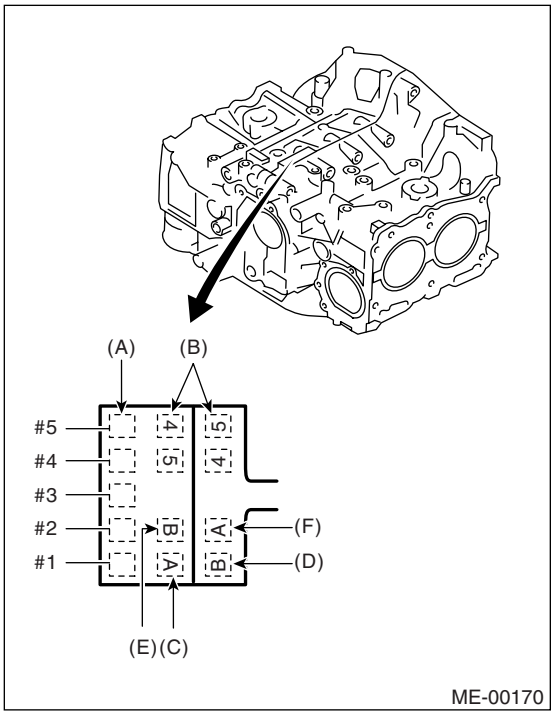
NOTE:
• Measurement should be performed at a temperature 20°C (68°F).
• Standard sized pistons are classified into two grades, "A" and "B". These grades should be used as a guide line in selecting a standard piston.

Standard diameter:

1.6 L model
A: 87.905 — 87.915 mm (3.4608 — 3.4612 in)
B: 87.895 — 87.905 mm (3.4604 — 3.4608 in)

2.0 L model
A: 92.005 — 92.015 mm (3.6222 — 3.6226 in)
B: 91.995 — 92.005 mm (3.6218 — 3.6222 in)

2.5 L model
A: 99.505 — 99.515 mm (3.9175 — 3.9179 in)
B: 99.495 — 99.505 mm (3.9171 — 3.9175 in)



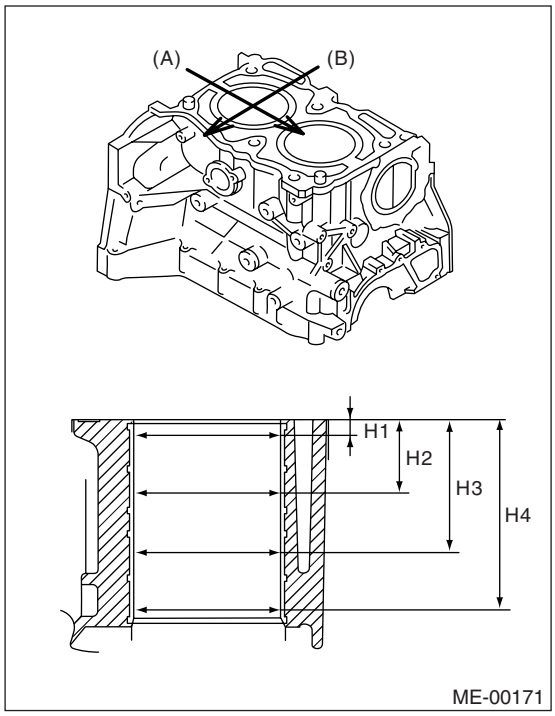
(A) Main journal size mark
(B) Cylinder block RH-LH combination mark
(C) #1 cylinder bore size mark
(D) #2 cylinder bore size mark
(E) #3 cylinder bore size mark
(F) #4 cylinder bore size mark

2) How to measure the inner diameter of each cylinder
Measure the inner diameter of each cylinder in both the thrust and piston pin directions at the heights shown in the figure, using a cylinder bore gauge.

NOTE:
Measurement should be performed at a temperature 20°C (68°F).

Cylindricity:
Standard
0.015 mm (0.0006 in)
Limit
0.050 mm (0.0020 in)

Out-of-roundness:
Standard
0.010 mm (0.0004 in)
Limit
0.050 mm (0.0020 in)



(A) Piston pin direction
(B) Thrust direction
H1 10 mm (0.39 in)
H2 45 mm (1.77 in)
H3 80 mm (3.15 in)
H4 115 mm (4.35 in)

3) When the piston is to be replaced due to general or cylinder wear, determine a suitable sized piston by measuring the piston clearance.
4) How to measure the outer diameter of each piston
Measure the outer diameter of each piston at the height shown in the figure. (Thrust direction)

NOTE:
Measurement should be performed at a temperature of 20°C (68°F).

Piston grade point H:
1.6 L and 2.0 L model
40.0 mm (1.575 in)
2.5 L model
37.0 mm (1.457 in)

Piston outer diameter:

1.6 L model

Standard
A: 87.885 — 87.895 mm (3.4600 — 3.4604 in)
B: 87.875 — 87.885 mm (3.4596 — 3.4600 in)

0.25 mm (0.0098 in) oversize
88.125 — 88.145 mm (3.4695 — 3.4702 in)

0.50 mm (0.0197 in) oversize
88.375 — 88.395 mm (3.4793 — 3.4801 in)

2.0 L model

Standard
A: 91.985 — 91.995 mm (3.6214 — 3.6218 in)
B: 91.975 — 91.985 mm (3.6211 — 3.6214 in)

0.25 mm (0.0098 in) oversize
92.225 — 92.245 mm (3.6309 — 3.6316 in)

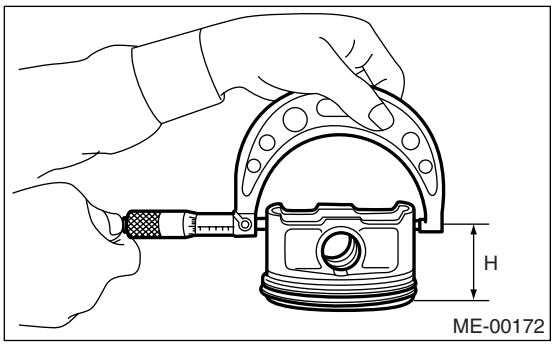
0.50 mm (0.0197 in) oversize
92.475 — 92.495 mm (3.6407 — 3.6415 in)

2.5 L model

Standard
A: 99.485 — 99.495 mm (3.9167 — 3.9171 in)
B: 99.475 — 99.485 mm (3.9163 — 3.9167 in)

0.25 mm (0.0098 in) oversize
99.725 — 99.745 mm (3.9262 — 3.9269 in)

0.50 mm (0.0197 in) oversize
99.975 — 99.995 mm (3.9360 — 3.9368 in)



5) Calculate the clearance between cylinder and piston.

NOTE:
Measurement should be performed at a temperature of 20°C (68°F).

Cylinder to piston clearance at 20°C (68°F):
Standard
0.010 — 0.030 mm (0.0004 — 0.0012 in)
Limit
0.050 mm (0.0020 in)

6) Boring and honing
(1) If the value of cylindricity, out-of-roundness, or cylinder-to-piston clearance measured exceeds the specified limit or if there is any damage on the cylinder wall, reboring it to use an oversize piston.

CAUTION:
When any of the cylinders needs reboring, all other cylinders must be bored at the same time, and use oversize pistons. Do not perform boring on one cylinder only, nor use an oversize piston for one cylinder only.

(2) If the cylinder inner diameter exceeds the limit after boring and honing, replace the crankcase.

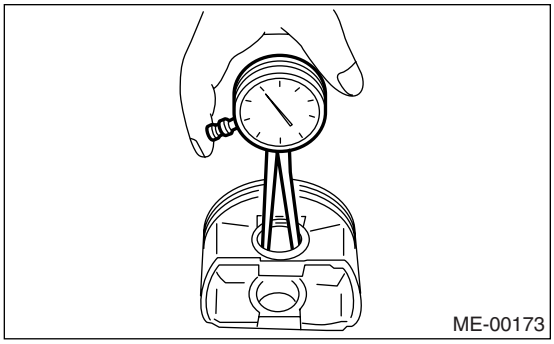
NOTE:
Immediately after reboring, the cylinder diameter may differ from its real diameter due to temperature rise. Thus, pay attention to this when measuring the cylinder diameter.

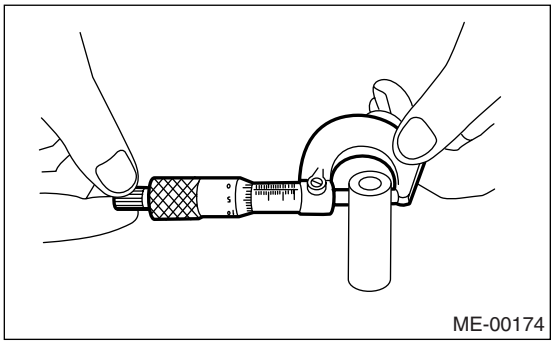
Limit of cylinder enlarging (boring):
0.5 mm (0.020 in)

3. PISTON AND PISTON PIN

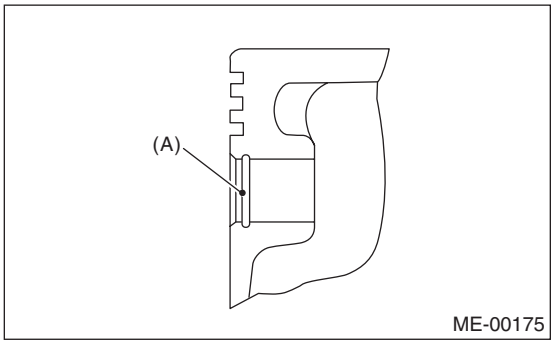
1) Check the pistons and piston pins for damage, cracks, and wear and the piston ring grooves for wear and damage. Replace if defective.
2) Measure the piston-to-cylinder clearance at each cylinder. <Ref. to ME(H4SO)-80, CYLINDER AND PISTON, Cylinder Block.> If any of the clearances is not to specification, replace the piston or bore the cylinder to use an oversize piston.
3) Make the sure that piston pin can be inserted into piston pin hole with a thumb at 20°C (68°F). Replace if defective.

Standard clearance between piston pin and hole in piston:
Standard
0.004 — 0.008 mm (0.0002 — 0.0003 in)
Limit
0.020 mm (0.0008 in)





4) Check the circlip installation groove (A) on piston for burr. If necessary, remove the burr from groove so that piston pin can lightly move.

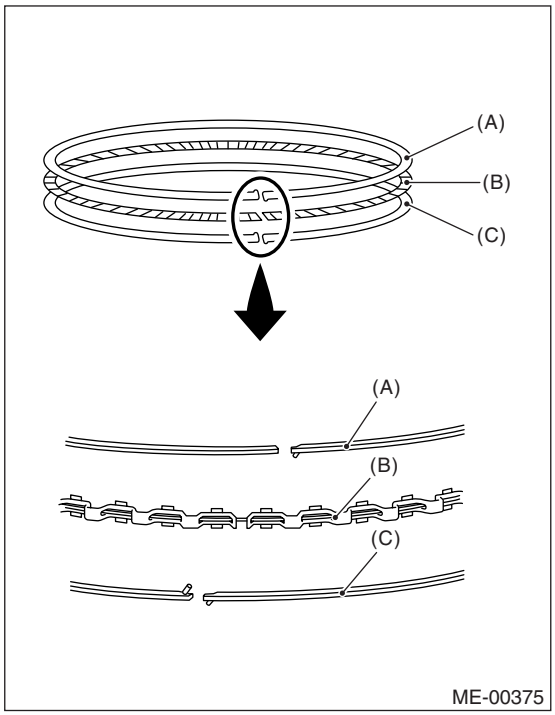


5) Check the piston pin circlip for distortion, cracks and wear.

4. PISTON RING

1) If the piston ring is broken, damaged, or worn, or if its tension is insufficient, or when the piston is replaced, replace the piston ring with a new one of the same size as the piston.

CAUTION:
• Marks are shown on the end of top and second rings. When installing the rings to piston, face these marks upward.
• Oil ring is composed of upper rail, expander and lower rail. Be careful of the rail direction when installing oil ring to the piston.

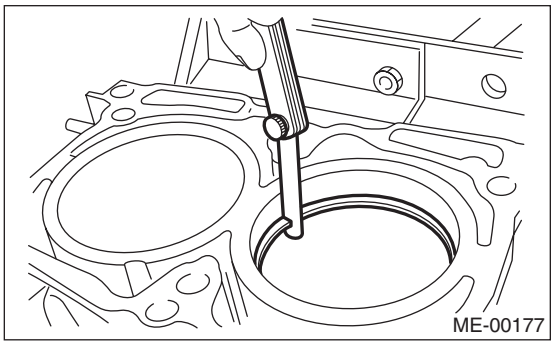


(A) Upper rail
(B) Expander
(C) Lower rail

2) Clean the piston ring groove and piston ring.
3) Squarely place the piston ring and oil ring in cylinder, and then measure the piston ring gap with a thickness gauge.

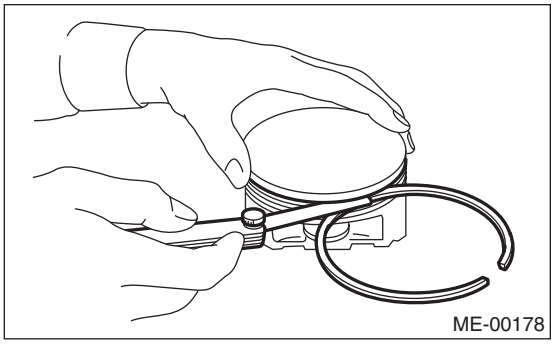
			Unit: mm (in)
		Standard	Limit
Piston ring gap	Top ring	0.20 — 0.35 (0.0079 — 0.0138)	1.0 (0.039)
	Second ring	0.35 — 0.50 (0.0138 — 0.0197) 0.40 — 0.50 (0.0157 — 0.0197)* 0.37 — 0.52 (0.0144 — 0.0203)**	1.0 (0.039)
	Oil ring rail	0.20 — 0.50 (0.0079 — 0.0197)	1.5 (0.059)

*: 2.0 L model
**: 2.5 L model



4) Measure the clearance between piston ring and piston ring groove with a thickness gauge.

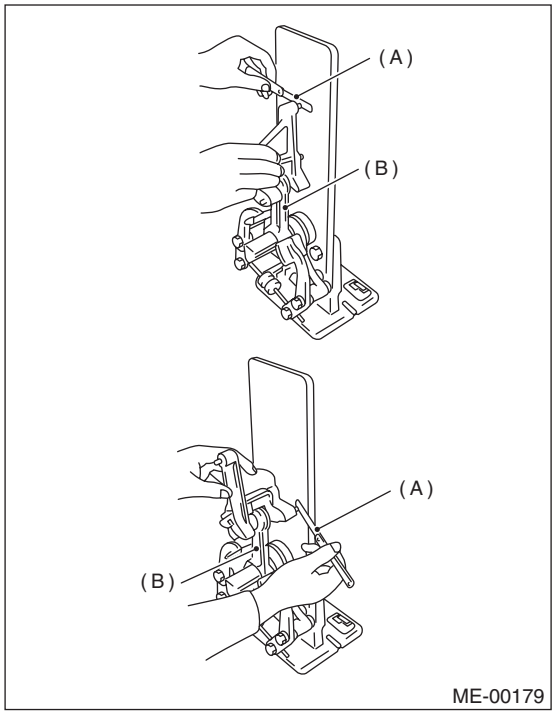
			Unit: mm (in)
		Standard	Limit
Clearance between piston ring and piston ring groove	Top ring	0.040 — 0.080 (0.0016 — 0.0031)	0.15 (0.0059)
	Second ring	0.030 — 0.070 (0.0012 — 0.0028)	0.15 (0.0059)



5. CONNECTING ROD

1) Replace the connecting rod, if the large or small end thrust surface is damaged.
2) Check for bend or twist using a connecting rod aligner. Replace the connecting rod if the bend or twist exceeds the limit.

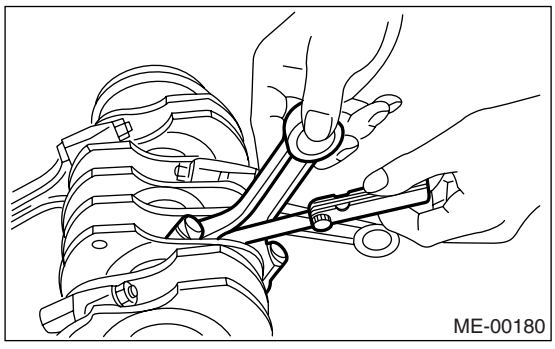
Limit of bend or twist per 100 mm (3.94 in) in length:
0.10 mm (0.0039 in)



(A) Thickness gauge
(B) Connecting rod

3) Install the connecting rod fitted with bearing to crankshaft, and then measure the side clearance (thrust clearance). Replace the connecting rod if the side clearance exceeds the specified limit.

Connecting rod side clearance:
Standard
0.070 — 0.330 mm (0.0028 — 0.0130 in)
Limit
0.4 mm (0.016 in)



4) Inspect the connecting rod bearing for scar, peeling, seizure, melting, wear, etc.
5) Measure the oil clearance on individual connecting rod bearings by means of plastigauge. If any oil clearance is not within specification, replace the defective bearing with a new one of standard size or undersize as necessary. (See the table below.)

Connecting rod oil clearance:

1.6 L model
Standard
0.016 — 0.044 mm (0.00063 — 0.0017 in)
Limit
0.05 mm (0.0020 in)

Unit: mm (in)

Bearing	Bearing size (Thickness at center)	Outer diameter of crank pin
Standard	1.492 — 1.501 (0.0587 — 0.0591)	47.984 — 48.000 (1.8891 — 1.8898)
0.03 (0.0012) undersize	1.510 — 1.513 (0.0594 — 0.0596)	47.954 — 47.970 (1.8879 — 1.8868)
0.05 (0.0020) undersize	1.520 — 1.523 (0.0598 — 0.0600)	47.934 — 47.950 (1.8872 — 1.8878)
0.25 (0.0098) undersize	1.620 — 1.623 (0.0638 — 0.0639)	47.734 — 47.750 (1.8793 — 1.8799)

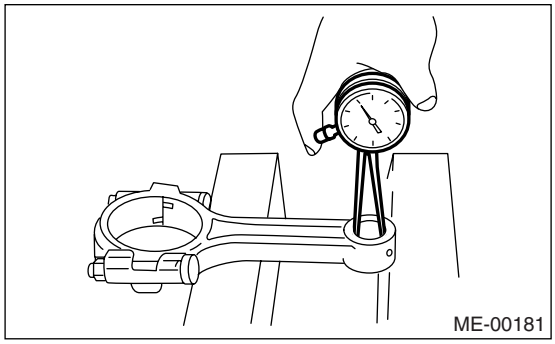
2.0 L, 2.5 L model
Standard
0.016 — 0.044 mm (0.00063 — 0.0017 in)
Limit
0.05 mm (0.0020 in)

Unit: mm (in)

Bearing	Bearing size (Thickness at center)	Outer diameter of crank pin
Standard	1.492 — 1.501 (0.0587 — 0.0591)	51.984 — 52.000 (2.0466 — 2.0472)
0.03 (0.0012) undersize	1.510 — 1.513 (0.0594 — 0.0596)	51.954 — 51.970 (2.0454 — 2.0461)
0.05 (0.0020) undersize	1.520 — 1.523 (0.0598 — 0.0600)	51.934 — 51.950 (2.0446 — 2.0453)
0.25 (0.0098) undersize	1.620 — 1.623 (0.0638 — 0.0639)	51.734 — 51.750 (2.0368 — 2.0374)

6) Inspect the bushing at connecting rod small end, and replace if worn or damaged. Also measure the piston pin clearance at connecting rod small end.

Clearance between piston pin and bushing:
Standard
0 — 0.022 mm (0 — 0.0009 in)
Limit
0.030 mm (0.0012 in)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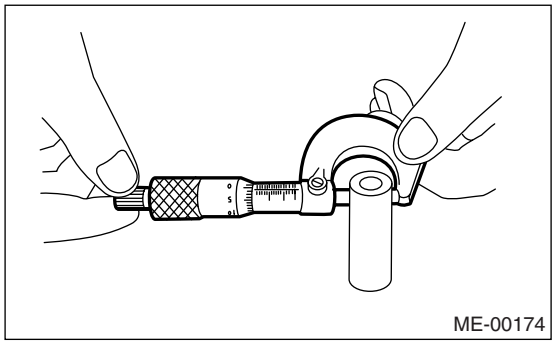
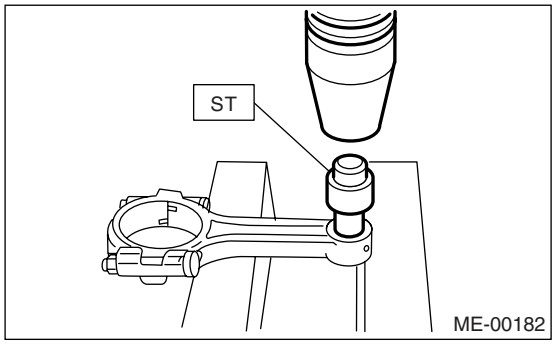

ME-00174

7) Replacement procedure is as follows.
(1) Remove the bushing from connecting rod with ST and press.
(2) Press the bushing with ST after applying oil on the periphery of bushing.

ST 499037100 CONNECTING ROD BUSHING REMOVER AND INSTALLER



ME-00182

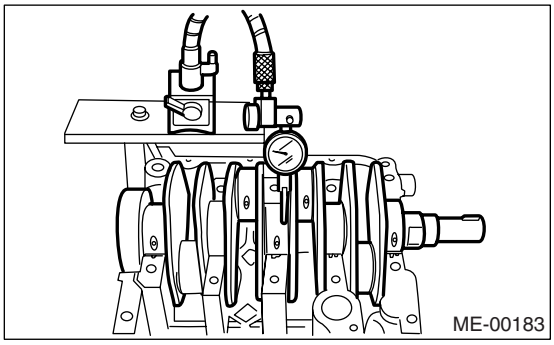
(3) Make two 3 mm (0.12 in) holes in bushing. Ream the inside of bushing.
(4) After the reaming, clean the bushing to remove chips.

6. CRANKSHAFT AND CRANKSHAFT BEARING

1) Clean the crankshaft completely and check for cracks by means of liquid penetrant tester, and replace if defective.
2) Measure the crankshaft bend, and correct or replace if it exceeds the limit.

NOTE:
If a suitable V-block is not available, install the #1 and #5 crankshaft bearing on cylinder block, position the crankshaft on these bearings and measure the crankshaft bend using a dial gauge.

Crankshaft bend limit:
0.035 mm (0.0014 in)



3) Inspect the crank journal and crank pin for wear. If they are not within the specifications, replace the bearing with a suitable (undersize) one, and then replace or recondition the crankshaft as necessary. When grinding the crank journal or crank pin, finish them to specified dimensions according to the undersize bearing to be used.

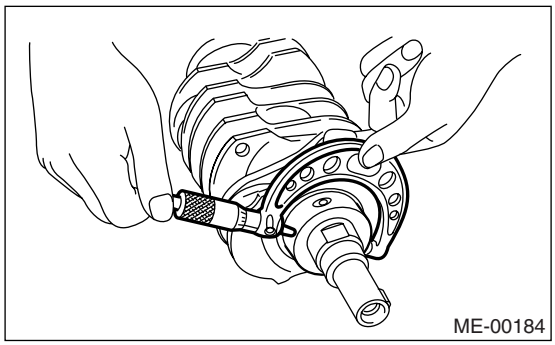
Crank pin:

1.6 L model
Out-of-roundness
0.005 mm (0.0002 in)
Cylindricity
0.006 mm (0.0002 in)
Surface grinding limit (dia.)
To 47.750 mm (1.8799 in)

2.0 L model
Out-of-roundness
0.005 mm (0.0002 in)
Cylindricity
0.006 mm (0.0002 in)
Surface grinding limit (dia.)
To 51.750 mm (2.0374 in)

2.5 L model
Out-of-roundness
0.003 mm (0.0001 in)
Cylindricity
0.004 mm (0.0002 in)
Surface grinding limit (dia.)
To 51.750 mm (2.0374 in)

Crank journal:
Out-of-roundness
0.005 mm (0.0002 in)
Cylindricity
0.006 mm (0.0002 in)
Surface grinding limit (dia.)
To 59.750 mm (2.3524 in)



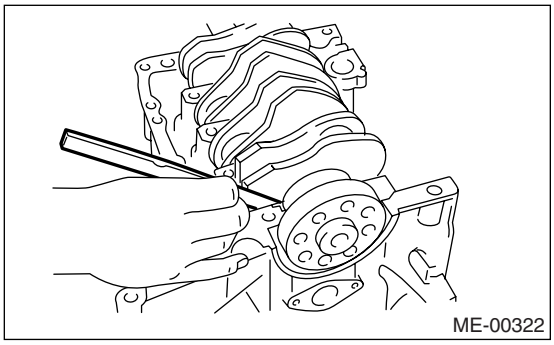
Unit: mm (in)

		Crank journal diameter		Crank pin diameter	
		#1, #3	#2, #4, #5	1.6 L	2.0 L, 2.5 L
Standard	Journal O.D.	59.992 — 60.008 (2.3619 — 2.3625)	59.992 — 60.008 (2.3619 — 2.3625)	47.984 — 48.000 (1.8891 — 1.8898)	51.984 — 52.000 (2.0466 — 2.0472)
	Bearing size (Thickness at center)	1.998 — 2.011 (0.0787 — 0.0792)	2.000 — 2.013 (0.0787 — 0.0793)	1.492 — 1.510 (0.0587 — 0.0594)	1.492 — 1.501 (0.0587 — 0.0591)
0.03 (0.0012) undersize	Journal O.D.	59.962 — 59.978 (2.3607 — 2.3613)	59.962 — 59.978 (2.3607 — 2.3613)	47.954 — 47.970 (1.8879 — 1.8886)	51.954 — 51.970 (2.0454 — 2.0461)
	Bearing size (Thickness at center)	2.017 — 2.020 (0.0794 — 0.0795)	2.019 — 2.022 (0.0795 — 0.0796)	1.510 — 1.513 (0.0594 — 0.0596)	1.510 — 1.513 (0.0594 — 0.0596)
0.05 (0.0020) undersize	Journal O.D.	59.942 — 59.958 (2.3599 — 2.3605)	59.942 — 59.958 (2.3599 — 2.3605)	47.934 — 47.950 (1.8872 — 1.8878)	51.934 — 51.950 (2.0446 — 2.0453)
	Bearing size (Thickness at center)	2.027 — 2.030 (0.0798 — 0.0799)	2.029 — 2.032 (0.0799 — 0.0800)	1.520 — 1.523 (0.0598 — 0.0600)	1.520 — 1.523 (0.0598 — 0.0600)
0.25 (0.0098) undersize	Journal O.D.	59.742 — 59.758 (2.3520 — 2.3527)	59.742 — 59.758 (2.3520 — 2.3527)	47.734 — 47.750 (1.8793 — 1.8799)	51.734 — 51.750 (2.0368 — 2.0374)
	Bearing size (Thickness at center)	2.127 — 2.130 (0.0837 — 0.0839)	2.129 — 2.132 (0.0838 — 0.0839)	1.620 — 1.623 (0.0638 — 0.0639)	1.620 — 1.623 (0.0638 — 0.0639)

O.D.: Outer Diameter

4) Measure the thrust clearance of crankshaft at center bearing. If the clearance exceeds the limit, replace bearing.

Crankshaft thrust clearance:
Standard
0.030 — 0.115 mm (0.0012 — 0.0045 in)
Limit
0.25 mm (0.0098 in)


ME-00322

5) Inspect the individual crankshaft bearings for signs of flaking, seizure, melting, and wear.

6) Measure the oil clearance on each crankshaft bearing by means of plastigauge. If the measurement is not within the standard, replace the defective bearing with an undersize one, and then replace or recondition the crankshaft as necessary.

Crankshaft oil clearance:
Standard
0.010 — 0.030 mm (0.0004 — 0.0012 in)
Limit
0.040 mm (0.0016 in)

22.Engine Trouble in General

A: INSPECTION

NOTE:
“RANK” shown in the chart refer to the possibility of reason for the trouble in order (“Very often” to “Rarely”)
A — Very often
B — Sometimes
C — Rarely

TROUBLE	PROBLEM PARTS, ETC.	POSSIBLE CAUSE	RANK
1. Engine will not start.			
1) Starter does not turn.	Starter	Defective battery-to-starter harness	B
		Defective starter switch	C
		Defective inhibitor switch or neutral switch	C
		Defective starter	B
	Battery	Poor terminal connection	A
		Run-down battery	A
		Defective charging system	B
	Friction	Seizure of crankshaft and connecting rod bearing	C
		Seized camshaft	C
		Seized or stuck piston and cylinder	C
2) Initial combustion does not occur.	Starter	Defective starter	C
	Engine control system <Ref. to EN(H4SO)(diag)-2, Basic Diagnostic Procedure.> or <Ref. to EN(H4SOw/oOBD)(diag)-2, Basic Diagnostic Procedure.>		A
	Fuel line	Defective fuel pump and relay	A
		Lack of or insufficient fuel	B
	Belt	Defective	B
		Defective timing	B
	Compression	Incorrect valve clearance	C
		Loosened spark plugs or defective gasket	C
		Loosened cylinder head bolts or defective gasket	C
		Improper valve sealing	C
		Defective valve stem	C
		Worn or broken valve spring	B
		Worn or stuck piston rings, cylinder and piston	C
		Incorrect valve timing	B
		Improper engine oil (low viscosity)	B

TROUBLE	PROBLEM PARTS, ETC.	POSSIBLE CAUSE	RANK
3) Initial combustion occurs.	Engine control system <Ref. to EN(H4SO)(diag)-2, Basic Diagnostic Procedure.> or <Ref. to EN(H4SOw/oOBD)(diag)-2, Basic Diagnostic Procedure.>		A
	Intake system	Defective intake manifold gasket	B
		Defective throttle body gasket	B
	Fuel line	Defective fuel pump and relay	C
		Clogged fuel line	C
		Lack of or insufficient fuel	B
	Belt	Defective	B
		Defective timing	B
	Compression	Incorrect valve clearance	C
		Loosened spark plugs or defective gasket	C
		Loosened cylinder head bolts or defective gasket	C
		Improper valve sealing	C
		Defective valve stem	C
		Worn or broken valve spring	B
		Worn or stuck piston rings, cylinder and piston	C
		Incorrect valve timing	B
		Improper engine oil (low viscosity)	B
4) Engine stalls after initial combustion.	Engine control system <Ref. to EN(H4SO)(diag)-2, Basic Diagnostic Procedure.> or <Ref. to EN(H4SOw/oOBD)(diag)-2, Basic Diagnostic Procedure.>		A
	Intake system	Loosened or cracked intake duct	B
		Loosened or cracked PCV hose	C
		Loosened or cracked vacuum hose	C
		Defective intake manifold gasket	B
		Defective throttle body gasket	B
		Dirty air cleaner element	C
	Fuel line	Clogged fuel line	C
		Lack of or insufficient fuel	B
	Belt	Defective	B
		Defective timing	B
	Compression	Incorrect valve clearance	C
		Loosened spark plugs or defective gasket	C
		Loosened cylinder head bolts or defective gasket	C
		Improper valve sealing	C
		Defective valve stem	C
		Worn or broken valve spring	B
		Worn or stuck piston rings, cylinder and piston	C
		Incorrect valve timing	B
		Improper engine oil (low viscosity)	B

TROUBLE	PROBLEM PARTS, ETC.	POSSIBLE CAUSE	RANK
2. Rough idle and engine stall	Engine control system <Ref. to EN(H4SO)(diag)-2, Basic Diagnostic Procedure.> or <Ref. to EN(H4SOw/oOBD)(diag)-2, Basic Diagnostic Procedure.>		A
	Intake system	Loosened or cracked intake duct	A
		Loosened or cracked PCV hose	A
		Loosened or cracked vacuum hose	A
		Defective intake manifold gasket	B
		Defective throttle body gasket	B
		Defective PCV valve	C
		Loosened oil filler cap	B
		Dirty air cleaner element	C
	Fuel line	Defective fuel pump and relay	C
		Clogged fuel line	C
		Lack of or insufficient fuel	B
	Belt	Defective timing	C
	Compression	Incorrect valve clearance	B
		Loosened spark plugs or defective gasket	B
		Loosened cylinder head bolts or defective gasket	B
		Improper valve sealing	B
		Defective valve stem	C
		Worn or broken valve spring	B
		Worn or stuck piston rings, cylinder and piston	B
		Incorrect valve timing	A
		Improper engine oil (low viscosity)	B
	Lubrication system	Incorrect oil pressure	B
		Defective rocker cover gasket	C
	Cooling system	Overheating	C
	Others	Malfunction of evaporative emission control system	A
		Stuck or damaged throttle valve	B
		Accelerator cable out of adjustment	C

TROUBLE	PROBLEM PARTS, ETC.	POSSIBLE CAUSE	RANK
3. Low output, hesitation and poor acceleration	Engine control system <Ref. to EN(H4SO)(diag)-2, Basic Diagnostic Procedure.> or <Ref. to EN(H4SOw/oOBD)(diag)-2, Basic Diagnostic Procedure.>		A
	Intake system	Loosened or cracked intake duct	A
		Loosened or cracked PCV hose	A
		Loosened or cracked vacuum hose	B
		Defective intake manifold gasket	B
		Defective throttle body gasket	B
		Defective PCV valve	B
		Loosened oil filler cap	B
		Dirty air cleaner element	A
	Fuel line	Defective fuel pump and relay	B
		Clogged fuel line	B
		Lack of or insufficient fuel	C
	Belt	Defective timing	B
	Compression	Incorrect valve clearance	B
		Loosened spark plugs or defective gasket	B
		Loosened cylinder head bolts or defective gasket	B
		Improper valve sealing	B
		Defective valve stem	C
		Worn or broken valve spring	B
		Worn or stuck piston rings, cylinder and piston	C
		Incorrect valve timing	A
		Improper engine oil (low viscosity)	B
	Lubrication system	Incorrect oil pressure	B
	Cooling system	Overheating	C
		Over cooling	C
	Others	Malfunction of evaporative emission control system	A
4. Surging	Engine control system <Ref. to EN(H4SO)(diag)-2, Basic Diagnostic Procedure.> or <Ref. to EN(H4SOw/oOBD)(diag)-2, Basic Diagnostic Procedure.>		A
	Intake system	Loosened or cracked intake duct	A
		Loosened or cracked PCV hose	A
		Loosened or cracked vacuum hose	A
		Defective intake manifold gasket	B
		Defective throttle body gasket	B
		Defective PCV valve	B
		Loosened oil filler cap	B
		Dirty air cleaner element	B
	Fuel line	Defective fuel pump and relay	B
		Clogged fuel line	B
		Lack of or insufficient fuel	C
	Belt	Defective timing	B
	Compression	Incorrect valve clearance	B
		Loosened spark plugs or defective gasket	C
		Loosened cylinder head bolts or defective gasket	C
		Improper valve sealing	C
		Defective valve stem	C
		Worn or broken valve spring	C
		Worn or stuck piston rings, cylinder and piston	C
		Incorrect valve timing	A
		Improper engine oil (low viscosity)	B
	Cooling system	Overheating	B
	Others	Malfunction of evaporative emission control system	C

TROUBLE	PROBLEM PARTS, ETC.	POSSIBLE CAUSE	RANK
5. Engine does not return to idle.	Engine control system <Ref. to EN(H4SO)(diag)-2, Basic Diagnostic Procedure.> or <Ref. to EN(H4SOw/oOBD)(diag)-2, Basic Diagnostic Procedure.>		A
	Intake system	Loosened or cracked vacuum hose	A
	Others	Stuck or damaged throttle valve	A
		Accelerator cable out of adjustment	B
6. Dieseling (Run-on)	Engine control system <Ref. to EN(H4SO)(diag)-2, Basic Diagnostic Procedure.> or <Ref. to EN(H4SOw/oOBD)(diag)-2, Basic Diagnostic Procedure.>		A
	Cooling system	Overheating	B
	Others	Malfunction of evaporative emission control system	B
7. After burning in exhaust system	Engine control system <Ref. to EN(H4SO)(diag)-2, Basic Diagnostic Procedure.> or <Ref. to EN(H4SOw/oOBD)(diag)-2, Basic Diagnostic Procedure.>		A
	Intake system	Loosened or cracked intake duct	C
		Loosened or cracked PCV hose	C
		Loosened or cracked vacuum hose	B
		Defective PCV valve	B
		Loosened oil filler cap	C
	Belt	Defective timing	B
	Compression	Incorrect valve clearance	B
		Loosened spark plugs or defective gasket	C
		Loosened cylinder head bolts or defective gasket	C
		Improper valve sealing	B
		Defective valve stem	C
		Worn or broken valve spring	C
		Worn or stuck piston rings, cylinder and piston	C
		Incorrect valve timing	A
	Lubrication system	Incorrect oil pressure	C
	Cooling system	Over cooling	C
	Others	Malfunction of evaporative emission control system	C
8. Knocking	Engine control system <Ref. to EN(H4SO)(diag)-2, Basic Diagnostic Procedure.> or <Ref. to EN(H4SOw/oOBD)(diag)-2, Basic Diagnostic Procedure.>		A
	Intake system	Loosened oil filler cap	B
	Belt	Defective timing	B
	Compression	Incorrect valve clearance	C
		Incorrect valve timing	B
	Cooling system	Overheating	A
9. Excessive engine oil consumption	Intake system	Loosened or cracked PCV hose	A
		Defective PCV valve	B
		Loosened oil filler cap	C
	Compression	Defective valve stem	A
		Worn or stuck piston rings, cylinder and piston	A
	Lubrication system	Loosened oil pump attaching bolts and defective gasket	B
		Defective oil filter seal	B
		Defective crankshaft oil seal	B
		Defective rocker cover gasket	B
		Loosened oil drain plug or defective gasket	B
		Loosened oil pan fitting bolts or defective oil pan	B

TROUBLE	PROBLEM PARTS, ETC.	POSSIBLE CAUSE	RANK
10. Excessive fuel consumption	Engine control system <Ref. to EN(H4SO)(diag)-2, Basic Diagnostic Procedure.> or <Ref. to EN(H4SOw/oOBD)(diag)-2, Basic Diagnostic Procedure.>		A
	Intake system	Dirty air cleaner element	A
	Belt	Defective timing	B
	Compression	Incorrect valve clearance	B
		Loosened spark plugs or defective gasket	C
		Loosened cylinder head bolts or defective gasket	C
		Improper valve sealing	B
		Defective valve stem	C
		Worn or broken valve spring	C
		Worn or stuck piston rings, cylinder and piston	B
		Incorrect valve timing	B
	Lubrication system	Incorrect oil pressure	C
	Cooling system	Over cooling	C
	Others	Accelerator cable out of adjustment	B

23.Engine Noise

A: INSPECTION

Type of sound	Condition	Possible cause
Regular clicking sound	Sound increases as engine speed increases.	• Valve mechanism is defective. • Incorrect valve clearance • Worn valve rocker • Worn camshaft • Broken valve spring
Heavy and dull clank	Oil pressure is low.	• Worn crankshaft main bearing • Worn connecting rod bearing (big end)
	Oil pressure is normal.	• Loose flywheel mounting bolts • Damaged engine mounting
High-pitched clank (Spark knock)	Sound is noticeable when accelerating with an overload.	• Ignition timing advanced • Accumulation of carbon inside combustion chamber • Wrong spark plug • Improper gasoline
Clank when engine speed is medium (1,000 to 2,000 rpm).	Sound is reduced when fuel injector connector of noisy cylinder is disconnected. (NOTE*)	• Worn crankshaft main bearing • Worn bearing at crankshaft end of connecting rod
Knocking sound when engine is operating under idling speed and engine is warm	Sound is reduced when fuel injector connector of noisy cylinder is disconnected. (NOTE*)	• Worn cylinder liner and piston ring • Broken or stuck piston ring • Worn piston pin and hole at piston end of connecting rod
	Sound is not reduced if each fuel injector connector is disconnected in turn. (NOTE*)	• Worn cam sprocket • Worn camshaft journal bore in cylinder head ASSY
Squeaky sound	—	• Insufficient generator lubrication
Rubbing sound	—	• Defective generator brush and rotor contact
Gear scream when starting engine	—	• Defective ignition starter switch • Worn gear and starter pinion
Sound like polishing glass with a dry cloth	—	• Loose drive belt • Defective water pump shaft
Hissing sound	—	• Loss of compression • Air leakage in air intake system, hoses, connections or manifolds
Timing belt noise	—	• Loose timing belt • Belt contacting case/adjacent part
Valve tappet noise	—	• Incorrect valve clearance

NOTE*:
When disconnecting the fuel injector connector, Malfunction Indicator Light illuminates and DTC is stored in ECM memory. Therefore, carry out the CLEAR MEMORY MODE <Ref. to EN(H4SO)(diag)-44, OPERATION, Clear Memory Mode.> or <Ref. to EN(H4SOw/oOBD)(diag)-27, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4SO)(diag)-37, PROCEDURE, Inspection Mode.> or <Ref. to EN(H4SOw/oOBD)(diag)-25, PROCEDURE, Inspection Mode.> after connecting fuel injector connector.

EXHAUST

EX(H4SO)

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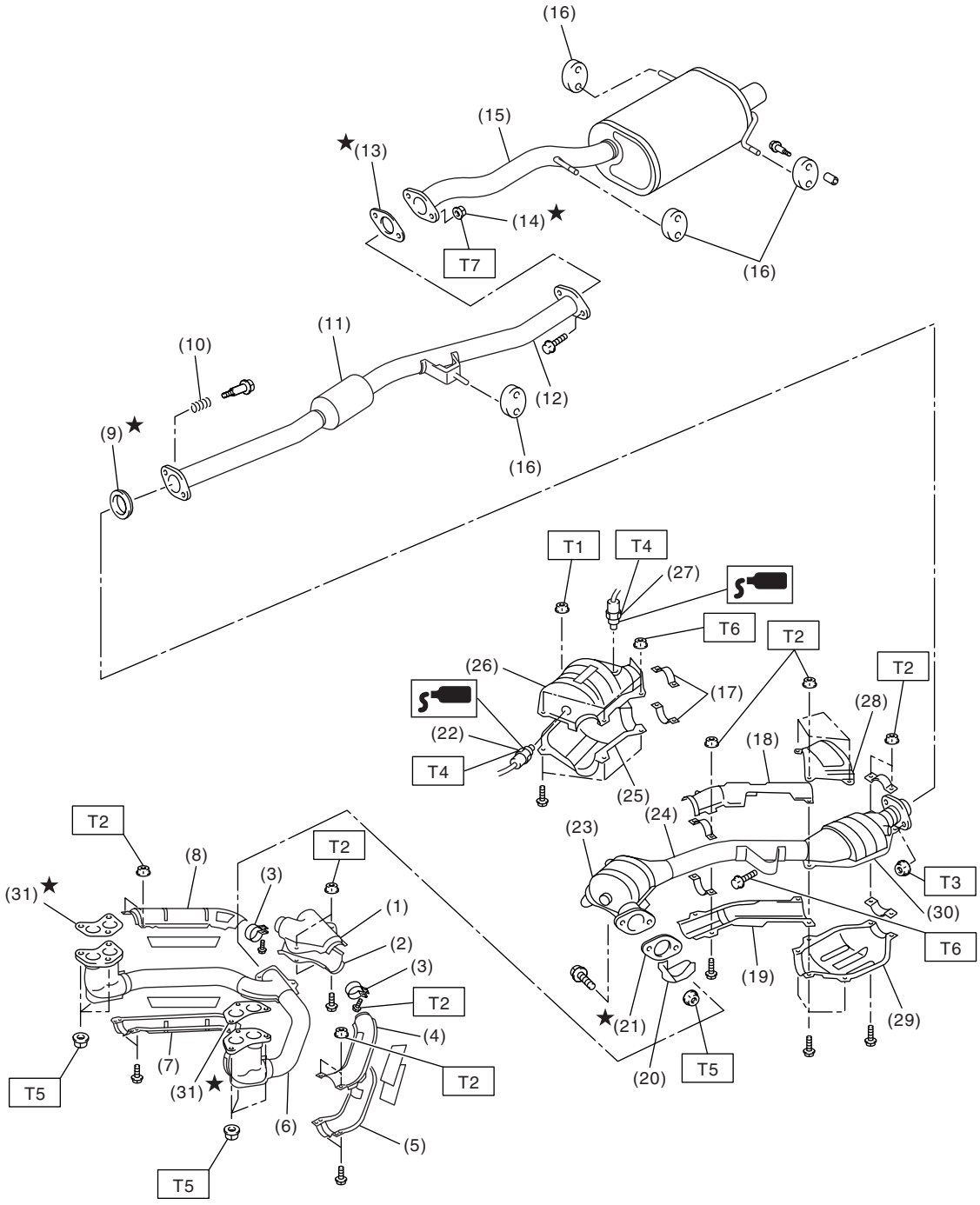
4. Rear Exhaust Pipe 10
5. Muffler 12

1. General Description

A: COMPONENT

1. 1.6 L

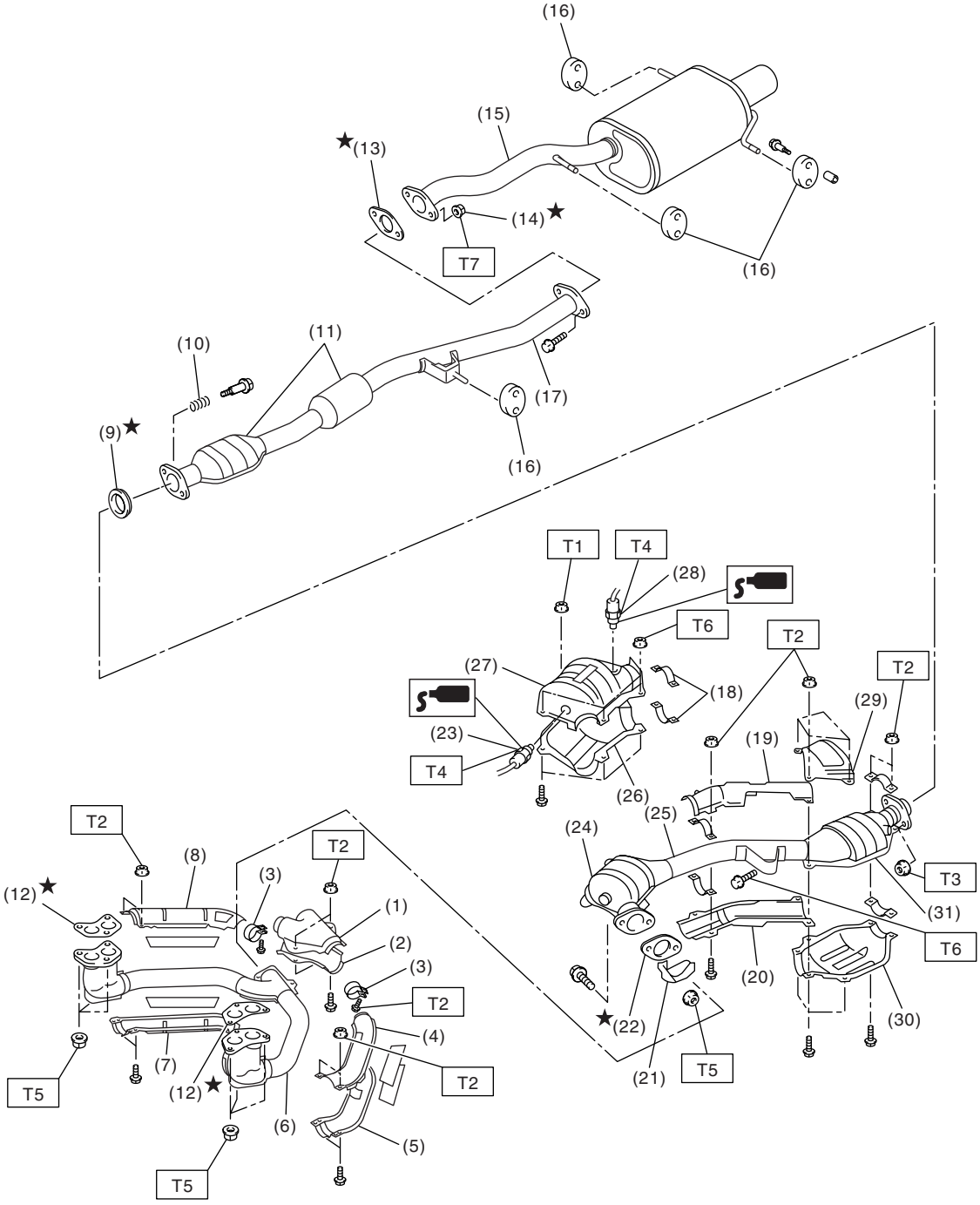


EX-02096

(1) Front exhaust pipe upper cover
(2) Front exhaust pipe lower cover
(3) Clamp
(4) Front exhaust pipe upper cover LH
(5) Front exhaust pipe lower cover LH
(6) Front exhaust pipe
(7) Front exhaust pipe lower cover RH
(8) Front exhaust pipe upper cover RH
(9) Gasket
(10) Spring
(11) Chamber
(12) Rear exhaust pipe
(13) Gasket
(14) Self-locking nut
(15) Muffler
(16) Cushion rubber
(17) Clamp
(18) Center exhaust pipe upper cover
(19) Center exhaust pipe lower cover
(20) Protector
(21) Gasket
(22) Front oxygen (A/F) sensor
(23) Front catalytic converter
(24) Center exhaust pipe
(25) Front catalytic converter lower cover
(26) Front catalytic converter upper cover
(27) Rear oxygen sensor
(28) Rear catalytic converter upper cover
(29) Rear catalytic converter lower cover
(30) Rear catalytic converter
(31) Gasket

Tightening torque: N·m (kgf-m, ft-lb)
T1: 8 (0.8, 5.8)
T2: 13 (1.3, 9.4)
T3: 18 (1.8, 13.0)
T4: 21 (2.1, 15.2)
T5: 30 (3.1, 22.1)
T6: 35 (3.6, 26.0)
T7: 48 (4.9, 35.4)

2. 2.0 L



EX-02111

(1) Front exhaust pipe upper cover
(2) Front exhaust pipe lower cover
(3) Clamp
(4) Front exhaust pipe upper cover LH
(5) Front exhaust pipe lower cover LH
(6) Front exhaust pipe
(7) Front exhaust pipe lower cover RH
(8) Front exhaust pipe upper cover RH
(9) Gasket
(10) Spring
(11) Chamber
(12) Gasket
(13) Gasket
(14) Self-locking nut
(15) Muffler
(16) Cushion rubber
(17) Rear exhaust pipe
(18) Clamp
(19) Center exhaust pipe upper cover
(20) Center exhaust pipe lower cover
(21) Protector
(22) Gasket
(23) Front oxygen (A/F) sensor
(24) Front catalytic converter
(25) Center exhaust pipe
(26) Front catalytic converter lower cover
(27) Front catalytic converter upper cover
(28) Rear oxygen sensor
(29) Rear catalytic converter upper cover
(30) Rear catalytic converter lower cover
(31) Rear catalytic converter

Tightening torque: N·m (kgf-m, ft-lb)	
T1:	***8 (0.8, 5.8)***
T2:	***13 (1.3, 9.4)***
T3:	***18 (1.8, 13.0)***
T4:	***21 (2.1, 15.2)***
T5:	***30 (3.1, 22.1)***
T6:	***35 (3.6, 26.0)***
T7:	***48 (4.9, 35.4)***

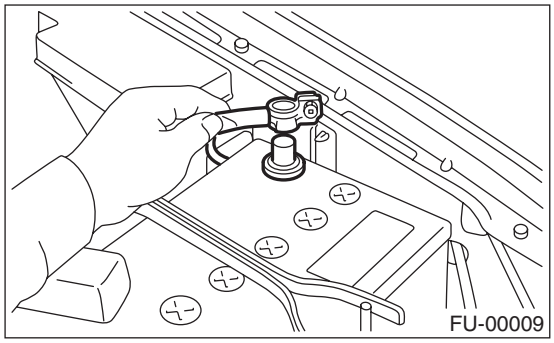
B: CAUTION

• Wear working clothing, including a cap, protective goggles and protective shoes during operation.
• Remove contamination including dirt and corrosion before removal, installation or disassembly.
• Keep the disassembled parts in order and protect them from dust or dirt.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly, and replacement.
• Be careful not to burn, because each part on the vehicle is hot after running.
• Be sure to tighten fasteners including bolts and nuts to the specified torque.
• Place shop jacks or rigid racks at the specified points.
• Before disconnecting electrical connectors of sensors or units, be sure to disconnect the ground cable from battery.

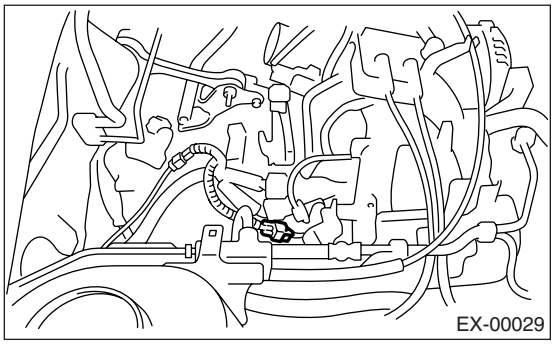
2. Front Exhaust Pipe

A: REMOVAL

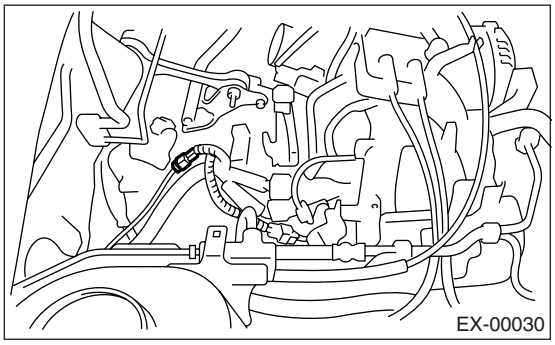
1) Disconnect the ground cable from battery.



2) Disconnect the front oxygen (A/F) sensor connector.



3) Disconnect the rear oxygen sensor connector.

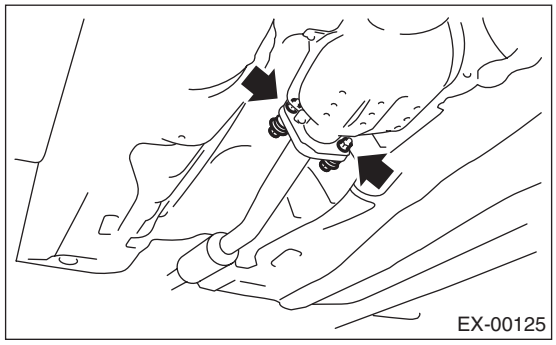


4) Lift-up the vehicle.

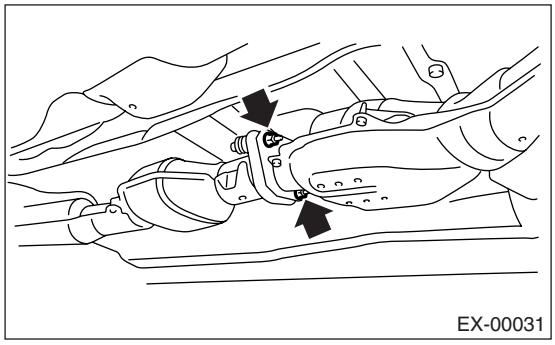
5) Separate the front and center exhaust pipe assembly and rear exhaust pipe.

CAUTION:
Be careful, the exhaust pipe is hot.

- 1.6 L



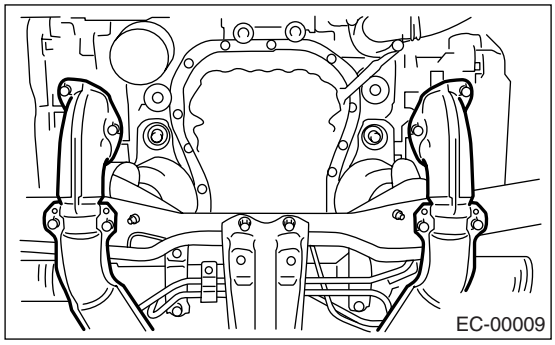
- 2.0 L



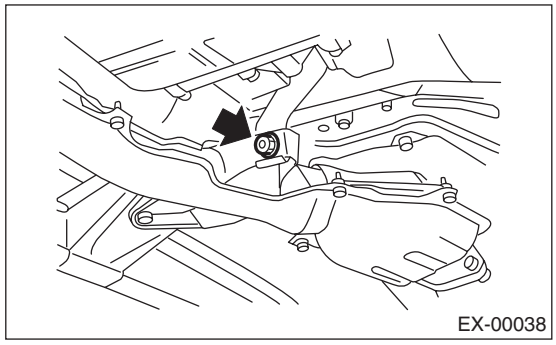
6) Remove the under cover.

7) Remove the nuts which hold the front exhaust pipe onto cylinder heads.

CAUTION:
Be careful not to pull down the front and center exhaust pipe assembly.



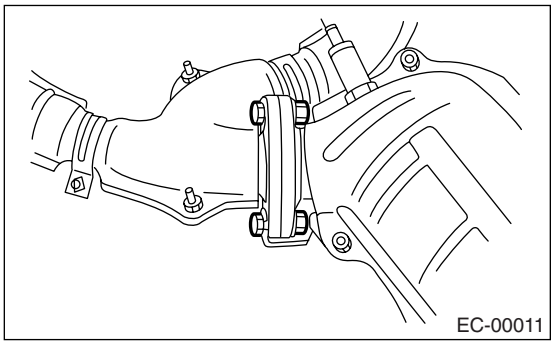
8) Remove the bolt which installs the front and center exhaust pipe assembly to hanger bracket.



9) Remove the front and center exhaust pipe assembly from vehicle.

CAUTION:
• Be careful not to let the front and center exhaust pipe assembly fall off when removing as it is quite heavy.
• After removing the front and center exhaust pipe assembly, do not apply excessive pulling force on the rear exhaust pipe.

10) Separate the front exhaust pipe from center exhaust pipe.



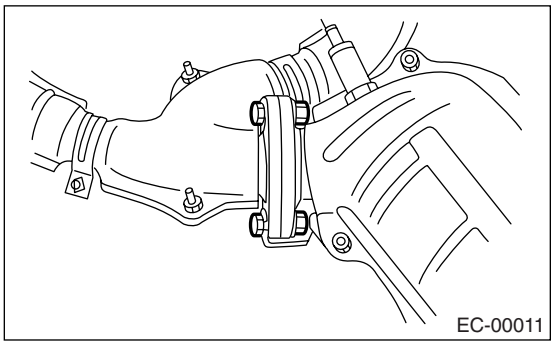
11) Remove the front oxygen (A/F) sensor and the rear oxygen sensor. <Ref. to FU(H4SO)-43, REMOVAL, Front Oxygen (A/F) Sensor.> and <Ref. to FU(H4SO)-45, REMOVAL, Rear Oxygen Sensor.>.

B: INSTALLATION

1) Install the front oxygen (A/F) sensor and the rear oxygen sensor. <Ref. to FU(H4SO)-43, INSTALLATION, Front Oxygen (A/F) Sensor.> and <Ref. to FU(H4SO)-45, INSTALLATION, Rear Oxygen Sensor.>.
2) Install the front exhaust pipe to center exhaust pipe.

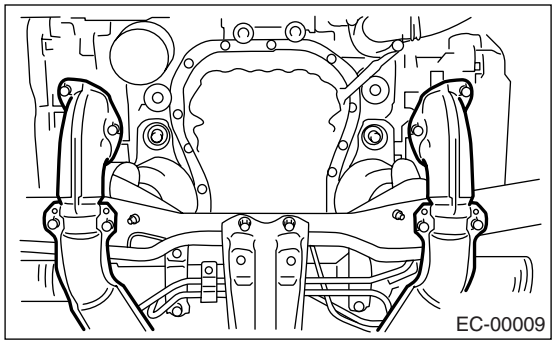
NOTE:
Use new gaskets.

Tightening torque:
30 N·m (3.1 kgf-m, 22.1 ft-lb)



3) Install the front and center exhaust pipe assembly to vehicle.

4) Temporarily tighten the bolt which installs the front exhaust pipe to cylinder head.

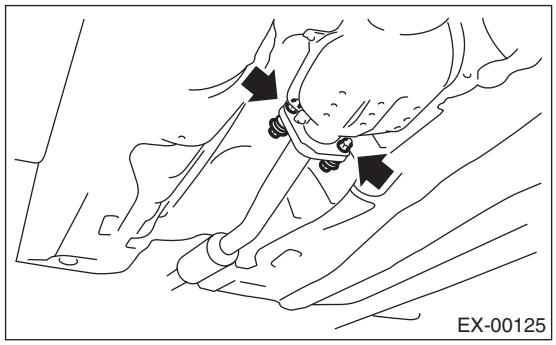


5) Tighten the bolts which install the front and center exhaust pipe assembly to rear exhaust pipe.

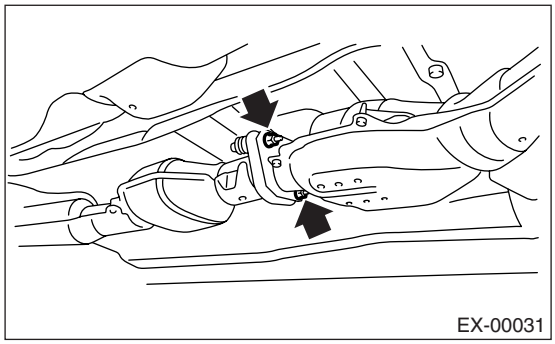
NOTE:
Use new gaskets.

Tightening torque:
18 N·m (1.8 kgf-m, 13.0 ft-lb)

- 1.6 L

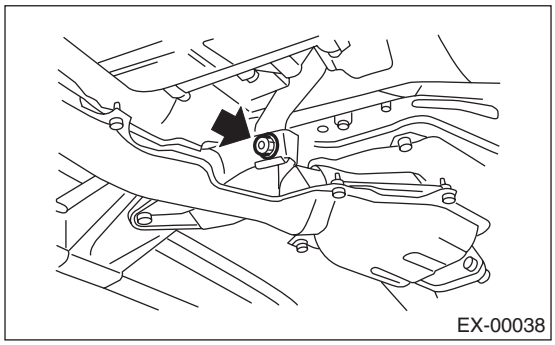


- 2.0 L



6) Tighten the bolt which holds the front and center exhaust pipe assembly to hanger bracket.

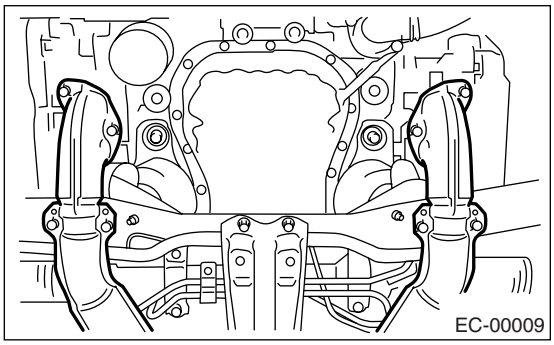
Tightening torque:
35 N·m (3.6 kgf-m, 26.0 ft-lb)



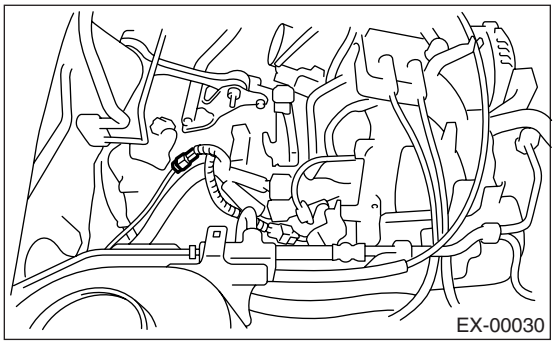
7) Tighten the nuts which hold the front exhaust pipe onto cylinder heads.

NOTE:
Use new gaskets.

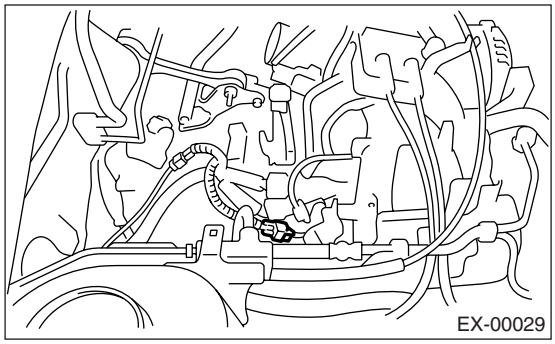
Tightening torque:
30 N·m (3.1 kgf-m, 22.1 ft-lb)



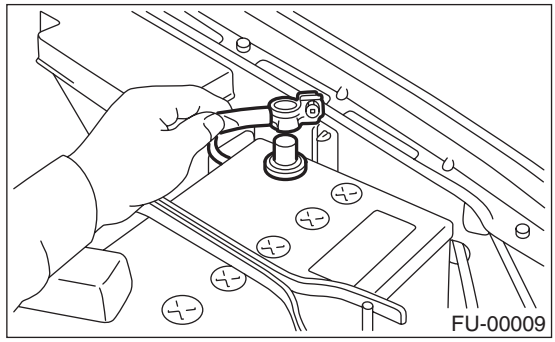
8) Install the under cover.
9) Lower the vehicle.
10) Connect the rear oxygen sensor connector.



11) Connect the front oxygen (A/F) sensor connector.



12) Connect the battery ground cable to battery.



C: INSPECTION

1) Make sure there are no exhaust leaks from connections and welds.
2) Make sure there are no holes or rusting.

3. Center Exhaust Pipe

A: REMOVAL

After removing the center and front exhaust pipes as one unit, separate them. Refer to the procedure for removing the front exhaust pipe. <Ref. to EX(H4SO)-6, REMOVAL, Front Exhaust Pipe.>

B: INSTALLATION

Install the center exhaust pipe and front exhaust pipe as one unit. Refer to the procedure for installing the front exhaust pipe. <Ref. to EX(H4SO)-7, INSTALLATION, Front Exhaust Pipe.>

C: INSPECTION

1) Make sure there are no exhaust leaks from connections and welds.
2) Make sure there are no holes or rusting.

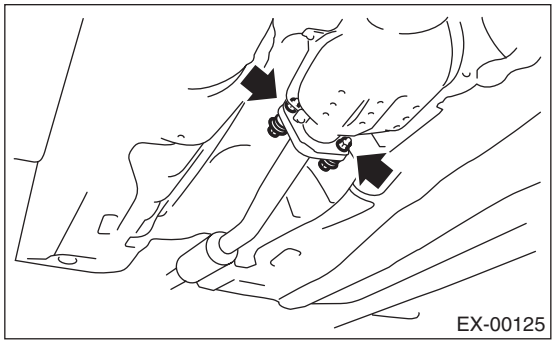
4. Rear Exhaust Pipe

A: REMOVAL

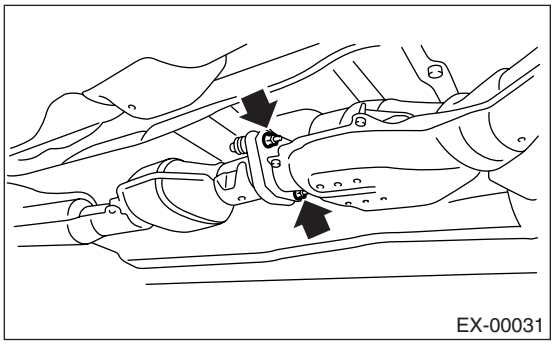
1) Separate the rear exhaust pipe from center exhaust pipe.

CAUTION:
Be careful, the exhaust pipe is hot.

- 1.6 L

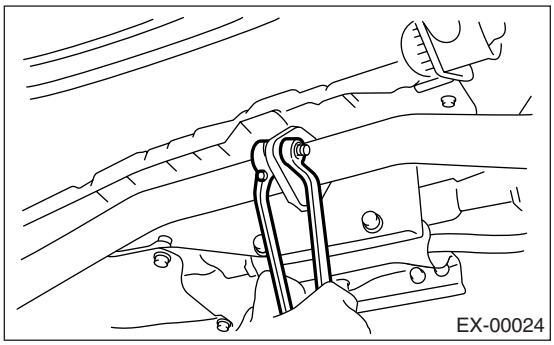


- 2.0 L



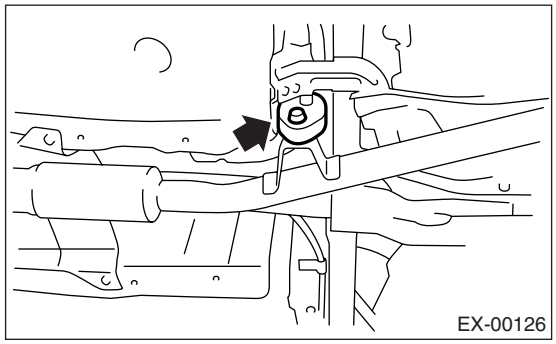
2) Separate the rear exhaust pipe from muffler.

CAUTION:
Be careful not to pull down the rear exhaust pipe.



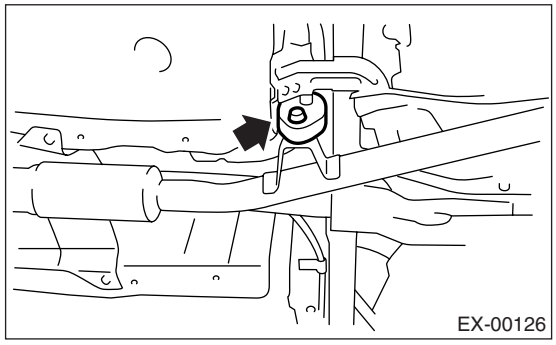
3) Apply a coat of spray type lubricant to the mating area of cushion rubbers in advance.

4) Remove the rear exhaust pipe bracket from cushion rubber.



B: INSTALLATION

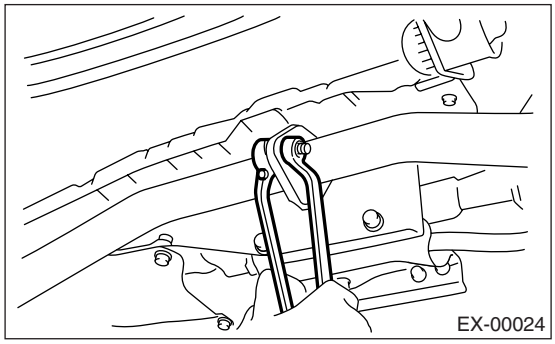
1) Apply a coat of spray type lubricant to the mating area of cushion rubbers in advance.
2) Install the rear exhaust pipe bracket to cushion rubber.



3) Install the rear exhaust pipe to muffler.

NOTE:
Use new gaskets and self-locking nuts.

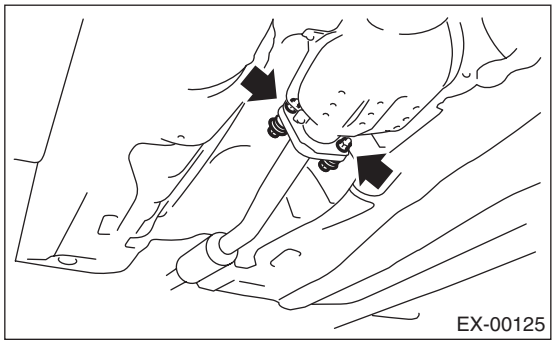
Tightening torque:
48 N·m (4.9 kgf-m, 35.4 ft-lb)



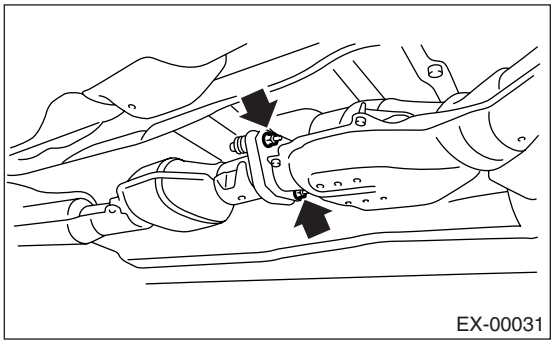
4) Install the rear exhaust pipe to center exhaust pipe.

Tightening torque:
18 N·m (1.8 kgf-m, 13.0 ft-lb)

- 1.6 L



- 2.0 L



C: INSPECTION

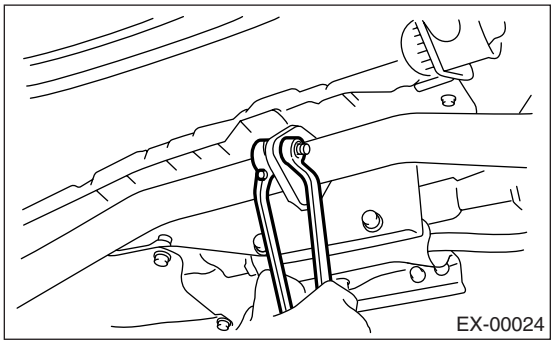
1) Make sure there are no exhaust leaks from connections and welds.
2) Make sure there are no holes or rusting.
3) Make sure the cushion rubber is not worn or cracked.

5. Muffler

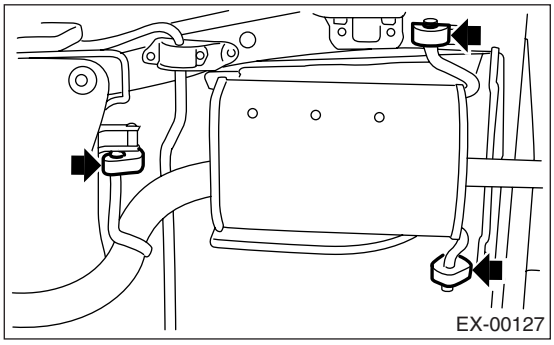
A: REMOVAL

1) Separate the muffler from rear exhaust pipe.

CAUTION:
Be careful, the exhaust pipe is hot.



2) Apply a coat of spray type lubricant to the mating area of cushion rubbers in advance.



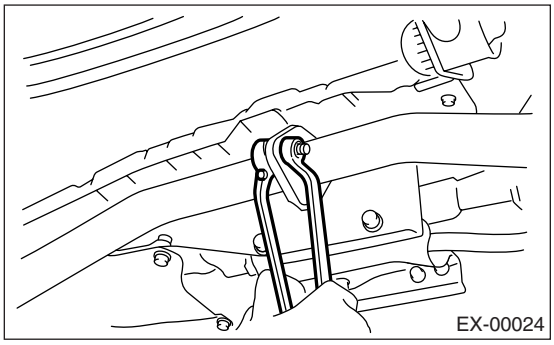
3) Remove the front, right and left cushion rubber, and detach the muffler assembly.

B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Use new gasket and self-locking nuts.

Tightening torque:
48 N·m (4.9 kgf-m, 35.4 ft-lb)



C: INSPECTION

1) Make sure there are no exhaust leaks from connections and welds.
2) Make sure there are no holes or rusting.
3) Make sure the cushion rubber is not worn or cracked.

COOLING

CO(H4SO)

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1. General Description

A: SPECIFICATION

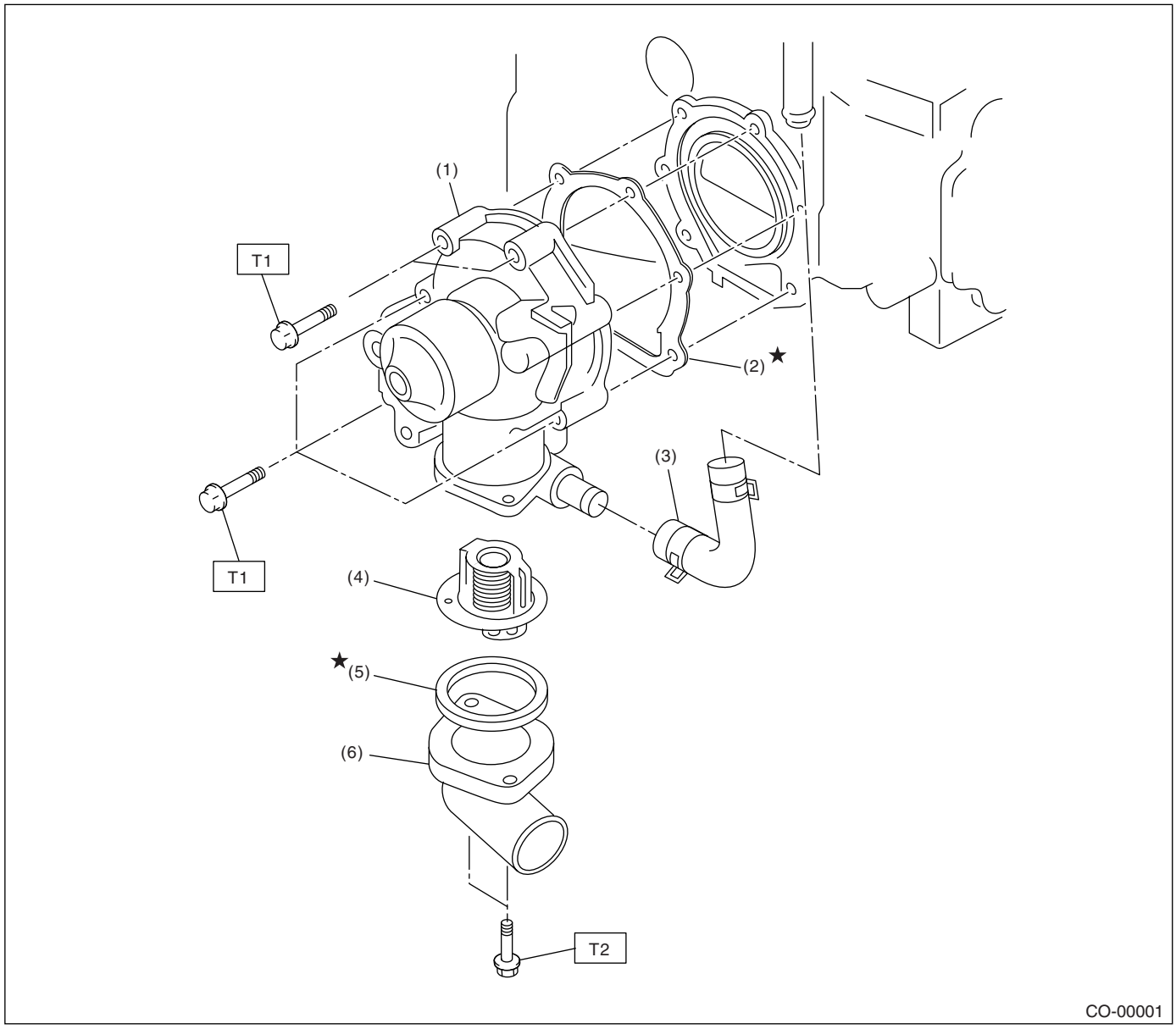
Cooling system				Electric fan + Forced engine coolant circulation system
Total engine coolant capacity ℓ (US qt, Imp qt)				1.6 L AT model: 7.3 (7.71, 6.42) 1.6 L MT model: 7.4 (7.82, 6.51) 2.0 L with ATF warmer: 6.9 (7.29, 6.07) 2.0 L and 2.5 L AT model: 6.9 (7.29, 6.07) 2.0 L and 2.5 L MT model: 7.0 (7.4, 6.2)
Water pump	Type			Centrifugal impeller type
	Discharge performance I	Discharge		20 ℓ (5.3 US gal, 4.4 Imp gal)/min.
		Pump speed — Discharge pressure		760 rpm — 2.9 kPa (0.3 mAq)
		Engine coolant temperature		80°C (176°F)
	Discharge performance II	Discharge		100 ℓ (26.4 US gal, 22.0 Imp gal)/min.
		Pump speed — Discharge pressure		3,000 rpm — 49.0 kPa (5.0 mAq)
		Engine coolant temperature		80°C (176°F)
	Discharge performance III	Discharge		200 ℓ (52.8 US gal, 44.0 Imp gal)/min.
		Pump speed — Discharge pressure		6,000 rpm — 225.4 kPa (23.0 mAq)
		Engine coolant temperature		80°C (176°F)
	Impeller diameter			76 mm (2.99 in)
	Number of impeller vanes			8
	Pump pulley diameter			60 mm (2.36 in)
	Model without ATF warmer, heater cock	Clearance between impeller and case	Standard	0.5 — 0.7 mm (0.020 — 0.028 in)
			Limit	1.0 mm (0.039 in)
		"Thrust" runout of impeller end		0.5 mm (0.020 in)
	Model with ATF warmer, heater cock	Clearance between impeller and case	Standard	0.5 — 1.5 mm (0.020 — 0.059 in)
			Limit	—
		"Thrust" runout of impeller end		—
Thermostat	Type			Wax pellet type
	Starts to open			Model with OBD: 80 — 84°C (176 — 183°F)
				Model without OBD: 76 — 80°C (169 — 176°F)
	Fully opened			Model with OBD: 95°C (203°F)
				Model without OBD: 91°C (196°F)
	Valve lift			9.0 mm (0.354 in) or more
	Valve bore			35 mm (1.38 in)
Radiator fan	Motor	Main fan		70 W
		Sub fan		70 W
	Fan diameter × Blade			320 mm (12.60 in) × 5 (main fan) 320 mm (12.60 in) × 7 (sub fan)

Radiator	Type		Down flow, pressure type
	Core dimensions	Width × Height × Thickness	691.5 × 340 × 16 mm (27.22 × 13.39 × 0.63 in)
	Pressure range in which cap valve is open		Above: 108±15 kPa (1.1±0.15 kgf/cm^2, 16±2 psi) Below: −1.0 to −4.9 kPa (−0.01 to −0.05 kgf/cm^2, −0.1 to −0.7 psi)
	Fins		Corrugated fin type
Reservoir tank	Capacity		0.5 ℓ (0.5 US qt, 0.4 Imp qt)

B: COMPONENT

1. WATER PUMP

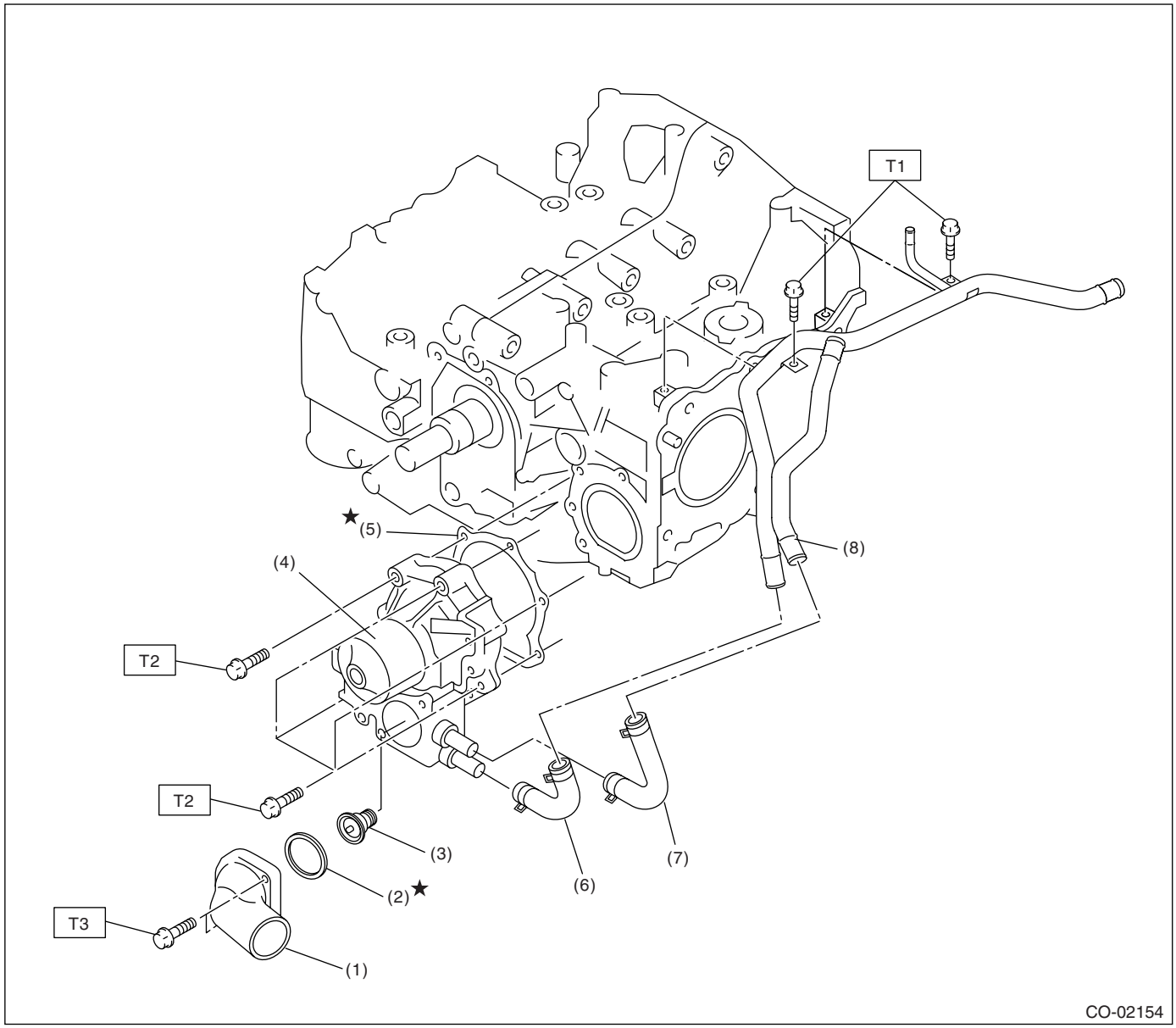
- Model without ATF warmer and heater cock



(1) Water pump ASSY
(2) Gasket
(3) Heater by-pass hose
(4) Thermostat
(5) Gasket
(6) Thermostat cover

Tightening torque: N·m (kgf-m, ft-lb)
T1: First 12 (1.2, 8.7)
Second 12 (1.2, 8.7)
T2: 6.5 (0.66, 4.8)

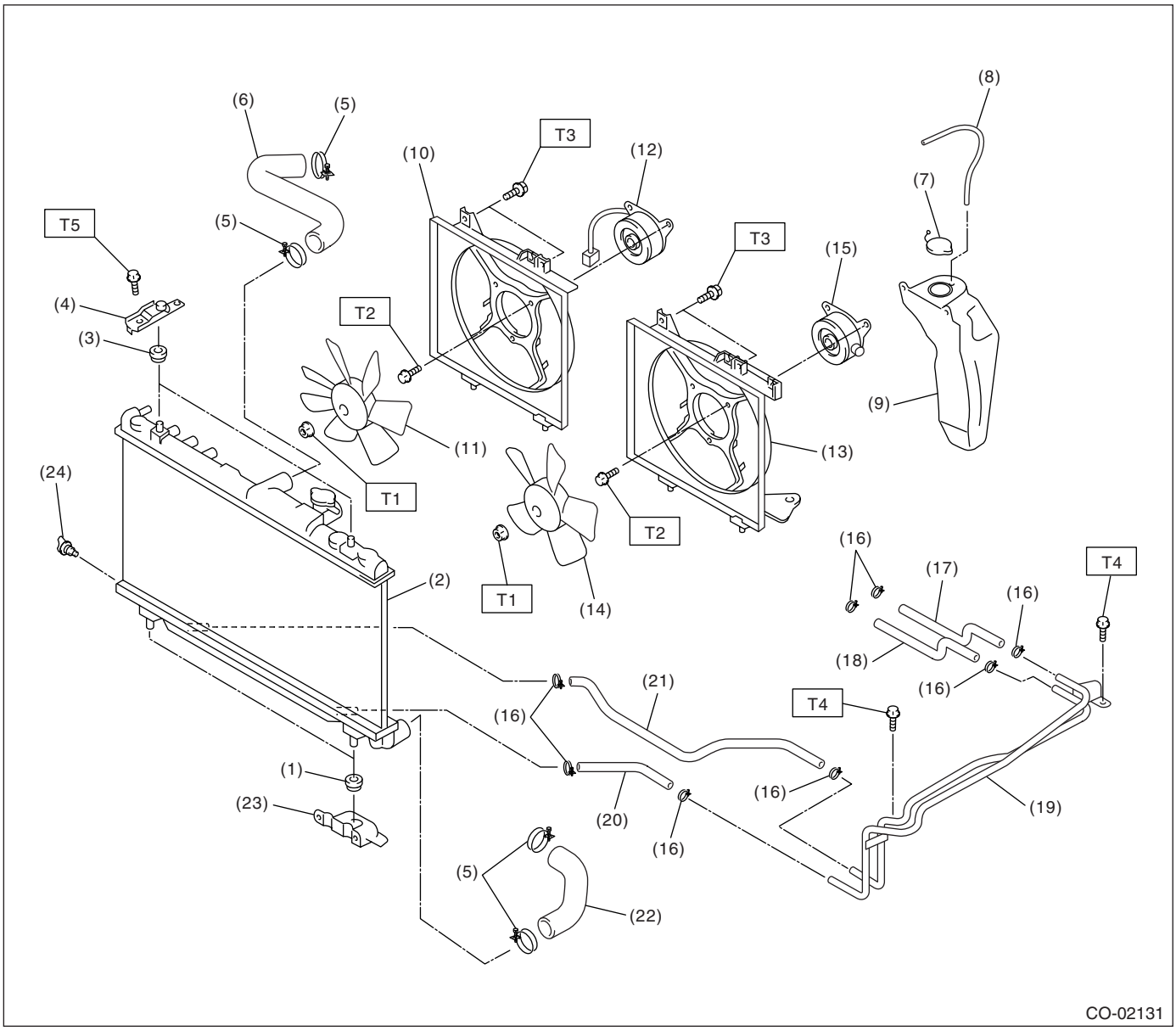
- Model with ATF warmer and heater cock



(1) Thermostat cover
(2) Gasket
(3) Thermostat
(4) Water pump ASSY
(5) Gasket
(6) Heater by-pass hose
(7) ATF warmer by-pass hose
(8) Water by-pass pipe

Tightening torque: N·m (kgf-m, ft-lb)
T1: 6.5 (0.66, 4.8)
T2: First 12 (1.2, 8.7)
Second 12 (1.2, 8.7)
T3: 12 (1.2, 8.7)

2. RADIATOR AND RADIATOR FAN



(1) Radiator lower cushion
(2) Radiator
(3) Radiator upper cushion
(4) Radiator upper bracket
(5) Clamp
(6) Radiator inlet hose
(7) Engine coolant reservoir tank cap
(8) Overflow hose
(9) Engine coolant reservoir tank
(10) Radiator sub fan shroud
(11) Radiator sub fan
(12) Radiator sub fan motor
(13) Radiator main fan shroud
(14) Radiator main fan
(15) Radiator main fan motor
(16) ATF hose clamp (AT model)
(17) ATF hose A (AT model)
(18) ATF hose B (AT model)
(19) ATF pipe (AT model)
(20) ATF hose C (AT model)
(21) ATF hose D (AT model)
(22) Radiator outlet hose
(23) Radiator lower bracket
(24) Radiator drain plug

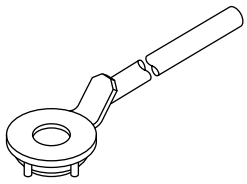
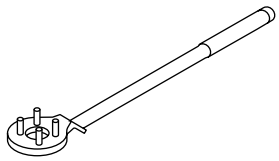
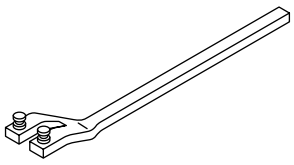
Tightening torque: N·m (kgf-m, ft-lb)
T1: 3.4 (0.35, 2.5)
T2: 4.4 (0.45, 3.3)
T3: 4.9 (0.50, 3.6)
T4: 12 (1.2, 8.7)
T5: 18 (1.8, 13.0)

C: CAUTION

• Wear working clothing, including a cap, protective goggles, and protective shoes during operation.
• Remove contamination including dirt and corrosion before removal, installation or disassembly.
• Keep the disassembled parts in order and protect them from dust or dirt.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly, and replacement.
• Be careful not to burn, because each part in the vehicle is hot after running.
• Be sure to tighten fasteners including bolts and nuts to the specified torque.
• Place shop jacks or rigid racks at the specified points.
• Before disconnecting electrical connectors of sensors or units, be sure to disconnect the ground cable from battery.

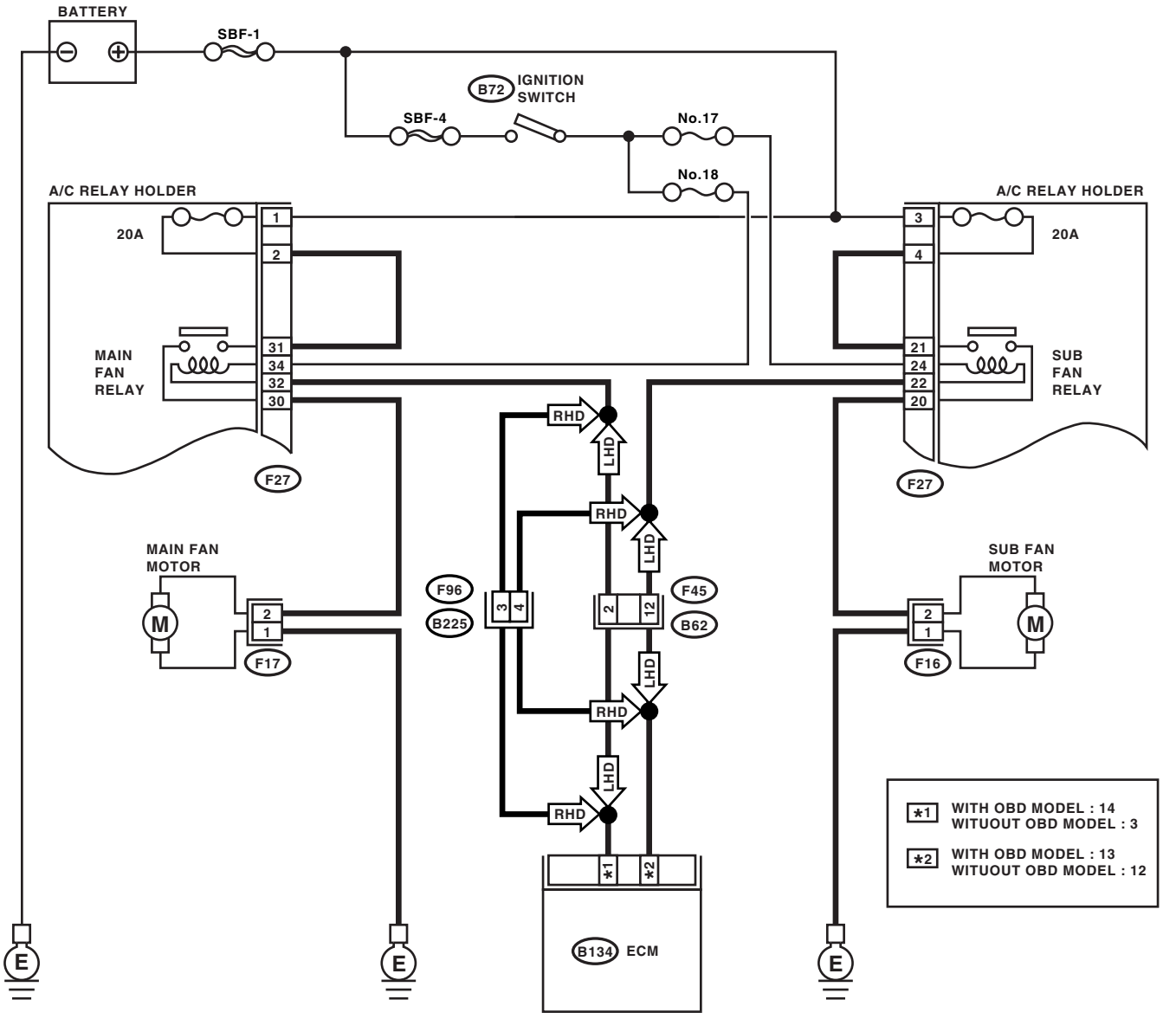
D: PREPARATION TOOL

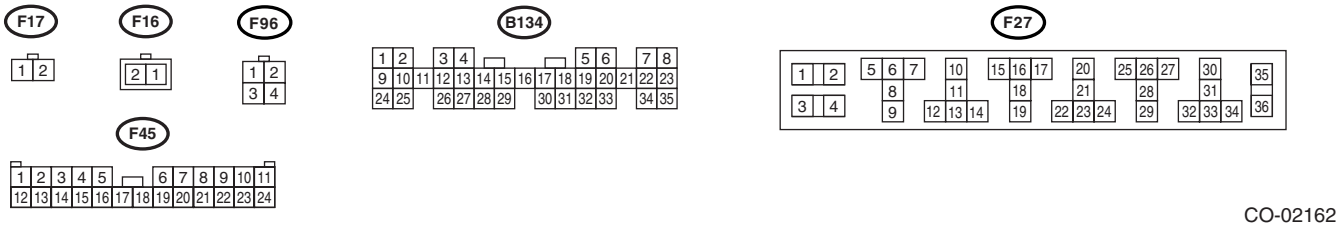
1. SPECIAL TOOLS

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499977400	499977400	CRANK PULLEY WRENCH	Used for stopping crank pulley when loosening and tightening crank pulley bolts. (1.6 L and 2.0 L model)
 ST-499977100	499977100	CRANK PULLEY WRENCH	Used for stopping rotation of crank pulley when loosening and tightening crank pulley bolt. (2.5 L model)
 ST18231AA010	18231AA010	CAM SPROCKET WRENCH	• Used for removing and installing cam sprocket. • Also the CAM SPROCKET WRENCH (499207100) can be used.

2. Radiator Main Fan System

A: WIRING DIAGRAM





CO-02162

B: INSPECTION

DETECTING CONDITION:

- Engine coolant temperature is above 96°C (205°F).
- Vehicle speed is below 19 km/h (12 MPH).

TROUBLE SYMPTOM:

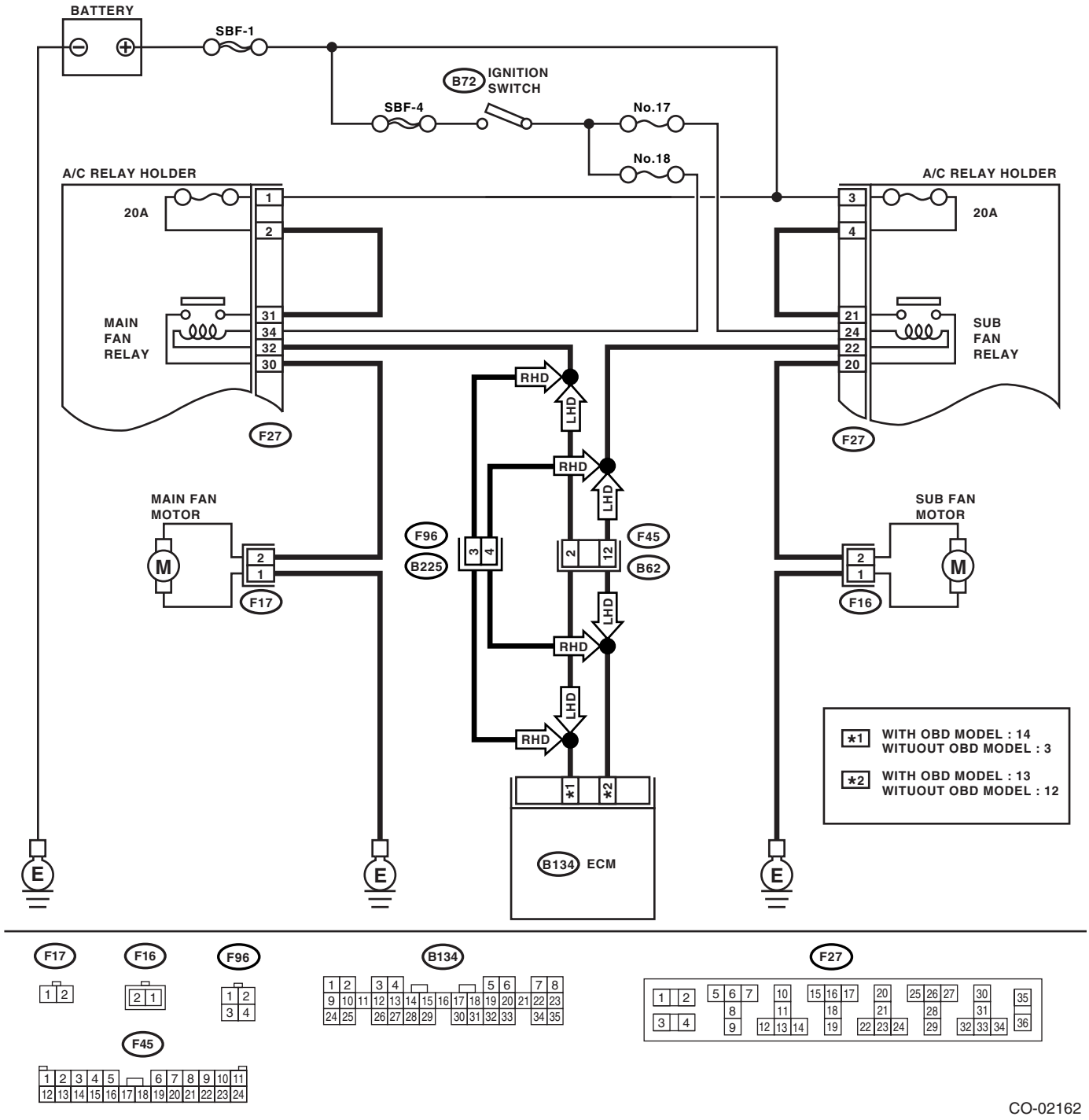
Radiator main fan does not rotate under the above conditions.

	Step	Check	Yes	No
1	**CHECK POWER SUPPLY TO MAIN FAN MOTOR.** **CAUTION:** **Be careful not to overheat the engine during repair.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from main fan motor. 3) Start the engine, and warm it up until engine coolant temperature increases over 96°C (205°F). 4) Stop the engine and turn ignition switch to ON. 5) Measure the voltage between main fan motor connector and chassis ground. ***Connector & terminal*** ***(F17) No. 2 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **2.**	Go to step **5.**
2	**CHECK GROUND CIRCUIT OF MAIN FAN MOTOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between main fan motor connector and chassis ground. ***Connector & terminal*** ***(F17) No. 1 — Chassis ground:***	Is the resistance less than 5 Ω?	Go to step **3.**	Repair the open circuit in harness between main fan motor connector and chassis ground.
3	**CHECK POOR CONTACT.** Check poor contact in main fan motor connector.	Is there poor contact in main fan motor connector?	Repair the poor contact in main fan motor connector.	Go to step **4.**
4	**CHECK MAIN FAN MOTOR.** Connect the battery positive (+) terminal to terminal No. 2, and ground (–) terminal to terminal No. 1 of main fan motor connector.	Does the main fan rotate?	Repair the poor contact in main fan motor connector.	Replace the main fan motor with a new one.
5	**CHECK POWER SUPPLY TO MAIN FAN RELAY.** 1) Turn the ignition switch to OFF. 2) Remove the main fan relay from A/C relay holder. 3) Measure the voltage between main fan relay terminal and chassis ground. ***Connector & terminal*** ***(F27) No. 31 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **6.**	Go to step **7.**
6	**CHECK POWER SUPPLY TO MAIN FAN RELAY.** 1) Turn the ignition switch to ON. 2) Measure the voltage between main fan relay terminal and chassis ground. ***Connector & terminal*** ***(F27) No. 34 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **10.**	Go to step **9.**
7	**CHECK 20 A FUSE.** 1) Remove the 20 A fuse from A/C relay holder. 2) Check the condition of fuse.	Is the fuse blown out?	Replace the fuse.	Go to step **8.**

	Step	Check	Yes	No
8	**CHECK POWER SUPPLY TO A/C RELAY HOLDER 20 A FUSE TERMINAL.** Measure the voltage of harness between A/C relay holder 20 A fuse terminal and chassis ground. ***Connector & terminal*** ***(F27) No. 1 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Repair the open circuit in harness between 20 A fuse and main fan relay terminal.	Repair the open circuit in harness between main fuse box connector and 20 A fuse terminal.
9	**CHECK FUSE.** 1) Turn the ignition switch to OFF. 2) Remove the fuse No. 18 from joint box. 3) Check the condition of fuse.	Is the fuse blown out?	Replace the fuse.	Repair the open circuit in harness between main fan relay and ignition switch.
10	**CHECK MAIN FAN RELAY.** 1) Turn the ignition switch to OFF. 2) Remove the main fan relay. 3) Measure the resistance of main fan relay. ***Terminal*** ***No. 31 — No. 30:***	Is the resistance more than 1 MΩ?	Go to step **11.**	Replace the main fan relay.
11	**CHECK MAIN FAN RELAY.** 1) Connect the battery to terminals No. 34 and No. 32 of main fan relay. 2) Measure the resistance of main fan relay. ***Terminal*** ***No. 31 — No. 30:***	Is the resistance less than 1 Ω?	Go to step **12.**	Replace the main fan relay.
12	**CHECK HARNESS BETWEEN MAIN FAN RELAY TERMINAL AND MAIN FAN MOTOR CONNECTOR.** Measure the resistance of harness between main fan motor connector and main fan relay terminal. ***Connector & terminal*** ***(F17) No. 2 — (F27) No. 30:***	Is the resistance less than 1 Ω?	Go to step **13.**	Repair the open circuit in harness between main fan motor connector and main fan relay terminal.
13	**CHECK HARNESS BETWEEN MAIN FAN RELAY AND ECM.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance of harness between main fan relay connector and ECM connector. ***Connector & terminal*** ***With OBD:*** ***(F27) No. 32 — (B134) No. 14:*** ***Without OBD:*** ***(F27) No. 32 — (B134) No. 3:***	Is the resistance less than 1 Ω?	Go to step **14.**	Repair the open circuit in harness between main fan relay and ECM.
14	**CHECK POOR CONTACT.** Check poor contact in connector between main fan and ECM.	Is there poor contact in connector between main fan motor and ECM?	Repair the poor contact connector.	Verify the DTC. Repair the trouble cause. <Ref. to EN(H4SO)(diag)-36, Read Diagnostic Trouble Code (DTC).> , <Ref. to EN(H4SOw/oOBD)(diag)-24, Read Diagnostic Trouble Code (DTC).>

3. Radiator Sub Fan System

A: WIRING DIAGRAM



CO-02162

B: INSPECTION

NOTE:
System for A/C equipped models only.

DETECTING CONDITION:

Condition (1):

- Engine coolant temperature is below 95°C (203°F).
- A/C switch is turned ON.
- Vehicle speed is below 19 km/h (12 MPH).

Condition (2):

- Engine coolant temperature is above 100°C (212°F).
- A/C switch is turned OFF.
- Vehicle speed is below 19 km/h (12 MPH).

TROUBLE SYMPTOM:

Radiator sub fan does not rotate under conditions (1) and (2) above.

	Step	Check	Yes	No
1	**CHECK POWER SUPPLY TO SUB FAN MOTOR.** **CAUTION:** **Be careful not to overheat the engine during repair.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from sub fan motor and main fan motor. 3) Start the engine, and warm it up until engine coolant temperature increases over 100°C (212°F). 4) Stop the engine and turn ignition switch to ON. 5) Measure the voltage between sub fan motor connector and chassis ground. ***Connector & terminal*** ***(F16) No. 2 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **2.**	Go to step **5.**
2	**CHECK GROUND CIRCUIT OF SUB FAN MOTOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between sub fan motor connector and chassis ground. ***Connector & terminal*** ***(F16) No. 1 — Chassis ground:***	Is the resistance less than 5 Ω?	Go to step **3.**	Repair the open circuit in harness between sub fan motor connector and chassis ground.
3	**CHECK POOR CONTACT.** Check poor contact in sub fan motor connector.	Is there poor contact in sub fan motor connector?	Repair the poor contact in sub fan motor connector.	Go to step **4.**
4	**CHECK SUB FAN MOTOR.** Connect the battery positive (+) terminal to terminal No. 2, and ground (−) terminal to terminal No. 1 of sub fan motor connector.	Does the sub fan rotate?	Repair the poor contact in sub fan motor connector.	Replace the sub fan motor with a new one.
5	**CHECK POWER SUPPLY TO SUB FAN RELAY.** 1) Turn the ignition switch to OFF. 2) Remove the sub fan relay from A/C relay holder. 3) Measure the voltage between sub fan relay terminal and chassis ground. ***Connector & terminal*** ***(F27) No. 21 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **6.**	Go to step **7.**

	Step	Check	Yes	No
6	**CHECK POWER SUPPLY TO SUB FAN RELAY.** 1) Turn the ignition switch to ON. 2) Measure the voltage between sub fan relay terminal and chassis ground. ***Connector & terminal*** ***(F27) No. 24 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **10.**	Go to step **9.**
7	**CHECK 20 A FUSE.** 1) Remove the 20 A fuse from A/C relay holder. 2) Check the condition of fuse.	Is the fuse blown out?	Replace the fuse.	Go to step **8.**
8	**CHECK POWER SUPPLY TO A/C RELAY HOLDER 20 A FUSE TERMINAL.** Measure the voltage of harness between A/C relay holder 20 A fuse terminal and chassis ground. ***Connector & terminal*** ***(F27) No. 3 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Repair the open circuit in harness between 20 A fuse and sub fan relay terminal.	Repair the open circuit in harness between main fuse box connector and 20 A fuse terminal.
9	**CHECK FUSE.** 1) Turn the ignition switch to OFF. 2) Remove the fuse No. 17 from joint box. 3) Check the condition of fuse.	Is the fuse blown out?	Replace the fuse.	Repair the open circuit in harness between sub fan relay and ignition switch.
10	**CHECK SUB FAN RELAY.** 1) Turn the ignition switch to OFF. 2) Measure the resistance of sub fan relay. ***Terminals*** ***No. 20 — No. 21:***	Is the resistance more than 1 MΩ?	Go to step **11.**	Replace the sub fan relay.
11	**CHECK SUB FAN RELAY.** 1) Connect the battery to terminals No. 24 and No. 22 of sub fan relay. 2) Measure the resistance of sub fan relay. ***Terminals*** ***No. 20 — No. 21:***	Is the resistance less than 1 Ω?	Go to step **12.**	Replace the sub fan relay.
12	**CHECK HARNESS BETWEEN SUB FAN RELAY TERMINAL AND SUB FAN MOTOR CONNECTOR.** Measure the resistance of harness between sub fan motor connector and sub fan relay terminal. ***Connector & terminal*** ***(F16) No. 2 — (F27) No. 20:***	Is the resistance less than 1 Ω?	Go to step **13.**	Repair the open circuit in harness between sub fan motor and sub fan relay connector.
13	**CHECK HARNESS BETWEEN SUB FAN RELAY AND ECM.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance of harness between sub fan relay connector and ECM connector. ***Connector & terminal*** ***With OBD:*** ***(F27) No. 22 — (B134) No. 13:*** ***Without OBD:*** ***(F27) No. 22 — (B134) No. 12:***	Is the resistance less than 1 Ω?	Go to step **14.**	Repair the open circuit in harness between sub fan relay and ECM.

	Step	Check	Yes	No
14	**CHECK POOR CONTACT.** Check poor contact in connector between sub fan and ECM.	Is there poor contact in connector between sub fan motor and ECM?	Repair the poor contact connector.	Verify the DTC. Repair the trouble cause. <Ref. to EN(H4SO)(diag)-36, Read Diagnostic Trouble Code (DTC).>, <Ref. to EN(H4SOw/oOBD)(diag)-24, Read Diagnostic Trouble Code (DTC).>

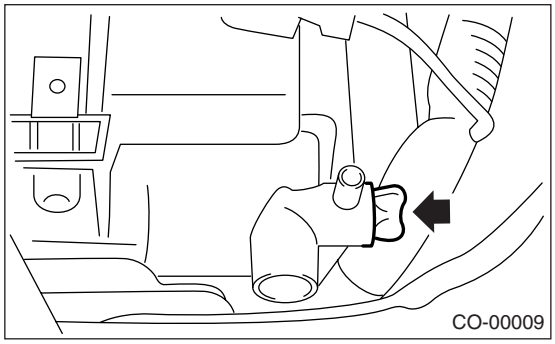
4. Engine Coolant

A: REPLACEMENT

1. DRAINING OF ENGINE COOLANT

1) Lift-up the vehicle.
2) Remove the under cover.
3) Remove the drain plug to drain engine coolant into container.

NOTE:
Remove the radiator cap so that engine coolant will drain faster.



4) Install the drain plug.

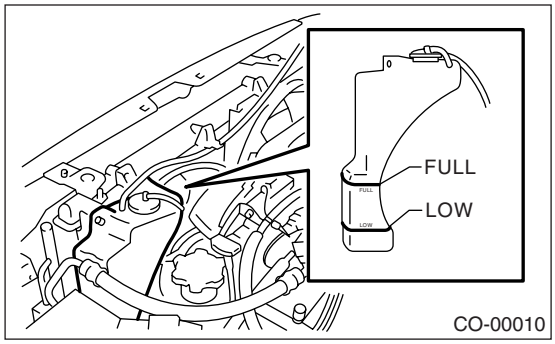
2. FILLING OF ENGINE COOLANT

1) Fill engine coolant into the radiator up to filler neck position.

Coolant capacity (fill up to "FULL" level):
1.6 L AT model:
7.3 ℓ (7.71 US qt, 6.42 Imp qt)
1.6 L MT model:
7.4 ℓ (7.82 US qt, 6.51 Imp qt)
2.0 L and 2.5 L AT model:
6.9 ℓ (7.29 US qt, 6.07 Imp qt)
2.0 L and 2.5 L MT model:
7.0 ℓ (7.4 US qt, 6.2 Imp qt)

NOTE:
The SUBARU Genuine Coolant containing anti-freeze and anti-rust agents is especially made for SUBARU engine, which has an aluminum crank-case. Always use SUBARU Genuine Coolant, since other coolant may cause corrosion.

2) Fill engine coolant into the reservoir tank up to "FULL" level.



3) Close the radiator cap and start the engine. Race 5 to 6 times at less than 3,000 rpm, then stop the engine. (Complete this operation within 40 seconds.)
4) Wait for one minute after the engine stops, open the radiator cap. If the engine coolant level drops, add engine coolant to the filler neck position of radiator.
5) Perform the procedures 3) and 4) again.
6) Attach the radiator cap and reservoir tank cap properly.
7) Start the engine and operate the heater at maximum hot position and the blower speed setting to "LO".
8) Run the engine at 2,000 rpm or less until radiator fan starts and stops.

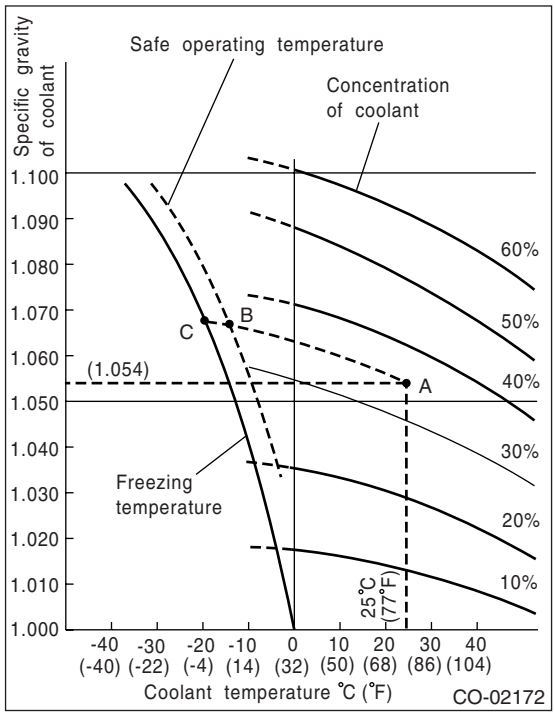
NOTE:
• Be careful with the water temperature gauge to prevent overheating.
• If the radiator hose becomes to harden by the pressure of engine coolant, air bleeding operation seems to be almost completed.

9) Stop the engine and wait until engine coolant temperature lowers to 30°C (86°F).
10) Install the radiator cap. If the engine coolant level drops, add engine coolant into radiator up to the filler neck position and reservoir tank to "FULL" level.
11) Attach the radiator cap and reservoir tank cap properly.
12) Operate the heater at maximum hot position and the blower speed setting to "LO" and start the engine. Race at less than 3,000 rpm. If the flowing sound is heard at this time, perform the procedures from 8) again.

B: INSPECTION

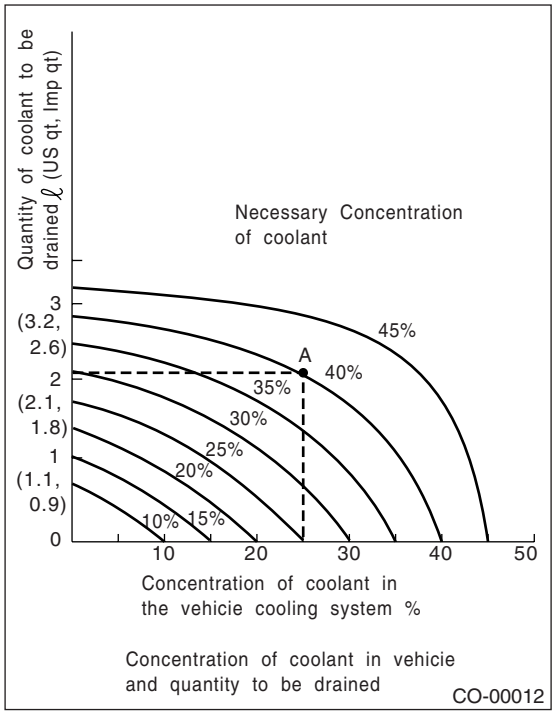
1. RELATIONSHIP OF SUBARU GENUINE COOLANT CONCENTRATION AND FREEZING TEMPERATURE

The concentration and safe operating temperature of the SUBARU genuine coolant is shown in the diagram. Measuring the temperature and specific gravity of the coolant will provide this information.
[Example]
If the coolant temperature is 25°C (77°F) and its specific gravity is 1.054 and the concentration is 35% (point A), the safe operating temperature is −14°C (7°F) (point B), and the freezing temperature is −20°C (−4°F) (point C).



2. PROCEDURE TO ADJUST THE CONCENTRATION OF THE ENGINE COOLANT

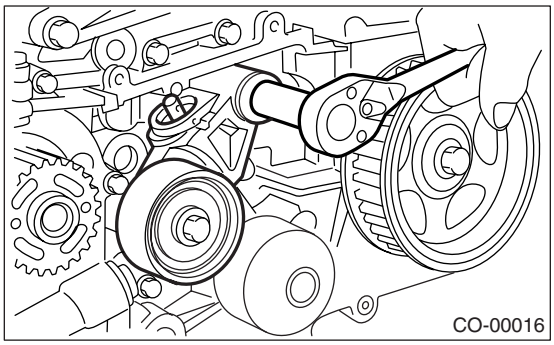
To adjust the concentration of the coolant according to temperature, find the proper coolant concentration in the above diagram and replace the necessary amount of coolant with an undiluted solution of SUBARU genuine coolant (concentration 50%).
The amount of coolant that should be replaced can be determined using the diagram.
[Example]
Assume that the coolant concentration must be increased from 25% to 40%. Find point A, where the 25% line of coolant concentration intersects with the 40% curve of the necessary coolant concentration, and read the scale on the vertical axis of the graph at height A. The quantity of coolant to be drained is 2.1 ℓ (2.2 US qt, 1.8 Imp qt). Drain 2.1 ℓ (2.2 US qt, 1.8 Imp qt) of coolant from the cooling system and add 2.1 ℓ (2.2 US qt, 1.8 Imp qt) of the undiluted solution of SUBARU genuine coolant.
If a coolant concentration of 50% is needed, drain all the coolant and refill with the undiluted solution only.



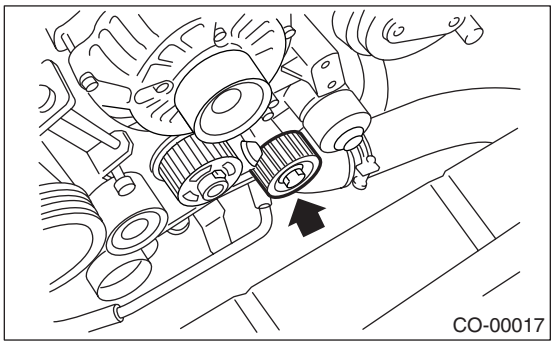
5. Water Pump

A: REMOVAL

1) Remove the radiator. <Ref. to CO(H4SO)-22, REMOVAL, Radiator.>
2) Remove the V-belts.
<Ref. to ME(H4SO)-41, REMOVAL, V-belt.>
3) Remove the timing belt.
<Ref. to ME(H4SO)-46, TIMING BELT, REMOVAL, Timing Belt.>
4) Remove the automatic belt tension adjuster.

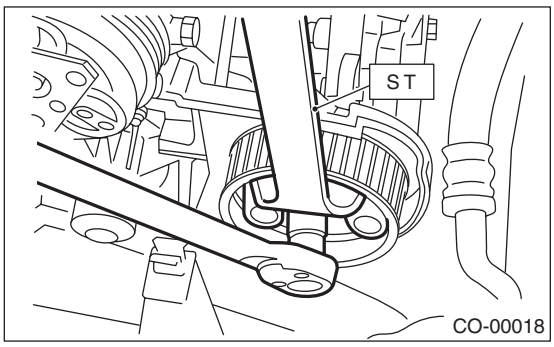

CO-00016

5) Remove the belt idler No. 2.


CO-00017

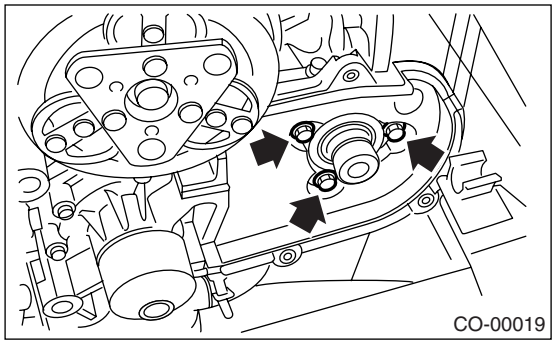
6) Remove the cam sprocket (LH) by using ST.
ST 18231AA010 CAM SPROCKET WRENCH

NOTE:
Also the CAM SPROCKET WRENCH (499207100) can be used.

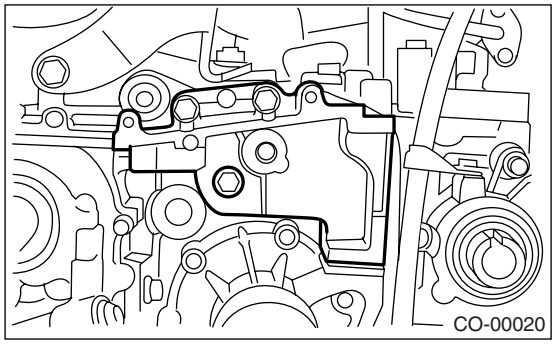


CO-00018

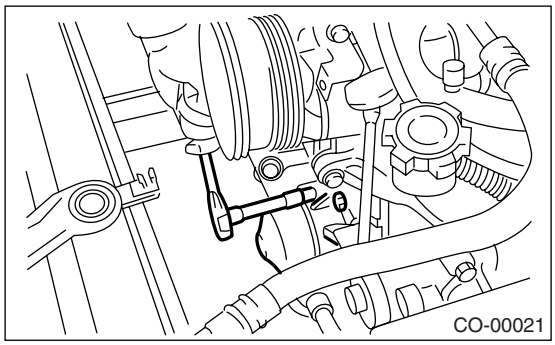
7) Remove the belt cover No. 2 (LH).


CO-00019

8) Remove the tensioner bracket.


CO-00020

9) Disconnect the hose from water pump.
10) Remove the water pump.


CO-00021

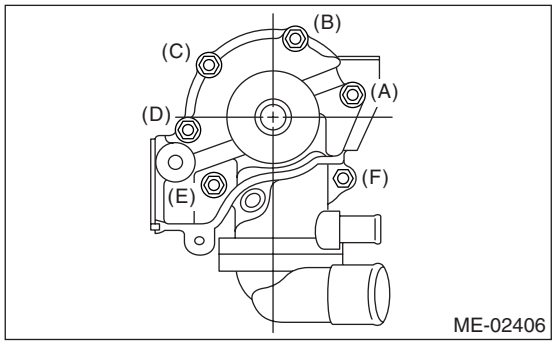
B: INSTALLATION

1) Install the water pump onto cylinder block (LH).

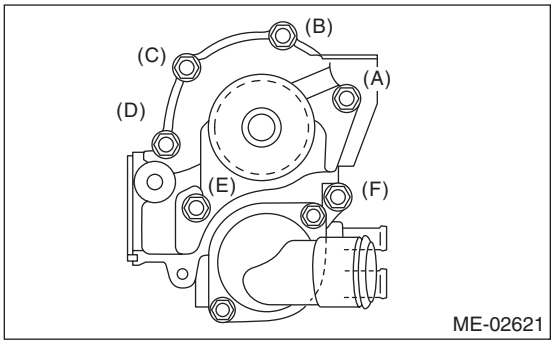
NOTE:
- Use a new gasket.
- When installing the water pump, tighten the bolts in two stages in alphabetical sequence as shown in the figure.

Tightening torque:
First:
12 N·m (1.2 kgf-m, 8.7 ft-lb)
Second:
12 N·m (1.2 kgf-m, 8.7 ft-lb)

- Model without ATF warmer

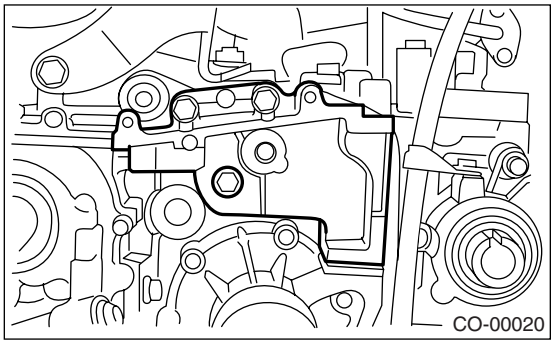


- Model with ATF warmer



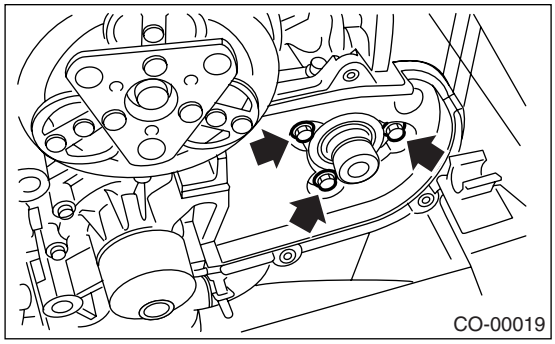
2) Connect the hose to water pump.
3) Install the tensioner bracket.

Tightening torque:
24.5 N·m (2.5 kgf-m, 18.1 ft-lb)



4) Install the belt cover No. 2 (LH).

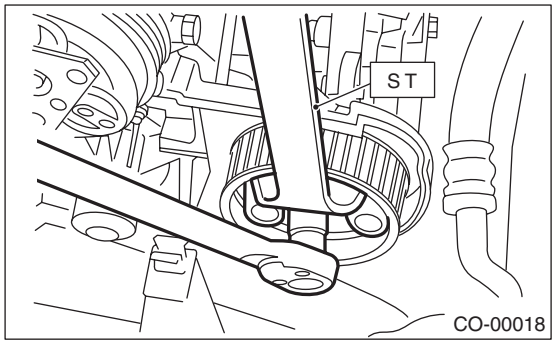
Tightening torque:
5 N·m (0.5 kgf-m, 3.6 ft-lb)



5) Install the cam sprockets (LH) by using ST.
ST 18231AA010 CAM SPROCKET WRENCH

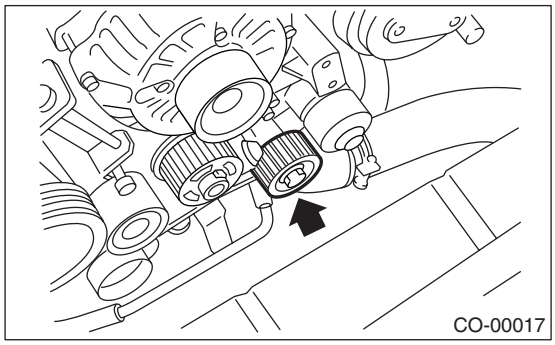
NOTE:
Also the CAM SPROCKET WRENCH (499207100) can be used.

Tightening torque:
78 N·m (8.0 kgf-m, 57.9 ft-lb)



6) Install the belt idler No. 2.

Tightening torque:
39 N·m (4.0 kgf-m, 28.9 ft-lb)



7) Install the automatic belt tension adjuster whose tension rod is held with pin. <Ref. to ME(H4SO)-47, AUTOMATIC BELT TENSION ADJUSTER ASSEMBLY AND BELT IDLER, INSTALLATION, Timing Belt.>
8) Install the timing belt. <Ref. to ME(H4SO)-48, TIMING BELT, INSTALLATION, Timing Belt.>

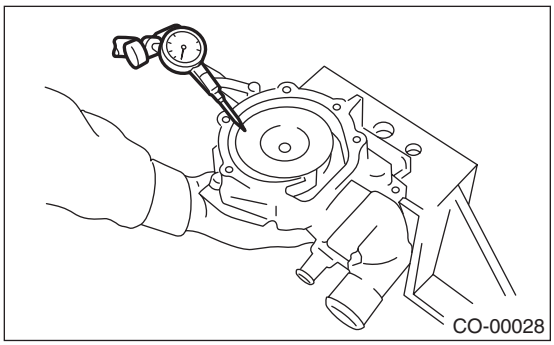
9) Install the V-belts. <Ref. to ME(H4SO)-41, INSTALLATION, V-belt.>
10) Install the radiator. <Ref. to CO(H4SO)-23, INSTALLATION, Radiator.>

C: INSPECTION

1. MODEL WITHOUT ATF WARMER AND HEATER COCK

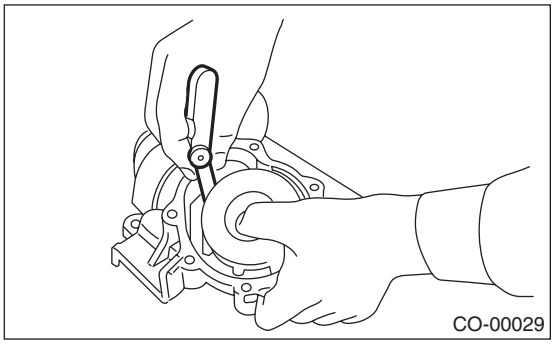
1) Check the water pump bearing for smooth rotation.
2) Check the water pump pulley for abnormalities.
3) Using a dial gauge, measure the impeller runout in thrust direction while rotating the pulley.

"Thrust" runout limit:
0.5 mm (0.020 in)



4) Check the clearance between impeller and pump case.

Clearance between impeller and pump case:
Standard
0.5 — 0.7 mm (0.020 — 0.028 in)
Limit
1.0 mm (0.039 in)

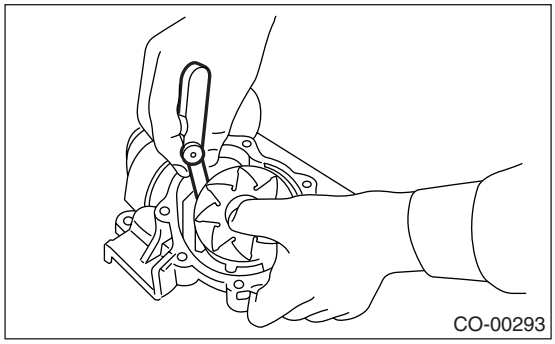


5) After water pump installation, check the pulley shaft for engine coolant leaks. If leaks are noted, replace the water pump assembly.

2. MODEL WITH ATF WARMER AND HEATER COCK

1) Check the water pump bearing for smooth rotation.
2) Check the water pump pulley for abnormalities.
3) Make sure the impeller is not deformed or damaged.
4) Inspect the clearance between impeller and pump case.

Clearance between impeller and pump case:
Standard value
0.5 — 1.5 mm (0.020 — 0.059 in)

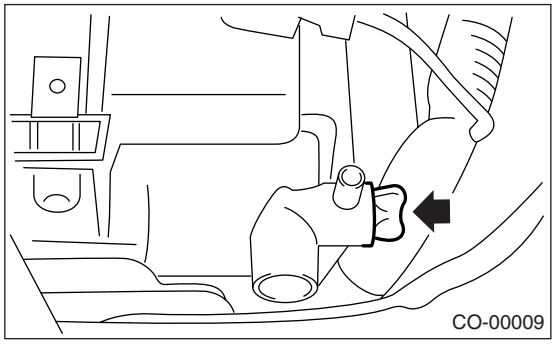


5) After water pump installation, check the pulley shaft for engine coolant leaks and noise. If leaks or noise are noted, replace the water pump assembly.

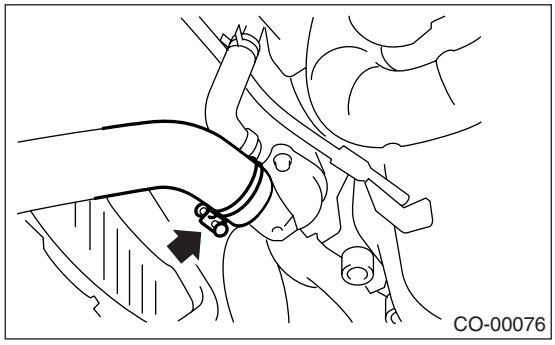
6. Thermostat

A: REMOVAL

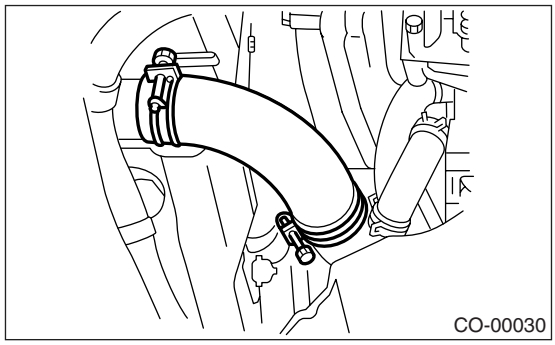
1) Set the vehicle on a lift.
2) Lift-up the vehicle.
3) Remove the under cover.
4) Drain the engine coolant completely. <Ref. to CO(H4SO)-15, DRAINING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>


CO-00009

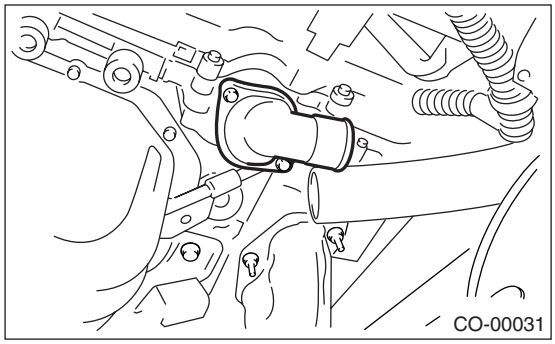
5) Disconnect the radiator outlet hose from thermostat cover.
- Model without ATF warmer and heater cock


CO-00076

- Model with ATF warmer and heater cock


CO-00030

6) Remove the thermostat cover and gasket, and then pull out the thermostat.

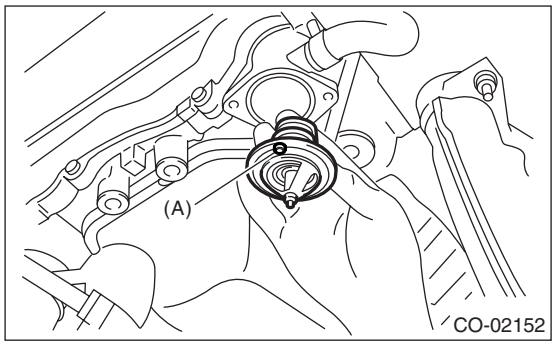

CO-00031

B: INSTALLATION

1) Install the gasket to thermostat, and install the thermostat and gasket to water pump as a unit. Then, install the thermostat cover.

NOTE:
- When reinstalling the thermostat, use a new gasket.
- The thermostat must be installed with the jiggle pin (A) facing upward (model with ATF warmer and heater cock) or forward of vehicle (model without ATF warmer amd heater cock).
  - Model without ATF warmer and heater cock.

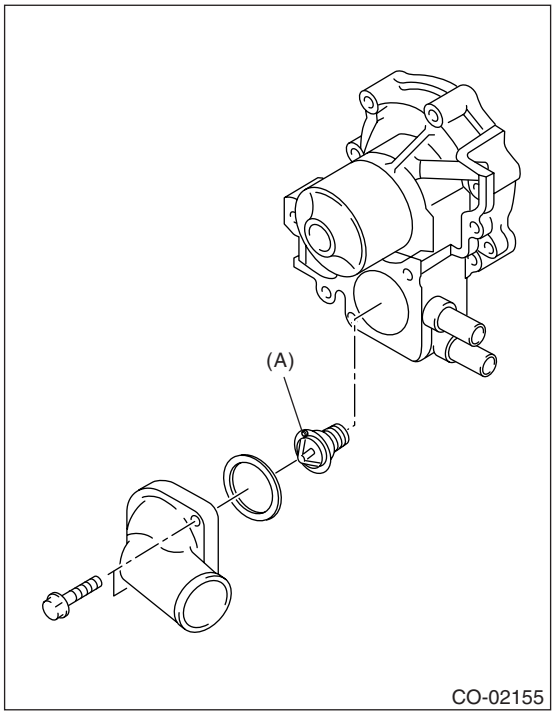
Tightening torque:
6.5 N·m (0.66 kgf-m, 4.7 ft-lb)



CO-02152

• Model with ATF warmer and heater cock.

Tightening torque:
12 N·m (1.2 kgf-m, 8.7 ft-lb)



2) Fill engine coolant. <Ref. to CO(H4SO)-15, FILLING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>

C: INSPECTION

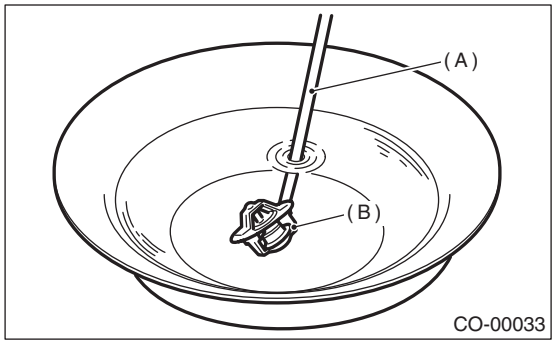
Replace the thermostat if the valve does not close completely at an ambient temperature or if the following test shows unsatisfactory results.
Immerse the thermostat and thermometer in water. Raise water temperature gradually, and measure the temperature and valve lift when the valve begins to open and when the valve is fully opened. During the test, agitate the water for even temperature distribution. The measurement should be to the specification.

NOTE:
• Leave the thermostat in the boiling water for more than five minutes before measuring the valve list.
• Hold the thermostat with a wire or the like to avoid contacting with container bottom.

Starts to open:
Model with OBD:
80 — 84°C (176 — 183°F)
Model without OBD:
76 — 80°C (169 — 176°F)

Fully opens:
Model with OBD:
95°C (203°F)
Model without OBD:
91°C (196°F)

Valve lift:
9.0 mm (0.354 in) or more



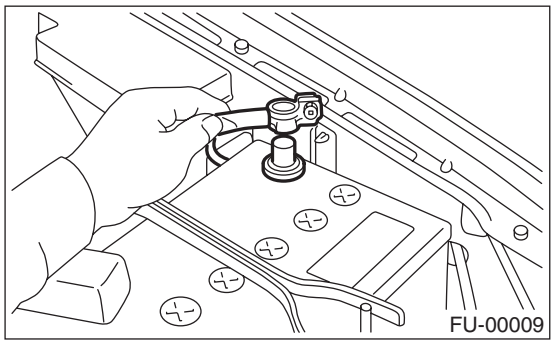
(A) Thermometer
(B) Thermostat

7. Radiator

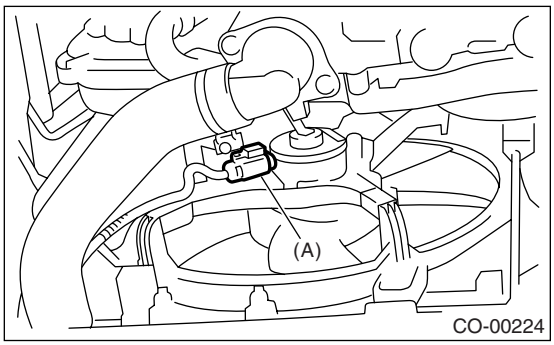
A: REMOVAL

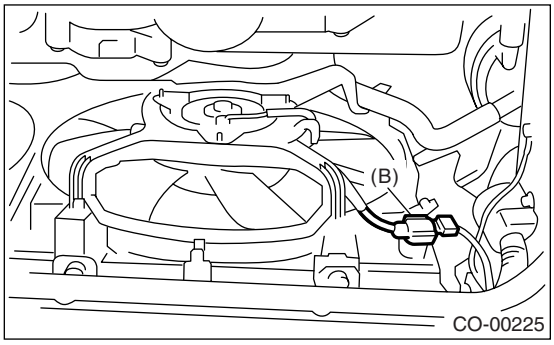
CAUTION:
Wait until the engine cools down before working since the radiator is pressurized.

1) Set the vehicle on a lift.
2) Disconnect the ground cable from battery.

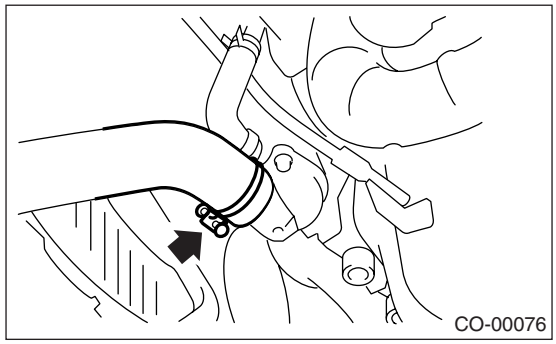


3) Lift-up the vehicle.
4) Remove the under cover.
5) Drain the engine coolant completely. <Ref. to CO(H4SO)-15, DRAINING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>
6) Disconnect the connectors of radiator main fan motor (A) and sub fan motor (B).

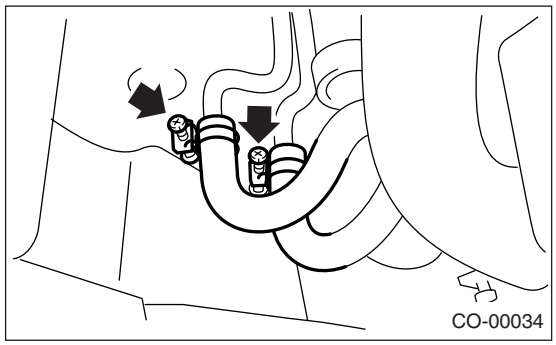




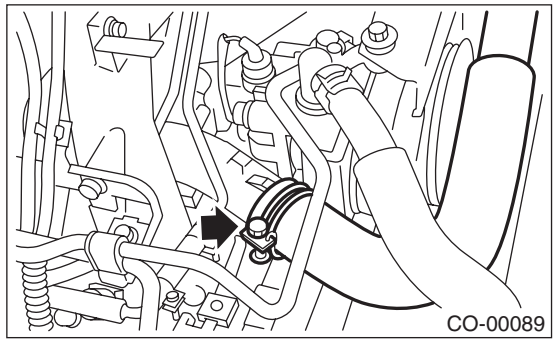
7) Disconnect the radiator outlet hose from water pump.



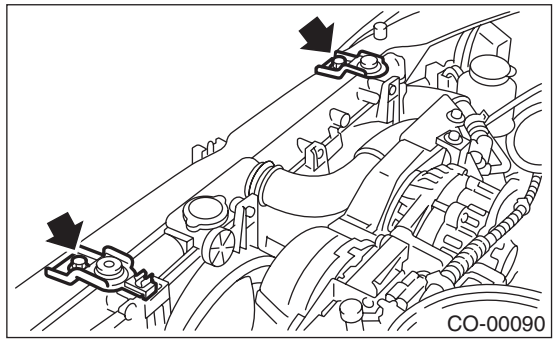
8) Disconnect the ATF hoses from ATF pipe. (AT model) Plug the openings in the hose and radiator with caps in order to prevent ATF from leaking.



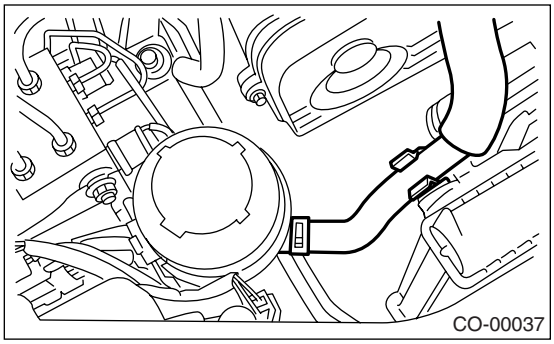
9) Lower the vehicle.
10) Disconnect the overflow hose.
11) Remove the reservoir tank. <Ref. to CO(H4SO)-30, REMOVAL, Reservoir Tank.>
12) Remove the air intake duct. (2.5 L model)
13) Disconnect the radiator inlet hose from engine.



14) Remove the radiator upper brackets.



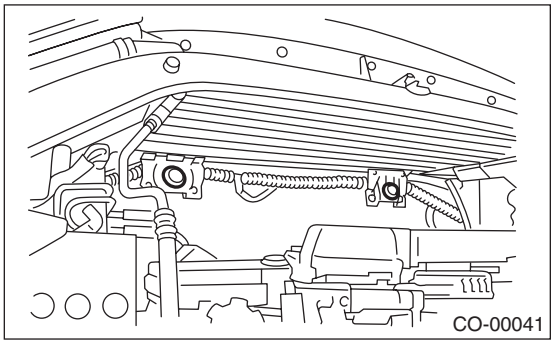
15) Detach the power steering hose from clip on radiator.



16) Lift the radiator up and away from the vehicle.

B: INSTALLATION

1) Attach the radiator lower cushions to holes on the radiator lower bracket.

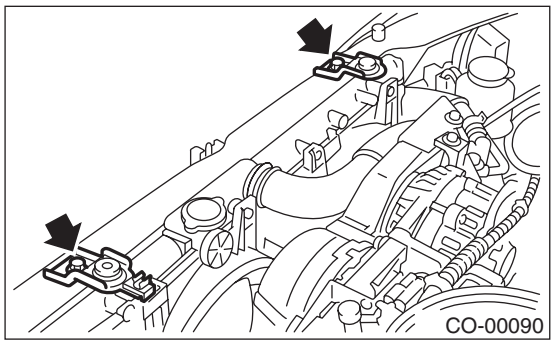


2) Install the radiator to vehicle.

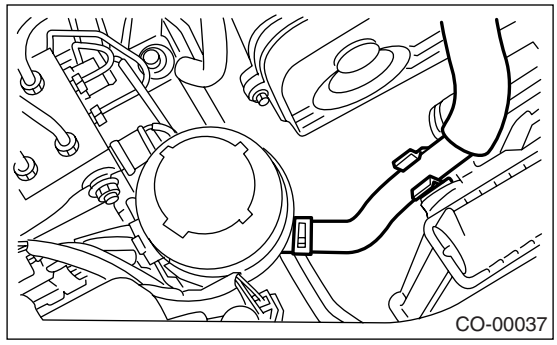
NOTE:
Fit the pins on lower side of radiator into the cushions on the body side.

3) Install the radiator upper brackets, and then tighten the bolts.

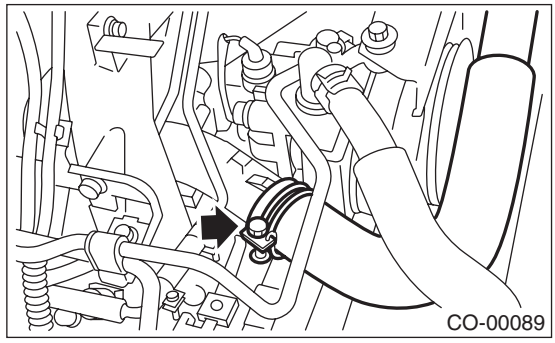
Tightening torque:
18 N·m (1.8 kgf-m, 13.0 ft-lb)



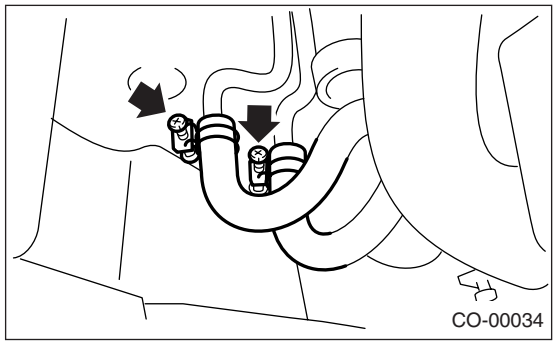
4) Attach the power steering hose to radiator.



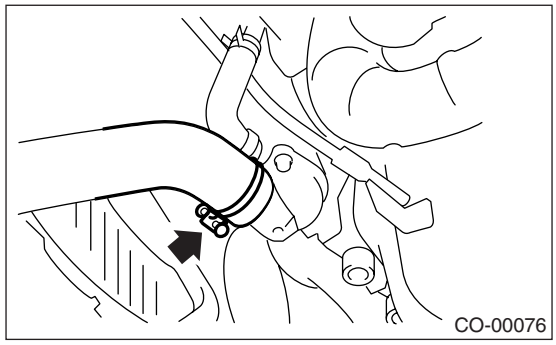
5) Connect the radiator inlet hose.



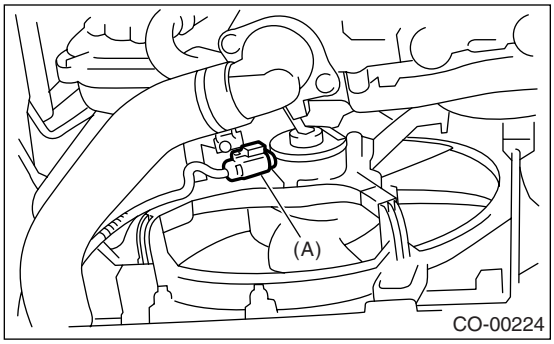
6) Install the air intake duct. (2.5 L model)
7) Install the reservoir tank.
8) Connect the overflow hose.
9) Lift-up the vehicle.
10) Connect the ATF hoses. (AT model)

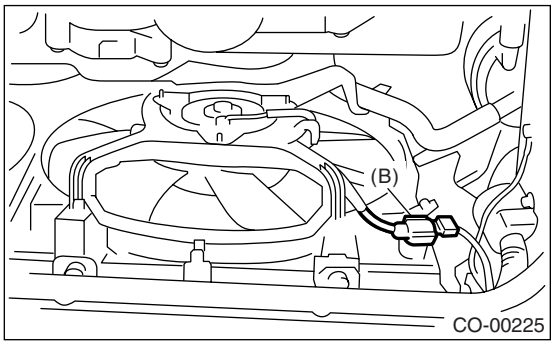


11) Connect the radiator outlet hose.

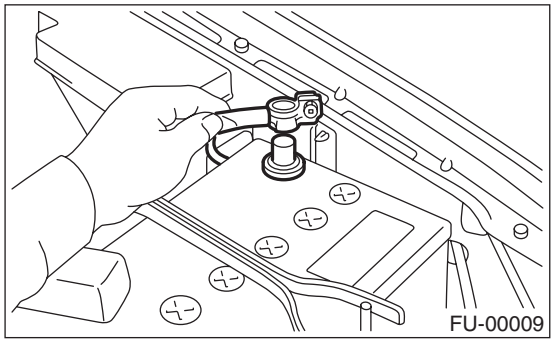


12) Connect the connectors to radiator main fan motor (A) and sub fan motor (B).





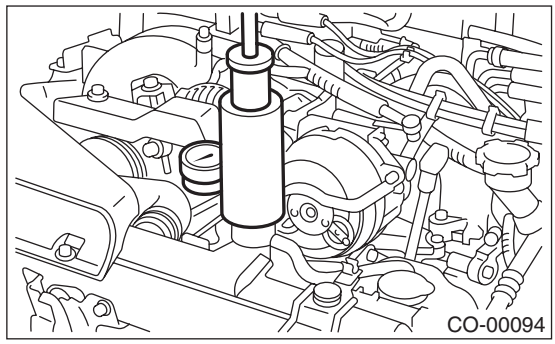
13) Install the under cover.
14) Lower the vehicle.
15) Connect the battery ground cable to battery.



16) Fill engine coolant. <Ref. to CO(H4SO)-15, FILLING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>
17) Check the ATF level. (AT model) <Ref. to 4AT-32, INSPECTION, Automatic Transmission Fluid.>

C: INSPECTION

1) Remove the radiator cap, top off radiator, and then attach the tester to radiator in place of cap.



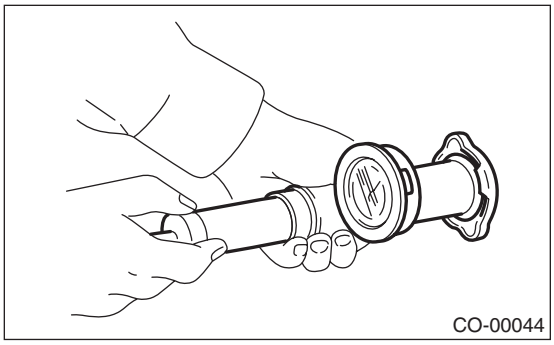
2) Apply a pressure of 157 kPa (1.6 kgf/cm^2, 23 psi) to the radiator to check if:
(1) Engine coolant leaks at/around radiator.
(2) Engine coolant leaks at/around hoses or connections.

CAUTION:
• Engine should be turned off.
• Wipe engine coolant from check points in advance.
• Be careful to prevent engine coolant from spurting out when removing the tester.
• Be careful also not to deform the filler neck of radiator when installing or removing tester.

8. Radiator Cap

A: INSPECTION

1) Attach the radiator cap to tester.



2) Increase the pressure until needle of tester gauge stops. Radiator cap is functioning properly if it holds the service limit pressure for 5 to 6 seconds.

Standard pressure:
93 — 123 kPa (0.95 — 1.25 kgf/cm^2 , 14 — 18 psi)

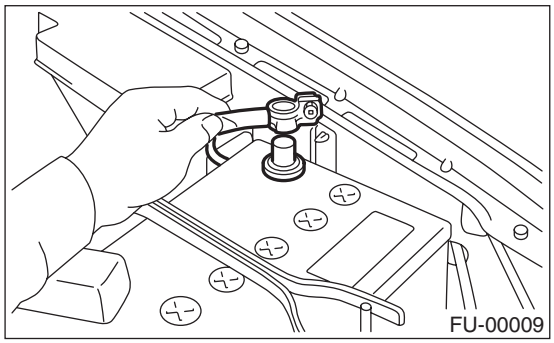
Service limit pressure:
83 kPa (0.85 kgf/cm^2, 12 psi)

CAUTION:
Be sure to remove foreign matter and rust from the cap in advance otherwise, results of pressure test will be incorrect.

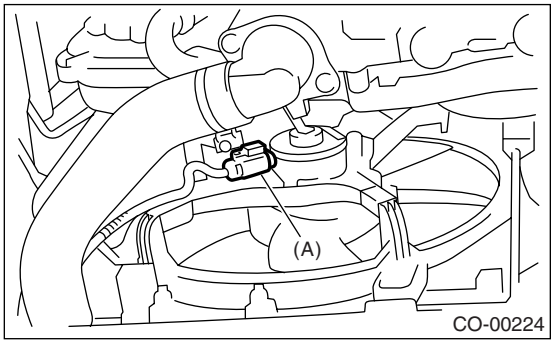
9. Radiator Main Fan and Fan Motor

A: REMOVAL

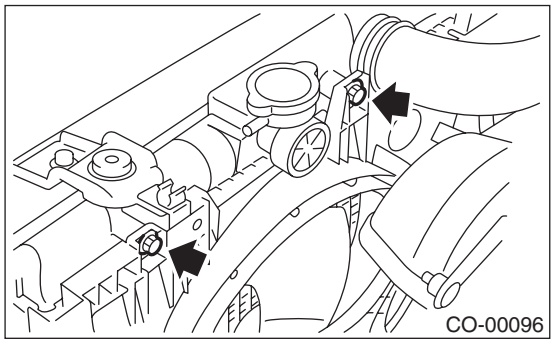
1) Set the vehicle on a lift.
2) Disconnect the ground cable from battery.



3) Lift-up the vehicle.
4) Remove the under cover.
5) Disconnect the connector of main fan motor (A).



6) Remove the ATF hose from clip of radiator main fan motor assembly. (AT model)
7) Lower the vehicle.
8) Disconnect the overflow hose.
9) Remove the reservoir tank. <Ref. to CO(H4SO)-30, REMOVAL, Reservoir Tank.>
10) Remove the bolts which secure the radiator main fan shroud to radiator.



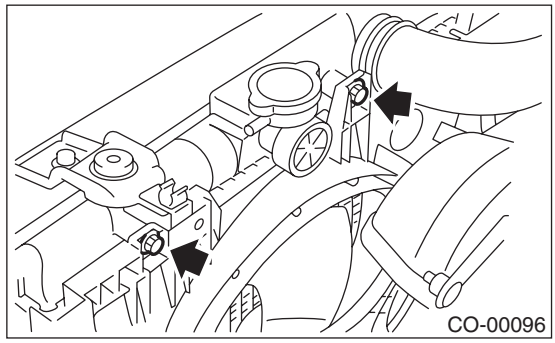
11) Remove the radiator fan motor assembly.

B: INSTALLATION

Install in the reverse order of removal.

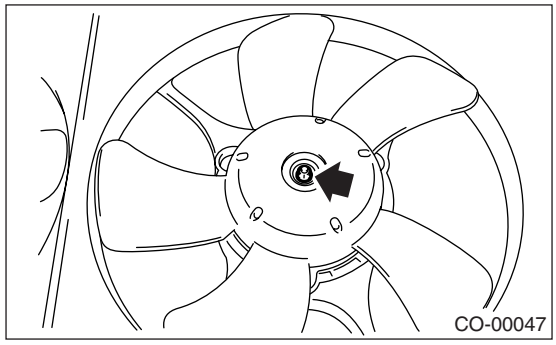
NOTE:
If it is difficult to install the radiator main fan motor assembly, first loosen the bolts which hold the radiator sub fan motor assembly.

Tightening torque:
4.9 N·m (0.50 kgf-m, 3.6 ft-lb)

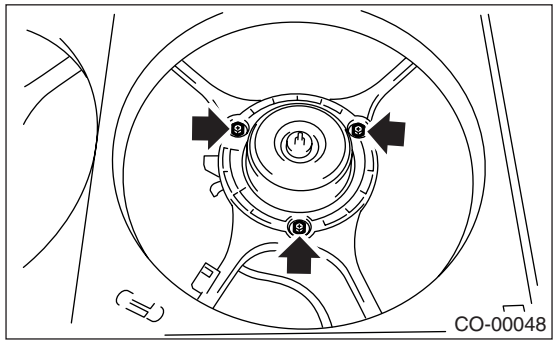


C: DISASSEMBLY

1) Remove the nut which holds the fan itself onto fan motor and shroud assembly.



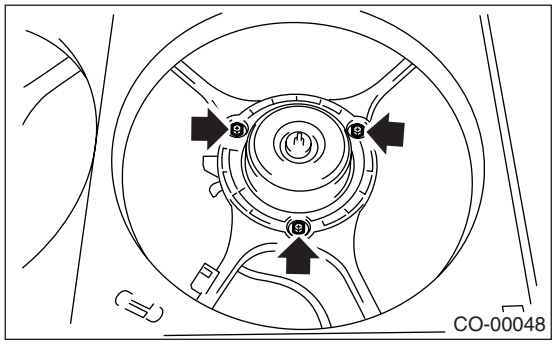
2) Remove the bolts which install the fan motor.



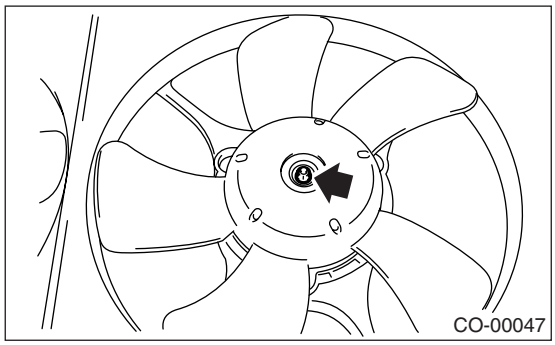
D: ASSEMBLY

Assemble in the reverse order of disassembly.

Tightening torque:
4.4 N·m (0.45 kgf-m, 3.3 ft-lb)



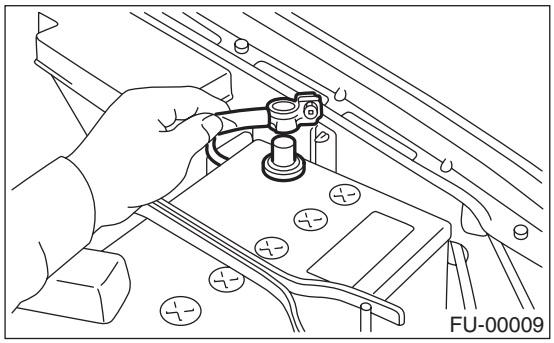
Tightening torque:
3.4 N·m (0.35 kgf-m, 2.5 ft-lb)



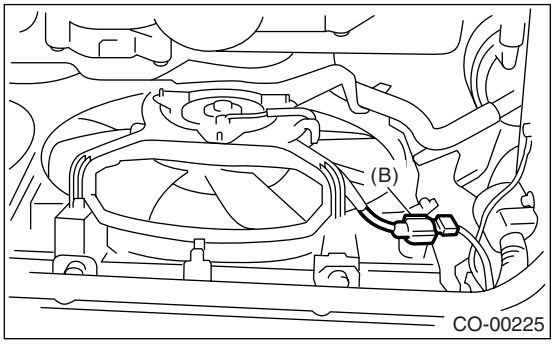
10. Radiator Sub Fan and Fan Motor

A: REMOVAL

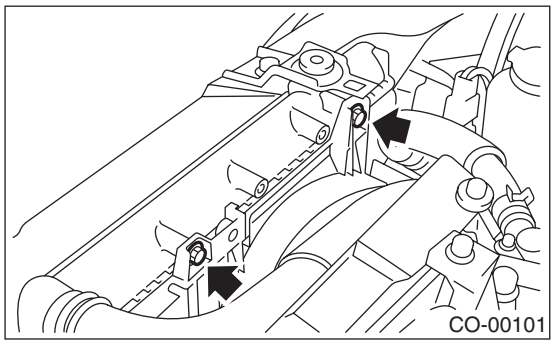
1) Set the vehicle on a lift.
2) Disconnect the ground cable from battery.



3) Lift-up the vehicle.
4) Remove the under cover.
5) Disconnect the connector of sub fan motor (B).



6) Remove the ATF hose from clips of radiator sub fan motor assembly. (AT model)
7) Lower the vehicle.
8) Remove the air intake duct. (2.5 L model)
9) Remove the bolts which hold the radiator sub fan shroud to radiator.

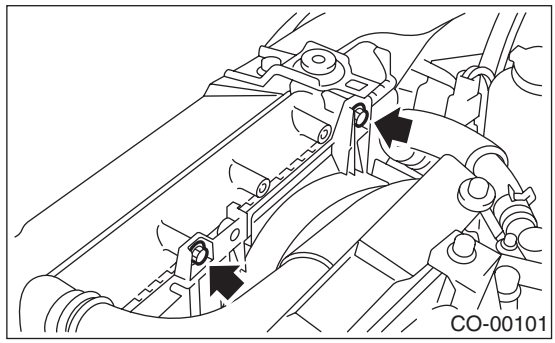


10) Remove the radiator sub fan motor assembly through the under side of vehicle.

B: INSTALLATION

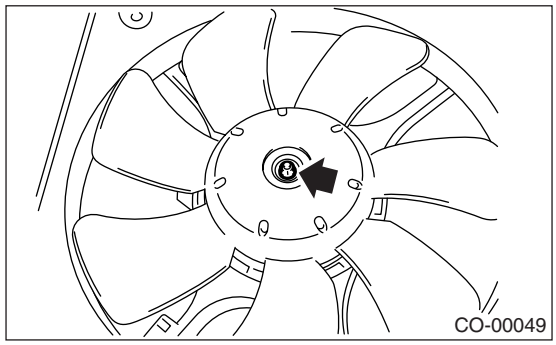
Install in the reverse order of removal.

Tightening torque:
49 N·m (0.50 kgf-m, 3.6 ft-lb)

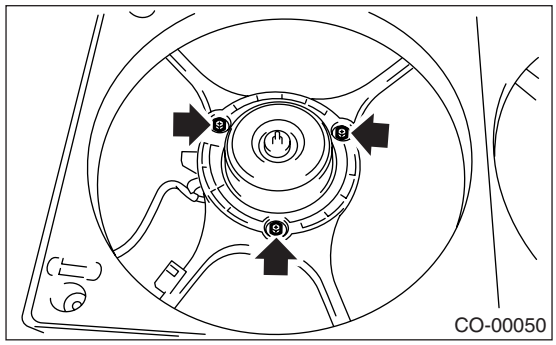


C: DISASSEMBLY

1) Remove the clip which holds the motor connector onto shroud.
2) Remove the nut which holds the fan itself onto fan motor.



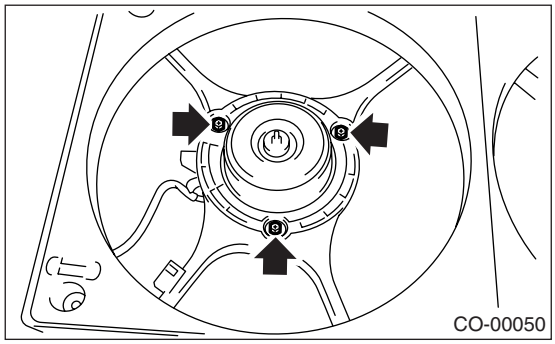
3) Remove the bolts which install the fan motor onto shroud.



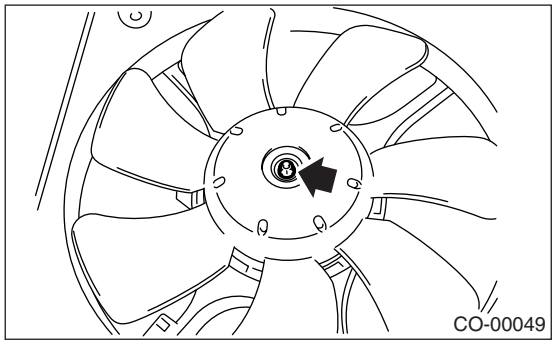
D: ASSEMBLY

Assemble in the reverse order of disassembly.

Tightening torque:
4.4 N·m (0.45 kgf-m, 3.3 ft-lb)



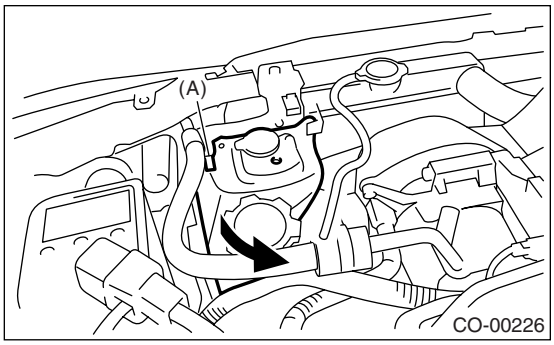
Tightening torque:
3.4 N·m (0.35 kgf-m, 2.5 ft-lb)



11.Reservoir Tank

A: REMOVAL

1) Disconnect the overflow hose from the radiator filler neck position.
2) Pressing the pawl (A), remove the reservoir tank by pulling in the direction indicated by the arrow.



B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

Make sure the engine coolant level is between full and low.

12.Engine Cooling System Trouble in General

A: INSPECTION

Trouble	Possible cause	Corrective action
Over-heating	a. Insufficient engine coolant	Replenish the engine coolant, inspect for leakage, and repair.
	b. Loose timing belt	Repair or replace the timing belt tensioner.
	c. Oil on timing belt	Replace.
	d. Malfunction of thermostat	Replace.
	e. Malfunction of water pump	Replace.
	f. Clogged engine coolant passage	Clean.
	g. Improper ignition timing	Inspect and repair the ignition control system. <Ref. to EN(H4SO)(diag)-2, Basic Diagnostic Procedure.> or <Ref. to EN(H4SOw/oOBD)(diag)-2, Basic Diagnostic Procedure.>
	h. Clogged or leaking radiator	Clean or repair, or replace.
	i. Improper engine oil in engine coolant	Check, repair or replace the parts around engine.
	j. Air/fuel mixture ratio too lean	Inspect and repair the fuel injection system. <Ref. to EN(H4SO)(diag)-2, Basic Diagnostic Procedure.> or <Ref. to EN(H4SOw/oOBD)(diag)-2, Basic Diagnostic Procedure.>
	k. Excessive back pressure in exhaust system	Clean or replace.
	l. Insufficient clearance between piston and cylinder	Adjust or replace.
	m. Slipping clutch	Repair or replace.
	n. Dragging brake	Adjust.
	o. Malfunction of radiator fan	Inspect the radiator fan relay, engine coolant temperature sensor or radiator motor and replace there.
Over-cooling	a. Atmospheric temperature extremely low	Partly cover the radiator front area.
	b. Defective thermostat	Replace.
Engine coolant leaks	a. Loosened or damaged connecting units on hoses	Repair or replace.
	b. Leakage from water pump	Replace.
	c. Leakage from water pipe	Repair or replace.
	d. Leakage around cylinder head gasket	Retighten the cylinder head bolts or replace gasket.
	e. Damaged or cracked cylinder head and crankcase	Repair or replace.
	f. Damaged or cracked thermostat case	Repair or replace.
	g. Leakage from radiator	Repair or replace.
Noise	a. Defective timing belt	Replace.
	b. Defective radiator fan	Replace.
	c. Defective water pump bearing	Replace the water pump.
	d. Defective water pump mechanical seal	Replace the water pump.

LUBRICATION

LU(H4SO)

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4. Oil Pump 12
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7. Engine Oil Filter....21
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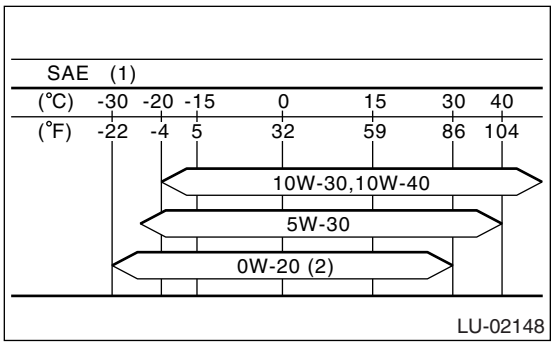
1. General Description

A: SPECIFICATION

Lubrication method				Forced lubrication
Oil pump	Pump type			Trochoid type
	Number of teeth	Inner rotor		9
		Outer rotor		10
	Outer rotor diameter × thickness			78 × 7 mm (3.07 × 0.28 in)
	Tip clearance between inner and outer rotor		STANDARD	0.04 — 0.14 mm (0.0016 — 0.0055 in)
			LIMIT	0.18 mm (0.0071 in)
	Side clearance between inner rotor and pump case		STANDARD	0.02 — 0.07 mm (0.0008 — 0.0028 in)
			LIMIT	0.12 mm (0.0047 in)
	Case clearance between outer rotor and pump case		STANDARD	0.10 — 0.175 mm (0.0039 — 0.0069 in)
			LIMIT	0.20 mm (0.0079 in)
	Capacity at 80°C (176°F)	600 rpm	Discharge pressure	98 kPa (1.0 kgf/cm^2, 14 psi)
			Discharge quantity	3.2 ℓ (3.4 US qt, 2.8 Imp qt)/min.
		5,000 rpm	Discharge pressure	294 kPa (3.0 kgf/cm^2, 43 psi)
			Discharge quantity	32.6 ℓ (34.4 US qt, 28.7 Imp qt)/min.
	Relief valve operation pressure			490 kPa (5.0 kgf/cm^2, 71 psi)
Oil filter	Type			Full-flow filter type
	Filtration area	Diameter 65 mm (2.56 in)		470 cm^2 (73 sq in)
		Diameter 68 mm (2.68 in)		800 cm^2 (124 sq in)
		Diameter 80 mm (3.15 in)		760 cm^2 (118 sq in)
	By-pass valve opening pressure			157 kPa (1.60 kgf/cm^2, 22.8 psi)
	Outer diameter × width	Diameter 65 mm (2.56 in)		65 × 74.4 mm (2.56 × 2.93 in)
		Diameter 68 mm (2.68 in)		68 × 65 mm (2.68 × 2.56 in)
		Diameter 80 mm (3.15 in)		80 × 70 mm (3.15 × 2.76 in)
	Oil filter to engine thread size			M 20 × 1.5
Oil pressure switch	Type			Immersed contact point type
	Working voltage — wattage			12 V — 3.4 W or less
	Warning light activation pressure			14.7 kPa (0.15 kgf/cm^2, 2.1 psi)
	Proof pressure			More than 981 kPa (10 kgf/cm^2, 142 psi)
Oil capacity (at replacement)				4.0 ℓ (4.2 US qt, 3.5 Imp qt)

Recommended oil:

API standard SL, SJ with the "Energy Conserving" logo is printed (if you cannot obtain the oil with SL, SJ grade, you may use SH grade "ENERGY CONSERVING" oil.)
ACEA standard A1, A2 or A3
ILSAC standard, GF-3 "Star burst mark" label is on the container



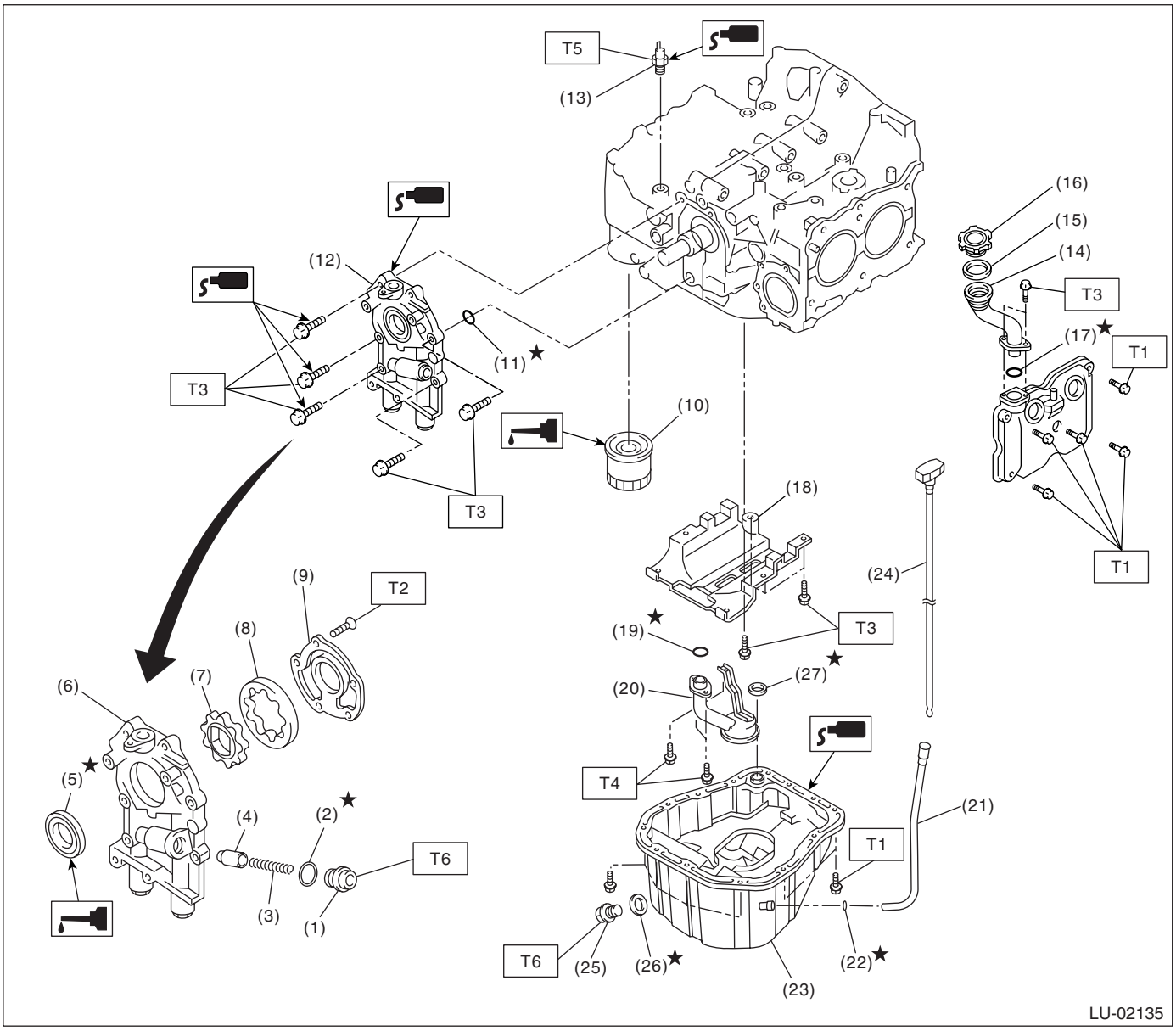
(1) SAE viscosity No. and applicable temperature
(2) Recommend

The proper viscosity helps vehicle get good cold and hot starting by reducing viscous friction and thus increasing cranking speed.

CAUTION:
When replenishing oil, it does not matter if the oil to be added is a different brand from that in the engine; however, use oil having the API standard and SAE viscosity No. designated by SUBARU.

NOTE:
If the vehicle is used in areas with very high temperatures or for other heavy duty applications, the following viscosity oils may be used: API standard: SL or SJ
SAE Viscosity No.: 30, 40, 10W-50, 20W-40, 20W-50.

B: COMPONENT



(1) Plug
(2) Gasket
(3) Relief valve spring
(4) Relief valve
(5) Oil seal
(6) Oil pump case
(7) Inner rotor
(8) Outer rotor
(9) Oil pump cover
(10) Oil filter
(11) O-ring
(12) Oil pump ASSY
(13) Oil pressure switch
(14) Oil filler duct
(15) O-ring
(16) Oil filler cap
(17) O-ring
(18) Baffle plate
(19) O-ring
(20) Oil strainer
(21) Oil level gauge guide
(22) O-ring
(23) Oil pan
(24) Oil level gauge
(25) Drain plug
(26) Metal gasket
(27) Gasket

Tightening torque: N·m (kgf-m, ft-lb)

T1:	***5 (0.5, 3.6)***
T2:	***5.4 (0.55, 4.0)***
T3:	***6.4 (0.65, 4.7)***
T4:	***10 (1.0, 7.2)***
T5:	***25 (2.5, 18.1)***
T6:	***44 (4.5, 32.5)***

C: CAUTION

• Wear working clothing, including a cap, protective goggles, and protective shoes during operation.
• Remove contamination including dirt and corrosion before removal, installation or disassembly.
• Keep the disassembled parts in order and protect them from dust or dirt.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly, and replacement.
• Be careful not to burn, because each part in the vehicle is hot after running.
• Be sure to tighten fasteners including bolts and nuts to the specified torque.
• Place shop jacks or rigid racks at the specified points.
• Before disconnecting electrical connectors of sensors or units, be sure to disconnect the ground cable from battery.

D: PREPARATION TOOL

1. SPECIAL TOOLS

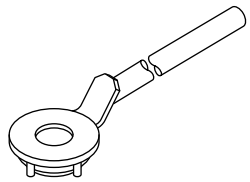
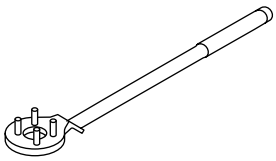
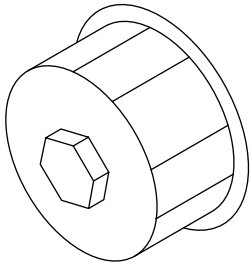
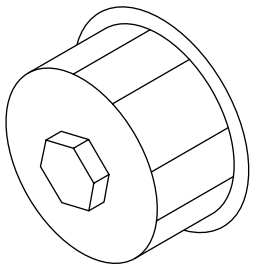
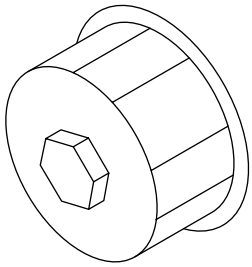
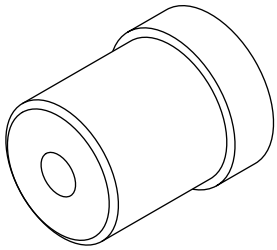
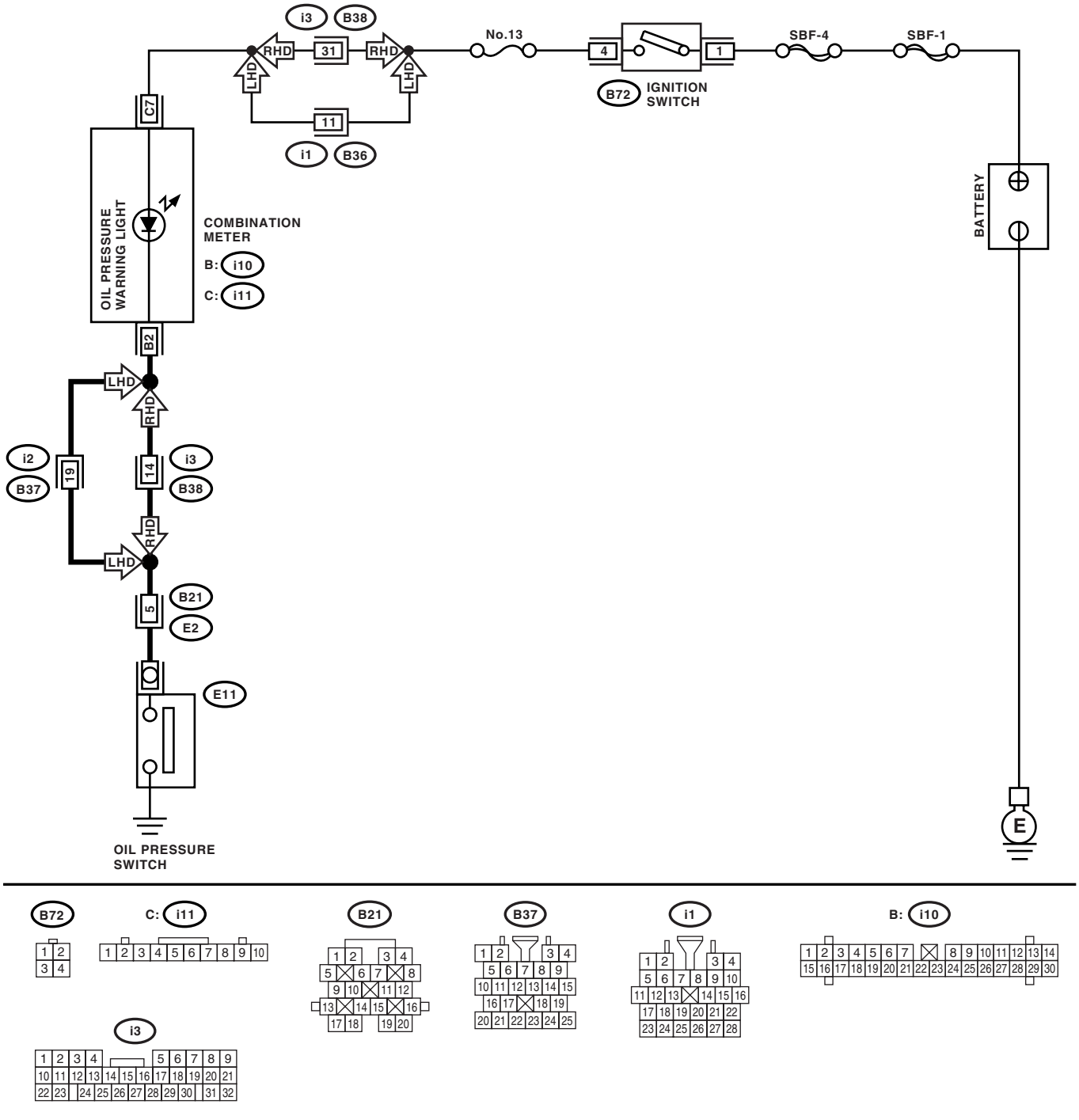
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499977400	499977400	CRANK PULLEY WRENCH	• Used for stopping rotation of crank pulley when loosening and tightening crank pulley bolt. • For 1.6 L and 2.0 L models.
 ST-499977100	499977100	CRANK PULLEY WRENCH	• Used for stopping rotation of crank pulley when loosening and tightening crank pulley bolt. • For 2.5 L model.
 ST-498547000	498547000	OIL FILTER WRENCH	• Used for removing and installing oil filter. • For oil filter (Outer diameter: 80 mm (3.15 in))
 ST18332AA000	18332AA000	OIL FILTER WRENCH	• Used for removing and installing oil filter. • For oil filter (Outer diameter: 68 mm (2.68 in))

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18332AA010	18332AA010	OIL FILTER WRENCH	• Used for removing and installing oil filter. • For oil filter (Outer diameter: 65 mm (2.56 in))
 ST-499587100	499587100	OIL SEAL INSTALLER	Used for installing oil pump oil seal.

2. Oil Pressure System

A: WIRING DIAGRAM



LU-02154

B: INSPECTION

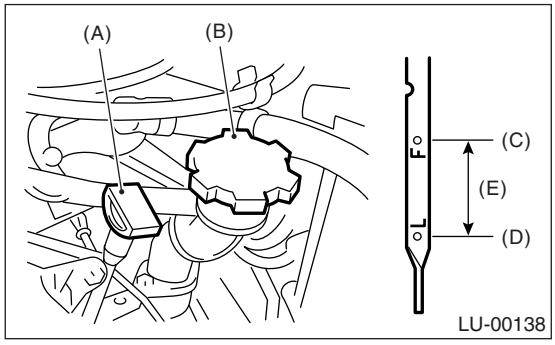
	Step	Check	Yes	No
1	**CHECK COMBINATION METER.** 1) Turn the ignition switch to ON. (engine OFF) 2) Check other warning lights.	Does the warning lights go on?	Go to step **2.**	Repair or replace the combination meter. <Ref. to IDI-3, INSPECTION, Combination Meter System.>
2	**CHECK HARNESS CONNECTOR BETWEEN COMBINATION METER AND OIL PRESSURE SWITCH.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from oil pressure switch. 3) Turn the ignition switch to ON. 4) Measure the voltage of harness between the oil pressure switch connector and chassis ground. ***Connector & terminal*** ***(E11) No. 1 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Replace the oil pressure switch.	Go to step **3.**
3	**CHECK COMBINATION METER.** 1) Turn the ignition switch to OFF. 2) Remove the combination meter. 3) Measure the resistance of combination meter. ***Terminal*** ***(i11) No. 7 — (i10) No. 2:***	Is the resistance less than 10 Ω?	Replace the harness connector between combination meter and oil pressure switch.	Repair or replace the combination meter. <Ref. to IDI-3, INSPECTION, Combination Meter System.>

3. Engine Oil

A: INSPECTION

1) Park the vehicle on a level surface.
2) Remove the oil level gauge and wipe it clean.
3) Reinsert the oil level gauge all the way. Be sure that the oil level gauge is correctly inserted and in the proper orientation.
4) Remove the oil level gauge again and check the level. If the engine oil level is below the “L” line, add oil to bring the level up to “F” line.
5) After turning off the engine, wait a few minutes for the oil to drain back into the oil pan before checking the level.
6) Just after driving or while the engine is warm, engine oil level may show in the range between the “F” line and notch mark. This is caused by thermal expansion of the engine oil.

NOTE:
To prevent overfilling the engine oil, do not add oil above the “F” line when the engine is cold.

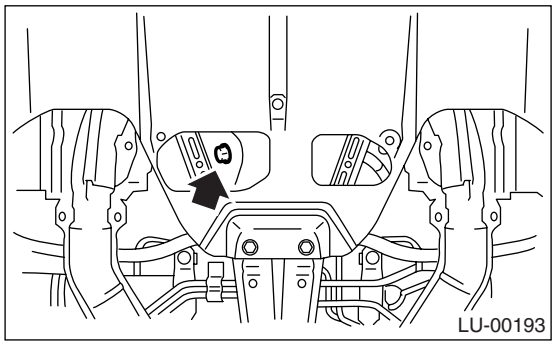


(A) Oil level gauge
(B) Engine oil filler cap
(C) Upper level
(D) Lower level
(E) Approx. 1.0 ℓ (1.1 US qt, 0.9 Imp qt)

B: REPLACEMENT

1) Open the engine oil filler cap for quick draining of the engine oil.
2) Lift up the vehicle.
3) Drain the engine oil by loosening the engine oil drain plug.

NOTE:
Prepare the container for draining of engine oil.



4) Tighten the engine oil drain plug after draining engine oil.

NOTE:
- Replace the drain plug gasket.
- Refer to COMPONENT of General Description for tightening torque. <Ref. to LU(H4SO)-4, COMPONENT, General Description.>

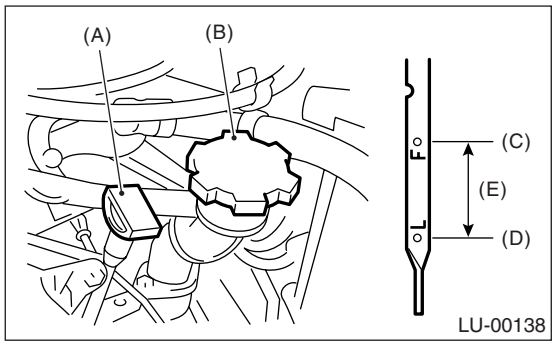
5) Using the engine oil of proper quality and viscosity, fill engine oil through the filler duct up to upper level on level gauge. Make sure that the vehicle is placed level when checking oil level.

Recommended oil
Refer to “SPECIFICATION” for recommended oil. <Ref. to LU(H4SO)-2, SPECIFICATION, General Description.>

Engine oil capacity:
Upper level
4.0 ℓ (4.2 US qt, 3.5 Imp qt)
Lower level
3.0 ℓ (3.2 US qt, 2.6 Imp qt)

6) Close the engine oil filler cap.
7) Start the engine and warm it up for a time.

8) After the engine stops, recheck the oil level. If necessary, add engine oil up to the upper level on level gauge.

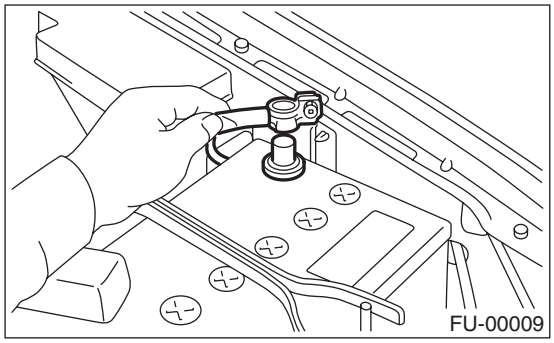


(A) Oil level gauge
(B) Engine oil filler cap
(C) Upper level
(D) Lower level
(E) Approx. 1.0 ℓ (1.1 US qt, 0.9 Imp qt)

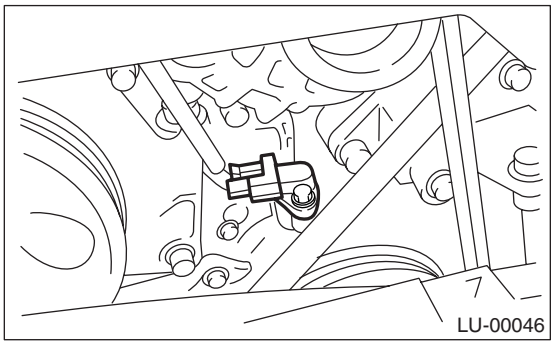
4. Oil Pump

A: REMOVAL

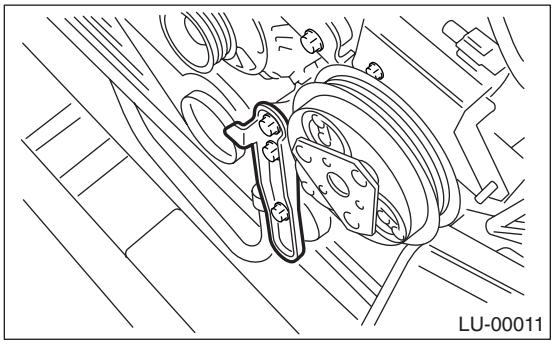
1) Disconnect the ground cable from battery.



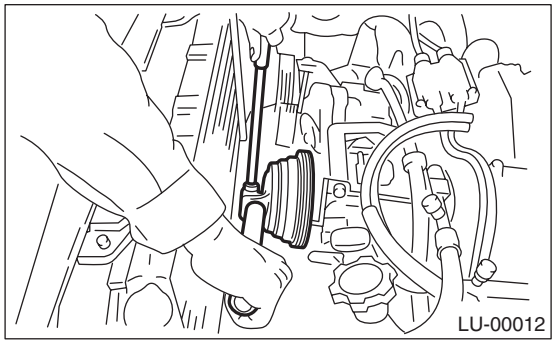
2) Lift-up the vehicle.
3) Remove the under cover.
4) Lower the vehicle.
5) Remove the radiator. <Ref. to CO(H4SO)-22, REMOVAL, Radiator.>
6) Remove the crank position sensor.



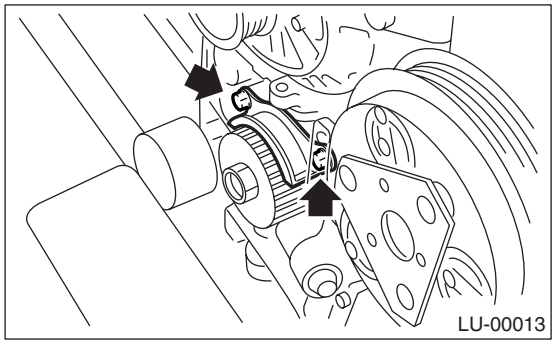
7) Remove the V-belts.
<Ref. to ME(H4SO)-41, REMOVAL, V-belt.>
8) Remove the belt tensioner.



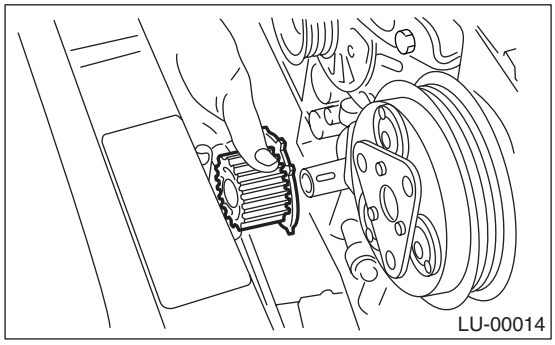
9) Remove the crank pulley by using ST.
ST 499977400 CRANK PULLEY WRENCH (1.6 L and 2.0 L models)
ST 499977100 CRANK PULLEY WRENCH (2.5 L model)



10) Remove the water pump. <Ref. to CO(H4SO)-17, REMOVAL, Water Pump.>
11) Remove the timing belt guide. (MT model)

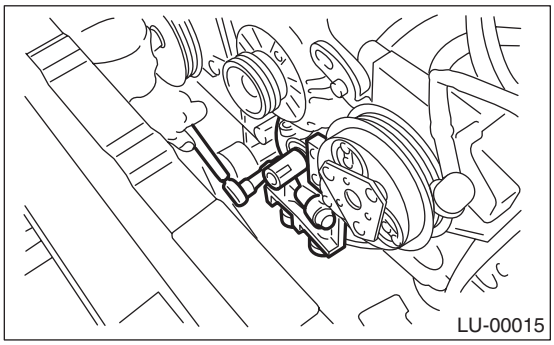


12) Remove the crank sprocket.



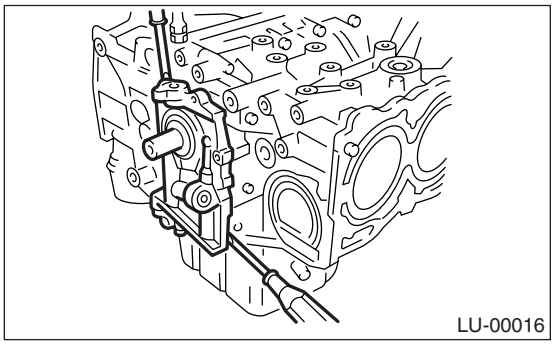
13) Remove the bolts which install the oil pump onto cylinder block.

NOTE:
If disassembling or inspecting the oil pump, loosen the plug of relief valve before removing the oil pump.


LU-00015

14) Remove the oil pump by using flat tip screwdriver.

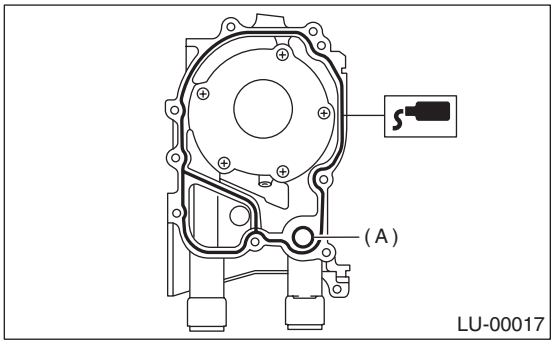
CAUTION:
Be careful not to scratch the mating surfaces of cylinder block and oil pump.


LU-00016

B: INSTALLATION

Install in the reverse order of removal.
Do the following:
1) Apply liquid gasket to the matching surfaces of oil pump.

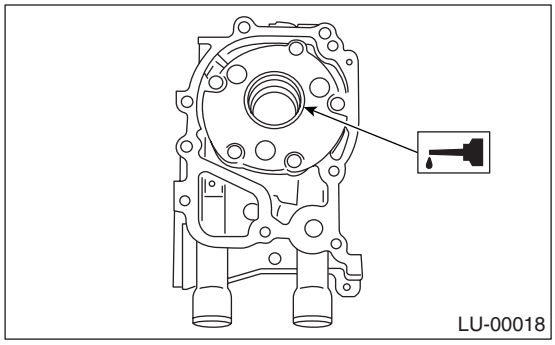
Liquid gasket:
THREE BOND 1215 (Part No. 004403007) or equivalent



LU-00017

2) Replace the O-ring (A) with a new one.

3) Apply a coat of engine oil to the inside of oil seal.


LU-00018

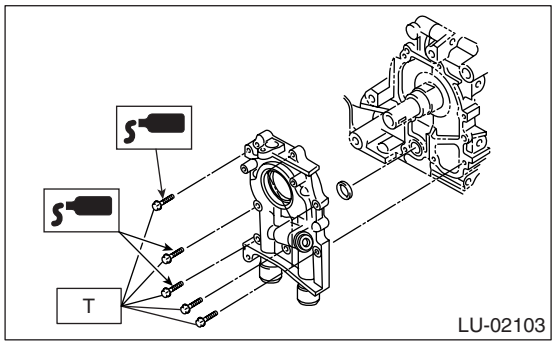
4) Position the oil pump, aligning the notched area with crankshaft, and push the oil pump straight.

CAUTION:
- **Do not fold the oil seal lip.**
- **Do not forget to install the O-ring and seal when installing the oil pump.**

5) Install the oil pump.
6) Apply liquid gasket to the threaded portion of three bolts in. (If reusing the bolts.)

Liquid gasket:
THREE BOND 1215 (Part No. 004403007) or equivalent

Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)

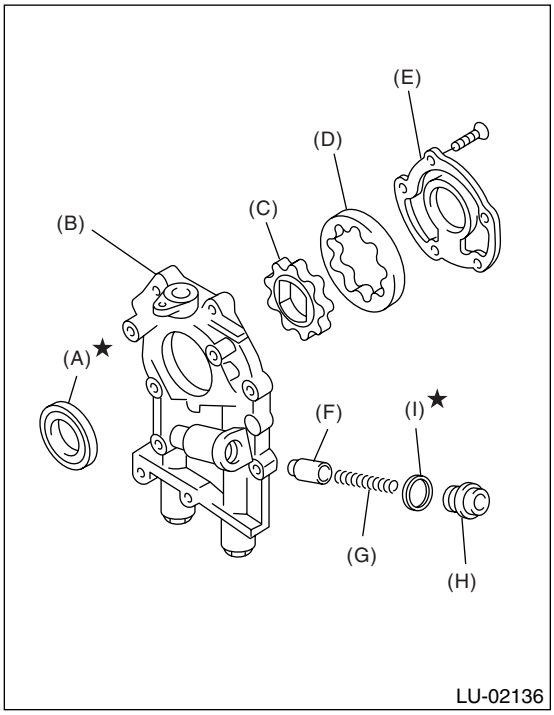


LU-02103

C: DISASSEMBLY

Remove the screws which secure the oil pump cover and disassemble oil pump. Inscribe alignment marks on the inner and outer rotors so that they can be replaced in their original positions during reassembly.

CAUTION:
Before disassembling the oil pump, remove the relief valve.

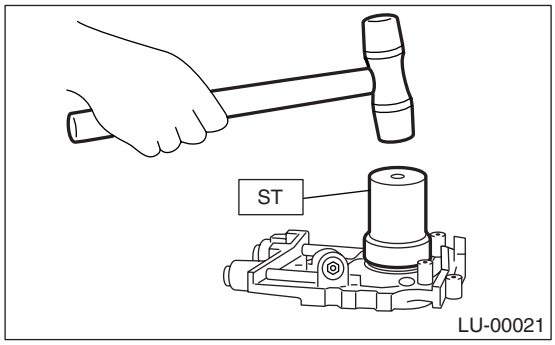


(A) Oil seal
(B) Oil pump case
(C) Inner rotor
(D) Outer rotor
(E) Oil pump cover
(F) Relief valve
(G) Relief valve spring
(H) Plug
(I) Gasket

D: ASSEMBLY

1) Install the front oil seal by using ST.
ST 499587100 OIL SEAL INSTALLER

NOTE:
Use a new oil seal.

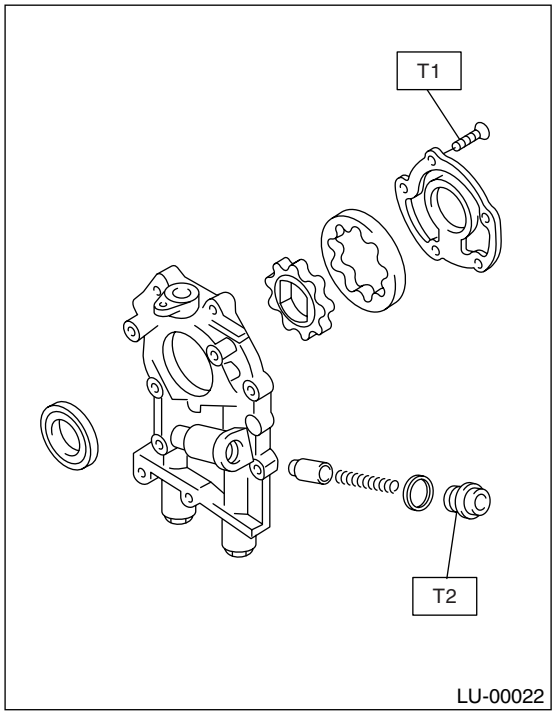


2) Apply a coat of engine oil to the inner and outer rotors.
3) Install the inner and outer rotors in their original positions.
4) Install the oil relief valve and relief valve spring and plug.

NOTE:
Use a new gasket.

5) Install the oil pump cover.

Tightening torque:
T1: 5.4 N·m (0.55 kgf-m, 4.0 ft-lb)
T2: 44 N·m (4.5 kgf-m, 32.5 ft-lb)

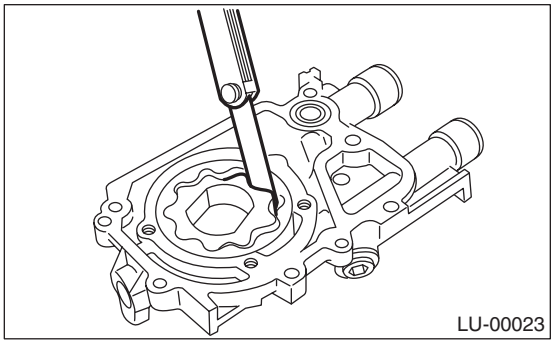


E: INSPECTION

1. TIP CLEARANCE

Measure the tip clearance of rotors. If clearance exceeds the limit, replace the rotors as a matched set.

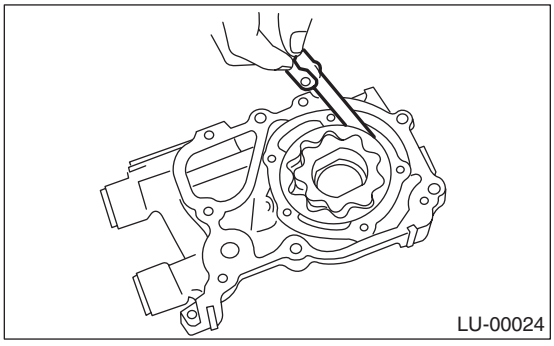
Tip clearance:
Standard
0.04 — 0.14 mm (0.0016 — 0.0055 in)
Limit
0.18 mm (0.0071 in)



2. CASE CLEARANCE

Measure the clearance between the outer rotor and oil pump rotor housing. If clearance exceeds the limit, replace the rotor.

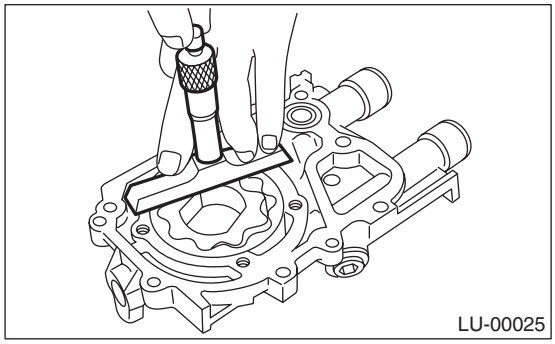
Case clearance:
Standard
0.10 — 0.175 mm (0.0039 — 0.0069 in)
Limit
0.20 mm (0.0079 in)



3. SIDE CLEARANCE

Measure the clearance between the oil pump inner rotor and pump cover. If clearance exceeds the limit, replace the rotor or pump body.

Side clearance:
Standard
0.02 — 0.07 mm (0.0008 — 0.0028 in)
Limit
0.12 mm (0.0047 in)



4. OIL RELIEF VALVE

Check the valve for fitting condition and damage, and the relief valve spring for damage and deterioration. Replace the parts if defective.

Relief valve spring:
Free length
72.8 mm (2.866 in)
Installed length
54.7 mm (2.154 in)
Load when installed
81.3 N (8.29 kgf, 18.24 lbf)

5. OIL PUMP CASE

Check the oil pump case for worn shaft hole, clogged oil passage, worn rotor chamber, cracks, and other faults.

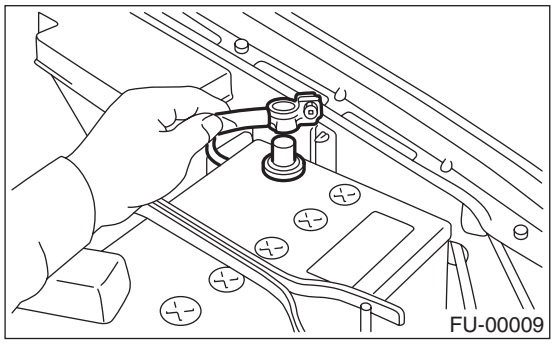
6. OIL SEAL

Check the oil seal lips for deformation, hardening, wear, etc. and replace if defective.

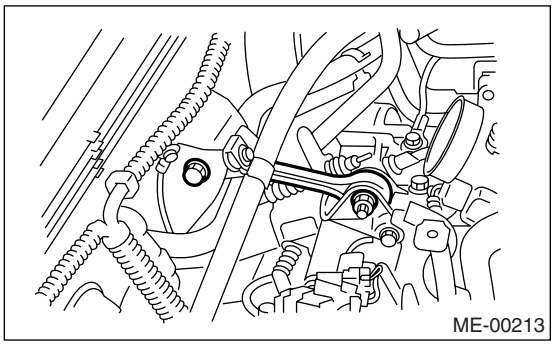
5. Oil Pan and Strainer

A: REMOVAL

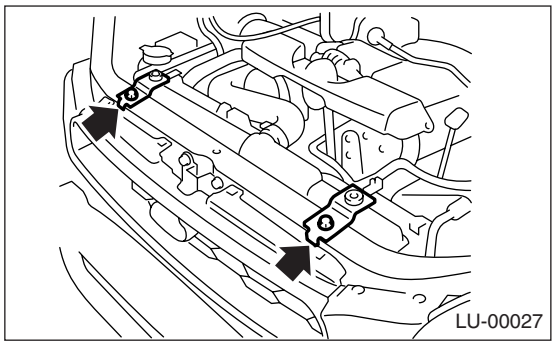
1) Set the vehicle on a lift.
2) Remove the front wheels.
3) Disconnect the ground cable from battery.



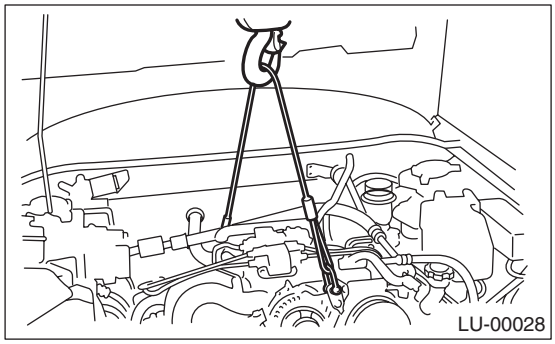
4) Remove the air intake duct and air cleaner case. <Ref. to IN(H4SO)-6, REMOVAL, Air Intake Duct.> and <Ref. to IN(H4SO)-5, REMOVAL, Air Cleaner Case.>
5) Remove the resonator chamber. <Ref. to IN(H4SO)-7, REMOVAL, Resonator Chamber.>
6) Remove the pitching stopper.



7) Remove the radiator upper brackets.



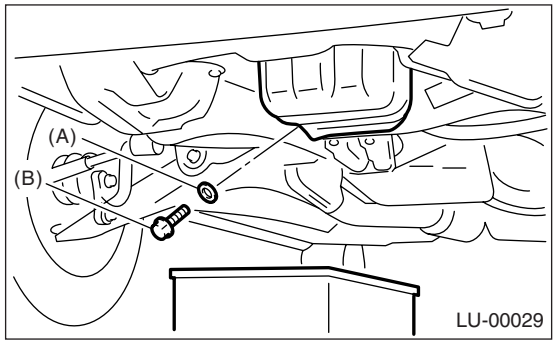
8) Support the engine with a lifting device and wire ropes.



9) Lift-up the vehicle.

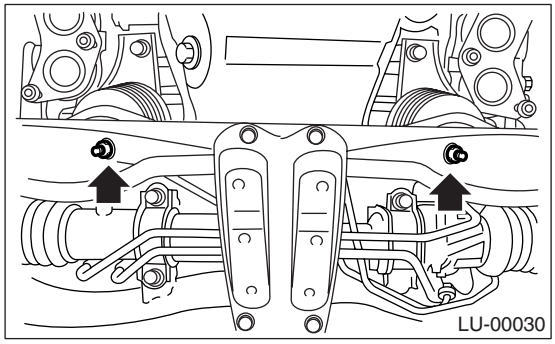
CAUTION:
When lifting up the vehicle, rise up the wire rope together.

10) Remove the under cover.
11) Drain the engine oil.
Set a container under the vehicle, and then remove the drain plug from oil pan.



(A) Gasket
(B) Drain plug

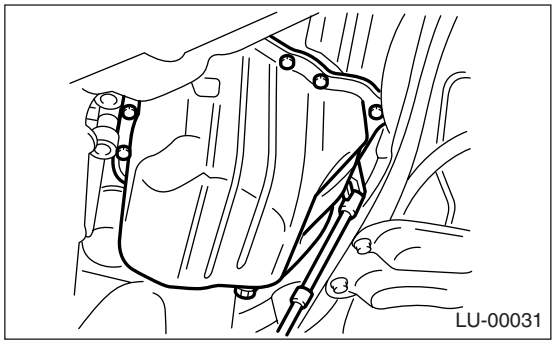
12) Remove the front and center exhaust pipes. <Ref. to EX(H4SO)-6, REMOVAL, Front Exhaust Pipe.> and <Ref. to EX(H4SOw/oOBD)-6, REMOVAL, Front Exhaust Pipe.>
13) Remove the nuts which install the front cushion rubber onto front crossmember.



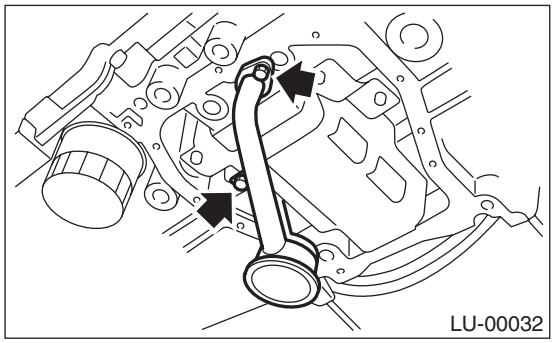
14) Remove the bolts which install the oil pan on cylinder block while raising up engine.

15) Insert the oil pan cutter blade between the cylinder block to oil pan clearance.

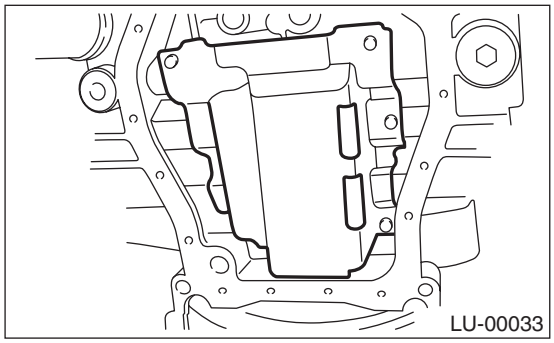
CAUTION:
Do not use a screwdriver or similar tool in place of oil pan cutter.


LU-00031

16) Remove the oil strainer.


LU-00032

17) Remove the baffle plate.

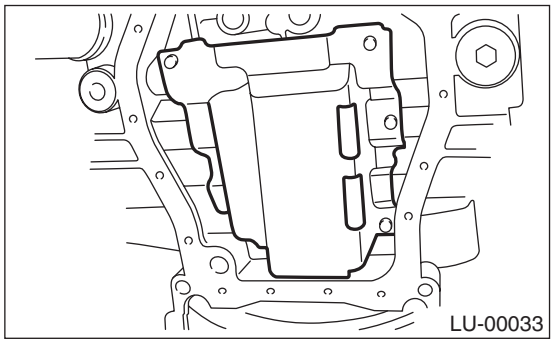

LU-00033

B: INSTALLATION

CAUTION:
Before installing the oil pan, clean the sealant from oil pan and engine block.

1) Install the baffle plate.

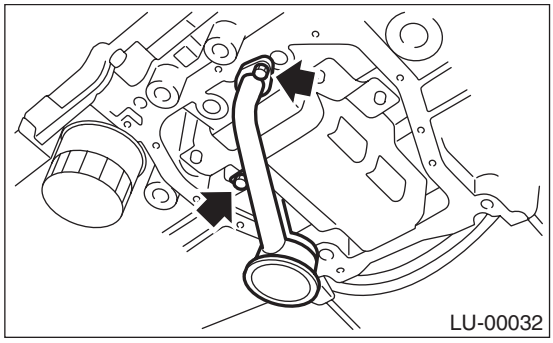
Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)


LU-00033

2) Install the oil strainer onto baffle plate.

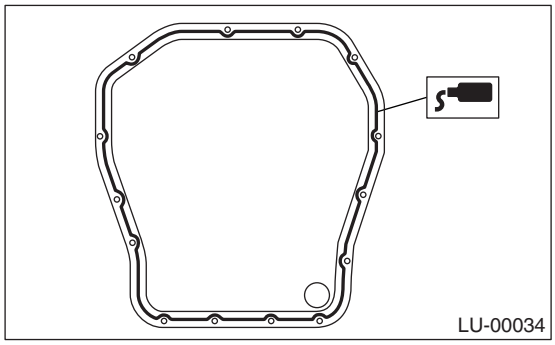
NOTE:
Replace the O-ring with a new one.

Tightening torque:
10 N·m (1.0 kgf-m, 7.2 ft-lb)


LU-00032

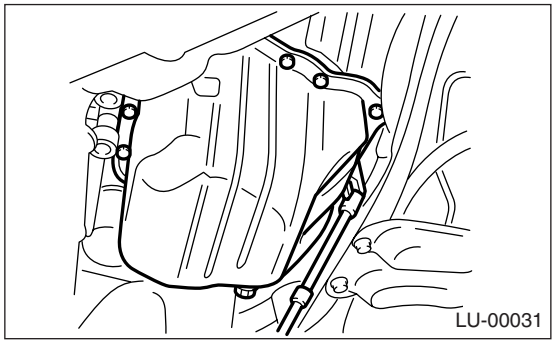
3) Apply liquid gasket to the mating surfaces, and then install the oil pan.

Liquid gasket:
THREE BOND 1207C (Part No. 004403012) or equivalent


LU-00034

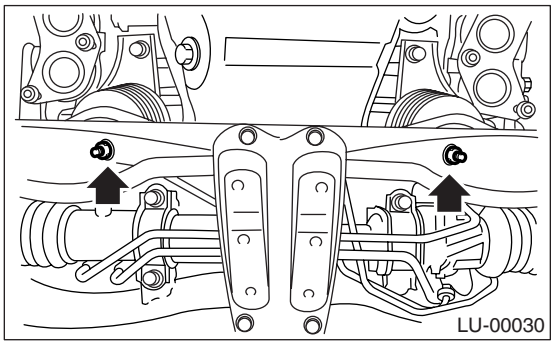
4) Tighten the bolts which install the oil pan onto engine block.

Tightening torque:
5 N·m (0.5 kgf-m, 3.6 ft-lb)



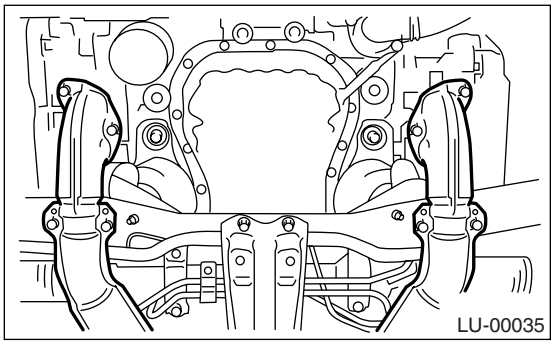
5) Lower the engine onto front crossmember.
6) Tighten the nuts which install the front cushion rubber onto front crossmember.

Tightening torque:
85 N·m (8.7 kgf-m, 62.7 ft-lb)



7) Install the front and center exhaust pipes. <Ref. to EX(H4SO)-7, INSTALLATION, Front Exhaust Pipe.> and <Ref. to EX(H4SOw/oOBD)-7, INSTALLATION, Front Exhaust Pipe.>

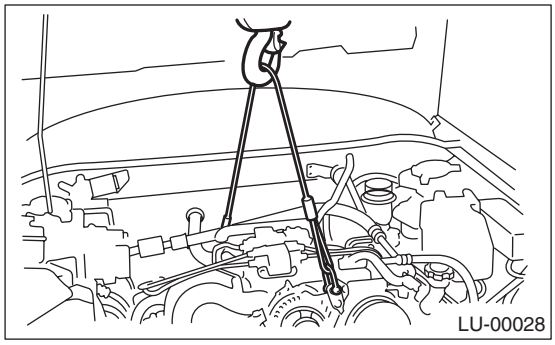
NOTE:
Always use new gaskets.



8) Install the under cover.
9) Lower the vehicle.

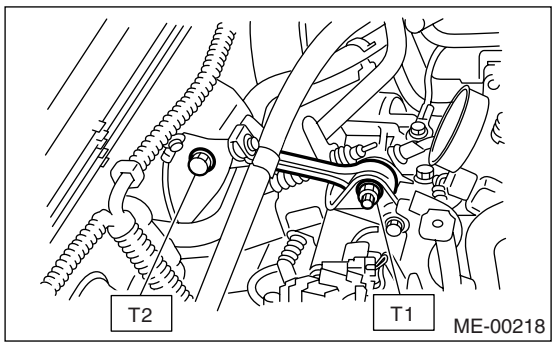
CAUTION:
When lowering the vehicle, lower the lifting device and wire rope together.

10) Remove the lifting device and steel cables.

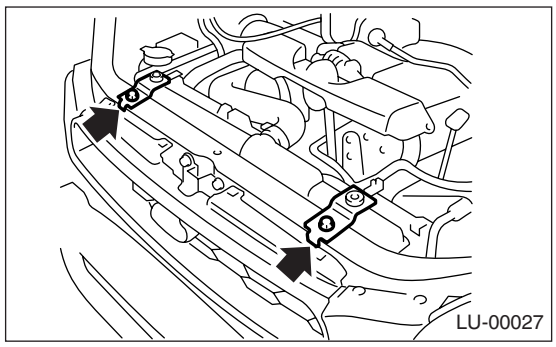


11) Install the pitching stopper.

Tightening torque:
T1: 50 N·m (5.1 kgf-m, 36.9 ft-lb)
T2: 58 N·m (5.9 kgf-m, 42.8 ft-lb)

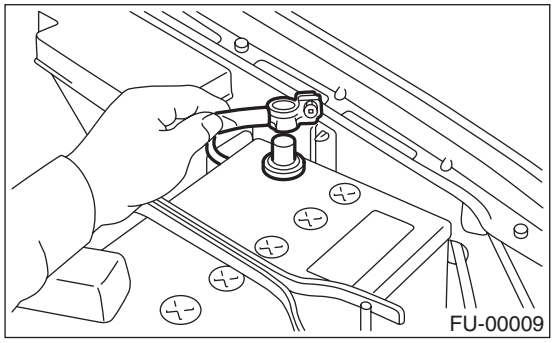


12) Install the radiator upper brackets.



13) Install the resonator chamber. <Ref. to IN(H4SO)-7, INSTALLATION, Resonator Chamber.>
14) Install the air intake duct and air cleaner case. <Ref. to IN(H4SO)-6, INSTALLATION, Air Intake Duct.> and <Ref. to IN(H4SO)-5, INSTALLATION, Air Cleaner Case.>
15) Install the front wheels.

16) Connect the battery ground cable to battery.



17) Fill engine oil. <Ref. to LU(H4SO)-10, INSPECTION, Engine Oil.>

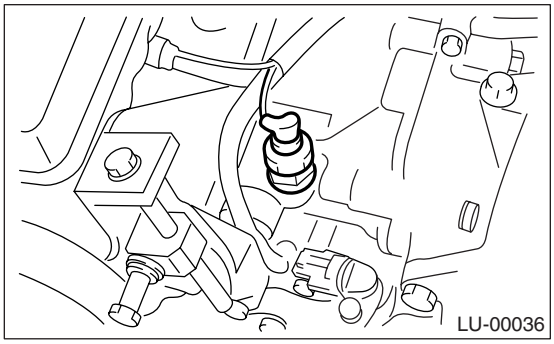
C: INSPECTION

By visual check make sure the oil pan, oil strainer, oil strainer stay and baffle plate are not damaged.

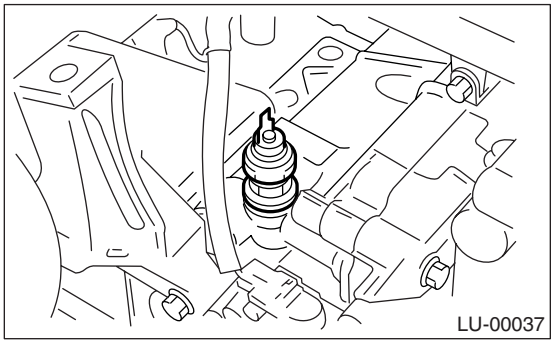
6. Oil Pressure Switch

A: REMOVAL

1) Remove the generator from bracket. <Ref. to SC(H4SO)-14, REMOVAL, Generator.>
2) Disconnect the terminal from oil pressure switch.



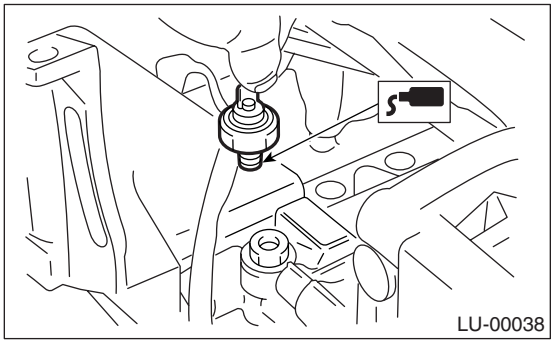
3) Remove the oil pressure switch.



B: INSTALLATION

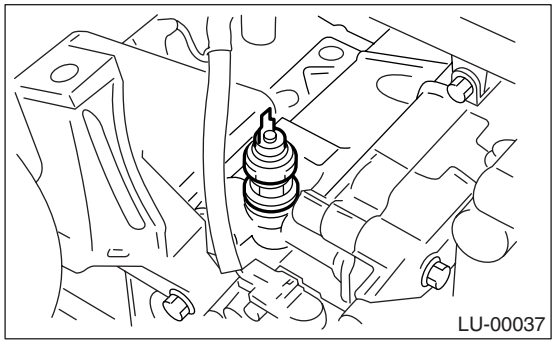
1) Apply liquid gasket to the oil pressure switch threads.

Liquid gasket:
THREE BOND 1324 (Part No. 004403042) or equivalent

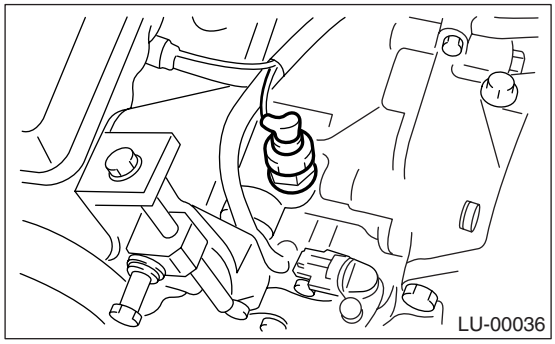


2) Install the oil pressure switch onto engine block.

Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)



3) Connect the terminal of oil pressure switch.



4) Install the generator on bracket. <Ref. to SC(H4SO)-14, INSTALLATION, Generator.>

C: INSPECTION

Make sure oil does not leak or seep from where the oil pressure switch is installed.

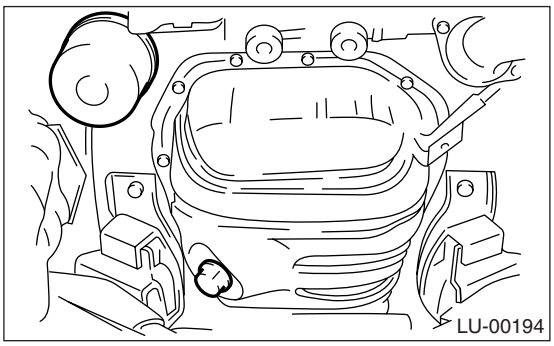
7. Engine Oil Filter

A: REMOVAL

1) Lift up the vehicle.
2) Remove the under cover.
3) Remove the oil filter with ST.

ST	498547000	OIL FILTER WRENCH (Outer diameter: 80 mm (3.15 in))
ST	18332AA000	OIL FILTER WRENCH (Outer diameter: 68 mm (2.68 in))
ST	18332AA010	OIL FILTER WRENCH (Outer diameter: 65 mm (2.56 in))

NOTE:
Standard oil filter has outer diameter of 68 mm (2.68 in). However, SUBARU genuine oil filter having outer diameter of 65 mm (2.56 in) or 80 mm (3.15 in) can also be used.



B: INSTALLATION

1) Wipe and clean the oil filter matching surface on cylinder block.
2) Get a new oil filter and apply a thin coat of engine oil to the seal rubber.
3) Install the oil filter by turning it by hand, being careful not to damage seal rubber.
• Tighten the oil filter 80 mm (3.15 in) or 65 mm (2.56 in) in diameter by approx. 2/3 — 3/4 rotation more after the seal rubber of oil filter comes in contact with cylinder block.
• Tighten the oil filter 68 mm (2.68 in) in diameter by approx. 1 rotation more after the seal rubber of oil filter comes in contact with cylinder block.

CAUTION:
Do not tighten excessively, or oil may leak.

C: INSPECTION

1) After installing the oil filter, run the engine and make sure no oil is leaking around seal rubber.

NOTE:
The filter element and filter case are permanently jointed; therefore, interior cleaning is not necessary.

2) Check the engine oil level. <Ref. to LU(H4SO)-10, INSPECTION, Engine Oil.>

8. Engine Lubrication System Trouble in General

A: INSPECTION

Before performing diagnostics, make sure the engine oil level is correct and no oil leakage exists.

Trouble	Possible cause		Corrective action
1. Warning light remains on.	1) Oil pressure switch failure	Cracked diaphragm or oil leakage within switch	Replace.
		Broken spring or seized contacts	Replace.
	2) Low oil pressure	Clogged oil filter	Replace.
		Malfunction of oil by-pass valve of oil filter	Clean or replace.
		Malfunction of oil relief valve of oil pump	Clean or replace.
		Clogged oil passage	Clean.
		Excessive tip clearance and side clearance of oil pump rotor and gear	Replace.
		Clogged oil strainer or broken pipe	Clean or replace.
	3) No oil pressure	Shortage of engine oil	Replenish.
		Broken pipe of oil strainer	Replace.
		Stuck oil pump rotor	Replace.
2. Warning light does not go on.	1) Malfunction of combination meter		Replace.
	2) Poor contact of switch contact points		Replace.
	3) Disconnection of wiring		Repair.
3. Warning light flickers momentarily.	1) Poor contact at terminals		Repair.
	2) Defective wiring harness		Repair.
	3) Low oil pressure		Check for the same possible causes as listed in 1. — 2).

SPEED CONTROL SYSTEMS

SP(H4SO)

Page

1. General Description 2
2. Accelerator Pedal 4
3. Accelerator Control Cable 9

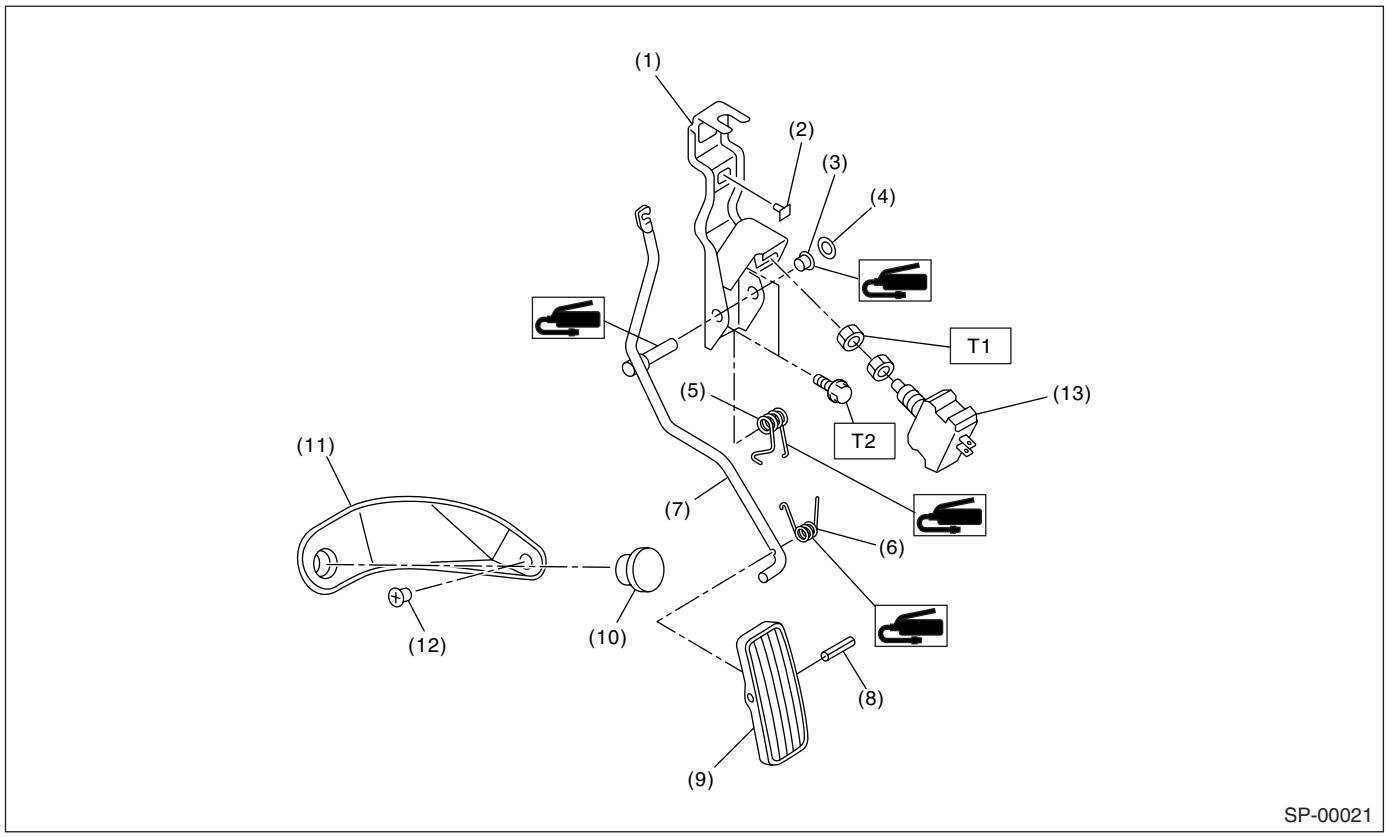
1. General Description

A: SPECIFICATION

Accelerator pedal	Free play	At pedal pad	0 — 4 mm (0 — 0.16 in)
	Stroke	At pedal pad	52 — 57 mm (2.05 — 2.24 in)

B: COMPONENT

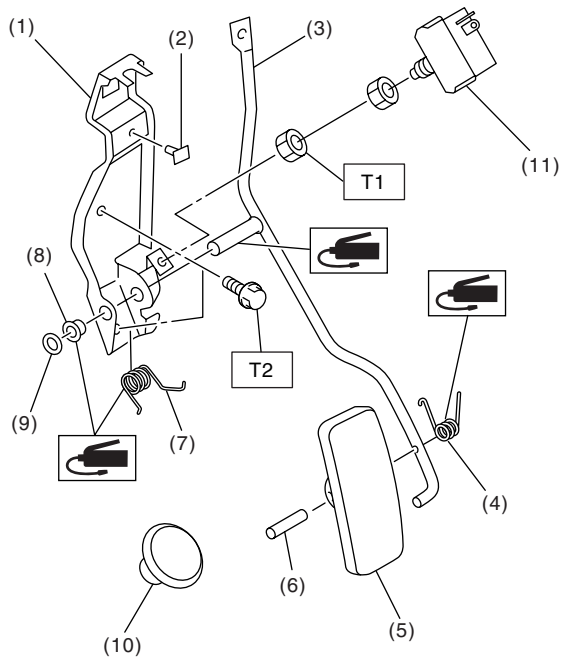
1. LHD MODEL



(1) Accelerator bracket
(2) Stopper
(3) Bushing
(4) Clip
(5) Accelerator spring
(6) Accelerator pedal spring
(7) Accelerator pedal lever
(8) Spring pin
(9) Accelerator pedal
(10) Accelerator stopper
(11) Accelerator plate
(12) Clip
(13) Kick-down switch (AT model)

Tightening torque: N·m (kgf-m, ft-lb)
T1: 12 (1.2, 9.0)
T2: 18 (1.8, 13.0)

2. RHD MODEL



SP-00022

(1) Accelerator bracket
(2) Stopper
(3) Accelerator pedal lever
(4) Accelerator pedal spring
(5) Accelerator pedal
(6) Spring pin
(7) Accelerator spring
(8) Bushing
(9) Clip
(10) Accelerator stopper
(11) Kick-down switch (AT model)

Tightening torque: N·m (kgf-m, ft-lb)
T1: 12 (1.2, 9.0)
T2: 18 (1.8, 13.0)

C: CAUTION

- Wear work clothing, including a cap, protective goggles, and protective shoes during operation.
- Remove contamination, including dirt and corrosion, before removal, installation or disassembly.
- Keep the disassembled parts in order and protect them from dust and dirt.
- Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly, and replacement.
- Be careful not to burn, because each part in the vehicle is hot after running.
- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or rigid racks at the specified points.
- Before disconnecting electrical connectors of sensors or units, be sure to disconnect the ground cable from battery.

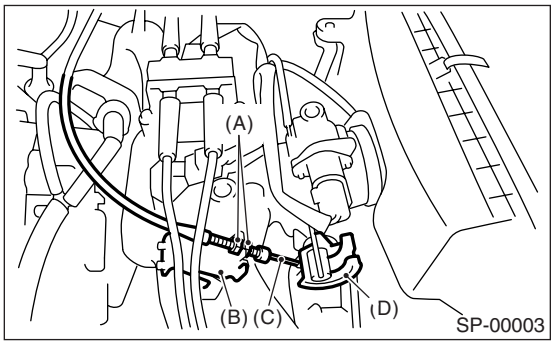
2. Accelerator Pedal

A: REMOVAL

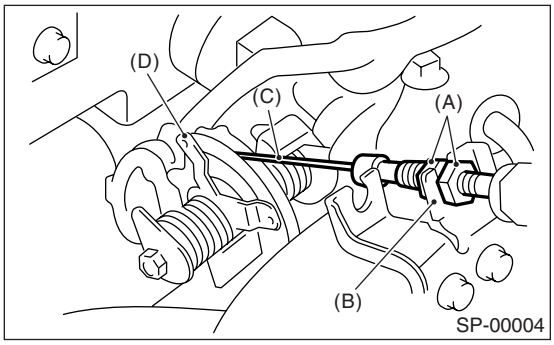
1) Disconnect the ground cable from battery.
2) Remove the lock nut from accelerator cable bracket.
3) Separate the accelerator cable from bracket.
4) Remove the accelerator cable end from throttle cam.

NOTE:
Be careful not to kink the accelerator cable.

- NON-TURBO MODEL



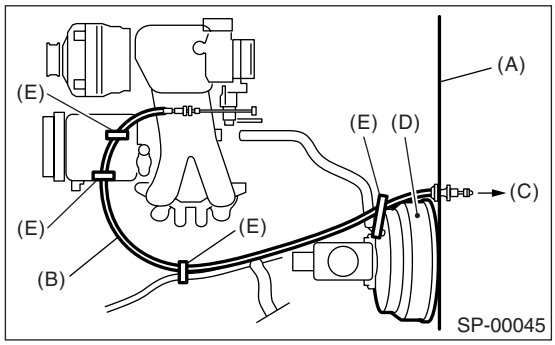
- TURBO MODEL



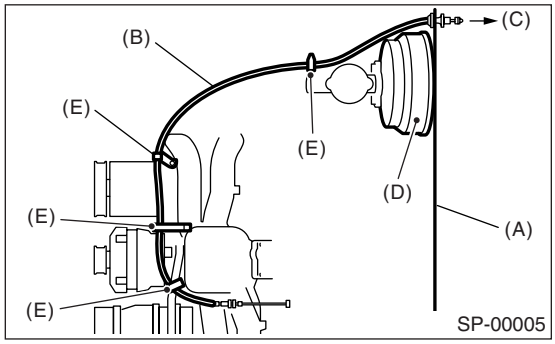
(A) Lock nut
(B) Accelerator cable bracket
(C) Accelerator cable
(D) Throttle cam

5) Remove the clip inside engine compartment.

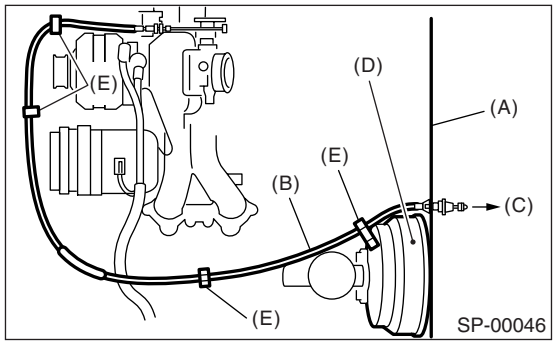
- LHD NON-TURBO MODEL



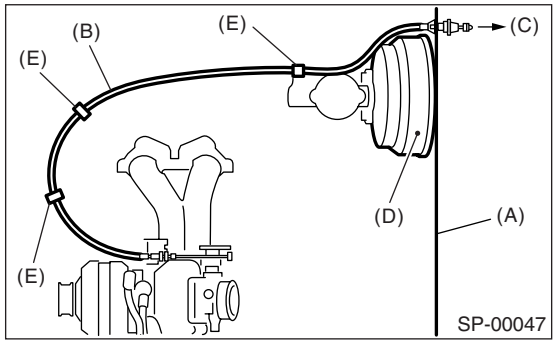
- RHD NON-TURBO MODEL



- LHD TURBO MODEL



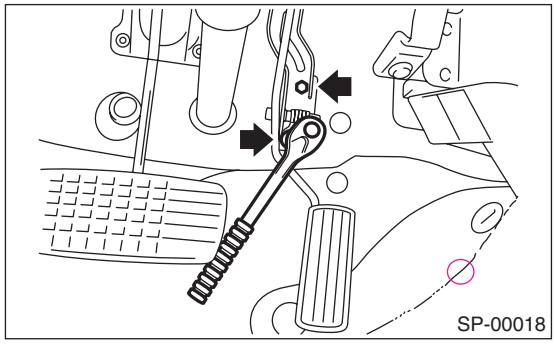
- RHD TURBO MODEL



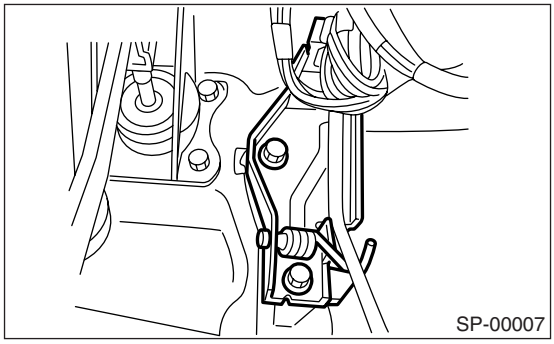
(A) Toe board
(B) Accelerator cable
(C) To accelerator pedal
(D) Brake booster
(E) Clip

6) Remove the instrument panel lower cover from instrument panel.
7) Disconnect the connector from kick-down switch. (AT model)
8) Remove the accelerator pedal connecting bolt from accelerator pedal bracket.

- LHD MODEL

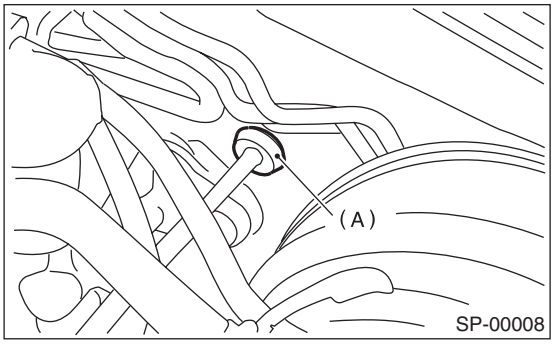


- RHD MODEL

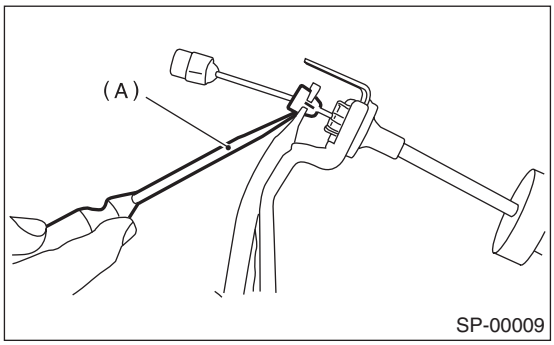


9) Disconnect the grommet from toe board.

NOTE:
From inside compartment, push the grommet (A) into hole.

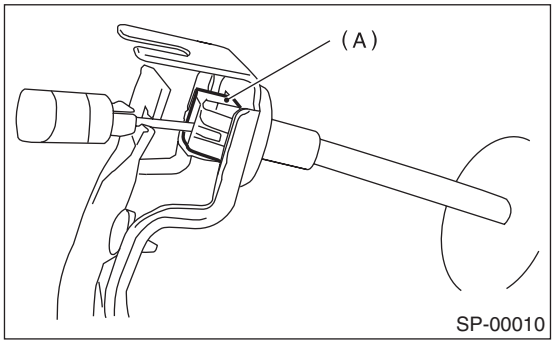


10) Pull out the cable from toe board hole.
11) Disconnect the accelerator cable bushing from accelerator pedal lever.



(A) Flat tip screwdriver

12) Disconnect the accelerator cable stopper (A) from bracket.



13) Separate the accelerator cable and bracket.

B: INSTALLATION

Install in the reverse order of removal.

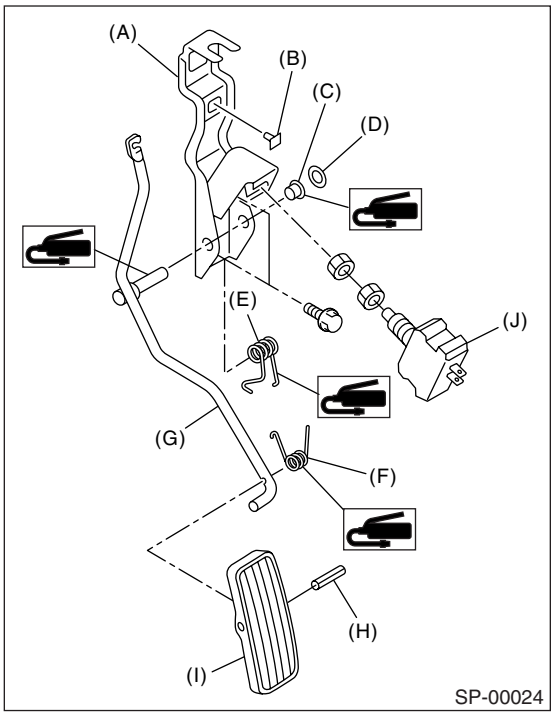
NOTE:
- If the cable clamp is damaged, replace it with a new one.
- Never fail to cover the outer cable end with boot.
- Be careful not to kink the accelerator cable.

Tightening torque:
18 N·m (1.8 kgf-m, 13.0 ft-lb)

C: DISASSEMBLY

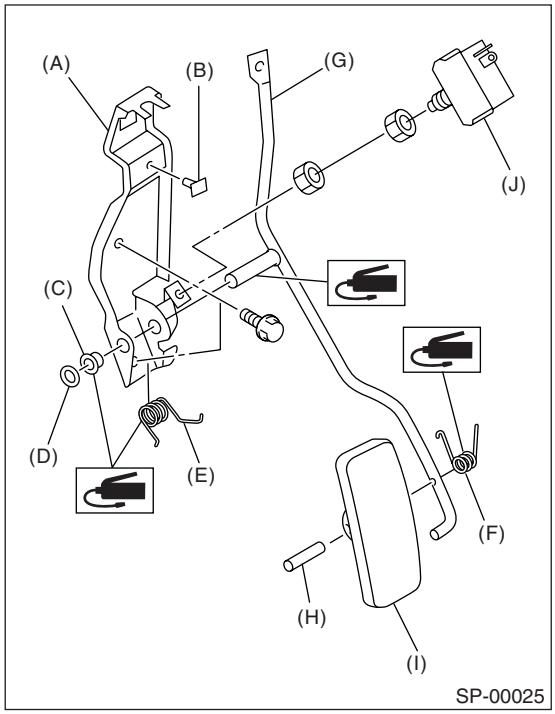
1) Remove the clip, and then remove the accelerator pedal from bracket.
2) Pull out the spring pin, and then remove the accelerator pedal from accelerator pedal lever.

- LHD MODEL



(A) Accelerator bracket
(B) Stopper
(C) Bushing
(D) Clip
(E) Accelerator spring
(F) Accelerator pedal spring
(G) Accelerator pedal lever
(H) Spring pin
(I) Accelerator pedal
(J) Kick-down switch (AT model)

- RHD MODEL



(A) Accelerator bracket
(B) Stopper
(C) Bushing
(D) Clip
(E) Accelerator spring
(F) Accelerator pedal spring
(G) Accelerator pedal lever
(H) Spring pin
(I) Accelerator pedal
(J) Kick-down switch (AT model)

D: ASSEMBLY

Assemble in the reverse order of disassembly.

NOTE:
Clean and apply grease to the portions indicated in the figure.

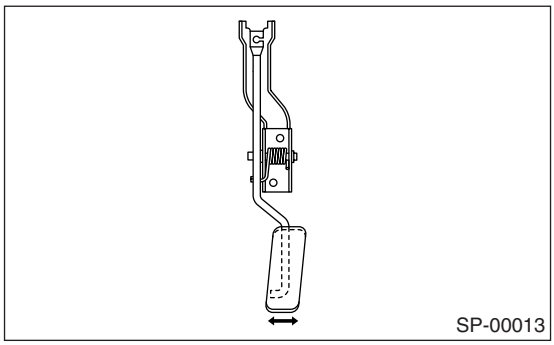
Grease:
SUNLIGHT No. 2 (Part No. 003602010)

E: INSPECTION

1. ACCELERATOR PEDAL

1) Lightly move the pedal pad in lateral direction to ensure that pedal deflection is in specified range.
2) If excessive deflection is noted, replace the bushing and clip with new ones.

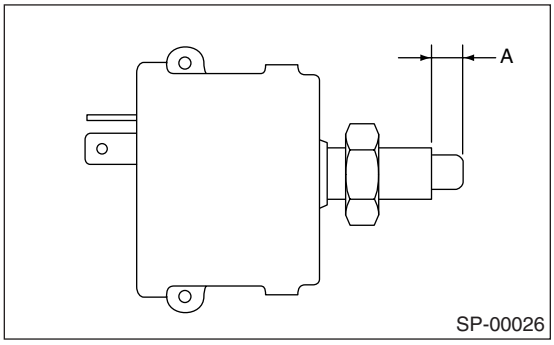
Deflection of accelerator pedal:
Specification
±2.0 mm (±0.079 in) or less



2. KICK-DOWN SWITCH

If the kick-down switch does not operate properly (or if it does not stop at the specified position), replace with a new one.

Specified position A:
2.0 — 3.5 mm (0.079 — 0.098 in)

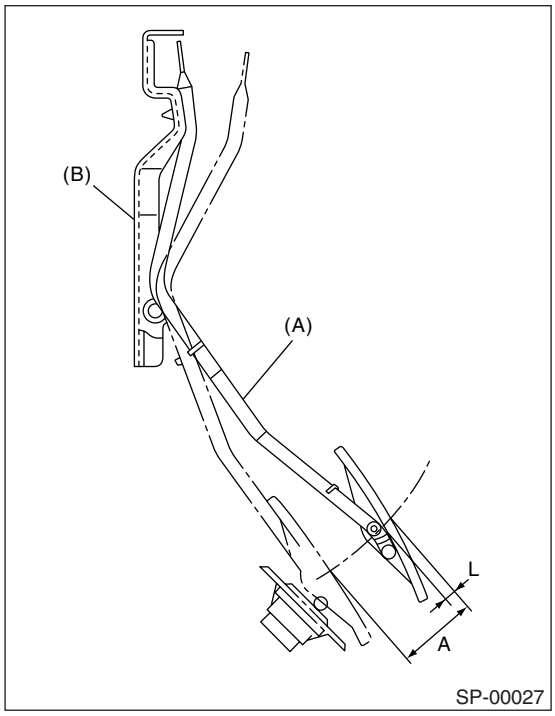


F: ADJUSTMENT

1) Check the pedal stroke and free play by operating the accelerator pedal by hand.
2) If it is not within specified value, adjust it by turning the nut connecting the accelerator cable to throttle body.

Free play at pedal pad L:
0 — 4 mm (0 — 0.16 in)

Stroke at pedal pad A:
52 — 57 mm (2.05 — 2.24 in)



(A) Accelerator pedal
(B) Accelerator pedal bracket

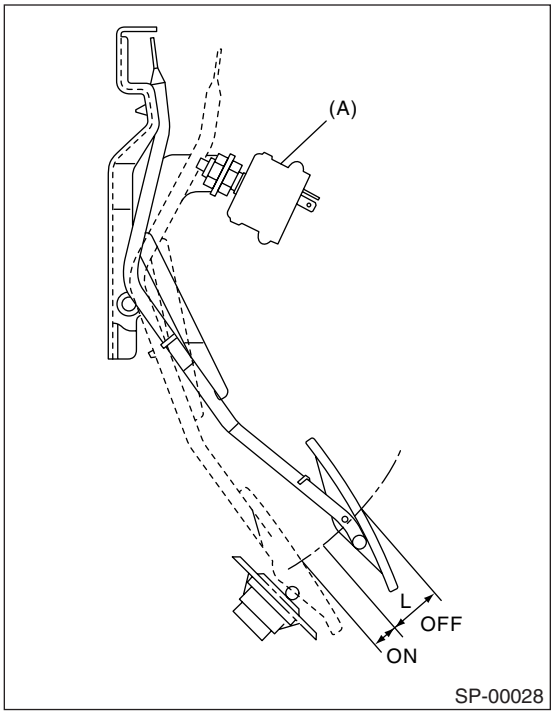
Accelerator cable lock nut tightening torque:
12 N·m (1.2 kgf-m, 9 ft-lb)

3) Ensure the kick-down switch operates at the specified value in relation to the stroke of accelerator pedal.
If it is not within specified value, adjust it by adjusting the position of kick-down switch.

CAUTION:
Be careful not to rotate the kick-down switch.

Kick-down switch stroke L:
47 — 49 mm (1.85 — 1.93 in)

Kick-down switch tightening torque:
12 N·m (1.2 kgf-m, 9 ft-lb)



(A) Kick down switch

3. Accelerator Control Cable

A: REMOVAL

1) Remove the accelerator pedal.
<Ref. to SP(H4SO)-4, REMOVAL, Accelerator Pedal.>
2) Separate the accelerator cable and accelerator pedal.

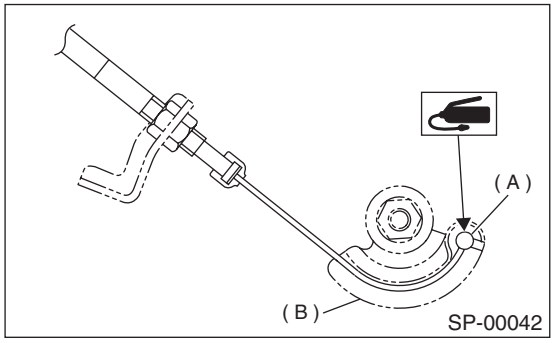
B: INSTALLATION

1) Install in the reverse order of removal.

NOTE:
- If the cable clamp is damaged, replace it with a new one.
- Never fail to cover the outer cable end with boot.
- Be careful not to kink the accelerator cable.
- Do not apply grease to except specified part.

2) Apply grease to engine side accelerator cable end.

Grease:
Silicolube G-30M (Part No. 004404002)



(A) Accelerator cable end
(B) Throttle cam

3) Adjustment after pedal installation. <Ref. to SP(H4SO)-7, ADJUSTMENT, Accelerator Pedal.>

C: INSPECTION

1) Make sure the inner cable is not twisted or worn.
2) Make sure the outer cable is not cracked.

IGNITION

IG(H4SO)

Page

1. General Description 2
2. Spark Plug 5
3. Ignition Coil and Ignitor Assembly 8
4. Spark Plug Cord 10

1. General Description

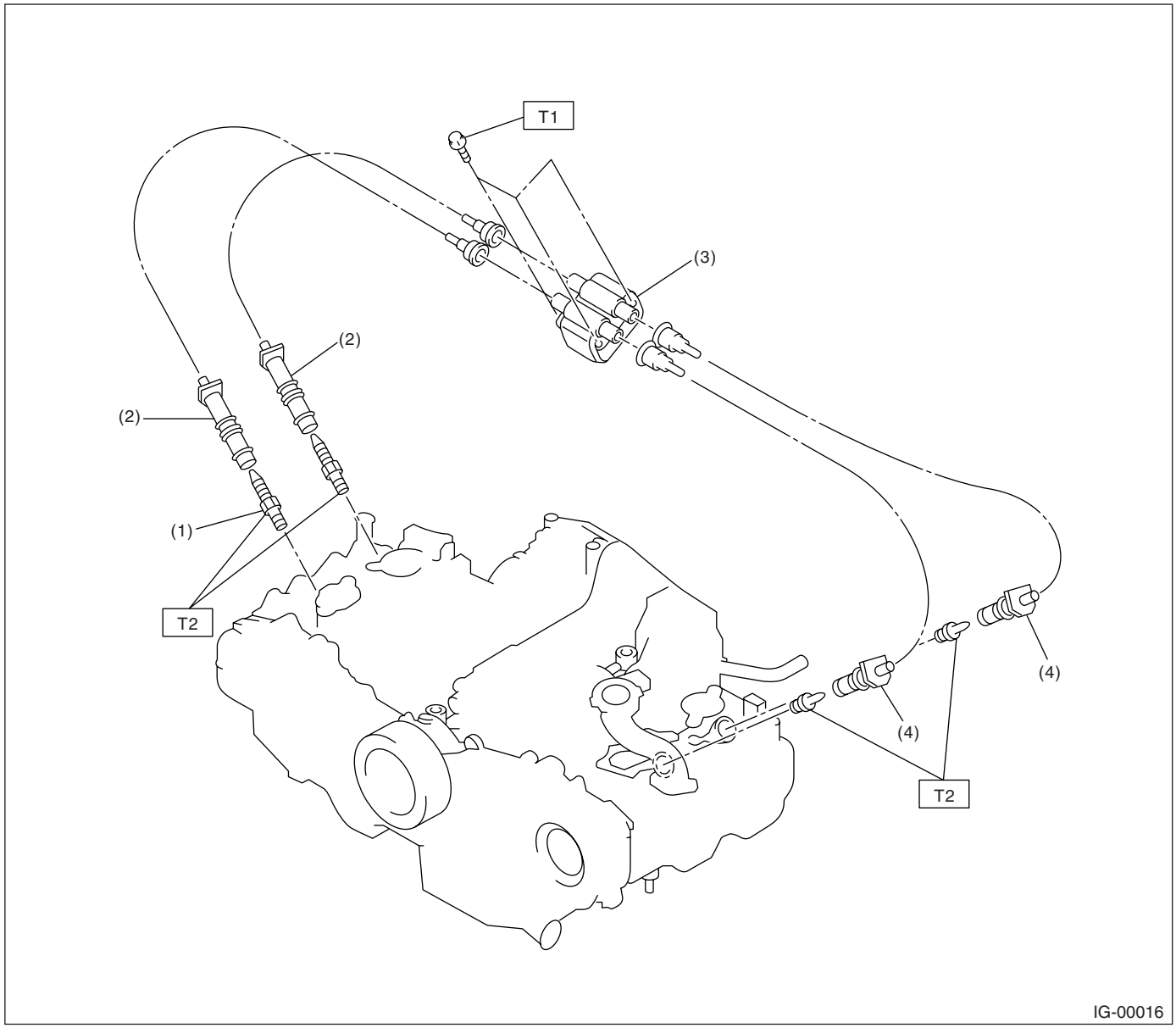
A: SPECIFICATION

Item			Designation
Ignition coil & ignitor assembly	Model	1.6 L	CM12 — 100C
		2.0 L	FH0137
		2.5 L	
	Manufacturer	1.6 L	HITACHI
		2.0 L	DIAMOND
		2.5 L	
	Secondary coil resistance	1.6 L	18.0 kΩ±20%
		2.0 L	12.8 kΩ±15%
		2.5 L	
Spark plug	Type and manufacturer	1.6 L	NGK: BKR6E* CHAMPION: RC8YC4** NGK: BKR6E-11** (Alternate)
		2.0 L	NGK: BKR6E* CHAMPION: RC10YC4** NGK: BKR5E-11** (Alternate)
		2.5 L	
	Thread size (diameter, pitch, length) mm		14, 1.25, 19
	Spark plug gap mm (in)		0.7 — 0.8 (0.028 — 0.031)* 1.0 — 1.1 (0.039 — 0.043)**

*: Without catalytic converter
**: With catalytic converter

B: COMPONENT

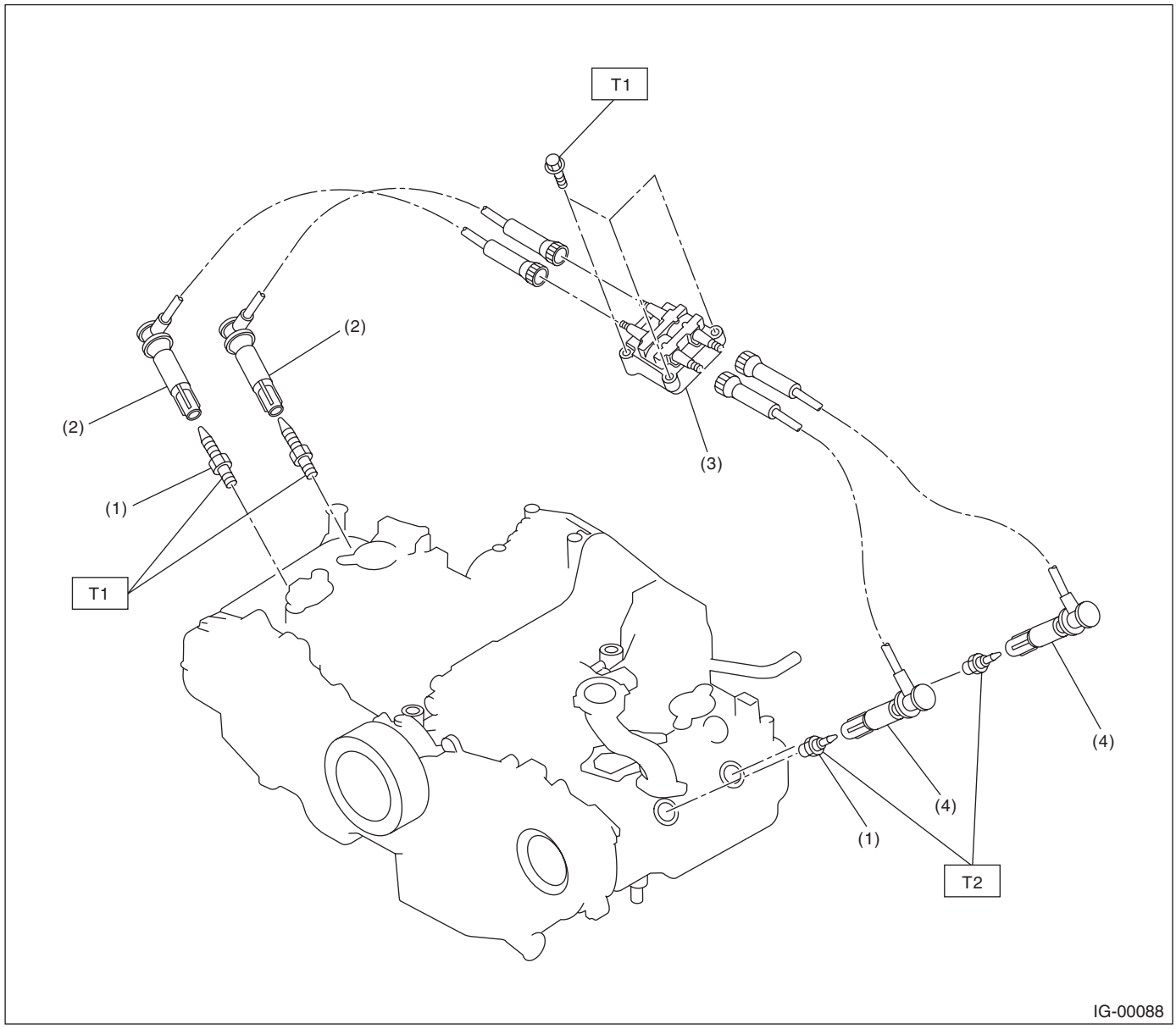
1. 1.6 L MODEL



(1) Spark plug
(2) Spark plug cord (#1, #3)
(3) Ignition coil & ignitor ASSY
(4) Spark plug cord (#2, #4)

Tightening torque: N·m (kgf-m, ft-lb)
T1: 6.4 (0.65, 4.7)
T2: 21 (2.1, 15.5)

2. 2.0 L AND 2.5 L MODEL



(1) Spark plug
(2) Spark plug cord (#1, #3)
(3) Ignition coil & ignitor ASSY
(4) Spark plug cord (#2, #4)

Tightening torque: N·m (kgf-m, ft-lb)
T1: 6.4 (0.65, 4.7)
T2: 21 (2.1, 15.5)

C: CAUTION

- Wear working clothing, including a cap, protective goggles, and protective shoes during operation.
- Remove contamination including dirt and corrosion before removal, installation or disassembly.
- Keep the disassembled parts in order and protect them from dust or dirt.
- Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly, and replacement.
- Be careful not to burn, because each part on the vehicle is hot after running.
- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or rigid racks at the specified points.
- Before disconnecting electrical connectors of sensors or units, be sure to disconnect the ground cable from battery.

2. Spark Plug

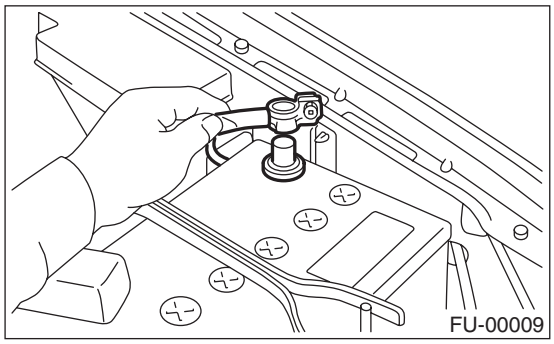
A: REMOVAL

CAUTION:
All spark plugs installed on an engine, must be of the same heat range.

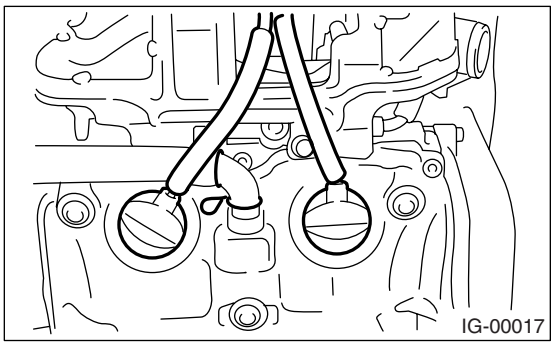
Spark plug:
<Ref. to IG(H4SO)-2, SPECIFICATION, General Description.>

1. RH SIDE

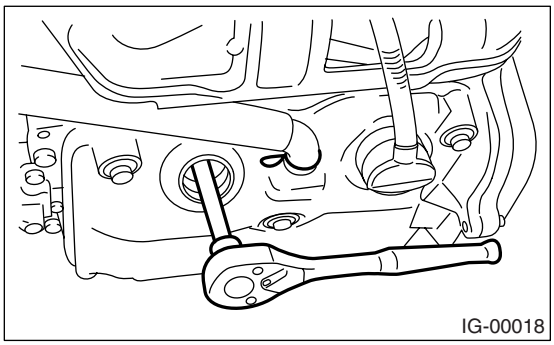
1) Disconnect the ground cable from battery.



2) Remove the resonator chamber. <Ref. to IN(H4SO)-7, REMOVAL, Resonator Chamber.>
3) Remove the spark plug cords by pulling the boot, not cord itself.

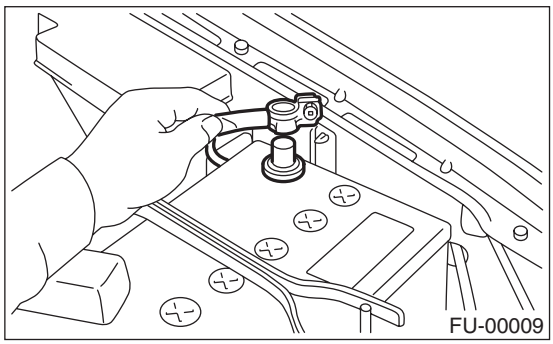


4) Remove the spark plugs using spark plug sockets.

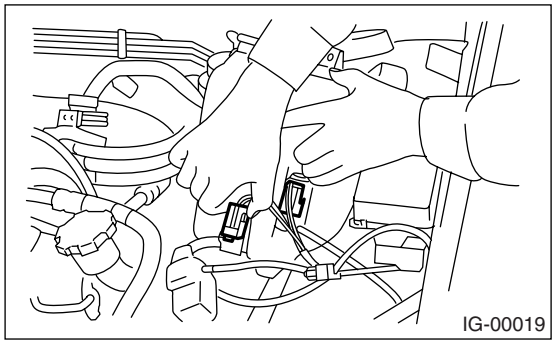


2. LH SIDE

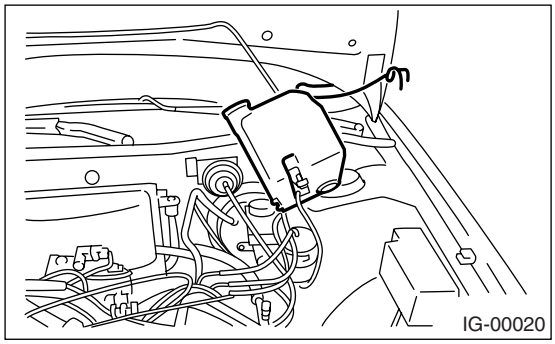
1) Disconnect the ground cable from battery.



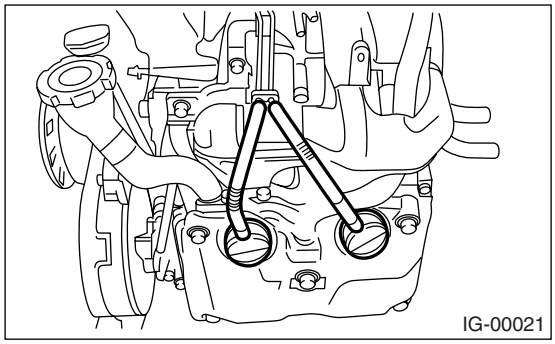
2) Disconnect the washer motor connector.



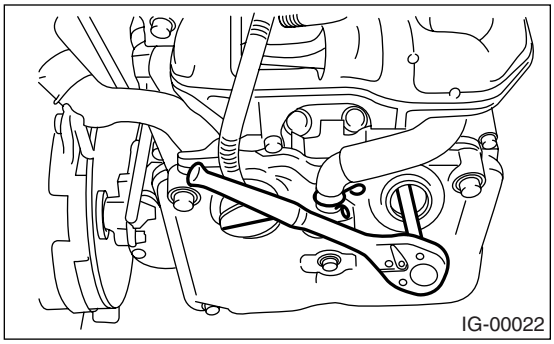
3) Disconnect the rear window glass washer hose from washer motor, then plug the connection with a suitable cap.
4) Remove the two bolts which hold the washer tank, then take the tank away from working area.



5) Remove the spark plug cords by pulling the boot, not cord itself.



6) Remove the spark plugs with spark plug sockets.


IG-00022

B: INSTALLATION

1. RH SIDE

Install in the reverse order of removal.

Tightening torque:
21 N·m (2.1 kgf-m, 15.5 ft-lb)

NOTE:
The above torque should be only applied to new spark plugs without oil on their threads.
In case their threads are lubricated, the torque should be reduced by approx. 1/3 of the specified torque in order to avoid over-stressing.

2. LH SIDE

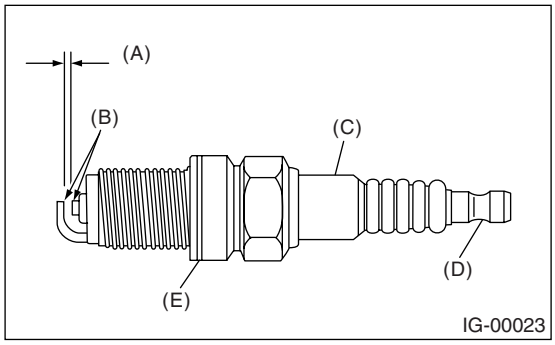
Install in the reverse order of removal.

Tightening torque:
21 N·m (2.1 kgf-m, 15.5 ft-lb)

NOTE:
The above torque should be only applied to new spark plugs without oil on their threads.
In case their threads are lubricated, the torque should be reduced by approx. 1/3 of the specified torque in order to avoid over-stressing.

C: INSPECTION

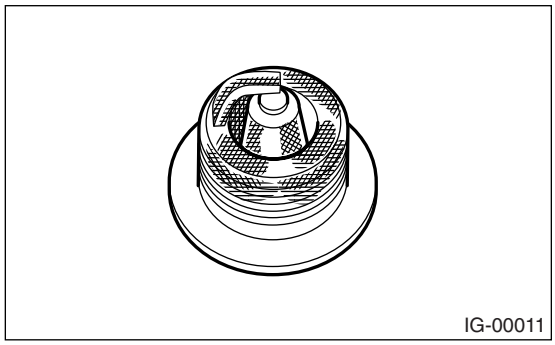
Check the electrodes and inner and outer ceramic insulator of plugs, noting the type of deposits and the degree of electrode erosion.



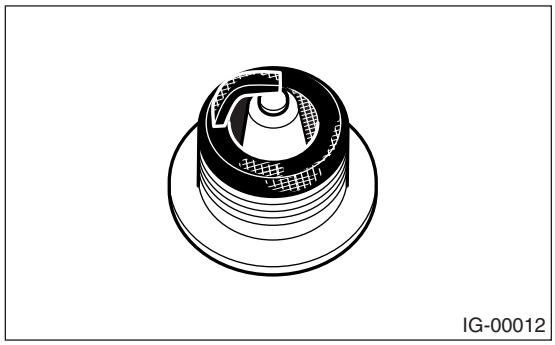
IG-00023

(A) Spark plug gap
(B) Carbon accumulation or wear
(C) Cracks
(D) Damage
(E) Damaged gasket

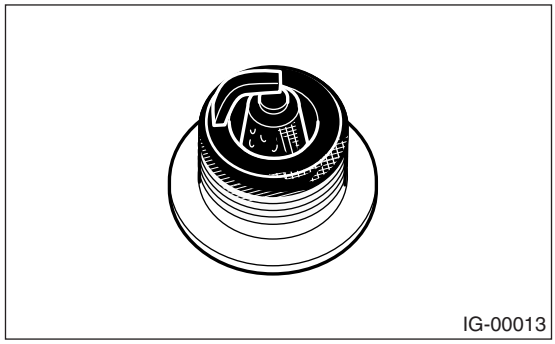
1) Normal:
Brown to grayish-tan deposits and slight electrode wear indicates correct spark plug heat range.


IG-00011

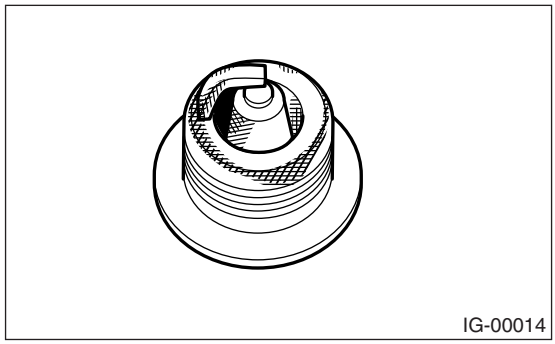
2) Carbon fouled:
Dry fluffy carbon deposits on insulator and electrode are mostly caused by slow speed driving in city, weak ignition, too rich fuel mixture or dirty air cleaner.


IG-00012

3) Oil fouled:
Wet black deposits show excessive oil entrance into combustion chamber through worn rings and pistons or excessive clearance between valve guides and stems.


IG-00013

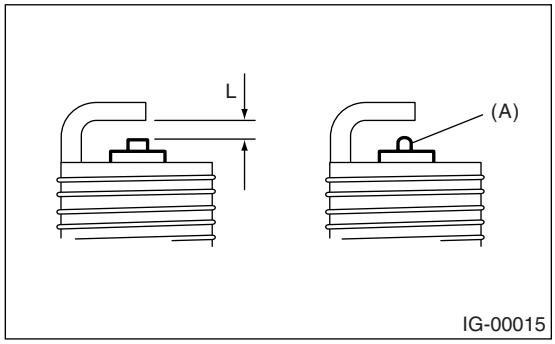
4) Overheating:
White or light gray insulator with black or gray brown spots and bluish burnt electrodes indicates engine overheating. Moreover, the appearance results from incorrect ignition timing, loose spark plugs, wrong selection of fuel, etc.


IG-00014

D: CLEANING
Clean the spark plugs in a sand blast type cleaner. Avoid excessive blasting. Clean and remove the carbon or oxide deposits, but do not wear away ceramic insulator.
If deposits are too stubborn, replace the plugs.

E: ADJUSTMENT
Correct it if the spark plug gap is measured with a gap gauge, and it is necessary.

Spark plug gap L:
With catalyst:
1.0 — 1.1 mm (0.039 — 0.043 in)
Without catalyst:
0.7 — 0.8 mm (0.028 — 0.031 in)



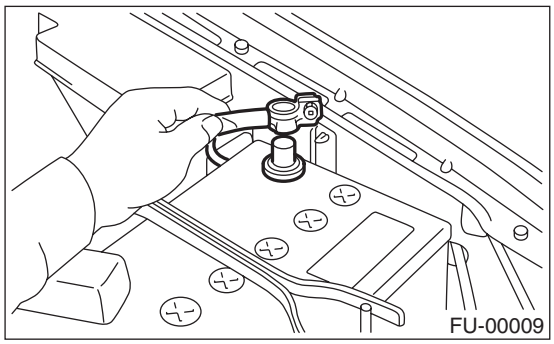
IG-00015

NOTE:
Replace with a new spark plug if this area (A) is worn to “ball” shape.

3. Ignition Coil and Ignitor Assembly

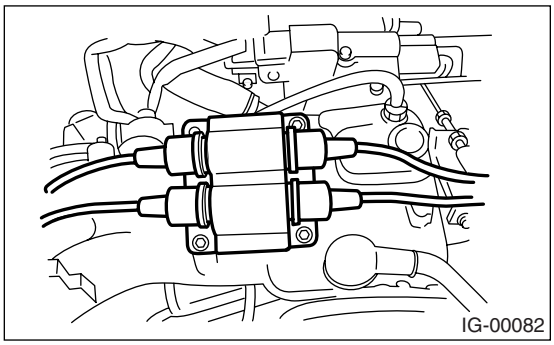
A: REMOVAL

1) Disconnect the ground cable from battery.

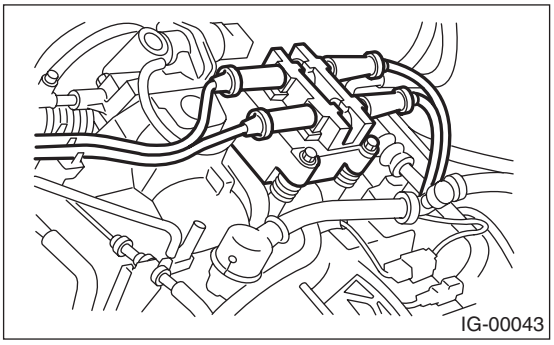


2) Disconnect the spark plug cords from ignition coil and ignitor assembly.

- 1.6 L MODEL



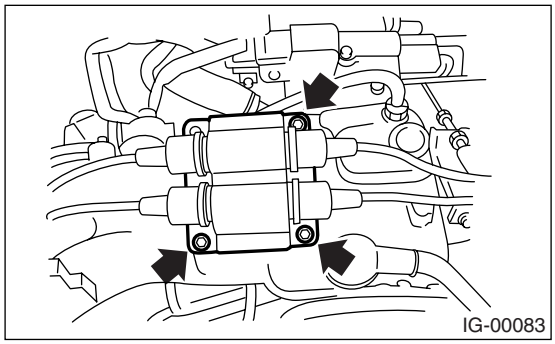
- 2.0 L and 2.5 L MODEL



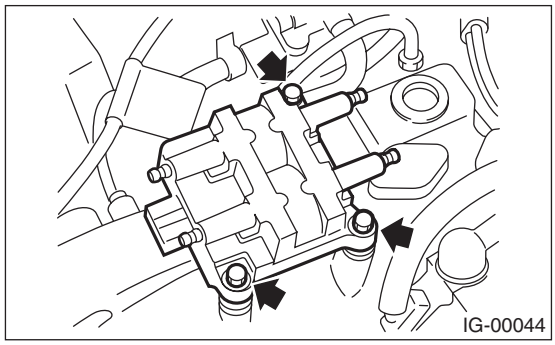
3) Disconnect the connector from ignition coil and ignitor assembly.

4) Remove the ignition coil and ignitor assembly.

- 1.6 L MODEL



- 2.0 L and 2.5 L MODEL



B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)

CAUTION:
Connect the spark plugs to correct position. Misconnection may damage the unit.

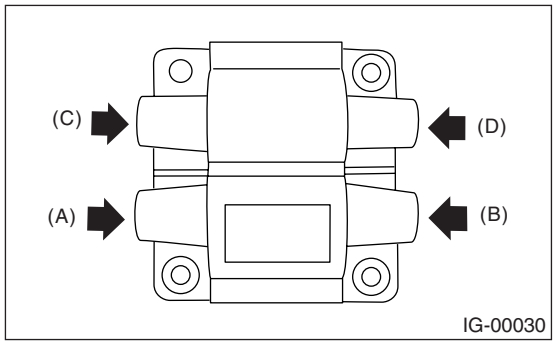
C: INSPECTION

Using the accurate tester, inspect the secondary coil resistance, and replace if defective.

CAUTION:
• If the resistance is extremely low, this indicates the presence of a short-circuit.
• Ignitor is integrated with the coil. Therefore the resistance of primary side coil cannot be measured.

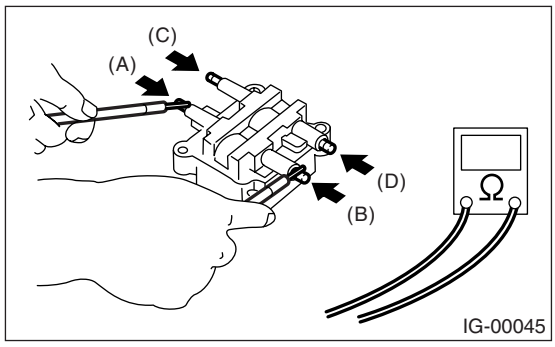
Specified resistance: (1.6 L model)

[Secondary side]
Between (A) and (B)
18.0 kΩ±20%
Between (C) and (D)
18.0 kΩ±20%



Specified resistance: (2.0 L and 2.5 L model)

[Secondary side]
Between (A) and (B)
12.8 kΩ±15%
Between (C) and (D)
12.8 kΩ±15%

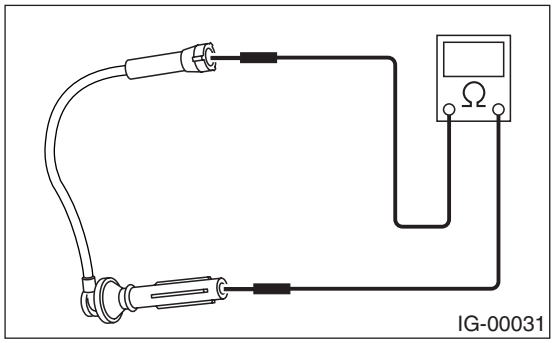


4. Spark Plug Cord

A: INSPECTION

Check for:
1) Damage to cords, deformation, burning or rust formation of terminals
2) Resistance values of cords

Resistance value:
#1 cord: 6.1 — 10.5 kΩ
#2 cord: 8.0 — 13.5 kΩ
#3 cord: 6.4 — 11.1 kΩ
#4 cord: 8.3 — 13.9 kΩ



STARTING/CHARGING SYSTEMS

SC(H4SO)

Page

1. General Description 2
2. Starter 8
3. Generator 14
4. Battery 20

1. General Description

A: SPECIFICATION

1. NON-TURBO MODEL

Item			Designation		
Starter	Type		Reduction type		
	Vehicle type		MT	1.6 L AT	2.0 L AT, 2.5 L AT
	Model		M000T30471	M000T30571	M000T20171
	Manufacturer		Mitsubishi Electric		
	Voltage and output		12 V — 1.0 kW		12 V — 1.4 kW
	Direction of rotation		Counterclockwise (when observed from pinion)		
	Number of pinion teeth		8		9
	No-load characteristics Voltage	Voltage	11 V		
		Current	95 A or less		90 A or less
		Rotating speed	2,500 rpm or more		2,000 rpm or more
	Load characteristics	Voltage	7.5 V		7.7 V
		Current	300 A		400 A
		Torque	8.84 N·m (0.9 kgf-m, 6.5 ft-lb) or more		16.7 N·m (1.70 kgf-m, 12.3 ft-lb) or more
		Rotating speed	870 rpm or more		710 rpm or more
	Lock characteristics	Voltage	4 V		3.5 V
		Current	680 A or less		960 A or less
		Torque	17 N·m (1.73 kgf-m, 12.5 ft-lb) or more		31 N·m (3.16 kgf-m, 22.9 ft-lb) or more
Generator	Type		Rotating-field three-phase type, voltage regulator built-in type, with load response controlsystem (A2TB5391 and A2TG0391 are the power generation control response type.)		
	Vehicle type		1.6 L: EC, E2, K4, KS, EK, ER 2.0 L: K4, KS	1.6 L: K0, K1 2.0 L: K0, K1, KA 2.5 L: KA	2.0 L: EC, E2, EK, ER
	Model		A2TB5391	A2TB6291	A2TG0391
	Manufacturer		Mitsubishi Electric		
	Voltage & output		12 V — 75 A		12 V — 90 A
	Polarity on ground side		Negative		
	Direction of rotation		Clockwise (when observed from pulley side)		
	Armature connection		Three-phase Y-type		
	Output current		1500 rpm — 30 A or more 2500 rpm — 64 A or more 5000 rpm — 76 A or more		1500 rpm — 40 A or more 2500 rpm — 74 A or more 5000 rpm — 84 A or more
	Regulated voltage		14.1 — 14.8 V [20°C (68°F)]		
Battery	Vehicle type		1.6 L	2.0 L	2.5 L
	Type and capacity	Europe and South America	12 V — 48 AH (55D 23L)	MT: 12 V — 48 AH (55D 23L) AT: 12 V — 48 AH (65D 23L)	MT: 12 V — 48 AH (55D 23L) AT: 12 V — 48 AH (75D 23L)
		Israel	12 V — 48 AH (55D 23L)	—	—
		Others	12 V — 27 AH (34B 19L)		

2. TURBO MODEL

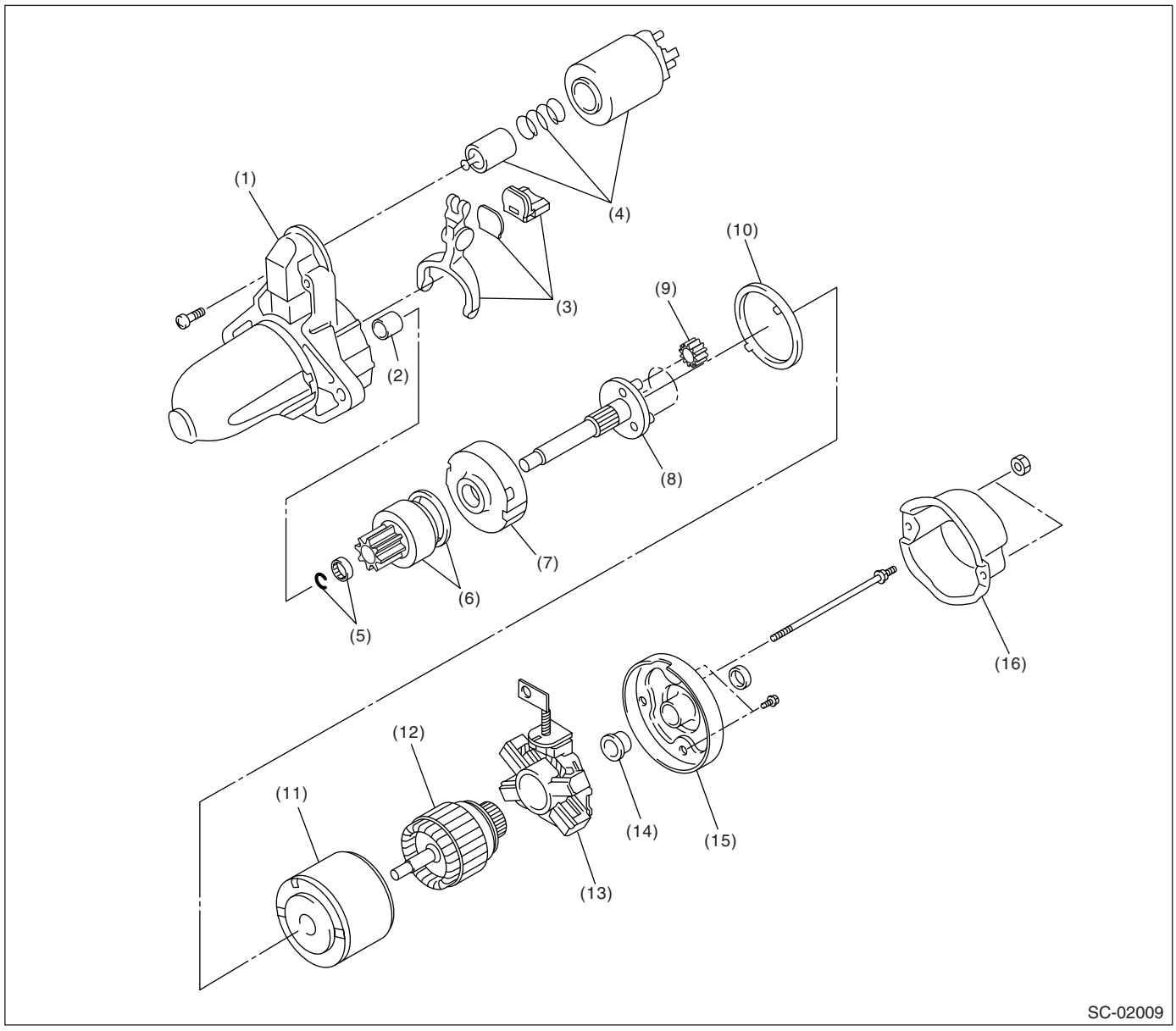
Item			Designation	
Starter	Type		Reduction type	
	Vehicle type		MT	AT
	Model		228000 — 9270	M001T20171
	Manufacturer		DENSO	Mitsubishi Electric
	Voltage and output		12 V — 1.0 kW	12 V — 1.4 kW
	Direction of rotation		Counterclockwise (when observed from pinion)	
	Number of pinion teeth		9	
	No-load characteristics	Voltage	11.5 V	11 V
		Current	90 A or less	
		Rotating speed	3,000 rpm or more	2,000 rpm or more
	Load characteristics	Voltage	8 V	7.7 V
		Current	280 A	400 A
		Torque	9.3 N·m (0.95 kgf-m, 6.9 ft-lb) or more	16.7 N·m (1.70 kgf-m, 12.3 ft-lb) or more
		Rotating speed	860 rpm or more	710 rpm or more
	Lock characteristics	Voltage	5 V	3.5 V
		Current	515 A or less	960 A or less
		Torque	16 N·m (1.63 kgf-m, 11.8 ft-lb) or more	31 N·m (3.16 kgf-m, 22.9 ft-lb) or more
Generator	Type		Rotating-field three-phase type, voltage regulator built-in type, with load response control system	
	Model		A2TB5391, A2TB6291*	
	Manufacturer		Mitsubishi Electric	
	Voltage and output		12 V — 75 A	
	Polarity on ground side		Negative	
	Direction of rotation		Clockwise (when observed from pulley side)	
	Armature connection		Three-phase Y-type	
	Output current		1,500 rpm — 30 A or more 2,500 rpm — 64 A or more 5,000 rpm — 76 A or more	
	Regulated voltage		14.1 — 14.8 V [20°C (68°F)]	
Battery	Vehicle type		MT	AT
	Type and capacity	Europe and South America	12 V — 48 AH (55D 23L)	12 V — 52 AH (65D 23L)
		Australia	12 V— 48 AH (55D 23L)	

*: For Australia and South America (except STi)

B: COMPONENT

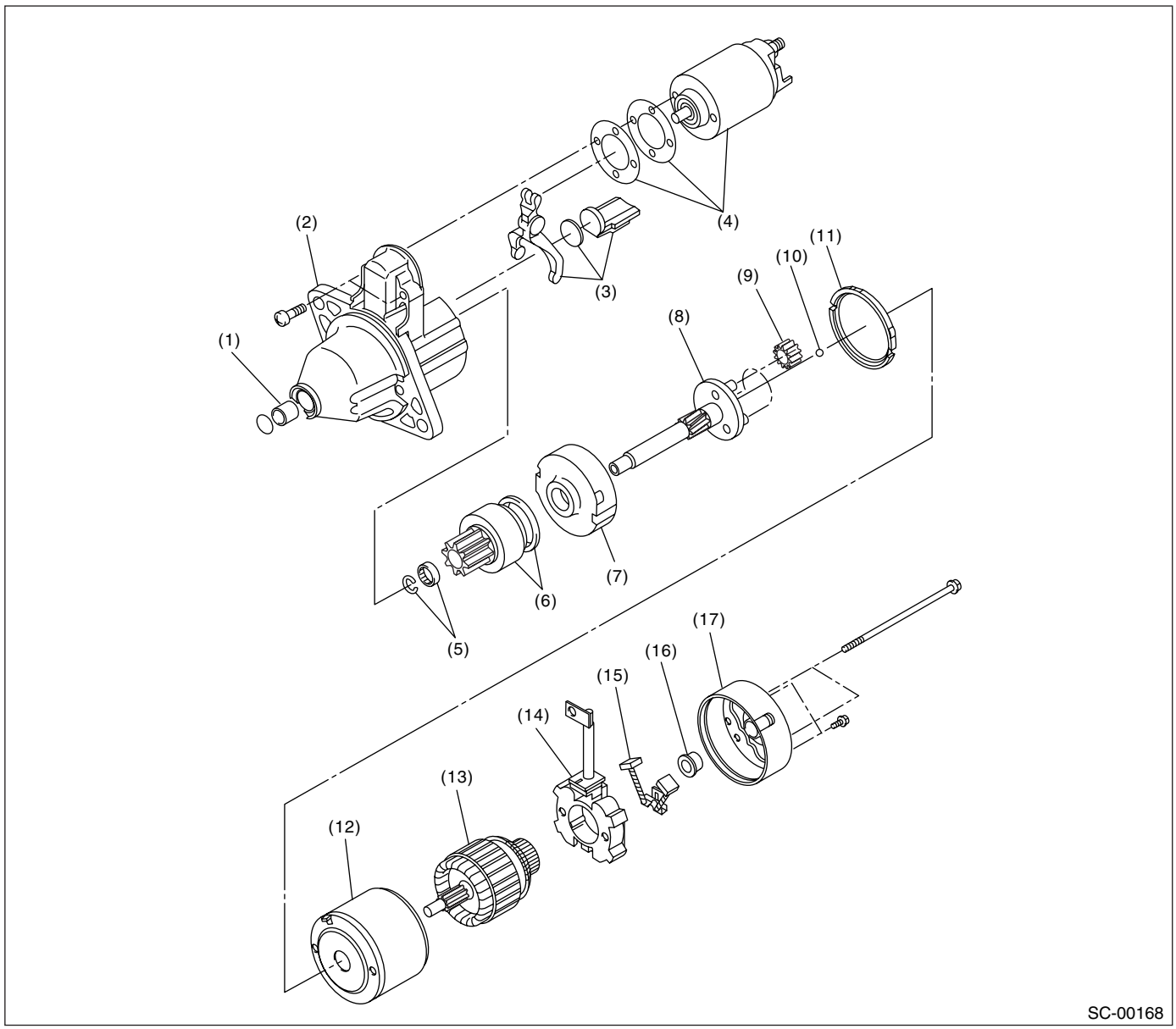
1. STARTER

• EXCEPT TURBO MT MODEL



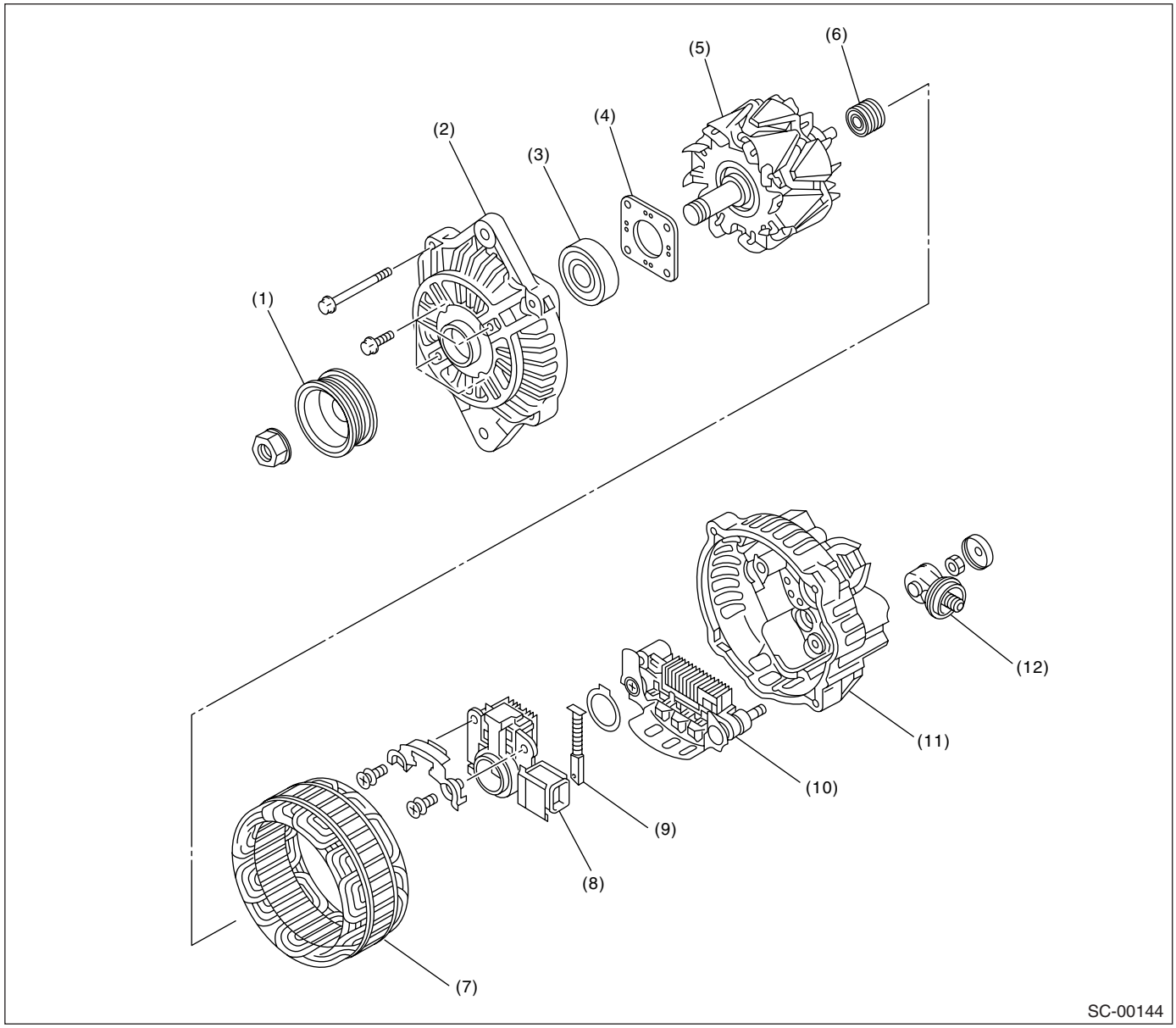
(1) Front bracket
(2) Sleeve bearing
(3) Lever set
(4) Magnet switch ASSY
(5) Stopper set
(6) Overrunning clutch
(7) Internal gear ASSY
(8) Shaft ASSY
(9) Gear ASSY
(10) Packing
(11) Yoke ASSY
(12) Armature
(13) Brush holder ASSY
(14) Sleeve bearing
(15) Rear cover
(16) Rear cover set

• TURBO MT MODEL



(1) Sleeve bearing
(2) Front bracket
(3) Lever set
(4) Magnet switch ASSY
(5) Stopper set
(6) Overrunning clutch
(7) Internal gear ASSY
(8) Shaft ASSY
(9) Gear ASSY
(10) Ball
(11) Packing
(12) Yoke ASSY
(13) Armature
(14) Brush holder ASSY
(15) Brush
(16) Sleeve bearing
(17) Rear cover

2. GENERATOR



(1)	Pulley	(5)	Rotor	(9)	Brush
(2)	Front cover	(6)	Bearing	(10)	Rectifier
(3)	Ball bearing	(7)	Stator coil	(11)	Rear cover
(4)	Bearing retainer	(8)	IC regulator with brush	(12)	Terminal

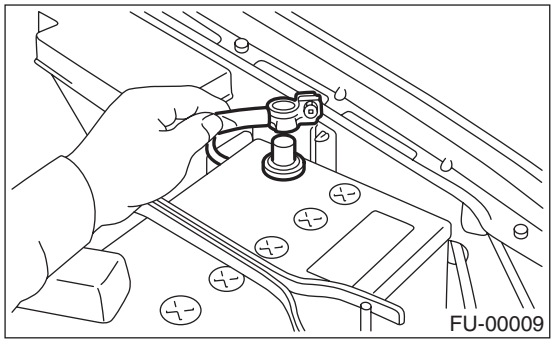
C: CAUTION

• Wear working clothing, including a cap, protective goggles and protective shoes during operation.
• Remove contamination including dirt and corrosion before removal, installation or disassembly.
• Keep the disassembled parts in order and protect them from dust or dirt.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly, and replacement.
• Be careful not to burn, because each part on the vehicle is hot after running.
• Be sure to tighten fasteners including bolts and nuts to the specified torque.
• Place shop jacks or rigid racks at the specified points.
• Before disconnecting electrical connectors of sensors or units, be sure to disconnect the ground cable from battery.

2. Starter

A: REMOVAL

1) Disconnect the ground cable from battery.

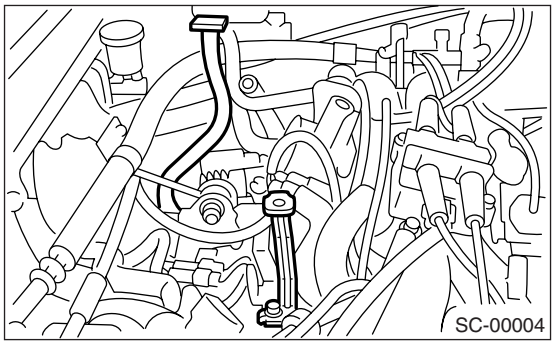


2) Remove the air cleaner case. (Non-turbo model) <Ref. to IN(H4SO)-5, REMOVAL, Air Cleaner Case.>

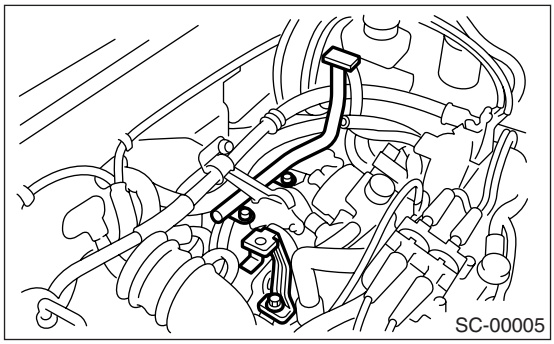
3) Remove the intercooler. (Turbo model) <Ref. to IN(H4DOTC)-12, REMOVAL, Intercooler.>

4) Remove the air cleaner case stay. (Non-turbo model)

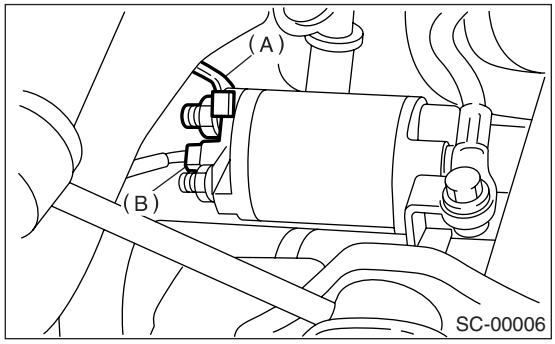
- MT MODEL



- AT MODEL

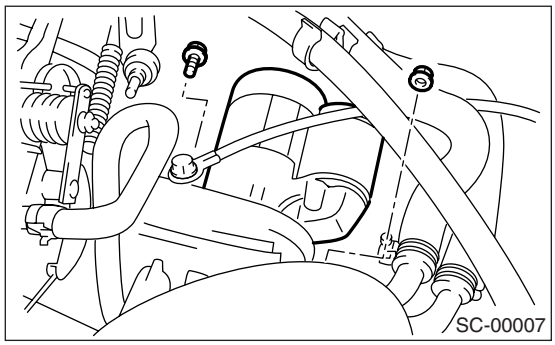


5) Disconnect the connector and terminal from starter.



(A) Terminal
(B) Connector

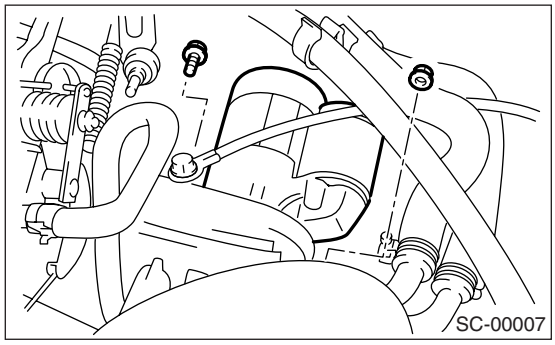
6) Remove the starter from transmission.



B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
50 N·m (5.1 kgf-m, 37 ft-lb)

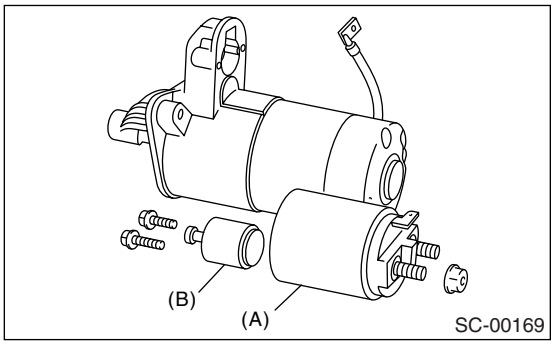


C: DISASSEMBLY

1. STARTER ASSEMBLY

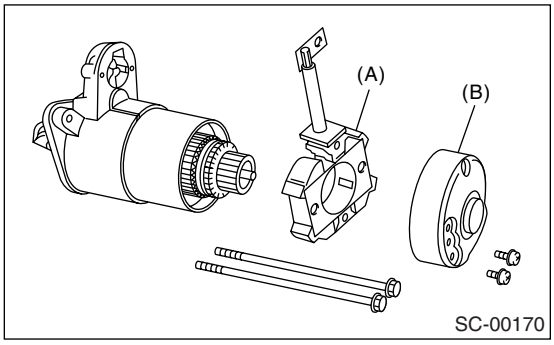
1) Loosen the nut which holds the terminal M of switch assembly, and then disconnect the connector.
2) Remove the bolts which hold the switch assembly, and then remove switch assembly, plunger and plunger spring from starter as a unit.

NOTE:
Be careful because the pinion gap adjustment washer may sometimes be used on the mounting surface of switch assembly.



(A) Switch ASSY
(B) Plunger

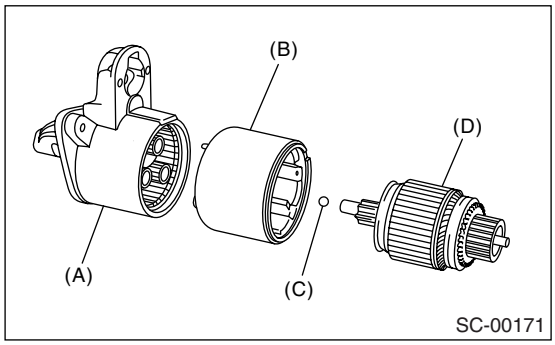
3) Remove both through-bolts and brush holder screws, and then detach the rear cover and brush holder.



(A) Brush holder
(B) Rear cover

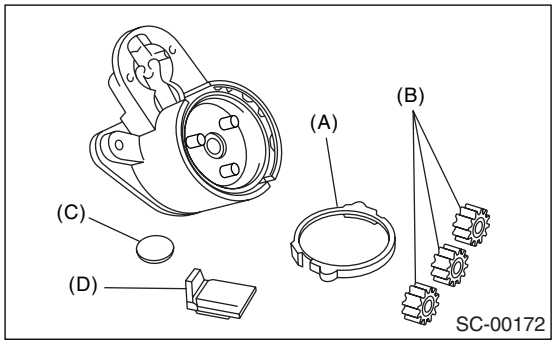
4) Remove the armature and yoke from front bracket. The ball used as a bearing will come off from the armature end.

NOTE:
Before removal of the yoke, put alignment marks on the yoke and front bracket.



(A) Front bracket
(B) Yoke
(C) Ball
(D) Armature

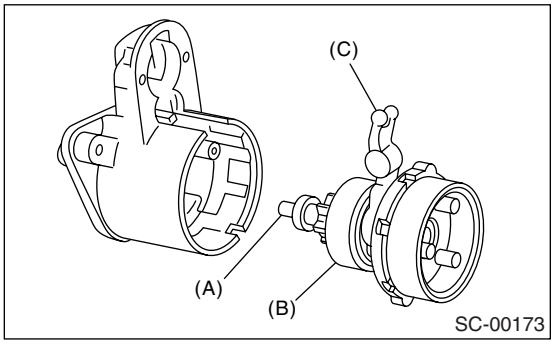
5) Remove packing A, planetary gears, packing B and plate.



(A) Packing A
(B) Planetary gear
(C) Plate
(D) Packing B

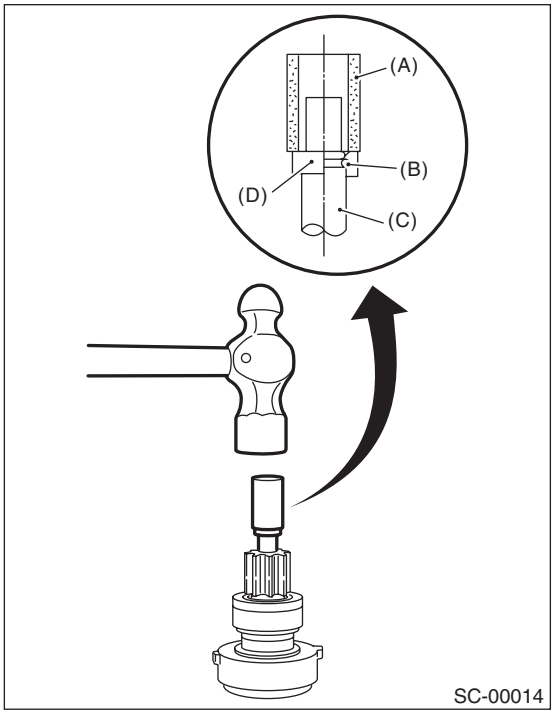
6) Remove the shaft assembly and overrunning clutch as a unit.

NOTE:
Note the direction of the lever before removing.



(A) Shaft ASSY
(B) Overrunning clutch
(C) Lever

7) Remove the overrunning clutch from shaft assembly as follows:
(1) Remove the stopper from ring by lightly tapping the stopper with an appropriate tool (such as a fit socket wrench).
(2) Remove the ring, stopper and clutch from shaft.

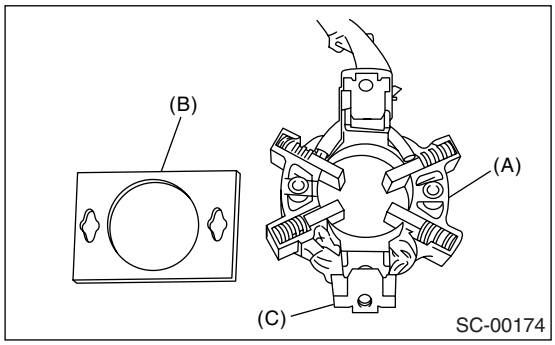


(A) Socket wrench
(B) Ring
(C) Shaft
(D) Stopper

2. BRUSH HOLDER

NOTE:
Only the brush holder of turbo MT model starter can be disassembled.

Slightly open the metal fitting while holding the insulating plate against the brush holder. Remove the insulating plate.
The brush and spring can be easily removed from the brush holder at this time.



(A) Brush holder
(B) Insulating plate
(C) Metal fitting

D: ASSEMBLY

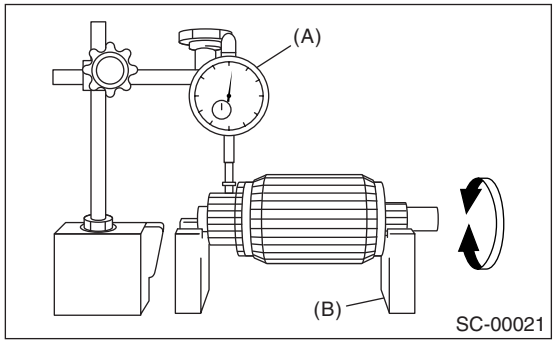
1) Assemble in the reverse order of disassembly.
2) Apply grease to the following parts before assembly.
- Front and rear bracket sleeve bearings
- Armature shaft gear
- Outer periphery of plunger
- Mating surfaces of plunger and lever
- Gear shaft splines
- Mating surfaces of lever and clutch
- Ball at armature shaft end
- Planetary gear

E: INSPECTION

1. ARMATURE

1) Check the commutator for any sign of burns of rough surfaces or stepped wear. If wear is of a minor nature, correct it by using sand paper.
2) Run-out test
Check the commutator run-out, and then replace if it exceeds the limit.

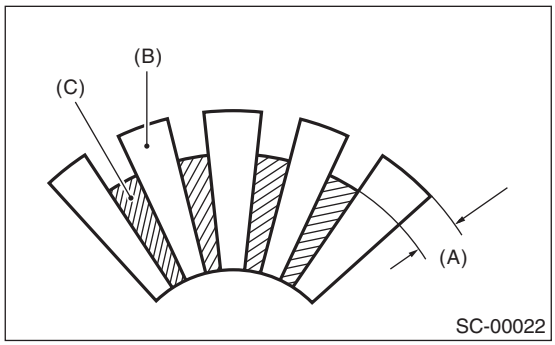
Commutator run-out:
Standard
0.05 mm (0.0020 in)
Service limit
Less than 0.10 mm (0.0039 in)



(A) Dial gauge
(B) V-block

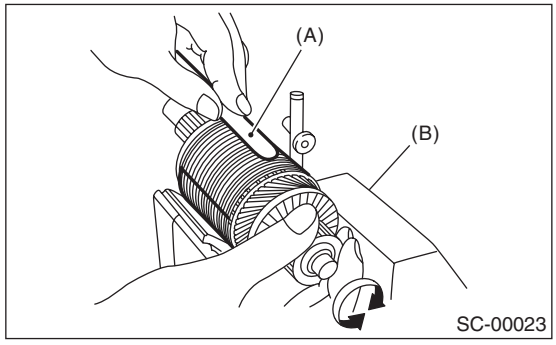
3) Depth of segment mold
Check the depth of segment mold.

Depth of segment mold:
0.5 mm (0.020 in)



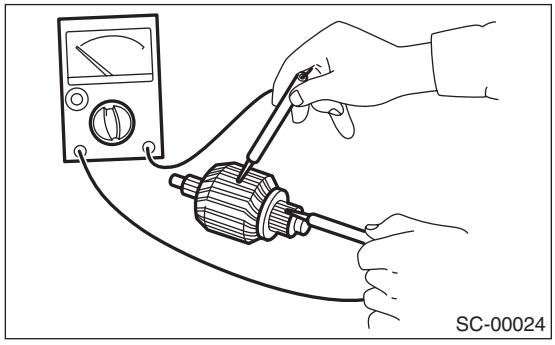
(A) Depth of mold
(B) Segment
(C) Mold

4) Armature short-circuit test
Check the armature for short-circuit by placing it on a growler tester. Hold an iron sheet against the armature core while slowly rotating armature. A short-circuited armature will cause the iron sheet to vibrate and to be attracted to core. If the iron sheet is attracted or vibrates, the armature, which is short-circuited, must be replaced or repaired.



(A) Iron sheet
(B) Grower tester

5) Armature ground test
Using a circuit tester, touch one probe to the commutator segment and the other to shaft. There should be no continuity. If there is continuity, the armature is grounded.
Replace the armature if it is grounded.



2. YOKE

Make sure the pole is set in position.

3. OVERRUNNING CLUTCH

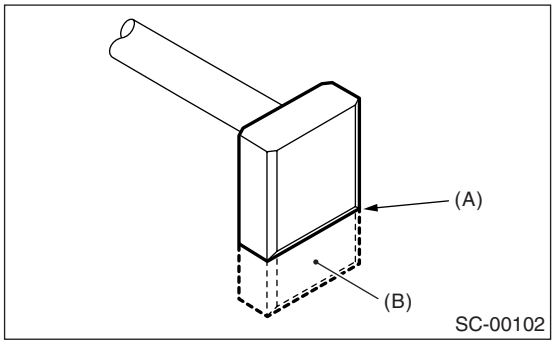
Inspect the teeth of pinion for wear and damage. Replace if it is damaged. It is normal if the pinion rotates smoothly in direction of rotation (counterclockwise) and does not rotate in the opposite direction.

CAUTION:
Do not clean the overrunning clutch with oil to prevent grease from flowing out.

4. BRUSH AND BRUSH HOLDER

1) Brush length
Measure the brush length, and then replace if it is worn down to under the service limit.
Replace if abnormal wear or cracks are noticed.

Brush length:
Standard
12.3 mm (0.484 in)
Service limit
7.0 mm (0.276 in)



(A) Service limit line
(B) Brush

2) Brush movement
Be sure the brush moves smoothly inside brush holder.
3) Brush spring force
Measure the brush spring force with a spring scale. If it is less than the service limit, replace the brush holder.

Brush spring force:

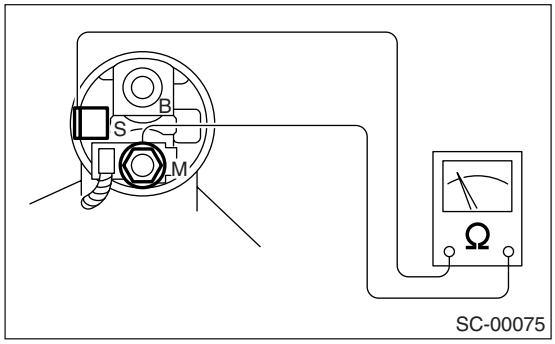
Standard
Except Turbo MT model
15.9 — 19.5 N (1.62 — 1.99 kgf, 3.57 — 4.38 lbf) (when new)
Turbo MT model
21.6 N (2.2 kgf, 4.9 lbf) (when new)

Service limit
Except Turbo MT model
2.5 N (0.25 kgf, 0.56 lbf)
Turbo MT model
5.9 N (0.6 kgf, 1.3 lbf)

5. SWITCH ASSEMBLY

Using a circuit tester (set in “ohm”), check that there is continuity between terminals S and M, and between terminal S and ground.
Also check to be sure there is no continuity between terminals M and B.

Terminal/Specified resistance:
S — M/Less than 1 Ω
S — Ground/Less than 1Ω
M — B/More than 1 MΩ

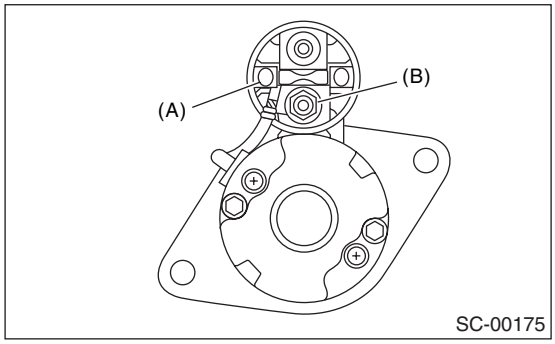


6. SWITCH ASSEMBLY OPERATION

1) Connect the terminal S of switch assembly to positive terminal of battery with a lead wire, and starter body to ground terminal of battery. The pinion should be forced endwise on shaft.

CAUTION:
With the pinion forced endwise on shaft, the starter motor may rotate because current flows through the pull-in coil to motor, however, this is not a problem.

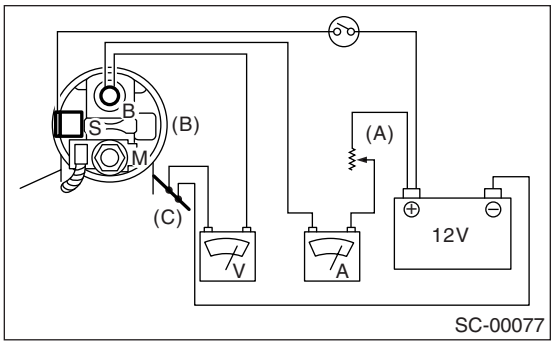
2) Disconnect the connector from terminal M, and then connect the positive terminal of battery and terminal M using a lead wire and ground terminal to starter body.
In this test set up, the pinion should return to its original position even when it is pulled out with a screwdriver.



(A) Terminal S
(B) Terminal M

7. PERFORMANCE TEST

The starter should be submitted to performance tests whenever it has been overhauled, to assure its satisfactory performance when installed on the engine.
Three performance tests, no-load test, load test, and lock test, are presented here; however, if the load test and lock test cannot be performed, carry out at least the no-load test.
For these performance tests, use the circuit shown in figure.



(A) Variable resistor
(B) Magnetic switch
(C) Starter body

1) No-load test
With switch on, adjust the variable resistor to obtain 11 V, take the ammeter reading, and then measure the starter speed. Compare these values with the specifications.

No-load test (standards):

Voltage/Current
1.6L MT, 2.0L Non-turbo MT, 2.5L MT and 1.6L AT
MAX. 11 V/Less than 95 A
2.0L Non-turbo AT, 2.5L AT
MAX. 11 V/Less than 90 A
2.0L Turbo MT
MAX. 11.5 V/Less than 90 A
2.0L Turbo AT
MAX. 11 V/Less than 90 A

Rotating speed
1.6L MT, 2.0L Non-turbo MT, 2.5L MT and 1.6L AT
More than 2,500 rpm
2.0L Non-turbo AT, 2.5L AT
More than 2,000 rpm
2.0L Turbo MT
More than 3,000 rpm
2.0L Turbo AT
More than 2,000 rpm

2) Load test
Apply the specified braking torque to starter. The condition is satisfactory if the current draw and starter speed are within the specifications.

Load test (standards):

Voltage/Load
1.6L MT, 2.0L Non-turbo MT, 2.5L MT and 1.6L AT
7.5 V/More than 8.84 N·m (0.90 kgf-m, 6.5 ft-lb)
2.0L Non-turbo AT, 2.5L AT
7.7 V/More than 16.7 N·m (1.70 kgf-m, 12.3 ft-lb)
2.0L Turbo MT
8 V/More than 9.3 N·m (0.95 kgf-m, 6.9 ft-lb)
2.0L Turbo AT
7.7 V/More than 16.7 N·m (1.70 kgf-m, 12.3 ft-lb)

Current/Speed
1.6L MT, 2.0L Non-turbo MT, 2.5L MT and 1.6L AT
More than 300 A/870 rpm
2.0L Non-turbo AT, 2.5L AT
More than 400 A/710 rpm
2.0L Turbo MT
More than 280 A/860 rpm
2.0L Turbo AT
More than 400 A/710 rpm

3) Lock test
With the starter stalled, or not rotating, measure the torque developed and current draw when the voltage is adjusted to the specified voltage.

Lock test (standards):

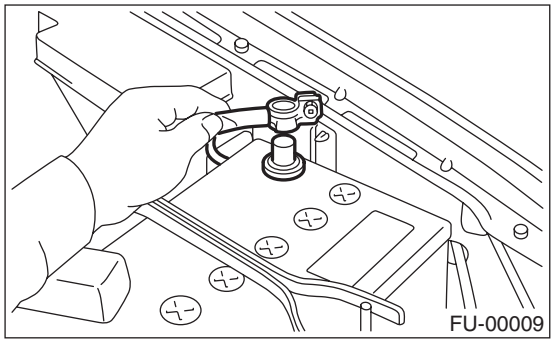
Voltage/Current
1.6L MT, 2.0L Non-turbo MT, 2.5L MT and 1.6L AT
Less than 4 V/680 A
2.0L Non-turbo AT, 2.5L AT
Less than 3.5 V/960 A
2.0L Turbo MT
Less than 5 V/515 A
2.0L Turbo AT
Less than 3.5 V/960 A

Torque
1.6L MT, 2.0L Non-turbo MT, 2.5L MT and 1.6L AT
17 N·m (1.73 kgf-m, 12.5 ft-lb)
2.0L Non-turbo AT, 2.5L AT
31 N·m (3.16 kgf-m, 22.9 ft-lb)
2.0L Turbo MT
16 N·m (1.63 kgf-m, 11.8 ft-lb)
2.0L Turbo AT
31 N·m (3.16 kgf-m, 22.9 ft-lb)

3. Generator

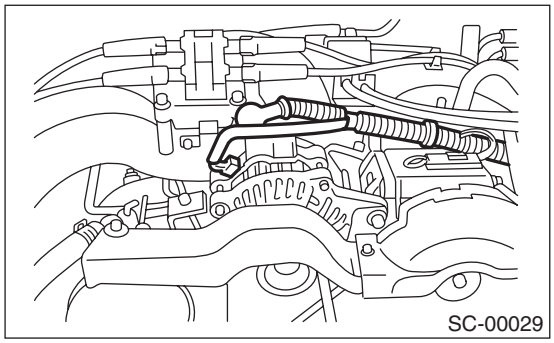
A: REMOVAL

1) Disconnect the ground cable from battery.

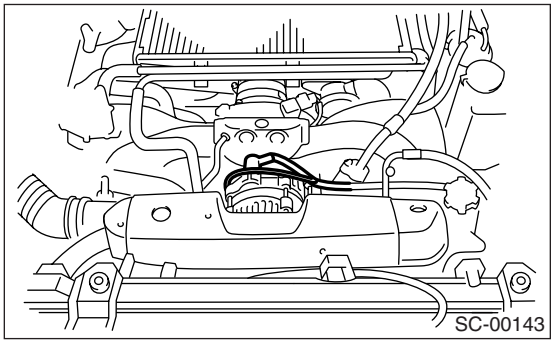


2) Disconnect the connector and terminal from generator.

- NON-TURBO MODEL



- TURBO MODEL

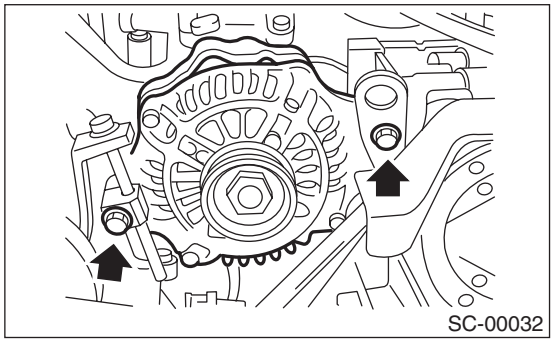


3) Remove the V-belt cover.

4) Remove the front side V-belt.

<Ref. to ME(H4SO)-41, FRONT SIDE BELT, REMOVAL, V-belt.> or <Ref. to ME(H4DOTC)-53, FRONT SIDE BELT, REMOVAL, V-belt.>

5) Remove the bolts which install generator onto bracket.

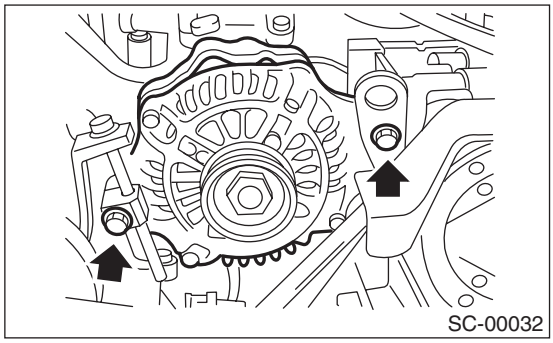


B: INSTALLATION

Install in the reverse order of removal.

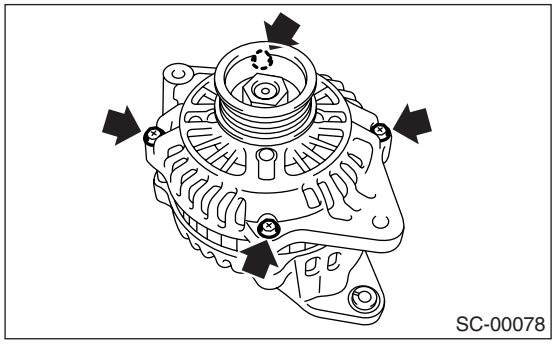
Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)

CAUTION:
Check and adjust the V-belt tension. <Ref. to ME(H4SO)-42, INSPECTION, V-belt.> or <Ref. to ME(H4DOTC)-54, INSPECTION, V-belt.>

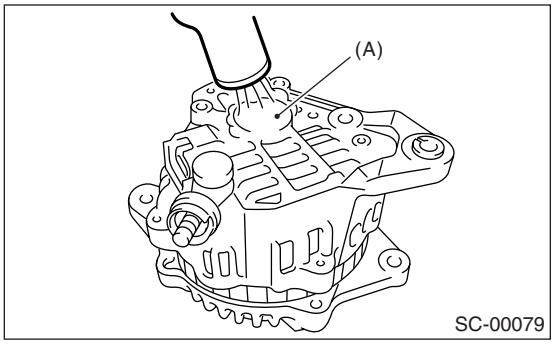


C: DISASSEMBLY

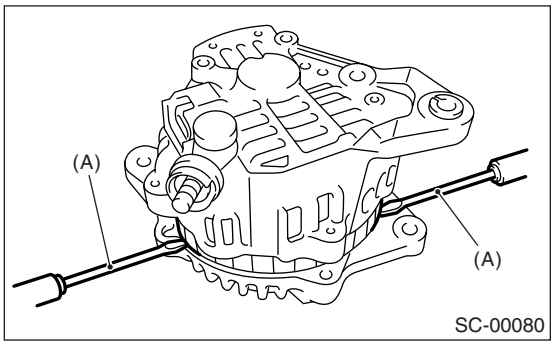
1) Remove the four through-bolts.



2) Heat portion (A) of rear cover to 50°C (122°F) with a heater drier.

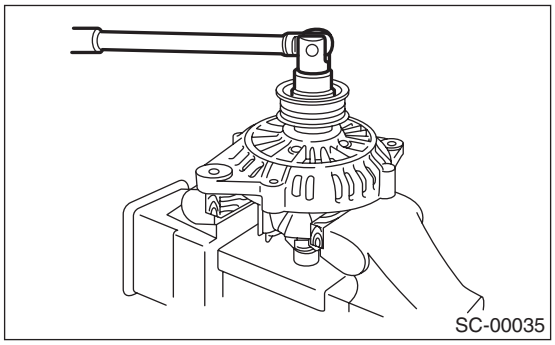


3) Then insert the tip of a flat tip screwdriver into the gap between stator core and front cover. Pry them apart to disassemble.

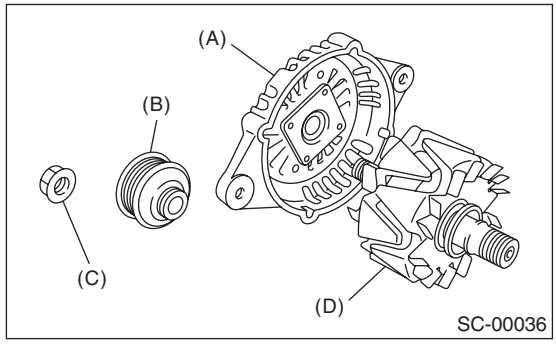


(A) Screwdriver

4) Hold the rotor with a vise and remove pulley nut.

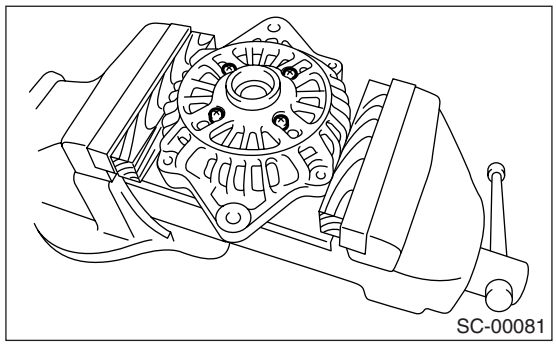


CAUTION:
When holding the rotor with a vise, place aluminum plates or wood blocks on the vise jaws to prevent rotor from damage.

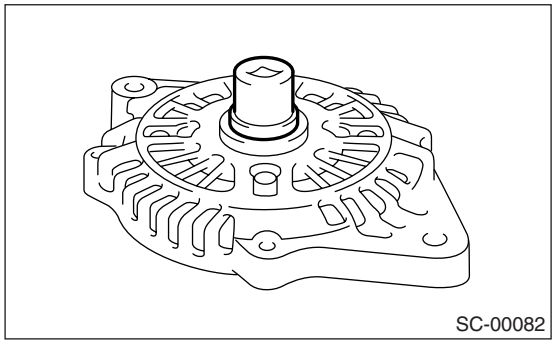


(A) Front cover
(B) Pulley
(C) Nut
(D) Rotor

5) Remove the ball bearing as follows.
(1) Remove the bolt, and then remove the bearing retainer.

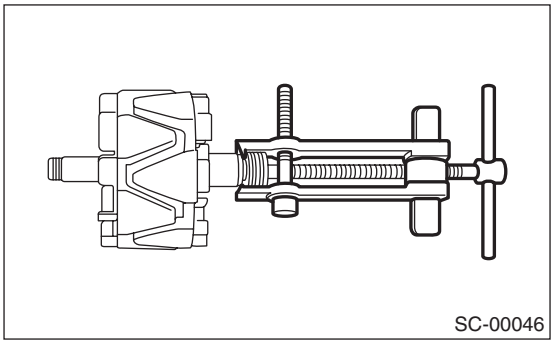


(2) Firmly install an appropriate tool (such as a fit socket wrench) to bearing inner race.



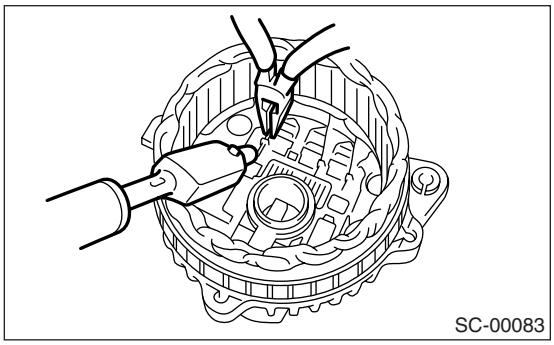
(3) Push the ball bearing off the front cover using a press.

6) Remove the bearing from rotor using a bearing puller.

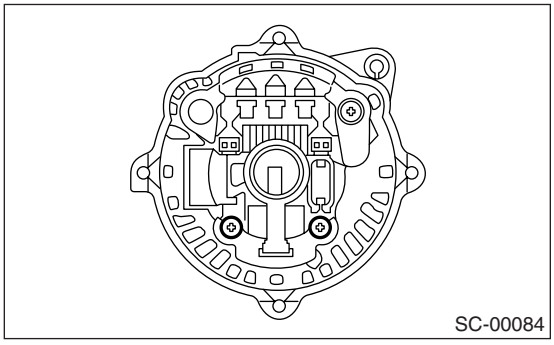

SC-00046

7) Unsolder connection between rectifier and stator coil to remove the stator coil.

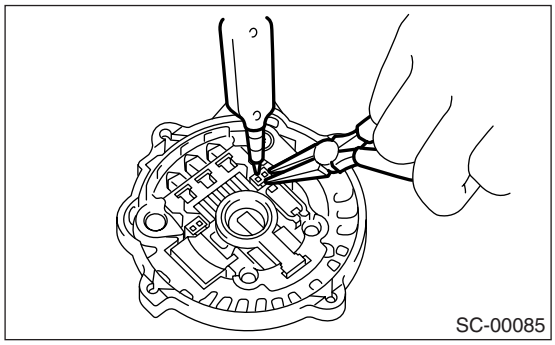
CAUTION:
Do not allow a 180 — 270 W soldering iron to contact the terminals for more than 5 seconds at once because the rectifier cannot withstand so much heat.


SC-00083

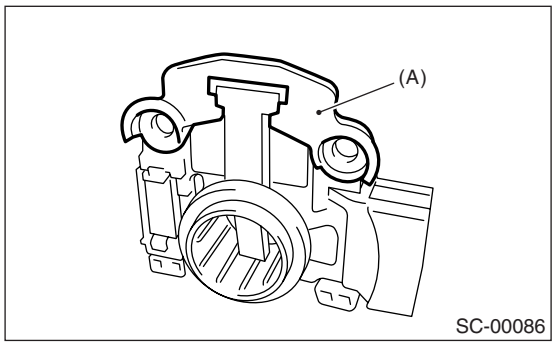
8) Remove the IC regulator as follows.
(1) Remove the screws which secure IC regulator to rear cover.


SC-00084

(2) Unsolder the connection between IC regulator and rectifier to remove the IC regulator.


SC-00085

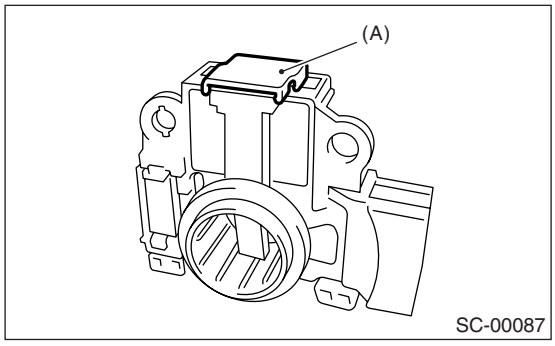
9) Remove the brush as follows.
(1) Remove cover A.



SC-00086

(A) Cover A

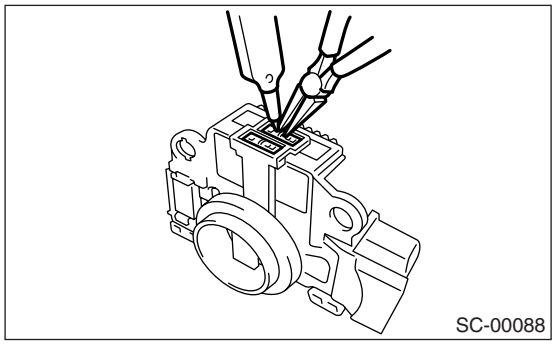
(2) Remove cover B.



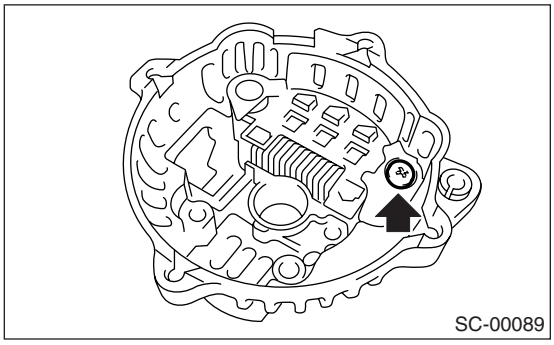
SC-00087

(A) Cover B

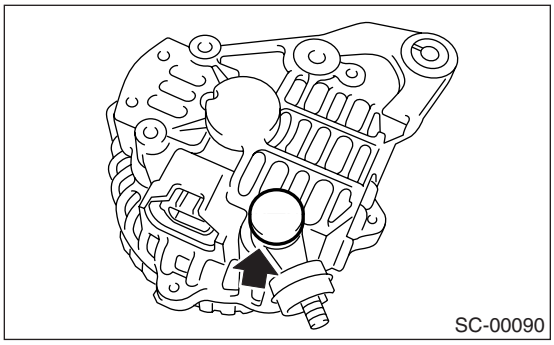
(3) Separate the brush from connection to remove.


SC-00088

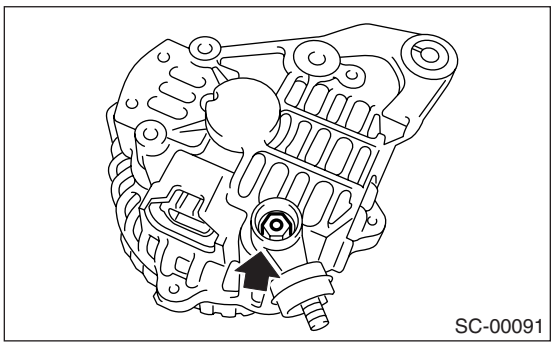
10) Remove the rectifier as follows.
(1) Remove the bolts which secure the rectifier.


SC-00089

(2) Remove the cover of terminal B.


SC-00090

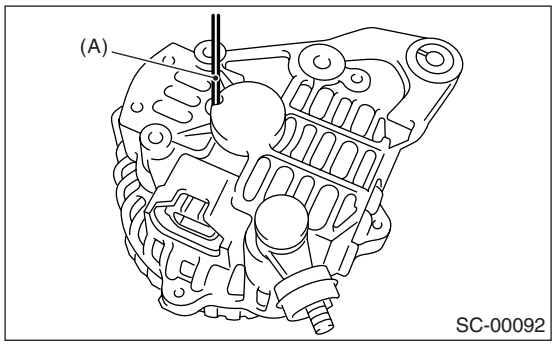
(3) Remove the nut of terminal B, and then remove the rectifier.


SC-00091

D: ASSEMBLY

Assemble in the reverse order of disassembly.
1) Pulling up brush
Before assembling, press the brush down into brush holder, and then fix them in that position by passing a [1 mm (0.04 in) dia. 40 to 50 mm (1.6 to 2.0 in) long] wire through the hole as shown in the figure.

CAUTION:
Be sure to remove the wire after reassembly.



SC-00092

(A) Wire

2) Install the ball bearing.
(1) Set the ball bearing on the front cover, and then securely install an appropriate tool (such as a fit socket wrench) to the bearing outer race.
(2) Press the ball bearing into the specified position using a press.
(3) Install the bearing retainer.
3) Press the bearing (rear side) into the rotor shaft using a press to install.
4) Heat the bearing box in rear cover [50 to 60°C (122 to 140°F)], and then press the rear bearing into rear cover.

CAUTION:
Grease should not be applied to rear bearing. Remove the oil completely if it is found on bearing box.

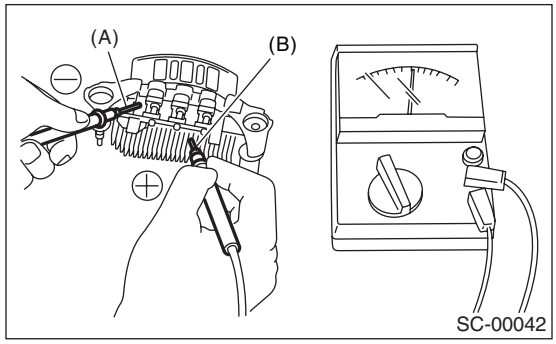
5) After reassembly, turn the pulley by hand to check that rotor turns smoothly.

E: INSPECTION

1. DIODE

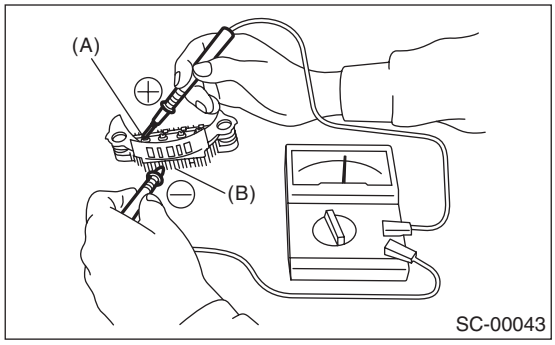
CAUTION:
Never use a mega tester (designed for reading high voltage) or any other similar instrument for this test; otherwise, the diodes may be damaged.

1) Checking positive diode
Check for continuity between the diode lead and positive side heat sink. The positive diode is in good condition if resistance is 1 Ω or less only in the direction from the diode lead to heat sink.



(A) Diode lead
(B) Heat sink (positive side)

2) Checking negative diode
Check for continuity between the negative side heat sink and diode lead. The negative diode is in good condition if resistance is 1 Ω or less only in the direction from the heat sink to diode lead.



(A) Diode lead
(B) Heat sink (negative side)

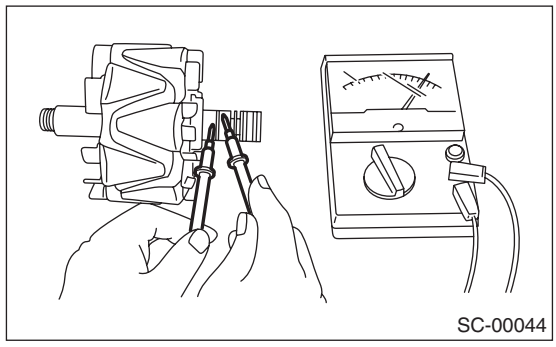
2. ROTOR

1) Slip ring surface
Inspect the slip rings for contamination or any roughness on the sliding surface. Repair the slip ring surface using a lathe or sand paper.
2) Slip ring outer diameter
Measure the slip ring outer diameter. If the slip ring is worn, replace the rotor assembly.

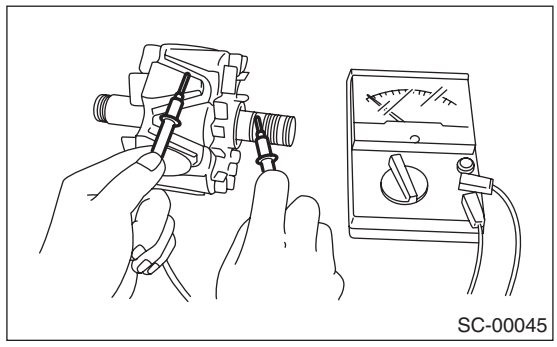
Slip ring outer diameter:
Standard
22.7 mm (0.894 in)
Limit
22.1 mm (0.870 in)

3) Continuity test
Check the resistance between slip rings using circuit tester.
If the resistance is not within the specified range, replace the rotor assembly.

Specified resistance:
Approx. 1.8 — 2.2 Ω



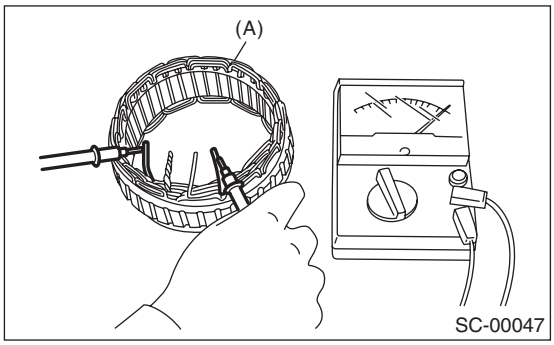
4) Insulation test
Check the continuity between slip ring and rotor core or shaft. If resistance is 1 Ω or less, the rotor coil is grounded, and so replace the rotor assembly.



5) Ball bearing (rear side)
Check the rear ball bearing. Replace if it is noisy or if the rotor does not turn smoothly.

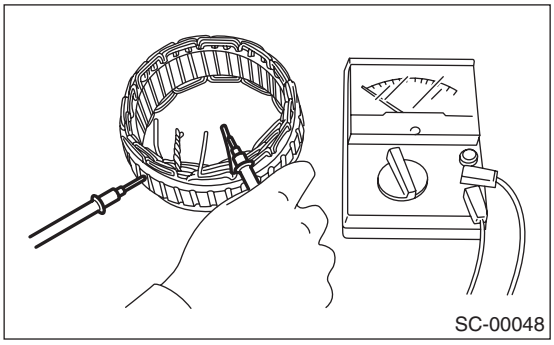
3. STATOR

1) Continuity test
Inspect the stator coil for continuity between each end of the lead wires. If resistance is 1 MΩ or more, the lead wire is broken, and so replace the stator assembly.



(A) Stator

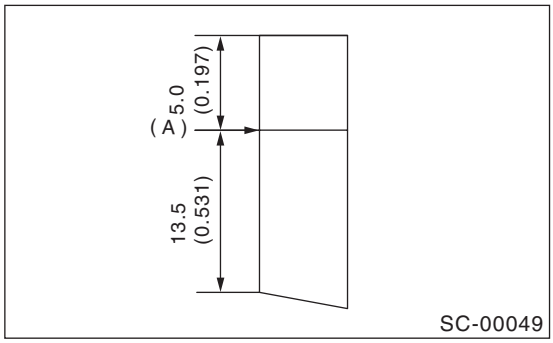
2) Insulation test
Inspect the stator coil for continuity between stator core and each end of lead wire. If resistance is 1 Ω or less, the stator coil is grounded, and so replace the stator assembly.



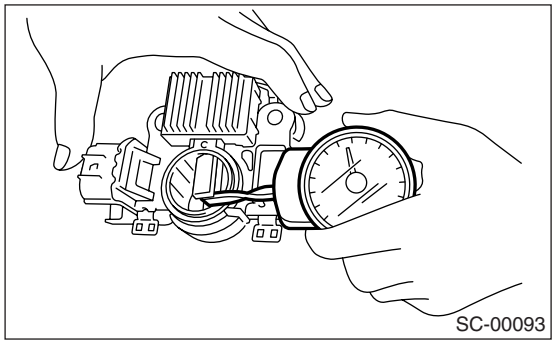
4. BRUSH

1) Measure the length of each brush. If wear exceeds the service limit, replace the brush. Each brush has the service limit mark (A) on it.

Brush length:
Standard
18.5 mm (0.728 in)
Service limit
5.0 mm (0.197 in)



2) Checking brush spring for proper pressure
Using a spring pressure indicator, push the brush into the brush holder until its tip protrudes 2 mm (0.08 in). Then measure the pressure of brush spring. If the pressure is less than 2.648 N (270 gf, 9.52 ozf), replace the brush spring with a new one. The new spring must have a pressure of 4.609 to 5.786 N (470 to 590 gf, 16.58 to 20.810 ozf).



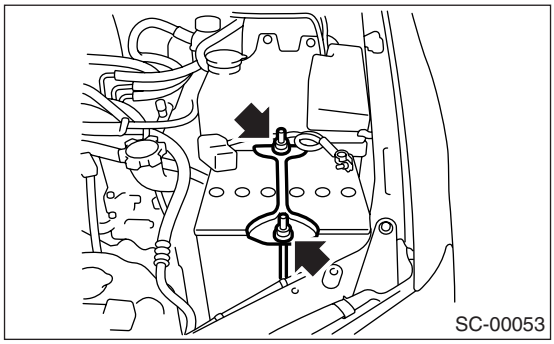
5. BEARING (FRONT SIDE)

Check the front ball bearing. If the resistance is felt while rotating, or if abnormal noise is heard, replace the ball bearing.

4. Battery

A: REMOVAL

1) Disconnect the positive (+) cable after disconnecting the ground (–) cable of battery.
2) Remove the flange nuts from battery rods, and then take off the battery holder.



3) Remove the battery.

B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
3.4 N·m (0.35 kgf-m, 2.5 ft-lb)

NOTE:
• Clean the battery cable terminals, and then apply grease to retard formation of corrosion.
• Connect the positive (+) cable of battery and then the ground (–) cable of battery.

C: INSPECTION

WARNING:
• Electrolyte has toxicity; be careful handling the fluid.
• Avoid contact with skin, eyes or clothing. Especially at contact with eyes, flush with running water for 15 minutes and get prompt medical attention.
• Batteries produce explosive gasses. Keep sparks, flame, cigarettes away.
• Ventilate when charging or using in enclosed space.
• For safety, in case an explosion does occur, wear eye protection or shield your eyes when working near any battery. Never lean over a battery.
• Do not let the battery fluid contact eyes, skin, fabrics, or paint-work because battery fluid is corrosive acid.
• To lessen the risk of sparks, remove rings, metal watch-bands, and other metal jewelry. Never allow metal tools to contact the positive battery terminal and anything connected to it while you are at the same time in contact with any other metallic portion of the vehicle. This may cause a short circuit.

1. EXTERNAL PARTS:

Check for the existence of dirt or cracks on battery case, top cover, vent plugs, and terminal posts. If necessary, clean with water and wipe with a dry cloth.
Apply a thin coat of grease on the terminal posts to prevent corrosion.

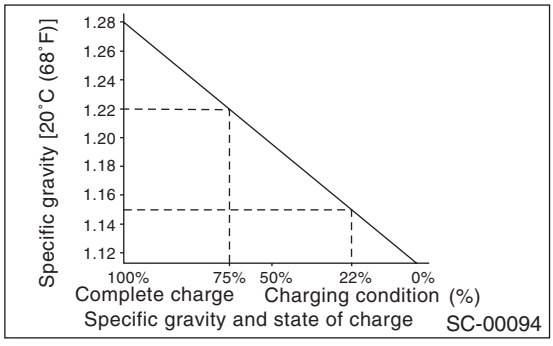
2. ELECTROLYTE LEVEL:

Check the electrolyte level in each cell. If the level is below MIN LEVEL, bring the level to MAX LEVEL by pouring distilled water into the battery cell. Do not fill beyond MAX LEVEL.

3. SPECIFIC GRAVITY OF ELECTROLYTE:

1) Measure the specific gravity of electrolyte using a hydrometer and a thermometer.
Specific gravity varies with temperature of electrolyte so that it must be corrected at 20°C (68°F) using the following equation:

S_{20} = St + 0.0007 × (t − 20)
S_{20}: Specific gravity corrected at electrolyte temperature of 20°C
St: Measured specific gravity
t: Measured temperature (°C)
Determine whether or not battery must be charged, according to corrected specific gravity.
Standard specific gravity: 1.220 — 1.290 [at 20°C (68°F)]



2) Measuring the specific gravity of the electrolyte in battery will disclose the state of charge of battery. The relation between specific gravity and state of charge is as shown in the figure.

D: MEASUREMENT

WARNING:
Do not bring an open flame close to the battery at this time.

CAUTION:
• Prior to charging, corroded terminals should be cleaned with a brush and common caustic soda solution.

• Be careful since the battery electrolyte overflows while charging the battery.
• Observe the instructions when handling battery charger.
• Before charging the battery on vehicle, disconnect battery ground terminal to prevent damage of generator diodes or other electrical units.

1. JUDGMENT OF BATTERY IN CHARGED CONDITION

1) Specific gravity of electrolyte is held within the specified range from 1.250 to 1.290 for more than one hour.
2) Voltage per battery cell is held at the specified range from 2.5 to 2.8 volts for more than one hour.

2. STATE OF CHARGE CHECK USING A HYDROMETER

Hydrometer indicator	State of charge	Corrective action
Green dot	Above 65%	Load test
Dark dot	Below 65%	Charge battery
Clear dot	Low electrolyte	Replace battery* (If cranking is difficult)
*: Check electrical system before replacement.		

3. NORMAL CHARGING

Charge the battery at current value specified by manufacturer or at approx. 1/10 of the battery's ampere-hour rating.

4. QUICK CHARGING

Quick charging is a method in which the battery is charged in a short period of time with a relatively large current by using a quick charger.
Since a large current flow raises electrolyte temperature, the battery is subject to damage if large current is used for prolonged time. For this reason, the quick charging must be carried out within a current range that will not increase the electrolyte temperature above 40°C (104°F).
It should be also remembered that the quick charging is a temporary means to bring battery voltage up to a fair value and, as a rule, a battery should be charged slowly with a low current.

CAUTION:
• Observe the items in 3. NORMAL CHARGING.
• Never use more than 10 amperes when charging the battery because that will shorten battery life.

ENGINE (DIAGNOSTICS)

EN(H4SO)(diag)

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1. Basic Diagnostic Procedure

A: PROCEDURE

1. ENGINE

	Step	Check	Yes	No
1	**CHECK ENGINE START FAILURE.** 1) Ask the customer when and how the trouble occurred using the check list for interview. <Ref. to EN(H4SO)(diag)-4, CHECK, Check List for Interview.> 2) Start the engine.	Does the engine start?	Go to step **2.**	Inspection using "Diagnostics for Engine Start Failure". <Ref. to EN(H4SO)(diag)-56, Diagnostics for Engine Starting Failure.>
2	**CHECK ILLUMINATION OF MALFUNCTION INDICATOR LIGHT.**	Does malfunction indicator light illuminate?	Go to step **3.**	Inspection using "General Diagnostics Table". <Ref. to EN(H4SO)(diag)-249, INSPECTION, General Diagnostic Table.>
3	**CHECK INDICATION OF DTC ON DISPLAY.** 1) Turn the ignition switch to OFF. 2) Connect the Subaru Select Monitor or the general scan tool to data link connector. 3) Turn the ignition switch to ON and the Subaru Select Monitor or general scan tool switch to ON. 4) Read the DTC on the Subaru Select Monitor or general scan tool.	Does the Subaru Select Monitor or general scan tool indicate DTC?	Record the DTC. Repair the trouble cause. <Ref. to EN(H4SO)(diag)-70, List of Diagnostic Trouble Code (DTC).> Go to step **4.**	Repair the related parts. NOTE: If DTC is not shown on display although the malfunction indicator light illuminates, perform diagnostics of malfunction indicator light circuit or combination meter. <Ref. to EN(H4SO)(diag)-47, Malfunction Indicator Light.>
4	**PERFORM THE DIAGNOSIS.** 1) Perform the clear memory mode. <Ref. to EN(H4SO)(diag)-44, Clear Memory Mode.> 2) Perform the inspection mode. <Ref. to EN(H4SO)(diag)-37, Inspection Mode.>	Does the Subaru Select Monitor or general scan tool indicate DTC?	Inspect using "Diagnostics Procedure with Diagnostic Trouble Code (DTC)". <Ref. to EN(H4SO)(diag)-76, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Complete the diagnosis.

2. AUTOMATIC TRANSMISSION

When the DTC about automatic transmission is shown on display, carry out the following basic check. After that, carry out the replacement or repair work.

1) ATF level check <Ref. to 4AT-32, Automatic Transmission Fluid.>
2) Differential gear oil level check <Ref. to 4AT-34, Differential Gear Oil.>
3) ATF leak check <Ref. to 4AT-32, Automatic Transmission Fluid.>
4) Differential gear oil leak check <Ref. to 4AT-34, Differential Gear Oil.>
5) Stall test <Ref. to 4AT-36, Stall Test.>
6) Line pressure test <Ref. to 4AT-39, Line Pressure Test.>
7) Transfer clutch pressure test <Ref. to 4AT-40, Transfer Clutch Pressure Test.>
8) Time lag test <Ref. to 4AT-38, Time Lag Test.>
9) Road test <Ref. to 4AT-35, Road Test.>
10) Shift characteristics <Ref. to 4AT-40, Transfer Clutch Pressure Test.>

2. Check List for Interview

A: CHECK

1. CHECK LIST No. 1

Check the following items when problem has occurred.

NOTE:
Use copies of this page for interviewing customers.

Customer's name		Engine No.	
Date of sale		Fuel brand	
Date of repair		Odometer reading	km
VIN No.			miles
Weather	❑ Fine ❑ Cloudy ❑ Rainy ❑ Snowy ❑ Various/Others:		
Outdoor temperature	°C (°F)		
	❑ Hot ❑ Warm ❑ Cool ❑ Cold		
Place	❑ Highway ❑ Suburbs ❑ Inner city ❑ Uphill ❑ Downhill ❑ Rough road ❑ Others:		
Engine temperature	❑ Cold ❑ Warming-up ❑ After warming-up ❑ Any temperature ❑ Others:		
Engine speed	rpm		
Vehicle speed	km/h (MPH)		
Driving conditions	❑ Not affected ❑ At starting ❑ While idling ❑ At racing ❑ While accelerating ❑ While cruising ❑ While decelerating ❑ While turning (RH/LH)		
Headlight	❑ ON / ❑ OFF	Rear defogger	❑ ON / ❑ OFF
Blower	❑ ON / ❑ OFF	Radio	❑ ON / ❑ OFF
A/C compressor	❑ ON / ❑ OFF	CD/Cassette	❑ ON / ❑ OFF
Radiator fan	❑ ON / ❑ OFF	Car phone	❑ ON / ❑ OFF
Front wiper	❑ ON / ❑ OFF	CB	❑ ON / ❑ OFF
Rear wiper	❑ ON / ❑ OFF		

2. CHECK LIST No. 2

Check the following items about the vehicle's state when malfunction indicator light turns on.

NOTE:
Use copies of this page for interviewing customers.

a) Other warning lights or indicators turn on. ❑ Yes / ❑ No
❑ Low fuel warning light ❑ Charge indicator light ❑ AT diagnostics indicator light ❑ ABS warning light ❑ Engine oil pressure warning light
b) Fuel level
• Lack of gasoline: ❑ Yes / ❑ No • Indicator position of fuel gauge: • Experienced running out of fuel: ❑ Yes / ❑ No
c) Intentional connecting or disconnecting of harness connectors or spark plug cords: ❑ Yes / ❑ No
• What:
d) Intentional connecting or disconnecting of hoses: ❑ Yes / ❑ No
• What:
e) Installing of parts other than genuine parts: ❑ Yes / ❑ No
• What: • Where:
f) Occurrence of noise: ❑ Yes / ❑ No
• From where: • What kind:
g) Occurrence of smell: ❑ Yes / ❑ No
• From where: • What kind:
h) Intrusion of water into engine compartment or passenger compartment: ❑ Yes / ❑ No
i) Troubles occurred
❑ Engine does not start. ❑ Engine stalls during idling. ❑ Engine stalls while driving. ❑ Engine speed decreases. ❑ Engine speed does not decrease. ❑ Rough idling ❑ Poor acceleration ❑ Back fire ❑ After fire ❑ No shift ❑ Excessive shift shock

3. General Description

A: CAUTION

1) Airbag system wiring harness is routed near the ECM, main relay and fuel pump relay.

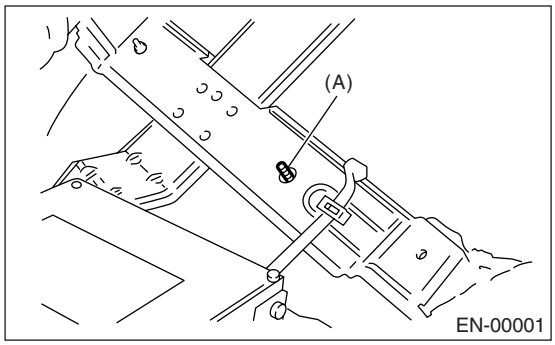
CAUTION:
• All airbag system wiring harness and connectors are colored yellow. Do not use electrical test equipment on these circuit.
• Be careful not to damage the airbag system wiring harness when servicing the ECM, TCM, main relay and fuel pump relay.

2) Never connect the battery in reverse polarity.
• The ECM will be destroyed instantly.
• The fuel injector and other part will be damaged in just a few minutes more.
3) Do not disconnect the battery terminals while the engine is running.
• A large counter electromotive force will be generated in the generator, and this voltage may damage electronic parts such as ECM, etc.
4) Before disconnecting the connectors of each sensor and the ECM, be sure to turn OFF the ignition switch.
5) Poor contact has been identified as a primary cause of this problem. To measure the voltage and/or resistance of individual sensors or all electrical control modules at the harness side connector, use a tapered pin with a diameter of less than 0.64 mm (0.025 in). Do not insert the pin more than 5 mm (0.20 in) into the part.
6) Before removing the ECM from the located position, disconnect two cables on battery.
• Otherwise, the ECM may be damaged.

CAUTION:
When replacing the ECM, be careful not to use the wrong spec. ECM to avoid any damage on fuel injection system.

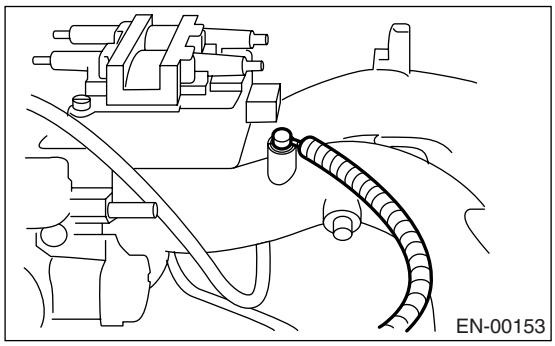
7) The connectors to each sensor in the engine compartment and the harness connectors on the engine side and body side are all designed to be waterproof. However, it is still necessary to take care not to allow water to get into the connectors when washing the vehicle, or when servicing the vehicle on a rainy day.

8) Use ECM mounting stud bolts at the body side grounding point when measuring voltage and resistance inside the passenger compartment.

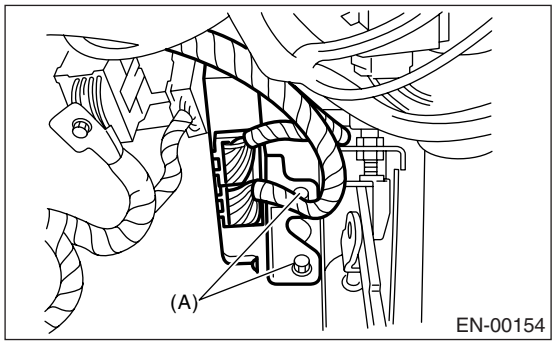


(A) Stud bolt

9) Use engine grounding terminal or engine proper as the grounding point to the body when measuring voltage and resistance in the engine compartment.



10) Use TCM mounting stud bolts at the body side grounding point when measuring voltage and resistance inside the passenger compartment.



(A) Stud bolt

11) Every engine-related part is a precision part. Do not drop them.
12) Observe the following cautions when installing a radio in the vehicle.

CAUTION:
• The antenna must be kept as far apart as possible from the control module.
• The antenna feeder must be placed as far apart as possible from the ECM and MFI harness.
• Carefully adjust the antenna for correct matching.
• When mounting a large power type radio, pay special attention to the three items above mentioned.
• Incorrect installation of the radio may affect the operation of the ECM.

13) Before disconnecting the fuel hose, disconnect the fuel pump connector and crank the engine for more than five seconds to release pressure in the fuel system. If engine starts during this operation, run it until it stops.
14) Problems in the electronic-controlled automatic transmission may be caused by failure of the engine, the electronic control system, the transmission proper, or by a combination of these. These three causes must be distinguished clearly when performing diagnostics.
15) Diagnostics should be conducted by rotating with simple, easy operations and proceeding to complicated, difficult operations. The most important thing in diagnostics is to understand the customer's complaint, and distinguish between the three causes.
16) In AT models, do not continue the stall for more than five seconds at a time.
17) On models with ABS, when performing driving test in jacked-up or lifted-up position, sometimes the warning light may be lit, but this is not a malfunction of the system. The reason for this is the speed difference between the front and rear wheels. After diagnosis of engine control system, perform the ABS memory clearance procedure of self-diagnosis system.

B: INSPECTION

Before performing diagnostics, check the following items which might affect engine problems:

1. BATTERY

1) Measure battery voltage and specific gravity of electrolyte.

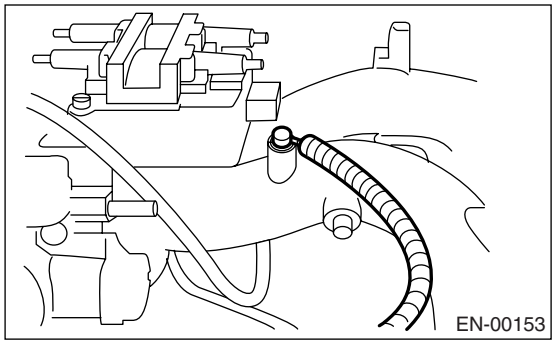
Standard voltage: 12 V

Specific gravity: Above 1.260

2) Check the condition of the main and other fuses, and harnesses and connectors. Also check for proper grounding.

2. ENGINE GROUNDING

Make sure the engine grounding terminal is properly connected to the engine.



C: NOTE

1. GENERAL DESCRIPTION

• On-board diagnostic (OBD) system detects and indicates a fault in various inputs and outputs of the complex electronic control. Malfunction indicator light in the combination meter indicates occurrence of a fault or trouble.
• Further, against such a failure or sensors as may disable the drive, the fail-safe function is provided to ensure the minimal driveability.
• The OBD system incorporated with the vehicles within this engine family complies with E-OBD regulation. The OBD system monitors the components and the system malfunction listed in Engine Section which affects on emissions.
• When the system decides that a malfunction occurs, malfunction indicator light illuminates. At the same time of the malfunction indicator light illumination or blinking, the DTC and a freeze frame engine conditions are stored into on-board computer.
• The OBD system stores freeze frame engine condition data (engine load, engine coolant temperature, fuel trim, engine speed and vehicle speed, etc.) into on-board computer when it detects a malfunction first.
• If the OBD system detects the various malfunctions including the fault of fuel trim or misfire, the OBD system first stores freeze frame engine conditions about the fuel trim or misfire.
• When the malfunction does not occur again for three consecutive driving cycles, malfunction indicator light is turned off, but DTC remains at on-board computer.
• When troubleshooting the vehicles complied with E-OBD regulation, connect Subaru Select Monitor or the general scan tool to the vehicle.

2. ENGINE AND EMISSION CONTROL SYSTEM

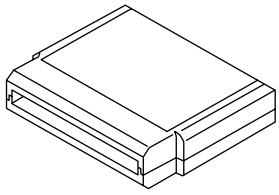
• The Multipoint Fuel Injection (MFI) system is a system that supplies the optimum air-fuel mixture to the engine for all the various operating conditions through the use of the latest electronic technology.
With this system fuel, which is pressurized at a constant pressure, is injected into the intake air passage of the cylinder head. The injection quantity of fuel is controlled by an intermittent injection system where the electro-magnetic injection valve (fuel injector) opens only for a short period of time, depending on the quantity of air required for one cycle of operation. In actual operation, the injection quantity is determined by the duration of an electric pulse applied to the fuel injector and this permits simple, yet highly precise metering of the fuel.
• Further, all the operating conditions of the engine are converted into electric signals, and this results in additional features of the system, such as large improved adaptability, easier addition of compensating element, etc.

The MFI system also has the following features:
- Reduced emission of harmful exhaust gases.
- Reduction in fuel consumption.
- Increased engine output.
- Superior acceleration and deceleration.
- Superior startability and warm-up performance in cold weather since compensation is made for coolant and intake air temperature.

3. AUTOMATIC TRANSMISSION AND ELECTRONIC-HYDRAULIC CONTROL SYSTEM

The electronic-hydraulic control system consists of various sensors and switches, the TCM and the hydraulic controller including solenoid valves. The system controls the transmission proper including shift control, lock-up control, overrunning clutch control, line pressure control and shift timing control. It also controls the AWD transfer clutch. In other words, the system detects various operating conditions from various input signals and sends output signals to shift solenoids 1, 2 and low clutch timing solenoid and 2-4 brake timing solenoid, line pressure duty solenoid, lock-up duty solenoid, transfer duty solenoid and 2-4 brake duty solenoid (a total of eight solenoids).

D: PREPARATION TOOL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18482AA000	18482AA000	CARTRIDGE	Troubleshooting for electrical systems.
ST22771AA030	22771AA030	SUBARU SELECT MONITOR KIT	Troubleshooting for electrical systems. • English: 22771AA030 (Without printer) • German: 22771AA070 (Without printer) • French: 22771AA080 (Without printer) • Spanish: 22771AA090 (Without printer)

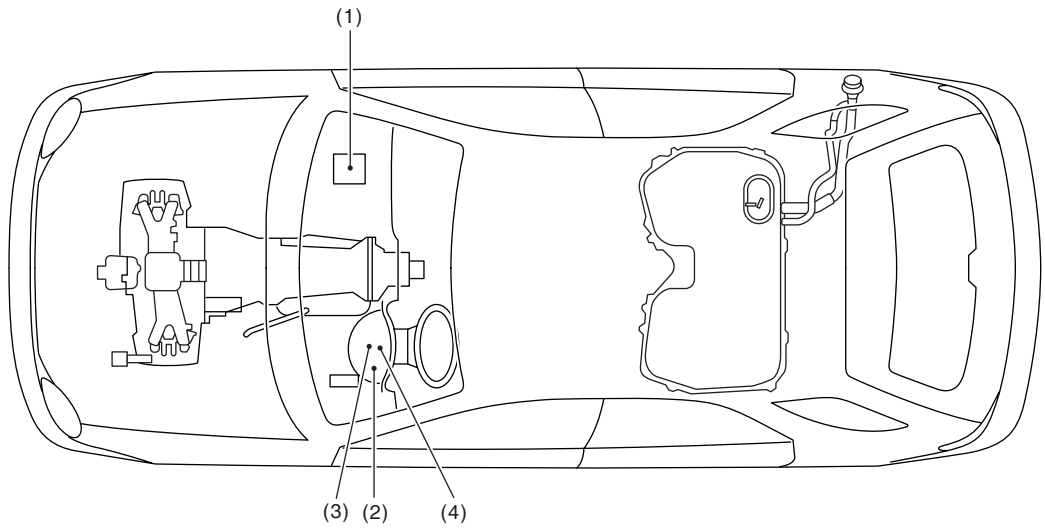
4. Electrical Component Location

A: LOCATION

1. ENGINE

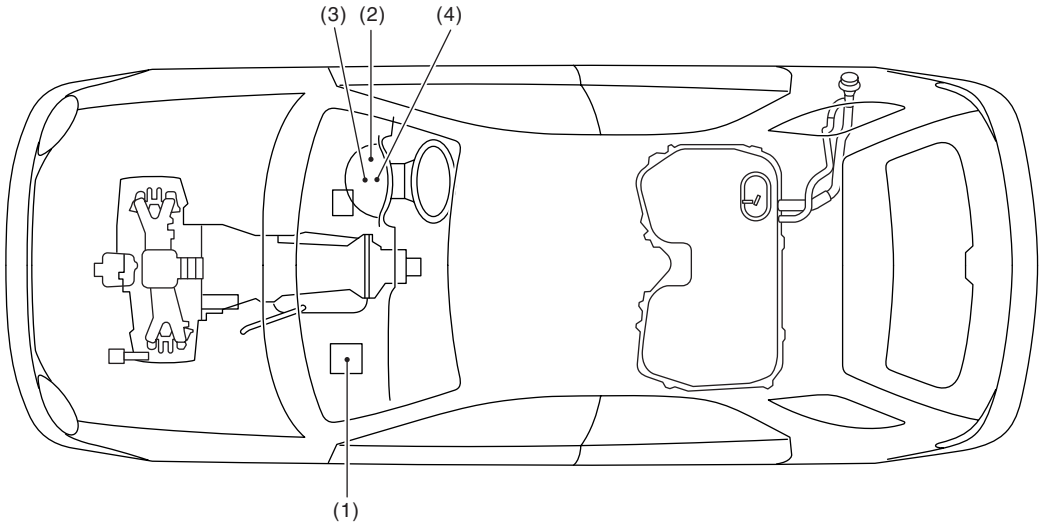
• MODULE

LHD



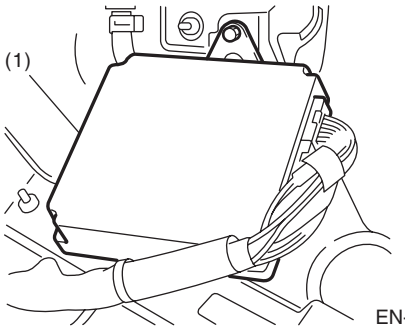
EN-01397

RHD

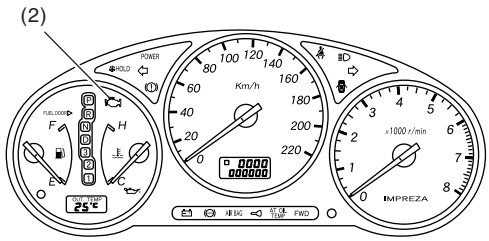


EN-01398

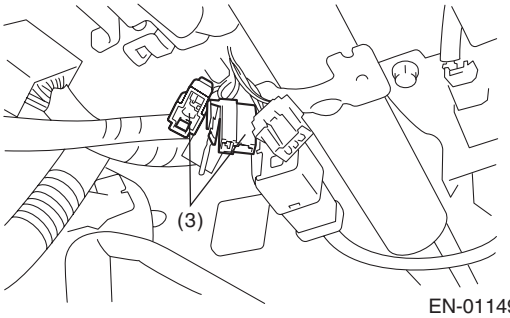
(1) Engine control module (ECM)
(2) Malfunction indicator light
(3) Test mode connector
(4) Data link connector



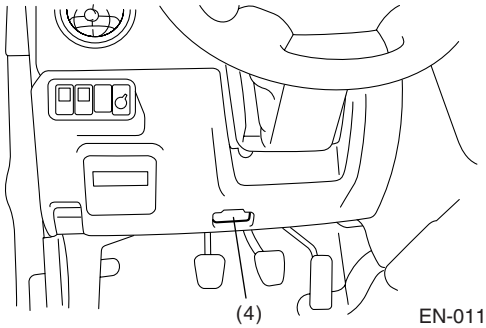
EN-00156



EN-01399

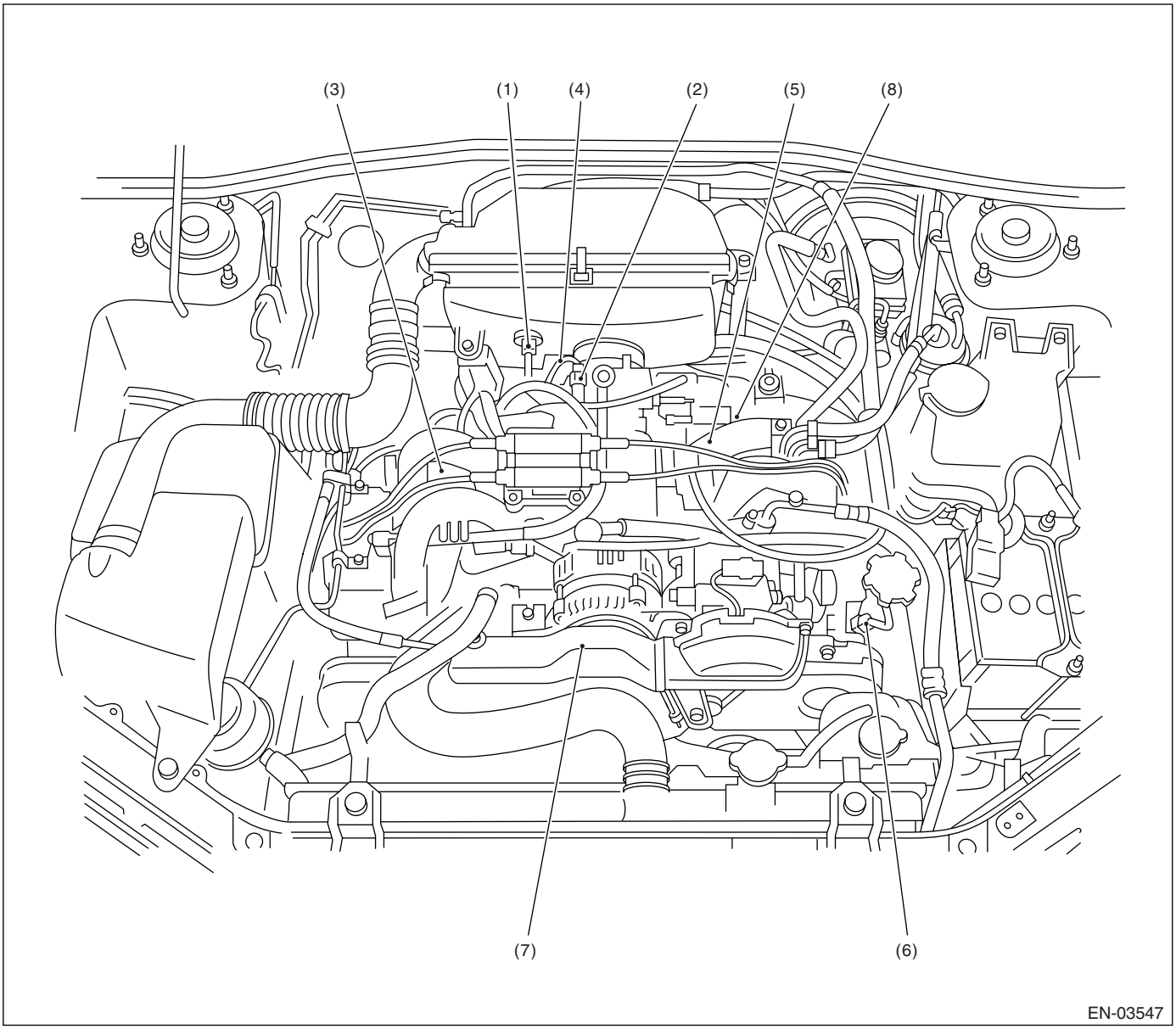


EN-01149



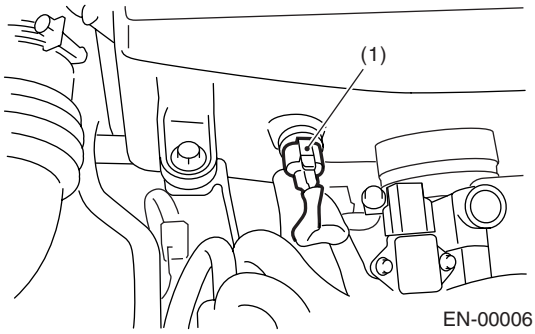
EN-01150

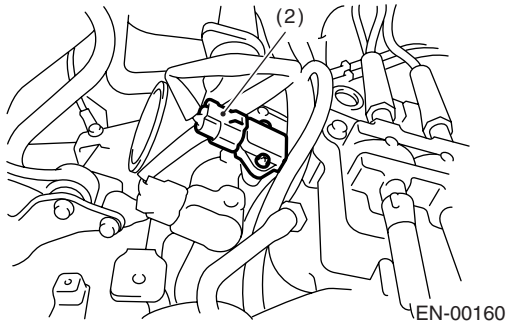
• SENSOR

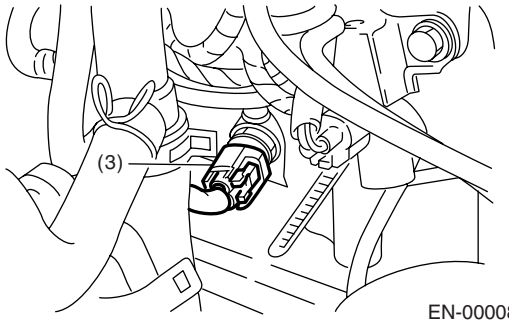


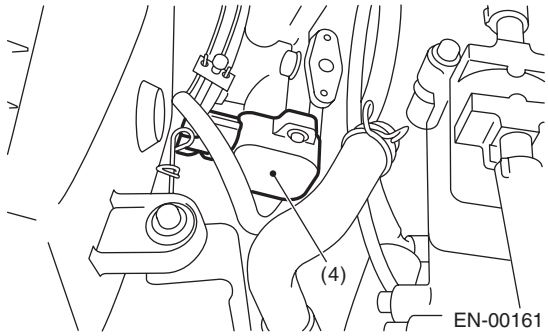
(1) Intake air temperature sensor
(2) Manifold absolute pressure sensor
(3) Engine coolant temperature sensor (without ATF warmer)
(4) Throttle position sensor
(5) Knock sensor
(6) Camshaft position sensor
(7) Crankshaft position sensor
(8) Engine coolant temperature sensor (with ATF warmer)

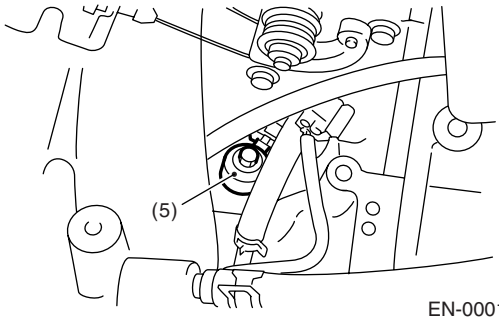
Electrical Component Location

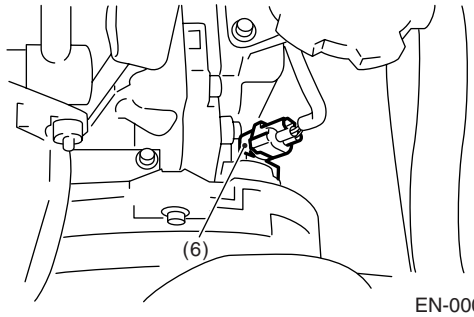


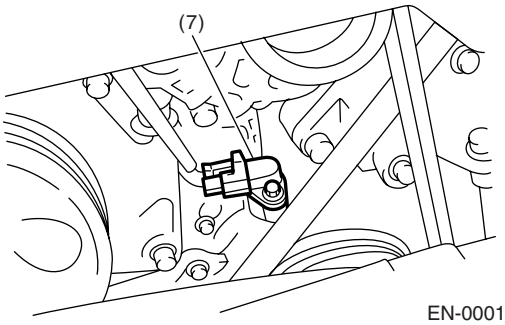


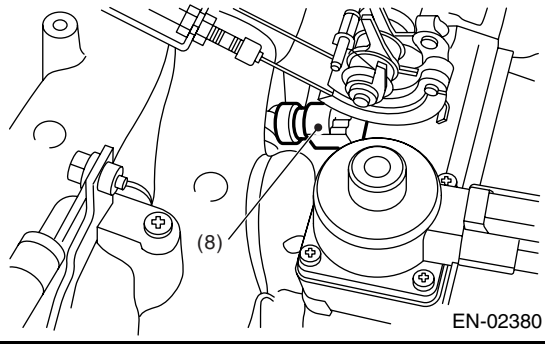


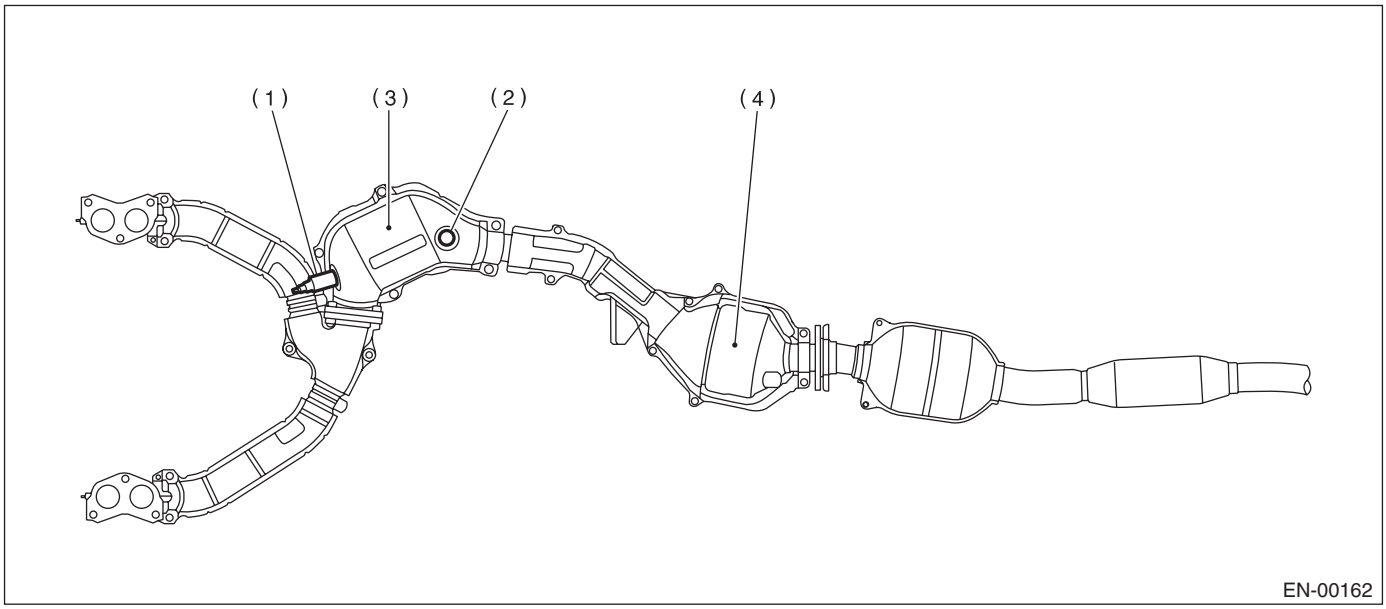




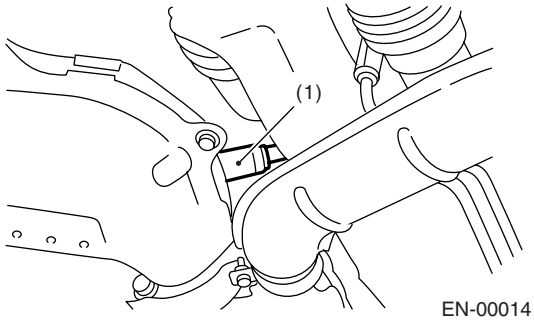


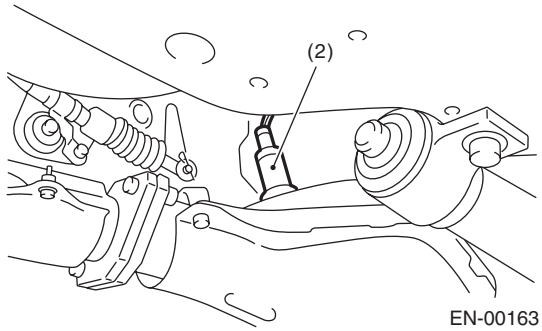


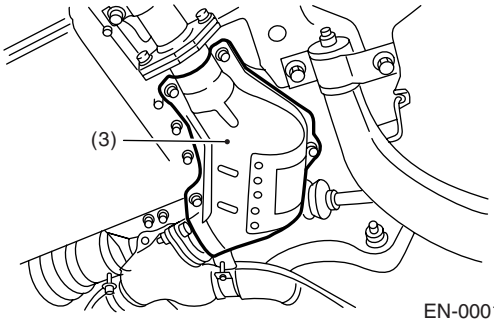


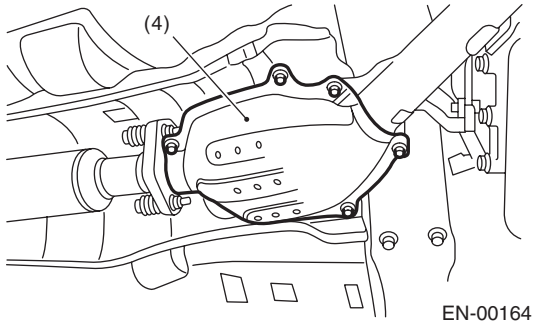


(1) Front oxygen (A/F) sensor
(2) Rear oxygen sensor
(3) Front catalytic converter
(4) Rear catalytic converter



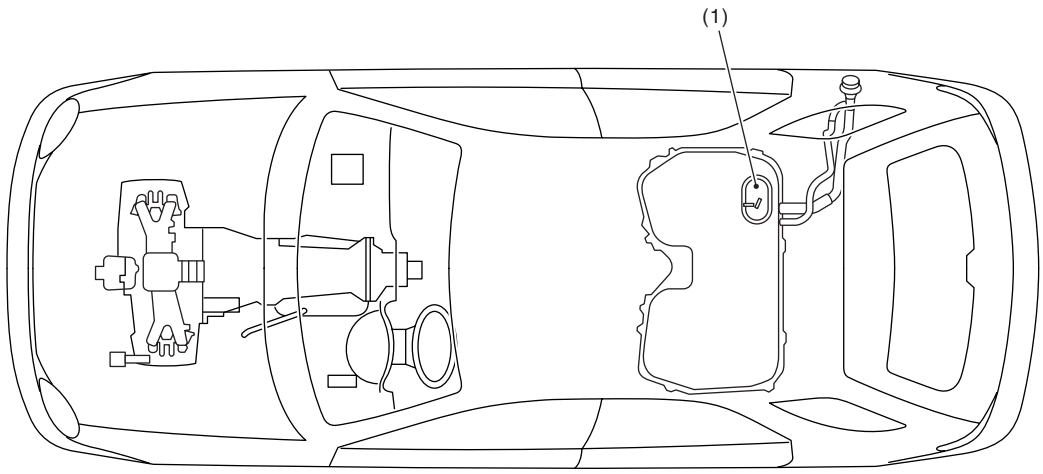






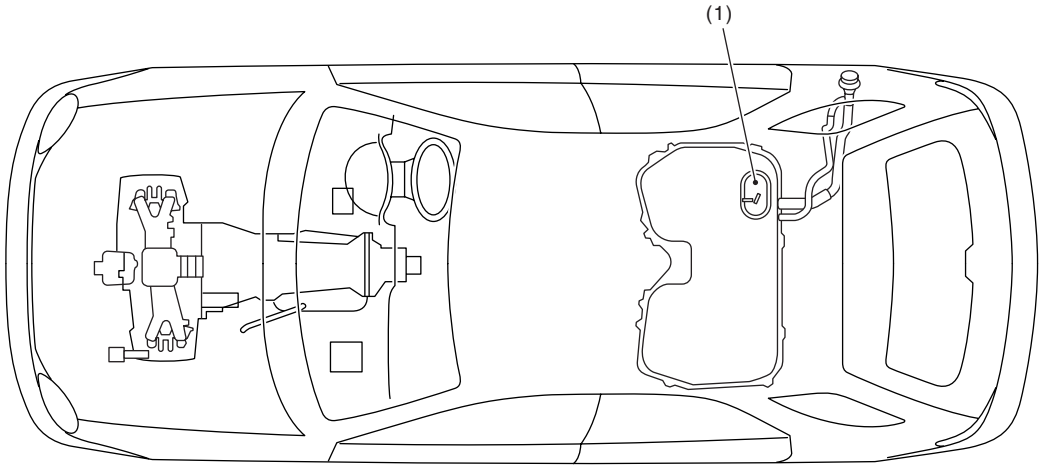
Electrical Component Location

LHD



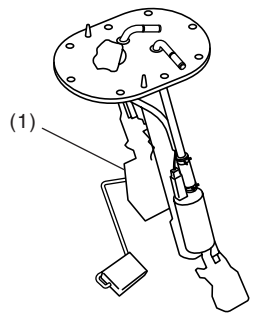
EN-01401

RHD



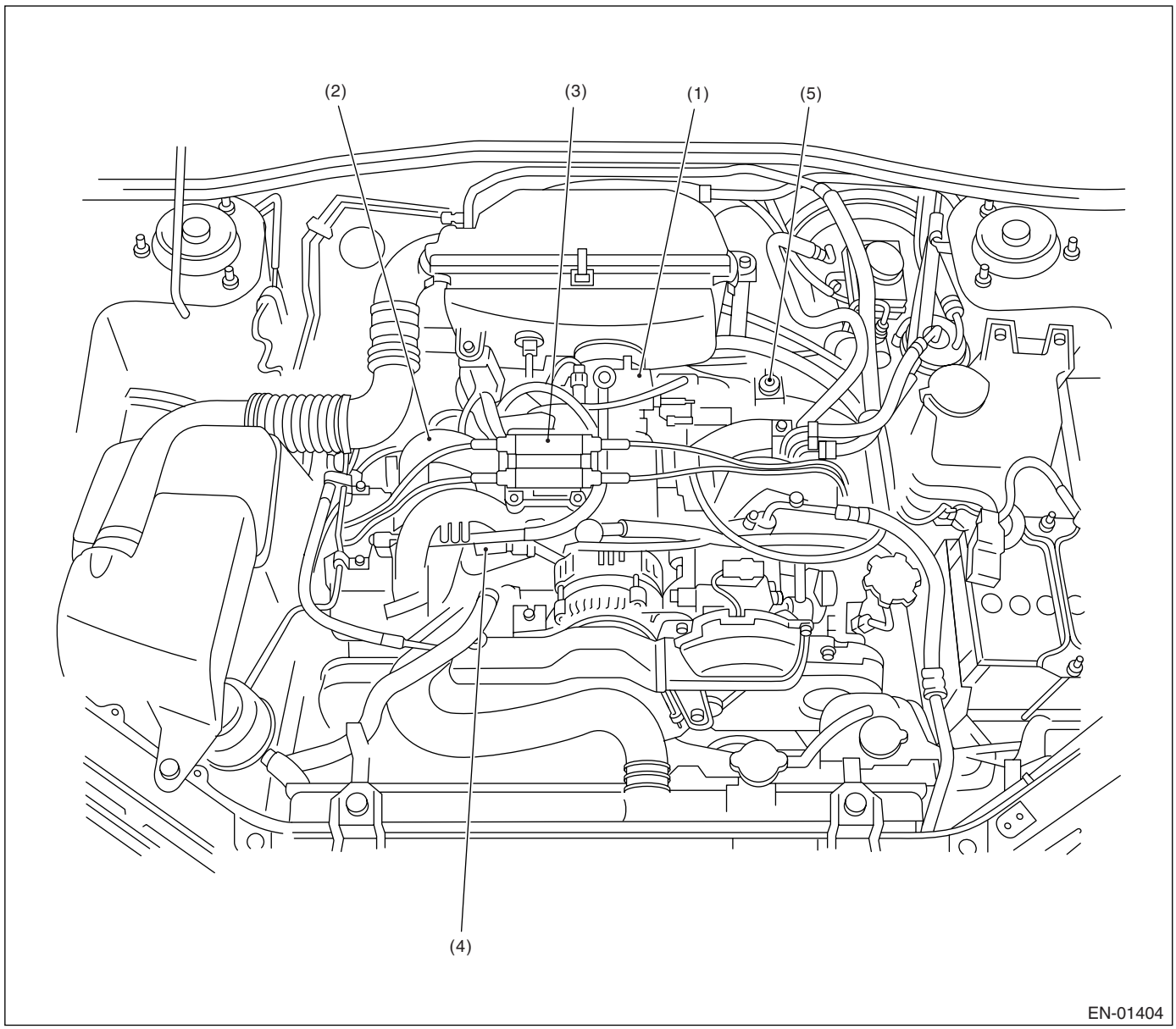
EN-01402

(1) Fuel level sensor

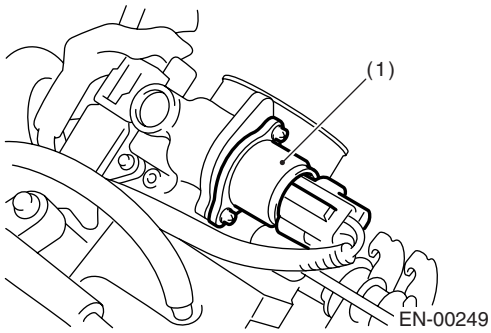


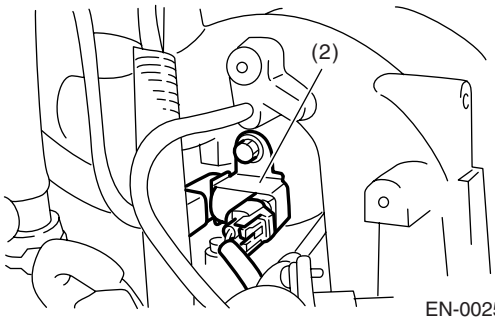
EN-01403

• SOLENOID VALVE, EMISSION CONTROL SYSTEM PARTS AND IGNITION SYSTEM PARTS



(1) Idle air control solenoid valve
(2) Purge control solenoid valve
(3) Ignition coil & ignitor ASSY
(4) Air assisted injector solenoid valve (1.6 L model)
(5) EGR valve


(1)
EN-00249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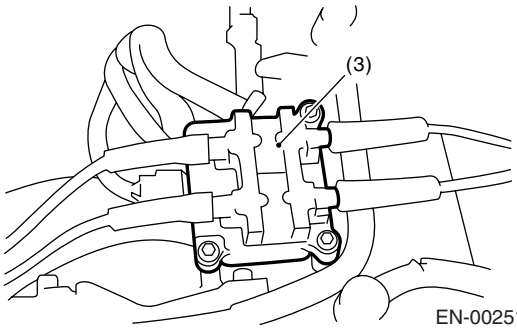
EN-00250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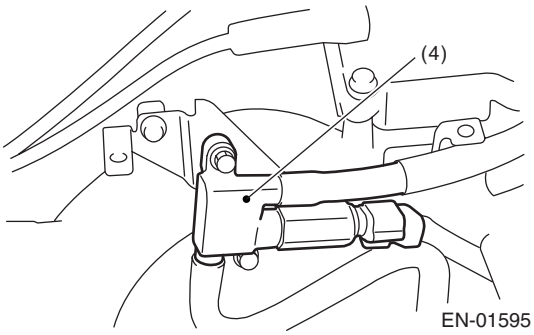
EN-00251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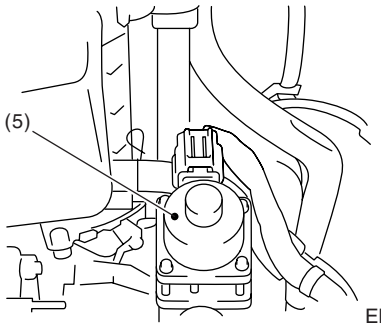
EN-01595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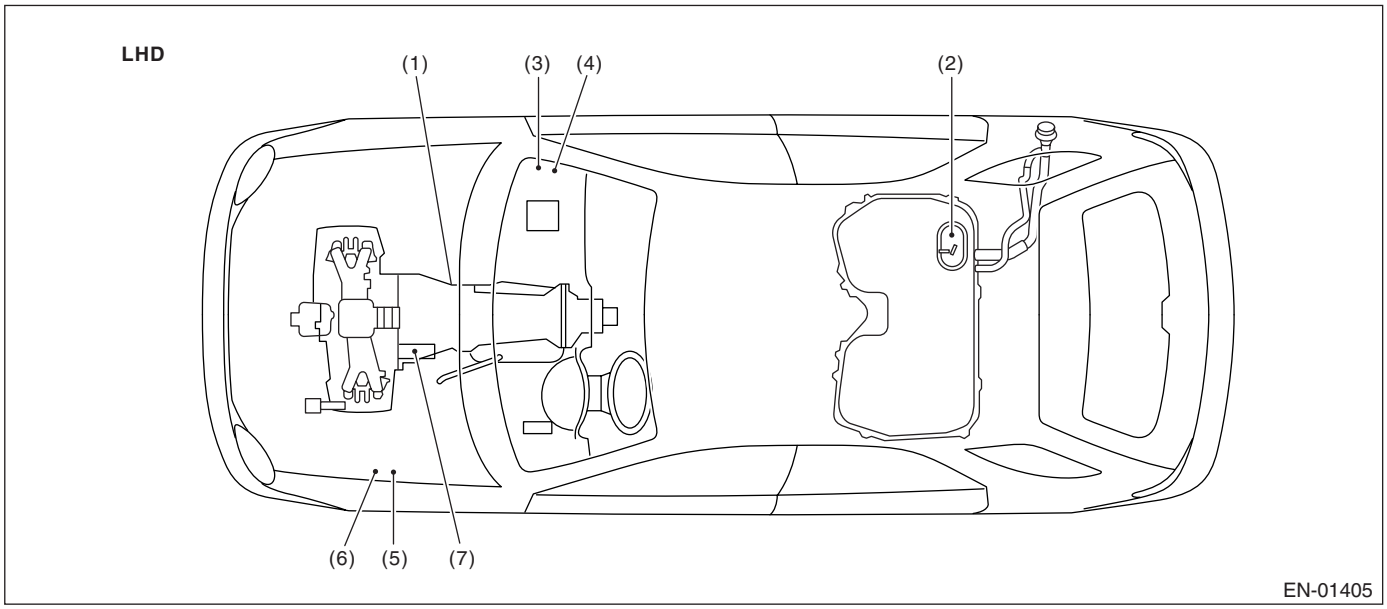
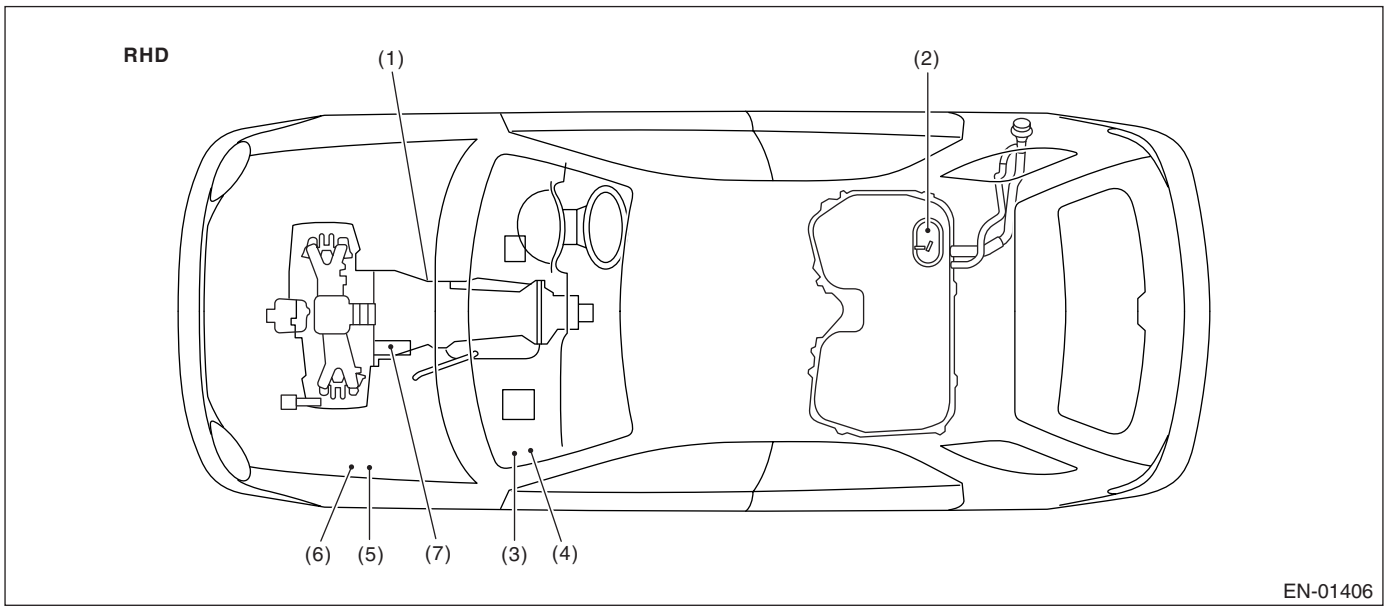
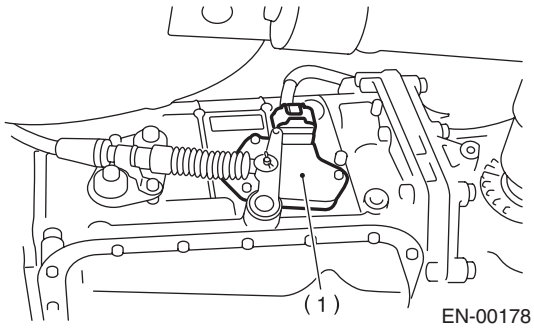
EN-01590



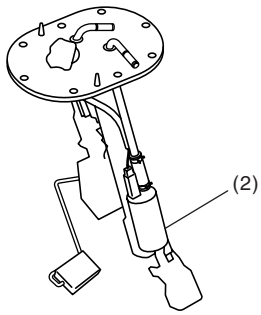


(1) Inhibitor switch
(2) Fuel pump
(3) Main relay
(4) Fuel pump relay
(5) Radiator main fan relay
(6) Radiator sub fan relay
(7) Starter

Electrical Component Location

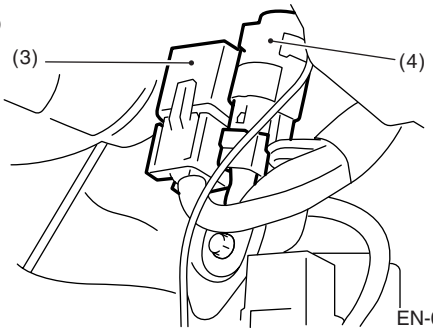


EN-00178



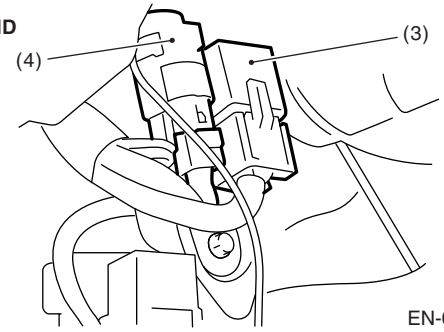
EN-01407

LHD

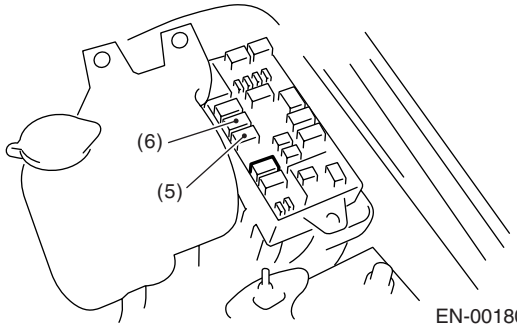


EN-01408

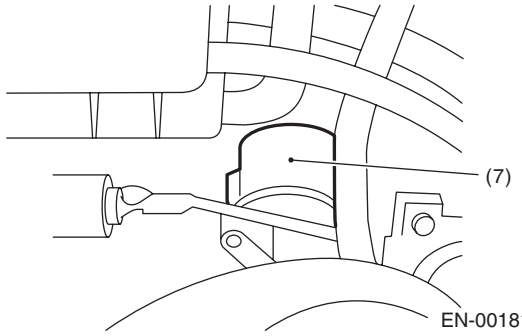
RHD



EN-01409



EN-00180

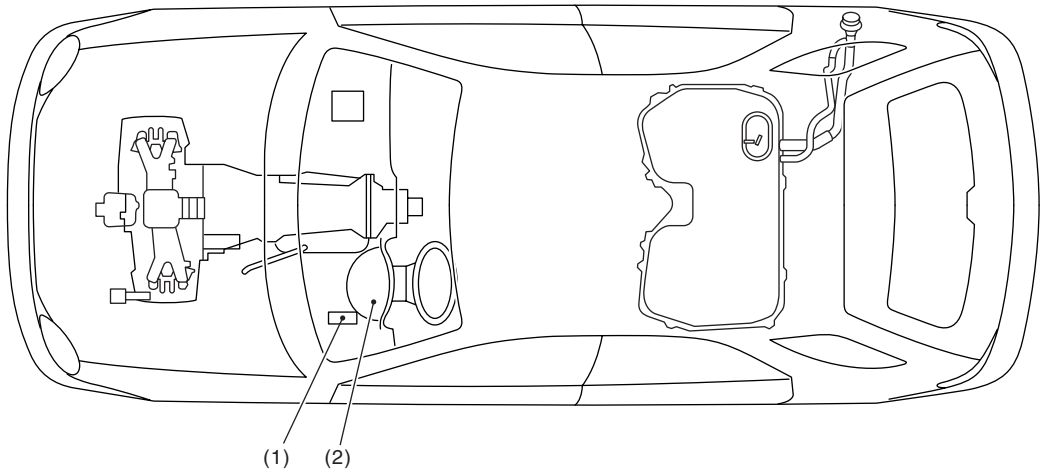


EN-00181

2. TRANSMISSION

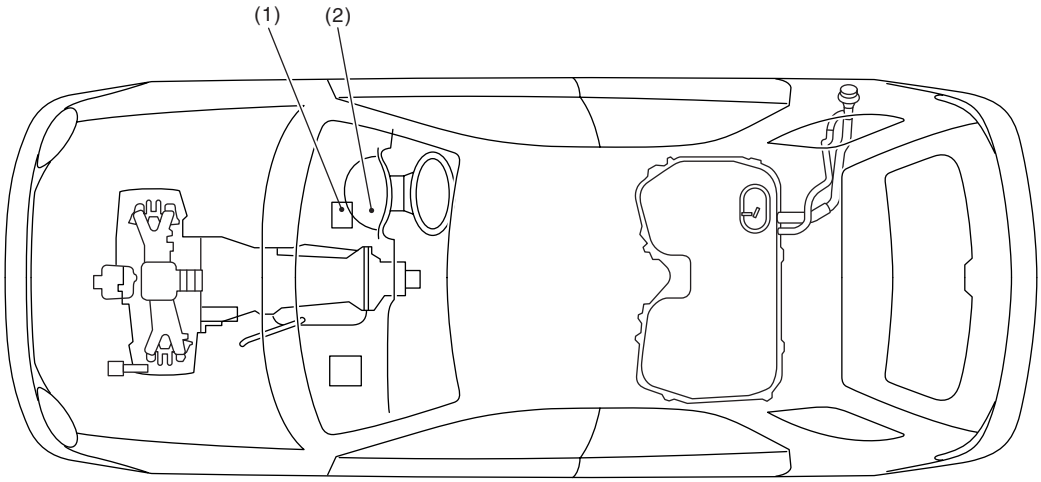
• MODULE

LHD



EN-01410

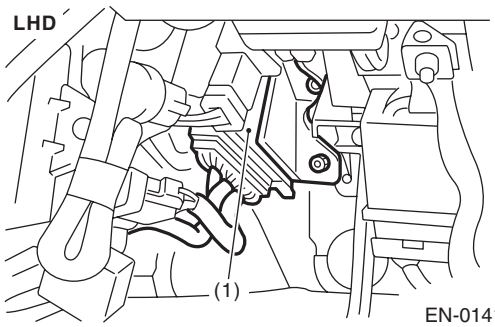
RHD



EN-01411

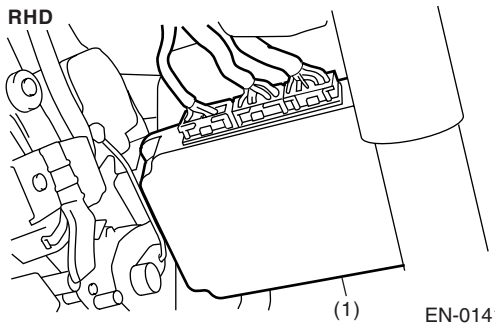
(1) Transmission control module (TCM) (AT model)
(2) AT diagnostic indicator light (AT model)

LHD



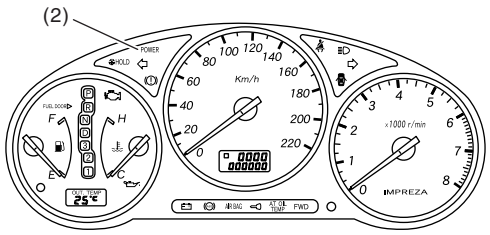
EN-01412

RHD



EN-01413

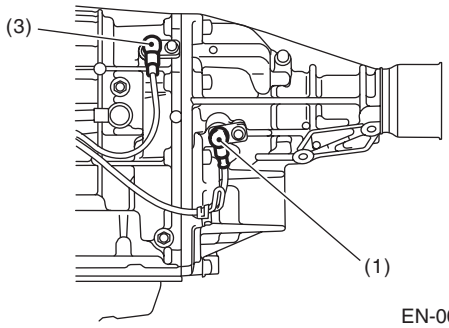
Electrical Component Location



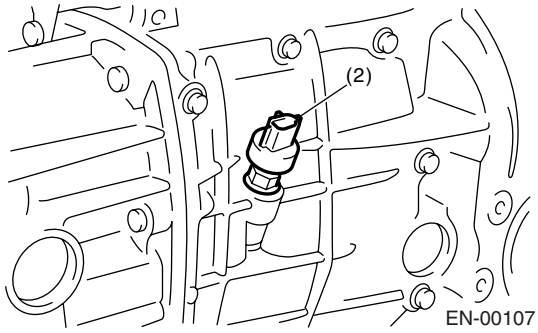
EN-01414

SUBARU

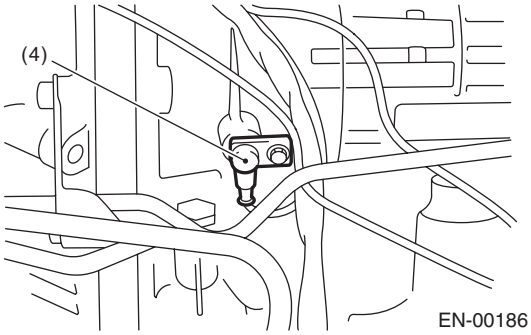
• SENSOR



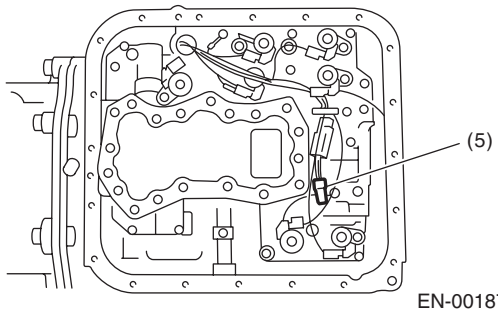
EN-00184



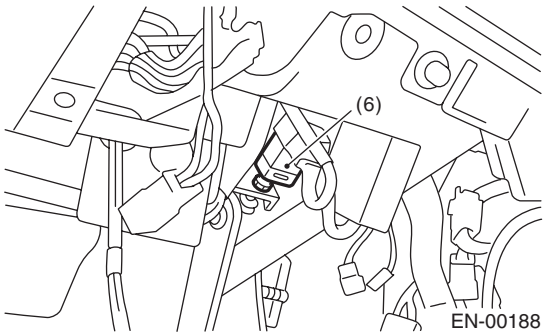
EN-00107



EN-00186



EN-00187

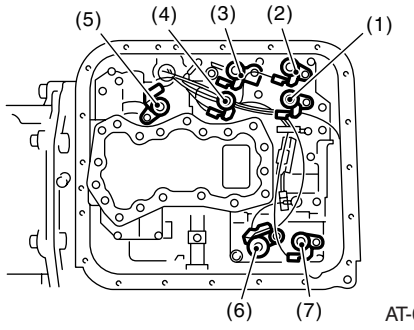


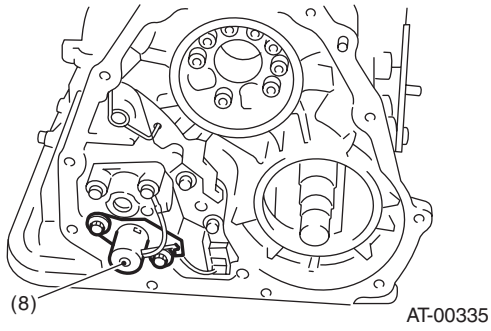
EN-00188

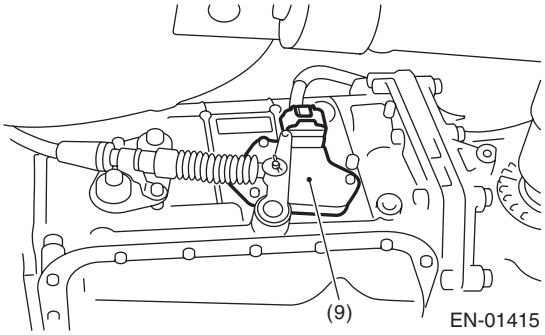
SUBARU

(1) Rear vehicle speed sensor (AT model)
(2) Front vehicle speed sensor (MT model)
(3) Front vehicle speed sensor (AT model)
(4) Torque converter turbine speed sensor
(5) ATF temperature sensor (AT model)
(6) Brake light switch

• SOLENOID VALVE AND SWITCH (AT MODELS)

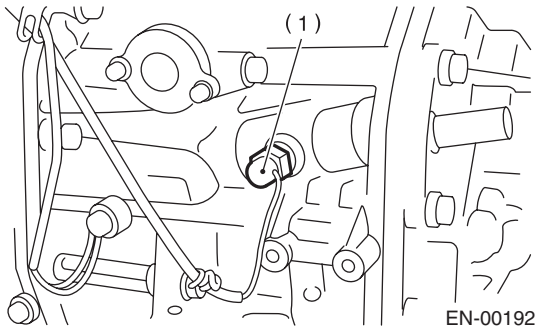






(1) Shift solenoid valve 1
(2) Shift solenoid valve 2
(3) Line pressure duty solenoid
(4) Low clutch timing solenoid
(5) Lock up duty solenoid
(6) 2-4 brake duty solenoid
(7) 2-4 brake timing solenoid
(8) Transfer duty solenoid
(9) Inhibitor switch

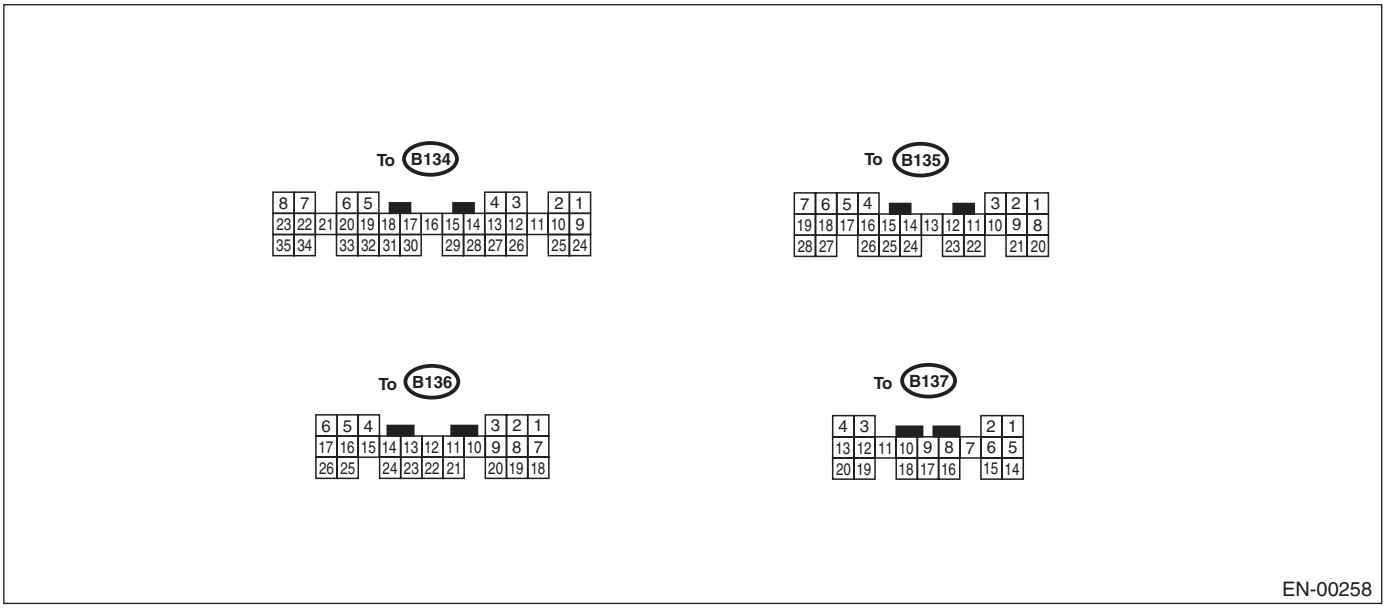
• SOLENOID VALVE AND SWITCH (MT MODELS)



(1) Neutral position switch

5. Engine Control Module (ECM) I/O Signal

A: ELECTRICAL SPECIFICATION



Content		Connector No.	Terminal No.	Signal (V)		Note
				Ignition SW ON (Engine OFF)	Engine ON (Idling)	
Crankshaft position sensor	Signal (+)	B135	6 7*	0	−7 to +7	Sensor output waveform
	Signal (−)	B135	17	0	0	—
	Shield	B135	28	0	0	—
Camshaft position sensor	Signal (+)	B135	7 6*	0	−7 to +7	Sensor output waveform
	Signal (−)	B135	18	0	0	—
	Shield	B135	28	0	0	—
Throttle position sensor	Signal	B135	13	Fully closed: 0.2 — 1.0 Fully opened: 4.2 — 4.7		—
	Power supply	B135	3	5	5	—
	GND (sensor)	B135	19	0	0	—
Rear oxygen sensor	Signal	B135	14	0	0 — 0.9	—
	Shield	B137	15	0	0	—
	GND (sensor)	B135	19	0	0	—
Front oxygen (A/F) sensor heater	Signal 1	B136	6	10, or more	0 — 14	—
	Signal 2	B136	17	10, or more	0 — 1.0	—
Rear oxygen sensor heater signal		B136	4	0 — 1.0	0 — 1.0	—
Engine coolant temperature sensor	Signal	B135	12	0.8 — 1.4	0.8 — 1.4	After warm-up the engine.
	GND (sensor)	B135	19	0	0	After warm-up the engine.
Vehicle speed signal		B137	10	0 or 5	0 or 5	“5” and “0” are repeatedly displayed when vehicle is driven.
Starter switch		B136	20	0	0	Cranking: 8 — 14

Content		Connector No.	Terminal No.	Signal (V)		Note
				Ignition SW ON (Engine OFF)	Engine ON (Idling)	
A/C switch		B136	11	ON: 10 — 13 OFF: 0	ON: 12 — 14 OFF: 0	—
Ignition switch		B136	10	10 — 13	12 — 14	—
Neutral position switch	MT	B136	21	ON: 12±0.5 OFF: 0		Switch is ON when gear is in neutral position.
	AT	B136	21	ON: 0 OFF: 12±0.5		Switch is ON when shift is in “N” or “P” position.
Test mode connector		B136	3	5	5	When connected: 0
Knock sensor	Signal	B135	16	2.8	2.8	—
	Shield	B135	27	0	0	—
Back-up power supply		B135	9	10 — 13	12 — 14	Ignition switch “OFF”: 10 — 13
Control unit power supply		B135	1	10 — 13	12 — 14	—
		B135	2	10 — 13	12 — 14	—
Sensor power supply		B135	3	5	5	—
Ignition control	#1, #2	B134	33	0	1 — 3.4	Waveform
	#3, #4	B134	32	0	1 — 3.4	Waveform
Fuel injector	#1	B134	34	10 — 13	1 — 14	Waveform
	#2	B134	23	10 — 13	1 — 14	Waveform
	#3	B134	22	10 — 13	1 — 14	Waveform
	#4	B134	8	10 — 13	1 — 14	Waveform
Idle air control solenoid valve	Signal 1	B134	20	—	1 — 14	Waveform
	Signal 2	B134	6	—	1 — 14	Waveform
	Signal 3	B134	5	—	1 — 14	Waveform
	Signal 4	B134	19	—	1 — 14	Waveform
	Power supply	B135	2	10 — 13	12 — 14	—
Fuel pump relay control		B134	2	ON: 0.5, or less OFF: 10 — 13	0.5, or less	—
A/C relay control		B134	9	ON: 0.5, or less OFF: 10 — 13	ON: 0.5, or less OFF: 13 — 14	—
Radiator fan relay 1 control		B134	14	ON: 0.5, or less OFF: 10 — 13	ON: 0.5, or less OFF: 12 — 14	—
Radiator fan relay 2 control		B134	13	ON: 0.5, or less OFF: 10 — 13	ON: 0.5, or less OFF: 12 — 14	Models with A/C
Self-shutoff control		B136	12	10 — 13	12 — 14	—
Malfunction indicator light		B134	28	—	—	Light “ON”: 1, or less Light “OFF”: 10 — 14
Engine speed output		B134	10	—	0 — 13, or more	Waveform
Torque control 1 signal		B136	1	5	5	—
Torque control 2 signal		B136	18	5	5	—
Torque control cut signal		B136	15	8	8	—
Purge control solenoid valve		B134	29	ON: 1, or less OFF: 10 — 13	ON: 1, or less OFF: 12 — 14	—
Fuel level sensor		B135	25	0.12 — 4.75	0.12 — 4.75	—
EGR solenoid valve	Signal 1	B134	18	0 or 10 — 13	0 or 10 — 13	—
	Signal 2	B134	17	0 or 10 — 13	0 or 10 — 13	—
	Signal 3	B134	16	0 or 10 — 13	0 or 10 — 13	—
	Signal 4	B134	15	0 or 10 — 13	0 or 10 — 13	—
AT diagnosis input signal		B137	19	Less than 1 ←→ More than 4	Less than 1 ←→ More than 4	Waveform

Engine Control Module (ECM) I/O Signal

Content	Connector No.	Terminal No.	Signal (V)		Note
			Ignition SW ON (Engine OFF)	Engine ON (Idling)	
Small light switch	B137	20	ON: 0 OFF: 10 — 13	ON: 0 OFF: 12 — 14	—
Blower fan switch	B137	13	ON: 0 OFF: 10 — 13	ON: 0 OFF: 12 — 14	—
Rear defogger switch	B137	4	ON: 0 OFF: 10 — 13	ON: 0 OFF: 12 — 14	—
Front oxygen (A/F) sensor signal 1	B136	13	—	2.05 — 2.25	—
Front oxygen (A/F) sensor signal 2	B136	22	—	1.75 — 1.95	—
Manifold absolute pressure sensor	B135	15	4.0 — 4.8	1.1 — 1.9	—
Intake air temperature sensor	B137	6	3.15 — 3.33	3.15 — 3.33	Intake air temperature: 25°C (75°F)
Air assisted injector solenoid valve	B134	12	ON: 1, or less OFF: 10 — 13	ON: 1, or less OFF: 12 — 14	—
Immobilizer input/output	B137	17	Less than 1 ←→ More than 4	Less than 1 ←→ More than 4	—
Immobilizer input/output	B137	18	Less than 1 ←→ More than 4	Less than 1 ←→ More than 4	—
Power steering switch	B136	9	ON: 1, or less OFF: 10 — 13	ON: 1, or less OFF: 12 — 14	—
Front wiper signal	B137	11	ON: 0, or 10 — 13 OFF: 0	ON: 0, or 12 — 14 OFF: 0	—
Generator control	B136	25	0 — 6.5	0 — 6.5	—
SSM/GST communication line	B137	16	Less than 1 ←→ More than 4	Less than 1 ←→ More than 4	—
GND (sensors)	B135	19	0	0	—
GND (injectors)	B134	35	0	0	—
GND (ignition system)	B136	26	0	0	—
GND (power supply)	B134	7	0	0	—
GND (control systems)	B137	14	0	0	—
	B135	21	0	0	—
GND (oxygen sensor heater 1)	B136	5	0	0	—
GND (oxygen sensor heater 2)	B136	16	0	0	—

* : Without immobilizer

6. Engine Condition Data

A: ELECTRICAL SPECIFICATION

Content	Specified data
Engine load	1.6 — 2.9 (%): Idling
	6.4 — 12.8 (%): 2,500 rpm racing

Measuring condition:
- After the engine is warmed-up.
- Gear position is in “N” or “P” range.
- A/C is turned OFF.
- All accessory switches are turned OFF.

7. Transmission Control Module (TCM) I/O Signal

A: ELECTRICAL SPECIFICATION

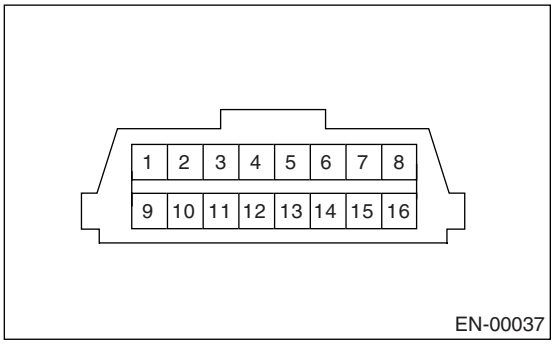
For electrical specification of TCM I/O signal, refer to 4AT section. <Ref. to 4AT(diag)-12, ELECTRICAL SPECIFICATION, Transmission Control Module (TCM) I/O Signal.>

8. Data Link Connector

A: NOTE

This connector is used both for general scan tools and the Subaru Select Monitor.

CAUTION:
Do not connect any scan tools other than the general scan tools and the Subaru Select Monitor, because the circuit for the Subaru Select Monitor may be damaged.



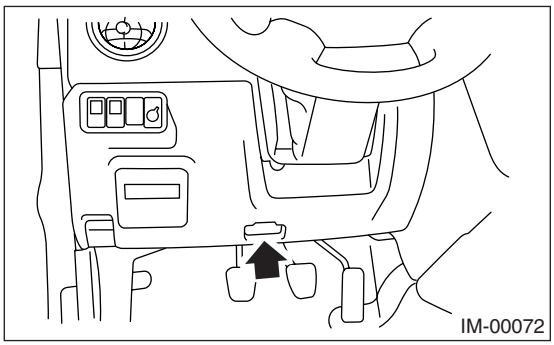
Terminal No.	Contents	Terminal No.	Contents
1	Power supply	9	Blank
2	Blank	10	Subaru Select Monitor signal
3	Blank	11	Blank
4	Blank	12	Ground
5	Blank	13	Ground
6	Blank	14	Blank
7	Blank	15	Blank
8	Blank	16	Blank

9. General Scan Tool

A: OPERATION

1. HOW TO USE GENERAL SCAN TOOL

1) Prepare a general scan tool required by SAE J1978.
2) Connect the general scan tool to data link connector located in the lower portion of the instrument panel (on driver's side).



3) Using the general scan tool, call up DTC and freeze frame data.
General scan tool functions consist of:
(1) MODE $01: Current powertrain diagnostic data
(2) MODE $02: Powertrain freeze frame data
(3) MODE $03: Emission-related powertrain DTC
(4) MODE $04: Clear/Reset emission-related diagnostic information
Read out data according to repair procedures. (For detailed operation procedures, refer to the General Scan Tool Operation Manual.)

NOTE:
For details concerning DTC, refer to the List of Diagnostic Trouble Code (DTC). <Ref. to EN(H4SO)(diag)-70, List of Diagnostic Trouble Code (DTC).>

2. MODE $01 (CURRENT POWERTRAIN DIAGNOSTIC DATA)

Refers to data denoting the current operating condition of analog input/output, digital input/output or the powertrain system.
A list of the support data and PID (Parameter Identification) codes are shown in the following table.

PID	Data	Unit of measure
01	Number of emission-related powertrain DTC and malfunction indicator light status	ON/OFF
03	Fuel system control status	—
04	Calculated engine load value	%
05	Engine coolant temperature	°C or °F
06	Short term fuel trim	%
07	Long term fuel trim	%
0B	Intake manifold absolute pressure	mmHg, kPa, inHg or psig
0C	Engine revolution	rpm
0D	Vehicle speed	km/h or MPH
0E	Ignition timing advance	°
0F	Intake air temperature	°C or °F
10	Air flow rate from manifold absolute pressure sensor	g/s or lb/m
11	Throttle valve opening angle	%
13	Check whether oxygen sensor is installed.	—
15	Oxygen sensor output voltage and short term fuel trim associated with oxygen sensor—bank 1 sensor 2	V and %
1C	On-board diagnosis system	—

NOTE:
Refer to general scan tool manufacturer's instruction manual to access current powertrain diagnostic data (MODE $01).

3. MODE $02 (POWERTRAIN FREEZE FRAME DATA)

Refers to data denoting the operating condition when trouble is sensed by on-board diagnosis system. A list of the support data and PID (Parameter Identification) codes are shown in the following table.

PID	Data	Unit of measure
02	DTC that caused CARB to require freeze frame data storage	—
03	Fuel system control status	—
04	Calculated engine load value	%
05	Engine coolant temperature	°C or °F
06	Short term fuel trim	%
07	Long term fuel trim	%
0B	Intake manifold absolute pressure	mmHg, kPa. inHg or psig
0C	Engine revolution	rpm
0D	Vehicle speed	km/h or MPH

NOTE:
Refer to general scan tool manufacturer's instruction manual to access freeze frame data (MODE $02).

4. MODE $03 (EMISSION-RELATED POWERTRAIN DIAGNOSTIC TROUBLE CODE (DTC))

Refer to Read Diagnostic Trouble Code (DTC) for information about data denoting emission-related powertrain DTC. <Ref. to EN(H4SO)(diag)-36, Read Diagnostic Trouble Code (DTC).>

5. MODE $04 (CLEAR/RESET EMISSION-RELATED DIAGNOSTIC INFORMATION)

Refers to mode used to clear or reset emission-related diagnostic information (OBD-II trouble diagnostic information).

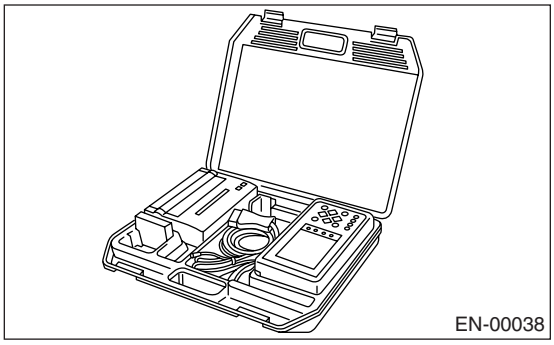
NOTE:
Refer to general scan tool manufacturer's instruction manual to clear or reset emission-related diagnostic information (MODE $04).

10.Subaru Select Monitor

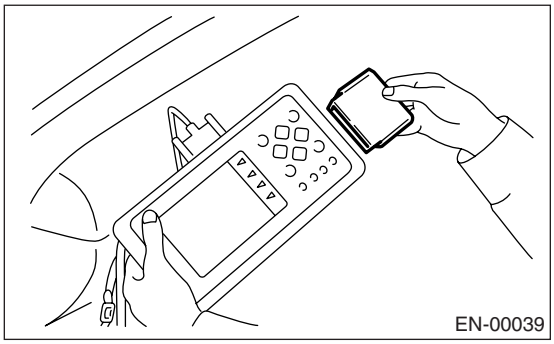
A: OPERATION

1. HOW TO USE SUBARU SELECT MONITOR

1) Prepare the Subaru Select Monitor kit. <Ref. to EN(H4SO)(diag)-8, PREPARATION TOOL, General Description.>

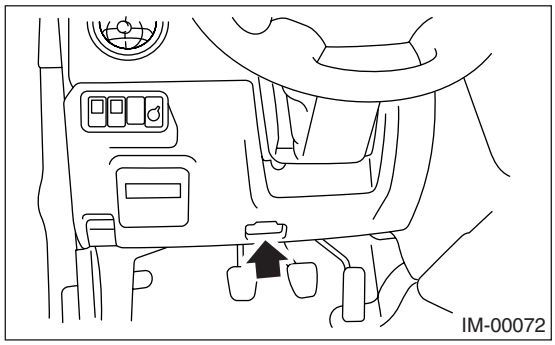


2) Connect the diagnosis cable to Subaru Select Monitor.
3) Insert the cartridge into Subaru Select Monitor. <Ref. to EN(H4SO)(diag)-8, PREPARATION TOOL, General Description.>



4) Connect the Subaru Select Monitor to data link connector.

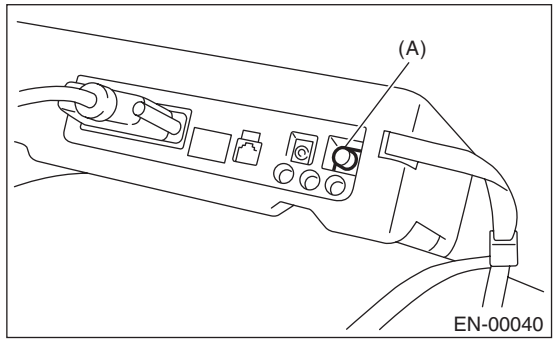
(1) Data link connector located in the lower portion of instrument panel (on driver's side).



(2) Connect the diagnosis cable to data link connector.

CAUTION:
Do not connect scan tools except for Subaru Select Monitor and general scan tool.

5) Turn the ignition switch to ON (engine OFF) and Subaru Select Monitor power switch to ON.



(A) Power switch

6) Using the Subaru Select Monitor, call up DTC and various data, then record them.

2. READ DIAGNOSTIC TROUBLE CODE (DTC) FOR ENGINE (NORMAL MODE)

Refer to Read Diagnostic Trouble Code (DTC) for information about how to indicate DTC. <Ref. to EN(H4SO)(diag)-36, Read Diagnostic Trouble Code (DTC).>

3. READ DIAGNOSTIC TROUBLE CODE (DTC) FOR ENGINE (OBD MODE)

Refer to Read Diagnostic Trouble Code (DTC) for information about how to indicate DTC. <Ref. to EN(H4SO)(diag)-36, Read Diagnostic Trouble Code (DTC).>

4. READ CURRENT DATA FOR ENGINE (NORMAL MODE)

1) On «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On «System Selection Menu» display screen, select the {Engine Control System} and press the [YES] key.
3) Press the [YES] key after the information of engine type is displayed.
4) On «Engine Diagnosis» display screen, select the {Current Data Display & Save} and press the [YES] key.
5) On «Data Display Menu» display screen, select the {Data Display} and press the [YES] key.
6) Using the scroll key, move the display screen up or down until the desired data is shown.
• A list of support data is shown in the following table.

Remarks	Display	Unit of measure	Note (at idling)
Engine load	Engine Load	%	1.5 — 3.0%
Engine coolant temperature signal	Coolant Temp.	°C or °F	80 — 100°C or 176 — 212°F
A/F correction 1	A/F Correction #1	%	010%
A/F learning 1	A/F Learning #1	%	05%
Intake manifold absolute pressure	Mani. Absolute Pressure	mmHg, kPa, inHg or psig	200 — 300 mmHg, 26.7 — 40.0 kPa, 7.9 — 11.8 inHg or 3.9 — 5.8 psig
Engine speed signal	Engine Speed	rpm	500 — 900 rpm (Agree with the tachometer indication)
Vehicle speed signal	Vehicle Speed	km/h or MPH	0 km/h or 0 MPH (at parking)
Ignition timing signal	Ignition Timing	deg	10 — 20 deg
Intake air temperature signal	Intake Air Temp.	°C or °F	(Ambient air temperature)
Idle air control signal	ISC Valve Step	STEP	10 — 40
Throttle opening angle signal	Throttle Opening Angle	%	1 — 5%
Rear oxygen sensor voltage	Rear O2 Sensor	V	0 — 0.9 V
Battery voltage	Battery Voltage	V	12 — 14 V
Injection 1 pulse width	Fuel Injection #1 Pulse	ms	2 — 5 ms
Knock sensor correction	Knocking Correction	deg	0.0 deg
Atmospheric pressure signal	Atmosphere Pressure	mmHg, kPa, inHg or psig	(Atmosphere pressure)
Intake manifold relative pressure	Mani. Relative Pressure	mmHg, kPa, inHg or psig	(Mani. absolute pressure – Atmosphere pressure)
Purge control solenoid duty ratio	CPC Valve Duty Ratio	%	0%
EGR steps	No. of EGR Steps	STEP	0
Generator duty ratio	ALT Duty	%	0 — 100%
A/F sensor resistance value 1	A/F Sensor #1 Resistance	ohm	23 — 37 Ω
A/F correction 3	A/F Correction #3	%	5±1 %
Front oxygen (A/F) sensor heater current	Front O_2 Heater #1	A	10±2 A
Rear oxygen sensor heater current	Rear O_2 Heater Current	A	1±1 A
Fuel level signal	Fuel Level	V	0 — 5 V
Throttle sensor voltage	Throttle Sensor Voltage	V	0.2 — 1.0 V
Learned ignition timing	Learned Ignition Timing	deg	±10 deg
AT/MT identification terminal	AT Vehicle ID Signal	—	ON
Test mode terminal	Test Mode Signal	—	OFF
Neutral position switch signal	Neutral Position Switch	—	ON
Soft idle switch signal	Idle Switch Signal	—	ON
Ignition switch signal	Ignition Switch	—	ON
Power steering switch input signal	P/S Switch	—	OFF (At OFF)

Remarks	Display	Unit of measure	Note (at idling)
Air conditioning switch signal	A/C Switch	—	OFF (At OFF)
Starter switch signal	Starter Switch	—	OFF
Rear O_2 monitor	Rear O2 Rich Signal	—	OFF
Knocking signal	Knocking Signal	—	OFF
Crankshaft position sensor signal	Crankshaft Position Sig.	—	OFF
Camshaft position sensor signal	Camshaft Position Sig.	—	OFF
Rear defogger switch signal	Rear Defogger SW	—	OFF (At OFF)
Blower fan switch signal	Blower Fan SW	—	OFF (At OFF)
Light switch signal	Light Switch	—	OFF (At OFF)
Wiper switch signal	Wiper Switch	—	OFF (At OFF)
Air conditioner compressor relay output signal	A/C Compressor Signal	—	OFF
Radiator fan relay 1 signal	Radiator Fan Relay #1	—	OFF
Radiator fan relay 2 signal	Radiator Fan Relay #2	—	OFF
Fuel pump relay signal	Fuel Pump Relay	—	ON
Air assisted injector solenoid valve signal	Assist Air Sol. Valve	—	ON or OFF
Engine torque control signal #1	Torque Control Signal #1	—	OFF
Engine torque control signal #2	Torque Control Signal #2	—	OFF
Engine torque control permission signal	Torque Permission Signal	—	ON or OFF

NOTE:
For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

5. READ CURRENT DATA FOR ENGINE (OBD MODE)

1) On «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On «System Selection Menu» display screen, select the {Engine Control System} and press the [YES] key.
3) Press the [YES] key after the information of engine type is displayed.
4) On «Engine Diagnosis» display screen, select the {OBD System} and press the [YES] key.
5) On «OBD Menu» display screen, select the {Current Data Display & Save} and press the [YES] key.
6) On «Data Display Menu» display screen, select the {Data Display} and press the [YES] key.
7) Using the scroll key, move the display screen up or down until the desired data is shown.
• A list of support data is shown in the following table.

Contents	Display	Unit of measure
Number of DTC	Number of DTC	—
Malfunction indicator light status	MI (MIL)	ON or OFF
Monitoring test of misfire	Misfire monitoring	Complete or incomplete
Monitoring test of fuel system	Fuel system monitoring	Complete or incomplete
Monitoring test of comprehensive component	Component monitoring	Complete or incomplete
Test of catalytic converter	Catalyst Diagnosis	Complete or incomplete
Test of heated catalytic converter	Heated catalyst	No support
Test of evaporative emission purge control system	Evaporative purge system	No support
Test of secondary air system	Secondary air system	No support
Test of air conditioning system refrigerant	A/C system refrigerant	No support
Test of oxygen sensor	Oxygen sensor	Complete or incomplete
Test of oxygen sensor heater	O_2 Heater Diagnosis	Complete or incomplete
Test of EGR system	EGR system	No support
Air fuel ratio control system for bank 1	Fuel System for Bank 1	—
Engine load data	Calculated load value	%
Engine coolant temperature signal	Coolant Temp.	°C or °F
Short term fuel trim by front oxygen (A/F) sensor	Short term fuel trim B1	%

Contents	Display	Unit of measure
Long term fuel trim by front oxygen (A/F) sensor	Long term fuel trim B1	%
Intake manifold absolute pressure signal	Mani. Absolute Pressure	mmHg, kPa, inHg or psig
Engine speed signal	Engine Speed	rpm
Vehicle speed signal	Vehicle Speed	km/h or MPH
Ignition timing advance for #1 cylinder	Ignition timing adv. #1	°
Intake air temperature signal	Intake Air Temp.	°C or °F
Intake air amount	Mass Air Flow	g/s or lb/m
Throttle position signal	Throttle Opening Angle	%
Rear oxygen sensor output signal	Oxygen Sensor #12	V
Air fuel ratio correction by rear oxygen sensor	Short term fuel trim #12	%
On-board diagnostic system	OBD System	—
A/F sensor check	A/F sensor	—
A/F sensor #11	A/F sensor #11	V
A/F sensor #11	A/F sensor #11	—

NOTE:
For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

6. READ FREEZE FRAME DATA FOR ENGINE (OBD MODE)

1) On «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On «System Selection Menu» display screen, select the {Engine Control System} and press the [YES] key.
3) Press the [YES] key after the information of engine type is displayed.
4) On «Engine Diagnosis» display screen, select the {OBD System} and press the [YES] key.
5) On «OBD Menu» display screen, select the {Freeze Frame Data} and press the [YES] key.
• A list of support data is shown in the following table.

Contents	Display	Unit of measure
DTC for freeze frame data	Freeze frame data	DTC
Air fuel ratio control system for bank 1	Fuel system for Bank1	—
Engine load data	Engine Load	%
Engine coolant temperature signal	Coolant Temp.	°C or °F
Short term fuel trim by front oxygen (A/F) sensor	Short term fuel trim B1	%
Long term fuel trim by front oxygen (A/F) sensor	Long term fuel trim B1	%
Intake manifold absolute pressure signal	Mani. Absolute Pressure	mmHg, kPa, inHg or psig
Engine speed signal	Engine Speed	rpm
Vehicle speed signal	Vehicle Speed	km/h or MPH

NOTE:
For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

7. LED OPERATION MODE FOR ENGINE

1) On «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On «System Selection Menu» display screen, select the {Engine Control System} and press the [YES] key.
3) Press the [YES] key after the information of engine type is displayed.
4) On «Engine Diagnosis» display screen, select the {Current Data Display & Save} and press the [YES] key.
5) On «Data Display Menu» display screen, select the {Data & LED Display} and press the [YES] key.
6) Using the scroll key, move the display screen up or down until the desired data is shown.
• A list of support data is shown in the following table.

Remarks	Display	Message	LED “ON” requirements
AT/MT identification signal	AT Vehicle ID Signal	ON or OFF	Illuminate (AT model)
Test mode signal	Test Mode Signal	ON or OFF	D check
Neutral position switch signal	Neutral Position Switch	ON or OFF	When neutral position signal is entered.
Idle switch signal	Idle Switch Signal	ON or OFF	When idle switch signal is entered.
Ignition switch signal	Ignition Switch	ON or OFF	When ignition switch is turned ON.
Power steering switch signal	P/S Switch	ON or OFF	When power steering switch is entered.
Air conditioning switch signal	A/C Switch	ON or OFF	When air conditioning switch is input.
Starter switch signal	Starter Switch	ON or OFF	When starter switch is input.
Rear oxygen sensor rich signal	Rear O2 Rich Signal	ON or OFF	When rear oxygen sensor mixture ratio is rich.
Knocking signal	Knocking Signal	ON or OFF	When knocking signal is input.
Crankshaft position sensor signal	Crankshaft Position Signal	ON or OFF	When crankshaft position sensor signal is input.
Camshaft position sensor signal	Camshaft Position Signal	ON or OFF	When camshaft position sensor signal is entered.
Rear defogger switch signal	Rear Defogger Switch	ON or OFF	When rear defogger switch is turned ON.
Blower fan switch signal	Blower Fan Switch	ON or OFF	When blower fan switch is turned ON.
Small light switch signal	Light Switch	ON or OFF	When small light switch is turned ON.
Windshield wiper switch signal	Wiper SW	ON or OFF	When windshield wiper switch is turned ON.
Air conditioning relay signal	A/C Compressor Signal	ON or OFF	When air conditioning relay is in function.
Radiator fan relay 1 signal	Radiator Fan Relay #1	ON or OFF	When radiator fan relay 1 is in function.
Radiator fan relay 2 signal	Radiator Fan Relay #2	ON or OFF	When radiator fan relay 2 is in function.
Fuel pump relay signal	Fuel Pump Relay	ON or OFF	ON output
Air assist injector solenoid valve signal	Assist Air Sol. Valve	ON or OFF	When air assist injector solenoid valve signal is input.
Engine torque control signal #1	Torque Control Signal #1	ON or OFF	When engine torque control signal 1 is entered.
Engine torque control signal #2	Torque Control Signal #2	ON or OFF	When engine torque control signal 2 is entered.
Engine torque control permission signal	Torque Control Permit	ON or OFF	When engine torque control permission signal is entered.

NOTE:
For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

8. READ CURRENT DATA FOR AT

1) On «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On «System Selection Menu» display screen, select the {Transmission Control System} and press the [YES] key.
3) Press the [YES] key after the information of transmission type is displayed.
4) On «Transmission Diagnosis» display screen, select the {Current Data Display & Save} and press the [YES] key.
5) On «Data Display Menu» display screen, select the {Data Display} and press the [YES] key.
6) Using the scroll key, move the display screen up or down until the desired data is shown.
• A list of support data is shown in the following table.

Contents	Display	Unit of measure
Battery voltage	Battery Voltage	V
Rear vehicle speed sensor signal	Vehicle Speed #1	km/h or MPH
Front vehicle speed sensor signal	Vehicle Speed #2	km/h or MPH
Engine speed signal	Engine Speed	rpm
Automatic transmission fluid temperature signal	ATF Temp.	°C or °F
Throttle position signal	Throttle Sensor Voltage	V
Gear position	Gear Position	—
Line pressure control duty ratio	Line Pressure Duty Ratio	%
Lock up clutch control duty ratio	Lock Up Duty Ratio	%
Transfer clutch control duty ratio	Transfer Duty Ratio	%
Power supply for throttle position sensor	Throttle Sensor Power	V
Torque converter turbine speed signal	AT Turbine Speed	rpm
2-4 brake timing pressure control duty ratio	2-4B Duty Ratio	%
Manifold absolute pressure sensor voltage	Mani. Pressure Voltage	V
2 wheel drive switch signal	2WD Switch	ON or OFF
Kick down switch signal	Kick Down Switch	ON or OFF
Stop light switch signal	Stop light Switch	ON or OFF
Anti lock brake system signal	ABS Signal	ON or OFF
Cruise control system signal	Cruise Control Signal	ON or OFF
Neutral/Parking range signal	N/P Range Signal	ON or OFF
Reverse range signal	R Range Signal	ON or OFF
Drive range signal	D Range Signal	ON or OFF
3rd range signal	3rd Range Signal	ON or OFF
2nd range signal	2nd Range Signal	ON or OFF
1st range signal	1st Range Signal	ON or OFF
Shift control solenoid A	Shift Solenoid #1	ON or OFF
Shift control solenoid B	Shift Solenoid #2	ON or OFF
Torque control output signal #1	Torque Control Signal #1	ON or OFF
Torque control output signal #2	Torque Control Signal #2	ON or OFF
Torque control cut signal	Torque Control Cut Sig.	ON or OFF
2-4 brake timing control solenoid valve	2-4 Brake Timing Sol.	ON or OFF
Low clutch timing control solenoid valve	Low Clutch Timing Sol.	ON or OFF
Automatic transmission diagnosis indicator light	AT Diagnosis light	ON or OFF

NOTE:
For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

11. Read Diagnostic Trouble Code (DTC)

A: OPERATION

1. SUBARU SELECT MONITOR (NORMAL MODE)

1) On «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On «System Selection Menu» display screen, select the {Engine Control System} and press the [YES] key.
3) Press the [YES] key after the information of engine type is displayed.
4) On «Engine Diagnosis» display screen, select the {Diagnostic Code(s) Display} and press the [YES] key.
5) On «Diagnostic Code(s) Display» display screen, select the {Current Diagnostic Code(s)} or {History Diagnostic Code(s)} and press the [YES] key.

NOTE:
• For detailed operation procedure, refer to SUBARU SELECT MONITOR OPERATION MANUAL.
• For details concerning DTC, refer to the List of Diagnostic Trouble Code (DTC). <Ref. to EN(H4SO)(diag)-70, List of Diagnostic Trouble Code (DTC).>

2. SUBARU SELECT MONITOR (OBD MODE)

1) On «Main Menu» display screen, select the {2. Each System Check} and press the [YES] key.
2) On «System Selection Menu» display screen, select the {Engine Control System} and press the [YES] key.
3) Press the [YES] key after the information of engine type is displayed.
4) On «Engine Diagnosis» display screen, select the {OBD System} and press the [YES] key.
5) On «OBD Menu» display screen, select the {Diagnosis Code(s) Display} and press the [YES] key.
6) Make sure that a DTC is shown on display screen.

NOTE:
• For detailed operation procedure, refer to SUBARU SELECT MONITOR OPERATION MANUAL.
• For details concerning DTC, refer to the List of Diagnostic Trouble Code (DTC). <Ref. to EN(H4SO)(diag)-70, List of Diagnostic Trouble Code (DTC).>

3. GENERAL SCAN TOOL

Refers to data denoting emission-related powertrain DTC.
For details concerning DTC, refer to the List of Diagnostic Trouble Code (DTC). <Ref. to EN(H4SO)(diag)-70, List of Diagnostic Trouble Code (DTC).>

NOTE:
Refer to general scan tool manufacturer's instruction manual to access emission-related powertrain DTC (MODE $03).

12.Inspection Mode

A: PROCEDURE

Carry out trouble diagnosis shown in the following DTC table.
When performing trouble diagnosis which is not shown in the DTC table, refer to the next item Drive cycle. <Ref. to EN(H4SO)(diag)-42, Drive Cycle.>

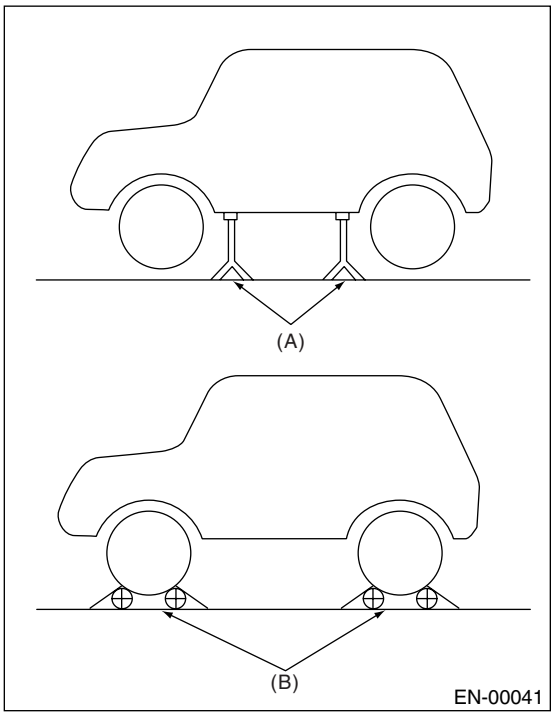
DTC	Item
P0031	HO2S Heater Control Circuit Low (Bank 1 Sensor 1)
P0032	HO2S Heater Control Circuit High (Bank 1 Sensor 1)
P0037	HO2S Heater Control Circuit Low (Bank 1 Sensor 2)
P0038	HO2S Heater Control Circuit High (Bank 1 Sensor 2)
P0066	Air Assisted Injector Control Circuit or Circuit Low
P0107	Manifold Absolute Pressure/Barometric Pressure Circuit Low Input
P0108	Manifold Absolute Pressure/Barometric Pressure Circuit High Input
P0112	Intake Air Temperature Sensor 1 Circuit Low
P0113	Intake Air Temperature Sensor 1 Circuit High
P0117	Engine Coolant Temperature Circuit Low
P0118	Engine Coolant Temperature Circuit High
P0122	Throttle/Pedal Position Sensor/Switch “A” Circuit Low
P0123	Throttle/Pedal Position Sensor/Switch “A” Circuit High
P0131	O_2 Sensor Circuit Low Voltage (Bank 1 Sensor 1)
P0132	O2 Sensor Circuit High Voltage (Bank 1 Sensor 1)
P0134	O_2 Sensor Circuit No Activity Detected (Bank 1 Sensor 1)
P0137	O_2 Sensor Circuit Low Voltage (Bank 1 Sensor 2)
P0138	O_2 Sensor Circuit High Voltage (Bank 1 Sensor 2)
P0327	Knock Sensor 1 Circuit Low (Bank 1 or Single Sensor)
P0328	Knock Sensor 1 Circuit High (Bank 1 or Single Sensor)
P0335	Crankshaft Position Sensor “A” Circuit
P0336	Crankshaft Position Sensor “A” Circuit Range/Performance
P0340	Camshaft Position Sensor “A” Circuit (Bank 1 or Single Sensor)
P0341	Camshaft Position Sensor “A” Circuit Range/Performance (Bank 1 or Single Sensor)
P0458	Evaporative Emission System Purge Control Valve Circuit Low
P0459	Evaporative Emission System Purge Control Valve Circuit High
P0462	Fuel Level Sensor “A” Circuit Low
P0463	Fuel Level Sensor “A” Circuit High
P0502	Vehicle Speed Sensor “A” Circuit Low Input
P0503	Vehicle Speed Sensor “A” Intermittent/Erratic/High
P0512	Starter Request Circuit
P0513	Incorrect Immobilizer Key
P0519	Idle Air Control System Performance
P0604	Internal Control Module Random Access Memory (RAM) Error
P0691	Fan 1 Control Circuit Low
P0692	Fan 1 Control Circuit High
P0703	Brake Switch “B” Circuit
P0705	Transmission Range Sensor Circuit Malfunction (PRNDL Input)
P0710	Transmission Fluid Temperature Sensor “A” Circuit
P0716	Input/Turbine Speed Sensor “A” Circuit Range/Performance
P0720	Output Speed Sensor Circuit
P0726	Engine Speed Input Circuit Range/Performance
P0731	Gear 1 Incorrect Ratio
P0732	Gear 2 Incorrect Ratio
P0733	Gear 3 Incorrect Ratio

DTC	Item
P0734	Gear 4 Incorrect Ratio
P0741	Torque Converter Clutch Circuit Performance or Stuck Off
P0743	Torque Converter Clutch Circuit Electrical
P0748	Pressure Control Solenoid “A” Electrical
P0753	Shift Solenoid “A” Electrical
P0758	Shift Solenoid “B” Electrical
P0771	Shift Solenoid “E” Performance or Stuck Off
P0778	Pressure Control Solenoid “B” Electrical
P0785	Shift/Timing Solenoid
P0851	Park/Neutral Switch Input Circuit Low
P0852	Park/Neutral Switch Input Circuit High
P0864	TCM Communication Circuit Range/Performance
P0865	TCM Communication Circuit Low
P0866	TCM Communication Circuit High
P1510	ISC Solenoid Valve Signal #1 Circuit Malfunction (Low Input)
P1511	ISC Solenoid Valve Signal #1 Circuit Malfunction (High Input)
P1512	ISC Solenoid Valve Signal #2 Circuit Malfunction (Low Input)
P1513	ISC Solenoid Valve Signal #2 Circuit Malfunction (High Input)
P1514	ISC Solenoid Valve Signal #3 Circuit Malfunction (Low Input)
P1515	ISC Solenoid Valve Signal #3 Circuit Malfunction (High Input)
P1516	ISC Solenoid Valve Signal #4 Circuit Malfunction (Low Input)
P1517	ISC Solenoid Valve Signal #4 Circuit Malfunction (High Input)
P1518	Starter Switch Circuit Low Input
P1560	Back-up Voltage Circuit Malfunction
P1570	Antenna
P1571	Reference Code Incompatibility
P1572	IMM Circuit Failure (Except Antenna Circuit)
P1574	Key Communication Failure
P1576	EGI Control Module EEPROM
P1577	IMM Control Module EEPROM
P1698	Engine Torque Control Cut Signal Circuit Low Input
P1699	Engine Torque Control Cut Signal Circuit High Input
P1700	Throttle Position Sensor
P1711	Engine Torque Control Signal 1 Circuit Malfunction
P1712	Engine Torque Control Signal 2 Circuit Malfunction
P2503	Charging System Voltage Low

1. PREPARATION FOR THE INSPECTION MODE

1) Make sure the fuel remains approx. half amount [20 — 40 ℓ (5.3 — 10.6 US gal, 4.4 — 8.8 Imp gal)] and the battery voltage is 12 V or more.
2) Raise the vehicle using a garage jack and place on rigid racks or drive the vehicle onto free rollers.

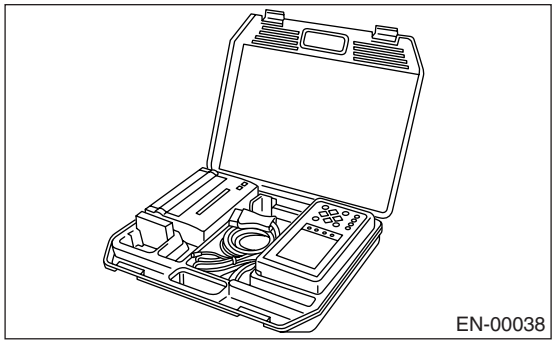
WARNING:
• Before raising the vehicle, ensure the parking brake is applied.
• Do not use a pantograph jack in place of a rigid rack.
• Secure a rope or wire to the front and rear towing or tie-down hooks to prevent the lateral runout of front wheels.
• Do not abruptly depress/release the clutch pedal or accelerator pedal during works even when engine is operating at low speeds since this may cause vehicle to jump off free rollers.
• In order to prevent the vehicle from slipping due to vibration, do not place any wooden blocks or similar items between the rigid racks and the vehicle.
• Since the rear wheels will also rotate, do not place anything near them. Also, make sure nobody goes in front of the vehicle.



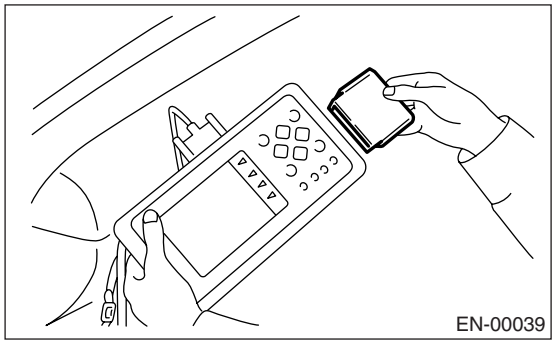
(A) Rigid rack
(B) Free rollers

2. SUBARU SELECT MONITOR

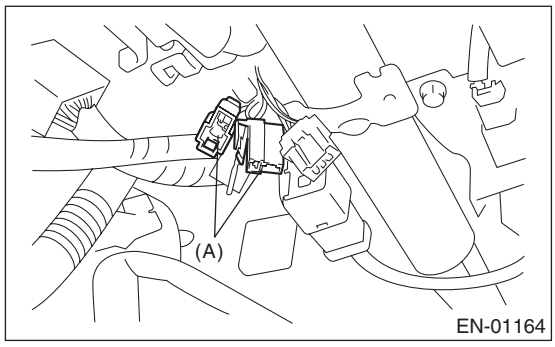
1) After clearing the memory, check for any remaining unresolved trouble data. <Ref. to EN(H4SO)(diag)-44, Clear Memory Mode.>
2) Warm up the engine.
3) Prepare the Subaru Select Monitor kit. <Ref. to EN(H4SO)(diag)-8, PREPARATION TOOL, General Description.>



4) Connect the diagnosis cable to Subaru Select Monitor.
5) Insert the cartridge into Subaru Select Monitor. <Ref. to EN(H4SO)(diag)-8, PREPARATION TOOL, General Description.>

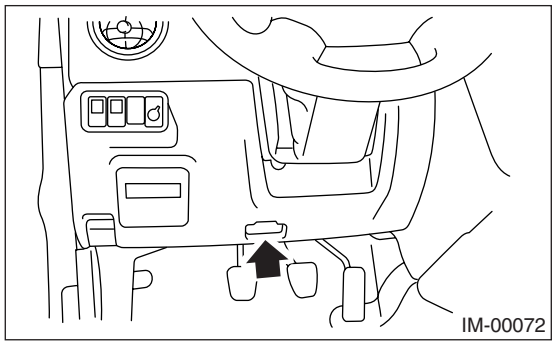


6) Connect the test mode connector (A) at the lower portion of instrument panel (on driver's side).



7) Connect the Subaru Select Monitor to data link connector.

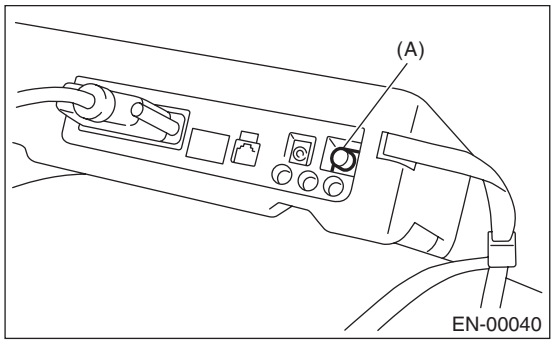
(1) Data link connector is located in the lower portion of the instrument panel (on the driver's side).



(2) Connect the diagnosis cable to data link connector.

CAUTION:
Do not connect the scan tools except for Subaru Select Monitor and general scan tool.

8) Turn the ignition power switch to ON (engine OFF) and Subaru Select Monitor switch to ON.



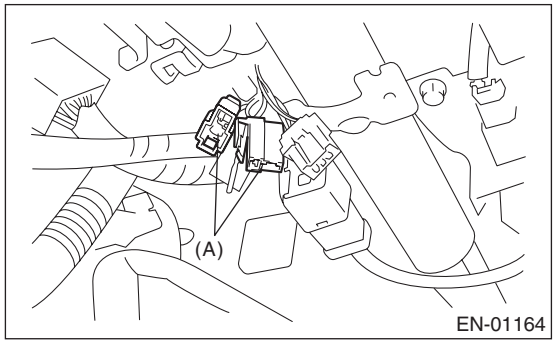
(A) Power switch

9) On «Main Menu» display screen, select the {2. Each System Check} and press the [YES] key.
10) On «System Selection Menu» display screen, select the {Engine Control System} and press the [YES] key.
11) Press the [YES] key after the information of engine type is displayed.
12) On «Engine Diagnosis» display screen, select the {Dealer Check Mode Procedure} and press the [YES] key.
13) When the "Perform Inspection (Dealer Check) Mode?" is shown on display screen, press the [YES] key.
14) Perform subsequent procedures as instructed on display screen.
• If trouble still remains in memory, the corresponding DTC appears on display screen.

NOTE:
• For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.
• For details concerning the DTC, refer to the List of Diagnostic Trouble Code (DTC).
<Ref. to EN(H4SO)(diag)-70, List of Diagnostic Trouble Code (DTC).>
• Release the parking brake.
• The speed difference between front and rear wheels may light either the ABS warning light, but this indicates no malfunctions. When the engine control diagnosis is finished, perform the ABS memory clearance procedure of self-diagnosis system.

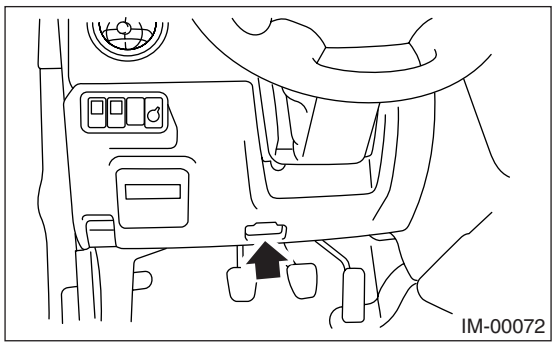
3. GENERAL SCAN TOOL

1) After clearing memory, check for any remaining unresolved trouble data: <Ref. to EN(H4SO)(diag)-44, Clear Memory Mode.>
2) Warm up the engine.
3) Connect the test mode connector (A) at the lower side of instrument panel (on the driver's side).



4) Connect the general scan tool to its data link connector in the lower portion of instrument panel (on the driver's side).

CAUTION:
Do not connect the scan tools except for Subaru Select Monitor and general scan tool.



5) Start the engine.

NOTE:
• Ensure the selector lever is placed in “P” position before starting. (AT models)
• Depress the clutch pedal when starting engine. (MT models)

6) Using the selector lever or shift lever, turn the “P” position switch and “N” position switch to ON.
7) Depress the brake pedal to turn brake switch ON. (AT models)
8) Keep the engine speed in 2,500 — 3,000 rpm range for 40 seconds.
9) Place the selector lever or shift lever in “D” position (AT models) or “1st” gear (MT models) and drive the vehicle at 5 to 10 km/h (3 to 6 MPH).

NOTE:
• On AWD vehicles, release the parking brake.
• The speed difference between front and rear wheels may light ABS warning light, but this indicates no malfunctions. When the engine control diagnosis is finished, perform the ABS memory clearance procedure of self-diagnosis system.

10) Using the general scan tool, check for DTC and record the result(s).

NOTE:
• For detailed operation procedures, refer to the General Scan Tool Instruction Manual.
• For details concerning DTC, refer to the List of Diagnostic Trouble Code (DTC).
<Ref. to EN(H4SO)(diag)-70, List of Diagnostic Trouble Code (DTC).>

13.Drive Cycle

A: OPERATION

There are three drive patterns for the trouble diagnosis. Driving in the specified pattern allows to diagnose malfunctioning items listed below. After the malfunctioning items listed below are repaired, always check whether they correctly resume their functions by driving in the required drive pattern.

1. PREPARATION FOR DRIVE CYCLE

1) Make sure that the fuel remains approx. half amount [20 — 40 ℓ (5.3 — 10.6 US gal, 4.4 — 8.8 Imp gal)], and battery voltage is 12V or more.
2) After performing the diagnostics and cleaning memory, check for any remaining unresolved trouble data. <Ref. to EN(H4SO)(diag)-44, Clear Memory Mode.>
3) Separate the test mode connector.

NOTE:
• Except for the water temperature specified items at starting, the diagnosis is carried out after engine warm up.
• Carry out the diagnosis which is marked * on DTC twice, then, after finishing first diagnosis, stop the engine and do second time at the same condition.

2. AFTER RUNNING 20 MINUTES AT 80 KM/H (50 MPH), IDLE ENGINE FOR 1 MINUTE.

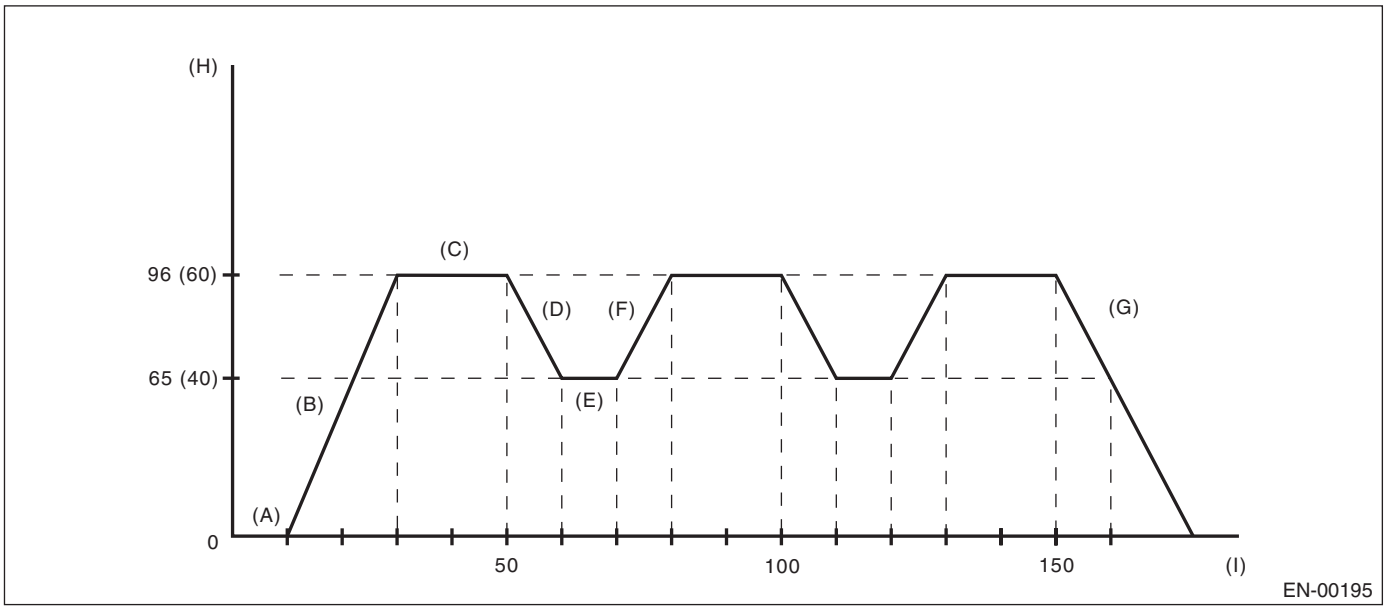
DTC	Item	Condition
*P0125	Insufficient Coolant Temperature for Closed Loop Fuel Control	Coolant temperature at start is less than 20°C (68°F).
*P0133	O_2 Sensor Circuit Slow Response (Bank 1 Sensor 1)	—
*P0171	System too Lean (Bank 1)	—
*P0172	System too Rich (Bank 1)	—
*P0420	Catalyst System Efficiency Below Threshold (Bank 1)	—
P0562	System Voltage Low	—
P0563	System Voltage High	—
P1137	O_2 Sensor Circuit (Mid) (Bank1 Sensor1)	—

3. IDLE FOR 10 MINUTES

NOTE:
Before the diagnosis, drive the vehicle at 10 km/h (6 MPH) or more.

DTC	Item	Condition
*P0483	Fan Rationality Check	—
*P0506	Idle Control System RPM Lower Than Expected	—
*P0507	Idle Control System RPM Higher Than Expected	—

4. DRIVE ACCORDING TO THE FOLLOWING DRIVE PATTERN



(A) Idle engine for 1 minute.
(B) Accelerate to 96 km/h (60 MPH) within 20 seconds.
(C) Drive vehicle at 96 km/h (60 MPH) for 20 seconds.
(D) Decelerate with fully closed throttle to 65 km/h (40 MPH).
(E) Drive vehicle at 65 km/h (40 MPH) for 10 seconds.
(F) Accelerate to 96 km/h (60 MPH) within 10 seconds.
(G) Stop vehicle with throttle fully closed.
(H) Vehicle speed km/h (MPH)
(I) Seconds

DTC	Item	Condition
*P0030	HO2S Heater Control Circuit (Bank 1 Sensor 1)	—
P0067	Air Assisted Injector Control Circuit High	Coolant temperature at start is less than 60°C (140°F).
*P0111	Intake Air Temperature Sensor 1 Circuit Range/Performance	Coolant temperature at start is less than 30°C (86°F).
*P0121	Throttle/Pedal Position Sensor/Switch “A” Circuit Range/Performance	—
P0130	O_2 Sensor Circuit Low Voltage (Bank 1 Sensor 1)	—
*P0139	O_2 Sensor Circuit Slow Response (Bank 1 Sensor 2)	—
P0301	Cylinder 1 Misfire Detected	Diagnosis frequency is different from misfire ratio.
P0302	Cylinder 2 Misfire Detected	Diagnosis frequency is different from misfire ratio.
P0303	Cylinder 3 Misfire Detected	Diagnosis frequency is different from misfire ratio.
P0304	Cylinder 4 Misfire Detected	Diagnosis frequency is different from misfire ratio.
P0400	Exhaust gas recirculation flow	—
*P1134	A/F Sensor Micro-Computer Problem (Bank 1 Sensor 1)	—
P1492	EGR Solenoid Valve Signal #1 Circuit Malfunction (Low Input)	—
P1493	EGR Solenoid Valve Signal #1 Circuit Malfunction (High Input)	—
P1494	EGR Solenoid Valve Signal #2 Circuit Malfunction (Low Input)	—
P1495	EGR Solenoid Valve Signal #2 Circuit Malfunction (High Input)	—
P1496	EGR Solenoid Valve Signal #3 Circuit Malfunction (Low Input)	—
P1497	EGR Solenoid Valve Signal #3 Circuit Malfunction (High Input)	—
P1498	EGR Solenoid Valve Signal #4 Circuit Malfunction (Low Input)	—
P1499	EGR Solenoid Valve Signal #4 Circuit Malfunction (High Input)	—
P2504	Charging System Voltage High	—

14.Clear Memory Mode

A: OPERATION

1. SUBARU SELECT MONITOR (NORMAL MODE)

1) On «Main Menu» display screen, select the {2. Each System Check} and press the [YES] key.
2) On «System Selection Menu» display screen, select the {Engine Control System} and press the [YES] key.
3) Press the [YES] key after the information of engine type is displayed.
4) On «Engine Diagnosis» display screen, select the {Clear Memory} and press the [YES] key.
5) When the 'Done' and 'Turn Ignition Switch OFF' are shown on display screen, turn the ignition switch to OFF, and then turn the Subaru Select Monitor to OFF.

NOTE:
• After the memory has been cleared, the idle air control solenoid valve must be initialized. To do this, turn the ignition switch to ON position. Wait 3 seconds before starting the engine.
• For detailed operation procedure, refer to SUBARU SELECT MONITOR OPERATION MANUAL.

2. SUBARU SELECT MONITOR (OBD MODE)

1) On «Main Menu» display screen, select the {2. Each System Check} and press the [YES] key.
2) On «System Selection Menu» display screen, select the {Engine Control System} and press the [YES] key.
3) Press the [YES] key after the information of engine type is displayed.
4) On «Engine Diagnosis» display screen, select the {OBD System} and press the [YES] key.
5) On «OBD Menu» display screen, select the {4. Diagnosis Code(s) Cleared} and press the [YES] key.
6) When the 'Clear Diagnostic Code?' is shown on the display screen, press the [YES] key.
7) Turn the Subaru Select Monitor and ignition switch to OFF.

NOTE:
• After the memory has been cleared, the idle air control solenoid valve must be initialized. To do this, turn the ignition switch to ON position. Wait 3 seconds before starting the engine.
• For detailed operation procedure, refer to SUBARU SELECT MONITOR OPERATION MANUAL.

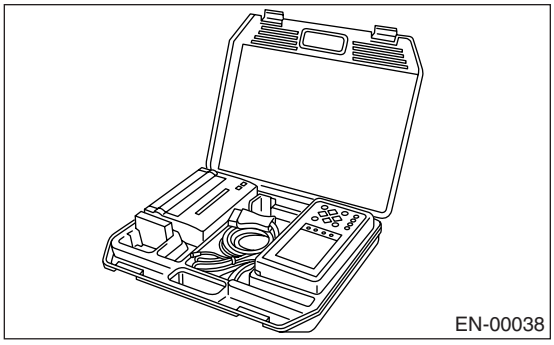
3. GENERAL SCAN TOOL

For clear memory procedures using the general scan tool, refer to General Scan Tool Instruction Manual.
After the memory has been cleared, the idle air control solenoid valve must be initialized. To do this, turn the ignition switch to ON position. Wait 3 seconds before starting the engine.

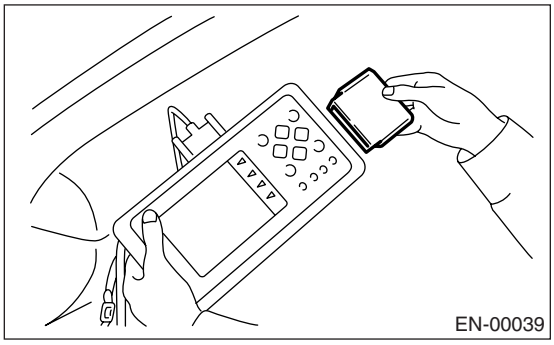
15. Compulsory Valve Operation Check Mode

A: OPERATION

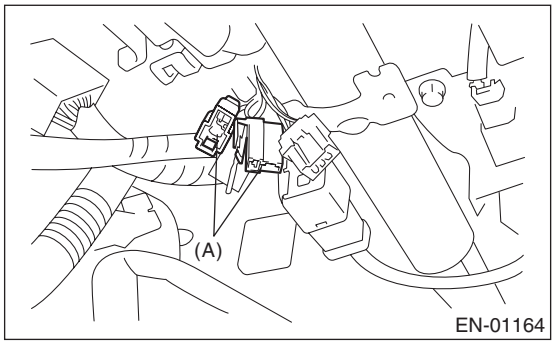
1) Prepare the Subaru Select Monitor kit. <Ref. to EN(H4SO)(diag)-8, PREPARATION TOOL, General Description.>



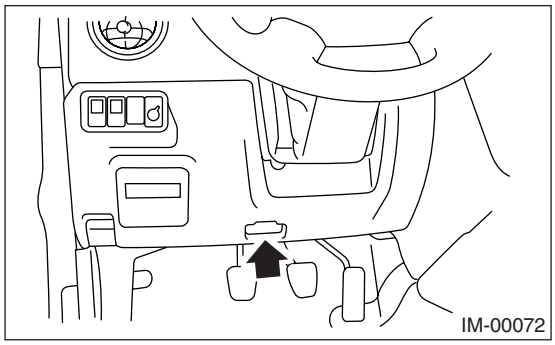
2) Connect the diagnosis cable to Subaru Select Monitor.
3) Insert the cartridge into Subaru Select Monitor. <Ref. to EN(H4SO)(diag)-8, PREPARATION TOOL, General Description.>



4) Connect the test mode connector (A) at the lower portion of instrument panel (on driver's side).



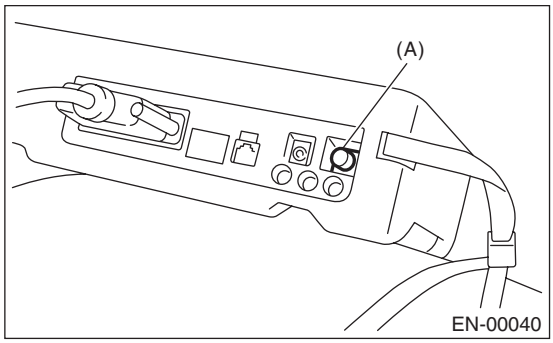
5) Connect the Subaru Select Monitor to data link connector.
(1) Data link connector is located in the lower portion of instrument panel (on driver's side).



(2) Connect the diagnosis cable to data link connector.

CAUTION:
Do not connect scan tools except for Subaru Select Monitor and general scan tool.

6) Turn the ignition switch to ON (engine OFF) and Subaru Select Monitor power switch to ON.



(A) Power switch

7) On «Main Menu» display screen, select the {2. Each System Check} and press the [YES] key.
8) On «System Selection Menu» display screen, select the {Engine Control System} and press the [YES] key.
9) Press the [YES] key after the information of engine type is displayed.
10) On «Engine Diagnosis» display screen, select the {System Operation Check Mode} and press the [YES] key.
11) On «System Operation Check Mode» display screen, select the {Actuator ON/OFF Operation} and press the [YES] key.
12) Select the desired compulsory actuator on the «Actuator ON/OFF Operation» display screen and press the [YES] key.

13) Pressing the [NO] key completes the compulsory operation check mode. The display will then return to the «Actuator ON/OFF Operation» screen.

• A list of support data is shown in the following table.

Contents	Display
Compulsory fuel pump relay operation check	Fuel Pump Relay
Compulsory radiator fan relay operation check	Radiator Fan Relay
Compulsory air conditioning relay operation check	A/C Compressor Relay
Compulsory purge control solenoid valve operation check	CPC Solenoid Valve
Compulsory air assist injector solenoid valve operation check	AAI Solenoid Valve

NOTE:

• The following parts will be displayed but not functional because they are not installed on vehicle.

Display
EGR Solenoid Valve
ASV Solenoid Valve
PCV Solenoid Valve
Vent Control Solenoid Valve
FICD Solenoid
Pressure Switching Sol. 1
Pressure Switching Sol. 2
Fuel Tank Sensor Control Valve
Turbocharger Wastegate Solenoid
EXH. Bypass Control Permit Flag

• For detailed operation procedure, refer to SUBARU SELECT MONITOR OPERATION MANUAL.

16.Malfunction Indicator Light

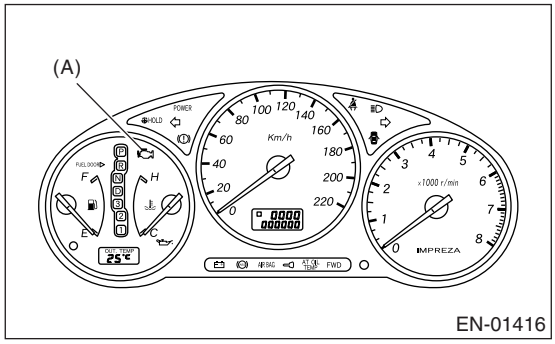
A: PROCEDURE

1. Activation of malfunction indicator light. <Ref. to EN(H4SO)(diag)-48, ACTIVATION OF MALFUNCTION INDICATOR LIGHT, Malfunction Indicator Light.>
↓
2. Malfunction indicator light does not come on. <Ref. to EN(H4SO)(diag)-49, MALFUNCTION INDICATOR LIGHT DOES NOT COME ON, Malfunction Indicator Light.>
↓
3. Malfunction indicator light does not go off. <Ref. to EN(H4SO)(diag)-51, MALFUNCTION INDICATOR LIGHT DOES NOT GO OFF., Malfunction Indicator Light.>
↓
4. Malfunction indicator light does not blink at a cycle of 3 Hz. <Ref. to EN(H4SO)(diag)-52, MALFUNCTION INDICATOR LIGHT DOES NOT BLINK., Malfunction Indicator Light.>
↓
5. Malfunction indicator light remains blinking at a cycle of 3 Hz. <Ref. to EN(H4SO)(diag)-54, MALFUNCTION INDICATOR LIGHT REMAINS BLINKING., Malfunction Indicator Light.>

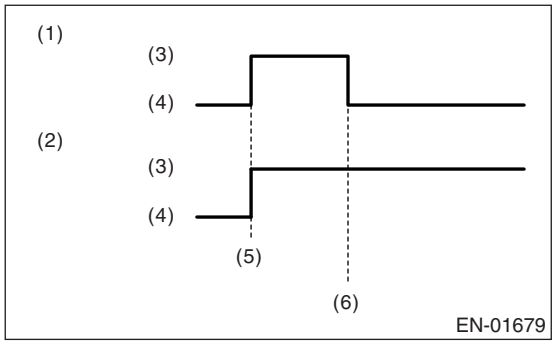
B: ACTIVATION OF MALFUNCTION INDICATOR LIGHT

1) When the ignition switch is turned to ON (engine off), the malfunction indicator light (A) in the combination meter illuminates.

NOTE:
If the malfunction indicator light does not illuminate, perform diagnostics of the malfunction indicator light circuit or the combination meter circuit. <Ref. to EN(H4SO)(diag)-49, MALFUNCTION INDICATOR LIGHT DOES NOT COME ON, Malfunction Indicator Light.>

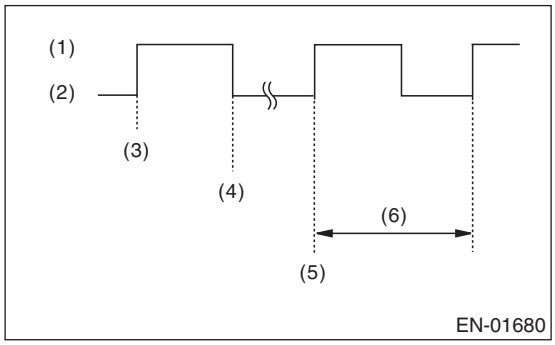


2) After starting the engine, the malfunction indicator light goes out. If it does not, either the engine or the emission control system is malfunctioning.



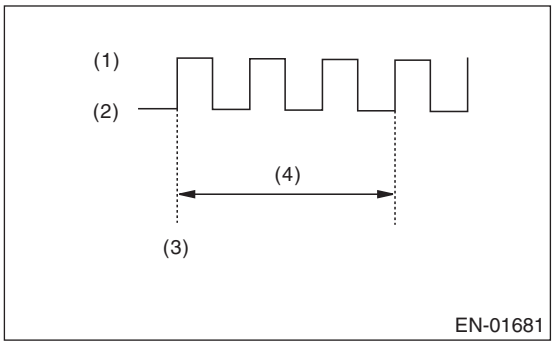
(1) No trouble
(2) Trouble occurs
(3) ON
(4) OFF
(5) Ignition switch ON
(6) Engine start

3) If the diagnosis system senses a misfire which could damage the catalyzer, the malfunction indicator light will blink at a cycle of 1 Hz.



(1) ON
(2) OFF
(3) Ignition switch ON
(4) Engine start
(5) Misfire start
(6) 1 sec.

4) When the ignition switch is turned to ON (engine off) or to “START” with test mode connector connected, the malfunction indicator light blinks at a cycle of 3 Hz.



(1) ON
(2) OFF
(3) Ignition switch ON
(4) 1 sec.

C: MALFUNCTION INDICATOR LIGHT DOES NOT COME ON

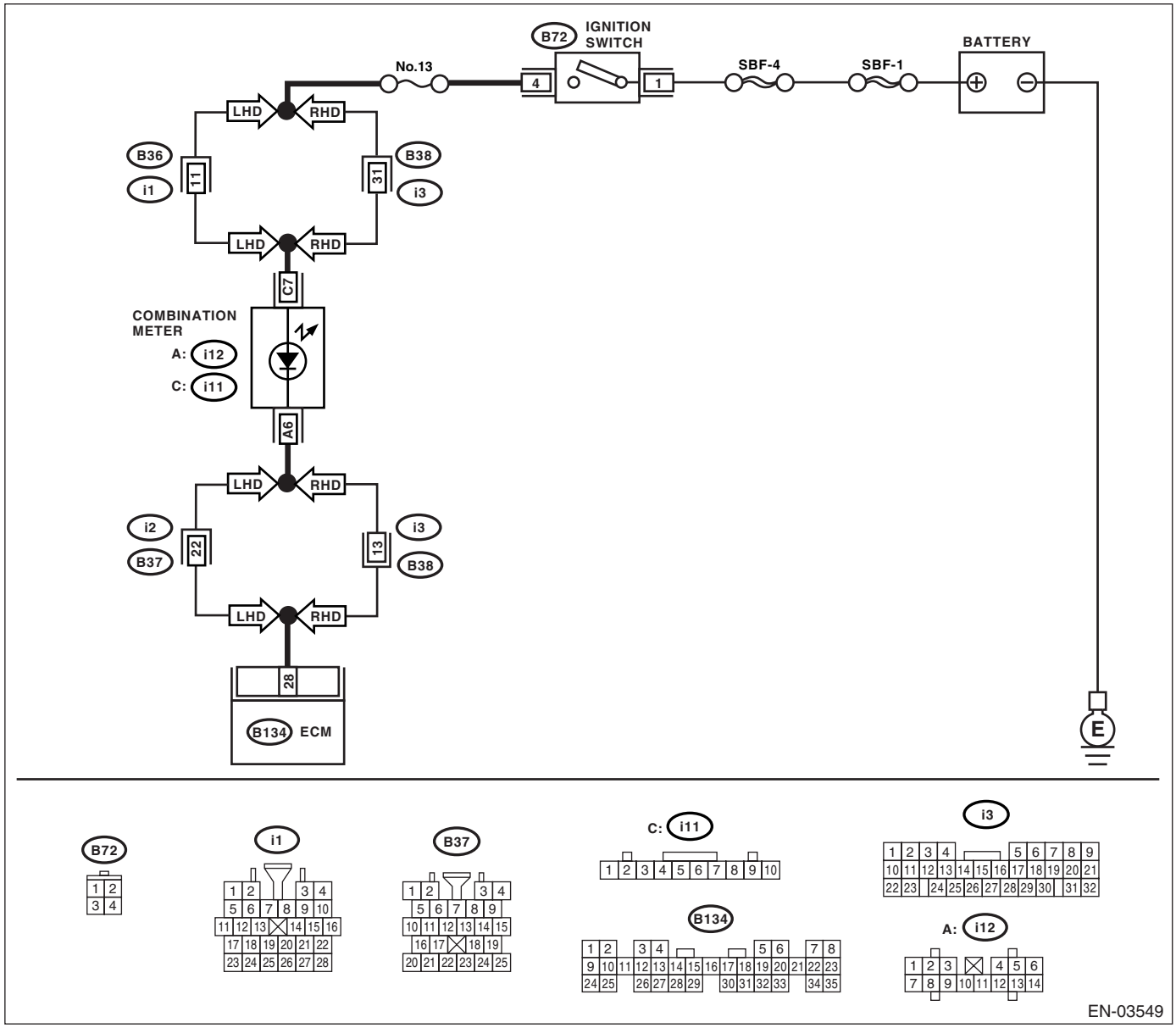
DIAGNOSIS:

The malfunction indicator light circuit is open or shorted.

TROUBLE SYMPTOM:

When the ignition switch is turned ON (engine OFF), malfunction indicator light does not come on.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 28 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **4.**	Go to step **2.**
2	**CHECK POOR CONTACT.** Check poor contact by shaking or pulling ECM connector and harness.	Does the malfunction indicator light illuminate?	Repair poor contact in connector.	Go to step **3.**
3	**CHECK ECM CONNECTOR.** Check the ECM connector connection.	Is the ECM connector correctly connected?	Replace the ECM. <Ref. to FU(H4SO)-47, Engine Control Module (ECM).>	Repair connection of ECM connector.
4	**CHECK HARNESS BETWEEN COMBINATION METER AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Remove the combination meter. <Ref. to IDI-12, Combination Meter.> 3) Disconnect the connector from ECM and combination meter. 4) Measure the resistance of harness between ECM and combination meter connector. ***Connector & terminal*** ***(B134) No. 28 — (i12) No. 6:***	Is the resistance less than 1 Ω?	Go to step **5.**	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and combination meter connector • Poor contact in coupling connector
5	**CHECK POOR CONTACT.** Check poor contact in combination meter connector.	Is there poor contact in combination meter connector?	Repair poor contact in combination meter connector.	Go to step **6.**
6	**CHECK HARNESS BETWEEN COMBINATION METER AND IGNITION SWITCH CONNECTOR.** 1) Turn the ignition switch to ON. 2) Measure the voltage between combination meter connector and chassis ground. ***Connector & terminal*** ***(i11) No. 7 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Replace the combination meter circuit board. <Ref. to IDI-12, Combination Meter.>	Check the following and repair if necessary. NOTE: • Blown out fuse (No. 13). • Open or short circuit in harness between fuse (No. 13) and battery terminal • Poor contact in ignition switch connector

D: MALFUNCTION INDICATOR LIGHT DOES NOT GO OFF.

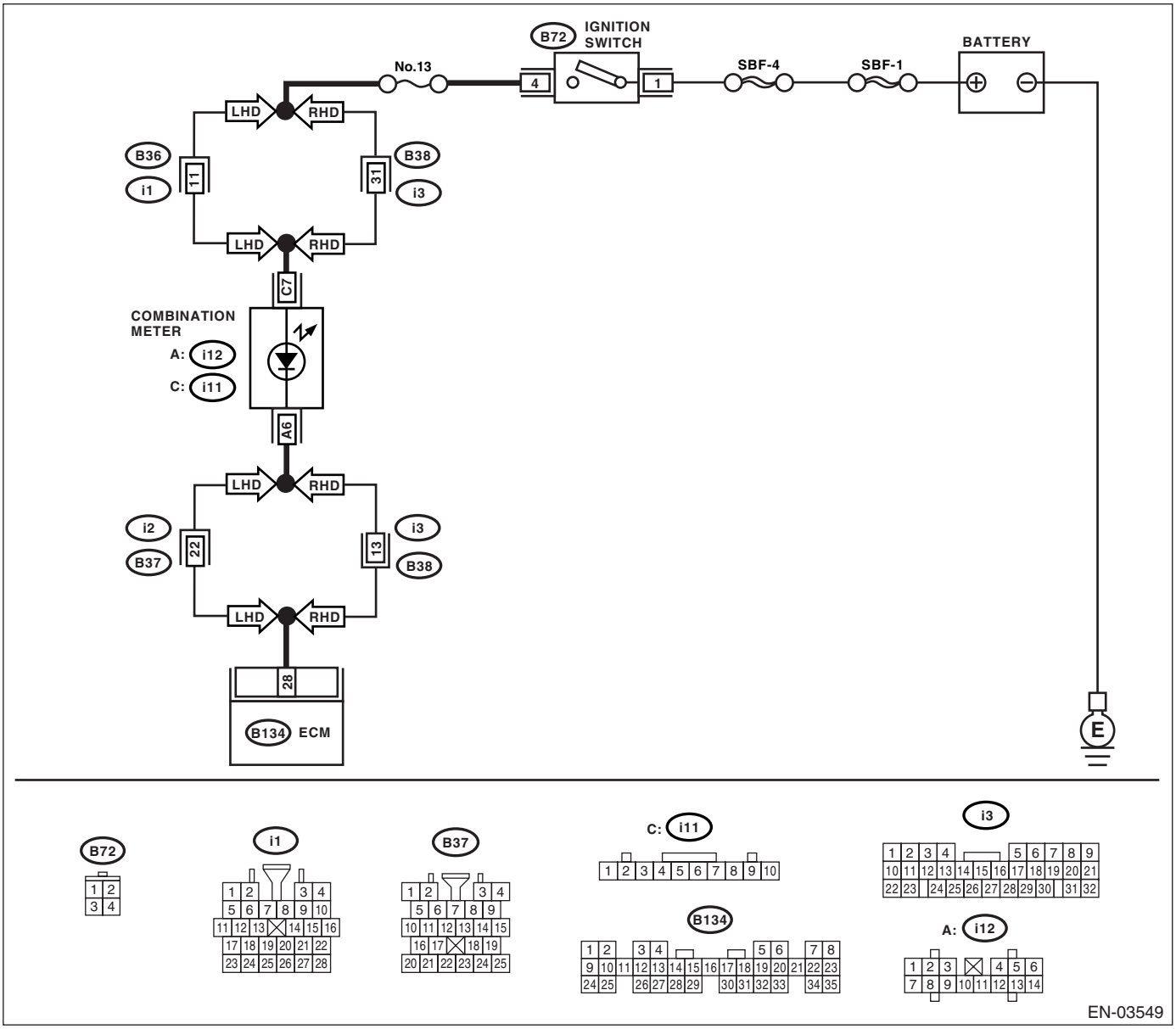
DIAGNOSIS:

The malfunction indicator light circuit is shorted.

TROUBLE SYMPTOM:

Although malfunction indicator light comes on when the engine runs, DTC is not shown on Subaru select monitor or general scan tool display.

WIRING DIAGRAM:



Step		Check	Yes	No
1	**CHECK HARNESS BETWEEN COMBINATION METER AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Turn the ignition switch to ON.	Dose the malfunction indicator light illuminate?	Repair short circuit in harness between combination meter and ECM connector.	Replace the ECM. <Ref. to FU(H4SO)-47, Engine Control Module (ECM).>

E: MALFUNCTION INDICATOR LIGHT DOES NOT BLINK.

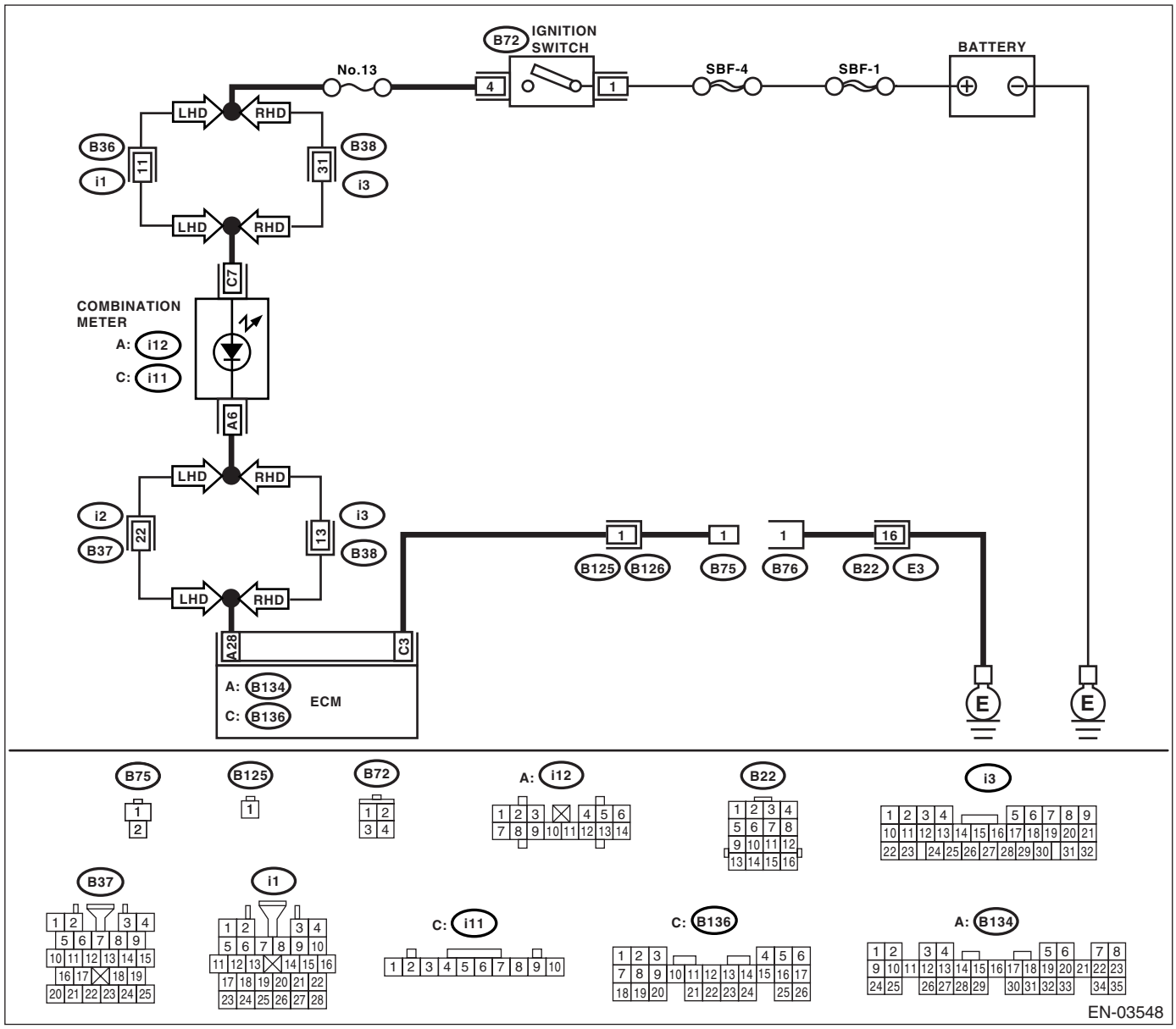
DIAGNOSIS:

- The malfunction indicator light circuit is open or shorted.
- Test mode connector circuit is in open.

TROUBLE SYMPTOM:

When in inspection mode, malfunction indicator light does not blink at a cycle of 3 Hz.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK STATUS OF MALFUNCTION INDICATOR LIGHT.** 1) Turn the ignition switch to OFF. 2) Disconnect the test mode connector. 3) Turn the ignition switch to ON. (engine OFF)	Dose the malfunction indicator light illuminate?	Go to step **2.**	Repair the malfunction indicator light circuit. <Ref. to EN(H4SO)(diag)-49, MALFUNCTION INDICATOR LIGHT DOES NOT COME ON, Malfunction Indicator Light.>
2	**CHECK HARNESS BETWEEN COMBINATION METER AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Turn the ignition switch to ON.	Dose the malfunction indicator light illuminate?	Repair ground short circuit in harness between combination meter and ECM connector.	Go to step **3.**
3	**CHECK HARNESS BETWEEN TEST MODE CONNECTOR AND CHASSIS GROUND.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance of harness between test mode connector and chassis ground. ***Connector & terminal*** ***(B76) No. 1 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between test mode connector and chassis ground
4	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair poor contact in ECM connector.	Go to step **5.**
5	**CHECK HARNESS BETWEEN ECM AND TEST MODE CONNECTOR.** 1) Connect the test mode connector. 2) Measure the resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***(B136) No. 3 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **6.**	Repair open circuit in harness between ECM and test mode connector.
6	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H4SO)-47, Engine Control Module (ECM).>

F: MALFUNCTION INDICATOR LIGHT REMAINS BLINKING.

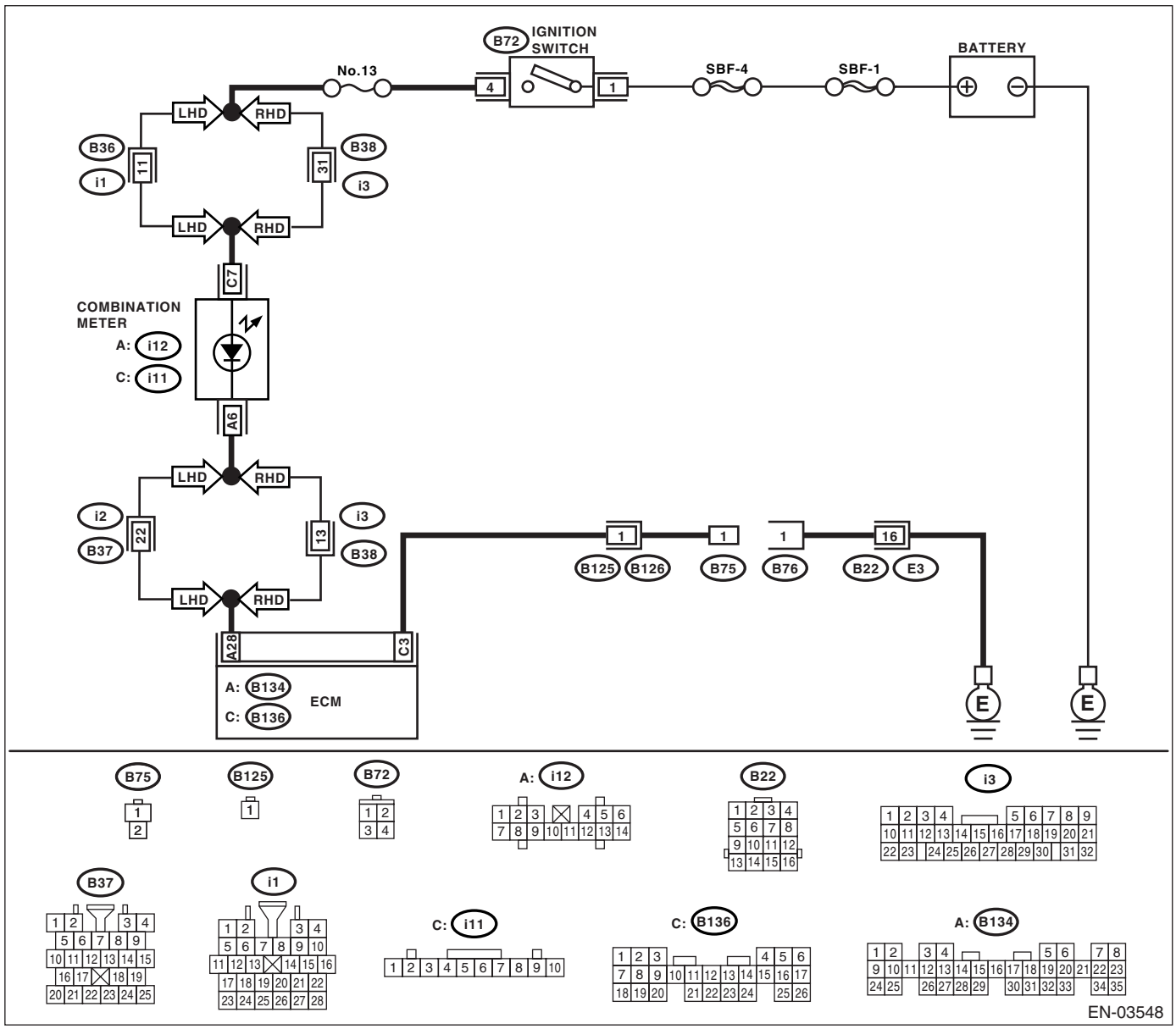
DIAGNOSIS:

Test mode connector circuit is shorted.

TROUBLE SYMPTOM:

Malfunction indicator light blinks at a cycle of 3 Hz when the ignition switch is turned to ON.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK TEST MODE CONNECTOR.** 1) Disconnect the test mode connector. 2) Turn the ignition switch to ON.	Dose the malfunction indicator light blink?	Go to step **2.**	System is in good order. NOTE: Malfunction indicator light blinks at a cycle of 3 Hz when test mode connector is connected.
2	**CHECK HARNESS BETWEEN ECM CONNECTOR AND ENGINE GROUNDING TERMINAL.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 3 — Chassis ground:***	Is the resistance less than 5 Ω?	Repair short circuit in harness between ECM and test mode connector.	Replace the ECM. <Ref. to FU(H4SO)-47, Engine Control Module (ECM).>

17.Diagnostics for Engine Starting Failure

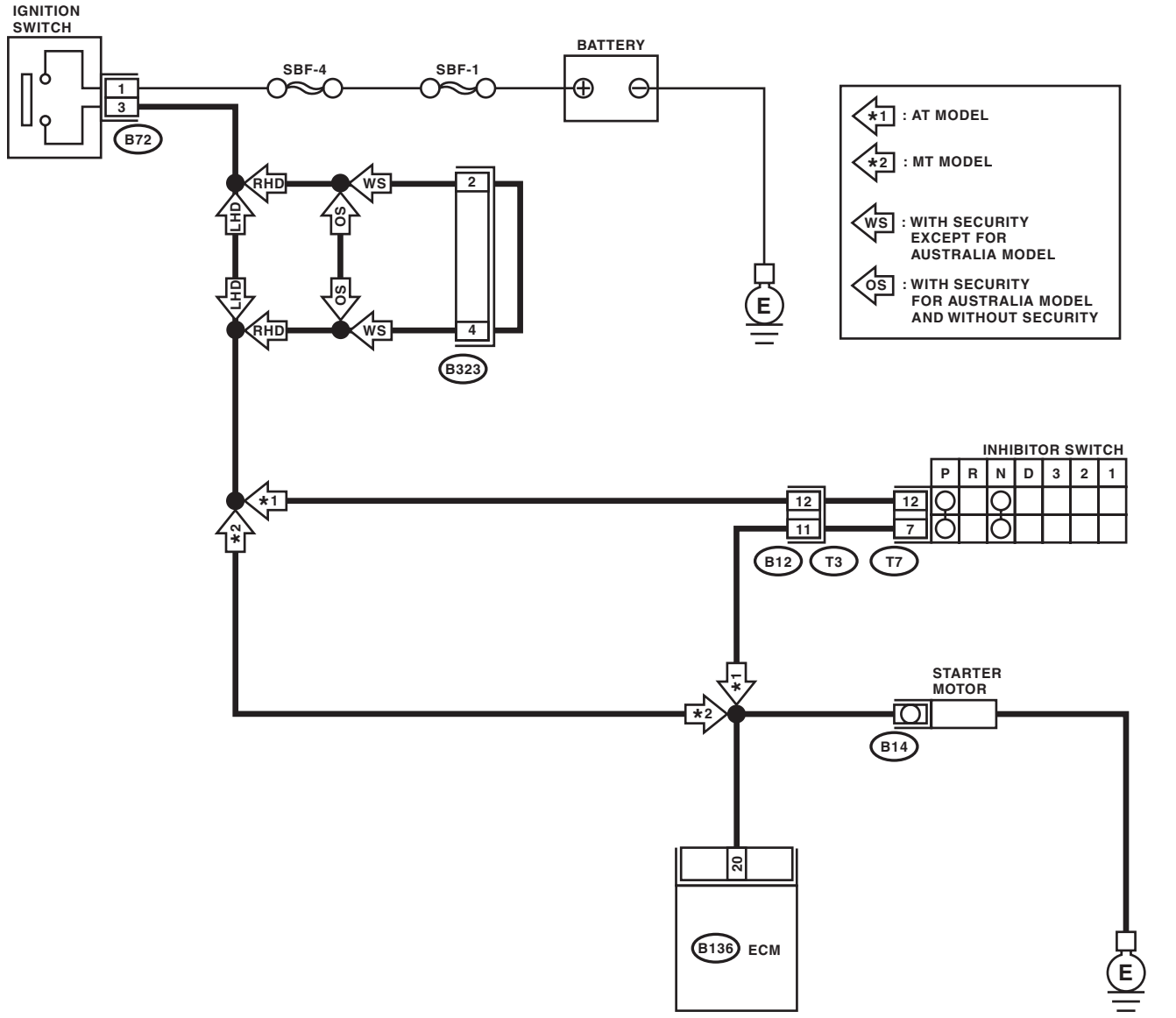
A: PROCEDURE

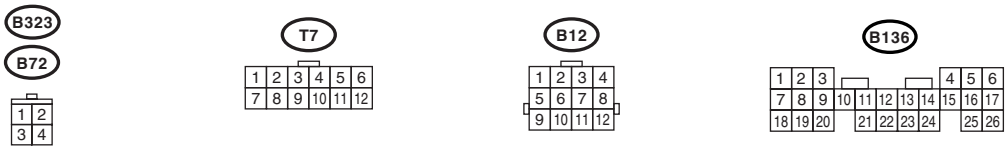
1. Check for fuel amount.
↓
2. Inspection of starter motor circuit. <Ref. to EN(H4SO)(diag)-57, STARTER MOTOR CIRCUIT, Diagnostics for Engine Starting Failure.>
↓
3. Inspection of ECM power supply and ground line. <Ref. to EN(H4SO)(diag)-59, CHECK POWER SUPPLY AND GROUND LINE OF ENGINE CONTROL MODULE (ECM), Diagnostics for Engine Starting Failure.>
↓
4. Inspection of ignition control system. <Ref. to EN(H4SO)(diag)-62, IGNITION CONTROL SYSTEM, Diagnostics for Engine Starting Failure.>
↓
5. Inspection of fuel pump circuit. <Ref. to EN(H4SO)(diag)-65, FUEL PUMP CIRCUIT, Diagnostics for Engine Starting Failure.>
↓
6. Inspection of fuel injector circuit. <Ref. to EN(H4SO)(diag)-68, FUEL INJECTOR CIRCUIT, Diagnostics for Engine Starting Failure.>

B: STARTER MOTOR CIRCUIT

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO)(diag)-44, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO)(diag)-37, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:





EN-03560

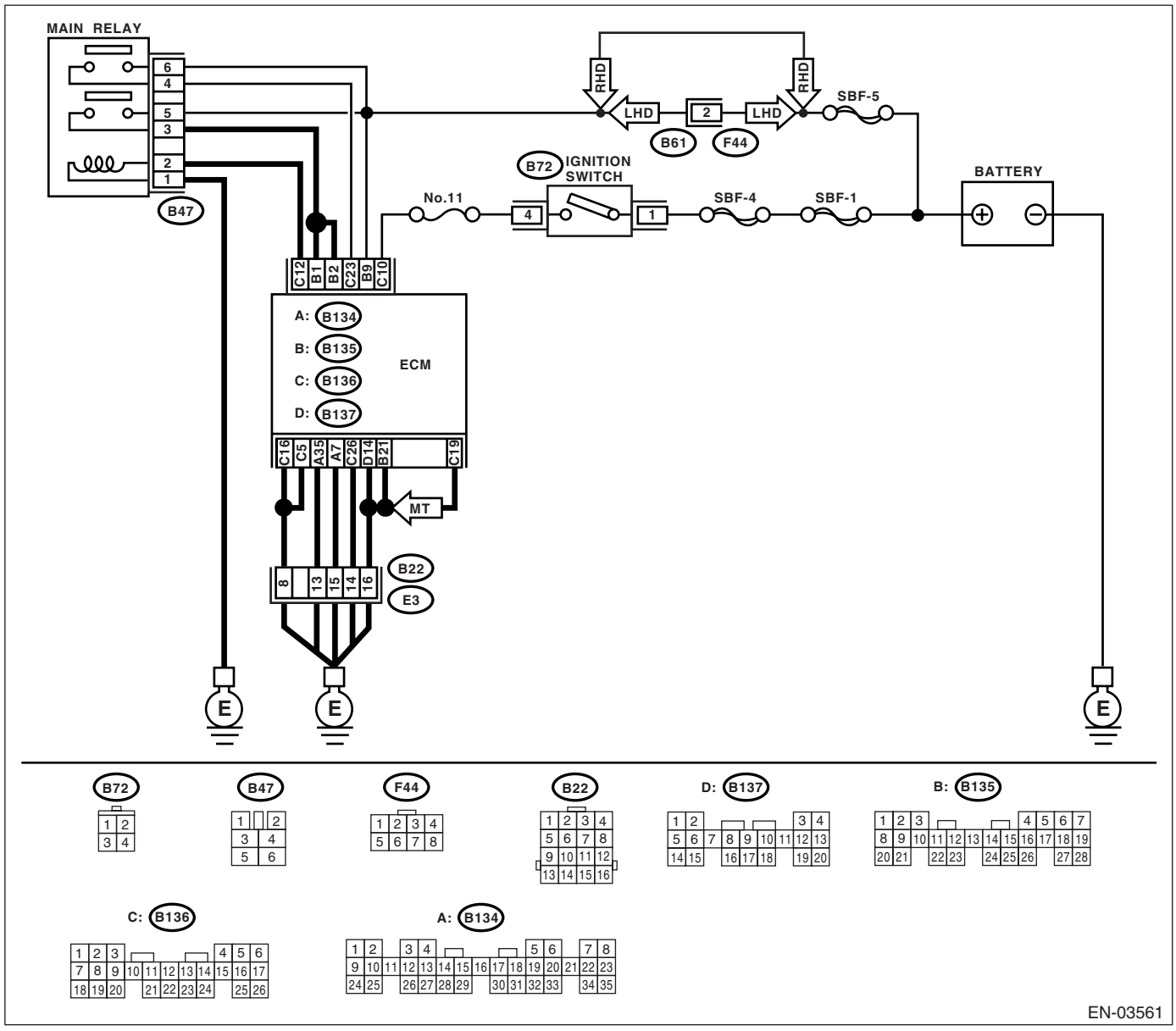
Diagnostics for Engine Starting Failure

	Step	Check	Yes	No
1	**CHECK BATTERY.** Check the battery voltage.	Is the voltage more than 12 V?	Go to step **2.**	Charge or replace the battery.
2	**CHECK INPUT SIGNAL FOR STARTER MOTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from starter motor. 3) Turn the ignition switch to ST. 4) Measure the power supply voltage between starter motor connector terminal and engine ground. ***Connector & terminal*** ***(B14) No. 1 (+) — Engine ground (−):*** NOTE: • On AT models, place the select lever in the "P" or "N" range. • On MT models, depress the clutch pedal.	Is the voltage more than 10 V?	Check the starter motor. <Ref. to SC(H4SO)-8, Starter.>	Go to step **3.**
3	**CHECK HARNESS BETWEEN BATTERY AND IGNITION SWITCH CONNECTOR.** 1) Disconnect the connector from ignition switch. 2) Measure the power supply voltage between ignition switch connector and chassis ground. ***Connector & terminal*** ***(B72) No. 1 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **4.**	Repair open circuit in harness between ignition switch and battery, and check fuse SBF No. 4 and SBF No. 1.
4	**CHECK IGNITION SWITCH.** 1) Disconnect the connector from ignition switch. 2) Measure the resistance between ignition switch terminals while turning ignition switch to the "ST" position. ***Terminals*** ***No. 1 — No. 3:***	Is the resistance less than 5 Ω?	Go to step **5.**	Replace the ignition switch.
5	**CHECK TRANSMISSION TYPE.**	Is the target AT model?	Go to step **6.**	A temporary poor contact. Check each connector for poor contact.
6	**CHECK INPUT VOLTAGE OF INHIBITOR SWITCH.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from inhibitor switch. 3) Connect the connector to ignition switch. 4) Measure the input voltage between inhibitor switch connector terminal and engine ground while turning ignition switch to ST. ***Connector & terminal*** ***(B12) No. 12 (+) — Engine ground (−):***	Is the voltage more than 10 V?	Go to step **7.**	Repair open or ground short circuit in harness between inhibitor switch and ignition switch. NOTE: Check security system (if equipped).
7	**CHECK INHIBITOR SWITCH.** 1) Place the select lever in the "P" or "N" range. 2) Measure the resistance between inhibitor switch terminals. ***Connector & terminal*** ***(T3) No. 11 — No. 12:***	Is the resistance less than 1 Ω?	Repair open or ground short circuit in harness between inhibitor switch and starter motor.	Replace the inhibitor switch. <Ref. to 4AT-53, Inhibitor Switch.>

C: CHECK POWER SUPPLY AND GROUND LINE OF ENGINE CONTROL MODULE (ECM)

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO)(diag)-44, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO)(diag)-37, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



Diagnostics for Engine Starting Failure

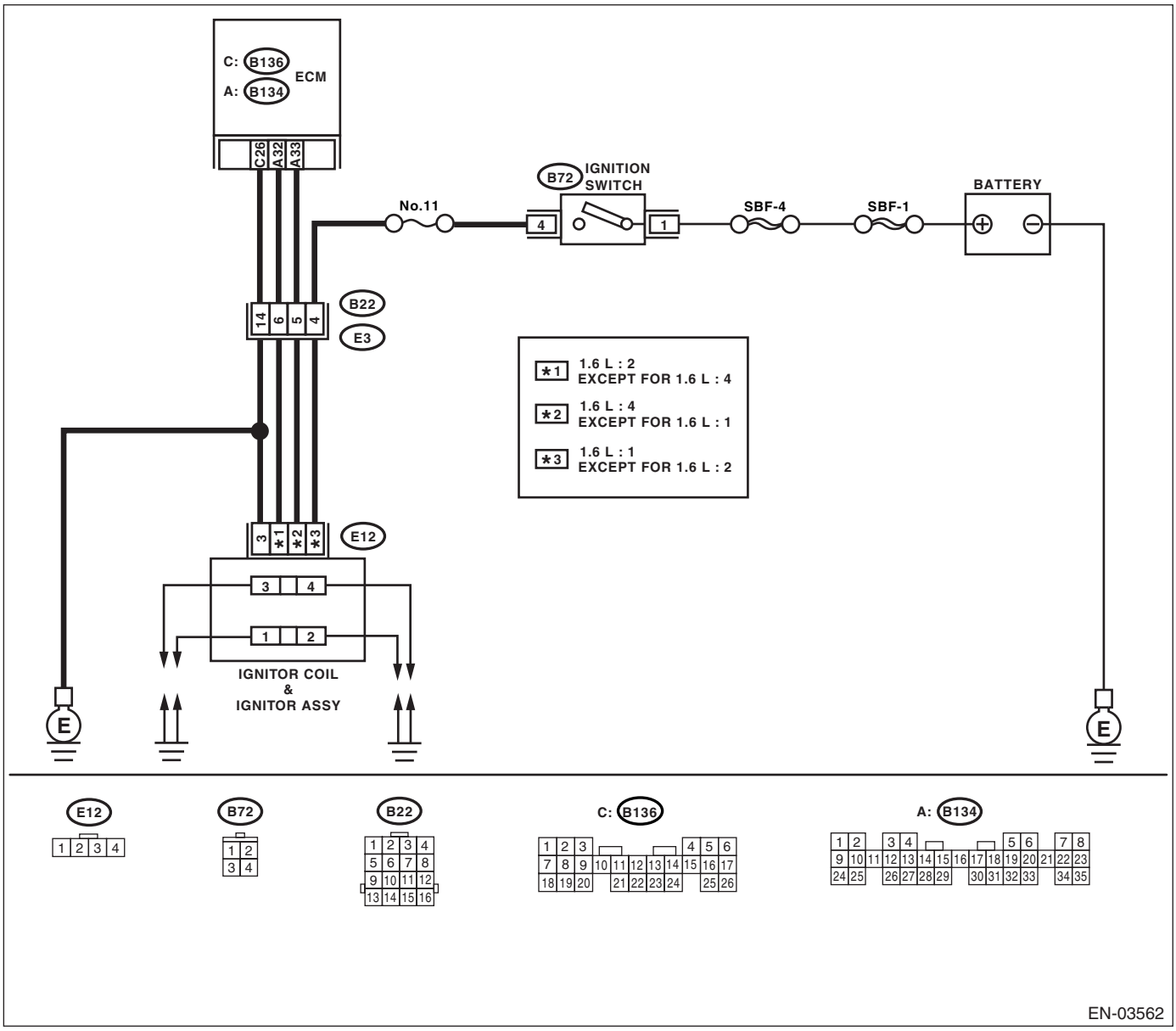
	Step	Check	Yes	No
1	**CHECK MAIN RELAY.** 1) Turn the ignition switch to OFF. 2) Remove the main relay. 3) Connect the battery to main relay terminals No. 1 and No. 2. 4) Measure the resistance between main relay terminals. ***Terminals*** ***No. 3 — No. 5:*** ***No. 4 — No. 6:***	Is the resistance less than 10 Ω?	Go to step **2.**	Replace the main relay.
2	**CHECK GROUND CIRCUIT OF ECM.** 1) Disconnect the connector from ECM. 2) Measure the resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 7 — Chassis ground:*** ***(B134) No. 35 — Chassis ground:*** ***(B135) No. 21 — Chassis ground:*** ***(B136) No. 5 — Chassis ground:*** ***(B136) No. 16 — Chassis ground:*** ***(B136) No. 26 — Chassis ground:*** ***(B137) No. 14 — Chassis ground:*** ***(B136) No. 19 — Chassis ground: (MT model)***	Is the resistance less than 5 Ω?	Go to step **3.**	Repair open circuit in harness between ECM connector and engine grounding terminal.
3	**CHECK INPUT VOLTAGE OF ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 9 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **4.**	Repair open or ground short circuit of power supply circuit.
4	**CHECK INPUT VOLTAGE OF ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 10 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **5.**	Repair open or ground short circuit of power supply circuit.
5	**CHECK HARNESS BETWEEN ECM AND MAIN RELAY CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between ECM and chassis ground. ***Connector & terminal*** ***(B136) No. 12 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **6.**	Repair ground short circuit in harness between ECM connector and main relay connector, then replace the ECM.
6	**CHECK OUTPUT VOLTAGE FROM ECM.** 1) Connect the connector to ECM. 2) Turn the ignition switch to ON. 3) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 12 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **7.**	Replace the ECM.
7	**CHECK INPUT VOLTAGE OF MAIN RELAY.** Check the voltage between main relay connector and chassis ground. ***Connector & terminal*** ***(B47) No. 2 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **8.**	Repair open circuit in harness between ECM connector and main relay connector.

	Step	Check	Yes	No
8	**CHECK GROUND CIRCUIT OF MAIN RELAY.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between main relay connector and chassis ground. ***Connector & terminal*** ***(B47) No. 1 — Chassis ground:***	Is the resistance less than 5 Ω?	Go to step **9.**	Repair open circuit between main relay and chassis ground.
9	**CHECK INPUT VOLTAGE OF MAIN RELAY.** Measure the voltage between main relay connector and chassis ground. ***Connector & terminal*** ***(B47) No. 5 (+) — Chassis ground (−):*** ***(B47) No. 6 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **10.**	Repair open or ground short circuit in harness of power supply circuit.
10	**CHECK INPUT VOLTAGE OF ECM.** 1) Connect the main relay connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 1 (+) — Chassis ground (−):*** ***(B135) No. 2 (+) — Chassis ground (−):*** ***(B136) No. 23 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Check ignition control system. <Ref. to EN(H4SO)(diag)-62, IGNITION CONTROL SYSTEM, Diagnostics for Engine Starting Failure.>	Repair open or ground short circuit in harness between ECM connector and main relay connector.

D: IGNITION CONTROL SYSTEM

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO)(diag)-44, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO)(diag)-37, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



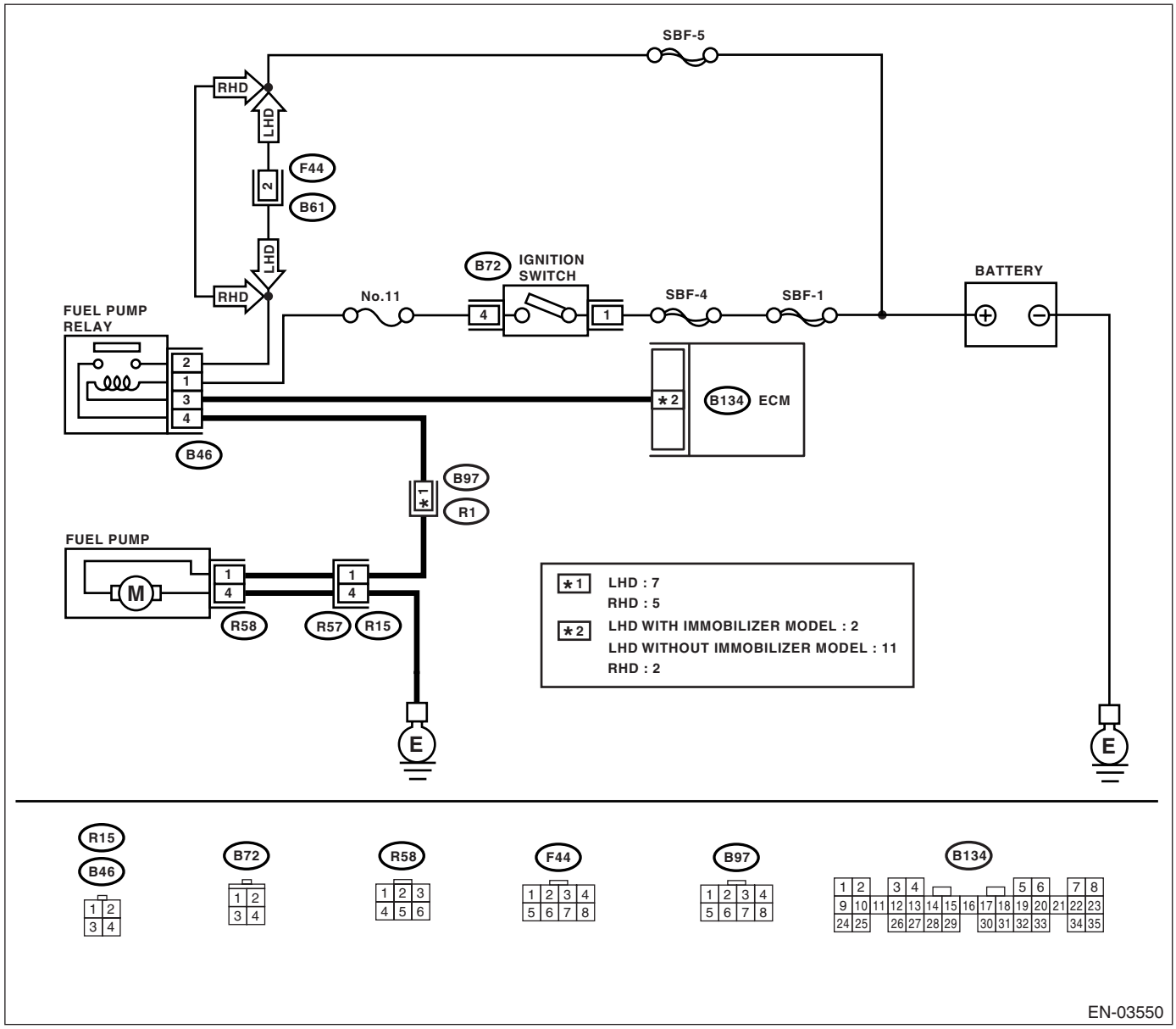
	Step	Check	Yes	No
1	**CHECK IGNITION SYSTEM FOR SPARKS.** 1) Remove the plug cord cap from each spark plug. 2) Install the new spark plug on plug cord cap. **CAUTION:** **Do not remove the spark plug from engine.** 3) Contact the spark plug's thread portion on engine. 4) While opening the throttle valve fully, crank the engine to check that spark occurs at each cylinder.	Does spark occur at each cylinder?	Check fuel pump system. <Ref. to EN(H4SO)(diag)-65, FUEL PUMP CIRCUIT, Diagnostics for Engine Starting Failure.>	Go to step **2.**
2	**CHECK POWER SUPPLY CIRCUIT FOR IGNITION COIL & IGNITOR ASSY.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ignition coil & ignitor ASSY. 3) Turn the ignition switch to ON. 4) Measure the power supply voltage between ignition coil & ignitor ASSY connector and engine ground. ***Connector & terminal*** ***1.6 L : (E12) No. 1 (+) — Engine ground (−):*** ***Except 1.6 L : (E12) No. 2 (+) — Engine ground (−):***	Is the voltage more than 10 V?	Go to step **3.**	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ignition coil & ignitor ASSY, and ignition switch connector • Poor contact in coupling connectors
3	**CHECK HARNESS OF IGNITION COIL & IGNITOR ASSY GROUND CIRCUIT.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between ignition coil & ignitor ASSY connector and engine ground. ***Connector & terminal*** ***(E12) No. 3 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **4.**	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ignition coil & ignitor ASSY connector and engine grounding terminal
4	**CHECK IGNITION COIL & IGNITOR ASSY.** 1) Remove the spark plug cords. 2) Measure the resistance between spark plug cord contact portions to check secondary coil. ***Terminals*** ***No. 1 — No. 2:*** ***No. 3 — No. 4:***	Is the resistance 14.4 — 21.6 kΩ or 10.9 — 14.7 kΩ (2.0 L and 2.5 L)?	Go to step **5.**	Replace the ignition coil & ignitor ASSY. <Ref. to IG(H4SO)-8, Ignition Coil and Ignitor Assembly.>

	Step	Check	Yes	No
5	**CHECK INPUT SIGNAL FOR IGNITION COIL & IGNITOR ASSY.** 1) Connect the connector to ignition coil & ignitor ASSY. 2) Check if voltage varies synchronously with engine speed when cranking, while monitoring voltage between ignition coil & ignitor ASSY connector and engine ground. ***Connector & terminal*** ***1.6 L : (E12) No. 4 (+) — Engine ground (–):*** ***Except 1.6 L : (E12) No. 1 (+) — Engine ground (–):*** ***1.6 L : (E12) No. 2 (+) — Engine ground (–):*** ***Except 1.6 L : (E12) No. 4 (+) — Engine ground (–):***	Is the voltage more than 10 V?	Go to step **6.**	Replace the ignition coil & ignitor ASSY. <Ref. to IG(H4SO)-8, Ignition Coil and Ignitor Assembly.>
6	**CHECK HARNESS BETWEEN ECM AND IGNITION COIL & IGNITOR ASSY CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connector from ignition coil & ignitor ASSY. 4) Measure the resistance of harness between ECM and ignition coil & ignitor ASSY connector. ***Connector & terminal*** ***1.6 L : (B134) No. 33 — (E12) No. 4:*** ***Except 1.6 L : (B134) No. 33 — (E12) No. 1:*** ***1.6 L : (B134) No. 32 — (E12) No. 2:*** ***Except 1.6 L : (B134) No. 32 — (E12) No. 4:***	Is the resistance less than 1 Ω?	Go to step **7.**	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and ignition coil & ignitor ASSY connector • Poor contact in coupling connector
7	**CHECK HARNESS BETWEEN ECM AND IGNITION COIL & IGNITOR ASSY CONNECTOR.** Measure the resistance of harness between ECM and engine ground. ***Connector & terminal:*** ***(B134) No. 33 — Engine ground:*** ***(B134) No. 32 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **8.**	Repair ground short circuit in harness between ECM and ignition coil & ignitor ASSY connector.
8	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair poor contact in ECM connector.	Check fuel pump circuit. <Ref. to EN(H4SO)(diag)-65, FUEL PUMP CIRCUIT, Diagnostics for Engine Starting Failure.>

E: FUEL PUMP CIRCUIT

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO)(diag)-44, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO)(diag)-37, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



Diagnostics for Engine Starting Failure

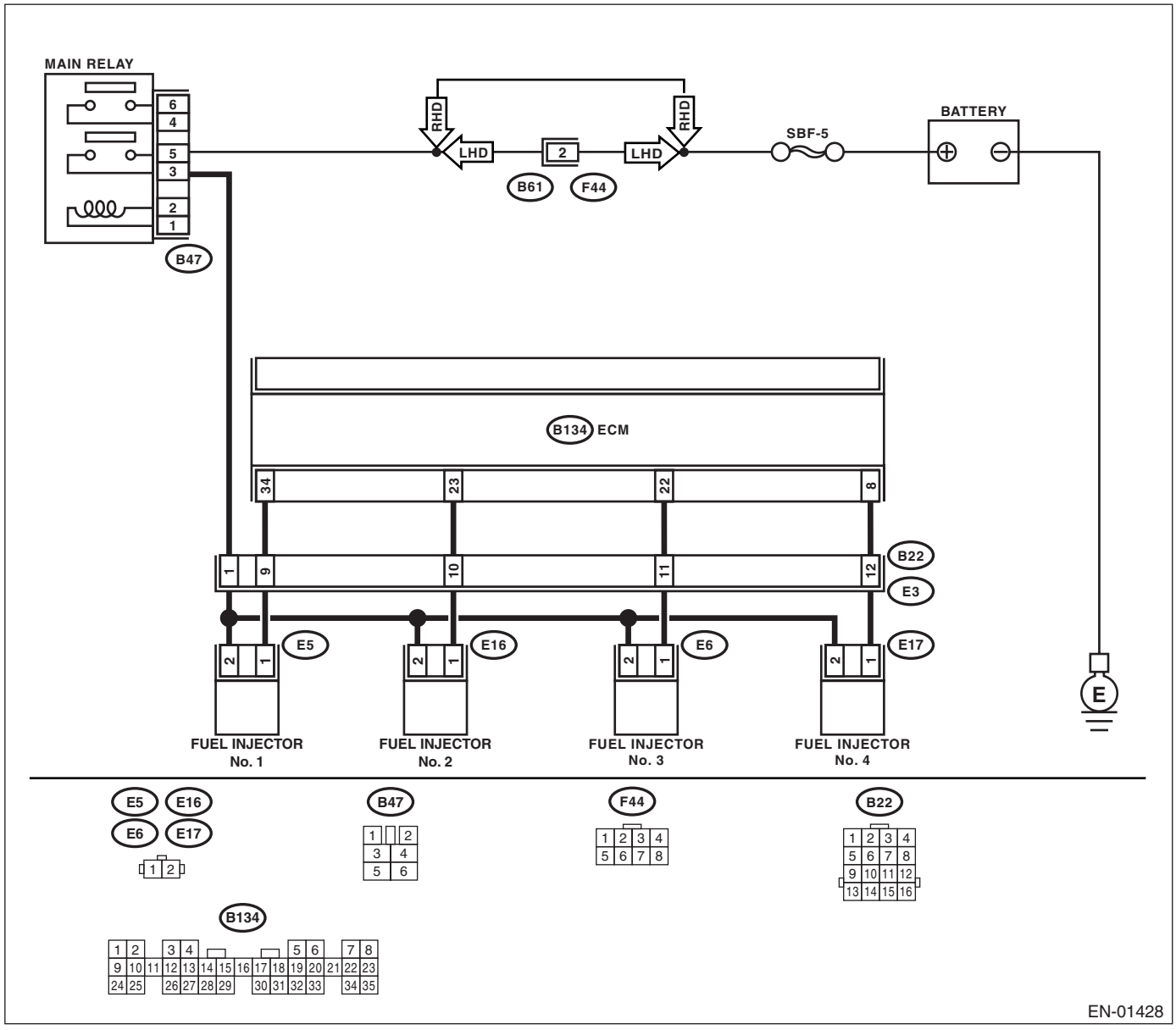
	Step	Check	Yes	No
1	**CHECK OPERATING SOUND OF FUEL PUMP.** Make sure that fuel pump is in operation for two seconds when turning the ignition switch to ON. NOTE: Fuel pump operation can also be executed using Subaru Select Monitor. For the procedure, refer to "Compulsory Valve Operation Check Mode". <Ref. to EN(H4SO)(diag)-45, Compulsory Valve Operation Check Mode.>	Does the fuel pump produce operating sound?	Check fuel injector circuit. <Ref. to EN(H4SO)(diag)-68, FUEL INJECTOR CIRCUIT, Diagnostics for Engine Starting Failure.>	Go to step **2.**
2	**CHECK GROUND CIRCUIT OF FUEL PUMP.** 1) Turn the ignition switch to OFF. 2) Remove the fuel pump access hole lid. 3) Disconnect the connector from fuel pump. 4) Measure the resistance of harness connector between fuel pump and chassis ground. ***Connector & terminal*** ***(R58) No. 4 — Chassis ground:***	Is the resistance less than 5 Ω?	Go to step **3.**	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between fuel pump connector and chassis grounding terminal • Poor contact in coupling connector
3	**CHECK POWER SUPPLY TO FUEL PUMP.** 1) Turn the ignition switch to ON. 2) Measure the voltage of power supply circuit between fuel pump connector and chassis ground. ***Connector & terminal*** ***(R58) No. 1 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Replace the fuel pump. <Ref. to FU(H4SO)-57, Fuel Pump.>	Go to step **4.**
4	**CHECK HARNESS BETWEEN FUEL PUMP AND FUEL PUMP RELAY CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance of harness connector between fuel pump and fuel pump relay. ***Connector & terminal*** ***(R58) No. 1 — (B46) No. 4:***	Is the resistance less than 1 Ω?	Go to step **5.**	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between fuel pump connector and chassis grounding terminal • Poor contact in coupling connectors
5	**CHECK HARNESS BETWEEN FUEL PUMP AND FUEL PUMP RELAY CONNECTOR.** Measure the resistance of harness between fuel pump and fuel pump relay connector. ***Connector & terminal*** ***(R58) No. 1 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **6.**	Repair short circuit in harness between fuel pump and fuel pump relay connector.

	Step	Check	Yes	No
6	**CHECK FUEL PUMP RELAY.** 1) Disconnect the connectors from fuel pump relay and main relay. 2) Remove the fuel pump relay and main relay with bracket. 3) Connect the battery to fuel pump relay connector terminals No. 1 and No. 3. 4) Measure the resistance between connector terminals of fuel pump relay. ***Terminals*** ***No. 2 — No. 4:***	Is the resistance less than 10 Ω?	Go to step **7.**	Replace the fuel pump relay. <Ref. to FU(H4SO)-49, Fuel Pump Relay.>
7	**CHECK HARNESS BETWEEN ECM AND FUEL PUMP RELAY CONNECTOR.** 1) Disconnect the connectors from ECM. 2) Measure the resistance of harness between ECM and fuel pump relay connector. ***Connector & terminal*** ***LHD (with immobilizer model)*** ***(B134) No. 2 — (B46) No. 3*** ***LHD (without immobilizer model)*** ***(B134) No. 11 — (B46) No. 3*** ***RHD*** ***(B134) No. 2 — (B46) No. 3***	Is the resistance less than 1 Ω?	Go to step **8.**	Repair open circuit in harness between ECM and fuel pump relay connector.
8	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair poor contact in ECM connector.	Check fuel injector circuit. <Ref. to EN(H4SO)(diag)-68, FUEL INJECTOR CIRCUIT, Diagnostics for Engine Starting Failure.>

F: FUEL INJECTOR CIRCUIT

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO)(diag)-44, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO)(diag)-37, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK OPERATION OF EACH FUEL INJECTOR.** While cranking the engine, check that each fuel injector emits “operating” sound. Use a sound scope or attach a screwdriver to the injector for this check.	Dose the fuel injector operate?	Check the fuel pressure. <Ref. to ME(H4SO)-29, INSPECTION, Fuel Pressure.>	Go to step **2.**

	Step	Check	Yes	No
2	**CHECK POWER SUPPLY TO EACH FUEL INJECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from #1 cylinder fuel injector. 3) Turn the ignition switch to ON. 4) Measure the power supply voltage between the fuel injector terminal and engine ground. ***Connector & terminal*** ***#1 (E5) No. 2 (+) — Engine ground (–):*** ***#2 (E16) No. 2 (+) — Engine ground (–):*** ***#3 (E6) No. 2 (+) — Engine ground (–):*** ***#4 (E17) No. 2 (+) — Engine ground (–):***	Is the voltage more than 10 V?	Go to step **3.**	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between main relay and fuel injector connector • Poor contact in main relay connector • Poor contact in coupling connector (B22) • Poor contact in fuel injector connector
3	**CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR.** 1) Disconnect the connector from ECM. 2) Measure the resistance of harness between ECM and fuel injector connector. ***Connector & terminal*** ***#1 (B134) No. 34 — (E5) No. 1:*** ***#2 (B134) No. 23 — (E16) No. 1:*** ***#3 (B134) No. 22 — (E6) No. 1:*** ***#4 (B134) No. 8 — (E17) No. 1:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and fuel injector connector • Poor contact in coupling connector
4	**CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR.** Measure the resistance of harness between ECM and fuel injector connector. ***Connector & terminal*** ***#1 (B134) No. 34 — Chassis ground:*** ***#2 (B134) No. 23 — Chassis ground:*** ***#3 (B134) No. 22 — Chassis ground:*** ***#4 (B134) No. 8 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **5.**	Repair ground short circuit in harness between ECM and fuel injector connector.
5	**CHECK EACH FUEL INJECTOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between each fuel injector terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 5 — 20 Ω?	Go to step **6.**	Replace the faulty fuel injector.
6	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair poor contact in ECM connector.	Inspection using “General Diagnostic Table”. <Ref. to EN(H4SO)(diag)-249, INSPECTION, General Diagnostic Table.>

18.List of Diagnostic Trouble Code (DTC)

A: LIST

DTC	Item	Index
P0030	HO2S Heater Control Circuit (Bank 1 Sensor 1)	<Ref. to EN(H4SO)(diag)-76, DTC P0030 HO2S HEATER CONTROL CIRCUIT (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0031	HO2S Heater Control Circuit Low (Bank 1 Sensor 1)	<Ref. to EN(H4SO)(diag)-78, DTC P0031 HO2S HEATER CONTROL CIRCUIT LOW (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0032	HO2S Heater Control Circuit High (Bank 1 Sensor 1)	<Ref. to EN(H4SO)(diag)-81, DTC P0032 HO2S HEATER CONTROL CIRCUIT HIGH (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0037	HO2S Heater Control Circuit Low (Bank 1 Sensor 2)	<Ref. to EN(H4SO)(diag)-83, DTC P0037 HO2S HEATER CONTROL CIRCUIT LOW (BANK 1 SENSOR 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0038	HO2S Heater Control Circuit High (Bank 1 Sensor 2)	<Ref. to EN(H4SO)(diag)-86, DTC P0038 HO2S HEATER CONTROL CIRCUIT HIGH (BANK 1 SENSOR 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0066	Air Assisted Injector Control Circuit or Circuit Low	<Ref. to EN(H4SO)(diag)-88, DTC P0066 AIR ASSISTED INJECTOR CONTROL CIRCUIT OR CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0067	Air Assisted Injector Control Circuit High	<Ref. to EN(H4SO)(diag)-90, DTC P0067 AIR ASSISTED INJECTOR CONTROL CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0107	Manifold Absolute Pressure/Barometric Pressure Circuit Low Input	<Ref. to EN(H4SO)(diag)-92, DTC P0107 MANIFOLD ABSOLUTE PRESSURE/BAROMETRIC PRESSURE CIRCUIT LOW INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0108	Manifold Absolute Pressure/Barometric Pressure Circuit High Input	<Ref. to EN(H4SO)(diag)-95, DTC P0108 MANIFOLD ABSOLUTE PRESSURE/BAROMETRIC PRESSURE CIRCUIT HIGH INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0111	Intake Air Temperature Sensor 1 Circuit Range/Performance	<Ref. to EN(H4SO)(diag)-98, DTC P0111 INTAKE AIR TEMPERATURE SENSOR 1 CIRCUIT RANGE/PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0112	Intake Air Temperature Sensor 1 Circuit Low	<Ref. to EN(H4SO)(diag)-100, DTC P0112 INTAKE AIR TEMPERATURE SENSOR 1 CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0113	Intake Air Temperature Sensor 1 Circuit High	<Ref. to EN(H4SO)(diag)-102, DTC P0113 INTAKE AIR TEMPERATURE SENSOR 1 CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0117	Engine Coolant Temperature Circuit Low	<Ref. to EN(H4SO)(diag)-105, DTC P0117 ENGINE COOLANT TEMPERATURE CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0118	Engine Coolant Temperature Circuit High	<Ref. to EN(H4SO)(diag)-107, DTC P0118 ENGINE COOLANT TEMPERATURE CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0121	Throttle/Pedal Position Sensor/ Switch “A” Circuit Range/Performance	<Ref. to EN(H4SO)(diag)-110, DTC P0121 THROTTLE/PEDAL POSITION SENSOR/SWITCH “A” CIRCUIT RANGE/PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0122	Throttle/Pedal Position Sensor/ Switch “A” Circuit Low	<Ref. to EN(H4SO)(diag)-112, DTC P0122 THROTTLE/PEDAL POSITION SENSOR/SWITCH “A” CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0123	Throttle/Pedal Position Sensor/ Switch “A” Circuit High	<Ref. to EN(H4SO)(diag)-115, DTC P0123 THROTTLE/PEDAL POSITION SENSOR/SWITCH “A” CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0125	Insufficient Coolant Temperature for Closed Loop Fuel Control	<Ref. to EN(H4SO)(diag)-117, DTC P0125 INSUFFICIENT COOLANT TEMPERATURE FOR CLOSED LOOP FUEL CONTROL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC	Item	Index
P0130	O2 Sensor Circuit (Bank 1 Sensor 1)	<Ref. to EN(H4SO)(diag)-119, DTC P0130 O2 SENSOR CIRCUIT (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0131	O2 Sensor Circuit Low Voltage (Bank 1 Sensor 1)	<Ref. to EN(H4SO)(diag)-122, DTC P0131 O2 SENSOR CIRCUIT LOW VOLTAGE (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0132	O2 Sensor Circuit High Voltage (Bank 1 Sensor 1)	<Ref. to EN(H4SO)(diag)-124, DTC P0132 O2 SENSOR CIRCUIT HIGH VOLTAGE (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0133	O2 Sensor Circuit Slow Response (Bank 1 Sensor 1)	<Ref. to EN(H4SO)(diag)-126, DTC P0133 O2 SENSOR CIRCUIT SLOW RESPONSE (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0134	O2 Sensor Circuit No Activity Detected (Bank 1 Sensor 1)	<Ref. to EN(H4SO)(diag)-128, DTC P0134 O2 SENSOR CIRCUIT NO ACTIVITY DETECTED (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0137	O2 Sensor Circuit Low Voltage (Bank 1 Sensor 2)	<Ref. to EN(H4SO)(diag)-130, DTC P0137 O2 SENSOR CIRCUIT LOW VOLTAGE (BANK 1 SENSOR 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0138	O2 Sensor Circuit High Voltage (Bank 1 Sensor 2)	<Ref. to EN(H4SO)(diag)-133, DTC P0138 O2 SENSOR CIRCUIT HIGH VOLTAGE (BANK 1 SENSOR 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0139	O2 Sensor Circuit Slow Response (Bank 1 Sensor 2)	<Ref. to EN(H4SO)(diag)-136, DTC P0139 O2 SENSOR CIRCUIT SLOW RESPONSE (BANK 1 SENSOR 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0171	System Too Lean (Bank 1)	<Ref. to EN(H4SO)(diag)-137, DTC P0171 SYSTEM TOO LEAN (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0172	System Too Rich (Bank 1)	<Ref. to EN(H4SO)(diag)-138, DTC P0172 SYSTEM TOO RICH (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0301	Cylinder 1 Misfire Detected	<Ref. to EN(H4SO)(diag)-140, DTC P0301 CYLINDER 1 MISFIRE DETECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0302	Cylinder 2 Misfire Detected	<Ref. to EN(H4SO)(diag)-140, DTC P0302 CYLINDER 2 MISFIRE DETECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0303	Cylinder 3 Misfire Detected	<Ref. to EN(H4SO)(diag)-140, DTC P0303 CYLINDER 3 MISFIRE DETECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0304	Cylinder 4 Misfire Detected	<Ref. to EN(H4SO)(diag)-141, DTC P0304 CYLINDER 4 MISFIRE DETECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0327	Knock Sensor 1 Circuit Low (Bank 1 or Single Sensor)	<Ref. to EN(H4SO)(diag)-148, DTC P0327 KNOCK SENSOR 1 CIRCUIT LOW (BANK 1 OR SINGLE SENSOR), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0328	Knock Sensor 1 Circuit High (Bank 1 or Single Sensor)	<Ref. to EN(H4SO)(diag)-150, DTC P0328 KNOCK SENSOR 1 CIRCUIT HIGH (BANK 1 OR SINGLE SENSOR), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0335	Crankshaft Position Sensor “A” Circuit	<Ref. to EN(H4SO)(diag)-152, DTC P0335 CRANKSHAFT POSITION SENSOR “A” CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0336	Crankshaft Position Sensor “A” Circuit Range/Performance	<Ref. to EN(H4SO)(diag)-154, DTC P0336 CRANKSHAFT POSITION SENSOR “A” CIRCUIT RANGE/PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0340	Camshaft Position Sensor “A” Circuit (Bank 1 or Single Sensor)	<Ref. to EN(H4SO)(diag)-156, DTC P0340 CAMSHAFT POSITION SENSOR “A” CIRCUIT (BANK 1 OR SINGLE SENSOR), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0341	Camshaft Position Sensor “A” Circuit Range/Performance (Bank 1 or Single Sensor)	<Ref. to EN(H4SO)(diag)-158, DTC P0341 CAMSHAFT POSITION SENSOR “A” CIRCUIT RANGE/PERFORMANCE (BANK 1 OR SINGLE SENSOR), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0400	Exhaust Gas Recirculation Flow	<Ref. to EN(H4SO)(diag)-161, DTC P0400 EXHAUST GAS RECIRCULATION FLOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

List of Diagnostic Trouble Code (DTC)

DTC	Item	Index
P0420	Catalyst System Efficiency Below Threshold (Bank 1)	<Ref. to EN(H4SO)(diag)-164, DTC P0420 CATALYST SYSTEM EFFICIENCY BELOW THRESHOLD (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0458	Evaporative Emission System Purge Control Valve Circuit Low	<Ref. to EN(H4SO)(diag)-166, DTC P0458 EVAPORATIVE EMISSION SYSTEM PURGE CONTROL VALVE CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0459	Evaporative Emission System Purge Control Valve Circuit High	<Ref. to EN(H4SO)(diag)-168, DTC P0459 EVAPORATIVE EMISSION SYSTEM PURGE CONTROL VALVE CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0462	Fuel Level Sensor “A” Circuit Low	<Ref. to EN(H4SO)(diag)-170, DTC P0462 FUEL LEVEL SENSOR “A” CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0463	Fuel Level Sensor “A” Circuit High	<Ref. to EN(H4SO)(diag)-173, DTC P0463 FUEL LEVEL SENSOR “A” CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0483	Fan Rationality Check	<Ref. to EN(H4SO)(diag)-176, DTC P0483 FAN RATIONALITY CHECK, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0502	Vehicle Speed Sensor “A” Circuit Low Input	<Ref. to EN(H4SO)(diag)-178, DTC P0502 VEHICLE SPEED SENSOR “A” CIRCUIT LOW INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0503	Vehicle Speed Sensor “A” Intermittent/Erratic/High	<Ref. to EN(H4SO)(diag)-179, DTC P0503 VEHICLE SPEED SENSOR “A” INTERMITTENT/ERRATIC/HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0506	Idle Air Control System RPM Lower Than Expected	<Ref. to EN(H4SO)(diag)-181, DTC P0506 IDLE AIR CONTROL SYSTEM RPM LOWER THAN EXPECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0507	Idle Air Control System RPM Higher Than Expected	<Ref. to EN(H4SO)(diag)-183, DTC P0507 IDLE AIR CONTROL SYSTEM RPM HIGHER THAN EXPECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0512	Starter Request Circuit	<Ref. to EN(H4SO)(diag)-184, DTC P0512 STARTER REQUEST CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0513	Incorrect Immobilizer Key	<Ref. to IM(diag)-16, DTC P0513 INCORRECT IMMOBILIZER KEY, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0519	Idle Air Control System Performance	<Ref. to EN(H4SO)(diag)-187, DTC P0519 IDLE AIR CONTROL SYSTEM PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0562	System Voltage Low	<Ref. to EN(H4SO)(diag)-189, DTC P0562 SYSTEM VOLTAGE LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0563	System Voltage High	<Ref. to EN(H4SO)(diag)-191, DTC P0563 SYSTEM VOLTAGE HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0604	Internal Control Module Random Access Memory (RAM) Error	<Ref. to EN(H4SO)(diag)-193, DTC P0604 INTERNAL CONTROL MODULE RANDOM ACCESS MEMORY (RAM) ERROR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0691	Fan 1 Control Circuit Low	<Ref. to EN(H4SO)(diag)-194, DTC P0691 FAN 1 CONTROL CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0692	Fan 1 Control Circuit High	<Ref. to EN(H4SO)(diag)-197, DTC P0692 FAN 1 CONTROL CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0703	Brake Switch “B” Circuit	<Ref. to EN(H4SO)(diag)-200, DTC P0703 BRAKE SWITCH “B” CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0705	Transmission Range Sensor Circuit Malfunction (PRNDL Input)	<Ref. to 4AT(diag)-99, CHECK INHIBITOR SWITCH, Diagnostic Procedure without Diagnostic Trouble Code (DTC).>
P0710	Transmission Fluid Temperature Sensor “A” Circuit	<Ref. to 4AT(diag)-42, DTC 27 ATF TEMPERATURE SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0716	Input/Turbine Speed Sensor “A” Circuit Range/Performance	<Ref. to 4AT(diag)-53, DTC 36 TORQUE CONVERTER TURBINE SPEED SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0720	Output Speed Sensor Circuit	<Ref. to 4AT(diag)-49, DTC 33 FRONT VEHICLE SPEED SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0726	Engine Speed Input Circuit Range/Performance	<Ref. to 4AT(diag)-38, DTC 11 ENGINE SPEED SIGNAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC	Item	Index
P0731	Gear 1 Incorrect Ratio	<Ref. to EN(H4SO)(diag)-202, DTC P0731 GEAR 1 INCORRECT RATIO, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0732	Gear 2 Incorrect Ratio	<Ref. to EN(H4SO)(diag)-202, DTC P0732 GEAR 2 INCORRECT RATIO, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0733	Gear 3 Incorrect Ratio	<Ref. to EN(H4SO)(diag)-202, DTC P0733 GEAR 3 INCORRECT RATIO, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0734	Gear 4 Incorrect Ratio	<Ref. to EN(H4SO)(diag)-203, DTC P0734 GEAR 4 INCORRECT RATIO, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0741	Torque Converter Clutch Circuit Performance or Stuck Off	<Ref. to EN(H4SO)(diag)-204, DTC P0741 TORQUE CONVERTER CLUTCH CIRCUIT PERFORMANCE OR STUCK OFF, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0743	Torque Converter Clutch Circuit Electrical	<Ref. to 4AT(diag)-77, DTC 77 LOCK-UP DUTY SOLENOID, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0748	Pressure Control Solenoid “A” Electrical	<Ref. to 4AT(diag)-71, DTC 75 LINE PRESSURE DUTY SOLENOID, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0753	Shift Solenoid “A” Electrical	<Ref. to 4AT(diag)-59, DTC 71 SHIFT SOLENOID 1, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0758	Shift Solenoid “B” Electrical	<Ref. to 4AT(diag)-62, DTC 72 SHIFT SOLENOID 2, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0771	Shift Solenoid “E” Performance or Stuck Off	<Ref. to 4AT(diag)-65, DTC 73 LOW CLUTCH TIMING SOLENOID, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0778	Pressure Control Solenoid “B” Electrical	<Ref. to 4AT(diag)-74, DTC 76 2-4 BRAKE DUTY SOLENOID, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0785	Shift/Timing Solenoid	<Ref. to 4AT(diag)-68, DTC 74 2-4 BRAKE TIMING SOLENOID, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0851	Park/Neutral Switch Input Circuit Low	<Ref. to EN(H4SO)(diag)-206, DTC P0851 PARK/NEUTRAL SWITCH INPUT CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0852	Park/Neutral Switch Input Circuit High	<Ref. to EN(H4SO)(diag)-210, DTC P0852 PARK/NEUTRAL SWITCH INPUT CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0864	TCM Communication Circuit Range/Performance	<Ref. to EN(H4SO)(diag)-215, DTC P0864 TCM COMMUNICATION CIRCUIT RANGE/PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0865	TCM Communication Circuit Low	<Ref. to EN(H4SO)(diag)-217, DTC P0865 TCM COMMUNICATION CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0866	TCM Communication Circuit High	<Ref. to EN(H4SO)(diag)-219, DTC P0866 TCM COMMUNICATION CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1134	A/F Sensor Micro-computer Problem (Bank 1 Sensor 1)	<Ref. to EN(H4SO)(diag)-221, DTC P1134 A/F SENSOR MICRO-COMPUTER PROBLEM (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1137	O2 Sensor Circuit (Mid) (Bank1 Sensor1)	<Ref. to EN(H4SO)(diag)-223, DTC P1137 O2 SENSOR CIRCUIT (MID) (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1492	EGR Solenoid Valve Signal #1 Circuit Malfunction (Low Input)	<Ref. to EN(H4SO)(diag)-225, DTC P1492 EGR SOLENOID VALVE SIGNAL #1 CIRCUIT MALFUNCTION (LOW INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1493	EGR Solenoid Valve Signal #1 Circuit Malfunction (High Input)	<Ref. to EN(H4SO)(diag)-225, DTC P1493 EGR SOLENOID VALVE SIGNAL #1 CIRCUIT MALFUNCTION (HIGH INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1494	EGR Solenoid Valve Signal #2 Circuit Malfunction (Low Input)	<Ref. to EN(H4SO)(diag)-225, DTC P1494 EGR SOLENOID VALVE SIGNAL #2 CIRCUIT MALFUNCTION (LOW INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1495	EGR Solenoid Valve Signal #2 Circuit Malfunction (High Input)	<Ref. to EN(H4SO)(diag)-225, DTC P1495 EGR SOLENOID VALVE SIGNAL #2 CIRCUIT MALFUNCTION (HIGH INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC	Item	Index
P1496	EGR Solenoid Valve Signal #3 Circuit Malfunction (Low Input)	<Ref. to EN(H4SO)(diag)-225, DTC P1496 EGR SOLENOID VALVE SIGNAL #3 CIRCUIT MALFUNCTION (LOW INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1497	EGR Solenoid Valve Signal #3 Circuit Malfunction (High Input)	<Ref. to EN(H4SO)(diag)-225, DTC P1497 EGR SOLENOID VALVE SIGNAL #3 CIRCUIT MALFUNCTION (HIGH INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1498	EGR Solenoid Valve Signal #4 Circuit Malfunction (Low Input)	<Ref. to EN(H4SO)(diag)-226, DTC P1498 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (LOW INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1499	EGR Solenoid Valve Signal #4 Circuit Malfunction (High Input)	<Ref. to EN(H4SO)(diag)-228, DTC P1499 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (HIGH INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1510	ISC Solenoid Valve Signal #1 Circuit Malfunction (Low Input)	<Ref. to EN(H4SO)(diag)-230, DTC P1510 ISC SOLENOID VALVE SIGNAL #1 CIRCUIT MALFUNCTION (LOW INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1511	ISC Solenoid Valve Signal #1 Circuit Malfunction (High Input)	<Ref. to EN(H4SO)(diag)-230, DTC P1511 ISC SOLENOID VALVE SIGNAL #1 CIRCUIT MALFUNCTION (HIGH INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1512	ISC Solenoid Valve Signal #2 Circuit Malfunction (Low Input)	<Ref. to EN(H4SO)(diag)-230, DTC P1512 ISC SOLENOID VALVE SIGNAL #2 CIRCUIT MALFUNCTION (LOW INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1513	ISC Solenoid Valve Signal #2 Circuit Malfunction (High Input)	<Ref. to EN(H4SO)(diag)-230, DTC P1513 ISC SOLENOID VALVE SIGNAL #2 CIRCUIT MALFUNCTION (HIGH INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1514	ISC Solenoid Valve Signal #3 Circuit Malfunction (Low Input)	<Ref. to EN(H4SO)(diag)-230, DTC P1514 ISC SOLENOID VALVE SIGNAL #3 CIRCUIT MALFUNCTION (LOW INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1515	ISC Solenoid Valve Signal #3 Circuit Malfunction (High Input)	<Ref. to EN(H4SO)(diag)-230, DTC P1515 ISC SOLENOID VALVE SIGNAL #3 CIRCUIT MALFUNCTION (HIGH INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1516	ISC Solenoid Valve Signal #4 Circuit Malfunction (Low Input)	<Ref. to EN(H4SO)(diag)-231, DTC P1516 ISC SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (LOW INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1517	ISC Solenoid Valve Signal #4 Circuit Malfunction (High Input)	<Ref. to EN(H4SO)(diag)-233, DTC P1517 ISC SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (HIGH INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1518	Starter Switch Circuit Low input	<Ref. to EN(H4SO)(diag)-234, DTC P1518 STARTER SWITCH CIRCUIT LOW INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1560	Back-up Voltage Circuit Malfunction	<Ref. to EN(H4SO)(diag)-237, DTC P1560 BACK-UP VOLTAGE CIRCUIT MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1570	Antenna	<Ref. to IM(diag)-17, DTC P1570 ANTENNA, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1571	Reference Code Incompatibility	<Ref. to IM(diag)-19, DTC P1571 REFERENCE CODE INCOMPATIBILITY, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1572	IMM Circuit Failure (Except antenna circuit)	<Ref. to IM(diag)-20, DTC P1572 IMM CIRCUIT FAILURE (EXCEPT ANTENNA CIRCUIT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1574	Key Communication Failure	<Ref. to IM(diag)-23, DTC P1574 KEY COMMUNICATION FAILURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1576	EGI Control Module EEPROM	<Ref. to IM(diag)-23, DTC P1576 EGI CONTROL MODULE EEPROM, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1577	IMM Control Module EEPROM	<Ref. to IM(diag)-23, DTC P1577 IMM CONTROL MODULE EEPROM, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1698	Engine Torque Control Cut Signal Circuit Low Input	<Ref. to EN(H4SO)(diag)-239, DTC P1698 ENGINE TORQUE CONTROL CUT SIGNAL CIRCUIT LOW INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC	Item	Index
P1699	Engine Torque Control Cut Signal Circuit High Input	<Ref. to EN(H4SO)(diag)-241, DTC P1699 ENGINE TORQUE CONTROL CUT SIGNAL CIRCUIT HIGH INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1700	Throttle Position Sensor	<Ref. to 4AT(diag)-45, DTC 31 THROTTLE POSITION SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1711	Engine Torque Control Signal #1 Circuit Malfunction	<Ref. to EN(H4SO)(diag)-243, DTC P1711 ENGINE TORQUE CONTROL SIGNAL #1 CIRCUIT MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1712	Engine Torque Control Signal #2 Circuit Malfunction	<Ref. to EN(H4SO)(diag)-245, DTC P1712 ENGINE TORQUE CONTROL SIGNAL #2 CIRCUIT MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2503	Charging System Voltage Low	<Ref. to EN(H4SO)(diag)-246, DTC P2503 CHARGING SYSTEM VOLTAGE LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2504	Charging System Voltage High	<Ref. to EN(H4SO)(diag)-247, DTC P2504 CHARGING SYSTEM VOLTAGE HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

19.Diagnostic Procedure with Diagnostic Trouble Code (DTC)

A: DTC P0030 HO2S HEATER CONTROL CIRCUIT (BANK 1 SENSOR 1)

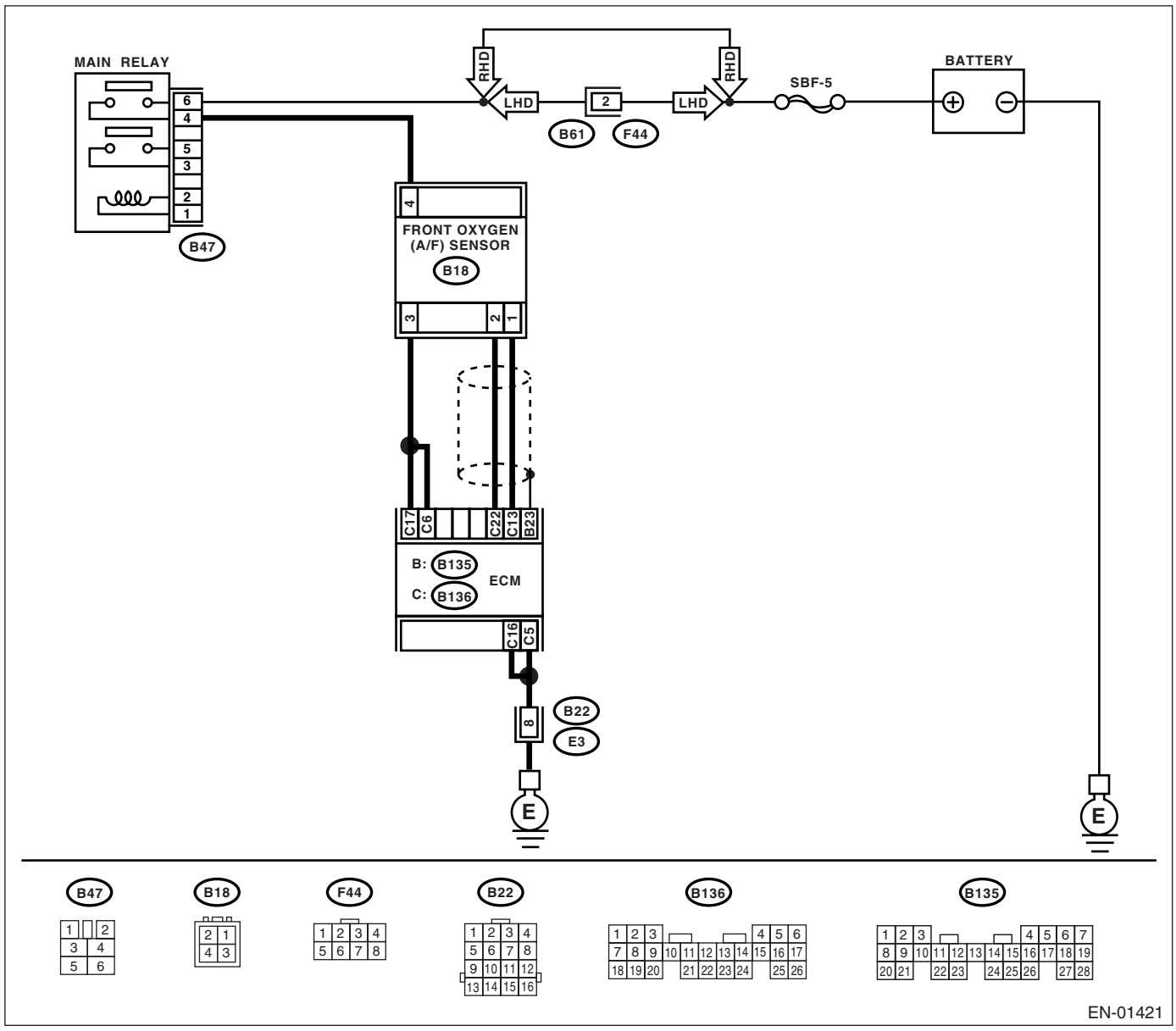
DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO)(diag)-44, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO)(diag)-37, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** 1) Start the engine and warm-up engine. 2) Turn the ignition switch to OFF. 3) Disconnect the connectors from ECM and front oxygen (A/F) sensor. 4) Measure the resistance of harness between ECM and front oxygen (A/F) sensor connector. ***Connector & terminal*** ***(B136) No. 6 — (B18) No. 3:*** ***(B136) No. 17 — (B18) No. 3:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the open circuit in harness between ECM and front oxygen (A/F) sensor connector.
2	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** Measure the resistance of harness between ECM and front oxygen (A/F) sensor connector. ***Connector & terminal*** ***(B136) No. 13 — (B18) No. 1:*** ***(B136) No. 22 — (B18) No. 2:***	Is the resistance less than 1 Ω?	Go to step **3.**	Repair the open circuit in harness between ECM and front oxygen (A/F) sensor connector.
3	**CHECK HARNESS BETWEEN MAIN RELAY AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** Measure the resistance of harness between main relay and front oxygen (A/F) sensor connector. ***Connector & terminal*** ***(B47) No. 4 — (B18) No. 4:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the open circuit in harness between ECM and front oxygen (A/F) sensor connector.
4	**CHECK FRONT OXYGEN (A/F) SENSOR.** Measure the resistance between front oxygen (A/F) sensor connector terminals. ***Terminals*** ***No. 3 — No. 4:***	Is the resistance less than 5 Ω?	Go to step **5.**	Replace the front oxygen (A/F) sensor. <Ref. to FU(H4SO)-43, Front Oxygen (A/F) Sensor.>
5	**CHECK POOR CONTACT.** Check the poor contact in ECM and front oxygen (A/F) sensor connector.	Is there poor contact in ECM or front oxygen (A/F) sensor connector?	Repair the poor contact in ECM or front oxygen (A/F) sensor connector.	Replace the front oxygen (A/F) sensor. <Ref. to FU(H4SO)-43, Front Oxygen (A/F) Sensor.>

B: DTC P0031 HO2S HEATER CONTROL CIRCUIT LOW (BANK 1 SENSOR 1)

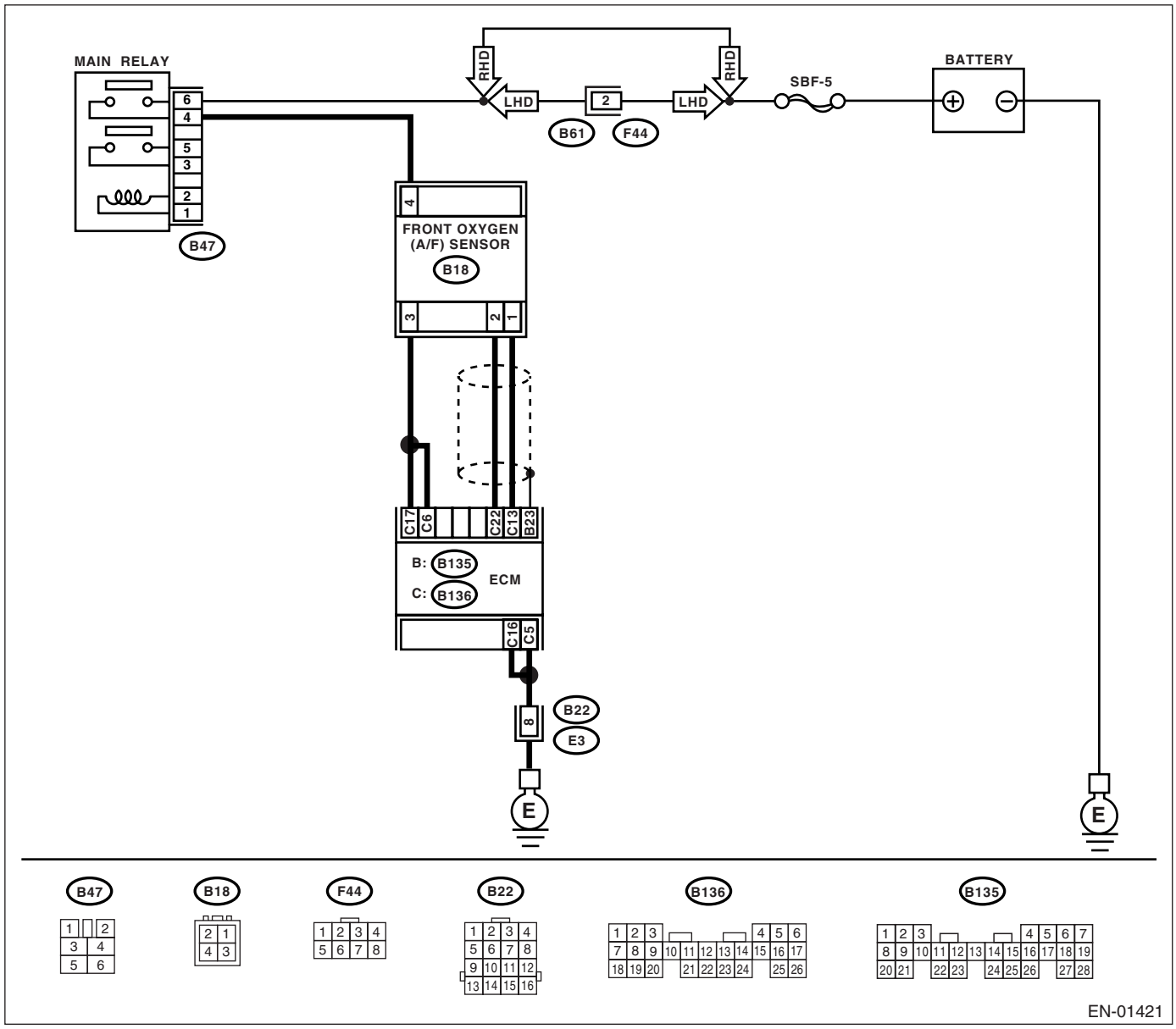
DTC DETECTING CONDITION:

Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO)(diag)-44, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO)(diag)-37, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Does the Subaru Select Monitor or general scan tool display DTC P0031 and P0037 at the same time?	Go to step **2.**	Go to step **5.**
2	**CHECK POWER SUPPLY TO FRONT OXYGEN (A/F) SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from front oxygen (A/F) sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between front oxygen (A/F) sensor connector and engine ground. ***Connector & terminal*** ***(B18) No. 4 (+) — Engine ground (–):***	Is the voltage more than 10 V?	Go to step **3.**	Repair power supply line. NOTE: In this case, repair the following: • Open circuit in harness between main relay and front oxygen (A/F) sensor connector • Poor contact in front oxygen (A/F) sensor connector • Poor contact in main relay connector
3	**CHECK GROUND CIRCUIT OF ECM.** Measure the resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 5 — Chassis ground:*** ***(B136) No. 16 — Chassis ground:***	Is the resistance less than 5 Ω?	Go to step **4.**	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and engine ground terminal • Poor contact in ECM connector • Poor contact in coupling connector
4	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of front oxygen (A/F) sensor heater current using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to the “READ CURRENT DATA FOR ENGINE”. <Ref. to EN(H4SO)(diag)-30, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the General Scan Tool Instruction Manual.	Is the current more than 0.2 A?	Repair poor contact in connector. NOTE: In this case, repair the following: • Poor contact in front oxygen (A/F) sensor connector • Poor contact in ECM connector	Go to step **5.**
5	**CHECK INPUT SIGNAL FROM ECM.** 1) Start and idle the engine. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 6 (+) — Chassis ground (–):*** ***(B136) No. 17 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Go to step **7.**	Go to step **6.**
6	**CHECK OUTPUT SIGNAL FROM ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 6 (+) — Chassis ground (–):*** ***(B136) No. 17 (+) — Chassis ground (–):***	Does the voltage change by shaking the ECM harness and connector?	Repair poor contact in ECM connector.	Go to step **7.**

	Step	Check	Yes	No
7	**CHECK FRONT OXYGEN (A/F) SENSOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between front oxygen (A/F) sensor connector terminals. ***Terminals*** ***No. 3 — No. 4:***	Is the resistance less than 10 Ω?	Repair harness and connector. NOTE: In this case, repair the following: • Open or ground short circuit in harness between front oxygen (A/F) sensor and ECM connector • Poor contact in front oxygen (A/F) sensor connector • Poor contact in ECM connector	Replace the front oxygen (A/F) sensor. <Ref. to FU(H4SO)-50, Fuel.>

C: DTC P0032 HO2S HEATER CONTROL CIRCUIT HIGH (BANK 1 SENSOR 1)

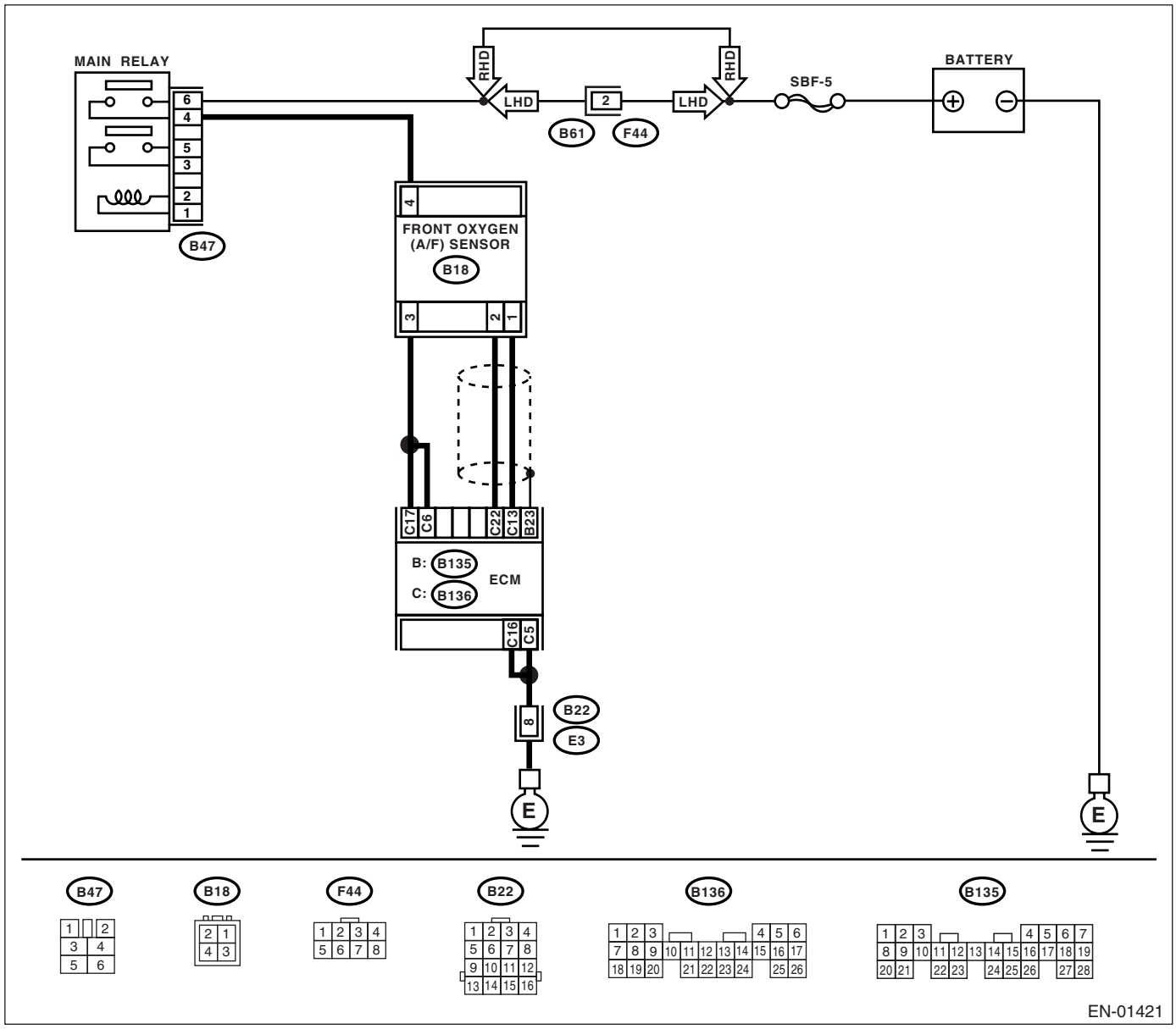
DTC DETECTING CONDITION:

Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO)(diag)-44, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO)(diag)-37, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 6 (+) — Chassis ground (−):*** ***(B136) No. 17 (+) — Chassis ground (−):***	Is the voltage more than 8 V?	Go to step **2.**	Go to step **3.**
2	**CHECK FRONT OXYGEN (A/F) SENSOR HEATER CURRENT.** 1) Turn the ignition switch to OFF. 2) Repair the battery short circuit in harness between ECM and front oxygen (A/F) sensor connector. 3) Turn the ignition switch to ON. 4) Read the data of front oxygen (A/F) sensor heater current using Subaru Select Monitor or the general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO)(diag)-30, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the General Scan Tool Instruction Manual.	Is the current more than 2.3 A?	Replace the ECM. <Ref. to FU(H4SO)-47, Engine Control Module (ECM).>	Finish the diagnosis.
3	**CHECK OUTPUT SIGNAL FROM ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 6 (+) — Chassis ground (−):*** ***(B136) No. 17 (+) — Chassis ground (−):***	Does the voltage change by shaking the ECM harness and connector?	Repair battery short circuit in harness between ECM and front oxygen (A/F) sensor connector.	Finish the diagnosis.

D: DTC P0037 HO2S HEATER CONTROL CIRCUIT LOW (BANK 1 SENSOR 2)

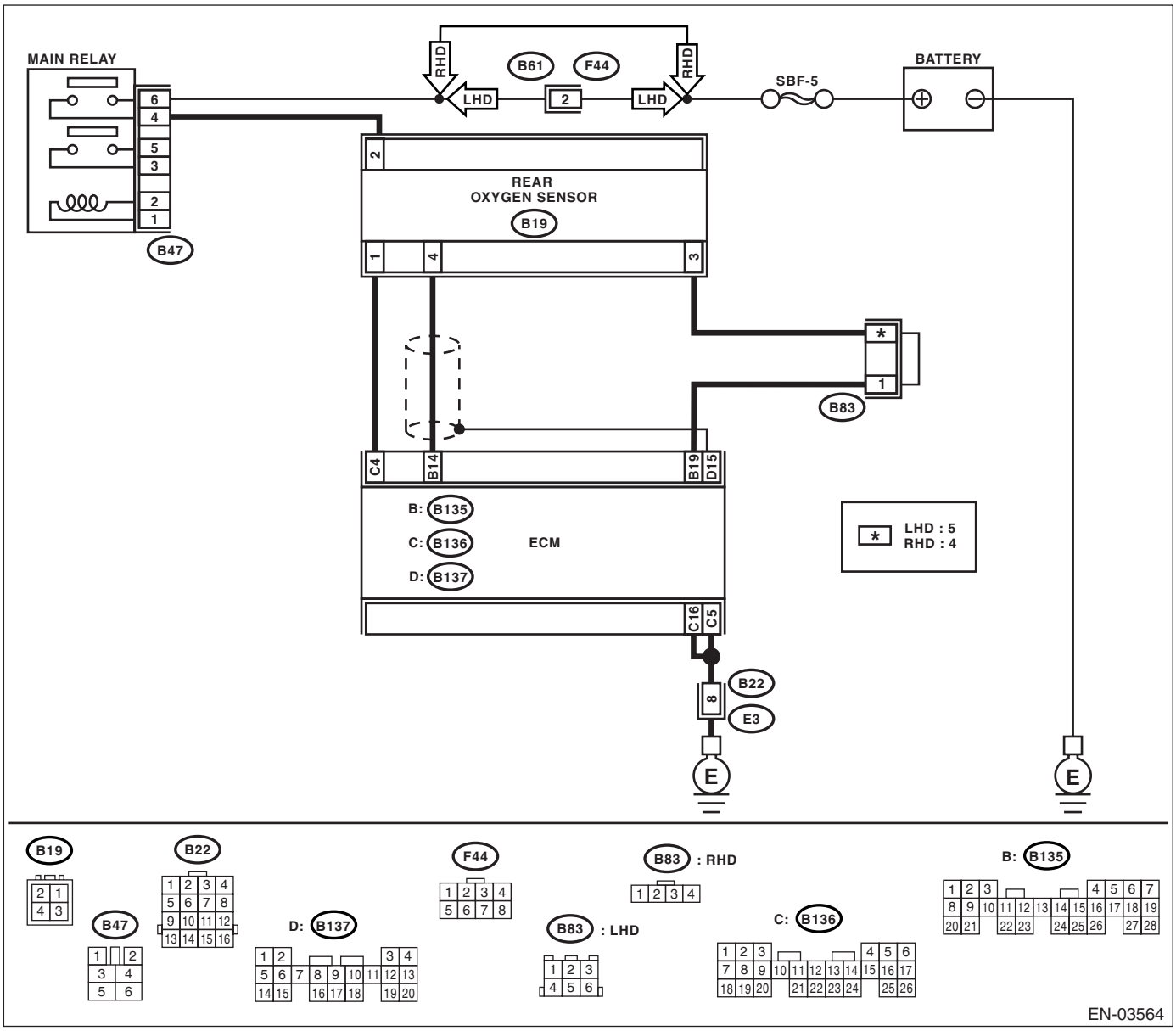
DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO)(diag)-44, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO)(diag)-37, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK GROUND CIRCUIT OF ECM.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 5 — Chassis ground:*** ***(B136) No. 16 — Chassis ground:***	Is the resistance less than 5 Ω?	Go to step **2.**	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and engine ground terminal • Poor contact in ECM connector • Poor contact in coupling connector
2	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of rear oxygen sensor heater current using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO)(diag)-30, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the General Scan Tool Instruction Manual.	Is the current more than 0.2 A?	Repair the connector. NOTE: In this case, repair the following: • Poor contact in rear oxygen sensor connector • Poor contact in rear oxygen sensor connecting harness connector • Poor contact in ECM connector	Go to step **3.**
3	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Start and idle the engine. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 4 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Go to step **6.**	Go to step **4.**
4	**CHECK OUTPUT SIGNAL FROM ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 4 (+) — Chassis ground (–):***	Does the voltage change by shaking the ECM harness and connector?	Repair poor contact in ECM connector.	Go to step **5.**
5	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Disconnect the connector from rear oxygen sensor. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 4 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Replace the ECM. <Ref. to FU(H4SO)-47, Engine Control Module (ECM).>	Repair battery short circuit in harness between ECM and rear oxygen sensor connector. After repair, replace the ECM. <Ref. to FU(H4SO)-47, Engine Control Module (ECM).>

	Step	Check	Yes	No
6	**CHECK POWER SUPPLY TO REAR OXYGEN SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from rear oxygen sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between rear oxygen sensor connector and engine ground or chassis ground. ***Connector & terminal*** ***(B19) No. 2 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **7.**	Repair power supply line. NOTE: In this case, repair the following: • Open circuit in harness between main relay and rear oxygen sensor connector • Poor contact in rear oxygen sensor connector • Poor contact in coupling connector
7	**CHECK REAR OXYGEN SENSOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between rear oxygen sensor connector terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance less than 30 Ω?	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between rear oxygen sensor and ECM connector • Poor contact in rear oxygen sensor connector • Poor contact in ECM connector • Poor contact in coupling connector	Replace the rear oxygen sensor. <Ref. to FU(H4SO)-45, Rear Oxygen Sensor.>

E: DTC P0038 HO2S HEATER CONTROL CIRCUIT HIGH (BANK 1 SENSOR 2)

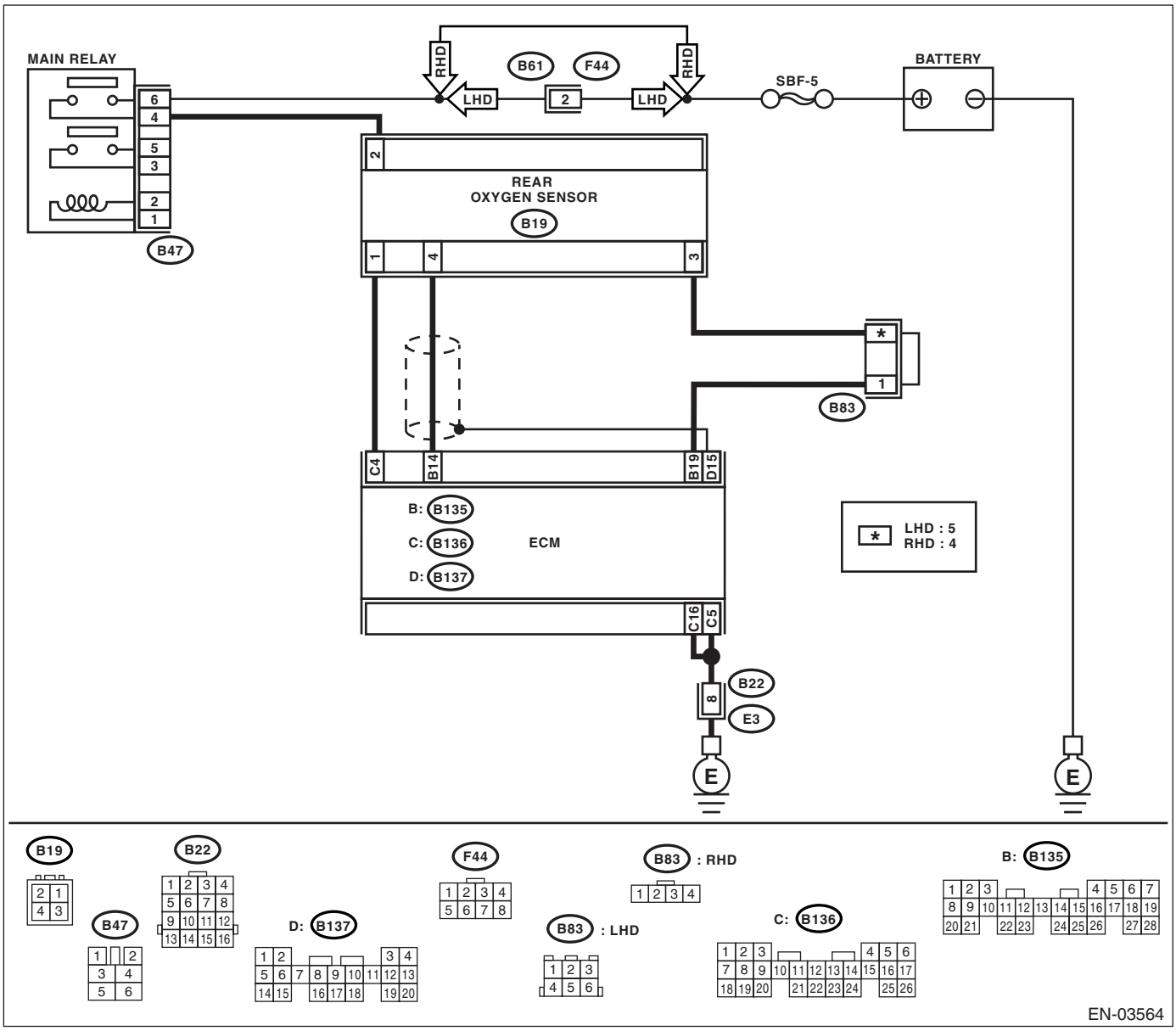
DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO)(diag)-44, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO)(diag)-37, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK INPUT SIGNAL FOR ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 4 (+) — Chassis ground (−):***	Is the voltage more than 8 V?	Go to step **2.**	Go to step **3.**
2	**CHECK CURRENT DATA.** 1) Turn the ignition switch to OFF. 2) Repair the battery short circuit in harness between ECM and rear oxygen sensor connector. 3) Turn the ignition switch to ON. 4) Read the data of rear oxygen sensor heater current using Subaru Select Monitor or the general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO)(diag)-30, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the General Scan Tool Instruction Manual.	Is the current more than 7 A?	Replace the ECM. <Ref. to FU(H4SO)-47, Engine Control Module (ECM).>	Finish the diagnosis.
3	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair poor contact in ECM connector.	Finish the diagnosis.

F: DTC P0066 AIR ASSISTED INJECTOR CONTROL CIRCUIT OR CIRCUIT LOW

DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

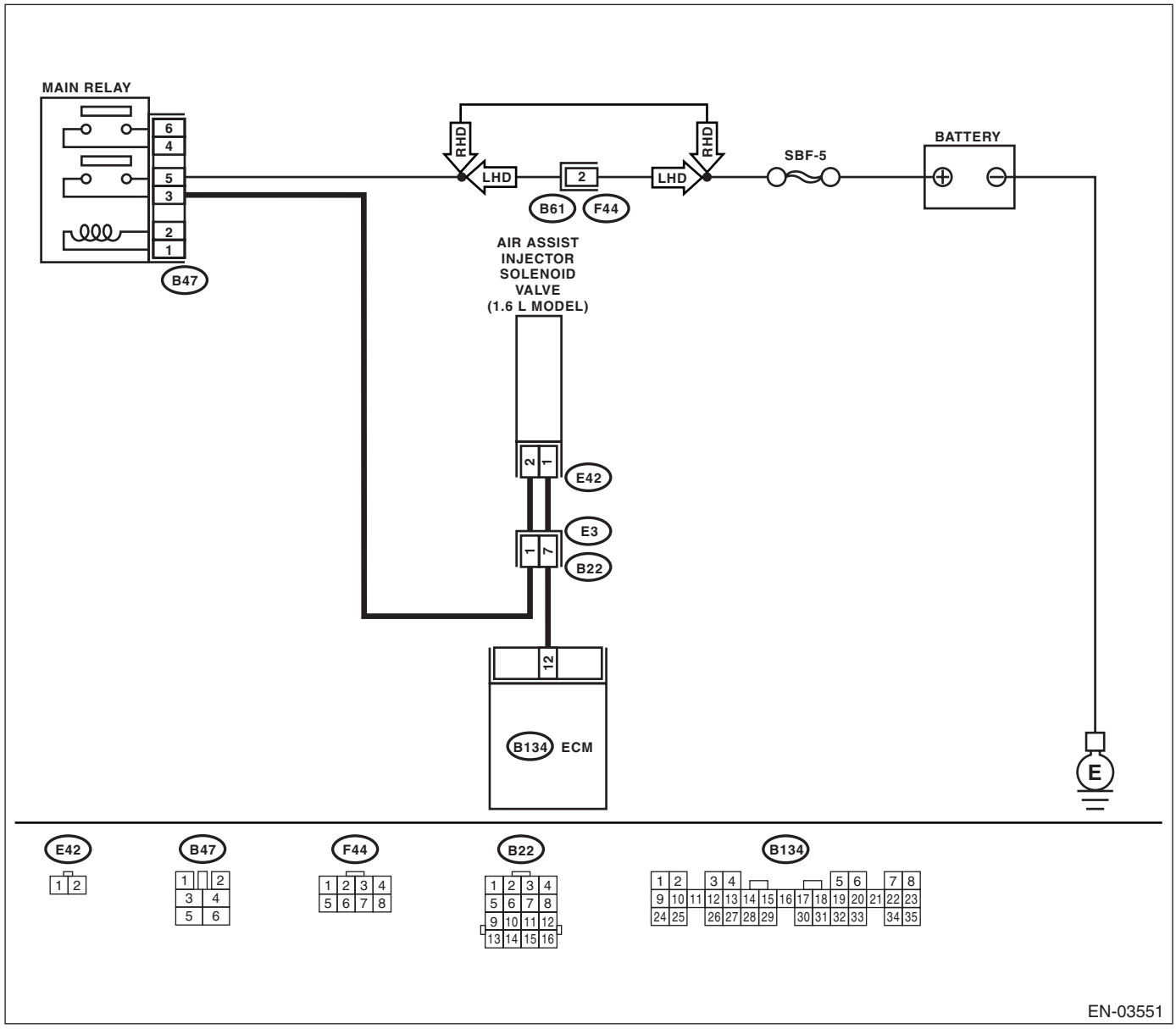
TROUBLE SYMPTOM:

- Erroneous idling
- Engine stalls

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO)(diag)-44, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO)(diag)-37, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn ignition switch to ON. 2) Measure voltage between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 12 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Repair poor contact in ECM connector.	Go to step **2.**
2	**CHECK POWER SUPPLY TO AIR ASSIST INJECTOR SOLENOID VALVE.** 1) Turn ignition switch to OFF. 2) Disconnect connector from air assist injector solenoid valve. 3) Turn ignition switch to ON. 4) Measure voltage between air assist injector solenoid valve and engine ground. ***Connector & terminal*** ***(E42) No. 2 (+) — Engine ground (−):***	Is the voltage more than 10 V?	Go to step **3.**	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between air assist injector solenoid valve and main relay connector • Poor contact in coupling connector
3	**CHECK HARNESS BETWEEN ECM AND AIR ASSIST INJECTOR SOLENOID VALVE CONNECTOR.** 1) Turn ignition switch to OFF. 2) Disconnect connector from ECM. 3) Measure resistance of harness between ECM and air assist injector solenoid valve connector. ***Connector & terminal*** ***(B134) No. 12— (E42) No. 1:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and air assist injector solenoid valve connector • Poor contact in coupling connector
4	**CHECK HARNESS BETWEEN ECM AND AIR ASSIST INJECTOR SOLENOID VALVE CONNECTOR.** Measure resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 12— Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **5.**	Repair ground short circuit in harness between ECM and air assist injector solenoid valve connector.
5	**CHECK POOR CONTACT.** Check poor contact in ECM and air assist injector solenoid valve connectors.	Is there poor contact in ECM and air assist injector solenoid valve connectors?	Repair poor contact in ECM and air assist injector solenoid valve connectors.	Replace air assist injector solenoid valve. <Ref. to FU(H4SO)-37, Air Assist Injector Solenoid Valve.>

G: DTC P0067 AIR ASSISTED INJECTOR CONTROL CIRCUIT HIGH

DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

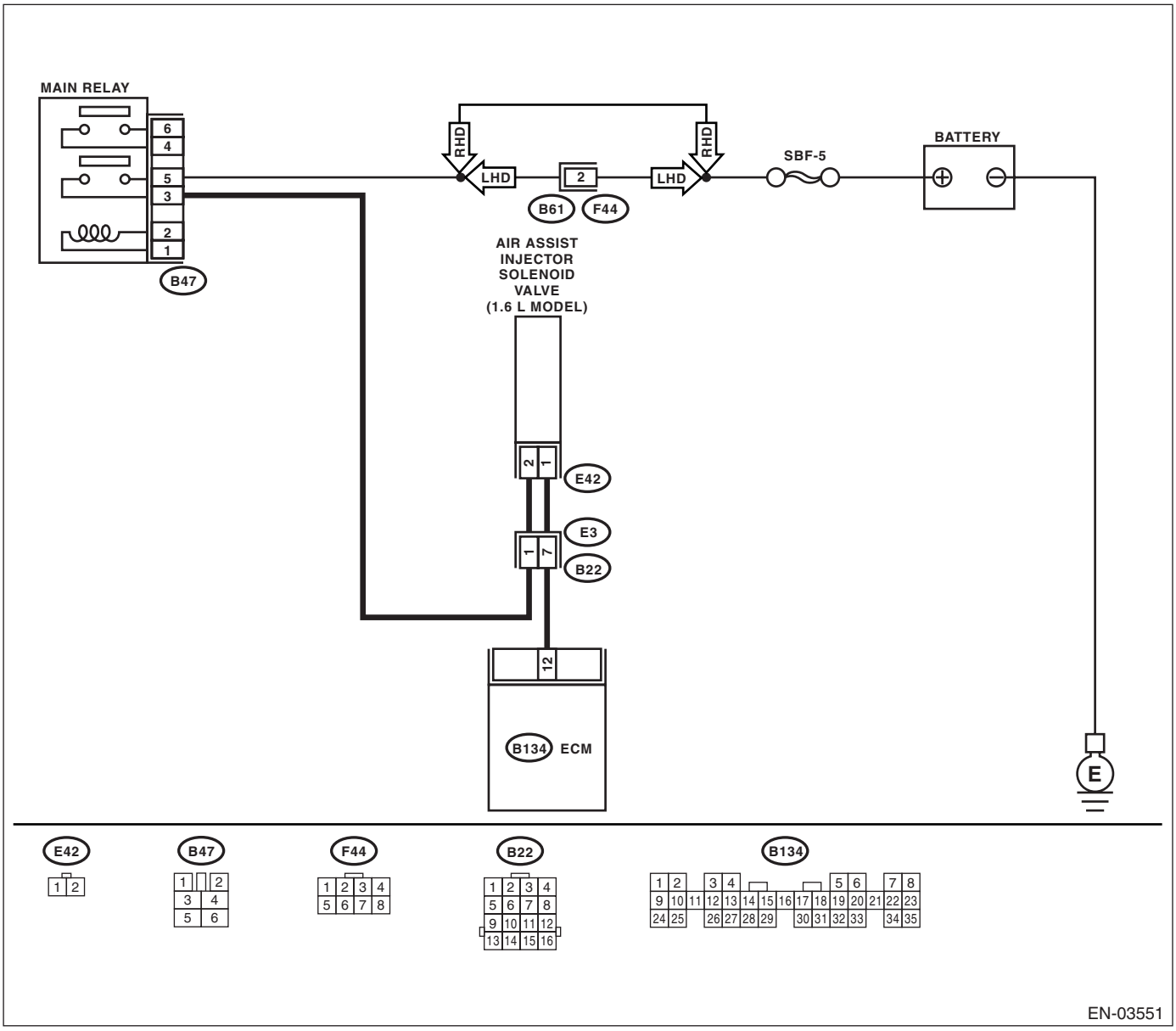
TROUBLE SYMPTOM:

- Erroneous idling
- Engine stalls

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO)(diag)-44, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO)(diag)-37, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn ignition switch to ON. 2) Measure voltage between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 12 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **2.**	Go to step **3.**
2	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn ignition switch to OFF. 2) Disconnect connector from air assist injector solenoid valve. 3) Turn ignition switch to ON. 4) Measure voltage between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 12 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Repair battery short circuit in harness between ECM and air assist injector solenoid valve connector. After repair, replace ECM. <Ref. to FU(H4SO)-47, Engine Control Module (ECM).>	Replace air assist injector solenoid valve <Ref. to FU(H4SO)-37, Air Assist Injector Solenoid Valve.> and ECM <Ref. to FU(H4SO)-47, Engine Control Module (ECM).>
3	**CHECK OUTPUT SIGNAL FROM ECM.** Measure voltage between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 12 (+) — Chassis ground (−):***	Does the voltage change by shaking the ECM harness and connector?	Repair battery short circuit in harness between ECM and air assist injector solenoid valve connector. After repair, replace ECM. <Ref. to FU(H4SO)-47, Engine Control Module (ECM).>	Contact with your Subaru distributor service.

H: DTC P0107 MANIFOLD ABSOLUTE PRESSURE/BAROMETRIC PRESSURE CIRCUIT LOW INPUT

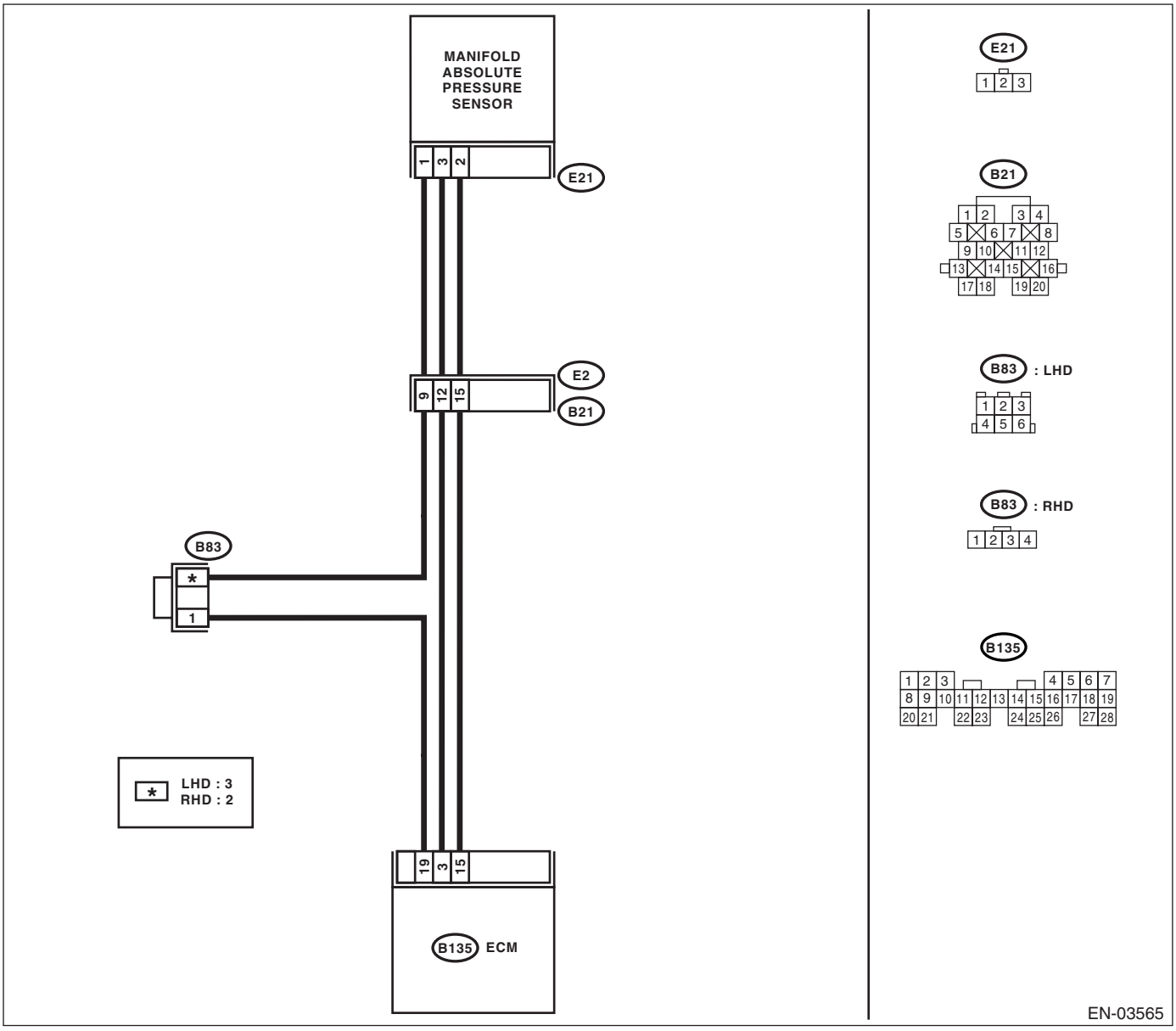
DTC DETECTING CONDITION:

Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO)(diag)-44, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO)(diag)-37, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of intake manifold absolute pressure signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO)(diag)-30, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the General Scan Tool Instruction Manual.	Is the measured value less than 13.3 kPa (100 mmHg, 3.94 inHg)?	Go to step **3.**	Go to step **2.**
2	**CHECK POOR CONTACT.** Check poor contact in ECM and manifold absolute pressure sensor connector.	Is there poor contact in ECM or manifold absolute pressure sensor connector?	Repair poor contact in ECM or manifold absolute pressure sensor connector.	Even if malfunction indicator light lights up, the circuit has returned to a normal condition at this time.
3	**CHECK OUTPUT SIGNAL FOR ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 3 (+) — Chassis ground (–):***	Is the voltage more than 4.5 V?	Go to step **5.**	Go to step **4.**
4	**CHECK OUTPUT SIGNAL FOR ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 3 (+) — Chassis ground (–):***	Does the voltage change by shaking the ECM harness and connector?	Repair poor contact in ECM connector.	Contact with SUBARU distributor service.
5	**CHECK INPUT SIGNAL FOR ECM.** Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 15 (+) — Chassis ground (–):***	Is the voltage less than 0.2 V?	Go to step **7.**	Go to step **6.**
6	**CHECK INPUT SIGNAL FOR ECM. (USING SUBARU SELECT MONITOR)** Read the data of atmospheric absolute pressure signal using Subaru Select Monitor. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO)(diag)-30, Subaru Select Monitor.>	Is the measured value more than 13.3 kPa (100 mmHg, 3.94 inHg) by shaking the harness and connector of ECM?	Repair poor contact in ECM connector.	Go to step **7.**
7	**CHECK HARNESS BETWEEN MANIFOLD ABSOLUTE PRESSURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from manifold absolute pressure sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between manifold absolute pressure sensor connector and engine ground. ***Connector & terminal*** ***(E21) No. 3 (+) — Engine ground (–):***	Is the voltage more than 4.5 V?	Go to step **8.**	Repair open circuit in harness between ECM and manifold absolute pressure sensor connector.

	Step	Check	Yes	No
8	**CHECK HARNESS BETWEEN MANIFOLD ABSOLUTE PRESSURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance of harness between ECM and manifold absolute pressure sensor connector. ***Connector & terminal*** ***(B135) No. 19 — (E21) No. 1:***	Is the resistance less than 1 Ω?	Go to step **9.**	Repair open circuit in harness between ECM and manifold absolute pressure sensor connector.
9	**CHECK POOR CONTACT.** Check poor contact in manifold absolute pressure sensor connector.	Is there poor contact in manifold absolute pressure sensor connector?	Repair poor contact in manifold absolute pressure sensor connector.	Replace the manifold absolute pressure sensor. <Ref. to FU(H4SO)-33, Manifold Absolute Pressure Sensor.>

I: DTC P0108 MANIFOLD ABSOLUTE PRESSURE/BAROMETRIC PRESSURE CIRCUIT HIGH INPUT

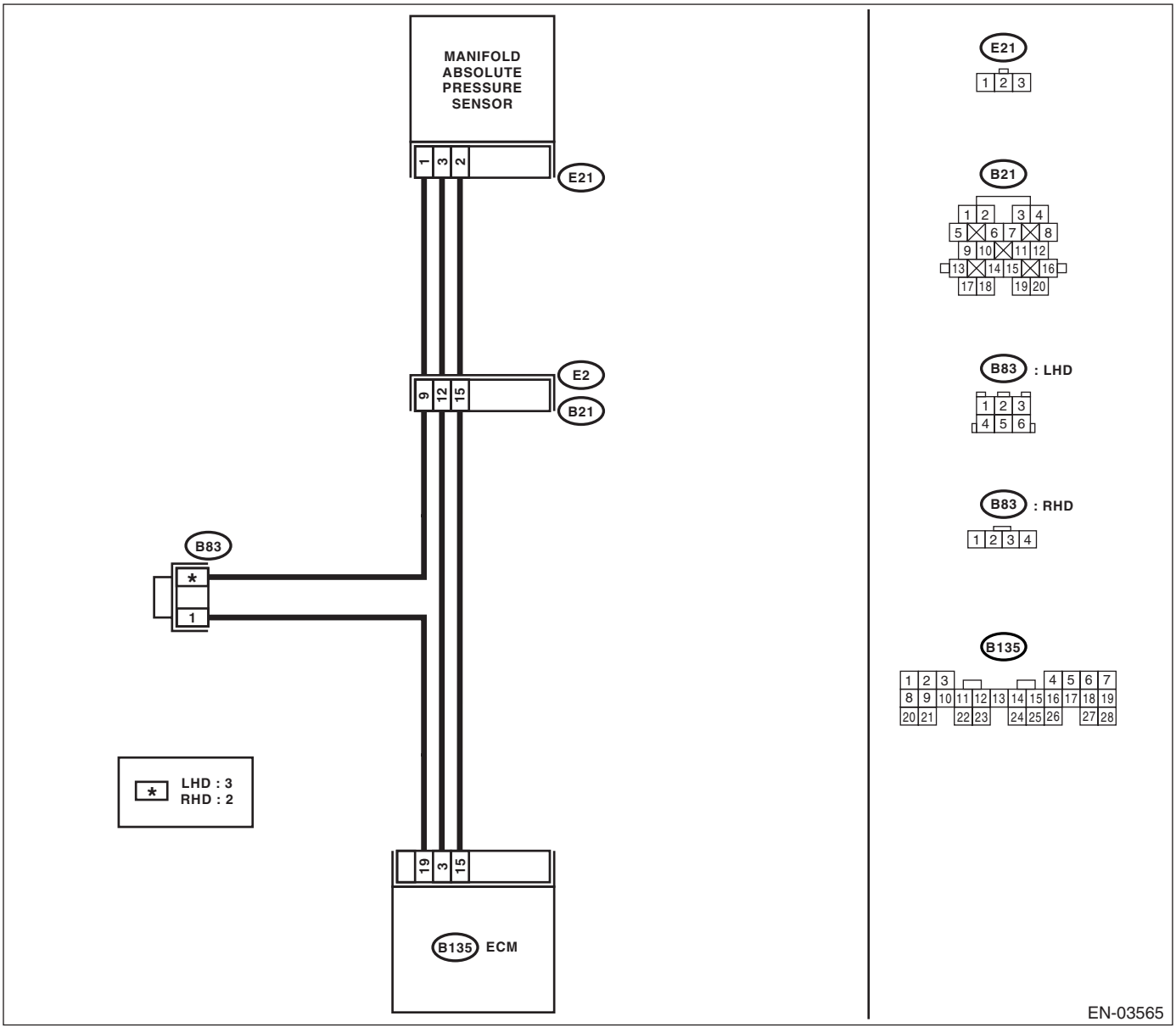
DTC DETECTING CONDITION:

Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO)(diag)-44, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO)(diag)-37, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of intake manifold absolute pressure signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO)(diag)-30, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the General Scan Tool Instruction Manual.	Is the measured value more than 119.5 kPa (896.5 mmHg, 35.29 inHg)?	Go to step **10.**	Go to step **2.**
2	**CHECK OUTPUT SIGNAL FOR ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 3 (+) — Chassis ground (–):***	Is the voltage more than 4.5 V?	Go to step **4.**	Go to step **3.**
3	**CHECK OUTPUT SIGNAL FOR ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 3 (+) — Chassis ground (–):***	Does the voltage change by shaking the ECM harness and connector?	Repair poor contact in ECM connector.	Contact with SUBARU distributor service.
4	**CHECK INPUT SIGNAL FOR ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 15 (+) — Chassis ground (–):***	Is the voltage less than 0.2 V?	Go to step **6.**	Go to step **5.**
5	**CHECK INPUT SIGNAL FOR ECM. (USING SUBARU SELECT MONITOR)** Read the data of atmospheric absolute pressure signal using Subaru Select Monitor. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO)(diag)-30, Subaru Select Monitor.>	Is the measured value more than 13.3 kPa (100 mmHg, 3.94 inHg) by shaking the harness and connector of ECM?	Repair poor contact in ECM connector.	Go to step **6.**
6	**CHECK HARNESS BETWEEN MANIFOLD ABSOLUTE PRESSURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from manifold absolute pressure sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between manifold absolute pressure sensor connector and engine ground. ***Connector & terminal*** ***(E21) No. 3 (+) — Engine ground (–):***	Is the voltage more than 4.5 V?	Go to step **7.**	Repair open circuit in harness between ECM and manifold absolute pressure sensor connector.

	Step	Check	Yes	No
7	**CHECK HARNESS BETWEEN MANIFOLD ABSOLUTE PRESSURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance of harness between ECM and manifold absolute pressure sensor connector. ***Connector & terminal*** ***(B135) No. 15 — (E21) No. 2:***	Is the resistance less than 1 Ω?	Go to step **8.**	Repair open circuit in harness between ECM and manifold absolute pressure sensor connector.
8	**CHECK HARNESS BETWEEN MANIFOLD ABSOLUTE PRESSURE SENSOR AND ECM CONNECTOR.** Measure the resistance of harness between ECM and manifold absolute pressure sensor connector. ***Connector & terminal*** ***(B135) No. 19 — (E21) No. 1:***	Is the resistance less than 1 Ω?	Go to step **9.**	Repair open circuit in harness between ECM and manifold absolute pressure sensor connector.
9	**CHECK POOR CONTACT.** Check poor contact in manifold absolute pressure sensor connector.	Is there poor contact in manifold absolute pressure sensor connector?	Repair poor contact in manifold absolute pressure sensor connector.	Replace the manifold absolute pressure sensor. <Ref. to FU(H4SO)-33, Manifold Absolute Pressure Sensor.>
10	**CHECK HARNESS BETWEEN MANIFOLD ABSOLUTE PRESSURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF and Subaru Select Monitor or the general scan tool switch to OFF. 2) Disconnect the connector from manifold absolute pressure sensor. 3) Turn the ignition switch to ON and Subaru Select Monitor or the general scan tool switch to ON. 4) Read the data of intake manifold absolute pressure signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO)(diag)-30, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the General Scan Tool Instruction Manual.	Is the measured value more than 119.5 kPa (896.5 mmHg, 35.29 inHg)?	Repair battery short circuit in harness between ECM and manifold absolute pressure sensor connector.	Replace the manifold absolute pressure sensor. <Ref. to FU(H4SO)-33, Manifold Absolute Pressure Sensor.>

J: DTC P0111 INTAKE AIR TEMPERATURE SENSOR 1 CIRCUIT RANGE/PERFORMANCE

DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

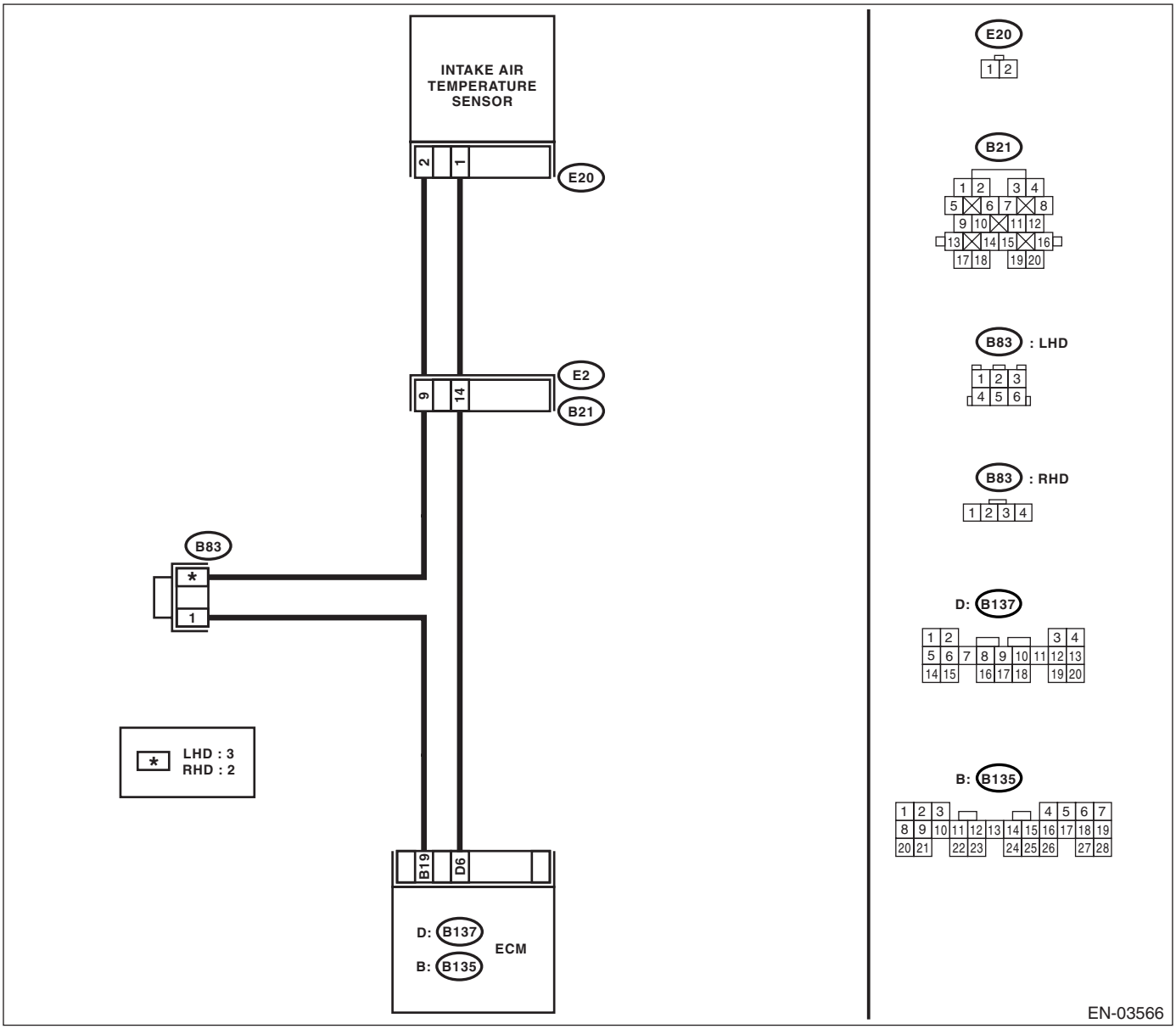
TROUBLE SYMPTOM:

- Erroneous idling
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO)(diag)-44, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO)(diag)-37, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect DTC using “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(H4SO)(diag)-70, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0111.	Go to step **2.**
2	**CHECK ENGINE COOLANT TEMPERATURE.** 1) Start the engine and warm it up completely. 2) Measure the engine coolant temperature using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to the “READ CURRENT DATA FOR ENGINE”. <Ref. to EN(H4SO)(diag)-30, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the General Scan Tool Instruction Manual.	Is the engine coolant temperature 75 — 95°C (167 — 203°F)?	Replace the intake air temperature sensor. <Ref. to FU(H4SO)-34, Intake Air Temperature Sensor.>	Inspect DTC P0125 using “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(H4SO)(diag)-70, List of Diagnostic Trouble Code (DTC).>

K: DTC P0112 INTAKE AIR TEMPERATURE SENSOR 1 CIRCUIT LOW

DTC DETECTING CONDITION:

Immediately at fault recognition

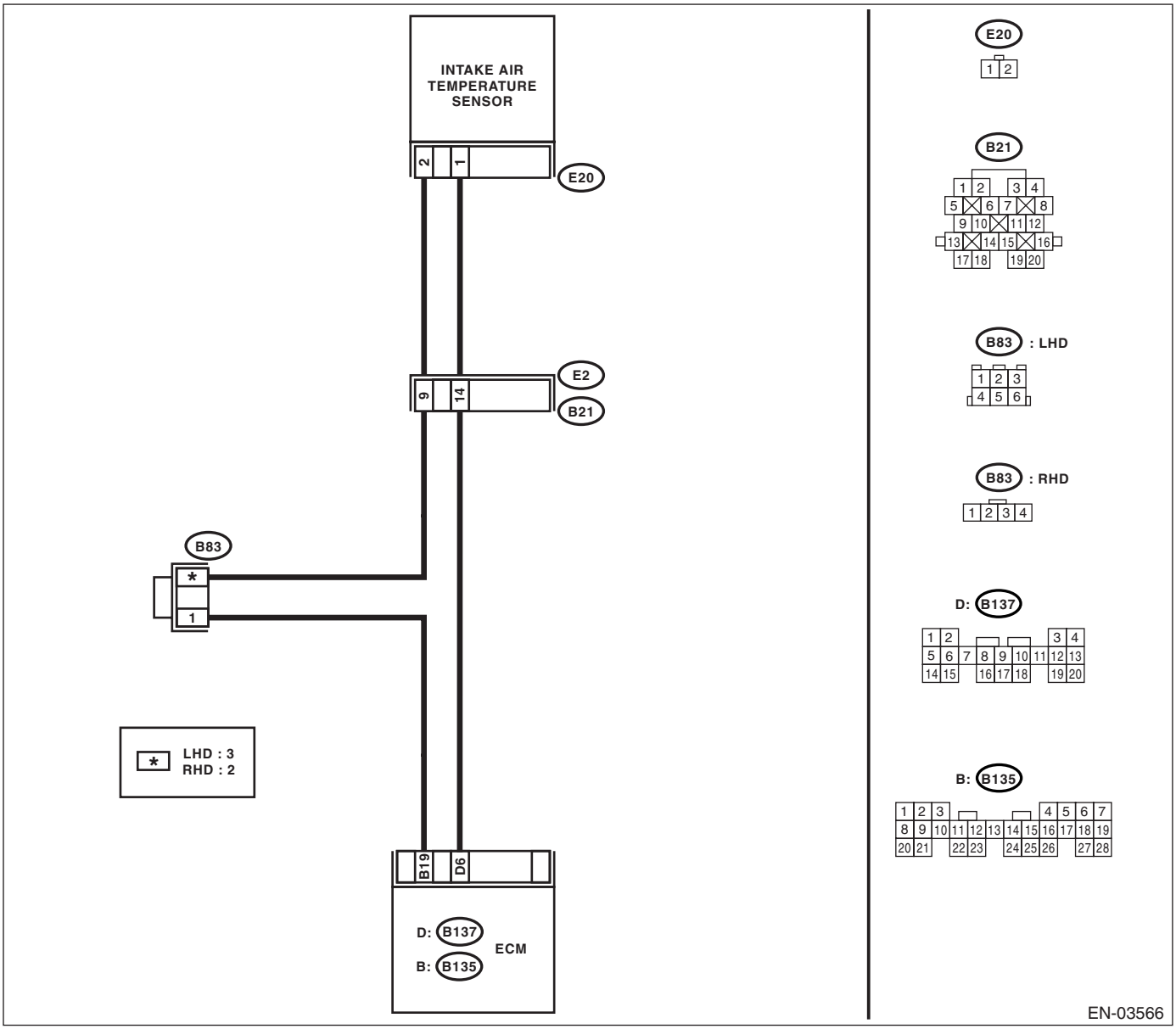
TROUBLE SYMPTOM:

- Erroneous idling
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO)(diag)-44, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO)(diag)-37, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of intake air temperature sensor signal using Subaru Select Monitor or the general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO)(diag)-30, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the General Scan Tool Instruction Manual.	Is the intake air temperature more than 120°C (248°F)?	Go to step **2.**	Repair poor contact. NOTE: In this case, repair the following: • Poor contact in intake air temperature sensor • Poor contact in ECM • Poor contact in coupling connector • Poor contact in joint connector
2	**CHECK HARNESS BETWEEN INTAKE AIR TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from intake air temperature sensor. 3) Turn the ignition switch to ON. 4) Read the data of intake air temperature sensor signal using Subaru Select Monitor or the general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO)(diag)-30, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the General Scan Tool Instruction Manual.	Is the intake air temperature less than −40°C (−40°F)?	Replace the intake air temperature sensor. <Ref. to FU(H4SO)-34, Intake Air Temperature Sensor.>	Repair ground short circuit in harness between intake air temperature sensor and ECM connector.

L: DTC P0113 INTAKE AIR TEMPERATURE SENSOR 1 CIRCUIT HIGH

DTC DETECTING CONDITION:

Immediately at fault recognition

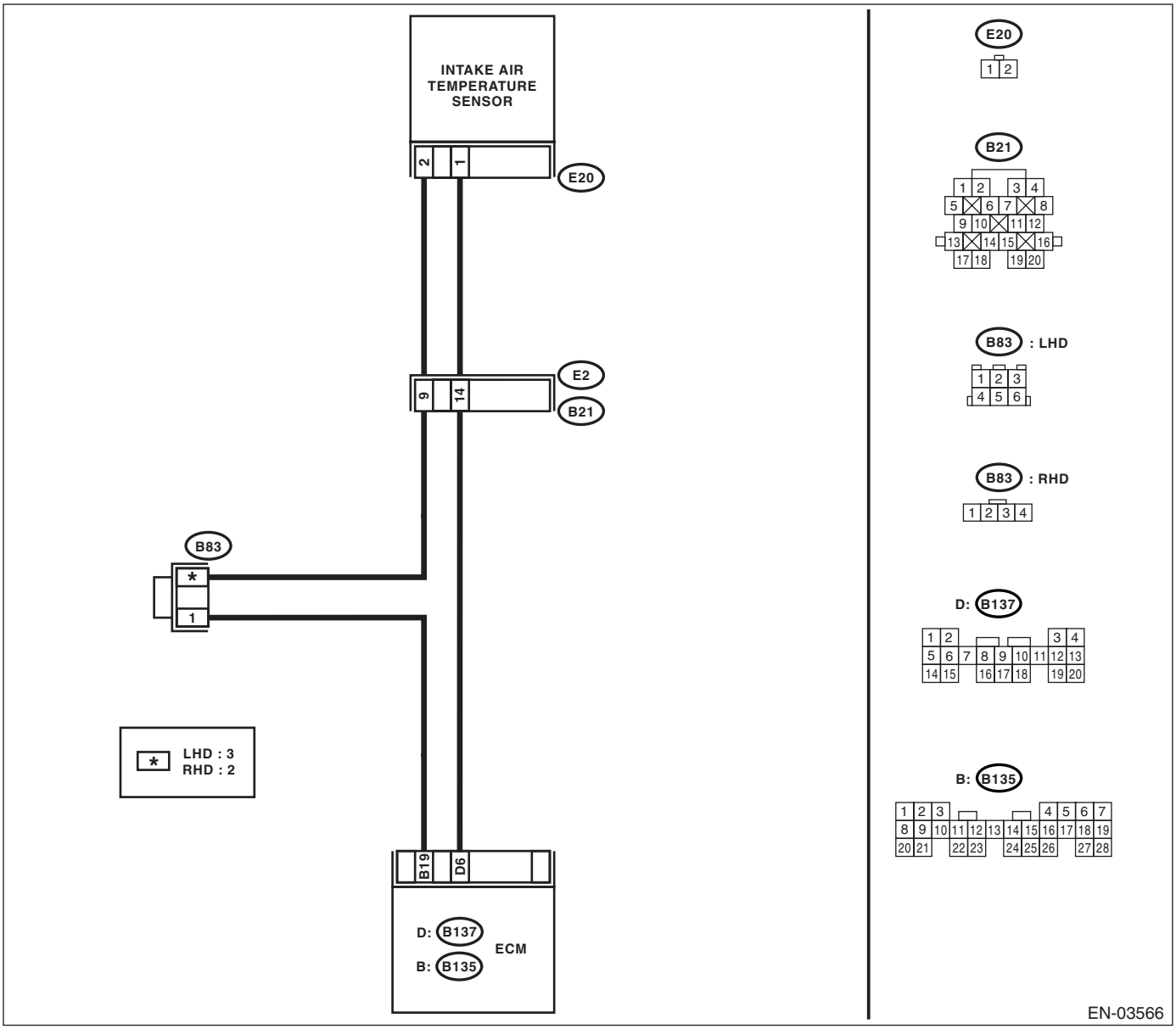
TROUBLE SYMPTOM:

- Erroneous idling
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO)(diag)-44, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO)(diag)-37, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of intake air temperature sensor signal using Subaru Select Monitor or the general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO)(diag)-30, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the General Scan Tool Instruction Manual.	Is the intake air temperature less than −40°C (−40°F)?	Go to step **2.**	Repair poor contact. NOTE: In this case, repair the following: • Poor contact in intake air temperature sensor • Poor contact in ECM • Poor contact in coupling connector • Poor contact in joint connector
2	**CHECK HARNESS BETWEEN INTAKE AIR TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from intake air temperature sensor. 3) Measure the voltage between intake air temperature and manifold absolute pressure sensor connector and engine ground. ***Connector & terminal*** ***(E20) No. 1 (+) — Engine ground (−):***	Is the voltage more than 10 V?	Repair battery short circuit in harness between intake air temperature sensor and ECM connector.	Go to step **3.**
3	**CHECK HARNESS BETWEEN INTAKE AIR TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to ON. 2) Measure the voltage between intake air temperature sensor connector and engine ground. ***Connector & terminal*** ***(E20) No. 1 (+) — Engine ground (−):***	Is the voltage more than 10 V?	Repair battery short circuit in harness between intake air temperature sensor and ECM connector.	Go to step **4.**
4	**CHECK HARNESS BETWEEN INTAKE AIR TEMPERATURE SENSOR AND ECM CONNECTOR.** Measure the voltage between intake air temperature sensor connector and engine ground. ***Connector & terminal*** ***(E20) No. 1 (+) — Engine ground (−):***	Is the voltage more than 3 V?	Go to step **5.**	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between intake air temperature sensor and ECM connector • Poor contact in intake air temperature sensor • Poor contact in ECM • Poor contact in coupling connector • Poor contact in joint connector

	Step	Check	Yes	No
5	**CHECK HARNESS BETWEEN INTAKE AIR TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance of harness between intake air temperature sensor connector and engine ground. ***Connector & terminal*** ***(E20) No. 2 — Engine ground:***	Is the resistance less than 5 Ω?	Replace the intake air temperature sensor. <Ref. to FU(H4SO)-34, Intake Air Temperature Sensor.>	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between intake air temperature sensor and ECM connector • Poor contact in intake air temperature sensor • Poor contact in ECM • Poor contact in coupling connector • Poor contact in joint connector

M: DTC P0117 ENGINE COOLANT TEMPERATURE CIRCUIT LOW

DTC DETECTING CONDITION:

Immediately at fault recognition

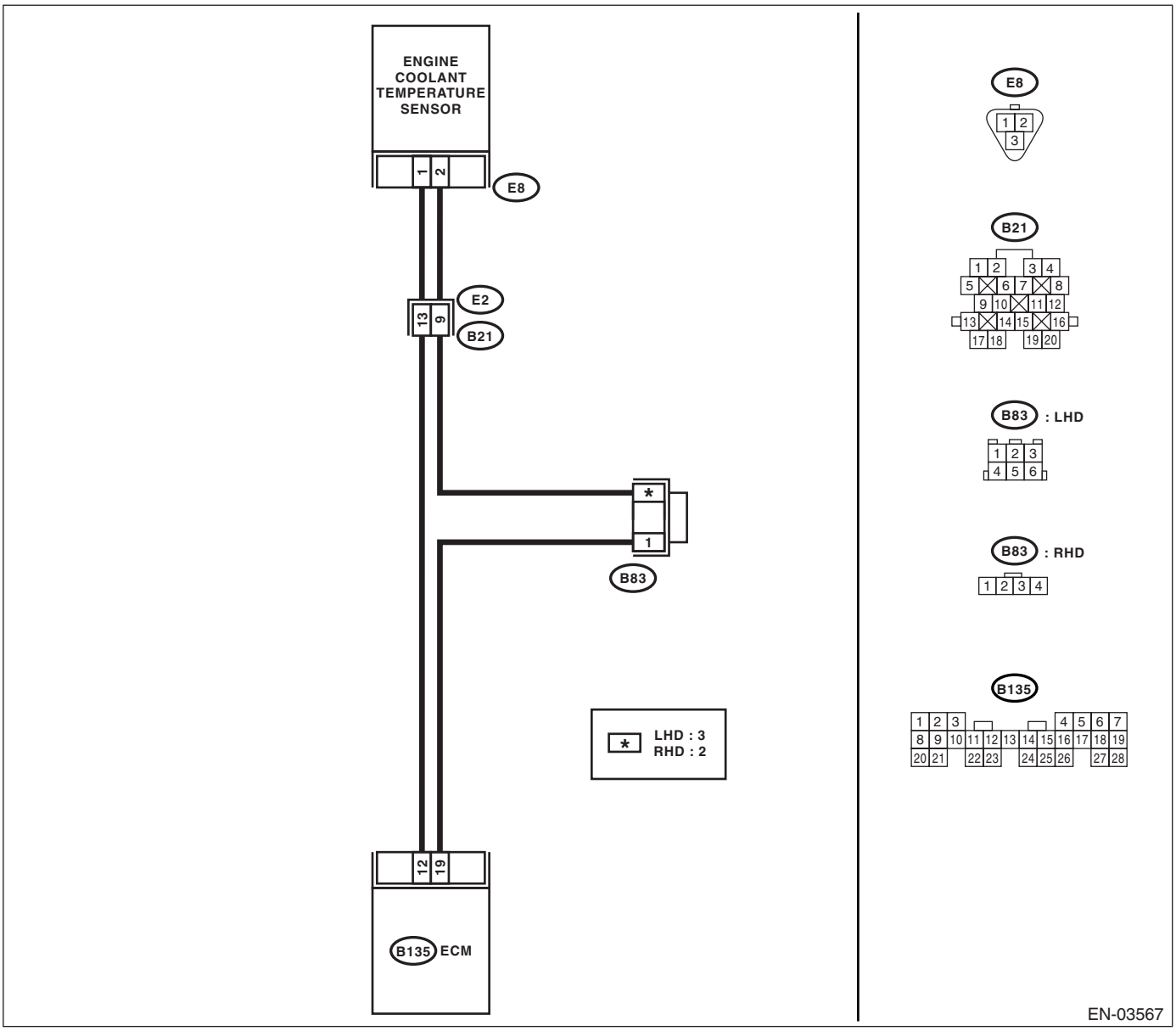
TROUBLE SYMPTOM:

- Hard to start
- Erroneous idling
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO)(diag)-44, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO)(diag)-37, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of engine coolant temperature sensor signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO)(diag)-30, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the General Scan Tool Instruction Manual.	Is the engine coolant temperature more than 150°C (302°F)?	Go to step **2.**	Repair poor contact. NOTE: In this case, repair the following: • Poor contact in engine coolant temperature sensor • Poor contact in ECM • Poor contact in coupling connector • Poor contact in joint connector
2	**CHECK HARNESS BETWEEN ENGINE COOLANT TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from engine coolant temperature sensor. 3) Turn the ignition switch to ON. 4) Read the data of engine coolant temperature sensor signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO)(diag)-30, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the General Scan Tool Instruction Manual.	Is the engine coolant temperature less than −40°C (−40°F)?	Replace the engine coolant temperature sensor. <Ref. to FU(H4SO)-27, Engine Coolant Temperature Sensor.>	Repair ground short circuit in harness between engine coolant temperature sensor and ECM connector.

N: DTC P0118 ENGINE COOLANT TEMPERATURE CIRCUIT HIGH

DTC DETECTING CONDITION:

Immediately at fault recognition

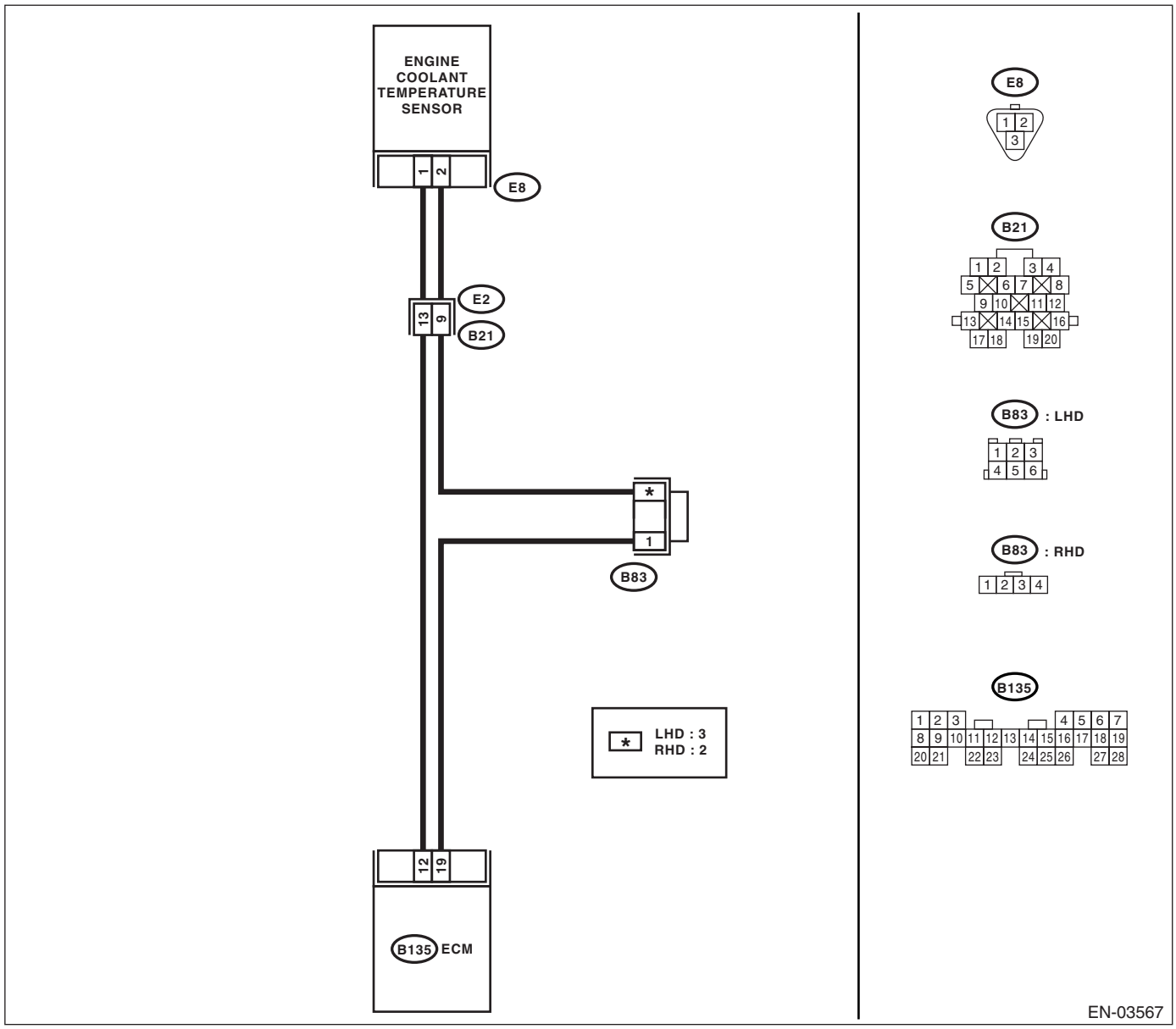
TROUBLE SYMPTOM:

- Hard to start
- Erroneous idling
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO)(diag)-44, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO)(diag)-37, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of engine coolant temperature sensor signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO)(diag)-30, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the General Scan Tool Instruction Manual.	Is the engine coolant temperature less than −40°C (−40°F)?	Go to step **2.**	Repair poor contact. NOTE: In this case, repair the following: • Poor contact in engine coolant temperature sensor • Poor contact in ECM • Poor contact in coupling connector • Poor contact in joint connector
2	**CHECK HARNESS BETWEEN ENGINE COOLANT TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from engine coolant temperature sensor. 3) Measure the voltage between engine coolant temperature sensor connector and engine ground. ***Connector & terminal*** ***(E8) No. 1 (+) — Engine ground (−):***	Is the voltage more than 10 V?	Repair battery short circuit in harness between ECM and engine coolant temperature sensor connector.	Go to step **3.**
3	**CHECK HARNESS BETWEEN ENGINE COOLANT TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to ON. 2) Measure the voltage between engine coolant temperature sensor connector and engine ground. ***Connector & terminal*** ***(E8) No. 1 (+) — Engine ground (−):***	Is the voltage more than 10 V?	Repair battery short circuit in harness between ECM and engine coolant temperature sensor connector.	Go to step **4.**
4	**CHECK HARNESS BETWEEN ENGINE COOLANT TEMPERATURE SENSOR AND ECM CONNECTOR.** Measure the voltage between engine coolant temperature sensor connector and engine ground. ***Connector & terminal*** ***(E8) No. 1 (+) — Engine ground (−):***	Is the voltage more than 4 V?	Go to step **5.**	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and engine coolant temperature sensor connector • Poor contact in engine coolant temperature sensor connector • Poor contact in ECM connector • Poor contact in coupling connector • Poor contact in joint connector

	Step	Check	Yes	No
5	**CHECK HARNESS BETWEEN ENGINE COOLANT TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance of harness between engine coolant temperature sensor connector and engine ground. ***Connector & terminal*** ***(E8) No. 2 — Engine ground:***	Is the resistance less than 5 Ω?	Replace the engine coolant temperature sensor. <Ref. to FU(H4SO)-27, Engine Coolant Temperature Sensor.>	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and engine coolant temperature sensor connector • Poor contact in engine coolant temperature sensor connector • Poor contact in ECM connector • Poor contact in coupling connector • Poor contact in joint connector

O: DTC P0121 THROTTLE/PEDAL POSITION SENSOR/SWITCH "A" CIRCUIT RANGE/PERFORMANCE

DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

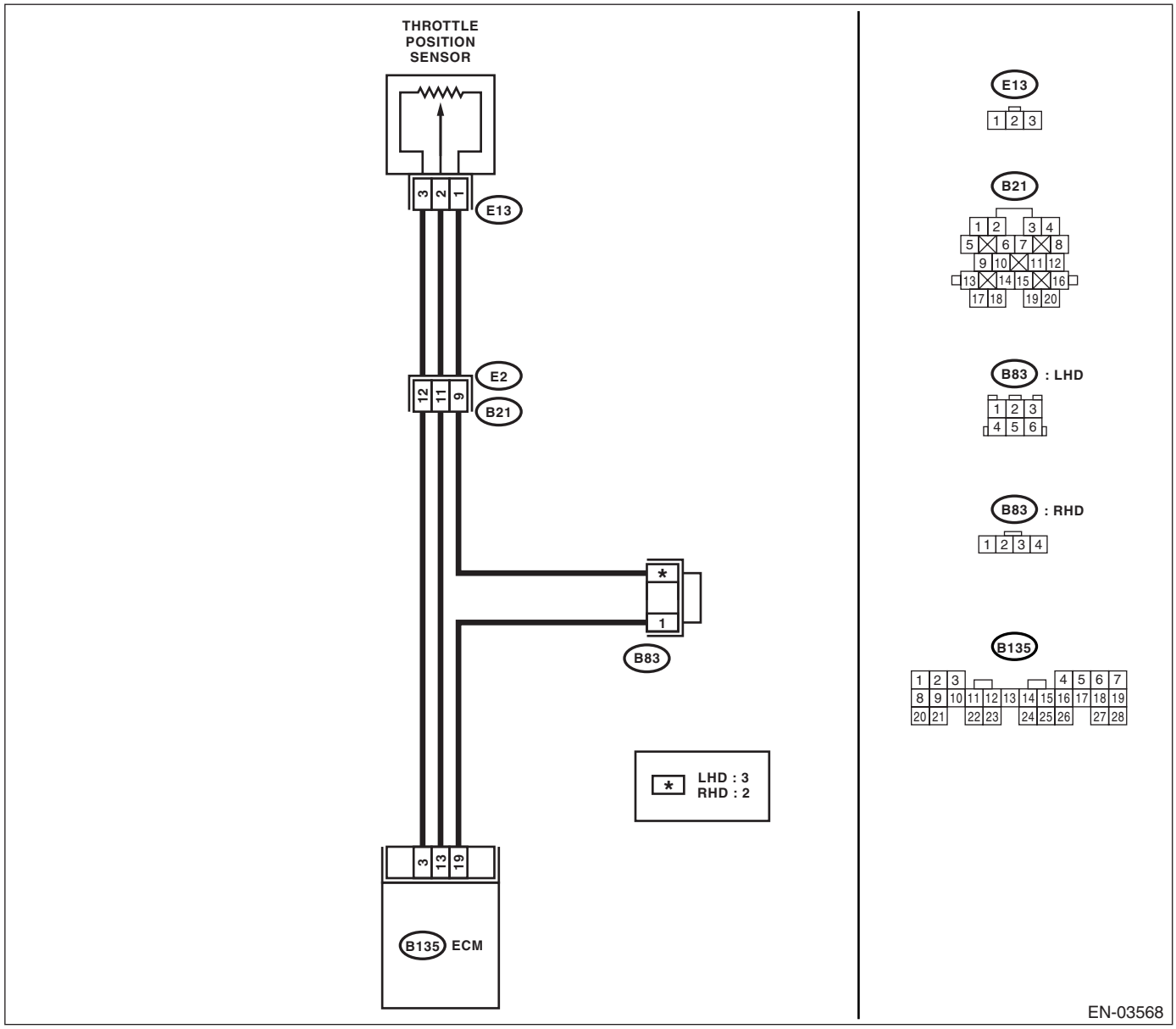
TROUBLE SYMPTOM:

- Erroneous idling
- Engine stalls.
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO)(diag)-44, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO)(diag)-37, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



Step		Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect DTC P0122 or P0123 using “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(H4SO)(diag)-70, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0121.	Replace the throttle position sensor. <Ref. to FU(H4SO)-31, Throttle Position Sensor.>

P: DTC P0122 THROTTLE/PEDAL POSITION SENSOR/SWITCH "A" CIRCUIT LOW

DTC DETECTING CONDITION:

Immediately at fault recognition

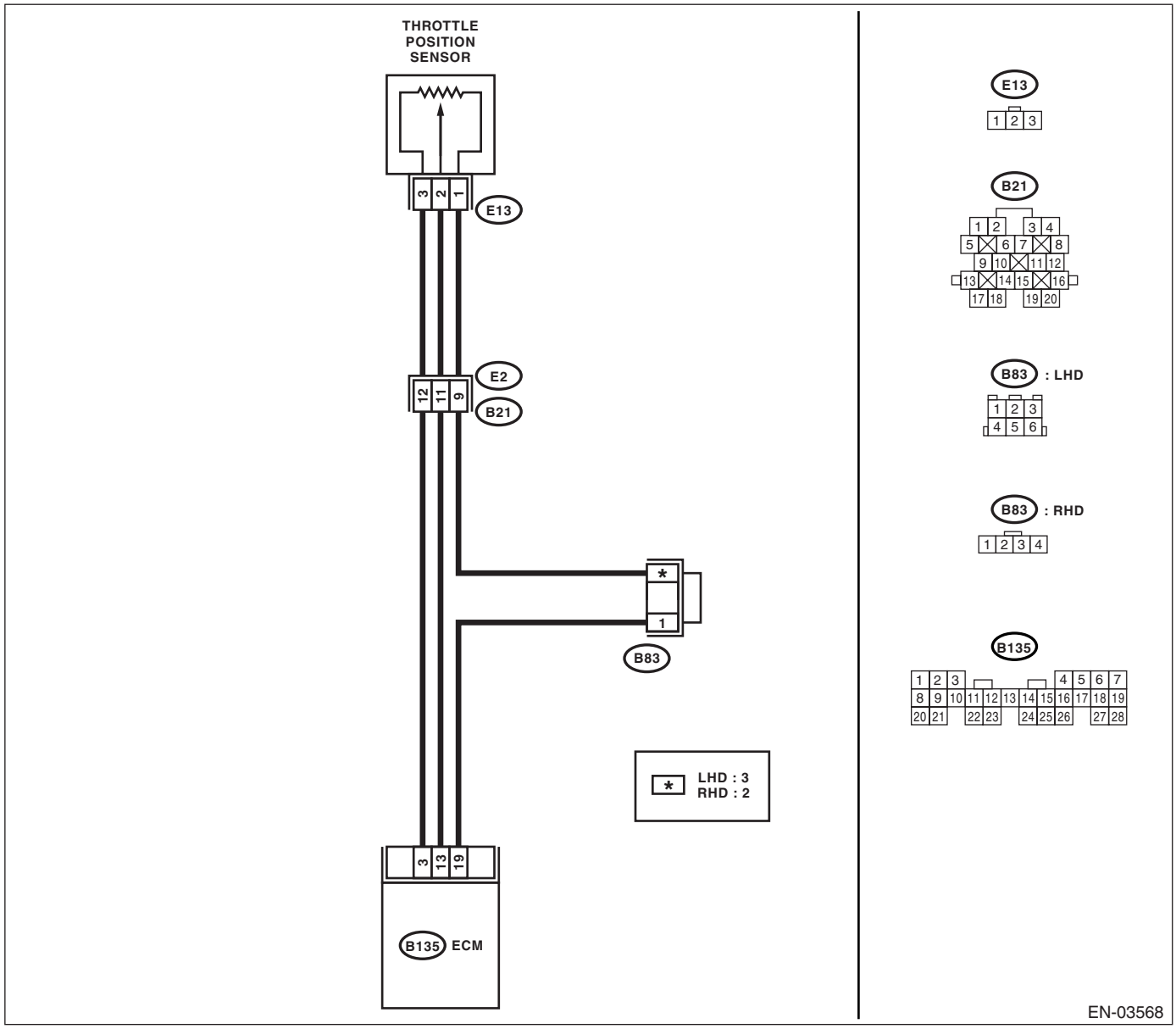
TROUBLE SYMPTOM:

- Erroneous idling
- Engine stalls.
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO)(diag)-44, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO)(diag)-37, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of throttle position sensor signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO)(diag)-30, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the General Scan Tool Instruction Manual.	Is the voltage less than 0.1 V?	Go to step **2.**	Even if malfunction indicator light lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector may be the cause. NOTE: In this case, repair the following: • Poor contact in throttle position sensor connector • Poor contact in ECM connector • Poor contact in coupling connector
2	**CHECK OUTPUT SIGNAL FOR ECM.** Measure the voltage between ECM connector and chassis ground while throttle valve is fully closed. ***Connector & terminal*** ***(B135) No. 3 (+) — Chassis ground (−):***	Is the voltage more than 4.5 V?	Go to step **4.**	Go to step **3.**
3	**CHECK OUTPUT SIGNAL FOR ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 3 (+) — Chassis ground (−):***	Does the voltage change by shaking the ECM harness and connector?	Repair poor contact in ECM connector.	Contact with SUBARU distributor service.
4	**CHECK INPUT SIGNAL FOR ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 13 (+) — Chassis ground (−):***	Is the voltage less than 0.1 V?	Go to step **6.**	Go to step **5.**
5	**CHECK INPUT SIGNAL FOR ECM. (USING SUBARU SELECT MONITOR.)** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 13 (+) — Chassis ground (−):***	Does the voltage change by shaking the ECM harness and connector?	Repair poor contact in ECM connector.	Go to step **6.**

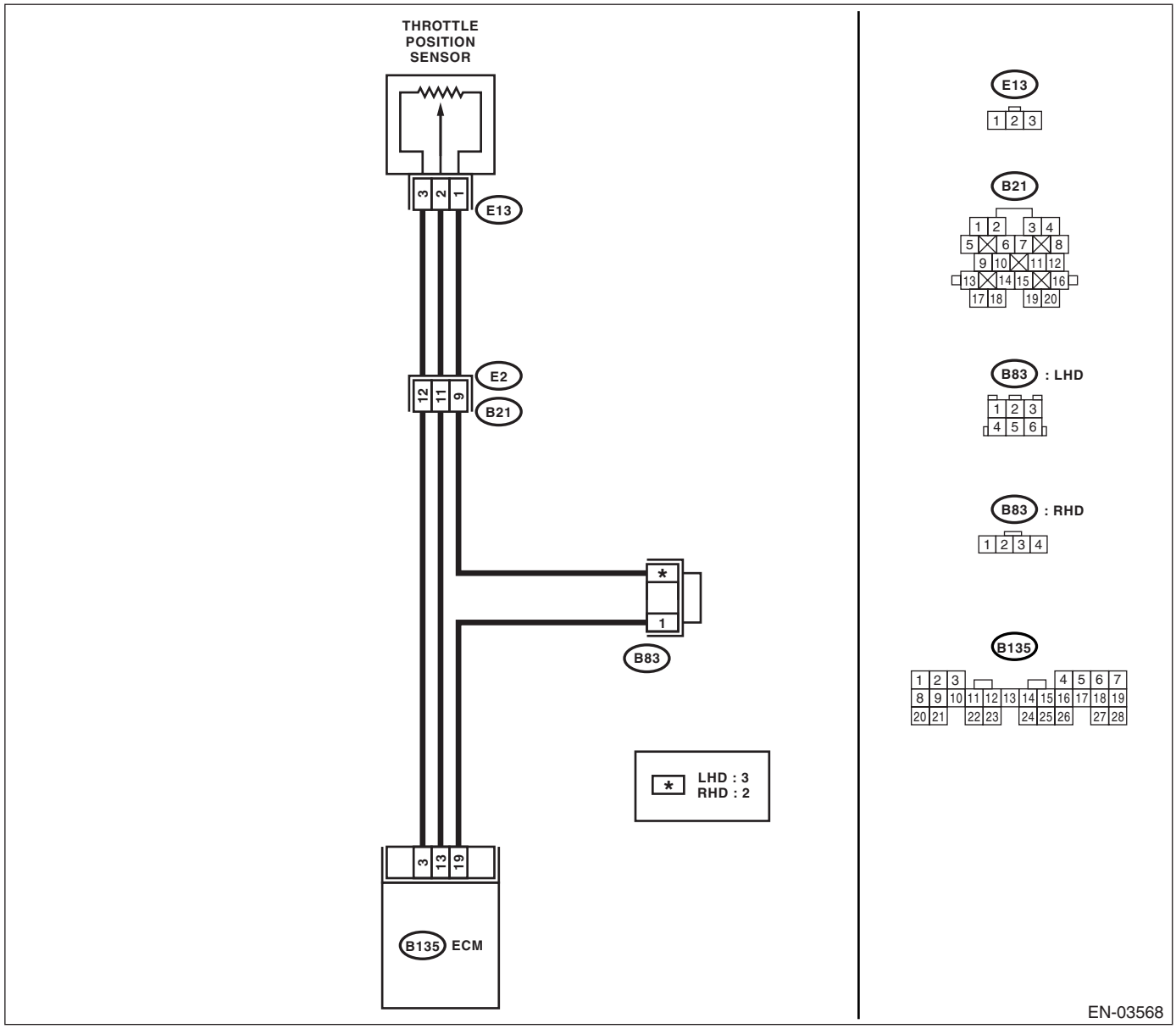
	Step	Check	Yes	No
6	**CHECK HARNESS BETWEEN ECM AND THROTTLE POSITION SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from throttle position sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between throttle position sensor connector and engine ground. ***Connector & terminal*** ***(E13) No. 3 (+) — Engine ground (−):***	Is the voltage more than 4.5 V?	Go to step **7.**	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between throttle position sensor and ECM connector • Poor contact in throttle position sensor connector • Poor contact in ECM connector • Poor contact in coupling connector • Poor contact in joint connector
7	**CHECK HARNESS BETWEEN ECM AND THROTTLE POSITION SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance of harness between ECM connector and throttle position sensor connector. ***Connector & terminal*** ***(B135) No. 13 — (E13) No. 2:***	Is the resistance less than 1 Ω?	Go to step **8.**	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between throttle position sensor and ECM connector • Poor contact in ECM connector • Poor contact in throttle position sensor connector • Poor contact in coupling connector
8	**CHECK HARNESS BETWEEN ECM AND THROTTLE POSITION SENSOR CONNECTOR.** Measure the resistance of harness between throttle position sensor connector and engine ground. ***Connector & terminal*** ***(E13) No. 2 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **9.**	Repair ground short circuit in harness between throttle position sensor and ECM connector.
9	**CHECK POOR CONTACT.** Check poor contact in throttle position sensor connector.	Is there poor contact in throttle position sensor connector?	Repair poor contact in throttle position sensor connector.	Replace the throttle position sensor. <Ref. to FU(H4SO)-31, Throttle Position Sensor.>

Q: DTC P0123 THROTTLE/PEDAL POSITION SENSOR/SWITCH "A" CIRCUIT HIGH

DTC DETECTING CONDITION:
Immediately at fault recognition
TROUBLE SYMPTOM:

- Erroneous idling
- Engine stalls.
- Poor driving performance

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO)(diag)-44, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO)(diag)-37, PROCEDURE, Inspection Mode.>.
WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of throttle position sensor signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO)(diag)-30, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the General Scan Tool Instruction Manual.	Is the voltage more than 4.9 V?	Go to step **2.**	Even if malfunction indicator light lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector may be the cause. NOTE: In this case, repair the following: • Poor contact in throttle position sensor connector • Poor contact in ECM connector • Poor contact in coupling connector
2	**CHECK HARNESS BETWEEN THROTTLE POSITION SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from throttle position sensor. 3) Measure the resistance of harness between throttle position sensor connector and engine ground. ***Connector & terminal*** ***(E13) No. 1 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **3.**	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between throttle position sensor and ECM connector • Poor contact in coupling connector • Poor contact in joint connector
3	**CHECK HARNESS BETWEEN THROTTLE POSITION SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to ON. 2) Measure the voltage between throttle position sensor connector and engine ground. ***Connector & terminal*** ***(E13) No. 2 (+) — Engine ground (−):***	Is the voltage more than 4.9 V?	Repair battery short circuit in harness between throttle position sensor and ECM connector. After repair, replace the ECM. <Ref. to FU(H4SO)-47, Engine Control Module (ECM).>	Replace the throttle position sensor. <Ref. to FU(H4SO)-31, Throttle Position Sensor.>

R: DTC P0125 INSUFFICIENT COOLANT TEMPERATURE FOR CLOSED LOOP FUEL CONTROL

DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

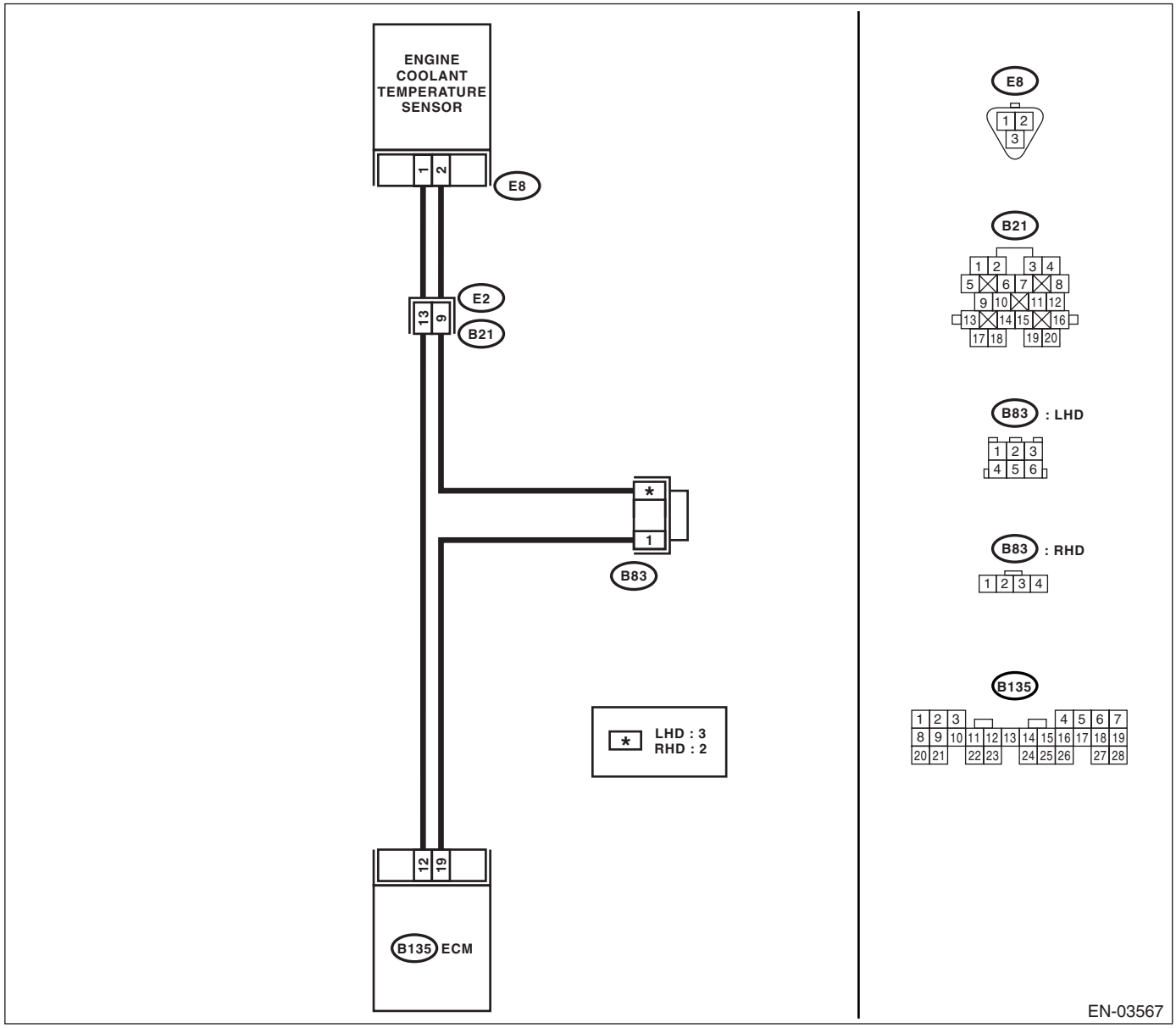
TROUBLE SYMPTOM:

Engine would not return to idling.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO)(diag)-44, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO)(diag)-37, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



Step		Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4SO)(diag)-70, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0125.	Go to step **2.**
2	**CHECK THERMOSTAT.**	Does the thermostat remain opened?	Replace the thermostat. <Ref. to CO(H4SO)-20, Thermostat.>	Replace the engine coolant temperature sensor. <Ref. to FU(H4SO)-27, Engine Coolant Temperature Sensor.>

S: DTC P0130 O2 SENSOR CIRCUIT (BANK 1 SENSOR 1)

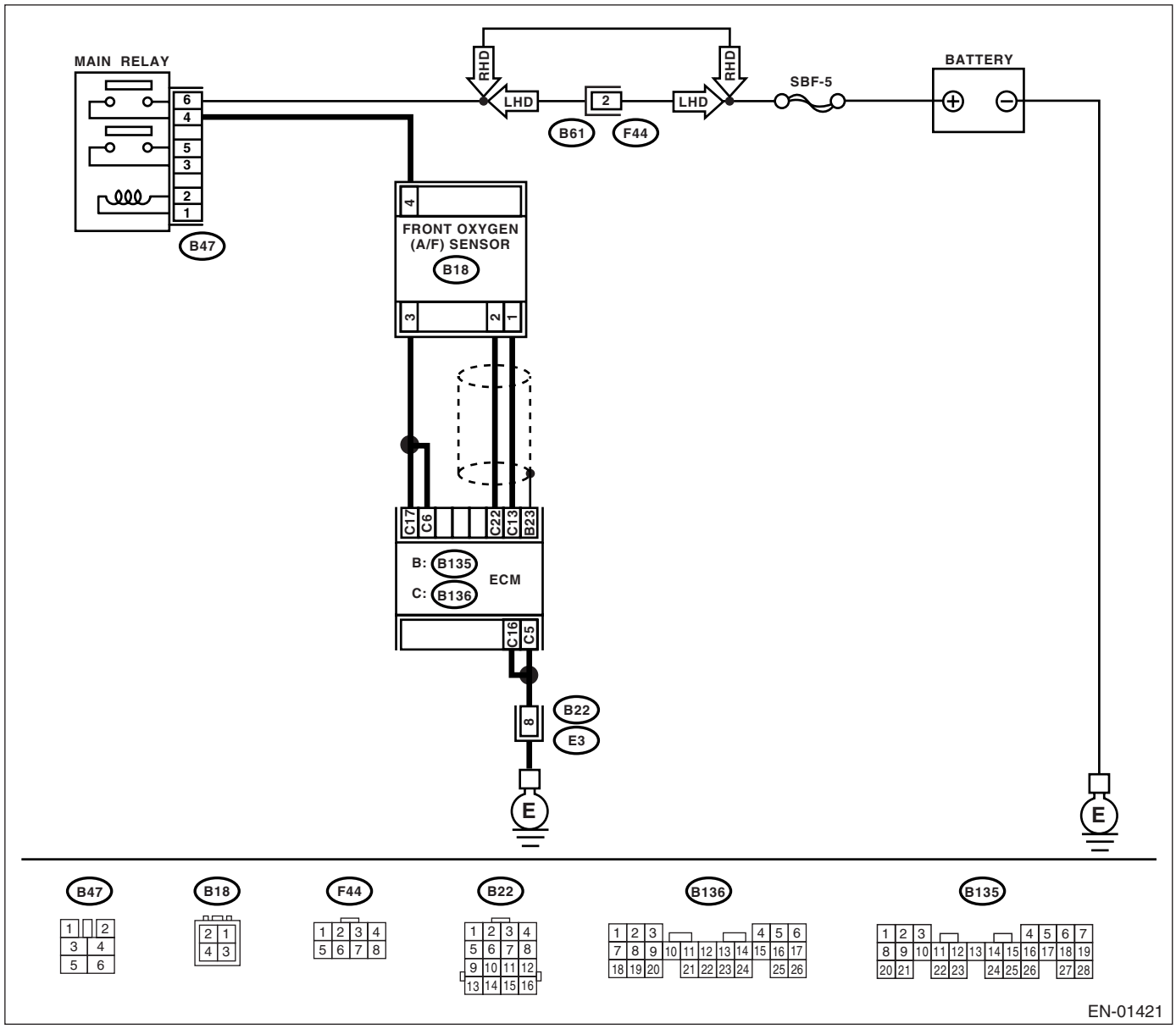
DTC DETECTING CONDITION:

Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO)(diag)-44, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO)(diag)-37, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4SO)(diag)-70, List of Diagnostic Trouble Code (DTC).>	Go to step **2.**
2	**CHECK FRONT OXYGEN (A/F) SENSOR DATA.** 1) Start the engine. 2) While observing the Subaru Select Monitor or general scan tool screen, warm-up the engine until coolant temperature is above 70°C (160°F). If the engine is already warmed-up, operate at idle speed for at least 1 minute. 3) Read the data of front oxygen (A/F) sensor signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO)(diag)-30, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the General Scan Tool Instruction Manual.	Is the voltage 0.85 — 1.15 V?	Go to step **3.**	Go to step **4.**
3	**CHECK FRONT OXYGEN (A/F) SENSOR DATA.** 1) Race the engine at speeds from idling to 5,000 rpm for a total of 5 cycles. 2) Read the data of front oxygen (A/F) sensor signal during racing using Subaru Select Monitor or general scan tool. NOTE: • Air fuel ratio is rich at normal condition or during racing. • To increase engine speed to 5,000 rpm, slowly depress accelerator pedal, taking approximately 5 seconds, and quickly release accelerator pedal to decrease engine speed.	Is the voltage more than 1.1 V?	Go to step **6.**	Go to step **4.**
4	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM and front oxygen (A/F) sensor connector. 3) Measure the resistance between ECM and front oxygen (A/F) sensor. ***Connector & terminals*** ***(B136) No. 13 — (B18) No. 1:*** ***(B136) No. 22 — (B18) No. 2:***	Is the resistance less than 5 Ω?	Go to step **5.**	Repair open circuit between ECM and front oxygen (A/F) sensor.
5	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR.** Measure the resistance between ECM and chassis ground. ***Connector & terminals*** ***(B136) No. 13 — Chassis ground:*** ***(B136) No. 22 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **6.**	Repair ground short circuit between ECM and front oxygen (A/F) sensor.

	Step	Check	Yes	No
6	**CHECK EXHAUST SYSTEM.** Check exhaust system parts. NOTE: Check the following items. • Loose installation of portions • Damage (crack, hole etc.) of parts • Looseness of front oxygen (A/F) sensor • Looseness and ill fitting of parts between front oxygen (A/F) sensor and rear oxygen sensor	Is there a fault in exhaust system?	Repair or replace faulty parts.	Replace the front oxygen (A/F) sensor. <Ref. to FU(H4SO)-43, Front Oxygen (A/F) Sensor.>

T: DTC P0131 O2 SENSOR CIRCUIT LOW VOLTAGE (BANK 1 SENSOR 1)

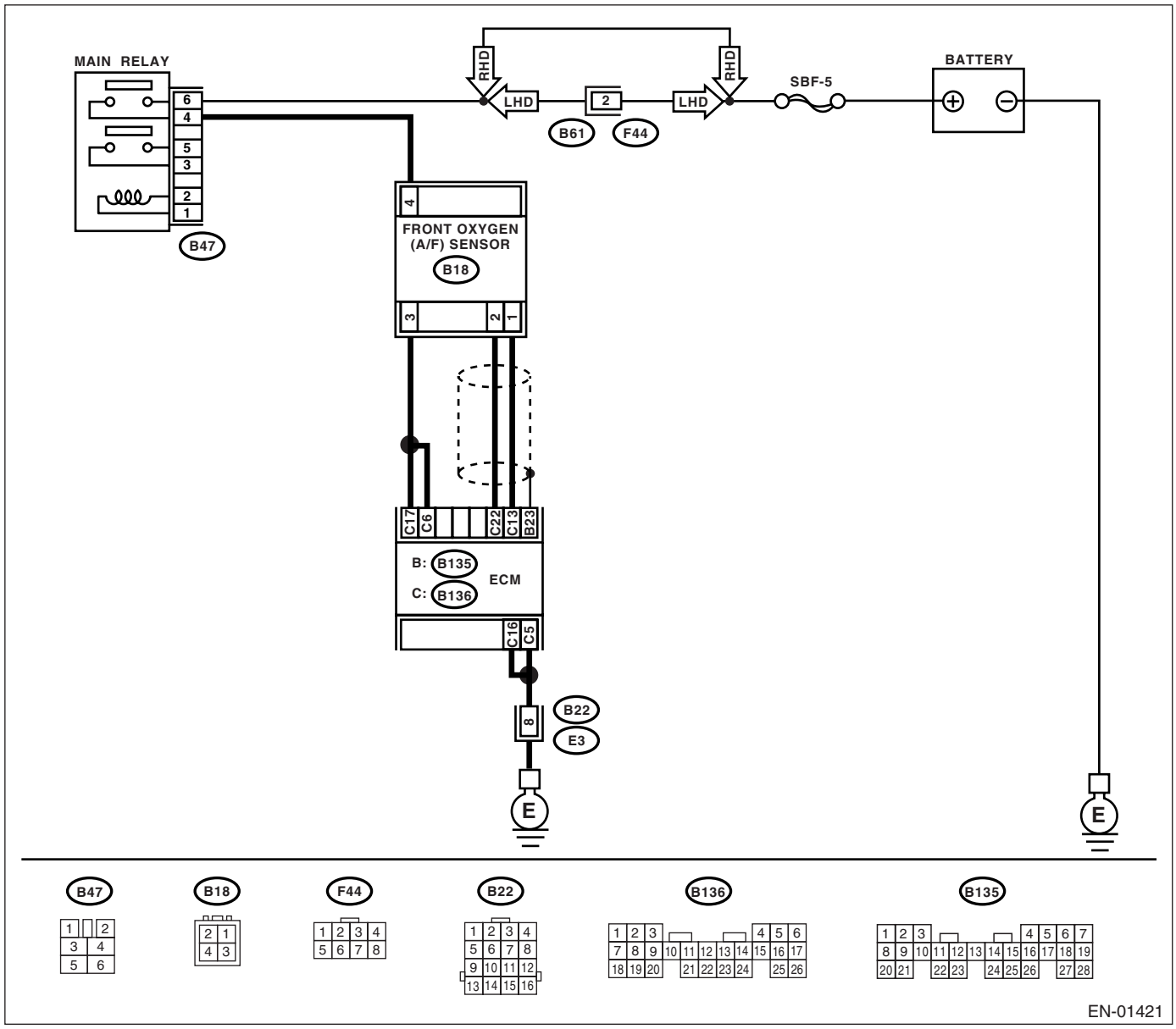
DTC DETECTING CONDITION:

Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO)(diag)-44, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO)(diag)-37, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and front oxygen (A/F) sensor connector. 3) Measure the resistance of harness between ECM and front oxygen (A/F) sensor connector. ***Connector & terminal*** ***(B136) No. 13 — Chassis ground:*** ***(B136) No. 22 — Chassis ground:***	Is the resistance more than 1 MΩ?	Replace the front oxygen (A/F) sensor. <Ref. to FU(H4SO)-43, Front Oxygen (A/F) Sensor.>	Repair ground short circuit in harness between ECM and front oxygen (A/F) sensor connector.

U: DTC P0132 O2 SENSOR CIRCUIT HIGH VOLTAGE (BANK 1 SENSOR 1)

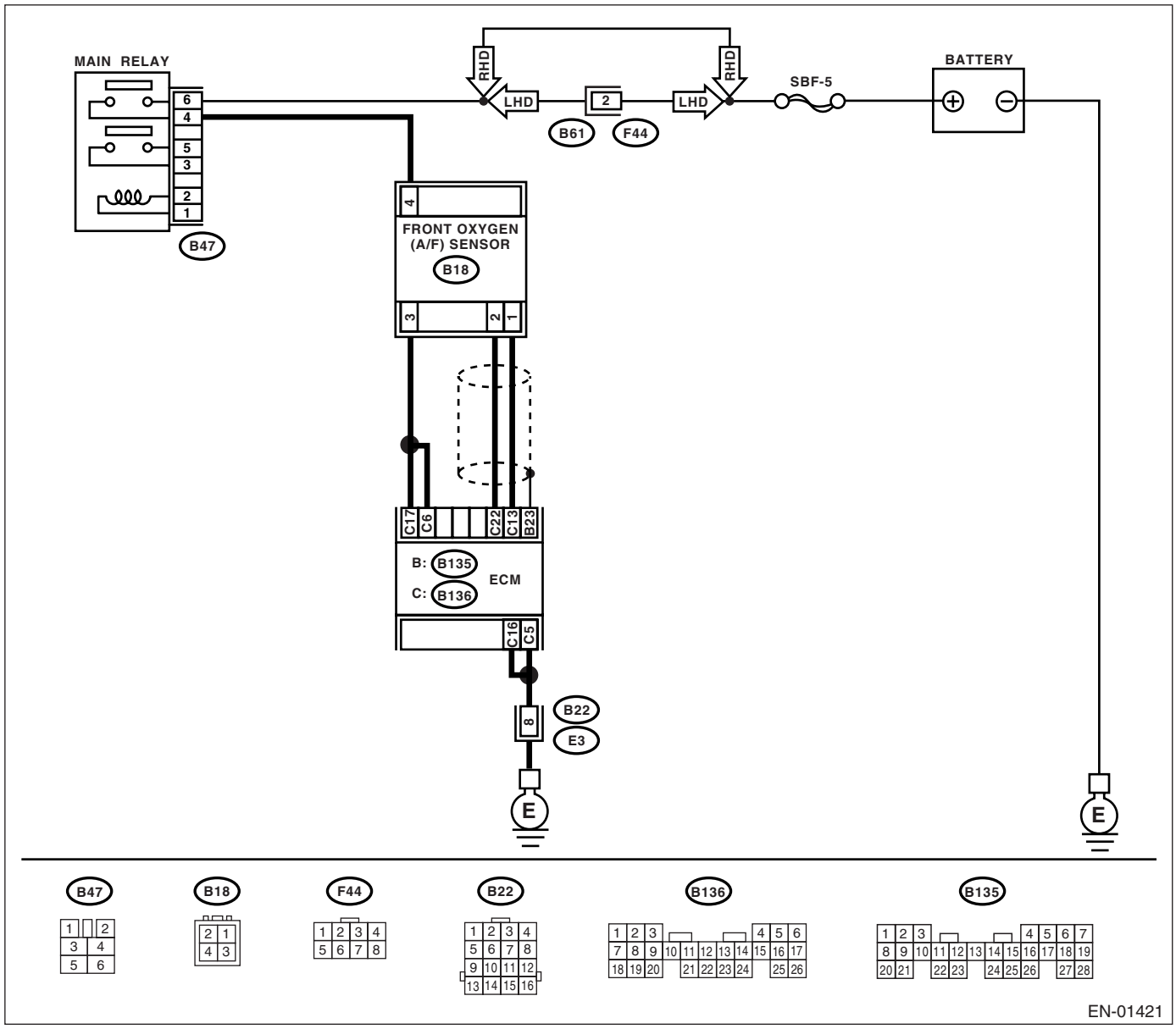
DTC DETECTING CONDITION:

Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO)(diag)-44, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO)(diag)-37, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from front oxygen (A/F) sensor. 3) Measure the voltage of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 13 (+) — Chassis ground (−):*** ***(B136) No. 22 (+) — Chassis ground (−):***	Is the voltage more than 8 V?	Replace the front oxygen (A/F) sensor. <Ref. to FU(H4SO)-43, Front Oxygen (A/F) Sensor.>	Repair battery short circuit in harness between ECM and front oxygen (A/F) sensor connector.

V: DTC P0133 O2 SENSOR CIRCUIT SLOW RESPONSE (BANK 1 SENSOR 1)

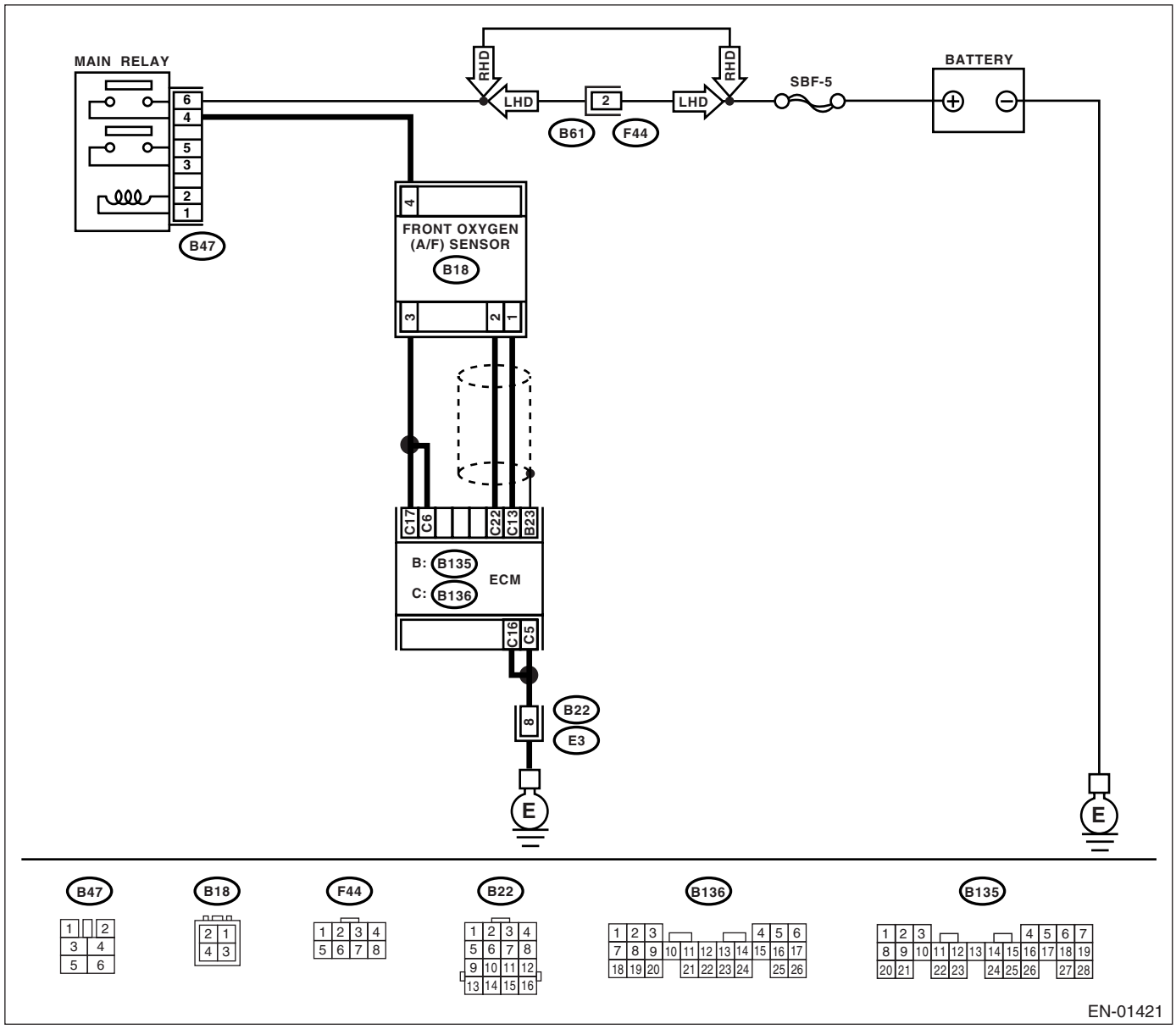
DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO)(diag)-44, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO)(diag)-37, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4SO)(diag)-70, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0133.	Go to step **2.**
2	**CHECK EXHAUST SYSTEM.** NOTE: Check the following items. • Loose installation of front portion of exhaust pipe onto cylinder heads • Loose connection between front exhaust pipe and front catalytic converter • Damage of exhaust pipe resulting in a hole	Is there a fault in exhaust system?	Repair exhaust system.	Replace the front oxygen (A/F) sensor. <Ref. to FU(H4SO)-43, Front Oxygen (A/F) Sensor.>

W: DTC P0134 O2 SENSOR CIRCUIT NO ACTIVITY DETECTED (BANK 1 SENSOR 1)

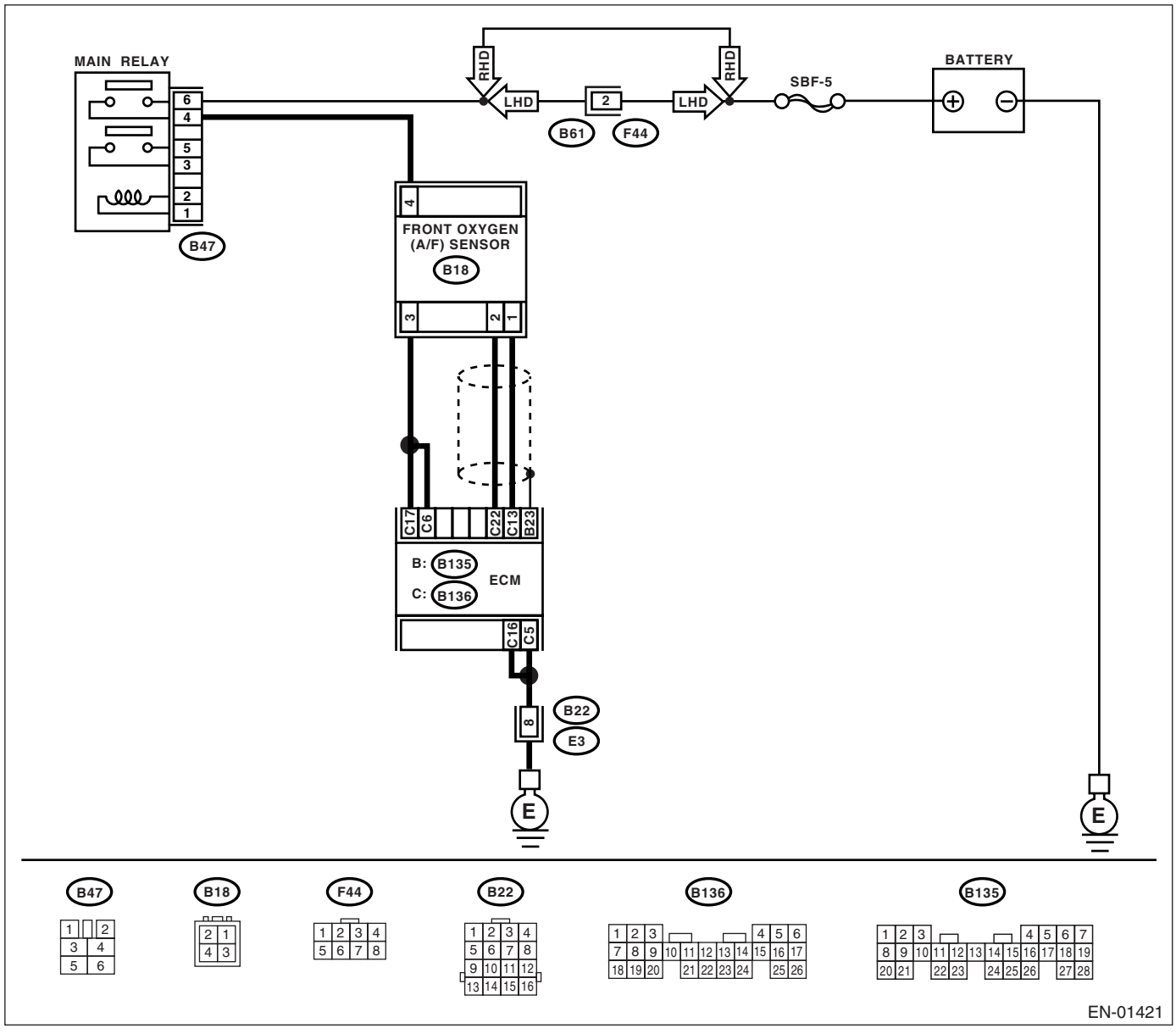
DTC DETECTING CONDITION:

Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO)(diag)-44, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO)(diag)-37, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and front oxygen (A/F) sensor connector. 3) Measure the resistance of harness between ECM and front oxygen (A/F) sensor connector. ***Connector & terminal*** ***(B136) No. 13 — (B18) No. 1:*** ***(B136) No. 22 — (B18) No. 2:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and front oxygen (A/F) sensor connector • Poor contact in front oxygen (A/F) sensor connector • Poor contact in ECM connector
2	**CHECK POOR CONTACT.** Check poor contact in front oxygen (A/F) sensor connector.	Is there poor contact in front oxygen (A/F) sensor connector?	Repair poor contact in front oxygen (A/F) sensor connector.	Replace the front oxygen (A/F) sensor. <Ref. to FU(H4SO)-43, Front Oxygen (A/F) Sensor.>

X: DTC P0137 O2 SENSOR CIRCUIT LOW VOLTAGE (BANK 1 SENSOR 2)

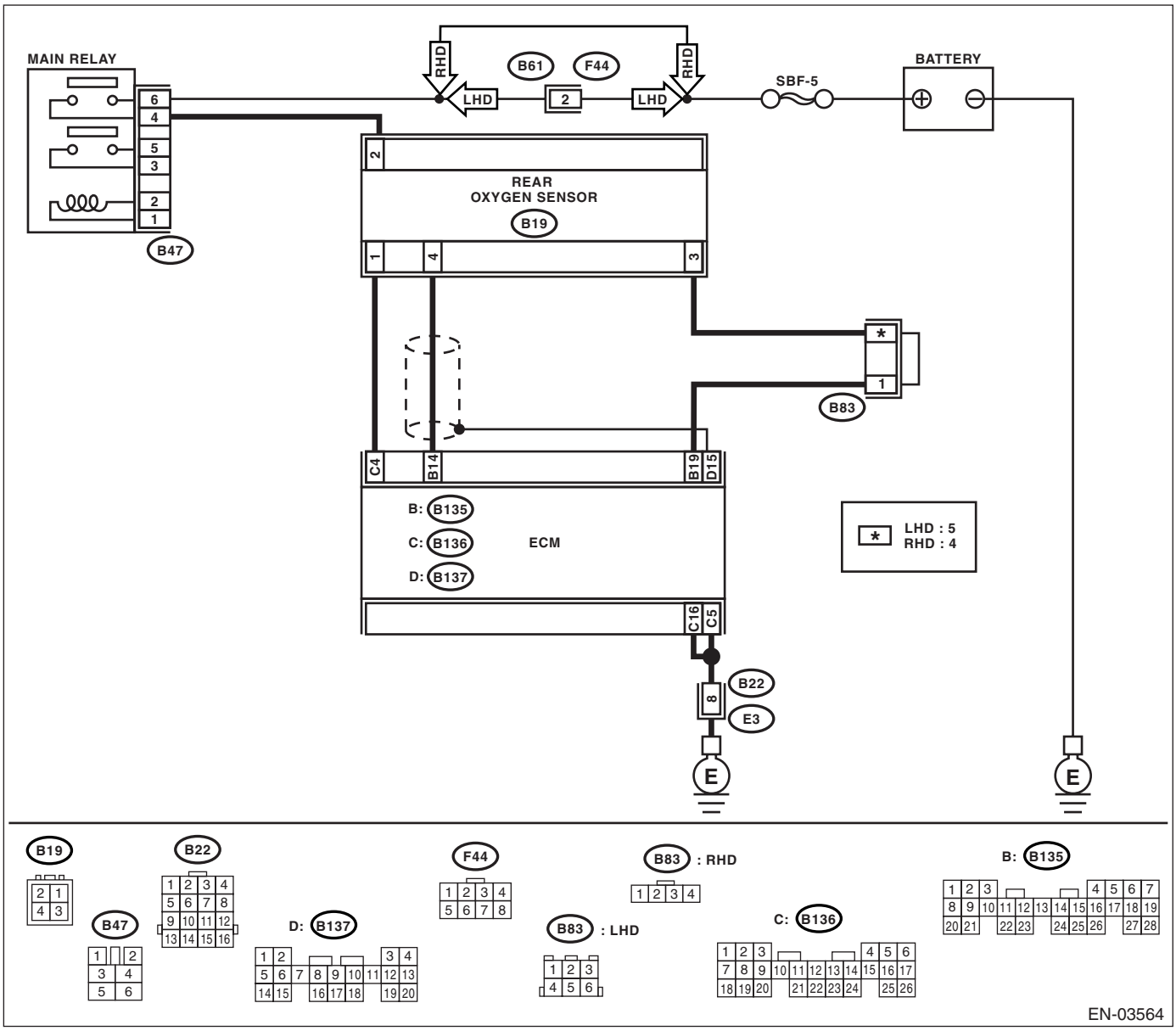
DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO)(diag)-44, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO)(diag)-37, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4SO)(diag)-70, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0137.	Go to step **2.**
2	**CHECK REAR OXYGEN SENSOR DATA.** 1) Warm-up the engine until engine coolant temperature is above 70°C (158°F), and keep the engine speed at 5,000 rpm for two minutes. 2) Read the data of rear oxygen sensor signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to EN(H4SO)(diag)-30, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the General Scan Tool Instruction Manual.	Is the voltage 490 mV?	Go to step **5.**	Go to step **3.**
3	**CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and rear oxygen sensor. 3) Measure the resistance of harness between ECM and rear oxygen sensor connector. ***Connector & terminal*** ***(B135) No. 14 — (B19) No. 4:*** ***(B135) No. 19 — (B19) No. 3:***	Is the resistance more than 3 Ω?	Repair open circuit in harness between ECM and rear oxygen sensor connector.	Go to step **4.**
4	**CHECK HARNESS BETWEEN REAR OXYGEN SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from rear oxygen sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between rear oxygen sensor harness connector and engine ground or chassis ground. ***Connector & terminal*** ***(B19) No. 4 (+) — Engine ground (−):***	Is the voltage 0.2 — 0.5 V?	Replace the rear oxygen sensor. <Ref. to FU(H4SO)-45, Rear Oxygen Sensor.>	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between rear oxygen sensor and ECM connector • Poor contact in rear oxygen sensor connector • Poor contact in ECM connector

	Step	Check	Yes	No
5	**CHECK EXHAUST SYSTEM.** Check exhaust system parts. NOTE: Check the following items. • Loose installation of portions • Damage (crack, hole etc.) of parts • Looseness and ill fitting of parts between front oxygen (A/F) sensor and rear oxygen sensor	Is there a fault in exhaust system?	Repair or replace faulty parts.	Replace the rear oxygen sensor. <Ref. to FU(H4SO)-45, Rear Oxygen Sensor.>

Y: DTC P0138 O2 SENSOR CIRCUIT HIGH VOLTAGE (BANK 1 SENSOR 2)

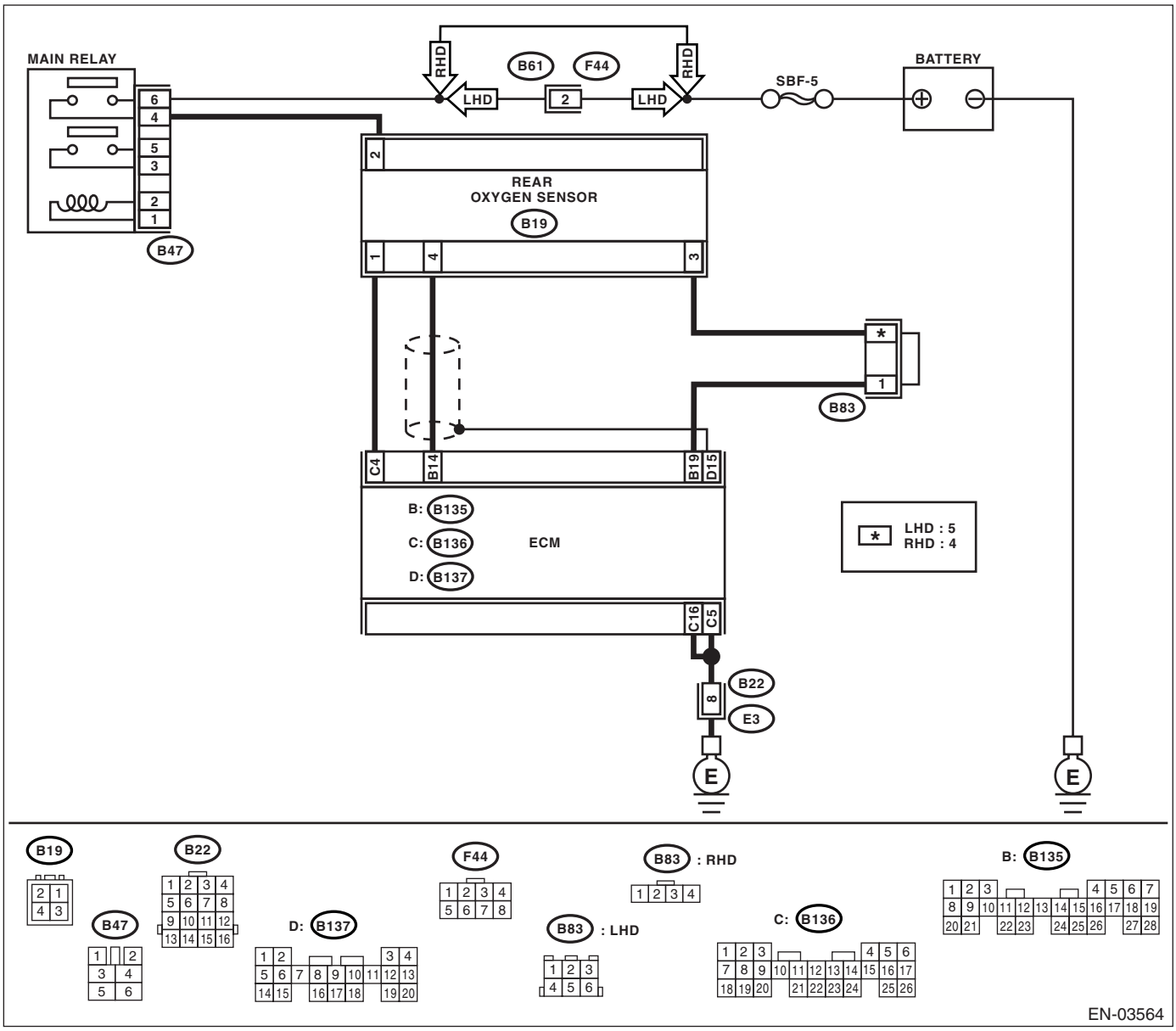
DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO)(diag)-44, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO)(diag)-37, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4SO)(diag)-70, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0138.	Go to step **2.**
2	**CHECK REAR OXYGEN SENSOR DATA.** 1) Warm-up the engine until engine coolant temperature is above 70°C (158°F), and immediately decrease the engine speed from 5,000 rpm. 2) Read the data of rear oxygen sensor signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to EN(H4SO)(diag)-30, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the General Scan Tool Instruction Manual.	Is the voltage 250 mV?	Go to step **5.**	Go to step **3.**
3	**CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and rear oxygen sensor. 3) Measure the resistance of harness between ECM and rear oxygen sensor connector. ***Connector & terminal*** ***(B135) No. 14 — (B19) No. 4:*** ***(B135) No. 19 — (B19) No. 3:***	Is the resistance more than 3 Ω?	Repair open circuit in harness between ECM and rear oxygen sensor connector.	Go to step **4.**
4	**CHECK HARNESS BETWEEN REAR OXYGEN SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from rear oxygen sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between rear oxygen sensor harness connector and engine ground or chassis ground. ***Connector & terminal*** ***(B19) No. 4 (+) — Engine ground (−):***	Is the voltage 0.2 — 0.5 V?	Replace the rear oxygen sensor. <Ref. to FU(H4SO)-45, Rear Oxygen Sensor.>	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between rear oxygen sensor and ECM connector • Poor contact in rear oxygen sensor connector • Poor contact in ECM connector

	Step	Check	Yes	No
5	**CHECK EXHAUST SYSTEM.** Check exhaust system parts. NOTE: Check the following items. • Loose installation of portions • Damage (crack, hole etc.) of parts • Looseness and ill fitting of parts between front oxygen (A/F) sensor and rear oxygen sensor	Is there a fault in exhaust system?	Repair or replace faulty parts.	Replace the rear oxygen sensor. <Ref. to FU(H4SO)-45, Rear Oxygen Sensor.>

Z: DTC P0139 O2 SENSOR CIRCUIT SLOW RESPONSE (BANK 1 SENSOR 2)

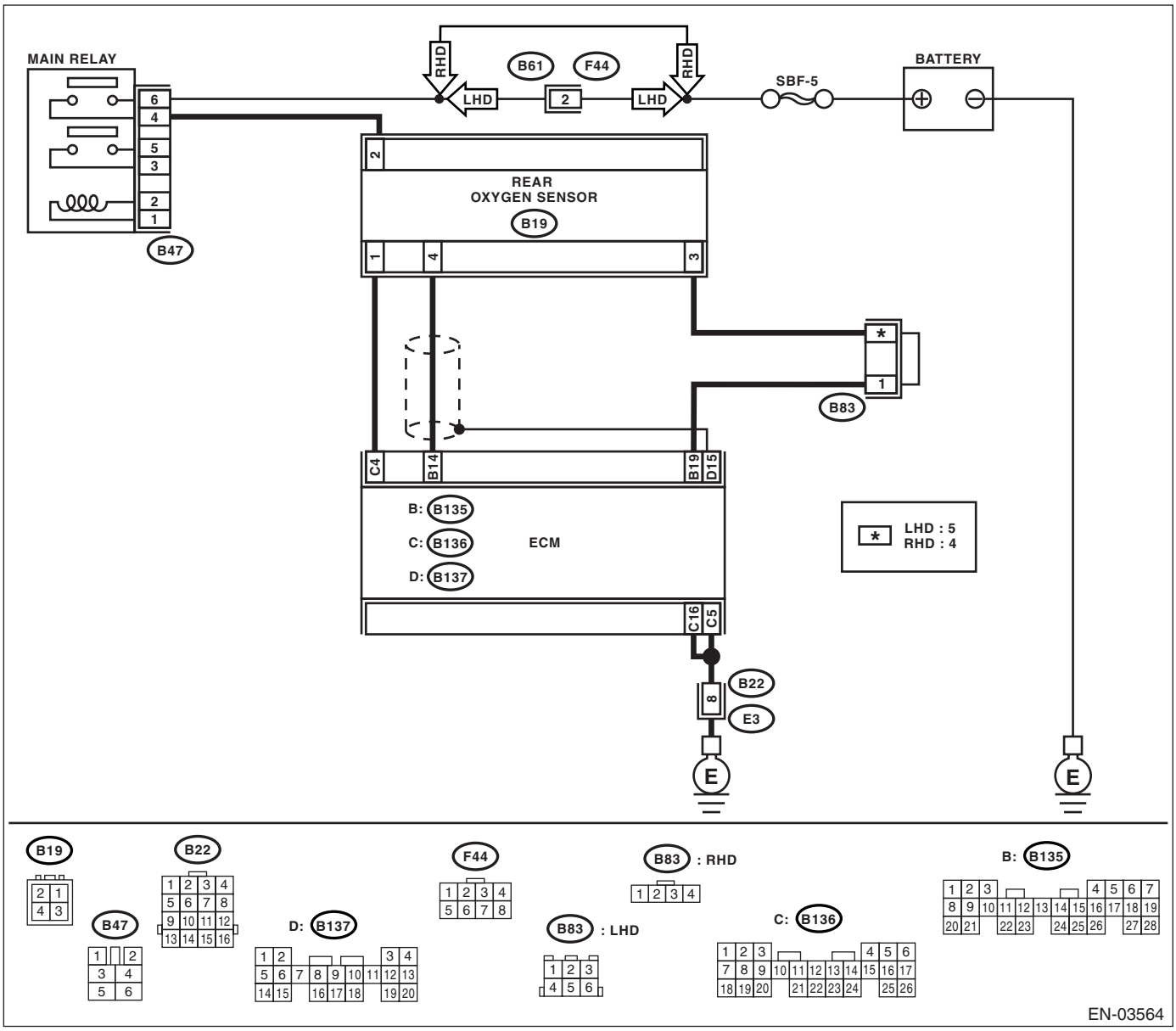
DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO)(diag)-44, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO)(diag)-37, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4SO)(diag)-70, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0139.	Go to step **2.**
2	**CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and rear oxygen sensor. 3) Measure the resistance of harness between ECM and rear oxygen sensor connector. ***Connector & terminal*** ***(B135) No. 14 — (B19) No. 4:***	Is the resistance less than 1 Ω?	Go to step **3.**	Repair open circuit in harness between ECM and rearoxygen sensor connector.
3	**CHECK HARNESS BETWEEN REAR OXYGEN SENSOR AND ECM CONNECTOR.** Measure the resistance between rear oxygen sensor harness connector and chassis ground. ***Connector & terminal*** ***(B19) No. 4 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **4.**	Repair short circuit to ground in harness.
4	**CHECK REAR OXYGEN SENSOR DATA.** Measure the resistance between connector terminals of rear oxygen sensor. ***terminals*** ***No. 3 — No. 4:***	Is the resistance less than 1 Ω?	Replace the rear oxygen sensor. <Ref. to FU(H4SO)-45, Rear Oxygen Sensor.>	A temporary poor compact occurs. Check poor contact in connector.

AA:DTC P0171 SYSTEM TOO LEAN (BANK 1)

Refer to DTC P0172 for diagnostic procedure. <Ref. to EN(H4SO)(diag)-138, DTC P0172 SYSTEM TOO RICH (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AB:DTC P0172 SYSTEM TOO RICH (BANK 1)

DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

TROUBLE SYMPTOM:

- Erroneous idling
- Engine stalls.
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO)(diag)-44, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO)(diag)-37, PROCEDURE, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK EXHAUST SYSTEM.**	Are there holes or loose bolts on exhaust system?	Repair exhaust system.	Go to step **2.**
2	**CHECK EGR VALVE.**	Is the EGR valve stuck?	Replace the EGR valve.	Go to step **3.**
3	**CHECK AIR INTAKE SYSTEM.**	Are there holes, loose bolts or disconnection of hose on air intake system?	Repair air intake system.	Go to step **4.**
4	**CHECK PURGE CONTROL SOLENOID VALVE.**	Is the purge control solenoid valve stuck?	Replace the purge control solenoid valve.	Go to step **5.**
5	**CHECK PCV VALVE.**	Is PCV valve operated?	Go to step **6.**	Replace the PCV valve.
6	**CHECK FUEL PRESSURE.** **Warning:** **• Place "NO FIRE" signs near the working area.** **• Be careful not to spill fuel on the floor.** 1) Release fuel pressure. (1) Disconnect the connector from fuel pump relay. (2) Start the engine and run it until it stalls. (3) After the engine stalls, crank it for five more seconds. (4) Turn the ignition switch to OFF. 2) Connect the connector to fuel pump relay. 3) Disconnect the fuel delivery hose from fuel filter, and connect fuel pressure gauge. 4) Install the fuel filler cap. 5) Start the engine and idle while gear position is neutral. 6) Measure the fuel pressure while disconnecting pressure regulator vacuum hose from intake manifold. **Warning:** **Before removing the fuel pressure gauge, release fuel pressure.** NOTE: If fuel pressure does not increase, squeeze fuel return hose 2 to 3 times, then measure fuel pressure again.	Is the fuel pressure 284 — 314 kPa (2.9 — 3.2 kgf/cm^2, 41 — 46 psi)?	Go to step **7.**	Repair the following items. Fuel pressure too high • Clogged fuel return line or bent hose Fuel pressure too low • Improper fuel pump discharge • Clogged fuel supply line

	Step	Check	Yes	No
7	**CHECK FUEL PRESSURE.** After connecting the pressure regulator vacuum hose, measure fuel pressure. **Warning:** **Before removing the fuel pressure gauge, release fuel pressure.** NOTE: • If fuel pressure does not increase, squeeze fuel return hose 2 to 3 times, then measure fuel pressure again. • If out of specification as measured at this step, check or replace pressure regulator and pressure regulator vacuum hose.	Is the fuel pressure 206 — 235 kPa (2.1 — 2.4 kgf/cm^2, 30 — 34 psi)?	Go to step **8.**	Repair the following items. Fuel pressure too high • Faulty pressure regulator • Clogged fuel return line or bent hose Fuel pressure too low • Faulty pressure regulator • Improper fuel pump discharge • Clogged fuel supply line
8	**CHECK ENGINE COOLANT TEMPERATURE SENSOR.** 1) Start the engine and warm-up completely. 2) Read the data of engine coolant temperature sensor signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO)(diag)-30, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the General Scan Tool Instruction Manual.	Is the engine coolant temperature 70 — 100°C (158 — 212°F)?	Go to step **9.**	Replace the engine coolant temperature sensor. <Ref. to FU(H4SO)-27, Engine Coolant Temperature Sensor.>
9	**CHECK PRESSURE SENSOR SIGNAL.** 1) Start the engine and warm-up engine until coolant temperature is greater than 60°C (140°F). 2) Place the select lever in "N" or "P" range. 3) Turn the A/C switch to OFF. 4) Turn all accessory switches to OFF. 5) Read the data of pressure sensor signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO)(diag)-30, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the General Scan Tool Instruction Manual.	Idling: Is the measured value 24.0 — 41.3 kPa (180 — 310 mmHg, 7.09 — 12.20 inHg)?, Ignition ON: Is the measured value 73.3 — 106.6 kPa (550 — 800 mmHg, 21.65 — 31.50 inHg)?	Contact with SUBARU distributor service.	Replace the Pressure sensor. <Ref. to FU(H4SO)-33, Manifold Absolute Pressure Sensor.>

AC:DTC P0301 CYLINDER 1 MISFIRE DETECTED

NOTE:
For the diagnostic procedure, refer to DTC P0304. <Ref. to EN(H4SO)(diag)-141, DTC P0304 CYLINDER 4 MISFIRE DETECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AD:DTC P0302 CYLINDER 2 MISFIRE DETECTED

NOTE:
For the diagnostic procedure, refer to DTC P0304. <Ref. to EN(H4SO)(diag)-141, DTC P0304 CYLINDER 4 MISFIRE DETECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AE:DTC P0303 CYLINDER 3 MISFIRE DETECTED

NOTE:
For the diagnostic procedure, refer to DTC P0304. <Ref. to EN(H4SO)(diag)-141, DTC P0304 CYLINDER 4 MISFIRE DETECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AF:DTC P0304 CYLINDER 4 MISFIRE DETECTED

DTC DETECTING CONDITION:

- Two consecutive driving cycles with fault
- Immediately at fault recognition (A misfire which could damage catalyst occurs.)

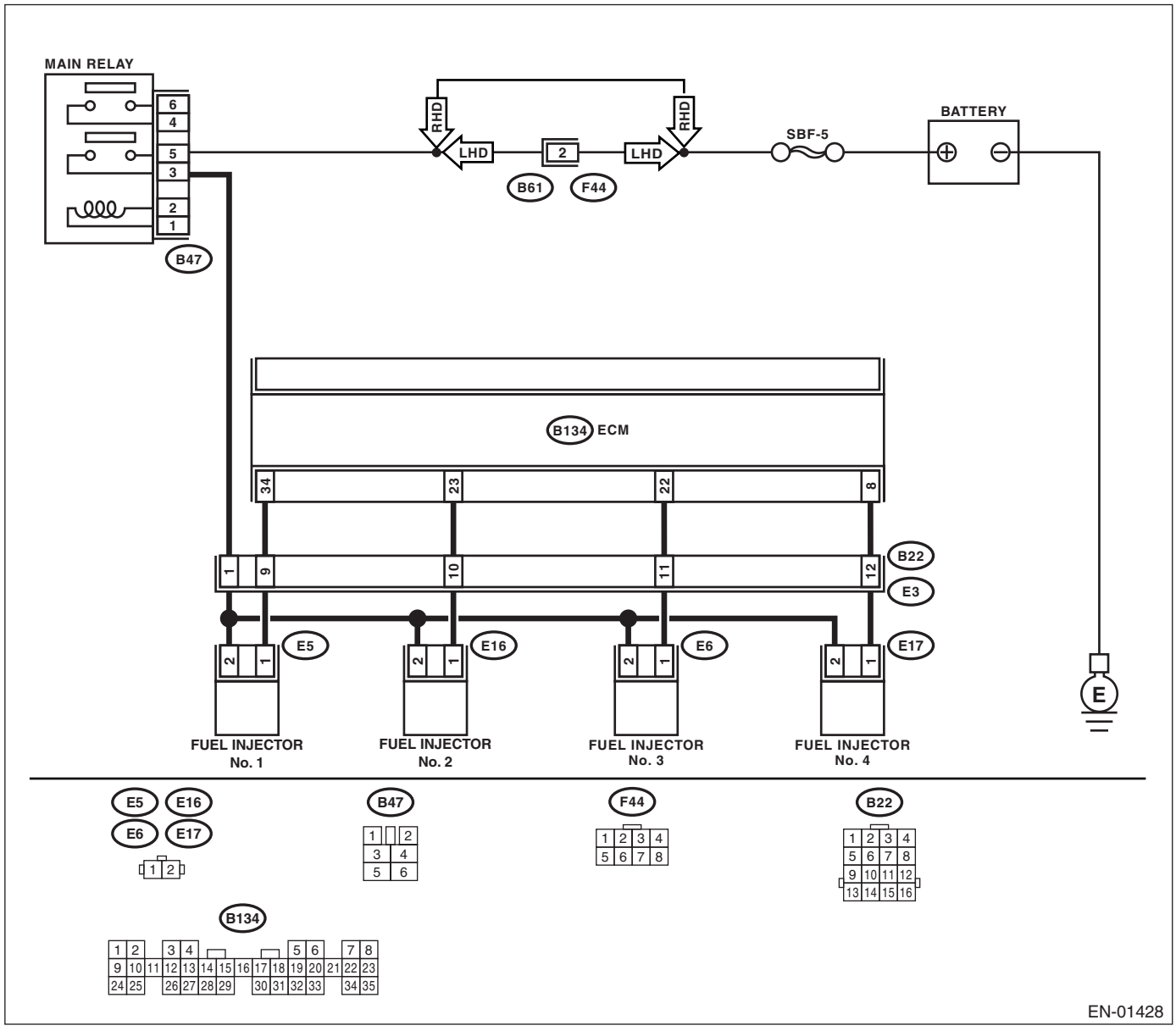
TROUBLE SYMPTOM:

- Engine stalls.
- Erroneous idling
- Rough driving

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO)(diag)-44, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO)(diag)-37, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4SO)(diag)-70, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0301, P0302, P0303 and P0304.	Go to step **2.**
2	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM connector and chassis ground on faulty cylinders. ***Connector & terminal*** ***#1 (B134) No. 34 (+) — Chassis ground (–):*** ***#2 (B134) No. 23 (+) — Chassis ground (–):*** ***#3 (B134) No. 22 (+) — Chassis ground (–):*** ***#4 (B134) No. 8 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **7.**	Go to step **3.**
3	**CHECK HARNESS BETWEEN FUEL INJECTOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from fuel injector on faulty cylinders. 3) Measure the resistance between ECM connector and engine ground on faulty cylinders. ***Connector & terminal*** ***#1 (E5) No. 1 — Engine ground:*** ***#2 (E16) No. 1 — Engine ground:*** ***#3 (E6) No. 1 — Engine ground:*** ***#4 (E17) No. 1 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **4.**	Repair ground short circuit in harness between fuel injector and ECM connector.
4	**CHECK HARNESS BETWEEN FUEL INJECTOR AND ECM CONNECTOR.** Measure the resistance of harness connector between ECM connector and fuel injector on faulty cylinders. ***Connector & terminal*** ***#1 (B134) No. 34 — (E5) No. 1:*** ***#2 (B134) No. 23 — (E16) No. 1:*** ***#3 (B134) No. 22 — (E6) No. 1:*** ***#4 (B134) No. 8 — (E17) No. 1:***	Is the resistance less than 1 Ω?	Go to step **5.**	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and fuel injector connector • Poor contact in coupling connector
5	**CHECK FUEL INJECTOR.** Measure the resistance between fuel injector terminals on faulty cylinder. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 5 Ω — 20 Ω?	Go to step **6.**	Replace the faulty fuel injector. <Ref. to FU(H4SO)-38, Fuel Injector.>

	Step	Check	Yes	No
6	**CHECK POWER SUPPLY LINE.** 1) Turn the ignition switch to ON. 2) Measure the voltage between fuel injector and engine ground on faulty cylinders. ***Connector & terminal*** ***#1 (E5) No. 2 (+) — Engine ground (–):*** ***#2 (E16) No. 2 (+) — Engine ground (–):*** ***#3 (E6) No. 2 (+) — Engine ground (–):*** ***#4 (E17) No. 2 (+) — Engine ground (–):***	Is the voltage more than 10 V?	Repair poor contact in all connectors in fuel injector circuit.	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between main relay and fuel injector connector on faulty cylinders • Poor contact in coupling connector • Poor contact in main relay connector • Poor contact in fuel injector connector on faulty cylinders
7	**CHECK HARNESS BETWEEN FUEL INJECTOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from fuel injector on faulty cylinder. 3) Turn the ignition switch to ON. 4) Measure the voltage between ECM connector and chassis ground on faulty cylinders. ***Connector & terminal*** ***#1 (B134) No. 34 (+) — Chassis ground (–):*** ***#2 (B134) No. 23 (+) — Chassis ground (–):*** ***#3 (B134) No. 22 (+) — Chassis ground (–):*** ***#4 (B134) No. 8 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Repair battery short circuit in harness between ECM and fuel injector. After repair, replace the ECM. <Ref. to FU(H4SO)-47, Engine Control Module (ECM).>	Go to step **8.**
8	**CHECK FUEL INJECTOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between fuel injector terminals on faulty cylinder. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance less than 1 Ω?	Replace the faulty fuel injector <Ref. to FU(H4SO)-38, Fuel Injector.> and ECM <Ref. to FU(H4SO)-47, Engine Control Module (ECM).>	Go to step **9.**
9	**CHECK INSTALLATION OF CAMSHAFT POSITION SENSOR/CRANKSHAFT POSITION SENSOR.**	Is the camshaft position sensor or crankshaft position sensor loosely installed?	Tighten camshaft position sensor or crankshaft position sensor.	Go to step **10.**
10	**CHECK CRANK SPROCKET.** Remove the timing belt cover.	Is the crank sprocket rusted or does it have broken teeth?	Replace the crank sprocket. <Ref. to ME(H4SO)-52, Crank Sprocket.>	Go to step **11.**
11	**CHECK INSTALLATION CONDITION OF TIMING BELT.** Turn the crankshaft using ST, and align alignment mark on crank sprocket with alignment mark on cylinder block. ST 499987500 CRANKSHAFT SOCKET	Is the timing belt dislocated from its proper position?	Repair installation condition of timing belt. <Ref. to ME(H4SO)-46, Timing Belt.>	Go to step **12.**

	Step	Check	Yes	No
12	**CHECK FUEL LEVEL.**	Is the fuel meter indication higher than the “Lower” level?	Go to step **13.**	Replenish fuel so fuel meter indication is higher than the “Lower” level. After replenishing fuel, Go to step **13.**
13	**CHECK STATUS OF MALFUNCTION INDICATOR LIGHT.** 1) Clear the memory using Subaru Select Monitor. <Ref. to EN(H4SO)(diag)-44, Clear Memory Mode.> 2) Start the engine, and drive the vehicle more than 10 minutes.	Does the malfunction indicator light illuminate or blink?	Go to step **15.**	Go to step **14.**
14	**CHECK CAUSE OF MISFIRE DIAGNOSED.**	Was the cause of misfire identified when the engine is running. Ex. Disconnection of spark plug cord.	Finish diagnostics operation, if the engine has no abnormality.	1. Repair poor contact. NOTE: In this case, repair the following: • Poor contact in ignitor connector • Poor contact in ignition coil connector • Poor contact in fuel injector connector on faulty cylinders • Poor contact in ECM connector • Poor contact in coupling connector 2. If there is no poor contact, check the followings and contact with your Subaru distributor service. • Fuel condition • Whether addition agent is used or not • Spark plug condition • Spark plug cord condition • Engine oil condition

	Step	Check	Yes	No
15	**CHECK AIR INTAKE SYSTEM.**	Is there a fault in air intake system?	Repair air intake system. NOTE: Check the following items: • Are there air leaks or air suction caused by loose or dislocated nuts and bolts? • Are there cracks or any disconnection of hoses?	Go to step **16.**
16	**CHECK MISFIRE SYMPTOM.** 1) Turn the ignition switch to ON. 2) Read the DTC. • Subaru Select Monitor <Ref. to EN(H4SO)(diag)-30, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the General Scan Tool Operation Manual. NOTE: Perform diagnosis according to the items listed below.	Does the Subaru Select Monitor or general scan tool display only one DTC?	Go to step **21.**	Go to step **17.**
17	**CHECK DIAGNOSTIC TROUBLE CODE (DTC) ON DISPLAY.**	Does the Subaru Select Monitor or general scan tool indicate DTC P0301 and P0302?	Go to step **22.**	Go to step **18.**
18	**CHECK DIAGNOSTIC TROUBLE CODE (DTC) ON DISPLAY.**	Does the Subaru Select Monitor or general scan tool indicate DTC P0303 and P0304?	Go to step **23.**	Go to step **19.**
19	**CHECK DIAGNOSTIC TROUBLE CODE (DTC) ON DISPLAY.**	Does the Subaru Select Monitor or general scan tool indicate DTC P0301 and P0303?	Go to step **24.**	Go to step **20.**
20	**CHECK DIAGNOSTIC TROUBLE CODE (DTC) ON DISPLAY.**	Does the Subaru Select Monitor or general scan tool indicate DTC P0302 and P0304?	Go to step **25.**	Go to step **26.**
21	**ONLY ONE CYLINDER**	Is there a fault in that cylinder?	Repair or replace faulty parts. NOTE: Check the following items. • Spark plug • Spark plug cord • Fuel injector • Compression ratio	Go to DTC P0171. <Ref. to EN(H4SO)(diag)-137, DTC P0171 SYSTEM TOO LEAN (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

Step		Check	Yes	No
22	GROUP OF #1 AND #2 CYLINDERS	Are there faults in #1 and #2 cylinders?	Repair or replace faulty parts. NOTE: • Check the following items. • Spark plugs • Fuel injectors • Ignition coil • Compression ratio • If no abnormal is discovered, check for “IGNITION CONTROL SYSTEM” of #1 and #2 cylinders side. <Ref. to EN(H4SO)(diag)-62, IGNITION CONTROL SYSTEM, Diagnostics for Engine Starting Failure.>	Go to DTC P0171. <Ref. to EN(H4SO)(diag)-137, DTC P0171 SYSTEM TOO LEAN (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
23	GROUP OF #3 AND #4 CYLINDERS	Are there faults in #3 and #4 cylinders?	Repair or replace faulty parts. NOTE: • Check the following items. • Spark plugs • Fuel injectors • Ignition coil • If no abnormal is discovered, check for “16. D: IGNITION CONTROL SYSTEM” of #3 and #4 cylinders side. <Ref. to EN(H4SO)(diag)-62, IGNITION CONTROL SYSTEM, Diagnostics for Engine Starting Failure.>	Go to DTC P0171. <Ref. to EN(H4SO)(diag)-137, DTC P0171 SYSTEM TOO LEAN (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
24	GROUP OF #1 AND #3 CYLINDERS	Are there faults in #1 and #3 cylinders?	Repair or replace faulty parts. NOTE: Check the following items. • Spark plugs • Fuel injectors • Skipping timing belt teeth	Go to DTC P0171. <Ref. to EN(H4SO)(diag)-137, DTC P0171 SYSTEM TOO LEAN (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

Step		Check	Yes	No
25	GROUP OF #2 AND #4 CYLINDERS	Are there faults in #2 and #4 cylinders?	Repair or replace faulty parts. NOTE: Check the following items. • Spark plugs • Fuel injectors • Compression ratio • Skipping timing belt teeth	Go to DTC P0171. <Ref. to EN(H4SO)(diag)-137, DTC P0171 SYSTEM TOO LEAN (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
26	CYLINDER AT RANDOM	Is the engine idle rough?	Go to DTC P0170. <Ref. to EN(H4SO)(diag)-137, DTC P0171 SYSTEM TOO LEAN (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Repair or replace faulty parts. NOTE: Check the following items. • Spark plugs • Fuel injectors • Compression ratio

AG:DTC P0327 KNOCK SENSOR 1 CIRCUIT LOW (BANK 1 OR SINGLE SENSOR)

DTC DETECTING CONDITION:

Immediately at fault recognition

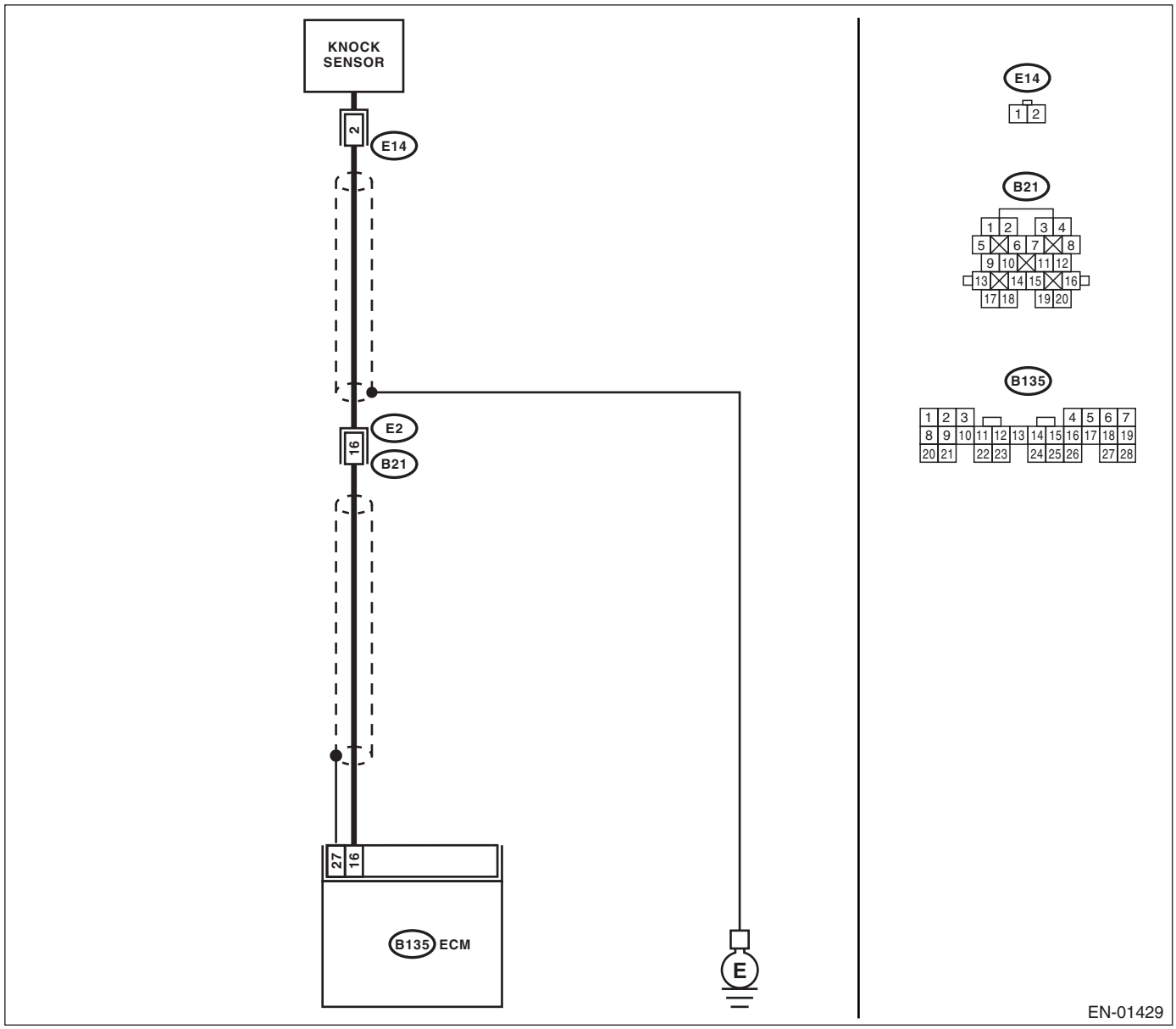
TROUBLE SYMPTOM:

- Poor driving performance
- Knocking occurs.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO)(diag)-44, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO)(diag)-37, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN KNOCK SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between ECM harness connector and chassis ground. ***Connector & terminal*** ***(B135) No. 16 — Chassis ground:***	Is the resistance more than 700 kΩ?	Go to step **2.**	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between knock sensor and ECM connector • Poor contact in knock sensor connector • Poor contact in coupling connector
2	**CHECK KNOCK SENSOR.** 1) Disconnect the connector from knock sensor. 2) Measure the resistance between knock sensor connector terminal and engine ground. ***Terminal*** ***No. 2 — Engine ground:***	Is the resistance more than 700 kΩ?	Go to step **3.**	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between knock sensor and ECM connector • Poor contact in knock sensor connector • Poor contact in coupling connector
3	**CHECK CONDITION OF KNOCK SENSOR INSTALLATION.**	Is the knock sensor installation bolt tightened securely?	Replace the knock sensor. <Ref. to FU(H4SO)-30, Knock Sensor.>	Tighten knock sensor installation bolt securely.

AH:DTC P0328 KNOCK SENSOR 1 CIRCUIT HIGH (BANK 1 OR SINGLE SENSOR)

DTC DETECTING CONDITION:

Immediately at fault recognition

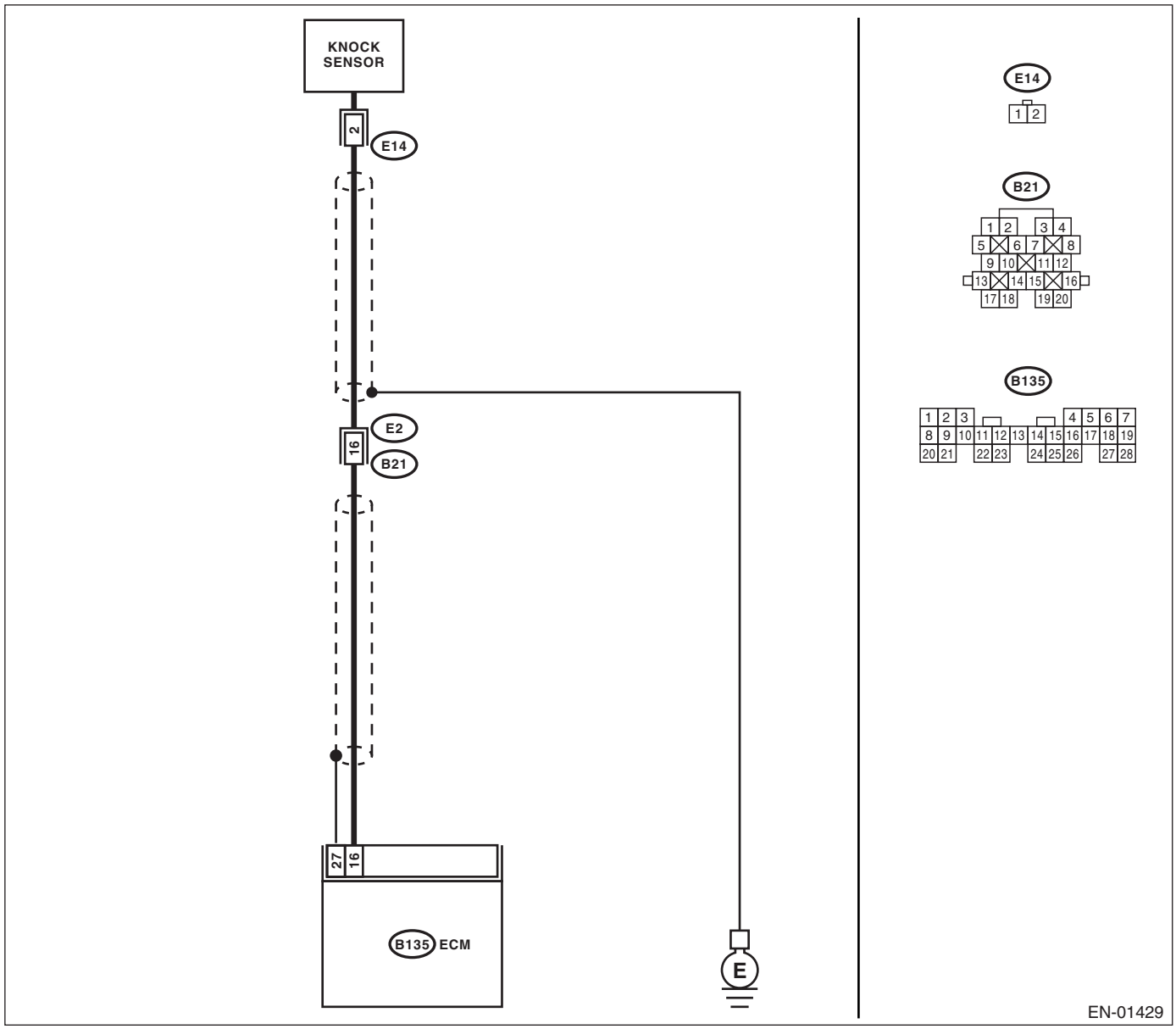
TROUBLE SYMPTOM:

- Poor driving performance
- Knocking occurs.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO)(diag)-44, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO)(diag)-37, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN KNOCK SENSOR AND ECM CONNECTOR.** Measure the resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 16 — Chassis ground:***	Is the resistance less than 400 kΩ?	Go to step **2.**	Go to step **3.**
2	**CHECK KNOCK SENSOR.** 1) Disconnect the connector from knock sensor. 2) Measure the resistance between knock sensor connector terminal and engine ground. ***Terminal*** ***No. 2 — Engine ground:***	Is the resistance less than 400 kΩ?	Replace the knock sensor. <Ref. to FU(H4SO)-30, Knock Sensor.>	Repair ground short circuit in harness between knock sensor connector and ECM connector. NOTE: The harness between both connectors is shielded. Repair short circuit of harness together with shield.
3	**CHECK INPUT SIGNAL FOR ECM.** 1) Connect the connectors to ECM and knock sensor. 2) Turn the ignition switch to ON. 3) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 16 (+) — Chassis ground (−):***	Is the voltage more than 2 V?	Even if malfunction indicator light lights up, the circuit has returned to a normal condition at this time. (However, the possibility of poor contact still remains.) NOTE: In this case, repair the following: • Poor contact in knock sensor connector • Poor contact in ECM connector • Poor contact in coupling connector	Repair poor contact in ECM connector.

AI: DTC P0335 CRANKSHAFT POSITION SENSOR “A” CIRCUIT

DTC DETECTING CONDITION:

Immediately at fault recognition

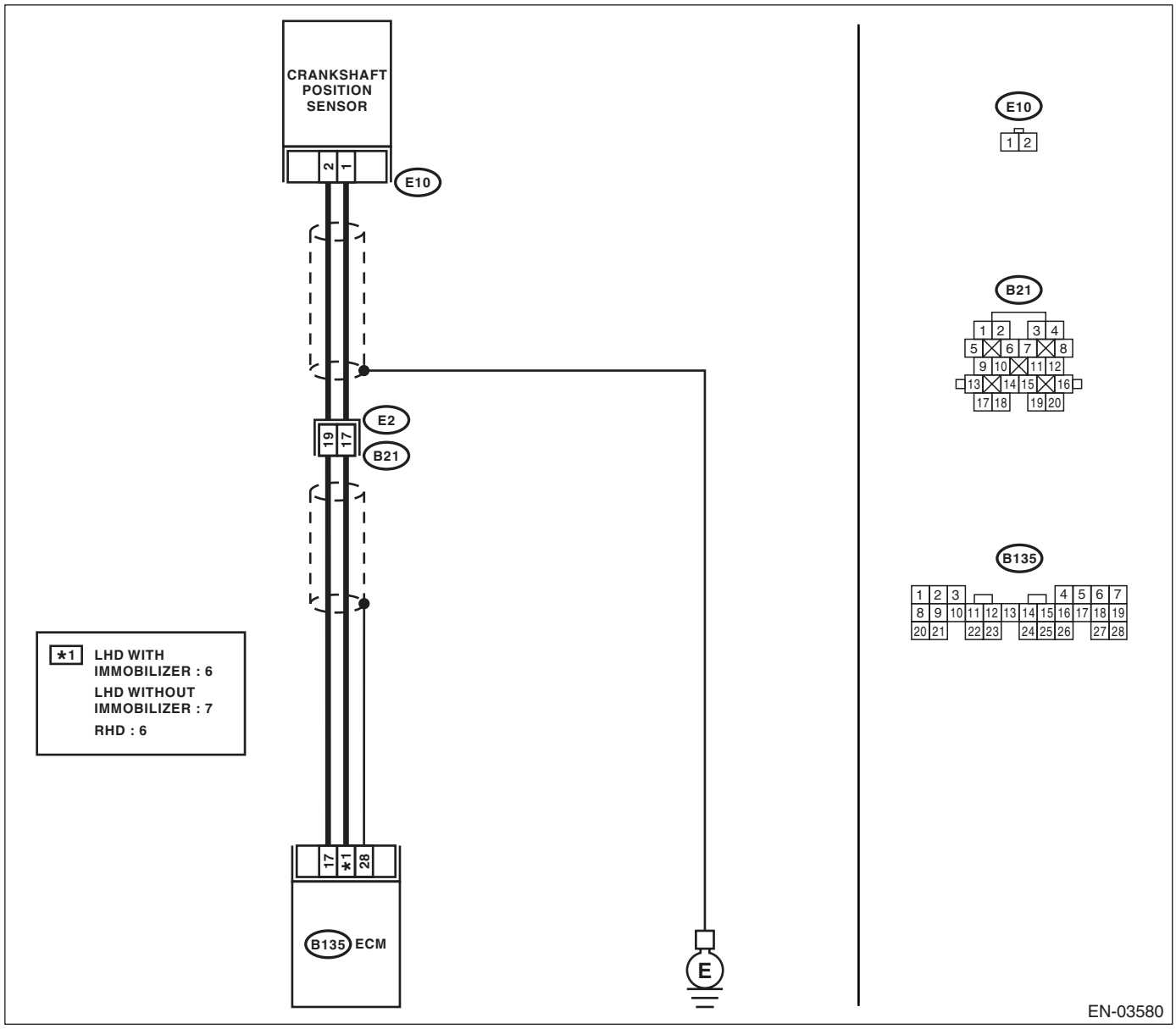
TROUBLE SYMPTOM:

- Engine stalls.
- Failure of engine to start

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO)(diag)-44, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO)(diag)-37, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN CRANKSHAFT POSITION SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from crankshaft position sensor. 3) Measure the resistance of harness between crankshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E10) No. 1 — Engine ground:***	Is the resistance more than 100 kΩ?	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between crankshaft position sensor and ECM connector • Poor contact in ECM connector • Poor contact in coupling connector	Go to step **2.**
2	**CHECK HARNESS BETWEEN CRANKSHAFT POSITION SENSOR AND ECM CONNECTOR.** Measure the resistance of harness between crankshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E10) No. 1 — Engine ground:***	Is the resistance less than 10 Ω?	Repair ground short circuit in harness between crankshaft position sensor and ECM connector. NOTE: The harness between both connectors are shielded. Repair ground short circuit in harness together with shield.	Go to step **3.**
3	**CHECK HARNESS BETWEEN CRANKSHAFT POSITION SENSOR AND ECM CONNECTOR.** Measure the resistance of harness between crankshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E10) No. 2 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **4.**	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between crankshaft position sensor and ECM connector • Poor contact in ECM connector • Poor contact in coupling connector
4	**CHECK CONDITION OF CRANKSHAFT POSITION SENSOR.**	Is the crankshaft position sensor installation bolt tightened securely?	Go to step **5.**	Tighten crankshaft position sensor installation bolt securely.
5	**CHECK CRANKSHAFT POSITION SENSOR.** 1) Remove the crankshaft position sensor. 2) Measure the resistance between connector terminals of crankshaft position sensor. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 1 — 4 kΩ?	Repair poor contact in crankshaft position sensor connector.	Replace the crankshaft position sensor. <Ref. to FU(H4SO)-28, Crankshaft Position Sensor.>

AJ:DTC P0336 CRANKSHAFT POSITION SENSOR “A” CIRCUIT RANGE/PERFORMANCE

DTC DETECTING CONDITION:

Immediately at fault recognition

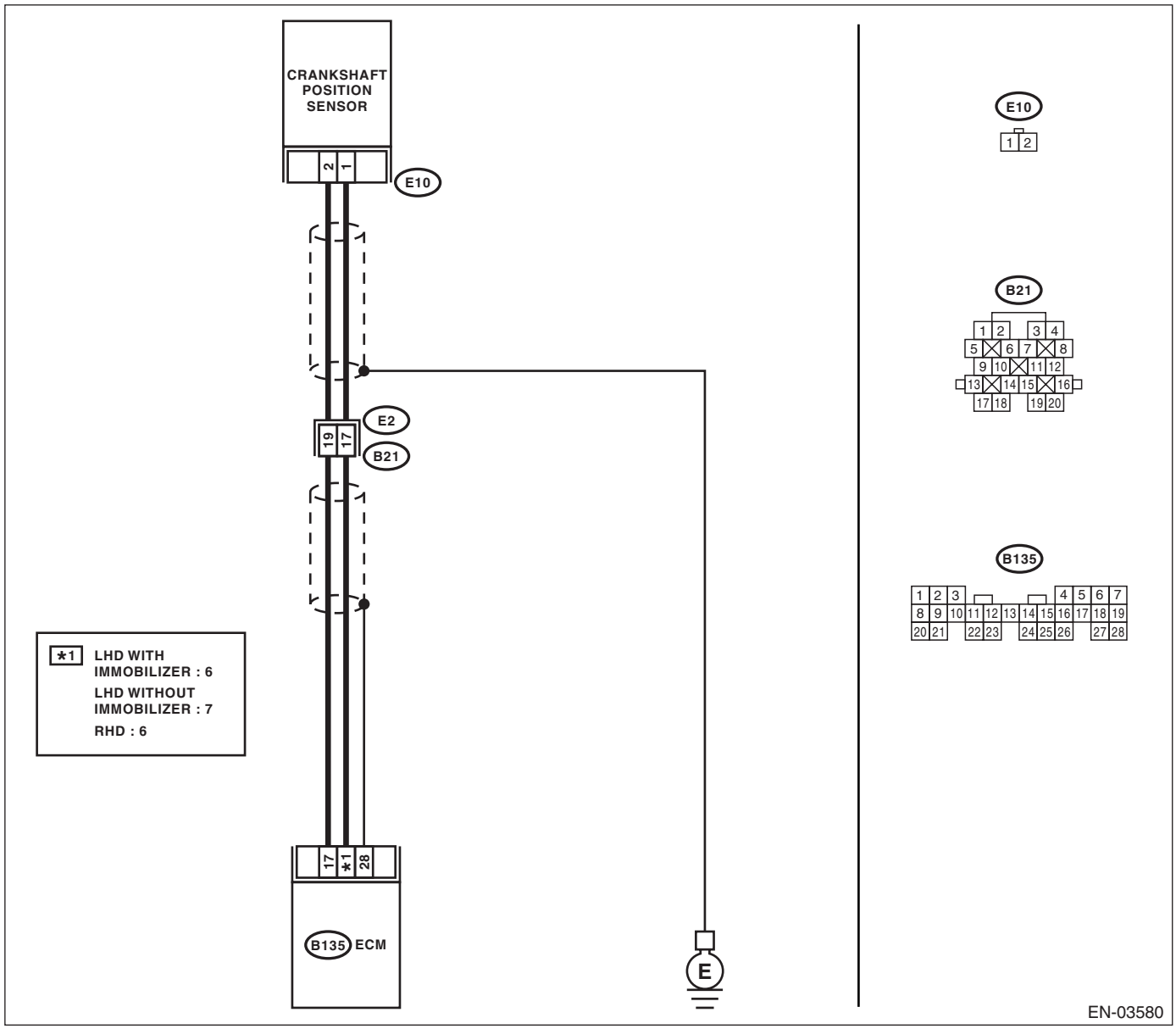
TROUBLE SYMPTOM:

- Engine stalls.
- Failure of engine to start

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO)(diag)-44, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO)(diag)-37, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4SO)(diag)-70, List of Diagnostic Trouble Code (DTC).>	Go to step **2.**
2	**CHECK CONDITION OF CRANKSHAFT POSITION SENSOR.** Turn the ignition switch to OFF.	Is the crankshaft position sensor installation bolt tightened securely?	Go to step **3.**	Tighten crankshaft position sensor installation bolt securely.
3	**CHECK CRANK SPROCKET.** Remove the front belt cover.	Are crank sprocket teeth cracked or damaged?	Replace the crank sprocket. <Ref. to ME(H4SO)-52, Crank Sprocket.>	Go to step **4.**
4	**CHECK INSTALLATION CONDITION OF TIMING BELT.** Turn the crankshaft using ST, and align alignment mark on crank sprocket with alignment mark on cylinder block. ST 499987500 CRANKSHAFT SOCKET	Is the timing belt dislocated from its proper position?	Repair installation condition of timing belt. <Ref. to ME(H4SO)-46, Timing Belt.>	Replace the crankshaft position sensor. <Ref. to FU(H4SO)-28, Crankshaft Position Sensor.>

AK:DTC P0340 CAMSHAFT POSITION SENSOR “A” CIRCUIT (BANK 1 OR SINGLE SENSOR)

DTC DETECTING CONDITION:

Immediately at fault recognition

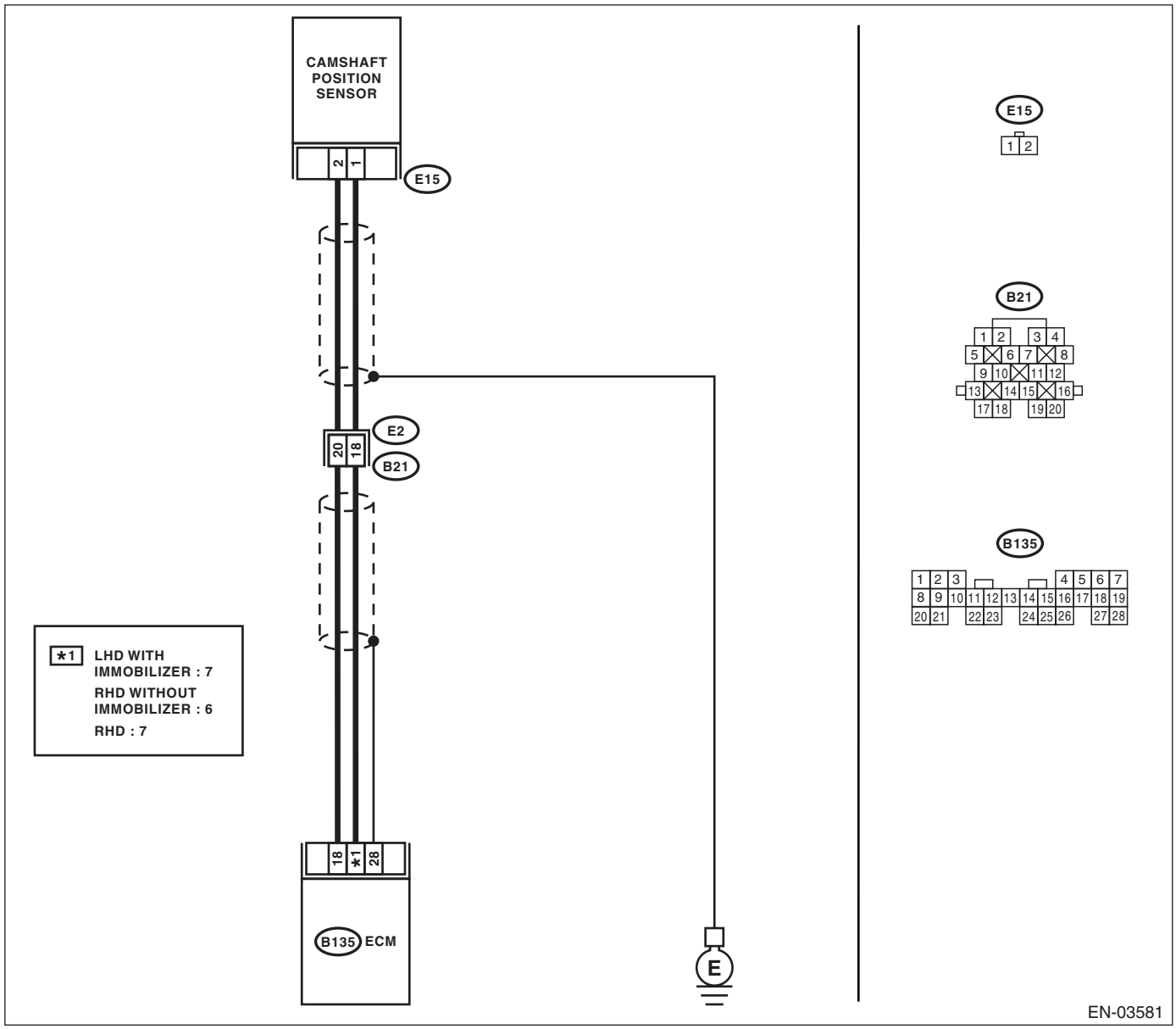
TROUBLE SYMPTOM:

- Engine stalls.
- Failure of engine to start

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO)(diag)-44, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO)(diag)-37, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN CAMSHAFT POSITION SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from camshaft position sensor. 3) Measure the resistance of harness between camshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E15) No. 1 — Engine ground:***	Is the resistance more than 100 kΩ?	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between camshaft position sensor and ECM connector • Poor contact in ECM connector • Poor contact in coupling connector	Go to step **2.**
2	**CHECK HARNESS BETWEEN CAMSHAFT POSITION SENSOR AND ECM CONNECTOR.** Measure the resistance of harness between camshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E15) No. 1 — Engine ground:***	Is the resistance less than 10 Ω?	Repair ground short circuit in harness between camshaft position sensor and ECM connector. NOTE: The harness between both connectors are shielded. Repair ground short circuit in harness together with shield.	Go to step **3.**
3	**CHECK HARNESS BETWEEN CAMSHAFT POSITION SENSOR AND ECM CONNECTOR.** Measure the resistance of harness between camshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E15) No. 2 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **4.**	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between camshaft position sensor and ECM connector • Poor contact in ECM connector • Poor contact in coupling connector
4	**CHECK CONDITION OF CAMSHAFT POSITION SENSOR.**	Is the camshaft position sensor installation bolt tightened securely?	Go to step **5.**	Tighten camshaft position sensor installation bolt securely.
5	**CHECK CAMSHAFT POSITION SENSOR.** 1) Remove the camshaft position sensor. 2) Measure the resistance between connector terminals of camshaft position sensor. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 1 — 4 kΩ?	Repair poor contact in camshaft position sensor connector.	Replace the camshaft position sensor. <Ref. to FU(H4SO)-29, Camshaft Position Sensor.>

AL:DTC P0341 CAMSHAFT POSITION SENSOR “A” CIRCUIT RANGE/PERFORMANCE (BANK 1 OR SINGLE SENSOR)

DTC DETECTING CONDITION:

Immediately at fault recognition

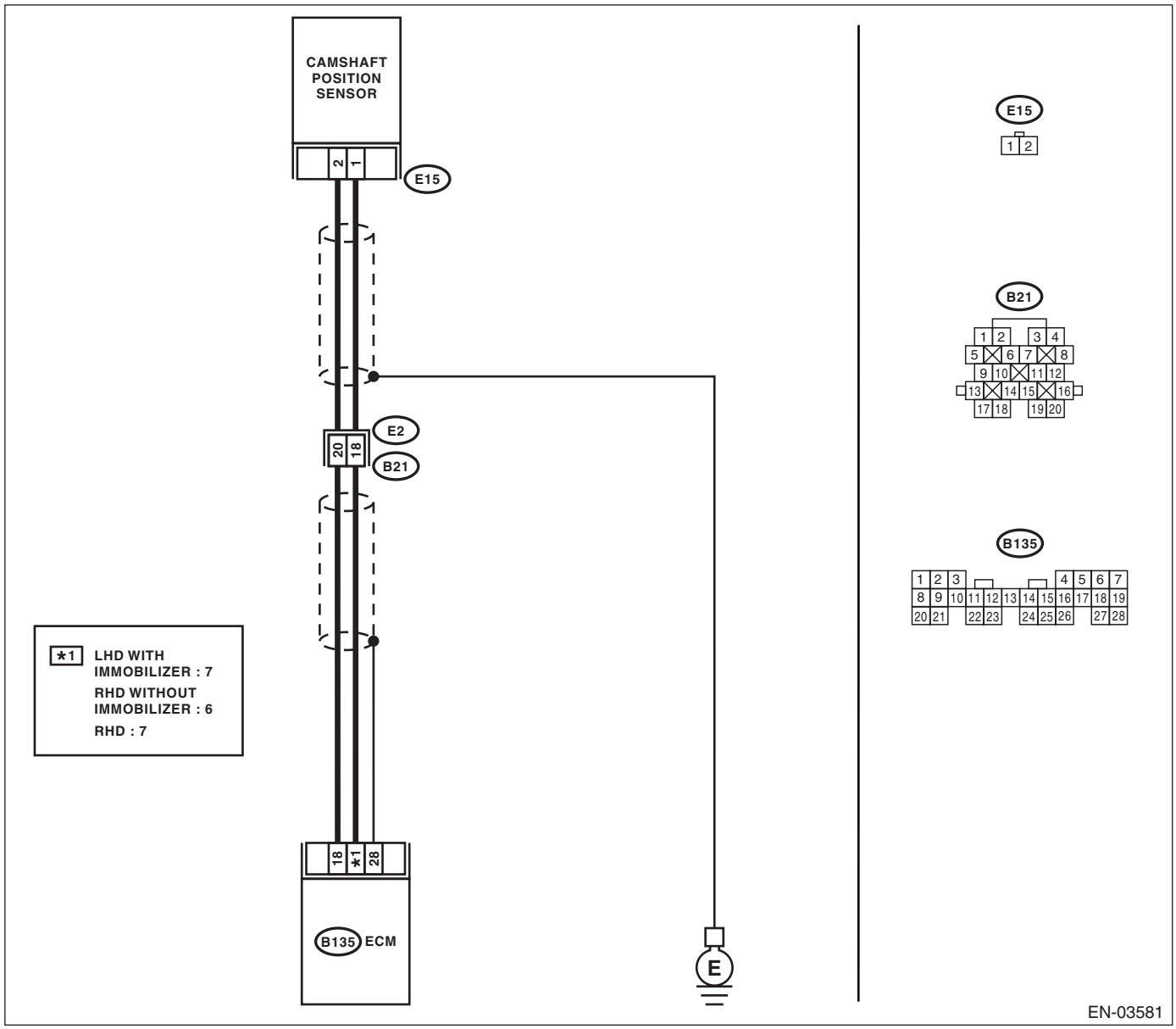
TROUBLE SYMPTOM:

- Engine stalls.
- Failure of engine to start

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO)(diag)-44, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO)(diag)-37, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4SO)(diag)-70, List of Diagnostic Trouble Code (DTC).>	Go to step **2.**
2	**CHECK HARNESS BETWEEN CAMSHAFT POSITION SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from camshaft position sensor. 3) Measure the resistance of harness between camshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E15) No. 1 — Engine ground:***	Is the resistance more than 100 kΩ?	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between camshaft position sensor and ECM connector • Poor contact in ECM connector • Poor contact in coupling connector	Go to step **3.**
3	**CHECK HARNESS BETWEEN CAMSHAFT POSITION SENSOR AND ECM CONNECTOR.** Measure the resistance of harness between camshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E15) No. 1 — Engine ground:***	Is the resistance less than 10 Ω?	Repair ground short circuit in harness between camshaft position sensor and ECM connector. NOTE: The harness between both connectors are shielded. Repair ground short circuit in harness together with shield.	Go to step **4.**
4	**CHECK HARNESS BETWEEN CAMSHAFT POSITION SENSOR AND ECM CONNECTOR.** Measure the resistance of harness between camshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E15) No. 2 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **5.**	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between camshaft position sensor and ECM connector • Poor contact in ECM connector • Poor contact in coupling connector
5	**CHECK CONDITION OF CAMSHAFT POSITION SENSOR.**	Is the camshaft position sensor installation bolt tightened securely?	Go to step **6.**	Tighten camshaft position sensor installation bolt securely.
6	**CHECK CAMSHAFT POSITION SENSOR.** 1) Remove the camshaft position sensor. 2) Measure the resistance between connector terminals of camshaft position sensor. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 1 — 4 kΩ?	Go to step **7.**	Replace the camshaft position sensor. <Ref. to FU(H4SO)-29, Camshaft Position Sensor.>

	Step	Check	Yes	No
7	**CHECK CONDITION OF CAMSHAFT POSITION SENSOR.** Turn the ignition switch to OFF.	Is the camshaft position sensor installation bolt tightened securely?	Go to step **8.**	Tighten camshaft position sensor installation bolt securely.
8	**CHECK CAM SPROCKET.** Remove the front belt cover. <Ref. to ME(H4SO)-45, Timing Belt Cover.>	Are cam sprocket teeth cracked or damaged?	Replace the cam sprocket. <Ref. to ME(H4SO)-51, Cam Sprocket.>	Go to step **9.**
9	**CHECK INSTALLATION CONDITION OF TIMING BELT.** Turn the camshaft using ST, and align alignment mark on cam sprocket with alignment mark on timing belt cover LH. ST 499987500 CRANKSHAFT SOCKET	Is the timing belt dislocated from its proper position?	Repair installation condition of timing belt. <Ref. to ME(H4SO)-46, Timing Belt.>	Replace the camshaft position sensor. <Ref. to FU(H4SO)-29, Camshaft Position Sensor.>

AM:DTC P0400 EXHAUST GAS RECIRCULATION FLOW

DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

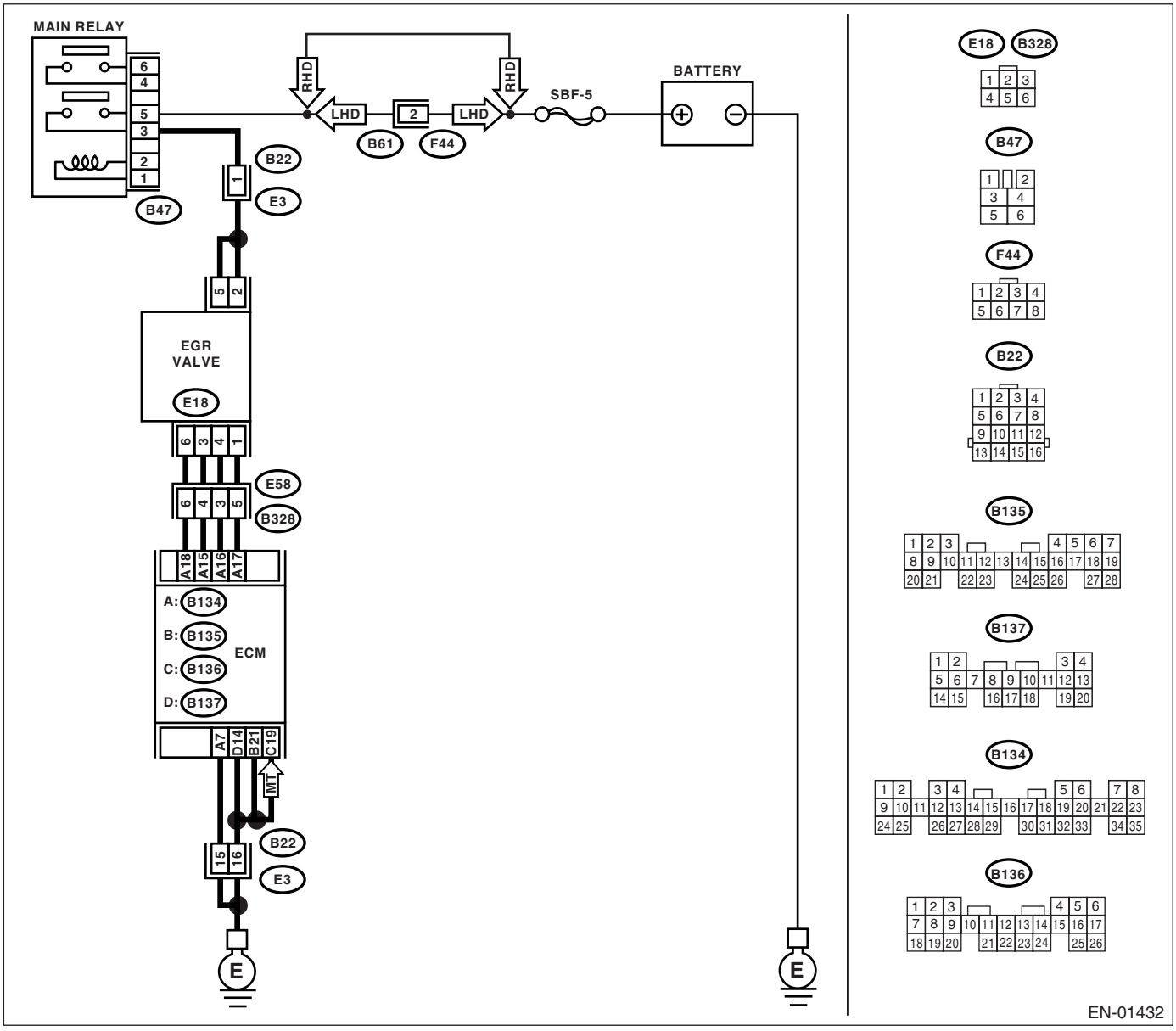
TROUBLE SYMPTOM:

- Poor driving performance on low engine speed
- Erroneous idling
- Poor driving performance.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO)(diag)-44, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO)(diag)-37, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the relevant DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4SO)(diag)-70, List of Diagnostic Trouble Code (DTC).>	Go to step **2.**
2	**CHECK CURRENT DATA.** 1) Start engine. 2) Rear the data of intake manifold absolute pressure signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO)(diag)-30, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the General Scan Tool Instruction Manual.	Is the measured value more than 53.3 kPa (400 mmHg, 15.75 inHg)?	Check if EGR valve, intake manifold pressure sensor and throttle body are securely installed.	Go to step **3.**
3	**CHECK POWER SUPPLY TO EGR SOLENOID VALVE.** 1) Disconnect the connector from EGR solenoid valve. 2) Turn the ignition switch to ON. 3) Measure the voltage between EGR solenoid valve and engine ground. ***Connector & terminal*** ***(E18) No. 2 (+) — Engine ground (−):*** ***(E18) No. 5 (+) — Engine ground (−):***	Is the voltage more than 10 V?	Go to step **4.**	Repair the open circuit in harness between main relay and EGR solenoid valve connector.
4	**CHECK EGR SOLENOID VALVE.** Measure the resistance between EGR solenoid valve terminals. NOTE: Make sure there are no foreign objects caught between EGR solenoid valve and valve seat. ***Terminals*** ***No. 1 — No. 2:*** ***No. 3 — No. 2:*** ***No. 4 — No. 5:*** ***No. 6 — No. 5:***	In the resistance 20 — 30 Ω?	Go to step **5.**	Replace the EGR solenoid valve. <Ref. to EC(H4SO)-5, EGR Valve.>
5	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn the ignition switch to OFF. 2) Connect the connectors to ECM and EGR solenoid valve. 3) Turn the ignition switch to ON. 4) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 15 (+) — Chassis ground (−):*** ***(B134) No. 16 (+) — Chassis ground (−):*** ***(B134) No. 17 (+) — Chassis ground (−):*** ***(B134) No. 18 (+) — Chassis ground (−):***	Is the voltage 0 — 10 V?	Repair the poor contact in ECM connector.	Go to step **6.**

	Step	Check	Yes	No
6	**CHECK HARNESS BETWEEN EGR SOLENOID VALVE AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from EGR solenoid valve and ECM. 3) Measure the resistance of harness between EGR solenoid valve and ECM connector. ***Connector & terminal*** ***(B134) No. 18 — (E18) No. 6:*** ***(B134) No. 17 — (E18) No. 1:*** ***(B134) No. 16 — (E18) No. 4:*** ***(B134) No. 15 — (E18) No. 3:***	Is the resistance less than 1 Ω?	Go to step **7.**	Repair the open circuit in harness between ECM and EGR solenoid valve connector.
7	**CHECK HARNESS BETWEEN EGR SOLENOID VALVE AND ECM CONNECTOR.** Measure the resistance of harness between EGR solenoid valve and chassis ground. ***Connector & terminal*** ***(B134) No. 15 — Chassis ground:*** ***(B134) No. 16 — Chassis ground:*** ***(B134) No. 17 — Chassis ground:*** ***(B134) No. 18 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **8.**	Repair the short circuit in harness between main relay and EGR solenoid valve connector.
8	**CHECK POOR CONTACT.** Check the poor contact in ECM and EGR solenoid valve connector.	Is there poor contact in ECM and EGR solenoid valve connector?	Repair the poor contact in ECM and EGR solenoid valve connector.	Even if malfunction indicator light lights up, the circuit has returned to a normal condition at this time.

AN:DTC P0420 CATALYST SYSTEM EFFICIENCY BELOW THRESHOLD (BANK 1)

DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

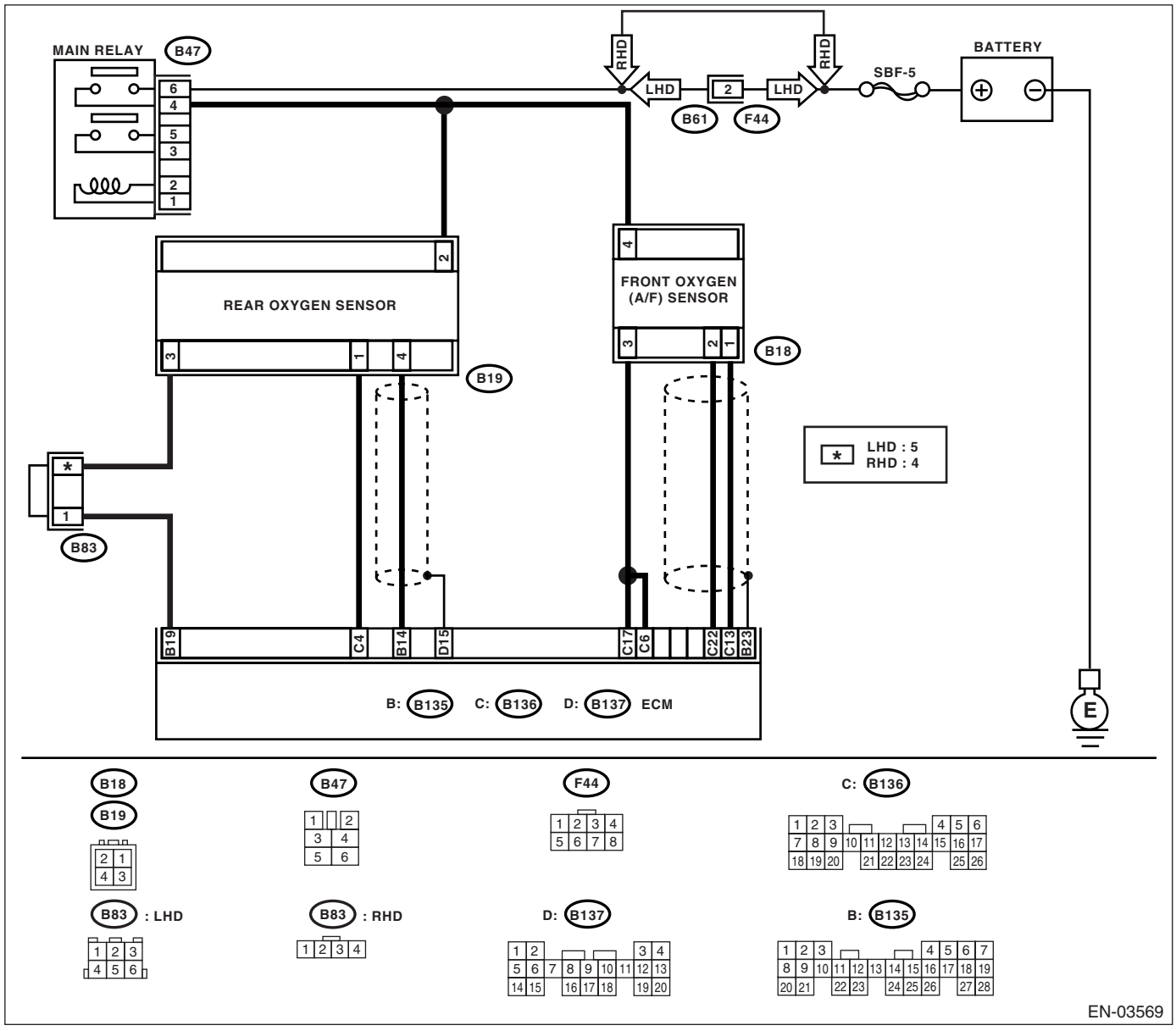
TROUBLE SYMPTOM:

- Engine stalls.
- Idle mixture is out of specifications.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO)(diag)-44, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO)(diag)-37, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK FOR ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the relevant DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4SO)(diag)-70, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0420.	Go to step **2.**
2	**CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and rear oxygen sensor. 3) Measure the resistance of harness between ECM and rear oxygen sensor connector. ***Connector & terminal*** ***(B135) No. 14 — (B19) No. 4:*** ***(B135) No. 19 — (B19) No. 3:***	Is the resistance less than 1 Ω?	Go to step **3.**	Repair open circuit in harness between ECM and rear oxygen sensor connector.
3	**CHECK HARNESS BETWEEN REAR OXYGEN SENSOR AND ECM CONNECTOR.** Measure the resistance between rear oxygen sensor harness connector and chassis ground. ***Connector & terminal*** ***(B137) No. 15 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair open circuit in harness between ECM and rear oxygen sensor connector.
4	**CHECK EXHAUST SYSTEM.** Check for gas leaks or air suction caused by loose or dislocated nuts and bolts, and open hole at exhaust pipes. NOTE: Check the following positions. • Between cylinder head and front exhaust pipe • Between front exhaust pipe and front catalytic converter • Between front catalytic converter and rear catalytic converter	Is there a fault in exhaust system?	Repair or replace the exhaust system. <Ref. to EX(H4SO)-2, General Description.>	Go to step **5.**
5	**CHECK CATALYTIC CONVERTER.**	Is there damage at rear face or front face of front catalyst?	Replace the catalytic converter. <Ref. to EC(H4SO)-3, Front Catalytic Converter.>	Contact with SUBARU distributor service.

AO:DTC P0458 EVAPORATIVE EMISSION SYSTEM PURGE CONTROL VALVE CIRCUIT LOW

DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

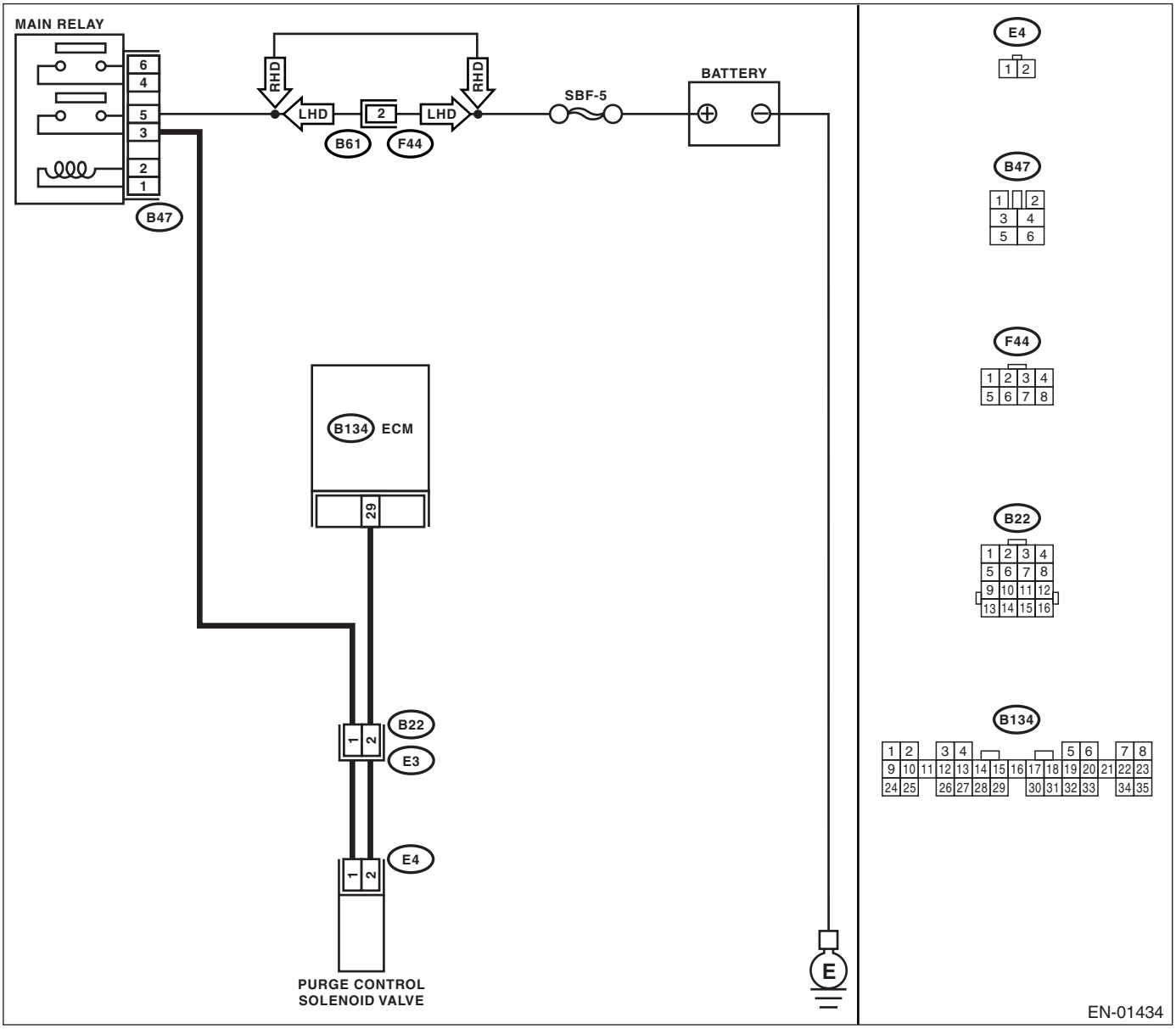
TROUBLE SYMPTOM:

Erroneous idling

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO)(diag)-44, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO)(diag)-37, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 29 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Even if malfunction indicator light lights up, the circuit has returned to a normal condition at this time. Contact with SUBARU distributor service.	Go to step **2.**
2	**CHECK HARNESS BETWEEN PURGE CONTROL SOLENOID VALVE AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from purge control solenoid valve and ECM. 3) Measure the resistance of harness between purge control solenoid valve connector and engine ground. ***Connector & terminal*** ***(E4) No. 2 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **3.**	Repair ground short circuit in harness between ECM and purge control solenoid valve connector.
3	**CHECK HARNESS BETWEEN PURGE CONTROL SOLENOID VALVE AND ECM CONNECTOR.** Measure the resistance of harness between ECM and purge control solenoid valve of harness connector. ***Connector & terminal*** ***(B134) No. 29 — (E4) No. 2:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair open circuit in harness between ECM and purge control solenoid valve connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and purge control solenoid valve connector • Poor contact in coupling connector
4	**CHECK PURGE CONTROL SOLENOID VALVE.** 1) Remove the purge control solenoid valve. 2) Measure the resistance between purge control solenoid valve terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 10 — 100 Ω?	Go to step **5.**	Replace the purge control solenoid valve. <Ref. to EC(H4SO)-7, Purge Control Solenoid Valve.>
5	**CHECK POWER SUPPLY TO PURGE CONTROL SOLENOID VALVE.** 1) Turn the ignition switch to ON. 2) Measure the voltage between purge control solenoid valve and engine ground. ***Connector & terminal*** ***(E4) No. 1 (+) — Engine ground (−):***	Is the voltage more than 10 V?	Go to step **6.**	Repair open circuit in harness between main relay and purge control solenoid valve connector.
6	**CHECK POOR CONTACT.** Check poor contact in purge control solenoid valve connector.	Is there poor contact in purge control solenoid valve connector?	Repair poor contact in purge control solenoid valve connector.	Contact with SUBARU distributor service.

AP:DTC P0459 EVAPORATIVE EMISSION SYSTEM PURGE CONTROL VALVE CIRCUIT HIGH

DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

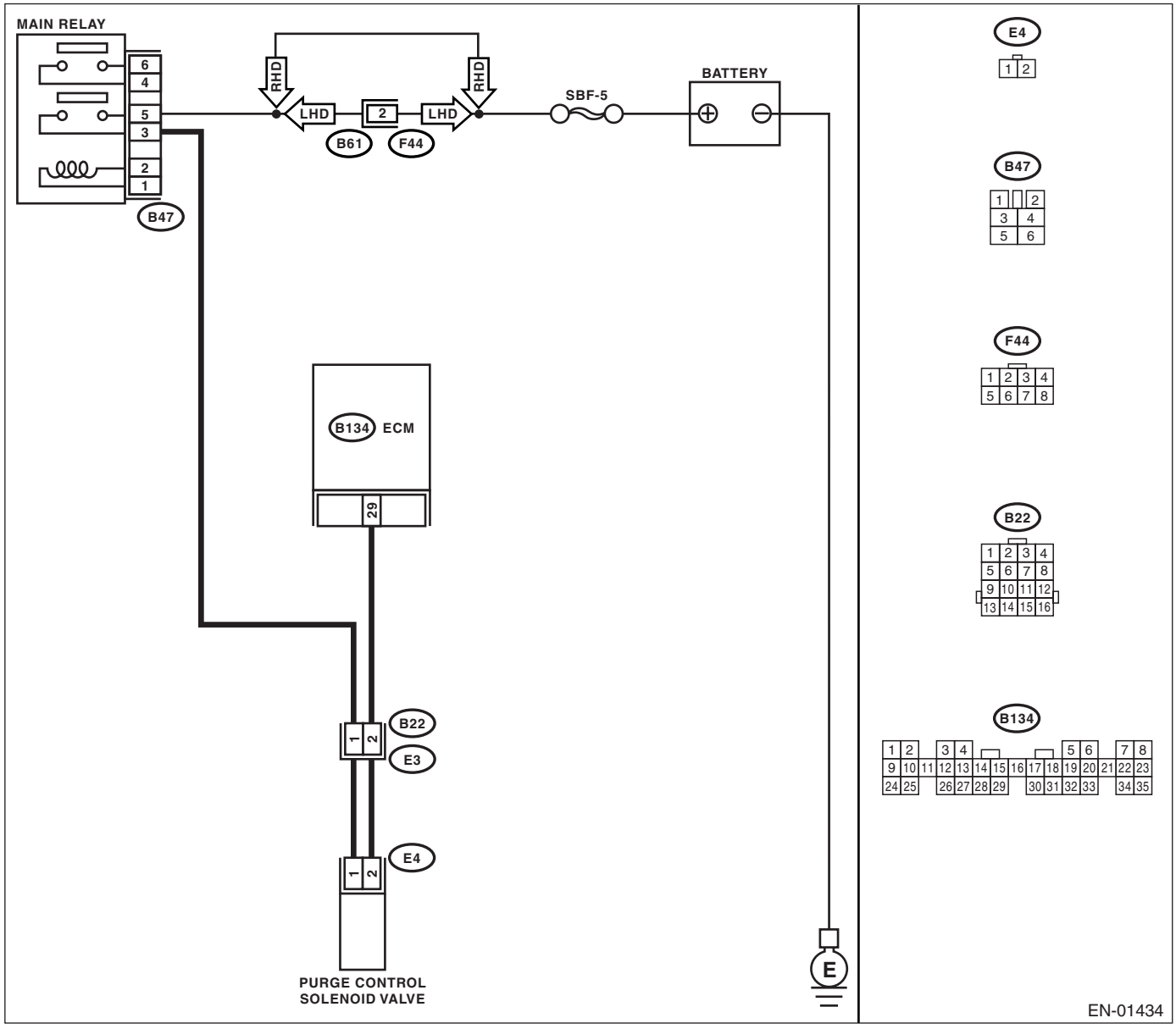
TROUBLE SYMPTOM:

Erroneous idling

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO)(diag)-44, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO)(diag)-37, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn the ignition switch to OFF. 2) Connect the test mode connector at the lower portion of instrument panel (on the driver's side). 3) Turn the ignition switch to ON. 4) While operating the purge control solenoid valve, measure voltage between ECM and chassis ground. NOTE: Purge control solenoid valve operation can be executed using Subaru Select Monitor. For procedure, refer to "Compulsory Valve Operation Check Mode". <Ref. to EN(H4SO)(diag)-45, Compulsory Valve Operation Check Mode.> ***Connector & terminal*** ***(B134) No. 29 (+) — Chassis ground (–):***	Is the voltage 0 — 10 V?	Go to step **2.**	Even if malfunction indicator light light up, the circuit has returned to a normal condition at this time. In this case, repair poor contact in ECM connector.
2	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 29 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **4.**	Go to step **3.**
3	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H4SO)-47, Engine Control Module (ECM).>
4	**CHECK HARNESS BETWEEN PURGE CONTROL SOLENOID VALVE AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from purge control solenoid valve. 3) Turn the ignition switch to ON. 4) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 29 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Repair battery short circuit in harness between ECM and purge control solenoid valve connector. After repair, replace the ECM. <Ref. to FU(H4SO)-47, Engine Control Module (ECM).>	Go to step **5.**
5	**CHECK PURGE CONTROL SOLENOID VALVE.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between purge control solenoid valve terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance less than 1 Ω?	Replace the purge control solenoid valve <Ref. to EC(H4SO)-7, Purge Control Solenoid Valve.> and ECM <Ref. to FU(H4SO)-47, Engine Control Module (ECM).>	Go to step **6.**
6	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H4SO)-47, Engine Control Module (ECM).>

AQ:DTC P0462 FUEL LEVEL SENSOR “A” CIRCUIT LOW

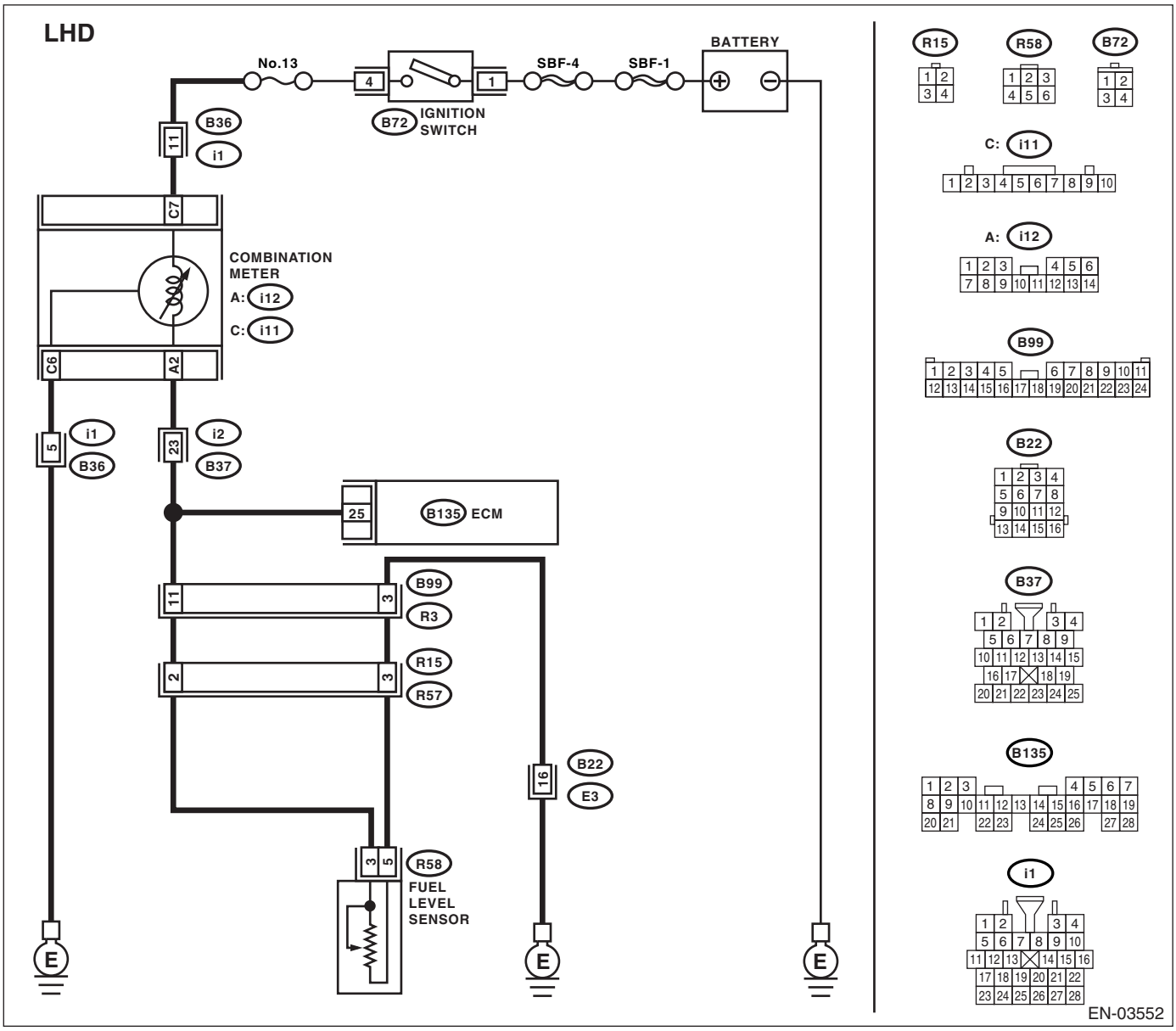
DTC DETECTING CONDITION:

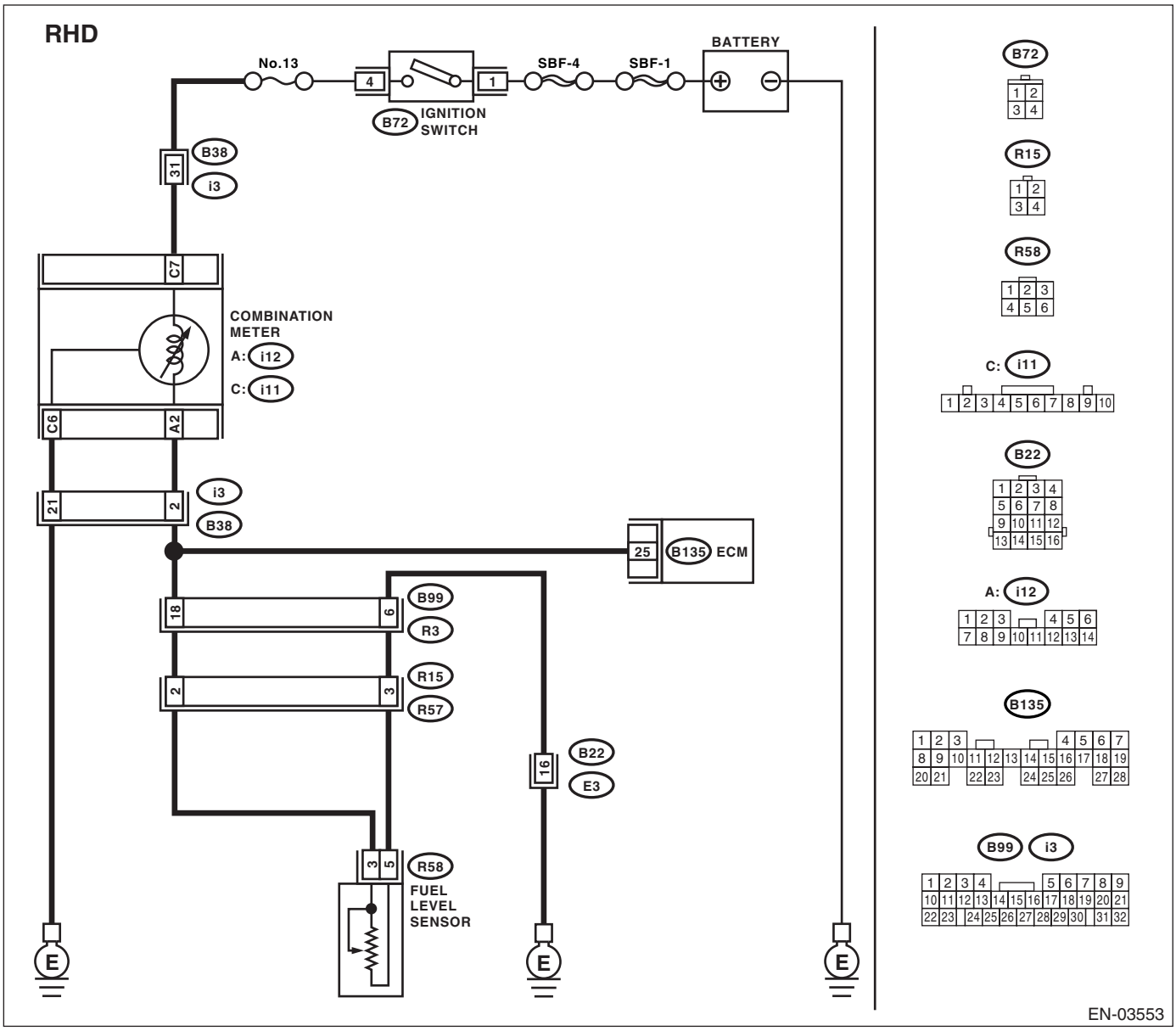
Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO)(diag)-44, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO)(diag)-37, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:





Step		Check	Yes	No
1	**CHECK SPEEDOMETER AND TACHOMETER OPERATION IN COMBINATION METER.**	Does the speedometer and tachometer operate normally?	Go to step **2.**	Repair or replace the combination meter. <Ref. to IDI-3, Combination Meter System.>
2	**CHECK INPUT SIGNAL FOR ECM.** 1) Turn the ignition switch to ON. (Engine OFF) 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 25 (+) — Chassis ground (−):***	Is the voltage less than 0.12 V?	Go to step **4.**	Go to step **3.**

	Step	Check	Yes	No
3	**CHECK INPUT SIGNAL FOR ECM. (USING SUBARU SELECT MONITOR.)** Read the data of fuel level sensor signal using Subaru Select Monitor. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO)(diag)-30, Subaru Select Monitor.>	Is the voltage less than 0.12 V by shaking the harness and connector of ECM?	Repair poor contact in ECM connector.	Even if malfunction indicator light lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector may be the cause. NOTE: In this case, repair the following: • Poor contact in combination meter connector • Poor contact in ECM connector • Poor contact in coupling connectors
4	**CHECK INPUT VOLTAGE OF ECM.** 1) Turn the ignition switch to OFF. 2) Separate fuel tank cord connector (R57) and rear wiring harness connector (R15). 3) Turn the ignition switch to ON. 4) Measure the voltage of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 25 (+) — Chassis ground (−):***	Is the voltage more than 0.12 V?	Go to step **5.**	Go to step **6.**
5	**CHECK HARNESS BETWEEN ECM AND COMBINATION METER.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from connector (i11) and ECM connector. 3) Measure the resistance between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 25 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **7.**	Repair ground short circuit in harness between ECM and combination meter connector.
6	**CHECK HARNESS BETWEEN ECM AND COMBINATION METER.** Measure the resistance between ECM and combination meter connector. ***Connector & terminal*** ***(B135) No. 25 — (i12) No. 2:***	Is the resistance less than 10 Ω?	Repair or replace the combination meter. <Ref. to IDI-3, Combination Meter System.>	Repair open circuit between ECM and combination meter connector. NOTE: In this case, repair the following: Poor contact in coupling connector
7	**CHECK FUEL TANK CORD.** 1) Disconnect the connector from fuel pump assembly. 2) Measure the resistance between fuel pump assembly and chassis ground. ***Connector & terminal*** ***(R58) No. 3 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **8.**	Repair ground short circuit in fuel tank cord.

Step		Check	Yes	No
8	**CHECK FUEL LEVEL SENSOR.** 1) Remove the fuel pump assembly. <Ref. to FU(H4SO)-57, Fuel Pump.> 2) Measure the resistance between fuel level sensor and terminals with its float set to the full position. ***Terminals*** ***No. 3 — No. 5:***	Is the resistance 0.5 — 2.5 Ω?	Repair poor contact in harness between ECM and combination meter connector.	Replace the fuel level sensor.

AR:DTC P0463 FUEL LEVEL SENSOR “A” CIRCUIT HIGH

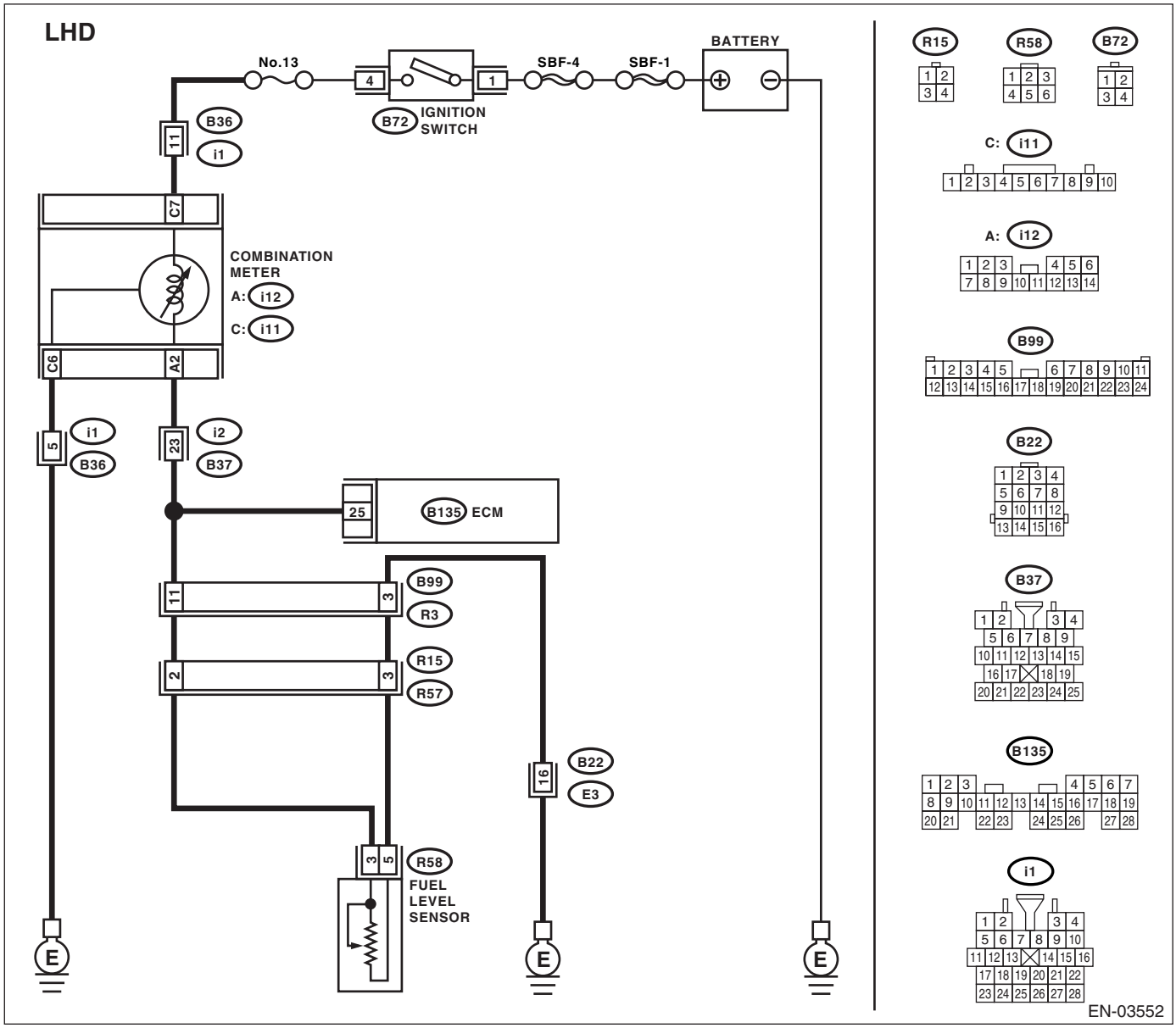
DTC DETECTING CONDITION:

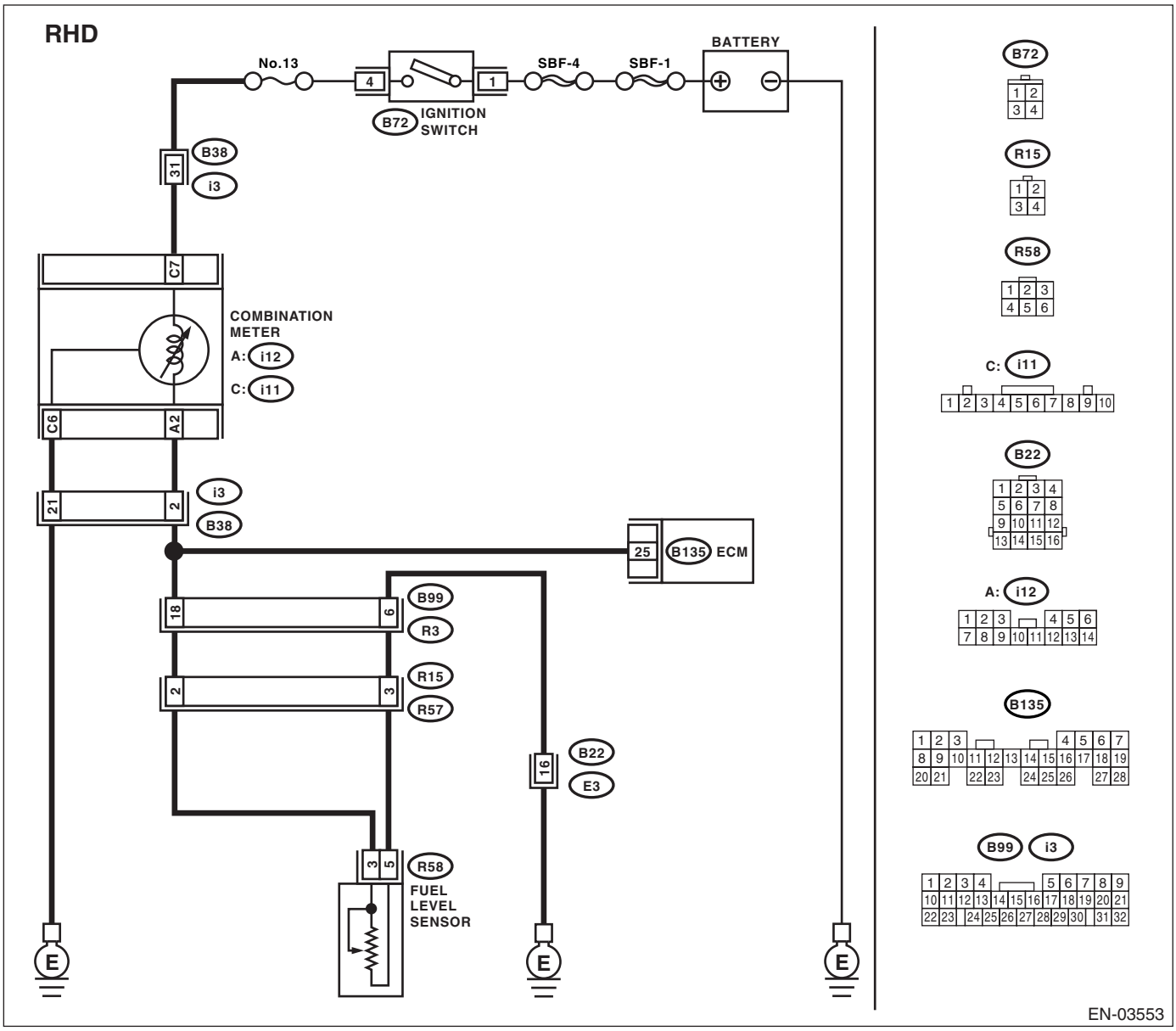
Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO)(diag)-44, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO)(diag)-37, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:





Step		Check	Yes	No
1	**CHECK SPEEDOMETER AND TACHOMETER OPERATION IN COMBINATION METER.**	Does the speedometer and tachometer operate normally?	Go to step **2.**	Repair or replace the combination meter. <Ref. to IDI-3, Combination Meter System.>

	Step	Check	Yes	No
2	**CHECK INPUT SIGNAL FOR ECM.** 1) Turn the ignition switch to ON. (Engine OFF) 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 25 (+) — Chassis ground (−):***	Is the voltage more than 4.75 V?	Go to step **3.**	Even if malfunction indicator light lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector may be the cause. NOTE: In this case, repair the following: • Poor contact in fuel pump connector • Poor contact in coupling connector
3	**CHECK INPUT VOLTAGE OF ECM.** 1) Turn the ignition switch to OFF. 2) Disconnect the combination meter connector (i12) and ECM connector. 3) Turn the ignition switch to ON. 4) Measure the voltage of harness between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 25 (+) — Chassis ground (−):***	Is the voltage more than 4.75 V?	Go to step **4.**	Repair battery short circuit between ECM and combination meter connector.
4	**CHECK HARNESS BETWEEN ECM AND FUEL TANK CORD.** 1) Turn the ignition switch to OFF. 2) Separate fuel tank cord connector (R57) and rear wiring harness connector (R15). 3) Measure the resistance between ECM and fuel tank cord. ***Connector & terminal*** ***(B135) No. 25 — (R15) No. 2:***	Is the resistance less than 5 Ω?	Go to step **5.**	Repair open circuit between ECM and fuel tank cord.
5	**CHECK HARNESS BETWEEN FUEL TANK CORD AND CHASSIS GROUND.** Measure the resistance between fuel tank cord and chassis ground. ***Connector & terminal*** ***(R15) No. 3 — Chassis ground:***	Is the resistance less than 5 Ω?	Go to step **6.**	Repair open circuit between fuel tank cord and chassis ground. NOTE: In this case, repair the following: Poor contact in coupling connectors
6	**CHECK FUEL TANK CORD.** 1) Disconnect the connector from fuel level sensor. 2) Measure the resistance between fuel level sensor and coupling connector. ***Connector & terminal*** ***(R57) No. 3 — (R58) No. 5:***	Is the resistance less than 10 Ω?	Go to step **7.**	Repair open circuit between coupling connector and fuel level sensor.
7	**CHECK FUEL TANK CORD.** Measure the resistance between fuel level sensor and coupling connector. ***Connector & terminal*** ***(R57) No. 2 — (R58) No. 3:***	Is the resistance less than 10 Ω?	Go to step **8.**	Repair open circuit between coupling connector and fuel level sensor.

	Step	Check	Yes	No
8	**CHECK FUEL LEVEL SENSOR.** 1) Remove the fuel pump assembly. <Ref. to FU(H4SO)-57, Fuel Pump.> 2) While moving the fuel level sensor float up and down, measure resistance between fuel level sensor terminals. ***Terminals*** ***No. 3 — No. 5:***	Is the resistance more than 54.5 Ω?	Replace the fuel level sensor. <Ref. to FU(H4SO)-59, Fuel Level Sensor.>	Replace the combination meter. <Ref. to IDI-12, Combination Meter.>

AS:DTC P0483 FAN RATIONALITY CHECK

DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

TROUBLE SYMPTOM:

- Occurrence of noise
- Overheating

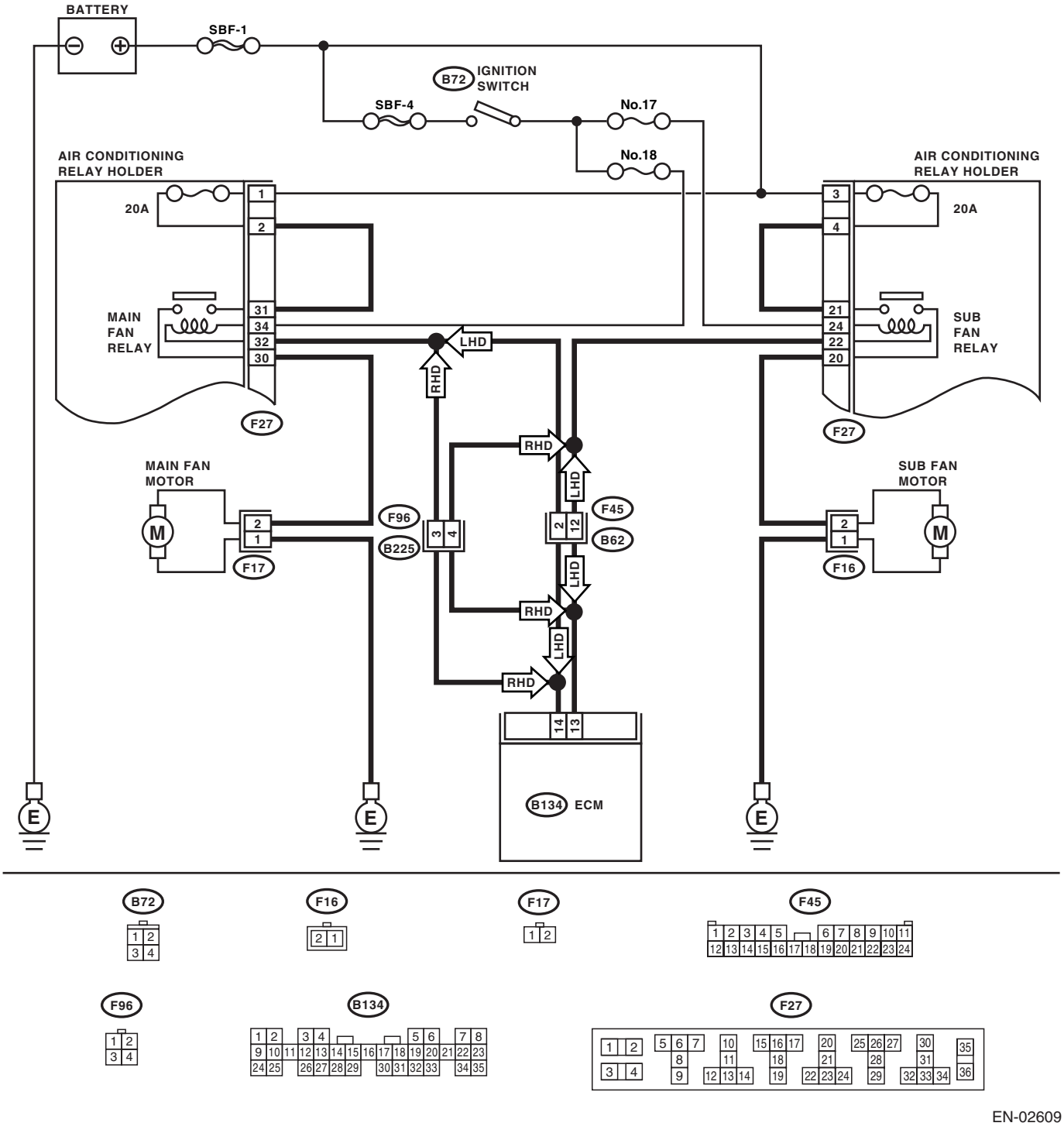
CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO)(diag)-44, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO)(diag)-37, PROCEDURE, Inspection Mode.>.

NOTE:

If the vehicle, with the engine idling, is placed very close to a wall or another vehicle, preventing normal cooling function, the OBD system may detect malfunction.

WIRING DIAGRAM:



EN-02609

Step		Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the relevant DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4SO)(diag)-70, List of Diagnostic Trouble Code (DTC).>	Check the radiator fan motor connector for connecting condition. If connected securely, check radiator fan and fan motor. <Ref. to CO(H4SO)-26, Radiator Main Fan and Fan Motor.> and <Ref. to CO(H4SO)-28, Radiator Sub Fan and Fan Motor.>

AT:DTC P0502 VEHICLE SPEED SENSOR "A" CIRCUIT LOW INPUT

NOTE:
For the diagnostic procedure, refer to DTC P0503. <Ref. to EN(H4SO)(diag)-179, DTC P0503 VEHICLE SPEED SENSOR "A" INTERMITTENT/ERRATIC/HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AU:DTC P0503 VEHICLE SPEED SENSOR “A” INTERMITTENT/ERRATIC/HIGH

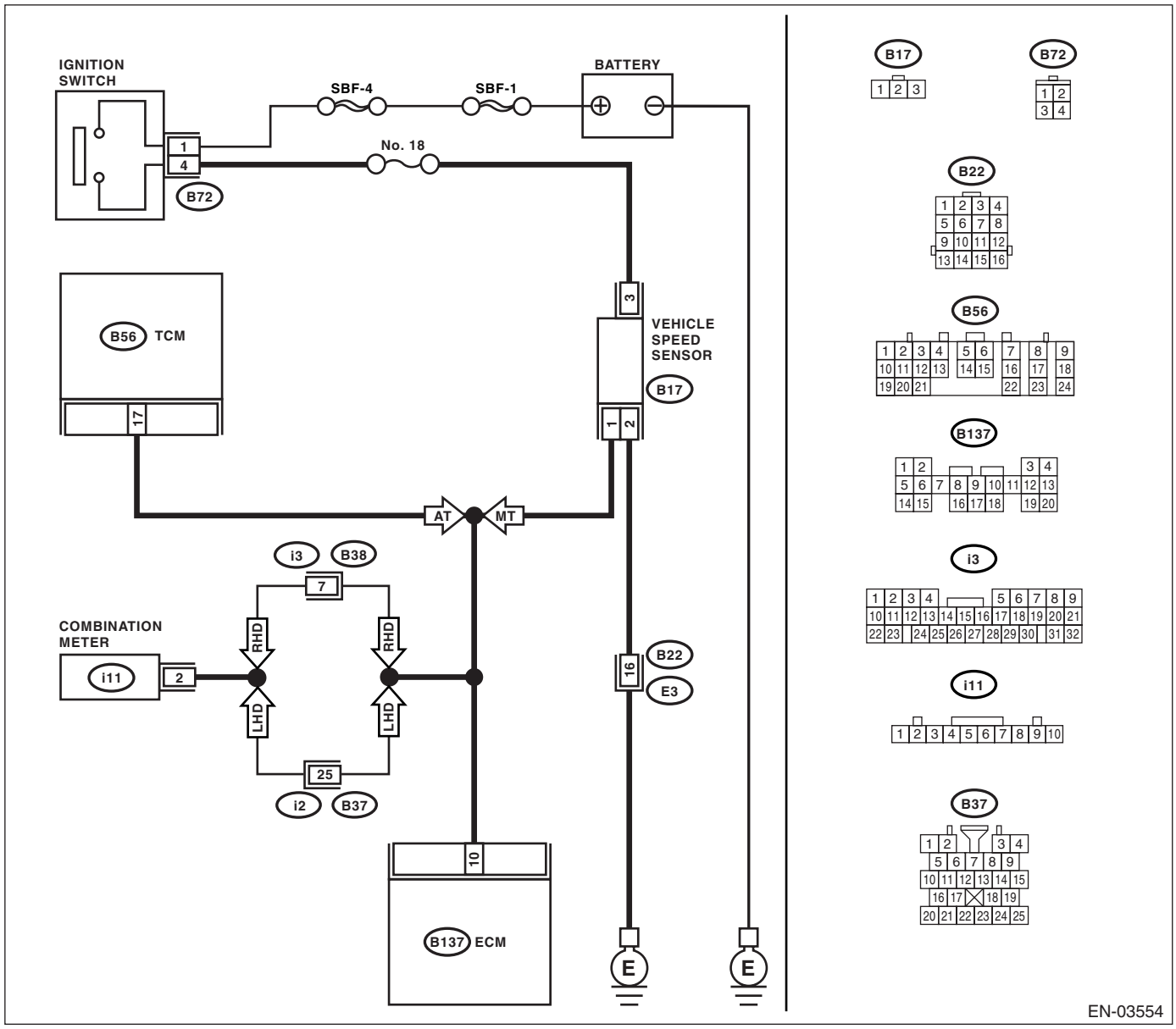
DTC DETECTING CONDITION:

Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO)(diag)-44, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO)(diag)-37, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK TRANSMISSION TYPE.**	Is the target AT model?	Go to step **2.**	Go to step **3.**
2	**CHECK DTC P0720 ON DISPLAY.**	Does the Subaru Select Monitor or general scan tool indicate DTC P0720?	Check front vehicle speed sensor signal circuit. <Ref. to 4AT(diag)-49, DTC 33 FRONT VEHICLE SPEED SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Go to step **3.**
3	**CHECK SPEEDOMETER OPERATION IN COMBINATION METER.**	Does the speedometer operate normally?	Go to step **4.**	Check speedometer and vehicle speed sensor. <Ref. to IDI-16, Speedometer.> and <Ref. to 4AT-57, Front Vehicle Speed Sensor.> and <Ref. to 4AT-61, Rear Vehicle Speed Sensor.> and <Ref. to 4AT-62, Torque Converter Turbine Speed Sensor.>
4	**CHECK HARNESS BETWEEN ECM AND COMBINATION METER CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from combination meter. 3) Measure the resistance between ECM and combination meter. ***Connector & terminal*** ***(B137) No. 10 — (i11) No. 2:***	Is the resistance less than 10 Ω?	Repair poor contact in ECM connector.	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and combination meter connector • Poor contact in ECM connector • Poor contact in combination meter connector • Poor contact in coupling connector

AV:DTC P0506 IDLE AIR CONTROL SYSTEM RPM LOWER THAN EXPECTED

DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

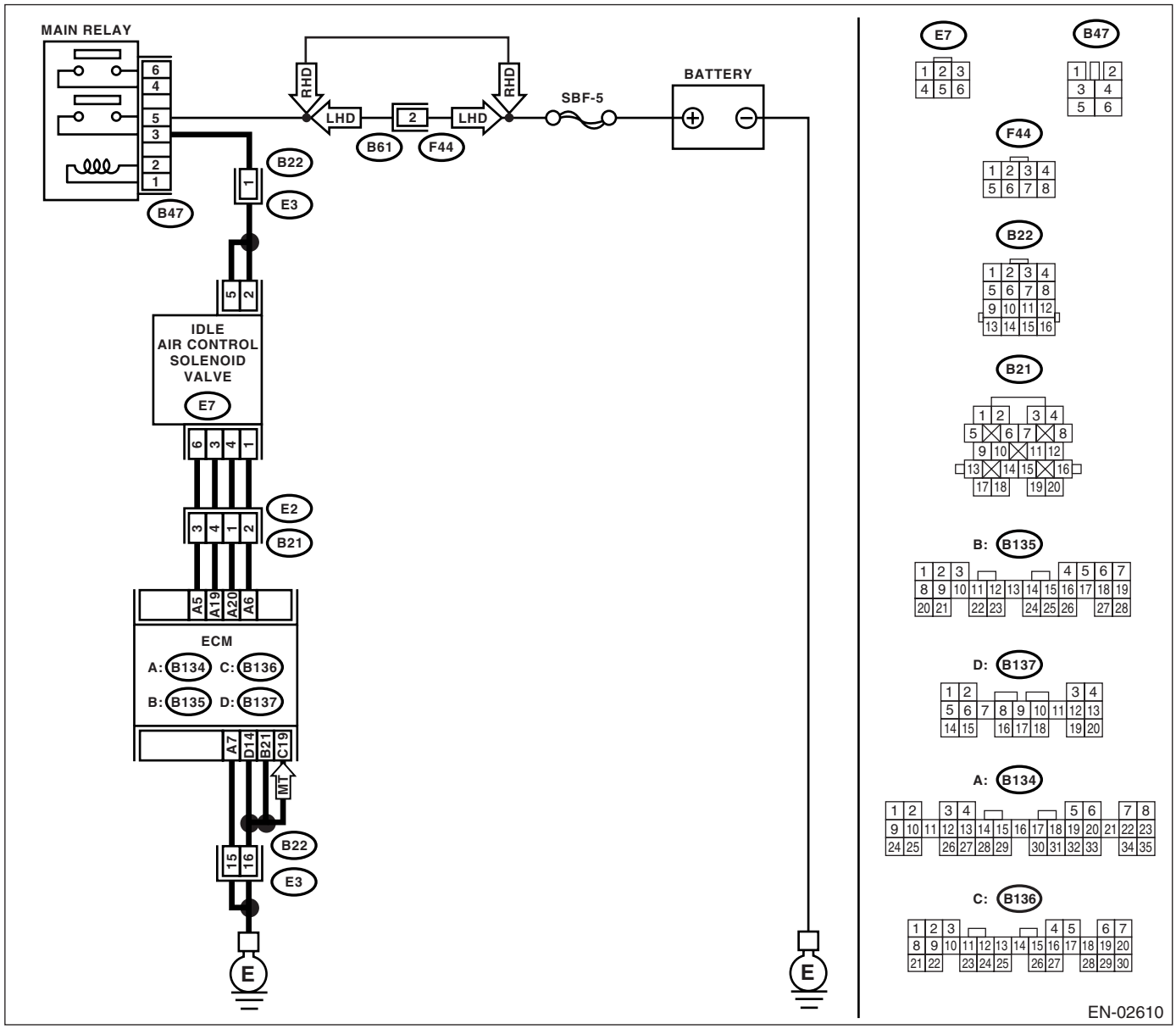
TROUBLE SYMPTOM:

- Engine is difficult to start.
- Engine does not start.
- Erroneous idling
- Engine stalls.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO)(diag)-44, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO)(diag)-37, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4SO)(diag)-70, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0506.	Go to step **2.**
2	**CHECK AIR BY-PASS LINE.** 1) Turn the ignition switch to OFF. 2) Remove the idle air control solenoid valve from throttle body. <Ref. to FU(H4SO)-35, REMOVAL, Idle Air Control Solenoid Valve.> 3) Remove the throttle body from intake manifold. <Ref. to FU(H4SO)-15, REMOVAL, Throttle Body.> 4) Using compression air, force air into the idle air control solenoid valve installation area. Confirm that forced air subsequently escapes from throttle body interior.	Does air flow out?	Replace the idle air control solenoid valve. <Ref. to FU(H4SO)-35, INSTALLATION, Idle Air Control Solenoid Valve.>	Replace the throttle body. <Ref. to FU(H4SO)-15, INSTALLATION, Throttle Body.>

AW:DTC P0507 IDLE AIR CONTROL SYSTEM RPM HIGHER THAN EXPECTED

DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

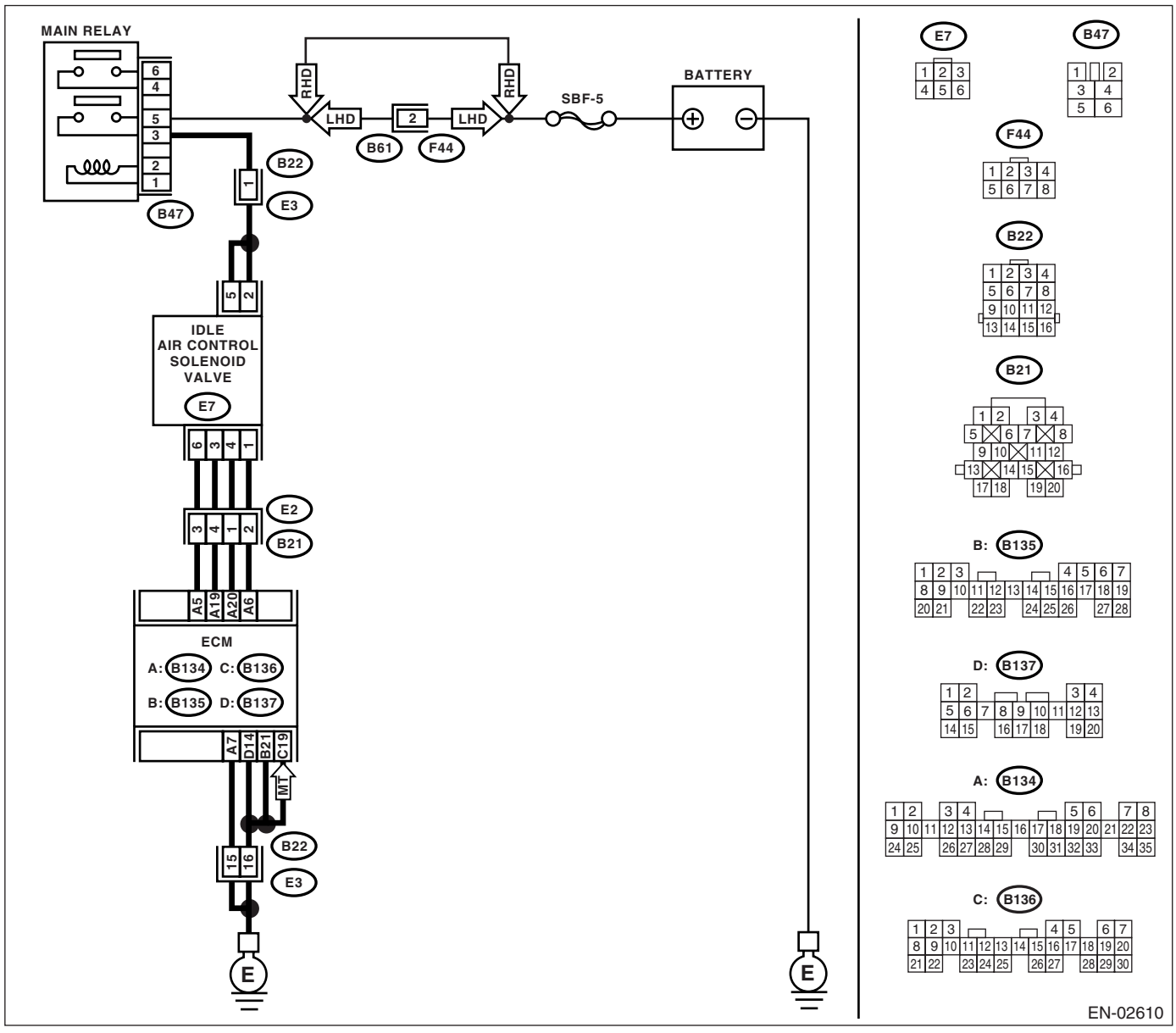
TROUBLE SYMPTOM:

Engine keeps running at higher revolution than specified idling revolution.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO)(diag)-44, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO)(diag)-37, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4SO)(diag)-70, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0507.	Go to step **2.**
2	**CHECK AIR INTAKE SYSTEM.** 1) Turn the ignition switch to ON. 2) Start the engine, and idle it. 3) Check the following items. • Loose installation of intake manifold, idle air control solenoid valve and throttle body • Cracks of intake manifold gasket, idle air control solenoid valve gasket and throttle body gasket • Disconnections of vacuum hoses	Is there a fault in air intake system?	Repair air suction and leaks.	Go to step **3.**
3	**CHECK THROTTLE CABLE.**	Is throttle cable play correct?	Go to step **4.**	Adjust throttle cable. <Ref. to SP(H4SO)-9, INSTALLATION, Accelerator Control Cable.>
4	**CHECK AIR BY-PASS LINE.** 1) Turn the ignition switch to OFF. 2) Remove the idle air control solenoid valve from throttle body. <Ref. to FU(H4SO)-35, REMOVAL, Idle Air Control Solenoid Valve.> 3) Confirm that there are no foreign particles in air by-pass line.	Is air by-pass line clogged by foreign particles?	Remove foreign particles from air by-pass line.	Replace the idle air control solenoid valve. <Ref. to FU(H4SO)-35, INSTALLATION, Idle Air Control Solenoid Valve.>

AX:DTC P0512 STARTER REQUEST CIRCUIT

DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

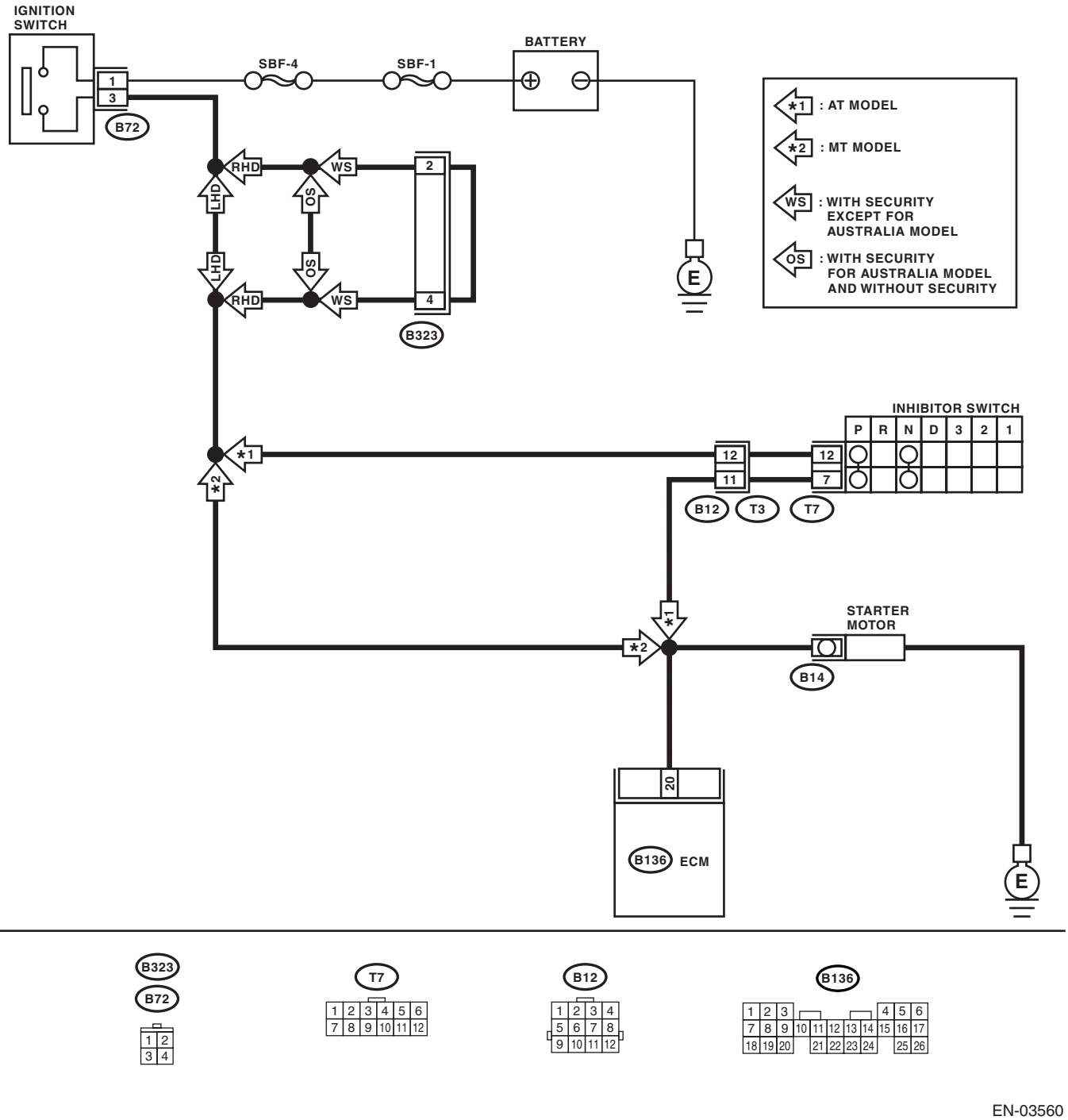
TROUBLE SYMPTOM:

Failure of engine to start

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO)(diag)-44, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO)(diag)-37, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



EN-03560

Step		Check	Yes	No
1	**CHECK OPERATION OF STARTER MOTOR.** Turn the ignition switch to ON. NOTE: Place the inhibitor switch in each position. (AT model) Depress or release the clutch pedal. (MT model)	Dose the starter motor operate?	Repair battery short circuit in starter motor circuit.	Check starter motor circuit. <Ref. to EN(H4SO)(diag)-57, STARTER MOTOR CIRCUIT, Diagnostics for Engine Starting Failure.>

AY:DTC P0519 IDLE AIR CONTROL SYSTEM PERFORMANCE

DTC DETECTING CONDITION:

Immediately at fault recognition

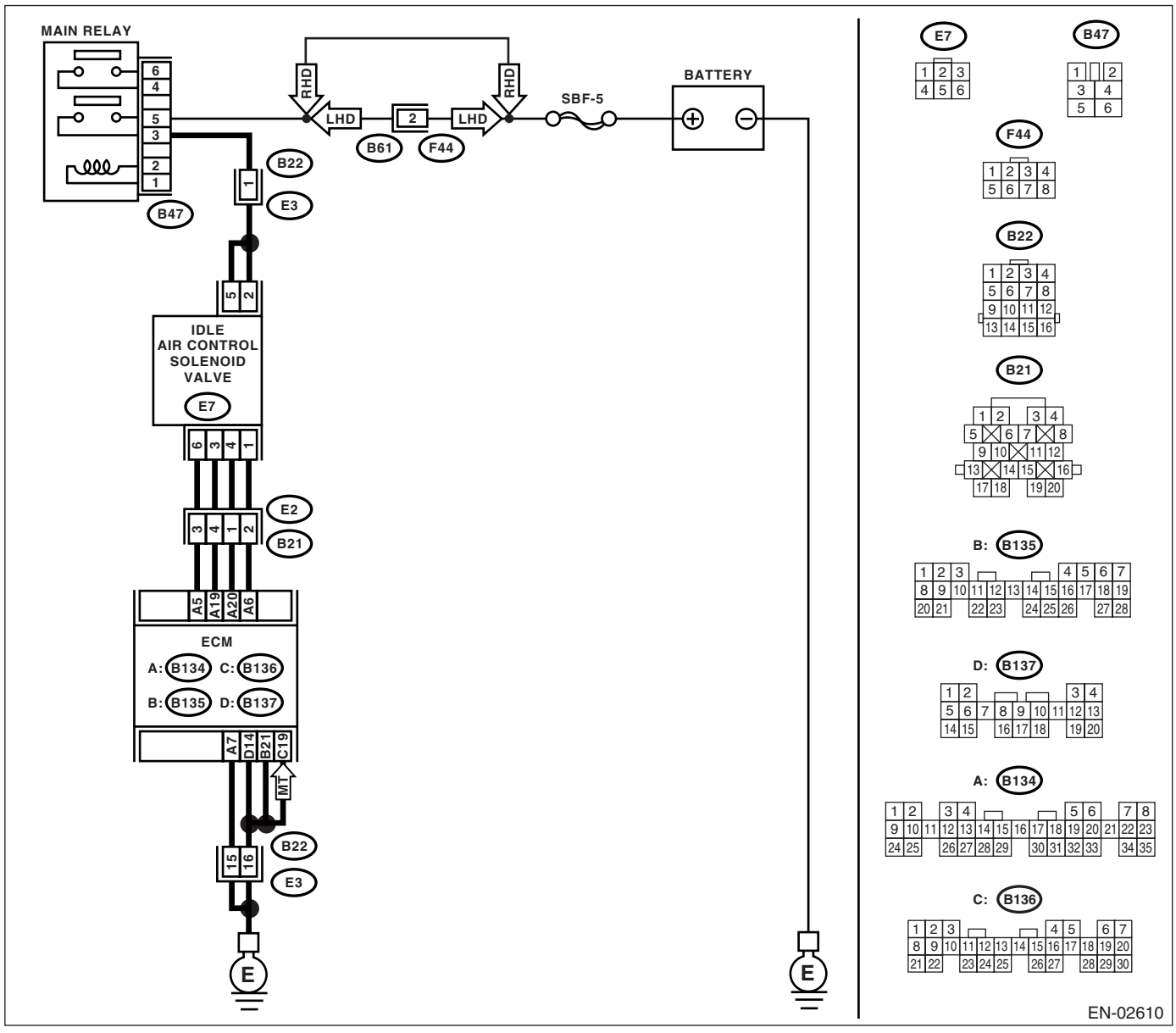
TROUBLE SYMPTOM:

Engine keeps running at higher revolution than specified idling revolution.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO)(diag)-44, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO)(diag)-37, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4SO)(diag)-70, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0519.	Go to step **2.**
2	**CHECK AIR INTAKE SYSTEM.** 1) Turn the ignition switch to ON. 2) Start the engine, and idle it. 3) Check the following items. • Loose installation of intake manifold, idle air control solenoid valve and throttle body • Cracks of intake manifold gasket, idle air control solenoid valve gasket and throttle body gasket • Disconnections of vacuum hoses	Is there a fault in air intake system?	Repair air suction and leaks.	Go to step **3.**
3	**CHECK THROTTLE CABLE.**	Is throttle cable play correct?	Go to step **4.**	Adjust throttle cable. <Ref. to SP(H4SO)-9, INSTALLATION, Accelerator Control Cable.>
4	**CHECK AIR BY-PASS LINE.** 1) Turn the ignition switch to OFF. 2) Remove the idle air control solenoid valve from throttle body. <Ref. to FU(H4SO)-35, Idle Air Control Solenoid Valve.> 3) Confirm that there are no foreign particles in air by-pass line.	Is air by-pass line clogged by foreign particles?	Remove foreign particles from air by-pass line.	Replace the idle air control solenoid valve. <Ref. to FU(H4SO)-35, Idle Air Control Solenoid Valve.>

AZ:DTC P0562 SYSTEM VOLTAGE LOW

DTC DETECTING CONDITION:

Immediately at fault recognition

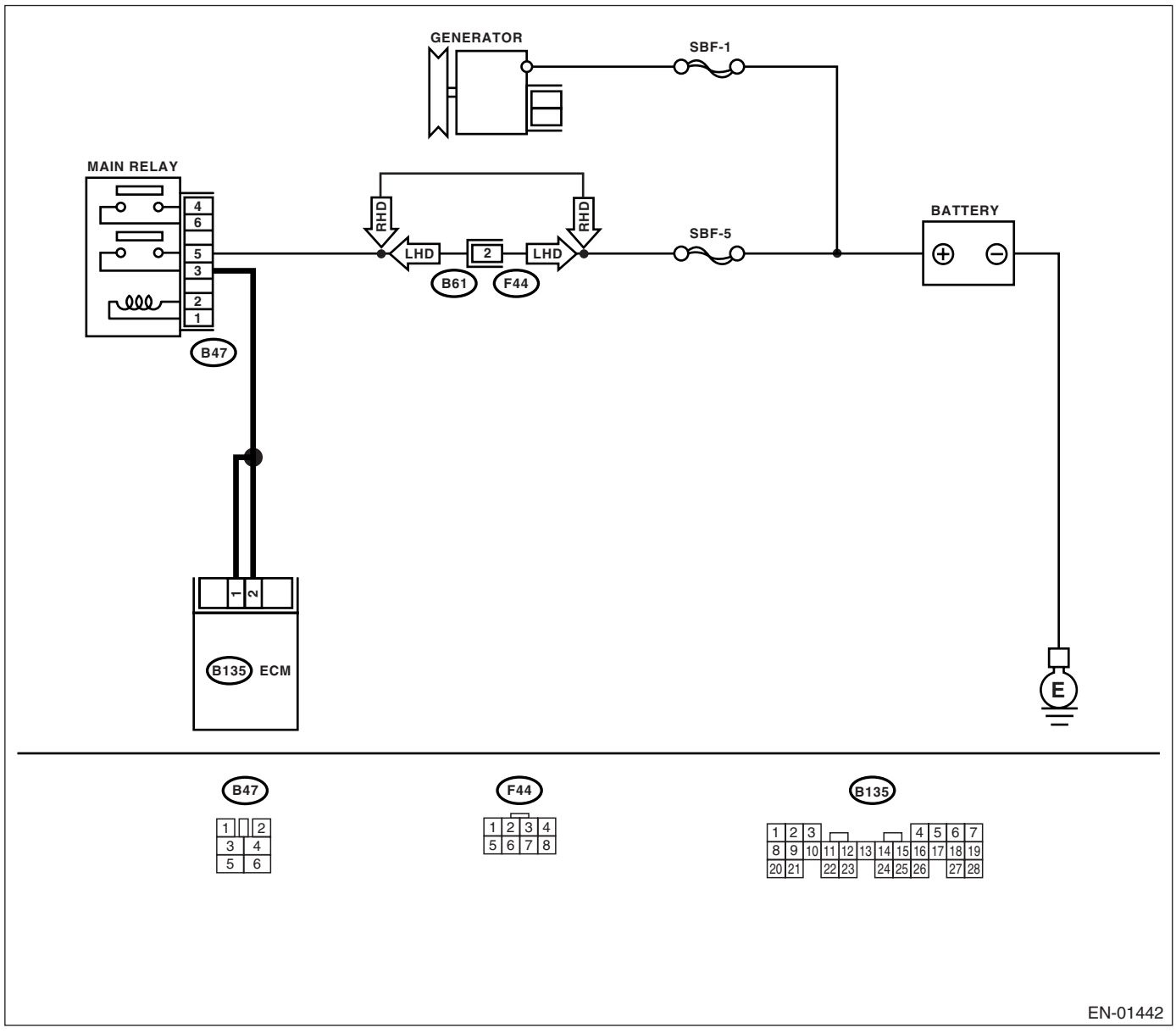
TROUBLE SYMPTOM:

Charge warning light comes on.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO)(diag)-44, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO)(diag)-37, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK GENERATOR.** 1) Start the engine. 2) Idle after warm-up. 3) Measure the voltage between generator B terminal and chassis ground. ***Terminal*** ***Generator B terminal (+) — Chassis ground (−):***	Is the voltage more than 10.8 V?	Go to step **2.**	Repair the generator. <Ref. to SC(H4SO)-14, Generator.>
2	**CHECK GENERATOR.** 1) Run the engine at 5,000 rpm. 2) Measure the voltage between generator B terminal and chassis ground. ***Terminal*** ***Generator B terminal (+) — Chassis ground (−):***	Is the voltage more than 10.8 V?	Go to step **3.**	Repair the generator. <Ref. to SC(H4SO)-14, Generator.>
3	**CHECK BATTERY TERMINAL.** Turn the ignition switch to OFF.	Are the positive and ground battery terminals tightly clamped?	Go to step **4.**	Tighten the clamp of terminal.
4	**CHECK INPUT VOLTAGE OF ECM.** 1) Run the engine at idle. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 1 (+) — Chassis ground (−):*** ***(B135) No. 2 (+) — Chassis ground (−):***	Is the voltage more than 10.8 V?	Go to step **5.**	Repair the harness connector between battery, main relay and ECM.
5	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in connectors between generator, battery and ECM?	Repair the connector.	Go to step **6.**
6	**CHECK ECM.** 1) Connect all connectors. 2) Erase the memory. 3) Perform inspection mode. 4) Read out the DTC.	Is the same DTC as in the current diagnosis still being output?	Replace the generator. <Ref. to SC(H4SO)-14, Generator.>	Go to step **7.**
7	**CHECK ANY OTHER DTC ON DISPLAY.**	Is there any other DTC on display?	Check the relevant DTC using the List of Diagnostic Trouble Code (DTC). <Ref. to EN(H4SO)(diag)-70, List of Diagnostic Trouble Code (DTC).>	A temporary poor contact.

BA:DTC P0563 SYSTEM VOLTAGE HIGH

DTC DETECTING CONDITION:

Immediately at fault recognition

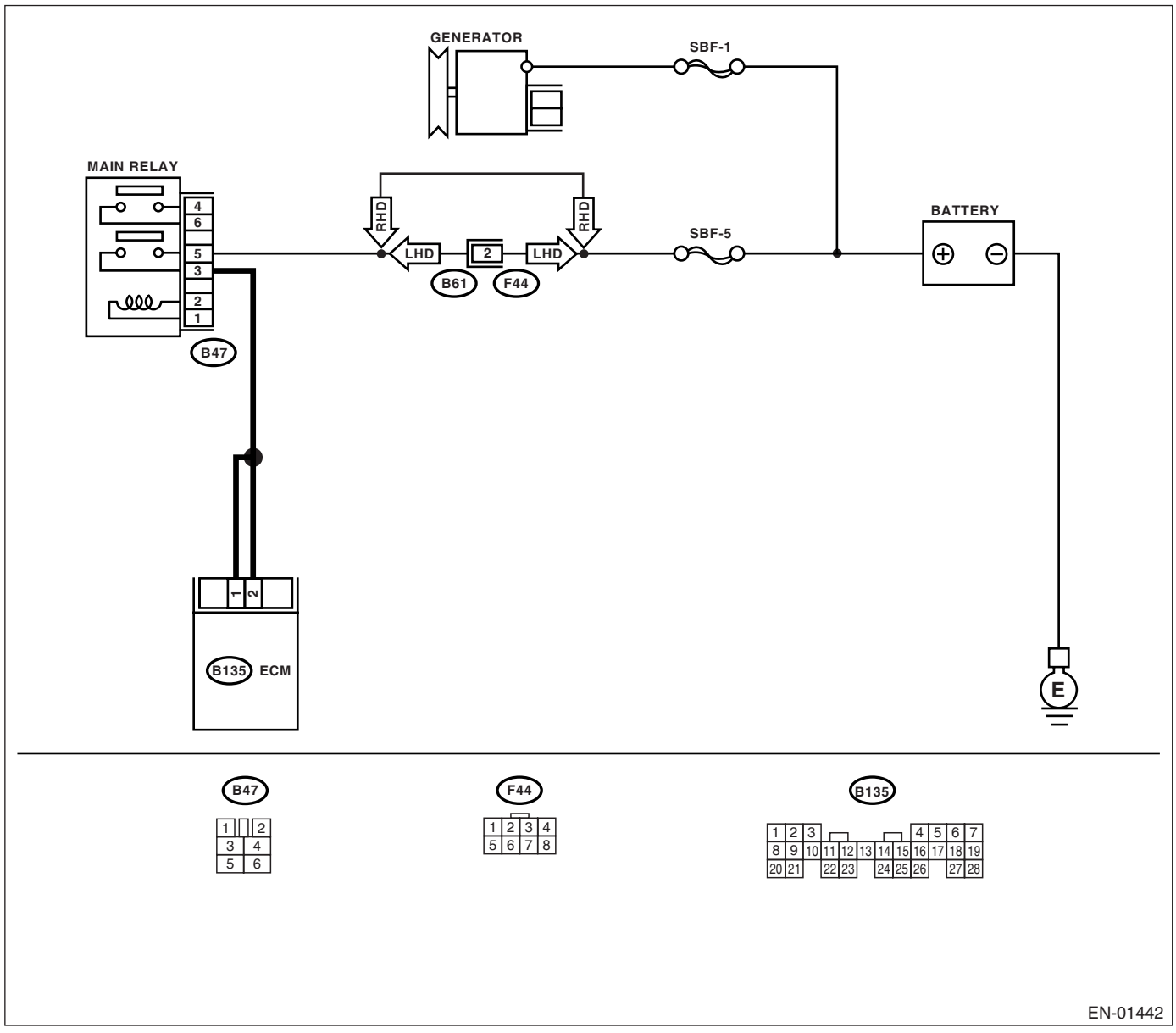
TROUBLE SYMPTOM:

Charge warning light comes on.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO)(diag)-44, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO)(diag)-37, PROCEDURE, Inspection Mode.> .

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK GENERATOR.** 1) Start the engine. 2) Idle after warm-up. 3) Measure the voltage between generator B terminal and chassis ground. ***Terminal*** ***Generator B terminal (+) — Chassis ground (−):***	Is the voltage less than 16.2 V?	Go to step **2.**	Repair the generator. <Ref. to SC(H4SO)-14, Generator.>
2	**CHECK GENERATOR.** 1) Run the engine at 5,000 rpm. 2) Measure the voltage between generator B terminal and chassis ground. ***Terminal*** ***Generator B terminal (+) — Chassis ground (−):***	Is the voltage less than 16.2 V?	Go to step **3.**	Repair the generator. <Ref. to SC(H4SO)-14, Generator.>
3	**CHECK BATTERY TERMINAL.** Turn the ignition switch to OFF.	Are the positive and ground battery terminals tightly clamped?	Go to step **4.**	Tighten the clamp of terminal.
4	**CHECK INPUT VOLTAGE OF ECM.** 1) Run the engine at idle. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 1 (+) — Chassis ground (−):*** ***(B135) No. 2 (+) — Chassis ground (−):***	Is the voltage less than 16.2 V?	Go to step **5.**	Repair the harness connector between battery, main relay and ECM.
5	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in connectors between generator, battery and ECM?	Repair the connector.	Go to step **6.**
6	**CHECK ECM.** 1) Connect all connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read out the DTC.	Is the same DTC as in the current diagnosis still being output?	Replace the generator. <Ref. to SC(H4SO)-14, Generator.>	Go to step **7.**
7	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check the relevant DTC using the List of Diagnostic Trouble Code (DTC). <Ref. to EN(H4SO)(diag)-70, List of Diagnostic Trouble Code (DTC).>	A temporary poor contact.

BB:DTC P0604 INTERNAL CONTROL MODULE RANDOM ACCESS MEMORY (RAM) ERROR

DTC DETECTING CONDITION:

Immediately at fault recognition

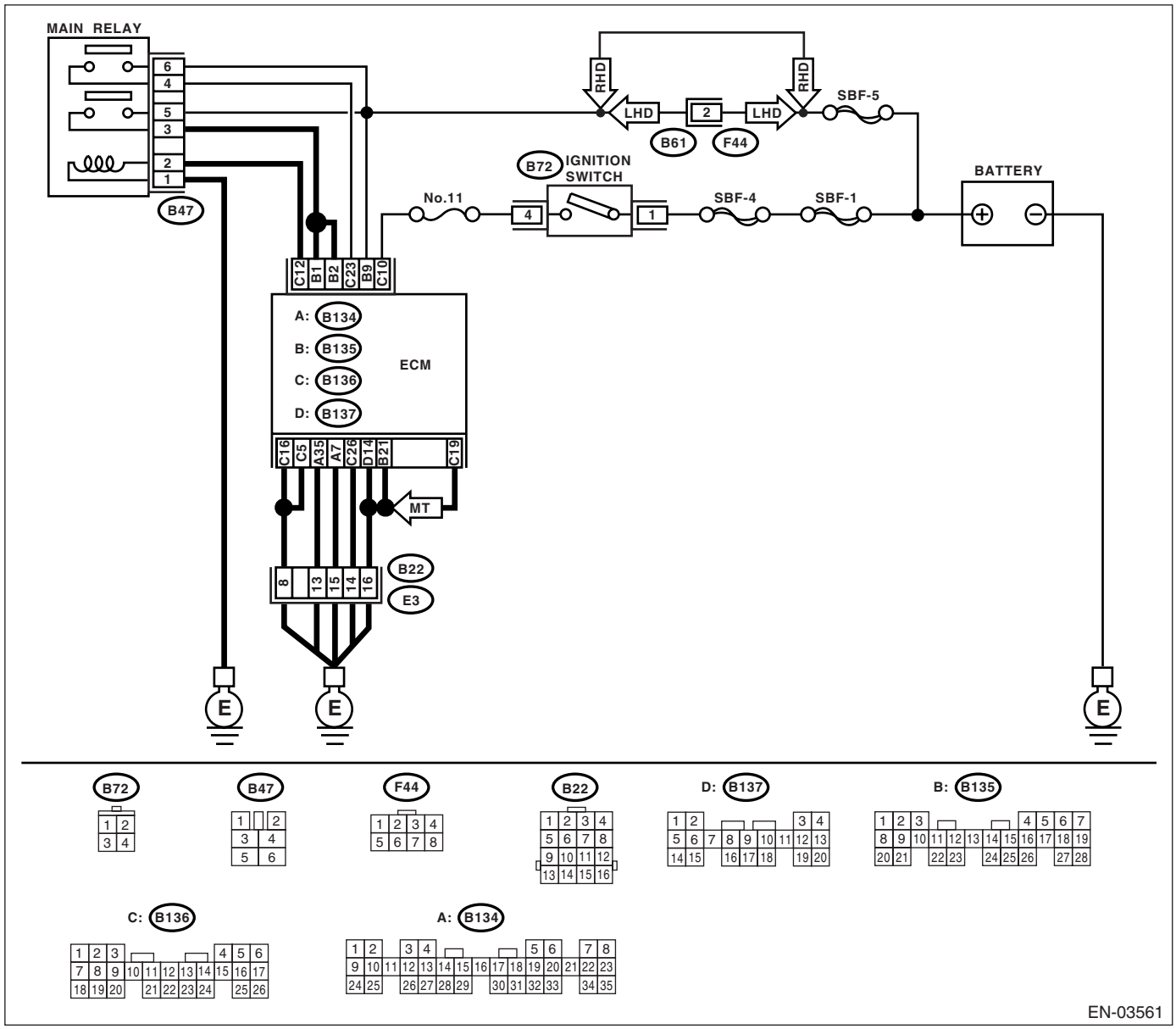
TROUBLE SYMPTOM:

- Engine does not start.
- Engine stalls.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO)(diag)-44, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO)(diag)-37, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



Step		Check	Yes	No
1	CHECK ANY OTHER DTC ON DISPLAY.	Is any other DTC displayed?	Check the relevant DTC using the List of Diagnostic Trouble Code (DTC). <Ref. to EN(H4SO)(diag)-70, List of Diagnostic Trouble Code (DTC).>	A temporary poor contact occurs.

BC:DTC P0691 FAN 1 CONTROL CIRCUIT LOW

DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

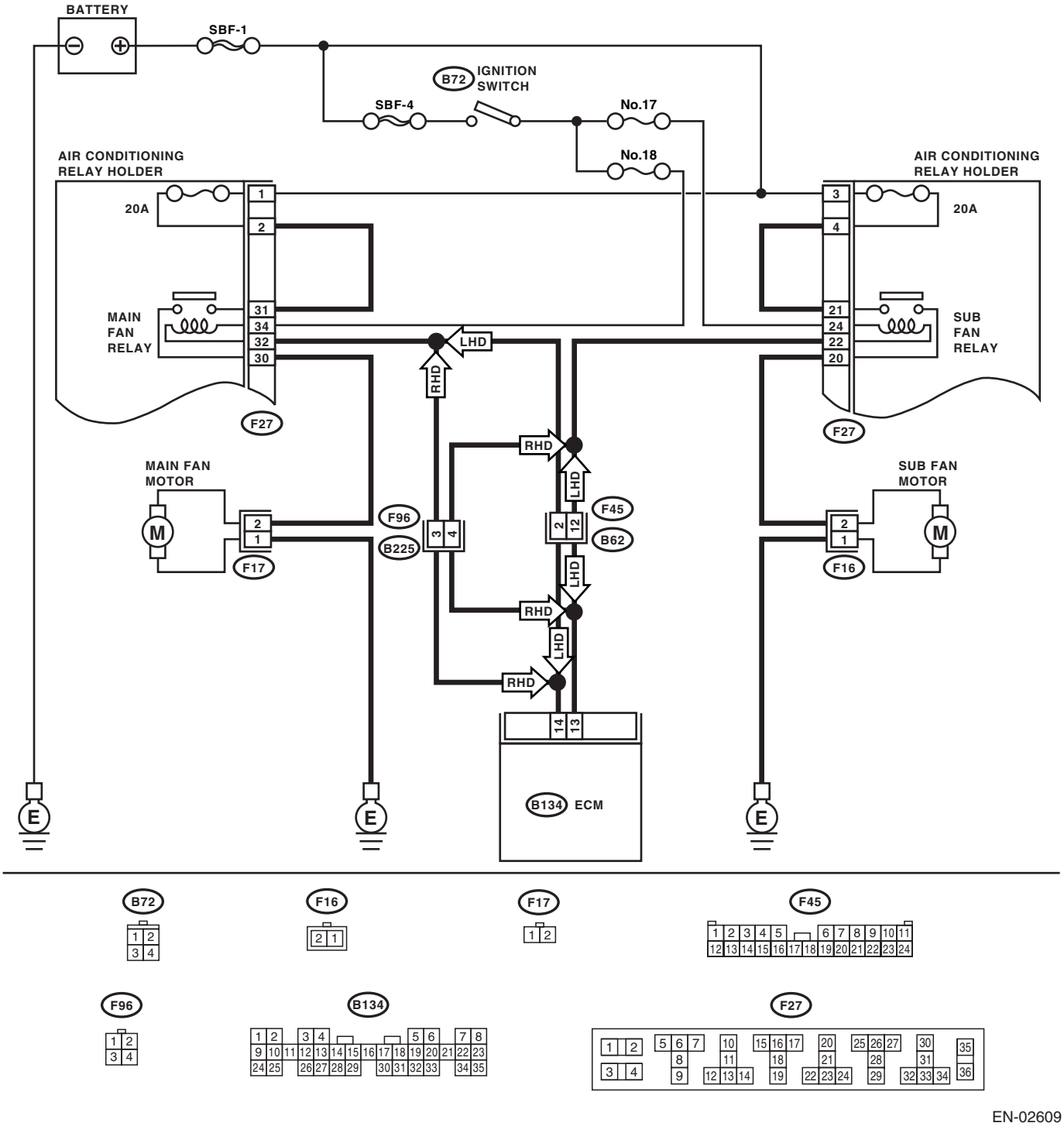
TROUBLE SYMPTOM:

- Radiator fan does not operate properly.
- Overheating

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO)(diag)-44, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO)(diag)-37, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



EN-02609

	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn the ignition switch to OFF. 2) Connect the test mode connector at the lower portion of instrument panel (on the driver's side). 3) Turn the ignition switch to ON. 4) While operating the radiator fan relay, measure voltage between ECM terminal and ground. NOTE: Radiator fan relay operation can be executed using Subaru Select Monitor. For procedure, refer to "Compulsory Valve Operation Check Mode". <Ref. to EN(H4SO)(diag)-30, Subaru Select Monitor.> ***Connector & terminal*** ***(B134) No. 14 (+) — Chassis ground (–):***	Is the voltage 0 — 10 V?	Repair poor contact in ECM connector.	Go to step **2.**
2	**CHECK GROUND SHORT CIRCUIT IN RADIATOR MAIN FAN RELAY CONTROL CIRCUIT.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM. 3) Measure the resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 14 — Chassis ground:***	Is the resistance less than 10 Ω?	Repair ground short circuit in radiator main fan relay control circuit.	Go to step **3.**
3	**CHECK POWER SUPPLY FOR RELAY.** 1) Remove the main fan relay from A/C relay holder. 2) Turn the ignition switch to ON. 3) Measure the voltage between fuse and relay box (F/B) connector and chassis ground. ***Connector & terminal*** ***(F27) No. 34 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **4.**	Repair open circuit in harness between ignition switch and fuse and relay box (F/B) connector.
4	**CHECK MAIN FAN RELAY.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between main fan relay terminals. ***Terminal*** ***No. 32 — No. 34:***	Is the resistance 87 — 107 Ω?	Go to step **5.**	Replace the main fan relay.
5	**CHECK OPEN CIRCUIT IN MAIN FAN RELAY CONTROL CIRCUIT.** Measure the resistance of harness between ECM and main fan relay connector. ***Connector & terminal*** ***(B134) No. 14 — (F27) No. 32:***	Is the resistance less than 1 Ω?	Go to step **6.**	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and main fan relay connector • Poor contact in coupling connector
6	**CHECK POOR CONTACT.** Check poor contact in ECM or main fan relay connector.	Is there poor contact in ECM or main fan relay connector?	Repair poor contact in ECM or main fan relay connector.	Contact with SUBARU distributor service.

BD:DTC P0692 FAN 1 CONTROL CIRCUIT HIGH

DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

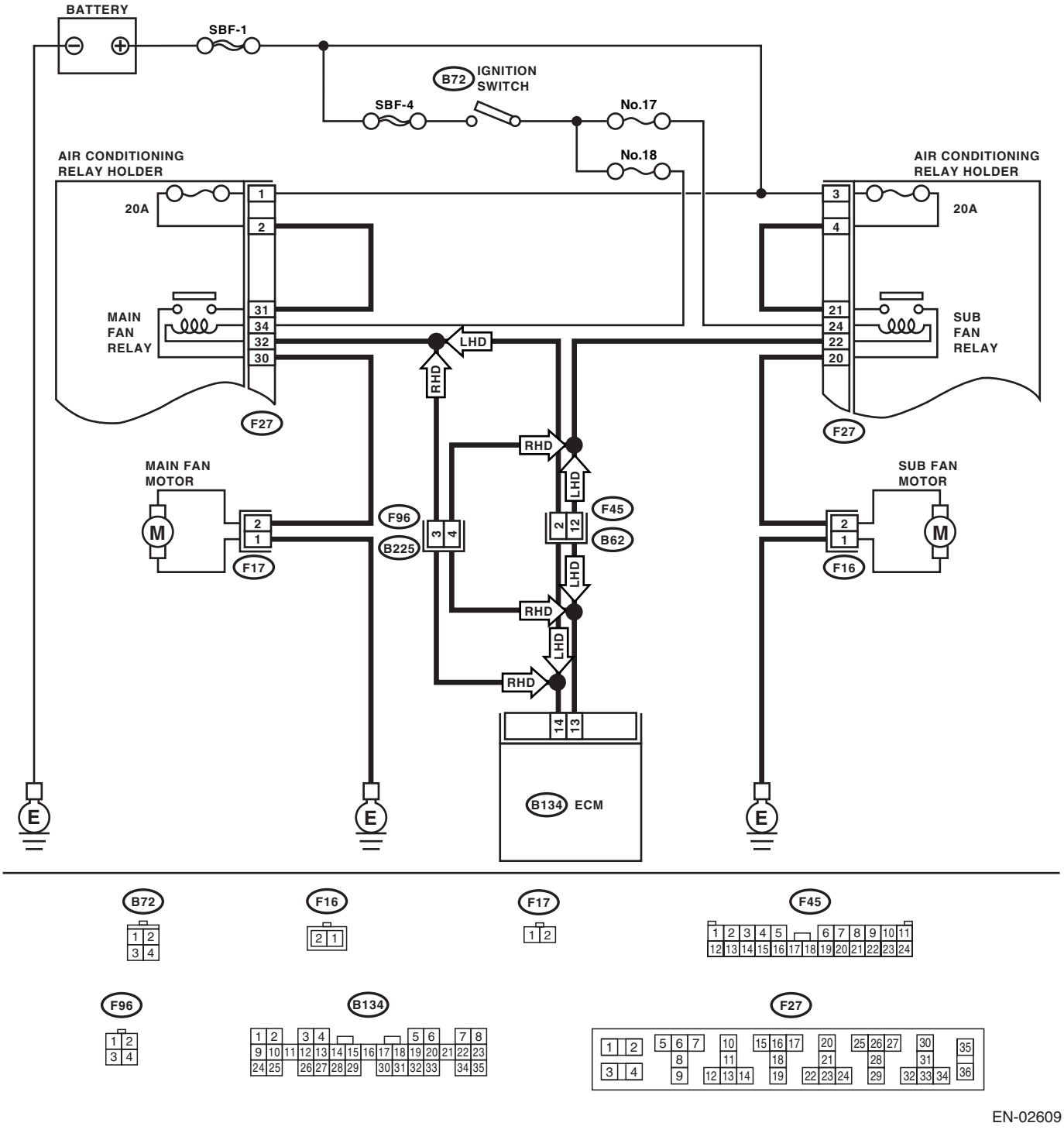
TROUBLE SYMPTOM:

- Radiator fan does not operate properly.
- Overheating

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO)(diag)-44, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO)(diag)-37, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



EN-02609

	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn the ignition switch to OFF. 2) Connect the test mode connector at the lower portion of instrument panel (on the drive's side). 3) Turn the ignition switch to ON. 4) While operating the radiator fan relay, measure voltage between ECM and chassis ground. NOTE: Radiator fan relay operation can be executed using Subaru Select Monitor. For procedure, refer to "Compulsory Valve Operation Check Mode". <Ref. to EN(H4SO)(diag)-45, Compulsory Valve Operation Check Mode.> ***Connector & terminal*** ***(B134) No. 14 (+) — Chassis ground (−):*** ***(B134) No. 13 (+) — Chassis ground (−):***	Is the voltage 0 — 10 V?	Even if malfunction indicator light lights up, the circuit has returned to a normal condition at this time. In this case, repair poor contact in ECM connector.	Go to step **2.**
2	**CHECK SHORT CIRCUIT IN RADIATOR FAN RELAY CONTROL CIRCUIT.** 1) Turn the ignition switch to OFF. 2) Remove the main fan relay and sub fan relay. (with A/C models) 3) Disconnect the test mode connector. 4) Turn the ignition switch to ON. 5) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 14 (+) — Chassis ground (−):*** ***(B134) No. 13 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Repair battery short circuit in radiator fan relay control circuit. After repair, replace the ECM. <Ref. to FU(H4SO)-47, Engine Control Module (ECM).>	Go to step **3.**
3	**CHECK MAIN FAN RELAY.** 1) Turn the ignition switch to OFF. 2) Remove the main fan relay. 3) Measure the resistance between main fan relay terminals. ***Terminal*** ***No. 30 — No. 31:***	Is the resistance less than 1 Ω?	Replace the main fan relay and ECM. <Ref. to FU(H4SO)-47, Engine Control Module (ECM).>	Go to step **4.**
4	**CHECK SUB FAN RELAY.** 1) Remove the sub fan relay. 2) Measure the resistance between sub fan relay terminals. ***Terminal*** ***No. 20 — No. 21:***	Is the resistance less than 1 Ω?	Replace the sub fan relay and ECM. <Ref. to FU(H4SO)-47, Engine Control Module (ECM).>	Go to step **5.**
5	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H4SO)-47, Engine Control Module (ECM).>

BE:DTC P0703 BRAKE SWITCH “B” CIRCUIT

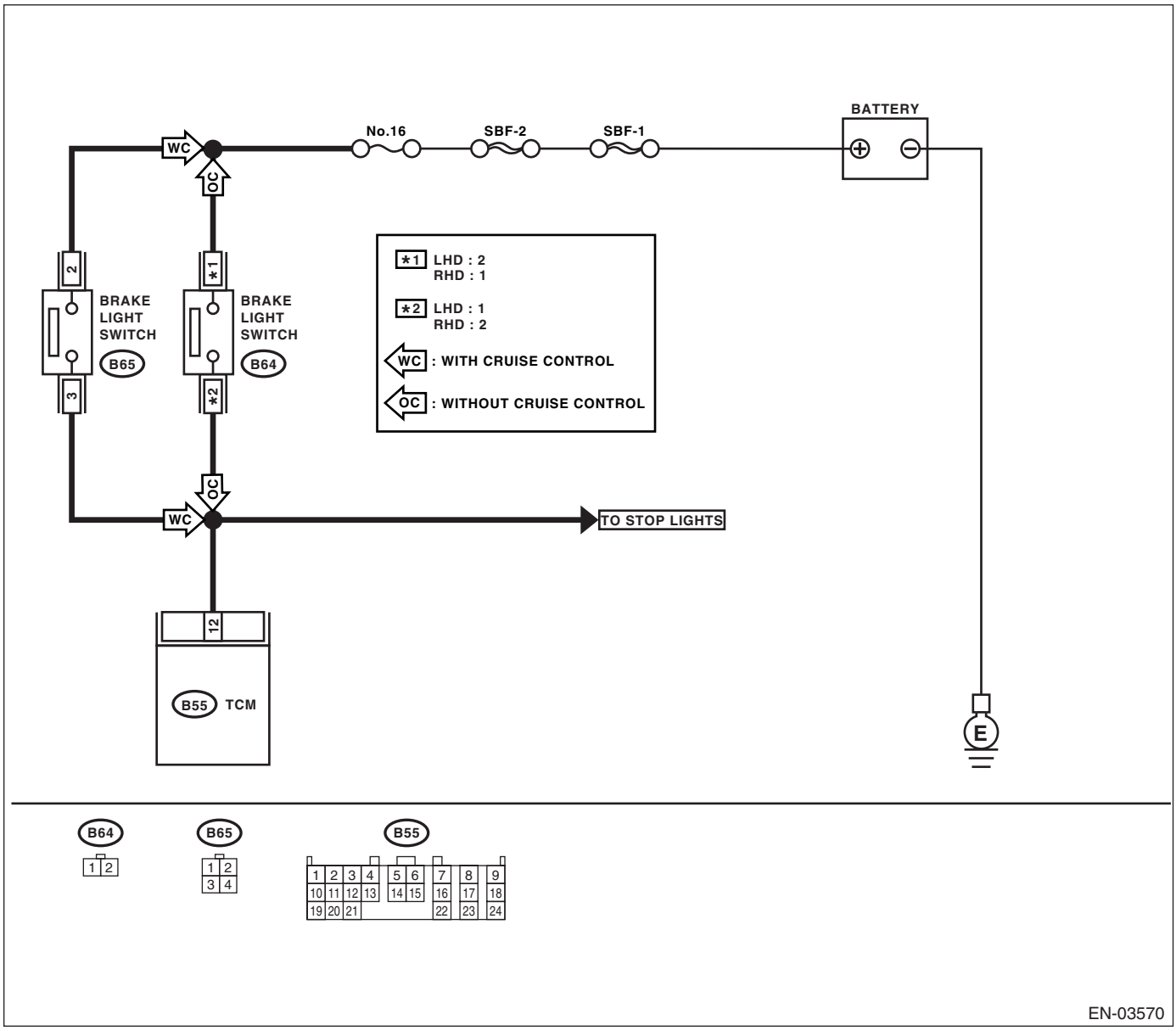
DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO)(diag)-44, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO)(diag)-37, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



EN-03570

	Step	Check	Yes	No
1	**CHECK OPERATION OF BRAKE LIGHT.**	Does the brake light illuminate when depressing the brake pedal?	Go to step **2.**	Repair or replace the brake light circuit.
2	**CHECK HARNESS BETWEEN TCM AND BRAKE LIGHT SWITCH CONNECTOR.** 1) Disconnect the connectors from TCM and brake light switch. 2) Measure the resistance of harness between TCM and brake light switch connector. ***Connector & terminal*** ***LHD*** ***(B55) No. 12 — (B64) No. 1:*** ***RHD with cruise control model*** ***(B55) No. 12 — (B65) No. 3:*** ***RHD without cruise control model*** ***(B55) No. 12 — (B64) No. 2:***	Is the resistance less than 1 Ω?	Go to step **3.**	Repair or replace the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between TCM and brake light switch connector • Poor contact in TCM connector • Poor contact in brake light switch connector
3	**CHECK HARNESS BETWEEN TCM AND BRAKE LIGHT SWITCH CONNECTOR.** Measure the resistance of harness between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 12 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **4.**	Repair ground short circuit in harness between TCM and brake light switch connector.
4	**CHECK INPUT SIGNAL FOR TCM.** 1) Connect the connectors to TCM and brake light switch. 2) Measure the voltage between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 12 (+) — Chassis ground (−):***	Is the voltage less than 1 V when releasing the brake pedal?	Go to step **5.**	Adjust or replace the brake light switch. <Ref. to LI-8, STOP LIGHT SWITCH, INSPECTION, Stop Light System.>
5	**CHECK INPUT SIGNAL FOR TCM.** Measure the voltage between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 12 (+) — Chassis ground (−):***	Is the voltage more than 10 V when depressing the brake pedal?	Go to step **6.**	Adjust or replace the brake light switch. <Ref. to LI-8, STOP LIGHT SWITCH, INSPECTION, Stop Light System.>
6	**CHECK POOR CONTACT.** Check poor contact in TCM connector.	Is there poor contact in TCM connector?	Repair poor contact in TCM connector.	Replace the TCM. <Ref. to 4AT-75, Transmission Control Module (TCM).>

BF:DTC P0731 GEAR 1 INCORRECT RATIO

NOTE:
For the diagnostic procedure, refer to DTC P0734. <Ref. to EN(H4SO)(diag)-203, DTC P0734 GEAR 4 INCORRECT RATIO, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

BG:DTC P0732 GEAR 2 INCORRECT RATIO

NOTE:
For the diagnostic procedure, refer to DTC P0734. <Ref. to EN(H4SO)(diag)-203, DTC P0734 GEAR 4 INCORRECT RATIO, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

BH:DTC P0733 GEAR 3 INCORRECT RATIO

NOTE:
For the diagnostic procedure, refer to DTC P0734. <Ref. to EN(H4SO)(diag)-203, DTC P0734 GEAR 4 INCORRECT RATIO, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

BI: DTC P0734 GEAR 4 INCORRECT RATIO

DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

TROUBLE SYMPTOM:

Shift point too high or too low; engine brake not effected in “3” range; excessive shift shock; excessive tight corner “braking”

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO)(diag)-44, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO)(diag)-37, PROCEDURE, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect relevant DTC using “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(H4SO)(diag)-70, List of Diagnostic Trouble Code (DTC).>	Go to step **2.**
2	**CHECK THROTTLE POSITION SENSOR CIRCUIT.** Check throttle position sensor circuit. <Ref. to 4AT(diag)-45, DTC 31 THROTTLE POSITION SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Is there any trouble in throttle position sensor circuit?	Repair or replace the throttle position sensor circuit.	Go to step **3.**
3	**CHECK FRONT VEHICLE SPEED SENSOR CIRCUIT.** Check front vehicle speed sensor circuit. <Ref. to 4AT(diag)-49, DTC 33 FRONT VEHICLE SPEED SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Is there any trouble in front vehicle speed sensor circuit?	Repair or replace the front vehicle speed sensor circuit.	Go to step **4.**
4	**CHECK TORQUE CONVERTER TURBINE SPEED SENSOR CIRCUIT.** Check torque converter turbine speed sensor circuit. <Ref. to 4AT(diag)-53, DTC 36 TORQUE CONVERTER TURBINE SPEED SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Is there any trouble in torque converter turbine speed sensor circuit?	Repair or replace the torque converter turbine speed sensor circuit.	Go to step **5.**
5	**CHECK POOR CONTACT.** Check poor contact in TCM connector.	Is there poor contact in TCM connector?	Repair poor contact in TCM connector.	Go to step **6.**
6	**CHECK MECHANICAL TROUBLE.** Check mechanical trouble in automatic transmission.	Is there any mechanical trouble in automatic transmission?	Repair or replace the automatic transmission. <Ref. to 4AT-35, INSPECTION, Road Test.>	Replace the TCM. <Ref. to 4AT-75, Transmission Control Module (TCM).>

BJ:DTC P0741 TORQUE CONVERTER CLUTCH CIRCUIT PERFORMANCE OR STUCK OFF

DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

TROUBLE SYMPTOM:

- No lock-up (after engine warm-up)
- No shift or excessive tight corner “braking”

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO)(diag)-44, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO)(diag)-37, PROCEDURE, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the relevant DTC using “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(H4SO)(diag)-70, List of Diagnostic Trouble Code (DTC).>	Go to step **2.**
2	**CHECK LOCK-UP DUTY SOLENOID CIRCUIT.** Check lock-up duty solenoid circuit. <Ref. to 4AT(diag)-77, DTC 77 LOCK-UP DUTY SOLENOID, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Is there any trouble in lock-up duty solenoid circuit?	Repair or replace the lock-up duty solenoid circuit.	Go to step **3.**
3	**CHECK THROTTLE POSITION SENSOR CIRCUIT.** Check throttle position sensor circuit. <Ref. to 4AT(diag)-45, DTC 31 THROTTLE POSITION SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Is there any trouble in throttle position sensor circuit?	Repair or replace the throttle position sensor circuit.	Go to step **4.**
4	**CHECK TORQUE CONVERTER TURBINE SPEED SENSOR CIRCUIT.** Check torque converter turbine speed sensor circuit. <Ref. to 4AT(diag)-53, DTC 36 TORQUE CONVERTER TURBINE SPEED SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Is there any trouble in torque converter turbine speed sensor circuit?	Repair or replace the torque converter turbine speed sensor circuit.	Go to step **5.**
5	**CHECK ENGINE SPEED INPUT CIRCUIT.** Check engine speed input circuit. <Ref. to 4AT(diag)-38, DTC 11 ENGINE SPEED SIGNAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Is there any trouble in engine speed input circuit?	Repair or replace the engine speed input circuit.	Go to step **6.**
6	**CHECK INHIBITOR SWITCH CIRCUIT.** Check inhibitor switch circuit. <Ref. to 4AT(diag)-99, CHECK INHIBITOR SWITCH, Diagnostic Procedure without Diagnostic Trouble Code (DTC).>	Is there any trouble in inhibitor switch circuit?	Repair or replace the inhibitor switch circuit.	Go to step **7.**
7	**CHECK BRAKE LIGHT SWITCH CIRCUIT.** Check brake light switch circuit. <Ref. to 4AT(diag)-93, CHECK BRAKE SWITCH, Diagnostic Procedure without Diagnostic Trouble Code (DTC).>	Is there any trouble in brake light switch circuit?	Repair or replace the brake light switch circuit.	Go to step **8.**

	Step	Check	Yes	No
8	**CHECK ATF TEMPERATURE SENSOR CIRCUIT.** Check ATF temperature sensor circuit. <Ref. to 4AT(diag)-42, DTC 27 ATF TEMPERATURE SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Is there any trouble in ATF temperature sensor circuit?	Repair or replace the ATF temperature sensor circuit.	Go to step **9.**
9	**CHECK POOR CONTACT.** Check poor contact in TCM connector.	Is there poor contact in TCM connector?	Repair poor contact in TCM connector.	Go to step **10.**
10	**CHECK MECHANICAL TROUBLE.** Check mechanical trouble in automatic transmission.	Is there any mechanical trouble in automatic transmission?	Repair or replace the automatic transmission. <Ref. to 4AT-35, INSPECTION, Road Test.>	Replace the TCM. <Ref. to 4AT-75, Transmission Control Module (TCM).>

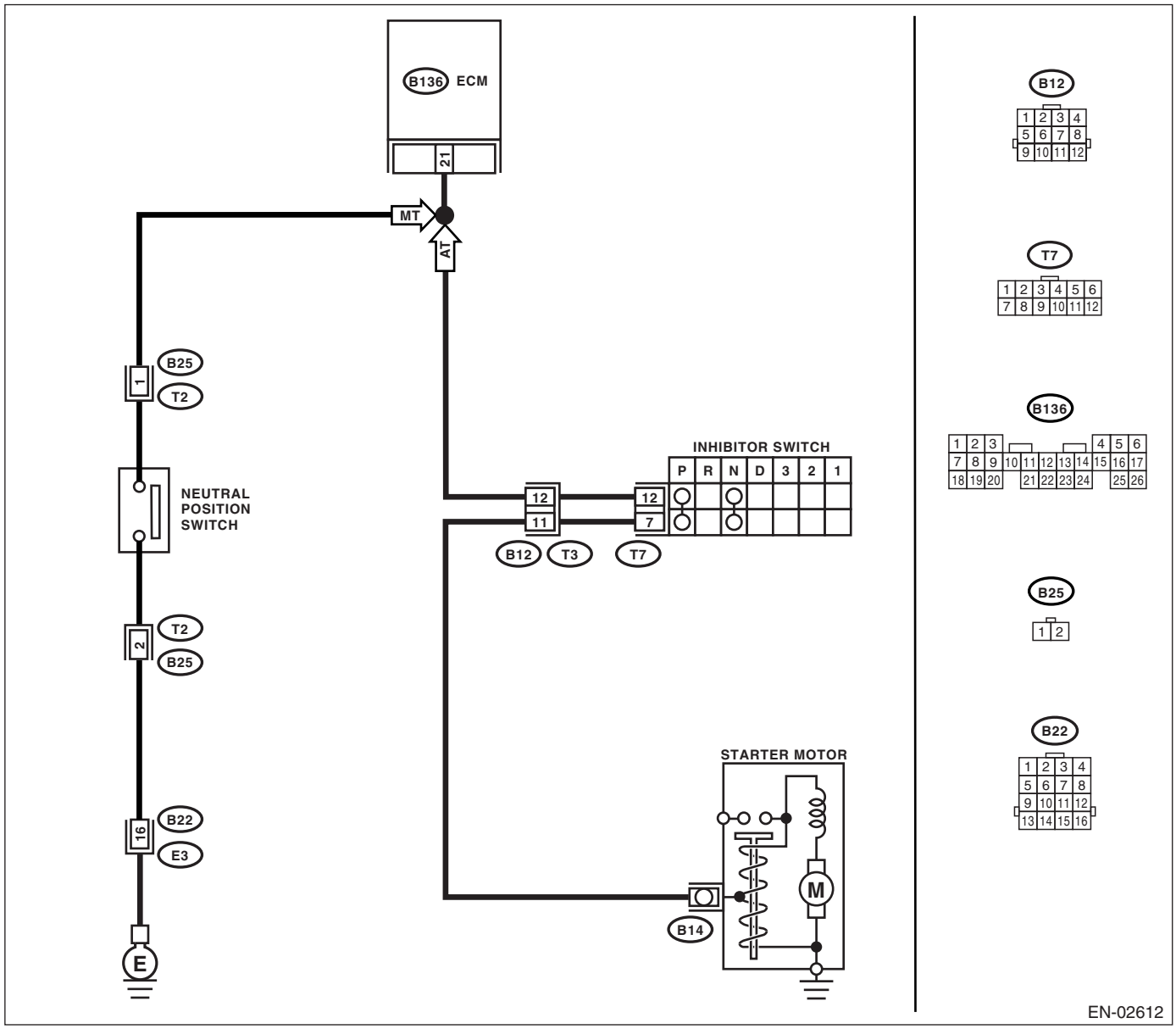
BK:DTC P0851 PARK/NEUTRAL SWITCH INPUT CIRCUIT LOW

1. AT MODEL

DTC DETECTING CONDITION:
Two consecutive driving cycles with fault
TROUBLE SYMPTOM:
Erroneous idling

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO)(diag)-44, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO)(diag)-37, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



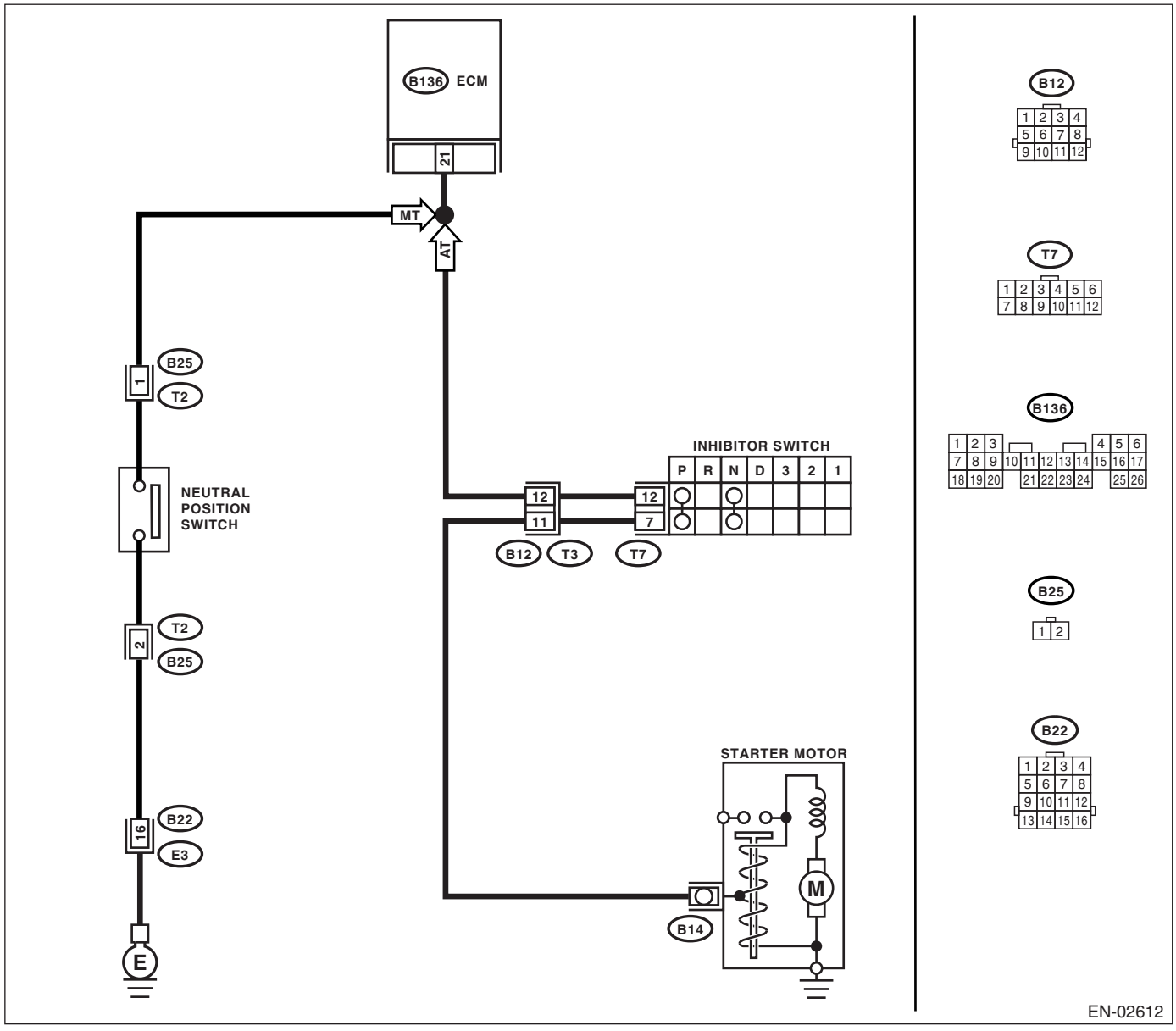
	Step	Check	Yes	No
1	**CHECK OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect DTC P0705 using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4SO)(diag)-70, List of Diagnostic Trouble Code (DTC).>	Go to step **2.**
2	**CHECK INPUT SIGNAL FOR ECM.** 1) Turn the ignition switch to ON. 2) Place the select lever except for "N" and "P" ranges. 3) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B136) No. 21 (+) — Chassis ground (−):***	Is the voltage 4.5 — 5.5 V?	Even if malfunction indicator light lights up, the circuit has returned to a normal condition at this time.	Go to step **3.**
3	**CHECK HARNESS BETWEEN ECM AND TRANSMISSION HARNESS CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and transmission harness connector (T3). 3) Measure the resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 21 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **4.**	Repair ground short circuit in harness between ECM and transmission harness connector.
4	**CHECK TRANSMISSION HARNESS CONNECTOR.** 1) Disconnect the connector from inhibitor switch. 2) Measure the resistance of harness between transmission harness connector and engine ground. ***Connector & terminal*** ***(T3) No. 12 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **5.**	Repair ground short circuit in harness between transmission harness and inhibitor switch connector.
5	**CHECK INHIBITOR SWITCH.** Measure the resistance between inhibitor switch connector the receptacle's terminals in select lever except for "N" range. ***Terminals*** ***No. 7 — No. 12:***	Is the resistance more than 1 MΩ?	Go to step **6.**	Replace the inhibitor switch. <Ref. to 4AT-53, Inhibitor Switch.>
6	**CHECK SELECTOR CABLE CONNECTION.**	Is there any fault in selector cable connection to inhibitor switch?	Repair selector cable connection. <Ref. to CS-34, INSPECTION, Select Cable.>	Contact with SUBARU distributor service.

2. MT MODEL

DTC DETECTING CONDITION:
Two consecutive driving cycles with fault
TROUBLE SYMPTOM:
Erroneous idling

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO)(diag)-44, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO)(diag)-37, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK INPUT SIGNAL FOR ECM.** 1) Turn the ignition switch to ON. 2) Place the shift lever in neutral. 3) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B136) No. 21 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **2.**	Go to step **4.**
2	**CHECK INPUT SIGNAL FOR ECM.** 1) Place the shift lever in a position except for neutral. 2) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B136) No. 21 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **3.**	Go to step **4.**
3	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair poor contact in ECM connector.	Contact with SUBARU distributor service.
4	**CHECK NEUTRAL POSITION SWITCH.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission harness. 3) Place the shift lever in neutral. 4) Measure the resistance between transmission harness and connector terminals. ***Connector & terminal*** ***(T2) No. 1 — No. 2:***	Is the resistance more than 1 MΩ?	Go to step **5.**	Repair short circuit in transmission harness or replace neutral position switch.
5	**CHECK NEUTRAL POSITION SWITCH.** 1) Place the shift lever in a position except for neutral. 2) Measure the resistance between transmission harness connector terminals.	Is the resistance less than 1 Ω?	Go to step **6.**	Repair short circuit in transmission harness or replace neutral position switch.
6	**CHECK HARNESS BETWEEN ECM AND NEUTRAL POSITION SWITCH CONNECTOR.** Measure the resistance between ECM and chassis ground. ***Connector & terminal*** ***(B136) No. 21 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **7.**	Repair ground short circuit in harness between ECM and transmission harness connector.
7	**CHECK HARNESS BETWEEN ECM AND NEUTRAL POSITION SWITCH CONNECTOR.** 1) Disconnect the connector from ECM. 2) Measure the resistance of harness between ECM and transmission harness connector. ***Connector & terminal*** ***(B136) No. 21 — (B25) No. 1:***	Is the resistance less than 1 Ω?	Go to step **8.**	Repair open circuit in harness between ECM and transmission harness connector.
8	**CHECK HARNESS BETWEEN ECM AND NEUTRAL POSITION SWITCH CONNECTOR.** Measure the resistance of harness between transmission harness connector and engine ground. ***Connector & terminal*** ***(B25) No. 2 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **9.**	Repair open circuit between transmission harness connector and engine ground terminal.
9	**CHECK POOR CONTACT.** Check poor contact in transmission harness connector.	Is there poor contact in transmission harness connector?	Repair poor contact in transmission harness connector.	Contact with SUBARU distributor service.

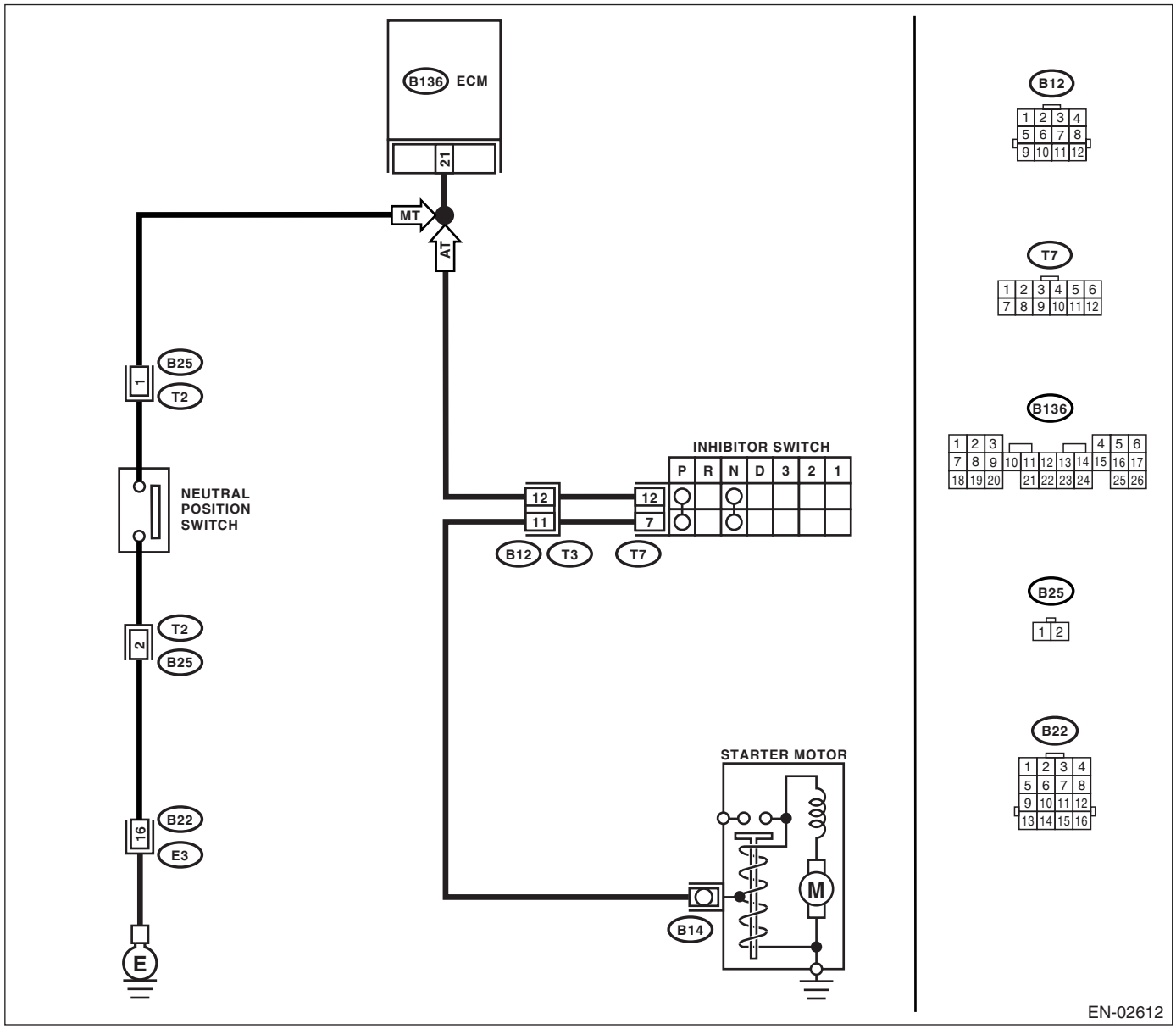
BL:DTC P0852 PARK/NEUTRAL SWITCH INPUT CIRCUIT HIGH

1. AT MODEL

DTC DETECTING CONDITION:
Two consecutive driving cycles with fault
TROUBLE SYMPTOM:
Erroneous idling

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO)(diag)-44, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO)(diag)-37, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4SO)(diag)-70, List of Diagnostic Trouble Code (DTC).>	Go to step **2.**
2	**CHECK INPUT SIGNAL FOR ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM and chassis ground in select lever "N" and "P" ranges. ***Connector & terminal*** ***(B136) No. 21 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **3.**	Go to step **5.**
3	**CHECK INPUT SIGNAL FOR ECM.** Measure the voltage between ECM and chassis ground in select lever except for "N" and "P" ranges. ***Connector & terminal*** ***(B136) No. 21 (+) — Chassis ground (−):***	Is the voltage 4.5 — 5.5 V?	Go to step **4.**	Go to step **5.**
4	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair poor contact in ECM connector.	Contact with SUBARU distributor service.
5	**CHECK INPUT SIGNAL FOR ECM.** Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B136) No. 21 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Repair battery short circuit in harness between ECM and inhibitor switch connector.	Go to step **6.**
6	**CHECK HARNESS BETWEEN ECM AND INHIBITOR SWITCH CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and inhibitor switch. 3) Measure the resistance of harness between ECM and inhibitor switch connector. ***Connector & terminal*** ***(B136) No. 21 — (T7) No. 12:***	Is the resistance less than 1 Ω?	Go to step **7.**	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and inhibitor switch connector • Poor contact in coupling connector • Poor contact in inhibitor switch connector • Poor contact in ECM connector

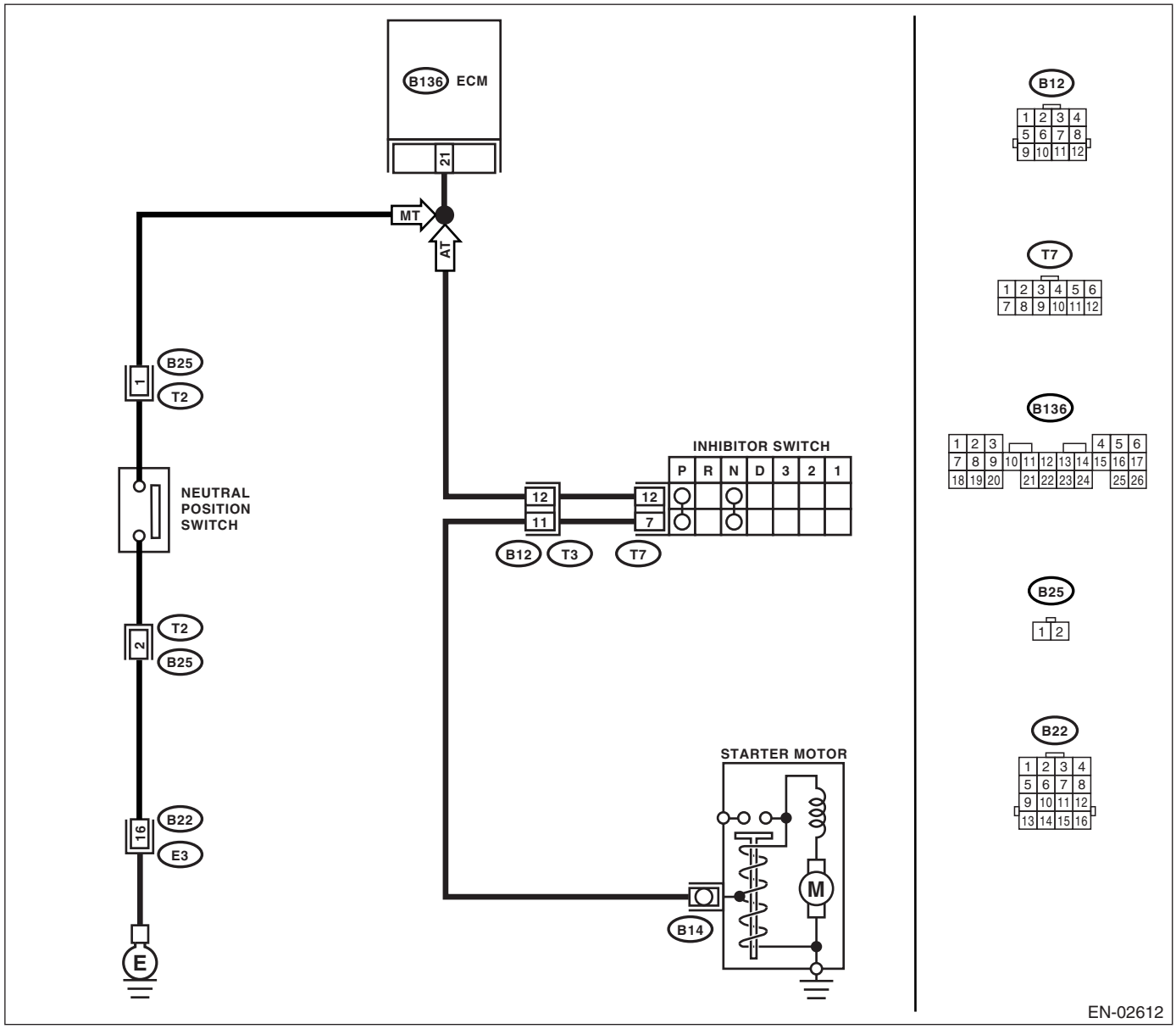
	Step	Check	Yes	No
7	**CHECK INHIBITOR SWITCH GROUND LINE.** Measure the resistance of harness between inhibitor switch connector and engine ground. ***Connector & terminal*** ***(T7) No. 7 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **8.**	Repair open circuit in harness between inhibitor switch connector and starter motor ground line. NOTE: In this case, repair the following: • Open circuit in harness between inhibitor switch connector and starter motor ground line • Poor contact in starter motor connector • Poor contact in starter motor ground • Starter motor
8	**CHECK INHIBITOR SWITCH.** Measure the resistance between inhibitor switch connector receptacle's terminals in select lever "N" and "P" ranges. ***Terminals*** ***No. 7 — No. 12:***	Is the resistance less than 1 Ω?	Go to step **9.**	Replace the inhibitor switch. <Ref. to 4AT-53, Inhibitor Switch.>
9	**CHECK SELECTOR CABLE CONNECTION.**	Is there any fault in selector cable connection to inhibitor switch?	Repair selector cable connection. <Ref. to CS-34, INSPECTION, Select Cable.>	Contact with SUBARU distributor service.

2. MT MODEL

DTC DETECTING CONDITION:
Two consecutive driving cycles with fault
TROUBLE SYMPTOM:
Erroneous idling

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO)(diag)-44, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO)(diag)-37, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



Step		Check	Yes	No
1	**CHECK INPUT SIGNAL FOR ECM.** 1) Turn the ignition switch to ON. 2) Set the shift lever to except neutral position. 3) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B136) No. 21 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **2.**	Go to step **4.**
2	**CHECK INPUT SIGNAL FOR ECM.** 1) Set the shift lever to neutral position. 2) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B136) No. 21 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **3.**	Go to step **4.**
3	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair the poor contact in ECM connector.	Contact your Subaru distributor service.
4	**CHECK INPUT SIGNAL FOR ECM.** 1) Disconnect ECM connector from ECM. 2) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B136) No. 21 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Repair the battery short circuit in harness between ECM and transmission connector.	Go to step **5.**
5	**CHECK HARNESS BETWEEN ECM AND TRANSMISSION HARNESS CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and transmission harness connector (T2). 3) Measure the resistance of harness between ECM and neutral switch connector. ***Connector & terminal*** ***(B136) No. 21 — (B25) No. 1:***	Is the resistance less than 1 Ω?	Go to step **6.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and transmission harness • Poor contact in transmission harness connector • Poor contact in ECM connector
6	**CHECK NEUTRAL POSITION SWITCH GROUND LINE.** Measure the resistance of harness between transmission harness connector and engine ground. ***Connector & terminal*** ***(B25) No. 2 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **7.**	Repair the open circuit in harness of neutral position switch ground line.
7	**CHECK NEUTRAL POSITION SWITCH.** 1) Set the shift lever to except neutral position. 2) Measure the resistance between transmission harness connector receptacle's terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance less than 1 Ω?	Go to step **8.**	Replace the neutral position switch.
8	**CHECK POOR CONTACT.** Check poor contact in the transmission harness connector.	Is there poor contact in the transmission harness connector?	Repair poor contact in transmission harness connector.	Contact your Subaru distributor service.

BM:DTC P0864 TCM COMMUNICATION CIRCUIT RANGE/PERFORMANCE

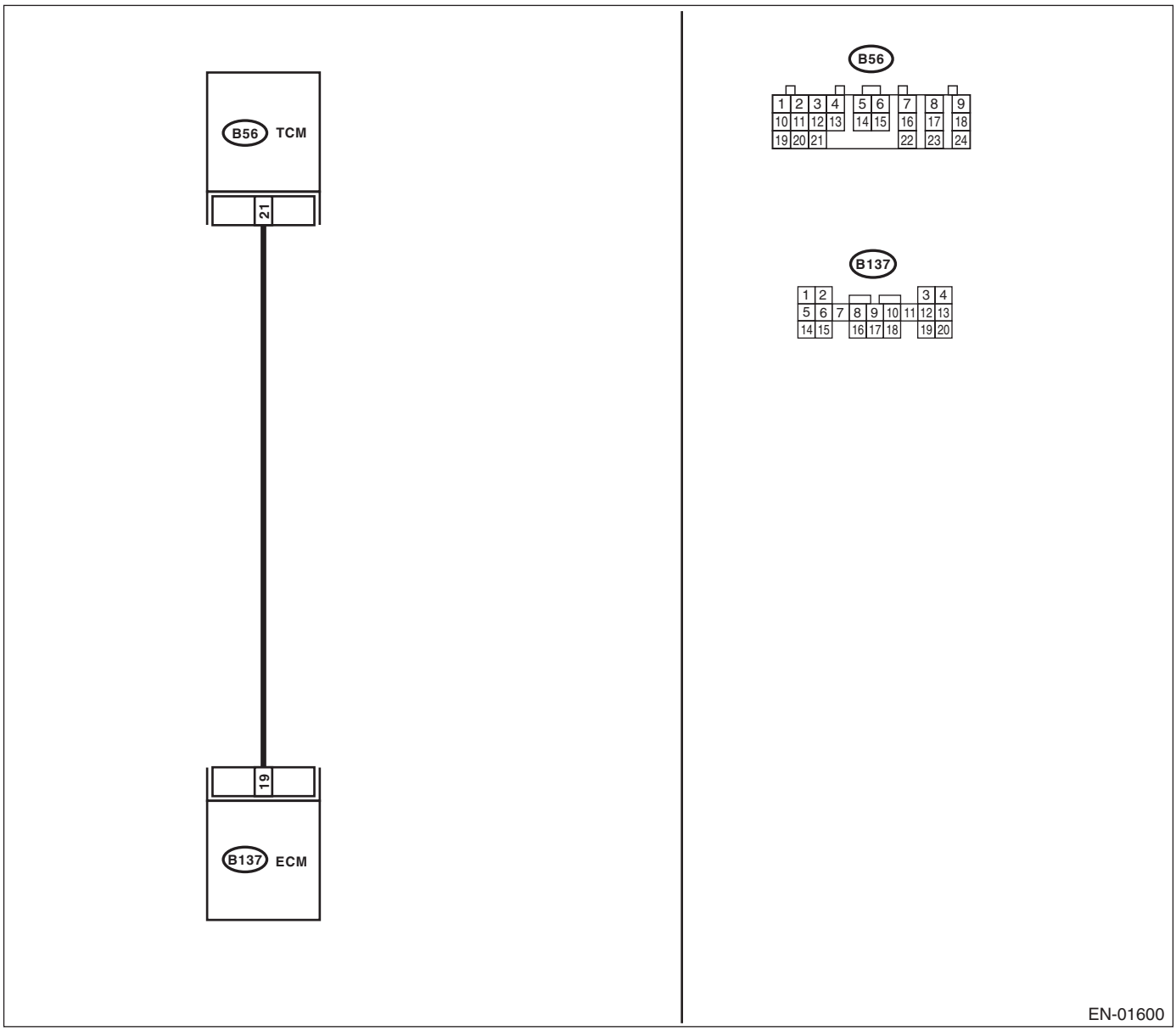
DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO)(diag)-44, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO)(diag)-37, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



Step		Check	Yes	No
1	**CHECK DRIVING CONDITION.** 1) Start and warm-up the engine until the radiator fan makes one complete rotation. 2) Drive the vehicle.	Is the AT shift control functioning properly?	Go to step **2.**	Replace the TCM. <Ref. to 4AT-75, Transmission Control Module (TCM).>
2	**CHECK ACCESSORY.**	Are car phone and/or CB installed on vehicle?	Repair grounding line of car phone or CB system.	Replace the TCM. <Ref. to 4AT-75, Transmission Control Module (TCM).>

BN:DTC P0865 TCM COMMUNICATION CIRCUIT LOW

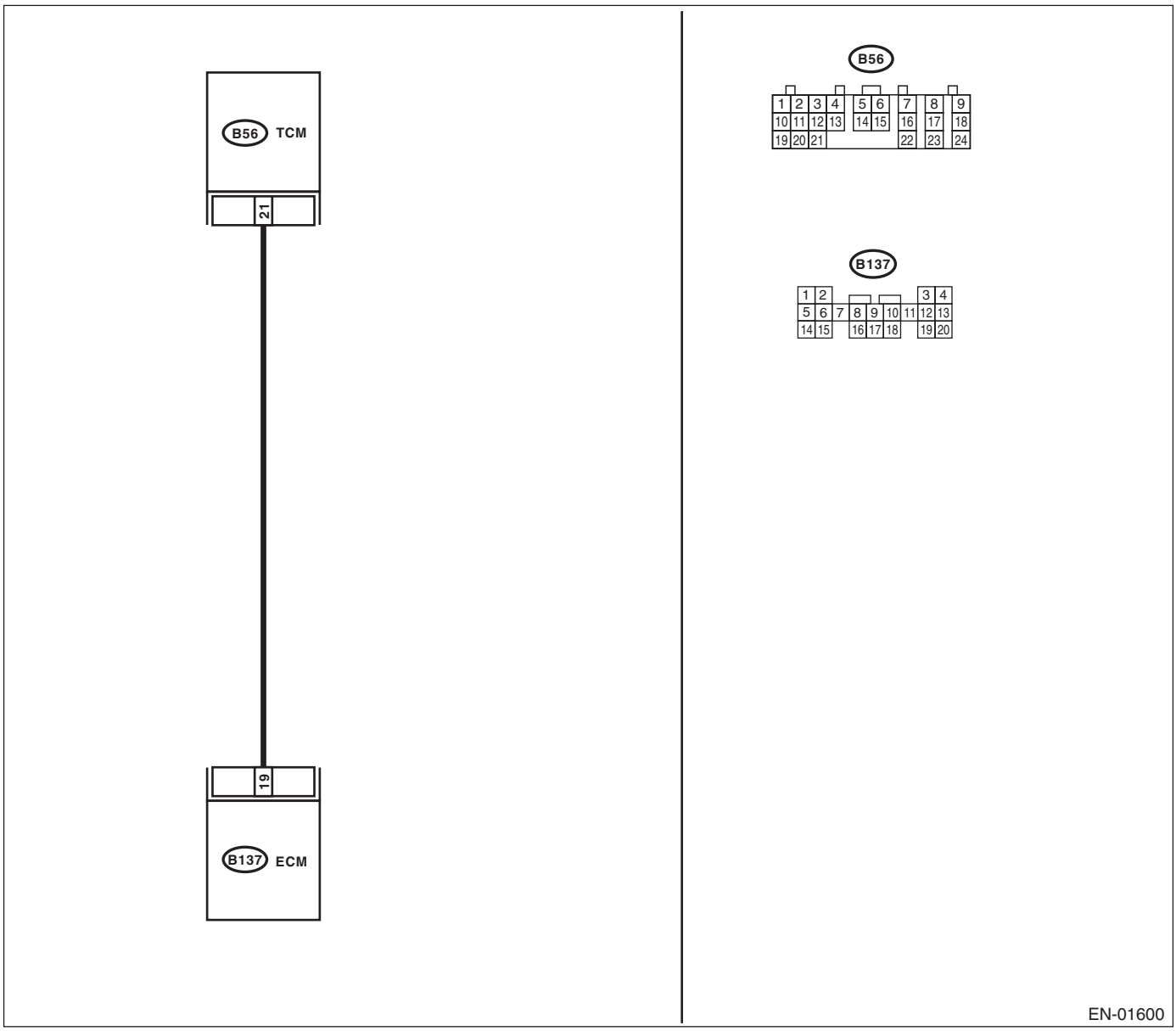
DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO)(diag)-44, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO)(diag)-37, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B137) No. 19 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **2.**	Even if malfunction indicator light lights up, the circuit has returned to a normal condition at this time. NOTE: In this case, repair the following: • Poor contact in ECM connector • Poor contact in TCM connector
2	**CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM and TCM. 3) Measure the resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***(B137) No. 19 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **3.**	Repair ground short circuit in harness between ECM and TCM connector.
3	**CHECK OUTPUT SIGNAL FOR ECM.** 1) Connect the connector to ECM. 2) Turn the ignition switch to ON. 3) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B137) No. 19 (+) — Chassis ground (−):***	Is the voltage more than 5 V?	Go to step **4.**	Repair poor contact in ECM connector.
4	**CHECK DTC FOR AUTOMATIC TRANSMISSION.** Read the DTC for automatic transmission. <Ref. to 4AT(diag)-23, Read Diagnostic Trouble Code (DTC).>	Does the DTC appear for automatic transmission?	Check DTC for automatic transmission. <Ref. to 4AT(diag)-38, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Replace the TCM. <Ref. to 4AT-75, Transmission Control Module (TCM).>

BO:DTC P0866 TCM COMMUNICATION CIRCUIT HIGH

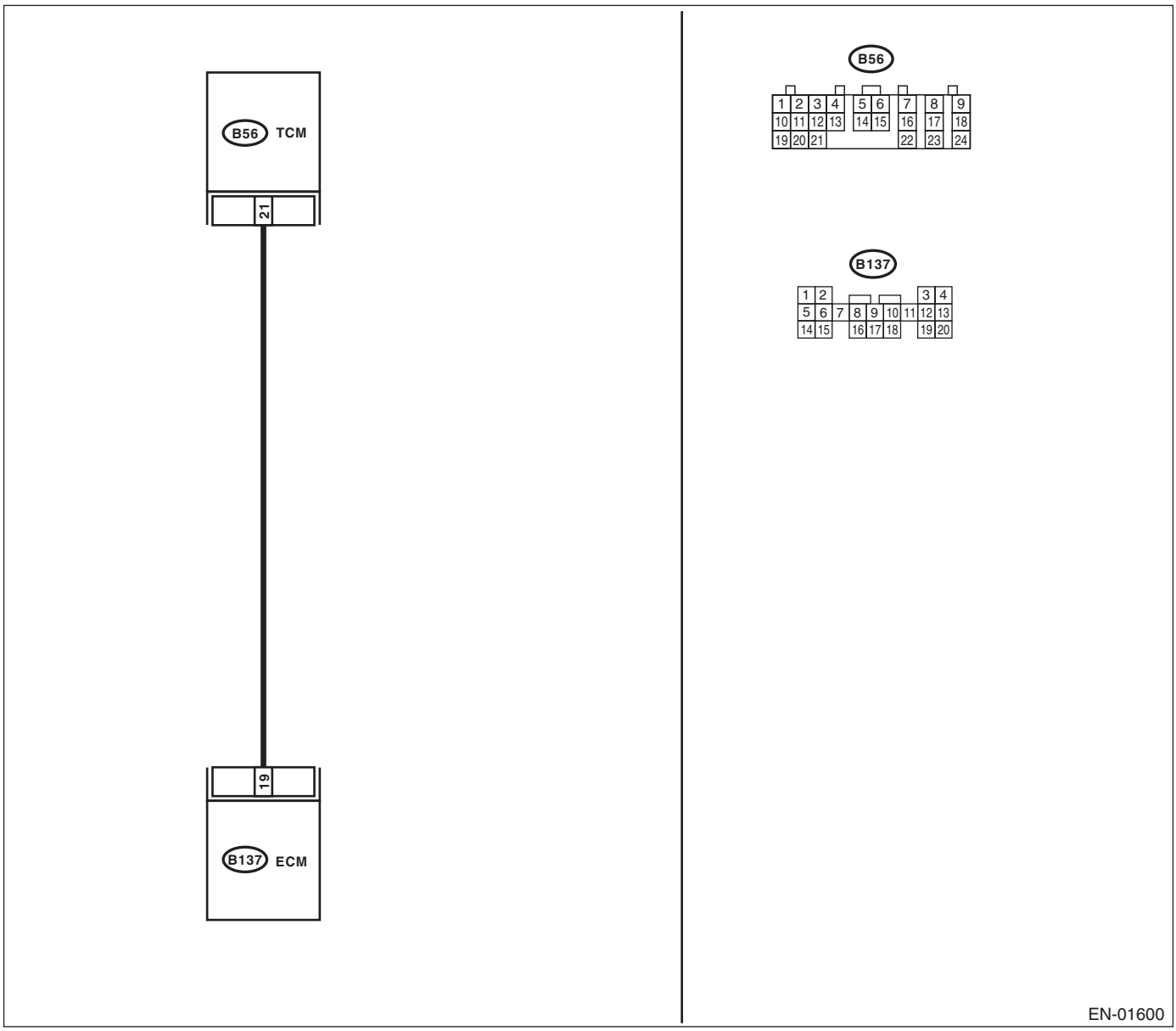
DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO)(diag)-44, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO)(diag)-37, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B137) No. 19 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Repair battery short circuit in harness between ECM and TCM connector.	Go to step **2.**
2	**CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B137) No. 19 (+) — Chassis ground (−):***	Is the voltage more than 4 V?	Go to step **5.**	Go to step **3.**
3	**CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B137) No. 19 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Repair poor contact in ECM connector.	Go to step **4.**
4	**CHECK OUTPUT SIGNAL FROM ECM.** Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B137) No. 19 (+) — Chassis ground (−):***	Is the voltage 1 — 4 V?	Even if malfunction indicator light lights up, the circuit has returned to a normal condition at this time. NOTE: In this case, repair the following: • Poor contact in ECM connector • Poor contact in TCM connector	Contact with SUBARU distributor service.
5	**CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.** Measure the voltage between TCM and chassis ground. ***Connector & terminal*** ***(B56) No. 21 (+) — Chassis ground (−):***	Is the voltage more than 4 V?	Go to step **6.**	Repair open circuit in harness between ECM and TCM connector.
6	**CHECK POOR CONTACT.** Check poor contact in TCM connector.	Is there poor contact in TCM connector?	Repair poor contact in TCM connector.	Check TCM power supply line and grounding line.

BP:DTC P1134 A/F SENSOR MICRO-COMPUTER PROBLEM (BANK 1 SENSOR 1)

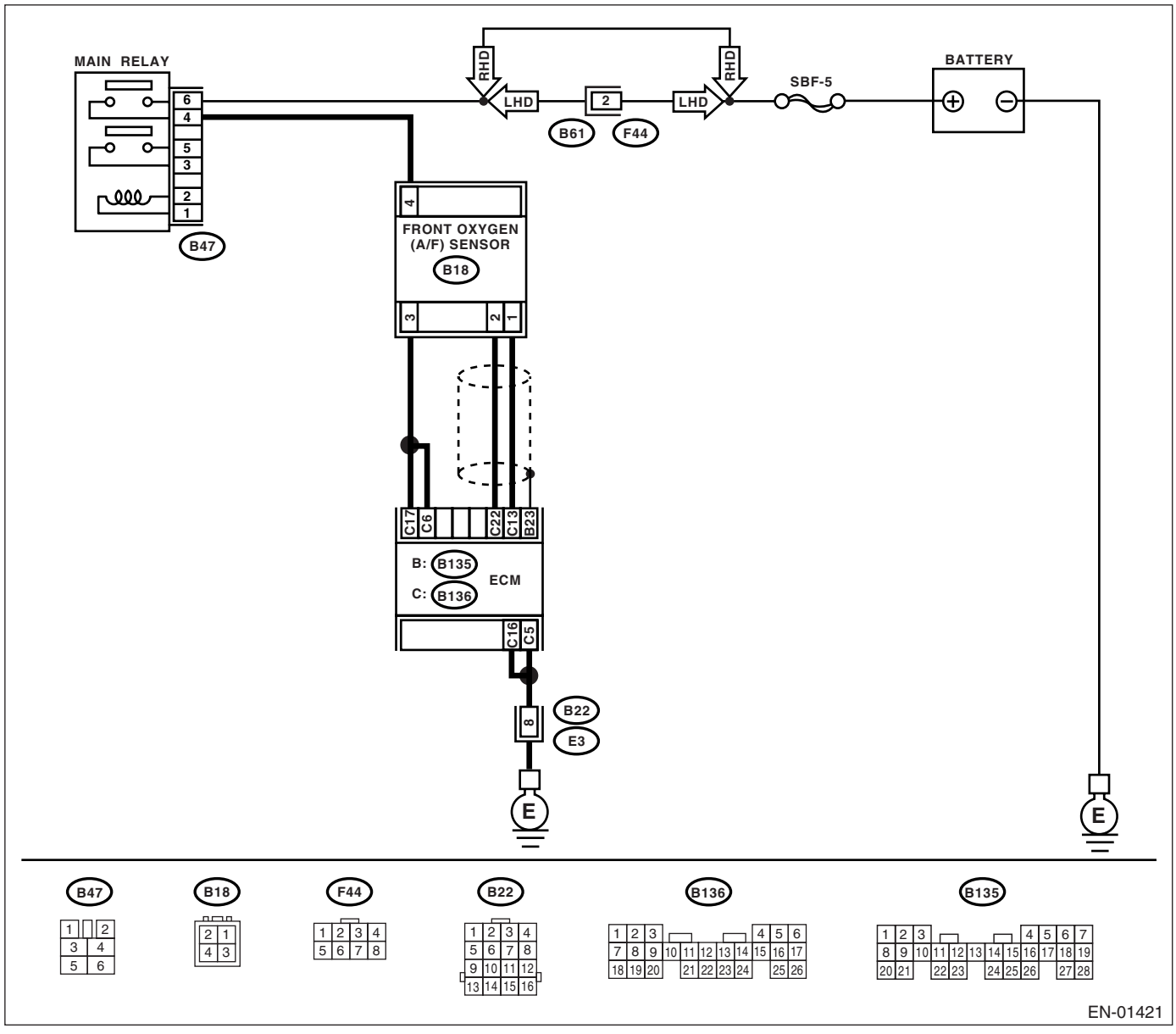
DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO)(diag)-44, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO)(diag)-37, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



Step		Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check DTC using the List of Diagnostic Trouble Code (DTC). <Ref. to EN(H4SO)(diag)-70, List of Diagnostic Trouble Code (DTC).> NOTE: It is not necessary to inspect DTC P1134.	Replace the ECM. <Ref. to FU(H4SO)-47, Engine Control Module (ECM).>

BQ:DTC P1137 O2 SENSOR CIRCUIT (MID) (BANK 1 SENSOR 1)

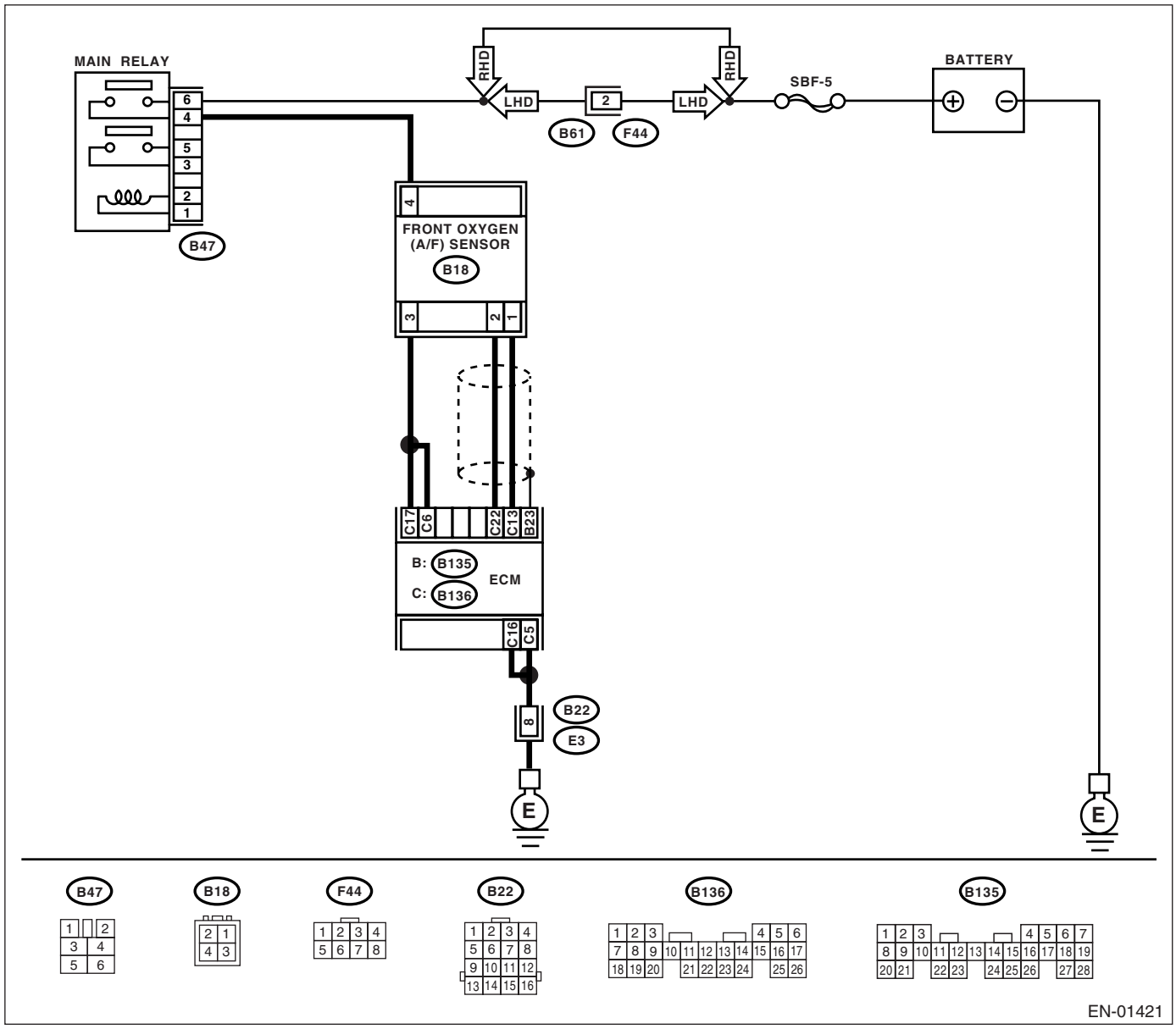
DTC DETECTING CONDITION:

Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO)(diag)-44, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO)(diag)-37, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4SO)(diag)-70, List of Diagnostic Trouble Code (DTC).>	Go to step **2.**
2	**CHECK FRONT OXYGEN (A/F) SENSOR DATA.** 1) Start the engine. 2) While observing the Subaru Select Monitor or general scan tool screen, warm-up the engine until coolant temperature is above 70°C (160°F). If the engine is already warmed-up, operate at idle speed for at least 1 minute. 3) Read the data of front oxygen (A/F) sensor signal during idling using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO)(diag)-30, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the General Scan Tool Instruction Manual.	Is the voltage 0.85 V — 1.15 V?	Go to step **3.**	Go to step **4.**
3	**CHECK FRONT OXYGEN (A/F) SENSOR DATA.** Race the engine at speeds from idling to 5,000 rpm for a total of 5 cycles. NOTE: • Air fuel ratio is rich at normal condition or during racing. • To increase engine speed to 5,000 rpm, slowly depress accelerator pedal, taking approximately 5 seconds, and quickly release accelerator pedal to decrease engine speed.	Is the voltage more than 1.1 V?	Go to step **6.**	Go to step **4.**
4	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM and front oxygen (A/F) sensor connector. 3) Measure the resistance between ECM and front oxygen (A/F) sensor. ***Connector & terminals*** ***(B136) No. 13 — (B18) No. 1:*** ***(B136) No. 22 — (B18) No. 2:***	Is the resistance less than 5 Ω?	Go to step **5.**	Repair open circuit between ECM and front oxygen (A/F) sensor.
5	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR.** Measure the resistance between ECM and chassis ground. ***Connector & terminals*** ***(B136) No. 13 — Chassis ground:*** ***(B136) No. 22 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **6.**	Repair ground short circuit between ECM and front oxygen (A/F) sensor.

Step		Check	Yes	No
6	**CHECK EXHAUST SYSTEM.** Check exhaust system parts. NOTE: Check the following items. • Loose installation of portions • Damage (crack, hole etc.) of parts • Looseness of front oxygen (A/F) sensor • Looseness and ill fitting of parts between front oxygen (A/F) sensor and rear oxygen sensor	Is there a fault in exhaust system?	Repair or replace faulty parts.	Replace the front oxygen (A/F) sensor. <Ref. to FU(H4SO)-43, Front Oxygen (A/F) Sensor.>

BR:DTC P1492 EGR SOLENOID VALVE SIGNAL #1 CIRCUIT MALFUNCTION (LOW INPUT)

NOTE:
For the diagnostic procedure, refer to DTC P1498. <Ref. to EN(H4SO)(diag)-226, DTC P1498 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (LOW INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

BS:DTC P1493 EGR SOLENOID VALVE SIGNAL #1 CIRCUIT MALFUNCTION (HIGH INPUT)

NOTE:
For the diagnostic procedure, refer to DTC P1499. <Ref. to EN(H4SO)(diag)-228, DTC P1499 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (HIGH INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

BT:DTC P1494 EGR SOLENOID VALVE SIGNAL #2 CIRCUIT MALFUNCTION (LOW INPUT)

NOTE:
For the diagnostic procedure, refer to DTC P1498. <Ref. to EN(H4SO)(diag)-226, DTC P1498 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (LOW INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

BU:DTC P1495 EGR SOLENOID VALVE SIGNAL #2 CIRCUIT MALFUNCTION (HIGH INPUT)

NOTE:
For the diagnostic procedure, refer to DTC P1499. <Ref. to EN(H4SO)(diag)-228, DTC P1499 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (HIGH INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

BV:DTC P1496 EGR SOLENOID VALVE SIGNAL #3 CIRCUIT MALFUNCTION (LOW INPUT)

NOTE:
For the diagnostic procedure, refer to DTC P1498. <Ref. to EN(H4SO)(diag)-226, DTC P1498 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (LOW INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

BW:DTC P1497 EGR SOLENOID VALVE SIGNAL #3 CIRCUIT MALFUNCTION (HIGH INPUT)

NOTE:
For the diagnostic procedure, refer to DTC P1499. <Ref. to EN(H4SO)(diag)-228, DTC P1499 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (HIGH INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

BX:DTC P1498 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (LOW INPUT)

DTC DETECTING CONDITION:

Immediately at fault recognition

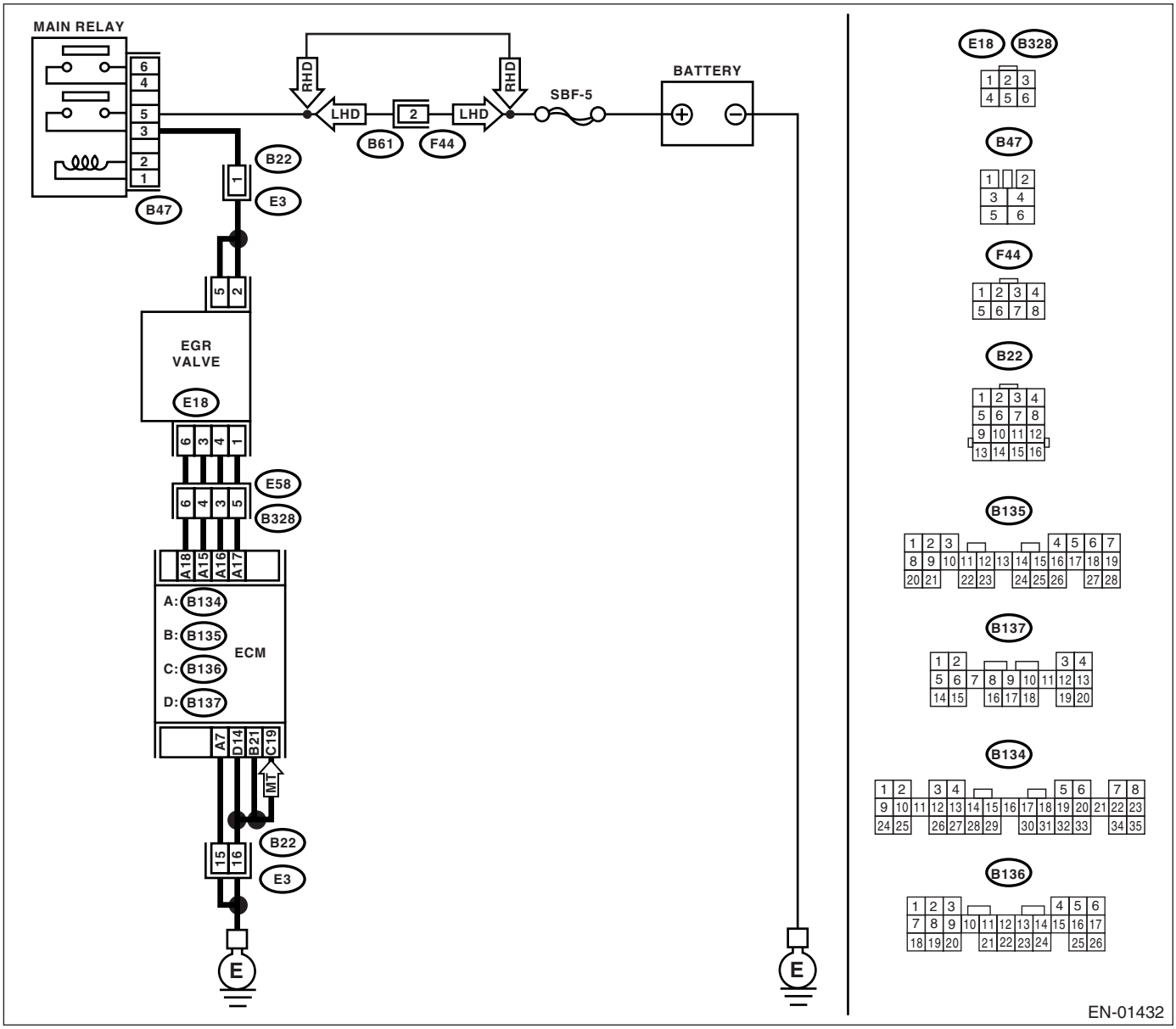
TROUBLE SYMPTOM:

- Erroneous idling
- Poor driving performance.
- Engine breathing

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO)(diag)-44, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO)(diag)-37, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK POWER SUPPLY TO EGR SOLENOID VALVE.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from EGR solenoid valve. 3) Turn the ignition switch to ON. 4) Measure the voltage between EGR solenoid valve connector and engine ground. ***Connector & terminal*** ***(E18) No. 2 (+) — Engine ground (−):*** ***(E18) No. 5 (+) — Engine ground (−):***	Is the voltage more than 10 V?	Go to step **2.**	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between EGR solenoid valve and main relay connector • Poor contact in coupling connector
2	**CHECK HARNESS BETWEEN ECM AND EGR SOLENOID VALVE CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between ECM and EGR solenoid valve connector. ***Connector & terminal*** ***DTC P1492; (B134) No. 18 — (E18) No. 6:*** ***DTC P1494; (B134) No. 17 — (E18) No. 1:*** ***DTC P1496; (B134) No. 16 — (E18) No. 4:*** ***DTC P1498; (B134) No. 15 — (E18) No. 3:***	Is the resistance less than 1 Ω?	Go to step **3.**	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and EGR solenoid valve connector • Poor contact in coupling connector
3	**CHECK HARNESS BETWEEN ECM AND EGR SOLENOID VALVE CONNECTOR.** 1) Disconnect the connector from ECM. 2) Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***DTC P1492; (B134) No. 18 — Chassis ground:*** ***DTC P1494; (B134) No. 17 — Chassis ground:*** ***DTC P1496; (B134) No. 16 — Chassis ground:*** ***DTC P1498; (B134) No. 15 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **4.**	Repair ground short circuit in harness between ECM and EGR solenoid valve connector.
4	**CHECK POOR CONTACT.** Check poor contact in ECM connector and EGR solenoid valve connector.	Is there poor contact in ECM connector or EGR solenoid valve connector?	Repair poor contact in ECM connector or EGR solenoid valve connector.	Replace the EGR solenoid valve. <Ref. to FU(H4SO)-35, Idle Air Control Solenoid Valve.>

BY:DTC P1499 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (HIGH INPUT)

DTC DETECTING CONDITION:

Immediately at fault recognition

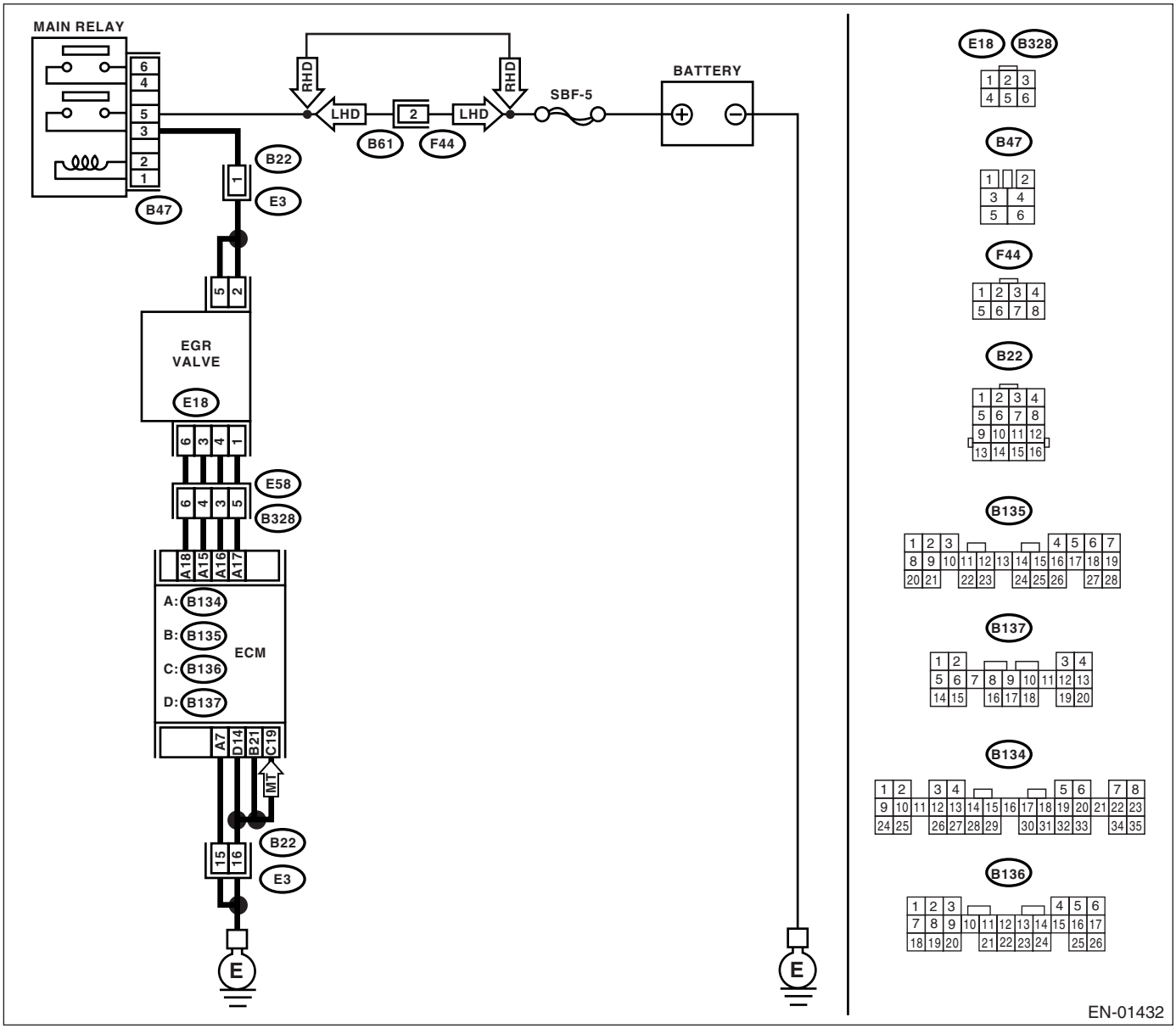
TROUBLE SYMPTOM:

- Erroneous idling
- Poor driving performance.
- Engine breathing

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO)(diag)-44, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO)(diag)-37, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check the DTC using the List of Diagnostic Trouble Code (DTC). <Ref. to EN(H4SO)(diag)-70, List of Diagnostic Trouble Code (DTC).>	Go to step **2.**
2	**CHECK GROUND CIRCUIT FOR ECM.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 7 — Chassis ground:*** ***(B137) No. 14 — Chassis ground:*** ***(B135) No. 21 — Chassis ground:*** ***(B136) No. 19 — Chassis ground: (MT model)***	Is the resistance less than 5 Ω?	Go to step **3.**	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM connector and engine ground terminal • Poor contact in ECM connector • Poor contact in coupling connector
3	**CHECK HARNESS BETWEEN ECM AND EGR SOLENOID VALVE CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from EGR solenoid valve. 3) Turn the ignition switch to ON. 4) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***DTC P1493; (B134) No. 18 (+) — Chassis ground (−):*** ***DTC P1495; (B134) No. 17 (+) — Chassis ground (−):*** ***DTC P1497; (B134) No. 16 (+) — Chassis ground (−):*** ***DTC P1499; (B134) No. 15 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Repair battery short circuit in harness between ECM and EGR solenoid valve connector. After repair, replace the ECM. <Ref. to FU(H4SO)-47, Engine Control Module (ECM).>	Replace the ECM. <Ref. to FU(H4SO)-47, Engine Control Module (ECM).>

BZ:DTC P1510 ISC SOLENOID VALVE SIGNAL #1 CIRCUIT MALFUNCTION (LOW INPUT)

NOTE:
For the diagnostic procedure, refer to DTC P1516. <Ref. to EN(H4SO)(diag)-231, DTC P1516 ISC SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (LOW INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

CA:DTC P1511 ISC SOLENOID VALVE SIGNAL #1 CIRCUIT MALFUNCTION (HIGH INPUT)

NOTE:
For the diagnostic procedure, refer to DTC P1517. <Ref. to EN(H4SO)(diag)-233, DTC P1517 ISC SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (HIGH INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

CB:DTC P1512 ISC SOLENOID VALVE SIGNAL #2 CIRCUIT MALFUNCTION (LOW INPUT)

NOTE:
For the diagnostic procedure, refer to DTC P1516. <Ref. to EN(H4SO)(diag)-231, DTC P1516 ISC SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (LOW INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

CC:DTC P1513 ISC SOLENOID VALVE SIGNAL #2 CIRCUIT MALFUNCTION (HIGH INPUT)

NOTE:
For the diagnostic procedure, refer to DTC P1517. <Ref. to EN(H4SO)(diag)-233, DTC P1517 ISC SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (HIGH INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

CD:DTC P1514 ISC SOLENOID VALVE SIGNAL #3 CIRCUIT MALFUNCTION (LOW INPUT)

NOTE:
For the diagnostic procedure, refer to DTC P1516. <Ref. to EN(H4SO)(diag)-231, DTC P1516 ISC SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (LOW INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

CE:DTC P1515 ISC SOLENOID VALVE SIGNAL #3 CIRCUIT MALFUNCTION (HIGH INPUT)

NOTE:
For the diagnostic procedure, refer to DTC P1517. <Ref. to EN(H4SO)(diag)-233, DTC P1517 ISC SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (HIGH INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

CF:DTC P1516 ISC SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (LOW INPUT)

DTC DETECTING CONDITION:

Immediately at fault recognition

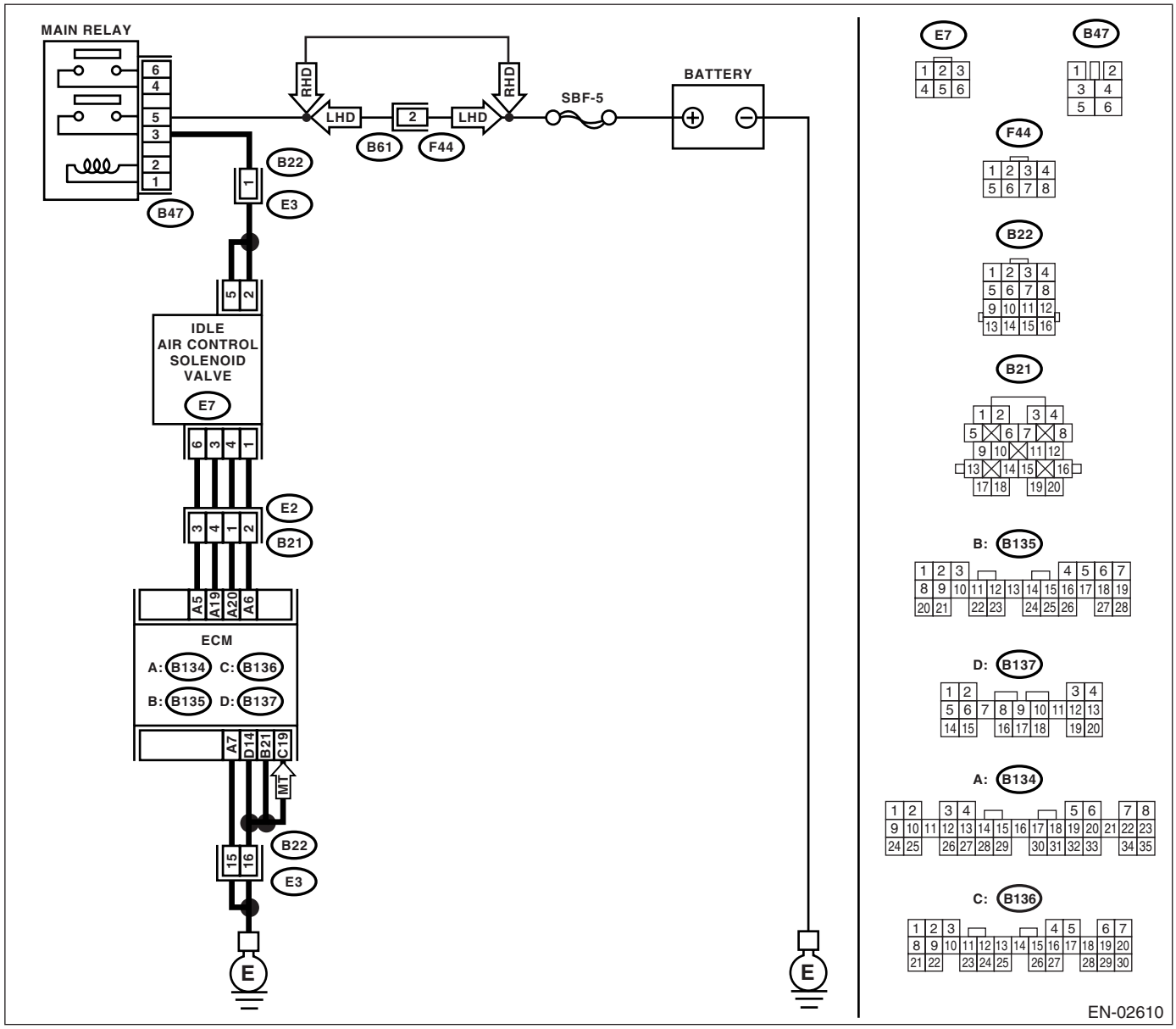
TROUBLE SYMPTOM:

- Erroneous idling
- Engine stalls.
- Engine breathing

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO)(diag)-44, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO)(diag)-37, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK POWER SUPPLY TO IDLE AIR CONTROL SOLENOID VALVE.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from idle air control solenoid valve. 3) Turn the ignition switch to ON. 4) Measure the voltage between idle air control solenoid valve connector and engine ground. ***Connector & terminal*** ***(E7) No. 2 (+) — Engine ground (−):*** ***(E7) No. 5 (+) — Engine ground (−):***	Is the voltage more than 10 V?	Go to step **2.**	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between idle air control solenoid valve and main relay connector • Poor contact in coupling connector
2	**CHECK HARNESS BETWEEN ECM AND IDLE AIR CONTROL SOLENOID VALVE CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between ECM and idle air control solenoid valve connector. ***Connector & terminal*** ***DTC P1510; (B134) No. 20 — (E7) No. 4:*** ***DTC P1512; (B134) No. 6 — (E7) No. 1:*** ***DTC P1514; (B134) No. 5 — (E7) No. 6:*** ***DTC P1516; (B134) No. 19 — (E7) No. 3:***	Is the resistance less than 1 Ω?	Go to step **3.**	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and idle air control solenoid valve connector • Poor contact in coupling connector
3	**CHECK HARNESS BETWEEN ECM AND IDLE AIR CONTROL SOLENOID VALVE CONNECTOR.** 1) Disconnect the connector from ECM. 2) Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***DTC P1510; (B134) No. 20 — Chassis ground:*** ***DTC P1512; (B134) No. 6 — Chassis ground:*** ***DTC P1514; (B134) No. 5 — Chassis ground:*** ***DTC P1516; (B134) No. 19 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **4.**	Repair ground short circuit in harness between ECM and idle air control solenoid valve connector.
4	**CHECK POOR CONTACT.** Check poor contact in ECM connector and idle air control solenoid valve connector.	Is there poor contact in ECM connector or idle air control solenoid valve connector?	Repair poor contact in ECM connector or idle air control solenoid valve connector.	Replace the idle air control solenoid valve. <Ref. to FU(H4SO)-35, Idle Air Control Solenoid Valve.>

CG:DTC P1517 ISC SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (HIGH INPUT)

DTC DETECTING CONDITION:

Immediately at fault recognition

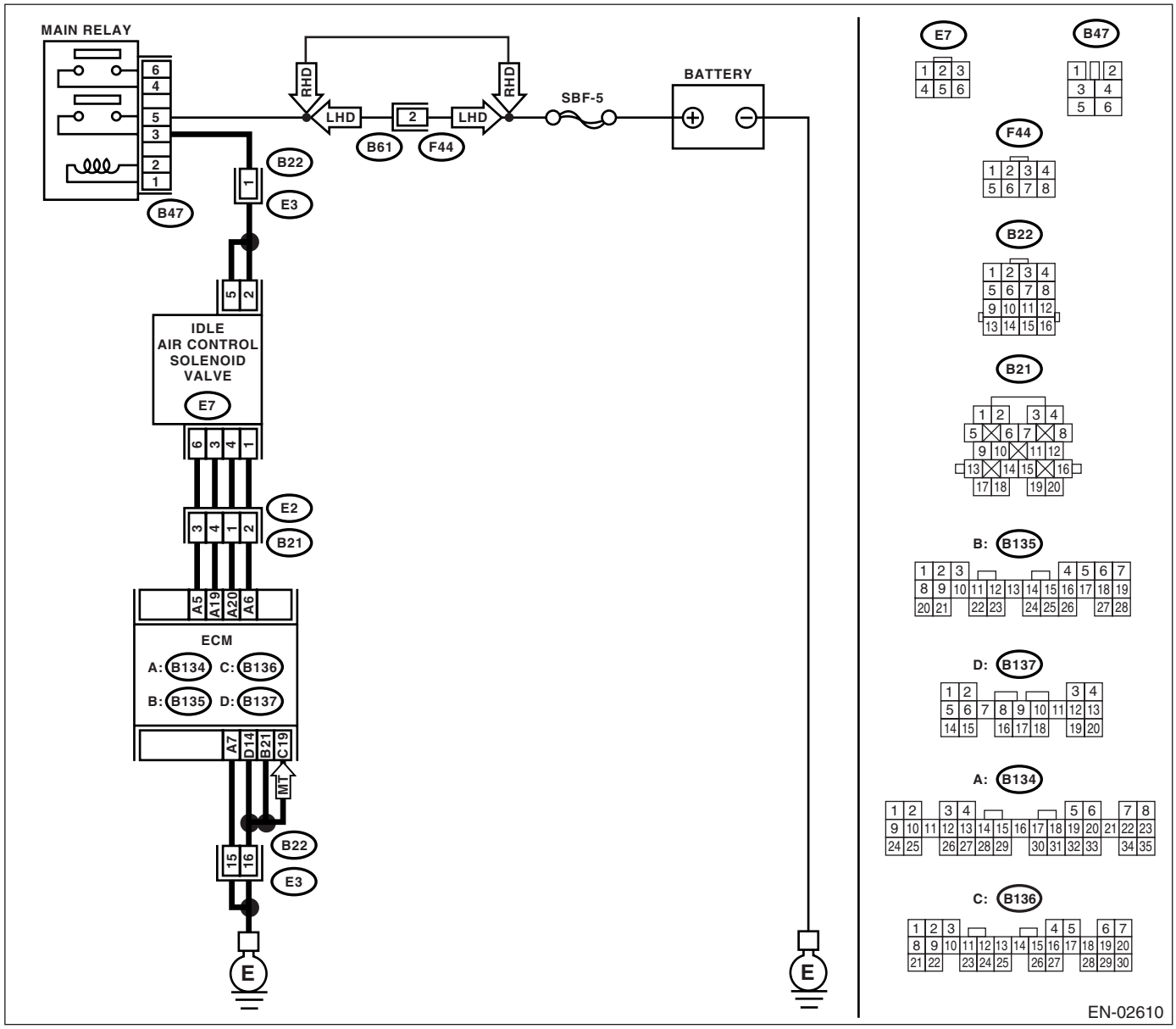
TROUBLE SYMPTOM:

- Erroneous idling
- Engine stalls.
- Engine breathing

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO)(diag)-44, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO)(diag)-37, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check the DTC using the List of Diagnostic Trouble Code (DTC). <Ref. to EN(H4SO)(diag)-70, List of Diagnostic Trouble Code (DTC).>	Go to step **2.**
2	**CHECK GROUND CIRCUIT FOR ECM.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 7 — Chassis ground:*** ***(B137) No. 14 — Chassis ground:*** ***(B135) No. 21 — Chassis ground:*** ***(B136) No. 19 — Chassis ground: (MT model)***	Is the resistance less than 5 Ω?	Go to step **3.**	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM connector and engine ground terminal • Poor contact in ECM connector • Poor contact in coupling connector
3	**CHECK HARNESS BETWEEN ECM AND IDLE AIR CONTROL SOLENOID VALVE CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from idle air control solenoid valve. 3) Turn the ignition switch to ON. 4) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***DTC P1511; (B134) No. 20 (+) — Chassis ground (−):*** ***DTC P1513; (B134) No. 6 (+) — Chassis ground (−):*** ***DTC P1515; (B134) No. 5 (+) — Chassis ground (−):*** ***DTC P1517; (B134) No. 19 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Repair battery short circuit in harness between ECM and idle air control solenoid valve connector. After repair, replace the ECM. <Ref. to FU(H4SO)-47, Engine Control Module (ECM).>	Replace the ECM. <Ref. to FU(H4SO)-47, Engine Control Module (ECM).>

CH:DTC P1518 STARTER SWITCH CIRCUIT LOW INPUT

DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

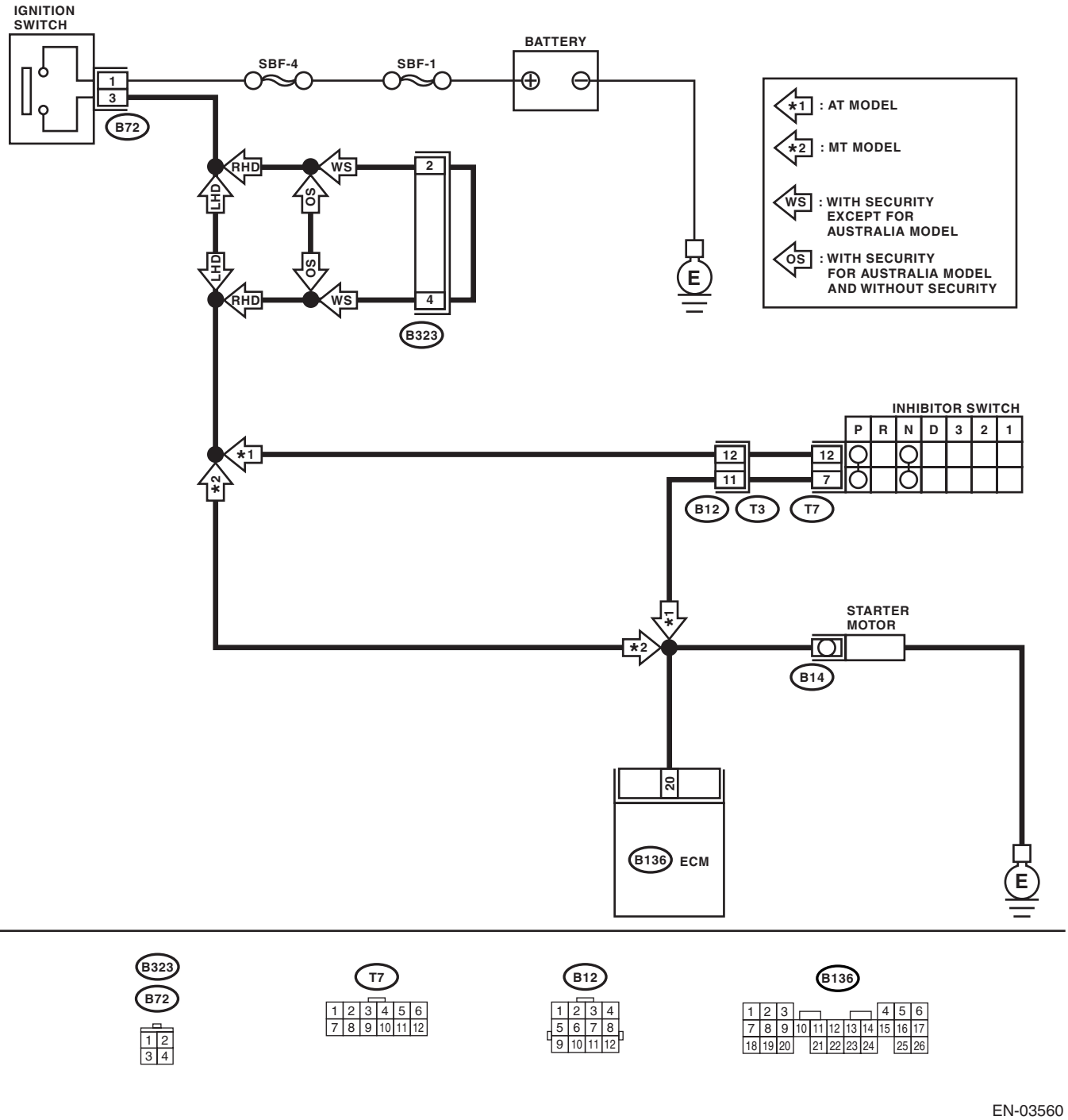
TROUBLE SYMPTOM:

Failure of engine to start

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO)(diag)-44, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO)(diag)-37, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



EN-03560

	Step	Check	Yes	No
1	**CHECK OPERATION OF STARTER MOTOR.** Place the inhibitor switch in the “P” or “N” range. (AT model) Depress the clutch pedal. (MT model)	Does the starter motor operate when ignition switch is turned to “ST”?	Repair harness and connector. NOTE: In this case, repair the following: • Open or ground short circuit in harness between ECM and starter motor connector. • Poor contact in ECM connector.	Check starter motor circuit. <Ref. to EN(H4SO)(diag)-57, STARTER MOTOR CIRCUIT, Diagnostics for Engine Starting Failure.>

CI: DTC P1560 BACK-UP VOLTAGE CIRCUIT MALFUNCTION

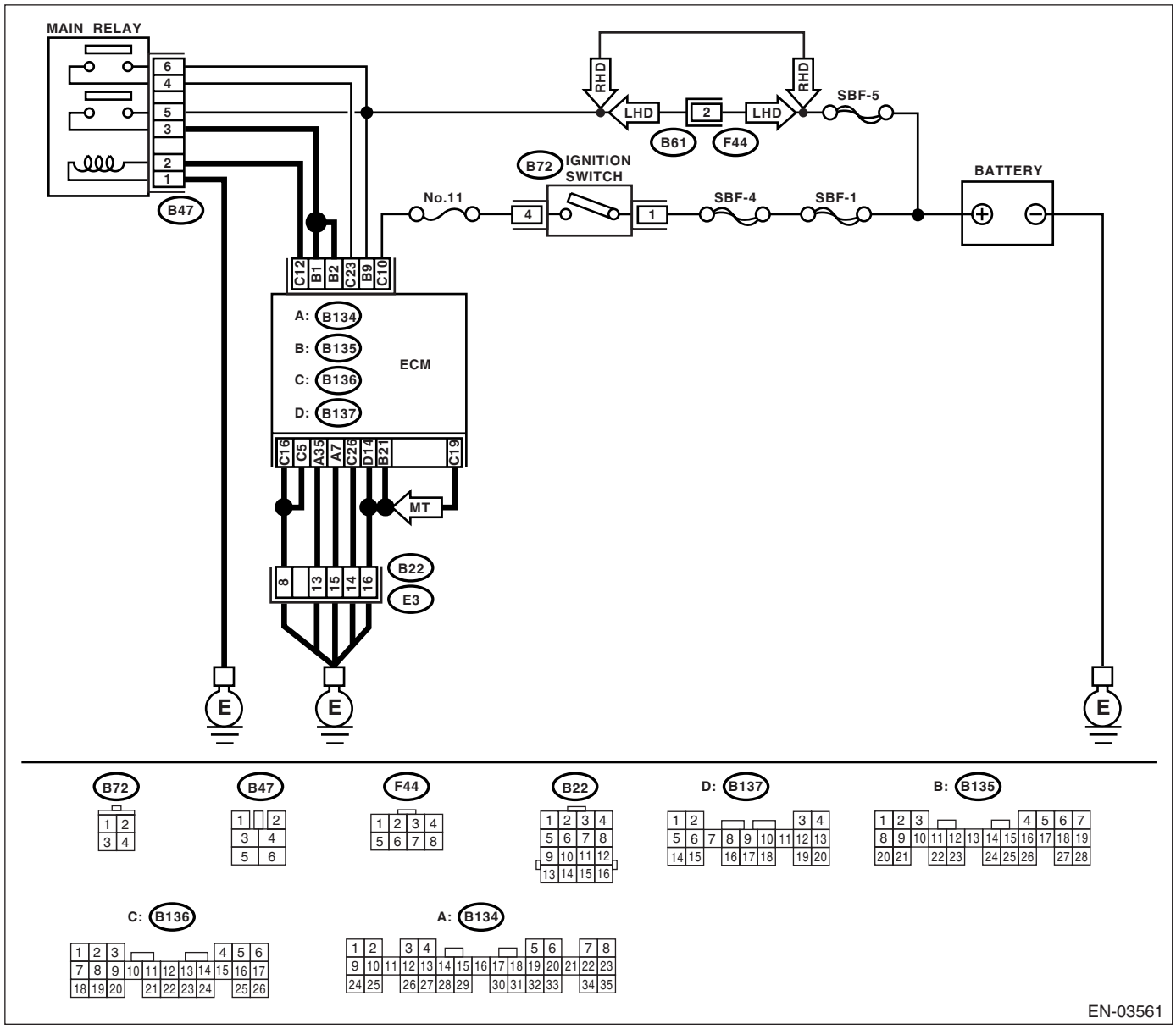
DTC DETECTING CONDITION:

Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO)(diag)-44, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO)(diag)-37, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK INPUT SIGNAL FOR ECM.** 1) Turn the ignition switch to OFF. 2) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 9 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Repair poor contact in ECM connector.	Go to step **2.**
2	**CHECK HARNESS BETWEEN ECM AND MAIN FUSE BOX CONNECTOR.** 1) Disconnect the negative terminal from battery, and then disconnect the positive terminal. 2) Disconnect the connector from ECM. 3) Measure the resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 9 — Chassis ground:***	Is the resistance less than 10 Ω?	Repair ground short circuit in harness between ECM connector and battery terminal.	Go to step **3.**
3	**CHECK FUSE SBF-5.**	Is the fuse blown out?	Replace the fuse.	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and battery • Poor contact in ECM connector • Poor contact in battery terminal

CJ:DTC P1698 ENGINE TORQUE CONTROL CUT SIGNAL CIRCUIT LOW INPUT

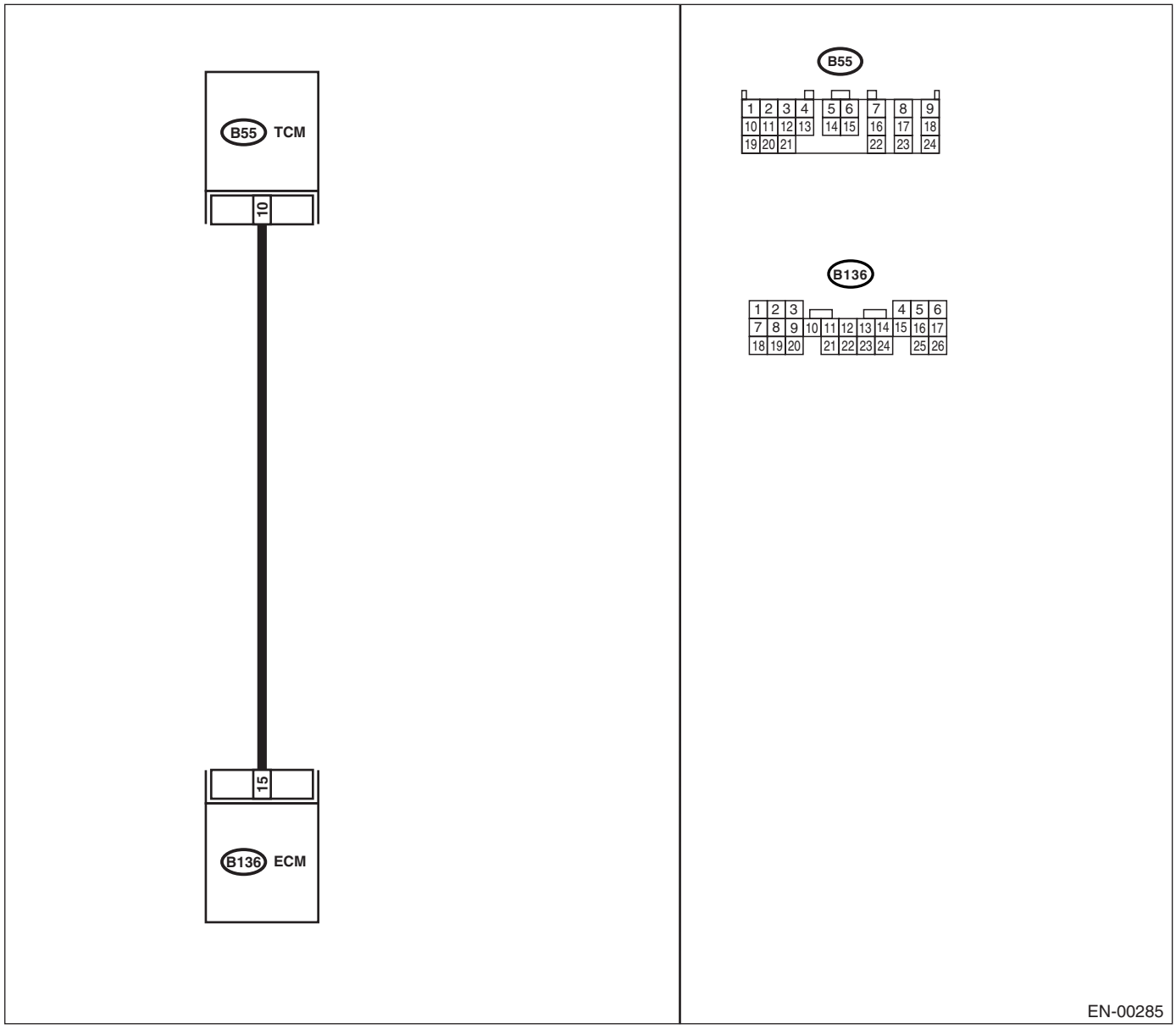
DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO)(diag)-44, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO)(diag)-37, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Start the engine, and warm-up the engine. 2) Turn the ignition switch to OFF. 3) Turn the ignition switch to ON. 4) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B136) No. 15 (+) — Chassis ground (−):***	Is the voltage more than 3 V?	Repair poor contact in ECM connector.	Go to step **2.**
2	**CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and TCM. 3) Measure the resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***(B136) No. 15 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **3.**	Repair ground short circuit in harness between ECM and TCM connector.
3	**CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.** Measure the resistance of harness between ECM and TCM connector. ***Connector & terminal*** ***(B136) No. 15 — (B55) No. 10:***	Is the resistance less than 1 Ω?	Repair poor contact in ECM or TCM connector.	Repair open circuit in harness between ECM and TCM connector.

CK:DTC P1699 ENGINE TORQUE CONTROL CUT SIGNAL CIRCUIT HIGH INPUT

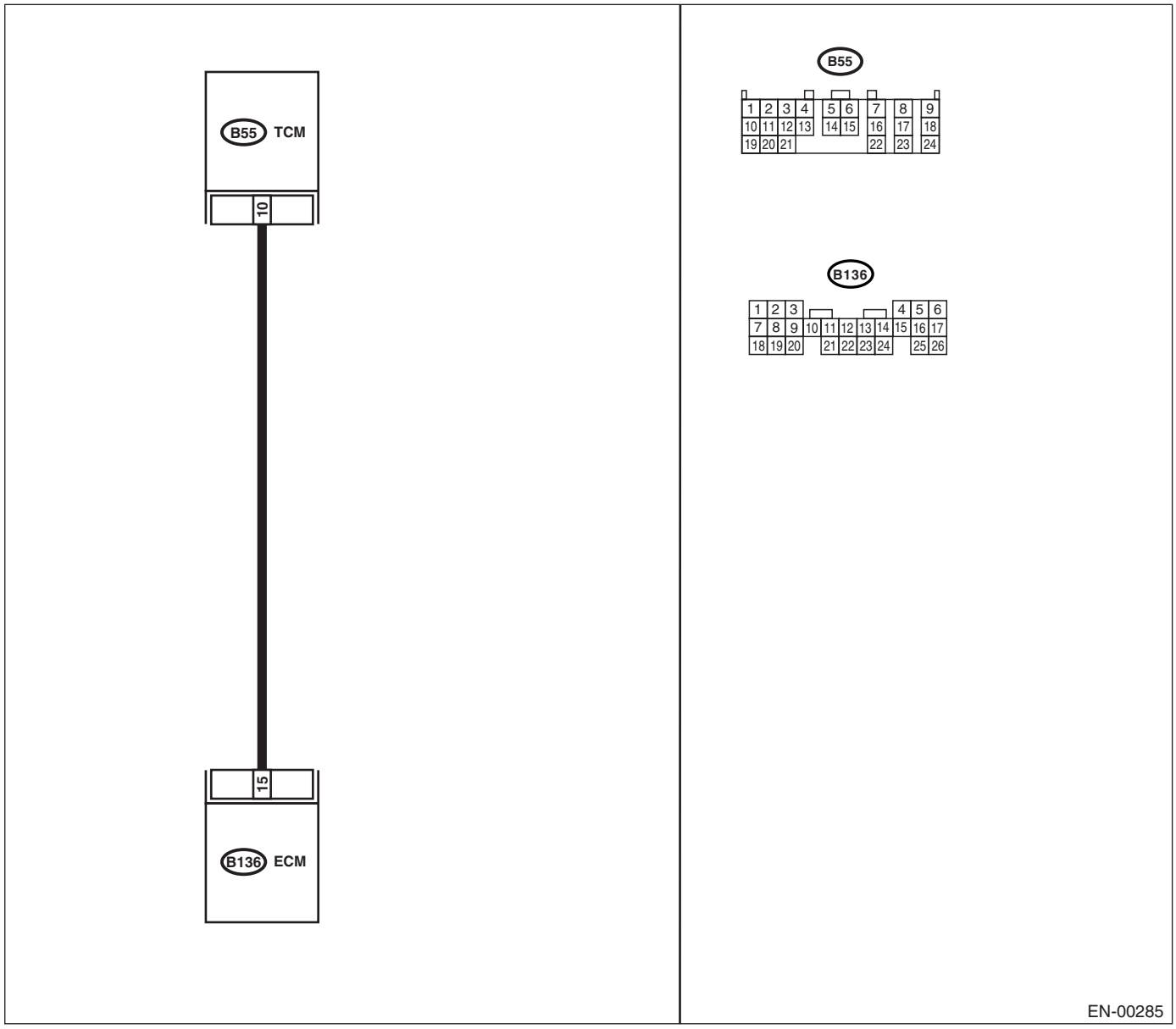
DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO)(diag)-44, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO)(diag)-37, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Start the engine, and warm-up the engine. 2) Turn the ignition switch to OFF. 3) Disconnect the connector from TCM. 4) Turn the ignition switch to ON. 5) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B136) No. 15 (+) — Chassis ground (–):***	Is the voltage less than 3 V?	Go to step **2.**	Repair battery short circuit in harness between ECM and TCM connector. After repair, replace the ECM. <Ref. to FU(H4SO)-47, Engine Control Module (ECM).>
2	**CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B136) No. 15 (+) — Chassis ground (–):***	Is the voltage more than 10 V by shaking the harness and connector of ECM?	Repair battery short circuit in harness between ECM and TCM connector. After repair, replace the ECM. <Ref. to FU(H4SO)-47, Engine Control Module (ECM).>	Contact with SUBARU distributor service.

CL:DTC P1711 ENGINE TORQUE CONTROL SIGNAL #1 CIRCUIT MALFUNCTION

DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

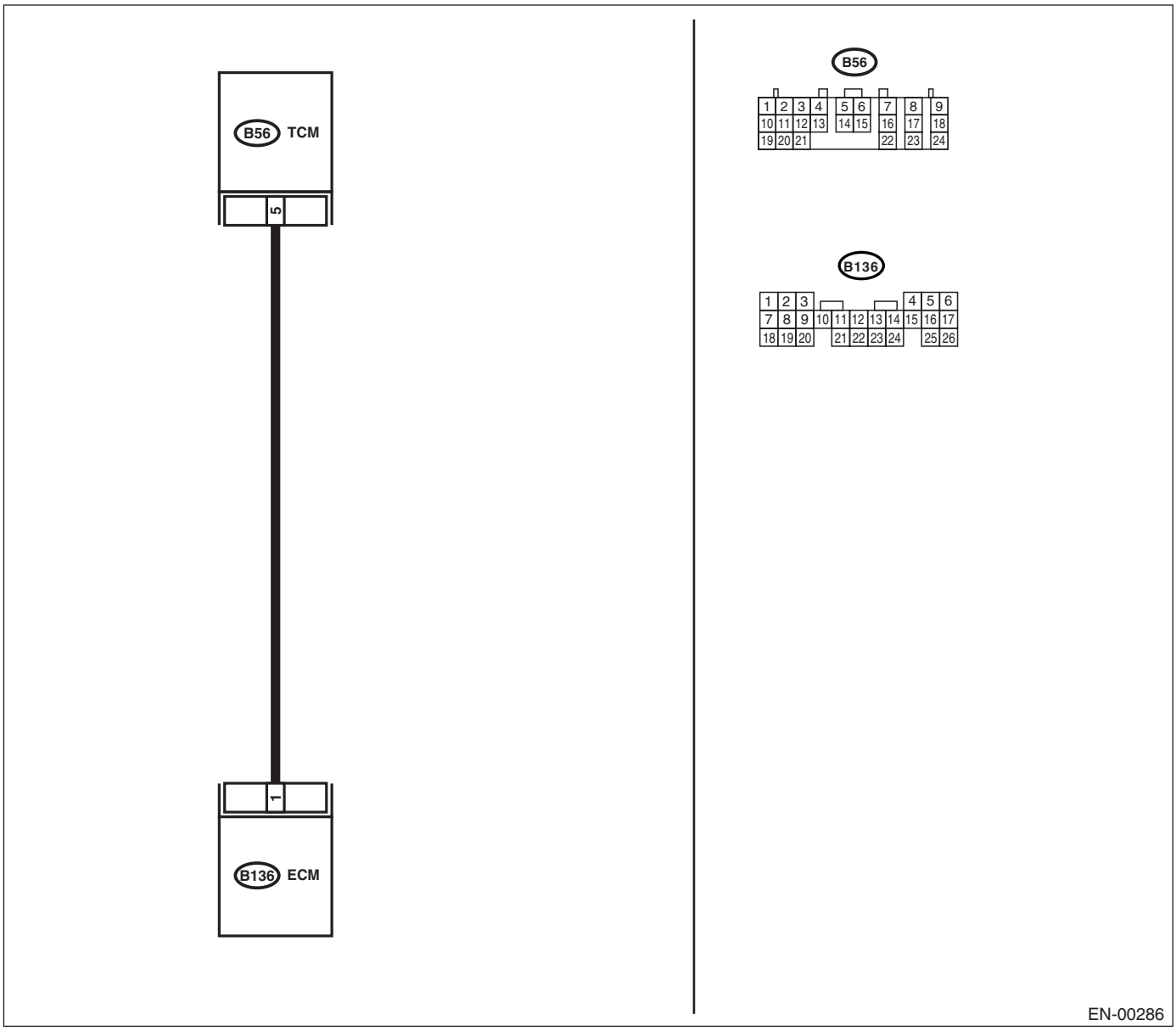
TROUBLE SYMPTOM:

Excessive shift shock

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO)(diag)-44, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO)(diag)-37, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK INPUT SIGNAL FOR ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B136) No. 1 (+) — Chassis ground (−):***	Is the voltage more than 4.5 V?	Go to step **2.**	Go to step **4.**
2	**CHECK INPUT SIGNAL FOR ECM.** Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B136) No. 1 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Repair battery short circuit in harness between ECM and TCM connector.	Go to step **3.**
3	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H4SO)-47, Engine Control Module (ECM).>
4	**CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and TCM. 3) Measure the resistance of harness between ECM and TCM connector. ***Connector & terminal*** ***(B136) No. 1 — (B56) No. 5:***	Is the resistance less than 1 Ω?	Go to step **5.**	Repair open circuit in harness between ECM and TCM connector.
5	**CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.** Measure the resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***(B136) No. 1 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **6.**	Repair ground short circuit in harness between ECM and TCM connector.
6	**CHECK POOR CONTACT.** Check poor contact in TCM connector.	Is there poor contact in TCM connector?	Repair poor contact in TCM connector.	Replace the TCM. <Ref. to 4AT-75, Transmission Control Module (TCM).>

CM:DTC P1712 ENGINE TORQUE CONTROL SIGNAL #2 CIRCUIT MALFUNCTION

DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

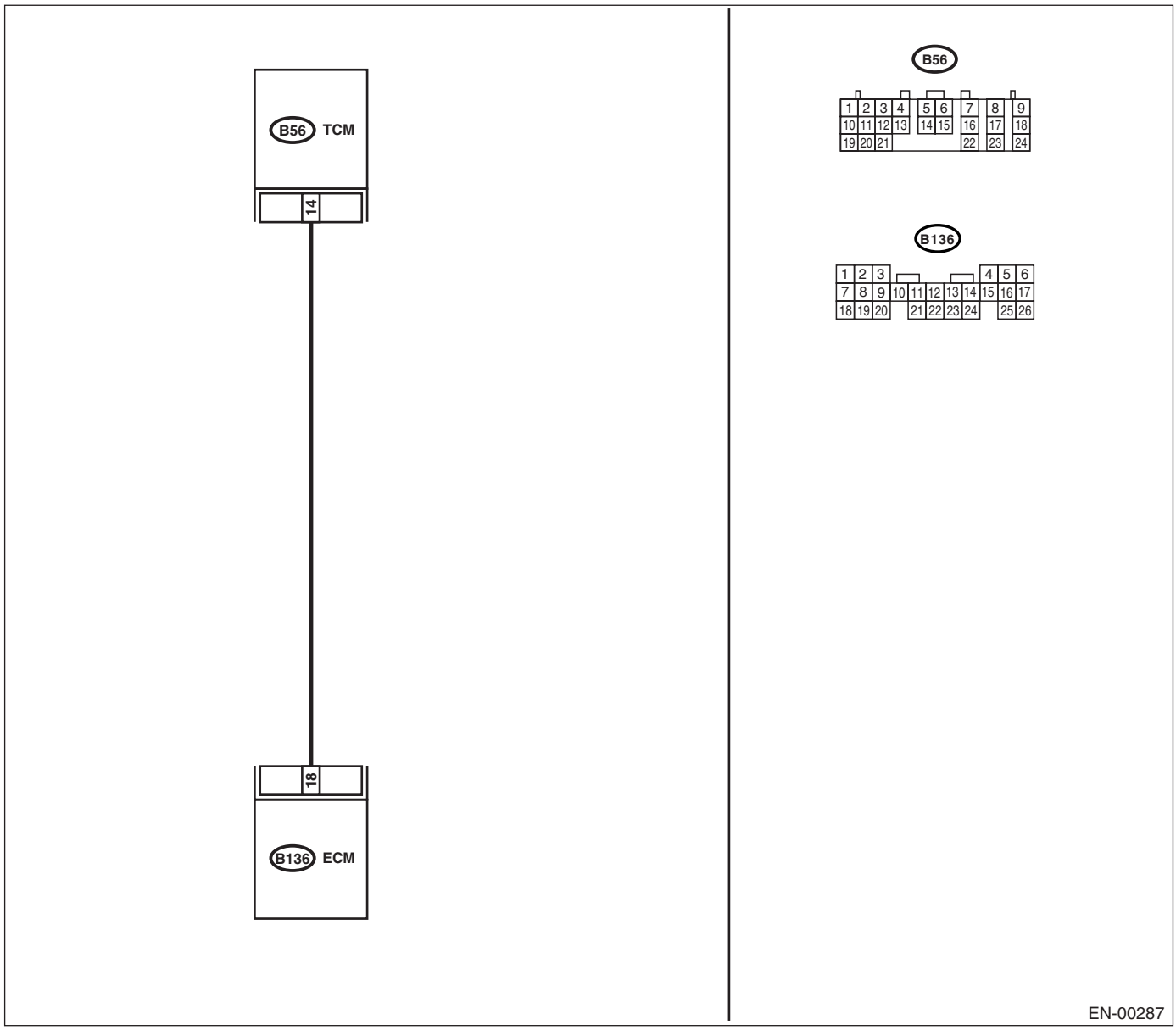
TROUBLE SYMPTOM:

Excessive shift shock

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO)(diag)-44, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO)(diag)-37, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK INPUT SIGNAL FOR ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B136) No. 18 (+) — Chassis ground (−):***	Is the voltage more than 4.5 V?	Go to step **2.**	Go to step **4.**
2	**CHECK INPUT SIGNAL FOR ECM.** Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B136) No. 18 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Repair battery short circuit in harness between ECM and TCM connector.	Go to step **3.**
3	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H4SO)-47, Engine Control Module (ECM).>
4	**CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and TCM. 3) Measure the resistance of harness between ECM and TCM connector. ***Connector & terminal*** ***(B136) No. 18 — (B56) No. 14:***	Is the resistance less than 1 Ω?	Go to step **5.**	Repair open circuit in harness between ECM and TCM connector.
5	**CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.** Measure the resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***(B136) No. 18 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **6.**	Repair ground short circuit in harness between ECM and TCM connector.
6	**CHECK POOR CONTACT.** Check poor contact in TCM connector.	Is there poor contact in TCM connector?	Repair poor contact in TCM connector.	Replace the TCM. <Ref. to 4AT-75, Transmission Control Module (TCM).>

CN:DTC P2503 CHARGING SYSTEM VOLTAGE LOW

CAUTION:
For diagnostic procedure, refer to DTC P0559. <Ref. to EN(H4SO)(diag)-247, DTC P2504 CHARGING SYSTEM VOLTAGE HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>.

CO:DTC P2504 CHARGING SYSTEM VOLTAGE HIGH

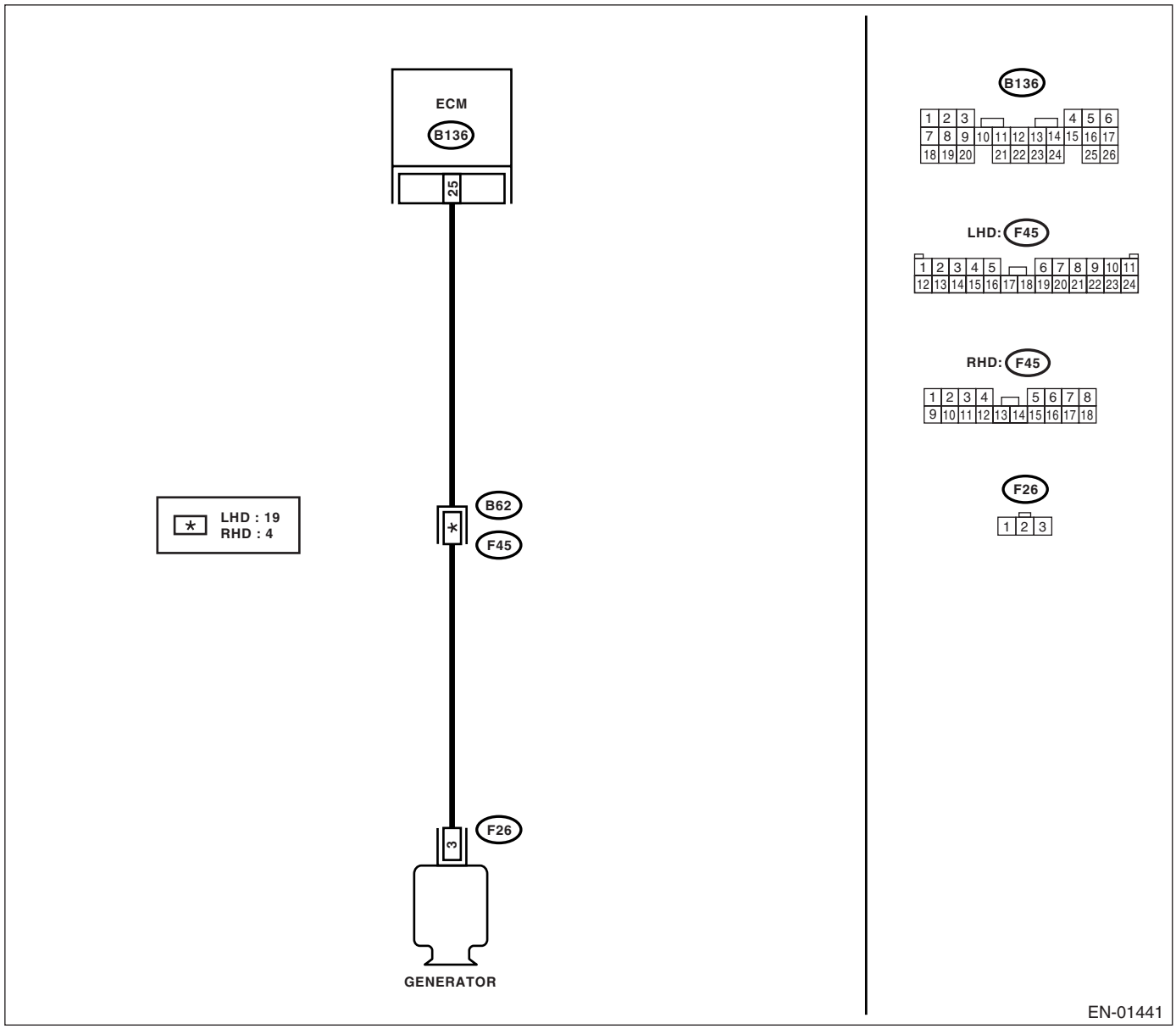
DTC DETECTING CONDITION:

Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO)(diag)-44, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO)(diag)-37, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN GENERATOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from generator and ECM. 3) Measure the resistance of harness between generator connector and engine ground. ***Connector & terminal*** ***(F26) No. 3 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **2.**	Repair the ground short circuit in harness between ECM and purge control solenoid valve connector.
2	**CHECK HARNESS BETWEEN GENERATOR AND ECM CONNECTOR.** Measure the resistance of harness between ECM and generator of harness connector. ***Connector & terminal*** ***(B136) No. 25 — (F26) No. 3:***	Is the resistance less than 1 Ω?	Repair poor contact in connector.	Repair the open circuit in harness between ECM and generator connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and generator connector • Poor contact in coupling connector

20.General Diagnostic Table

A: INSPECTION

1. ENGINE

NOTE:
Malfunction of parts other than those listed is also possible. <Ref. to ME(H4SO)-88, Engine Trouble in General.>

Symptom	Problem parts
1. Engine stalls during idling.	1) Idle air control solenoid valve 2) Manifold absolute pressure sensor 3) Intake air temperature sensor 4) Ignition parts (*1) 5) Engine coolant temperature sensor (*2) 6) Crankshaft position sensor (*3) 7) Camshaft position sensor (*3) 8) Fuel injection parts (*4)
2. Rough idling	1) Idle air control solenoid valve 2) Manifold absolute pressure sensor 3) Intake air temperature sensor 4) Engine coolant temperature sensor (*2) 5) Ignition parts (*1) 6) Air intake system (*5) 7) Fuel injection parts (*4) 8) Throttle position sensor 9) Crankshaft position sensor (*3) 10) Camshaft position sensor (*3) 11) Oxygen sensor 12) Fuel pump and fuel pump relay
3. Engine does not return to idle.	1) Idle air control solenoid valve 2) Engine coolant temperature sensor 3) Accelerator cable (*6) 4) Throttle position sensor 5) Manifold absolute pressure sensor 6) Intake air temperature sensor
4. Poor acceleration	1) Manifold absolute pressure sensor 2) Intake air temperature sensor 3) Throttle position sensor 4) Fuel injection parts (*4) 5) Fuel pump and fuel pump relay 6) Engine coolant temperature sensor (*2) 7) Crankshaft position sensor (*3) 8) Camshaft position sensor (*3) 9) A/C switch and A/C cut relay 10) Engine torque control signal circuit 11) Ignition parts (*1)
5. Engine stalls or engine sags or hesitates at acceleration.	1) Manifold absolute pressure sensor 2) Intake air temperature sensor 3) Engine coolant temperature sensor (*2) 4) Crankshaft position sensor (*3) 5) Camshaft position sensor (*3) 6) Purge control solenoid valve 7) Fuel injection parts (*4) 8) Throttle position sensor 9) Fuel pump and fuel pump relay

Symptom	Problem parts
6. Surge	1) Intake air temperature sensor 2) Manifold absolute pressure sensor 3) Engine coolant temperature sensor (*2) 4) Crankshaft position sensor (*3) 5) Camshaft position sensor (*3) 6) Fuel injection parts (*4) 7) Throttle position sensor 8) Fuel pump and fuel pump relay
7. Spark knock	1) Intake air temperature sensor 2) Manifold absolute pressure sensor 3) Engine coolant temperature sensor 4) Knock sensor 5) Fuel injection parts (*4) 6) Fuel pump and fuel pump relay
8. After burning in exhaust system	1) Intake air temperature sensor 2) Manifold absolute pressure sensor 3) Engine coolant temperature sensor (*2) 4) Fuel injection parts (*4) 5) Fuel pump and fuel pump relay

*1: Check ignition coil & ignitor ASSY and spark plug.
*2: Indicate the symptom occurring only in cold temperatures.
*3: Ensure the secure installation.
*4: Check fuel injector, fuel pressure regulator and fuel filter.
*5: Inspect air leak in air intake system.
*6: Adjust accelerator cable.

2. AUTOMATIC TRANSMISSION

NOTE:
Check general diagnostics table with non-conformity symptom for automatic transmission. <Ref. to 4AT(diag)-2, Basic Diagnostic Procedure.>

FUEL INJECTION (FUEL SYSTEMS)

FU(H4SOw/oOBD)

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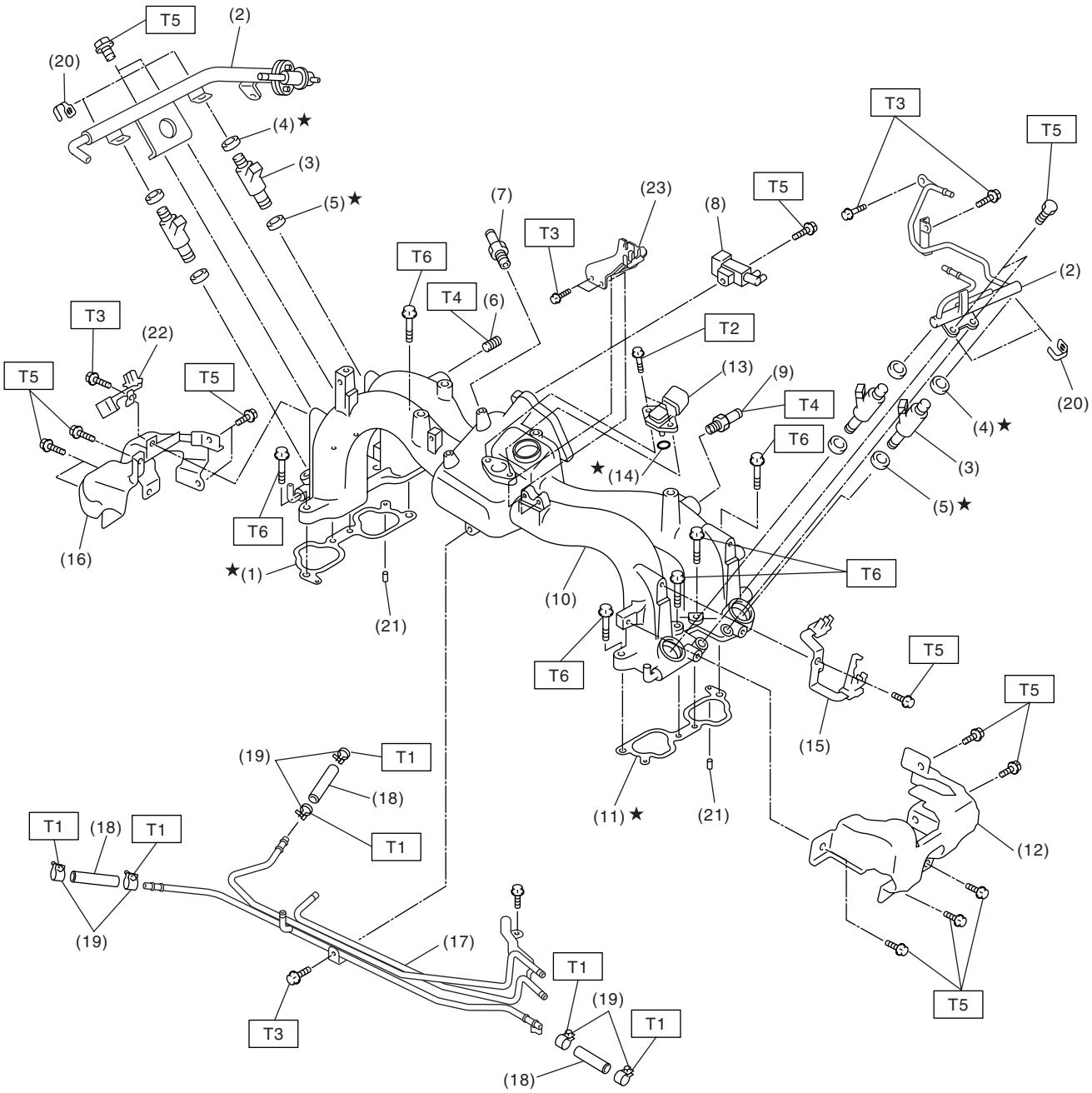
1. General Description

A: SPECIFICATION

Model		1.6 L and 2.0 L	2.5 L
Fuel tank	Capacity	50 ℓ (13.2 US gal, 11.0 Imp gal)	60 ℓ (15.9 US gal, 13.2 Imp gal)
	Location	Under rear seat	
Fuel pump	Type	Impeller	
	Shutoff discharge pressure	370 — 677 kPa (3.77 — 6.9 kgf/cm^2, 53.6 — 98 psi)	
	Discharge flow	More than 65 ℓ (17.2 US gal, 14.3 Imp gal)/h [12 V at 300 kPa (3.06 kgf/cm^2, 43.5 psi)]	
Fuel filter		Cartridge type	

B: COMPONENT

1. INTAKE MANIFOLD

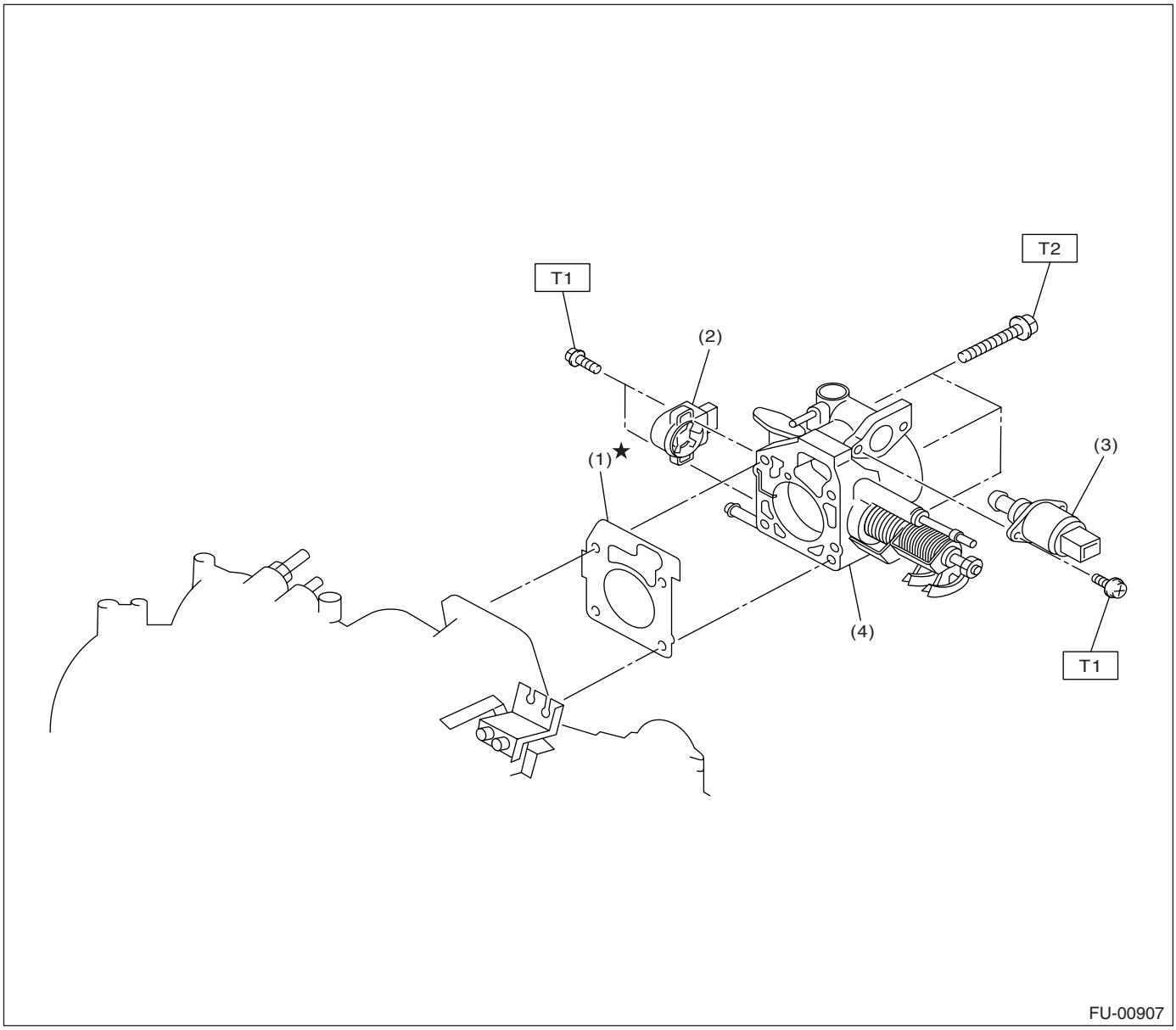


FU-00906

(1) Intake manifold gasket RH
(2) Fuel injector pipe
(3) Fuel injector
(4) O-ring
(5) O-ring
(6) Plug
(7) PCV valve
(8) Purge control solenoid valve
(9) Nipple
(10) Intake manifold
(11) Intake manifold gasket LH
(12) Fuel pipe protector LH
(13) Manifold absolute pressure and intake air temperature sensor
(14) O-ring
(15) Plug cord holder LH
(16) Fuel pipe protector RH
(17) Fuel pipe ASSY
(18) Fuel hose
(19) Clip
(20) Clip
(21) Guide pin
(22) Plug cord holder RH
(23) Accelerator cable bracket

Tightening torque: N·m (kgf-m, ft-lb)
T1: 1.25 (0.13, 0.94)
T2: 3.4 (0.35, 2.5)
T3: 6.4 (0.65, 4.7)
T4: 17 (1.7, 12.5)
T5: 19 (1.9, 14.0)
T6: 25 (2.5, 18.4)

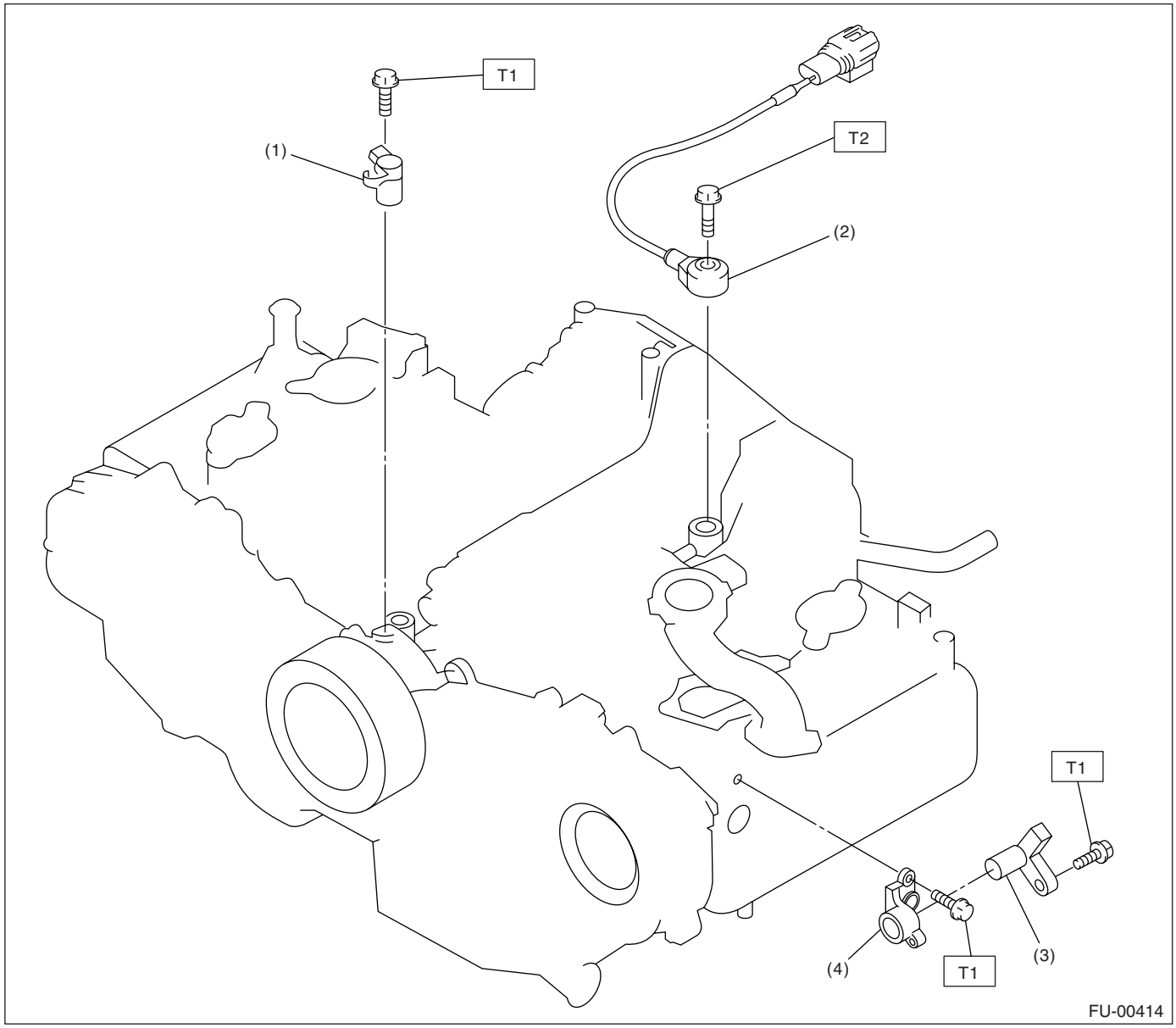
2. AIR INTAKE SYSTEM



(1) Gasket
(2) Throttle position sensor
(3) Idle air control solenoid valve
(4) Throttle body

Tightening torque: N·m (kgf-m, ft-lb)
T1: 1.6 (0.16, 1.2)
T2: 22 (2.2, 16.2)

3. CRANKSHAFT POSITION, CAMSHAFT POSITION AND KNOCK SENSORS

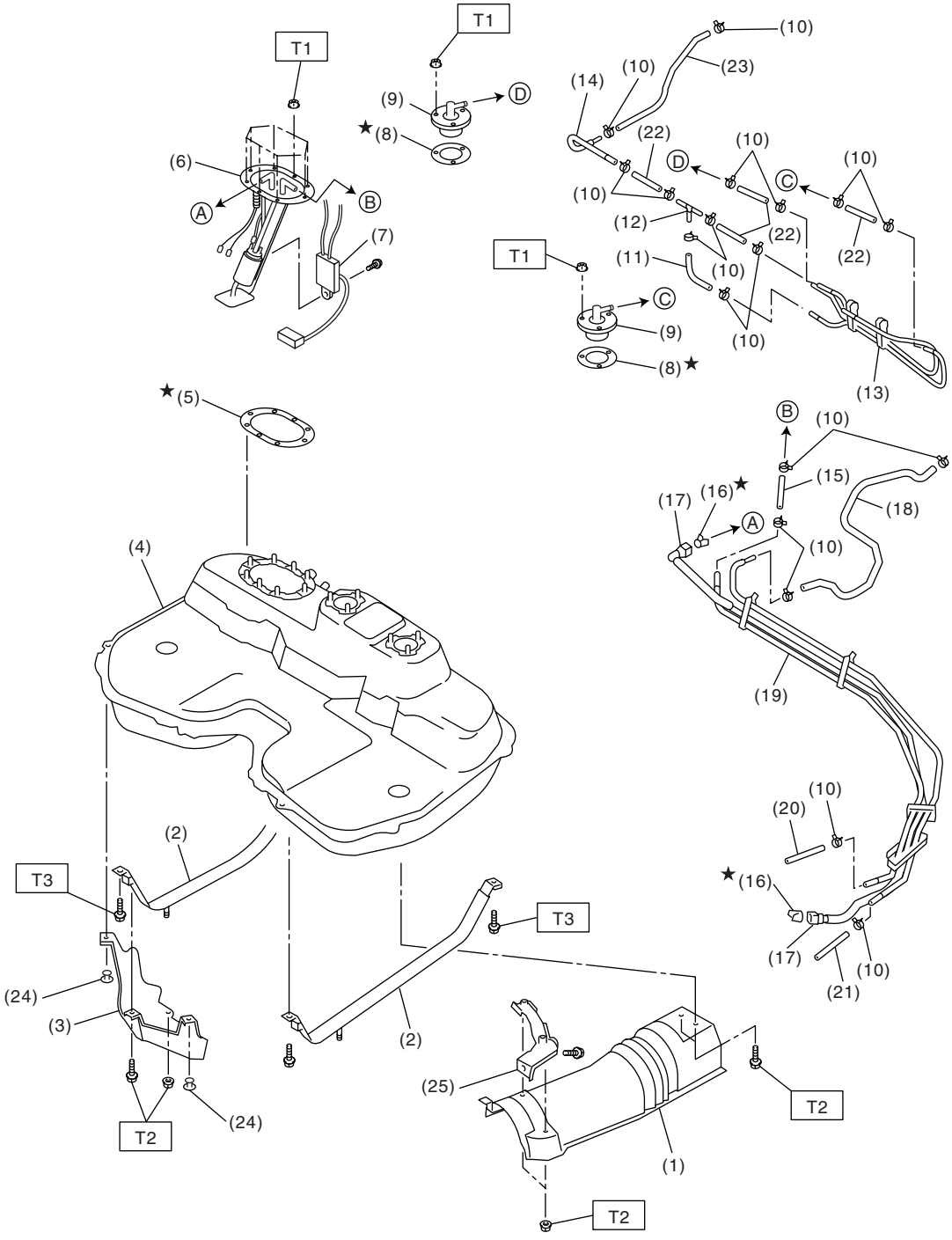


(1) Crankshaft position sensor
(2) Knock sensor
(3) Camshaft position sensor
(4) Camshaft position sensor support

Tightening torque: N·m (kgf-m, ft-lb)
T1: 6.4 (0.65, 4.7)
T2: 24 (2.4, 17.4)

4. FUEL TANK

• 1.6 L and 2.0 L MODEL

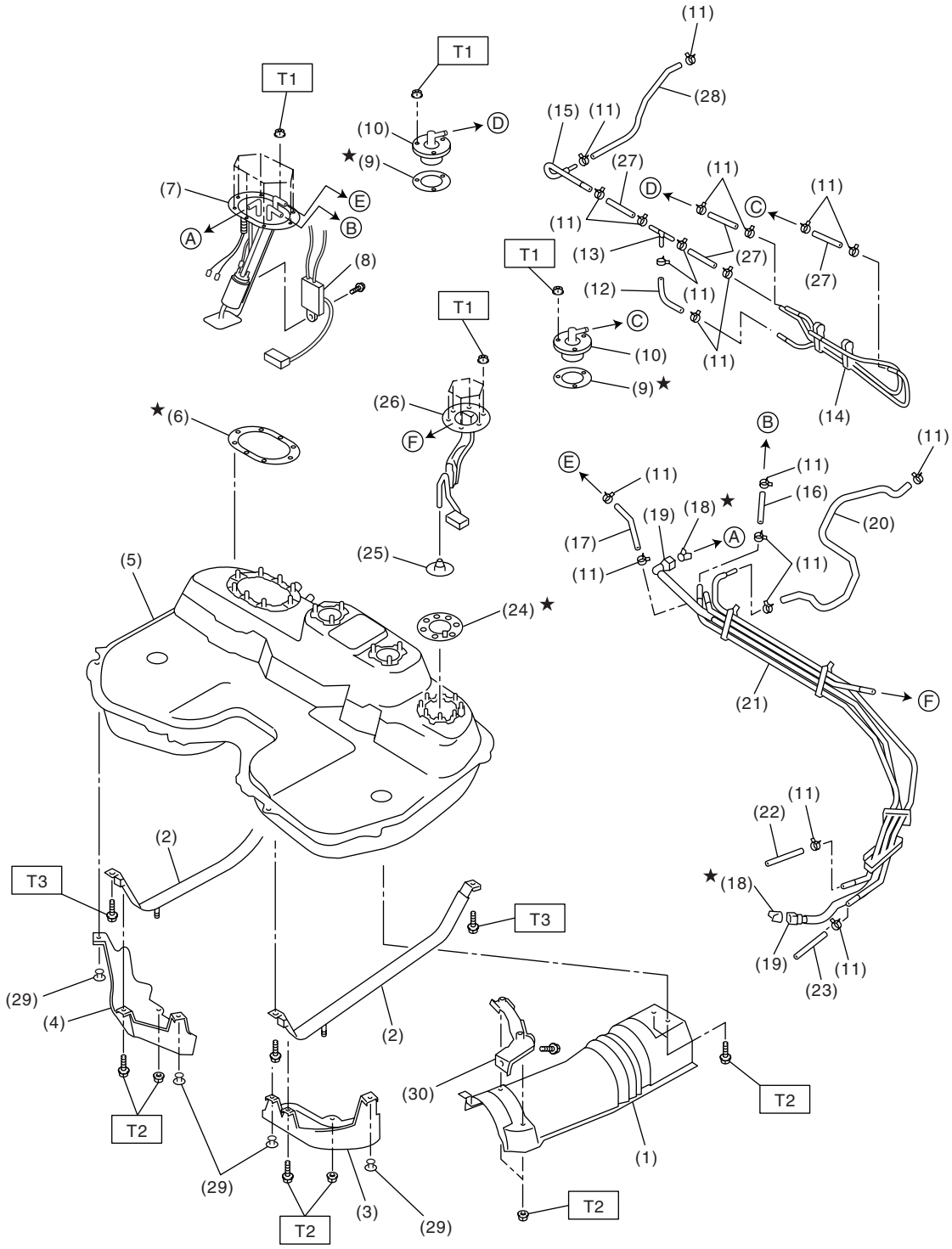


FU-02623

(1) Heat shield cover
(2) Fuel tank band
(3) Protector RH
(4) Fuel tank
(5) Fuel pump gasket
(6) Fuel pump ASSY
(7) Fuel level sensor
(8) Fuel cut valve gasket
(9) Fuel cut valve
(10) Clip
(11) Evaporation hose A
(12) Joint pipe
(13) Evaporation pipe ASSY
(14) Evaporation pipe
(15) Fuel return hose A
(16) Retainer
(17) Quick connector
(18) Evaporation hose B
(19) Fuel pipe ASSY
(20) Fuel return hose B
(21) Evaporation hose C
(22) Evaporation hose D
(23) Evaporation hose E
(24) Clip
(25) Cover bracket

Tightening torque: N·m (kgf-m, ft-lb)
T1: 4.4 (0.45, 3.3)
T2: 7.4 (0.75, 5.4)
T3: 33 (3.4, 24.3)

• 2.5 L MODEL

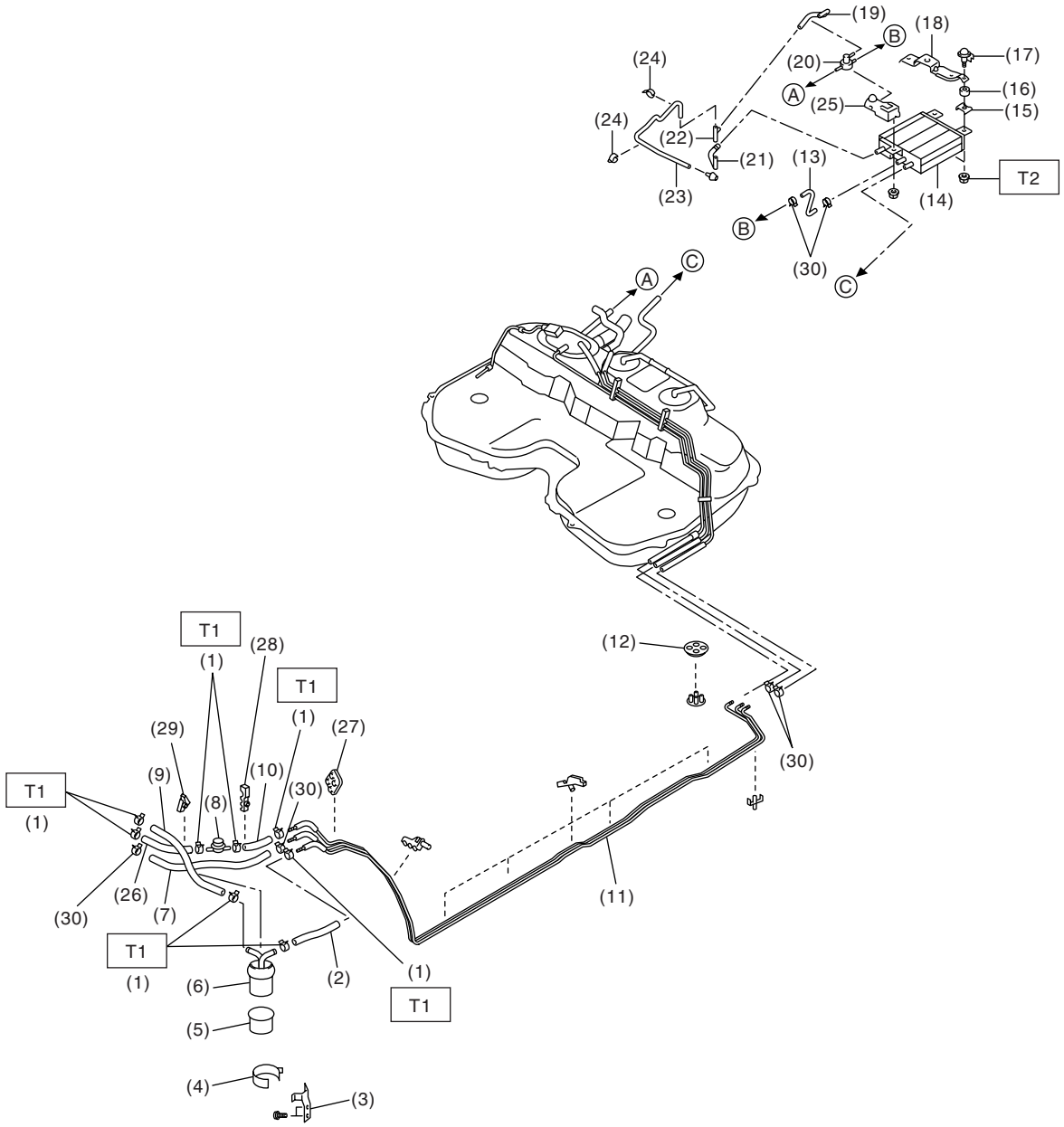


FU-02624

(1) Heat shield cover
(2) Fuel tank band
(3) Protector LH
(4) Protector RH
(5) Fuel tank
(6) Fuel pump gasket
(7) Fuel pump ASSY
(8) Fuel level sensor
(9) Fuel cut valve gasket
(10) Fuel cut valve
(11) Clip
(12) Evaporation hose A
(13) Joint pipe
(14) Evaporation pipe ASSY
(15) Evaporation pipe
(16) Fuel return hose A
(17) Jet pump hose
(18) Retainer
(19) Quick connector
(20) Evaporation hose B
(21) Fuel pipe ASSY
(22) Fuel return hose B
(23) Evaporation hose C
(24) Fuel sub level sensor gasket
(25) Jet pump filter
(26) Fuel sub level sensor
(27) Evaporation hose D
(28) Evaporation hose E
(29) Clip
(30) Cover bracket

Tightening torque: N·m (kgf-m, ft-lb)
T1: 4.4 (0.45, 3.3)
T2: 7.4 (0.75, 5.4)
T3: 33 (3.4, 24.3)

5. FUEL LINE

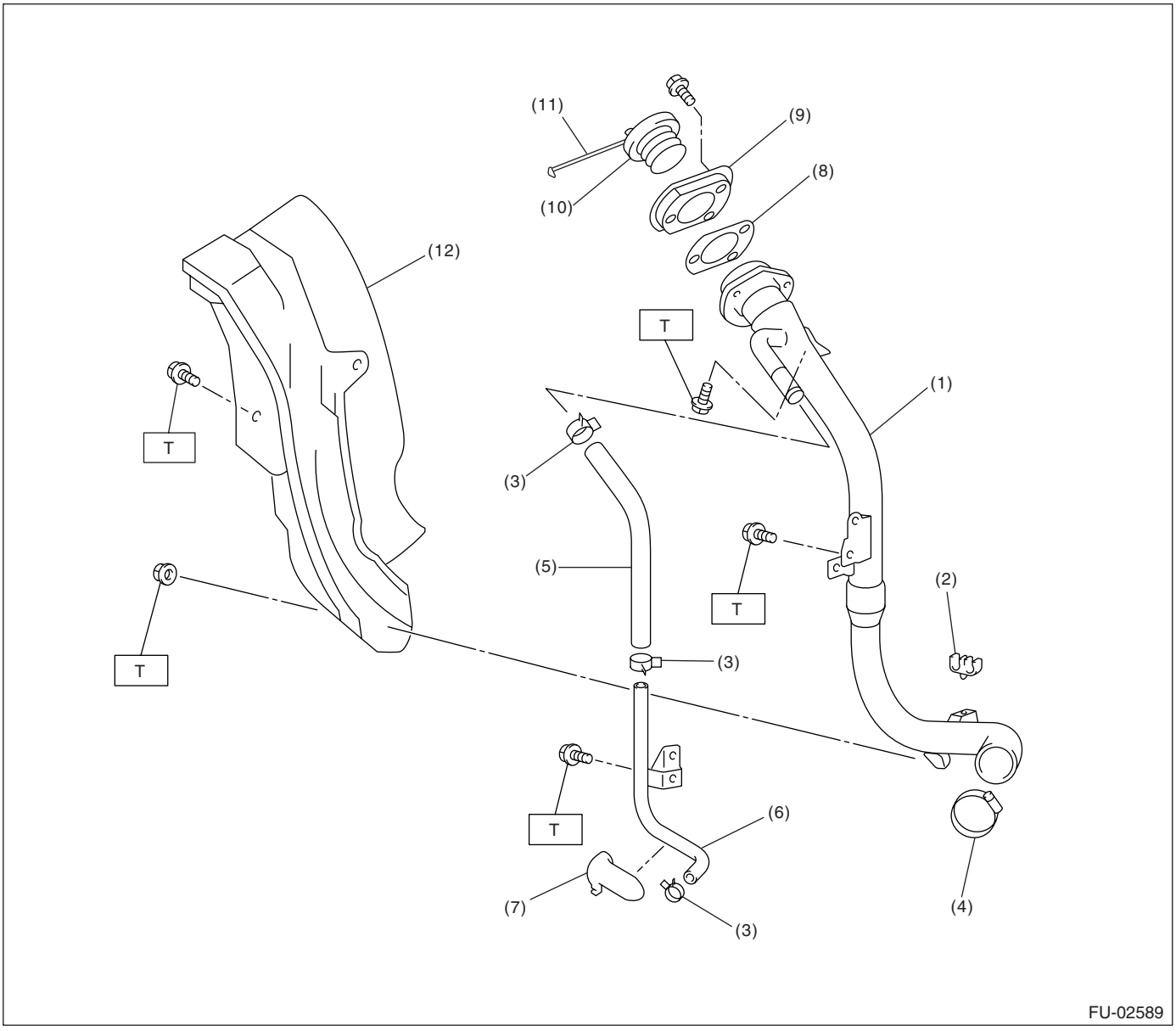


FU-02625

(1) Clamp
(2) Fuel delivery hose A
(3) Fuel filter bracket
(4) Fuel filter holder
(5) Fuel filter cup
(6) Fuel filter
(7) Evaporation hose
(8) Fuel damper
(9) Fuel delivery hose B
(10) Fuel return hose A
(11) Fuel pipe ASSY
(12) Grommet A
(13) Canister hose A
(14) Canister
(15) Canister bracket plate
(16) Cushion
(17) Canister bracket spacer
(18) Rear canister bracket
(19) Two-way valve hose
(20) Two-way valve
(21) Canister drain hose
(22) Connector
(23) Drain hose
(24) Clamp
(25) Front canister bracket
(26) Fuel return hose B
(27) Gromet B
(28) Clip
(29) Clip
(30) Clip

Tightening torque: N·m (kgf-m, ft-lb)
T1: 1.25 (0.13, 0.94)
T2: 23 (2.3, 17.0)

6. FUEL FILLER PIPE



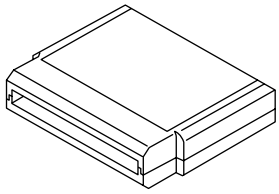
(1) Fuel filler pipe ASSY
(2) Evaporation hose holder
(3) Clip
(4) Clamp
(5) Air vent hose
(6) Air vent pipe
(7) Air vent pipe holder
(8) Filler pipe packing
(9) Filler ring
(10) Filler cap
(11) Filler cap tether
(12) Filler pipe protector

Tightening torque: N·m (kgf-m, ft-lb)
T: 7.4 (0.75, 5.4)

C: CAUTION

• Wear working clothing, including a cap, protective goggles and protective shoes during operation.
• Remove contamination including dirt and corrosion before removal, installation or disassembly.
• Keep the disassembled parts in order and protect them from dust or dirt.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly, and replacement.
• Be careful not to burn, because each part on the vehicle is hot after running.
• Be sure to tighten fasteners including bolts and nuts to the specified torque.
• Place shop jacks or rigid racks at the specified points.
• Before disconnecting electrical connectors of sensors or units, be sure to disconnect the ground cable from battery.
• Place “NO FIRE” signs near the working area.
• Be careful not to spill fuel on the floor.

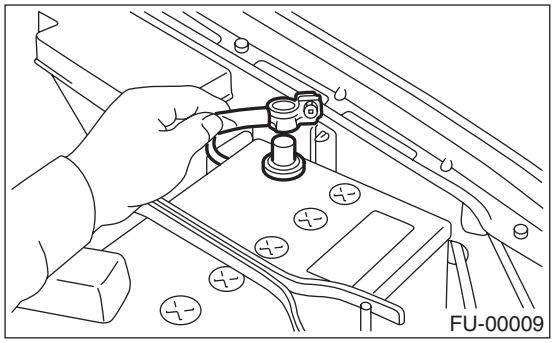
D: PREPARATION TOOL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18482AA000	18482AA000	CARTRIDGE	Troubleshooting for electrical system.
ST22771AA030	22771AA030	SUBARU SELECT MONITOR KIT	Troubleshooting for electrical systems. • English: 22771AA030 (Without printer) • German: 22771AA070 (Without printer) • French: 22771AA080 (Without printer) • Spanish: 22771AA090 (Without printer)

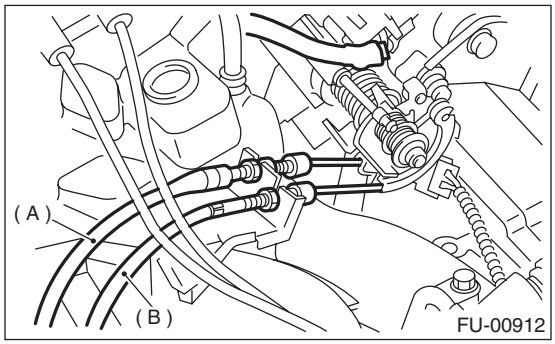
2. Throttle Body

A: REMOVAL

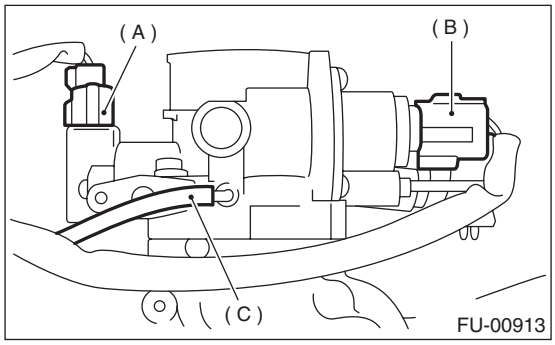
1) Disconnect the ground cable from battery.



2) Remove the air cleaner case.
<Ref. to IN(H4SO)-5, REMOVAL, Air Cleaner Case.>
3) Disconnect the accelerator cable (A).
4) Disconnect the cruise control cable (B). (Model with cruise control)

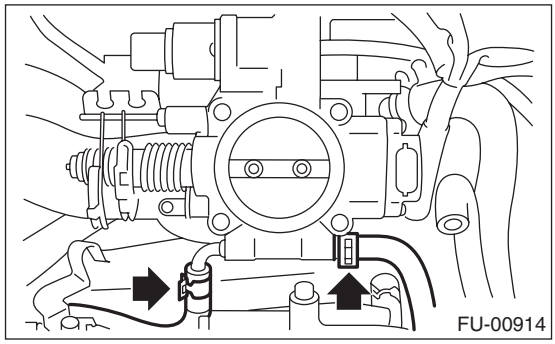


5) Disconnect the connectors from idle air control solenoid valve and throttle position sensor.
6) Disconnect the air by-pass hose from purge control solenoid valve.



(A) Throttle position sensor
(B) Idle air control solenoid valve
(C) Air by-pass hose from purge control solenoid valve

7) Disconnect the engine coolant hoses from throttle body.



8) Remove the bolts which install the throttle body to intake manifold.

B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Use a new gasket.

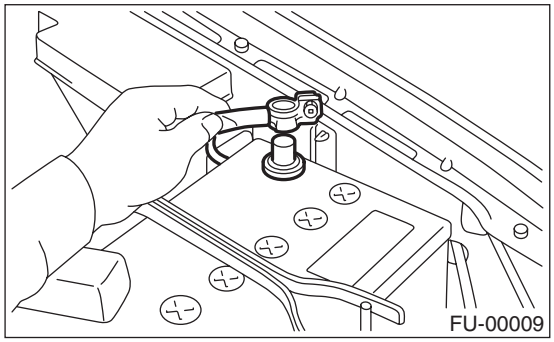
Tightening torque:

Throttle body
22 N·m (2.2 kgf-m, 16.2 ft-lb)

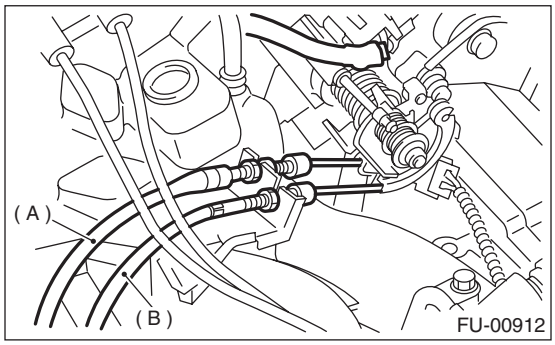
3. Intake Manifold

A: REMOVAL

1) Release the fuel pressure. <Ref. to FU(H4SOw/oOBD)-45, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
2) Open the fuel filler flap lid and remove the fuel filler cap.
3) Disconnect the ground cable from battery.

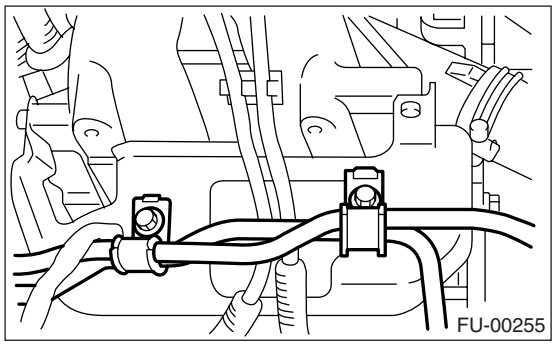


4) Remove the air intake duct and air cleaner assembly. <Ref. to IN(H4SO)-6, REMOVAL, Air Intake Duct.> and <Ref. to IN(H4SO)-5, REMOVAL, Air Cleaner Case.>
5) Disconnect the accelerator cable (A).
6) Disconnect the cruise control cable (B). (Model with cruise control)

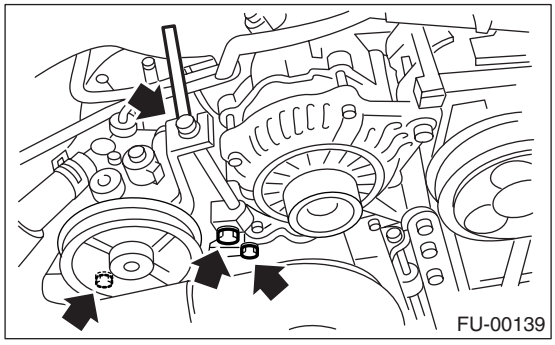


7) Remove the power steering pump and tank from brackets.
   (1) Remove the resonator chamber. <Ref. to IN(H4SO)-7, REMOVAL, Resonator Chamber.>
   (2) Remove the front side V-belt. <Ref. to ME(H4SO)-41, REMOVAL, V-belt.>
   (3) Remove the bolts which hold the power steering pipes onto intake manifold protector.

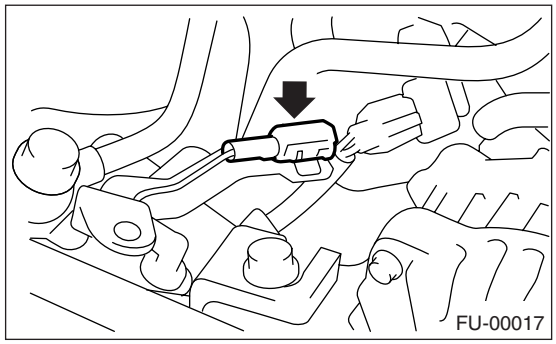
NOTE:
Do not disconnect the power steering hose.



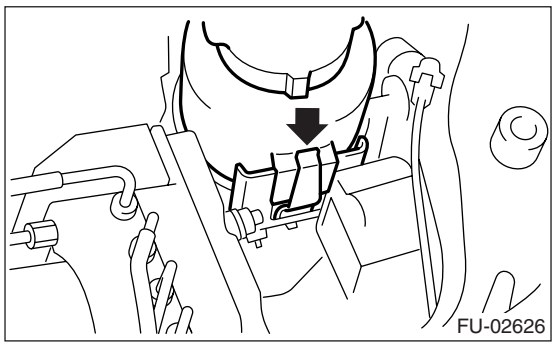
(4) Remove the bolts which install the power steering pump bracket.



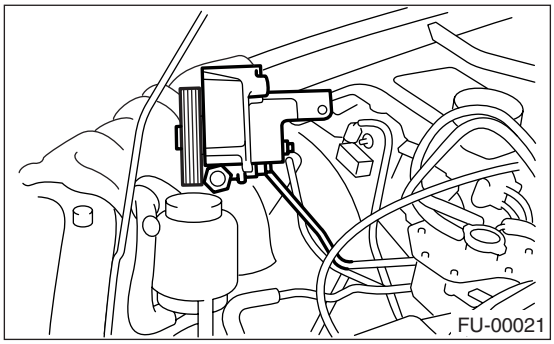
(5) Disconnect the connector from power steering pump switch.



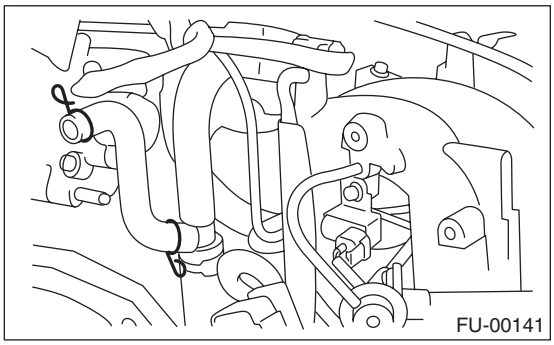
(6) Remove the power steering tank from the bracket by pulling it upward.



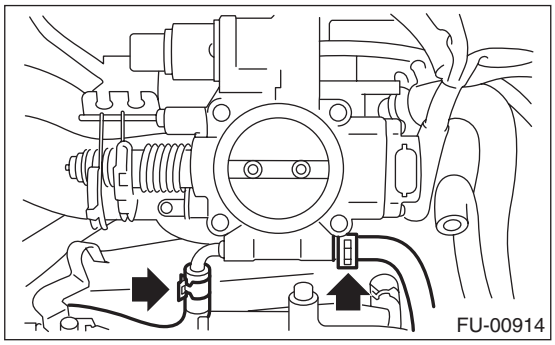
(7) Place the power steering pump and tank on right side wheel apron.



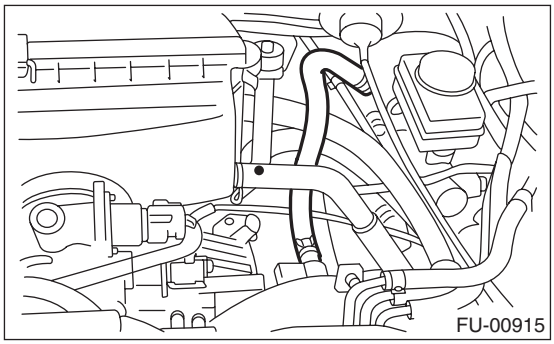
8) Disconnect the spark plug cords from spark plugs.
9) Disconnect the PCV hose from intake manifold.



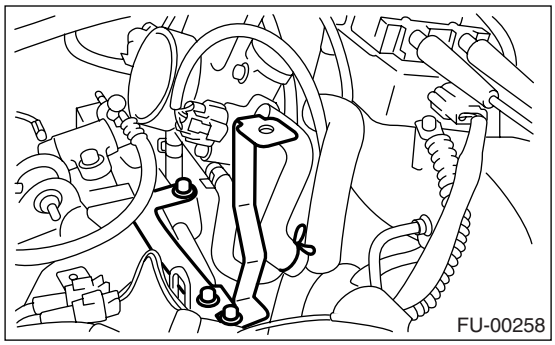
10) Disconnect the engine coolant hose from throttle body.



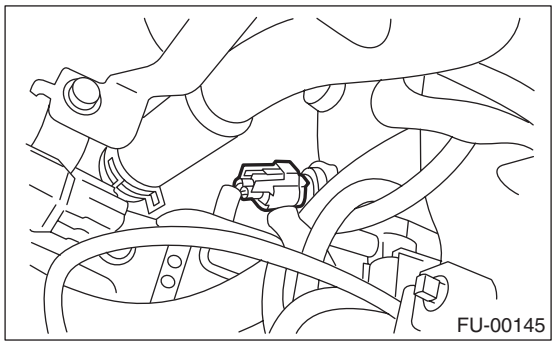
11) Disconnect the brake booster hose.



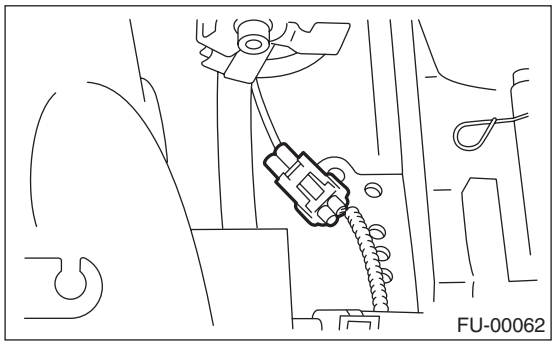
12) Remove the air cleaner case stay RH and engine harness bracket, and then disconnect the engine harness connectors from bulkhead harness connectors.



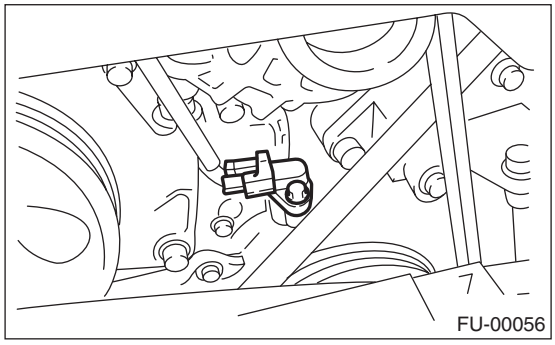
13) Disconnect the connectors from engine coolant temperature sensor.



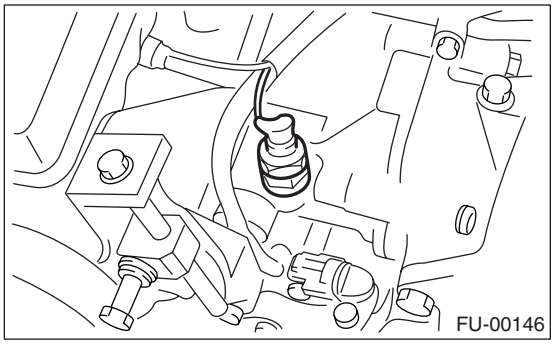
14) Disconnect the knock sensor connector.



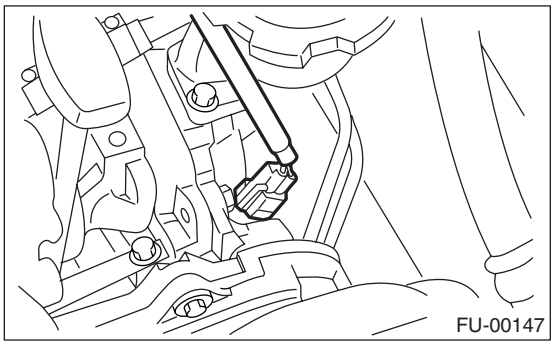
15) Disconnect the connector from crankshaft position sensor.



16) Disconnect the connector from oil pressure switch.

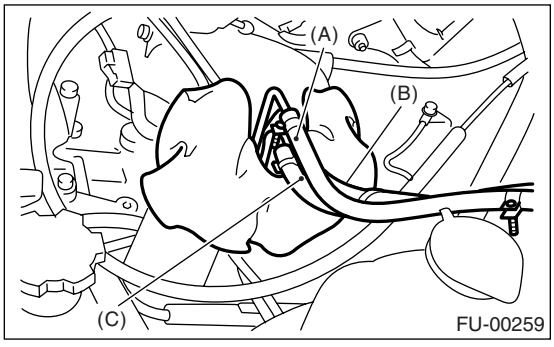


17) Disconnect the connector from camshaft position sensor.



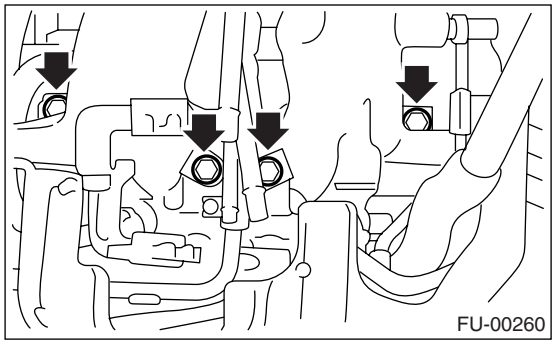
18) Disconnect the fuel hoses from fuel pipes.

WARNING:
• Do not spill fuel.
• Catch the fuel from hoses in a container or cloth.



(A) Fuel delivery hose
(B) Return hose
(C) Evaporation hose

19) Remove the bolts which hold the intake manifold onto cylinder heads.



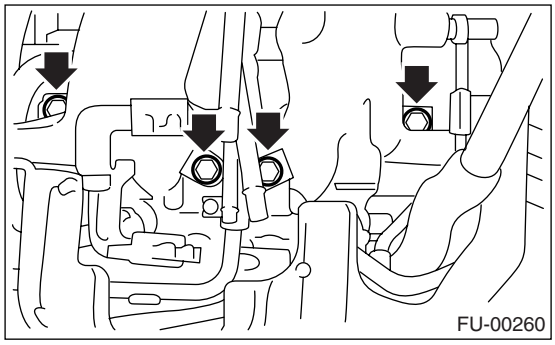
20) Remove the intake manifold.

B: INSTALLATION

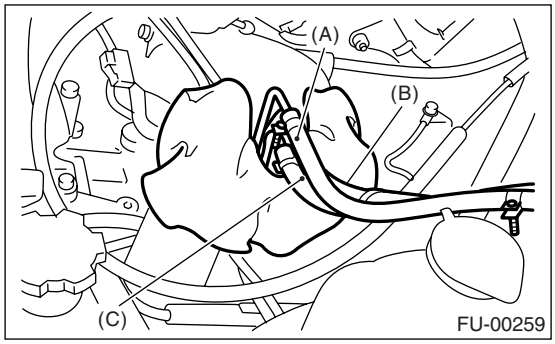
1) Install the intake manifold onto cylinder heads.

NOTE:
Use new gaskets.

Tightening torque:
25 N·m (2.5 kgf-m, 18.4 ft-lb)

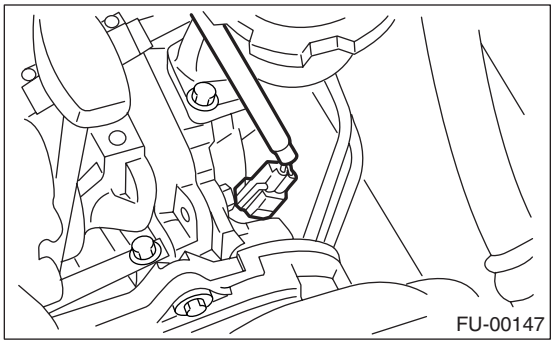


2) Connect the fuel hoses.

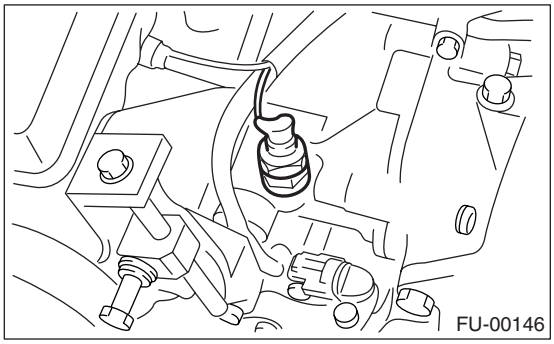


(A) Fuel delivery hose
(B) Return hose
(C) Evaporation hose

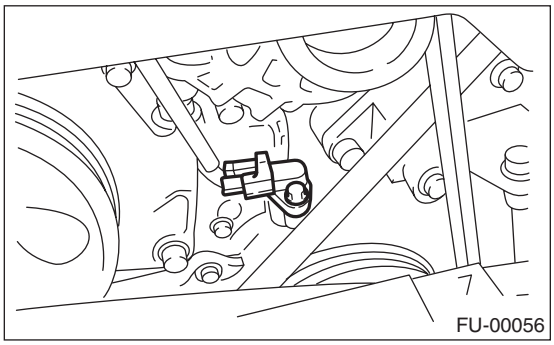
3) Connect the connector to camshaft position sensor.



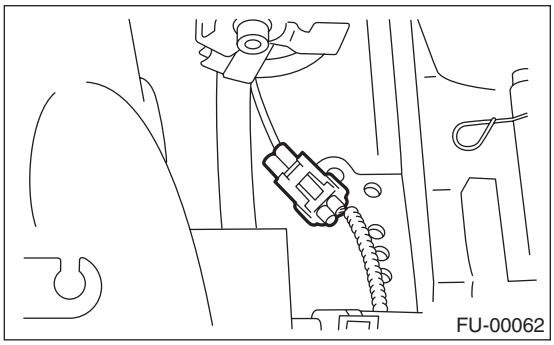
4) Connect the connector to oil pressure switch.



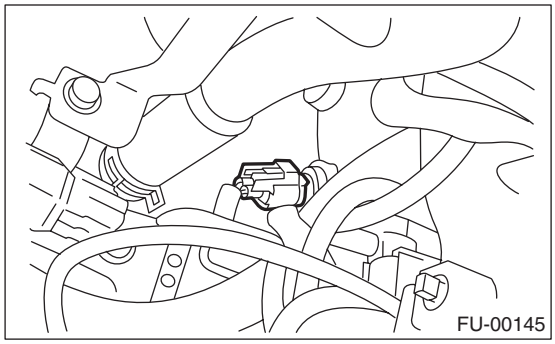
5) Connect the connector to crankshaft position sensor.



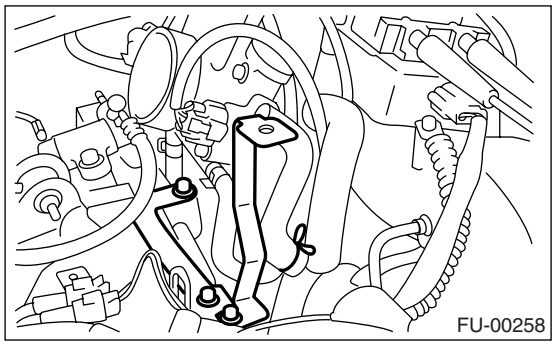
6) Connect the knock sensor connector.



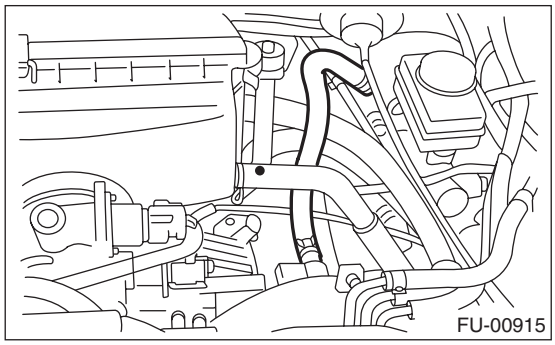
7) Connect the connectors to engine coolant temperature sensor.



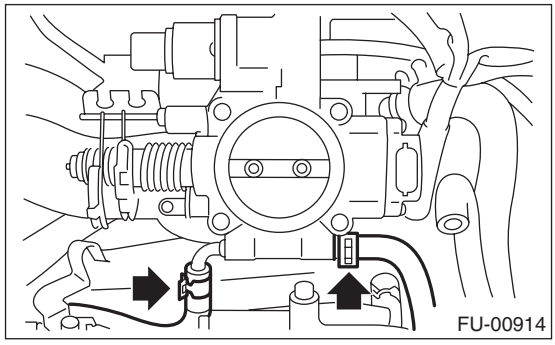
8) Install the air cleaner case stay RH and engine harness bracket, and then connect the engine harness connectors to bulkhead connectors.



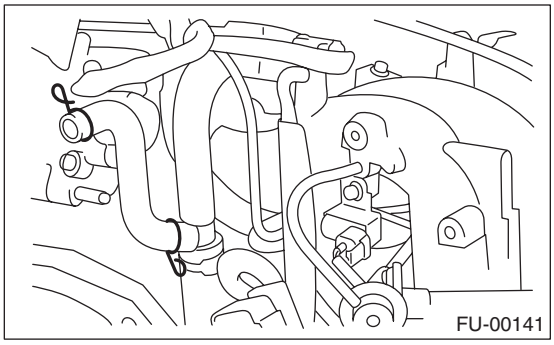
9) Connect the brake booster hose.



10) Connect the engine coolant hose to throttle body.



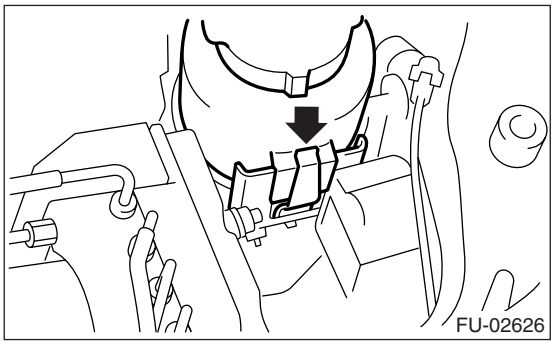
11) Connect the PCV hose to intake manifold.



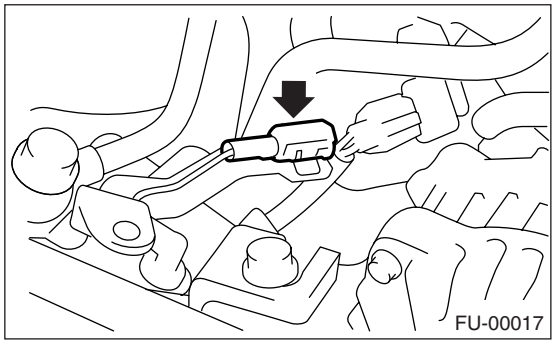
12) Connect the spark plug cords to the spark plugs.

13) Install the power steering pump and tank on brackets.

(1) Install the power steering tank on bracket.

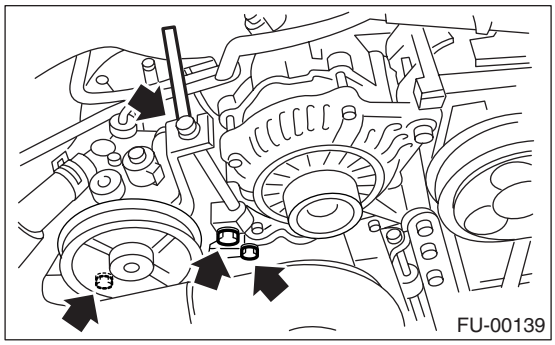


(2) Connect the connector to the power steering pump switch.

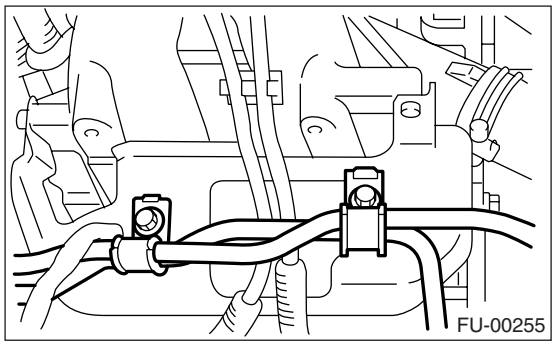


(3) Tighten the bolts which install the power steering pump on bracket.

Tightening torque:
22 N·m (2.2 kgf-m, 16.2 ft-lb)



(4) Install the power steering pipes onto intake manifold protector RH.

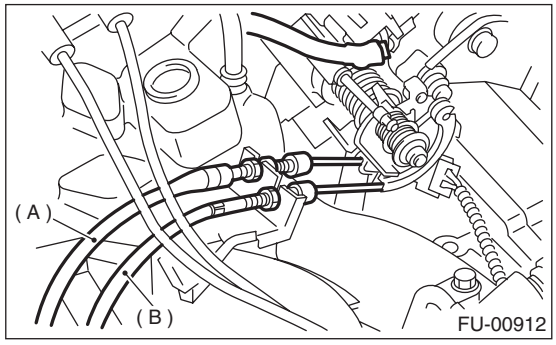


(5) Install the front side V-belt. <Ref. to ME(H4SO)-41, INSTALLATION, V-belt.>

(6) Install the resonator chamber.
<Ref. to IN(H4SO)-7, INSTALLATION, Resonator Chamber.>

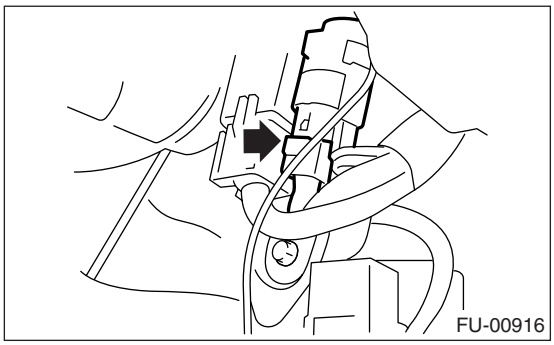
14) Connect the accelerator cable (A).

15) Connect the cruise control cable (B). (Model with cruise control)

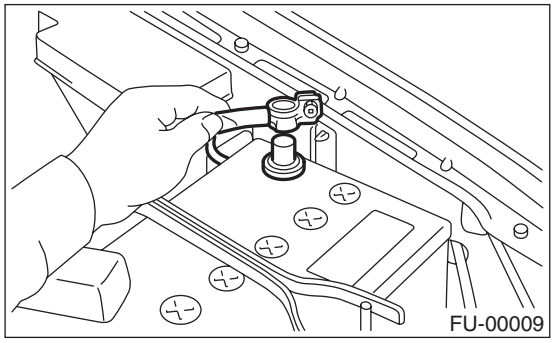


16) Install the air intake duct and air cleaner assembly. <Ref. to IN(H4SO)-6, INSTALLATION, Air Intake Duct.> and <Ref. to IN(H4SO)-5, INSTALLATION, Air Cleaner Case.>

17) Connect the connector to the fuel pump relay.

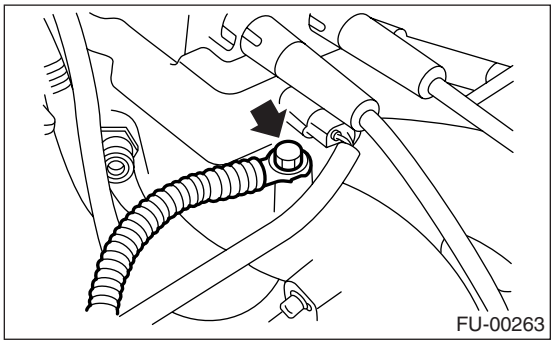


18) Connect the battery ground cable to battery.

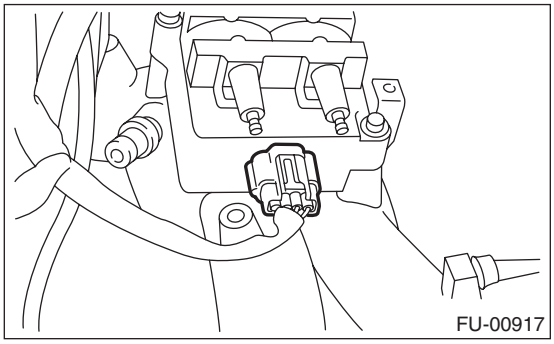


C: DISASSEMBLY

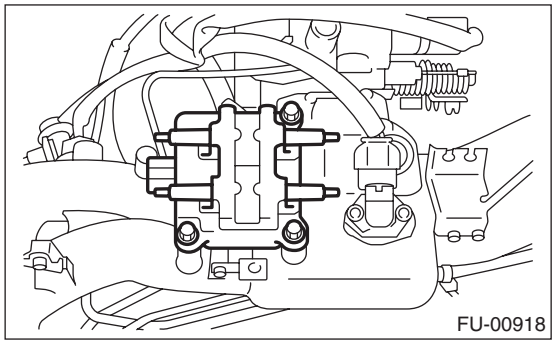
1) Disconnect the engine ground cable from intake manifold.



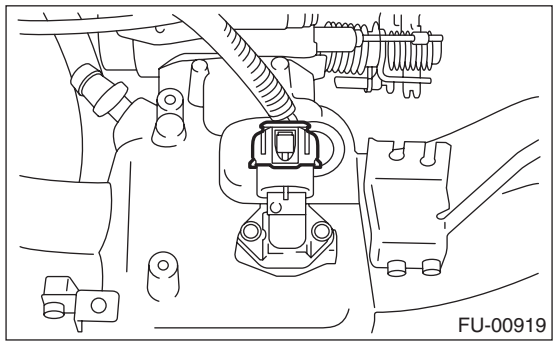
2) Disconnect the connector from ignition coil & ignitor ASSY.



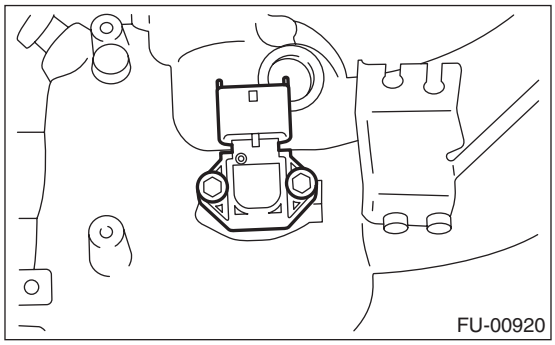
3) Remove the ignition coil & ignitor ASSY.



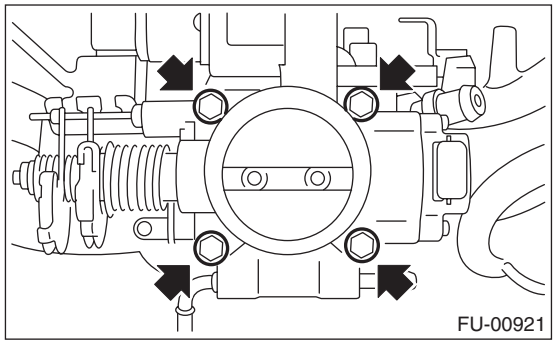
4) Disconnect the connector from manifold absolute pressure and intake air temperature sensor.



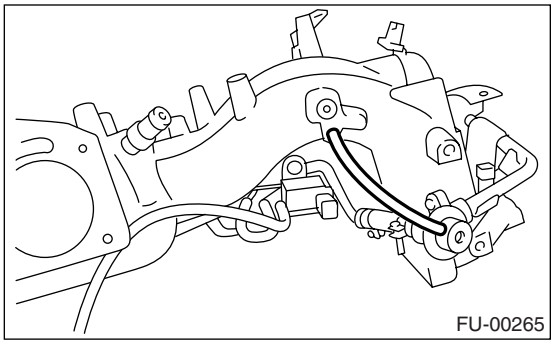
5) Remove the manifold absolute pressure and intake air temperature sensor from intake manifold.



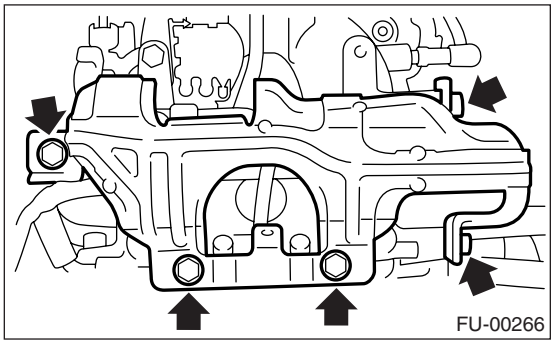
6) Disconnect the connectors from throttle position sensor and idle air control solenoid valve.
7) Remove the throttle body.



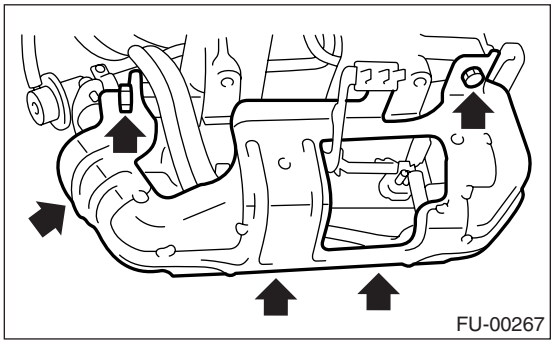
8) Disconnect the pressure regulator vacuum hose from intake manifold.



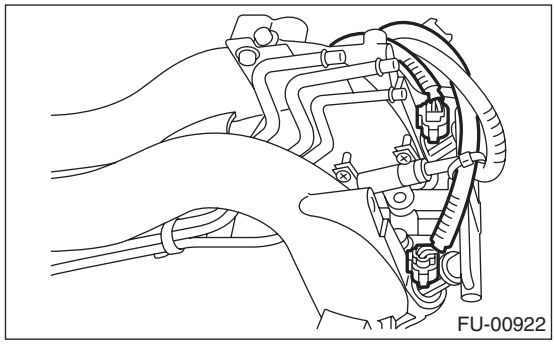
9) Remove the fuel pipe protector LH.



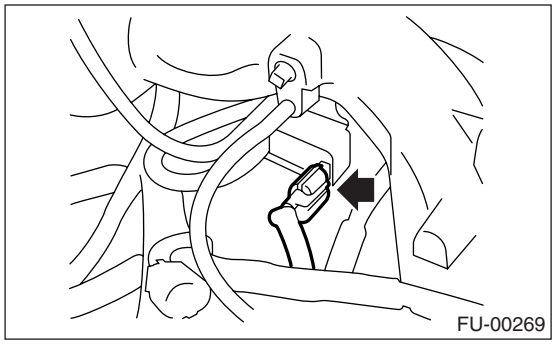
10) Remove the fuel pipe protector RH.



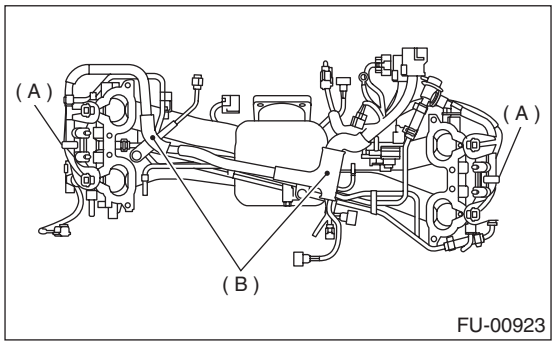
11) Disconnect the connectors from fuel injectors.



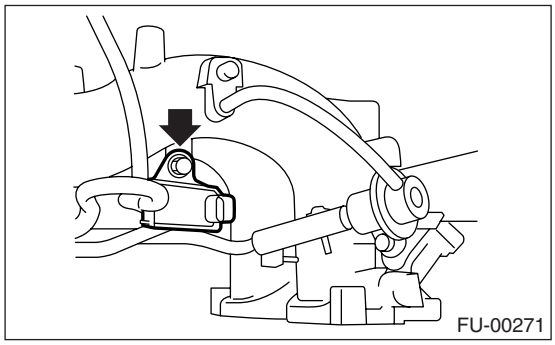
12) Disconnect the connector from purge control solenoid valve.



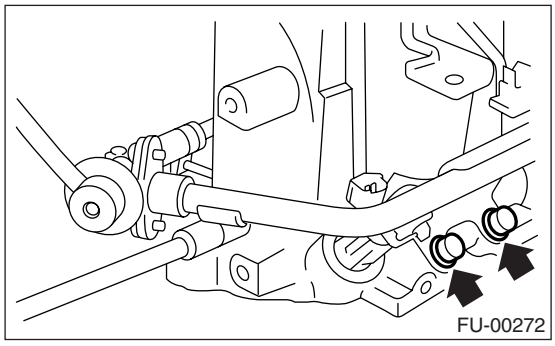
13) Disconnect the air by-pass hose from purge control solenoid valve.
14) Remove the harness bands (A) and harness bracket (B) which hold the engine harness onto intake manifold.



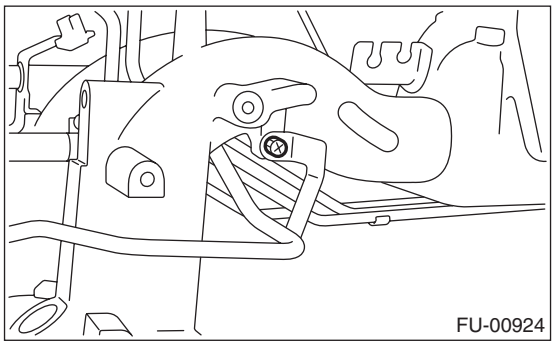
15) Remove the engine harness from intake manifold.
16) Remove the purge control solenoid valve.



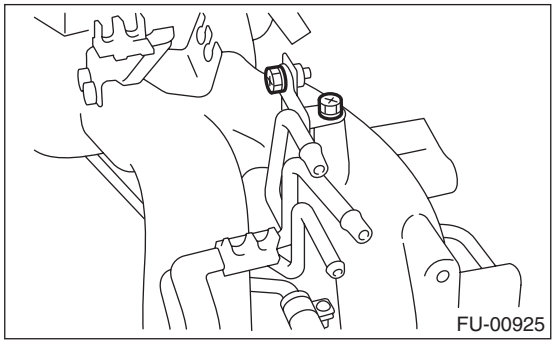
17) Remove the bolt which installs the fuel injector pipe on intake manifold as shown in the figure.



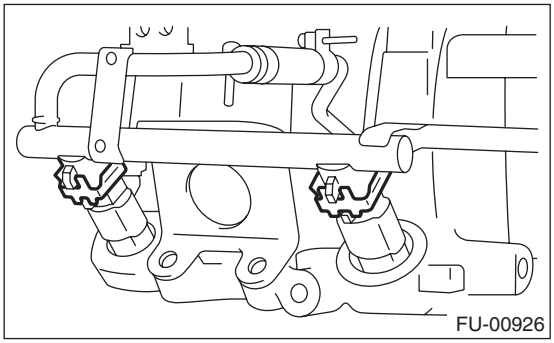
18) Remove the bolt which installs the fuel injector pipe LH on intake manifold.



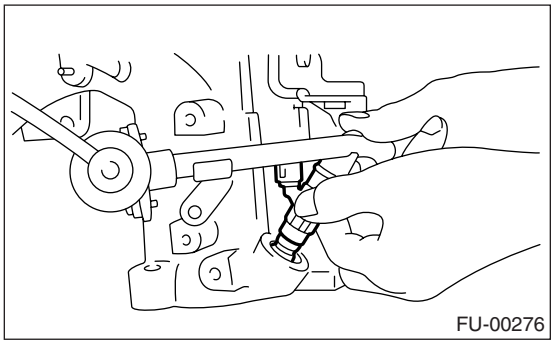
19) Remove the two bolts which hold the fuel pipes on intake manifold.



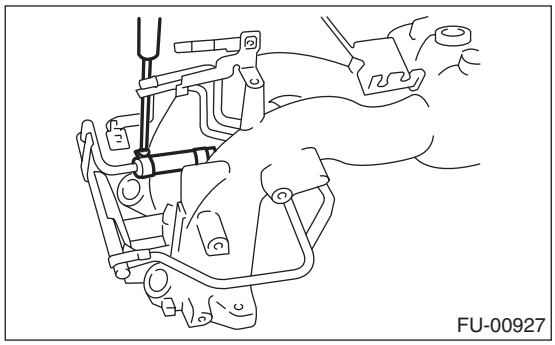
20) Remove the fuel injectors.
(1) Remove the fuel injector securing clip.



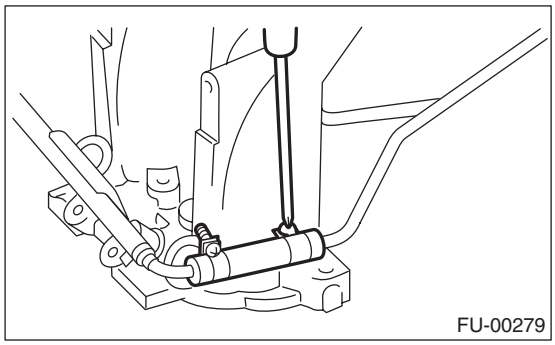
(2) Remove the fuel injector while lifting up the fuel injector pipe.



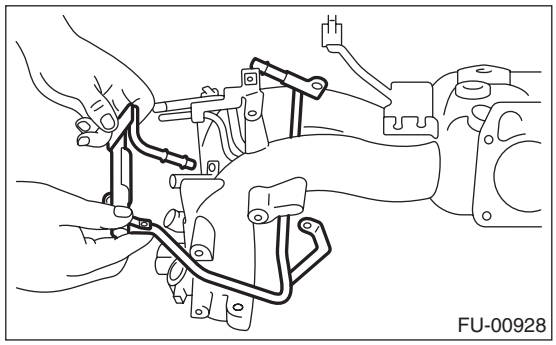
21) Loosen the clamp which holds the fuel injector pipe LH to fuel hose, and then remove the pipe from fuel hose.



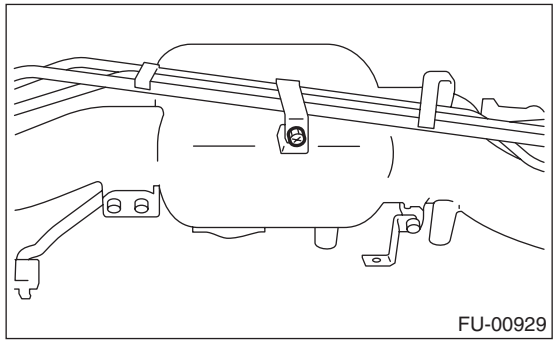
22) Loosen the clamp which holds the fuel injector pipe RH to fuel hose, and remove the pipe from fuel hose.



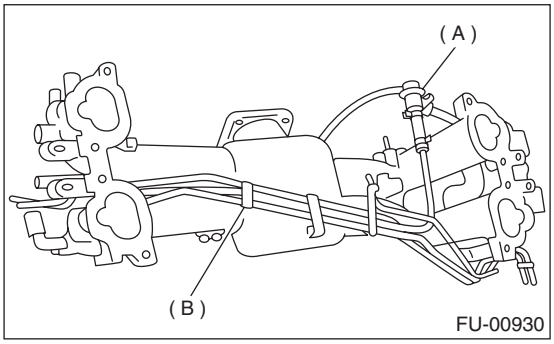
23) Remove the fuel injector pipe.



24) Remove the bolt which installs the fuel pipes on intake manifold.

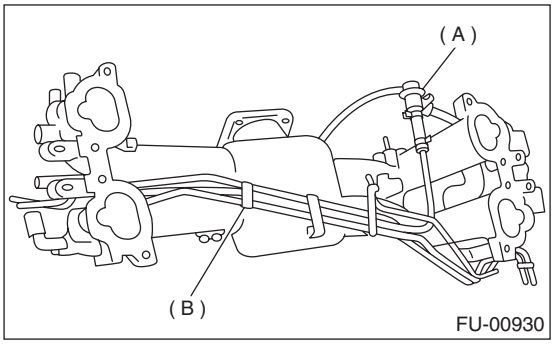


25) Remove the fuel pipe assembly (B) and pressure regulator (A) from intake manifold.



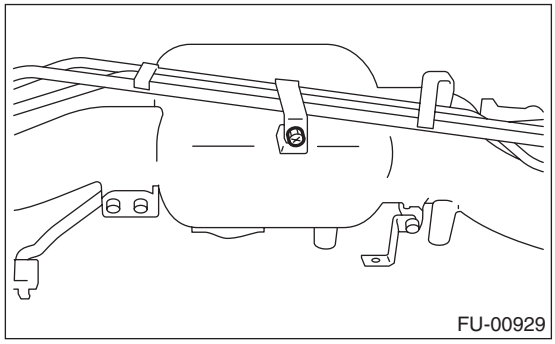
D: ASSEMBLY

1) Install the fuel pipe assembly (B) and pressure regulator (A), etc. to intake manifold.

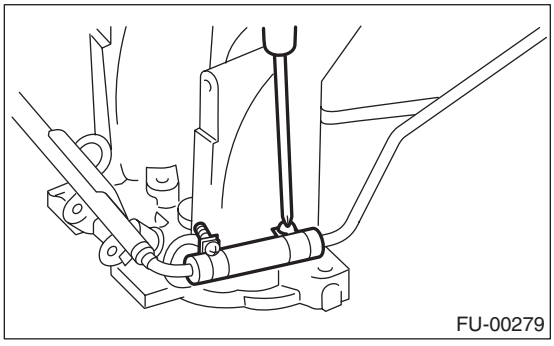


2) Tighten the bolt which installs the fuel pipes on intake manifold.

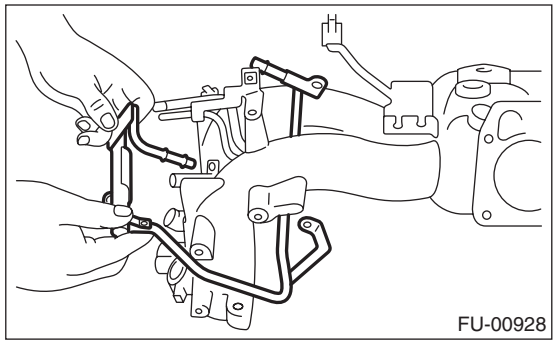
Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



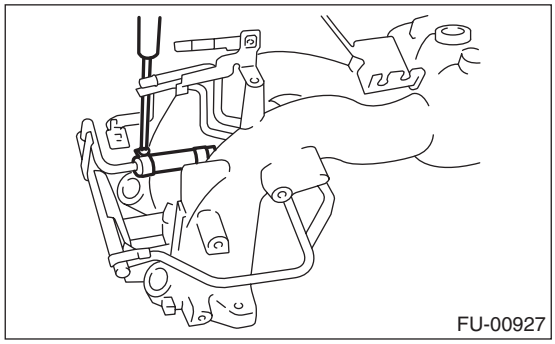
3) Connect the fuel injector pipe RH to fuel hose, and tighten the clamp screws.



4) Install the fuel injector pipe.

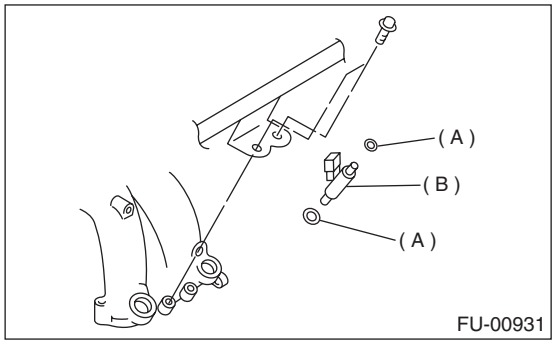


5) Connect the fuel injector pipe LH to fuel hose, and then tighten the clamp screw.



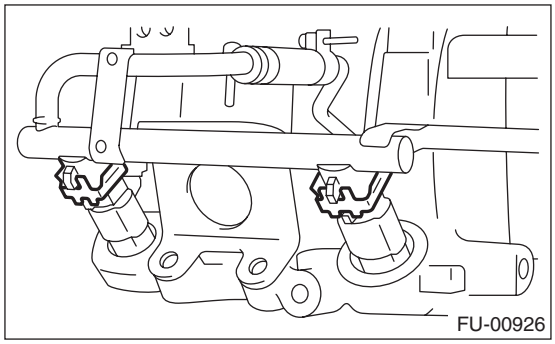
6) Install the fuel injectors.

NOTE:
Use new O-rings.



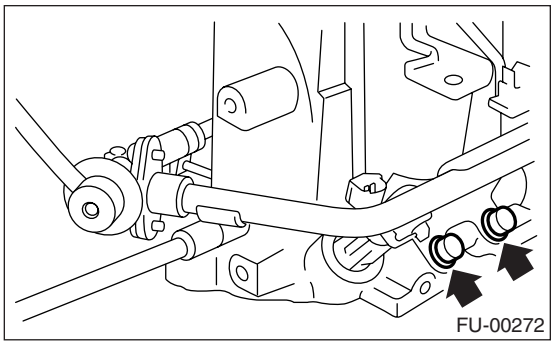
(A) O-ring
(B) Fuel injector

NOTE:
Do not forget to install the fuel injector securing clip.



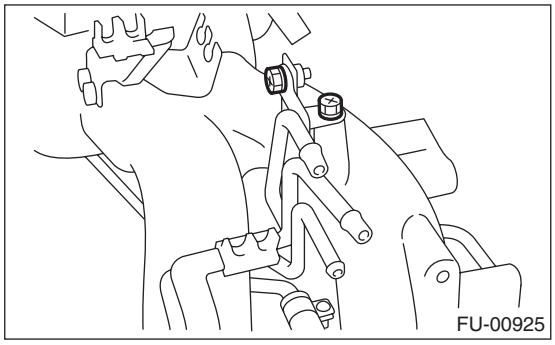
7) Tighten the bolt which installs the fuel injector pipe on intake manifold.

Tightening torque:
19 N·m (1.9 kgf-m, 14.0 ft-lb)



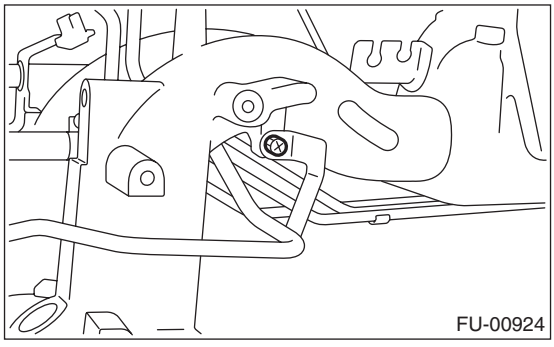
8) Tighten the two bolts which install the fuel pipes on intake manifold.

Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)

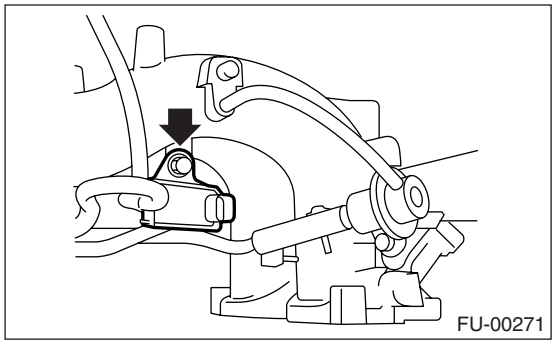


9) Tighten the bolt which installs the injector pipe LH on intake manifold.

Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)

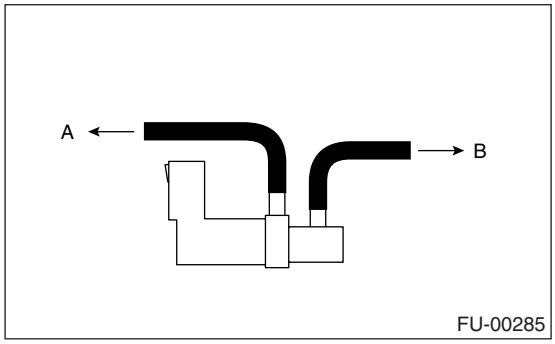


10) Install the purge control solenoid valve.



11) Connect the hoses to the purge control solenoid valve.

NOTE:
Carefully connect the evaporation hoses.

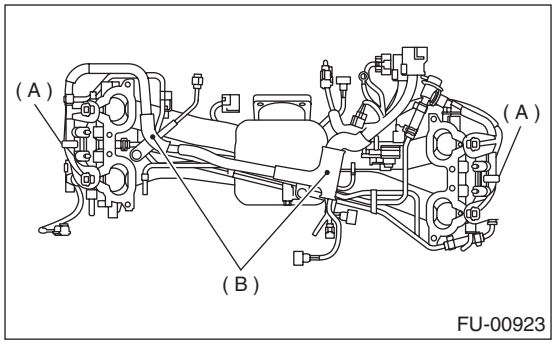


A: To fuel pipe
B: To throttle body

12) Install the engine harness onto intake manifold.

Tightening torque:
16 N·m (1.6 kgf-m, 11.8 ft-lb)

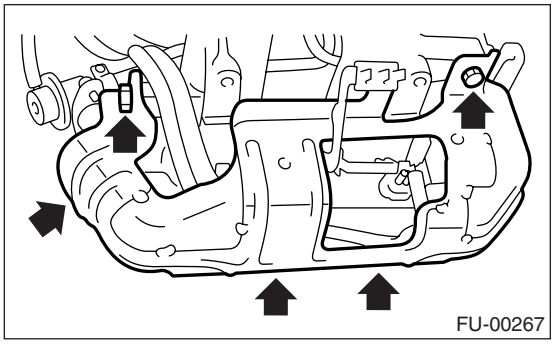
13) Connect the connectors to the fuel injectors and purge control solenoid valve.
14) Hold the engine harness by harness band (A) and harness bracket (B).



NOTE:
Do not use harness bands on the harnesses which are supposed to be protected by fuel pipe protector.

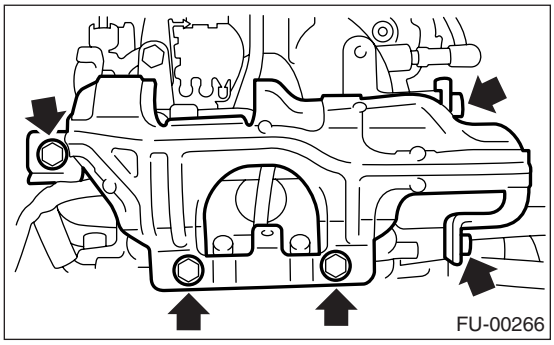
15) Install the fuel pipe protector RH.

Tightening torque:
19 N·m (1.9 kgf-m, 14.0 ft-lb)

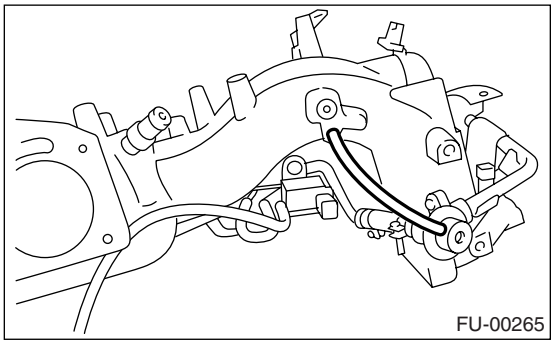


16) Install the fuel pipe protector LH.

Tightening torque:
19 N·m (1.9 kgf-m, 14.0 ft-lb)



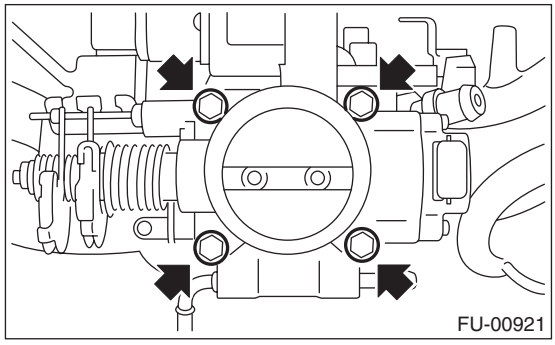
17) Connect the pressure regulator vacuum hose to intake manifold.



18) Install the throttle body to intake manifold.

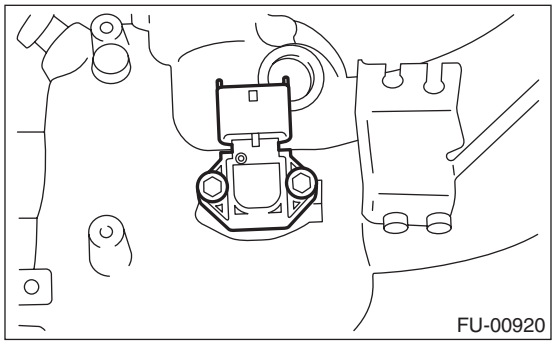
NOTE:
Use a new gasket.

Tightening torque:
22 N·m (2.2 kgf-m, 16.2 ft-lb)

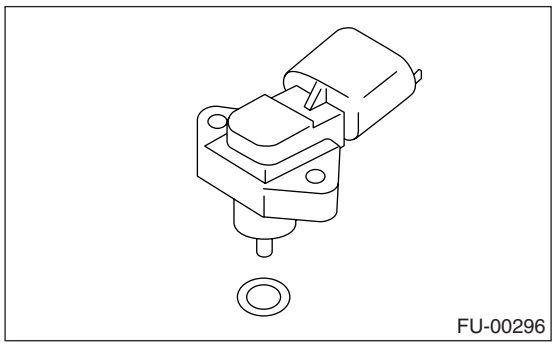


19) Connect the air by-pass hose from purge control solenoid valve to throttle body.
20) Install the manifold absolute pressure and intake air temperature sensor.

Tightening torque:
3.4 N·m (0.35 kgf-m, 2.5 ft-lb)

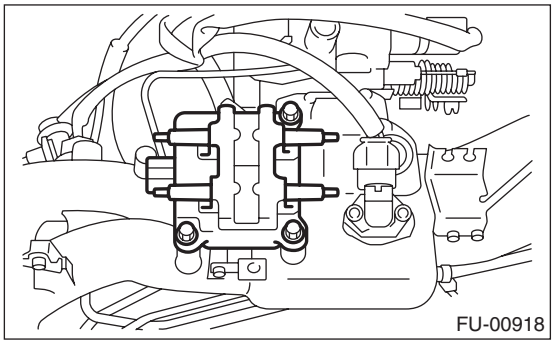


NOTE:
Use a new O-ring.



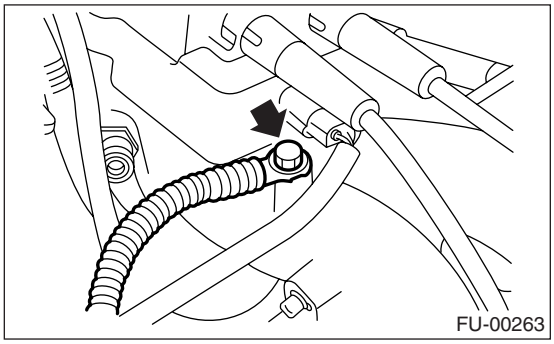
21) Connect the connector to manifold absolute pressure and intake air temperature sensor.
22) Connect the connectors to throttle position sensor and idle air control solenoid valve.

23) Install the ignition coil & ignitor ASSY.



24) Connect the connector to ignition coil & ignitor ASSY.
25) Install the engine ground cable to intake manifold.

Tightening torque:
19 N·m (1.9 kgf-m, 14.0 ft-lb)



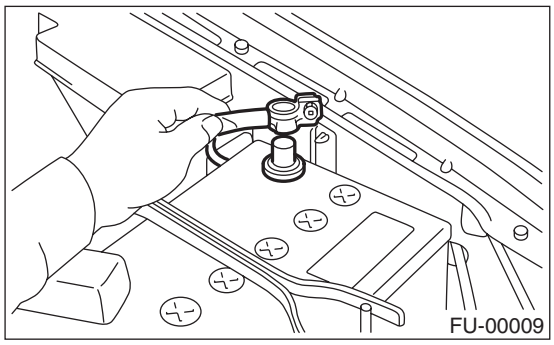
E: INSPECTION

Make sure the fuel pipe and fuel hoses are not cracked and the connections are tightened firmly.

4. Engine Coolant Temperature Sensor

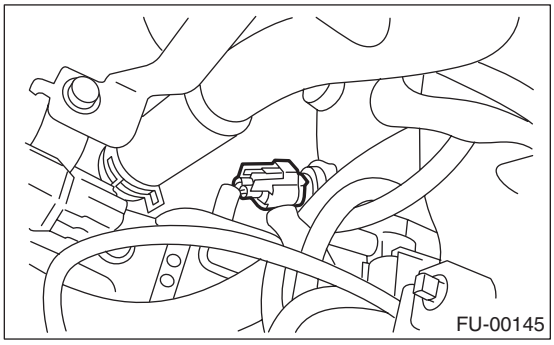
A: REMOVAL

1) Disconnect the ground cable from battery.



2) Remove the air intake duct and air cleaner case. <Ref. to IN(H4SO)-6, REMOVAL, Air Intake Duct.> and <Ref. to IN(H4SO)-5, REMOVAL, Air Cleaner Case.>

3) Disconnect the connector from engine coolant temperature sensor.

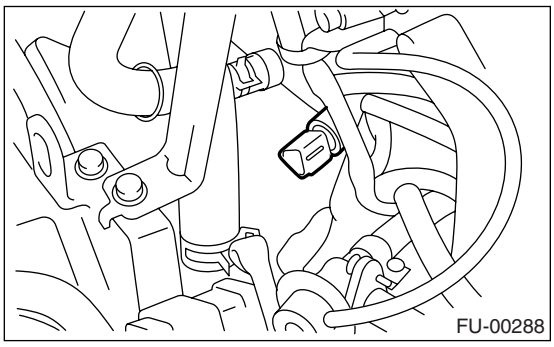


4) Remove the engine coolant temperature sensor.

B: INSTALLATION

Install in the reverse order of removal.

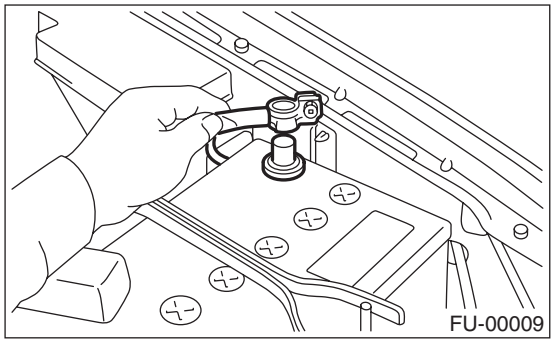
Tightening torque:
18 N·m (1.8 kgf-m, 13.0 ft-lb)



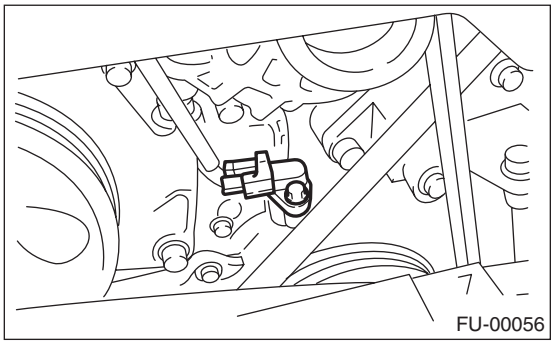
5. Crankshaft Position Sensor

A: REMOVAL

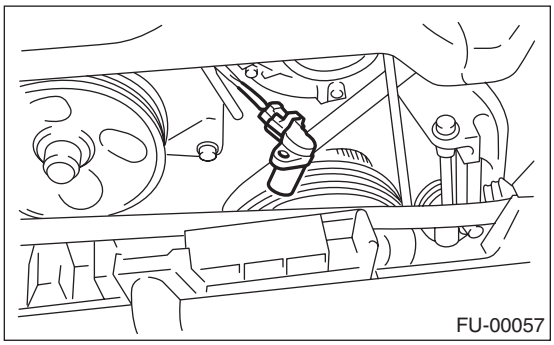
1) Disconnect the ground cable from battery.



2) Remove the bolt which installs the crankshaft position sensor to cylinder block.



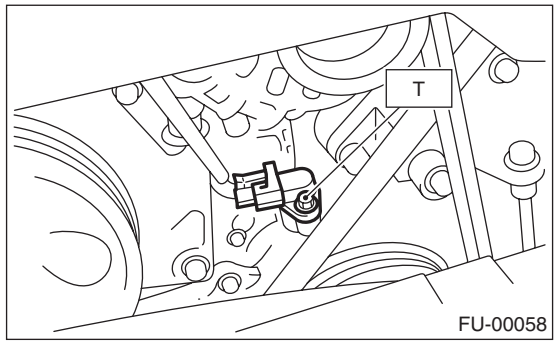
3) Remove the crankshaft position sensor, and then disconnect the connector from it.



B: INSTALLATION

Install in the reverse order of removal.

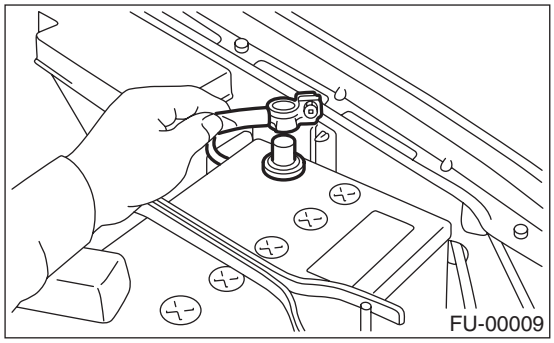
Tightening torque:
T : 6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



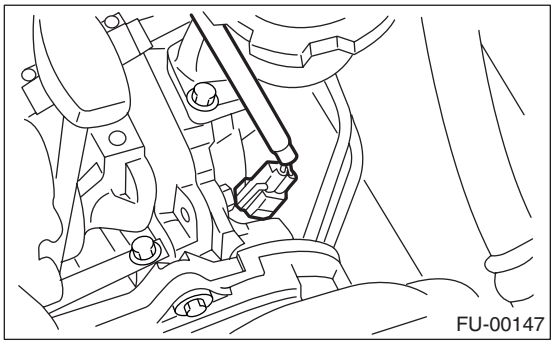
6. Camshaft Position Sensor

A: REMOVAL

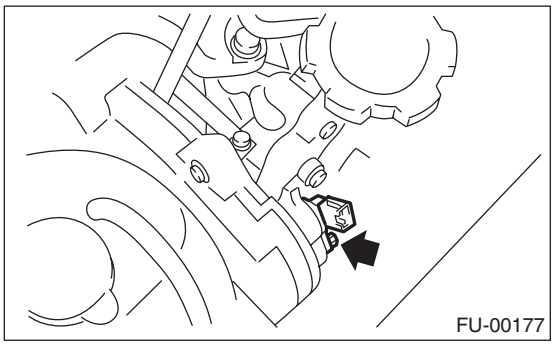
1) Disconnect the ground cable from battery.



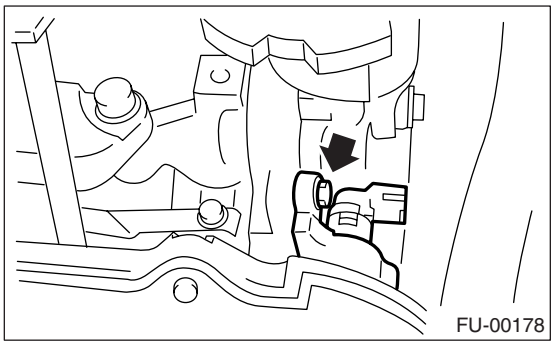
2) Disconnect the connector from camshaft position sensor.



3) Remove the bolt which installs the camshaft position sensor to camshaft position sensor support.

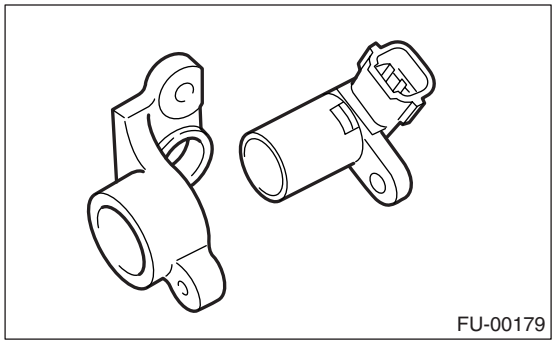


4) Remove the bolt which installs the camshaft position sensor support to camshaft cap LH.



5) Remove the camshaft position sensor and camshaft position sensor support as a unit.

6) Remove the camshaft position sensor itself.



B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:

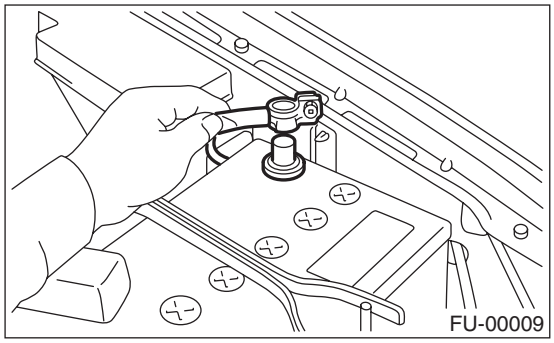
Camshaft position sensor support
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)

Camshaft position sensor
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)

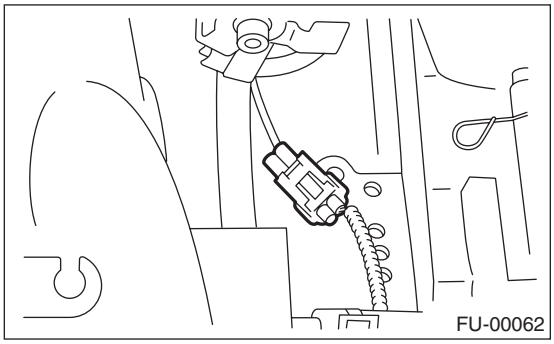
7. Knock Sensor

A: REMOVAL

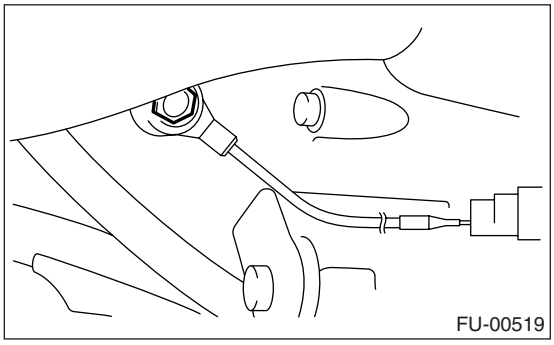
1) Disconnect the ground cable from battery.



2) Remove the air cleaner case.
<Ref. to IN(H4SO)-5, REMOVAL, Air Cleaner Case.>
3) Disconnect the knock sensor connector.



4) Remove the knock sensor from cylinder block.



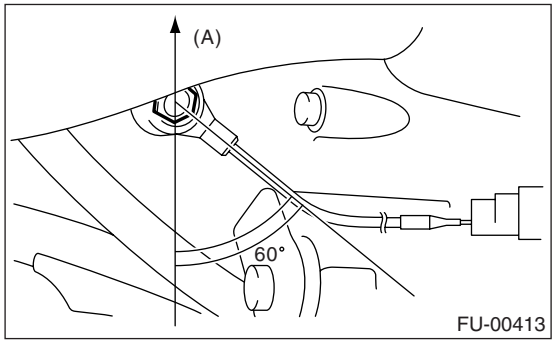
B: INSTALLATION

1) Install the knock sensor to cylinder block.

NOTE:
Extraction area of knock sensor cord must be positioned at a 60° angle relative to engine rear.

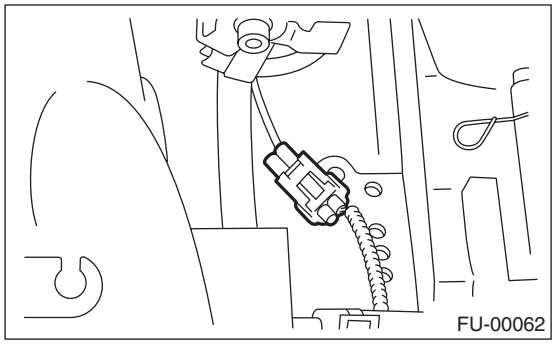
Tightening torque:

Knock sensor
24 N·m (2.4 kgf-m, 17.4 ft-lb)

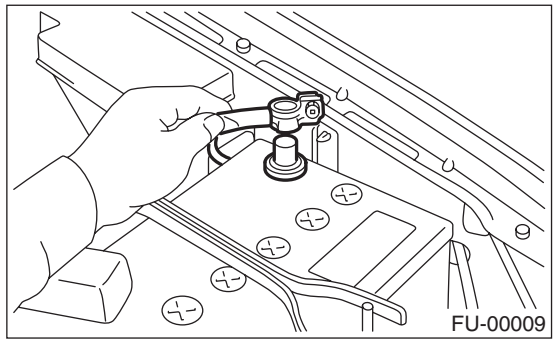


(A) Front side

2) Connect the knock sensor connector.



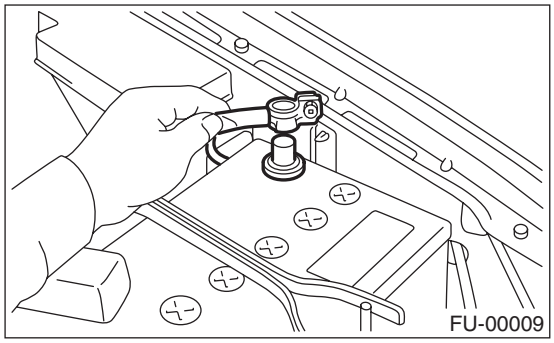
3) Install the air cleaner case.
<Ref. to IN(H4SO)-5, INSTALLATION, Air Cleaner Case.>
4) Connect the battery ground cable to battery.



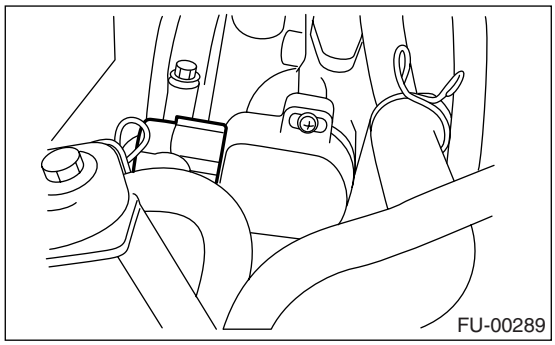
8. Throttle Position Sensor

A: REMOVAL

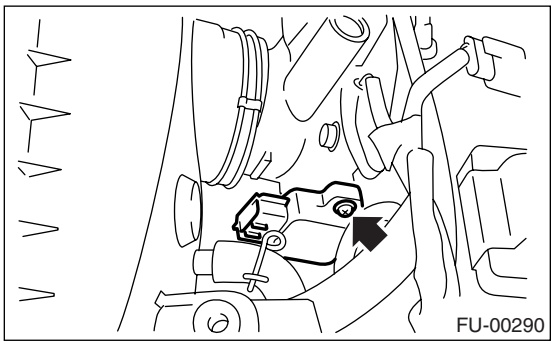
1) Disconnect the ground cable from battery.



2) Disconnect the connector from throttle position sensor.



3) Remove the throttle position sensor holding screws, and remove it.



B: INSTALLATION

Install in the reverse order of removal.

CAUTION:
When installing the throttle position sensor, adjust to specified data.

Tightening torque:

Throttle position sensor
1.6 N·m (0.16 kgf-m, 1.2 ft-lb)

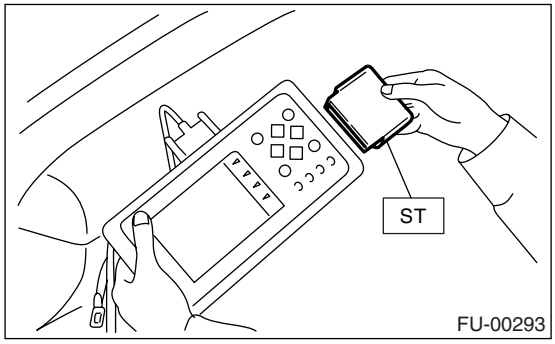
C: ADJUSTMENT

1. WHEN USING THE SUBARU SELECT MONITOR

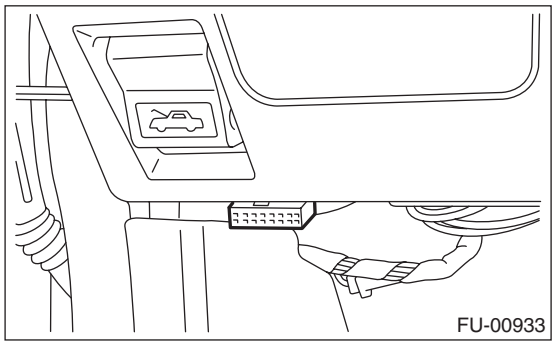
1) Turn the ignition switch to OFF.
2) Loosen the throttle position sensor holding screws.

NOTE:
For detailed operation procedures, refer to Subaru Select Monitor Operation Manual.

3) Insert the cartridge to Subaru Select Monitor.



4) Connect the Subaru Select Monitor to data link connector.



5) Turn the ignition switch to ON, and Subaru Select Monitor switch to ON.
6) Select the {2. Each System Check} in Main Menu.
7) Select the {Engine Control System} in Selection Menu.
8) Select the {1. Current Data Display & Save} in Engine Control System Diagnosis.
9) Select the {1.12 Data Display} in Data Display Menu.
10) Adjust the throttle position sensor to proper position to match with the following specifications.

Condition: Throttle fully closed
Throttle opening angle 0.00%
Throttle sensor voltage 0.50 V

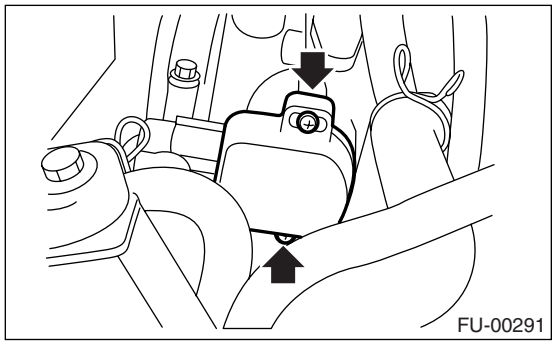
11) Tighten the throttle position sensor holding screws.

Tightening torque:

Throttle position sensor
1.6 N·m (0.16 kgf-m, 1.2 ft-lb)

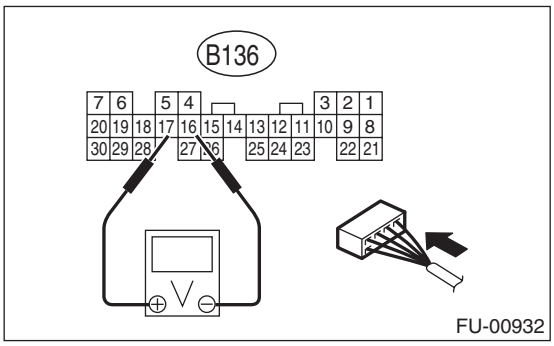
2. WHEN USING THE CIRCUIT TESTER

1) Turn the ignition switch to OFF.
2) Loosen the throttle position sensor holding screws.



3) Take out the ECM.
4) Turn the ignition switch to ON.
5) Adjust the throttle position sensor to proper position to make the voltage signal to ECM come to specification.

Connector & terminal/Specified voltage
(B136) No. 16 — (B136) No. 17/0.45 — 0.55 V
[Fully closed.]



6) Tighten the throttle position sensor holding screws.

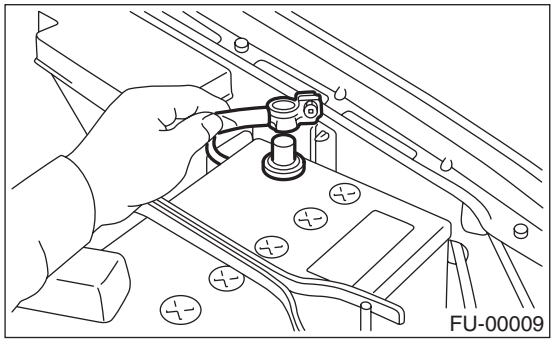
Tightening torque:

Throttle position sensor
1.6 N·m (0.16 kgf-m, 1.2 ft-lb)

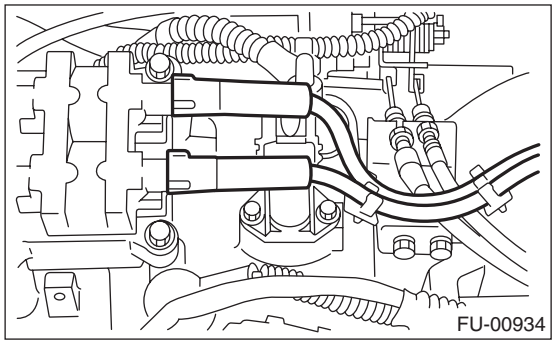
9. Manifold Absolute Pressure and Intake Air Temperature Sensor

A: REMOVAL

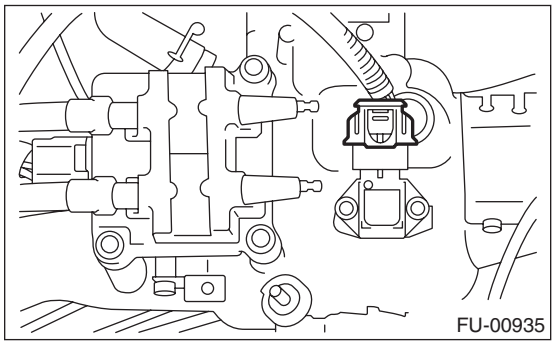
1) Disconnect the ground cable from battery.



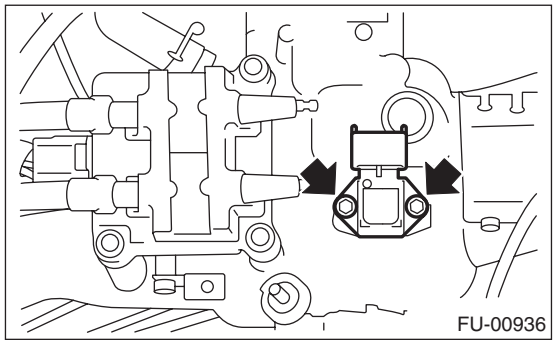
2) Disconnect the spark plug cord from ignition coil and ignitor ASSY.



3) Disconnect the connector from manifold absolute pressure and intake air temperature sensor.



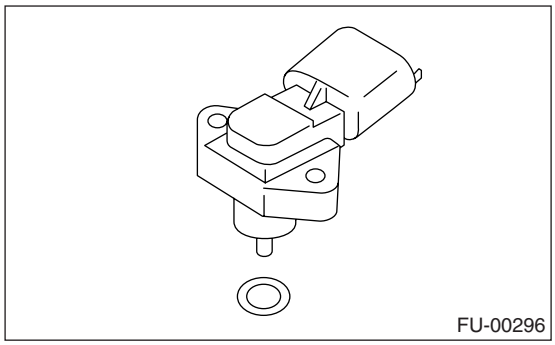
4) Remove the manifold absolute pressure and intake air temperature sensor.



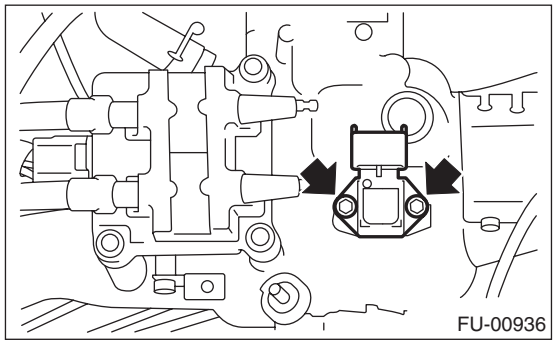
B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Use a new O-ring.



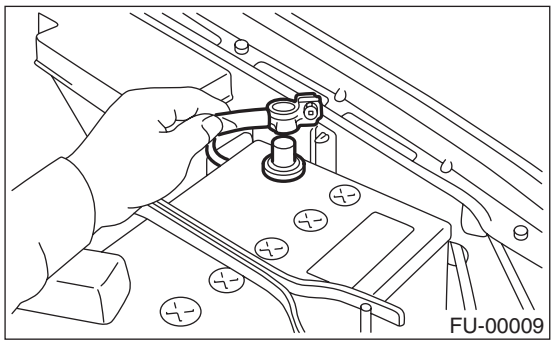
Tightening torque:
3.4 N·m (0.35 kgf-m, 2.5 ft-lb)



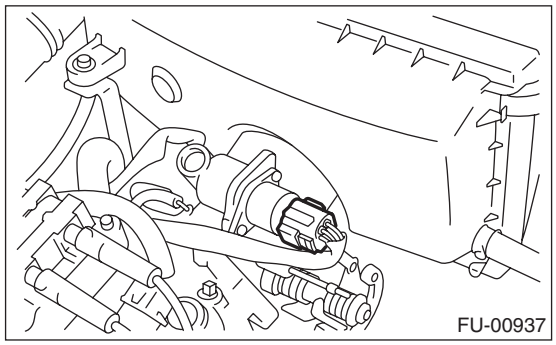
10.Idle Air Control Solenoid Valve

A: REMOVAL

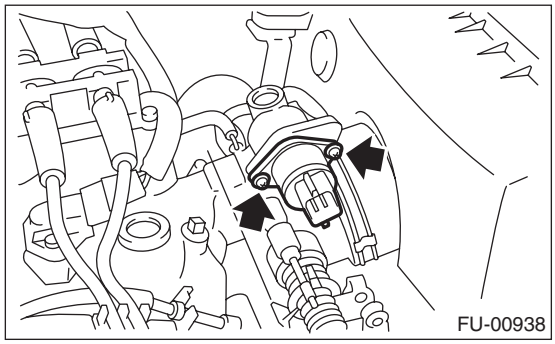
1) Disconnect the ground cable from battery.



2) Disconnect the connector from idle air control solenoid valve.



3) Remove the idle air control solenoid valve from throttle body.



B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Use a new gasket.

Tightening torque:

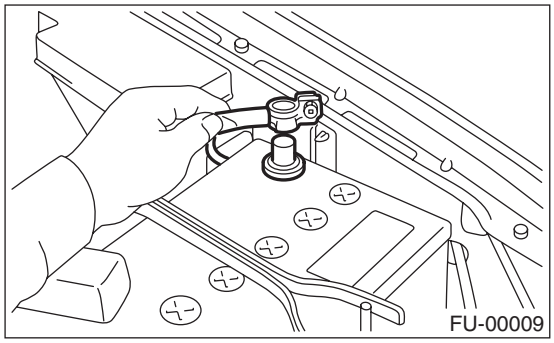
Idle air control solenoid valve
1.6 N·m (0.16 kgf-m, 1.2 ft-lb)

11.Fuel Injector

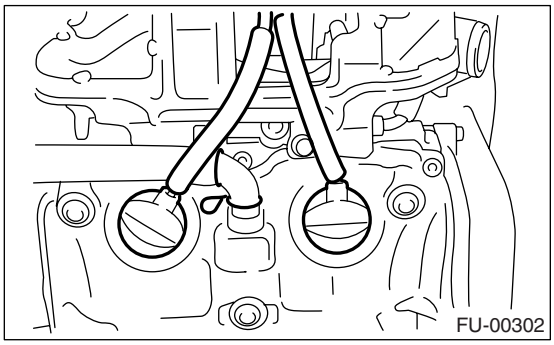
A: REMOVAL

1. RH SIDE

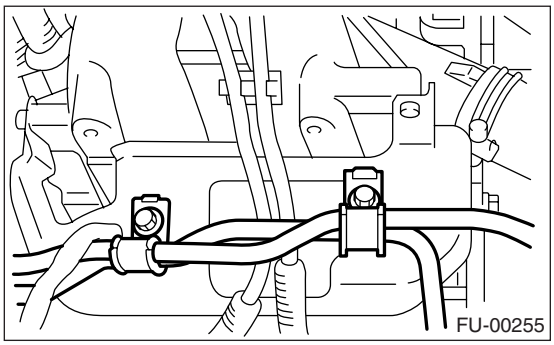
1) Release the fuel pressure.
<Ref. to FU(H4SOw/oOBD)-45, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
2) Open the fuel filler flap lid and remove the fuel filler cap.
3) Disconnect the ground cable from battery.


FU-00009

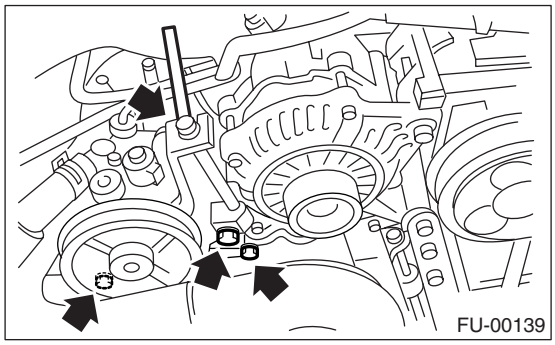
4) Remove the resonator chamber. <Ref. to IN(H4SO)-7, REMOVAL, Resonator Chamber.>
5) Remove the spark plug cords from spark plugs (#1 and #3 cylinders).


FU-00302

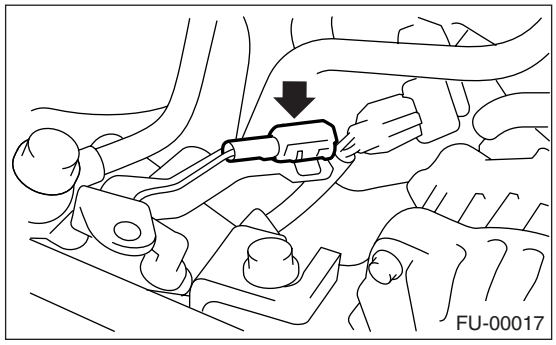
6) Remove the power steering pump and tank from brackets.
(1) Remove the front side V-belt. <Ref. to ME(H4SO)-41, REMOVAL, V-belt.>
(2) Remove the bolts which hold the power steering pipes onto intake manifold protector.


FU-00255

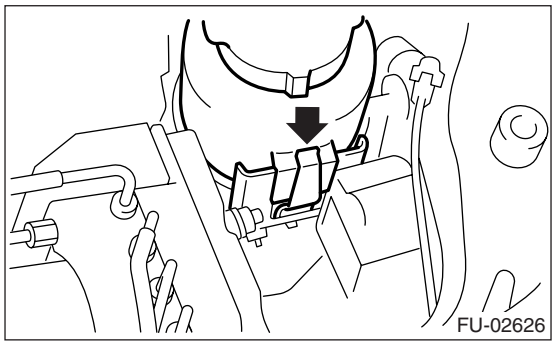
(3) Remove the bolts which install the power steering pump to bracket.


FU-00139

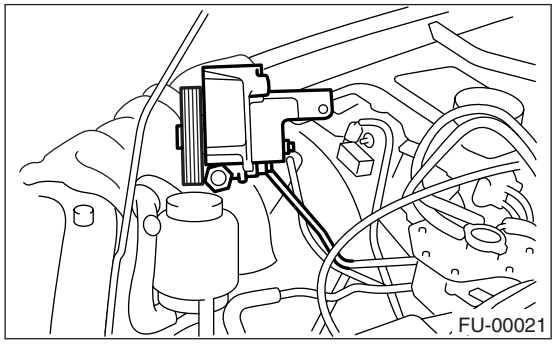
(4) Disconnect the connector from power steering pump switch.


FU-00017

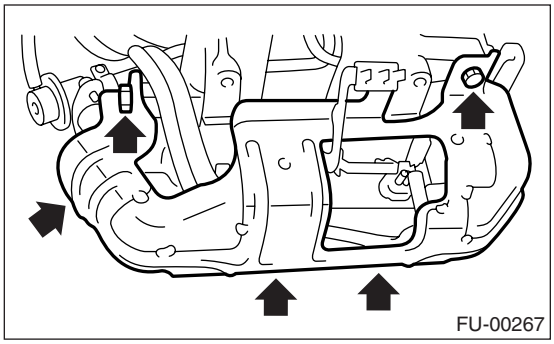
(5) Remove the power steering tank from the bracket by pulling it upwards.


FU-02626

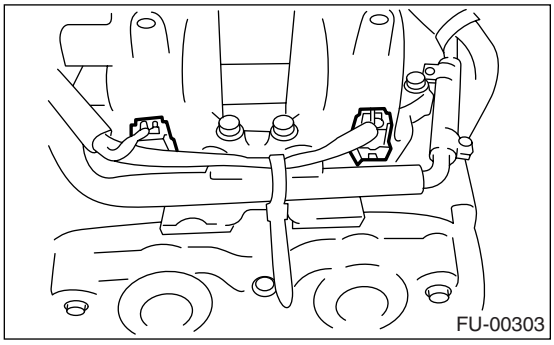
(6) Place the power steering pump and tank on the right side wheel apron.


FU-00021

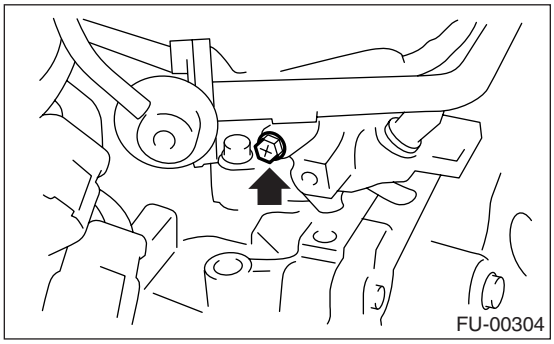
7) Remove the fuel pipe protector RH.

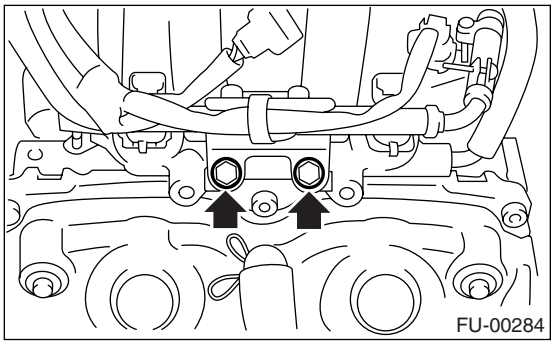


8) Disconnect the connector from fuel injector.



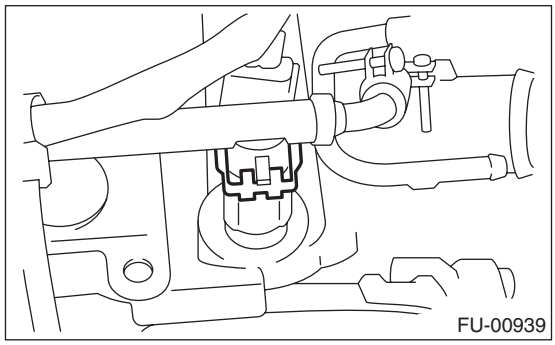
9) Remove the bolts which hold the fuel injector pipe to intake manifold.



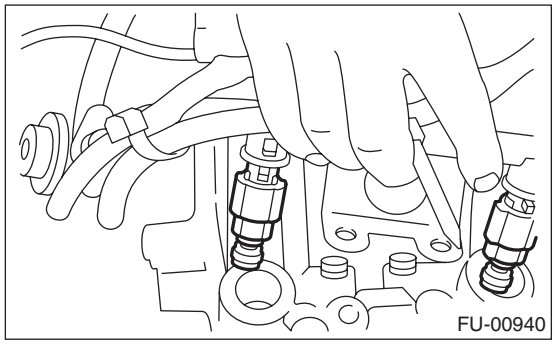


10) Remove the fuel injector from intake manifold.

(1) Remove the fuel injector securing clip.

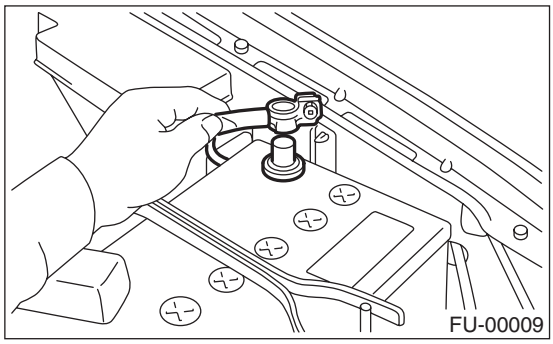


(2) Remove the fuel injector while lifting up the fuel injector pipe.

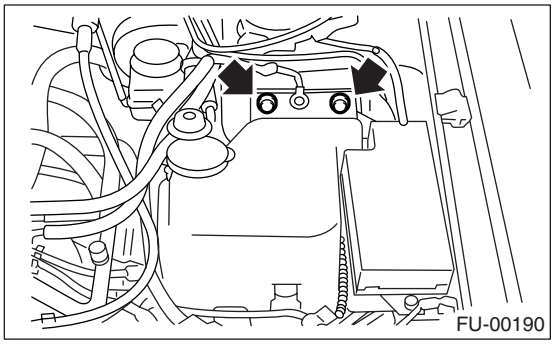


2. LH SIDE

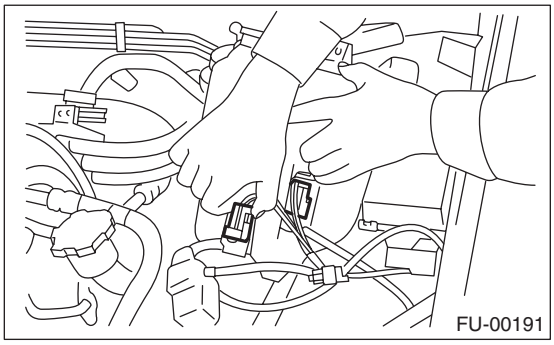
1) Release the fuel pressure. <Ref. to FU(H4SOw/oOBD)-45, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
2) Open the fuel filler flap lid and remove the fuel filler cap.
3) Disconnect the ground cable from battery.



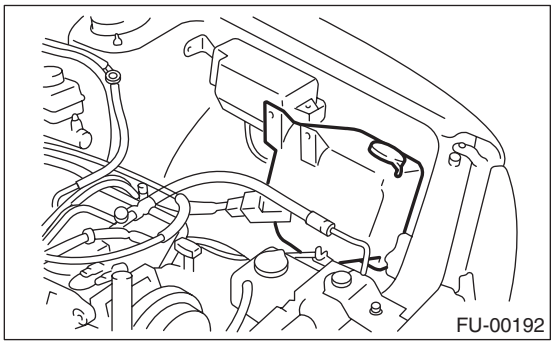
4) Remove the two bolts which install the washer tank on body.



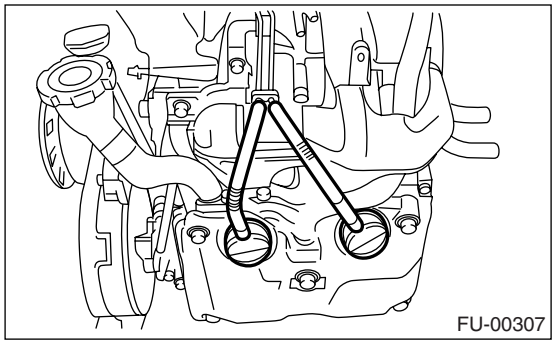
5) Disconnect the connector from front window washer motor.
6) Disconnect the connector from rear gate glass washer motor.



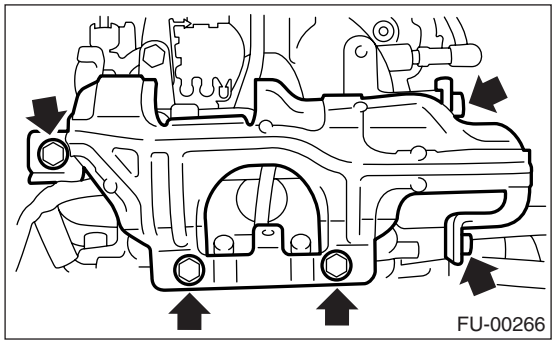
7) Disconnect the rear window glass washer hose from washer motor, and then plug the connection with a suitable cap.
8) Move the washer tank, and secure it away from working area.



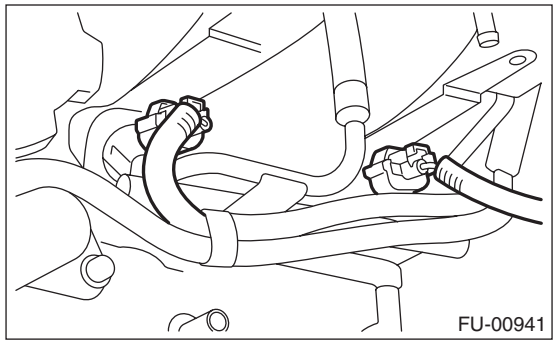
9) Remove the spark plug cords from spark plugs (#2 and #4 cylinders).



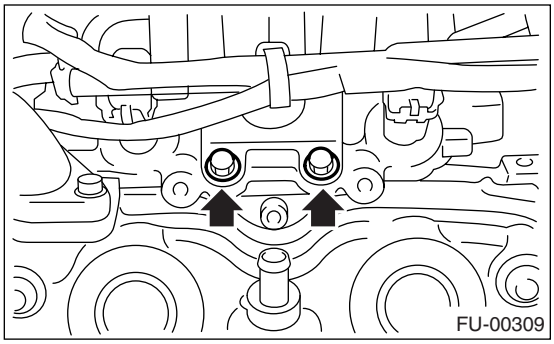
10) Remove the fuel pipe protector LH.

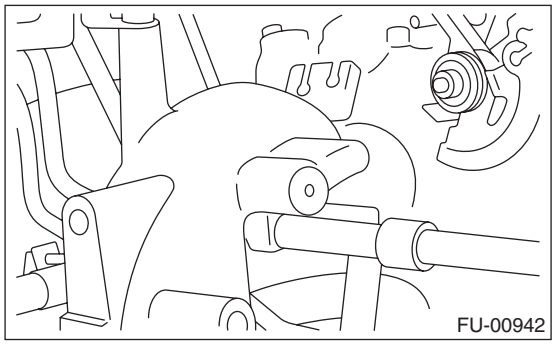


11) Disconnect the connector from fuel injector.

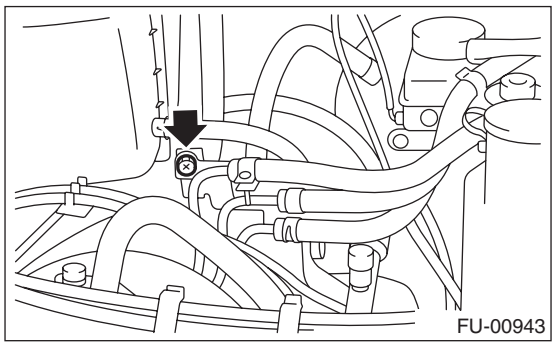


12) Remove the bolt which installs the fuel injector pipe to intake manifold.

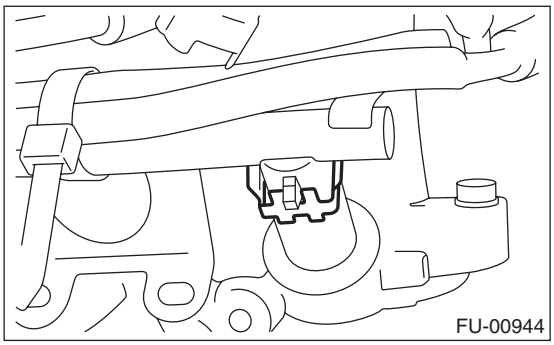




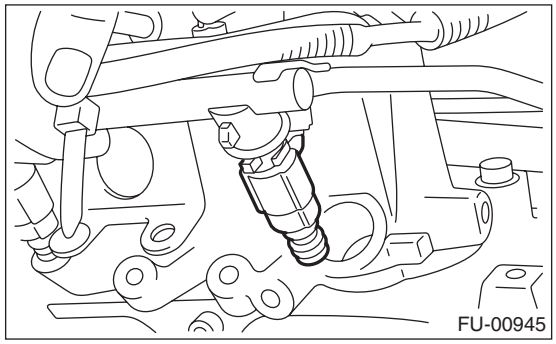
13) Remove the bolt which holds the fuel pipe on intake manifold.



14) Remove the fuel injector from intake manifold.
(1) Remove the fuel injector securing clip.



(2) Remove the fuel injector while lifting up the fuel injector pipe.

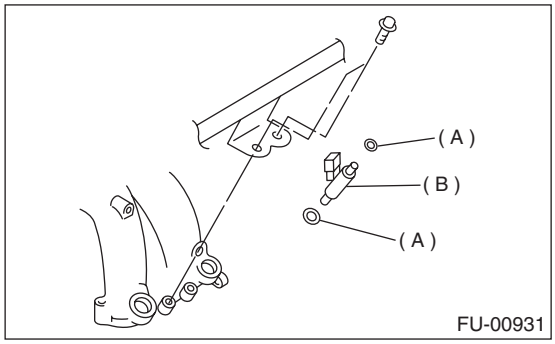


B: INSTALLATION

1. RH SIDE

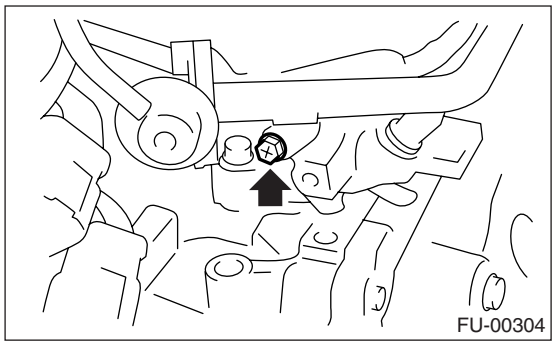
Install in the reverse order of removal.

NOTE:
Use new O-rings.

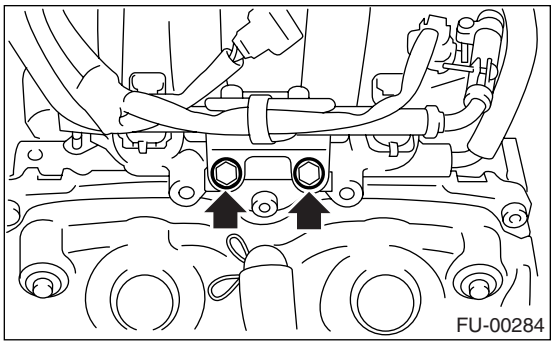


(A) O-ring
(B) Fuel injector

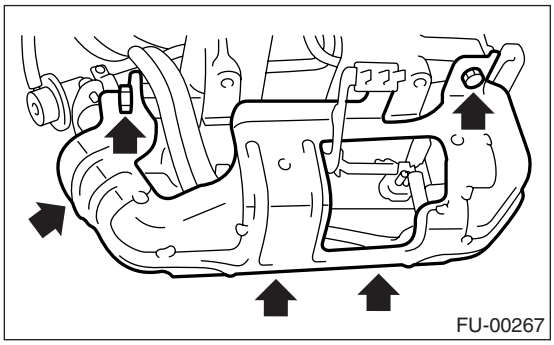
Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



Tightening torque:
19 N·m (1.9 kgf-m, 14.0 ft-lb)



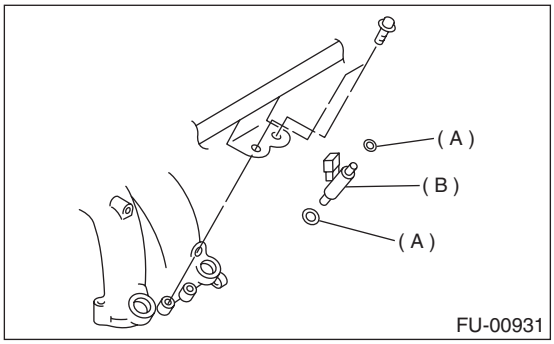
Tightening torque:
19 N·m (1.9 kgf-m, 14.0 ft-lb)



2. LH SIDE

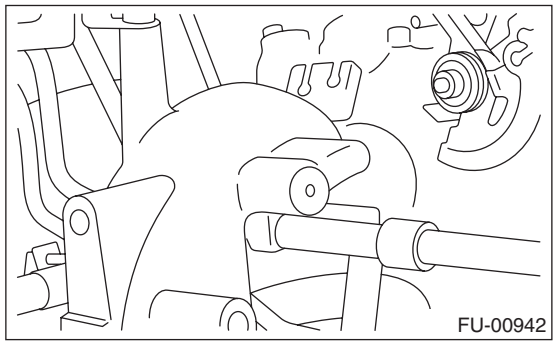
Install in the reverse order of removal.

NOTE:
Use new O-rings.

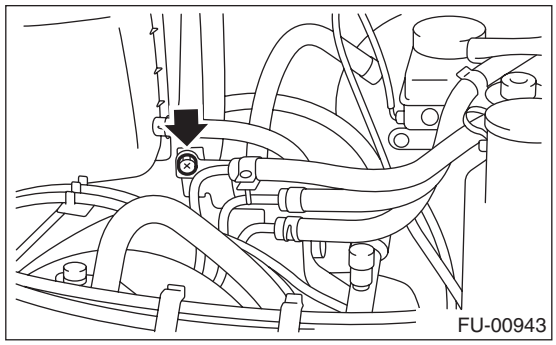


(A) O-ring
(B) Fuel injector

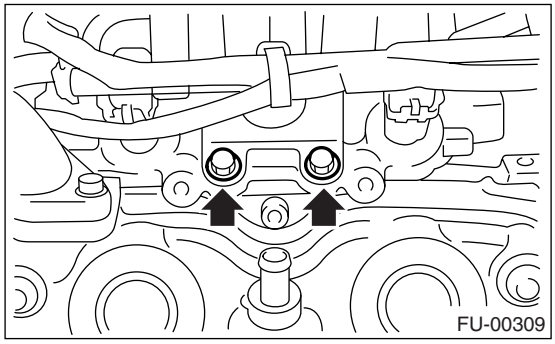
Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



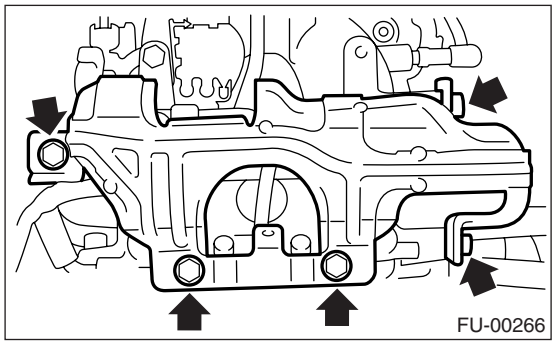
Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



Tightening torque:
19 N·m (1.9 kgf-m, 14.0 ft-lb)



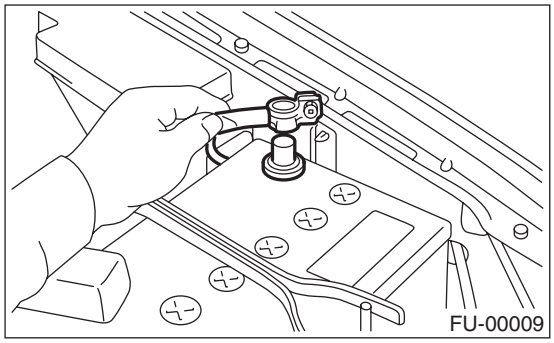
Tightening torque:
19 N·m (1.9 kgf-m, 14.0 ft-lb)



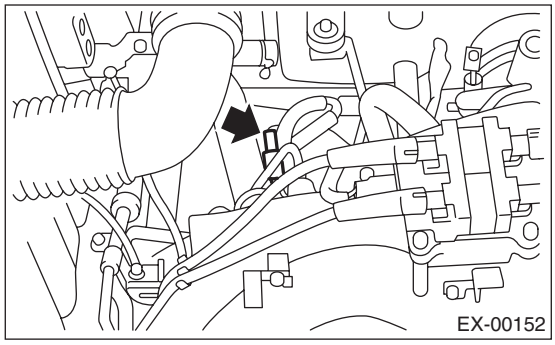
12.Oxygen Sensor

A: REMOVAL

1) Disconnect the ground cable from battery.

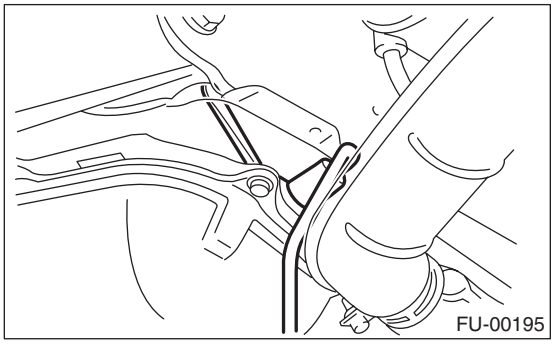


2) Disconnect the connector from oxygen sensor.



3) Lift-up the vehicle.
4) Apply a coat of spray type lubricant to the threaded portion of oxygen sensor, and leave it for 1 minute or more.
5) Remove the oxygen sensor.

CAUTION:
When removing the oxygen sensor, wait until the exhaust pipe cools, otherwise it will damage exhaust pipe.

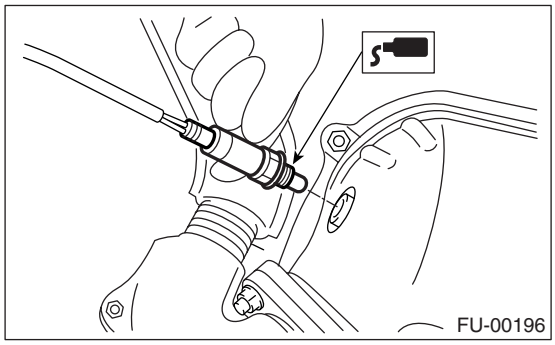


B: INSTALLATION

1) Before installing the oxygen sensor, apply anti-seize compound only to the threaded portion of oxygen sensor to make the next removal easier.

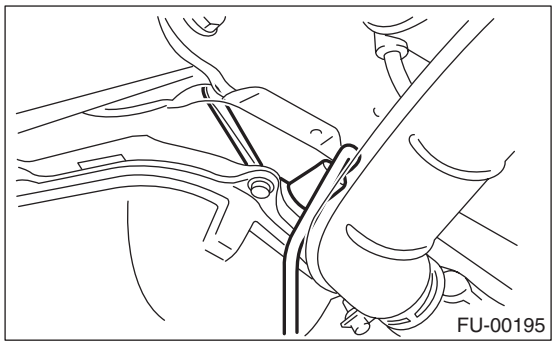
Anti-seize compound:
SS-30 by JET LUBE

CAUTION:
Never apply anti-seize compound to the protector of oxygen sensor.

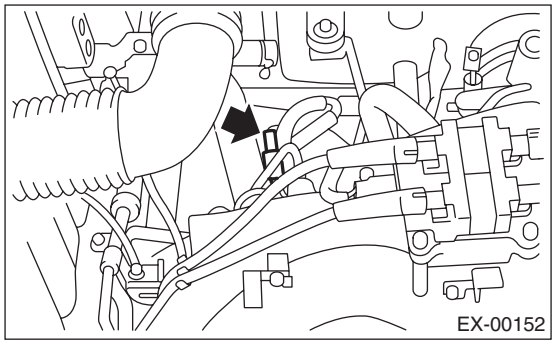


2) Install the oxygen sensor.

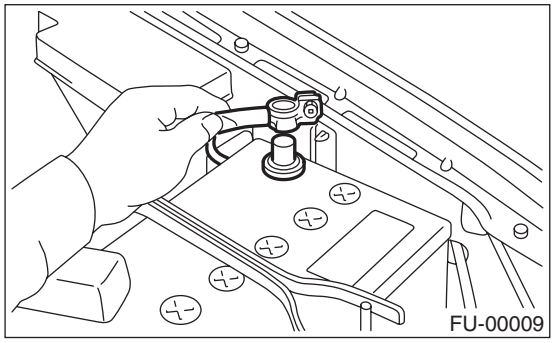
Tightening torque:
21 N·m (2.1 kgf-m, 15.2 ft-lb)



3) Lower the vehicle.
4) Connect the connector of oxygen sensor.



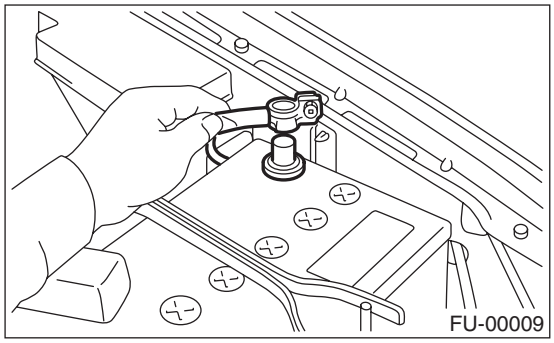
5) Connect the battery ground cable to battery.



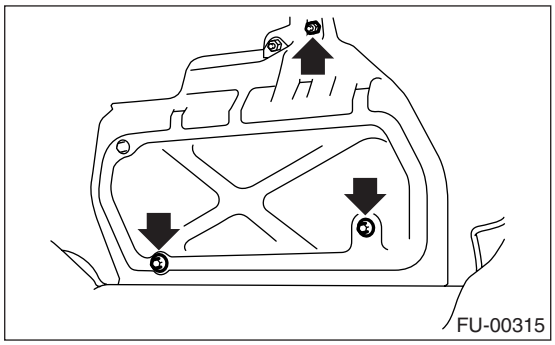
13.Engine Control Module (ECM)

A: REMOVAL

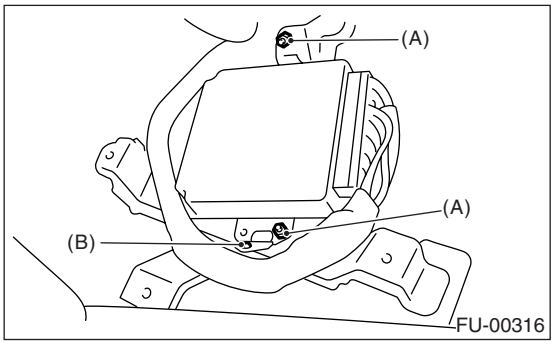
1) Disconnect the ground cable from battery.



2) Remove the lower inner trim of passenger side.
<Ref. to EI-50, REMOVAL, Lower Inner Trim.>
3) Detach the floor mat of front passenger seat.
4) Remove the protect cover.



5) Remove the nuts (A) which hold the ECM to bracket.
6) Remove the clip (B) from bracket.



7) Disconnect the ECM connectors and take out the ECM.

B: INSTALLATION

Install in the reverse order of removal.

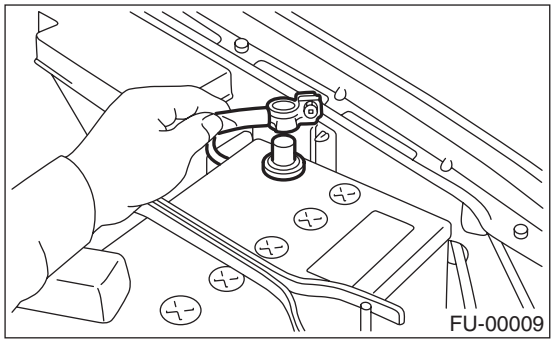
CAUTION:
When replacing the ECM, be careful not to use the wrong spec. ECM to avoid any damage to fuel injection system.

Tightening torque:
5 N·m (0.5 kgf-m, 3.7 ft-lb)

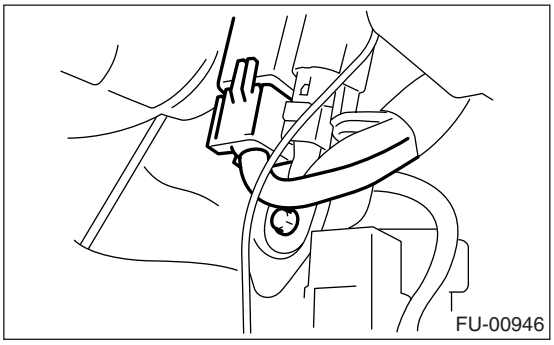
14.Main Relay

A: REMOVAL

1) Disconnect the ground cable from battery.



2) Remove the front side sill cover of passenger side.
3) Remove the bolt which holds the main relay bracket on body.
4) Disconnect the connectors from main relay.



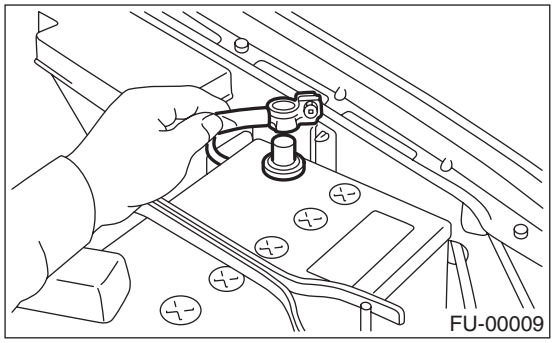
B: INSTALLATION

Install in the reverse order of removal.

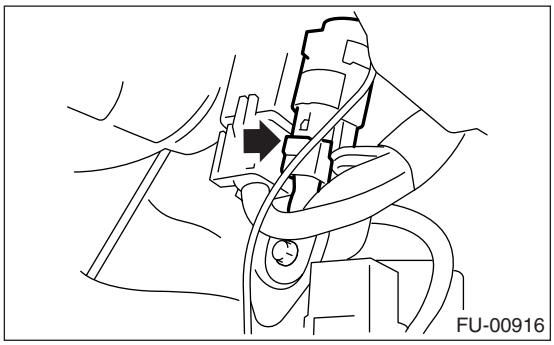
15.Fuel Pump Relay

A: REMOVAL

1) Disconnect the ground cable from battery.



2) Remove the front side sill cover of passenger side.
3) Remove the bolt which holds the fuel pump relay bracket on body.
4) Disconnect the connector from fuel pump relay.



5) Remove the fuel pump relay from mounting bracket.

B: INSTALLATION

Install in the reverse order of removal.

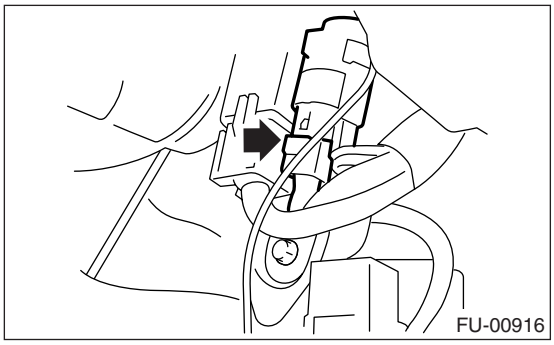
16.Fuel

A: PROCEDURE

1. RELEASING OF FUEL PRESSURE

WARNING:
- **Place "NO FIRE" signs near the working area.**
- **Be careful not to spill fuel on the floor.**

1) Disconnect the connector from fuel pump relay.

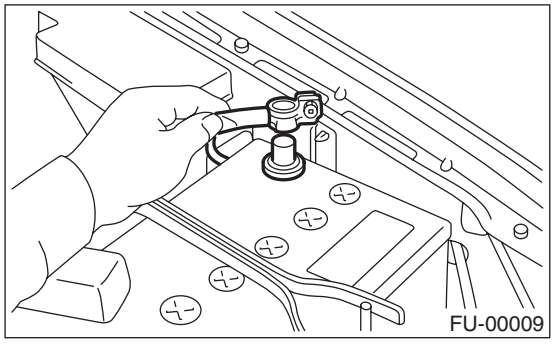


2) Start and run the engine until it stalls.
3) After the engine stalls, crank it for 5 more seconds.
4) Turn the ignition switch to OFF.

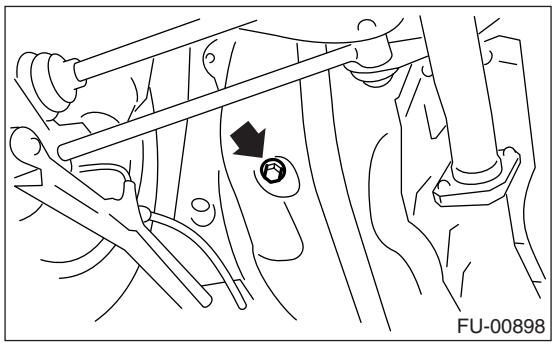
2. DRAINING FUEL

WARNING:
- **Place "NO FIRE" signs near the working area.**
- **Be careful not to spill fuel on the floor.**

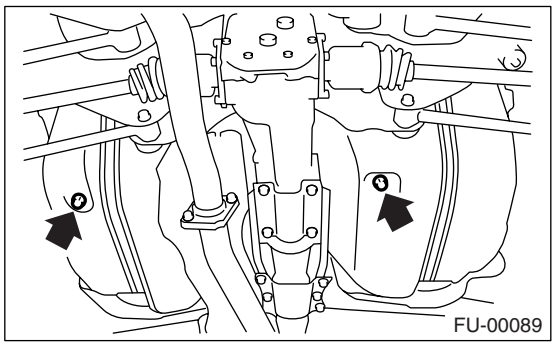
1) Set the vehicle on a lift.
2) Disconnect the ground cable from battery.



3) Open the fuel filler flap lid and remove the fuel filler cap.
4) Lift-up the vehicle.
5) Drain fuel from fuel tank.
Set a container under the vehicle and remove the drain plug from fuel tank.
- 1.6 L and 2.0 L MODEL



- 2.5 L MODEL



6) Tighten the fuel drain plug.

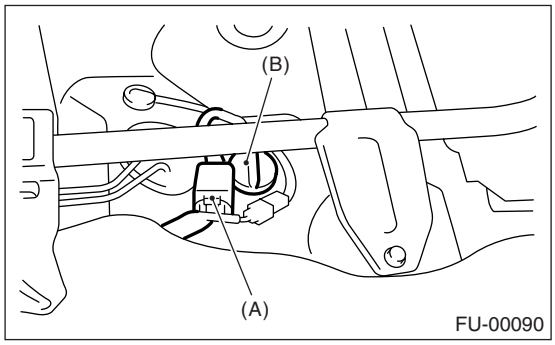
Tightening torque:
26 N·m (2.7 kgf-m, 19.2 ft-lb)

17.Fuel Tank

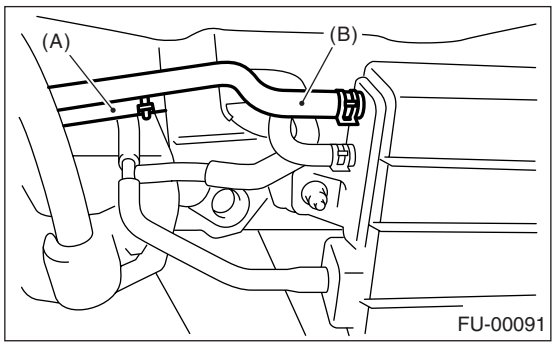
A: REMOVAL

WARNING:
- **Place "NO FIRE" signs near the working area.**
- **Be careful not to spill fuel on the floor.**

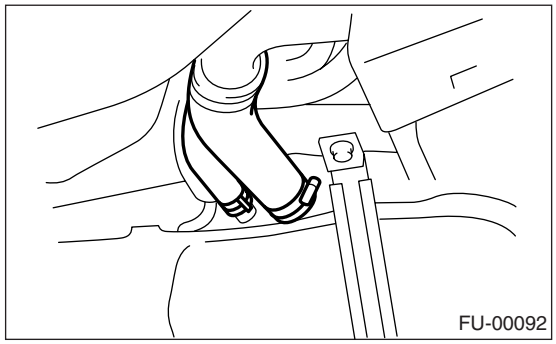
1) Set the vehicle on a lift.
2) Release the fuel pressure. <Ref. to FU(H4SOw/oOBD)-45, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
3) Drain fuel from fuel tank. <Ref. to FU(H4SOw/oOBD)-45, DRAINING FUEL, PROCEDURE, Fuel.>
4) Remove the rear seat.
5) Disconnect the connector (A) of fuel tank cord to rear harness.
6) Push the grommet (B) which hold the fuel tank cord on floor panel down under body.



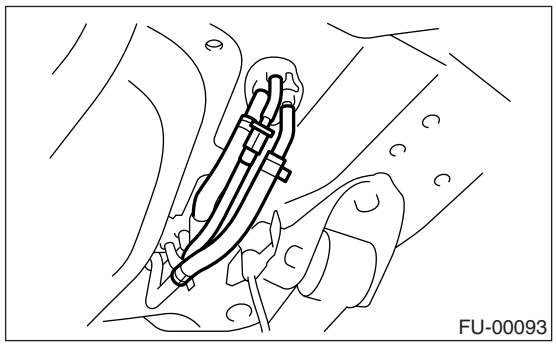
7) Remove the rear crossmember. <Ref. to RS-20, REMOVAL, Rear Crossmember.>
8) Disconnect the two-way valve hose (A) from two-way valve and disconnect the canister hose (B) from canister.



9) Loosen the clamp and disconnect the fuel filler hose and air vent hose from fuel filler pipe.

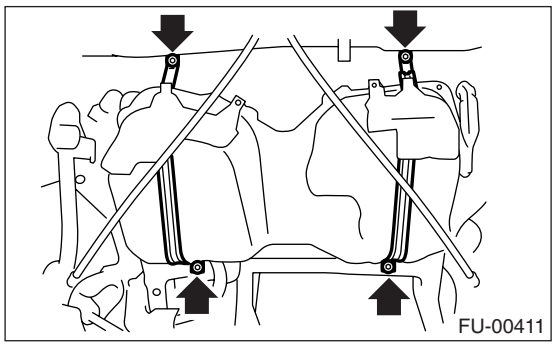


10) Move the clips, and then disconnect the quick connector. <Ref. to FU(H4SOw/oOBD)-61, REMOVAL, Fuel Delivery, Return and Evaporation Lines.>
11) Disconnect the fuel hoses.



12) Support the fuel tank with transmission jack, remove the bolts from bands, and then dismount the fuel tank from vehicle.

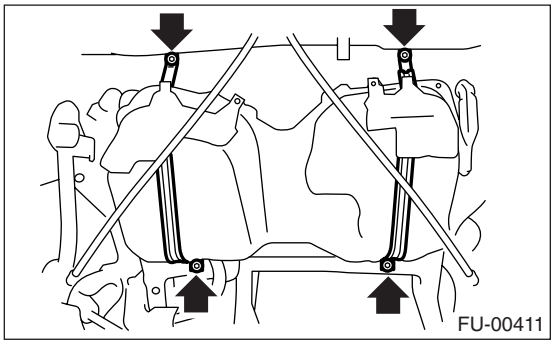
WARNING:
A helper is required to perform this work.



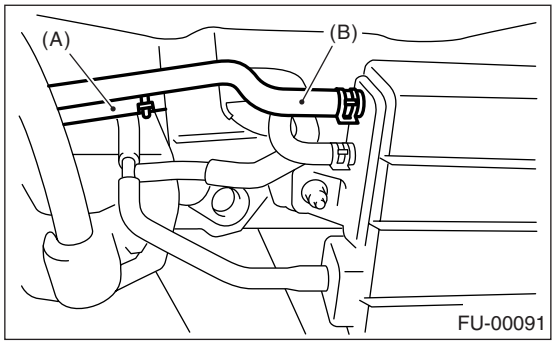
B: INSTALLATION

1) Support the fuel tank with transmission jack and push the fuel tank harness into access hole with grommet.
2) Set the fuel tank and temporarily tighten the bolts of fuel tank bands.

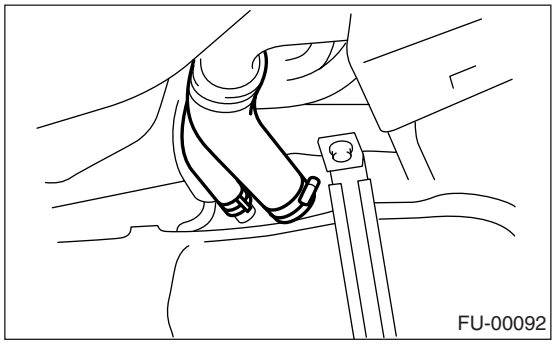
WARNING:
A helper is required to perform this work.



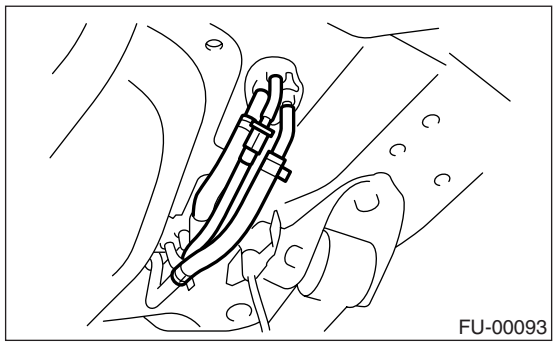
3) Connect the two-way valve hose (A) to two-way valve and connect the canister hose (B) to canister.



4) Connect the fuel filler hose and air vent hose.

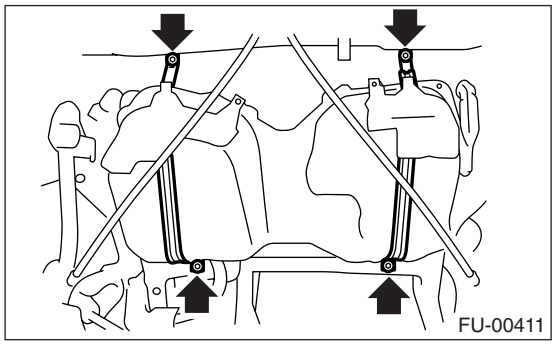


5) Connect the fuel hoses, and then secure them with clips and quick connector. <Ref. to FU(H4SOw/oOBD)-62, INSTALLATION, Fuel Delivery, Return and Evaporation Lines.>

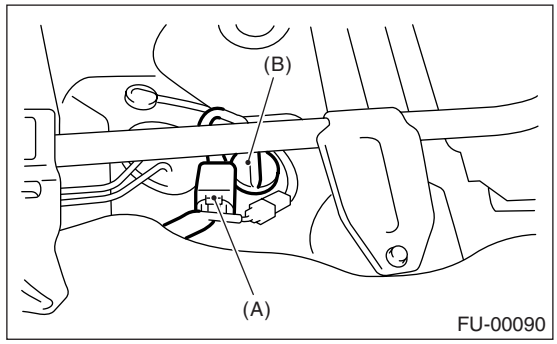


6) Tighten the band mounting bolts.

Tightening torque:
33 N·m (3.4 kgf-m, 24.3 ft-lb)

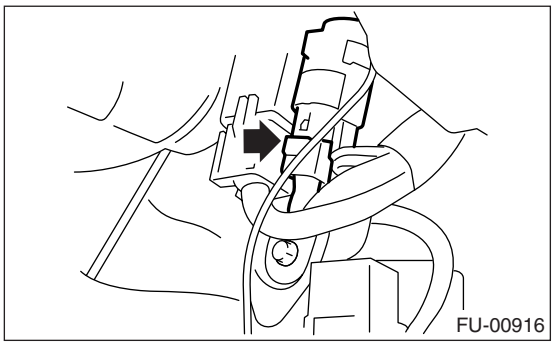


7) Install the rear crossmember. <Ref. to RS-20, INSTALLATION, Rear Crossmember.>
8) Connect the connectors (A) to fuel tank cord and plug the service hole with grommet (B).



9) Set the rear seat and floor mat.

10) Connect the connector to the fuel pump relay.



C: INSPECTION

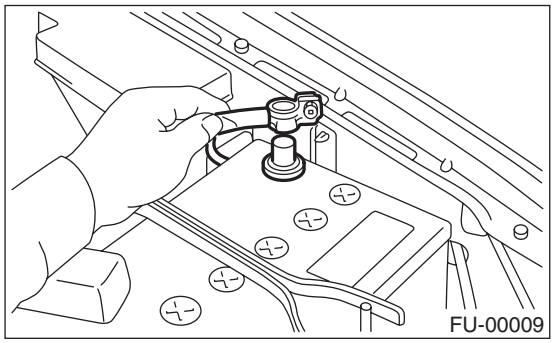
1) Make sure there are no cracks, holes or other damage on fuel tank.
2) Make sure the fuel hoses and fuel pipes are not cracked and the connections are tightened firmly.

18.Fuel Filler Pipe

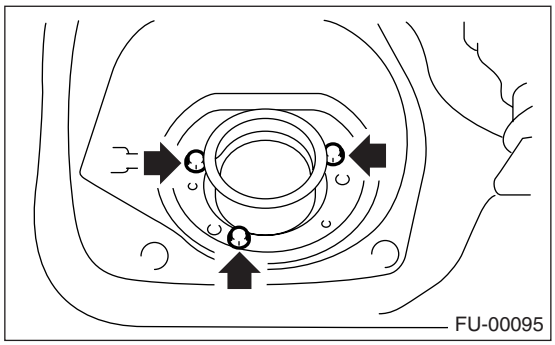
A: REMOVAL

WARNING:
- **Place "NO FIRE" signs near the working area.**
- **Be careful not to spill fuel on the floor.**

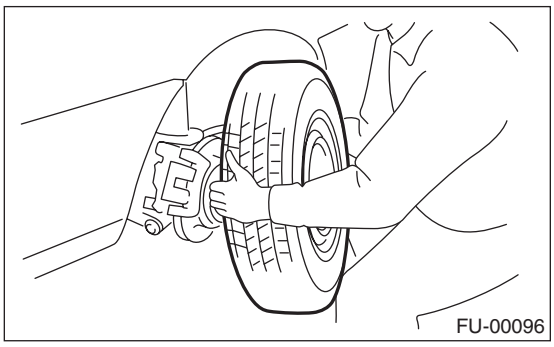
1) Set the vehicle on a lift.
2) Disconnect the ground cable from battery.



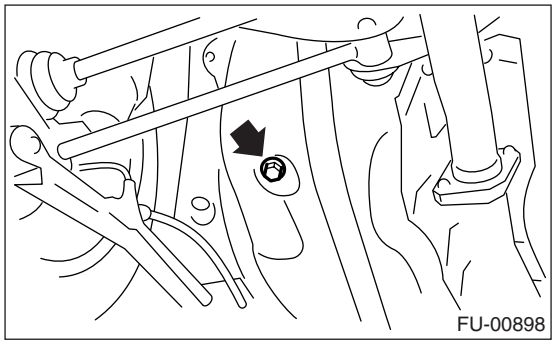
3) Open the fuel filler flap lid and remove the fuel filler cap.
4) Remove the screws holding packing in place.



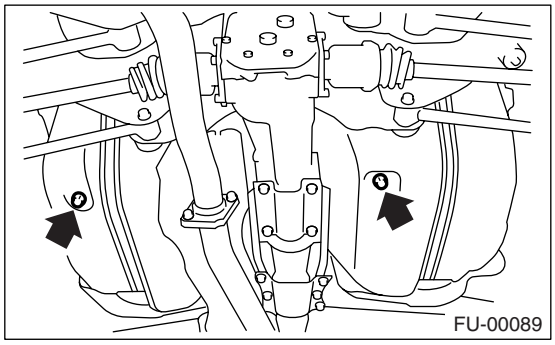
5) Remove the nuts of rear wheel RH.
6) Lift-up the vehicle.
7) Remove the rear wheel RH.



8) Drain fuel from the fuel tank. Set a container under the vehicle and remove the drain plug from fuel tank.
- 1.6 L and 2.0 L MODEL



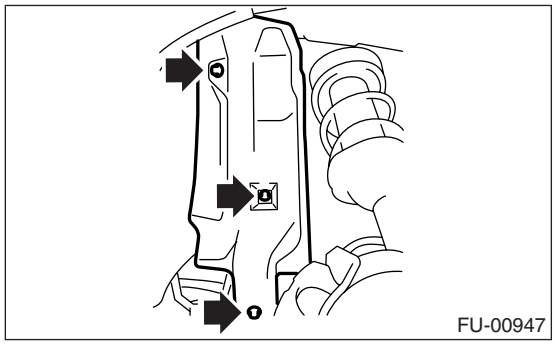
- 2.5 L MODEL



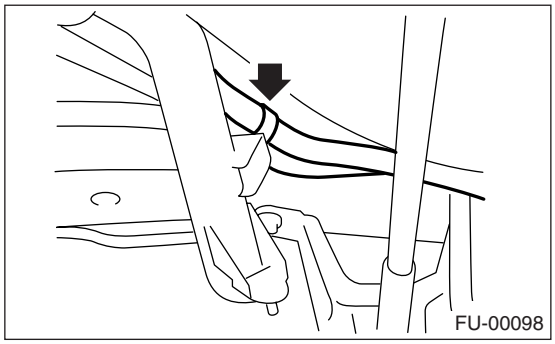
9) Tighten the fuel drain plug and then install the front right side tank cover.

Tightening torque:
26 N·m (2.7 kgf-m, 19.2 ft-lb)

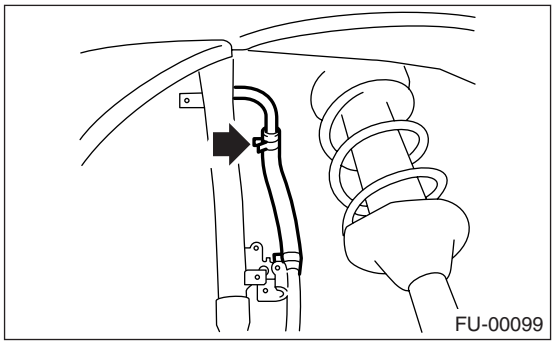
10) Remove the fuel filler pipe protector.



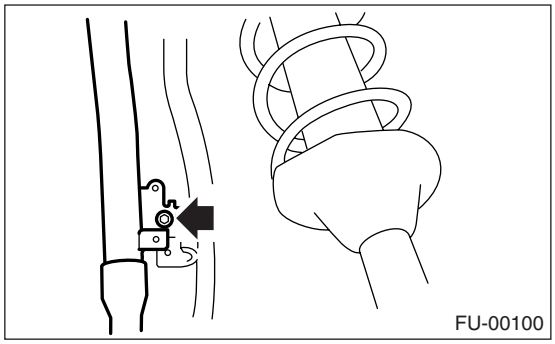
11) Separate the evaporation hoses from clip of fuel filler pipe.



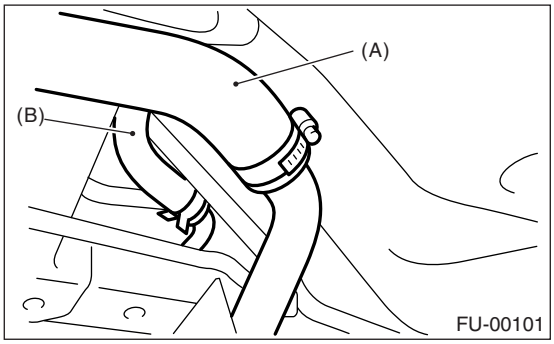
12) Disconnect the air vent hose from fuel filler pipe.



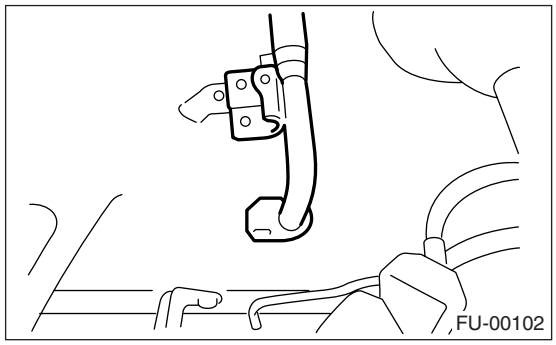
13) Remove the bolt which holds the fuel filler pipe bracket on body.



14) Loosen the clamp and separate the fuel filler hose (A) from fuel filler pipe.
15) Move the clip and separate the air vent hose (B).



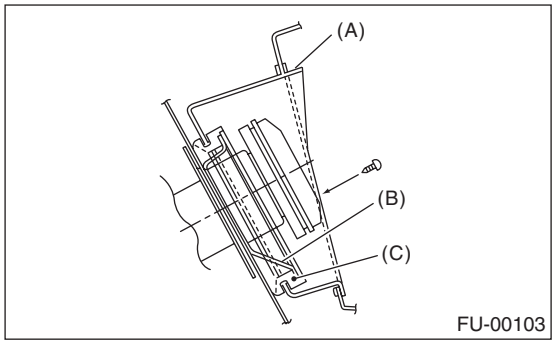
16) Remove the fuel filler pipe to under side of vehicle.
17) Remove the air vent pipe together with clip from body.



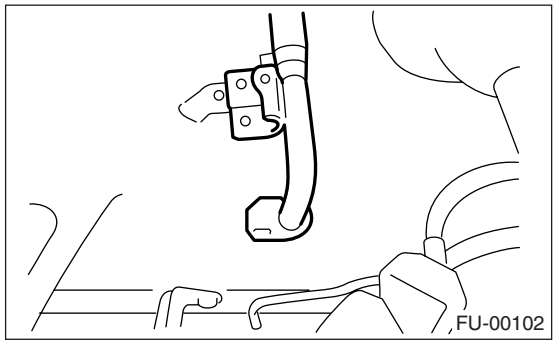
B: INSTALLATION

1) Open the fuel filler flap lid.
2) Set the fuel saucer (A) with rubber packing (C) and insert the fuel filler pipe into hole from the inner side of apron.
3) Align the holes in fuel filler pipe neck, set the cup (B), and then tighten the screws.

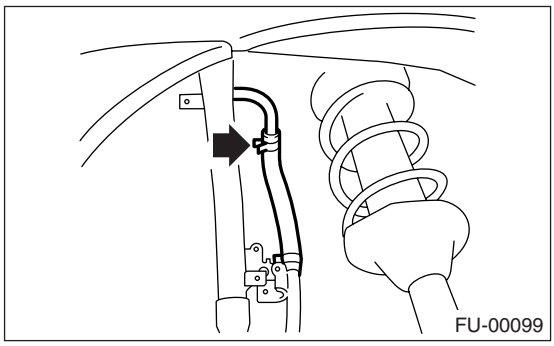
NOTE:
If the edges of rubber packing are folded toward inside, straighten it with a screwdriver.



4) Install the air vent pipe.

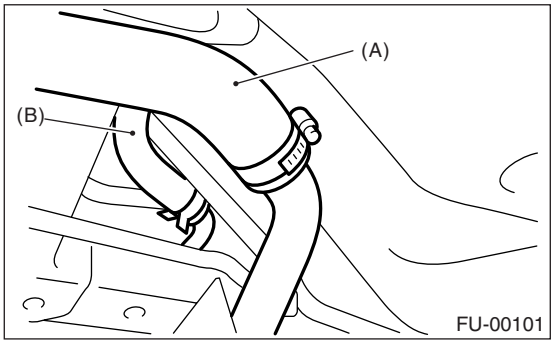


5) Connect the air vent hose to the fuel filler pipe.



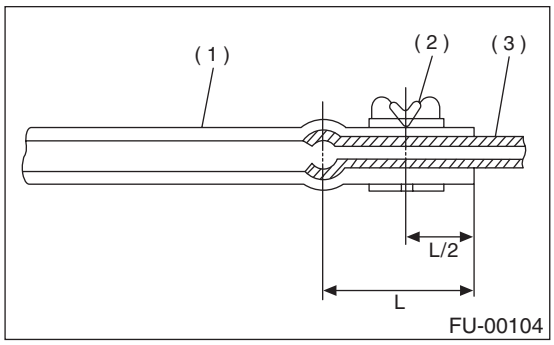
6) Insert the fuel filler hose (A) approx. 35 to 40 mm (1.38 to 1.57 in) over the lower end of fuel filler pipe and tighten the clamp.

CAUTION:
Do not allow the clips to touch the air vent hose (B) and rear suspension crossmember.



7) Insert the air vent hose approx. 25 to 30 mm (0.98 to 1.18 in) into the lower end of air vent pipe and hold clip.

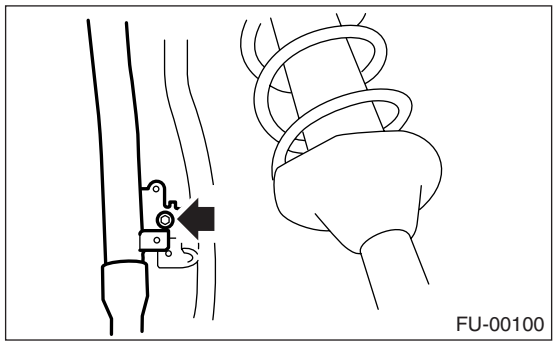
L = 27.5±2.5 mm (1.083±0.098 in)



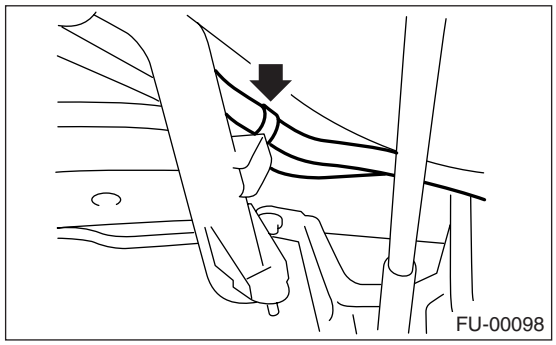
(1) Hose
(2) Clip
(3) Pipe

8) Tighten the bolt which holds the fuel filler pipe bracket on body.

Tightening torque:
7.4 N·m (0.75 kgf-m, 5.4 ft-lb)

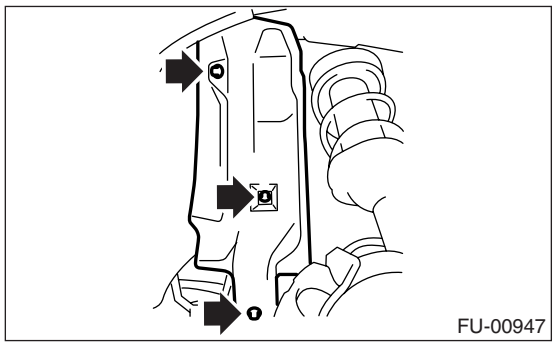


9) Tighten the bolts which hold the evaporation hoses onto clip of fuel filler pipe.

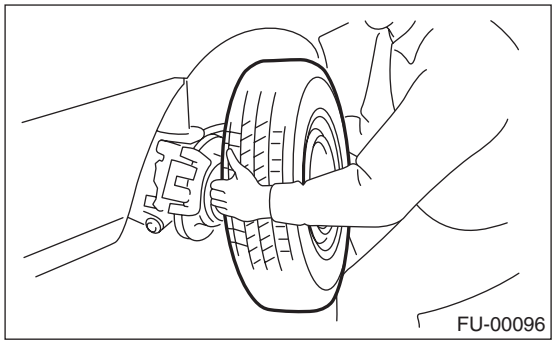


10) Install the fuel filler pipe protector.

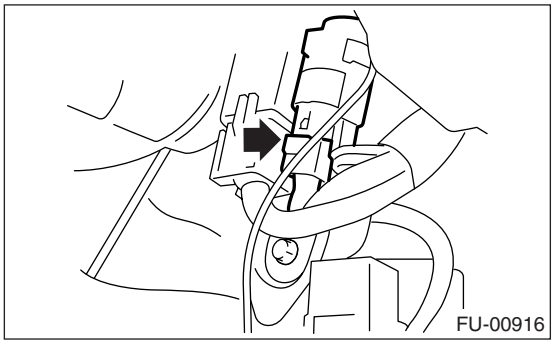
Tightening torque:
7.4 N·m (0.75 kgf-m, 5.4 ft-lb)



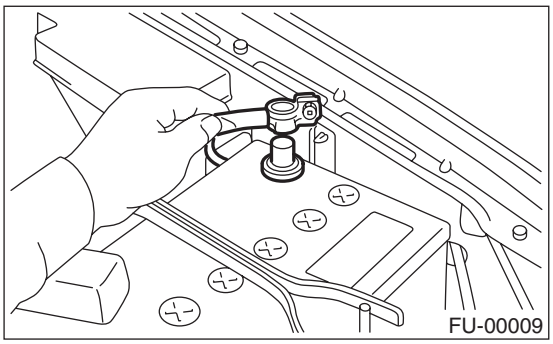
11) Install the rear wheel RH.



12) Lower the vehicle.
13) Tighten the wheel nuts.
14) Connect the connector to the fuel pump relay.



15) Connect the battery ground cable to battery.



19.Fuel Pump

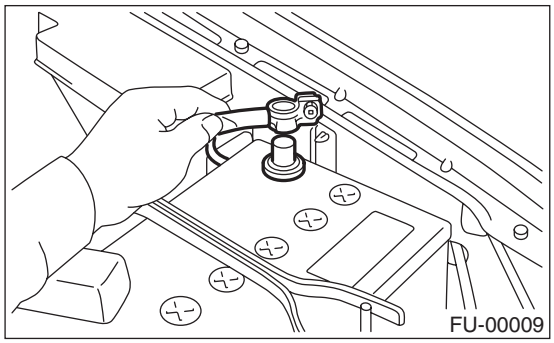
A: REMOVAL

WARNING:
- **Place "NO FIRE" signs near the working area.**
- **Be careful not to spill fuel on the floor.**

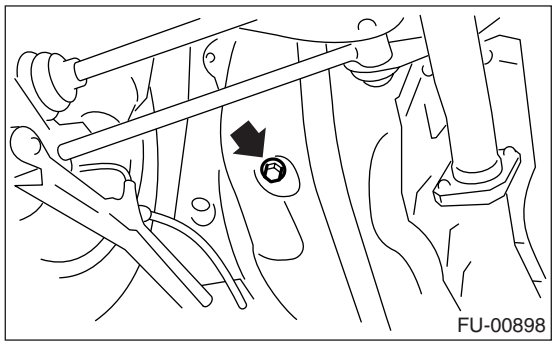
NOTE:
Fuel pump assembly consists of fuel pump and fuel level sensor.

• 1.6 L and 2.0 L MODEL

1) Release the fuel pressure. <Ref. to FU(H4SOw/oOBD)-45, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
2) Open the fuel filler flap lid and remove the fuel filler cap.
3) Disconnect the ground cable from battery.


FU-00009

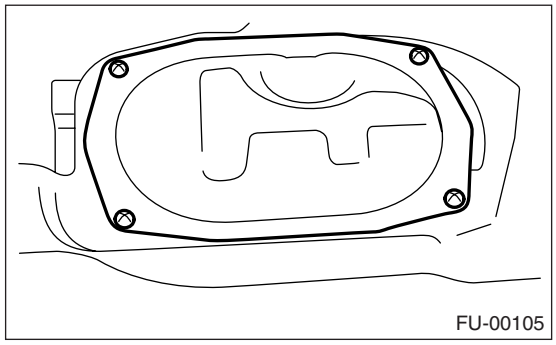
4) Lift-up the vehicle.
5) Drain fuel from fuel tank. Set a container under vehicle and remove the drain plug from fuel tank.


FU-00898

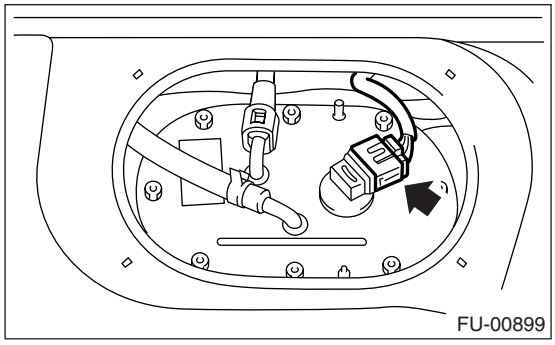
6) Tighten the fuel drain plug.

Tightening torque:
26 N·m (2.7 kgf-m, 19.2 ft-lb)

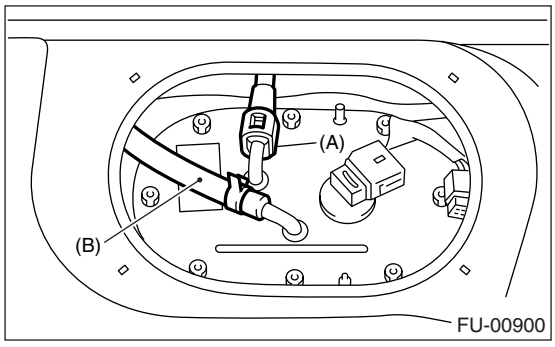
7) Raise the rear seat and turn the floor mat up.
8) Remove the access hole lid.


FU-00105

9) Disconnect the connector from fuel pump.

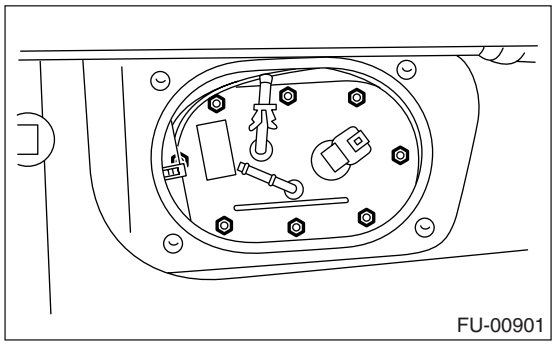

FU-00899

10) Disconnect the quick connector and then disconnect the fuel delivery hose (A). <Ref. to FU(H4SOw/oOBD)-61, REMOVAL, Fuel Delivery, Return and Evaporation Lines.>
11) Move the clip and then disconnect the fuel return hose (B).



FU-00900

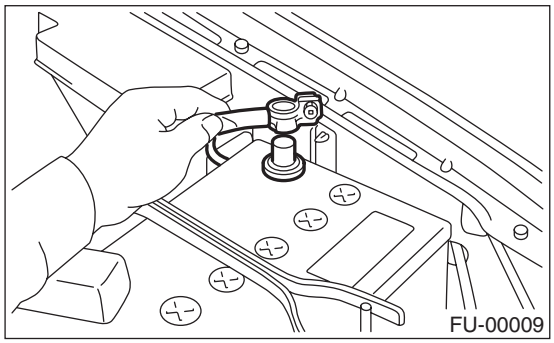
12) Remove the nuts which install the fuel pump assembly onto fuel tank.


FU-00901

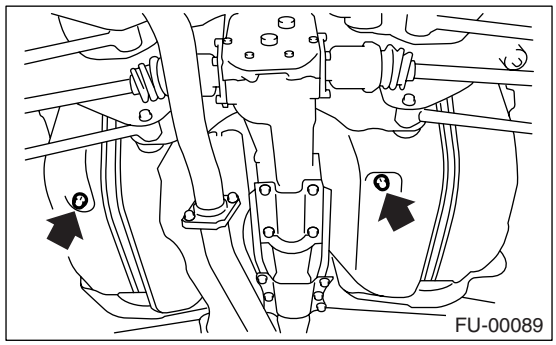
13) Take off the fuel pump assembly from fuel tank.

• 2.5 L MODEL

1) Release the fuel pressure. <Ref. to FU(H4SOw/oOBD)-45, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
2) Open the fuel filler flap lid and remove the fuel filler cap.
3) Disconnect the ground cable from battery.


FU-00009

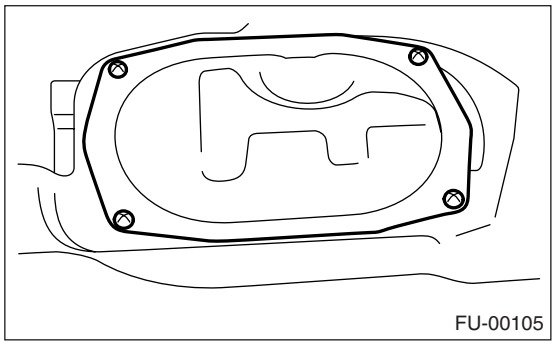
4) Lift-up the vehicle.
5) Drain fuel from fuel tank. Set a container under the vehicle and remove the drain plug from fuel tank.


FU-00089

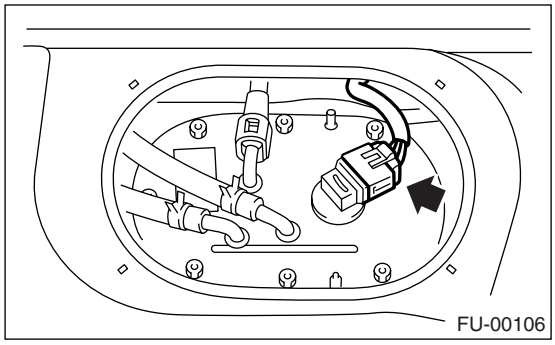
6) Tighten the fuel drain plug.

Tightening torque:
26 N·m (2.7 kgf-m, 19.2 ft-lb)

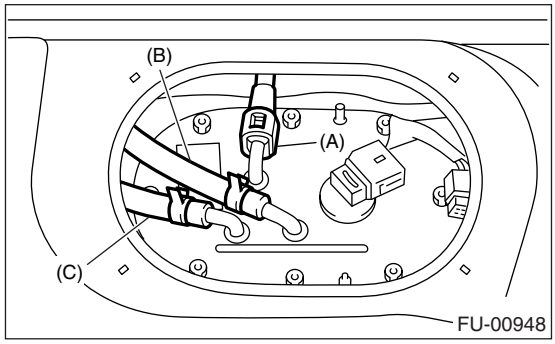
7) Raise the rear seat and turn the floor mat up.
8) Remove the access hole lid.


FU-00105

9) Disconnect the connector from fuel pump.

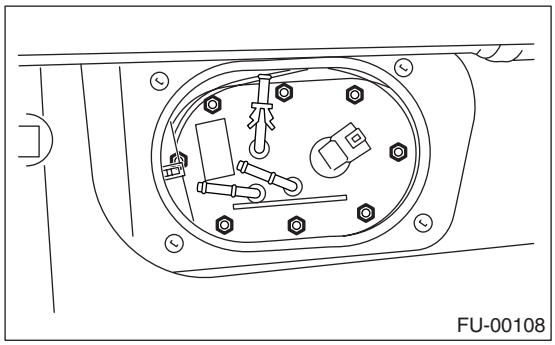

FU-00106

10) Disconnect the quick connector, and then disconnect the fuel delivery hose (A). <Ref. to FU(H4SOw/oOBD)-61, REMOVAL, Fuel Delivery, Return and Evaporation Lines.>
11) Move the clips, and then disconnect the fuel return hose (B) and jet pump hose (C).



FU-00948

12) Remove the nuts which install the fuel pump assembly onto fuel tank.


FU-00108

13) Take off the fuel pump assembly from fuel tank.

B: INSTALLATION

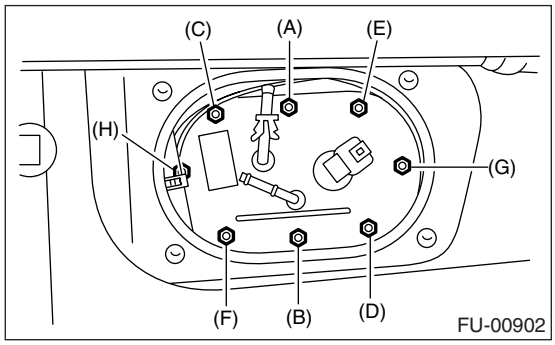
Install in the reverse order of removal. Do the following:

NOTE:
Use new gaskets.

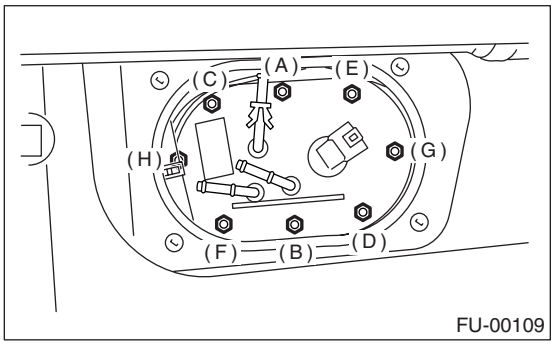
(1) Ensure the sealing portion is free from fuel or foreign particles before installation.
(2) Tighten the nuts to specified torque in alphabetical sequence shown in the figure.

Tightening torque:
4.4 N·m (0.45 kgf-m, 3.3 ft-lb)

- 1.6 L and 2.0 L MODEL



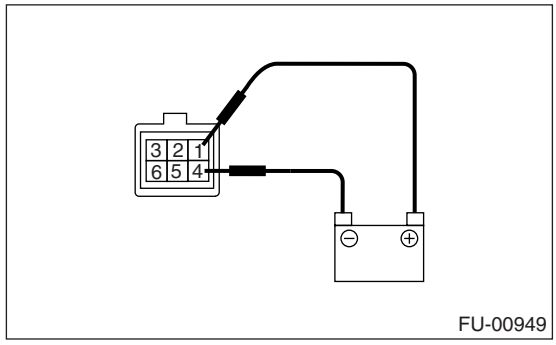
- 2.5 L MODEL



C: INSPECTION

Connect the lead harness to connector terminal of fuel pump and apply battery power supply to check whether the pump operates.

WARNING:
• Wipe off the fuel completely.
• Keep the battery as far apart from fuel pump as possible.
• Be sure to turn the battery supply ON and OFF on battery side.
• Do not run the fuel pump for a long time under non-load condition.



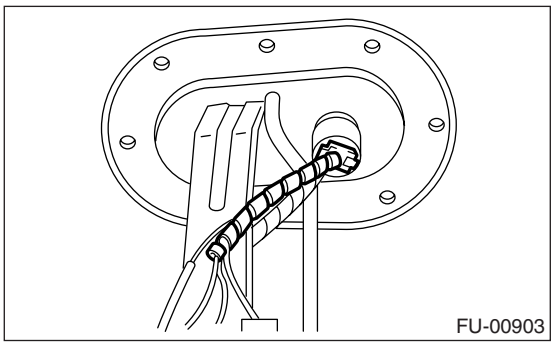
20.Fuel Level Sensor

A: REMOVAL

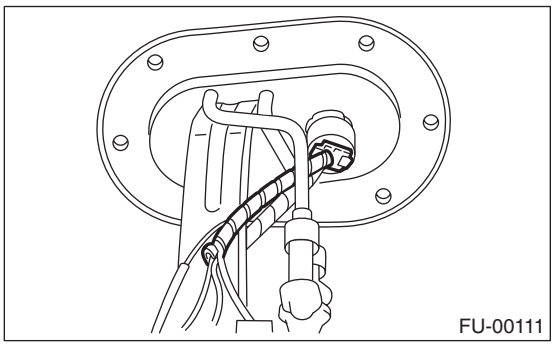
WARNING:
- **Place "NO FIRE" signs near the working area.**
- **Be careful not to spill fuel on the floor.**

NOTE:
Fuel level sensor is built in the fuel pump assembly.

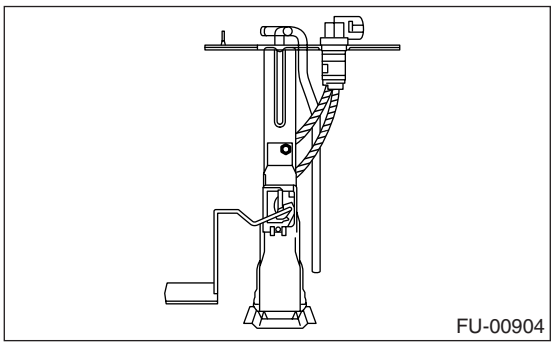
1) Remove the fuel pump assembly. <Ref. to FU(H4SOw/oOBD)-53, REMOVAL, Fuel Pump.>
2) Disconnect the connector from fuel pump bracket.
- 1.6 L and 2.0 L MODEL



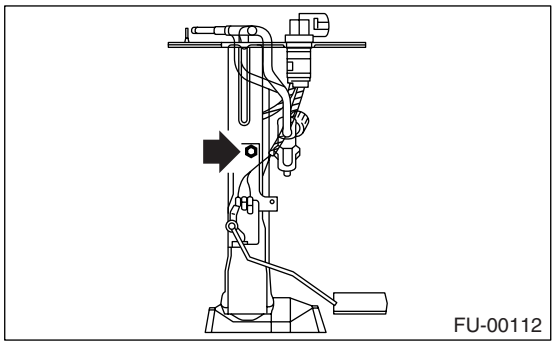
- 2.5 L MODEL



3) Remove the bolt which installs the fuel level sensor on mounting bracket.
- 1.6 L and 2.0 L MODEL



- 2.5 L MODEL



B: INSTALLATION

Install in the reverse order of removal.

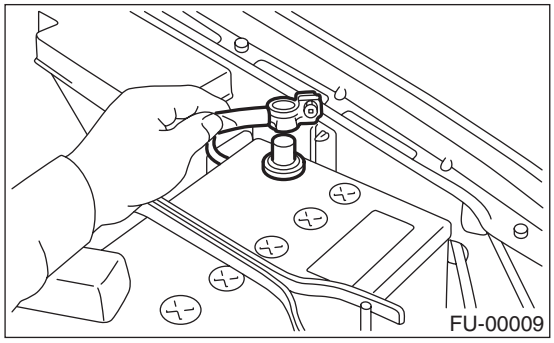
21.Fuel Sub Level Sensor

A: REMOVAL

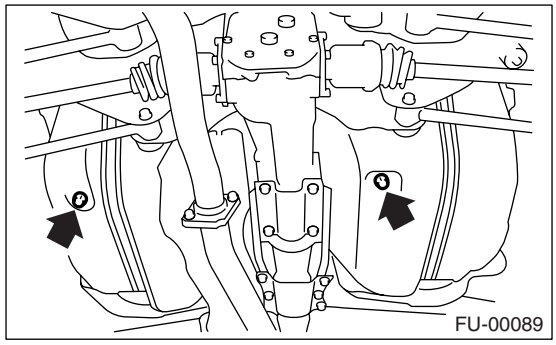
NOTE:
Fuel sub level sensor is equipped to only 2.5 L model.

WARNING:
- **Place "NO FIRE" signs near the working area.**
- **Be careful not to spill fuel on the floor.**

1) Disconnect the ground cable from battery.



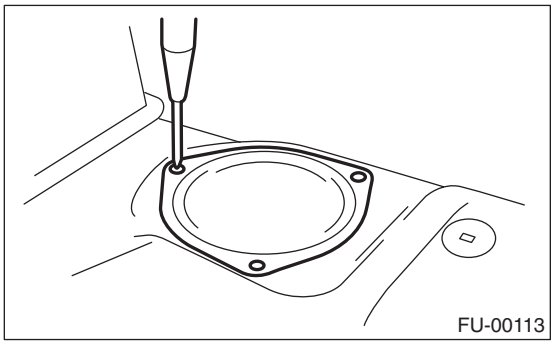
2) Lift-up the vehicle.
3) Drain fuel from fuel tank. Set a container under vehicle and remove the drain plug from fuel tank.



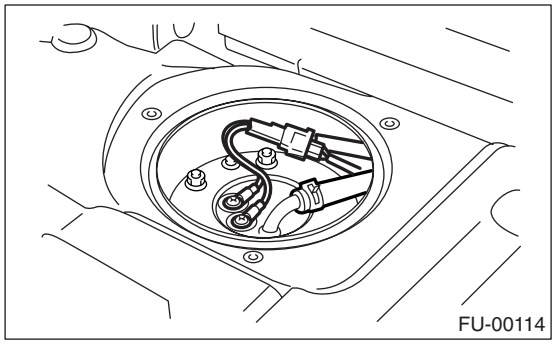
4) Tighten the fuel drain plug.

Tightening torque:
26 N·m (2.7 kgf-m, 19.2 ft-lb)

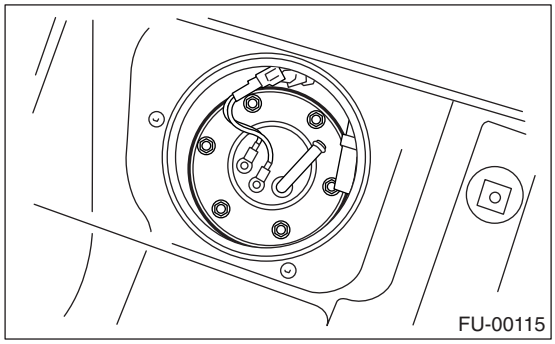
5) Remove the rear seat.
6) Remove the service hole cover.



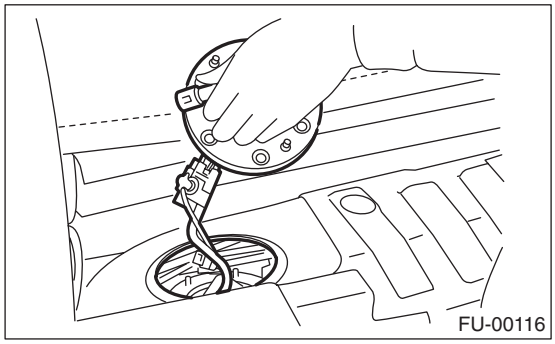
7) Disconnect the connector from fuel sub level sensor.
8) Disconnect the fuel jet pump hose.



9) Remove the bolts which install the fuel sub meter unit on fuel tank.



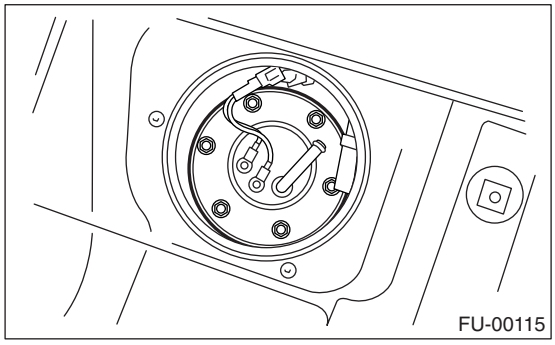
10) Remove the fuel sub level sensor.



B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
4.4 N·m (0.45 kgf-m, 3.3 ft-lb)

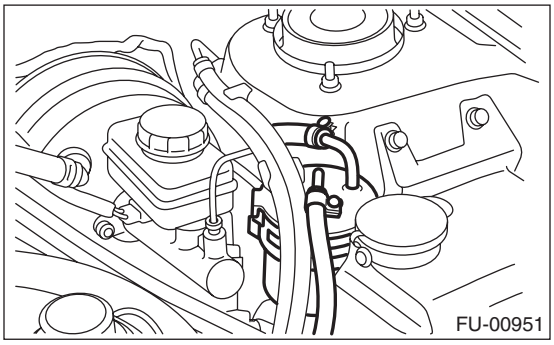


22.Fuel Filter

A: REMOVAL

WARNING:
- **Place "NO FIRE" signs near the working area.**
- **Be careful not to spill fuel on the floor.**

1) Release the fuel pressure. <Ref. to FU(H4SOw/oOBD)-45, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
2) Disconnect the fuel delivery hoses from fuel filter.



3) Remove the filter from holder.

B: INSTALLATION

CAUTION:
- **If fuel hoses are damaged at connecting portion, replace them with new ones.**
- **If clamps are badly damaged, replace them with new ones.**

1) Install in the reverse order of removal.
2) Tighten the hose clamp screws.

Tightening torque:
1.25 N·m (0.13 kgf -m, 0.94 ft-lb)

C: INSPECTION

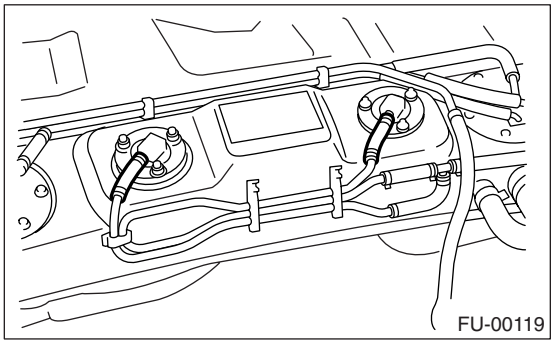
1) Check the inside of fuel filter for dirt and water sediment.
2) If it is clogged, or if replacement interval has been reached, replace it.
3) If water is found in it, shake and expel the water from inlet port.

23.Fuel Cut Valve

A: REMOVAL

WARNING:
- **Place “NO FIRE” signs near the working area.**
- **Be careful not to spill fuel on the floor.**

1) Remove the fuel tank. <Ref. to FU(H4SOw/oOBD)-46, REMOVAL, Fuel Tank.>
2) Move the clip and disconnect the evaporation hose from fuel cut valve.



3) Remove the bolts which install the fuel cut valve.

B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Use new gaskets.

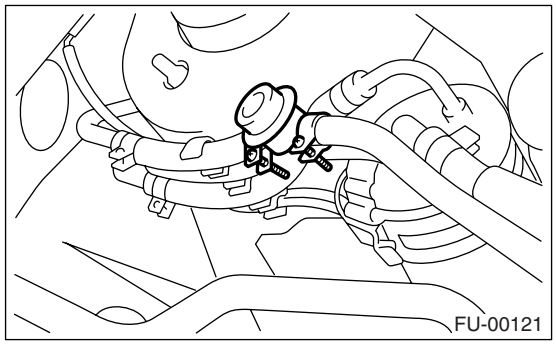
Tightening torque:

Fuel cut valve
4.4 N·m (0.45 kgf-m, 3.3 ft-lb)

24.Fuel Damper Valve

A: REMOVAL

1) Release the fuel pressure. <Ref. to FU(H4SOw/oOBD)-45, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
2) Remove the fuel damper valve from fuel return line.



B: INSTALLATION

Install in the reverse order of removal.

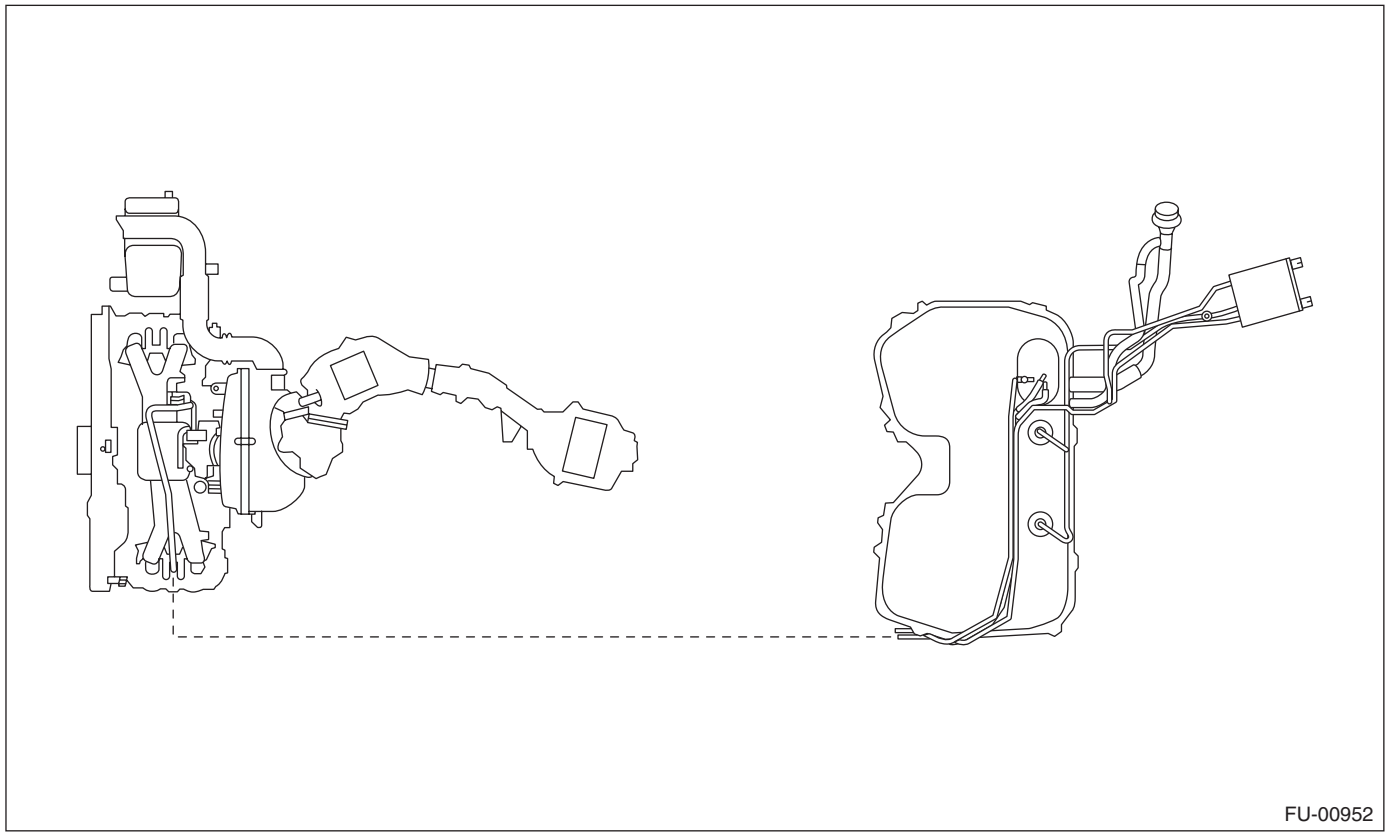
Tightening torque:

Fuel damper valve
1.25 N·m (0.13 kgf-m, 0.94 ft-lb)

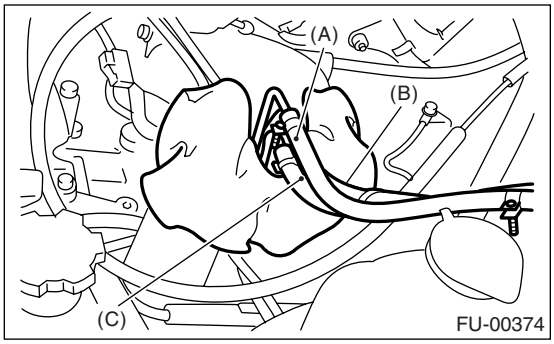
25.Fuel Delivery, Return and Evaporation Lines

A: REMOVAL

1) Set the vehicle on a lift.
2) Release the fuel pressure. <Ref. to FU(H4SOw/oOBD)-45, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
3) Open the fuel filler flap lid and remove the fuel filler cap.
4) Remove the floor mat. <Ref. to EI-58, REMOVAL, Floor Mat.>
5) Remove the fuel delivery pipes and hoses, fuel return pipes and hoses, evaporation pipes and hoses.

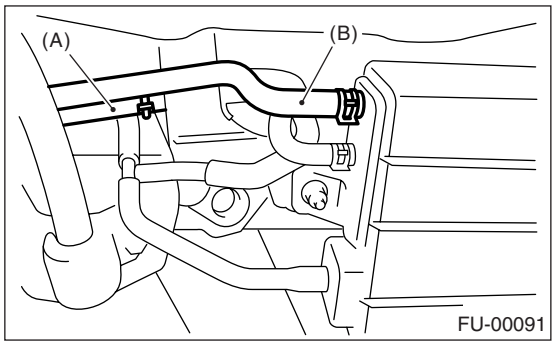


6) In the engine compartment, detach the fuel delivery hoses, return hoses and evaporation hose.

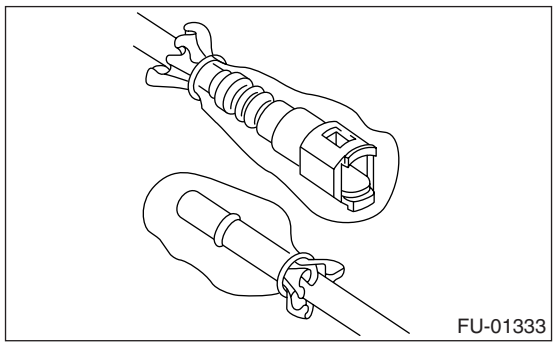


(A) Fuel delivery hose
(B) Return hose
(C) Evaporation hose

7) Lift-up the vehicle.
8) Disconnect the two-way valve hose (A) from two-way valve and disconnect the canister hose (B) from canister.

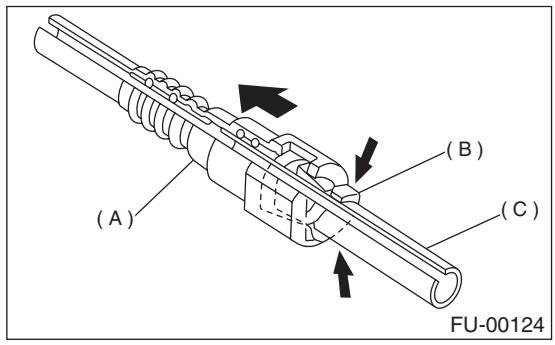


9) Separate the quick connector on fuel delivery line.
(1) Clean the pipe and connector, if they are covered with dust.
(2) To prevent from damaging or entering foreign matter, wrap the pipes and connectors with plastic bag, etc.



(3) Hold the connector (A) and push retainer (B) down.
(4) Pull out the connector (A) from retainer (B).

NOTE:
Use a new retainer.

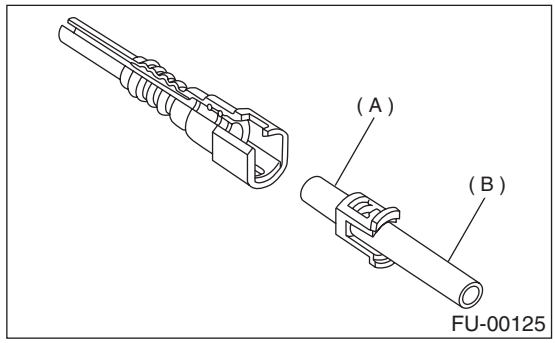


(A) Connector
(B) Retainer
(C) Pipe

B: INSTALLATION

1) Connect the quick connector on fuel delivery line.

NOTE:
- Use a new retainer.
- Make sure the connected portion is not damaged or not covered with dust. If necessary, clean the seal surface of pipe.

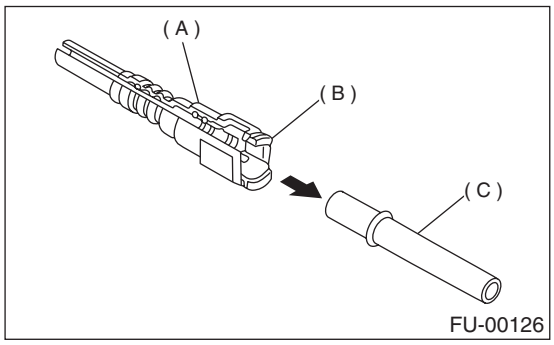


(A) Seal surface
(B) Pipe

(1) Set the new retainer (B) to connector (A).

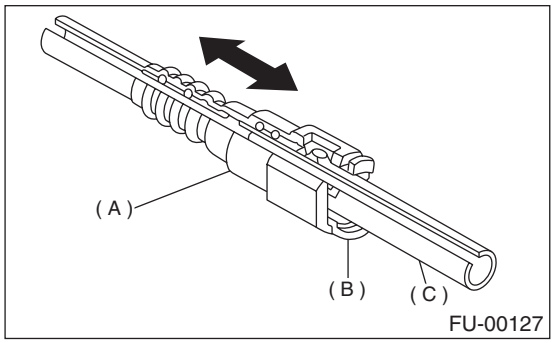
(2) Push the pipe into connector completely.

NOTE:
At this time, two clicking sounds are heard.



(A) Connector
(B) Retainer
(C) Pipe

CAUTION:
• Pull the connector to ensure it is connected securely.
• Ensure the two retainer pawls are engaged in their mating positions in connector.
• Inspect the hoses and their connections for any leakage of fuel.

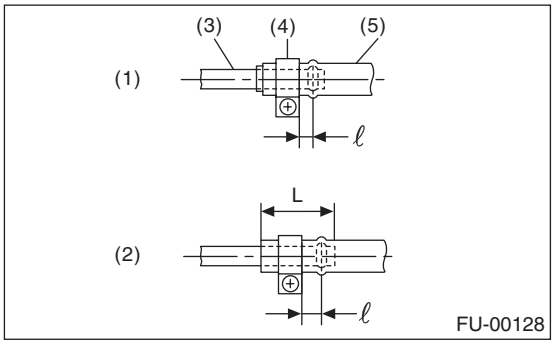


(A) Connector
(B) Retainer
(C) Pipe

2) Connect the fuel delivery hose to pipe with an overlap of 20 to 25 mm (0.79 to 0.98 in).
Type A: When the fitting length is specified.
Type B: When the fitting length is not specified.

ℓ : 2.5±1.5 mm (0.098±0.059 in)

L: 22.5±2.5 mm (0.886±0.098 in)

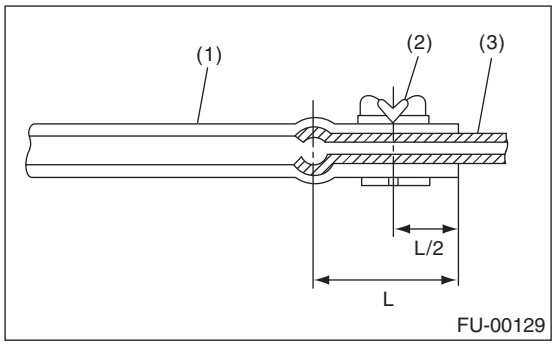


(1) Type A
(2) Type B
(3) Pipe
(4) Clamp
(5) Hose

3) Connect the evaporation hose to pipe by approx. 15 mm (0.59 in) from hose end.

L = 17.5±2.5 mm (0.689±0.098 in)

CAUTION:
Inspect the hoses and their connections for any leakage of fuel.



(1) Hose
(2) Clip
(3) Pipe

C: INSPECTION

1) Make sure there are no cracks on fuel pipes and fuel hoses.
2) Make sure the fuel pipe and fuel hose connections are tightened firmly.

26.Fuel System Trouble in General

A: INSPECTION

Trouble and possible cause		Corrective action
1. Insufficient fuel supply to injector		
1)	Fuel pump will not operate.	
	❍ Defective terminal contact.	Inspect connections, especially ground, and tighten securely.
	❍ Trouble in electromagnetic or electronic circuit parts.	Replace the fuel pump.
2)	Lowering of fuel pump function.	Replace the fuel pump.
3)	Clogged dust or water in fuel filter.	Replace the fuel filter, clean or replace fuel tank.
4)	Clogged or bent fuel pipe or hose.	Clean, correct or replace the fuel pipe or hose.
5)	Air is mixed in fuel system.	Inspect or retighten each connection part.
6)	Clogged or bent breather tube or pipe.	Clean, correct or replace the air breather tube or pipe.
7)	Damaged diaphragm of pressure regulator.	Replace.
2. Leakage or blow out fuel		
1)	Loosened joints of fuel pipe.	Retightening.
2)	Cracked fuel pipe, hose and fuel tank.	Replace.
3)	Defective welding part on fuel tank.	Replace.
4)	Defective packing of fuel tank.	Replace.
5)	Clogged or bent air breather tube or air vent tube.	Clean, correct or replace the air breather tube or air vent tube.
3. Gasoline smell inside of compartment		
1)	Loose joints at air breather tube, air vent tube and fuel filler pipe.	Retightening.
2)	Defective packing air tightness on fuel saucer.	Correct or replace the packing.
3)	Inoperative fuel pump modulator or circuit.	Replace.
4. Defective fuel meter indicator		
1)	Defective operation of fuel meter unit.	Replace.
2)	Defective operation of fuel meter.	Replace.
5. Noise		
1)	Large operation noise or vibration of fuel pump.	Replace.

NOTE:
• When the vehicle is left unattended for an extended period of time, water may accumulate in the fuel tank. Fill fuel fully to prevent those problem. And also drain the water condensation from fuel filter.
• In snow-covered areas, mountainous areas, skiing areas, etc. where ambient temperatures drop below 0°C (32°F) throughout the winter season, use water removing agent in the fuel system to prevent freezing fuel system and accumulating water. Fill the water removing agent at the time when the fuel reduced at half to maintain the advantage.
• When water condensation is noticed in the fuel filter, drain the water from both the fuel filter and fuel tank or use water removing agent in the fuel tank.
• Before using a water removing agent, follow the cautions that noted on the bottle.

EMISSION CONTROL
(AUX. EMISSION CONTROL DEVICES)
EC(H4SOw/oOBD)

		Page
1.	General Description	2
2.	Front Catalytic Converter	3
3.	Rear Catalytic Converter	4
4.	Canister	5
5.	Purge Control Solenoid Valve	6
6.	Two-way Valve	7

1. General Description

A: CAUTION

• Wear working clothing, including a cap, protective goggles, and protective shoes during operation.
• Remove contamination including dirt and corrosion before removal, installation or disassembly.
• Keep the disassembled parts in order and protect them from dust or dirt.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly, and replacement.
• Be careful not to burn, because each part on the vehicle is hot after running.
• Be sure to tighten fasteners including bolts and nuts to the specified torque.
• Place shop jacks or rigid racks at the specified points.
• Before disconnecting electrical connectors of sensors or units, be sure to disconnect the ground cable from battery.

2. Front Catalytic Converter

A: REMOVAL

The front catalytic converter and center exhaust pipe are integrated into one unit. Therefore, the removal procedures are the same as those for center exhaust pipe. <Ref. to EX(H4SOw/oOBD)-9, REMOVAL, Center Exhaust Pipe.>

B: INSTALLATION

The front catalytic converter and center exhaust pipe are integrated into one unit. Therefore, the installation procedures are the same as those for center exhaust pipe. <Ref. to EX(H4SOw/oOBD)-9, INSTALLATION, Center Exhaust Pipe.>

C: INSPECTION

1) Make sure there are no exhaust leaks from connections and welds.
2) Make sure there are no holes or rusting.

3. Rear Catalytic Converter

A: REMOVAL

The rear catalytic converter and center exhaust pipe are integrated into one unit. Therefore, the removal procedures are the same as those for center exhaust pipe. <Ref. to EX(H4SOw/oOBD)-9, REMOVAL, Center Exhaust Pipe.>

B: INSTALLATION

The rear catalytic converter and center exhaust pipe are integrated into one unit. Therefore, the installation procedures are the same as those for center exhaust pipe. <Ref. to EX(H4SOw/oOBD)-9, INSTALLATION, Center Exhaust Pipe.>

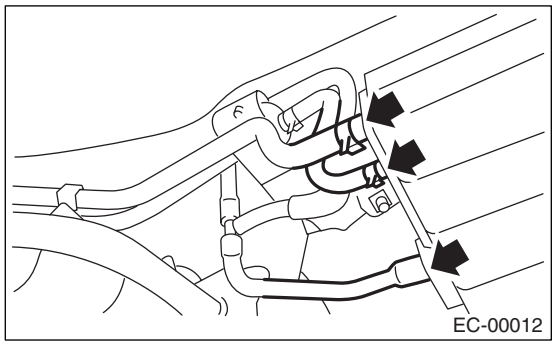
C: INSPECTION

1) Make sure there are no exhaust leaks from connections and welds.
2) Make sure there are no holes or rusting.

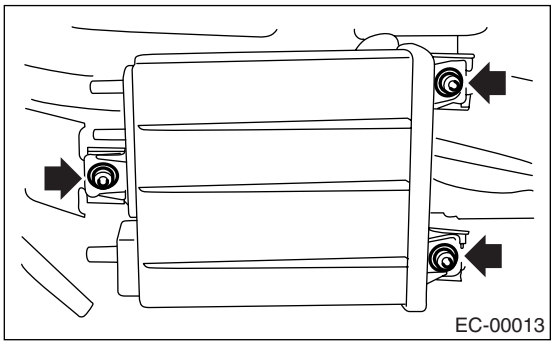
4. Canister

A: REMOVAL

1) Lift-up the vehicle.
2) Loosen the two clamps which hold the two canister hoses, and then disconnect the three evaporation hoses from canister.



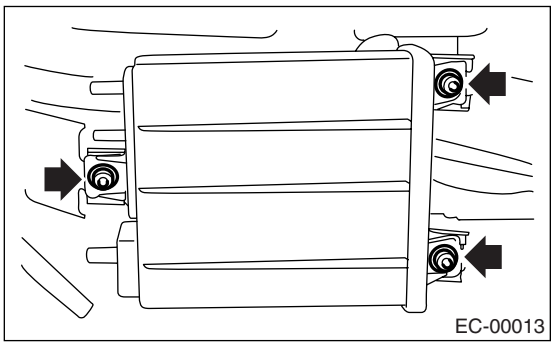
3) Remove the canister from body.



B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
23 N·m (2.3 kgf-m, 17 ft-lb)



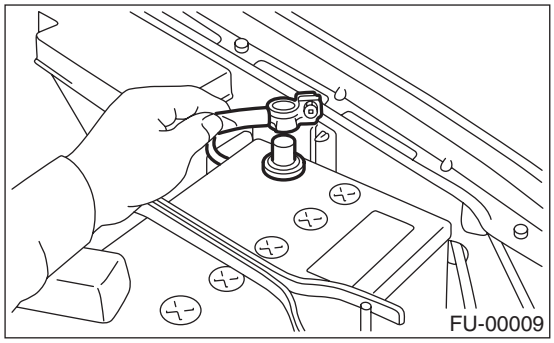
C: INSPECTION

Make sure the canister and canister hoses are not cracked or loose.

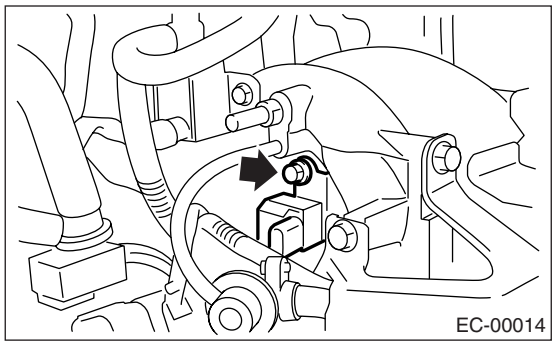
5. Purge Control Solenoid Valve

A: REMOVAL

1) Disconnect the ground cable from battery.



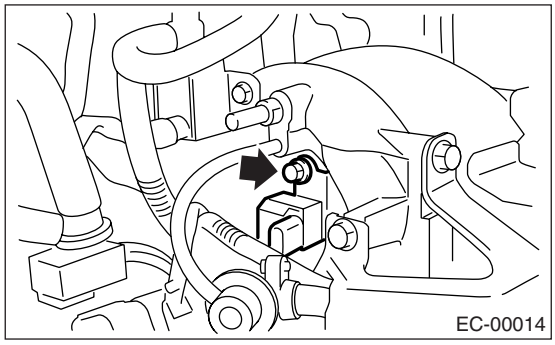
2) Disconnect the connector and hose of purge control solenoid valve, and then remove the purge control solenoid valve.



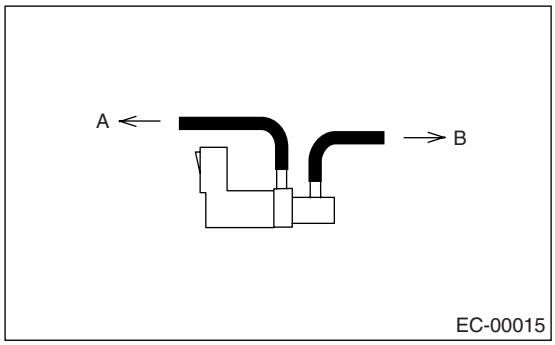
B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
19 N·m (1.9 kgf-m, 13.7 ft-lb)



NOTE:
Connect the evaporation hoses as shown in the figure.



(A) To fuel pipe
(B) To throttle body

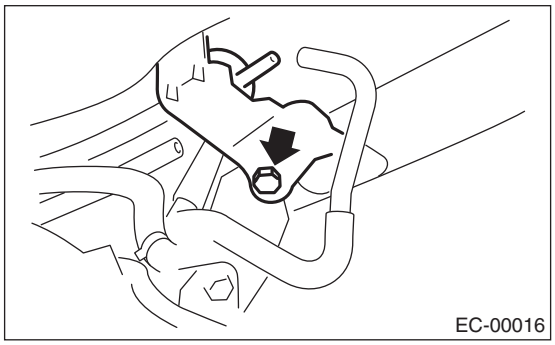
C: INSPECTION

Make sure hoses are not cracked or loose.

6. Two-way Valve

A: REMOVAL

1) Lift-up the vehicle.
2) Remove the canister from body. <Ref. to EC(H4SOw/oOBD)-5, REMOVAL, Canister.>
3) Remove the two-way valve with bracket as a single unit from body.



4) Remove the two-way valve from bracket.

B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

Make sure that the hoses are not cracked or loose.

INTAKE (INDUCTION)

IN(H4SOw/oOBD)

Page
1. General Description 2

1. General Description

A: SPECIFICATION

Specification of model without OBD is included in IN(H4SO) section. <Ref. to IN(H4SO)-2, General Description.>

MECHANICAL

ME(H4SOw/oOBD)

Page

1. General Description 2

1. General Description

A: SPECIFICATION

Specification of model without OBD is the same as that of model with OBD. <Ref. to ME(H4SO)-2, General Description.>

EXHAUST

EX(H4SOw/oOBD)

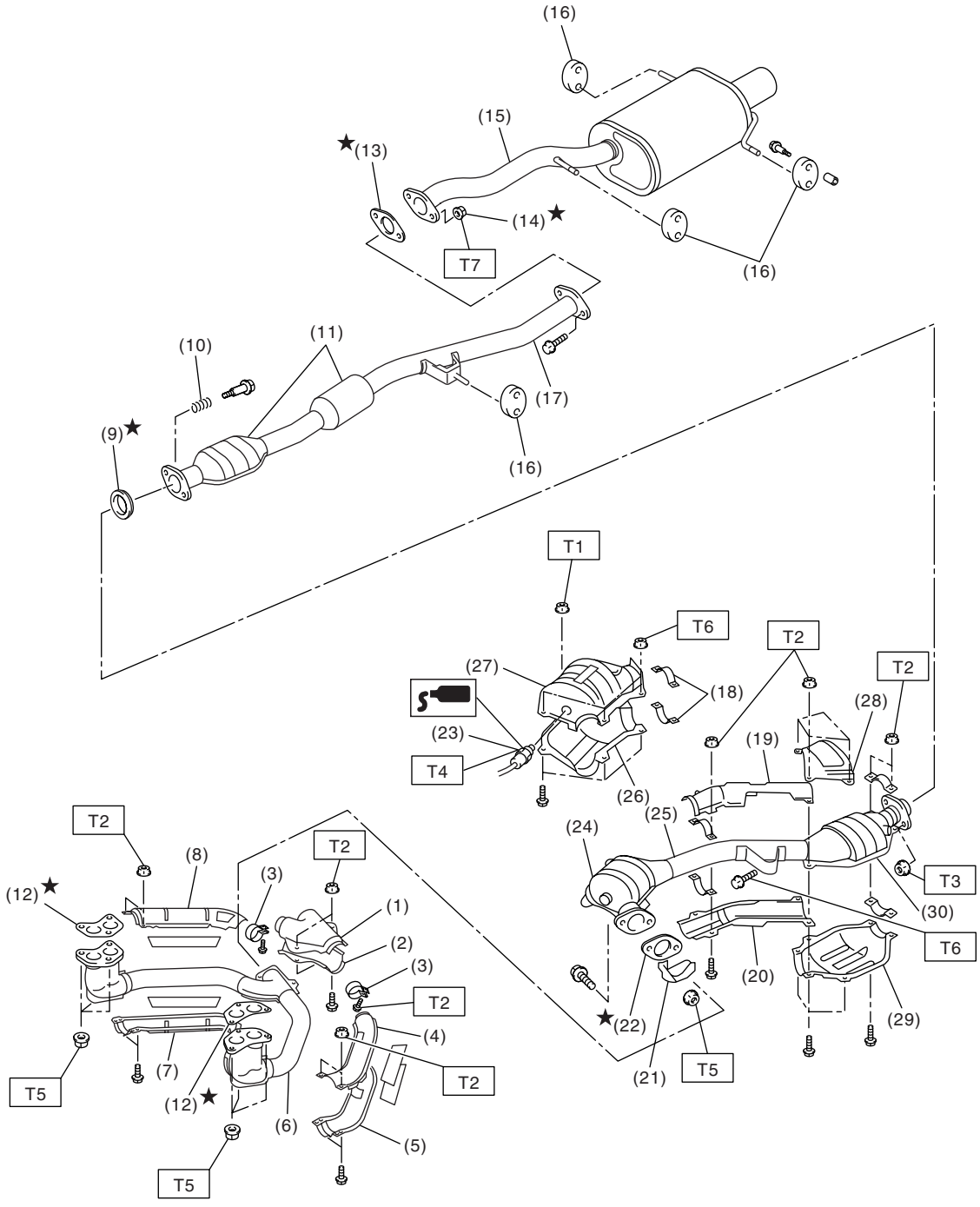
Page

1. General Description 2
2. Front Exhaust Pipe....6
3. Center Exhaust Pipe 9
4. Rear Exhaust Pipe 10
5. Muffler 11

1. General Description

A: COMPONENT

1. WITH CATALYTIC CONVERTER



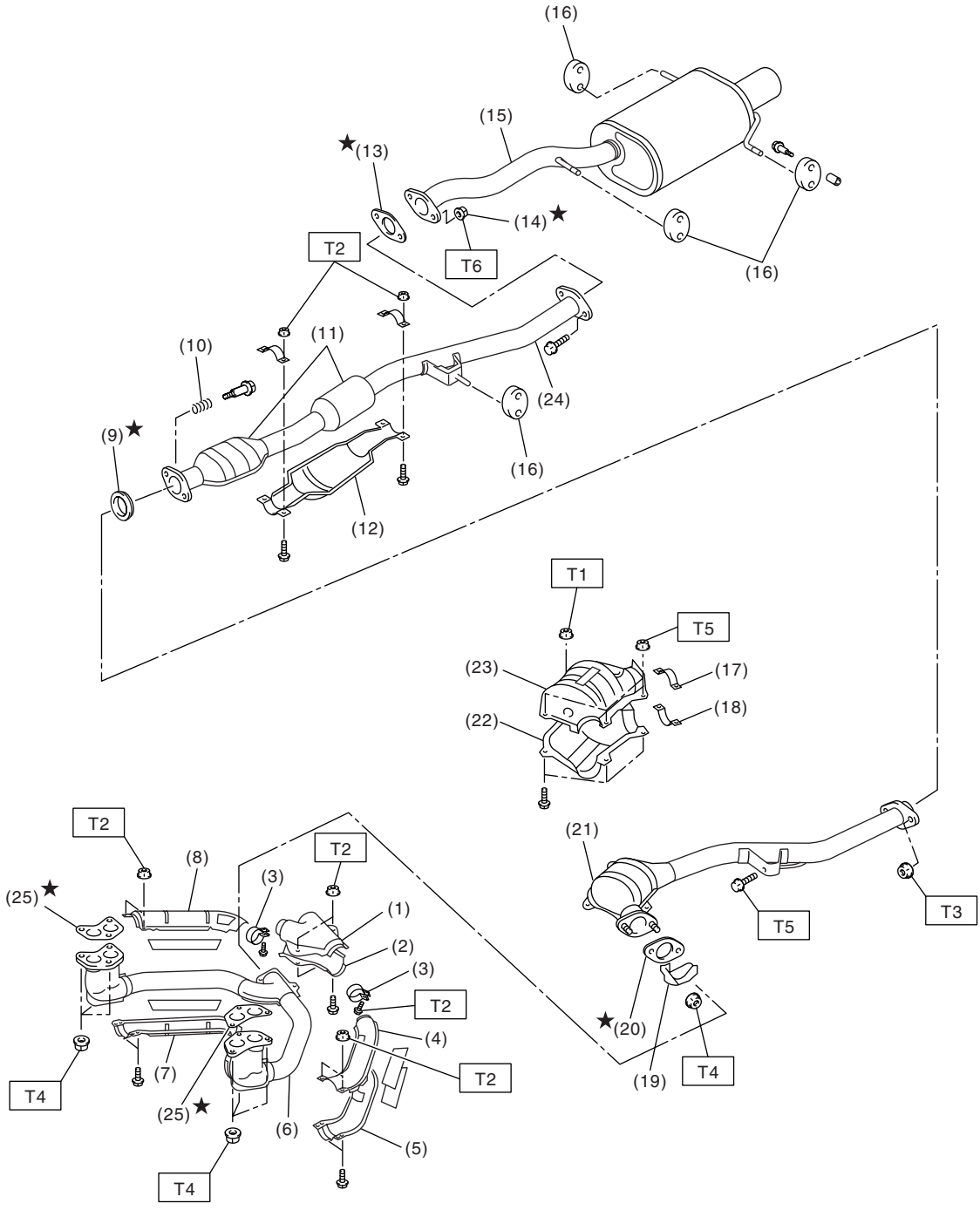
EX-02109

(1) Front exhaust pipe upper cover
(2) Front exhaust pipe lower cover
(3) Clamp
(4) Front exhaust pipe upper cover LH
(5) Front exhaust pipe lower cover LH
(6) Front exhaust pipe
(7) Front exhaust pipe lower cover RH
(8) Front exhaust pipe upper cover RH
(9) Gasket
(10) Spring
(11) Chamber
(12) Gasket
(13) Gasket
(14) Self-locking nut
(15) Muffler
(16) Cushion rubber
(17) Rear exhaust pipe
(18) Clamp
(19) Center exhaust pipe upper cover
(20) Center exhaust pipe lower cover
(21) Protector
(22) Gasket
(23) Oxygen sensor
(24) Front catalytic converter
(25) Center exhaust pipe
(26) Front catalytic converter lower cover
(27) Front catalytic converter upper cover
(28) Rear catalytic converter upper cover
(29) Rear catalytic converter lower cover
(30) Rear catalytic converter

Tightening torque: N·m (kgf-m, ft-lb)

T1: 8 (0.8, 5.9)
T2: 13 (1.3, 9.6)
T3: 18 (1.8, 13.3)
T4: 21 (2.1, 15.5)
T5: 30 (3.1, 22.1)
T6: 35 (3.6, 25.8)
T7: 48 (4.9, 35.4)

2. WITHOUT CATALYTIC CONVERTER



EX-02110

(1) Front exhaust pipe upper cover
(2) Front exhaust pipe lower cover
(3) Clamp
(4) Front exhaust pipe upper cover LH
(5) Front exhaust pipe lower cover LH
(6) Front exhaust pipe
(7) Front exhaust pipe lower cover RH
(8) Front exhaust pipe upper cover RH
(9) Gasket
(10) Spring
(11) Chamber
(12) Rear exhaust pipe cover
(13) Gasket
(14) Self-locking nut
(15) Muffler
(16) Cushion rubber
(17) Upper clamp
(18) Lower clamp
(19) Protector
(20) Gasket
(21) Center exhaust pipe
(22) Center exhaust pipe lower cover
(23) Center exhaust pipe upper cover
(24) Rear exhaust pipe
(25) Gasket

Tightening torque: N·m (kgf-m, ft-lb)
T1: 8 (0.8, 5.9)
T2: 13 (1.3, 9.6)
T3: 18 (1.8, 13.3)
T4: 30 (3.1, 22.1)
T5: 35 (3.6, 25.8)
T6: 48 (4.9, 35.4)

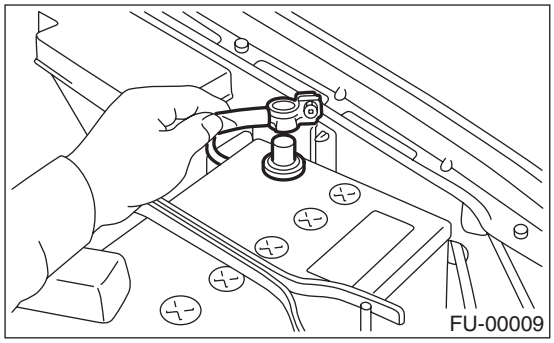
B: CAUTION

• Wear working clothing, including a cap, protective goggles, and protective shoes during operation.
• Remove contamination including dirt and corrosion before removal, installation or disassembly.
• Keep the disassembled parts in order and protect them from dust or dirt.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly, and replacement.
• Be careful not to burn, because each part on the vehicle is hot after running.
• Be sure to tighten fasteners including bolts and nuts to the specified torque.
• Place shop jacks or rigid racks at the specified points.
• Before disconnecting electrical connectors of sensors or units, be sure to disconnect the ground cable from battery.

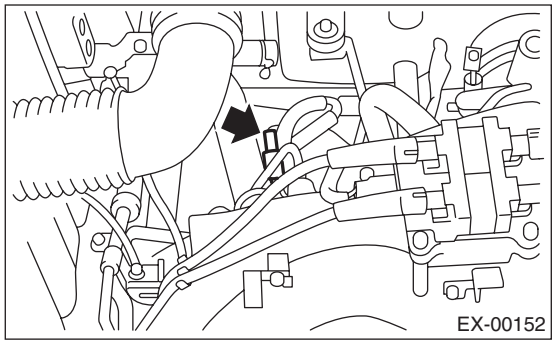
2. Front Exhaust Pipe

A: REMOVAL

1) Disconnect the ground cable from battery.



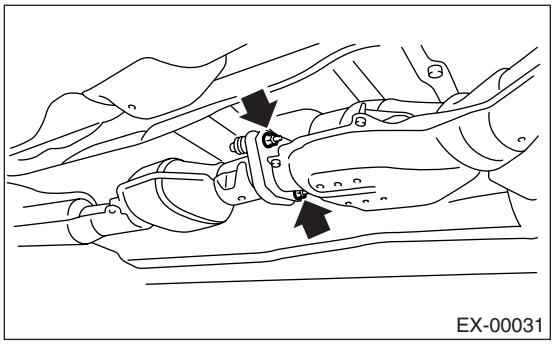
2) Disconnect the oxygen sensor connector. (With catalytic converter)



3) Lift-up the vehicle.

4) Separate the front and center exhaust pipe assembly from rear exhaust pipe.

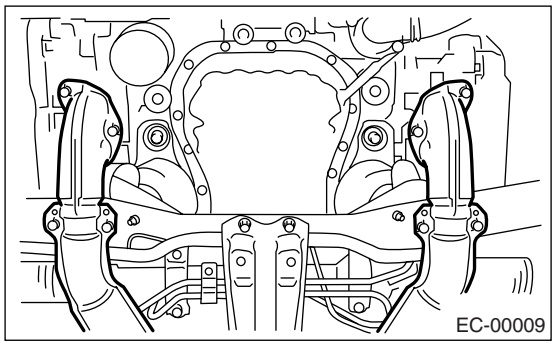
CAUTION:
Be careful, the exhaust pipe is hot.



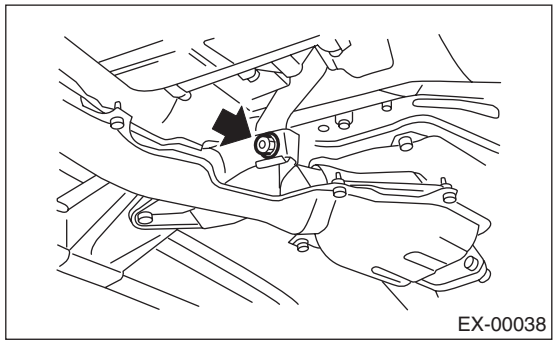
5) Remove the under cover.

6) Remove the nuts which hold the front exhaust pipe onto cylinder heads.

CAUTION:
Be careful not to pull down the front and center exhaust pipe assembly.



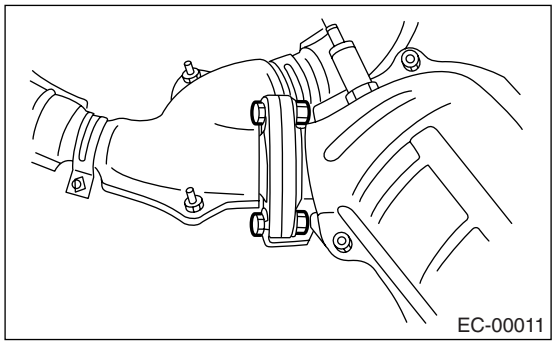
7) Remove the bolt which installs the front and center exhaust pipe assembly to hanger bracket.



8) Remove the front and center exhaust pipe assembly from vehicle.

CAUTION:
- **Be careful not to let the front and center exhaust pipe assembly fall off when removing as it is quite heavy.**
- **After removing the front and center exhaust pipe assembly, do not apply excessive pulling force on the rear exhaust pipe.**

9) Separate the front exhaust pipe from center exhaust pipe.



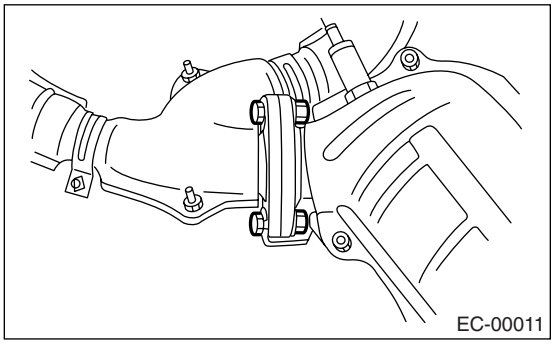
10) Remove the oxygen sensor. (With catalytic converter) <Ref. to FU(H4SOw/oOBD)-40, REMOVAL, Oxygen Sensor.>

B: INSTALLATION

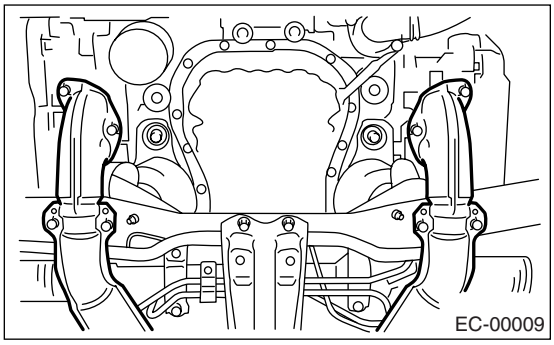
1) Install the oxygen sensor. (With catalytic converter) <Ref. to FU(H4SOw/oOBD)-40, INSTALLATION, Oxygen Sensor.>
2) Install the front exhaust pipe to center exhaust pipe.

NOTE:
Use the gaskets with new ones.

Tightening torque:
30 N·m (3.1 kgf-m, 22.1 ft-lb)



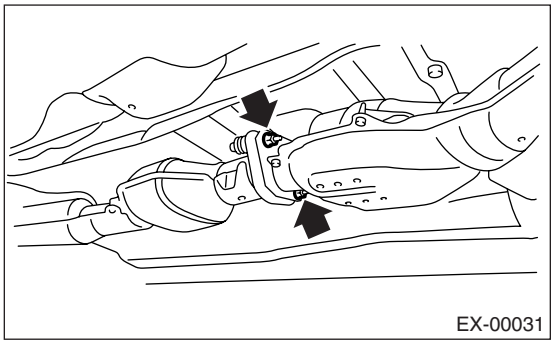
3) Install the front and center exhaust pipe assembly to vehicle.
4) Temporarily tighten the bolt which installs the front exhaust pipe to cylinder head.



5) Tighten the bolts which install front and center exhaust pipe assembly to rear exhaust pipe.

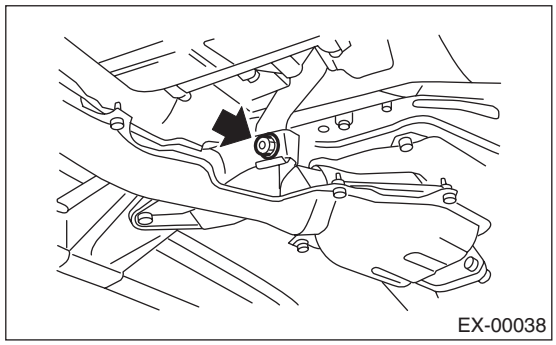
NOTE:
Use the gaskets with new ones.

Tightening torque:
18 N·m (1.8 kgf-m, 13.3 ft-lb)



6) Tighten the bolt which holds the front and center exhaust pipe assembly to hanger bracket.

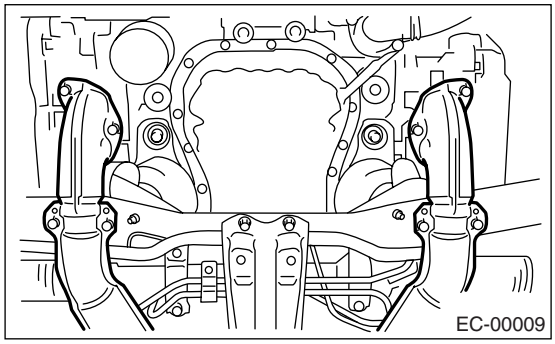
Tightening torque:
35 N·m (3.6 kgf-m, 25.8 ft-lb)



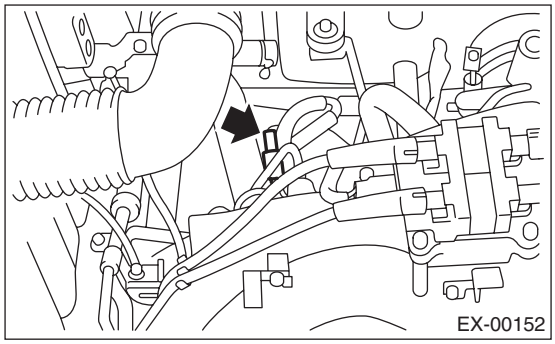
7) Tighten the nuts which hold the front exhaust pipe onto cylinder heads.

NOTE:
Use the gaskets with new ones.

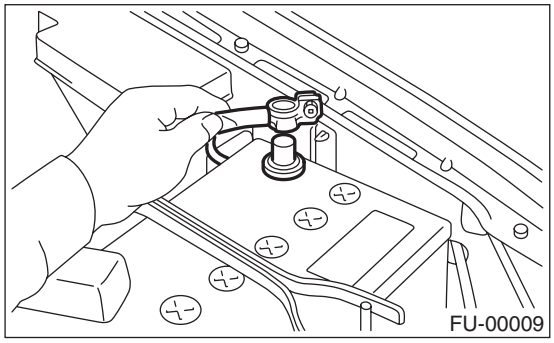
Tightening torque:
30 N·m (3.1 kgf-m, 22.1 ft-lb)



8) Install the under cover.
9) Lower the vehicle.
10) Connect the oxygen sensor connector. (With catalytic converter)



11) Connect the battery ground cable to battery.



C: INSPECTION

1) Make sure there are no exhaust leaks from connections and welds.
2) Make sure there are no holes or rusting.

3. Center Exhaust Pipe

A: REMOVAL

After removing the center and front exhaust pipes as one unit, separate them. Refer to the procedure for removing the front exhaust pipe. <Ref. to EX(H4SOw/oOBD)-6, REMOVAL, Front Exhaust Pipe.>

B: INSTALLATION

Install the center exhaust pipe and front exhaust pipe as one unit. Refer to the procedure for installing the front exhaust pipe. <Ref. to EX(H4SOw/oOBD)-7, INSTALLATION, Front Exhaust Pipe.>

C: INSPECTION

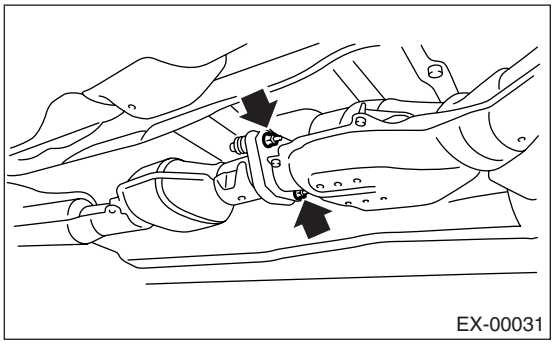
1) Make sure there are no exhaust leaks from the connections and welds.
2) Make sure there are no holes or rusting.

4. Rear Exhaust Pipe

A: REMOVAL

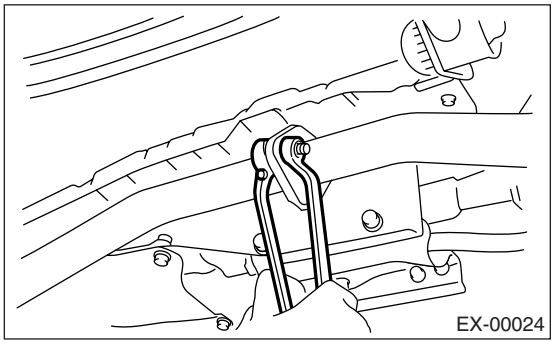
1) Separate the rear exhaust pipe from center exhaust pipe.

CAUTION:
Be careful, the exhaust pipe is hot.

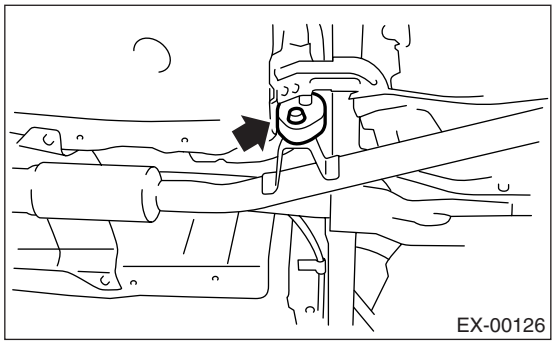


2) Separate the rear exhaust pipe from muffler.

CAUTION:
Be careful not to pull down the rear exhaust pipe.

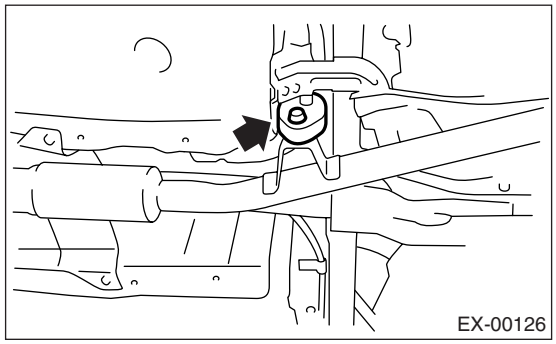


3) Apply a coat of spray type lubricant to the mating area of cushion rubbers in advance.
4) Remove the rear exhaust pipe bracket from cushion rubber.



B: INSTALLATION

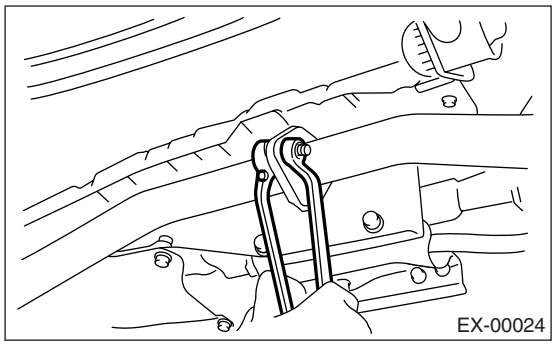
1) Apply a coat of spray type lubricant to the mating area of cushion rubbers in advance.
2) Install the rear exhaust pipe bracket to cushion rubber.



3) Install the rear exhaust pipe to muffler.

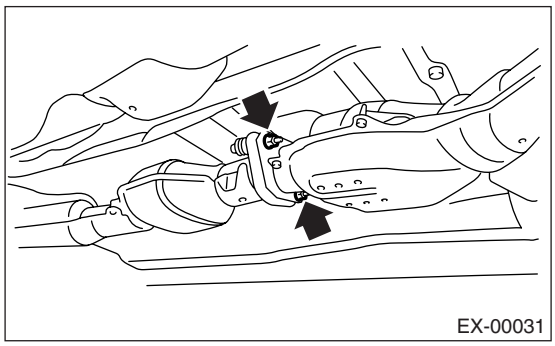
NOTE:
Use the gaskets and self-locking nuts with new ones.

Tightening torque:
48 N·m (4.9 kgf-m, 35.4 ft-lb)



4) Install the rear exhaust pipe to center exhaust pipe.

Tightening torque:
18 N·m (1.8 kgf-m, 13.3 ft-lb)



C: INSPECTION

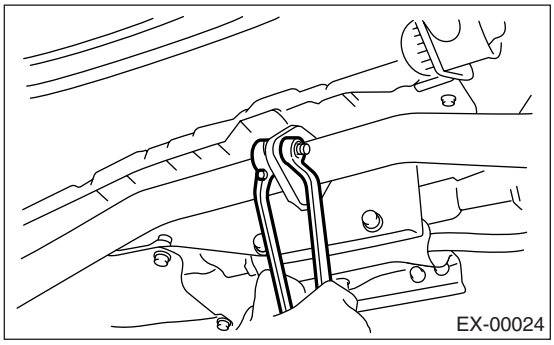
1) Make sure there are no exhaust leaks from connections and welds.
2) Make sure there are no holes or rusting.
3) Make sure the cushion rubber is not worn or cracked.

5. Muffler

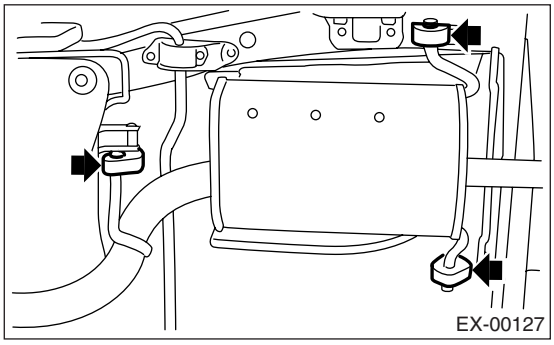
A: REMOVAL

1) Separate the muffler from rear exhaust pipe.

CAUTION:
Be careful, the exhaust pipe is hot.



2) Apply a coat of spray type lubricant to the mating area of cushion rubbers in advance.



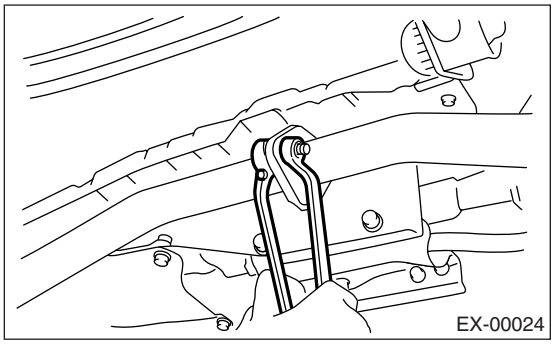
3) Remove the front, right and left cushion rubber, and detach the muffler assembly.

B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Use the gaskets and self-locking nuts with a new one.

Tightening torque:
48 N·m (4.9 kgf-m, 35.4 ft-lb)



C: INSPECTION

1) Make sure there are no exhaust leaks from connections and welds.
2) Make sure there are no holes or rusting.
3) Make sure the cushion rubber is not worn or cracked.

COOLING

CO(H4SOw/oOBD)

Page

1. General Description 2

1. General Description

A: SPECIFICATION

Specification of model without OBD is the same as that of model with OBD. <Ref. to CO(H4SO)-2, General Description.>

LUBRICATION

LU(H4SOw/oOBD)

Page
1. General Description 2

1. General Description

A: SPECIFICATION

Specification of model without OBD is the same as that of model with OBD. <Ref. to LU(H4SO)-2, General Description.>

SPEED CONTROL SYSTEMS

SP(H4SOw/oOBD)

Page

1. General Description 2

1. General Description

A: SPECIFICATION

Specification of model without OBD is the same as that of model with OBD. <Ref. to SP(H4SO)-2, General Description.>

IGNITION

IG(H4SOw/oOBD)

Page

1. General Description 2

1. General Description

A: SPECIFICATION

Specifications for model without OBD is included in IG(H4SO) section. <Ref. to IG(H4SO)-2, General Description.>

STARTING/CHARGING SYSTEMS

SC(H4SOw/oOBD)

Page

1. General Description 2

1. General Description

A: SPECIFICATION

Specification of model without OBD is included in SC(H4SO) section. <Ref. to SC(H4SO)-2, General Description.>

ENGINE (DIAGNOSTICS)

EN(H4SOw/oOBD)(diag)

		Page
1.	Basic Diagnostic Procedure	2
2.	Check List for Interview	3
3.	General Description	5
4.	Electrical Component Location	8
5.	Engine Control Module (ECM) I/O Signal	17
6.	Subaru Select Monitor	20
7.	Read Diagnostic Trouble Code (DTC)	24
8.	Inspection Mode	25
9.	Clear Memory Mode	27
10.	Compulsory Valve Operation Check Mode	28
11.	Malfunction Indicator Light	29
12.	Diagnostics for Engine Starting Failure	37
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14.	Diagnostic Procedure with Diagnostic Trouble Code (DTC)	56
15.	General Diagnostic Table	94

1. Basic Diagnostic Procedure

A: PROCEDURE

1. ENGINE

	Step	Check	Yes	No
1	**CHECK ENGINE START FAILURE.** 1) Ask the customer when and how trouble occurred using the interview check list. <Ref. to EN(H4SOw/oOBD)(diag)-3, CHECK, Check List for Interview.> 2) Start the engine.	Does the engine start?	Go to step **2.**	Inspection using "Diagnostics for Engine Starting Failure". <Ref. to EN(H4SOw/oOBD)(diag)-37, Diagnostics for Engine Starting Failure.>
2	**CHECK ILLUMINATION OF MALFUNCTION INDICATOR LIGHT.** <Ref. to EN(H4SOw/oOBD)(diag)-30, ACTIVATION OF MALFUNCTION INDICATOR LIGHT, Malfunction Indicator Light.>	Does the malfunction indicator light illuminate?	Go to step **3.**	Inspection using "General Diagnostic Table". <Ref. to EN(H4SOw/oOBD)(diag)-94, INSPECTION, General Diagnostic Table.>
3	**CHECK INDICATION OF DTC ON DISPLAY.** 1) Turn the ignition switch to OFF. 2) Connect the SUBARU Select Monitor to data link connector. 3) Turn the ignition switch to ON and the SUBARU Select Monitor switch to ON. 4) Read DTC on SUBARU Select Monitor. <Ref. to EN(H4SOw/oOBD)(diag)-24, WITH SUBARU SELECT MONITOR, OPERATION, Read Diagnostic Trouble Code (DTC).>	Does the SUBARU Select Monitor indicate DTC? <Ref. to EN(H4SOw/oOBD)(diag)-54, LIST, List of Diagnostic Trouble Code (DTC).>	Record the DTC. Repair the trouble cause. <Ref. to EN(H4SOw/oOBD)(diag)-56, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> Go to step **4.**	Repair the related parts. NOTE: If a DTC is not shown on display although malfunction indicator light illuminates, perform diagnostics of circuit or combination meter. <Ref. to EN(H4SOw/oOBD)(diag)-29, Malfunction Indicator Light.>
4	**PERFORM THE DIAGNOSIS.** 1) Perform the Clear Memory Mode. <Ref. to EN(H4SOw/oOBD)(diag)-27, OPERATION, Clear Memory Mode.> 2) Perform the inspection mode. <Ref. to EN(H4SOw/oOBD)(diag)-25, PROCEDURE, Inspection Mode.>	Does the SUBARU Select Monitor indicate DTC? <Ref. to EN(H4SOw/oOBD)(diag)-54, LIST, List of Diagnostic Trouble Code (DTC).>	Record the DTC. Repair the trouble cause. <Ref. to EN(H4SOw/oOBD)(diag)-56, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Finish the diagnosis.

2. Check List for Interview

A: CHECK

1. CHECK LIST No. 1

Check the following items when problem has occurred.

NOTE:
Use copies of this page for interviewing customers.

Customer's name		Engine No.	
Date of sale		Fuel brand	
Date of repair		Odometer reading	km
VIN			miles
Weather	❑ Fine ❑ Cloudy ❑ Rainy ❑ Snowy ❑ Various/Others:		
Outdoor temperature	°C (°F)		
	❑ Hot ❑ Warm ❑ Cool ❑ Cold		
Place	❑ Highway ❑ Suburbs ❑ Inner city ❑ Uphill ❑ Downhill ❑ Rough road ❑ Others:		
Engine temperature	❑ Cold ❑ Warming-up ❑ After warming-up ❑ Any temperature ❑ Others:		
Engine speed	rpm		
Vehicle speed	km/h (MPH)		
Driving conditions	❑ Not affected ❑ At starting ❑ While idling ❑ At racing ❑ While accelerating ❑ While cruising ❑ While decelerating ❑ While turning (RH/LH)		
Headlight	❑ ON / ❑ OFF	Rear defogger	❑ ON / ❑ OFF
Blower	❑ ON / ❑ OFF	Radio	❑ ON / ❑ OFF
A/C compressor	❑ ON / ❑ OFF	CD/Cassette	❑ ON / ❑ OFF
Radiator fan	❑ ON / ❑ OFF	Car phone	❑ ON / ❑ OFF
Front wiper	❑ ON / ❑ OFF	CB	❑ ON / ❑ OFF
Rear wiper	❑ ON / ❑ OFF		

2. CHECK LIST No. 2

Check the following items about the vehicle's state when the malfunction indicator light turns on.

NOTE:
Use copies of this page for interviewing customers.

a) Other warning lights or indicators turn on. ❑ Yes / ❑ No
❑ Low fuel warning light ❑ Charge indicator light ❑ AT diagnostics indicator light ❑ ABS warning light ❑ Engine oil pressure warning light
b) Fuel level
• Lack of gasoline: ❑ Yes / ❑ No • Indicator position of fuel gauge:
c) Intentional connecting or disconnecting of harness connectors or spark plug cords: ❑ Yes / ❑ No
• What:
d) Intentional connecting or disconnecting of hoses: ❑ Yes / ❑ No
• What:
e) Installing of parts other than genuine parts: ❑ Yes / ❑ No
• What: • Where:
f) Occurrence of noise: ❑ Yes / ❑ No
• From where: • What kind:
g) Occurrence of smell: ❑ Yes / ❑ No
• From where: • What kind:
h) Intrusion of water into engine compartment or passenger compartment: ❑ Yes / ❑ No
i) Troubles occurred
❑ Engine does not start. ❑ Engine stalls during idling. ❑ Engine stalls while driving. ❑ Engine speed decreases. ❑ Engine speed does not decrease. ❑ Rough idling ❑ Poor acceleration ❑ Back fire ❑ After fire ❑ No shift ❑ Excessive shift shock

3. General Description

A: CAUTION

1) Airbag system wiring harness is routed near engine control module (ECM), main relay and fuel pump relay.

CAUTION:
• All airbag system wiring harness and connectors are colored yellow. Do not use electrical test equipment on these circuit.
• Be careful not to damage the airbag system wiring harness when servicing the engine control module (ECM), transmission control module (TCM), main relay and fuel pump relay.

2) Never connect the battery in reverse polarity.
• The ECM will be destroyed instantly.
• The fuel injector and other part will be damaged in just a few minutes more.

3) Do not disconnect the battery cables while the engine is running.
• A large counter electromotive force will be generated in the alternator, and this voltage may damage electronic parts such as ECM, etc.

4) Before disconnecting the connectors of each sensor and the ECM, be sure to turn the ignition switch to OFF.

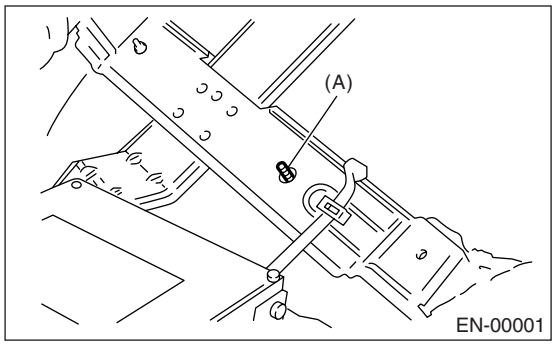
5) Poor contact has been identified as a primary cause of this problem. To measure the voltage and/or resistance of individual sensors or all electrical control modules at the harness side connector, use a tapered pin with a diameter of less than 0.64 mm (0.025 in). Do not insert the pin more than 5 mm (0.20 in) into the part.

6) Before removing the ECM from located position, disconnect two cables on battery.
• Otherwise, the ECM may be damaged.

CAUTION:
When replacing the ECM, be careful not to use the wrong spec. ECM to avoid any damage on the fuel injection system.

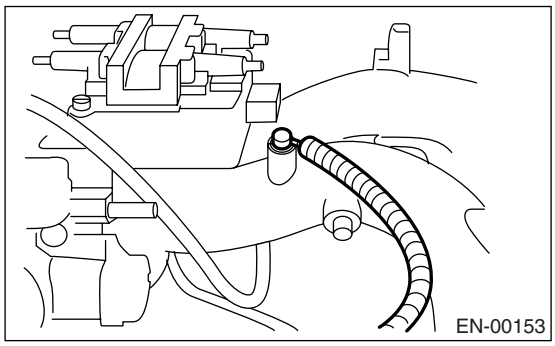
7) The connectors to each sensor in the engine compartment and the harness connectors on the engine side and body side are all designed to be waterproof. However, it is still necessary to take care not to allow water to get into the connectors when washing the vehicle, or when servicing the vehicle on a rainy day.

8) Use the ECM mounting stud bolt at the body side grounding points when measuring voltage and resistance inside the passenger compartment.

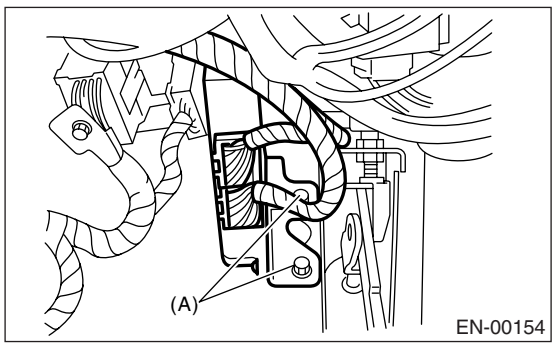


(A) Stud bolt

9) Use the engine grounding terminal or engine proper as the grounding point to the body, when measuring voltage and resistance in the engine compartment.



10) Use the TCM mounting stud bolts at the body head grounding point, when measuring voltage and resistance inside the passenger compartment.



(A) Stud bolt

11) Every engine-related part is a precision part. Do not drop them.

12) Observe the following cautions when installing a radio wave device in the vehicle.

CAUTION:
• The antenna must be kept as far apart as possible from the control module.
• The antenna feeder must be placed as far apart as possible from the ECM and engine harness.
• Carefully adjust the antenna for correct matching.
• When mounting a large power type radio wave devices, pay special attention to the three items above mentioned.
• Incorrect installation of the radio wave devices may affect the operation of the ECM.

13) Before disconnecting the fuel hose, disconnect the fuel pump connector and crank the engine for more than 5 seconds to release pressure in the fuel system. If the engine starts during this operation, run it until it stops.
14) Problems in the electronic-controlled automatic transmission may be caused by failure of the engine, the electronic control system, the transmission proper, or by a combination of these. These three causes must be distinguished clearly when performing diagnostics.
15) Diagnostics should be conducted by rotating with simple, easy operations and proceeding to complicated, difficult operations. The most important thing in diagnostics is to understand customer's complaint, and distinguish between the three causes.
16) In AT model, do not continue the stall for more than 5 seconds at a time.
17) On ABS model, when performing driving test in jacked-up or lifted-up position, sometimes the warning light may be lit, but this is not a malfunction of the system. The reason for this is the speed difference between the front and rear wheels. After diagnosis of engine control system, perform the ABS memory clearance procedure of self-diagnosis system.

B: INSPECTION

Before performing diagnostics, check the following items which might affect engine problems:

1. BATTERY

1) Measure the battery voltage and specific gravity of electrolyte.

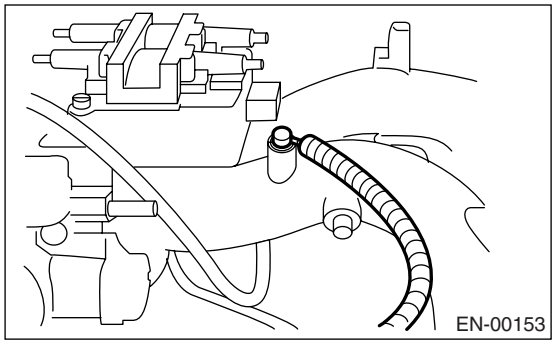
Standard voltage: 12 V

Specific gravity: Above 1.260

2) Check the condition of the main and other fuses, and harnesses and connectors. Also check for proper grounding.

2. ENGINE GROUNDING

Make sure the engine grounding cable is properly connected to the engine.



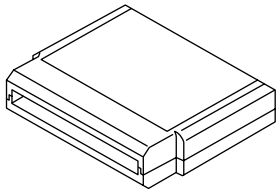
C: NOTE

1. ENGINE AND EMISSION CONTROL SYSTEM

• The Multipoint Fuel Injection (MFI) system is a system that supplies the optimum air-fuel mixture to the engine for all the various operating conditions through the use of the latest electronic technology.
With this system fuel, which is pressurized at a constant pressure, is injected into the intake air passage of the cylinder head. The injection quantity of fuel is controlled by an intermittent injection system where the electro-magnetic injection valve (fuel injector) opens only for a short period of time, depending on the quantity of air required for one cycle of operation. In actual operation, the injection quantity is determined by the duration of an electric pulse applied to the fuel injector and this permits simple, yet highly precise metering of the fuel.
• Further, all the operating conditions of the engine are converted into electric signals, and this results in additional features of the system, such as large improved adaptability, easier addition of compensating element, etc.
The MFI system also has the following features:

- Reduced emission of harmful exhaust gases.
- Reduced in fuel consumption.
- Increased engine output.
- Superior acceleration and deceleration.
- Superior startability and warm-up performance in cold since compensation is made for coolant and intake air temperature.

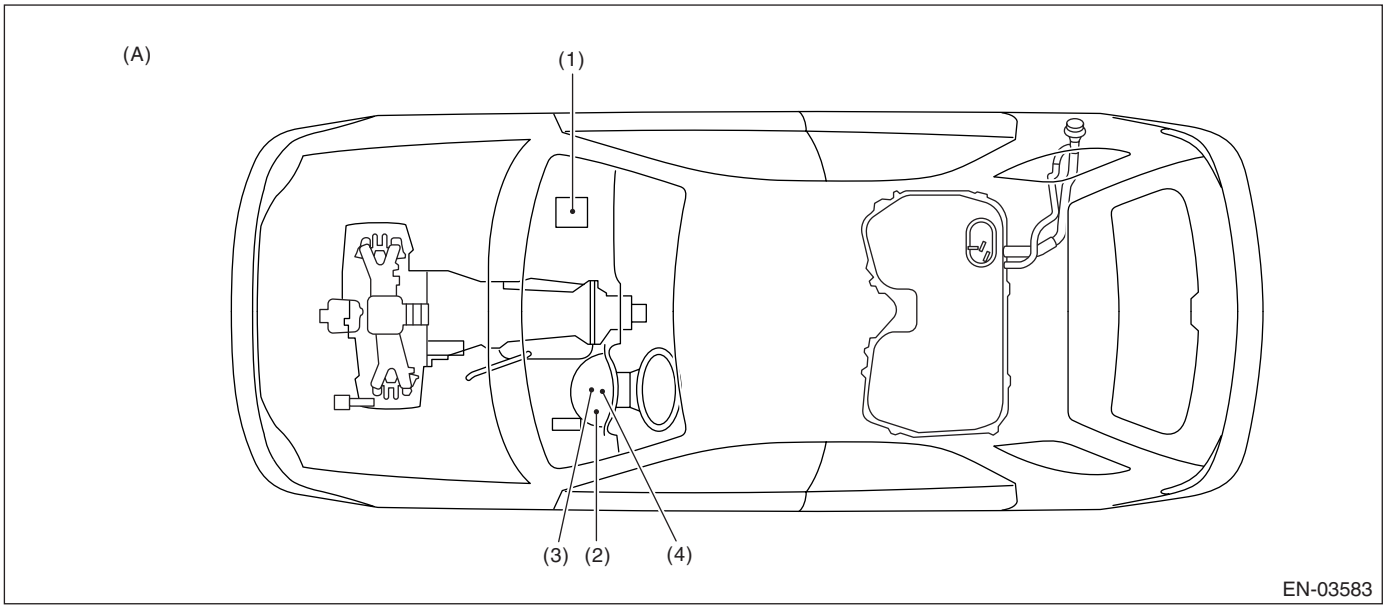
D: PREPARATION TOOL

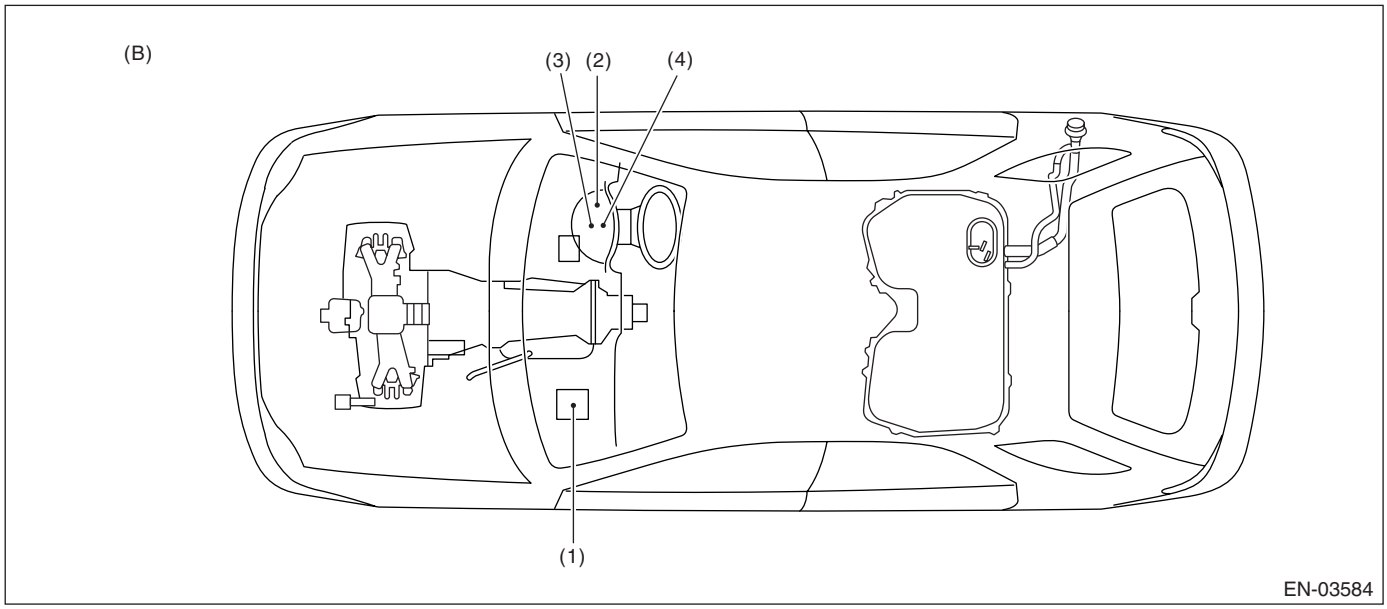
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18482AA000	18482AA000	CARTRIDGE	Troubleshooting for electrical systems.
ST22771AA030	22771AA030	SUBARU SELECT MONITOR KIT	Troubleshooting for electrical systems. • English: 22771AA030 (Without printer) • German: 22771AA070 (Without printer) • French: 22771AA080 (Without printer) • Spanish: 22771AA090 (Without printer)

4. Electrical Component Location

A: LOCATION

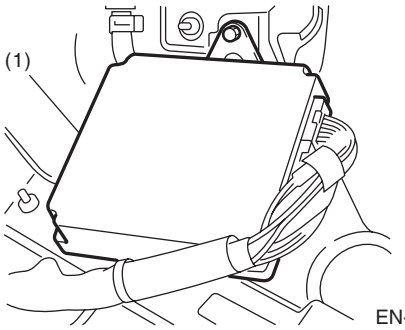
1. CONTROL MODULE



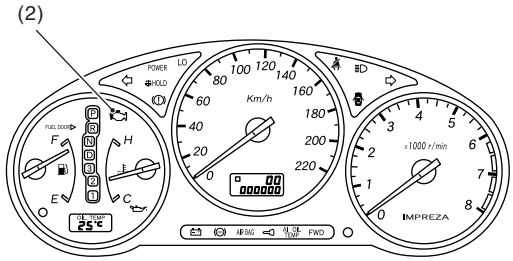


(A) LHD
(B) RHD

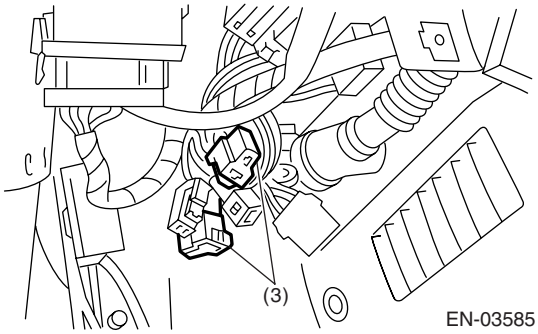
(1) Engine control module (ECM)
(2) Malfunction indicator light
(3) Test mode connector
(4) Data link connector



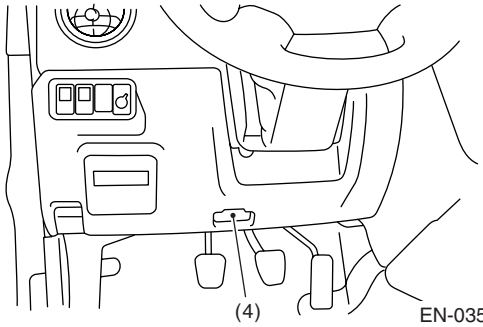
EN-00156



EN-01517

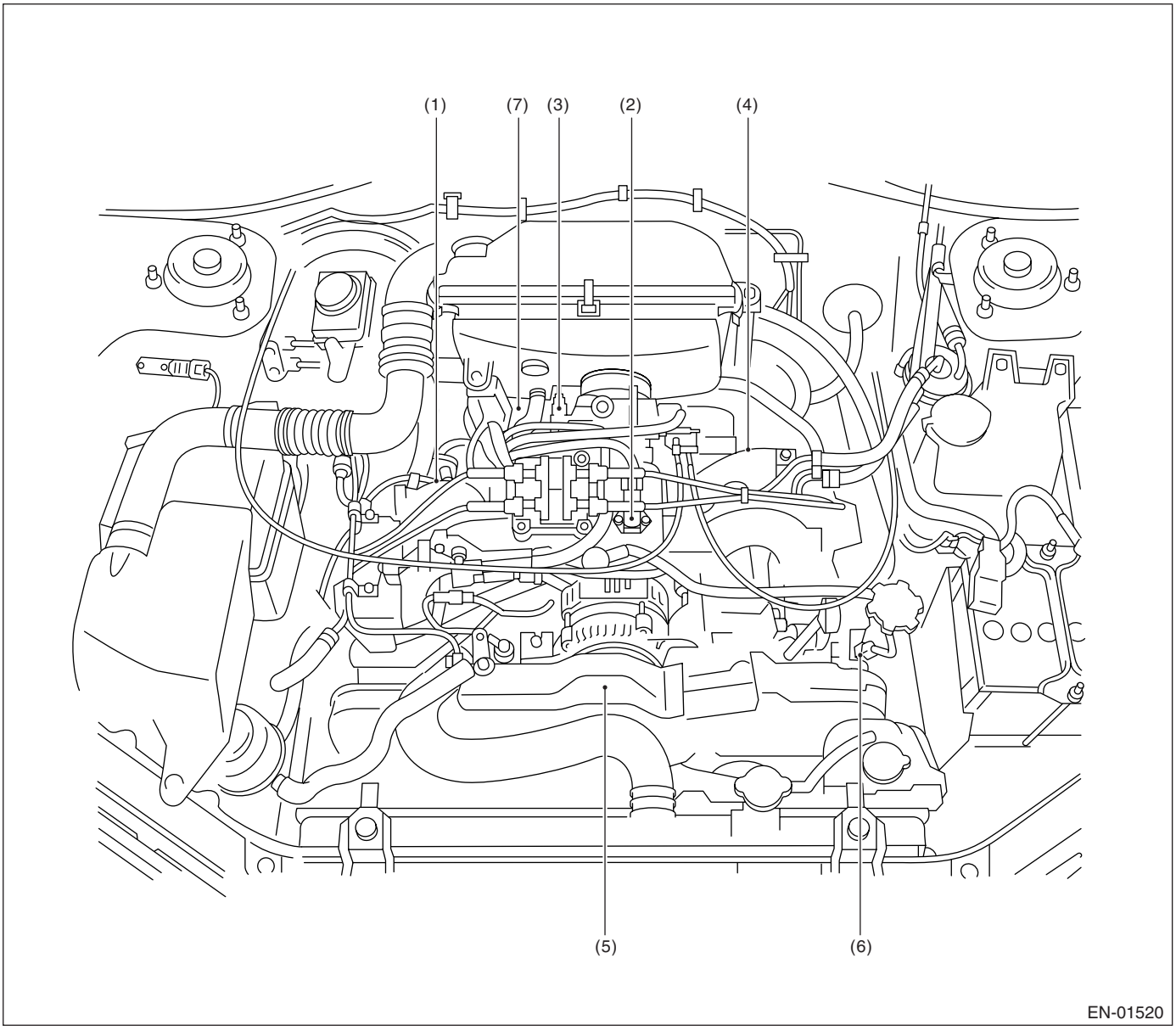


EN-03585

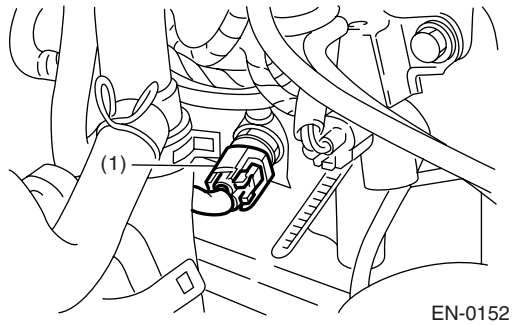


EN-03586

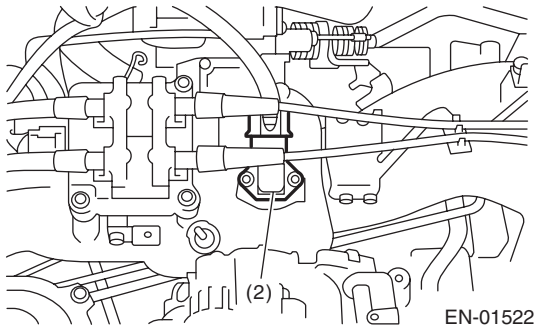
2. SENSOR



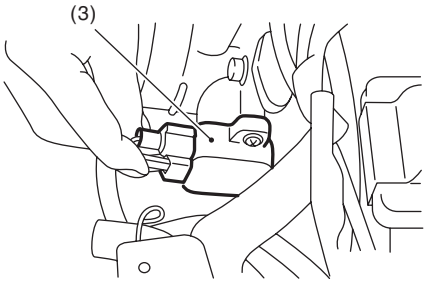
(1) Engine coolant temperature sensor
(2) Manifold absolute pressure and intake air temperature sensor
(3) Throttle position sensor
(4) Knock sensor
(5) Crankshaft position sensor
(6) Camshaft position sensor
(7) Vehicle speed sensor



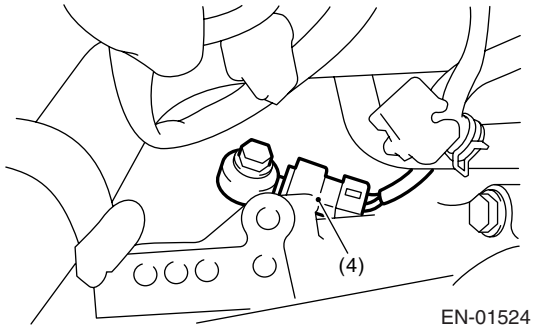
EN-01521



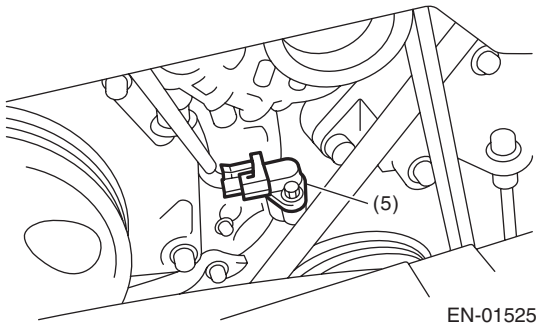
EN-01522



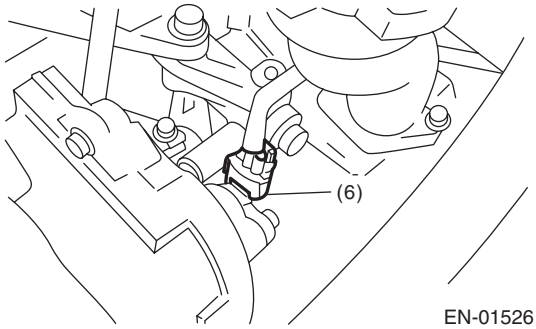
EN-01523



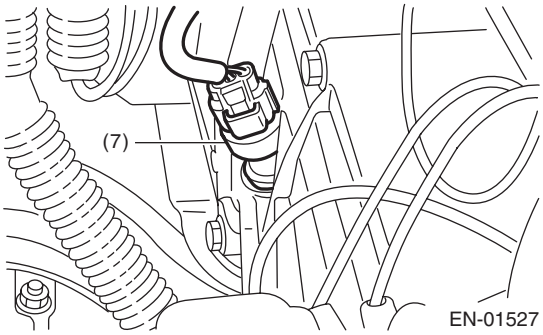
EN-01524



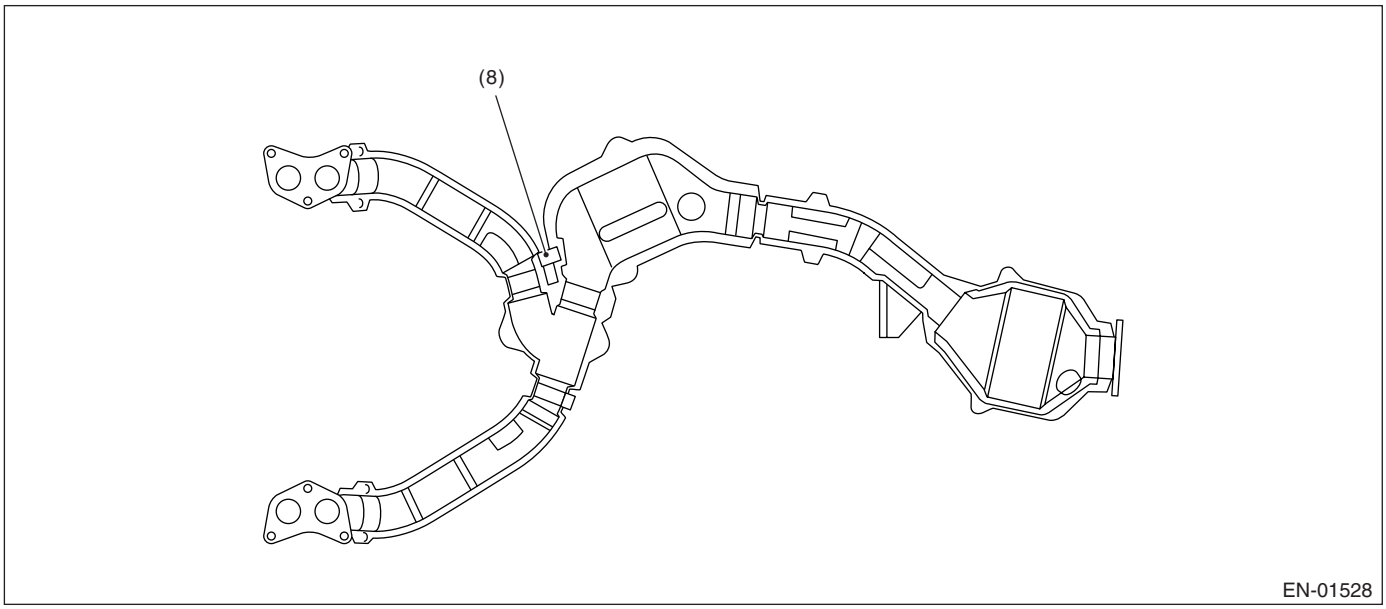
EN-01525



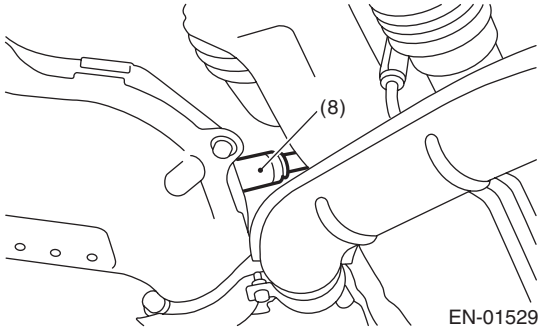
EN-01526



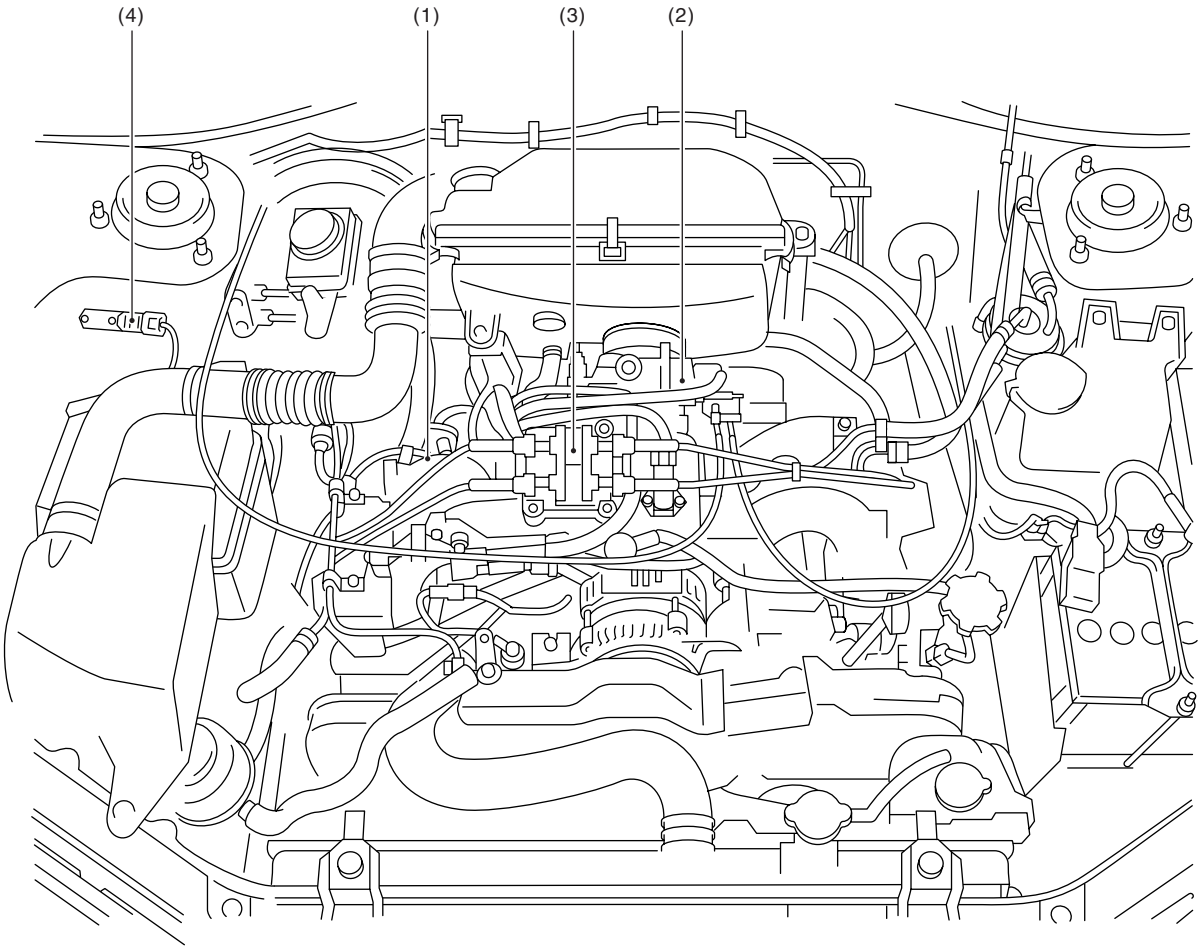
EN-01527



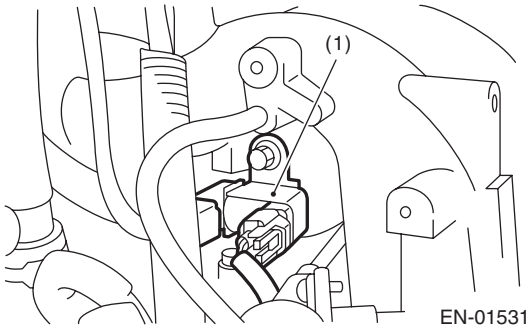
(8) Oxygen sensor (With catalyst converter model)



3. SOLENOID VALVE, EMISSION CONTROL SYSTEM PARTS AND IGNITION SYSTEM PARTS



(1) Purge control solenoid valve
(2) Idle air control solenoid valve
(3) Ignition coil and ignitor ASSY
(4) CO resistor (Without catalyst converter model)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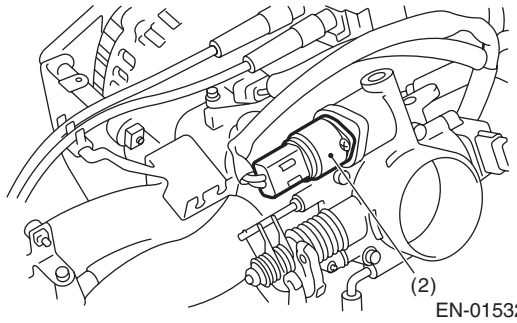
EN-01531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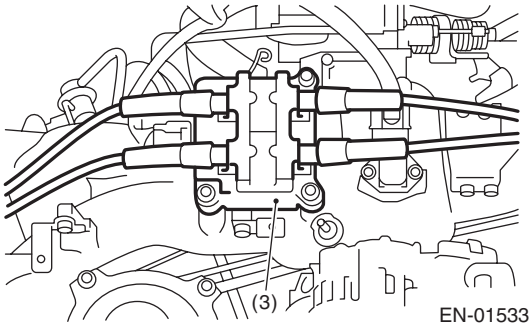
EN-01532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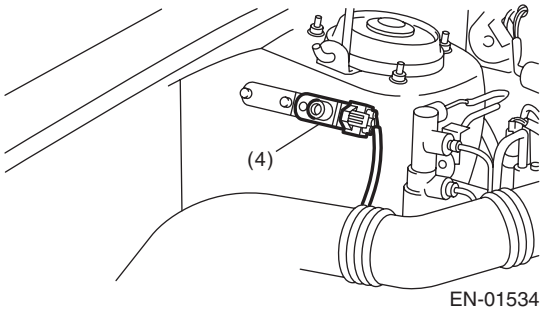
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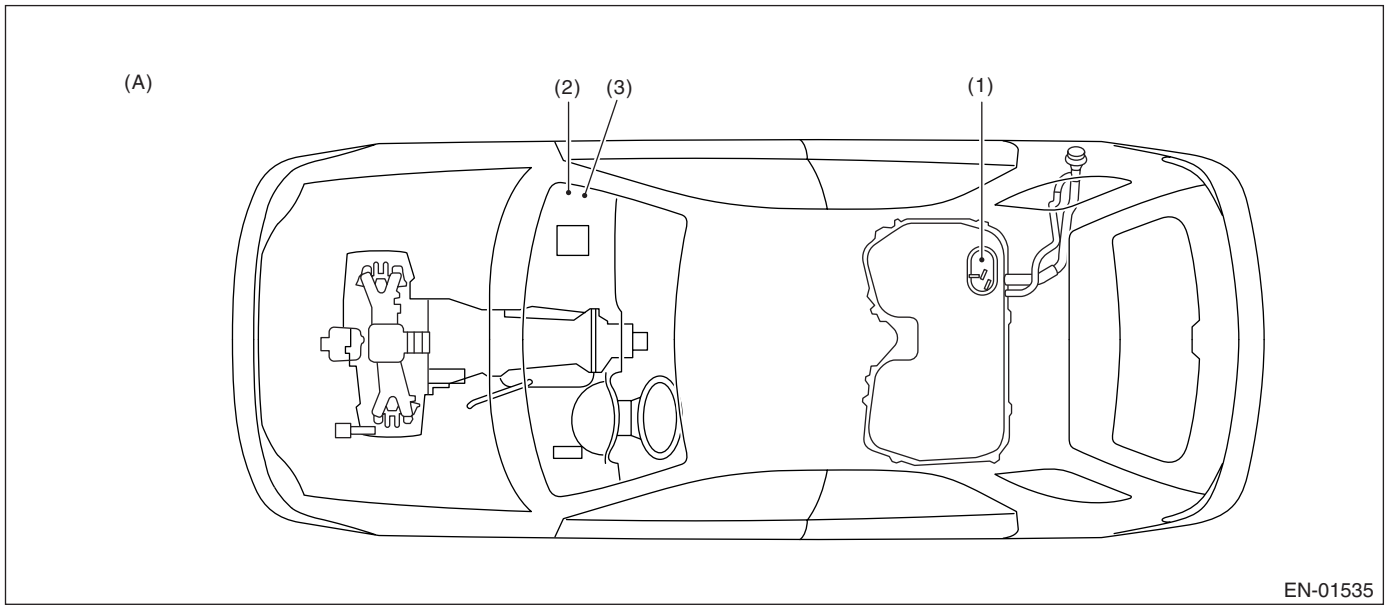
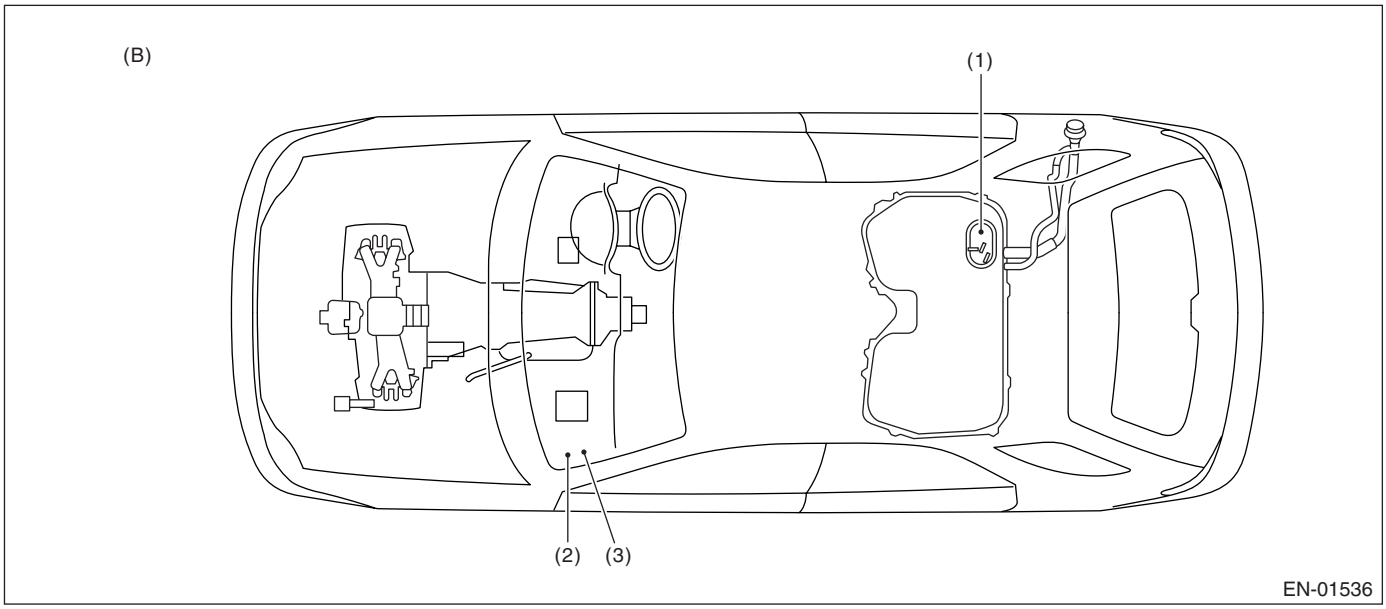
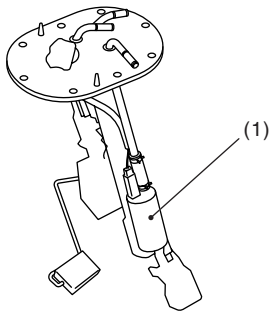
EN-01534

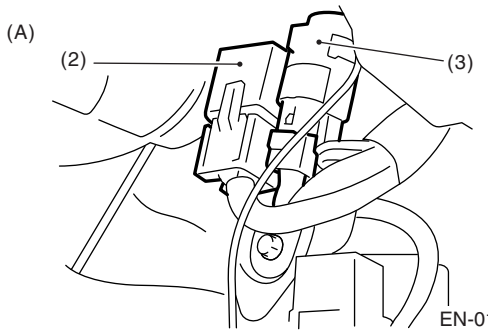




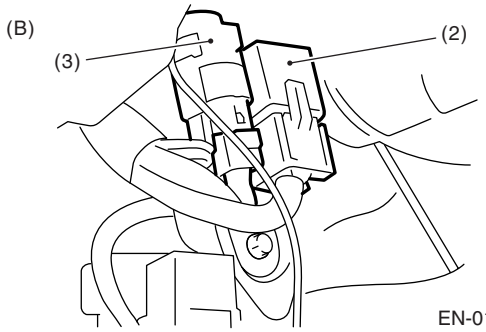
(A) LHD
(B) RHD
(1) Fuel pump
(2) Main relay
(3) Fuel pump relay



EN-01537



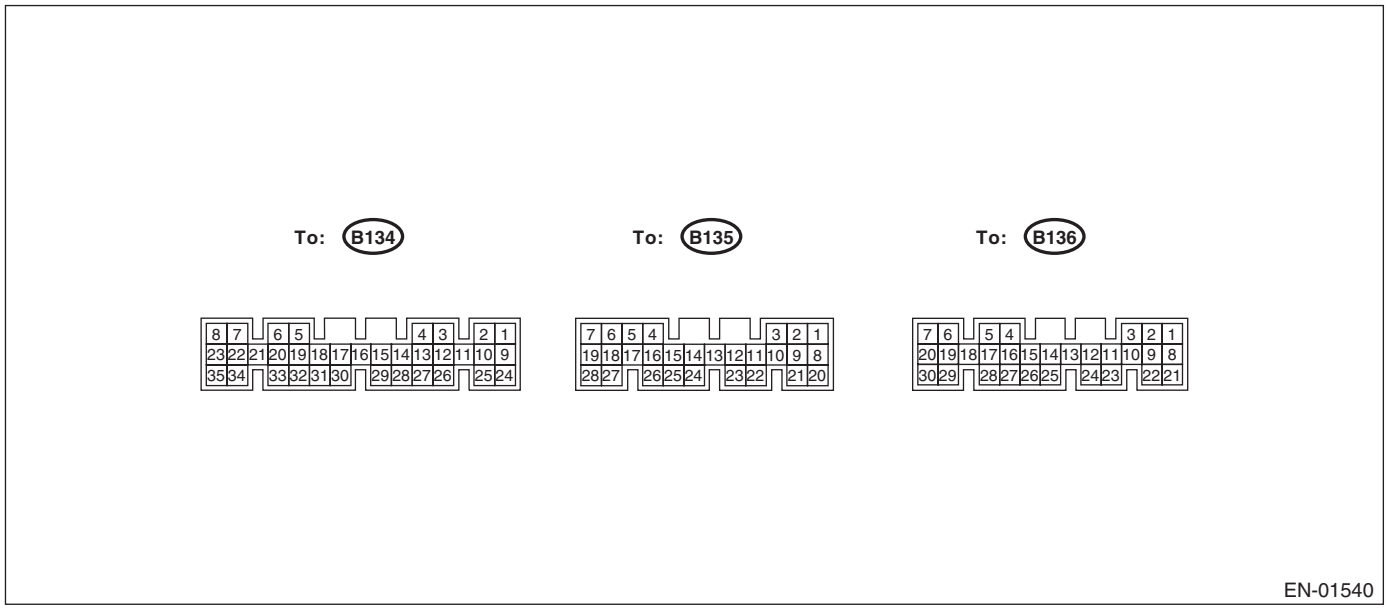
EN-01538



EN-01539

5. Engine Control Module (ECM) I/O Signal

A: ELECTRICAL SPECIFICATION



Content		Connector No.	Terminal No.	Signal (V) Ignition SW ON (Engine OFF)	Signal (V) Engine ON (Idling)	Note
Crankshaft position sensor	Signal (+)	B135	*2 1	0	±6	Sensor output waveform
	Signal (–)	B135	8	0	0	—
	Shield	B135	10	0	0	—
Camshaft position sensor	Signal (+)	B135	*1 2	0	±6	Sensor output waveform
	Signal (–)	B135	8	0	0	—
	Shield	B135	10	0	0	—
Intake air temperature sensor	Signal	B136	13	2.3 — 2.5	1.4 — 1.6	Ambient temperature: 25°C (77°F)
Throttle position sensor	Signal	B136	17	Fully closed: 0.5±0.3 Fully opened: 4.3±0.3		—
	Power supply	B136	15	5	5	—
	GND	B136	16	0	0	—
Oxygen sensor	Signal	B136	7	0	Rich mixture: 0.7 Lean mixture: 0	
	Shield	B136	23	0	0	—
Engine coolant temperature sensor	Signal	B136	14	0.6 — 1.0	0.6 — 1.0	After warm-up
	GND	B136	16	0	0	—
Vehicle speed sensor		B135	24	0 or 5	0 or 5	“5” and “0” are repeatedly displayed when vehicle is driven.
Starter switch		B135	28	0	0	Cranking: 10 to 14
A/C switch		B135	27	ON: 10 — 13 OFF: 0	ON: 13 — 14 OFF: 0	—
Ignition switch		B135	7	10 — 13	13 — 14	—
Neutral position switch (MT)		B135	26	ON: 5 OFF: 0		Switch is ON when gear is in neutral position.
Park/Neutral position switch (AT)		B135	26	ON: 0 OFF: 5		Switch is ON when shift lever is in “P” or “N” position.

Engine Control Module (ECM) I/O Signal

Content		Connector No.	Terminal No.	Signal (V)		Note
				Ignition SW ON (Engine OFF)	Engine ON (Idling)	
Test mode connector		B135	14	5	5	When connected: 0
Read memory connector		B135	15	5	5	When connected: 0
Back-up power supply		B136	9	10 — 13	13 — 14	—
Control unit power supply		B136	1	10 — 13	13 — 14	—
			2			
Ignition control	# 1, # 2	B134	25	0	3.4, max.	—
	# 3, # 4	B134	26	0	3.4, max.	—
Fuel injector	# 1	B134	4	10 — 13	13 — 14	Waveform
	# 2	B134	13	10 — 13	13 — 14	Waveform
	# 3	B134	14	10 — 13	13 — 14	Waveform
	# 4	B134	15	10 — 13	13 — 14	Waveform

*: With immobilizer

Engine Control Module (ECM) I/O Signal

Content		Connector No.	Terminal No.	Signal (V)		Note
				Ignition SW ON (Engine OFF)	Engine ON (Idling)	
Idle air control solenoid valve	Signal 1	B134	5	—	1 — 13	Waveform
	Signal 2	B134	6	—	1 — 13	Waveform
	Signal 3	B134	19	—	1 — 13	Waveform
	Signal 4	B134	20	—	1 — 13	Waveform
Torque control signal 1		B135	16	5	5	—
Torque control signal 2		B135	17	5	5	—
Fuel pump relay control		B134	29* 16	ON: 0 OFF: 10 — 13	0	—
A/C relay control		B134	17	ON: 0 OFF: 10 — 13	ON: 0 OFF: 13 — 14	—
Radiator fan relay 1 control		B134	3	ON: 0 OFF: 10 — 13	ON: 0 OFF: 13 — 14	—
Radiator fan relay 2 control		B134	12	ON: 0 OFF: 10 — 13	ON: 0 OFF: 13 — 14	—
Self-shutoff control		B135	19	10 — 13	13 — 14	—
Malfunction indicator light		B134	11	—	—	Light “ON”: 1, max. Light “OFF”: 10 — 14
Engine speed output		B134	30	—	0 — 13, min.	Waveform
Knock sensor	Signal	B136	4	2.8	2.8	—
	Shield	B136	25	0	0	—
Manifold absolute pressure sensor	Signal	B136	5	3.4 — 3.6	1.2 — 1.8	—
	Power supply		15	5	5	—
	GND		16	0	0	—
Purge control solenoid valve		B134	2	ON: 0 OFF: 10 — 13	ON: 0 OFF: 13 — 14	—
GND (sensors)		B136	16	0	0	—
GND (injectors)		B134	7	0	0	—
GND (ignition system)		B134	27	0	0	—
GND (power supply)		B134	8	0	0	—
GND (control systems)		B136	21	0	0	—
		B136	22	0	0	—
Select monitor signal		B135	3	—	—	—
Power steering switch		B135	13	ON: 0 OFF: 10 — 13	ON: 0 OFF: 10 — 13	—
Torque control cut signal		B134	31	8	8	—
AT load signal		B136	11	0 — 0.3	0.8 — 1.2	—
MT/AT identification		B135	25	MT: 0 AT: 5	MT: 0 AT: 5	—
CO resister		B136	12	0 — 5	0 — 5	—

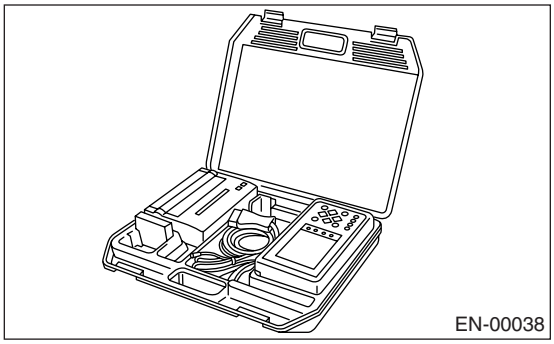
*: With immobilizer

6. Subaru Select Monitor

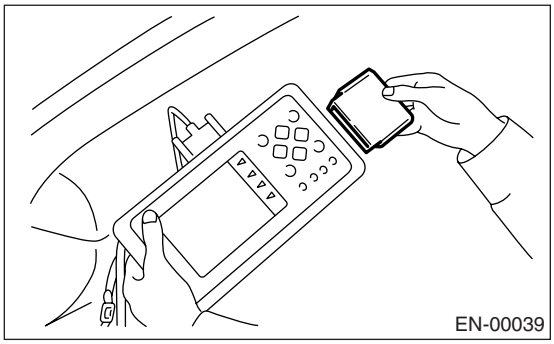
A: OPERATION

1. HOW TO USE SUBARU SELECT MONITOR

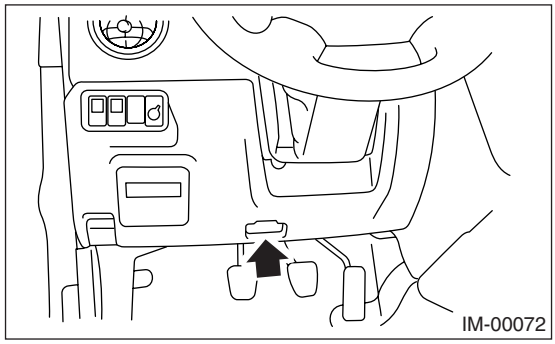
1) Prepare the SUBARU Select Monitor kit.



2) Connect the diagnosis cable to SUBARU Select Monitor.
3) Insert the cartridge into SUBARU Select Monitor.



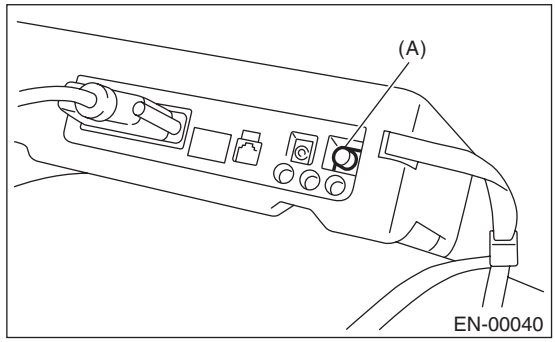
4) Connect the SUBARU Select Monitor to data link connector.
(1) The data link connector is located in lower portion of instrument panel (on driver's side).



(2) Connect the diagnosis cable to data link connector.

CAUTION:
Do not connect the scan tools except SUBARU Select Monitor.

5) Turn the ignition switch to ON (engine OFF) and SUBARU Select Monitor power switch to ON.



(A) Power switch

6) Using the SUBARU Select Monitor, call up any DTCs and various data, then record them.

2. READ DIAGNOSTIC TROUBLE CODE (DTC) FOR ENGINE.

Refer to Read DTC for information about how to indicate the DTC. <Ref. to EN(H4SOw/oOBD)(diag)-24, Read Diagnostic Trouble Code (DTC).>

3. READ CURRENT DATA SHOWN ON DISPLAY.

1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Engine Control System} and press the [YES] key.
3) Press the [YES] key after the information of engine type is displayed.
4) On the «Engine Diagnosis» display screen, select the {Current Data Display & Save} and press the [YES] key.
5) On the «Data Display Menu» display screen, select the {Data Display} and press the [YES] key.
6) Using the scroll key, move the display screen up or down until desired data is shown.
• A list of the support data is shown in the following table.

Remarks	Display	Unit of measure	Note (at idling)
Engine coolant temperature signal	Coolant Temp.	°C or °F	80 — 100°C or 176 — 212°F
A/F correction 1	A/F Correction #1	%	0±10%
A/F learning 1	A/F Learning #1	%	0±5%
Intake manifold absolute pressure	Mani. Absolute Pressure	mmHg, kPa, inHg or psig	200 — 300 mmHg, 26.7 — 40.0 kPa, 7.9 — 11.8 inHg or 3.9 — 5.8 psig
Engine speed signal	Engine Speed	rpm	500 — 900 rpm (Agree with the tachometer indication)
Vehicle speed signal	Vehicle Speed	km/h or MPH	0 km/h or 0 MPH (at parking)
Ignition timing signal	Ignition Timing	deg	10 — 20 deg
Intake air temperature signal	Intake Air Temp.	°C or °F	(Ambient air temperature)
Battery voltage	Battery Voltage	V	13 — 14 V
Injection 1 pulse width	Fuel Injection #1 Pulse	ms	2 — 5 ms
Knock sensor correction	Knocking Correction	deg	0.0 deg
Idle air control signal	ISC Valve Step	STEP	10 — 40
Throttle sensor voltage	Throttle Sensor Voltage	V	0.2 — 1.0 V
Oxygen sensor output signal *1	Oxygen Sensor Output Signal	V	0 — 0.9 V
CO resistor*2	CO Resistor	V	0 — 5 V
AT/MT identification terminal	AT Vehicle ID Signal	—	ON or OFF
Test mode terminal	Test Mode Signal	—	OFF
Read memory terminal	Read Memory Terminal	—	OFF
Neutral position switch signal	Neutral Position Switch	—	ON
Soft idle switch signal	Idle Switch Signal	—	ON
Ignition switch signal	Ignition Switch	—	ON
Power steering switch input signal	P/S Switch	—	OFF (At OFF)
Air conditioning switch signal	A/C Switch	—	OFF (At OFF)
Starter switch signal	Starter Switch	—	OFF
Rear O_2 monitor	Rear O2 Rich Signal	—	OFF
Knocking signal	Knocking Signal	—	OFF
Crankshaft position sensor signal	Crankshaft Position Sig.	—	OFF
Camshaft position sensor signal	Camshaft Position Sig.	—	OFF
Rear defogger switch signal	Rear Defogger SW	—	OFF (At OFF)
Blower fan switch signal	Blower Fan SW	—	OFF (At OFF)
Light switch signal	Light Switch	—	OFF (At OFF)
Air conditioner compressor relay output signal	A/C Compressor Signal	—	OFF
Radiator fan relay 1 signal	Radiator Fan Relay #1	—	OFF
Radiator fan relay 2 signal	Radiator Fan Relay #2	—	OFF

Remarks	Display	Unit of measure	Note (at idling)
Fuel pump relay signal	Fuel Pump Relay	—	ON
Engine torque control signal #1	Torque Control Signal #1	—	OFF
Engine torque control signal #2	Torque Control Signal #2	—	OFF
Engine torque control permission signal	Torque Permission Signal	—	ON or OFF
TCS AET signal	TCS AET Signal	—	ON or OFF
Canister purge control solenoid valve	Canister Purge Control Solenoid Valve	—	ON or OFF

*1: With catalyst model only
*2: Without catalyst model only

NOTE:
For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

4. LED OPERATION MODE FOR ENGINE

Remarks	Display	Message	LED “ON” requirements
AT/MT identification signal	AT Vehicle ID Signal	ON or OFF	Illuminate (AT model)
Test mode signal	Test Mode Signal	ON or OFF	D check
Read memory signal	Read Memory Terminal	ON or OFF	Clear memory connector is connected.
Neutral position switch signal*1	Neutral Position Switch	ON or OFF	When neutral position signal is entered.
Idle switch signal	Idle Switch Signal	ON or OFF	When idle switch signal is entered.
Ignition switch signal	Ignition Switch	ON or OFF	When ignition switch is turned ON.
Power steering switch signal	P/S Switch	ON or OFF	When power steering switch is entered.
Air conditioning switch signal	A/C Switch	ON or OFF	When air conditioning switch is input.
Starter switch signal	Starter Switch	ON or OFF	When starter switch is input.
Oxygen sensor rich signal *2	O2 Rich Signal	ON or OFF	When oxygen sensor mixture ratio is rich.
Knocking signal	Knocking Signal	ON or OFF	When knocking signal is input.
Crankshaft position sensor signal	Crankshaft Position Signal	ON or OFF	When crankshaft position sensor signal is input.
Camshaft position sensor signal	Camshaft Position Signal	ON or OFF	When camshaft position sensor signal is entered.
Rear defogger switch signal	Rear Defogger Switch	ON or OFF	When rear defogger switch is turned ON.
Blower fan switch signal	Blower Fan Switch	ON or OFF	When blower fan switch is turned ON.
Small light switch signal	Light Switch	ON or OFF	When small light switch is turned ON.
Air conditioning relay signal	A/C Compressor Signal	ON or OFF	When air conditioning relay is in function.
Radiator fan relay 1 signal	Radiator Fan Relay #1	ON or OFF	When radiator fan relay 1 is in function.
Radiator fan relay 2 signal	Radiator Fan Relay #2	ON or OFF	When radiator fan relay 2 is in function.
Fuel pump relay signal	Fuel Pump Relay	ON or OFF	ON output
Engine torque control signal #1	Torque Control Signal #1	ON or OFF	When engine torque control signal 1 is entered.
Engine torque control signal #2	Torque Control Signal #2	ON or OFF	When engine torque control signal 2 is entered.
Engine torque control permission signal	Torque Control Permit	ON or OFF	When engine torque control permission signal is entered.
TCS AET signal	TCS AET Signal	ON or OFF	When TCS AET signal is entered.
Canister purge control solenoid valve	Canister Purge Control Solenoid Valve	ON or OFF	When canister purge control solenoid valve is in function.

*1: On MT model, switch is turned ON when gear position is in neutral position.
On AT model, switch is turned ON when shift position is in “P” or “N” position.
*2: With catalyst model only

NOTE:
For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

7. Read Diagnostic Trouble Code (DTC)

A: OPERATION

1. WITH SUBARU SELECT MONITOR

1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Engine Control System} and press the [YES] key.
3) Press the [YES] key after the information of engine type is displayed.
4) On the «Engine Diagnosis» display screen, select the {DTC Display} and press the [YES] key.
5) On the «DTC Display» display screen, select the {Current DTC} or {History DTC} and press the [YES] key.

NOTE:
• For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.
• For detailed concerning DTCs, refer to the List of DTC. <Ref. to EN(H4SOw/oOBD)(diag)-54, LIST, List of Diagnostic Trouble Code (DTC).>

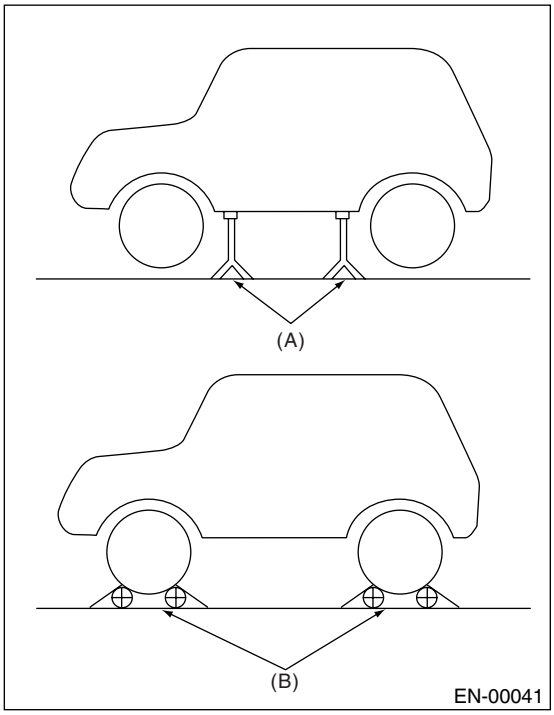
8. Inspection Mode

A: PROCEDURE

1. PREPARATIONS FOR THE INSPECTION MODE

Raise the vehicle using a garage jack and place on rigid racks or drive the vehicle onto free rollers.

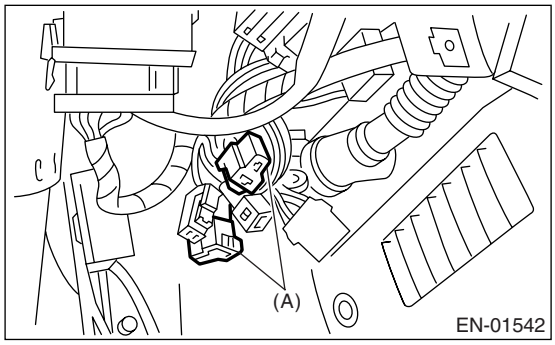
WARNING:
• Before raising the vehicle, ensure parking brake is applied.
• Do not use a pantograph jack in place of a rigid rack.
• Secure a rope or wire to the front and rear towing or tie-down hooks to prevent the lateral runout of front wheels.
• Do not abruptly depress/release the clutch pedal or accelerator pedal during works even when engine is operating at low speeds since this may cause vehicle to jump off free rollers.
• In order to prevent the vehicle from slipping due to vibration, do not place any wooden blocks or similar items between the rigid racks and the vehicle.
• Since the rear wheels will also rotate, do not place anything near them. Also, make sure that nobody goes in front of the vehicle.



(A) Rigid rack
(B) Free rollers

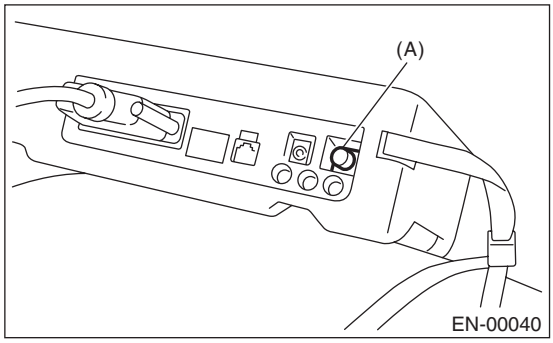
2. WITH SUBARU SELECT MONITOR

After performing diagnostics and clearing memory, check for any remaining unresolved trouble data.
1) Connect the test mode connector (green) at the lower portion of instrument panel (on the driver's side).



(A) Test mode connector

2) Connect the SUBARU Select Monitor to data link connector. <Ref. to EN(H4SOw/oOBD)(diag)-8, LOCATION, Electrical Component Location.>
3) Turn the ignition switch to ON (engine OFF) and SUBARU Select Monitor power switch to ON.



(A) Power switch

4) On the «Main Menu» display screen, select the {2. Each System Check} and press the [YES] key.
5) On the «System Selection Menu» display screen, select the {Engine Control System} and press the [YES] key.
6) Press the [YES] key after displayed the information of engine type.
7) On the «Engine Diagnosis» display screen, select the {6. Dealer Check Mode Procedure} and press the [YES] key.
8) When the "Perform Inspection (Dealer Check) Mode?" is shown on the display screen, press the [YES] key.
9) Perform subsequent procedures as instructed on the display screen.

• If trouble still remains in the memory, the corresponding DTC appears on the display screen.

NOTE:
• For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.
• For detailed concerning DTCs, refer to the DTC LIST. <Ref. to EN(H4SOw/oOBD)(diag)-54, LIST, List of Diagnostic Trouble Code (DTC).>
• On AWD vehicles, release the parking brake.
• The speed difference between front and rear wheels may light ABS warning light, but this indicates no malfunctions. When the engine control diagnosis is finished, perform the ABS memory clearance procedure of self-diagnosis system.

9. Clear Memory Mode

A: OPERATION

1. WITH SUBARU SELECT MONITOR

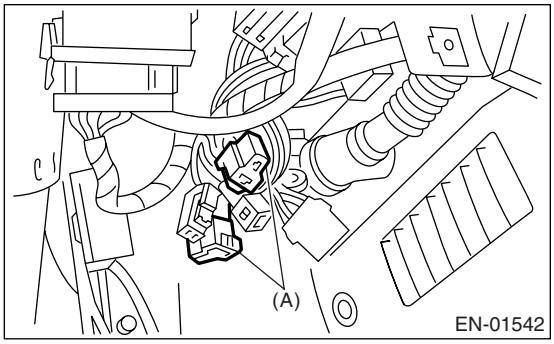
1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Engine Control System} and press the [YES] key.
3) Press the [YES] key after the information of engine type is displayed.
4) On the «Engine Diagnosis» display screen, select the {Clear Memory} and press the [YES] key.
5) When the “Done” and “Turn Ignition Switch OFF” are shown on the display screen, turn the SUBARU Select Monitor and ignition switch to OFF.

NOTE:
• After the memory has been cleared, the ISC must be initialized. To do this, turn the ignition switch to the ON position. Wait 3 seconds before starting the engine.
• For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

10.Compulsory Valve Operation Check Mode

A: OPERATION

1) Connect the test mode connector at the lower portion of instrument panel (on the driver's side).



(A) Test mode connector

2) Each valve functions when the ignition switch is turned to ON (engine OFF).

• A list of the support portion is shown in the following table.

Contents
Compulsory fuel pump relay operation check
Compulsory purge control solenoid valve operation check
Compulsory radiator fan relay operation check
Compulsory air conditioning relay operation check

11.Malfunction Indicator Light

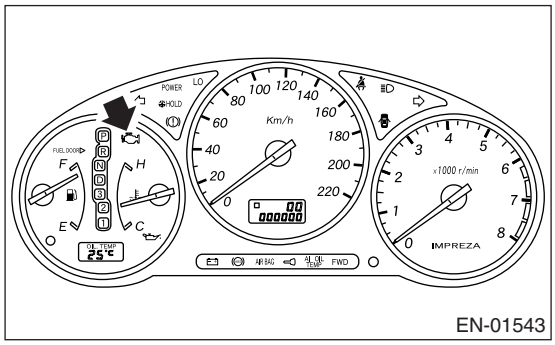
A: PROCEDURE

1. Activation of malfunction indicator light. <Ref. to EN(H4SOw/oOBD)(diag)-30, ACTIVATION OF MALFUNCTION INDICATOR LIGHT, Malfunction Indicator Light.>
↓
2. Malfunction indicator light does not come on. <Ref. to EN(H4SOw/oOBD)(diag)-31, MALFUNCTION INDICATOR LIGHT DOES NOT COME ON, Malfunction Indicator Light.>
↓
3. Malfunction indicator light does not go off. <Ref. to EN(H4SOw/oOBD)(diag)-33, MALFUNCTION INDICATOR LIGHT DOES NOT GO OFF., Malfunction Indicator Light.>
↓
4. Malfunction indicator light does not blink at a cycle of 3 Hz. <Ref. to EN(H4SOw/oOBD)(diag)-34, MALFUNCTION INDICATOR LIGHT DOES NOT BLINK., Malfunction Indicator Light.>
↓
5. Malfunction indicator light remains blinking at a cycle of 3 Hz. <Ref. to EN(H4SOw/oOBD)(diag)-36, MALFUNCTION INDICATOR LIGHT REMAINS BLINKING., Malfunction Indicator Light.>

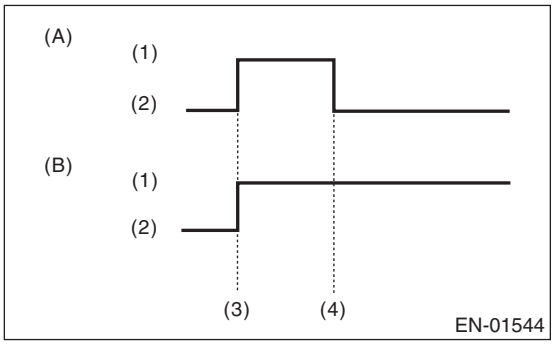
B: ACTIVATION OF MALFUNCTION INDICATOR LIGHT

1) When the ignition switch is turned to ON (engine off), the malfunction indicator light in the combination meter illuminates.

NOTE:
If the malfunction indicator light does not illuminate, perform diagnostics of the malfunction indicator light circuit or the combination meter circuit. <Ref. to IDI-12, Combination Meter.>

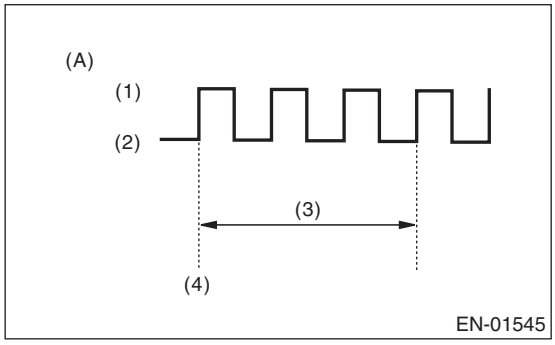


2) After starting the engine, the malfunction indicator light goes out. If it does not, either the engine or the emission control system is malfunctioning. <Ref. to EN(H4SOw/oOBD)(diag)-2, PROCEDURE, Basic Diagnostic Procedure.>



(A) Malfunction indicator light when no trouble
(B) Malfunction indicator light when trouble occurs
(1) ON
(2) OFF
(3) Ignition switch ON
(4) Engine start

3) When the ignition switch is turned to ON (engine off) or to START with the test mode connector connected, the malfunction indicator light blinks at a cycle of 3 Hz.



(A) Malfunction indicator light when no trouble
(1) ON
(2) OFF
(3) 1 sec.
(4) Ignition switch ON

C: MALFUNCTION INDICATOR LIGHT DOES NOT COME ON

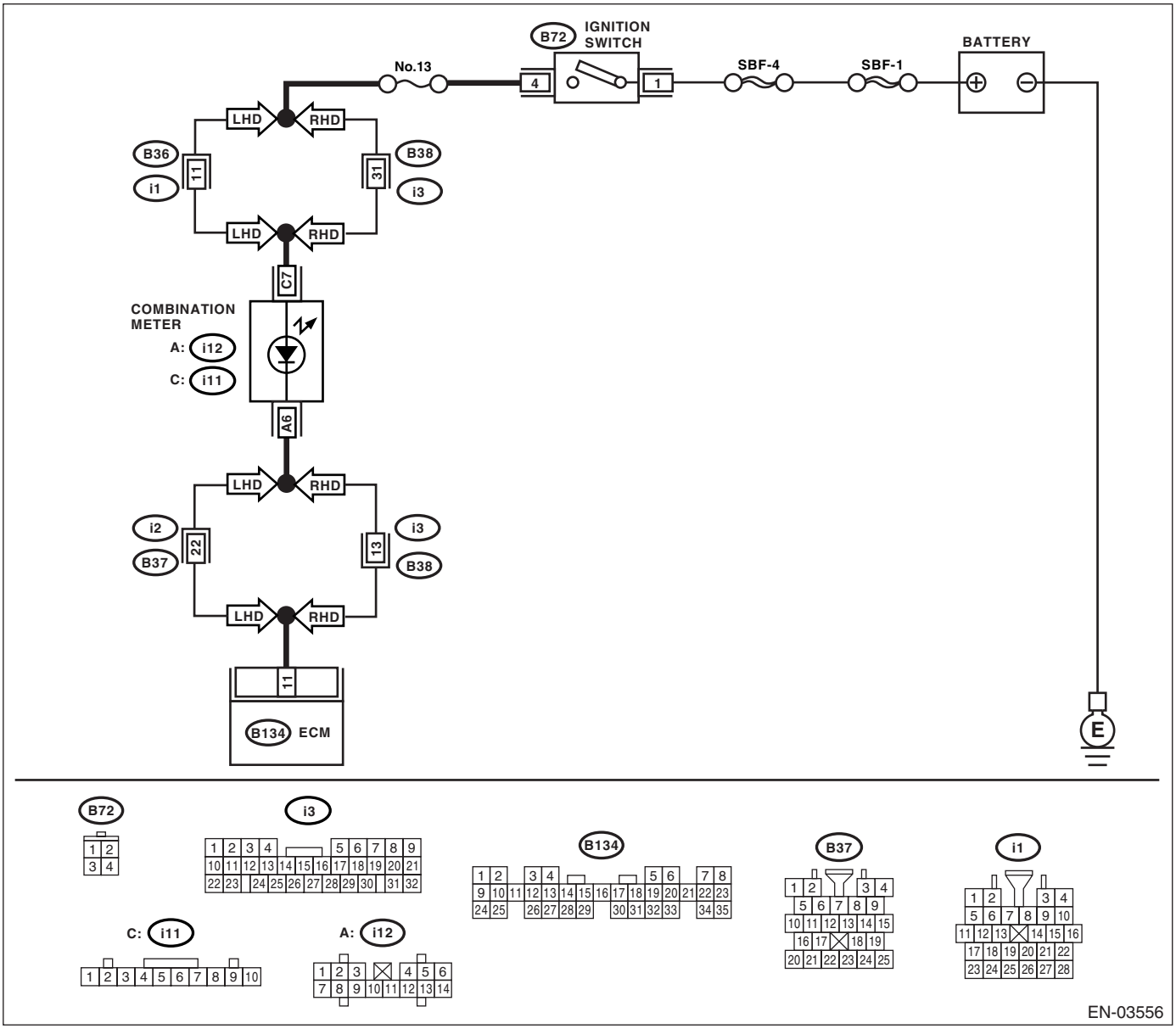
DIAGNOSIS:

The malfunction indicator light circuit is open or shorted.

TROUBLE SYMPTOM:

When the ignition switch is turned ON (engine OFF), the malfunction indicator light does not come on.

WIRING DIAGRAM:



Step		Check	Yes	No
1	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 11 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **4.**	Go to step **2.**
2	**CHECK POOR CONTACT.**	Does the malfunction indicator light come on when shaking or pulling ECM connector and harness?	Repair poor contact in the ECM connector.	Go to step **3.**

	Step	Check	Yes	No
3	**CHECK ECM CONNECTOR.**	Is the ECM connector correctly connected?	Replace the ECM.	Repair the connection of ECM connector.
4	**CHECK HARNESS BETWEEN COMBINATION METER AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Remove the combination meter. <Ref. to IDI-12, Combination Meter.> 3) Disconnect the connector from ECM and combination meter. 4) Measure the resistance of harness between ECM and combination meter connector. ***Connector & terminal*** ***(B134) No. 11 — (i12) No. 6:***	Is the resistance less than 1 Ω?	Go to step **5.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and combination meter connector • Poor contact in coupling connector
5	**CHECK POOR CONTACT.** Check poor contact in combination meter connector. <Ref. to IDI-12, Combination Meter.>	Is there poor contact in combination meter connector?	Repair the poor contact in combination meter connector.	Go to step **6.**
6	**CHECK HARNESS BETWEEN COMBINATION METER AND IGNITION SWITCH CONNECTOR.** 1) Turn the ignition switch to ON. 2) Measure the voltage between combination meter connector and chassis ground. ***Connector & terminal*** ***(i11) No. 7 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Replace the printed circuit board of combination meter. <Ref. to IDI-12, Combination Meter.>	Check the following and repair if necessary. NOTE: • Blown out fuse (No. 13) • Open or short circuit in harness between fuse (No. 13) and battery terminal • Poor contact in ignition switch connector

D: MALFUNCTION INDICATOR LIGHT DOES NOT GO OFF.

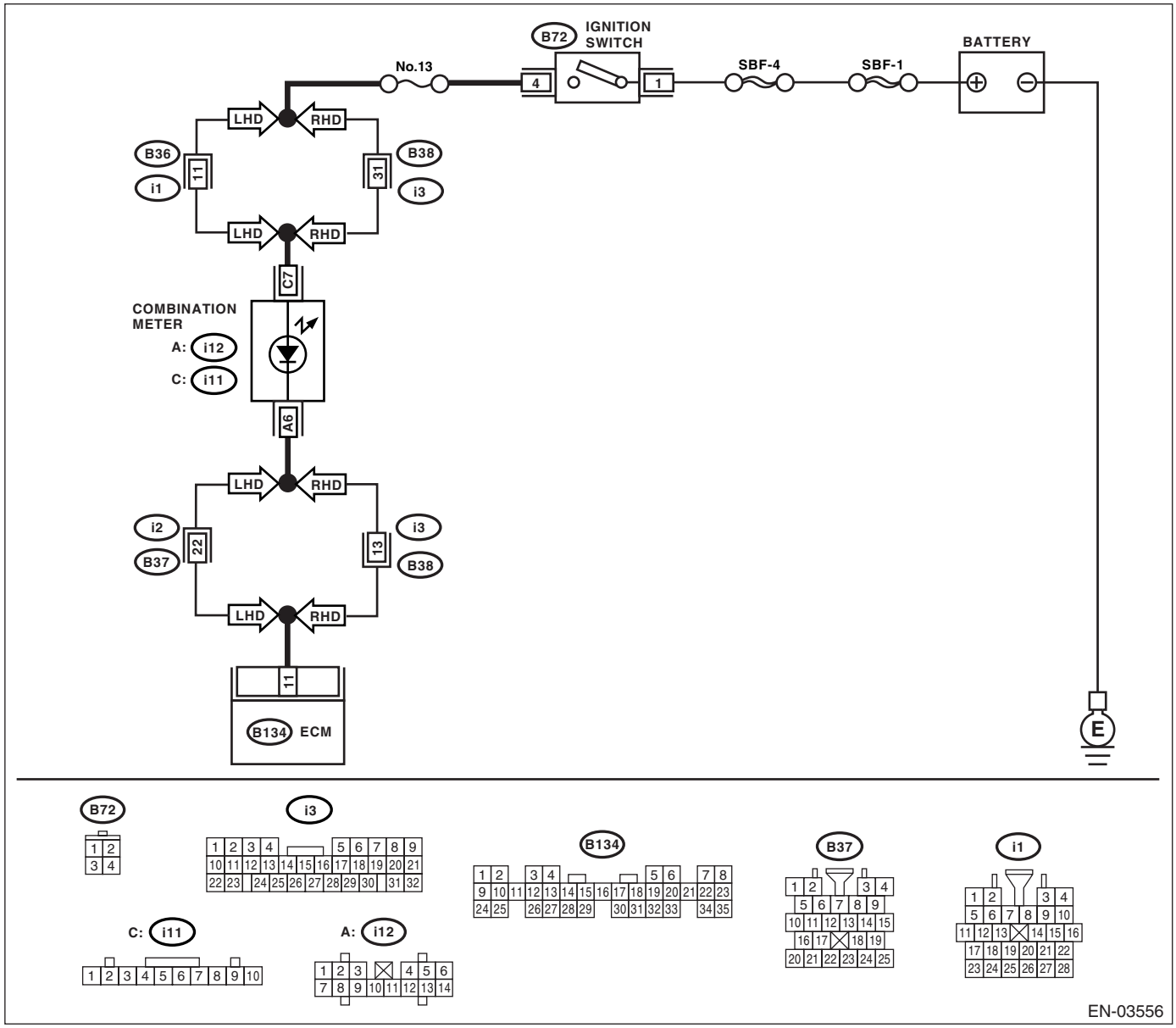
DIAGNOSIS:

The malfunction indicator light circuit is shorted.

TROUBLE SYMPTOM:

Although the malfunction indicator light comes on when engine runs, but DTC is not shown on SUBARU Select Monitor display.

WIRING DIAGRAM:



Step		Check	Yes	No
1	**CHECK HARNESS BETWEEN COMBINATION METER AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Turn the ignition switch to ON.	Does the malfunction indicator light come on?	Repair the short circuit in harness between combination meter and ECM connector.	Replace the ECM. <Ref. to FU(H4SOw/oOBD)-42, Engine Control Module (ECM).>

E: MALFUNCTION INDICATOR LIGHT DOES NOT BLINK.

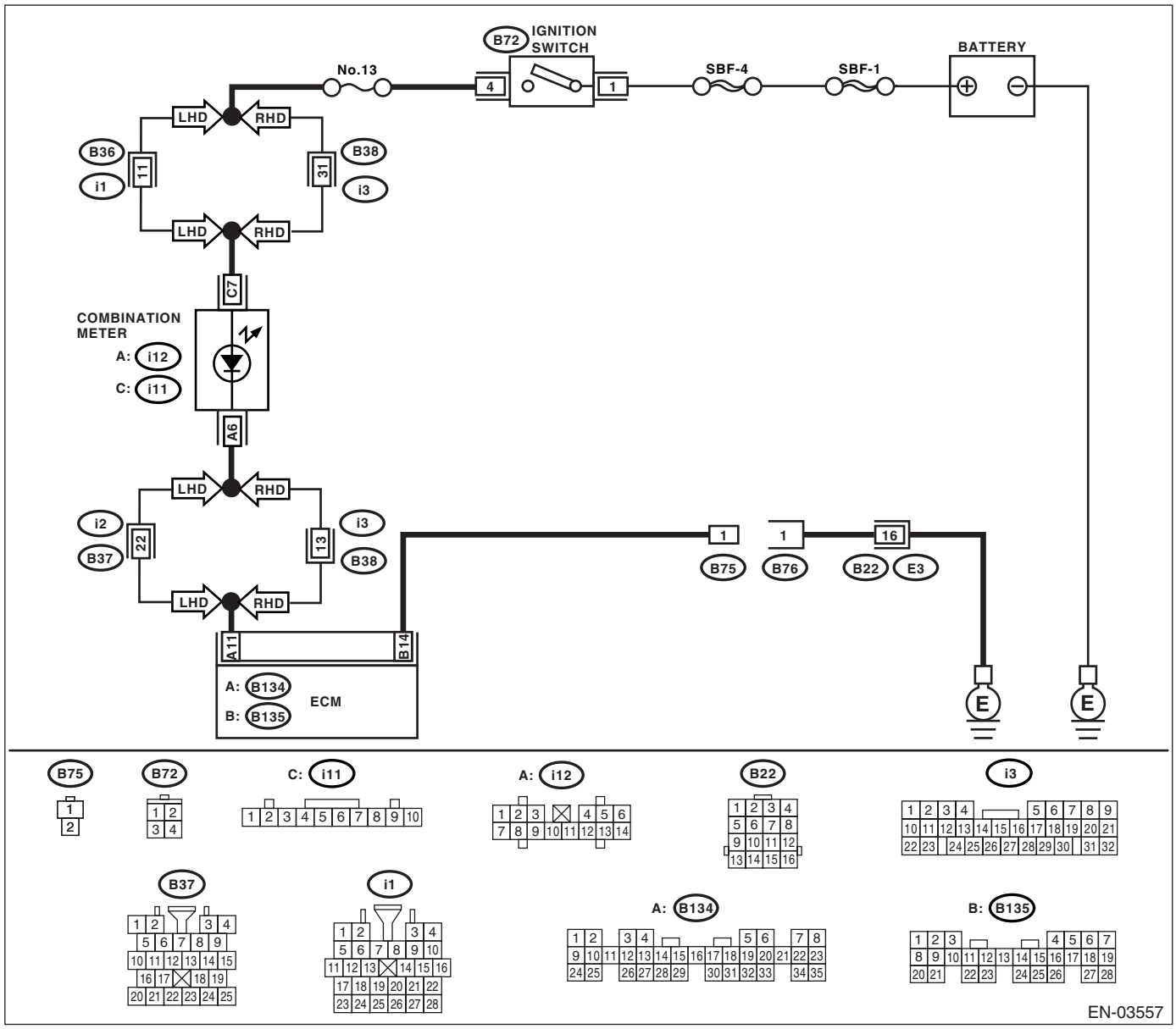
DIAGNOSIS:

- The malfunction indicator light circuit is open or shorted.
- Test mode connector circuit is in open.

TROUBLE SYMPTOM:

During inspection mode, the malfunction indicator light does not blink at a cycle of 3 Hz.

WIRING DIAGRAM:



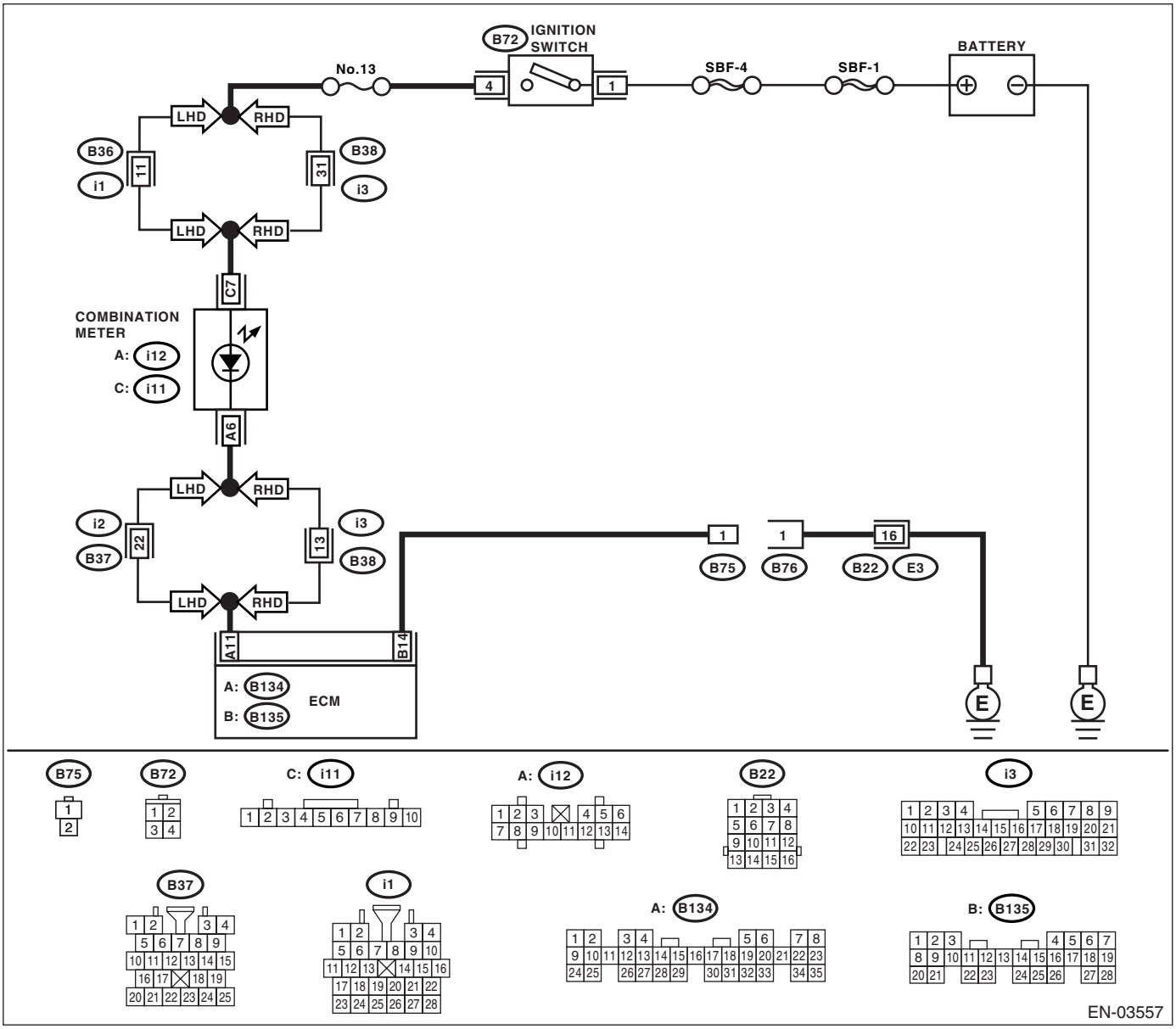
	Step	Check	Yes	No
1	**CHECK STATUS OF MALFUNCTION INDICATOR LIGHT.** 1) Turn the ignition switch to OFF. 2) Disconnect the test mode connector at lower portion of instrument panel (on driver's side). 3) Turn the ignition switch to ON.	Does the malfunction indicator light come on?	Go to step **2.**	Repair the malfunction indicator light circuit. <Ref. to EN(H4SOw/oOBD)(diag)-31, MALFUNCTION INDICATOR LIGHT DOES NOT COME ON, Malfunction Indicator Light.>
2	**CHECK OUTPUT SIGNAL FROM ECM.** Measure the voltage between test mode connector and chassis ground. ***Connector & terminal*** ***(B75) No. 1 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **3.**	Go to step **5.**
3	**CHECK HARNESS BETWEEN ECM AND TEST MODE CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance of harness between ECM and test mode connector. ***Connector & terminal*** ***(B135) No. 14 — (B75) No. 1:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and test mode connector
4	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair the poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H4SOw/oOBD)-42, Engine Control Module (ECM).>
5	**CHECK HARNESS BETWEEN TEST MODE CONNECTOR AND CHASSIS GROUND.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance of harness between test mode connector and chassis ground. ***Connector & terminal*** ***(B76) No. 1 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **6.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between test mode connector and chassis ground
6	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair the poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H4SOw/oOBD)-42, Engine Control Module (ECM).>

F: MALFUNCTION INDICATOR LIGHT REMAINS BLINKING.

DIAGNOSIS:
Test mode connector circuit is shorted.

TROUBLE SYMPTOM:
Even though test mode connector is disconnected, the malfunction indicator light blinks at a cycle of 3 Hz when ignition switch is turned to ON.

WIRING DIAGRAM:



Step		Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM CONNECTOR AND ENGINE GROUNDING TERMINAL.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance of harness between ECM connector and engine ground. ***Connector & terminal*** ***(B135) No. 14 — Engine ground:***	Is the resistance less than 5 Ω?	Repair the short circuit in harness between ECM and test mode connector.	Replace the ECM. <Ref. to FU(H4SOw/oOBD)-42, Engine Control Module (ECM).>

12.Diagnostics for Engine Starting Failure

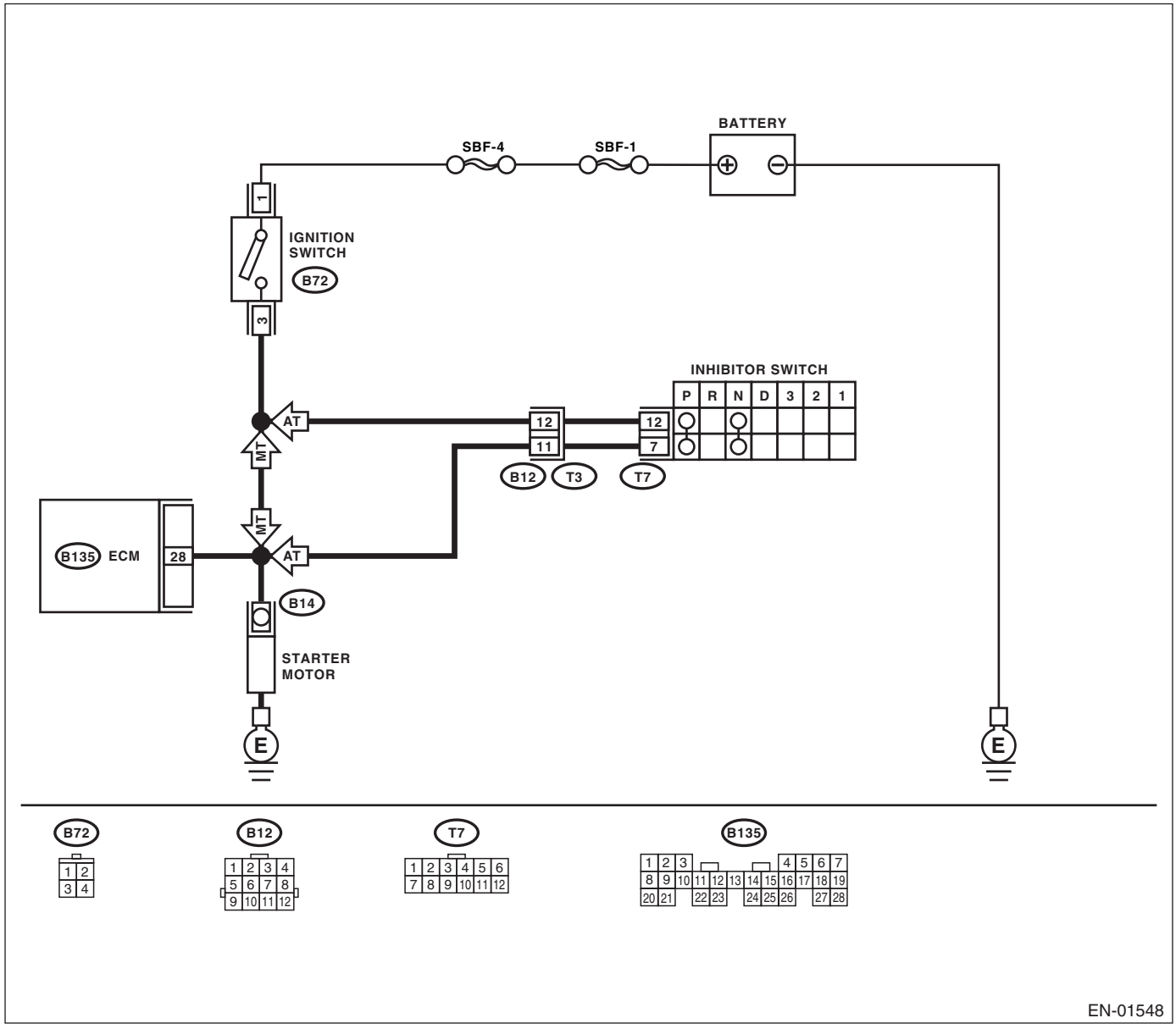
A: PROCEDURE

1. Inspection of starter motor circuit. <Ref. to EN(H4SOw/oOBD)(diag)-38, STARTER MOTOR CIRCUIT, Diagnostics for Engine Starting Failure.>
↓
2. Inspection of ECM power supply and ground line. <Ref. to EN(H4SOw/oOBD)(diag)-41, CHECK POWER SUPPLY AND GROUND LINE OF ENGINE CONTROL MODULE (ECM), Diagnostics for Engine Starting Failure.>
↓
3. Inspection of ignition control system. <Ref. to EN(H4SOw/oOBD)(diag)-44, IGNITION CONTROL SYSTEM, Diagnostics for Engine Starting Failure.>
↓
4. Inspection of fuel pump circuit. <Ref. to EN(H4SOw/oOBD)(diag)-48, FUEL PUMP CIRCUIT, Diagnostics for Engine Starting Failure.>
↓
5. Inspection of fuel injector circuit. <Ref. to EN(H4SOw/oOBD)(diag)-51, FUEL INJECTOR CIRCUIT, Diagnostics for Engine Starting Failure.>

B: STARTER MOTOR CIRCUIT

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory and inspection modes. <Ref. to EN(H4SOw/oOBD)(diag)-27, OPERATION, Clear Memory Mode.> and <Ref. to EN(H4SOw/oOBD)(diag)-25, PROCEDURE, Inspection Mode.>

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK OPERATION OF STARTER MOTOR.**	Does the starter motor operate when the switch starts?	Go to step **2.**	Go to step **3.**
2	**CHECK DTC.** <Ref. to EN(H4SOw/oOBD)(diag)-24, OPERATION, Read Diagnostic Trouble Code (DTC).>	Is the DTC stored in memory? <Ref. to EN(H4SOw/oOBD)(diag)-54, LIST, List of Diagnostic Trouble Code (DTC).>	Record the DTC. Repair the trouble cause. <Ref. to EN(H4SOw/oOBD)(diag)-56, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Go to step **3.**

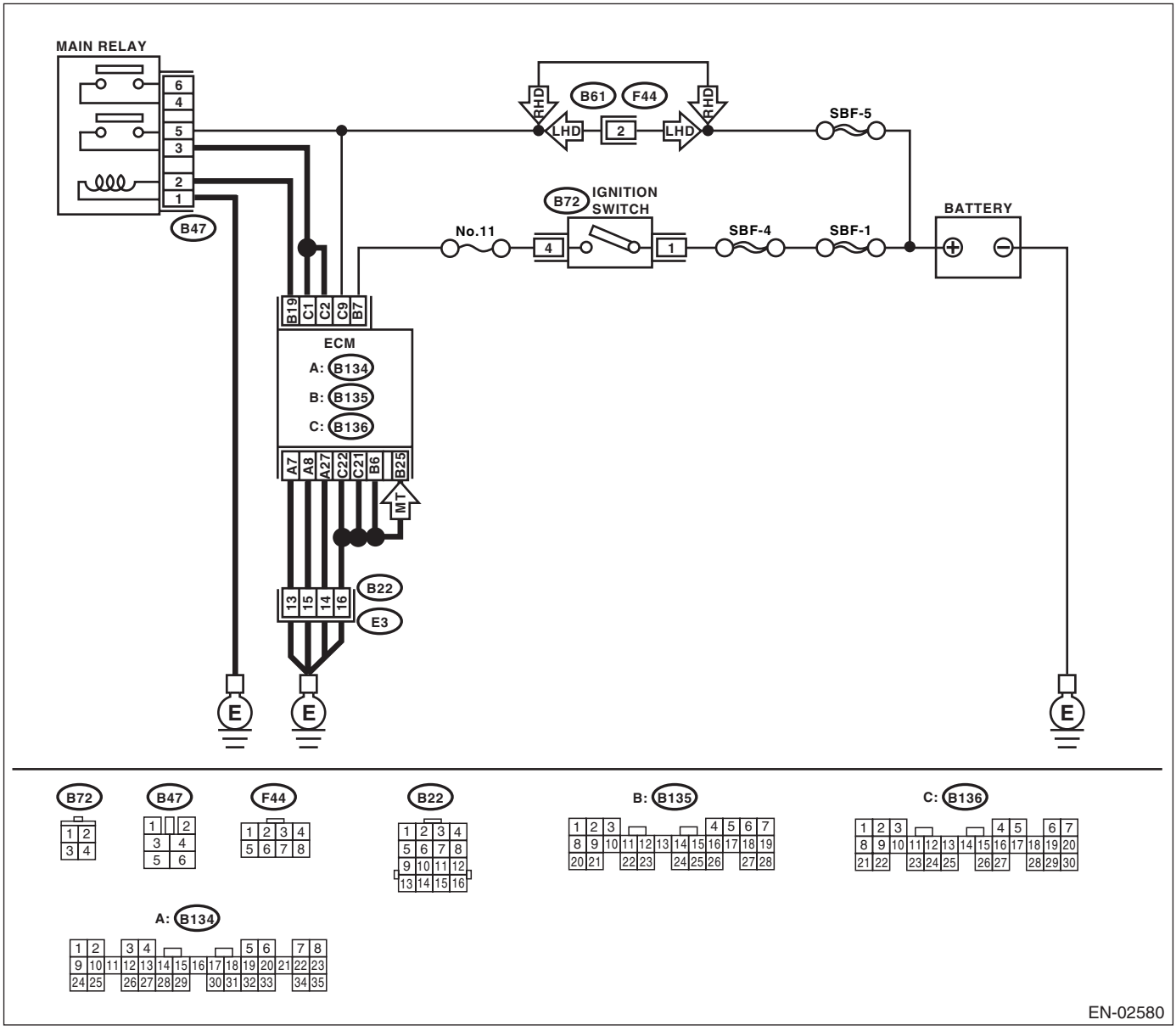
	Step	Check	Yes	No
3	**CHECK INPUT SIGNAL FOR STARTER MOTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from starter motor. 3) Turn the ignition switch to START. 4) Measure the power supply voltage between starter motor connector terminal and engine ground. ***Connector & terminal*** ***(B14) No. 1 (+) — Engine ground (−):*** NOTE: On AT model, place the selector lever in the "P" or "N" position.	Is the voltage more than 10 V?	Check the starter motor. <Ref. to SC(H4SO)-11, INSPECTION, Starter.>	Go to step **4.**
4	**CHECK HARNESS BETWEEN ECM AND STARTER MOTOR CIRCUIT.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between starter motor and ECM. ***Connector & terminal*** ***(B14) No. 1 — Engine ground:***	Is the resistance less than 1 Ω?	Repair the ground short circuit.	Go to step **5.**
5	**CHECK HARNESS BETWEEN ECM AND STARTER MOTOR CIRCUIT.** 1) Turn the ignition switch to START. 2) Measure the resistance of fuse. ***Connector & terminal*** ***(B14) No. 1 — Engine ground:***	Is the resistance less than 1 Ω?	Go to step **6.**	Repair the ground short circuit.
6	**CHECK HARNESS BETWEEN BATTERY AND IGNITION SWITCH CONNECTOR.** 1) Ignition the switch to OFF. 2) Disconnect the connector from ignition switch. 3) Measure the power supply voltage between ignition switch connector and chassis ground. ***Connector & terminal*** ***(B72) No. 1 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **7.**	Repair the open circuit in harness between ignition switch and battery.
7	**CHECK HARNESS BETWEEN BATTERY AND IGNITION SWITCH CONNECTOR.** 1) Connect the connector to ignition switch. 2) Turn the ignition switch to START. 3) Measure the voltage between ignition switch and chassis ground. ***Connector & terminal*** ***(B72) No. 3 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **8.**	Replace the ignition switch.
8	**CHECK TRANSMISSION TYPE.**	Is the vehicle AT?	Go to step **9.**	Repair the open circuit between ignition switch and starter motor circuit.
9	**CHECK INHIBITOR SWITCH CIRCUIT.** 1) Turn the ignition switch to OFF. 2) Place the selector lever in the "P" or "N" position. 3) Separate the transmission harness connector. 4) Measure the resistance between transmission harness connector receptacle's terminals. ***Connector & terminal*** ***(T3) No. 11 — No. 12:***	Is the resistance less than 1 Ω?	Repair the open circuit in harness between starter motor and ignition switch connector.	Go to step **10.**

	Step	Check	Yes	No
10	**CHECK TRANSMISSION HARNESS.** 1) Disconnect the connector from inhibitor switch. 2) Measure the resistance of harness between transmission harness and inhibitor switch connector. ***Connector & terminal*** ***(T3) No. 11 — (T7) No. 7:*** ***(T3) No. 12 — (T7) No. 12:***	Is the resistance less than 1 Ω?	Go to step **11.**	Repair the open circuit in harness between transmission harness and inhibitor switch connector.
11	**CHECK POOR CONTACT.** Check poor contact in inhibitor switch connector.	Is there poor contact in inhibitor switch connector?	Repair the poor contact in inhibitor switch connector.	Replace the inhibitor switch.

C: CHECK POWER SUPPLY AND GROUND LINE OF ENGINE CONTROL MODULE (ECM)

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory and inspection modes. <Ref. to EN(H4SOw/oOBD)(diag)-27, OPERATION, Clear Memory Mode.> and <Ref. to EN(H4SOw/oOBD)(diag)-25, PROCEDURE, Inspection Mode.>

WIRING DIAGRAM:



Diagnostics for Engine Starting Failure

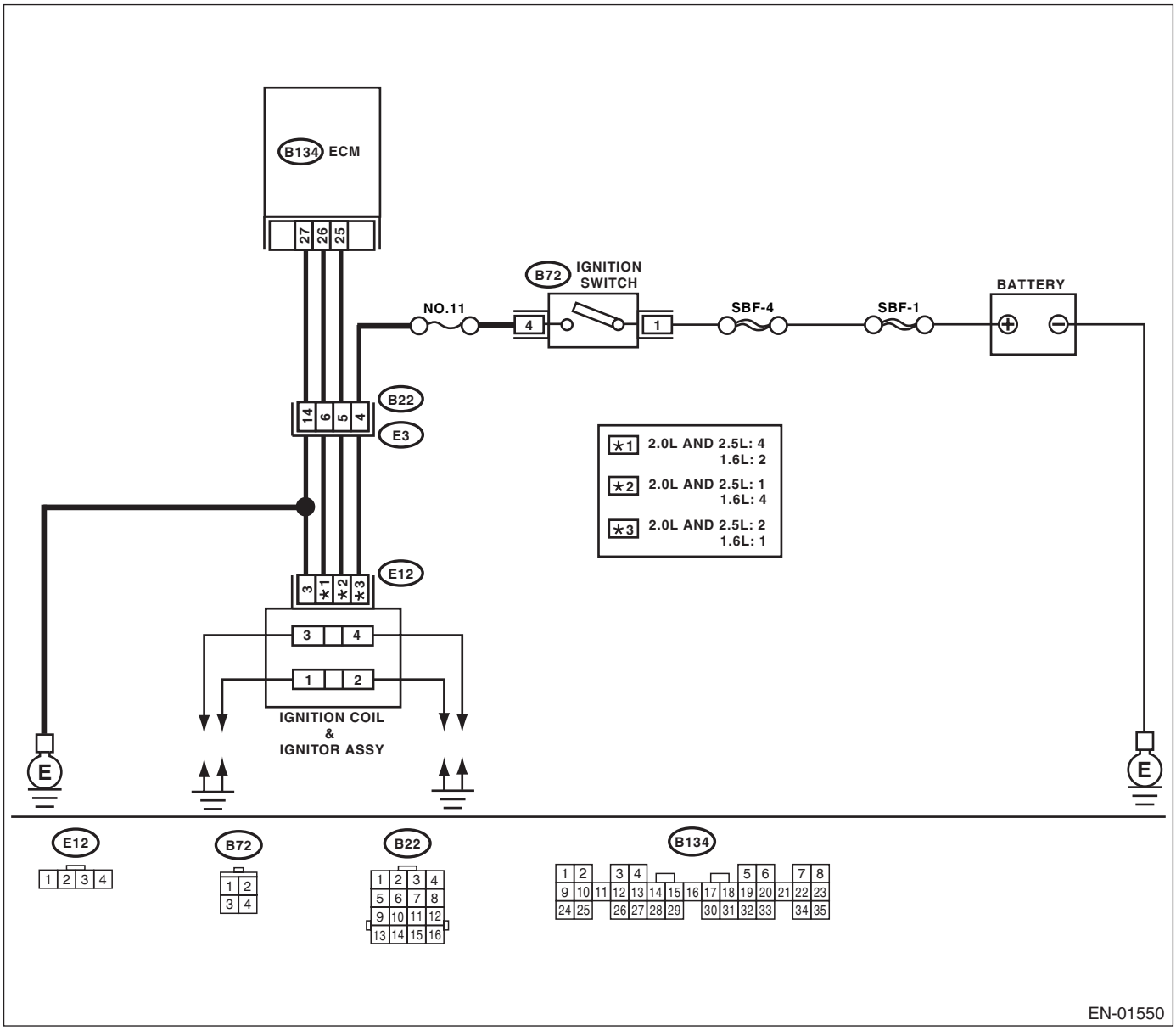
	Step	Check	Yes	No
1	**CHECK MAIN RELAY.** 1) Turn the ignition switch to OFF. 2) Remove the main relay. 3) Connect the battery to main relay terminals No. 1 and No. 2. 4) Measure the resistance between main relay terminals. ***Terminals*** ***No. 3 — No. 5:*** ***No. 4 — No. 6:***	Is the resistance less than 10 Ω?	Go to step **2.**	Replace the main relay.
2	**CHECK GROUND CIRCUIT OF ECM.** 1) Disconnect the connector from ECM. 2) Measure the resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***(B136) No. 21 — Chassis ground:*** ***(B136) No. 22 — Chassis ground:*** ***(B134) No. 27 — Chassis ground:*** ***(B134) No. 8 — Chassis ground:*** ***(B134) No. 7 — Chassis ground:*** ***(B135) No. 25 — Chassis ground: (MT model)*** ***(B135) No. 6 — Chassis ground:***	Is the resistance less than 5 Ω?	Go to step **3.**	Repair the open circuit in harness between ECM connector and engine grounding terminal.
3	**CHECK INPUT VOLTAGE OF ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 9 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **4.**	Repair the open or ground short circuit of power supply circuit.
4	**CHECK INPUT VOLTAGE OF ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 7 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **5.**	Repair the open or ground short circuit of power supply circuit.
5	**CHECK HARNESS BETWEEN ECM AND MAIN RELAY CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 19 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **6.**	Repair the ground short circuit in harness between ECM connector and main relay connector, and then replace the ECM.
6	**CHECK OUTPUT VOLTAGE FROM ECM.** 1) Connect the connector to ECM. 2) Turn the ignition switch to ON. 3) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 19 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **7.**	Replace the ECM.
7	**CHECK INPUT VOLTAGE OF MAIN RELAY.** Check the voltage between main relay connector and chassis ground. ***Connector & terminal*** ***(B47) No. 2 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **8.**	Repair the open circuit in harness between ECM connector and main relay connector.

	Step	Check	Yes	No
8	**CHECK GROUND CIRCUIT OF MAIN RELAY.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between main relay connector and chassis ground. ***Connector & terminal*** ***(B47) No. 1 — Chassis ground:***	Is the resistance less than 5 Ω?	Go to step **9.**	Repair the open circuit between main relay and chassis ground.
9	**CHECK INPUT VOLTAGE OF MAIN RELAY.** Measure the voltage between main relay connector and chassis ground. ***Connector & terminal*** ***(B47) No. 5 (+) — Chassis ground (−):*** ***(B47) No. 6 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **10.**	Repair the open or ground short circuit in harness of power supply circuit.
10	**CHECK INPUT VOLTAGE OF ECM.** 1) Connect the main relay connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 1 (+) — Chassis ground (−):*** ***(B136) No. 2 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Check the ignition control system. <Ref. to EN(H4SOw/oOBD)(diag)-44, IGNITION CONTROL SYSTEM, Diagnostics for Engine Starting Failure.>	Repair the open or ground short circuit in harness between ECM connector and main relay connector.

D: IGNITION CONTROL SYSTEM

CAUTION:
After repair or replacement of the faulty parts, conduct the Clear Memory and inspection modes. <Ref. to EN(H4SOw/oOBD)(diag)-27, OPERATION, Clear Memory Mode.> and <Ref. to EN(H4SOw/oOBD)(diag)-25, PROCEDURE, Inspection Mode.>

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK IGNITION SYSTEM FOR SPARKS.** 1) Remove the plug cord cap from each spark plug. 2) Install new spark plug on the plug cord cap. **CAUTION:** **Do not remove the spark plug from engine.** 3) Contact the spark plug's thread portion on engine. 4) While opening the throttle valve fully, crank engine to check that spark occurs at each cylinder.	Does spark occur at each cylinder?	Check the fuel pump system. <Ref. to EN(H4SOw/oOBD)(diag)-48, FUEL PUMP CIRCUIT, Diagnostics for Engine Starting Failure.>	Go to step **2.**
2	**CHECK POWER SUPPLY CIRCUIT FOR IGNITION COIL & IGNITOR ASSY.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ignition coil & ignitor ASSY. 3) Turn the ignition switch to ON. 4) Measure the power supply voltage between ignition coil & ignitor ASSY connector and engine ground. ***Connector & terminal*** ***1.6 L*** ***(E12) No. 1 (+) — Engine ground (−):*** ***2.0 L and 2.5 L*** ***(E12) No. 2 (+) — Engine ground (−):***	Is the voltage more than 10 V?	Go to step **3.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit or ground short in harness between ignition coil & ignitor ASSY, and ignition switch connector • Poor contact in coupling connector (B22)
3	**CHECK HARNESS OF IGNITION COIL & IGNITOR ASSY GROUND CIRCUIT.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between ignition coil & ignitor ASSY connector and engine ground. ***Connector & terminal*** ***(E12) No. 3 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **4.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ignition coil & ignitor ASSY connector and engine grounding terminal
4	**CHECK IGNITION COIL & IGNITOR ASSY.** 1) Remove the spark plug cords. 2) Measure the resistance between spark plug cord contact portions to check secondary coil. ***Terminals*** ***1.6 L*** ***No. 4 — No. 1:*** ***2.0 L and 2.5 L*** ***No. 1 — No. 2:***	Is the resistance 10 — 15 kΩ?	Go to step **5.**	Replace the ignition coil & ignitor ASSY.
5	**CHECK IGNITION COIL & IGNITOR ASSY.** Measure the resistance between spark plug cord contact portions to check secondary coil. ***Terminals*** ***1.6 L*** ***No. 3 — No. 2:*** ***2.0 L and 2.5 L*** ***No. 3 — No. 4:***	Is the resistance 10 — 15 kΩ?	Go to step **6.**	Replace the ignition coil & ignitor ASSY.

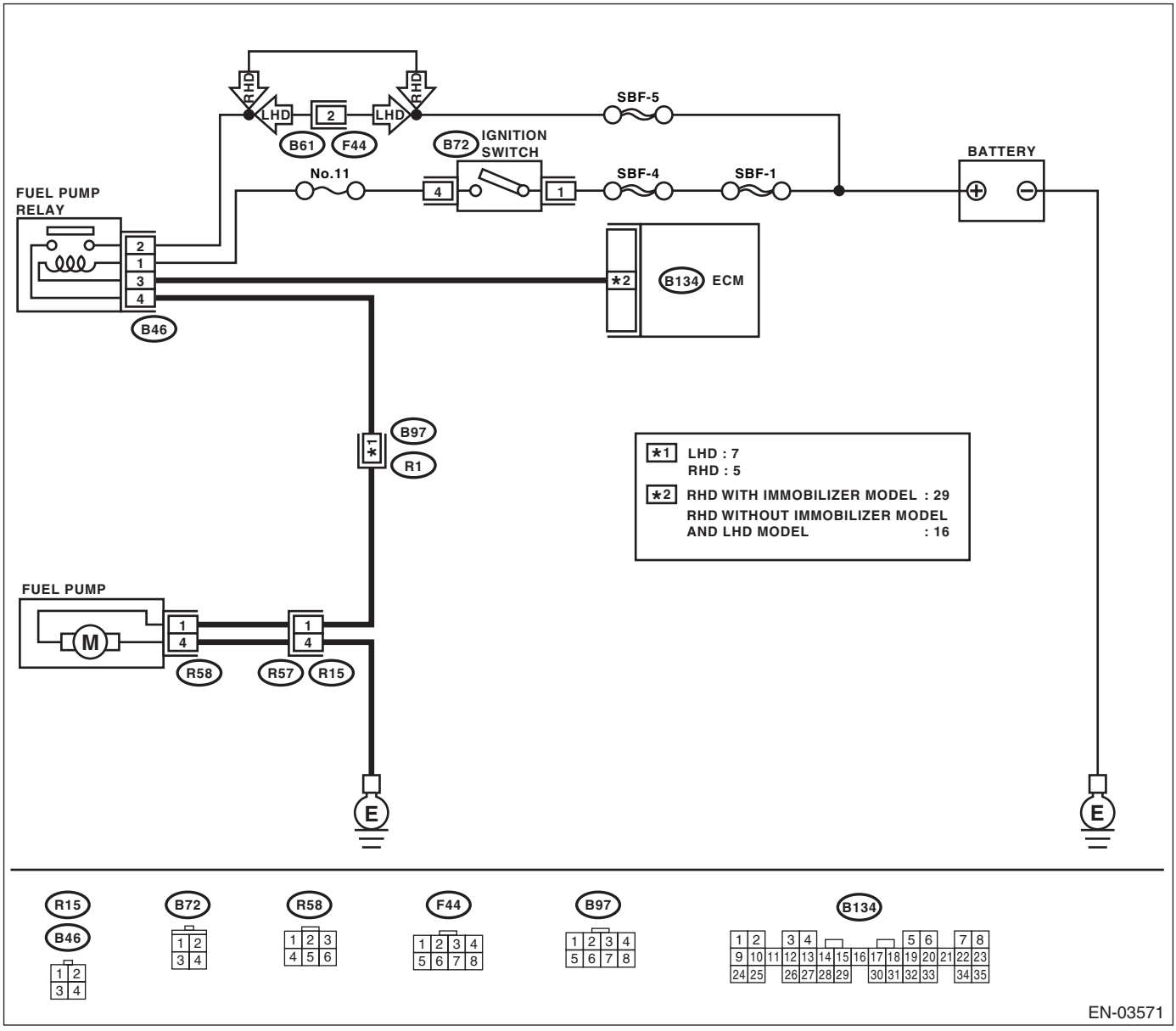
	Step	Check	Yes	No
6	**CHECK INPUT SIGNAL FOR IGNITION COIL & IGNITOR ASSY.** Check if the voltage varies synchronously with engine speed when cranking, while monitoring voltage between ignition coil & ignitor ASSY connector and engine ground. ***Connector & terminal*** ***1.6 L*** ***(E12) No. 4 (+) — Engine ground (–):*** ***2.0 L and 2.5 L*** ***(E12) No. 1 (+) — Engine ground (–):***	Is the voltage more than 10 V?	Go to step **7.**	Replace the ignition coil & ignitor ASSY.
7	**CHECK INPUT SIGNAL FOR IGNITION COIL & IGNITOR ASSY.** Check if the voltage varies synchronously with engine speed when cranking, while monitoring voltage between ignition coil & ignitor ASSY connector and engine ground. ***Connector & terminal*** ***1.6 L*** ***(E12) No. 2 (+) — Engine ground (–):*** ***2.0 L and 2.5 L*** ***(E12) No. 4 (+) — Engine ground (–):***	Is the voltage more than 10 V?	Go to step **8.**	Replace the ignition coil & ignitor ASSY.
8	**CHECK HARNESS BETWEEN ECM AND IGNITION COIL & IGNITOR ASSY CONNECTOR.** 1) Disconnect the connector from ECM. 2) Measure the resistance of harness between ECM and ignition coil & ignitor ASSY connector. ***Connector & terminal*** ***1.6 L*** ***(B134) No. 26 — (E12) No. 2:*** ***2.0 L and 2.5 L*** ***(B134) No. 26 — (E12) No. 4:***	Is the resistance less than 1 Ω?	Go to step **9.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and ignition coil & ignitor ASSY connector • Poor contact in a coupling connector (B22)
9	**CHECK HARNESS BETWEEN ECM AND IGNITION COIL & IGNITOR ASSY CONNECTOR.** Measure the resistance of harness between ECM and ignition coil & ignitor ASSY connector. ***Connector & terminal*** ***1.6 L*** ***(B134) No. 25 — (E12) No. 4:*** ***2.0 L and 2.5 L*** ***(B134) No. 25 — (E12) No. 1:***	Is the resistance less than 1 Ω?	Go to step **10.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and ignition coil & ignitor ASSY connector • Poor contact in a coupling connector (B22)

	Step	Check	Yes	No
10	**CHECK HARNESS BETWEEN ECM AND IGNITION COIL & IGNITOR ASSY CONNECTOR.** Measure the resistance of harness between ECM and ignition coil & ignitor ASSY connector. ***Connector & terminal:*** ***(B134) No. 27 — (E12) No. 3:***	Is the resistance less than 1 Ω?	Go to step **11.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and ignition coil & ignitor ASSY connector • Poor contact in a coupling connector (B22)
11	**CHECK HARNESS BETWEEN ECM AND IGNITION COIL & IGNITOR ASSY CONNECTOR.** Measure the resistance of harness between ECM and chassis ground. ***Connector & terminal:*** ***(B134) No. 26 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **12.**	Repair the ground short circuit in harness between ECM and ignition coil & ignitor ASSY connector.
12	**CHECK HARNESS BETWEEN ECM AND IGNITION COIL & IGNITOR ASSY CONNECTOR.** Measure the resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 25 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **13.**	Repair the ground short circuit in harness between ECM and ignition coil & ignitor ASSY connector.
13	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair the poor contact in ECM connector.	Check the spark plug and spark plug cord. <Ref. to IG(H4SO)-6, INSPECTION, Spark Plug.> <Ref. to IG(H4SO)-10, INSPECTION, Spark Plug Cord.>

E: FUEL PUMP CIRCUIT

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory and inspection modes. <Ref. to EN(H4SOw/oOBD)(diag)-27, OPERATION, Clear Memory Mode.> and <Ref. to EN(H4SOw/oOBD)(diag)-25, PROCEDURE, Inspection Mode.>

WIRING DIAGRAM:



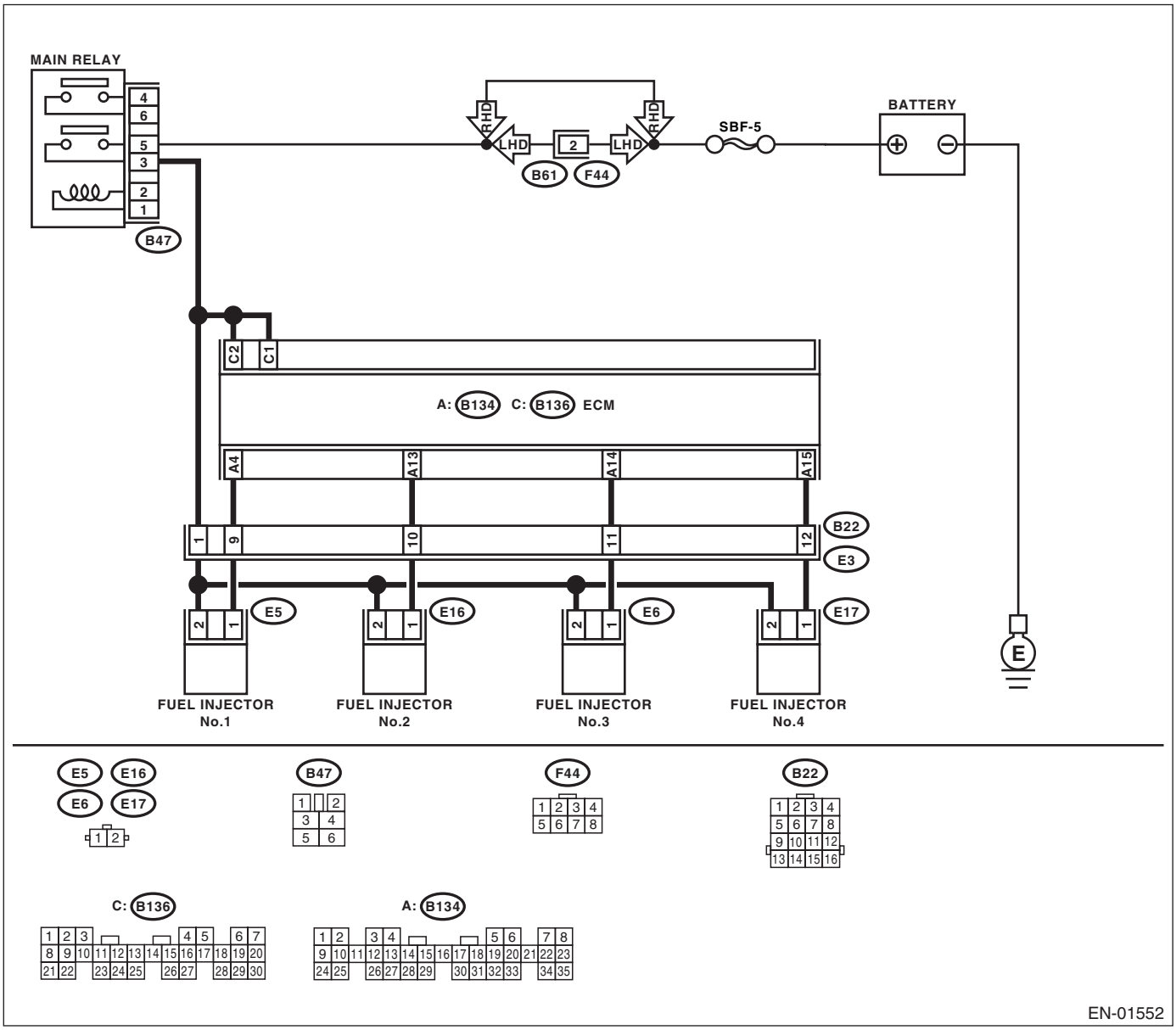
	Step	Check	Yes	No
1	**CHECK OPERATING SOUND OF FUEL PUMP.** Make sure that the fuel pump is in operation for 2 seconds when turning ignition switch to ON. NOTE: Fuel pump operation check can also be executed using "COMPULSORY VALVE OPERATION CHECK MODE". For the procedure, refer to "COMPULSORY VALVE OPERATION CHECK MODE". <Ref. to EN(H4SOw/oOBD)(diag)-28, OPERATION, Compulsory Valve Operation Check Mode.>	Does the fuel pump produce operating sound?	Check the fuel injector circuit. <Ref. to EN(H4SOw/oOBD)(diag)-51, FUEL INJECTOR CIRCUIT, Diagnostics for Engine Starting Failure.>	Go to step **2.**
2	**CHECK GROUND CIRCUIT OF FUEL PUMP.** 1) Turn the ignition switch to OFF. 2) Raise the rear seat, and turn the floor mat up. 3) Remove the service hole cover. 4) Disconnect the connector from fuel pump. 5) Measure the resistance of harness connector between fuel pump and chassis ground. ***Connector & terminal*** ***(R58) No. 4 — Chassis ground:***	Is the resistance less than 5 Ω?	Go to step **3.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between fuel pump connector and chassis grounding terminal • Poor contact in coupling connector (R15) and (B97)
3	**CHECK POWER SUPPLY TO FUEL PUMP.** 1) Turn the ignition switch to ON. 2) Measure the voltage of power supply circuit between fuel pump connector and chassis ground. ***Connector & terminal*** ***(R58) No. 1 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Replace the fuel pump.	Go to step **4.**
4	**CHECK HARNESS BETWEEN FUEL PUMP AND FUEL PUMP RELAY CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance of harness between fuel pump and fuel pump relay connector. ***Connector & terminal*** ***(R58) No. 1 — (B46) No. 4:***	Is the resistance less than 1 Ω?	Go to step **5.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between fuel pump and fuel pump relay connector • Poor contact in coupling connectors (R15) and (B97)
5	**CHECK HARNESS BETWEEN FUEL PUMP AND FUEL PUMP RELAY CONNECTOR.** Measure the resistance of harness between fuel pump and fuel pump relay connector. ***Connector & terminal*** ***(R58) No. 1 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **6.**	Repair the ground short circuit in harness between fuel pump and fuel pump relay connector.

	Step	Check	Yes	No
6	**CHECK FUEL PUMP RELAY.** 1) Disconnect the connector from fuel pump relay. 2) Remove the fuel pump relay from bracket. 3) Connect the battery to fuel pump relay connector terminals No. 1 and No. 3. 4) Measure the resistance between connector terminals of fuel pump relay. ***Terminals*** ***No. 2 — No. 4:***	Is the resistance less than 10 Ω?	Go to step **7.**	Replace the fuel pump relay.
7	**CHECK HARNESS BETWEEN ECM AND FUEL PUMP RELAY CONNECTOR.** 1) Disconnect the connectors from ECM. 2) Measure the resistance of harness between ECM and fuel pump relay connector. ***Connector & terminal*** ***With Immobilizer*** ***(B134) No. 29 — (B46) No. 3:*** ***Without Immobilizer and LHD*** ***(B134) No. 16 — (B46) No. 3:***	Is the resistance less than 1 Ω?	Go to step **8.**	Repair the open circuit in harness between ECM and fuel pump relay connector.
8	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair the poor contact in ECM connector.	Check the fuel injector circuit. <Ref. to EN(H4SOw/oOBD)(diag)-51, FUEL INJECTOR CIRCUIT, Diagnostics for Engine Starting Failure.>

F: FUEL INJECTOR CIRCUIT

CAUTION:
- **Check or repair only the faulty parts.**
- **After repair or replacement of the faulty parts, conduct the Clear Memory and inspection modes. <Ref. to EN(H4SOw/oOBD)(diag)-27, OPERATION, Clear Memory Mode.> and <Ref. to EN(H4SOw/oOBD)(diag)-25, PROCEDURE, Inspection Mode.>**

WIRING DIAGRAM:



Step		Check	Yes	No
1	**CHECK OPERATION OF EACH FUEL INJECTOR.** While cranking the engine, check that each fuel injector emits “operating” sound. Use a sound scope or attach a screwdriver to injector for this check.	Does the fuel injector emit “operating” sound?	Check the fuel pressure. <Ref. to ME(H4SO)-29, INSPECTION, Fuel Pressure.>	Go to step **2.**

	Step	Check	Yes	No
2	**CHECK POWER SUPPLY TO EACH FUEL INJECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from each cylinder fuel injector. 3) Turn the ignition switch to ON. 4) Measure the power supply voltage between the fuel injector terminal and engine ground. ***Connector & terminal*** ***#1 (E5) No. 2 (+) — Engine ground (−):*** ***#2 (E16) No. 2 (+) — Engine ground (−):*** ***#3 (E6) No. 2 (+) — Engine ground (−):*** ***#4 (E17) No. 2 (+) — Engine ground (−):***	Is the voltage more than 10 V?	Go to step **3.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between main relay and fuel injector connector • Poor contact in main relay connector • Poor contact in coupling connector (B22) • Poor contact in fuel injector connector
3	**CHECK EACH FUEL INJECTOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between each fuel injector terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 5 — 20 Ω?	Go to step **4.**	Replace the faulty fuel injector.
4	**CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR.** 1) Disconnect the connector from ECM. 2) Connect the connector to #1 fuel injector. 3) Measure the resistance of harness between ECM and fuel injector connector. ***Connector & terminal*** ***(B134) No. 4 — (B136) No. 2:***	Is the resistance 5 — 20 Ω?	Go to step **5.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and fuel injector connector • Poor contact in coupling connector (B22)
5	**CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR.** Measure the resistance of harness between ECM and fuel injector connector. ***Connector & terminal*** ***(B134) No. 4 — Chassis ground:***	Is the resistance less than 1 Ω?	Repair the ground short circuit in harness between ECM and fuel injector connector.	Go to step **6.**
6	**CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR.** 1) Connect the connector to #2 fuel injector. 2) Measure the resistance of harness between ECM and fuel injector connector. ***Connector & terminal*** ***(B134) No. 13 — (B136) No. 2:***	Is the resistance 5 — 20 Ω?	Go to step **7.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and fuel injector connector • Poor contact in coupling connector (B22)

	Step	Check	Yes	No
7	**CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR.** Measure the resistance of harness between ECM and fuel injector connector. ***Connector & terminal*** ***(B134) No. 13 — Chassis ground:***	Is the resistance less than 1 Ω?	Repair the ground short circuit in harness between ECM and fuel injector connector.	Go to step **8.**
8	**CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR.** 1) Connect the connector to #3 fuel injector. 2) Measure the resistance of harness between ECM and fuel injector connector. ***Connector & terminal*** ***(B134) No. 14 — (B136) No. 2:***	Is the resistance 5 — 20 Ω?	Go to step **9.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and fuel injector connector • Poor contact in coupling connector (B22)
9	**CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR.** Measure the resistance of harness between ECM and fuel injector connector. ***Connector & terminal*** ***(B134) No. 14 — Chassis ground:***	Is the resistance less than 1 Ω?	Repair the ground short circuit in harness between ECM and fuel injector connector.	Go to step **10.**
10	**CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR.** 1) Connect the connector to #4 fuel injector. 2) Measure the resistance of harness between ECM and fuel injector connector. ***Connector & terminal*** ***(B134) No. 15 — (B136) No. 2:***	Is the resistance 5 — 20 Ω?	Go to step **11.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and fuel injector connector • Poor contact in coupling connector (B22)
11	**CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR.** Measure the resistance of harness between ECM and fuel injector connector. ***Connector & terminal*** ***(B134) No. 15 — Chassis ground:***	Is the resistance less than 1 Ω?	Repair the ground short circuit in harness between ECM and fuel injector connector.	Go to step **12.**
12	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair the poor contact in ECM connector.	Inspection using “General Diagnostic Table”. <Ref. to EN(H4SO)(diag)-249, INSPECTION, General Diagnostic Table.>

13.List of Diagnostic Trouble Code (DTC)

A: LIST

DTC	Item	Contents of diagnosis	Index
11	Crankshaft position sensor	• No signal entered from crankshaft position sensor when starter switch is ON. • Harness connector between ECM and crankshaft position sensor is in short or open.	<Ref. to EN(H4SOw/oOBD)(diag)-56, DTC 11 CRANKSHAFT POSITION SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
12	Starter switch	• Starter switch signal is abnormal. • Harness connector between ECM and starter switch is in short or open.	<Ref. to EN(H4SOw/oOBD)(diag)-58, DTC 12 STARTER SWITCH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
13	Camshaft position sensor	• No signal entered from camshaft position sensor, but signal entered from crankshaft position sensor. • Harness connector between ECM and camshaft position sensor is in short or open.	<Ref. to EN(H4SOw/oOBD)(diag)-60, DTC 13 CAMSHAFT POSITION SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
21	Engine coolant temperature sensor	• Engine coolant temperature sensor signal is abnormal. • Harness connector between ECM and engine coolant temperature sensor is in short or open.	<Ref. to EN(H4SOw/oOBD)(diag)-62, DTC 21 ENGINE COOLANT TEMPERATURE SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
22	Knock sensor	• Knock sensor signal is abnormal. • Harness connector between ECM and knock sensor is in short or open.	<Ref. to EN(H4SOw/oOBD)(diag)-65, DTC 22 KNOCK SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
24	Idle air control solenoid valve	• Idle air control solenoid valve is not in function. • Harness connector between ECM and idle air control solenoid valve is in short or open.	<Ref. to EN(H4SOw/oOBD)(diag)-67, DTC 24 IDLE AIR CONTROL SOLENOID VALVE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
26	Intake air temperature sensor	• Intake air temperature sensor signal is abnormal. • Harness connector between ECM and intake air temperature sensor is in short or open.	<Ref. to EN(H4SOw/oOBD)(diag)-70, DTC 26 INTAKE AIR TEMPERATURE SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
31	Throttle position sensor	• Throttle position sensor signal is abnormal. • Throttle position sensor is installed abnormally. • Harness connector between ECM and throttle position sensor is in short or open.	<Ref. to EN(H4SOw/oOBD)(diag)-72, DTC 31 THROTTLE POSITION SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
32	Oxygen sensor	• Oxygen sensor is not in function. • Harness connector between ECM and oxygen sensor is in short or open.	<Ref. to EN(H4SOw/oOBD)(diag)-74, DTC 32 OXYGEN SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
33	Vehicle speed signal	• Vehicle speed signal is abnormal. • Harness connector between ECM and vehicle speed sensor is in short or open.	<Ref. to EN(H4SOw/oOBD)(diag)-77, DTC 33 VEHICLE SPEED SIGNAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
35	Purge control solenoid valve	• Purge control solenoid valve is not in function. • Harness connector between ECM and purge control solenoid valve is in short or open.	<Ref. to EN(H4SOw/oOBD)(diag)-79, DTC 35 PURGE CONTROL SOLENOID VALVE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC	Item	Contents of diagnosis	Index
38	Torque control signal (AT)	• Abnormal signal is entered from TCM. • Harness connector between ECM and TCM is in short or open.	<Ref. to EN(H4SOw/oOBD)(diag)-82, DTC 38 TORQUE CONTROL SIGNAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
45	Manifold absolute pressure sensor	• Manifold absolute pressure sensor signal is abnormal. • Harness connector between ECM and Manifold absolute pressure sensor is in short or open.	<Ref. to EN(H4SOw/oOBD)(diag)-84, DTC 45 PRESSURE SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
46	CO resistor (General spec. vehicles)	• CO resistor signal is abnormal. • Harness connector between ECM and CO resistor is in short or open. • CO valve is not adjusted to specification.	<Ref. to EN(H4SOw/oOBD)(diag)-86, DTC 46 CO RESISTOR (GENERAL SPEC. VEHICLES), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
51	Neutral position switch (MT)	• Neutral position switch signal is abnormal. • Harness connector between ECM and neutral position switch is in short or open.	<Ref. to EN(H4SOw/oOBD)(diag)-88, DTC 51 NEUTRAL POSITION SWITCH (MT MODEL), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	Park/Neutral position switch (AT)	• Park/neutral position switch signal is abnormal. • Shift cable is connected abnormally. • Harness connector between ECM and inhibitor switch is in short or open.	<Ref. to EN(H4SOw/oOBD)(diag)-90, DTC 51 PARK/NEUTRAL POSITION SWITCH (AT MODEL), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
53*	Immobilizer system	Faulty immobilizer system.	<Ref. to IM(diag)-2, Basic Diagnostic Procedure.>
85	Charge system	Charge system is abnormal.	<Ref. to EN(H4SOw/oOBD)(diag)-92, DTC 85 CHARGE SYSTEM, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

*: Immobilizer system equipped model only

14.Diagnostic Procedure with Diagnostic Trouble Code (DTC)

A: DTC 11 CRANKSHAFT POSITION SENSOR

DIAGNOSIS:

- No signal entered from crankshaft position sensor when ignition switch is ON.
- The harness connector between ECM and crankshaft position sensor is open or shorted.

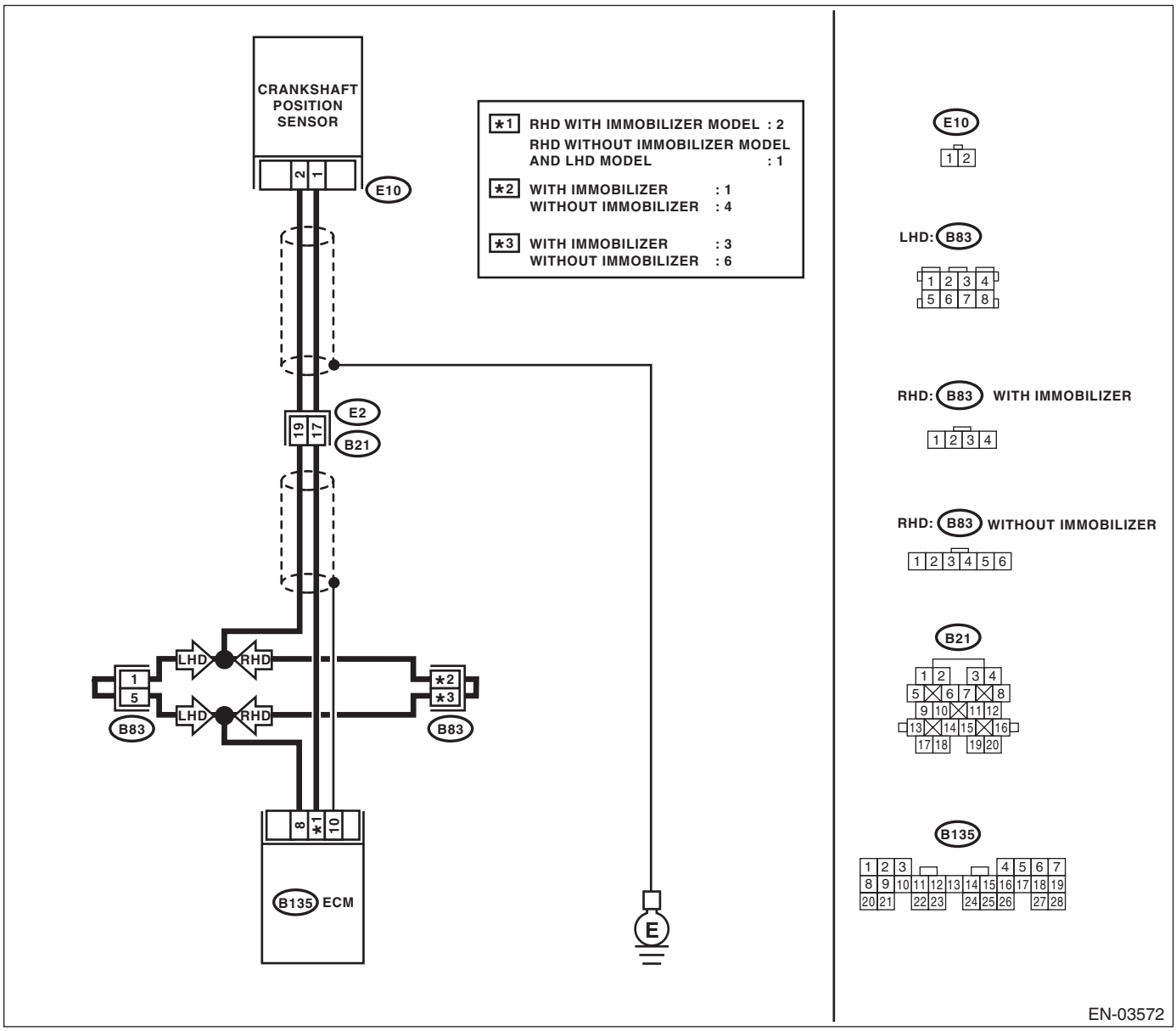
TROUBLE SYMPTOM:

- Engine stalls.
- Restarting impossible

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory and inspection modes. <Ref. to EN(H4SOw/oOBD)(diag)-27, OPERATION, Clear Memory Mode.> and <Ref. to EN(H4SOw/oOBD)(diag)-25, PROCEDURE, Inspection Mode.>

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK CONDITION OF CRANKSHAFT POSITION SENSOR INSTALLATION.**	Are the crankshaft position sensor installing bolts tightened securely?	Go to step **2.**	Tighten the crankshaft position sensor installing bolts securely.
2	**CHECK CRANKSHAFT POSITION SENSOR.** 1) Remove the crankshaft position sensor. 2) Measure the resistance between connector terminals of crankshaft position sensor. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 1 — 4 kΩ?	Go to step **3.**	Replace the crankshaft position sensor.
3	**CHECK HARNESS BETWEEN ECM AND CRANKSHAFT POSITION SENSOR CONNECTOR.** 1) Connect the connector to crankshaft position sensor. 2) Disconnect the connector from ECM. 3) Measure the resistance of harness between crankshaft position sensor connector and ECM. ***Connector & terminal*** ***With Immobilizer*** ***(B135) No. 8 — (B135) No. 2*** ***Without Immobilizer and LHD*** ***(B135) No. 8 — (B135) No. 1***	Is the resistance 1 — 5 kΩ?	Go to step **4.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between crankshaft position sensor and ECM connector • Poor contact in coupling connector (B21)
4	**CHECK HARNESS BETWEEN ECM AND CRANKSHAFT POSITION SENSOR CONNECTOR.** Measure the resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 8 — Chassis ground:***	Is the resistance less than 10 Ω?	Repair the ground short circuit in harness between crankshaft position sensor and ECM connector.	Go to step **5.**
5	**CHECK INPUT SIGNAL FOR ECM.** 1) Turn the ignition switch to OFF. 2) Set the oscilloscope probe at ECM connector terminal positive (+) and its ground lead at negative (−). 3) Measure the voltage indicated on oscilloscope while cranking engine. ***Connector & terminal*** ***With Immobilizer*** ***(B135) No. 2 (+) — (B135) No. 8 (−)*** ***Without Immobilizer and LHD*** ***(B135) No. 1 (+) — (B135) No. 8 (−)***	Is the voltage more than 400 mV?	Go to step **6.**	Replace the crankshaft position sensor.
6	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair the poor contact in ECM connector.	Go to step **7.**
7	**CHECK ECM.** 1) Connect all connectors. 2) Erase the memory. <Ref. to EN(H4SOw/oOBD)(diag)-27, OPERATION, Clear Memory Mode.> 3) Perform the inspection mode. <Ref. to EN(H4SOw/oOBD)(diag)-25, PROCEDURE, Inspection Mode.> 4) Read any DTC on the display. <Ref. to EN(H4SOw/oOBD)(diag)-24, OPERATION, Read Diagnostic Trouble Code (DTC).>	Is the same DTC as in current diagnosis still being output?	Replace the generator.	Go to step **8.**

Step	Check	Yes	No
8 CHECK ANY OTHER DTCs APPEARANCE.	Is any other DTC displayed?	Proceed with the diagnosis corresponding to the DTC.	A temporary poor contact.

B: DTC 12 STARTER SWITCH

DIAGNOSIS:

- The starter switch signal is abnormal.
- The harness connector between ECM and starter switch is open or shorted.

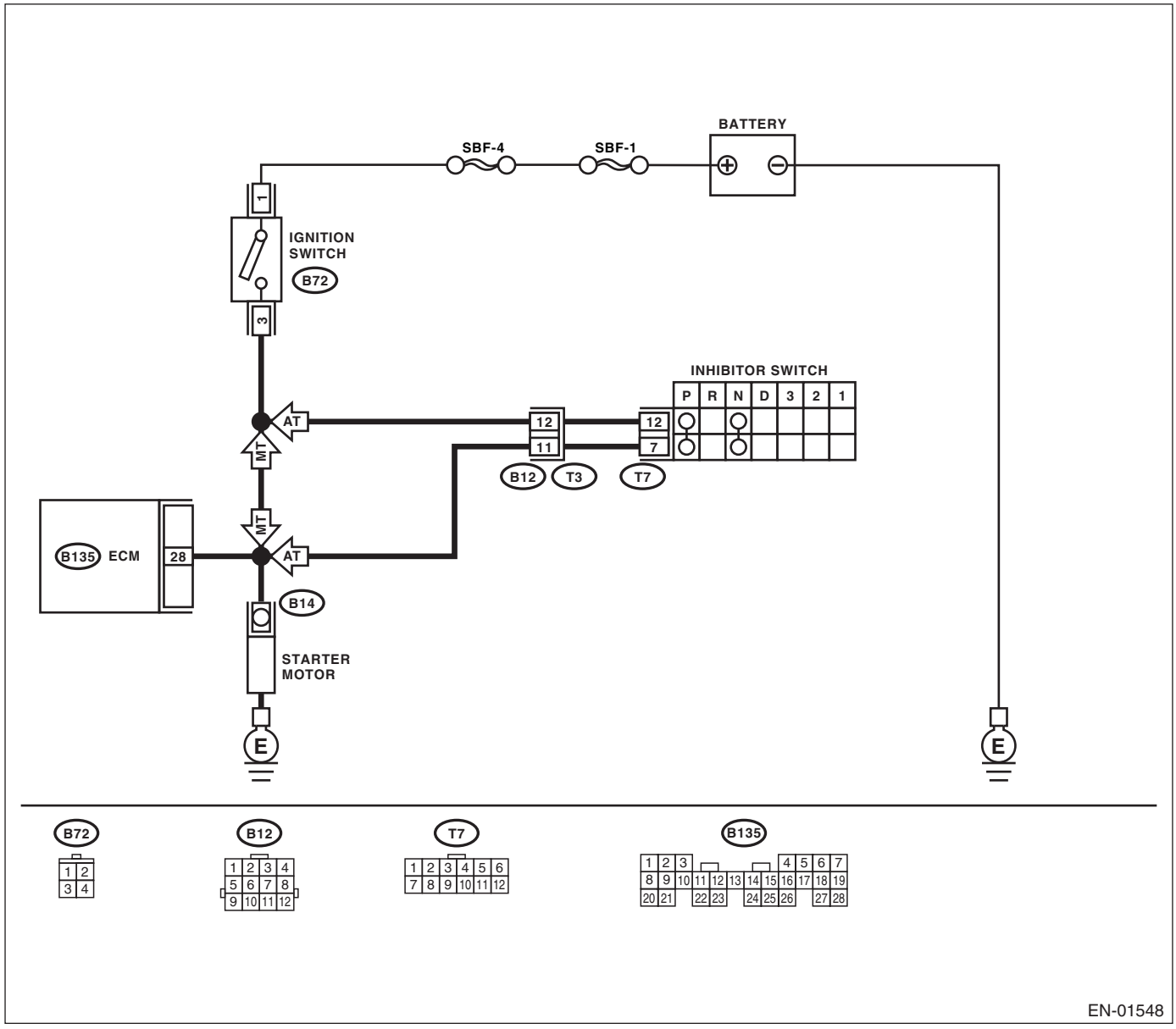
TROUBLE SYMPTOM:

Failure of engine to start

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory and inspection modes. <Ref. to EN(H4SOw/oOBD)(diag)-27, OPERATION, Clear Memory Mode.> and <Ref. to EN(H4SOw/oOBD)(diag)-25, PROCEDURE, Inspection Mode.>

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK OPERATION OF STARTER MOTOR.**	Does the starter motor operate when ignition switch is turned to START?	Go to step **2.**	Check the starter motor circuit.
2	**CHECK HARNESS BETWEEN ECM AND IGNITION SWITCH CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Set the selector lever to “P” or “N” position (AT model). 4) Turn the ignition switch to START. 5) Measure the power supply voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 28 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Repair the poor contact in ECM connector.	Repair the open or ground short circuit in harness between ECM and ignition switch connector.

C: DTC 13 CAMSHAFT POSITION SENSOR

DIAGNOSIS:

- No signal entered from camshaft position sensor, but signal entered from crankshaft position sensor.
- The harness connector between ECM and camshaft position sensor is open or shorted.

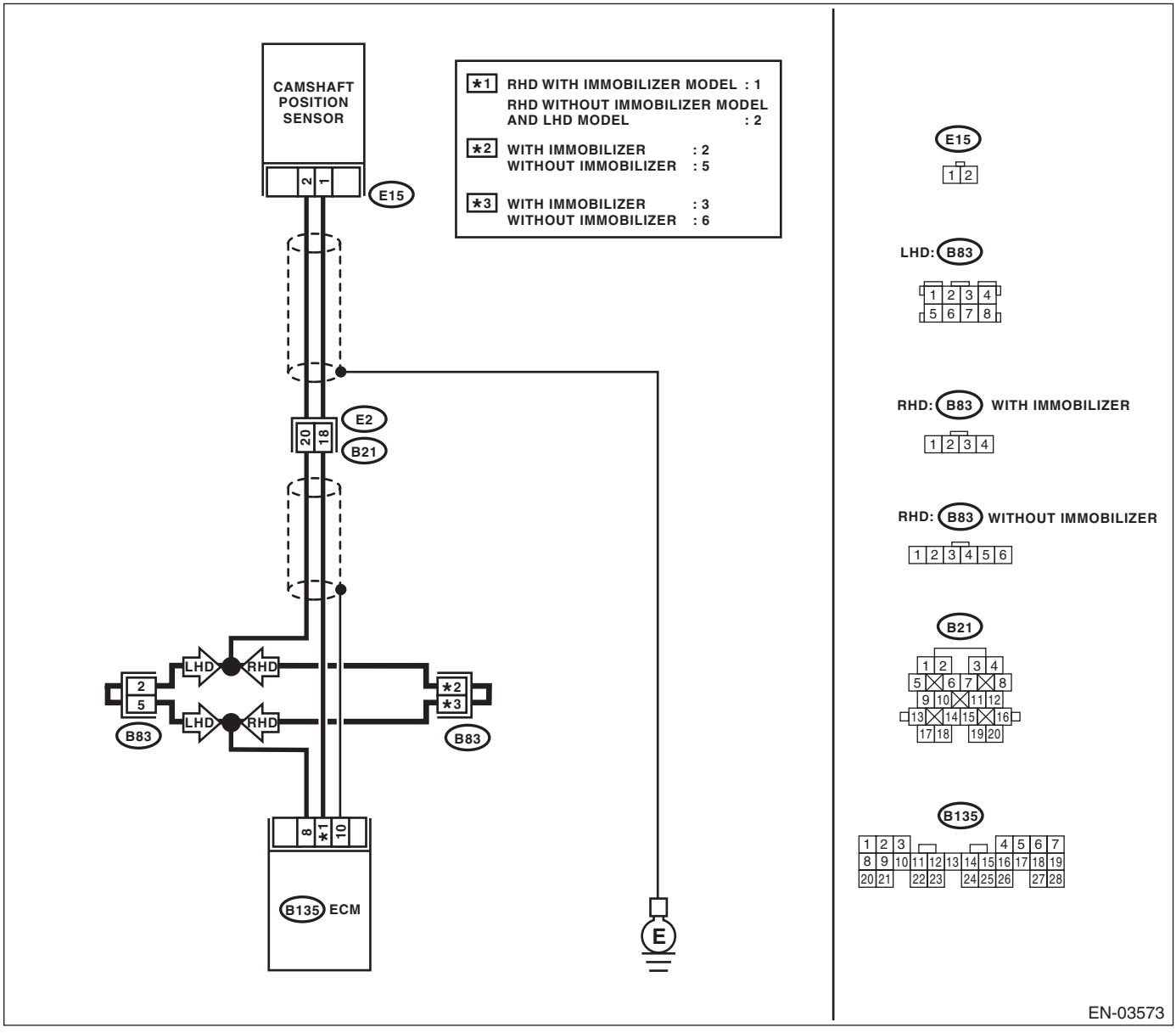
TROUBLE SYMPTOM:

- Engine stalls.
- Failure of engine to start

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory and inspection modes. <Ref. to EN(H4SOw/oOBD)(diag)-27, OPERATION, Clear Memory Mode.> and <Ref. to EN(H4SOw/oOBD)(diag)-25, PROCEDURE, Inspection Mode.>

WIRING DIAGRAM:



Step		Check	Yes	No
1	**CHECK CONDITION OF CAMSHAFT POSITION SENSOR INSTALLATION.**	Are the camshaft position sensor installing bolts tightened securely?	Go to step **2.**	Tighten the camshaft position sensor installing bolts securely.

	Step	Check	Yes	No
2	**CHECK CAMSHAFT POSITION SENSOR.** 1) Remove the camshaft position sensor. 2) Measure the resistance between connector terminals of camshaft position sensor. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 1 — 4 kΩ?	Go to step **3.**	Replace the camshaft position sensor.
3	**CHECK HARNESS BETWEEN ECM AND CAMSHAFT POSITION SENSOR CONNECTOR.** 1) Connect the connector to camshaft position sensor. 2) Disconnect the connector from ECM. 3) Measure the resistance of harness between camshaft position sensor connector and ECM. ***Connector & terminal*** ***With Immobilizer*** ***(B135) No. 8 — (B135) No. 1:*** ***Without Immobilizer and LHD*** ***(B135) No. 8 — (B135) No. 2:***	Is the resistance 1 — 5 kΩ?	Go to step **4.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between camshaft position sensor and ECM connector • Poor contact in coupling connector (B21)
4	**CHECK HARNESS BETWEEN ECM AND CAMSHAFT POSITION SENSOR CONNECTOR.** Measure the resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 8 — Chassis ground:***	Is the resistance less than 5 Ω?	Repair the ground short circuit in harness between camshaft position sensor and ECM connector.	Go to step **5.**
5	**CHECK INPUT SIGNAL FOR ECM.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Set the oscilloscope probe at ECM connector terminal positive (+) and its ground lead at negative (−). 4) Measure the voltage indicated on oscilloscope while cranking engine. ***Connector & terminal*** ***With Immobilizer*** ***(B135) No. 1 (+) — (B135) No. 8 (−):*** ***Without Immobilizer and LHD*** ***(B135) No. 2 (+) — (B135) No. 8 (−):***	Is the voltage more than 400 mV?	Go to step **6.**	Replace the camshaft position sensor.
6	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair the poor contact in ECM connector.	Go to step **7.**
7	**CHECK ECM.** 1) Connect all connectors. 2) Erase the memory. <Ref. to EN(H4SOw/oOBD)(diag)-27, OPERATION, Clear Memory Mode.> 3) Perform the inspection mode. <Ref. to EN(H4SOw/oOBD)(diag)-25, PROCEDURE, Inspection Mode.> 4) Read any DTC on the display. <Ref. to EN(H4SOw/oOBD)(diag)-24, OPERATION, Read Diagnostic Trouble Code (DTC).>	Is the same DTC as in the current diagnosis still being output?	Replace the generator.	Go to step **8.**
8	**CHECK ANY OTHER DTCs APPEARANCE.**	Is any other DTC displayed?	Proceed with the diagnosis corresponding to the DTC.	A temporary poor contact.

D: DTC 21 ENGINE COOLANT TEMPERATURE SENSOR

DIAGNOSIS:

- The engine coolant temperature sensor signal is abnormal.
- The harness connector between ECM and engine coolant temperature sensor is open or shorted.

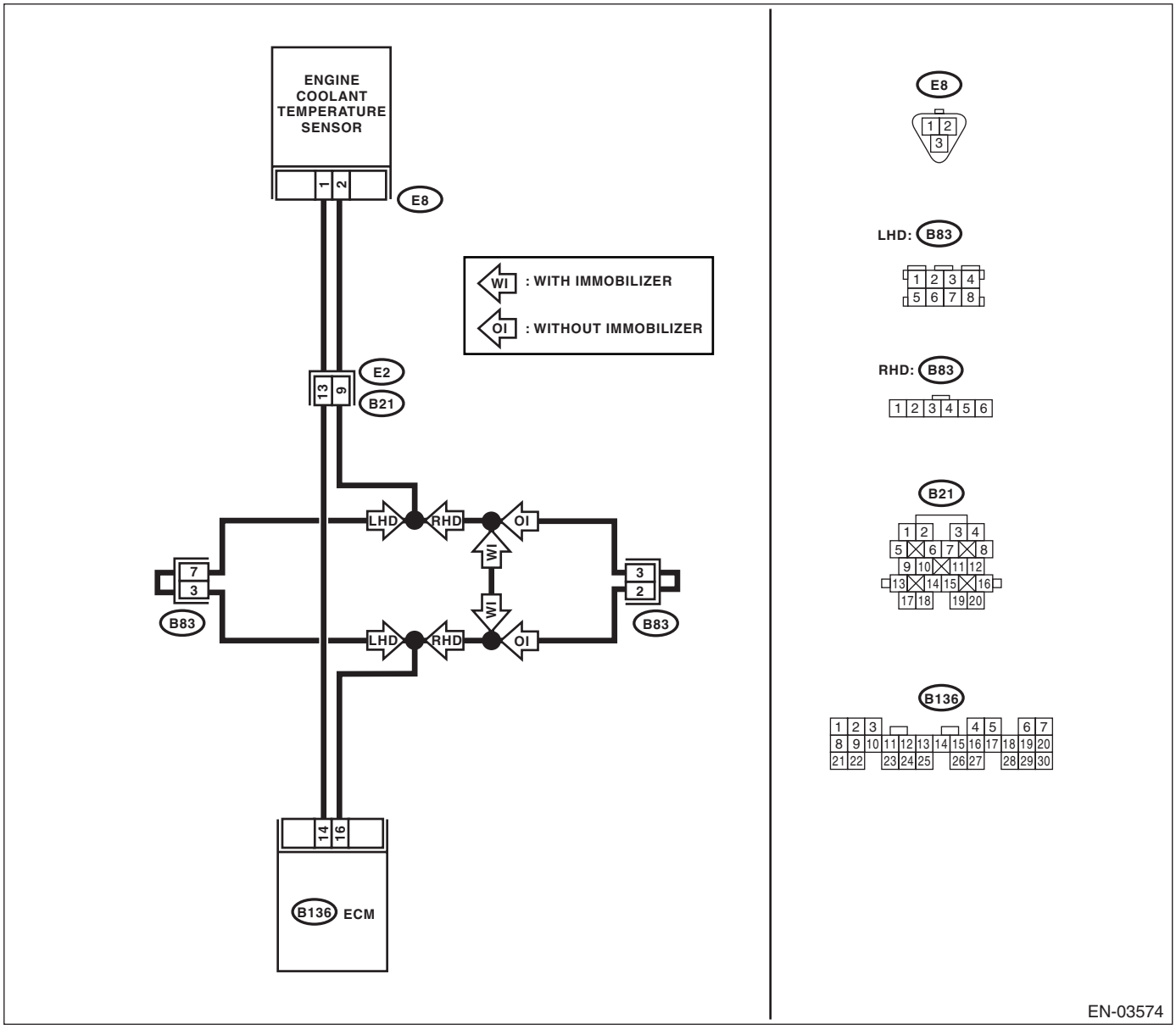
TROUBLE SYMPTOM:

- Hard to start
- Erroneous idling
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory and inspection modes. <Ref. to EN(H4SOw/oOBD)(diag)-27, OPERATION, Clear Memory Mode.> and <Ref. to EN(H4SOw/oOBD)(diag)-25, PROCEDURE, Inspection Mode.>

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ENGINE COOLANT TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Remove the generator. 3) Disconnect the connector from engine coolant temperature sensor. 4) Measure the voltage between engine coolant temperature sensor connector and engine ground. ***Connector & terminal*** ***(E8) No. 1 (+) — Engine ground (−):***	Is the voltage more than 10 V?	Repair the battery short circuit in harness between ECM and engine coolant temperature sensor connector.	Go to step **2.**
2	**CHECK HARNESS BETWEEN ENGINE COOLANT TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to ON. 2) Measure the voltage between engine coolant temperature sensor connector and engine ground. ***Connector & terminal*** ***(E8) No. 1 (+) — Engine ground (−):***	Is the voltage more than 10 V?	Repair the battery short circuit in harness between ECM and engine coolant temperature sensor connector.	Go to step **3.**
3	**CHECK HARNESS BETWEEN ENGINE COOLANT TEMPERATURE SENSOR AND ECM CONNECTOR.** Measure the voltage between engine coolant temperature sensor connector and engine ground. ***Connector & terminal*** ***(E8) No. 1 (+) — Engine ground (−):***	Is the voltage more than 4 V?	Go to step **4.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and engine coolant temperature sensor connector • Poor contact in engine coolant temperature sensor connector • Poor contact in ECM connector • Poor contact in coupling connector (B21)

	Step	Check	Yes	No
4	**CHECK HARNESS BETWEEN ENGINE COOLANT TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance of harness between engine coolant temperature sensor connector and engine ground. ***Connector & terminal*** ***(E8) No. 2 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **5.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and engine coolant temperature sensor connector • Poor contact in engine coolant temperature sensor connector • Poor contact in ECM connector • Poor contact in coupling connector (B21) • Poor contact in sensor ground joint connector (B83)
5	**CHECK ENGINE COOLANT TEMPERATURE SENSOR.** Measure the resistance between engine coolant temperature sensor terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 2 — 3 kΩ at 20°C (68°F)?	Go to step **6.**	Replace the engine coolant temperature sensor.
6	**CHECK ENGINE COOLANT TEMPERATURE SENSOR.** Measure the resistance between engine coolant temperature sensor terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 0.35 — 0.4 kΩ at 80°C (176°F)?	Go to step **7.**	Replace the engine coolant temperature sensor.
7	**CHECK ENGINE COOLANT TEMPERATURE SENSOR.** Measure the resistance between engine coolant temperature sensor terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 0.2 — 0.3 kΩ at 90°C (194°F)?	Replace the ECM.	Replace the engine coolant temperature sensor.

E: DTC 22 KNOCK SENSOR

DIAGNOSIS:

- The knock sensor signal is abnormal.
- The harness connector between ECM and knock sensor is open or shorted.

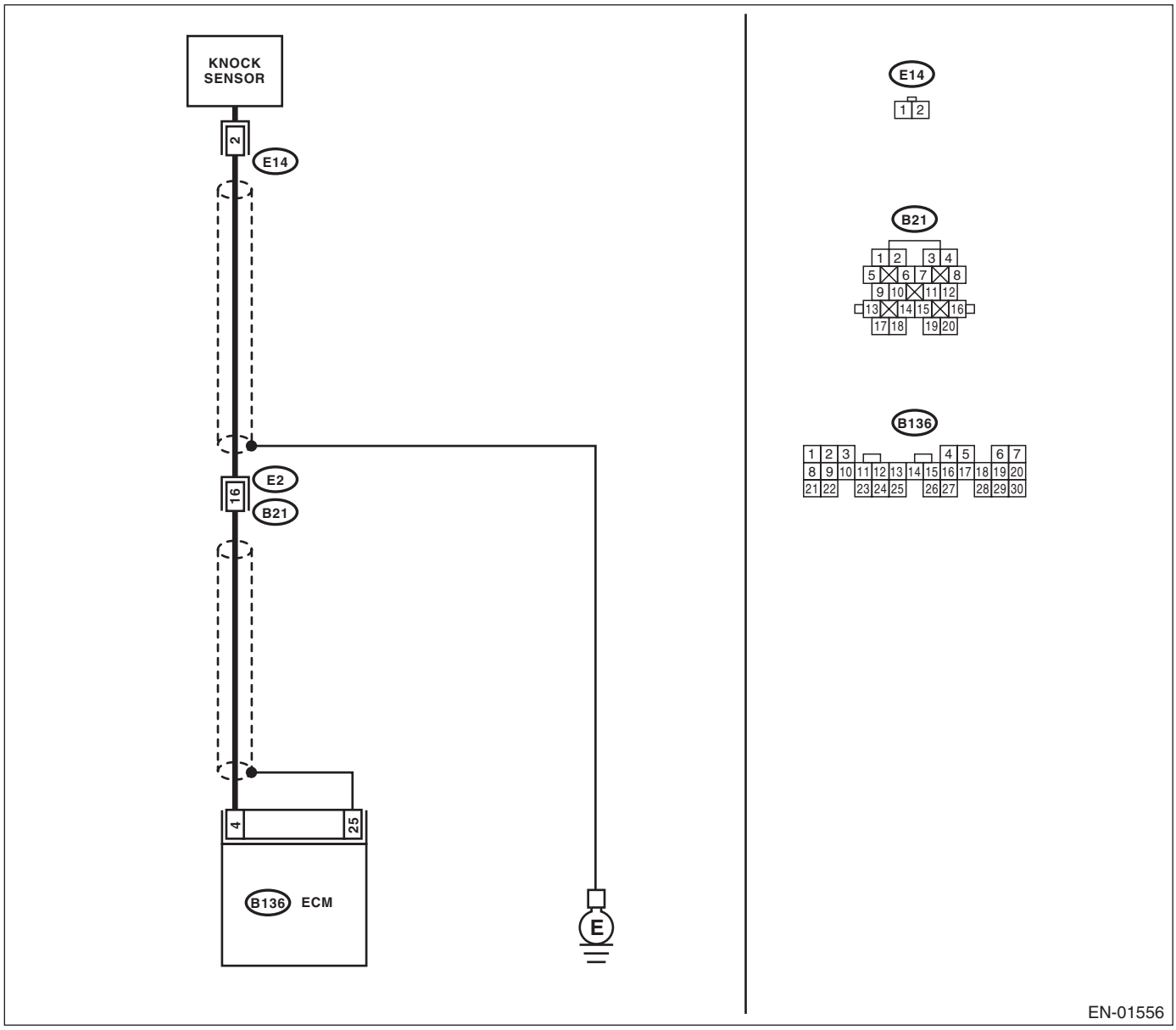
TROUBLE SYMPTOM:

Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory and inspection modes. <Ref. to EN(H4SOw/oOBD)(diag)-27, OPERATION, Clear Memory Mode.> and <Ref. to EN(H4SOw/oOBD)(diag)-25, PROCEDURE, Inspection Mode.>

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK INPUT SIGNAL FOR ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 4 (+) — Chassis ground (−):***	Is the voltage more than 3 V?	Go to step **2.**	Go to step **3.**
2	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair the poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H4SOw/oOBD)-42, Engine Control Module (ECM).>
3	**CHECK KNOCK SENSOR.** 1) Disconnect the connector from knock sensor. 2) Measure the resistance between knock sensor connector terminal and engine ground. ***Terminals*** ***No. 2 — Engine ground:***	Is the resistance 530 kΩ — 590 kΩ?	Go to step **4.**	Replace the knock sensor. <Ref. to FU(H4SOw/oOBD)-30, Knock Sensor.>
4	**CHECK HARNESS CONNECTOR BETWEEN ECM AND KNOCK SENSOR.** Measure the resistance of harness connector between ECM and knock sensor. ***Connector & terminal*** ***(E14) No. 2 — (B136) No. 4***	Is the resistance less than 1 Ω?	Go to step **5.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between knock sensor and ECM connector • Poor contact in knock sensor connector • Poor contact in coupling connector (B21)
5	**CHECK HARNESS CONNECTOR BETWEEN ECM AND KNOCK SENSOR.** Measure the resistance of harness of harness connector between ECM connector and knock sensor. ***Connector & terminal*** ***(B136) No. 4 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **6.**	Repair the ground short circuit between ECM and knock sensor.
6	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair the poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H4SOw/oOBD)-42, Engine Control Module (ECM).>

F: DTC 24 IDLE AIR CONTROL SOLENOID VALVE

DIAGNOSIS:

- The idle air control solenoid valve is not in function.
- The harness connector between ECM and idle air control solenoid valve is open or shorted.

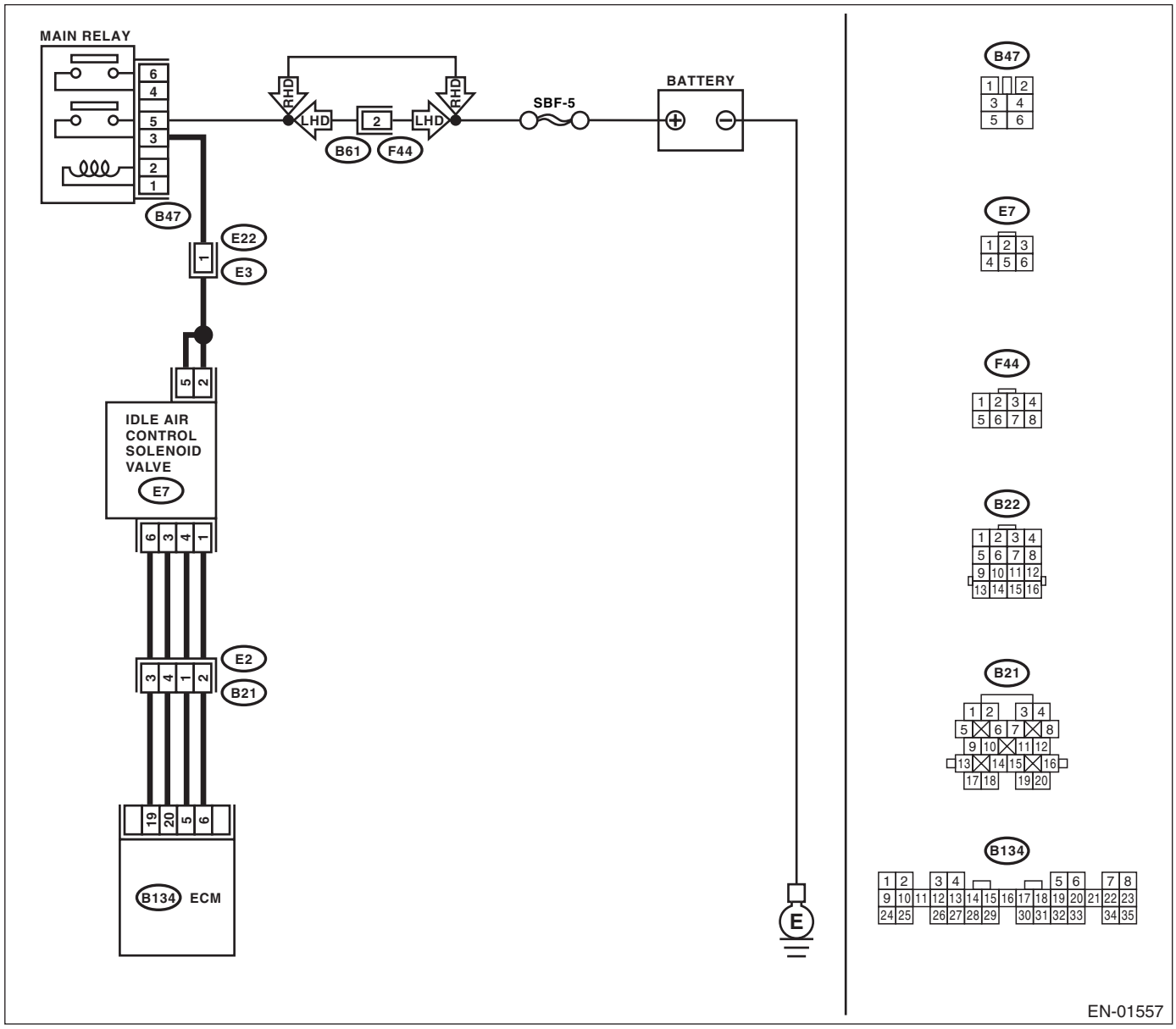
TROUBLE SYMPTOM:

- Erroneous idling
- Hard to start
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory and inspection modes. <Ref. to EN(H4SOw/oOBD)(diag)-27, OPERATION, Clear Memory Mode.> and <Ref. to EN(H4SOw/oOBD)(diag)-25, PROCEDURE, Inspection Mode.>

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK POWER SUPPLY TO IDLE AIR CONTROL SOLENOID VALVE.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from idle air control solenoid valve. 3) Turn the ignition switch to ON. 4) Measure the voltage between idle air control solenoid valve connector and engine ground. ***Connector & terminal*** ***(E7) No. 2 (+) — Engine ground (–):*** ***(E7) No. 5 (+) — Engine ground (–):***	Is the voltage more than 10 V?	Go to step **2.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between idle air control solenoid valve and main relay connector • Poor contact in coupling connector (B22)
2	**CHECK HARNESS BETWEEN ECM AND IDLE AIR CONTROL SOLENOID VALVE CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between ECM and idle air control solenoid valve connector. ***Connector & terminal*** ***#1 (B134) No. 20 — (E7) No. 3:*** ***#2 (B134) No. 6 — (E7) No. 1:*** ***#3 (B134) No. 19 — (E7) No. 6:*** ***#4 (B134) No. 5 — (E7) No. 4:***	Is the resistance less than 1 Ω?	Go to step **3.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and idle air control solenoid valve connector • Poor contact in coupling connector (B21)
3	**CHECK HARNESS BETWEEN ECM AND IDLE AIR CONTROL SOLENOID VALVE CONNECTOR.** 1) Disconnect the connector from ECM. 2) Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***#1 (B134) No. 20 — Chassis ground:*** ***#2 (B134) No. 6 — Chassis ground:*** ***#3 (B134) No. 19 — Chassis ground:*** ***#4 (B134) No. 5 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **4.**	Repair the ground short circuit in harness between ECM and idle air control solenoid valve connector.
4	**CHECK POOR CONTACT.** Check poor contact in ECM connector and idle air control solenoid valve connector.	Is there poor contact in ECM connector or idle air control solenoid valve connector?	Repair the poor contact in ECM connector or idle air control solenoid valve connector.	Go to step **5.**
5	**CHECK IDLE SPEED.**	Is the idling speed higher than standard?	Go to step **6.**	Go to step **8.**
6	**CHECK AIR INTAKE SYSTEM.** 1) Turn the ignition switch to ON. 2) Start the engine, and idle it. 3) Check the following items. • Loose installation of intake manifold, idle air control solenoid valve and throttle body • Cracks of intake manifold gasket, idle air control solenoid valve gasket and throttle body gasket • Disconnections of vacuum hoses	Is there a fault in the air intake system?	Repair the air suction and leaks.	Go to step **7.**

	Step	Check	Yes	No
7	**CHECK AIR BY-PASS LINE.** 1) Turn the ignition switch to OFF. 2) Remove the idle air control solenoid valve from throttle body. <Ref. to FU(H4SOw/oOBD)-34, Idle Air Control Solenoid Valve.> 3) Confirm that there are no foreign particles in the air by-pass line.	Are foreign particles in the air by-pass line?	Remove the foreign particles from air by-pass line.	Replace the idle air control solenoid valve. <Ref. to FU(H4SOw/oOBD)-34, Idle Air Control Solenoid Valve.>
8	**CHECK AIR BY-PASS LINE.** 1) Turn the ignition switch to OFF. 2) Remove the idle air control solenoid valve from throttle body. <Ref. to FU(H4SOw/oOBD)-34, Idle Air Control Solenoid Valve.> 3) Remove the throttle body from intake manifold. <Ref. to FU(H4SOw/oOBD)-14, Throttle Body.> 4) Confirm that there are no foreign particles in the throttle body. 5) Using an air gun, force air into the idle air control solenoid valve installation area. Confirm that forced air subsequently escapes from the throttle body interior.	Does air flow out?	Replace the idle air control solenoid valve. <Ref. to FU(H4SOw/oOBD)-34, Idle Air Control Solenoid Valve.>	Replace the throttle body. <Ref. to FU(H4SOw/oOBD)-14, Throttle Body.>

G: DTC 26 INTAKE AIR TEMPERATURE SENSOR

DIAGNOSIS:

- The intake air temperature sensor signal is abnormal.
- The harness connector between ECM and intake air temperature sensor is open or shorted.

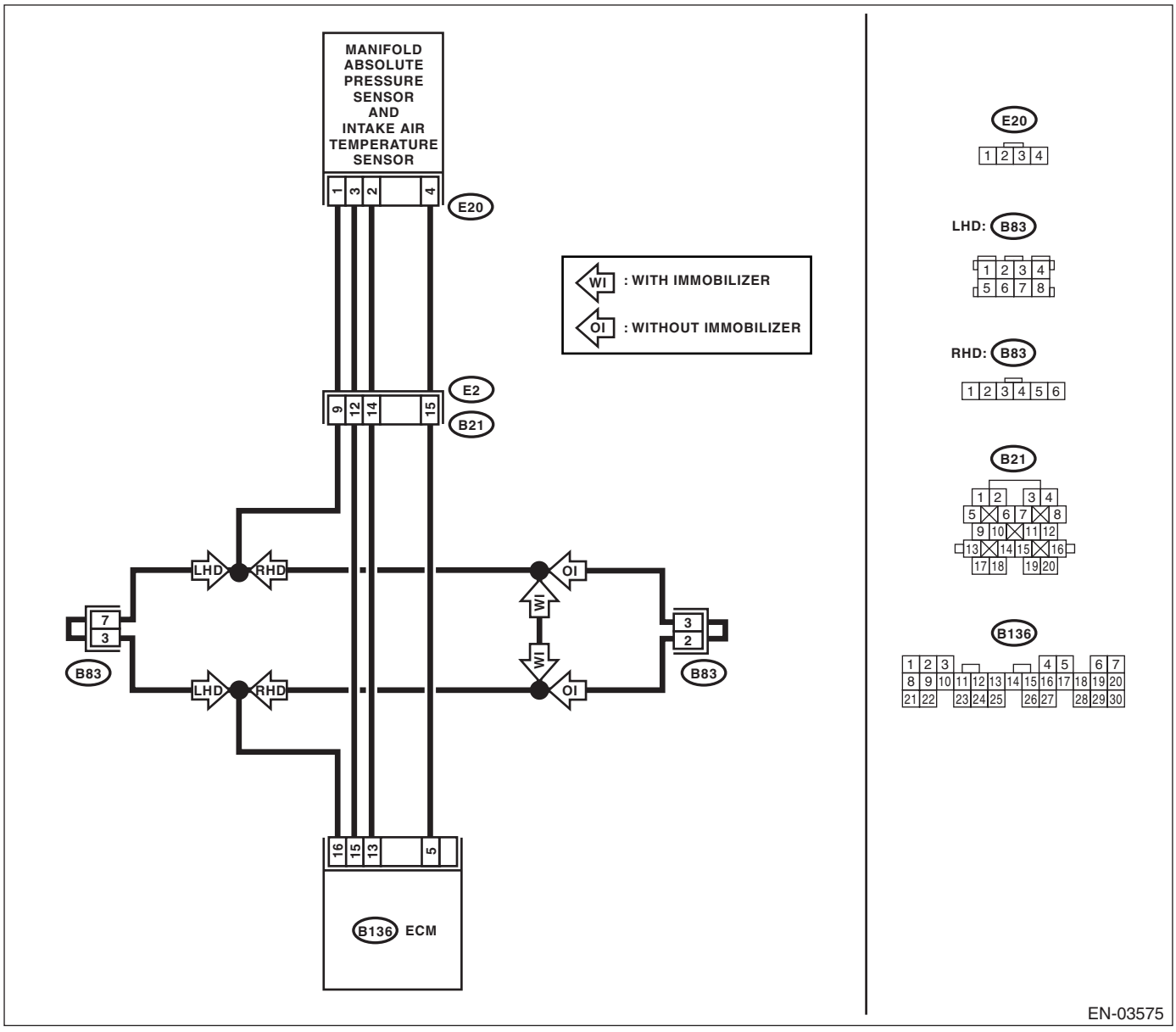
TROUBLE SYMPTOM:

- Hard to start
- Erroneous idling
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory and inspection modes. <Ref. to EN(H4SOw/oOBD)(diag)-27, OPERATION, Clear Memory Mode.> and <Ref. to EN(H4SOw/oOBD)(diag)-25, PROCEDURE, Inspection Mode.>

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK INTAKE AIR TEMPERATURE SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from intake air temperature sensor. 3) Measure the resistance between intake air temperature sensor terminals. ***Terminals*** ***No. 2 — No. 3:***	Is the resistance 2 — 3 kΩ at 20°C (68°F)?	Go to step **2.**	Replace the intake air temperature sensor. <Ref. to FU(H4SOw/oOBD)-33, Manifold Absolute Pressure and Intake Air Temperature Sensor.>
2	**CHECK INTAKE AIR TEMPERATURE SENSOR.** Measure the resistance between intake air temperature sensor terminals. ***Terminals*** ***No. 2 — No. 3:***	Is the resistance 0.66 — 1 kΩ at 50°C (122°F)?	Go to step **3.**	Replace the intake air temperature sensor. <Ref. to FU(H4SOw/oOBD)-33, Manifold Absolute Pressure and Intake Air Temperature Sensor.>
3	**CHECK HARNESS BETWEEN ECM AND INTAKE AIR TEMPERATURE SENSOR CONNECTOR.** 1) Disconnect the connector from ECM. 2) Measure the resistance of harness connector between ECM and intake air temperature sensor connector. ***Connector & terminal*** ***(B136) No. 15 — (E20) No. 3:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and manifold absolute pressure and intake air temperature sensor connector • Poor contact in coupling connector (B21)
4	**CHECK HARNESS BETWEEN ECM AND INTAKE AIR TEMPERATURE SENSOR CONNECTOR.** Measure the resistance of harness connector between ECM and intake air temperature sensor connector. ***Connector & terminal*** ***(B136) No. 13 — (E20) No. 2:***	Is the resistance less than 1 Ω?	Go to step **5.**	Repair the harness and connector.
5	**CHECK HARNESS BETWEEN ECM AND INTAKE AIR TEMPERATURE SENSOR CONNECTOR.** Measure the resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 15 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **6.**	Repair the ground short circuit in harness between ECM and idle air control solenoid valve connector.
6	**CHECK HARNESS BETWEEN ECM AND INTAKE AIR TEMPERATURE SENSOR CONNECTOR.** Measure the resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 13 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **7.**	Repair the ground short circuit in harness between ECM and idle air control solenoid valve connector.
7	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair the poor contact in ECM connector.	Contact with your SUBARU distributor service.

H: DTC 31 THROTTLE POSITION SENSOR

DIAGNOSIS:

- The throttle position sensor signal is abnormal.
- The throttle position sensor is installed abnormally.
- The harness connector between ECM and throttle position sensor is open or shorted.

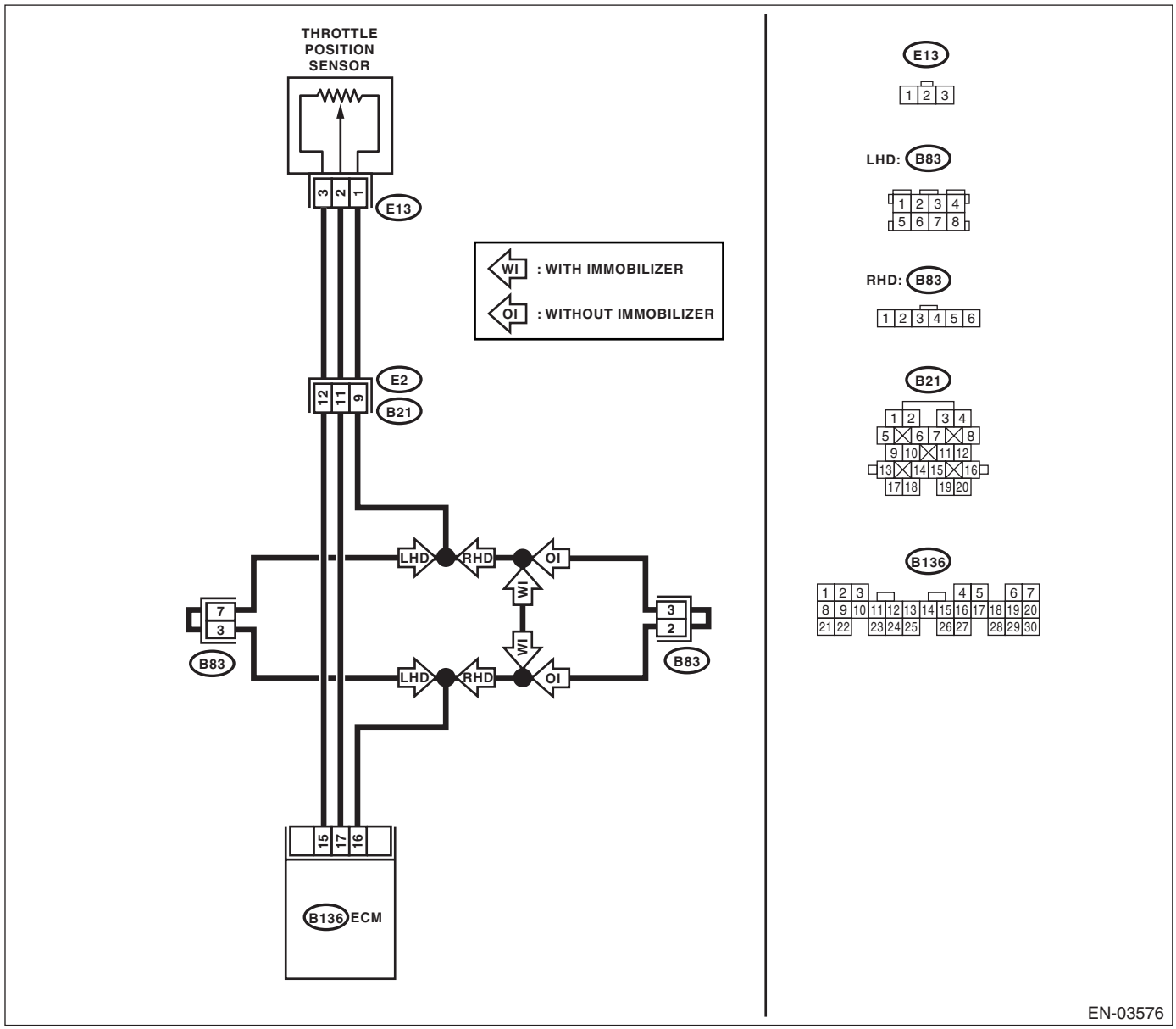
TROUBLE SYMPTOM:

- Erroneous idling
- Engine stalls
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory and inspection modes. <Ref. to EN(H4SOw/oOBD)(diag)-27, OPERATION, Clear Memory Mode.> and <Ref. to EN(H4SOw/oOBD)(diag)-25, PROCEDURE, Inspection Mode.>

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND THROTTLE POSITION SENSOR.** 1) Disconnect the connector from ECM and throttle position sensor. 2) Measure the resistance between ECM and throttle position sensor. ***Connector & terminal*** ***(B136) No. 16 — (E13) No. 1:*** ***(B136) No. 17 — (E13) No. 2:*** ***(B136) No. 15 — (E13) No. 3:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the open circuit between ECM and throttle position sensor.
2	**CHECK HARNESS BETWEEN ECM AND THROTTLE POSITION SENSOR CONNECTOR.** 1) Disconnect the connector from TCM. (AT model) 2) Measure the resistance between ECM and chassis ground. ***Connector & terminal*** ***(B136) No. 16 — Chassis ground:*** ***(B136) No. 17 — Chassis ground:*** ***(B136) No. 15 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **3.**	Repair the ground short circuit between ECM and chassis ground.
3	**CHECK INPUT SIGNAL FOR ECM.** 1) Connect the connector to ECM and throttle position sensor. 2) Ignition the switch to ON. 3) Measure the voltage between ECM terminals while throttle valve is fully closed. ***Connector & terminal*** ***(B136) No. 15 (+) — No. 17 (–):***	Is the voltage less than 0.1 V?	Go to step **5.**	Go to step **4.**
4	**CHECK INPUT SIGNAL FOR ECM.** Measure the voltage between ECM terminals while throttle valve is fully opened. ***Connector & terminal*** ***(B136) No. 15 (+) — No. 17 (–):***	Is the voltage more than 4.5 V?	Go to step **5.**	Go to step **6.**
5	**CHECK POOR CONTACT.** Check poor contact in throttle position sensor connector.	Is there poor contact in throttle position sensor connector?	Repair the poor contact in throttle position sensor connector.	Replace the throttle position sensor.
6	**CHECK CONDITION OF THROTTLE POSITION SENSOR INSTALLATION.**	Are the throttle position sensor installing screw tightened securely?	Replace the throttle position sensor.	Adjust the throttle position sensor and tighten throttle position sensor installing screws securely.

I: DTC 32 OXYGEN SENSOR

NOTE:
Oxygen sensor is equipped on Australia model.

DIAGNOSIS:

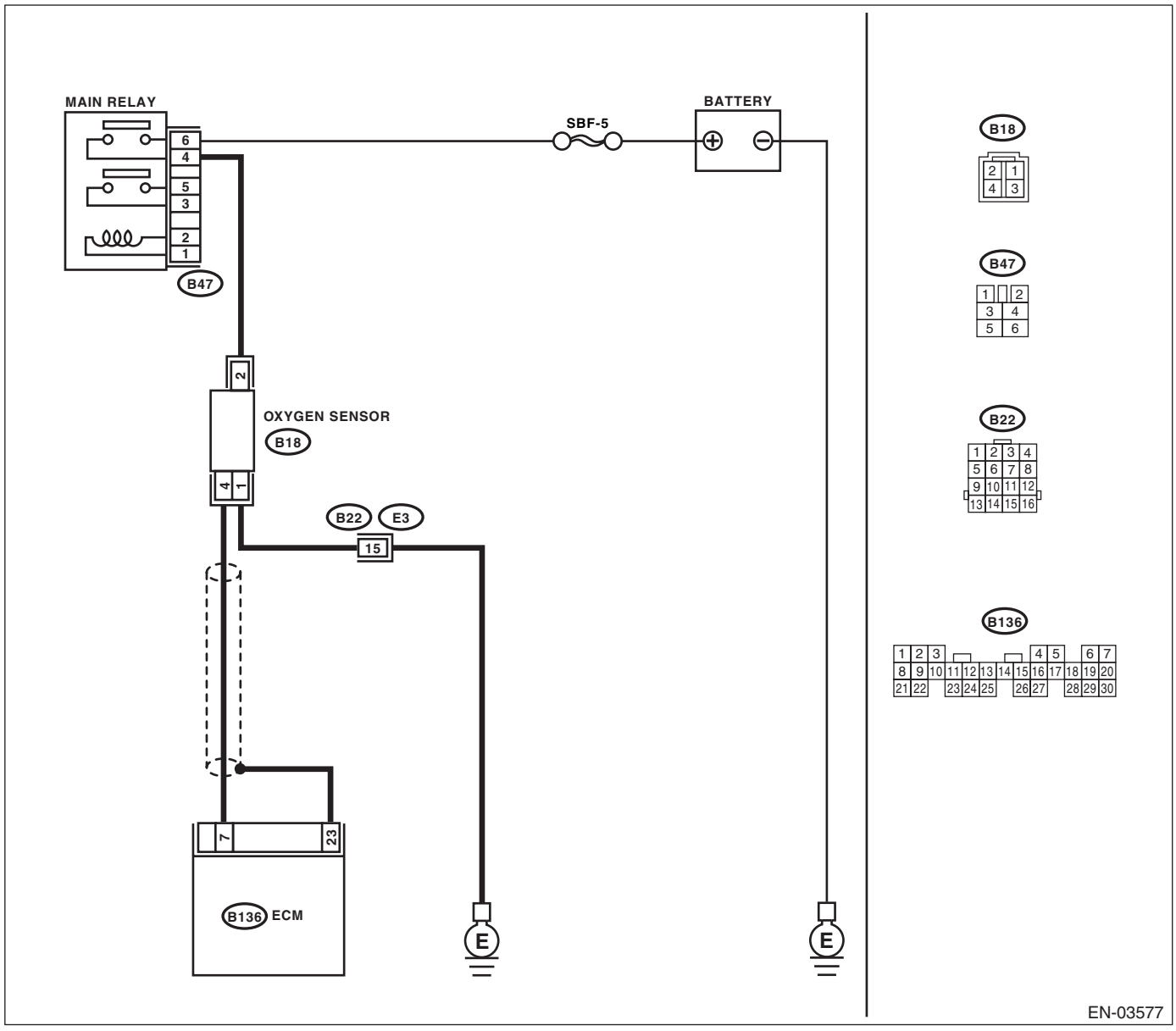
- The oxygen sensor is not in function.
- The harness connector between ECM and oxygen sensor is open or shorted.

TROUBLE SYMPTOM:

- Failure of engine to start
- Erroneous idling
- Poor driving performance
- Engine stalls.
- Idle mixture is out of specifications.

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory and inspection modes. <Ref. to EN(H4SOw/oOBD)(diag)-27, OPERATION, Clear Memory Mode.> and <Ref. to EN(H4SOw/oOBD)(diag)-25, PROCEDURE, Inspection Mode.>

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK FOR OTHER CAUSES AFFECTING EXHAUST GAS.** NOTE: • Check for use of improper fuel. • Check if engine oil or coolant level is extremely low.	Is CO % more than 2% after the engine warm up?	Check the fuel system.	Go to step **2.**
2	**CHECK EXHAUST SYSTEM.**	Is there a fault in the exhaust system?	Repair the exhaust system. NOTE: • Loose installation of front portion of exhaust pipe onto cylinder heads • Loose connection between front exhaust pipe and front catalytic converter • Damage of exhaust pipe resulting in hole	Go to step **3.**
3	**CHECK INPUT VOLTAGE FOR OXYGEN SENSOR.** 1) Disconnect the connector from oxygen sensor connector. 2) Measure the voltage between main relay and oxygen sensor. ***Connector & terminal*** ***(B18) No. 2 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **4.**	Repair the open circuit between main relay and oxygen sensor.
4	**CHECK HARNESS CONNECTOR BETWEEN OXYGEN SENSOR AND ENGINE GROUND CABLE.** Measure the resistance between oxygen sensor and chassis ground. ***Connector & terminal*** ***(B18) No. 1 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **5.**	Repair the open circuit between oxygen sensor and chassis ground.
5	**CHECK OXYGEN SENSOR.** Measure the resistance between oxygen sensor terminals. ***Connector & terminal*** ***No. 1 — No. 2:***	Is the resistance less than 30 Ω?	Repair poor contact.	Go to step **6.**
6	**CHECK HARNESS BETWEEN ECM AND OXYGEN SENSOR.** 1) Disconnect the connector from ECM. 2) Measure the resistance between ECM and chassis ground. ***Connector & terminal*** ***(B136) No. 7 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **7.**	Repair the ground short circuit between ECM and chassis ground.
7	**CHECK HARNESS BETWEEN ECM AND OXYGEN SENSOR.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B136) No. 7 (+) — Chassis ground (–):***	Is the voltage more than 0.2 V?	Repair the battery short circuit between ECM and oxygen sensor.	Go to step **8.**

	Step	Check	Yes	No
8	**CHECK INPUT VOLTAGE FOR ECM.** 1) Turn the ignition switch to OFF. 2) Connect the connector to ECM and oxygen sensor. 3) Set the oscilloscope probe at ECM connector terminal positive (+) and its ground lead at negative (−). 4) Start the engine.	Do 0.1 and 1 V waveform patterns alternately appear on the oscilloscope screen?	Go to step **9.**	Replace the oxygen sensor.
9	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Replace the oxygen sensor connector.	Replace the ECM. <Ref. to FU(H4SOw/oOBD)-42, Engine Control Module (ECM).>

J: DTC 33 VEHICLE SPEED SIGNAL

DIAGNOSIS:

- The vehicle speed signal is abnormal.
- The harness connector between ECM and vehicle speed sensor is open or shorted.

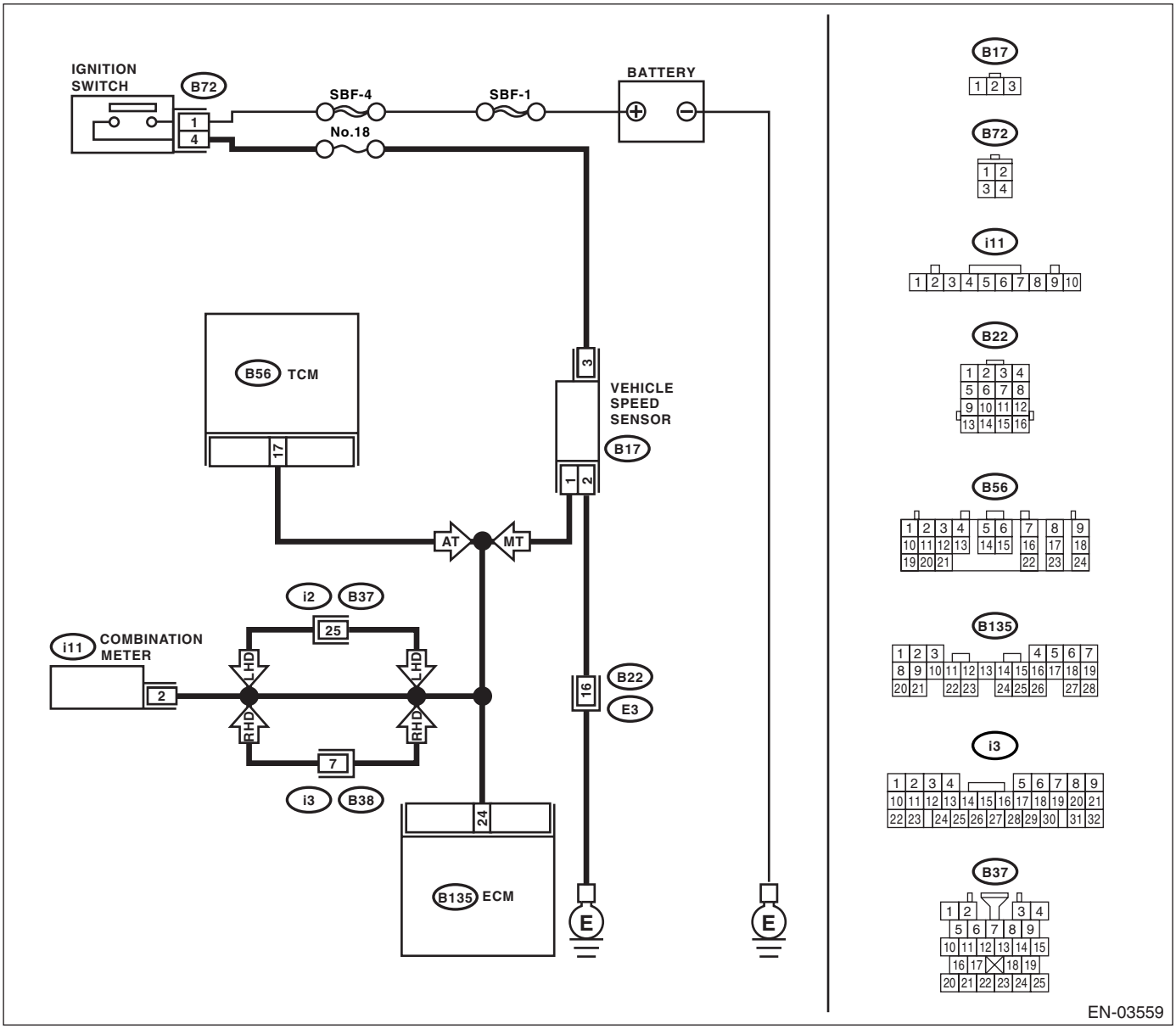
TROUBLE SYMPTOM:

- Erroneous idling
- Engine stalls.
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory and inspection modes. <Ref. to EN(H4SOw/oOBD)(diag)-27, OPERATION, Clear Memory Mode.> and <Ref. to EN(H4SOw/oOBD)(diag)-25, PROCEDURE, Inspection Mode.>

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK SPEEDOMETER OPERATION IN COMBINATION METER.**	Does the speedometer operate normally?	Go to step **2.**	Check the speedometer and vehicle speed sensor.
2	**CHECK INPUT SIGNAL FOR ECM.** 1) Lift-up the vehicle. 2) Set the oscilloscope probe at ECM connector terminal positive (+) and its ground lead at negative (–). ***Connector & terminal*** ***(B135) No. 24 (+) — Chassis ground (–):*** 3) Start the engine. 4) Shift on the gear position, and put the vehicle at constant speed. 5) Measure the signal voltage indicated on oscilloscope.	Is the voltage more than 3 V?	Go to step **3.**	Go to step **4.**
3	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair the poor contact in ECM.	Replace the ECM. <Ref. to FU(H4SOw/oOBD)-42, Engine Control Module (ECM).>
4	**CHECK HARNESS BETWEEN ECM AND COMBINATION METER CONNECTOR.** Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 24 (+) — Chassis ground (–):***	Is the voltage more than 2 V?	Repair the harness and connector. NOTE: In this case, repair the following: Battery short circuit in harness between ECM and combination meter connector	Go to step **5.**
5	**CHECK HARNESS BETWEEN ECM AND COMBINATION METER CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 24 — Chassis ground:***	Is the resistance less than 10 Ω?	Repair the ground short circuit in harness between ECM and combination meter connector.	Go to step **6.**
6	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair the poor contact in ECM.	Replace the ECM. <Ref. to FU(H4SOw/oOBD)-42, Engine Control Module (ECM).>

K: DTC 35 PURGE CONTROL SOLENOID VALVE

DIAGNOSIS:

- The purge control solenoid valve is not in function.
- The harness connector between ECM and purge control solenoid valve is open or shorted.

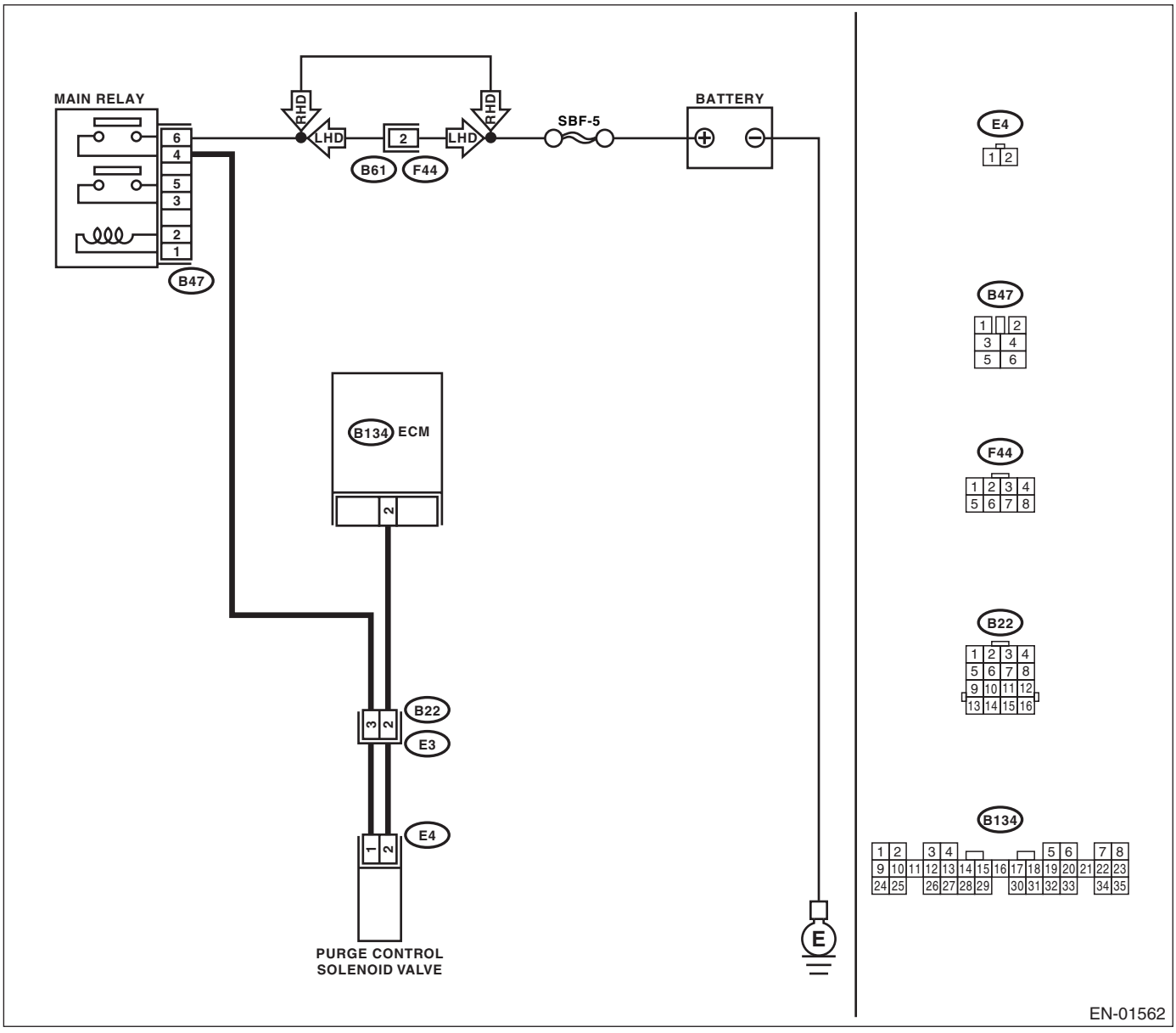
TROUBLE SYMPTOM:

Erroneous idling

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory and inspection modes. <Ref. to EN(H4SOw/oOBD)(diag)-27, OPERATION, Clear Memory Mode.> and <Ref. to EN(H4SOw/oOBD)(diag)-25, PROCEDURE, Inspection Mode.>

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK OPERATION SOUND OF PURGE CONTROL SOLENOID VALVE.** 1) Turn the ignition switch to OFF. 2) Connect the test mode connector at lower portion of instrument panel (on driver's side). 3) Turn the ignition switch to ON. 4) Make sure that the ON/OFF operating sound of purge control solenoid valve occurs at about 10 Hz.	Does the purge control solenoid valve produce operating sound?	Go to step **2.**	Go to step **3.**
2	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair the poor contact in ECM.	Replace the ECM. <Ref. to FU(H4SOw/oOBD)-42, Engine Control Module (ECM).>
3	**CHECK HARNESS BETWEEN PURGE CONTROL SOLENOID VALVE AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the test mode connector. 3) Disconnect the connector from purge control solenoid valve. 4) Turn the ignition switch to ON. 5) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 2 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Repair the battery short circuit in harness between ECM and purge control solenoid valve connector. After repair, replace the ECM.	Go to step **4.**
4	**CHECK HARNESS BETWEEN PURGE CONTROL SOLENOID VALVE AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance of harness between ECM and purge control solenoid valve of harness connector. ***Connector & terminal*** ***(B134) No. 2 — (E4) No. 2:***	Is the resistance less than 1 Ω?	Go to step **5.**	Repair the open circuit in harness between ECM and purge control solenoid valve connector.
5	**CHECK PURGE CONTROL SOLENOID VALVE.** 1) Remove the purge control solenoid valve. 2) Measure the resistance between purge control solenoid valve terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 23 — 27 Ω?	Go to step **6.**	Replace the purge control solenoid valve. <Ref. to EC(H4SOw/oOBD)-6, Purge Control Solenoid Valve.>

	Step	Check	Yes	No
6	**CHECK POWER SUPPLY TO PURGE CONTROL SOLENOID VALVE.** 1) Connect the connector to engine control module (ECM). 2) Turn the ignition switch to ON. 3) Measure the voltage between purge control solenoid valve and engine ground. ***Connector & terminal*** ***(E4) No. 1 (+) — Engine ground (−):***	Is the voltage more than 10 V?	Go to step **7.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between main relay and purge control solenoid valve connector • Poor contact in main relay connector • Poor contact in coupling connector (B22)
7	**CHECK POOR CONTACT.** Check poor contact in purge control solenoid valve connector.	Is there poor contact in purge control solenoid valve connector?	Repair the poor contact in purge control solenoid valve connector.	Contact with your SUBARU distributor service.

L: DTC 38 TORQUE CONTROL SIGNAL

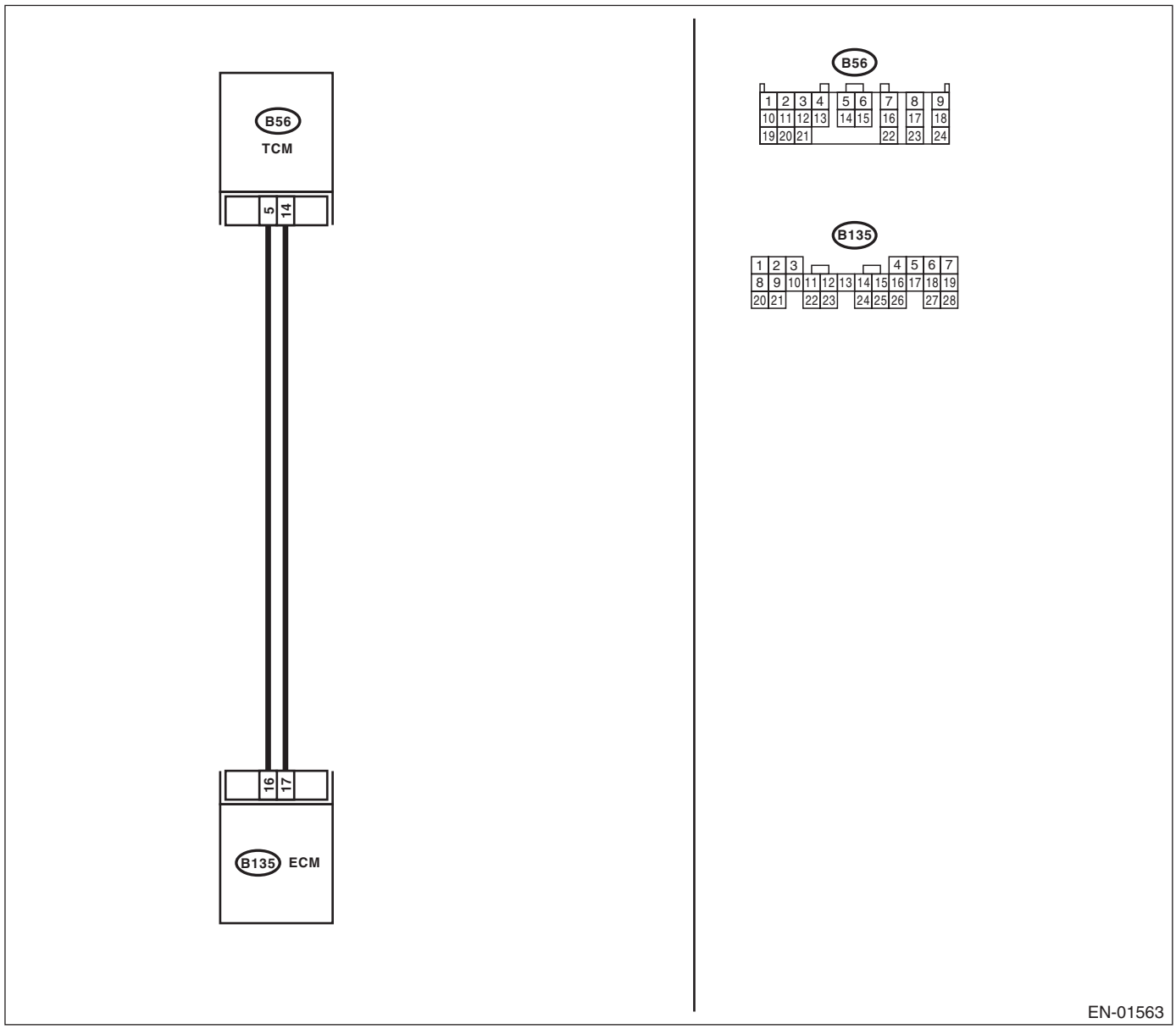
DIAGNOSIS:

- Abnormal signal entered from TCM
- The harness connector between ECM and TCM is shorted.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory and inspection modes. <Ref. to EN(H4SOw/oOBD)(diag)-27, OPERATION, Clear Memory Mode.> and <Ref. to EN(H4SOw/oOBD)(diag)-25, PROCEDURE, Inspection Mode.>

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.** 1) Disconnect the connectors from ECM and TCM. 2) Measure the resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 17 — Chassis ground:***	Is the resistance less than 10 Ω?	Repair the ground short circuit in harness between ECM and TCM connector.	Go to step **2.**
2	**CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.** Measure the resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 16 — Chassis ground:***	Is the resistance less than 10 Ω?	Repair the ground short circuit in harness between ECM and TCM connector.	Replace the TCM. <Ref. to 4AT-75, Transmission Control Module (TCM).>

M: DTC 45 PRESSURE SENSOR

DIAGNOSIS:

- The manifold absolute pressure sensor signal is abnormal.
- The harness connector between ECM and manifold absolute pressure sensor is open or shorted.

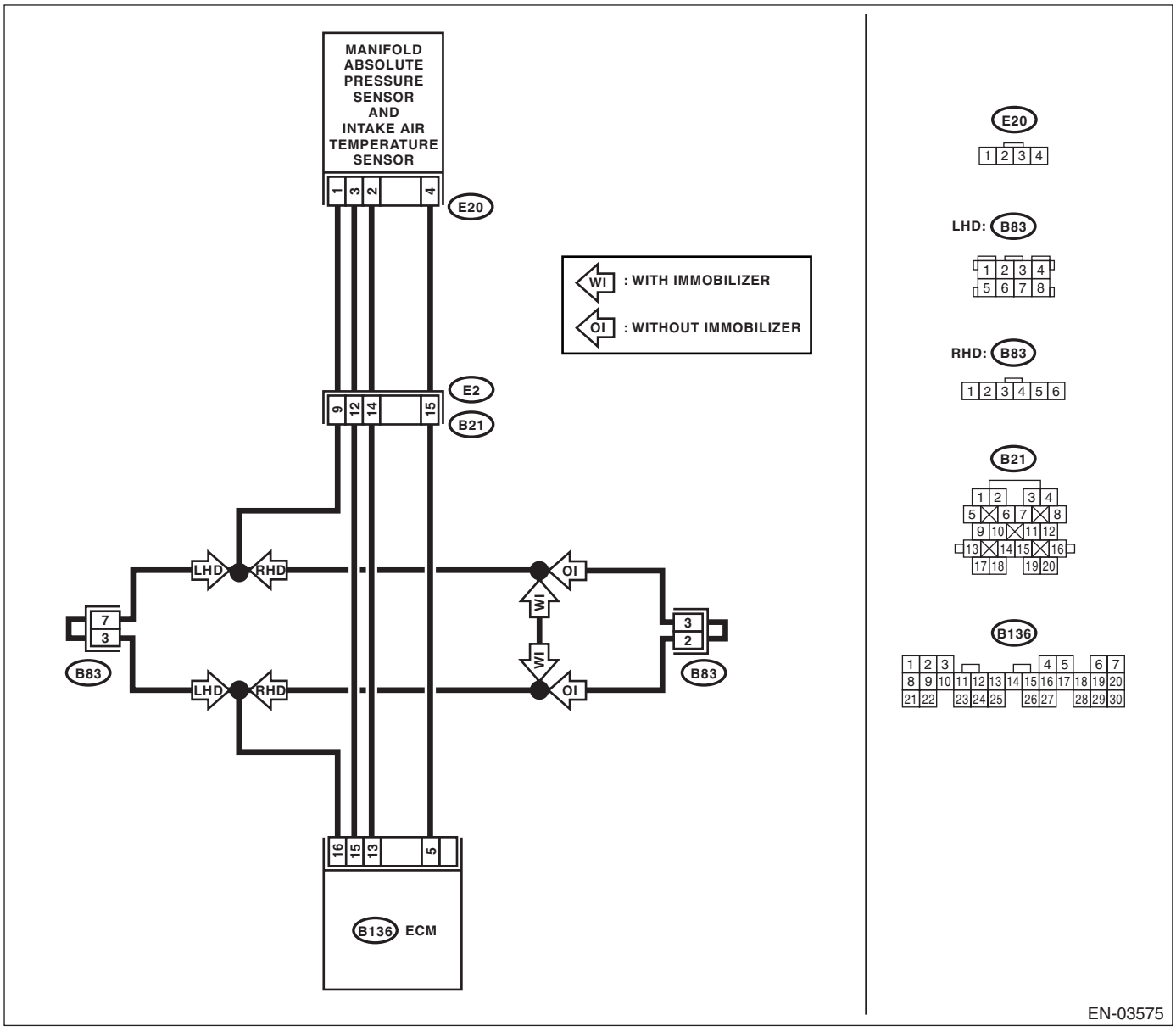
TROUBLE SYMPTOM:

- Erroneous idling
- Engine stalls.
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory and inspection modes. <Ref. to EN(H4SOw/oOBD)(diag)-27, OPERATION, Clear Memory Mode.> and <Ref. to EN(H4SOw/oOBD)(diag)-25, PROCEDURE, Inspection Mode.>

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND MANIFOLD ABSOLUTE PRESSURE SENSOR CONNECTOR.** 1) Disconnect the connector from manifold absolute pressure sensor. 2) Turn the ignition switch to ON. 3) Measure the voltage between manifold absolute pressure sensor connector and engine ground. ***Connector & terminal*** ***(E20) No. 3 (+) — Engine ground (−):***	Is the voltage 4.5 — 5.5 V?	Go to step **2.**	Repair the open or ground short circuit in harness between ECM and manifold absolute pressure sensor.
2	**CHECK HARNESS BETWEEN ECM AND MANIFOLD ABSOLUTE PRESSURE SENSOR CONNECTOR.** 1) Disconnect the connector from ECM. 2) Measure the resistance of harness between ECM and manifold absolute pressure sensor connector. ***Connector & terminal*** ***(B136) No. 16 — (E20) No. 1:*** ***(B136) No. 5 — (E20) No. 4:***	Is the resistance less than 1 Ω?	Go to step **3.**	Repair the open circuit in harness between ECM and manifold absolute pressure sensor connector.
3	**CHECK HARNESS BETWEEN ECM AND MANIFOLD ABSOLUTE PRESSURE SENSOR CONNECTOR.** Measure the resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 5 — Chassis ground:*** ***(B136) No. 16 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **4.**	Repair the ground short circuit in harness between ECM and manifold absolute pressure sensor connector.
4	**CHECK INPUT SIGNAL FOR ECM.** 1) Turn the ignition switch to OFF. 2) Connect the connector to ECM and manifold absolute pressure sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B136) No. 5 (+) — Chassis ground (−):***	Is the voltage 2.3 — 2.5 V?	Go to step **5.**	Replace the manifold absolute pressure sensor. <Ref. to FU(H4SOw/oOBD)-33, Manifold Absolute Pressure and Intake Air Temperature Sensor.>
5	**CHECK INPUT SIGNAL FOR ECM.** 1) Start the engine, and idle it. 2) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B136) No. 5 (+) — Chassis ground (−):***	Is the voltage 1.2 — 1.8 V?	Go to step **6.**	Replace the manifold absolute pressure sensor. <Ref. to FU(H4SOw/oOBD)-33, Manifold Absolute Pressure and Intake Air Temperature Sensor.>
6	**CHECK POOR CONTACT.** Check poor contact in manifold absolute pressure sensor connector.	Is there poor contact in manifold absolute pressure sensor connector?	Repair the poor contact in manifold absolute pressure sensor connector.	Replace the manifold absolute pressure sensor. <Ref. to FU(H4SOw/oOBD)-33, Manifold Absolute Pressure and Intake Air Temperature Sensor.>

N: DTC 46 CO RESISTOR (GENERAL SPEC. VEHICLES)

DIAGNOSIS:

- The CO resistor signal is abnormal.
- The harness connector between ECM and CO resistor is open or shorted.
- The CO value is not adjusted to specifications.

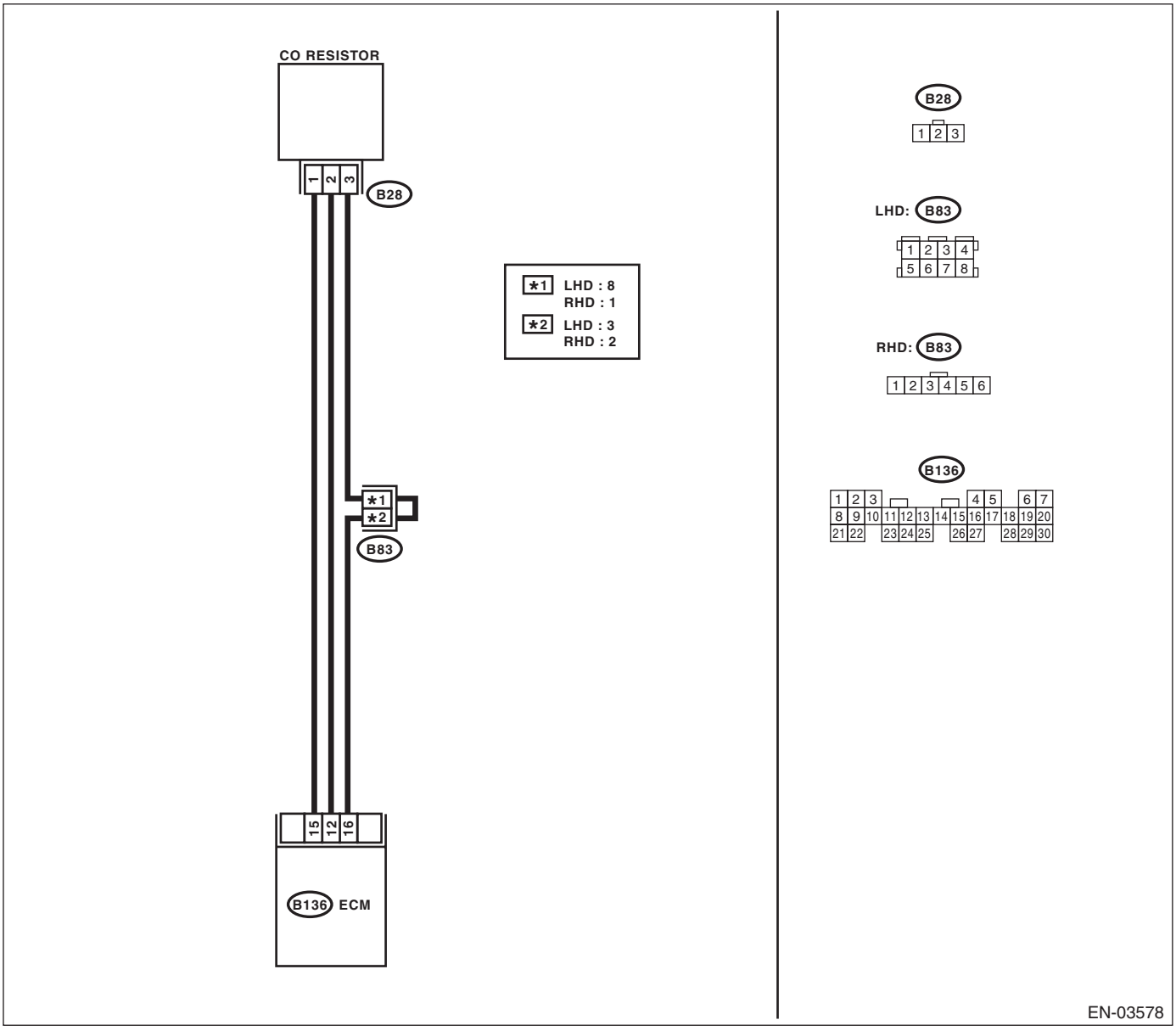
TROUBLE SYMPTOM:

- Erroneous idling
- Mixture ratio is too rich or too lean.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory and inspection modes. <Ref. to EN(H4SOw/oOBD)(diag)-27, OPERATION, Clear Memory Mode.> and <Ref. to EN(H4SOw/oOBD)(diag)-25, PROCEDURE, Inspection Mode.>

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK INPUT SIGNAL FOR ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B136) No. 12 (+) — Chassis ground (−):***	Is the voltage 0.5 — 4.5 V?	Go to step **3.**	Go to step **2.**
2	**CHECK POOR CONTACT.**	Is there poor contact in ECM connector?	Repair the poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H4SOw/oOBD)-42, Engine Control Module (ECM).>
3	**CHECK HARNESS BETWEEN CO RESISTOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM and CO resistor. 3) Measure the resistance of harness between ECM and CO resistor connector. ***Connector & terminal*** ***(B136) No. 15 — (B28) No. 1:*** ***(B136) No. 12 — (B28) No. 2:*** ***(B136) No. 16 — (B28) No. 3:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the open circuit in harness between ECM and CO resistor connector.
4	**CHECK HARNESS BETWEEN CO RESISTOR AND ECM CONNECTOR.** Measure the resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 15 — Chassis ground:*** ***(B136) No. 12 — Chassis ground:*** ***(B136) No. 16 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **5.**	Repair the short circuit in harness between ECM and CO resistor connector.
5	**CHECK CO RESISTOR.** Measure the resistance between CO resistor terminals. ***Terminals*** ***No. 1 — No. 3:***	Is the resistance 4 — 6 kΩ?	Go to step **6.**	Replace the CO resistor.
6	**CHECK CO RESISTOR.** Measure the variable resistance between CO resistor terminals while rotating the screw of CO resistor. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 0 — 6 kΩ?	Replace the ECM.	Replace the CO resistor. NOTE: Ensure resistance varies in response to screw rotation.

O: DTC 51 NEUTRAL POSITION SWITCH (MT MODEL)

DIAGNOSIS:

- The neutral position switch signal is abnormal.
- The harness connector between ECM and neutral position switch is open or shorted.

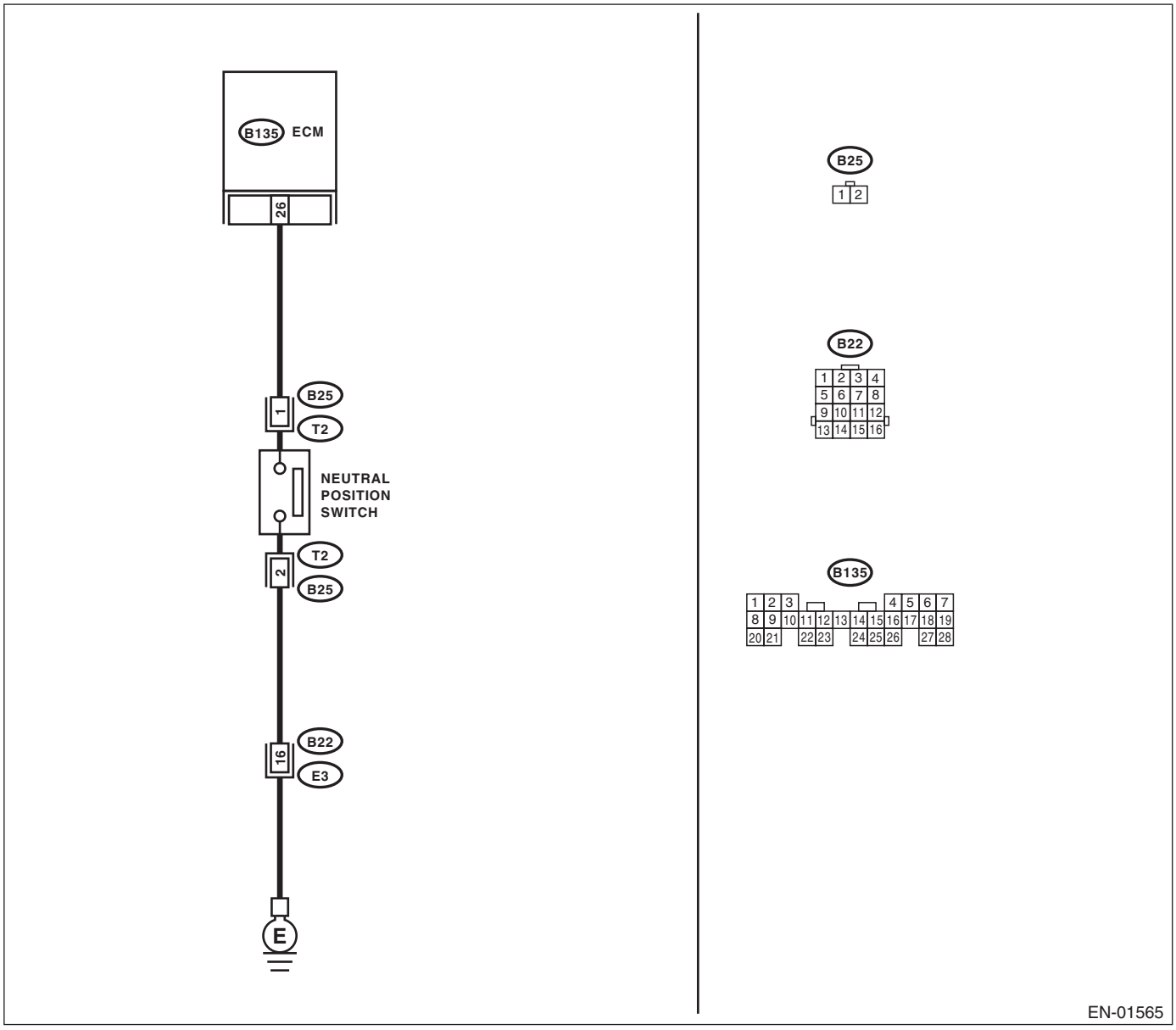
TROUBLE SYMPTOM:

Erroneous idling

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory and inspection modes. <Ref. to EN(H4SOw/oOBD)(diag)-27, OPERATION, Clear Memory Mode.> and <Ref. to EN(H4SOw/oOBD)(diag)-25, PROCEDURE, Inspection Mode.>

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK INPUT SIGNAL FOR ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 26 (+) — Chassis ground (−):***	Is the voltage 4.5 — 5.5 V in neutral position?	Go to step **3.**	Go to step **2.**
2	**CHECK INPUT SIGNAL FOR ECM.** Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 26 (+) — Chassis ground (−):***	Is the voltage less than 1 V in other positions?	Go to step **3.**	Go to step **4.**
3	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair the poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H4SOw/oOBD)-42, Engine Control Module (ECM).>
4	**CHECK NEUTRAL POSITION SWITCH.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission harness. 3) Measure the resistance between transmission harness and connector terminals. ***Connector & terminal*** ***(T2) No. 1 — No. 2:***	Is the resistance more than 1 MΩ in neutral position?	Go to step **5.**	Repair the short circuit in transmission harness or replace neutral position switch.
5	**CHECK NEUTRAL POSITION SWITCH.** Measure the resistance between transmission harness connector terminals. ***Connector & terminal*** ***(T2) No. 1 — No. 2:***	Is the resistance less than 10 Ω in other positions?	Go to step **6.**	Repair the open circuit in transmission harness or replace neutral position switch.
6	**CHECK HARNESS BETWEEN ECM AND NEUTRAL POSITION SWITCH CONNECTOR.** 1) Disconnect the connector from ECM. 2) Measure the resistance of harness between ECM and transmission harness connector. ***Connector & terminal*** ***(B135) No. 26 — (B25) No. 1:***	Is the resistance less than 1 Ω?	Go to step **7.**	Repair the open circuit in harness between ECM and transmission harness connector.
7	**CHECK HARNESS BETWEEN ECM AND NEUTRAL POSITION SWITCH CONNECTOR.** Measure the resistance between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 26 — Chassis ground:***	Is the resistance less than 10 Ω?	Repair the ground short circuit in harness between ECM and transmission harness connector.	Go to step **8.**
8	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H4SOw/oOBD)-42, Engine Control Module (ECM).>

P: DTC 51 PARK/NEUTRAL POSITION SWITCH (AT MODEL)

DIAGNOSIS:

- The park/neutral position switch signal is abnormal.
- The shift cable is connected abnormally.
- The harness connector between ECM/TCM and inhibitor switch is open or shorted.

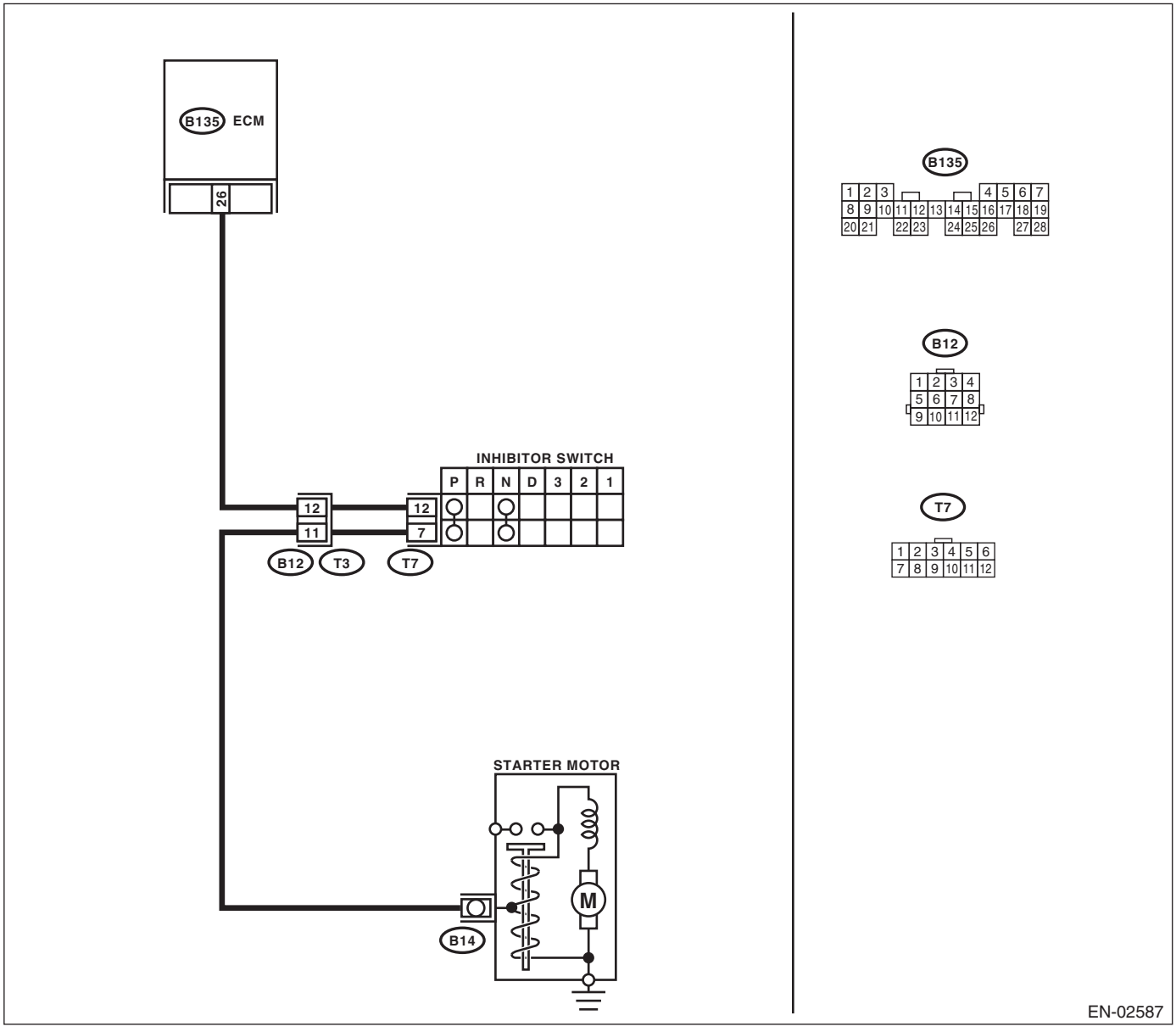
TROUBLE SYMPTOM:

Erroneous idling

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory and inspection modes. <Ref. to EN(H4SOw/oOBD)(diag)-27, OPERATION, Clear Memory Mode.> and <Ref. to EN(H4SOw/oOBD)(diag)-25, PROCEDURE, Inspection Mode.>

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK INPUT SIGNAL FOR ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM and chassis ground in selector lever "N" and "P" positions. ***Connector & terminal*** ***(B135) No. 26 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **2.**	Go to step **3.**
2	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair the poor contact in ECM connector.	Go to step **3.**
3	**CHECK HARNESS BETWEEN ECM AND INHIBITOR SWITCH CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and inhibitor switch. 3) Measure the resistance of harness between ECM and inhibitor switch connector. ***Connector & terminal*** ***(B135) No. 26 — (T7) No. 12:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and inhibitor switch connector • Poor contact in coupling connector (B12) • Poor contact in inhibitor switch connector • Poor contact in ECM connector
4	**CHECK INHIBITOR SWITCH GROUND LINE.** Measure the resistance of harness between inhibitor switch connector and engine ground. ***Connector & terminal*** ***(T7) No. 12 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **5.**	Repair the open circuit in inhibitor switch ground line.
5	**CHECK HARNESS BETWEEN ECM AND TRANSMISSION HARNESS CONNECTOR.** Measure the resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 26 — Chassis ground:***	Is the resistance less than 10 Ω?	Repair the ground short circuit in harness between ECM and transmission harness connector.	Go to step **6.**
6	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair the poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H4SOw/oOBD)-42, Engine Control Module (ECM).>

Q: DTC 85 CHARGE SYSTEM

DIAGNOSIS:

Power source voltage of the ECM is low or high.

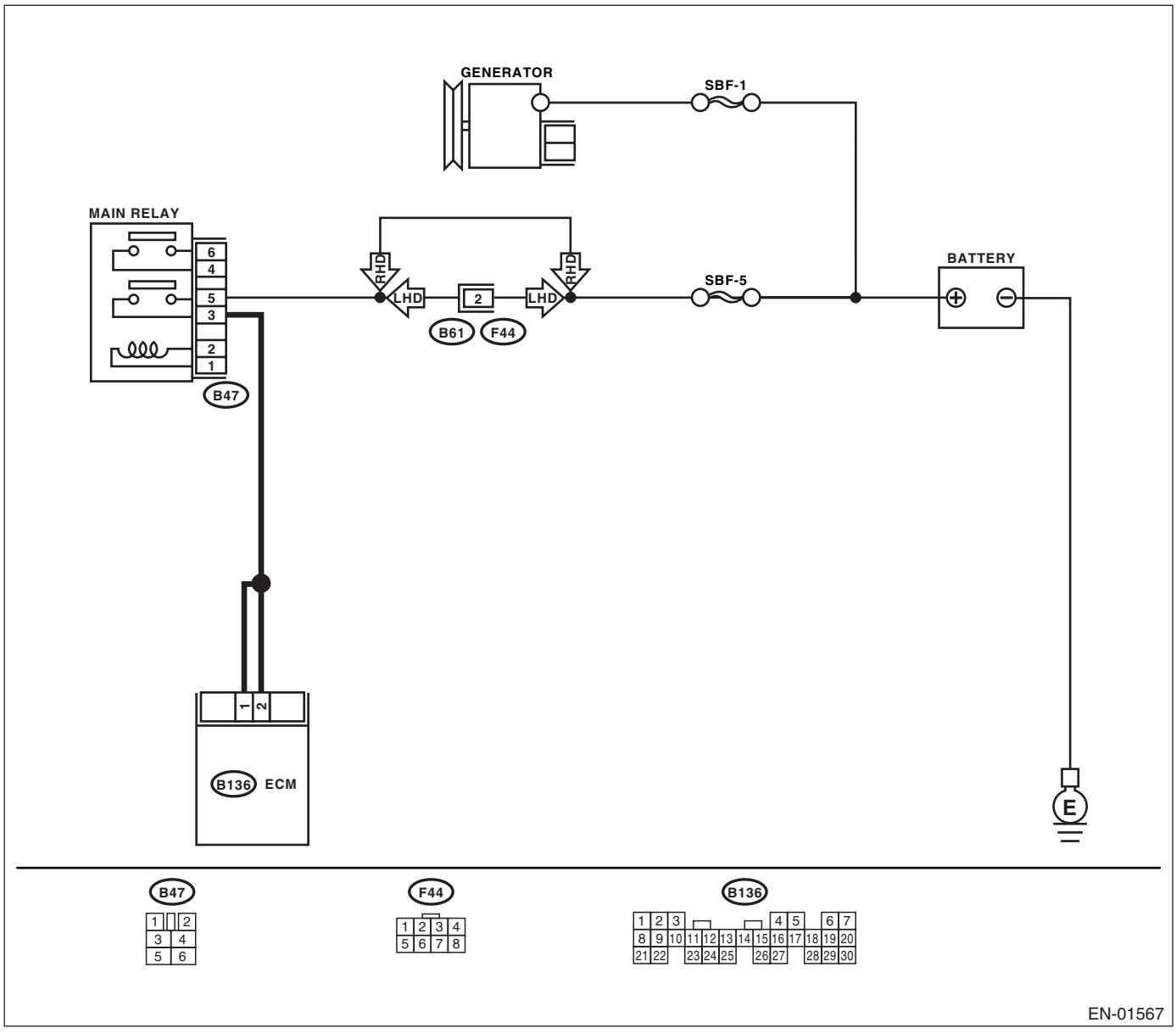
TROUBLE SYMPTOM:

Charge warning light comes on.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory and inspection modes. <Ref. to EN(H4SOw/oOBD)(diag)-27, OPERATION, Clear Memory Mode.> and <Ref. to EN(H4SOw/oOBD)(diag)-25, PROCEDURE, Inspection Mode.>

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK GENERATOR.** 1) Start the engine. 2) Idle after warm-up. 3) Measure the voltage between generator B terminal and chassis ground. ***Terminal*** ***Generator B terminal (+) — Chassis ground (−):***	Is the voltage 10.8 V — 16.2 V?	Go to step **2.**	Repair the generator. <Ref. to SC(H4SO)-14, Generator.>
2	**CHECK GENERATOR.** 1) Run the engine at 5,000 rpm. 2) Measure the voltage between generator B terminal and chassis ground. ***Terminal*** ***Generator B terminal (+) — Chassis ground (−):***	Is the voltage 10.8 V — 16.2 V?	Go to step **3.**	Repair the generator. <Ref. to SC(H4SO)-14, Generator.>
3	**CHECK BATTERY TERMINAL.** Turn the ignition switch to OFF.	Are the positive and ground battery terminals tightly clamped?	Go to step **4.**	Tighten the clamp of terminal.
4	**CHECK INPUT VOLTAGE OF ECM.** 1) Run the engine at idle. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 1 (+) — Chassis ground (−):*** ***(B136) No. 2 (+) — Chassis ground (−):***	Is the voltage 10.8 V — 16.2 V?	Go to step **5.**	Repair the harness connector between battery, main relay and ECM.
5	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in the connectors between generator, battery and ECM?	Repair the connector.	Go to step **6.**
6	**CHECK ECM.** 1) Connect all connectors. 2) Erase the memory. <Ref. to EN(H4SOw/oOBD)(diag)-27, OPERATION, Clear Memory Mode.> 3) Perform the inspection mode. <Ref. to EN(H4SOw/oOBD)(diag)-25, PROCEDURE, Inspection Mode.> 4) Read any DTC on the display. <Ref. to EN(H4SOw/oOBD)(diag)-24, OPERATION, Read Diagnostic Trouble Code (DTC).>	Is the same DTC as in the current diagnosis still being output?	Replace the generator.	Go to step **7.**
7	**CHECK ANY OTHER DTCs APPEARANCE.**	Is any other DTC displayed?	Proceed with the diagnosis corresponding to the DTC.	A temporary poor contact.

15.General Diagnostic Table

A: INSPECTION

1. ENGINE

NOTE:
Malfunction of parts other than those listed is also possible. <Ref. to ME(H4SO)-88, Engine Trouble in General.>

Symptom	Problem parts
1. Engine stalls during idling.	1) Idle air control solenoid valve 2) Manifold absolute pressure sensor 3) Intake air temperature sensor 4) Ignition parts (*1) 5) Engine coolant temperature sensor (*2) 6) Crankshaft position sensor (*3) 7) Camshaft position sensor (*3) 8) Fuel injection parts (*4)
2. Rough idling	1) Idle air control solenoid valve 2) Manifold absolute pressure sensor 3) Intake air temperature sensor 4) Engine coolant temperature sensor (*2) 5) Ignition parts (*1) 6) Air intake system (*5) 7) Fuel injection parts (*4) 8) Throttle position sensor 9) Crankshaft position sensor (*3) 10) Camshaft position sensor (*3) 11) Oxygen sensor 12) Fuel pump and fuel pump relay
3. Engine does not return to idle.	1) Idle air control solenoid valve 2) Engine coolant temperature sensor 3) Accelerator cable (*6) 4) Throttle position sensor 5) Manifold absolute pressure sensor 6) Intake air temperature sensor
4. Poor acceleration	1) Manifold absolute pressure sensor 2) Intake air temperature sensor 3) Throttle position sensor 4) Fuel injection parts (*4) 5) Fuel pump and fuel pump relay 6) Engine coolant temperature sensor (*2) 7) Crankshaft position sensor (*3) 8) Camshaft position sensor (*3) 9) A/C switch and A/C cut relay 10) Engine torque control signal circuit 11) Ignition parts (*1)
5. Engine stalls or engine sags or hesitates at acceleration.	1) Manifold absolute pressure sensor 2) Intake air temperature sensor 3) Engine coolant temperature sensor (*2) 4) Crankshaft position sensor (*3) 5) Camshaft position sensor (*3) 6) Purge control solenoid valve 7) Fuel injection parts (*4) 8) Throttle position sensor 9) Fuel pump and fuel pump relay

Symptom	Problem parts
6. Surge	1) Intake air temperature sensor 2) Manifold absolute pressure sensor 3) Engine coolant temperature sensor (*2) 4) Crankshaft position sensor (*3) 5) Camshaft position sensor (*3) 6) Fuel injection parts (*4) 7) Throttle position sensor 8) Fuel pump and fuel pump relay
7. Spark knock	1) Intake air temperature sensor 2) Manifold absolute pressure sensor 3) Engine coolant temperature sensor 4) Knock sensor 5) Fuel injection parts (*4) 6) Fuel pump and fuel pump relay
8. After burning in exhaust system	1) Intake air temperature sensor 2) Manifold absolute pressure sensor 3) Engine coolant temperature sensor (*2) 4) Fuel injection parts (*4) 5) Fuel pump and fuel pump relay

*1: Check ignition coil & ignitor ASSY and spark plug.
*2: Indicate the symptom occurring only in cold temperatures.
*3: Ensure the secure installation.
*4: Check fuel injector, fuel pressure regulator and fuel filter.
*5: Inspect air leak in air intake system.
*6: Adjust accelerator cable.

2. AUTOMATIC TRANSMISSION

NOTE:
Check general diagnostics table with non-conformity symptom for automatic transmission. <Ref. to 4AT(diag)-2, Basic Diagnostic Procedure.>

ENGINE SECTION 2

FUEL INJECTION (FUEL SYSTEMS)	FU(H4DOTC)
EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)	EC(H4DOTC)
INTAKE (INDUCTION)	IN(H4DOTC)
MECHANICAL	ME(H4DOTC)
EXHAUST	EX(H4DOTC)
COOLING	CO(H4DOTC)
LUBRICATION	LU(H4DOTC)
SPEED CONTROL SYSTEMS	SP(H4DOTC)
IGNITION	IG(H4DOTC)
STARTING/CHARGING SYSTEMS	SC(H4DOTC)
ENGINE (DIAGNOSTICS)	EN(H4DOTC)(diag)

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

FUJI HEAVY INDUSTRIES LTD. G1880GE3

FUEL INJECTION (FUEL SYSTEMS)

FU(H4DOTC)

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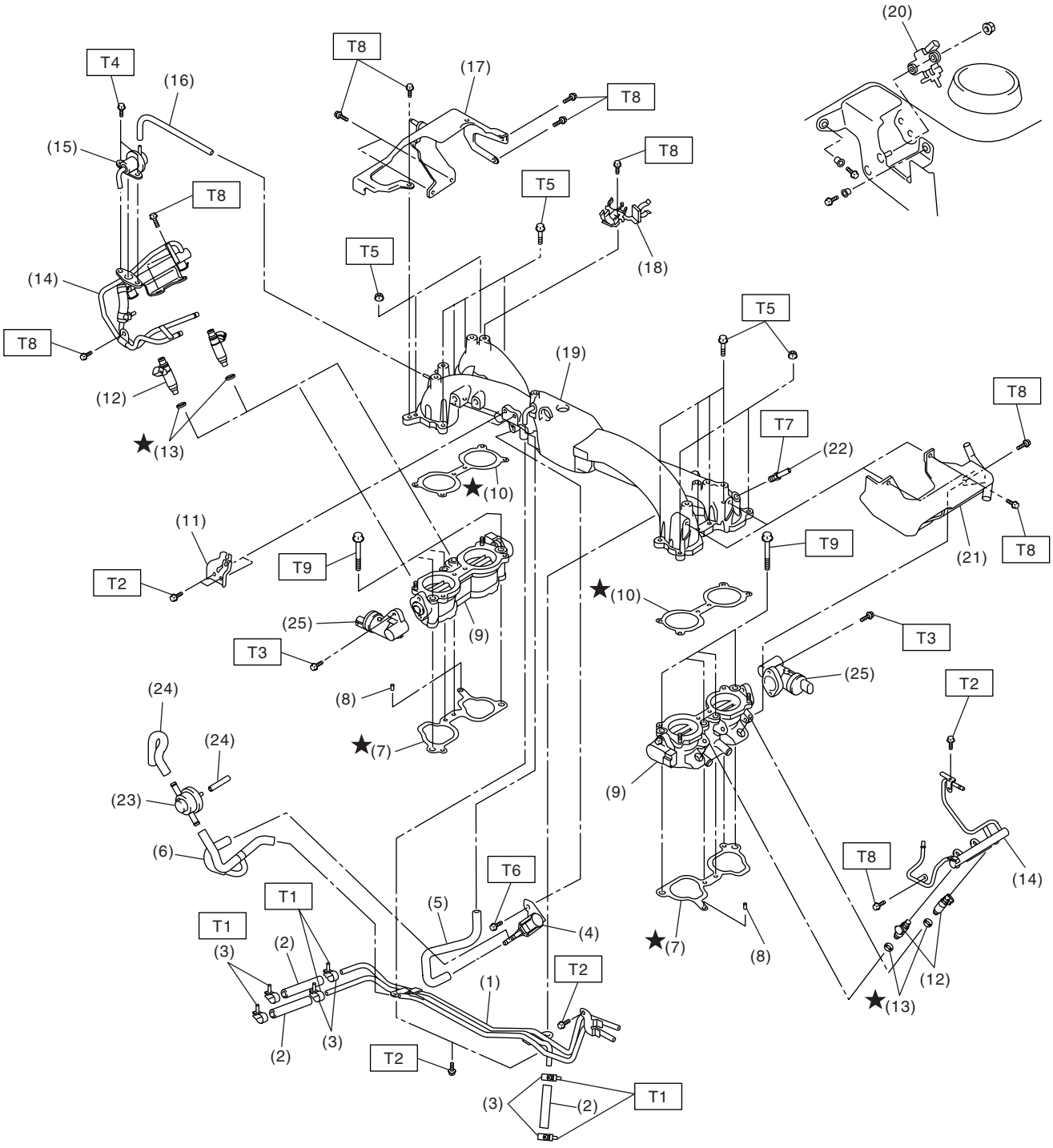
1. General Description

A: SPECIFICATION

Fuel tank	Capacity	60 ℓ (15.9 US gal, 13.2 Imp gal)
	Location	Under rear seat
Fuel pump	Type	Impeller
	Shutoff discharge pressure	450 — 677 kPa (4.59 — 6.9 kgf/cm^2, 65.27 — 98.2 psi)
	Discharge flow	More than 130 ℓ (34.3 US gal, 28.6 Imp gal)/h [12 V at 300 kPa (3.06 kgf/cm^2, 43.5 psi)]
Fuel filter		Cartridge type

B: COMPONENT

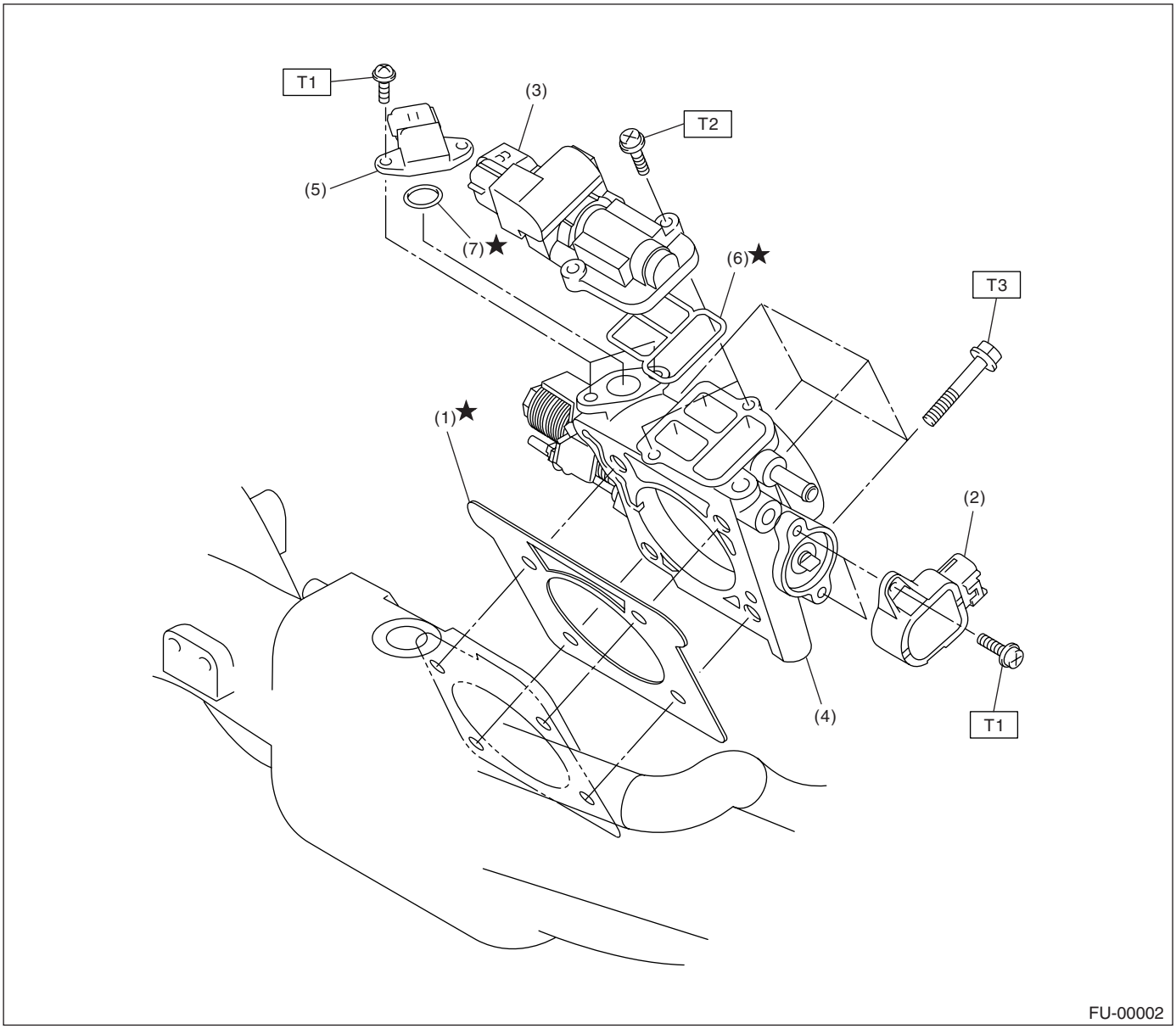
1. INTAKE MANIFOLD



(1) Fuel pipe ASSY
(2) Fuel hose
(3) Clamp
(4) Purge control solenoid valve
(5) Vacuum hose
(6) Vacuum control hose
(7) Intake manifold gasket
(8) Guide pin
(9) Tumble generator valve ASSY (Except STi model)
(10) Gasket
(11) Accelerator cable bracket (MT model)
(12) Fuel injector
(13) Insulator
(14) Fuel injector pipe
(15) Pressure regulator
(16) Pressure regulator hose
(17) Fuel pipe protector RH
(18) Blow-by hose stay
(19) Intake manifold
(20) Wastegate control solenoid valve ASSY
(21) Fuel pipe protector LH
(22) Nipple
(23) Purge valve (Except Australia model)
(24) Purge hose (Except Australia model)
(25) Tumble generator valve actuator (Except STi model)

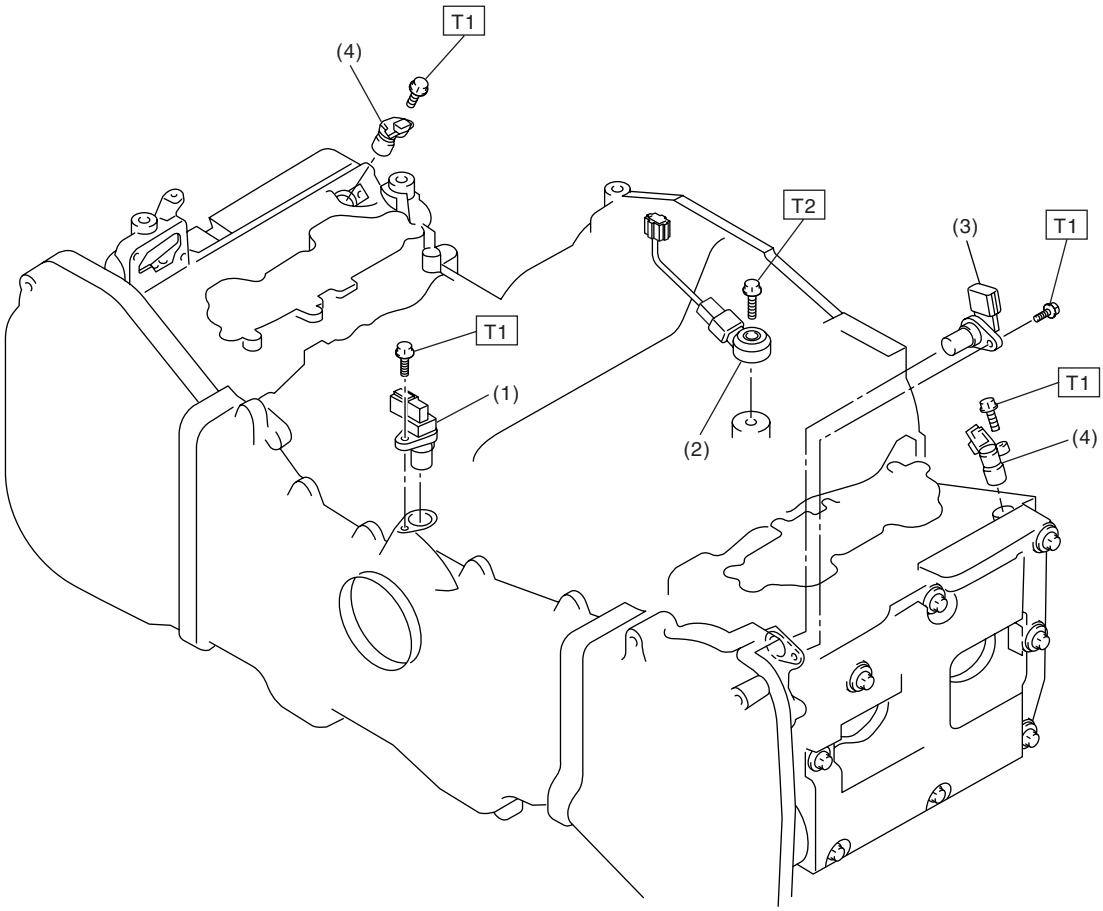
Tightening torque: N·m (kgf-m, ft-lb)
T1: 1.25 (0.13, 0.94)
T2: 4.9 (0.5, 3.6)
T3: 6 (0.6, 4.4)
T4: 6.4 (0.65, 4.7)
T5: 8.25 (0.84, 6.1)
T6: 16 (1.6, 11.8)
T7: 17 (1.7, 12.5)
T8: 19 (1.9, 14.0)
T9: 25 (2.5, 18.4)

2. AIR INTAKE SYSTEM



(1)	Gasket	(5)	Manifold absolute pressure sensor	***Tightening torque: N·m (kgf-m, ft-lb)***
(2)	Throttle position sensor	(6)	Gasket	***T1: 1.6 (0.16, 1.2)***
(3)	Idle air control solenoid valve	(7)	O-ring	***T2: 2.8 (0.29, 2.1)***
(4)	Throttle body			***T3: 22 (2.2, 16.2)***

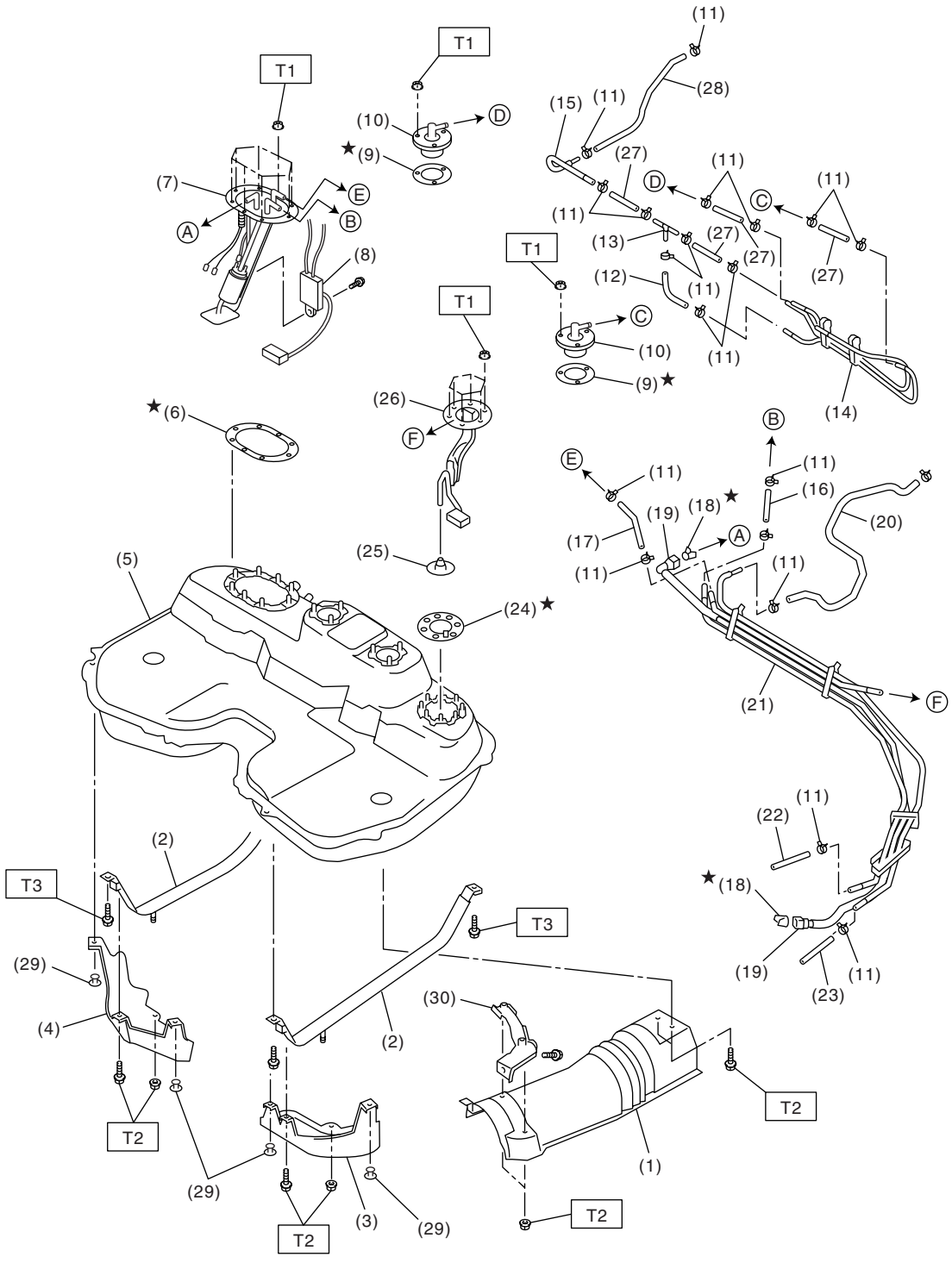
3. CRANKSHAFT POSITION, CAMSHAFT POSITION AND KNOCK SENSORS



(1) Crankshaft position sensor
(2) Knock sensor
(3) Camshaft position sensor
(4) AVCS camshaft position sensor (STi model and Australia model)

Tightening torque: N·m (kgf-m, ft-lb)
T1: 6.4 (0.65, 4.7)
T2: 24 (2.4, 17.4)

4. FUEL TANK

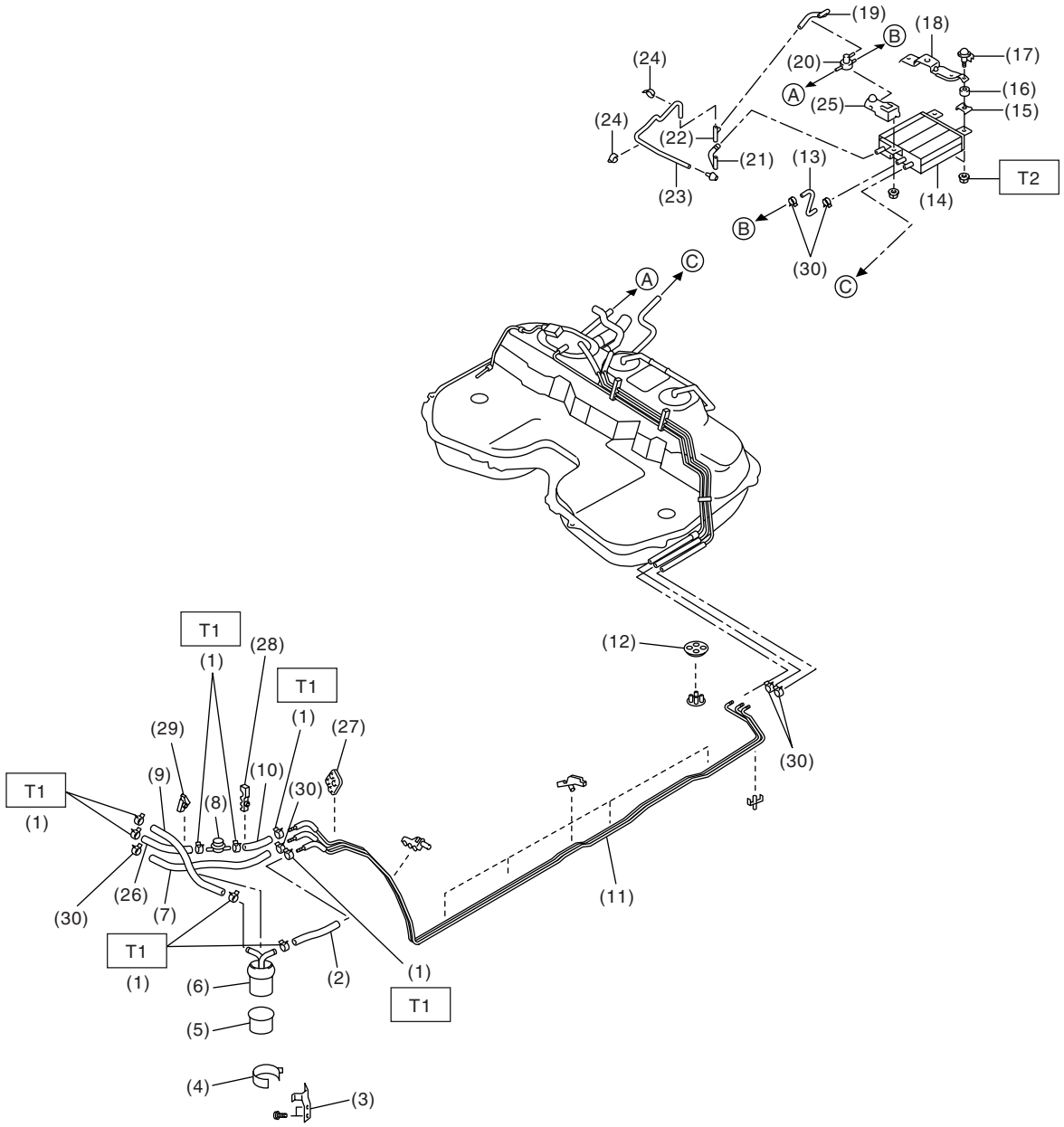


FU-02632

(1) Heat shield cover
(2) Fuel tank band
(3) Protector LH
(4) Protector RH
(5) Fuel tank
(6) Fuel pump gasket
(7) Fuel pump ASSY
(8) Fuel level sensor
(9) Fuel cut valve gasket
(10) Fuel cut valve
(11) Clip
(12) Evaporation hose A
(13) Joint pipe
(14) Evaporation pipe ASSY
(15) Evaporation pipe
(16) Fuel return hose A
(17) Jet pump hose
(18) Retainer
(19) Quick connector
(20) Evaporation hose B
(21) Fuel pipe ASSY
(22) Fuel return hose B
(23) Evaporation hose C
(24) Fuel sub level sensor gasket
(25) Jet pump filter
(26) Fuel sub level sensor
(27) Evaporation hose D
(28) Evaporation hose E
(29) Clip
(30) Cover bracket

Tightening torque: N·m (kgf-m, ft-lb)
T1: 4.4 (0.45, 3.3)
T2: 7.4 (0.75, 5.4)
T3: 33 (3.4, 24.3)

5. FUEL LINE

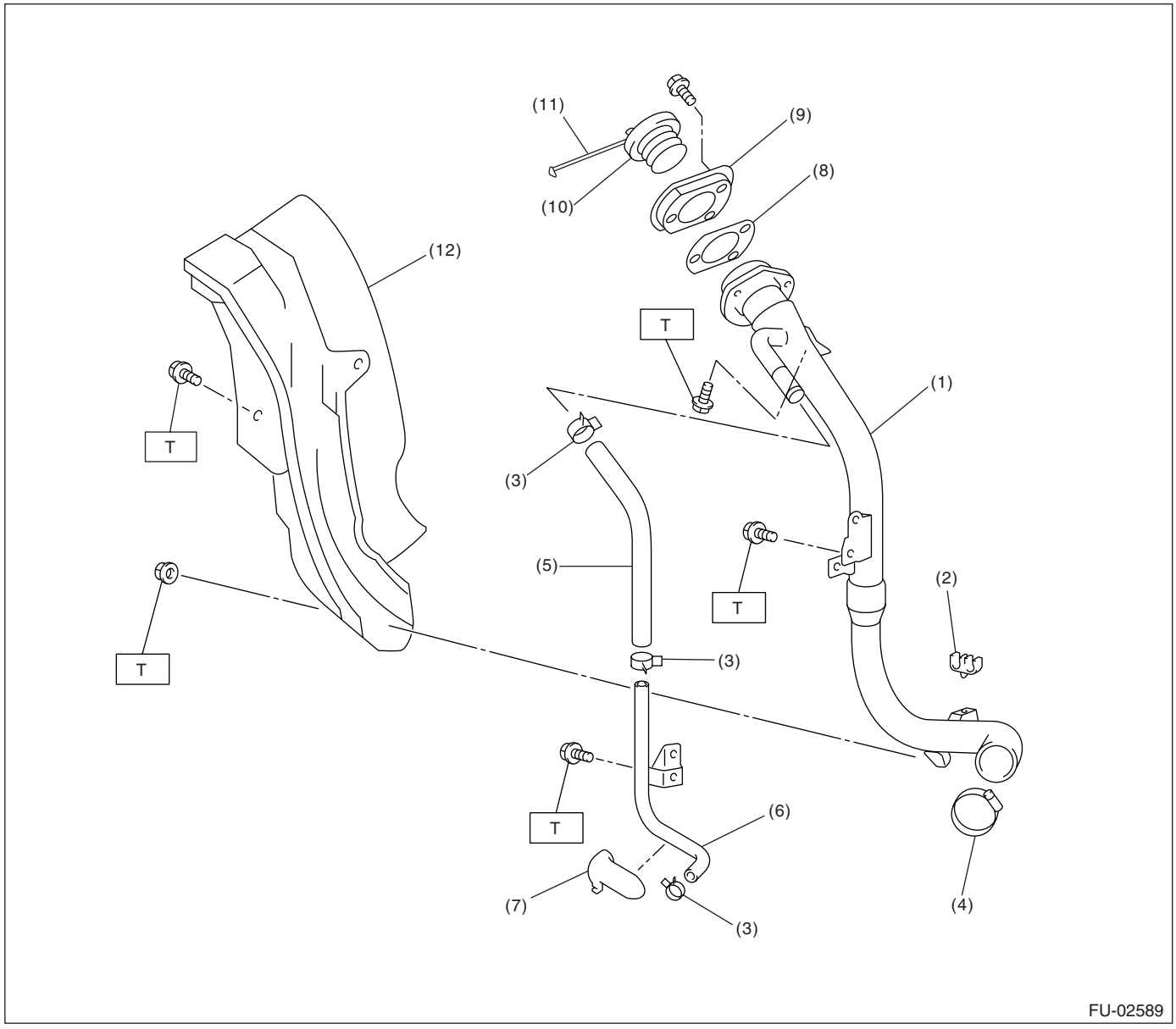


FU-02625

(1) Clamp
(2) Fuel delivery hose A
(3) Fuel filter bracket
(4) Fuel filter holder
(5) Fuel filter cup
(6) Fuel filter
(7) Evaporation hose
(8) Fuel damper
(9) Fuel delivery hose B
(10) Fuel return hose A
(11) Fuel pipe ASSY
(12) Grommet A
(13) Canister hose
(14) Canister
(15) Canister bracket plate
(16) Cushion
(17) Canister bracket spacer
(18) Rear canister bracket
(19) Two-way valve hose
(20) Two-way valve
(21) Canister drain hose
(22) Connector
(23) Drain hose
(24) Clamp
(25) Front canister bracket
(26) Fuel return hose B
(27) Grommet B
(28) Clip
(29) Clip
(30) Clip

Tightening torque: N·m (kgf-m, ft-lb)
T1: 1.25 (0.13, 0.94)
T2: 23 (2.3, 17.0)

6. FUEL FILLER PIPE



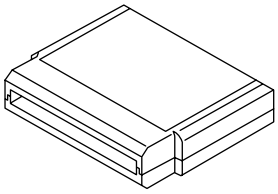
(1) Fuel filler pipe ASSY
(2) Evaporation hose holder
(3) Clip
(4) Clamp
(5) Air vent hose
(6) Air vent pipe
(7) Air vent pipe holder
(8) Filler pipe packing
(9) Filler ring
(10) Filler cap
(11) Filler cap tether
(12) Filler pipe protector

Tightening torque: N·m (kgf-m, ft-lb)
T: 7.5 (0.76, 5.5)

C: CAUTION

- Wear working clothing, including a cap, protective goggles and protective shoes during operation.
- Remove contamination including dirt and corrosion before removal, installation or disassembly.
- Keep the disassembled parts in order and protect them from dust or dirt.
- Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly, and replacement.
- Be careful not to burn, because each part on the vehicle is hot after running.
- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or rigid racks at the specified points.
- Before disconnecting electrical connectors of sensors or units, be sure to disconnect the ground cable from battery.
- Place “NO FIRE” signs near the working area.
- Be careful not to spill fuel on the floor.

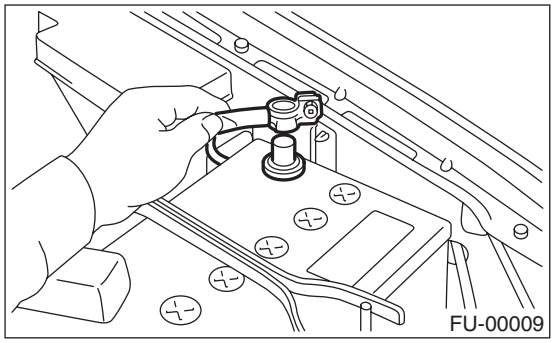
D: PREPARATION TOOL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18482AA000	18482AA000	CARTRIDGE	Troubleshooting for electrical system.
ST22771AA030	22771AA030	SUBARU SELECT MONITOR KIT	Troubleshooting for electrical systems. • English: 22771AA030 (Without printer) • German: 22771AA070 (Without printer) • French: 22771AA080 (Without printer) • Spanish: 22771AA090 (Without printer)

2. Throttle Body

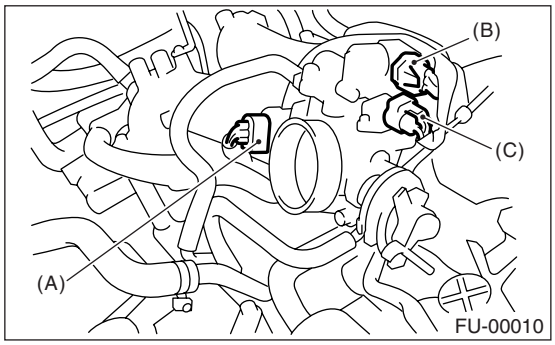
A: REMOVAL

1) Disconnect the ground cable from battery.

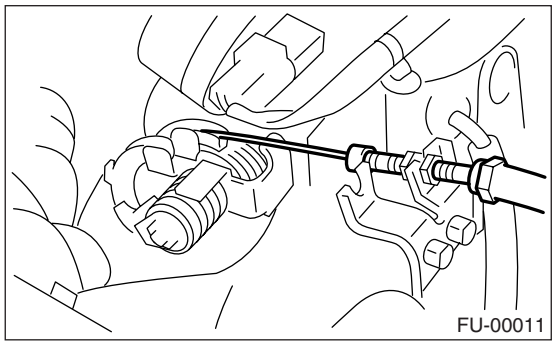


2) Remove the intercooler. <Ref. to IN(H4DOTC)-12, REMOVAL, Intercooler.>

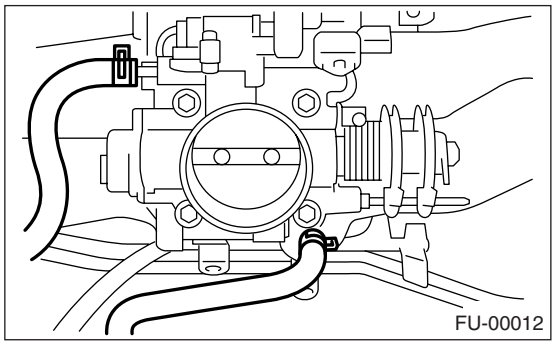
3) Disconnect the connector from the throttle position sensor (A) and idle air control solenoid valve (B) and manifold absolute pressure sensor (C).



4) Disconnect the accelerator cable.



5) Disconnect the engine coolant hoses from throttle body.



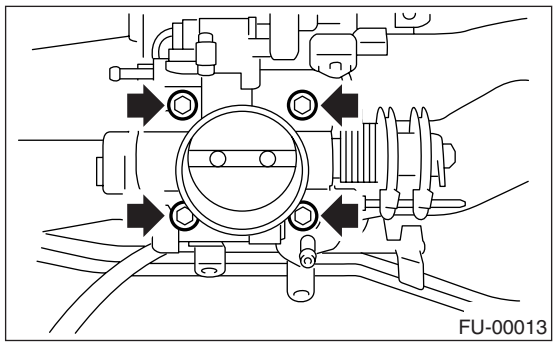
6) Remove the bolts which secure the throttle body to intake manifold.

B: INSTALLATION

1) Install in the reverse order of removal.

NOTE:
Use a new gasket.

Tightening torque:
Throttle body
22 N·m (2.2 kgf-m, 16.2 ft-lb)

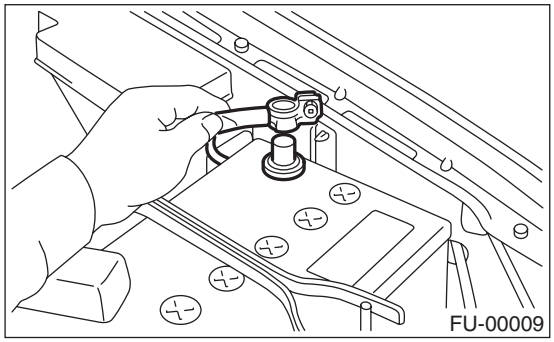


2) Adjust the accelerator cable play. <Ref. to SP(H4SO)-9, INSTALLATION, Accelerator Control Cable.>

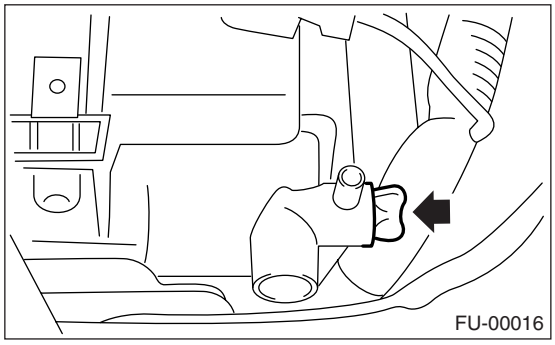
3. Intake Manifold

A: REMOVAL

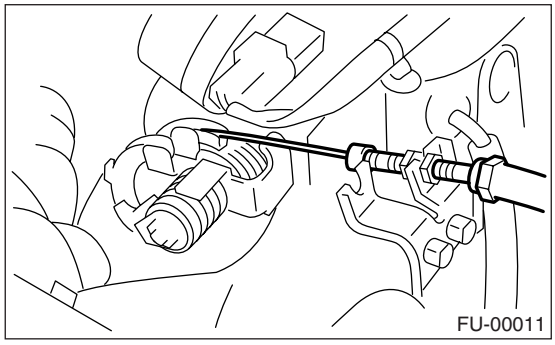
1) Release the fuel pressure. <Ref. to FU(H4DOTC)-54, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
2) Open the fuel filler flap lid and remove the fuel filler cap.
3) Disconnect the ground cable from battery.



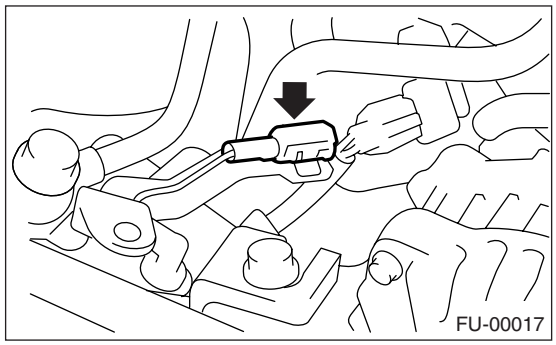
4) Lift-up the vehicle.
5) Remove the under cover.
6) Drain the coolant about 3.0 ℓ (3.2 US qt, 2.6 Imp qt).



7) Remove the air cleaner upper cover and air intake boot. <Ref. to IN(H4DOTC)-8, REMOVAL, Air Cleaner Element.>
8) Remove the air cleaner element.
9) Remove the intercooler. <Ref. to IN(H4DOTC)-12, REMOVAL, Intercooler.>
10) Disconnect the accelerator cable.

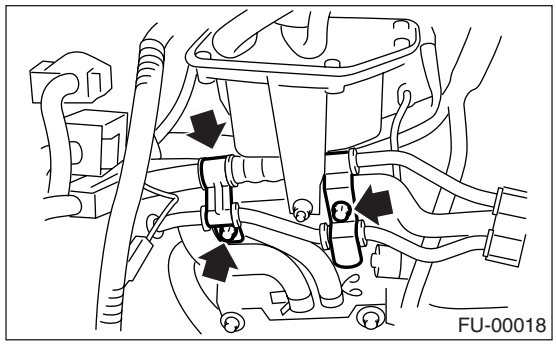


11) Remove the coolant filler tank. <Ref. to CO(H4DOTC)-33, REMOVAL, Coolant Filler Tank.>
12) Remove the power steering pump.
(1) Remove the front side V-belt. <Ref. to ME(H4DOTC)-53, REMOVAL, V-belt.>
(2) Disconnect the power steering switch connector.

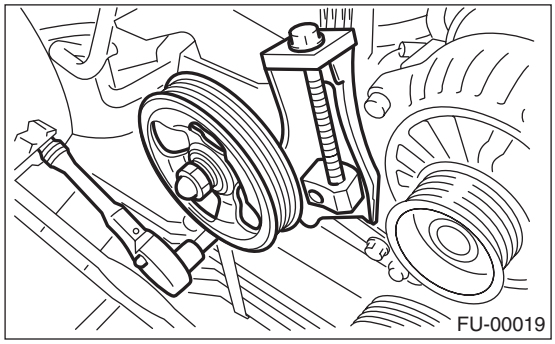


(3) Remove the bolts which secure the power steering pipe brackets to intake manifold.

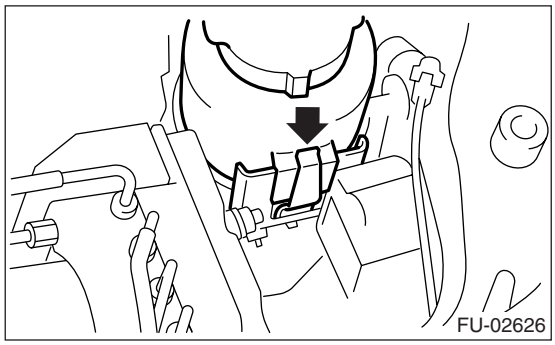
NOTE:
Do not disconnect the power steering hose.



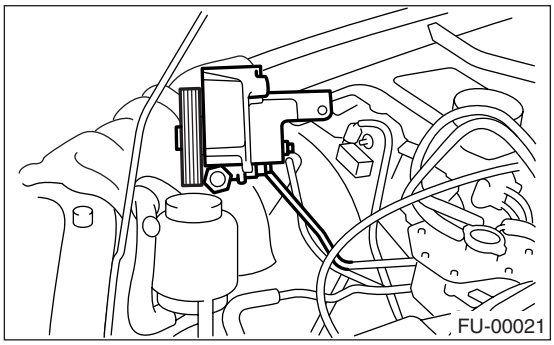
(4) Remove the bolts which secure the power steering pump bracket.



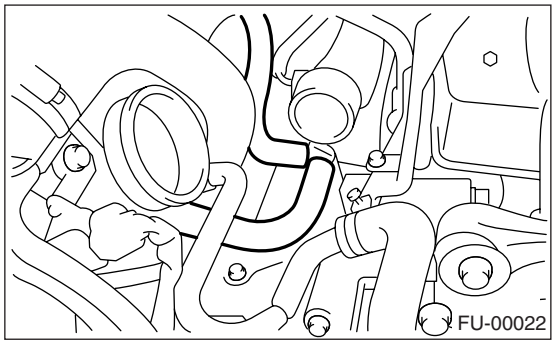
(5) Remove the power steering tank from the bracket by pulling it upward.



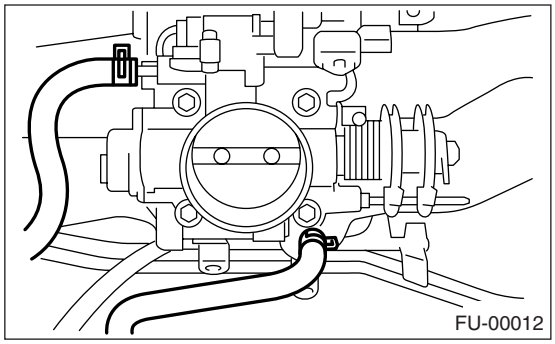
(6) Place the power steering pump on right side wheel apron.



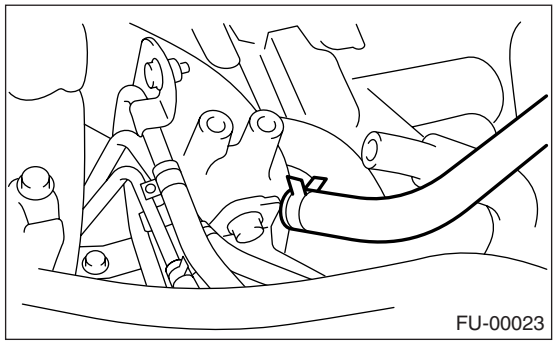
13) Disconnect the emission hose from PCV valve.



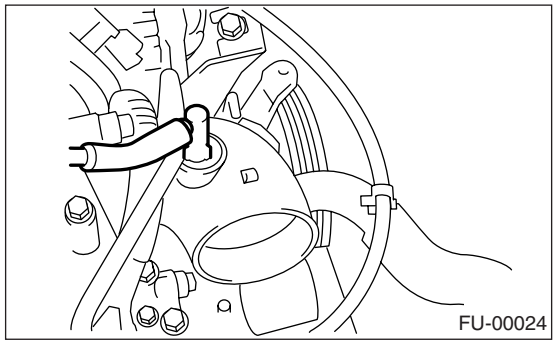
14) Disconnect the engine coolant hoses from throttle body.



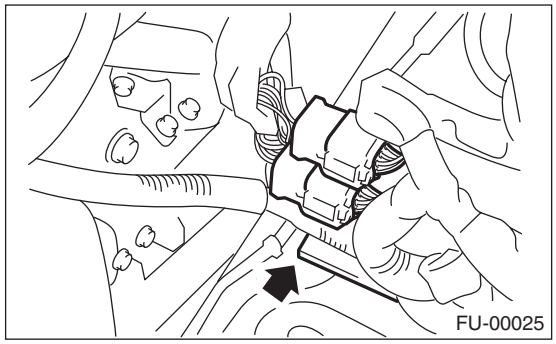
15) Disconnect the brake booster hose.

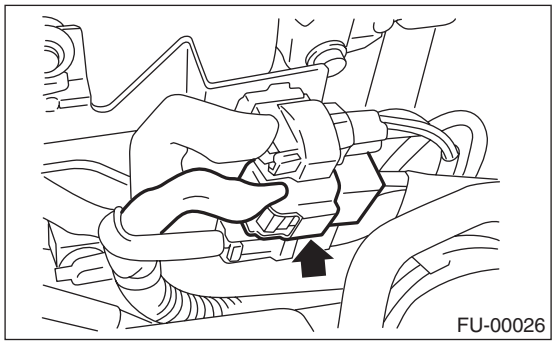


16) Disconnect the pressure hose from intake duct.

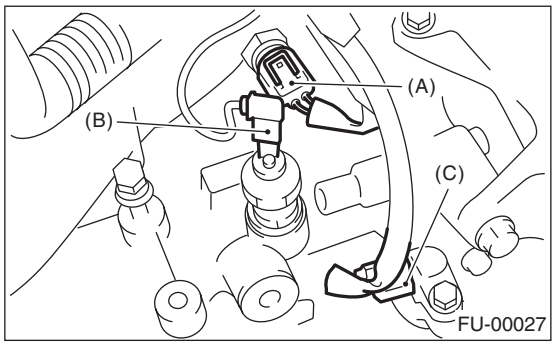


17) Disconnect the engine harness connectors from bulkhead harness connectors.

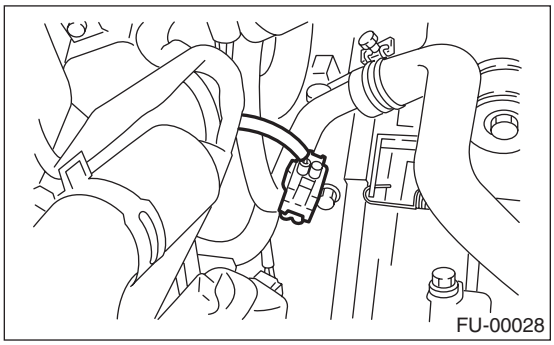




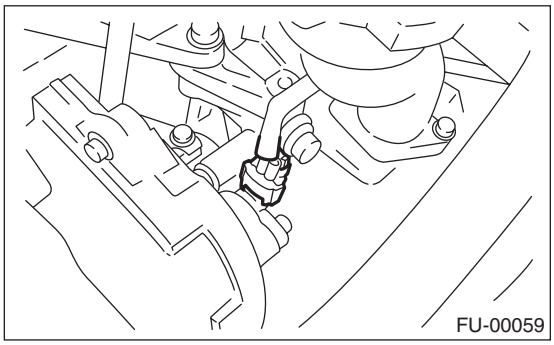
18) Disconnect the connectors from the engine coolant temperature sensor (A), oil pressure switch (B) and crankshaft position sensor (C).



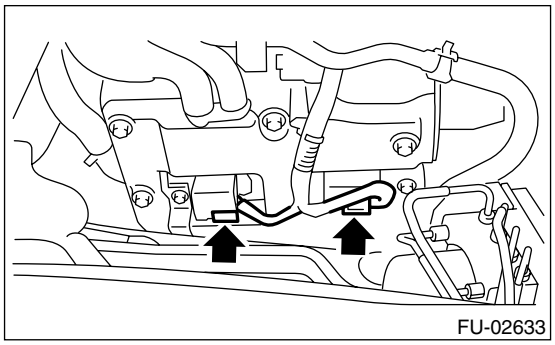
19) Disconnect the knock sensor connector.



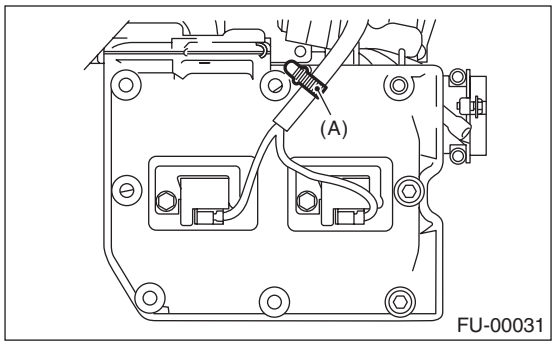
20) Disconnect the connector from camshaft position sensor.



21) Disconnect the connector from ignition coil.

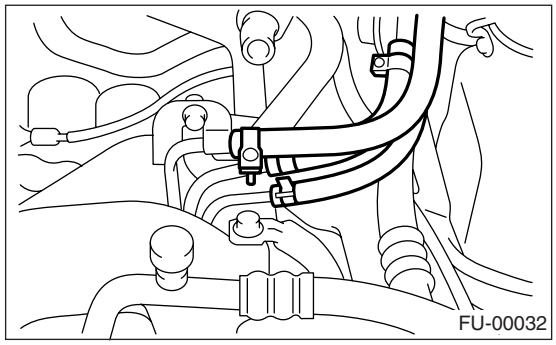


22) Disconnect the engine harness fixed by clip (A) from bracket.

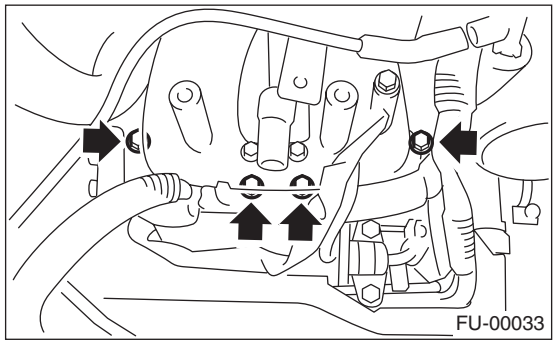


23) Disconnect the fuel delivery hose, return hose and evaporation hose.

CAUTION:
- **Do not spill fuel on the floor.**
- **Catch the fuel from hoses in a container or cloth.**



24) Remove the bolts which secure the intake manifold to cylinder heads.



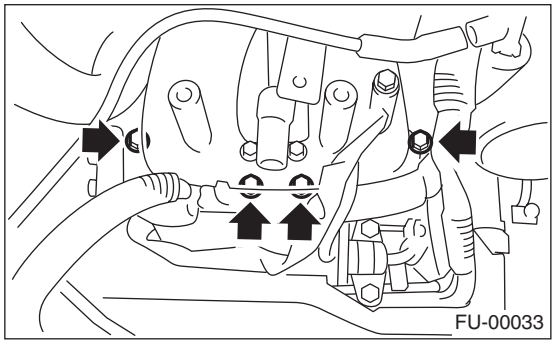
25) Remove the intake manifold.

B: INSTALLATION

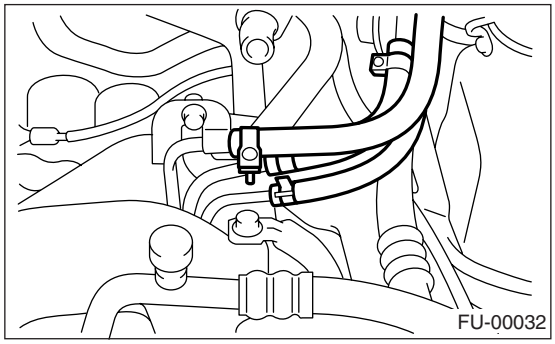
1) Install the intake manifold onto cylinder heads.

NOTE:
Use new gaskets.

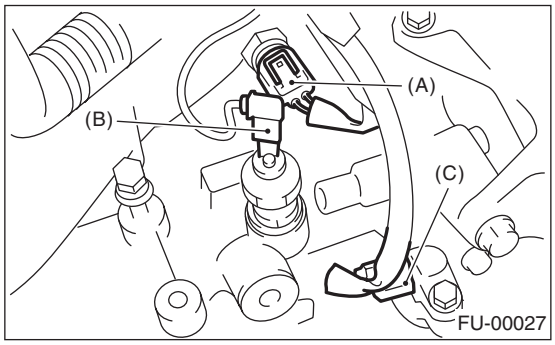
Tightening torque:
25 N·m (2.5 kgf-m, 18.4 ft-lb)



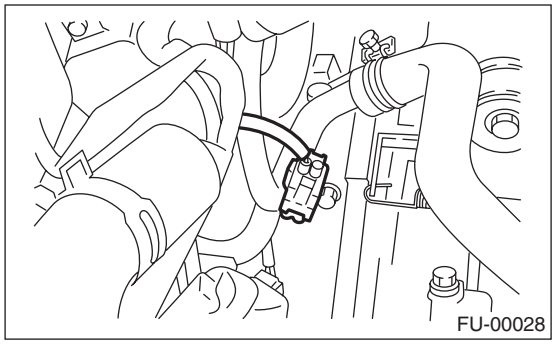
2) Connect the fuel delivery hose, return hose and evaporation hose.



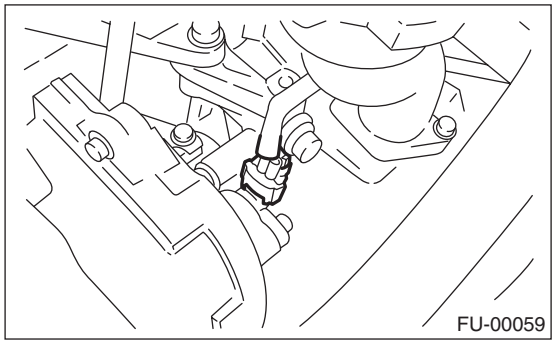
3) Connect the connector to the oil pressure switch (B), crankshaft position sensor (C) and engine coolant temperature sensor (A).



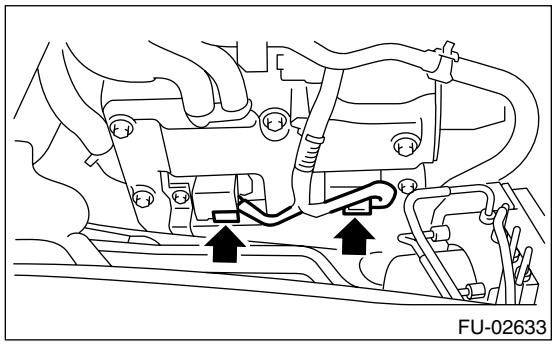
4) Connect the connector to knock sensor.



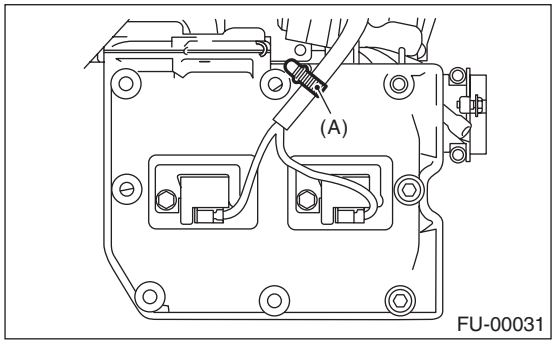
5) Connect the connector to camshaft position sensor.



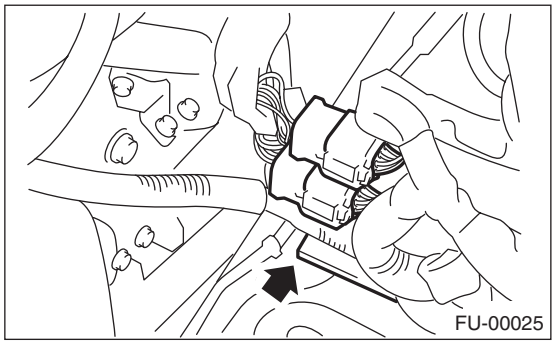
6) Connect the connector to ignition coil.

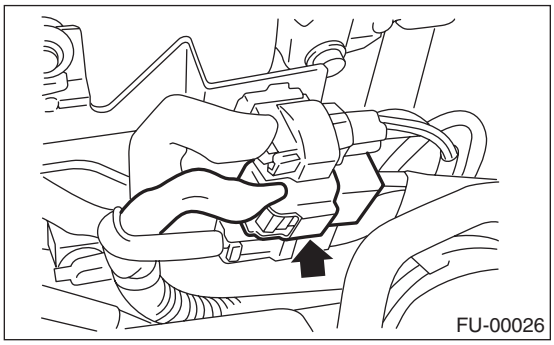


7) Connect the engine harness with clip (A) to the bracket.

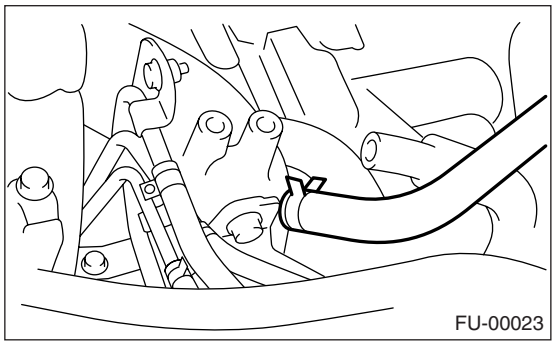


8) Connect the engine harness connector to bulkhead harness connectors.

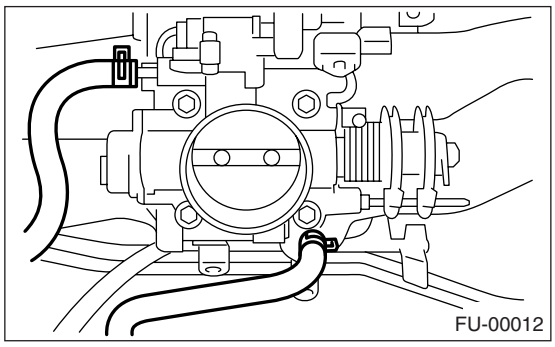




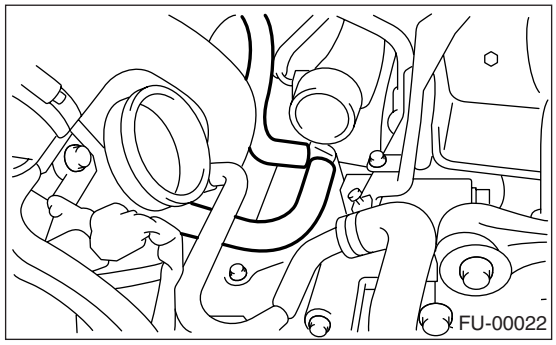
9) Connect the brake booster vacuum hose.



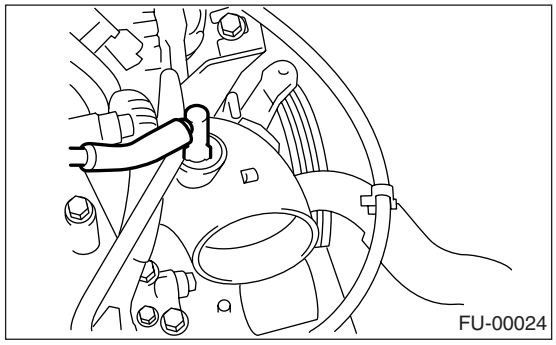
10) Connect the engine coolant hoses to throttle body.



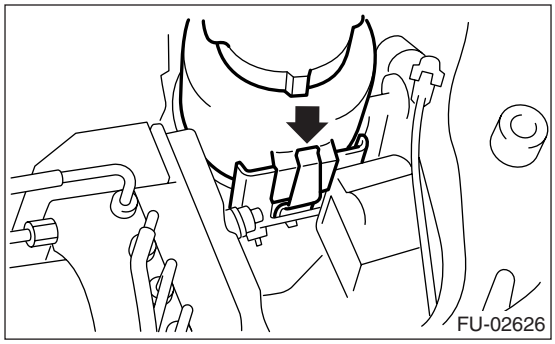
11) Connect the emission hose to PCV valve.



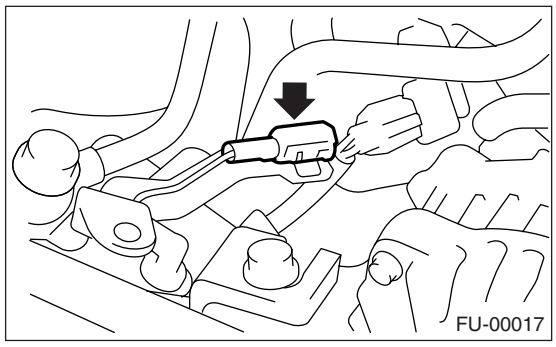
12) Connect the pressure hose to intake duct.



13) Install the power steering pump.
(1) Install the power steering tank on bracket.

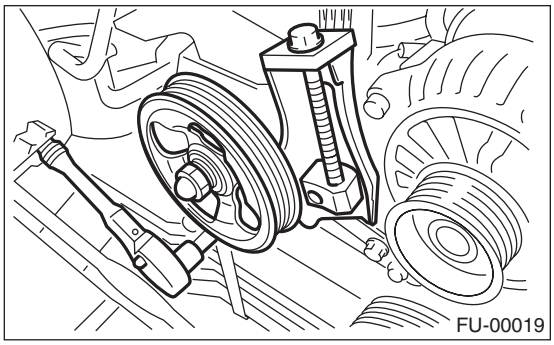


(2) Connect the connector to the power steering pump switch.

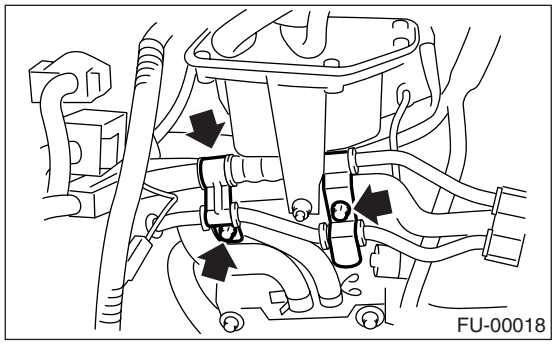


(3) Install the power steering pump, and then tighten the bolts.

Tightening torque:
22 N·m (2.2 kgf-m, 16.2 ft-lb)


FU-00019

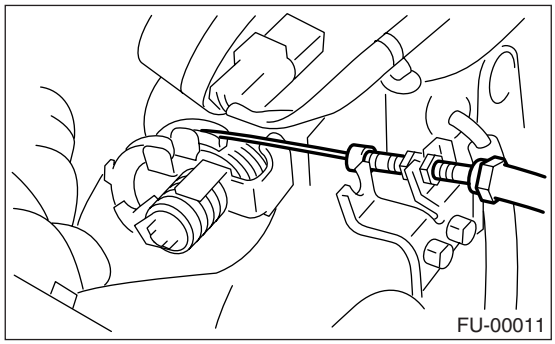
(4) Install the power steering pipe brackets on right side intake manifold.


FU-00018

(5) Install the front side V-belt. <Ref. to ME(H4DOTC)-53, INSTALLATION, V-belt.>

14) Install the coolant filler tank. <Ref. to CO(H4DOTC)-33, INSTALLATION, Coolant Filler Tank.>

15) Connect the accelerator cable. <Ref. to SP(H4SO)-9, INSTALLATION, Accelerator Control Cable.>

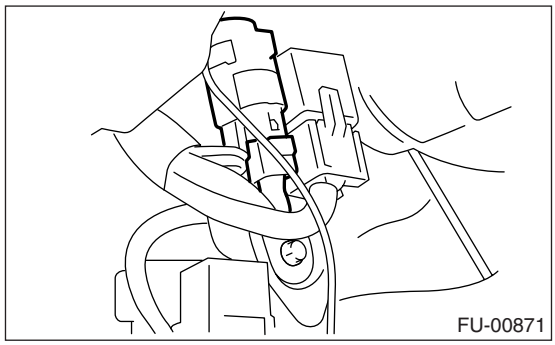

FU-00011

16) Install the intercooler. <Ref. to IN(H4DOTC)-12, INSTALLATION, Intercooler.>

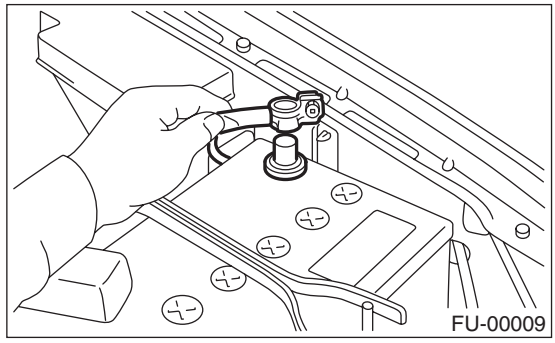
17) Install the air cleaner element.

18) Install the air cleaner upper cover and air intake duct as a unit. <Ref. to IN(H4DOTC)-8, INSTALLATION, Air Cleaner Element.>

19) Connect the connector to the fuel pump relay.


FU-00871

20) Connect the battery ground cable to battery.


FU-00009

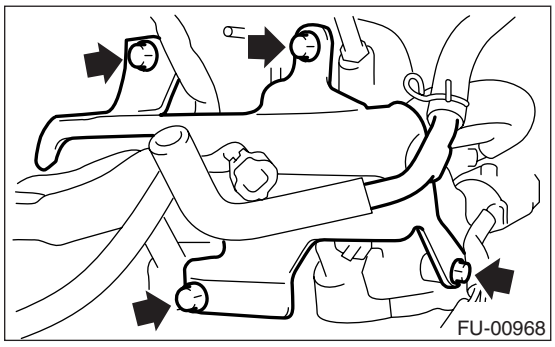
21) Lift-up the vehicle.

22) Install the under cover.

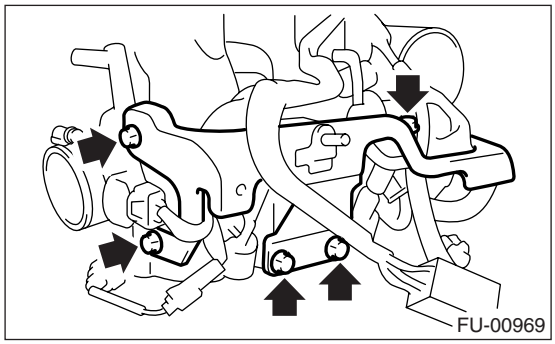
23) Fill the coolant. <Ref. to CO(H4DOTC)-18, FILLING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>

C: DISASSEMBLY

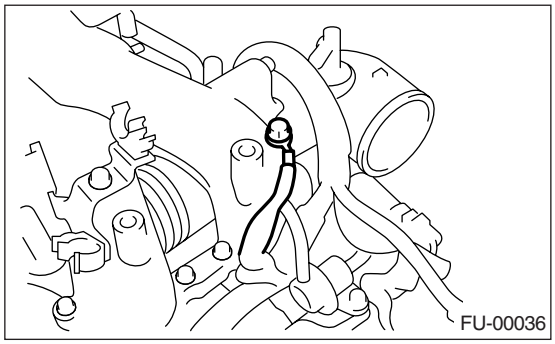
1) Remove the fuel pipe protector LH.

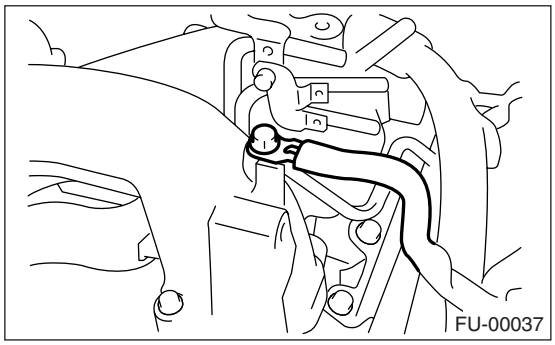

FU-00968

2) Remove the fuel pipe protector RH.

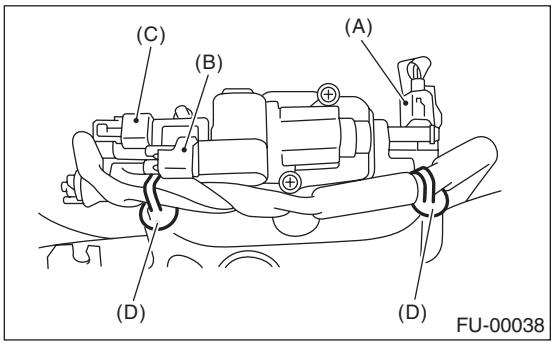

FU-00969

3) Remove the engine ground cable from intake manifold.

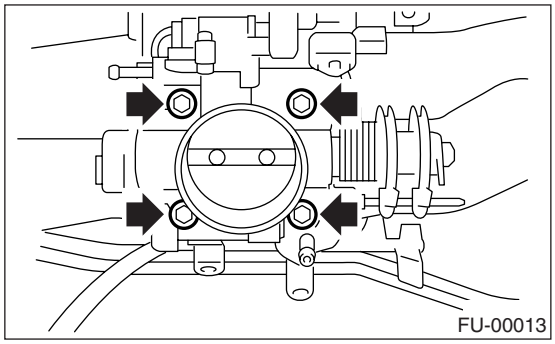




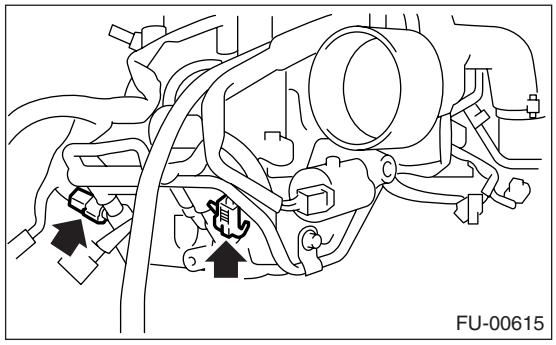
4) Disconnect the connector from the throttle position sensor (A), idle air control solenoid valve (B) and manifold absolute pressure sensor (C).
5) Disconnect the engine harness fixed by clip (D) from intake manifold.



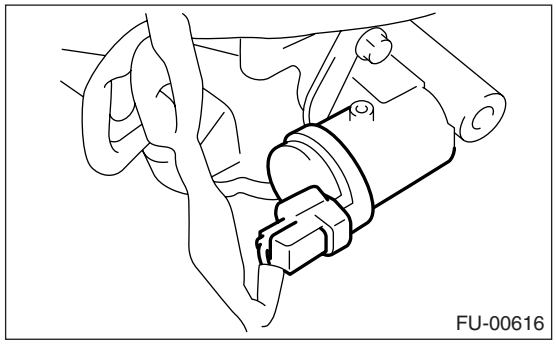
6) Remove the throttle body from intake manifold.



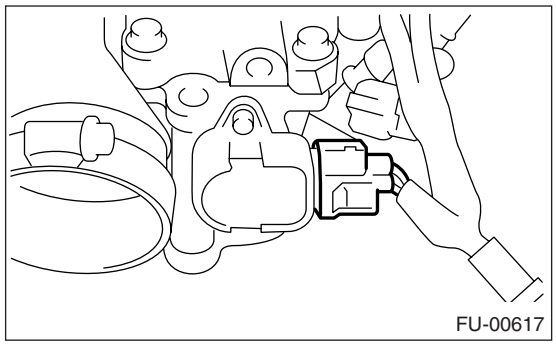
7) Disconnect the connector from fuel injector.



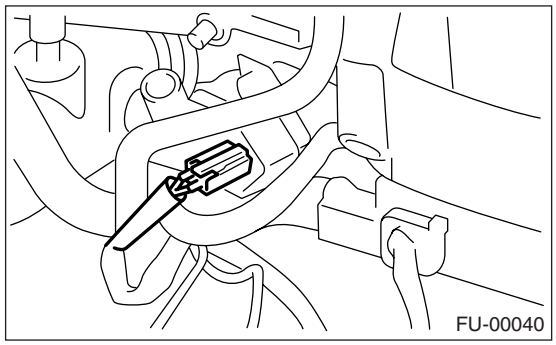
8) Disconnect the connector from tumble generator valve actuator. (Except STi model)



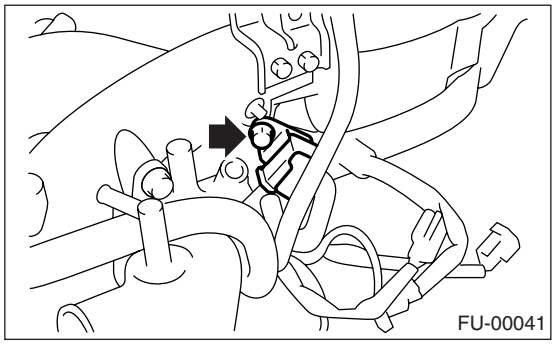
9) Disconnect the connector from tumble generator valve sensor. (Except STi model)



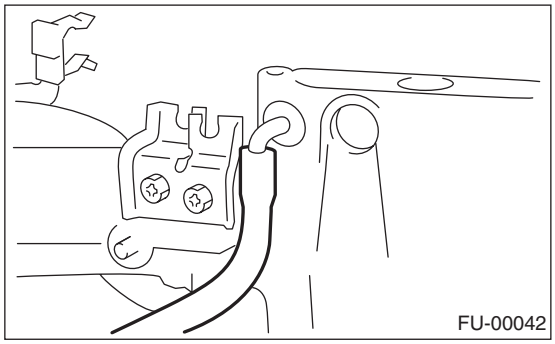
10) Disconnect the connector from purge control solenoid valve.



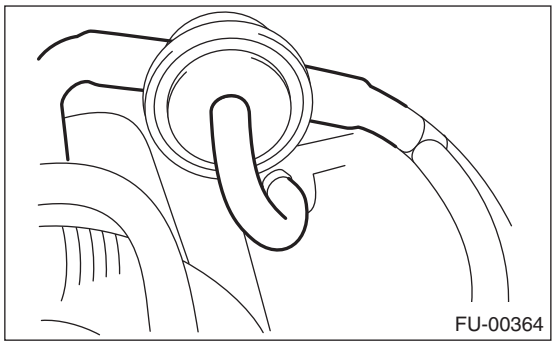
11) Remove the purge control solenoid valve.



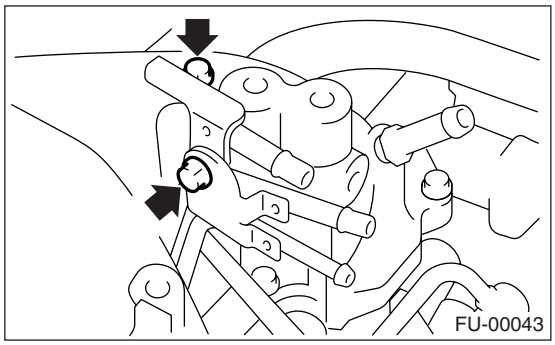
12) Disconnect the evaporation hose from intake manifold.



13) Disconnect the evaporation hose from purge valve. (Except Australia model)

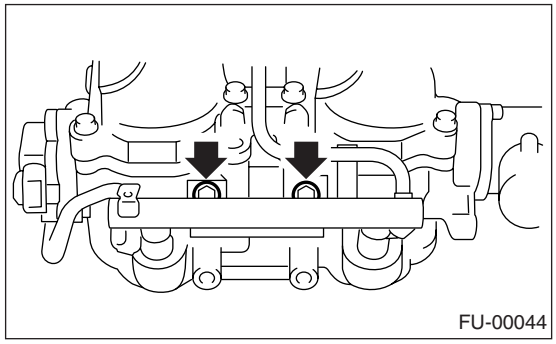


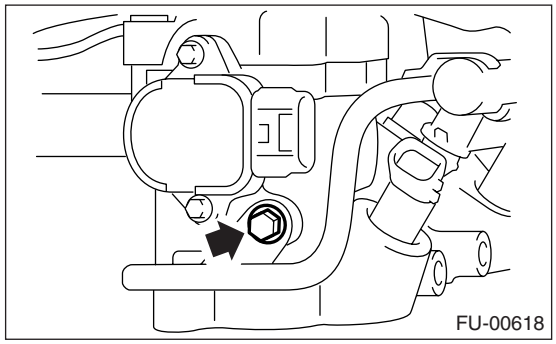
14) Remove the two bolts which hold the fuel pipes on the left side of intake manifold.



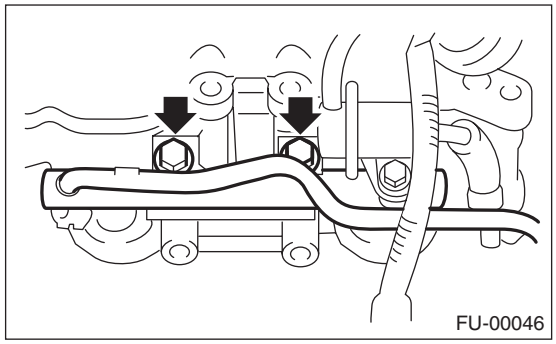
15) Remove the bolts which hold the fuel injector pipe onto intake manifold.

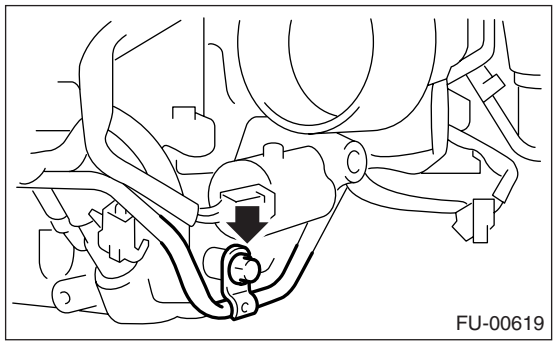
- LH SIDE



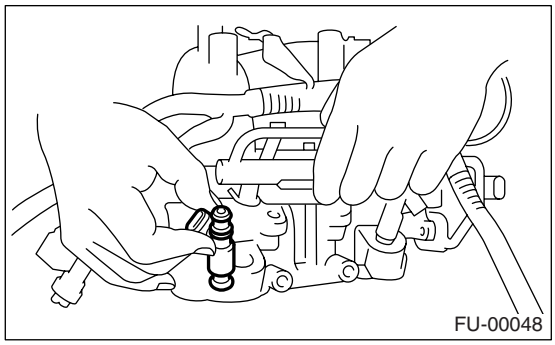


- RH SIDE

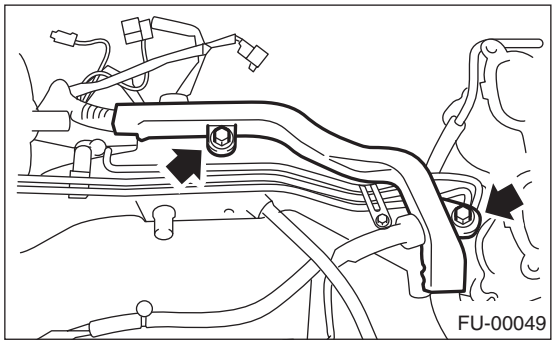




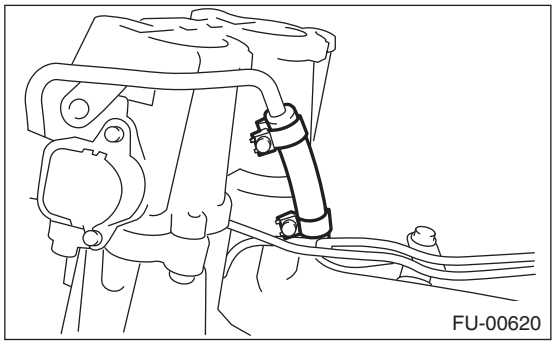
16) Remove the fuel injector.



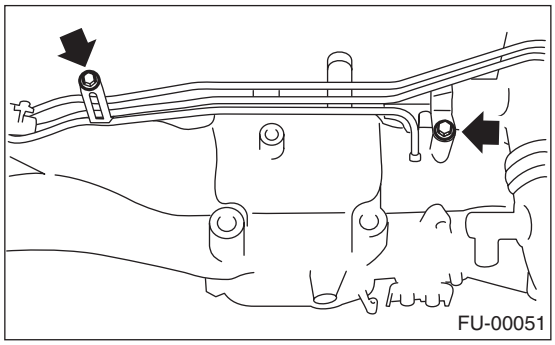
17) Remove the harness bracket which holds the engine harness onto intake manifold.



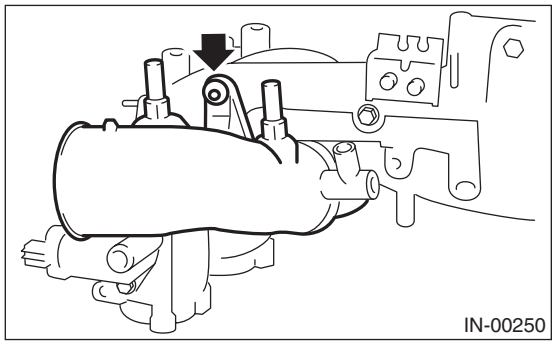
18) Remove the engine harness from intake manifold.
19) Loosen the clamp which holds the front left side fuel hose to injector pipe, and remove the pipe from clamp.



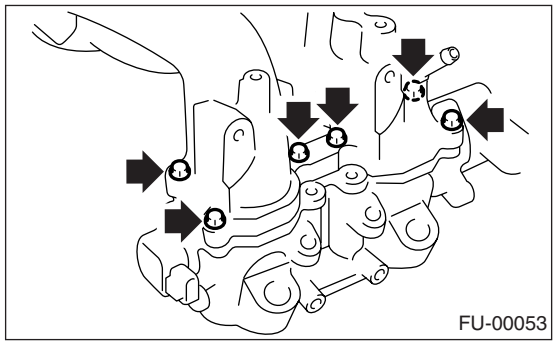
20) Remove the fuel injector pipe LH.
21) Remove the bolts which install the fuel pipe on intake manifold.



22) Remove the fuel pipe assembly and pressure regulator from intake manifold.
23) Remove the intake duct from intake manifold.



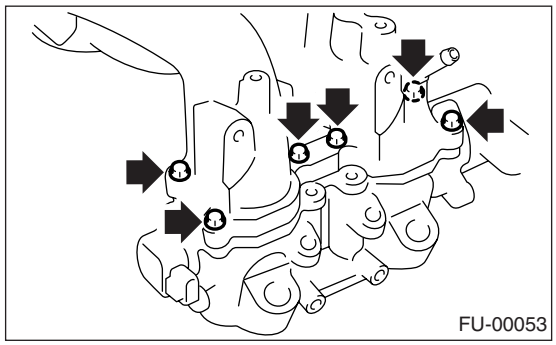
24) Remove the intake manifold.



D: ASSEMBLY

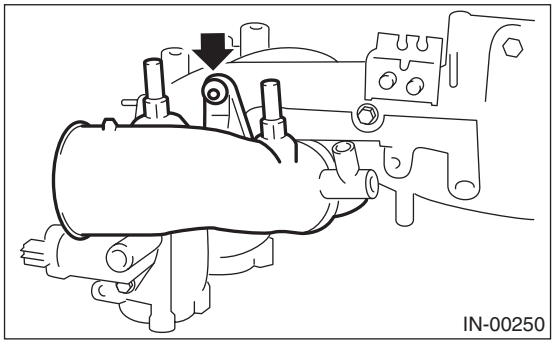
NOTE:
Use a new gasket.
1) Install the intake manifold.

Tightening torque:
8.25 N·m (0.84 kgf-m, 6.1 ft-lb)



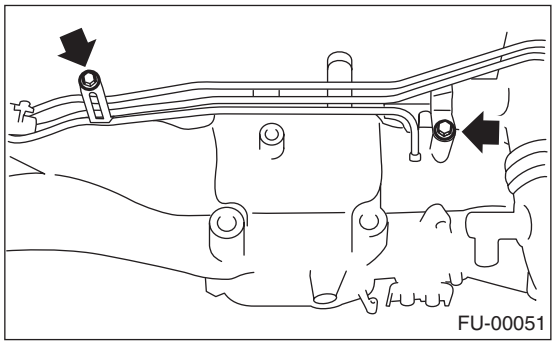
2) Install the air intake duct to intake manifold.

Tightening torque:
19 N·m (1.9 kgf-m, 14.0 ft-lb)

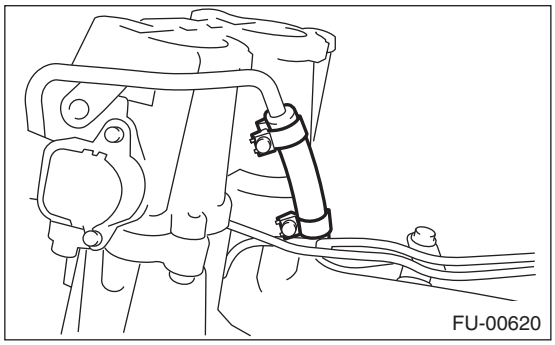


3) Install the fuel pipe assembly and pressure regulator to intake manifold.

Tightening torque:
4.9 N·m (0.5 kgf-m, 3.6 ft-lb)



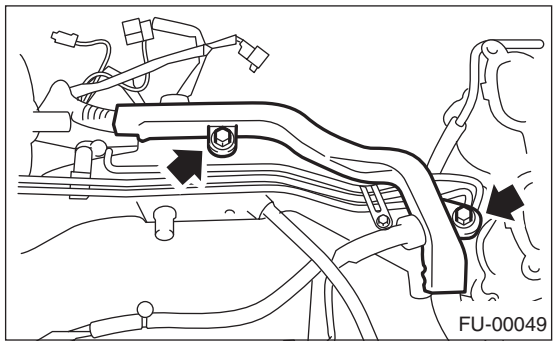
4) Install the fuel injector pipe LH.
5) Connect the left side fuel hose to injector pipe, and tighten the clamp screw.



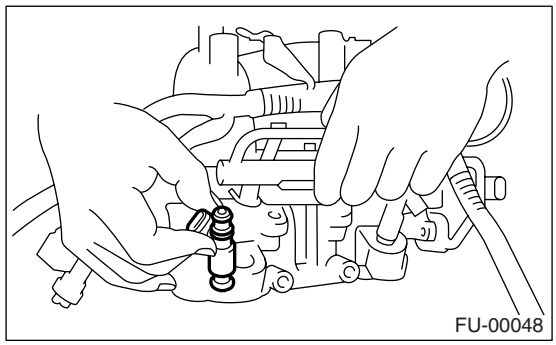
6) Install the engine harness to intake manifold.

7) Install the harness bracket which holds the engine harness onto intake manifold.

Tightening torque:
19 N·m (1.9 kgf-m, 14.0 ft-lb)



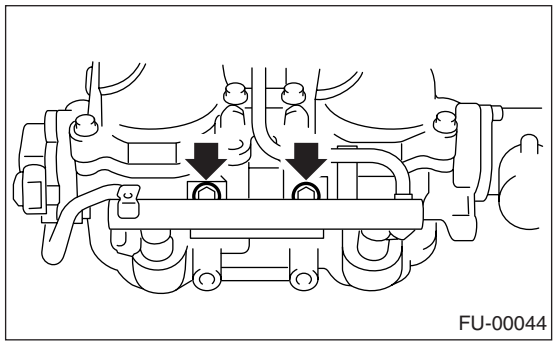
8) Install the fuel injector.

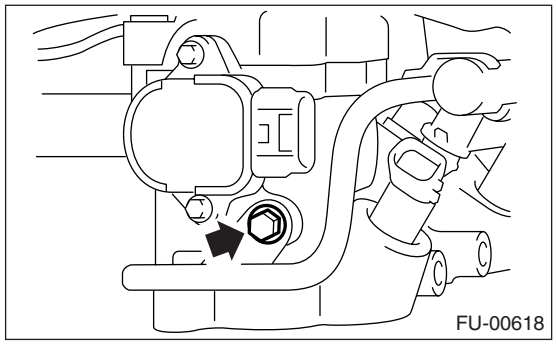


9) Tighten the bolts which install the fuel injector pipe onto intake manifold.

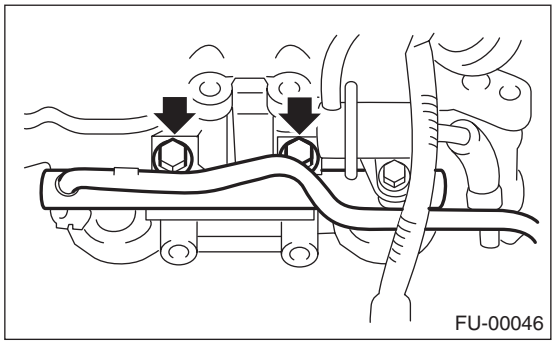
Tightening torque:
19 N·m (1.9 kgf-m, 14.0 ft-lb)

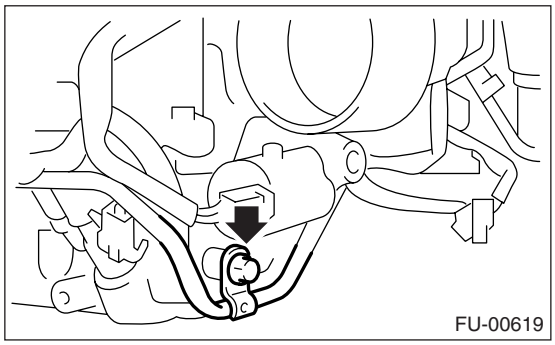
- LH SIDE





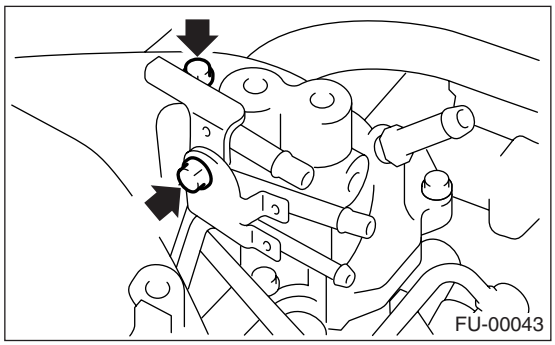
- RH SIDE





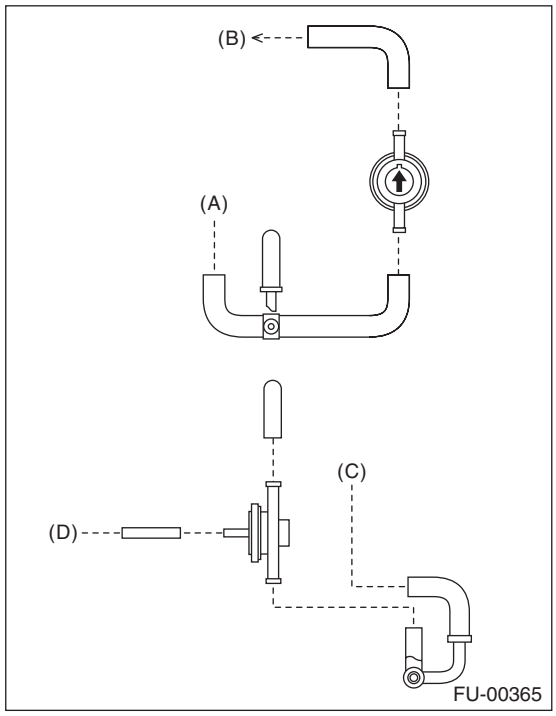
10) Tighten the two bolts which install the fuel pipes on the left side of intake manifold.

Tightening torque:
4.9 N·m (0.5 kgf-m, 3.6 ft-lb)



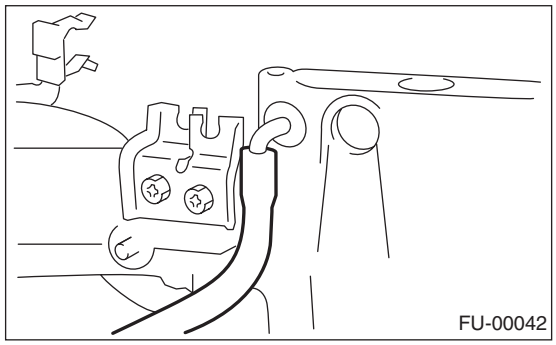
11) Connect the evaporation hoses to the purge valve. (Except Australia model)

NOTE:
Connect the evaporation hose as shown in the figure.



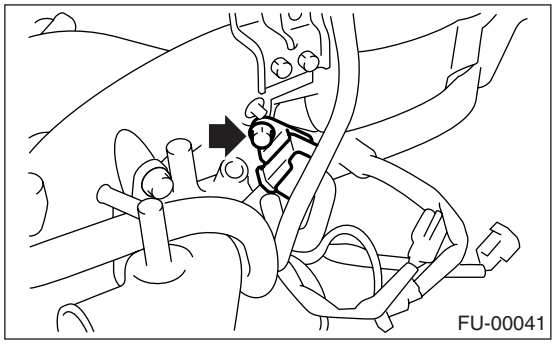
(A) To fuel pipe ASSY
(B) To intake duct
(C) To purge control solenoid valve
(D) To intake manifold

12) Connect the evaporation hose to intake manifold.



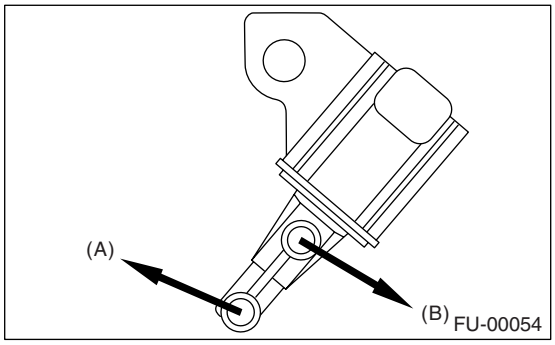
13) Install the purge control solenoid valve.

Tightening torque:
16 N·m (1.6 kgf-m, 11.8 ft-lb)



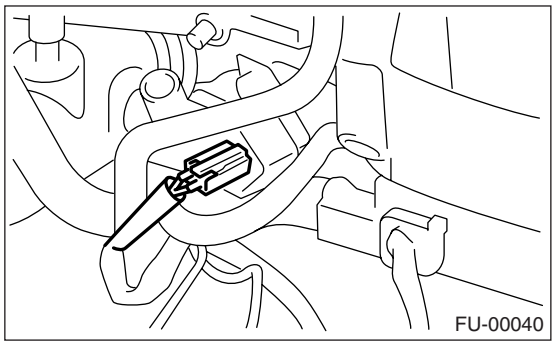
14) Connect the hoses to the purge control solenoid valve.

NOTE:
Connect the evaporation hose as shown in the figure.

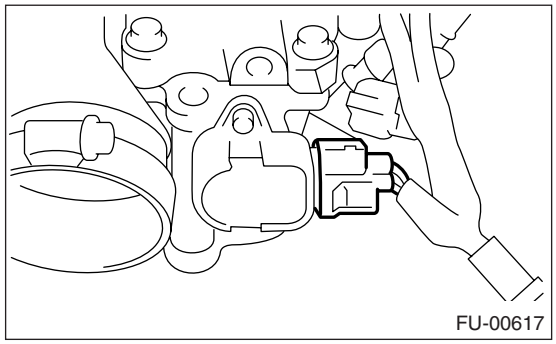


(A) To intake manifold
(B) To fuel pipe (Australia model)
To purge valve (Except Australia model)

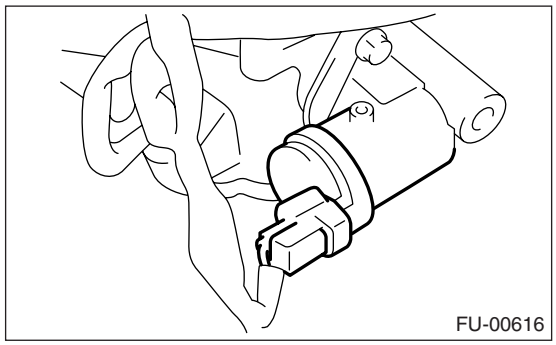
15) Connect the connector to the purge control solenoid valve.



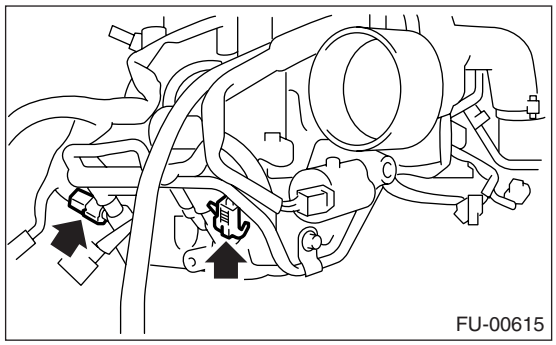
16) Connect the connector to the tumble generator valve sensor. (Except STi model)



17) Connect the connector to the tumble generator valve actuator. (Except STi model)



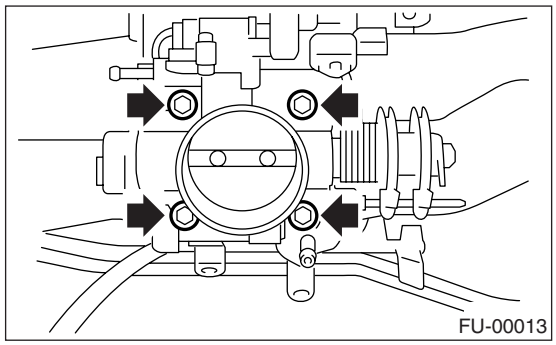
18) Connect the connector to fuel injector.



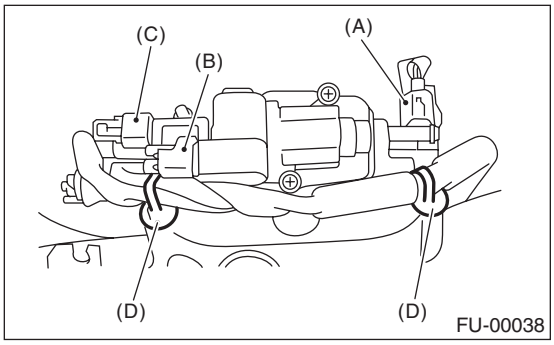
19) Install the throttle body to intake manifold.

NOTE:
Use a new gasket.

Tightening torque:
22 N·m (2.2 kgf-m, 16.2 ft-lb)

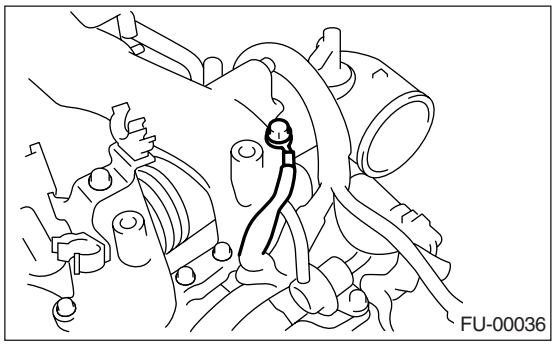


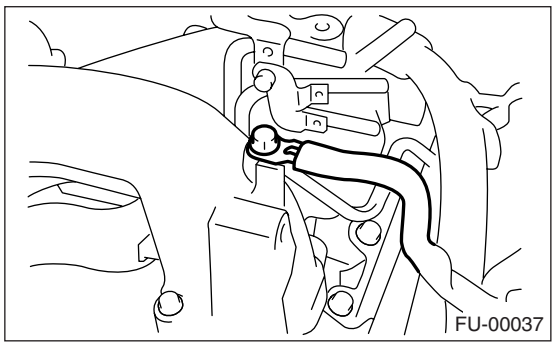
20) Connect the connector to the throttle position sensor (A), idle air control solenoid valve (B) and manifold absolute pressure sensor (C).
21) Connect the engine harness with clip (D) to intake manifold.



22) Install the engine ground cable to intake manifold.

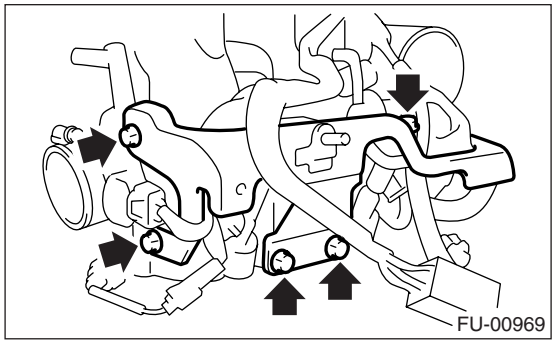
Tightening torque:
19 N·m (1.9 kgf-m, 14.0 ft-lb)





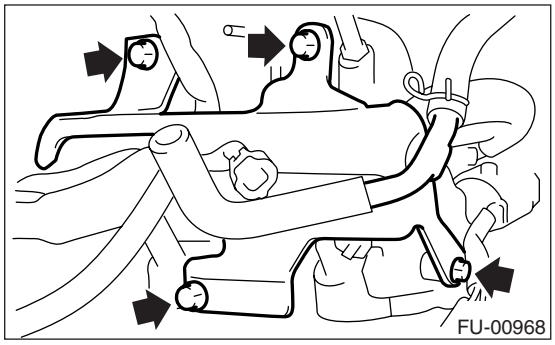
23) Install the fuel pipe protector RH.

Tightening torque:
19 N·m (1.9 kgf-m, 14.0 ft-lb)



24) Install the fuel pipe protector LH.

Tightening torque:
19 N·m (1.9 kgf-m, 14.0 ft-lb)



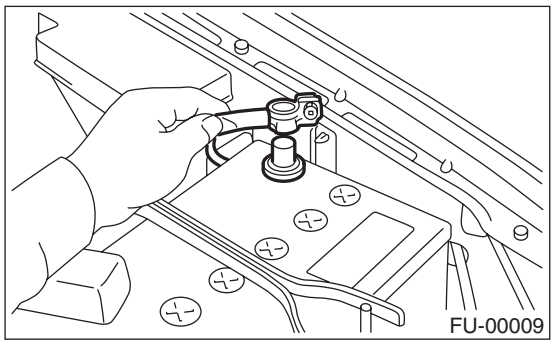
E: INSPECTION

Make sure the fuel pipe and fuel hoses are not cracked and the connections are tightened firmly.

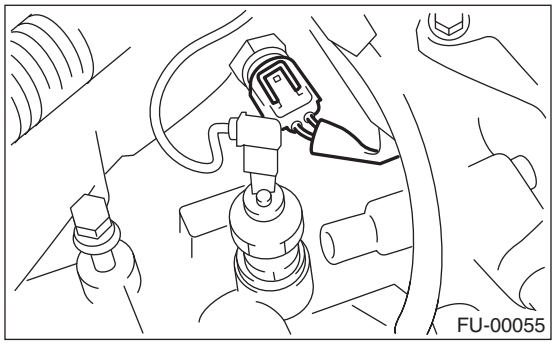
4. Engine Coolant Temperature Sensor

A: REMOVAL

1) Disconnect the ground cable from battery.



2) Remove the generator. <Ref. to SC(H4SO)-14, REMOVAL, Generator.>
3) Drain the engine coolant. <Ref. to CO(H4DOTC)-18, DRAINING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>
4) Disconnect the connector from engine coolant temperature sensor.



5) Remove the engine coolant temperature sensor.

B: INSTALLATION

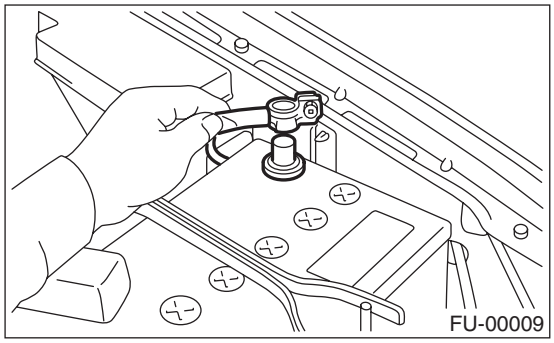
Install in the reverse order of removal.

Tightening torque:
Engine coolant temperature sensor
18 N·m (1.8 kgf-m, 13.3 ft-lb)

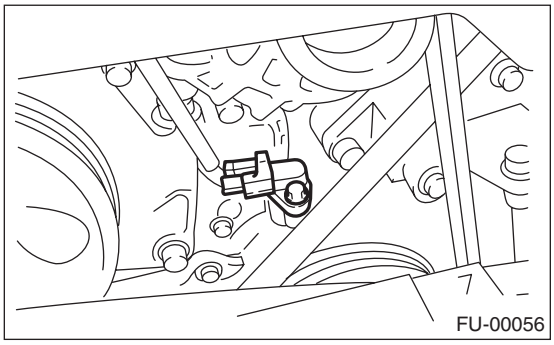
5. Crankshaft Position Sensor

A: REMOVAL

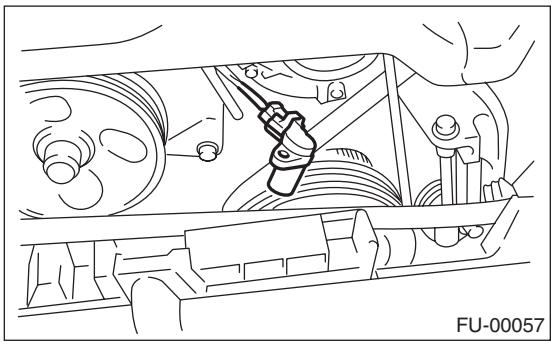
1) Disconnect the ground cable from battery.



2) Remove the bolt which installs the crankshaft position sensor to cylinder block.



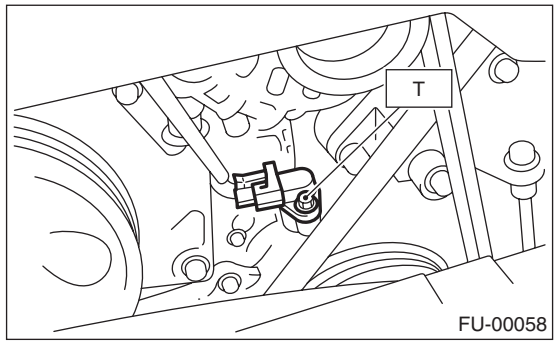
3) Remove the crankshaft position sensor, and disconnect the connector from it.



B: INSTALLATION

Install in the reverse order of removal.

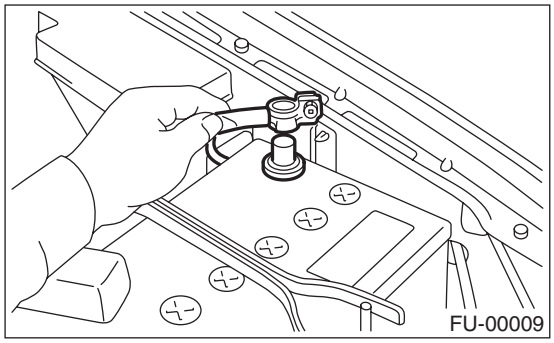
Tightening torque:
T: 6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



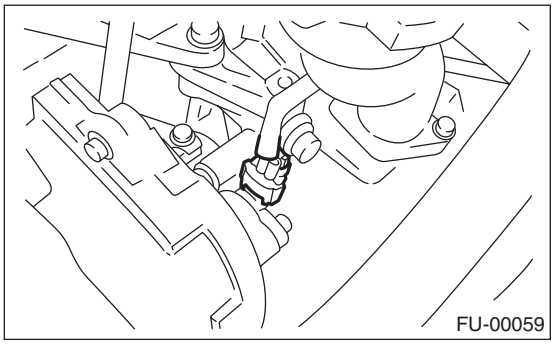
6. Camshaft Position Sensor

A: REMOVAL

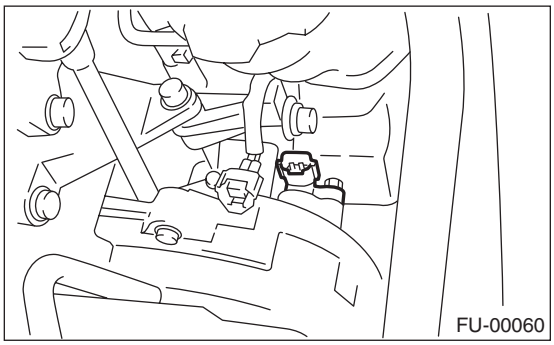
1) Disconnect the ground cable from battery.



2) Disconnect the connector from camshaft position sensor.



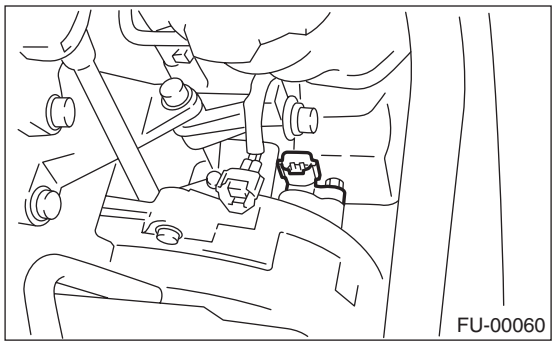
3) Remove the camshaft position sensor from camshaft support LH.



B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)

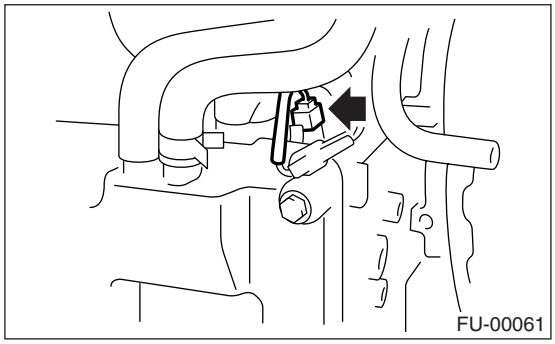


7. AVCS Camshaft Position Sensor

A: REMOVAL

NOTE:
This component is installed to STi and Australia model.

1) Disconnect the ground cable from battery.
2) Remove the intercooler. <Ref. to IN(H4DOTC)-12, REMOVAL, Intercooler.>
3) Remove the intake manifold. <Ref. to FU(H4DOTC)-14, REMOVAL, Intake Manifold.>
4) Disconnect the AVCS camshaft position sensor connector.
5) Remove the AVCS camshaft position sensor.



B: INSTALLATION

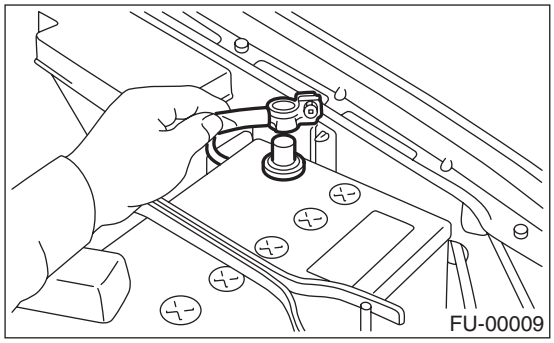
Install in the reverse order of removal.

Tightening torque:
AVCS camshaft position sensor
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)

8. Knock Sensor

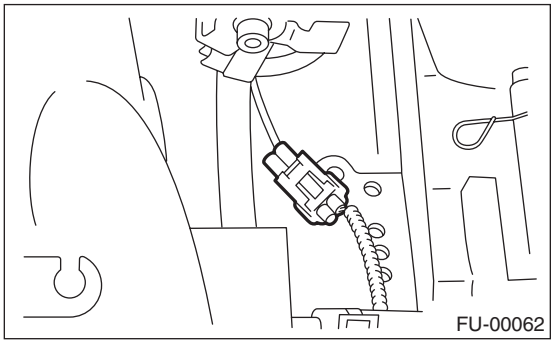
A: REMOVAL

1) Disconnect the ground cable from battery.

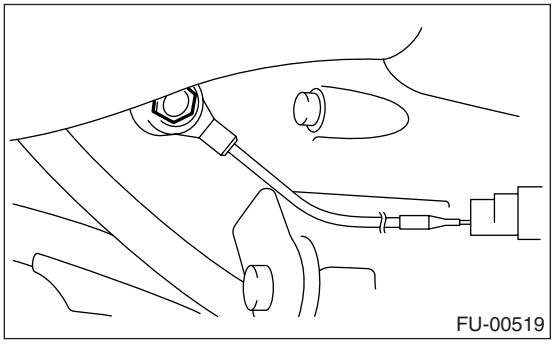


2) Remove the intercooler. <Ref. to IN(H4DOTC)-12, REMOVAL, Intercooler.>

3) Disconnect the knock sensor connector.



4) Remove the knock sensor from cylinder block.

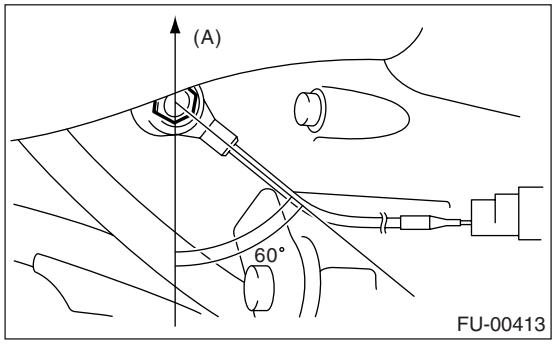


B: INSTALLATION

1) Install the knock sensor to cylinder block.

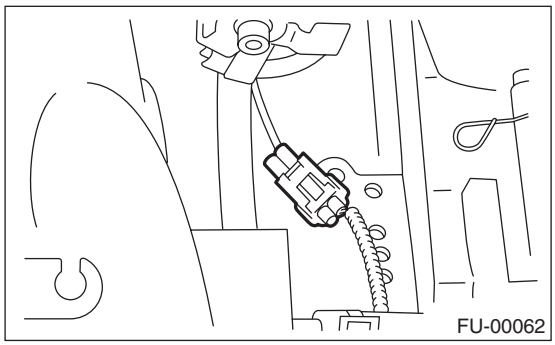
NOTE:
Extraction area of knock sensor cord must be positioned at a 60° angle relative to engine rear.

Tightening torque:
Knock sensor
24 N·m (2.4 kgf-m, 17.4 ft-lb)



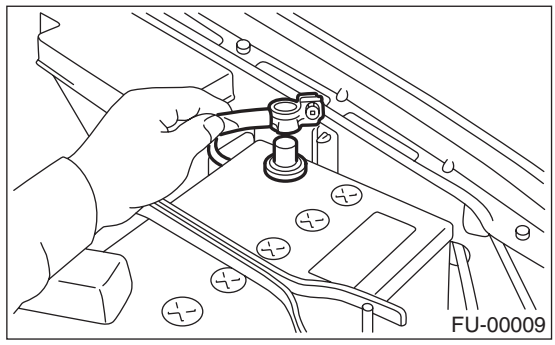
(A) Front side

2) Connect the knock sensor connector.



3) Install the intercooler. <Ref. to IN(H4DOTC)-12, INSTALLATION, Intercooler.>

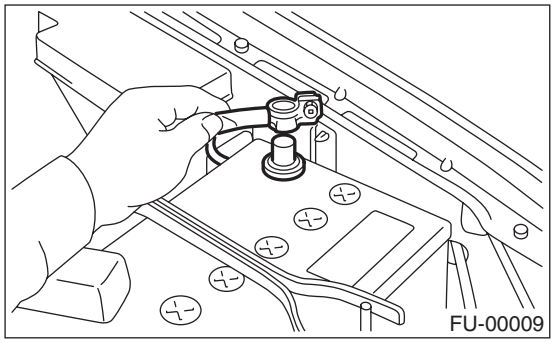
4) Connect the battery ground cable to battery.



9. Throttle Position Sensor

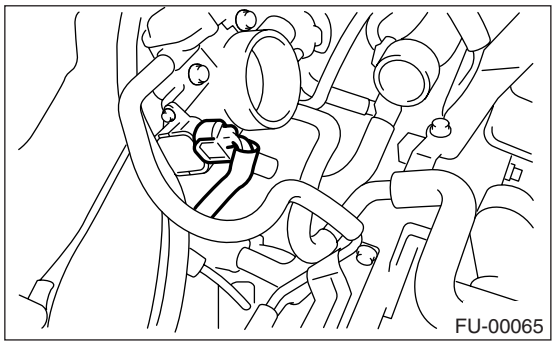
A: REMOVAL

1) Disconnect the ground cable from battery.

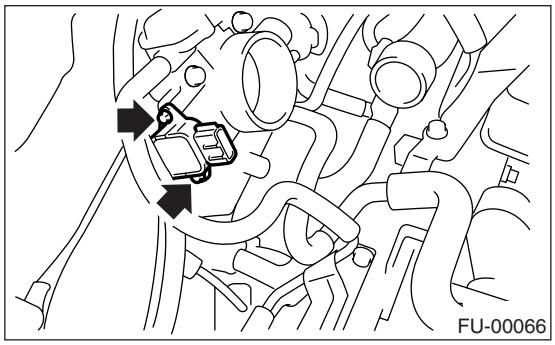


2) Remove the intercooler. <Ref. to IN(H4DOTC)-12, REMOVAL, Intercooler.>

3) Disconnect the connector from throttle position sensor.



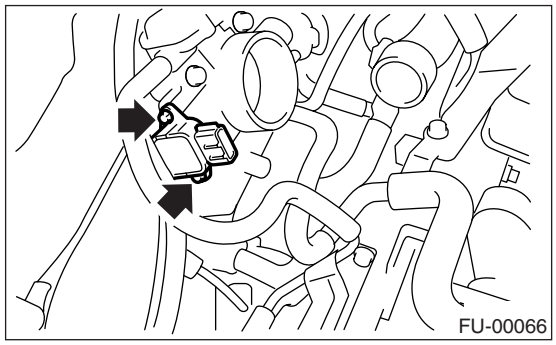
4) Remove the throttle position sensor holding screws, and remove it.



B: INSTALLATION

Install in the reverse order of removal.

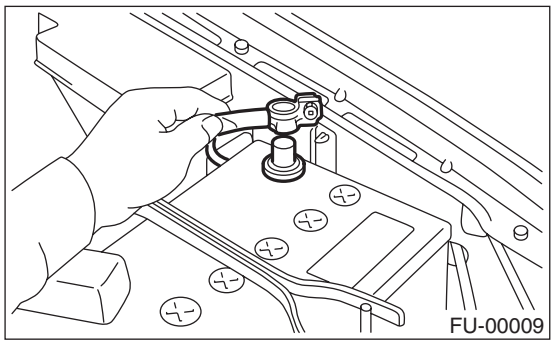
Tightening torque:
Throttle position sensor
1.6 N·m (0.16 kgf-m, 1.2 ft-lb)



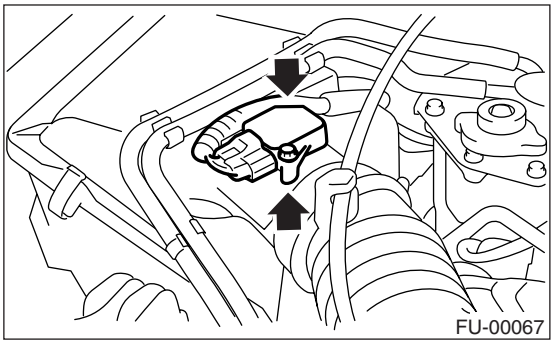
10.Mass Air Flow and Intake Air Temperature Sensor

A: REMOVAL

1) Disconnect the ground cable from battery.



2) Disconnect the connector from mass air flow and intake air temperature sensor.
3) Remove the mass air flow and intake air temperature sensor.



B: INSTALLATION

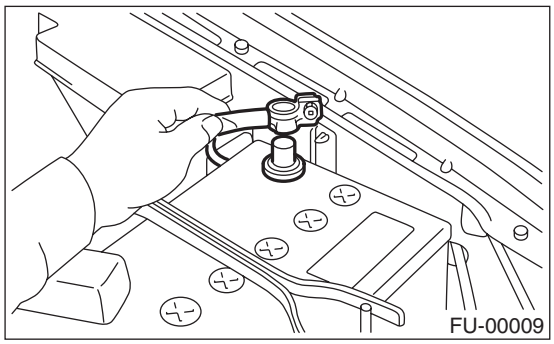
Install in the reverse order of removal.

Tightening torque:
Mass air flow and intake air temperature sensor
1.7 N·m (0.17 kgf-m, 1.2 ft-lb)

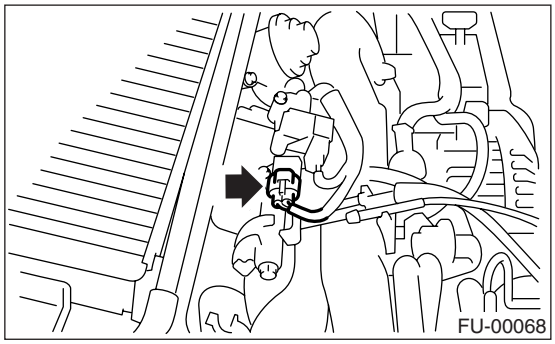
11.Manifold Absolute Pressure Sensor

A: REMOVAL

1) Disconnect the ground cable from battery.



2) Remove the idle air control solenoid valve. <Ref. to FU(H4DOTC)-35, REMOVAL, Idle Air Control Solenoid Valve.>
3) Disconnect the connectors from manifold absolute pressure sensor.



4) Remove the manifold absolute pressure sensor from throttle body.

B: INSTALLATION

Install in the reverse order of removal.

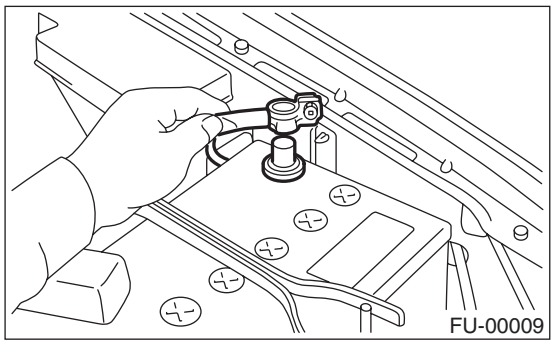
NOTE:
Use a new O-ring.

Tightening torque:
Manifold absolute pressure sensor
1.6 N·m (0.16 kgf-m, 1.2 ft-lb)

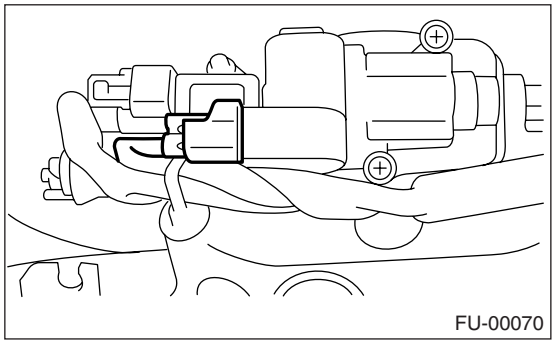
12.Idle Air Control Solenoid Valve

A: REMOVAL

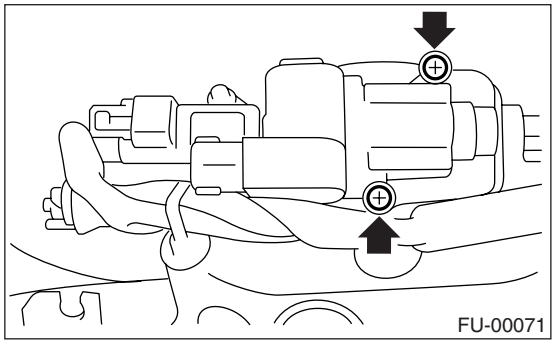
1) Disconnect the ground cable from battery.



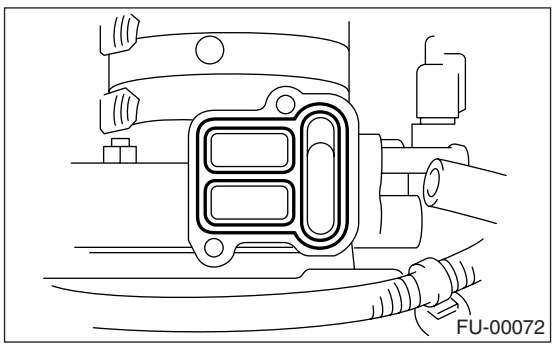
2) Disconnect the connector from idle air control solenoid valve.



3) Remove the idle air control solenoid valve from throttle body.



4) Remove the gasket from throttle body.

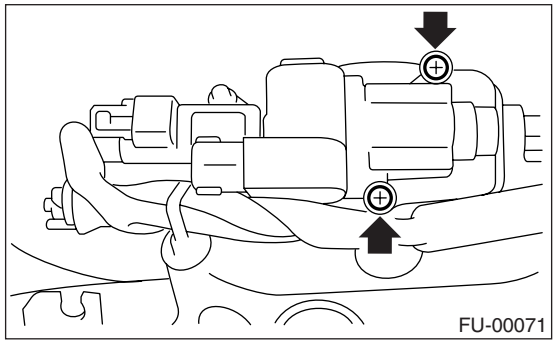


B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Use a new gasket.

Tightening torque:
2.8 N·m (0.29 kgf-m, 2.1 ft-lb)

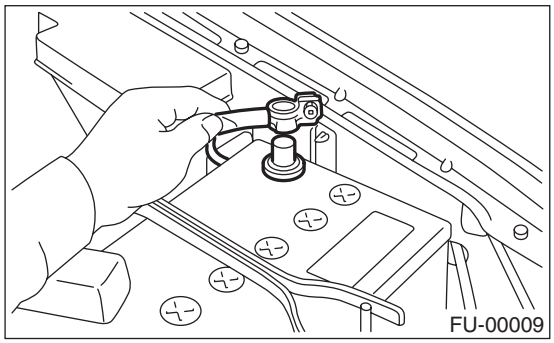


13.Fuel Injector

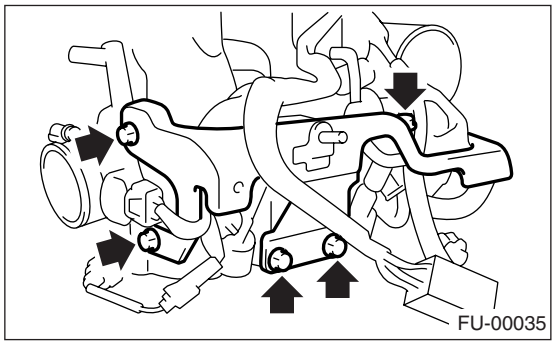
A: REMOVAL

1. RH SIDE

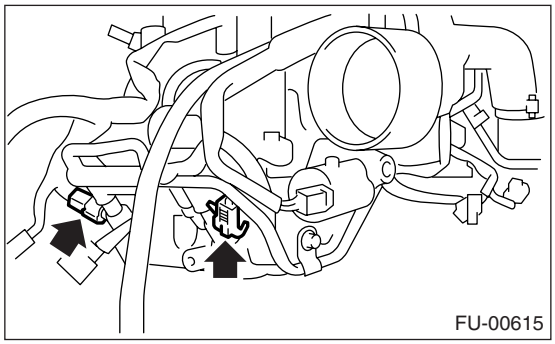
1) Release the fuel pressure. <Ref. to FU(H4DOTC)-54, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
2) Open the fuel filler flap lid and remove the fuel filler cap.
3) Disconnect the ground cable from battery.


FU-00009

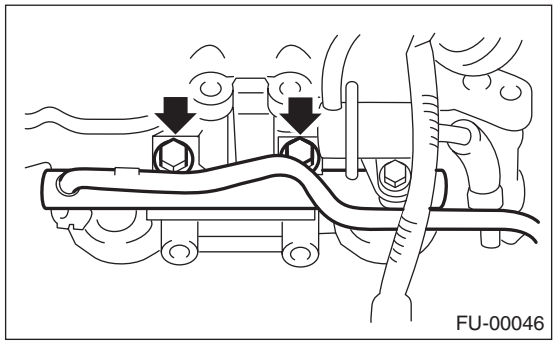
4) Remove the intake manifold. <Ref. to FU(H4DOTC)-14, REMOVAL, Intake Manifold.>
5) Remove the fuel pipe protector RH.

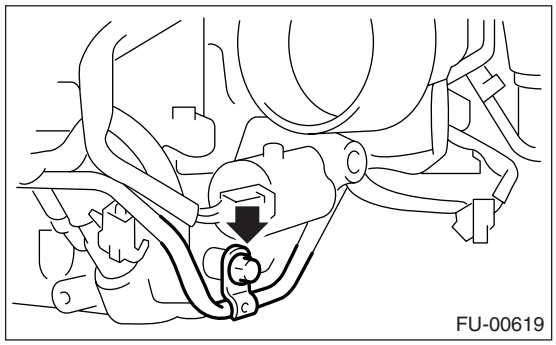

FU-00035

6) Disconnect the connector from fuel injector.

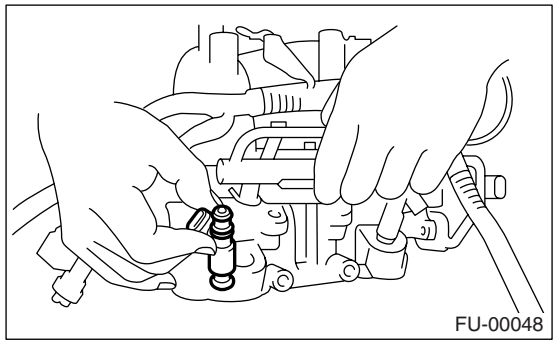

FU-00615

7) Remove the bolts which hold the injector pipe to intake manifold.


FU-00046

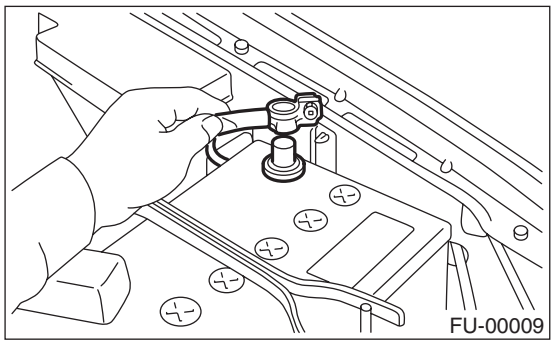

FU-00619

8) Remove the fuel injector while lifting up the fuel injector pipe.

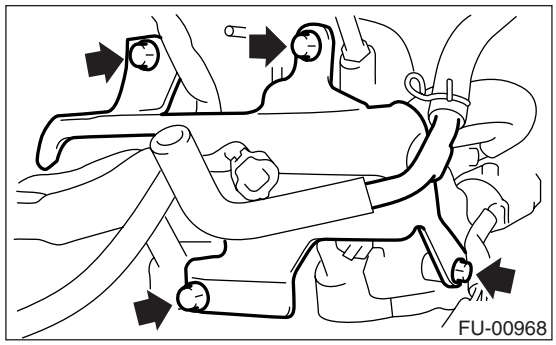

FU-00048

2. LH SIDE

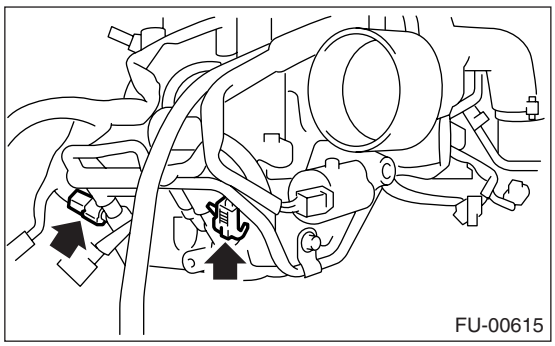
1) Release the fuel pressure. <Ref. to FU(H4DOTC)-54, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
2) Open the fuel filler flap lid and remove the fuel filler cap.
3) Disconnect the ground cable from battery.


FU-00009

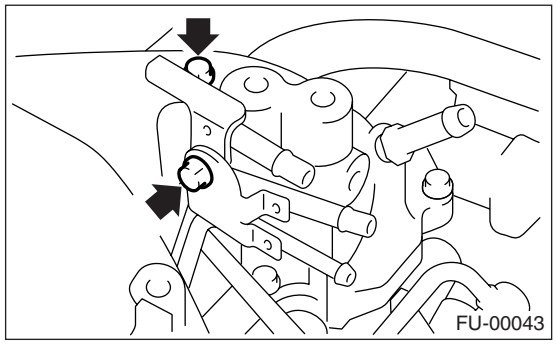
4) Remove the intake manifold. <Ref. to FU(H4DOTC)-14, REMOVAL, Intake Manifold.>
5) Remove the fuel pipe protector LH.

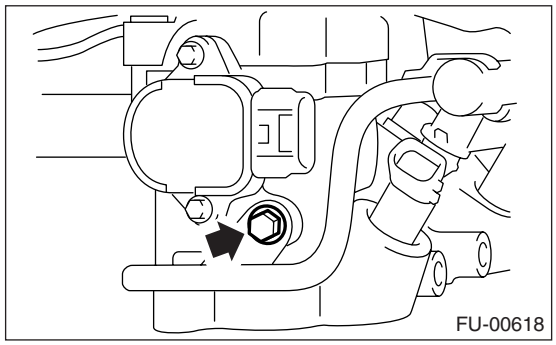

FU-00968

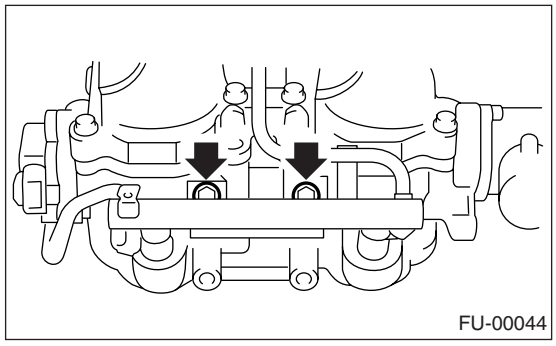
6) Disconnect the connector from fuel injector.


FU-00615

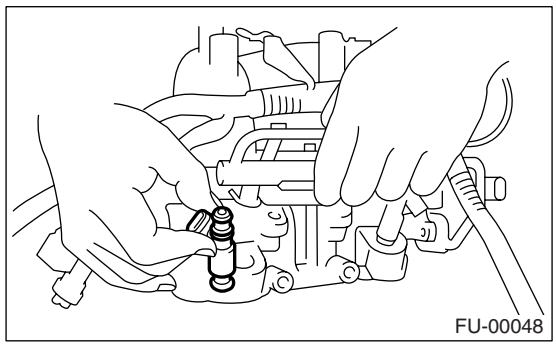
7) Remove the bolts which hold the injector pipe to intake manifold.


FU-00043


FU-00618


FU-00044

8) Remove the fuel injector while lifting up the fuel injector pipe.

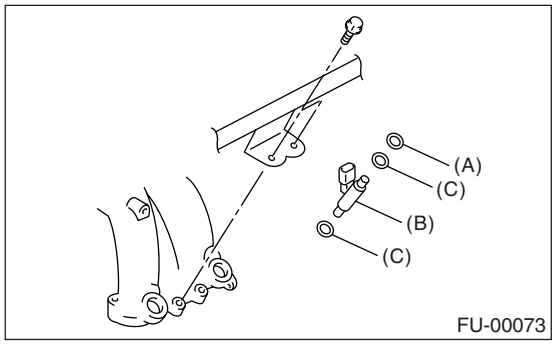

FU-00048

B: INSTALLATION

1. RH SIDE

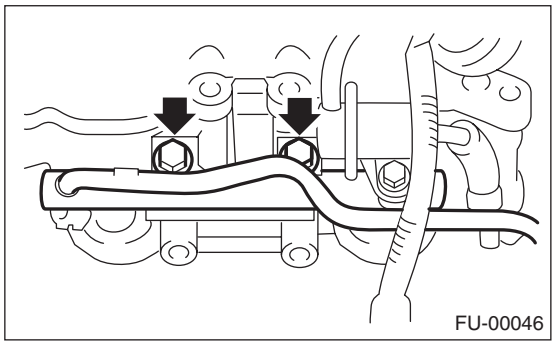
Install in the reverse order of removal.

NOTE:
Use a new O-ring and insulators.

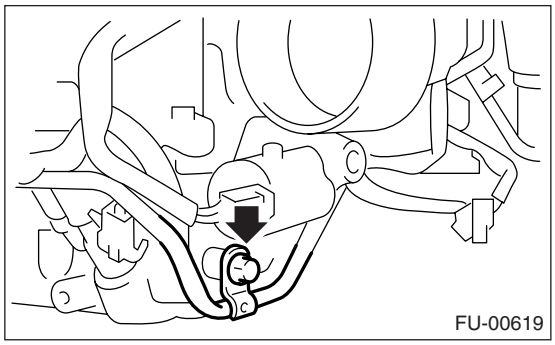


(A) O-ring
(B) Fuel injector
(C) Insulator

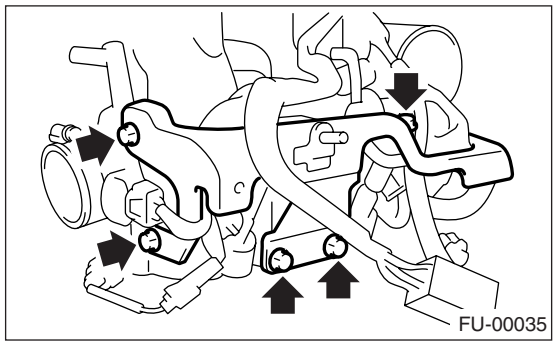
Tightening torque:
19 N·m (1.9 kgf-m, 14.0 ft-lb)



Tightening torque:
19 N·m (1.9 kgf-m, 14.0 ft-lb)



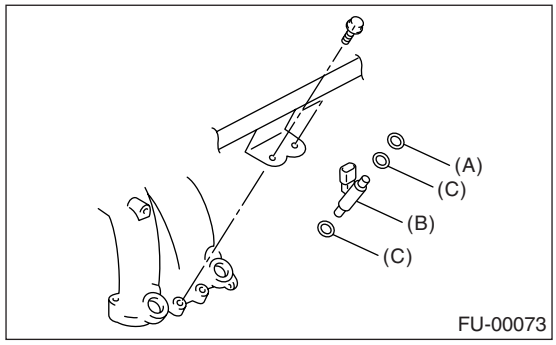
Tightening torque:
19 N·m (1.9 kgf-m, 14.0 ft-lb)



2. LH SIDE

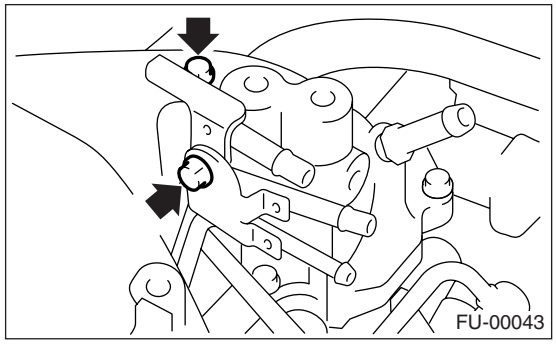
Install in the reverse order of removal.

NOTE:
Use a new O-ring and insulators.

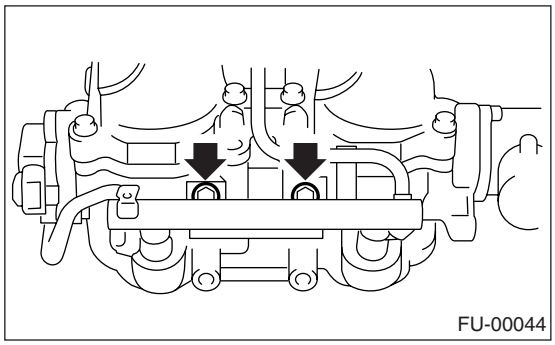


(A) O-ring
(B) Fuel injector
(C) Insulator

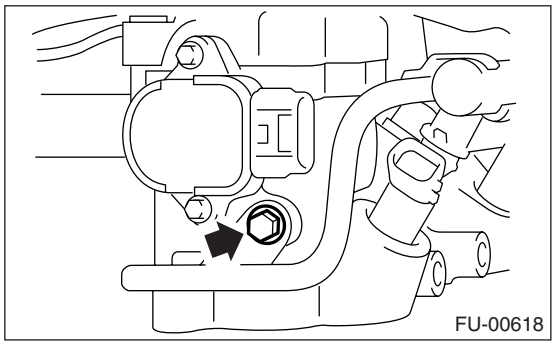
Tightening torque:
4.9 N·m (0.5 kgf-m, 3.6 ft-lb)



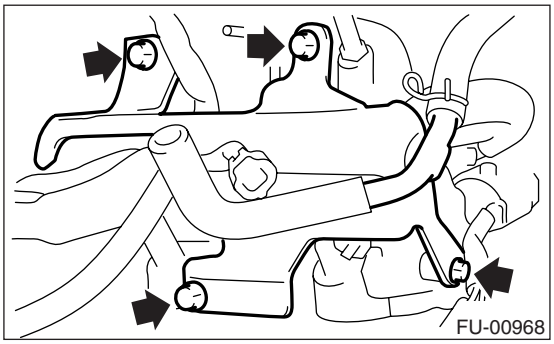
Tightening torque:
19 N·m (1.9 kgf-m, 14.0 ft-lb)



Tightening torque:
19 N·m (1.9 kgf-m, 14.0 ft-lb)



Tightening torque:
19 N·m (1.9 kgf-m, 14.0 ft-lb)

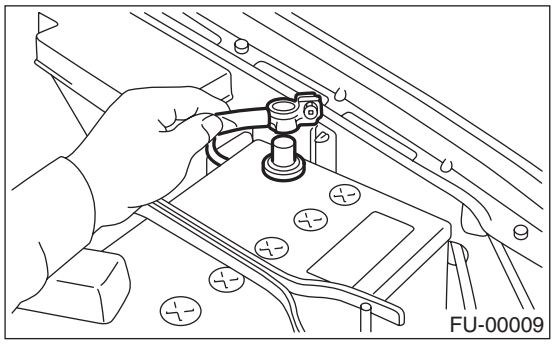


14. Tumble Generator Valve Assembly

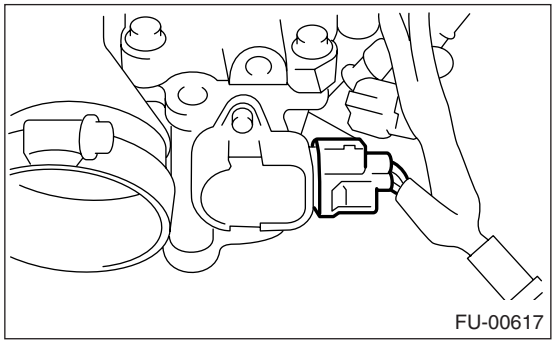
A: REMOVAL

NOTE:
This component is installed to except for STi model.

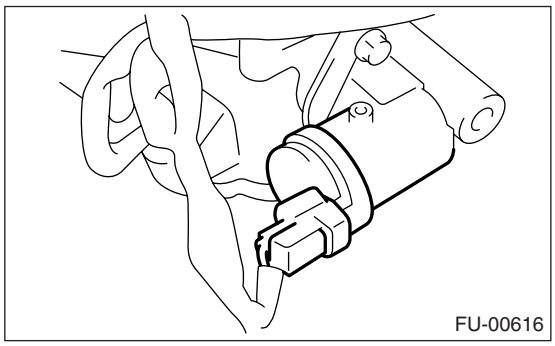
1) Release the fuel pressure. <Ref. to FU(H4DOTC)-54, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
2) Open the fuel filler flap lid, and then remove the fuel filler cap.
3) Disconnect the ground cable from battery.


FU-00009

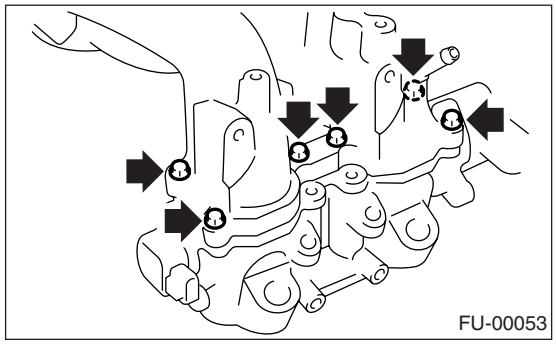
4) Remove the intake manifold. <Ref. to FU(H4DOTC)-14, REMOVAL, Intake Manifold.>
5) Disconnect the connector from tumble generator valve sensor.


FU-00617

6) Disconnect the connector from tumble generator valve actuator.


FU-00616

7) Remove the fuel injector. <Ref. to FU(H4DOTC)-36, REMOVAL, Fuel Injector.>
8) Remove the tumble generator valve body from intake manifold.

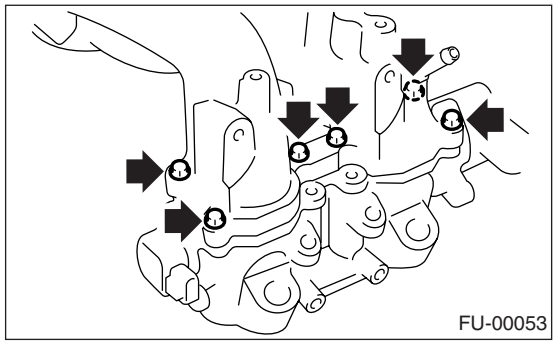

FU-00053

B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Use new gaskets.

Tightening torque:
8.25 N·m (0.84 kgf-m, 6.1 ft-lb)


FU-00053

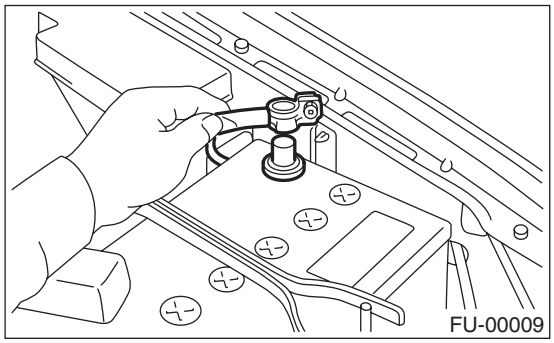
15. Tumble Generator Valve Actuator

A: REMOVAL

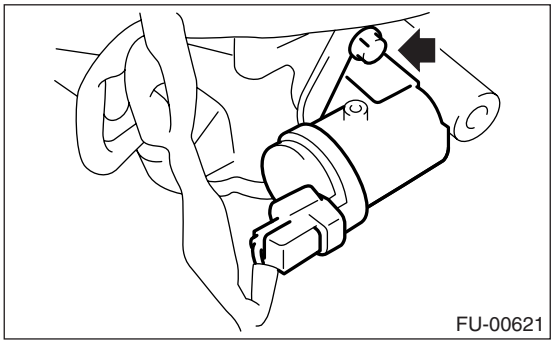
NOTE:
This component is installed to except for STi model.

1. RH SIDE

1) Release the fuel pressure. <Ref. to FU(H4DOTC)-54, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
2) Open the fuel filler flap lid and remove the fuel filler cap.
3) Disconnect the ground cable from battery.

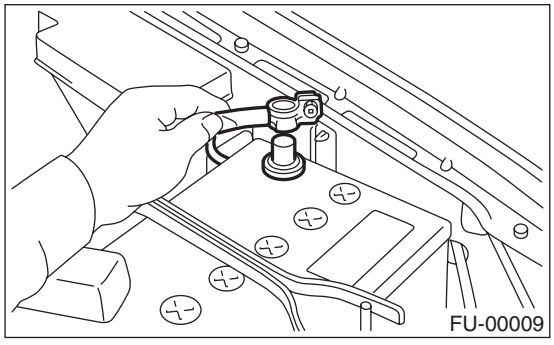


4) Remove the intake manifold. <Ref. to FU(H4DOTC)-14, REMOVAL, Intake Manifold.>
5) Disconnect the connector from tumble generator valve actuator RH.
6) Remove the tumble generator valve RH.

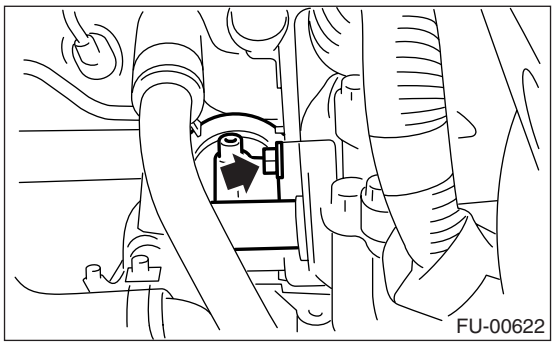


2. LH SIDE

1) Disconnect the ground cable from battery.



2) Disconnect the connector from tumble generator valve LH.
3) Remove the tumble generator valve actuator LH.



B: INSTALLATION

1. RH SIDE

Install in the reverse order of removal.

Tightening torque:
Tumble generator valve actuator
6 N·m (0.6 kgf-m,4.4 ft-lb)

2. LH SIDE

Install in the reverse order of removal.

Tightening torque:
Tumble generator valve actuator
6 N·m (0.6 kgf-m,4.4 ft-lb)

16. Tumble Generator Valve Position Sensor

A: SPECIFICATION

Do not remove the tumble generator valve position sensor from tumble generator valve assembly, since it cannot be adjusted during installation.
Refer to “Tumble Generator Valve Assembly” for removal and installation procedures. <Ref. to FU(H4DOTC)-40, REMOVAL, Tumble Generator Valve Assembly.> <Ref. to FU(H4DOTC)-40, INSTALLATION, Tumble Generator Valve Assembly.>

17.Oil Flow Control Solenoid Valve

A: REMOVAL

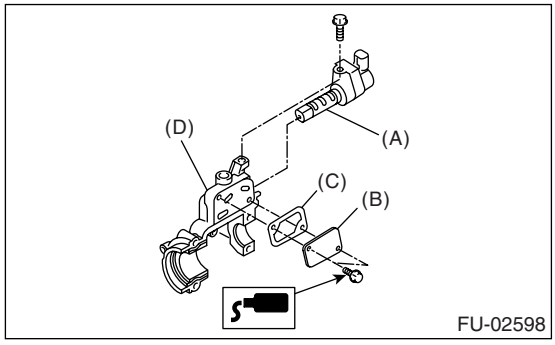
Oil flow control solenoid valve forms a unit with camshaft cap.
Refer to “Camshaft” for removal. <Ref. to ME(H4DOTC)-69, REMOVAL, Camshaft.>

B: INSTALLATION

Install in the reverse order of removal.

C: DISASSEMBLY

1) Remove the two installation bolts, and then remove the oil return cover and gasket.
2) Remove the installation bolt, and then remove the oil flow control solenoid valve.



(A) Oil flow control solenoid valve
(B) Oil return cover
(C) Gasket
(D) Intake camshaft cap

D: ASSEMBLY

1) Install the oil flow control solenoid valve.

Tightening torque:
8 N·m (0.8 kgf-m, 5.9 ft-lb)

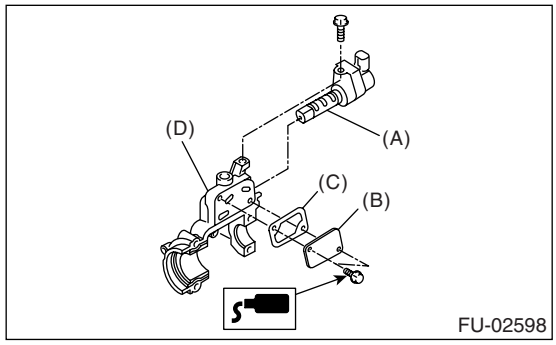
2) Apply liquid gasket to two oil return cover installation bolts.

Liquid gasket:
THREE BOND 1324 (Part No. 004403042) or equivalent

3) Install the oil return cover and gasket.

Tightening torque:
8 N·m (0.8 kgf-m, 5.9 ft-lb)

NOTE:
Use a new gasket.

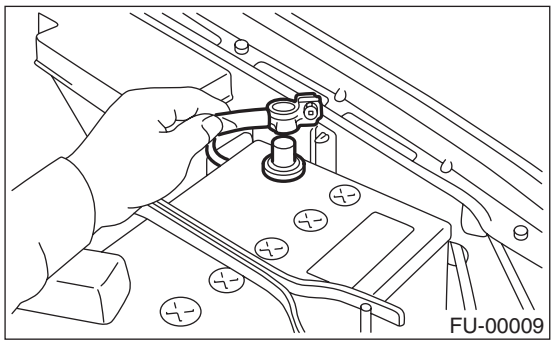


(A) Oil flow control solenoid valve
(B) Oil return cover
(C) Gasket
(D) Intake camshaft cap

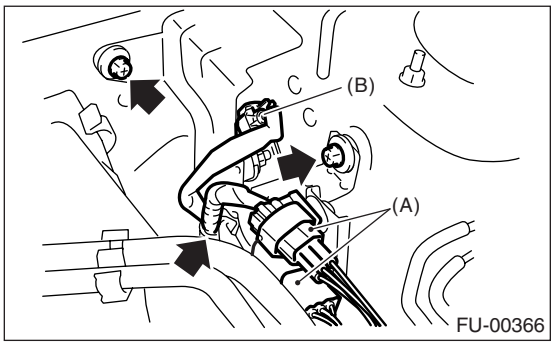
18. Wastegate Control Solenoid Valve

A: REMOVAL

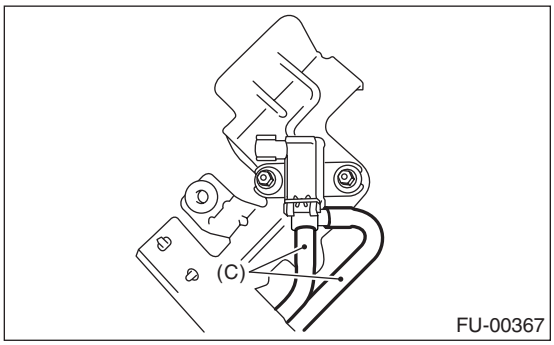
1) Disconnect the ground cable from battery.



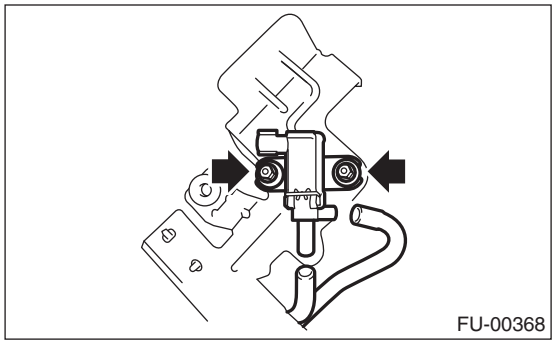
2) Disconnect the engine harness connector (A) from bracket.
3) Disconnect the connector (B) from wastegate control solenoid valve.
4) Remove the bracket from body.



5) Disconnect the pressure hoses (C) from wastegate control solenoid valve.



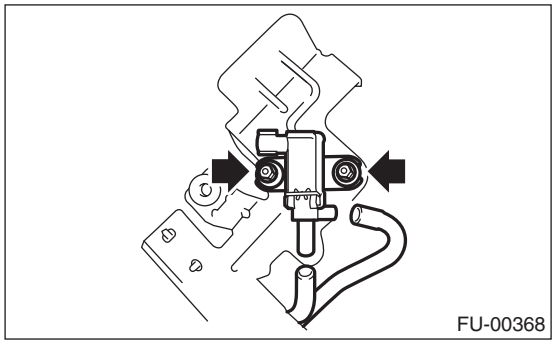
6) Remove the wastegate control solenoid valve from bracket.



B: INSTALLATION

Install in the reverse order of removal.

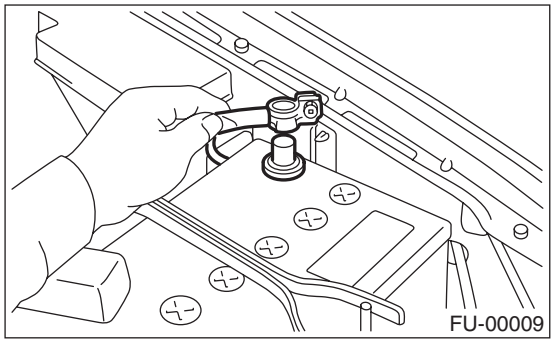
Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



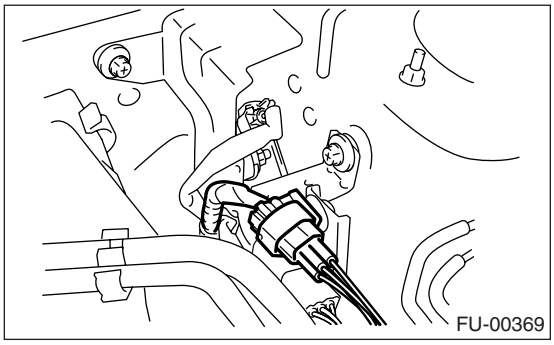
19.Front Oxygen (A/F) Sensor

A: REMOVAL

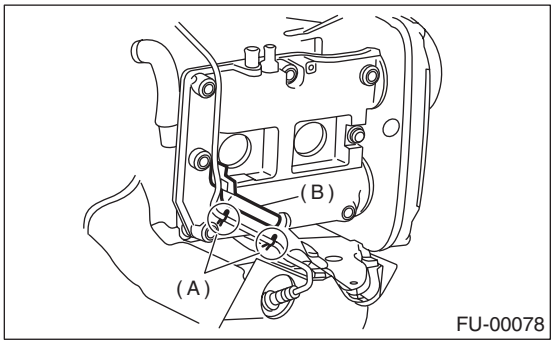
1) Disconnect the ground cable from battery.



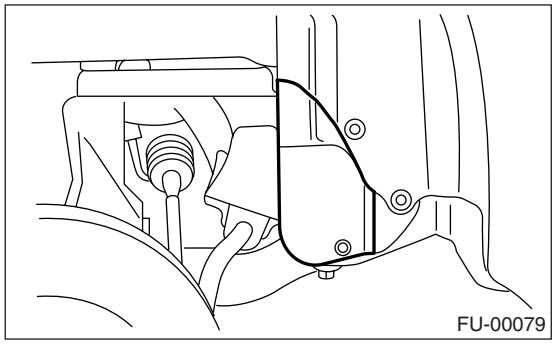
2) Disconnect the connector from front oxygen (A/F) sensor.



3) Disconnect the engine harness fixed by clip (A) from bracket (B).

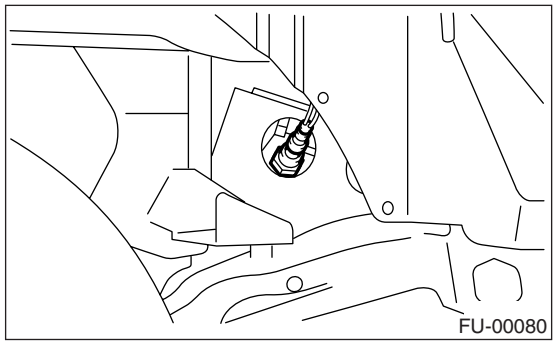


4) Remove the front right side wheel.
5) Lift-up the vehicle.
6) Remove the service hole cover.



7) Apply spray type lubricant or its equivalent to the threaded portion of front oxygen (A/F) sensor, and leave it for 1 minute or more.
8) Remove the front oxygen (A/F) sensor.

CAUTION:
When removing the oxygen (A/F) sensor, wait until the exhaust pipe cools, otherwise it will damage the exhaust pipe.



B: INSTALLATION

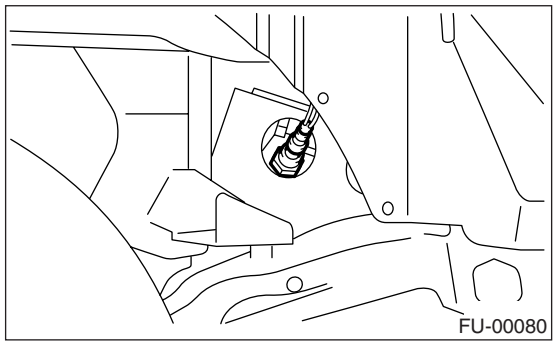
1) Before installing the front oxygen (A/F) sensor, apply anti-seize compound only to the threaded portion of front oxygen (A/F) sensor to make next removal easier.

Anti-seize compound:
SS-30 by JET LUBE

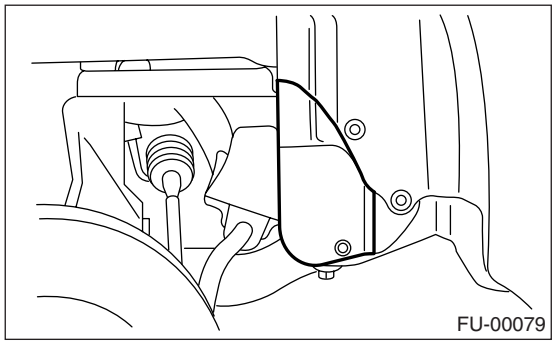
CAUTION:
Never apply anti-seize compound to the protector of front oxygen (A/F) sensor.

2) Install the front oxygen (A/F) sensor.

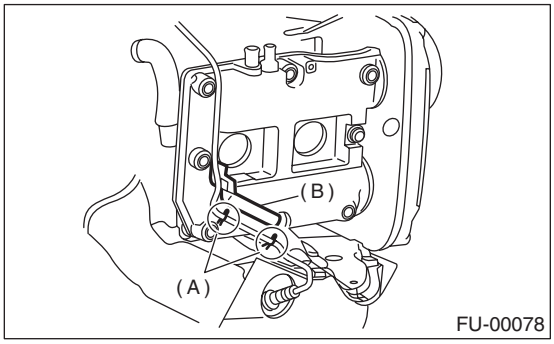
Tightening torque:
30 N·m (3.1 kgf-m, 22.1 ft-lb)



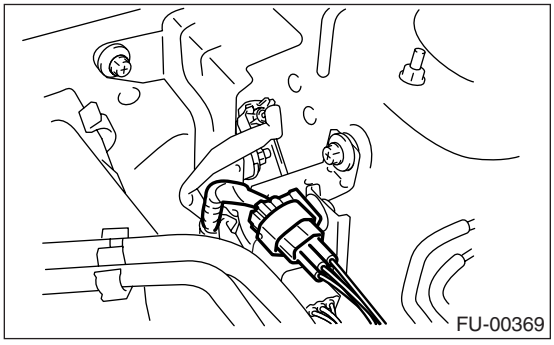
3) Install the service hole cover.



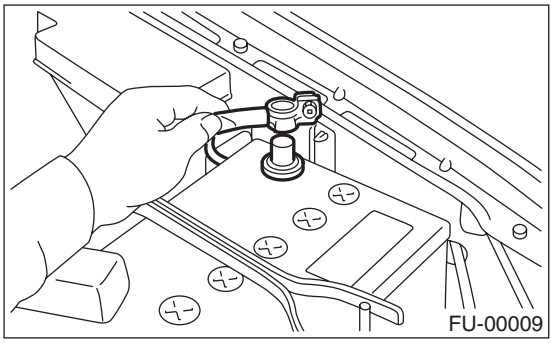
4) Lower the vehicle.
5) Install the front right side wheel.
6) Connect the engine harness with clip (A) to bracket (B).



7) Connect the connector of front oxygen (A/F) sensor.



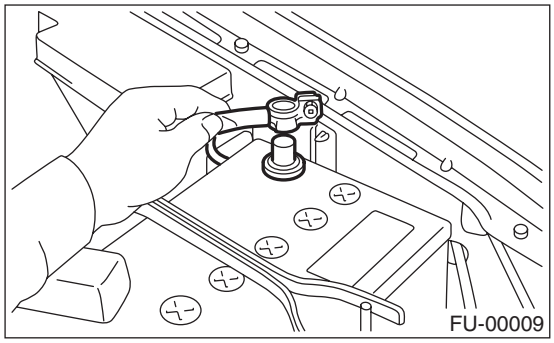
8) Connect the battery ground cable to battery.



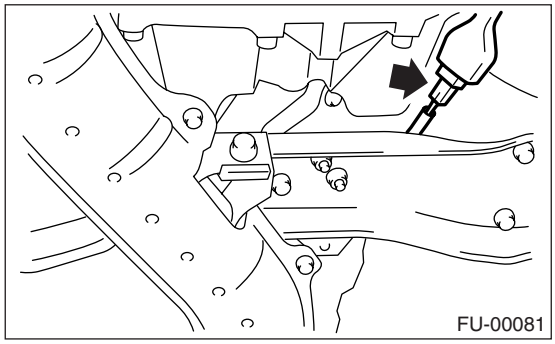
20.Rear Oxygen Sensor

A: REMOVAL

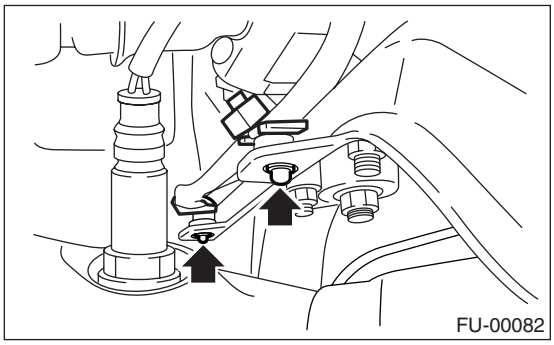
1) Disconnect the ground cable from battery.



2) Lift-up the vehicle.
3) Disconnect the connector from rear oxygen sensor.

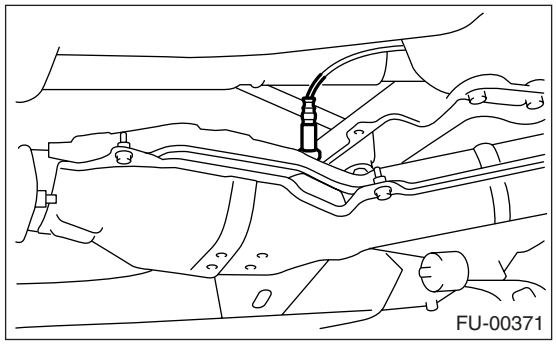


4) Remove the clip by pulling it out from the upper side of crossmember.



5) Apply spray type lubricant or its equivalent to the threaded portion of rear oxygen sensor, and leave it for 1 minute or more.
6) Remove the rear oxygen sensor.

CAUTION:
When removing the oxygen sensor, wait until the exhaust pipe cools, otherwise it will damage the exhaust pipe.



B: INSTALLATION

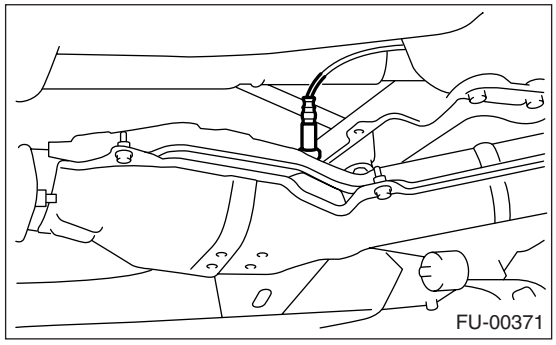
1) Before installing the rear oxygen sensor, apply anti-seize compound only to the threaded portion of rear oxygen sensor to make next removal easier.

CAUTION:
Never apply anti-seize compound to the protector of rear oxygen sensor.

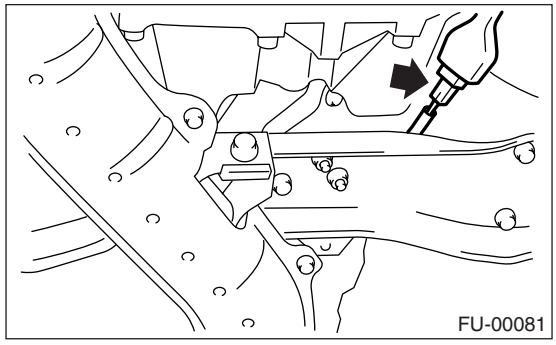
Anti-seize compound:
SS-30 by JET LUBE

2) Install the rear oxygen sensor.

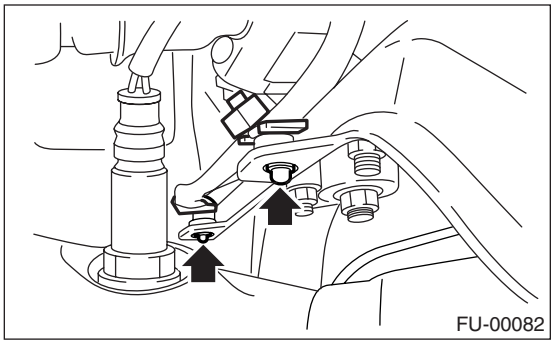
Tightening torque:
21 N·m (2.1 kgf-m, 15.2 ft-lb)



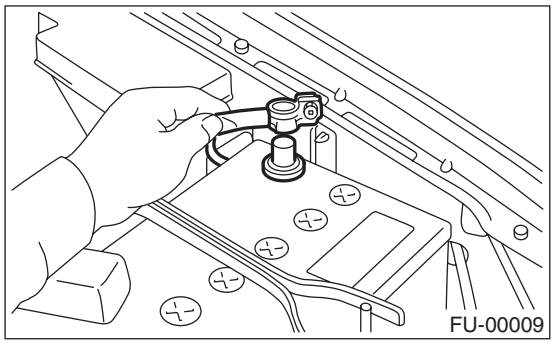
3) Connect the connector to rear oxygen sensor.



4) Connect the clip to crossmember.



5) Lower the vehicle.
6) Connect the battery ground cable to battery.

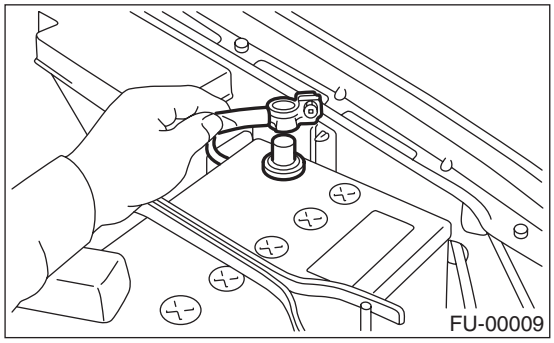


21.Exhaust Temperature Sensor

A: REMOVAL

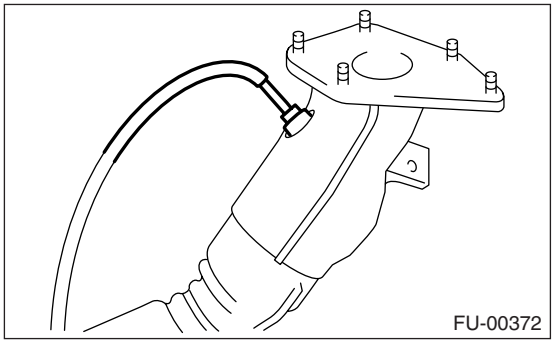
NOTE:
This component is installed to except for STi and Australia model.

1) Disconnect the ground cable from battery.



2) Remove the joint pipe. <Ref. to EX(H4DOTC)-14, REMOVAL, Joint Pipe.>
3) Apply spray type lubricant or its equivalent to the threaded portion of exhaust temperature sensor, and leave it for 1 minute or more.
4) Remove the exhaust temperature sensor.

CAUTION:
When removing the exhaust temperature sensor, wait until the exhaust pipe cools, otherwise it will damage the exhaust pipe.



B: INSTALLATION

1) Before installing the exhaust temperature sensor, apply anti-seize compound only to the threaded portion of exhaust temperature sensor to make next removal easier.

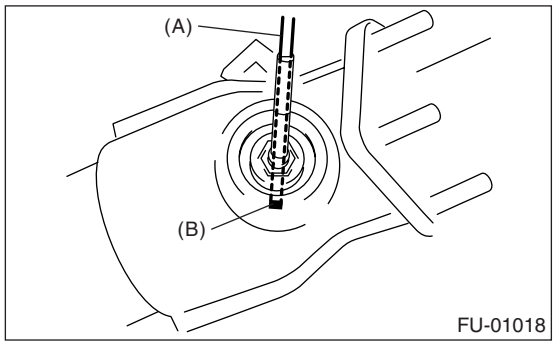
CAUTION:
Never apply anti-seize compound to the protector of exhaust temperature sensor.

Anti-seize compound:
SS-30 by JET LUBE

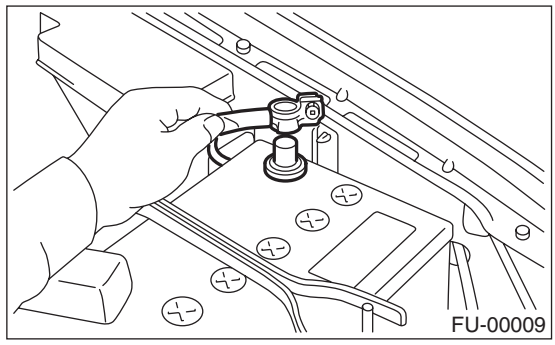
2) Install the exhaust temperature sensor.

NOTE:
Align the harness (A) direction of exhaust temperature sensor to the marking (B) of joint pipe, and tighten the screws.

Tightening torque:
21 N·m (2.1 kgf-m, 15.2 ft-lb)



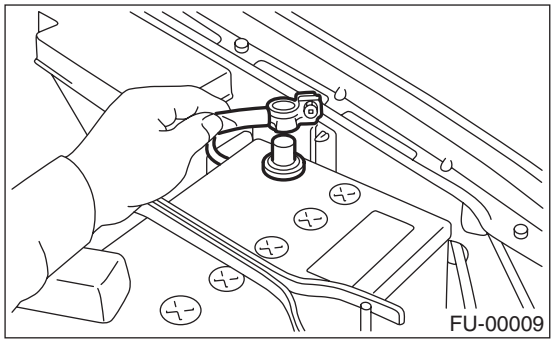
3) Install the joint pipe. <Ref. to EX(H4DOTC)-14, INSTALLATION, Joint Pipe.>
4) Connect the battery ground cable to battery.



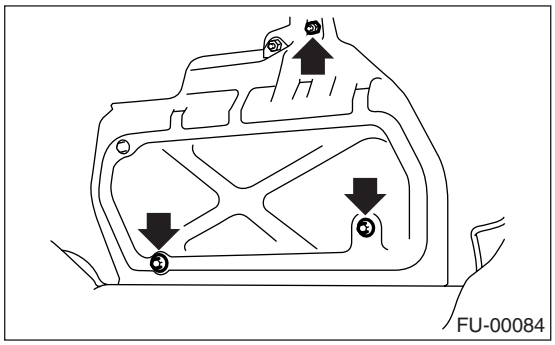
22.Engine Control Module (ECM)

A: REMOVAL

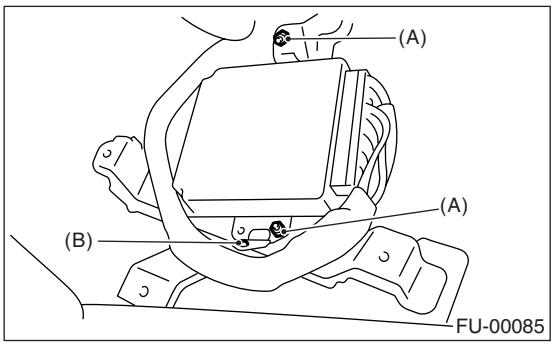
1) Disconnect the ground cable from battery.



2) Remove the lower inner trim of passenger side. <Ref. to EI-50, REMOVAL, Lower Inner Trim.>
3) Detach the floor mat of front passenger seat side.
4) Remove the protect cover.



5) Remove the nuts (A) which hold the ECM to bracket.
6) Remove the clip (B) from bracket.



7) Disconnect the ECM connectors and take out the ECM.

B: INSTALLATION

Install in the reverse order of removal.

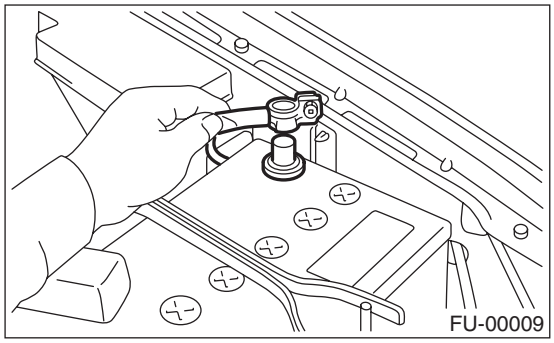
CAUTION:
When replacing the ECM, be careful not to use the wrong spec. ECM to avoid any damage to the fuel injection system.

Tightening torque:
5 N·m (0.5 kgf-m, 3.7 ft-lb)

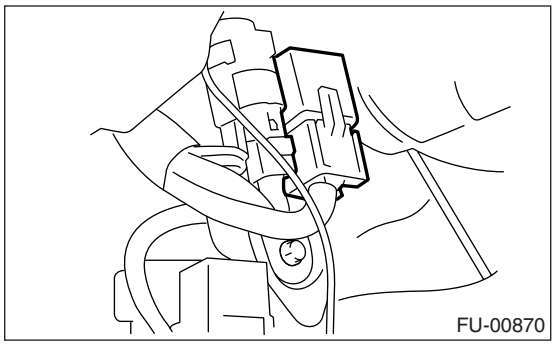
23.Main Relay

A: REMOVAL

1) Disconnect the ground cable from battery.



2) Remove the glove box. <Ref. to EI-42, REMOVAL, Glove Box.>
3) Remove the bolt which holds the main relay bracket on body.
4) Disconnect the connectors from main relay.



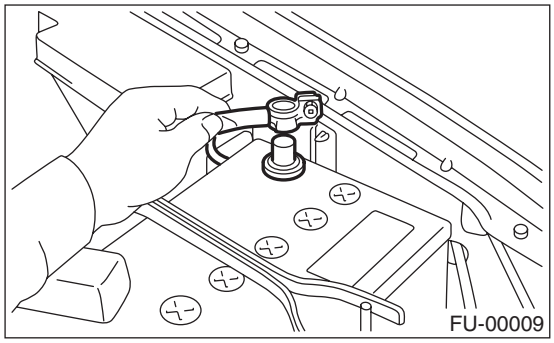
B: INSTALLATION

Install in the reverse order of removal.

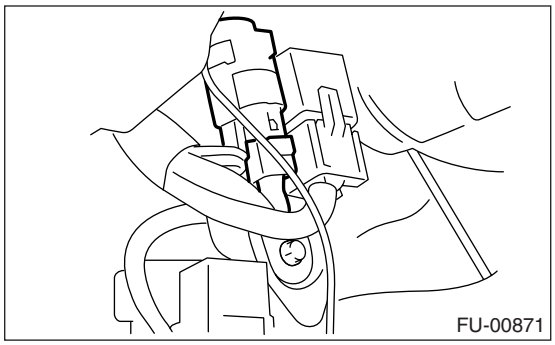
24.Fuel Pump Relay

A: REMOVAL

1) Disconnect the ground cable from battery.



2) Remove the glove box. <Ref. to EI-42, REMOVAL, Glove Box.>
3) Remove the bolt which holds the fuel pump relay bracket on body.
4) Disconnect the connector from fuel pump relay.



5) Remove the fuel pump relay from mounting bracket.

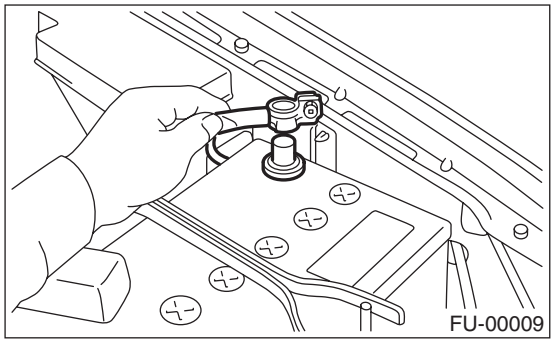
B: INSTALLATION

Install in the reverse order of removal.

25.Fuel Pump Control Unit

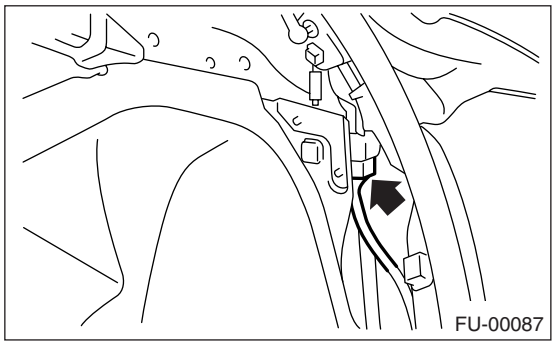
A: REMOVAL

1) Disconnect the ground cable from battery.

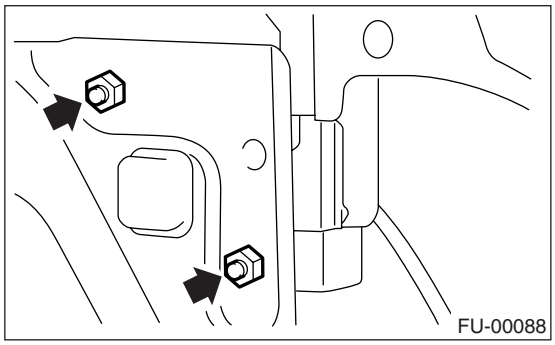


2) Remove the rear quarter trim. <Ref. to EI-51, REMOVAL, Rear Quarter Trim.>

3) Disconnect the connector from fuel pump control unit.



4) Remove the fuel pump control unit.



B: INSTALLATION

Install in the reverse order of removal.

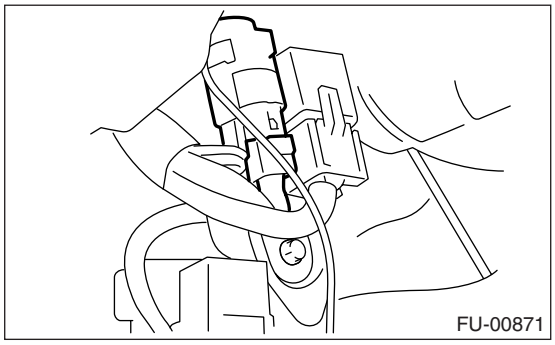
26.Fuel

A: PROCEDURE

1. RELEASING OF FUEL PRESSURE

WARNING:
- **Place “NO FIRE” signs near working area.**
- **Be careful not to spill fuel on the floor.**

1) Disconnect the connector from fuel pump relay.

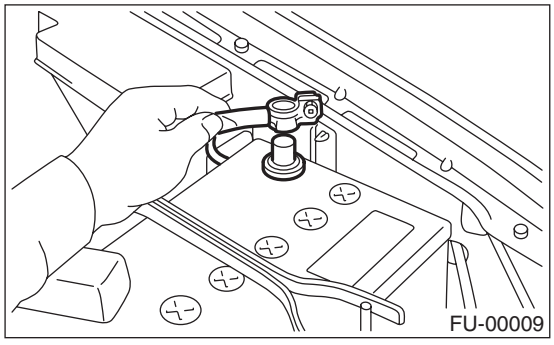


2) Start and run the engine until it stalls.
3) After the engine stalls, crank it for 5 more seconds.
4) Turn the ignition switch to OFF.

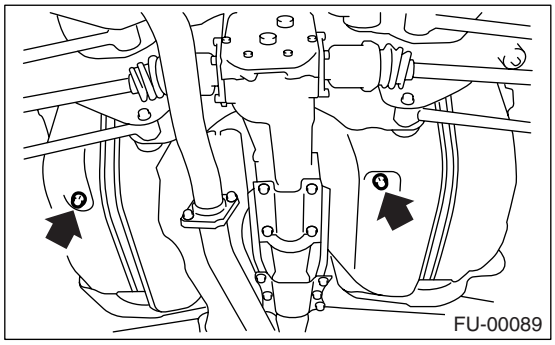
2. DRAINING FUEL

WARNING:
- **Place “NO FIRE” signs near working area.**
- **Be careful not to spill fuel on the floor.**

1) Set the vehicle on a lift.
2) Disconnect the ground cable from battery.

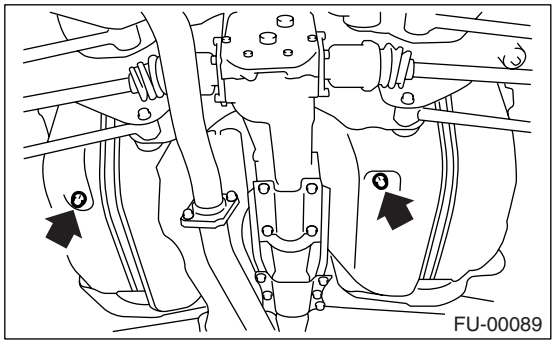


3) Open the fuel filler flap lid and remove the fuel filler cap.
4) Lift-up the vehicle.
5) Drain fuel from the fuel tank.
Set a container under vehicle and remove the drain plug from fuel tank.



6) Tighten the fuel drain plug.

Tightening torque:
26 N·m (2.7 kgf-m, 19.2 ft-lb)

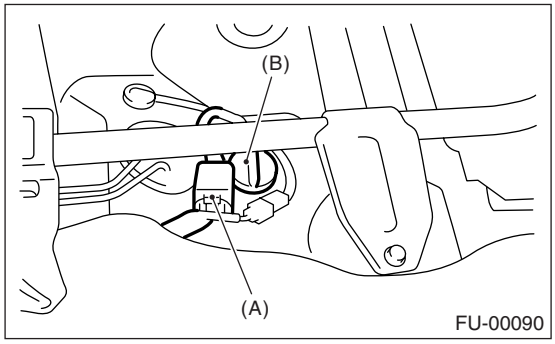


27.Fuel Tank

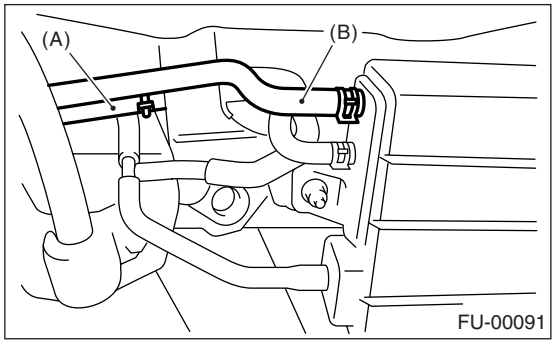
A: REMOVAL

WARNING:
- **Place “NO FIRE” signs near working area.**
- **Be careful not to spill fuel on the floor.**

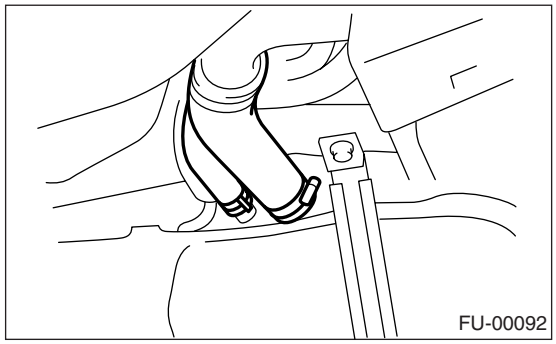
1) Set the vehicle on a lift.
2) Release the fuel pressure. <Ref. to FU(H4DOTC)-54, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
3) Drain fuel from fuel tank. <Ref. to FU(H4DOTC)-54, DRAINING FUEL, PROCEDURE, Fuel.>
4) Remove the rear seat.
5) Disconnect the connector (A) of fuel tank cord to rear harness.
6) Push the grommet (B) which holds the fuel tank cord on floor panel down under body.



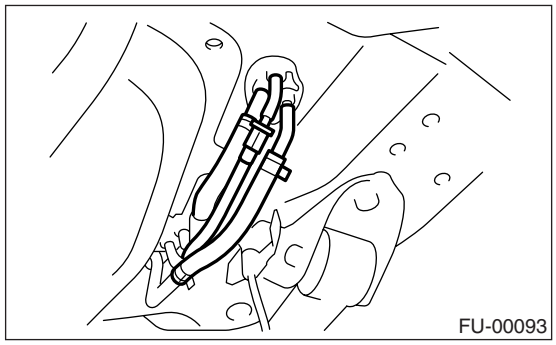
7) Remove the rear crossmember. <Ref. to RS-20, REMOVAL, Rear Crossmember.>
8) Disconnect the two-way valve hose (A) from two-way valve, and disconnect the canister hose (B) from canister.



9) Loosen the clamp and disconnect the fuel filler hose and air vent hose from fuel filler pipe.

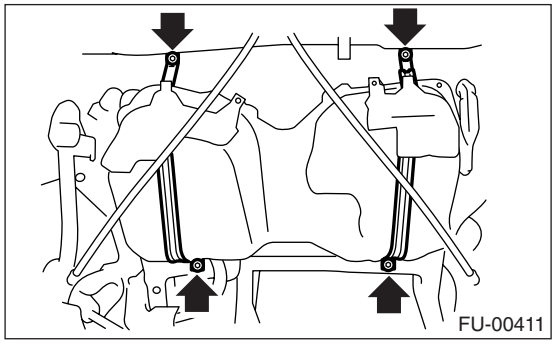


10) Move the clips and disconnect the quick connector. <Ref. to FU(H4DOTC)-69, REMOVAL, Fuel Delivery, Return and Evaporation Lines.>
11) Disconnect the fuel hoses.



12) Support the fuel tank with transmission jack, remove the bolts from bands, and then dismount the fuel tank from vehicle.

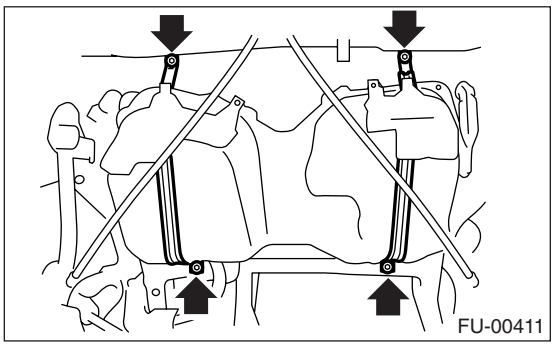
WARNING:
A helper is required to perform this work.



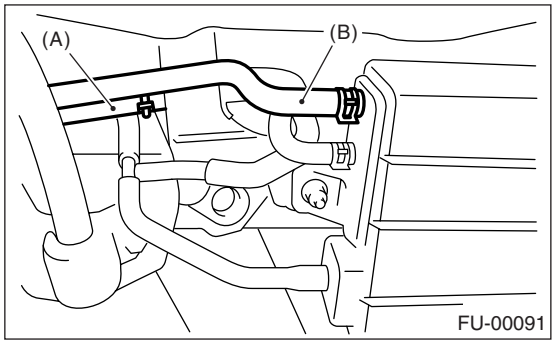
B: INSTALLATION

1) Support the fuel tank with transmission jack and push the fuel tank harness into access hole with grommet.
2) Set the fuel tank and temporarily tighten the bolts of fuel tank bands.

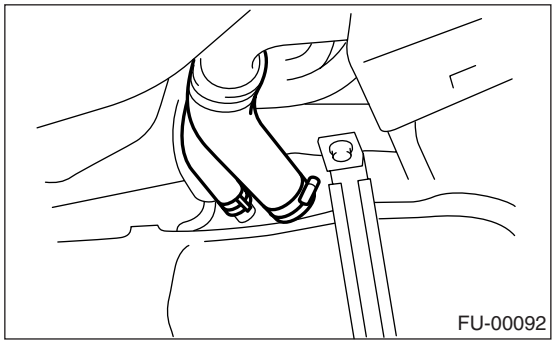
WARNING:
A helper is required to perform this work.



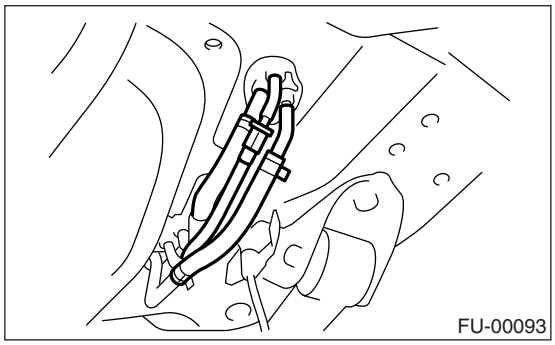
3) Connect the two-way valve hose (A) to two-way valve and connect the canister hose (B) to canister.



4) Connect the fuel filler hose and air vent hose.

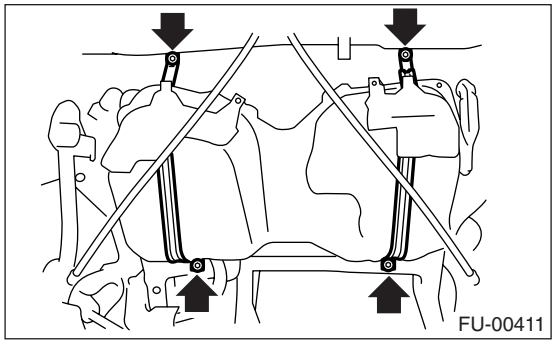


5) Connect the fuel hoses, and secure them with clips and quick connector. <Ref. to FU(H4DOTC)-70, INSTALLATION, Fuel Delivery, Return and Evaporation Lines.>

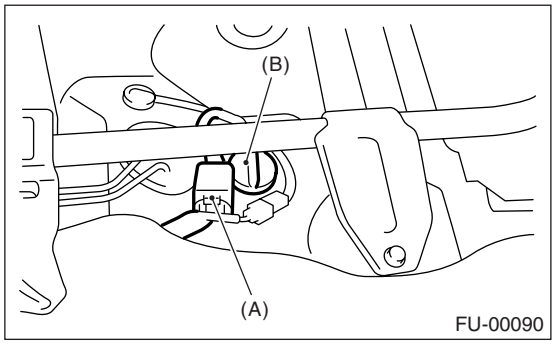


6) Tighten the band mounting bolts.

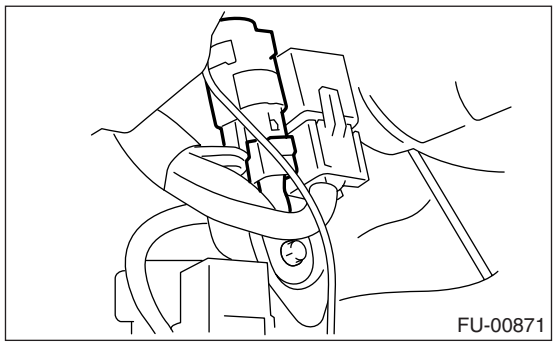
Tightening torque:
33 N·m (3.4 kgf-m, 24.3 ft-lb)



7) Install the rear crossmember. <Ref. to RS-20, INSTALLATION, Rear Crossmember.>
8) Connect the connector (A) to the fuel tank cord, and plug the service hole with grommet (B).



9) Set the rear seat and floor mat.
10) Connect the connector to the fuel pump relay.



C: INSPECTION

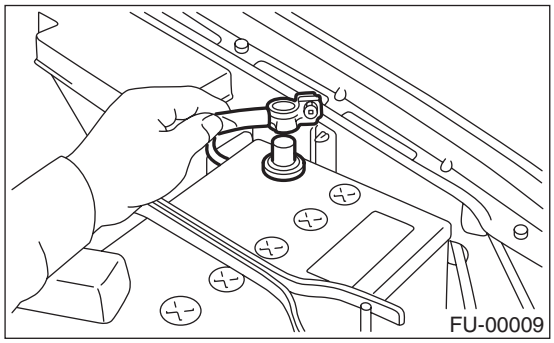
1) Check that the fuel tank is not holed, cracked or otherwise damaged.
2) Make sure the fuel hoses and fuel pipes are not cracked and the connections are tightened firmly.

28.Fuel Filler Pipe

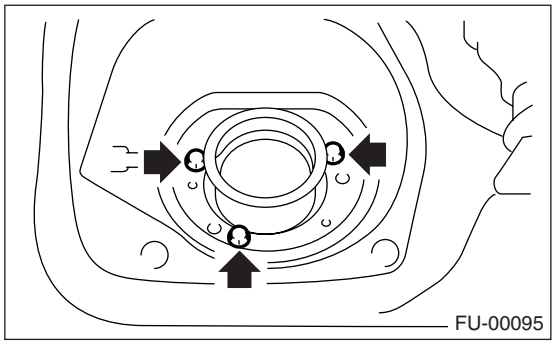
A: REMOVAL

WARNING:
- **Place “NO FIRE” signs near working area.**
- **Be careful not to spill fuel on the floor.**

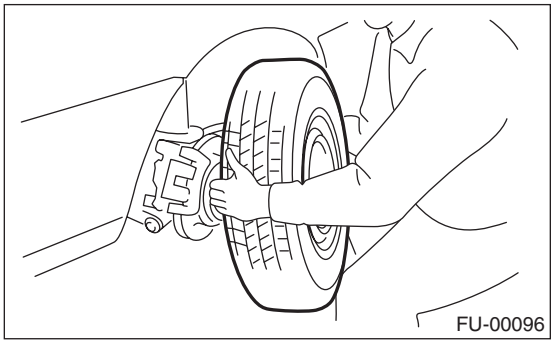
1) Set the vehicle on a lift.
2) Disconnect the ground cable from battery.



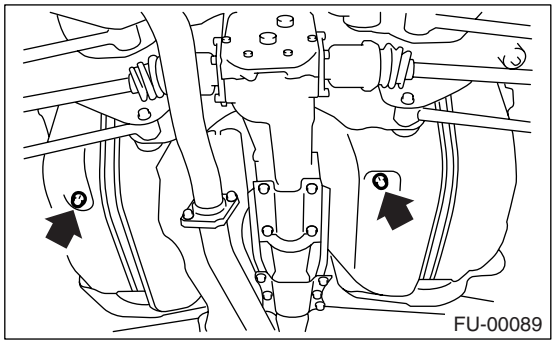
3) Open the fuel filler flap lid and remove the fuel filler cap.
4) Remove the screws holding the packing in place.



5) Loosen the rear right side wheel nuts.
6) Lift-up the vehicle.
7) Remove the rear right side wheel.

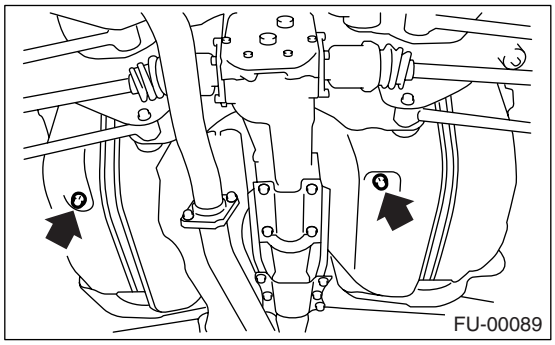


8) Drain fuel from fuel tank. Set a container under vehicle and remove the drain plug from fuel tank.

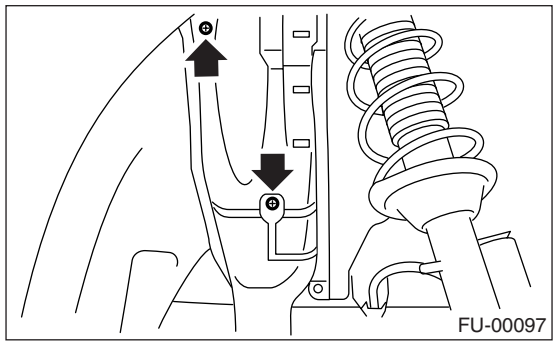


9) Tighten the fuel drain plug, and install the front right side tank cover.

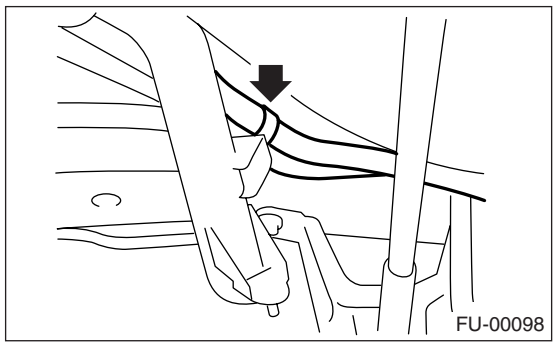
Tightening torque:
26 N·m (2.7 kgf-m, 19.2 ft-lb)



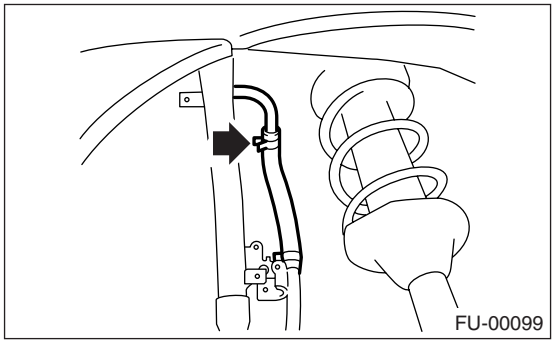
10) Remove the fuel filler pipe protector.



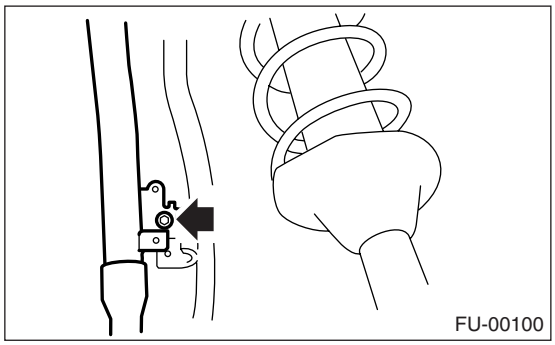
11) Separate the evaporation hoses from clip of fuel filler pipe.



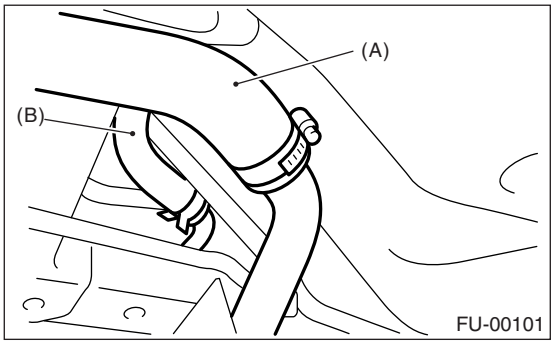
12) Disconnect the air vent hose from fuel filler pipe.



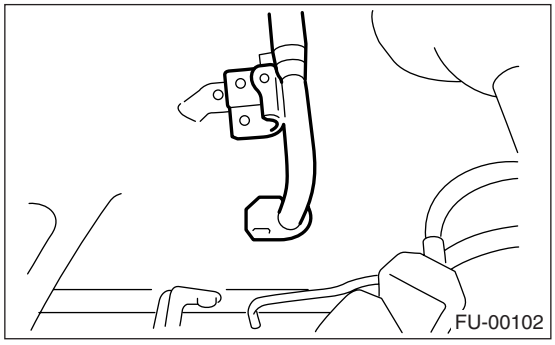
13) Remove the bolts which hold the fuel filler pipe bracket on body.



14) Loosen the clamp and separate the fuel filler hose (A) from fuel filler pipe.
15) Move the clip and separate the air vent hose (B).



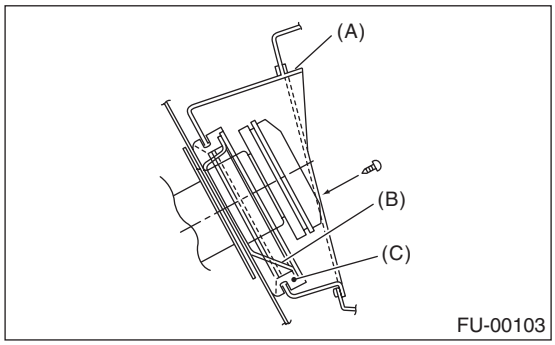
16) Remove the fuel filler pipe to under side of vehicle.
17) Remove the air vent pipe together with clip from body.



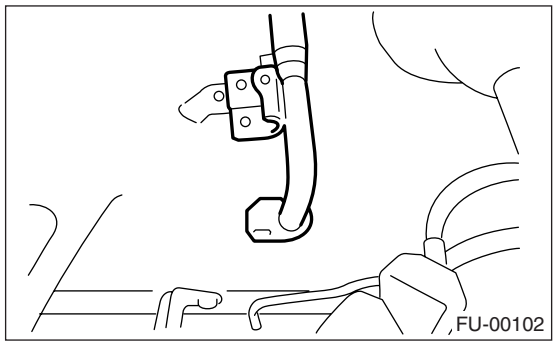
B: INSTALLATION

1) Hold the fuel filler flap open.
2) Set the fuel saucer (A) with rubber packing (C) and insert the fuel filler pipe into hole from the inner side of apron.
3) Align the holes in fuel filler pipe neck, set the cup (B), and then tighten the screws.

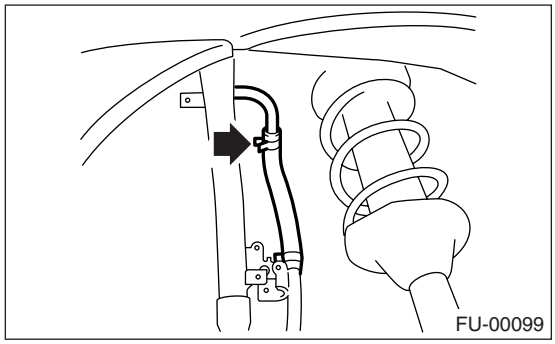
NOTE:
If the edges of rubber packing are folded toward inside, straighten it with a screwdriver.



4) Install the air vent pipe.

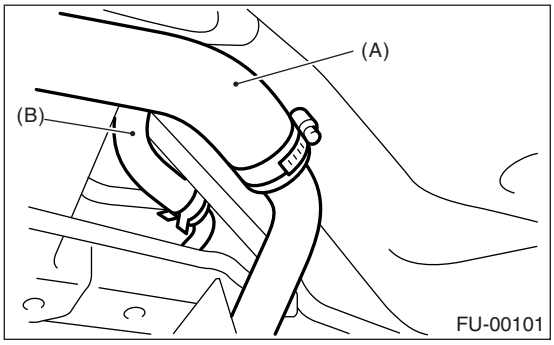


5) Connect the air vent hose to the fuel filler pipe.



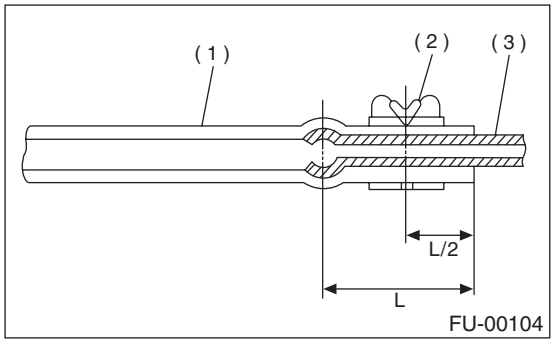
6) Insert the fuel filler hose (A) approx. 35 to 40 mm (1.38 to 1.57 in) over the lower end of fuel filler pipe and tighten the clamp.

CAUTION:
Do not allow clips to touch the air vent hose (B) and rear suspension crossmember.



7) Insert the air vent hose approx. 25 to 30 mm (0.98 to 1.18 in) into the lower end of air vent pipe and hold clip.

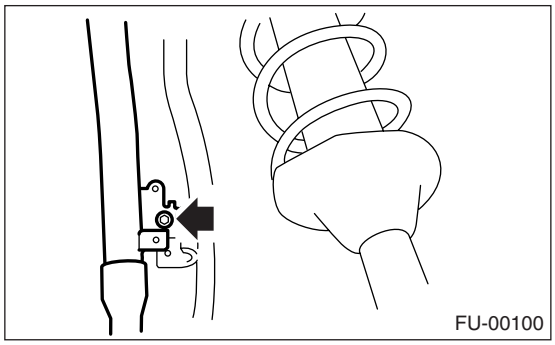
L = 27.5±2.5 mm (1.083±0.098 in)



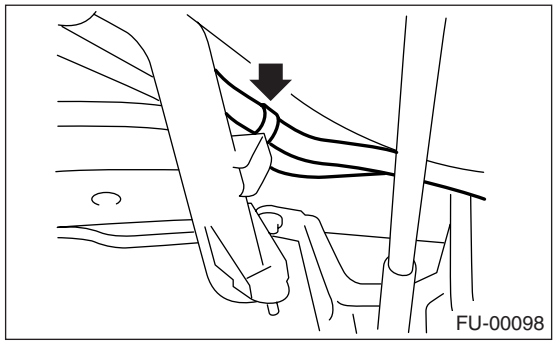
(1) Hose
(2) Clip
(3) Pipe

8) Tighten the bolt which holds the fuel filler pipe bracket on body.

Tightening torque:
7.5 N·m (0.76 kgf-m, 5.5 ft-lb)

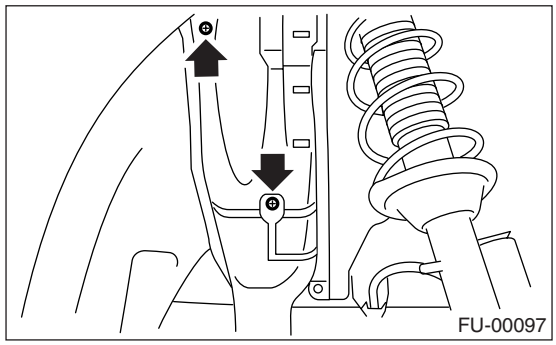


9) Hold the evaporation hoses onto clip of fuel filler pipe.

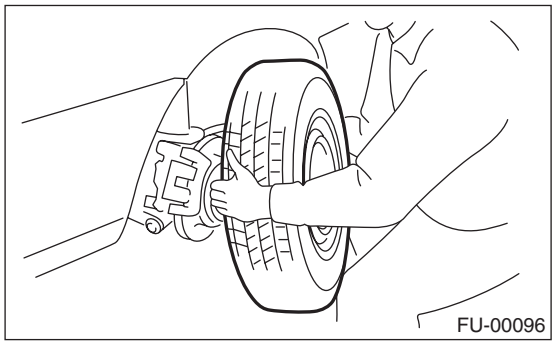


10) Install the fuel filler pipe protector.

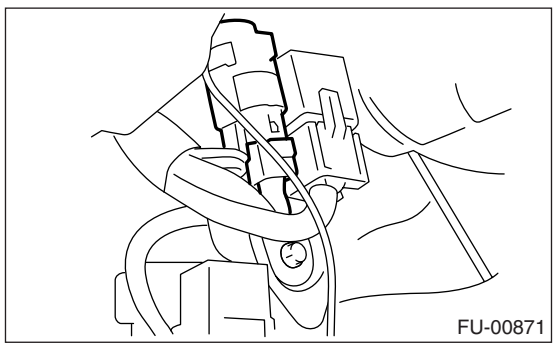
Tightening torque:
7.4 N·m (0.75 kgf-m, 5.4 ft-lb)



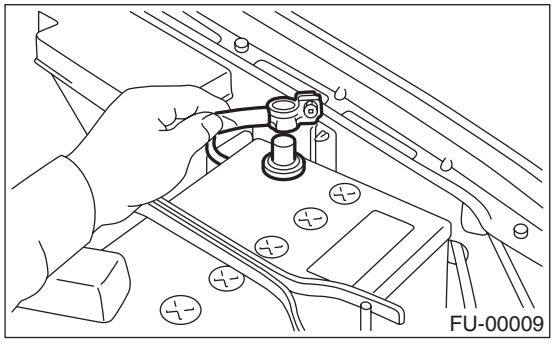
11) Install the rear right wheel.



12) Lower the vehicle.
13) Tighten the wheel nuts.
14) Connect the connector to the fuel pump relay.



15) Connect the battery ground cable to battery.



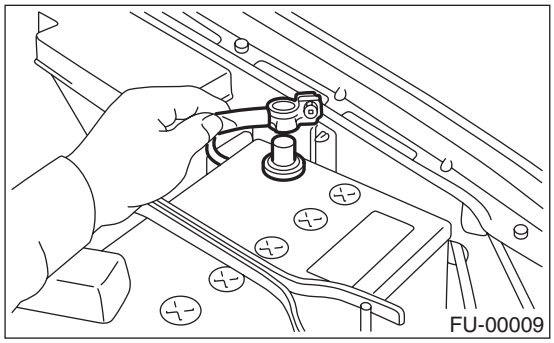
29.Fuel Pump

A: REMOVAL

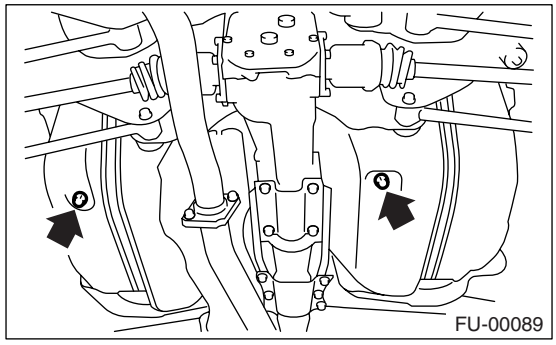
WARNING:
- **Place "NO FIRE" signs near working area.**
- **Be careful not to spill fuel on the floor.**

NOTE:
Fuel pump assembly consists of fuel pump and fuel level sensor.

1) Release the fuel pressure. <Ref. to FU(H4DOTC)-54, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
2) Open the fuel filler flap lid and remove the fuel filler cap.
3) Disconnect the ground cable from battery.

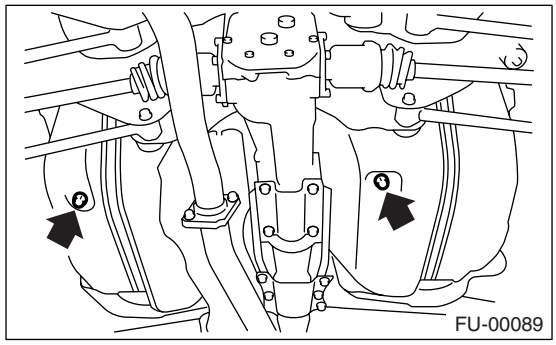

FU-00009

4) Lift-up the vehicle.
5) Drain fuel from fuel tank. Set a container under vehicle and remove the drain plug from fuel tank.

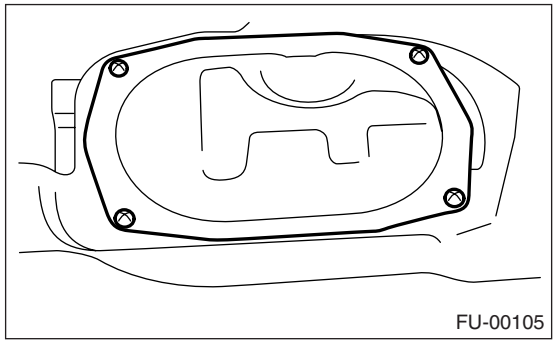

FU-00089

6) Tighten the fuel drain plug.

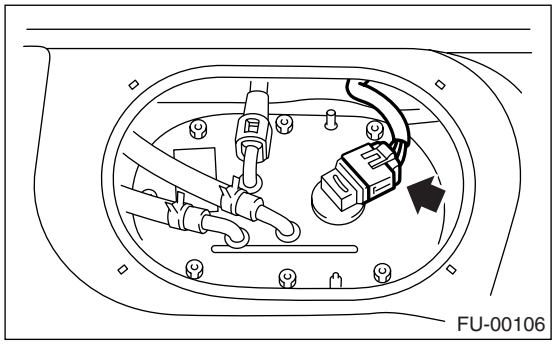
Tightening torque:
26 N·m (2.7 kgf-m, 19.2 ft-lb)


FU-00089

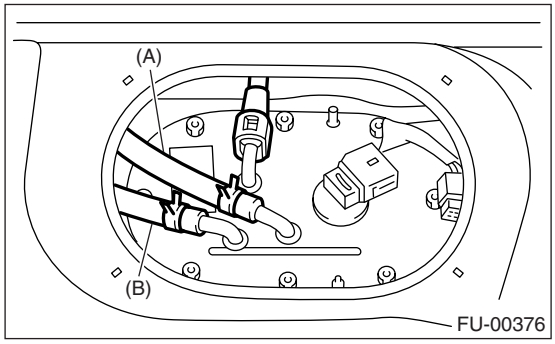
7) Raise the rear seat and turn the floor mat up.
8) Remove the access hole lid.


FU-00105

9) Disconnect the connector from fuel pump.

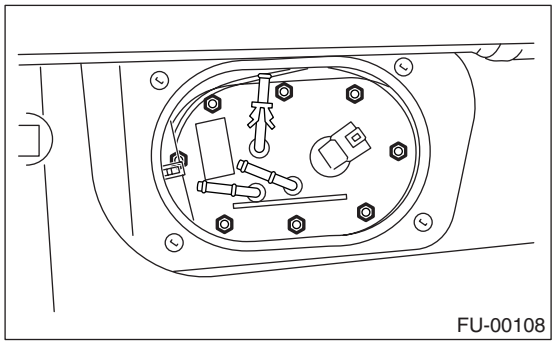

FU-00106

10) Disconnect the quick connector, and disconnect the fuel delivery hose. <Ref. to FU(H4DOTC)-69, Fuel Delivery, Return and Evaporation Lines.>
11) Move the clips, and then disconnect the fuel return hose (A) and jet pump hose (B).



FU-00376

12) Remove the nuts which install the fuel pump assembly onto fuel tank.


FU-00108

13) Take off the fuel pump assembly from fuel tank.

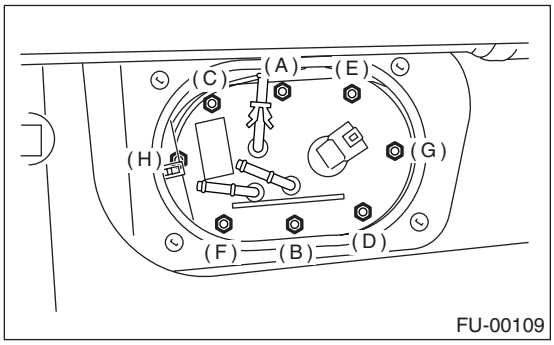
B: INSTALLATION

Install in the reverse order of removal. Do the following:

NOTE:
Use a new gasket.

(1) Ensure sealing portion is free from fuel or foreign particles before installation.
(2) Tighten the nuts to specified torque in alphabetical sequence as shown in the figure.

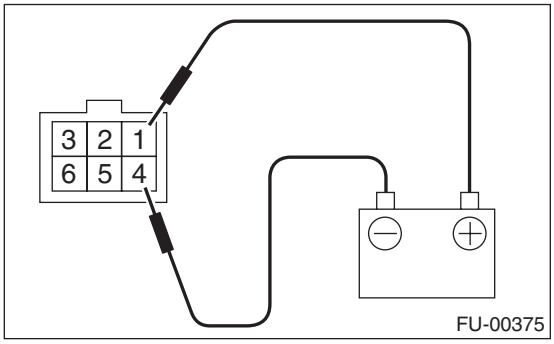
Tightening torque:
4.4 N·m (0.45 kgf-m, 3.3 ft-lb)



C: INSPECTION

Connect the lead harness to connector terminal of fuel pump, and then apply battery power supply to check whether the pump operates.

WARNING:
• Wipe off the fuel completely.
• Keep the battery as far apart from fuel pump as possible.
• Be sure to turn the battery supply ON and OFF on battery side.
• Do not run the fuel pump for a long time under non-load condition.



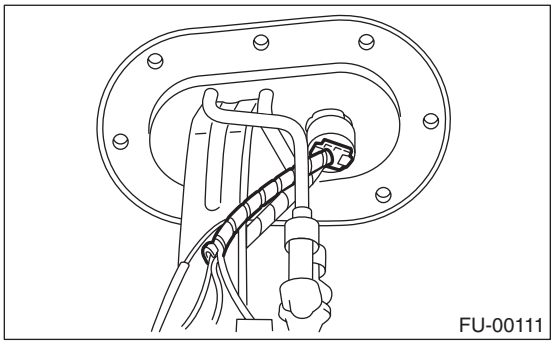
30.Fuel Level Sensor

A: REMOVAL

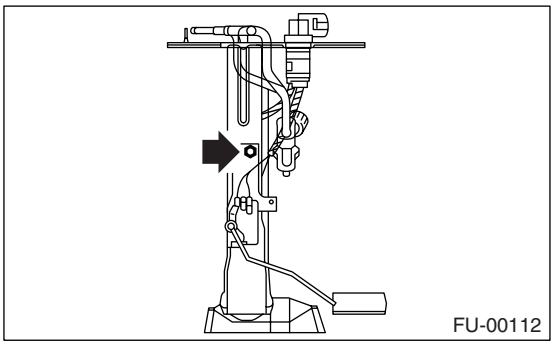
WARNING:
- **Place “NO FIRE” signs near working area.**
- **Be careful not to spill fuel on the floor.**

NOTE:
Fuel level sensor is built in fuel pump assembly.

1) Remove the fuel pump assembly. <Ref. to FU(H4DOTC)-61, REMOVAL, Fuel Pump.>
2) Disconnect the connector from fuel pump bracket.



3) Remove the bolt which installs the fuel level sensor on mounting bracket.



B: INSTALLATION

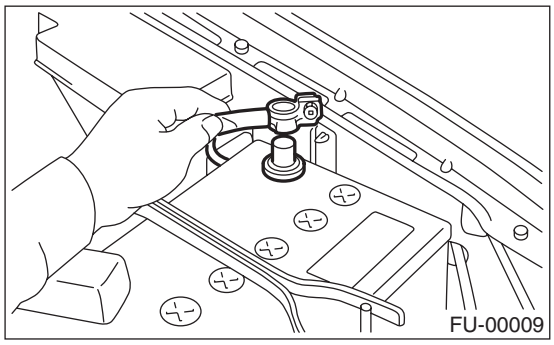
Install in the reverse order of removal.

31.Fuel Sub Level Sensor

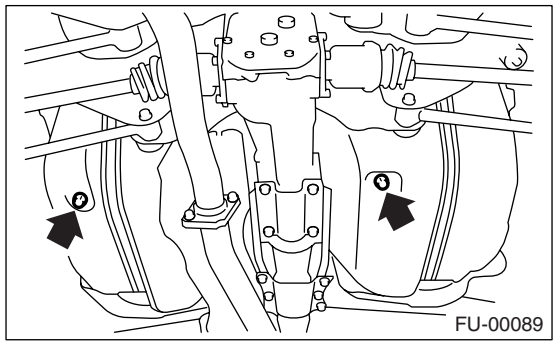
A: REMOVAL

WARNING:
- **Place “NO FIRE” signs near working area.**
- **Be careful not to spill fuel on the floor.**

1) Disconnect the ground cable from battery.

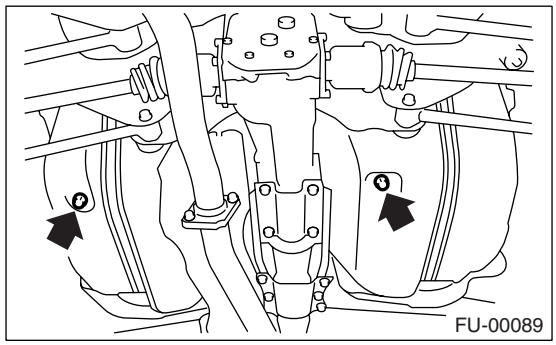


2) Lift-up the vehicle.
3) Drain fuel from fuel tank. Set a container under vehicle and remove the drain plug from fuel tank.

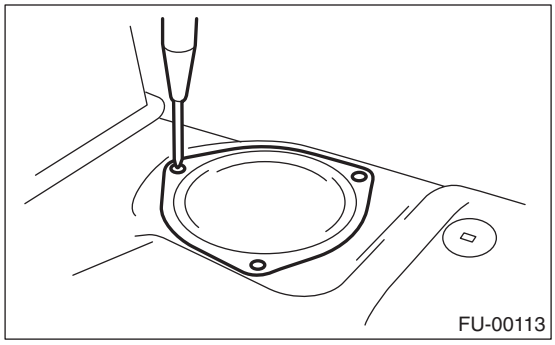


4) Tighten the fuel drain plug.

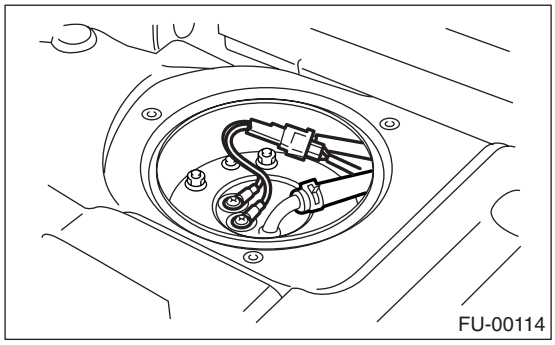
Tightening torque:
26 N·m (2.7 kgf-m, 19.2 ft-lb)



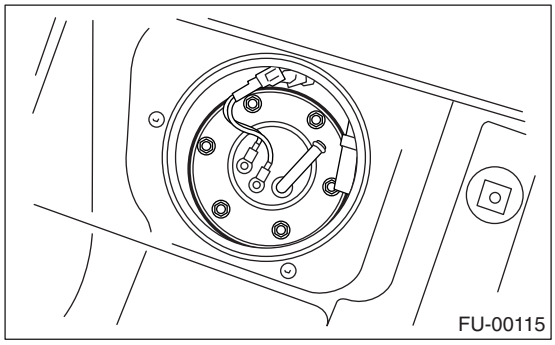
5) Remove the rear seat.
6) Remove the service hole cover.



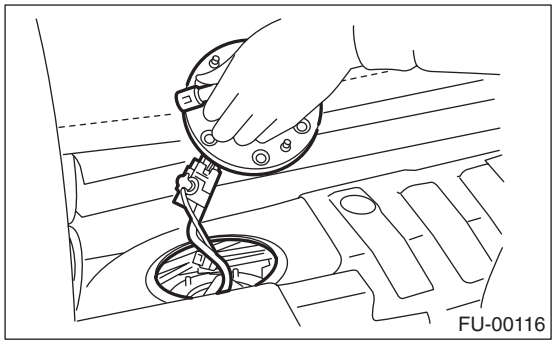
7) Disconnect the connector from fuel sub level sensor.
8) Disconnect the fuel jet pump hose.



9) Remove the bolts which install the fuel sub level sensor on fuel tank.



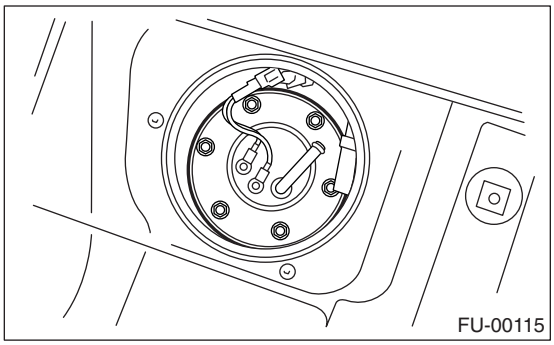
10) Remove the fuel sub level sensor.



B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
4.4 N·m (0.45 kgf-m, 3.3 ft-lb)

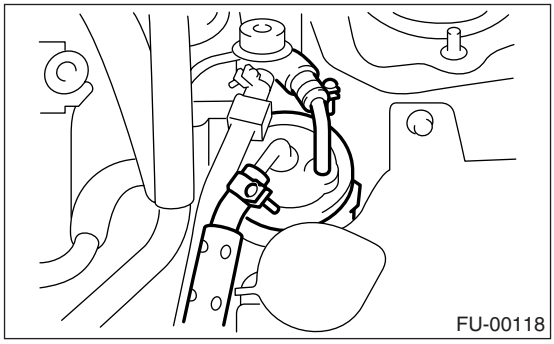


32.Fuel Filter

A: REMOVAL

WARNING:
- **Place “NO FIRE” signs near working area.**
- **Be careful not to spill fuel on the floor.**

1) Release the fuel pressure. <Ref. to FU(H4DOTC)-54, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
2) Disconnect the fuel delivery hoses from fuel filter.



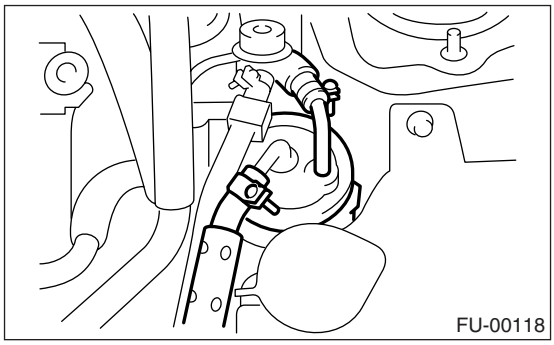
3) Remove the filter from holder.

B: INSTALLATION

CAUTION:
- **If fuel hoses are damaged at connecting portions, replace them with new ones.**
- **If clamps are badly damaged, replace them with new ones.**

1) Install in the reverse order of removal.
2) Tighten the hose clamp screws.

Tightening torque:
1.25 N·m (0.13 kgf-m, 0.94 ft-lb)



C: INSPECTION

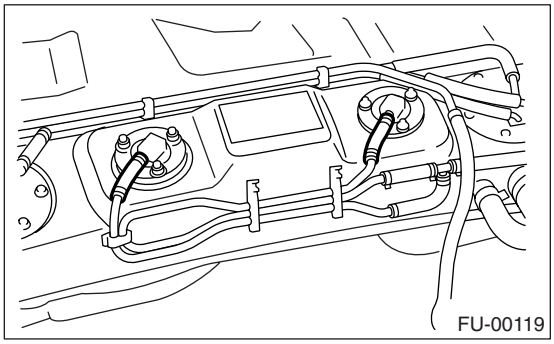
1) Check the inside of fuel filter for dirt and water sediment.
2) If it is clogged, or if replacement interval has been reached, replace it.
3) If water is found in it, shake and expel the water from inlet port.

33.Fuel Cut Valve

A: REMOVAL

WARNING:
- **Place “NO FIRE” signs near working area.**
- **Be careful not to spill fuel on the floor.**

1) Remove the fuel tank. <Ref. to FU(H4DOTC)-55, REMOVAL, Fuel Tank.>
2) Move the clip and disconnect the evaporation hose from fuel cut valve.

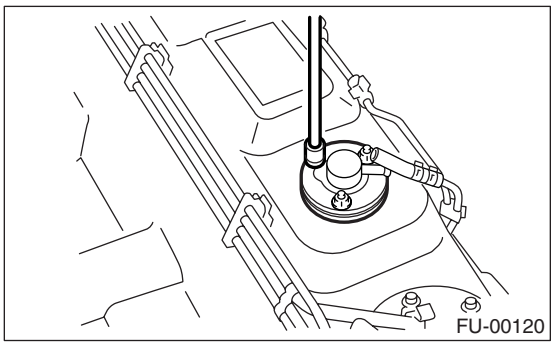


3) Remove the bolts which install the fuel cut valve.

B: INSTALLATION

Install in the reverse order of removal.

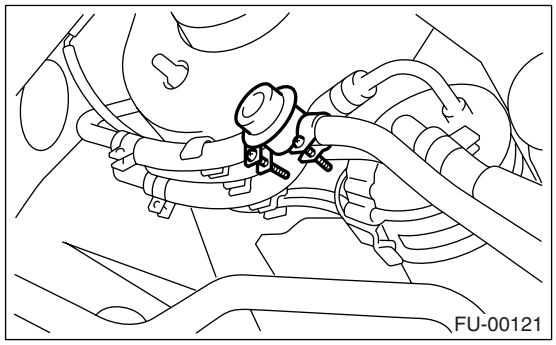
Tightening torque:
4.4 N·m (0.45 kgf-m, 3.3 ft-lb)



34.Fuel Damper Valve

A: REMOVAL

1) Release the fuel pressure. <Ref. to FU(H4DOTC)-54, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
2) Remove the fuel damper valve from fuel return line.



B: INSTALLATION

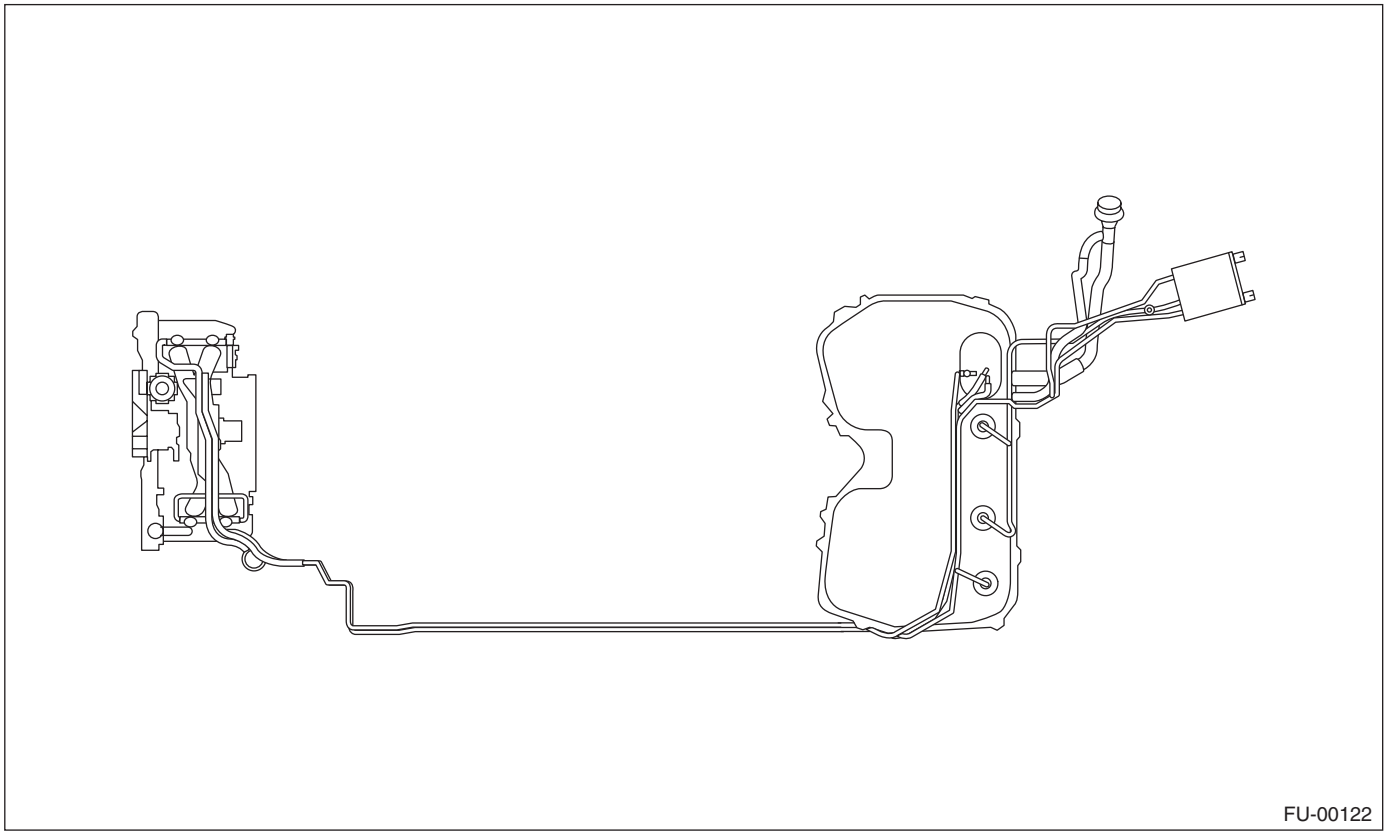
Install in the reverse order of removal.

Tightening torque:
Fuel damper valve
1.25 N·m (0.13 kgf-m, 0.94 ft-lb)

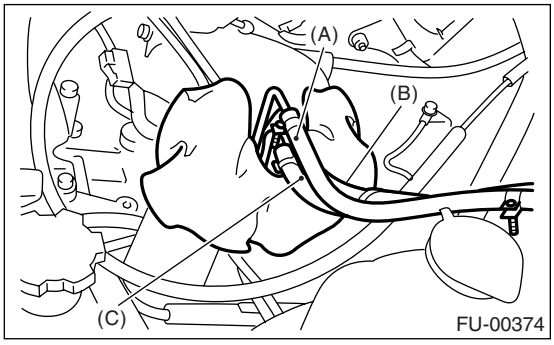
35.Fuel Delivery, Return and Evaporation Lines

A: REMOVAL

1) Set the vehicle on a lift.
2) Release the fuel pressure. <Ref. to FU(H4DOTC)-54, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
3) Open the fuel filler flap lid and remove the fuel filler cap.
4) Remove the floor mat. <Ref. to EI-58, REMOVAL, Floor Mat.>
5) Remove the fuel delivery pipes and hoses, fuel return pipes and hoses, evaporation pipes and hoses.


FU-00122

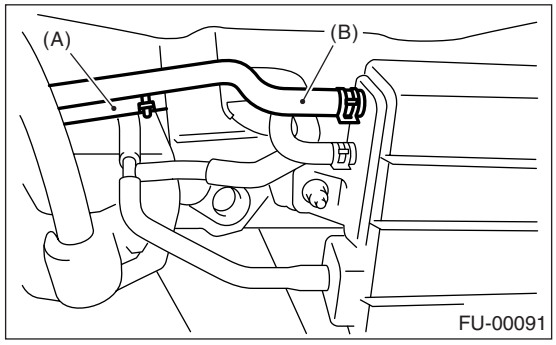
6) In the engine compartment, detach the fuel delivery hoses (A), return hoses (B) and evaporation hoses (C).



FU-00374

7) Lift-up the vehicle.

8) Disconnect the two-way valve hose (A) from two-way valve and disconnect the canister hose (B) from canister.

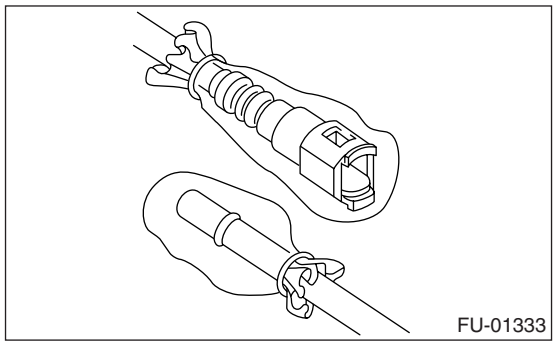


FU-00091

9) Separate the quick connector on fuel delivery line.

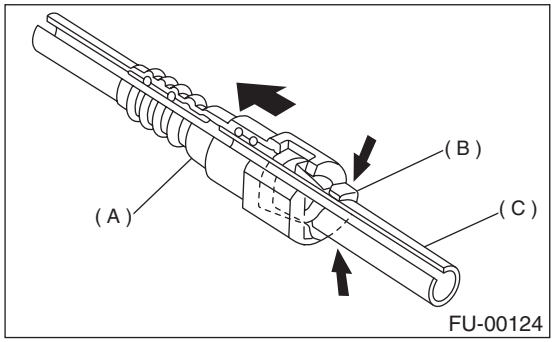
(1) Clean the pipe and connector, if they are covered with dust.

(2) To prevent from damaging or entering foreign matter, wrap the pipes and connectors with plastic bag, etc.



(3) Hold the connector (A) and push retainer (B) down.

(4) Pull out the connector (A) from retainer (B).

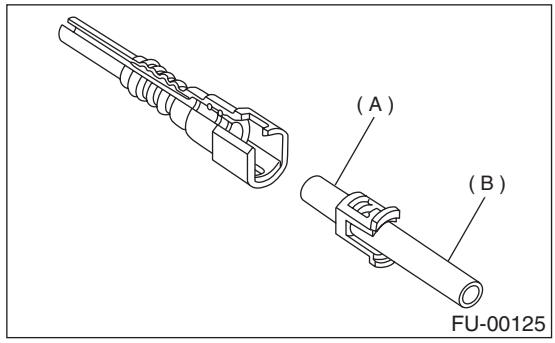


(A) Connector
(B) Retainer
(C) Pipe

B: INSTALLATION

1) Connect the quick connector on fuel delivery line.

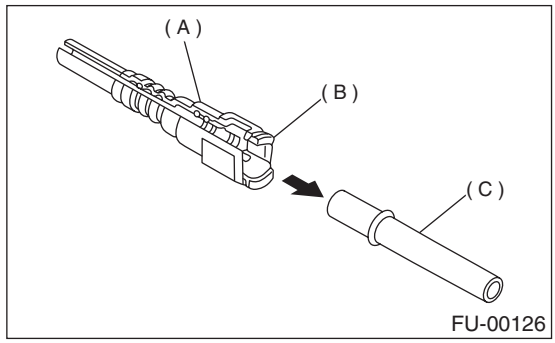
NOTE:
- Use a new retainer.
- Make sure the connected portion is not damaged or has dust. If necessary, clean the seal surface of pipe.



(A) Seal surface
(B) Pipe

(1) Set the new retainer (B) to connector (A).
(2) Push the pipe into connector completely.

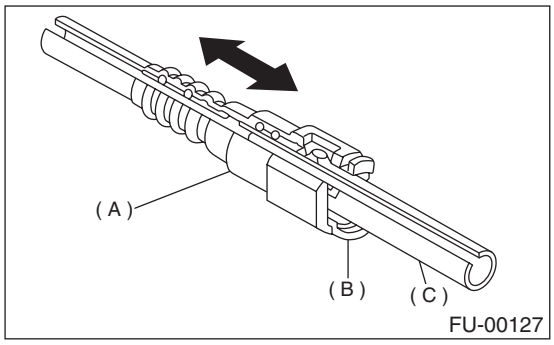
NOTE:
At this time, two clicking sounds are heard.



(A) Connector
(B) Retainer
(C) Pipe

CAUTION:
- **Pull the connector to ensure it is connected securely.**
- **Ensure the two retainer pawls are engaged in their mating positions in connector.**

• Be sure to inspect the hoses and their connections for any leakage of fuel.



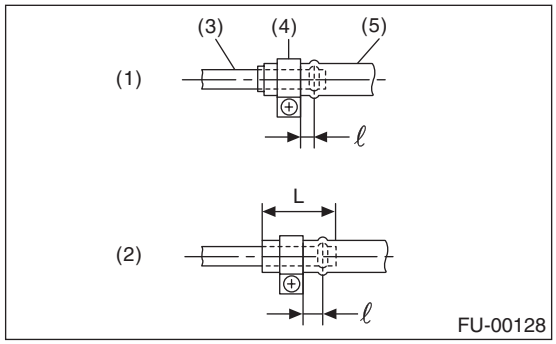
(A) Connector
(B) Retainer
(C) Pipe

2) Connect the fuel delivery hose to pipe with an overlap of 20 to 25 mm (0.79 to 0.98 in).
Type A: When the fitting length is specified.
Type B: When the fitting length is not specified.

ℓ : 2.5±1.5 mm (0.098±0.059 in)

L: 22.5±2.5 mm (0.886±0.098 in)

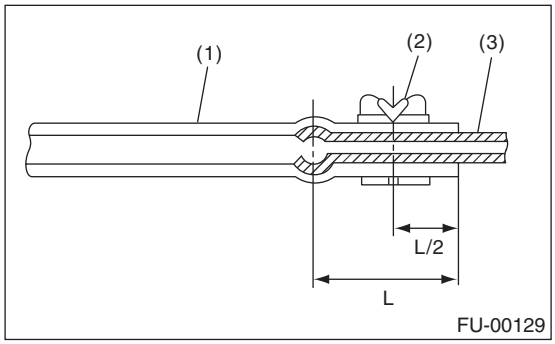
CAUTION:
Be sure to inspect the hoses and their connections for any leakage of fuel.



(1) Type A
(2) Type B
(3) Pipe
(4) Clamp
(5) Hose

3) Connect the evaporation hose to pipe by approx. 15 to 20 mm (0.59 to 0.79 in) from hose end.

L = 17.5±2.5 mm (0.689±0.098 in)



(1) Hose
(2) Clip
(3) Pipe

C: INSPECTION

1) Make sure there are no cracks on fuel pipes and fuel hoses.
2) Make sure the fuel pipe and fuel hose connections are tightened firmly.

36.Fuel System Trouble in General

A: INSPECTION

Trouble and possible cause		Corrective action
1. Insufficient fuel supply to injector		
1)	Fuel pump will not operate	
	❍ Defective terminal contact	Inspect connections, especially ground, and tighten securely.
	❍ Trouble in electromagnetic or electronic circuit parts	Replace the fuel pump.
2)	Lowering of fuel pump function	Replace the fuel pump.
3)	Clogged dust or water in fuel filter	Replace the fuel filter, clean or replace fuel tank.
4)	Clogged or bent fuel pipe or hose	Clean, correct or replace the fuel pipe or hose.
5)	Air is mixed in fuel system	Inspect or retighten each connection part.
6)	Clogged or bent breather tube or pipe	Clean, correct or replace the air breather tube or pipe.
7)	Damaged diaphragm of pressure regulator	Replace.
2. Leakage or blow out fuel		
1)	Loosened joints of fuel pipe	Retightening.
2)	Cracked fuel pipe, hose and fuel tank	Replace.
3)	Defective welding part on fuel tank	Replace.
4)	Defective packing of fuel tank	Replace.
5)	Clogged or bent air breather tube or air vent tube	Clean, correct or replace the air breather tube or air vent tube.
3. Gasoline smell inside of compartment		
1)	Loose joints at air breather tube, air vent tube and fuel filler pipe	Retightening.
2)	Defective packing air tightness on fuel saucer	Correct or replace the packing.
3)	Inoperative fuel pump modulator or circuit	Replace.
4. Defective fuel meter indicator		
1)	Defective operation of fuel level sensor	Replace.
2)	Defective operation of fuel meter	Replace.
5. Noise		
1)	Large operation noise or vibration of fuel pump	Replace.

NOTE:
• When the vehicle is left unattended for an extended period of time, water may accumulate in the fuel tank. Fill fuel fully to prevent those problem. And also drain the water condensation from fuel filter.
• In snow-covered areas, mountainous areas, skiing areas, etc. where ambient temperatures drop below 0°C (32°F) throughout the winter season, use water removing agent in the fuel system to prevent freezing fuel system and accumulating water. Fill the water removing agent at the time when the fuel reduced at half to maintain the advantage.
• When water condensation is noticed in the fuel filter, drain the water from both the fuel filter and fuel tank or use water removing agent in the fuel tank.
• Before using a water removing agent, follow the cautions that noted on the bottle.

EMISSION CONTROL
(AUX. EMISSION CONTROL DEVICES)
EC(H4DOTC)

Page

1. General Description 2
2. Front Catalytic Converter 3
3. Rear Catalytic Converter 4
4. Precatalytic Converter 5
5. Canister 6
6. Purge Control Solenoid Valve 7
7. Two-way Valve 8

1. General Description

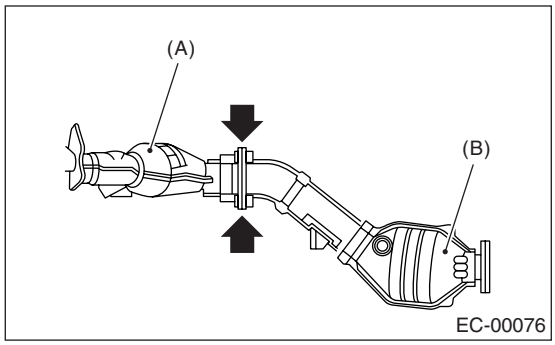
A: CAUTION

• Wear working clothing, including a cap, protective goggles, and protective shoes during operation.
• Remove contamination including dirt and corrosion before removal, installation or disassembly.
• Keep the disassembled parts in order and protect them from dust or dirt.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly, and replacement.
• Be careful not to burn, because each part on the vehicle is hot after running.
• Be sure to tighten fasteners including bolts and nuts to the specified torque.
• Place shop jacks or rigid racks at the specified points.
• Before disconnecting electrical connectors of sensors or units, be sure to disconnect the ground cable from battery.

2. Front Catalytic Converter

A: REMOVAL

1) Remove the front catalytic converter and center exhaust pipe as a unit. <Ref. to EX(H4DOTC)-10, REMOVAL, Center Exhaust Pipe.>
2) Separate the front catalytic converter (A) from rear catalytic converter (B). (Except Australia model)



B: INSTALLATION

NOTE:
Replace the gaskets with new ones.
Install in the reverse order of removal.

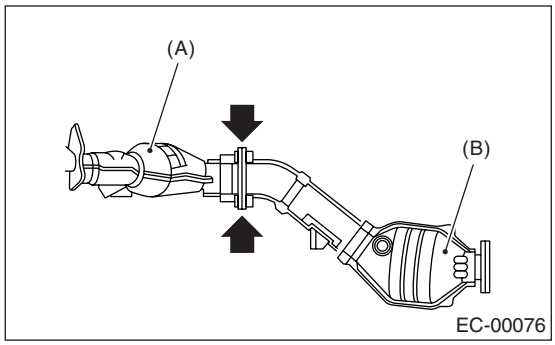
C: INSPECTION

1) Make sure there are no exhaust leaks from connections and welds.
2) Make sure there are no holes or rusting.

3. Rear Catalytic Converter

A: REMOVAL

1) Remove the rear catalytic converter and center exhaust pipe as a unit. <Ref. to EX(H4DOTC)-10, REMOVAL, Center Exhaust Pipe.>
2) Separate the rear catalytic converter (B) from front catalytic converter (A). (Except Australia model)



B: INSTALLATION

NOTE:
Replace the gaskets with new ones.
Install in the reverse order of removal.

C: INSPECTION

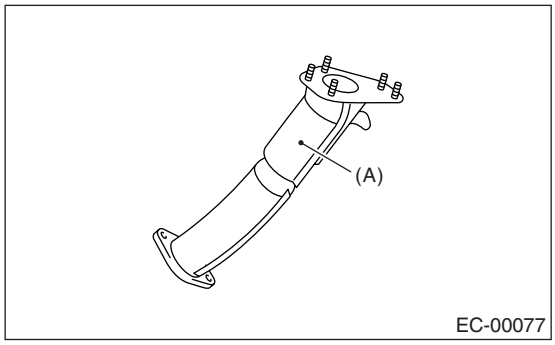
1) Make sure there are no exhaust leaks from connections and welds.
2) Make sure there are no holes or rusting.

4. Precatalytic Converter

A: REMOVAL

NOTE:
Precatalytic converter is equipped on models except for STi and Australia model.

Precatalytic converter (A) is built in the joint pipe. Refer to the removal of joint pipe for removal procedure. <Ref. to EX(H4DOTC)-14, REMOVAL, Joint Pipe.>



B: INSTALLATION

Install in the reverse order of removal.

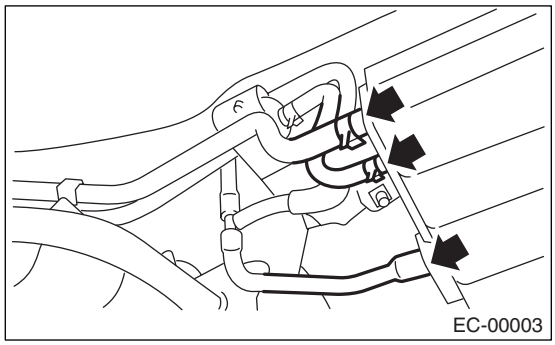
C: INSPECTION

1) Make sure there are no exhaust leaks from connections and welds.
2) Make sure there are no holes or rusting.

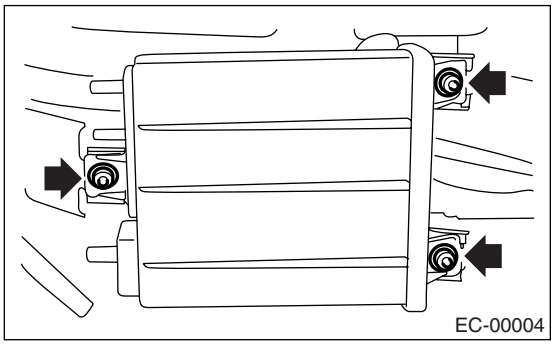
5. Canister

A: REMOVAL

1) Lift-up the vehicle.
2) Loosen the two clamps which hold the two canister hoses, and then disconnect the three evaporation hoses from canister.



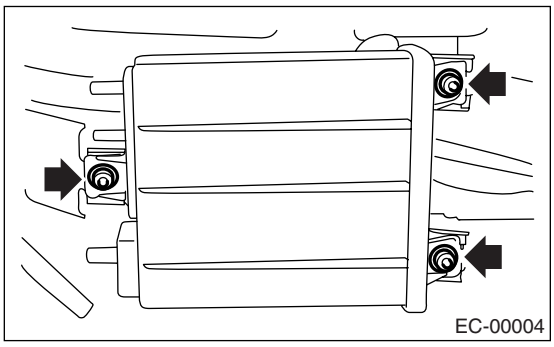
3) Remove the canister from body.



B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
23 N·m (2.3 kgf-m, 17 ft-lb)



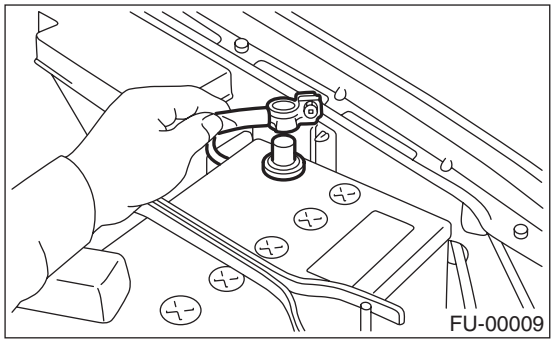
C: INSPECTION

Make sure the canister and canister hoses are not cracked or loose.

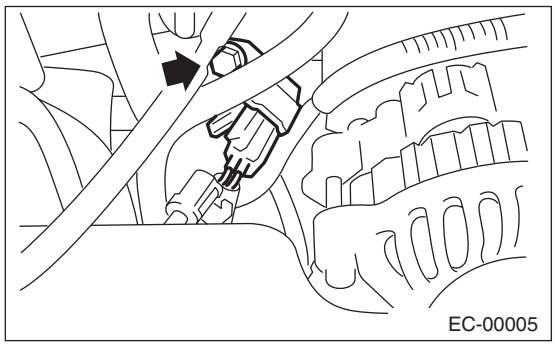
6. Purge Control Solenoid Valve

A: REMOVAL

1) Disconnect the ground cable from battery.



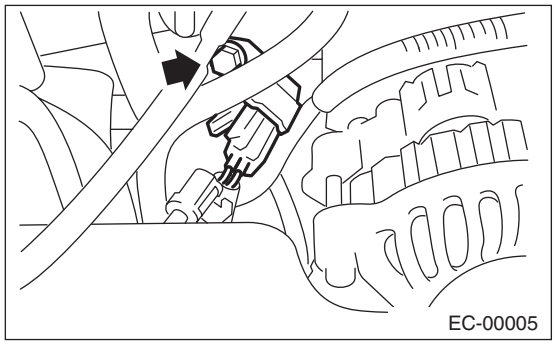
2) Disconnect the connector and hoses from purge control solenoid valve.
3) Remove the bolt which installs the purge control solenoid valve onto intake manifold.



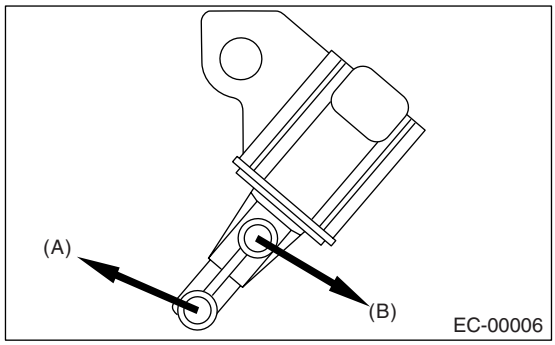
B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
19 N·m (1.9 kgf-m, 13.7 ft-lb)



NOTE:
Connect the evaporation hoses as shown in the figure.



(A) To intake manifold
(B) To purge valve (Except Australia model)
To fuel pipe (Australia model)

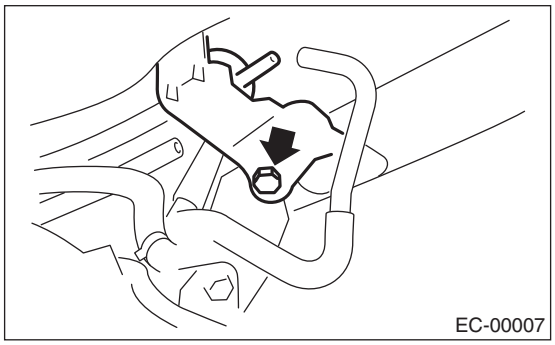
C: INSPECTION

Make sure the hoses are not cracked or loose.

7. Two-way Valve

A: REMOVAL

1) Lift-up the vehicle.
2) Remove the canister from body. <Ref. to EC(H4DOTC)-6, REMOVAL, Canister.>
3) Remove the two-way valve with bracket as a unit from body.



4) Remove the two-way valve from bracket.

B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

Make sure that the hoses are not cracked or loose.

INTAKE (INDUCTION)

IN(H4DOTC)

		Page
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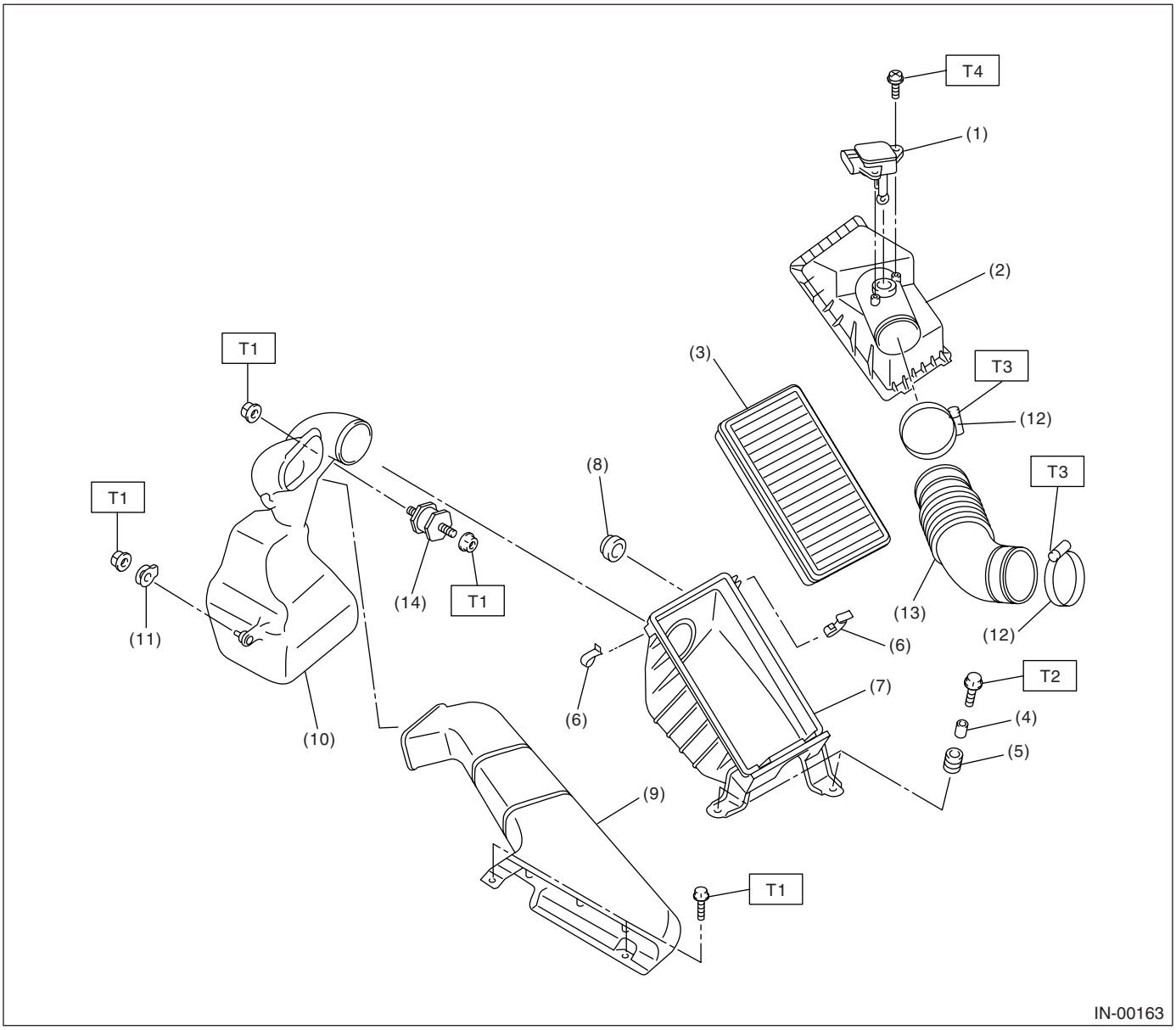
3.	Air Cleaner Case	9
4.	Air Intake Duct	10
5.	Intake Duct	11
6.	Intercooler	12
7.	Turbocharger	14
8.	Air By-pass Valve	17
9.	Resonator Chamber	18
10.	Intercooler Water Spray Tank	19
11.	Intercooler Water Spray Nozzle	20

1. General Description

A: COMPONENT

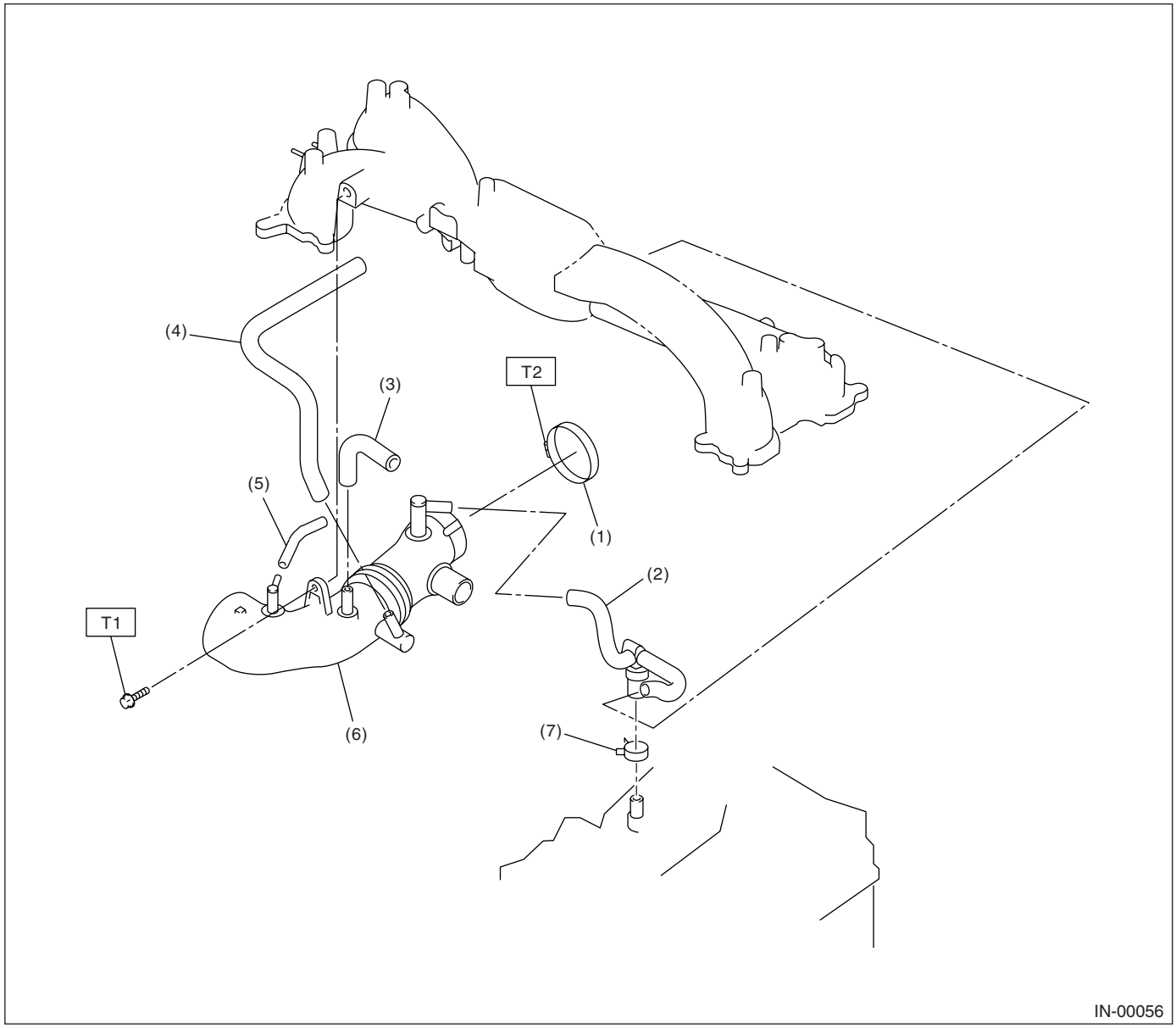
1. AIR CLEANER



(1) Mass air flow and intake air temperature sensor
(2) Air cleaner upper cover
(3) Air cleaner element
(4) Spacer
(5) Bushing
(6) Clip
(7) Air cleaner lower case
(8) Cushion rubber
(9) Air intake duct
(10) Resonator chamber ASSY
(11) Cushion rubber
(12) Clamp
(13) Air intake boot
(14) Cushion

Tightening torque: N·m (kgf-m, ft-lb)
T1: 7.5 (0.76, 5.5)
T2: 33 (3.4, 24.6)
T3: 2.5 (0.25, 1.8)
T4: 1.7 (0.17, 1.2)

2. INTAKE DUCT

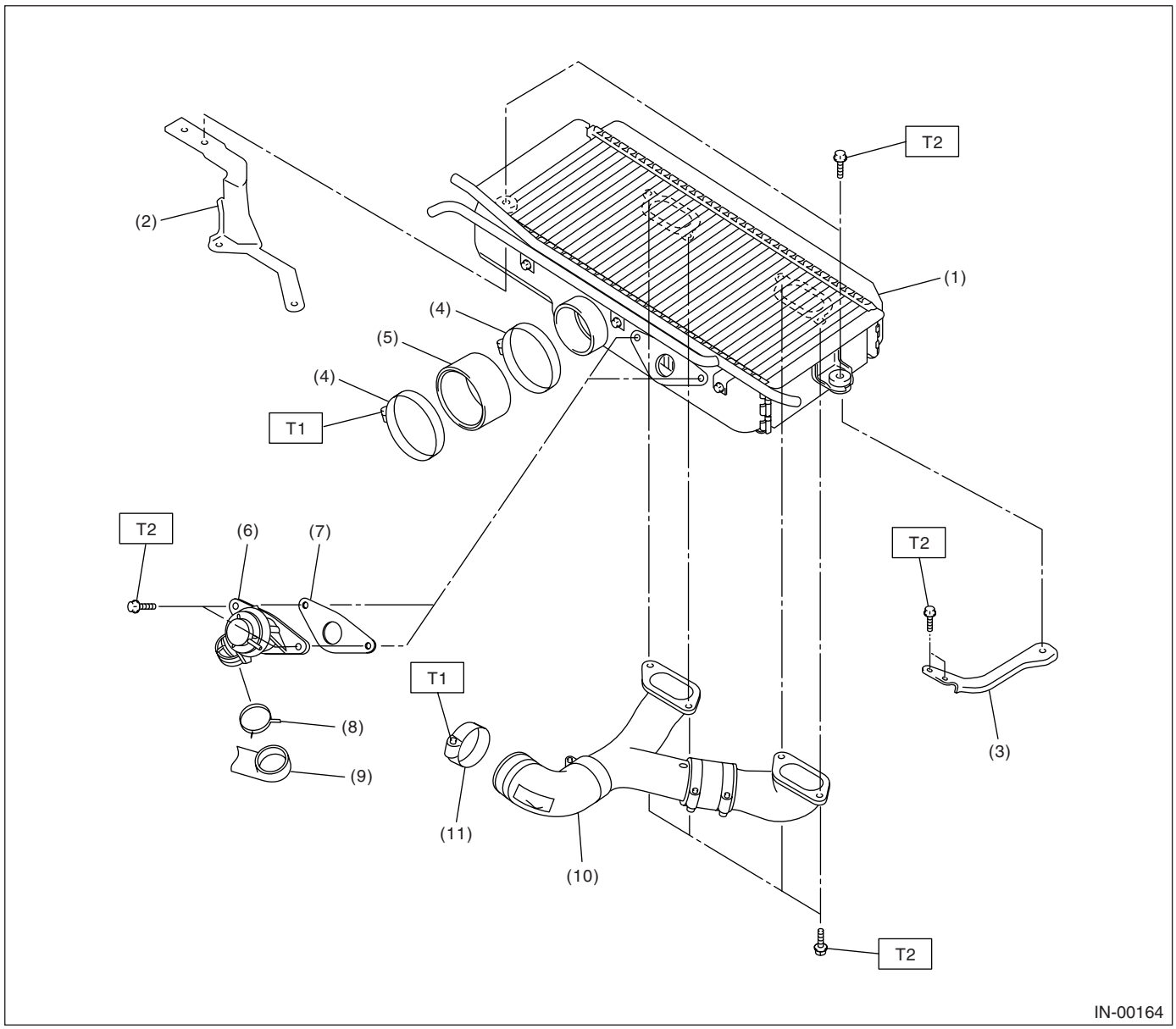


(1) Clamp
(2) PCV hose ASSY
(3) Air by-pass hose A
(4) Air by-pass hose B
(5) Air by-pass hose C
(6) Intake duct
(7) Clamp

Tightening torque: N·m (kgf-m, ft-lb)
T1: 19 (1.9, 13.7)
T2: 3 (0.3, 2.2)

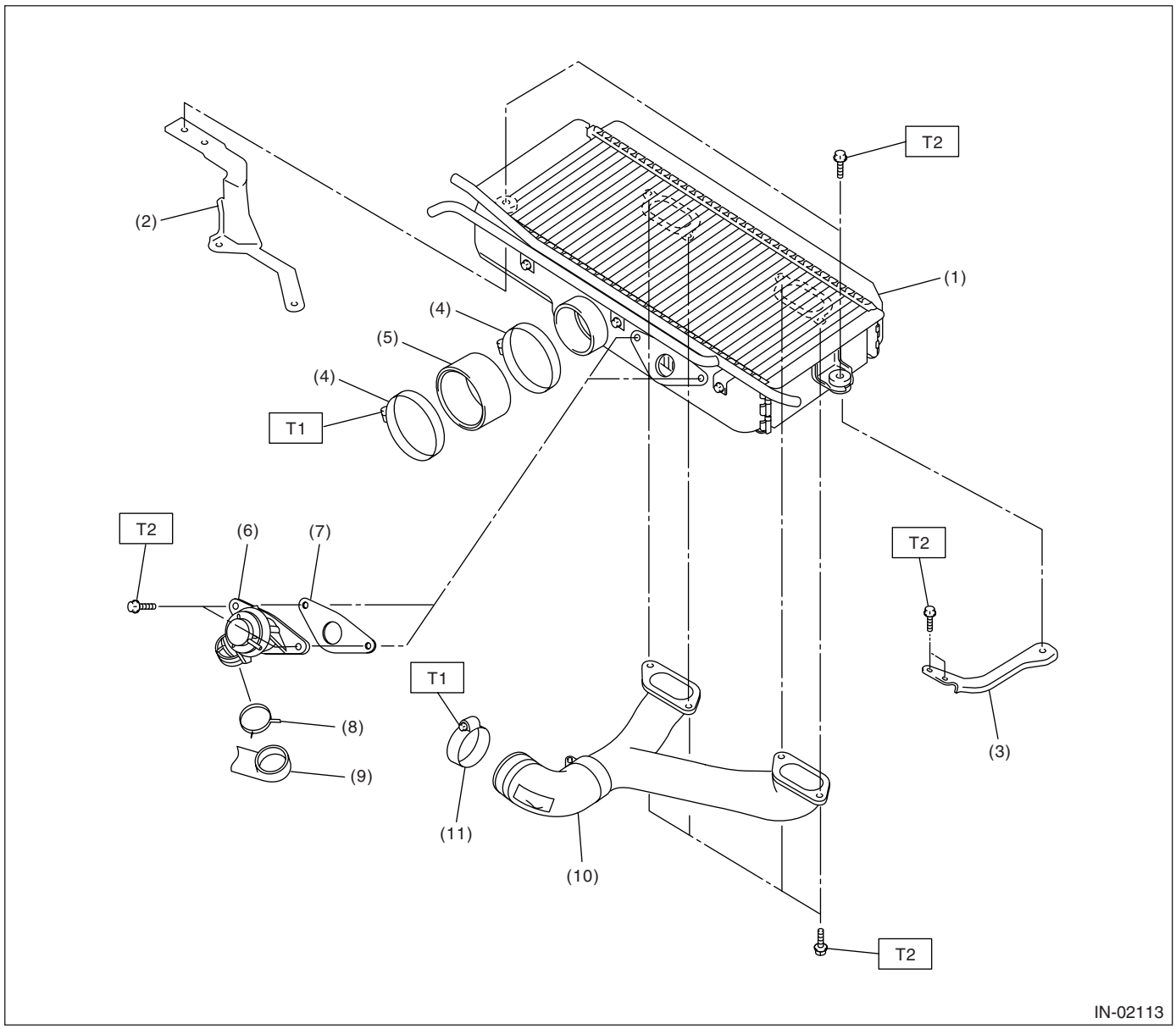
3. INTERCOOLER

- Except STi model



(1)	Intercooler	(6)	Air by-pass valve	(11)	Clamp
(2)	Intercooler bracket RH	(7)	Gasket		
(3)	Intercooler bracket LH	(8)	Clamp	***Tightening torque: N·m (kgf-m, ft-lb)***	
(4)	Clamp	(9)	Air by-pass hose	***T1: 3 (0.3, 2.2)***	
(5)	Air intake duct	(10)	Intercooler duct	***T2: 16 (1.6, 11.8)***	

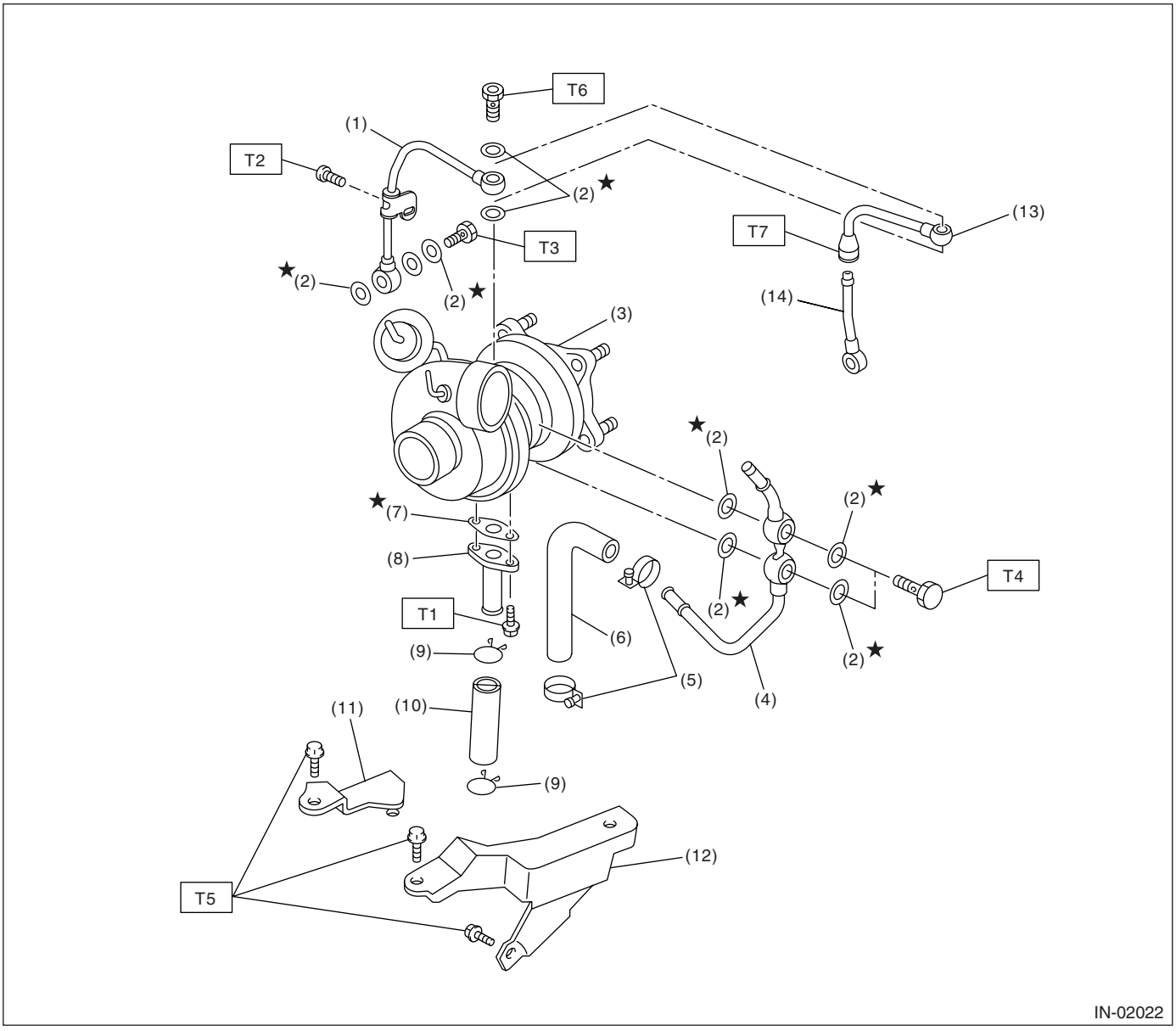
- STi model



(1) Intercooler
(2) Intercooler bracket RH
(3) Intercooler bracket LH
(4) Clamp
(5) Air intake duct
(6) Air by-pass valve
(7) Gasket
(8) Clamp
(9) Air by-pass hose
(10) Intercooler duct
(11) Clamp

Tightening torque: N·m (kgf-m, ft-lb)
T1: 3 (0.3, 2.2)
T2: 16 (1.6, 11.8)

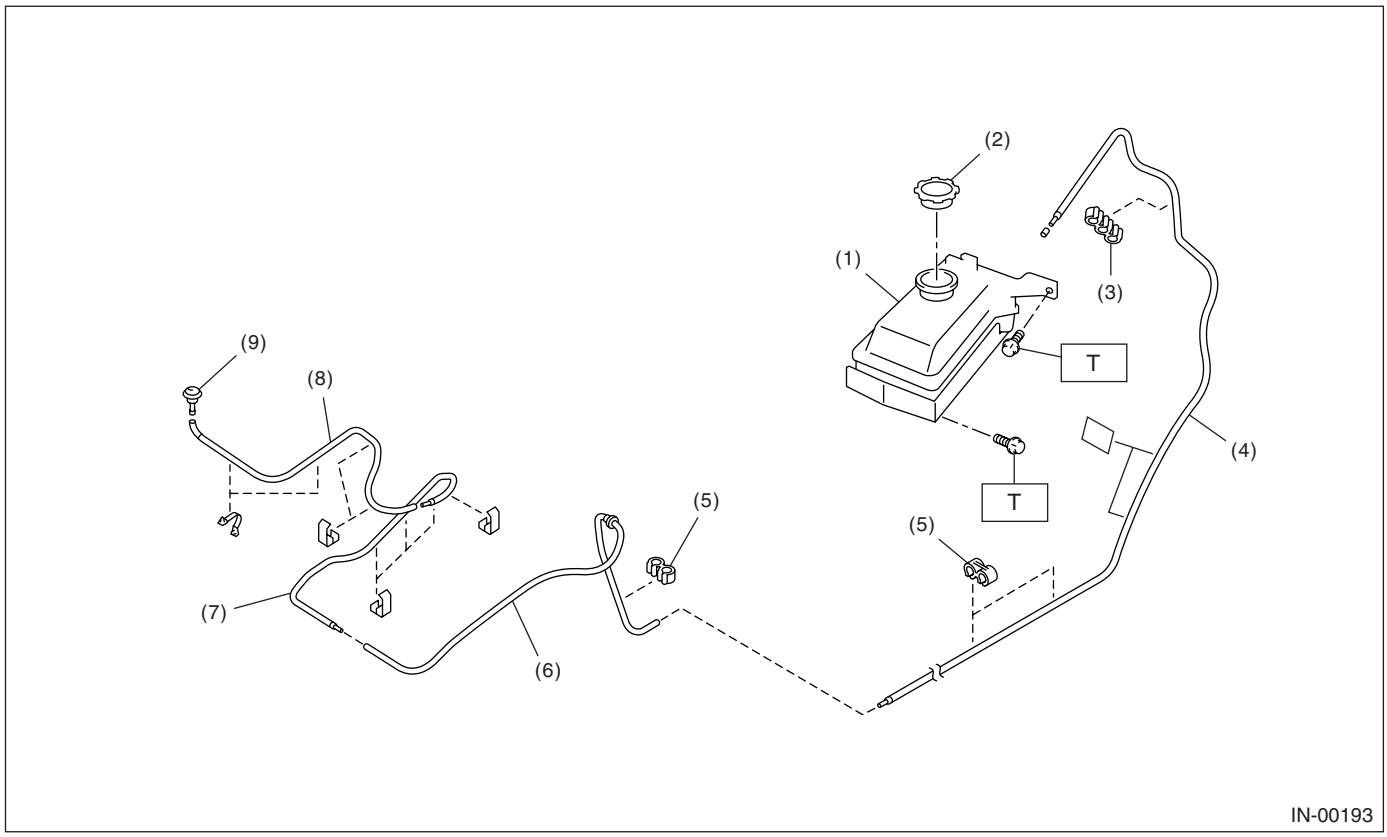
4. TURBOCHARGER



(1) Oil inlet pipe (Except Australia model, STi model)
(2) Metal gasket
(3) Turbocharger
(4) Water pipe
(5) Clamp
(6) Engine coolant hose
(7) Gasket
(8) Oil outlet pipe
(9) Clip
(10) Oil outlet hose
(11) Turbocharger bracket RH
(12) Turbocharger bracket LH
(13) Oil inlet pipe A (Australia model, STi model)
(14) Oil inlet pipe B (Australia model, STi model)

Tightening torque: N·m (kgf-m, ft-lb)
T1: 4.4 (0.45, 3.3)
T2: 4.9 (0.50, 3.6)
T3: 29 (3.0, 21.7)
T4: 35 (3.6, 25.8)
T5: 33 (3.4, 24.6)
T6: 16 (1.6, 11.8)
T7: 20 (2.0, 14.8)

5. INTERCOOLER WATER SPRAY



(1) Water tank ASSY
(2) Water tank cap
(3) Clamp
(4) Rear hose
(5) Clamp
(6) Center hose
(7) Front hose
(8) Intercooler hose
(9) Nozzle

Tightening torque: N·m (kgf-m, ft-lb)
T: 6 (0.6, 4.4)

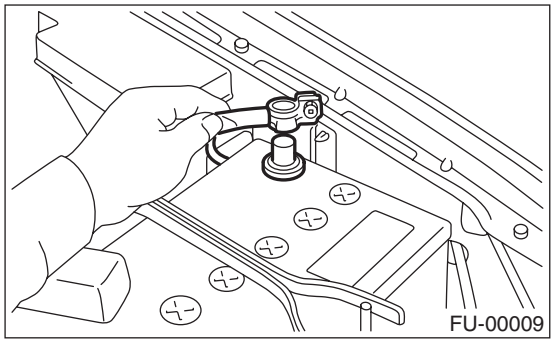
B: CAUTION

- Wear working clothing, including a cap, protective goggles, and protective shoes during operation.
- Remove contamination including dirt and corrosion before removal, installation or disassembly.
- Keep the disassembled parts in order and protect them from dust or dirt.
- Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly, and replacement.
- Be careful not to burn, because each part on the vehicle is hot after running.
- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or rigid racks at the specified points.
- Before disconnecting electrical connectors of sensor or units, be sure to disconnect the ground cable from battery.

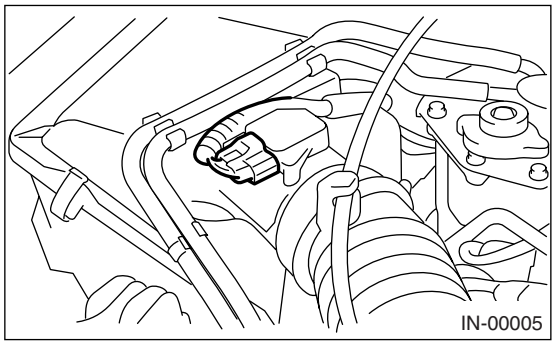
2. Air Cleaner Element

A: REMOVAL

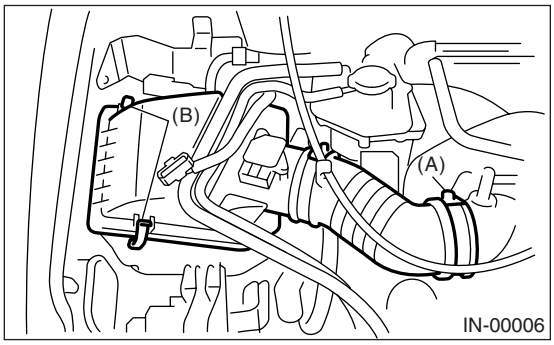
1) Disconnect the ground cable from battery.



2) Disconnect the connector from mass air flow sensor.



3) Loosen the clamp (A) which connects the air intake boot and intake duct.
4) Remove the clip (B) from air cleaner upper cover.

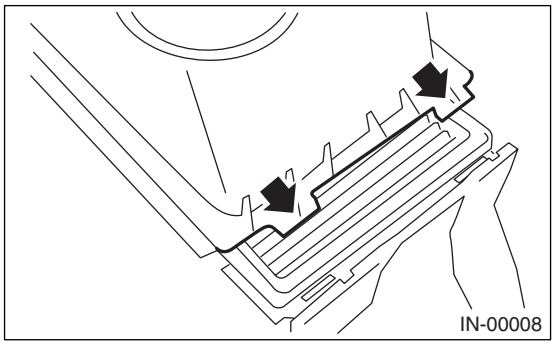


5) Remove the air cleaner upper cover.
6) Remove the air cleaner element.

B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Before installing the air cleaner upper cover, align the holes with protruding portions of air cleaner lower case, then secure the upper cover to the lower case.



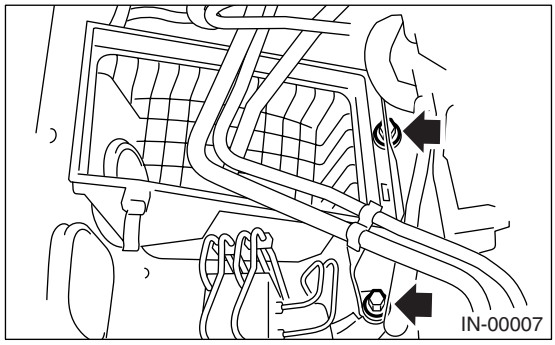
C: INSPECTION

Replace it if excessively damaged or dirty.

3. Air Cleaner Case

A: REMOVAL

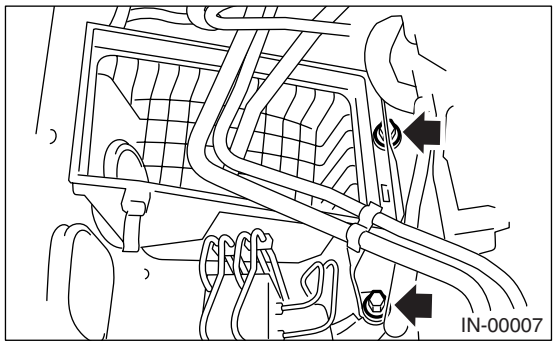
1) Remove the air cleaner element. <Ref. to IN(H4DOTC)-8, REMOVAL, Air Cleaner Element.>
2) Remove the air cleaner lower case.



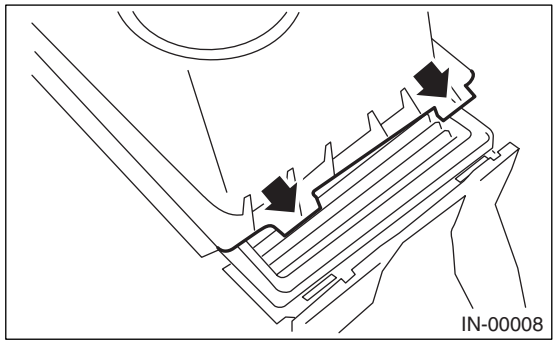
B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
33 N·m (3.4 kgf-m, 24.6 ft-lb)



NOTE:
Before installing the air cleaner upper cover, align the holes with protruding portions of air cleaner lower case, then secure the upper cover to the lower case.



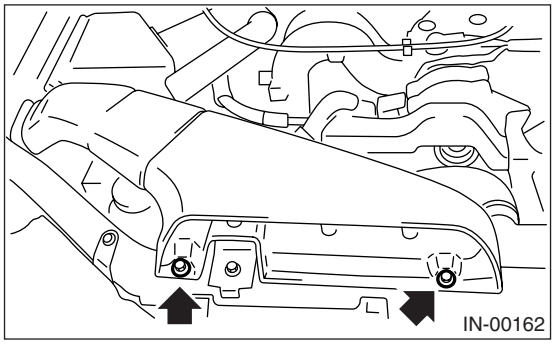
C: INSPECTION

Inspect for cracks and loose connections.

4. Air Intake Duct

A: REMOVAL

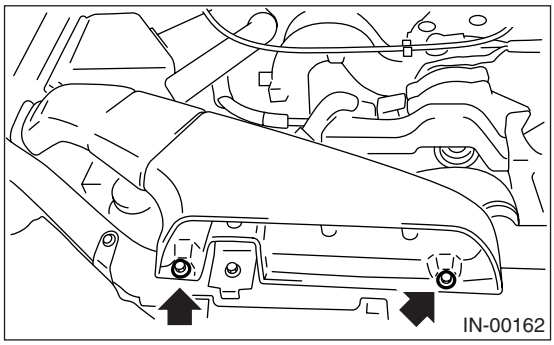
Remove the bolts which install the air intake duct on front side of body.



B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
7.5 N·m (0.76 kgf-m, 5.5 ft-lb)



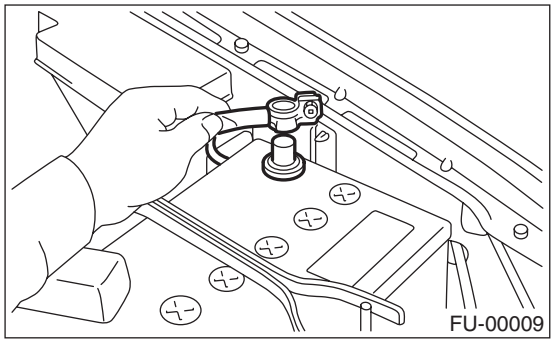
C: INSPECTION

1) Inspect for cracks and loose connections.
2) Inspect that no foreign objects are mixed in air intake duct.

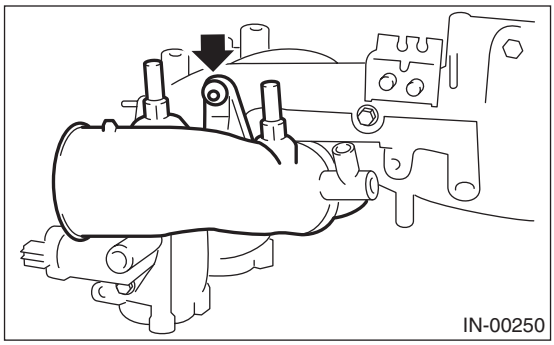
5. Intake Duct

A: REMOVAL

1) Disconnect the ground cable from battery.



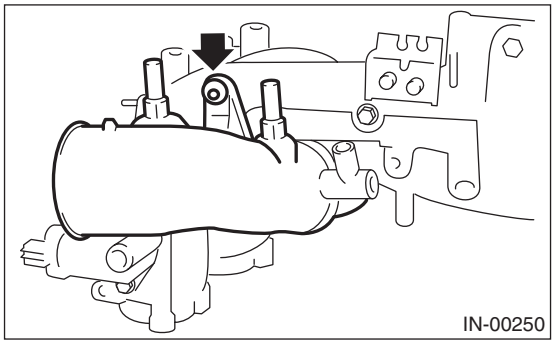
2) Remove the intake manifold. <Ref. to FU(H4DOTC)-14, REMOVAL, Intake Manifold.>
3) Remove the sensor, engine harness and fuel pipe attached to intake manifold. <Ref. to FU(H4DOTC)-19, DISASSEMBLY, Intake Manifold.>
4) Remove the intake duct from intake manifold.



B: INSTALLATION

Install in the reverse order of removal.

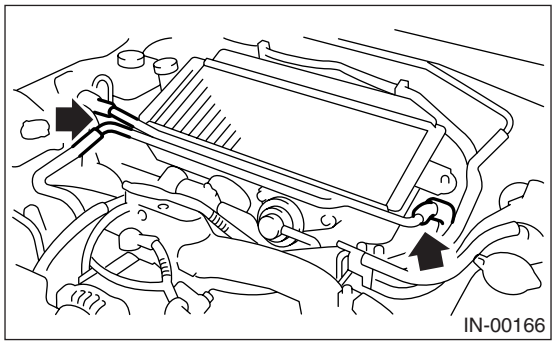
Tightening torque:
19 N·m (1.9 kgf-m, 13.7 ft-lb)



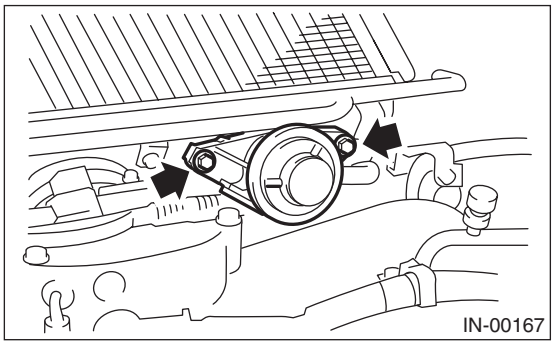
6. Intercooler

A: REMOVAL

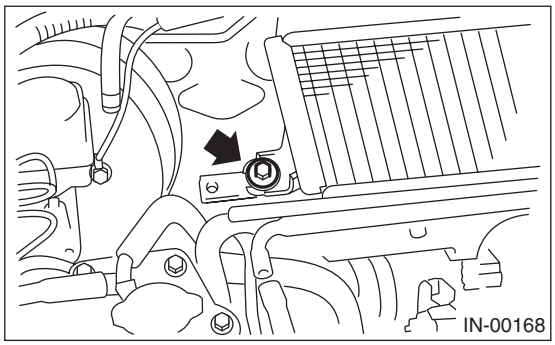
1) Disconnect the air by-pass hoses from intercooler.

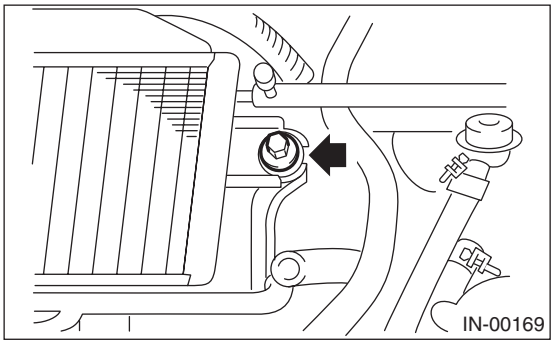


2) Separate the air by-pass valve from intercooler.



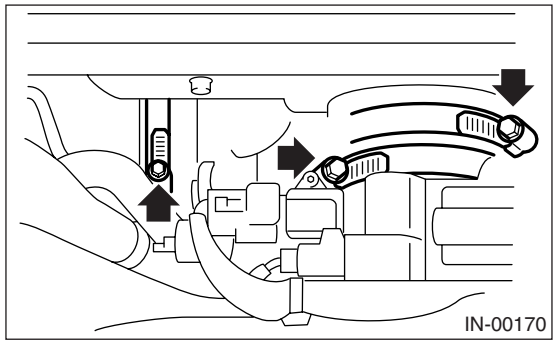
3) Remove the bolts which secure the intercooler to bracket.





4) Separate the intercooler air duct from turbocharger.

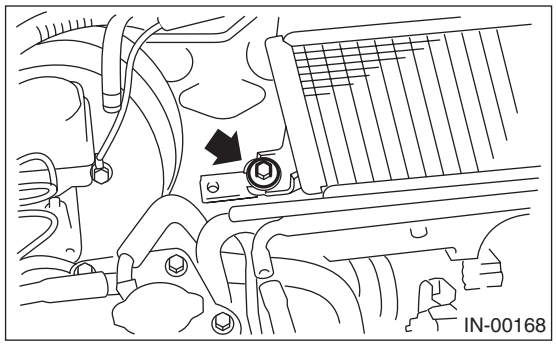
5) Separate the intercooler from throttle body.

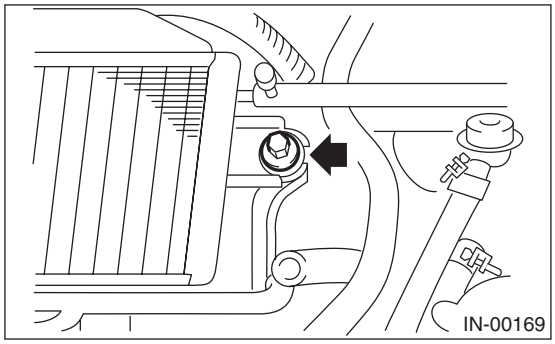


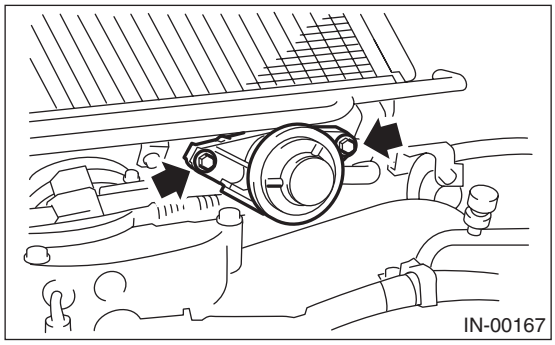
B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
16 N·m (1.6 kgf-m, 11.8 ft-lb)

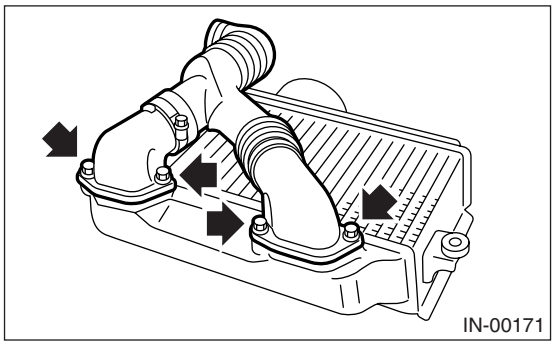






C: DISASSEMBLY

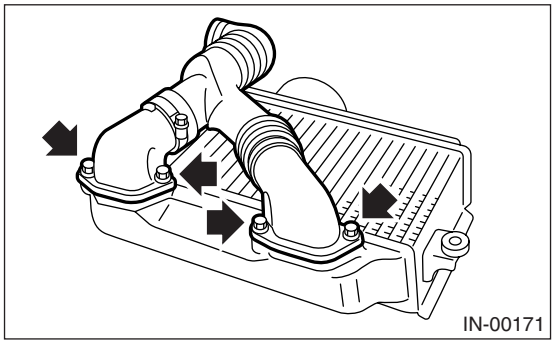
Remove the intercooler ducts from intercooler.



D: ASSEMBLY

Assemble in the reverse order of disassembly.

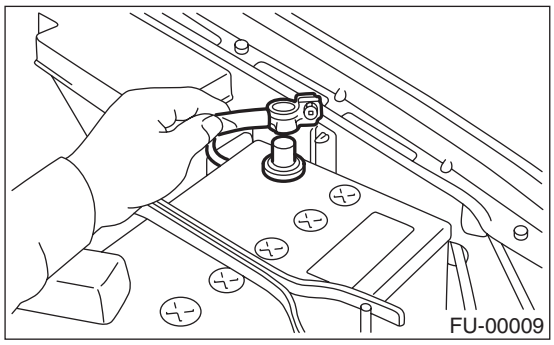
Tightening torque:
16 N·m (1.6 kgf-m, 11.8 ft-lb)



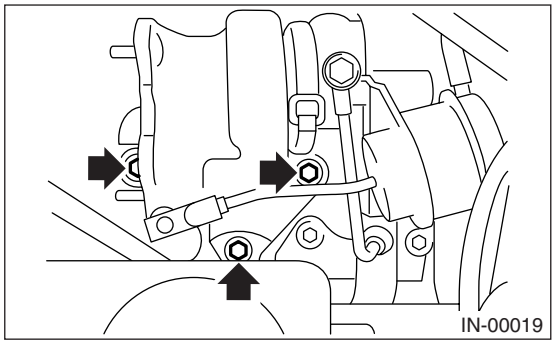
7. Turbocharger

A: REMOVAL

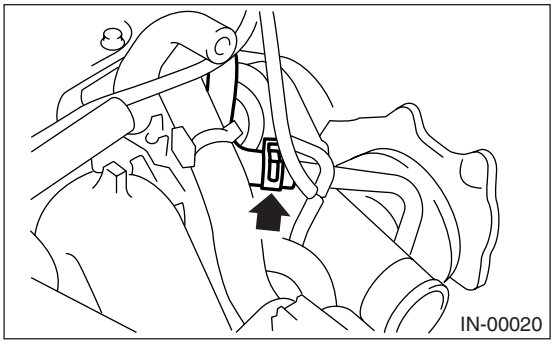
1) Set the vehicle on a lift.
2) Disconnect the ground cable from battery.



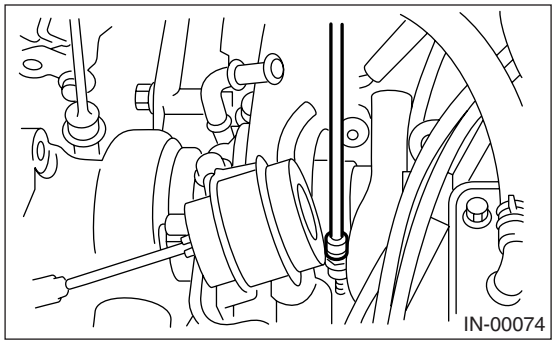
3) Remove the center exhaust pipe. <Ref. to EX(H4DOTC)-10, REMOVAL, Center Exhaust Pipe.>
4) Lower the vehicle.
5) Separate the turbocharger joint pipe from turbocharger.



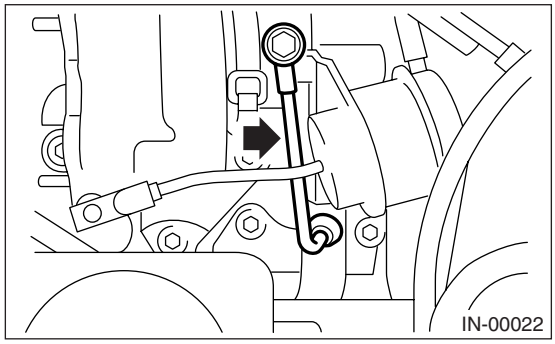
6) Disconnect the engine coolant hose which is connected to coolant filler tank.



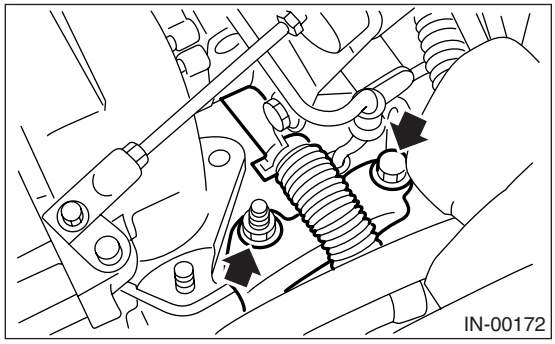
7) Loosen the clamp which secures the turbocharger to intake duct.



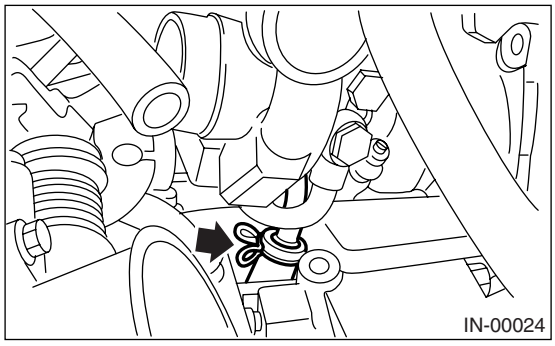
8) Remove the bolt which secures the bracket of oil pipe to turbocharger.
9) Remove the oil pipe from turbocharger.



10) Disconnect the engine coolant hose.
11) Remove the turbocharger bracket.



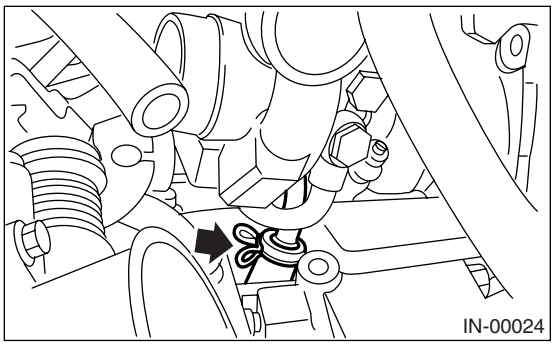
12) Disconnect the oil outlet hose from pipe.



13) Take out the turbocharger from engine compartment.

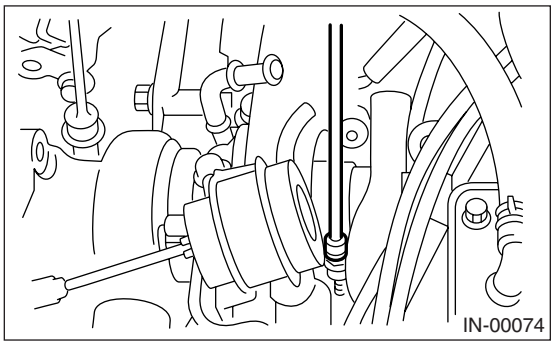
B: INSTALLATION

1) Connect the oil outlet hose to outlet pipe.



2) Install the turbocharger to intake duct.

Tightening torque:
3 N·m (0.3 kgf-m, 2.2 ft-lb)

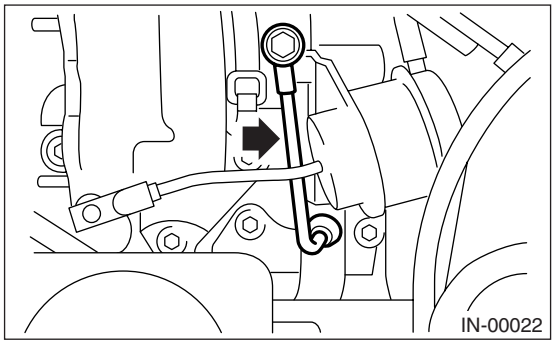


3) Temporarily tighten the oil pipe, and then tighten to specified torque.

NOTE:
Use new gaskets.

- Except Australia model, STi model

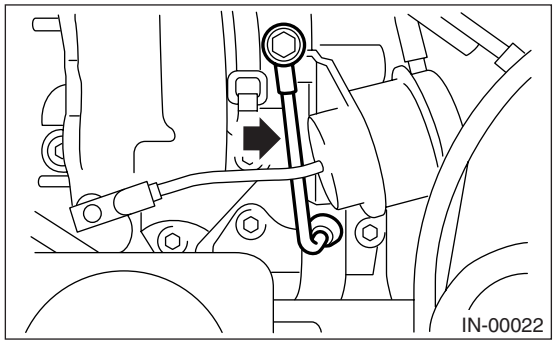
Tightening torque:
16 N·m (1.6 kgf-m, 11.8 ft-lb)

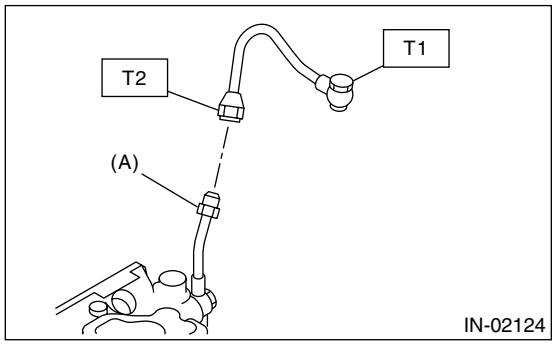


- Australia model, STi model

NOTE:
Don't turn the (A) section shown in a figure at the time of tightening.

Tightening torque:
T1: 16 N·m (1.6 kgf-m, 11.8 ft-lb)
T2: 20 N·m (2.0 kgf-m, 14.8 ft-lb)

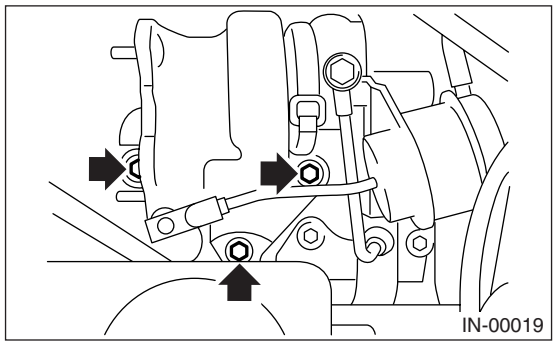




4) Install the joint pipe to turbocharger.

NOTE:
Use new gaskets.

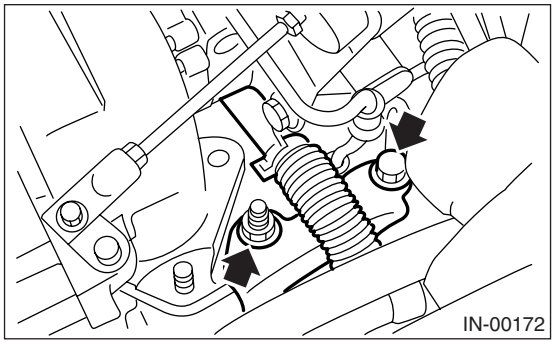
Tightening torque:
35 N·m (3.6 kgf-m, 25.8 ft-lb)



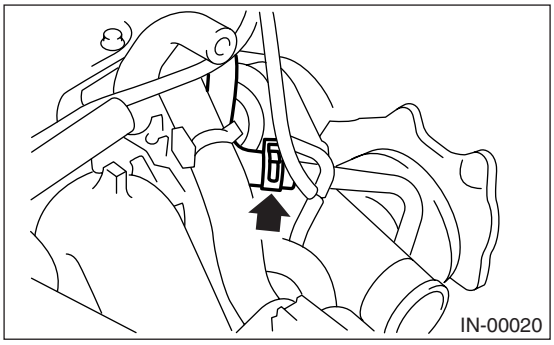
5) Connect the engine coolant hose.

6) Install the turbocharger bracket.

Tightening torque:
33 N·m (3.4 kgf-m, 24.6 ft-lb)



7) Connect the engine coolant hose which is connected to coolant filler tank.

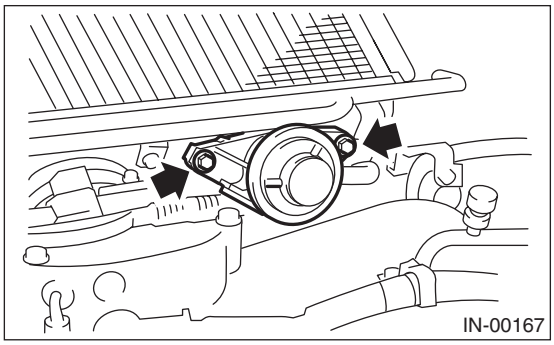


8) Lift-up the vehicle.
9) Install the center exhaust pipe. <Ref. to EX(H4DOTC)-11, INSTALLATION, Center Exhaust Pipe.>

8. Air By-pass Valve

A: REMOVAL

1) Remove the air by-pass valve from intercooler.

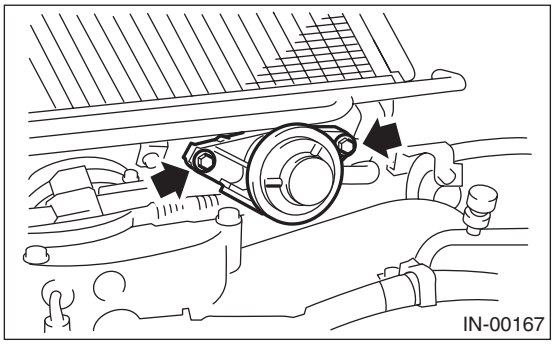


2) Disconnect the air by-pass hoses from air by-pass valve.

B: INSTALLATION

Install in the reverse order of removal.

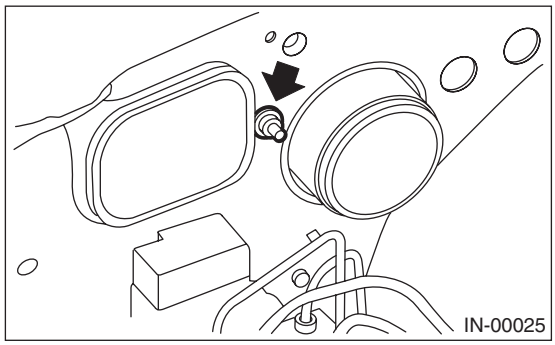
Tightening torque:
16 N·m (1.6 kgf-m, 11.8 ft-lb)



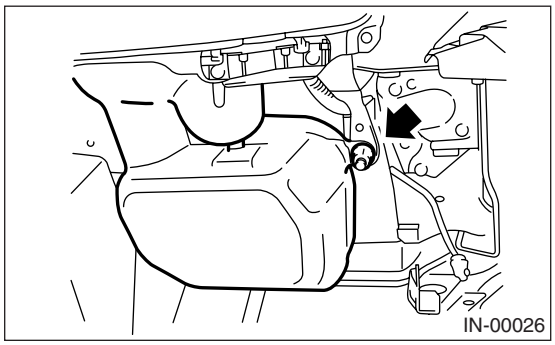
9. Resonator Chamber

A: REMOVAL

1) Set the vehicle on a lift.
2) Remove the air intake duct. <Ref. to IN(H4DOTC)-10, REMOVAL, Air Intake Duct.>
3) Remove the air cleaner lower case. <Ref. to IN(H4DOTC)-9, REMOVAL, Air Cleaner Case.>
4) Remove the resonator chamber mounting bolt on right side of engine compartment.



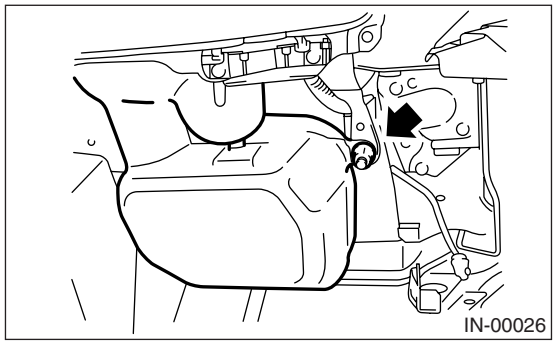
5) Remove the front right tire, and lift up the vehicle.
6) Remove the front mudguard RH.
7) Remove the resonator chamber from the inside front fender.

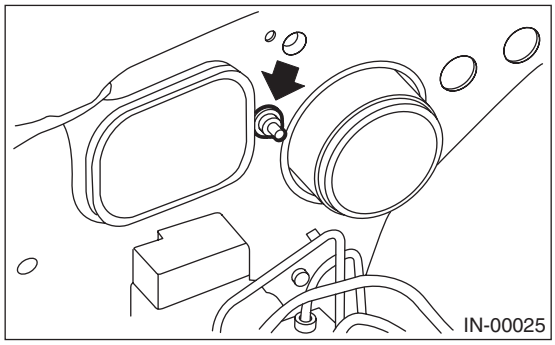


B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
7.5 N·m (0.76 kgf-m, 5.5 ft-lb)





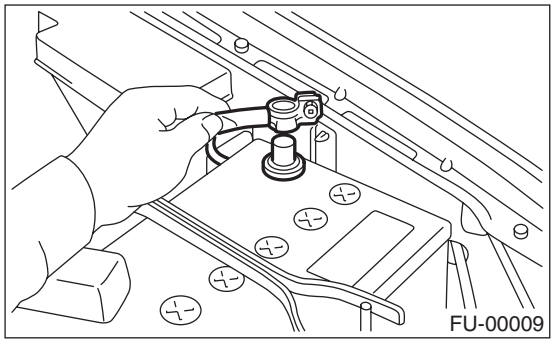
C: INSPECTION

Inspect for cracks and loose connections. Check that no foreign objects are mixed in resonator chamber.

10.Intercooler Water Spray Tank

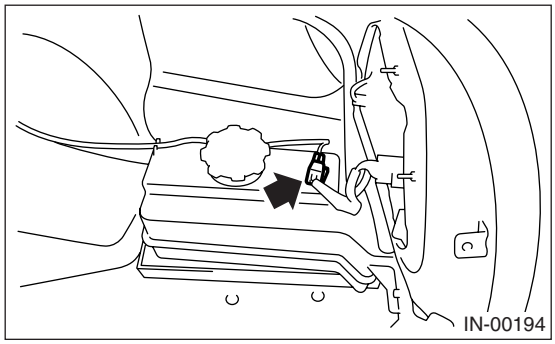
A: REMOVAL

1) Disconnect the ground cable from battery.

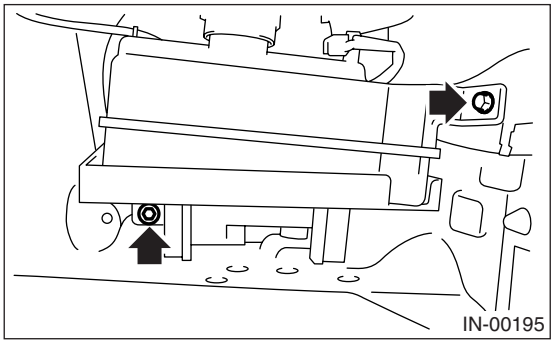


2) Remove the trunk room trim. <Ref. to EI-57, REMOVAL, Trunk Room Trim.>

3) Disconnect the water tank connector.



4) Remove the two water tank installation bolts.



5) Remove the hose between body and water tank, then remove the water tank.

B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
6 N·m (0.6 kgf-m, 4.4 ft-lb)

C: INSPECTION

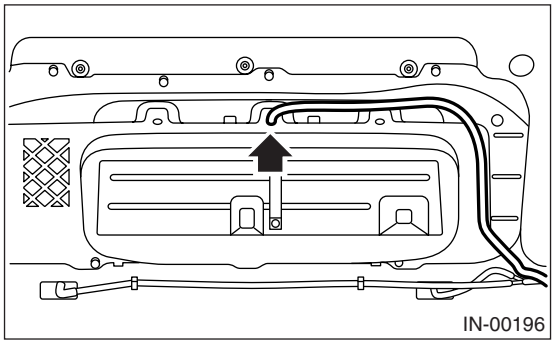
1) Make sure the hose is not deformed, damaged, cracked or clogged.

2) Make sure the water tank is not damaged or cracked.

11.Intercooler Water Spray Nozzle

A: REMOVAL

1) Open the front hood.
2) Disconnect the connecting part of hose.
3) Push the clip of nozzle upward with the clip pressed by fingers from inside of front hood.



B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

Make sure the hose and nozzle are not deformed, damaged, cracked or clogged.

MECHANICAL

ME(H4DOTC)

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1. General Description

A: SPECIFICATION

1. TURBO MODEL (EXCEPT STi AND AUSTRALIA MODEL)

Engine	Type			Horizontally opposed, liquid cooled, 4-cylinder, 4-stroke gasoline engine
	Valve arrangement			Belt driven, double overhead camshaft, 4-valve/cylinder
	Bore × Stroke		mm (in)	92 × 75 (3.62 × 2.95)
	Piston displacement		cm^3 (cu in)	1,994 (121.67)
	Compression ratio			8.0
	Compression pressure (at 200 — 300 rpm)		kPa (kgf/cm^2, psi)	981 — 1,177 (10 — 12, 142 — 171)
	Number of piston rings			Pressure ring: 2, Oil ring: 1
	Intake valve timing	Opening		BTDC 10°
		Closing		ABDC 50°
	Exhaust valve timing	Opening		BBDC 53°
		Closing		ATDC 7°
	Valve clearance	Intake	mm (in)	0.20±0.02 (0.0079±0.0008)
		Exhaust	mm (in)	0.35±0.02 (0.0138±0.0008)
	Idling speed [At neutral position on MT or “P” or “N” range on AT]		rpm	700±100 (No load) 800±150 (A/C switch ON)
	Firing order			1 → 3 → 2 → 4
	Ignition timing		BTDC/rpm	12°±10°/700

NOTE:
STD: Standard I.D.: Inner Diameter O.D.: Outer Diameter OS: Oversize US: Undersize

Belt tension adjuster	Protrusion of adjuster rod			5.2 — 6.2 mm (0.205 — 0.244 in)
Belt tensioner	Spacer O.D.			17.955 — 17.975 mm (0.7069 — 0.7077 in)
	Tensioner bush I.D.			18.0 — 18.08 mm (0.7087 — 0.7118 in)
	Clearance between spacer and bush		STD	0.025 — 0.125 mm (0.0010 — 0.0049 in)
			Limit	0.175 mm (0.0069 in)
	Side clearance of spacer		STD	0.2 — 0.55 mm (0.0079 — 0.0217 in)
			Limit	0.81 mm (0.0319 in)
Camshaft	Bend limit			0.020 mm (0.0008 in)
	Thrust clearance		STD	0.068 — 0.116 mm (0.0026 — 0.0045 in)
	Cam lobe height	Intake	STD	46.25 — 46.35 mm (1.821 — 1.825 in)
			Limit	46.15 mm (1.817 in)
		Exhaust	STD	46.25 — 46.35 mm (1.821 — 1.825 in)
			Limit	46.15 mm (1.817 in)
	Journal O.D.	STD	Front	37.946 — 37.963 mm (1.4939 — 1.4946 in)
			Center, Rear	29.946 — 29.963 mm (1.1790 — 1.1796 in)
	Oil clearance		STD	0.037 — 0.072 mm (0.0015 — 0.0028 in)
			Limit	0.10 mm (0.0039 in)
Cylinder head	Surface warpage limit			0.035 mm (0.0014 in)
	Surface grinding limit			0.3 mm (0.012 in)
	Standard height			127.5 mm (5.02 in)

Valve seat	Refacing angle			90°
	Contacting width	Intake	STD	0.85 — 1.15 mm (0.033 — 0.045 in)
			Limit	1.7 mm (0.067 in)
		Exhaust	STD	1.35 — 1.65 mm (0.053 — 0.064 in)
			Limit	2.2 mm (0.087 in)
Valve guide	Inner diameter			6.000 — 6.012 mm (0.2362 — 0.2367 in)
	Protrusion above head			15.8 — 16.2 mm (0.622 — 0.638 in)
Valve	Head edge thickness	Intake	STD	1.0 — 1.4 mm (0.039 — 0.055 in)
			Limit	0.8 mm (0.031 in)
		Exhaust	STD	1.3 — 1.7 mm (0.051 — 0.067 in)
			Limit	0.8 mm (0.031 in)
	Stem diameter		Intake	5.955 — 5.970 mm (0.2344 — 0.2350 in)
			Exhaust	5.945 — 5.960 mm (0.2341 — 0.2346 in)
	Stem oil clearance	STD	Intake	0.030 — 0.057 mm (0.0012 — 0.0022 in)
			Exhaust	0.040 — 0.067 mm (0.0016 — 0.0026 in)
		Limit	—	0.15 mm (0.0059 in)
	Overall length		Intake	104.4 mm (4.110 in)
			Exhaust	104.65 mm (4.120 in)
Valve spring (Europe)	Free length			47.32 mm (1.8630 in)
	Squareness			2.5°, 2.1 mm (0.083 in) or less
	Tension/spring height		Set	205 — 235 N (20.9 — 24.0 kgf, 46.1 — 52.8 lbf)/ 36.0 mm (1.417 in)
			Lift	426 — 490 N (43.4 — 50.0 kgf, 95.8 — 110 lbf)/ 26.5 mm (1.043 in)
Valve spring (Normal)	Free length			44.67 mm (1.759 in)
	Squareness			2.5°, 2.0 mm (0.079 in) or less
	Tension/spring height		Set	206 — 236 N (21.0 — 24.1 kgf, 46.3 — 53.1 lbf)/ 36.0 mm (1.417 in)
			Lift	485 — 537 N (49.5 — 54.8 kgf, 109 — 121 lbf)/ 26.0 mm (1.024 in)
Cylinder block	Surface warpage limit (mating with cylinder head)			0.025 mm (0.00098 in)
	Surface grinding limit			0.1 mm (0.004 in)
	Cylinder bore	STD	A	92.005 — 92.015 mm (3.6222 — 3.6226 in)
			B	91.995 — 92.005 mm (3.6218 — 3.6222 in)
	Cylindricity		STD	0.015 mm (0.0006 in)
			Limit	0.050 mm (0.0020 in)
	Out-of-roundness		STD	0.010 mm (0.0004 in)
			Limit	0.050 mm (0.0020 in)
	Piston clearance		STD	0.010 — 0.030 mm (0.0004 — 0.0012 in)
			Limit	0.050 mm (0.0020 in)
	Enlarging (boring) limit			0.5 mm (0.020 in)
Piston	Outer diameter	STD	A	91.985 — 91.995 mm (3.6214 — 3.6218 in)
			B	91.975 — 91.985 mm (3.6211 — 3.6214 in)
		0.25 mm (0.0098 in) OS		92.225 — 92.235 mm (3.6309 — 3.6313 in)
		0.50 mm (0.0197 in) OS		92.475 — 92.485 mm (3.6407 — 3.6411 in)
	Standard diameter of piston pin			23.000 — 23.006 mm (0.9055 — 0.9057 in)
Piston pin	Outer diameter			22.994 — 23.000 mm (0.9053 — 0.9055 in)
	Standard clearance between piston pin and hole in piston		STD	0.004 — 0.008 mm (0.0002 — 0.0003 in)
			Limit	0.020 mm (0.0008 in)
	Degree of fit			Piston pin must be fitted into position with thumb at 20°C (68°F).

Piston ring	Piston ring gap	Top ring	STD	Inner circle side: 0.20 — 0.30 mm (0.0079 — 0.0117 in) Outer circle side: 0.20 — 0.25 mm (0.0079 — 0.0098 in)
			Limit	1.0 mm (0.039 in)
		Second ring	STD	0.40 — 0.50 mm (0.016 — 0.020 in)
			Limit	1.0 mm (0.039 in)
		Oil ring	STD	0.20 — 0.50 mm (0.0079 — 0.020 in)
			Limit	1.5 mm (0.059 in)
	Clearance between piston ring and piston ring groove	Top ring	STD	0.04 — 0.08 mm (0.0016 — 0.0031 in)
			Limit	0.15 mm (0.0059 in)
		Second ring	STD	0.030 — 0.070 mm (0.0012 — 0.0028 in)
			Limit	0.15 mm (0.0059 in)
Connecting rod	Bend or twist per 100 mm (3.94 in) in length		Limit	0.10 mm (0.0039 in)
	Side clearance		STD	0.070 — 0.330 mm (0.0028 — 0.0130 in)
			Limit	0.4 mm (0.016 in)
Connecting rod bearing	Oil clearance		STD	0.026 — 0.052 mm (0.001 — 0.002 in)
	Thickness at center portion		STD	1.486 — 1.498 mm (0.0585 — 0.0590 in)
			0.03 mm (0.0012 in) US	1.504 — 1.512 mm (0.0592 — 0.0595 in)
			0.05 mm (0.0020 in) US	1.514 — 1.522 mm (0.0596 — 0.0599 in)
			0.25 mm (0.0098 in) US	1.614 — 1.622 mm (0.0635 — 0.0639 in)
Connecting rod bushing	Clearance between piston pin and bushing		STD	0 — 0.022 mm (0 — 0.0009 in)
			Limit	0.030 mm (0.0012 in)
Crankshaft	Bend limit			0.035 mm (0.0014 in)
	Crank pin and crank journal	Out-of-roundness		0.005 mm (0.0002 in) or less
		Grinding limit		0.25 mm (0.0098 in)
	Crank pin outer diameter		STD	51.984 — 52.000 mm (2.0466 — 2.0472 in)
			0.03 mm (0.0012 in) US	51.954 — 51.970 mm (2.0454 — 2.0461 in)
			0.05 mm (0.0020 in) US	51.934 — 51.950 mm (2.0447 — 2.0453 in)
			0.25 mm (0.0098 in) US	51.734 — 51.750 mm (2.0368 — 2.0374 in)
	Crank journal outer diameter		STD	59.992 — 60.008 mm (2.3619 — 2.3625 in)
			0.03 mm (0.0012 in) US	59.962 — 59.978 mm (2.3607 — 2.3613 in)
			0.05 mm (0.0020 in) US	59.942 — 59.958 mm (2.3599 — 2.3605 in)
			0.25 mm (0.0098 in) US	59.742 — 59.758 mm (2.3520 — 2.3527 in)
	Thrust clearance		STD	0.030 — 0.115 mm (0.0012 — 0.0045 in)
			Limit	0.25 mm (0.0098 in)
	Oil clearance		STD	0.010 — 0.030 mm (0.0004 — 0.0012 in)
			Limit	0.040 mm (0.0016 in)

Crankshaft bearing	Crankshaft bearing thickness	#1, #3	STD	1.998 — 2.011 mm (0.0787 — 0.0792 in)
			0.03 mm (0.0012 in) US	2.017 — 2.020 mm (0.0794 — 0.0795 in)
			0.05 mm (0.0020 in) US	2.027 — 2.030 mm (0.0798 — 0.0799 in)
			0.25 mm (0.0098 in) US	2.127 — 2.130 mm (0.0837 — 0.0839 in)
		#2, #4, #5	STD	2.000 — 2.013 mm (0.0787 — 0.0793 in)
			0.03 mm (0.0012 in) US	2.019 — 2.022 mm (0.0795 — 0.0796 in)
			0.05 mm (0.0020 in) US	2.029 — 2.032 mm (0.0799 — 0.0800 in)
			0.25 mm (0.0098 in) US	2.129 — 2.132 mm (0.0838 — 0.0839 in)

2. STi MODEL

Engine	Type			Horizontally opposed, liquid cooled, 4-cylinder, 4-stroke gasoline engine
	Valve arrangement			Belt driven, double overhead camshaft, 4-valve/cylinder
	Bore × Stroke mm (in)			92 × 75 (3.62 × 2.95)
	Piston displacement cm^3 (cu in)			1,994 (121.67)
	Compression ratio			8.0
	Compression pressure (at 200 — 300 rpm) kPa (kgf/cm^2, psi)			981 — 1,177 (10 — 12, 142 — 171)
	Number of piston rings			Pressure ring: 2, Oil ring: 1
	Intake valve timing	Opening	Max. retard	ATDC 6°
			Min. advance	BTDC 24°
		Closing	Max. retard	ABDC 68°
			Min. advance	ABDC 38°
	Exhaust valve timing	Opening		BBDC 58°
		Closing		ATDC 10°
	Valve clearance	Intake mm (in)		0.20±0.02 (0.0079±0.0008)
		Exhaust mm (in)		0.35±0.02 (0.0138±0.0008)
	Idling speed [At neutral position on MT] rpm			700±100 (No load) 800±150 (A/C switch ON)
	Firing order			1 → 3 → 2 → 4
	Ignition timing BTDC/rpm			12°±10°/700

NOTE:
STD: Standard I.D.: Inner Diameter O.D.: Outer Diameter OS: Oversize US: Undersize

Belt tension adjuster	Protrusion of adjuster rod			5.2 — 6.2 mm (0.205 — 0.244 in)
Belt tensioner	Spacer O.D.			17.955 — 17.975 mm (0.7069 — 0.7077 in)
	Tensioner bush I.D.			18.0 — 18.08 mm (0.7087 — 0.7118 in)
	Clearance between spacer and bush		STD	0.025 — 0.125 mm (0.0010 — 0.0049 in)
			Limit	0.175 mm (0.0069 in)
	Side clearance of spacer		STD	0.2 — 0.55 mm (0.0079 — 0.0217 in)
			Limit	0.81 mm (0.0319 in)
Camshaft	Bend limit			0.020 mm (0.0008 in)
	Thrust clearance		STD	0.068 — 0.116 mm (0.0026 — 0.0045 in)
	Cam lobe height	Intake	STD	45.25 — 45.35 mm (1.781 — 1.785 in)
			Limit	45.15 mm (1.758 in)
		Exhaust	STD	45.70 — 45.80 mm (1.799 — 1.803 in)
			Limit	45.60 mm (1.795 in)
	Journal O.D.	STD	Front	37.946 — 37.963 mm (1.4939 — 1.4946 in)
			Center, Rear	29.946 — 29.963 mm (1.1790 — 1.1796 in)
	Oil clearance		STD	0.037 — 0.072 mm (0.0015 — 0.0028 in)
			Limit	0.10 mm (0.0039 in)
Cylinder head	Surface warpage limit			0.035 mm (0.0014 in)
	Surface grinding limit			0.3 mm (0.012 in)
	Standard height			127.5 mm (5.02 in)
Valve seat	Refacing angle			90°
	Contacting width	Intake	STD	0.85 — 1.15 mm (0.033 — 0.045 in)
			Limit	1.7 mm (0.067 in)
		Exhaust	STD	1.35 — 1.65 mm (0.053 — 0.064 in)
			Limit	2.2 mm (0.087 in)
Valve guide	Inner diameter			6.000 — 6.012 mm (0.2362 — 0.2367 in)
	Protrusion above head			15.8 — 16.2 mm (0.622 — 0.638 in)
Valve	Head edge thickness	Intake	STD	1.0 — 1.4 mm (0.039 — 0.055 in)
			Limit	0.8 mm (0.031 in)
		Exhaust	STD	1.3 — 1.7 mm (0.051 — 0.067 in)
			Limit	0.8 mm (0.031 in)
	Stem diameter		Intake	5.955 — 5.970 mm (0.2344 — 0.2350 in)
			Exhaust	5.945 — 5.960 mm (0.2341 — 0.2346 in)
	Stem oil clearance	STD	Intake	0.030 — 0.057 mm (0.0012 — 0.0022 in)
			Exhaust	0.040 — 0.067 mm (0.0016 — 0.0026 in)
		Limit	—	0.15 mm (0.0059 in)
	Overall length		Intake	104.4 mm (4.110 in)
			Exhaust	104.65 mm (4.120 in)
Valve spring	Free length			43.89 mm (1.728 in)
	Squareness			2.5°, 1.9 mm (0.075 in) or less
	Tension/spring height		Set	205 — 237 N (20.9 — 24.2 kgf, 46.1 — 53.3 lbf)/ 36.0 mm (1.417 in)
			Lift	553 — 611 N (56.4 — 62.3 kgf, 124 — 137 lbf)/ 26.45 mm (1.041 in)

Cylinder block	Surface warpage limit (mating with cylinder head)			0.025 mm (0.00098 in)
	Surface grinding limit			0.1 mm (0.004 in)
	Cylinder bore	STD	A	92.005 — 92.015 mm (3.6222 — 3.6226 in)
			B	91.995 — 92.005 mm (3.6218 — 3.6222 in)
	Cylindricity		STD	0.015 mm (0.0006 in)
			Limit	0.050 mm (0.0020 in)
	Out-of-roundness		STD	0.010 mm (0.0004 in)
			Limit	0.050 mm (0.0020 in)
	Piston clearance		STD	0.010 — 0.030 mm (0.0004 — 0.0012 in)
			Limit	0.050 mm (0.0020 in)
	Enlarging (boring) limit			0.5 mm (0.020 in)
Piston	Outer diameter	STD	A	91.985 — 91.995 mm (3.6214 — 3.6218 in)
			B	91.975 — 91.985 mm (3.6211 — 3.6214 in)
		0.25 mm (0.0098 in) OS		92.225 — 92.235 mm (3.6309 — 3.6313 in)
		0.50 mm (0.0197 in) OS		92.475 — 92.485 mm (3.6407 — 3.6411 in)
	Standard diameter of piston pin			23.000 — 23.006 mm (0.9055 — 0.9057 in)
Piston pin	Outer diameter			22.994 — 23.000 mm (0.9053 — 0.9055 in)
	Standard clearance between piston pin and hole in piston		STD	0.004 — 0.008 mm (0.0002 — 0.0003 in)
			Limit	0.020 mm (0.0008 in)
	Degree of fit			Piston pin must be fitted into position with thumb at 20°C (68°F).
Piston ring	Piston ring gap	Top ring	STD	Inner circle side: 0.20 — 0.30 mm (0.0079 — 0.0117 in) Outer circle side: 0.20 — 0.25 mm (0.0079 — 0.0098 in)
			Limit	1.0 mm (0.039 in)
		Second ring	STD	0.40 — 0.50 mm (0.016 — 0.020 in)
			Limit	1.0 mm (0.039 in)
		Oil ring	STD	0.20 — 0.50 mm (0.0079 — 0.020 in)
			Limit	1.5 mm (0.059 in)
	Clearance between piston ring and piston ring groove	Top ring	STD	0.040 — 0.080 mm (0.0016 — 0.0031 in)
			Limit	0.15 mm (0.0059 in)
		Second ring	STD	0.030 — 0.070 mm (0.0012 — 0.0028 in)
			Limit	0.15 mm (0.0059 in)
Connecting rod	Bend or twist per 100 mm (3.94 in) in length		Limit	0.10 mm (0.0039 in)
	Side clearance		STD	0.070 — 0.330 mm (0.0028 — 0.0130 in)
			Limit	0.4 mm (0.016 in)
Connecting rod bearing	Oil clearance		STD	0.017 — 0.045 mm (0.0007 — 0.0018 in)
	Thickness at center portion		STD	1.490 — 1.502 mm (0.0587 — 0.0591 in)
			0.03 mm (0.0012 in) US	1.504 — 1.512 mm (0.0592 — 0.0595 in)
			0.05 mm (0.0020 in) US	1.514 — 1.522 mm (0.0596 — 0.0599 in)
			0.25 mm (0.0098 in) US	1.614 — 1.622 mm (0.0635 — 0.0639 in)
Connecting rod bushing	Clearance between piston pin and bushing		STD	0 — 0.022 mm (0 — 0.0009 in)
			Limit	0.030 mm (0.0012 in)

Crankshaft	Bend limit			0.035 mm (0.0014 in)
	Crank pin and crank journal	Out-of-roundness		0.005 mm (0.0002 in) or less
		Grinding limit		0.25 mm (0.0098 in)
	Crank pin outer diameter		STD	51.984 — 52.000 mm (2.0466 — 2.0472 in)
			0.03 mm (0.0012 in) US	51.954 — 51.970 mm (2.0454 — 2.0461 in)
			0.05 mm (0.0020 in) US	51.934 — 51.950 mm (2.0447 — 2.0453 in)
			0.25 mm (0.0098 in) US	51.734 — 51.750 mm (2.0368 — 2.0374 in)
	Crank journal outer diameter		STD	59.992 — 60.008 mm (2.3619 — 2.3625 in)
			0.03 mm (0.0012 in) US	59.962 — 59.978 mm (2.3607 — 2.3613 in)
			0.05 mm (0.0020 in) US	59.942 — 59.958 mm (2.3599 — 2.3605 in)
			0.25 mm (0.0098 in) US	59.742 — 59.758 mm (2.3520 — 2.3527 in)
	Thrust clearance		STD	0.030 — 0.115 mm (0.0012 — 0.0045 in)
			Limit	0.25 mm (0.0098 in)
	Oil clearance		STD	0.010 — 0.030 mm (0.0004 — 0.0012 in)
			Limit	0.040 mm (0.0016 in)
Crankshaft bearing	Crankshaft bearing thickness	#1, #3	STD	1.998 — 2.011 mm (0.0787 — 0.0792 in)
			0.03 mm (0.0012 in) US	2.017 — 2.020 mm (0.0794 — 0.0795 in)
			0.05 mm (0.0020 in) US	2.027 — 2.030 mm (0.0798 — 0.0799 in)
			0.25 mm (0.0098 in) US	2.127 — 2.130 mm (0.0837 — 0.0839 in)
		#2, #4, #5	STD	2.000 — 2.013 mm (0.0787 — 0.0793 in)
			0.03 mm (0.0012 in) US	2.019 — 2.022 mm (0.0795 — 0.0796 in)
			0.05 mm (0.0020 in) US	2.029 — 2.032 mm (0.0799 — 0.0800 in)
			0.25 mm (0.0098 in) US	2.129 — 2.132 mm (0.0838 — 0.0839 in)

3. TURBO MODEL (AUSTRALIA MODEL EXCEPT STi MODEL)

Engine	Type			Horizontally opposed, liquid cooled, 4-cylinder, 4-stroke gasoline engine
	Valve arrangement			Belt driven, double overhead camshaft, 4-valve/cylinder
	Bore × Stroke mm (in)			92 × 75 (3.62 × 2.95)
	Piston displacement cm^3 (cu in)			1,994 (121.67)
	Compression ratio			9.0
	Compression pressure (at 200 — 300 rpm) kPa (kgf/cm^2, psi)			1,108 — 1,304 (11 — 13, 161 — 189)
	Number of piston rings			Pressure ring: 2, Oil ring: 1
	Intake valve timing	Opening	Max. retard	ATDC 7°
			Min. advance	BTDC 27°
		Closing	Max. retard	ABDC 67°
			Min. advance	ABDC 33°
	Exhaust valve timing	Opening		BBDC 53°
		Closing		ATDC 7°
	Valve clearance	Intake mm (in)		0.20±0.02 (0.0079±0.0008)
		Exhaust mm (in)		0.35±0.02 (0.0138±0.0008)
	Idling speed [At neutral position on MT, or "P" or "N" position on AT] rpm		MT	650±50 (No load) 800±50 (A/C switch ON)
			AT	700±50 (No load) 820±50 (A/C switch ON)
	Firing order			1 → 3 → 2 → 4
	Ignition timing BTDC/rpm		MT	12°±3°/650
			AT	12°±3°/700

NOTE:
STD: Standard I.D.: Inner Diameter O.D.: Outer Diameter OS: Oversize US: Undersize

Belt tension adjuster	Protrusion of adjuster rod			5.2 — 6.2 mm (0.205 — 0.244 in)
Belt tensioner	Spacer O.D.			17.955 — 17.975 mm (0.7069 — 0.7077 in)
	Tensioner bush I.D.			18.0 — 18.08 mm (0.7087 — 0.7118 in)
	Clearance between spacer and bush		STD	0.025 — 0.125 mm (0.0010 — 0.0049 in)
			Limit	0.175 mm (0.0069 in)
	Side clearance of spacer		STD	0.2 — 0.55 mm (0.0079 — 0.0217 in)
			Limit	0.81 mm (0.0319 in)
Camshaft	Bend limit			0.020 mm (0.0008 in)
	Thrust clearance		STD	0.068 — 0.116 mm (0.0026 — 0.0045 in)
	Cam lobe height	Intake	STD	46.25 — 46.35 mm (1.821 — 1.825 in)
			Limit	46.15 mm (1.817 in)
		Exhaust	STD	46.25 — 46.35 mm (1.821 — 1.825 in)
			Limit	46.15 mm (1.817 in)
	Journal O.D.	STD	Front	37.946 — 37.963 mm (1.4939 — 1.4946 in)
			Center, Rear	29.946 — 29.963 mm (1.1790 — 1.1796 in)
	Oil clearance		STD	0.037 — 0.072 mm (0.0015 — 0.0028 in)
			Limit	0.10 mm (0.0039 in)
Cylinder head	Surface warpage limit			0.035 mm (0.0014 in)
	Surface grinding limit			0.3 mm (0.012 in)
	Standard height			127.5 mm (5.02 in)

Valve seat	Refacing angle			90°
	Contacting width	Intake	STD	0.85 — 1.15 mm (0.033 — 0.045 in)
			Limit	1.7 mm (0.067 in)
		Exhaust	STD	1.35 — 1.65 mm (0.053 — 0.064 in)
			Limit	2.2 mm (0.087 in)
Valve guide	Inner diameter			6.000 — 6.012 mm (0.2362 — 0.2367 in)
	Protrusion above head			15.8 — 16.2 mm (0.622 — 0.638 in)
Valve	Head edge thickness	Intake	STD	1.0 — 1.4 mm (0.039 — 0.055 in)
			Limit	0.8 mm (0.031 in)
		Exhaust	STD	1.3 — 1.7 mm (0.051 — 0.067 in)
			Limit	0.8 mm (0.031 in)
	Stem diameter		Intake	5.955 — 5.970 mm (0.2344 — 0.2350 in)
			Exhaust	5.945 — 5.960 mm (0.2341 — 0.2346 in)
	Stem oil clearance	STD	Intake	0.030 — 0.057 mm (0.0012 — 0.0022 in)
			Exhaust	0.040 — 0.067 mm (0.0016 — 0.0026 in)
		Limit	—	0.15 mm (0.0059 in)
	Overall length		Intake	104.4 mm (4.110 in)
			Exhaust	104.65 mm (4.120 in)
Valve spring	Free length			47.32 mm (1.8630 in)
	Squareness			2.5°, 2.1 mm (0.083 in)
	Tension/spring height		Set	205 — 235 N (20.9 — 24.0 kgf, 46.1 — 52.8 lbf)/ 36.0 mm (1.417 in)
			Lift	426 — 490 N (43.4 — 50.0 kgf, 95.8 — 110 lbf)/ 26.5 mm (1.043 in)
Cylinder block	Surface warpage limit (mating with cylinder head)			0.025 mm (0.00098 in)
	Surface grinding limit			0.1 mm (0.004 in)
	Cylinder bore	STD	A	92.005 — 92.015 mm (3.6222 — 3.6226 in)
			B	91.995 — 92.005 mm (3.6218 — 3.6222 in)
	Cylindricity		STD	0.015 mm (0.0006 in)
			Limit	0.050 mm (0.0020 in)
	Out-of-roundness		STD	0.010 mm (0.0004 in)
			Limit	0.050 mm (0.0020 in)
	Piston clearance		STD	0.010 — 0.030 mm (0.0004 — 0.0012 in)
			Limit	0.050 mm (0.0020 in)
	Enlarging (boring) limit			0.5 mm (0.020 in)
Piston	Outer diameter	STD	A	91.985 — 91.995 mm (3.6214 — 3.6218 in)
			B	91.975 — 91.985 mm (3.6211 — 3.6214 in)
		0.25 mm (0.0098 in) OS		92.225 — 92.235 mm (3.6309 — 3.6313 in)
		0.50 mm (0.0197 in) OS		92.475 — 92.485 mm (3.6407 — 3.6411 in)
	Standard diameter of piston pin			23.000 — 23.006 mm (0.9055 — 0.9057 in)
Piston pin	Outer diameter			22.994 — 23.000 mm (0.9053 — 0.9055 in)
	Standard clearance between piston pin and hole in piston		STD	0.004 — 0.008 mm (0.0002 — 0.0003 in)
			Limit	0.020 mm (0.0008 in)
	Degree of fit			Piston pin must be fitted into position with thumb at 20°C (68°F).

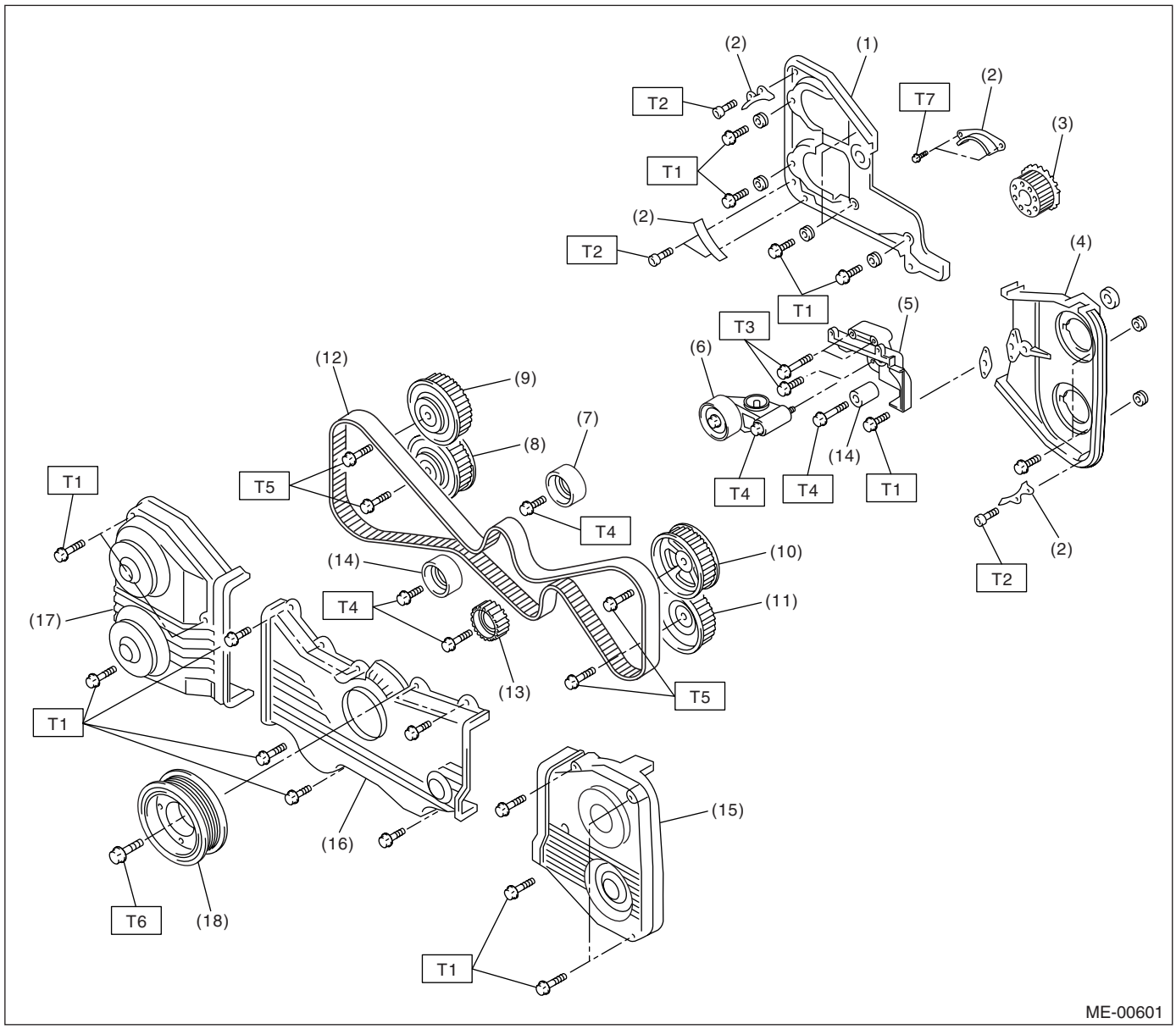
Piston ring	Piston ring gap	Top ring	STD	Inner circle side: 0.20 — 0.30 mm (0.0079 — 0.0117 in) Outer circle side: 0.20 — 0.25 mm (0.0079 — 0.0098 in)
			Limit	1.0 mm (0.039 in)
		Second ring	STD	0.40 — 0.50 mm (0.016 — 0.020 in)
			Limit	1.0 mm (0.039 in)
		Oil ring	STD	0.20 — 0.50 mm (0.0079 — 0.020 in)
			Limit	1.5 mm (0.059 in)
	Clearance between piston ring and piston ring groove	Top ring	STD	0.040 — 0.080 mm (0.0016 — 0.0031 in)
			Limit	0.15 mm (0.0059 in)
		Second ring	STD	0.030 — 0.070 mm (0.0012 — 0.0028 in)
			Limit	0.15 mm (0.0059 in)
Connecting rod	Bend or twist per 100 mm (3.94 in) in length		Limit	0.10 mm (0.0039 in)
	Side clearance		STD	0.070 — 0.330 mm (0.0028 — 0.0130 in)
			Limit	0.4 mm (0.016 in)
Connecting rod bearing	Oil clearance		STD	0.026 — 0.052 mm (0.001 — 0.002 in)
	Thickness at center portion		STD	1.486 — 1.498 mm (0.0585 — 0.0590 in)
			0.03 mm (0.0012 in) US	1.504 — 1.512 mm (0.0592 — 0.0595 in)
			0.05 mm (0.0020 in) US	1.514 — 1.522 mm (0.0596 — 0.0599 in)
			0.25 mm (0.0098 in) US	1.614 — 1.622 mm (0.0635 — 0.0639 in)
Connecting rod bushing	Clearance between piston pin and bushing		STD	0 — 0.022 mm (0 — 0.0009 in)
			Limit	0.030 mm (0.0012 in)
Crankshaft	Bend limit			0.035 mm (0.0014 in)
	Crank pin and crank journal	Out-of-roundness		0.005 mm (0.0002 in) or less
		Grinding limit		0.25 mm (0.0098 in)
	Crank pin outer diameter		STD	51.984 — 52.000 mm (2.0466 — 2.0472 in)
			0.03 mm (0.0012 in) US	51.954 — 51.970 mm (2.0454 — 2.0461 in)
			0.05 mm (0.0020 in) US	51.934 — 51.950 mm (2.0447 — 2.0453 in)
			0.25 mm (0.0098 in) US	51.734 — 51.750 mm (2.0368 — 2.0374 in)
	Crank journal outer diameter		STD	59.992 — 60.008 mm (2.3619 — 2.3625 in)
			0.03 mm (0.0012 in) US	59.962 — 59.978 mm (2.3607 — 2.3613 in)
			0.05 mm (0.0020 in) US	59.942 — 59.958 mm (2.3599 — 2.3605 in)
			0.25 mm (0.0098 in) US	59.742 — 59.758 mm (2.3520 — 2.3527 in)
	Thrust clearance		STD	0.030 — 0.115 mm (0.0012 — 0.0045 in)
			Limit	0.25 mm (0.0098 in)
	Oil clearance		STD	0.010 — 0.030 mm (0.0004 — 0.0012 in)
			Limit	0.040 mm (0.0016 in)

Crankshaft bearing	Crankshaft bearing thickness	#1, #3	STD	1.998 — 2.011 mm (0.0787 — 0.0792 in)
			0.03 mm (0.0012 in) US	2.017 — 2.020 mm (0.0794 — 0.0795 in)
			0.05 mm (0.0020 in) US	2.027 — 2.030 mm (0.0798 — 0.0799 in)
			0.25 mm (0.0098 in) US	2.127 — 2.130 mm (0.0837 — 0.0839 in)
		#2, #4, #5	STD	2.000 — 2.013 mm (0.0787 — 0.0793 in)
			0.03 mm (0.0012 in) US	2.019 — 2.022 mm (0.0795 — 0.0796 in)
			0.05 mm (0.0020 in) US	2.029 — 2.032 mm (0.0799 — 0.0800 in)
			0.25 mm (0.0098 in) US	2.129 — 2.132 mm (0.0838 — 0.0839 in)

B: COMPONENT

1. TIMING BELT

• EXCEPT STi AND AUSTRALIA MODEL

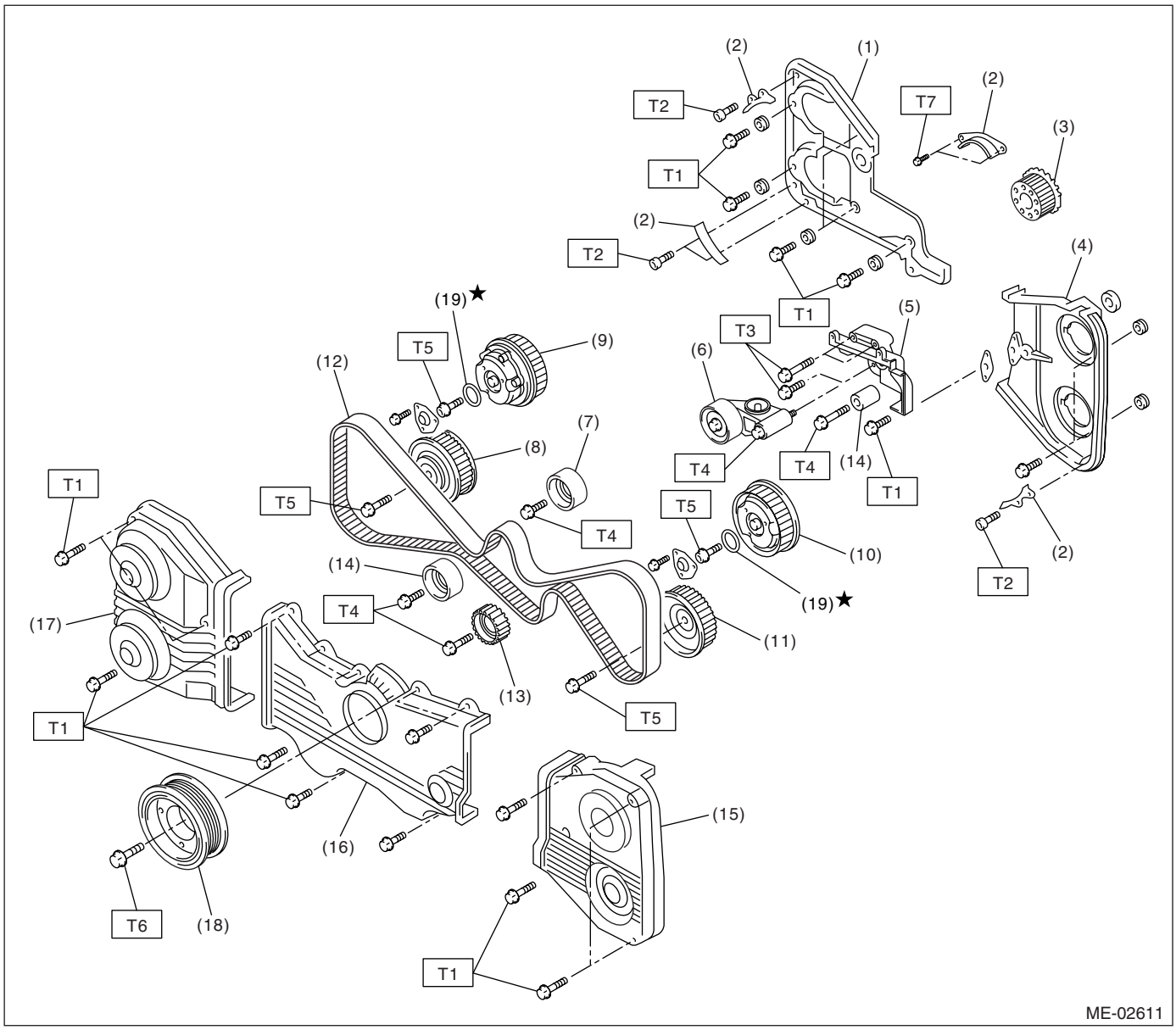


(1) Timing belt cover No. 2 (RH)
(2) Timing belt guide (MT model)
(3) Crank sprocket
(4) Timing belt cover No. 2 (LH)
(5) Tensioner bracket
(6) Automatic belt tension adjuster ASSY
(7) Belt idler
(8) Exhaust cam sprocket (RH)
(9) Intake cam sprocket (RH)
(10) Intake cam sprocket (LH)
(11) Exhaust cam sprocket (LH)
(12) Timing belt
(13) Belt idler No. 2
(14) Belt idler
(15) Timing belt cover (LH)
(16) Front belt cover
(17) Timing belt cover (RH)
(18) Crank pulley

Tightening torque: N·m (kgf-m, ft-lb)

T1: 5 (0.5, 3.6)
T2: 6.4 (0.65, 4.7)
T3: 24.5 (2.5, 18.1)
T4: 39 (4.0, 28.9)
T5: <Ref. to ME(H4DOTC)-66, INSTALLATION, Cam Sprocket.>
T6: <Ref. to ME(H4DOTC)-55, INSTALLATION, Crank Pulley.>
T7: 9.75 (1.0, 7.2)

• STi AND AUSTRALIA MODEL

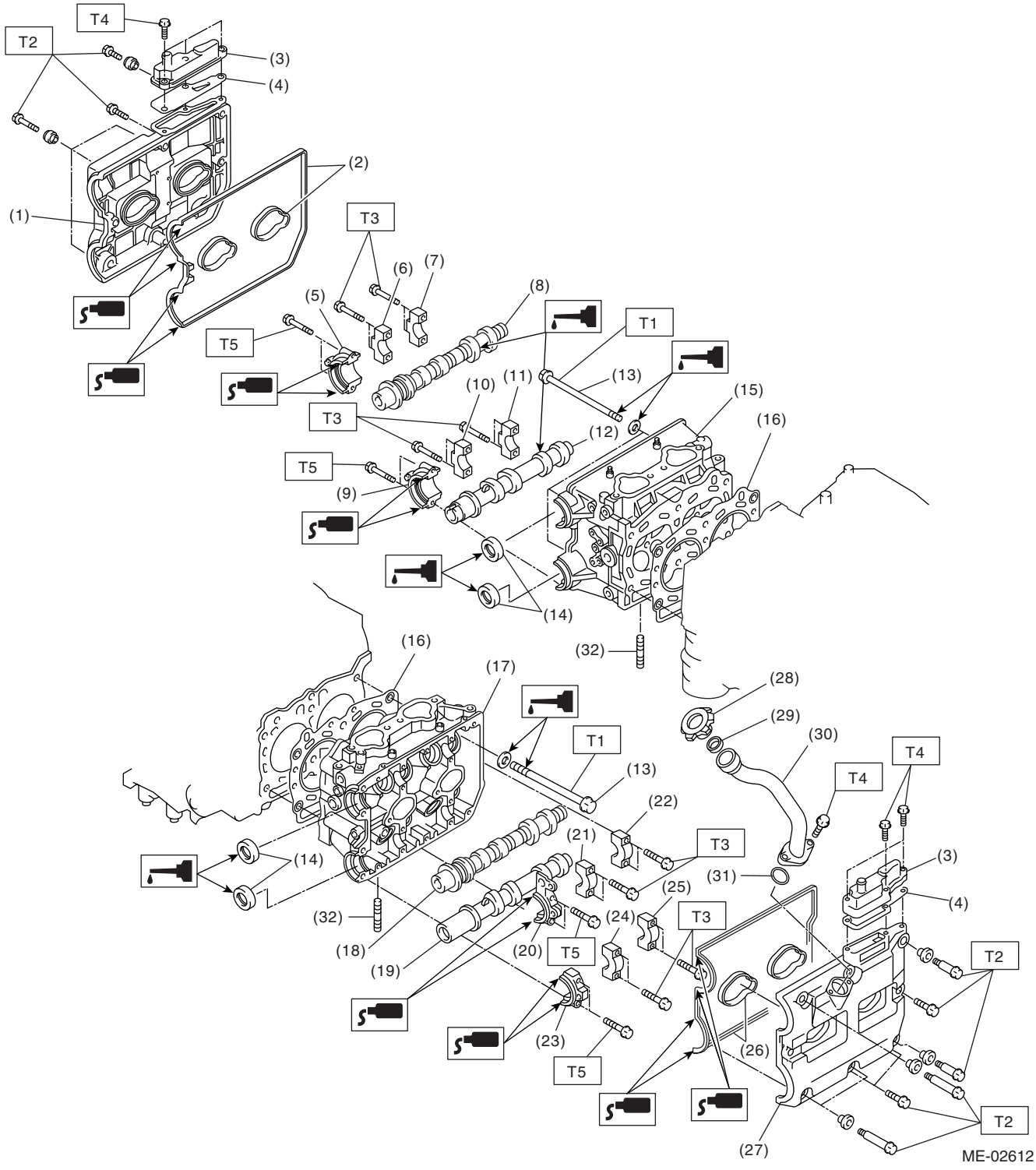


(1) Timing belt cover No. 2 (RH)
(2) Timing belt guide
(3) Crank sprocket
(4) Timing belt cover No. 2 (LH)
(5) Tensioner bracket
(6) Automatic belt tension adjuster ASSY
(7) Belt idler
(8) Exhaust cam sprocket (RH)
(9) Intake cam sprocket (RH)
(10) Intake cam sprocket (LH)
(11) Exhaust cam sprocket (LH)
(12) Timing belt
(13) Belt idler No. 2
(14) Belt idler
(15) Timing belt cover (LH)
(16) Front belt cover
(17) Timing belt cover (RH)
(18) Crank pulley
(19) O-ring

Tightening torque: N·m (kgf-m, ft-lb)
T1: 5 (0.5, 3.6)
T2: 6.4 (0.65, 4.7)
T3: 24.5 (2.5, 18.1)
T4: 39 (4.0, 28.9)
T5: <Ref. to ME(H4DOTC)-66, INSTALLATION, Cam Sprocket.>
T6: <Ref. to ME(H4DOTC)-55, INSTALLATION, Crank Pulley.>
T7: 9.75 (1.0, 7.2)

2. CYLINDER HEAD AND CAMSHAFT

• EXCEPT STi AND AUSTRALIA MODEL

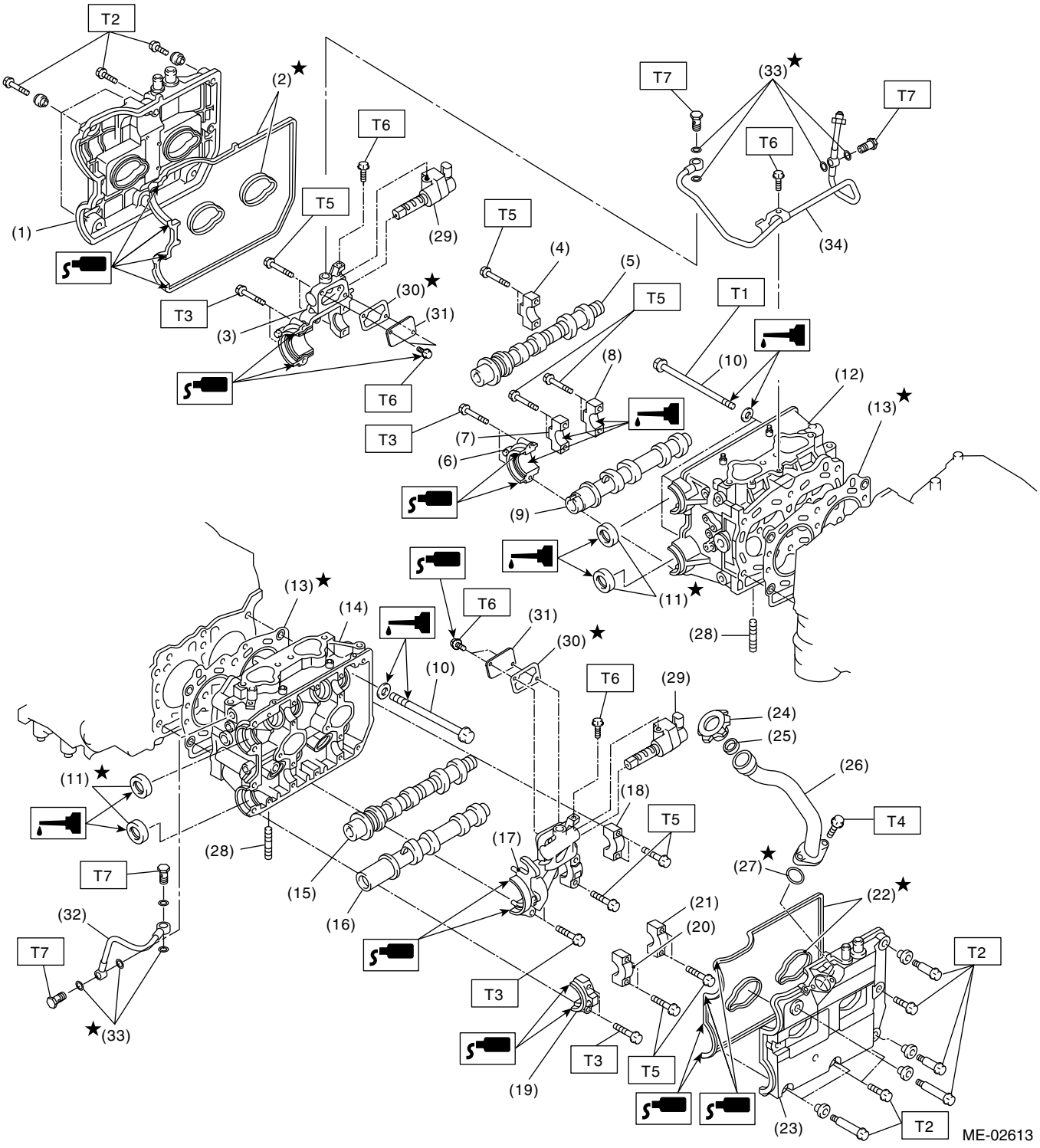


(1) Rocker cover (RH)
(2) Rocker cover gasket (RH)
(3) Oil separator cover
(4) Gasket
(5) Intake camshaft cap (Front RH)
(6) Intake camshaft cap (Center RH)
(7) Intake camshaft cap (Rear RH)
(8) Intake camshaft cap (RH)
(9) Exhaust camshaft cap (Front RH)
(10) Exhaust camshaft cap (Center RH)
(11) Exhaust camshaft cap (Rear RH)
(12) Exhaust camshaft (RH)
(13) Cylinder head bolt
(14) Oil seal
(15) Cylinder head (RH)
(16) Cylinder head gasket
(17) Cylinder head (LH)
(18) Intake camshaft (LH)
(19) Exhaust camshaft (LH)
(20) Intake camshaft cap (Front LH)
(21) Intake camshaft cap (Center LH)
(22) Intake camshaft cap (Rear LH)
(23) Exhaust camshaft cap (Front LH)
(24) Exhaust camshaft cap (Center LH)
(25) Exhaust camshaft cap (Rear LH)
(26) Rocker cover gasket (LH)
(27) Rocker cover (LH)
(28) Oil filler cap
(29) Gasket
(30) Oil filler duct
(31) O-ring
(32) Stud bolt

Tightening torque: N·m (kgf-m, ft-lb)

T1: <Ref. to ME(H4DOTC)-77, INSTALLATION, Cylinder Head.>
T2: 5 (0.5, 3.6)
T3: 20 (2.0, 14.5)
T4: 6.4 (0.65, 4.7)
T5: 9.75 (1.0, 7.2)

• STi AND AUSTRALIA MODEL

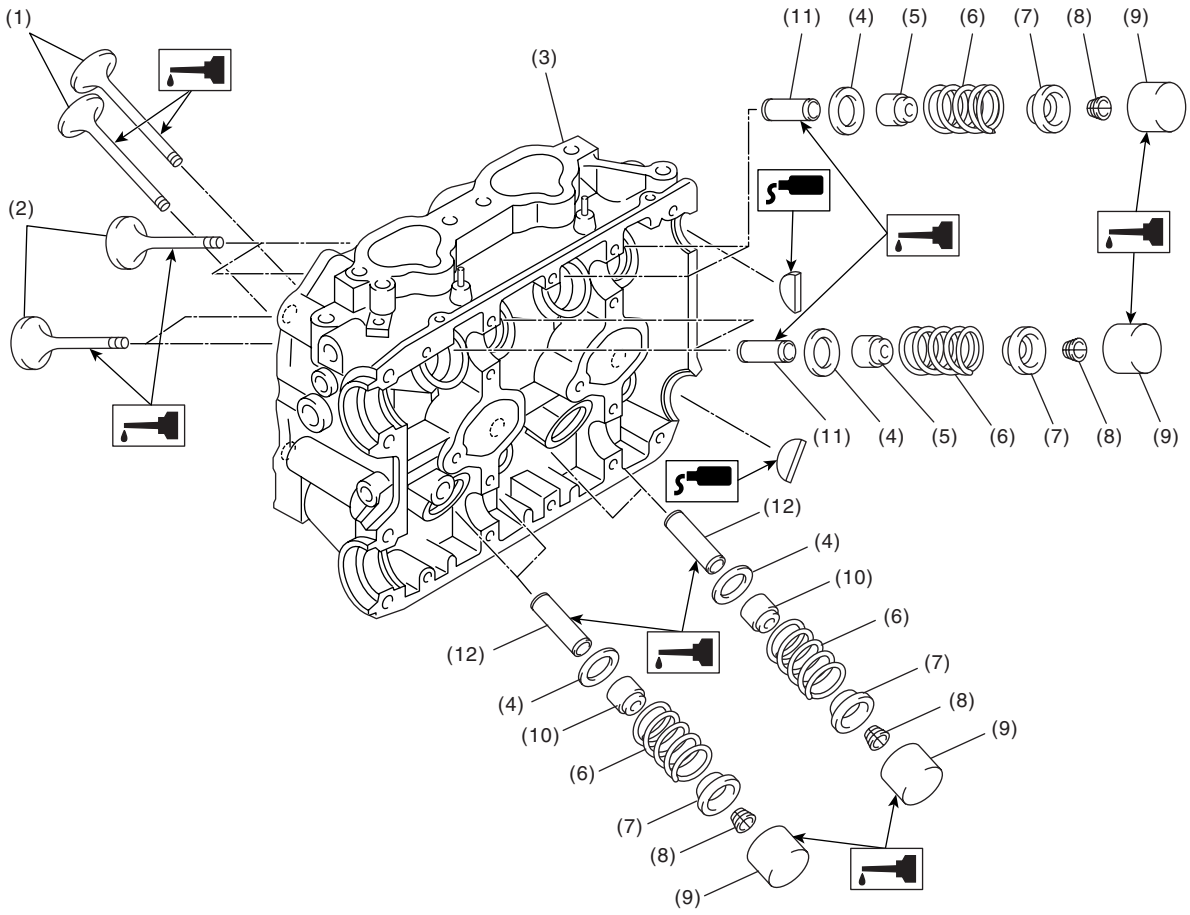


(1) Rocker cover (RH)
(2) Rocker cover gasket (RH)
(3) Intake camshaft cap (Front RH)
(4) Intake camshaft cap (Rear RH)
(5) Intake camshaft (RH)
(6) Exhaust camshaft cap (Front RH)
(7) Exhaust camshaft cap (Center RH)
(8) Exhaust camshaft cap (Rear RH)
(9) Exhaust camshaft (RH)
(10) Cylinder head bolt
(11) Oil seal
(12) Cylinder head (RH)
(13) Cylinder head gasket
(14) Cylinder head (LH)
(15) Intake camshaft (LH)
(16) Exhaust camshaft (LH)
(17) Intake camshaft cap (Front LH)
(18) Intake camshaft cap (Rear LH)
(19) Exhaust camshaft cap (Front LH)
(20) Exhaust camshaft cap (Center LH)
(21) Exhaust camshaft cap (Rear LH)
(22) Rocker cover gasket (LH)
(23) Rocker cover (LH)
(24) Oil filler cap
(25) Gasket
(26) Oil filler duct
(27) O-ring
(28) Stud bolt
(29) Oil flow control solenoid valve
(30) Gasket
(31) Oil return cover
(32) Oil pipe (LH)
(33) Gasket
(34) Oil pipe (RH)

Tightening torque: N·m (kgf-m, ft-lb)

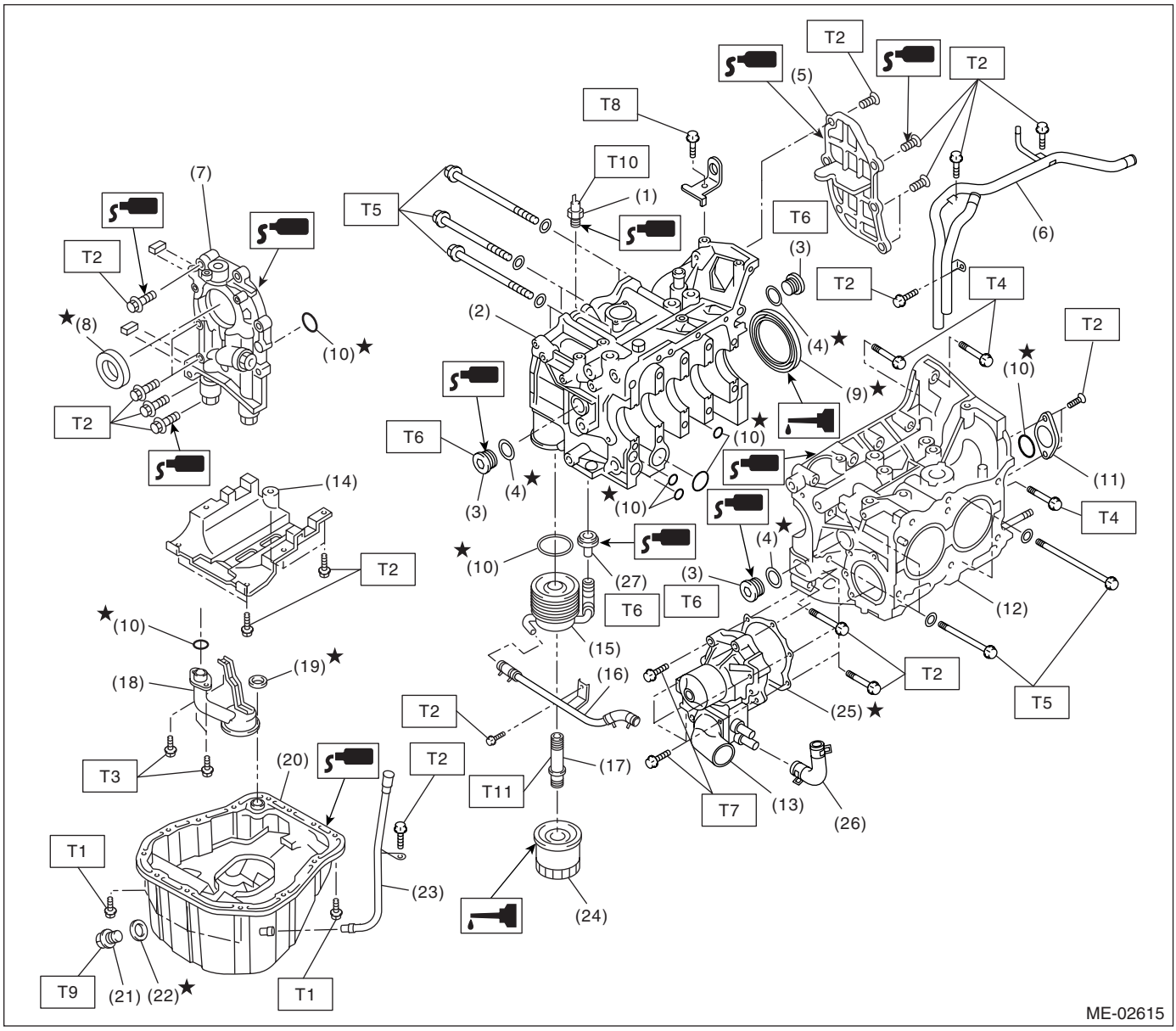
T1:	***<Ref. to ME(H4DOTC)-77, INSTALLATION, Cylinder Head.>***
T2:	***5 (0.5, 3.6)***
T3:	***9.75 (1.0, 7)***
T4:	***6.4 (0.65, 4.7)***
T5:	***20 (2.0, 14.5)***
T6:	***8 (0.8, 5.8)***
T7:	***29 (3.0, 21.4)***

3. CYLINDER HEAD AND VALVE ASSEMBLY



(1) Exhaust valve
(2) Intake valve
(3) Cylinder head
(4) Valve spring seat
(5) Intake valve oil seal
(6) Valve spring
(7) Retainer
(8) Retainer key
(9) Valve lifter
(10) Exhaust valve oil seal
(11) Intake valve guide
(12) Exhaust valve guide

4. CYLINDER BLOCK



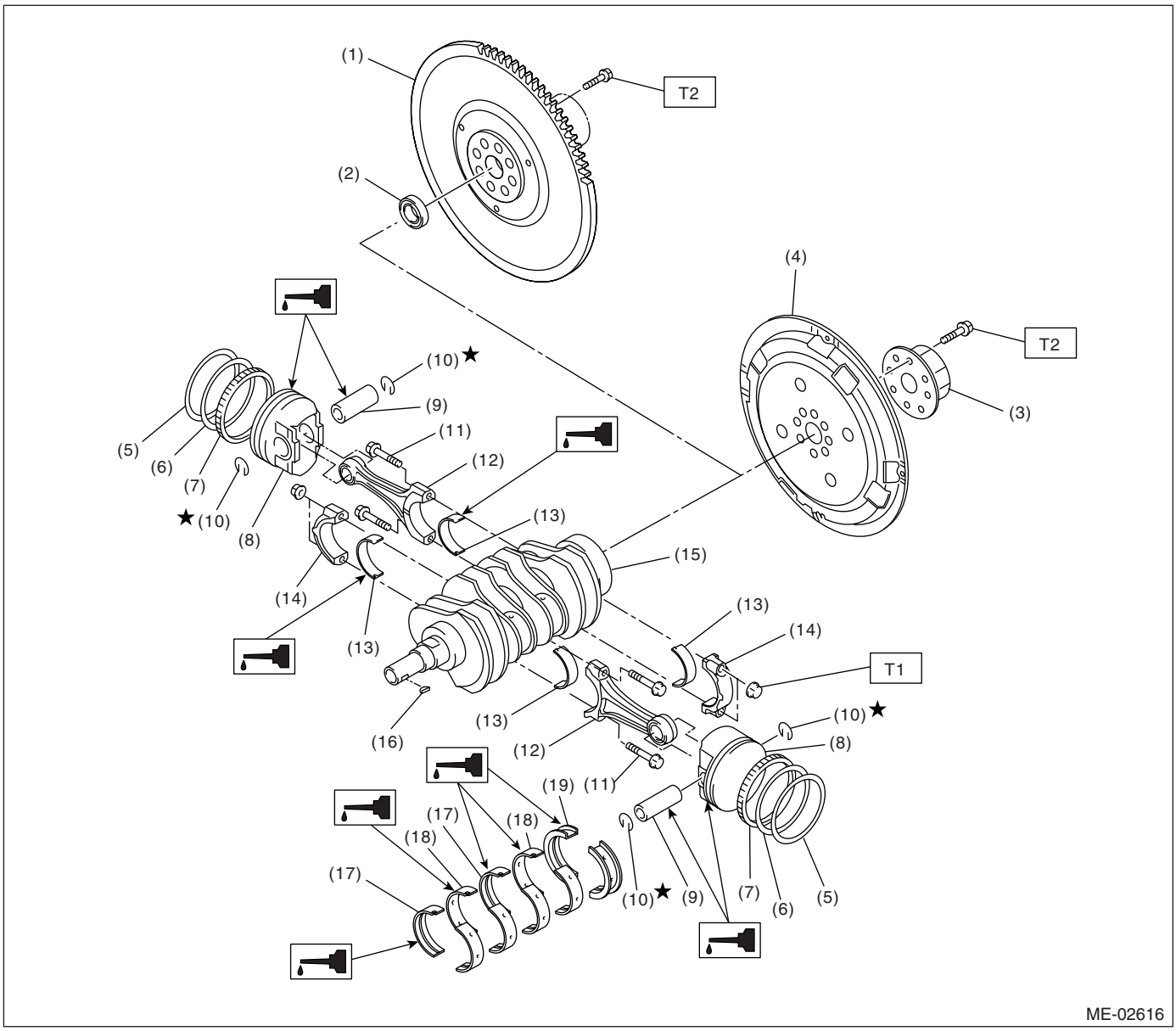
(1) Oil pressure switch
(2) Cylinder block (RH)
(3) Service hole plug
(4) Gasket
(5) Oil separator cover
(6) Water by-pass pipe
(7) Oil pump
(8) Front oil seal
(9) Rear oil seal
(10) O-ring
(11) Service hole cover
(12) Cylinder block (LH)
(13) Water pump
(14) Baffle plate
(15) Oil cooler
(16) Water by-pass pipe
(17) Connector
(18) Oil strainer
(19) Gasket
(20) Oil pan
(21) Drain plug
(22) Metal gasket
(23) Oil level gauge guide
(24) Oil filter
(25) Gasket
(26) Water pump hose
(27) Plug

Tightening torque: N·m (kgf-m, ft-lb)

T1: 5 (0.5, 3.6)
T2: 6.4 (0.65, 4.7)
T3: 10 (1.0, 7.2)
T4: 25 (2.5, 18.4)
T5: <Ref. to ME(H4DOTC)-88, INSTALLATION, Cylinder Block.>
T6: 69 (7.0, 50.6)
T7: First 12 (1.2, 8.7)
Second 12 (1.2, 8.7)
T8: 16 (1.6, 11.6)
T9: 44 (4.5, 33)
T10: 25 (2.5, 18.4)
T11: 54 (5.5, 40)

5. CRANKSHAFT AND PISTON

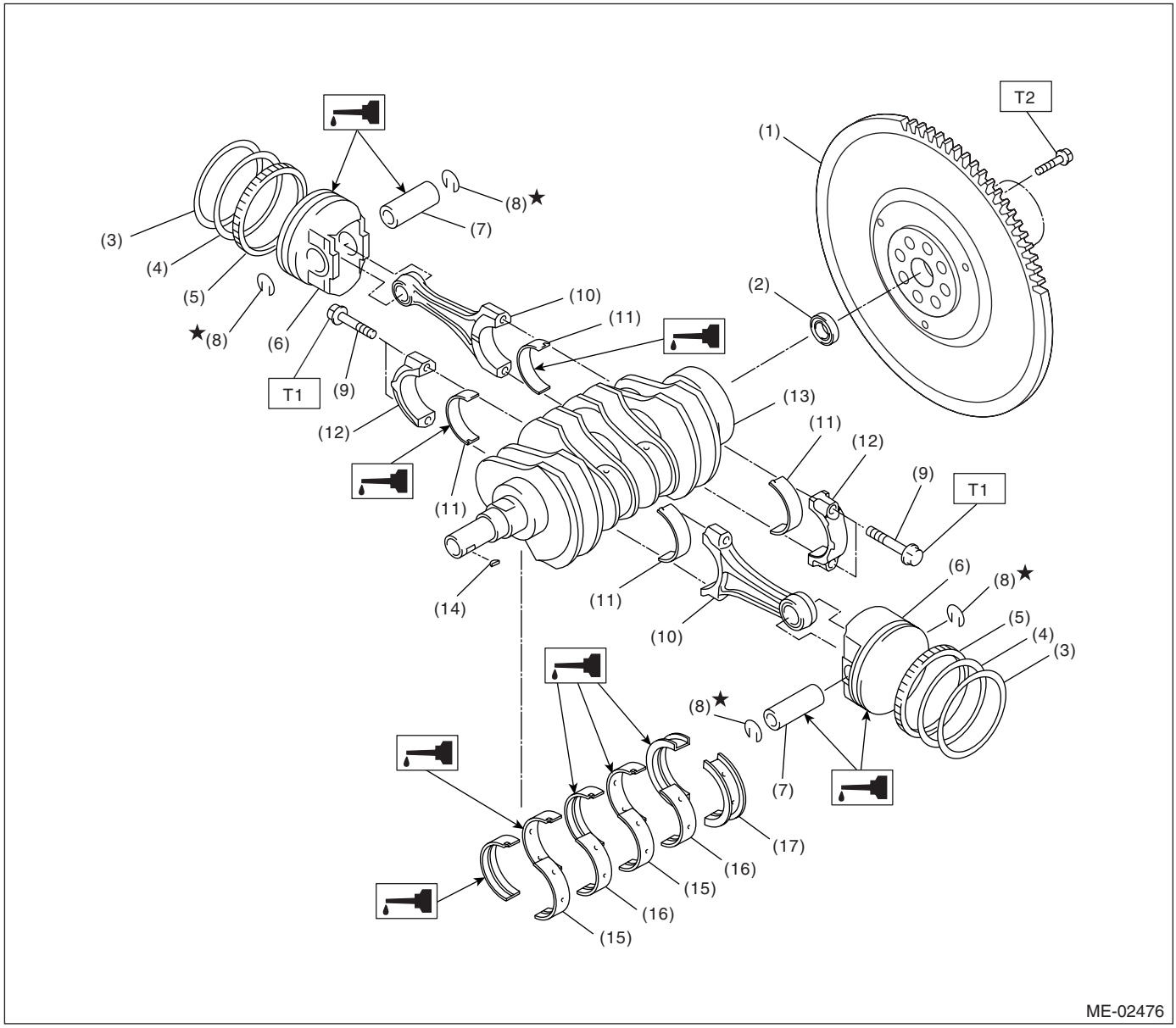
• EXCEPT STi MODEL



(1) Flywheel (MT model)
(2) Ball bearing (MT model)
(3) Reinforcement (AT model)
(4) Drive plate (AT model)
(5) Top ring
(6) Second ring
(7) Oil ring
(8) Piston
(9) Piston pin
(10) Circlip
(11) Connecting rod bolt
(12) Connecting rod
(13) Connecting rod bearing
(14) Connecting rod cap
(15) Crankshaft
(16) Woodruff key
(17) Crankshaft bearing #1, #3
(18) Crankshaft bearing #2, #4
(19) Crankshaft bearing #5

Tightening torque: N·m (kgf-m, ft-lb)
T1: 45 (4.6, 33.3)
T2: 72 (7.3, 52.8)

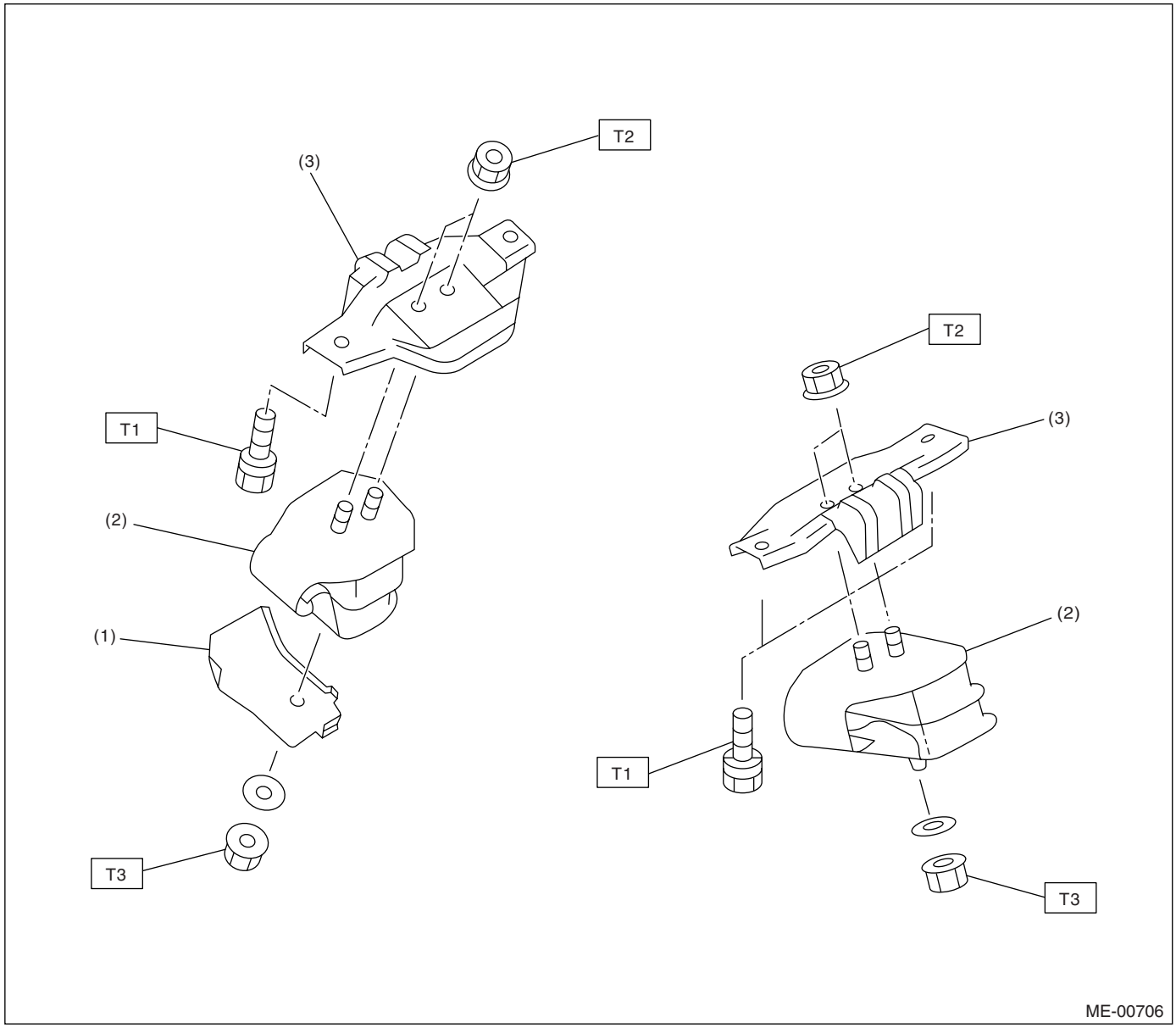
• STi MODEL



(1) Flywheel
(2) Ball bearing
(3) Top ring
(4) Second ring
(5) Oil ring
(6) Piston
(7) Piston pin
(8) Circlip
(9) Connecting rod bolt
(10) Connecting rod
(11) Connecting rod bearing
(12) Connecting rod cap
(13) Crankshaft
(14) Woodruff key
(15) Crankshaft bearing #1, #3
(16) Crankshaft bearing #2, #4
(17) Crankshaft bearing #5

Tightening torque: N·m (kgf-m, ft-lb)
T1: 52 (5.3, 38.4)
T2: 75 (7.6, 55.3)

6. ENGINE MOUNTING



(1) Heat shield cover
(2) Front cushion rubber
(3) Front engine mounting bracket

Tightening torque: N·m (kgf-m, ft-lb)
T1: 35 (3.6, 25.8)
T2: 42 (4.3, 30.9)
T3: 85 (8.7, 62.7)

C: CAUTION

• Wear working clothing, including a cap, protective goggles, and protective shoes during operation.
• Remove contamination including dirt and corrosion before removal, installation or disassembly.
• Keep the disassembled parts in order and protect them from dust or dirt.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly, and replacement.
• Be careful not to burn, because each part in the vehicle is hot after running.
• Be sure to tighten fasteners including bolts and nuts to the specified torque.
• Place shop jacks or rigid racks at the specified points.
• Before disconnecting electrical connectors of sensors or units, be sure to disconnect the ground cable from battery.
• All parts should be thoroughly cleaned, paying special attention to the engine oil passages, pistons and bearings.
• Rotating parts and sliding parts such as piston, bearing and gear should be coated with oil prior to assembly.
• Be careful not to let oil, grease or coolant contact the timing belt, clutch disc and flywheel.
• All removed parts, if to be reused, should be reinstalled in the original positions and directions.
• Bolts, nuts and washers should be replaced with new ones as required.
• Even if necessary inspections have been made in advance, proceed with assembly work while making rechecks.
• Remove or install the engine in an area where chain hoists, lifting devices, etc. are available for ready use.
• Be sure not to damage coated surfaces of body panels with tools or stain seats and windows with coolant or oil. Place a cover over fenders, as required, for protection.
• Prior to starting work, prepare the following:
Service tools, clean cloth, containers to catch coolant and oil, wire ropes, chain hoist, transmission jacks, etc.
• Lift-up or lower the vehicle when necessary. Make sure to support the correct positions.

D: PREPARATION TOOL

1. SPECIAL TOOLS

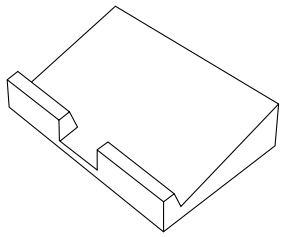
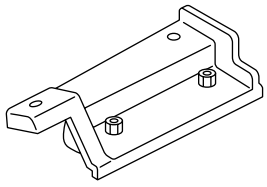
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498267600	498267600	CYLINDER HEAD TABLE	• Used for replacing valve guides. • Used for removing and installing valve springs.
 ST-498457000	498457000	ENGINE STAND ADAPTER RH	Used with ENGINE STAND (499817000).

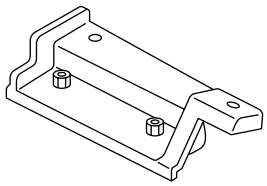
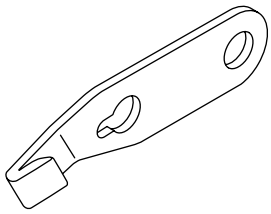
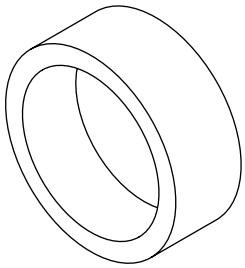
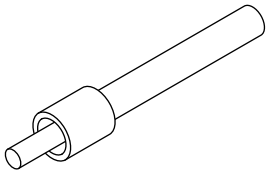
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498457100	498457100	ENGINE STAND ADAPTER LH	Used with ENGINE STAND (499817000).
 ST-498497100	498497100	CRANKSHAFT STOPPER	Used for stopping rotation of flywheel when loosening and tightening crank pulley bolt, etc.
 ST-398744300	398744300	PISTON GUIDE	Used for installing piston in cylinder for 2.0 L engine.
 ST-498857100	498857100	VALVE OIL SEAL GUIDE	Used for press-fitting of intake and exhaust valve guide oil seals.

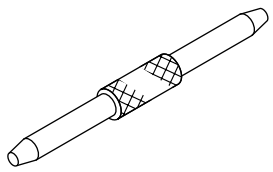
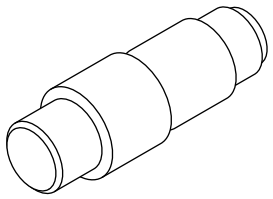
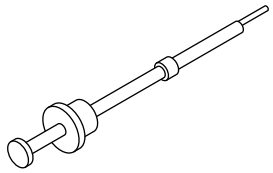
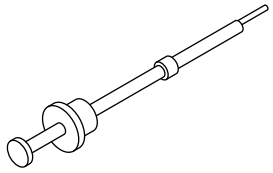
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499017100	499017100	PISTON PIN GUIDE	Used for installing piston pin, piston and connecting rod.
 ST-499037100	499037100	CONNECTING ROD BUSHING REMOVER & INSTALLER	Used for removing and installing connecting rod bushing.
 ST-499097600	499097600	PISTON PIN REMOVER ASSY	Used for removing piston pin. (Except Australia model)
 ST-499097700	499097700	PISTON PIN REMOVER ASSY	Used for removing piston pin. (Australia model except STi model)

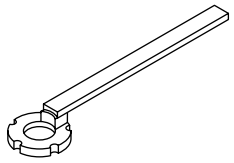
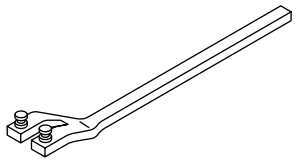
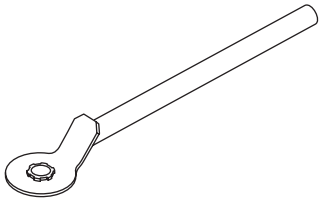
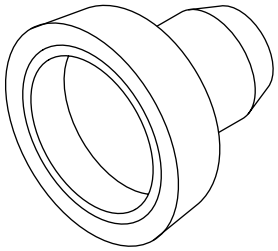
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499207400	499207400	CAM SPROCKET WRENCH	• Used for removing and installing exhaust cam sprocket and intake cam sprocket (RH). (Except STi and Australia model) • Used for removing and installing exhaust camshaft. (STi and Australia model)
 ST18231AA010	18231AA010	CAM SPROCKET WRENCH	Used for removing and installing intake cam sprocket (LH). (Except STi and Australia model)
 ST-499977500	499977500	CAM SPROCKET WRENCH	Used for removing and installing intake cam sprocket. (STi and Australia model)
 ST-499587200	499587200	CRANKSHAFT OIL SEAL INSTALLER	• Used for installing crankshaft oil seal. • Used with CRANKSHAFT OIL SEAL GUIDE (499597100).

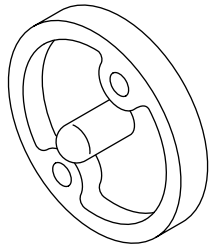
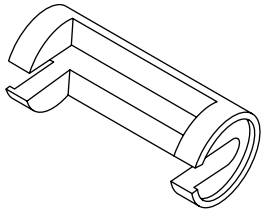
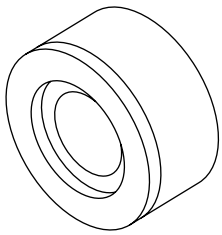
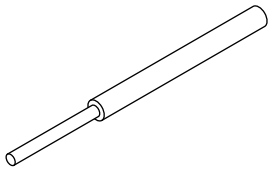
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499597100	499597100	CRANKSHAFT OIL SEAL GUIDE	• Used for installing crankshaft oil seal. • Used with CRANKSHAFT OIL SEAL INSTALLER (499587200).
 ST-499718000	499718000	VALVE SPRING REMOVER	Used for removing and installing valve spring.
 ST18251AA020	18251AA020	VALVE GUIDE ADJUSTER	Used for installing intake and exhaust valve guides.
 ST-499767200	499767200	VALVE GUIDE REMOVER	Used for removing valve guides.

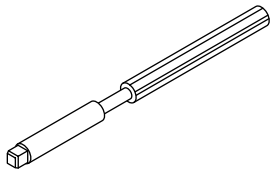
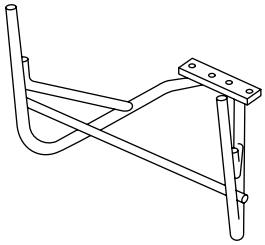
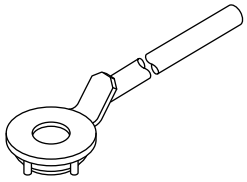
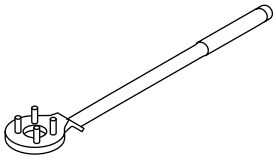
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499767400	499767400	VALVE GUIDE REAMER	Used for reaming valve guides.
 ST-499817000	499817000	ENGINE STAND	• Stand used for engine disassembly and assembly. • Used with ENGINE STAND ADAPTER RH (498457000) & LH (498457100).
 ST-499977400	499977400	CRANK PULLEY WRENCH	Used for stopping rotation of crank pulley when loosening and tightening crank pulley bolts. (Except STi model)
 ST-499977100	499977100	CRANK PULLEY WRENCH	Used for stopping rotation of crank pulley when loosening and tightening crank pulley bolts. (STi model)

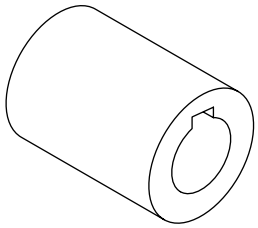
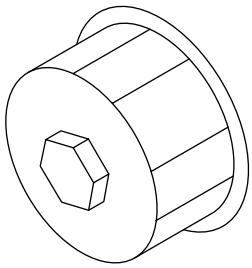
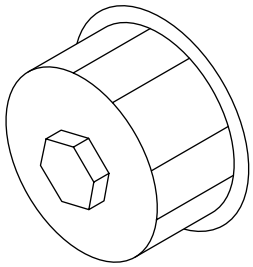
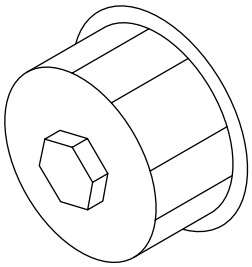
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499987500	499987500	CRANKSHAFT SOCKET	Used for rotating crankshaft.
 ST-498547000	498547000	OIL FILTER WRENCH	• Used for removing and installing oil filter. • For oil filter (Outer diameter: 80 mm (3.15 in))
 ST18332AA000	18332AA000	OIL FILTER WRENCH	• Used for removing and installing oil filter. • For oil filter (Outer diameter: 68 mm (2.68 in))
 ST18332AA010	18332AA010	OIL FILTER WRENCH	• Used for removing and installing oil filter. • For oil filter (Outer diameter: 65 mm (2.56 in))

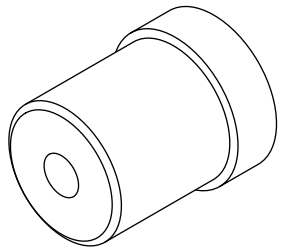
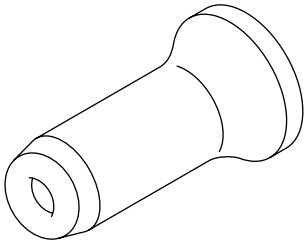
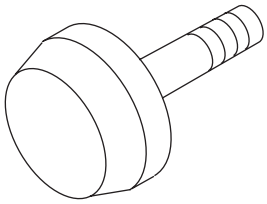
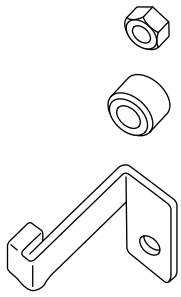
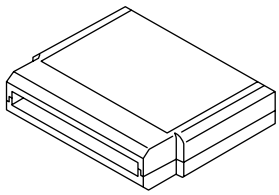
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499587100	499587100	OIL SEAL INSTALLER	Used for installing oil pump oil seal.
 ST-499587600	499587600	OIL SEAL INSTALLER	Used for installing camshaft oil seal for DOHC engine.
 ST-499597200	499597200	OIL SEAL GUIDE	Used for installing camshaft oil seal for DOHC engine. Used with OIL SEAL GUIDE (499587600).
 ST-498277200	498277200	STOPPER SET	Used for installing automatic transmission assembly to engine.

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18482AA000	18482AA000	CARTRIDGE	Troubleshooting for electrical systems.
ST22771AA030	22771AA030	SUBARU SELECT MONITOR KIT	Troubleshooting for electrical systems. • English: 22771AA030 (Without printer) • German: 22771AA070 (Without printer) • French: 22771AA080 (Without printer) • Spanish: 22771AA090 (Without printer)

2. GENERAL PURPOSE TOOLS

TOOL NAME	REMARKS
Compression Gauge	Used for measuring compression.

E: PROCEDURE

It is possible to conduct the following service procedures with engine on the vehicle, however, the procedures described in this section are based on the condition that the engine is removed from the vehicle.

- V-belt
- Timing Belt
- Camshaft
- Cylinder Head

2. Compression

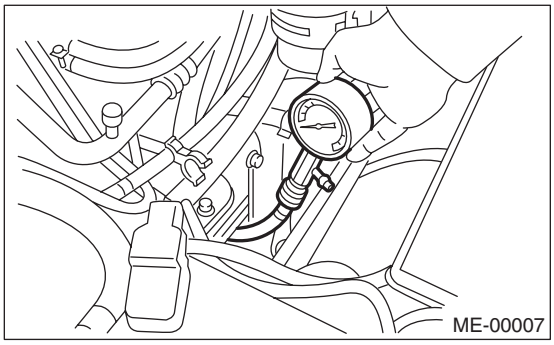
A: INSPECTION

CAUTION:
After warming-up, engine becomes very hot. Be careful not to burn yourself during measurement.

1) After warming-up the engine, turn the ignition switch to OFF.
2) Make sure that the battery is fully charged.
3) Release the fuel pressure. <Ref. to FU(H4DOTC)-54, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
4) Remove all the spark plugs. <Ref. to IG(H4DOTC)-4, REMOVAL, Spark Plug.>
5) Fully open the throttle valve.
6) Check the starter motor for satisfactory performance and operation.
7) Hold the compression gauge tight against spark plug hole.

NOTE:
When using a screw-in type compression gauge, the screw (put into cylinder head spark plug hole) should be less than 18 mm (0.71 in) long.

8) Crank the engine by means of starter motor, and then read the maximum value on the needle of gauge when the needle is steady.



9) Perform at least two measurements per cylinder, and make sure that the values are correct.

Compression (350 rpm and fully open throttle):

Except Australia model
Standard
981 — 1,177 kPa (10 — 12 kgf/cm^2, 142 — 171 psi)
Limit
882 kPa (9.0 kgf/cm^2, 128 psi)
Difference between cylinders
Less than 49 kPa (0.5 kgf/cm^2, 7 psi)

Australia model (Except STi model)
Standard
1.108 — 1,304 kPa (11 — 13 kgf/cm^2, 161 — 189 psi)
Limit
951 kPa (10 kgf/cm^2, 138 psi)
Difference between cylinders
Less than 49 kPa (0.5 kgf/cm^2, 7 psi)

3. Idle Speed

A: INSPECTION

1. USING SUBARU SELECT MONITOR

1) Before checking the idle speed, check the following:
   (1) Ensure the air cleaner element is free from clogging, ignition timing is correct, spark plugs are in good condition, and that the hoses are connected properly.
   (2) Ensure the malfunction indicator light does not illuminate.
2) Warm-up the engine.
3) Stop the engine, and then turn the ignition switch to OFF.
4) Insert the cartridge to SUBARU SELECT MONITOR.
5) Connect the SUBARU SELECT MONITOR to data link connector.
6) Turn the ignition switch to ON, and SUBARU SELECT MONITOR switch to ON.
7) Select the {2. Each System Check} in Main Menu.
8) Select the {Engine Control System} in Selection Menu.
9) Select the {1. Current Data Display & Save} in Engine Control System Diagnosis.
10) Select the {1.12 Data Display} in Data Display Menu.
11) Start the engine, and then read the engine idle speed.
12) Check the idle speed when unloaded. (With headlights, heater fan, rear defroster, radiator fan, A/C, etc. OFF)

Idle speed [No load and gears in neutral]:
Except Australia model
700±100 rpm
Australia model (Except STi model)
750±100 rpm

13) Check the idle speed when loaded. (Turn the A/C switch to “ON” and operate the compressor for at least 1 minute before measurement.)

Idle speed [A/C “ON”, no load and gears in neutral]:

Except Australia model
800±150 rpm

Australia model (Except STi model)
800±50 rpm (MT model)
820±50 rpm (AT model)

NOTE:
As idle speed is controlled by the automatic adjustment type, it can not be adjusted manually. If the idle speed is out of specifications, refer to General On-board Diagnosis Table under “Engine Control System”. <Ref. to EN(H4DOTC)(diag)-2, Basic Diagnostic Procedure.>

4. Ignition Timing

A: INSPECTION

1. USING SUBARU SELECT MONITOR

1) Before checking the ignition timing speed, check the following:
   (1) Ensure the air cleaner element is free from clogging, spark plugs are in good condition, and that hoses are connected properly.
   (2) Ensure the malfunction indicator light does not illuminate.
2) Warm-up the engine.
3) Stop the engine, and then turn the ignition switch to OFF.
4) Insert the cartridge to SUBARU SELECT MONITOR.
5) Connect the SUBARU SELECT MONITOR to data link connector.
6) Turn the ignition switch to ON, and SUBARU SELECT MONITOR switch to ON.
7) Select the {2. Each System Check} in Main Menu.
8) Select the {Engine Control System} in Selection Menu.
9) Select the {1. Current Data Display & Save} in Engine Control System Diagnosis.
10) Select the {1.12 Data Display} in Data Display Menu.
11) Start the engine and check the ignition timing at idle speed.

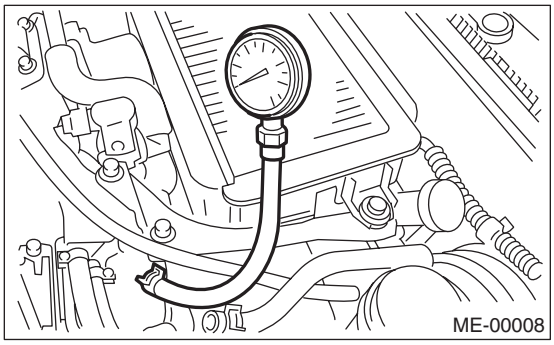
Ignition timing [BTDC/rpm]:
Except Australia model
12°±10°/700
Australia model (Except STi model)
12°±10°/750

If the timing is not correct, check the ignition control system. Refer to Engine Control System. <Ref. to EN(H4DOTC)(diag)-2, Basic Diagnostic Procedure.>

5. Intake Manifold Vacuum

A: INSPECTION

1) Warm-up the engine.
2) Disconnect the brake vacuum hose, and then install the vacuum gauge to hose fitting on intake manifold.
3) Keep the engine at the idle speed, and then read the vacuum gauge indication.
By observing the needle of gauge movement, the internal condition of engine can be diagnosed as described below.



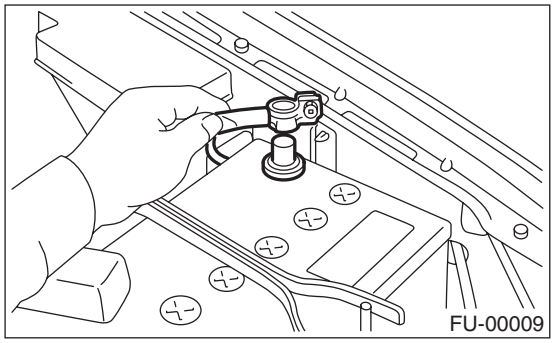
Vacuum pressure (at idling, A/C "OFF"):
Less than −60.0 kPa (−450 mmHg, −17.72 in-Hg)

Diagnosis of engine condition by measurement of manifold vacuum	
Vacuum gauge indication	Possible engine condition
1. Needle is steady but lower than normal position. This tendency becomes more evident as engine temperature rises.	Leakage around intake manifold gasket or disconnection or damaged vacuum hose
2. Needle intermittently drops to position lower than normal position.	Leakage around cylinder
3. Needle drops suddenly and intermittently from normal position.	Sticky valves
4. When engine speed is gradually increased, needle begins to vibrate rapidly at certain speed, and then vibration increases as engine speed increases.	Weak or broken valve springs
5. Needle vibrates above and below normal position in narrow range.	Defective ignition system or throttle chamber idle adjustment

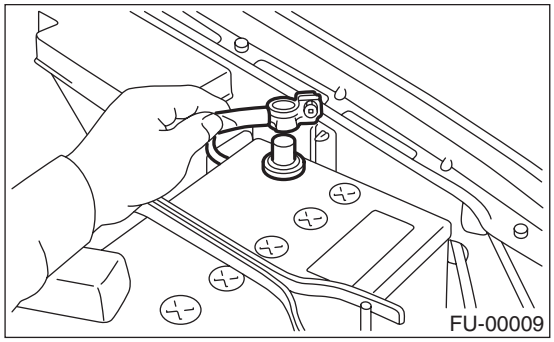
6. Engine Oil Pressure

A: INSPECTION

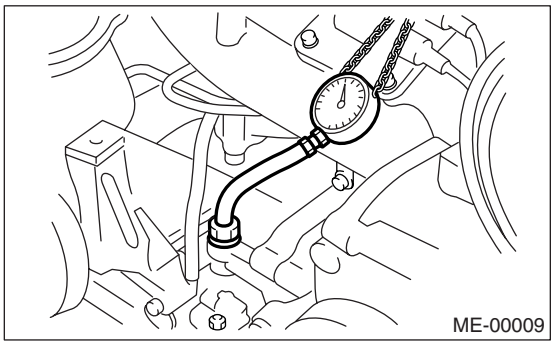
1) Disconnect the ground cable from battery.



2) Remove the oil pressure switch from engine cylinder block. <Ref. to LU(H4DOTC)-19, REMOVAL, Oil Pressure Switch.>
3) Connect the oil pressure gauge hose to cylinder block.
4) Connect the battery ground cable to battery.



5) Start the engine, and then measure the oil pressure.



Oil pressure:
98 kPa (1.0 kgf/cm^2, 14 psi) or more at 600 rpm
294 kPa (3.0 kgf/cm^2, 43 psi) or more at 5,000 rpm

- If the oil pressure is out of specification, check oil pump, oil filter and lubrication line. <Ref. to LU(H4DOTC)-22, INSPECTION, Engine Lubrication System Trouble in General.>
- If the oil pressure warning light is turned ON and oil pressure is in standard valve, replace the oil pressure switch. <Ref. to LU(H4DOTC)-22, INSPECTION, Engine Lubrication System Trouble in General.>

NOTE:
The standard valve is based on an engine oil temperature of 80°C (176°F).

6) After measuring the oil pressure, install the oil pressure switch. <Ref. to LU(H4DOTC)-19, INSTALLATION, Oil Pressure Switch.>

Tightening torque:
25 N·m (2.5 kgf-m, 18.4 ft-lb)

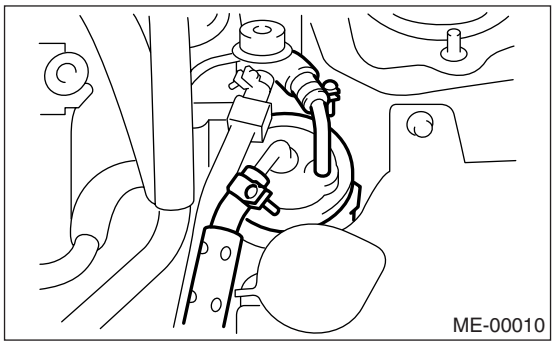
7. Fuel Pressure

A: INSPECTION

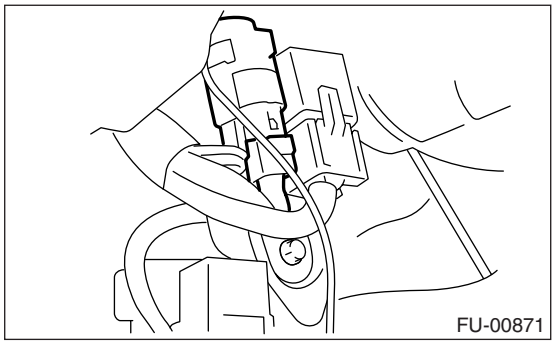
CAUTION:
Before removing the fuel pressure gauge, release the fuel pressure.

NOTE:
If out of standard valve, check or replace the pressure regulator and pressure regulator vacuum hose.

1) Release the fuel pressure. <Ref. to FU(H4DOTC)-54, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
2) Open the fuel filler flap lid, and then remove the fuel filler cap.
3) Disconnect the fuel delivery hoses from fuel filter, and then connect the fuel pressure gauge.

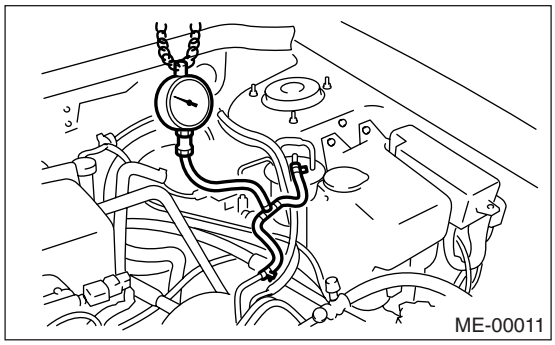


4) Connect the connector of fuel pump relay.



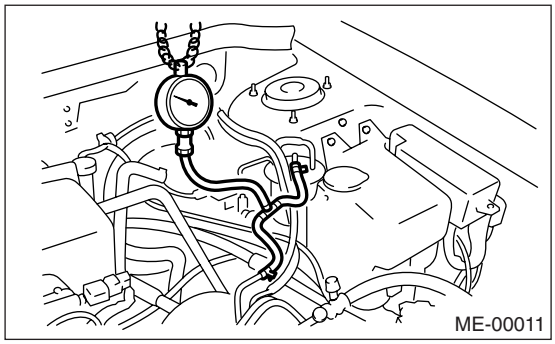
5) Start the engine.
6) Measure the fuel pressure while disconnecting the pressure regulator vacuum hose from intake manifold.

Fuel pressure:
Standard; 284 — 314 kPa (2.9 — 3.2 kgf/cm^2, 41 — 46 psi)



7) After connecting the pressure regulator vacuum hose, measure the fuel pressure.

Fuel pressure:
Standard; 230 — 260 kPa (2.35 — 2.65 kgf/cm^2, 33 — 38 psi)



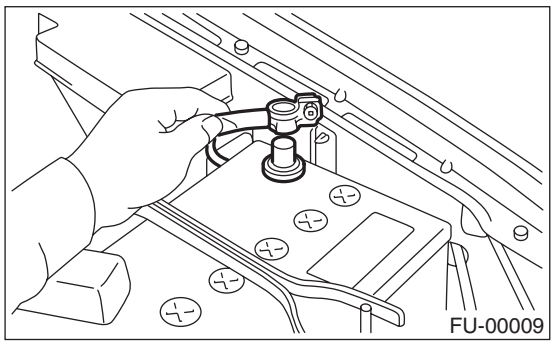
NOTE:
The fuel pressure gauge registers 10 to 20 kPa (0.1 to 0.2 kgf/cm^2, 1 to 3 psi) higher than standard values during high-altitude operations.

8. Valve Clearance

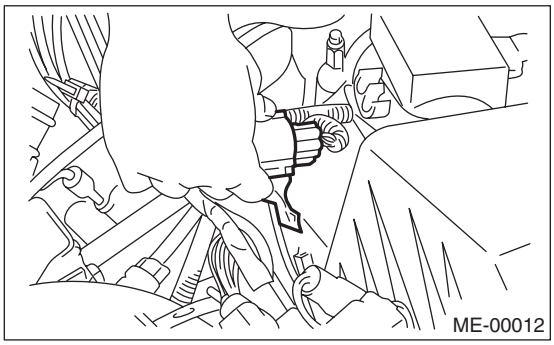
A: INSPECTION

Inspection and adjustment of the valve clearance should be performed while engine is cold.

1) Set the vehicle on a lift.
2) Disconnect the ground cable from battery.

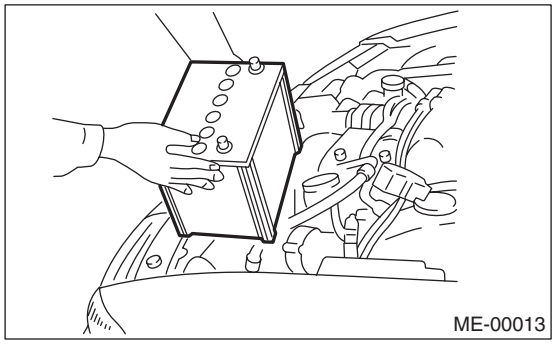


3) Remove the air intake duct. <Ref. to IN(H4DOTC)-10, REMOVAL, Air Intake Duct.>
4) Remove the bolts which secure the timing belt cover (RH).
5) Lift-up the vehicle.
6) Remove the under cover.
7) Loosen the remaining bolts which secure the timing belt cover (RH), and then remove the timing belt cover.
8) Lower the vehicle.
9) When inspecting the #1 and #3 cylinders:
   (1) Pull out the engine harness connector with bracket from air cleaner upper cover.

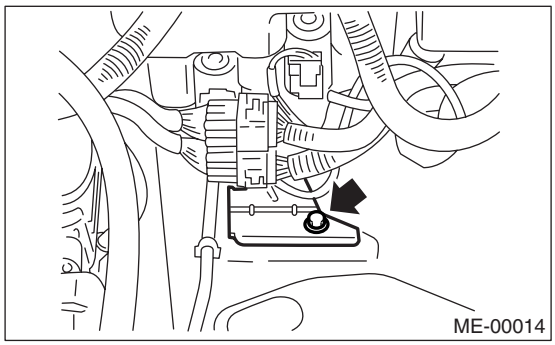


   (2) Remove the air cleaner case. <Ref. to IN(H4DOTC)-9, REMOVAL, Air Cleaner Case.>
   (3) Disconnect the ignition coil connector.
   (4) Remove the ignition coil.
   (5) Place a suitable container under the vehicle.
   (6) Disconnect the PCV hose from rocker cover (RH).
   (7) Remove the bolts, and then remove the rocker cover (RH).

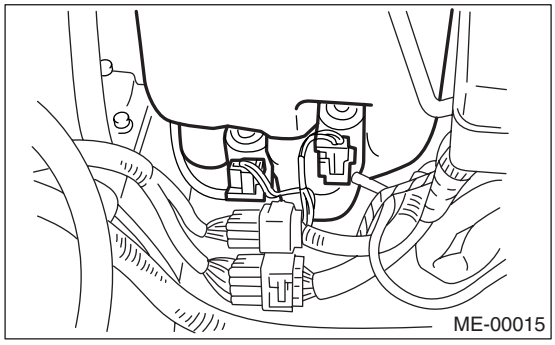
10) When inspecting the #2 and #4 cylinders:
   (1) Disconnect the battery cable, and then remove the battery and battery carrier.



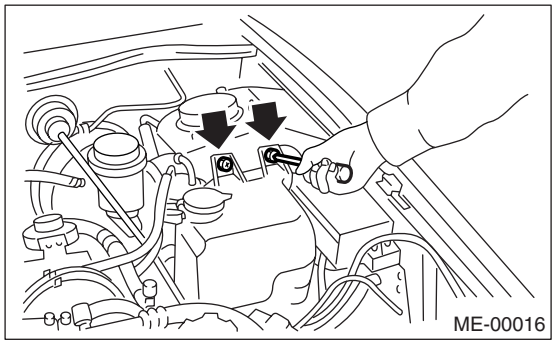
   (2) Remove the bolt which secures the engine harness bracket onto body.



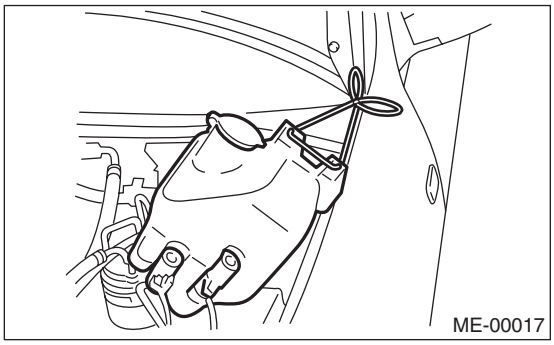
   (3) Disconnect the washer motor connectors.



   (4) Remove the washer tank mounting bolts.



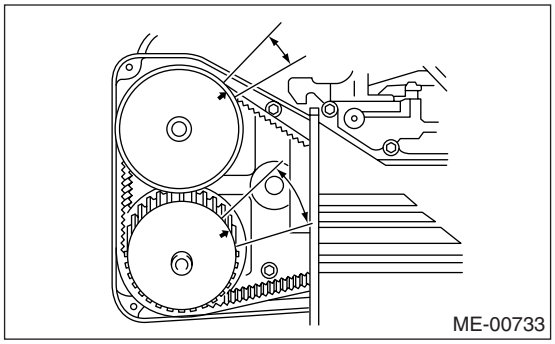
(5) Move the washer tank upward.



(6) Disconnect the ignition coil connector.
(7) Remove the ignition coil.
(8) Place a suitable container under the vehicle.
(9) Disconnect the PCV hose from rocker cover (LH).
(10) Remove the bolts, and then remove the rocker cover (LH).

11) Turn the crank pulley clockwise until arrow mark on the cam sprocket is set to position shown in the figure.

NOTE:
Turn the crankshaft using socket wrench.

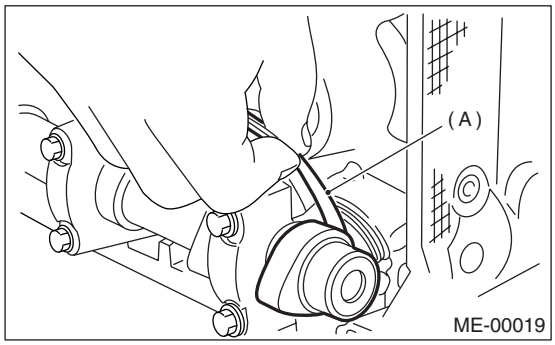


12) Measure the #1 cylinder intake valve and #3 cylinder exhaust valve clearance by using thickness gauge (A).

NOTE:
• Insert the thickness gauge in as horizontal a direction as possible with respect to the shim.
• Measure the exhaust valve clearances while lifting-up the vehicle.

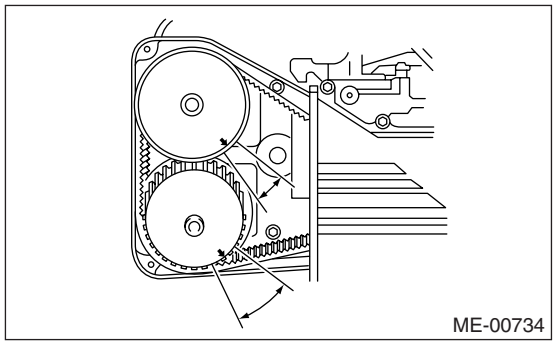
Valve clearance:
Intake: 0.20±0.02 mm (0.0079±0.0008 in)
Exhaust: 0.35±0.02 mm (0.0138±0.0008 in)

NOTE:
If the measured value is not within specification, take notes of the value in order to adjust the valve clearance later on.

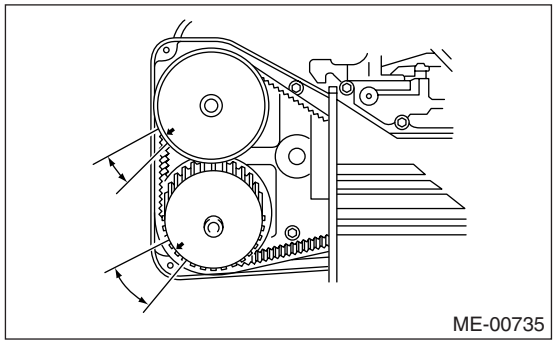


13) If necessary, adjust the valve clearance. <Ref. to ME(H4DOTC)-41, ADJUSTMENT, Valve Clearance.>

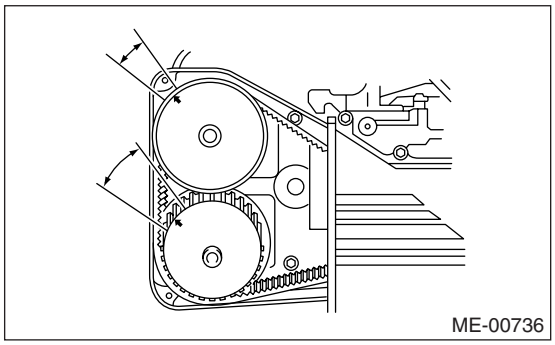
14) Further turn the crank pulley clockwise. Using the same procedures described previously, and then measure the valve clearances again.
(1) Set the arrow mark on cam sprocket to position shown in the figure, and then measure the #2 cylinder exhaust valve and #3 cylinder intake valve clearances.



(2) Set the arrow mark on cam sprocket to position shown in the figure, and then measure the #2 cylinder intake valve and #4 cylinder exhaust valve clearances.

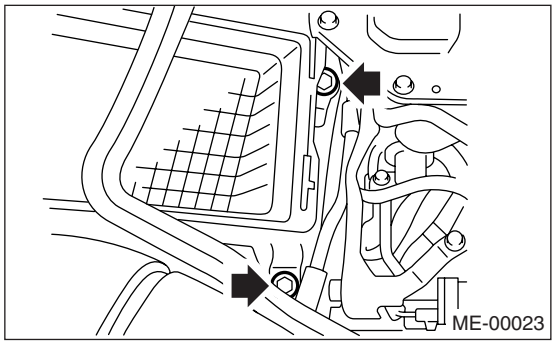


(3) Set the arrow mark on cam sprocket to position shown in the figure, and then measure the #1 cylinder exhaust valve and #4 cylinder intake valve clearances.


ME-00736

15) After inspection, install the related parts in the reverse order of removal.

Tightening torque:
33 N·m (3.4 kgf-m, 25 ft-lb)

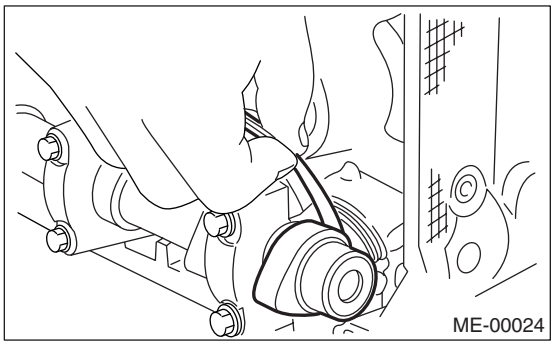

ME-00023

B: ADJUSTMENT

CAUTION:
Adjustment of the valve clearance should be performed while engine is cold.

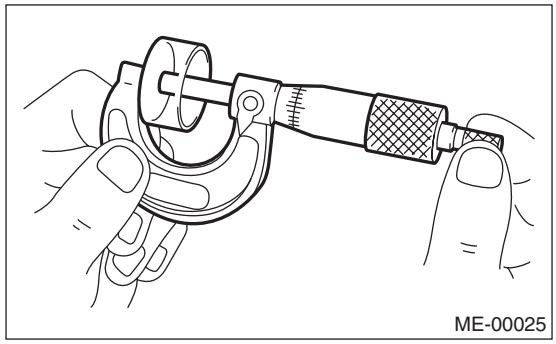
1) Measure all valve clearances. <Ref. to ME(H4DOTC)-39, INSPECTION, Valve Clearance.>

NOTE:
Record each valve clearance after it has been measured.


ME-00024

2) Remove the camshaft. <Ref. to ME(H4DOTC)-69, REMOVAL, Camshaft.>
3) Remove the valve lifter.

4) Measure the thickness of valve lifter with a micrometer.


ME-00025

5) Select a valve lifter of suitable thickness using measured valve clearance and valve lifter thickness, by referring to the following table.

Unit: mm
Intake valve: S = (V + T) − 0.20 Exhaust valve: S = (V + T) − 0.35
S: Valve lifter thickness required V: Measured valve clearance T: Valve lifter thickness to be used

Part No.	Thickness mm (in)
13228 AB101	4.68 (0.1843)
13228 AB111	4.69 (0.1846)
13228 AB121	4.70 (0.1850)
13228 AB131	4.71 (0.1854)
13228 AB141	4.72 (0.1858)
13228 AB151	4.73 (0.1862)
13228 AB161	4.74 (0.1866)
13228 AB171	4.75 (0.1870)
13228 AB181	4.76 (0.1874)
13228 AB191	4.77 (0.1878)
13228 AB201	4.78 (0.1882)
13228 AB211	4.79 (0.1886)
13228 AB221	4.80 (0.1890)
13228 AB231	4.81 (0.1894)
13228 AB241	4.82 (0.1898)
13228 AB251	4.83 (0.1902)
13228 AB261	4.84 (0.1906)
13228 AB271	4.85 (0.1909)
13228 AB281	4.86 (0.1913)
13228 AB291	4.87 (0.1917)
13228 AB301	4.88 (0.1921)
13228 AB311	4.89 (0.1925)
13228 AB321	4.90 (0.1929)
13228 AB331	4.91 (0.1933)
13228 AB341	4.92 (0.1937)
13228 AB351	4.93 (0.1941)
13228 AB361	4.94 (0.1945)
13228 AB371	4.95 (0.1949)
13228 AB381	4.96 (0.1953)

Part No.	Thickness mm (in)
13228 AB391	4.97 (0.1957)
13228 AB401	4.98 (0.1961)
13228 AB411	4.99 (0.1965)
13228 AB421	5.00 (0.1969)
13228 AB431	5.01 (0.1972)
13228 AB441	5.02 (0.1976)
13228 AB451	5.03 (0.1980)
13228 AB461	5.04 (0.1984)
13228 AB471	5.05 (0.1988)
13228 AB481	5.06 (0.1992)
13228 AB491	5.07 (0.1996)
13228 AB501	5.08 (0.2000)
13228 AB511	5.09 (0.2004)
13228 AB521	5.10 (0.2008)
13228 AB531	5.11 (0.2012)
13228 AB541	5.12 (0.2016)
13228 AB551	5.13 (0.2020)
13228 AB561	5.14 (0.2024)
13228 AB571	5.15 (0.2028)
13228 AB581	5.16 (0.2031)
13228 AB591	5.17 (0.2035)
13228 AB601	5.18 (0.2039)
13228 AB611	5.19 (0.2043)
13228 AB621	5.20 (0.2047)
13228 AB631	5.21 (0.2051)
13228 AB641	5.22 (0.2055)
13228 AB651	5.23 (0.2059)
13228 AB661	5.24 (0.2063)
13228 AB671	5.25 (0.2067)
13228 AB681	5.26 (0.2071)
13228 AB691	5.27 (0.2075)
13228 AB701	4.38 (0.1724)
13228 AB711	4.40 (0.1732)
13228 AB721	4.42 (0.1740)
13228 AB731	4.44 (0.1748)
13228 AB741	4.46 (0.1756)
13228 AB751	4.48 (0.1764)
13228 AB761	4.50 (0.1771)
13228 AB771	4.52 (0.1780)
13228 AB781	4.54 (0.1787)
13228 AB791	4.56 (0.1795)
13228 AB801	4.58 (0.1803)
13228 AB811	4.60 (0.1811)
13228 AB821	4.62 (0.1819)
13228 AB831	4.64 (0.1827)
13228 AB841	4.66 (0.1835)
13228 AB851	5.29 (0.2083)
13228 AB861	5.31 (0.2091)
13228 AB871	5.33 (0.2098)
13228 AB881	5.35 (0.2106)
13228 AB891	5.37 (0.2114)

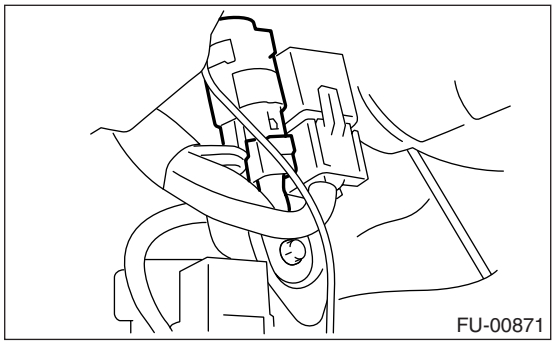
Part No.	Thickness mm (in)
13228 AB901	5.39 (0.2122)
13228 AB911	5.41 (0.2123)
13228 AB921	5.43 (0.2138)
13228 AB931	5.45 (0.2146)
13228 AB941	5.47 (0.2154)
13228 AB951	5.49 (0.2161)
13228 AB961	5.51 (0.2169)
13228 AB971	5.53 (0.2177)
13228 AB981	5.55 (0.2185)
13228 AB991	5.57 (0.2193)
13228 AC001	5.59 (0.2201)
13228 AC011	5.61 (0.2209)
13228 AC021	5.63 (0.2217)
13228 AC031	5.65 (0.2224)

6) Inspect all valves for clearance again at this stage. If the valve clearance is not correct, repeat the procedure over again from the first step.
7) After inspection, install the related parts in the reverse order of removal.

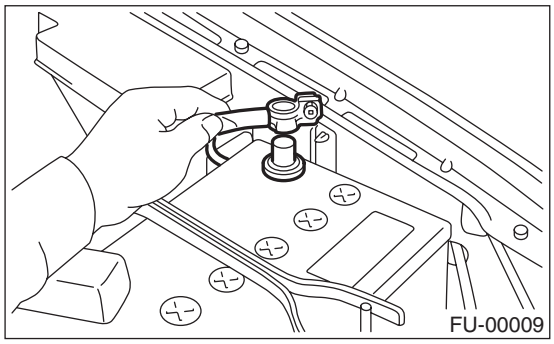
9. Engine Assembly

A: REMOVAL

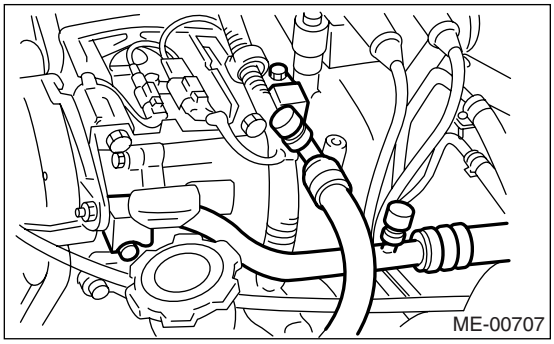
1) Set the vehicle on a lift.
2) Open the front hood fully, and then support with the hood stay.
3) Collect the refrigerant from A/C system.
4) Release the fuel pressure.
   (1) Disconnect the fuel pump relay connector.



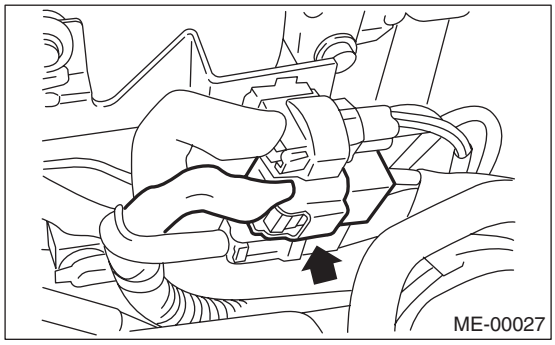
   (2) Start the engine, and run until stalls.
   (3) After the engine stalls, crank it for 5 seconds more.
   (4) Turn the ignition switch to OFF.
5) Remove the filler cap.
6) Disconnect the ground cable from battery.



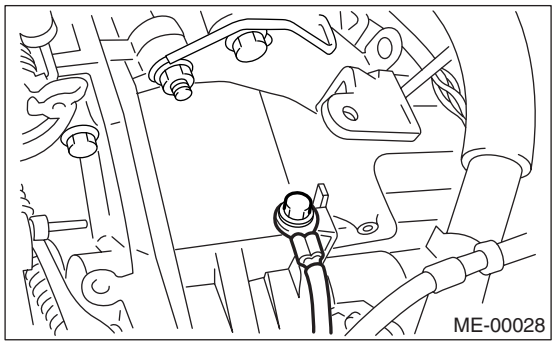
7) Remove the radiator from vehicle. <Ref. to CO(H4DOTC)-24, REMOVAL, Radiator.>
8) Remove the coolant filler tank. <Ref. to CO(H4DOTC)-33, REMOVAL, Coolant Filler Tank.>
9) Disconnect the A/C pressure hoses from A/C compressor.



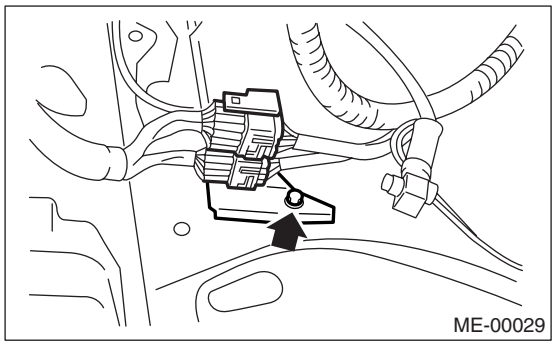
10) Remove the intercooler. <Ref. to IN(H4DOTC)-12, REMOVAL, Intercooler.>
11) Disconnect the following connectors and cable.
   (1) Engine harness connector



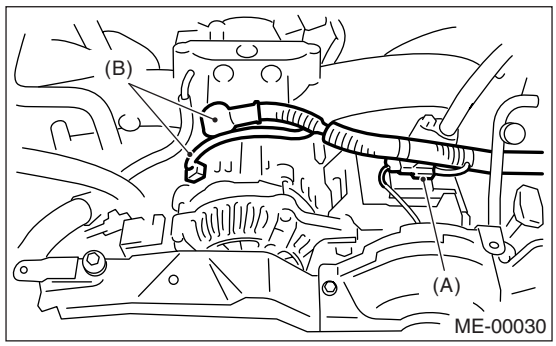
   (2) Engine ground terminal



   (3) Engine harness connector

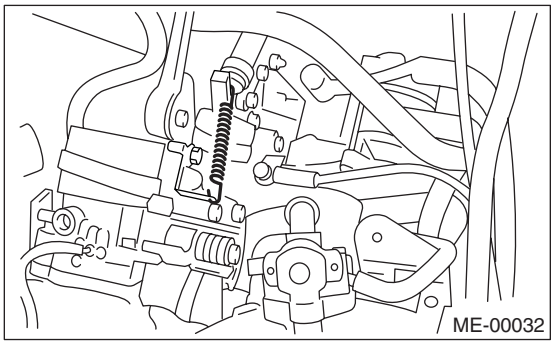


   (4) Generator connector, terminal and A/C compressor connectors

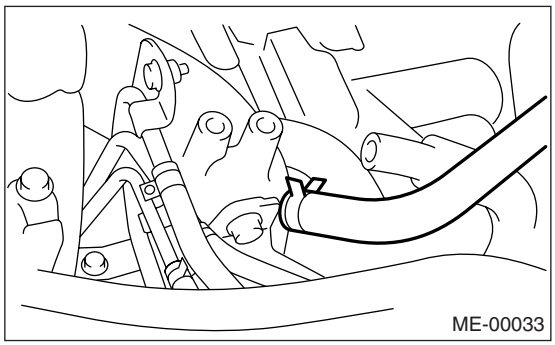


   (A) A/C compressor connector
   (B) Generator connector and terminal

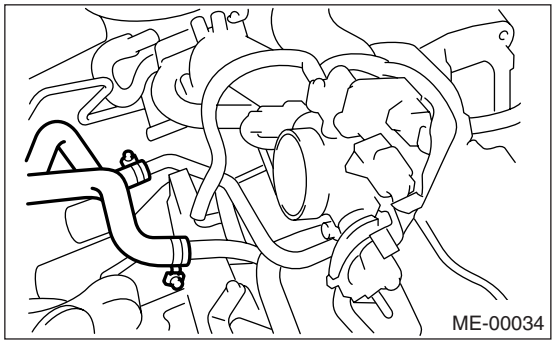
(5) Accelerator cable <Ref. to SP(H4SO)-9, REMOVAL, Accelerator Control Cable.>
(6) Clutch release spring (MT model)



12) Disconnect the following hoses.
(1) Brake booster vacuum hose

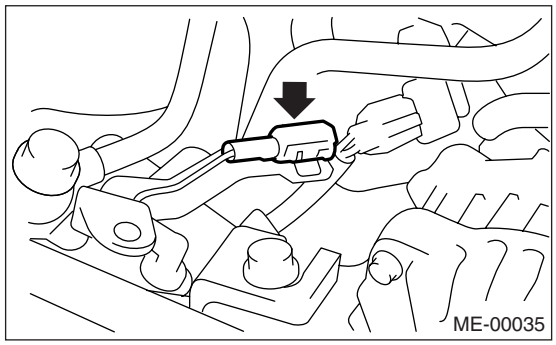


(2) Heater inlet outlet hose

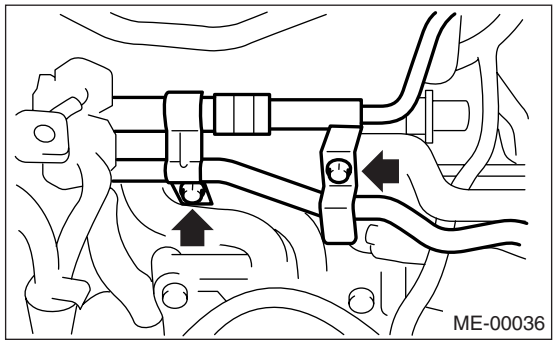


13) Remove the power steering pump from bracket.
(1) Loosen the lock bolt and slider bolt, and then remove the front side V-belt. <Ref. to ME(H4DOTC)-53, FRONT SIDE BELT, REMOVAL, V-belt.>

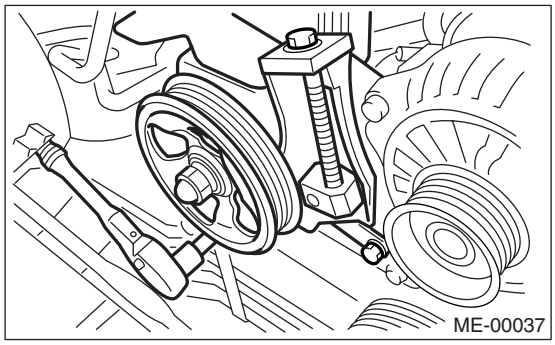
(2) Disconnect the power steering switch connector.



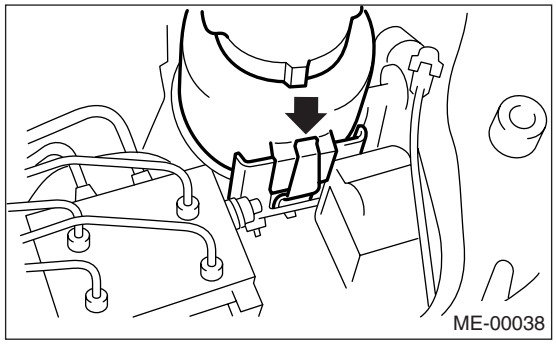
(3) Remove the pipe with bracket from intake manifold.



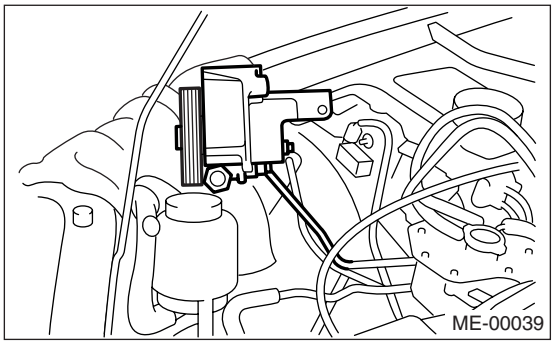
(4) Remove the power steering pump from engine.



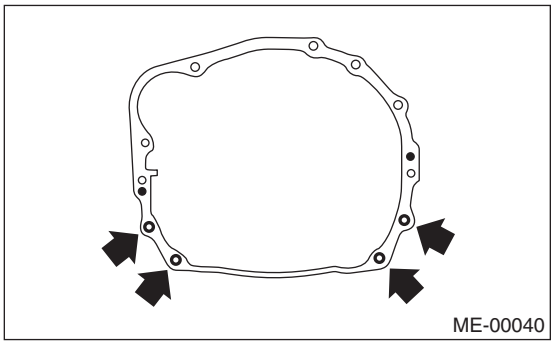
(5) Remove the power steering tank from bracket by pulling it upward.



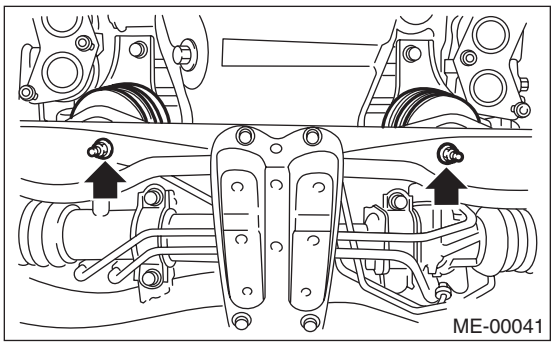
(6) Place the power steering pump on right side wheel apron.


ME-00039

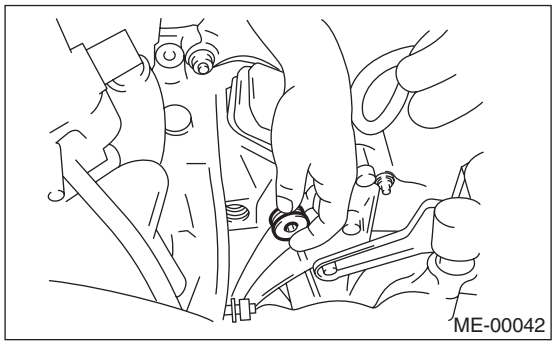
14) Lift-up the vehicle.
15) Remove the ATF cooler pipe from frame. (AT model)
16) Remove the center exhaust pipe. <Ref. to EX(H4DOTC)-10, REMOVAL, Center Exhaust Pipe.>
17) Remove the bolts and nuts which hold the lower side of transmission to engine.


ME-00040

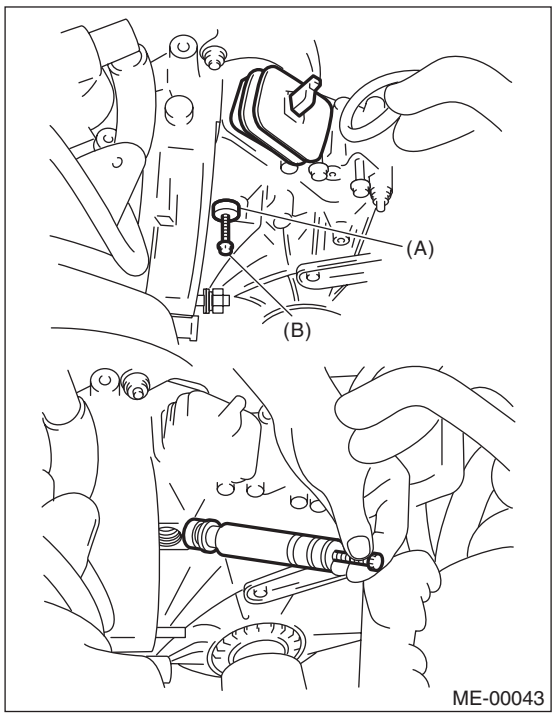
18) Remove the nuts which install the front cushion rubber onto front crossmember.


ME-00041

19) Lower the vehicle.
20) Separate the clutch release fork from release bearing. (MT model)
(1) Remove the clutch operating cylinder from transmission.
(2) Remove the plug using a 10 mm hexagon wrench.


ME-00042

(3) Screw the 6 mm dia. bolt into release fork shaft, and remove it.



ME-00043

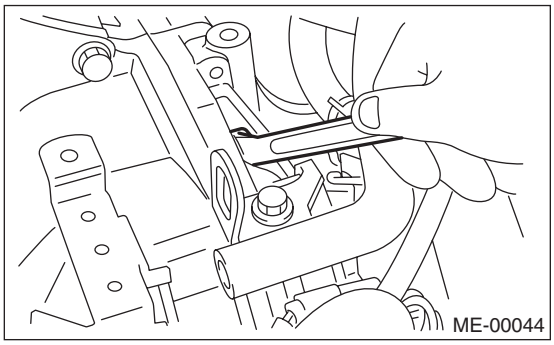
(A) Shaft
(B) Bolt

(4) Raise the release fork, and then unfasten the release bearing tabs to free release fork.

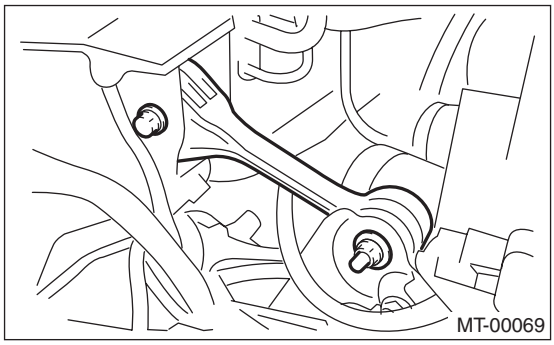
NOTE:
Step (4) is required to prevent interference with engine when removing the engine from transmission.

21) Separate the torque converter clutch from drive plate. (AT model)
(1) Lower the vehicle.
(2) Remove the service hole plug.
(3) Remove the bolts which hold the torque converter clutch to drive plate.

(4) Remove the other bolts while rotating the engine using socket wrench.

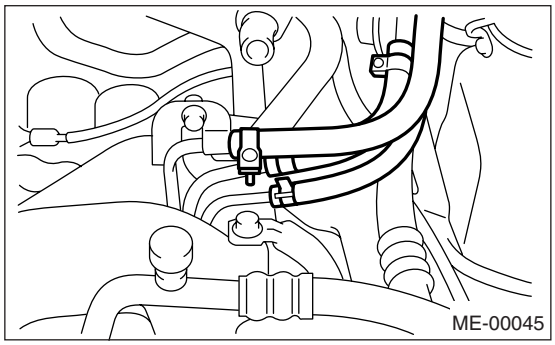


22) Remove the pitching stopper.

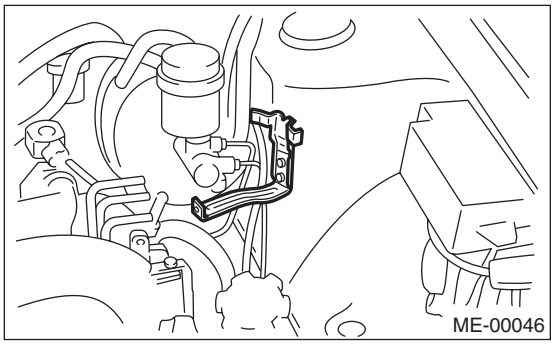


23) Disconnect the fuel delivery hose, return hose and evaporation hose.

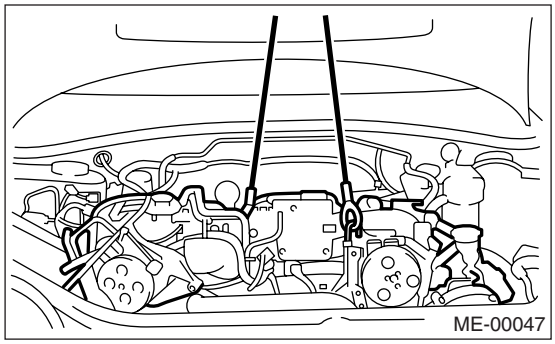
CAUTION:
• Disconnect the hose with its end wrapped with cloth to prevent fuel from splashing.
• Catch fuel from the hose into container.



24) Remove the fuel filter and bracket.

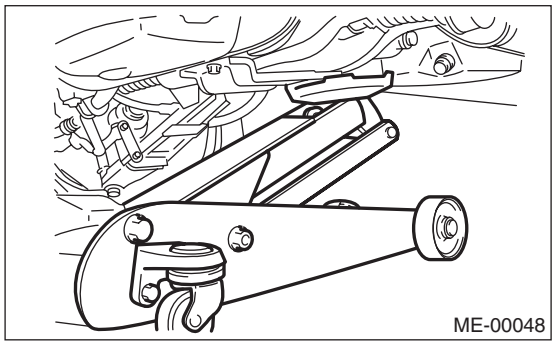


25) Support the engine with a lifting device and wire ropes.



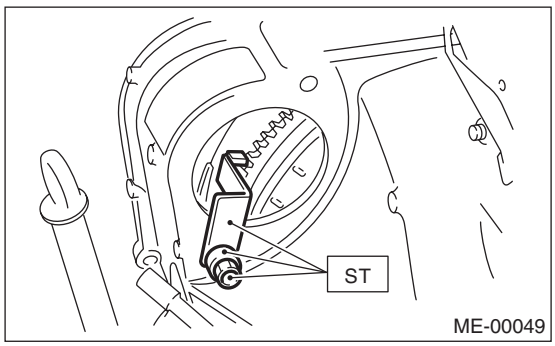
26) Support the transmission with a garage jack.

CAUTION:
Doing this is very important because the transmission lowers for its own weight. This work is also of great importance for facilitating reinstallation.

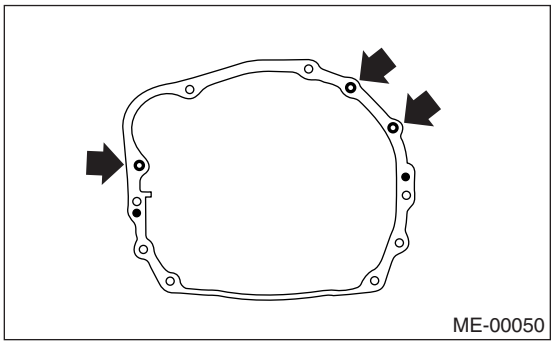


CAUTION:
Before moving the engine away from transmission, check to be sure no work has been overlooked.

27) Separation of the engine and transmission.
(1) Remove the starter. <Ref. to SC(H4SO)-8, REMOVAL, Starter.>
(2) Install the ST to converter case. (AT model)
ST 498277200 STOPPER SET



(3) Remove the bolts which hold the right upper side of transmission to engine.



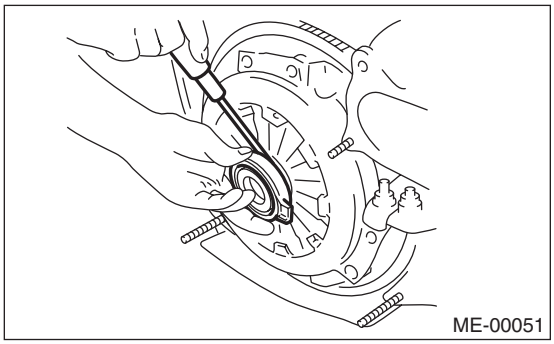
28) Remove the engine from vehicle.
(1) Slightly raise the engine.
(2) Raise the transmission with garage jack.
(3) Move the engine horizontally until the main-shaft is withdrawn from clutch cover.
(4) Slowly move the engine away from engine compartment.

NOTE:
Be careful not to damage adjacent parts or body panels with crank pulley, oil pressure gauge, etc.

29) Remove the front cushion rubbers.

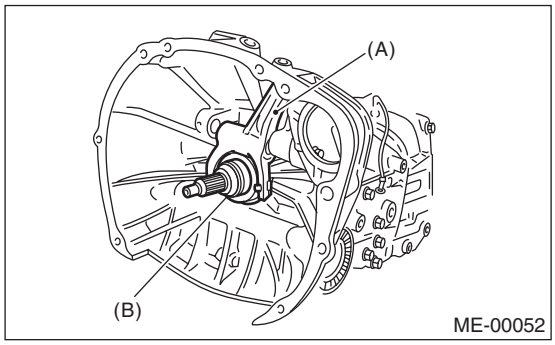
B: INSTALLATION

1) Install the clutch release fork and bearing onto transmission. (MT model)
(1) Remove the release bearing from clutch cover with flat type screw driver.



(2) Install the release bearing on transmission.

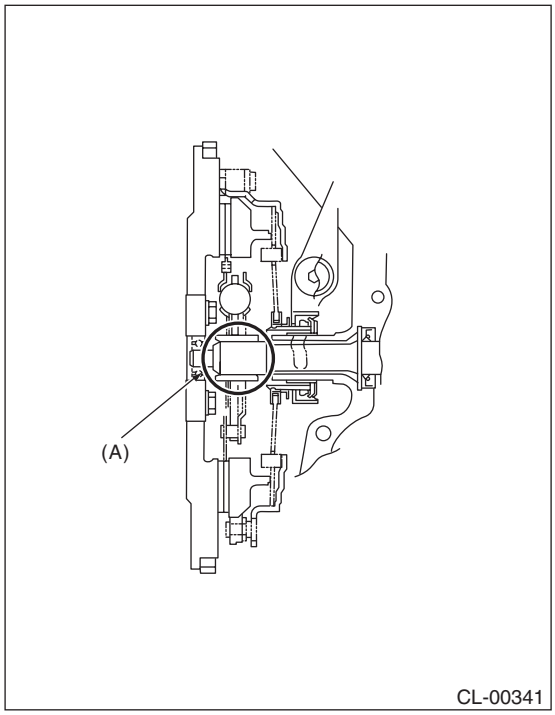
(3) Install the release fork into release bearing tab.



(A) Release fork
(B) Release bearing

(4) Apply grease to the spline.

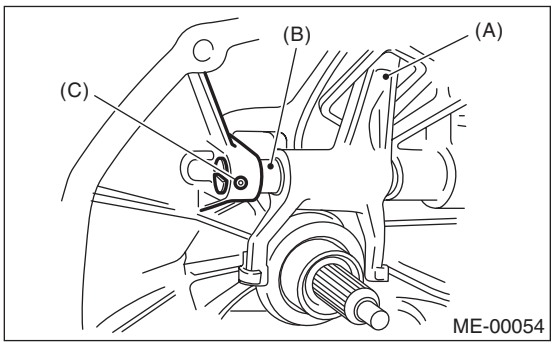
Grease: FX2200 (Part No. 000040901)



(A) Spline

(5) Insert the release fork shaft into release fork.

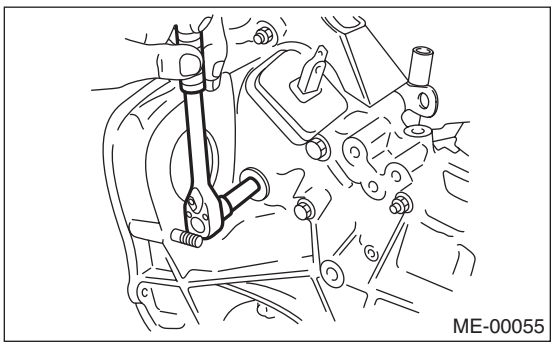
CAUTION:
Make sure the cutout portion of release fork shaft contacts spring pin.



(A) Release fork
(B) Release shaft
(C) Spring pin

(6) Tighten the plug.

Tightening torque:
44 N·m (4.5 kgf-m, 32.5 ft-lb)



2) Install the front cushion rubbers to engine.

Tightening torque:
35 N·m (3.6 kgf-m, 25.8 ft-lb)

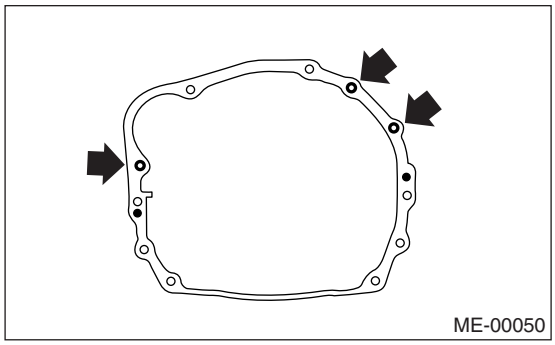
3) Install the engine onto transmission.
(1) Position the engine in engine compartment, and then align it with the transmission.

NOTE:
Be careful not to damage the adjacent parts or body panels with crank pulley, oil level gauge, etc.

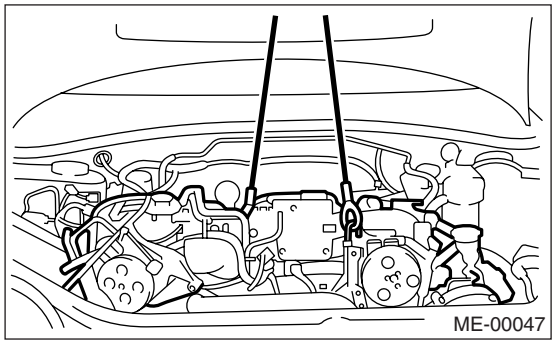
(2) Apply a small amount of grease to the splines of mainshaft. (MT model)

4) Tighten the bolts which hold the upper side of transmission to engine.

Tightening torque:
50 N·m (5.1 kgf-m, 36.9 ft-lb)

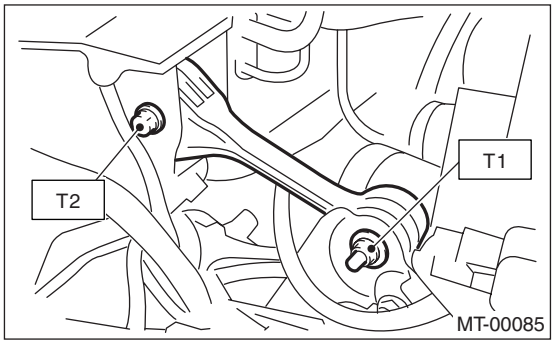


5) Remove the lifting device and wire ropes.
6) Remove the garage jack.



7) Install the pitching stopper.

Tightening torque:
T1: 50 N·m (5.1 kgf-m, 36.9 ft-lb)
T2: 58 N·m (5.9 kgf-m, 43 ft-lb)



8) Remove the ST from converter case. (AT model)

NOTE:
Be careful not to drop the ST into converter case when removing ST.
ST 498277200 STOPPER SET

9) Install the starter. <Ref. to SC(H4SO)-8, INSTALLATION, Starter.>

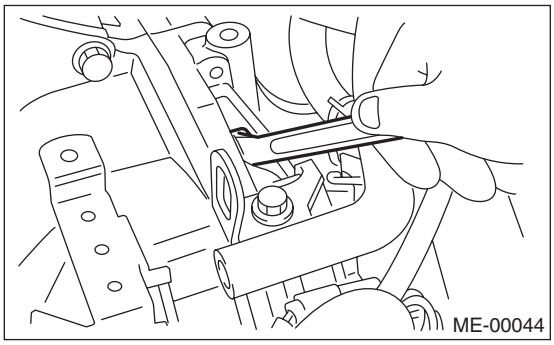
10) Install the torque converter clutch onto drive plate. (AT model)
(1) Tighten the bolts which hold the torque converter clutch to drive plate.

(2) Tighten other bolts while rotating the engine by using ST.

CAUTION:
Be careful not to drop bolts into the torque converter clutch housing.

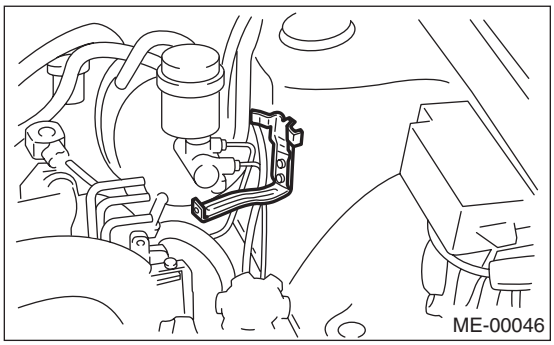
ST 499977400 CRANK PULLEY WRENCH

Tightening torque:
25 N·m (2.5 kgf-m, 18.4 ft-lb)

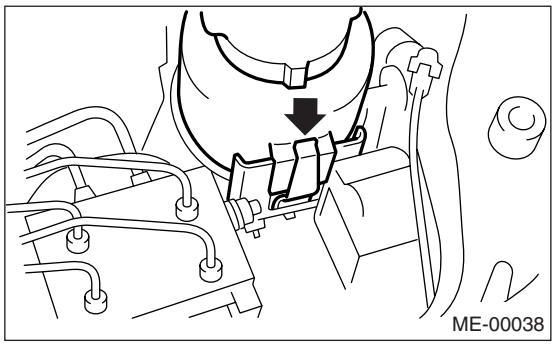


(3) Install the service hole with plug and prevent foreign matters from being mixed.

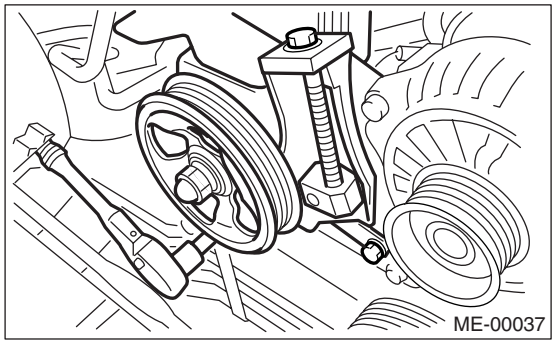
11) Install the fuel filter and bracket.



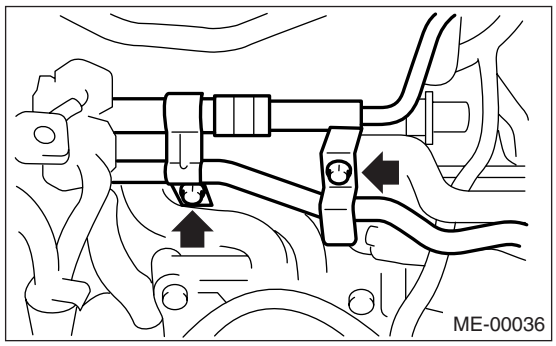
12) Install the power steering pump on bracket.
(1) Install the power steering tank on bracket.



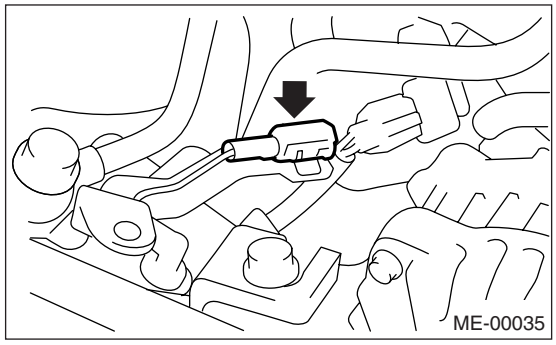
(2) Install the power steering pump.
<Ref. to PS-94, INSTALLATION, Oil Pump.>



(3) Install the power steering pipe bracket on intake manifold RH.



(4) Connect the power steering switch connector.

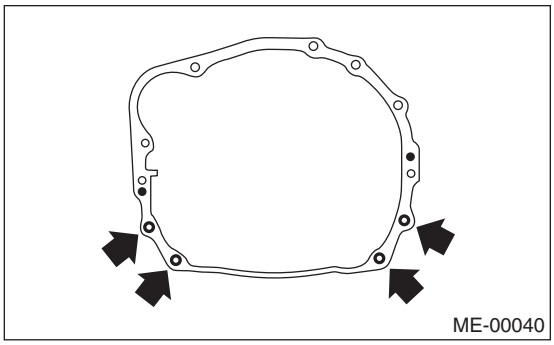


(5) Install the front side V-belt, and adjust it. <Ref. to ME(H4DOTC)-53, FRONT SIDE BELT, INSTALLATION, V-belt.>

13) Lift-up the vehicle.

14) Tighten the bolts and nuts which hold the lower side of transmission to engine.

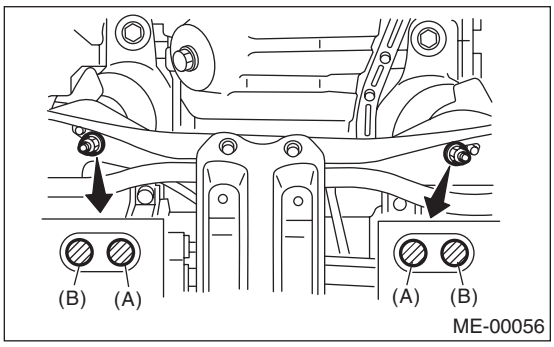
Tightening torque:
50 N·m (5.1 kgf-m, 36.9 ft-lb)



15) Tighten the nuts which install the front cushion rubber onto crossmember.

Tightening torque:
85 N·m (8.7 kgf-m, 62.7 ft-lb)

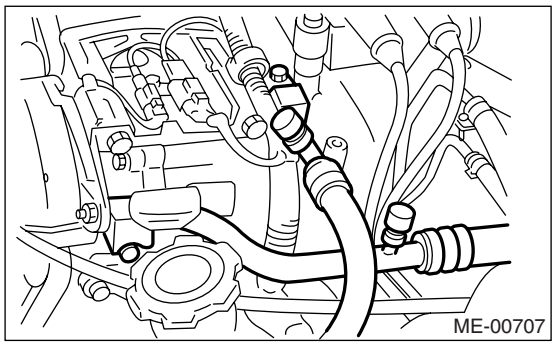
NOTE:
Make sure the front cushion rubber mounting bolts (A) and locator (B) are securely installed.



16) Install the ATF cooler pipe to frame. (AT model)
17) Install the center exhaust pipe.
<Ref. to EX(H4DOTC)-11, INSTALLATION, Center Exhaust Pipe.>
18) Lower the vehicle.
19) Connect the following hoses:
(1) Fuel delivery hose, return hose and evaporation hose
(2) Heater inlet and outlet hoses
(3) Brake booster vacuum hose
20) Connect the following connectors and terminals:
(1) Engine ground terminal
(2) Engine harness connectors
(3) Generator connector and terminal
(4) A/C compressor connectors
21) Connect the following cables:
(1) Accelerator cable
<Ref. to SP(H4SO)-9, INSTALLATION, Accelerator Control Cable.>
(2) Clutch release spring
22) After connecting each cable, adjust them.
23) Install the air intake system.
(1) Install the intercooler. <Ref. to IN(H4DOTC)-12, INSTALLATION, Intercooler.>
(2) Install the air cleaner element and air cleaner upper cover.
(3) Install the engine harness connector bracket.
(4) Install the filler hose to air cleaner case.
24) Install the A/C pressure hoses.

NOTE:
Use new O-rings.

Tightening torque:
25 N·m (2.5 kgf-m, 18.4 ft-lb)



25) Install the radiator. <Ref. to CO(H4DOTC)-25, INSTALLATION, Radiator.>
26) Install the coolant filler tank. <Ref. to CO(H4DOTC)-33, INSTALLATION, Coolant Filler Tank.>
27) Install the window washer tank.
28) Install the battery in the vehicle, and then connect the cables.
29) Fill coolant.
<Ref. to CO(H4DOTC)-18, FILLING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>
30) Charge the A/C system with refrigerant.
<Ref. to AC-22, PROCEDURE, Refrigerant Charging Procedure.>
31) Remove the front hood stay, and close the front hood.
32) Take off the vehicle from lift arms.

10.Engine Mounting

A: REMOVAL

1) Remove the engine assembly. <Ref. to ME(H4DOTC)-43, REMOVAL, Engine Assembly.>
2) Remove the engine mounting from engine assembly.

B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
Engine mounting;
35 N·m (3.6 kgf-m, 25.8 ft-lb)

C: INSPECTION

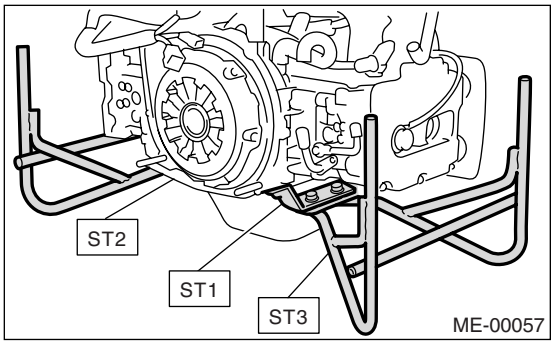
Make sure there are no cracks or other damage.

11.Preparation for Overhaul

A: PROCEDURE

1) After removing the engine from body, secure it in the ST shown below.

ST1	498457000	ENGINE STAND ADAPTER RH
ST2	498457100	ENGINE STAND ADAPTER LH
ST3	499817000	ENGINE STAND



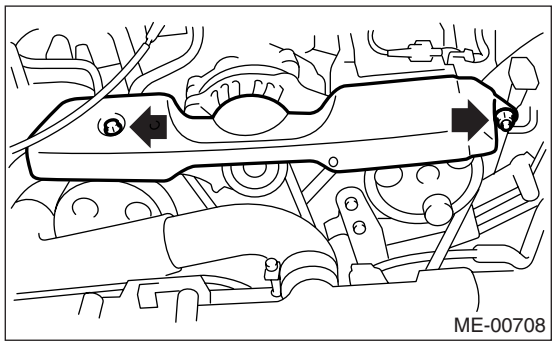
2) In this section the procedures described under each index are all connected and stated in order. It will be the complete procedure for overhauling of the engine itself when you go through all steps in the process.
Therefore, in this section, to conduct the particular procedure within the flow of a section, you need to go back and conduct the procedure described previously in order to do that particular procedure.

12.V-belt

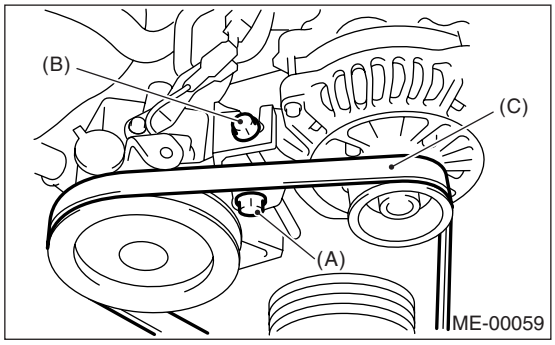
A: REMOVAL

1. FRONT SIDE BELT

1) Remove the V-belt cover.

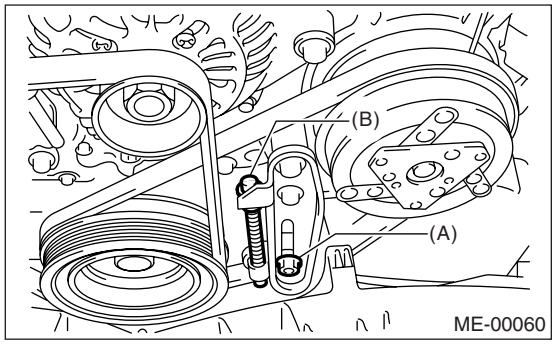


2) Loosen the lock bolt (A).
3) Loosen the slider bolt (B).
4) Remove the front side belt (C).

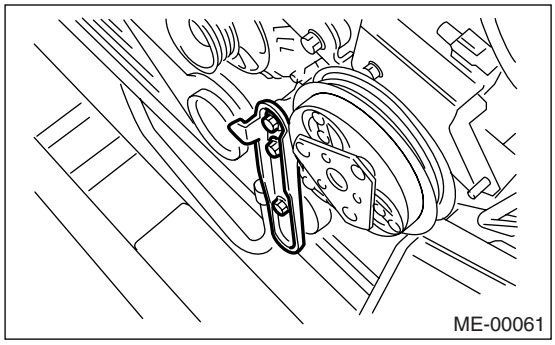


2. REAR SIDE BELT

1) Loosen the lock nut (A).
2) Loosen the slider bolt (B).



3) Remove the A/C belt.
4) Remove the A/C belt tensioner.



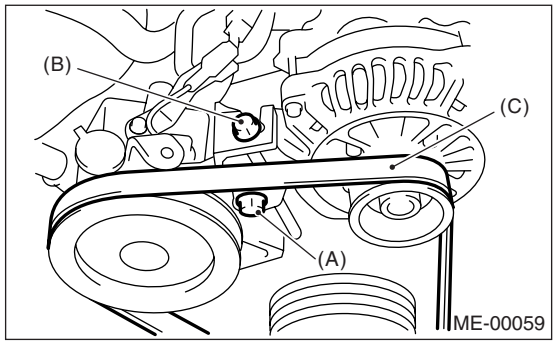
B: INSTALLATION

NOTE:
Wipe off any oil or water on the belt and pulley.

1. FRONT SIDE BELT

1) Install a V-belt (C), and tighten the slider bolt so as to obtain the specified belt tension. <Ref. to ME(H4DOTC)-54, INSPECTION, V-belt.>
2) Tighten the lock bolt (A).
3) Tighten the slider bolt (B).

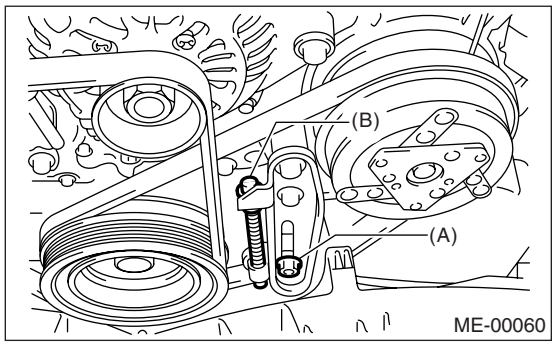
Tightening torque:
Lock bolt (A):
25 N·m (2.5 kgf-m, 18.4 ft-lb)
Slider bolt (B):
8 N·m (0.8 kgf-m, 5.9 ft-lb)



2. REAR SIDE BELT

1) Install the A/C belt tensioner.
2) Install a V-belt, and tighten the slider bolt (B) so as to obtain the specified belt tension.
<Ref. to ME(H4DOTC)-54, INSPECTION, V-belt.>
3) Tighten the lock nut (A).

Tightening torque:
Lock nut (A):
22.6 N·m (2.3 kgf-m, 16.6 ft-lb)



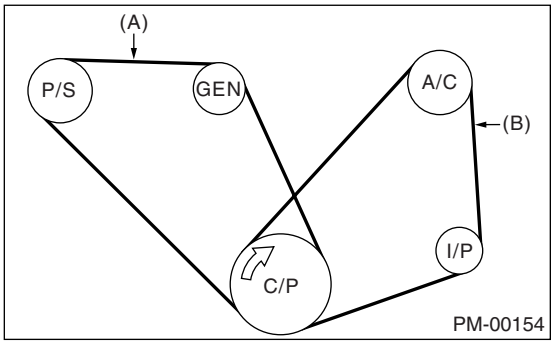
C: INSPECTION

1) Replace the belts, if cracks, fraying or wear is found.
2) Check the V-belt tension and adjust it if necessary by changing the generator installing position and idler pulley installing position.

Belt tension (with belt tension gauge)

(A)
When installing new parts:
618 — 755 N (63 — 77 kgf, 139 — 170 lbf)
At inspection:
490 — 640 N (50 — 65 kgf, 110 — 144 lbf)

(B)
When installing new parts:
740 — 880 N (75 — 90 kgf, 166 — 198 lbf)
At inspection:
350 — 450 N (36 — 46 kgf, 78 — 101 lbf)

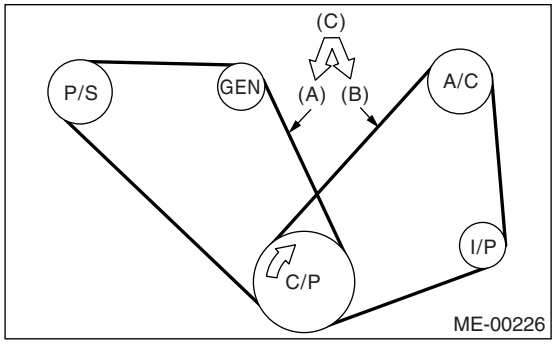


(A) Front side belt
(B) Rear side belt
C/P Crank pulley
GEN Generator
P/S Power steering oil pump pulley
A/C A/C compressor pulley
I/P Idler pulley

Belt tension (without belt tension gauge)

(A)
When installing new parts:
7 — 9 mm (0.276 — 0.354 in)
At inspection:
9 — 11 mm (0.354 — 0.433 in)

(B)
When installing new parts:
7.5 — 8.5 mm (0.295 — 0.335 in)
At inspection:
9.0 — 10.0 mm (0.354 — 0.394 in)



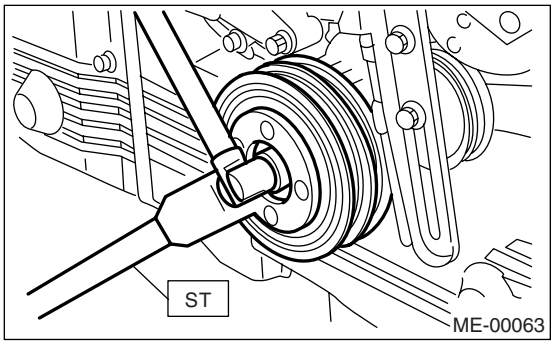
(A) Front side belt
(B) Rear side belt
(C) 98 N (10 kgf, 22 lbf)
C/P Crank pulley
GEN Generator
P/S Power steering oil pump pulley
A/C A/C compressor pulley
I/P Idler pulley

13.Crank Pulley

A: REMOVAL

1) Remove the V-belt. <Ref. to ME(H4DOTC)-53, REMOVAL, V-belt.>
2) Remove the crank pulley bolt. To lock the crankshaft, use ST.

ST 499977400 CRANK PULLEY WRENCH (Except STi model)
ST 499977100 CRANK PULLEY WRENCH (STi model)



3) Remove the crank pulley.

B: INSTALLATION

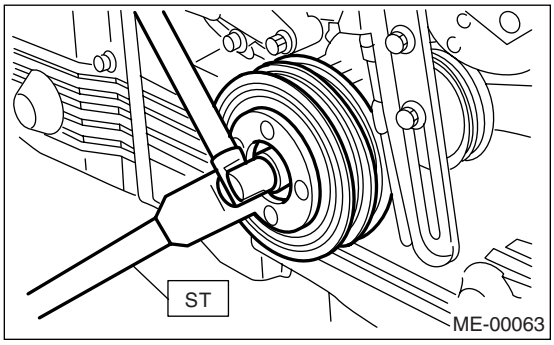
1. EXCEPT STi MODEL

1) Install the crank pulley.
2) Install the pulley bolt.
To lock the crankshaft, use ST.

ST 499977400 CRANK PULLEY WRENCH (Except STi model)
ST 499977100 CRANK PULLEY WRENCH (STi model)

(1) Clean the crank pulley thread using an compressed air.
(2) Apply engine oil to the crank pulley bolt seat and thread.
(3) Tighten the bolts temporarily with tightening torque of 44 N·m (4.5 kgf-m, 32.5 ft-lb).
(4) Tighten the crank pulley bolts.

Tightening torque:
130 N·m (13.3 kgf-m, 95.9 ft-lb)



3) Confirm that the tightening angle of crank pulley bolt is 45 degrees or more. If the tightening angle of crank pulley bolt is less than 45 degrees, conduct the following procedures.

CAUTION:
If the tightening angle of crank pulley bolt is less than 45 degrees, the bolt should be damaged. In this case, the bolt must be replaced.

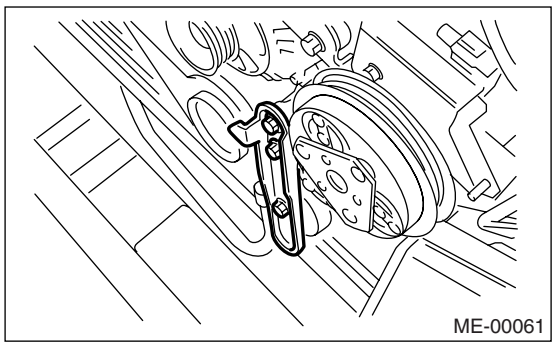
(1) Replace the crank pulley bolts and clean them.

Crank pulley bolt:
12369AA011

(2) Clean the crankshaft thread using compressed air.
(3) Tighten the bolts temporarily with tightening torque of 44 N·m (4.5 kgf-m, 32.5 ft-lb).
(4) Tighten the crank pulley bolts keeping them in an angle between 45 degrees and 60 degrees.

NOTE:
Conduct the tightening procedures by confirming the turning angle of crank pulley bolt referring to the gauge indicated on timing belt cover.

4) Install the A/C belt tensioner.



5) Install the V-belt. <Ref. to ME(H4DOTC)-53, INSTALLATION, V-belt.>

2. STi MODEL

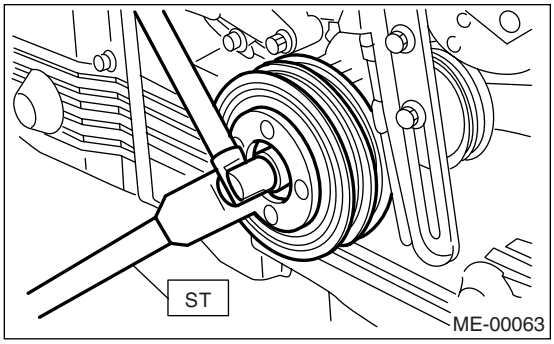
1) Install the crank pulley.
2) Install the pulley bolt.
To lock the crankshaft, use ST.

ST 499977100 CRANK PULLEY WRENCH

(1) Clean the crank pulley thread using compressed air.
(2) Apply engine oil to the crank pulley bolt seat and thread.
(3) Tighten the bolts temporarily with tightening torque of 40 N·m (4.0 kgf-m, 29 ft-lb).

(4) Tighten the crank pulley bolts.

Tightening torque:
180 N·m (18.3 kgf-m, 132.7 ft-lb)



3) Confirm that the tightening angle of crank pulley bolt is 60 degrees or more. If the tightening angle of crank pulley bolt is less than 60 degrees, conduct the following procedures.

(1) Replace the crank pulley bolts and clean them.

Crank pulley bolt:
12369AA030

(2) Clean the crankshaft thread using compressed air.

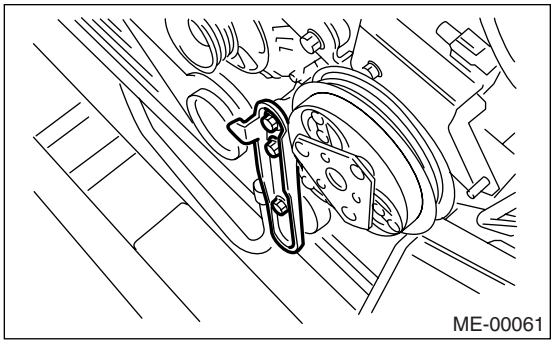
(3) Apply engine oil to the crank pulley bolt seat and thread.

(4) Tighten the bolts temporarily with tightening torque of 40 N·m (4.0 kgf-m, 29 ft-lb).

(5) Tighten the crank pulley bolts keeping them in an angle between 60 degrees and 70 degrees.

NOTE:
Conduct the tightening procedures by confirming the turning angle of crank pulley bolt referring to the gauge indicated on timing belt cover.

4) Install the A/C belt tensioner.



5) Install the V-belt. <Ref. to ME(H4DOTC)-53, INSTALLATION, V-belt.>

C: INSPECTION

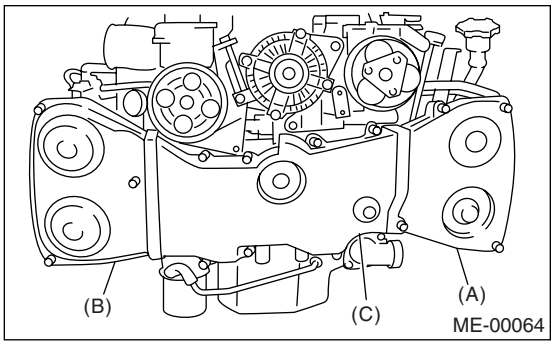
1) Make sure the V-belt is not worn or otherwise damaged.

2) Check the tension of the belt. <Ref. to ME(H4DOTC)-54, INSPECTION, V-belt.>

14.Timing Belt Cover

A: REMOVAL

1) Remove the V-belt. <Ref. to ME(H4DOTC)-53, REMOVAL, V-belt.>
2) Remove the crank pulley. <Ref. to ME(H4DOTC)-55, REMOVAL, Crank Pulley.>
3) Remove the timing belt cover (LH) (A).
4) Remove the timing belt cover (RH) (B).
5) Remove the front timing belt cover (C).



B: INSTALLATION

1) Install the front timing belt cover (C).

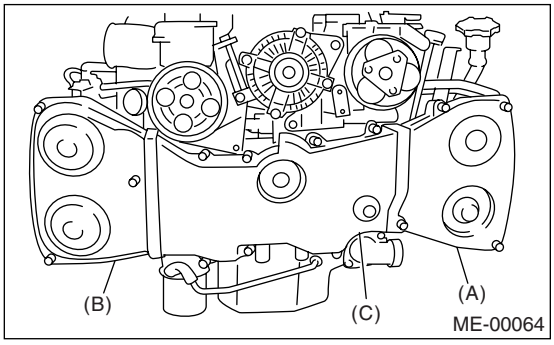
Tightening torque:
5 N·m (0.5 kgf-m, 3.6 ft-lb)

2) Install the timing belt cover (RH) (B).

Tightening torque:
5 N·m (0.5 kgf-m, 3.6 ft-lb)

3) Install the timing belt cover (LH) (A).

Tightening torque:
5 N·m (0.5 kgf-m, 3.6 ft-lb)



4) Install the crank pulley. <Ref. to ME(H4DOTC)-55, INSTALLATION, Crank Pulley.>
5) Install the V-belt. <Ref. to ME(H4DOTC)-53, INSTALLATION, V-belt.>

C: INSPECTION

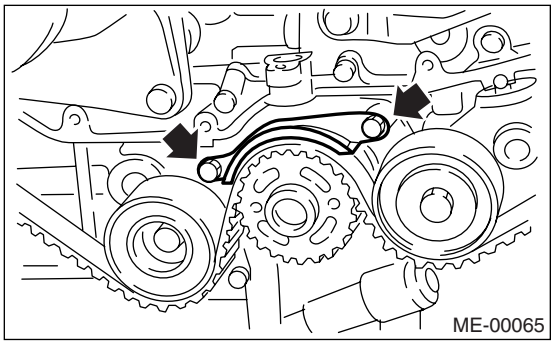
Make sure the cover is not damaged.

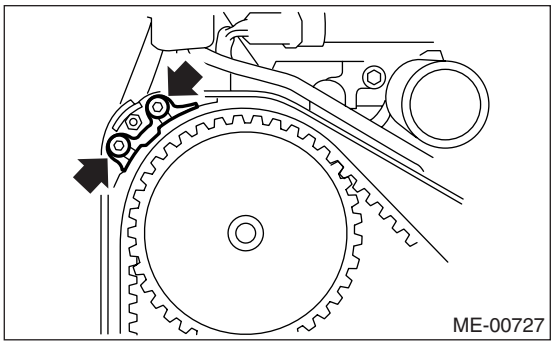
15.Timing Belt

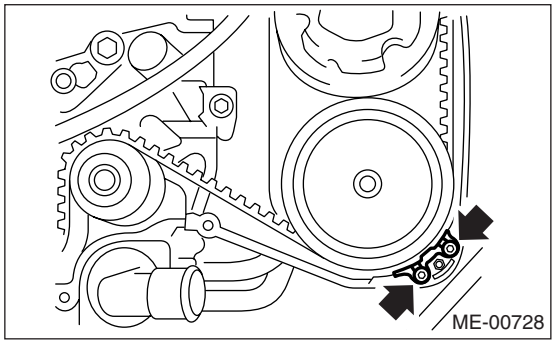
A: REMOVAL

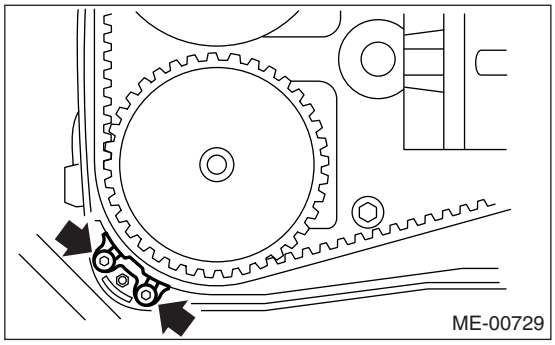
1. TIMING BELT

1) Remove the V-belt. <Ref. to ME(H4DOTC)-53, REMOVAL, V-belt.>
2) Remove the crank pulley. <Ref. to ME(H4DOTC)-55, REMOVAL, Crank Pulley.>
3) Remove the timing belt cover. <Ref. to ME(H4DOTC)-57, REMOVAL, Timing Belt Cover.>
4) Remove the timing belt guides. (MT model)


ME-00065

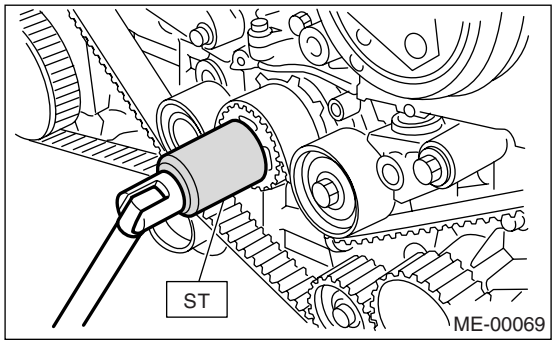

ME-00727


ME-00728


ME-00729

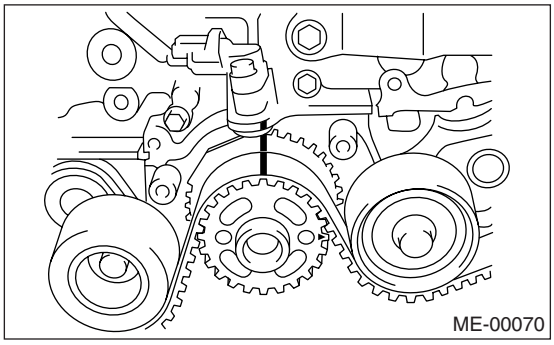
5) If the alignment mark and/or arrow mark (which indicates rotation direction) on timing belt fade away, put new marks before removing the timing belt as follows:
(1) Turn the crankshaft using ST, and align the alignment marks on crank sprocket, intake cam sprocket (LH), exhaust cam sprocket (LH), intake cam sprocket (RH) and exhaust cam sprocket (RH) with notches of timing belt cover and cylinder block.

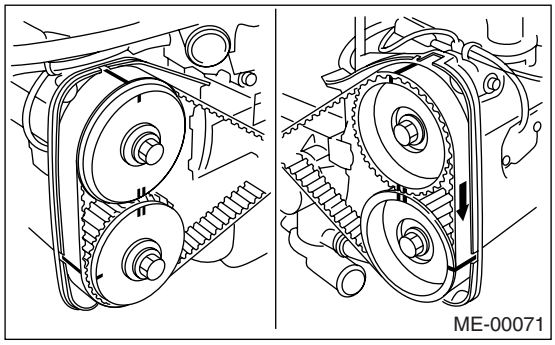
ST 499987500 CRANKSHAFT SOCKET



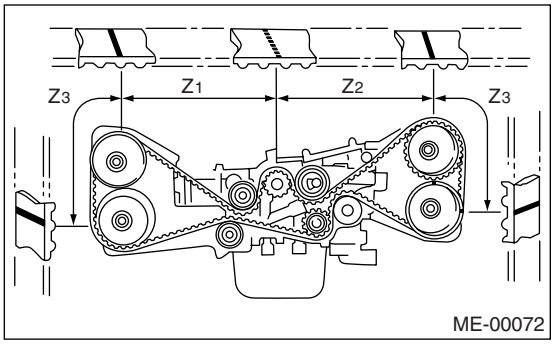
ME-00069

(2) Using white paint, put alignment and/or arrow marks on the timing belts in relation to the sprockets.

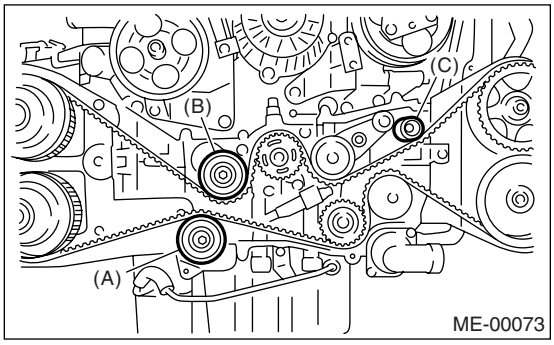

ME-00070


ME-00071

Z_1: 54.5 tooth length
Z_2: 51 tooth length
Z_3: 28 tooth length



6) Remove the belt idler (A).

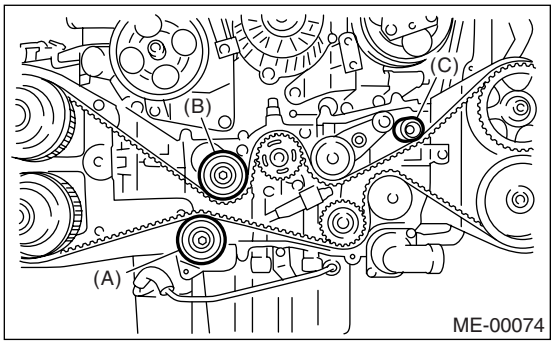


7) Remove the timing belt.

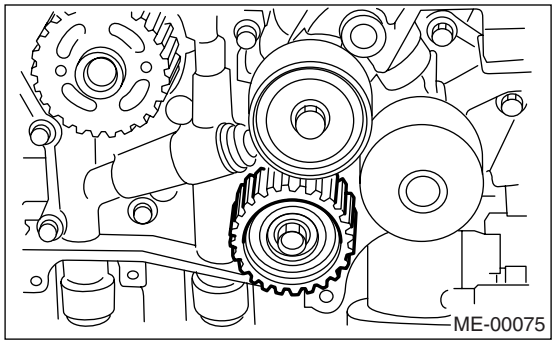
CAUTION:
After the timing belt has been removed, never rotate the intake and exhaust, cam sprocket. If the cam sprocket is rotated, the intake and exhaust valve heads strike together and valve stems are bent.

2. BELT IDLER AND AUTOMATIC BELT TENSION ADJUSTER ASSEMBLY

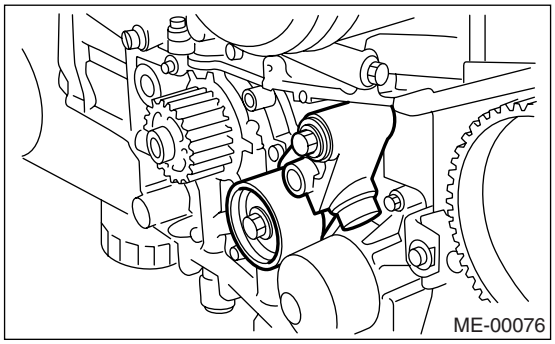
1) Remove the belt idler (B) and (C).



2) Remove the belt idler No. 2.



3) Remove the automatic belt tension adjuster assembly.



B: INSTALLATION

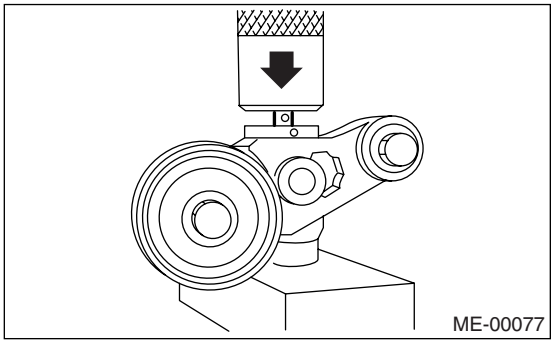
1. AUTOMATIC BELT TENSION ADJUSTER ASSEMBLY AND BELT IDLER

1) Preparation for installation of automatic belt tension adjuster assembly:

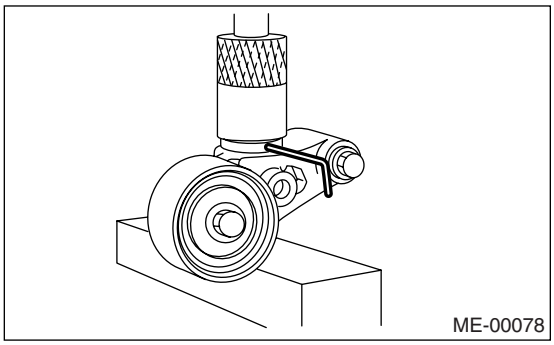
CAUTION:
• Always use a vertical type pressing tool to move the adjuster rod down.
• Do not use a lateral type vise.
• Push the adjuster rod vertically.
• Press-in the push adjuster rod gradually taking more than 3 minutes.
• Do not allow press pressure to exceed 9,807 N (1,000 kgf, 2,205 lbf).
• Press the adjuster rod as far as the end surface of cylinder. Do not press the adjuster rod into the cylinder. Doing so may damage the cylinder.
• Do not release the press pressure until stopper pin is completely inserted.

(1) Attach the automatic belt tension adjuster assembly to the vertical pressing tool.

(2) Slowly move the adjuster rod down with a pressure of more than 294 N (30 kgf, 66 lbf) until the adjuster rod is aligned with the stopper pin hole in the cylinder.

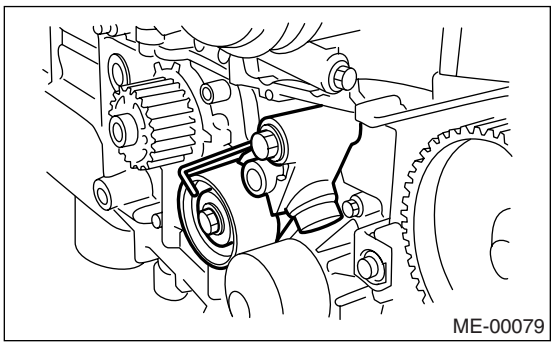


(3) With a 2 mm (0.08 in) dia. stopper pin or a 2 mm (0.08 in) (nominal) dia. hex bar wrench inserted into the stopper pin hole in the cylinder, secure the adjuster rod.



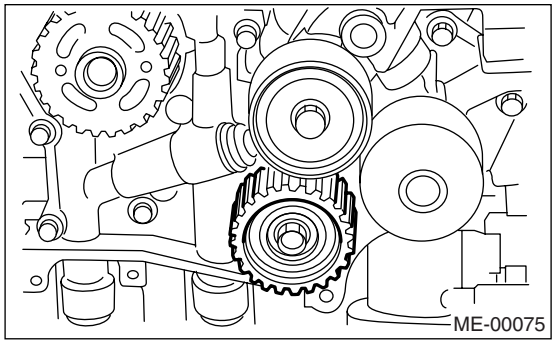
2) Install the automatic belt tension adjuster assembly.

Tightening torque:
39 N·m (4.0 kgf-m, 28.9 ft-lb)



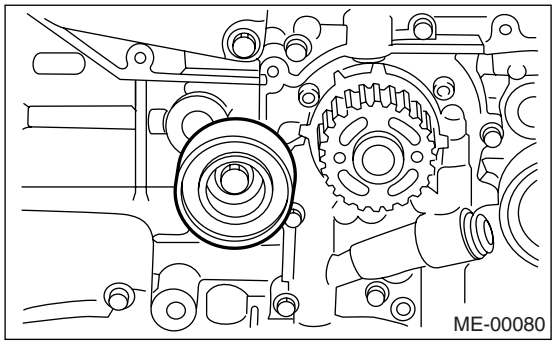
3) Install the belt idler No. 2.

Tightening torque:
39 N·m (4.0 kgf-m, 28.9 ft-lb)



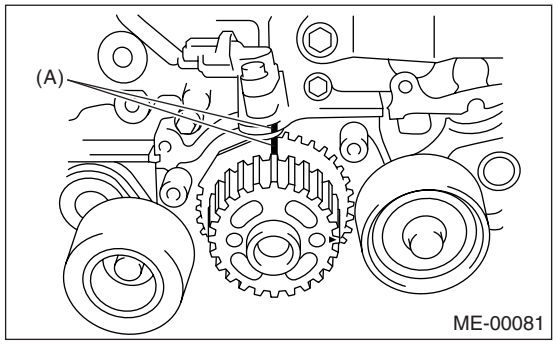
4) Install the belt idler.

Tightening torque:
39 N·m (4.0 kgf-m, 28.9 ft-lb)

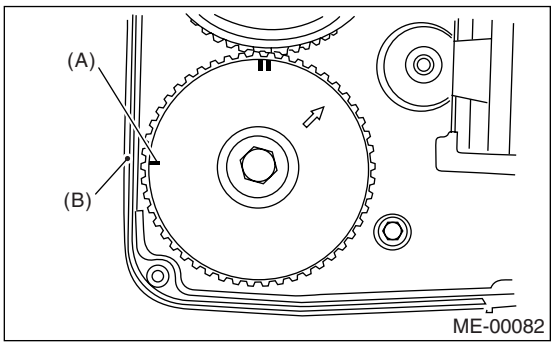


2. TIMING BELT

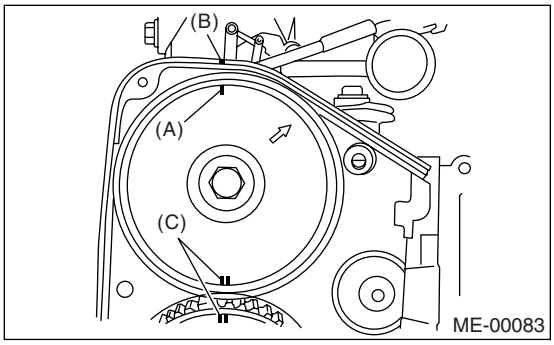
1) Preparation for installation of automatic belt tension adjuster assembly. <Ref. to ME(H4DOTC)-59, AUTOMATIC BELT TENSION ADJUSTER ASSEMBLY AND BELT IDLER, INSTALLATION, Timing Belt.>
2) Crankshaft and cam sprocket alignment.
(1) Align mark (A) on the crank sprocket with mark on the oil pump cover at cylinder block.



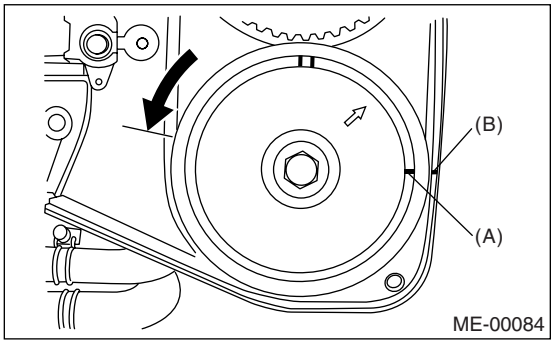
(2) Align single line mark (A) on the exhaust cam sprocket (RH) with notch (B) on timing belt cover.



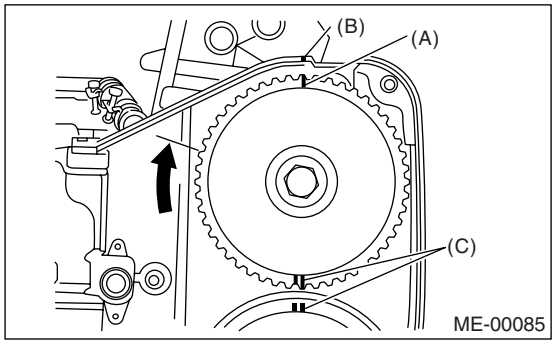
(3) Align single line mark (A) on the intake cam sprocket (RH) with notch (B) on timing belt cover.
(Make sure double lines (C) on intake camshaft and exhaust cam sprockets are aligned.)



(4) Align single line mark (A) on exhaust cam sprocket (LH) with notch (B) on timing belt cover by turning the sprocket counterclockwise (as viewed from front of engine).

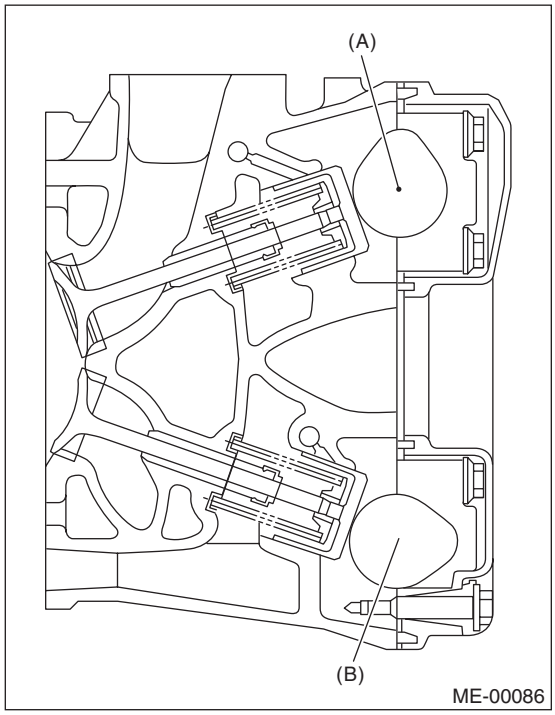


(5) Align the single line mark (A) on intake cam sprocket (LH) with notch (B) on timing belt cover by turning the sprocket clockwise (as viewed from front of engine).
Ensure the double lines (C) on intake and exhaust cam sprockets are aligned.



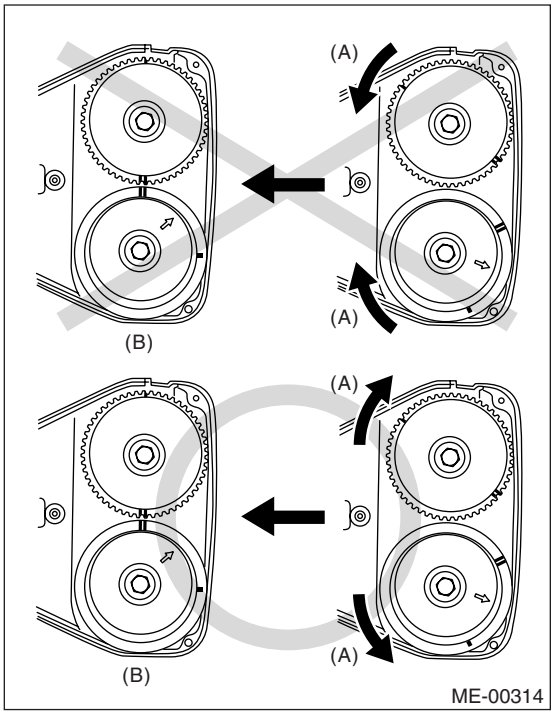
(6) Ensure the camshaft and crank sprockets are positioned properly.

CAUTION:
• Intake and exhaust camshafts for this DOHC engine can be independently rotated with the timing belts removed. As can be seen from the figure, if the intake and exhaust valves are lifted simultaneously, their heads will interfere with each other, resulting in bent valves.



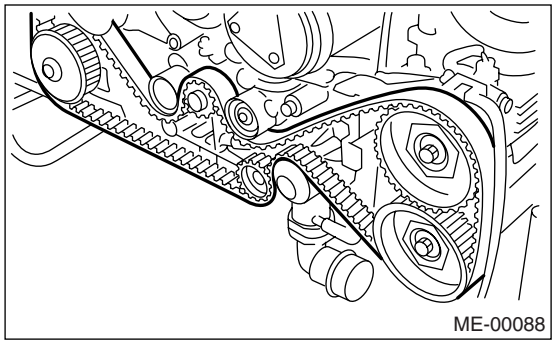
(A) Intake camshaft
(B) Exhaust camshaft

• When the timing belts are not installed, four camshafts are held at the "zero-lift" position, where all cams on camshafts do not push the intake and exhaust valves down. (Under this condition, all valves remain unlifted.)
• When the camshafts are rotated to install the timing belts, #2 intake and #4 exhaust cam of camshafts (LH) are held to push their corresponding valves down. (Under this condition, these valves are held lifted.) Camshafts (RH) are held so that their cams do not push valves down.
• Camshafts (LH) must be rotated from the "zero-lift" position to the position where the timing belt is to be installed at as small an angle as possible, in order to prevent mutual interference of intake and exhaust valve heads.
• Do not allow the camshafts to rotate in the direction shown in the figure of upper side as this causes both intake and exhaust valves to lift simultaneously, resulting in interference with their heads.



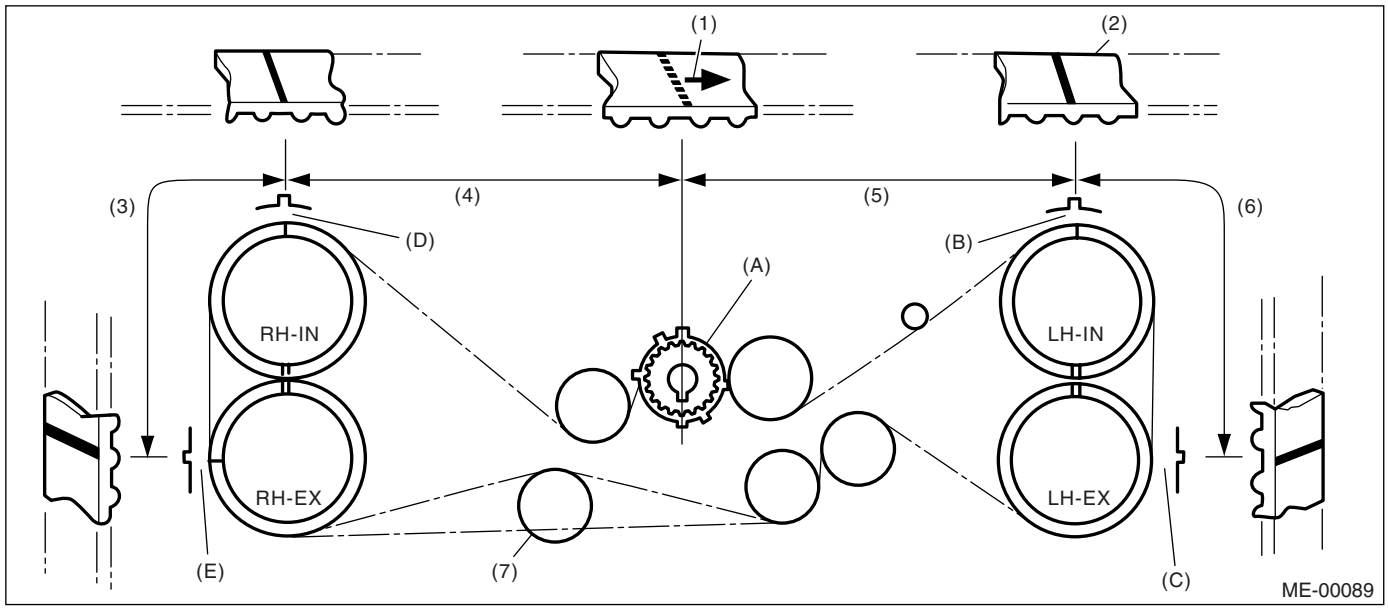
(A) Rotating direction
(B) Timing belt installation position

3) Installation of timing belt:



Align the alignment mark on timing belt with marks on sprockets in alphabetical order shown in the figure. While aligning marks, position the timing belt properly.

CAUTION:
• Disengagement of more than three timing belt teeth may result in interference between the valve and piston.
• Ensure the belt's rotating direction is correct.

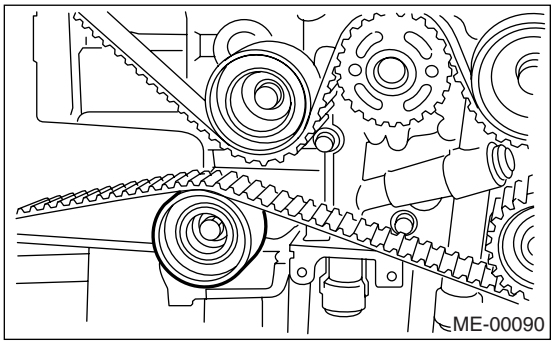


(1) Arrow mark
(2) Timing belt
(3) 28 tooth length
(4) 54.5 tooth length
(5) 51 tooth length
(6) 28 tooth length
(7) Install it in the end

4) Install the belt idlers.

Tightening torque:
39 N·m (4.0 kgf-m, 28.9 ft-lb)

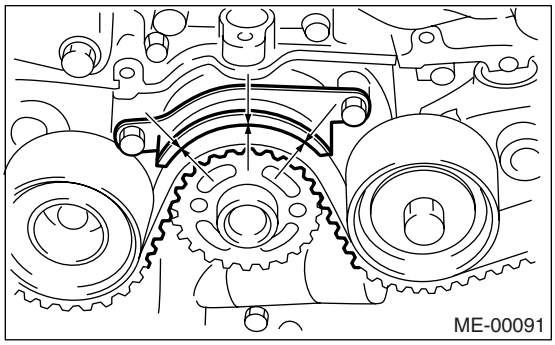
NOTE:
Make sure that the marks on the timing belt and sprockets are aligned.

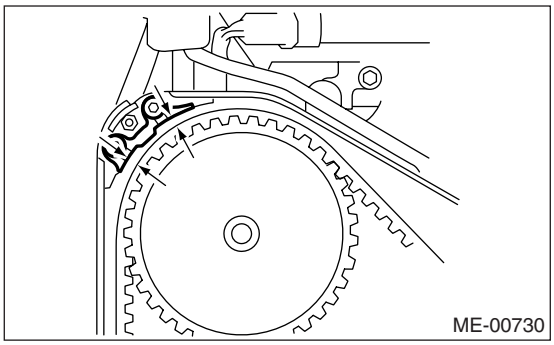


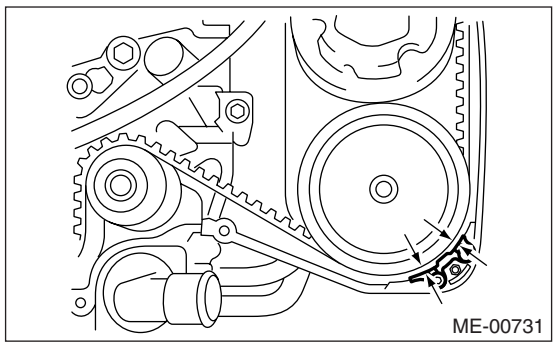
5) After ensuring that the marks on the timing belt and sprockets are aligned, remove the stopper pin from tensioner adjuster.
6) Install the timing belt guide. (MT model)
(1) Temporarily tighten the bolts.

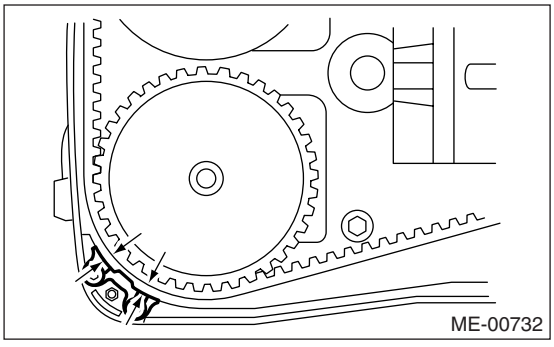
(2) Check and adjust the clearance between timing belt and timing belt guide.

Clearance:
1.0±0.5 mm (0.039±0.020 in)



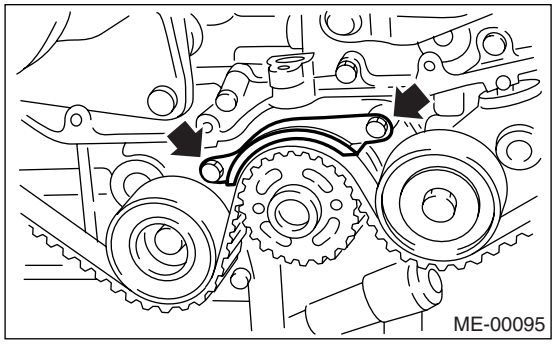




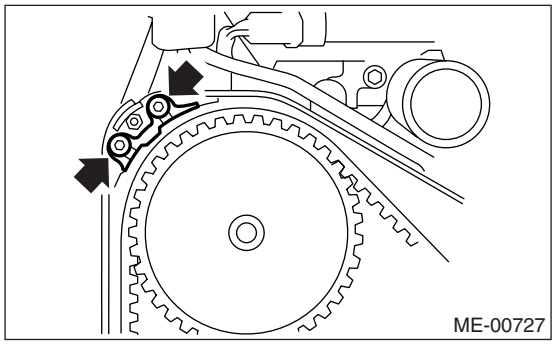


(3) Tighten the bolts.

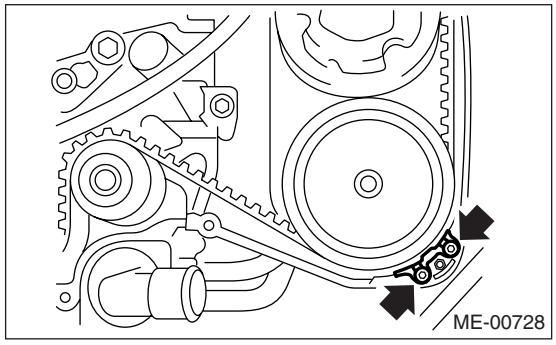
Tightening torque:
9.75 N·m (1.0 kgf-m, 7.2 ft-lb)



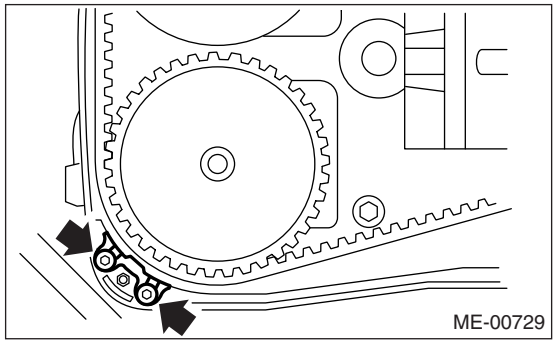
Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



7) Install the timing belt cover. <Ref. to ME(H4DOTC)-57, INSTALLATION, Timing Belt Cover.>
8) Install the crank pulley. <Ref. to ME(H4DOTC)-55, INSTALLATION, Crank Pulley.>
9) Install the V-belt. <Ref. to ME(H4DOTC)-53, INSTALLATION, V-belt.>

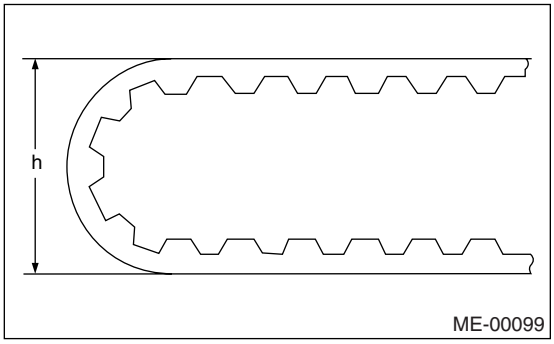
C: INSPECTION

1. TIMING BELT

1) Check the timing belt teeth for breaks, cracks, and wear. If any fault is found, replace the belt.
2) Check the condition of back side of belt; if any crack is found, replace the belt.

NOTE:
• Be careful not to let oil, grease or coolant contact the belt. Remove quickly and thoroughly if this happens.
• Do not bend the belt sharply.

Bending radius h:
60 mm (2.36 in) or more



2. AUTOMATIC BELT TENSION ADJUSTER

1) Visually check the oil seals for leaks, and rod ends for abnormal wear or scratches. If necessary, replace the automatic belt tension adjuster assembly.

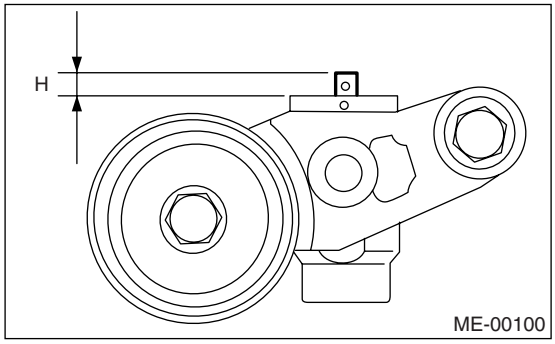
NOTE:
Slight traces of oil at rod's oil seal does not indicate a problem.

2) Check that the adjuster rod does not move when a pressure of 294 N (30 kgf, 66 lbf) is applied to it. This is to check adjuster rod stiffness.
3) If the adjuster rod is not stiff and moves freely when applying 294 N (30 kgf, 66 lbf), check it using the following procedures:
(1) Slowly press the adjuster rod down to the end surface of the cylinder. Repeat this motion 2 or 3 times.
(2) With the adjuster rod moved all the way up, apply a pressure of 294 N (30 kgf, 66 lbf) to it. Check the adjuster rod stiffness.
(3) If the adjuster rod is not stiff and moves down, replace the automatic belt tension adjuster assembly with a new one.

CAUTION:
• Always use a vertical type pressing tool to move the adjuster rod down.
• Do not use a lateral type vise.
• Push the adjuster rod vertically.
• Press-in the push adjuster rod gradually taking more than 3 minutes.
• Do not allow press pressure to exceed 9,807 N (1,000 kgf, 2,205 lbf).
• Press the adjuster rod as far as the end surface of cylinder. Do not press the adjuster rod into the cylinder. Doing so may damage the cylinder.

4) Measure the extension of rod beyond the body. If it is not within specifications, replace with a new one.

Rod extension amount H:
5.7±0.5 mm (0.224±0.020 in)



3. BELT TENSION PULLEY

1) Check the mating surfaces of timing belt and contact point of adjuster rod for abnormal wear or scratches. Replace the belt tension pulley if faulty.
2) Check the belt tension pulley for smooth rotation. Replace if noise or excessive play is noted.
3) Check the belt tension pulley for grease leakage.

4. BELT IDLER

1) Check the belt idler for smooth rotation. Replace if noise or excessive play is noted.
2) Check the outer contacting surfaces of idler pulley for abnormal wear and scratches.
3) Check the belt idler for grease leakage.

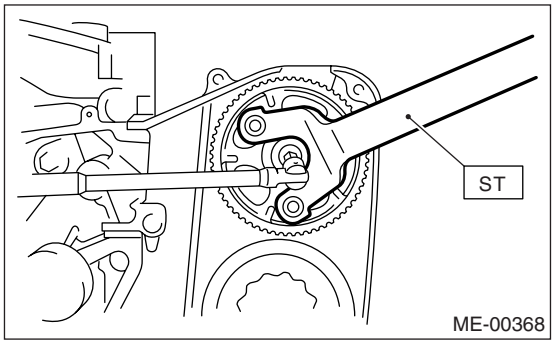
16.Cam Sprocket

A: REMOVAL

1. EXCEPT STi AND AUSTRALIA MODEL

1) Remove the V-belt. <Ref. to ME(H4DOTC)-53, REMOVAL, V-belt.>
2) Remove the crank pulley. <Ref. to ME(H4DOTC)-55, REMOVAL, Crank Pulley.>
3) Remove the timing belt cover. <Ref. to ME(H4DOTC)-57, REMOVAL, Timing Belt Cover.>
4) Remove the timing belt assembly. <Ref. to ME(H4DOTC)-58, REMOVAL, Timing Belt.>
5) Remove the camshaft position sensor. <Ref. to FU(H4DOTC)-29, REMOVAL, Camshaft Position Sensor.>
6) Remove the cam sprockets. To lock the camshaft, use ST.

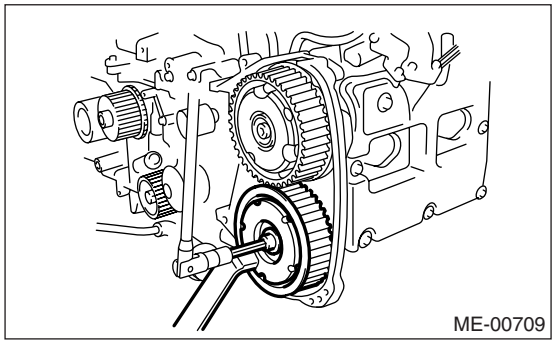
ST 18231AA010 CAM SPROCKET WRENCH (INTAKE LH)
ST 499207400 CAM SPROCKET WRENCH (Except INTAKE LH)



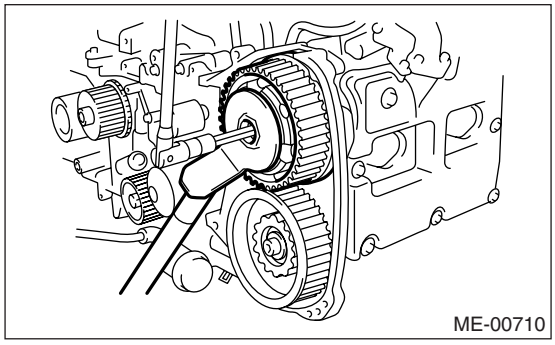
2. STi AND AUSTRALIA MODEL

1) Remove the V-belt. <Ref. to ME(H4DOTC)-53, REMOVAL, V-belt.>
2) Remove the crank pulley. <Ref. to ME(H4DOTC)-55, REMOVAL, Crank Pulley.>
3) Remove the timing belt cover. <Ref. to ME(H4DOTC)-57, REMOVAL, Timing Belt Cover.>
4) Remove the timing belt assembly. <Ref. to ME(H4DOTC)-58, REMOVAL, Timing Belt.>
5) Remove the camshaft position sensor. <Ref. to FU(H4DOTC)-29, REMOVAL, Camshaft Position Sensor.>
6) Remove the cam sprockets. To lock the camshaft, use ST.

ST 499207400 CAM SPROCKET WRENCH



ST 499977500 CAM SPROCKET WRENCH



B: INSTALLATION

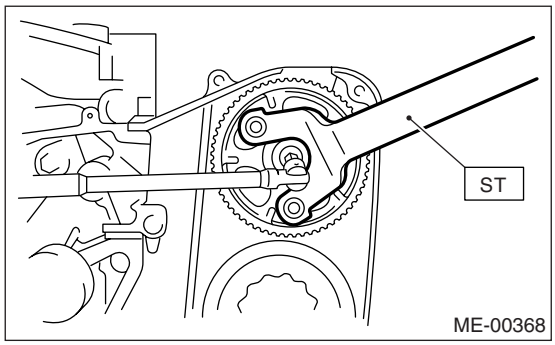
1. EXCEPT STi AND AUSTRALIA MODEL

1) Install the cam sprocket. To lock the camshaft, use ST.

ST 18231AA010 CAM SPROCKET WRENCH (INTAKE LH)
ST 499207400 CAM SPROCKET WRENCH (Except INTAKE LH)

Tightening torque:
Tighten to 30 N·m (3.0 kgf-m, 21.8 ft-lb) of torque, and then tighten further by 45°.

NOTE:
Do not confuse the cam sprockets (RH) and (LH) intake side during installation. The cam sprocket (LH) is identified by a projection used to monitor camshaft position sensor.



2) Install the camshaft position sensor. <Ref. to FU(H4DOTC)-29, INSTALLATION, Camshaft Position Sensor.>

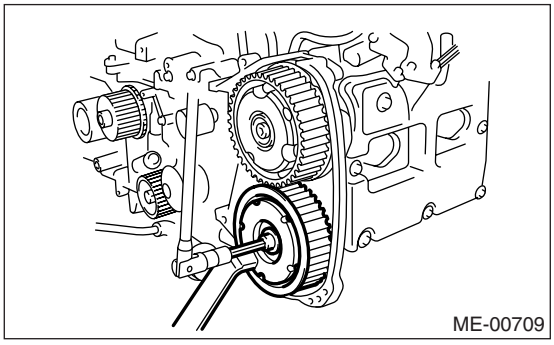
3) Install the timing belt assembly. <Ref. to ME(H4DOTC)-59, INSTALLATION, Timing Belt.>
4) Install the timing belt cover. <Ref. to ME(H4DOTC)-57, INSTALLATION, Timing Belt Cover.>
5) Install the crank pulley. <Ref. to ME(H4DOTC)-55, INSTALLATION, Crank Pulley.>
6) Install the V-belt. <Ref. to ME(H4DOTC)-53, INSTALLATION, V-belt.>

2. STi AND AUSTRALIA MODEL

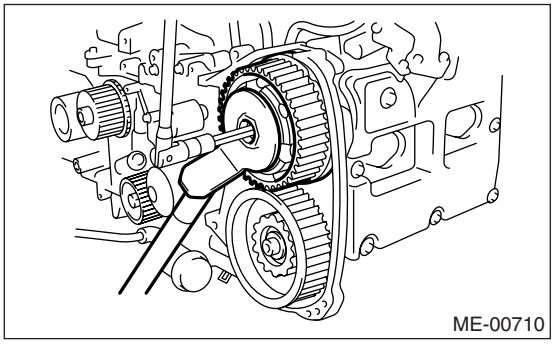
1) Install the cam sprocket No. 1 and No. 2. To lock the camshaft, use ST.
ST 499207400 CAM SPROCKET WRENCH

Tightening torque:
Tighten to 30 N·m (3.0 kgf-m, 21.8 ft-lb) of torque, and then tighten further by 45°.

NOTE:
Do not confuse cam sprockets (RH) and (LH) during installation. The cam sprocket (LH) is identified by a projection used to monitor camshaft position sensor.


ME-00709

ST 499977500 CAM SPROCKET WRENCH


ME-00710

2) Install the camshaft position sensor. <Ref. to FU(H4DOTC)-29, INSTALLATION, Camshaft Position Sensor.>
3) Install the timing belt assembly. <Ref. to ME(H4DOTC)-59, INSTALLATION, Timing Belt.>
4) Install the timing belt cover. <Ref. to ME(H4DOTC)-57, INSTALLATION, Timing Belt Cover.>
5) Install the crank pulley. <Ref. to ME(H4DOTC)-55, INSTALLATION, Crank Pulley.>
6) Install the V-belt. <Ref. to ME(H4DOTC)-53, INSTALLATION, V-belt.>

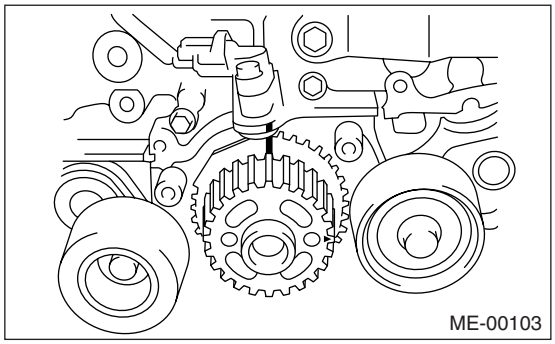
C: INSPECTION

1) Check the sprocket teeth for abnormal wear and scratches.
2) Make sure there is no free play between sprocket and key.
3) Check the crank sprocket notch used for sensor for damage and contamination of foreign matter.

17.Crank Sprocket

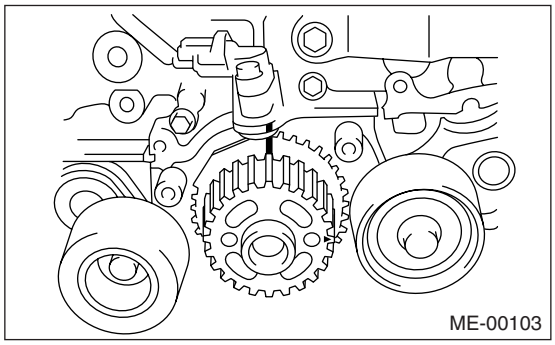
A: REMOVAL

1) Remove the V-belt. <Ref. to ME(H4DOTC)-53, REMOVAL, V-belt.>
2) Remove the crank pulley. <Ref. to ME(H4DOTC)-55, REMOVAL, Crank Pulley.>
3) Remove the timing belt cover. <Ref. to ME(H4DOTC)-57, REMOVAL, Timing Belt Cover.>
4) Remove the timing belt assembly. <Ref. to ME(H4DOTC)-58, REMOVAL, Timing Belt.>
5) Remove the cam sprocket. <Ref. to ME(H4DOTC)-66, REMOVAL, Cam Sprocket.>
6) Remove the crank sprocket.



B: INSTALLATION

1) Install the crank sprocket.



2) Install the cam sprocket. <Ref. to ME(H4DOTC)-66, INSTALLATION, Cam Sprocket.>
3) Install the timing belt assembly. <Ref. to ME(H4DOTC)-59, INSTALLATION, Timing Belt.>
4) Install the timing belt cover. <Ref. to ME(H4DOTC)-57, INSTALLATION, Timing Belt Cover.>
5) Install the crank pulley. <Ref. to ME(H4DOTC)-55, INSTALLATION, Crank Pulley.>
6) Install the V-belt. <Ref. to ME(H4DOTC)-53, INSTALLATION, V-belt.>

C: INSPECTION

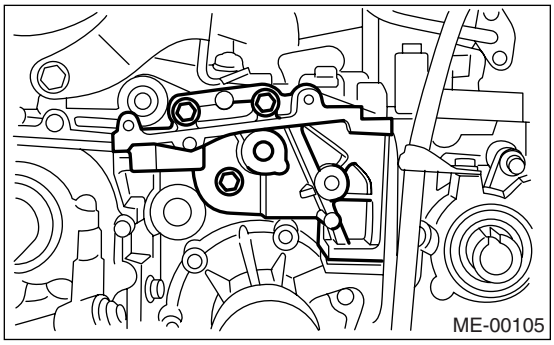
1) Check the crank sprocket teeth for abnormal wear and scratches.
2) Make sure there is no free play between crank sprocket and key.
3) Check the crank sprocket notch used for sensor for damage and contamination of foreign matter.

18.Camshaft

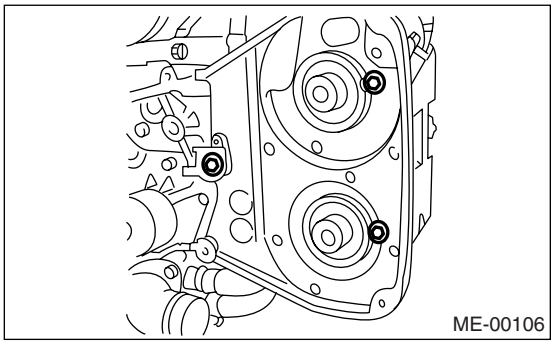
A: REMOVAL

1. EXCEPT STi AND AUSTRALIA MODEL

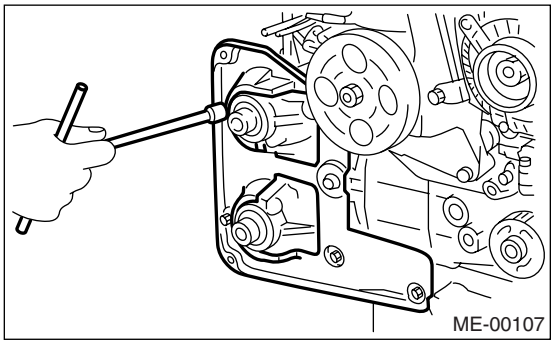
1) Remove the V-belt. <Ref. to ME(H4DOTC)-53, REMOVAL, V-belt.>
2) Remove the crank pulley. <Ref. to ME(H4DOTC)-55, REMOVAL, Crank Pulley.>
3) Remove the timing belt cover. <Ref. to ME(H4DOTC)-57, REMOVAL, Timing Belt Cover.>
4) Remove the timing belt assembly. <Ref. to ME(H4DOTC)-58, REMOVAL, Timing Belt.>
5) Remove the cam sprocket. <Ref. to ME(H4DOTC)-66, REMOVAL, Cam Sprocket.>
6) Remove the crank sprocket. <Ref. to ME(H4DOTC)-68, REMOVAL, Crank Sprocket.>
7) Remove the tensioner bracket.



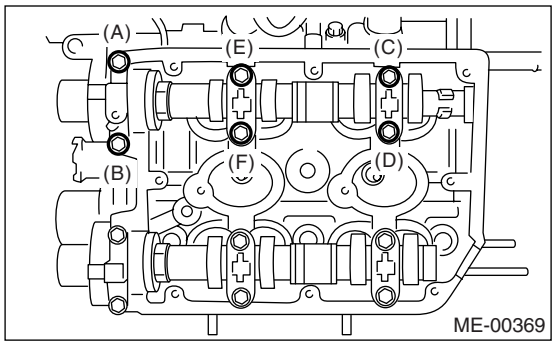
8) Remove the timing belt cover No. 2 (LH).



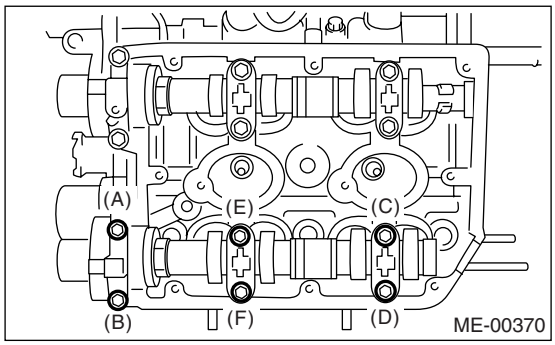
9) Remove the timing belt cover No. 2 (RH).



10) Disconnect the ignition coil connector.
11) Remove the ignition coil.
12) Remove the rocker cover and gasket.
13) Loosen the intake camshaft cap bolts equally, a little at a time in alphabetical sequence shown in the figure.



14) Remove the camshaft cap and intake camshaft.
15) Loosen the exhaust camshaft cap bolts equally, a little at a time in alphabetical sequence shown in the figure.



16) Remove the camshaft caps and exhaust camshaft.

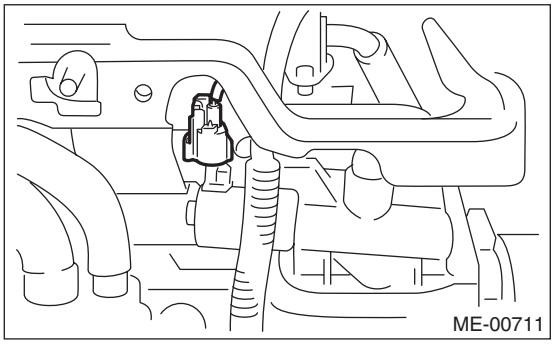
NOTE:
Arrange the camshaft caps in order so that they can be installed in their original positions.

17) Similarly, remove the camshafts (RH) and related parts.

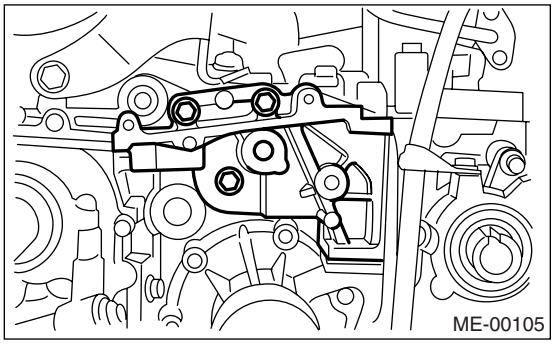
2. STi AND AUSTRALIA MODEL

1) Remove the V-belt. <Ref. to ME(H4DOTC)-53, INSTALLATION, V-belt.>
2) Remove the crank pulley. <Ref. to ME(H4DOTC)-55, REMOVAL, Crank Pulley.>
3) Remove the timing belt cover. <Ref. to ME(H4DOTC)-57, REMOVAL, Timing Belt Cover.>
4) Remove the timing belt assembly. <Ref. to ME(H4DOTC)-58, REMOVAL, Timing Belt.>
5) Remove the cam sprocket. <Ref. to ME(H4DOTC)-66, REMOVAL, Cam Sprocket.>
6) Remove the crank sprocket. <Ref. to ME(H4DOTC)-68, REMOVAL, Crank Sprocket.>

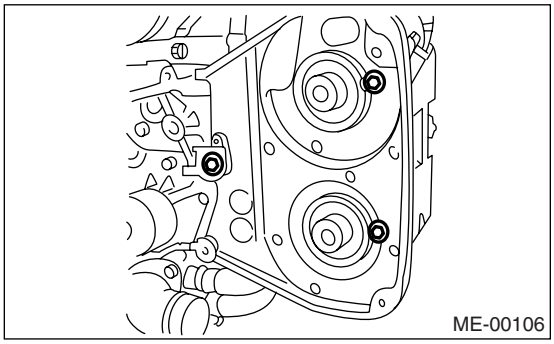
7) Disconnect the oil flow control solenoid valve assembly connector.



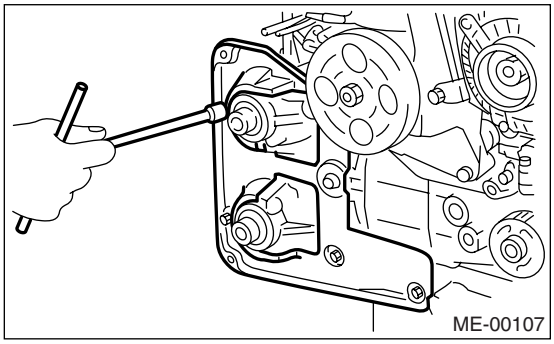
8) Remove the tensioner bracket.



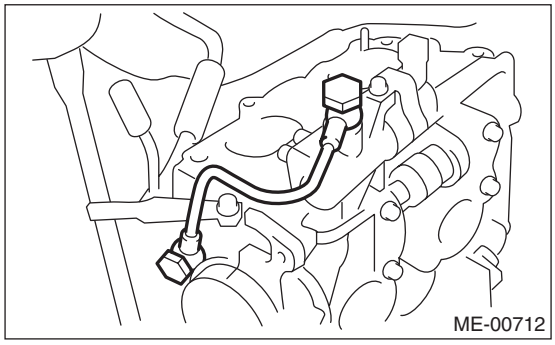
9) Remove the timing belt cover No. 2 (LH).



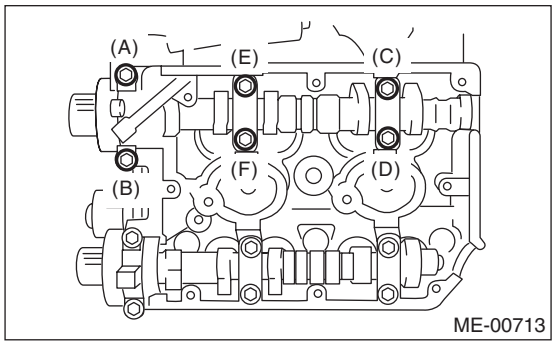
10) Remove the timing belt cover No. 2 (RH).



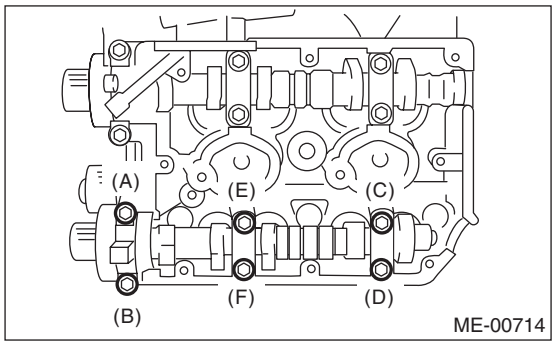
11) Remove the spark plug cord.
12) Remove the oil level gauge guide. (LH side)
13) Remove the rocker cover and gasket.
14) Remove the oil pipe.



15) Loosen the oil flow control solenoid valve assembly and intake camshaft cap bolts equally, a little at a time in alphabetical sequence shown in the figure.



16) Remove the oil flow control solenoid valve assembly, intake camshaft cap, and camshaft.
17) Loosen the exhaust camshaft cap bolts equally, a little at a time in alphabetical sequence shown in the figure.



18) Remove the exhaust camshaft cap and camshaft.

NOTE:
Arrange the camshaft caps in order so that they can be installed in their original positions.

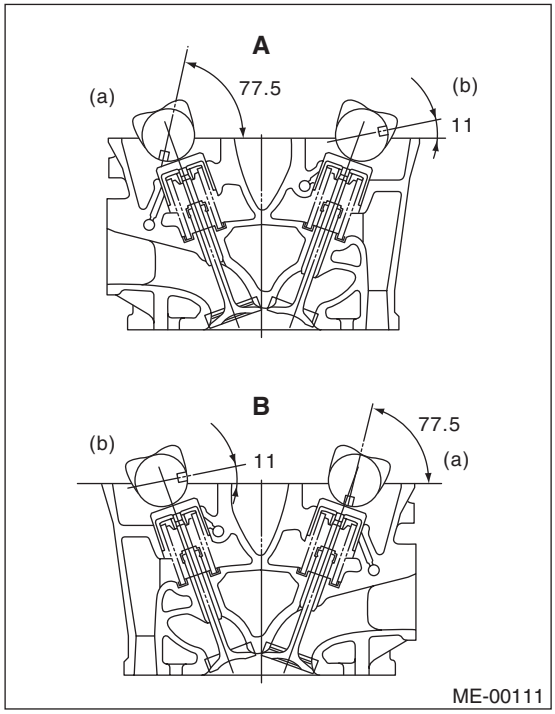
19) Similarly, remove the camshafts (RH) and related parts.

B: INSTALLATION

1. EXCEPT STi AND AUSTRALIA MODEL

1) Camshaft installation: Apply engine oil to the cylinder head at camshaft bearing location before installing the camshaft. Install the camshaft so that each valves is close to or in contact with “base circle” of cam lobe.

NOTE:
• When the camshafts are positioned as shown in the figure, camshafts need to be rotated at a minimum to align with the timing belt during installation.
• Camshaft (RH) need not be rotated when set at the position shown in the figure. Intake camshaft (LH): Rotate 80° clockwise. Exhaust camshaft (LH): Rotate 45° counterclockwise.

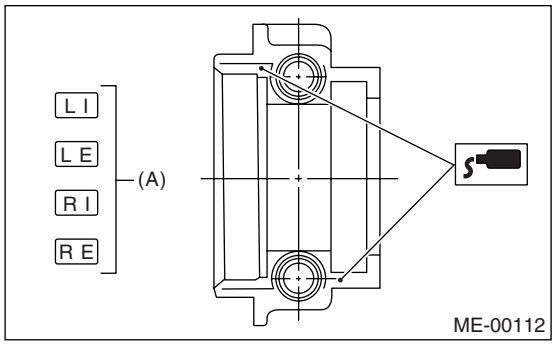


A Cylinder head (LH)
B Cylinder head (RH)
(a) Intake camshaft
(b) Exhaust camshaft

2) Camshaft cap installation:
(1) Apply liquid gasket sparingly to the cap mating surface.

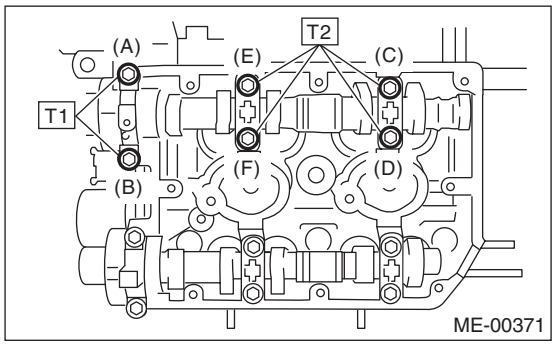
NOTE:
Do not apply liquid gasket excessively. Failure to do so may cause excess packing to come out and flow toward oil seal, resulting in oil leaks.

Liquid gasket:
THREE BOND 1215 (Part No. 004403007) or equivalent



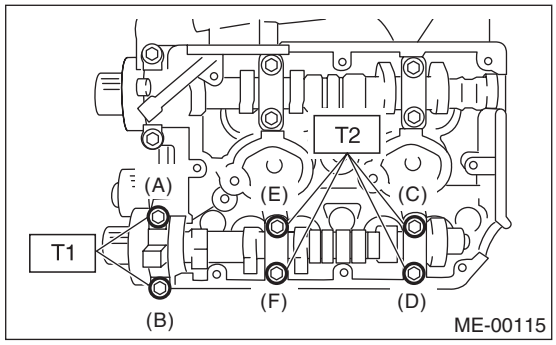
(2) Apply engine oil to cap bearing surface and install the cap on camshaft as shown by identification mark (A).
(3) Gradually tighten the camshaft cap in at least two stages in alphabetical sequence shown in the figure, and then tighten to specified torque.

Tightening torque:
T1: 9.75 N·m (1.0 kgf-m, 7.2 ft-lb)
T2: 20 N·m (2.0 kgf-m, 14.5 ft-lb)



(4) Similarly, tighten the cap on exhaust side. After tightening the cap, ensure the camshaft rotates only slightly while holding it at “base” circle.

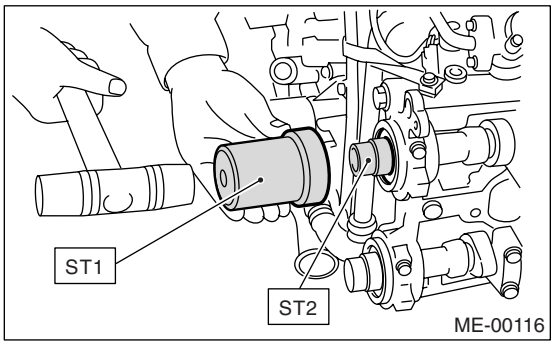
Tightening torque:
T1: 9.75 N·m (1.0 kgf-m, 7.2 ft-lb)
T2: 20 N·m (2.0 kgf-m, 14.5 ft-lb)



3) Camshaft oil seal installation:
Apply engine oil to the new oil seal pressing-in portion, and press onto the front end of camshaft by using ST1 and ST2.

NOTE:
Use a new oil seal.

ST1 499587600 OIL SEAL INSTALLER
ST2 499597200 OIL SEAL GUIDE

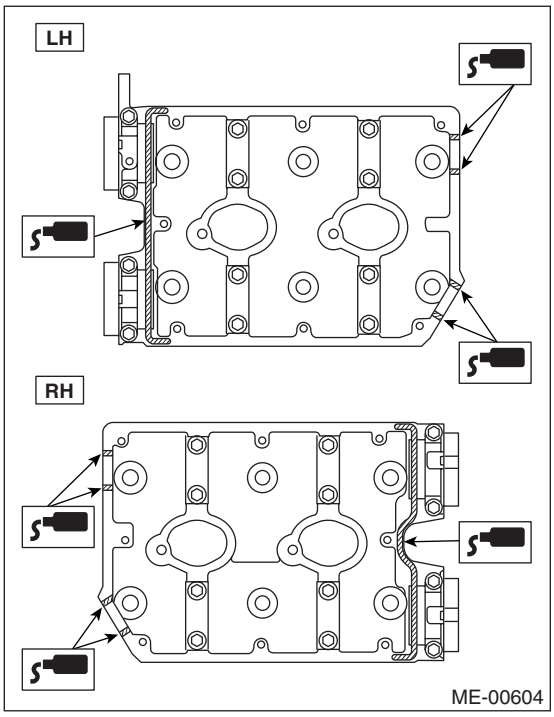


4) Rocker cover installation:
(1) Install the gasket on rocker cover. Install the peripheral gasket and ignition coil gasket.

NOTE:
Use a new gasket.

(2) Apply liquid gasket to the indicated portion on rocker cover.

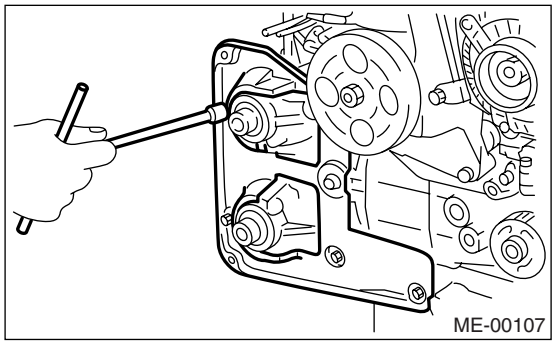
Liquid gasket:
THREE BOND 1215 (Part No. 004403007) or equivalent



(3) Install the rocker cover on cylinder head. Ensure the gasket is properly positioned during installation.

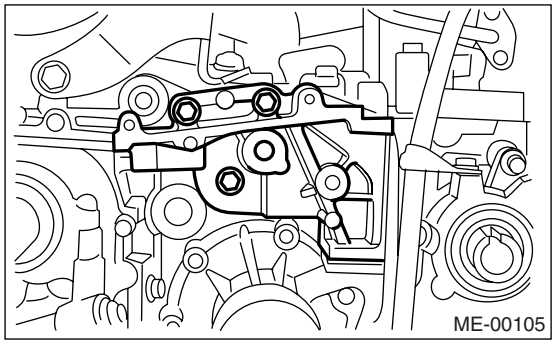
5) Install the ignition coil.
6) Connect the ignition coil connector.
7) Similarly, install the parts on right-hand side.
8) Install the timing belt cover No. 2 (RH).

Tightening torque:
5 N·m (0.5 kgf-m, 3.6 ft-lb)



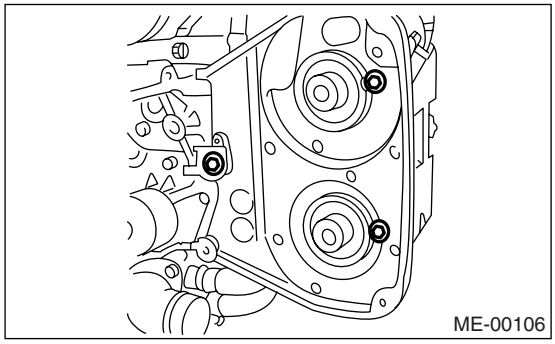
9) Install the tensioner bracket.

Tightening torque:
24.5 N·m (2.5 kgf-m, 18.1 ft-lb)



10) Install the timing belt cover No. 2 (LH).

Tightening torque:
5 N·m (0.5 kgf-m, 3.6 ft-lb)



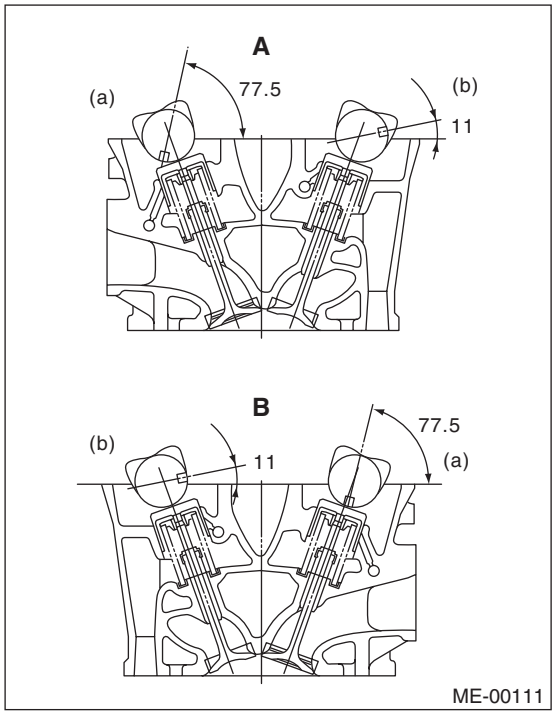
11) Install the crank sprocket. <Ref. to ME(H4DOTC)-68, INSTALLATION, Crank Sprocket.>
12) Install the cam sprockets. <Ref. to ME(H4DOTC)-66, INSTALLATION, Cam Sprocket.>
13) Install the timing belt assembly. <Ref. to ME(H4DOTC)-59, INSTALLATION, Timing Belt.>

14) Install the timing belt cover. <Ref. to ME(H4DOTC)-57, INSTALLATION, Timing Belt Cover.>
15) Install the crank pulley. <Ref. to ME(H4DOTC)-55, INSTALLATION, Crank Pulley.>
16) Install the V-belt. <Ref. to ME(H4DOTC)-53, INSTALLATION, V-belt.>

2. STi AND AUSTRALIA MODEL

1) Camshaft installation: Apply engine oil to cylinder head at camshaft bearing location before installing the camshaft. Install the camshaft so that each valve is close to or in contact with “base circle” of cam lobe.

NOTE:
• When the camshafts are positioned as shown in the figure, camshafts need to be rotated at a minimum to align with the timing belt during installation.
• Camshaft (RH) need not be rotated when set at position shown in the figure. Intake camshaft (LH): Rotate 80° clockwise. Exhaust camshaft (LH): Rotate 45° counterclockwise.

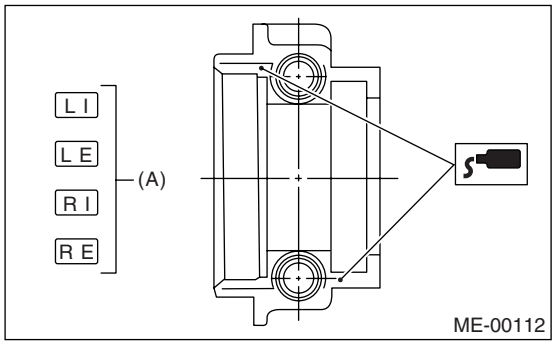


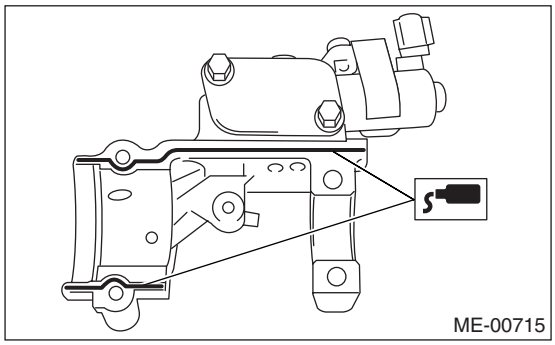
A Cylinder head (LH)
B Cylinder head (RH)
(a) Intake camshaft
(b) Exhaust camshaft

2) Camshaft cap and oil flow control solenoid valve assembly installation:
(1) Apply liquid gasket sparingly to cap mating surface.

NOTE:
Do not apply liquid gasket excessively. Failure to do so may cause excess packing to come out and flow toward the oil seal, resulting in oil leaks.

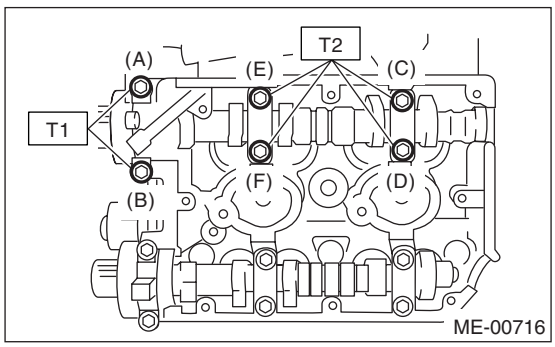
Liquid gasket:
THREE BOND 1215 (Part No. 004403007) or equivalent





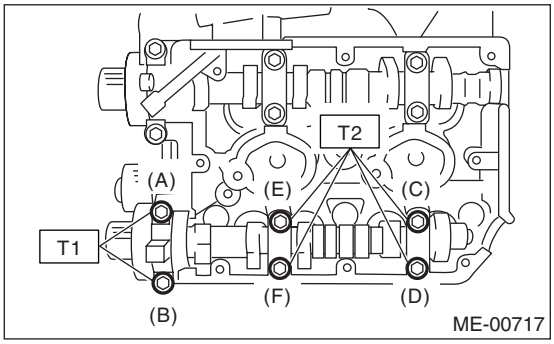
(2) Apply engine oil to cap bearing surface and install the cap on camshaft as shown by identification mark (A).
(3) Gradually tighten the camshaft cap and oil control valve assembly in at least two stages in alphabetical sequence shown in the figure, and then tighten to specified torque.

Tightening torque:
T1: 9.75 N·m (1.0 kgf-m, 7.2 ft-lb)
T2: 20 N·m (2.0 kgf-m, 14.5 ft-lb)



(4) Similarly, tighten cap on the exhaust side. After tightening cap, ensure the camshaft rotates only slightly while holding it at “base” circle.

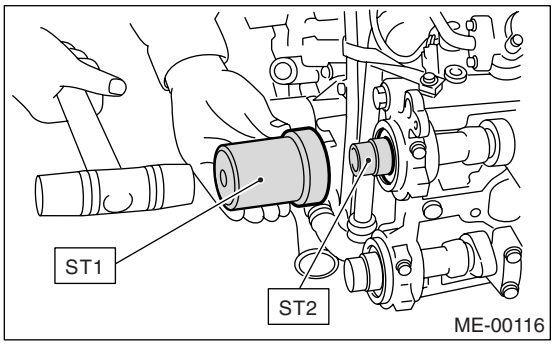
Tightening torque:
T1: 9.75 N·m (1.0 kgf-m, 7.2 ft-lb)
T2: 20 N·m (2.0 kgf-m, 14.5 ft-lb)



3) Camshaft oil seal installation:
Apply engine oil to new oil seal pressing-in portion and press onto front end of camshaft by using ST1 and ST2.

NOTE:
Use a new oil seal.

ST1 499587600 OIL SEAL INSTALLER
ST2 499597200 OIL SEAL GUIDE

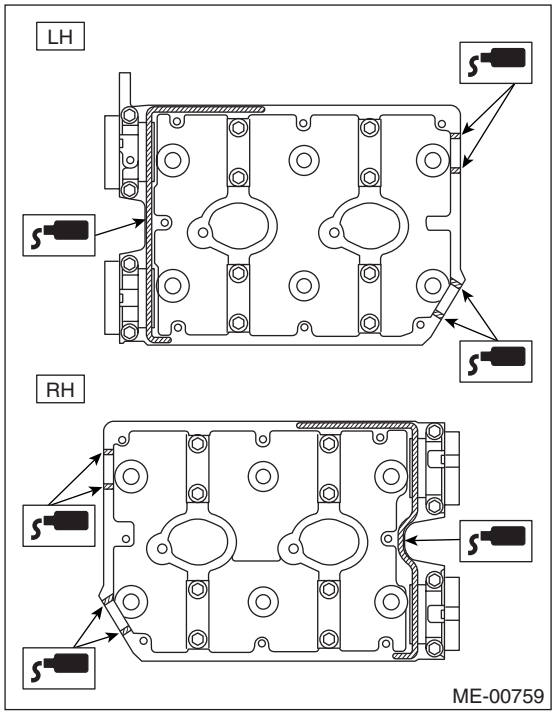


4) Rocker cover installation:
(1) Install the gasket on rocker cover. Install the peripheral gasket and ignition coil gasket.

NOTE:
Use a new gasket.

(2) Apply liquid gasket to the directions part of the locker cover of peripheral gasket.

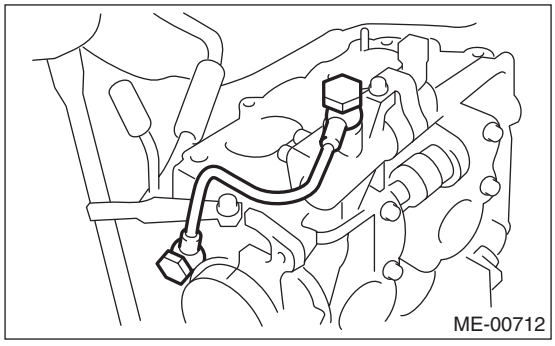
Liquid gasket:
THREE BOND 1215 (Part No. 004403007) or equivalent



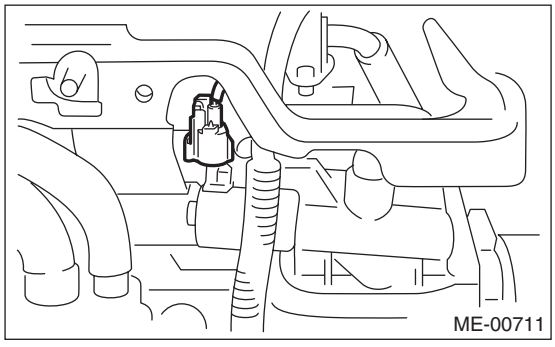
(3) Install the rocker cover on cylinder head. Ensure the gasket is properly positioned during installation.

5) Install the oil pipe.

Tightening torque:
30 N·m (3.1 kgf-m, 22.1 ft-lb)

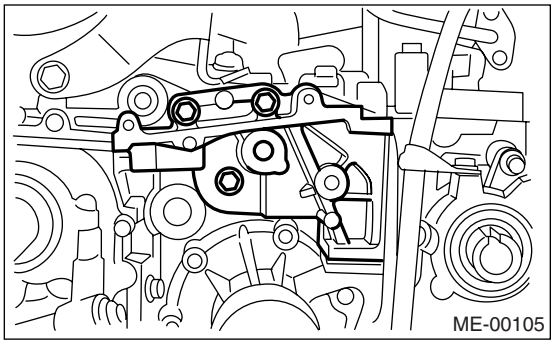


6) Connect the oil flow control solenoid valve connector.



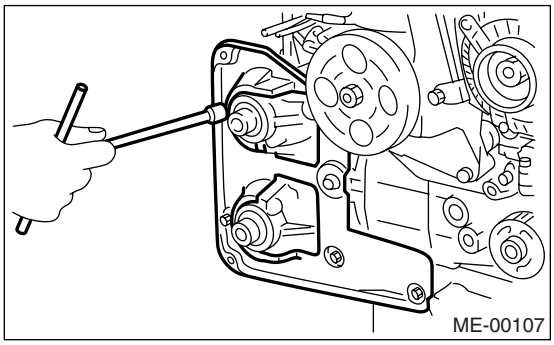
7) Install the spark plug cord.
8) Similarly, install the parts on right-hand side.
9) Install the tensioner bracket.

Tightening torque:
24.5 N·m (2.5 kgf-m, 18.1 ft-lb)



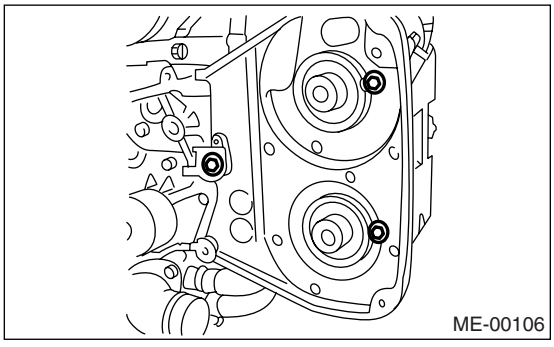
10) Install the timing belt cover No. 2 (RH).

Tightening torque:
5 N·m (0.5 kgf-m, 3.6 ft-lb)



11) Install the timing belt cover No. 2 (LH).

Tightening torque:
5 N·m (0.5 kgf-m, 3.6 ft-lb)

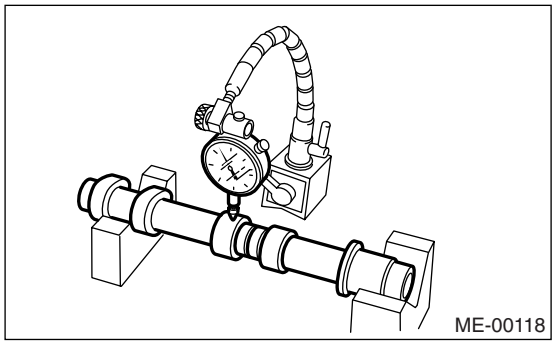


12) Install the crank sprocket. <Ref. to ME(H4DOTC)-66, INSTALLATION, Cam Sprocket.>
13) Install the cam sprockets. <Ref. to ME(H4DOTC)-66, INSTALLATION, Cam Sprocket.>
14) Install the timing belt assembly. <Ref. to ME(H4DOTC)-59, INSTALLATION, Timing Belt.>
15) Install the timing belt cover. <Ref. to ME(H4DOTC)-57, INSTALLATION, Timing Belt Cover.>
16) Install the crank pulley. <Ref. to ME(H4DOTC)-55, INSTALLATION, Crank Pulley.>
17) Install the V-belt. <Ref. to ME(H4DOTC)-53, INSTALLATION, V-belt.>

C: INSPECTION

1) Measure the bend, and repair or replace if necessary.

Limit:
0.020 mm (0.0008 in)



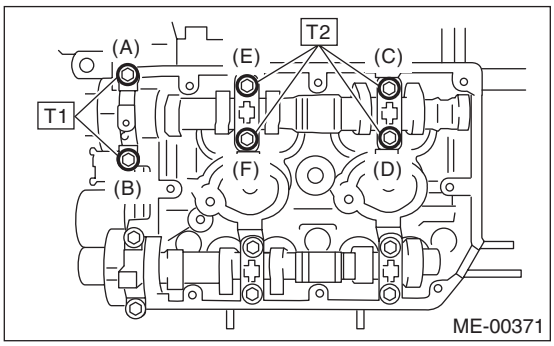
2) Check the journal for damage and wear. Replace if faulty.
3) Measure the outside diameter of camshaft journal. If the journal diameter is not as specified, check the oil clearance.

	Camshaft journal	
	Front	Center, rear
Standard	37.946 — 37.963 mm (1.4939 — 1.4946 in)	29.946 — 29.963 mm (1.1790 — 1.1796 in)

4) Measurement of the camshaft journal oil clearance:
(1) Clean the bearing caps and camshaft journals.
(2) Place the camshafts on cylinder head. (Without installing the valve rocker.)
(3) Place a plastigauge across each of the camshaft journals.

(4) Gradually tighten the cap in at least two stages in alphabetical sequence shown in the figure, and then tighten to specified torque.
Do not turn the camshaft.

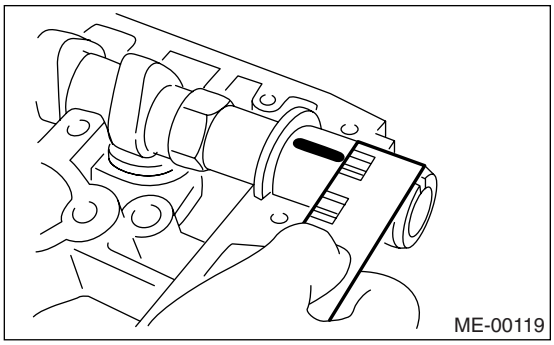
Tightening torque:
T1: 9.75 N·m (1.0 kgf-m, 7.2 ft-lb)
T2: 20 N·m (2.0 kgf-m, 14.5 ft-lb)



(5) Remove the bearing caps.
(6) Measure the widest point of plastigauge on each journal. If the oil clearance exceeds the limit, replace the camshaft. If necessary, replace the camshaft caps and cylinder head as a set.

Standard:
0.037 — 0.072 mm (0.0015 — 0.0028 in)

Limit:
0.10 mm (0.0039 in)



(7) Completely remove the plastigauge.

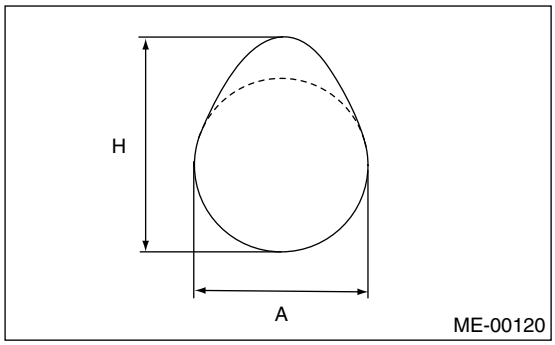
5) Check the cam face condition; remove the minor faults by grinding with oil stone. Measure the cam height H, replace if the limit has been exceeded.

Cam height H:

Standard:
Except STi model
Intake:
46.25 — 46.35 mm (1.821 — 1.825 in)
Exhaust:
46.25 — 46.35 mm (1.821 — 1.825 in)
STi model
Intake:
45.25 — 45.35 mm (1.781 — 1.785 in)
Exhaust:
45.70 — 45.80 mm (1.799 — 1.803 in)

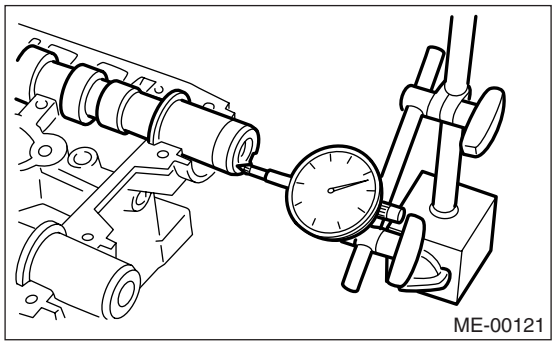
Limit:
Except STi model
Intake:
46.15 mm (1.817 in)
Exhaust:
46.15 mm (1.817 in)
STi model
Intake:
45.15 mm (1.778 in)
Exhaust:
45.60 mm (1.795 in)

Cam base circle diameter A:
37.0 mm (1.457 in)



6) Measure the thrust clearance of camshaft with dial gauge. If the clearance exceeds the standard value, replace the caps and cylinder head as a set. If necessary, replace the camshaft.

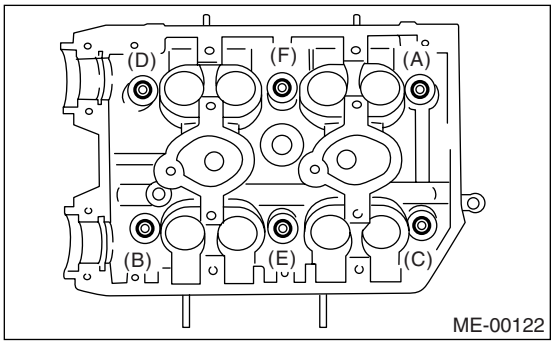
Standard:
0.068 — 0.116 mm (0.0026 — 0.0045 in)



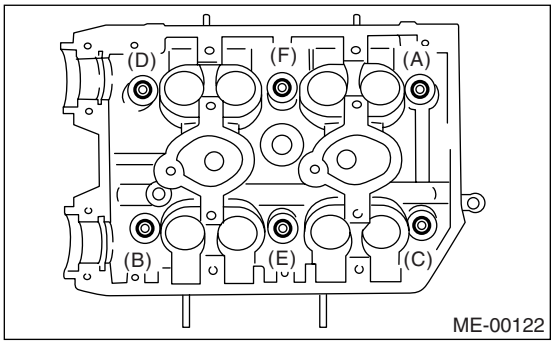
19.Cylinder Head

A: REMOVAL

1) Remove the V-belt. <Ref. to ME(H4DOTC)-53, REMOVAL, V-belt.>
2) Remove the crank pulley. <Ref. to ME(H4DOTC)-55, REMOVAL, Crank Pulley.>
3) Remove the timing belt cover. <Ref. to ME(H4DOTC)-57, REMOVAL, Timing Belt Cover.>
4) Remove the timing belt assembly. <Ref. to ME(H4DOTC)-58, REMOVAL, Timing Belt.>
5) Remove the cam sprocket. <Ref. to ME(H4DOTC)-66, REMOVAL, Cam Sprocket.>
6) Remove the intake manifold. <Ref. to FU(H4DOTC)-14, REMOVAL, Intake Manifold.>
7) Remove the bolt which installs the A/C compressor bracket on cylinder head.
8) Remove the camshaft. <Ref. to ME(H4DOTC)-69, REMOVAL, Camshaft.>
9) Remove the cylinder head bolts in alphabetical sequence shown in the figure.
Leave bolts (A) and (D) engaged by three or four threads to prevent the cylinder head from falling.



10) While tapping the cylinder head with a plastic hammer, separate it from cylinder block. Remove the bolts (A) and (D) to remove cylinder head.



11) Remove the cylinder head gasket.

NOTE:
Do not scratch the mating surface of cylinder head and cylinder block.

12) Similarly, remove the cylinder head (RH).

B: INSTALLATION

1) Install the cylinder head and gaskets on cylinder block.

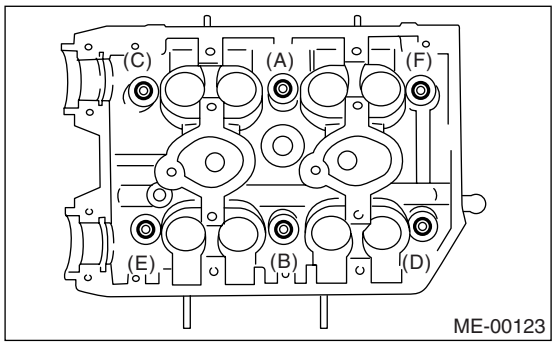
NOTE:
- Use new cylinder head gaskets.
- Be careful not to scratch the mating surface of cylinder head and cylinder block.

2) Tighten the cylinder head bolts.
   (1) Apply a coat of engine oil to the washers and bolt threads.
   (2) Tighten all bolts to 29 N·m (3.0 kgf-m, 22 ft-lb) in alphabetical sequence.
   (3) Tighten all bolts to 69 N·m (7.0 kgf-m, 51 ft-lb) in alphabetical sequence again.
   (4) Back off all bolts by 180° first; back them off by 180° again in reverse order of installation.
   (5) Tighten all bolts to 49 N·m (5.0 kgf-m, 36 ft-lb) in alphabetical sequence.
   (6) Tighten all bolts 80 to 90° in alphabetical sequence.
   (7) Tighten all bolts by 40 to 45° in alphabetical sequence again.

NOTE:
Do not tighten the bolts by more than 45°.

   (8) Further tighten all bolts (A) and (B) by 40 to 45°.

NOTE:
Ensure that the total “re-tightening angle” in the previous two steps do not exceed 90°.



3) Install the camshaft. <Ref. to ME(H4DOTC)-71, INSTALLATION, Camshaft.>
4) Install the A/C compressor bracket on cylinder head.
5) Install the intake manifold. <Ref. to FU(H4DOTC)-17, INSTALLATION, Intake Manifold.>
6) Install the cam sprocket. <Ref. to ME(H4DOTC)-66, INSTALLATION, Cam Sprocket.>
7) Install the timing belt assembly. <Ref. to ME(H4DOTC)-59, INSTALLATION, Timing Belt.>
8) Install the timing belt cover. <Ref. to ME(H4DOTC)-57, INSTALLATION, Timing Belt Cover.>

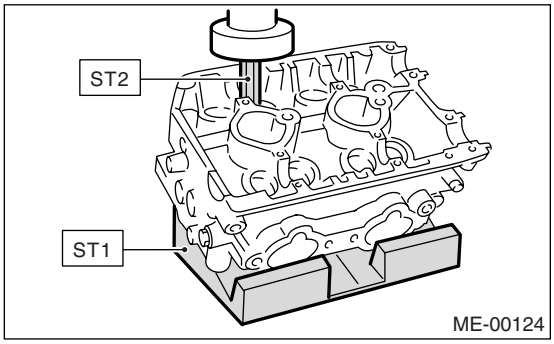
9) Install the crank pulley. <Ref. to ME(H4DOTC)-55, INSTALLATION, Crank Pulley.>
10) Install the V-belt. <Ref. to ME(H4DOTC)-53, INSTALLATION, V-belt.>

C: DISASSEMBLY

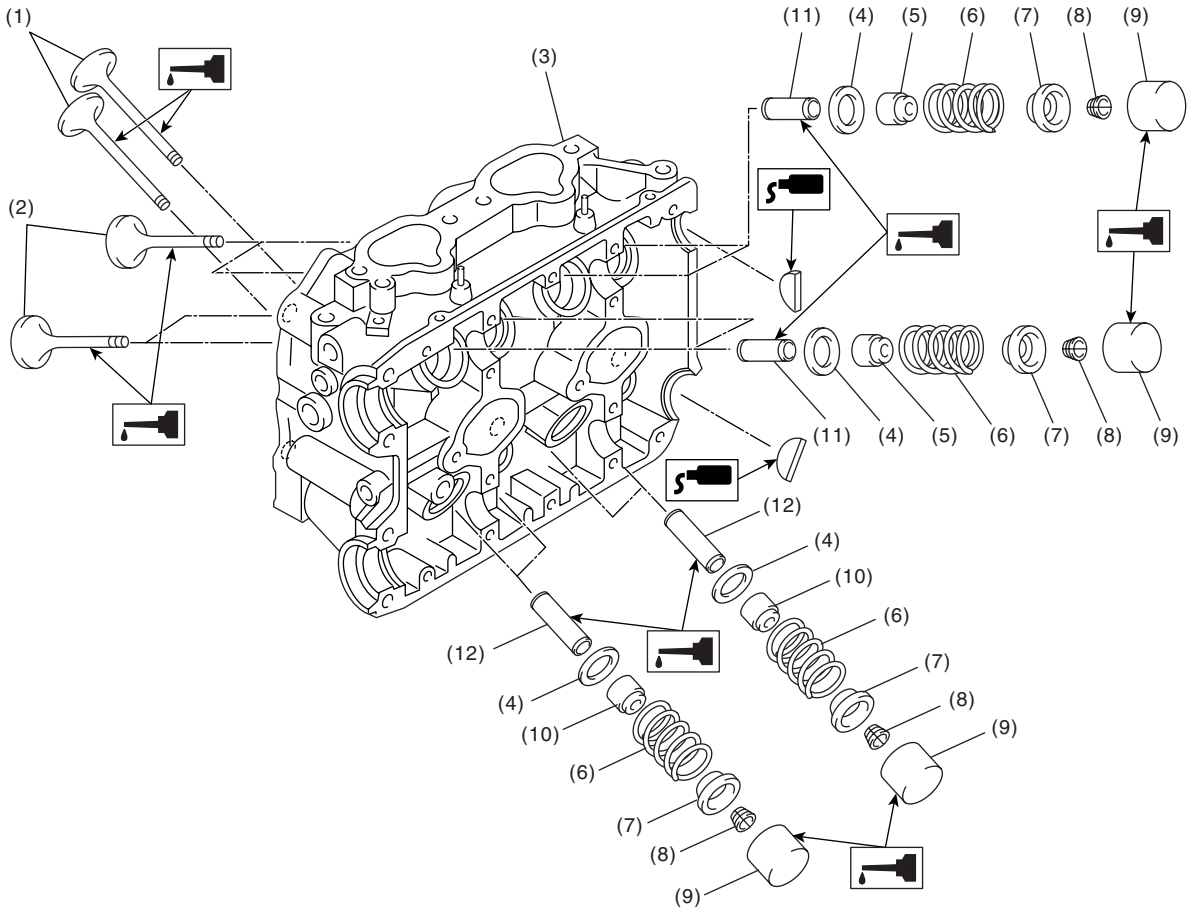
1) Remove the valve lifters.
2) Compress the valve spring and remove the valve spring retainer key. Remove each valve and valve spring.

ST1 498267600 CYLINDER HEAD TABLE
ST2 499718000 VALVE SPRING REMOVER

NOTE:
- Keep the removed parts in order for re-installing in their original positions.
- Mark each valve to prevent confusion.
- Use extreme care not to damage the lips of the intake valve oil seals and exhaust valve oil seals.



D: ASSEMBLY



(1) Exhaust valve
(2) Intake valve
(3) Cylinder head
(4) Valve spring seat
(5) Intake valve oil seal
(6) Valve spring
(7) Retainer
(8) Retainer key
(9) Valve lifter
(10) Exhaust valve oil seal
(11) Intake valve guide
(12) Exhaust valve guide

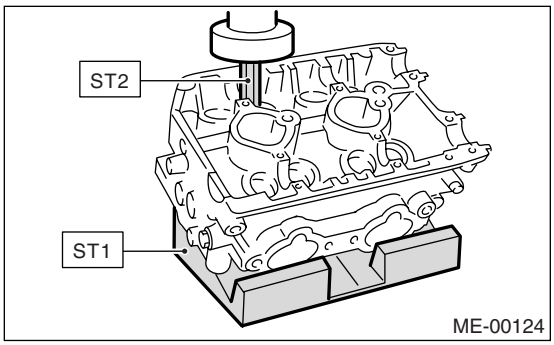
1) Installation of valve spring and valve:
(1) Coat the stem of each valve with engine oil and insert the valve into valve guide.

NOTE:
When inserting the valve into valve guide, use special care not to damage the oil seal lip.

(2) Set the cylinder head on ST1.
(3) Install the valve spring and retainer using ST2.

ST1 498267600 CYLINDER HEAD TABLE
ST2 499718000 VALVE SPRING REMOVER

NOTE:
Be sure to install the valve springs with their close-coiled end facing the seat on cylinder head.



(4) Compress the valve spring, and then fit the valve spring retainer key.
(5) After installing, tap the valve spring retainers lightly with wooden hammer for better seating.

2) Apply oil to the surface of the valve lifter.
3) Install the valve lifter.

E: INSPECTION

1. CYLINDER HEAD

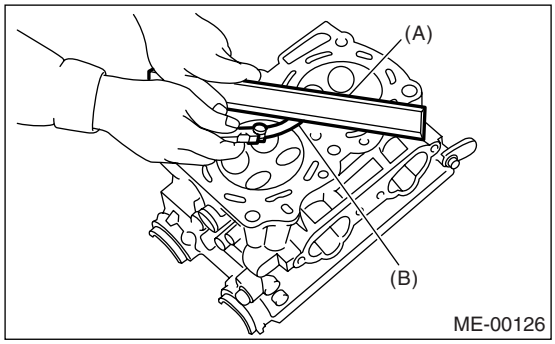
1) Make sure that no crack or other damage exists. In addition to visual inspection, inspect the important areas by means of liquid penetrant tester.
2) Measure the warping of the cylinder head surface that mates with crankcase by using a straight edge (A) and thickness gauge (B).
If the warping exceeds the limit, regrind the surface with a surface grinder.

Warping limit:
0.035 mm (0.0014 in)

Grinding limit:
0.3 mm (0.012 in)

Standard height of cylinder head:
127.5 mm (5.02 in)

NOTE:
Uneven torque for the cylinder head bolts can cause warping. When reassembling, pay special attention to the torque so as to tighten evenly.



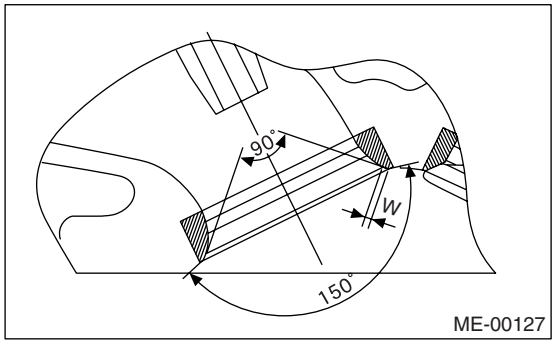
2. VALVE SEAT

Inspect the intake and exhaust valve seats, and then correct the contact surfaces with valve seat cutter if they are defective or when valve guides are replaced.

Valve seat width W:

Intake
Standard
0.85 — 1.15 mm (0.033 — 0.045 in)
Limit
1.7 mm (0.067 in)

Exhaust
Standard
1.35 — 1.65 mm (0.053 — 0.064 in)
Limit
2.2 mm (0.087 in)



3. VALVE GUIDE

1) Check the clearance between valve guide and stem. The clearance can be checked by measuring the outside diameter of valve stem and the inside diameter of valve guide with outside and inside micrometers respectively.

Clearance between the valve guide and valve stem:

Standard
Intake
0.030 — 0.057 mm (0.0012 — 0.0022 in)
Exhaust
0.040 — 0.067 mm (0.0016 — 0.0026 in)

Limit
0.15 mm (0.0059 in)

2) If the clearance between valve guide and stem exceeds the limit, replace the valve guide or valve itself whichever shows greater amount of wear. See the following procedure for valve guide replacement.

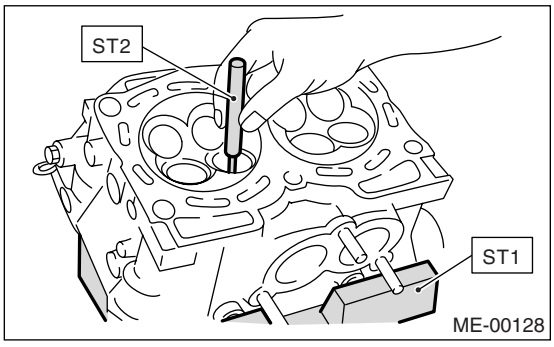
Valve guide inner diameter:
6.000 — 6.012 mm (0.2362 — 0.2367 in)

Valve stem outer diameters:
Intake
5.955 — 5.970 mm (0.2344 — 0.2350 in)
Exhaust
5.945 — 5.960 mm (0.2341 — 0.2346 in)

(1) Place the cylinder head on ST1 with the combustion chamber upward so that valve guides enter the holes in ST1.

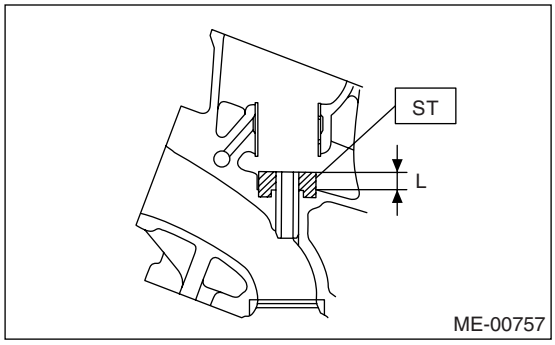
(2) Insert the ST2 into valve guide and press it down to remove the valve guide.

ST1 498267600 CYLINDER HEAD TABLE
ST2 499767200 VALVE GUIDE REMOVER



(3) Turn the cylinder head upside down and place ST as shown in the figure.

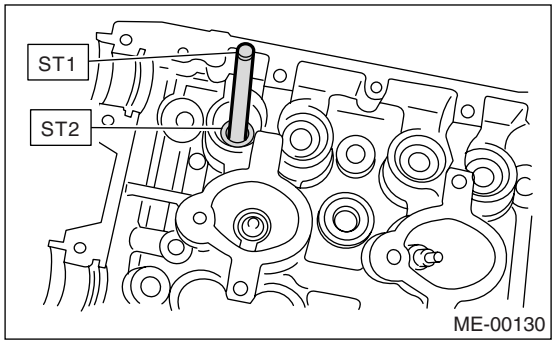
ST 18251AA020 VALVE GUIDE ADJUSTER



(4) Before installing a new valve guide, make sure that neither scratches nor damages exist on the inside surface of the valve guide holes in cylinder head.

(5) Put a new valve guide, coated with sufficient oil, in cylinder, and insert ST1 into valve guide. Press in until the valve guide upper end is flush with the upper surface of ST2.

ST1 499767200 VALVE GUIDE REMOVER
ST2 18251AA020 VALVE GUIDE ADJUSTER



(6) Check the valve guide protrusion.

Valve guide protrusion L:
15.8 — 16.2 mm (0.622 — 0.638 in)

(7) Ream the inside of valve guide with ST. Gently rotate the reamer clockwise while pressing it lightly into the valve guide, and return it also rotating clockwise. After reaming, clean the valve guide to remove chips.

ST 499767400 VALVE GUIDE REAMER

NOTE:
• Apply engine oil to the reamer when reaming.
• If the inner surface of the valve guide is torn, the edge of the reamer should be slightly ground with an oil stone.
• If the inner surface of the valve guide becomes lustrous and the reamer does not chip, use a new reamer or remedy the reamer.

(8) Recheck the contact condition between valve and valve seat after replacing the valve guide.

4. INTAKE AND EXHAUST VALVE

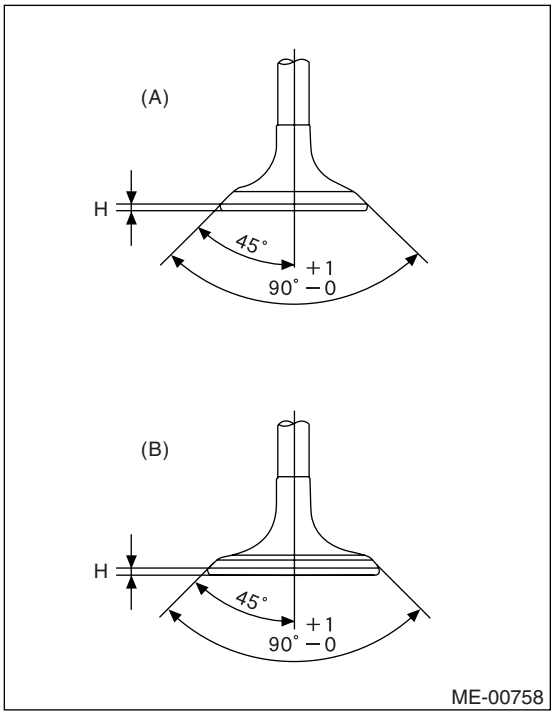
1) Inspect the flange and stem of valve, and replace if damaged, worn, or deformed, or if "H" is less than the specified limit.

Head edge thickness H:

Intake (A)
Standard
1.0 — 1.4 mm (0.039 — 0.055 in)
Limit
0.8 mm (0.031 in)

Exhaust (B)
Standard
1.3 — 1.7 mm (0.051 — 0.067 in)
Limit
0.8 mm (0.031 in)

Valve overall length:
Intake (A)
104.4 mm (4.110 in)
Exhaust (B)
104.65 mm (4.120 in)



2) Put a small amount of grinding compound on the seat surface and lap the valve and seat surface. Install a new intake valve oil seal after lapping.

5. VALVE SPRINGS

1) Check the valve springs for damage, free length, and tension. Replace the valve spring if it is not within specifications presented in the table.
2) To measure the squareness of valve spring, stand the spring on a surface plate and measure its deflection at the top using a try square.

• Europe model and Australia model (Except STi model)

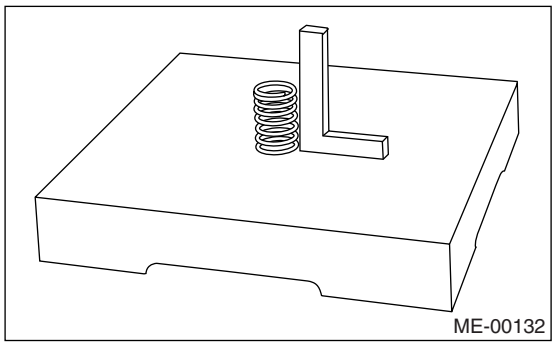
		Valve spring
Free length		47.32 mm (1.863 in)
Tension/spring height	Set	205 — 235 N (20.9 — 24.0 kgf, 41.6 — 52.8 lbf) /36.0 mm (1.417 in)
	Lift	426 — 490 N (43.4 — 50.0 kgf, 95.8 — 110 lbf) /26.5 mm (1.04 in)
Squareness		2.5°, 2.1 mm (0.083 in) or less

• General model (Except STi model)

		Valve spring
Free length		44.67 mm (1.759 in)
Tension/spring height	Set	206 — 236 N (21.0 — 24.1 kgf, 46.3 — 53.1 lbf) /36.0 mm (1.417 in)
	Lift	485 — 537 N (49.5 — 54.8 kgf, 109 — 121 lbf) /26.0 mm (1.024 in)
Squareness		2.5°, 2.0 mm (0.079 in) or less

• STi model

		Valve spring
Free length		43.89 mm (1.728 in)
Tension/spring height	Set	205 — 237 N (20.9 — 24.2 kgf, 46.1 — 53.3 lbf) /36.0 mm (1.417 in)
	Lift	553 — 611 N (56.4 — 62.3 kgf, 124 — 137 lbf) /26.45 mm (1.041 in)
Squareness		2.5°, 1.9 mm (0.075 in) or less

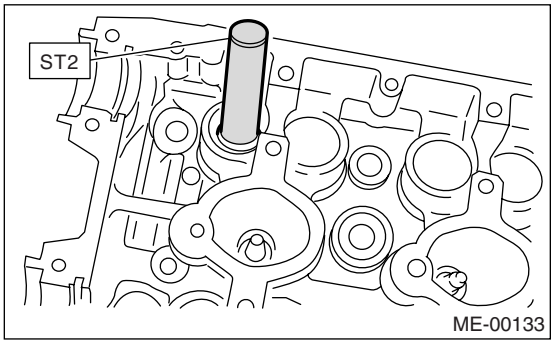


6. INTAKE AND EXHAUST VALVE OIL SEAL

Replace the oil seal with a new one, if the lip is damaged or spring out of place, or when the surfaces of intake valve and valve seat are reconditioned or intake valve guide is replaced.
1) Place the cylinder head on ST1.
2) Press in the oil seal by using ST2.
ST1 498267600 CYLINDER HEAD TABLE
ST2 498857100 VALVE OIL SEAL GUIDE

NOTE:
• Apply engine oil to oil seal before press-fit.
• Differentiate between the intake valve oil seal and exhaust valve oil seal by noting their difference in color.

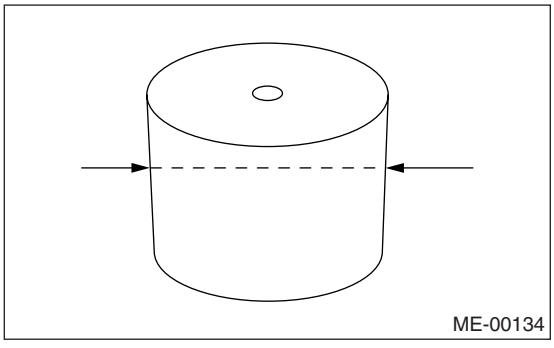
Color of rubber part:
Intake [Gray]
Exhaust [Green]



7. VALVE LIFTER

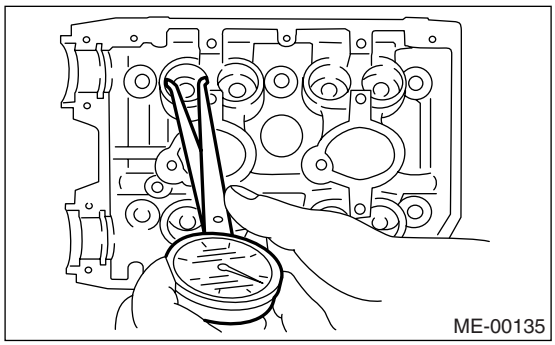
1) Visually check the valve lifter.
2) Measure the outer diameter of valve lifter.

Outer diameter:
34.959 — 34.975 mm (1.3763 — 1.3770 in)



3) Measure the inner diameter of valve lifter mating part on cylinder head.

Inner diameter:
34.994 — 35.016 mm (1.3777 — 1.3786 in)



NOTE:
If difference between outer diameter of valve lifter and inner diameter of valve lifter mating part is over the limit, replace the cylinder head.

Standard:
0.019 — 0.057 mm (0.0007 — 0.0022 in)

Limit:
0.100 mm (0.0039 in)

F: DISPOSAL

1. EXCEPT GENERAL MODEL

CAUTION:
• Metallic sodium is enclosed in the exhaust valve. Metallic sodium is extremely alkaline and may produce severe chemical reactions. Full consideration must therefore be given to the following points when handling or disposing of the valve.
• Since metallic sodium may cause blindness if contacted with the eyes, burns if contacted with the skin, and fire, do not deliberately take the valve apart.

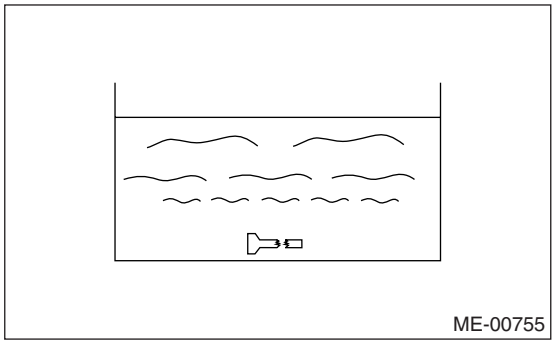
1) If the valve is damaged, remove the valve and neutralize it by immersing it in water, and dispose of it in the same way that general steel materials are disposed of. The disposal method is described in the following.
(1) Wearing rubber gloves, remove the damaged valve from the cylinder head.
(2) Prepare a large receptacle (bucket or other container) in a well ventilated location, and fill the receptacle with water (at least 10 liters).
(3) Immerse the damaged valve in the receptacle.

CAUTION:
A severe reaction may occur, so stand at least 2 — 3 m from the receptacle. Because the reaction will produce hydrogen gas, moreover, keep the receptacle away from sparks or flames.

(4) Once the reaction is completed (about 4 — 5 hours have elapsed), carefully remove the valve using large pincers so that the reaction liquid does not contact your skin, and dispose of it with other parts that are being disposed of.

(5) The reaction liquid is a strong alkaline solution, so it must be disposed of in accordance with local regulations.

CAUTION:
Make sure the reaction liquid does not contact your skin. If contact with skin occurs, immediately wash the affected area with large quantities of water.



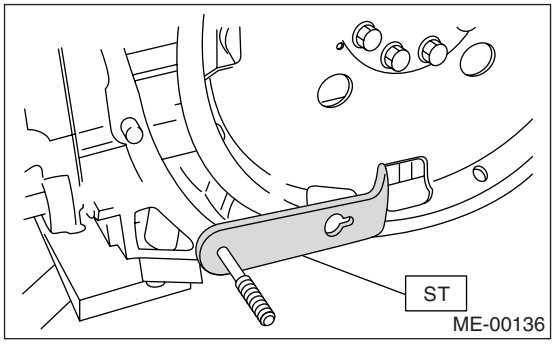
20.Cylinder Block

A: REMOVAL

NOTE:
Before conducting this procedure, drain the engine oil completely if applicable .

1) Remove the intake manifold. <Ref. to FU(H4DOTC)-14, REMOVAL, Intake Manifold.>
2) Remove the V-belt. <Ref. to ME(H4DOTC)-53, REMOVAL, V-belt.>
3) Remove the crank pulley. <Ref. to ME(H4DOTC)-55, REMOVAL, Crank Pulley.>
4) Remove the timing belt cover. <Ref. to ME(H4DOTC)-57, REMOVAL, Timing Belt Cover.>
5) Remove the timing belt assembly. <Ref. to ME(H4DOTC)-58, REMOVAL, Timing Belt.>
6) Remove the cam sprocket. <Ref. to ME(H4DOTC)-66, REMOVAL, Cam Sprocket.>
7) Remove the crank sprocket. <Ref. to ME(H4DOTC)-68, REMOVAL, Crank Sprocket.>
8) Remove the generator and A/C compressor with their brackets.
9) Remove the cylinder head assembly. <Ref. to ME(H4DOTC)-77, REMOVAL, Cylinder Head.>
10) Remove the clutch disc and cover. (MT model) <Ref. to CL-20, REMOVAL, Clutch Disc and Cover.>
11) Remove the flywheel. (MT model) <Ref. to CL-24, REMOVAL, Flywheel.>
12) Remove the drive plate. (AT model)
Using the ST, lock crankshaft.

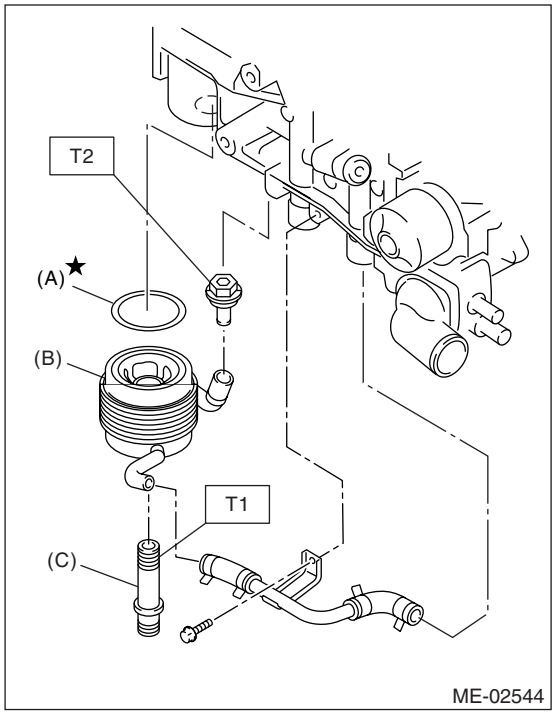
ST 498497100 CRANKSHAFT STOPPER



13) Remove the oil separator cover.
14) Remove the water by-pass pipe for heater.
15) Remove the oil filter.

ST 498547000 OIL FILTER WRENCH (For oil filter (Outer diameter: 80 mm (3.15 in)))
ST 18332AA000 OIL FILTER WRENCH (For oil filter (Outer diameter: 68 mm (2.68 in)))
ST 18332AA010 OIL FILTER WRENCH (For oil filter (Outer diameter: 65 mm (2.56 in)))

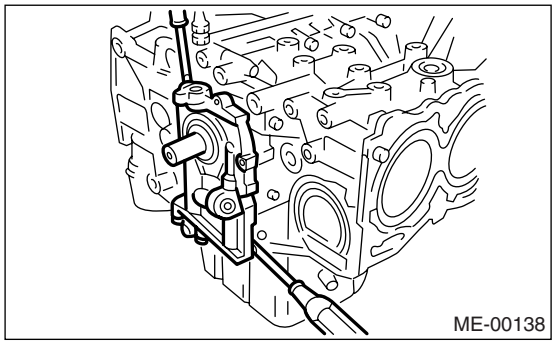
16) Remove the oil cooler.



(A) Gasket
(B) Oil cooler
(C) Oil cooler connector

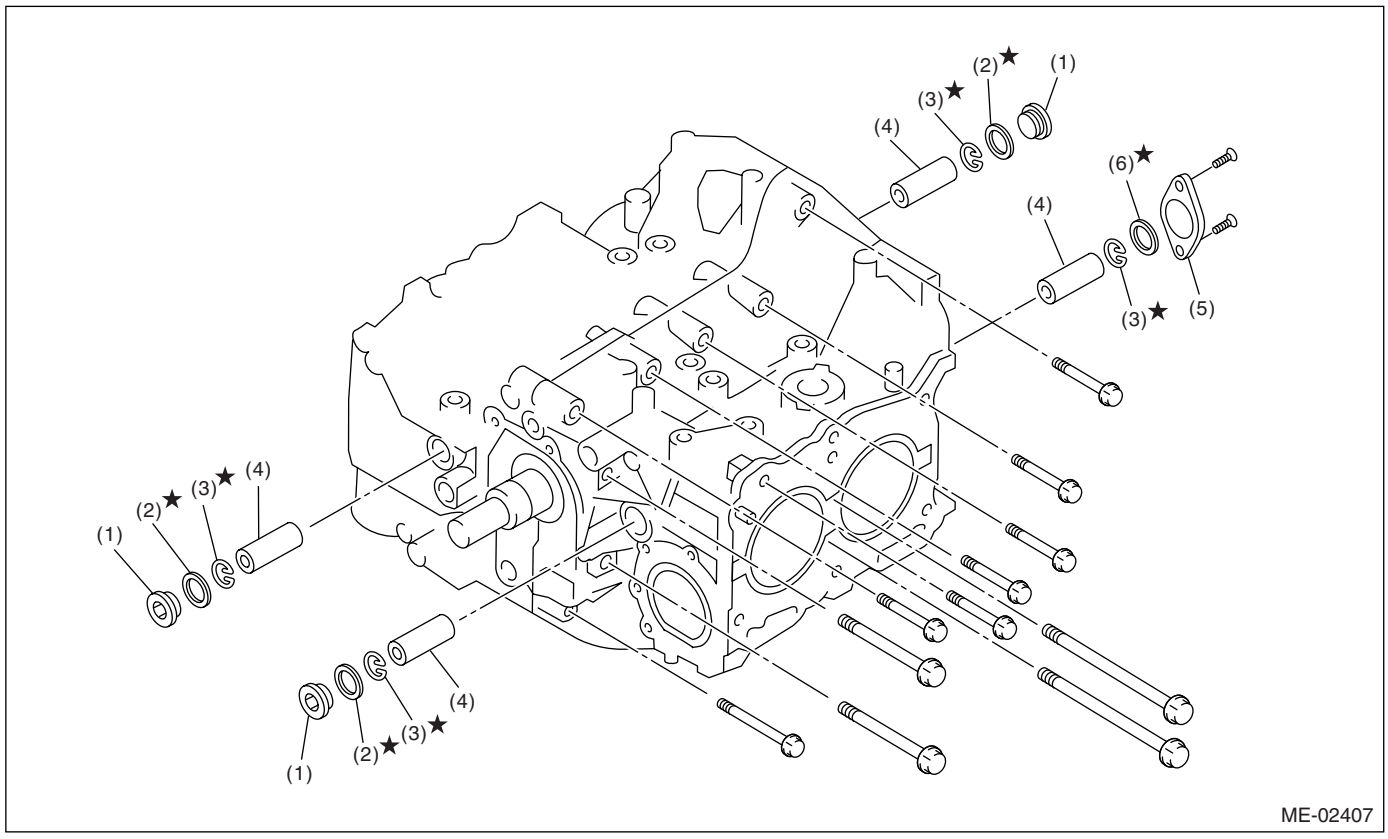
17) Remove the water pump.
18) Remove the oil pump from cylinder block.
Use a flat-bladed screwdriver as shown in the figure when removing the oil pump.

NOTE:
Be careful not to scratch the mating surface of cylinder block and oil pump.



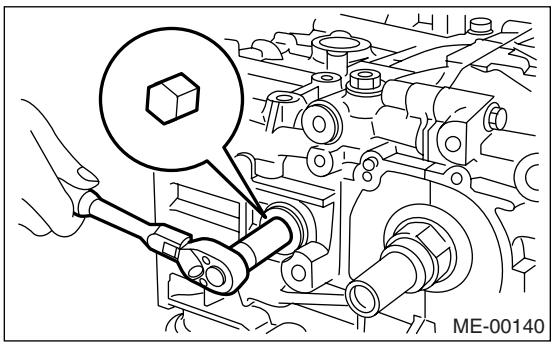
19) Removal of oil pan:
(1) Turn the cylinder block with #2 and #4 piston sides facing upward.
(2) Remove the bolts which secure oil pan to cylinder block.
(3) Insert an oil pan cutter blade between cylinder block-to-oil pan clearance, and then remove the oil pan.
Do not use a screwdriver or similar tool in place of oil pan cutter.

20) Remove the oil strainer stay.
21) Remove the oil strainer.
22) Remove the baffle plate.
23) Remove the water pipes.

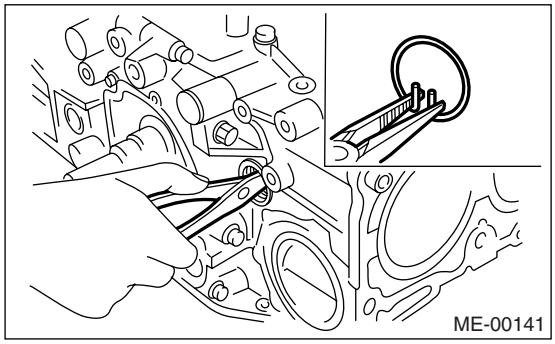


(1) Service hole plug
(2) Gasket
(3) Circlip
(4) Piston pin
(5) Service hole cover
(6) O-ring

24) Remove the service hole cover and service hole plugs using hexagon wrench [14 mm (0.55 in)].



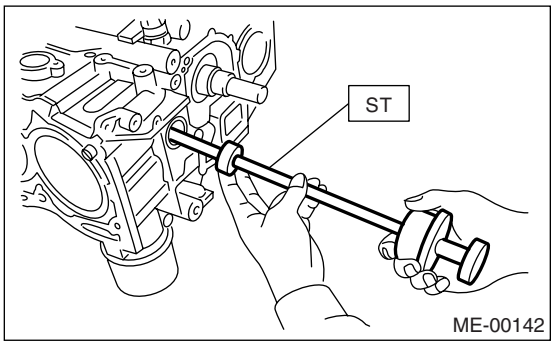
25) Rotate the crankshaft to bring #1 and #2 pistons to bottom dead center position, and then remove the piston circlip through service hole of #1 and #2 cylinders.



26) Draw out the piston pin from #1 and #2 pistons using ST.

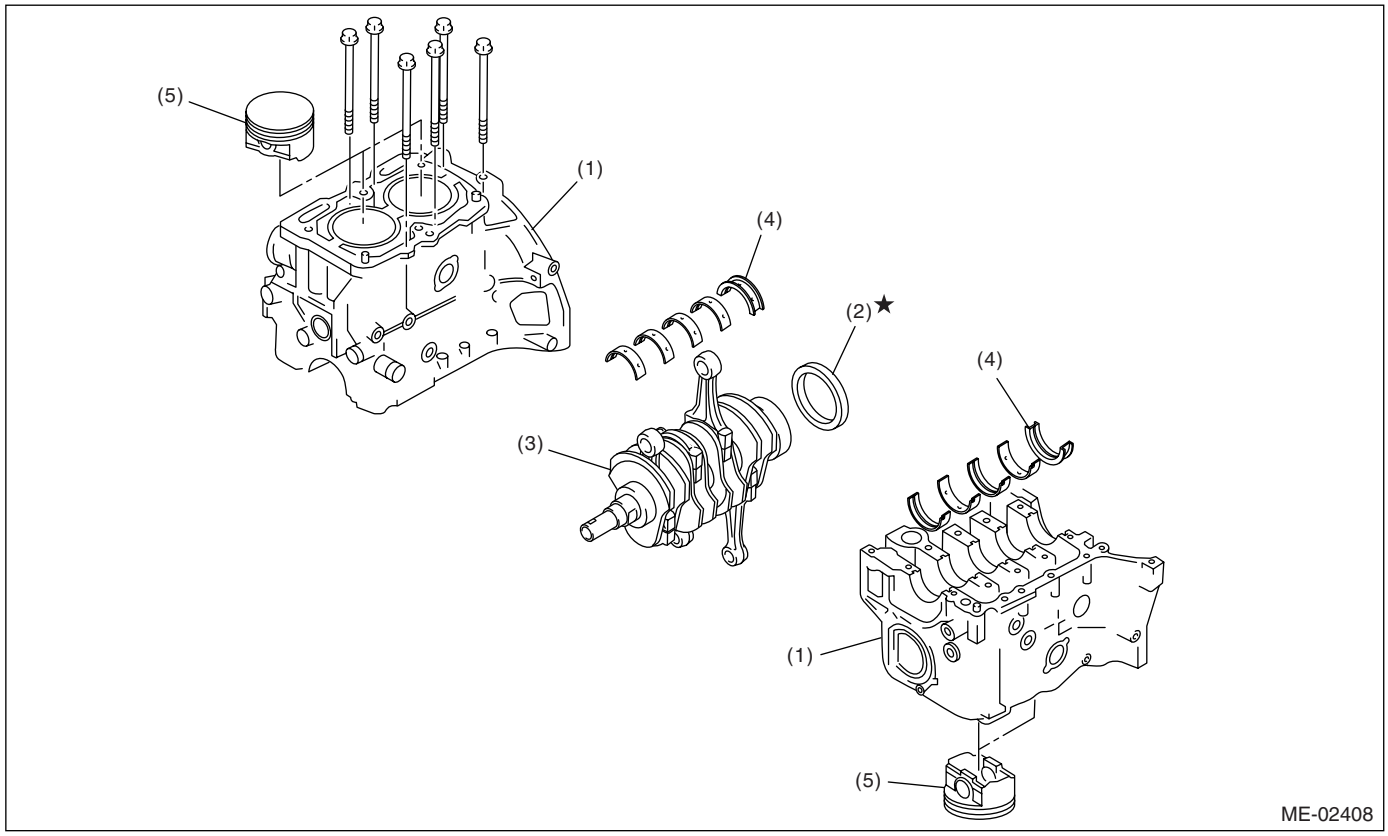
ST	499097700	PISTON PIN REMOVER ASSY (Australia model except STi model)
ST	499097600	PISTON PIN REMOVER ASSY (Except Australia model)

NOTE:
Be careful not to confuse the combination of piston, piston pin and cylinder.



27) Similarly remove the piston pins from #3 and #4 pistons.
28) Remove the bolts which connect the cylinder block on the side of #2 and #4 cylinders.
29) Back off the bolts which connect the cylinder block on the side of #1 and #3 cylinders two or three turns.
30) Set up the cylinder block so that #1 and #3 cylinders are on the upper side, then remove the cylinder block connecting bolts.
31) Separate the cylinder blocks (LH) and (RH).

NOTE:
When separating the cylinder block, do not allow the connecting rod to fall and damage the cylinder block.



(1) Cylinder block
(2) Rear oil seal
(3) Crankshaft
(4) Crankshaft bearing
(5) Piston

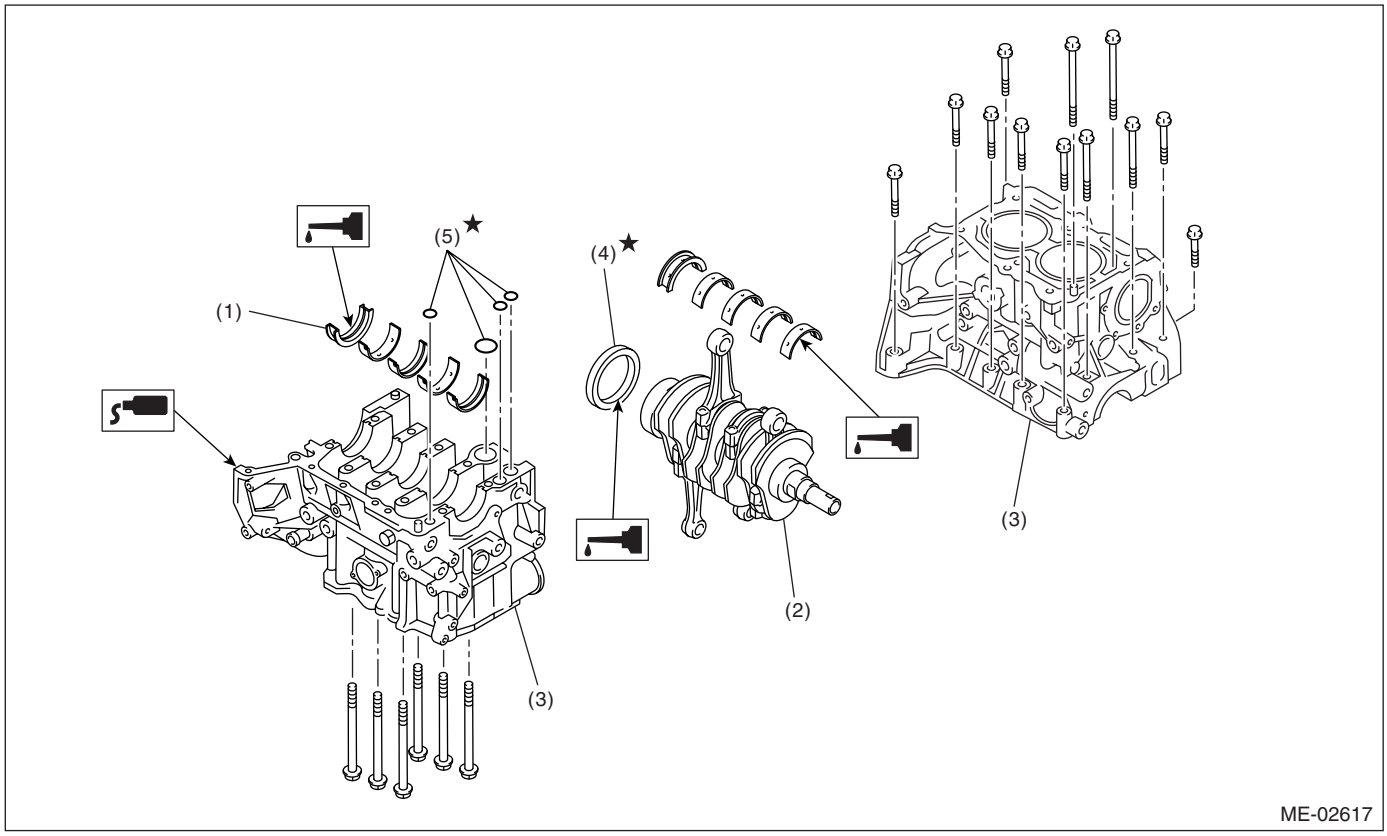
32) Remove the rear oil seal.
33) Remove the crankshaft together with connecting rod.
34) Remove the crankshaft bearings from cylinder block using a hammer handle.

NOTE:
Do not confuse the combination of crankshaft bearings. Press the bearing at the end opposite to locking lip.

35) Draw out each piston from cylinder block using a wooden bar or hammer handle.

NOTE:
Do not confuse the combination of piston and cylinder.

B: INSTALLATION

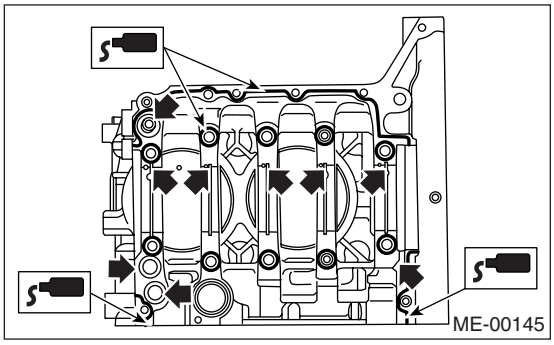


(1) Crankshaft bearing
(2) Crankshaft
(3) Cylinder block
(4) Rear oil seal
(5) O-ring

1) Remove oil in the mating surface of bearing and cylinder block before installation. Also apply a coat of engine oil to crankshaft pins.
2) Position the crankshaft on #2 and #4 cylinder block.
3) Apply liquid gasket to the mating surface of #1 and #3 cylinder block, and position it on #2 and #4 cylinder block.

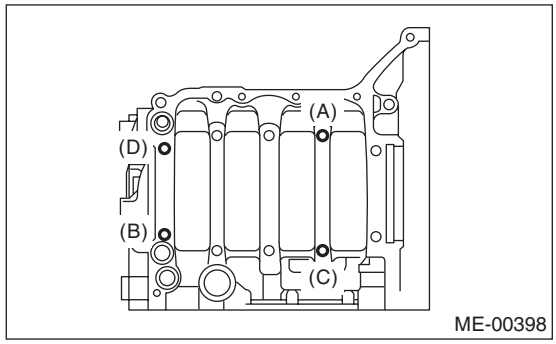
Liquid gasket:
THREE BOND 1215 (Part No. 004403007) or equivalent

NOTE:
Do not allow liquid gasket to jut into O-ring grooves, oil passages, bearing grooves, etc.



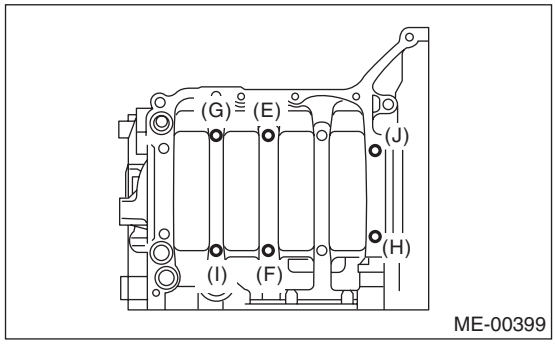
4) Tighten the 10 mm cylinder block connecting bolts in alphabetical sequence shown in the figure. (LH side)

Tightening torque:
10 N·m (1.0 kgf-m, 7.4 ft-lb)



5) Tighten the 10 mm cylinder block connecting bolts in alphabetical sequence shown in the figure. (RH side)

Tightening torque:
10 N·m (1.0 kgf-m, 7.4 ft-lb)



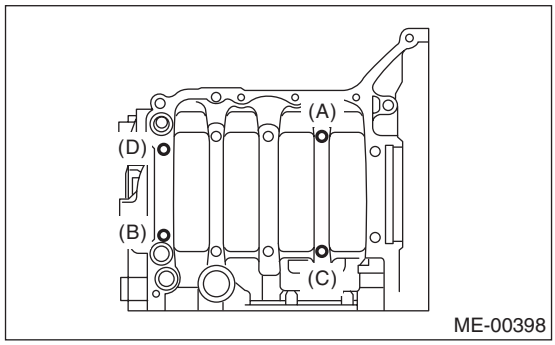
6) Further tighten the LH side bolts (A — D) in alphabetical sequence.

Tightening torque:
18 N·m (1.8 kgf-m, 13.3 ft-lb)

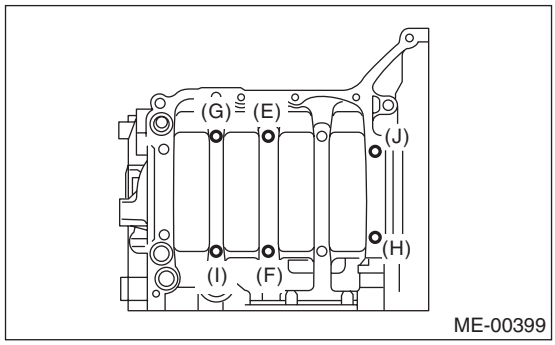
7) Further tighten the RH side bolts (E — J) in alphabetical sequence.

Tightening torque:
18 N·m (1.8 kgf-m, 13.3 ft-lb)

8) Further tighten the LH side bolts (A), (C) to 90°, (B), (D) 40 N·m (4.1 kgf-m, 29.5 ft-lb) in alphabetical sequence.

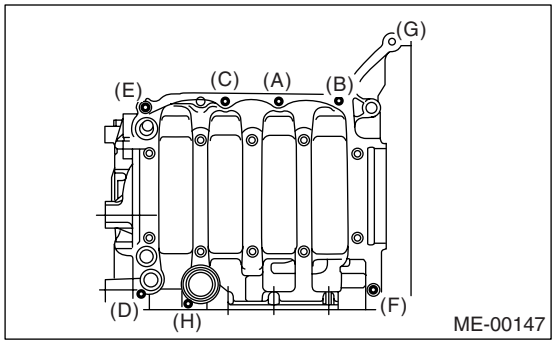


9) Further tighten the RH side bolts (E — J) to 90° in alphabetical sequence.



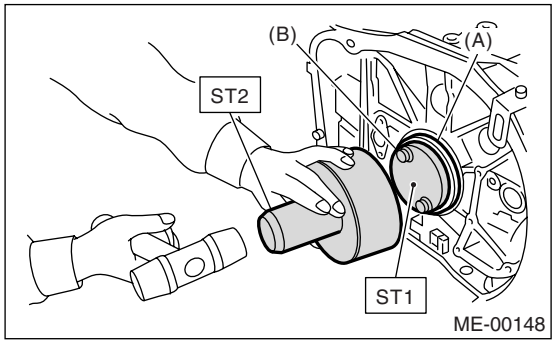
10) Tighten the 8 mm and 6 mm cylinder block connecting bolts in alphabetical sequence shown in the figure.

Tightening torque:
(A) — (G): 25 N·m (2.5 kgf-m, 18.4 ft-lb)
(H): 6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



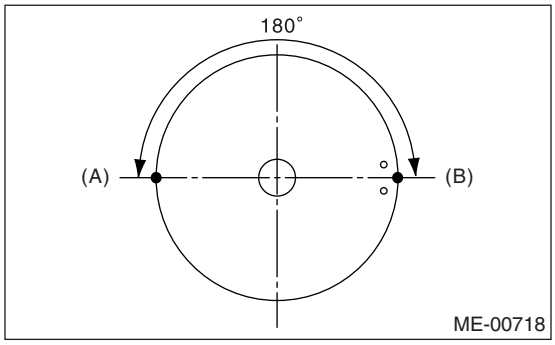
11) Install the rear oil seal using ST1 and ST2.

ST1	499597100	CRANKSHAFT OIL SEAL GUIDE
ST2	499587200	CRANKSHAFT OIL SEAL INSTALLER

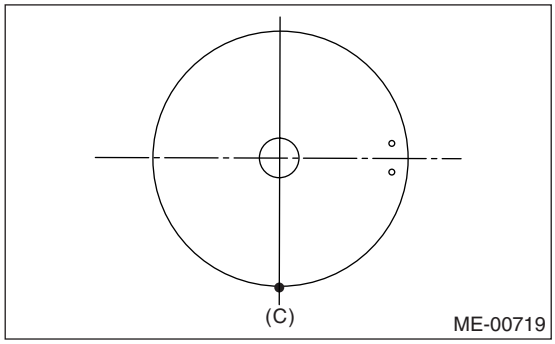


(A) Rear oil seal
(B) Flywheel attaching bolt

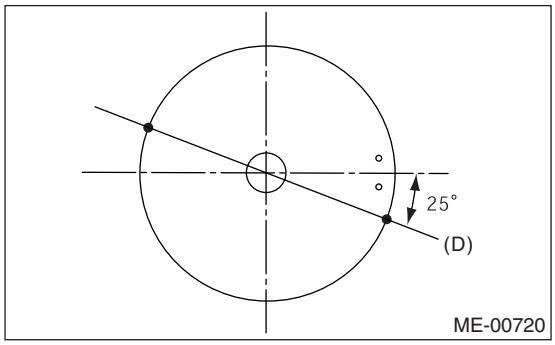
12) Position the top ring gap at (A) or (B) in the figure.
13) Position the second ring gap at 180° on the reverse side for the top ring gap.



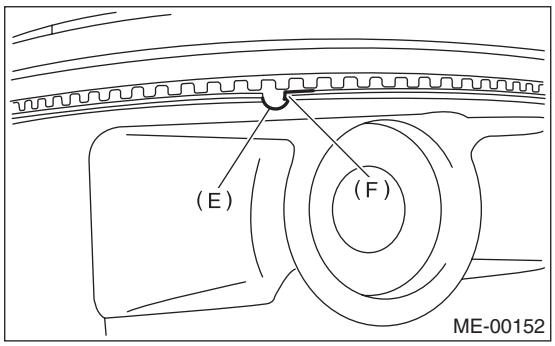
14) Position the expander gap at (C) in the figure.



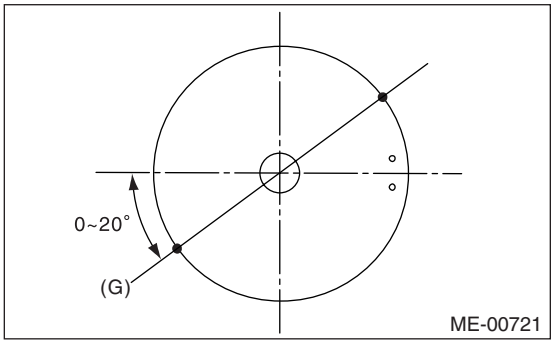
15) Position the lower rail gap at (D) in the figure.



16) Align lower rail spin stopper (F) with piston side surface hole (E).



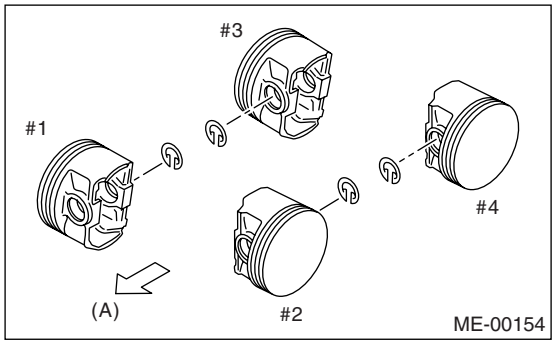
17) Position the upper rail gap at (G) in the figure.

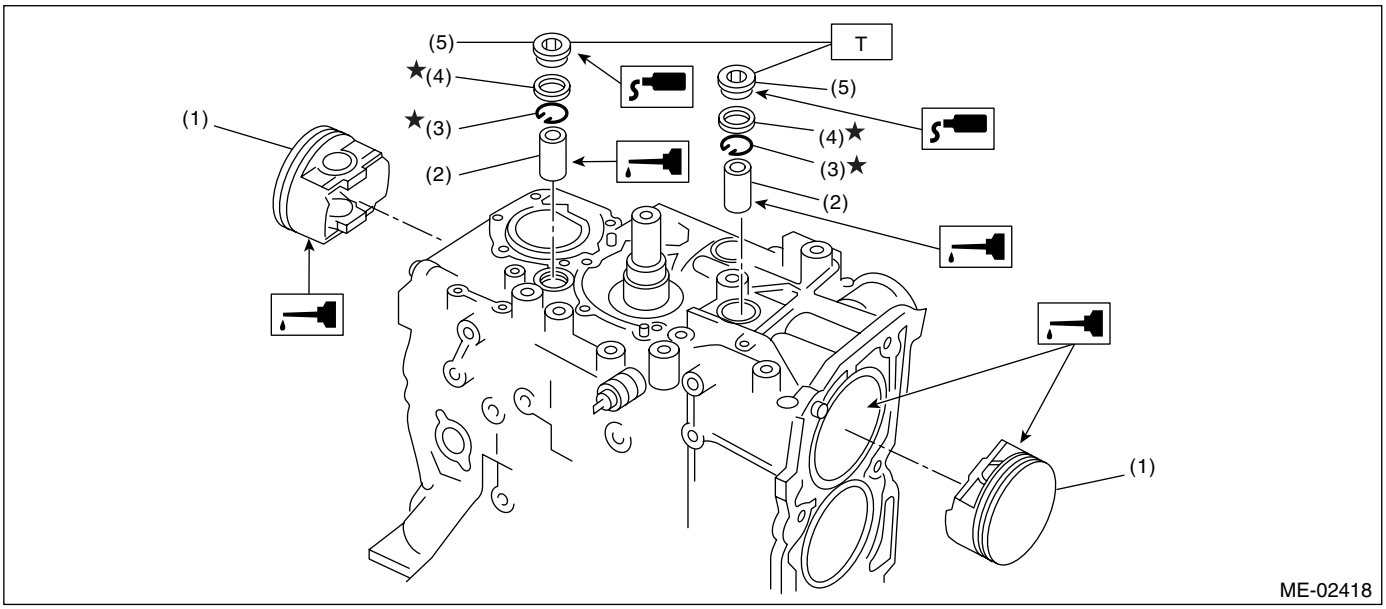


NOTE:
- Ensure ring gaps do not face the same direction.
- Ensure ring gaps are not within the piston skirt area.

18) Install the circlip.
Install the circlips in piston holes located opposite of service holes in cylinder block, when positioning all pistons in the corresponding cylinders.

NOTE:
Use new circlips.





(1) Piston
(2) Piston pin
(3) Circlip
(4) Gasket
(5) Service hole plug

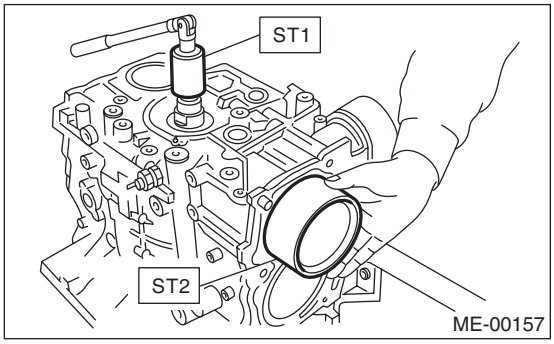
Tightening torque: N·m (kgf-m, ft-lb)
T: 69 (7.0, 50.6)

19) Installing the piston:
(1) Turn the cylinder block so that #1 and #2 cylinders face upward.
(2) Using the ST1, turn the crankshaft so that #1 and #2 connecting rods are set at bottom dead center.

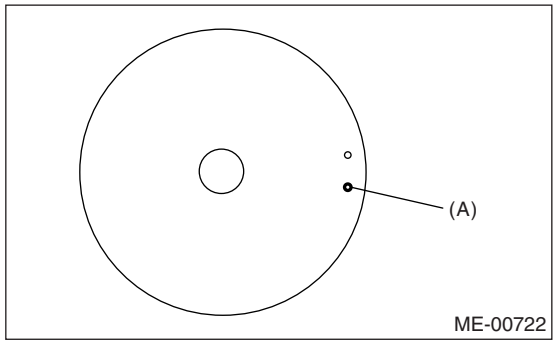
ST1 499987500 CRANKSHAFT SOCKET

(3) Apply a coat of engine oil to the pistons and cylinders and insert pistons in their cylinders using ST2.

ST2 398744300 PISTON GUIDE



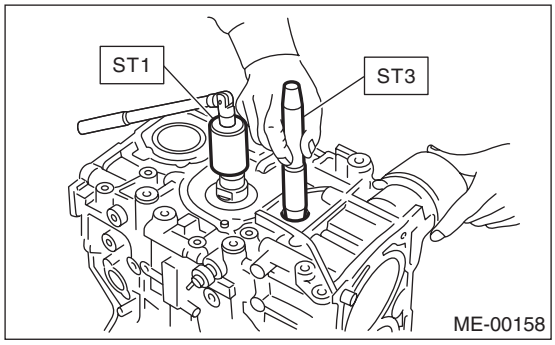
NOTE:
Piston front mark faces towards the front of the engine.



(A) Front mark

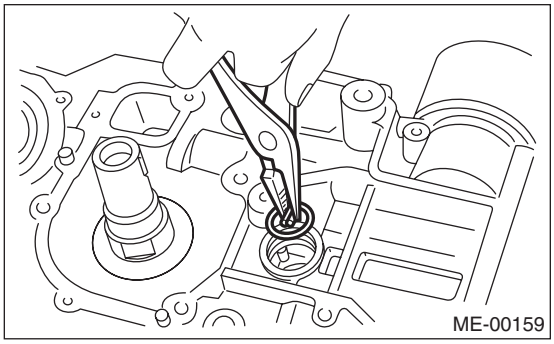
20) Installing piston pin:
(1) Apply a coat of engine oil to ST3, and then insert the ST3 into service hole to align piston pin hole with connecting rod small end.

ST3 499017100 PISTON PIN GUIDE



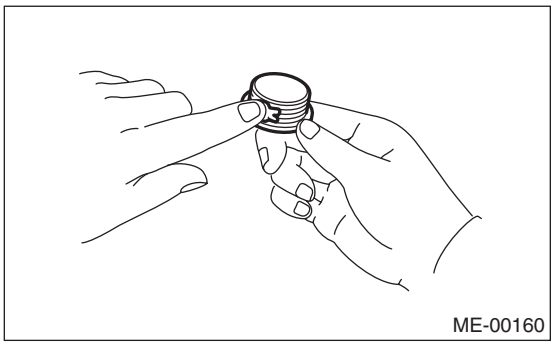
(2) Apply a coat of engine oil to the piston pin and insert piston pin into piston and connecting rod through service hole.
(3) Using the ST, install the circlip.

NOTE:
Use new circlips.



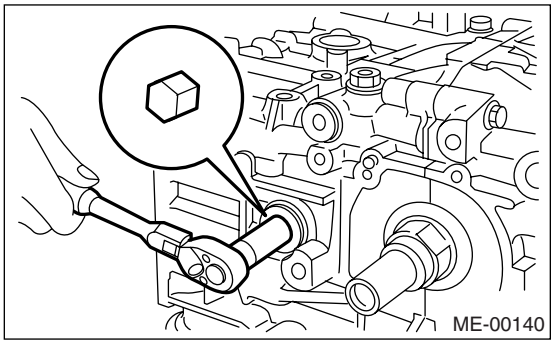
(4) Apply liquid gasket around the service hole plug.

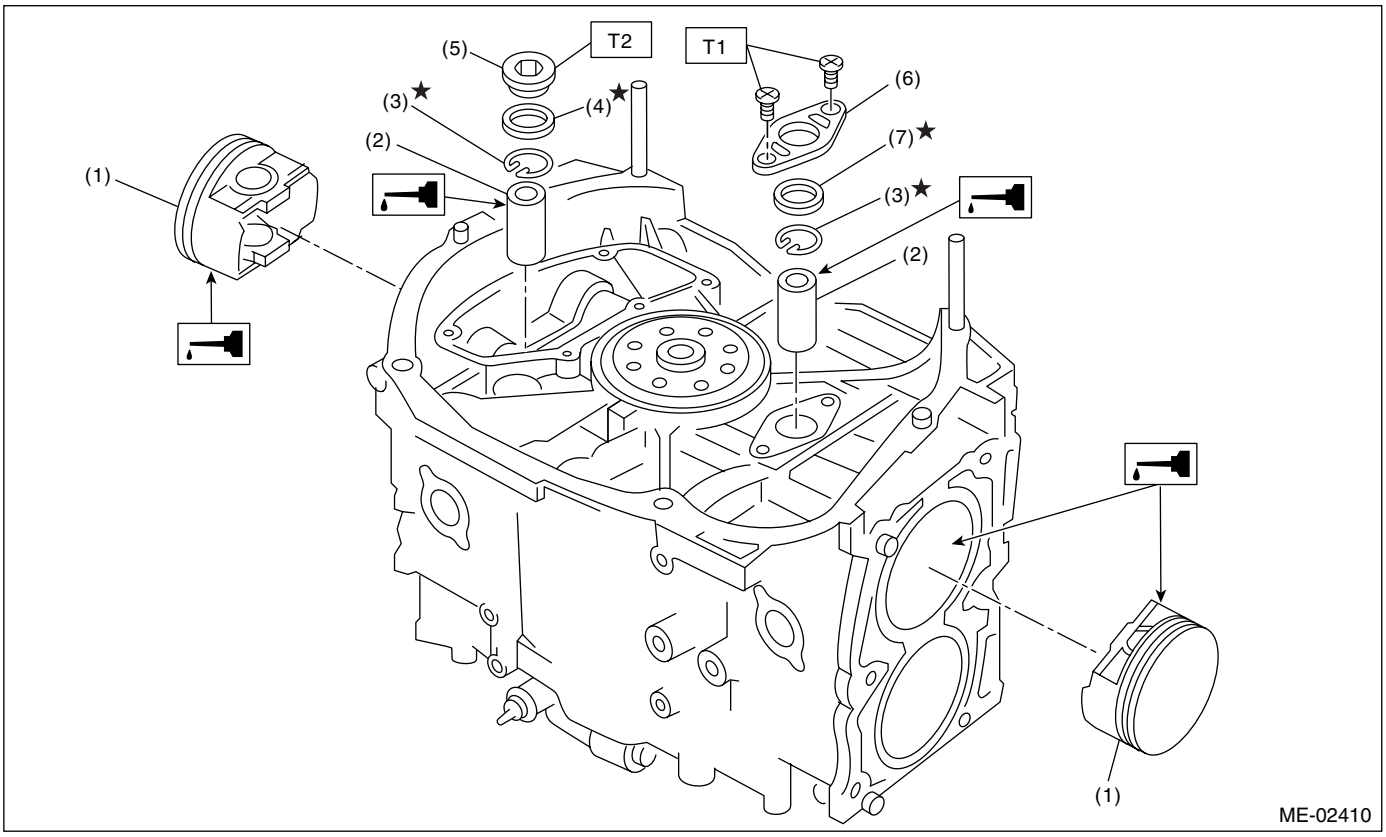
Liquid gasket:
THREE BOND 1215 (Part No. 004403007) or equivalent



(5) Install the service hole plug and gasket.

NOTE:
Use a new gasket.





(1) Piston
(2) Piston pin
(3) Circlip
(4) Gasket
(5) Service hole plug
(6) Service hole cover
(7) O-ring

Tightening torque: N·m (kgf-m, ft-lb)	
T1:	*6.4 (0.65, 4.7)*
T2:	*69 (7.0, 50.6)*

(6) Turn the cylinder block so that #3 and #4 cylinders face upward. Using the same procedures as used for #1 and #2 cylinders, install the pistons and piston pins.

21) Install the water pipe.

22) Install the baffle plate.

Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)

23) Install the oil strainer and O-ring

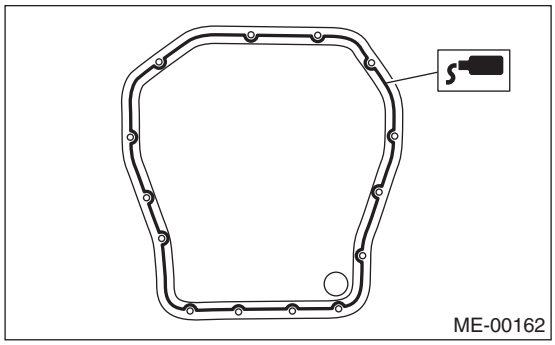
Tightening torque:
10 N·m (1.0 kgf-m, 7.2 ft-lb)

24) Install the oil strainer stay.

25) Apply liquid gasket to the matching surfaces, and then install the oil pan.

Liquid gasket:
THREE BOND 1207C (Part No. 004403012) or equivalent

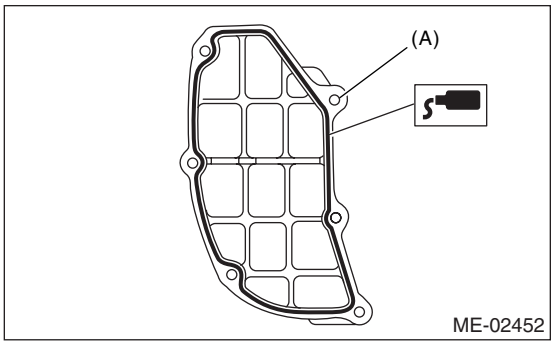
Tightening torque:
5 N·m (0.5 kgf-m, 3.6 ft-lb)



26) Apply liquid gasket to the matching surfaces and threaded portion of bolt (A) as shown in the figure, and then install the oil separator cover.

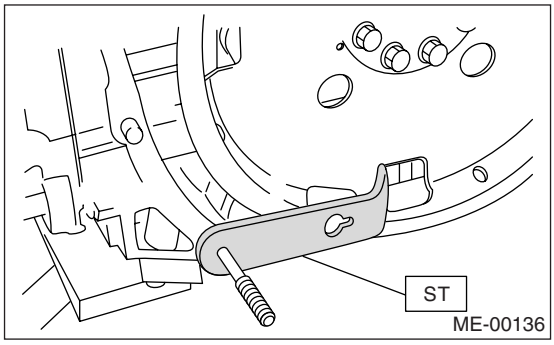
Liquid gasket:
THREE BOND 1207C (Part No. 004403012) or equivalent

Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)

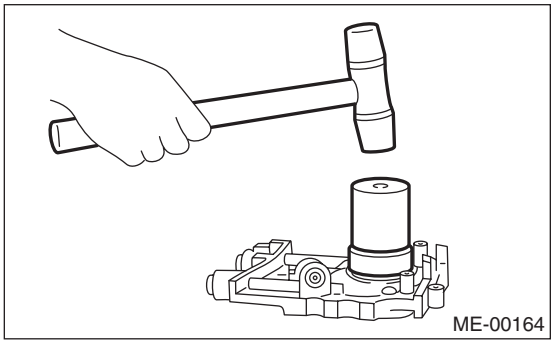


27) Install the drive plate. (AT model)
To lock the crankshaft, use ST.
ST 498497100 CRANKSHAFT STOPPER

Tightening torque:
72 N·m (7.3 kgf-m, 52.8 ft-lb)

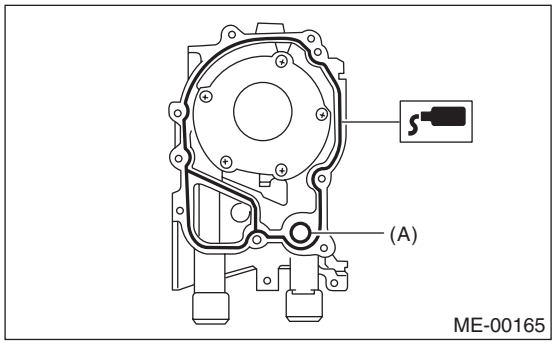


28) Install the flywheel. (MT model) <Ref. to CL-24, INSTALLATION, Flywheel.>
29) Install the clutch disc and cover. (MT model) <Ref. to CL-20, INSTALLATION, Clutch Disc and Cover.>
30) Installation of oil pump:
(1) Discard the front oil seal after removal. Replace with a new one using the ST.
ST 499587100 OIL SEAL INSTALLER



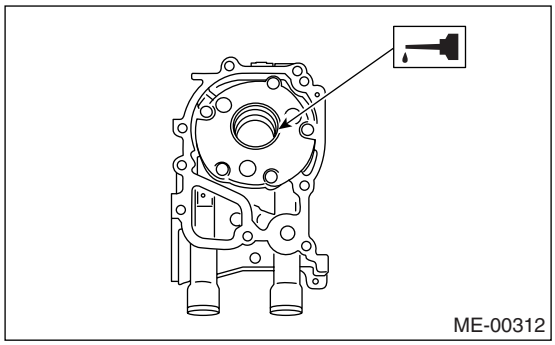
(2) Apply liquid gasket to the matching surface of oil pump.

Liquid gasket:
THREE BOND 1215 (Part No. 004403007) or equivalent



(A) O-ring

(3) Apply a coat of engine oil to the inside of the oil seal.



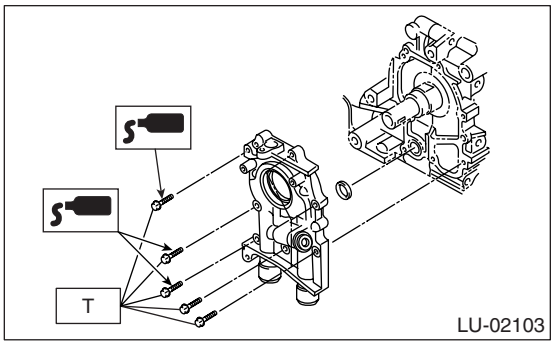
(4) Position the oil pump, aligning the notched area with crankshaft, and push the oil pump straight.

CAUTION:
• Make sure the oil seal lip is not folded.
• Do not forget to install the O-ring and seal when installing the oil pump.

(5) Install the oil pump.
(6) Apply liquid gasket to the threaded portion of three bolts. (If to be reuse the bolts)

Liquid gasket:
THREE BOND 1324 (Part No. 004403042) or equivalent

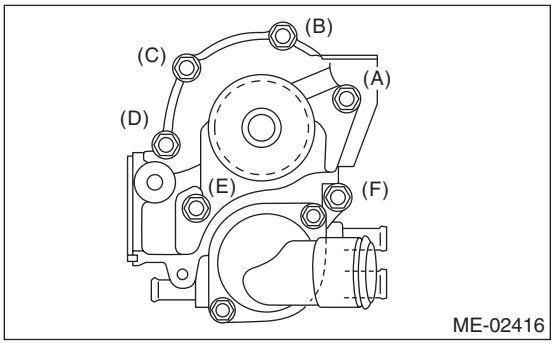
Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



31) Install the water pump and gasket.

Tightening torque:
First; 12 N·m (1.2 kgf-m, 8.7 ft-lb)
Second; 12 N·m (1.2 kgf-m, 8.7 ft-lb)

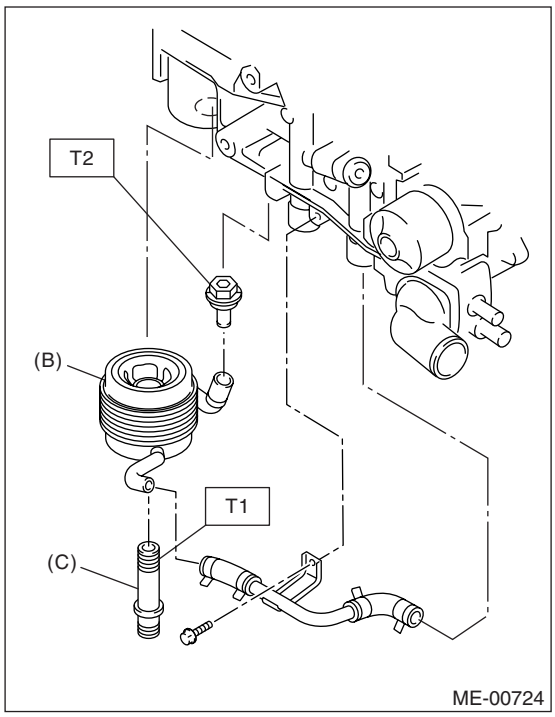
NOTE:
- Be sure to use a new gasket.
- When installing the water pump, tighten the bolts in two stages in alphabetical sequence as shown in the figure.



32) Install the water by-pass pipe for heater.

33) Install the oil cooler.

Tightening torque:
T1: 54 N·m (5.5 kgf-m, 40 ft-lb)
T2: 69 N·m (7.0 kgf-m, 50.6 ft-lb)



(B) Oil cooler
(C) Oil cooler connector

34) Install the oil filter using ST.

ST	498547000	OIL FILTER WRENCH (For oil filter (Outer diameter: 80 mm (3.15 in)))
ST	18332AA000	OIL FILTER WRENCH (For oil filter (Outer diameter: 68 mm (2.68 in)))
ST	18332AA010	OIL FILTER WRENCH (For oil filter (Outer diameter: 65 mm (2.56 in)))

35) Install the water by-pass pipe between oil cooler and water pump.
36) Install the water pipe.

NOTE:
Always use a new O-ring.

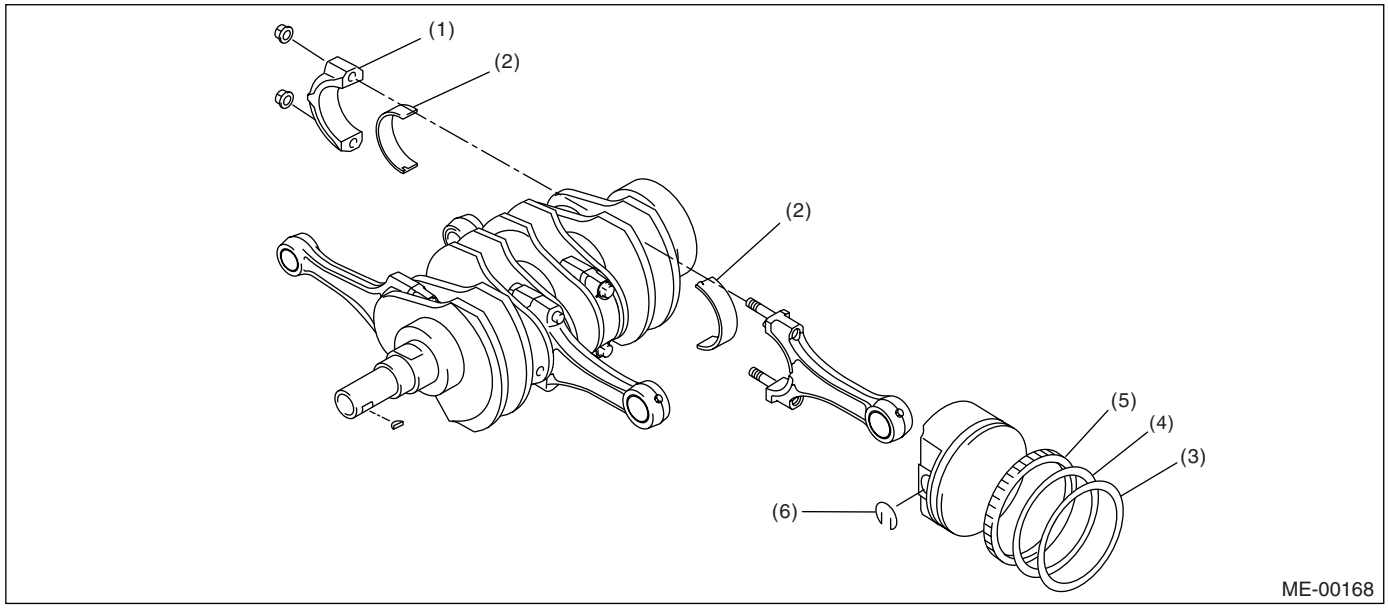
37) Install the cylinder head assembly. <Ref. to ME(H4DOTC)-77, INSTALLATION, Cylinder Head.>
38) Install the oil level gauge guide and tighten the attaching bolt (LH side).
39) Install the rocker cover and rocker cover gasket.

NOTE:
Use a new rocker cover gasket.

40) Install the crank sprocket. <Ref. to ME(H4DOTC)-68, INSTALLATION, Crank Sprocket.>
41) Install the cam sprocket. <Ref. to ME(H4DOTC)-66, INSTALLATION, Cam Sprocket.>
42) Install the timing belt assembly. <Ref. to ME(H4DOTC)-59, INSTALLATION, Timing Belt.>
43) Install the timing belt cover. <Ref. to ME(H4DOTC)-57, INSTALLATION, Timing Belt Cover.>
44) Install the crank pulley. <Ref. to ME(H4DOTC)-55, INSTALLATION, Crank Pulley.>
45) Install the generator and A/C compressor brackets on cylinder head.
46) Install the V-belt. <Ref. to ME(H4DOTC)-53, INSTALLATION, V-belt.>
47) Install the intake manifold. <Ref. to FU(H4DOTC)-17, INSTALLATION, Intake Manifold.>

C: DISASSEMBLY

1. EXCEPT STi MODEL



(1) Connecting rod cap
(2) Connecting rod bearing
(3) Top ring
(4) Second ring
(5) Oil ring
(6) Circlip

1) Remove the connecting rod cap.
2) Remove the connecting rod bearing.

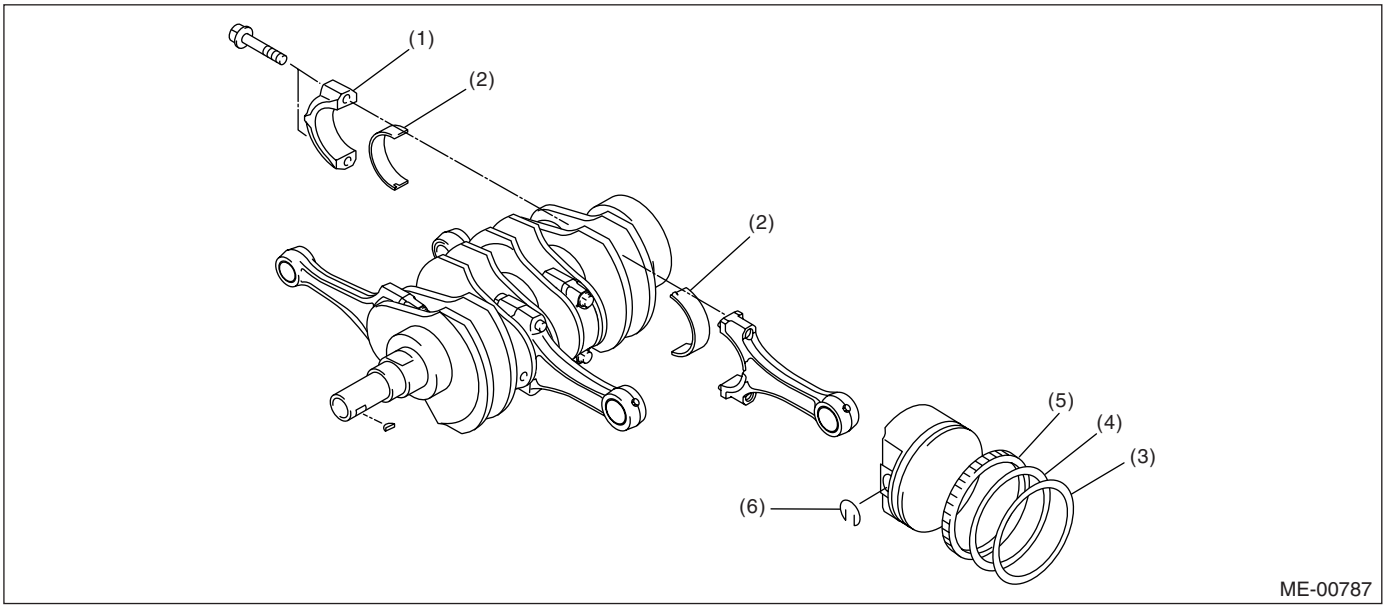
NOTE:
Arrange the removed connecting rod, connecting rod cap and bearing in order to prevent confusion.

3) Remove the piston rings using the piston ring expander.
4) Remove the oil ring by hand.

NOTE:
Arrange the removed piston rings in proper order to prevent confusion.

5) Remove the circlip.

2. STi MODEL



(1) Connecting rod cap
(2) Connecting rod bearing
(3) Top ring
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(5) Oil ring
(6) Circlip

1) Remove the connecting rod cap.
2) Remove the connecting rod bearing.

NOTE:
Arrange the removed connecting rod, connecting rod cap and bearing in order to prevent confusion.

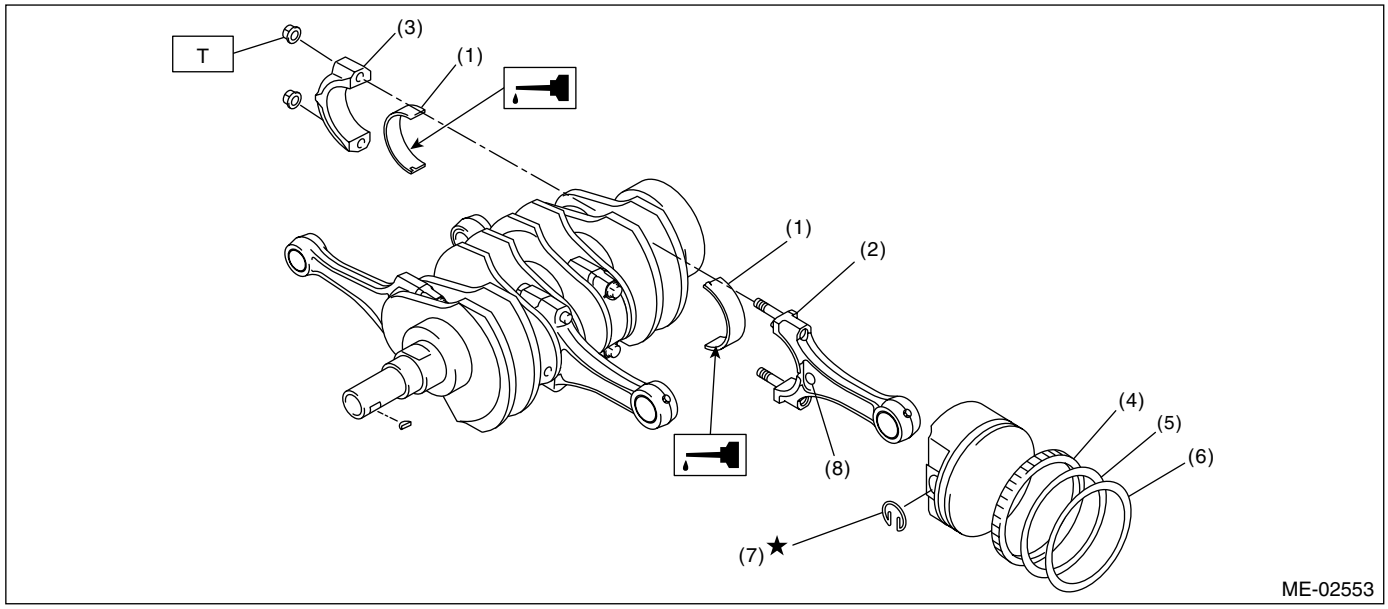
3) Remove the piston rings using the piston ring expander.
4) Remove the oil ring by hand.

NOTE:
Arrange the removed piston rings in proper order to prevent confusion.

5) Remove the circlip.

D: ASSEMBLY

1. EXCEPT STi MODEL



(1) Connecting rod bearing
(2) Connecting rod
(3) Connecting rod cap
(4) Oil ring
(5) Second ring
(6) Top ring
(7) Circlip
(8) Side mark

Tightening torque: N·m (kgf-m, ft-lb)
T: 45 (4.6, 33.3)

1) Apply oil to the surfaces of the connecting rod bearings. Install the connecting rod bearings on connecting rods and connecting rod caps.
2) Install the connecting rod on crankshaft.

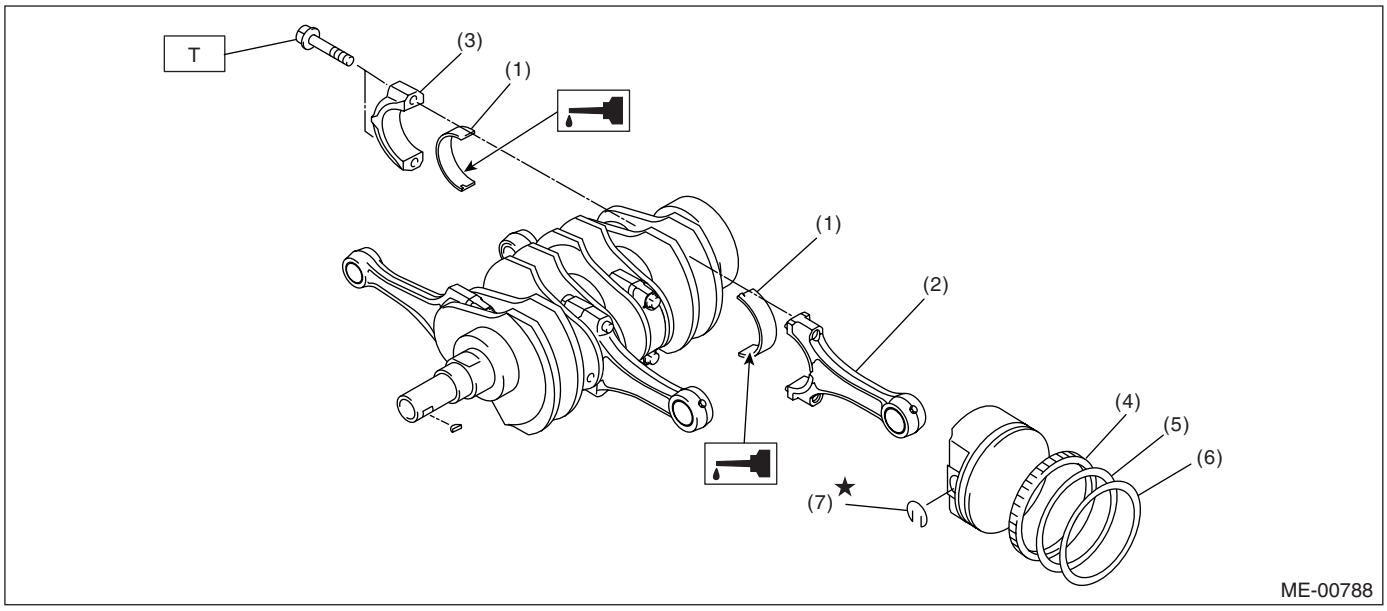
NOTE:
Position each connecting rod with the side marked facing forward.

3) Install the connecting rod cap with connecting rod nut.
Ensure the arrow on connecting rod cap faces the front during installation.

CAUTION:
• Each connecting rod has its own mating cap. Make sure that they are assembled correctly by checking their matching number.
• When tightening the connecting rod nuts, apply oil on the threads.

4) Install the oil ring spacer, upper rail and lower rail in this order by hand. Then install the second ring and top ring with a piston ring expander.

2. STi MODEL



(1) Connecting rod bearing
(2) Connecting rod
(3) Connecting rod cap
(4) Oil ring
(5) Second ring
(6) Top ring
(7) Circlip

Tightening torque: N·m (kgf-m, ft-lb)
T: 52 (5.3, 38.4)

1) Apply oil to the surfaces of the connecting rod bearings. Install the connecting rod bearings on connecting rods and connecting rod caps.
2) Install the connecting rod on crankshaft.

NOTE:
Position each connecting rod with the side marked facing forward.

3) Install the connecting rod cap with connecting rod nut.
Ensure the arrow on connecting rod cap faces the front during installation.

CAUTION:
• Each connecting rod has its own mating cap. Make sure that they are assembled correctly by checking their matching number.
• When tightening the connecting rod nuts, apply oil on the threads.

4) Install the oil ring spacer, upper rail and lower rail in this order by hand. Then install the second ring and top ring with a piston ring expander.

E: INSPECTION

1. CYLINDER BLOCK

1) Visually check for cracks and damage. Especially, inspect the important parts by means of liquid penetrant tester.
2) Check the oil passages for clogging.
3) Inspect the crankcase surface that mates with cylinder head for warping by using a straight edge, and correct by grinding if necessary.

Warping limit:
0.025 mm (0.00098 in)

Grinding limit:
0.1 mm (0.004 in)

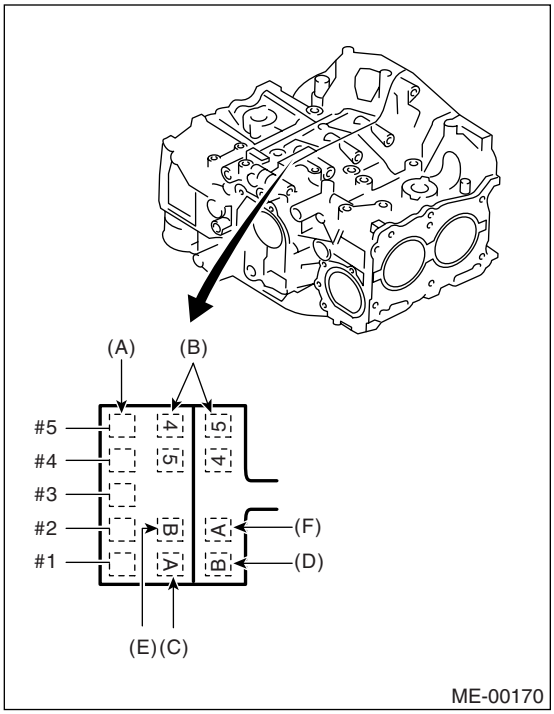
Standard height of cylinder block:
201.0 mm (7.91 in)

2. CYLINDER AND PISTON

1) The cylinder bore size is stamped on cylinder block's front upper surface.

NOTE:
• Measurement should be performed at a temperature of 20°C (68°F).
• Standard sized pistons are classified into two grades, "A" and "B". These grades should be used as a guide line in selecting a standard piston.

Standard diameter:
A: 92.005 — 92.015 mm (3.6222 — 3.6226 in)
B: 91.995 — 92.005 mm (3.6218 — 3.6222 in)



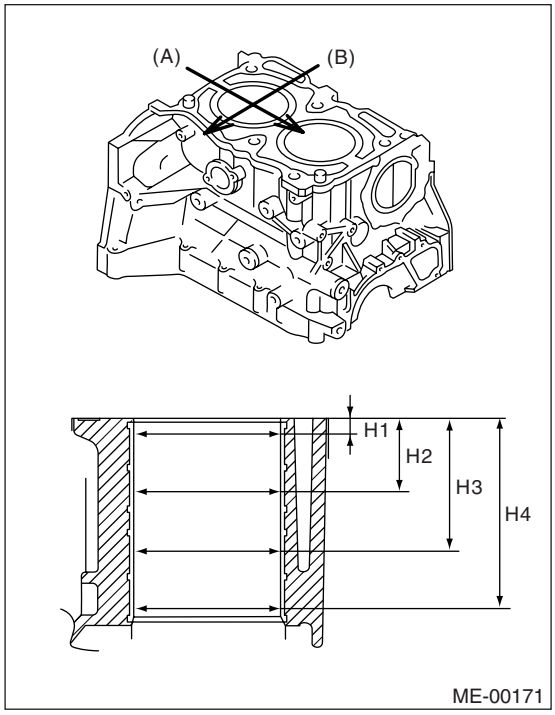
(A) Main journal size mark
(B) Cylinder block (RH)-(LH) combination mark
(C) #1 cylinder bore size mark
(D) #2 cylinder bore size mark
(E) #3 cylinder bore size mark
(F) #4 cylinder bore size mark

2) How to measure the inner diameter of each cylinder:
Measure the inner diameter of each cylinder in both the thrust and piston pin directions at the heights shown in the figure, using a cylinder bore gauge.

NOTE:
Measurement should be performed at a temperature of 20°C (68°F).

Cylindricity:
Standard
0.015 mm (0.0006 in)
Limit
0.050 mm (0.0020 in)

Out-of-roundness:
Standard
0.010 mm (0.0004 in)
Limit
0.050 mm (0.0020 in)



(A) Piston pin direction
(B) Thrust direction
H1: 10 mm (0.39 in)
H2: 45 mm (1.77 in)
H3: 80 mm (3.15 in)
H4: 115 mm (4.53 in)

3) When the piston is to be replaced due to general or cylinder wear, determine a suitable sized piston by measuring the piston clearance.
4) How to measure the outer diameter of each piston:
Measure the outer diameter of each piston at the height shown in the figure. (Thrust direction)

NOTE:
Measurement should be performed at a temperature of 20°C (68°F).

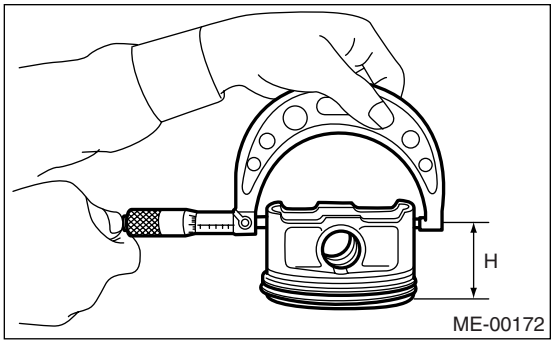
Piston grade point H:
40.0 mm (1.57 in)

Piston outer diameter:

Standard
A: 91.985 — 91.995 mm (3.6214 — 3.6218 in)
B: 91.975 — 91.985 mm (3.6211 — 3.6214 in)

0.25 mm (0.0098 in) oversize
92.225 — 92.235 mm (3.6309 — 3.6313 in)

0.50 mm (0.0197 in) oversize
92.475 — 92.485 mm (3.6407 — 3.6411 in)



5) Calculate the clearance between cylinder and piston.

NOTE:
Measurement should be performed at a temperature of 20°C (68°F).

Cylinder to piston clearance at 20°C (68°F):
Standard
0.010 — 0.030 mm (0.0004 — 0.0012 in)
Limit
0.050 mm (0.0020 in)

6) Boring and honing:
(1) If the value of cylindricity, out-of-roundness, or cylinder-to-piston clearance measured exceeds the specified standard value or if there is any damage on the cylinder wall, reboring it to use an oversize piston.

CAUTION:
When any of the cylinders needs reboring, all other cylinders must be bored at the same time, and use oversize pistons. Do not perform boring on one cylinder only, nor use an oversize piston for one cylinder only.

(2) If the cylinder inner diameter exceeds the limit after boring and honing, replace the crankcase.

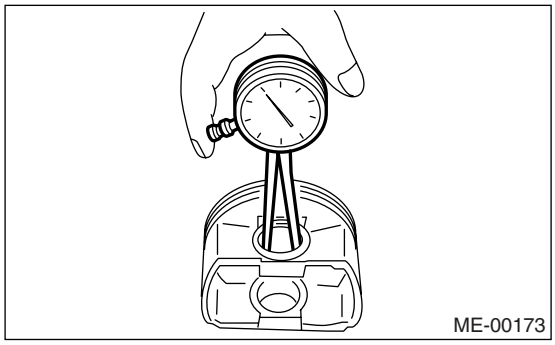
NOTE:
Immediately after reboring, the cylinder diameter may differ from its real diameter due to temperature rise. Thus, pay attention to this when measuring the cylinder diameter.

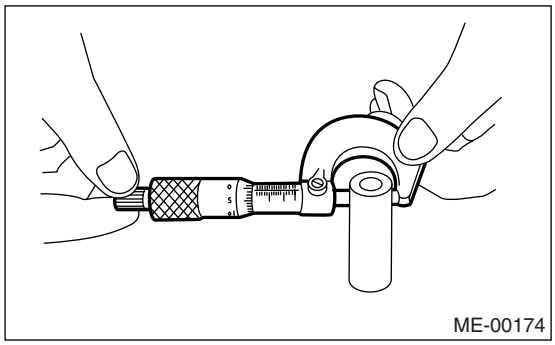
Limit of cylinder enlarging (boring):
0.5 mm (0.020 in)

3. PISTON AND PISTON PIN

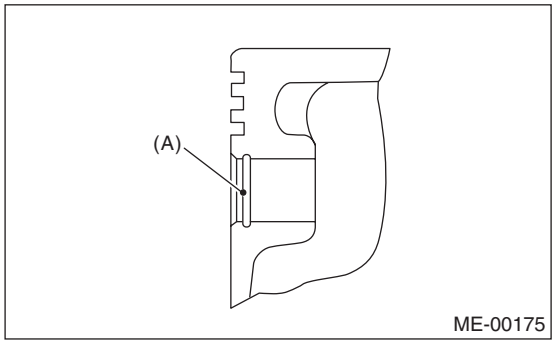
1) Check the pistons and piston pins for damage, cracks, and wear and the piston ring grooves for wear and damage. Replace if defective.
2) Measure the piston-to-cylinder clearance at each cylinder. <Ref. to ME(H4DOTC)-99, CYLINDER AND PISTON, INSPECTION, Cylinder Block.> If any of the clearances is not within specification, replace the piston or bore the cylinder to use an oversize piston.
3) Make sure that the piston pin can be inserted into the piston pin hole with a thumb at 20°C (68°F). Replace if defective.

Standard clearance between piston pin and hole in piston:
Standard
0.004 — 0.008 mm (0.0002 — 0.0003 in)
Limit
0.020 mm (0.0008 in)





4) Check the circlip installation groove (A) on piston for burr. If necessary, remove the burr from groove so that the piston pin can lightly move.

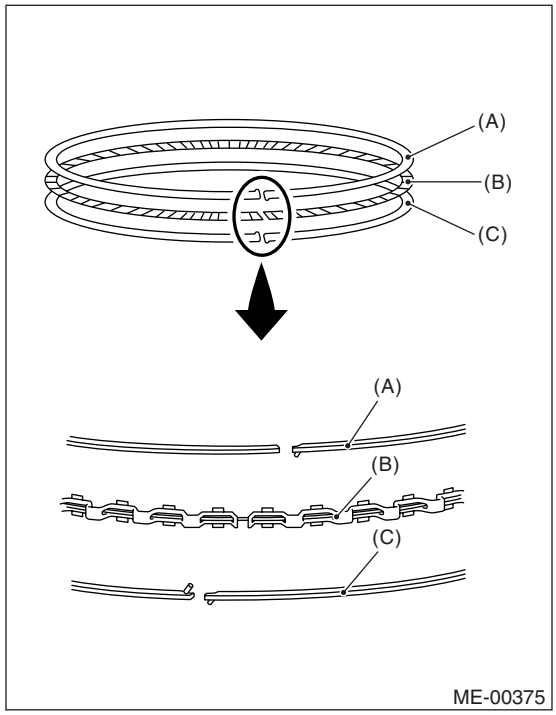


5) Check the piston pin circlip for distortion, cracks and wear.

4. PISTON RING

1) If the piston ring is broken, damaged, or worn, or if its tension is insufficient, or when the piston is replaced, replace the piston ring with a new one of the same size as the piston.

CAUTION:
• Marks are shown on the end of top and second rings. When installing the rings to piston, face this mark upward.
• Oil ring consists of upper rail, expander and lower rail. When installing on piston, be careful of each rail's direction.

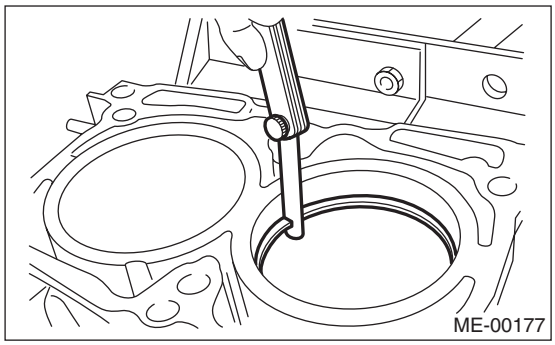


(A) Upper rail
(B) Expander
(C) Lower rail

2) Squarely place the piston ring and oil ring in cylinder, and then measure the piston ring gap with a thickness gauge.

Unit: mm (in)

		Standard	Limit
Piston ring gap	Top ring	Outer circle side: 0.20 — 0.25 (0.0079 — 0.0098) Inner circle side: 0.20 — 0.30 (0.0079 — 0.0117)	1.0 (0.039)
	Second ring	0.40 — 0.50 (0.0157 — 0.0197)	1.0 (0.039)
	Oil ring rail	0.20 — 0.50 (0.0079 — 0.0197)	1.5 (0.059)

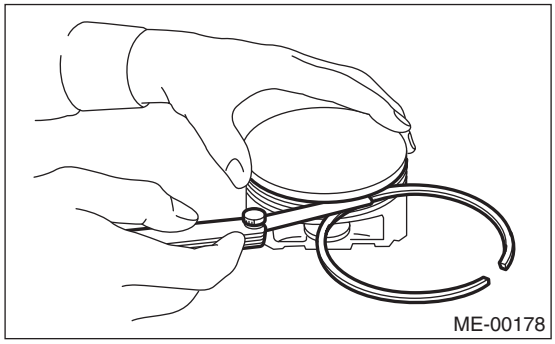


3) Measure the clearance between piston ring and piston ring groove with a thickness gauge.

NOTE:
Before measuring the clearance, clean the piston ring groove and piston ring.

Unit: mm (in)

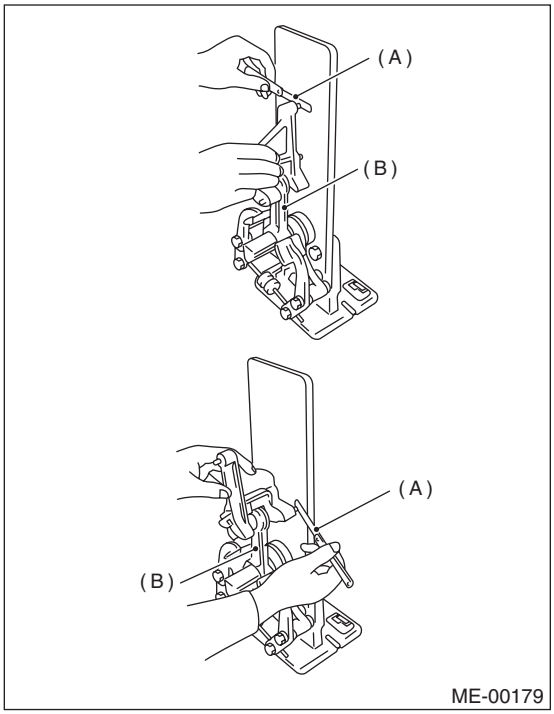
		Standard	Limit
Clearance between piston ring and piston ring groove	Top ring	0.040 — 0.080 (0.0016 — 0.0031)	0.15 (0.0059)
	Second ring	0.030 — 0.070 (0.0012 — 0.0028)	0.15 (0.0059)



5. CONNECTING ROD

1) Replace the connecting rod, if the large or small end thrust surface is damaged.
2) Check for bend or twist using a connecting rod aligner. Replace the connecting rod if the bend or twist exceeds the limit.

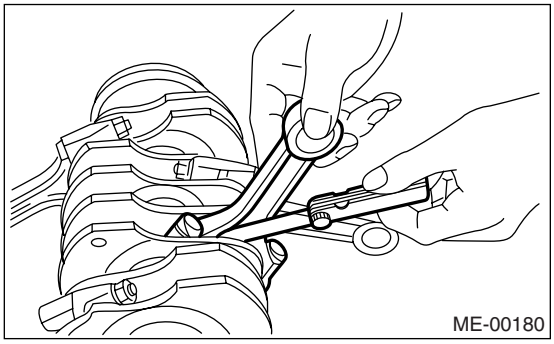
Limit of bend or twist per 100 mm (3.94 in) in length:
0.10 mm (0.0039 in)



(A) Thickness gauge
(B) Connecting rod

3) Install the connecting rod fitted with bearing to crankshaft, and then measure the side clearance (thrust clearance). Replace the connecting rod if the side clearance exceeds the specified limit.

Connecting rod side clearance:
Standard
0.070 — 0.330 mm (0.0028 — 0.0130 in)
Limit
0.40 mm (0.016 in)



4) Inspect the connecting rod bearing for scar, peeling, seizure, melting, wear, etc.
5) Measure the oil clearance on individual connecting rod bearings by means of plastigauge. If any oil clearance is not within specification, replace the defective bearing with a new one of standard size or undersize as necessary. (See the table below.)

Connecting rod oil clearance:

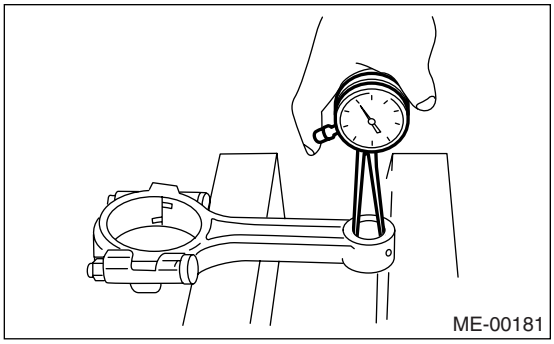
Standard
Except STi model
0.026 — 0.052 mm (0.0010 — 0.0020 in)
STi model
0.017 — 0.045 mm (0.0007 — 0.0018 in)

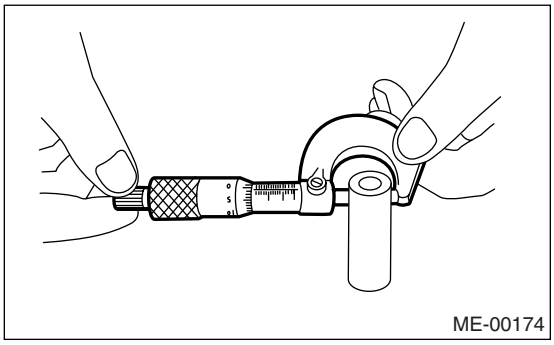
Unit: mm (in)

Bearing	Bearing size (Thickness at center)	Outer diameter of crank pin
Standard	Except STi model 1.486 — 1.498 (0.0585 — 0.0590) STi model 1.490 — 1.502 (0.0587 — 0.0591)	51.984 — 52.000 (2.0466 — 2.0472)
0.03 (0.0012) undersize	1.504 — 1.512 (0.0592 — 0.0595)	51.954 — 51.970 (2.0454 — 2.0461)
0.05 (0.0020) undersize	1.514 — 1.522 (0.0596 — 0.0599)	51.934 — 51.950 (2.0447 — 2.0453)
0.25 (0.0098) undersize	1.614 — 1.622 (0.0635 — 0.0639)	51.734 — 51.750 (2.0368 — 2.0374)

6) Inspect the bushing at connecting rod small end, and replace if worn or damaged. Also measure the piston pin clearance at connecting rod small end.

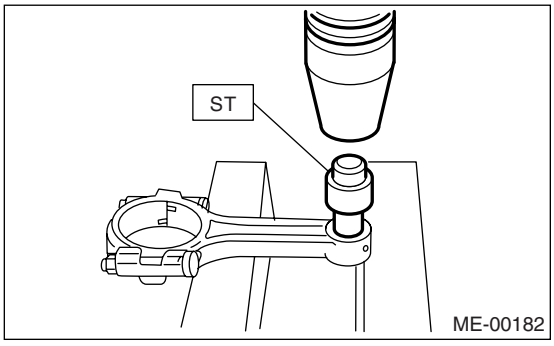
Clearance between piston pin and bushing:
Standard
0 — 0.022 mm (0 — 0.0009 in)
Limit
0.030 mm (0.0012 in)


ME-00181


ME-00174

7) Replacement procedure is as follows:
(1) Remove the bushing from connecting rod with ST and press.
(2) Press the bushing with ST after applying oil on the periphery of bushing.

ST 499037100 CONNECTING ROD BUSHING REMOVER AND INSTALLER



ME-00182

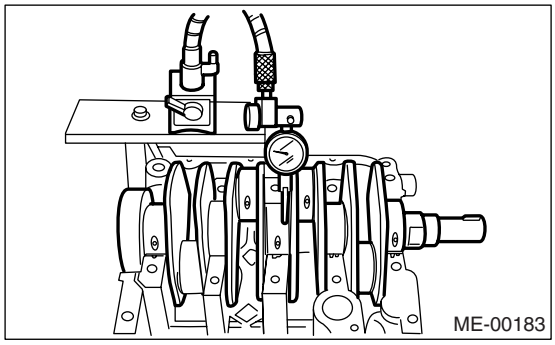
(3) Make two 3 mm (0.12 in) holes in bushing. Ream the inside of bushing.
(4) After the completion of reaming, clean the bushing to remove chips.

6. CRANKSHAFT AND CRANKSHAFT BEARING

1) Clean the crankshaft completely and check for cracks by means of liquid penetrant tester, and replace if defective.
2) Measure the crankshaft bend, and correct or replace if it exceeds the limit.

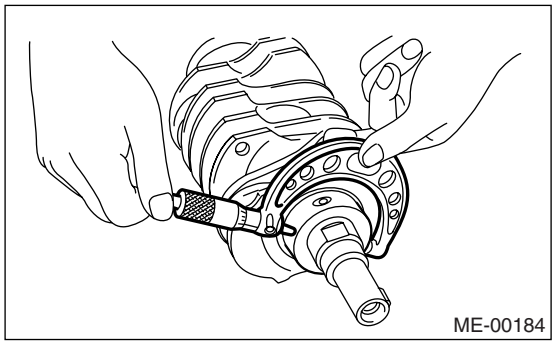
NOTE:
If a suitable V-block is not available, install the #1 and #5 crankshaft bearing on cylinder block, position the crankshaft on these bearings and measure the crankshaft bend using a dial gauge.

Crankshaft bend limit:
0.035 mm (0.0014 in)


ME-00183

3) Inspect the crank journal and crank pin for wear. If they are not within the specifications, replace the bearing with a suitable (undersize) one, and then replace or recondition the crankshaft as necessary. When grinding the crank journal or crank pin, finish them to specified dimensions according to the undersize bearing to be used.

Crank pin and crank journal:
Out-of-roundness
0.005 mm (0.0002 in) or less
Cylindricity
0.006 mm (0.00024 in)
Grinding limit
0.250 mm (0.0098 in)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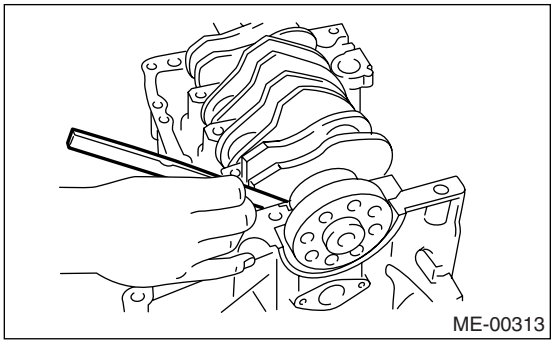
Unit: mm (in)

		Crank journal diameter		Crank pin diameter
		#1, #3	#2, #4, #5	
Standard	Journal O.D.	59.992 — 60.008 (2.3619 — 2.3625)	59.992 — 60.008 (2.3619 — 2.3625)	51.984 — 52.000 (2.0466 — 2.0472)
	Bearing size (Thickness at center)	1.998 — 2.011 (0.0787 — 0.0792)	2.000 — 2.013 (0.0787 — 0.0793)	Except STi model 1.486 — 1.498 (0.0585 — 0.0590) STi model 1.490 — 1.502 (0.0587 — 0.0591)
0.03 (0.0012) undersize	Journal O.D.	59.962 — 59.978 (2.3607 — 2.3613)	59.962 — 59.978 (2.3607 — 2.3613)	51.954 — 51.970 (2.0454 — 2.0461)
	Bearing size (Thickness at center)	2.017 — 2.020 (0.0794 — 0.0795)	2.019 — 2.022 (0.0795 — 0.0796)	1.504 — 1.512 (0.0592 — 0.0595)
0.05 (0.0020) undersize	Journal O.D.	59.942 — 59.958 (2.3599 — 2.3605)	59.942 — 59.958 (2.3599 — 2.3605)	51.934 — 51.950 (2.0447 — 2.0453)
	Bearing size (Thickness at center)	2.027 — 2.030 (0.0798 — 0.0799)	2.029 — 2.032 (0.0799 — 0.0800)	1.514 — 1.522 (0.0596 — 0.0599)
0.25 (0.0098) undersize	Journal O.D.	59.742 — 59.758 (2.3520 — 2.3527)	59.742 — 59.758 (2.3520 — 2.3527)	51.734 — 51.750 (2.0368 — 2.0374)
	Bearing size (Thickness at center)	2.127 — 2.130 (0.0837 — 0.0839)	2.129 — 2.132 (0.0838 — 0.0839)	1.614 — 1.622 (0.0635 — 0.0639)

O.D.: Outer Diameter

4) Measure the thrust clearance of crankshaft at center bearing. If the clearance exceeds the limit, replace the bearing.

Crankshaft thrust clearance:
Standard
0.030 — 0.115 mm (0.0012 — 0.0045 in)
Limit
0.25 mm (0.0098 in)


ME-00313

5) Inspect individual crankshaft bearings for signs of flaking, seizure, melting, and wear.

6) Measure the oil clearance on each crankshaft bearing by means of plastigauge. If the measurement is not within the standard value, replace the defective bearing with an undersize one, and replace or recondition the crankshaft as necessary.

Crankshaft oil clearance:
Standard
0.010 — 0.030 mm (0.0004 — 0.0012 in)
Limit
0.040 mm (0.0016 in)

21.Intake and Exhaust Valve

A: SPECIFICATION

For operations related to intake and exhaust valve, refer to “19. Cylinder Head.” <Ref. to ME(H4DOTC)-77, REMOVAL, Cylinder Head.> and <Ref. to ME(H4DOTC)-77, INSTALLATION, Cylinder Head.>

22.Piston

A: SPECIFICATION

For operations related to piston, refer to “20. Cylinder Block.” <Ref. to ME(H4DOTC)-85, REMOVAL, Cylinder Block.> and <Ref. to ME(H4DOTC)-88, INSTALLATION, Cylinder Block.>

23.Connecting Rod

A: SPECIFICATION

For operations related to connecting rod, refer to “20. Cylinder Block.” <Ref. to ME(H4DOTC)-85, REMOVAL, Cylinder Block.> and <Ref. to ME(H4DOTC)-88, INSTALLATION, Cylinder Block.>

24.Crankshaft

A: SPECIFICATION

For operations related to crankshaft, refer to “20. Cylinder Block.” <Ref. to ME(H4DOTC)-85, REMOVAL, Cylinder Block.> and <Ref. to ME(H4DOTC)-88, INSTALLATION, Cylinder Block.>

25.Engine Trouble in General

A: INSPECTION

NOTE:
“RANK” shown in the chart refers to the possibility of reason for the trouble in order (“Very often” to “Rarely”)
A — Very often
B — Sometimes
C — Rarely

TROUBLE	PROBLEM PARTS, ETC.	POSSIBLE CAUSE	RANK
1. Engine will not start.			
1) Starter does not turn.	Starter	Defective battery-to-starter harness	B
		Defective starter switch	C
		Defective inhibitor switch or neutral switch	C
		Defective starter	B
	Battery	Poor terminal connection	A
		Run-down battery	A
		Defective charging system	B
	Friction	Seizure of crankshaft and connecting rod bearing	C
		Seized camshaft	C
		Seized or stuck piston and cylinder	C
2) Initial combustion does not occur.	Starter	Defective starter	C
	Engine control system <Ref. to EN(H4DOTC)(diag)-2, Basic Diagnostic Procedure.>		A
	Fuel line	Defective fuel pump and relay	A
		Lack of or insufficient fuel	B
	Belt	Defective	B
		Defective timing	B
	Compression	Incorrect valve clearance	C
		Loosened spark plugs or defective gasket	C
		Loosened cylinder head bolts or defective gasket	C
		Improper valve seating	C
		Defective valve stem	C
		Worn or broken valve spring	B
		Worn or stuck piston rings, cylinder and piston	C
		Incorrect valve timing	B
		Improper engine oil (low viscosity)	B
3) Initial combustion occurs.	Engine control system <Ref. to EN(H4DOTC)(diag)-2, Basic Diagnostic Procedure.>		A
	Intake system	Defective intake manifold gasket	B
		Defective throttle body gasket	B
	Fuel line	Defective fuel pump and relay	C
		Clogged fuel line	C
		Lack of or insufficient fuel	B
	Belt	Defective	B
		Defective timing	B
	Compression	Incorrect valve clearance	C
		Loosened spark plugs or defective gasket	C
		Loosened cylinder head bolts or defective gasket	C
		Improper valve seating	C
		Defective valve stem	C
		Worn or broken valve spring	B
		Worn or stuck piston rings, cylinder and piston	C
		Incorrect valve timing	B
		Improper engine oil (low viscosity)	B

TROUBLE	PROBLEM PARTS, ETC.	POSSIBLE CAUSE	RANK
4) Engine stalls after initial combustion.	Engine control system <Ref. to EN(H4DOTC)(diag)-2, Basic Diagnostic Procedure.>		A
	Intake system	Loosened or cracked intake duct	B
		Loosened or cracked PCV hose	C
		Loosened or cracked vacuum hose	C
		Defective intake manifold gasket	B
		Defective throttle body gasket	B
		Dirty air cleaner element	C
	Fuel line	Clogged fuel line	C
		Lack of or insufficient fuel	B
	Belt	Defective	B
		Defective timing	B
	Compression	Incorrect valve clearance	C
		Loosened spark plugs or defective gasket	C
		Loosened cylinder head bolts or defective gasket	C
		Improper valve seating	C
		Defective valve stem	C
		Worn or broken valve spring	B
		Worn or stuck piston rings, cylinder and piston	C
		Incorrect valve timing	B
		Improper engine oil (low viscosity)	B
2. Rough idle and engine stall	Engine control system <Ref. to EN(H4DOTC)(diag)-2, Basic Diagnostic Procedure.>		A
	Intake system	Loosened or cracked intake duct	A
		Loosened or cracked PCV hose	A
		Loosened or cracked vacuum hose	A
		Defective intake manifold gasket	B
		Defective throttle body gasket	B
		Defective PCV valve	C
		Loosened oil filler cap	B
		Dirty air cleaner element	C
	Fuel line	Defective fuel pump and relay	C
		Clogged fuel line	C
		Lack of or insufficient fuel	B
	Belt	Defective timing	C
	Compression	Incorrect valve clearance	B
		Loosened spark plugs or defective gasket	B
		Loosened cylinder head bolts or defective gasket	B
		Improper valve seating	B
		Defective valve stem	C
		Worn or broken valve spring	B
		Worn or stuck piston rings, cylinder and piston	B
		Incorrect valve timing	A
		Improper engine oil (low viscosity)	B
	Lubrication system	Incorrect oil pressure	B
		Defective rocker cover gasket	C
	Cooling system	Overheating	C
	Others	Malfunction of evaporative emission control system	A
		Stuck or damaged throttle valve	B
		Accelerator cable out of adjustment	C

TROUBLE	PROBLEM PARTS, ETC.	POSSIBLE CAUSE	RANK
3. Low output, hesitation and poor acceleration	Engine control system <Ref. to EN(H4DOTC)(diag)-2, Basic Diagnostic Procedure.>		A
	Intake system	Loosened or cracked intake duct	A
		Loosened or cracked PCV hose	A
		Loosened or cracked vacuum hose	B
		Defective intake manifold gasket	B
		Defective throttle body gasket	B
		Defective PCV valve	B
		Loosened oil filler cap	B
		Dirty air cleaner element	A
	Fuel line	Defective fuel pump and relay	B
		Clogged fuel line	B
		Lack of or insufficient fuel	C
	Belt	Defective timing	B
	Compression	Incorrect valve clearance	B
		Loosened spark plugs or defective gasket	B
		Loosened cylinder head bolts or defective gasket	B
		Improper valve seating	B
		Defective valve stem	C
		Worn or broken valve spring	B
		Worn or stuck piston rings, cylinder and piston	C
		Incorrect valve timing	A
		Improper engine oil (low viscosity)	B
	Lubrication system	Incorrect oil pressure	B
	Cooling system	Overheating	C
		Over cooling	C
	Others	Malfunction of evaporative emission control system	A
4. Surging	Engine control system <Ref. to EN(H4DOTC)(diag)-2, Basic Diagnostic Procedure.>		A
	Intake system	Loosened or cracked intake duct	A
		Loosened or cracked PCV hose	A
		Loosened or cracked vacuum hose	A
		Defective intake manifold gasket	B
		Defective throttle body gasket	B
		Defective PCV valve	B
		Loosened oil filler cap	B
		Dirty air cleaner element	B
	Fuel line	Defective fuel pump and relay	B
		Clogged fuel line	B
		Lack of or insufficient fuel	C
	Belt	Defective timing	B
	Compression	Incorrect valve clearance	B
		Loosened spark plugs or defective gasket	C
		Loosened cylinder head bolts or defective gasket	C
		Improper valve seating	C
		Defective valve stem	C
		Worn or broken valve spring	C
		Worn or stuck piston rings, cylinder and piston	C
		Incorrect valve timing	A
		Improper engine oil (low viscosity)	B
	Cooling system	Overheating	B
	Others	Malfunction of evaporative emission control system	C

TROUBLE	PROBLEM PARTS, ETC.	POSSIBLE CAUSE	RANK
5. Engine does not return to idle.	Engine control system <Ref. to EN(H4DOTC)(diag)-2, Basic Diagnostic Procedure.>		A
	Intake system	Loosened or cracked vacuum hose	A
	Others	Stuck or damaged throttle valve	A
		Accelerator cable out of adjustment	B
6. Dieseling (Run-on)	Engine control system <Ref. to EN(H4DOTC)(diag)-2, Basic Diagnostic Procedure.>		A
	Cooling system	Overheating	B
	Others	Malfunction of evaporative emission control system	B
7. Afterburning in exhaust system	Engine control system <Ref. to EN(H4DOTC)(diag)-2, Basic Diagnostic Procedure.>		A
	Intake system	Loosened or cracked intake duct	C
		Loosened or cracked PCV hose	C
		Loosened or cracked vacuum hose	B
		Defective PCV valve	B
		Loosened oil filler cap	C
	Belt	Defective timing	B
	Compression	Incorrect valve clearance	B
		Loosened spark plugs or defective gasket	C
		Loosened cylinder head bolts or defective gasket	C
		Improper valve seating	B
		Defective valve stem	C
		Worn or broken valve spring	C
		Worn or stuck piston rings, cylinder and piston	C
		Incorrect valve timing	A
	Lubrication system	Incorrect oil pressure	C
	Cooling system	Over cooling	C
	Others	Malfunction of evaporative emission control system	C
8. Knocking	Engine control system <Ref. to EN(H4DOTC)(diag)-2, Basic Diagnostic Procedure.>		A
	Intake system	Loosened oil filler cap	B
	Belt	Defective timing	B
	Compression	Incorrect valve clearance	C
		Incorrect valve timing	B
	Cooling system	Overheating	A
9. Excessive engine oil consumption	Intake system	Loosened or cracked PCV hose	A
		Defective PCV valve	B
		Loosened oil filler cap	C
	Compression	Defective valve stem	A
		Worn or stuck piston rings, cylinder and piston	A
	Lubrication system	Loosened oil pump attaching bolts and defective gasket	B
		Defective oil filter o-ring	B
		Defective crankshaft oil seal	B
		Defective rocker cover gasket	B
		Loosened oil drain plug or defective gasket	B
		Loosened oil pan fitting bolts or defective oil pan	B

TROUBLE	PROBLEM PARTS, ETC.	POSSIBLE CAUSE	RANK
10. Excessive fuel consumption	Engine control system <Ref. to EN(H4DOTC)(diag)-2, Basic Diagnostic Procedure.>		A
	Intake system	Dirty air cleaner element	A
	Belt	Defective timing	B
	Compression	Incorrect valve clearance	B
		Loosened spark plugs or defective gasket	C
		Loosened cylinder head bolts or defective gasket	C
		Improper valve seating	B
		Defective valve stem	C
		Worn or broken valve spring	C
		Worn or stuck piston rings, cylinder and piston	B
		Incorrect valve timing	B
	Lubrication system	Incorrect oil pressure	C
	Cooling system	Over cooling	C
	Others	Accelerator cable out of adjustment	B

26.Engine Noise

A: INSPECTION

Type of sound	Condition	Possible cause
Regular clicking sound	Sound increases as engine speed increases.	• Valve mechanism is defective. • Incorrect valve clearance • Worn camshaft • Broken valve spring
Heavy and dull clank	Oil pressure is low.	• Worn crankshaft main bearing • Worn connecting rod bearing (big end)
	Oil pressure is normal.	• Loose flywheel mounting bolts • Damaged engine mounting
High-pitched clank (Spark knock)	Sound is noticeable when accelerating with an overload.	• Ignition timing advanced • Accumulation of carbon inside combustion chamber • Wrong spark plug • Improper gasoline
Clank when engine speed is medium (1,000 to 2,000 rpm).	Sound is reduced when fuel injector connector of noisy cylinder is disconnected. (NOTE*)	• Worn crankshaft main bearing • Worn bearing at crankshaft end of connecting rod
Knocking sound when engine is operating under idling speed and engine is warm	Sound is reduced when fuel injector connector of noisy cylinder is disconnected. (NOTE*)	• Worn cylinder liner and piston ring • Broken or stuck piston ring • Worn piston pin and hole at piston end of connecting rod
	Sound is not reduced if each fuel injector connector is disconnected in turn. (NOTE*)	• Unusually worn valve lifter • Worn cam sprocket • Worn camshaft journal bore in crankcase
Squeaky sound	—	• Insufficient generator lubrication
Rubbing sound	—	• Defective generator brush and rotor contact
Gear scream when starting engine	—	• Defective ignition starter switch • Worn gear and starter pinion
Sound like polishing glass with a dry cloth	—	• Loose drive belt • Defective water pump shaft
Hissing sound	—	• Loss of compression • Air leakage in air intake system, hoses, connections or manifolds
Timing belt noise	—	• Loose timing belt • Belt contacting case/adjacent part
Valve noise	—	• Incorrect valve clearance

NOTE*:
When disconnecting the fuel injector connector, Malfunction Indicator Light illuminates and DTC is stored in ECM memory.
Therefore, carry out the CLEAR MEMORY MODE <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)(diag)-39, PROCEDURE, Inspection Mode.> after connecting the fuel injector connector.

EXHAUST

EX(H4DOTC)

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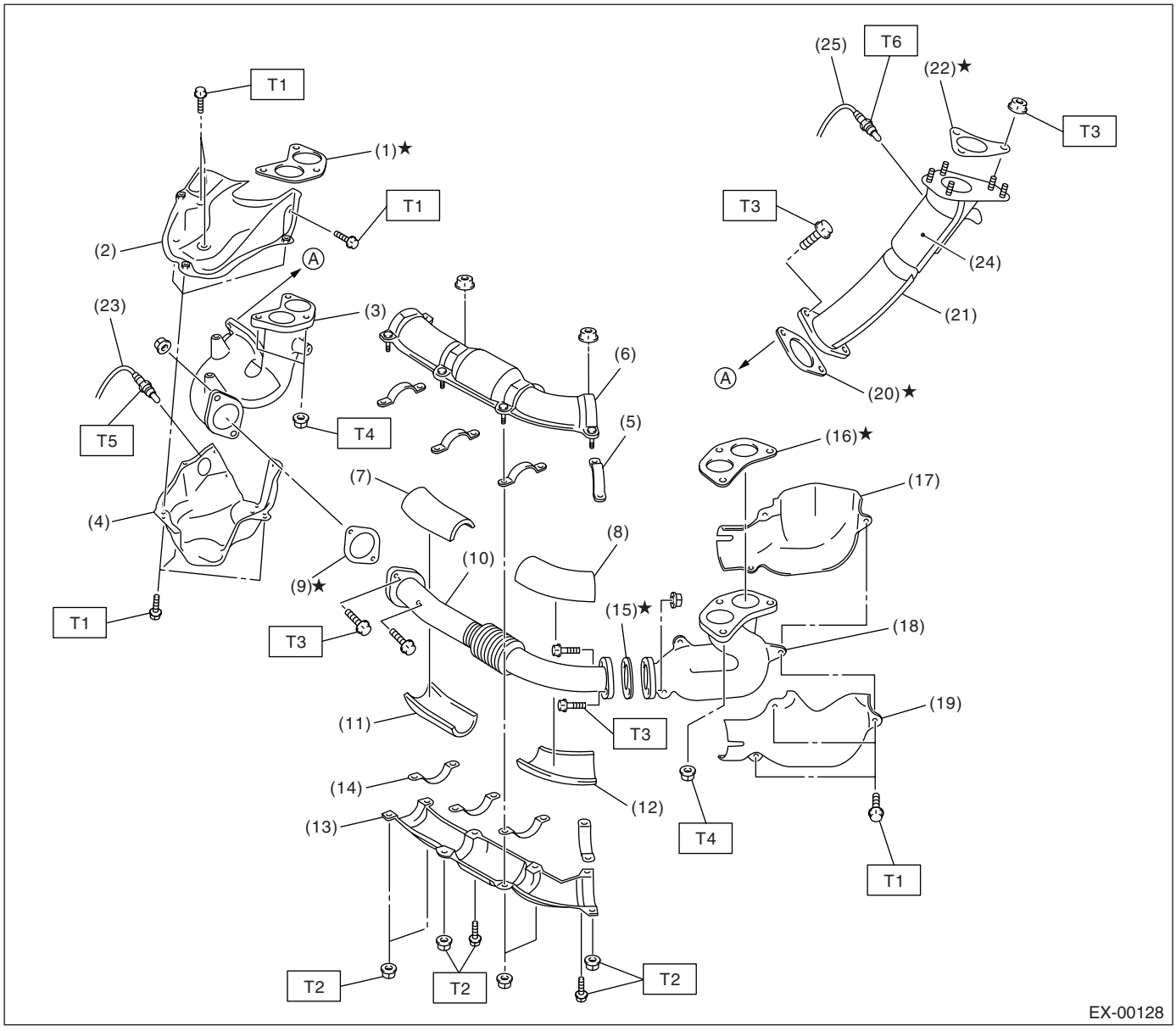
3. Center Exhaust Pipe 10
4. Joint Pipe 14
5. Rear Exhaust Pipe 15
6. Muffler 16

1. General Description

A: COMPONENT

1. FRONT EXHAUST PIPE



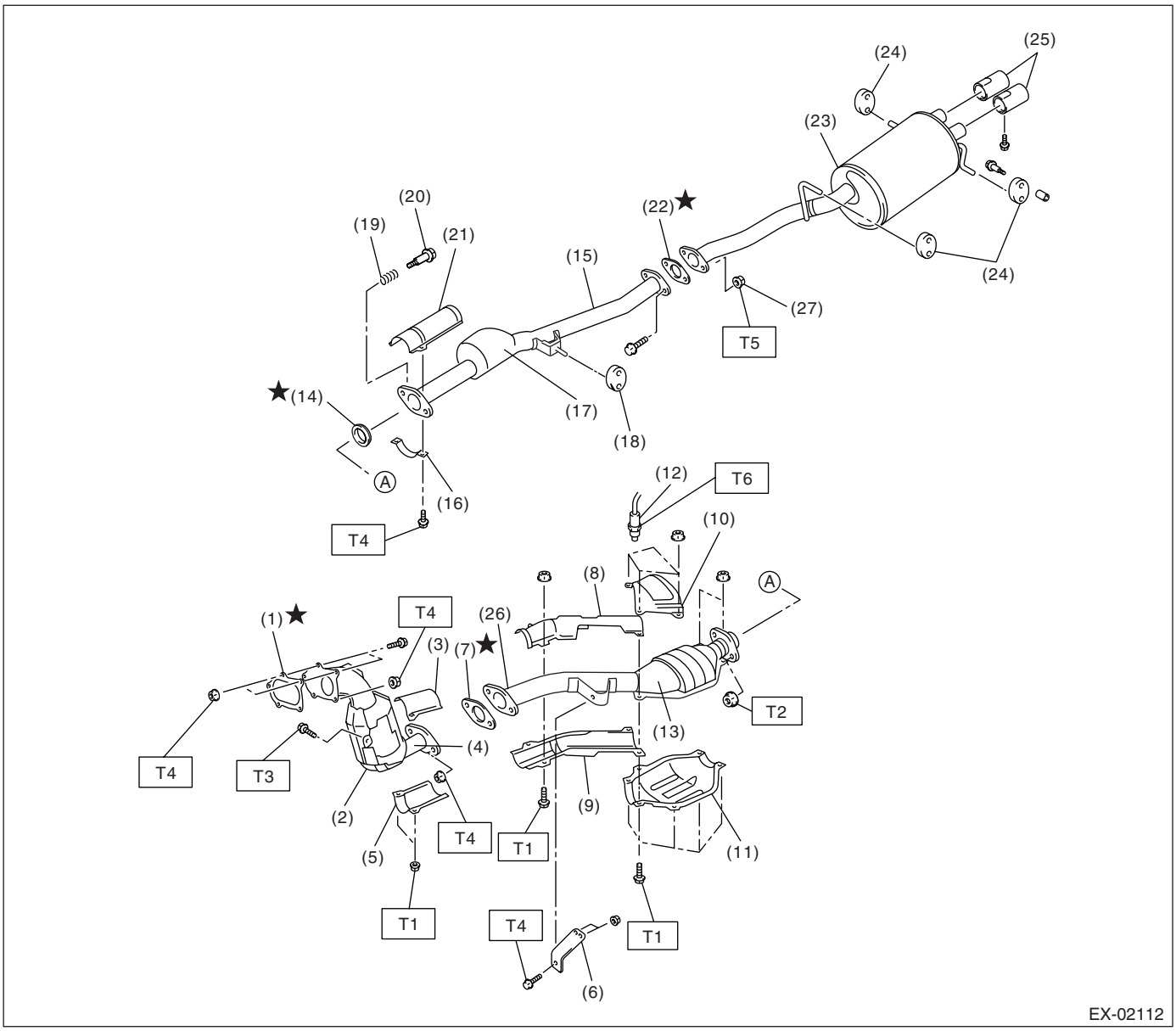
(1) Gasket
(2) Exhaust manifold upper cover (RH)
(3) Exhaust manifold (RH)
(4) Exhaust manifold lower cover (RH)
(5) Front exhaust pipe upper clamp
(6) Front exhaust pipe upper cover
(7) Front exhaust pipe upper insulator (RH)
(8) Front exhaust pipe upper insulator (LH)
(9) Gasket
(10) Front exhaust pipe
(11) Front exhaust pipe lower insulator (RH)
(12) Front exhaust pipe lower insulator (LH)
(13) Front exhaust pipe lower cover
(14) Front exhaust pipe lower clamp
(15) Gasket
(16) Gasket
(17) Exhaust manifold upper cover (LH)
(18) Exhaust manifold (LH)
(19) Exhaust manifold lower cover (LH)
(20) Gasket
(21) Turbocharger joint pipe
(22) Gasket
(23) Front oxygen (A/F) sensor
(24) Precatalytic converter (Except Australia model and STi model)
(25) Exhaust temperature sensor (Except Australia model and STi model)

Tightening torque: N·m (kgf-m, ft-lb)

T1: 19 (1.9, 13.7)
T2: 25 (2.5, 18.1)
T3: 35 (3.6, 26.0)
T4: 40 (4, 28.9)
T5: <Ref. to FU(H4DOTC)-45, INSTALLATION, Front Oxygen (A/F) Sensor.>
T6: <Ref. to FU(H4DOTC)-49, INSTALLATION, Exhaust Temperature Sensor.>

2. CENTER AND REAR EXHAUST PIPE, AND MUFFLER

• EXCEPT AUSTRALIA MODEL

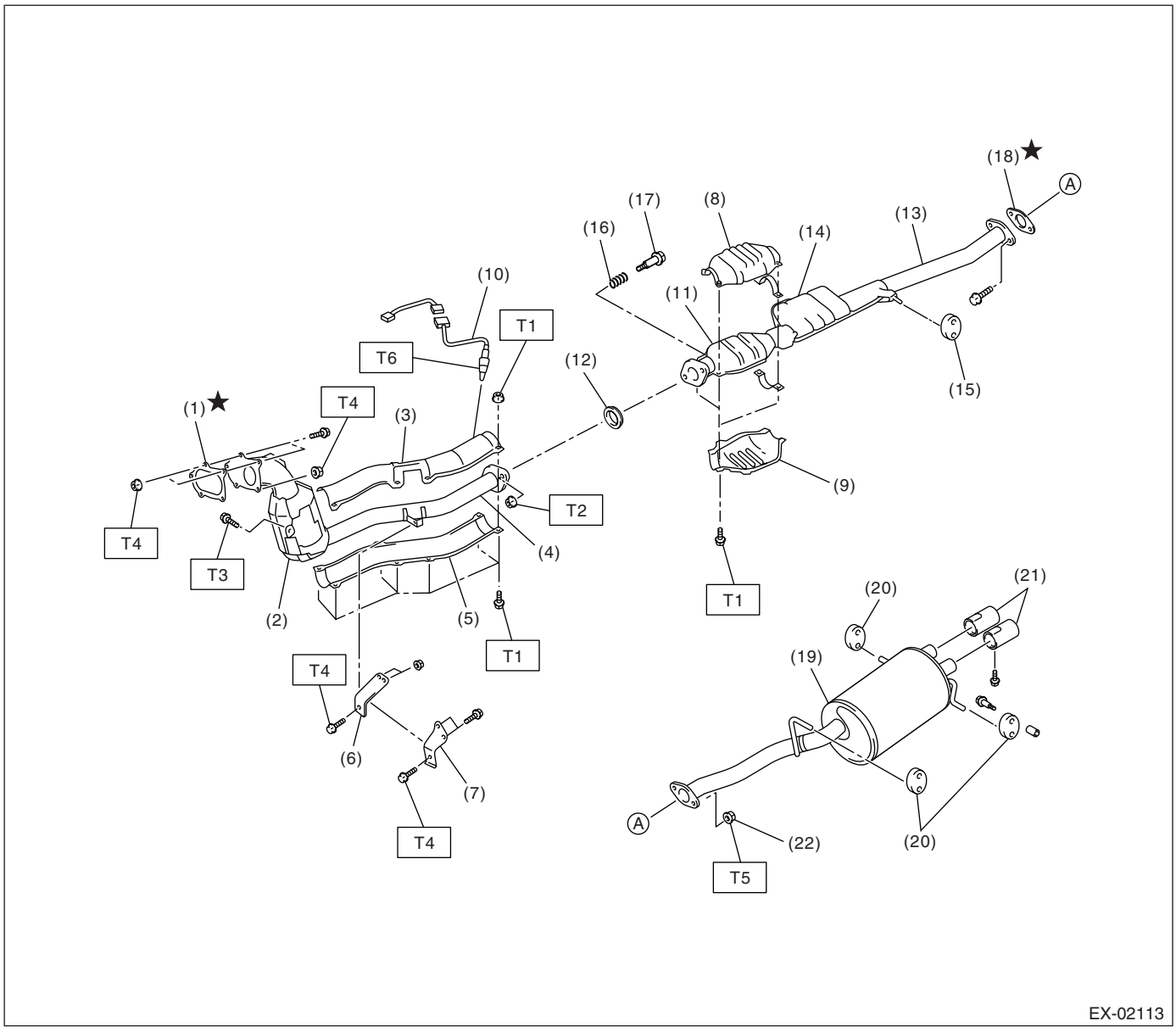


(1) Gasket
(2) Front catalytic converter
(3) Center pipe upper cover (Front)
(4) Center exhaust pipe (Front)
(5) Center pipe lower cover (Front)
(6) Bracket
(7) Gasket
(8) Center pipe upper cover (Rear)
(9) Center pipe lower cover (Rear)
(10) Rear catalytic converter upper cover
(11) Rear catalytic converter lower cover
(12) Rear oxygen sensor
(13) Rear catalytic converter
(14) Gasket
(15) Rear exhaust pipe
(16) Clamp
(17) Chamber
(18) Cushion rubber
(19) Spring
(20) Bolt
(21) Rear exhaust pipe upper cover (Front)
(22) Gasket
(23) Muffler
(24) Cushion rubber
(25) Muffler cutter
(26) Center exhaust pipe (Rear)
(27) Self locking nut

Tightening torque: N·m (kgf-m, ft-lb)

T1: 13 (1.3, 9.6)
T2: 18 (1.8, 13.0)
T3: 30 (3.1, 22.4)
T4: 35 (3.6, 26.0)
T5: 48 (4.9, 35.4)
T6: <Ref. to FU(H4DOTC)-47, INSTALLATION, Rear Oxygen Sensor.>

• AUSTRALIA MODEL



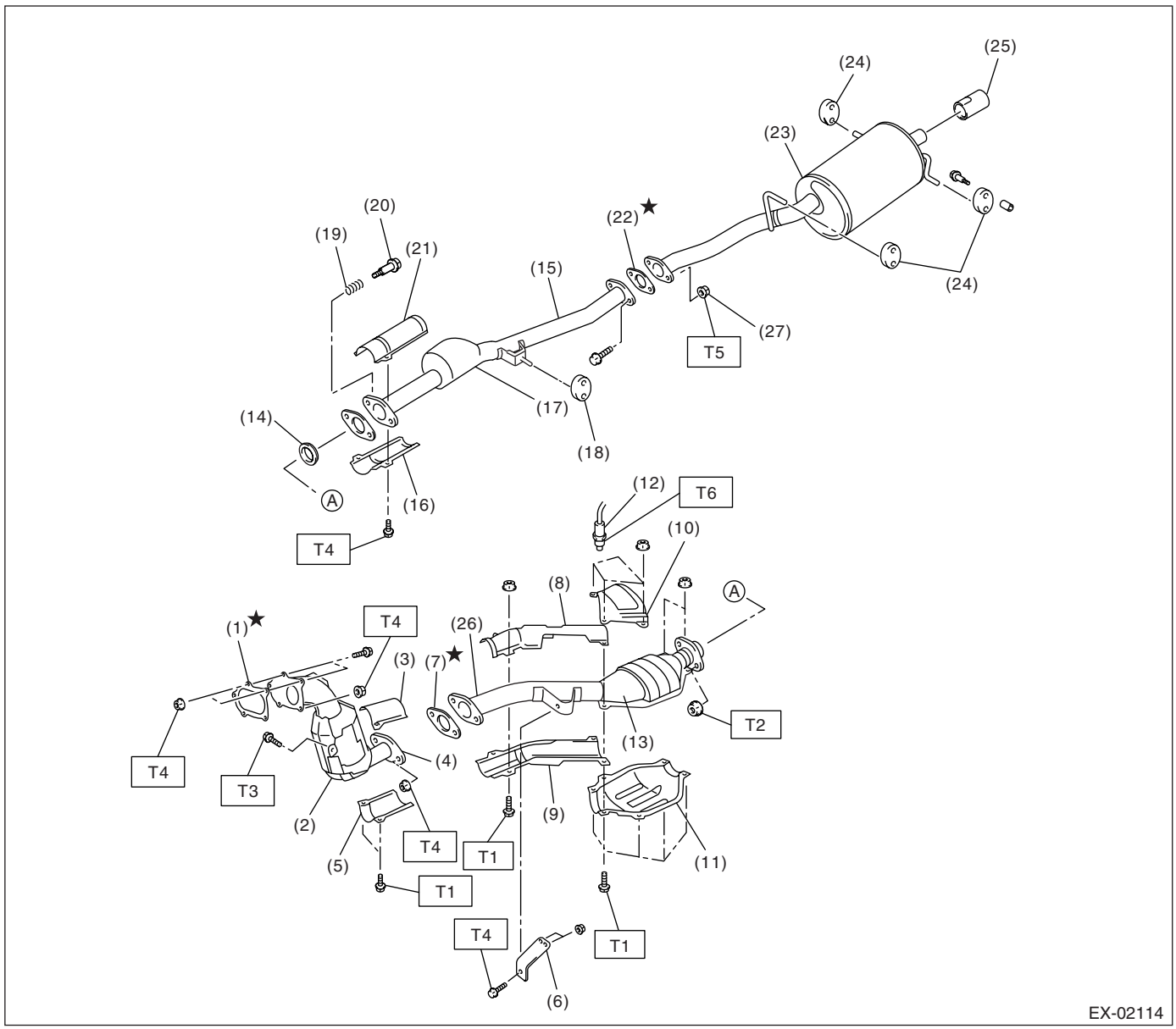
EX-02113

(1) Gasket
(2) Front catalytic converter
(3) Upper center pipe cover
(4) Center exhaust pipe
(5) Center pipe lower cover
(6) Bracket (MT model)
(7) Bracket (AT model)
(8) Rear catalytic converter upper cover
(9) Rear catalytic converter lower cover
(10) Rear oxygen sensor
(11) Rear catalytic converter
(12) Gasket
(13) Rear exhaust pipe
(14) Chamber
(15) Cushion rubber
(16) Spring
(17) Bolt
(18) Gasket
(19) Muffler
(20) Cushion rubber
(21) Muffler cutter
(22) Self locking nut

Tightening torque: N·m (kgf-m, ft-lb)

T1: 13 (1.3, 9.6)
T2: 18 (1.8, 13.0)
T3: 30 (3.1, 22.4)
T4: 35 (3.6, 26.0)
T5: 48 (4.9, 35.4)
T6: <Ref. to FU(H4DOTC)-47, INSTALLATION, Rear Oxygen Sensor.>

• STi model



(1) Gasket
(2) Front catalytic converter
(3) Center pipe upper cover (Front)
(4) Center exhaust pipe (Front)
(5) Center pipe lower cover (Front)
(6) Bracket
(7) Gasket
(8) Center pipe upper cover (Rear)
(9) Center pipe lower cover (Rear)
(10) Upper rear catalytic converter cover
(11) Lower rear catalytic converter cover
(12) Rear oxygen sensor
(13) Rear catalytic converter
(14) Gasket
(15) Rear exhaust pipe
(16) Lower rear exhaust pipe cover (Front)
(17) Chamber
(18) Cushion
(19) Spring
(20) Bolt
(21) Upper rear exhaust pipe cover (Front)
(22) Gasket
(23) Muffler
(24) Cushion rubber
(25) Muffler cutter
(26) Center exhaust pipe (Rear)
(27) Self locking nut

Tightening torque: N·m (kgf-m, ft-lb)
T1: 13 (1.3, 9.6)
T2: 18 (1.8, 13.0)
T3: 30 (3.1, 22.4)
T4: 35 (3.6, 26.0)
T5: 48 (4.9, 35.4)
T6: <Ref. to FU(H4DOTC)-47, INSTALLATION, Rear Oxygen Sensor.>

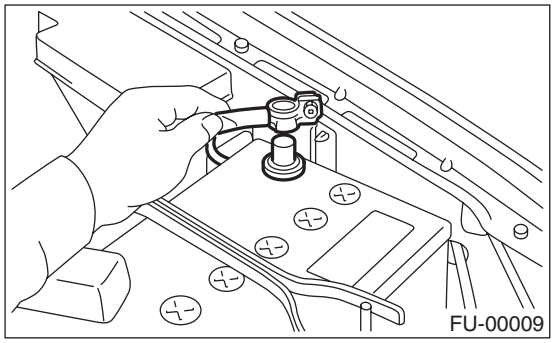
B: CAUTION

• Wear working clothing, including a cap, protective goggles, and protective shoes during operation.
• Remove contamination including dirt and corrosion before removal, installation or disassembly.
• Keep the disassembled parts in order and protect them from dust or dirt.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly, and replacement.
• Be careful not to burn, because each part on the vehicle is hot after running.
• Be sure to tighten fasteners including bolts and nuts to the specified torque.
• Place shop jacks or rigid racks at the specified points.
• Before disconnecting electrical connectors of sensors or units, be sure to disconnect the ground cable from battery.

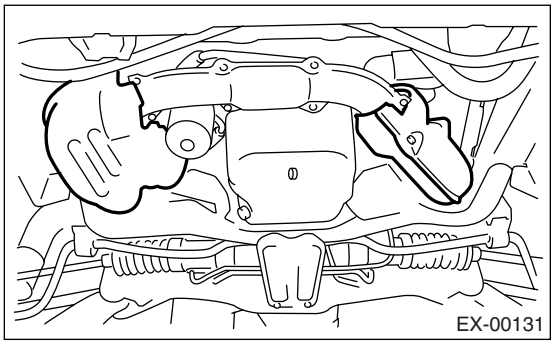
2. Front Exhaust Pipe

A: REMOVAL

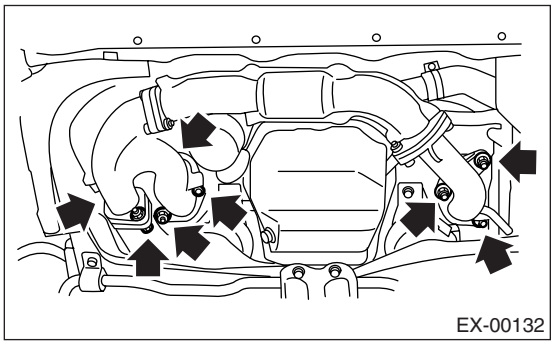
1) Disconnect the ground cable from battery.



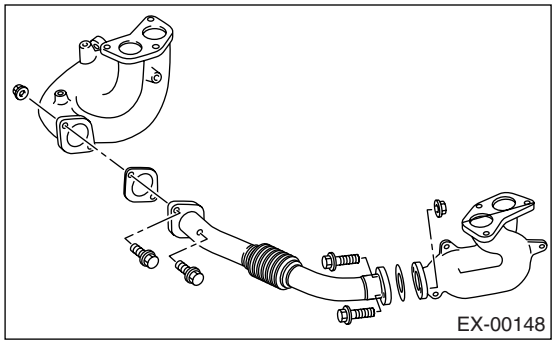
2) Remove the front oxygen (A/F) sensor. <Ref. to FU(H4DOTC)-45, REMOVAL, Front Oxygen (A/F) Sensor.>
3) Remove the under cover.
4) Remove the lower exhaust manifold cover (RH).
5) Remove the lower and upper exhaust manifold covers (LH).



6) Remove the bolts and nuts which hold the front exhaust pipe assembly to turbocharger joint pipe.
7) While holding the front exhaust pipe assembly with one hand, remove the nuts which hold the front exhaust pipe assembly to cylinder head exhaust port.



8) Remove the front exhaust pipe assembly.
9) Remove the covers from exhaust manifold and front exhaust pipe.
10) Separate the front exhaust pipe from exhaust manifolds.

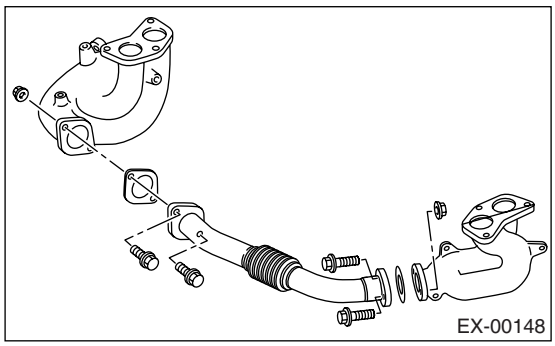


B: INSTALLATION

NOTE:
Use new gaskets.

1) Assemble the front exhaust pipe and exhaust manifolds.

Tightening torque:
35 N·m (3.6 kgf-m, 26.0 ft-lb)



2) Install the front exhaust pipe covers.

Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)

3) Install the upper exhaust manifold cover (RH).

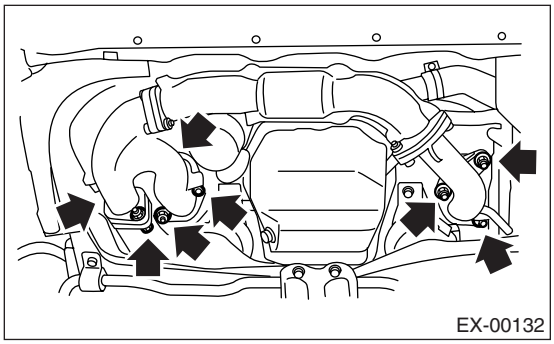
Tightening torque:
19 N·m (1.9 kgf-m, 13.7 ft-lb)

4) Install the front exhaust pipe assembly.

Tightening torque:
35 N·m (3.6 kgf-m, 26.0 ft-lb)

5) Connect the exhaust manifold (RH) to turbocharger joint pipe.

Tightening torque:
35 N·m (3.6 kgf-m, 26.0 ft-lb)

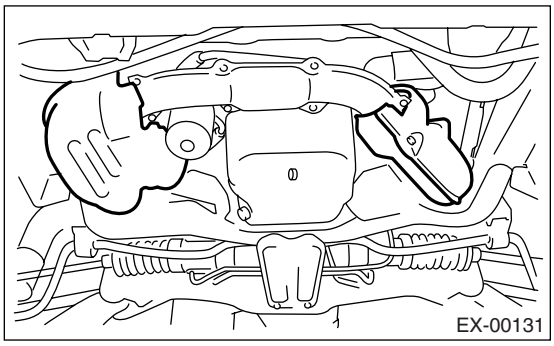


6) Install the upper and lower exhaust manifold covers (LH).

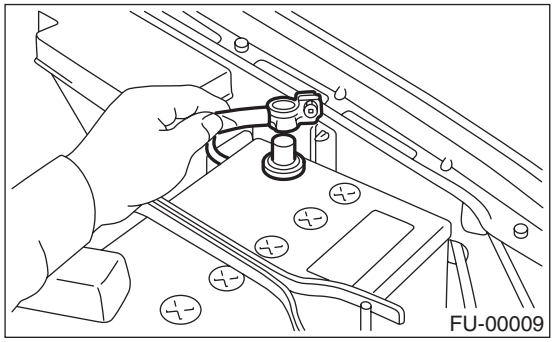
Tightening torque:
19 N·m (1.9 kgf-m, 13.7 ft-lb)

7) Install the lower exhaust manifold cover (RH).

Tightening torque:
19 N·m (1.9 kgf-m, 13.7 ft-lb)



8) Install the front oxygen (A/F) sensor. <Ref. to FU(H4DOTC)-45, INSTALLATION, Front Oxygen (A/F) Sensor.>
9) Install the under cover.
10) Connect the battery ground cable to battery.



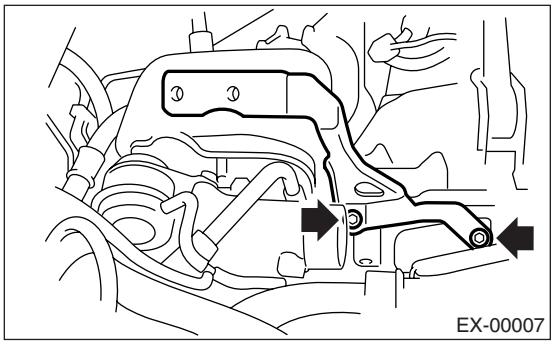
C: INSPECTION

1) Make sure there are no exhaust leaks from connections and welds.
2) Make sure there are no holes or rusting.

3. Center Exhaust Pipe

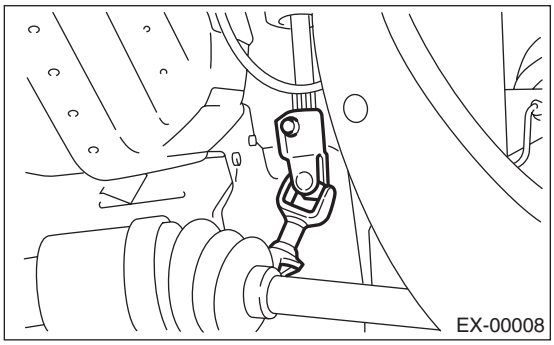
A: REMOVAL

1) Set the vehicle on a lift.
2) Disconnect the ground cable from battery.
3) Remove the intercooler. <Ref. to IN(H4DOTC)-12, REMOVAL, Intercooler.>
4) Remove the intercooler bracket.



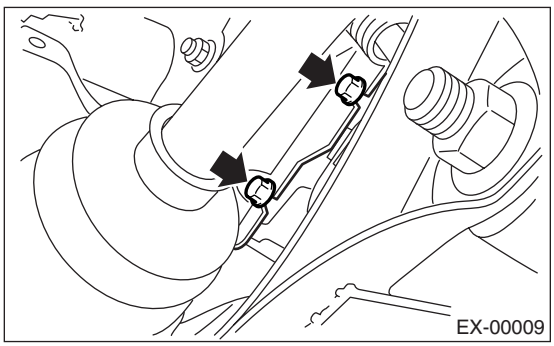
5) Lift-up the vehicle.
6) Remove the under cover.
7) Remove the universal joint bolts and then remove the universal joint (RHD model).

CAUTION:
Scribe alignment marks on the universal joint so that it can be reassembled at the original serration.

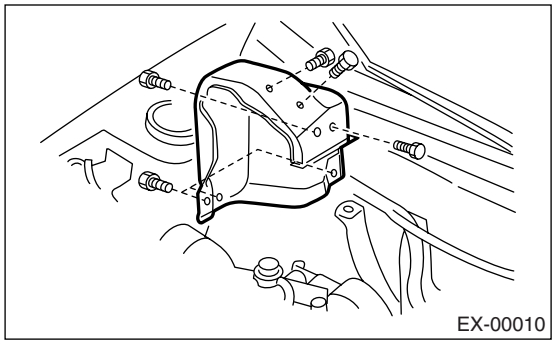


8) Remove the bolts which install the lower side of turbocharger upper cover.

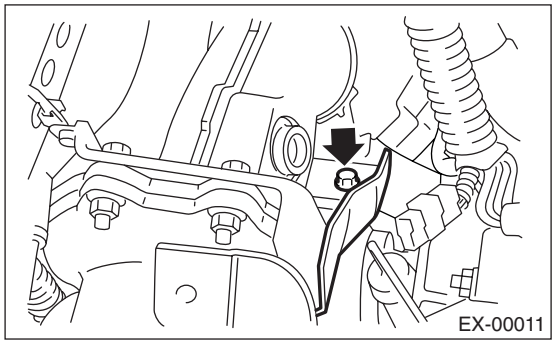
CAUTION:
Be careful, the turbocharger and exhaust pipe are hot.



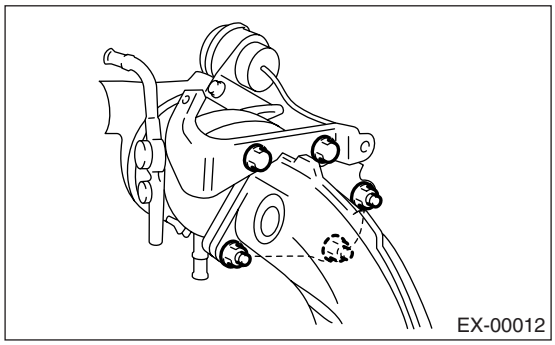
9) Lower the vehicle.
10) Remove the turbocharger upper cover.



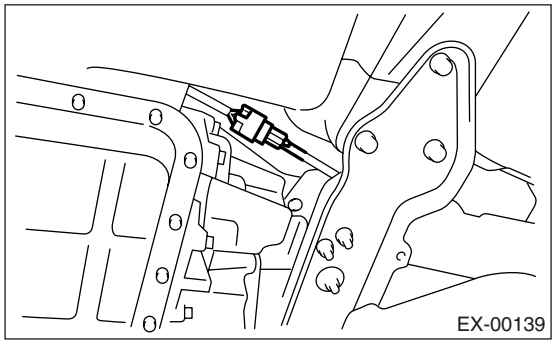
11) Remove the bolts which install the lower upper side of turbocharger upper cover, and remove it.



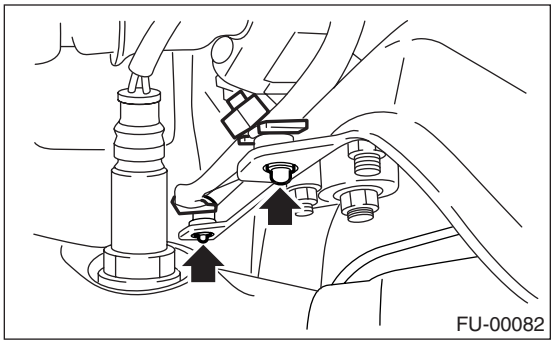
12) Separate the center exhaust pipe from turbocharger.



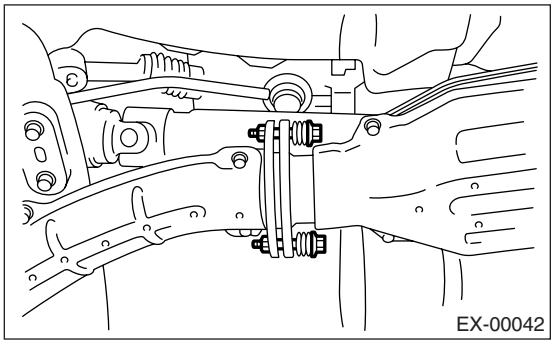
13) Lift-up the vehicle.
14) Disconnect the connector from rear oxygen sensor.



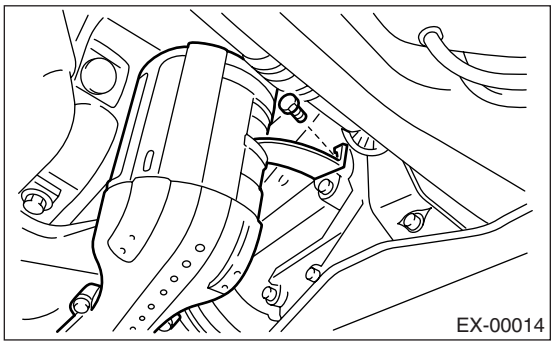
15) Vertically draw out the clip from crossmember.



16) Separate the center exhaust pipe from rear exhaust pipe.

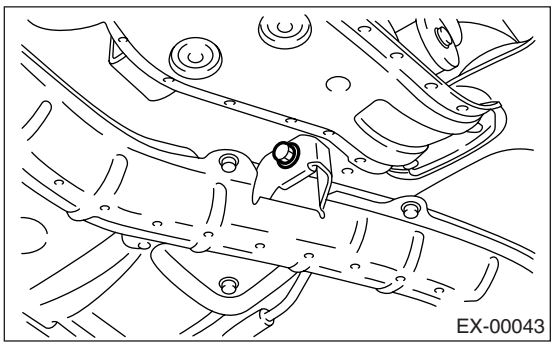


17) Remove the bolt which holds the center exhaust pipe bracket to transmission.

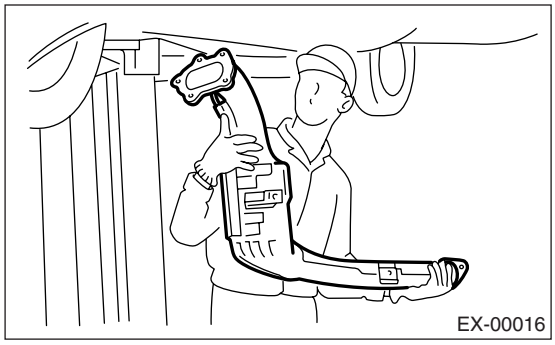


18) Remove the intercooler bracket.
19) Remove the bolt which holds the center exhaust pipe to hanger bracket.

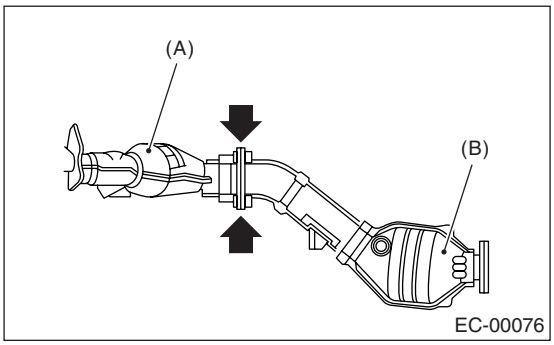
CAUTION:
Be careful not to pull down the center exhaust pipe.



20) Remove the center exhaust pipe.



21) Separate front catalytic converter (A) from rear catalytic converter (B). (Except Australia model, and STi model)

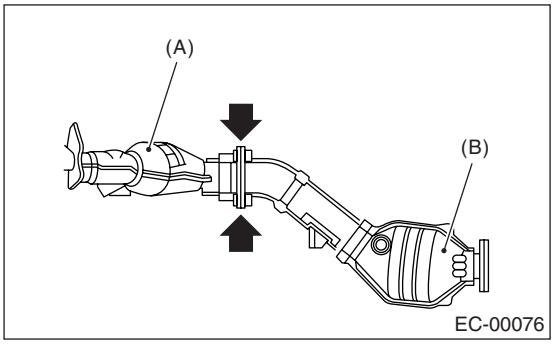


B: INSTALLATION

NOTE:
Use new gaskets.

1) Connect the front catalytic converter (A) to rear catalytic converter (B). (Except Australia model, and STi model)

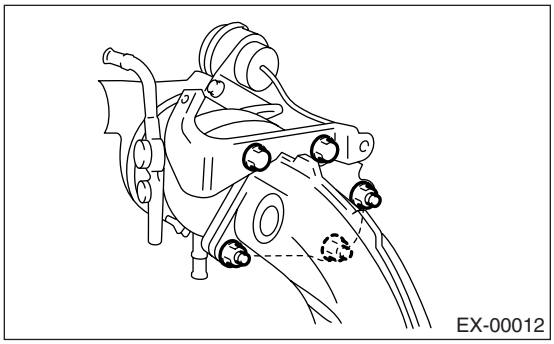
Tightening torque:
35 N·m (3.6 kgf-m, 26.0 ft-lb)



2) Install the center exhaust pipe and temporarily tighten the bolt which holds the center exhaust pipe to hanger bracket.
3) Temporarily tighten the bolt which holds the center pipe to transmission.

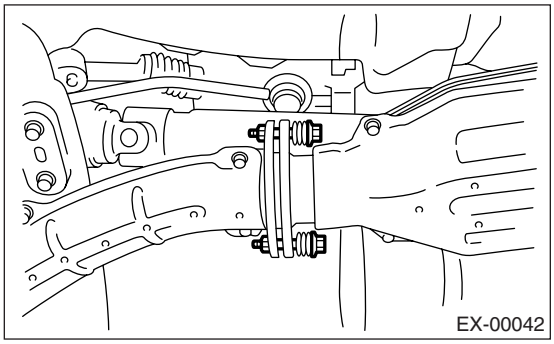
4) Connect the center exhaust pipe to turbocharger.

Tightening torque:
35 N·m (3.6 kgf-m, 26.0 ft-lb)

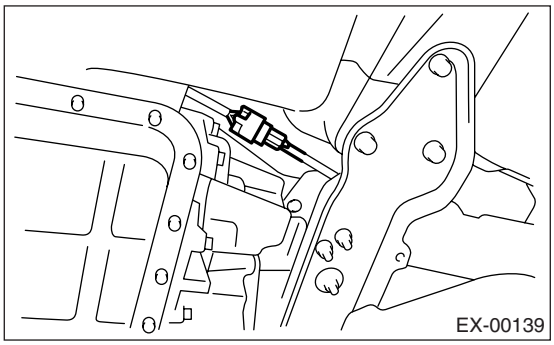


5) Install the center exhaust pipe to rear exhaust pipe.

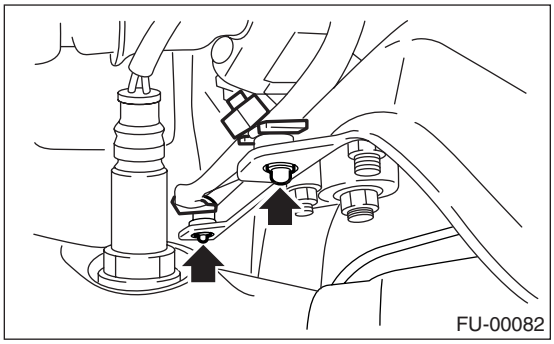
Tightening torque:
18 N·m (1.8 kgf-m, 13.0 ft-lb)



6) Connect the connector to rear oxygen sensor.

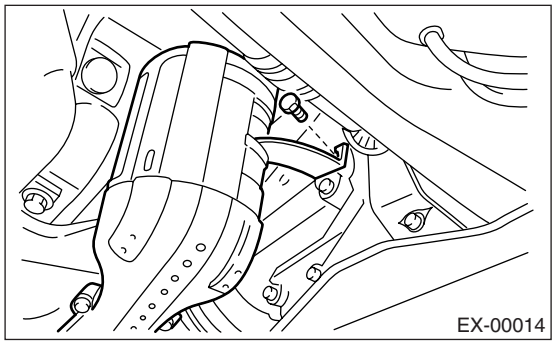


7) Secure the clip on crossmember.



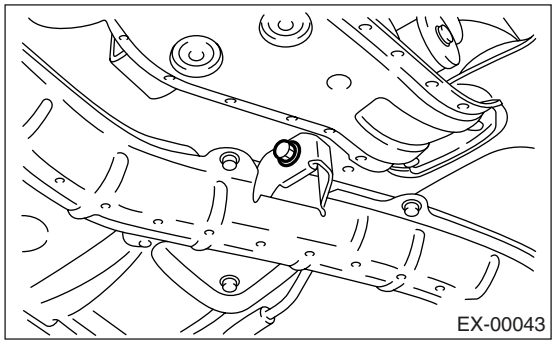
8) Tighten the bolt which holds the center exhaust pipe bracket to transmission.

Tightening torque:
30 N·m (3.1 kgf-m, 22.4 ft-lb)



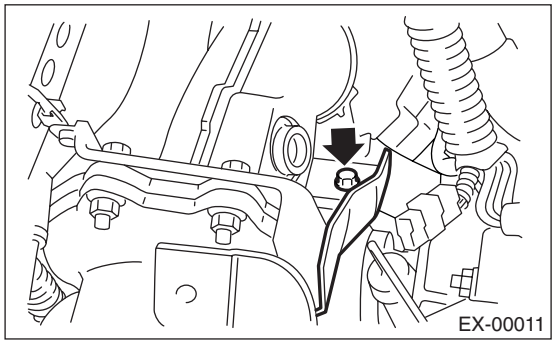
9) Tighten the bolt which holds the center exhaust pipe to hanger bracket.

Tightening torque:
35 N·m (3.6 kgf-m, 26.0 ft-lb)



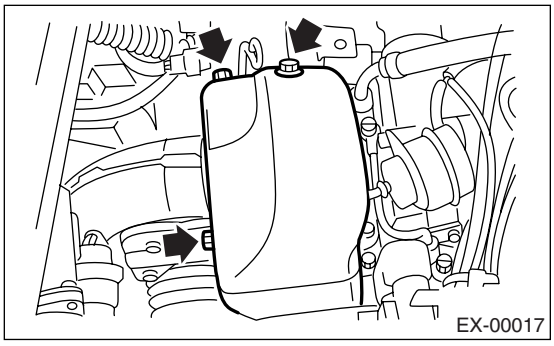
10) Lower the vehicle.
11) Place the turbocharger lower cover, and tighten the bolts which install the upper side of lower cover.

Tightening torque:
7.4 N·m (0.75 kgf-m, 5.4 ft-lb)



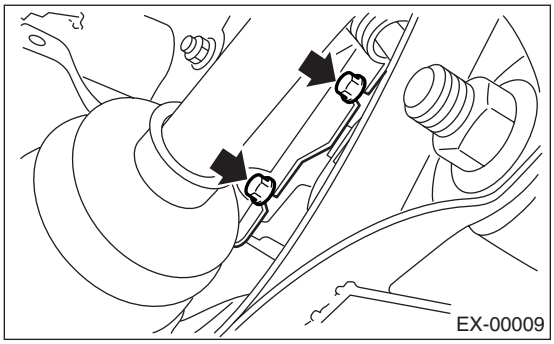
12) Place the turbocharger upper cover, and tighten the bolts which install the upper side of upper cover.

Tightening torque:
7.4 N·m (0.75 kgf-m, 5.4 ft-lb)



13) Lift-up the vehicle.
14) Tighten the bolts which install the under side of turbocharger upper cover.

Tightening torque:
7.4 N·m (0.75 kgf-m, 5.4 ft-lb)

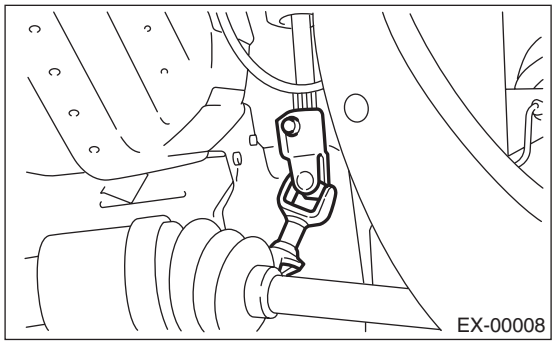


15) Install the universal joint (RHD model).
(1) Align the bolt hole on long yoke side of universal joint with the cutout at serrated section of shaft end, and insert the universal joint.
(2) Align the bolt hole on short yoke side of universal joint with the cutout at serrated section of gearbox assembly. Lower the universal joint completely.
(3) Temporarily tighten the bolt on short yoke side. Raise the universal joint to make sure the bolt is properly passing through the cutout at serrated section.
(4) Tighten the bolt on long yoke side, then that on the short yoke side.

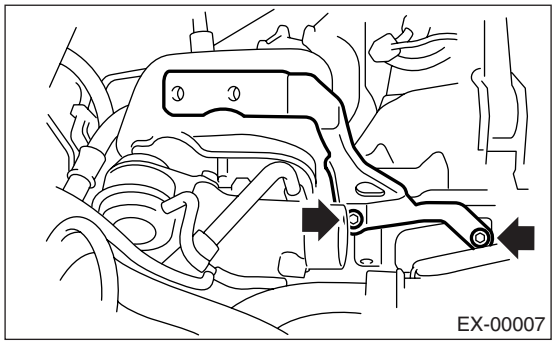
Tightening torque:
24 N·m (2.4 kgf-m, 17.4 ft-lb)

CAUTION:
• Make sure that the universal joint bolts are tightened through notches in shaft serration.
• Excessively large tightening torque of universal joint bolts may lead to heavy steering wheel operation.

Standard clearance between gearbox to DOJ:
More than 15 mm (0.59 in)



16) Install the under cover.
17) Lower the vehicle.
18) Install the intercooler bracket.



19) Install the intercooler. <Ref. to IN(H4DOTC)-12, INSTALLATION, Intercooler.>
20) Align the center of roll connector. <Ref. to AB-11, ROLL CONNECTOR, INSPECTION, Inspection Locations After a Collision.>

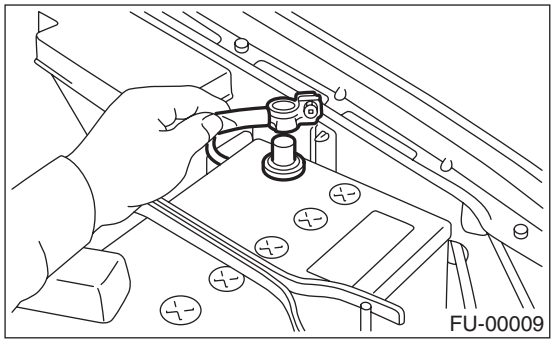
C: INSPECTION

1) Make sure there are no exhaust leaks from connections and welds.
2) Make sure there are no holes or rusting.

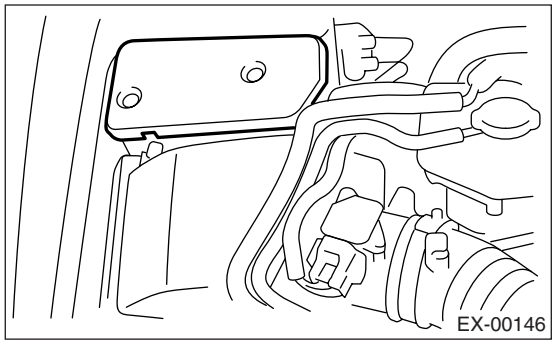
4. Joint Pipe

A: REMOVAL

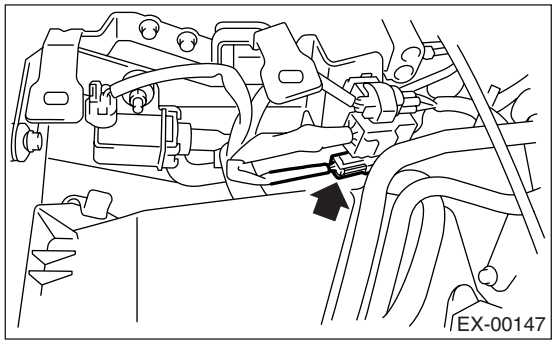
1) Disconnect the ground cable from battery.



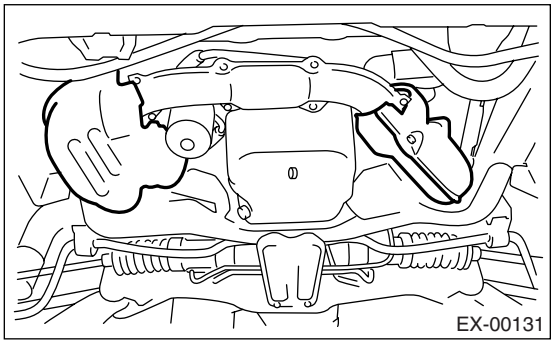
2) Remove the solenoid valve cover.



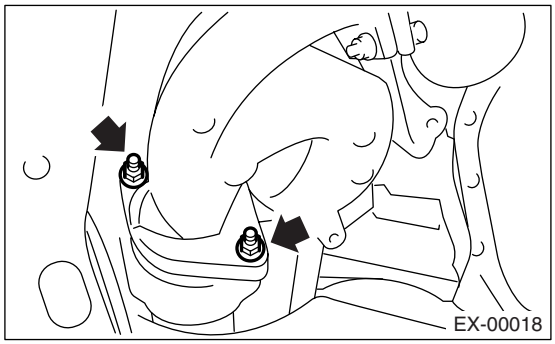
3) Disconnect the exhaust temperature sensor connector.



4) Remove the front oxygen (A/F) sensor. <Ref. to FU(H4DOTC)-45, REMOVAL, Front Oxygen (A/F) Sensor.>
5) Remove the under cover.
6) Remove the lower exhaust manifold cover (RH).



7) Remove the nuts which hold the front exhaust manifold to joint pipe.



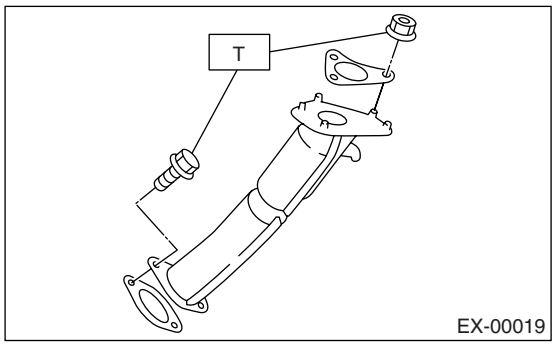
8) Remove the center exhaust pipe. <Ref. to EX(H4DOTC)-10, REMOVAL, Center Exhaust Pipe.>
9) Remove the turbocharger. <Ref. to IN(H4DOTC)-14, REMOVAL, Turbocharger.>
10) Take off the joint pipe in the upward direction.

B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Use new gaskets.

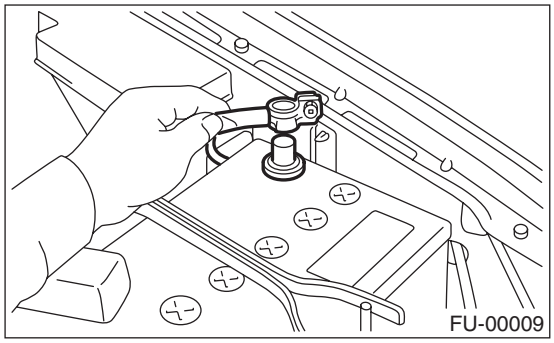
Tightening torque:
T: 35 N·m (3.6 kgf-m, 26.0 ft-lb)



5. Rear Exhaust Pipe

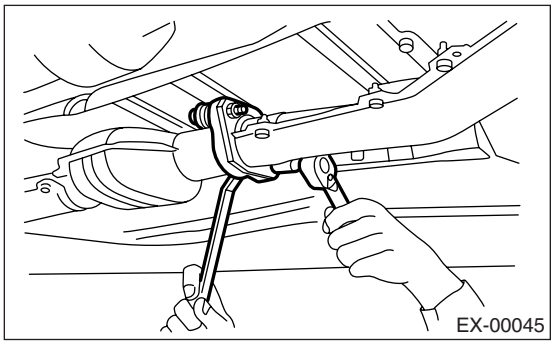
A: REMOVAL

1) Disconnect the ground cable from battery.



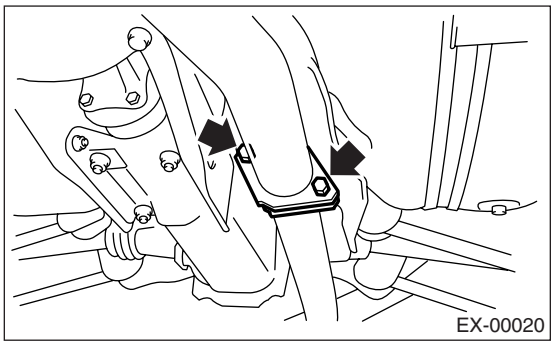
2) Lift-up the vehicle.
3) Separate the rear exhaust pipe from center exhaust pipe.

CAUTION:
Be careful, the exhaust pipe is hot.



4) Separate the rear exhaust pipe from muffler.

CAUTION:
Be careful not to pull down the rear exhaust pipe.



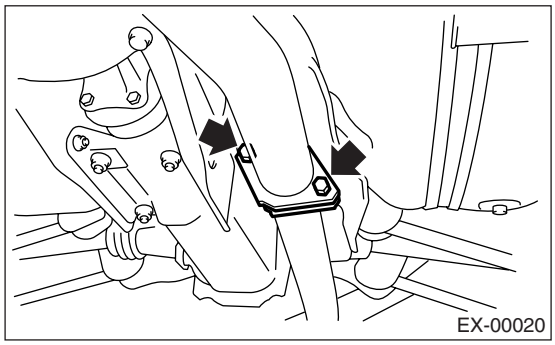
5) Remove the rear exhaust pipe.

B: INSTALLATION

NOTE:
Use new gaskets and self locking nuts.

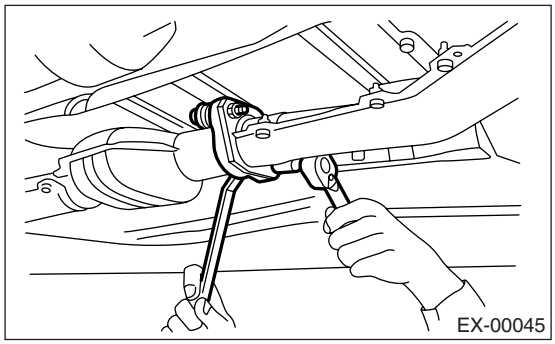
1) Install the rear exhaust pipe to muffler.

Tightening torque:
48 N·m (4.9 kgf-m, 35.4 ft-lb)

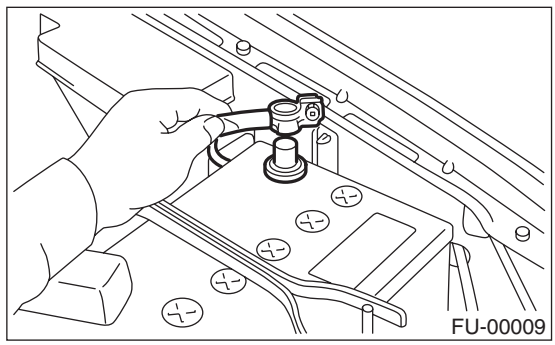


2) Install the rear exhaust pipe to center exhaust pipe.

Tightening torque:
18 N·m (1.8 kgf-m, 13.0 ft-lb)



3) Lower the vehicle.
4) Connect the battery ground cable to battery.



C: INSPECTION

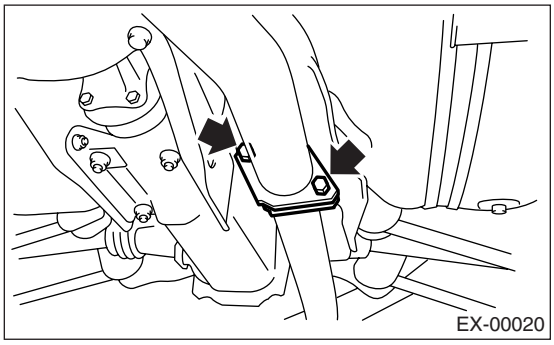
1) Make sure there are no exhaust leaks from connections and welds.
2) Make sure there are no holes or rusting.
3) Make sure the cushion rubber is not worn or cracked.

6. Muffler

A: REMOVAL

1) Separate the muffler from rear exhaust pipe.

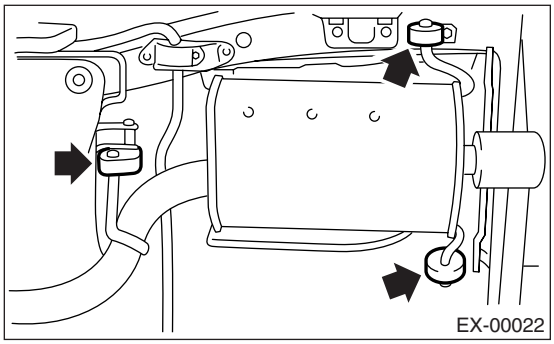
CAUTION:
Be careful, the exhaust pipe is hot.



2) Remove the rubber cushions, and detach the muffler.

CAUTION:
Be careful not to drop the muffler during removal.

NOTE:
To facilitate removal, apply a coat of spray type lubricant to the mating area of rubber cushions in advance.

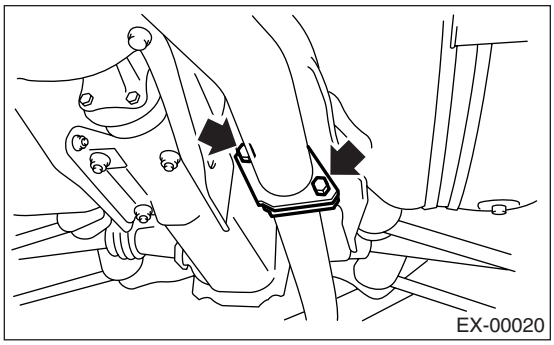


B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Use new gasket and self locking nuts.

Tightening torque:
48 N·m (4.9 kgf-m, 35.4 ft-lb)



C: INSPECTION

1) Make sure there are no exhaust leaks from connections and welds.
2) Make sure there are no holes or rusting.
3) Make sure the cushion rubber is not worn or cracked.

COOLING

CO(H4DOTC)

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3.	Radiator Sub Fan System	13
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6.	Thermostat	22
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8.	Radiator Cap	27
9.	Radiator Main Fan and Fan Motor	28
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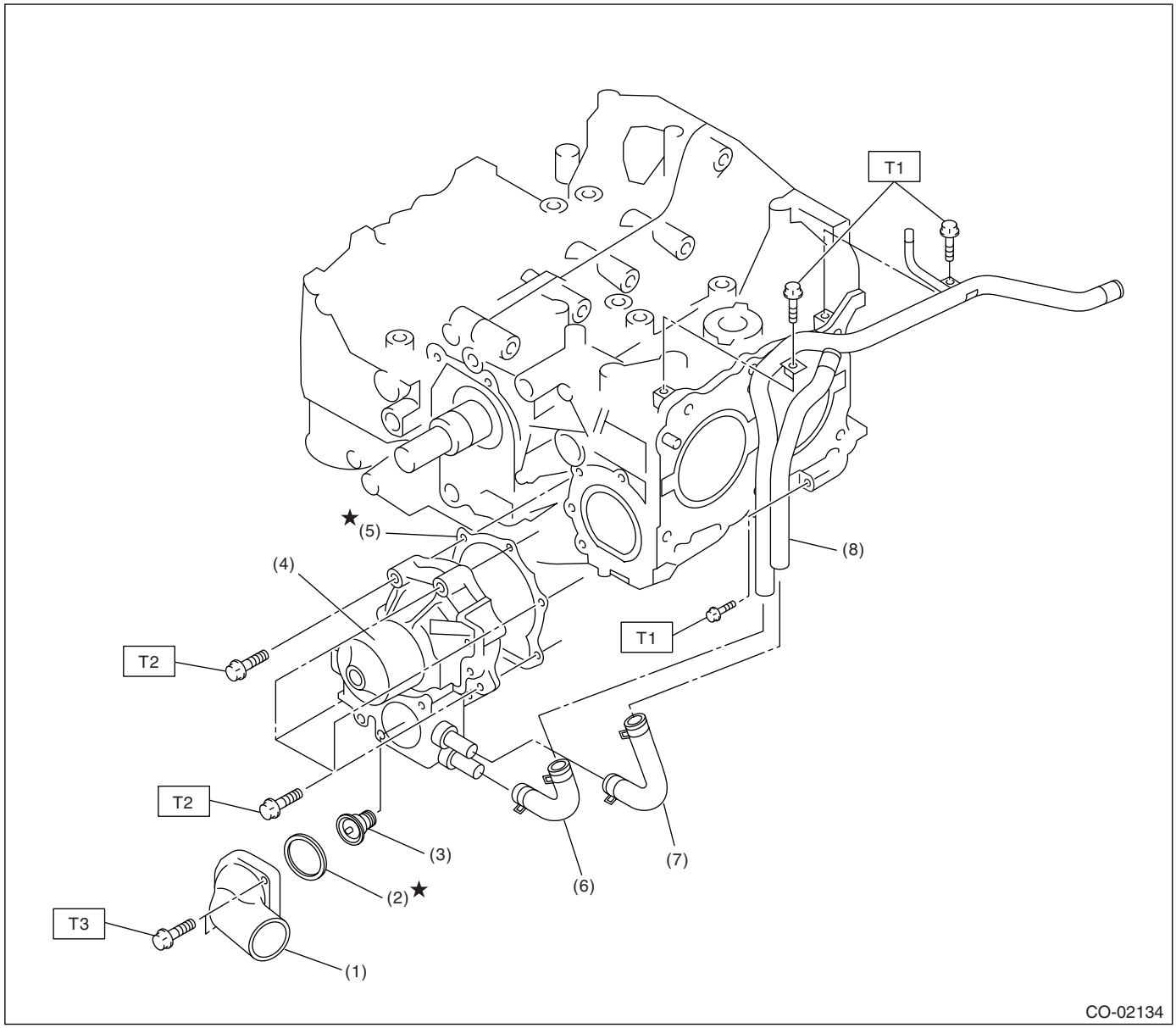
1. General Description

A: SPECIFICATION

Model			DOHC TURBO
Cooling system			Electric fan + Forced engine coolant circulation system
Total engine coolant capacity ℓ (US qt, Imp qt)			AT: 7.6 (8.03, 6.69) MT: 7.7 (8.14, 6.78)
Water pump	Type		Centrifugal impeller type
	Discharge performance I	Discharge	20 ℓ (5.3 US gal, 4.4 Imp gal)/min.
		Pump speed — Discharge pressure	760 rpm — 2.9 kPa (0.3 mAq)
		Engine coolant temperature	80°C (176°F)
	Discharge performance II	Discharge	100 ℓ (26.4 US gal, 22.0 Imp gal)/min.
		Pump speed — Discharge pressure	3,000 rpm — 49.0 kPa (5.0 mAq)
		Engine coolant temperature	80°C (176°F)
	Discharge performance III	Discharge	200 ℓ (52.8 US gal, 44.0 Imp gal)/min.
		Pump speed — Discharge pressure	6,000 rpm — 225.4 kPa (23.0 mAq)
		Engine coolant temperature	80°C (176°F)
	Impeller diameter		76 mm (2.99 in)
	Number of impeller vanes		8
	Pump pulley diameter		60 mm (2.36 in)
	Clearance between impeller and case		0.5 — 1.5 mm (0.020 — 0.059 in)
Thermostat	Type		Wax pellet type
	Starts to open		76 — 80°C (169 — 176°F)
	Fully opened		91°C (196°F)
	Valve lift		9.0 mm (0.354 in) or more/91°C (196°F)
	Valve bore		35 mm (1.38 in)
Radiator fan	Motor	Main fan	120 W
		Sub fan	120 W
	Fan diameter × Blade		320 mm (12.60 in) × 5 (main fan) 320 mm (12.60 in) × 7 (sub fan)
Radiator	Type		Down flow, pressure type
	Core dimensions	Width × Height × Thickness	AT: 691.5 × 340 × 16 mm (27.22 × 13.39 × 0.63 in) MT: 691.5 × 340 × 27 mm (27.22 × 13.39 × 1.06 in)
	Pressure range in which cap valve is open	Coolant filler tank side	Above: 108±15 kPa (1.1±0.15 kgf/cm^2, 16±2 psi) Below: −1.0 to −4.9 kPa (−0.01 to −0.05 kgf/cm^2, −0.1 to −0.7 psi)
		Radiator side	Above only: 137±14.7 kPa (1.40±0.15 kgf/cm^2, 20±2.1 psi)
	Fins		Corrugated fin type
Reservoir tank	Capacity		0.5 ℓ (0.5 US qt, 0.4 Imp qt)

B: COMPONENT

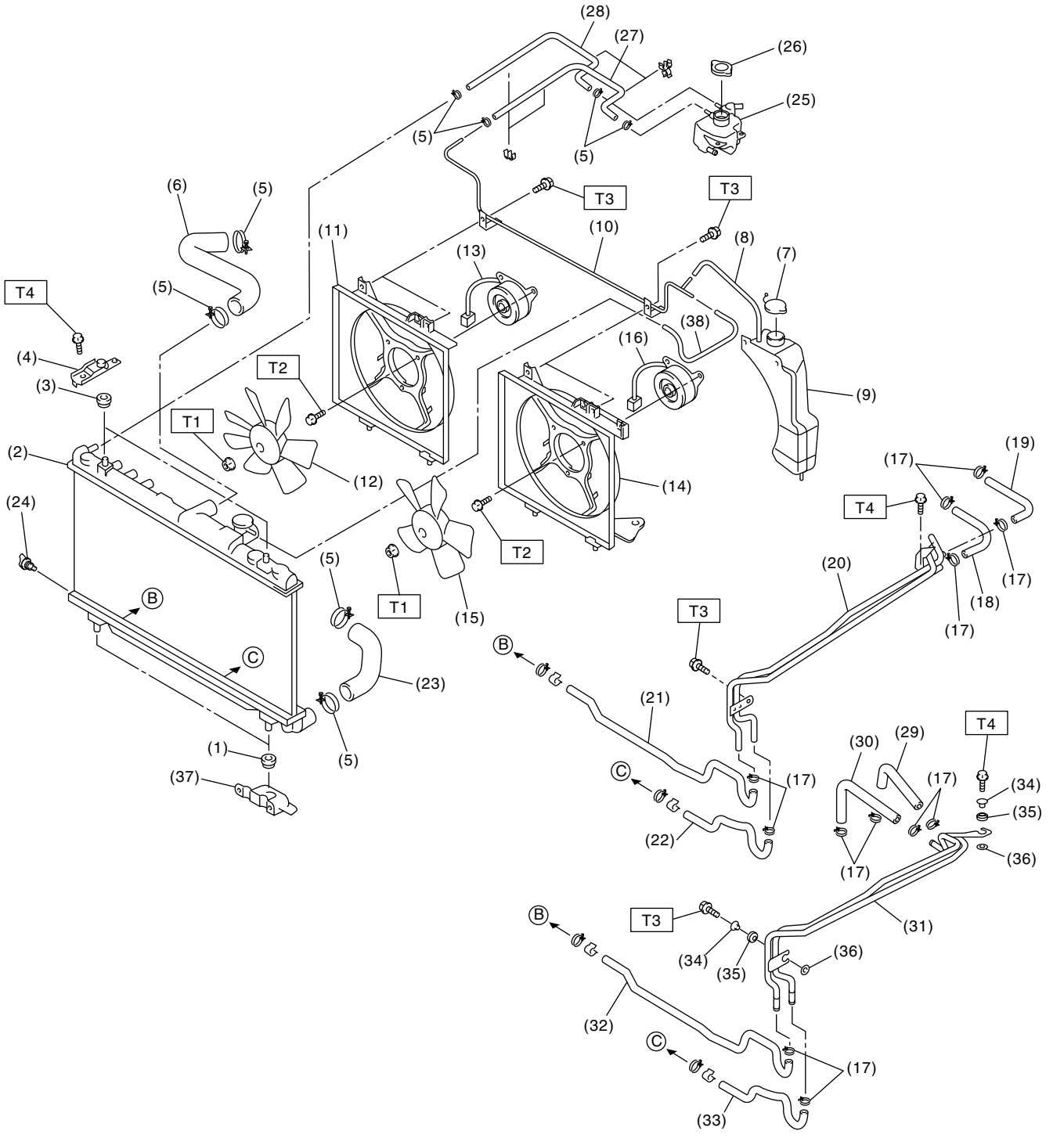
1. WATER PUMP



(1) Thermostat cover
(2) Gasket
(3) Thermostat
(4) Water pump ASSY
(5) Gasket
(6) Heater by-pass hose
(7) Coolant filler tank by-pass hose
(8) Water by-pass pipe

Tightening torque: N·m (kgf-m, ft-lb)
T1: 6.5 (0.66, 4.8)
T2: First 12 (1.2, 8.7)
Second 12 (1.2, 8.7)
T3: 12 (1.2, 8.7)

2. RADIATOR AND RADIATOR FAN



CO-02156

(1) Radiator lower cushion
(2) Radiator
(3) Radiator upper cushion
(4) Radiator upper bracket
(5) Clamp
(6) Radiator inlet hose
(7) Engine coolant reservoir tank cap
(8) Overflow hose A
(9) Engine coolant reservoir tank
(10) Overflow pipe
(11) Radiator sub fan shroud
(12) Radiator sub fan
(13) Radiator sub fan motor
(14) Radiator main fan shroud
(15) Radiator main fan
(16) Radiator main fan motor
(17) ATF hose clamp (AT model)
(18) ATF hose A (AT model)
(19) ATF hose B (AT model)
(20) ATF pipe (AT model)
(21) ATF hose C (AT model)
(22) ATF hose D (AT model)
(23) Radiator outlet hose
(24) Radiator drain plug
(25) Engine coolant filler tank
(26) Radiator cap (engine coolant filler tank cap)
(27) Engine overflow hose
(28) Engine air breather hose
(29) Oil cooler inlet hose A (MT model with oil cooler)
(30) Oil cooler outlet hose A (MT model with oil cooler)
(31) Oil cooler pipe (MT model with oil cooler)
(32) Oil cooler inlet hose B (MT model with oil cooler)
(33) Oil cooler outlet hose B (MT model with oil cooler)
(34) Spacer (MT model with oil cooler)
(35) Cushion (MT model with oil cooler)
(36) Setting washer (MT model with oil cooler)
(37) Radiator lower bracket
(38) Overflow hose B

Tightening torque: N·m (kgf-m, ft-lb)
T1: 3.4 (0.35, 2.5)
T2: 4.4 (0.45, 3.3)
T3: 7.5 (0.76, 5.5)
T4: 18 (1.8, 13.0)

C: CAUTION

• Wear working clothing, including a cap, protective goggles and protective shoes during operation.
• Remove contamination including dirt and corrosion before removal, installation or disassembly.
• Keep the disassembled parts in order and protect them from dust or dirt.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly, and replacement.
• Be careful not to burn, because each part in the vehicle is hot after running.
• Be sure to tighten fasteners including bolts and nuts to the specified torque.
• Place shop jacks or rigid racks at the specified points.
• Before disconnecting electrical connectors of sensors or units, be sure to disconnect the ground cable from battery.

D: PREPARATION TOOL

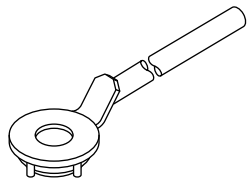
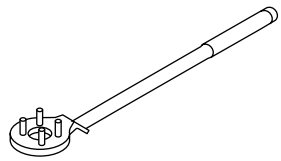
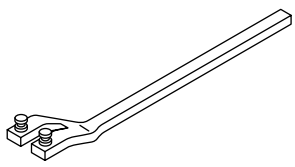
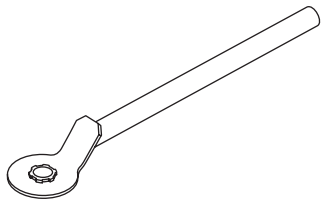
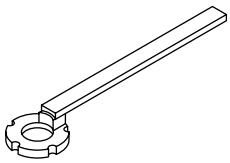
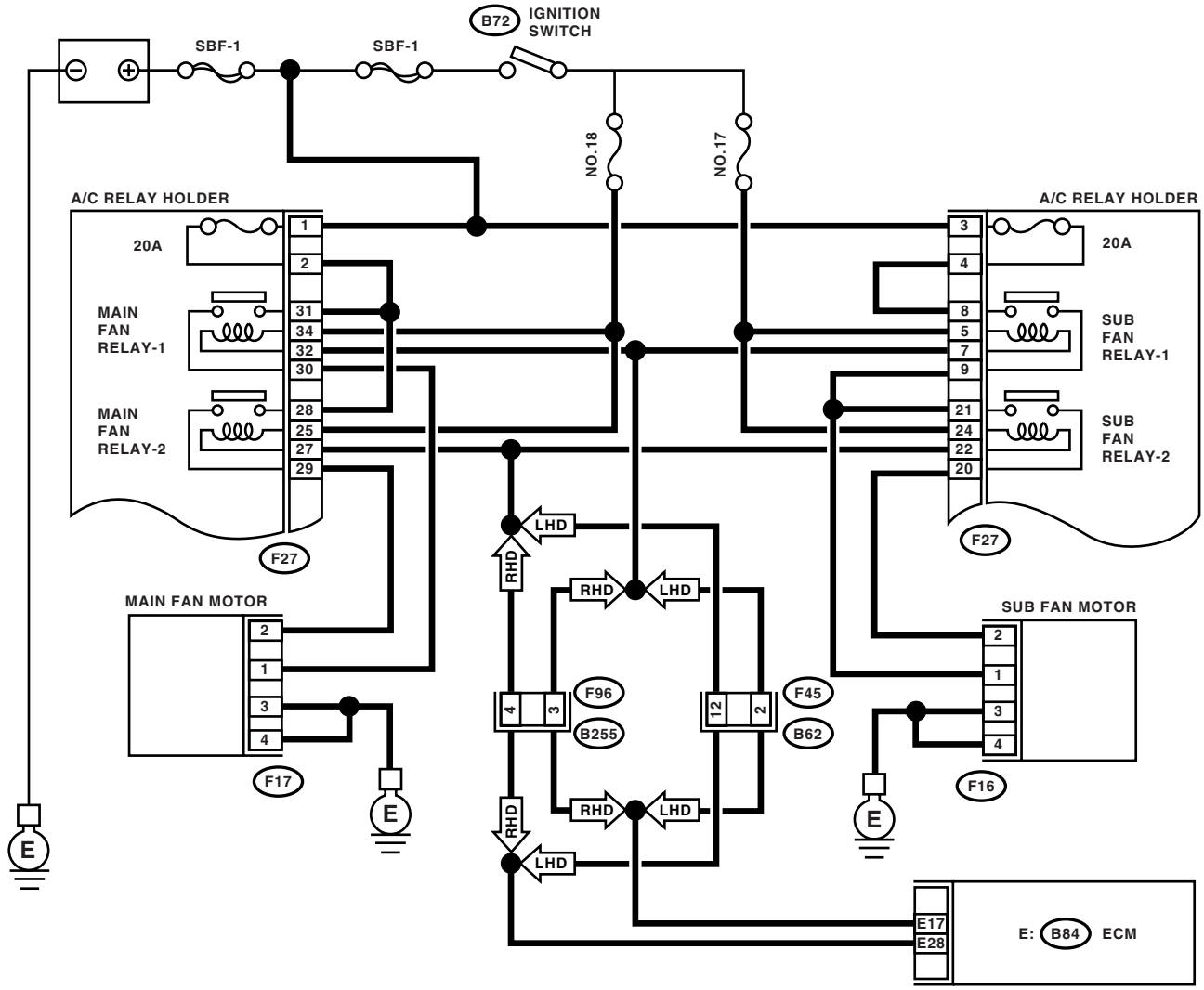
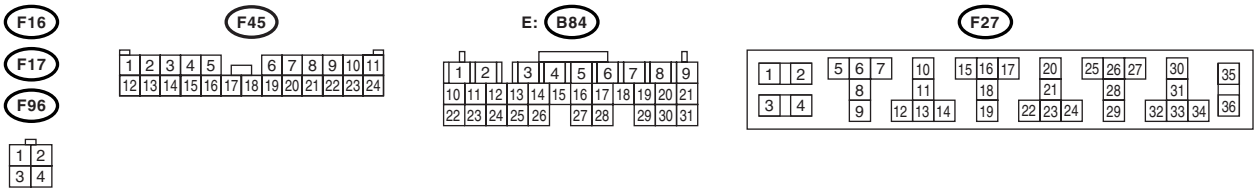
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499977400	499977400	CRANK PULLEY WRENCH	Used for stopping crank pulley when loosening and tightening crank pulley bolts.(Except STi model)
 ST-499977100	499977100	CRANK PULLEY WRENCH	Used for stopping crank pulley when loosening and tightening crank pulley bolts. (STi model)
 ST18231AA010	18231AA010	CAM SPROCKET WRENCH	Used for removing and installing intake cam sprocket. (Except STi and Australia model)

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499977500	499977500	CAM SPROCKET WRENCH	Used for removing and installing intake cam sprocket. (STi and Australia model)
 ST-499207400	499207400	CAM SPROCKET WRENCH	Used for removing and installing exhaust cam sprocket.

2. Radiator Main Fan System

A: WIRING DIAGRAM





CO-02161

B: INSPECTION

DETECTING CONDITION:

- Engine coolant temperature is above 96°C (205°F).
- A/C compressor is rotated.
- Vehicle speed is below 19 km/h (12 MPH).

TROUBLE SYMPTOM:

- Radiator main fan does not rotate under the above conditions.
- Radiator main fan does not rotate at high speed when the following conditions are both met:
  (1) Engine coolant temperature is above 90°C (194°F).
  (2) A/C is ON.

	Step	Check	Yes	No
1	**CHECK OPERATION OF RADIATOR.** 1) Run the engine at idle. (Vehicle stationary) 2) Turn the A/C switch to OFF. 3) Warm the engine coolant temperature over 96°C (205°F).	Does the radiator main fan rotate?	Go to step **2.**	Go to step **3.**
2	**CHECK OPERATION OF RADIATOR.** Turn the A/C switch to ON at condition of step 1.	Does the radiator main fan rotate at high speed when A/C compressor is operated?	Radiator main fan system is okay.	Go to step **17.**
3	**CHECK POWER SUPPLY TO MAIN FAN MOTOR.** **CAUTION:** **Be careful not to overheat the engine during repair.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from main fan motor. 3) Start the engine, and warm it up until engine coolant temperature increases over 96°C (205°F). 4) Stop the engine and turn ignition switch to ON. 5) Measure the voltage between main fan motor connector and chassis ground. ***Connector & terminal*** ***(F17) No. 1 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **4.**	Go to step **7.**
4	**CHECK GROUND CIRCUIT OF MAIN FAN MOTOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between main fan motor connector and chassis ground. ***Connector & terminal*** ***(F17) No. 3 — Chassis ground:*** ***(F17) No. 4 — Chassis ground:***	Is the resistance less than 5 Ω?	Go to step **5.**	Repair the open circuit in harness between main fan motor connector and chassis ground.
5	**CHECK POOR CONTACT.** Check poor contact in main fan motor connector.	Is there poor contact in main fan motor connector?	Repair the poor contact in main fan motor connector.	Go to step **6.**
6	**CHECK MAIN FAN MOTOR.** Connect the battery positive (+) terminal to terminal No. 1, and ground (–) terminal to terminal No. 3 or No. 4 of main fan motor connector.	Does the main fan rotate?	Repair the poor contact in main fan motor connector.	Replace the main fan motor with a new one.

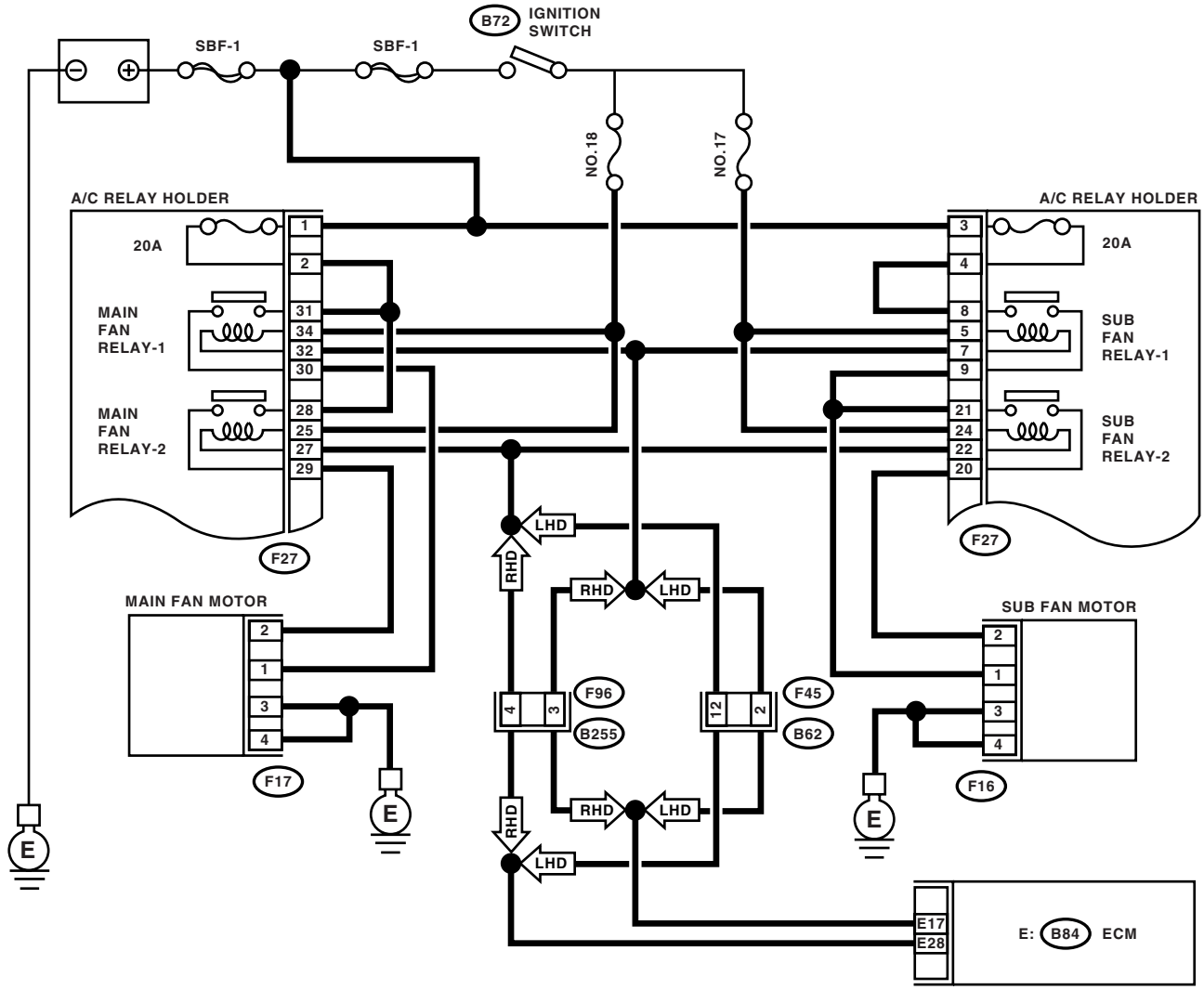
	Step	Check	Yes	No
7	**CHECK POWER SUPPLY TO MAIN FAN RELAY1.** 1) Turn the ignition switch to OFF. 2) Remove the main fan relay1 from A/C relay holder. 3) Measure the voltage between main fan relay1 terminal and chassis ground. ***Connector & terminal*** ***(F27) No. 31 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **8.**	Go to step **9.**
8	**CHECK POWER SUPPLY TO MAIN FAN RELAY1.** 1) Turn the ignition switch to ON. 2) Measure the voltage between main fan relay1 terminal and chassis ground. ***Connector & terminal*** ***(F27) No. 34 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **12.**	Go to step **11.**
9	**CHECK 20 A FUSE.** 1) Remove the 20 A fuse from A/C relay holder. 2) Check the condition of fuse.	Is the fuse blown out?	Replace the fuse.	Go to step **10.**
10	**CHECK POWER SUPPLY TO A/C RELAY HOLDER 20 A FUSE TERMINAL.** Measure the voltage of harness between A/C relay holder 20 A fuse terminal and chassis ground. ***Connector & terminal*** ***(F27) No. 1 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Repair the open circuit in harness between 20 A fuse and main fan relay terminal.	Repair the open circuit in harness between main fuse box connector and 20 A fuse terminal.
11	**CHECK FUSE.** 1) Turn the ignition switch to OFF. 2) Remove the fuse No. 18 from joint box. 3) Check the condition of fuse.	Is the fuse blown out?	Replace the fuse.	Repair the open circuit in harness between main fan relay and ignition switch.
12	**CHECK MAIN FAN RELAY.** 1) Turn the ignition switch to OFF. 2) Remove the main fan relay1. 3) Measure the resistance of main fan relay1. ***Terminals*** ***No. 31 — No. 30:***	Is the resistance more than 1 MΩ?	Go to step **13.**	Replace the main fan relay.
13	**CHECK MAIN FAN RELAY.** 1) Connect the battery to terminals No. 32 and No. 34 of main fan relay1. 2) Measure the resistance of main fan relay1. ***Terminals*** ***No. 31 — No. 30:***	Is the resistance less than 1 Ω?	Go to step **14.**	Replace the main fan relay.
14	**CHECK HARNESS BETWEEN MAIN FAN RELAY TERMINAL AND MAIN FAN MOTOR CONNECTOR.** Measure the resistance of harness between main fan motor connector and main fan relay terminal. ***Connector & terminal*** ***(F17) No. 1 — (F27) No. 30:***	Is the resistance less than 1 Ω?	Go to step **15.**	Repair the open circuit in harness between main fan motor connector and main fan relay terminal.

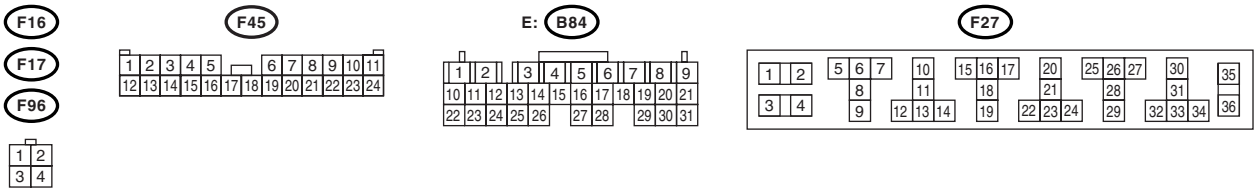
	Step	Check	Yes	No
15	**CHECK HARNESS BETWEEN MAIN FAN RELAY AND ECM.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance of harness between main fan relay connector and ECM connector. ***Connector & terminal*** ***(F27) No. 32 — (B84) No. 17:***	Is the resistance less than 1 Ω?	Go to step **16.**	Repair the open circuit in harness between main fan relay and ECM.
16	**CHECK POOR CONTACT.** Check poor contact in connector between main fan and ECM.	Is there poor contact in connector between main fan motor and ECM?	Repair the poor contact connector.	Record the DTC. Repair the trouble cause. <Ref. to EN(H4DOTC)(diag)-38, Read Diagnostic Trouble Code (DTC).>
17	**CHECK POWER SUPPLY TO MAIN FAN MOTOR.** **CAUTION:** **Be careful not to overheat the engine during repair.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from main fan motor. 3) Start the engine, and warm it up until engine coolant temperature increases over 96°C (205°F). 4) Turn the A/C switch ON. 5) Measure the voltage while A/C compressor is rotating. 6) Measure the voltage between main fan motor connector and chassis ground. ***Connector & terminal*** ***(F17) No. 2 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **18.**	Go to step **20.**
18	**CHECK POOR CONTACT.** Check poor contact in main fan motor connector.	Is there poor contact in main fan motor connector?	Repair the poor contact in main fan motor connector.	Go to step **19.**
19	**CHECK MAIN FAN MOTOR.** Connect the battery positive (+) terminal to terminal No. 2, and ground (−) terminal to terminal No. 3 or No. 4 of main fan motor connector.	Does the main fan rotate?	Repair the poor contact in main fan motor connector.	Replace the main fan motor with a new one.
20	**CHECK POWER SUPPLY TO MAIN FAN RELAY2.** 1) Turn the ignition switch to OFF. 2) Remove the main fan relay2 from A/C relay holder. 3) Measure the voltage between main fan relay2 terminal and chassis ground. ***Connector & terminal*** ***(F27) No. 28 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **21.**	Go to step **22.**
21	**CHECK POWER SUPPLY TO MAIN FAN RELAY2.** 1) Turn the ignition switch to ON. 2) Measure the voltage between main fan relay2 terminal and chassis ground. ***Connector & terminal*** ***(F27) No. 25 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **25.**	Go to step **24.**

	Step	Check	Yes	No
22	**CHECK 20 A FUSE.** 1) Remove the 20 A fuse from A/C relay holder. 2) Check the condition of fuse.	Is the fuse blown out?	Replace the fuse.	Go to step **23.**
23	**CHECK POWER SUPPLY TO A/C RELAY HOLDER 20 A FUSE TERMINAL.** Measure the voltage of harness between A/C relay holder 20 A fuse terminal and chassis ground. ***Connector & terminal*** ***(F27) No. 1 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Repair the open circuit in harness between 20 A fuse and main fan relay terminal.	Repair the open circuit in harness between main fuse box connector and 20 A fuse terminal.
24	**CHECK FUSE.** 1) Turn the ignition switch to OFF. 2) Remove the fuse No. 18 from joint box. 3) Check the condition of fuse.	Is the fuse blown out?	Replace the fuse.	Repair the open circuit in harness between main fan relay and ignition switch.
25	**CHECK MAIN FAN RELAY.** 1) Turn the ignition switch to OFF. 2) Remove the main fan relay2. 3) Measure the resistance of main fan relay2. ***Terminals*** ***No. 28 — No. 29:***	Is the resistance more than 1 MΩ?	Go to step **26.**	Replace the main fan relay.
26	**CHECK MAIN FAN RELAY.** 1) Connect the battery to terminals No. 25 and No. 27 of main fan relay2. 2) Measure the resistance of main fan relay2. ***Terminals*** ***No. 28 — No. 29:***	Is the resistance less than 1 Ω?	Go to step **27.**	Replace the main fan relay.
27	**CHECK HARNESS BETWEEN MAIN FAN RELAY TERMINAL AND MAIN FAN MOTOR CONNECTOR.** Measure the resistance of harness between main fan motor connector and main fan relay terminal. ***Connector & terminal*** ***(F17) No. 2 — (F27) No. 29:***	Is the resistance less than 1 Ω?	Go to step **28.**	Repair the open circuit in harness between main fan motor connector and main fan relay terminal.
28	**CHECK HARNESS BETWEEN MAIN FAN RELAY AND ECM.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance of harness between main fan relay connector and ECM connector. ***Connector & terminal*** ***(F27) No. 27 — (B84) No. 28:***	Is the resistance less than 1 Ω?	Go to step **29.**	Repair the open circuit in harness between main fan relay and ECM.
29	**CHECK POOR CONTACT.** Check poor contact in connector between main fan and ECM.	Is there poor contact in connector between main fan motor and ECM?	Repair the poor contact connector.	Record the DTC. Repair the trouble cause. <Ref. to EN(H4DOTC)(diag)-38, Read Diagnostic Trouble Code (DTC).>

3. Radiator Sub Fan System

A: WIRING DIAGRAM





CO-02161

B: INSPECTION

DETECTING CONDITION:

- Engine coolant temperature is above 96°C (205°F).
- A/C compressor is rotated.
- Vehicle speed is below 19 km/h (12 MPH).

TROUBLE SYMPTOM:

- Radiator sub fan does not rotate under the above conditions.
- Radiator sub fan does not rotate at high speed when the following conditions are both met:
  (1) Engine coolant temperature is above 90°C (194°F).
  (2) A/C is ON.

	Step	Check	Yes	No
1	**CHECK OPERATION OF RADIATOR.** 1) Run the engine at idle. (Vehicle stationary) 2) Turn the A/C switch to OFF. 3) Warm the engine coolant temperature over 96°C (205°F).	Does the radiator sub fan rotate?	Go to step **2.**	Go to step **3.**
2	**CHECK OPERATION OF RADIATOR.** Turn the A/C switch to ON at condition of step 1.	Does the radiator sub fan rotate at high speed when A/C compressor is operated?	Radiator sub fan system is okay.	Go to step **17.**
3	**CHECK POWER SUPPLY TO SUB FAN MOTOR.** **CAUTION:** **Be careful not to overheat the engine during repair.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from sub fan motor. 3) Start the engine, and warm it up until engine coolant temperature increases over 96°C (205°F). 4) Stop the engine and turn ignition switch to ON. 5) Measure the voltage between sub fan motor connector and chassis ground. ***Connector & terminal*** ***(F16) No. 1 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **4.**	Go to step **7.**
4	**CHECK GROUND CIRCUIT OF SUB FAN MOTOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between sub fan motor connector and chassis ground. ***Connector & terminal*** ***(F16) No. 3 — Chassis ground:*** ***(F16) No. 4 — Chassis ground:***	Is the resistance less than 5 Ω?	Go to step **5.**	Repair the open circuit in harness between sub fan motor connector and chassis ground.
5	**CHECK POOR CONTACT.** Check poor contact in sub fan motor connector.	Is there poor contact in sub fan motor connector?	Repair the poor contact in sub fan motor connector.	Go to step **6.**
6	**CHECK SUB FAN MOTOR.** Connect the battery positive (+) terminal to terminal No. 1, and ground (–) terminal to terminal No. 3 or No. 4 of sub fan motor connector.	Does the sub fan rotate?	Repair the poor contact in sub fan motor connector.	Replace the sub fan motor with a new one.

	Step	Check	Yes	No
7	**CHECK POWER SUPPLY TO SUB FAN RELAY1.** 1) Turn the ignition switch to OFF. 2) Remove the sub fan relay1 from A/C relay holder. 3) Measure the voltage between sub fan relay1 terminal and chassis ground. ***Connector & terminal*** ***(F27) No. 8 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **8.**	Go to step **9.**
8	**CHECK POWER SUPPLY TO SUB FAN RELAY1.** 1) Turn the ignition switch to ON. 2) Measure the voltage between sub fan relay1 terminal and chassis ground. ***Connector & terminal*** ***(F27) No. 5 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **12.**	Go to step **11.**
9	**CHECK 20 A FUSE.** 1) Remove the 20 A fuse from A/C relay holder. 2) Check the condition of fuse.	Is the fuse blown out?	Replace the fuse.	Go to step **10.**
10	**CHECK POWER SUPPLY TO A/C RELAY HOLDER 20 A FUSE TERMINAL.** Measure the voltage of harness between A/C relay holder 20 A fuse terminal and chassis ground. ***Connector & terminal*** ***(F27) No. 3 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Repair the open circuit in harness between 20 A fuse and sub fan relay terminal.	Repair the open circuit in harness between sub fuse box connector and 20 A fuse terminal.
11	**CHECK FUSE.** 1) Turn the ignition switch to OFF. 2) Remove the fuse No. 17 from joint box. 3) Check the condition of fuse.	Is the fuse blown out?	Replace the fuse.	Repair the open circuit in harness between sub fan relay and ignition switch.
12	**CHECK SUB FAN RELAY.** 1) Turn the ignition switch to OFF. 2) Remove the sub fan relay1. 3) Measure the resistance of sub fan relay1. ***Terminals*** ***No. 8 — No. 9:***	Is the resistance more than 1 MΩ?	Go to step **13.**	Replace the sub fan relay.
13	**CHECK SUB FAN RELAY.** 1) Connect the battery to terminals No. 5 and No. 7 of sub fan relay1. 2) Measure the resistance of sub fan relay. ***Terminals*** ***No. 8 — No. 9:***	Is the resistance less than 1 Ω?	Go to step **14.**	Replace the sub fan relay.
14	**CHECK HARNESS BETWEEN SUB FAN RELAY TERMINAL AND SUB FAN MOTOR CONNECTOR.** Measure the resistance of harness between sub fan motor connector and sub fan relay terminal. ***Connector & terminal*** ***(F16) No. 1 — (F27) No. 9:***	Is the resistance less than 1 Ω?	Go to step **15.**	Repair the open circuit in harness between sub fan motor connector and sub fan relay terminal.

	Step	Check	Yes	No
15	**CHECK HARNESS BETWEEN SUB FAN RELAY AND ECM.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance of harness between sub fan relay connector and ECM connector. ***Connector & terminal*** ***(F27) No. 7 — (B84) No. 17:***	Is the resistance less than 1 Ω?	Go to step **16.**	Repair the open circuit in harness between sub fan relay and ECM.
16	**CHECK POOR CONTACT.** Check poor contact in connector between sub fan and ECM.	Is there poor contact in connector between sub fan motor and ECM?	Repair the poor contact connector.	Record the DTC. Repair the trouble cause. <Ref. to EN(H4DOTC)(diag)-38, Read Diagnostic Trouble Code (DTC).>
17	**CHECK POWER SUPPLY TO SUB FAN MOTOR.** **CAUTION:** **Be careful not to overheat the engine during repair.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from sub fan motor. 3) Start the engine, and warm it up until engine coolant temperature increases over 96°C (205°F). 4) Turn the A/C switch ON. 5) Measure the voltage while A/C compressor is rotating. 6) Measure the voltage between sub fan motor connector and chassis ground. ***Connector & terminal*** ***(F16) No. 2 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **18.**	Go to step **20.**
18	**CHECK POOR CONTACT.** Check poor contact in sub fan motor connector.	Is there poor contact in sub fan motor connector?	Repair the poor contact in sub fan motor connector.	Go to step **19.**
19	**CHECK SUB FAN MOTOR.** Connect the battery positive (+) terminal to terminal No. 2, and ground (−) terminal to terminal No. 3 or No. 4 of sub fan motor connector.	Does the sub fan rotate?	Repair the poor contact in sub fan motor connector.	Replace the sub fan motor with a new one.
20	**CHECK POWER SUPPLY TO SUB FAN RELAY2.** 1) Turn the ignition switch to OFF. 2) Remove the sub fan relay2 from A/C relay holder. 3) Measure the voltage between sub fan relay2 terminal and chassis ground. ***Connector & terminal*** ***(F27) No. 21 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **21.**	Go to step **22.**
21	**CHECK POWER SUPPLY TO SUB FAN RELAY2.** 1) Turn the ignition switch to ON. 2) Measure the voltage between sub fan relay2 terminal and chassis ground. ***Connector & terminal*** ***(F27) No. 24 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **25.**	Go to step **24.**

	Step	Check	Yes	No
22	**CHECK 20 A FUSE.** 1) Remove the 20 A fuse from A/C relay holder. 2) Check the condition of fuse.	Is the fuse blown out?	Replace the fuse.	Go to step **23.**
23	**CHECK POWER SUPPLY TO A/C RELAY HOLDER 20 A FUSE TERMINAL.** Measure the voltage of harness between A/C relay holder 20 A fuse terminal and chassis ground. ***Connector & terminal*** ***(F27) No. 3 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Repair the open circuit in harness between 20 A fuse and sub fan relay terminal.	Repair the open circuit in harness between sub fuse box connector and 20 A fuse terminal.
24	**CHECK FUSE.** 1) Turn the ignition switch to OFF. 2) Remove the fuse No. 17 from joint box. 3) Check the condition of fuse.	Is the fuse blown out?	Replace the fuse.	Repair the open circuit in harness between sub fan relay and ignition switch.
25	**CHECK SUB FAN RELAY.** 1) Turn the ignition switch to OFF. 2) Remove the sub fan relay2. 3) Measure the resistance of sub fan relay2. ***Terminals*** ***No. 21 — No. 20:***	Is the resistance more than 1 MΩ?	Go to step **26.**	Replace the sub fan relay.
26	**CHECK SUB FAN RELAY.** 1) Connect the battery to terminals No. 22 and No. 24 of sub fan relay2. 2) Measure the resistance of sub fan relay2. ***Terminals*** ***No. 21 — No. 20:***	Is the resistance less than 1 Ω?	Go to step **27.**	Replace the sub fan relay.
27	**CHECK HARNESS BETWEEN SUB FAN RELAY TERMINAL AND SUB FAN MOTOR CONNECTOR.** Measure the resistance of harness between sub fan motor connector and sub fan relay2 terminal. ***Connector & terminal*** ***(F16) No. 2 — (F27) No. 20:***	Is the resistance less than 1 Ω?	Go to step **28.**	Repair the open circuit in harness between sub fan motor connector and sub fan relay terminal.
28	**CHECK HARNESS BETWEEN SUB FAN RELAY AND ECM.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance of harness between sub fan relay connector and ECM connector. ***Connector & terminal*** ***(F27) No. 22 — (B84) No. 28:***	Is the resistance less than 1 Ω?	Go to step **29.**	Repair the open circuit in harness between sub fan relay and ECM.
29	**CHECK POOR CONTACT.** Check poor contact in connector between sub fan and ECM.	Is there poor contact in connector between sub fan motor and ECM?	Repair the poor contact connector.	Record the DTC. Repair the trouble cause. <Ref. to EN(H4DOTC)(diag)-38, Read Diagnostic Trouble Code (DTC).>

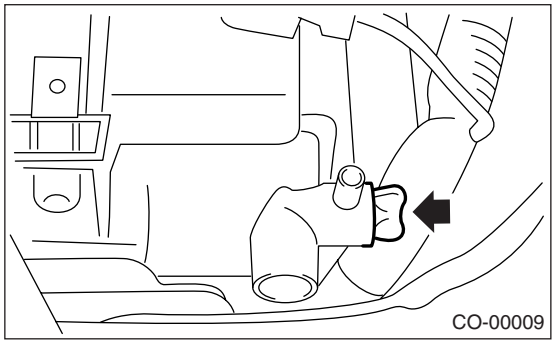
4. Engine Coolant

A: REPLACEMENT

1. DRAINING OF ENGINE COOLANT

1) Lift-up the vehicle.
2) Remove the under cover.
3) Remove the drain cock to drain engine coolant into container.

NOTE:
Remove the coolant filler tank cap so that engine coolant will drain faster.



4) Install the drain cock.

2. FILLING OF ENGINE COOLANT

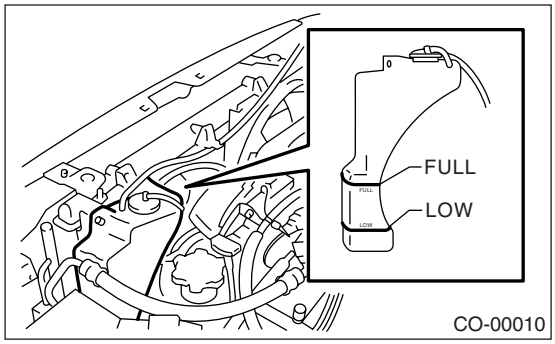
1) Fill engine coolant into the coolant filler tank up to filler neck position.

Coolant capacity (fill up to "FULL" level):
AT model
7.6 ℓ (8.03 US qt, 6.69 Imp qt)
MT model
7.7 ℓ (8.14 US qt, 6.78 Imp qt)

CAUTION:
Do not mix up the coolant filler tank side cap with radiator side cap.

NOTE:
• Do not remove the radiator side cap when filling engine coolant.
• The SUBARU Genuine Coolant containing anti-freeze and anti-rust agents is especially made for SUBARU engine, which has an aluminum crank-case. Always use SUBARU Genuine Coolant, since other coolant may cause corrosion.

2) Fill engine coolant into the reservoir tank up to FULL level.



3) Close the coolant filler tank cap and start the engine. Race 5 to 6 times at less than 3,000 rpm, then stop the engine. (Complete this operation within 40 seconds.)
4) Wait for one minute after the engine stops, open the coolant filler tank cap. If the engine coolant level drops, and engine coolant to the filler neck position of coolant filler tank.
5) Perform the procedures 3) and 4) again.
6) Attach the coolant filler tank cap and reservoir tank cap properly.
7) Start the engine and operate the heater at maximum hot position and the blower speed setting to "LO".
8) Run the engine at 2,000 rpm or less until radiator fan starts and stops.

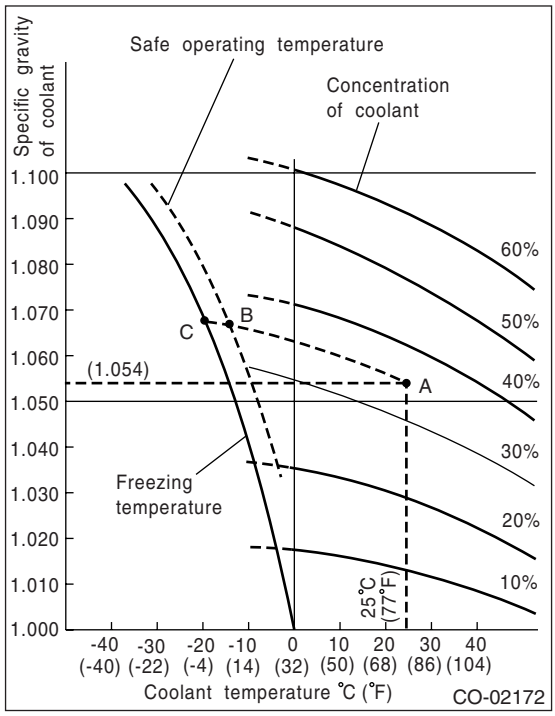
NOTE:
• Be careful with the water temperature gauge to prevent overheating.
• If the radiator hose becomes to harden by the pressure of engine coolant, air bleeding operation seems to be almost completed.

9) Stop the engine and wait until engine coolant temperature lowers to 30°C (86°F).
10) Install the coolant filler tank cap. If the engine coolant level drops, add engine coolant into coolant filler tank up to the filler neck position and reservoir tank to "FULL" level.
11) Attach the coolant filler tank cap and reservoir tank cap properly.
12) Operate the heater at maximum hot position and the blower speed setting to "LO" and start the engine. Race at less than 3,000 rpm. If the flowing sound is heard at this time, perform the procedures from 8) again.

B: INSPECTION

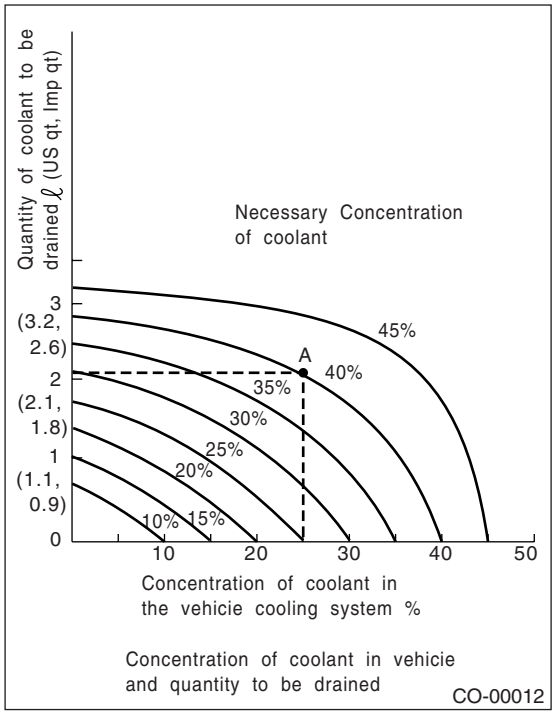
1. RELATIONSHIP OF SUBARU GENUINE COOLANT CONCENTRATION AND FREEZING TEMPERATURE

The concentration and safe operating temperature of the SUBARU genuine coolant is shown in the diagram. Measuring the temperature and specific gravity of the coolant will provide this information.
[Example]
If the coolant temperature is 25°C (77°F) and its specific gravity is 1.054 and the concentration is 35% (point A), the safe operating temperature is −14°C (7°F) (point B), and the freezing temperature is −20°C (−4°F) (point C).



2. PROCEDURE TO ADJUST THE CONCENTRATION OF THE ENGINE COOLANT

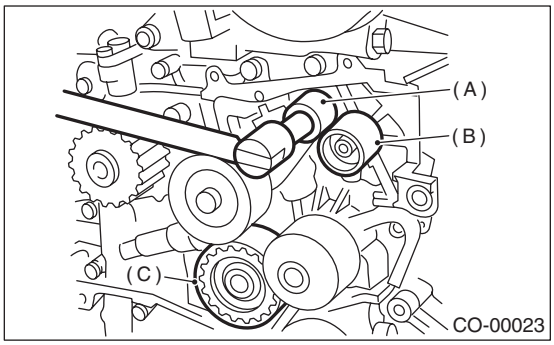
To adjust the concentration of the coolant according to temperature, find the proper coolant concentration in the above diagram and replace the necessary amount of engine coolant with an undiluted solution of SUBARU genuine coolant (concentration 50%).
The amount of engine coolant that should be replaced can be determined using the diagram.
[Example]
Assume that the engine coolant concentration must be increased from 25% to 40%. Find point A, where the 25% line of coolant concentration intersects with the 40% curve of the necessary coolant concentration, and read the scale on the vertical axis of the graph at height A. The quantity of coolant to be drained is 2.1 ℓ (2.2 US qt, 1.8 Imp qt). Drain 2.1 ℓ (2.2 US qt, 1.8 Imp qt) of coolant from the cooling system and add 2.1 ℓ (2.2 US qt, 1.8 Imp qt) of the undiluted solution of SUBARU genuine coolant.
If a coolant concentration of 50% is needed, drain all the coolant and refill with the undiluted solution only.



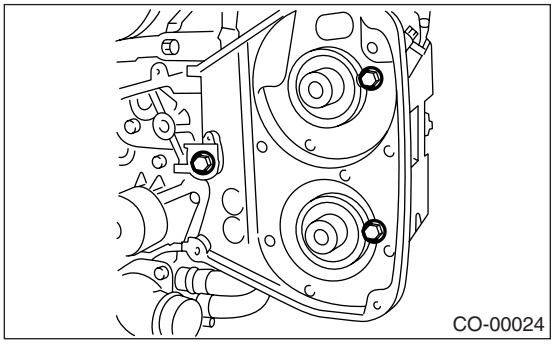
5. Water Pump

A: REMOVAL

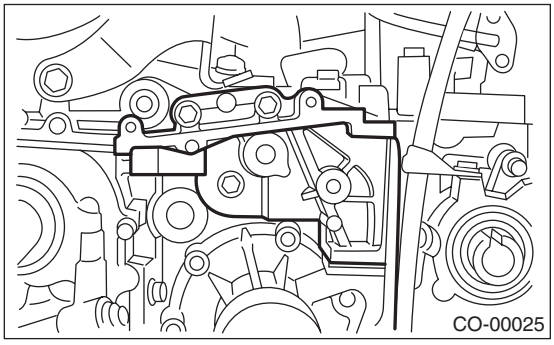
1) Remove the radiator. <Ref. to CO(H4DOTC)-24, REMOVAL, Radiator.>
2) Remove the V-belts. <Ref. to ME(H4DOTC)-53, REMOVAL, V-belt.>
3) Remove the timing belt. <Ref. to ME(H4DOTC)-58, REMOVAL, Timing Belt.>
4) Remove the automatic belt tension adjuster (A).
5) Remove the belt idler (B).
6) Remove the belt idler No. 2 (C).



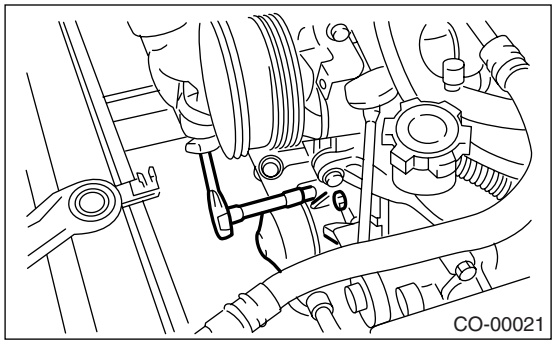
7) Remove the camshaft position sensor. <Ref. to FU(H4DOTC)-29, REMOVAL, Camshaft Position Sensor.>
8) Remove the cam sprockets (LH) by using ST. <Ref. to ME(H4DOTC)-66, REMOVAL, Cam Sprocket.>
9) Remove the belt cover No. 2 (LH).



10) Remove the tensioner bracket.



11) Disconnect the hose from water pump.
12) Remove the water pump.

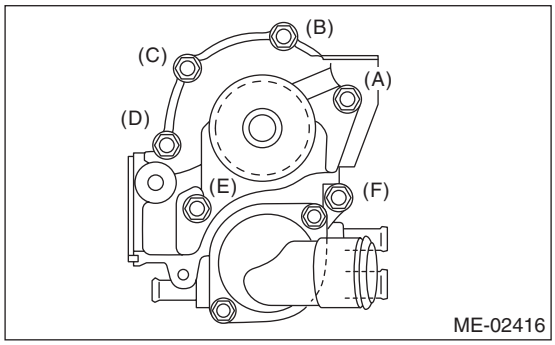


B: INSTALLATION

1) Install the water pump onto cylinder block (LH).

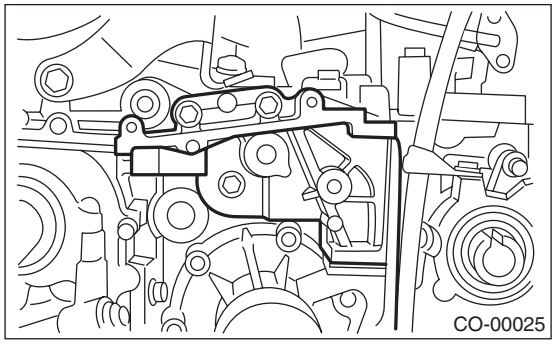
NOTE:
- Use a new gasket.
- When installing the water pump, tighten bolts in two stages in alphabetical sequence as shown in the figure.

Tightening torque:
First:
12 N·m (1.2 kgf-m, 8.7 ft-lb)
Second:
12 N·m (1.2 kgf-m, 8.7 ft-lb)



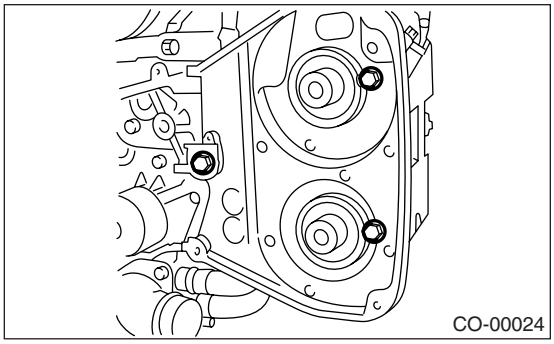
2) Connect the hose to water pump.
3) Install the tensioner bracket.

Tightening torque:
24.5 N·m (2.5 kgf-m, 18.1 ft-lb)



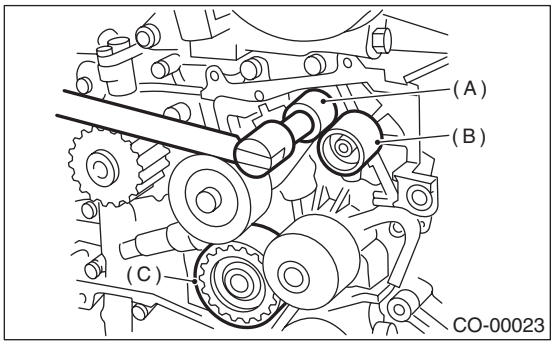
4) Install the belt cover No. 2 (LH).

Tightening torque:
5 N·m (0.5 kgf-m, 3.6 ft-lb)



5) Install the cam sprockets (LH) by using ST. <Ref. to ME(H4DOTC)-66, INSTALLATION, Cam Sprocket.>
6) Install the camshaft position sensor. <Ref. to FU(H4DOTC)-29, INSTALLATION, Camshaft Position Sensor.>
7) Install the belt idler No. 2 (C).
8) Install the belt idler (B).
9) Install the automatic belt tension adjuster (A) which has tension rod held by pin. <Ref. to ME(H4DOTC)-59, AUTOMATIC BELT TENSION ADJUSTER ASSEMBLY AND BELT IDLER, INSTALLATION, Timing Belt.>

Tightening torque:
39 N·m (4.0 kgf-m, 28.9 ft-lb)

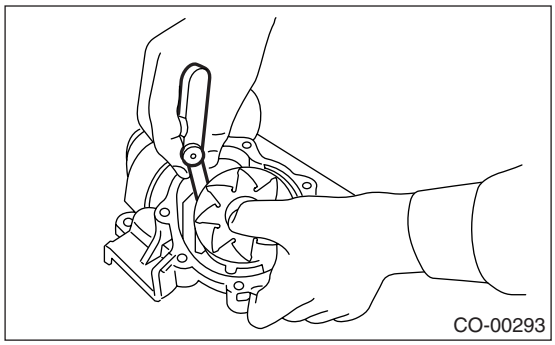


10) Install the timing belt. <Ref. to ME(H4DOTC)-60, TIMING BELT, INSTALLATION, Timing Belt.>
11) Install the V-belts. <Ref. to ME(H4DOTC)-53, INSTALLATION, V-belt.>
12) Install the radiator. <Ref. to CO(H4DOTC)-25, INSTALLATION, Radiator.>

C: INSPECTION

1) Check the water pump bearing for smooth rotation.
2) Check the water pump pulley for abnormalities.
3) Make sure the impeller is not deformed or damaged.
4) Inspect the clearance between impeller and pump case.

Clearance between impeller and pump case:
0.5 — 1.5 mm (0.020 — 0.059 in)

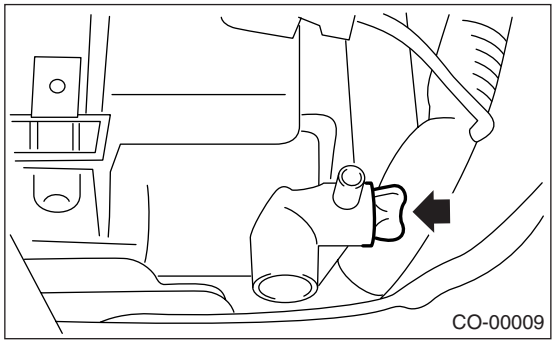


5) After water pump installation, check the pulley shaft for engine coolant leaks. If leaks are noted, replace the water pump assembly.

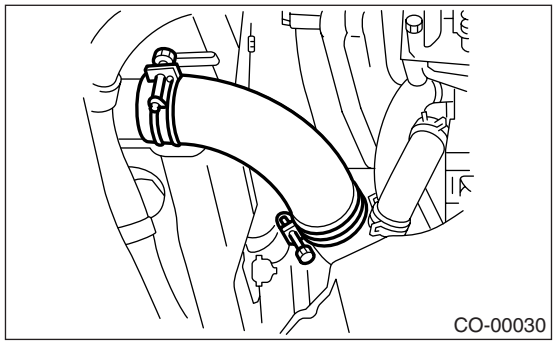
6. Thermostat

A: REMOVAL

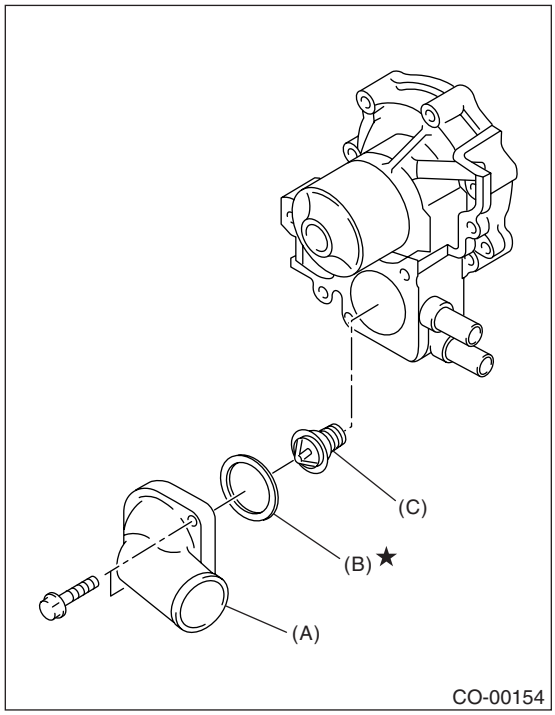
1) Set the vehicle on a lift.
2) Lift-up the vehicle.
3) Remove the under cover.
4) Drain the engine coolant completely. <Ref. to CO(H4DOTC)-18, DRAINING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>



5) Disconnect the radiator outlet hose.



6) Remove the thermostat cover and gasket, and then pull out the thermostat.



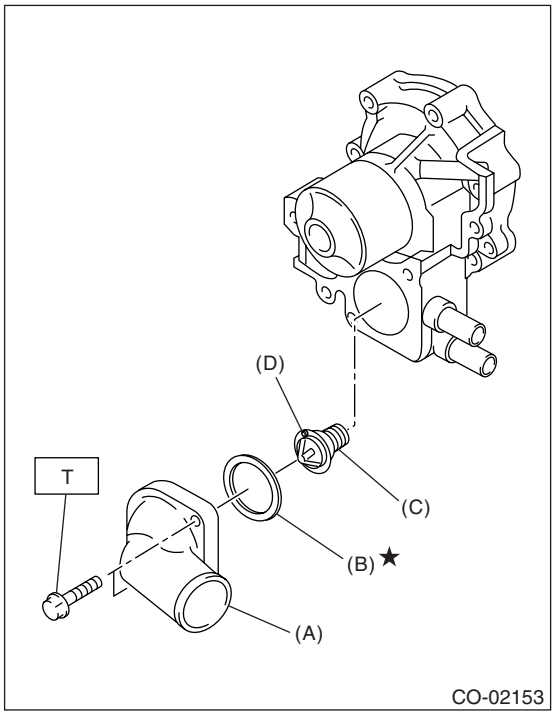
(A) Thermostat cover
(B) Gasket
(C) Thermostat

B: INSTALLATION

1) Install the gasket to thermostat, and install the thermostat and gasket to water pump as a unit. Then, install the thermostat cover.

NOTE:
• When reinstalling the thermostat, use a new gasket.
• The thermostat must be installed with the jiggle pin (D) facing upward.

Tightening torque:
12 N·m (1.2 kgf-m, 8.7 ft-lb)



(A) Thermostat cover
(B) Gasket
(C) Thermostat
(D) Jiggle pin

2) Fill engine coolant. <Ref. to CO(H4DOTC)-18, FILLING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>

C: INSPECTION

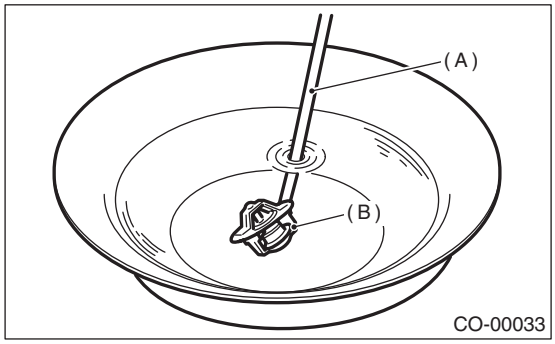
Replace the thermostat if the valve does not close completely at an ambient temperature or if the following test shows unsatisfactory results.
Immerse the thermostat and thermometer in water. Raise water temperature gradually, and measure the temperature and valve lift when the valve begins to open and when the valve is fully opened. During the test, agitate the water for even temperature distribution. The measurement should be to the specification.

NOTE:
• Leave the thermostat in a boiled water for more than five minutes before measuring the valve lift.
• Hold the thermostat with a wire or the like to avoid contacting with the bottom of container.

Starts to open:
76 — 80°C (169 — 176°F)

Fully opens:
91°C (196°F)

Valve lift:
9.0 mm (0.354 in) or more



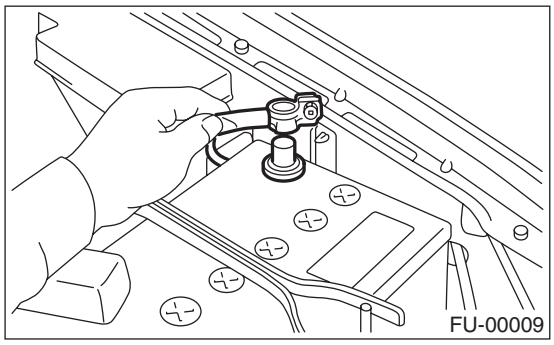
(A) Thermometer
(B) Thermostat

7. Radiator

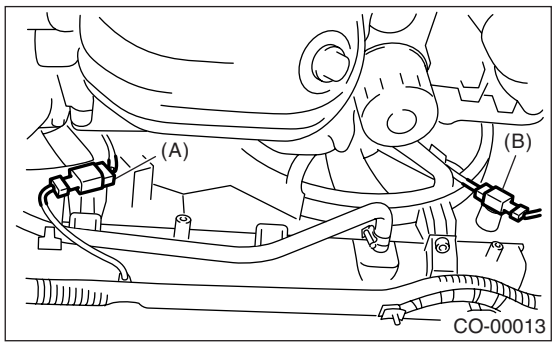
A: REMOVAL

CAUTION:
Wait until the engine cools down before working since the radiator is pressurized.

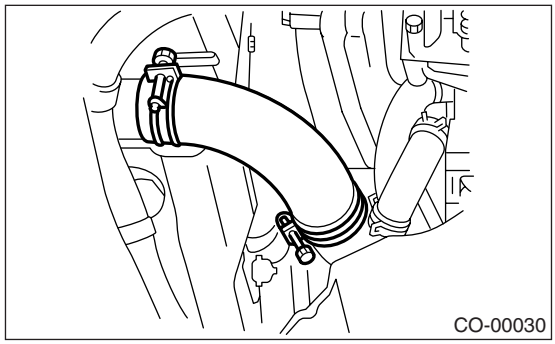
1) Set the vehicle on a lift.
2) Disconnect the ground cable from battery.



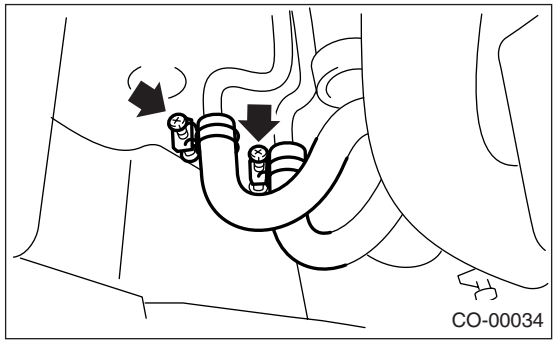
3) Lift-up the vehicle.
4) Remove the under cover.
5) Drain the engine coolant completely. <Ref. to CO(H4DOTC)-18, DRAINING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>
6) Disconnect the connectors of radiator main fan motor (A) and sub fan motor (B).



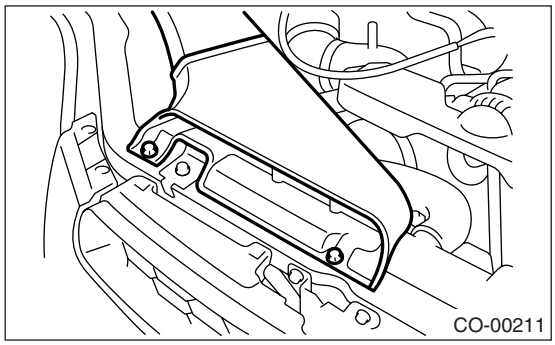
7) Disconnect the radiator outlet hose from thermostat cover.



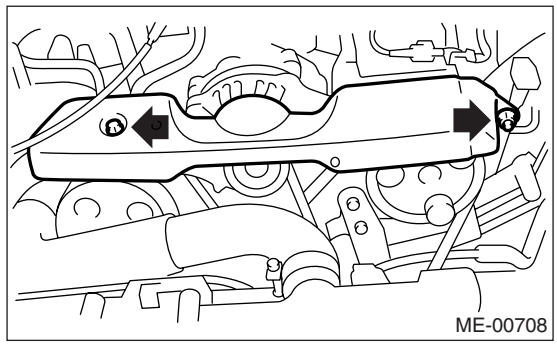
8) Disconnect the ATF hose from ATF pipe. (AT model) Plug the openings in the hose and radiator with caps in order to prevent ATF from leaking.
9) Disconnect the oil cooler hose from oil cooler pipe. (MT model with oil cooler)
Install the cap to prevent oil from leaking.



10) Lower the vehicle.
11) Remove the air intake duct.

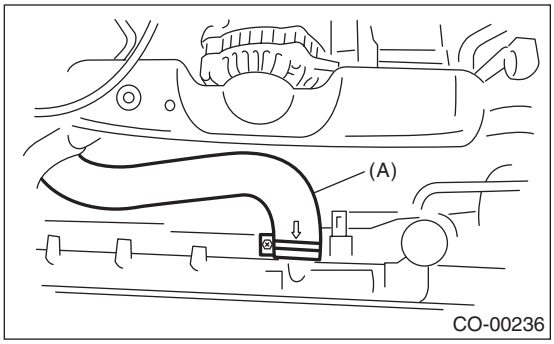


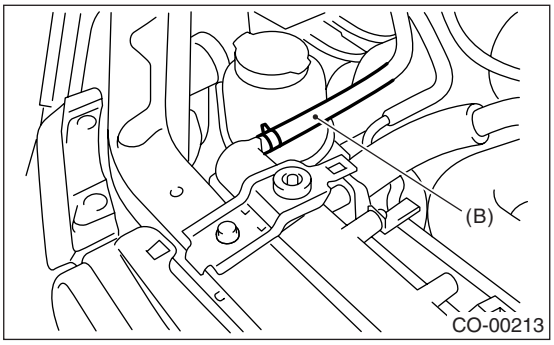
12) Remove the V-belt covers.



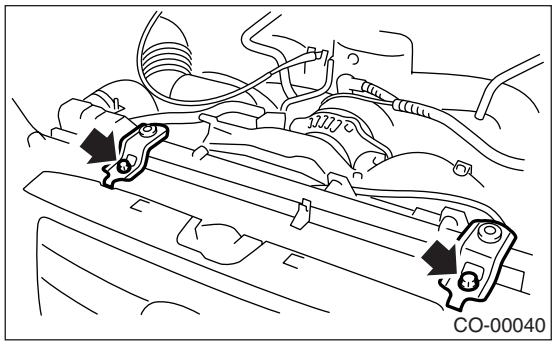
13) Disconnect the overflow hose.
14) Remove the reservoir tank. <Ref. to CO(H4DOTC)-32, REMOVAL, Reservoir Tank.>

15) Disconnect the radiator inlet hose (A) and engine air breather hose (B) from radiator.





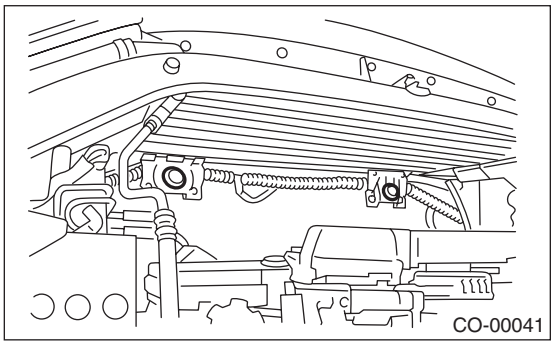
16) Remove the radiator upper brackets.



17) While lifting the radiator up, slide it to the left.
18) Lift-up the radiator, and then remove it from vehicle.

B: INSTALLATION

1) Attach the radiator lower cushions to the holes on vehicle.

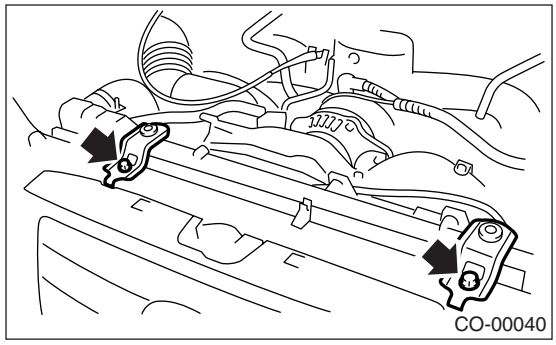


2) Install the radiator to vehicle.

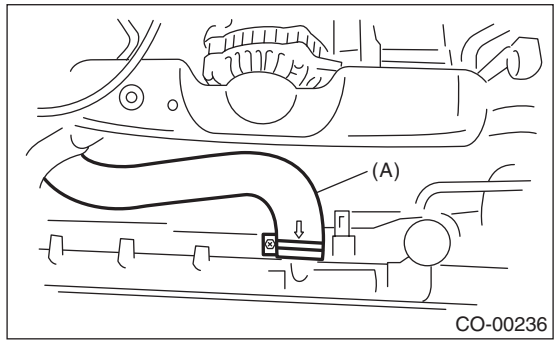
NOTE:
Fit the pins on lower side of radiator into the radiator lower cushions on body side.

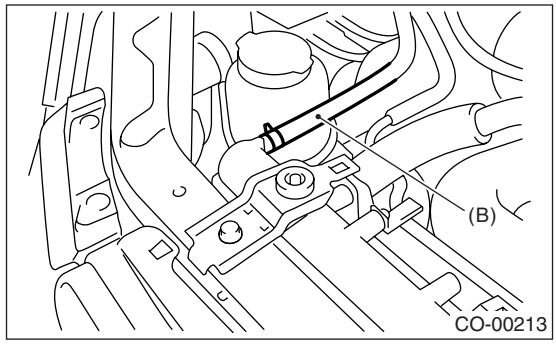
3) Install the radiator brackets, and then tighten the bolts.

Tightening torque:
18 N·m (1.8 kgf-m, 13.0 ft-lb)



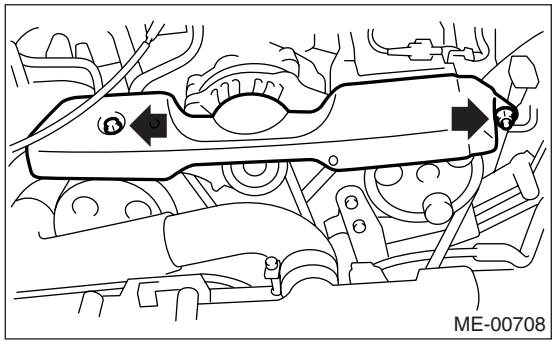
4) Connect the radiator inlet hose (A) and water tank hose (B).



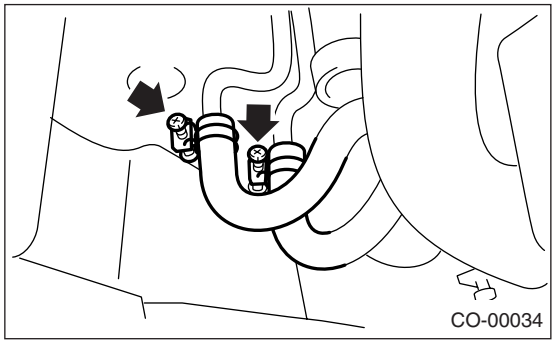


5) Install the reservoir tank. <Ref. to CO(H4DOTC)-32, INSTALLATION, Reservoir Tank.>
6) Connect the overflow hose.

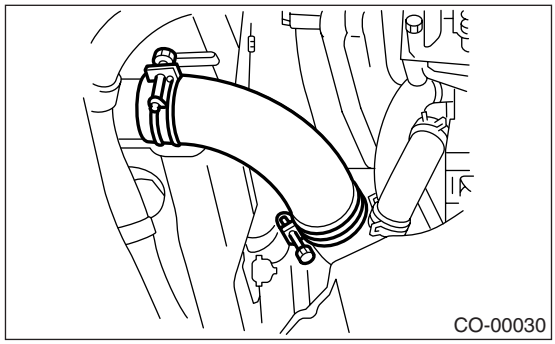
7) Install the V-belt cover.



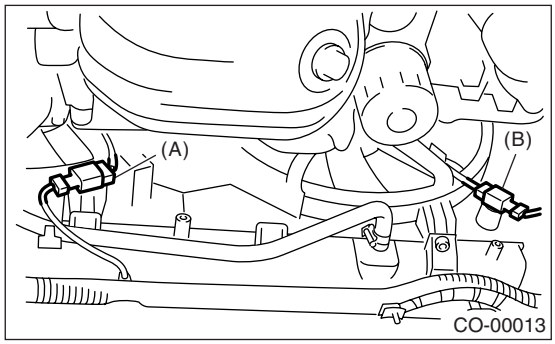
8) Install the air intake duct.
<Ref. to IN(H4DOTC)-10, INSTALLATION, Air Intake Duct.>
9) Lift-up the vehicle.
10) Connect the ATF hoses. (AT model).
11) Connect the oil cooler hose. (MT model with oil cooler)



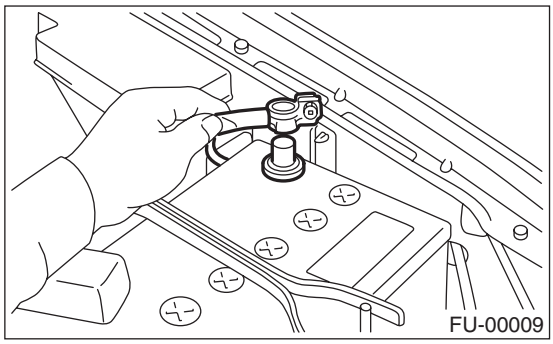
12) Connect the radiator outlet hose.



13) Connect the connectors to radiator main fan motor (A) and sub fan motor (B).



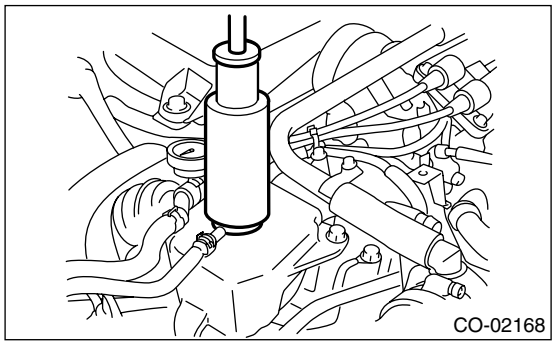
14) Install the under cover.
15) Lower the vehicle.
16) Connect the battery ground cable to battery.



17) Fill engine coolant. <Ref. to CO(H4DOTC)-18, FILLING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>
18) Check the ATF level. (AT model) <Ref. to 4AT-32, INSPECTION, Automatic Transmission Fluid.>

C: INSPECTION

1) Remove the coolant filler tank cap, top off coolant filler tank, and then attach the tester to coolant filler tank in place of cap.



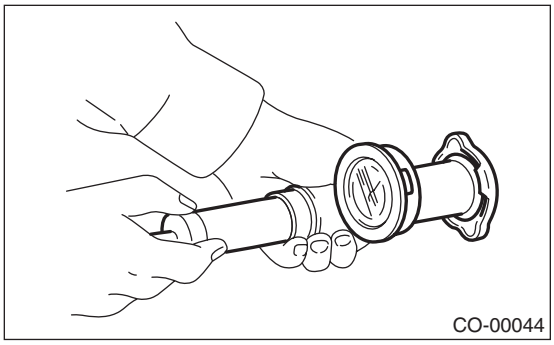
2) Apply a pressure of 122 kPa (1.2 kgf/cm^2, 18 psi) to the radiator to check if:
   (1) Engine coolant leaks at/around radiator.
   (2) Engine coolant leaks at/around hoses or connections.

CAUTION:
• Inspection must be carried out at the side of coolant filler tank, not at the side of radiator.
• Engine should be turned off.
• Wipe engine coolant from check points in advance.
• Be careful to prevent engine coolant from spurting out when removing the tester.
• Be careful also not to deform the filler neck of coolant filler tank when installing or removing tester.

8. Radiator Cap

A: INSPECTION

1) Attach the radiator cap to tester.



2) Increase the pressure until needle of gauge stops. Radiator cap is functioning properly if it holds the service limit pressure for 5 to 6 seconds.

Coolant filler tank side

Standard pressure:

93 — 123 kPa (0.95 — 1.25 kgf/cm^2, 14 — 18 psi)

Service limit pressure:

83 kPa (0.85 kgf/cm^2, 12 psi)

Radiator side

Standard pressure:

122 — 152 kPa (1.24 — 1.55 kgf/cm^2, 18 — 22 psi)

Service limit pressure:

112 kPa (1.14 kgf/cm^2, 16 psi)

CAUTION:

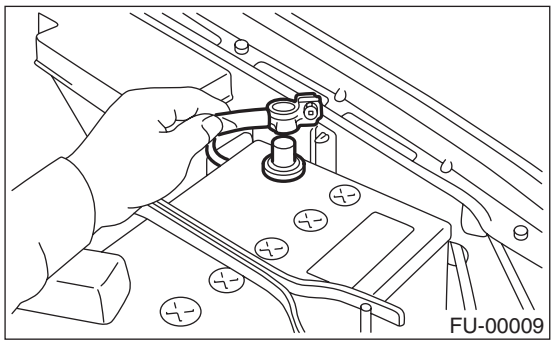
• Be sure to remove foreign matter and rust from the cap in advance otherwise, results of pressure test will be incorrect.

• Do not mix up the coolant filler tank side cap with radiator side cap.

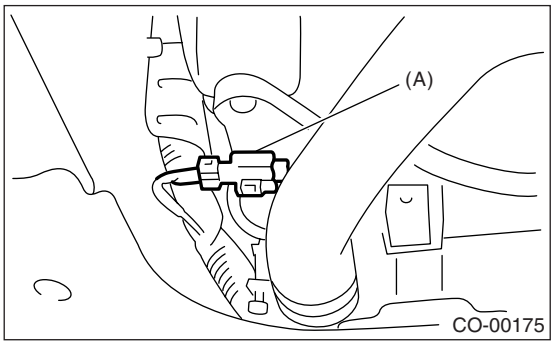
9. Radiator Main Fan and Fan Motor

A: REMOVAL

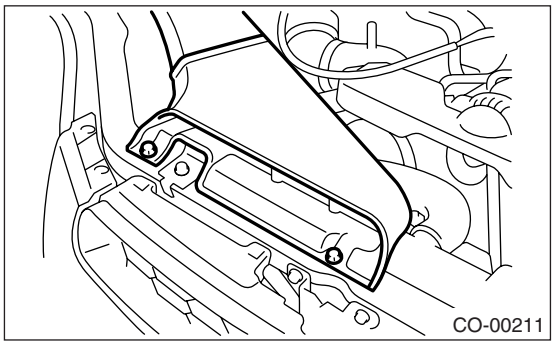
1) Disconnect the ground cable from battery.



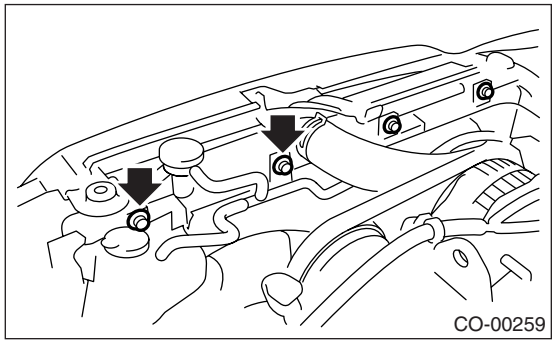
2) Lift-up the vehicle.
3) Remove the under cover.
4) Disconnect the connector of main fan motor (A).



5) Lower the vehicle.
6) Remove the air intake duct.



7) Disconnect the overflow hose.
8) Remove the overflow pipe.
9) Remove the reservoir tank. <Ref. to CO(H4DOTC)-32, REMOVAL, Reservoir Tank.>
10) Remove the radiator main fan motor assembly.

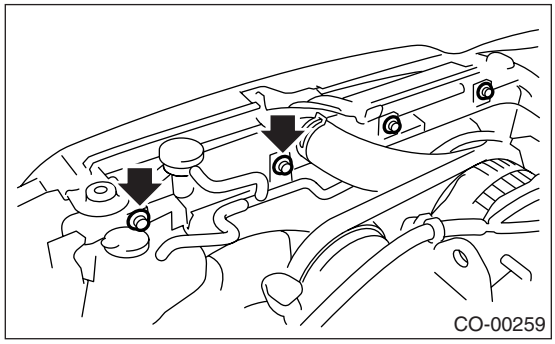


B: INSTALLATION

Install in the reverse order of removal.

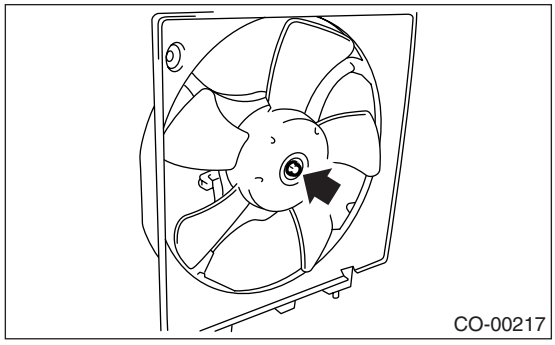
NOTE:
When the main fan motor assembly cannot be installed as is, loosen the sub fan motor assembly securing bolts to install it.

Tightening torque:
7.5 N·m (0.76 kgf-m, 5.5 ft-lb)

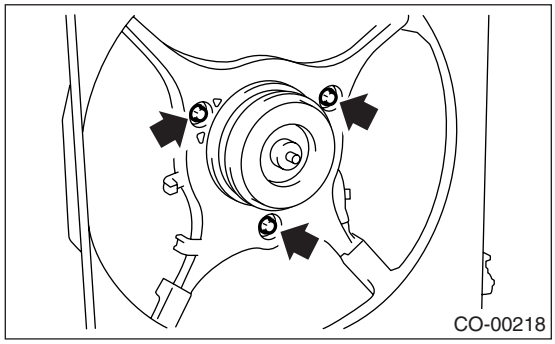


C: DISASSEMBLY

1) Remove the nut which holds the fan itself onto fan motor and shroud assembly.



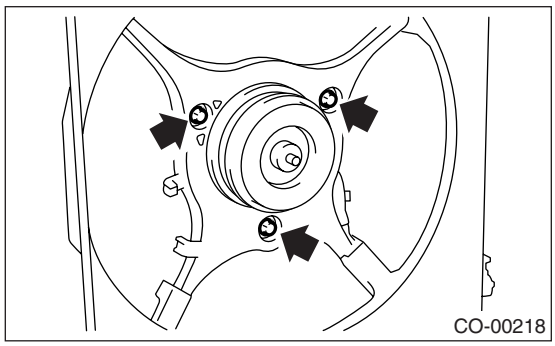
2) Remove the bolts which install the fan motor onto shroud.



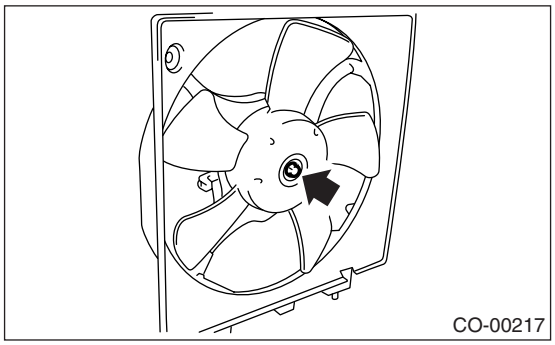
D: ASSEMBLY

Assemble in the reverse order of disassembly.

Tightening torque:
4.4 N·m (0.45 kgf-m, 3.3 ft-lb)



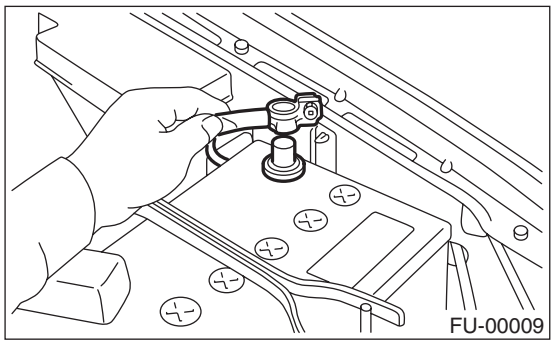
Tightening torque:
3.4 N·m (0.35 kgf-m, 2.5 ft-lb)



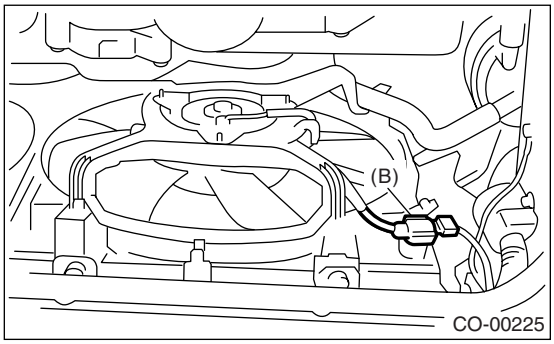
10. Radiator Sub Fan and Fan Motor

A: REMOVAL

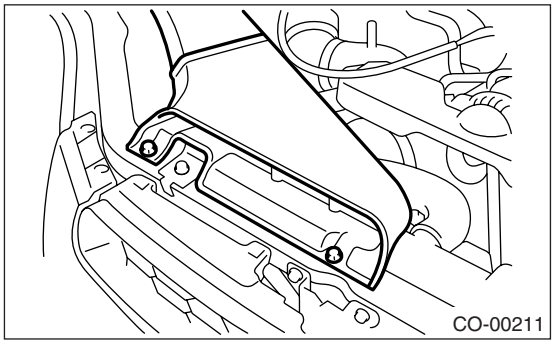
1) Disconnect the ground cable from battery.



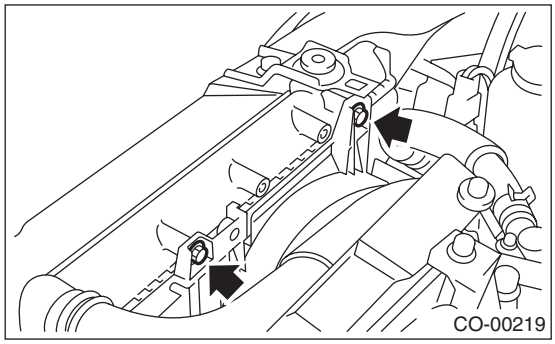
2) Lift-up the vehicle.
3) Remove the under cover.
4) Disconnect the connector of sub fan motor (B).



5) Lower the vehicle.
6) Remove the air intake duct.



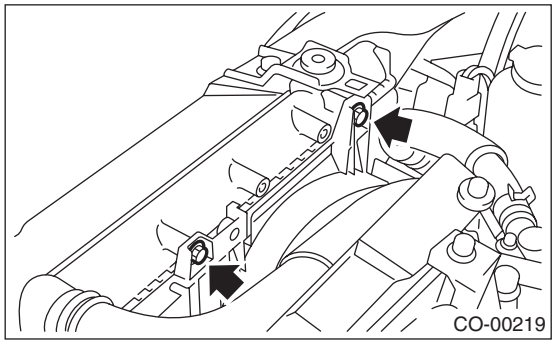
7) Remove the bolts which hold the sub fan shroud to radiator.
8) Remove the overflow pipe.
9) Remove the radiator sub fan shroud through the under side of vehicle.



B: INSTALLATION

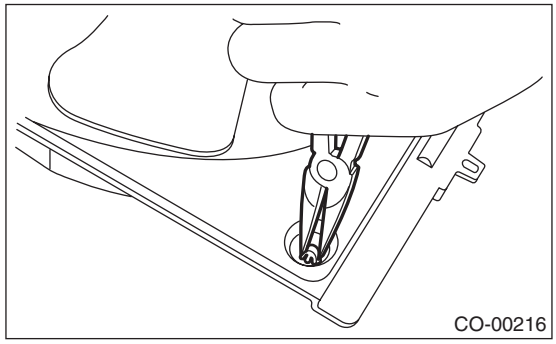
Install in the reverse order of removal.

Tightening torque:
7.5 N·m (0.76 kgf-m, 5.5 ft-lb)

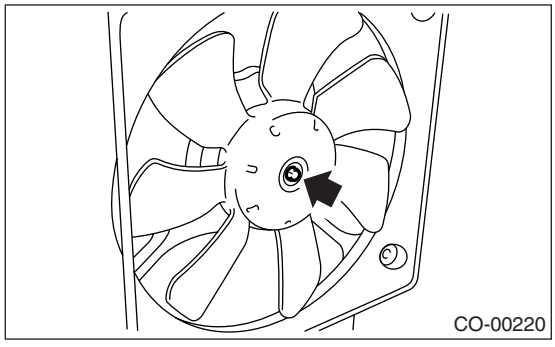


C: DISASSEMBLY

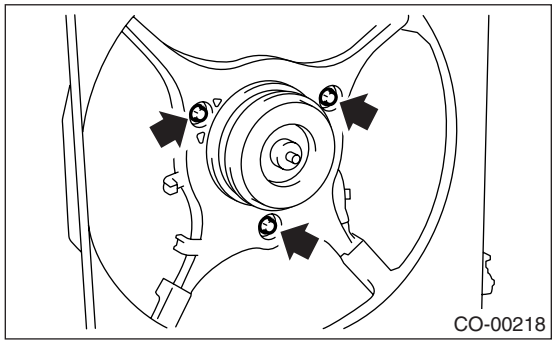
1) Remove the clip which holds the motor harness onto shroud.



2) Remove the nut which holds the fan itself onto fan motor and shroud assembly.



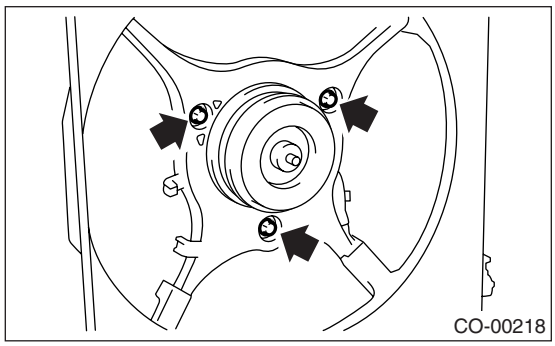
3) Remove the bolts which install the fan motor onto shroud.



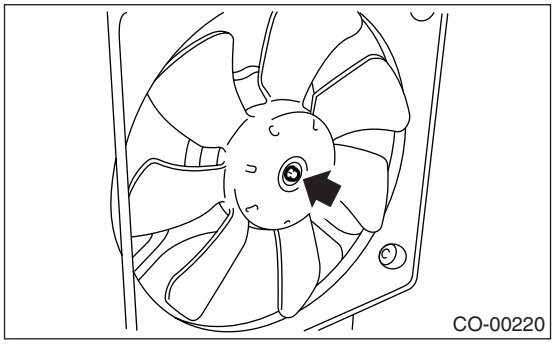
D: ASSEMBLY

Assemble in the reverse order of disassembly.

Tightening torque:
4.4 N·m (0.45 kgf-m, 3.3 ft-lb)



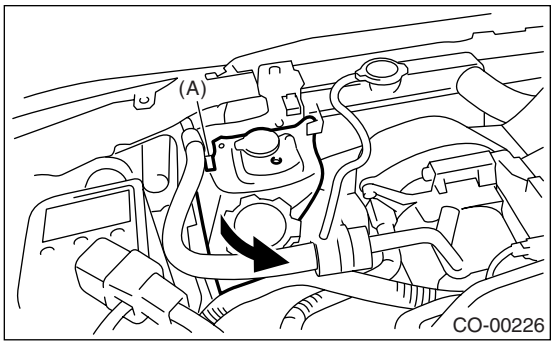
Tightening torque:
3.4 N·m (0.35 kgf-m, 2.5 ft-lb)



11.Reservoir Tank

A: REMOVAL

1) Disconnect the overflow hose from the radiator filler neck position.
2) Pull out the reservoir tank to direction of arrow while pushing the pawl (A).



B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

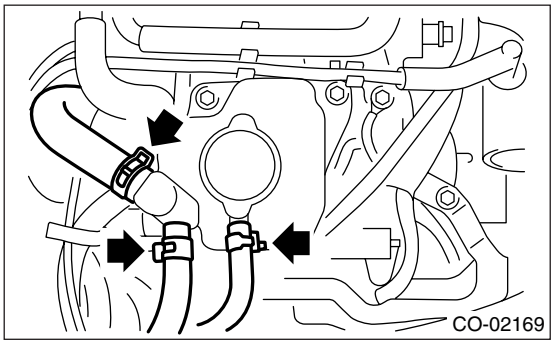
Make sure the engine coolant level is between full and low.

12.Coolant Filler Tank

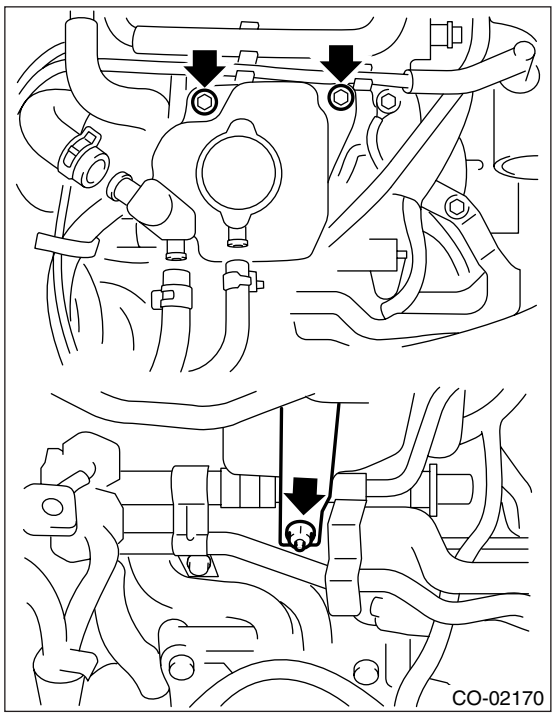
A: REMOVAL

CAUTION:
Wait until the engine cools down before working since the radiator is pressurized.

1) Drain the coolant about 3.0 ℓ (3.2 US qt, 2.6 Imp qt). <Ref. to CO(H4DOTC)-18, DRAINING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>
2) Remove the air cleaner upper cover and air intake boot. <Ref. to IN(H4DOTC)-9, REMOVAL, Air Cleaner Case.>
3) Remove the air cleaner element.
4) Disconnect the engine coolant hoses from coolant filler tank.



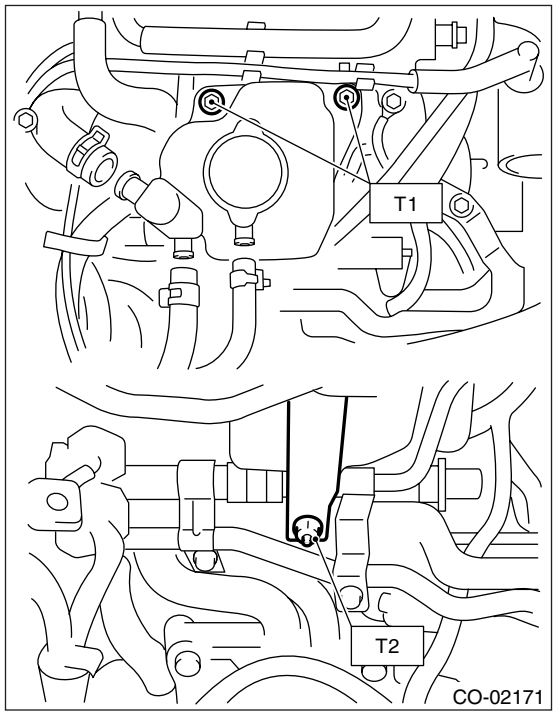
5) Remove the bolts and nut which install the coolant filler tank.
6) Disconnect the engine coolant hose which connects the under side of coolant filler tank.
7) Remove the coolant filler tank.



B: INSTALLATION

1) Install in the reverse order of removal.

Tightening torque:
T1: 16 N·m (1.6 kgf-m, 11.8 ft-lb)
T2: 13 N·m (1.3 kgf-m, 9.6 ft-lb)



2) Fill engine coolant. <Ref. to CO(H4DOTC)-18, FILLING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>

13.Engine Cooling System Trouble in General

A: INSPECTION

Trouble	Possible cause	Corrective action
Over-heating	a. Insufficient engine coolant	Replenish the engine coolant, inspect for leakage, and repair.
	b. Loose timing belt	Repair or replace the timing belt tensioner.
	c. Oil on drive belt	Replace.
	d. Malfunction of thermostat	Replace.
	e. Malfunction of water pump	Replace.
	f. Clogged engine coolant passage	Clean.
	g. Improper ignition timing	Inspect and repair the ignition control system. <Ref. to EN(H4DOTC)(diag)-2, PROCEDURE, Basic Diagnostic Procedure.>
	h. Clogged or leaking radiator	Clean or repair, or replace.
	i. Improper engine oil in engine coolant	Replace the engine coolant.
	j. Air/fuel mixture ratio too lean	Inspect and repair the fuel injection system. <Ref. to EN(H4DOTC)(diag)-2, PROCEDURE, Basic Diagnostic Procedure.>
	k. Excessive back pressure in exhaust system	Clean or replace.
	l. Insufficient clearance between piston and cylinder	Adjust or replace.
	m. Slipping clutch	Repair or replace.
	n. Dragging brake	Adjust.
	o. Malfunction of radiator fan	Inspect the radiator fan relay, engine coolant temperature sensor or radiator motor and replace there.
Over-cooling	a. Atmospheric temperature extremely low	Partly cover the radiator front area.
	b. Defective thermostat	Replace.
Engine coolant leaks	a. Loosened or damaged connecting units on hoses	Repair or replace.
	b. Leakage from water pump	Replace.
	c. Leakage from water pipe	Repair or replace.
	d. Leakage around cylinder head gasket	Retighten the cylinder head bolts or replace gasket.
	e. Damaged or cracked cylinder head and crankcase	Repair or replace.
	f. Damaged or cracked thermostat case	Repair or replace.
	g. Leakage from radiator	Repair or replace.
Noise	a. Defective drive belt	Replace.
	b. Defective radiator fan	Replace.
	c. Defective water pump bearing	Replace the water pump.
	d. Defective water pump mechanical seal	Replace the water pump.

LUBRICATION

LU(H4DOTC)

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5. Oil Pan and Strainer....15
6. Oil Pressure Switch....19
7. Engine Oil Cooler....20
8. Engine Oil Filter....21
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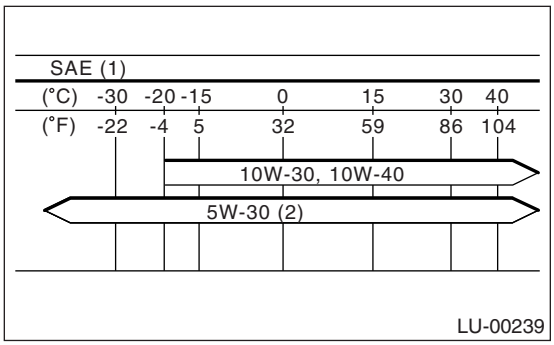
1. General Description

A: SPECIFICATION

Lubrication method				Forced lubrication
Oil pump	Pump type			Trochoid type
	Number of teeth	Inner rotor		9
		Outer rotor		10
	Outer rotor diameter × thickness			78 × 10 mm (3.07 × 0.39 in)
	Tip clearance between inner and outer rotor		STANDARD	0.04 — 0.14 mm (0.0016 — 0.0055 in)
			LIMIT	0.18 mm (0.0071 in)
	Side clearance between inner rotor and pump case		STANDARD	0.02 — 0.07 mm (0.0008 — 0.0028 in)
			LIMIT	0.12 mm (0.0047 in)
	Case clearance between outer rotor and pump case		STANDARD	0.10 — 0.175 mm (0.0039 — 0.0069 in)
			LIMIT	0.20 mm (0.0079 in)
	Capacity at 80°C (176°F)	600 rpm	Discharge pressure	98 kPa (1.0 kgf/cm^2, 14 psi)
			Discharge quantity	4.6 ℓ (4.9 US qt, 4.0 Imp qt)/min.
		5,000 rpm	Discharge pressure	294 kPa (3.0 kgf/cm^2, 43 psi)
			Discharge quantity	47.0 ℓ (49.7 US qt, 41.4 Imp qt)/min.
	Relief valve operation pressure			588 kPa (6.0 kgf/cm^2, 85 psi)
Oil filter	Type			Full-flow filter type
	Filtration area	Diameter 80 mm (3.15 in)		760 cm^2 (118 sq in)
		Diameter 68 mm (2.68 in)		800 cm^2 (124 sq in)
		Diameter 65 mm (2.56 in)		470 cm^2 (73 sq in)
	By-pass valve opening pressure			160 kPa (1.63 kgf/cm^2, 23.2 psi)
	Outer diameter × width	Diameter 80 mm (3.15 in)		80 × 70 mm (3.15 × 2.76 in)
		Diameter 68 mm (2.68 in)		68 × 65 mm (2.68 × 2.56 in)
		Diameter 65 mm (2.56 in)		65 × 74.4 mm (2.56 × 2.93 in)
	Oil filter to engine thread size			M 20 × 1.5
Oil pressure switch	Type			Immersed contact point type
	Working voltage — wattage			12 V — 3.4 W or less
	Warning light activation pressure			14.7 kPa (0.15 kgf/cm^2, 2.1 psi)
	Proof pressure			More than 981 kPa (10 kgf/cm^2, 142 psi)
Oil capacity (at replacement)				4.0 ℓ (4.2 US qt, 3.5 Imp qt)

Recommended oil:

API standard SL, SJ with the "Energy Conserving" logo is printed (if you cannot obtain the oil with SL, SJ grade, you may use SH grade "ENERGY CONSERVING" oil.)
ACEA standard A1, A2 or A3
ILSAC standard, GF3 "Star burst mark" label is on the container.



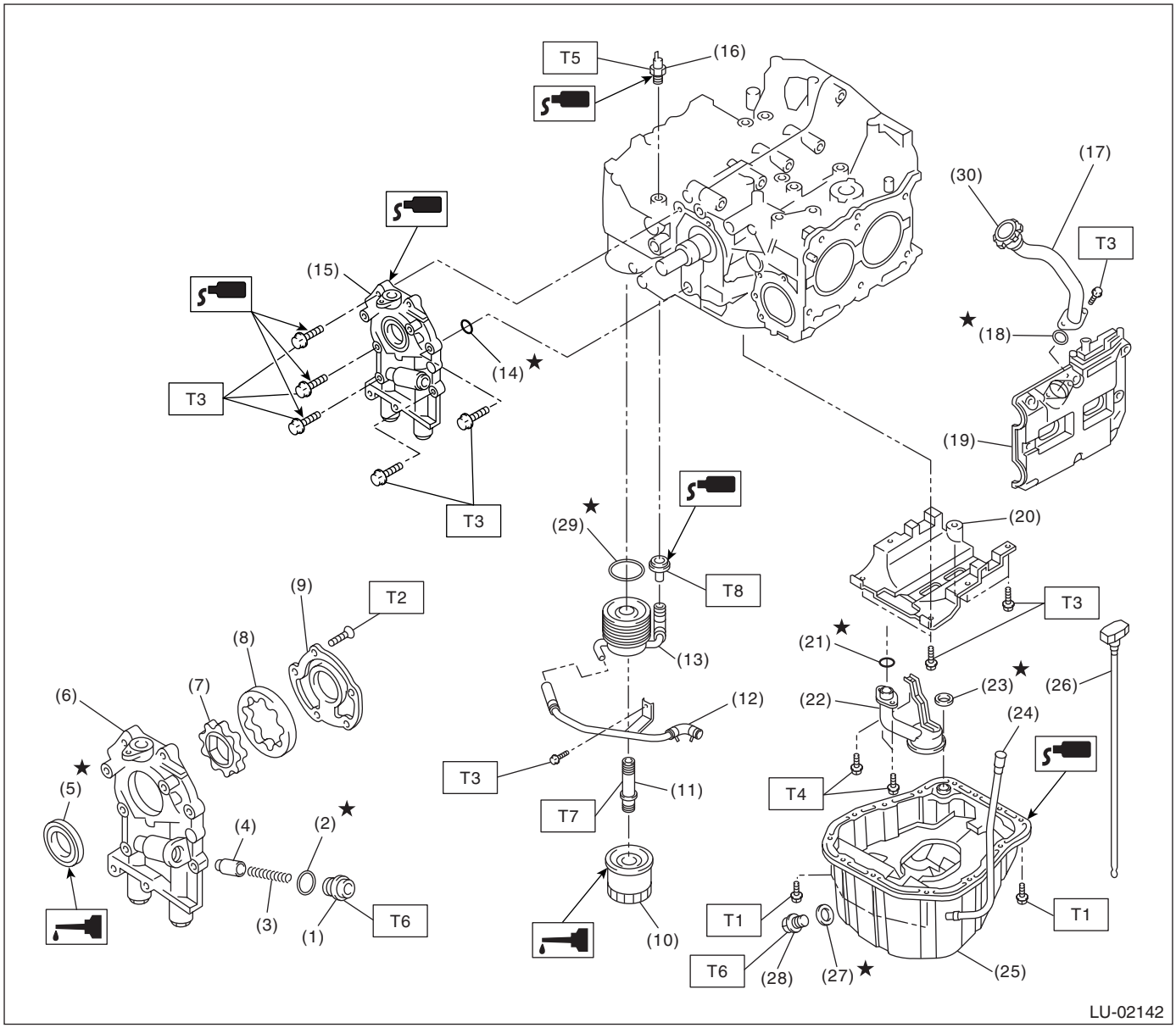
(1) SAE viscosity No. and applicable temperature
(2) Recommended

The proper viscosity helps vehicle get good cold and hot starting by reducing viscous friction and thus increasing cranking speed.

CAUTION:
When replenishing oil, it does not matter if the oil to be added is a different brand from that in the engine; however, use oil having the API standard and SAE viscosity No. designated by SUBARU.

NOTE:
If the vehicle is used in areas with very high temperatures or for other heavy duty applications, the following viscosity oils may be used: API standard: SL or SJ
SAE Viscosity No.: 30, 40, 10W-50, 20W-40, 20W-50.

B: COMPONENT



(1) Plug
(2) Gasket
(3) Relief valve spring
(4) Relief valve
(5) Oil seal
(6) Oil pump case
(7) Inner rotor
(8) Outer rotor
(9) Oil pump cover
(10) Oil filter
(11) Oil cooler connector (Model with oil cooler)
(12) Water by-pass pipe (Model with oil cooler)
(13) Oil cooler (Model with oil cooler)
(14) O-ring
(15) Oil pump ASSY
(16) Oil pressure switch
(17) Oil filler duct
(18) O-ring
(19) Rocker cover
(20) Baffle plate
(21) O-ring
(22) Oil strainer
(23) Gasket
(24) Oil level gauge guide
(25) Oil pan
(26) Oil level gauge
(27) Metal gasket
(28) Drain plug
(29) O-ring
(30) Oil filler cap

Tightening torque: N·m (kgf-m, ft-lb)
T1: 5 (0.5, 3.6)
T2: 5.4 (0.55, 4.0)
T3: 6.4 (0.65, 4.7)
T4: 10 (1.0, 7.2)
T5: 25 (2.5, 18.1)
T6: 44 (4.5, 32.5)
T7: 54 (5.5, 40)
T8: 69 (7.0, 50.9)

C: CAUTION

• Wear working clothing, including a cap, protective goggles, and protective shoes during operation.
• Remove contamination including dirt and corrosion before removal, installation or disassembly.
• Keep the disassembled parts in order and protect them from dust or dirt.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly, and replacement.
• Be careful not to burn, because each part in the vehicle is hot after running.
• Be sure to tighten fasteners including bolts and nuts to the specified torque.
• Place shop jacks or rigid racks at the specified points.
• Before disconnecting electrical connectors of sensors or units, be sure to disconnect the ground cable from battery.

D: PREPARATION TOOL

1. SPECIAL TOOLS

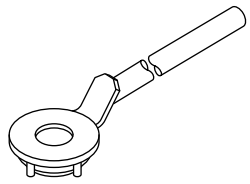
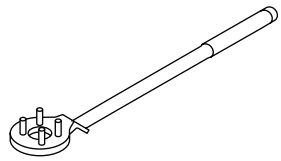
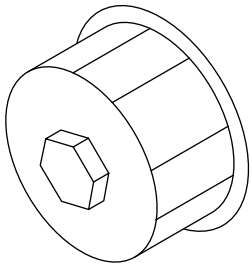
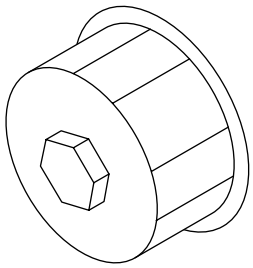
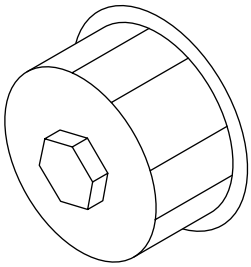
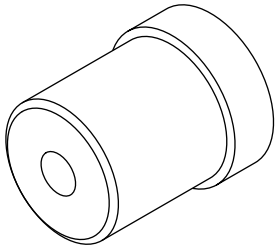
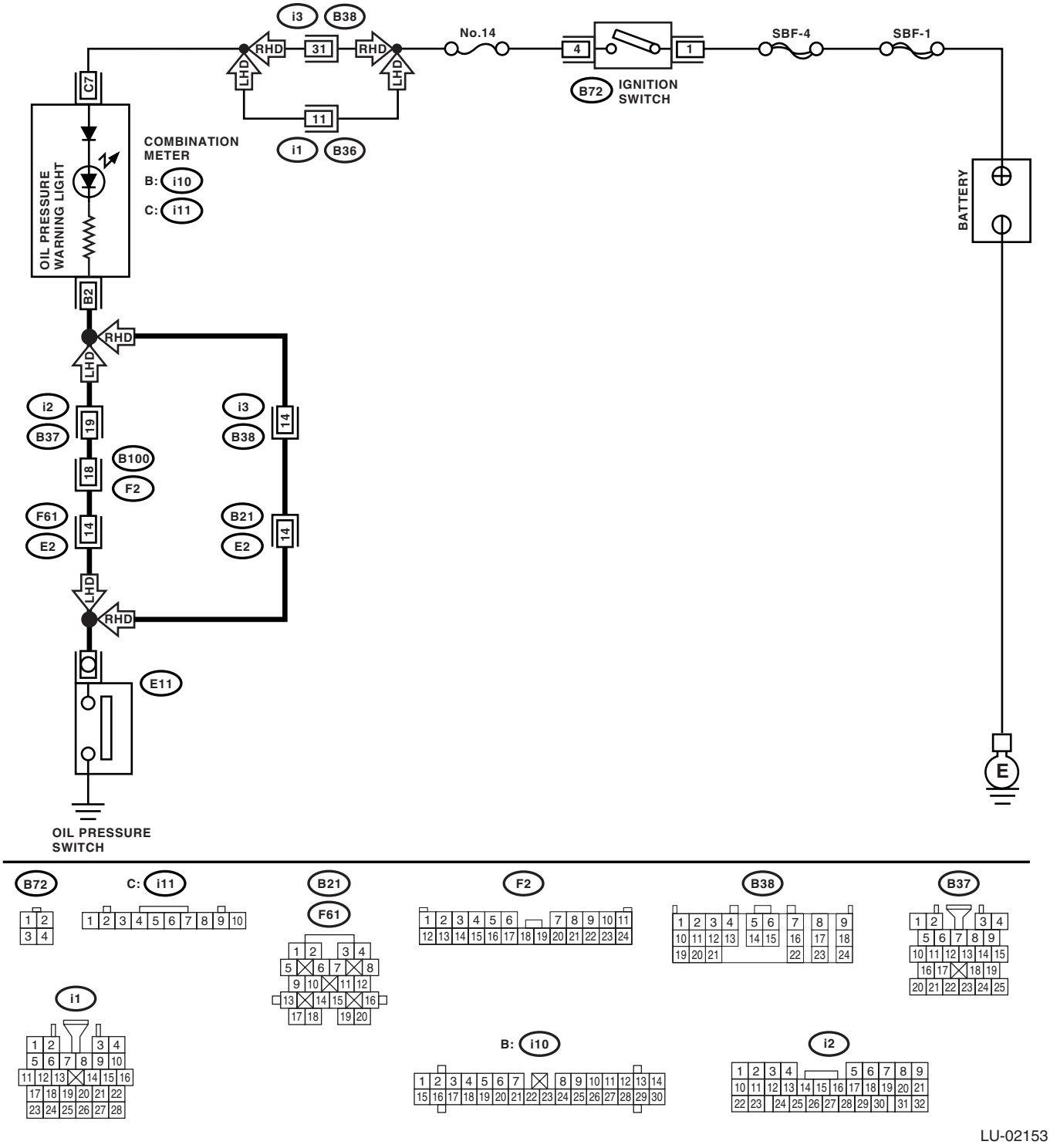
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499977400	499977400	CRANK PULLEY WRENCH	Used for stopping rotation of crank pulley when loosening and tightening crank pulley bolt. (Except STi model)
 ST-499977100	499977100	CRANK PULLEY WRENCH	Used for stopping rotation of crank pulley when loosening and tightening crank pulley bolt. (STi model)
 ST-498547000	498547000	OIL FILTER WRENCH	• Used for removing and installing oil filter. • For outer diameter 80 mm (3.15 in) filter.

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18332AA000	18332AA000	OIL FILTER WRENCH	• Used for removing and installing oil filter. • For outer diameter 68 mm (2.68 in) filter.
 ST18332AA010	18332AA010	OIL FILTER WRENCH	• Used for removing and installing oil filter. • For outer diameter 65 mm (2.56 in) filter.
 ST-499587100	499587100	OIL SEAL INSTALLER	Used for installing oil pump oil seal.

2. Oil Pressure System

A: WIRING DIAGRAM



LU-02153

B: INSPECTION

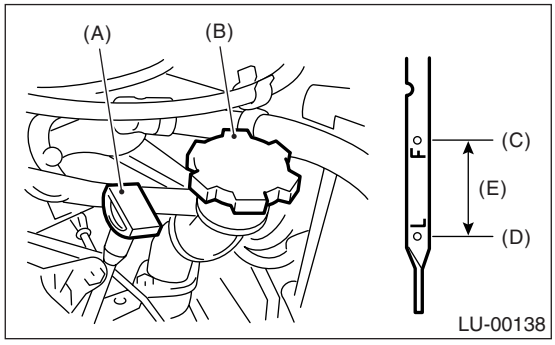
	Step	Check	Yes	No
1	**CHECK COMBINATION METER.** 1) Turn the ignition switch to ON. (engine OFF) 2) Check other warning lights.	Does the warning lights go on?	Go to step **2.**	Repair or replace the combination meter. <Ref. to IDI-3, INSPECTION, Combination Meter System.>
2	**CHECK HARNESS CONNECTOR BETWEEN COMBINATION METER AND OIL PRESSURE SWITCH.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from oil pressure switch. 3) Turn the ignition switch ON. 4) Measure the voltage of harness between the combination meter connector and chassis ground. ***Connector & terminal*** ***(E11) No. 1 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Replace the oil pressure switch.	Go to step **3.**
3	**CHECK COMBINATION METER.** 1) Turn the ignition switch to OFF. 2) Remove the combination meter. 3) Measure the resistance of combination meter. ***Terminals*** ***No. C7 — No. B2:***	Is the resistance less than 10 Ω?	Replace the harness connector between combination meter and oil pressure switch.	Repair or replace the combination meter.

3. Engine Oil

A: INSPECTION

1) Park the vehicle on a level surface.
2) Remove the oil level gauge and wipe it clean.
3) Reinsert the oil level gauge all the way. Be sure that the oil level gauge is correctly inserted and in proper orientation.
4) Remove the oil level gauge again and check the level. If the engine oil level is below the “L” line, add oil to bring the level up to “F” line.
5) After turning off the engine, wait a few minutes for oil to drain back into the oil pan before checking the level.
6) Just after driving or while the engine is warm, engine oil level may show in the range between the “F” line and notch mark. This is caused by thermal expansion of engine oil.

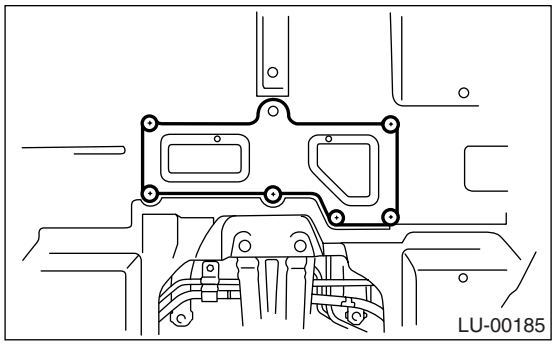
NOTE:
To prevent overfilling the engine oil, do not add oil above “F” line when the engine is cold.



(A) Oil level gauge
(B) Engine oil filler cap
(C) Upper level
(D) Lower level
(E) Approx. 1.0 ℓ (1.1 US qt, 0.9 Imp qt)

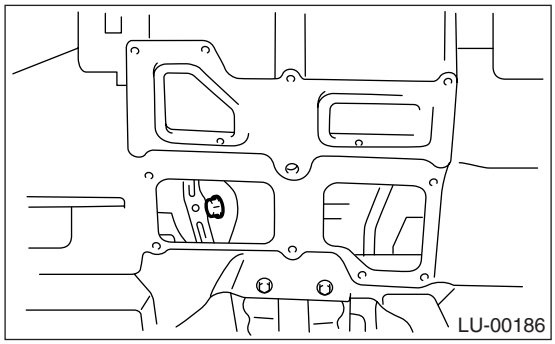
B: REPLACEMENT

1) Open the engine oil filler cap for quick draining of engine oil.
2) Remove the clips of service hole cover.



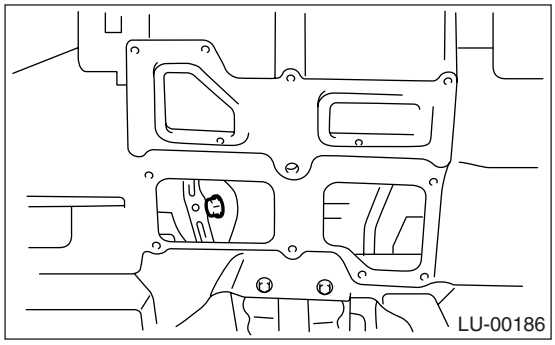
3) Drain the engine oil by loosening the engine oil drain plug.

NOTE:
Prepare the container for draining of engine oil.



4) Replace the drain plug gasket.
5) Tighten the engine oil drain plug after draining engine oil.

Tightening torque:
44 N·m (4.5 kgf-m, 32.5 ft-lb)

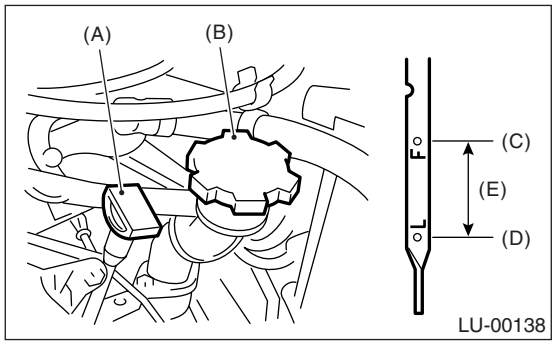


6) Install the service hole cover.
7) Use the engine oil of proper quality and viscosity, fill engine oil through the filler duct up to upper level on level gauge. Make sure that the vehicle is placed level when checking oil level.

Recommended oil
Refer to "SPECIFICATION" for the recommended oil. <Ref. to LU(H4DOTC)-2, SPECIFICATION, General Description.>

Engine oil capacity:
Upper level
4.0 ℓ (4.2 US qt, 3.5 Imp qt)
Lower level
3.0 ℓ (3.2 US qt, 2.6 Imp qt)

8) Close the engine oil filler cap.
9) Start the engine and warm it up for a time.
10) After the engine stops, recheck the oil level. If necessary, add engine oil up to the upper level on level gauge.

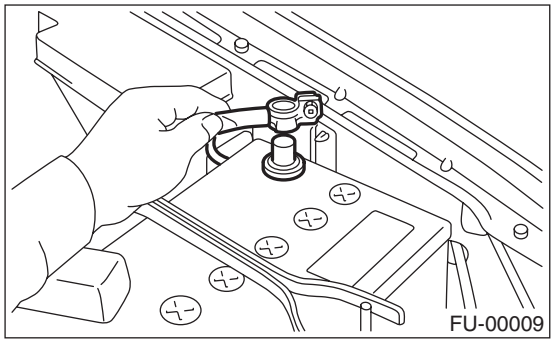


(A) Oil level gauge
(B) Engine oil filler cap
(C) Upper level
(D) Lower level
(E) Approx. 1.0 ℓ (1.1 US qt, 0.9 Imp qt)

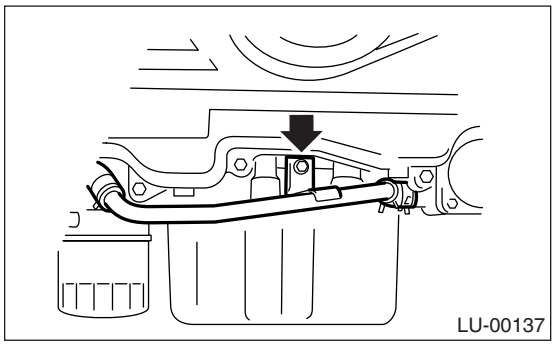
4. Oil Pump

A: REMOVAL

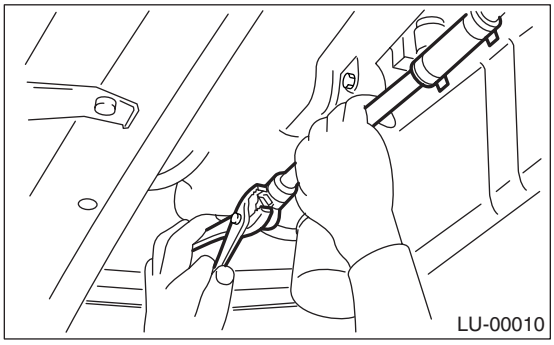
1) Disconnect the ground cable from battery.



2) Lift-up the vehicle.
3) Remove the under cover.
4) Remove the bolts which install the water pipe of oil cooler to oil pump.

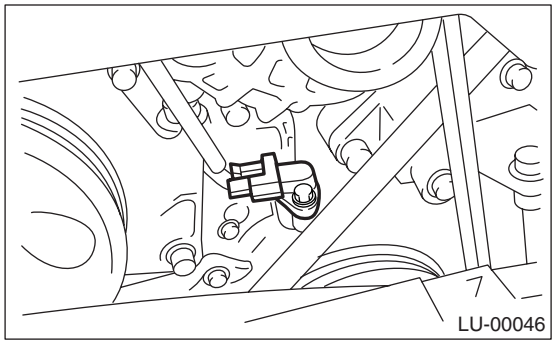


5) Remove the water pipe and hoses between oil cooler and water pump.

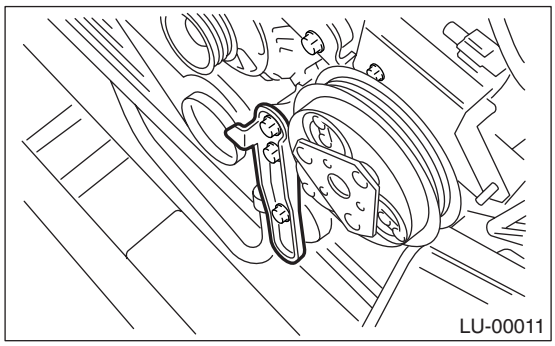


6) Remove the radiator. <Ref. to CO(H4SO)-22, REMOVAL, Radiator.>

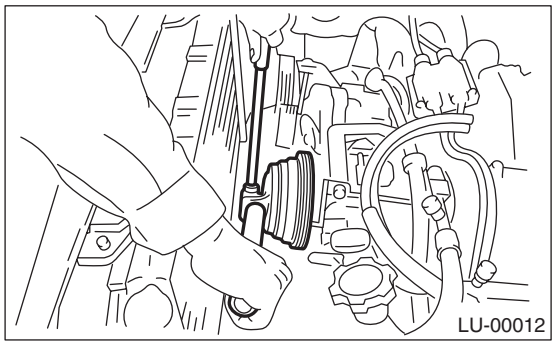
7) Remove the crankshaft position sensor.



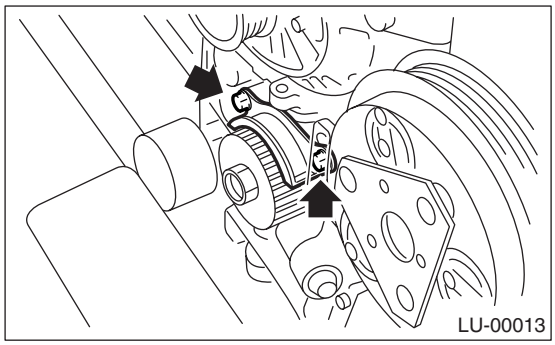
8) Remove the V-belts.
<Ref. to ME(H4DOTC)-53, REMOVAL, V-belt.>
9) Remove the rear side V-belt tensioner.



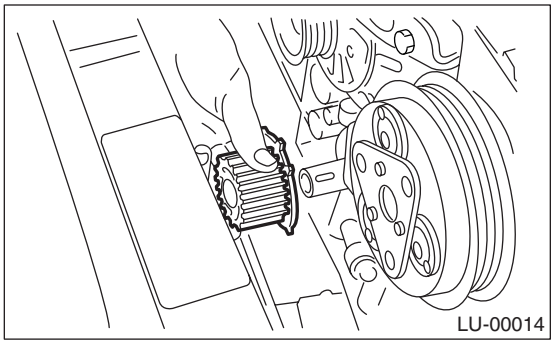
10) Remove the crank pulley by using ST.
<Ref. to ME(H4DOTC)-55, REMOVAL, Crank Pulley.>



11) Remove the water pump. <Ref. to CO(H4SO)-17, REMOVAL, Water Pump.>
12) Remove the timing belt guide. (MT model)

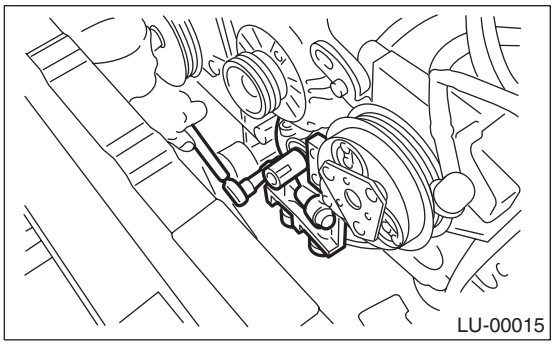


13) Remove the crank sprocket.



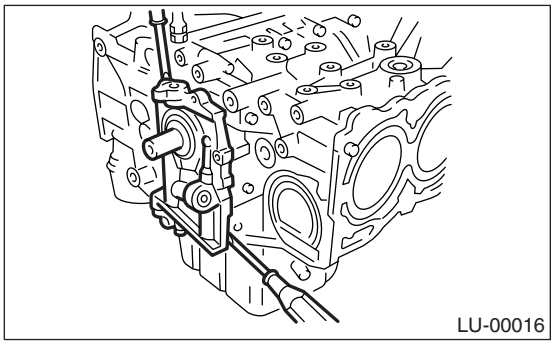
14) Remove the bolts which install the oil pump onto cylinder block.

NOTE:
If disassembling or inspecting the oil pump, loosen the plug of relief valve before removing the oil pump.



15) Remove the oil pump using the flat tip screwdriver.

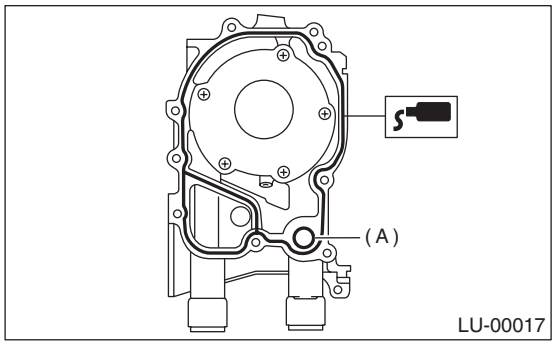
CAUTION:
Be careful not to scratch the mating surfaces of cylinder block and oil pump.



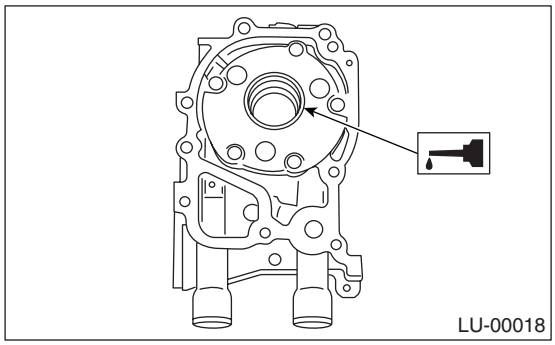
B: INSTALLATION

Install in the reverse order of removal.
Do the following:
1) Apply liquid gasket to the matching surfaces of oil pump.

Liquid gasket:
THREE BOND 1215 (Part No. 004403007) or equivalent



2) Replace the O-ring (A) with a new one.
3) Apply a coat of engine oil to the inside of oil seal.



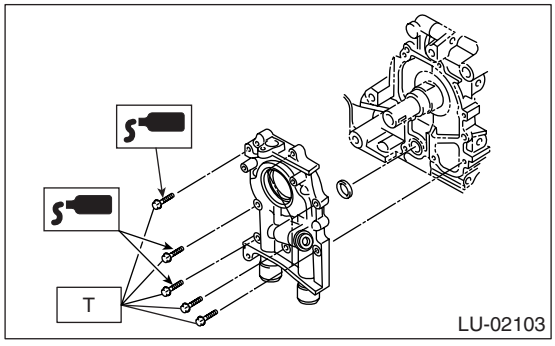
4) Position the oil pump, aligning the notched area with crankshaft, and push the oil pump straight.

CAUTION:
- **Make sure the oil seal lip is not folded.**
- **Do not forget to install the O-ring and seal when installing the oil pump.**

5) Install the oil pump.
6) Apply liquid gasket to the threaded portion of three bolts. (If to be reuse the bolts.)

Liquid gasket:
THREE BOND 1215 (Part No. 004403007) or equivalent

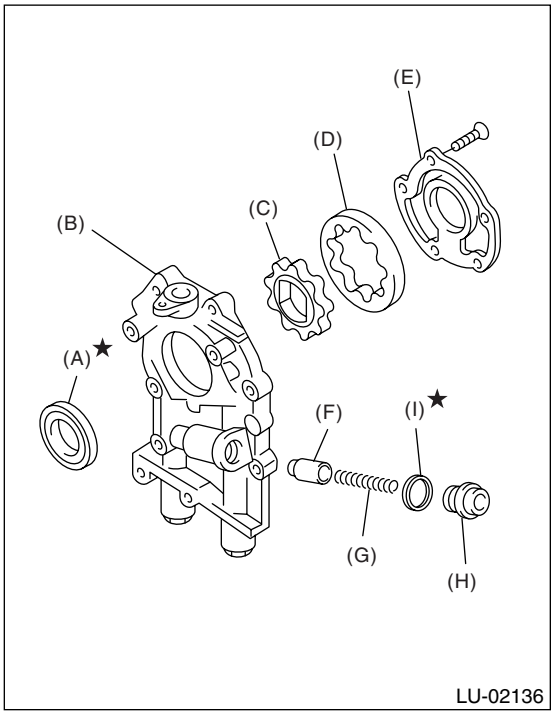
Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



C: DISASSEMBLY

Remove the screws which secure the oil pump cover and disassemble oil pump. Inscribe alignment marks on the inner and outer rotors so that they can be replaced in their original positions during reassembly.

CAUTION:
Before disassembling the oil pump, remove the relief valve.

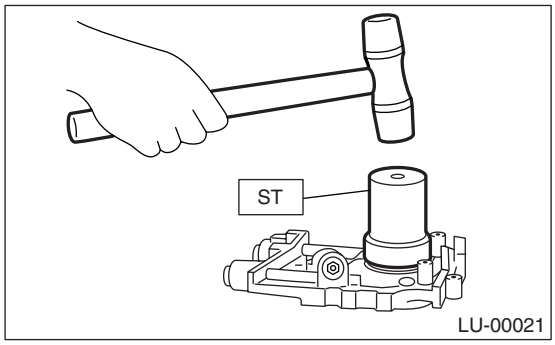


(A) Oil seal
(B) Pump case
(C) Inner rotor
(D) Outer rotor
(E) Pump cover
(F) Relief valve
(G) Relief valve spring
(H) Plug
(I) Gasket

D: ASSEMBLY

1) Install the front oil seal by using ST.
ST 499587100 OIL SEAL INSTALLER

NOTE:
Use a new oil seal.

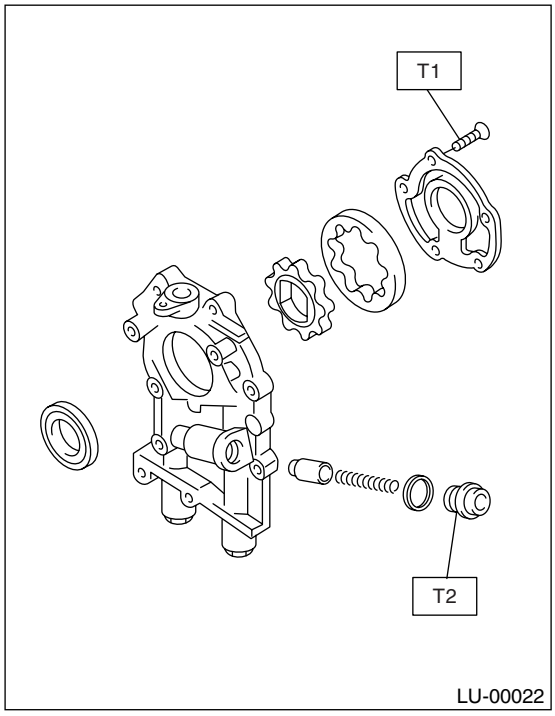


2) Apply a coat of engine oil to the inner and outer rotors.
3) Install the inner and outer rotors in their original positions.
4) Install the oil relief valve, relief valve spring and plug.

NOTE:
Use a new gasket.

5) Install the oil pump cover.

Tightening torque:
T1: 5.4 N·m (0.55 kgf-m, 4.0 ft-lb)
T2: 44 N·m (4.5 kgf-m, 32.5 ft-lb)

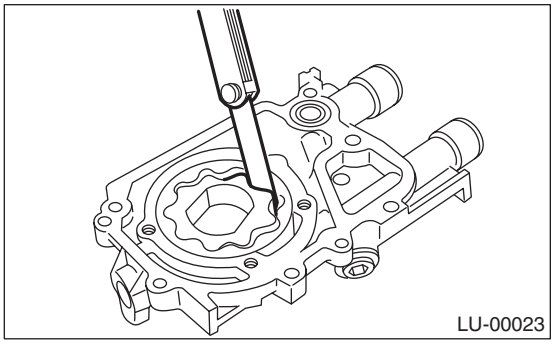


E: INSPECTION

1. TIP CLEARANCE

Measure the tip clearance of rotors. If clearance exceeds the limit, replace the rotors as a matched set.

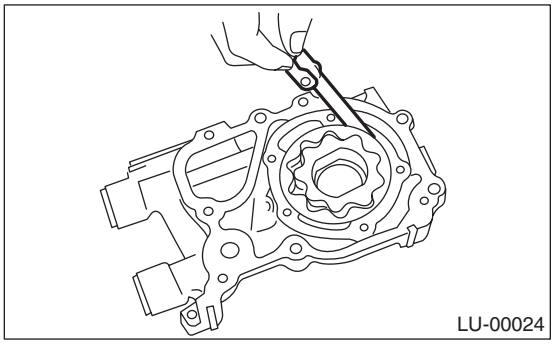
Tip clearance:
Standard
0.04 — 0.14 mm (0.0016 — 0.0055 in)
Limit
0.18 mm (0.0071 in)



2. CASE CLEARANCE

Measure the clearance between outer rotor and oil pump rotor housing. If clearance exceeds the limit, replace the rotor.

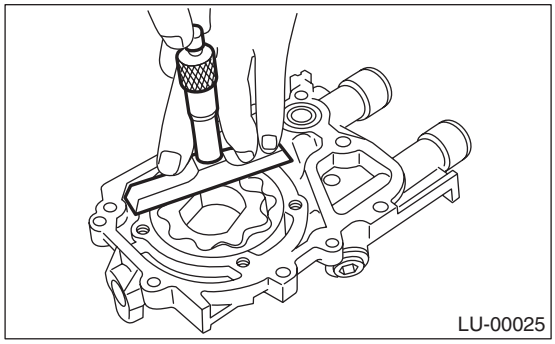
Case clearance:
Standard
0.10 — 0.175 mm (0.0039 — 0.0069 in)
Limit
0.20 mm (0.0079 in)



3. SIDE CLEARANCE

Measure the clearance between the oil pump inner rotor and pump case. If clearance exceeds the limit, replace the rotor or pump body.

Side clearance:
Standard
0.02 — 0.07 mm (0.0008 — 0.0028 in)
Limit
0.12 mm (0.0047 in)



4. OIL RELIEF VALVE

Check the valve for fitting condition and damage, and the relief valve spring for damage and deterioration. Replace the parts if defective.

Relief valve spring:
Free length
73.7 mm (2.902 in)
Installed length
54.7 mm (2.154 in)
Load when installed
93.1 N (9.49 kgf, 20.88 lbf)

5. OIL PUMP CASE

Check the oil pump case for worn shaft hole, clogged oil passage, worn rotor chamber, cracks, and other faults.

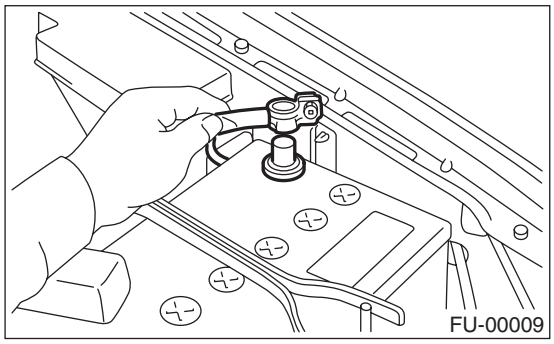
6. OIL SEAL

Check the oil seal lips for deformation, hardening, wear, etc. and replace if defective.

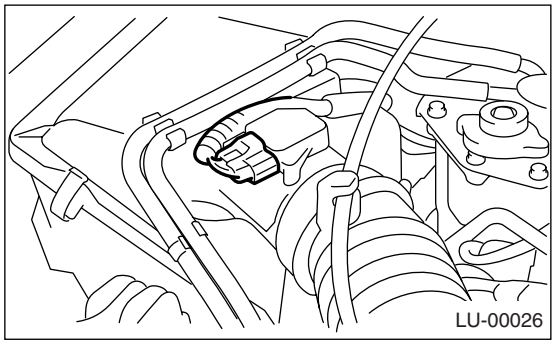
5. Oil Pan and Strainer

A: REMOVAL

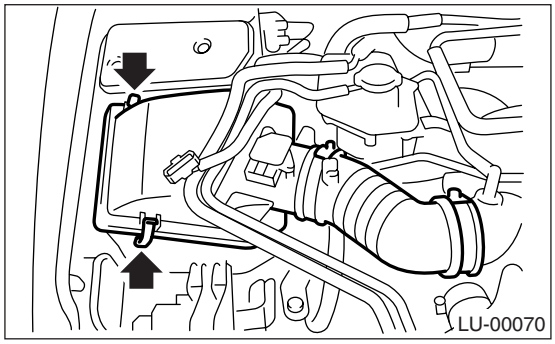
1) Set the vehicle on a lift.
2) Remove the front wheels.
3) Disconnect the ground cable from battery.



4) Disconnect the connector from mass air flow sensor.

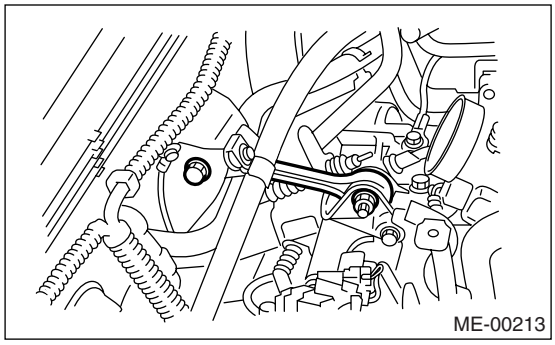


5) Remove the air intake boot and air cleaner upper cover.

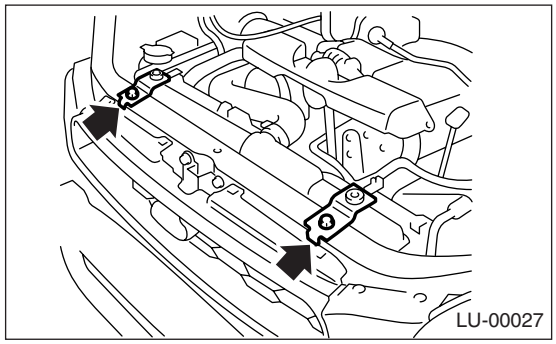


6) Remove the intercooler. <Ref. to IN(H4DOTC)-12, REMOVAL, Intercooler.>

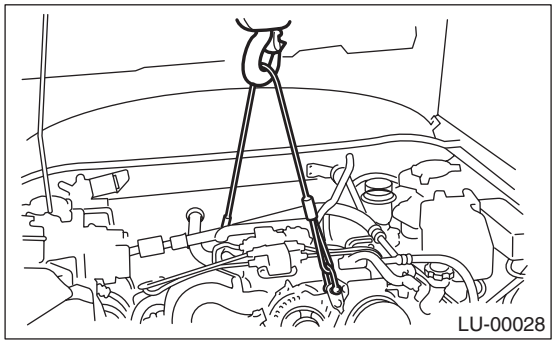
7) Remove the pitching stopper.



8) Remove the radiator upper brackets.



9) Support the engine with a lifting device and wire ropes.

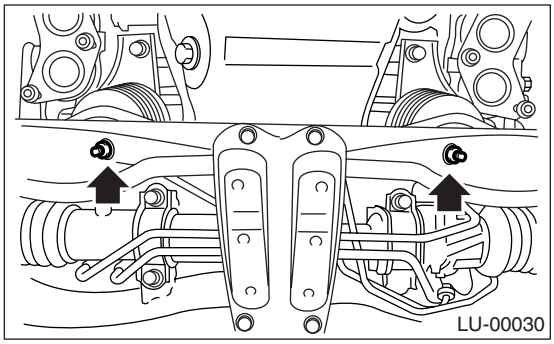


10) Lift-up the vehicle.

CAUTION:
When lifting up the vehicle, rise up the wire rope together.

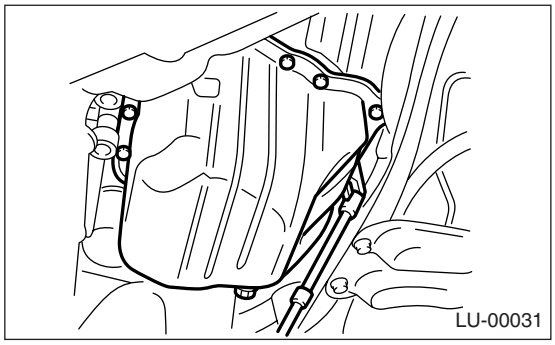
11) Remove the under cover.
12) Drain the engine oil.
13) Remove the front exhaust pipe. <Ref. to EX(H4DOTC)-8, REMOVAL, Front Exhaust Pipe.>

14) Remove the nuts which install the front cushion rubber onto front crossmember.

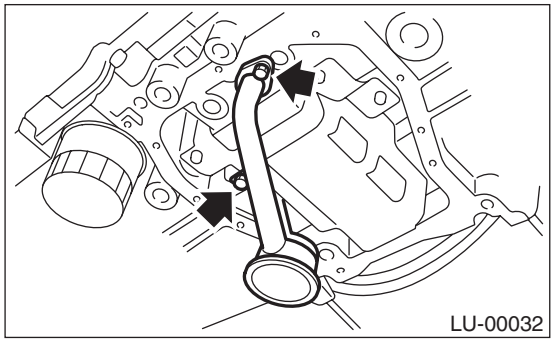

LU-00030

15) Remove the bolts which install the oil pan on cylinder block while raising up engine.
16) Insert the oil pan cutter blade between cylinder block-to-oil pan clearance.

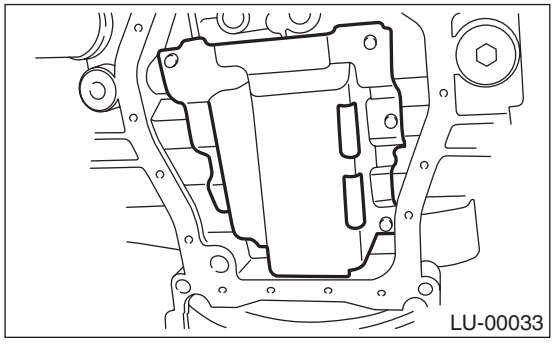
CAUTION:
Do not use a screwdriver or similar tool in place of oil pan cutter.


LU-00031

17) Remove the oil strainer.


LU-00032

18) Remove the baffle plate.

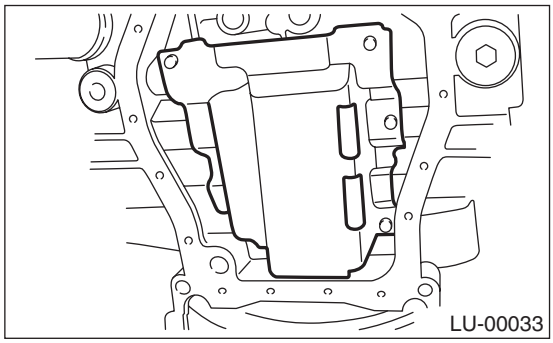

LU-00033

B: INSTALLATION

CAUTION:
Before installing the oil pan, clean sealant from oil pan and engine block.

1) Install the baffle plate.

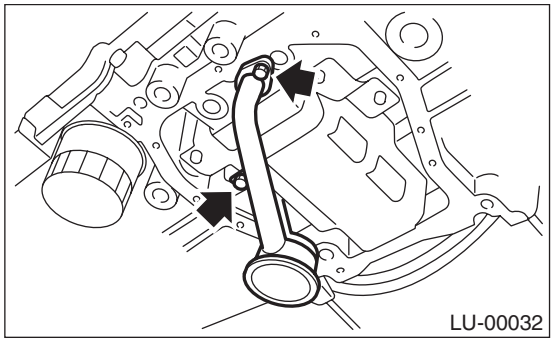
Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)


LU-00033

2) Install the oil strainer onto baffle plate.

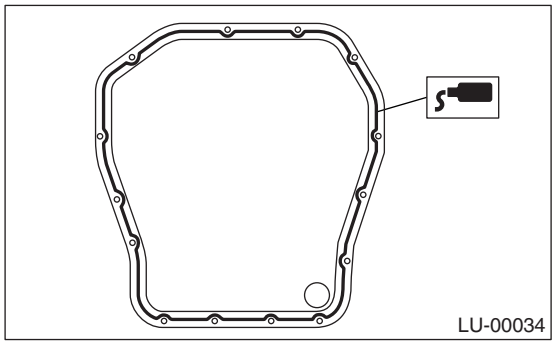
NOTE:
Replace the O-ring with a new one.

Tightening torque:
10 N·m (1.0 kgf-m, 7.2 ft-lb)


LU-00032

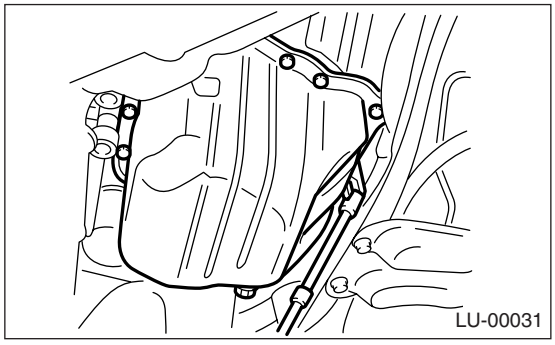
3) Apply liquid gasket to the mating surfaces, and then install the oil pan.

Liquid gasket:
THREE BOND 1207C (Part No. 004403012) or equivalent


LU-00034

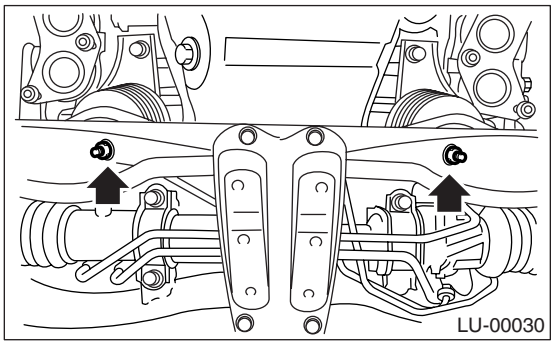
4) Tighten the bolts which install the oil pan onto engine block.

Tightening torque:
5 N·m (0.5 kgf-m, 3.6 ft-lb)



5) Lower the engine onto front crossmember.
6) Tighten the nuts which install the front cushion rubber onto front crossmember.

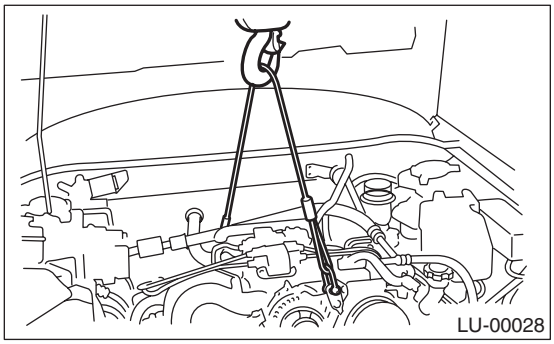
Tightening torque:
83 N·m (8.5 kgf-m, 61 ft-lb)



7) Install the front exhaust pipe. <Ref. to EX(H4DOTC)-8, INSTALLATION, Front Exhaust Pipe.>
8) Install the under cover.
9) Lower the vehicle.

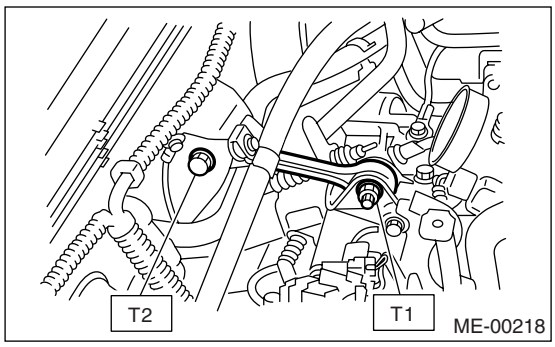
CAUTION:
When lowering the vehicle, lower the lifting device and wire rope together.

10) Remove the lifting device and steel cables.

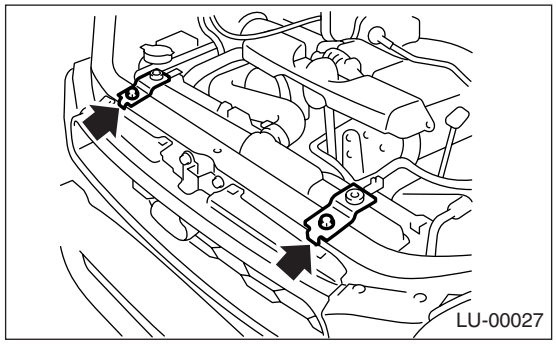


11) Install the pitching stopper.

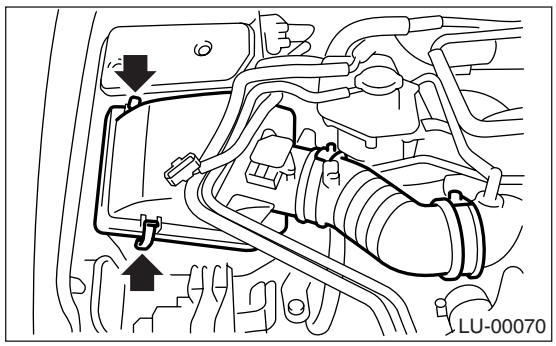
Tightening torque:
T1: 50 N·m (5.1 kgf-m, 36.9 ft-lb)
T2: 58 N·m (5.9 kgf-m, 42.8 ft-lb)



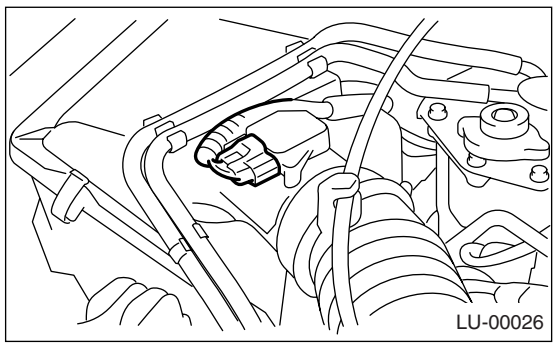
12) Install the radiator upper brackets.



13) Install the intercooler. <Ref. to IN(H4DOTC)-12, INSTALLATION, Intercooler.>
14) Install the air intake boot and air cleaner upper cover.

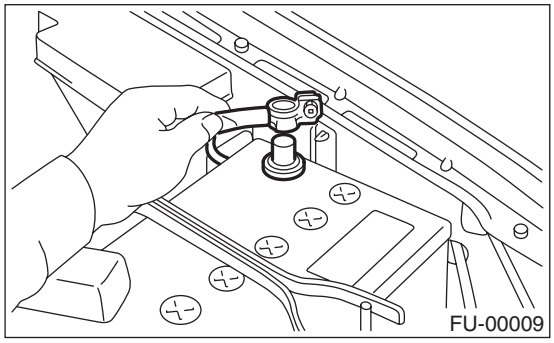


15) Connect the connector to mass air flow sensor.



16) Install the front wheels.

17) Connect the battery ground cable to battery.



18) Fill engine oil. <Ref. to LU(H4DOTC)-9, INSPECTION, Engine Oil.>

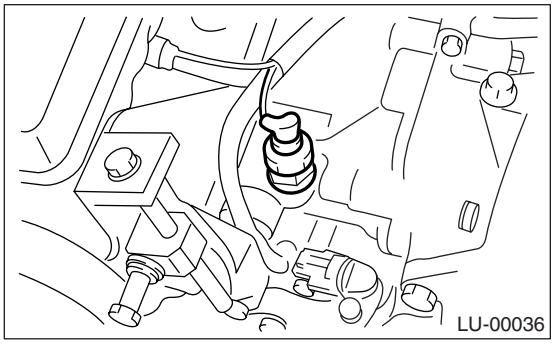
C: INSPECTION

By visual check, make sure the oil pan, oil strainer, oil strainer stay and baffle plate are not damaged.

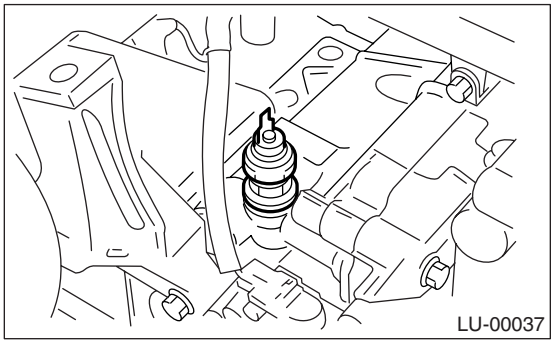
6. Oil Pressure Switch

A: REMOVAL

1) Remove the generator from bracket. <Ref. to SC(H4SO)-14, REMOVAL, Generator.>
2) Disconnect the terminal from oil pressure switch.



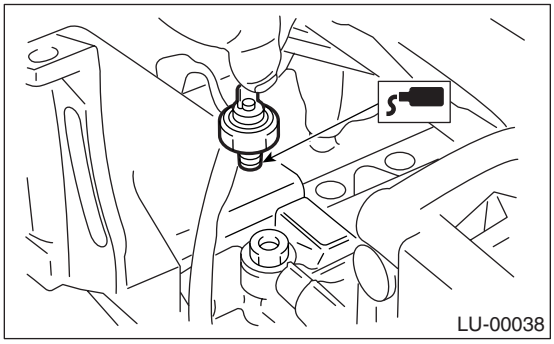
3) Remove the oil pressure switch.



B: INSTALLATION

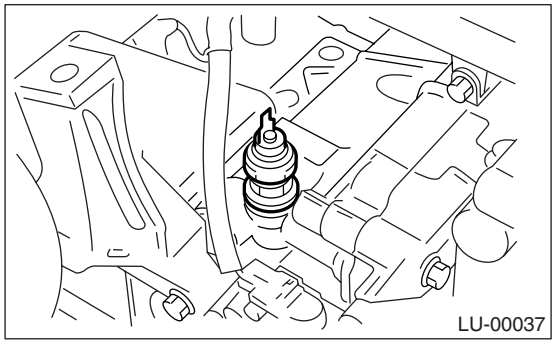
1) Apply liquid gasket to the oil pressure switch threads.

Liquid gasket:
THREE BOND 1324 (Part No. 004403042) or equivalent

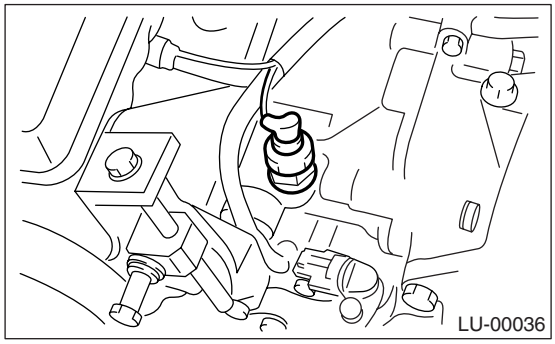


2) Install the oil pressure switch onto engine block.

Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)



3) Connect the terminal of oil pressure switch.



4) Install the generator on bracket. <Ref. to SC(H4SO)-14, INSTALLATION, Generator.>

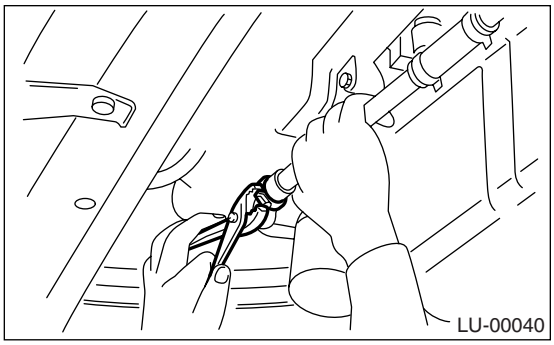
C: INSPECTION

Make sure oil does not leak or seep from where the oil pressure switch is installed.

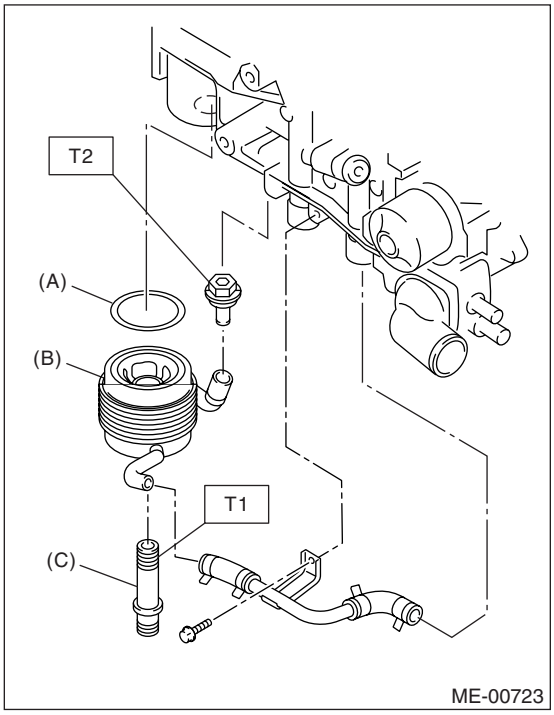
7. Engine Oil Cooler

A: REMOVAL

1) Lift-up the vehicle.
2) Remove the under cover.
3) Drain the engine oil.
4) Drain the engine coolant.
5) Remove the water by-pass pipe between oil cooler and water pump.



6) Remove the engine oil filter. <Ref. to LU(H4DOTC)-21, REMOVAL, Engine Oil Filter.>
7) Remove the connector, and then remove the oil cooler.



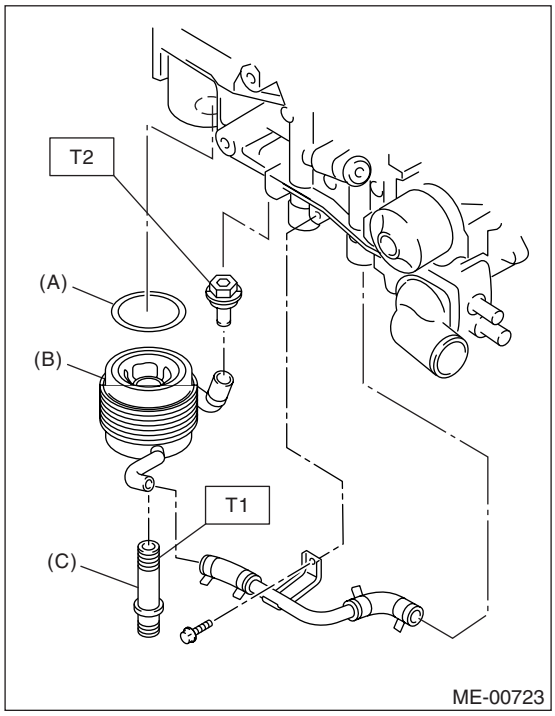
(A) O-ring
(B) Oil cooler
(C) Oil cooler connector

B: INSTALLATION

1) Install in the reverse order of removal.

Tightening torque:
T1: 54 N·m (5.5 kgf-m, 40 ft-lb)
T2: 69 N·m (7.0 kgf-m, 50.9 ft-lb)

NOTE:
Always use a new O-ring.



(A) O-ring
(B) Oil cooler
(C) Oil cooler connector

C: INSPECTION

1) Check the coolant passages are not clogged using air blow method.
2) Check the mating surfaces of cylinder block, O-ring groove and oil filter for damage.

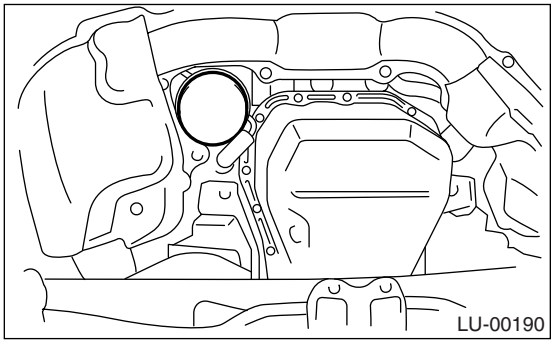
8. Engine Oil Filter

A: REMOVAL

1) Remove the under cover.
2) Remove the oil filter with ST.

ST	498547000	OIL FILTER WRENCH (Outer diameter: 80 mm (3.15 in))
ST	18332AA000	OIL FILTER WRENCH (Outer diameter: 68 mm (2.68 in))
ST	18332AA010	OIL FILTER WRENCH (Outer diameter: 65 mm (2.56 in))

NOTE:
Standard oil filter is outer diameter of 68 mm (2.68 in). However, SUBARU genuine oil filter having outer diameter of 65 mm (2.56 in) or 80 mm (3.15 in) can also be used.



B: INSTALLATION

1) Wipe and clean the oil filter matching surface on cylinder block and oil cooler.
2) Get a new oil filter and apply a thin coat of engine oil to the seal rubber.
3) Install the oil filter by turning it by hand, being careful not to damage seal rubber.
• Tighten the oil filter 80 mm (3.15 in) or 65 mm (2.56 in) in diameter by approx. 2/3 — 3/4 rotation more after the seal rubber of oil filter comes in contact with cylinder block or oil cooler.
• Tighten the oil filter 68 mm (2.68 in) in diameter by approx. 1 rotation more after the seal rubber of oil filter comes in contact with cylinder block or oil cooler.

CAUTION:
Do not tighten excessively, or oil may leak.

C: INSPECTION

1) After installing the oil filter, run the engine and make sure that no oil is leaking around seal rubber.

NOTE:
The filter element and filter case are permanently jointed; therefore, interior cleaning is not necessary.

2) Check the engine oil level. <Ref. to LU(H4DOTC)-9, INSPECTION, Engine Oil.>

9. Engine Lubrication System Trouble in General

A: INSPECTION

Before performing diagnostics, make sure that the engine oil level is correct and no oil leakage exists.

Trouble	Possible cause		Corrective action
1. Warning light remains on.	1) Oil pressure switch failure	Cracked diaphragm or oil leakage within switch	Replace.
		Broken spring or seized contacts	Replace.
	2) Low oil pressure	Clogged oil filter	Replace.
		Malfunction of oil by-pass valve of oil filter	Clean or replace.
		Malfunction of oil relief valve of oil pump	Clean or replace.
		Clogged oil passage	Clean.
		Excessive tip clearance and side clearance of oil pump rotor and gear	Replace.
		Clogged oil strainer or broken pipe	Clean or replace.
	3) No oil pressure	Shortage of engine oil	Replenish.
		Broken pipe of oil strainer	Replace.
		Stuck oil pump rotor	Replace.
2. Warning light does not go on.	1) Malfunction of combination meter		Replace.
	2) Poor contact of switch contact points		Replace.
	3) Disconnection of wiring		Repair.
3. Warning light flickers momentarily.	1) Poor contact at terminals		Repair.
	2) Defective wiring harness		Repair.
	3) Low oil pressure		Check for the same possible causes as listed in 1. — 2).

SPEED CONTROL SYSTEMS

SP(H4DOTC)

Page

1. General Description 2

1. General Description

A: SPECIFICATION

Specifications for Turbo model is included in SP (H4SO) section. <Ref. to SP(H4SO)-2, General Description.>

IGNITION

IG(H4DOTC)

Page

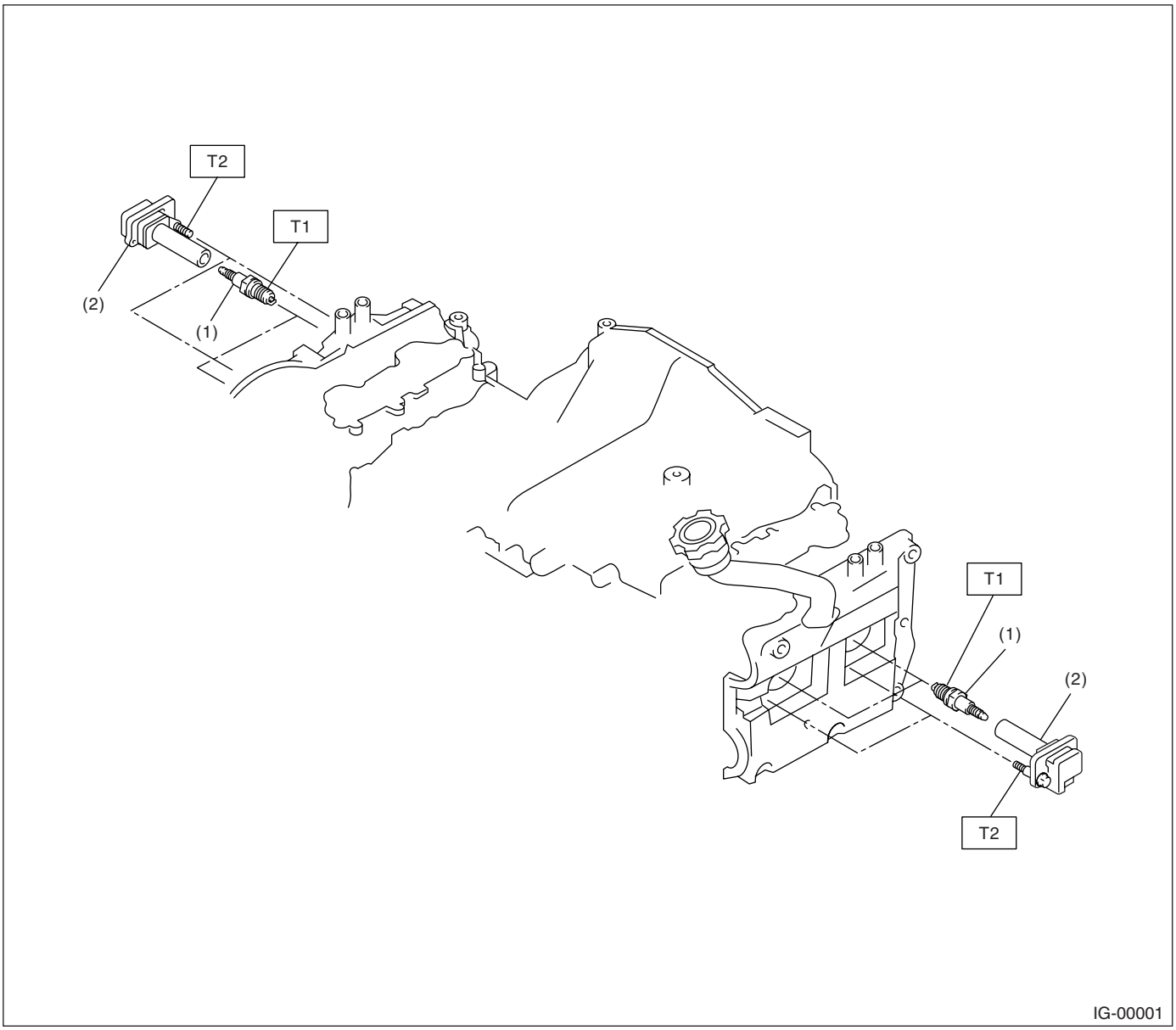
1. General Description 2
2. Spark Plug.....4
3. Ignition Coil 7

1. General Description

A: SPECIFICATION

Item			Designation
Ignition coil	Model		FK0186
	Ignition type		Direct ignition
	Manufacturer		DIAMOND
Spark plug	Type and manufacturer		NGK: PFR6G
	Thread size (diameter, pitch, length)	mm	14, 1.25, 19
	Spark plug gap	mm (in)	0.7 — 0.8 (0.028 — 0.031)
	Electrode		Platinum

B: COMPONENT



(1) Spark plug
(2) Ignition coil

Tightening torque: N·m (kgf-m, ft-lb)
T1: 21 (2.1, 15.5)
T2: 16 (1.6, 11.7)

C: CAUTION

• Wear working clothing, including a cap, protective goggles, and protective shoes during operation.
• Remove contamination including dirt and corrosion before removal, installation or disassembly.
• Keep the disassembled parts in order and protect them from dust or dirt.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly, and replacement.
• Be careful not to burn, because each part on the vehicle is hot after running.
• Be sure to tighten fasteners including bolts and nuts to the specified torque.
• Place shop jacks or rigid racks at the specified points.
• Before disconnecting electrical connectors of sensors or units, be sure to disconnect the ground cable from battery.

2. Spark Plug

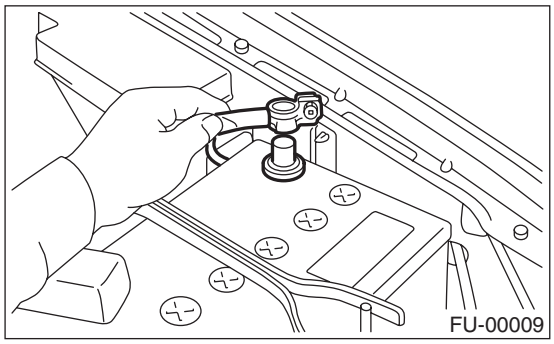
A: REMOVAL

CAUTION:
All spark plugs installed on an engine, must be of the same heat range.

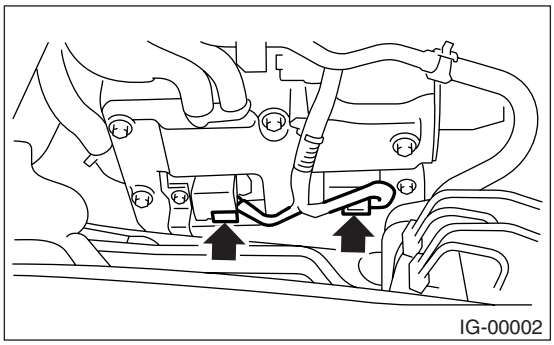
Spark plug:
<Ref. to IG(H4DOTC)-2, SPECIFICATION, General Description.>

1. RH SIDE

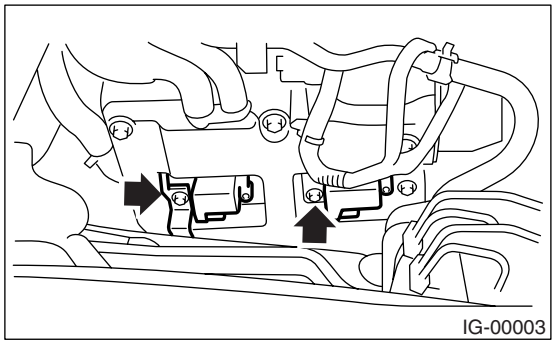
1) Disconnect the ground cable from battery.



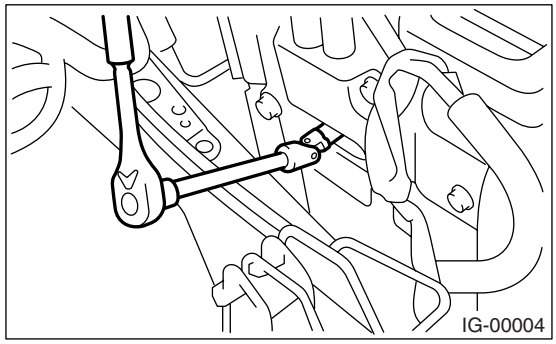
2) Remove the air cleaner lower case. <Ref. to IN(H4DOTC)-9, REMOVAL, Air Cleaner Case.>
3) Disconnect the connector from ignition coil.



4) Remove the ignition coil.

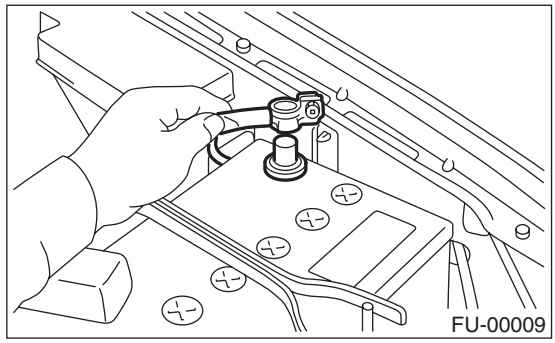


5) Remove the spark plugs with the spark plug sockets.

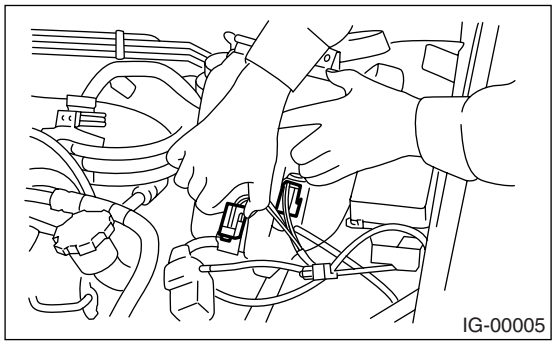


2. LH SIDE

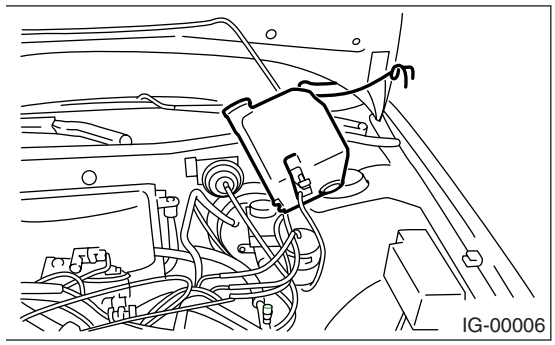
1) Disconnect the battery cables, and then remove the battery and battery carrier.



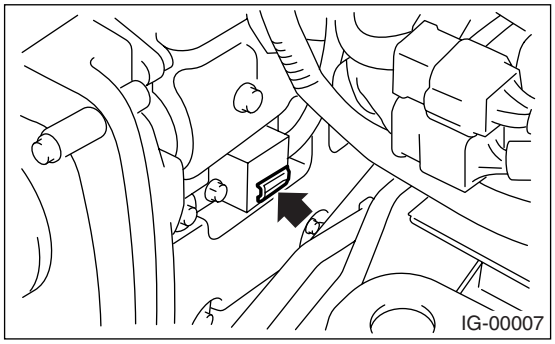
2) Disconnect the washer motor connector.



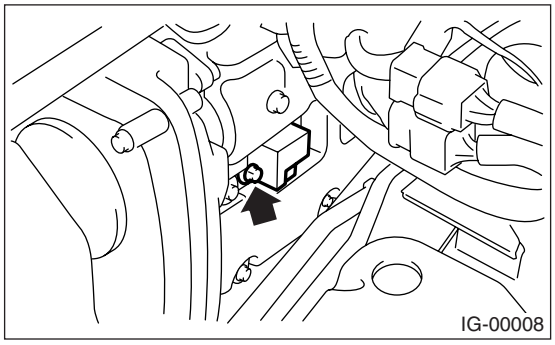
3) Disconnect the rear window glass washer hose from washer motor, then plug connection with a suitable cap.
4) Remove the two bolts which hold washer tank, then take the tank away from working area.



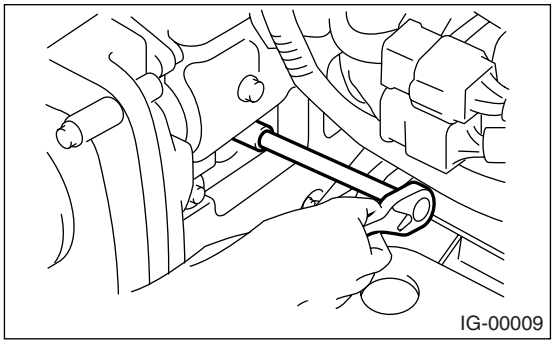
5) Disconnect the connector from ignition coil.



6) Remove the ignition coil.



7) Remove the spark plugs with the spark plug sockets.



B: INSTALLATION

1. RH SIDE

Install in the reverse order of removal.

Tightening torque (Spark plug):
21 N·m (2.1 kgf-m, 15.5 ft-lb)

Tightening torque (Ignition coil):
16 N·m (1.6 kgf-m, 11.7 ft-lb)

NOTE:
The above torque should be only applied to new spark plugs without oil on their threads.
In case their threads are lubricated, the torque should be reduced by approx. 1/3 of the specified torque in order to avoid over-stressing.

2. LH SIDE

Install in the reverse order of removal.

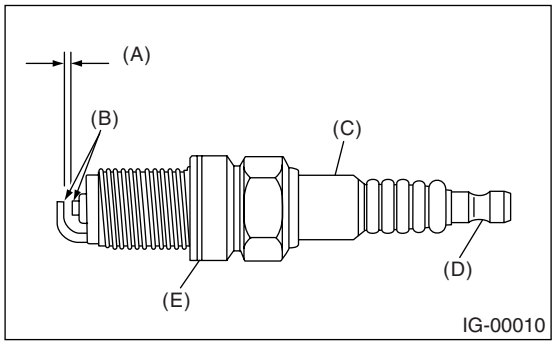
Tightening torque (Spark plug):
21 N·m (2.1 kgf-m, 15.5 ft-lb)

Tightening torque (Ignition coil):
16 N·m (1.6 kgf-m, 11.7 ft-lb)

NOTE:
The above torque should be only applied to new spark plugs without oil on their threads.
In case their threads are lubricated, the torque should be reduced by approx. 1/3 of the specified torque in order to avoid over-stressing.

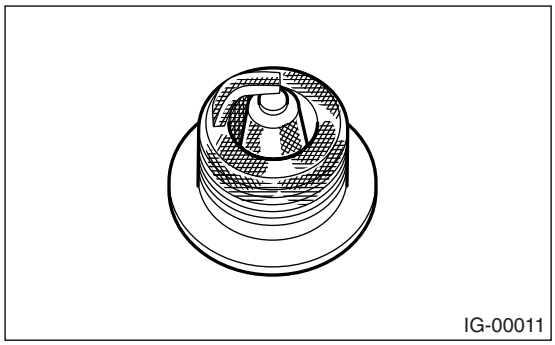
C: INSPECTION

Check the electrodes and inner and outer porcelain of plugs, noting the type of deposits and the degree of electrode erosion.

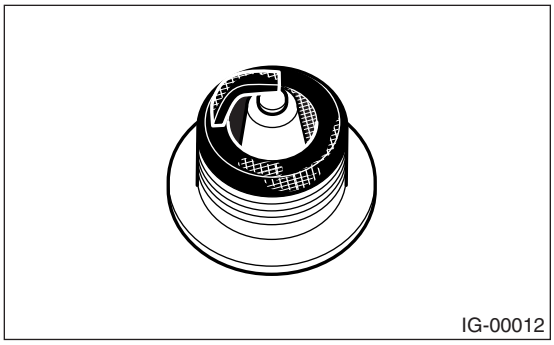


(A) Spark plug gap
(B) Carbon accumulation or wear
(C) Cracks
(D) Damage
(E) Damaged gasket

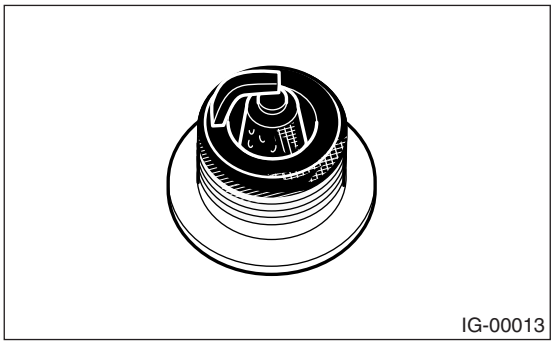
1) Normal:
Brown to grayish-tan deposits and slight electrode wear indicates correct spark plug heat range.



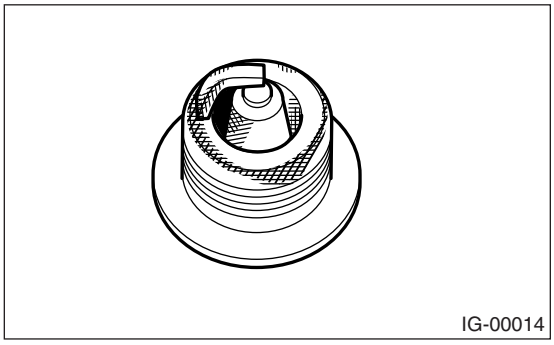
2) Carbon fouled:
Dry fluffy carbon deposits on insulator and electrode are mostly caused by slow speed driving in city, weak ignition, too rich fuel mixture or dirty air cleaner.


IG-00012

3) Oil fouled:
Wet black deposits show excessive oil entrance into combustion chamber through worn rings and pistons or excessive clearance between valve guides and stems.


IG-00013

4) Overheating:
White or light gray insulator with black or brown spots and bluish burnt electrodes indicates engine overheating. Moreover, the appearance results from incorrect ignition timing, loose spark plugs, wrong selection of fuel, etc.

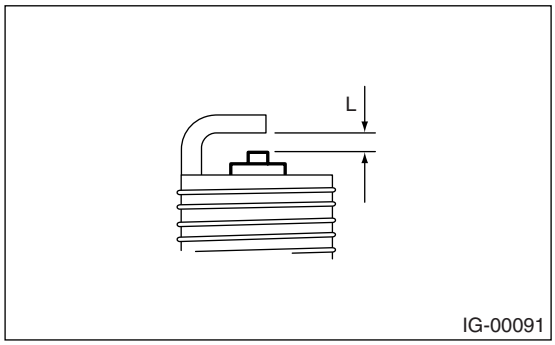

IG-00014

D: ADJUSTMENT

Clean the spark plugs with a wire brush. Clean and remove the carbon or oxide deposits, but do not wear away porcelain.
If deposits are too stubborn, replace the plugs.
After cleaning the spark plugs, correct the spark plug gap using a gap gauge.

NOTE:
Do not use spark plug cleaners, because the spark plugs are applied with platinum tips.

Spark plug gap L:
0.7 — 0.8 mm (0.028 — 0.031 in)



IG-00091

3. Ignition Coil

A: REMOVAL

Direct ignition type has been adopted. Refer to the “Spark Plug Removal” for removal procedure. <Ref. to IG(H4DOTC)-4, REMOVAL, Spark Plug.>

B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
16 N·m (1.6 kgf-m, 11.7 ft-lb)

C: INSPECTION

For inspection, refer to the following. <Ref. to EN(H4DOTC)(diag)-65, IGNITION CONTROL SYSTEM, Diagnostics for Engine Starting Failure.>

STARTING/CHARGING SYSTEMS

SC(H4DOTC)

Page

1. General Description 2

1. General Description

A: SPECIFICATION

Specifications for Turbo model is included in SC (H4SO) section. <Ref. to SC(H4SO)-2, General Description.>

ENGINE (DIAGNOSTICS)

EN(H4DOTC)(diag)

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1. Basic Diagnostic Procedure

A: PROCEDURE

1. ENGINE

	Step	Check	Yes	No
1	**CHECK ENGINE START FAILURE.** 1) Ask the customer when and how trouble occurred using the interview check list. <Ref. to EN(H4DOTC)(diag)-4, CHECK, Check List for Interview.> 2) Start the engine.	Does the engine start?	Go to step **2.**	Inspection using “Diagnostics for Engine Start Failure”. <Ref. to EN(H4DOTC)(diag)-58, Diagnostics for Engine Starting Failure.>
2	**CHECK OF MALFUNCTION INDICATOR LIGHT.**	Does the malfunction indicator light illuminate?	Go to step **3.**	Inspection using “General Diagnostics Table”. <Ref. to EN(H4DOTC)(diag)-298, General Diagnostic Table.>
3	**CHECK OF DTC.** 1) Turn the ignition switch to OFF. 2) Connect the Subaru Select Monitor or general scan tool to data link connector. 3) Turn the ignition switch to ON and the Subaru Select Monitor or general scan tool power switch to ON. 4) Read the DTC on Subaru Select Monitor or general scan tool.	Does the Subaru Select Monitor or general scan tool indicate DTC?	Record the DTC code. Repair the trouble cause. <Ref. to EN(H4DOTC)(diag)-72, List of Diagnostic Trouble Code (DTC).> Go to step **4.**	Repair the related parts. NOTE: If a DTC is not shown on display although malfunction indicator light illuminates, perform diagnostics of malfunction indicator light circuit or combination meter. <Ref. to EN(H4DOTC)(diag)-49, Malfunction Indicator Light.>
4	**PERFORM THE DIAGNOSIS.** 1) Perform the clear memory mode. <Ref. to EN(H4DOTC)(diag)-46, Clear Memory Mode.> 2) Perform the inspection mode. <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>	Does the Subaru Select Monitor or general scan tool indicate DTC?	Inspect using “Diagnostics Procedure with Diagnostic Trouble Code (DTC)”. <Ref. to EN(H4DOTC)(diag)-78, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Complete the diagnosis.

2. AUTOMATIC TRANSMISSION

When DTC about automatic transmission is displayed on Subaru Select Monitor or general scan tool, carry out the following basic check. After that, carry out the replacement or repair work.

1) ATF level check <Ref. to 4AT-32, Automatic Transmission Fluid.>
2) Differential gear oil level check <Ref. to 4AT-34, Differential Gear Oil.>
3) ATF leak check <Ref. to 4AT-32, Automatic Transmission Fluid.>
4) Differential gear oil leak check <Ref. to 4AT-34, Differential Gear Oil.>
5) Stall test <Ref. to 4AT-36, Stall Test.>
6) Line pressure test <Ref. to 4AT-39, Line Pressure Test.>
7) Transfer clutch pressure test <Ref. to 4AT-40, Transfer Clutch Pressure Test.>
8) Time lag test <Ref. to 4AT-38, Time Lag Test.>
9) Road test <Ref. to 4AT-35, Road Test.>
10) Shift characteristics <Ref. to 4AT-40, Transfer Clutch Pressure Test.>

2. Check List for Interview

A: CHECK

1. CHECK LIST No. 1

Check the following items when problem has occurred.

NOTE:
Use copies of this page for interviewing customers.

Customer's name		Engine No.	
Date of sale		Fuel brand	
Date of repair		Odometer reading	km
VIN			miles
Weather	❑ Fine ❑ Cloudy ❑ Rainy ❑ Snowy ❑ Various/Others:		
Outdoor temperature	°C (°F)		
	❑ Hot ❑ Warm ❑ Cool ❑ Cold		
Place	❑ Highway ❑ Suburbs ❑ Inner city ❑ Uphill ❑ Downhill ❑ Rough road ❑ Others:		
Engine temperature	❑ Cold ❑ Warming-up ❑ After warming-up ❑ Any temperature ❑ Others:		
Engine speed	rpm		
Vehicle speed	km/h (MPH)		
Driving conditions	❑ Not affected ❑ At starting ❑ While idling ❑ At racing ❑ While accelerating ❑ While cruising ❑ While decelerating ❑ While turning (RH/LH)		
Headlight	❑ ON / ❑ OFF	Rear defogger	❑ ON / ❑ OFF
Blower	❑ ON / ❑ OFF	Radio	❑ ON / ❑ OFF
A/C compressor	❑ ON / ❑ OFF	CD/Cassette	❑ ON / ❑ OFF
Cooling fan	❑ ON / ❑ OFF	Car phone	❑ ON / ❑ OFF
Front wiper	❑ ON / ❑ OFF	CB	❑ ON / ❑ OFF
Rear wiper	❑ ON / ❑ OFF		

2. CHECK LIST No. 2

Check the following items about the vehicle's state when malfunction indicator light turns on.

NOTE:
Use copies of this page for interviewing customers.

a) Other warning lights or indicators turn on. ❑ Yes / ❑ No
❑ Low fuel warning light ❑ Charge indicator light ❑ AT diagnostics indicator light ❑ ABS warning light ❑ Engine oil pressure warning light
b) Fuel level
• Lack of gasoline: ❑ Yes / ❑ No • Indicator position of fuel gauge: • Experienced running out of fuel: ❑ Yes / ❑ No
c) Intentional connecting or disconnecting of harness connectors or spark plug cords: ❑ Yes / ❑ No
• What:
d) Intentional connecting or disconnecting of hoses: ❑ Yes / ❑ No
• What:
e) Installing of parts other than genuine parts: ❑ Yes / ❑ No
• What: • Where:
f) Occurrence of noise: ❑ Yes / ❑ No
• From where: • What kind:
g) Occurrence of smell: ❑ Yes / ❑ No
• From where: • What kind:
h) Intrusion of water into engine compartment or passenger compartment: ❑ Yes / ❑ No
i) Troubles occurred
❑ Engine does not start. ❑ Engine stalls during idling. ❑ Engine stalls while driving. ❑ Engine speed decreases. ❑ Engine speed does not decrease. ❑ Rough idling ❑ Poor acceleration ❑ Back fire ❑ After fire ❑ No shift ❑ Excessive shift shock

3. General Description

A: CAUTION

1) Airbag system wiring harness is routed near the ECM, main relay and fuel pump relay.

CAUTION:
• All airbag system wiring harness and connectors are colored yellow. Do not use the electrical test equipment on these circuit.
• Be careful not to damage the airbag system wiring harness when servicing the ECM, TCM, main relay and fuel pump relay.

2) Never connect the battery in reverse polarity.
• The ECM will be destroyed instantly.
• The fuel injector and other part will be damaged in just a few minutes more.

3) Do not disconnect the battery cables while the engine is running.
• A large counter electromotive force will be generated in the alternator, and this voltage may damage electronic parts such as ECM, etc.

4) Before disconnecting the connectors of each sensor and the ECM, be sure to turn the ignition switch to OFF.

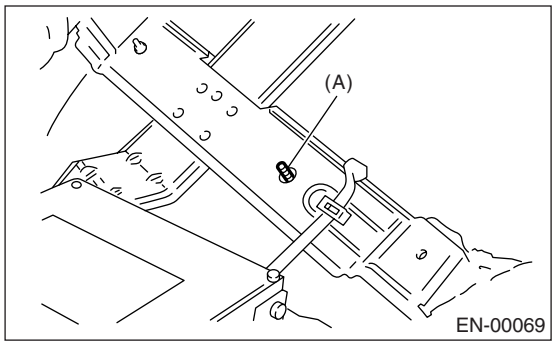
5) Poor contact has been identified as a primary cause of this problem. To measure the voltage and/or resistance of individual sensors or all electrical control modules at the harness side connector, use a tapered pin with a diameter of less than 0.64 mm (0.025 in). Do not insert the pin more than 5 mm (0.20 in) into the part.

6) Before removing the ECM from located position, disconnect two cables on battery.
• Otherwise, the ECM may be damaged.

CAUTION:
When replacing the ECM, be careful not to use the wrong spec. ECM to avoid any damage on the fuel injection system.

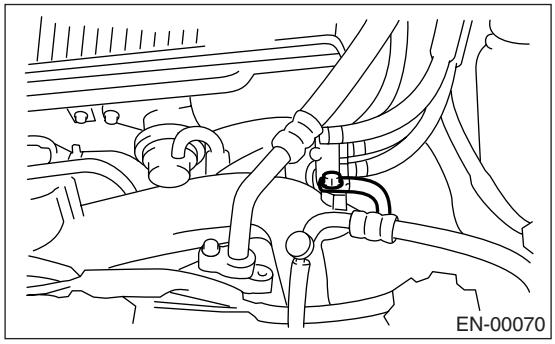
7) The connectors to each sensor in the engine compartment and the harness connectors on the engine side and body side are all designed to be waterproof. However, it is still necessary to take care not to allow water to get into the connectors when washing the vehicle, or when servicing the vehicle on a rainy day.

8) Use the ECM mounting stud bolt at the body side grounding points when measuring voltage and resistance inside the passenger compartment.

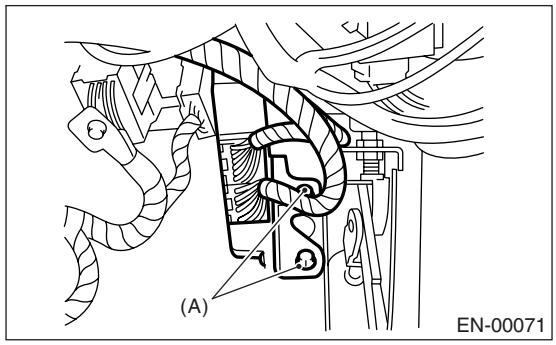


(A) Stud bolt

9) Use the engine grounding terminal or engine proper as the grounding point to the body, when measuring voltage and resistance in the engine compartment.



10) Use the TCM mounting stud bolts at the grounding point, when measuring voltage and resistance inside the passenger compartment.



(A) Stud bolt

11) Every engine-related part is a precision part. Do not drop them.

12) Observe the following cautions when installing a radio in the vehicle.

CAUTION:
• The antenna must be kept as far apart as possible from the control module.
• The antenna feeder must be placed as far as possible from ECM and MFI harness.
• Carefully adjust the antenna for correct matching.
• When mounting a large power type radio, pay special attention to the three items above mentioned.
• Incorrect installation of the radio may affect the operation of ECM.

13) Before disconnecting the fuel hose, disconnect the fuel pump connector and crank the engine for more than 5 seconds to release pressure in the fuel system. If the engine starts during this operation, run it until it stops.
14) Problems in the electronic-controlled automatic transmission may be caused by failure of the engine, the electronic control system, the transmission proper, or by a combination of these. These three causes must be distinguished clearly when performing diagnostics.
15) Diagnostics should be conducted by rotating with simple, easy operations and proceeding to complicated, difficult operations. The most important thing in diagnostics is to understand the customer's complaint, and distinguish between the three causes.
16) On model with ABS, when performing driving test in jacked-up or lifted-up position, sometimes the warning light may be lit, but this is not a malfunction of the system. The reason for this is the speed difference between front and rear wheels. After diagnosis of engine control system, perform the ABS memory clearance procedure of self-diagnosis system.

B: INSPECTION

Before performing diagnostics, check the following items which might affect engine problems:

1. BATTERY

1) Measure the battery voltage and specific gravity of electrolyte.

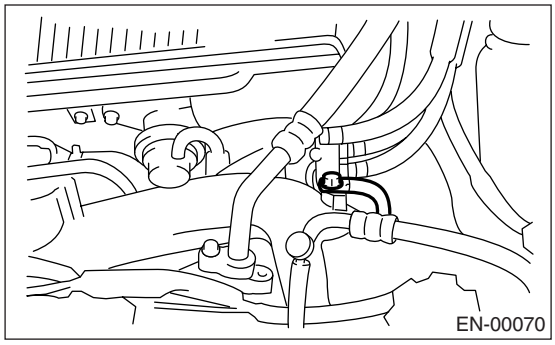
Standard voltage: 12 V

Specific gravity: Above 1.260

2) Check the condition of main and other fuses, and harnesses and connectors. Also check for proper grounding.

2. ENGINE GROUNDING

Make sure the engine grounding terminal is properly connected to engine.



C: NOTE

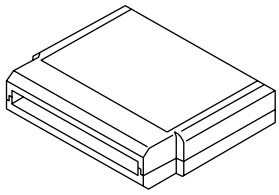
1. DESCRIPTION

• On-board diagnostic (OBD) system detects and indicates a fault in various inputs and outputs of the complex electronic control. Malfunction indicator light in the combination meter indicates occurrence of a fault or trouble.
• Further, against such a failure or sensors as may disable the drive, the fail-safe function is provided to ensure the minimal driveability.
• The OBD system incorporated with the vehicles within this engine family complies with E-OBD regulation. The OBD system monitors the components and the system malfunction listed in Engine Section which affects on emissions.
• When the system decides that a malfunction occurs, malfunction indicator light illuminates. At the same time of the malfunction indicator light illumination or blinking, the DTC and a freeze frame engine conditions are stored into on-board computer.
• The OBD system stores freeze frame engine condition data (engine load, engine coolant temperature, fuel trim, engine speed and vehicle speed, etc.) into on-board computer when it detects a malfunction first.
• If the OBD system detects the various malfunctions including the fault of fuel trim or misfire, the OBD system first stores freeze frame engine conditions about the fuel trim or misfire.
• When the malfunction does not occur again for three consecutive driving cycles, malfunction indicator light is turned off, but DTC remains at on-board computer.
• When troubleshooting the vehicles complied with E-OBD regulation, connect Subaru Select Monitor or the general scan tool to the vehicle.

2. ENGINE AND EMISSION CONTROL SYSTEM

• The Multipoint Fuel Injection (MFI) system is a system that supplies the optimum air-fuel mixture to the engine for all the various operating conditions through the use of the latest electronic technology.
With this system fuel, which is pressurized at a constant pressure, is injected into the intake air passage of the cylinder head. The injection quantity of fuel is controlled by an intermittent injection system where the electro-magnetic injection valve (fuel injector) opens only for a short period of time, depending on the quantity of air required for one cycle of operation. In actual operation, the injection quantity is determined by the duration of an electric pulse applied to the fuel injector and this permits simple, yet highly precise metering of the fuel.
• Further, all the operating conditions of the engine are converted into electric signals, and this results in additional features of the system, such as large improved adaptability, easier addition of compensating element, etc.
The MFI system also has the following features:
- Reduced emission of harmful exhaust gases.
- Reduced in fuel consumption.
- Increased engine output.
- Superior acceleration and deceleration.
- Superior startability and warm-up performance in cold weather since compensation is made for coolant and intake air temperature.

D: PREPARATION TOOL

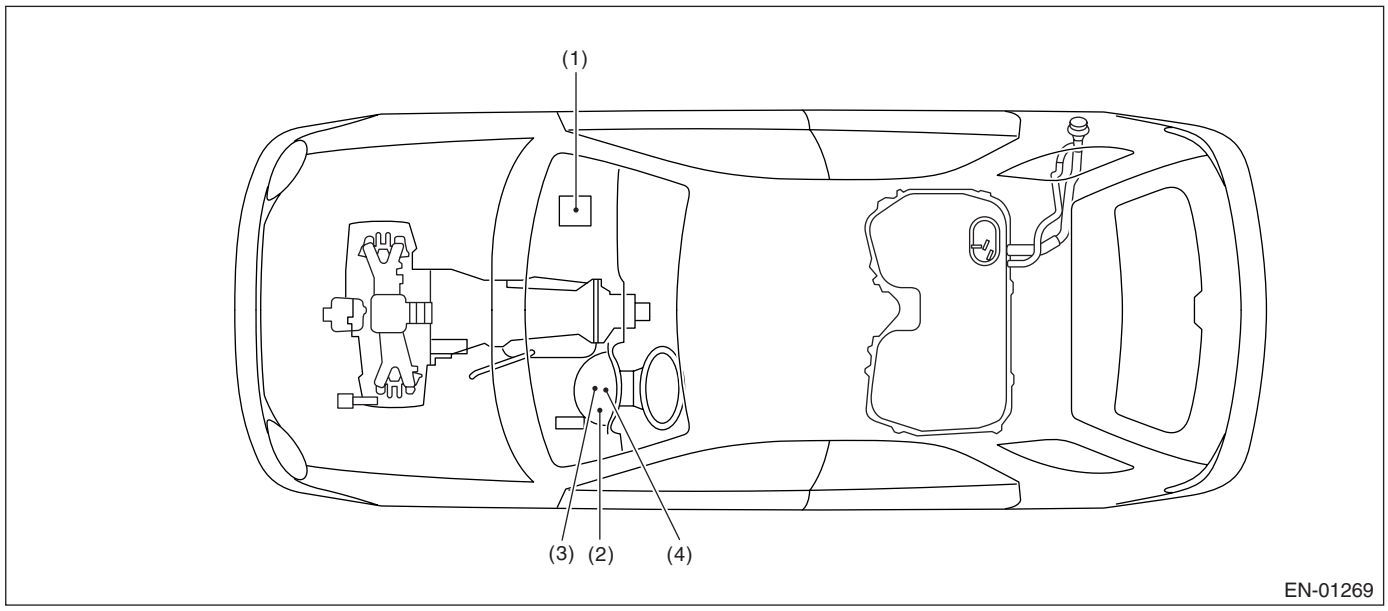
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18482AA000	18482AA000	CARTRIDGE	Troubleshooting for electrical systems.
ST22771AA030	22771AA030	SUBARU SELECT MONITOR KIT	Troubleshooting for electrical systems. • English: 22771AA030 (Without printer) • German: 22771AA070 (Without printer) • French: 22771AA080 (Without printer) • Spanish: 22771AA090 (Without printer)

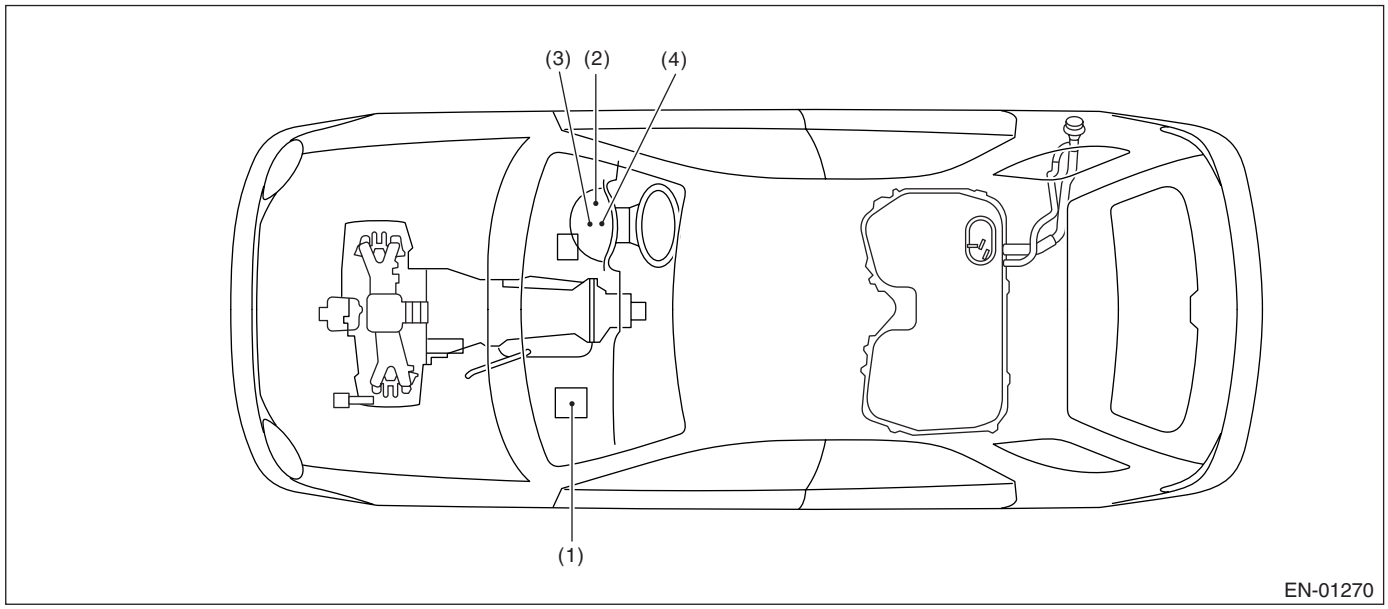
4. Electrical Component Location

A: LOCATION

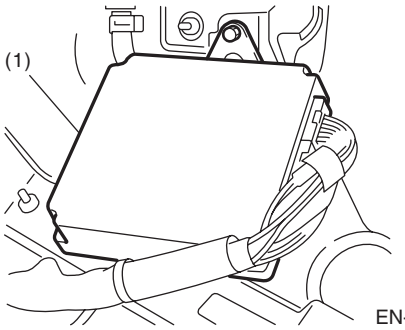
1. ENGINE

• Module

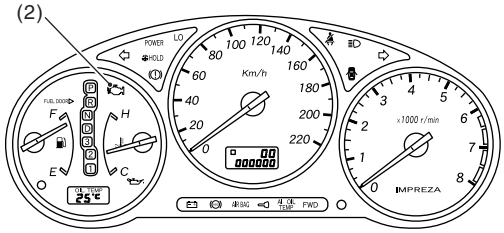




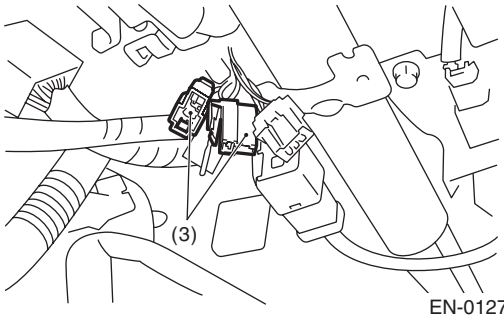
(1) Engine control module (ECM)
(2) Malfunction indicator light
(3) Test mode connector
(4) Data link connector



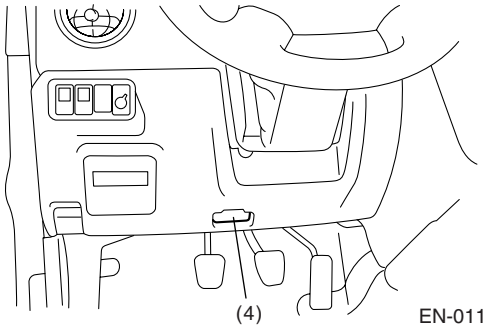
EN-00156



EN-01271

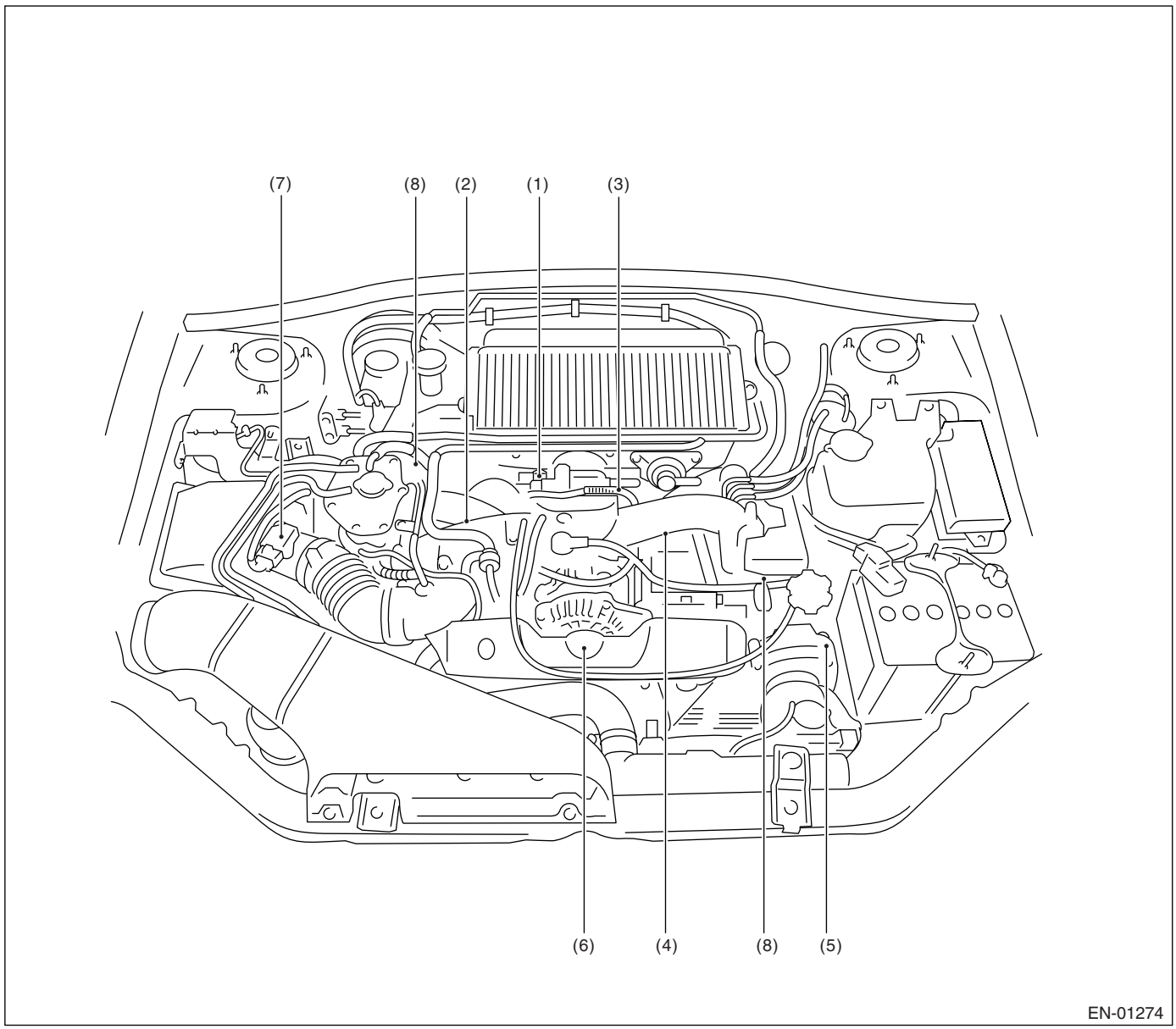


EN-01272



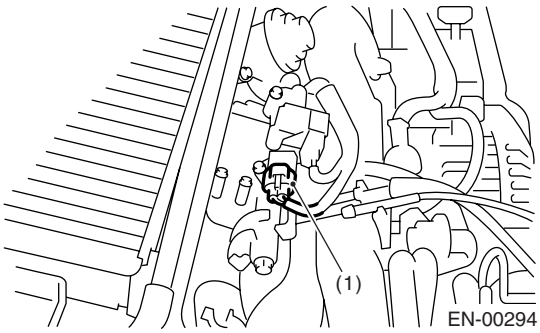
EN-01150

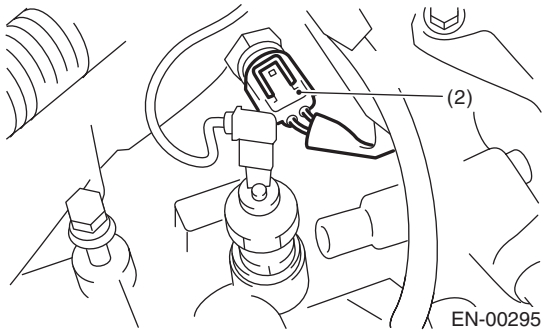
• Sensor

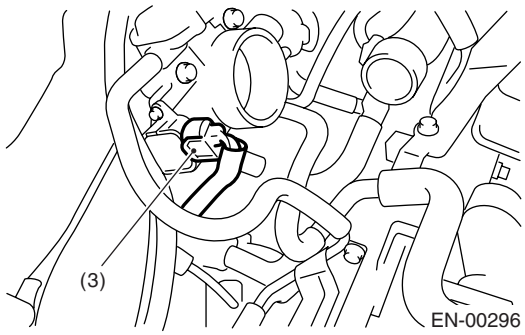


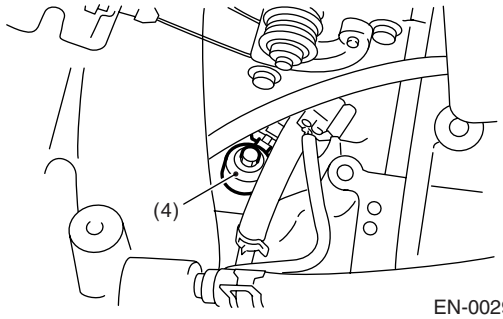
(1) Manifold absolute pressure sensor
(2) Engine coolant temperature sensor
(3) Throttle position sensor
(4) Knock sensor
(5) Camshaft position sensor
(6) Crankshaft position sensor
(7) Mass air flow and intake air temperature sensor
(8) Tumble generator valve position sensor

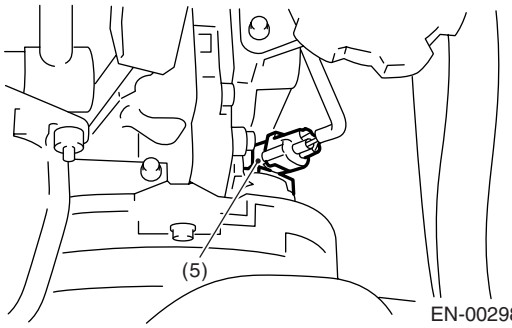
Electrical Component Location

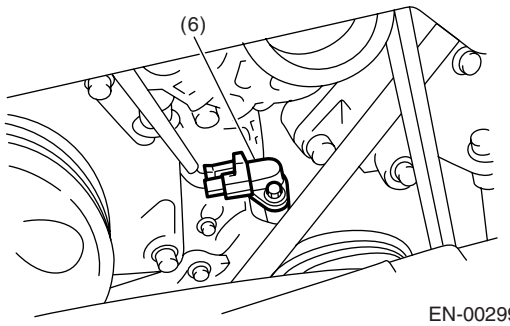


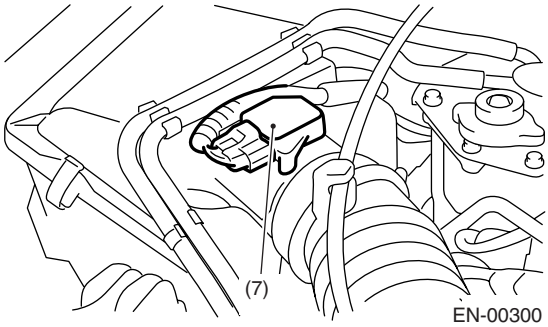


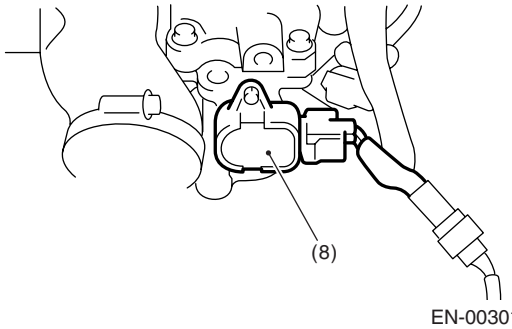




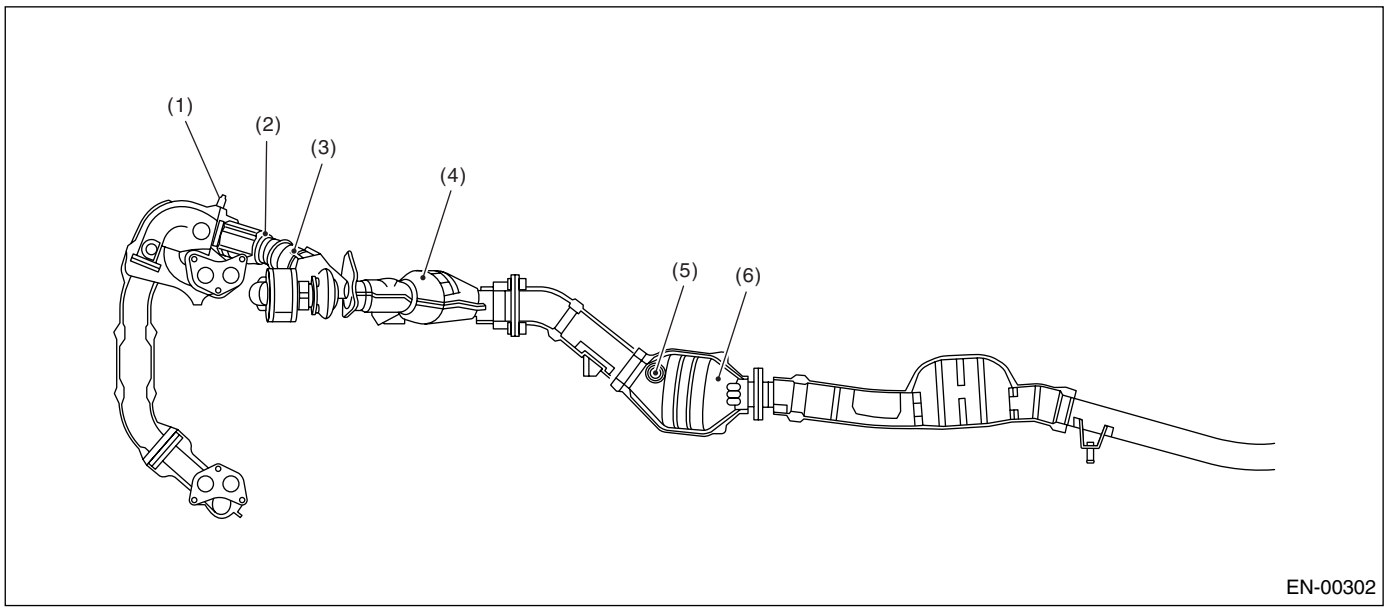




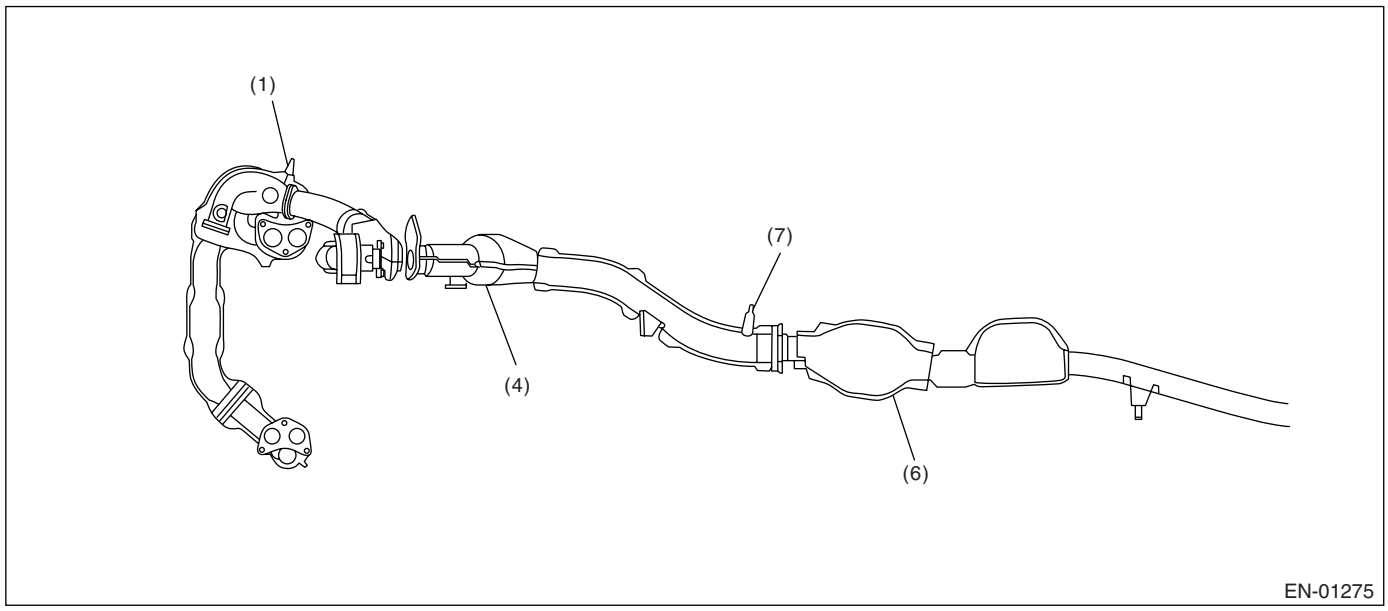




• Except Australia model but including Australia STi model

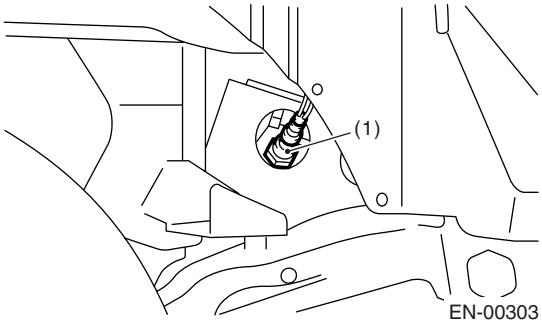


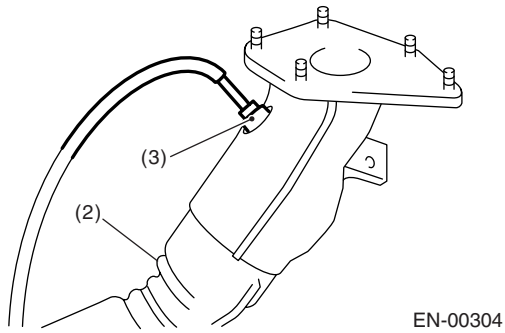
• For Australia model except STi

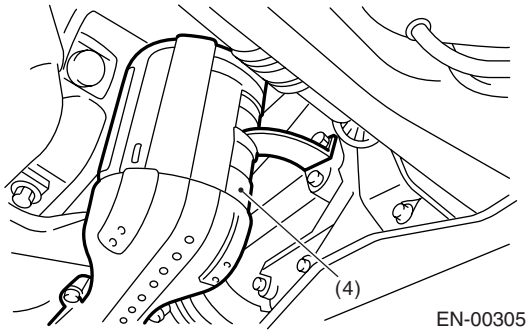


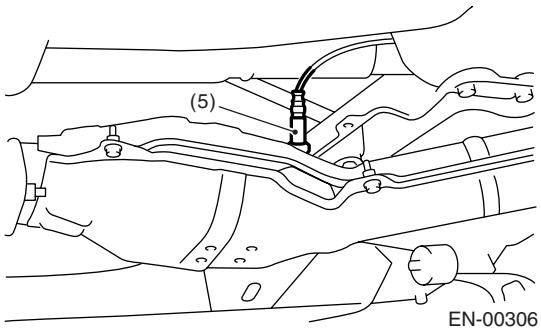
(1) Front oxygen (A/F) sensor
(2) Precatalytic converter (Except Australia model and STi model)
(3) Exhaust temperature sensor (Except Australia model and STi model)
(4) Front catalytic converter
(5) Rear oxygen sensor (Except Australia model but including Australia STi model)
(6) Rear catalytic converter
(7) Rear oxygen sensor (Australia model except STi)

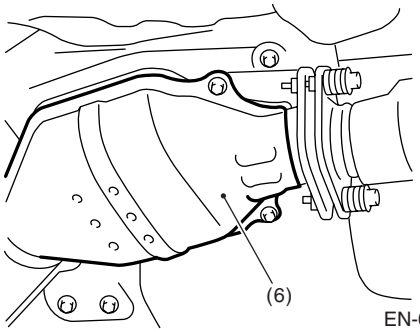
Electrical Component Location

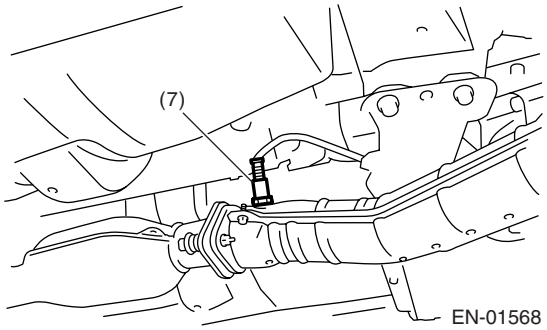


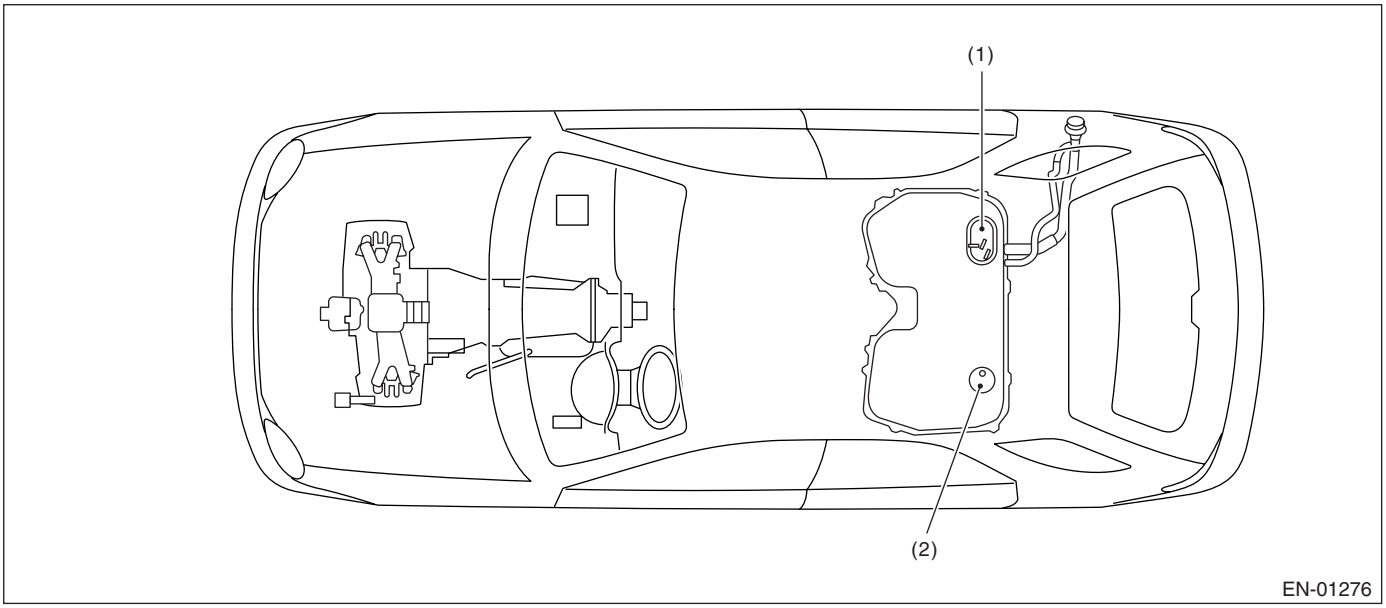


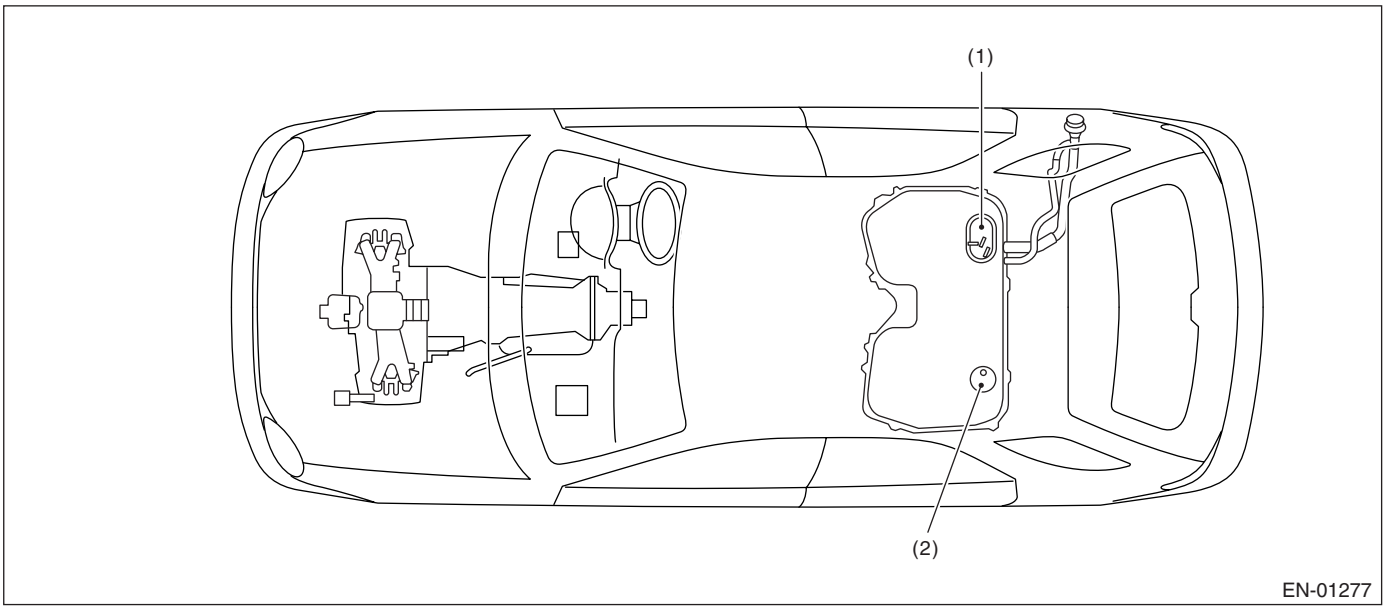




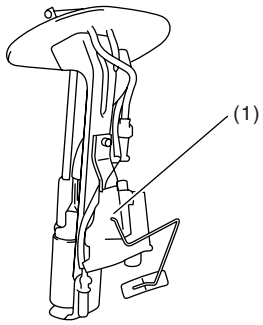




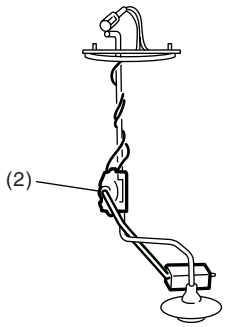




(1) Fuel level sensor
(2) Fuel sub level sensor

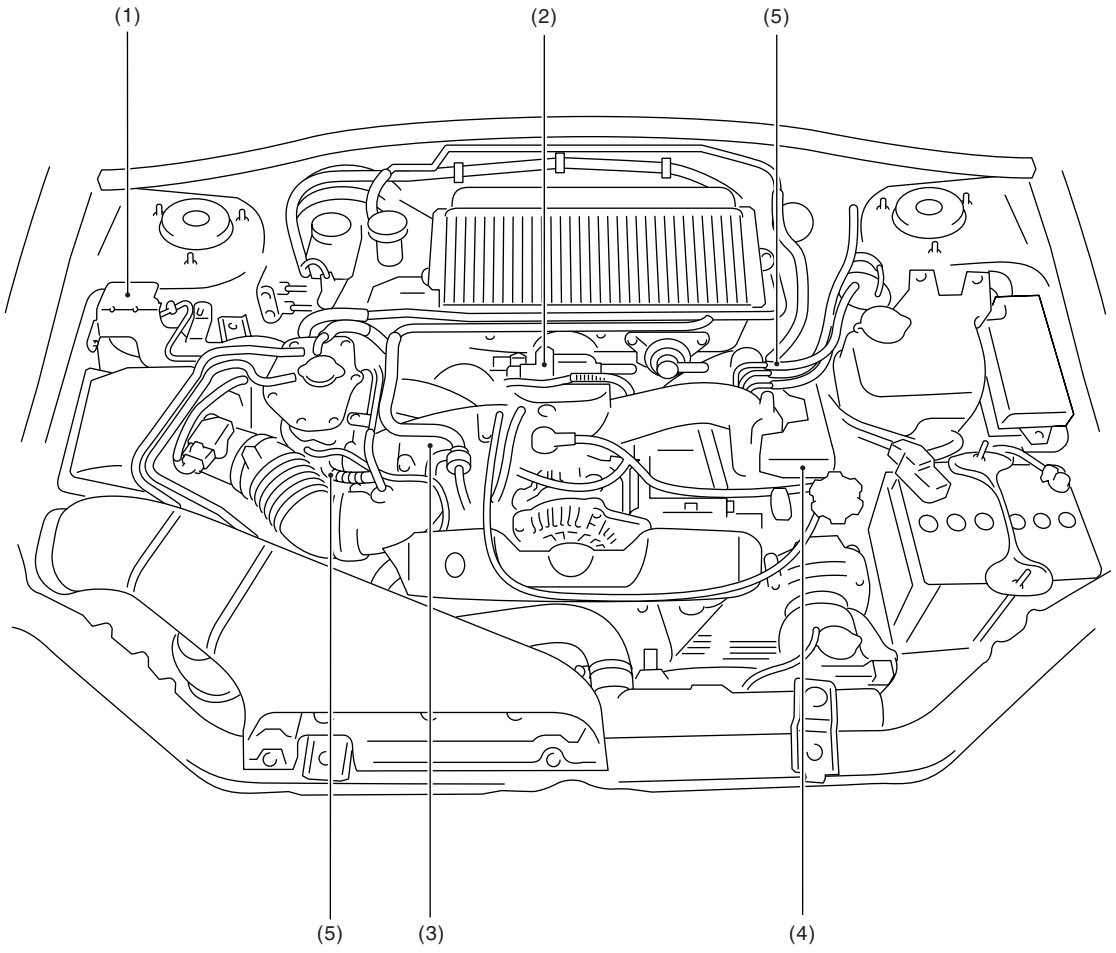


EN-00310



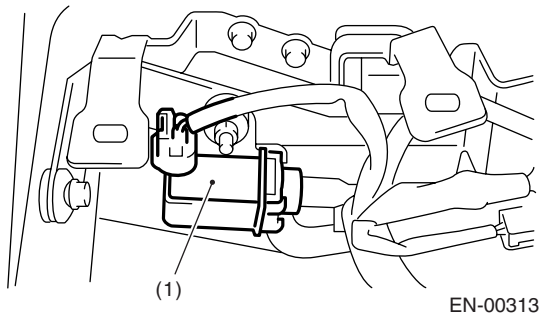
EN-00311

• Solenoid Valve, Actuator, Emission Control System Parts and Ignition System Parts

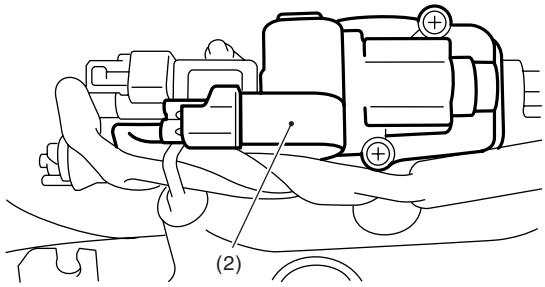


EN-01278

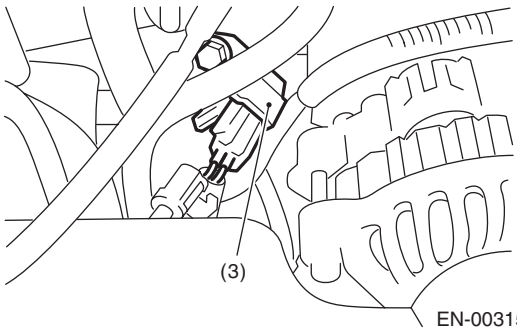
(1) Wastegate control solenoid valve
(2) Idle air control solenoid valve
(3) Purge control solenoid valve
(4) Ignition coil
(5) Tumble generator valve actuator



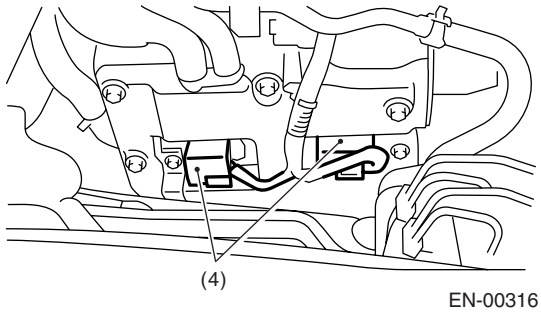
EN-00313



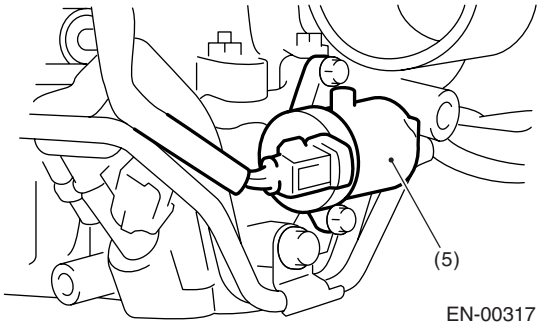
EN-00314



EN-00315

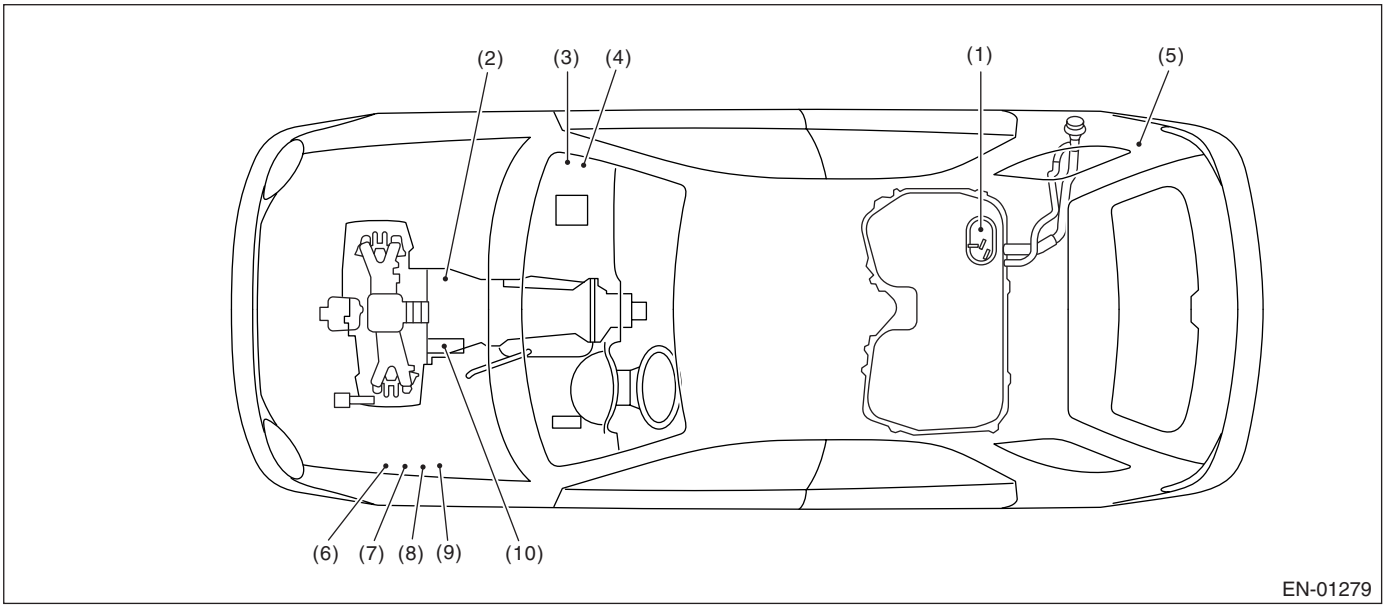


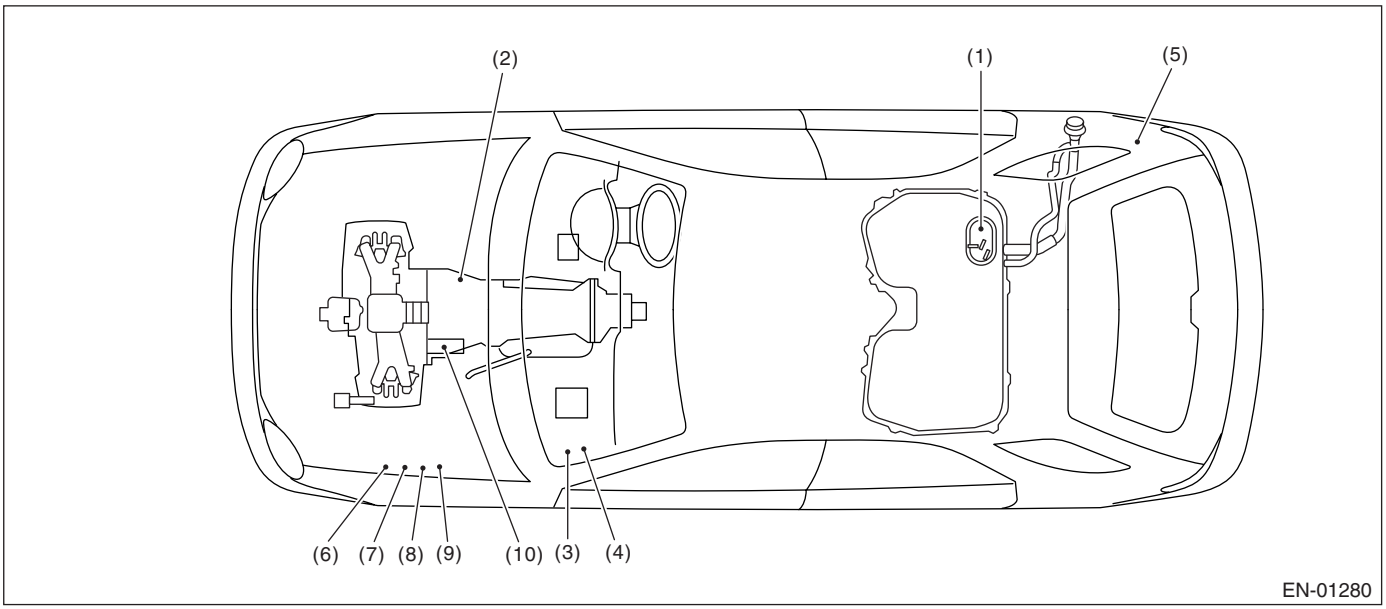
EN-00316



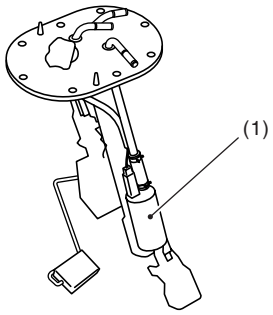
EN-00317

Electrical Component Location

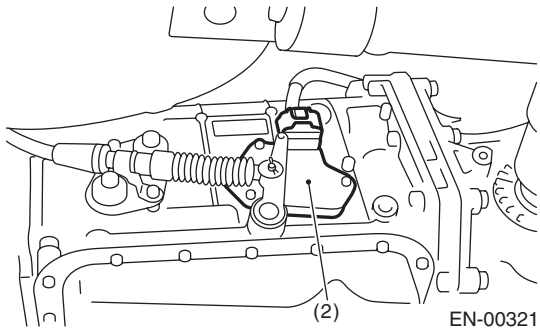




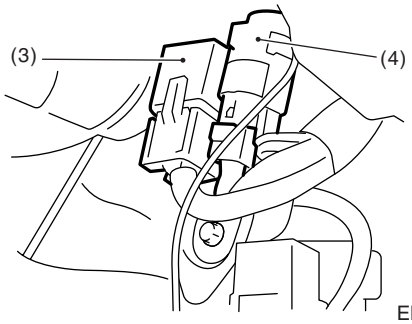
(1) Fuel pump
(2) Inhibitor switch
(3) Main relay
(4) Fuel pump relay
(5) Fuel pump control unit
(6) Radiator main fan relay 1
(7) Radiator main fan relay 2
(8) Radiator sub fan relay 1
(9) Radiator sub fan relay 2
(10) Starter



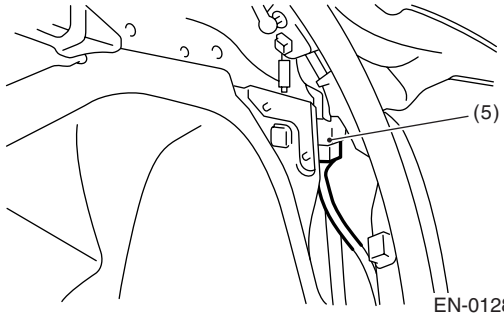
EN-00320



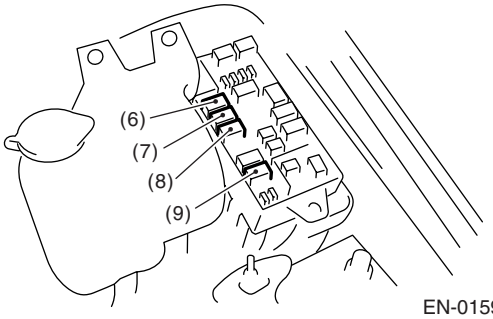
EN-00321



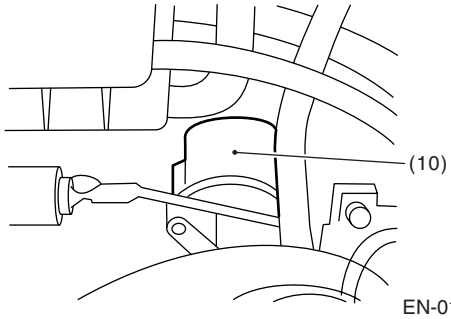
EN-01281



EN-01282



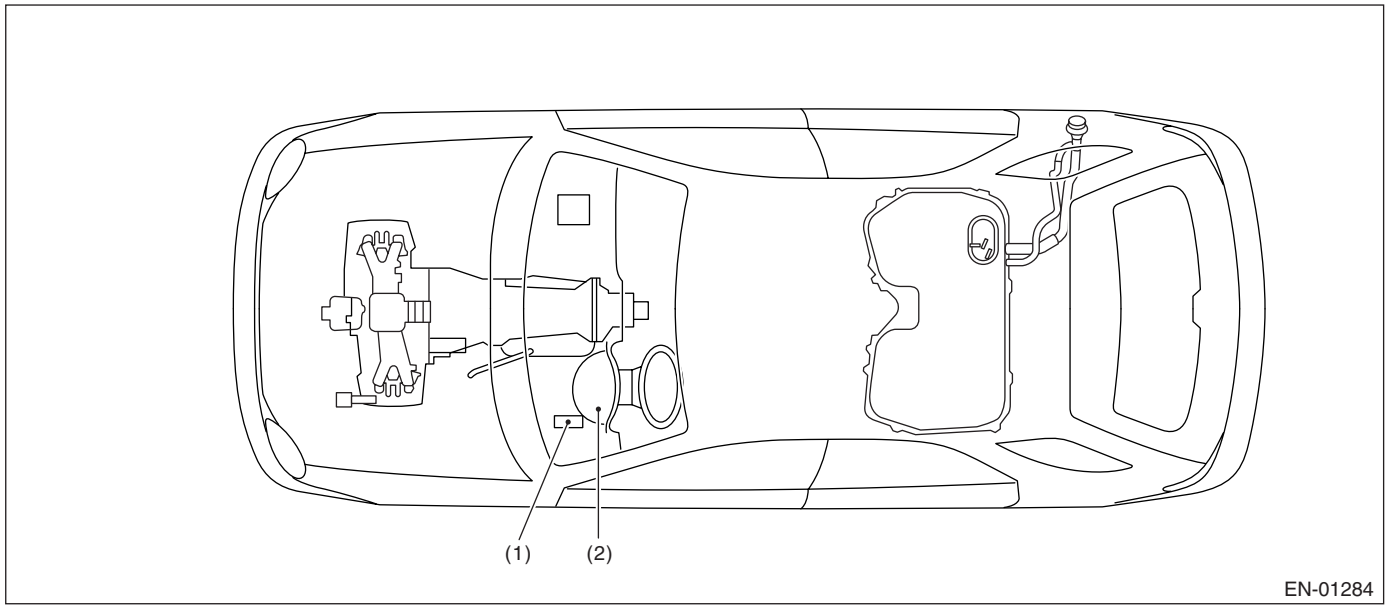
EN-01596



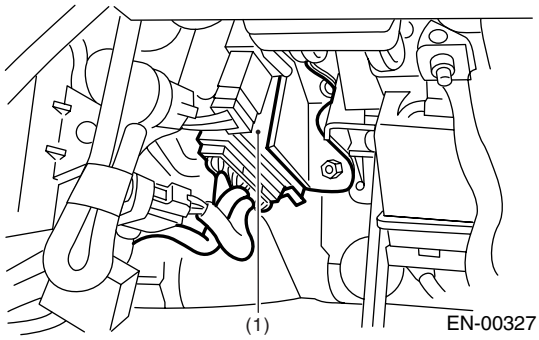
EN-01328

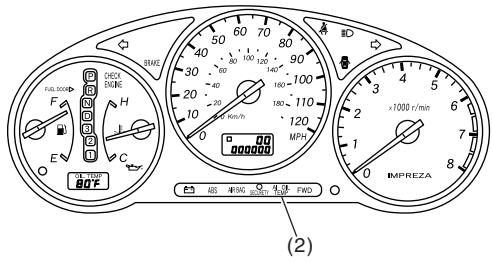
2. TRANSMISSION

• Module

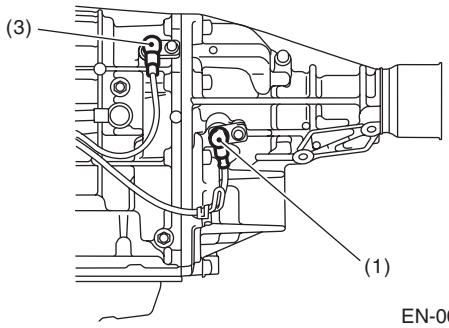


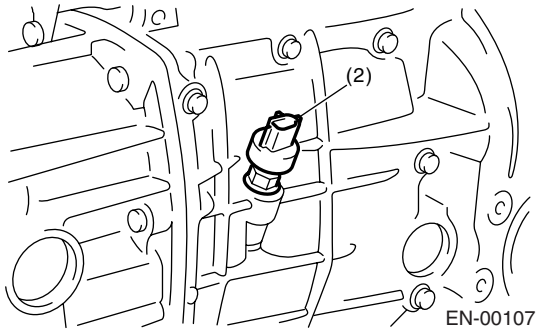
(1) Transmission control module (TCM) (for AT model)
(2) AT diagnostic indicator light (for AT model)

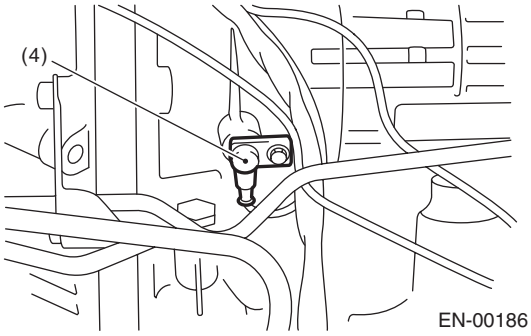


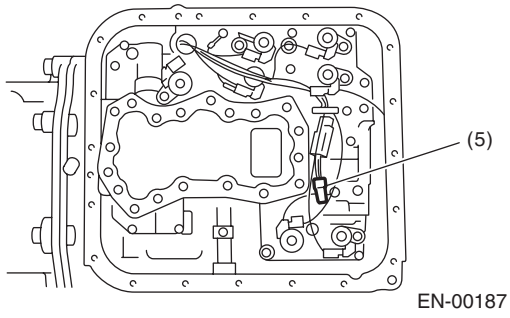


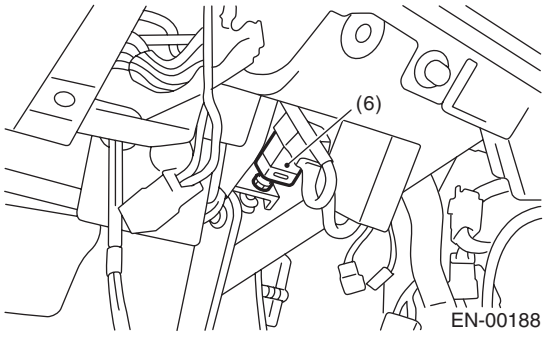
• Sensor





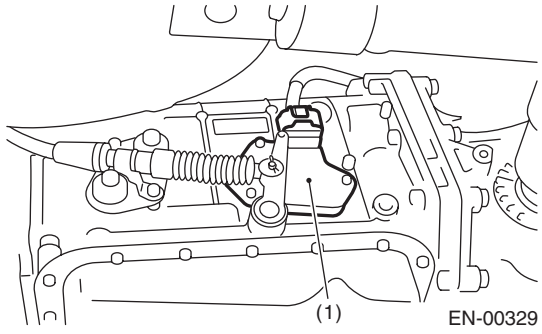


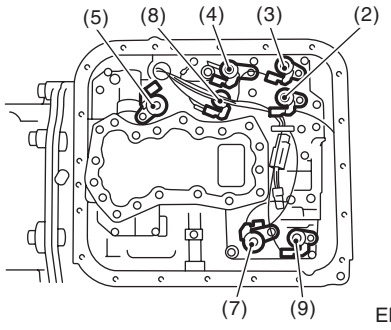


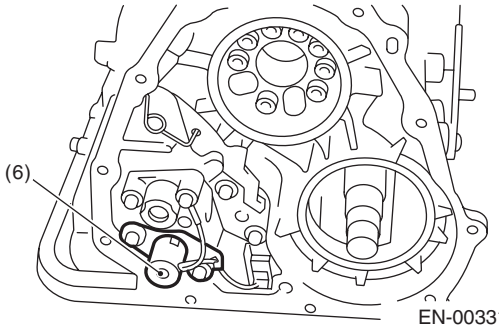


(1) Rear vehicle speed sensor (for AT model)
(2) Front vehicle speed sensor (for MT model)
(3) Front vehicle speed sensor (for AT model)
(4) Torque converter turbine speed sensor (for AT model)
(5) ATF temperature sensor (for AT model)
(6) Brake light switch

• Solenoid Valve and Switch (AT model)



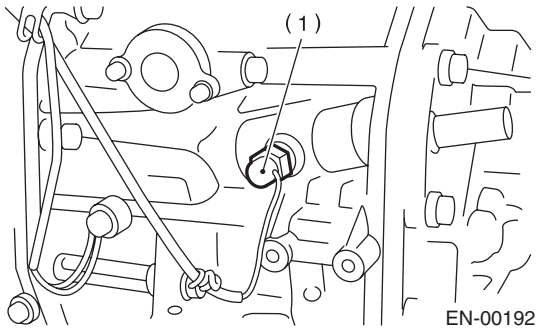




SUBARU.

(1) Inhibitor switch
(2) Shift solenoid valve 1
(3) Shift solenoid valve 2
(4) Line pressure duty solenoid
(5) Lock-up duty solenoid
(6) Transfer duty solenoid
(7) 2-4 brake duty solenoid
(8) Low clutch timing solenoid valve
(9) 2-4 brake timing solenoid valve

• Solenoid Valve and Switch (MT model)

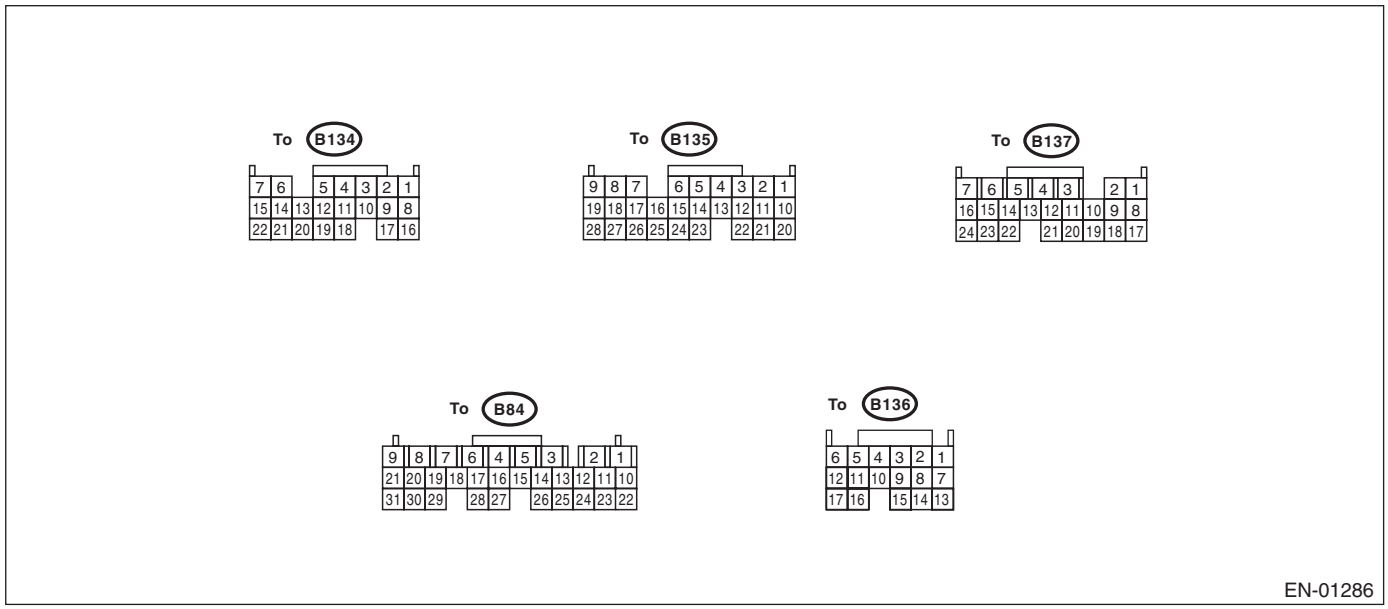


SUBARU.

(1) Neutral position switch

5. Engine Control Module (ECM) I/O Signal

A: ELECTRICAL SPECIFICATION



Content		Connector No.	Terminal No.		Signal (V)		Note
					Ignition SW ON (Engine OFF)	Engine ON (Idling)	
Crankshaft position sensor	Signal (+)	B135	2		0	–7 — +7	Sensor output waveform
	Signal (–)	B135	11		0	0	—
	Shield	B135	21		0	0	—
Camshaft position sensor	Signal (+)	B135	1		0	–7 — +7	Sensor output waveform
	Signal (–)	B135	10		0	0	—
	Shield	B135	21		0	0	—
Throttle position sensor	Signal	B135	7		Fully closed: 0.2 — 1.0 Fully opened: 4.2 — 4.7		—
	Power supply	B135	9		5	5	—
	GND (sensor)	B135	19		0	0	—
Rear oxygen sensor	Signal	B135	17		0	0 — 0.9	—
	Shield	B135	26		0	0	—
	GND (sensor)	B135	19		0	0	—
Front oxygen (A/F) sensor heater	Signal 1	B84	5		0 — 1.0	—	Sensor output waveform
	Signal 2	B84	4		0 — 1.0	—	Sensor output waveform
Rear oxygen sensor heater signal		B137	13		0 — 1.0	—	Sensor output waveform
Engine coolant temperature sensor	Signal	B135	18		1.0 — 1.4	1.0 — 1.4	After warm-up the engine.
	GND (sensor)	B135	19		0	0	After warm-up the engine.
Vehicle speed signal		B134	1		0 or 5	0 or 5	“5” and “0” are repeatedly displayed when vehicle is driven.
Generator signal		B84	*12	11	ON: 1, or less OFF: 5 — 7	ON: 1, or less OFF: 5 — 7	Waveform

Engine Control Module (ECM) I/O Signal

Content		Connector No.	Terminal No.	Signal (V)		Note
				Ignition SW ON (Engine OFF)	Engine ON (Idling)	
Mass air flow sensor	Signal	B136	13	—	0.3 — 4.5	—
	Shield	B136	8	0	0	—
	GND	B136	7	0	0	—
Intake air temperature sensor signal		B135	27	0.3 — 4.6	0.3 — 4.6	—
Exhaust gas temperature sensor	Signal	B135	16	—	—	—
	GND (sensor)	B135	19	0	0	—
Tumble generator valve position sensor RH	Signal	B135	23	Fully closed: 3.8 — 4.9 Fully opened: 0.2 — 0.9		—
	Power supply	B135	9	5	5	—
	GND (sensor)	B135	19	0	0	—
Tumble generator valve position sensor LH	Signal	B135	13	Fully closed: 3.8 — 4.9 Fully opened: 0.2 — 0.9		—
	Power supply	B135	9	5	5	—
	GND (sensor)	B135	19	0	0	—
Tumble generator valve RH (open)		B136	4	0 or 10 — 13	0 or 13 — 14	—
Tumble generator valve RH (close)		B136	5	0 or 10 — 13	0 or 13 — 14	—
Tumble generator valve LH (open)		B136	10	0 or 10 — 13	0 or 13 — 14	—
Tumble generator valve LH (close)		B136	11	0 or 10 — 13	0 or 13 — 14	—
Wastegate control solenoid valve		B84	24	10 — 13	13 — 14	—
Starter switch		B134	16	0	0	Cranking: 8 — 14
A/C switch		B134	6	ON: 10 — 13 OFF: 0	ON: 13 — 14 OFF: 0	—
Ignition switch		B134	14	10 — 13	13 — 14	—
Neutral position switch		B134	8	ON: 0 OFF: 10 — 13	ON: 0 OFF: 13 — 14	Switch is ON when gear is in neutral position.
Test mode connector		B134	5	5	5	When connected: 0
Knock sensor	Signal	B135	4	2.8	2.8	—
	Shield	B135	22	0	0	—
Back-up power supply		B84	10	10 — 13	13 — 14	Ignition switch “OFF”: 10 — 13
Control unit power supply		B84	2	10 — 13	13 — 14	—
		B84	3	10 — 13	13 — 14	—
Sensor power supply		B135	9	5	5	—
Line end check 1		B134	10	0	0	—
Ignition control	#1	B137	24	0	13 — 14	Waveform
	#2	B137	23	0	13 — 14	Waveform
	#3	B137	22	0	13 — 14	Waveform
	#4	B137	21	0	13 — 14	Waveform
Oil flow control solenoid valve (LH)	Signal (+)	B136	17	ON: 10 — 13 OFF: 0	ON: 13 — 14 OFF: 0	—
	Signal (–)	B136	16	0	0	—

Content		Connector No.	Terminal No.	Signal (V)		Note
				Ignition SW ON (Engine OFF)	Engine ON (Idling)	
Oil flow control solenoid valve (RH)	Signal (+)	B136	6	ON: 10 — 13 OFF: 0	ON: 13 — 14 OFF: 0	—
	Signal (–)	B136	12	0	0	—
Fuel injector	#1	B84	1	10 — 13	1 — 14	Waveform
	#2	B137	6	10 — 13	1 — 14	Waveform
	#3	B137	5	10 — 13	1 — 14	Waveform
	#4	B137	4	10 — 13	1 — 14	Waveform
Idle air control solenoid valve	Signal	B137	10	0 or 13 — 14	0 or 13 — 14	Waveform
Fuel pump control unit	Signal 1	B134	13	0 or 10 — 13	0 or 13 — 14	—
	Signal 2	B137	16	0 or 5	0 or 5	Waveform
A/C relay control		B84	27	ON: 0.5, or less OFF: 10 — 13	ON: 0.5, or less OFF: 13 — 14	—
Radiator fan relay 1 control		B84	17	ON: 0.5, or less OFF: 10 — 13	ON: 0.5, or less OFF: 13 — 14	—
Radiator fan relay 2 control		B84	28	ON: 0.5, or less OFF: 10 — 13	ON: 0.5, or less OFF: 13 — 14	Model with A/C only
Malfunction indicator lamp		B84	15	—	—	Light “ON”: 1, or less Light “OFF”: 10 — 14
Engine speed output		B137	9	—	0 — 13, or more	Waveform
Purge control solenoid valve		B84	16	ON: 1, or less OFF: 10 — 13	ON: 1, or less OFF: 13 — 14	Waveform
Manifold absolute pressure sensor	Signal	B135	8	1.7 — 2.4	1.1 — 1.6	—
	Power supply	B135	9	5	5	
	GND (sensor)	B135	19	0	0	
Fuel level sensor		B135	25	0.12 — 4.75	0.12 — 4.75	—
Small light switch		B134	17	ON: 0 OFF: 10 — 13	ON: 0 OFF: 13 — 14	—
Blower fan switch		B134	9	ON: 0 OFF: 10 — 13	ON: 0 OFF: 13 — 14	—
Rear defogger switch		B134	3	ON: 0 OFF: 10 — 13	ON: 0 OFF: 13 — 14	—
Power steering oil pressure switch		B135	24	10 — 13	ON: 0 OFF: 13 — 14	—
Wiper switch		B135	12	ON: 10 — 13 OFF: 0	ON: 13 — 14 OFF: 0	—
Front oxygen (A/F) sensor signal (+)		B84	29	2.8 — 3.2	2.8 — 3.2	—
Front oxygen (A/F) sensor signal (–)		B84	19	2.4 — 2.7	2.4 — 2.7	—
Front oxygen (A/F) sensor shield		B84	18	0	0	—
AVCS camshaft position sensor (LH)	Signal (+)	B136	9	0	–5 — +5	Sensor output waveform
	Signal (–)	B136	15	0	0	—
	Shield	B136	14	0	0	—
AVCS camshaft position sensor (RH)	Signal (+)	B136	2	0	–5 — +5	Sensor output waveform
	Signal (–)	B136	3	0	0	—
	Shield	B136	14	0	0	—

Content	Connector No.	Terminal No.	Signal (V)		Note
			Ignition SW ON (Engine OFF)	Engine ON (Idling)	
SSM/GST communication line	B134	21	Less than 1 ←→ More than 4	Less than 1 ←→ More than 4	—
Torque control 1 signal	B134	19	More than 4	More than 4	—
Torque control 2 signal	B134	18	More than 4	More than 4	—
Torque control cut signal	B137	14	More than 8	More than 8	—
AT load signal	B135	28	4.3 — 4.4	0.9 — 1.4	—
GND (sensors)	B135	19	0	0	—
GND (injectors)	B137	8	0	0	—
GND (ignition system)	B137	18	0	0	—
GND (power supply)	B137	17	0	0	—
	B134	22	0	0	—
GND (control systems)	B134	7	0	0	—
	B134	15	0	0	—
GND (oxygen sensor heater 1)	B84	9	0	0	—
GND (oxygen sensor heater 2)	B84	8	0	0	—

*: Australia model (Except STi)

6. Engine Condition Data

A: ELECTRICAL SPECIFICATION

Content	Specified data
Engine load	1.6 — 2.9 (%): Idling
	6.4 — 12.8 (%): 2,500 rpm racing

Measuring condition:
- After warm-up the engine.
- Gear position is in neutral position.
- A/C is turned to OFF.
- All accessory switches are turned to OFF.

7. Transmission Control Module (TCM) I/O Signal

A: ELECTRICAL SPECIFICATION

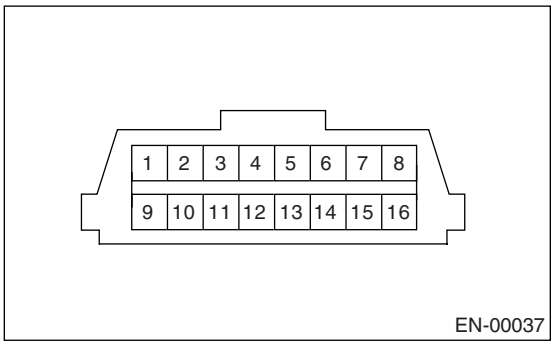
<Ref. to 4AT(diag)-12, Transmission Control Module (TCM) I/O Signal.>

8. Data Link Connector

A: NOTE

This connector is used both for the general scan tools and Subaru Select Monitor.

CAUTION:
Do not connect any scan tools other than the general scan tools and Subaru Select Monitor, because the circuit for Subaru Select Monitor may be damaged.



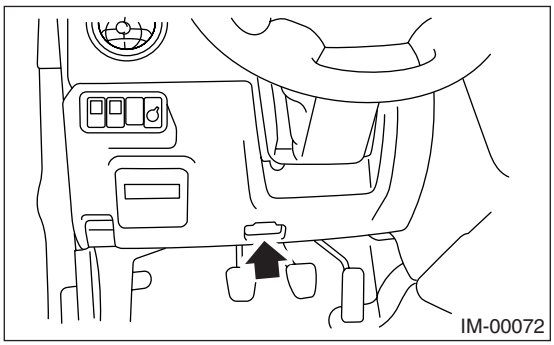
Terminal No.	Contents	Terminal No.	Contents
1	Power supply	9	Blank
2	Blank	10	Subaru Select Monitor signal
3	Blank	11	Blank
4	Blank	12	Ground
5	Blank	13	Ground
6	Line end check signal 1	14	Blank
7	Blank	15	Blank
8	Blank	16	Blank

9. General Scan Tool

A: OPERATION

1. HOW TO USE GENERAL SCAN TOOL

1) Prepare a general scan tool required by SAE J1978.
2) Connect the general scan tool to data link connector located in the lower portion of instrument panel (on the driver's side).



3) Using the general scan tool, call up DTC and freeze frame data.
General scan tool functions consist of:
(1) MODE $01: Current powertrain diagnostic data
(2) MODE $02: Powertrain freeze frame data
(3) MODE $03: Emission-related powertrain DTC
(4) MODE $04: Clear/Reset emission-related diagnostic information
Read out the data according to repair procedures. (For detailed operation procedures, refer to the General Scan Tool Operation Manual.)

NOTE:
For details concerning DTC, refer to the List of Diagnostic Trouble Code (DTC). <Ref. to EN(H4DOTC)(diag)-72, List of Diagnostic Trouble Code (DTC).>

2. MODE $01 (CURRENT POWERTRAIN DIAGNOSTIC DATA)

Refers to data denoting the current operating condition of analog input/output, digital input/output and/or the powertrain system.
A list of the support data and PID (Parameter Identification) codes are shown in the following table.

PID	Data	Unit of measure
01	Number of emission-related powertrain DTC and malfunction indicator light status Support of diagnosis and status information	ON/OFF
03	Fuel system control status	—
04	Calculated engine load value	%
05	Engine coolant temperature	°C
06	Short term fuel trim	%
07	Long term fuel trim	%
0B	Intake manifold absolute pressure	kPa
0C	Engine revolution	rpm
0D	Vehicle speed	km/h
0E	Ignition timing advance	°
0F	Intake air temperature	°C
10	Intake air amount	g/sec
11	Throttle valve opening angle	%
13	Check whether oxygen sensor is installed.	—
15	Oxygen sensor output voltage and short term fuel trim associated with oxygen sensor — bank 2	V and %
21	Driving distance after the malfunction indicator light illuminates	km
24	A/F sensor 1 output voltage and short term fuel trim associated with A/F sensor 1	V and %
1C	On-board diagnosis system	—

NOTE:
Refer to general scan tool manufacturer's instruction manual to access current powertrain diagnostic data (MODE $01).

3. MODE $02 (POWERTRAIN FREEZE FRAME DATA)

Refers to data denoting the operating condition when trouble is sensed by the on-board diagnosis system. A list of the support data and PID (Parameter Identification) codes are shown in the following table.

PID	Data	Unit of measure
02	DTC that caused CARB required freeze frame data storage	—
03	Fuel system control status	—
04	Calculated engine load value	%
05	Engine coolant temperature	°C
06	Short term fuel trim	%
07	Long term fuel trim	%
0B	Intake manifold absolute pressure	kPa
0C	Engine revolution	rpm
0D	Vehicle speed	km/h
0E	Cylinder 1 ignition timing	°
0F	Intake air temperature	°C
10	Air flow amount	g/sec
11	Throttle opening angle	%

NOTE:
Refer to general scan tool manufacturer's instruction manual to access freeze frame data (MODE $02).

4. MODE $03 (EMISSION-RELATED POWERTRAIN DIAGNOSTIC TROUBLE CODE (DTC))

Refer to Read Diagnostic Trouble Code (DTC) for information about data denoting emission-related powertrain DTC. <Ref. to EN(H4DOTC)(diag)-38, Read Diagnostic Trouble Code (DTC).>

5. MODE $04 (CLEAR/RESET EMISSION-RELATED DIAGNOSTIC INFORMATION)

Refers to the mode used to clear or reset emission-related diagnostic information.

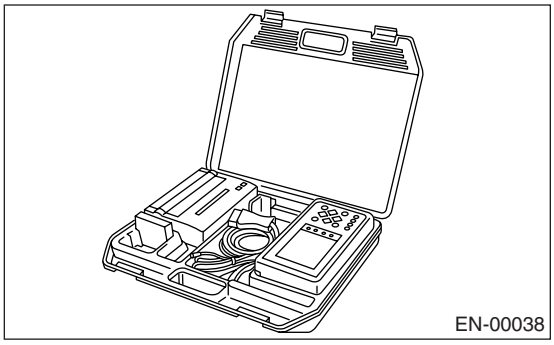
NOTE:
Refer to general scan tool manufacturer's instruction manual to clear or reset emission-related diagnostic information (MODE $04).

10.Subaru Select Monitor

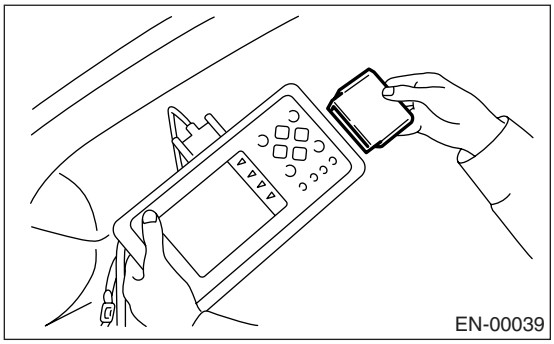
A: OPERATION

1. HOW TO USE SUBARU SELECT MONITOR

1) Prepare the Subaru Select Monitor kit. <Ref. to EN(H4DOTC)(diag)-8, PREPARATION TOOL, General Description.>

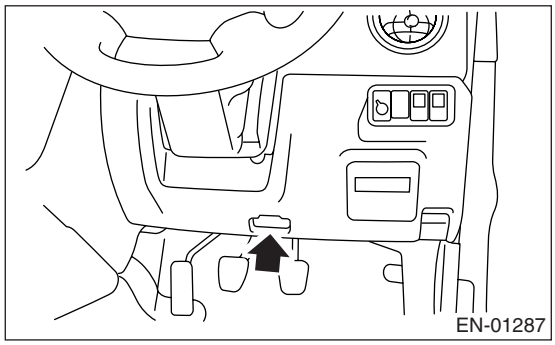


2) Connect the diagnosis cable to Subaru Select Monitor.
3) Insert the cartridge into Subaru Select Monitor. <Ref. to EN(H4DOTC)(diag)-8, PREPARATION TOOL, General Description.>



4) Connect the Subaru Select Monitor to data link connector.

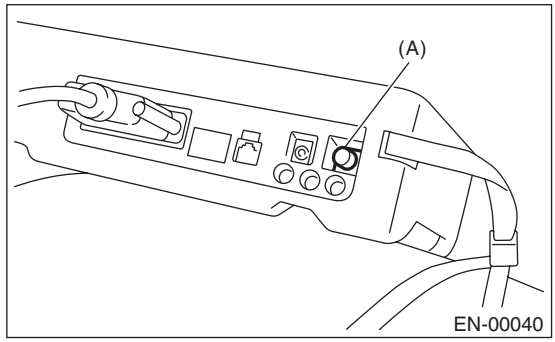
(1) Data link connector is located in the lower portion of instrument panel (on the driver's side).



(2) Connect the diagnosis cable to data link connector.

CAUTION:
Do not connect the scan tools except for Subaru Select Monitor and general scan tool.

5) Turn the ignition switch to ON (engine OFF) and Subaru Select Monitor power switch to ON.



(A) Power switch

6) Using the Subaru Select Monitor, read the DTC and various data, and then record them.

2. READ DIAGNOSTIC TROUBLE CODE (DTC) FOR ENGINE. (NORMAL MODE)

Refer to Read Diagnostic Trouble Code (DTC) for information about how to indicate DTC. <Ref. to EN(H4DOTC)(diag)-38, Read Diagnostic Trouble Code (DTC).>

3. READ DIAGNOSTIC TROUBLE CODE (DTC) FOR ENGINE. (OBD MODE)

Refer to Read Diagnostic Trouble Code (DTC) for information about how to indicate DTC. <Ref. to EN(H4DOTC)(diag)-38, Read Diagnostic Trouble Code (DTC).>

4. READ CURRENT DATA FOR ENGINE. (NORMAL MODE)

1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Engine} and press the [YES] key.
3) Press the [YES] key after the information of engine type was displayed.
4) On the «Engine Diagnosis» screen, select the {Current Data Display/Save}, and then press the [YES] key.
5) On the «Data Display Menu» screen, select the {Data Display} and press the [YES] key.
6) Using the scroll key, move the display screen up or down until the desired data is shown.

• A list of the support data is shown in the following table.

Remarks	Display	Unit of measure	Note (at idling)
Engine coolant temperature signal	Coolant Temp.	°C	80 — 100°C
A/F correction 1	A/F Correction #1	%	–10 — +10%
A/F learning 1	A/F Learning #1	%	–10 — +10%
Intake manifold absolute pressure	Mani. Absolute Pressure	mmHg	250 — 350 mmHg
Intake manifold relative pressure	Mani. Relative Pressure	mmHg	Intake manifold absolute pressure – atmospheric pressure
Engine speed signal	Engine Speed	rpm	630 — 770 rpm (Agree with the tachometer indication)
Vehicle speed signal	Vehicle Speed	km/h	0 km/h (at parking)
Ignition timing signal	Ignition Timing	deg	9 — 15 deg
Intake air temperature signal	Intake Air Temp.	°C	10 — 30°C higher than ambient temperature
Amount of intake air	Mass Air Flow	g/s	2 — 3 g/s
Throttle opening angle signal	Throttle Opening Angle	%	0% (80° = 100%)
Throttle voltage	Throttle voltage	V	0.35 — 0.65 V
Rear oxygen sensor voltage	Rear O2 Sensor	V	0 — 1.0 V
Rear oxygen sensor heater voltage	Rear O2 Heater Voltage	V	0 — 4 V
Battery voltage	Battery Voltage	V	12 — 15 V
Mass air flow voltage	Air Flow Sensor Voltage	V	1.0 — 1.3 V
Injection 1 pulse width	Fuel Injection #1 Pulse	ms	2 — 3.5 ms
Knock sensor correction	Knock Correction	deg	0.0 deg
Primary supercharged pressure control signal	Primary Control	%	0.0%
Purge control solenoid duty ratio	CPC Valve Duty Ratio	%	0 — 25%
Generator duty ratio	ALT Duty	%	0 — 100%
Fuel pump duty ratio	Fuel Pump Duty	%	28 — 38%
AVCS advance angle amount RH	VVT Adv. Ang. Amount R	deg	–2 — +2 deg
AVCS advance angle amount LH	VVT Adv. Ang. Amount L	deg	–2 — +2 deg
Oil flow control solenoid valve duty RH (AVCS)	OCV Duty R	%	10 — 20%
Oil flow control solenoid valve duty LH (AVCS)	OCV Duty L	%	10 — 20%
Oil flow control solenoid valve current RH	OCV Current R	mA	50 — 100 mA
Oil flow control solenoid valve current LH	OCV Current L	mA	50 — 100 mA
A/F sensor current value 1	A/F Sensor #1 Current	mA	–0.2 — +0.2 mA
A/F sensor resistance value 1	A/F Sensor #1 Resistance	ohm	27 — 32 Ω
A/F sensor output lambda 1	A/F Sensor #1	—	0.8 — 1.2
A/F correction 3	A/F Correction #3	%	0.00%
A/F sensor heater current valve 1	A/F Heater Current #1	A	1.0 — 2.0 A
Idle air control solenoid valve signal	ISC Duty	%	15 — 25%
Tumble generator valve signal	TGV Position Sensor R	V	4.0 — 4.5 V
Tumble generator valve signal	TGV Position Sensor L	V	4.0 — 4.5 V
Atmospheric pressure signal	Atmospheric Pressure	mmHg	700 — 800 mmHg

Remarks	Display	Unit of measure	Note (at idling)
AT/MT identification terminal	AT Vehicle ID Signal	—	ON/OFF
Test mode terminal	Test Mode Signal	—	OFF
Read memory terminal	Read Memory Terminal	—	OFF
Neutral position switch signal	Neutral Position Switch	—	ON
Soft idle switch signal	Idle Switch Signal	—	ON
Ignition switch signal	Ignition Switch	—	ON
Power steering switch input signal	P/S Switch	—	OFF (At OFF)
Air conditioning switch signal	A/C Switch	—	OFF (At OFF)
Starter switch signal	Starter Switch	—	OFF
Rear O_2 monitor	Rear O2 Rich Signal	—	OFF
Knocking signal	Knocking Signal	—	OFF
Crankshaft position sensor signal	Crankshaft Position Sig.	—	OFF
Camshaft position sensor signal	Camshaft Position Sig.	—	OFF
Rear defogger switch signal	Rear Defogger SW	—	OFF (At OFF)
Blower fan switch signal	Blower Fan SW	—	OFF (At OFF)
Light switch signal	Light Switch	—	OFF (At OFF)
Air conditioner compressor relay output signal	A/C Compressor Signal	—	OFF
Radiator fan relay 1 signal	Radiator Fan Relay #1	—	OFF
Radiator fan relay 2 signal	Radiator Fan Relay #2	—	OFF
Tumble generator valve output signal	TGV Output	—	OFF
Tumble generated valve drive signal	TGV Drive	—	Open
AT cooperative control request signal 1	Torque Control Signal #1	—	OFF
AT cooperative control request signal 2	Torque Control Signal #2	—	OFF
AT coordinate permission demand	Torque Permission Signal	—	ON
Intercooler water spray auto switch signal	IC Washer Switch	—	OFF (At OFF)
Intercooler water spray relay signal	IC Washer Relay	—	OFF (At OFF)

NOTE:
For detailed operation procedure, refer to the “SUBARU SELECT MONITOR OPERATION MANUAL”.

5. READ CURRENT DATA FOR ENGINE (OBD MODE)

1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Engine} and press the [YES] key.
3) Press the [YES] key after the information of engine type was displayed.
4) On the «Engine Diagnosis» display screen, select the {OBD System} and press the [YES] key.
5) On the «OBD Menu» screen, select the {Current Data Display/Save}, and then press the [YES] key.
6) On the «Data Display Menu» screen, select the {Data Display} and press the [YES] key.
7) Using the scroll key, move the display screen up or down until the desired data is shown.
• A list of the support data is shown in the following table.

Description	Display	Unit of measure
Number of diagnosis code	Number of Diag. Code:	—
Condition of malfunction indicator light	MI (MIL)	ON or OFF
Monitoring test of misfire	Misfire monitoring	no support
Monitoring test of fuel system	Fuel system monitoring	complete or incomplete
Monitoring test of comprehensive component	Component monitoring	complete or incomplete
Test of catalyst	Catalyst Diagnosis	no support
Test of heating-type catalyst	Heated catalyst	no support
Test of evaporative emission purge control system	Evaporative purge system	no support
Test of secondary air system	Secondary air system	no support
Test of air conditioning system refrigerant	A/C system refrigerant	no support
Test of oxygen sensor	Oxygen sensor	complete or incomplete
Test of oxygen sensor heater	O2 Heater Diagnosis	complete or incomplete
Test of EGR system	EGR system	no support

NOTE:
For detailed operation procedure, refer to the “SUBARU SELECT MONITOR OPERATION MANUAL”.

6. READ FREEZE FRAME DATA FOR ENGINE. (OBD MODE)

1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Engine Control System} and press the [YES] key.
3) Press the [YES] key after the information of engine type is displayed.
4) On the «Engine Diagnosis» display screen, select the {OBD System} and press the [YES] key.
5) On the «OBD Menu» display screen, select the {Freeze Frame Data} and press the [YES] key.
• A list of the support data is shown in the following table.

Contents	Display	Unit of measure
DTC for freeze frame data	Freeze frame data	DTC
Air fuel ratio control system for bank 1	Fuel system for Bank1	ON or OFF
Engine load data	Engine Load	%
Engine coolant temperature signal	Coolant Temp.	°C or °F
Short term fuel trim by front oxygen (A/F) sensor	Short term fuel trim B1	%
Long term fuel trim by front oxygen (A/F) sensor	Long term fuel trim B1	%
Intake manifold absolute pressure signal	Mani. Absolute Pressure	mmHg, kPa, inHg or psi
Engine speed signal	Engine Speed	rpm
Vehicle speed signal	Vehicle Speed	km/h or MPH
Air fuel ratio control system for bank 1	Fuel System for Bank 1	—
Ignition timing advance for #1 cylinder	Ignition timing adv. #1	°
Intake air temperature signal	Intake Air Temp.	°C or °F
Intake air amount	Mass Air Flow	g/s
Throttle position signal	Throttle Opening Angle	%

NOTE:
For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

7. LED OPERATION MODE FOR ENGINE

1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Engine} and press the [YES] key.
3) Press the [YES] key after the information of engine type was displayed.
4) On the «Engine Diagnosis» screen, select the {Current Data Display/Save}, and then press the [YES] key.
5) On the «Data Display» screen, select the {Data & LED Display} and press the [YES] key.
6) Using the scroll key, move the display screen up or down until the desired data is shown.

- A list of the support data is shown in the following table.

Remarks	Display	Message	LED "ON" requirements
AT/MT identification signal	AT Vehicle ID Signal	ON or OFF	Illuminate (AT model)
Test mode signal	Test Mode Signal	ON or OFF	When test mode connector is connected.
Read memory signal	Read Memory Terminal	ON or OFF	When read memory connector is connected.
Neutral position switch signal	Neutral Position Switch	ON or OFF	When neutral position signal is entered.
Idle switch signal	Idle Switch Signal	ON or OFF	When idle switch signal is entered.
Ignition switch signal	Ignition Switch	ON or OFF	When ignition switch is turned to ON.
Power steering switch signal	P/S Switch	ON or OFF	When power steering switch is entered.
Starter switch signal	Starter Switch	ON or OFF	When starter switch is input.
Air conditioning switch signal	A/C Switch	ON or OFF	When air conditioning switch is input.
Rear oxygen sensor rich signal	Rear O2 Rich Signal	ON or OFF	When rear oxygen sensor mixture ratio is rich.
Knocking signal	Knocking Signal	ON or OFF	When knocking signal is input.
Crankshaft position sensor signal	Crankshaft Position Signal	ON or OFF	When crankshaft position sensor signal is input.
Camshaft position sensor signal	Camshaft Position Signal	ON or OFF	When camshaft position sensor signal is input.
Rear defogger switch signal	Rear Defogger Switch	ON or OFF	When rear defogger switch is turned to ON.
Blower fan switch signal	Blower Fan Switch	ON or OFF	When blower fan switch is turned to ON.
Small light switch signal	Light Switch	ON or OFF	When small light switch is turned to ON.
Air conditioning relay signal	A/C Compressor Signal	ON or OFF	When air conditioning relay is in function.
Radiator fan relay 1 signal	Radiator Fan Relay #1	ON or OFF	When radiator fan relay 1 is in function.
Radiator fan relay 2 signal	Radiator Fan Relay #2	ON or OFF	When radiator fan relay 2 is in function.
AT cooperative control request signal 1	Torque Control Signal #1	ON or OFF	When AT cooperative control request signal is input.
AT cooperative control request signal 2	Torque Control Signal #2	ON or OFF	When AT cooperative control request signal is input.
AT coordinate permission signal	Torque Control Permission	ON or OFF	When AT coordinate permission signal is input.
Intercooler water spray auto switch signal	IC Washer Switch	ON or OFF	When intercooler water spray auto switch signal is input.
Intercooler water spray relay signal	IC Washer Relay	ON or OFF	When intercooler water spray relay signal is input.

NOTE:
For detailed operation procedure, refer to the “SUBARU SELECT MONITOR OPERATION MANUAL”.

8. READ CURRENT DATA FOR AT

1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Transmission Control System} and press the [YES] key.
3) Press the [YES] key after the information of transmission type is displayed.
4) On the «Transmission Diagnosis» display screen, select the {Current Data Display & Save} and press the [YES] key.
5) On the «Data Display Menu» display screen, select the {Data Display} and press the [YES] key.
6) Using the scroll key, move the display screen up or down until desired data is shown.
• A list of the support data is shown in the following table.

Contents	Display	Unit of measure
Battery voltage	Battery Voltage	V
Rear vehicle speed sensor signal	Rear Wheel Speed	km/h or MPH
Front vehicle speed sensor signal	Front Wheel Speed	km/h or MPH
Engine speed signal	Engine Speed	rpm
Automatic transmission fluid temperature signal	ATF Temp.	°C or °F
Mass air flow sensor signal	Air Flow Sensor Voltage	V
Throttle position signal	Throttle Sensor Voltage	V
Gear position	Gear Position	—
Line pressure control duty ratio	Line Pressure Duty Ratio	%
Lock up clutch control duty ratio	Lock Up Duty Ratio	%
Transfer clutch control duty ratio	Transfer Duty Ratio	%
Power supply for throttle position sensor	Throttle Sensor Power	V
Torque converter turbine speed signal	Turbine Revolution Speed	rpm
2-4 brake timing pressure control duty ratio	Brake Clutch Duty Ratio	%
Stop lamp switch signal	Stop Light Switch	ON or OFF
Anti lock brake system signal	ABS Signal	ON or OFF
Cruise control system signal	Cruise Control Signal	ON or OFF
Neutral/Parking range signal	N/P Range Signal	ON or OFF
Reverse range signal	R Range Signal	ON or OFF
Drive range signal	D Range Signal	ON or OFF
3rd range signal	3rd Range Signal	ON or OFF
2nd range signal	2nd Range Signal	ON or OFF
1st range signal	1st Range Signal	ON or OFF
Shift control solenoid A	Shift Solenoid #1	ON or OFF
Shift control solenoid B	Shift Solenoid #2	ON or OFF
Torque control output signal #1	Torque Control Signal #1	ON or OFF
Torque control output signal #2	Torque Control Signal #2	ON or OFF
Torque control cut signal	Torque Control Cut Sig.	ON or OFF
2-4 brake timing control solenoid valve	2-4 Brake Timing Sol.	ON or OFF
Low clutch timing control solenoid valve	Low Clutch Timing Sol.	ON or OFF
Automatic transmission diagnosis indicator lamp	Diagnosis Lamp	ON or OFF

NOTE:
For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

11. Read Diagnostic Trouble Code (DTC)

A: OPERATION

1. SUBARU SELECT MONITOR (NORMAL MODE)

1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Engine Control System} and press the [YES] key.
3) Press the [YES] key after the information of engine type is displayed.
4) On the «Engine Diagnosis» display screen, select the {DTC Display} and press the [YES] key.
5) On the «DTC Display» display screen, select the {Current DTC} or {History DTC} and press the [YES] key.

NOTE:
• For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.
• For detailed concerning DTC, refer to the List of Diagnostic Trouble Code (DTC). <Ref. to EN(H4DOTC)(diag)-72, List of Diagnostic Trouble Code (DTC).>

2. SUBARU SELECT MONITOR (OBD MODE)

1) On the «Main Menu» display screen, select the {2. Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Engine Control System} and press the [YES] key.
3) Press the [YES] key after the information of engine type is displayed.
4) On the «Engine Diagnosis» display screen, select the {OBD System} and press the [YES] key.
5) On the «OBD Menu» display screen, select the {DTC Display} and press the [YES] key.
6) Make sure that a DTC is shown on the display screen.

NOTE:
• For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.
• For detailed concerning DTC, refer to the List of Diagnostic Trouble Code (DTC). <Ref. to EN(H4DOTC)(diag)-72, List of Diagnostic Trouble Code (DTC).>

3. GENERAL SCAN TOOL

Refers to data denoting emission-related powertrain DTC.
For details concerning DTC, refer to the List of Diagnostic Trouble Code (DTC). <Ref. to EN(H4DOTC)(diag)-72, List of Diagnostic Trouble Code (DTC).>

NOTE:
Refer to general scan tool manufacturer's instruction manual to access emission-related powertrain DTC (MODE $03).

12.Inspection Mode

A: PROCEDURE

Carry out trouble diagnosis shown in the following DTC table.
When performing trouble diagnosis which is not shown in the DTC table, refer to the next item Drive cycle. <Ref. to EN(H4DOTC)(diag)-44, Drive Cycle.>

DTC	Item	Condition
P0011	Intake Camshaft Position-Timing Over-Advanced or System Performance (Bank 1)	—
P0021	Intake Camshaft Position-Timing Over-Advanced or System Performance (Bank 2)	—
P0030	HO2S Heater Control Circuit (Bank 1 Sensor 1)	—
P0031	HO2S Heater Control Circuit Low (Bank 1 Sensor 1)	—
P0032	HO2S Heater Control Circuit High (Bank 1 Sensor 1)	—
P0037	HO2S Heater Control Circuit Low (Bank 1 Sensor 2)	—
P0038	HO2S Heater Control Circuit High (Bank 1 Sensor 2)	—
P0068	MAP/MAF - Throttle Position Correlation	—
P0102	Mass or Volume Air Flow Circuit Low Input	—
P0103	Mass or Volume Air Flow Circuit High Input	—
P0107	Manifold Absolute Pressure/Barometric Pressure Circuit Low Input	—
P0108	Manifold Absolute Pressure/Barometric Pressure Circuit High Input	—
P0112	Intake Air Temperature Sensor 1 Circuit Low	—
P0113	Intake Air Temperature Sensor 1 Circuit High	—
P0117	Engine Coolant Temperature Circuit Low	—
P0118	Engine Coolant Temperature Circuit High	—
P0122	Throttle/Pedal Position Sensor/Switch “A” Circuit Low	—
P0123	Throttle/Pedal Position Sensor/Switch “A” Circuit High	—
P0130	O2 Sensor Circuit (Bank 1 Sensor 1)	—
P0134	O2 Sensor Circuit No Activity Detected (Bank 1 Sensor 1)	—
P0137	O2 Sensor Circuit Low Voltage (Bank 1 Sensor 2)	—
P0138	O2 Sensor Circuit High Voltage (Bank 1 Sensor 2)	—
P0171	System Too Lean (Bank 1)	—
P0172	System Too Rich (Bank 1)	—
P0230	Fuel Pump Primary Circuit	—
P0245	Turbo/Super Charger Wastegate Solenoid “A” Low	—
P0246	Turbo/Super Charger Wastegate Solenoid “A” High	—
P0327	Knock Sensor 1 Circuit Low (Bank 1 or Single Sensor)	—
P0328	Knock Sensor 1 Circuit High Input (Bank 1 or Single Sensor)	—
P0335	Crankshaft Position Sensor “A” Circuit	—
P0336	Crankshaft Position Sensor “A” Circuit Range/Performance	—
P0340	Camshaft Position Sensor “A” Circuit (Bank 1 or Single Sensor)	—
P0341	Camshaft Position Sensor “A” Circuit Range/Performance (Bank 1 or Single Sensor)	—
P0365	Camshaft Position Sensor “B” Circuit (Bank 1)	—
P0390	Camshaft Position Sensor “B” Circuit (Bank 2)	—
P0458	Evaporative Emission System Purge Control Valve Circuit Low	—
P0462	Fuel Level Sensor “A” Circuit Low	—
P0463	Fuel Level Sensor “A” Circuit High	—
P0502	Vehicle Speed Sensor “A” Circuit Low Input	—
P0503	Vehicle Speed Sensor “A” Intermittent/Erratic/High	—
P0508	Idle Air Control System Circuit Low	—
P0509	Idle Air Control System Circuit High	—
P0512	Starter Request Circuit	—

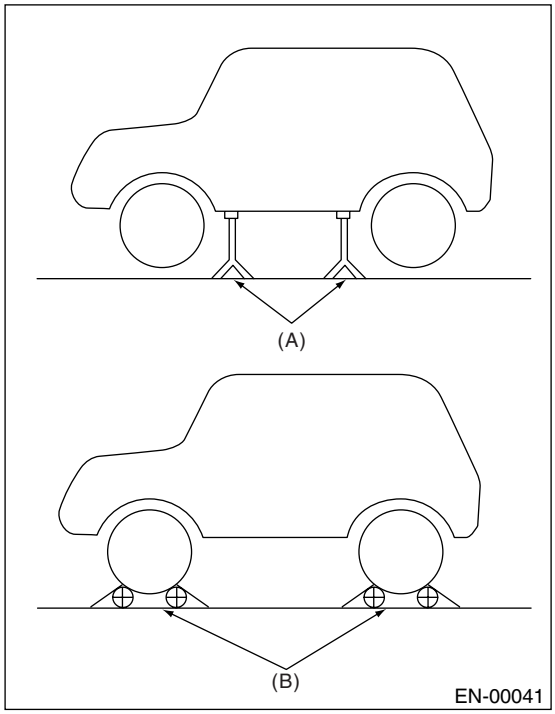
DTC	Item	Condition
P0513	Incorrect Immobilizer Key	—
P0519	Idle Air Control System Performance	—
P0565	Cruise Control On Signal	—
P0604	Internal Control Module Random Access Memory (RAM) Error	—
P0691	Fan 1 Control Circuit Low	—
P0692	Fan 1 Control Circuit High	—
P0703	Brake Switch “B” Circuit	—
P0705	Transmission Range Sensor Circuit Malfunction (PRNDL Input)	—
P0710	Transmission Fluid Temperature Sensor “A” Circuit	—
P0716	Input/Turbine Speed Sensor “A” Circuit Range/Performance	—
P0720	Output Speed Sensor Circuit	—
P0726	Engine Speed Input Circuit Range/Performance	—
P0731	Gear 1 Incorrect Ratio	—
P0732	Gear 2 Incorrect Ratio	—
P0733	Gear 3 Incorrect Ratio	—
P0734	Gear 4 Incorrect Ratio	—
P0741	Torque Converter Clutch Circuit Performance or Stuck Off	—
P0743	Torque Converter Clutch Circuit Electrical	—
P0748	Pressure Control Solenoid “A” Electrical	—
P0753	Shift Solenoid “A” Electrical	—
P0758	Shift Solenoid “B” Electrical	—
P0771	Shift Solenoid “E” Performance or Stuck Off	—
P0778	Pressure Control Solenoid “B” Electrical	—
P0785	Shift/Timing Solenoid	—
P0851	Park/Neutral Switch Input Circuit Low	—
P0852	Park/Neutral Switch Input Circuit High	—
P1134	A/F Sensor Micro-Computer Problem (Bank1 Sensor1)	—
P1152	O2 Sensor Circuit Range/Performance (Low) (Bank1 Sensor1)	—
P1153	O2 Sensor Circuit Range/Performance (High) (Bank1 Sensor1)	—
P1306	OCV Solenoid Valve Signal 1 Circuit Malfunction (Open)	—
P1307	OCV Solenoid Valve Signal 1 Circuit Malfunction (Short)	—
P1308	OCV Solenoid Valve Signal 2 Circuit Malfunction (Open)	—
P1309	OCV Solenoid Valve Signal 2 Circuit Malfunction (Short)	—
P1518	Starter Switch Circuit Low Input	—
P1560	Back-up Voltage Circuit Malfunction	—
P1570	Antenna	—
P1571	Reference Code Incompatibility	—
P1572	IMM Circuit Failure (Except Antenna Circuit)	—
P1574	Key Communication Failure	—
P1576	EGI Control Module EEPROM	—
P1577	IMM Control Module EEPROM	—
P1700	Throttle Position Sensor	—
P1711	Engine Torque Control Signal 1 Circuit Malfunction	—
P1712	Engine Torque Control Signal 2 Circuit Malfunction	—
P2004	Intake Manifold Runner Control Stuck Open (Bank 1)	Engine coolant temperature is –5 — 5°C (–41 — 41°F) at engine start.
P2005	Intake Manifold Runner Control Stuck Open (Bank 2)	Engine coolant temperature is –5 — 5°C (–41 — 41°F) at engine start.
P2006	Intake Manifold Runner Control Stuck Closed (Bank 1)	—
P2007	Intake Manifold Runner Control Stuck Closed (Bank 2)	—
P2008	Intake Manifold Runner Control Stuck Circuit/Open (Bank 1)	—
P2009	Intake Manifold Runner Control Stuck Circuit Low (Bank 1)	—

DTC	Item	Condition
P2011	Intake Manifold Runner Control Stuck Circuit/Open (Bank 2)	—
P2012	Intake Manifold Runner Control Stuck Circuit Low (Bank 2)	—
P2016	Intake Manifold Runner Position Sensor/Switch Circuit Low (Bank 1)	—
P2017	Intake Manifold Runner Position Sensor/Switch Circuit High (Bank 1)	—
P2021	Intake Manifold Runner Position Sensor/Switch Circuit Low (Bank 2)	—
P2022	Intake Manifold Runner Position Sensor/Switch Circuit High (Bank 2)	—
P2227	Barometric Pressure Circuit Range/Performance	—
P2228	Barometric Pressure Circuit Low	—
P2229	Barometric Pressure Circuit High	—
P2503	Charging System Voltage Low	—
P2504	Charging System Voltage High	—

1. PREPARATION FOR THE INSPECTION MODE

1) Make sure that the fuel remains approx. half amount [20 — 40 ℓ (5.3 — 10.6 US gal, 4.4 — 8.8 Imp gal)] and the battery voltage is 12 V or more.
2) Raise the vehicle using a garage jack and place on rigid racks or drive the vehicle onto free rollers.

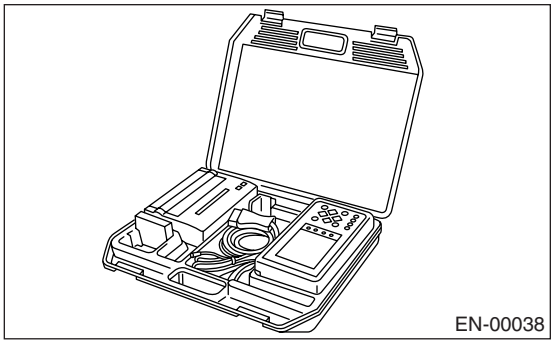
WARNING:
• Before raising the vehicle, ensure the parking brake is applied.
• Do not use a pantograph jack in place of a rigid rack.
• Secure a rope or wire to the front and rear towing or tie-down hooks to prevent the lateral runout of front wheels.
• Do not abruptly depress/release the clutch pedal or accelerator pedal during works even when engine is operating at low speeds since this may cause vehicle to jump off free rollers.
• In order to prevent the vehicle from slipping due to vibration, do not place any wooden blocks or similar items between the rigid racks and the vehicle.
• Since the rear wheels will also rotate, do not place anything near them. Also, make sure that nobody goes in front of the vehicle.



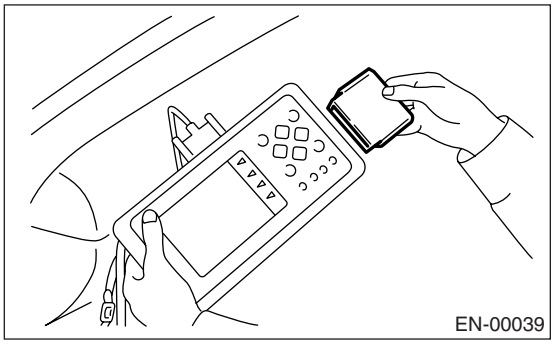
(A) Rigid rack
(B) Free rollers

2. SUBARU SELECT MONITOR

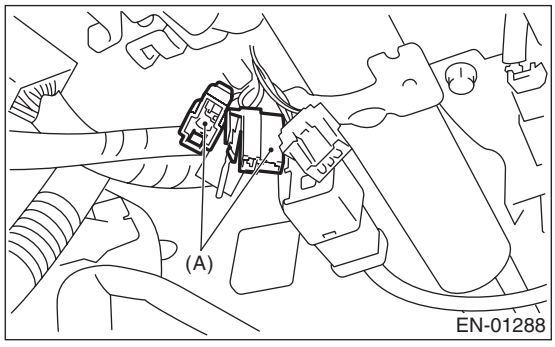
1) Clearing the memory, check for any remaining unresolved trouble data. <Ref. to EN(H4DOTC)(diag)-46, Clear Memory Mode.>
2) Warm up the engine.
3) Prepare the Subaru Select Monitor kit. <Ref. to EN(H4DOTC)(diag)-8, PREPARATION TOOL, General Description.>



4) Connect the diagnosis cable to Subaru Select Monitor.
5) Insert the cartridge into Subaru Select Monitor. <Ref. to EN(H4DOTC)(diag)-8, PREPARATION TOOL, General Description.>



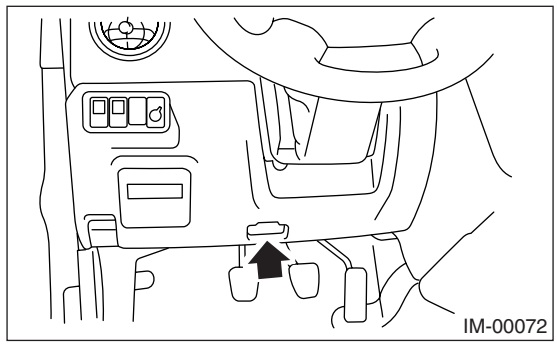
6) Connect the test mode connector (A) at the lower portion of instrument panel (on the driver's side).



(A) Test mode connector

7) Connect the Subaru Select Monitor to data link connector.

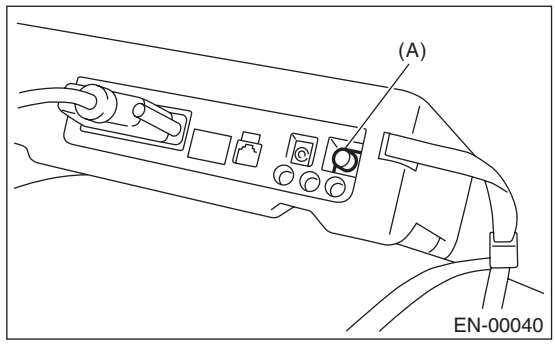
(1) Connect the Subaru Select Monitor to data link connector located in the lower portion of the instrument panel (on the driver's side).



(2) Connect the diagnosis cable to data link connector.

CAUTION:
Do not connect the scan tools except for Subaru Select Monitor and general scan tool.

8) Turn the ignition switch to ON (engine OFF) and Subaru Select Monitor power switch to ON.



(A) Power switch

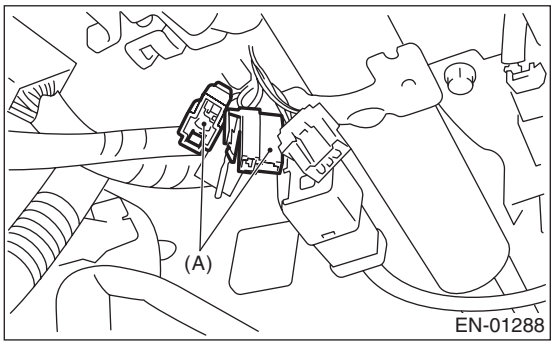
9) On the «Main Menu» display screen, select the {2. Each System Check} and press the [YES] key.
10) On the «System Selection Menu» display screen, select the {Engine Control System} and press the [YES] key.
11) Press the [YES] key after the information of engine type is displayed.
12) On the «Engine Diagnosis» display screen, select the {Dealer Check Mode Procedure} and press the [YES] key.
13) When the "Perform Inspection (Dealer Check) Mode?" is shown on the display screen, press the [YES] key.
14) Perform subsequent procedures as instructed on the display screen.
• If trouble still remains in the memory, the corresponding DTC appears on the display screen.

NOTE:
• For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

• For detailed concerning the DTC, refer to the List of Diagnostic Trouble Code (DTC).
<Ref. to EN(H4DOTC)(diag)-72, List of Diagnostic Trouble Code (DTC).>
• Release the parking brake.
• The speed difference between front and rear wheels may light either the ABS warning light, but this indicates no malfunctions. When the engine control diagnosis is finished, perform the ABS memory clearance procedure of self-diagnosis system.

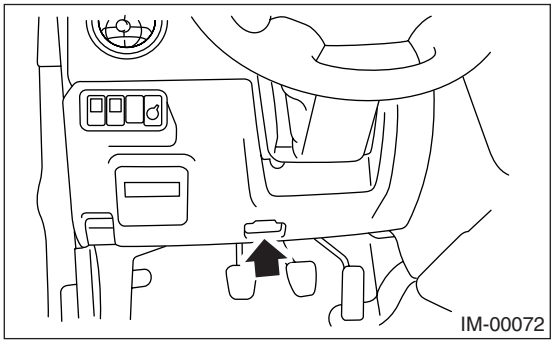
3. GENERAL SCAN TOOL

1) After performing the diagnostics and clearing memory, check for any remaining unresolved trouble data: <Ref. to EN(H4DOTC)(diag)-46, Clear Memory Mode.>
2) Warm up the engine.
3) Connect the test mode connector (A) at the lower side of instrument panel (on the driver's side).



4) Connect the general scan tool to its data link connector in the lower portion of instrument panel (on the driver's side).

CAUTION:
Do not connect the scan tools except for Subaru Select Monitor and general scan tool.



5) Start the engine.

NOTE:
• Ensure the select lever is placed in "P" range before starting. (AT model)
• Depress the clutch pedal when starting engine. (MT model)

6) Using the select lever or shift lever, turn the "P" position switch and "N" position switch to ON.
7) Depress the brake pedal to turn brake switch ON. (AT model)
8) Keep the engine speed in 2,500 — 3,000 rpm range for 40 seconds.
9) Place the select lever or shift lever in "D" range (AT model) or "1st" gear (MT model) and drive the vehicle at 5 to 10 km/h (3 to 6 MPH).

NOTE:
• On AWD model, release the parking brake.
• The speed difference between front and rear wheels may light ABS warning light, but this indicates no malfunctions. When the engine control diagnosis is finished, perform the ABS memory clearance procedure of self-diagnosis system.

10) Using the general scan tool, check for DTC and record the result(s).

NOTE:
• For detailed operation procedures, refer to the General Scan Tool Instruction Manual.
• For detailed concerning DTC, refer to the List of Diagnostic Trouble Code (DTC).
<Ref. to EN(H4DOTC)(diag)-72, List of Diagnostic Trouble Code (DTC).>

13.Drive Cycle

A: OPERATION

There are three drive patterns for the trouble diagnosis. Driving in the specified pattern allows to diagnose malfunctioning items listed below. After the malfunctioning items listed below are repaired, always check whether they correctly resume their functions by driving in the required drive pattern.

1. PREPARATION FOR THE DRIVE CYCLE

1) Make sure that the fuel remains approx. half amount [20 — 40 ℓ (5.3 — 10.6 US gal, 4.4 — 8.8 Imp gal)], and battery voltage is 12 V or more.
2) After performing the diagnostics and cleaning memory, check for any remaining unresolved trouble data. <Ref. to EN(H4DOTC)(diag)-46, Clear Memory Mode.>
3) Separate the test mode connector.

NOTE:
• Except for the engine coolant temperature specified items at starting, the diagnosis is carried out after engine warm up.
• Carry out the diagnosis which is marked * on DTC twice, then, after finishing first diagnosis, stop the engine and do second time at the same condition.

2. AFTER RUNNING 20 MINUTES AT 80 KM/H (50 MPH), IDLE ENGINE FOR 1 MINUTE.

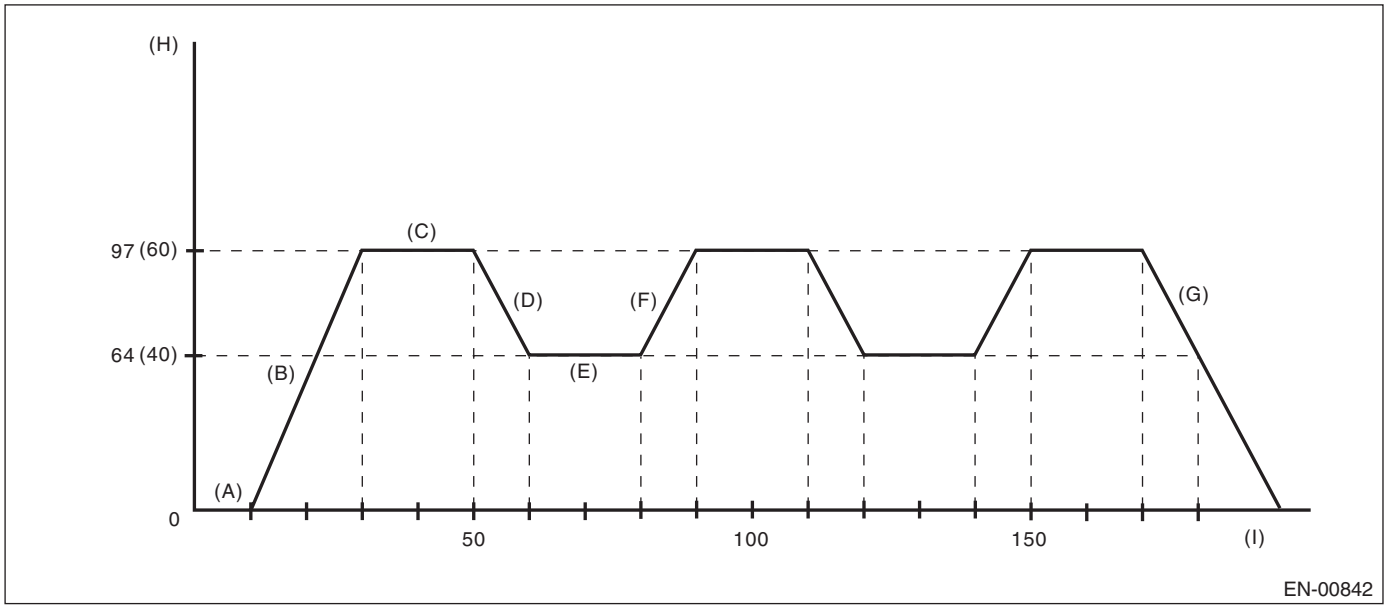
DTC	Item	Condition
*P0125	Insufficient Coolant Temperature for Closed Loop Fuel Control	Engine coolant temperature is less than 20°C (68°F) at engine start.
*P0133	O2 Sensor Circuit Slow Response (Bank 1 Sensor 1)	—
*P0420	Catalyst System Efficiency Below Threshold (Bank 1)	—
P0459	Evaporative Emission System Purge Control Valve Circuit High	—
P0461	Fuel Level Sensor “A” Circuit Range/Performance	—
P0545	Exhaust Gas Temperature Sensor Circuit Low (Bank 1 Sensor 1)	—
P0546	Exhaust Gas Temperature Sensor Circuit High (Bank 1 Sensor 1)	—
P1312	Exhaust Gas Temperature Sensor Malfunction	Engine coolant temperature is less than 30°C (86°F) at engine start.

3. IDLE FOR 10 MINUTES

NOTE:
Before the diagnosis, drive the vehicle at 10 km/h (6 MPH) or more.

DTC	Item	Condition
*P0483	Fan Rationality Check	—
*P0506	Idle Air Control System RPM Lower Than Expected	—
*P0507	Idle Air Control System RPM Higher Than Expected	—

4. DRIVE ACCORDING TO THE FOLLOWING DRIVE PATTERN



(A) Idle engine for 10 seconds or more.
(B) Accelerate to 97 km/h (60 MPH) within 20 seconds.
(C) Drive vehicle at 97 km/h (60 MPH) for 20 seconds.
(D) Decelerate with fully closed throttle to 64 km/h (40 MPH).
(E) Drive vehicle at 64 km/h (40 MPH) for 20 seconds.
(F) Accelerate to 97 km/h (60 MPH) within 10 seconds.
(G) Stop vehicle with throttle fully closed.
(H) Vehicle speed km/h (MPH)
(I) Seconds

DTC	Item	Condition
*P0121	Throttle/Pedal Position Sensor/Switch “A” Circuit Range/Performance	—
*P0139	O2 Sensor Circuit Slow Response (Bank 1 Sensor 2)	—
*P0301	Cylinder 1 Misfire Detected	In some cases, diagnosis may complete at once.
*P0302	Cylinder 2 Misfire Detected	In some cases, diagnosis may complete at once.
*P0303	Cylinder 3 Misfire Detected	In some cases, diagnosis may complete at once.
*P0304	Cylinder 4 Misfire Detected	In some cases, diagnosis may complete at once.
*P0101	Mass or Volume Air Flow Circuit Range/Performance	—
P0244	Turbo/Super Charger Wastegate Solenoid “A” Range/Performance	—
P1301	Misfire Detected (High Temperature Exhaust Gas)	—
P1544	Exhaust Gas Temperature Too High	—

14.Clear Memory Mode

A: OPERATION

1. SUBARU SELECT MONITOR (NORMAL MODE)

1) On the «Main Menu» display screen, select the {2. Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Engine Control System} and press the [YES] key.
3) Press the [YES] key after the information of engine type is displayed.
4) On the «Engine Diagnosis» display screen, select the {Clear Memory} and press the [YES] key.
5) When the 'Done' and 'Turn Ignition Switch OFF' are shown on the display screen, turn the ignition switch to OFF, and then turn the Subaru Select Monitor to OFF.

NOTE:
For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

2. SUBARU SELECT MONITOR (OBD MODE)

1) On the «Main Menu» display screen, select the {2. Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Engine Control System} and press the [YES] key.
3) Press the [YES] key after the information of engine type is displayed.
4) On the «Engine Diagnosis» display screen, select the {OBD System} and press the [YES] key.
5) On the «OBD Menu» display screen, select the {4. Diagnosis Code(s) Cleared} and press the [YES] key.
6) When the 'Clear Diagnostic Code?' is shown on the display screen, press the [YES] key.
7) Turn the ignition switch to OFF, and then turn the Subaru Select Monitor to OFF.

NOTE:
For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

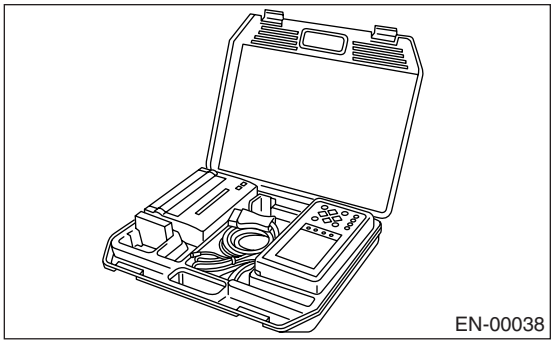
3. GENERAL SCAN TOOL

For clear memory procedures using the general scan tool, refer to the General Scan Tool Instruction Manual.

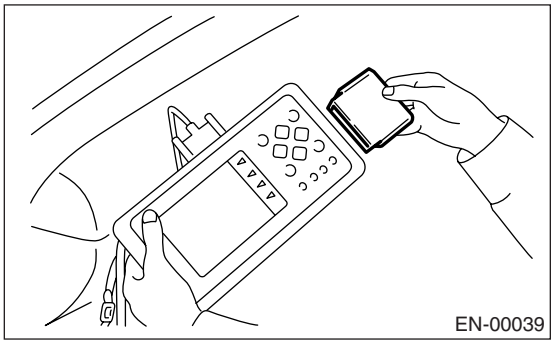
15. Compulsory Valve Operation Check Mode

A: OPERATION

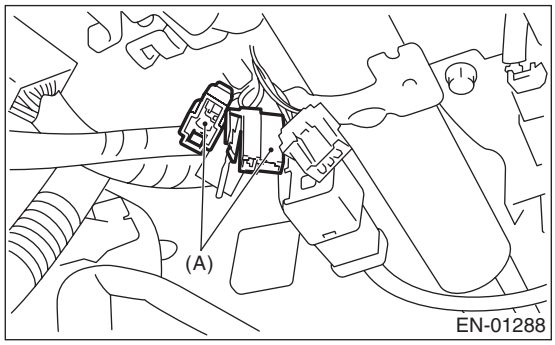
1) Prepare the Subaru Select Monitor kit. <Ref. to EN(H4DOTC)(diag)-8, PREPARATION TOOL, General Description.>



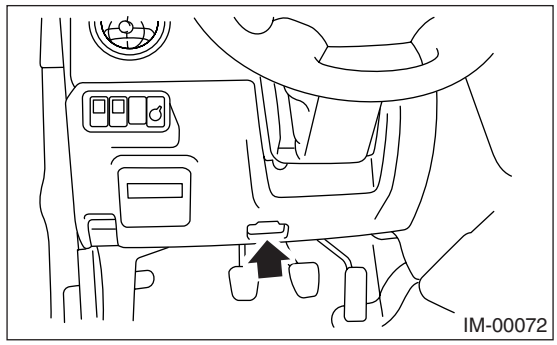
2) Connect the diagnosis cable to Subaru Select Monitor.
3) Insert the cartridge into Subaru Select Monitor. <Ref. to EN(H4DOTC)(diag)-8, PREPARATION TOOL, General Description.>



4) Connect the test mode connector (A) at the lower portion of instrument panel (on the driver's side).



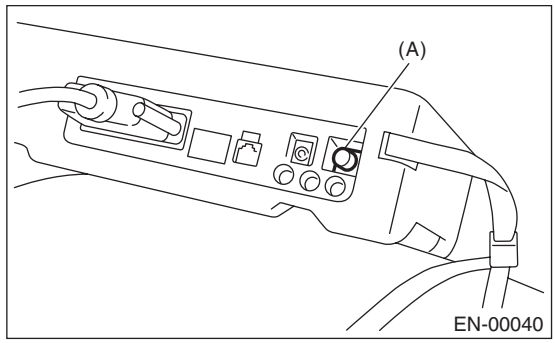
5) Connect the Subaru Select Monitor to data link connector.
(1) Connect the Subaru Select Monitor to data link connector located in the lower portion of instrument panel (on the driver's side).



(2) Connect the diagnosis cable to data link connector.

CAUTION:
Do not connect scan tools except for the Subaru Select Monitor and general scan tool.

6) Turn the ignition switch to ON (engine OFF) and Subaru Select Monitor switch to ON.



(A) Power switch

7) On the «Main Menu» display screen, select the {2. Each System Check} and press the [YES] key.
8) On the «System Selection Menu» display screen, select the {Engine Control System} and press the [YES] key.
9) Press the [YES] key after the information of engine type is displayed.
10) On the «Engine Diagnosis» display screen, select the {System Operation Check Mode} and press the [YES] key.
11) On the «System Operation Check Mode» display screen, select the {Actuator ON/OFF Operation} and press the [YES] key.
12) Select the desired compulsory actuator on the «Actuator ON/OFF Operation» display screen and press the [YES] key.

13) Pressing the [NO] key completes the compulsory operation check mode. The display will then return to the «Actuator ON/OFF Operation» screen.

• A list of support data is shown in the following table.

Contents	Display
Compulsory fuel pump relay operation check	Fuel Pump Relay
Compulsory radiator fan relay operation check	Radiator Fan Relay
Compulsory air conditioning relay operation check	A/C Compressor Relay
Compulsory purge control solenoid valve operation check	CPC Solenoid Valve

NOTE:

• The following parts will be displayed but not functional because they are not installed on the vehicle.

Display
EGR Solenoid Valve
ASV Solenoid Valve
PCV Solenoid Valve
Vent Control Solenoid Valve
FICD Solenoid
Pressure Switching Sol. 1
Pressure Switching Sol. 2
AAI Solenoid Valve
Fuel Tank Sensor Control Valve

• For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

16.Malfunction Indicator Light

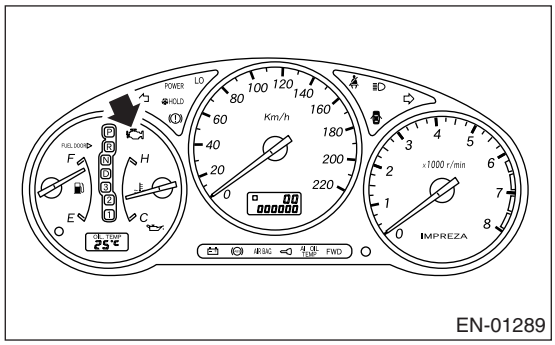
A: PROCEDURE

1. Activation of check malfunction indicator light. <Ref. to EN(H4DOTC)(diag)-50, ACTIVATION OF MALFUNCTION INDICATOR LIGHT, Malfunction Indicator Light.>
↓
2. Check that the malfunction indicator light does not come on. <Ref. to EN(H4DOTC)(diag)-51, MALFUNCTION INDICATOR LIGHT DOES NOT COME ON, Malfunction Indicator Light.>
↓
3. Check that the malfunction indicator light does not go off. <Ref. to EN(H4DOTC)(diag)-53, MALFUNCTION INDICATOR LIGHT DOES NOT GO OFF., Malfunction Indicator Light.>
↓
4. Check that the malfunction indicator light does not blink at a cycle of 3 Hz. <Ref. to EN(H4DOTC)(diag)-54, MALFUNCTION INDICATOR LIGHT DOES NOT BLINK., Malfunction Indicator Light.>
↓
5. Check that the malfunction indicator light remains blinking at a cycle of 3 Hz. <Ref. to EN(H4DOTC)(diag)-56, MALFUNCTION INDICATOR LIGHT REMAINS BLINKING., Malfunction Indicator Light.>

B: ACTIVATION OF MALFUNCTION INDICATOR LIGHT

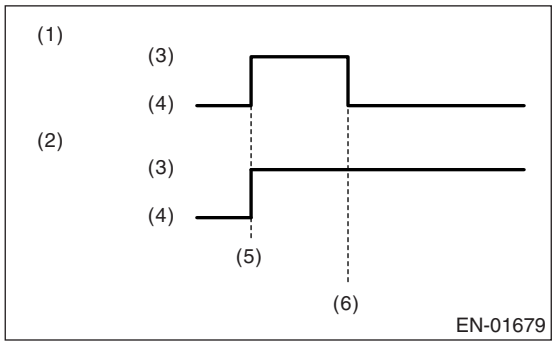
1) When the ignition switch is turned to ON (engine off), the malfunction indicator light in the combination meter illuminates.

NOTE:
If the malfunction indicator light does not illuminate, perform diagnostics of the malfunction indicator light circuit or the combination meter circuit. <Ref. to EN(H4DOTC)(diag)-51, MALFUNCTION INDICATOR LIGHT DOES NOT COME ON, Malfunction Indicator Light.>



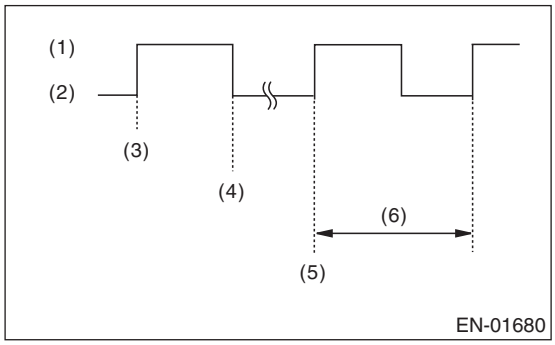
(A) Malfunction indicator light

2) After starting the engine, the malfunction indicator light goes out. If it does not, either the engine or the emission control system is malfunctioning.



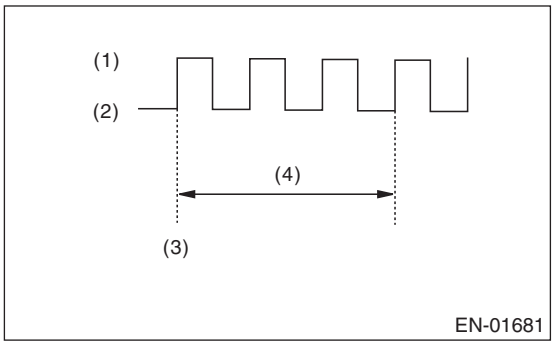
(1) No trouble
(2) Trouble occurs
(3) ON
(4) OFF
(5) Ignition switch ON
(6) Engine start

3) If the diagnosis system senses a misfire which could damage the catalyzer, the malfunction indicator light will blink at a cycle of 1 Hz.



(1) ON
(2) OFF
(3) Ignition switch ON
(4) Engine start
(5) Misfire start
(6) 1 second

4) When the ignition switch is turned to ON (engine off) or to START with the test mode connector connected, the malfunction indicator light blinks at a cycle of 3 Hz.



(1) ON
(2) OFF
(3) Ignition switch ON
(4) 1 second

C: MALFUNCTION INDICATOR LIGHT DOES NOT COME ON

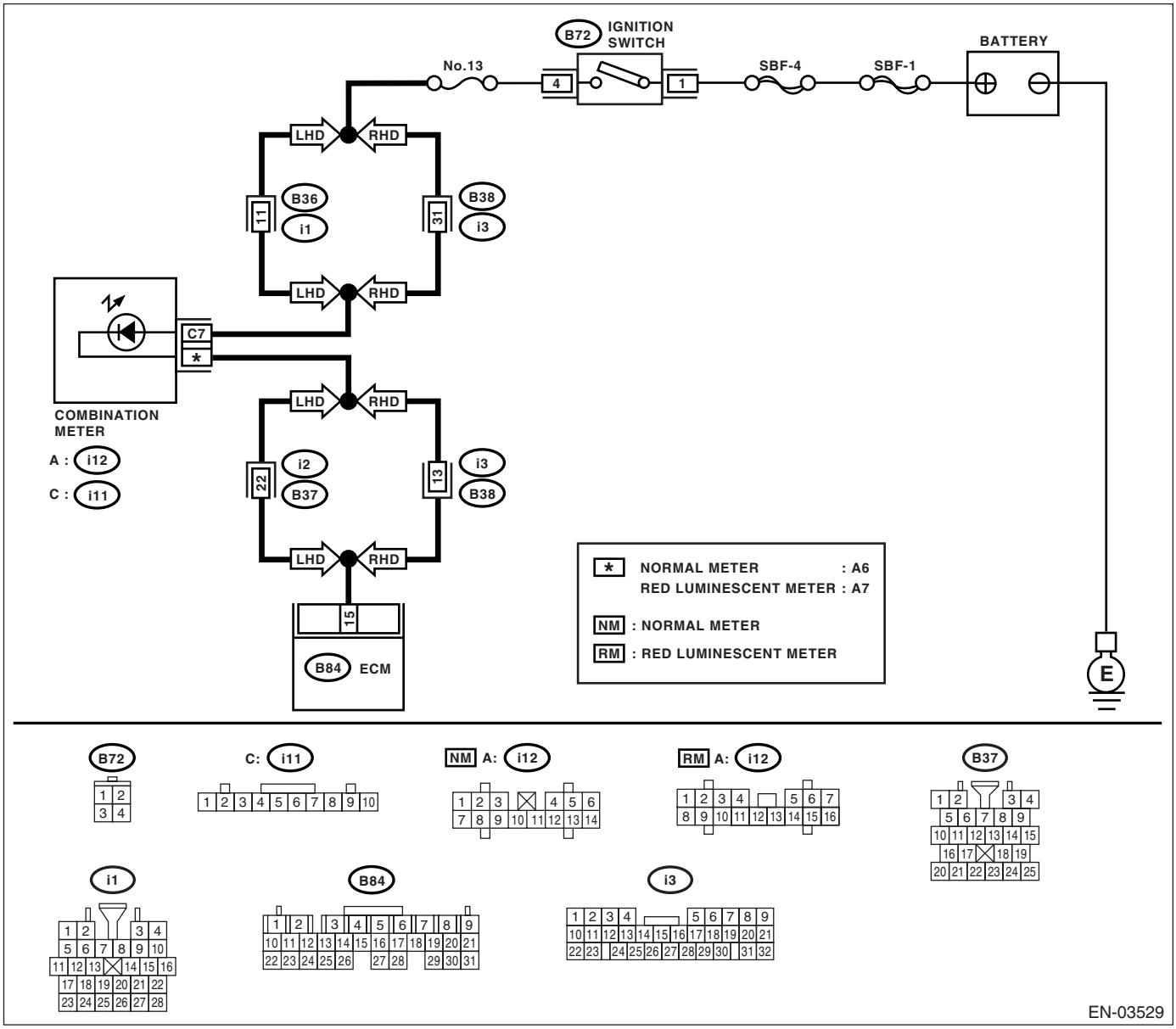
DIAGNOSIS:

The malfunction indicator light circuit is shorted.

TROUBLE SYMPTOM:

When the ignition switch is turned to ON (engine OFF), malfunction indicator light does not come on.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B84) No. 15 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **4.**	Go to step **2.**
2	**CHECK POOR CONTACT.**	Does the malfunction indicator light come on when shaking or pulling ECM connector and harness?	Repair the poor contact in ECM connector.	Go to step **3.**
3	**CHECK ECM CONNECTOR.**	Is the ECM connector correctly connected?	Replace the ECM. <Ref. to FU(H4DOTC)-50, Engine Control Module (ECM).>	Repair the connection of ECM connector.
4	**CHECK HARNESS BETWEEN COMBINATION METER AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Remove the combination meter. <Ref. to IDI-12, Combination Meter.> 3) Disconnect the connector from ECM and combination meter. 4) Measure the resistance of harness between ECM and combination meter connector. ***Connector & terminal*** ***Red luminescent meter*** ***(B84) No. 15 — (i12) No. 7:*** ***Normal meter*** ***(B84) No. 15 — (i12) No. 6:***	Is the resistance less than 1 Ω?	Go to step **5.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and combination meter connector • Poor contact in coupling connector
5	**CHECK POOR CONTACT.** Check poor contact in combination meter connector.	Is there poor contact in combination meter connector?	Repair the poor contact in combination meter connector.	Go to step **6.**
6	**CHECK HARNESS BETWEEN COMBINATION METER AND IGNITION SWITCH CONNECTOR.** 1) Turn the ignition switch to ON. 2) Measure the voltage between combination meter connector and chassis ground. ***Connector & terminal*** ***(i11) No. 7 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Replace the combination meter circuit board. <Ref. to IDI-12, Combination Meter.>	Check the following and repair if necessary. NOTE: • Blown out fuse (No. 13) • Open or short circuit in harness between fuse (No. 13) and battery terminal • Poor contact in ignition switch connector

D: MALFUNCTION INDICATOR LIGHT DOES NOT GO OFF.

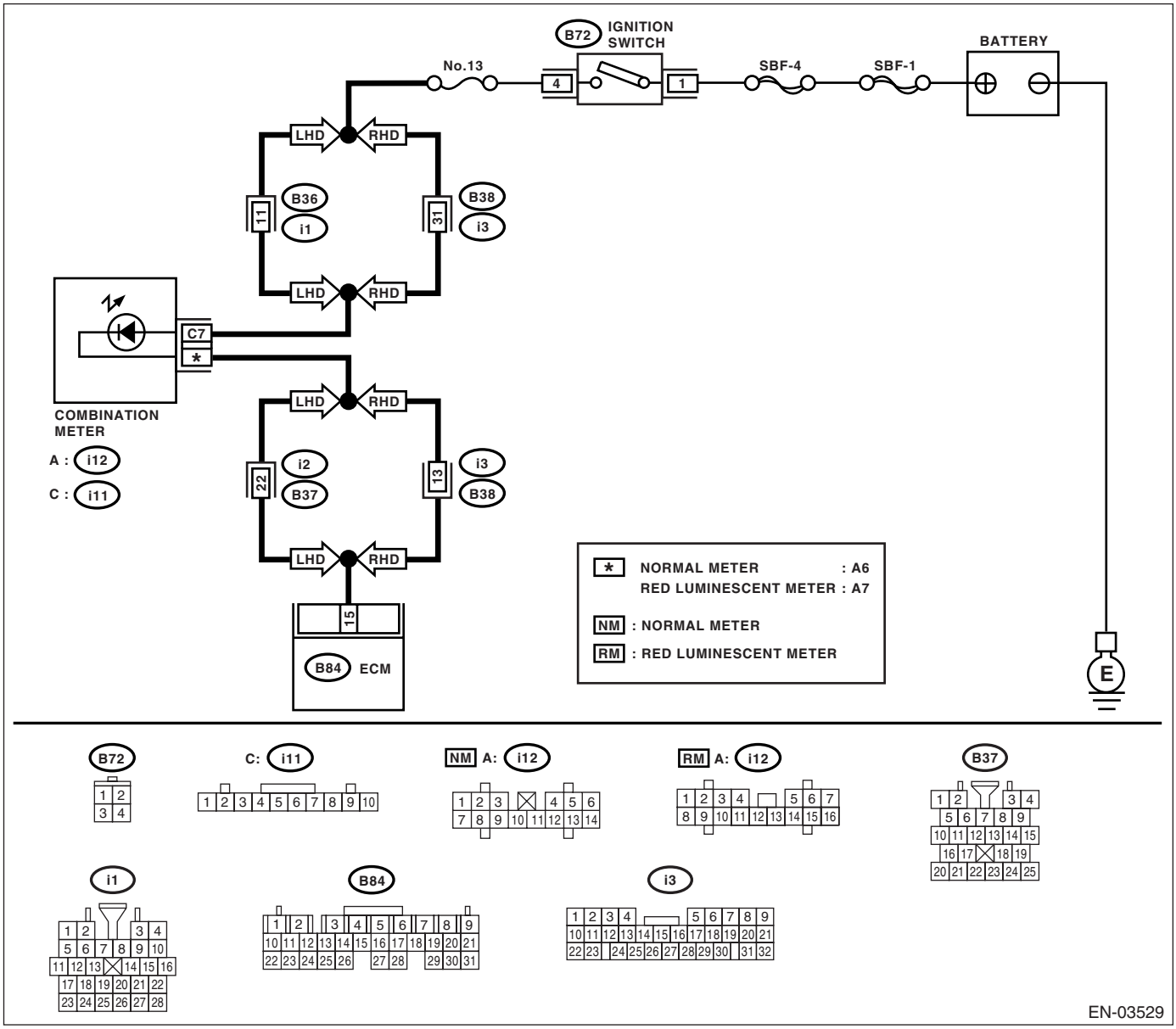
DIAGNOSIS:

The malfunction indicator light circuit is shorted.

TROUBLE SYMPTOM:

Although malfunction indicator light comes on when engine runs, but DTC is not shown on Subaru Select Monitor or general scan tool display.

WIRING DIAGRAM:



Step		Check	Yes	No
1	**CHECK HARNESS BETWEEN COMBINATION METER AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Turn the ignition switch to ON.	Does the malfunction indicator light come on?	Repair the short circuit in harness between combination meter and ECM connector.	Replace the ECM. <Ref. to FU(H4DOTC)-50, Engine Control Module (ECM).>

E: MALFUNCTION INDICATOR LIGHT DOES NOT BLINK.

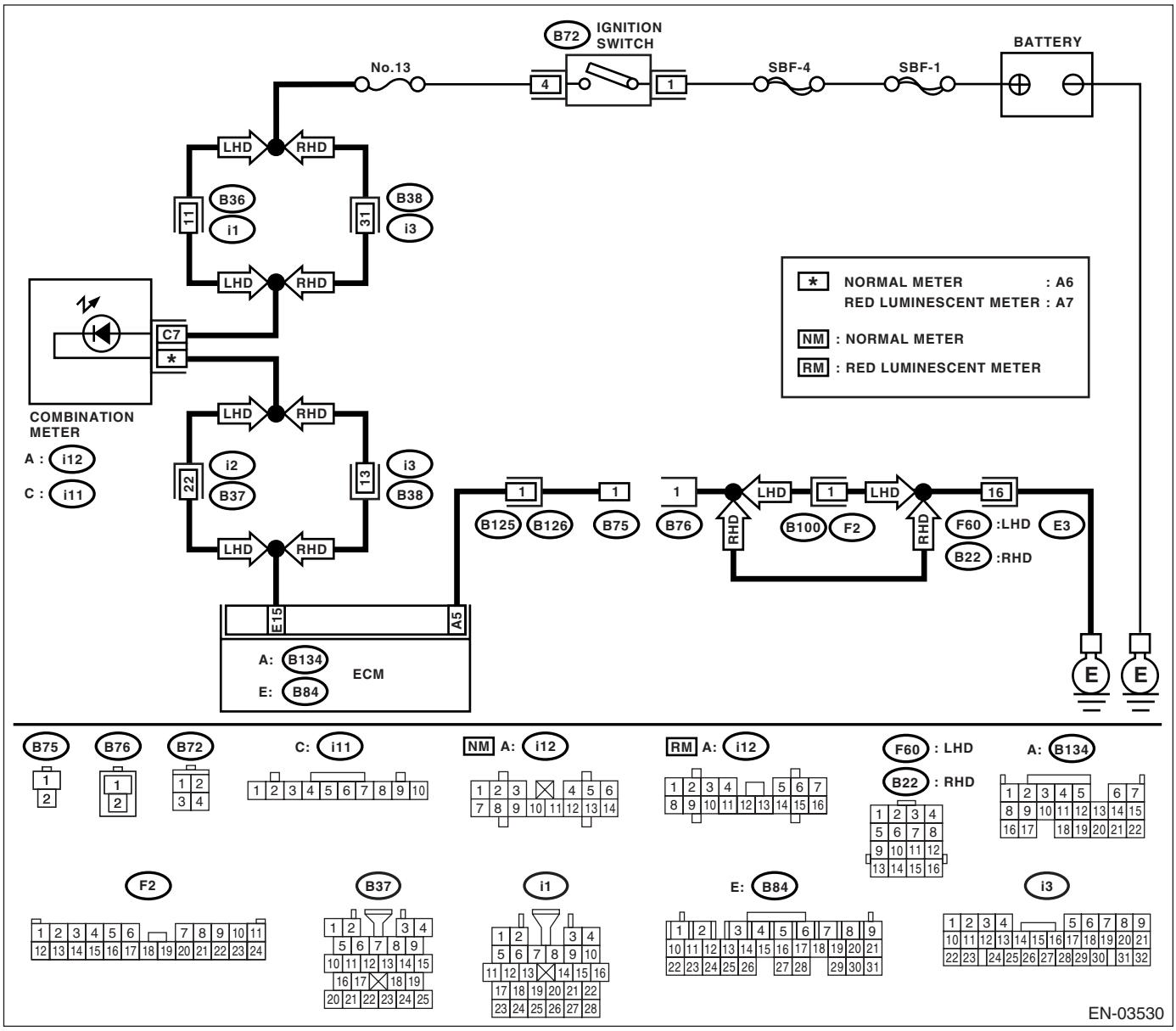
DIAGNOSIS:

- The malfunction indicator light circuit is open or shorted.
- Test mode connector circuit is open.

TROUBLE SYMPTOM:

During inspection mode, malfunction indicator light does not blink at a cycle of 3 Hz.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK STATUS OF MALFUNCTION INDICATOR LIGHT.** 1) Turn the ignition switch to OFF. 2) Disconnect the test mode connector. 3) Turn the ignition switch to ON. (engine OFF)	Does the malfunction indicator light come on?	Go to step **2.**	Repair the malfunction indicator light circuit. <Ref. to EN(H4DOTC)(diag)-51, MALFUNCTION INDICATOR LIGHT DOES NOT COME ON, Malfunction Indicator Light.>
2	**CHECK HARNESS BETWEEN COMBINATION METER AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Turn the ignition switch to ON.	Does the malfunction indicator light come on?	Repair the ground short circuit in harness between combination meter and ECM connector.	Go to step **3.**
3	**CHECK HARNESS BETWEEN TEST MODE CONNECTOR AND CHASSIS GROUND.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance of harness between test mode connector and chassis ground. ***Connector & terminal*** ***(B76) No. 1 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between test mode connector and chassis ground
4	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair the poor contact in ECM connector.	Go to step **5.**
5	**CHECK HARNESS BETWEEN ECM AND TEST MODE CONNECTOR.** 1) Connect the test mode connector. 2) Measure the resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 5 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **6.**	Repair the open circuit in harness between ECM and test mode connector.
6	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair the poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H4DOTC)-50, Engine Control Module (ECM).>

F: MALFUNCTION INDICATOR LIGHT REMAINS BLINKING.

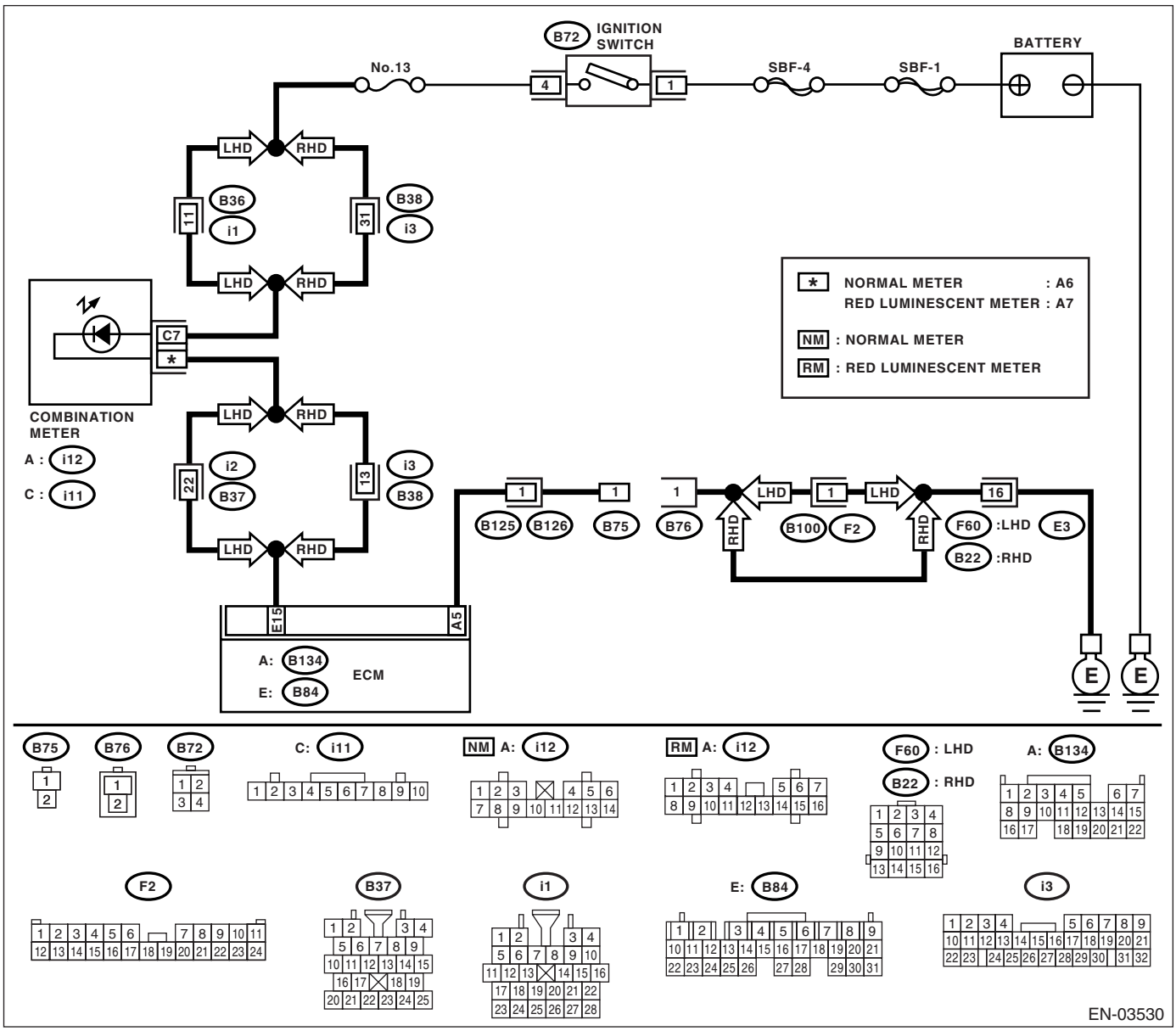
DIAGNOSIS:

Test mode connector circuit is shorted.

TROUBLE SYMPTOM:

Malfunction indicator light blinks at a cycle of 3 Hz when ignition switch is turned to ON.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK TEST MODE CONNECTOR.** 1) Disconnect the test mode connector. 2) Turn the ignition switch to ON.	Does the malfunction indicator light blink?	Go to step **2.**	System is in good order. NOTE: Malfunction indicator light blinks at a cycle of 3 Hz when test mode connector is connected.
2	**CHECK HARNESS BETWEEN ECM CONNECTOR AND ENGINE GROUNDING TERMINAL.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 5 — Chassis ground:***	Is the resistance less than 5 Ω?	Repair the short circuit in harness between ECM and test mode connector.	Replace the ECM. <Ref. to FU(H4DOTC)-50, Engine Control Module (ECM).>

17.Diagnostics for Engine Starting Failure

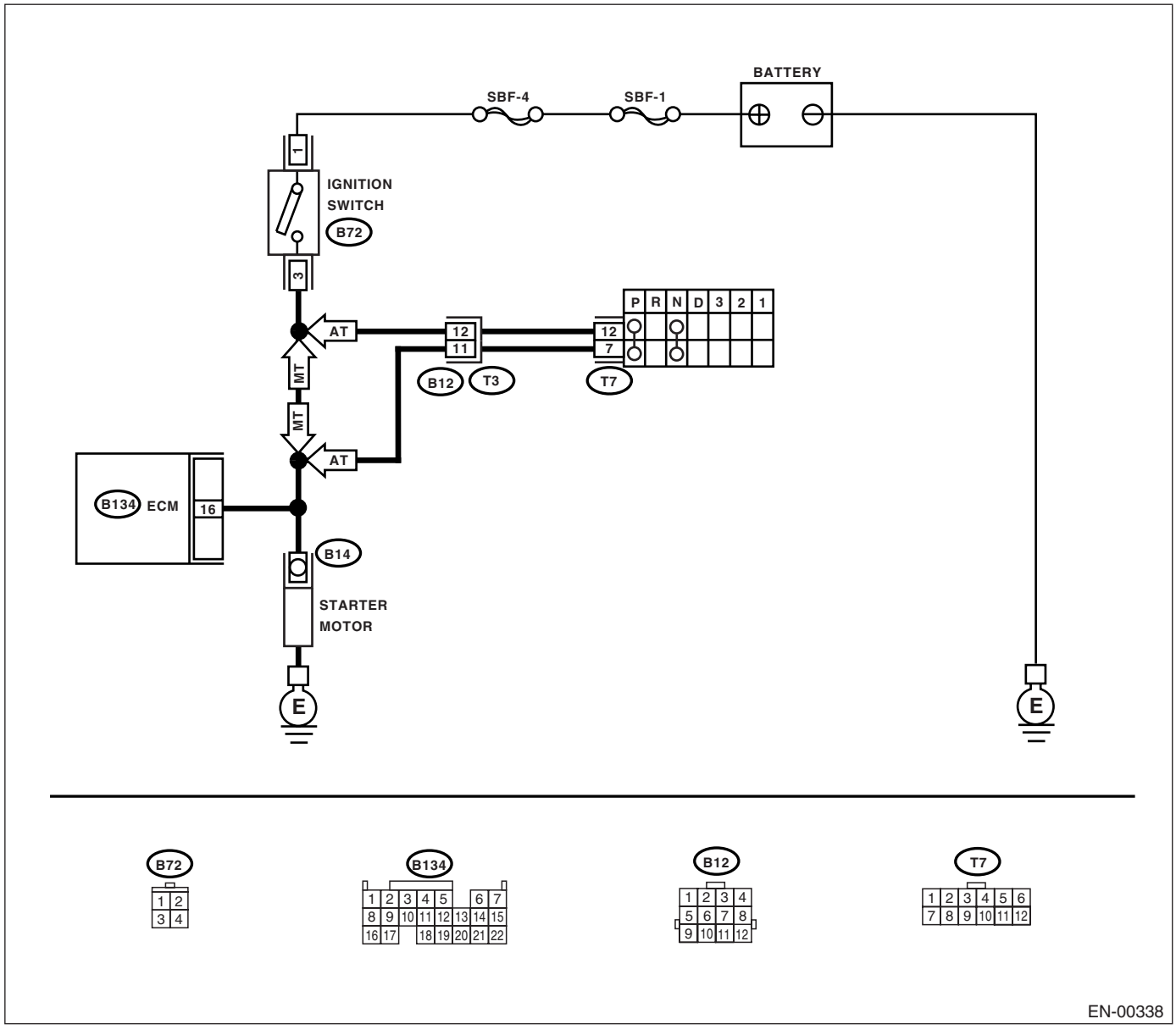
A: PROCEDURE

1. Inspection of starter motor circuit. <Ref. to EN(H4DOTC)(diag)-59, STARTER MOTOR CIRCUIT, Diagnostics for Engine Starting Failure.>
↓
2. Inspection of ECM power supply and ground line. <Ref. to EN(H4DOTC)(diag)-61, CONTROL MODULE POWER SUPPLY AND GROUND LINE, Diagnostics for Engine Starting Failure.>
↓
3. Inspection of ignition control system. <Ref. to EN(H4DOTC)(diag)-65, IGNITION CONTROL SYSTEM, Diagnostics for Engine Starting Failure.>
↓
4. Inspection of fuel pump circuit. <Ref. to EN(H4DOTC)(diag)-68, FUEL PUMP CIRCUIT, Diagnostics for Engine Starting Failure.>
↓
5. Inspection of fuel injector circuit. <Ref. to EN(H4DOTC)(diag)-69, FUEL INJECTOR CIRCUIT, Diagnostics for Engine Starting Failure.>

B: STARTER MOTOR CIRCUIT

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)(diag)-46, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

WIRING DIAGRAM:



Diagnostics for Engine Starting Failure

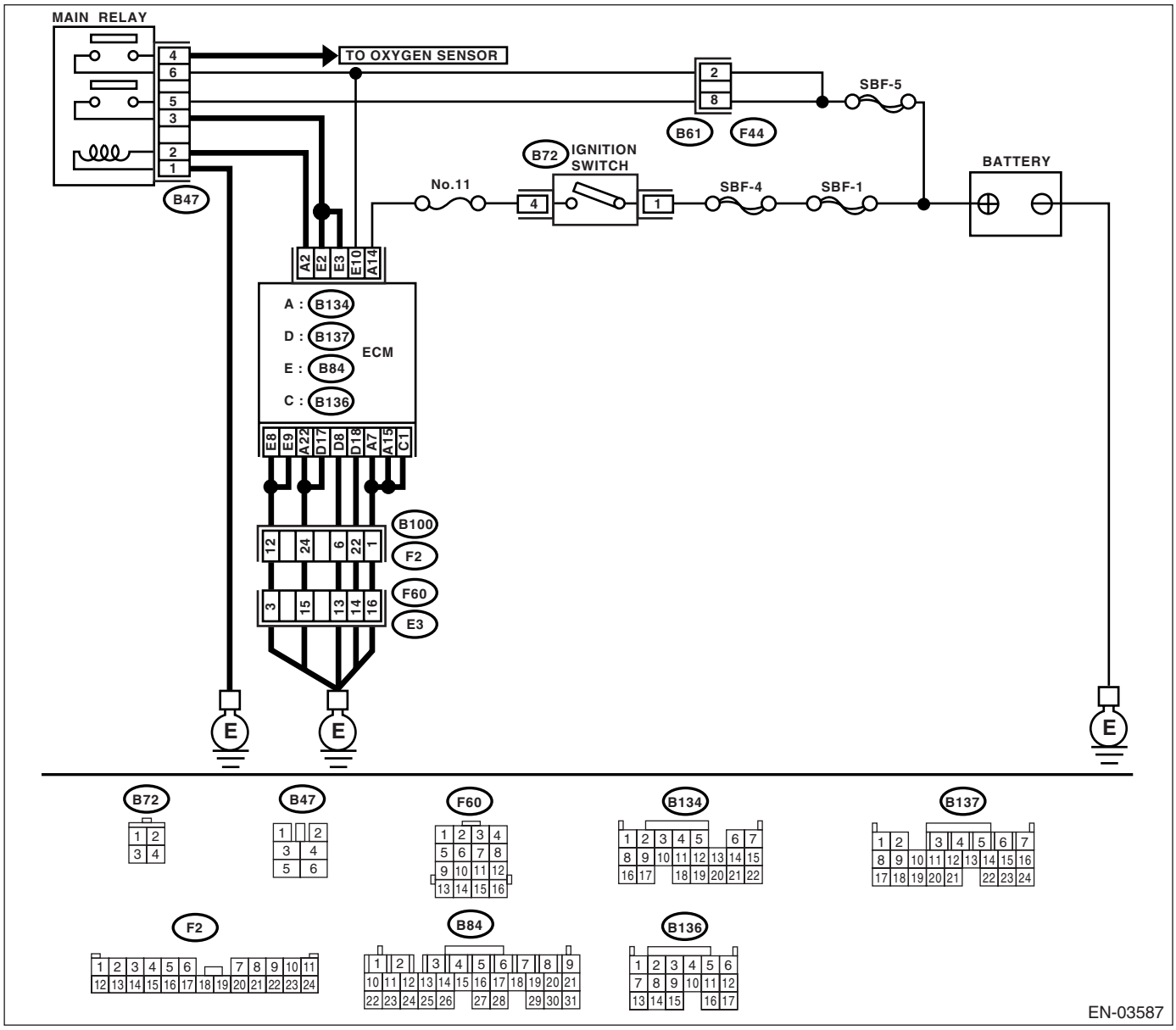
	Step	Check	Yes	No
1	**CHECK OPERATION OF STARTER MOTOR.**	Does the starter motor operate ?	Go to step **2.**	Go to step **3.**
2	**CHECK DTC.**	Is the DTC displayed? <Ref. to EN(H4DOTC)(diag)-38, OPERATION, Read Diagnostic Trouble Code (DTC).>	Using the List of Diagnostic Trouble Code (DTC), check the appropriate DTC. <Ref. to EN(H4DOTC)(diag)-72, List of Diagnostic Trouble Code (DTC).>	Go to step **3.**
3	**CHECK INPUT SIGNAL FOR STARTER MOTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from starter motor. 3) Turn the ignition switch to START. 4) Measure the power supply voltage between starter motor connector terminal and engine ground. ***Connector & terminal*** ***(B14) No. 1 (+) — Engine ground (−):***	Is the voltage more than 10 V?	Go to step **4.**	Go to step **5.**
4	**CHECK GROUND CIRCUIT OF STARTER MOTOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance of ground cable between ground cable terminal and engine ground.	Is the resistance less than 5 Ω?	Check the starter motor. <Ref. to SC(H4SO)-8, Starter.>	Repair the open circuit of ground cable.
5	**CHECK HARNESS BETWEEN BATTERY AND IGNITION SWITCH CONNECTOR.** 1) Ignition the switch to OFF. 2) Disconnect the connector from ignition switch. 3) Measure the power supply voltage between ignition switch connector and chassis ground. ***Connector & terminal*** ***(B72) No. 1 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **6.**	Check the following, repair if necessary. • Fuse is blown out. • Open circuit in harness between ignition switch and battery.
6	**CHECK HARNESS BETWEEN BATTERY AND IGNITION SWITCH CONNECTOR.** 1) Connect the connector to ignition switch. 2) Turn the ignition switch to START. 3) Measure the voltage between ignition switch and chassis ground. ***Connector & terminal*** ***(B72) No. 3 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Repair the open circuit between ignition switch and starter motor circuit.	Go to step **7.**
7	**CHECK POOR CONTACT.** Check poor contact in ignition switch connector.	Is there poor contact in ignition switch connector?	Repair the poor contact in ignition switch connector.	Replace the ignition switch.

C: CONTROL MODULE POWER SUPPLY AND GROUND LINE

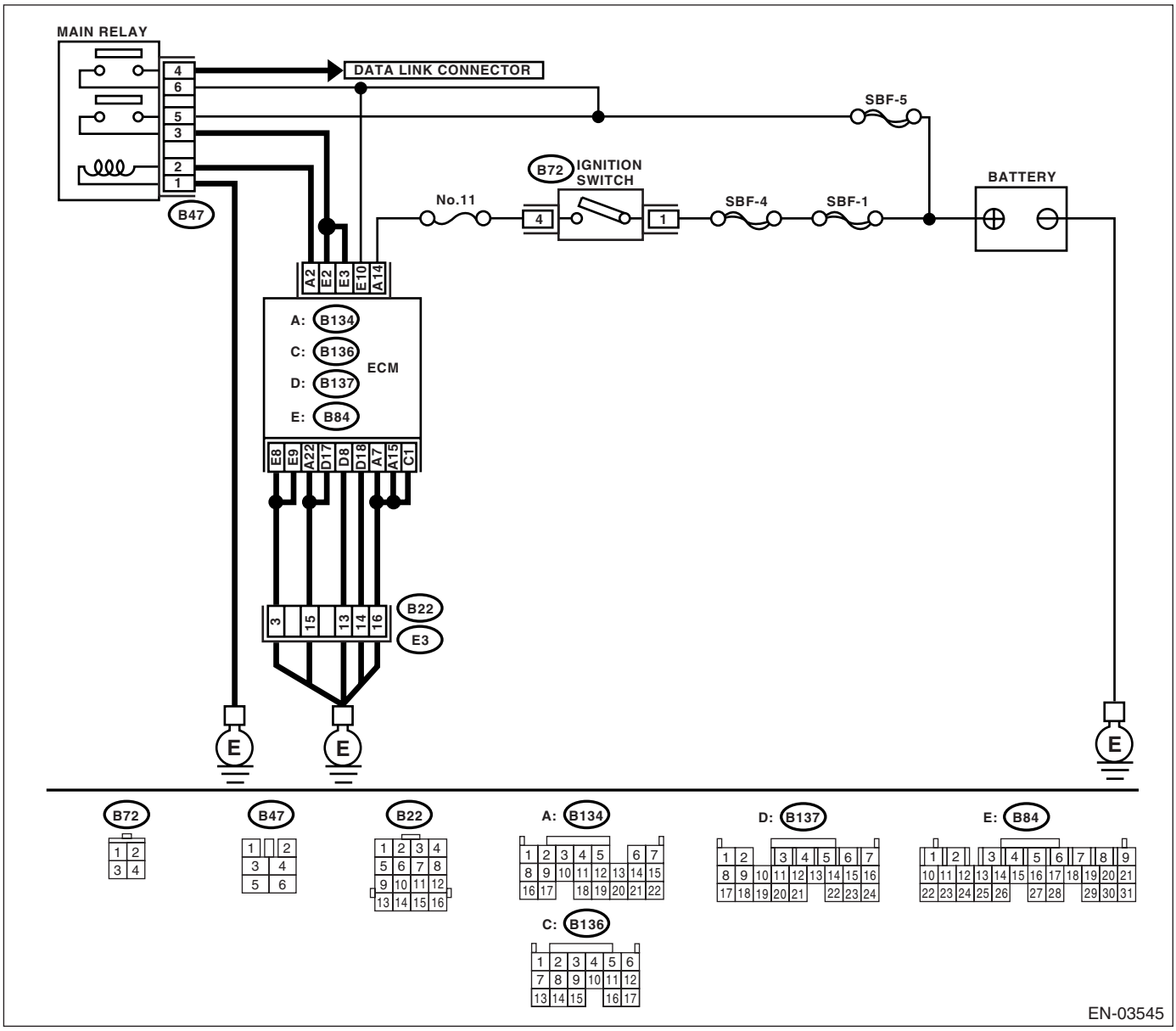
CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)(diag)-46, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

WIRING DIAGRAM:

- LHD model



- RHD model


MAIN RELAY
DATA LINK CONNECTOR
SBF-5
B72 IGNITION SWITCH
BATTERY
No.11
SBF-4
SBF-1
B47
A: B134
C: B136
D: B137
E: B84
ECM
B22
E3
E
EN-03545

	Step	Check	Yes	No
1	**CHECK MAIN RELAY.** 1) Turn the ignition switch to OFF. 2) Remove the main relay. 3) Connect the battery to main relay terminals No. 1 and No. 2. 4) Measure the resistance between main relay terminals. ***Terminals*** ***No. 3 — No. 5:*** ***No. 4 — No. 6:***	Is the resistance less than 10 Ω?	Go to step **2.**	Replace the main relay.
2	**CHECK GROUND CIRCUIT OF ECM.** 1) Disconnect the connector from ECM. 2) Measure the resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 7 — Chassis ground:*** ***(B134) No. 15 — Chassis ground:*** ***(B134) No. 22 — Chassis ground:*** ***(B136) No. 1 — Chassis ground:*** ***(B137) No. 8 — Chassis ground:*** ***(B137) No. 17 — Chassis ground:*** ***(B137) No. 18 — Chassis ground:*** ***(B84) No. 8 — Chassis ground:*** ***(B84) No. 9 — Chassis ground:***	Is the resistance less than 5 Ω?	Go to step **3.**	Repair the open circuit in harness between ECM connector and engine grounding terminal.
3	**CHECK INPUT VOLTAGE OF ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B84) No. 10 (+) — Chassis ground (−):*** ***(B134) No. 14 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **4.**	Repair the open or ground short circuit of power supply circuit.
4	**CHECK HARNESS BETWEEN ECM AND MAIN RELAY CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 2 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **5.**	Repair the ground short circuit in harness between ECM connector and main relay connector, and then replace ECM.
5	**CHECK OUTPUT VOLTAGE FROM ECM.** 1) Connect the connector to ECM. 2) Turn the ignition switch to ON. 3) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 2 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **6.**	Replace the ECM. <Ref. to FU(H4DOTC)-50, Engine Control Module (ECM).>
6	**CHECK INPUT VOLTAGE OF MAIN RELAY.** Check the voltage between main relay connector and chassis ground. ***Connector & terminal*** ***(B47) No. 2 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **7.**	Repair the open circuit in harness between ECM connector and main relay connector.
7	**CHECK GROUND CIRCUIT OF MAIN RELAY.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between main relay connector and chassis ground. ***Connector & terminal*** ***(B47) No. 1 — Chassis ground:***	Is the resistance less than 5 Ω?	Go to step **8.**	Repair the open circuit between main relay and chassis ground.

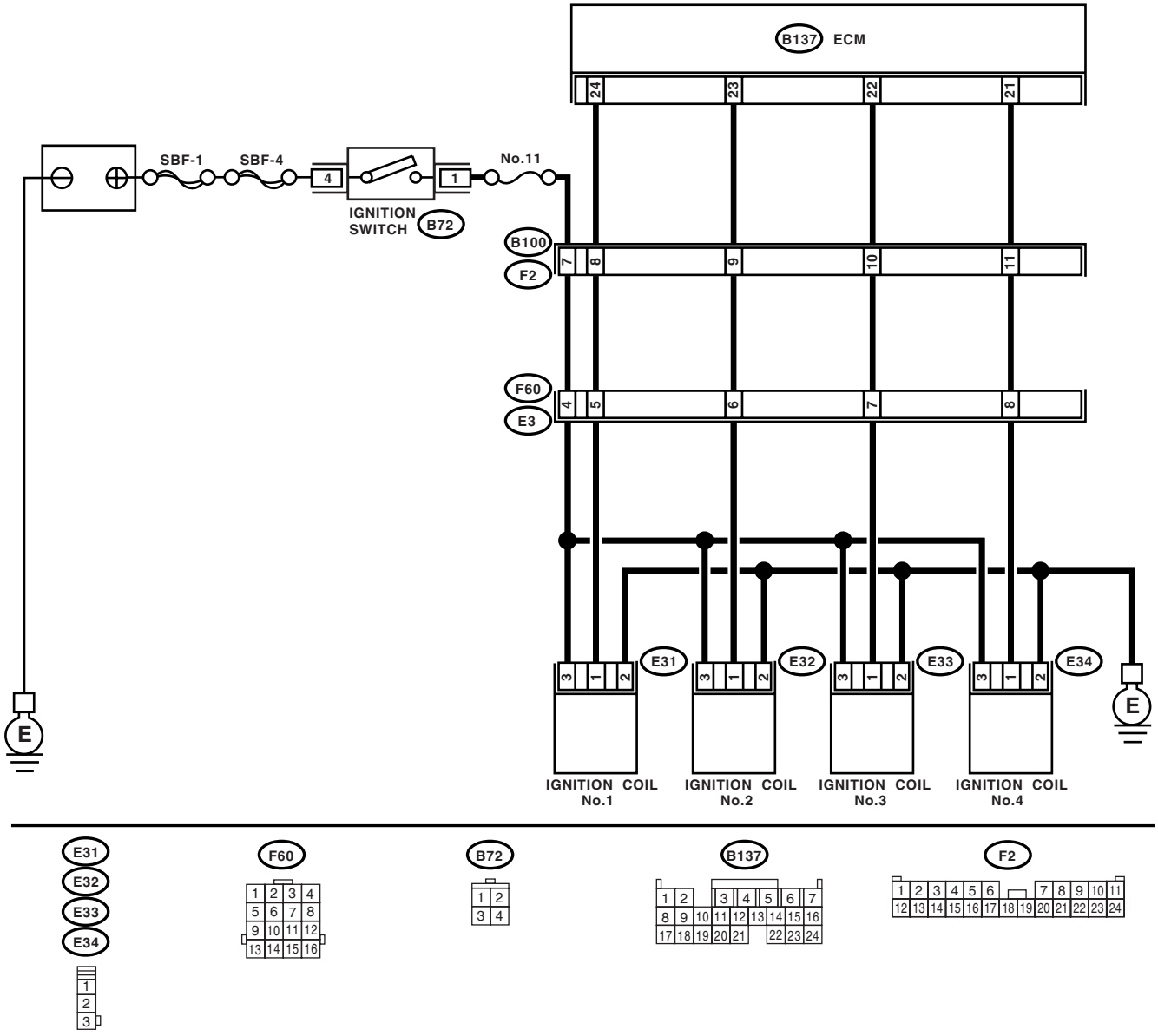
	Step	Check	Yes	No
8	**CHECK INPUT VOLTAGE OF MAIN RELAY.** Measure the voltage between main relay connector and chassis ground. ***Connector & terminal*** ***(B47) No. 5 (+) — Chassis ground (−):*** ***(B47) No. 6 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **9.**	Repair the open or ground short circuit in harness of power supply circuit.
9	**CHECK INPUT VOLTAGE OF ECM.** 1) Connect the main relay connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B84) No. 2 (+) — Chassis ground (−):*** ***(B84) No. 3 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Check the ignition control system. <Ref. to EN(H4DOTC)(diag)-65, IGNITION CONTROL SYSTEM, Diagnostics for Engine Starting Failure.>	Repair the open or ground short circuit in harness between ECM connector and main relay connector.

D: IGNITION CONTROL SYSTEM

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)(diag)-46, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

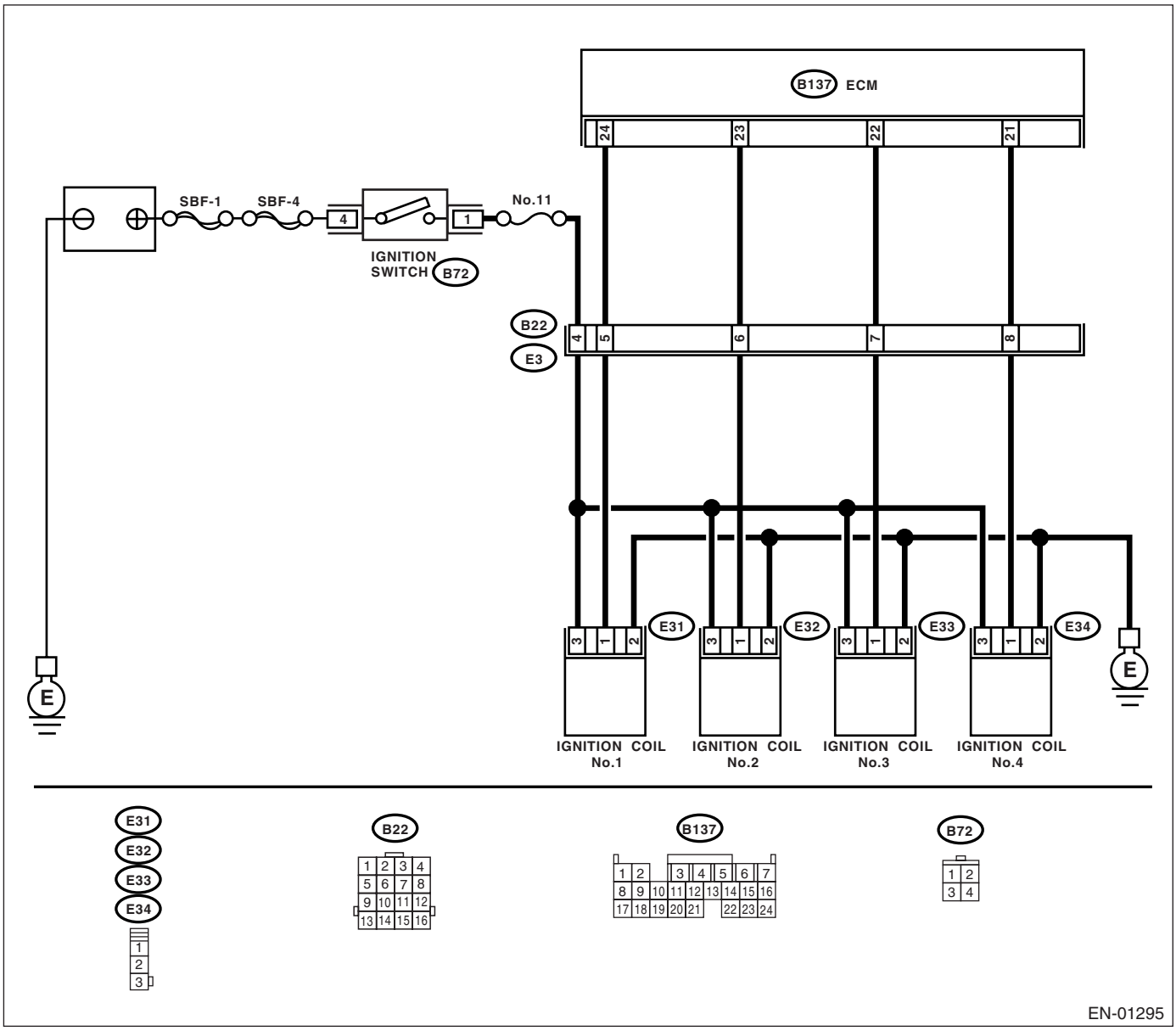
WIRING DIAGRAM:

- LHD model



EN-01294

- RHD model



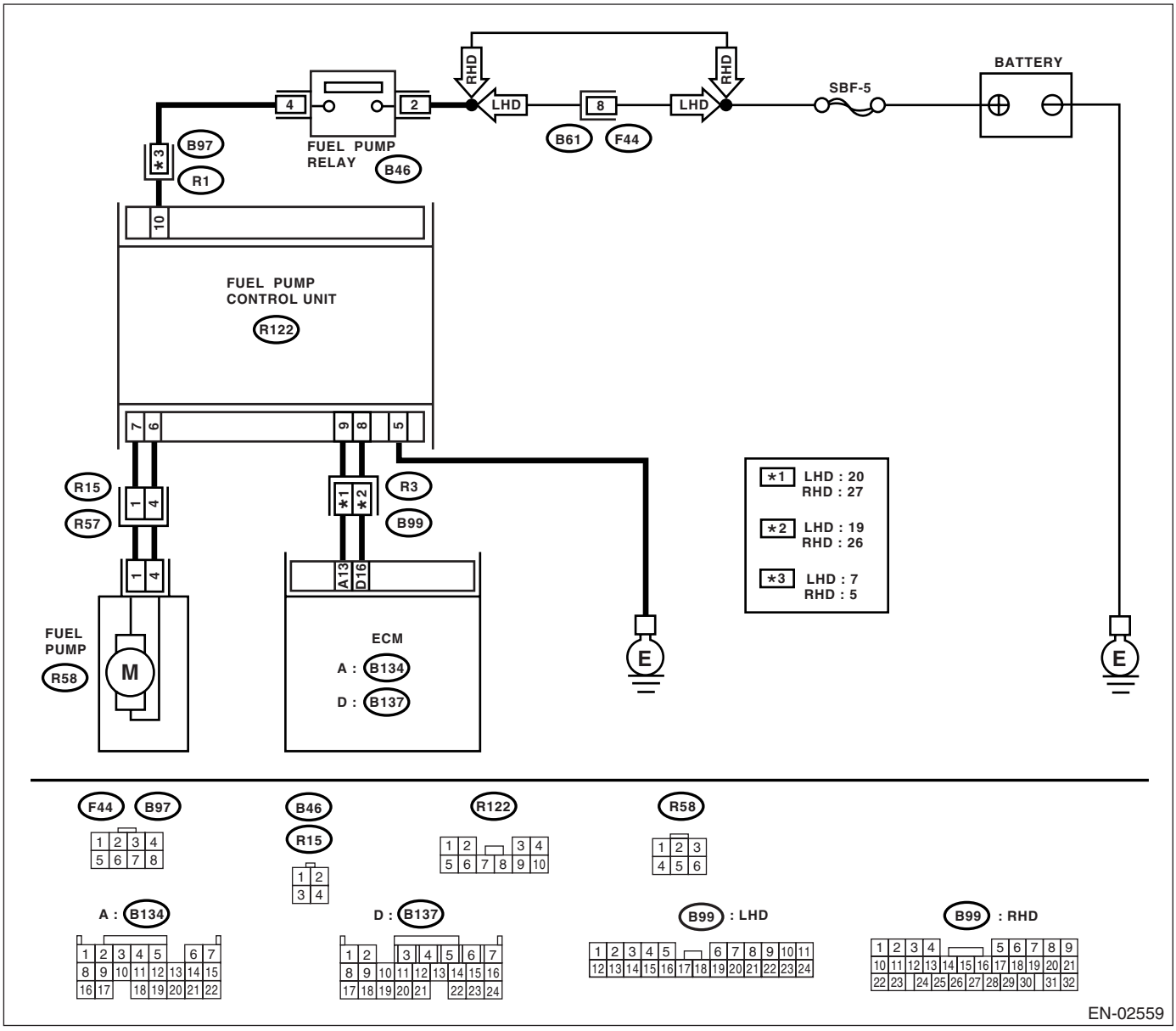
	Step	Check	Yes	No
1	**CHECK SPARK PLUG CONDITION.** 1) Remove the spark plug. <Ref. to IG(H4DOTC)-4, REMOVAL, Spark Plug.> 2) Check the spark plug condition. <Ref. to IG(H4DOTC)-5, INSPECTION, Spark Plug.>	Is the spark plug's status OK?	Go to step **2.**	Replace the spark plug.
2	**CHECK IGNITION SYSTEM FOR SPARKS.** 1) Connect the spark plug to ignition coil. 2) Release the fuel pressure. <Ref. to FU(H4DOTC)-54, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.> 3) Contact the spark plug's thread portion on engine. 4) While opening the throttle valve fully, crank engine to check that spark occurs at each cylinder.	Does spark occur at each cylinder?	Check the fuel pump system. <Ref. to EN(H4DOTC)(diag)-68, FUEL PUMP CIRCUIT, Diagnostics for Engine Starting Failure.>	Go to step **3.**

	Step	Check	Yes	No
3	**CHECK POWER SUPPLY CIRCUIT FOR IGNITION COIL.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ignition coil. 3) Turn the ignition switch to ON. 4) Measure the power supply voltage between ignition coil connector and engine ground. ***Connector & terminal*** ***(E31) No. 3 (+) — Engine ground (−):*** ***(E32) No. 3 (+) — Engine ground (−):*** ***(E33) No. 3 (+) — Engine ground (−):*** ***(E34) No. 3 (+) — Engine ground (−):***	Is the voltage more than 10 V?	Go to step **4.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ignition coil, and ignition switch connector • Poor contact in coupling connectors
4	**CHECK HARNESS OF IGNITION COIL GROUND CIRCUIT.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between ignition coil connector and engine ground. ***Connector & terminal*** ***(E31) No. 2 — Engine ground:*** ***(E32) No. 2 — Engine ground:*** ***(E33) No. 2 — Engine ground:*** ***(E34) No. 2 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **5.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ignition coil connector and engine grounding terminal
5	**CHECK HARNESS BETWEEN ECM AND IGNITION COIL CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connector from ignition coil. 4) Measure the resistance of harness between ECM and ignition coil connector. ***Connector & terminal*** ***(B137) No. 21 — (E34) No. 1:*** ***(B137) No. 22 — (E33) No. 1:*** ***(B137) No. 23 — (E32) No. 1:*** ***(B137) No. 24 — (E31) No. 1:***	Is the resistance less than 1 Ω?	Go to step **6.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and ignition coil connector • Poor contact in coupling connector
6	**CHECK HARNESS BETWEEN ECM AND IGNITION COIL CONNECTOR.** Measure the resistance of harness between ECM and engine ground. ***Connector & terminal:*** ***(B137) No. 21 — Engine ground:*** ***(B137) No. 22 — Engine ground:*** ***(B137) No. 23 — Engine ground:*** ***(B137) No. 24 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **7.**	Repair the ground short circuit in harness between ECM and ignition coil connector.
7	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair the poor contact in ECM connector.	Replace the ignition coil.

E: FUEL PUMP CIRCUIT

CAUTION:
After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)(diag)-46, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

WIRING DIAGRAM:



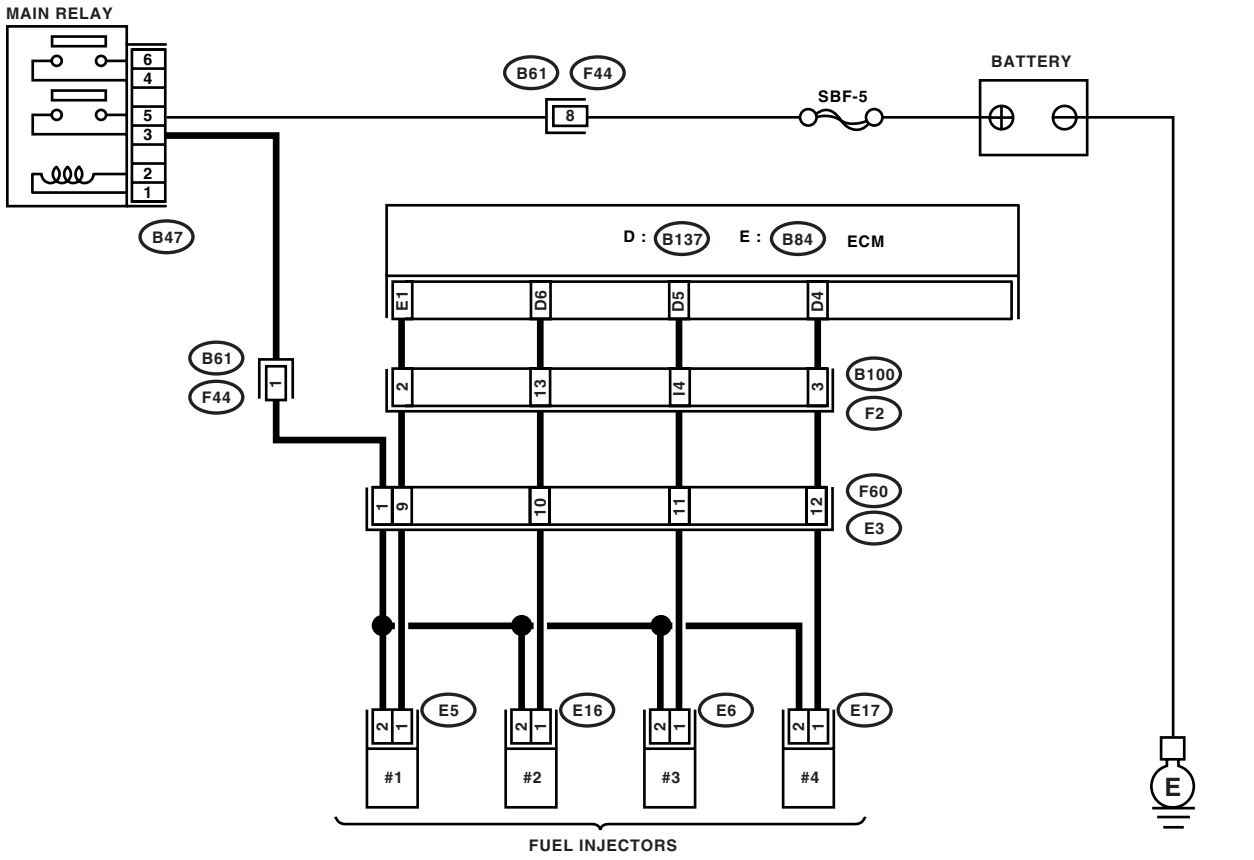
EN-02559

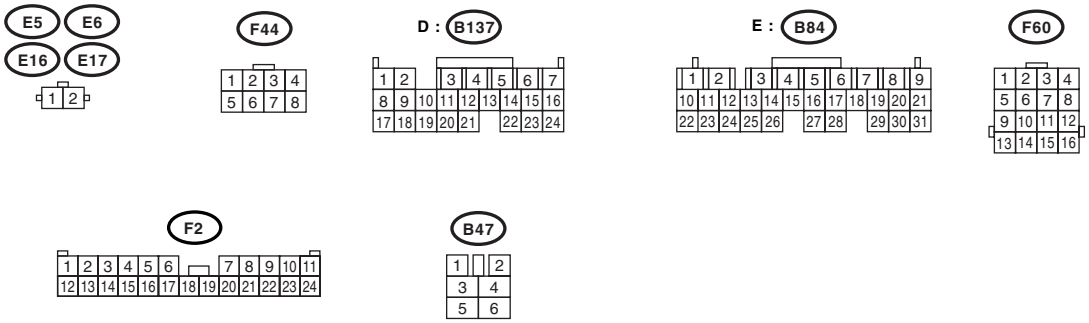
Step		Check	Yes	No
1	**CHECK OPERATING SOUND OF FUEL PUMP.** Make sure that the fuel pump is in operation for 2 seconds when turning ignition switch to ON. NOTE: Fuel pump operation check can also be executed using the Subaru Select Monitor. For the procedure, refer to "Compulsory Valve Operation Check Mode". <Ref. to EN(H4DOTC)(diag)-47, Compulsory Valve Operation Check Mode.>	Does the fuel pump produce "operating" sound?	Check the fuel injector circuit. <Ref. to EN(H4DOTC)(diag)-69, FUEL INJECTOR CIRCUIT, Diagnostics for Engine Starting Failure.>	Display the DTC. <Ref. to EN(H4DOTC)(diag)-38, OPERATION, Read Diagnostic Trouble Code (DTC).>

F: FUEL INJECTOR CIRCUIT

CAUTION:
- **Check or repair only faulty parts.**
- **After repair or replacement of faulty parts, conduct CLEAR MEMORY MODE <Ref. to EN(H4DOTC)(diag)-46, Clear Memory Mode.> and INSPECTION MODE <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.**

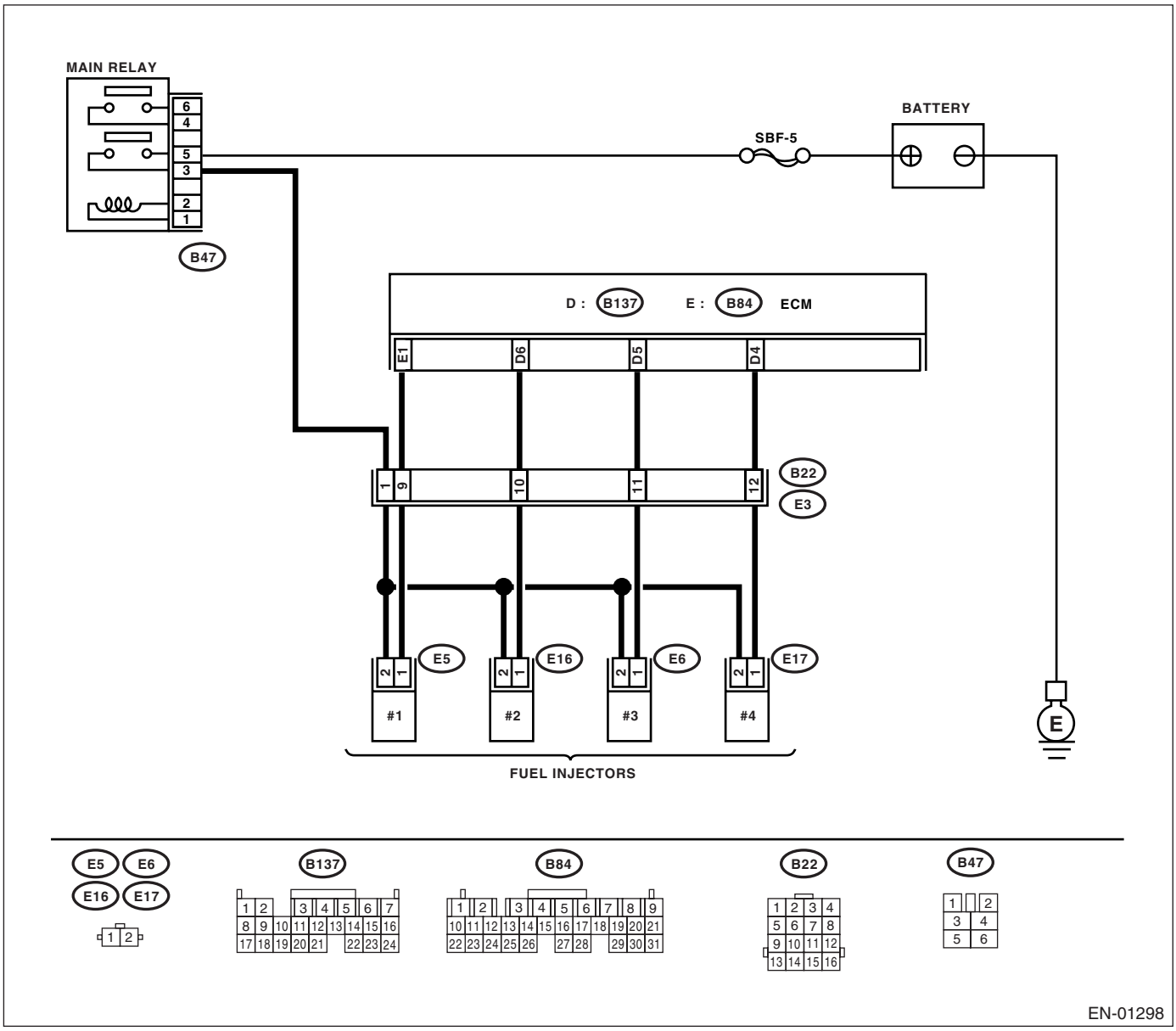
WIRING DIAGRAM:
- LHD model





EN-01297

- RHD model



	Step	Check	Yes	No
1	**CHECK OPERATION OF EACH FUEL INJECTOR.** While cranking the engine, check that each fuel injector emits “operating” sound. Use a sound scope or attach a screwdriver to injector for this check.	Does the fuel injector emit “operating” sound?	Check the fuel pressure. <Ref. to ME(H4DOTC)-38, INSPECTION, Fuel Pressure.>	Go to step **2.**

	Step	Check	Yes	No
2	**CHECK POWER SUPPLY TO EACH FUEL INJECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from fuel injector. 3) Turn the ignition switch to ON. 4) Measure the power supply voltage between the fuel injector terminal and engine ground. ***Connector & terminal*** ***#1 (E5) No. 2 (+) — Engine ground (–):*** ***#2 (E16) No. 2 (+) — Engine ground (–):*** ***#3 (E6) No. 2 (+) — Engine ground (–):*** ***#4 (E17) No. 2 (+) — Engine ground (–):***	Is the voltage more than 10 V?	Go to step **3.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between main relay and fuel injector connector • Poor contact in main relay connector • Poor contact in coupling connector • Poor contact in fuel injector connector
3	**CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR.** 1) Disconnect the connector from ECM. 2) Measure the resistance of harness between ECM and fuel injector connector. ***Connector & terminal*** ***(B84) No. 1 — (E5) No. 1:*** ***(B137) No. 6 — (E16) No. 1:*** ***(B137) No. 5 — (E6) No. 1:*** ***(B137) No. 4 — (E6) No. 1:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and fuel injector connector • Poor contact in coupling connector
4	**CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR.** Measure the resistance of harness between ECM and fuel injector connector. ***Connector & terminal*** ***(B84) No. 1 — Chassis ground:*** ***(B137) No. 6 — Chassis ground:*** ***(B137) No. 5 — Chassis ground:*** ***(B137) No. 4 — Chassis ground:***	Is the resistance less than 1 Ω?	Repair the ground short circuit in harness between ECM and fuel injector connector.	Go to step **5.**
5	**CHECK EACH FUEL INJECTOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between each fuel injector terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 5 — 20 Ω?	Go to step **6.**	Replace the faulty fuel injector.
6	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair the poor contact in ECM connector.	Inspection using “General Diagnostic Table”. <Ref. to EN(H4DOTC)(diag)-298, INSPECTION, General Diagnostic Table.>

18.List of Diagnostic Trouble Code (DTC)

A: LIST

DTC	Item	Index
P0011	Intake Camshaft Position - Timing Over-Advanced or System Performance (Bank 1)	<Ref. to EN(H4DOTC)(diag)-78, DTC P0011 INTAKE CAMSHAFT POSITION - TIMING OVER-ADVANCED OR SYSTEM PERFORMANCE (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0021	Intake Camshaft Position - Timing Over-Advanced or System Performance (Bank 2)	<Ref. to EN(H4DOTC)(diag)-79, DTC P0021 INTAKE CAMSHAFT POSITION - TIMING OVER-ADVANCED OR SYSTEM PERFORMANCE (BANK 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0030	HO2S Heater Control Circuit (Bank 1 Sensor 1)	<Ref. to EN(H4DOTC)(diag)-80, DTC P0030 HO2S HEATER CONTROL CIRCUIT (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0031	HO2S Heater Control Circuit Low (Bank 1 Sensor 1)	<Ref. to EN(H4DOTC)(diag)-82, DTC P0031 HO2S HEATER CONTROL CIRCUIT LOW (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0032	HO2S Heater Control Circuit High (Bank 1 Sensor 1)	<Ref. to EN(H4DOTC)(diag)-85, DTC P0032 HO2S HEATER CONTROL CIRCUIT HIGH (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0037	HO2S Heater Control Circuit Low (Bank 1 Sensor 2)	<Ref. to EN(H4DOTC)(diag)-87, DTC P0037 HO2S HEATER CONTROL CIRCUIT LOW (BANK 1 SENSOR 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0038	HO2S Heater Control Circuit High (Bank 1 Sensor 2)	<Ref. to EN(H4DOTC)(diag)-90, DTC P0038 HO2S HEATER CONTROL CIRCUIT HIGH (BANK 1 SENSOR 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0068	MAP/MAF - Throttle Position Correlation	<Ref. to EN(H4DOTC)(diag)-92, DTC P0068 MAP/MAF - THROTTLE POSITION CORRELATION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0101	Mass or Volume Air Flow Circuit Range/Performance	<Ref. to EN(H4DOTC)(diag)-95, DTC P0101 MASS OR VOLUME AIR FLOW CIRCUIT RANGE/PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0102	Mass or Volume Air Flow Circuit Low Input	<Ref. to EN(H4DOTC)(diag)-97, DTC P0102 MASS OR VOLUME AIR FLOW CIRCUIT LOW INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0103	Mass or Volume Air Flow Circuit High Input	<Ref. to EN(H4DOTC)(diag)-100, DTC P0103 MASS OR VOLUME AIR FLOW CIRCUIT HIGH INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0107	Manifold Absolute Pressure/Barometric Pressure Circuit Low Input	<Ref. to EN(H4DOTC)(diag)-102, DTC P0107 MANIFOLD ABSOLUTE PRESSURE/BAROMETRIC PRESSURE CIRCUIT LOW INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0108	Manifold Absolute Pressure/Barometric Pressure Circuit High Input	<Ref. to EN(H4DOTC)(diag)-105, DTC P0108 MANIFOLD ABSOLUTE PRESSURE/BAROMETRIC PRESSURE CIRCUIT HIGH INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0112	Intake Air Temperature Sensor 1 Circuit Low	<Ref. to EN(H4DOTC)(diag)-108, DTC P0112 INTAKE AIR TEMPERATURE SENSOR 1 CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0113	Intake Air Temperature Sensor 1 Circuit High	<Ref. to EN(H4DOTC)(diag)-110, DTC P0113 INTAKE AIR TEMPERATURE SENSOR 1 CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0117	Engine Coolant Temperature Circuit Low	<Ref. to EN(H4DOTC)(diag)-113, DTC P0117 ENGINE COOLANT TEMPERATURE CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0118	Engine Coolant Temperature Circuit High	<Ref. to EN(H4DOTC)(diag)-115, DTC P0118 ENGINE COOLANT TEMPERATURE CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0121	Throttle/Pedal Position Sensor/Switch “A” Circuit Range/Performance	<Ref. to EN(H4DOTC)(diag)-118, DTC P0121 THROTTLE/PEDAL POSITION SENSOR/SWITCH “A” CIRCUIT RANGE/PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC	Item	Index
P0122	Throttle/Pedal Position Sensor/ Switch “A” Circuit Low	<Ref. to EN(H4DOTC)(diag)-120, DTC P0122 THROTTLE/PEDAL POSITION SENSOR/SWITCH “A” CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0123	Throttle/Pedal Position Sensor/ Switch “A” Circuit High	<Ref. to EN(H4DOTC)(diag)-124, DTC P0123 THROTTLE/PEDAL POSITION SENSOR/SWITCH “A” CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0125	Insufficient Coolant Temperature for Closed Loop Fuel Control	<Ref. to EN(H4DOTC)(diag)-127, DTC P0125 INSUFFICIENT COOLANT TEMPERATURE FOR CLOSED LOOP FUEL CONTROL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0130	O2 Sensor Circuit (Bank 1 Sensor 1)	<Ref. to EN(H4DOTC)(diag)-129, DTC P0130 O2 SENSOR CIRCUIT (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0133	O2 Sensor Circuit Slow Response (Bank 1 Sensor 1)	<Ref. to EN(H4DOTC)(diag)-131, DTC P0133 O2 SENSOR CIRCUIT SLOW RESPONSE (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0134	O2 Sensor Circuit No Activity Detected (Bank 1 Sensor 1)	<Ref. to EN(H4DOTC)(diag)-132, DTC P0134 O2 SENSOR CIRCUIT NO ACTIVITY DETECTED (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0137	O2 Sensor Circuit Low Voltage (Bank 1 Sensor 2)	<Ref. to EN(H4DOTC)(diag)-133, DTC P0137 O2 SENSOR CIRCUIT LOW VOLTAGE (BANK 1 SENSOR 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0138	O2 Sensor Circuit High Voltage (Bank 1 Sensor 2)	<Ref. to EN(H4DOTC)(diag)-136, DTC P0138 O2 SENSOR CIRCUIT HIGH VOLTAGE (BANK 1 SENSOR 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0139	O2 Sensor Circuit Slow Response (Bank 1 Sensor 2)	<Ref. to EN(H4DOTC)(diag)-139, DTC P0139 O2 SENSOR CIRCUIT SLOW RESPONSE (BANK 1 SENSOR 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0171	System Too Lean (Bank 1)	<Ref. to EN(H4DOTC)(diag)-140, DTC P0171 SYSTEM TOO LEAN (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0172	System Too Rich (Bank 1)	<Ref. to EN(H4DOTC)(diag)-140, DTC P0172 SYSTEM TOO RICH (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0230	Fuel Pump Primary Circuit	<Ref. to EN(H4DOTC)(diag)-143, DTC P0230 FUEL PUMP PRIMARY CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0244	Turbo/Super Charger Wastegate Solenoid “A” Range/Performance	<Ref. to EN(H4DOTC)(diag)-146, DTC P0244 TURBO/SUPER CHARGER WASTEGATE SOLENOID “A” RANGE/PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0245	Turbo/Super Charger Wastegate Solenoid “A” Low	<Ref. to EN(H4DOTC)(diag)-148, DTC P0245 TURBO/SUPER CHARGER WASTEGATE SOLENOID “A” LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0246	Turbo/Super Charger Wastegate Solenoid “A” High	<Ref. to EN(H4DOTC)(diag)-150, DTC P0246 TURBO/SUPER CHARGER WASTEGATE SOLENOID “A” HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0301	Cylinder 1 Misfire Detected	<Ref. to EN(H4DOTC)(diag)-151, DTC P0301 CYLINDER 1 MISFIRE DETECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0302	Cylinder 2 Misfire Detected	<Ref. to EN(H4DOTC)(diag)-151, DTC P0302 CYLINDER 2 MISFIRE DETECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0303	Cylinder 3 Misfire Detected	<Ref. to EN(H4DOTC)(diag)-151, DTC P0303 CYLINDER 3 MISFIRE DETECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0304	Cylinder 4 Misfire Detected	<Ref. to EN(H4DOTC)(diag)-152, DTC P0304 CYLINDER 4 MISFIRE DETECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0327	Knock Sensor 1 Circuit Low (Bank 1 or Single Sensor)	<Ref. to EN(H4DOTC)(diag)-158, DTC P0327 KNOCK SENSOR 1 CIRCUIT LOW (BANK 1 OR SINGLE SENSOR), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0328	Knock Sensor 1 Circuit High (Bank 1 or Single Sensor)	<Ref. to EN(H4DOTC)(diag)-160, DTC P0328 KNOCK SENSOR 1 CIRCUIT HIGH (BANK 1 OR SINGLE SENSOR), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

List of Diagnostic Trouble Code (DTC)

DTC	Item	Index
P0335	Crankshaft Position Sensor “A” Circuit	<Ref. to EN(H4DOTC)(diag)-162, DTC P0335 CRANKSHAFT POSITION SENSOR “A” CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0336	Crankshaft Position Sensor “A” Circuit Range/Performance	<Ref. to EN(H4DOTC)(diag)-164, DTC P0336 CRANKSHAFT POSITION SENSOR “A” CIRCUIT RANGE/PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0340	Camshaft Position Sensor “A” Circuit (Bank 1 or Single Sensor)	<Ref. to EN(H4DOTC)(diag)-166, DTC P0340 CAMSHAFT POSITION SENSOR “A” CIRCUIT (BANK 1 OR SINGLE SENSOR), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0341	Camshaft Position Sensor “A” Circuit Range/Performance (Bank 1 or Single Sensor)	<Ref. to EN(H4DOTC)(diag)-168, DTC P0341 CAMSHAFT POSITION SENSOR “A” CIRCUIT RANGE/PERFORMANCE (BANK 1 OR SINGLE SENSOR), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0365	Camshaft Position Sensor “B” Circuit (Bank 1)	<Ref. to EN(H4DOTC)(diag)-171, DTC P0365 CAMSHAFT POSITION SENSOR “B” CIRCUIT (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0390	Camshaft Position Sensor “B” Circuit (Bank 2)	<Ref. to EN(H4DOTC)(diag)-173, DTC P0390 CAMSHAFT POSITION SENSOR “B” CIRCUIT (BANK 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0420	Catalyst System Efficiency Below Threshold (Bank 1)	<Ref. to EN(H4DOTC)(diag)-175, DTC P0420 CATALYST SYSTEM EFFICIENCY BELOW THRESHOLD (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0458	Evaporative Emission System Purge Control Valve Circuit Low	<Ref. to EN(H4DOTC)(diag)-177, DTC P0458 EVAPORATIVE EMISSION SYSTEM PURGE CONTROL VALVE CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0459	Evaporative Emission System Purge Control Valve Circuit High	<Ref. to EN(H4DOTC)(diag)-179, DTC P0459 EVAPORATIVE EMISSION SYSTEM PURGE CONTROL VALVE CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0461	Fuel Level Sensor “A” Circuit Range/Performance	<Ref. to EN(H4DOTC)(diag)-181, DTC P0461 FUEL LEVEL SENSOR “A” CIRCUIT RANGE/PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0462	Fuel Level Sensor “A” Circuit Low	<Ref. to EN(H4DOTC)(diag)-184, DTC P0462 FUEL LEVEL SENSOR “A” CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0463	Fuel Level Sensor “A” Circuit High	<Ref. to EN(H4DOTC)(diag)-188, DTC P0463 FUEL LEVEL SENSOR “A” CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0483	Fan Rationality Check	<Ref. to EN(H4DOTC)(diag)-191, DTC P0483 FAN RATIONALITY CHECK, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0502	Vehicle Speed Sensor “A” Circuit Low Input	<Ref. to EN(H4DOTC)(diag)-194, DTC P0502 VEHICLE SPEED SENSOR “A” CIRCUIT LOW INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0503	Vehicle Speed Sensor “A” Intermittent/Erratic/High	<Ref. to EN(H4DOTC)(diag)-196, DTC P0503 VEHICLE SPEED SENSOR “A” INTERMITTENT/ERRATIC/HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0506	Idle Air Control System RPM Lower Than Expected	<Ref. to EN(H4DOTC)(diag)-198, DTC P0506 IDLE AIR CONTROL SYSTEM RPM LOWER THAN EXPECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0507	Idle Air Control System RPM Higher Than Expected	<Ref. to EN(H4DOTC)(diag)-200, DTC P0507 IDLE AIR CONTROL SYSTEM RPM HIGHER THAN EXPECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0508	Idle Air Control System Circuit Low	<Ref. to EN(H4DOTC)(diag)-202, DTC P0508 IDLE AIR CONTROL SYSTEM CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0509	Idle Air Control System Circuit High	<Ref. to EN(H4DOTC)(diag)-204, DTC P0509 IDLE AIR CONTROL SYSTEM CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0512	Starter Request Circuit	<Ref. to EN(H4DOTC)(diag)-206, DTC P0512 STARTER REQUEST CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC	Item	Index
P0513	Incorrect Immobilizer Key	<Ref. to IM(diag)-16, DTC P0513 INCORRECT IMMOBILIZER KEY, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0519	Idle Air Control System Performance	<Ref. to EN(H4DOTC)(diag)-208, DTC P0519 IDLE AIR CONTROL SYSTEM PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0545	Exhaust Gas Temperature Sensor Circuit Low (Bank1 Sensor1)	<Ref. to EN(H4DOTC)(diag)-210, DTC P0545 EXHAUST GAS TEMPERATURE SENSOR CIRCUIT LOW (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0546	Exhaust Gas Temperature Sensor Circuit High (Bank1 Sensor1)	<Ref. to EN(H4DOTC)(diag)-212, DTC P0546 EXHAUST GAS TEMPERATURE SENSOR CIRCUIT HIGH (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0565	Cruise Control On Signal	<Ref. to EN(H4DOTC)(diag)-215, DTC P0565 CRUISE CONTROL ON SIGNAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0604	Internal Control Module Random Access Memory (RAM) Error	<Ref. to EN(H4DOTC)(diag)-217, DTC P0604 INTERNAL CONTROL MODULE RANDOM ACCESS MEMORY (RAM) ERROR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0691	Fan 1 Control Circuit Low	<Ref. to EN(H4DOTC)(diag)-219, DTC P0691 FAN 1 CONTROL CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0692	Fan 1 Control Circuit High	<Ref. to EN(H4DOTC)(diag)-222, DTC P0692 FAN 1 CONTROL CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0703	Brake Switch “B” Circuit	<Ref. to EN(H4DOTC)(diag)-225, DTC P0703 BRAKE SWITCH “B” CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0705	Transmission Range Sensor Circuit Malfunction (PRNDL Input)	<Ref. to 4AT(diag)-99, CHECK INHIBITOR SWITCH, Diagnostic Procedure without Diagnostic Trouble Code (DTC).>
P0710	Transmission Fluid Temperature Sensor “A” Circuit	<Ref. to 4AT(diag)-42, DTC 27 ATF TEMPERATURE SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0716	Input/Turbine Speed Sensor “A” Circuit Range/Performance	<Ref. to 4AT(diag)-53, DTC 36 TORQUE CONVERTER TURBINE SPEED SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0720	Output Speed Sensor Circuit	<Ref. to 4AT(diag)-49, DTC 33 FRONT VEHICLE SPEED SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0726	Engine Speed Input Circuit Range/ Performance	<Ref. to 4AT(diag)-38, DTC 11 ENGINE SPEED SIGNAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0731	Gear 1 Incorrect Ratio	<Ref. to EN(H4DOTC)(diag)-227, DTC P0731 GEAR 1 INCORRECT RATIO, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0732	Gear 2 Incorrect Ratio	<Ref. to EN(H4DOTC)(diag)-227, DTC P0732 GEAR 2 INCORRECT RATIO, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0733	Gear 3 Incorrect Ratio	<Ref. to EN(H4DOTC)(diag)-227, DTC P0733 GEAR 3 INCORRECT RATIO, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0734	Gear 4 Incorrect Ratio	<Ref. to EN(H4DOTC)(diag)-228, DTC P0734 GEAR 4 INCORRECT RATIO, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0741	Torque Converter Clutch Circuit Performance or Stuck Off	<Ref. to EN(H4DOTC)(diag)-229, DTC P0741 TORQUE CONVERTER CLUTCH CIRCUIT PERFORMANCE OR STUCK OFF, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0743	Torque Converter Clutch Circuit Electrical	<Ref. to 4AT(diag)-77, DTC 77 LOCK-UP DUTY SOLENOID, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0748	Pressure Control Solenoid “A” Electrical	<Ref. to 4AT(diag)-71, DTC 75 LINE PRESSURE DUTY SOLENOID, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0753	Shift Solenoid “A” Electrical	<Ref. to 4AT(diag)-59, DTC 71 SHIFT SOLENOID 1, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0758	Shift Solenoid “B” Electrical	<Ref. to 4AT(diag)-62, DTC 72 SHIFT SOLENOID 2, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0771	Shift Solenoid “E” Performance or Stuck Off	<Ref. to 4AT(diag)-65, DTC 73 LOW CLUTCH TIMING SOLENOID, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0778	Pressure Control Solenoid “B” Electrical	<Ref. to 4AT(diag)-74, DTC 76 2-4 BRAKE DUTY SOLENOID, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC	Item	Index
P0785	Shift/Timing Solenoid	<Ref. to 4AT(diag)-68, DTC 74 2-4 BRAKE TIMING SOLENOID, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0851	Park/Neutral Switch Input Circuit Low	<Ref. to EN(H4DOTC)(diag)-231, DTC P0851 PARK/NEUTRAL SWITCH INPUT CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0852	Park/Neutral Switch Input Circuit High	<Ref. to EN(H4DOTC)(diag)-236, DTC P0852 PARK/NEUTRAL SWITCH INPUT CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1134	A/F Sensor Micro-Computer Problem (Bank1 Sensor1)	<Ref. to EN(H4DOTC)(diag)-242, DTC P1134 A/F SENSOR MICRO-COMPUTER PROBLEM (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1152	O2 Sensor Circuit Range/Performance (Low) (Bank1 Sensor1)	<Ref. to EN(H4DOTC)(diag)-243, DTC P1152 O2 SENSOR CIRCUIT RANGE/PERFORMANCE (LOW) (BANK1 SENSOR1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1153	O2 Sensor Circuit Range/Performance (High) (Bank1 Sensor1)	<Ref. to EN(H4DOTC)(diag)-245, DTC P1153 O2 SENSOR CIRCUIT RANGE/PERFORMANCE (HIGH) (BANK1 SENSOR1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1301	Misfire Detected (High Temperature Exhaust Gas)	<Ref. to EN(H4DOTC)(diag)-247, DTC P1301 MISFIRE DETECTED (HIGH TEMPERATURE EXHAUST GAS), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1306	OCV Solenoid Valve Signal 1 Circuit Malfunction (Open)	<Ref. to EN(H4DOTC)(diag)-249, DTC P1306 OCV SOLENOID VALVE SIGNAL 1 CIRCUIT MALFUNCTION (OPEN), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1307	OCV Solenoid Valve Signal 1 Circuit Malfunction (Short)	<Ref. to EN(H4DOTC)(diag)-251, DTC P1307 OCV SOLENOID VALVE SIGNAL 1 CIRCUIT MALFUNCTION (SHORT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1308	OCV Solenoid Valve Signal 2 Circuit Malfunction (Open)	<Ref. to EN(H4DOTC)(diag)-253, DTC P1308 OCV SOLENOID VALVE SIGNAL 2 CIRCUIT MALFUNCTION (OPEN), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1309	OCV Solenoid Valve Signal 2 Circuit Malfunction (Short)	<Ref. to EN(H4DOTC)(diag)-255, DTC P1309 OCV SOLENOID VALVE SIGNAL 2 CIRCUIT MALFUNCTION (SHORT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1312	Exhaust Gas Temperature Sensor Malfunction	<Ref. to EN(H4DOTC)(diag)-257, DTC P1312 EXHAUST GAS TEMPERATURE SENSOR MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1518	Starter Switch Circuit Low Input	<Ref. to EN(H4DOTC)(diag)-259, DTC P1518 STARTER SWITCH CIRCUIT LOW INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1544	Exhaust Gas Temperature Too High	<Ref. to EN(H4DOTC)(diag)-261, DTC P1544 EXHAUST GAS TEMPERATURE TOO HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1560	Back-Up Voltage Circuit Malfunction	<Ref. to EN(H4DOTC)(diag)-263, DTC P1560 BACK-UP VOLTAGE CIRCUIT MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1570	Antenna	<Ref. to IM(diag)-17, DTC P1570 ANTENNA, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1571	Reference Code Incompatibility	<Ref. to IM(diag)-19, DTC P1571 REFERENCE CODE INCOMPATIBILITY, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1572	IMM Circuit Failure (Except Antenna Circuit)	<Ref. to IM(diag)-20, DTC P1572 IMM CIRCUIT FAILURE (EXCEPT ANTENNA CIRCUIT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1574	Key Communication Failure	<Ref. to IM(diag)-23, DTC P1574 KEY COMMUNICATION FAILURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1576	EGI Control Module EEPROM	<Ref. to IM(diag)-23, DTC P1576 EGI CONTROL MODULE EEPROM, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1577	IMM Control Module EEPROM	<Ref. to IM(diag)-23, DTC P1577 IMM CONTROL MODULE EEPROM, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC	Item	Index
P1700	Throttle Position Sensor	<Ref. to 4AT(diag)-45, DTC 31 THROTTLE POSITION SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1711	Engine Torque Control Signal #1 Circuit Malfunction	<Ref. to EN(H4DOTC)(diag)-266, DTC P1711 ENGINE TORQUE CONTROL SIGNAL #1 CIRCUIT MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1712	Engine Torque Control Signal #2 Circuit Malfunction	<Ref. to EN(H4DOTC)(diag)-268, DTC P1712 ENGINE TORQUE CONTROL SIGNAL #2 CIRCUIT MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2004	Intake Manifold Runner Control Stuck Open (Bank 1)	<Ref. to EN(H4DOTC)(diag)-270, DTC P2004 INTAKE MANIFOLD RUNNER CONTROL STUCK OPEN (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2005	Intake Manifold Runner Control Stuck Open (Bank 2)	<Ref. to EN(H4DOTC)(diag)-270, DTC P2005 INTAKE MANIFOLD RUNNER CONTROL STUCK OPEN (BANK 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2006	Intake Manifold Runner Control Stuck Closed (Bank 1)	<Ref. to EN(H4DOTC)(diag)-271, DTC P2006 INTAKE MANIFOLD RUNNER CONTROL STUCK CLOSED (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2007	Intake Manifold Runner Control Stuck Closed (Bank 2)	<Ref. to EN(H4DOTC)(diag)-271, DTC P2007 INTAKE MANIFOLD RUNNER CONTROL STUCK CLOSED (BANK 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2008	Intake Manifold Runner Control Stuck Circuit/Open (Bank 1)	<Ref. to EN(H4DOTC)(diag)-272, DTC P2008 INTAKE MANIFOLD RUNNER CONTROL CIRCUIT / OPEN (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2009	Intake Manifold Runner Control Stuck Circuit Low (Bank 1)	<Ref. to EN(H4DOTC)(diag)-274, DTC P2009 INTAKE MANIFOLD RUNNER CONTROL CIRCUIT LOW (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2011	Intake Manifold Runner Control Stuck Circuit/Open (Bank 2)	<Ref. to EN(H4DOTC)(diag)-276, DTC P2011 INTAKE MANIFOLD RUNNER CONTROL CIRCUIT / OPEN (BANK 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2012	Intake Manifold Runner Control Stuck Circuit Low (Bank 2)	<Ref. to EN(H4DOTC)(diag)-278, DTC P2012 INTAKE MANIFOLD RUNNER CONTROL CIRCUIT LOW (BANK 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2016	Intake Manifold Runner Position Sensor/Switch Circuit Low (Bank 1)	<Ref. to EN(H4DOTC)(diag)-280, DTC P2016 INTAKE MANIFOLD RUNNER POSITION SENSOR / SWITCH CIRCUIT LOW (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2017	Intake Manifold Runner Position Sensor/Switch Circuit High (Bank 1)	<Ref. to EN(H4DOTC)(diag)-284, DTC P2017 INTAKE MANIFOLD RUNNER POSITION SENSOR / SWITCH CIRCUIT HIGH (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2021	Intake Manifold Runner Position Sensor/Switch Circuit Low (Bank 2)	<Ref. to EN(H4DOTC)(diag)-287, DTC P2021 INTAKE MANIFOLD RUNNER POSITION SENSOR / SWITCH CIRCUIT LOW (BANK 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2022	Intake Manifold Runner Position Sensor/Switch Circuit High (Bank 2)	<Ref. to EN(H4DOTC)(diag)-291, DTC P2022 INTAKE MANIFOLD RUNNER POSITION SENSOR / SWITCH CIRCUIT HIGH (BANK 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2227	Barometric Pressure Circuit Range/ Performance	<Ref. to EN(H4DOTC)(diag)-294, DTC P2227 BAROMETRIC PRESSURE CIRCUIT RANGE/PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2228	Barometric Pressure Circuit Low	<Ref. to EN(H4DOTC)(diag)-294, DTC P2228 BAROMETRIC PRESSURE CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2229	Barometric Pressure Circuit High	<Ref. to EN(H4DOTC)(diag)-295, DTC P2229 BAROMETRIC PRESSURE CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2503	Charging System Voltage Low	<Ref. to EN(H4DOTC)(diag)-295, DTC P2503 CHARGING SYSTEM VOLTAGE LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2504	Charging System Voltage High	<Ref. to EN(H4DOTC)(diag)-296, DTC P2504 CHARGING SYSTEM VOLTAGE HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

19.Diagnostic Procedure with Diagnostic Trouble Code (DTC)

A: DTC P0011 INTAKE CAMSHAFT POSITION - TIMING OVER-ADVANCED OR SYSTEM PERFORMANCE (BANK 1)

DTC DETECTING CONDITION:
Immediately at fault recognition
TROUBLE SYMPTOM:
- Engine stalls.
- Erroneous idling

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC.**	Is any other DTC displayed?	Inspect the relevant DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4DOTC)(diag)-72, List of Diagnostic Trouble Code (DTC).>	Go to step **2.**
2	**CHECK CURRENT DATA.** 1) Start the engine and let it idle. 2) Inspect the AVCS operating angle and oil flow control solenoid valve duty output using Subaru Select Monitor and general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4DOTC)(diag)-32, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the General Scan Tool Instruction Manual.	Is the AVCS operating angle more than approx. 0° and the oil flow control solenoid valve duty output more than approx. 10%?	A temporary malfunction. Conduct the following to clean the oil passage. Replace the engine oil and idle the engine for 5 minutes, then replace the oil filter and engine oil.	Inspect the following items and repair or replace if necessary. • Engine oil (amount, contamination) • Oil pipe (clog) • Oil flow control solenoid valve (clog or contamination in oil passage, settling at spring, stuck at valve) • Intake camshaft (sludge, damage at camshaft) • Timing belt (timing mark aligning)

B: DTC P0021 INTAKE CAMSHAFT POSITION - TIMING OVER-ADVANCED OR SYSTEM PERFORMANCE (BANK 2)

DTC DETECTING CONDITION:

Immediately at fault recognition

TROUBLE SYMPTOM:

- Engine stalls.
- Erroneous idling

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC.**	Is any other DTC displayed?	Inspect the relevant DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4DOTC)(diag)-72, List of Diagnostic Trouble Code (DTC).>	Go to step **2.**
2	**CHECK CURRENT DATA.** 1) Start the engine and let it idle. 2) Inspect the AVCS operating angle and oil flow control solenoid valve duty output using Subaru Select Monitor and general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4DOTC)(diag)-32, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the General Scan Tool Instruction Manual.	Is the AVCS operating angle more than approx. 0° and the oil flow control solenoid valve duty output more than approx. 10%?	A temporary malfunction. Conduct the following to clean the oil passage. Replace the engine oil and idle the engine for 5 minutes, then replace the oil filter and engine oil.	Inspect the following items and repair or replace if necessary. • Engine oil (amount, contamination) • Oil pipe (clog) • Oil flow control solenoid valve (clog or contamination in oil passage, settling at spring, stuck at valve) • Intake camshaft (sludge, damage at camshaft) • Timing belt (timing mark aligning)

C: DTC P0030 HO2S HEATER CONTROL CIRCUIT (BANK 1 SENSOR 1)

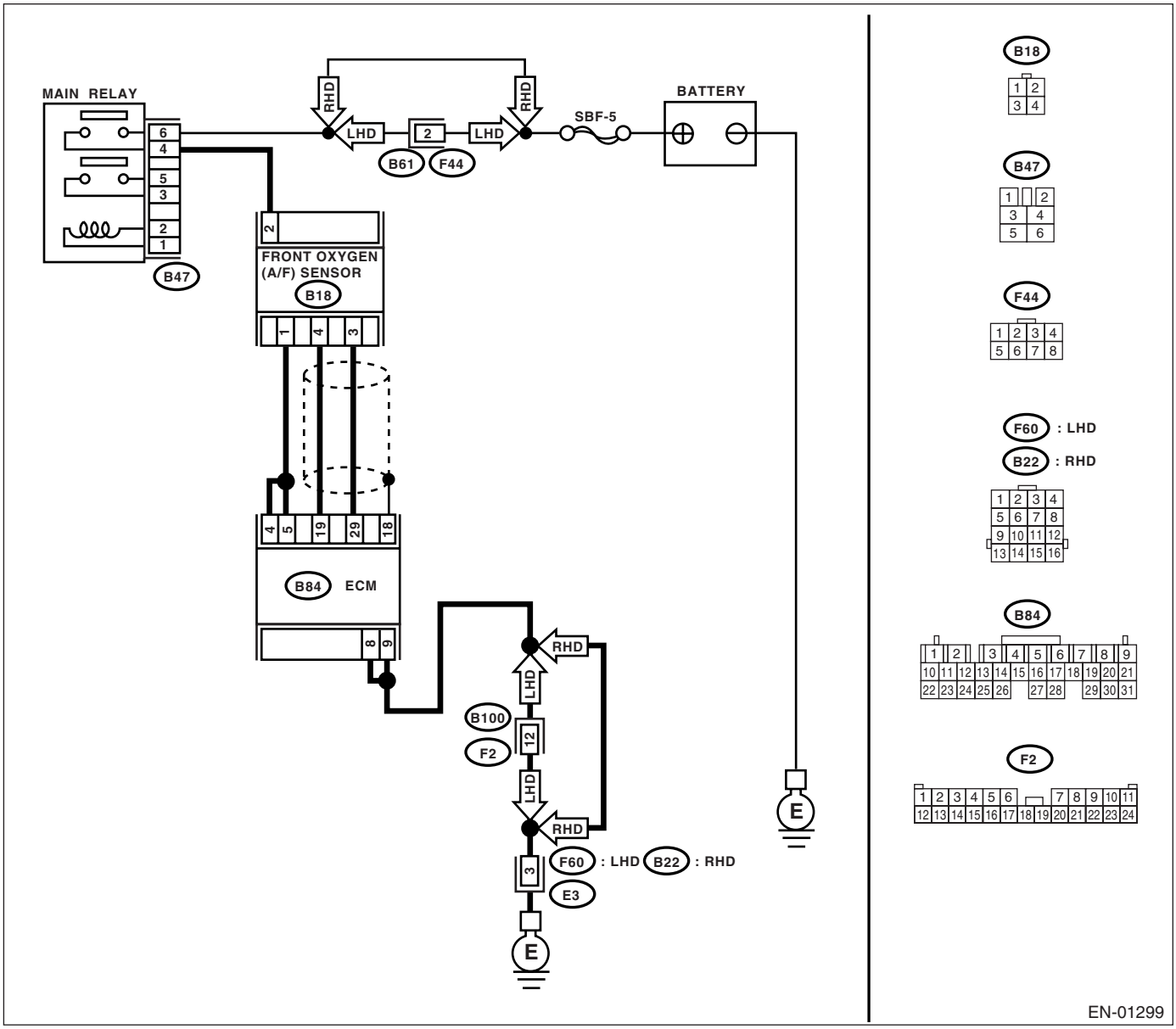
DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** 1) Start the engine and warm-up engine. 2) Turn the ignition switch to OFF. 3) Disconnect the connectors from ECM and front oxygen (A/F) sensor. 4) Measure the resistance of harness between ECM and front oxygen (A/F) sensor connector. ***Connector & terminal*** ***(B84) No. 5 — (B18) No. 1:*** ***(B84) No. 4 — (B18) No. 1:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the open circuit in harness between ECM and front oxygen (A/F) sensor connector.
2	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** Measure the resistance of harness between ECM and front oxygen (A/F) sensor connector. ***Connector & terminal*** ***(B84) No. 19 — (B18) No. 4:*** ***(B84) No. 29 — (B18) No. 3:***	Is the resistance less than 1 Ω?	Go to step **3.**	Repair the open circuit in harness between ECM and front oxygen (A/F) sensor connector.
3	**CHECK HARNESS BETWEEN MAIN RELAY AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** Measure the resistance of harness between main relay and front oxygen (A/F) sensor connector. ***Connector & terminal*** ***(B47) No. 4 — (B18) No. 2:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the open circuit in harness between main relay and front oxygen (A/F) sensor connector.
4	**CHECK FRONT OXYGEN (A/F) SENSOR.** Measure the resistance between front oxygen (A/F) sensor connector terminals. ***Terminals*** ***No. 2 — No. 1:***	Is the resistance less than 5 Ω?	Go to step **5.**	Replace the front oxygen (A/F) sensor. <Ref. to FU(H4DOTC)-45, Front Oxygen (A/F) Sensor.>
5	**CHECK POOR CONTACT.** Check the poor contact in ECM and front oxygen (A/F) sensor connector.	Is there poor contact in ECM or front oxygen (A/F) sensor connector?	Repair the poor contact in ECM or front oxygen (A/F) sensor connector.	Replace the front oxygen (A/F) sensor. <Ref. to FU(H4DOTC)-45, Front Oxygen (A/F) Sensor.>

D: DTC P0031 HO2S HEATER CONTROL CIRCUIT LOW (BANK 1 SENSOR 1)

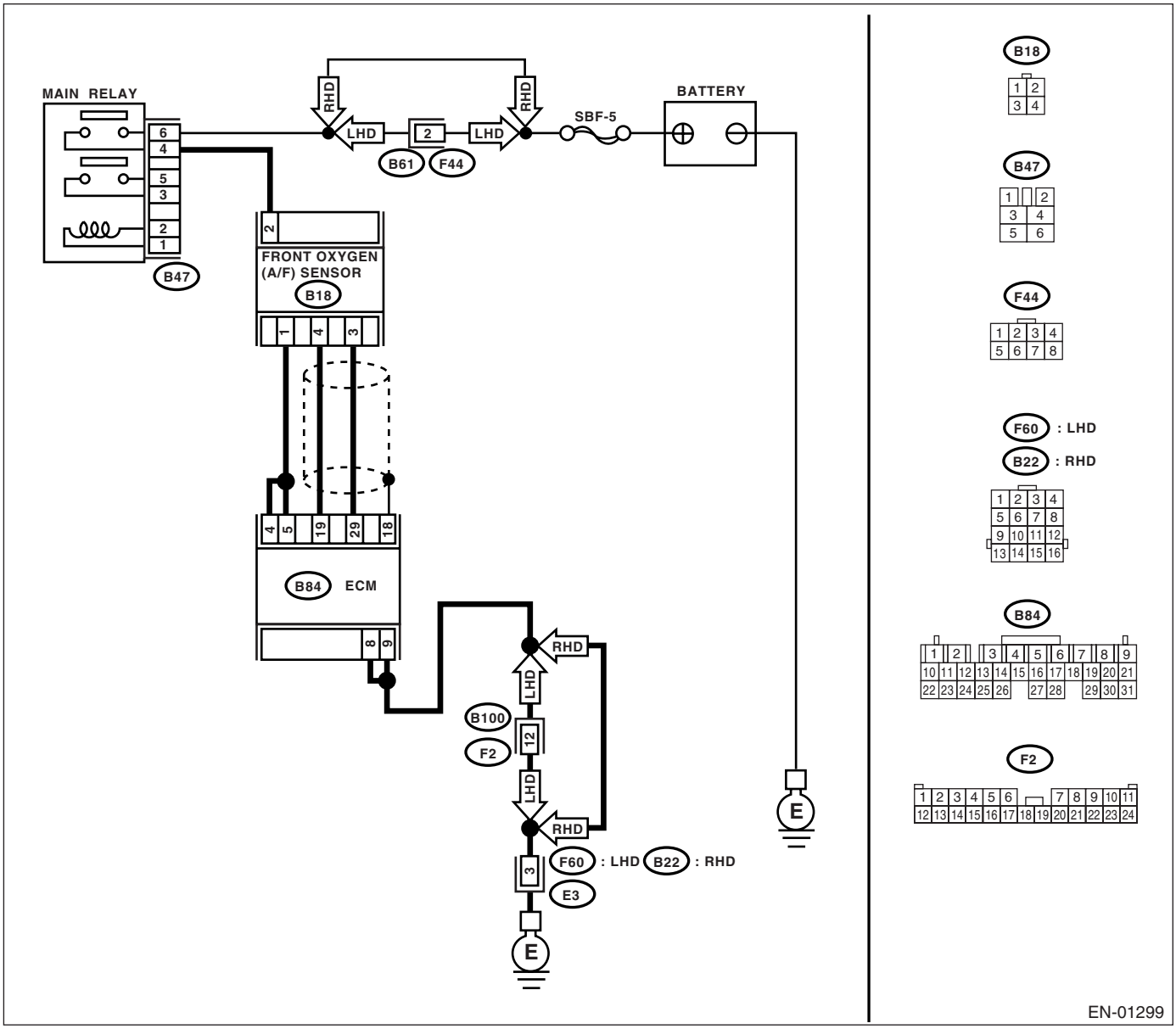
DTC DETECTING CONDITION:

Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK POWER SUPPLY TO FRONT OXYGEN (A/F) SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from front oxygen (A/F) sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between front oxygen (A/F) sensor connector and engine ground. ***Connector & terminal*** ***(B18) No. 2 (+) — Engine ground (–):***	Is the voltage more than 10 V?	Go to step **2.**	Repair the power supply line. NOTE: In this case, repair the following: • Open circuit in harness between main relay and front oxygen (A/F) sensor connector • Poor contact in front oxygen (A/F) sensor connector • Poor contact in main relay connector
2	**CHECK GROUND CIRCUIT OF ECM.** Measure the resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B84) No. 8 — Chassis ground:*** ***(B84) No. 9 — Chassis ground:***	Is the resistance less than 5 Ω?	Go to step **3.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and engine ground cable • Poor contact in ECM connector • Poor contact in coupling connector
3	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of front oxygen (A/F) sensor heater current using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4DOTC)(diag)-32, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the General Scan Tool Instruction Manual.	Is the current more than 0.2 A?	Repair the poor contact in connector. NOTE: In this case, repair the following: • Poor contact in front oxygen (A/F) sensor connector • Poor contact in ECM connector	Go to step **4.**
4	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Start and idle the engine. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B84) No. 4 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Go to step **6.**	Go to step **5.**
5	**CHECK OUTPUT SIGNAL FROM ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B84) No. 4 (+) — Chassis ground (–):***	Shake the ECM harness and connector, while monitoring value of voltage meter. Does the voltage change?	Repair the poor contact in ECM connector.	Go to step **6.**
6	**CHECK OUTPUT SIGNAL FROM ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B84) No. 5 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Go to step **8.**	Go to step **7.**

	Step	Check	Yes	No
7	**CHECK OUTPUT SIGNAL FROM ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B84) No. 5 (+) — Chassis ground (−):***	Shake the ECM harness and connector, while monitoring value of voltage meter. Does the voltage change?	Repair the poor contact in ECM connector.	Go to step **8.**
8	**CHECK FRONT OXYGEN (A/F) SENSOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between front oxygen (A/F) sensor connector terminals. ***Terminals*** ***No. 2 — No. 1:***	Is the resistance less than 10 Ω?	Repair the harness and connector. NOTE: In this case, repair the following: • Open or ground short circuit in harness between front oxygen (A/F) sensor and ECM connector • Poor contact in front oxygen (A/F) sensor connector • Poor contact in ECM connector	Replace the front oxygen (A/F) sensor. <Ref. to FU(H4DOTC)-45, Front Oxygen (A/F) Sensor.>

E: DTC P0032 HO2S HEATER CONTROL CIRCUIT HIGH (BANK 1 SENSOR 1)

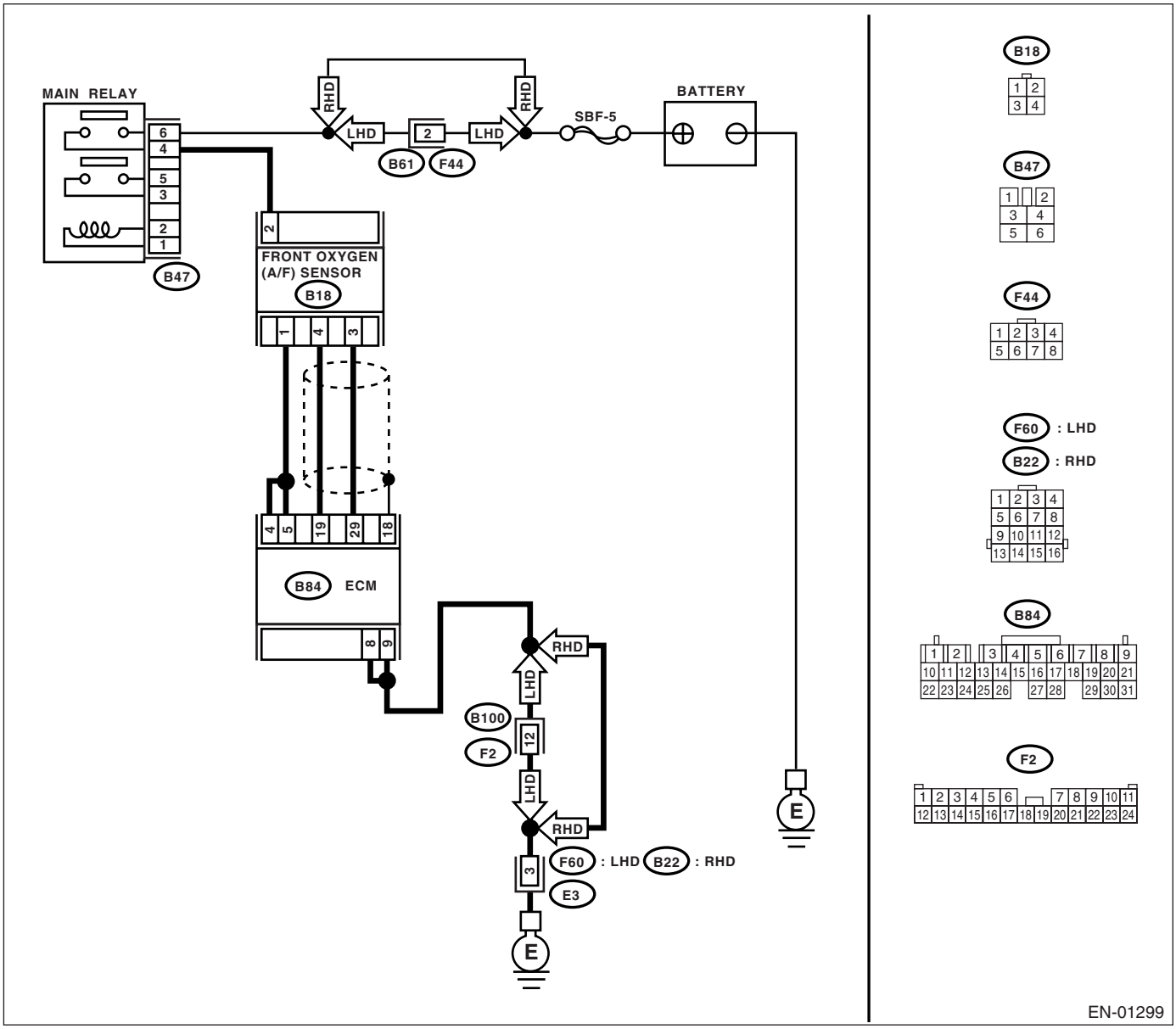
DTC DETECTING CONDITION:

Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B84) No. 4 (+) — Chassis ground (–):*** ***(B84) No. 5 (+) — Chassis ground (–):***	Is the voltage more than 8 V?	Go to step **3.**	Go to step **2.**
2	**CHECK FRONT OXYGEN (A/F) SENSOR HEATER CURRENT.** 1) Turn the ignition switch to OFF. 2) Repair the battery short circuit in harness between ECM and front oxygen (A/F) sensor connector. 3) Turn the ignition switch to ON. 4) Read the data of front oxygen (A/F) sensor heater current using Subaru Select Monitor or the general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4DOTC)(diag)-32, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the General Scan Tool Instruction Manual.	Is the current more than 2.3 A?	Replace the ECM. <Ref. to FU(H4DOTC)-50, Engine Control Module (ECM).>	Finish the diagnosis.
3	**CHECK OUTPUT SIGNAL FROM ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B84) No. 4 (+) — Chassis ground (–):*** ***(B84) No. 5 (+) — Chassis ground (–):***	Shake the ECM harness and connector, while monitoring value of voltage meter. Does the voltage change?	Repair the battery short circuit in harness between ECM and front oxygen (A/F) sensor connector.	Finish the diagnosis.

F: DTC P0037 HO2S HEATER CONTROL CIRCUIT LOW (BANK 1 SENSOR 2)

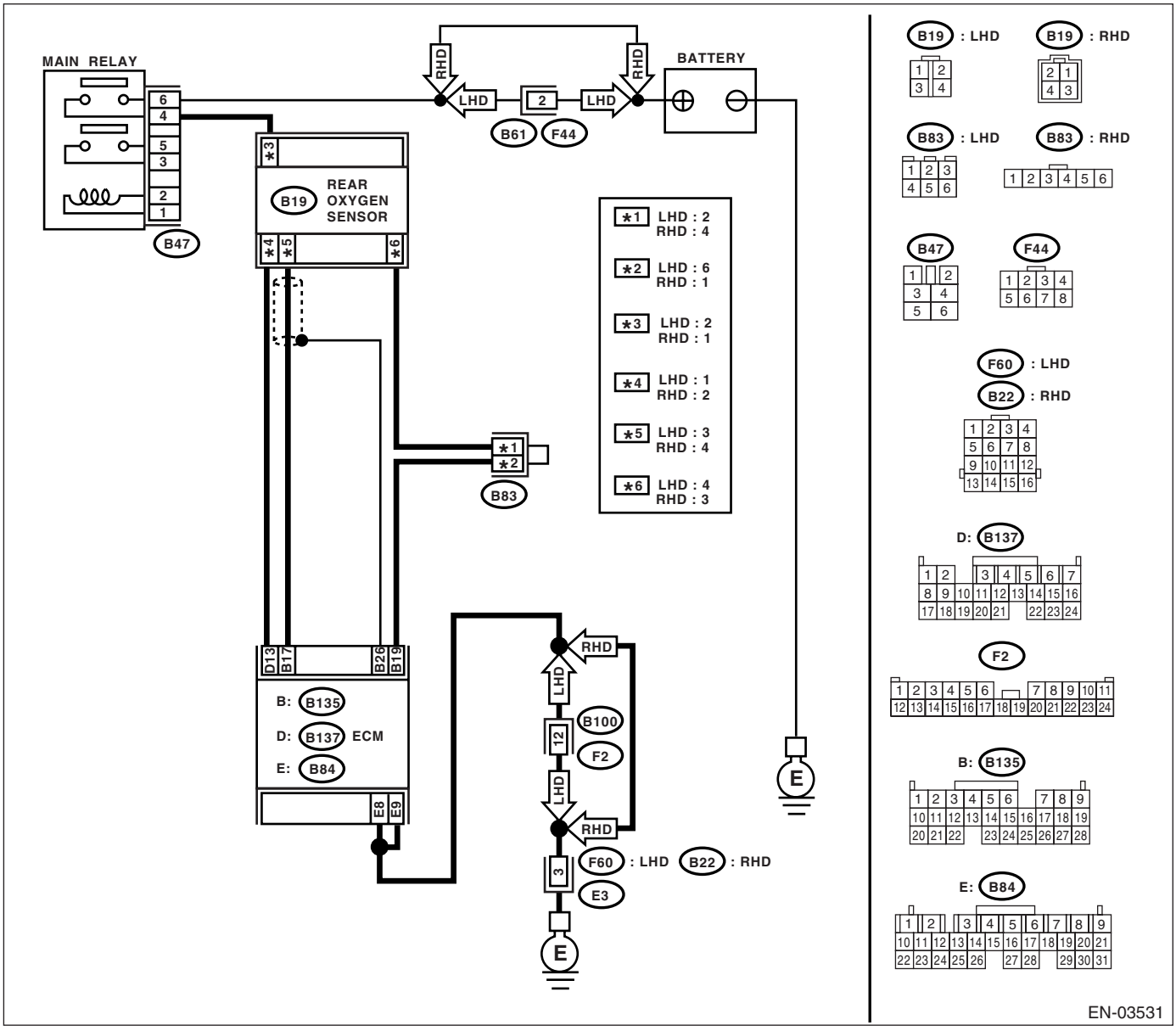
DTC DETECTING CONDITION:

Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK GROUND CIRCUIT OF ECM.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B84) No. 8 — Chassis ground:*** ***(B84) No. 9 — Chassis ground:***	Is the resistance less than 5 Ω?	Go to step **2.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and engine ground cable • Poor contact in ECM connector • Poor contact in coupling connector
2	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of rear oxygen sensor heater current using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4DOTC)(diag)-32, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the General Scan Tool Instruction Manual.	Is the current more than 0.2 A?	Repair the connector. NOTE: In this case, repair the following: • Poor contact in rear oxygen sensor connector • Poor contact in rear oxygen sensor connecting harness connector • Poor contact in ECM connector	Go to step **3.**
3	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Start and idle the engine. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B137) No. 13 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Go to step **6.**	Go to step **4.**
4	**CHECK OUTPUT SIGNAL FROM ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B137) No. 13 (+) — Chassis ground (–):***	Shake the ECM harness and connector, while monitoring value of voltage meter. Does the voltage change?	Repair the poor contact in ECM connector.	Go to step **5.**
5	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from rear oxygen sensor. 3) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B137) No. 13 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Replace the ECM. <Ref. to FU(H4DOTC)-50, Engine Control Module (ECM).>	Repair the battery short circuit in harness between ECM and rear oxygen sensor connector. After repair, replace the ECM. <Ref. to FU(H4DOTC)-50, Engine Control Module (ECM).>

	Step	Check	Yes	No
6	**CHECK POWER SUPPLY TO REAR OXYGEN SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from rear oxygen sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between rear oxygen sensor connector and engine ground or chassis ground. ***Connector & terminal*** ***LHD model*** ***(B19) No. 2 (+) — Chassis ground (−):*** ***RHD model*** ***(B19) No. 1 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **7.**	Repair the power supply line. NOTE: In this case, repair the following: • Open circuit in harness between main relay and rear oxygen sensor connector • Poor contact in rear oxygen sensor connector • Poor contact in coupling connector
7	**CHECK REAR OXYGEN SENSOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between rear oxygen sensor connector terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance less than 30 Ω?	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between rear oxygen sensor and ECM connector • Poor contact in rear oxygen sensor connector • Poor contact in ECM connector • Poor contact in coupling connector	Replace the rear oxygen sensor. <Ref. to FU(H4DOTC)-47, Rear Oxygen Sensor.>

G: DTC P0038 HO2S HEATER CONTROL CIRCUIT HIGH (BANK 1 SENSOR 2)

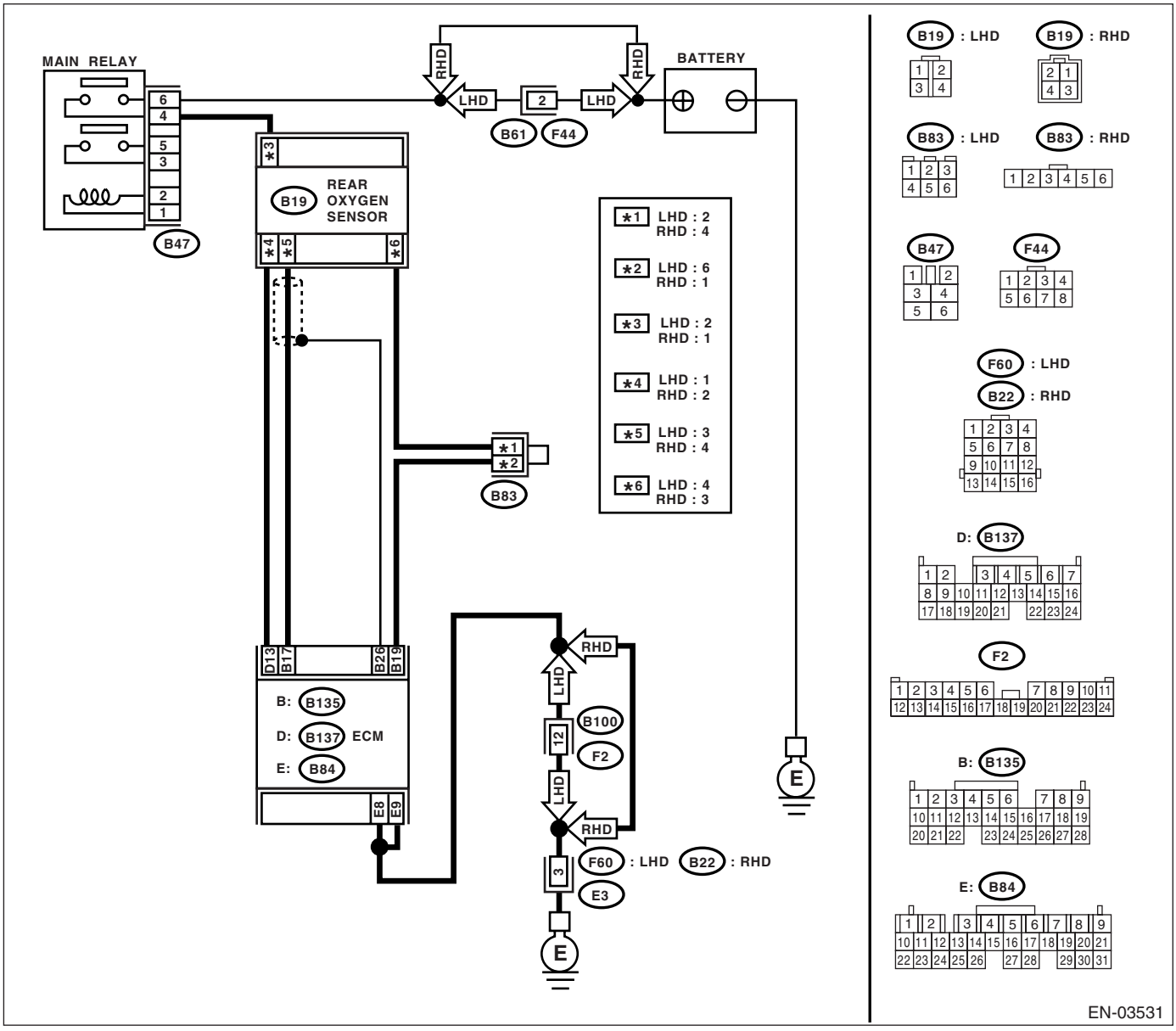
DTC DETECTING CONDITION:

Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK INPUT SIGNAL FOR ECM.** 1) Turn the ignition switch to OFF. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B137) No. 13 (+) — Chassis ground (−):***	Is the voltage more than 8 V?	Go to step **2.**	Go to step **3.**
2	**CHECK CURRENT DATA.** 1) Repair the battery short circuit in harness between ECM and rear oxygen sensor connector. 2) Turn the ignition switch to ON. 3) Read the data of rear oxygen sensor heater current using Subaru Select Monitor or the general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4DOTC)(diag)-32, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the General Scan Tool Instruction Manual.	Is the current more than 7 A?	Replace the ECM. <Ref. to FU(H4DOTC)-50, Engine Control Module (ECM).>	Finish the diagnosis.
3	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair the poor contact in ECM connector.	Finish the diagnosis.

H: DTC P0068 MAP/MAF - THROTTLE POSITION CORRELATION

DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

TROUBLE SYMPTOM:

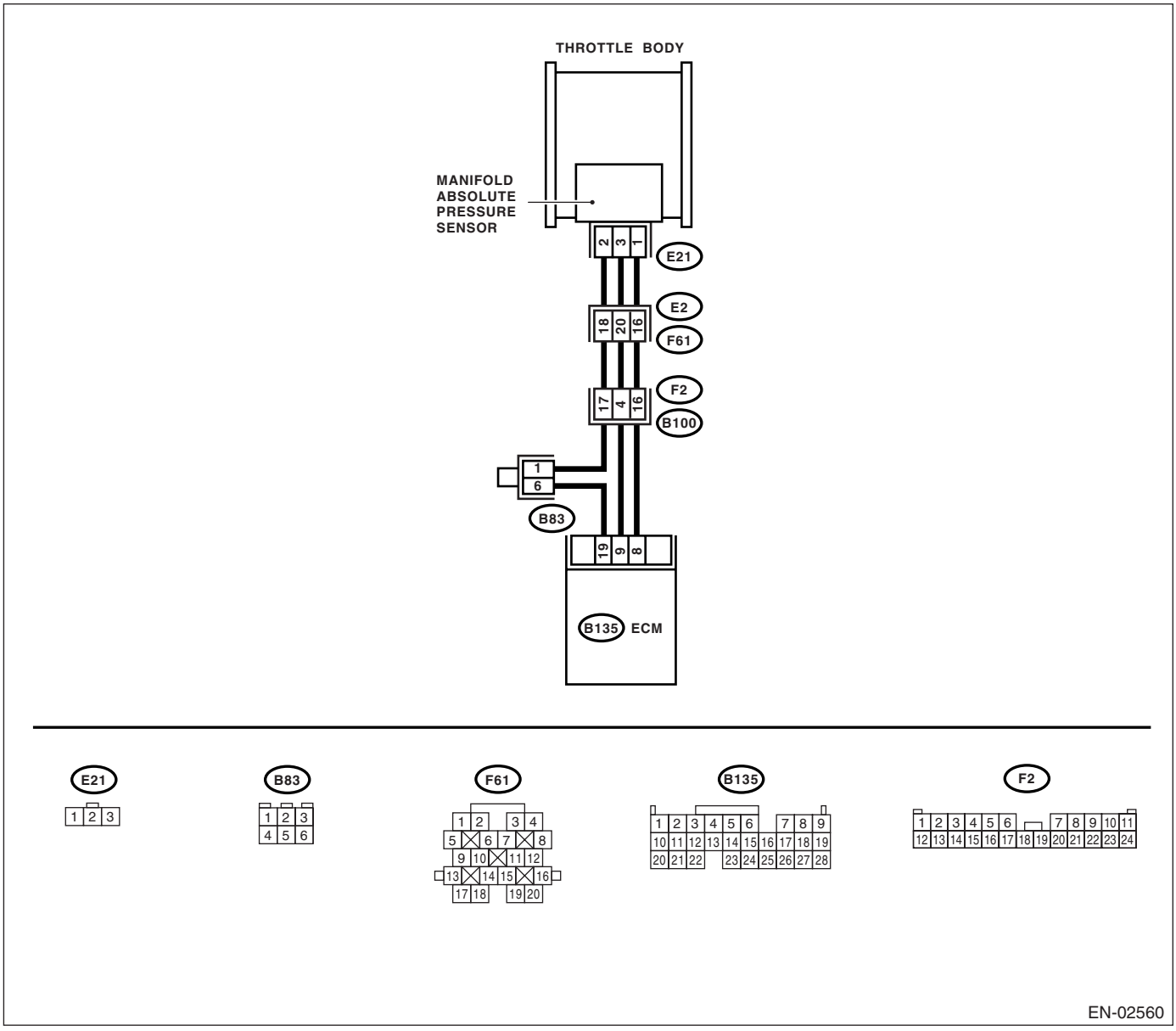
Failure of engine to start

CAUTION:

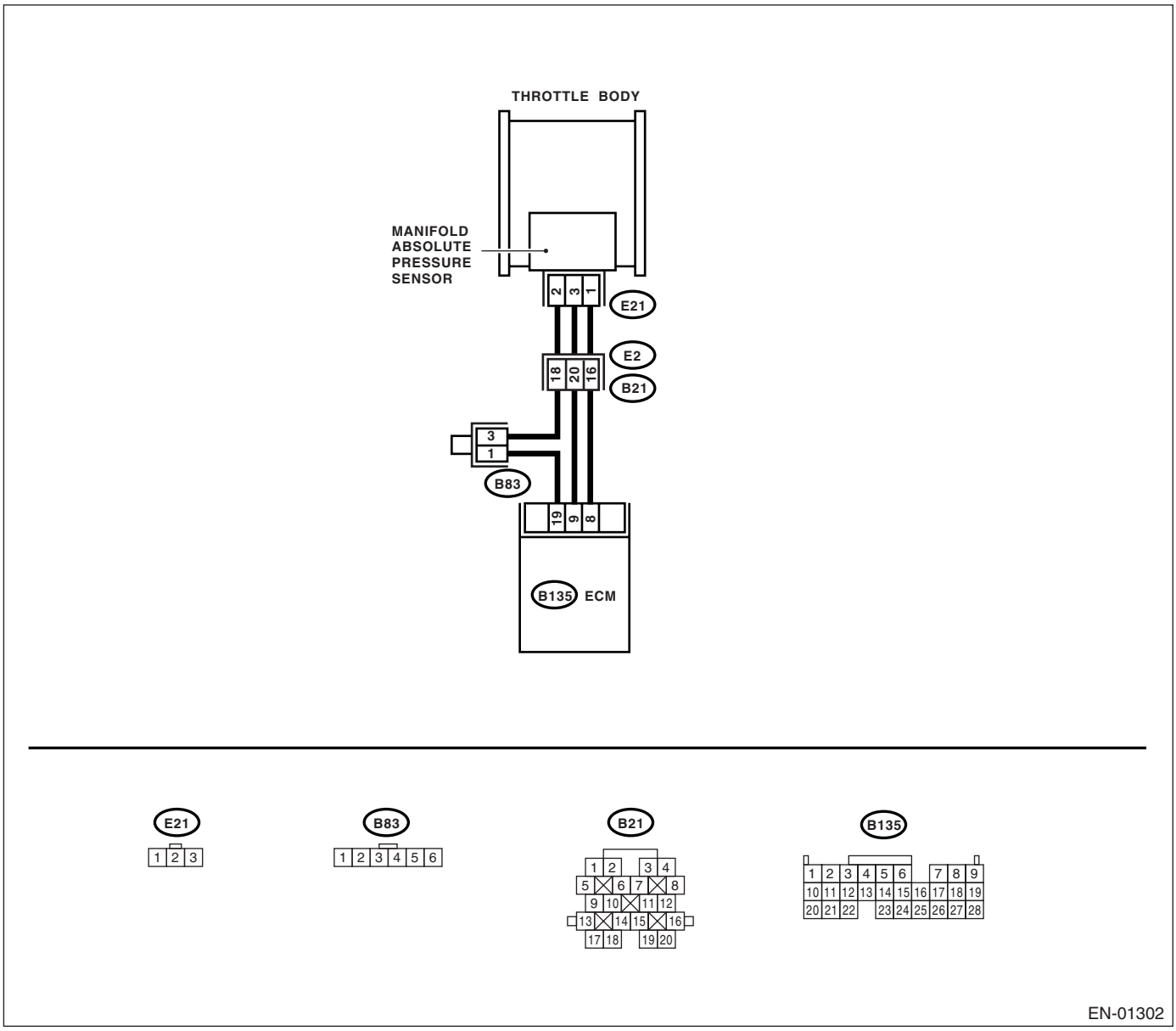
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

WIRING DIAGRAM:

- LHD model



- RHD model


THROTTLE BODY
MANIFOLD ABSOLUTE PRESSURE SENSOR
2 3 1
E21
E2
18 20 16
B21
3 1
B83
19 9 8
B135 ECM
E21
1 2 3
B83
1 2 3 4 5 6
B21
1 2 3 4
5 6 7 8
9 10 11 12
13 14 15 16
17 18 19 20
B135
1 2 3 4 5 6 7 8 9
10 11 12 13 14 15 16 17 18 19
20 21 22 23 24 25 26 27 28
EN-01302

	Step	Check	Yes	No
1	**CHECK IDLE SWITCH SIGNAL.** 1) Turn the ignition switch to ON. 2) Operate the LED operation mode for engine using Subaru Select Monitor. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to the "LED OPERATION MODE FOR ENGINE". <Ref. to EN(H4DOTC)(diag)-32, Subaru Select Monitor.>	Does the LED of {Idle Switch Signal} come on?	Go to step **2.**	Check the throttle position sensor circuit. <Ref. to EN(H4DOTC)(diag)-118, DTC P0121 THROTTLE/ PEDAL POSITION SENSOR/ SWITCH "A" CIRCUIT RANGE/ PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0106.
2	**CHECK ANY OTHER DTC.**	Is any other DTC displayed?	Inspect the relevant DTC. "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4DOTC)(diag)-72, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0106.	Go to step **3.**
3	**CHECK CONDITION OF MANIFOLD ABSOLUTE PRESSURE SENSOR.**	Is the manifold absolute pressure sensor installation bolt tightened securely?	Go to step **4.**	Tighten the manifold absolute pressure sensor installation bolt securely.
4	**CHECK CONDITION OF THROTTLE BODY.**	Is the throttle body installation bolt tightened securely?	Replace the manifold absolute pressure sensor. <Ref. to FU(H4DOTC)-34, Manifold Absolute Pressure Sensor.>	Tighten the throttle body installation bolt securely.

I: DTC P0101 MASS OR VOLUME AIR FLOW CIRCUIT RANGE/PERFORMANCE

DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

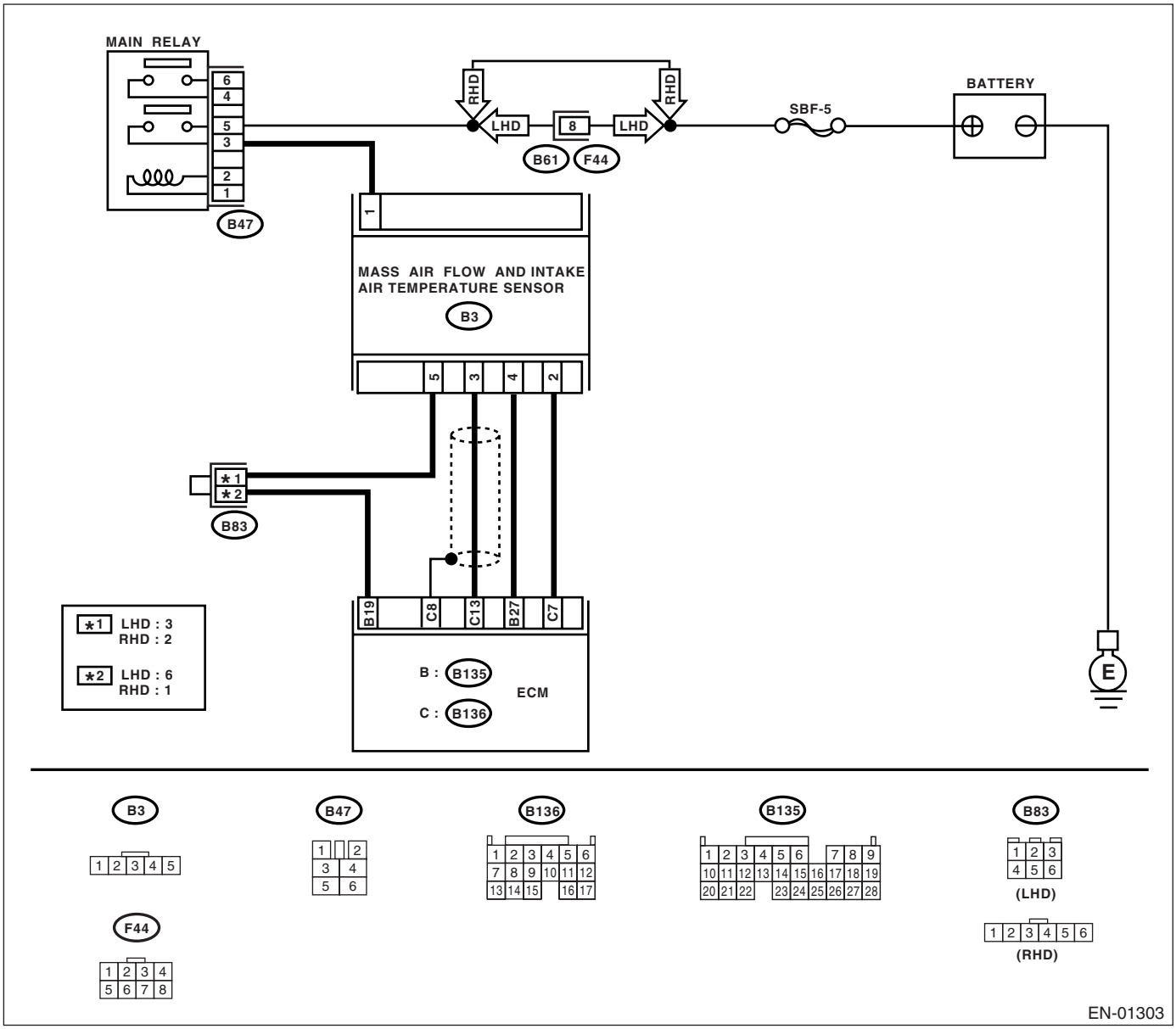
TROUBLE SYMPTOM:

- Erroneous idling
- Engine stalls.
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

WIRING DIAGRAM:



Step		Check	Yes	No
1	**CHECK ANY OTHER DTC.**	Is any other DTC displayed?	Inspect the relevant DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4DOTC)(diag)-72, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0101.	Replace the mass air flow and intake air temperature sensor. <Ref. to FU(H4DOTC)-33, Mass Air Flow and Intake Air Temperature Sensor.>

J: DTC P0102 MASS OR VOLUME AIR FLOW CIRCUIT LOW INPUT

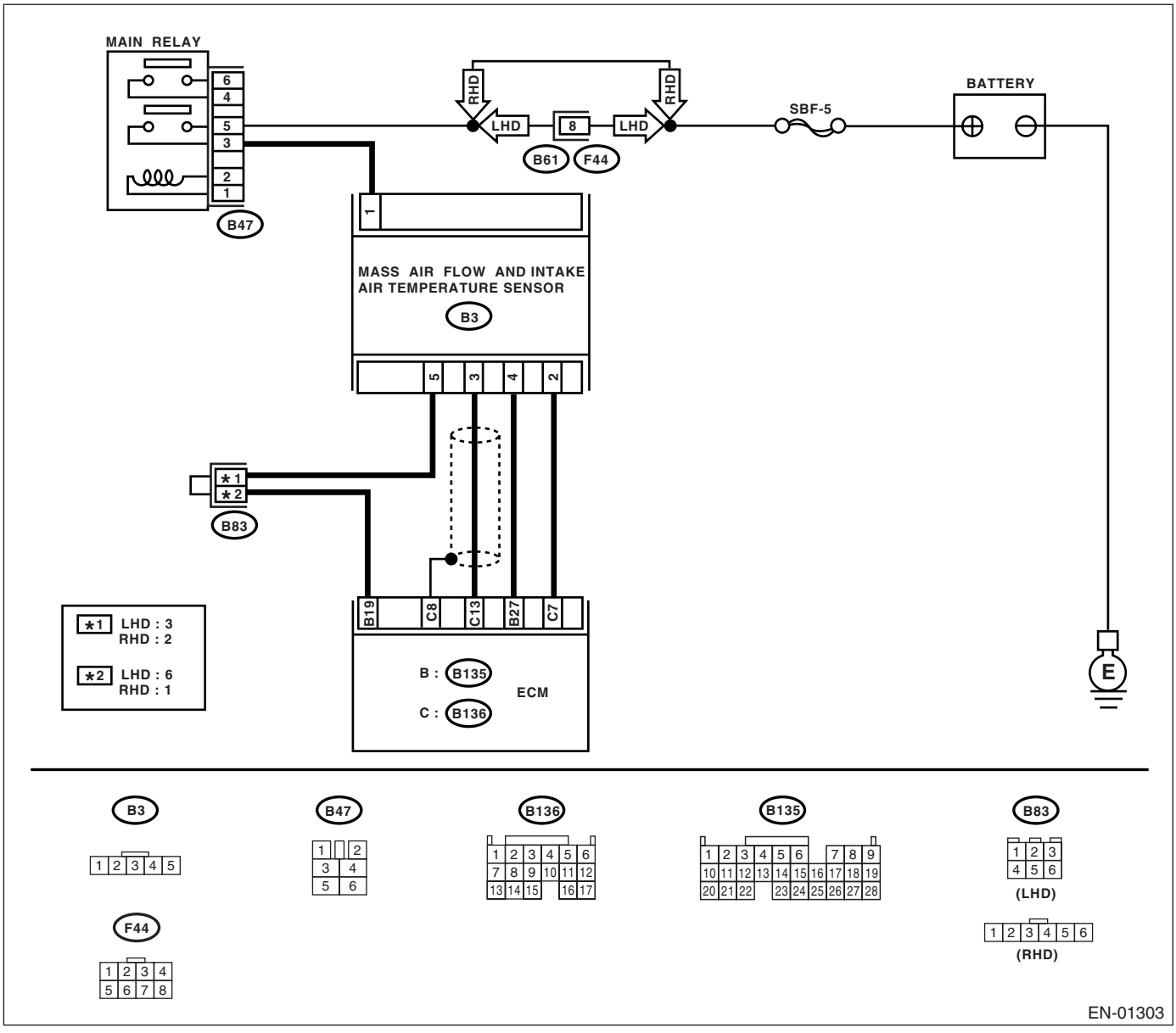
DTC DETECTING CONDITION:

Immediately at fault recognition

TROUBLE SYMPTOM:

- Erroneous idling
- Engine stalls.
- Poor driving performance

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CONNECT SUBARU SELECT MONITOR OR THE GENERAL SCAN TOOL, AND READ DATA.** 1) Turn the ignition switch to OFF. 2) Connect the Subaru Select Monitor or general scan tool to data link connector. 3) Turn the ignition switch to ON and Subaru Select Monitor or the general scan tool switch to ON. 4) Start the engine. 5) Read the mass air flow sensor voltage using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4DOTC)(diag)-32, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the General Scan Tool Instruction Manual.	Is the voltage 0.2 — 4.7 V?	Even if malfunction indicator light lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair the harness or connector in the mass air flow sensor. NOTE: In this case, repair the following: • Open or ground short circuit in harness between mass air flow sensor and ECM connector • Poor contact in mass air flow sensor or ECM connector	Go to step **2.**
2	**CHECK INPUT SIGNAL FOR ECM.** Measure the voltage between ECM connector and chassis ground while engine is idling. ***Connector & terminal*** ***(B136) No. 13 (+) — Chassis ground (−):***	Is the voltage less than 0.2 V?	Go to step **4.**	Go to step **3.**
3	**CHECK INPUT SIGNAL FOR ECM (USING SUBARU SELECT MONITOR).** Measure the voltage between ECM connector and chassis ground while engine is idling.	Shake the ECM harness and connector, while monitoring value of Subaru Select Monitor. Does the voltage change?	Repair the poor contact in ECM connector.	Contact your Subaru distributor service.
4	**CHECK POWER SUPPLY TO MASS AIR FLOW SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from mass air flow sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between mass air flow sensor connector and chassis ground. ***Connector & terminal*** ***(B3) No. 1 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **5.**	Repair the open circuit between mass air flow sensor and main relay.
5	**CHECK HARNESS BETWEEN ECM AND MASS AIR FLOW SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance of harness between ECM and mass air flow sensor connector. ***Connector & terminal*** ***(B136) No. 13 — (B3) No. 3:*** ***(B136) No. 7 — (B3) No. 2:*** ***(B135) No. 19 — (B3) No. 5:***	Is the resistance less than 1 Ω?	Go to step **6.**	Repair the open circuit between ECM and mass air flow sensor connector.

	Step	Check	Yes	No
6	**CHECK HARNESS BETWEEN ECM AND MASS AIR FLOW SENSOR CONNECTOR** Measure the resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***(B136) No. 13 — Chassis ground:*** ***(B136) No. 7 — Chassis ground:*** ***(B135) No. 19 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **7.**	Repair the ground short circuit between ECM and mass air flow sensor connector.
7	**CHECK POOR CONTACT** Check poor contact in mass air flow sensor connector.	Is there poor contact in mass air flow sensor connector?	Repair the poor contact in mass air flow sensor connector.	Replace the mass air flow and intake air temperature sensor. <Ref. to FU(H4DOTC)-33, Mass Air Flow and Intake Air Temperature Sensor.>

K: DTC P0103 MASS OR VOLUME AIR FLOW CIRCUIT HIGH INPUT

DTC DETECTING CONDITION:

Immediately at fault recognition

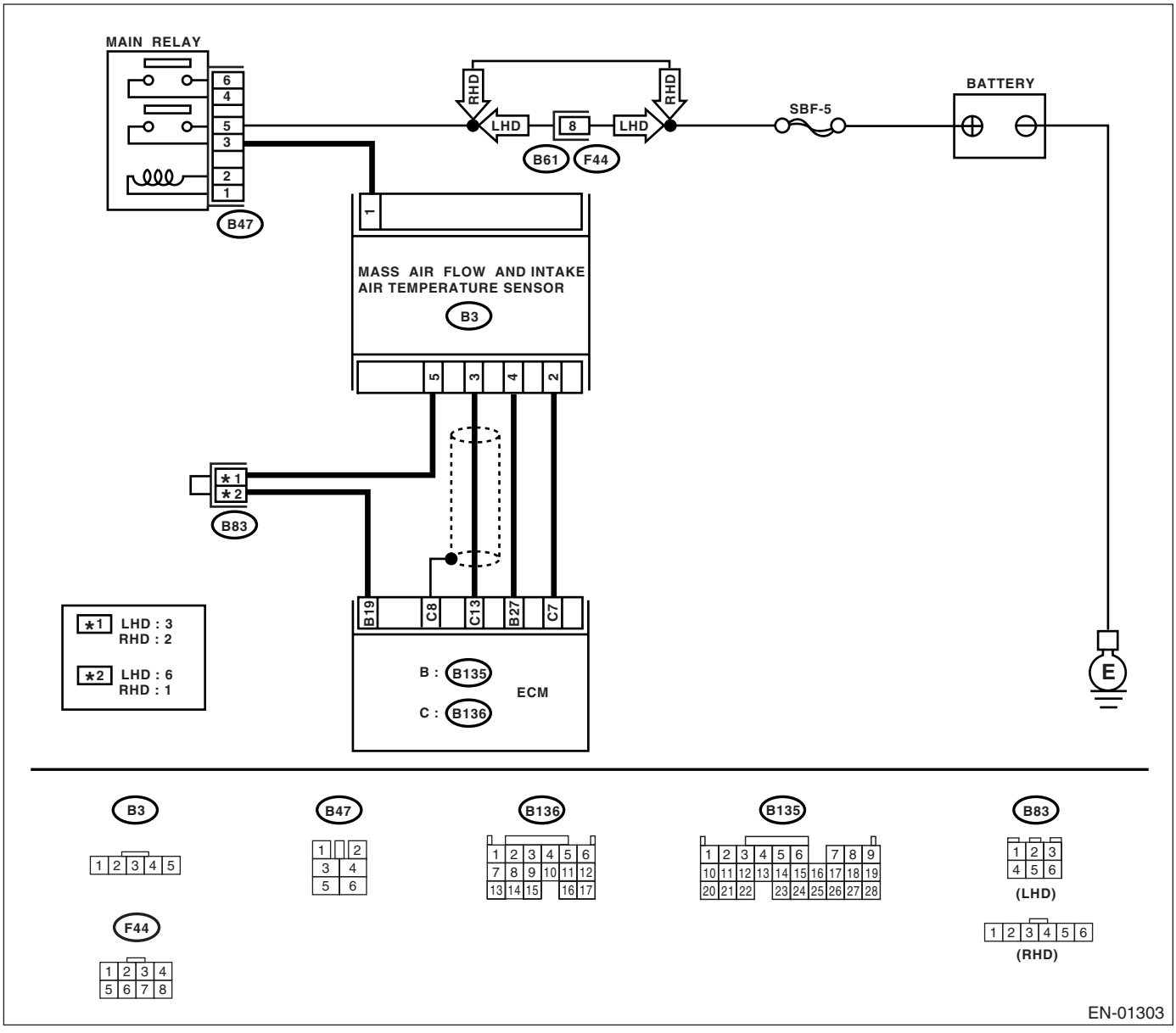
TROUBLE SYMPTOM:

- Erroneous idling
- Engine stalls.
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CONNECT SUBARU SELECT MONITOR OR THE GENERAL SCAN TOOL, AND READ DATA.** 1) Turn the ignition switch to OFF. 2) Connect the Subaru Select Monitor or general scan tool to data link connector. 3) Turn the ignition switch to ON and Subaru Select Monitor or general scan tool switch to ON. 4) Start the engine. 5) Read the mass air flow sensor voltage using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4DOTC)(diag)-32, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the General Scan Tool Instruction Manual.	Is the voltage 0.2 — 4.7 V?	Even if malfunction indicator light lights up, the circuit has returned to a normal condition at this time.	Go to step **2.**
2	**CHECK HARNESS BETWEEN ECM AND MASS AIR FLOW SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from mass air flow sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between mass air flow sensor connector and chassis ground. ***Connector & terminal*** ***(B3) No. 3 (+) — Chassis ground (−):***	Is the voltage more than 5 V?	Repair the battery short of harness between mass air flow sensor connector and ECM connector.	Go to step **3.**
3	**CHECK HARNESS BETWEEN ECM AND MASS AIR FLOW SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between ECM connector and mass air flow sensor connector. ***Connector & terminal*** ***(B3) No. 2 — (B136) No. 7:***	Is the resistance less than 1 Ω?	Replace the mass air flow sensor. <Ref. to FU(H4DOTC)-33, Mass Air Flow and Intake Air Temperature Sensor.>	Repair the open harness between mass air flow sensor connector and ECM connector.

L: DTC P0107 MANIFOLD ABSOLUTE PRESSURE/BAROMETRIC PRESSURE CIRCUIT LOW INPUT

DTC DETECTING CONDITION:

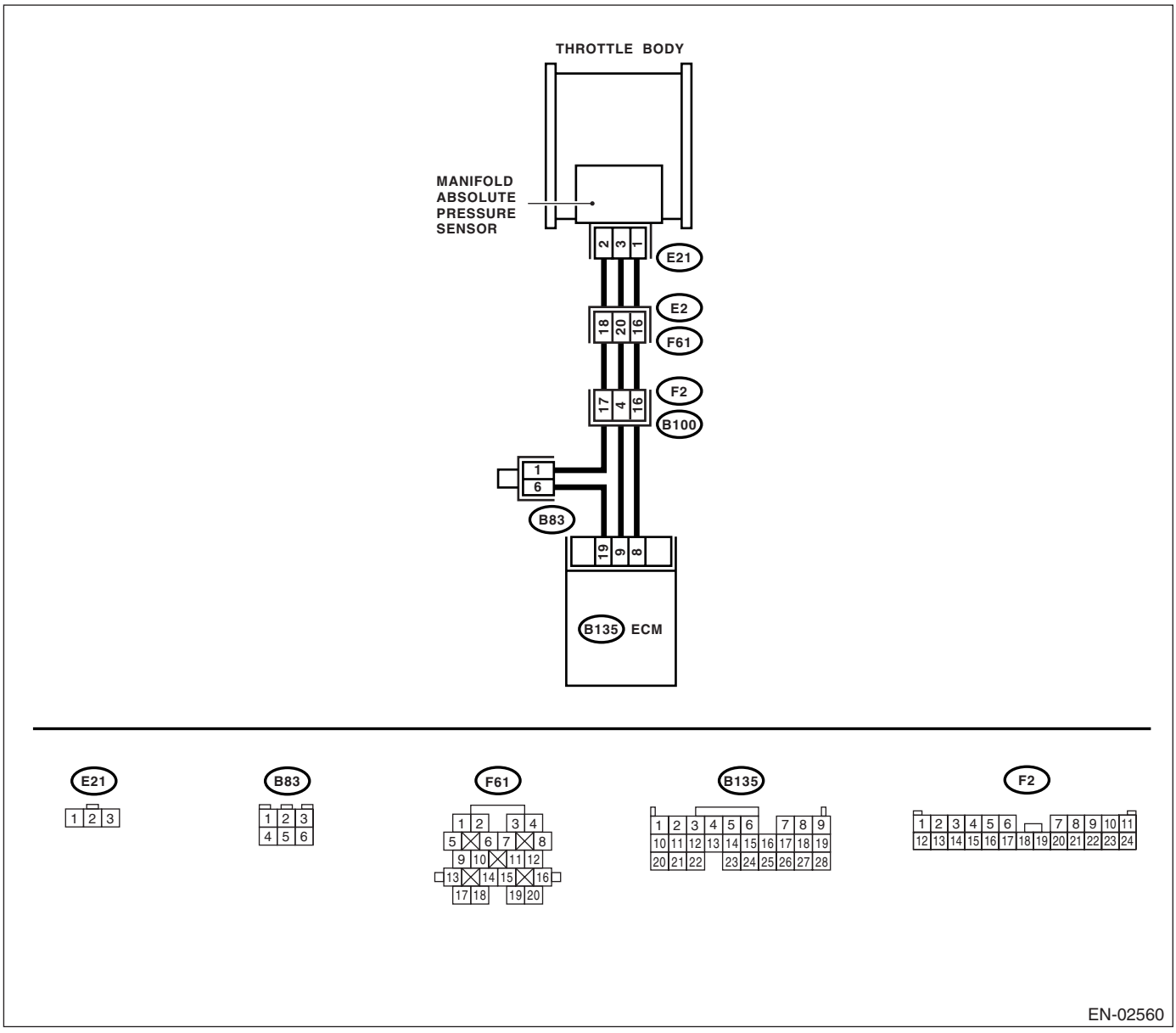
Immediately at fault recognition

CAUTION:

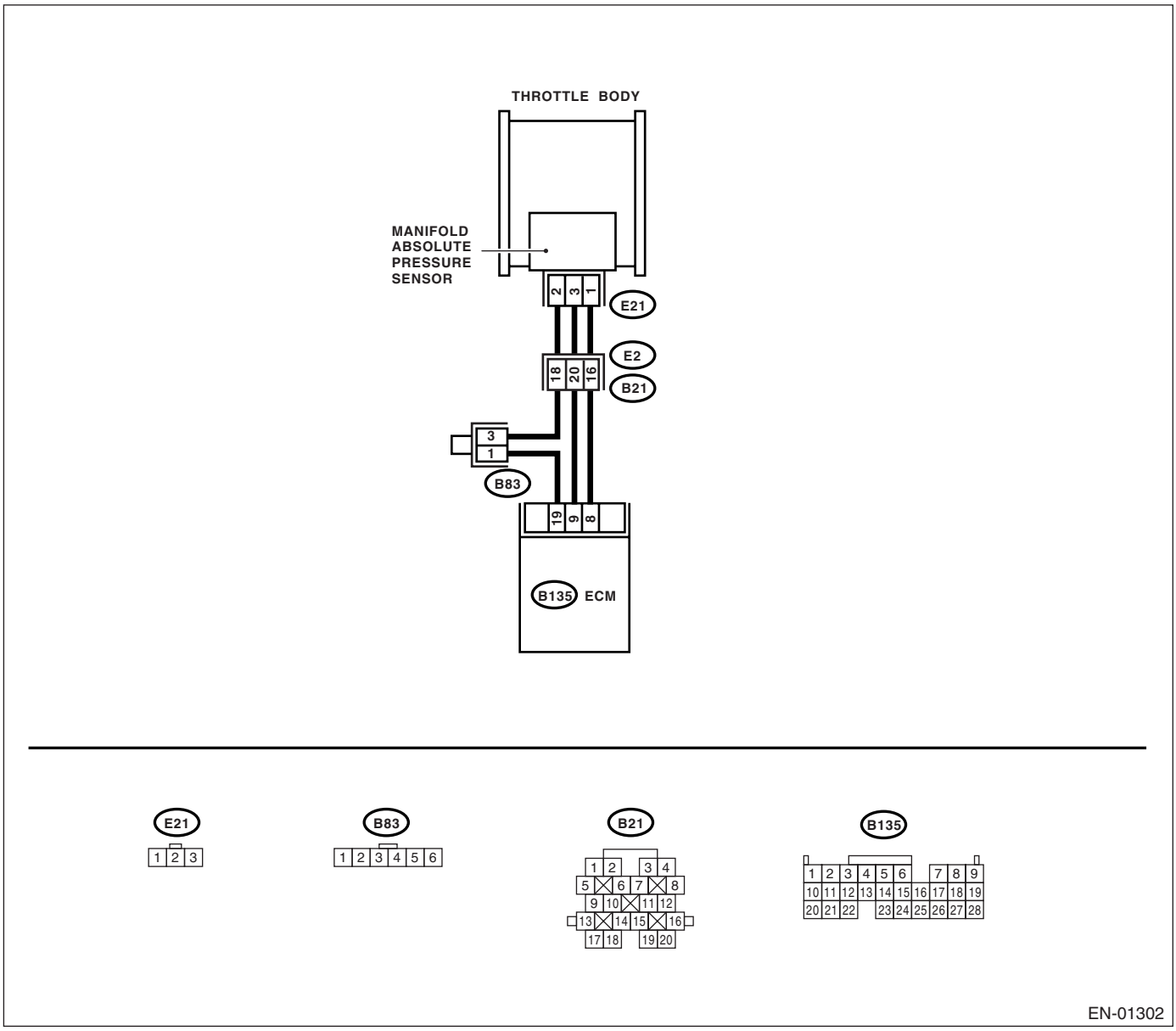
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

WIRING DIAGRAM:

- LHD model



- RHD model


THROTTLE BODY
MANIFOLD ABSOLUTE PRESSURE SENSOR
2 3 1
E21
E2
18 20 16
B21
3 1
B83
19 9 8
B135 ECM
E21
1 2 3
B83
1 2 3 4 5 6
B21
1 2 3 4
5 6 7 8
9 10 11 12
13 14 15 16
17 18 19 20
B135
1 2 3 4 5 6 7 8 9
10 11 12 13 14 15 16 17 18 19
20 21 22 23 24 25 26 27 28
EN-01302

	Step	Check	Yes	No
1	**CHECK INPUT SIGNAL FOR ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 9 (+) — Chassis ground (−):***	Is the voltage more than 4.5 V?	Go to step **3.**	Go to step **2.**
2	**CHECK INPUT SIGNAL FOR ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 9 (+) — Chassis ground (−):***	Shake the ECM harness and connector, while monitoring value of voltage meter. Does the voltage change?	Repair the poor contact in ECM connector.	Contact your Subaru distributor service.
3	**CHECK INPUT SIGNAL FOR ECM.** Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 8 (+) — Chassis ground (−):***	Is the voltage less than 0.7 V?	Go to step **4.**	Contact your Subaru distributor service.
4	**CHECK HARNESS BETWEEN ECM AND MANIFOLD ABSOLUTE PRESSURE SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from manifold absolute pressure sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between manifold absolute pressure sensor connector and engine ground. ***Connector & terminal*** ***(E21) No. 3 (+) — Engine ground (−):***	Is the voltage more than 4.5 V?	Go to step **5.**	Repair the open circuit in harness between ECM and manifold absolute pressure sensor connector.
5	**CHECK HARNESS BETWEEN ECM AND MANIFOLD ABSOLUTE PRESSURE SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance of harness between ECM and manifold absolute pressure sensor connector. ***Connector & terminal*** ***(B135) No. 19 — (E21) No. 2:***	Is the resistance less than 1 Ω?	Go to step **6.**	Repair the open circuit in harness between ECM and manifold absolute pressure sensor connector.
6	**CHECK HARNESS BETWEEN ECM AND MANIFOLD ABSOLUTE PRESSURE SENSOR CONNECTOR.** Measure the resistance of harness between manifold absolute pressure sensor connector and engine ground. ***Connector & terminal*** ***(E21) No. 1 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **7.**	Repair the ground short circuit in harness between ECM and manifold absolute pressure sensor connector.
7	**CHECK POOR CONTACT.** Check poor contact in manifold absolute pressure sensor connector.	Is there poor contact in manifold absolute pressure sensor connector?	Repair the poor contact in manifold absolute pressure sensor connector.	Replace the manifold absolute pressure sensor. <Ref. to FU(H4DOTC)-34, Manifold Absolute Pressure Sensor.>

M: DTC P0108 MANIFOLD ABSOLUTE PRESSURE/BAROMETRIC PRESSURE CIRCUIT HIGH INPUT

DTC DETECTING CONDITION:

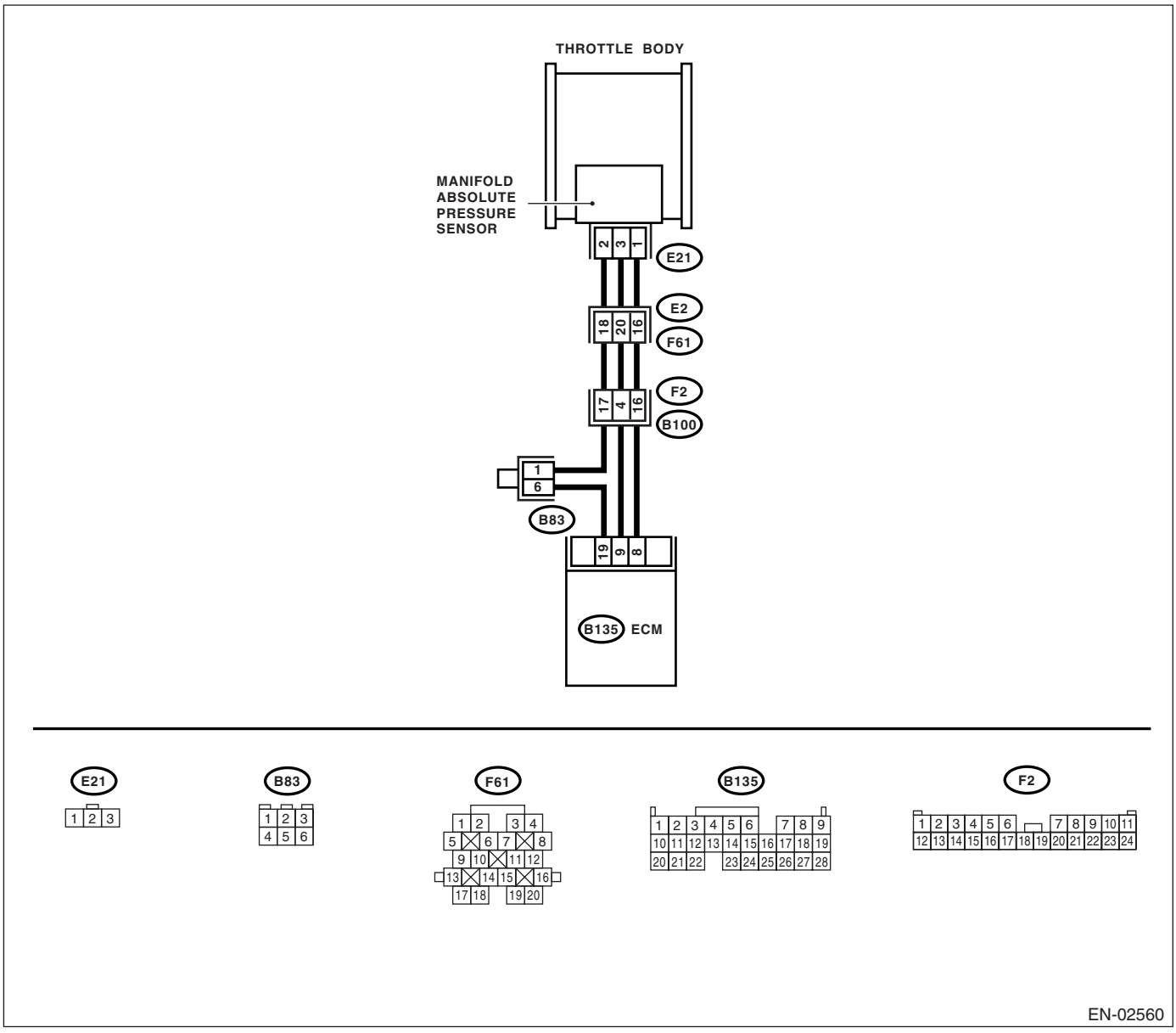
Immediately at fault recognition

CAUTION:

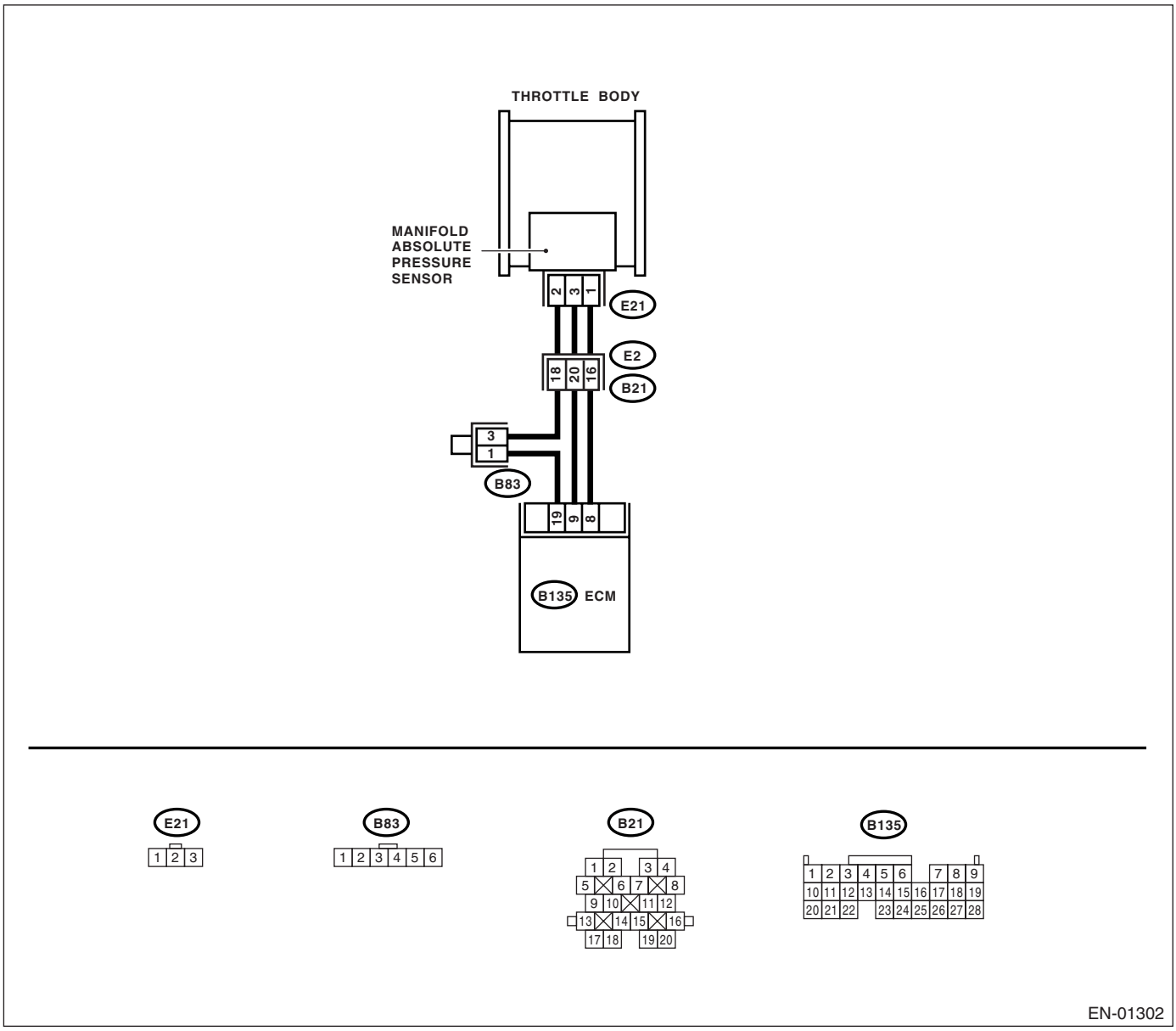
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

WIRING DIAGRAM:

- LHD model



- RHD model


THROTTLE BODY
MANIFOLD ABSOLUTE PRESSURE SENSOR
2
3
1
E21
E2
18
20
16
B21
3
1
B83
19
9
8
B135
ECM
E21
1 2 3
B83
1 2 3 4 5 6
B21
1 2 3 4
5 6 7 8
9 10 11 12
13 14 15 16
17 18 19 20
B135
1 2 3 4 5 6 7 8 9
10 11 12 13 14 15 16 17 18 19
20 21 22 23 24 25 26 27 28
EN-01302

	Step	Check	Yes	No
1	**CHECK INPUT SIGNAL FOR ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 9 (+) — Chassis ground (−):***	Is the voltage more than 4.5 V?	Go to step **3.**	Go to step **2.**
2	**CHECK INPUT SIGNAL FOR ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 9 (+) — Chassis ground (−):***	Shake the ECM harness and connector, while monitoring value of voltage meter. Does the voltage change?	Repair the poor contact in ECM connector.	Contact your Subaru distributor service.
3	**CHECK INPUT SIGNAL FOR ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 8 (+) — Chassis ground (−):***	Is the voltage more than 4.5 V?	Go to step **4.**	Contact your Subaru distributor service.
4	**CHECK HARNESS BETWEEN ECM AND MANIFOLD ABSOLUTE PRESSURE SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from manifold absolute pressure sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between manifold absolute pressure sensor connector and engine ground. ***Connector & terminal*** ***(E21) No. 3 (+) — Engine ground (−):***	Is the voltage more than 4.5 V?	Go to step **5.**	Repair the open circuit in harness between ECM and manifold absolute pressure sensor connector.
5	**CHECK HARNESS BETWEEN ECM AND MANIFOLD ABSOLUTE PRESSURE SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance of harness between ECM and manifold absolute pressure sensor connector. ***Connector & terminal*** ***(B135) No. 8 — (E21) No. 1:***	Is the resistance less than 1 Ω?	Go to step **6.**	Repair the open circuit in harness between ECM and manifold absolute pressure sensor connector.
6	**CHECK HARNESS BETWEEN ECM AND MANIFOLD ABSOLUTE PRESSURE SENSOR CONNECTOR.** Measure the resistance of harness between ECM and manifold absolute pressure sensor connector. ***Connector & terminal*** ***(B135) No. 19 — (E21) No. 2:***	Is the resistance less than 1 Ω?	Go to step **7.**	Repair the open circuit in harness between ECM and manifold absolute pressure sensor connector.
7	**CHECK POOR CONTACT.** Check poor contact in manifold absolute pressure sensor connector.	Is there poor contact in manifold absolute pressure sensor connector?	Repair the poor contact in manifold absolute pressure sensor connector.	Replace the manifold absolute pressure sensor. <Ref. to FU(H4DOTC)-34, Manifold Absolute Pressure Sensor.>

N: DTC P0112 INTAKE AIR TEMPERATURE SENSOR 1 CIRCUIT LOW

DTC DETECTING CONDITION:

Immediately at fault recognition

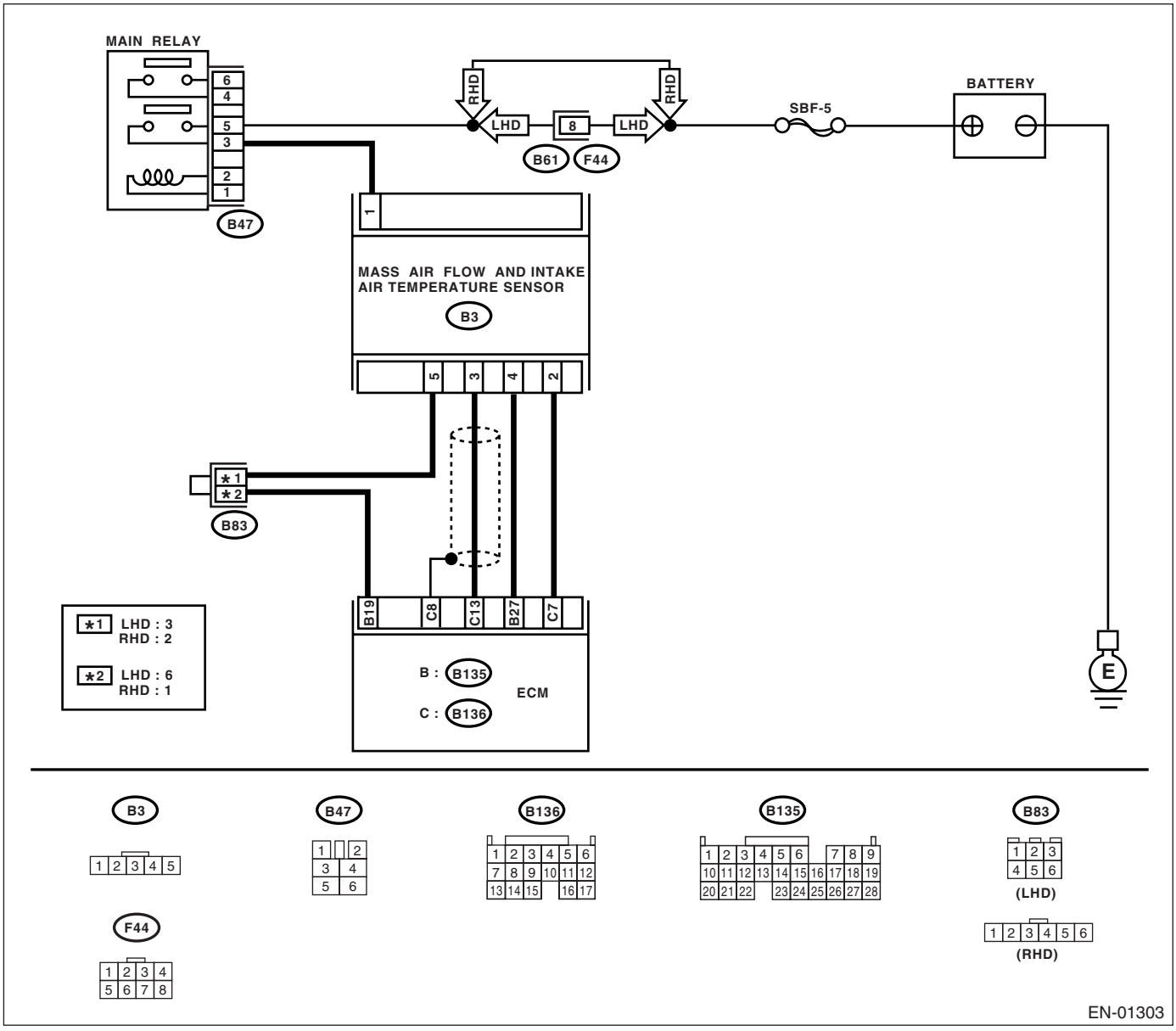
TROUBLE SYMPTOM:

- Erroneous idling
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of intake air temperature sensor signal using Subaru Select Monitor or the general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4DOTC)(diag)-32, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the General Scan Tool Instruction Manual.	Is the temperature more than 55°C (131°F)?	Go to step **2.**	Repair the poor contact. NOTE: In this case, repair the following: • Poor contact mass air flow and intake air temperature sensor • Poor contact in ECM • Poor contact in joint connector
2	**CHECK HARNESS BETWEEN MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from mass air flow and intake air temperature sensor. 3) Turn the ignition switch to ON. 4) Read the data of intake air temperature sensor signal using Subaru Select Monitor or the general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4DOTC)(diag)-32, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the General Scan Tool Instruction Manual.	Is the temperature less than −36°C (−33°F)?	Replace the mass air flow and intake air temperature sensor. <Ref. to FU(H4DOTC)-33, Mass Air Flow and Intake Air Temperature Sensor.>	Repair the ground short circuit in harness between mass air flow and intake air temperature sensor and ECM connector.

O: DTC P0113 INTAKE AIR TEMPERATURE SENSOR 1 CIRCUIT HIGH

DTC DETECTING CONDITION:

Immediately at fault recognition

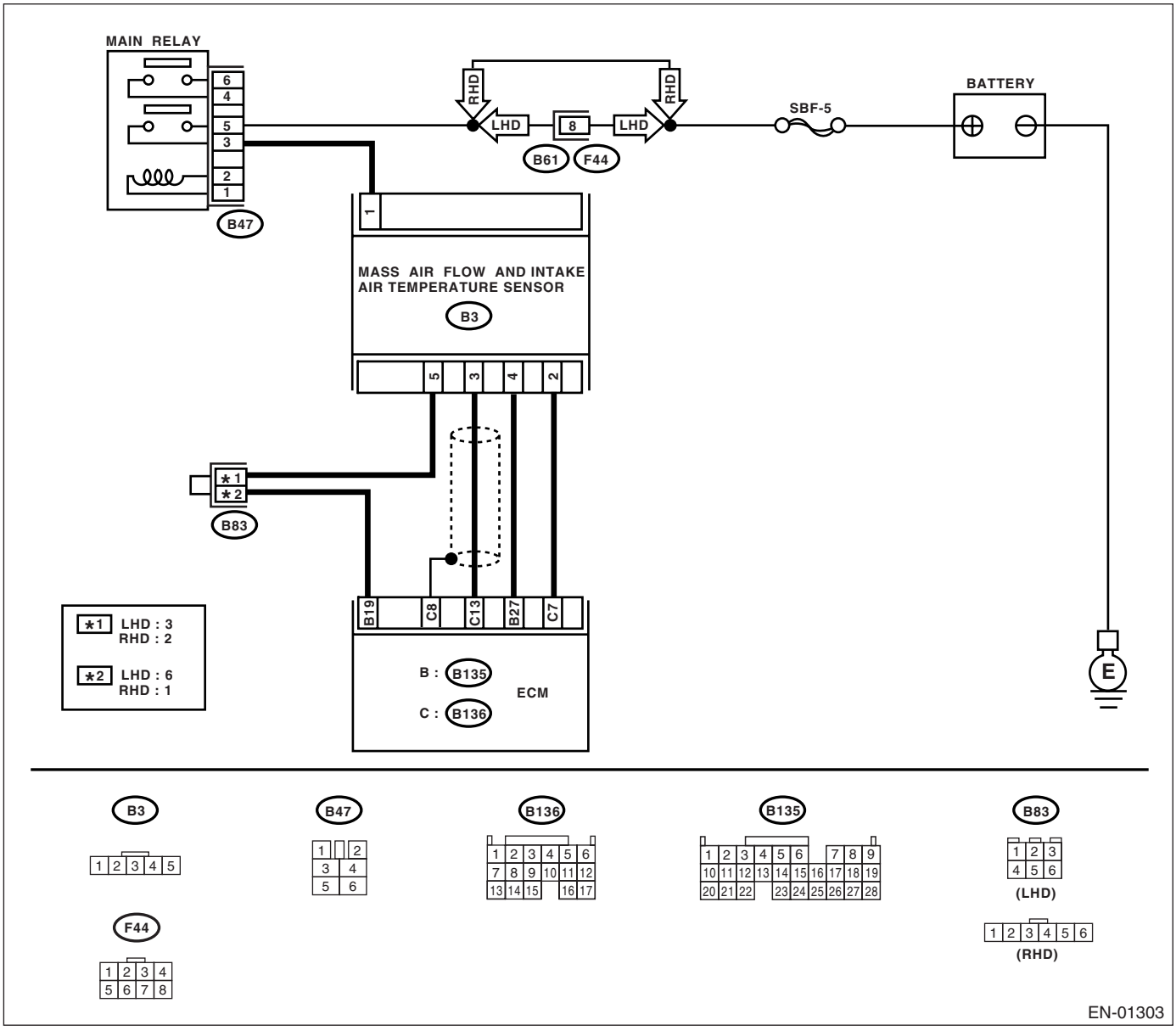
TROUBLE SYMPTOM:

- Erroneous idling
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of intake air temperature sensor signal using Subaru Select Monitor or the general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4DOTC)(diag)-32, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the General Scan Tool Instruction Manual.	Is the temperature less than –36°C (–33°F)?	Go to step **2.**	Repair the poor contact. NOTE: In this case, repair the following: • Poor contact in mass air flow and intake air temperature sensor • Poor contact in ECM • Poor contact in joint connector
2	**CHECK HARNESS BETWEEN MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from mass air flow and intake air temperature sensor. 3) Measure the voltage between mass air flow and intake air temperature sensor connector and engine ground. ***Connector & terminal*** ***(B3) No. 4 (+) — Engine ground (–):***	Is the voltage more than 10 V?	Repair the battery short circuit in harness between mass air flow and intake air temperature sensor and ECM connector.	Go to step **3.**
3	**CHECK HARNESS BETWEEN MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to ON. 2) Measure the voltage between mass air flow and intake air temperature sensor connector and engine ground. ***Connector & terminal*** ***(B3) No. 4 (+) — Engine ground (–):***	Is the voltage more than 10 V?	Repair the battery short circuit in harness between mass air flow and intake air temperature sensor and ECM connector.	Go to step **4.**
4	**CHECK HARNESS BETWEEN MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR AND ECM CONNECTOR.** Measure the voltage between mass air flow and intake air temperature sensor and manifold absolute pressure sensor connector and engine ground. ***Connector & terminal*** ***(B3) No. 4 (+) — Engine ground (–):***	Is the voltage more than 4 V?	Go to step **5.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between mass air flow and intake air temperature sensor and ECM connector • Poor contact in mass air flow and intake air temperature sensor • Poor contact in ECM • Poor contact in joint connector

Step		Check	Yes	No
5	**CHECK HARNESS BETWEEN MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance of harness between mass air flow and intake air temperature sensor and engine ground. ***Connector & terminal*** ***(B3) No. 5 — Engine ground:***	Is the resistance less than 5 Ω?	Replace the mass air flow and intake air temperature sensor. <Ref. to FU(H4DOTC)-33, Mass Air Flow and Intake Air Temperature Sensor.>	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between mass air flow and intake air temperature sensor and ECM connector • Poor contact in mass air flow and intake air temperature sensor • Poor contact in ECM • Poor contact in joint connector

P: DTC P0117 ENGINE COOLANT TEMPERATURE CIRCUIT LOW

DTC DETECTING CONDITION:

Immediately at fault recognition

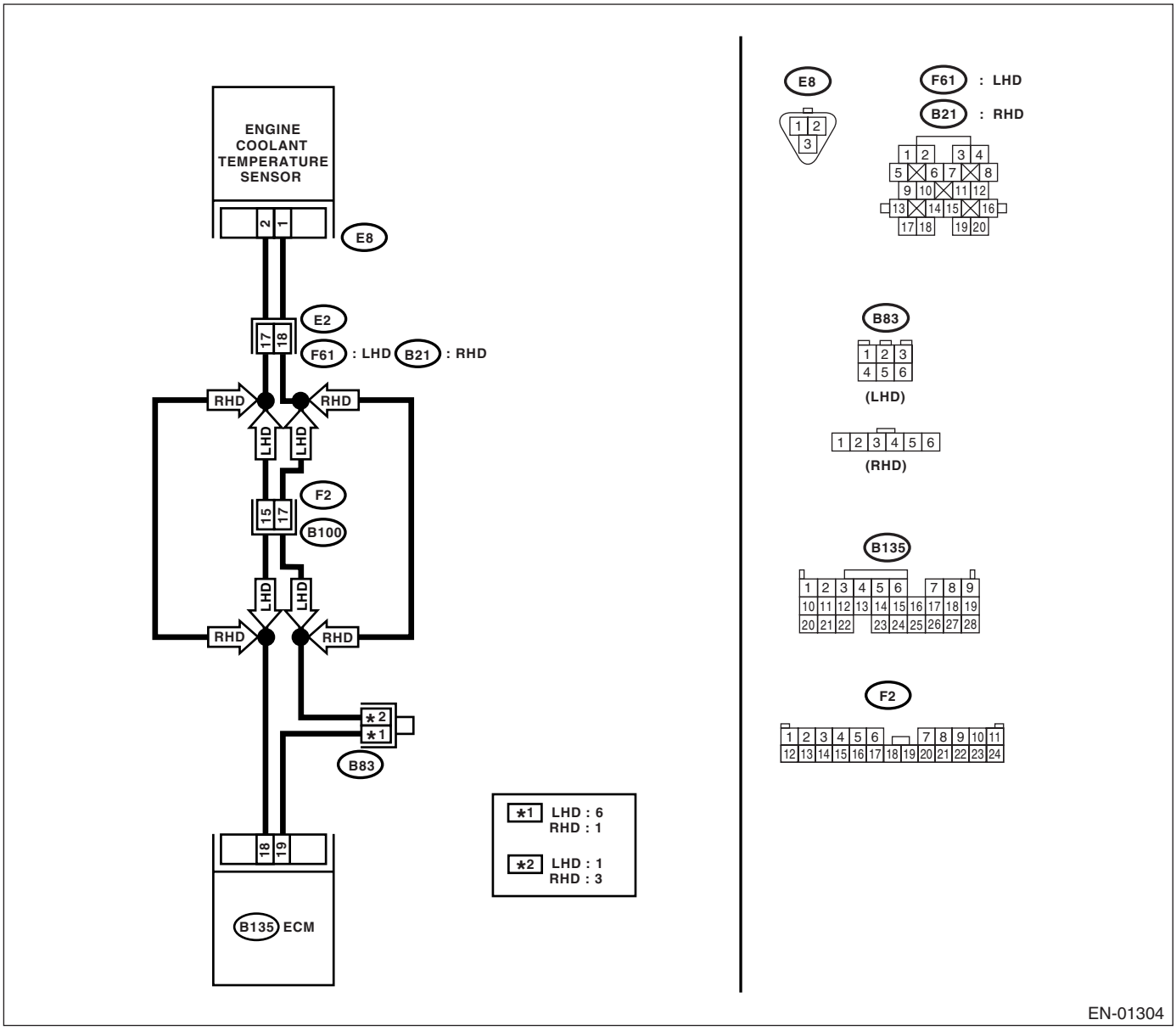
TROUBLE SYMPTOM:

- Hard to start
- Erroneous idling
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of engine coolant temperature sensor signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4DOTC)(diag)-32, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the General Scan Tool Instruction Manual.	Is the temperature more than 120°C (248°F)?	Go to step **2.**	Repair the poor contact. NOTE: In this case, repair the following: • Poor contact in engine coolant temperature sensor • Poor contact in ECM • Poor contact in coupling connector • Poor contact in joint connector
2	**CHECK HARNESS BETWEEN ENGINE COOLANT TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from engine coolant temperature sensor. 3) Turn the ignition switch to ON. 4) Read the data of engine coolant temperature sensor signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4DOTC)(diag)-32, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the General Scan Tool Instruction Manual.	Is the temperature less than −40°C (−40°F)?	Replace the engine coolant temperature sensor. <Ref. to FU(H4DOTC)-27, Engine Coolant Temperature Sensor.>	Repair the ground short circuit in harness between engine coolant temperature sensor and ECM connector.

Q: DTC P0118 ENGINE COOLANT TEMPERATURE CIRCUIT HIGH

DTC DETECTING CONDITION:

Immediately at fault recognition

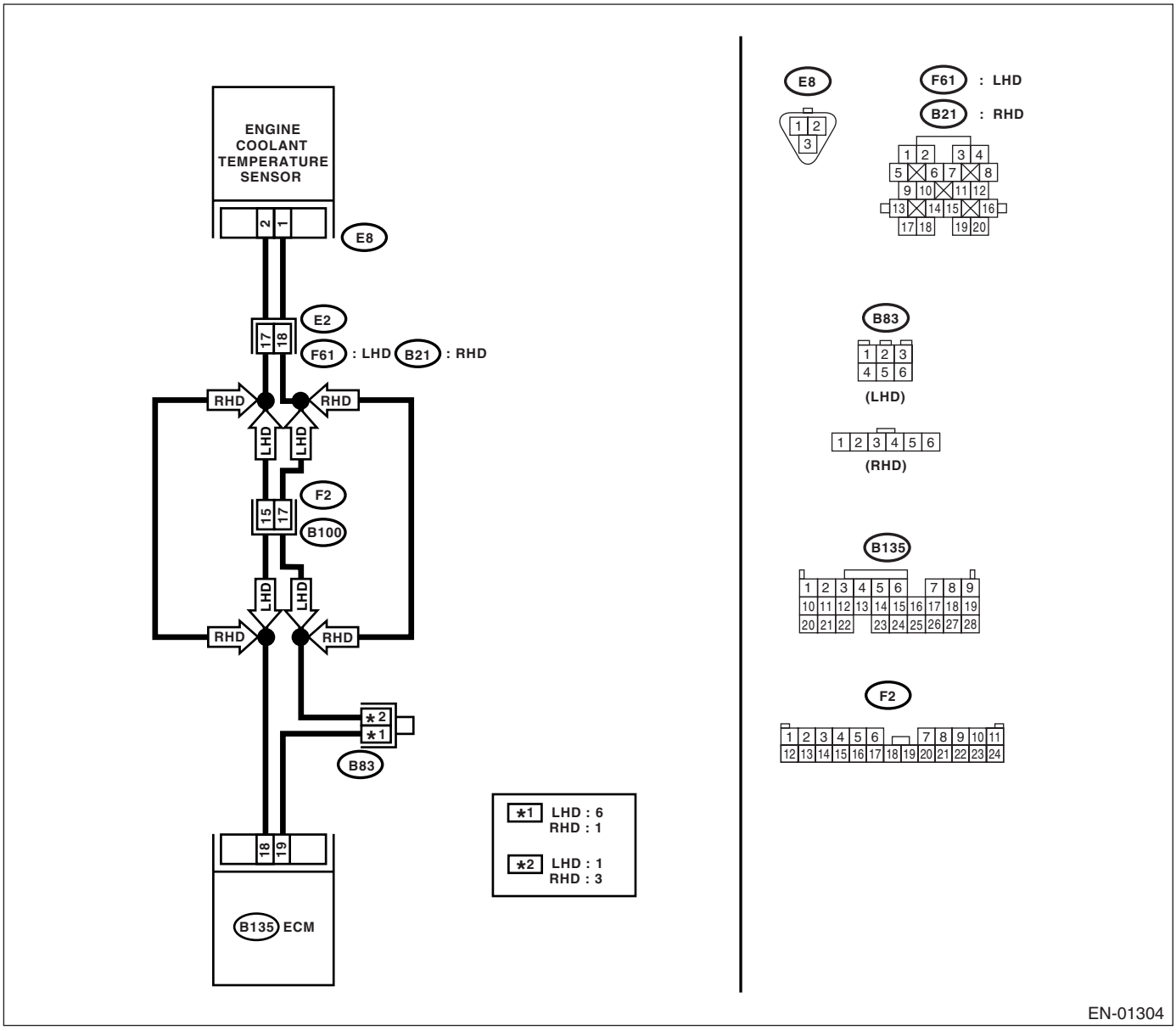
TROUBLE SYMPTOM:

- Hard to start
- Erroneous idling
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of engine coolant temperature sensor signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4DOTC)(diag)-32, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the General Scan Tool Instruction Manual.	Is the temperature less than −40°C (−40°F)?	Go to step **2.**	Repair the poor contact. NOTE: In this case, repair the following: • Poor contact in engine coolant temperature sensor • Poor contact in ECM • Poor contact in coupling connector • Poor contact in joint connector
2	**CHECK HARNESS BETWEEN ENGINE COOLANT TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from engine coolant temperature sensor. 3) Measure the voltage between engine coolant temperature sensor connector and engine ground. ***Connector & terminal*** ***(E8) No. 2 (+) — Engine ground (−):***	Is the voltage more than 10 V?	Repair the battery short circuit in harness between ECM and engine coolant temperature sensor connector.	Go to step **3.**
3	**CHECK HARNESS BETWEEN ENGINE COOLANT TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to ON. 2) Measure the voltage between engine coolant temperature sensor connector and engine ground. ***Connector & terminal*** ***(E8) No. 2 (+) — Engine ground (−):***	Is the voltage more than 10 V?	Repair the battery short circuit in harness between ECM and engine coolant temperature sensor connector.	Go to step **4.**
4	**CHECK HARNESS BETWEEN ENGINE COOLANT TEMPERATURE SENSOR AND ECM CONNECTOR.** Measure the voltage between engine coolant temperature sensor connector and engine ground. ***Connector & terminal*** ***(E8) No. 2 (+) — Engine ground (−):***	Is the voltage more than 4 V?	Go to step **5.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and engine coolant temperature sensor connector • Poor contact in engine coolant temperature sensor connector • Poor contact in ECM connector • Poor contact in coupling connector • Poor contact in joint connector

Step		Check	Yes	No
5	**CHECK HARNESS BETWEEN ENGINE COOLANT TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance of harness between engine coolant temperature sensor connector and engine ground. ***Connector & terminal*** ***(E8) No. 1 — Engine ground:***	Is the resistance less than 5 Ω?	Replace the engine coolant temperature sensor. <Ref. to FU(H4DOTC)-27, Engine Coolant Temperature Sensor.>	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and engine coolant temperature sensor connector • Poor contact in engine coolant temperature sensor connector • Poor contact in ECM connector • Poor contact in coupling connector • Poor contact in joint connector

R: DTC P0121 THROTTLE/PEDAL POSITION SENSOR/SWITCH "A" CIRCUIT RANGE/PERFORMANCE

DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

TROUBLE SYMPTOM:

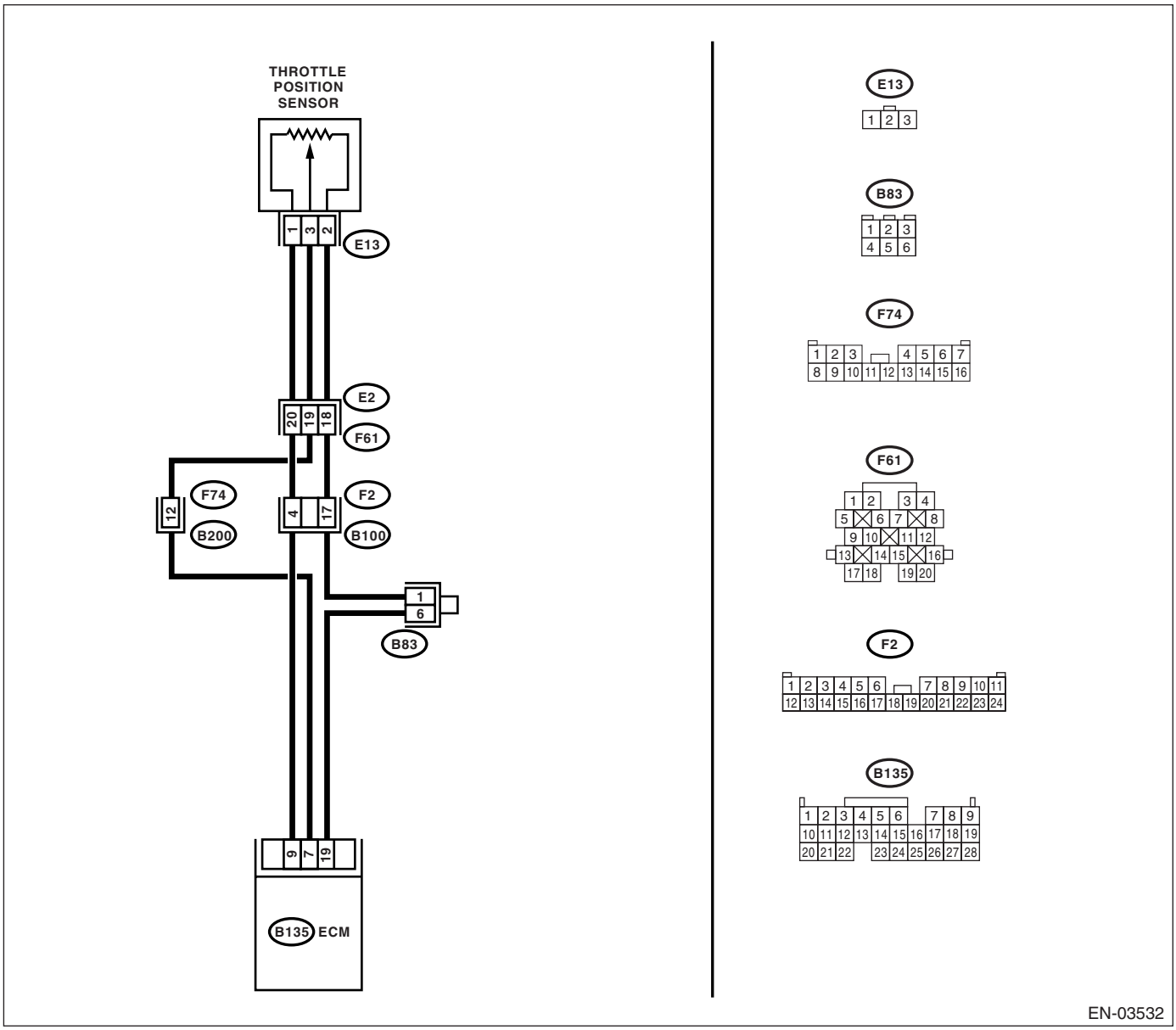
- Erroneous idling
- Engine stalls.
- Poor driving performance
- Fuel is cut.

CAUTION:

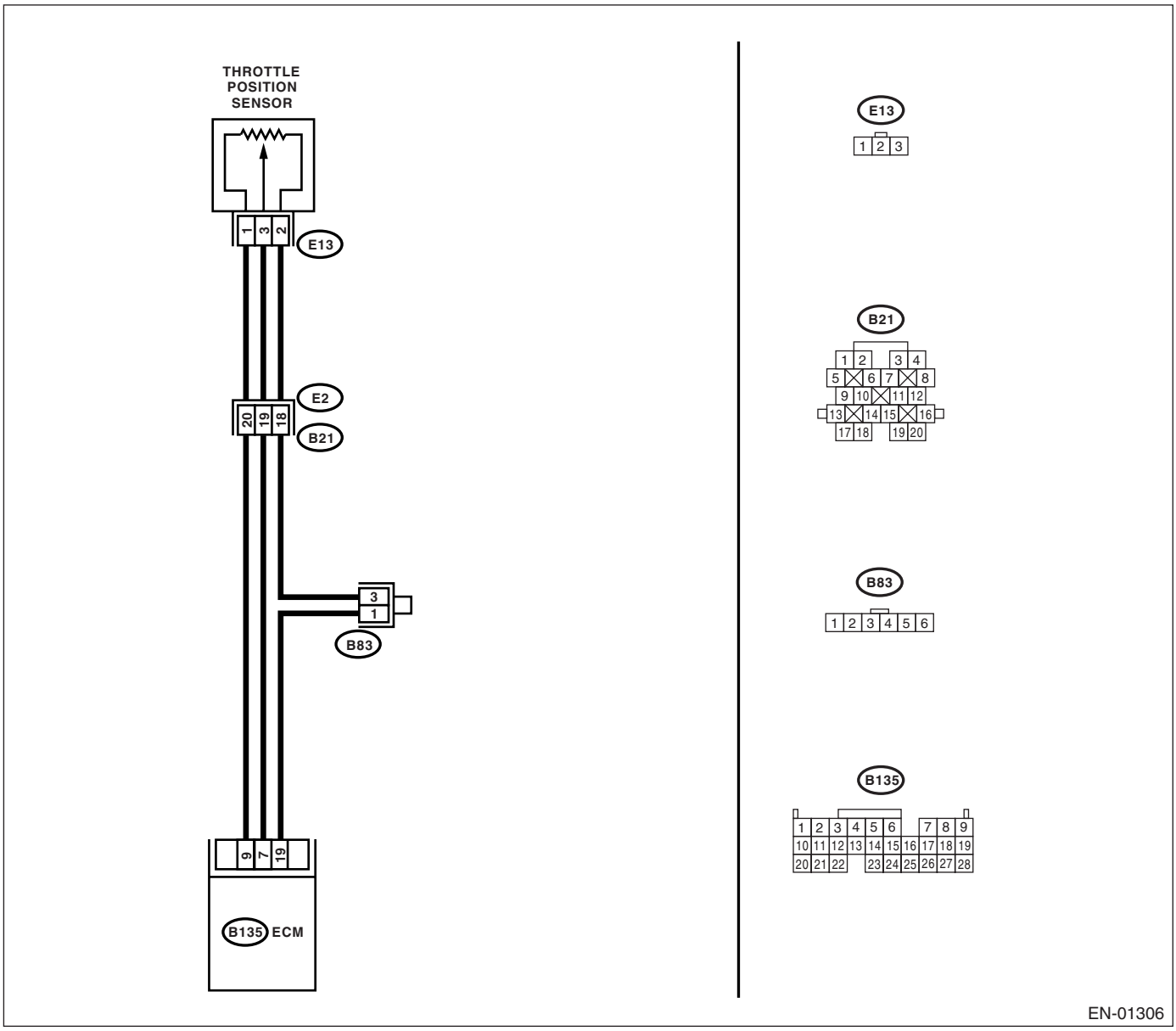
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

WIRING DIAGRAM:

- LHD model



- RHD model



Step	Check	Yes	No
1 CHECK ANY OTHER DTC.	Is any other DTC displayed?	Inspect the relevant DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4DOTC)(diag)-72, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0121.	Replace the throttle position sensor. <Ref. to FU(H4DOTC)-32, Throttle Position Sensor.>

S: DTC P0122 THROTTLE/PEDAL POSITION SENSOR/SWITCH "A" CIRCUIT LOW

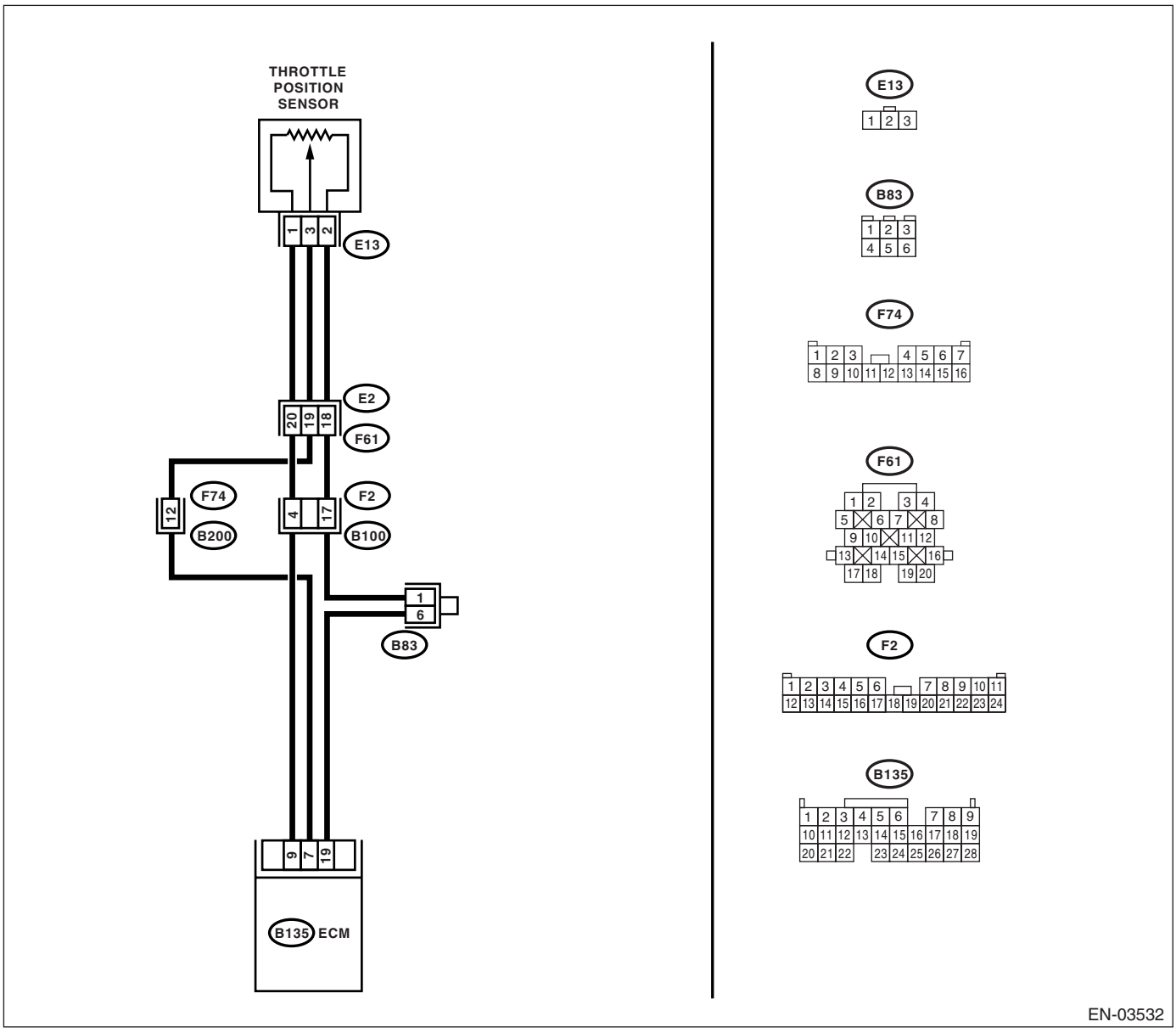
DTC DETECTING CONDITION:
Immediately at fault recognition
TROUBLE SYMPTOM:

- Erroneous idling
- Engine stalls.
- Poor driving performance

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

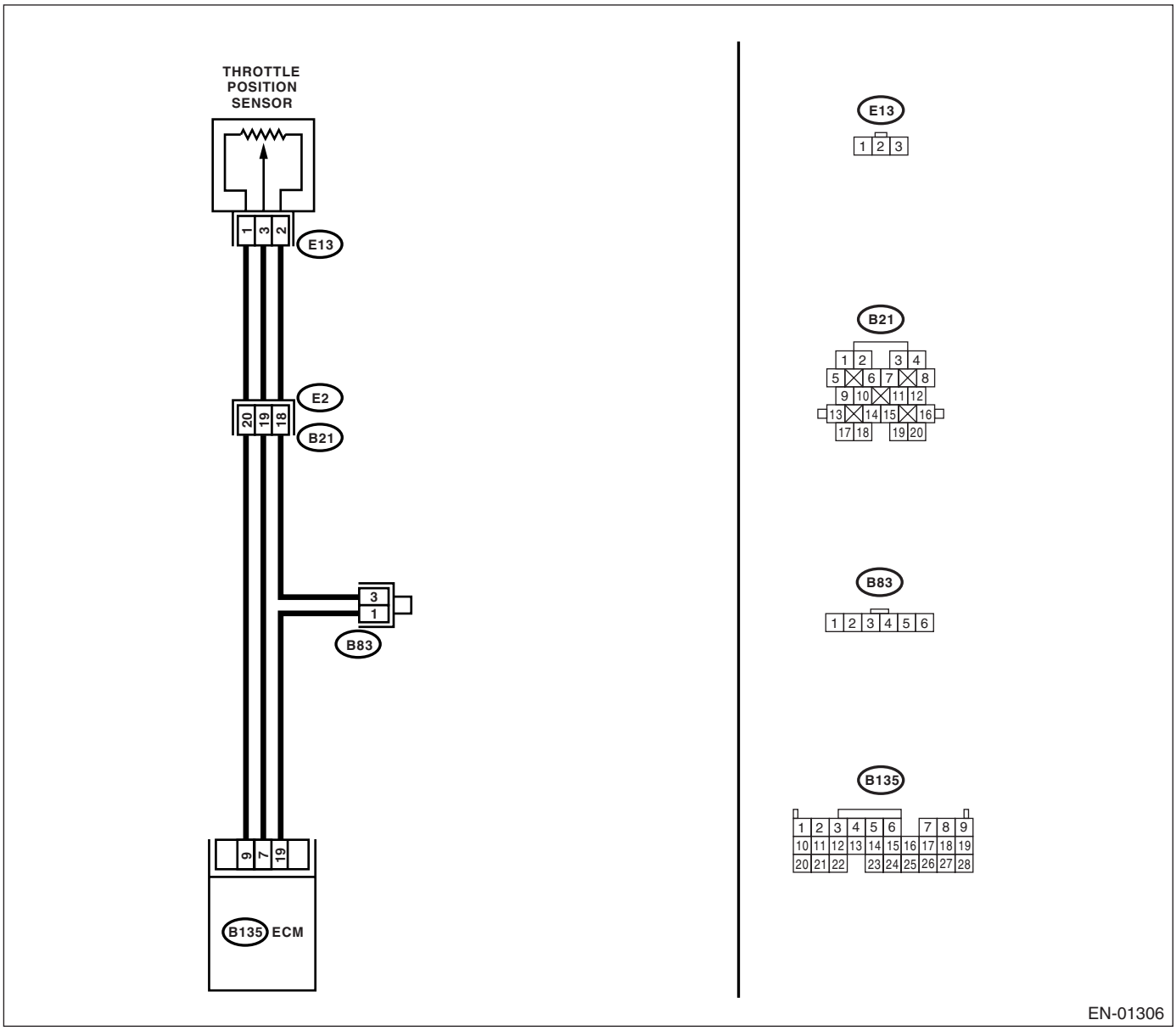
WIRING DIAGRAM:

- LHD model



EN-03532

- RHD model


THROTTLE POSITION SENSOR
1 3 2
E13
E2
20 19 18
B21
3 1
B83
9 7 19
B135 ECM
E13
1 2 3
B21
1 2 3 4
5 6 7 8
9 10 11 12
13 14 15 16
17 18 19 20
B83
1 2 3 4 5 6
B135
1 2 3 4 5 6 7 8 9
10 11 12 13 14 15 16 17 18 19
20 21 22 23 24 25 26 27 28
EN-01306

	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of throttle position sensor signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4DOTC)(diag)-32, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the General Scan Tool Instruction Manual.	Is the voltage less than 0.15 V?	Go to step **2.**	Even if malfunction indicator light lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector may be the cause. NOTE: In this case, repair the following: • Poor contact in throttle position sensor connector • Poor contact in ECM connector • Poor contact in coupling connector
2	**CHECK INPUT SIGNAL FOR ECM.** Measure the voltage between ECM connector and chassis ground while throttle valve is fully closed. ***Connector & terminal*** ***(B135) No. 9 (+) — Chassis ground (−):***	Is the voltage more than 4.5 V?	Go to step **4.**	Go to step **3.**
3	**CHECK INPUT SIGNAL FOR ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 9 (+) — Chassis ground (−):***	Shake the ECM harness and connector, while monitoring value of voltage meter. Does the voltage change?	Repair the poor contact in ECM connector.	Contact your Subaru distributor service.
4	**CHECK INPUT SIGNAL FOR ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 7 (+) — Chassis ground (−):***	Is the voltage less than 0.15 V?	Go to step **6.**	Go to step **5.**
5	**CHECK INPUT SIGNAL FOR ECM. (USING SUBARU SELECT MONITOR)** Measure the voltage between ECM connector and chassis ground.	Shake the ECM harness and connector, while monitoring value of Subaru Select Monitor. Does the voltage change?	Repair the poor contact in ECM connector.	Go to step **6.**
6	**CHECK HARNESS BETWEEN ECM AND THROTTLE POSITION SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from throttle position sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between throttle position sensor connector and engine ground. ***Connector & terminal*** ***(E13) No. 1 (+) — Engine ground (−):***	Is the voltage more than 4.5 V?	Go to step **7.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between throttle position sensor and ECM connector • Poor contact in throttle position sensor connector • Poor contact in ECM connector • Poor contact in coupling connector • Poor contact in joint connector

	Step	Check	Yes	No
7	**CHECK HARNESS BETWEEN ECM AND THROTTLE POSITION SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance of harness between ECM connector and throttle position sensor connector. ***Connector & terminal*** ***(B135) No. 7 — (E13) No. 3:***	Is the resistance less than 1 Ω?	Go to step **8.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between throttle position sensor and ECM connector • Poor contact in ECM connector • Poor contact in throttle position sensor connector • Poor contact in coupling connector
8	**CHECK HARNESS BETWEEN ECM AND THROTTLE POSITION SENSOR CONNECTOR.** Measure the resistance of harness between throttle position sensor connector and engine ground. ***Connector & terminal*** ***(E13) No. 3 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **9.**	Repair the ground short circuit in harness between throttle position sensor and ECM connector.
9	**CHECK POOR CONTACT.** Check poor contact in throttle position sensor connector.	Is there poor contact in throttle position sensor connector?	Repair the poor contact in throttle position sensor connector.	Replace the throttle position sensor. <Ref. to FU(H4DOTC)-32, Throttle Position Sensor.>

T: DTC P0123 THROTTLE/PEDAL POSITION SENSOR/SWITCH "A" CIRCUIT HIGH

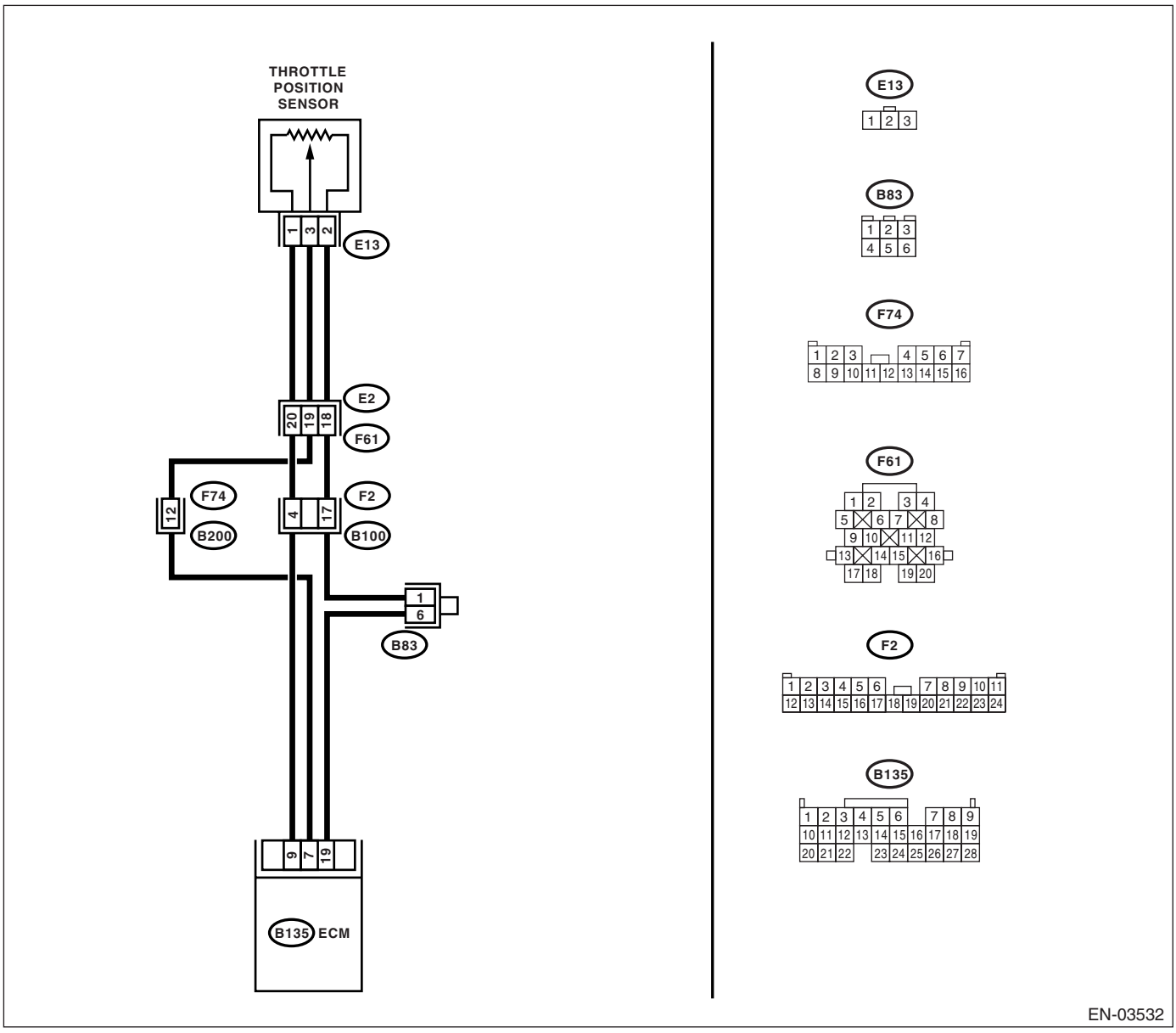
DTC DETECTING CONDITION:
Immediately at fault recognition
TROUBLE SYMPTOM:

- Erroneous idling
- Engine stalls.
- Poor driving performance

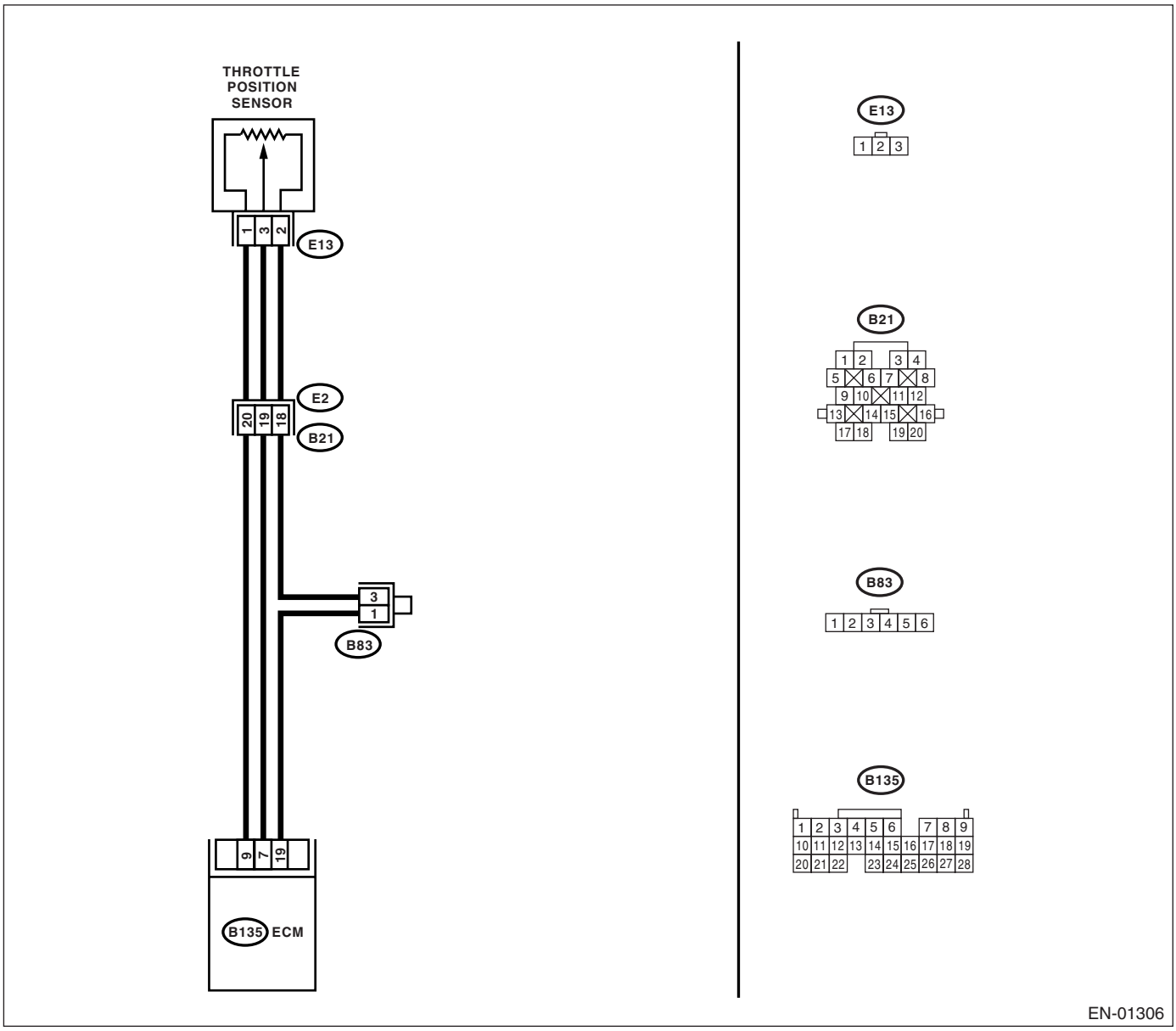
CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

WIRING DIAGRAM:

- LHD model



- RHD model


THROTTLE POSITION SENSOR
1 3 2
E13
E2
20 19 18
B21
3 1
B83
9 7 19
B135 ECM
E13
1 2 3
B21
1 2 3 4
5 6 7 8
9 10 11 12
13 14 15 16
17 18 19 20
B83
1 2 3 4 5 6
B135
1 2 3 4 5 6 7 8 9
10 11 12 13 14 15 16 17 18 19
20 21 22 23 24 25 26 27 28
EN-01306

	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of throttle position sensor signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4DOTC)(diag)-32, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the General Scan Tool Instruction Manual.	Is the voltage more than 4.7 V?	Go to step **2.**	Even if malfunction indicator light lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector may be the cause. NOTE: In this case, repair the following: • Poor contact in throttle position sensor connector • Poor contact in ECM connector • Poor contact in coupling connector
2	**CHECK HARNESS BETWEEN THROTTLE POSITION SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from throttle position sensor. 3) Measure the resistance of harness between throttle position sensor connector and engine ground. ***Connector & terminal*** ***(E13) No. 2 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **3.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between throttle position sensor and ECM connector • Poor contact in coupling connector • Poor contact in joint connector
3	**CHECK HARNESS BETWEEN THROTTLE POSITION SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to ON. 2) Measure the voltage between throttle position sensor connector and engine ground. ***Connector & terminal*** ***(E13) No. 3 (+) — Engine ground (−):***	Is the voltage more than 4.7 V?	Repair the battery short circuit in harness between throttle position sensor and ECM connector. After repair, replace the ECM. <Ref. to FU(H4DOTC)-50, Engine Control Module (ECM).>	Replace the throttle position sensor. <Ref. to FU(H4DOTC)-32, Throttle Position Sensor.>

U: DTC P0125 INSUFFICIENT COOLANT TEMPERATURE FOR CLOSED LOOP FUEL CONTROL

DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

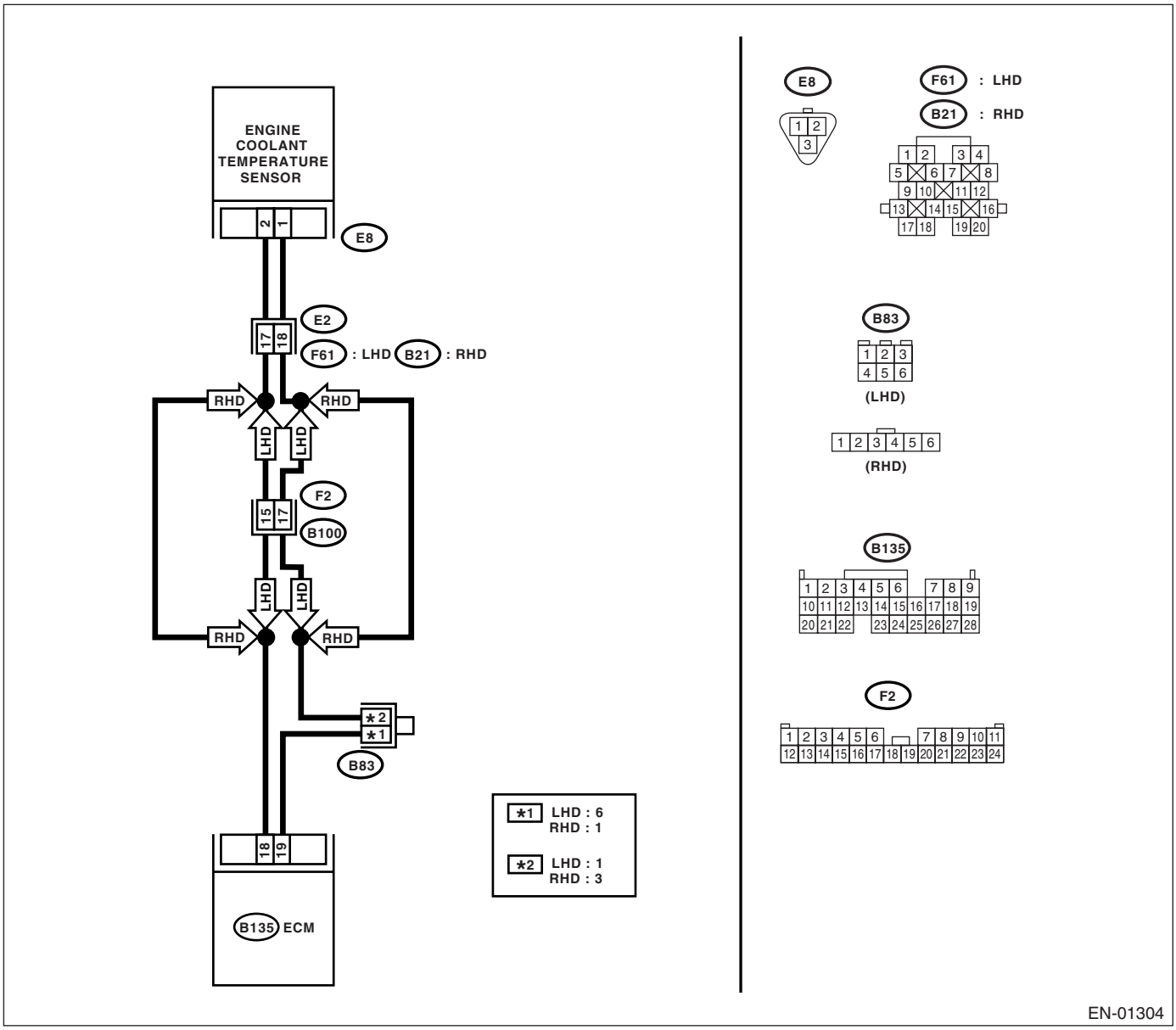
TROUBLE SYMPTOM:

Engine will not return to idling.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC.**	Is any other DTC displayed?	Inspect the relevant DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4DOTC)(diag)-72, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0125.	Go to step **2.**
2	**CHECK ENGINE COOLING SYSTEM.** NOTE: Check the following items. • Thermostat open stuck • Coolant level • Coolant freeze • Tire diameter	Is there a fault in engine cooling system?	Replace the thermostat. <Ref. to CO(H4SO)-20, Thermostat.>	Replace the engine coolant temperature sensor. <Ref. to FU(H4DOTC)-27, Engine Coolant Temperature Sensor.>

V: DTC P0130 O2 SENSOR CIRCUIT (BANK 1 SENSOR 1)

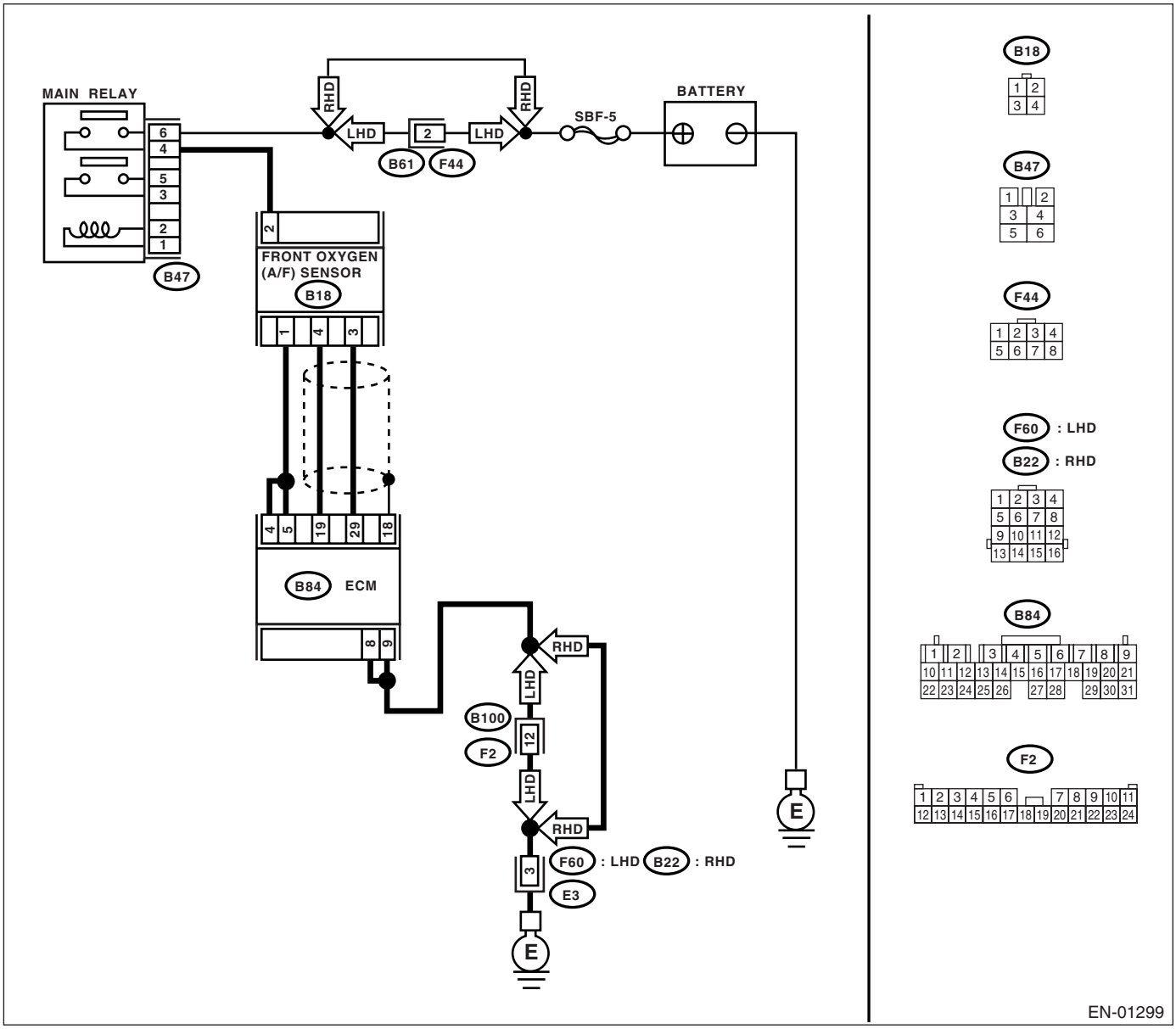
DTC DETECTING CONDITION:

Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC.**	Is any other DTC displayed?	Inspect the relevant DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4DOTC)(diag)-72, List of Diagnostic Trouble Code (DTC).>	Go to step **2.**
2	**CHECK FRONT (A/F) OXYGEN SENSOR DATA.** 1) Start the engine. 2) While observing the Subaru Select Monitor or general scan tool screen, warm-up the engine until coolant temperature is above 70°C (158°F). If the engine is already warmed-up, operate at idle speed for at least 1 minute. 3) Read the data of front oxygen (A/F) sensor signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4DOTC)(diag)-32, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the General Scan Tool Instruction Manual.	Is the measured value 0.85 — 1.15 (in idling)?	Go to step **3.**	Go to step **4.**
3	**CHECK REAR OXYGEN SENSOR SIGNAL.** 1) Race the engine at speeds from idling to 5,000 rpm for a total of 5 cycles. NOTE: To increase the engine speed to 5,000 rpm, slowly depress accelerator pedal, taking approx. 5 seconds, and quickly release accelerator pedal to decrease engine speed. 2) Operate the LED operation mode for engine. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to the "LED OPERATION MODE FOR ENGINE". <Ref. to EN(H4DOTC)(diag)-32, Subaru Select Monitor.>	Does the LED of {Rear O_2 Rich Signal} blink?	Repair the poor contact in front oxygen (A/F) sensor and rear oxygen sensor connector.	Check the rear oxygen sensor circuit. <Ref. to FU(H4DOTC)-47, Rear Oxygen Sensor.>
4	**CHECK EXHAUST SYSTEM.** Check the exhaust system parts. NOTE: Check the following items. • Loose installation of portions • Damage (crack, hole etc.) of parts • Looseness of front oxygen (A/F) sensor • Looseness and ill fitting of parts between front oxygen (A/F) sensor and rear oxygen sensor	Is there a fault in exhaust system?	Repair or replace the faulty parts.	Replace the front oxygen (A/F) sensor. <Ref. to FU(H4DOTC)-45, Front Oxygen (A/F) Sensor.>

W: DTC P0133 O2 SENSOR CIRCUIT SLOW RESPONSE (BANK 1 SENSOR 1)

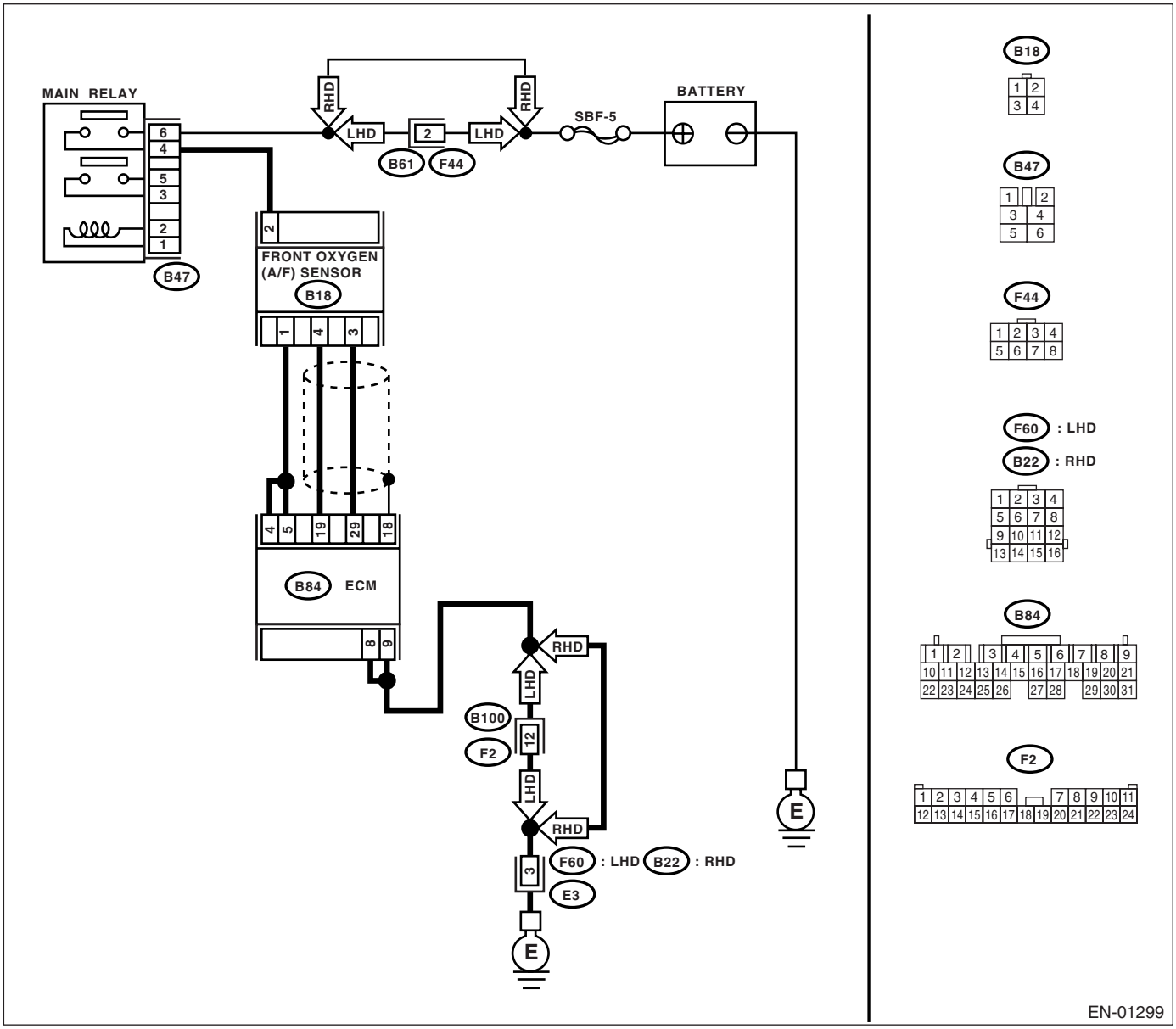
DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC.**	Is any other DTC displayed?	Inspect the relevant DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4DOTC)(diag)-72, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0133.	Go to step **2.**
2	**CHECK EXHAUST SYSTEM.** NOTE: Check the following items. • Loose installation of front portion of exhaust pipe onto cylinder heads • Loose connection between front exhaust pipe and front catalytic converter • Damage of exhaust pipe resulting in a hole	Is there a fault in exhaust system?	Repair the exhaust system.	Replace the front oxygen (A/F) sensor. <Ref. to FU(H4DOTC)-45, Front Oxygen (A/F) Sensor.>

X: DTC P0134 O2 SENSOR CIRCUIT NO ACTIVITY DETECTED (BANK 1 SENSOR 1)

NOTE:
For the diagnostic procedure, refer to DTC P0130. <Ref. to EN(H4DOTC)(diag)-129, DTC P0130 O2 SENSOR CIRCUIT (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

Y: DTC P0137 O2 SENSOR CIRCUIT LOW VOLTAGE (BANK 1 SENSOR 2)

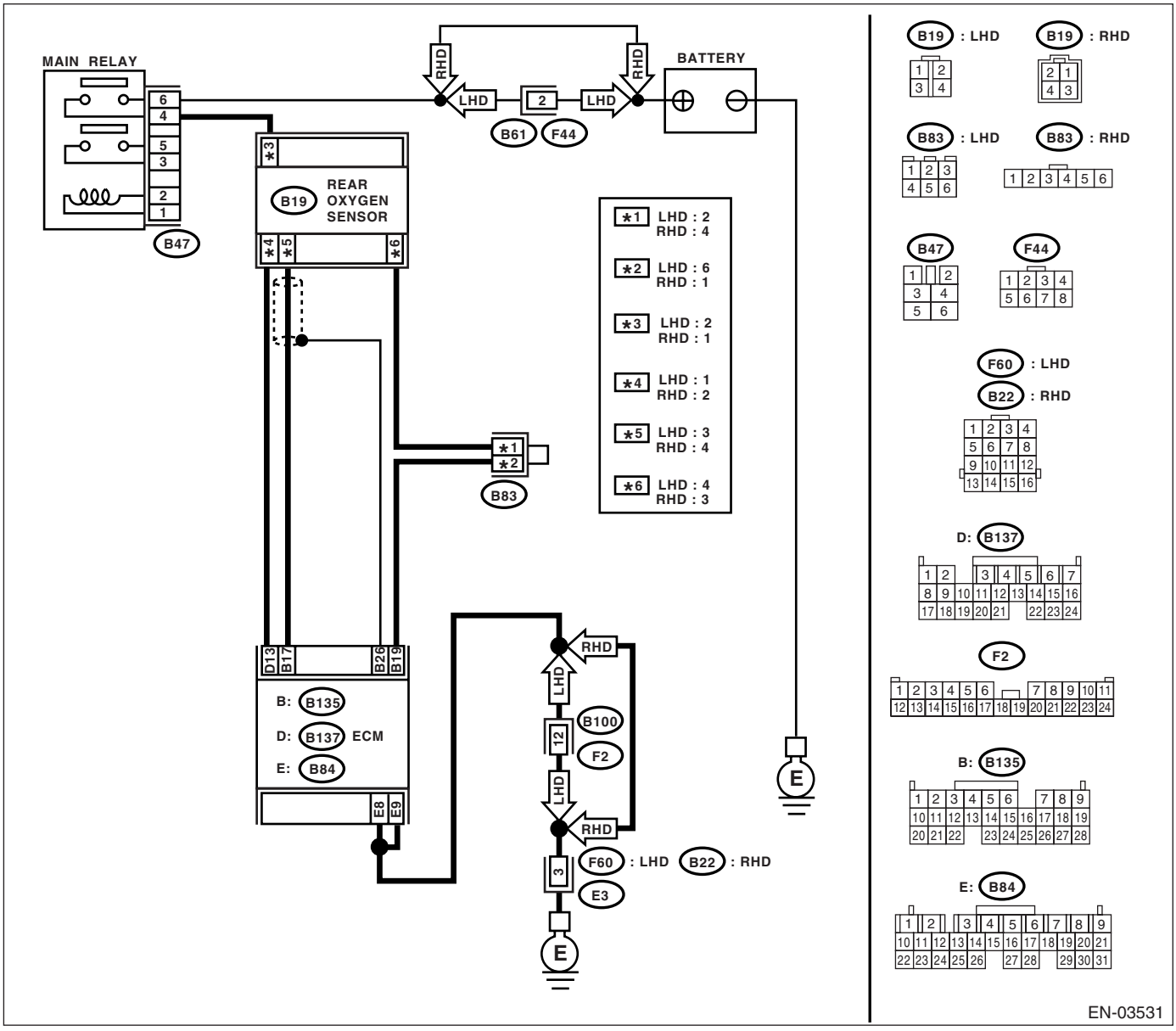
DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC.**	Is any other DTC displayed?	Using the List of Diagnostic Trouble Code (DTC), check the appropriate DTC. <Ref. to EN(H4DOTC)(diag)-72, List of Diagnostic Trouble Code (DTC).>	Go to step **2.**
2	**CHECK REAR OXYGEN SENSOR DATA.** 1) Warm-up the engine until engine coolant temperature is above 70°C (158°F), and keep the engine speed at 2,000 rpm to 3,000 rpm for 2 minutes. 2) Read the data of rear oxygen sensor signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to EN(H4DOTC)(diag)-32, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the General Scan Tool Instruction Manual.	Does the value fluctuate?	Go to step **6.**	Go to step **3.**
3	**CHECK REAR OXYGEN SENSOR DATA.** Read the data of rear oxygen sensor signal using Subaru Select Monitor or general scan tool.	Is the voltage 0.2 — 0.4 V?	Go to step **4.**	Replace the rear oxygen sensor. <Ref. to FU(H4DOTC)-47, Rear Oxygen Sensor.>
4	**CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and rear oxygen sensor. 3) Measure the resistance of harness between ECM and rear oxygen sensor connector. ***Connector & terminal*** ***LHD model*** ***(B135) No. 17 — (B19) No. 3:*** ***RHD model*** ***(B135) No. 17 — (B19) No. 4:***	Is the resistance more than 3 Ω?	Repair the open circuit in harness between ECM and rear oxygen sensor connector.	Go to step **5.**

	Step	Check	Yes	No
5	**CHECK HARNESS BETWEEN REAR OXYGEN SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from rear oxygen sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between rear oxygen sensor harness connector and engine ground or chassis ground. ***Connector & terminal*** ***LHD model*** ***(B19) No. 3 (+) — Engine ground (−):*** ***RHD model*** ***(B19) No. 4 (+) — Engine ground (−):***	Is the voltage more than 0.2 V?	Replace the rear oxygen sensor. <Ref. to FU(H4DOTC)-47, Rear Oxygen Sensor.>	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between rear oxygen sensor and ECM connector • Poor contact in rear oxygen sensor connector • Poor contact in ECM connector
6	**CHECK EXHAUST SYSTEM.** Check the exhaust system parts. NOTE: Check the following items. • Loose installation of portions • Damage (crack, hole etc.) of parts • Looseness and ill fitting of parts between front oxygen (A/F) sensor and rear oxygen sensor	Is there a fault in exhaust system?	Repair or replace the faulty parts.	Replace the rear oxygen sensor. <Ref. to FU(H4DOTC)-47, Rear Oxygen Sensor.>

Z: DTC P0138 O2 SENSOR CIRCUIT HIGH VOLTAGE (BANK 1 SENSOR 2)

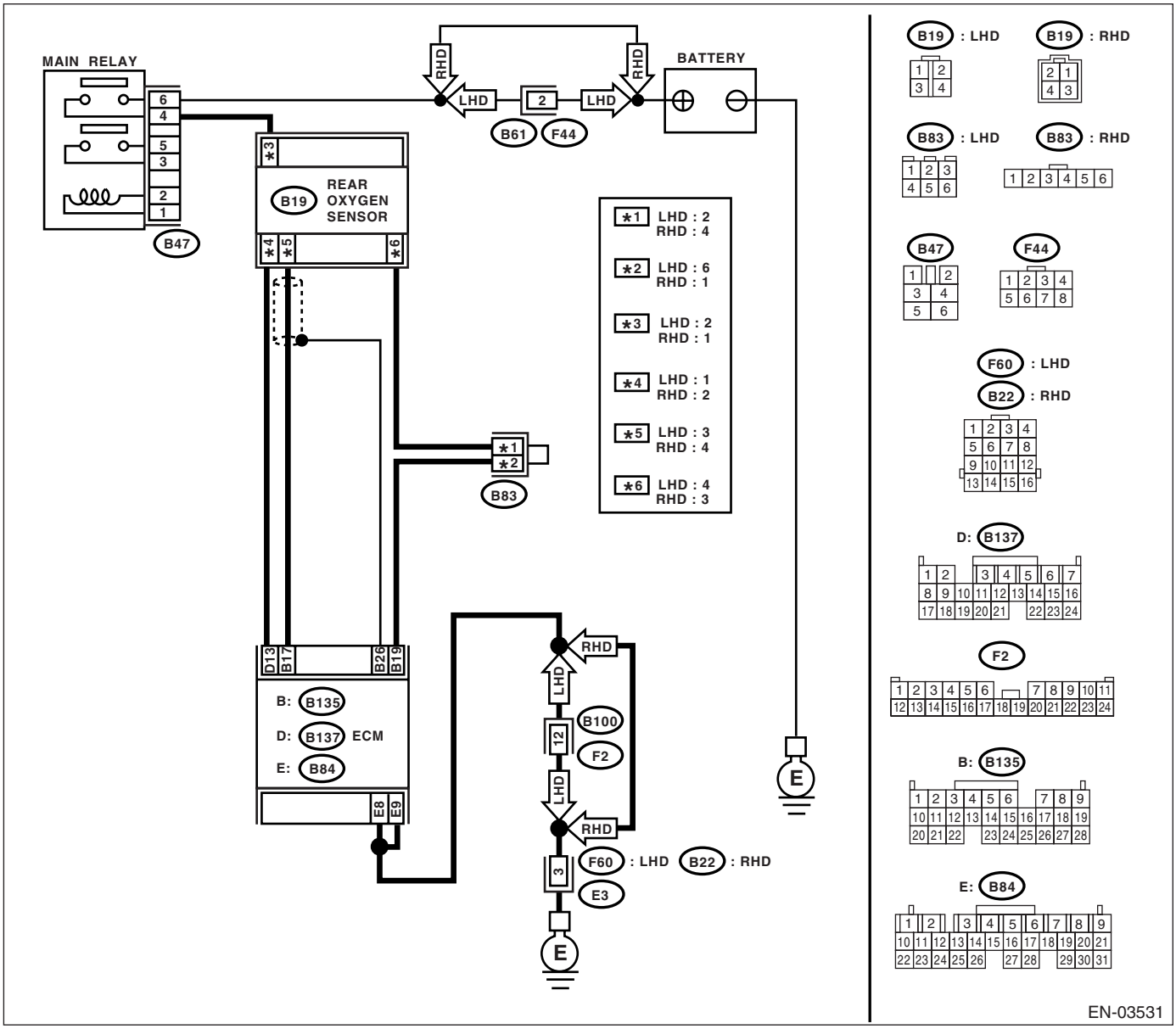
DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC.**	Is any other DTC displayed?	Using the List of Diagnostic Trouble Code (DTC), check the appropriate DTC. <Ref. to EN(H4DOTC)(diag)-72, List of Diagnostic Trouble Code (DTC).>	Go to step **2.**
2	**CHECK REAR OXYGEN SENSOR DATA.** 1) Warm-up the engine until engine coolant temperature is above 70°C (158°F), and keep the engine speed at 2,000 rpm to 3,000 rpm for 2 minutes. 2) Read the data of rear oxygen sensor signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to EN(H4DOTC)(diag)-32, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the General Scan Tool Instruction Manual.	Does the value fluctuate?	Go to step **6.**	Go to step **3.**
3	**CHECK REAR OXYGEN SENSOR DATA.** Read the data of rear oxygen sensor signal using Subaru Select Monitor or general scan tool.	Is the voltage 0.2 — 0.4 V?	Go to step **4.**	Replace the rear oxygen sensor. <Ref. to FU(H4DOTC)-47, Rear Oxygen Sensor.>
4	**CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and rear oxygen sensor. 3) Measure the resistance of harness between ECM and rear oxygen sensor connector. ***Connector & terminal*** ***LHD model*** ***(B135) No. 17 — (B19) No. 3:*** ***RHD model*** ***(B135) No. 17 — (B19) No. 4:***	Is the resistance more than 3 Ω?	Repair the open circuit in harness between ECM and rear oxygen sensor connector.	Go to step **5.**

	Step	Check	Yes	No
5	**CHECK HARNESS BETWEEN REAR OXYGEN SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from rear oxygen sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between rear oxygen sensor harness connector and engine ground or chassis ground. ***Connector & terminal*** ***LHD model*** ***(B19) No. 3 (+) — Engine ground (−):*** ***RHD model*** ***(B19) No. 4 (+) — Engine ground (−):***	Is the voltage more than 0.2 V?	Replace the rear oxygen sensor. <Ref. to FU(H4DOTC)-47, Rear Oxygen Sensor.>	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between rear oxygen sensor and ECM connector • Poor contact in rear oxygen sensor connector • Poor contact in ECM connector
6	**CHECK EXHAUST SYSTEM.** Check the exhaust system parts. NOTE: Check the following items. • Loose installation of portions • Damage (crack, hole etc.) of parts • Looseness and ill fitting of parts between front oxygen (A/F) sensor and rear oxygen sensor	Is there a fault in exhaust system?	Repair or replace the faulty parts.	Replace the rear oxygen sensor. <Ref. to FU(H4DOTC)-47, Rear Oxygen Sensor.>

AA:DTC P0139 O2 SENSOR CIRCUIT SLOW RESPONSE (BANK 1 SENSOR 2)

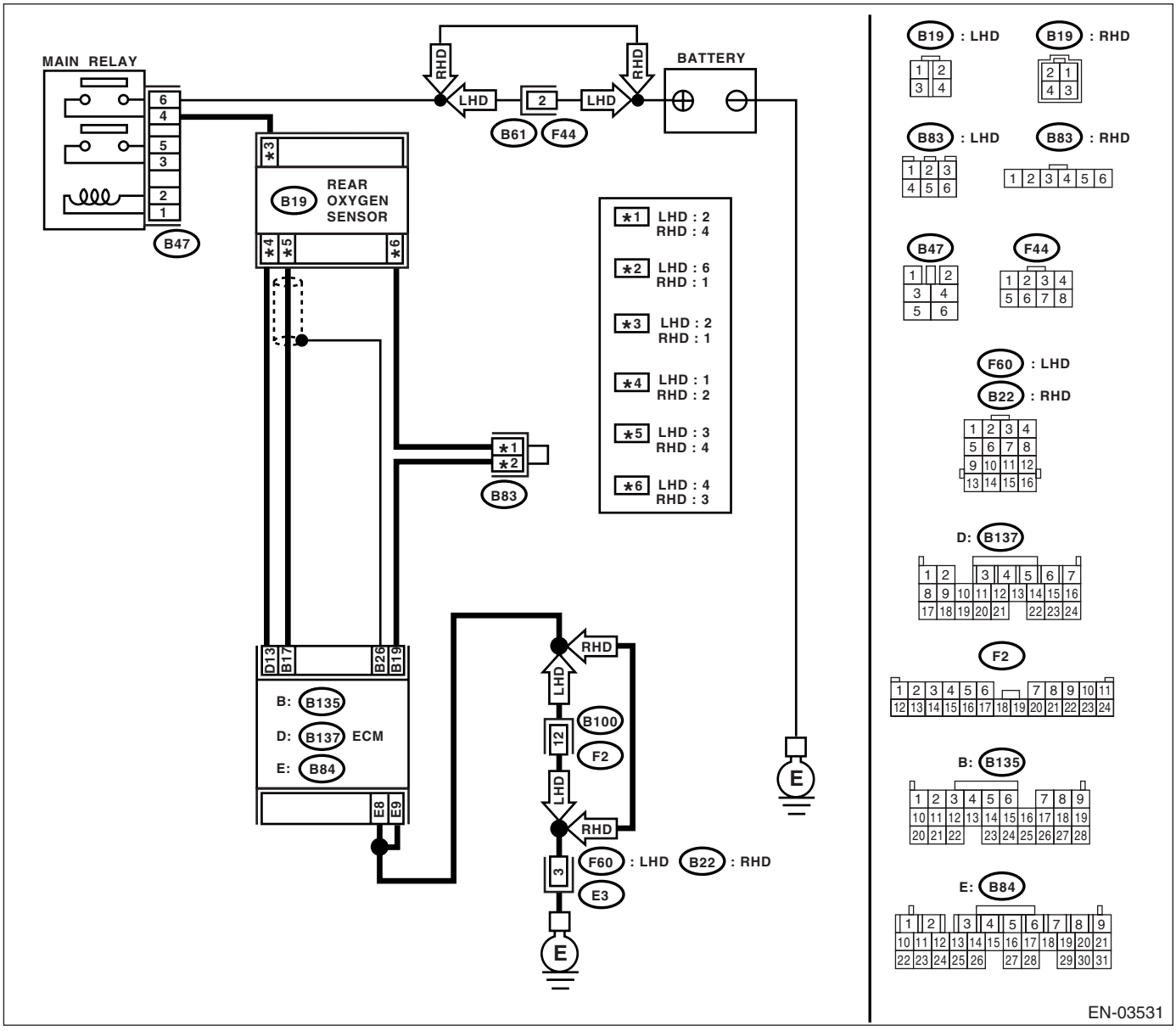
DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

WIRING DIAGRAM:



Step		Check	Yes	No
1	**CHECK ANY OTHER DTC.**	Is any other DTC displayed?	Inspect the relevant DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4DOTC)(diag)-72, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0139.	Replace the rear oxygen sensor. <Ref. to FU(H4DOTC)-47, Rear Oxygen Sensor.>

AB:DTC P0171 SYSTEM TOO LEAN (BANK 1)

NOTE:
For the diagnostic procedure, refer to DTC P0172. <Ref. to EN(H4DOTC)(diag)-140, DTC P0172 SYSTEM TOO RICH (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AC:DTC P0172 SYSTEM TOO RICH (BANK 1)

DTC DETECTING CONDITION:
Two consecutive driving cycles with fault

TROUBLE SYMPTOM:

- Erroneous idling
- Engine stalls.
- Poor driving performance

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

Step		Check	Yes	No
1	**CHECK EXHAUST SYSTEM.**	Are there holes or loose bolts on exhaust system?	Repair the exhaust system.	Go to step **2.**
2	**CHECK AIR INTAKE SYSTEM.**	Are there holes, loose bolts or disconnection of hose on air intake system?	Repair the air intake system.	Go to step **3.**

	Step	Check	Yes	No
3	**CHECK FUEL PRESSURE.** **Warning:** **• Place "NO FIRE" signs near the working area.** **• Be careful not to spill fuel on the floor.** 1) Release the fuel pressure. (1) Disconnect the connector from fuel pump relay. (2) Start the engine and run it until it stalls. (3) After the engine stalls, crank it for 5 more seconds. (4) Turn the ignition switch to OFF. 2) Connect the connector to fuel pump relay. 3) Disconnect the fuel delivery hose from fuel filter, and connect fuel pressure gauge. 4) Install the fuel filler cap. 5) Start the engine and idle while gear position is neutral. 6) Measure the fuel pressure while disconnecting pressure regulator vacuum hose from intake manifold. **Warning:** **Before removing the fuel pressure gauge, release fuel pressure.** NOTE: If the fuel pressure does not increase, squeeze fuel return hose 2 to 3 times, then measure fuel pressure again.	Is the measured value 284 — 314 kPa (2.9 — 3.2 kgf/cm^2, 41 — 46 psi)?	Go to step **4.**	Repair the following items. Fuel pressure too high: • Clogged fuel return line or bent hose Fuel pressure too low: • Improper fuel pump discharge • Clogged fuel supply line
4	**CHECK FUEL PRESSURE.** After connecting the pressure regulator vacuum hose, measure fuel pressure. **Warning:** **Before removing the fuel pressure gauge, release fuel pressure.** NOTE: • If the fuel pressure does not increase, squeeze fuel return hose 2 to 3 times, then measure fuel pressure again. • If out of specification as measured at this step, check or replace the pressure regulator and pressure regulator vacuum hose.	Is the measured value 206 — 235 kPa (2.1 — 2.4 kgf/cm^2, 30 — 34 psi)?	Go to step **5.**	Repair the following items. Fuel pressure too high: • Faulty pressure regulator • Clogged fuel return line or bent hose Fuel pressure too low: • Faulty pressure regulator • Improper fuel pump discharge • Clogged fuel supply line
5	**CHECK ENGINE COOLANT TEMPERATURE SENSOR.** 1) Start the engine and warm-up completely. 2) Read the data of engine coolant temperature sensor signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4DOTC)(diag)-32, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the General Scan Tool Instruction Manual.	Is the temperature more than 60°C (140°F)?	Go to step **6.**	Replace the engine coolant temperature sensor. <Ref. to FU(H4DOTC)-27, Engine Coolant Temperature Sensor.>

	Step	Check	Yes	No
6	**CHECK MASS AIR FLOW AND INTAKE AIR TEMPERATURE.** 1) Start the engine and warm-up engine until coolant temperature is greater than 60°C (140°F). 2) Place the shift lever in neutral position. 3) Turn the A/C switch to OFF. 4) Turn all accessory switches to OFF. 5) Read the data of mass air flow and intake air temperature sensor signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4DOTC)(diag)-32, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the General Scan Tool Instruction Manual.	Is the measured value within the followings? Ignition ON: 73.3 — 106.6 kPa (550 — 800 mmHg, 21.65 — 31.50 inHg) Idling: 24.0 — 41.3 kPa (180 — 310 mmHg, 7.09 — 12.20 inHg)	Go to step **7.**	Replace the mass air flow and intake air temperature sensor. <Ref. to FU(H4DOTC)-33, Mass Air Flow and Intake Air Temperature Sensor.>
7	**CHECK MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR.** 1) Start the engine and warm-up engine until coolant temperature is greater than 60°C (140°F). 2) Place the shift lever in neutral position. 3) Turn the A/C switch to OFF. 4) Turn all accessory switches to OFF. 5) Open the front hood. 6) Measure the ambient temperature. 7) Read the data of mass air flow and intake air temperature sensor signal using Subaru Select Monitor or General scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4DOTC)(diag)-32, Subaru Select Monitor.> • General scan tool For detailed operation procedure, refer to the General Scan Tool Instruction Manual.	Subtract ambient temperature from intake air temperature. Is the obtained value −10°C — 50°C (14°F — 122°F)?	Contact your Subaru distributor service. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.	Check the mass air flow and intake air temperature sensor. <Ref. to FU(H4DOTC)-33, Mass Air Flow and Intake Air Temperature Sensor.>

AD:DTC P0230 FUEL PUMP PRIMARY CIRCUIT

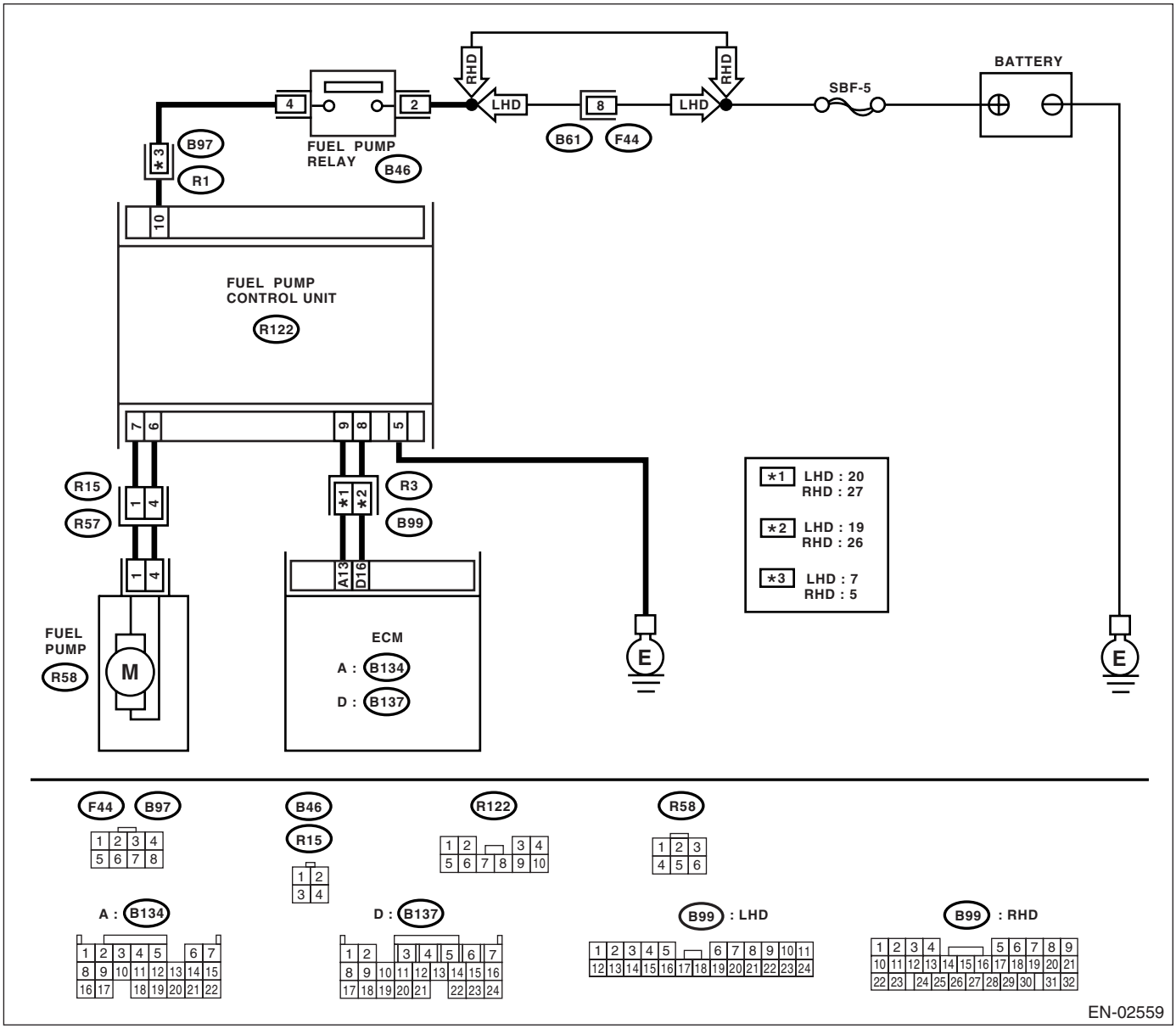
DTC DETECTING CONDITION:

Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK POWER SUPPLY CIRCUIT TO FUEL PUMP CONTROL UNIT.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from fuel pump control unit. 3) Turn the ignition switch to ON. 4) Measure the voltage between fuel pump control unit and chassis ground. ***Connector & terminal*** ***(R122) No. 10 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **2.**	Repair the power supply circuit. NOTE: In this case repair the following: • Open or ground short circuit in harness between fuel pump relay and fuel pump control unit • Poor contact in fuel pump control unit connector • Poor contact in fuel pump relay connector
2	**CHECK GROUND CIRCUIT OF FUEL PUMP CONTROL UNIT.** 1) Turn the ignition switch to OFF. 2) Measure the resistance of harness between fuel pump control unit and chassis ground. ***Connector & terminal*** ***(R122) No. 5 — Chassis ground:***	Is the resistance less than 5 Ω?	Go to step **3.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit between fuel pump control unit and chassis ground • Poor contact in fuel pump control unit connector
3	**CHECK HARNESS BETWEEN FUEL PUMP CONTROL UNIT AND FUEL PUMP CONNECTOR.** 1) Disconnect the connector from fuel pump. 2) Measure the resistance of harness between fuel pump control unit and fuel pump connector. ***Connector & terminal*** ***(R122) No. 7 — (R58) No. 1:*** ***(R122) No. 6 — (R58) No. 4:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the open circuit between fuel pump control unit and fuel pump.
4	**CHECK HARNESS BETWEEN FUEL PUMP CONTROL UNIT AND FUEL PUMP CONNECTOR.** Measure the resistance of harness between fuel pump control unit and chassis ground. ***Connector & terminal*** ***(R122) No. 7 — Chassis ground:*** ***(R122) No. 6 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **5.**	Repair the ground short circuit between fuel pump control unit and fuel pump.

	Step	Check	Yes	No
5	**CHECK HARNESS BETWEEN FUEL PUMP CONTROL UNIT AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance of harness between fuel pump control unit and ECM connector. ***Connector & terminal*** ***(R122) No. 9 — (B134) No. 13:*** ***(R122) No. 8 — (B137) No. 16:***	Is the resistance less than 1 Ω?	Go to step **6.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit between fuel pump control unit and ECM • Poor contact in fuel pump control unit and ECM connector
6	**CHECK HARNESS BETWEEN FUEL PUMP CONTROL UNIT AND ECM CONNECTOR.** Measure the resistance of harness between fuel pump control unit and chassis ground. ***Connector & terminal*** ***(R122) No. 9 — Chassis ground:*** ***(R122) No. 8 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **7.**	Repair the ground short circuit between fuel pump control unit and ECM.
7	**CHECK POOR CONTACT.** Check poor contact in ECM and fuel pump control unit connector.	Is there poor contact in ECM and fuel pump control unit connector?	Repair the poor contact in ECM and fuel pump control unit.	Go to step **8.**
8	**CHECK EXPERIENCE OF RUNNING OUT OF FUEL.**	Did the vehicle experience running out of fuel?	Finish the diagnosis. NOTE: DTC record may be conducted as a result of fuel pump idling while running out of fuel.	Replace the fuel pump control unit. <Ref. to FU(H4DOTC)-53, Fuel Pump Control Unit.>

AE:DTC P0244 TURBO/SUPER CHARGER WASTEGATE SOLENOID "A" RANGE/PERFORMANCE

DTC DETECTING CONDITION:

Immediately at fault recognition

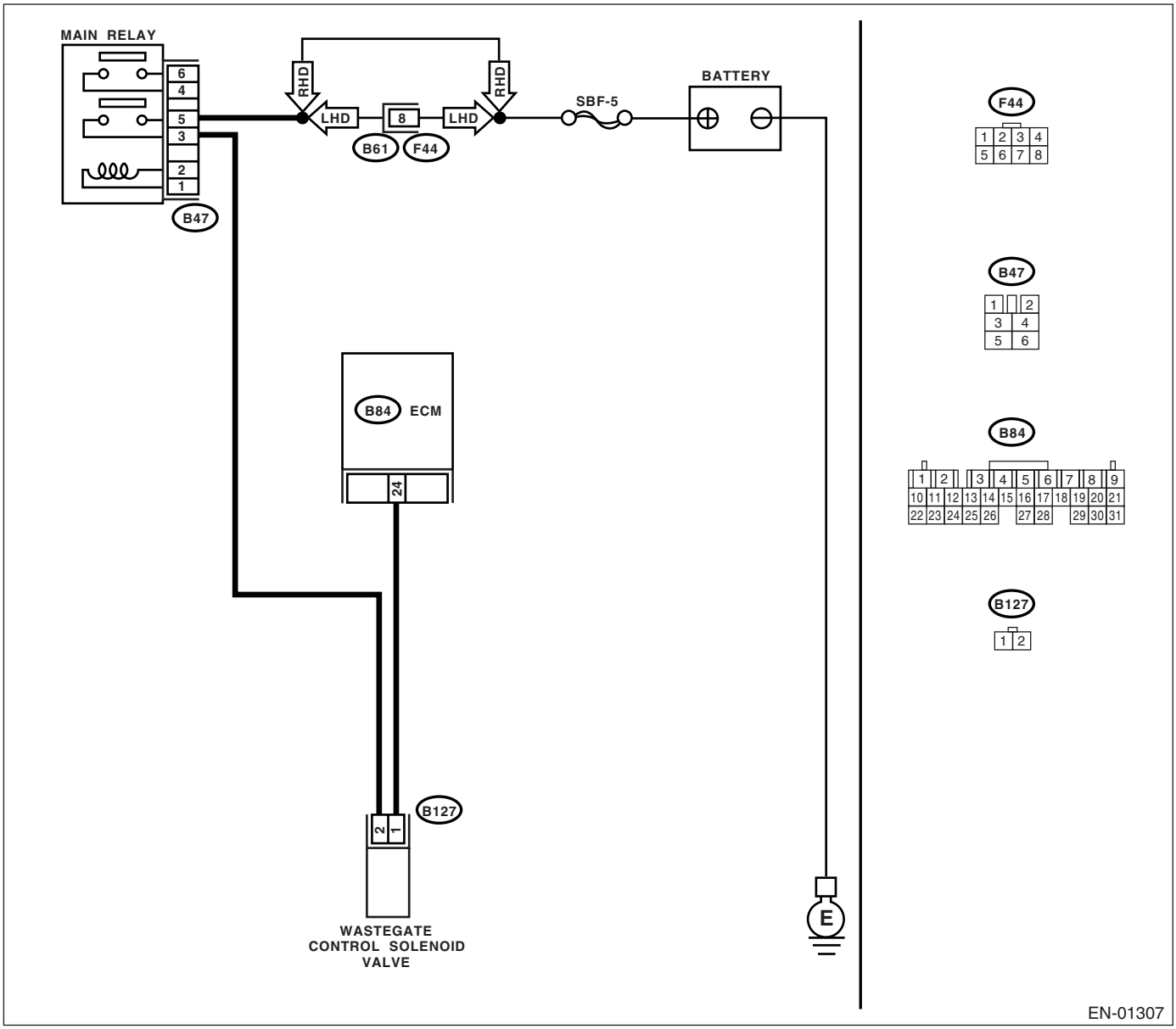
TROUBLE SYMPTOM:

- Erroneous idling
- Engine stalls.
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

WIRING DIAGRAM:



Step	Check	Yes	No
1 **CHECK ANY OTHER DTC.**	Is any other DTC displayed?	Inspect the relevant DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4DOTC)(diag)-72, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0244.	Replace the wastegate control solenoid valve. <Ref. to FU(H4DOTC)-44, Wastegate Control Solenoid Valve.>

AF:DTC P0245 TURBO/SUPER CHARGER WASTEGATE SOLENOID "A" LOW

DTC DETECTING CONDITION:

Immediately at fault recognition

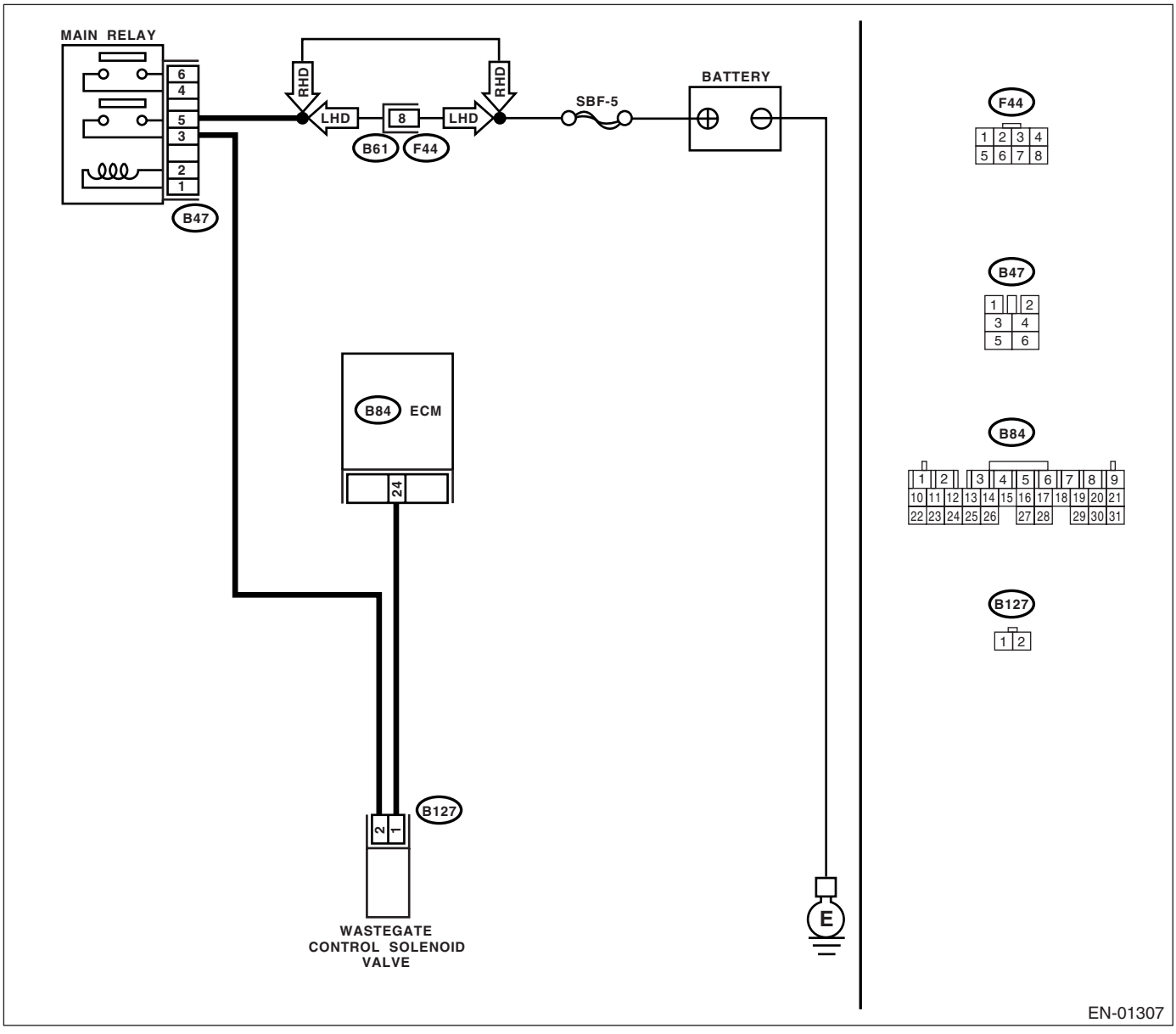
TROUBLE SYMPTOM:

Erroneous idling

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B84) No. 24 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Even if malfunction indicator light lights up, the circuit has returned to a normal condition at this time.	Go to step **2.**
2	**CHECK HARNESS BETWEEN WASTEGATE CONTROL SOLENOID VALVE AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from wastegate control solenoid valve and ECM. 3) Measure the resistance of harness between wastegate control solenoid valve connector and engine ground. ***Connector & terminal*** ***(B127) No. 1 — Engine ground:***	Is the resistance less than 10 Ω?	Repair the ground short circuit in harness between ECM and wastegate control solenoid valve connector.	Go to step **3.**
3	**CHECK HARNESS BETWEEN WASTEGATE CONTROL SOLENOID VALVE AND ECM CONNECTOR.** Measure the resistance of harness between ECM and wastegate control solenoid valve of harness connector. ***Connector & terminal*** ***(B84) No. 24 — (B127) No. 1:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the open circuit in harness between ECM and wastegate control solenoid valve connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and wastegate control solenoid valve connector
4	**CHECK WASTEGATE CONTROL SOLENOID VALVE.** 1) Remove the wastegate control solenoid valve. 2) Measure the resistance between wastegate control solenoid valve terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 30 — 40 Ω?	Go to step **5.**	Replace the wastegate control solenoid valve. <Ref. to FU(H4DOTC)-44, Wastegate Control Solenoid Valve.>
5	**CHECK POWER SUPPLY TO WASTEGATE CONTROL SOLENOID VALVE.** 1) Turn the ignition switch to ON. 2) Measure the voltage between wastegate control solenoid valve and engine ground. ***Connector & terminal*** ***(B127) No. 2 (+) — Engine ground (−):***	Is the voltage more than 10 V?	Go to step **6.**	Repair the open circuit in harness between main relay and wastegate control solenoid valve connector.
6	**CHECK POOR CONTACT.** Check poor contact in wastegate control solenoid valve connector.	Is there poor contact in wastegate control solenoid valve connector?	Repair the poor contact in wastegate control solenoid valve connector.	Contact your Subaru distributor service.

AG:DTC P0246 TURBO/SUPER CHARGER WASTEGATE SOLENOID "A" HIGH

DTC DETECTING CONDITION:

Immediately at fault recognition

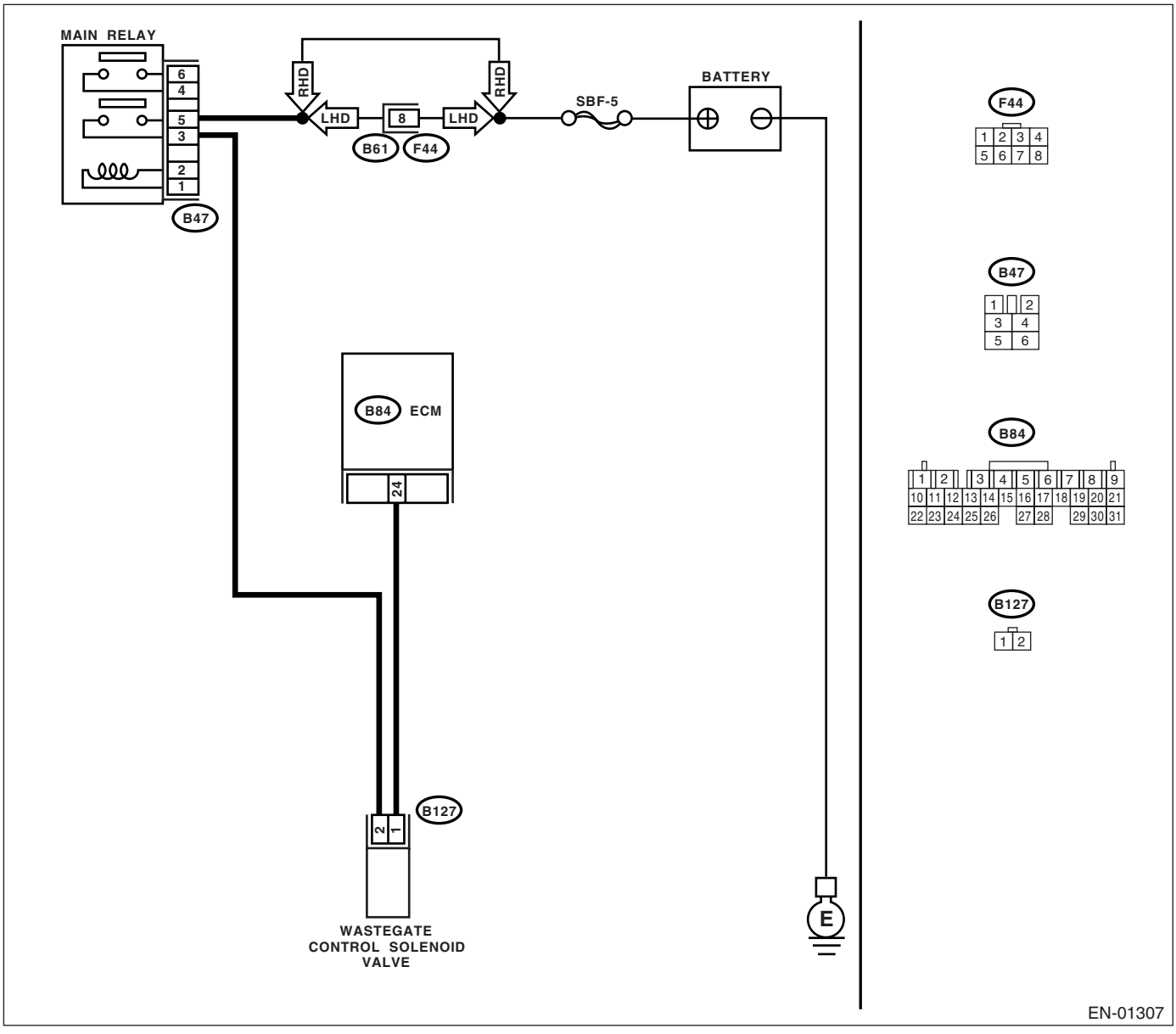
TROUBLE SYMPTOM:

Erroneous idling

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B84) No. 24 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **3.**	Go to step **2.**
2	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair the poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H4DOTC)-50, Engine Control Module (ECM).>
3	**CHECK HARNESS BETWEEN WASTEGATE CONTROL SOLENOID VALVE AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from wastegate control solenoid valve. 3) Turn the ignition switch to ON. 4) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B84) No. 24 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Repair the battery short circuit in harness between ECM and wastegate control solenoid valve connector. After repair, replace the ECM. <Ref. to FU(H4DOTC)-50, Engine Control Module (ECM).>	Go to step **4.**
4	**CHECK WASTEGATE CONTROL SOLENOID VALVE.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between wastegate control solenoid valve terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance less than 1 Ω?	Replace the wastegate control solenoid valve <Ref. to FU(H4DOTC)-44, Wastegate Control Solenoid Valve.> and ECM <Ref. to FU(H4DOTC)-50, Engine Control Module (ECM).>	Go to step **5.**
5	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair the poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H4DOTC)-50, Engine Control Module (ECM).>

AH:DTC P0301 CYLINDER 1 MISFIRE DETECTED

NOTE:
For the diagnostic procedure, refer to DTC P0304. <Ref. to EN(H4DOTC)(diag)-152, DTC P0304 CYLINDER 4 MISFIRE DETECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AI: DTC P0302 CYLINDER 2 MISFIRE DETECTED

NOTE:
For the diagnostic procedure, refer to DTC P0304. <Ref. to EN(H4DOTC)(diag)-152, DTC P0304 CYLINDER 4 MISFIRE DETECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AJ:DTC P0303 CYLINDER 3 MISFIRE DETECTED

NOTE:
For the diagnostic procedure, refer to DTC P0304. <Ref. to EN(H4DOTC)(diag)-152, DTC P0304 CYLINDER 4 MISFIRE DETECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AK:DTC P0304 CYLINDER 4 MISFIRE DETECTED

DTC DETECTING CONDITION:

- Two consecutive driving cycles with fault
- Immediately at fault recognition (A misfire which could damage catalyst occurs.)

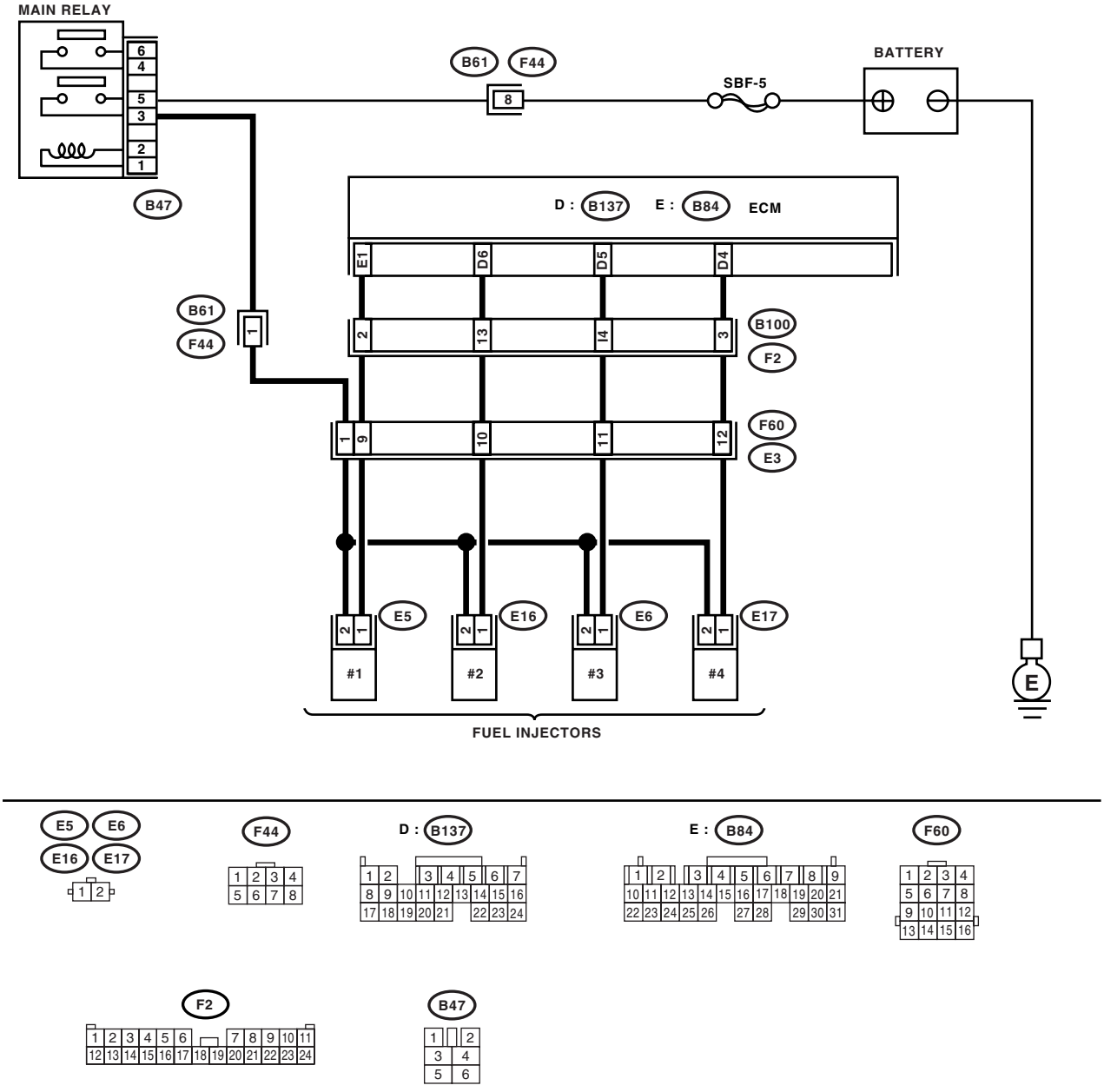
TROUBLE SYMPTOM:

- Engine stalls.
- Erroneous idling
- Rough driving

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

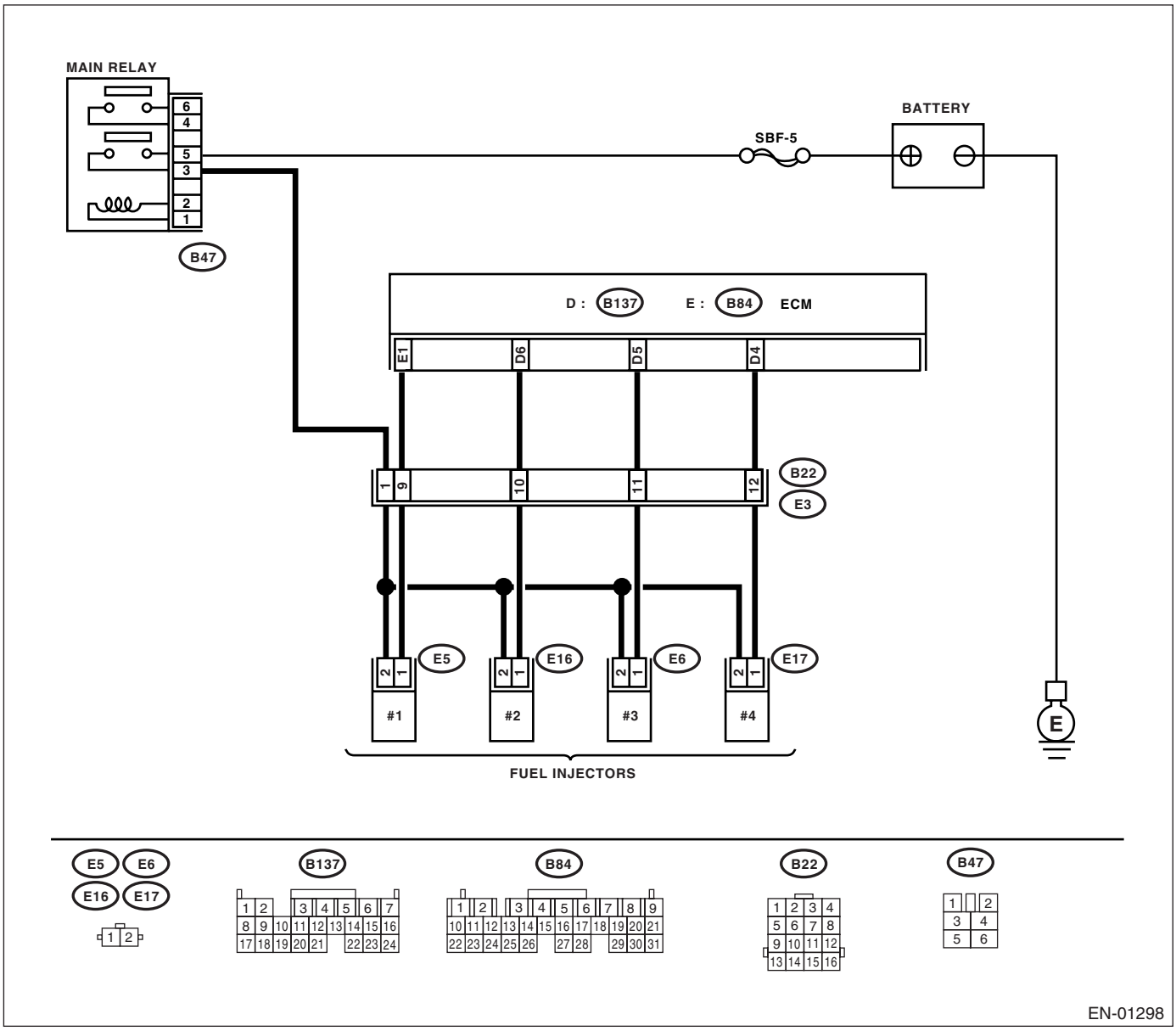
WIRING DIAGRAM:

- LHD model



EN-01297

- RHD model


MAIN RELAY
6
4
5
3
2
1
B47
BATTERY
SBF-5
D : B137
E : B84
ECM
E1
D6
D5
D4
1
9
10
11
12
B22
E3
2
1
E5
E16
E6
E17
#1
#2
#3
#4
FUEL INJECTORS
E
E5
E6
E16
E17
1 2
B137
1 2 3 4 5 6 7
8 9 10 11 12 13 14 15 16
17 18 19 20 21 22 23 24
B84
1 2 3 4 5 6 7 8 9
10 11 12 13 14 15 16 17 18 19 20 21
22 23 24 25 26 27 28 29 30 31
B22
1 2 3 4
5 6 7 8
9 10 11 12
13 14 15 16
B47
1 2
3 4
5 6
EN-01298

	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC.**	Is any other DTC displayed?	Inspect the relevant DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4DOTC)(diag)-72, List of Diagnostic Trouble Code (DTC).>	Go to step **2.**
2	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM connector and chassis ground on faulty cylinders. ***Connector & terminal*** ***#1 (B84) No. 1 (+) — Chassis ground (–):*** ***#2 (B137) No. 6 (+) — Chassis ground (–):*** ***#3 (B137) No. 5 (+) — Chassis ground (–):*** ***#4 (B137) No. 4 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **7.**	Go to step **3.**
3	**CHECK HARNESS BETWEEN FUEL INJECTOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from fuel injector on faulty cylinders. 3) Disconnect the connector from ECM. 4) Measure the resistance between ECM connector and engine ground on faulty cylinders. ***Connector & terminal*** ***#1 (E5) No. 1 — Engine ground:*** ***#2 (E16) No. 1 — Engine ground:*** ***#3 (E6) No. 1 — Engine ground:*** ***#4 (E17) No. 1 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **4.**	Repair the ground short circuit in harness between fuel injector and ECM connector.
4	**CHECK HARNESS BETWEEN FUEL INJECTOR AND ECM CONNECTOR.** Measure the resistance of harness connector between ECM connector and fuel injector on faulty cylinders. ***Connector & terminal*** ***#1 (B84) No. 1 — (E5) No. 1:*** ***#2 (B137) No. 6 — (E16) No. 1:*** ***#3 (B137) No. 5 — (E6) No. 1:*** ***#4 (B137) No. 4 — (E17) No. 1:***	Is the resistance less than 1 Ω?	Go to step **5.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and fuel injector connector • Poor contact in coupling connector
5	**CHECK FUEL INJECTOR.** Measure the resistance between fuel injector terminals on faulty cylinder. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 5 — 20 Ω?	Go to step **6.**	Replace the faulty fuel injector. <Ref. to FU(H4DOTC)-36, Fuel Injector.>

	Step	Check	Yes	No
6	**CHECK POWER SUPPLY LINE.** 1) Turn the ignition switch to ON. 2) Measure the voltage between fuel injector and engine ground on faulty cylinders. ***Connector & terminal*** ***#1 (E5) No. 2 (+) — Engine ground (–):*** ***#2 (E16) No. 2 (+) — Engine ground (–):*** ***#3 (E6) No. 2 (+) — Engine ground (–):*** ***#4 (E17) No. 2 (+) — Engine ground (–):***	Is the voltage more than 10 V?	Repair the poor contact in all connectors in fuel injector circuit.	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between main relay and fuel injector connector on faulty cylinders • Poor contact in coupling connector • Poor contact in main relay connector • Poor contact in fuel injector connector on faulty cylinders
7	**CHECK HARNESS BETWEEN FUEL INJECTOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from fuel injector on faulty cylinder. 3) Turn the ignition switch to ON. 4) Measure the voltage between ECM connector and chassis ground on faulty cylinders. ***Connector & terminal*** ***#1 (B84) No. 1 (+) — Chassis ground (–):*** ***#2 (B137) No. 6 (+) — Chassis ground (–):*** ***#3 (B137) No. 5 (+) — Chassis ground (–):*** ***#4 (B137) No. 4 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Repair the battery short circuit in harness between ECM and fuel injector. After repair, replace the ECM. <Ref. to FU(H4DOTC)-50, Engine Control Module (ECM).>	Go to step **8.**
8	**CHECK FUEL INJECTOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between fuel injector terminals on faulty cylinder. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance less than 1 Ω?	Replace the faulty fuel injector <Ref. to FU(H4DOTC)-36, Fuel Injector.> and ECM <Ref. to FU(H4DOTC)-50, Engine Control Module (ECM).>	Go to step **9.**
9	**CHECK INSTALLATION OF CAMSHAFT POSITION SENSOR/CRANKSHAFT POSITION SENSOR.**	Is the camshaft position sensor or crankshaft position sensor loosely installed?	Tighten the camshaft position sensor or crankshaft position sensor.	Go to step **10.**
10	**CHECK CRANK SPROCKET.** Remove the timing belt cover.	Is the crank sprocket rusted or does it have broken teeth?	Replace the crank sprocket. <Ref. to ME(H4DOTC)-68, Crank Sprocket.>	Go to step **11.**
11	**CHECK INSTALLATION CONDITION OF TIMING BELT.** Turn the crankshaft, and align alignment mark on crank sprocket with alignment mark on cylinder block.	Is the timing belt dislocated from its proper position?	Repair the installation condition of timing belt. <Ref. to ME(H4DOTC)-58, Timing Belt.>	Go to step **12.**

	Step	Check	Yes	No
12	**CHECK FUEL LEVEL.**	Is the fuel meter indication higher than the “Lower” level?	Go to step **13.**	Replenish the fuel so fuel meter indication is higher than the “Lower” level. After replenishing fuel; Go to step **13.**
13	**CHECK STATUS OF MALFUNCTION INDICATOR LIGHT.** 1) Clear the memory using Subaru Select Monitor. <Ref. to EN(H4DOTC)(diag)-46, Clear Memory Mode.> 2) Start the engine, and drive the vehicle more than 10 minutes.	Is the malfunction indicator light coming on or blinking?	Go to step **15.**	Go to step **14.**
14	**CHECK CAUSE OF MISFIRE DIAGNOSED.**	Was the cause of misfire diagnosed when the engine is running?	Finish the diagnostics operation, if the engine has no abnormality.	Repair the poor contact. NOTE: In this case, repair the following: • Poor contact in ignition coil connector • Poor contact in fuel injector connector on faulty cylinders • Poor contact in ECM connector • Poor contact in coupling connector
15	**CHECK AIR INTAKE SYSTEM.**	Is there a fault in air intake system?	Repair the air intake system. NOTE: Check the following items: • Are there air leaks or air suction caused by loose or dislocated nuts and bolts? • Are there cracks or any disconnection of hoses?	Go to step **16.**
16	**CHECK CYLINDER.**	Is there a fault in that cylinder?	Repair or replace the faulty parts. NOTE: Check the following items. • Spark plug • Fuel injector • Compression pressure	Go to DTC P0171 and P0172. <Ref. to EN(H4DOTC)(diag)-140, DTC P0171 SYSTEM TOO LEAN (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AL:DTC P0327 KNOCK SENSOR 1 CIRCUIT LOW (BANK 1 OR SINGLE SENSOR)

DTC DETECTING CONDITION:

Immediately at fault recognition

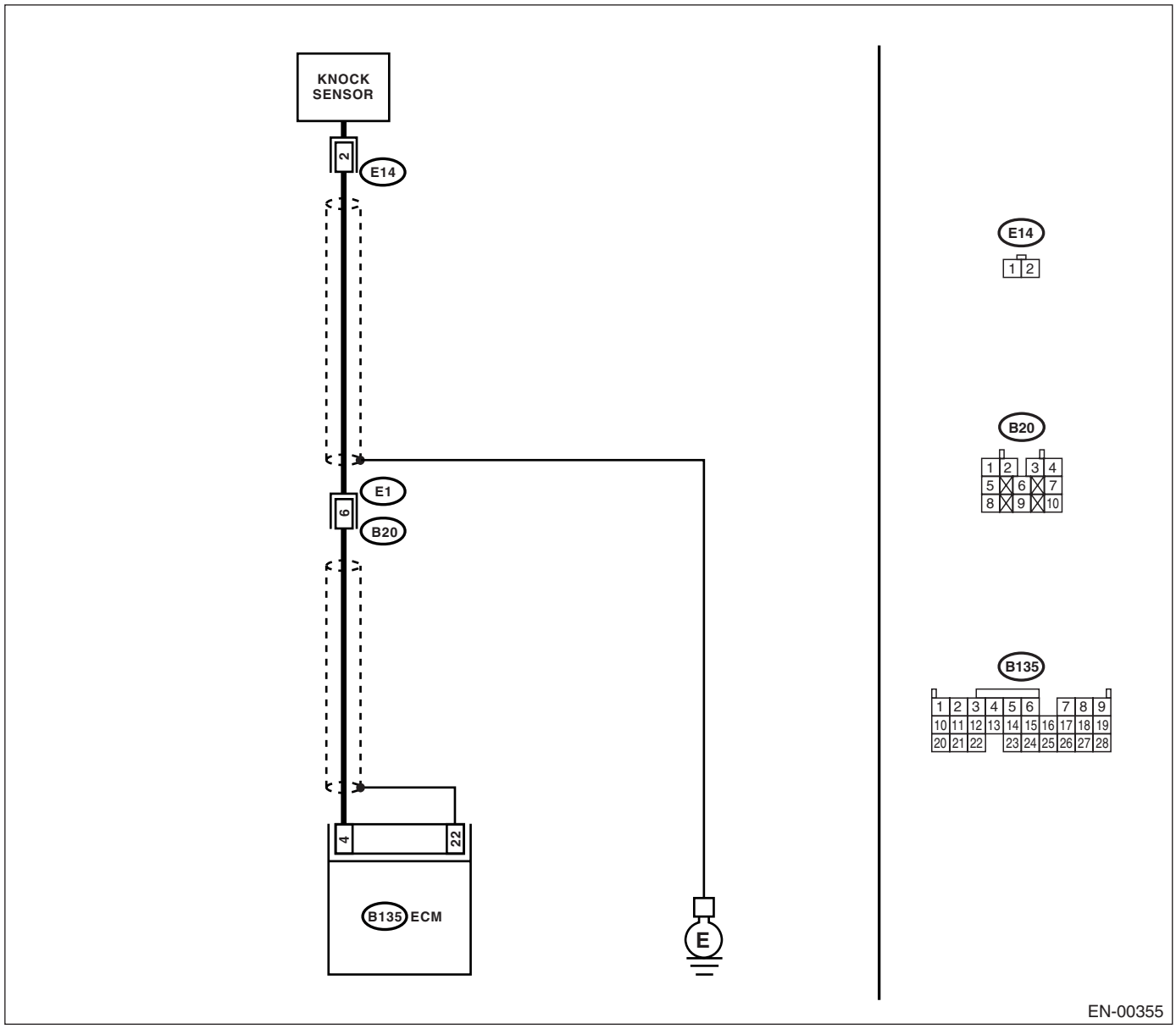
TROUBLE SYMPTOM:

- Poor driving performance
- Knocking occurs.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN KNOCK SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between ECM harness connector and chassis ground. ***Connector & terminal*** ***(B135) No. 4 — Chassis ground:***	Is the resistance more than 700 kΩ?	Go to step **2.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between knock sensor and ECM connector • Poor contact in knock sensor connector • Poor contact in coupling connector
2	**CHECK KNOCK SENSOR.** 1) Disconnect the connector from knock sensor. 2) Measure the resistance between knock sensor connector terminal and engine ground. ***Terminals*** ***No. 2 — Engine ground:***	Is the resistance more than 700 kΩ?	Go to step **3.**	Repair the harness and connector. NOTE: In this case, repair the following: • Poor contact in knock sensor connector • Poor contact in coupling connector
3	**CHECK CONDITION OF KNOCK SENSOR INSTALLATION.**	Is the knock sensor installation bolt tightened securely?	Replace the knock sensor. <Ref. to FU(H4DOTC)-31, Knock Sensor.>	Tighten the knock sensor installation bolt securely.

AM:DTC P0328 KNOCK SENSOR 1 CIRCUIT HIGH (BANK 1 OR SINGLE SENSOR)

DTC DETECTING CONDITION:

Immediately at fault recognition

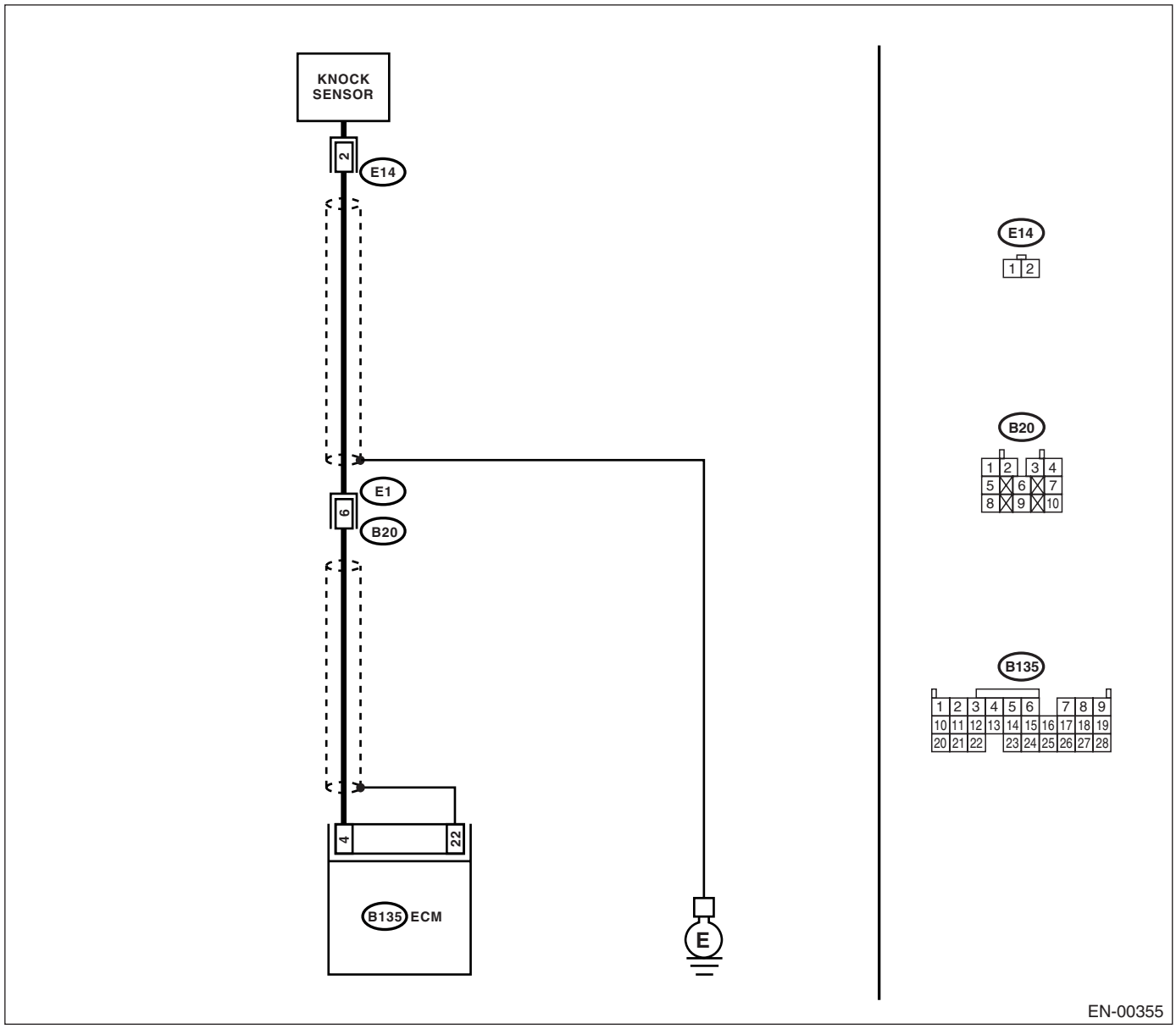
TROUBLE SYMPTOM:

- Poor driving performance
- Knocking occurs.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN KNOCK SENSOR AND ECM CONNECTOR.** Measure the resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 4 — Chassis ground:***	Is the resistance less than 400 kΩ?	Go to step **2.**	Go to step **3.**
2	**CHECK KNOCK SENSOR.** 1) Disconnect the connector from knock sensor. 2) Measure the resistance between knock sensor connector terminal and engine ground. ***Terminals*** ***No. 2 — Engine ground:***	Is the resistance less than 400 kΩ?	Replace the knock sensor. <Ref. to FU(H4DOTC)-31, Knock Sensor.>	Repair the ground short circuit in harness between knock sensor connector and ECM connector. NOTE: The harness between both connectors is shielded. Repair the short circuit of harness together with shield.
3	**CHECK INPUT SIGNAL FOR ECM.** 1) Connect the connectors to ECM and knock sensor. 2) Turn the ignition switch to ON. 3) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 4 (+) — Chassis ground (−):***	Is the voltage more than 2 V?	Even if malfunction indicator light lights up, the circuit has returned to a normal condition at this time. (However, the possibility of poor contact still remains.) NOTE: In this case, repair the following: • Poor contact in knock sensor connector • Poor contact in ECM connector • Poor contact in coupling connector	Repair the poor contact in ECM connector.

AN:DTC P0335 CRANKSHAFT POSITION SENSOR “A” CIRCUIT

DTC DETECTING CONDITION:

Immediately at fault recognition

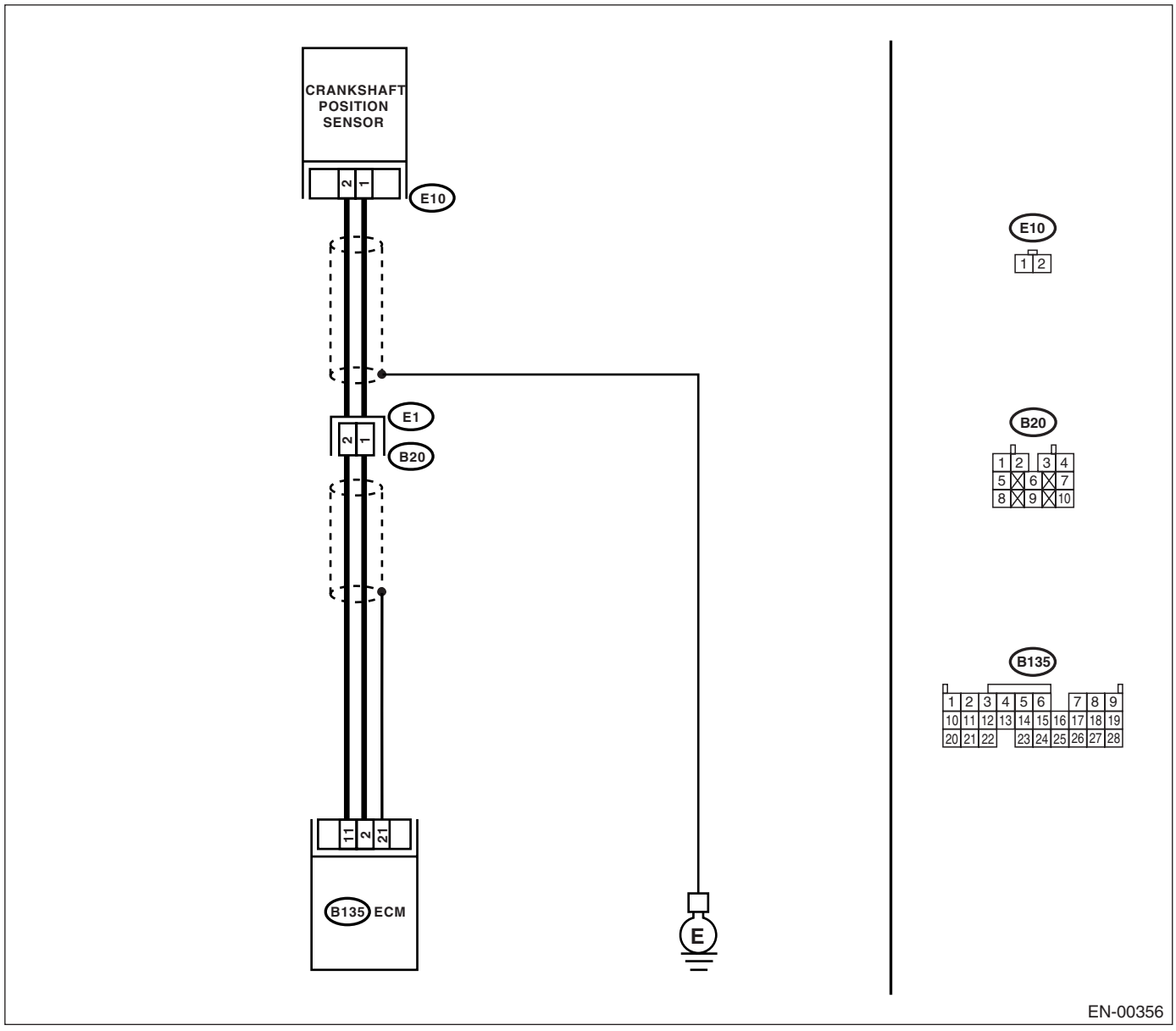
TROUBLE SYMPTOM:

- Engine stalls.
- Failure of engine to start

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN CRANKSHAFT POSITION SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from crankshaft position sensor. 3) Measure the resistance of harness between crankshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E10) No. 1 — Engine ground:***	Is the resistance more than 100 kΩ?	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between crankshaft position sensor and ECM connector • Poor contact in ECM connector • Poor contact in coupling connector	Go to step **2.**
2	**CHECK HARNESS BETWEEN CRANKSHAFT POSITION SENSOR AND ECM CONNECTOR.** Measure the resistance of harness between crankshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E10) No. 1 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **3.**	Repair the ground short circuit in harness between crankshaft position sensor and ECM connector. NOTE: The harness between both connectors are shielded. Repair ground short circuit in harness together with shield.
3	**CHECK HARNESS BETWEEN CRANKSHAFT POSITION SENSOR AND ECM CONNECTOR.** Measure the resistance of harness between crankshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E10) No. 2 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **4.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between crankshaft position sensor and ECM connector • Poor contact in ECM connector • Poor contact in coupling connector
4	**CHECK CONDITION OF CRANKSHAFT POSITION SENSOR.**	Is the crankshaft position sensor installation bolt tightened securely?	Go to step **5.**	Tighten the crankshaft position sensor installation bolt securely.
5	**CHECK CRANKSHAFT POSITION SENSOR.** 1) Remove the crankshaft position sensor. 2) Measure the resistance between connector terminals of crankshaft position sensor. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 1 — 4 kΩ?	Repair the poor contact in crankshaft position sensor connector.	Replace the crankshaft position sensor. <Ref. to FU(H4DOTC)-28, Crankshaft Position Sensor.>

AO:DTC P0336 CRANKSHAFT POSITION SENSOR “A” CIRCUIT RANGE/PERFORMANCE

DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

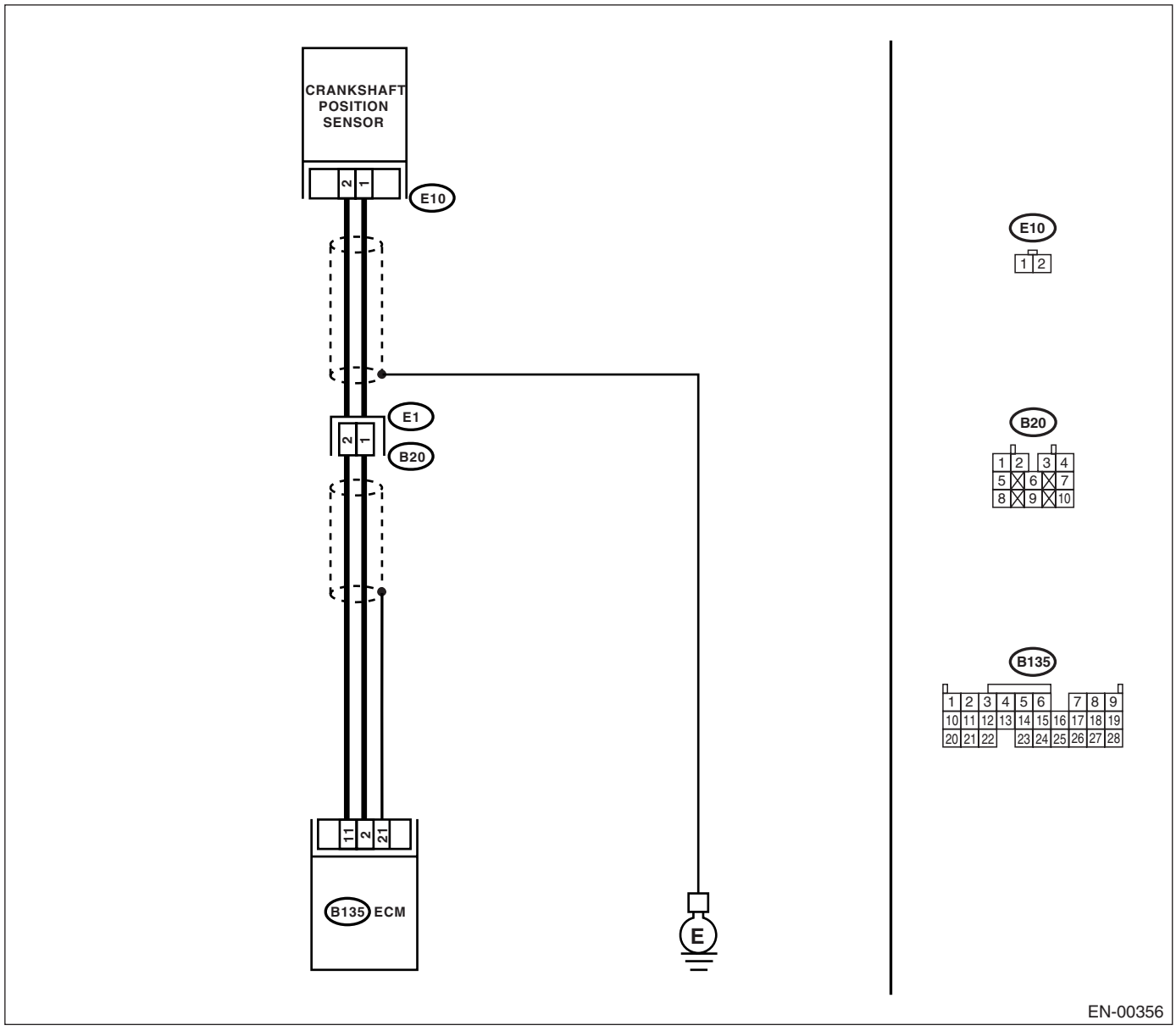
TROUBLE SYMPTOM:

- Engine stalls.
- Failure of engine to start

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC.**	Is any other DTC displayed?	Inspect the relevant DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4DOTC)(diag)-72, List of Diagnostic Trouble Code (DTC).>	Go to step **2.**
2	**CHECK CONDITION OF CRANKSHAFT POSITION SENSOR.** Turn the ignition switch to OFF.	Is the crankshaft position sensor installation bolt tightened securely?	Go to step **3.**	Tighten the crankshaft position sensor installation bolt securely.
3	**CHECK CRANK SPROCKET.** Remove the front belt cover.	Are the crank sprocket teeth cracked or damaged?	Replace the crank sprocket. <Ref. to FU(H4DOTC)-28, Crankshaft Position Sensor.>	Go to step **4.**
4	**CHECK INSTALLATION CONDITION OF TIMING BELT.** Turn the crankshaft, and align alignment mark on crank sprocket with alignment mark on cylinder block.	Is the timing belt dislocated from its proper position?	Repair the installation condition of timing belt. <Ref. to ME(H4DOTC)-58, Timing Belt.>	Replace the crankshaft position sensor. <Ref. to FU(H4DOTC)-28, Crankshaft Position Sensor.>

AP:DTC P0340 CAMSHAFT POSITION SENSOR “A” CIRCUIT (BANK 1 OR SINGLE SENSOR)

DTC DETECTING CONDITION:

Immediately at fault recognition

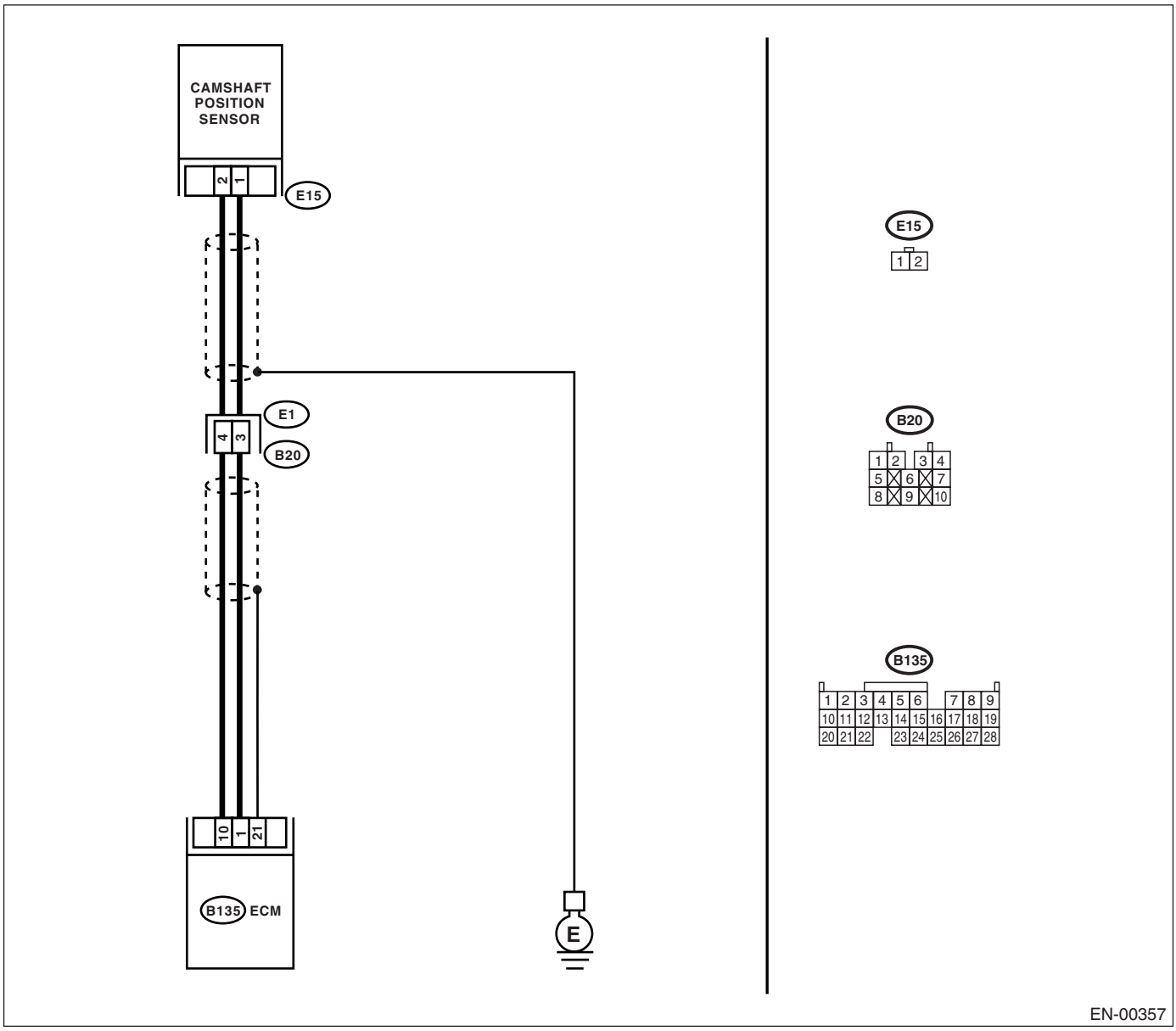
TROUBLE SYMPTOM:

- Engine stalls.
- Failure of engine to start

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN CAMSHAFT POSITION SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from camshaft position sensor. 3) Measure the resistance of harness between camshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E15) No. 1 — Engine ground:***	Is the resistance more than 100 kΩ?	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between camshaft position sensor and ECM connector • Poor contact in ECM connector • Poor contact in coupling connector	Go to step **2.**
2	**CHECK HARNESS BETWEEN CAMSHAFT POSITION SENSOR AND ECM CONNECTOR.** Measure the resistance of harness between camshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E15) No. 1 — Engine ground:***	Is the resistance less than 10 Ω?	Repair the ground short circuit in harness between camshaft position sensor and ECM connector. NOTE: The harness between both connectors are shielded. Repair the ground short circuit in harness together with shield.	Go to step **3.**
3	**CHECK HARNESS BETWEEN CAMSHAFT POSITION SENSOR AND ECM CONNECTOR.** Measure the resistance of harness between camshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E15) No. 2 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **4.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between camshaft position sensor and ECM connector • Poor contact in ECM connector • Poor contact in coupling connector
4	**CHECK CONDITION OF CAMSHAFT POSITION SENSOR.**	Is the camshaft position sensor installation bolt tightened securely?	Go to step **5.**	Tighten the camshaft position sensor installation bolt securely.
5	**CHECK CAMSHAFT POSITION SENSOR.** 1) Remove the camshaft position sensor. 2) Measure the resistance between connector terminals of camshaft position sensor. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 1 — 4 kΩ?	Repair the poor contact in camshaft position sensor connector.	Replace the camshaft position sensor. <Ref. to FU(H4DOTC)-29, Camshaft Position Sensor.>

AQ:DTC P0341 CAMSHAFT POSITION SENSOR “A” CIRCUIT RANGE/PERFORMANCE (BANK 1 OR SINGLE SENSOR)

DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

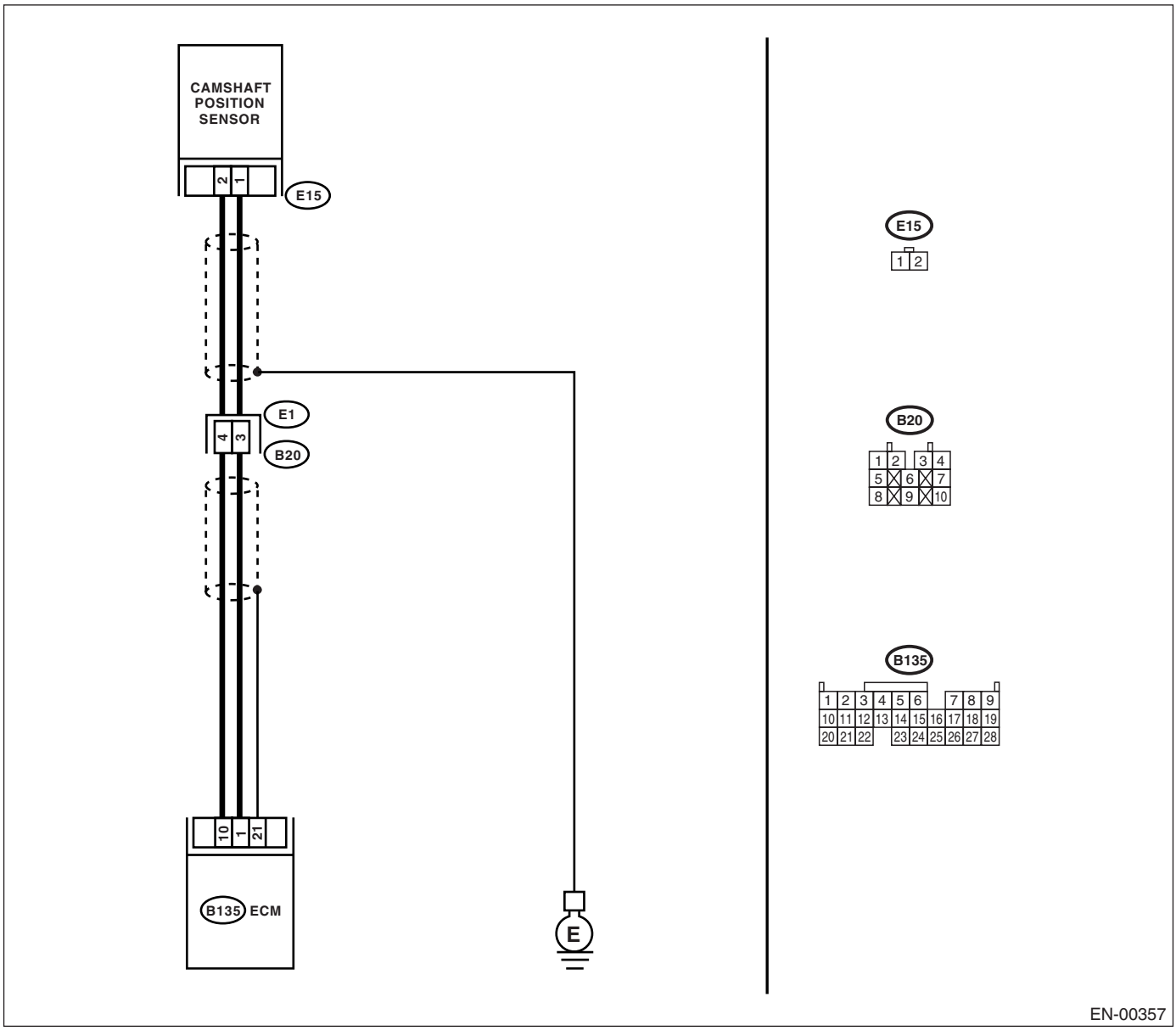
TROUBLE SYMPTOM:

- Engine stalls.
- Failure of engine to start

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC.**	Is any other DTC displayed?	Inspect the relevant DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4DOTC)(diag)-72, List of Diagnostic Trouble Code (DTC).>	Go to step **2.**
2	**CHECK HARNESS BETWEEN CAMSHAFT POSITION SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from camshaft position sensor. 3) Measure the resistance of harness between camshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E15) No. 1 — Engine ground:***	Is the resistance more than 100 kΩ?	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between camshaft position sensor and ECM connector • Poor contact in ECM connector • Poor contact in coupling connector	Go to step **3.**
3	**CHECK HARNESS BETWEEN CAMSHAFT POSITION SENSOR AND ECM CONNECTOR.** Measure the resistance of harness between camshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E15) No. 1 — Engine ground:***	Is the resistance less than 10 Ω?	Repair the ground short circuit in harness between camshaft position sensor and ECM connector. NOTE: The harness between both connectors are shielded. Repair ground short circuit in harness together with shield.	Go to step **4.**
4	**CHECK HARNESS BETWEEN CAMSHAFT POSITION SENSOR AND ECM CONNECTOR.** Measure the resistance of harness between camshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E15) No. 2 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **5.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between camshaft position sensor and ECM connector • Poor contact in ECM connector • Poor contact in coupling connector
5	**CHECK CONDITION OF CAMSHAFT POSITION SENSOR.**	Is the camshaft position sensor installation bolt tightened securely?	Go to step **6.**	Tighten the camshaft position sensor installation bolt securely.

	Step	Check	Yes	No
6	**CHECK CAMSHAFT POSITION SENSOR.** 1) Remove the camshaft position sensor. 2) Measure the resistance between connector terminals of camshaft position sensor. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 1 — 4 kΩ?	Go to step **7.**	Replace the camshaft position sensor. <Ref. to FU(H4DOTC)-29, Camshaft Position Sensor.>
7	**CHECK CONDITION OF CAMSHAFT POSITION SENSOR.** Turn the ignition switch to OFF.	Is the camshaft position sensor installation bolt tightened securely?	Go to step **8.**	Tighten the camshaft position sensor installation bolt securely.
8	**CHECK CAM SPROCKET.** Remove the front belt cover. <Ref. to ME(H4DOTC)-57, Timing Belt Cover.>	Are the cam sprocket teeth cracked or damaged?	Replace the cam sprocket. <Ref. to ME(H4DOTC)-66, Cam Sprocket.>	Go to step **9.**
9	**CHECK INSTALLATION CONDITION OF TIMING BELT.** Turn the camshaft, and align alignment mark on cam sprocket with alignment mark on timing belt cover LH.	Is the timing belt dislocated from its proper position?	Repair the installation condition of timing belt. <Ref. to ME(H4DOTC)-58, Timing Belt.>	Replace the camshaft position sensor. <Ref. to FU(H4DOTC)-29, Camshaft Position Sensor.>

AR:DTC P0365 CAMSHAFT POSITION SENSOR “B” CIRCUIT (BANK 1)

DTC DETECTING CONDITION:

Immediately at fault recognition

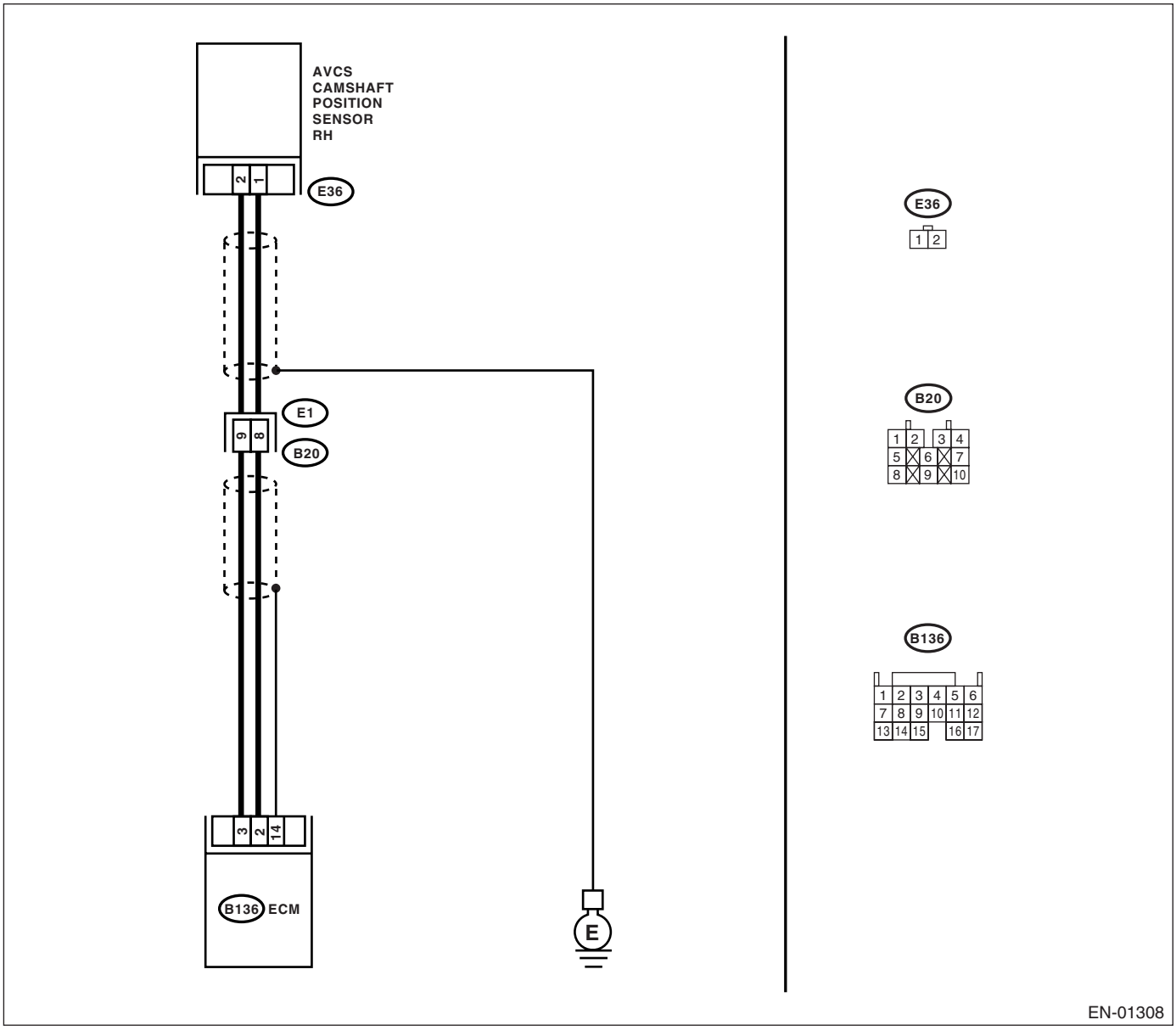
TROUBLE SYMPTOM:

- Engine stalls.
- Failure of engine to start

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start the engine. 2) Measure the ignition timing advance using Subaru Select Monitor or general scan tool, while running the vehicle at approx. 30 km/h (19 MPH). NOTE: • Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4DOTC)(diag)-32, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the General Scan Tool Instruction Manual.	Does the ignition timing advance smoothly change, according to engine output change? Idling: −2 — +2° Vehicle running: −2 — +50°	Repair the poor contact in connector. NOTE: In this case, repair the following: • Poor contact in AVCS camshaft position sensor • Poor contact in ECM connector	Go to step **2.**
2	**CHECK HARNESS BETWEEN AVCS CAMSHAFT POSITION SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from AVCS camshaft position sensor and ECM. 3) Measure the resistance of harness between AVCS camshaft position sensor connector and ECM. ***Connector & terminal*** ***(E36) No. 1 — (B84) No. 2:*** ***(E36) No. 2 — (B84) No. 3:***	Is the resistance less than 1 Ω?	Go to step **3.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between AVCS camshaft position sensor and ECM connector • Poor contact in ECM connector • Poor contact in coupling connector
3	**CHECK HARNESS BETWEEN AVCS CAMSHAFT POSITION SENSOR AND ECM CONNECTOR.** Measure the resistance of harness between AVCS camshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E36) No. 1 — Engine ground:*** ***(E36) No. 2 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **4.**	Repair the ground short circuit in harness between AVCS camshaft position sensor and ECM connector. NOTE: The harness between both connectors are shielded. Repair the ground short circuit in harness together with shield.
4	**CHECK CONDITION OF AVCS CAMSHAFT POSITION SENSOR.**	Is the AVCS camshaft position sensor installation bolt tightened securely?	Go to step **5.**	Tighten the AVCS camshaft position sensor installation bolt securely.
5	**CHECK AVCS CAMSHAFT POSITION SENSOR.** 1) Remove the AVCS camshaft position sensor. 2) Measure the resistance between connector terminals of AVCS camshaft position sensor. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 1 — 4 kΩ?	Check oil pressure passage and stuck of oil flow control solenoid valve.	Replace the AVCS camshaft position sensor. <Ref. to FU(H4DOTC)-30, AVCS Camshaft Position Sensor.>

AS:DTC P0390 CAMSHAFT POSITION SENSOR “B” CIRCUIT (BANK 2)

DTC DETECTING CONDITION:

Immediately at fault recognition

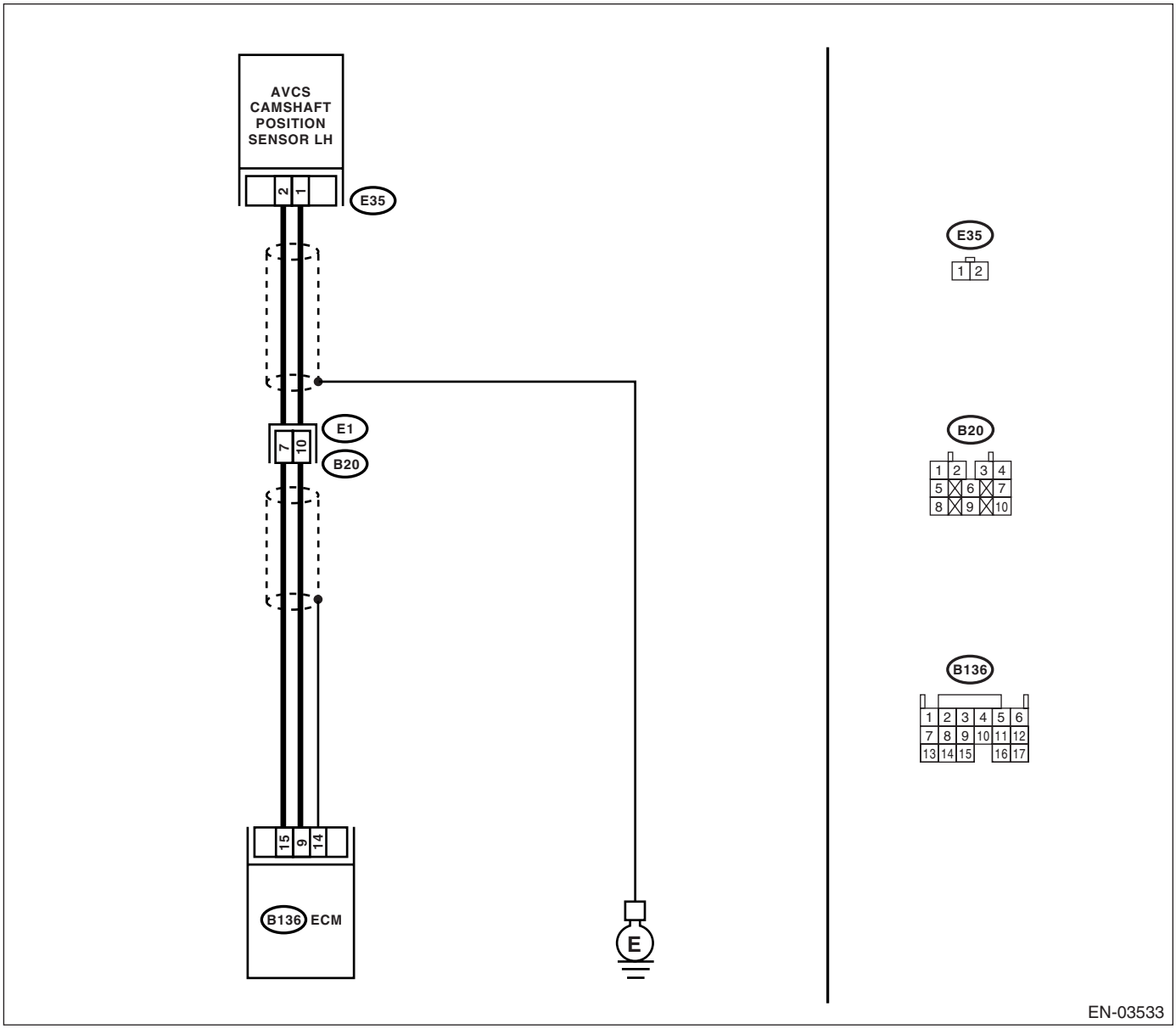
TROUBLE SYMPTOM:

- Engine stalls.
- Failure of engine to start

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start the engine. 2) Measure the ignition timing advance using Subaru Select Monitor or general scan tool, while running the vehicle at approx. 30 km/h (19 MPH). NOTE: • Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4DOTC)(diag)-32, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the General Scan Tool Instruction Manual.	Does the ignition timing advance smoothly change, according to engine output change? Idling: −2 — +2° Vehicle running: −2 — +50°	Repair the poor contact in connector. NOTE: In this case, repair the following: • Poor contact in AVCS camshaft position sensor • Poor contact in ECM connector	Go to step **2.**
2	**CHECK HARNESS BETWEEN AVCS CAMSHAFT POSITION SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from AVCS camshaft position sensor and ECM. 3) Measure the resistance of harness between AVCS camshaft position sensor connector and ECM. ***Connector & terminal*** ***(E35) No. 1 — (B136) No. 9:*** ***(E35) No. 2 — (B136) No. 15:***	Is the resistance less than 1 Ω?	Go to step **3.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between AVCS camshaft position sensor and ECM connector • Poor contact in ECM connector • Poor contact in coupling connector
3	**CHECK HARNESS BETWEEN AVCS CAMSHAFT POSITION SENSOR AND ECM CONNECTOR.** Measure the resistance of harness between AVCS camshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E35) No. 1 — Engine ground:*** ***(E35) No. 2 — Engine ground:***	Is the resistance more than 1M Ω?	Go to step **4.**	Repair the ground short circuit in harness between AVCS camshaft position sensor and ECM connector. NOTE: The harness between both connectors are shielded. Repair the ground short circuit in harness together with shield.
4	**CHECK CONDITION OF AVCS CAMSHAFT POSITION SENSOR.**	Is the AVCS camshaft position sensor installation bolt tightened securely?	Go to step **5.**	Tighten the AVCS camshaft position sensor installation bolt securely.
5	**CHECK AVCS CAMSHAFT POSITION SENSOR.** 1) Remove the AVCS camshaft position sensor. 2) Measure the resistance between connector terminals of AVCS camshaft position sensor. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 1 — 4 kΩ?	Check oil pressure passage and stuck of oil flow control solenoid valve.	Replace the AVCS camshaft position sensor. <Ref. to FU(H4DOTC)-30, AVCS Camshaft Position Sensor.>

AT:DTC P0420 CATALYST SYSTEM EFFICIENCY BELOW THRESHOLD (BANK 1)

DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

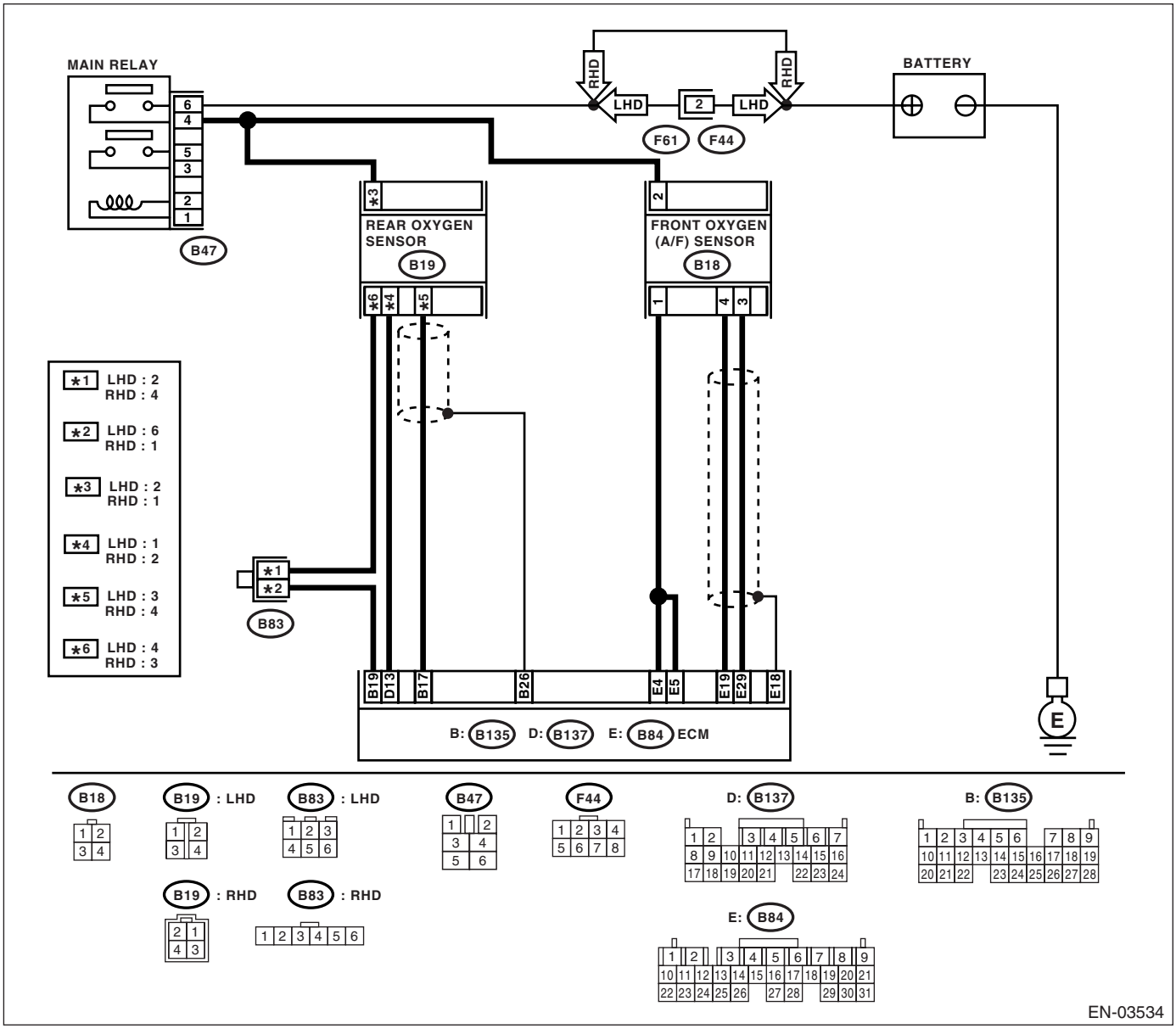
TROUBLE SYMPTOM:

- Engine stalls.
- Idle mixture is out of specifications.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC.**	Is any other DTC displayed?	Inspect the relevant DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4DOTC)(diag)-72, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0420.	Go to step **2.**
2	**CHECK EXHAUST SYSTEM.** Check for gas leaks or air suction caused by loose or dislocated nuts and bolts, and open hole at exhaust pipes. NOTE: Check the following positions. • Between cylinder head and front exhaust pipe • Between front exhaust pipe and front catalytic converter • Between front catalytic converter and rear catalytic converter	Is there a fault in exhaust system?	Repair or replace the exhaust system. <Ref. to EX(H4DOTC)-2, General Description.>	Go to step **3.**
3	**CHECK REAR CATALYTIC CONVERTER.** Separate the rear catalytic converter from rear exhaust pipe.	Is there damage at rear face of rear catalyst?	Replace the front catalytic converter. <Ref. to EC(H4DOTC)-3, Front Catalytic Converter.> and rear catalytic converter <Ref. to EC(H4DOTC)-4, Rear Catalytic Converter.>	Go to step **4.**
4	**CHECK FRONT CATALYTIC CONVERTER.** Remove the front catalytic converter.	Is there damage at rear face or front face of front catalyst?	Replace the front catalytic converter. <Ref. to EC(H4DOTC)-3, Front Catalytic Converter.>	Contact your Subaru distributor service.

AU:DTC P0458 EVAPORATIVE EMISSION SYSTEM PURGE CONTROL VALVE CIRCUIT LOW

DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

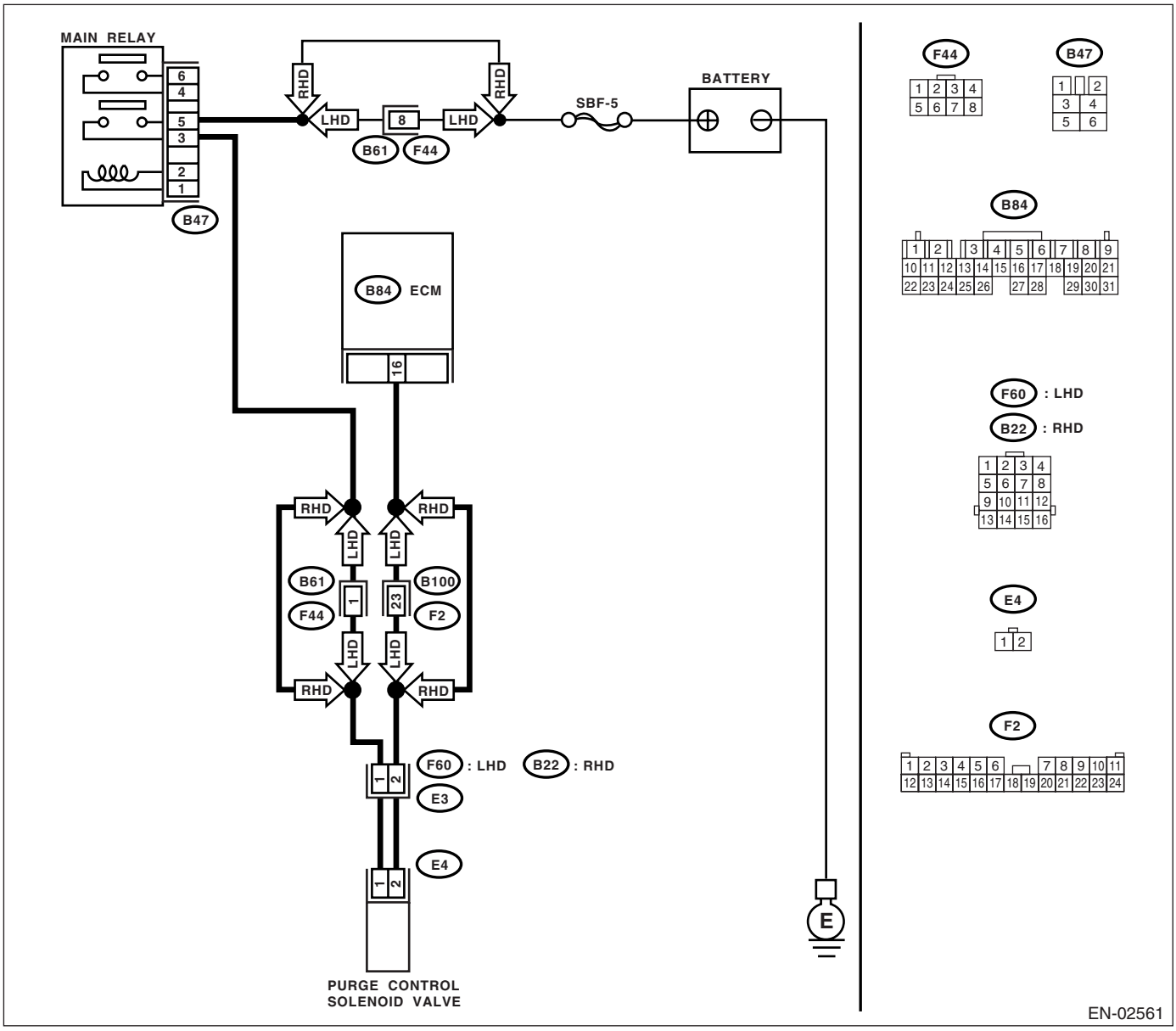
TROUBLE SYMPTOM:

Erroneous idling

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B84) No. 16 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Even if malfunction indicator light lights up, the circuit has returned to a normal condition at this time.	Go to step **2.**
2	**CHECK HARNESS BETWEEN PURGE CONTROL SOLENOID VALVE AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from purge control solenoid valve and ECM. 3) Measure the resistance of harness between purge control solenoid valve connector and engine ground. ***Connector & terminal*** ***(E4) No. 2 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **3.**	Repair the ground short circuit in harness between ECM and purge control solenoid valve connector.
3	**CHECK HARNESS BETWEEN PURGE CONTROL SOLENOID VALVE AND ECM CONNECTOR.** Measure the resistance of harness between ECM and purge control solenoid valve of harness connector. ***Connector & terminal*** ***(B84) No. 16 — (E4) No. 2:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the open circuit in harness between ECM and purge control solenoid valve connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and purge control solenoid valve connector • Poor contact in coupling connector
4	**CHECK PURGE CONTROL SOLENOID VALVE.** 1) Remove the purge control solenoid valve. 2) Measure the resistance between purge control solenoid valve terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 10 — 100 Ω?	Go to step **5.**	Replace the purge control solenoid valve. <Ref. to EC(H4DOTC)-7, Purge Control Solenoid Valve.>
5	**CHECK POWER SUPPLY TO PURGE CONTROL SOLENOID VALVE.** 1) Turn the ignition switch to ON. 2) Measure the voltage between purge control solenoid valve and engine ground. ***Connector & terminal*** ***(E4) No. 1 (+) — Engine ground (−):***	Is the voltage more than 10 V?	Go to step **6.**	Repair the open circuit in harness between main relay and purge control solenoid valve connector.
6	**CHECK POOR CONTACT.** Check poor contact in purge control solenoid valve connector.	Is there poor contact in purge control solenoid valve connector?	Repair the poor contact in purge control solenoid valve connector.	Contact your Subaru distributor service.

AV:DTC P0459 EVAPORATIVE EMISSION SYSTEM PURGE CONTROL VALVE CIRCUIT HIGH

DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

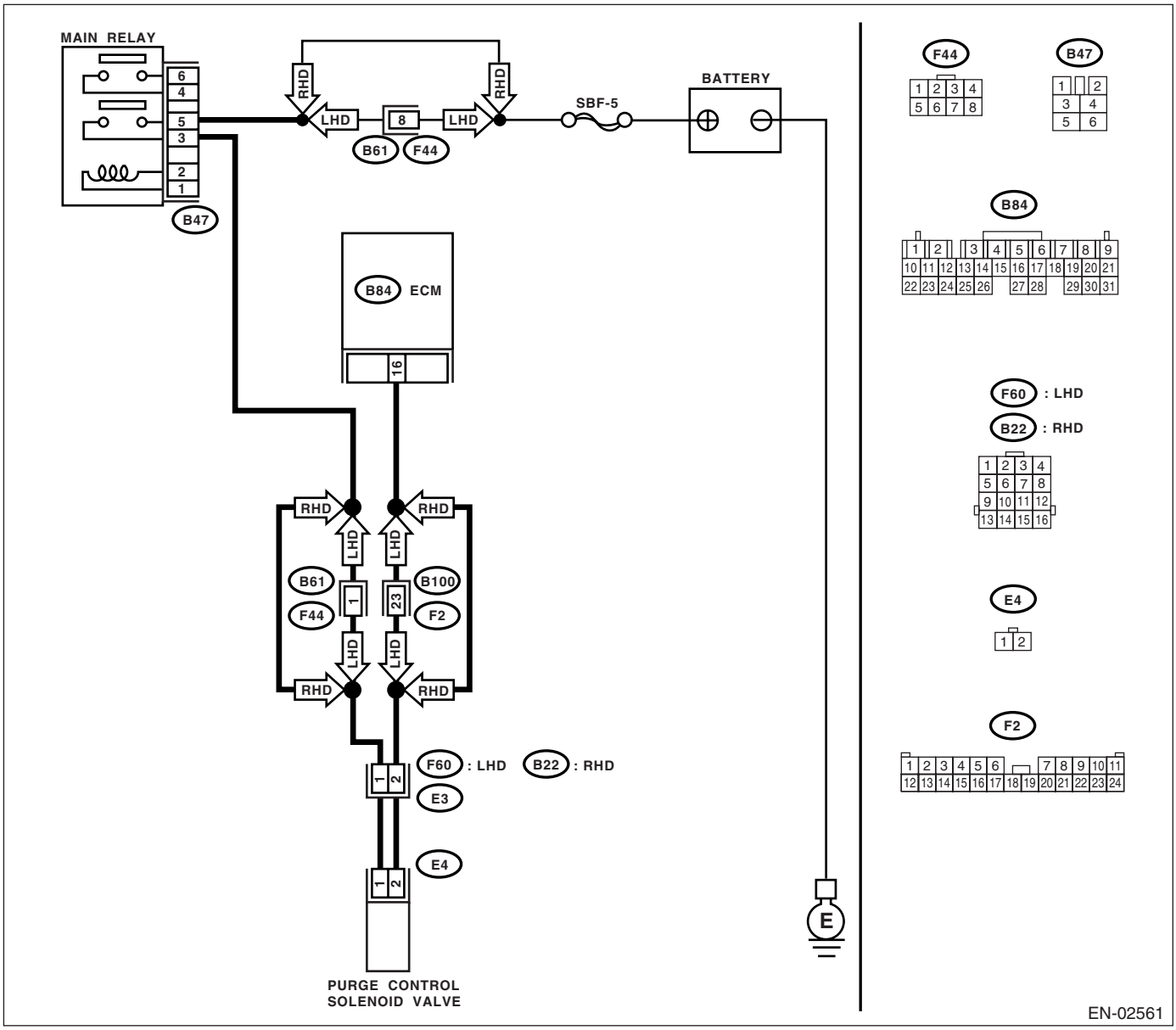
TROUBLE SYMPTOM:

Erroneous idling

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn the ignition switch to OFF. 2) Connect the test mode connector at the lower portion of instrument panel (on the driver's side). 3) Turn the ignition switch to ON. 4) While operating the purge control solenoid valve, measure the voltage between ECM and chassis ground. NOTE: Purge control solenoid valve operation can be executed using the Subaru Select Monitor. For procedure, refer to "Compulsory Valve Operation Check Mode". <Ref. to EN(H4DOTC)(diag)-47, Compulsory Valve Operation Check Mode.> ***Connector & terminal*** ***(B84) No. 16 (+) — Chassis ground (–):***	Is the voltage 0 — 13 V?	Go to step **2.**	Even if malfunction indicator light lights up, the circuit has returned to a normal condition at this time. In this case, repair the poor contact in ECM connector.
2	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B84) No. 16 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **4.**	Go to step **3.**
3	**CHECK POOR CONTACT.** Check the poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair the poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H4DOTC)-50, Engine Control Module (ECM).>
4	**CHECK HARNESS BETWEEN PURGE CONTROL SOLENOID VALVE AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from purge control solenoid valve. 3) Turn the ignition switch to ON. 4) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B84) No. 16 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Repair the battery short circuit in harness between ECM and purge control solenoid valve connector. After repair, replace the ECM. <Ref. to FU(H4DOTC)-50, Engine Control Module (ECM).>	Go to step **5.**
5	**CHECK PURGE CONTROL SOLENOID VALVE.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between purge control solenoid valve terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance less than 1 Ω?	Replace the purge control solenoid valve <Ref. to EC(H4DOTC)-7, Purge Control Solenoid Valve.> and ECM <Ref. to FU(H4DOTC)-50, Engine Control Module (ECM).>	Go to step **6.**
6	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair the poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H4DOTC)-50, Engine Control Module (ECM).>

AW:DTC P0461 FUEL LEVEL SENSOR "A" CIRCUIT RANGE/PERFORMANCE

DTC DETECTING CONDITION:

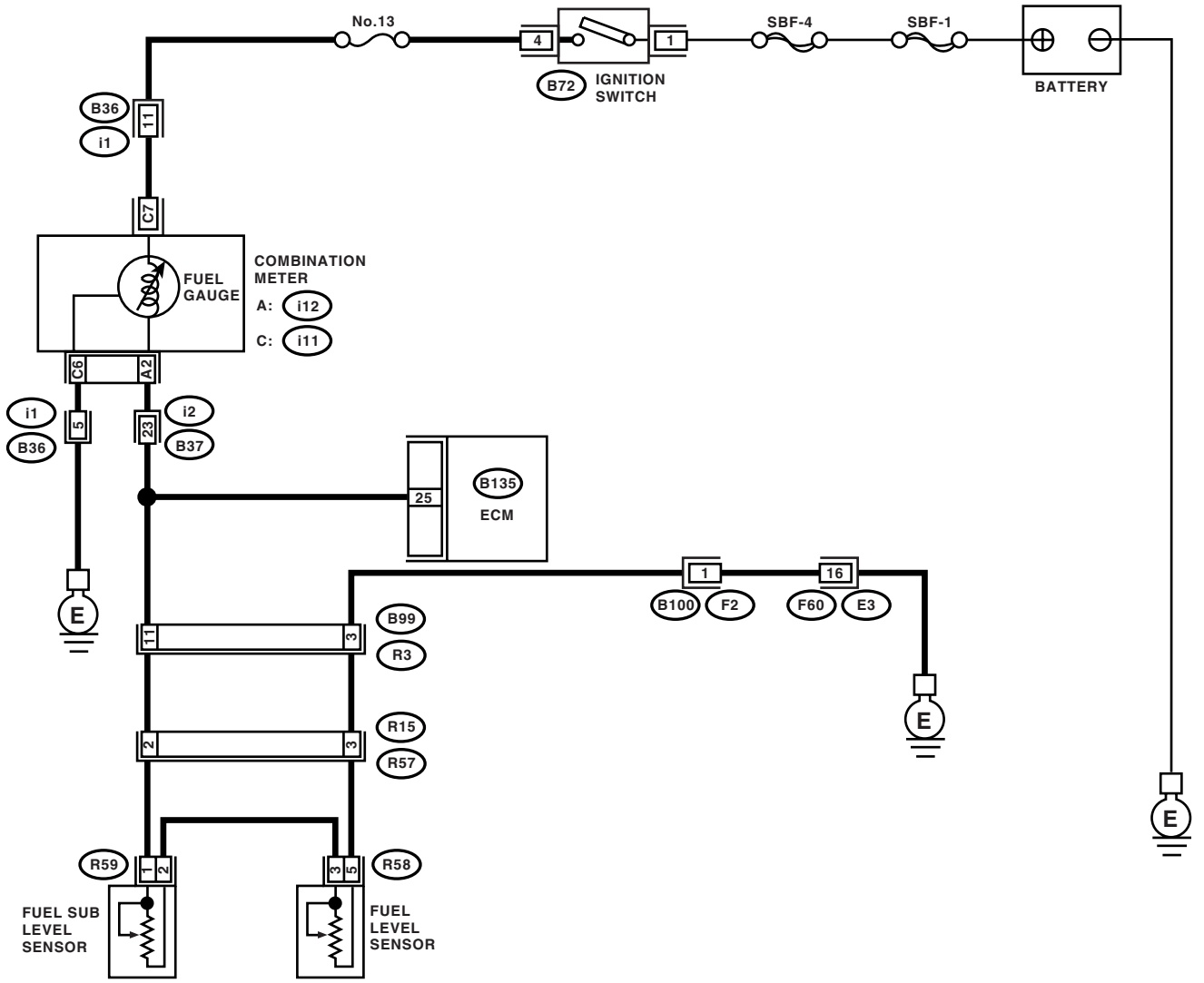
Two consecutive driving cycles with fault

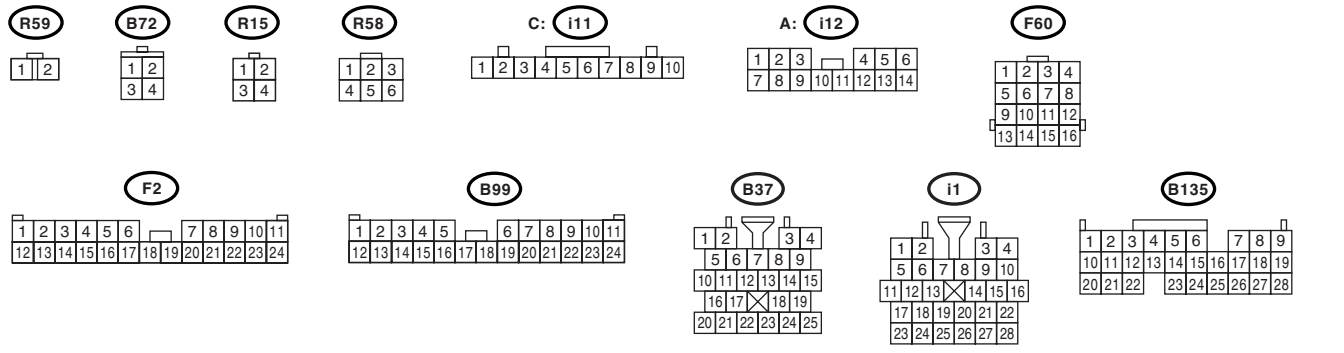
CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

WIRING DIAGRAM:

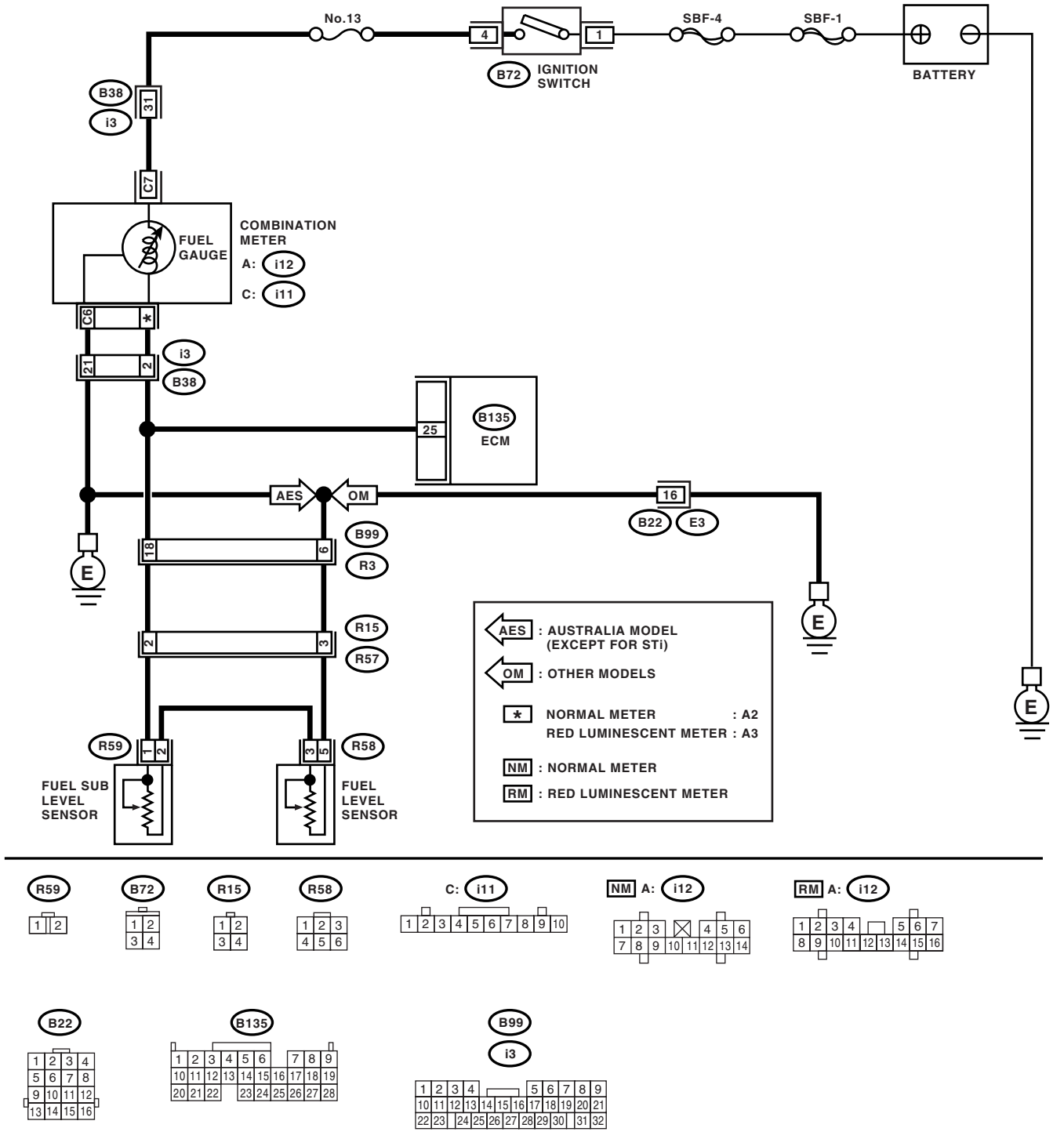
- LHD model





EN-03535

- RHD model



EN-03536

Step		Check	Yes	No
1	**CHECK ANY OTHER DTC.**	Is any other DTC displayed?	Inspect the relevant DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4DOTC)(diag)-72, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0461.	Replace the fuel level sensor. <Ref. to FU(H4DOTC)-63, Fuel Level Sensor.> and fuel sub level sensor <Ref. to FU(H4DOTC)-64, Fuel Sub Level Sensor.>

AX:DTC P0462 FUEL LEVEL SENSOR “A” CIRCUIT LOW

DTC DETECTING CONDITION:

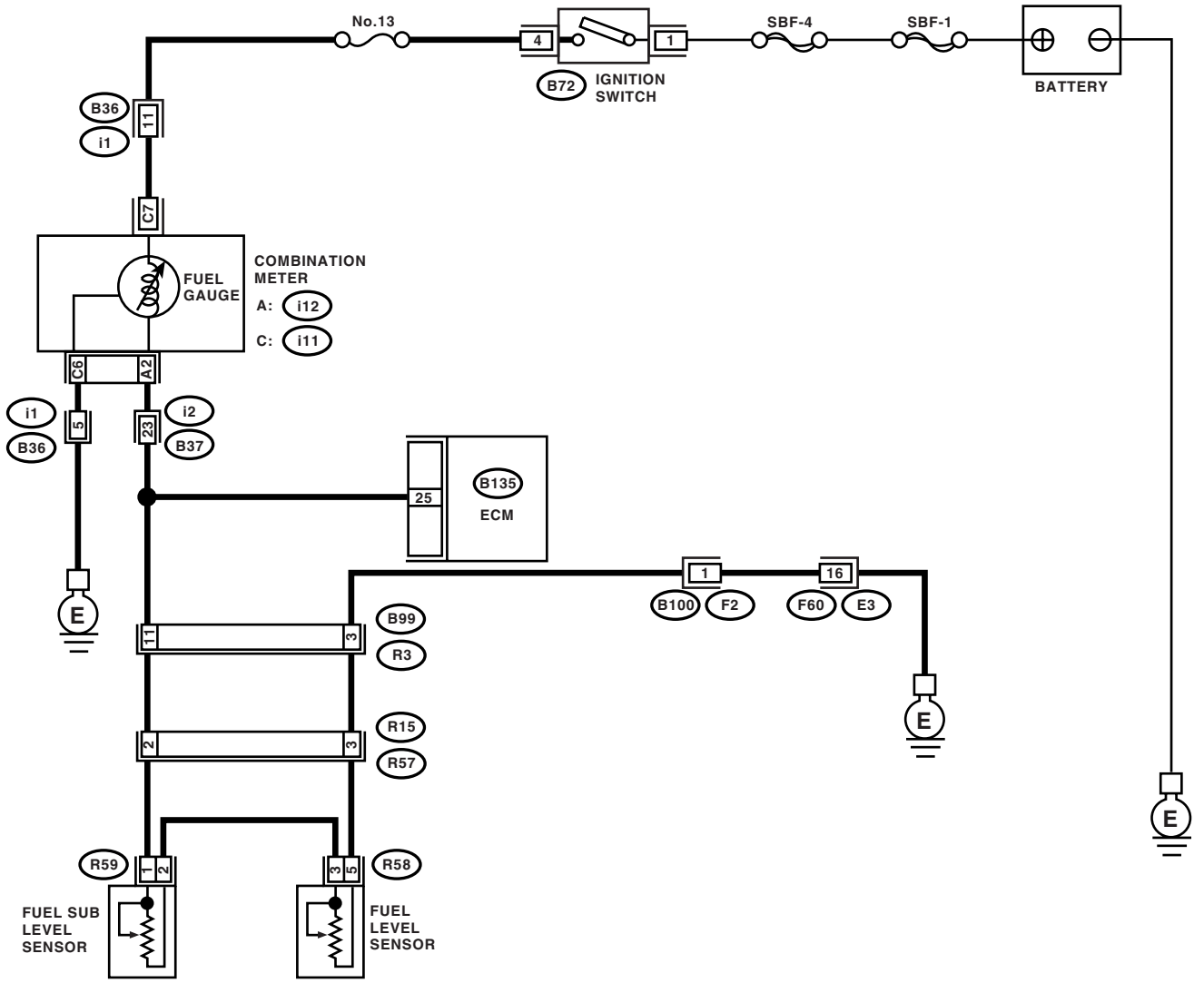
Two consecutive driving cycles with fault

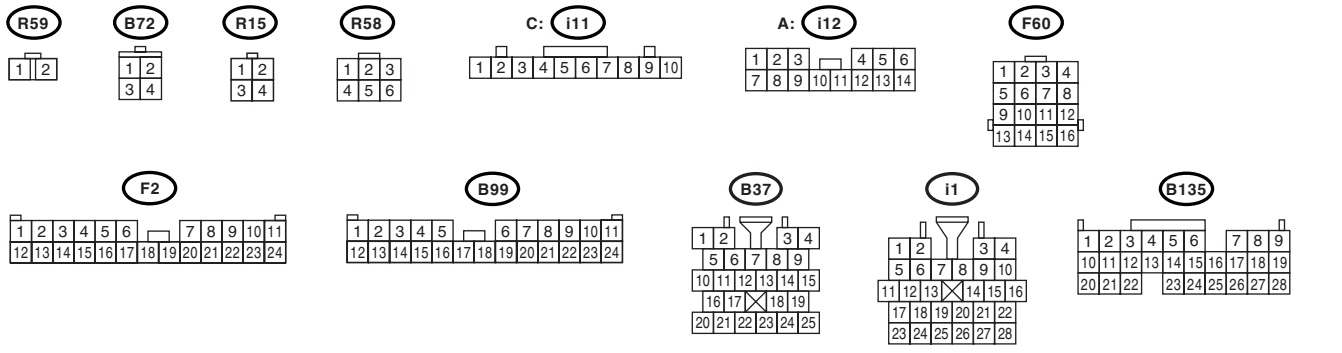
CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

WIRING DIAGRAM:

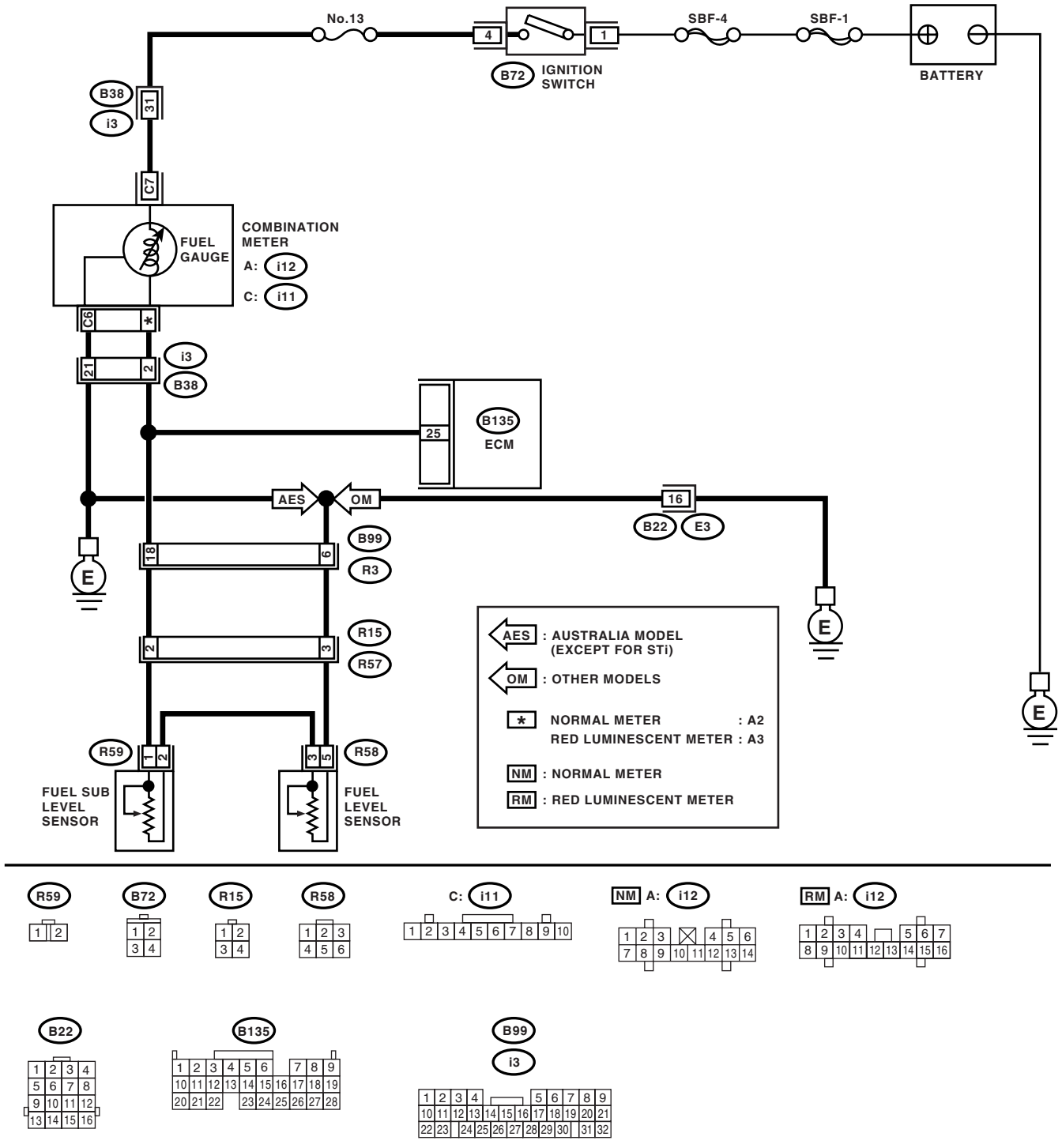
- LHD model





EN-03535

- RHD model



EN-03536

	Step	Check	Yes	No
1	**CHECK SPEEDOMETER AND TACHOMETER OPERATION IN COMBINATION METER.**	Does the speedometer and tachometer operate normally?	Go to step **2.**	Repair or replace the combination meter. <Ref. to IDI-3, Combination Meter System.>
2	**CHECK INPUT SIGNAL FOR ECM.** 1) Turn the ignition switch to ON. (engine OFF) 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 25 (+) — Chassis ground (−):***	Is the voltage less than 0.12 V?	Go to step **4.**	Go to step **3.**
3	**CHECK INPUT SIGNAL FOR ECM. (USING SUBARU SELECT MONITOR)** Read the data of fuel level sensor signal using Subaru Select Monitor. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4DOTC)(diag)-32, Subaru Select Monitor.>	Shake the ECM harness and connector, while monitoring value of Subaru Select Monitor. Does the voltage change?	Repair the poor contact in ECM connector.	Even if malfunction indicator light lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector may be the cause. NOTE: In this case, repair the following: • Poor contact in combination meter connector • Poor contact in ECM connector • Poor contact in coupling connectors
4	**CHECK INPUT VOLTAGE OF ECM.** 1) Turn the ignition switch to OFF. 2) Separate the fuel tank cord connector (R57) and rear wiring harness connector (R15). 3) Turn the ignition switch to ON. 4) Measure the voltage of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 25 (+) — Chassis ground (−):***	Is the voltage more than 0.12 V?	Go to step **5.**	Go to step **6.**
5	**CHECK HARNESS BETWEEN ECM AND COMBINATION METER.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector (i12) and ECM connector. 3) Measure the resistance between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 25 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **7.**	Repair the ground short circuit in harness between ECM and combination meter connector.

	Step	Check	Yes	No
6	**CHECK HARNESS BETWEEN ECM AND COMBINATION METER.** Measure the resistance between ECM and combination meter connector. ***Connector & terminal*** ***Red luminescent meter*** ***(B135) No. 25 — (i12) No. 3:*** ***Normal meter*** ***(B135) No. 25 — (i12) No. 2:***	Is the resistance less than 10 Ω?	Repair or replace the combination meter. <Ref. to IDI-3, Combination Meter System.>	Repair the open circuit between ECM and combination meter connector. NOTE: In this case, repair the following: Poor contact in coupling connector
7	**CHECK FUEL TANK CORD.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from fuel sub level sensor. 3) Measure the resistance between fuel sub level sensor and chassis ground. ***Connector & terminal*** ***(R59) No. 1 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **8.**	Repair the ground short circuit in fuel tank cord.
8	**CHECK FUEL TANK CORD.** 1) Disconnect the connector from fuel pump assembly. 2) Measure the resistance between fuel pump assembly and chassis ground. ***Connector & terminal*** ***(R59) No. 2 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **9.**	Repair the ground short circuit in fuel tank cord.
9	**CHECK FUEL LEVEL SENSOR.** 1) Remove the fuel pump assembly. <Ref. to FU(H4DOTC)-61, Fuel Pump.> 2) Measure the resistance between fuel level sensor and terminals with its float set to the full position. ***Terminals*** ***No. 3 — No. 5:***	Is the resistance 0.5 — 2.5 Ω?	Go to step **10.**	Replace the fuel level sensor.
10	**CHECK FUEL SUB LEVEL SENSOR.** 1) Remove the fuel sub level sensor. <Ref. to FU(H4DOTC)-64, Fuel Sub Level Sensor.> 2) Measure the resistance between fuel sub level sensor and terminals with its float set to the full position. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 0.5 — 2.5 Ω?	Repair the poor contact in harness between ECM and combination meter connector.	Replace the fuel sub level sensor.

AY:DTC P0463 FUEL LEVEL SENSOR “A” CIRCUIT HIGH

DTC DETECTING CONDITION:

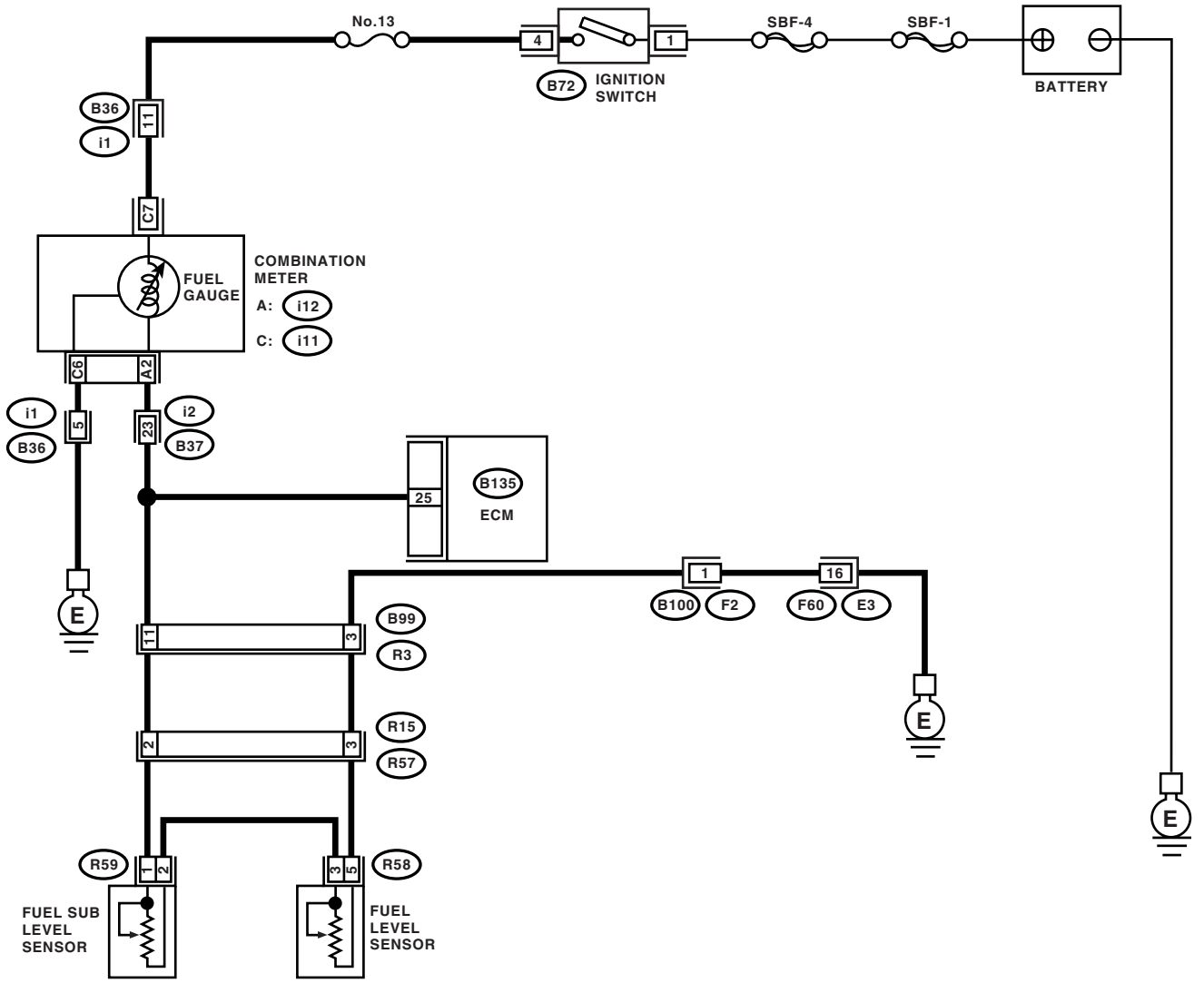
Two consecutive driving cycles with fault

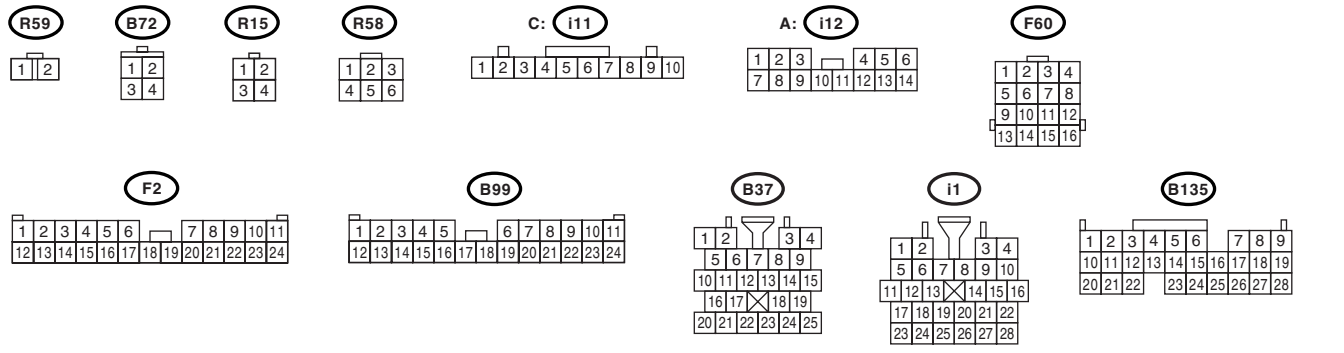
CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

WIRING DIAGRAM:

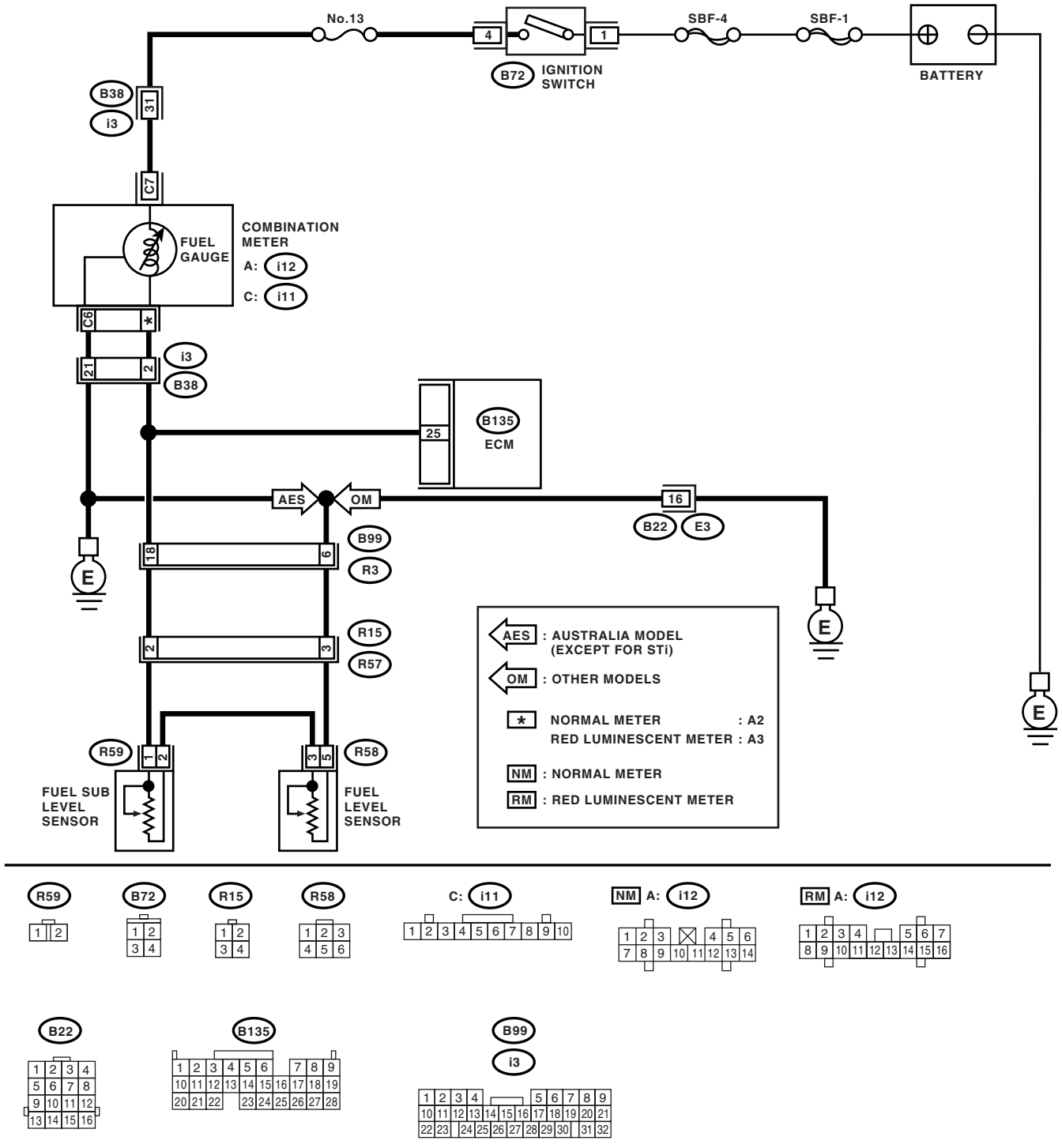
- LHD model





EN-03535

- RHD model



EN-03536

	Step	Check	Yes	No
1	**CHECK SPEEDOMETER AND TACHOMETER OPERATION IN COMBINATION METER.**	Does the speedometer and tachometer operate normally?	Go to step **2.**	Repair or replace the combination meter. <Ref. to IDI-3, Combination Meter System.>
2	**CHECK INPUT SIGNAL FOR ECM.** 1) Turn the ignition switch to ON. (engine OFF) 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 25 (+) — Chassis ground (−):***	Is the voltage more than 4.75 V?	Go to step **3.**	Even if malfunction indicator light lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector may be the cause. NOTE: In this case, repair the following: • Poor contact in fuel pump connector • Poor contact in coupling connector
3	**CHECK INPUT VOLTAGE OF ECM.** 1) Turn the ignition switch to OFF. 2) Disconnect the combination meter connector (i11) and ECM connector. 3) Turn the ignition switch to ON. 4) Measure the voltage of harness between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 25 (+) — Chassis ground (−):***	Is the voltage more than 4.75 V?	Go to step **4.**	Repair the battery short circuit between ECM and combination meter connector.
4	**CHECK HARNESS BETWEEN ECM AND FUEL TANK CORD.** 1) Turn the ignition switch to OFF. 2) Separate the fuel tank cord connector (R57) and rear wiring harness connector (R15). 3) Measure the resistance between ECM and fuel tank cord. ***Connector & terminal*** ***(B135) No. 25 — (R15) No. 2:***	Is the resistance less than 5 Ω?	Go to step **5.**	Repair the open circuit between ECM and fuel tank cord.
5	**CHECK HARNESS BETWEEN FUEL TANK CORD AND CHASSIS GROUND.** Measure the resistance between fuel tank cord and chassis ground. ***Connector & terminal*** ***(R15) No. 3 — Chassis ground:***	Is the resistance less than 5 Ω?	Go to step **6.**	Repair the open circuit between fuel tank cord and chassis ground. NOTE: In this case, repair the following: Poor contact in coupling connectors
6	**CHECK FUEL TANK CORD.** 1) Disconnect the connector from fuel level sensor. 2) Measure the resistance between fuel level sensor and coupling connector. ***Connector & terminal*** ***(R57) No. 3 — (R58) No. 5:***	Is the resistance less than 10 Ω?	Go to step **7.**	Repair the open circuit between coupling connector and fuel level sensor.

	Step	Check	Yes	No
7	**CHECK FUEL TANK CORD.** 1) Disconnect the connector from fuel sub level sensor. 2) Measure the resistance between fuel level sensor and fuel sub level sensor. ***Connector & terminal*** ***(R58) No. 3 — (R59) No. 2:***	Is the resistance less than 10 Ω?	Go to step **8.**	Repair the open circuit between fuel level sensor and fuel sub level sensor.
8	**CHECK FUEL TANK CORD.** Measure the resistance between fuel sub level sensor and coupling connector. ***Connector & terminal*** ***(R57) No. 2 — (R59) No. 1:***	Is the resistance less than 10 Ω?	Go to step **9.**	Repair the open circuit between coupling connector and fuel sub level sensor.
9	**CHECK FUEL LEVEL SENSOR.** 1) Remove the fuel pump assembly. <Ref. to FU(H4DOTC)-61, Fuel Pump.> 2) While setting the fuel level sensor float to empty position, measure the resistance between fuel level sensor terminals. ***Terminals*** ***No. 3 — No. 5:***	Is the resistance more than 53 Ω?	Replace the fuel level sensor. <Ref. to FU(H4DOTC)-63, Fuel Level Sensor.>	Go to step **10.**
10	**CHECK FUEL SUB LEVEL SENSOR.** 1) Remove the fuel sub level sensor. <Ref. to FU(H4DOTC)-64, Fuel Sub Level Sensor.> 2) While setting the fuel sub level sensor float to empty position, measure the resistance between fuel sub level sensor terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance more than 45 Ω?	Replace the fuel sub level sensor. <Ref. to FU(H4DOTC)-64, Fuel Sub Level Sensor.>	Replace the combination meter. <Ref. to IDI-12, Combination Meter.>

AZ:DTC P0483 FAN RATIONALITY CHECK

DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

TROUBLE SYMPTOM:

- Occurrence of noise
- Overheating

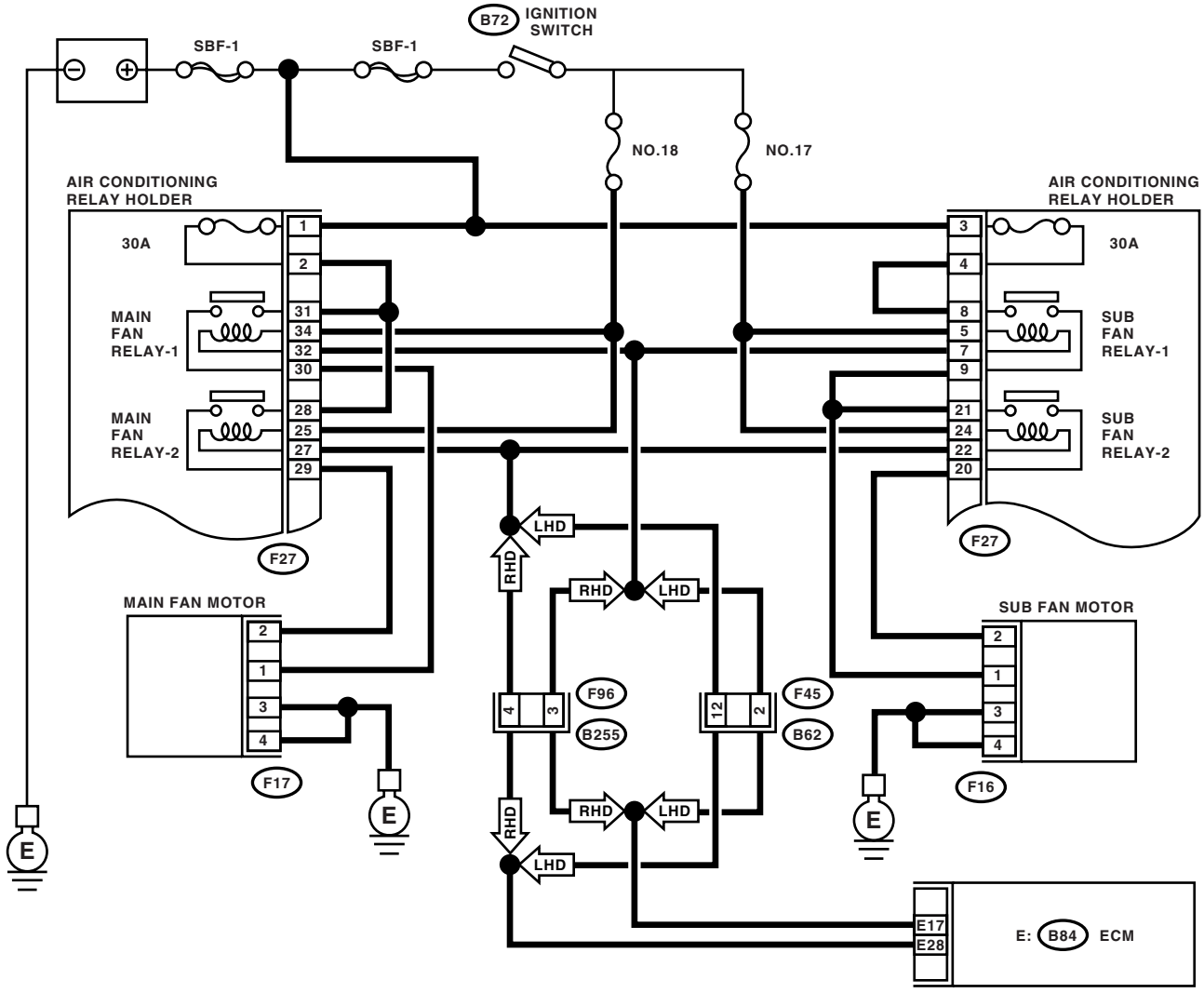
CAUTION:

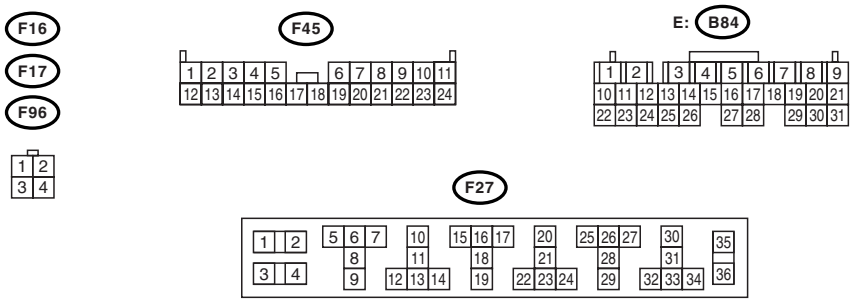
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

NOTE:

If the vehicle, with the engine idling, is placed very close to a wall or another vehicle, preventing normal cooling function, the OBD system may detect malfunction.

WIRING DIAGRAM:





EN-02564

Step	Check	Yes	No
1 **CHECK ANY OTHER DTC.**	Is any other DTC displayed?	Inspect the relevant DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4DOTC)(diag)-72, List of Diagnostic Trouble Code (DTC).>	Check the radiator fan, fan motor, fan motor connector and thermostat. <Ref. to CO(H4SO)-26, Radiator Main Fan and Fan Motor.> and <Ref. to CO(H4SO)-28, Radiator Sub Fan and Fan Motor.> If thermostat is stuck, replace thermostat.

BA:DTC P0502 VEHICLE SPEED SENSOR “A” CIRCUIT LOW INPUT

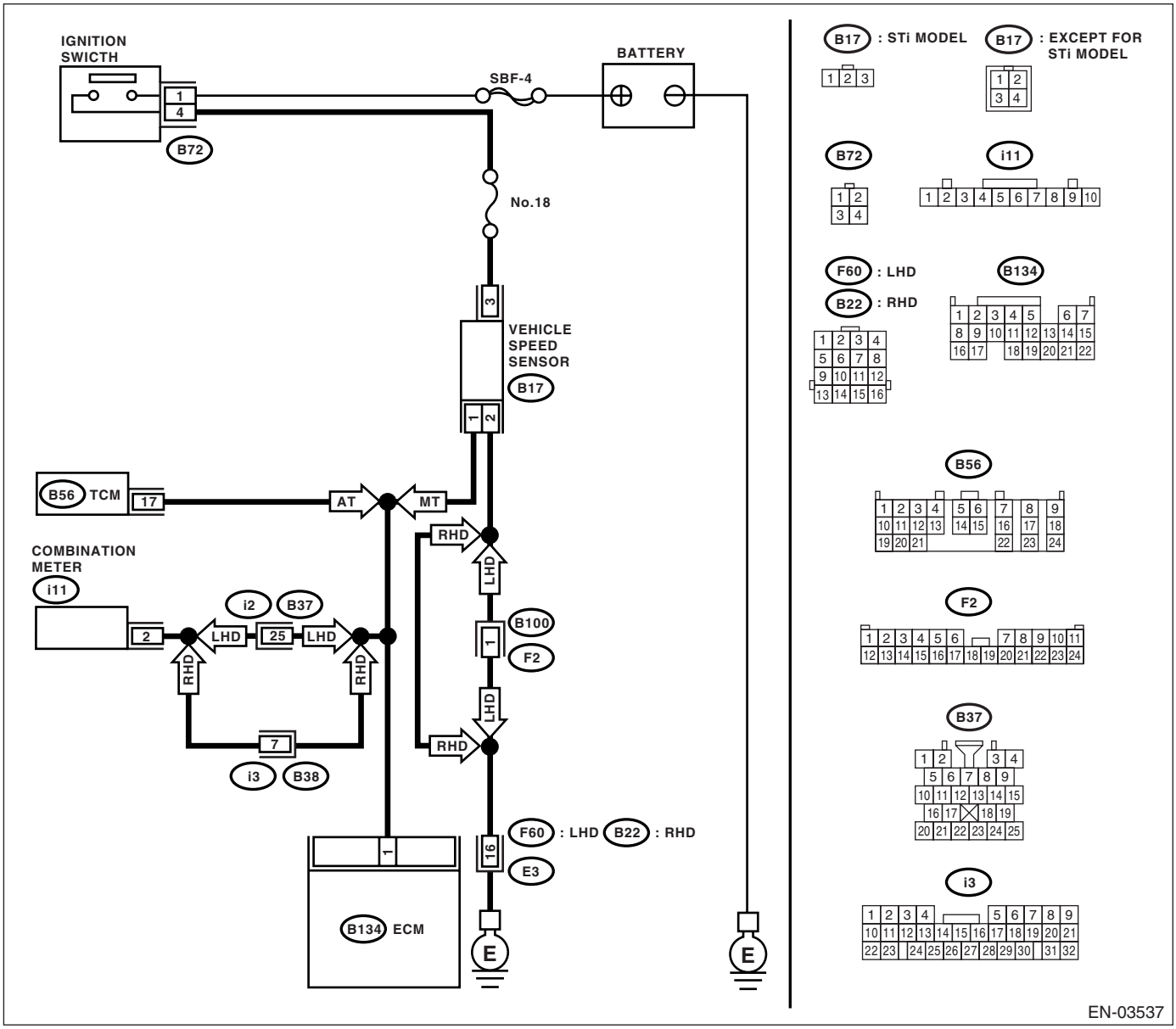
DTC DETECTING CONDITION:

Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK TRANSMISSION TYPE.**	Is the transmission type AT?	Go to step **2.**	Go to step **4.**
2	**CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and TCM. 3) Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B56) No. 17 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **3.**	Repair the ground short circuit in harness between ECM and TCM connector.
3	**CHECK POOR CONTACT.** Check poor contact in TCM connector.	Is there poor contact in TCM connector?	Repair poor contact in TCM connector.	Contact your Subaru distributor service.
4	**CHECK HARNESS BETWEEN VEHICLE SPEED SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from vehicle speed sensor and ECM. 3) Measure the resistance of harness between vehicle speed sensor connector and chassis ground. ***Connector & terminal*** ***(B17) No. 1 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **5.**	Repair the ground short circuit in harness between vehicle speed sensor and ECM connector.
5	**CHECK POOR CONTACT.** Check poor contact in the vehicle speed sensor connector.	Is there poor contact in the vehicle speed sensor connector?	Repair poor contact in the vehicle speed sensor connector.	Replace the vehicle speed sensor. <Ref. to 5MT-50, Vehicle Speed Sensor.>

BB:DTC P0503 VEHICLE SPEED SENSOR “A” INTERMITTENT/ERRATIC/HIGH

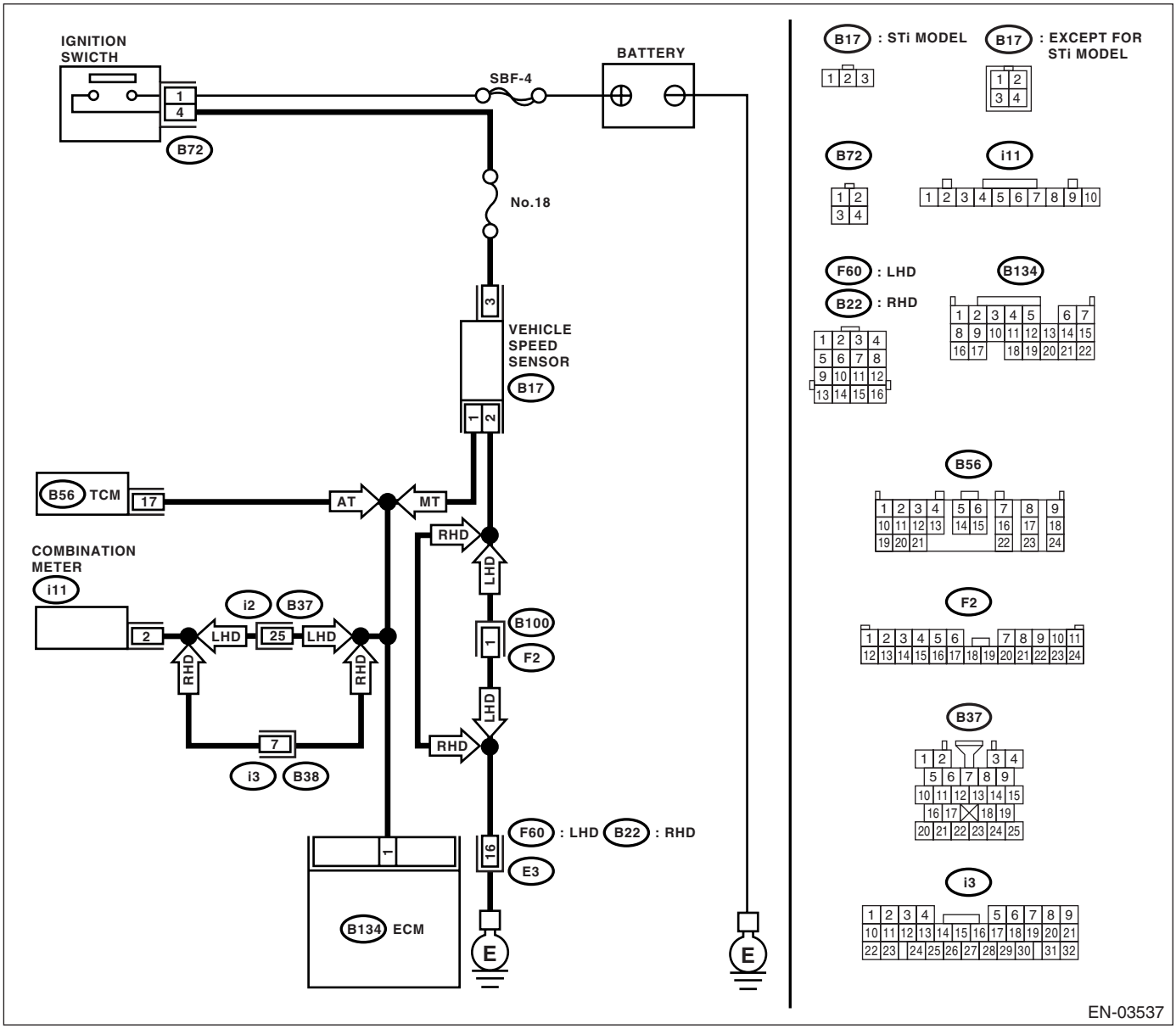
DTC DETECTING CONDITION:

Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK TRANSMISSION TYPE.**	Is the transmission type AT?	Go to step **2.**	Go to step **3.**
2	**CHECK DTC P0720 ON DISPLAY.**	Does the Subaru Select Monitor or general scan tool indicate DTC P0720?	Check the front vehicle speed sensor signal circuit. <Ref. to 4AT(diag)-49, DTC 33 FRONT VEHICLE SPEED SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Go to step **3.**
3	**CHECK SPEEDOMETER OPERATION IN COMBINATION METER.**	Does the speedometer operate normally?	Go to step **4.**	Check the speedometer. <Ref. to IDI-16, Speedometer.>
4	**CHECK HARNESS BETWEEN ECM AND COMBINATION METER CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from combination meter. 3) Measure the resistance between ECM and combination meter. ***Connector & terminal*** ***(B134) No. 1 — (i11) No. 2:***	Is the resistance less than 10 Ω?	Repair the poor contact in ECM connector.	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and combination meter connector • Poor contact in ECM connector • Poor contact in combination meter connector • Poor contact in coupling connector

BC:DTC P0506 IDLE AIR CONTROL SYSTEM RPM LOWER THAN EXPECTED

DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

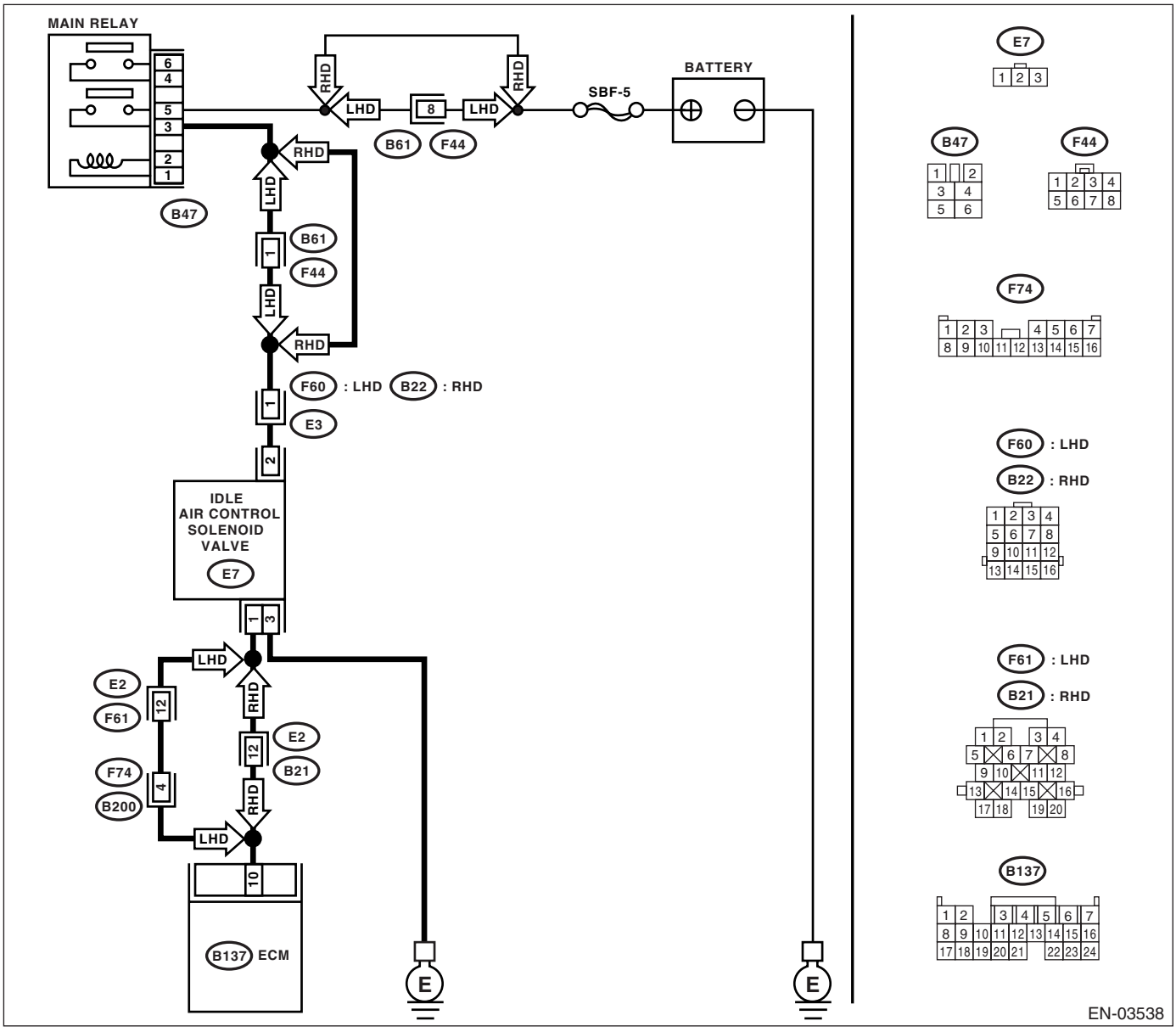
TROUBLE SYMPTOM:

- Engine is difficult to start.
- Engine does not start.
- Erroneous idling
- Engine stalls.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC.**	Is any other DTC displayed?	Inspect the relevant DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4DOTC)(diag)-72, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0506.	Go to step **2.**
2	**CHECK IDLE AIR CONTROL SOLENOID VALVE.** 1) Turn the ignition switch to OFF. 2) Remove the idle air control solenoid valve from throttle body. <Ref. to FU(H4DOTC)-35, REMOVAL, Idle Air Control Solenoid Valve.> 3) Using an air gun, force air into the idle air control solenoid valve by-pass air inlet. Confirm that forced air subsequently escapes from both main air passage and assist air passage.	Does air flow out?	Go to step **4.**	Replace the idle air control solenoid valve. <Ref. to FU(H4DOTC)-35, Idle Air Control Solenoid Valve.> After replace, Go to step **3.**
3	**CHECK IDLE AIR CONTROL SOLENOID VALVE DUTY RATIO.** 1) Turn the ignition switch to ON. 2) Start the engine, and warm-up the engine. 3) Turn all accessory switches to OFF. 4) Read the data of idle air control solenoid valve duty ratio using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4DOTC)(diag)-32, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the General Scan Tool Instruction Manual.	Is the duty ratio more than 60%?	Go to step **4.**	Finish the diagnosis.
4	**CHECK BY-PASS AIR LINE.** 1) Turn the ignition switch to OFF. 2) Remove the idle air control solenoid valve from throttle body. <Ref. to FU(H4DOTC)-35, REMOVAL, Idle Air Control Solenoid Valve.> 3) Remove the throttle body to intake manifold. <Ref. to FU(H4DOTC)-13, REMOVAL, Throttle Body.> 4) Using an air gun, force air into the solenoid valve installation area and throttle valve interior. Confirm that forced air subsequently escapes from both these areas.	Does air flow out?	Replace the idle air control solenoid valve. <Ref. to FU(H4DOTC)-35, Idle Air Control Solenoid Valve.>	Replace the throttle body. <Ref. to FU(H4DOTC)-13, Throttle Body.>

BD:DTC P0507 IDLE AIR CONTROL SYSTEM RPM HIGHER THAN EXPECTED

DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

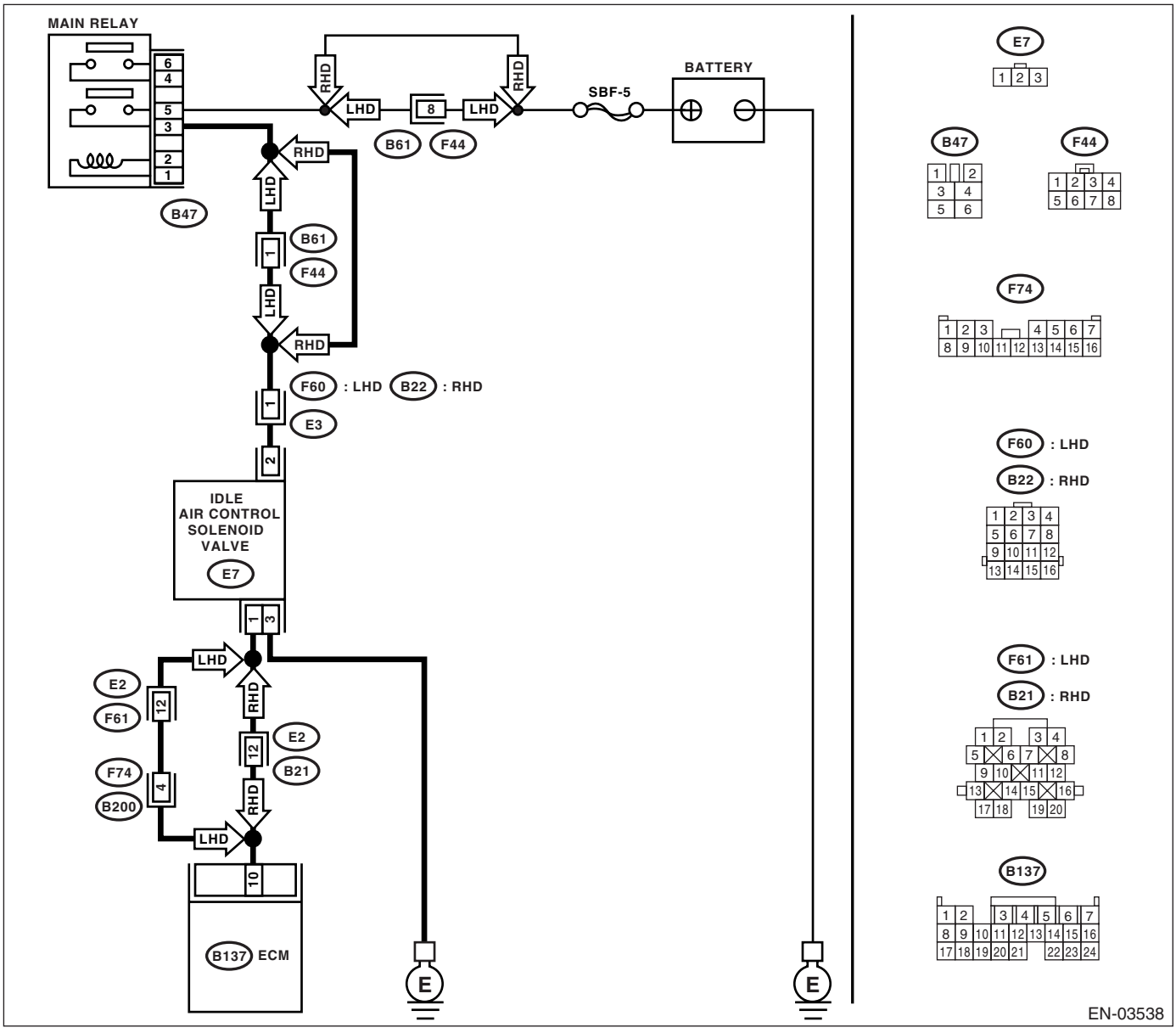
TROUBLE SYMPTOM:

Engine keeps running at higher revolution than specified idling revolution.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC.**	Is any other DTC displayed?	Inspect the relevant DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4DOTC)(diag)-72, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0507.	Go to step **2.**
2	**CHECK THROTTLE CABLE.**	Does the throttle cable have play for adjustment?	Go to step **3.**	Adjust the throttle cable. <Ref. to SP(H4SO)-9, INSTALLATION, Accelerator Control Cable.>
3	**CHECK AIR INTAKE SYSTEM.** 1) Turn the ignition switch to ON. 2) Start the engine, and idle it. 3) Check the following items. • Loose installation of intake manifold, idle air control solenoid valve and throttle body • Cracks of intake manifold gasket, idle air control solenoid valve gasket and throttle body gasket • Disconnections of vacuum hoses	Is there a fault in air intake system?	Repair the air suction and leaks.	Replace the idle air control solenoid valve. <Ref. to FU(H4DOTC)-35, Idle Air Control Solenoid Valve.>

BE:DTC P0508 IDLE AIR CONTROL SYSTEM CIRCUIT LOW

DTC DETECTING CONDITION:

Immediately at fault recognition

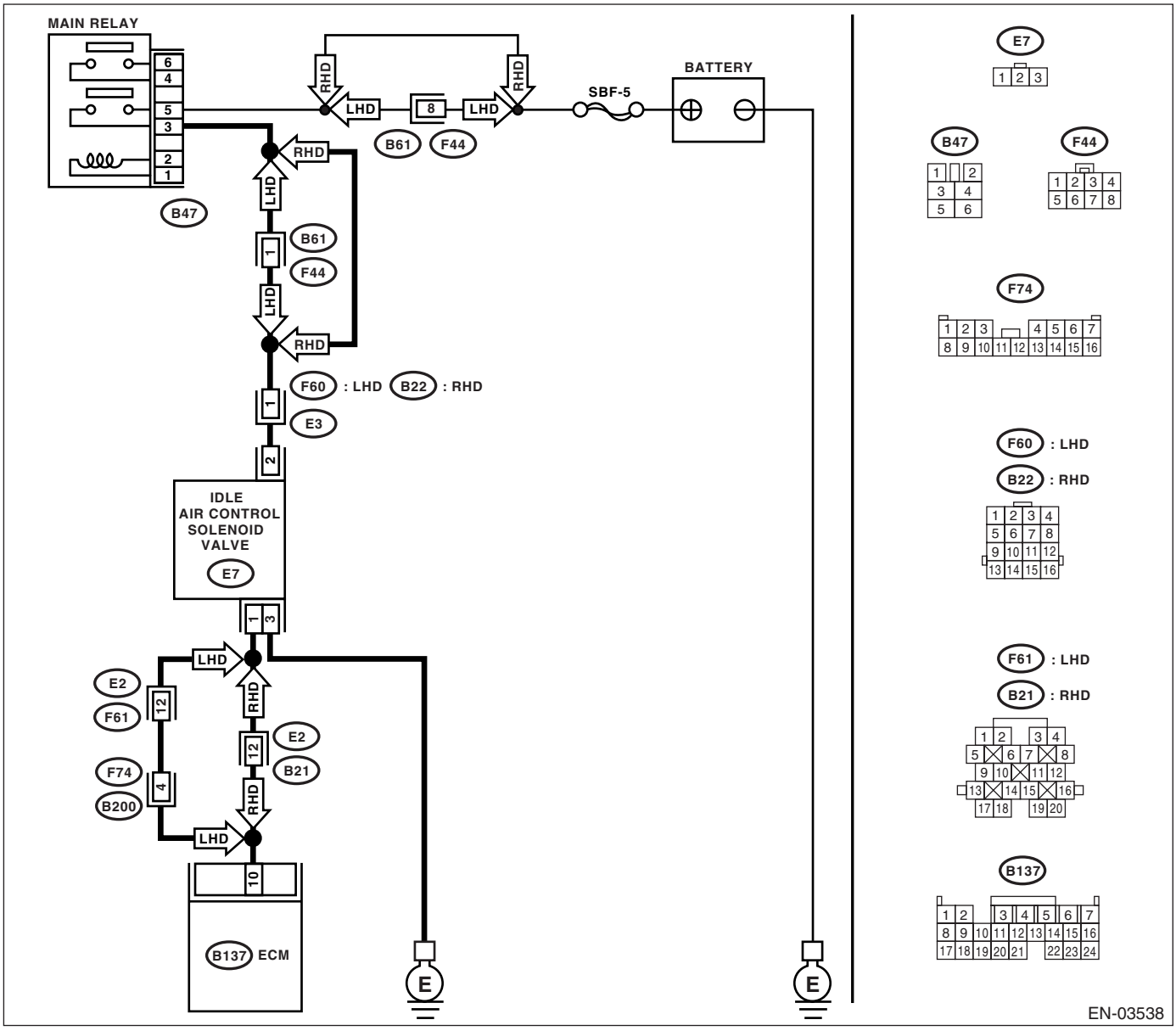
TROUBLE SYMPTOM:

- Erroneous idling
- Engine stalls.
- Engine breathing

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B137) No. 10 (+) — Chassis ground (−):***	Is the voltage more than 3 V?	Repair the poor contact in ECM connector.	Go to step **2.**
2	**CHECK POWER SUPPLY TO IDLE AIR CONTROL SOLENOID VALVE.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from idle air control solenoid valve. 3) Turn the ignition switch to ON. 4) Measure the voltage between idle air control solenoid valve and engine ground. ***Connector & terminal*** ***(E7) No. 2 (+) — Engine ground (−):***	Is the voltage more than 10 V?	Go to step **3.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between idle air control solenoid valve and main relay connector • Poor contact in coupling connector
3	**CHECK HARNESS BETWEEN ECM AND IDLE AIR CONTROL SOLENOID VALVE CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance of harness between ECM and idle air control solenoid valve connector. ***Connector & terminal*** ***(B137) No. 10 — (E7) No. 1:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and idle air control solenoid valve connector • Poor contact in coupling connector
4	**CHECK HARNESS BETWEEN ECM AND IDLE AIR CONTROL SOLENOID VALVE CONNECTOR.** Measure the resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***(B137) No. 10 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **5.**	Repair the ground short circuit in harness between ECM and idle air control solenoid valve connector.
5	**CHECK GROUND CIRCUIT OF IDLE AIR CONTROL SOLENOID VALVE.** Measure the resistance of harness between idle air control solenoid valve connector and engine ground. ***Connector & terminal*** ***(E7) No. 3 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **6.**	Repair the open circuit in harness between idle air control solenoid valve connector and engine ground cable.
6	**CHECK POOR CONTACT.** Check poor contact in ECM and idle air control solenoid valve connectors.	Is there poor contact in ECM and idle air control solenoid valve connectors?	Repair the poor contact in ECM and idle air control solenoid valve connectors.	Replace the idle air control solenoid valve. <Ref. to FU(H4DOTC)-35, Idle Air Control Solenoid Valve.>

BF:DTC P0509 IDLE AIR CONTROL SYSTEM CIRCUIT HIGH

DTC DETECTING CONDITION:

Immediately at fault recognition

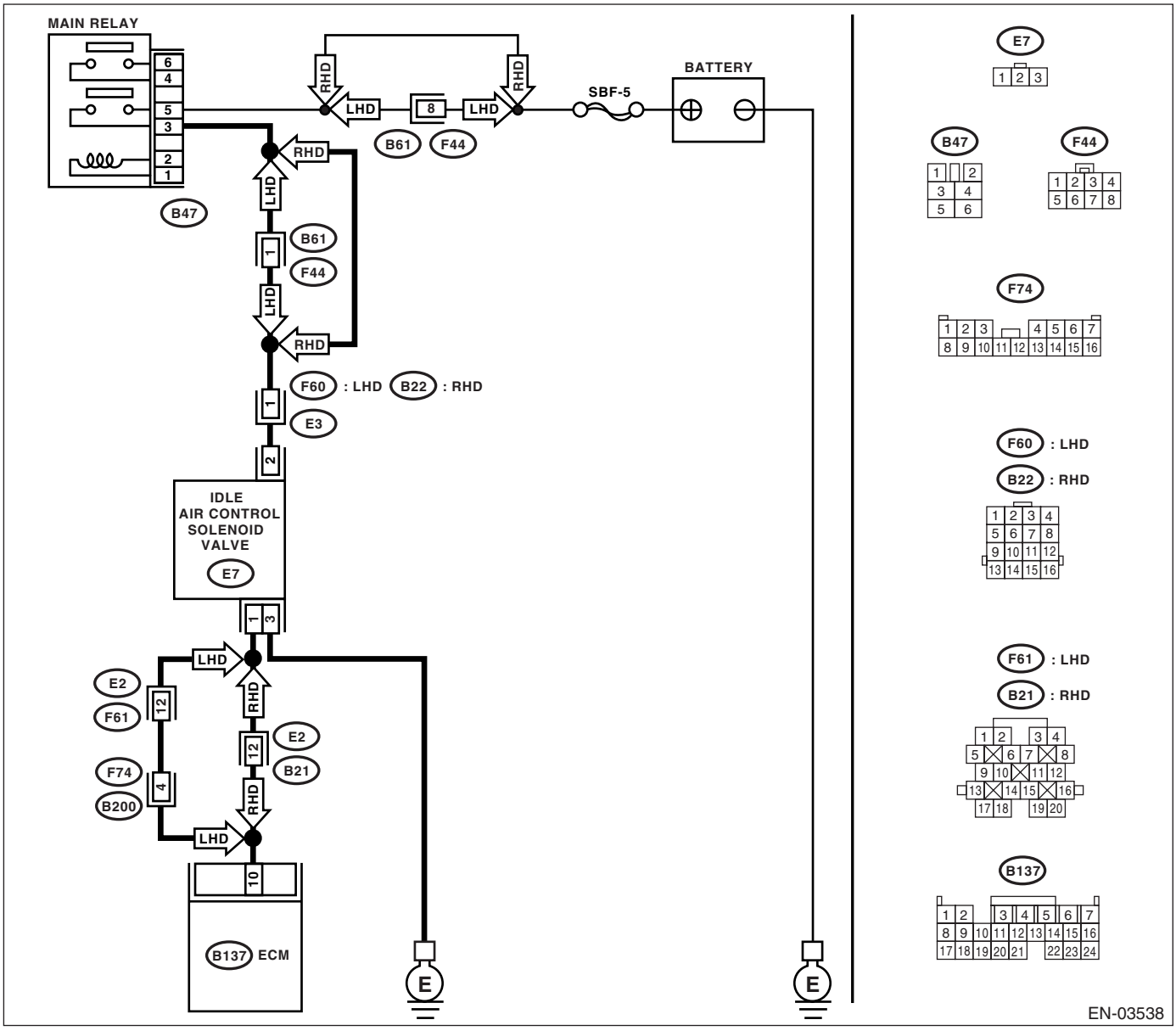
TROUBLE SYMPTOM:

- Erroneous idling
- Engine stalls.
- Engine breathing

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK THROTTLE CABLE.**	Does the throttle cable have play for adjustment?	Go to step **2.**	Adjust the throttle cable. <Ref. to SP(H4SO)-9, INSTALLATION, Accelerator Control Cable.>
2	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B137) No. 10 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **3.**	Go to step **4.**
3	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from idle air control solenoid valve. 3) Turn the ignition switch to ON. 4) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B137) No. 10 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Repair the battery short circuit in harness between ECM and idle air control solenoid valve connector. After repair, replace the ECM. <Ref. to FU(H4DOTC)-50, Engine Control Module (ECM).>	Replace the idle air control solenoid valve. <Ref. to FU(H4DOTC)-35, Idle Air Control Solenoid Valve.> and ECM <Ref. to FU(H4DOTC)-50, Engine Control Module (ECM).>
4	**CHECK OUTPUT SIGNAL FROM ECM.** Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B137) No. 10 (+) — Chassis ground (−):***	Shake the ECM harness and connector, while monitoring value of voltage meter. Does the voltage change?	Repair the battery short circuit in harness between ECM and idle air control solenoid valve connector. After repair, replace the ECM. <Ref. to FU(H4DOTC)-50, Engine Control Module (ECM).>	Contact your Subaru distributor service.

BG:DTC P0512 STARTER REQUEST CIRCUIT

DTC DETECTING CONDITION:

Immediately at fault recognition

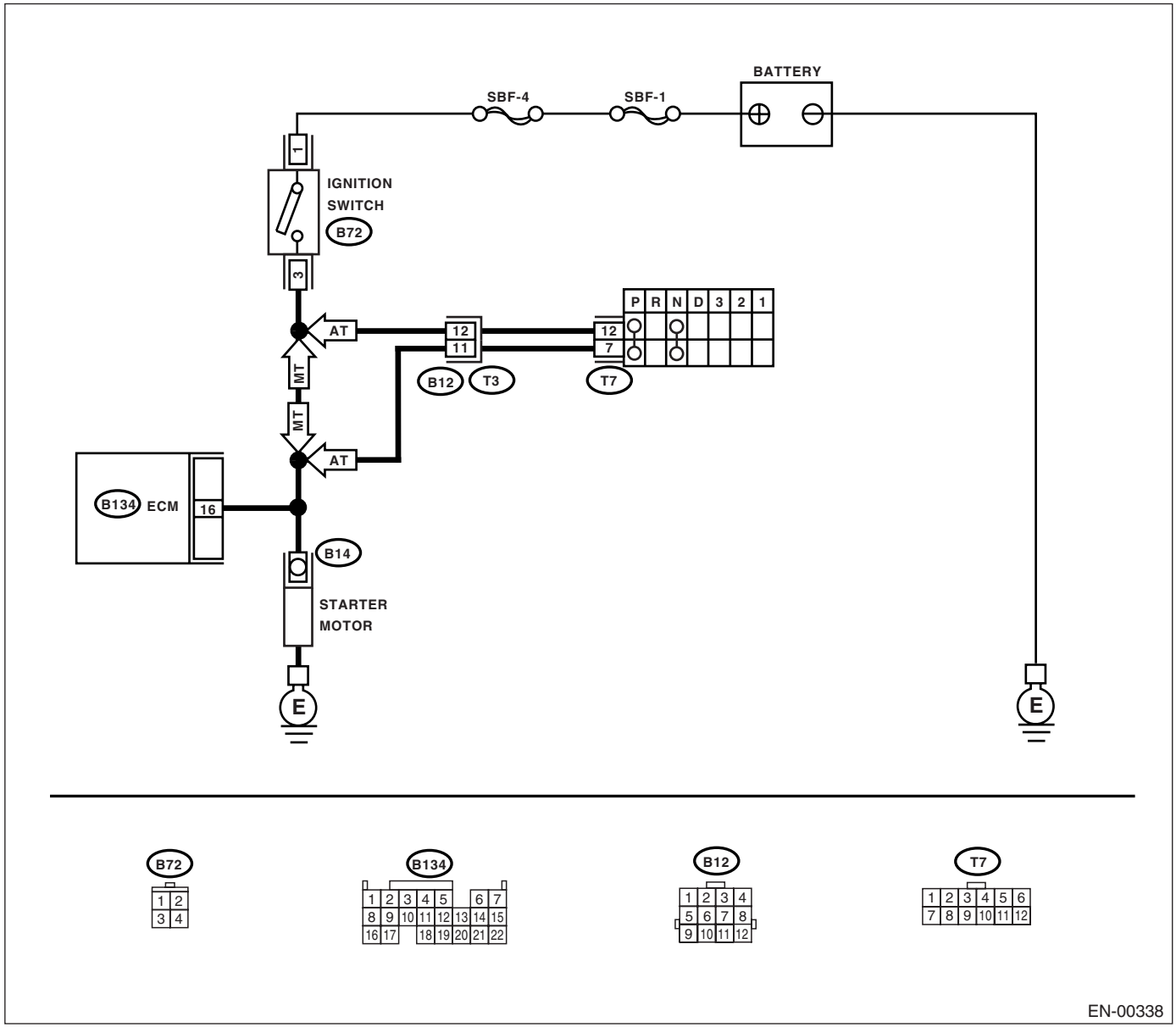
TROUBLE SYMPTOM:

Failure of engine to start

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

WIRING DIAGRAM:



Step		Check	Yes	No
1	CHECK OPERATION OF STARTER MOTOR.	Does the starter motor operate when ignition switch is turned to ON?	Repair the battery short circuit in starter motor circuit. After repair, replace the ECM. <Ref. to FU(H4DOTC)-50, Engine Control Module (ECM).>	Check the starter motor circuit. <Ref. to EN(H4DOTC)(diag)-59, STARTER MOTOR CIRCUIT, Diagnostics for Engine Starting Failure.>

BH:DTC P0519 IDLE AIR CONTROL SYSTEM PERFORMANCE

DTC DETECTING CONDITION:

Immediately at fault recognition

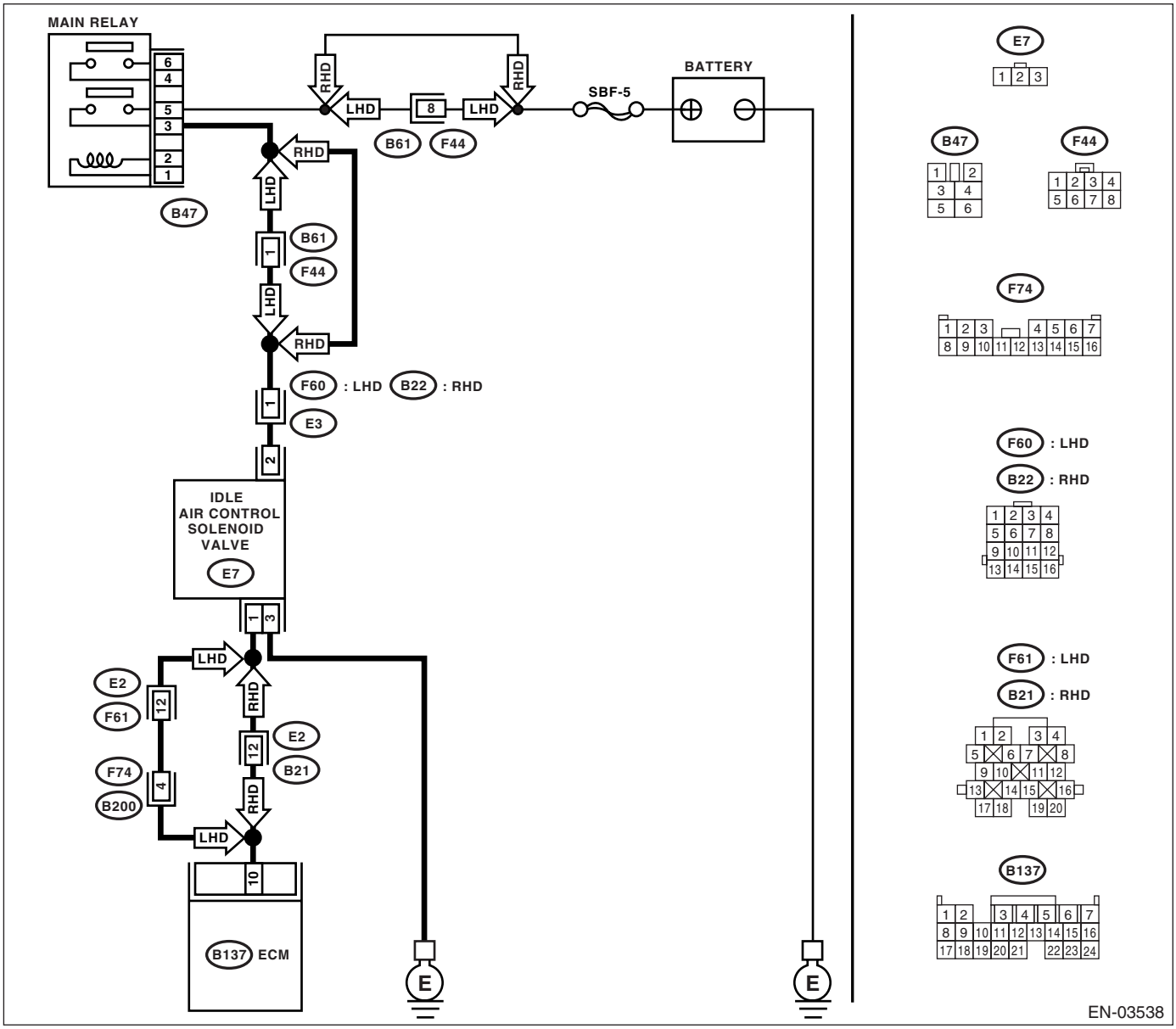
TROUBLE SYMPTOM:

- Engine keeps running at higher revolution than specified idling revolution.
- Fuel is cut according to fail-safe function.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC.**	Is any other DTC displayed?	Inspect the relevant DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4DOTC)(diag)-72, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0519.	Go to step **2.**
2	**CHECK AIR INTAKE SYSTEM.** 1) Turn the ignition switch to ON. 2) Start the engine, and idle it. 3) Check the following items. • Loose installation of intake manifold, idle air control solenoid valve and throttle body. • Cracks of intake manifold gasket, idle air control solenoid valve gasket and throttle body gasket. • Disconnections of vacuum hoses.	Is there a fault in air intake system?	Repair the air suction and leaks.	Go to step **3.**
3	**CHECK THROTTLE CABLE.**	Does the throttle cable have play for adjustment?	Go to step **4.**	Adjust the throttle cable. <Ref. to SP(H4SO)-9, INSTALLATION, Accelerator Control Cable.>
4	**CHECK AIR BY-PASS LINE.** 1) Turn the ignition switch to OFF. 2) Remove the idle air control solenoid valve from throttle body. <Ref. to FU(H4DOTC)-35, Idle Air Control Solenoid Valve.> 3) Confirm that there are no foreign particles in by-pass air line.	Are foreign particles in by-pass air line?	Remove the foreign particles from by-pass air line.	Replace the idle air control solenoid valve. <Ref. to FU(H4DOTC)-35, Idle Air Control Solenoid Valve.>

BI: DTC P0545 EXHAUST GAS TEMPERATURE SENSOR CIRCUIT LOW (BANK 1 SENSOR 1)

DTC DETECTING CONDITION:

Immediately at fault recognition

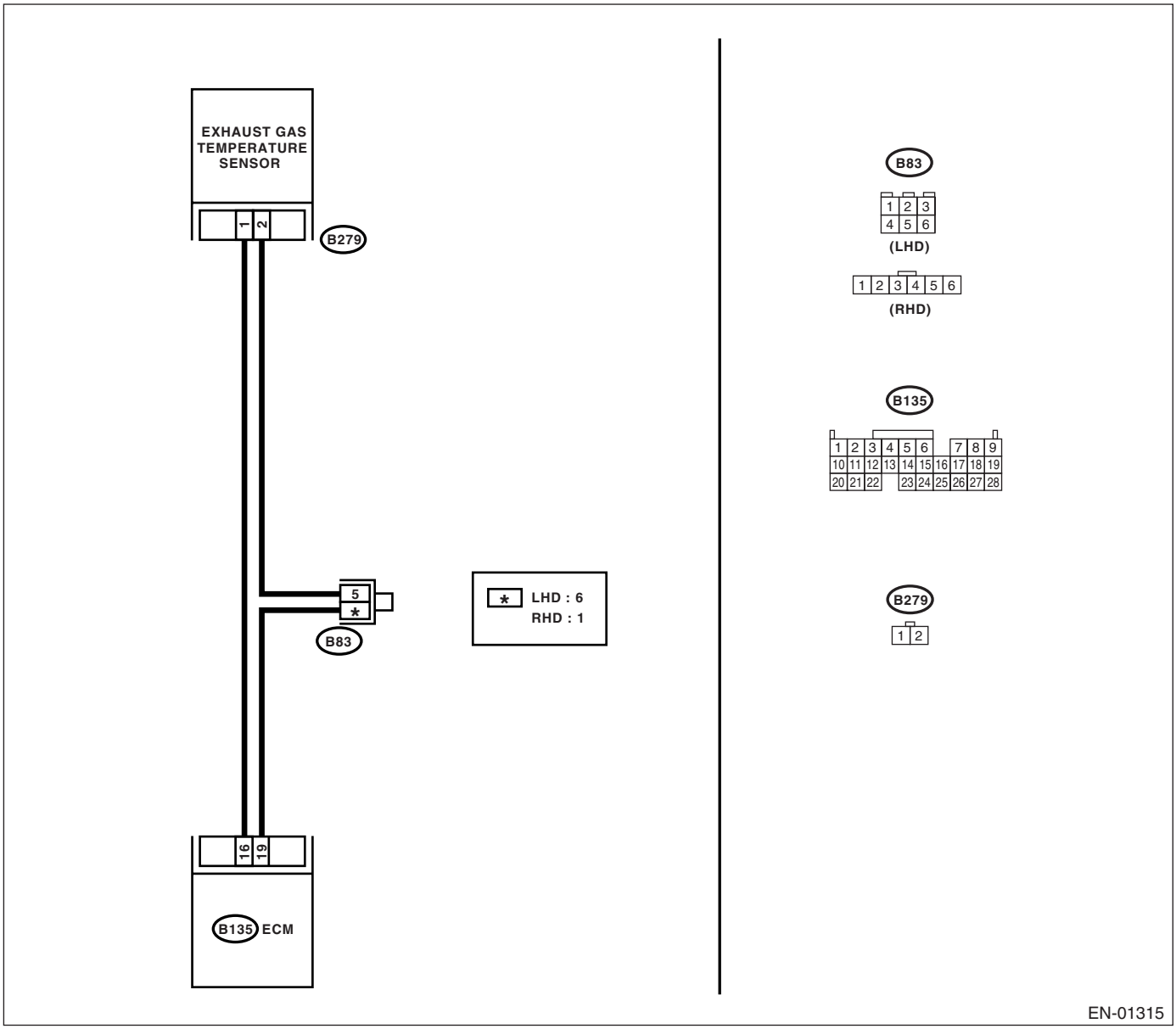
TROUBLE SYMPTOM:

- Hard tostart
- Erroneous idling
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of exhaust gas temperature sensor signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4DOTC)(diag)-32, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the General Scan Tool Instruction Manual.	Is the temperature more than 1,200°C (2,192°F)?	Go to step **2.**	Repair the poor contact. NOTE: In this case, repair the following: • Poor contact in exhaust gas temperature sensor • Poor contact in ECM • Poor contact in joint connector
2	**CHECK HARNESS BETWEEN EXHAUST GAS TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from exhaust gas temperature sensor. 3) Turn the ignition switch to ON. 4) Read the data of exhaust gas temperature sensor signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4DOTC)(diag)-32, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the General Scan Tool Instruction Manual.	Is the temperature less than 372°C (702°F)?	Replace the exhaust gas temperature sensor. <Ref. to FU(H4DOTC)-49, Exhaust Temperature Sensor.>	Repair the ground short circuit in harness between exhaust gas temperature sensor and ECM connector.

BJ:DTC P0546 EXHAUST GAS TEMPERATURE SENSOR CIRCUIT HIGH (BANK 1 SENSOR 1)

DTC DETECTING CONDITION:

Immediately at fault recognition

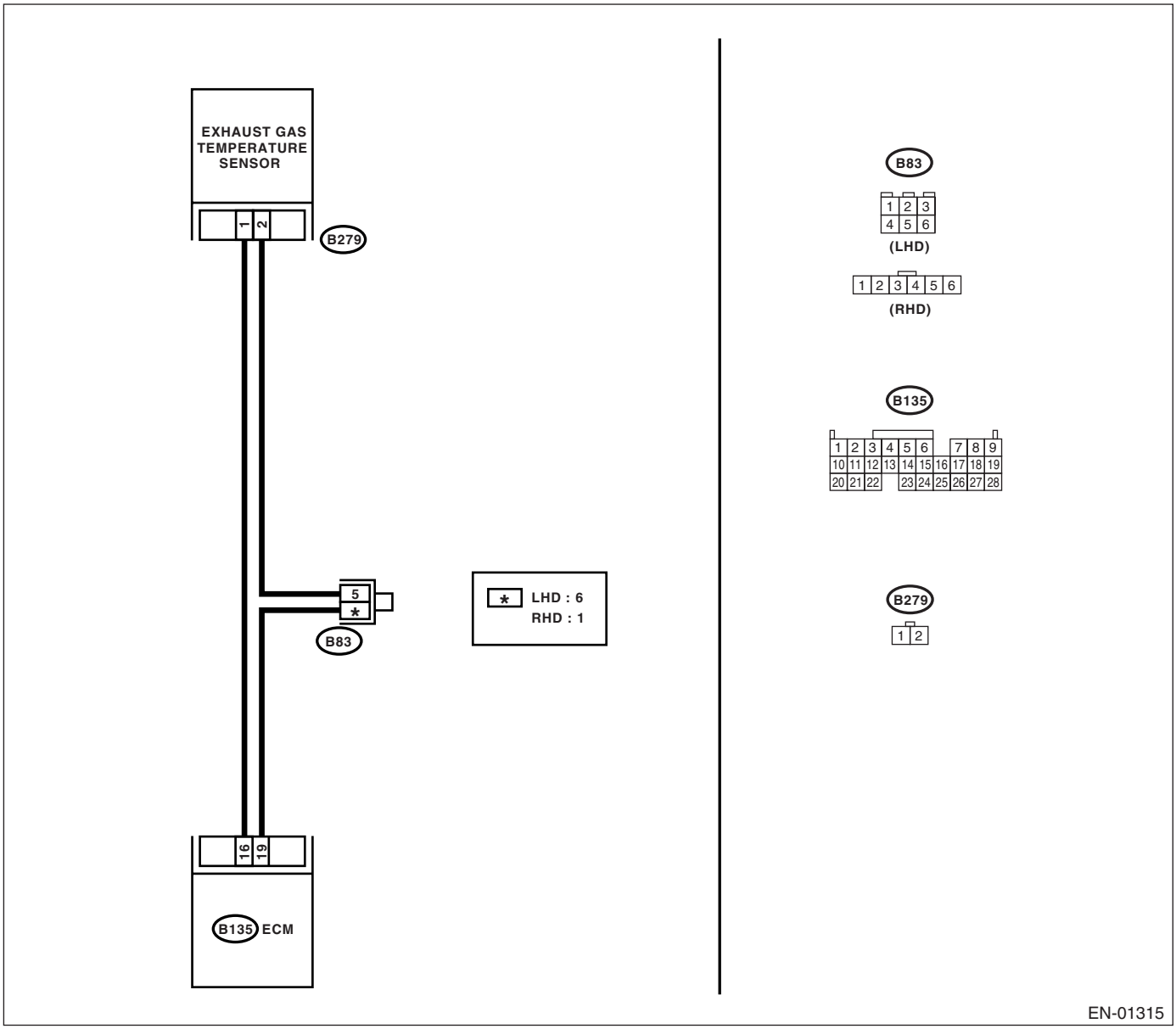
TROUBLE SYMPTOM:

- Hard to start
- Erroneous idling
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of exhaust gas temperature sensor signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4DOTC)(diag)-32, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the General Scan Tool Instruction Manual.	Is the temperature less than 372°C (702°F)?	Go to step **2.**	Repair the poor contact. NOTE: In this case, repair the following: • Poor contact in exhaust gas temperature sensor • Poor contact in ECM • Poor contact in joint connector
2	**CHECK HARNESS BETWEEN EXHAUST GAS TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from exhaust gas temperature sensor. 3) Measure the voltage between exhaust gas temperature sensor connector and engine ground. ***Connector & terminal*** ***(B279) No. 1 (+) — Engine ground (−):***	Is the voltage more than 10 V?	Repair the battery short circuit in harness between ECM and exhaust gas temperature sensor connector.	Go to step **3.**
3	**CHECK HARNESS BETWEEN EXHAUST GAS TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to ON. 2) Measure the voltage between exhaust gas temperature sensor connector and engine ground. ***Connector & terminal*** ***(B279) No. 1 (+) — Engine ground (−):***	Is the voltage more than 10 V?	Repair the battery short circuit in harness between ECM and exhaust gas temperature sensor connector.	Go to step **4.**
4	**CHECK HARNESS BETWEEN EXHAUST GAS TEMPERATURE SENSOR AND ECM CONNECTOR.** Measure the voltage between exhaust gas temperature sensor connector and engine ground. ***Connector & terminal*** ***(B279) No. 1 (+) — Engine ground (−):***	Is the voltage more than 4 V?	Go to step **5.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and exhaust gas temperature sensor connector • Poor contact in exhaust gas temperature sensor connector • Poor contact in ECM connector • Poor contact in joint connector

	Step	Check	Yes	No
5	**CHECK HARNESS BETWEEN EXHAUST GAS TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance of harness between exhaust gas temperature sensor connector and engine ground. ***Connector & terminal*** ***(B279) No. 2 — Engine ground:***	Is the resistance less than 5 Ω?	Replace the exhaust gas temperature sensor. <Ref. to FU(H4DOTC)-49, Exhaust Temperature Sensor.>	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and exhaust gas temperature sensor connector • Poor contact in exhaust gas temperature sensor connector • Poor contact in ECM connector • Poor contact in joint connector

BK:DTC P0565 CRUISE CONTROL ON SIGNAL

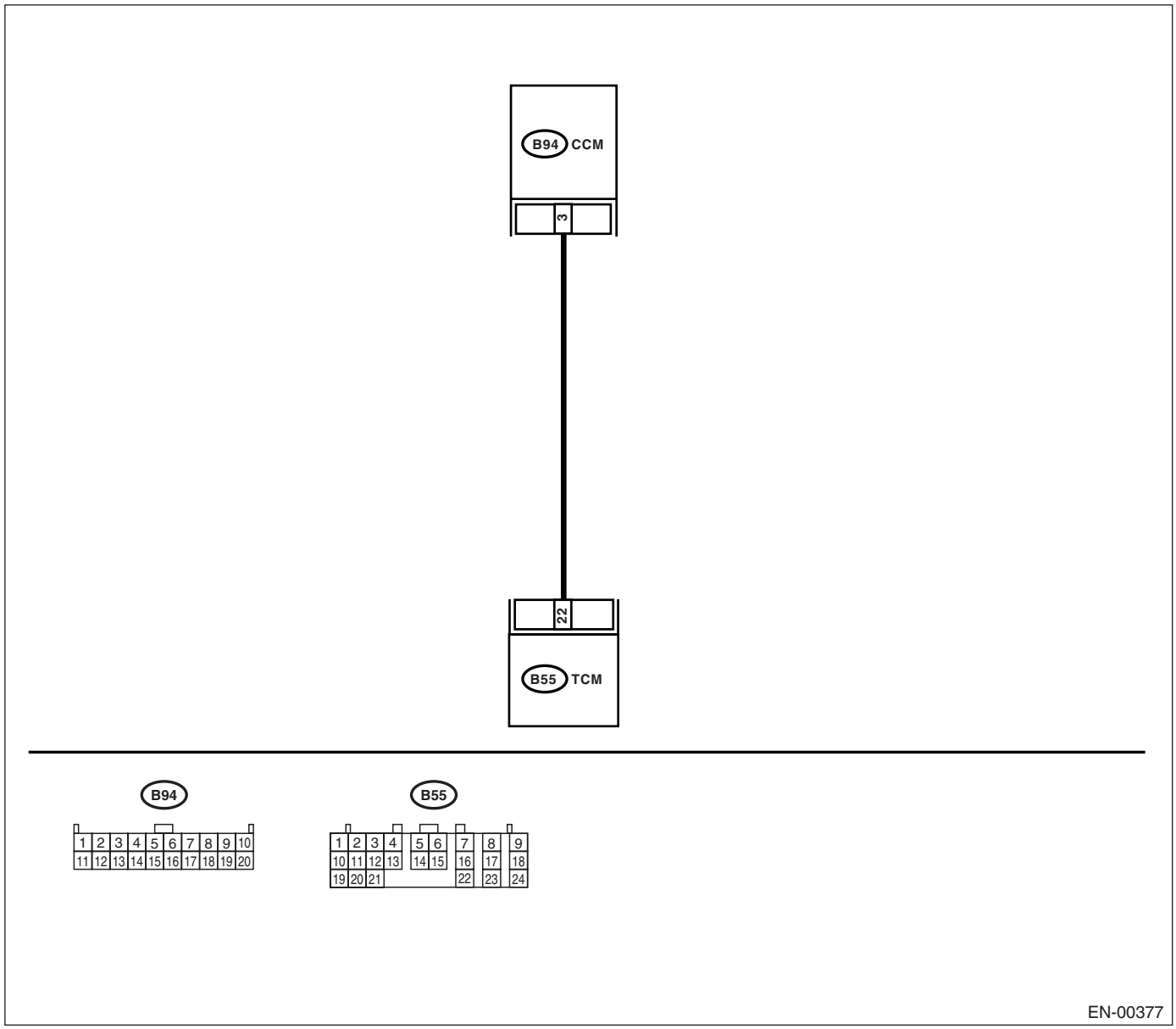
DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN TCM AND CCM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and CCM. 3) Measure the resistance of harness between TCM and CCM connector. ***Connector & terminal*** ***(B55) No. 22 — (B94) No. 3:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the open circuit in harness between TCM and CCM connector.
2	**CHECK HARNESS BETWEEN TCM AND CCM CONNECTOR.** Measure the resistance of harness between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 22 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **3.**	Repair the short circuit in harness between TCM and CCM connector.
3	**CHECK INPUT SIGNAL FOR TCM.** 1) Connect the connector to TCM and CCM. 2) Lift-up the vehicle or set the vehicle on free rollers. **CAUTION:** **Raise all wheels off ground.** 3) Start the engine. 4) Turn the cruise control main switch to ON. 5) Move the select lever to “D” range and slowly increase vehicle speed to 50 km/h (31 MPH). 6) Turn the cruise control command switch to ON. 7) Measure the voltage between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 22 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **4.**	Check the cruise control command switch circuit. <Ref. to CC-7, INSPECTION, Cruise Control Command Switch.>
4	**CHECK POOR CONTACT.** Check poor contact in TCM connector.	Is there poor contact in TCM connector?	Repair the poor contact in TCM connector.	Replace the TCM. <Ref. to 4AT-75, Transmission Control Module (TCM).>

BL:DTC P0604 INTERNAL CONTROL MODULE RANDOM ACCESS MEMORY (RAM) ERROR

DTC DETECTING CONDITION:

Immediately at fault recognition

TROUBLE SYMPTOM:

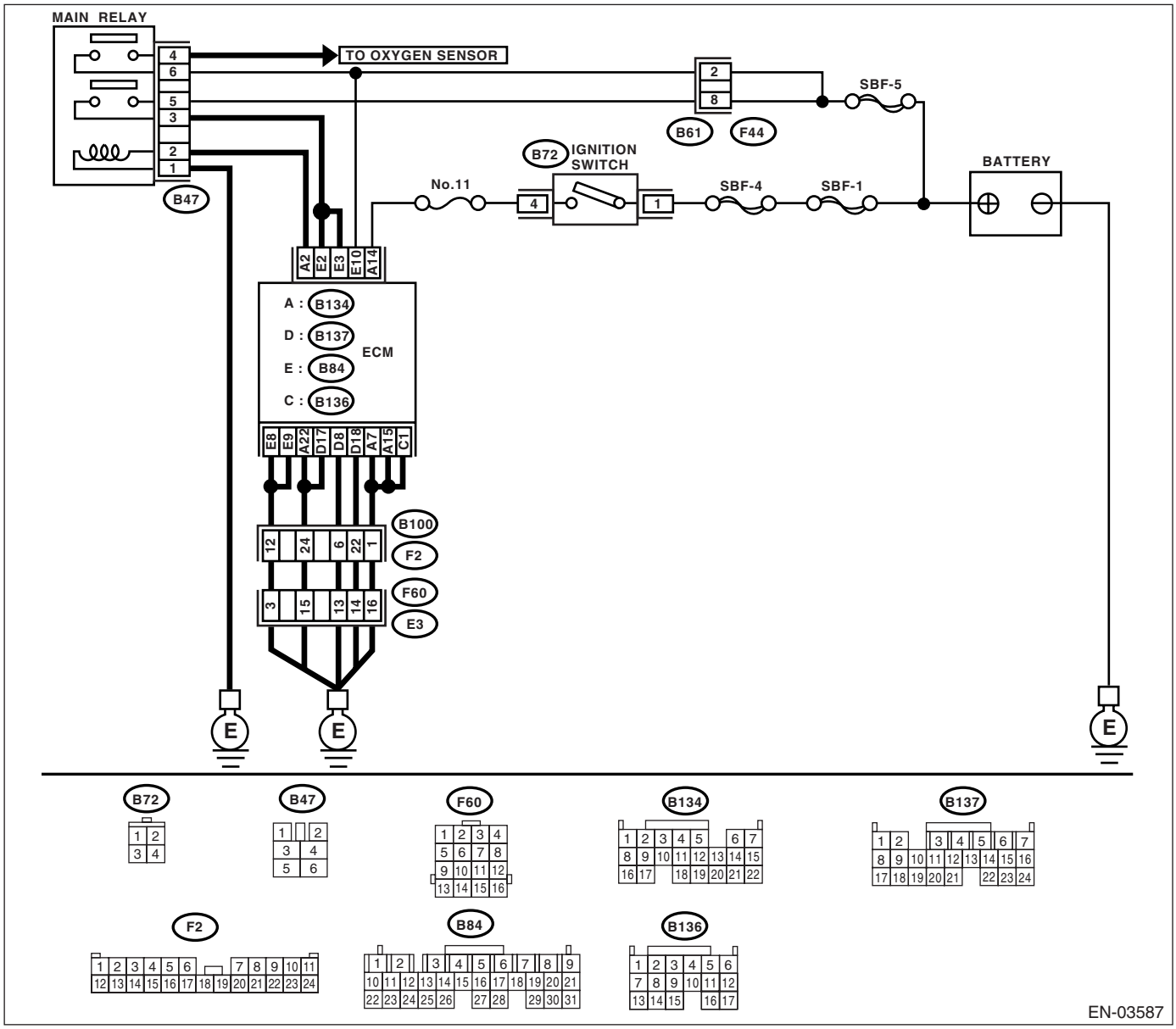
- Engine does not start.
- Engine stalls.

CAUTION:

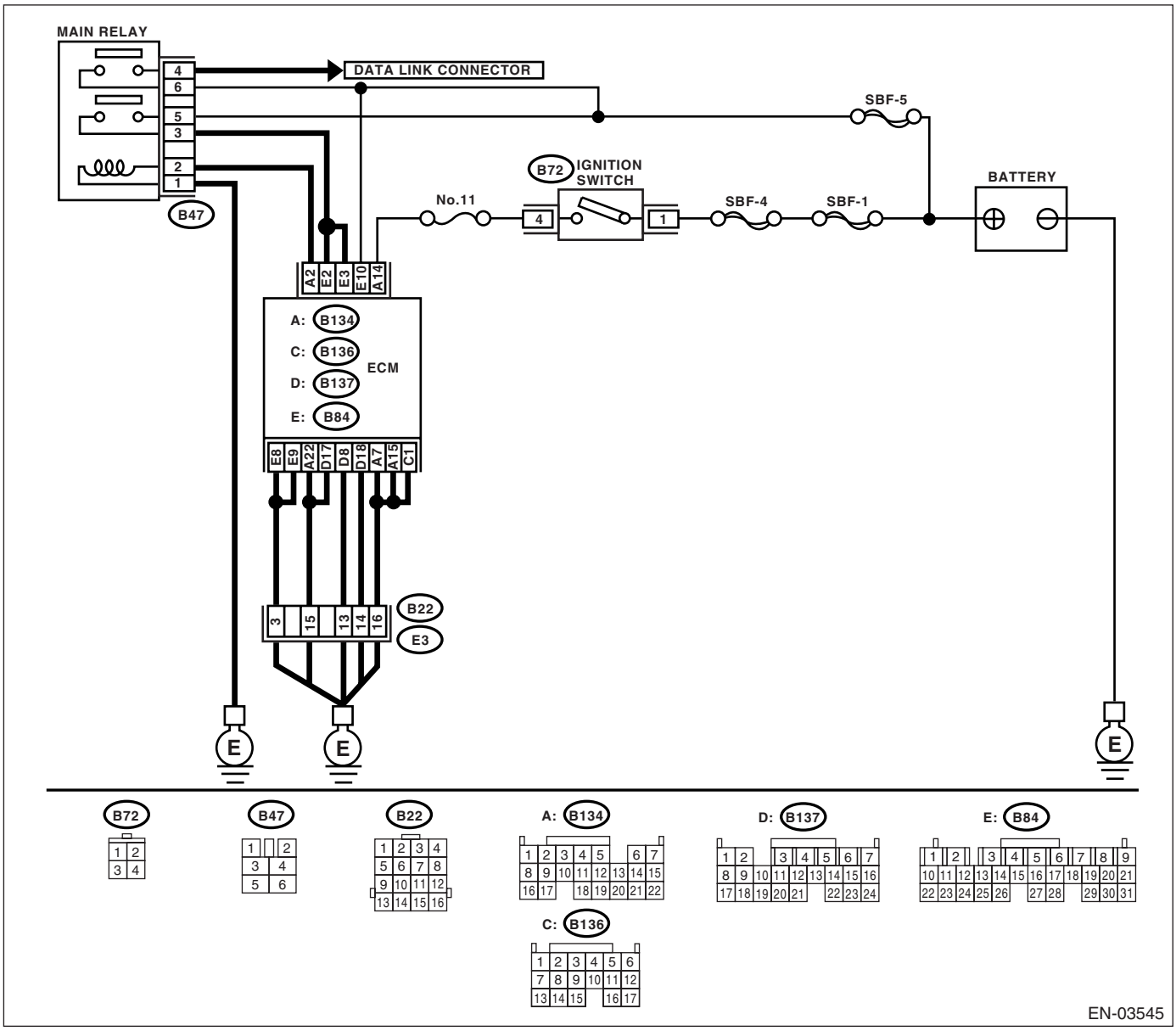
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

WIRING DIAGRAM:

- LHD model



- RHD model



Step		Check	Yes	No
1	**CHECK ANY OTHER DTC.**	Does the Subaru Select Monitor or general scan tool indicate DTC P0604?	Replace the ECM. <Ref. to FU(H4DOTC)-50, Engine Control Module (ECM).>	A temporary poor contact.

BM:DTC P0691 FAN 1 CONTROL CIRCUIT LOW

DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

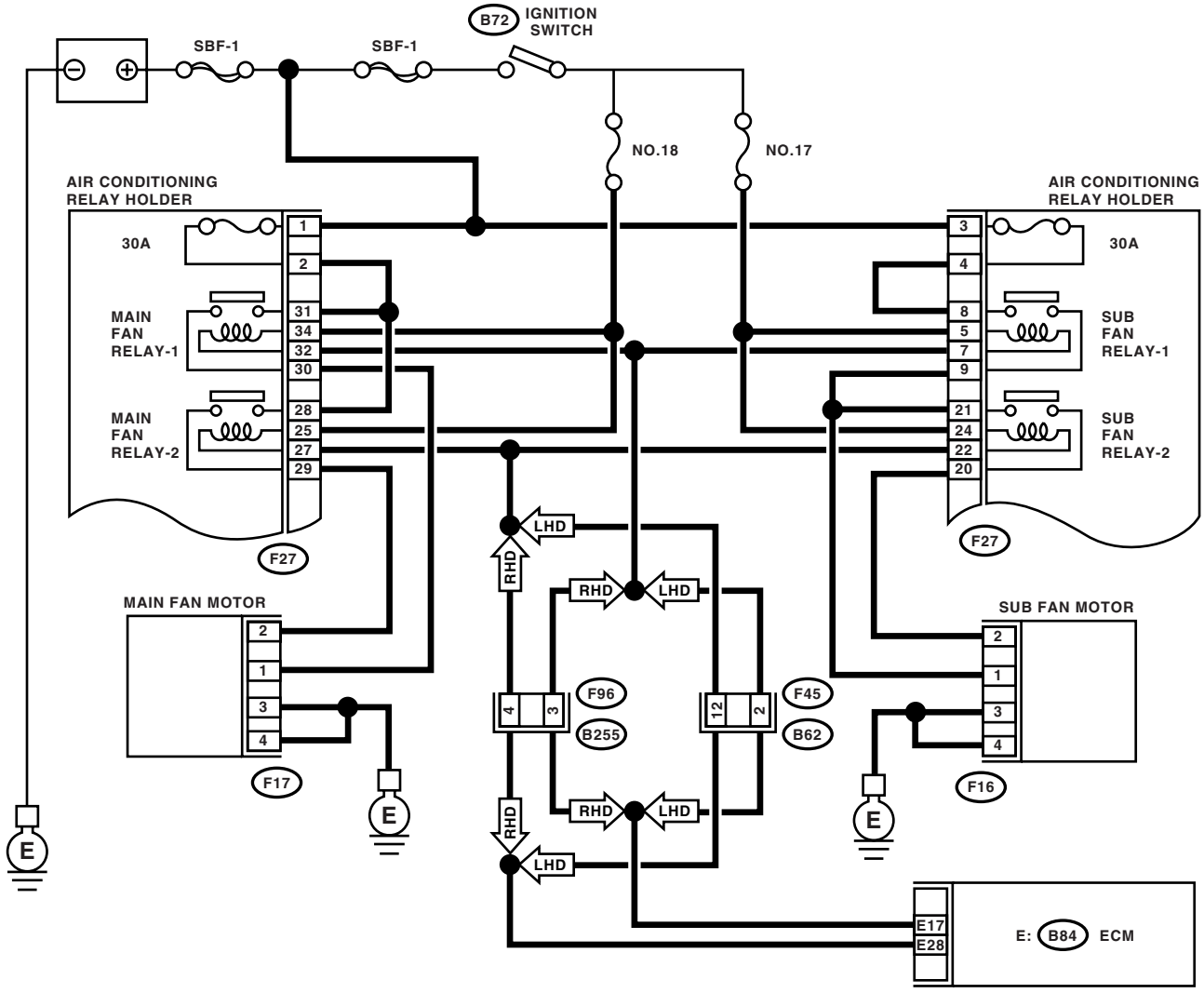
TROUBLE SYMPTOM:

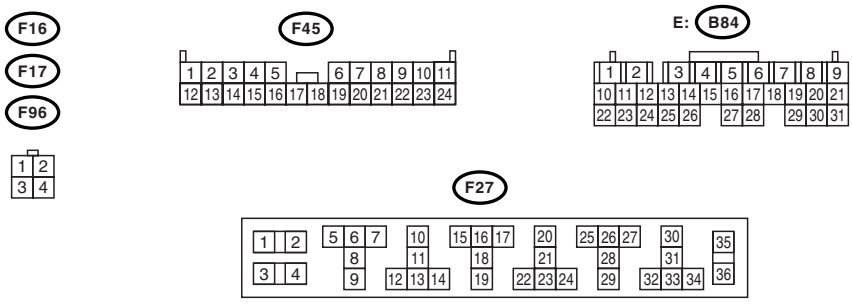
- Radiator fan does not operate properly.
- Overheating

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:





EN-02564

	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn the ignition switch to OFF. 2) Connect the test mode connector. 3) Turn the ignition switch to ON. 4) While operating the radiator fan relay, measure voltage between ECM terminal and ground. NOTE: Radiator fan relay operation can be executed using Subaru Select Monitor. For procedure, refer to "Compulsory Valve Operation Check Mode". <Ref. to EN(H4DOTC)(diag)-32, Subaru Select Monitor.> ***Connector & terminal*** ***(B84) No. 17 (+) — Chassis ground (−):*** ***(B84) No. 28 (+) — Chassis ground (−):***	Does the voltage change 0 — 10 V?	Repair poor contact in ECM connector.	Go to step **2.**
2	**CHECK GROUND SHORT CIRCUIT IN RADIATOR FAN RELAY CONTROL CIRCUIT.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM. 3) Measure the resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B84) No. 17 — Chassis ground:*** ***(B84) No. 28 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **3.**	Repair ground short circuit in radiator fan relay control circuit.
3	**CHECK POWER SUPPLY FOR RELAY.** 1) Remove the fan relay 1 and fan relay 2 from A/C relay holder. 2) Turn the ignition switch to ON. 3) Measure the voltage between fuse and relay box (F/B) connector and chassis ground. ***Connector & terminal*** ***(F27) No. 32 (+) — Chassis ground (−):*** ***(F27) No. 27 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **4.**	Repair open circuit in harness between ignition switch and fuse and relay box (F/B) connector.
4	**CHECK FAN RELAY 1.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between fan relay 1 terminals. ***Terminals*** ***No. 32 — No. 34:***	Is the resistance 87 — 107 Ω?	Go to step **5.**	Replace the fan relay 1.
5	**CHECK FAN RELAY 2.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between fan relay 2 terminals. ***Terminals*** ***No. 25 — No. 27:***	Is the resistance 87 — 107 Ω?	Go to step **6.**	Replace the fan relay 2.
6	**CHECK OPEN CIRCUIT IN FAN RELAY CONTROL CIRCUIT.** Measure the resistance of harness between ECM and fan relay connector. ***Connector & terminal*** ***(B84) No. 17 — (F27) No. 32:*** ***(B84) No. 28 — (F27) No. 27:***	Is the resistance less than 1 Ω?	Go to step **7.**	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and fan relay connector • Poor contact in coupling connector

Step		Check	Yes	No
7	**CHECK POOR CONTACT.** Check poor contact in ECM or fan relay connector.	Is there poor contact in ECM or fan relay connector?	Repair poor contact in ECM or fan relay connector.	Contact your Subaru distributor service.

BN:DTC P0692 FAN 1 CONTROL CIRCUIT HIGH

DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

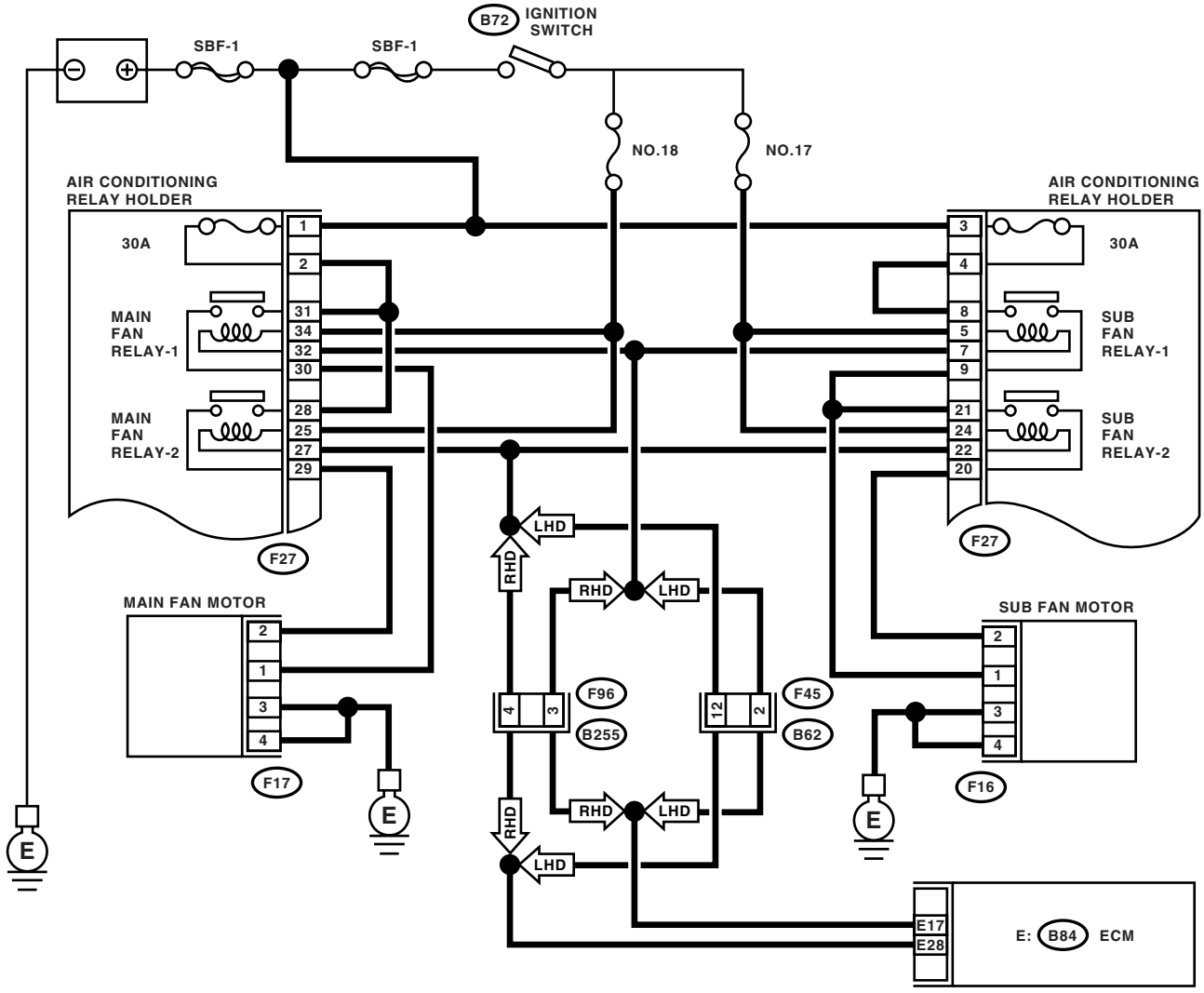
TROUBLE SYMPTOM:

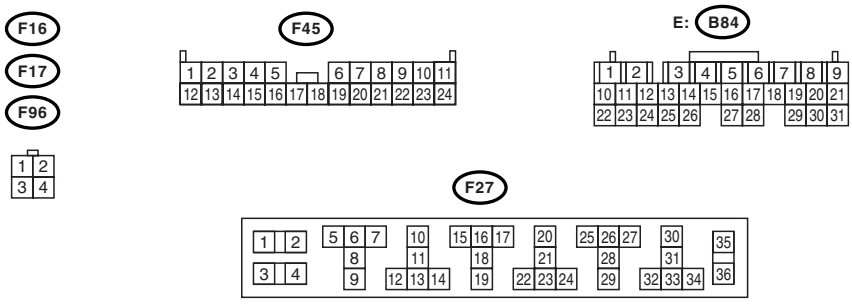
- Radiator fan does not operate properly.
- Overheating

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

WIRING DIAGRAM:





EN-02564

Step		Check	Yes	No
1	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn the ignition switch to OFF. 2) Connect the test mode connector. 3) Turn the ignition switch to ON. 4) While operating the radiator fan relay, measure the voltage between ECM and chassis ground. NOTE: Radiator fan relay operation can be executed using the Subaru Select Monitor. For procedure, refer to "Compulsory Valve Operation Check Mode". <Ref. to EN(H4DOTC)(diag)-47, Compulsory Valve Operation Check Mode.> ***Connector & terminal*** ***(B84) No. 17 (+) — Chassis ground (−):*** ***(B84) No. 28 (+) — Chassis ground (−):***	Does the voltage change 0 — 10 V?	Even if malfunction indicator light lights up, the circuit has returned to a normal condition at this time. In this case, repair the poor contact in ECM connector.	Go to step **2.**
2	**CHECK SHORT CIRCUIT IN RADIATOR FAN RELAY CONTROL CIRCUIT.** 1) Turn the ignition switch to OFF. 2) Remove the fan relay 1, fan relay 2 and fan mode relay. 3) Disconnect the test mode connector. 4) Turn the ignition switch to ON. 5) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B84) No. 17 (+) — Chassis ground (−):*** ***(B84) No. 28 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Repair the battery short circuit in radiator fan relay control circuit. After repair, replace the ECM. <Ref. to FU(H4DOTC)-50, Engine Control Module (ECM).>	Go to step **3.**
3	**CHECK FAN RELAY 1.** 1) Turn the ignition switch to OFF. 2) Remove the fan relay 1. 3) Measure the resistance between fan relay 1 terminals. ***Terminals*** ***No. 30 — No. 31:***	Is the resistance less than 1 Ω?	Replace the fan relay 1 and ECM. <Ref. to FU(H4DOTC)-50, Engine Control Module (ECM).>	Go to step **4.**
4	**CHECK FAN RELAY 2.** 1) Remove the fan relay 2. 2) Measure the resistance between fan relay 2 terminals. ***Terminals*** ***No. 28 — No. 29:***	Is the resistance less than 1 Ω?	Replace the fan relay 2 and ECM. <Ref. to FU(H4DOTC)-50, Engine Control Module (ECM).>	Go to step **5.**
5	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair the poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H4DOTC)-50, Engine Control Module (ECM).>

BO:DTC P0703 BRAKE SWITCH “B” CIRCUIT

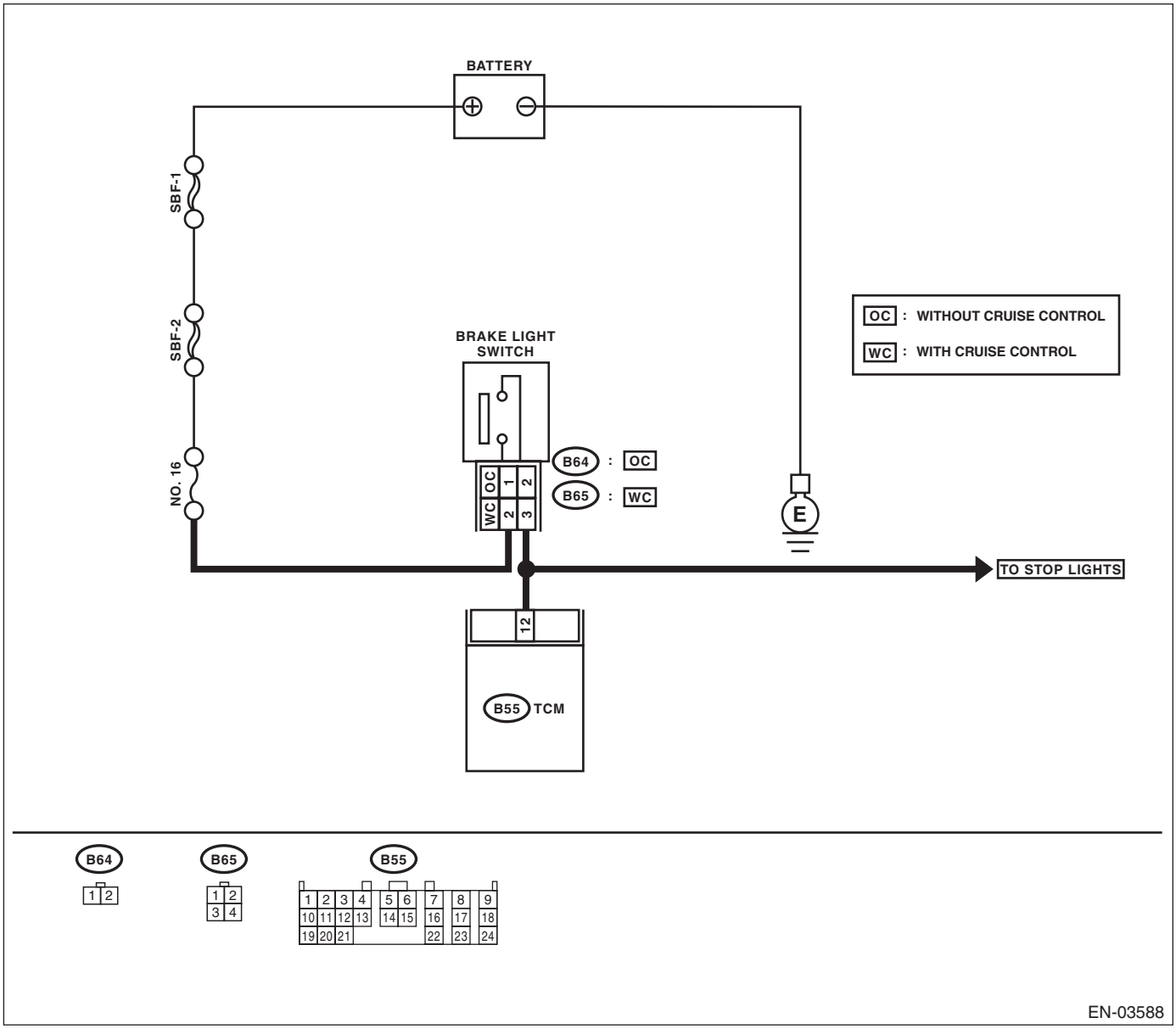
DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK OPERATION OF BRAKE LIGHT.**	Does the brake light come on when depressing the brake pedal?	Go to step **2.**	Repair or replace the brake light circuit.
2	**CHECK HARNESS BETWEEN TCM AND BRAKE LIGHT SWITCH CONNECTOR.** 1) Disconnect the connectors from TCM and brake light switch. 2) Measure the resistance of harness between TCM and brake light switch connector. ***Connector & terminal*** ***MODEL WITH CRUISE CONTROL*** ***(B55) No. 12 — (B65) No. 3:*** ***MODEL WITHOUT CRUISE CONTROL*** ***(B55) No. 12 — (B64) No. 2:***	Is the resistance less than 1 Ω?	Go to step **3.**	Repair or replace the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between TCM and brake light switch connector • Poor contact in TCM connector • Poor contact in brake light switch connector
3	**CHECK HARNESS BETWEEN TCM AND BRAKE LIGHT SWITCH CONNECTOR.** Measure the resistance of harness between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 12 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **4.**	Repair the ground short circuit in harness between TCM and brake light switch connector.
4	**CHECK INPUT SIGNAL FOR TCM.** 1) Connect the connectors to TCM and brake light switch. 2) Measure the voltage between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 12 (+) — Chassis ground (−):***	Is the voltage less than 1 V when releasing the brake pedal?	Go to step **5.**	Adjust or replace the brake light switch. <Ref. to LI-8, STOP LIGHT SWITCH, INSPECTION, Stop Light System.>
5	**CHECK INPUT SIGNAL FOR TCM.** Measure the voltage between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 12 (+) — Chassis ground (−):***	Is the voltage more than 10 V when depressing the brake pedal?	Go to step **6.**	Adjust or replace the brake light switch. <Ref. to LI-8, STOP LIGHT SWITCH, INSPECTION, Stop Light System.>
6	**CHECK POOR CONTACT.** Check poor contact in TCM connector.	Is there poor contact in TCM connector?	Repair the poor contact in TCM connector.	Replace the TCM. <Ref. to 4AT-75, Transmission Control Module (TCM).>

BP:DTC P0731 GEAR 1 INCORRECT RATIO

NOTE:
For the diagnostic procedure, refer to DTC P0734. <Ref. to EN(H4DOTC)(diag)-228, DTC P0734 GEAR 4 INCORRECT RATIO, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

BQ:DTC P0732 GEAR 2 INCORRECT RATIO

NOTE:
For the diagnostic procedure, refer to DTC P0734. <Ref. to EN(H4DOTC)(diag)-228, DTC P0734 GEAR 4 INCORRECT RATIO, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

BR:DTC P0733 GEAR 3 INCORRECT RATIO

NOTE:
For the diagnostic procedure, refer to DTC P0734. <Ref. to EN(H4DOTC)(diag)-228, DTC P0734 GEAR 4 INCORRECT RATIO, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

BS:DTC P0734 GEAR 4 INCORRECT RATIO

DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

TROUBLE SYMPTOM:

Shift point too high or too low; engine brake not effective in “3” range; excessive shift shock; excessive tight corner “braking”

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC.**	Is any other DTC displayed?	Inspect the relevant DTC using “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(H4DOTC)(diag)-72, List of Diagnostic Trouble Code (DTC).>	Go to step **2.**
2	**CHECK THROTTLE POSITION SENSOR CIRCUIT.** Check the throttle position sensor circuit. <Ref. to 4AT(diag)-45, DTC 31 THROTTLE POSITION SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Is there any trouble in throttle position sensor circuit?	Repair or replace the throttle position sensor circuit.	Go to step **3.**
3	**CHECK FRONT VEHICLE SPEED SENSOR CIRCUIT.** Check the front vehicle speed sensor circuit. <Ref. to 4AT(diag)-49, DTC 33 FRONT VEHICLE SPEED SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Is there any trouble in front vehicle speed sensor circuit?	Repair or replace the vehicle speed sensor 2 circuit.	Go to step **4.**
4	**CHECK TORQUE CONVERTER TURBINE SPEED SENSOR CIRCUIT.** Check the torque converter turbine speed sensor circuit. <Ref. to 4AT(diag)-53, DTC 36 TORQUE CONVERTER TURBINE SPEED SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Is there any trouble in torque converter turbine speed sensor circuit?	Repair or replace the torque converter turbine speed sensor circuit.	Go to step **5.**
5	**CHECK POOR CONTACT.** Check poor contact in TCM connector.	Is there poor contact in TCM connector?	Repair the poor contact in TCM connector.	Go to step **6.**
6	**CHECK MECHANICAL TROUBLE.** Check mechanical trouble in automatic transmission.	Is there any mechanical trouble in automatic transmission?	Repair or replace the automatic transmission. <Ref. to 4AT-35, INSPECTION, Road Test.>	Replace the TCM. <Ref. to 4AT-75, Transmission Control Module (TCM).>

BT:DTC P0741 TORQUE CONVERTER CLUTCH CIRCUIT PERFORMANCE OR STUCK OFF

DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

TROUBLE SYMPTOM:

- No lock-up (after engine warm-up)
- No shift or excessive tight corner “braking”

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC.**	Is any other DTC displayed?	Inspect the relevant DTC using “List of Diagnostic Trouble Code (DTC) ”. <Ref. to EN(H4DOTC)(diag)-72, List of Diagnostic Trouble Code (DTC).>	Go to step **2.**
2	**CHECK LOCK-UP DUTY SOLENOID CIRCUIT.** Check the lock-up duty solenoid circuit. <Ref. to 4AT(diag)-77, DTC 77 LOCK-UP DUTY SOLENOID, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Is there any trouble in lock-up duty solenoid circuit?	Repair or replace the lock-up duty solenoid circuit.	Go to step **3.**
3	**CHECK THROTTLE POSITION SENSOR CIRCUIT.** Check the throttle position sensor circuit. <Ref. to 4AT(diag)-45, DTC 31 THROTTLE POSITION SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Is there any trouble in throttle position sensor circuit?	Repair or replace the throttle position sensor circuit.	Go to step **4.**
4	**CHECK TORQUE CONVERTER TURBINE SPEED SENSOR CIRCUIT.** Check the torque converter turbine speed sensor circuit. <Ref. to 4AT(diag)-53, DTC 36 TORQUE CONVERTER TURBINE SPEED SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Is there any trouble in torque converter turbine speed sensor circuit?	Repair or replace the torque converter turbine speed sensor circuit.	Go to step **5.**
5	**CHECK ENGINE SPEED INPUT CIRCUIT.** Check the engine speed input circuit. <Ref. to 4AT(diag)-38, DTC 11 ENGINE SPEED SIGNAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Is there any trouble in engine speed input circuit?	Repair or replace the engine speed input circuit.	Go to step **6.**
6	**CHECK INHIBITOR SWITCH CIRCUIT.** Check the inhibitor switch circuit. <Ref. to 4AT(diag)-99, CHECK INHIBITOR SWITCH, Diagnostic Procedure without Diagnostic Trouble Code (DTC).>	Is there any trouble in inhibitor switch circuit?	Repair or replace the inhibitor switch circuit.	Go to step **7.**
7	**CHECK BRAKE LIGHT SWITCH CIRCUIT.** Check the brake light switch circuit. <Ref. to 4AT(diag)-93, CHECK BRAKE SWITCH, Diagnostic Procedure without Diagnostic Trouble Code (DTC).>	Is there any trouble in brake light switch circuit?	Repair or replace the brake light switch circuit.	Go to step **8.**

	Step	Check	Yes	No
8	**CHECK ATF TEMPERATURE SENSOR CIRCUIT.** Check the ATF temperature sensor circuit. <Ref. to 4AT(diag)-42, DTC 27 ATF TEMPERATURE SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Is there any trouble in ATF temperature sensor circuit?	Repair or replace the ATF temperature sensor circuit.	Go to step **9.**
9	**CHECK POOR CONTACT.** Check poor contact in TCM connector.	Is there poor contact in TCM connector?	Repair the poor contact in TCM connector.	Go to step **10.**
10	**CHECK MECHANICAL TROUBLE.** Check mechanical trouble in automatic transmission.	Is there any mechanical trouble in automatic transmission?	Repair or replace the automatic transmission. <Ref. to 4AT-35, INSPECTION, Road Test.>	Replace the TCM. <Ref. to 4AT-75, Transmission Control Module (TCM).>

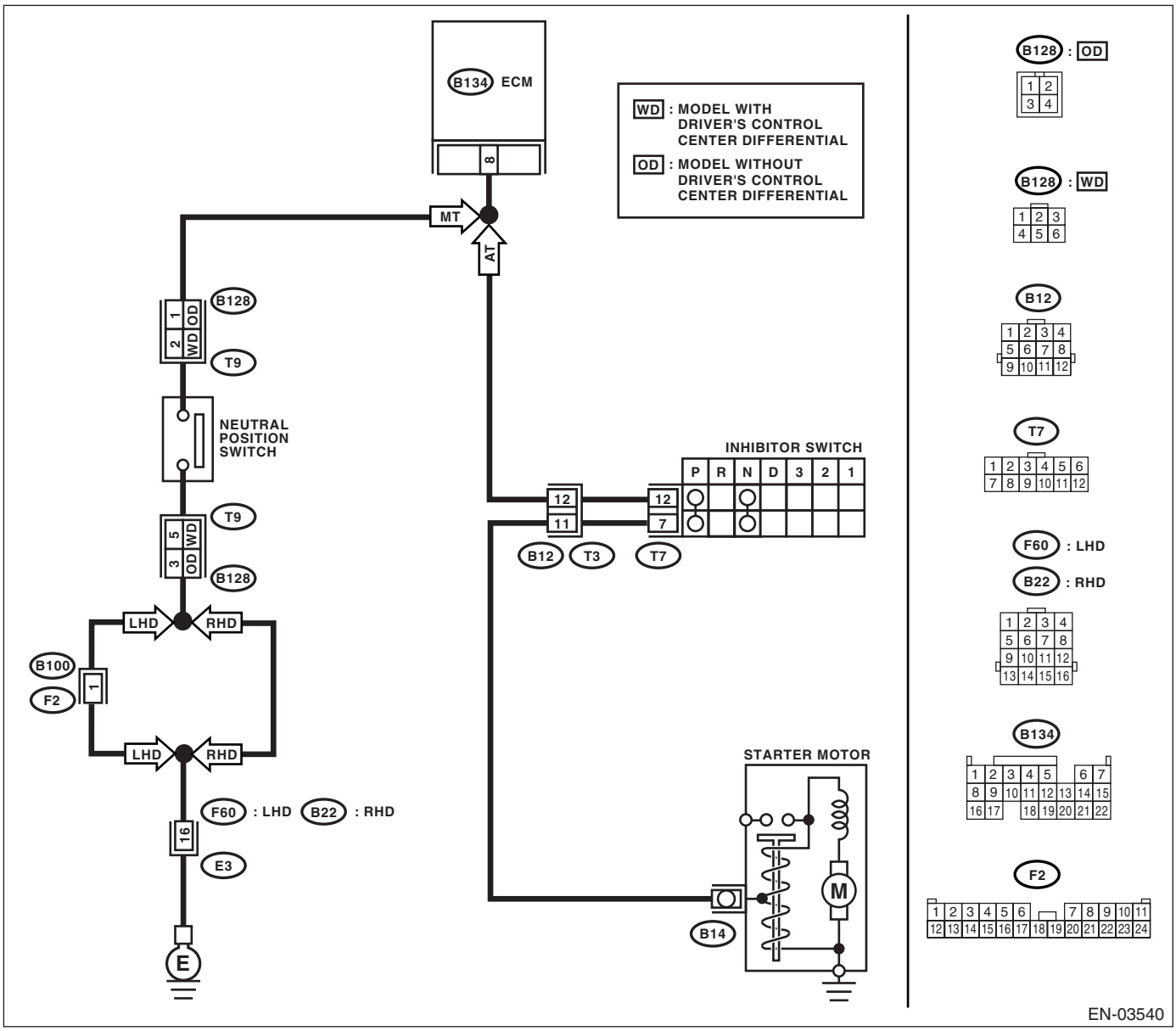
BU:DTC P0851 PARK/NEUTRAL SWITCH INPUT CIRCUIT LOW

1. AT MODEL

DTC DETECTING CONDITION:
Two consecutive driving cycles with fault
TROUBLE SYMPTOM:
Erroneous idling

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



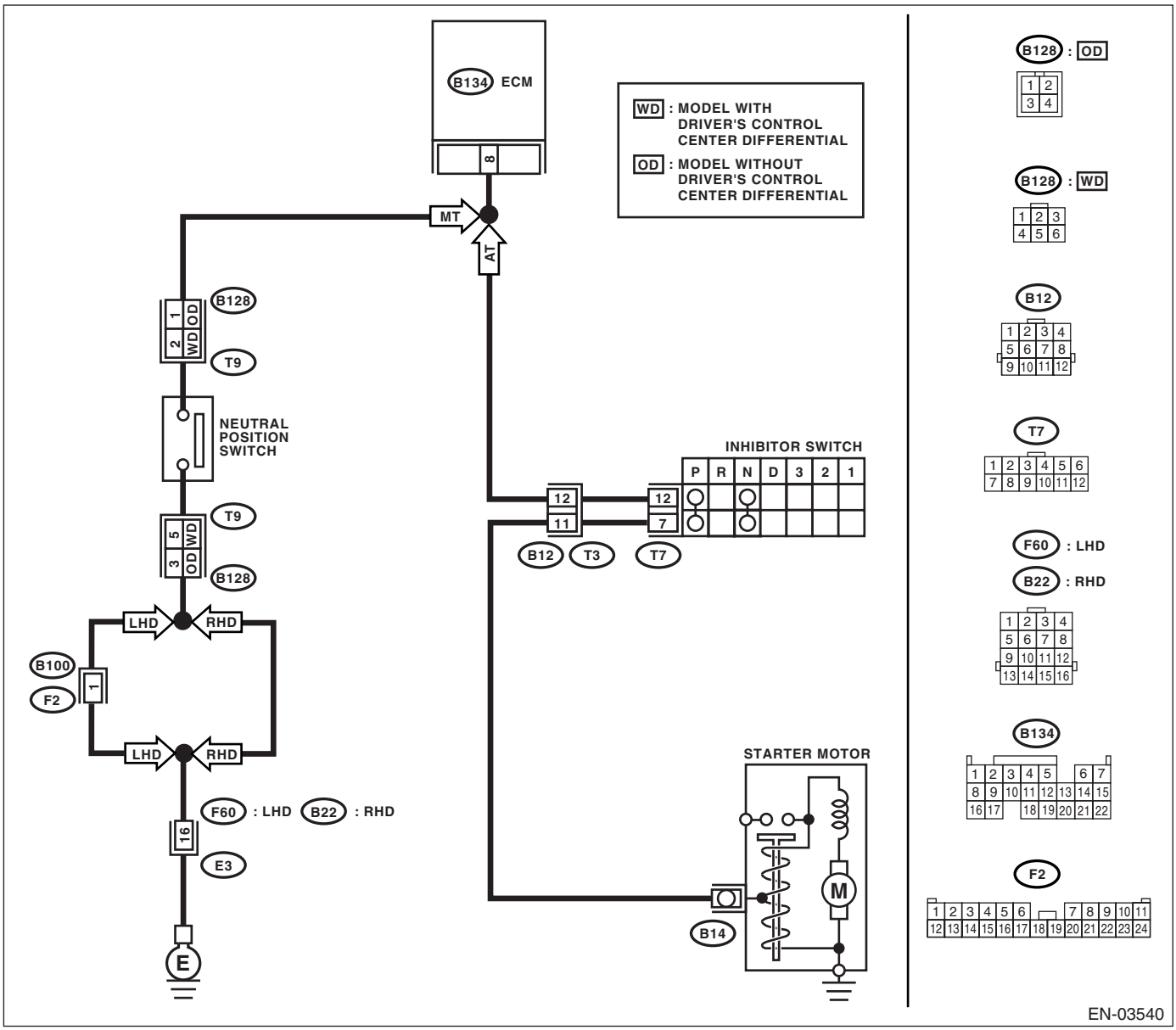
	Step	Check	Yes	No
1	**CHECK DTC P0705 ON DISPLAY.**	Is DTC P0705 indicated?	Inspect DTC P0705 using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4DOTC)(diag)-72, List of Diagnostic Trouble Code (DTC).>	Go to step **2.**
2	**CHECK INPUT SIGNAL FOR ECM.** 1) Turn the ignition switch to ON. 2) Place the select lever except for "N" and "P" positions. 3) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 8 (+) — Chassis ground (−):***	Is the voltage 4.5 — 5.5 V?	Even if malfunction indicator light lights up, the circuit has returned to a normal condition at this time.	Go to step **3.**
3	**CHECK HARNESS BETWEEN ECM AND TRANSMISSION HARNESS CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and transmission harness connector (T3). 3) Measure the resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 8 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **4.**	Repair ground short circuit in harness between ECM and transmission harness connector.
4	**CHECK TRANSMISSION HARNESS CONNECTOR.** 1) Disconnect the connector from inhibitor switch. 2) Measure the resistance of harness between transmission harness connector and engine ground. ***Connector & terminal*** ***(T3) No. 12 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **5.**	Repair ground short circuit in harness between transmission harness and inhibitor switch connector.
5	**CHECK INHIBITOR SWITCH.** Measure the resistance between inhibitor switch connector the receptacle's terminals in selector lever except for "N" position. ***Terminals*** ***No. 7 — No. 12:***	Is the resistance more than 1 MΩ?	Go to step **6.**	Replace the inhibitor switch. <Ref. to 4AT-53, Inhibitor Switch.>
6	**CHECK SELECTOR CABLE CONNECTION.**	Is there any fault in selector cable connection to inhibitor switch?	Repair selector cable connection. <Ref. to CS-34, INSPECTION, Select Cable.>	Contact your Subaru distributor service.

2. MT MODEL

DTC DETECTING CONDITION:
Two consecutive driving cycles with fault
TROUBLE SYMPTOM:
Erroneous idling

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK INPUT SIGNAL FOR ECM.** 1) Turn the ignition switch to ON. 2) Place the shift lever in neutral. 3) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 8 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **2.**	Go to step **4.**
2	**CHECK INPUT SIGNAL FOR ECM.** 1) Place the shift lever in a position except for neutral. 2) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 8 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **3.**	Go to step **4.**
3	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair poor contact in ECM connector.	Contact your Subaru distributor service.
4	**CHECK NEUTRAL POSITION SWITCH.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission harness. 3) Place the shift lever in neutral. 4) Measure the resistance between transmission harness and connector terminals. ***Connector & terminal*** ***Model without driver's control center differential*** ***(T9) No. 1 — No. 3:*** ***Model with driver's control center differential*** ***(T9) No. 2 — No. 5:***	Is the resistance less than 1 Ω?	Go to step **5.**	Repair short circuit in transmission harness or replace neutral position switch.
5	**CHECK NEUTRAL POSITION SWITCH.** 1) Place the shift lever in a position except for neutral. 2) Measure the resistance between transmission harness connector terminals. ***Connector & terminal*** ***Model without driver's control center differential*** ***(T9) No. 1 — No. 3:*** ***Model with driver's control center differential*** ***(T9) No. 2 — No. 5:***	Is the resistance more than 1 MΩ?	Go to step **6.**	Repair short circuit in transmission harness or replace neutral position switch.
6	**CHECK HARNESS BETWEEN ECM AND NEUTRAL POSITION SWITCH CONNECTOR.** Measure the resistance between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 8 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **7.**	Repair ground short circuit in harness between ECM and transmission harness connector.

	Step	Check	Yes	No
7	**CHECK HARNESS BETWEEN ECM AND NEUTRAL POSITION SWITCH CONNECTOR.** 1) Disconnect the connector from ECM. 2) Measure the resistance of harness between ECM and transmission harness connector. ***Connector & terminal*** ***Model without driver's control center differential*** ***(B134) No. 8 — (B128) No. 1:*** ***Model with driver's control center differential*** ***(B134) No. 8 — (B128) No. 2:***	Is the resistance less than 1 Ω?	Go to step **8.**	Repair open circuit in harness between ECM and transmission harness connector.
8	**CHECK HARNESS BETWEEN ENGINE GROUND AND NEUTRAL POSITION SWITCH CONNECTOR.** Measure the resistance of harness between transmission harness connector and engine ground. ***Connector & terminal*** ***Model without driver's control center differential*** ***(B128) No. 3 — Chassis ground:*** ***Model with driver's control center differential*** ***(B128) No. 5 — Chassis ground:***	Is the resistance less than 5 Ω?	Go to step **9.**	Repair open circuit between transmission harness connector and engine ground terminal.
9	**CHECK POOR CONTACT.** Check poor contact in transmission harness connector.	Is there poor contact in transmission harness connector?	Repair poor contact in transmission harness connector.	Contact your Subaru distributor service.

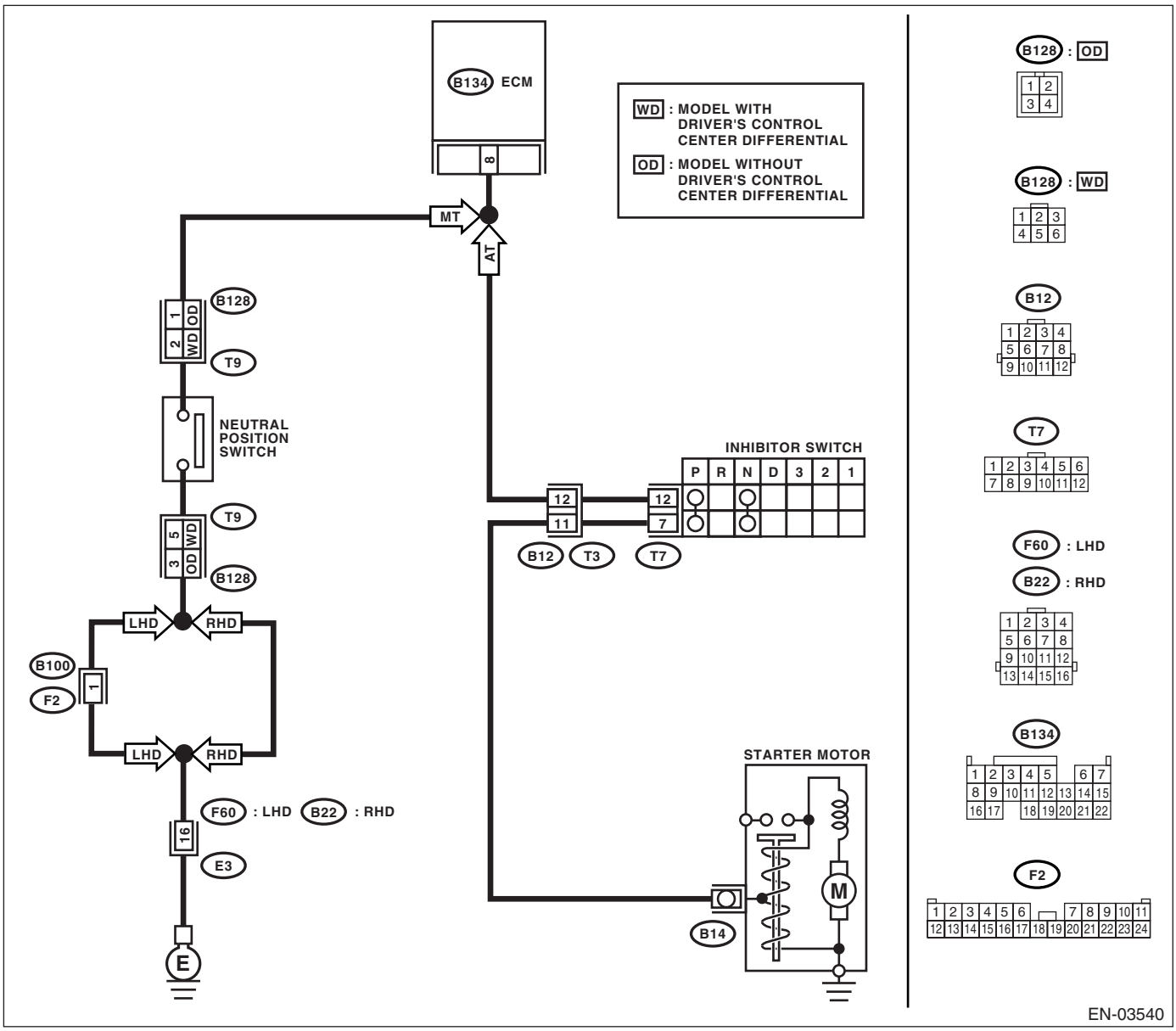
BV:DTC P0852 PARK/NEUTRAL SWITCH INPUT CIRCUIT HIGH

1. AT MODEL

DTC DETECTING CONDITION:
Two consecutive driving cycles with fault
TROUBLE SYMPTOM:
Erroneous idling

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK DTC P0705 ON DISPLAY.**	Is DTC P0705 indicated?	Inspect DTC P0705 using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4DOTC)(diag)-72, List of Diagnostic Trouble Code (DTC).>	Go to step **2.**
2	**CHECK INPUT SIGNAL FOR ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM and chassis ground in selector lever "N" and "P" positions. ***Connector & terminal*** ***(B134) No. 8 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Go to step **3.**	Go to step **5.**
3	**CHECK INPUT SIGNAL FOR ECM.** Measure the voltage between ECM and chassis ground in selector lever except for "N" and "P" positions. ***Connector & terminal*** ***(B134) No. 8 (+) — Chassis ground (–):***	Is the voltage 4.5 — 5.5 V?	Go to step **4.**	Go to step **5.**
4	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair poor contact in ECM connector.	Contact your Subaru distributor service. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.
5	**CHECK INPUT SIGNAL FOR ECM.** Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 8 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Repair battery short circuit in harness between ECM and inhibitor switch connector.	Go to step **6.**
6	**CHECK HARNESS BETWEEN ECM AND INHIBITOR SWITCH CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and inhibitor switch. 3) Measure the resistance of harness between ECM and inhibitor switch connector. ***Connector & terminal*** ***(B134) No. 8 — (T7) No. 12:***	Is the resistance less than 1 Ω?	Go to step **7.**	Repair harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and inhibitor switch connector • Poor contact in coupling connector • Poor contact in inhibitor switch connector • Poor contact in ECM connector

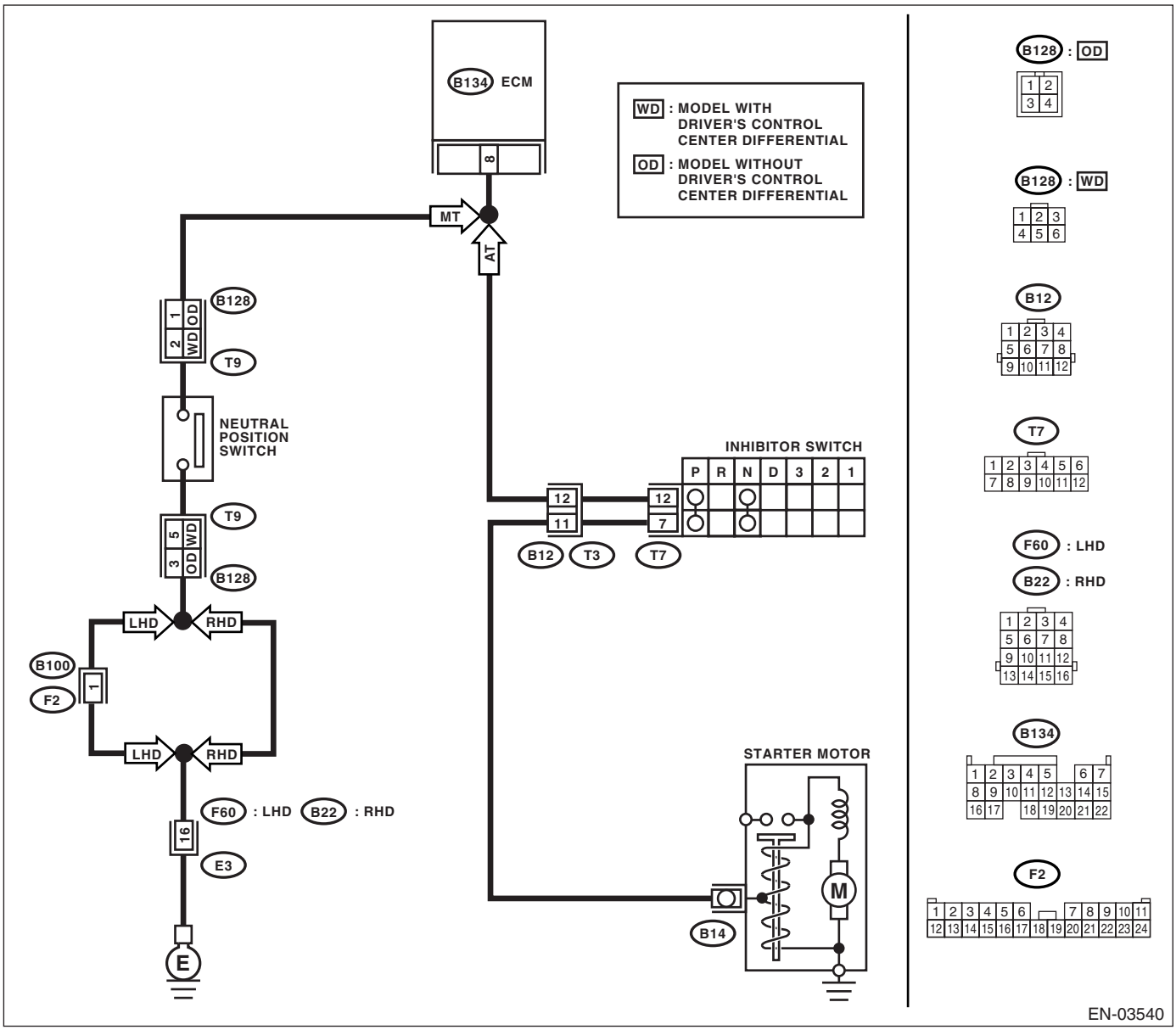
	Step	Check	Yes	No
7	**CHECK INHIBITOR SWITCH GROUND LINE.** Measure the resistance of harness between inhibitor switch connector and engine ground. ***Connector & terminal*** ***(T7) No. 7 — Chassis ground:***	Is the resistance less than 5 Ω?	Go to step **8.**	Repair open circuit in harness between inhibitor switch connector and starter motor ground line. NOTE: In this case, repair the following: • Open circuit in harness between inhibitor switch connector and starter motor ground line • Poor contact in starter motor connector • Poor contact in starter motor ground • Starter motor
8	**CHECK INHIBITOR SWITCH.** Measure the resistance between inhibitor switch connector receptacle's terminals in selector lever "N" and "P" positions. ***Terminals*** ***No. 7 — No. 12:***	Is the resistance less than 1 Ω?	Go to step **9.**	Replace the inhibitor switch. <Ref. to 4AT-53, Inhibitor Switch.>
9	**CHECK SELECTOR CABLE CONNECTION.**	Is there any fault in selector cable connection to inhibitor switch?	Repair selector cable connection. <Ref. to CS-34, INSPECTION, Select Cable.>	Contact your Subaru distributor service. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.

2. MT MODEL

DTC DETECTING CONDITION:
Two consecutive driving cycles with fault
TROUBLE SYMPTOM:
Erroneous idling

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK INPUT SIGNAL FOR ECM.** 1) Turn the ignition switch to ON. 2) Set the shift lever to except neutral position. 3) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 8 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **2.**	Go to step **4.**
2	**CHECK INPUT SIGNAL FOR ECM.** 1) Set the shift lever to neutral position. 2) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 8 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **3.**	Go to step **4.**
3	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair the poor contact in ECM connector.	Contact your Subaru distributor service.
4	**CHECK INPUT SIGNAL FOR ECM.** 1) Disconnect ECM connector from ECM. 2) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 8 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Repair the battery short circuit in harness between ECM and transmission connector.	Go to step **5.**
5	**CHECK HARNESS BETWEEN ECM AND TRANSMISSION HARNESS CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and transmission harness connector (T9). 3) Measure the resistance of harness between ECM and neutral switch connector. ***Connector & terminal*** ***Model without driver's control center differential*** ***(B134) No. 8 — (B128) No. 1:*** ***Model with driver's control center differential*** ***(B134) No. 8 — (B128) No. 2:***	Is the resistance less than 1 Ω?	Go to step **6.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and transmission harness • Poor contact in transmission harness connector • Poor contact in ECM connector
6	**CHECK NEUTRAL POSITION SWITCH GROUND LINE.** Measure the resistance of harness between transmission harness connector and engine ground. ***Connector & terminal*** ***Model without driver's control center differential*** ***(B128) No. 3 — Chassis ground:*** ***Model with driver's control center differential*** ***(B128) No. 5 — Chassis ground:***	Is the resistance less than 5 Ω?	Go to step **7.**	Repair the open circuit in harness of neutral position switch ground line.
7	**CHECK NEUTRAL POSITION SWITCH.** 1) Set the shift lever to neutral position. 2) Measure the resistance between transmission harness connector receptacle's terminals. ***Terminals*** ***Model without driver's control center differential*** ***No. 1 — No. 3:*** ***Model with driver's control center differential*** ***No. 2 — No. 5:***	Is the resistance less than 1 Ω?	Go to step **8.**	Replace the neutral position switch.

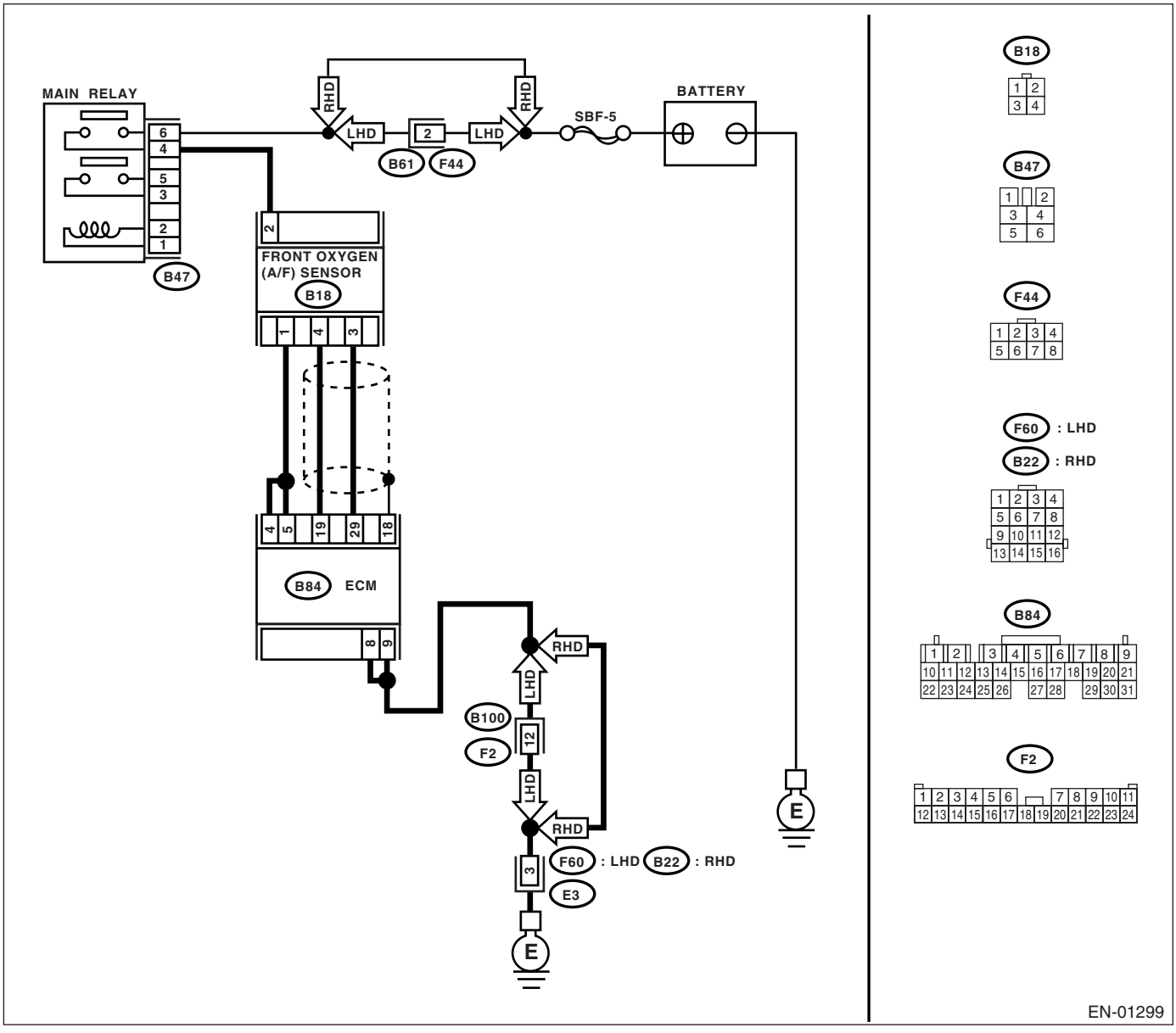
	Step	Check	Yes	No
8	**CHECK POOR CONTACT.** Check poor contact in the transmission harness connector.	Is there poor contact in the transmission harness connector?	Repair poor contact in transmission harness connector.	Contact your Subaru distributor service.

BW:DTC P1134 A/F SENSOR MICRO-COMPUTER PROBLEM (BANK 1 SENSOR 1)

DTC DETECTING CONDITION:
Immediately at fault recognition

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

WIRING DIAGRAM:



Step	Check	Yes	No
1 **CHECK ANY OTHER DTC.**	Does the Subaru Select Monitor or general scan tool indicate DTC P1134?	Replace the ECM. <Ref. to FU(H4DOTC)-50, Engine Control Module (ECM).>	A temporary poor contact.

BX:DTC P1152 O2 SENSOR CIRCUIT RANGE/PERFORMANCE (LOW) (BANK1 SENSOR1)

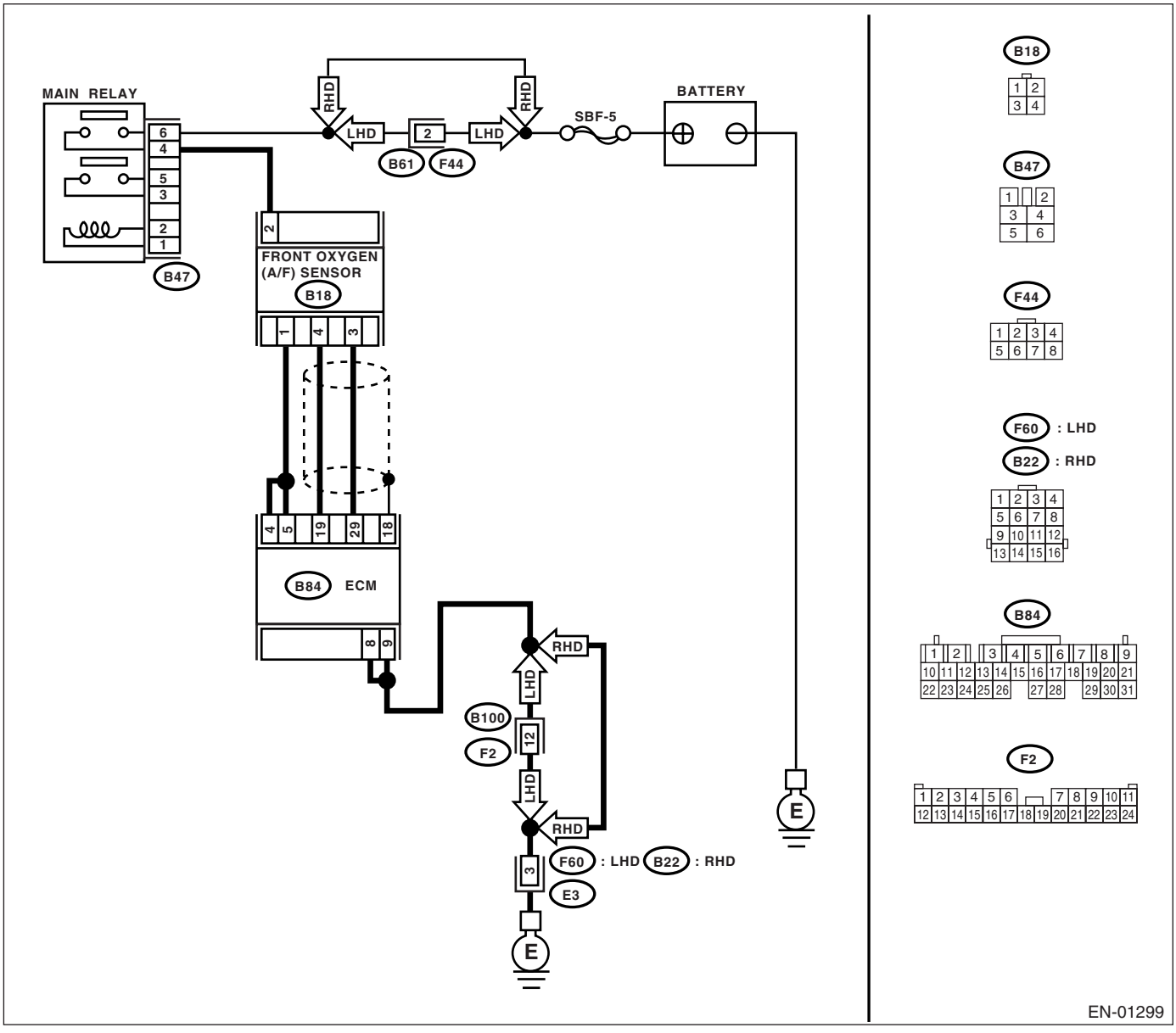
DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and front oxygen (A/F) sensor connector. 3) Measure the resistance of harness between ECM and front oxygen (A/F) sensor connector. ***Connector & terminal*** ***(B84) No. 29 — (B18) No. 3:*** ***(B84) No. 19 — (B18) No. 4:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and front oxygen (A/F) sensor connector • Poor contact in front oxygen (A/F) sensor connector • Poor contact in ECM connector
2	**CHECK POOR CONTACT.** Check poor contact in front oxygen (A/F) sensor connector.	Is there poor contact in front oxygen (A/F) sensor connector?	Repair the poor contact in front oxygen (A/F) sensor connector.	Replace the front oxygen (A/F) sensor. <Ref. to FU(H4DOTC)-45, Front Oxygen (A/F) Sensor.>

BY:DTC P1153 O2 SENSOR CIRCUIT RANGE/PERFORMANCE (HIGH) (BANK1 SENSOR1)

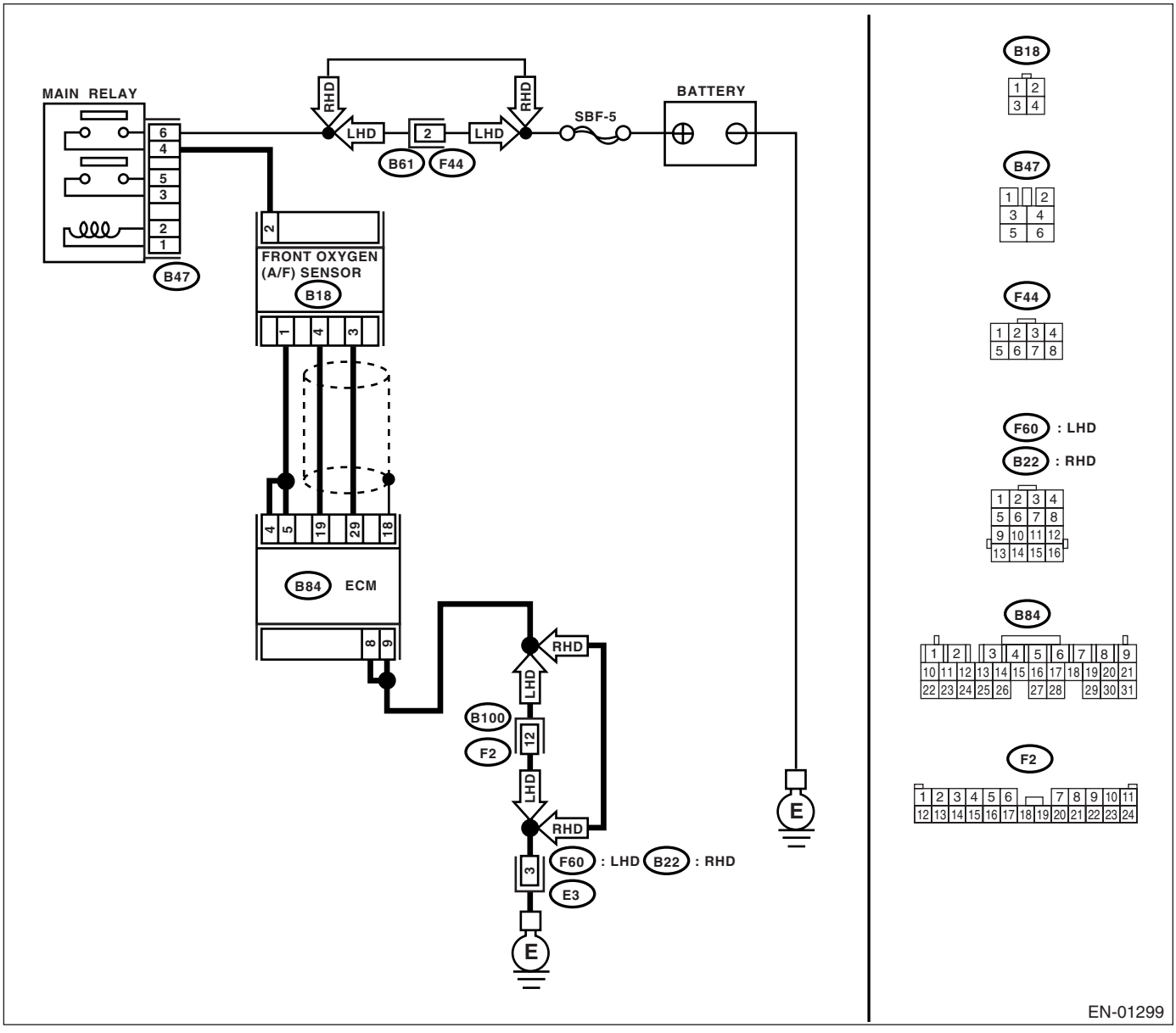
DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM and front oxygen (A/F) sensor. 3) Measure the resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B84) No. 19 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **2.**	Repair the ground short circuit in harness between ECM and front oxygen (A/F) sensor connector.
2	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** Measure the resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B84) No. 29 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **3.**	Repair the ground short circuit in harness between ECM and front oxygen (A/F) sensor connector.
3	**CHECK OUTPUT SIGNAL FOR ECM.** 1) Connect the connector to ECM and front oxygen (A/F) sensor. 2) Turn the ignition switch to ON. 3) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B84) No. 19 (+) — Chassis ground (−):***	Is the voltage more than 4.5 V?	Go to step **4.**	Go to step **5.**
4	**CHECK OUTPUT SIGNAL FOR ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B84) No. 19 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Repair the battery short circuit in harness between ECM and front oxygen (A/F) sensor connector. After repair, replace the ECM. <Ref. to FU(H4DOTC)-50, Engine Control Module (ECM).>	Repair the poor contact in ECM connector.
5	**CHECK OUTPUT SIGNAL FOR ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B84) No. 29 (+) — Chassis ground (−):***	Is the voltage more than 4.95 V?	Go to step **6.**	Replace the front oxygen (A/F) sensor. <Ref. to FU(H4DOTC)-45, Front Oxygen (A/F) Sensor.>
6	**CHECK OUTPUT SIGNAL FOR ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B84) No. 29 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Repair the battery short circuit in harness between ECM and front oxygen (A/F) sensor connector. After repair, replace the ECM. <Ref. to FU(H4DOTC)-50, Engine Control Module (ECM).>	Repair the poor contact in ECM connector.

BZ:DTC P1301 MISFIRE DETECTED (HIGH TEMPERATURE EXHAUST GAS)

DTC DETECTING CONDITION:

Immediately at fault recognition

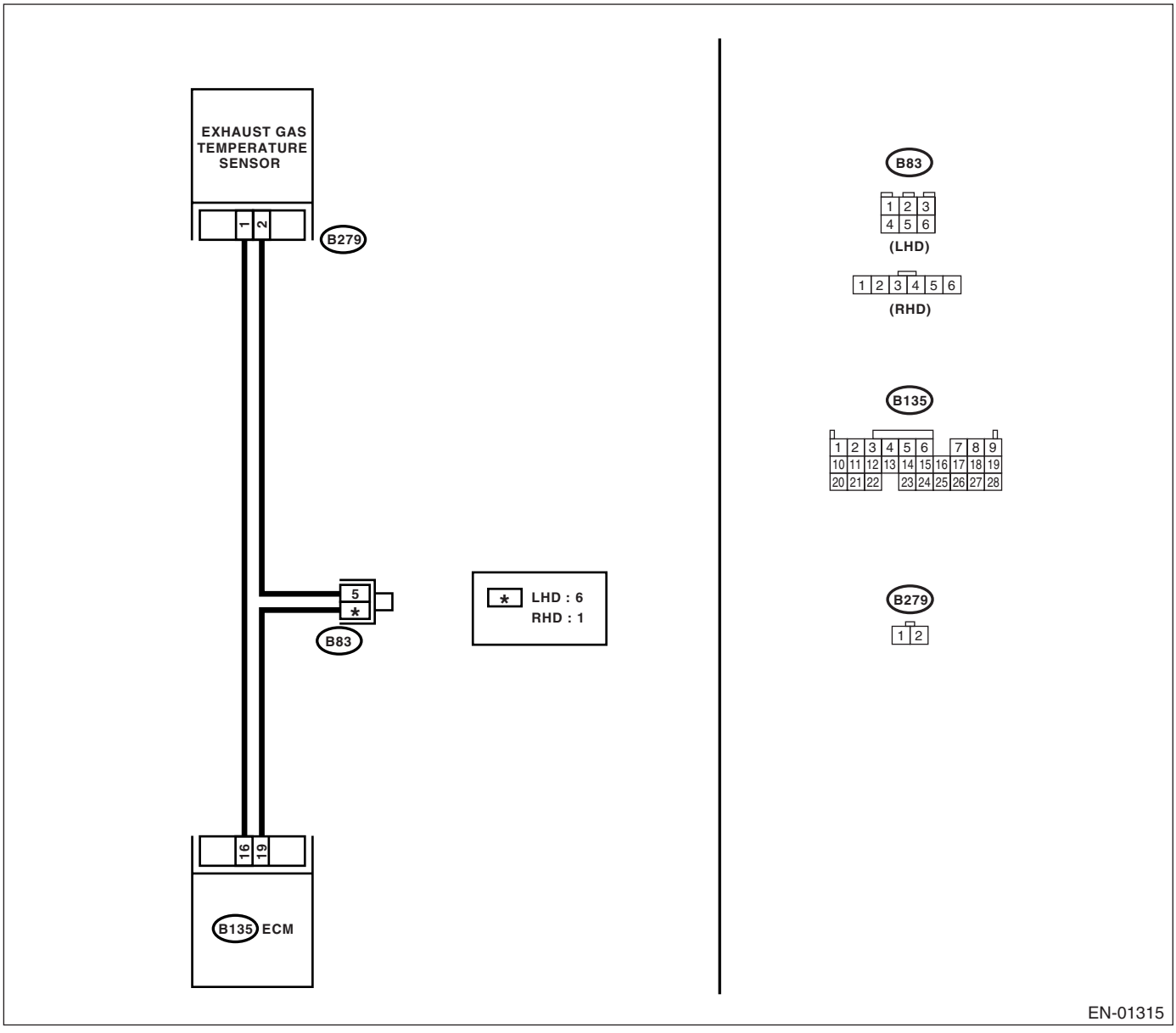
TROUBLE SYMPTOM:

- Erroneous idling
- Engine stalls.
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC.** Conduct the troubleshooting for all DTC P0301, P0302, P0303 and P0304. <Ref. to EN(H4DOTC)(diag)-72, List of Diagnostic Trouble Code (DTC).>	Does failure for repair or replacement exist?	Repair or replace the failure, then replace precatalytic converter.	Contact your Subaru distributor service.

CA:DTC P1306 OCV SOLENOID VALVE SIGNAL 1 CIRCUIT MALFUNCTION (OPEN)

DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

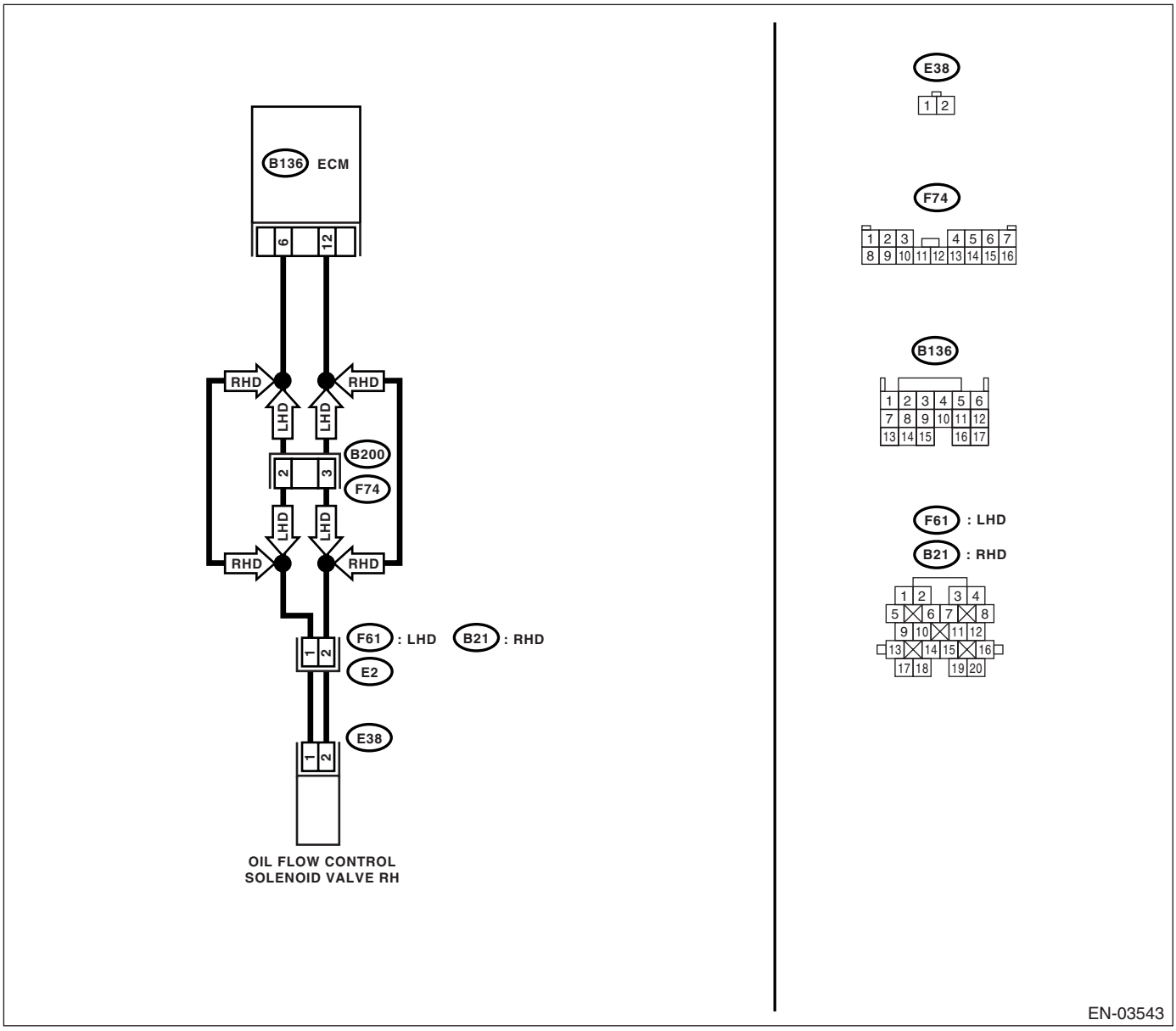
TROUBLE SYMPTOM:

Erroneous idling

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND OIL FLOW CONTROL SOLENOID VALVE.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM and oil flow control solenoid valve. 3) Measure the resistance between ECM and oil flow control solenoid valve. ***Connector & terminal*** ***(B136) No. 6 — (E38) No. 1:*** ***(B136) No. 12 — (E38) No. 2:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the open circuit in harness between ECM and oil flow control solenoid valve connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and oil flow control solenoid valve connector • Poor contact in coupling connector
2	**CHECK HARNESS BETWEEN ECM AND OIL FLOW CONTROL SOLENOID VALVE.** Measure the resistance between ECM and oil flow control solenoid valve. ***Connector & terminal*** ***(E38) No. 1 — Engine ground:*** ***(E38) No. 2 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **3.**	Repair the short circuit between ECM and oil flow control solenoid valve connector.
3	**CHECK OIL FLOW CONTROL SOLENOID VALVE.** 1) Remove the oil flow control solenoid valve. 2) Measure the resistance between oil flow control solenoid valve terminal. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 6 — 12 Ω?	Repair the poor contact in ECM and oil flow control solenoid valve.	Replace the oil flow control solenoid valve. <Ref. to ME(H4DOTC)-69, Camshaft.>

CB:DTC P1307 OCV SOLENOID VALVE SIGNAL 1 CIRCUIT MALFUNCTION (SHORT)

DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

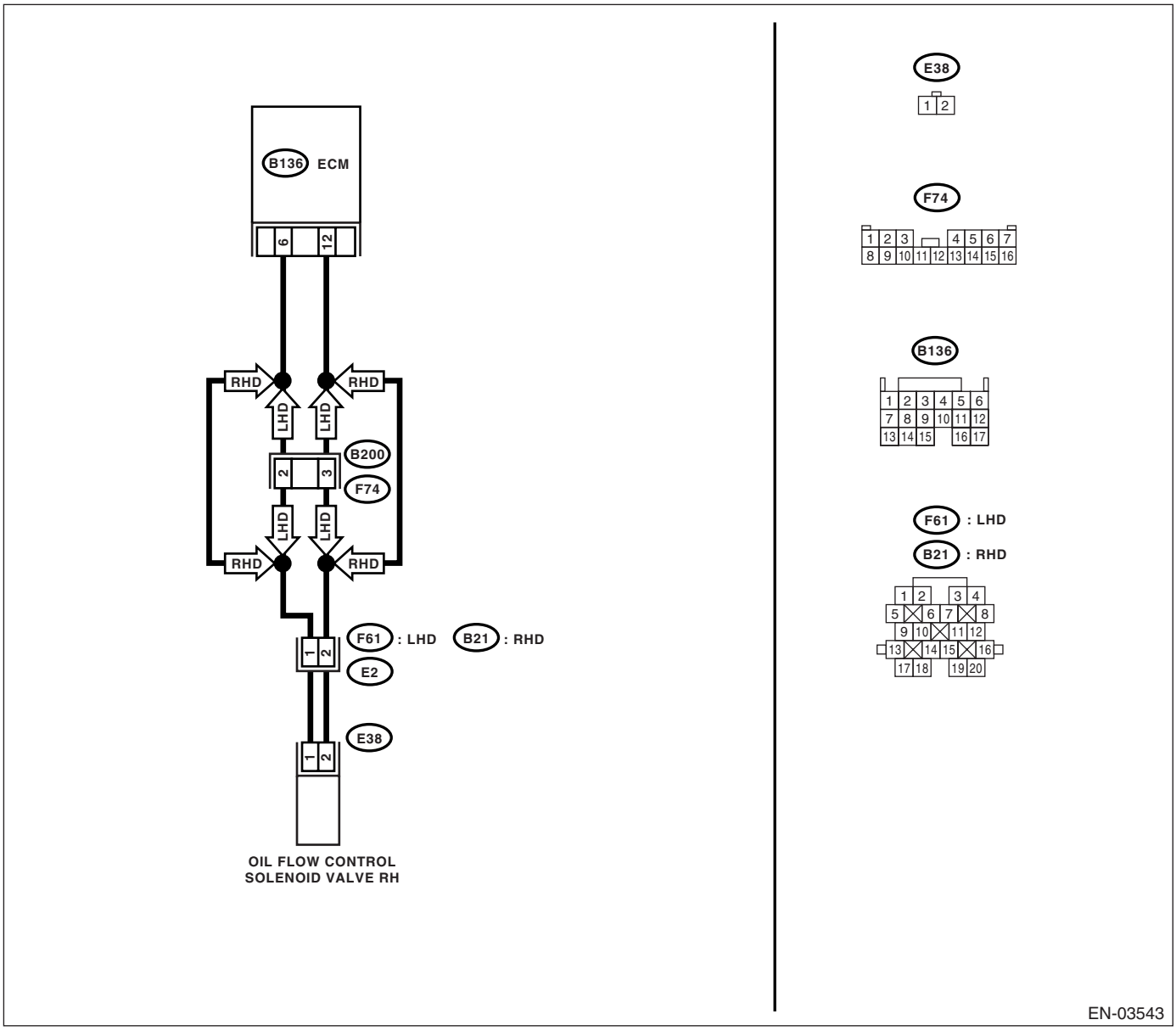
TROUBLE SYMPTOM:

Erroneous idling

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND OIL FLOW CONTROL SOLENOID VALVE.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM and oil flow control solenoid valve. 3) Measure the resistance between ECM and oil flow control solenoid valve. ***Connector & terminal*** ***(B136) No. 6 — (E38) No. 1:*** ***(B136) No. 12 — (E38) No. 2:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the open circuit in harness between ECM and oil flow control solenoid valve connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and oil flow control solenoid valve connector • Poor contact in coupling connector
2	**CHECK HARNESS BETWEEN ECM AND OIL FLOW CONTROL SOLENOID VALVE.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM and oil flow control solenoid valve. 3) Measure the resistance between ECM and oil flow control solenoid valve. ***Connector & terminal*** ***(E38) No. 1 — Engine ground:*** ***(E38) No. 2 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **3.**	Repair the short circuit between ECM and oil flow control solenoid valve connector.
3	**CHECK OIL FLOW CONTROL SOLENOID VALVE.** 1) Remove the oil flow control solenoid valve. 2) Measure the resistance between oil flow control solenoid valve terminal. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 6 — 12 Ω?	Repair the poor contact in ECM and oil flow control solenoid valve.	Replace the oil flow control solenoid valve. <Ref. to ME(H4DOTC)-69, Camshaft.>

CC:DTC P1308 OCV SOLENOID VALVE SIGNAL 2 CIRCUIT MALFUNCTION (OPEN)

DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

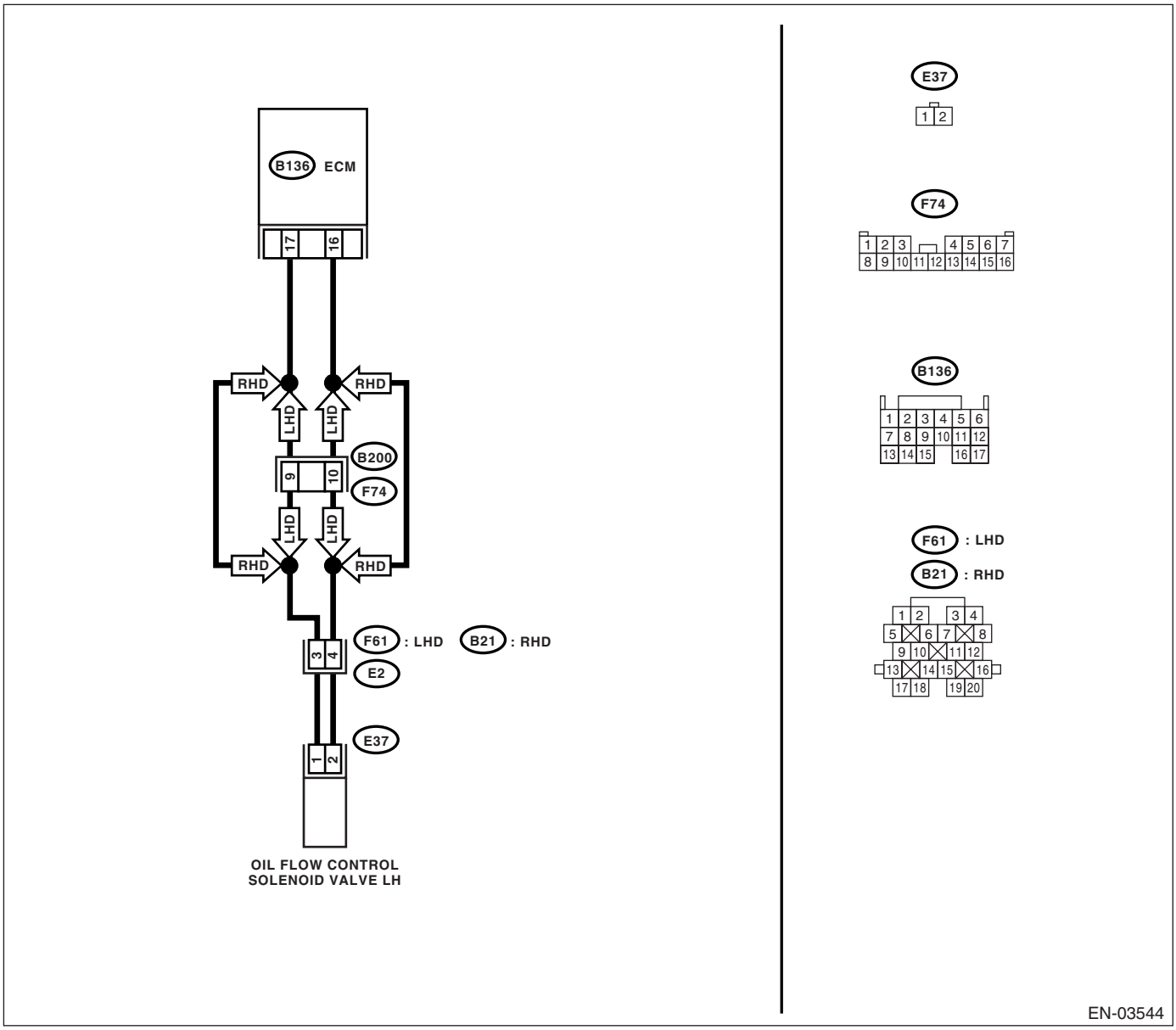
TROUBLE SYMPTOM:

Erroneous idling

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND OIL FLOW CONTROL SOLENOID VALVE.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM and oil flow control solenoid valve. 3) Measure the resistance between ECM and oil flow control solenoid valve. ***Connector & terminal*** ***(B136) No. 17 — (E37) No. 1:*** ***(B136) No. 16 — (E37) No. 2:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the open circuit in harness between ECM and oil flow control solenoid valve connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and oil flow control solenoid valve connector • Poor contact in coupling connector
2	**CHECK HARNESS BETWEEN ECM AND OIL FLOW CONTROL SOLENOID VALVE.** Measure the resistance between ECM and oil flow control solenoid valve. ***Connector & terminal*** ***(E37) No. 1 — Engine ground:*** ***(E37) No. 2 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **3.**	Repair the short circuit between ECM and oil flow control solenoid valve connector.
3	**CHECK OIL FLOW CONTROL SOLENOID VALVE.** 1) Remove the oil flow control solenoid valve. 2) Measure the resistance between oil flow control solenoid valve terminal. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 6 — 12 Ω?	Repair the poor contact in ECM and oil flow control solenoid valve.	Replace the oil flow control solenoid valve. <Ref. to ME(H4DOTC)-69, Camshaft.>

CD:DTC P1309 OCV SOLENOID VALVE SIGNAL 2 CIRCUIT MALFUNCTION (SHORT)

DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

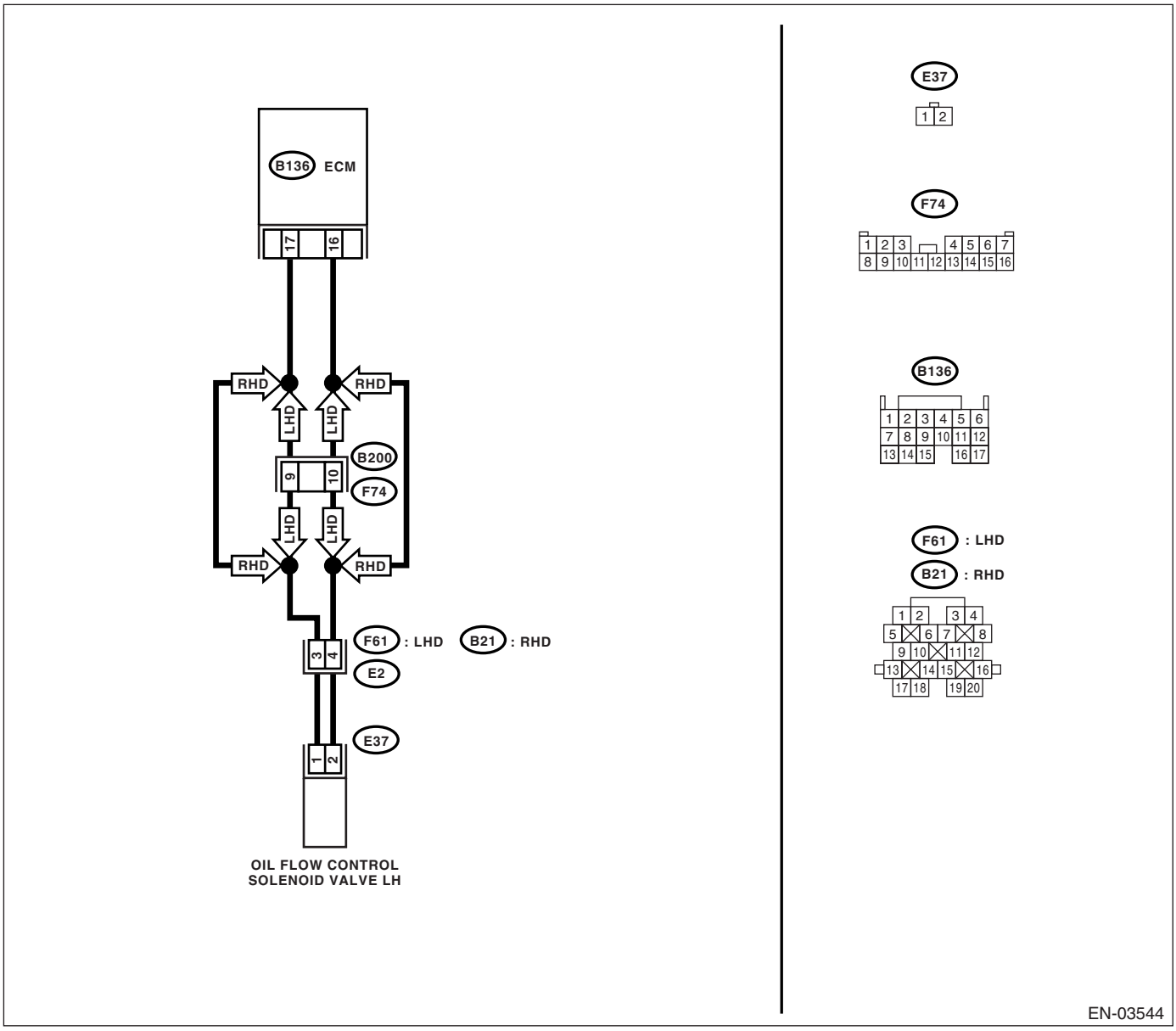
TROUBLE SYMPTOM:

Erroneous idling

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND OIL FLOW CONTROL SOLENOID VALVE.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM and oil flow control solenoid valve. 3) Measure the resistance between ECM and oil flow control solenoid valve. ***Connector & terminal*** ***(B136) No. 17 — (E37) No. 1:*** ***(B136) No. 16 — (E37) No. 2:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the open circuit in harness between ECM and oil flow control solenoid valve connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and oil flow control solenoid valve connector • Poor contact in coupling connector
2	**CHECK HARNESS BETWEEN ECM AND OIL FLOW CONTROL SOLENOID VALVE.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM and oil flow control solenoid valve. 3) Measure the resistance between ECM and oil flow control solenoid valve. ***Connector & terminal*** ***(E37) No. 1 — Engine ground:*** ***(E37) No. 2 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **3.**	Repair the short circuit between ECM and oil flow control solenoid valve connector.
3	**CHECK OIL FLOW CONTROL SOLENOID VALVE.** 1) Remove the oil flow control solenoid valve. 2) Measure the resistance between oil flow control solenoid valve terminal. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 6 — 12 Ω?	Repair the poor contact in ECM and oil flow control solenoid valve.	Replace the oil flow control solenoid valve. <Ref. to ME(H4DOTC)-69, Camshaft.>

CE:DTC P1312 EXHAUST GAS TEMPERATURE SENSOR MALFUNCTION

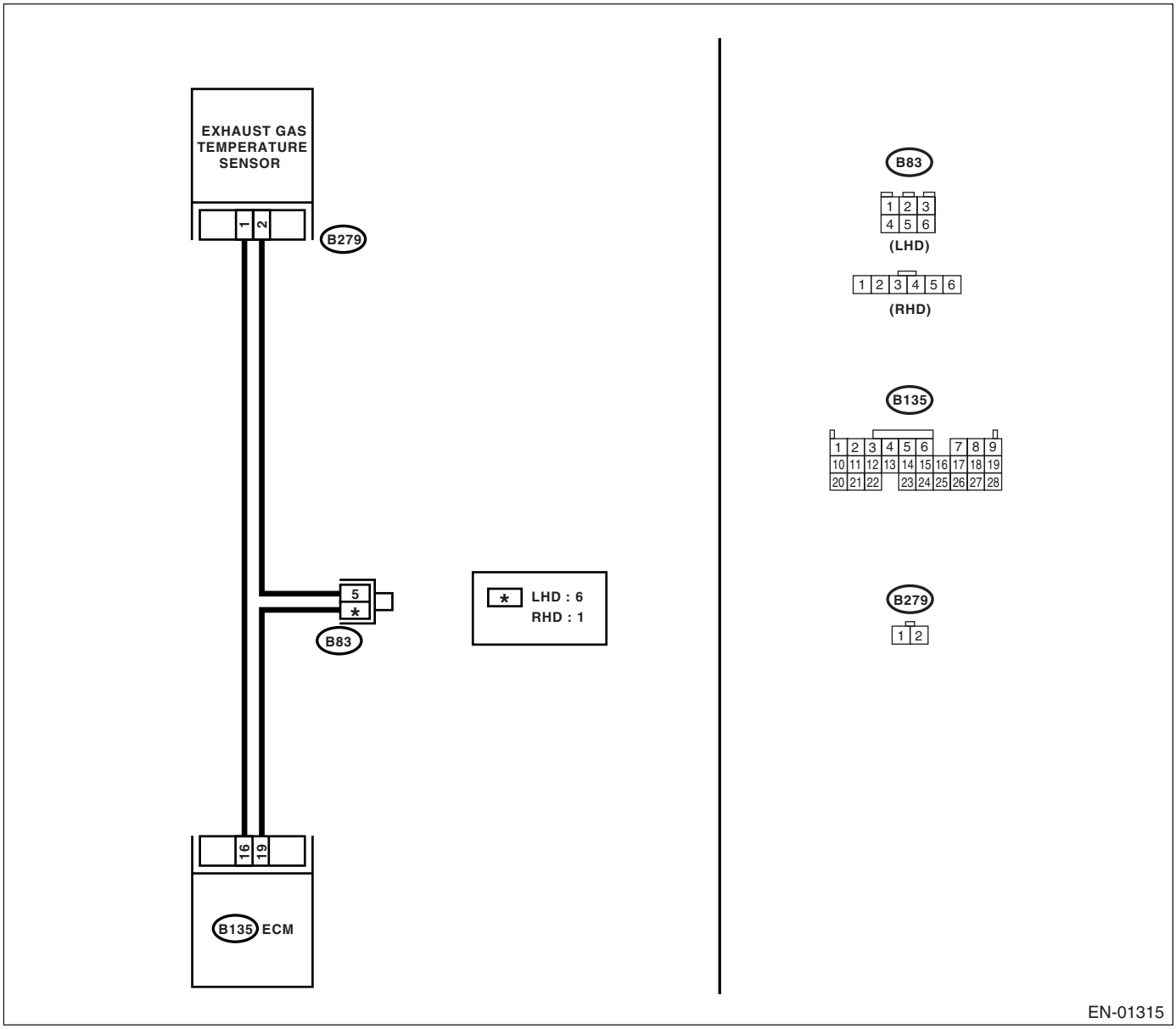
DTC DETECTING CONDITION:

Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

WIRING DIAGRAM:



Step		Check	Yes	No
1	**CHECK ANY OTHER DTC.**	Is any other DTC displayed?	Inspect the relevant DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4DOTC)(diag)-72, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P1312.	Replace the exhaust gas temperature sensor. <Ref. to FU(H4DOTC)-49, Exhaust Temperature Sensor.>

CF:DTC P1518 STARTER SWITCH CIRCUIT LOW INPUT

DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

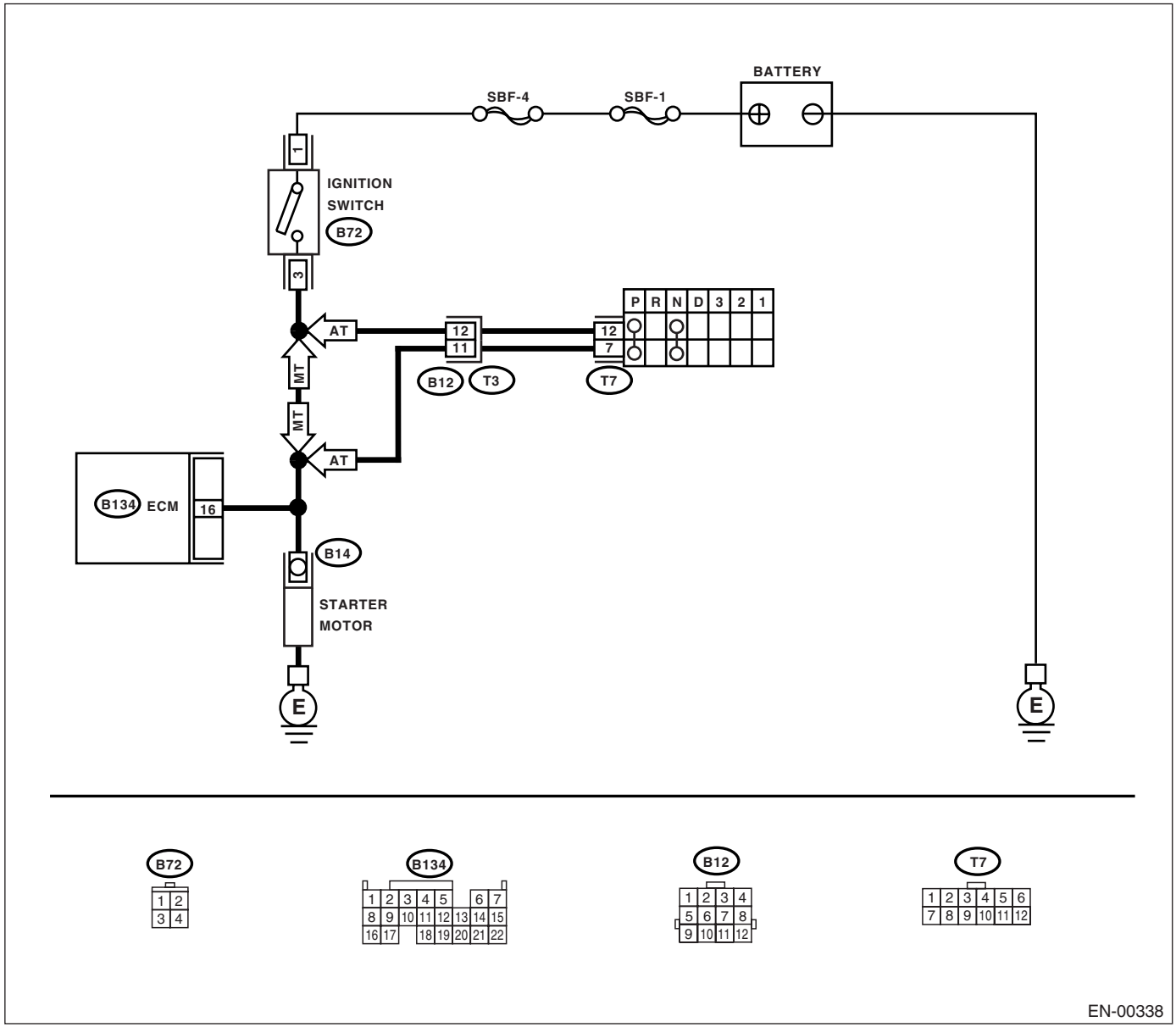
TROUBLE SYMPTOM:

Failure of engine to start

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

WIRING DIAGRAM:



Step	Check	Yes	No
1 **CHECK OPERATION OF STARTER MOTOR.**	Does the starter motor operate when ignition switch is turned to START?	Repair the harness and connector. NOTE: In this case, repair the following: • Open or ground short circuit in harness between ECM and starter motor connector • Poor contact in ECM connector	Check the starter motor circuit. <Ref. to EN(H4DOTC)(diag)-59, STARTER MOTOR CIRCUIT, Diagnostics for Engine Starting Failure.>

CG:DTC P1544 EXHAUST GAS TEMPERATURE TOO HIGH

DTC DETECTING CONDITION:

Immediately at fault recognition

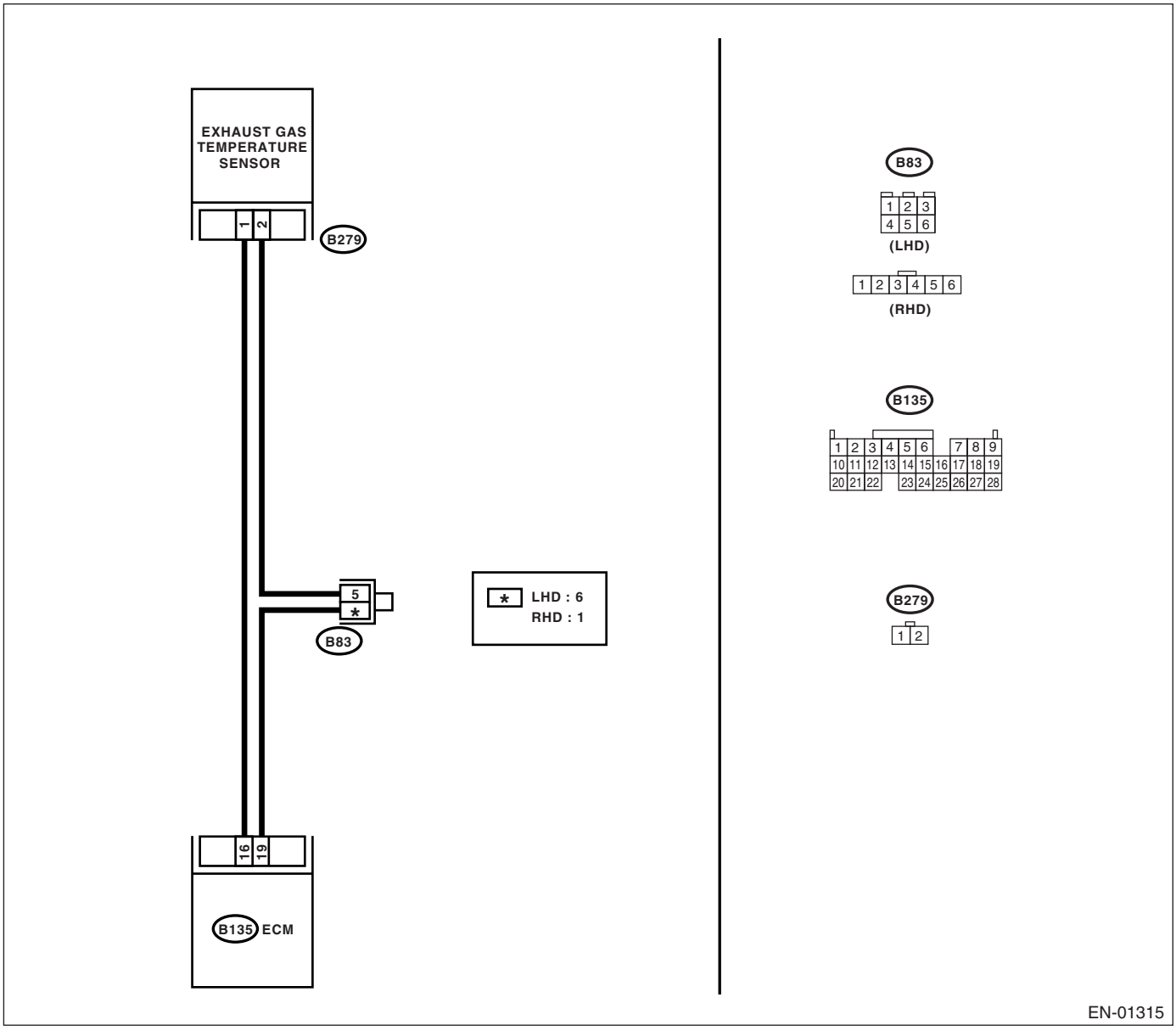
TROUBLE SYMPTOM:

- Erroneous idling
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC.**	Is any other DTC displayed?	Inspect the relevant DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4DOTC)(diag)-72, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P1544.	Go to step **2.**
2	**CHECK EXHAUST SYSTEM.** Check the exhaust system parts. NOTE: Check the following items. • Loose installation of exhaust manifold. • Cracks or hole of exhaust manifold. • Loose installation of front oxygen (A/F) sensor.	Is there a fault in exhaust system?	Repair or replace the failure, then replace precatalytic converter.	Contact your Subaru distributor service.

CH:DTC P1560 BACK-UP VOLTAGE CIRCUIT MALFUNCTION

DTC DETECTING CONDITION:

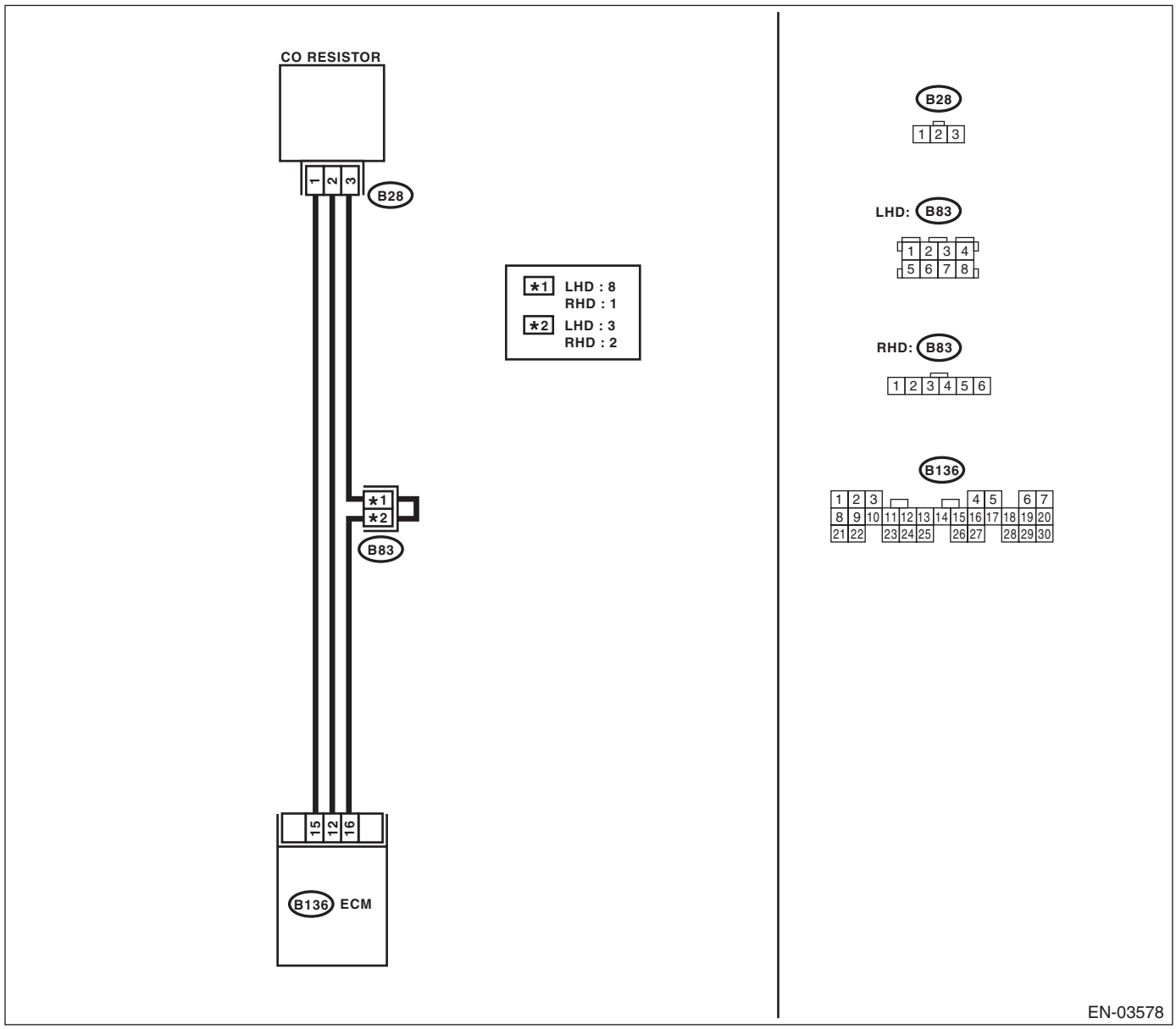
Immediately at fault recognition

CAUTION:

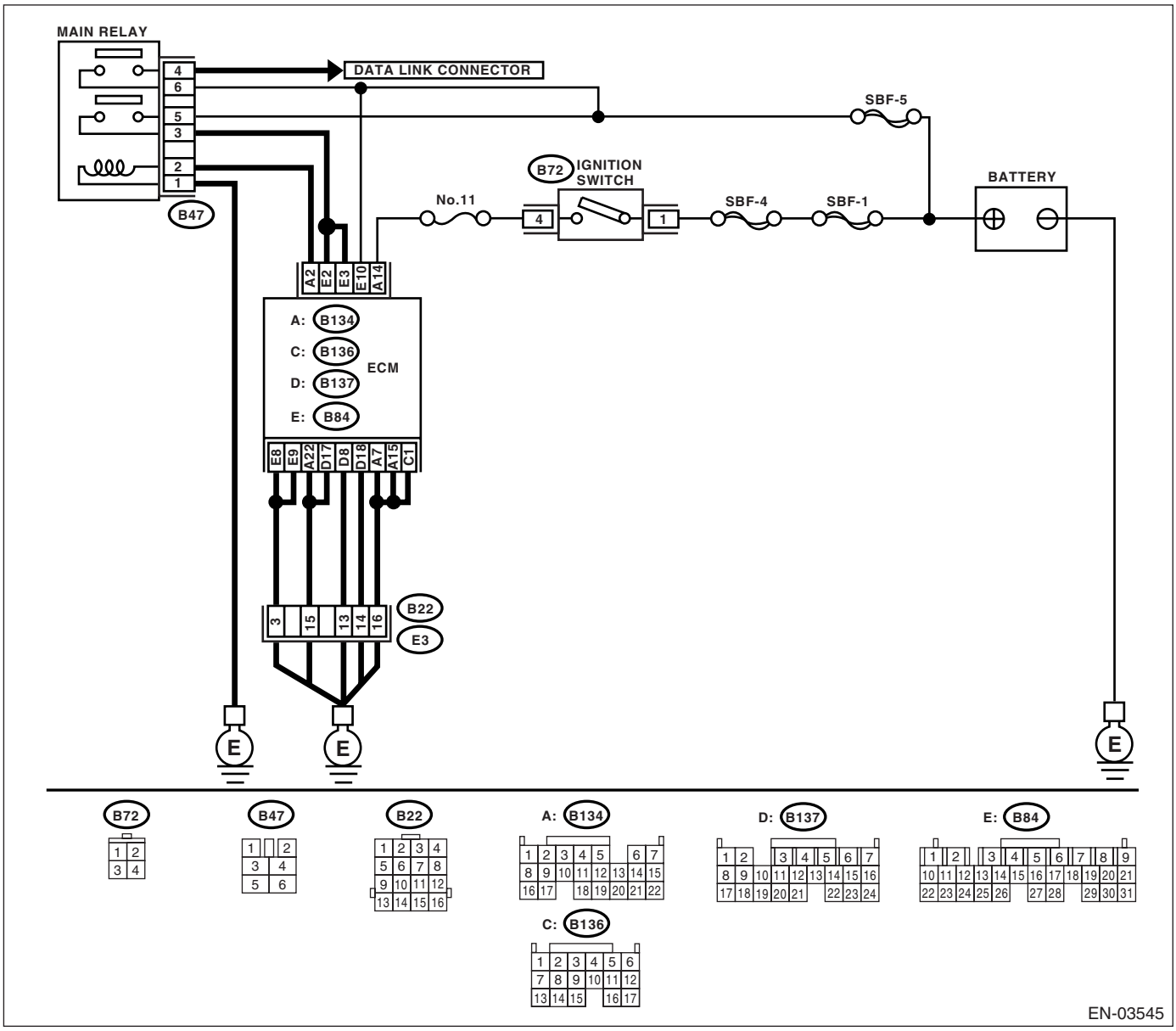
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

WIRING DIAGRAM:

- LHD model



- RHD model


MAIN RELAY
DATA LINK CONNECTOR
SBF-5
B72
IGNITION SWITCH
BATTERY
No.11
SBF-4
SBF-1
B47
A2
E2
E3
E10
A14
A: B134
C: B136
D: B137
E: B84
ECM
E8
E9
A22
D17
D8
D18
A7
A15
C1
B22
E3
3
15
13
14
16
E
B72
B47
B22
A: B134
D: B137
E: B84
C: B136
EN-03545

	Step	Check	Yes	No
1	**CHECK INPUT SIGNAL FOR ECM.** 1) Turn the ignition switch to OFF. 2) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B84) No. 10 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Repair the poor contact in ECM connector.	Go to step **2.**
2	**CHECK HARNESS BETWEEN ECM AND MAIN FUSE BOX CONNECTOR.** 1) Disconnect the battery negative terminal, and then disconnect the positive terminal. 2) Disconnect the connector from ECM. 3) Measure the resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***(B84) No. 10 — Chassis ground:***	Is the resistance less than 10 Ω?	Repair the ground short circuit in harness between ECM connector and battery terminal.	Go to step **3.**
3	**CHECK FUSE SBF-5.**	Is the fuse blown?	Replace the fuse.	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and battery • Poor contact in ECM connector • Poor contact in battery terminal

CI: DTC P1711 ENGINE TORQUE CONTROL SIGNAL #1 CIRCUIT MALFUNCTION

DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

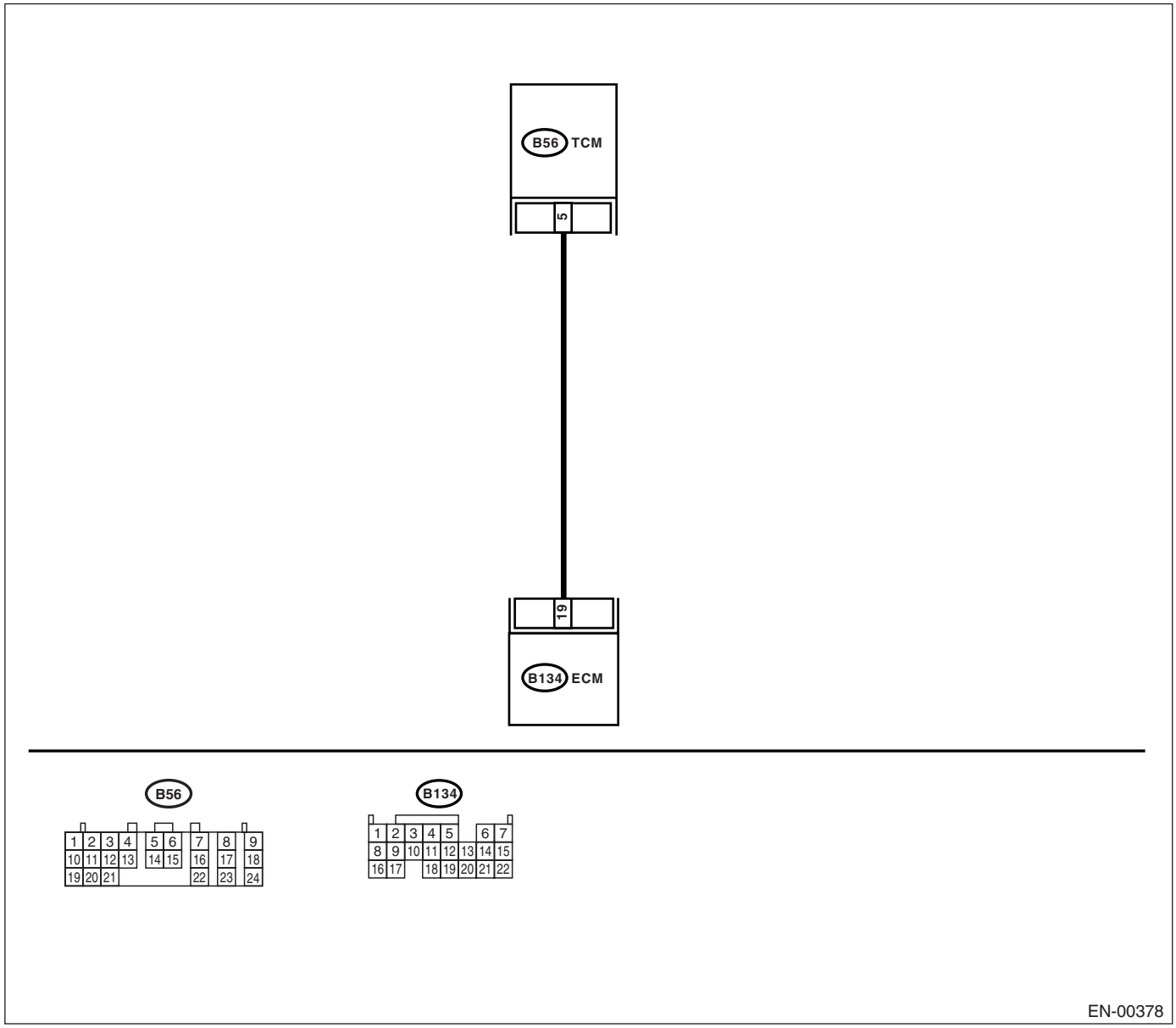
TROUBLE SYMPTOM:

Excessive shift shock

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK INPUT SIGNAL FOR ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 19 (+) — Chassis ground (−):***	Is the voltage more than 4.5 V?	Go to step **2.**	Go to step **4.**
2	**CHECK INPUT SIGNAL FOR ECM.** Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 19 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Repair the battery short circuit in harness between ECM and TCM connector.	Go to step **3.**
3	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair the poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H4DOTC)-50, Engine Control Module (ECM).>
4	**CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and TCM. 3) Measure the resistance of harness between ECM and TCM connector. ***Connector & terminal*** ***(B134) No. 19 — (B56) No. 5:***	Is the resistance less than 1 Ω?	Go to step **5.**	Repair the open circuit in harness between ECM and TCM connector.
5	**CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.** Measure the resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 19 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **6.**	Repair the ground short circuit in harness between ECM and TCM connector.
6	**CHECK POOR CONTACT.** Check poor contact in TCM connector.	Is there poor contact in TCM connector?	Repair the poor contact in TCM connector.	Replace the TCM. <Ref. to 4AT-75, Transmission Control Module (TCM).>

CJ:DTC P1712 ENGINE TORQUE CONTROL SIGNAL #2 CIRCUIT MALFUNCTION

DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

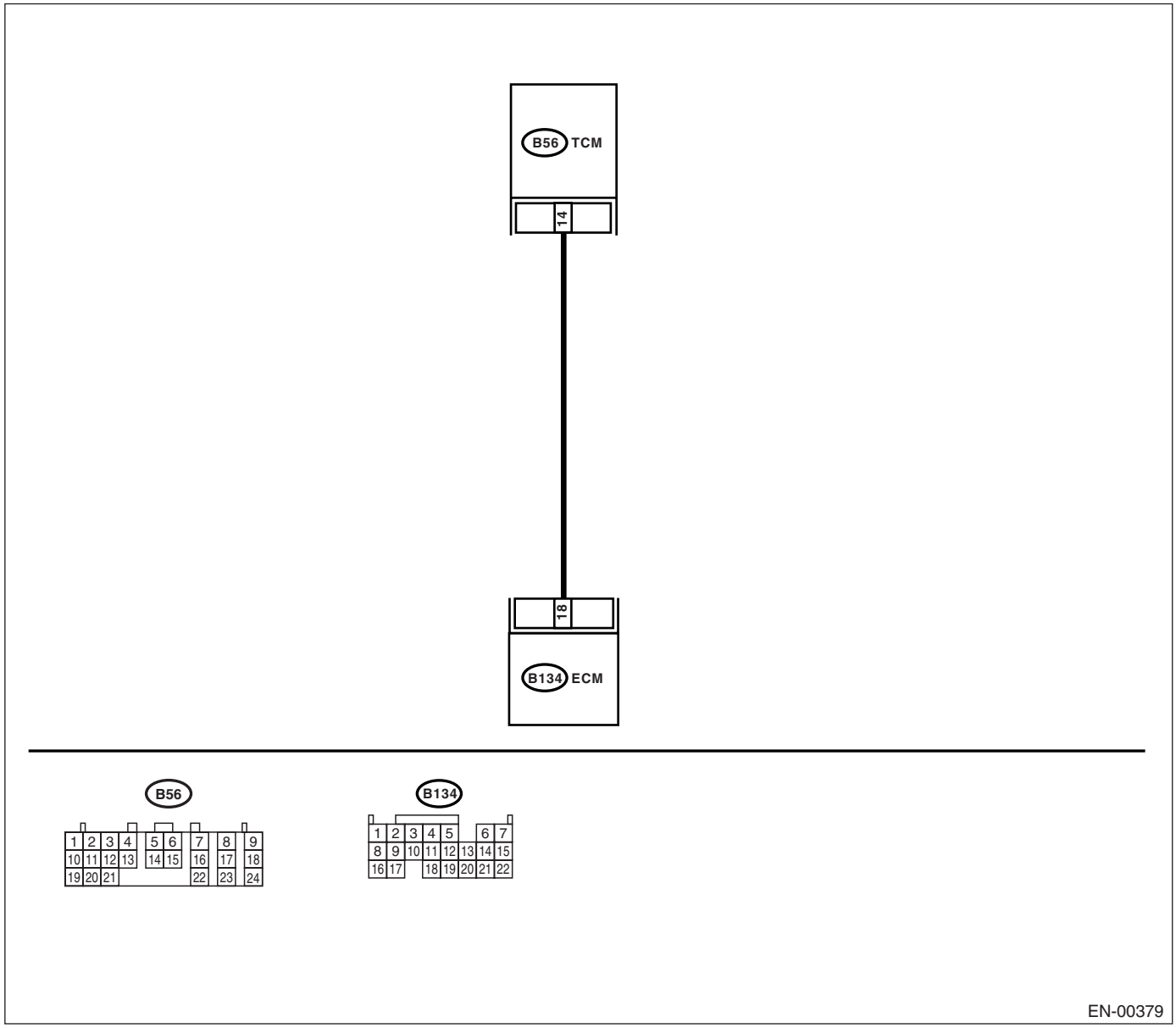
TROUBLE SYMPTOM:

Excessive shift shock

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK INPUT SIGNAL FOR ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 18 (+) — Chassis ground (−):***	Is the voltage more than 4.5 V?	Go to step **2.**	Go to step **4.**
2	**CHECK INPUT SIGNAL FOR ECM.** Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 18 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Repair the battery short circuit in harness between ECM and TCM connector.	Go to step **3.**
3	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair the poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H4DOTC)-50, Engine Control Module (ECM).>
4	**CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and TCM. 3) Measure the resistance of harness between ECM and TCM connector. ***Connector & terminal*** ***(B134) No. 18 — (B56) No. 14:***	Is the resistance less than 1 Ω?	Go to step **5.**	Repair the open circuit in harness between ECM and TCM connector.
5	**CHECK HARNESS BETWEEN ECM AND TCM CONNECTOR.** Measure the resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 18 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **6.**	Repair the ground short circuit in harness between ECM and TCM connector.
6	**CHECK POOR CONTACT.** Check poor contact in TCM connector.	Is there poor contact in TCM connector?	Repair the poor contact in TCM connector.	Replace the TCM. <Ref. to 4AT-75, Transmission Control Module (TCM).>

CK:DTC P2004 INTAKE MANIFOLD RUNNER CONTROL STUCK OPEN (BANK 1)

DTC DETECTING CONDITION:
Immediately at fault recognition

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC.**	Is any other DTC displayed?	Inspect the relevant DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4DOTC)(diag)-72, List of Diagnostic Trouble Code (DTC).>	Go to step **2.**
2	**CHECK TUMBLE GENERATOR VALVE RH.** 1) Remove the tumble generator valve assembly. 2) Check the tumble generator valve body.	Does the tumble generator valve move smoothly? (No dirt or foreign materials clogged)	Replace the tumble generator valve assembly. <Ref. to FU(H4DOTC)-40, Tumble Generator Valve Assembly.>	Clean the tumble generator valve.

CL:DTC P2005 INTAKE MANIFOLD RUNNER CONTROL STUCK OPEN (BANK 2)

DTC DETECTING CONDITION:
Immediately at fault recognition

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC.**	Is any other DTC displayed?	Inspect the relevant DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4DOTC)(diag)-72, List of Diagnostic Trouble Code (DTC).>	Go to step **2.**
2	**CHECK TUMBLE GENERATOR VALVE LH.** 1) Remove the tumble generator valve assembly. 2) Check the tumble generator valve body.	Does the tumble generator valve move smoothly? (No dirt or foreign materials clogged)	Replace the tumble generator valve assembly. <Ref. to FU(H4DOTC)-40, Tumble Generator Valve Assembly.>	Clean the tumble generator valve.

CM:DTC P2006 INTAKE MANIFOLD RUNNER CONTROL STUCK CLOSED (BANK 1)

DTC DETECTING CONDITION:
Immediately at fault recognition

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC.**	Is any other DTC displayed?	Inspect the relevant DTC using "List of Diagnostic Trouble Code (DTC)" <Ref. to EN(H4DOTC)(diag)-72, List of Diagnostic Trouble Code (DTC).>	Go to step **2.**
2	**CHECK TUMBLE GENERATOR VALVE RH.** 1) Remove the tumble generator valve assembly. 2) Check the tumble generator valve body.	Does the tumble generator valve move smoothly? (No dirt or foreign materials clogged)	Replace the tumble generator valve assembly. <Ref. to FU(H4DOTC)-40, Tumble Generator Valve Assembly.>	Clean the tumble generator valve.

CN:DTC P2007 INTAKE MANIFOLD RUNNER CONTROL STUCK CLOSED (BANK 2)

DTC DETECTING CONDITION:
Immediately at fault recognition

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC.**	Is any other DTC displayed?	Inspect the relevant DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4DOTC)(diag)-72, List of Diagnostic Trouble Code (DTC).>	Go to step **2.**
2	**CHECK TUMBLE GENERATOR VALVE LH.** 1) Remove the tumble generator valve assembly. 2) Check the tumble generator valve body.	Does the tumble generator valve move smoothly? (No dirt or foreign materials clogged)	Replace the tumble generator valve assembly. <Ref. to FU(H4DOTC)-40, Tumble Generator Valve Assembly.>	Clean the tumble generator valve.

CO:DTC P2008 INTAKE MANIFOLD RUNNER CONTROL CIRCUIT / OPEN (BANK 1)

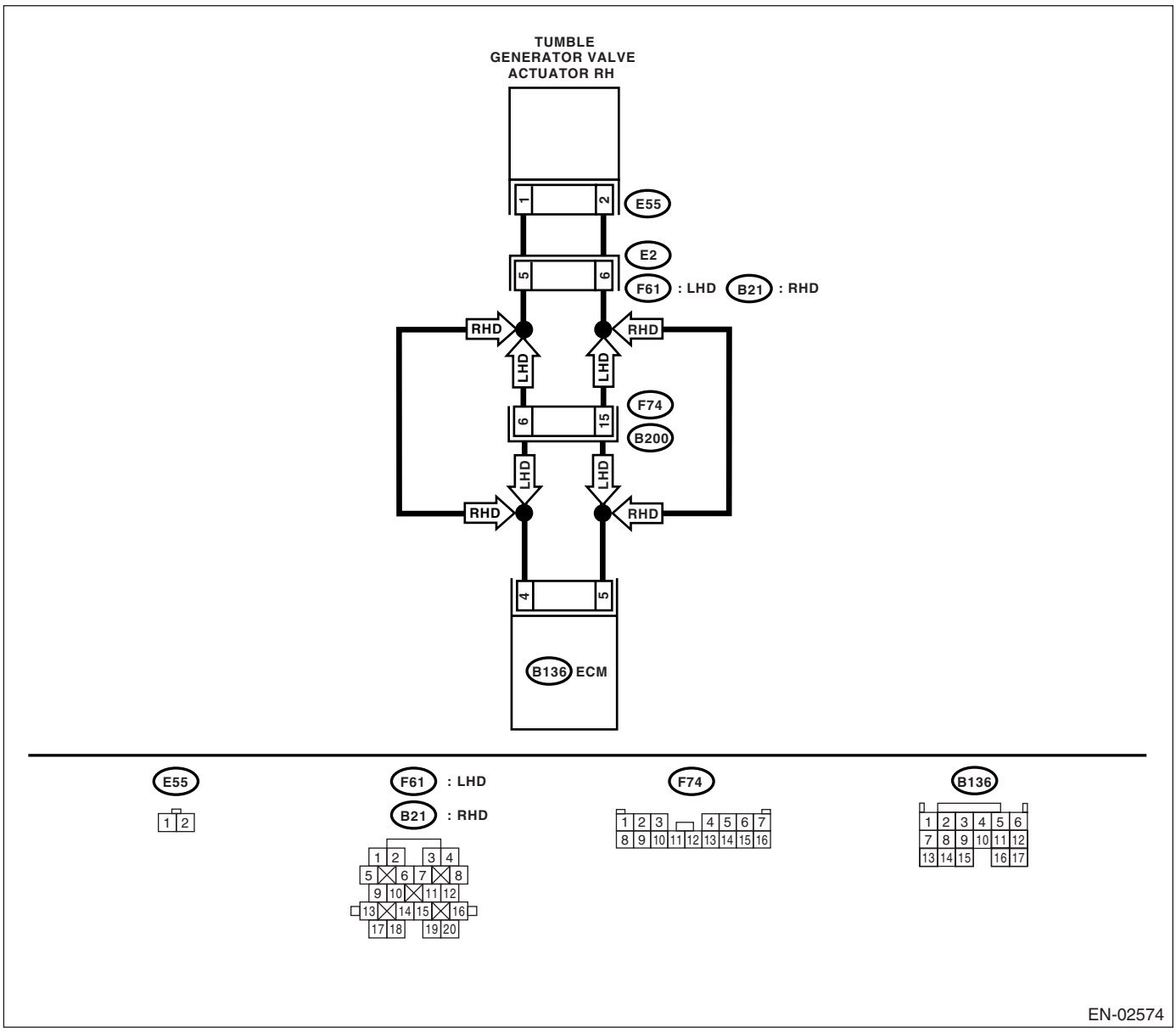
DTC DETECTING CONDITION:

Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND TUMBLE GENERATOR VALVE ACTUATOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from tumble generator valve and ECM connector. 3) Measure the resistance between tumble generator valve actuator and ECM connector. ***Connector & terminal*** ***(E55) No. 1 — (B136) No. 4:*** ***(E55) No. 2 — (B136) No. 5:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the open circuit between ECM and tumble generator valve connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and tumble generator valve actuator connector • Poor contact in coupling connector
2	**CHECK POOR CONTACT.** Check poor contact in tumble generator valve actuator connector.	Is there poor contact in tumble generator valve actuator connector?	Repair the poor contact in tumble generator valve actuator connector.	Replace the tumble generator valve actuator. <Ref. to FU(H4DOTC)-41, Tumble Generator Valve Actuator.>

CP:DTC P2009 INTAKE MANIFOLD RUNNER CONTROL CIRCUIT LOW (BANK 1)

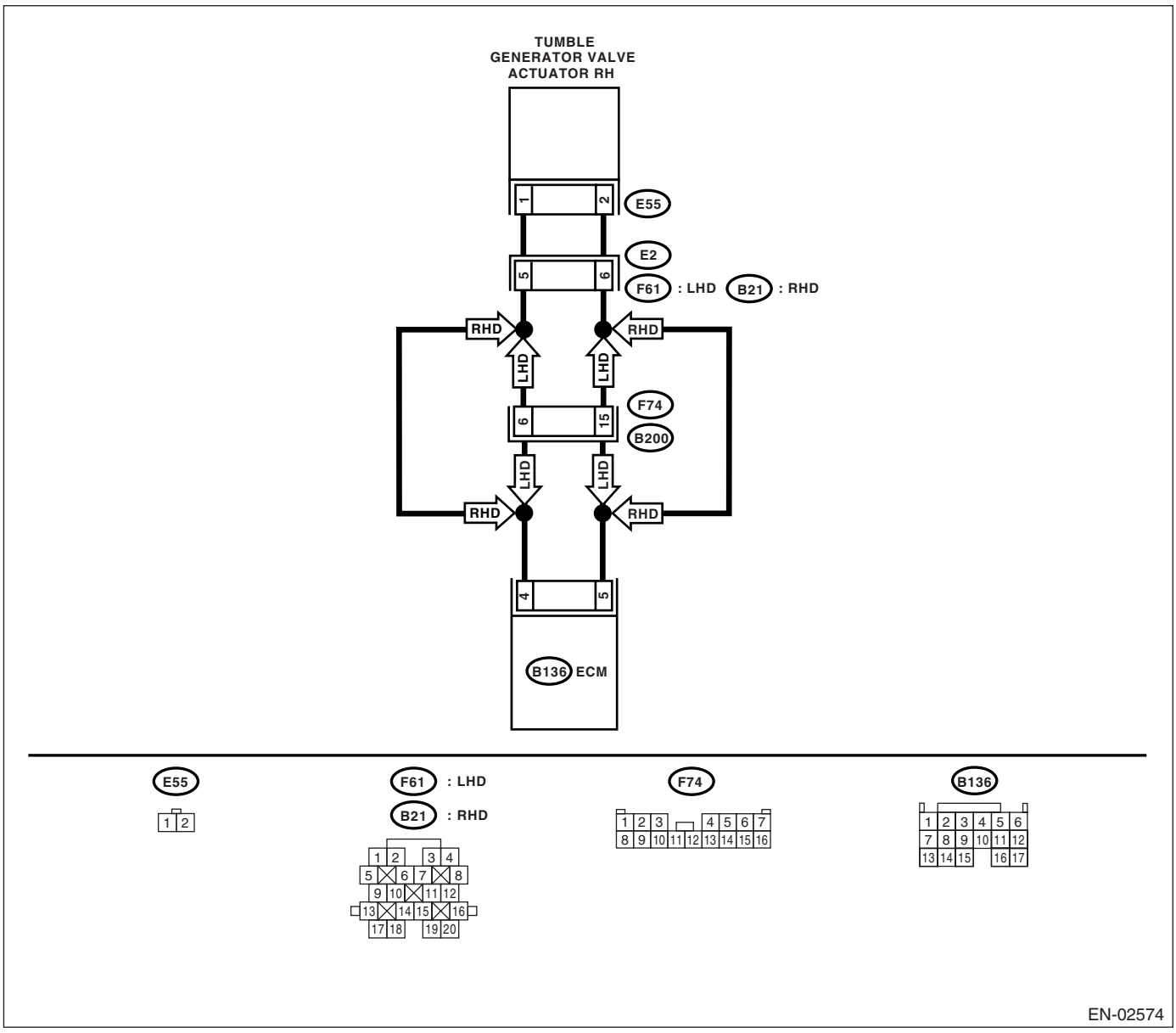
DTC DETECTING CONDITION:

Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND TUMBLE GENERATOR VALVE ACTUATOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from tumble generator valve connector. 3) Measure the voltage between tumble generator valve actuator and chassis ground. ***Connector & terminal*** ***(E55) No. 1 (+) — Chassis ground (−):*** ***(E55) No. 2 (+) — Chassis ground (−):***	Is the voltage less than 5 V?	Replace the tumble generator valve actuator. <Ref. to FU(H4DOTC)-41, Tumble Generator Valve Actuator.>	Repair the battery short circuit between ECM and tumble generator valve actuator.

CQ:DTC P2011 INTAKE MANIFOLD RUNNER CONTROL CIRCUIT / OPEN (BANK 2)

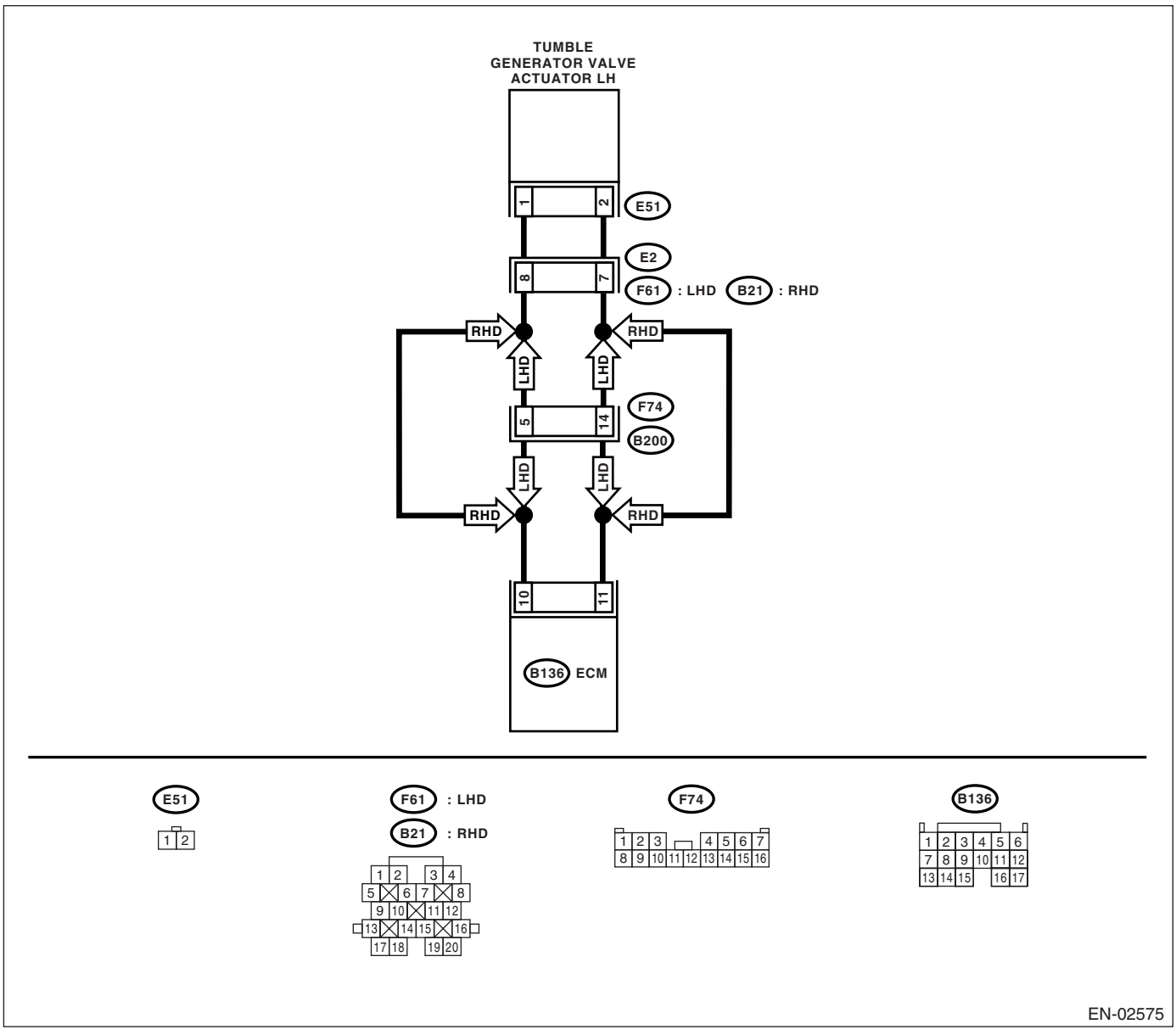
DTC DETECTING CONDITION:

Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND TUMBLE GENERATOR VALVE ACTUATOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from tumble generator valve and ECM connector. 3) Measure the resistance between tumble generator valve actuator and ECM connector. ***Connector & terminal*** ***(E51) No. 1 — (B136) No. 10:*** ***(E51) No. 2 — (B136) No. 11:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the open circuit between ECM and tumble generator valve connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and tumble generator valve actuator connector • Poor contact in coupling connector
2	**CHECK POOR CONTACT.** Check poor contact in tumble generator valve actuator connector.	Is there poor contact in tumble generator valve actuator connector?	Repair the poor contact in tumble generator valve actuator connector.	Replace the tumble generator valve actuator. <Ref. to FU(H4DOTC)-41, Tumble Generator Valve Actuator.>

CR:DTC P2012 INTAKE MANIFOLD RUNNER CONTROL CIRCUIT LOW (BANK 2)

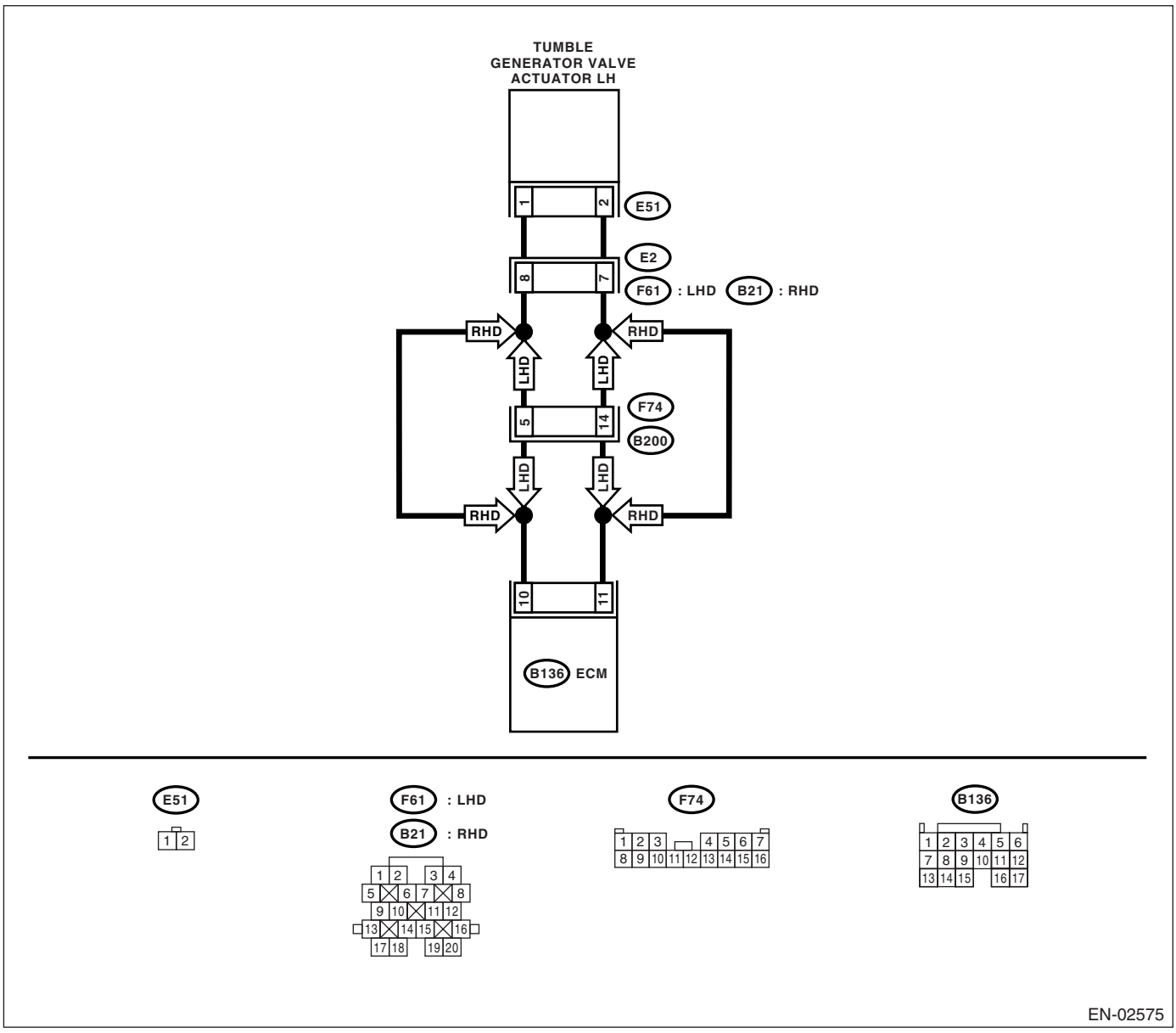
DTC DETECTING CONDITION:

Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND TUMBLE GENERATOR VALVE ACTUATOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from tumble generator valve connector. 3) Measure the voltage between tumble generator valve actuator and chassis ground. ***Connector & terminal*** ***(E51) No. 1 (+) — Chassis ground (−):*** ***(E51) No. 2 (+) — Chassis ground (−):***	Is the voltage less than 5 V?	Replace the tumble generator valve actuator. <Ref. to FU(H4DOTC)-41, Tumble Generator Valve Actuator.>	Repair the battery short circuit between ECM and tumble generator valve actuator.

CS:DTC P2016 INTAKE MANIFOLD RUNNER POSITION SENSOR / SWITCH CIRCUIT LOW (BANK 1)

DTC DETECTING CONDITION:

Immediately at fault recognition

TROUBLE SYMPTOM:

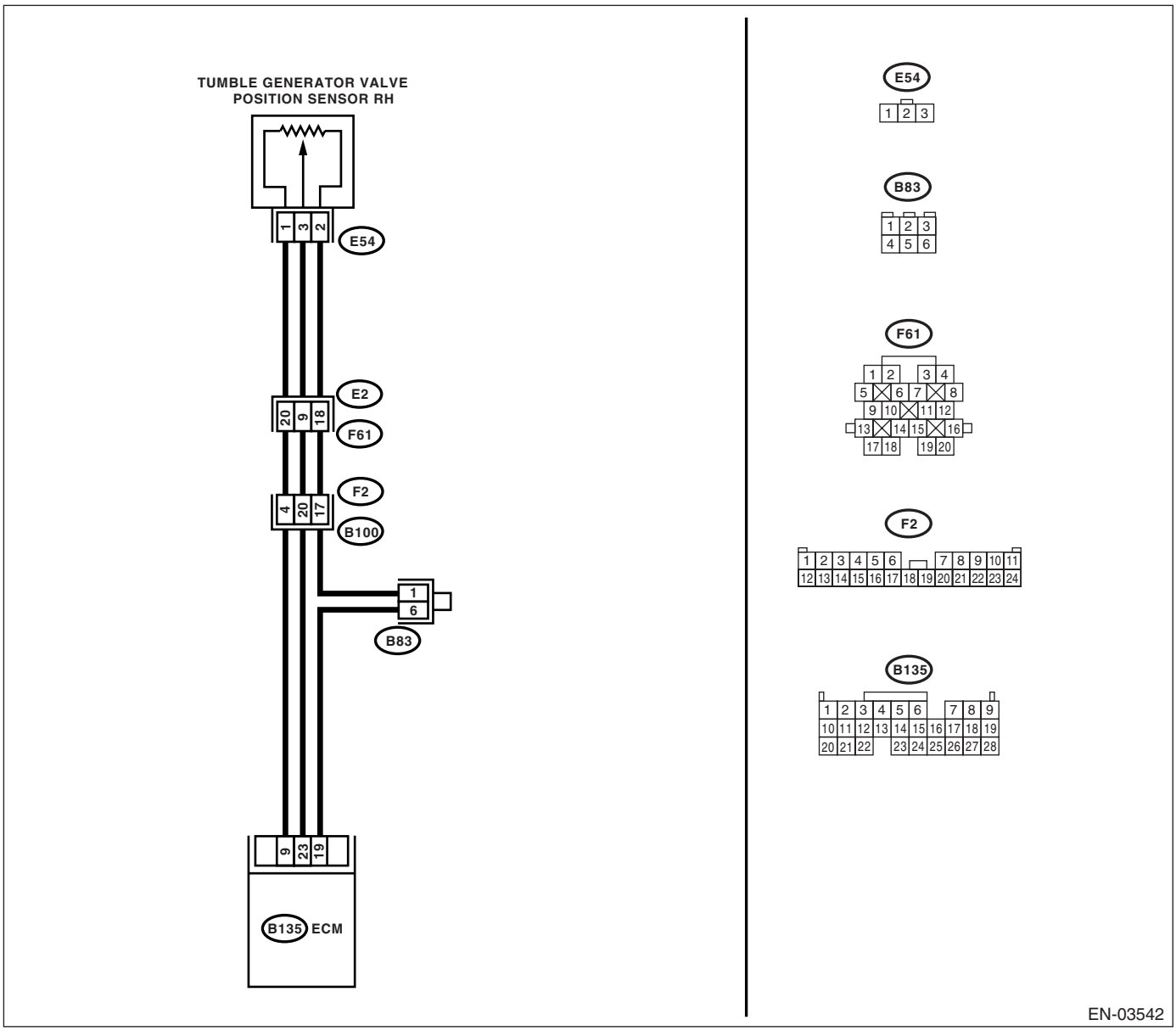
- Erroneous idling
- Engine stalls.
- Poor driving performance

CAUTION:

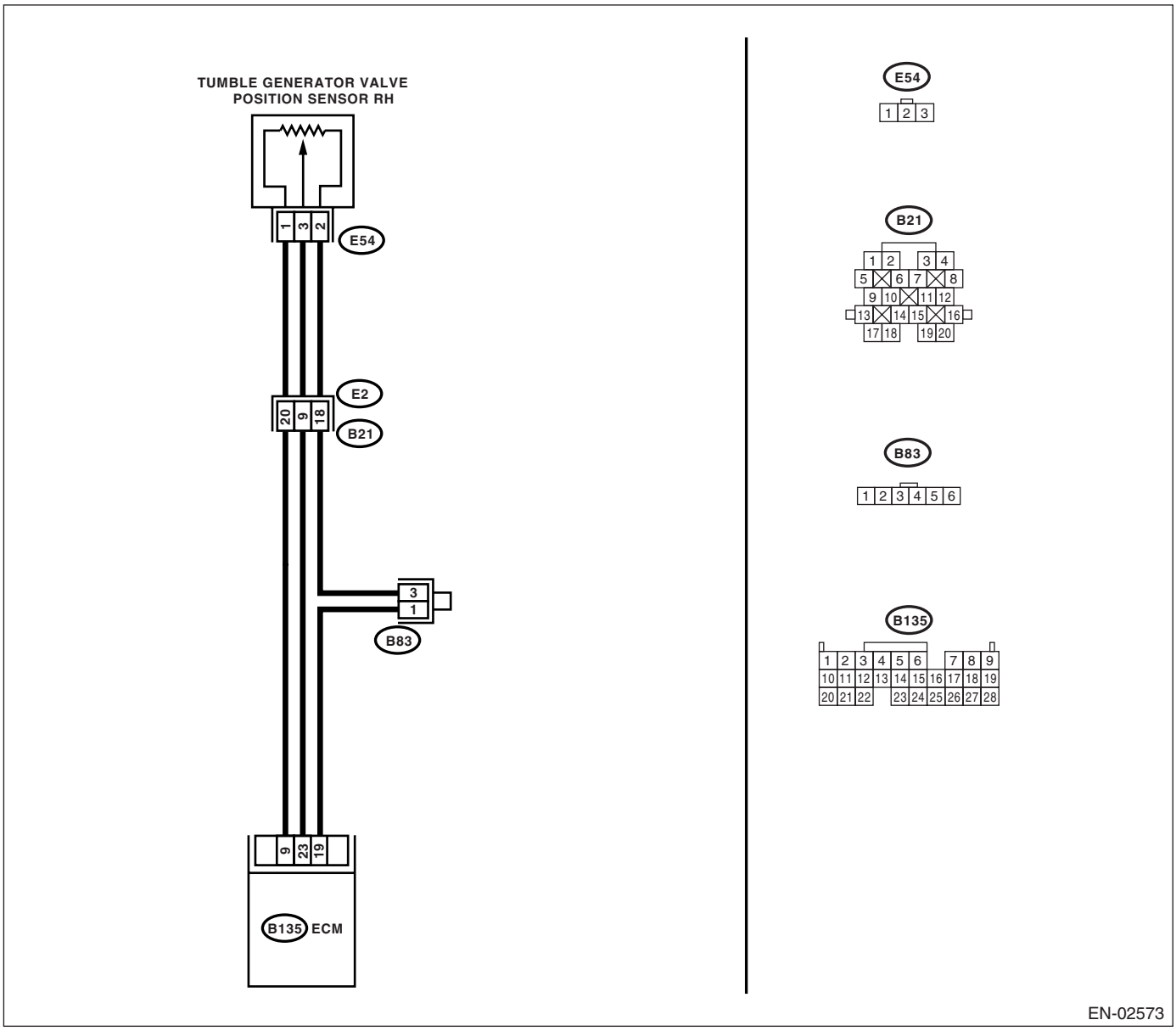
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

WIRING DIAGRAM:

- LHD model



- RHD model


TUMBLE GENERATOR VALVE POSITION SENSOR RH
E54
E2
B21
B83
B135 ECM
E54
B21
B83
B135
EN-02573

	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of tumble generator valve position sensor signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4DOTC)(diag)-32, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the General Scan Tool Instruction Manual.	Is the voltage less than 0.1 V?	Go to step **2.**	Even if malfunction indicator light lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector may be the cause. NOTE: In this case, repair the following: • Poor contact in tumble generator valve position sensor connector • Poor contact in ECM connector • Poor contact in coupling connector
2	**CHECK INPUT SIGNAL FOR ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 9 (+) — Chassis ground (−):***	Is the voltage more than 4.5 V?	Go to step **4.**	Go to step **3.**
3	**CHECK INPUT SIGNAL FOR ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 9 (+) — Chassis ground (−):***	Shake the ECM harness and connector, while monitoring value of voltage meter. Does the voltage change?	Repair the poor contact in ECM connector.	Contact your Subaru distributor service.
4	**CHECK INPUT SIGNAL FOR ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 23 (+) — Chassis ground (−):***	Is the voltage less than 0.1 V?	Go to step **6.**	Go to step **5.**
5	**CHECK INPUT SIGNAL FOR ECM. (USING SUBARU SELECT MONITOR)** Measure the voltage between ECM connector and chassis ground.	Shake the ECM harness and connector, while monitoring value of Subaru Select Monitor. Does the voltage change?	Repair the poor contact in ECM connector.	Go to step **6.**

	Step	Check	Yes	No
6	**CHECK HARNESS BETWEEN ECM AND TUMBLE GENERATOR VALVE POSITION SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from tumble generator valve position sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between tumble generator valve position sensor connector and engine ground. ***Connector & terminal*** ***(E54) No. 1 (+) — Engine ground (−):***	Is the voltage more than 4.5 V?	Go to step **7.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between tumble generator valve position sensor and ECM connector • Poor contact in tumble generator valve position sensor connector • Poor contact in ECM connector • Poor contact in coupling connector • Poor contact in joint connector
7	**CHECK HARNESS BETWEEN ECM AND TUMBLE GENERATOR VALVE POSITION SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance of harness between ECM connector and tumble generator valve position sensor connector. ***Connector & terminal*** ***(B135) No. 23 — (E54) No. 3:***	Is the resistance less than 1 Ω?	Go to step **8.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between tumble generator valve position sensor and ECM connector • Poor contact in ECM connector • Poor contact in tumble generator valve position sensor connector • Poor contact in coupling connector
8	**CHECK HARNESS BETWEEN ECM AND TUMBLE GENERATOR VALVE POSITION SENSOR CONNECTOR.** Measure the resistance of harness between tumble generator valve position sensor connector and engine ground. ***Connector & terminal*** ***(E54) No. 3 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **9.**	Repair the ground short circuit in harness between tumble generator valve position sensor and ECM connector.
9	**CHECK POOR CONTACT.** Check poor contact in tumble generator valve position sensor connector.	Is there poor contact in tumble generator valve position sensor connector?	Repair the poor contact in tumble generator valve position sensor connector.	Replace the tumble generator valve position sensor. <Ref. to FU(H4DOTC)-42, Tumble Generator Valve Position Sensor.>

CT:DTC P2017 INTAKE MANIFOLD RUNNER POSITION SENSOR / SWITCH CIRCUIT HIGH (BANK 1)

DTC DETECTING CONDITION:

Immediately at fault recognition

TROUBLE SYMPTOM:

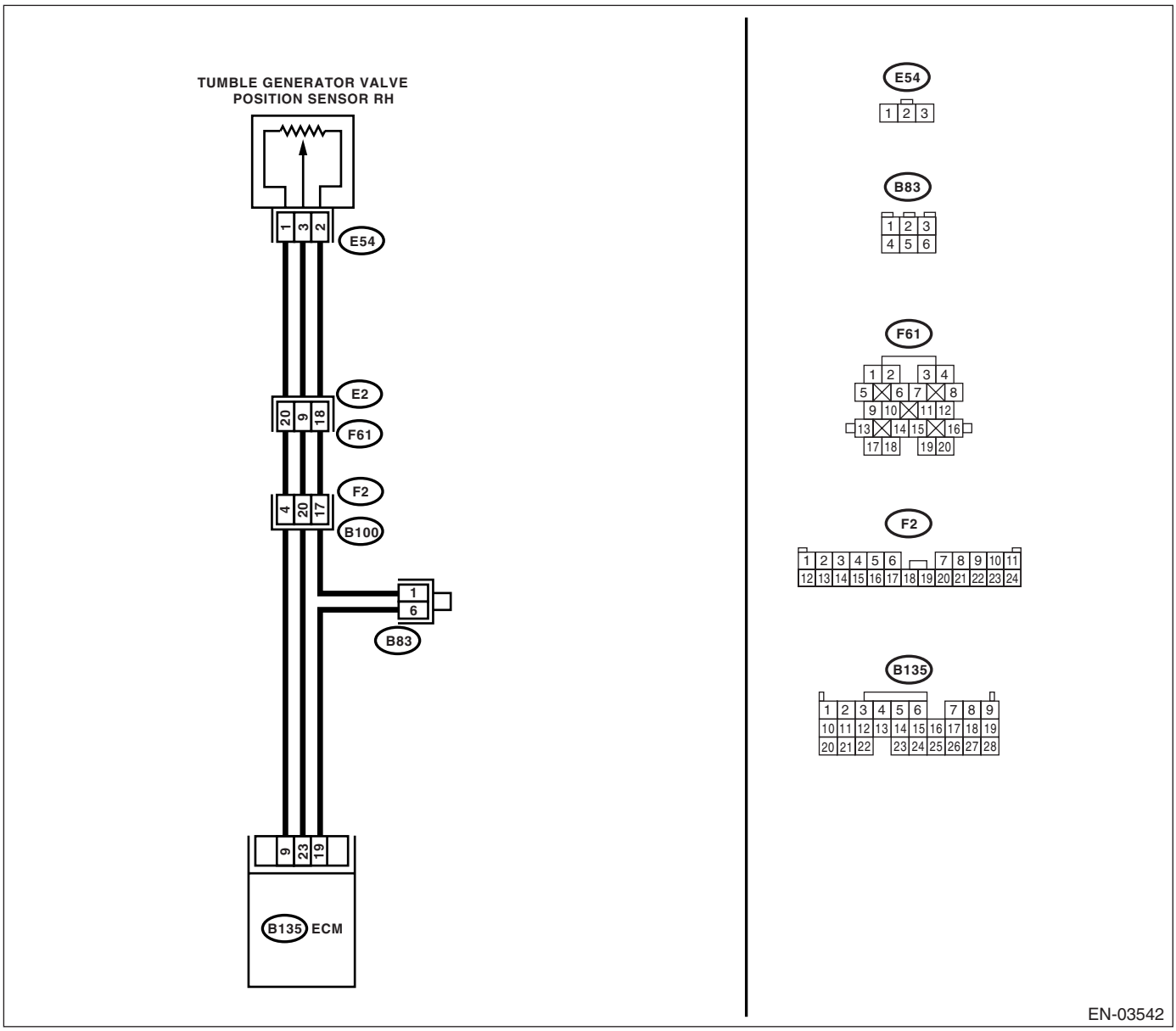
- Erroneous idling
- Engine stalls.
- Poor driving performance

CAUTION:

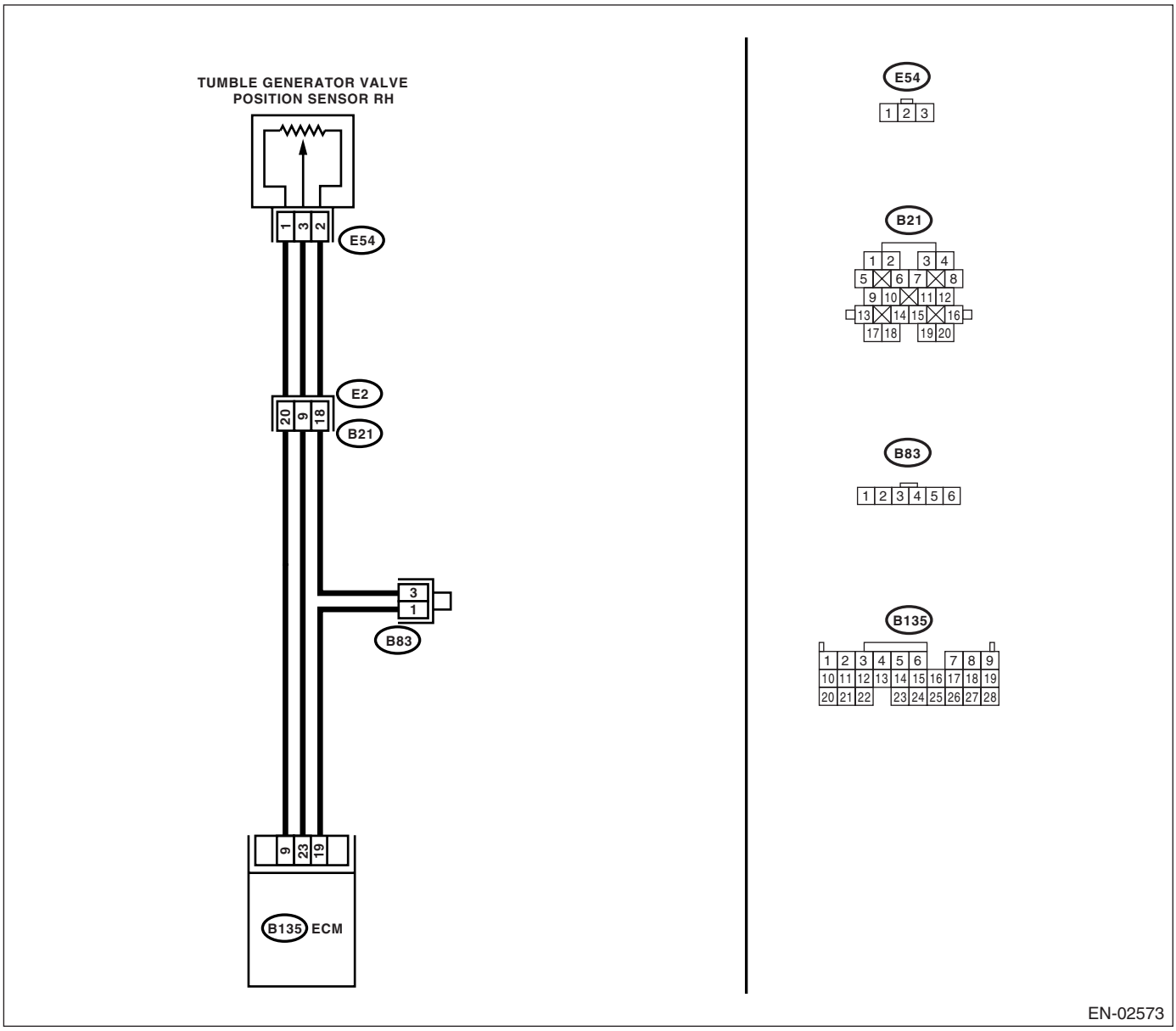
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

WIRING DIAGRAM:

- LHD model



- RHD model


TUMBLE GENERATOR VALVE POSITION SENSOR RH
E54
E2
B21
B83
B135 ECM
E54
B21
B83
B135
EN-02573

	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of tumble generator valve position sensor signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4DOTC)(diag)-32, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the General Scan Tool Instruction Manual.	Is the voltage more than 4.9 V?	Go to step **2.**	Even if malfunction indicator light lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector may be the cause. NOTE: In this case, repair the following: • Poor contact in tumble generator valve position sensor connector • Poor contact in ECM connector • Poor contact in coupling connector
2	**CHECK HARNESS BETWEEN TUMBLE GENERATOR VALVE POSITION SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from tumble generator valve position sensor. 3) Measure the resistance of harness between tumble generator valve position sensor connector and engine ground. ***Connector & terminal*** ***(E54) No. 2 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **3.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between tumble generator valve position sensor and ECM connector • Poor contact in coupling connector • Poor contact in joint connector
3	**CHECK HARNESS BETWEEN TUMBLE GENERATOR VALVE POSITION SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to ON. 2) Measure the voltage between tumble generator valve position sensor connector and engine ground. ***Connector & terminal*** ***(E54) No. 3 (+) — Engine ground (−):***	Is the voltage more than 4.9 V?	Repair the battery short circuit in harness between tumble generator valve position sensor and ECM connector. After repair, replace the ECM. <Ref. to FU(H4DOTC)-50, Engine Control Module (ECM).>	Replace the tumble generator valve position sensor. <Ref. to FU(H4DOTC)-42, Tumble Generator Valve Position Sensor.>

CU:DTC P2021 INTAKE MANIFOLD RUNNER POSITION SENSOR / SWITCH CIRCUIT LOW (BANK 2)

DTC DETECTING CONDITION:

Immediately at fault recognition

TROUBLE SYMPTOM:

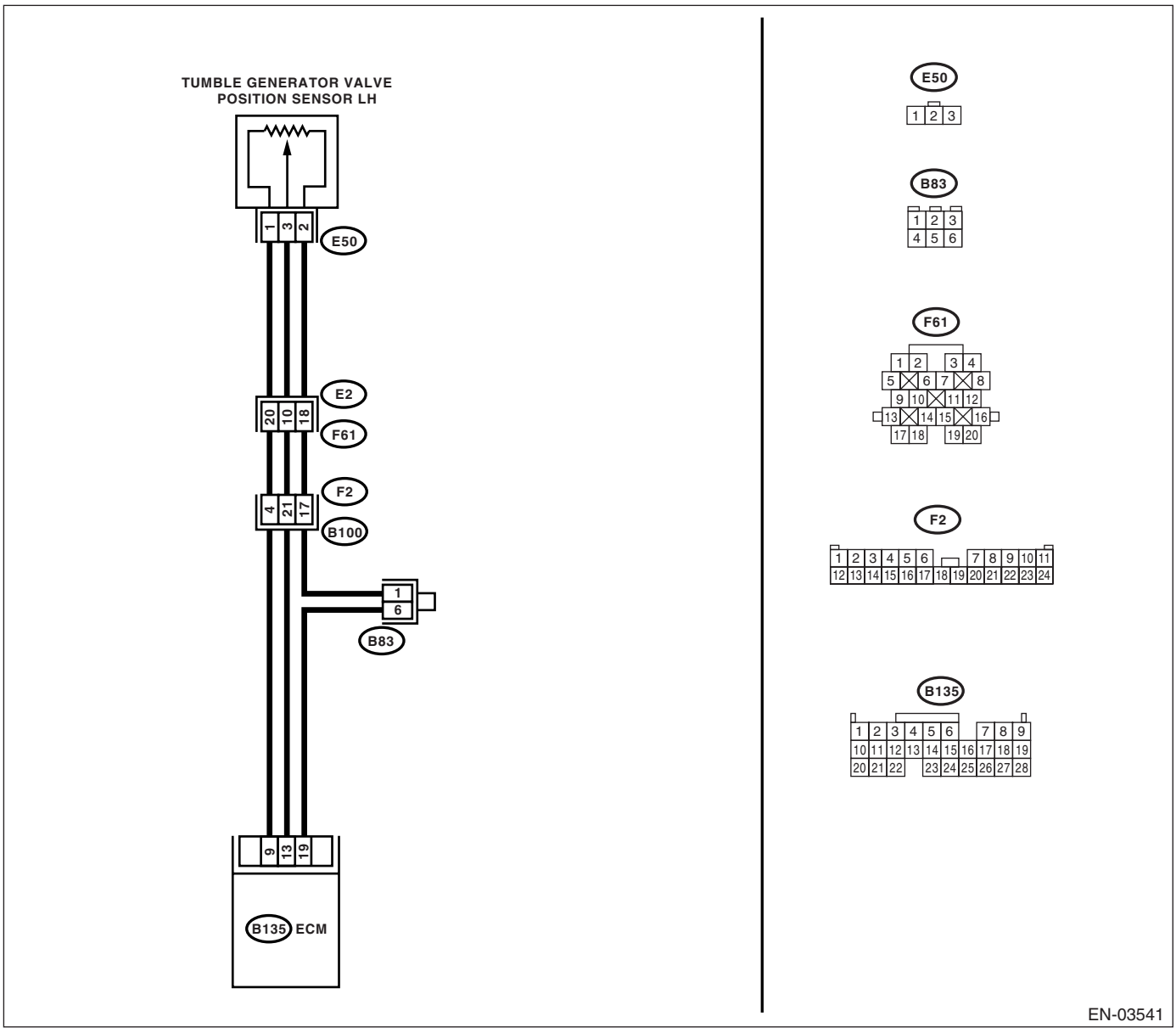
- Erroneous idling
- Engine stalls.
- Poor driving performance

CAUTION:

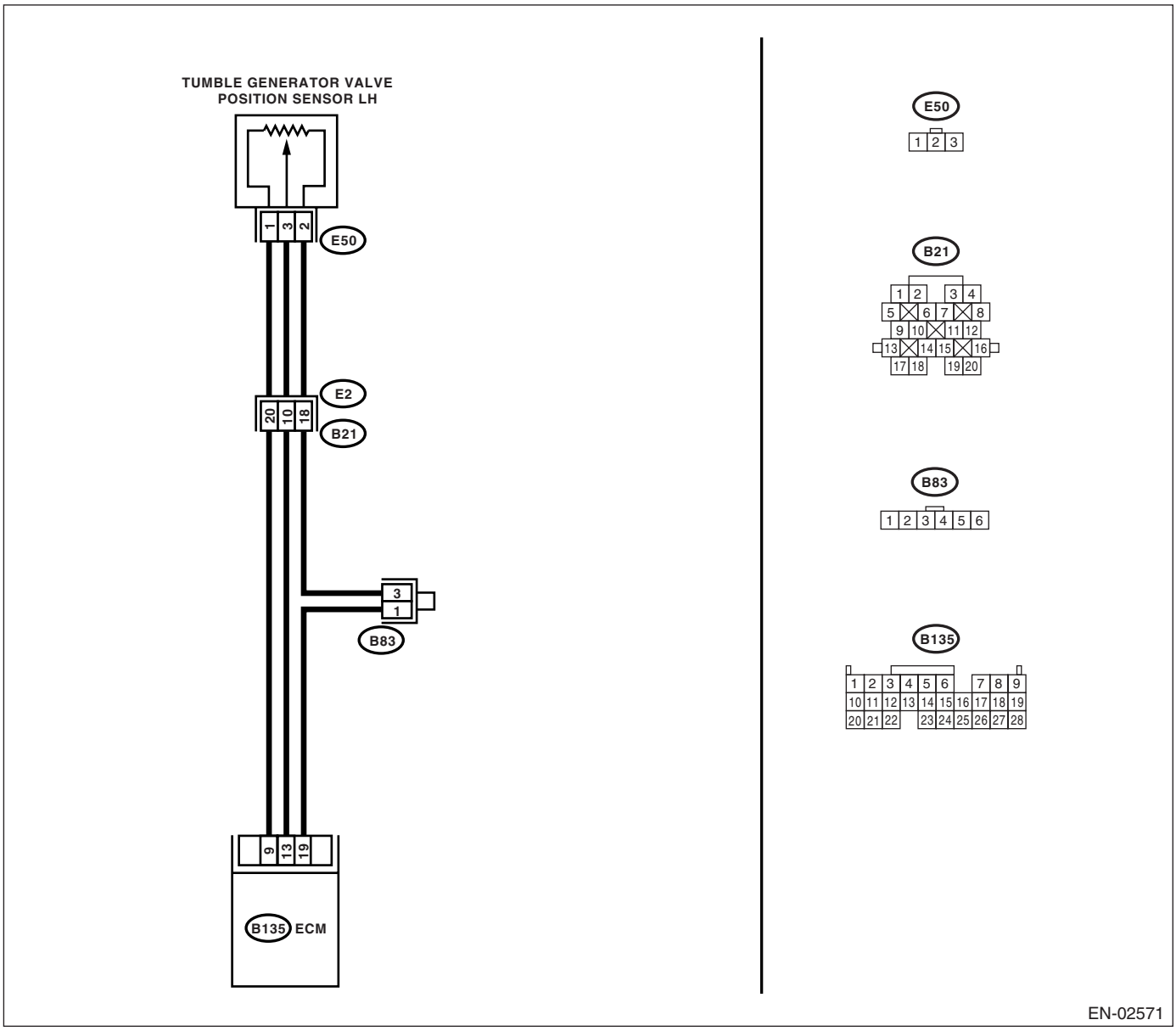
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

WIRING DIAGRAM:

- LHD model



- RHD model


TUMBLE GENERATOR VALVE POSITION SENSOR LH
1
3
2
E50
E2
20
10
18
B21
3
1
B83
9
13
19
B135
ECM
E50
1 2 3
B21
1 2 3 4
5 6 7 8
9 10 11 12
13 14 15 16
17 18 19 20
B83
1 2 3 4 5 6
B135
1 2 3 4 5 6 7 8 9
10 11 12 13 14 15 16 17 18 19
20 21 22 23 24 25 26 27 28
EN-02571

	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of tumble generator valve position sensor signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4DOTC)(diag)-32, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the General Scan Tool Instruction Manual.	Is the voltage less than 0.1 V?	Go to step **2.**	Even if malfunction indicator light lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector may be the cause. NOTE: In this case, repair the following: • Poor contact in tumble generator valve position sensor connector • Poor contact in ECM connector • Poor contact in coupling connector
2	**CHECK INPUT SIGNAL FOR ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 9 (+) — Chassis ground (−):***	Is the voltage more than 4.5 V?	Go to step **4.**	Go to step **3.**
3	**CHECK INPUT SIGNAL FOR ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 9 (+) — Chassis ground (−):***	Shake the ECM harness and connector, while monitoring value of voltage meter. Does the voltage change?	Repair the poor contact in ECM connector.	Contact your Subaru distributor service.
4	**CHECK INPUT SIGNAL FOR ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 13 (+) — Chassis ground (−):***	Is the voltage less than 0.1 V?	Go to step **6.**	Go to step **5.**
5	**CHECK INPUT SIGNAL FOR ECM. (USING SUBARU SELECT MONITOR)** Measure the voltage between ECM connector and chassis ground.	Shake the ECM harness and connector, while monitoring value of Subaru Select Monitor. Does the voltage change?	Repair the poor contact in ECM connector.	Go to step **6.**

	Step	Check	Yes	No
6	**CHECK HARNESS BETWEEN ECM AND TUMBLE GENERATOR VALVE POSITION SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from tumble generator valve position sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between tumble generator valve position sensor connector and engine ground. ***Connector & terminal*** ***(E50) No. 1 (+) — Engine ground (−):***	Is the voltage more than 4.5 V?	Go to step **7.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between tumble generator valve position sensor and ECM connector • Poor contact in tumble generator valve position sensor connector • Poor contact in ECM connector • Poor contact in coupling connector • Poor contact in joint connector
7	**CHECK HARNESS BETWEEN ECM AND TUMBLE GENERATOR VALVE POSITION SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance of harness between ECM connector and tumble generator valve position sensor connector. ***Connector & terminal*** ***(B135) No. 13 — (E50) No. 3:***	Is the resistance less than 1 Ω?	Go to step **8.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between tumble generator valve position sensor and ECM connector • Poor contact in ECM connector • Poor contact in tumble generator valve position sensor connector • Poor contact in coupling connector
8	**CHECK HARNESS BETWEEN ECM AND TUMBLE GENERATOR VALVE POSITION SENSOR CONNECTOR.** Measure the resistance of harness between tumble generator valve position sensor connector and engine ground. ***Connector & terminal*** ***(E50) No. 3 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **9.**	Repair the ground short circuit in harness between tumble generator valve position sensor and ECM connector.
9	**CHECK POOR CONTACT.** Check poor contact in tumble generator valve position sensor connector.	Is there poor contact in tumble generator valve position sensor connector?	Repair the poor contact in tumble generator valve position sensor connector.	Replace the tumble generator valve position sensor. <Ref. to FU(H4DOTC)-42, Tumble Generator Valve Position Sensor.>

CV:DTC P2022 INTAKE MANIFOLD RUNNER POSITION SENSOR / SWITCH CIRCUIT HIGH (BANK 2)

DTC DETECTING CONDITION:

Immediately at fault recognition

TROUBLE SYMPTOM:

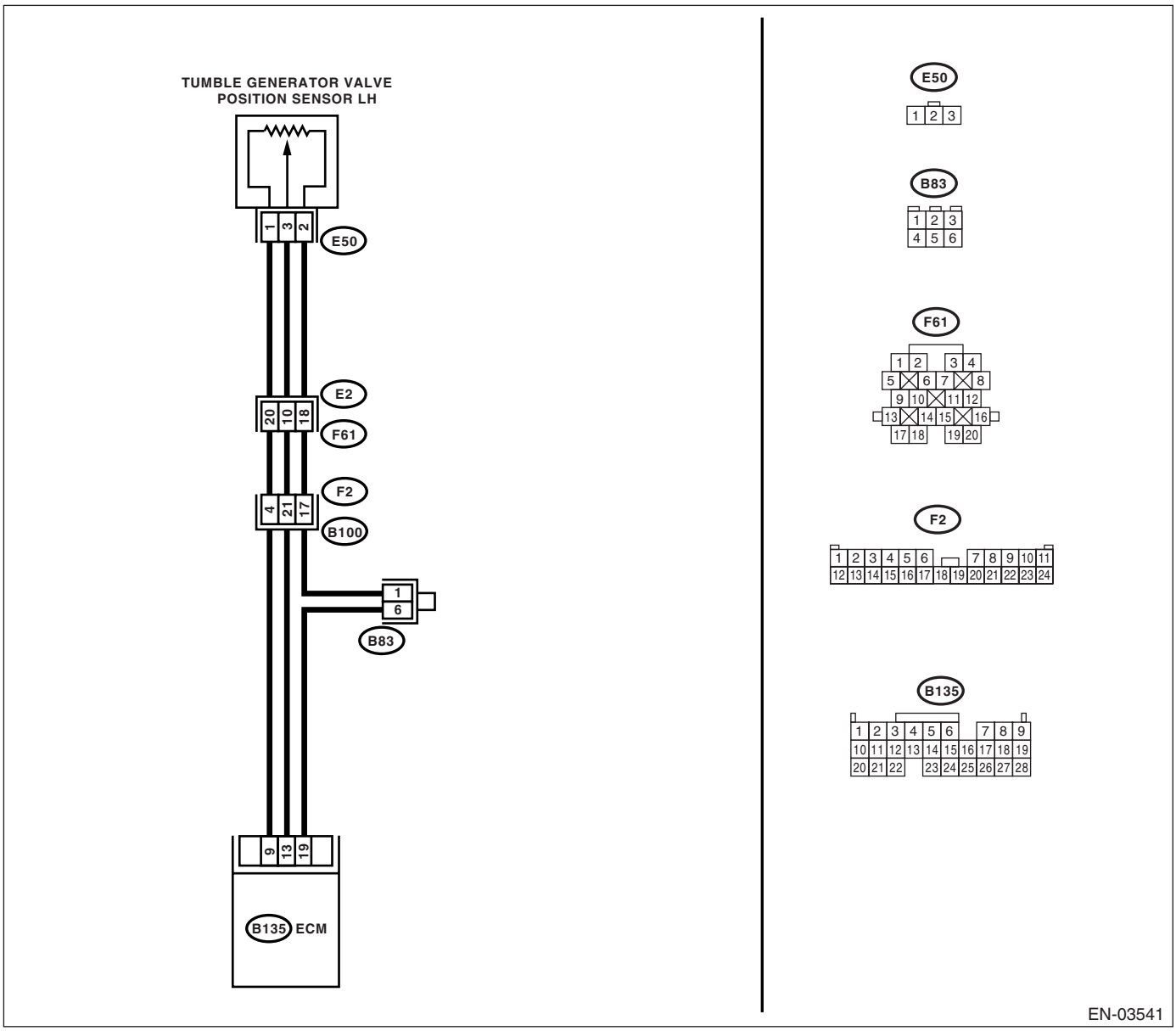
- Erroneous idling
- Engine stalls.
- Poor driving performance

CAUTION:

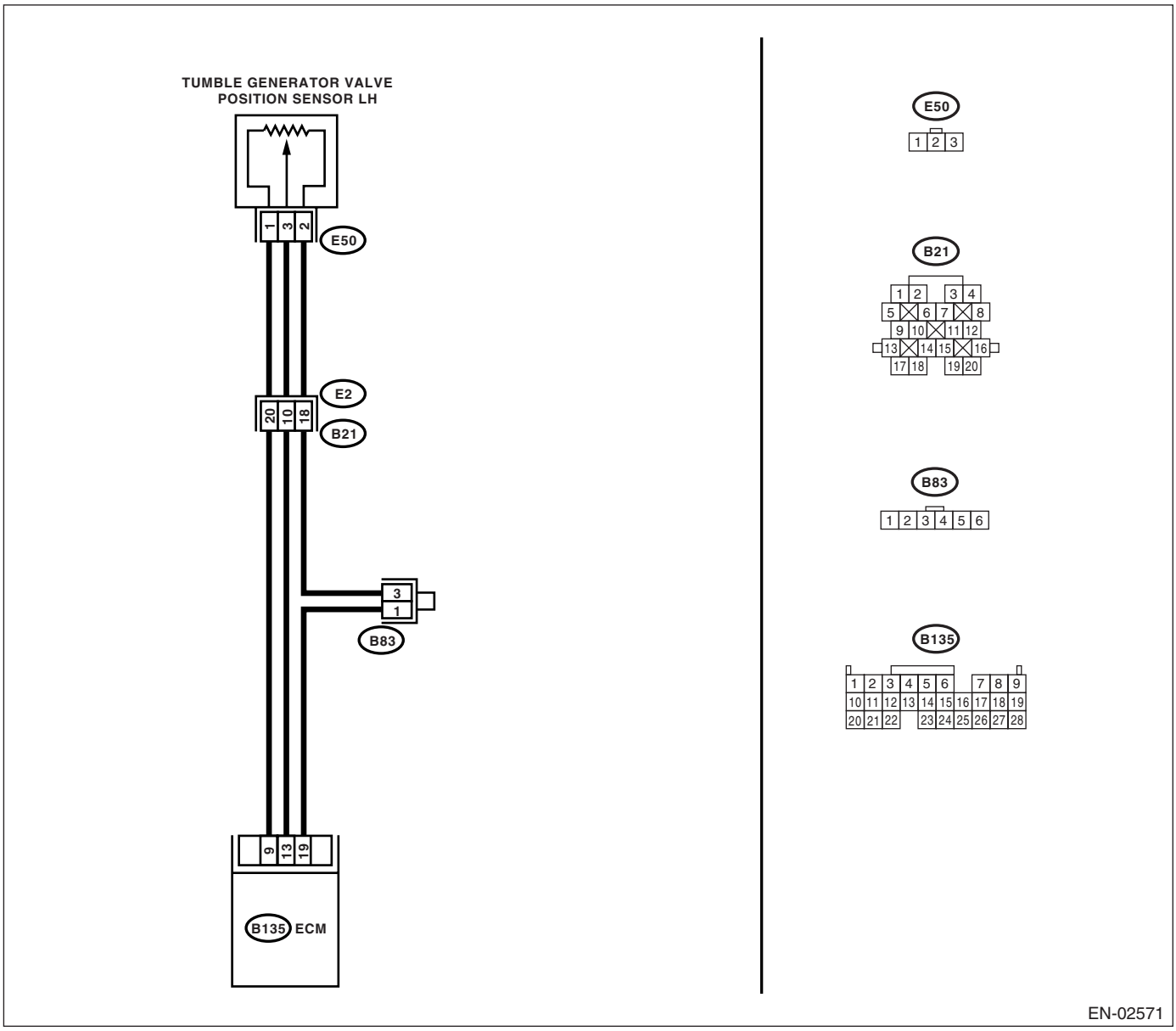
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

WIRING DIAGRAM:

- LHD model



- RHD model


TUMBLE GENERATOR VALVE POSITION SENSOR LH
1
3
2
E50
E2
20
10
18
B21
3
1
B83
9
13
19
B135
ECM
E50
1 2 3
B21
1 2 3 4
5 6 7 8
9 10 11 12
13 14 15 16
17 18 19 20
B83
1 2 3 4 5 6
B135
1 2 3 4 5 6 7 8 9
10 11 12 13 14 15 16 17 18 19
20 21 22 23 24 25 26 27 28
EN-02571

	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of tumble generator valve position sensor signal using Subaru Select Monitor or general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4DOTC)(diag)-32, Subaru Select Monitor.> • General scan tool For detailed operation procedures, refer to the General Scan Tool Instruction Manual.	Is the voltage more than 4.9 V?	Go to step **2.**	Even if malfunction indicator light lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector may be the cause. NOTE: In this case, repair the following: • Poor contact in tumble generator valve position sensor connector • Poor contact in ECM connector • Poor contact in coupling connector
2	**CHECK HARNESS BETWEEN TUMBLE GENERATOR VALVE POSITION SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from tumble generator valve position sensor. 3) Measure the resistance of harness between tumble generator valve position sensor connector and engine ground. ***Connector & terminal*** ***(E50) No. 2 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **3.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between tumble generator valve position sensor and ECM connector • Poor contact in coupling connector • Poor contact in joint connector
3	**CHECK HARNESS BETWEEN TUMBLE GENERATOR VALVE POSITION SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to ON. 2) Measure the voltage between tumble generator position sensor connector and engine ground. ***Connector & terminal*** ***(E50) No. 3 (+) — Engine ground (−):***	Is the voltage more than 4.9 V?	Repair the battery short circuit in harness between tumble generator valve position sensor and ECM connector. After repair, replace the ECM. <Ref. to FU(H4DOTC)-50, Engine Control Module (ECM).>	Replace the tumble generator valve position sensor. <Ref. to FU(H4DOTC)-42, Tumble Generator Valve Position Sensor.>

CW:DTC P2227 BAROMETRIC PRESSURE CIRCUIT RANGE/PERFORMANCE

DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

Step	Check	Yes	No
1 **CHECK ANY OTHER DTC.**	Is any other DTC displayed?	Inspect the relevant DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4DOTC)(diag)-72, List of Diagnostic Trouble Code (DTC).> NOTE: It is not necessary to inspect DTC P2227.	Replace the ECM. <Ref. to FU(H4DOTC)-50, Engine Control Module (ECM).> NOTE: Atmospheric pressure sensor is built into ECM.

CX:DTC P2228 BAROMETRIC PRESSURE CIRCUIT LOW

DTC DETECTING CONDITION:

Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

Step	Check	Yes	No
1 **CHECK ANY OTHER DTC.**	Does the Subaru Select Monitor or general scan tool indicate DTC P2228?	Replace the ECM. <Ref. to FU(H4DOTC)-50, Engine Control Module (ECM).> NOTE: Atmospheric pressure sensor is built into ECM.	A temporary poor contact.

CY:DTC P2229 BAROMETRIC PRESSURE CIRCUIT HIGH

DTC DETECTING CONDITION:

Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

Step		Check	Yes	No
1	**CHECK ANY OTHER DTC.**	Does the Subaru Select Monitor or general scan tool indicate DTC P2229?	Replace the ECM. <Ref. to FU(H4DOTC)-50, Engine Control Module (ECM).> NOTE: Atmospheric pressure sensor is built into ECM.	A temporary poor contact.

CZ:DTC P2503 CHARGING SYSTEM VOLTAGE LOW

CAUTION:

For diagnostic procedure, refer to DTC P2504. <Ref. to EN(H4DOTC)(diag)-296, DTC P2504 CHARGING SYSTEM VOLTAGE HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>.

DA:DTC P2504 CHARGING SYSTEM VOLTAGE HIGH

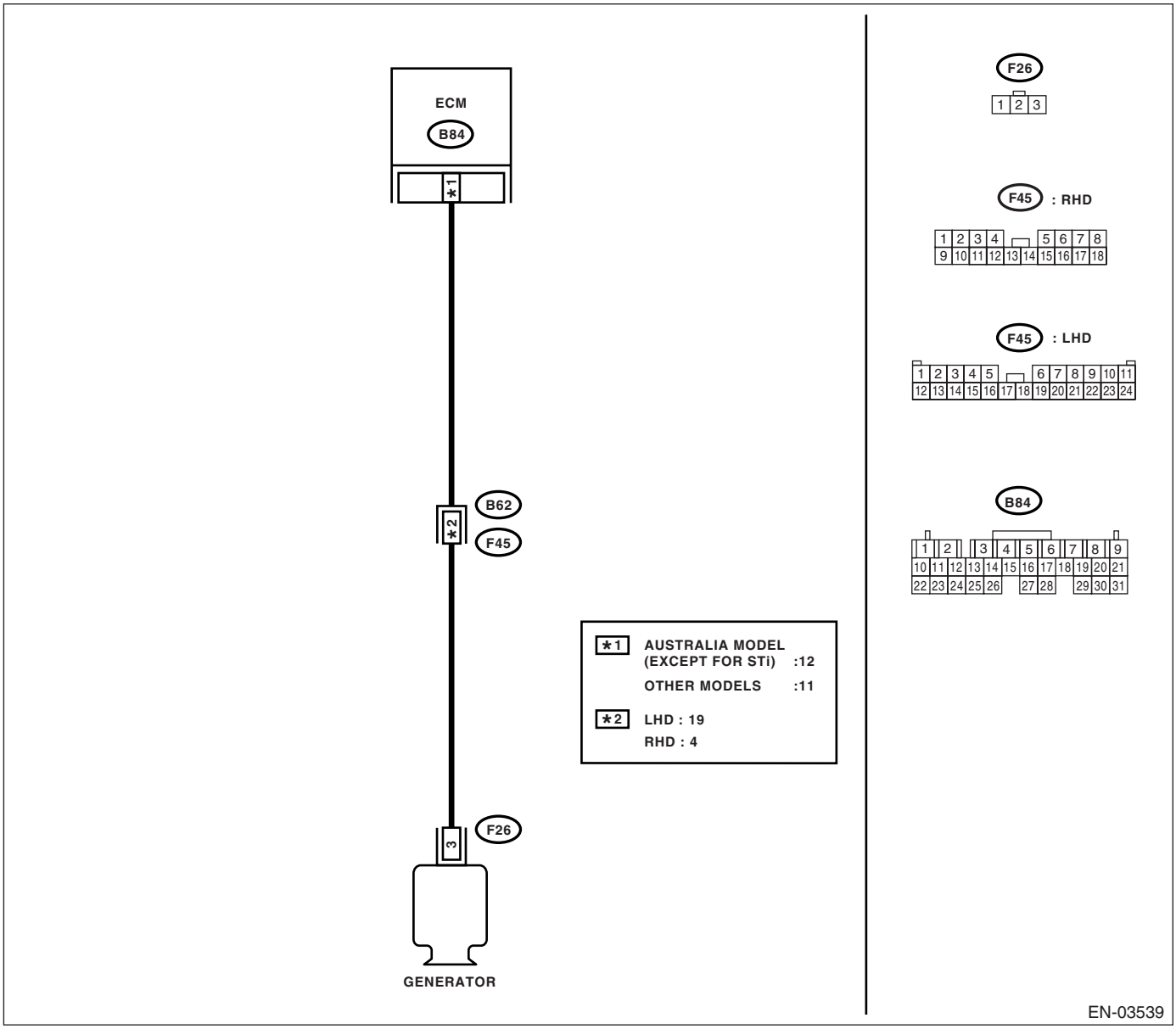
DTC DETECTING CONDITION:

Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-46, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-39, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN GENERATOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from generator and ECM. 3) Measure the resistance of harness between generator connector and engine ground. ***Connector & terminal*** ***(F26) No. 3 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **2.**	Repair the ground short circuit in harness between ECM and purge control solenoid valve connector.
2	**CHECK HARNESS BETWEEN GENERATOR AND ECM CONNECTOR.** Measure the resistance of harness between ECM and generator of harness connector. ***Connector & terminal*** ***Australia model (Except STi)*** ***(B84) No. 12 — (F26) No. 3:*** ***Except Australia model but including Australia STi model*** ***(B84) No. 11 — (F26) No. 3:***	Is the resistance less than 1 Ω?	Repair poor contact in connector.	Repair the open circuit in harness between ECM and generator connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and generator connector • Poor contact in coupling connector

20.General Diagnostic Table

A: INSPECTION

1. ENGINE

NOTE:
Malfunction of parts other than those listed is also possible. <Ref. to ME(H4DOTC)-110, Engine Trouble in General.>

Symptom	Problem parts
1. Engine stalls during idling.	1) Idle air control solenoid valve 2) Manifold absolute pressure sensor 3) Mass air flow and intake temperature sensor 4) Ignition parts (*1) 5) Engine coolant temperature sensor (*2) 6) Crankshaft position sensor (*3) 7) Camshaft position sensor (*3) 8) Fuel injection parts (*4)
2. Rough idling	1) Idle air control solenoid valve 2) Manifold absolute pressure sensor 3) Mass air flow and intake temperature sensor 4) Engine coolant temperature sensor (*2) 5) Ignition parts (*1) 6) Air intake system (*5) 7) Fuel injection parts (*4) 8) Throttle position sensor 9) Crankshaft position sensor (*3) 10) Camshaft position sensor (*3) 11) Oxygen sensor 12) Fuel pump and fuel pump relay
3. Engine does not return to idle.	1) Idle air control solenoid valve 2) Engine coolant temperature sensor 3) Accelerator cable (*6) 4) Throttle position sensor 5) Manifold absolute pressure sensor 6) Mass air flow sensor
4. Poor acceleration	1) Manifold absolute pressure sensor 2) Mass air flow and intake temperature sensor 3) Throttle position sensor 4) Fuel injection parts (*4) 5) Fuel pump and fuel pump relay 6) Engine coolant temperature sensor (*2) 7) Crankshaft position sensor (*3) 8) Camshaft position sensor (*3) 9) A/C switch and A/C cut relay 10) Engine torque control signal circuit 11) Ignition parts (*1)
5. Engine stalls or engine sags or hesitates at acceleration.	1) Manifold absolute pressure sensor 2) Mass air flow and intake temperature sensor 3) Engine coolant temperature sensor (*2) 4) Crankshaft position sensor (*3) 5) Camshaft position sensor (*3) 6) Purge control solenoid valve 7) Fuel injection parts (*4) 8) Throttle position sensor 9) Fuel pump and fuel pump relay

Symptom	Problem parts
6. Surge	1) Manifold absolute pressure sensor 2) Mass air flow and intake temperature sensor 3) Engine coolant temperature sensor (*2) 4) Crankshaft position sensor (*3) 5) Camshaft position sensor (*3) 6) Fuel injection parts (*4) 7) Throttle position sensor 8) Fuel pump and fuel pump relay
7. Spark knock	1) Manifold absolute pressure sensor 2) Mass air flow and intake temperature sensor 3) Engine coolant temperature sensor 4) Knock sensor 5) Fuel injection parts (*4) 6) Fuel pump and fuel pump relay
8. After-burning in exhaust system	1) Manifold absolute pressure sensor 2) Mass air flow and intake temperature sensor 3) Engine coolant temperature sensor (*2) 4) Fuel injection parts (*4) 5) Fuel pump and fuel pump relay

*1: Check ignition coil and spark plug.
*2: Indicate the symptom occurring only in cold temperatures.
*3: Ensure the secure installation.
*4: Check fuel injector, fuel pressure regulator and fuel filter.
*5: Inspect air leak in air intake system.
*6: Adjust accelerator cable.

TRANSMISSION SECTION

CONTROL SYSTEMS	CS
AUTOMATIC TRANSMISSION	4AT
AUTOMATIC TRANSMISSION (DIAGNOSTICS)	4AT(diag)
MANUAL TRANSMISSION AND DIFFERENTIAL	5MT
MANUAL TRANSMISSION AND DIFFERENTIAL	6MT
MANUAL TRANSMISSION AND DIFFERENTIAL (DIAGNOSTICS)	6MT(diag)
CLUTCH SYSTEM	CL

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

FUJI HEAVY INDUSTRIES LTD.

G1880GE4

CONTROL SYSTEMS

CS

		Page
1.	General Description	2
2.	AT Shift Lock Control System	9
3.	Select Lever	26
4.	Select Cable	33
5.	AT Shift Lock Solenoid and “P” Range Switch	36
6.	AT Shift Lock Control Module	39
7.	MT Gear Shift Lever	40
8.	Reverse Check Cable	53
9.	MT Drive Select Lever	58
10.	Drive Select Cable	60
11.	General Diagnostic Table	61

1. General Description

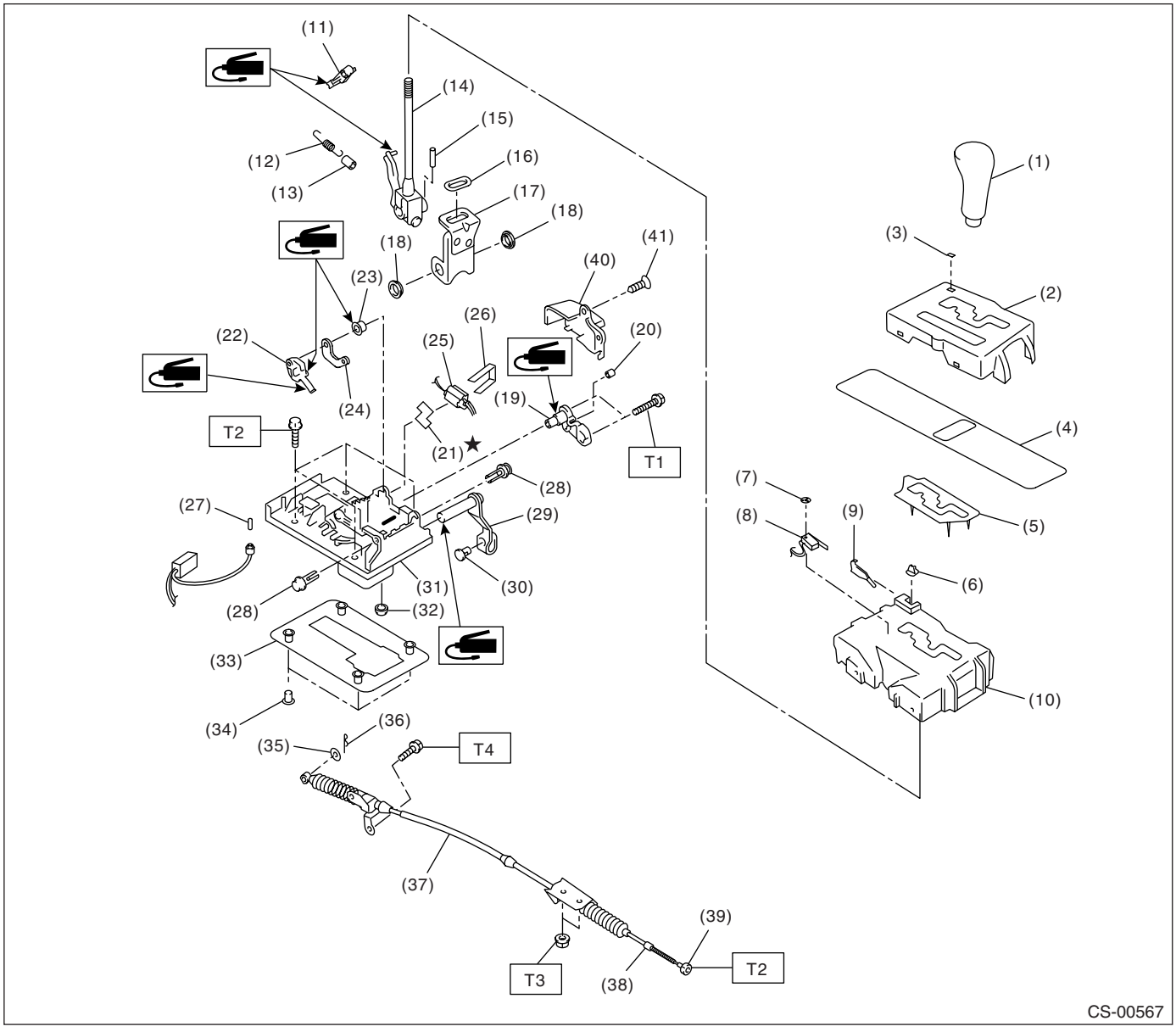
A: SPECIFICATION

Item		Specification
Swing torque of rod against lever	N (kgf, lbf)	3.7 (0.38, 0.84) or less

B: COMPONENT

1. AT SELECT LEVER

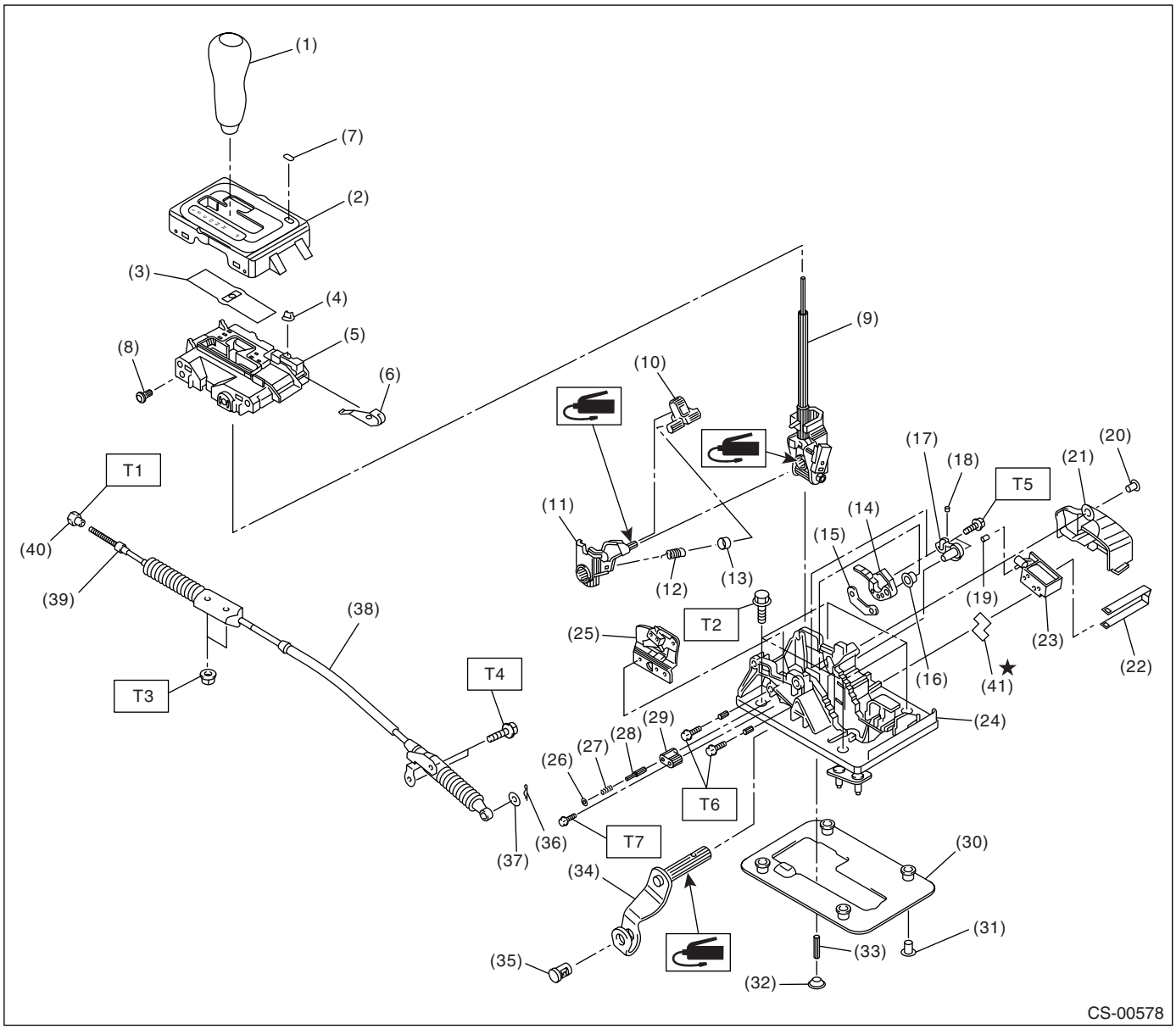
• EXCEPT SPORT SHIFT MODEL



(1) Grip
(2) Indicator cover
(3) Cover
(4) Blind
(5) Cushion
(6) Button
(7) Clip
(8) “P” range switch
(9) Spring
(10) Guide plate
(11) Detent arm
(12) Detent spring
(13) Tube
(14) Select lever COMPL
(15) Spring pin
(16) Bushing
(17) Bracket
(18) Bushing
(19) Lock plate B
(20) Cushion
(21) Cushion
(22) Lock plate A
(23) Bushing
(24) Lock plate C
(25) Shift lock solenoid
(26) Clamp
(27) Indicator light bulb
(28) Clip
(29) Arm
(30) Bushing COMPL
(31) Base plate
(32) Grommet
(33) Packing
(34) Spacer
(35) Washer
(36) Snap pin
(37) Select cable
(38) Nut B
(39) Nut A
(40) Cover
(41) Clip

Tightening torque: N·m (kgf-m, ft-lb)
T1: 2.0 (0.2, 1.4)
T2: 7.5 (0.76, 5.5)
T3: 13 (1.3, 9.4)
T4: 18 (1.8, 13.0)

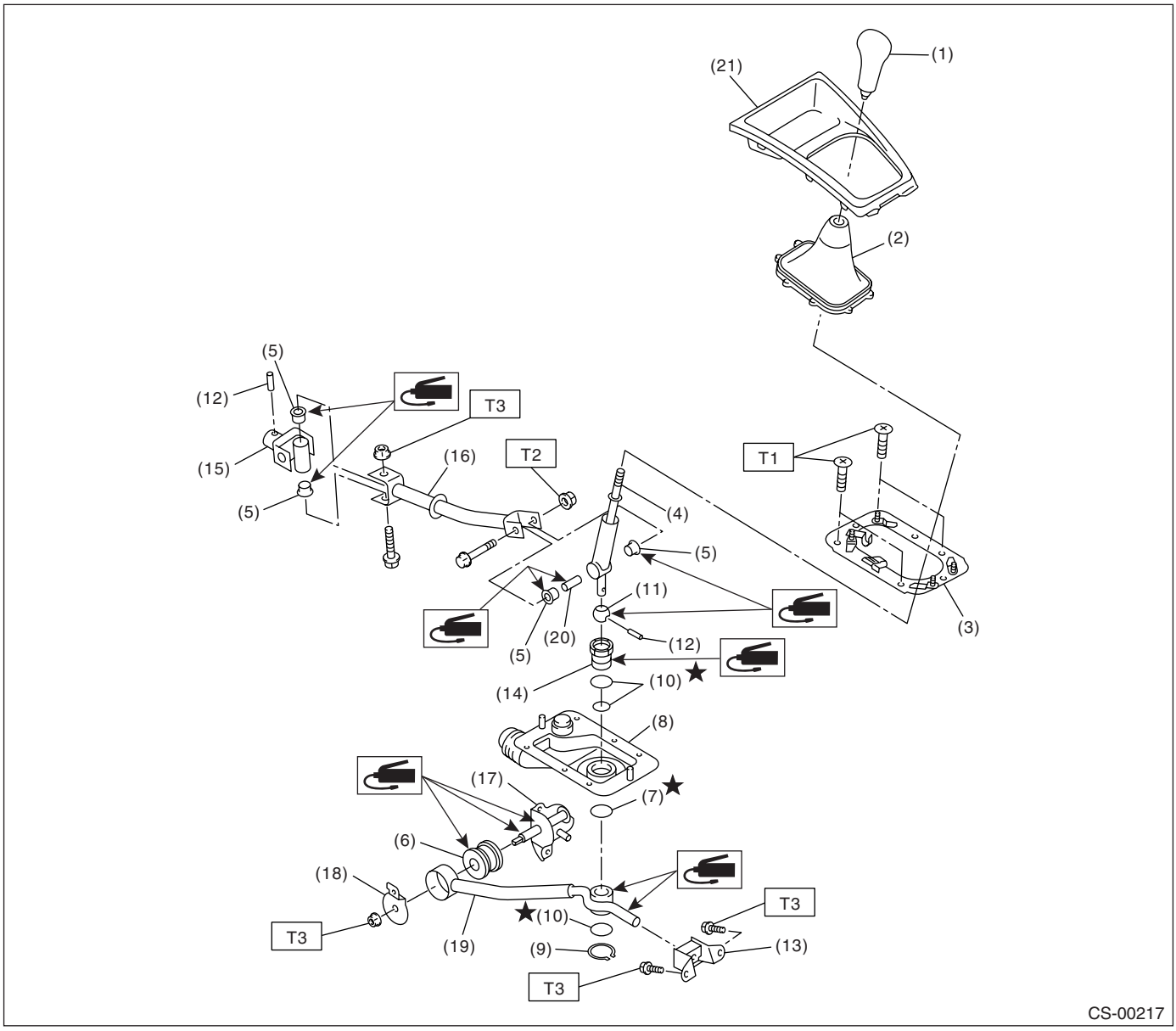
• SPORT SHIFT MODEL



(1) Grip
(2) Indicator cover
(3) Blind
(4) Button
(5) Guide plate
(6) Spring
(7) Cover
(8) Clip
(9) Select lever COMPL
(10) Detent arm
(11) Arm A
(12) Detent spring
(13) Tube
(14) Lock plate A
(15) Lock plate C
(16) Bush
(17) Lock plate B
(18) Cushion
(19) Bush
(20) Clamp
(21) Cover
(22) Clamp
(23) Shift lock solenoid
(24) Plate COMPL
(25) Bracket guide
(26) Clip
(27) Spring
(28) Rod
(29) Bush
(30) Packing
(31) Spacer
(32) Grommet
(33) Spring pin
(34) Arm
(35) Snap pin
(36) Snap pin
(37) Washer
(38) Select cable
(39) Nut B
(40) Nut A
(41) Cushion

Tightening torque: N·m (kgf-m, ft-lb)
T1: 7.5 (0.76, 5.5)
T2: 13 (1.3, 9.4)
T3: 18 (1.8, 13.0)
T4: 33 (3.4, 25)
T5: 2.0 (0.2, 1.4)
T6: 2.0 (0.2, 1.4)
T7: 7.5 (0.76, 5.5)

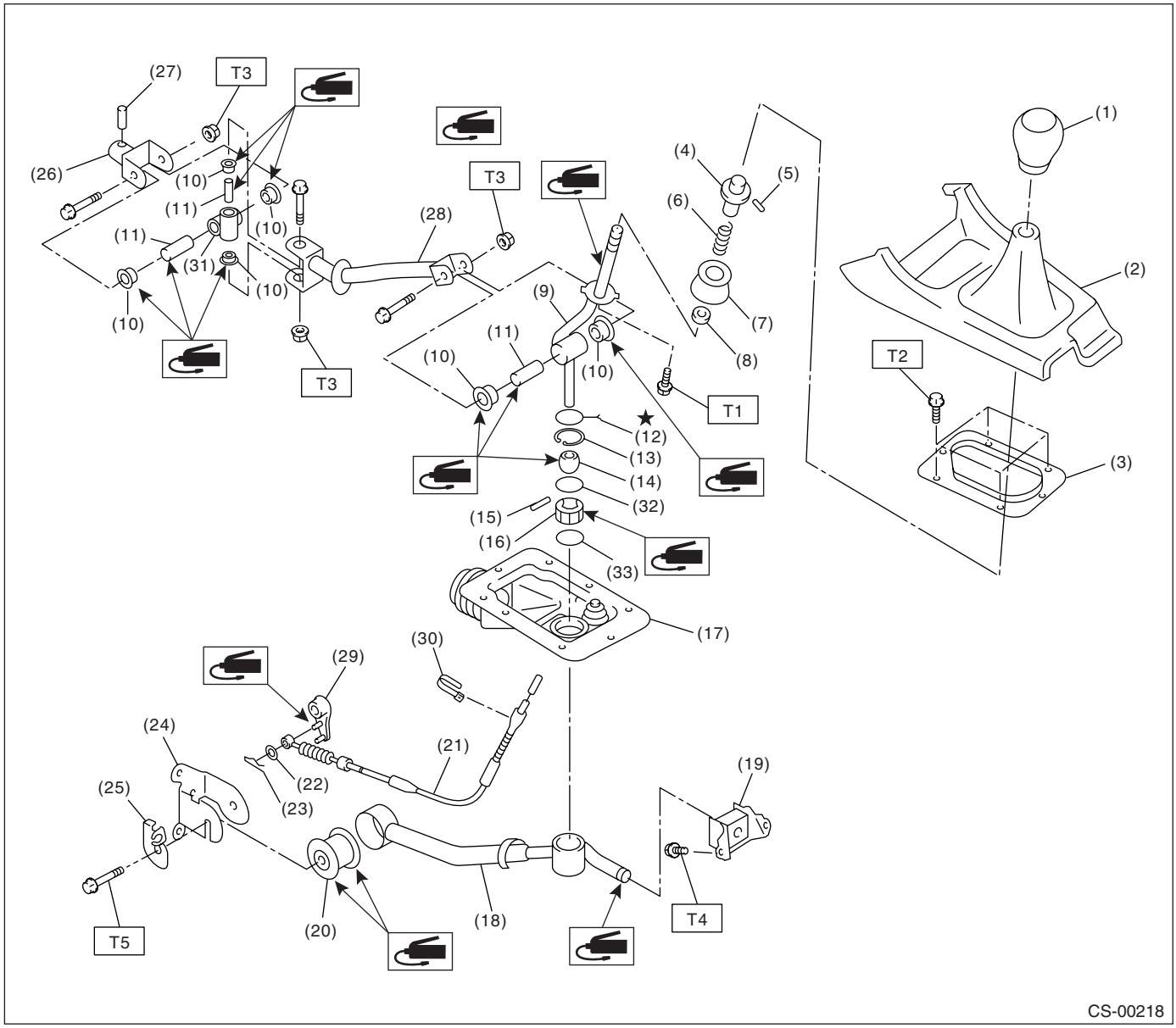
2. 5MT GEAR SHIFT LEVER



(1) Gear shift knob
(2) Console boot
(3) Plate ASSY
(4) Lever
(5) Bushing
(6) Bushing
(7) Lock wire
(8) Boot
(9) Snap ring
(10) O-ring
(11) Bushing A
(12) Spring pin
(13) Cushion rubber
(14) Bushing B
(15) Joint
(16) Rod
(17) Bracket
(18) Washer
(19) Stay
(20) Spacer
(21) Front cover

Tightening torque: N·m (kgf-m, ft-lb)
T1: 7.5 (0.76, 5.5)
T2: 12 (1.2, 8.7)
T3: 18 (1.8, 13.0)

3. 6MT GEAR SHIFT LEVER



(1) Gear shift knob
(2) Console box front
(3) Plate
(4) Slider
(5) Spring pin
(6) Spring
(7) Holder
(8) Seat cushion
(9) Lever
(10) Bushing
(11) Spacer
(12) Lock wire
(13) Snap ring
(14) Bushing
(15) Spring pin
(16) Bushing
(17) Boot
(18) Stay
(19) Cushion rubber
(20) Bushing
(21) Reverse check cable
(22) Washer
(23) Snap pin
(24) Bracket
(25) Cable plate
(26) Joint
(27) Spring pin
(28) Rod
(29) Reverse check lever
(30) Band clip
(31) Boss
(32) O-ring
(33) O-ring

Tightening torque: N·m (kgf-m, ft-lb)
T1: 1.3 (0.13, 0.96)
T2: 7.5 (0.76, 5.5)
T3: 11.8 (1.2, 8.7)
T4: 18 (1.8, 13.0)
T5: 32 (3.3, 23.6)

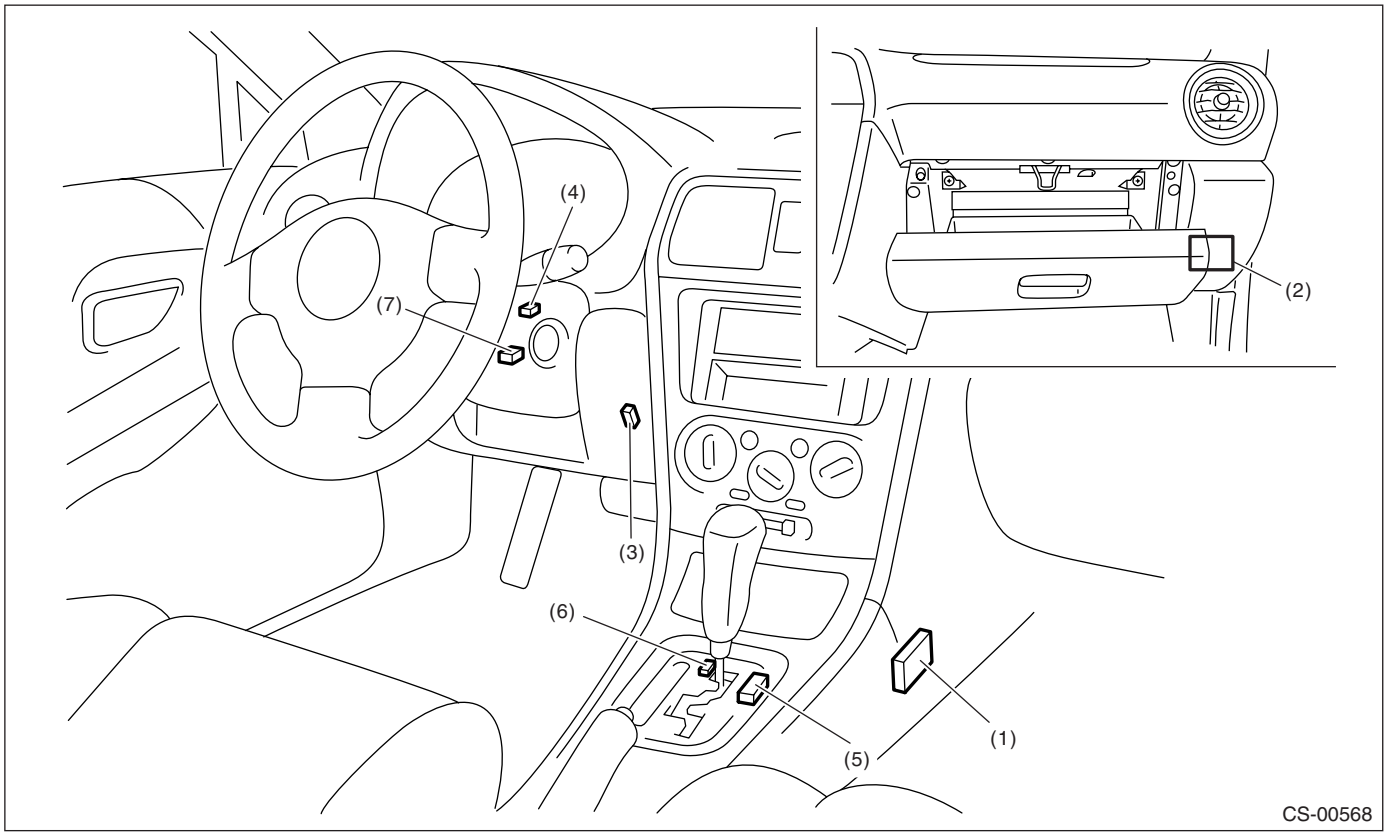
C: CAUTION

• Wear work clothing, including a cap, protective goggles, and protective shoes during operation.
• Remove contamination including dirt and corrosion before removal, installation or disassembly.
• Keep the disassembled parts in order and protect them from dust and dirt.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly, and replacement.
• Use SUBARU genuine grease etc. or the equivalent. Do not mix grease etc. with that of another grade or from other manufacturers.
• Be sure to tighten fasteners including bolts and nuts to the specified torque.
• Place shop jacks or rigid racks at the specified points.
• Apply grease onto sliding or revolution surfaces before installation.
• Before installing O-rings or snap rings, apply sufficient amount of grease to avoid damage and deformation.
• Before securing a part on a vise, place cushioning material such as wood blocks, aluminum plate, or shop cloth between the part and the vise.
• Before disconnecting electrical connectors, be sure to disconnect the ground cable from battery.

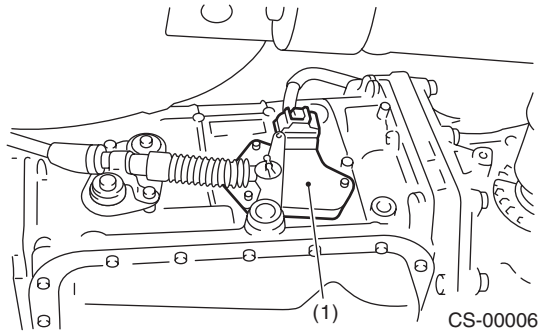
2. AT Shift Lock Control System

A: LOCATION

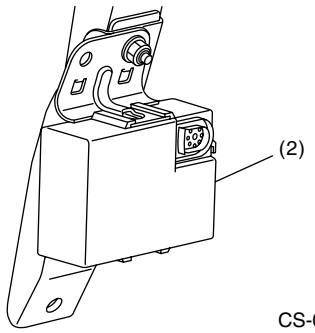
1. LHD MODEL



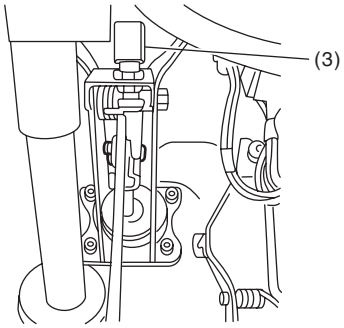
(1) Inhibitor switch
(2) AT shift lock control module
(3) Stop light switch
(4) Key warning switch
(5) Shift lock solenoid
(6) “P” range switch
(7) Key lock solenoid



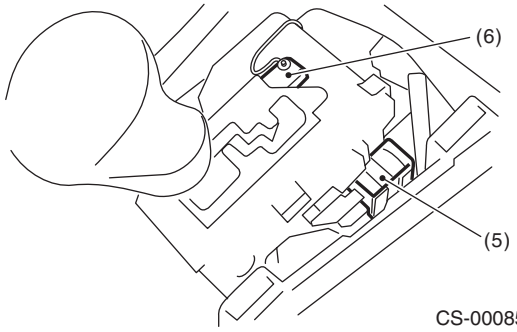
CS-00006



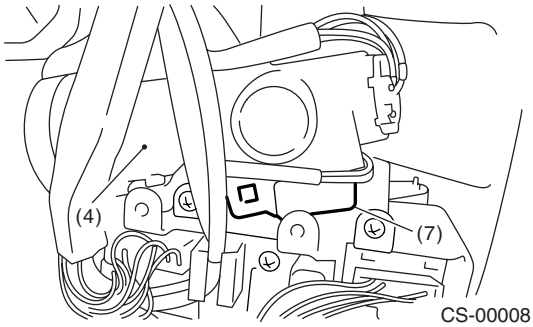
CS-00569



CS-00193

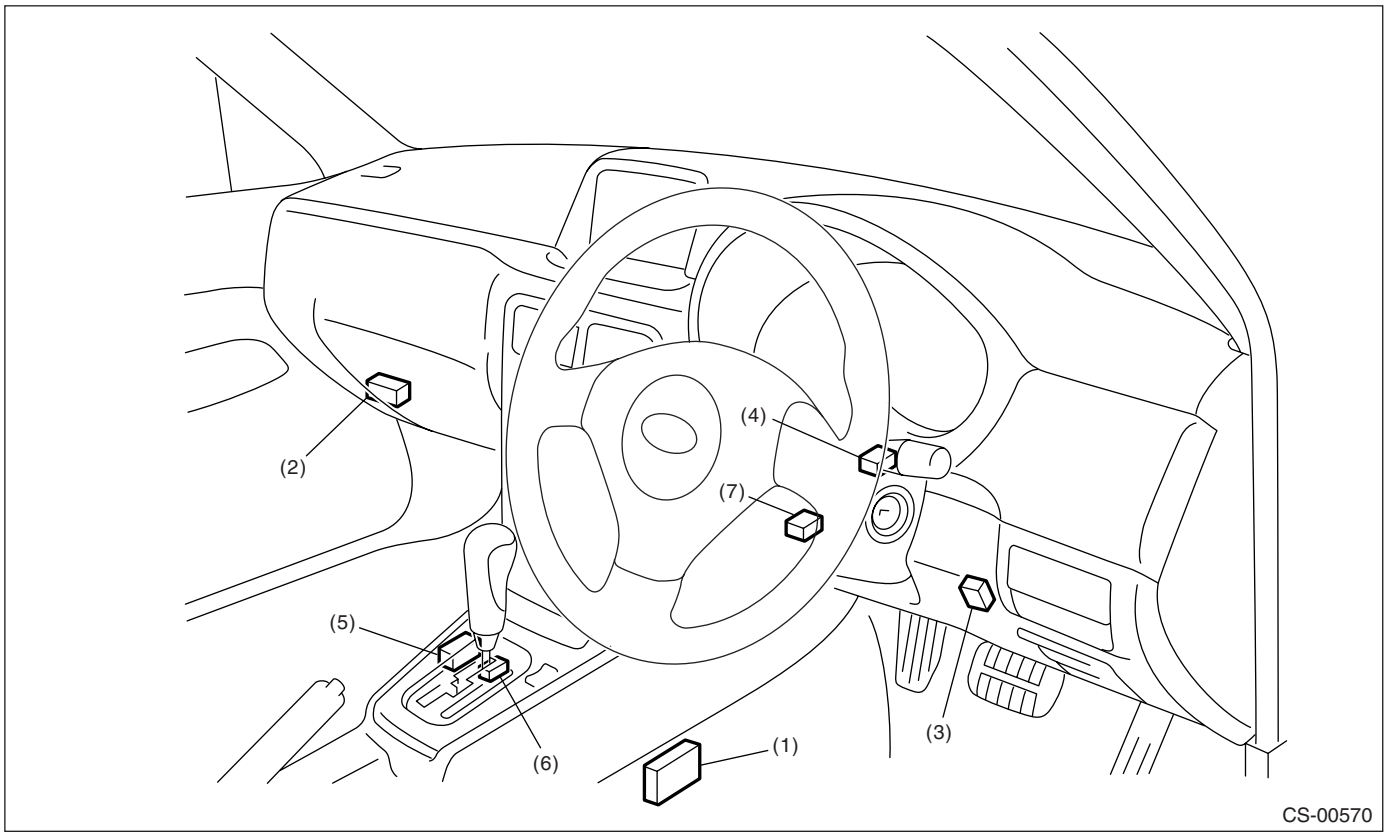


CS-00085

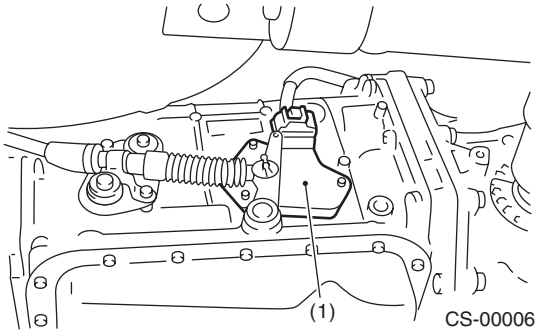


CS-00008

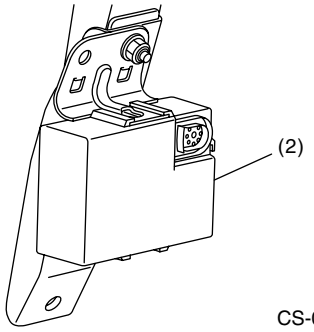
2. RHD MODEL



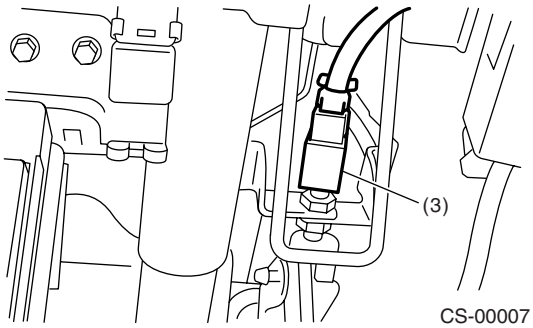
(1) Inhibitor switch
(2) AT shift lock control module
(3) Stop light switch
(4) Key warning switch
(5) Shift lock solenoid
(6) “P” range switch
(7) Key lock solenoid



CS-00006

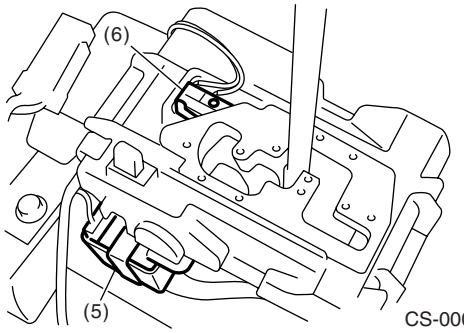


CS-00569

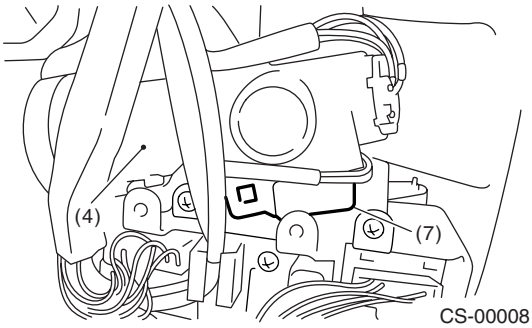


CS-00007

EXCEPT SPORT SHIFT MODEL

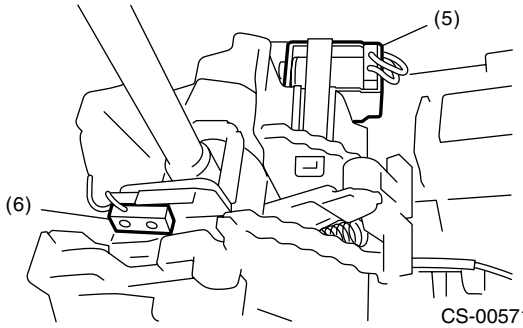


CS-00010



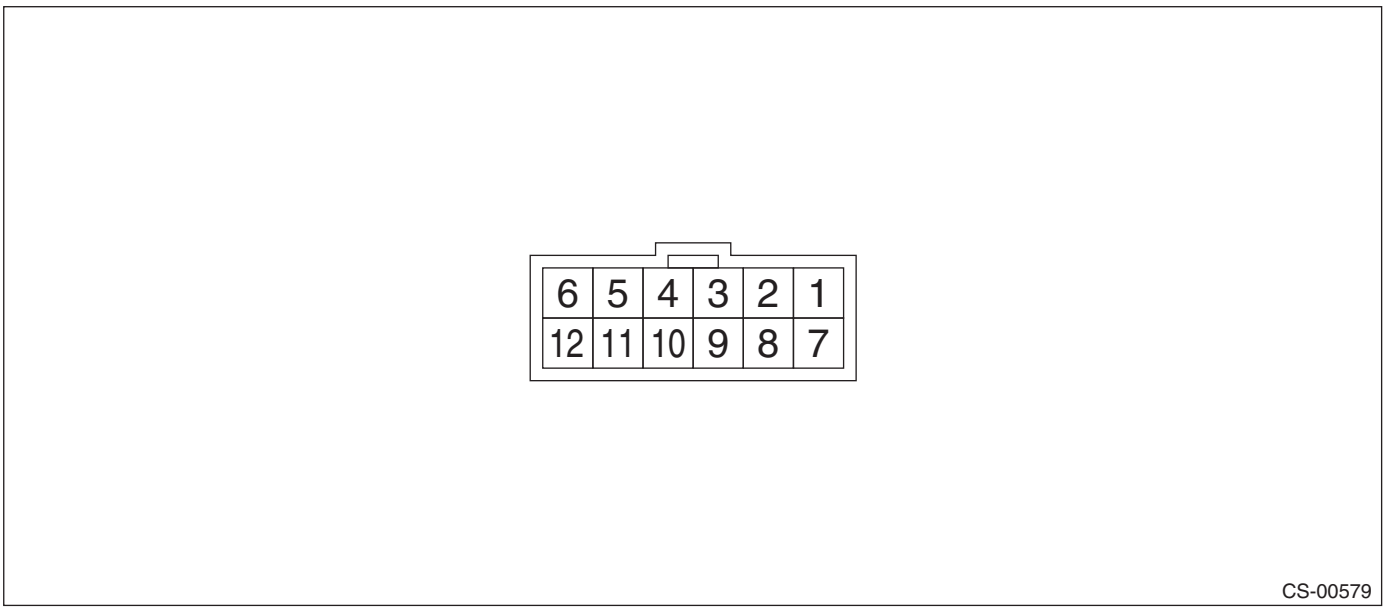
CS-00008

SPORT SHIFT MODEL



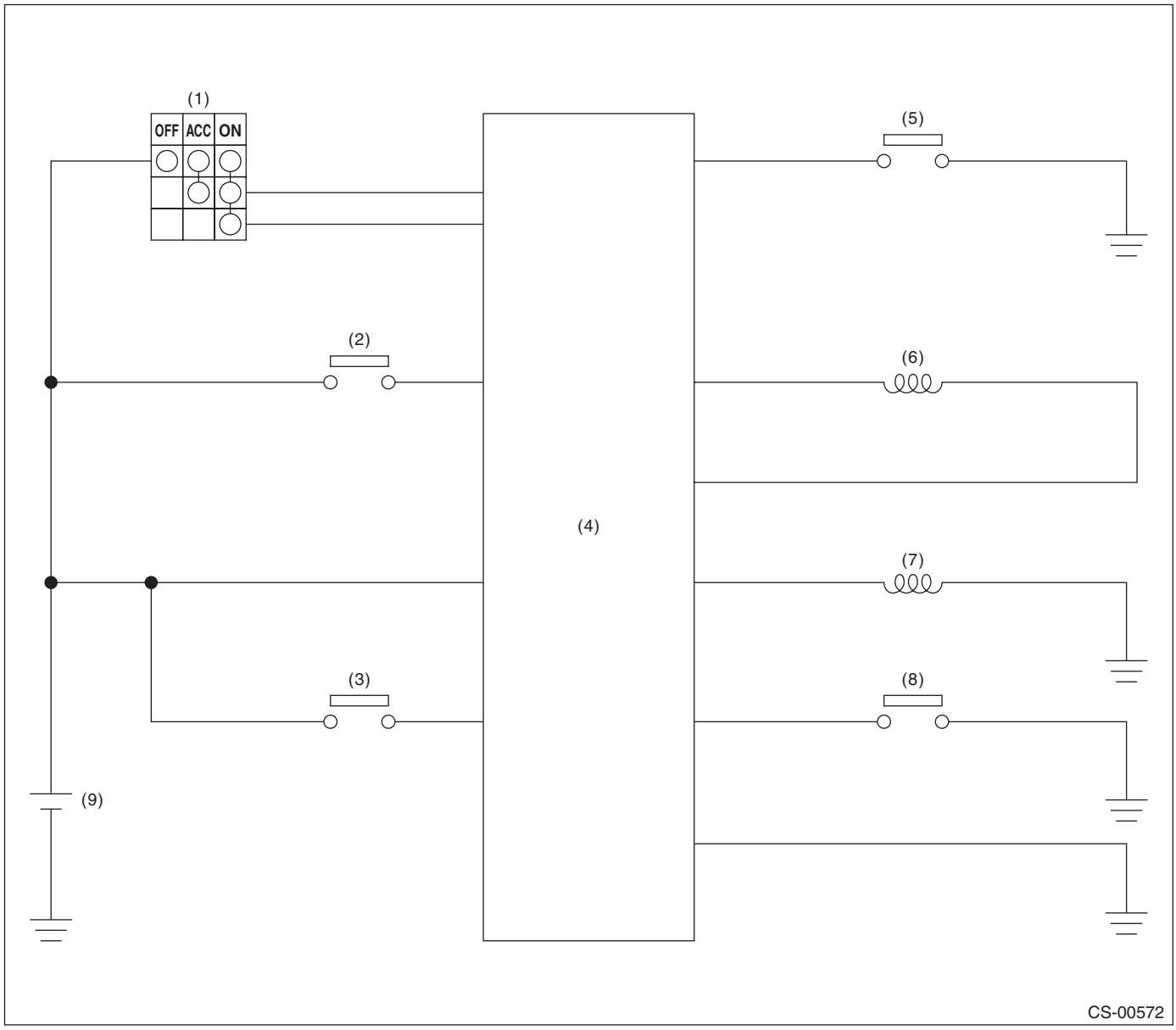
CS-00571

B: ELECTRICAL SPECIFICATION



Contents	Terminal No. (+) — (–)	Input/Output signal Measured value and measuring conditions
Battery power supply	3 — 10	9 — 16 V
Ignition power supply	1 — 10	9 — 16 V when ignition switch is at ON or START.
Ignition power supply	7 — 10	9 — 16 V when ignition switch is at ACC.
Inhibitor Switch (“P” range)	2 — 10	0 V when select lever is in “P” range. 9 — 16 V when select lever is in other ranges than “P” range.
Stop light switch	4 — 10	9 — 16 V when stop light switch is ON. 0 V when stop light switch is OFF.
“P” range switch	5 — 10	0 V when select lever is in “P” range. 9 — 16 V when select lever is in other ranges than “P” range.
Shift lock solenoid signal	6 — 10	8.5 — 16 V when the select lever is set to other than “P” range and the ignition switch is turned to the ACC or ON. 0 V when shift lock is operating.
Key warning switch signal	8 — 10	9 — 16 V when key is inserted. 0 V when key is removed.
Key lock solenoid signal	9 — 10	Pulse is output when the select lever is set from “P” range to other than “P” range, or from other than “P” range to “P” range.
Key lock solenoid ground	11 — 10	0 V
Ground	10	—

C: WIRING DIAGRAM



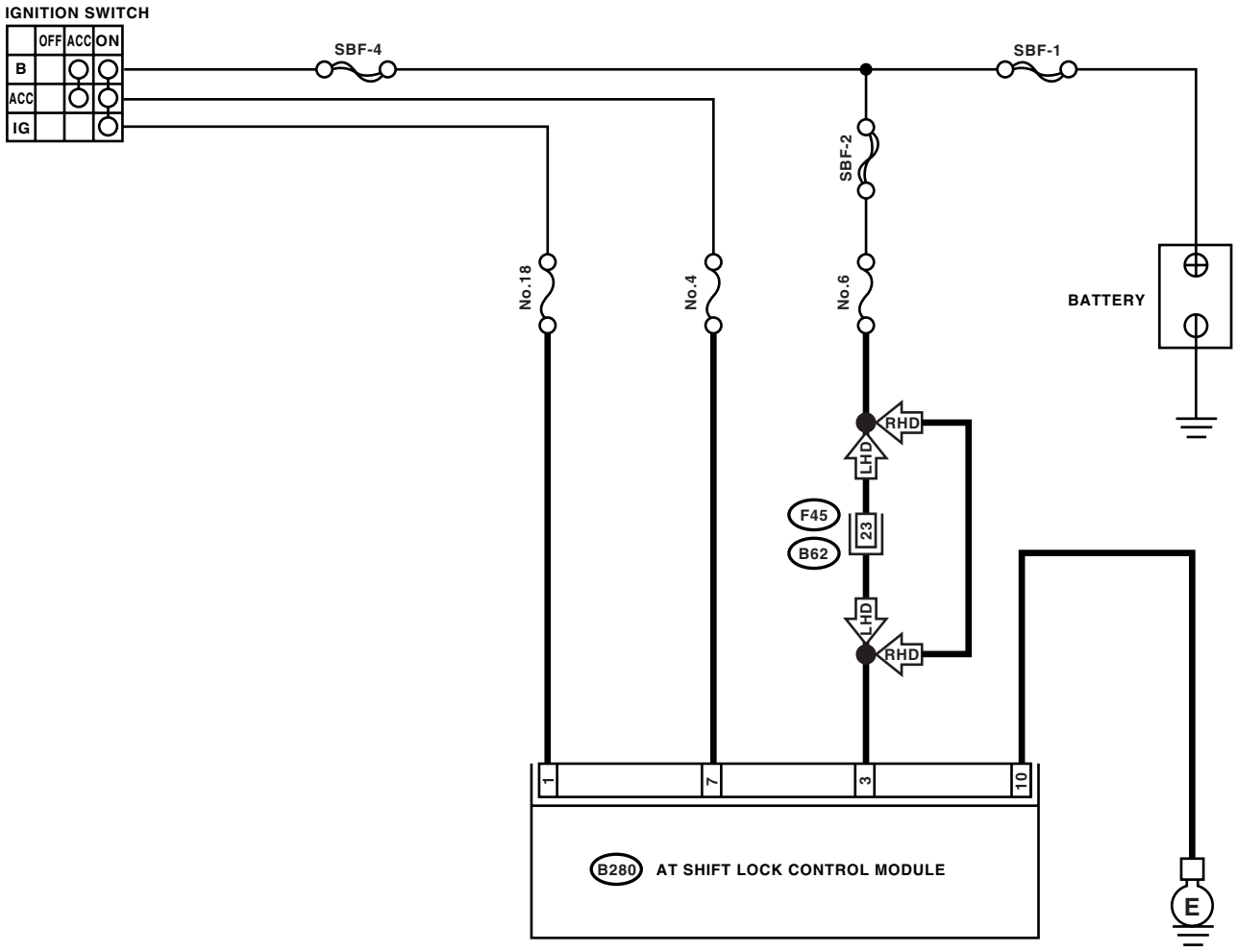
(1) Ignition switch
(2) Stop light switch
(3) Key warning switch
(4) AT shift lock control module
(5) Inhibitor switch
(6) Key lock solenoid
(7) Shift lock solenoid
(8) “P” range switch
(9) Battery

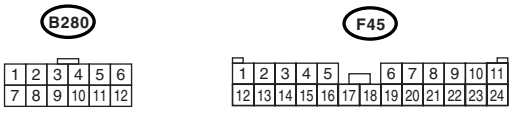
D: INSPECTION

1. SHIFT LOCK OPERATION

	Step	Check	Yes	No
1	**CHECK SHIFT LOCK.** 1) Turn the ignition switch ON. 2) Move the select lever to “P” range.	While the brake pedal is not depressed, can select lever move from “P” range to other ranges?	Inspect “SELECT LEVER CANNOT BE SHIFT LOCKED”. <Ref. to CS-18, SELECT LEVER CANNOT BE SHIFT LOCKED, INSPECTION, AT Shift Lock Control System.>	Go to step **2.**
2	**CHECK SHIFT LOCK.**	While the brake pedal is depressed, can select lever move from “P” range to other ranges?	Go to step **3.**	Inspect “SELECT LEVER SHIFT LOCK CANNOT BE RELEASED”. <Ref. to CS-20, SELECT LEVER SHIFT LOCK CANNOT BE RELEASED, INSPECTION, AT Shift Lock Control System.>
3	**CHECK KEY INTERLOCK.**	When the select lever is in other than “P” range, does ignition switch turn to “LOCK” position?	Inspect “KEY INTERLOCK DOES NOT BE LOCKED OR RELEASED. <Ref. to CS-23, KEY INTERLOCK DOES NOT LOCK OR RELEASE, INSPECTION, AT Shift Lock Control System.>	Go to step **4.**
4	**CHECK KEY INTERLOCK.**	When the select lever is in “P” range, does ignition switch turn to “LOCK” position?	AT shift lock system is normal.	Inspect “KEY INTERLOCK DOES NOT BE LOCKED OR RELEASED. <Ref. to CS-23, KEY INTERLOCK DOES NOT LOCK OR RELEASE, INSPECTION, AT Shift Lock Control System.>

2. AT SHIFT LOCK CONTROL MODULE POWER SUPPLY AND GROUND LINE

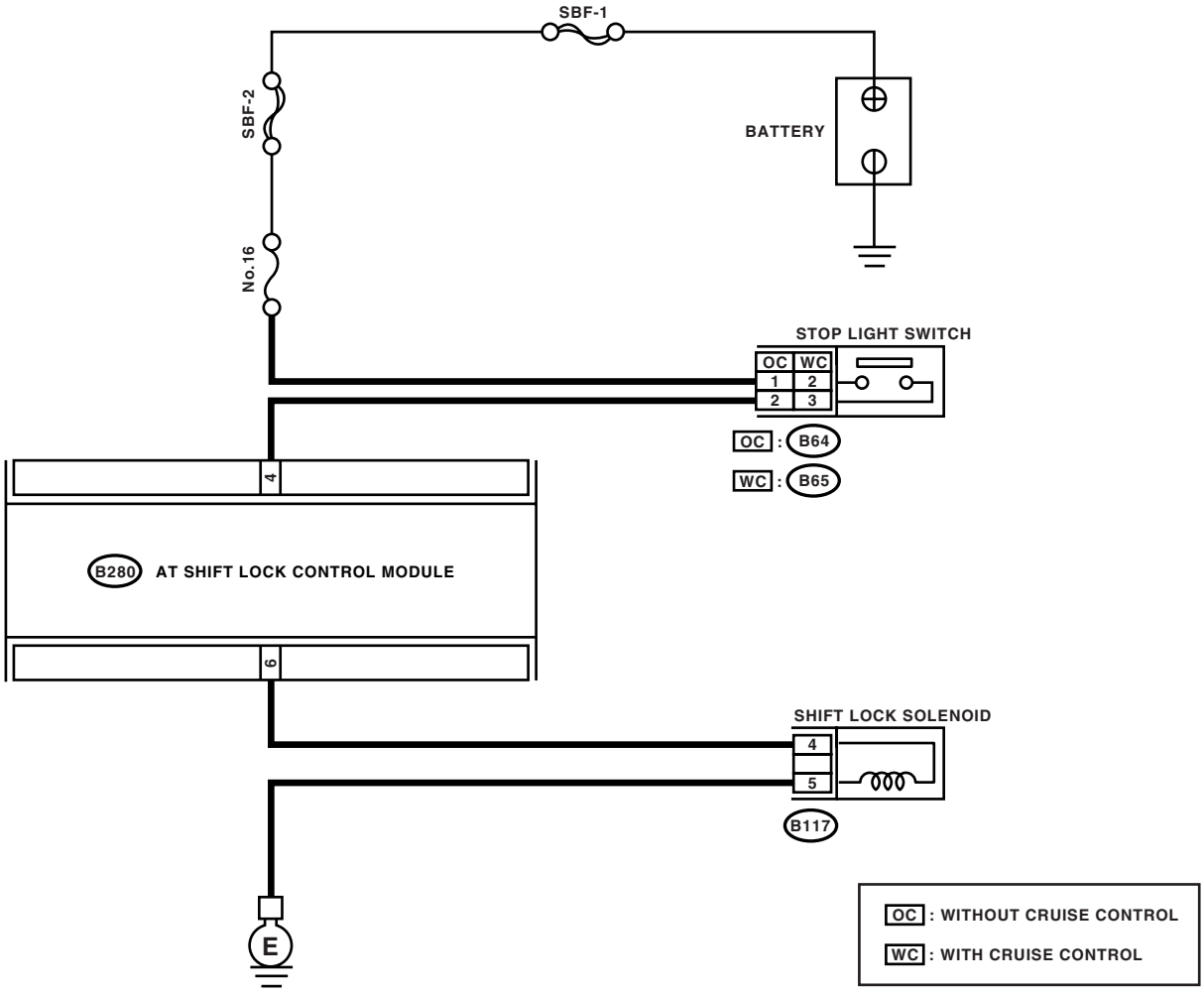




CS-00573

	Step	Check	Yes	No
1	**CHECK FUSE.** Remove the fuse (No. 4, 6 and 18).	Is the fuse (No. 4, 6 or 18) blown out?	Replace the fuse (No. 4, 6 or 18). If the replaced fuse (No. 4, 6 or 18) has blown out easily, repair short circuit in harness between fuse and AT shift lock control module.	Go to step **2.**
2	**CHECK HARNESS CONNECTOR BETWEEN AT SHIFT LOCK CONTROL MODULE AND BODY GROUND.** 1) Turn the ignition switch to OFF. 2) Measure the resistance of harness between AT shift lock control module and chassis ground. ***Connector & terminal*** ***(B280) No. 10 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **3.**	Repair the open circuit in harness between AT shift lock control module and body ground.
3	**CHECK BATTERY POWER SUPPLY.** 1) Turn the ignition switch to ON (engine OFF). 2) Measure the voltages between AT shift lock control module and chassis ground. ***Connector & terminal*** ***(B280) No. 3 (+) — Chassis ground (−):***	Is the voltage more than 9 V?	Go to step **4.**	Repair the open circuit harness between battery and AT shift lock control module, and poor contact in coupling connector.
4	**CHECK IGNITION POWER SUPPLY CIRCUIT.** 1) Turn the ignition switch to ACC. 2) Measure the voltage between AT shift lock control module and chassis ground. ***Connector & terminal*** ***(B280) No. 7 (+) — Chassis ground (−):***	Is the voltage more than 9 V?	Go to step **5.**	Repair the open circuit harness between battery and AT shift lock control module, and poor contact in coupling connector.
5	**CHECK IGNITION POWER SUPPLY CIRCUIT.** 1) Turn the ignition switch to ON (engine OFF). 2) Measure the voltage between AT shift lock control module and chassis ground. ***Connector & terminal*** ***(B280) No. 1 (+) — Chassis ground (−):***	Is the voltage more than 9 V?	Go to step **6.**	Repair the open circuit harness between battery and AT shift lock control module, and poor contact in coupling connector.
6	**CHECK POOR CONTACT.**	Is there poor contact in connector?	Repair the poor contact.	Replace the AT shift lock control module.

3. SELECT LEVER CANNOT BE SHIFT LOCKED

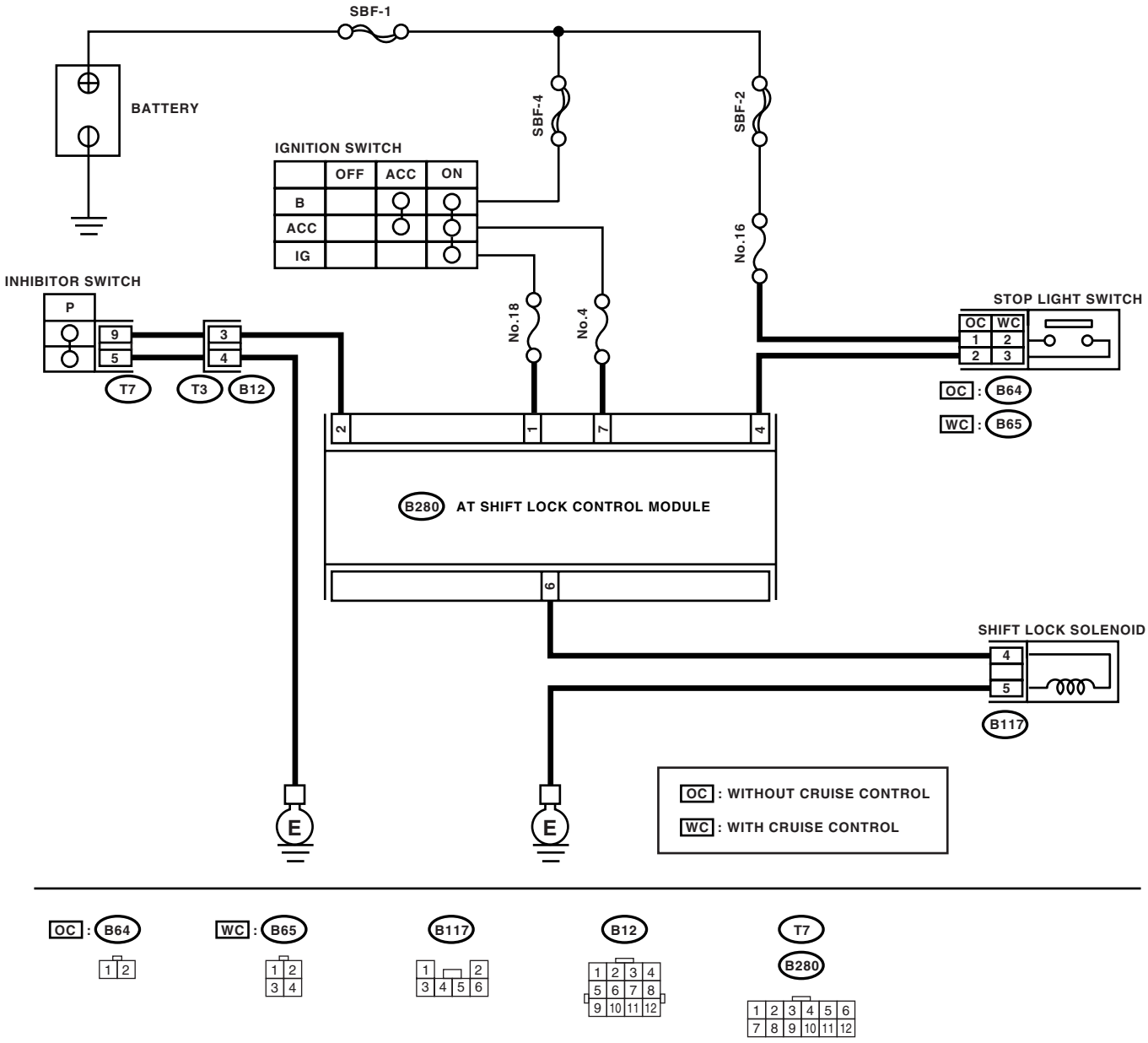


CS-00574

	Step	Check	Yes	No
1	**CHECK STOP LIGHT SWITCH.** Depress the brake pedal.	Does the stop light turn on?	Go to step **2.**	Inspect the stop light system.
2	**CHECK HARNESS BETWEEN STOP LIGHT SWITCH AND AT SHIFT LOCK CONTROL MODULE.** 1) Turn the ignition switch to OFF. 2) Disconnect the AT shift lock control module and stoplight switch connector. 3) Measure the resistance of harness between stop light switch and AT shift lock control module. ***Connector & terminal*** ***Without cruise control*** ***(B64) No. 2 — (B280) No. 4:*** ***With cruise control*** ***(B65) No. 3 — (B280) No. 4:***	Is the resistance more than 1 MΩ?	Repair the open circuit in harness between AT shift lock control module and stop light switch.	Go to step **3.**
3	**CHECK HARNESS BETWEEN STOP LIGHT SWITCH AND AT SHIFT LOCK CONTROL MODULE.** Measure the resistance of harness between stop light switch and chassis ground. ***Connector & terminal*** ***Without cruise control*** ***(B64) No. 2 — Chassis ground:*** ***With cruise control*** ***(B65) No. 3 — Chassis ground:***	Is the resistance less than 1 Ω?	Repair the short circuit in harness between AT shift lock control module and stop light switch.	Go to step **4.**
4	**CHECK HARNESS BETWEEN AT SHIFT LOCK CONTROL MODULE AND SHIFT LOCK SOLENOID.** 1) Disconnect the shift lock solenoid connector. 2) Measure the resistance of harness between AT shift lock control module and shift lock solenoid. ***Connector & terminal*** ***(B117) No. 4 — (B280) No. 6:***	Is the resistance more than 1 MΩ?	Repair the open circuit in harness between AT shift lock control module and shift lock solenoid.	Go to step **5.**
5	**CHECK HARNESS BETWEEN AT SHIFT LOCK CONTROL MODULE AND SHIFT LOCK SOLENOID.** Measure the resistance of harness between shift lock solenoid and chassis ground. ***Connector & terminal*** ***(B117) No. 4 — Chassis ground:***	Is the resistance less than 1 Ω?	Repair the short circuit in harness between AT shift lock control module and shift lock solenoid.	Go to step **6.**
6	**CHECK HARNESS BETWEEN SHIFT LOCK SOLENOID AND CHASSIS GROUND.** Measure the resistance of harness between shift lock solenoid and chassis ground. ***Connector & terminal*** ***(B117) No. 5 — Chassis ground:***	Is the resistance more than 1 MΩ?	Repair the open circuit in harness between shift lock solenoid and body ground.	Go to step **7.**
7	**CHECK SHIFT LOCK SOLENOID.** Measure the resistance of shift lock solenoid connector terminals. ***Terminals*** ***No. 4 — No. 5:***	Is the resistance 20 — 40 Ω?	Go to step **8.**	Replace the shift lock solenoid.
8	**CHECK SHIFT LOCK SOLENOID.** Connect the battery with shift lock solenoid connector terminal and operate solenoid. ***Terminals*** ***No. 4 (+) — No. 5 (−):***	Does the shift lock solenoid operate properly?	Go to step **9.**	Replace the shift lock solenoid.

Step	Check	Yes	No
9 CHECK POOR CONTACT.	Is there poor contact in connector?	Repair the poor contact.	Replace the AT shift lock control module.

4. SELECT LEVER SHIFT LOCK CANNOT BE RELEASED

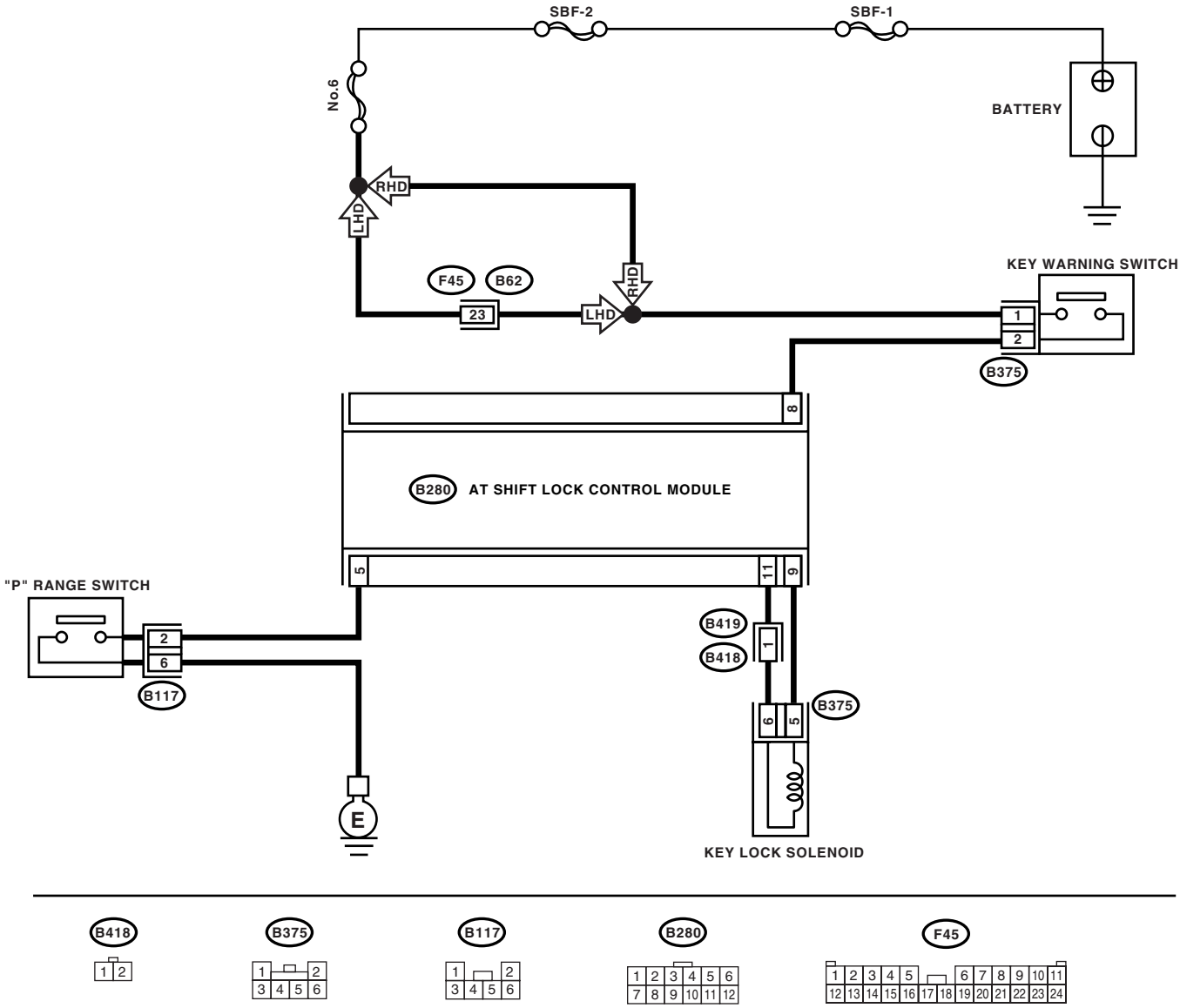


CS-00575

	Step	Check	Yes	No
1	**CHECK INHIBITOR SWITCH.** 1) Turn the ignition switch to ON (engine OFF). 2) Move the select lever from “P” to “1” range.	Are combination meter indicator light and select lever “P”, “R”, “N”, “D”, “3”, “2” and “1” correctly matched?	Go to step **2.**	Adjust the inhibitor switch and select cable.
2	**CHECK HARNESS BETWEEN INHIBITOR SWITCH AND AT SHIFT LOCK CONTROL MODULE.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector of transmission harness and AT shift lock control module. 3) Measure the resistance of harness between AT shift lock control module and chassis ground. ***Connector & terminal*** ***(B280) No. 2 — Chassis ground:***	Is the resistance less than 1 Ω?	Repair the short circuit in harness between AT shift lock control module and transmission connector.	Go to step **3.**
3	**CHECK HARNESS BETWEEN INHIBITOR SWITCH AND AT SHIFT LOCK CONTROL MODULE.** Measure the resistance of harness between AT shift lock control module and inhibitor switch. ***Connector & terminal*** ***(B12) No. 3 — (B280) No. 2:***	Is the resistance more than 1 MΩ?	Repair the open circuit in harness between AT shift lock control module and transmission connector.	Go to step **4.**
4	**CHECK HARNESS BETWEEN INHIBITOR SWITCH AND CHASSIS GROUND.** Measure the resistance of harness between AT shift lock control module and chassis ground. ***Connector & terminal*** ***(B12) No. 4 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **5.**	Repair the open circuit in harness between AT shift lock control module and chassis ground.
5	**CHECK INHIBITOR SWITCH.** 1) Move the select lever to “P” range. 2) Measure the resistance of transmission harness connector terminals. ***Connector & terminal*** ***(T3) No. 3 — No. 4:***	Is the resistance more than 1 MΩ?	Repair or replace the inhibitor switch.	Go to step **6.**
6	**CHECK OUTPUT SIGNAL FOR AT SHIFT LOCK CONTROL MODULE.** 1) Connect all connectors. 2) Turn the ignition switch to ON. 3) Move the select lever to except “P” range. 4) Measure the voltage between AT shift lock control module and chassis ground. ***Connector & terminal*** ***(B280) No. 2 (+) — Chassis ground (−):***	Is the voltage 9 — 16 V?	Go to step **7.**	Go to step **15.**
7	**CHECK STOP LIGHT SWITCH.** Depress the brake pedal.	Does the stop light turn on?	Go to step **8.**	Inspect the stop light system.
8	**CHECK HARNESS BETWEEN STOP LIGHT SWITCH AND AT SHIFT LOCK CONTROL MODULE.** 1) Depress the brake pedal. 2) Measure the voltage between AT shift lock control module and chassis ground. ***Connector & terminal*** ***(B280) No. 4 (+) — Chassis ground (−):***	Is the voltage more than 9 V?	Go to step **9.**	Repair the open or short circuit in harness between AT shift lock control module and stop light switch.

	Step	Check	Yes	No
9	**CHECK HARNESS BETWEEN AT SHIFT LOCK CONTROL MODULE AND SHIFT LOCK SOLENOID.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from shift lock solenoid and AT shift lock control module. 3) Measure the resistance of harness between AT shift lock control module and shift lock solenoid. ***Connector & terminal*** ***(B280) No. 6 — (B117) No. 4:***	Is the resistance more than 1 MΩ?	Repair the open circuit in harness between AT shift lock control module and shift lock solenoid.	Go to step **10.**
10	**CHECK HARNESS BETWEEN AT SHIFT LOCK CONTROL MODULE AND SHIFT LOCK SOLENOID.** Measure the resistance of harness between shift lock solenoid and chassis ground. ***Connector & terminal*** ***(B280) No. 6 — Chassis ground:***	Is the resistance less than 10 Ω?	Repair the short circuit in harness between AT shift lock control module and shift lock solenoid.	Go to step **11.**
11	**CHECK HARNESS BETWEEN SHIFT LOCK SOLENOID AND CHASSIS GROUND.** Measure the resistance of harness between shift lock solenoid and chassis ground. ***Connector & terminal*** ***(B117) No. 5 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **12.**	Repair the open circuit in harness between shift lock solenoid and chassis ground.
12	**CHECK SHIFT LOCK SOLENOID.** Measure the resistance of shift lock solenoid connector terminals. ***Terminals*** ***No. 4 — No. 5:***	Is the resistance 20 — 40 Ω?	Go to step **13.**	Replace the shift lock solenoid.
13	**CHECK SHIFT LOCK SOLENOID.** Connect the battery with shift lock solenoid connector terminal and operate solenoid. ***Terminals*** ***No. 4 (+) — No. 5 (−):***	Is the shift lock solenoid operating properly?	Go to step **14.**	Replace the shift lock solenoid.
14	**CHECK OUTPUT SIGNAL FOR AT SHIFT LOCK CONTROL MODULE.** 1) Turn the ignition switch to ON (engine OFF). 2) Measure the voltage between AT shift lock control module and chassis ground. ***Connector & terminal*** ***(B280) No. 6 (+) — Chassis ground (−):***	Is the voltage more than 8.5 V?	Go to step **15.**	Replace the AT shift lock control module.
15	**CHECK POOR CONTACT.**	Is there poor contact in connector?	Repair the poor contact.	Replace the AT shift lock control module.

5. KEY INTERLOCK DOES NOT LOCK OR RELEASE



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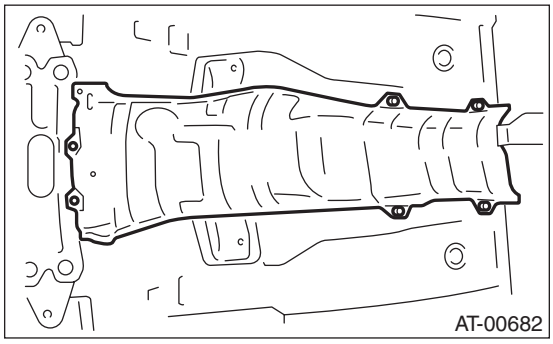
	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN BATTERY AND KEY WARNING SWITCH.** 1) Disconnect the connector key warning switch. 2) Measure the voltage of harness between key warning switch and chassis ground. ***Connector & terminal*** ***(B375) No. 1 (+) — Chassis ground (−):***	Is the voltage 9 — 16 V?	Go to step **2.**	Repair the open or short circuit in harness between battery and key warning switch.
2	**CHECK KEY WARNING SWITCH.** Measure the resistance of key warning switch connector terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance more than 1 MΩ?	Replace the key warning switch.	Go to step **3.**
3	**CHECK KEY WARNING SWITCH.** 1) Remove the key. 2) Measure the resistance of key warning switch connector terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance more than 1 MΩ?	Go to step **4.**	Replace the key warning switch.
4	**CHECK HARNESS BETWEEN AT SHIFT LOCK CONTROL MODULE AND KEY WARNING SWITCH.** 1) Disconnect the AT shift lock control module connector. 2) Measure the voltage of harness AT shift lock control module and chassis ground. ***Connector & terminal*** ***(B280) No. 8 (+) — Chassis ground (−):***	Is the voltage more than 9 V?	Go to step **5.**	Repair the open circuit in harness between AT shift lock control module and key warning switch.
5	**CHECK HARNESS BETWEEN AT SHIFT LOCK CONTROL MODULE AND KEY LOCK SOLENOID.** 1) Disconnect the connector of key lock solenoid. 2) Measure the resistance of harness between AT shift lock control module and key lock solenoid. ***Connector & terminal*** ***(B375) No. 5 — (B280) No. 9:*** ***(B375) No. 6 — (B280) No. 11:***	Is the resistance more than 1 MΩ?	Repair the open circuit in harness between AT shift lock control module and key lock solenoid.	Go to step **6.**
6	**CHECK HARNESS BETWEEN AT SHIFT LOCK CONTROL MODULE AND KEY LOCK SOLENOID.** Measure the resistance of harness between AT shift lock control module and chassis ground. ***Connector & terminal*** ***(B280) No. 9 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **7.**	Repair the short circuit in harness between AT shift lock control module and key lock solenoid.
7	**CHECK KEY LOCK SOLENOID.** Measure the resistance of key lock solenoid connector terminals. ***Terminals*** ***No. 5 — No. 6:***	Is the resistance 4 — 8 Ω?	Go to step **8.**	Replace the key lock solenoid.
8	**CHECK HARNESS BETWEEN "P" RANGE SWITCH AND CHASSIS GROUND.** Measure the resistance of harness between "P" range switch and chassis ground. ***Connector & terminal*** ***(B117) No. 2 — Chassis ground:***	Is the resistance less than 1 Ω?	Repair the short circuit in harness between "P" range switch and AT shift lock control module.	Go to step **9.**

	Step	Check	Yes	No
9	**CHECK HARNESS BETWEEN AT SHIFT LOCK CONTROL MODULE AND "P" RANGE SWITCH.** 1) Disconnect the connector from "P" range switch. 2) Measure the resistance of harness between AT shift lock control module and "P" range switch. ***Connector & terminal*** ***(B117) No. 2 — (B280) No. 5:***	Is the resistance more than 1 MΩ?	Repair the open circuit in harness between AT shift lock control module and "P" range switch.	Go to step **10.**
10	**CHECK HARNESS BETWEEN "P" RANGE SWITCH AND CHASSIS GROUND.** Measure the resistance of harness "P" range switch and chassis ground. ***Connector & terminal*** ***(B117) No. 6 — Chassis ground:***	Is the resistance more than 1 MΩ?	Repair the open circuit in harness between "P" range switch and chassis ground.	Go to step **11.**
11	**CHECK "P" RANGE SWITCH.** 1) Move the select lever to "P" range. 2) Measure resistance between "P" range switch connector terminals. ***Terminals*** ***No. 2 — No. 6:***	Is the resistance less than 1 Ω?	Go to step **12.**	Replace the "P" range switch.
12	**CHECK "P" RANGE SWITCH.** 1) Move the select lever to other than "P" range. 2) Measure resistance between "P" range switch connector terminals. ***Terminals*** ***No. 2 — No. 6:***	Is the resistance more than 1 MΩ?	Go to step **13.**	Replace the "P" range switch.
13	**CHECK OUTPUT SIGNAL FOR AT SHIFT LOCK CONTROL MODULE.** 1) Connect all connectors. 2) Set the probe of oscilloscope to AT shift lock control module connector terminals. ***Connector & terminal*** ***Positive lead ; (B280) No. 9 :*** ***Negative lead ; (B280) No. 11 :*** 3) Turn the ignition switch to ON. 4) Repeat shifting the select lever from "P" range to other than "P" range. 5) Read the waveform of oscilloscope.	Is the waveform of oscilloscope output as pulseform?	Go to step **14.**	Go to step **15.**
14	**CHECK IGNITION KEY.**	Is the ignition switch turned to OFF position?	The shift lock system is normal at present. A temporary poor contact of connector or harness may be the cause. Repair the harness or connector.	Replace the ignition key.
15	**CHECK POOR CONTACT.**	Is there poor contact in connector?	Repair the poor contact.	Replace the AT shift lock control module.

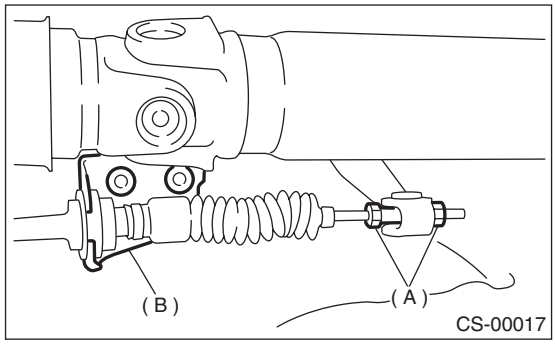
3. Select Lever

A: REMOVAL

1) Set the vehicle on a lift.
2) Disconnect the ground cable from battery.
3) Set the select lever to the “N” range.
4) Lift-up the vehicle.
5) Remove the rear exhaust pipe and muffler.
• Non-turbo model
<Ref. to EX(H4SO)-10, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4SO)-12, REMOVAL, Muffler.>
• Turbo model
<Ref. to EX(H4DOTC)-15, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4DOTC)-16, REMOVAL, Muffler.>
6) Remove the heat shield cover. (If equipped)

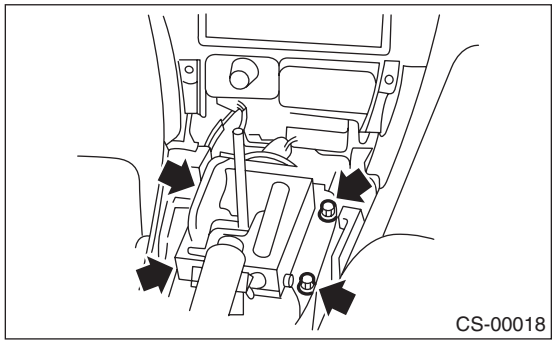


7) Disconnect the cable from select lever, and then remove the cable bracket.



(A) Adjusting nuts
(B) Cable bracket

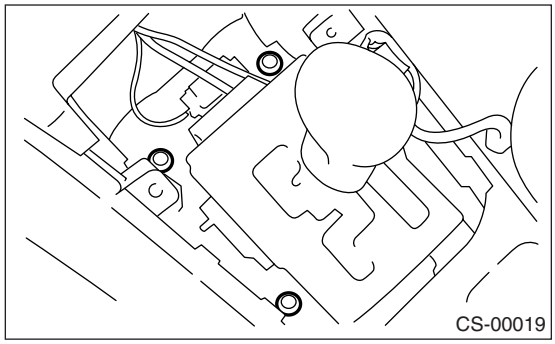
8) Lower the vehicle.
9) Remove the console box. <Ref. to EI-45, REMOVAL, Console Box.>
10) Disconnect the connectors, then remove the four bolts to take out the select lever assembly from the body.



B: INSTALLATION

1) Mount the select lever onto the vehicle body.
2) Tighten the four bolts to install the select lever to the vehicle body, then connect connector.

Tightening torque:
13 N·m (1.3 kgf-m, 9.4 ft-lb)



3) Install the console box. <Ref. to EI-45, INSTALLATION, Console Box.>
4) Set location of the select lever at “N” range.
5) Lift-up the vehicle.
6) Set location of the range select lever to “N” range.
7) Insert the thread portion of the other inner cable and into the connector hole of the select lever, and fix the other outer cable end to the bracket.

Tightening torque:
18 N·m (1.8 kgf-m, 13.0 ft-lb)

8) Adjust the select cable position. <Ref. to CS-34, ADJUSTMENT, Select Cable.>
9) After completion of fitting, make sure that the select lever operates smoothly all across the operating range.
10) Install the heat shield cover. (If equipped)

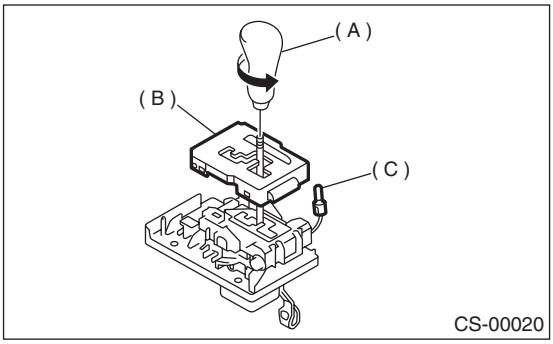
11) Install the rear exhaust pipe and muffler.
• Non-turbo model
<Ref. to EX(H4SO)-10, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H4SO)-12, INSTALLATION, Muffler.>
• Turbo model
<Ref. to EX(H4DOTC)-15, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H4DOTC)-16, INSTALLATION, Muffler.>
12) Inspect the following items. If the following inspection reveals problems, adjust the select cable and inhibitor switch. <Ref. to CS-34, ADJUSTMENT, Select Cable.> <Ref. to 4AT-54, ADJUSTMENT, Inhibitor Switch.>
(1) The engine starts operating when select lever is in range “P” and “N”, but not in other ranges.
(2) The back-up light is lit when the select lever is in range “R”, but not in other ranges.
(3) Select lever and indicator ranges are matched.

C: DISASSEMBLY

1. EXCEPT SPORT SHIFT MODEL

1) Remove the packing.
2) Remove the grip.
3) Remove the indicator light, and then remove the indicator cover.

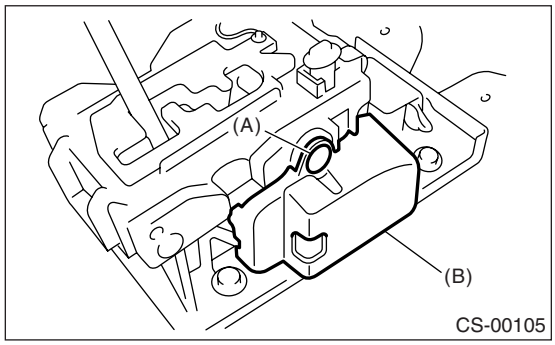
NOTE:
Be careful not to break the indicator light during removal.



(A) Grip
(B) Indicator cover
(C) Indicator light

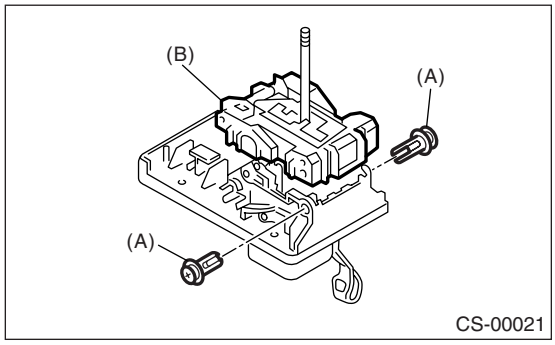
4) Remove the blind.

5) Remove the cover.



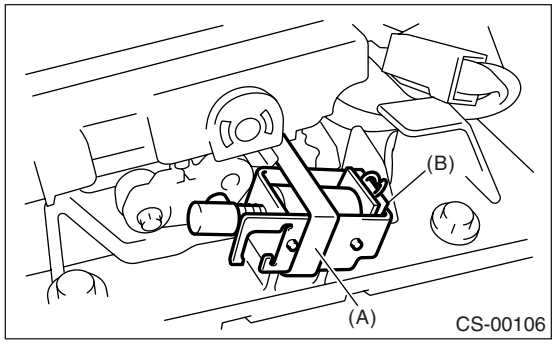
(A) Clip
(B) Blind

6) Remove the clips, and then remove the guide plate.



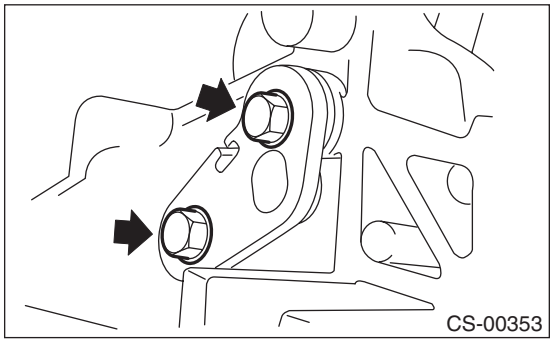
(A) Clips
(B) Guide plate

7) Remove the clamp, and the remove the shift lock solenoid.

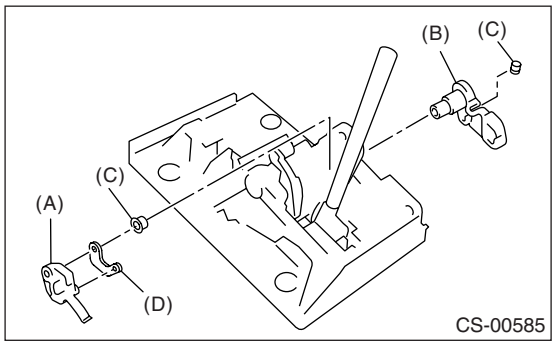


(A) Clamp
(B) Shift lock solenoid

8) Remove the bolt securing lock plate B.

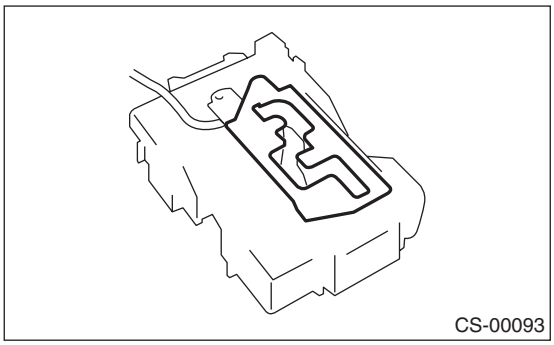


9) Remove the lock plate A, B, C and bushing.

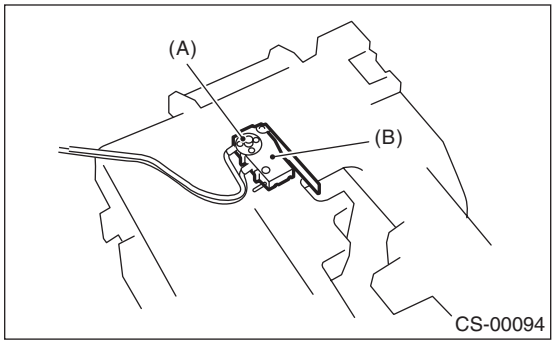


(A) Lock plate A
(B) Lock plate B
(C) Bushing
(D) Lock plate C

10) Remove the cushion plate.

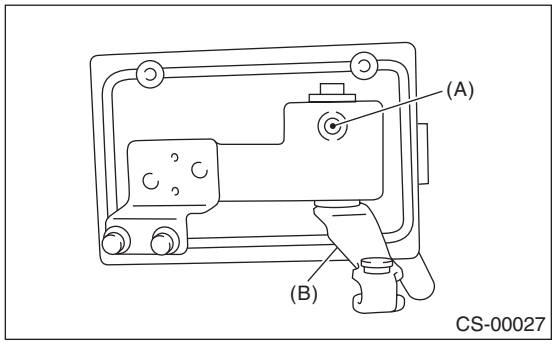


11) Remove the clip, and then remove the “P” range switch.



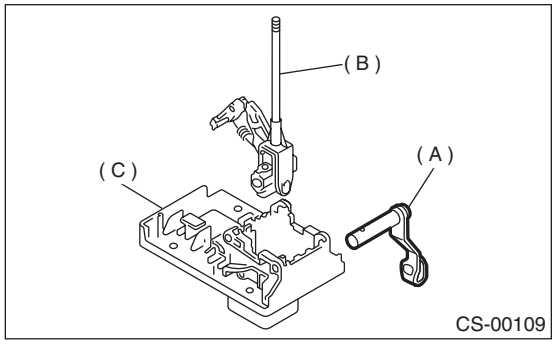
(A) Clip
(B) “P” range switch

12) Remove the grommet, and then extract spring pin.



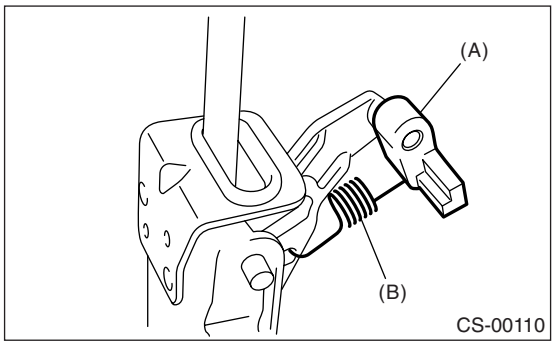
(A) Spring pin
(B) Arm

13) Remove the arm, and then take away the select lever COMPL from plate.



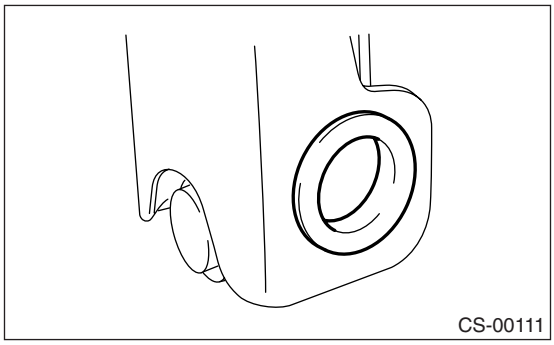
(A) Arm
(B) Select lever COMPL
(C) Plate

14) Remove the detent spring, and then remove the detent arm.

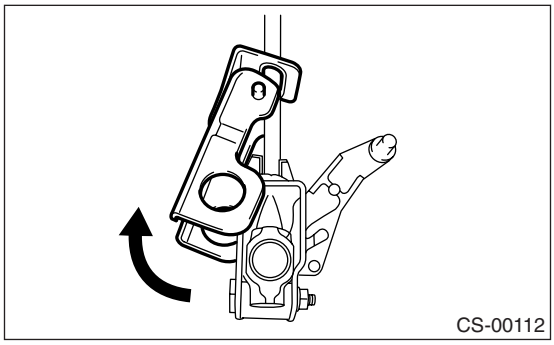


(A) Detent arm
(B) Detent spring

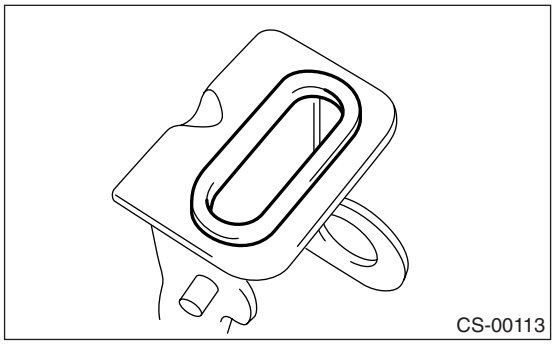
15) Remove the select lever COMPL bushing from bracket.



16) Remove the bracket from select lever COMPL.

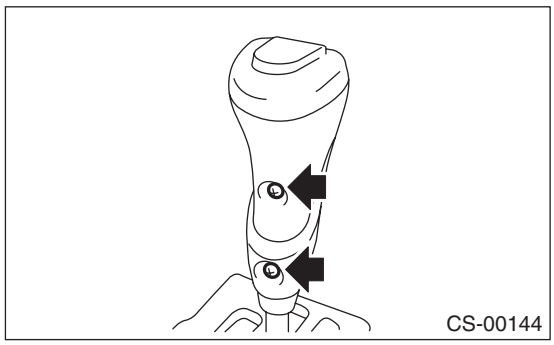


17) Remove the bushing from bracket.

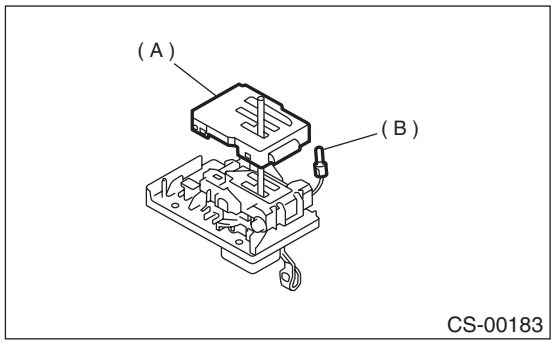


2. SPORT SHIFT MODEL

1) Remove the grip.

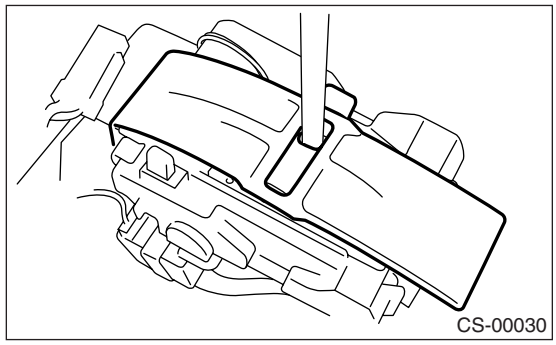


2) Remove the indicator bulb.
3) Remove the indicator cover.

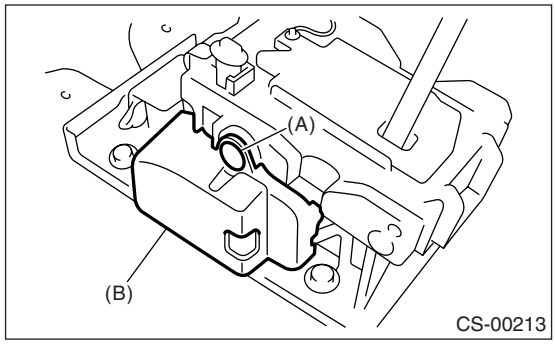


(A) Indicator cover
(B) Indicator bulb

4) Remove the blind.

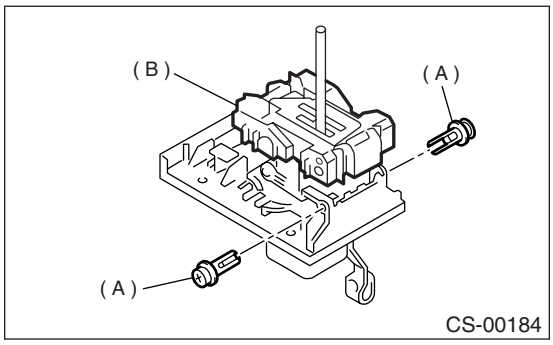


5) Remove the cover.



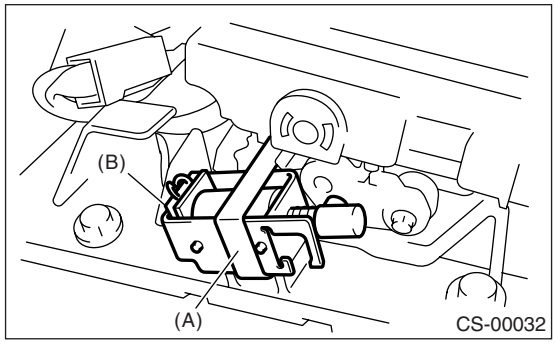
(A) Clip
(B) Cover

6) Remove the clip, and then remove the guide plate.



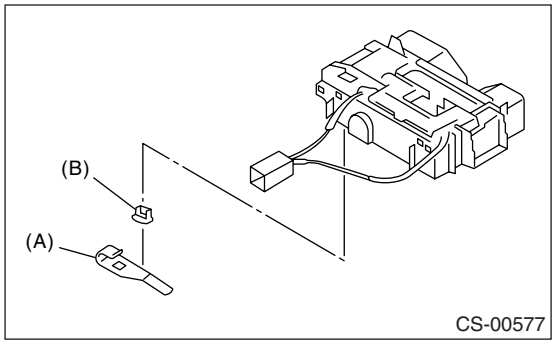
(A) Clip
(B) Guide plate

7) Remove the clamp, and then remove the shift lock solenoid.



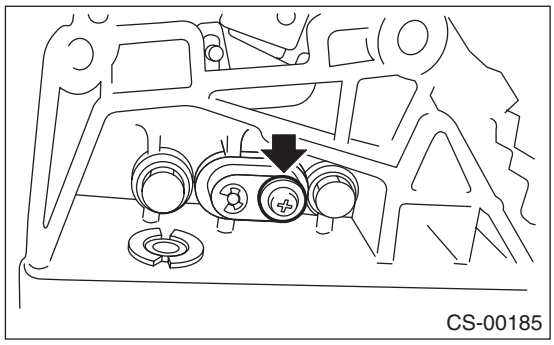
(A) Clamp
(B) Shift lock solenoid

8) Remove the packing, spring, and button.

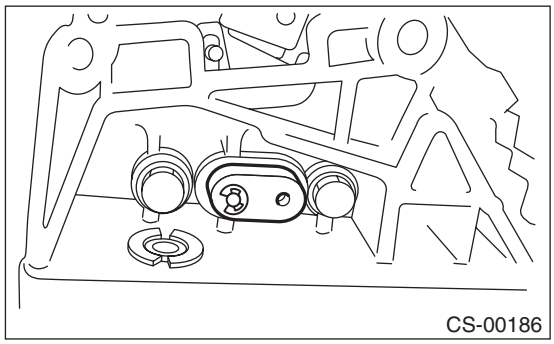


(A) Spring
(B) Button

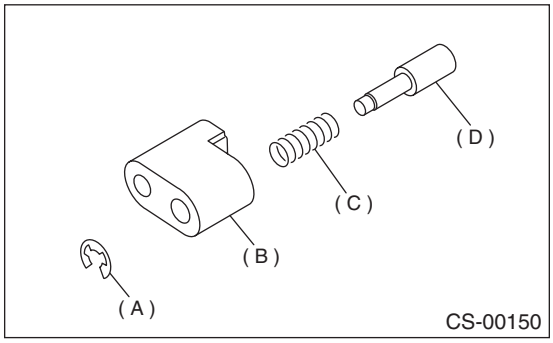
9) Remove the bolt.



10) Remove the bush.

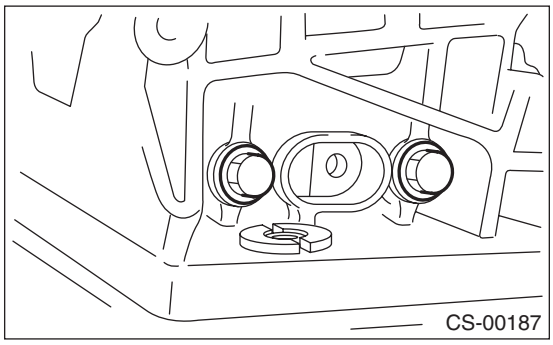


11) Remove the clip, and then remove the rod and spring.

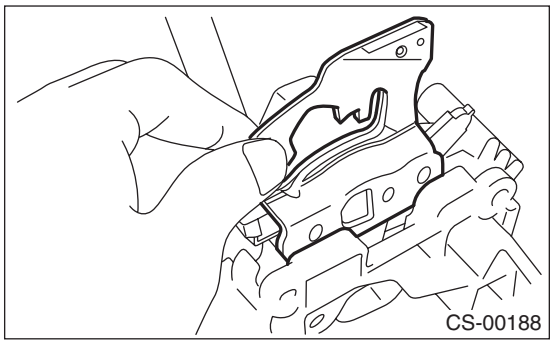


(A) Clip
(B) Bushing
(C) Spring
(D) Rod

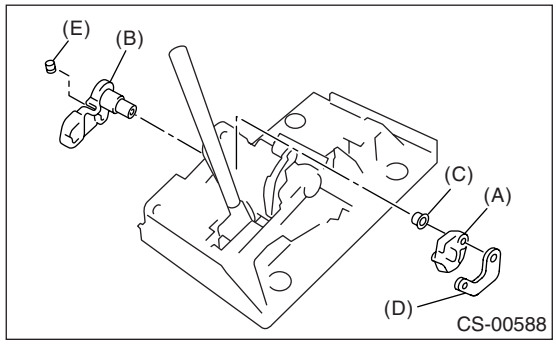
12) Remove the bolt.



13) Remove the bracket guide assembly.

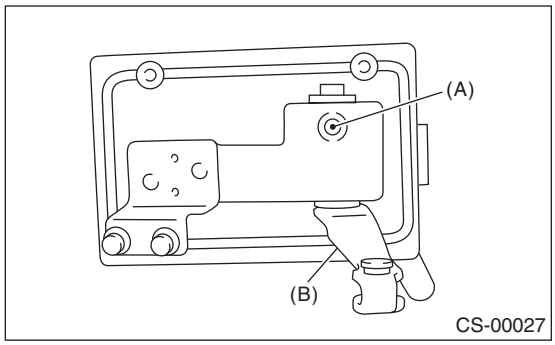


14) Remove the lock plate A, B, C and bushing.



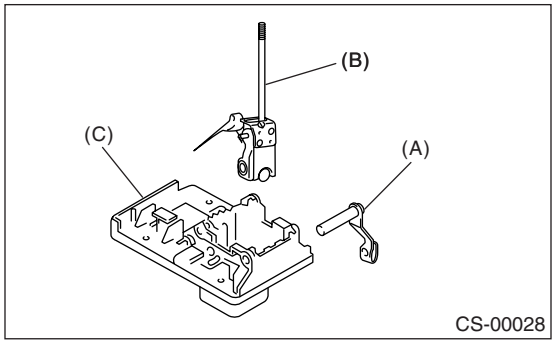
(A) Lock plate A
(B) Lock plate B
(C) Bushing
(D) Lock plate C
(E) Cushion

15) Remove the grommet and then remove the spring pin.



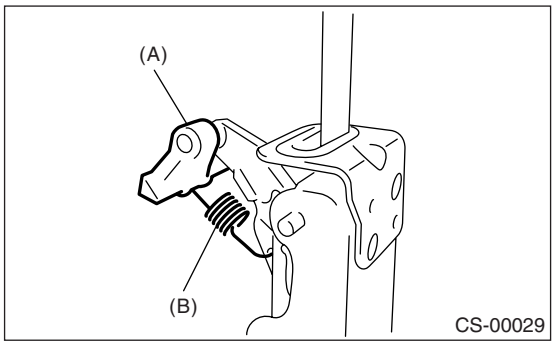
(A) Spring pin
(B) Arm

16) Remove the arm and then remove the select lever COMPL from guide plate.



(A) Arm
(B) Select lever COMPL
(C) Plate

17) Remove the spring and detent arm.

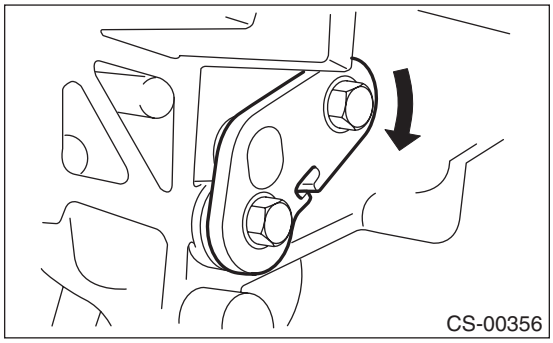


(A) Detent arm
(B) Spring

D: ASSEMBLY

1) Clean all parts before assembly.
2) Apply grease [KOPR-KOTE (Part No. 003603001) or equivalent] to each parts. Apply grease [SUNCALL GLO-244] to axis part of lock plate A and B. <Ref. to CS-2, AT SELECT LEVER, COMPONENT, General Description.>
3) Assembly is in the reverse order of disassembly.

NOTE:
• Refer to “COMPONENT” for tightening torque. <Ref. to CS-2, COMPONENT, General Description.>
• Tighten the lock plate bolt uniformly. After installation, put the base plate upside down, and then push the lock plate up. Make sure the lock plate falls by its weight when releasing it. If not, loosen the bolt and retighten.



4) After completion of fitting, transfer the select lever to range “P” — “1”, then check whether the indicator and select lever agree, whether the pointer and position mark agree and what the operating force is.

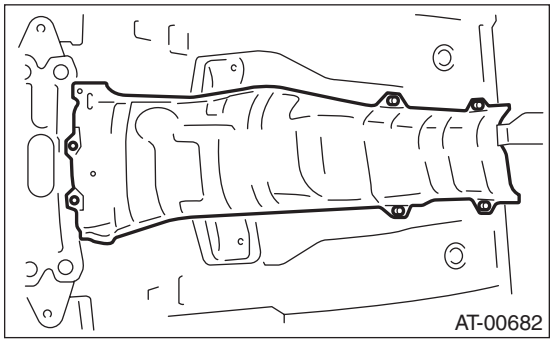
E: INSPECTION

1) Inspect the removed parts by comparing with new ones for deformation, damage and wear. Correct or replace if defective.
2) Confirm the following parts for operating condition before assembly. Moving condition of the select lever assembly, it should move smoothly.

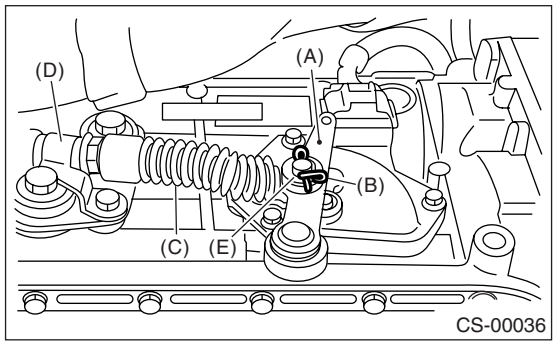
4. Select Cable

A: REMOVAL

1) Set the vehicle on a lift.
2) Set the select lever to “N” range.
3) Disconnect negative cable from battery.
4) Lift-up the vehicle.
5) Remove front, center, rear exhaust pipe and muffler. (Non-turbo model)
<Ref. to EX(H4SO)-6, REMOVAL, Front Exhaust Pipe.> <Ref. to EX(H4SO)-9, REMOVAL, Center Exhaust Pipe.> <Ref. to EX(H4SO)-10, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4SO)-12, REMOVAL, Muffler.>
6) Remove the center and rear exhaust pipes and muffler. (Turbo model)
<Ref. to EX(H4DOTC)-10, REMOVAL, Center Exhaust Pipe.> <Ref. to EX(H4DOTC)-15, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4DOTC)-16, REMOVAL, Muffler.>
7) Remove the heat shield cover. (If equipped)

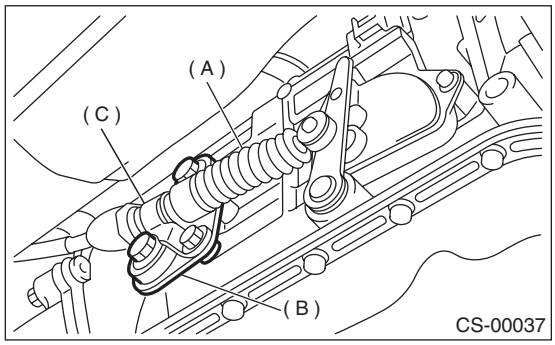


8) Remove the snap pin and washer from range select lever.



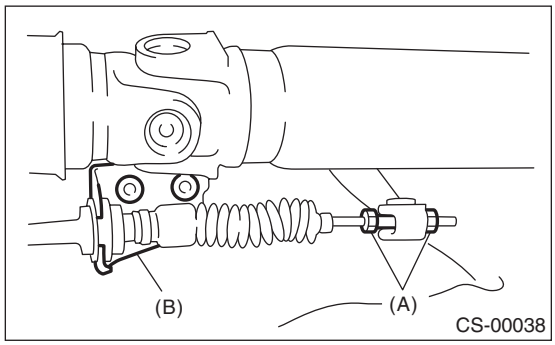
(A) Range select lever
(B) Snap pin
(C) Select cable
(D) Clamp
(E) Washer

9) Remove the plate assembly from transmission case.



(A) Select cable
(B) Plate ASSY
(C) Clamp

10) Disconnect the cable from select lever, and then remove the cable bracket.



(A) Adjusting nuts
(B) Cable bracket

11) Remove the select cable from plate assembly.

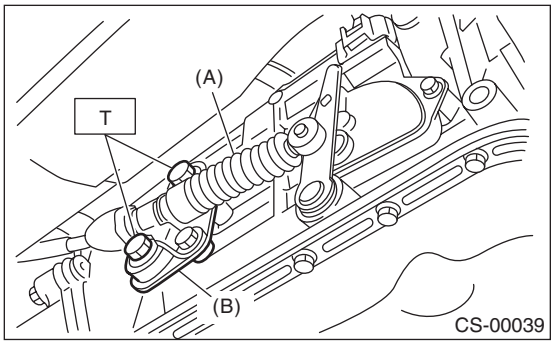
B: INSTALLATION

1) Install the select cable to plate assembly.

Tightening torque:
18 N·m (1.8 kgf-m, 13.0 ft-lb)

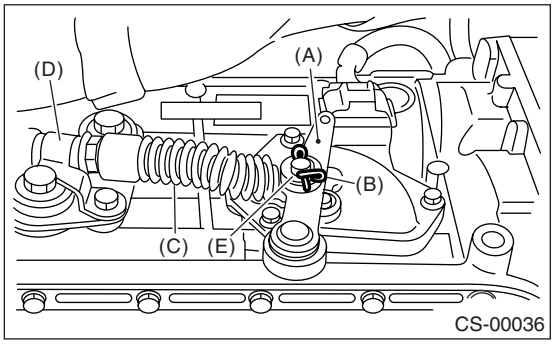
2) Install the select cable to range select lever.
3) Install the plate assembly to transmission.

Tightening torque:
T: 24.5 N·m (2.5 kgf-m, 18.1 ft-lb)



(A) Select cable
(B) Plate ASSY

4) Install the washer and snap pin to range select lever.



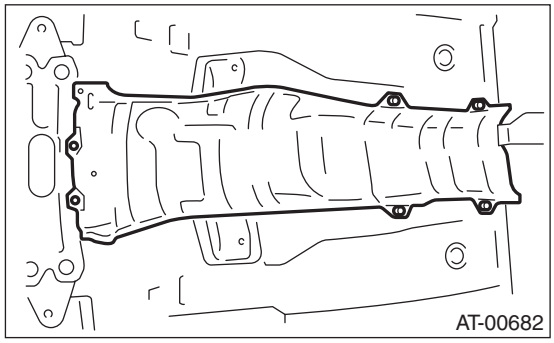
(A) Range select lever
(B) Snap pin
(C) Select cable
(D) Clamp
(E) Washer

5) Insert the thread portion of other inner cable and into connector hole of select lever, and fix the other outer cable end to the bracket.

Tightening torque:
18 N·m (1.8 kgf-m, 13.0 ft-lb)

6) Move the select lever to “N” range, and then adjust the select cable position. <Ref. to CS-34, ADJUSTMENT, Select Cable.>

7) Install the heat shield cover. (If equipped)



8) Install the front, center, rear exhaust pipe and muffler. (Non-turbo model)
<Ref. to EX(H4SO)-7, INSTALLATION, Front Exhaust Pipe.> <Ref. to EX(H4SO)-9, INSTALLATION, Center Exhaust Pipe.> <Ref. to EX(H4SO)-10, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H4SO)-12, INSTALLATION, Muffler.>
9) Install center and rear exhaust pipes and muffler. (Turbo model)
<Ref. to EX(H4DOTC)-11, INSTALLATION, Center Exhaust Pipe.> <Ref. to EX(H4DOTC)-15, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H4DOTC)-16, INSTALLATION, Muffler.>

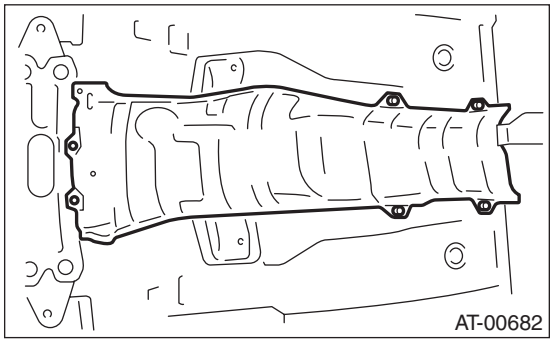
C: INSPECTION

Check the removed cable and replace if damaged, rusty, or malfunctioning.
1) Check for smooth operation of the cable.
2) Check the inner cable for damage and rust.
3) Check the outer cable for damage, bends, and cracks.
4) Check the boot for damage, cracks, and deterioration.
5) Move the select lever from “P” range to “1” range. You should be able to feel the detents in each range. If the detents cannot be felt or the range pointer is improperly aligned, adjust the cable.

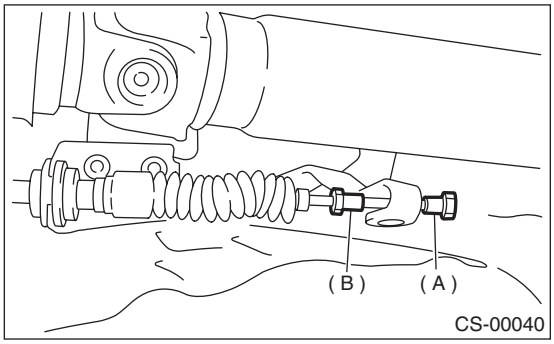
D: ADJUSTMENT

1) Set the select lever to “N” range.
2) Remove the rear exhaust pipe and muffler.
• Non-turbo model
<Ref. to EX(H4SO)-10, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4SO)-12, REMOVAL, Muffler.>
• Turbo model
<Ref. to EX(H4DOTC)-15, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4DOTC)-16, REMOVAL, Muffler.>

3) Remove the heat shield cover. (If equipped)

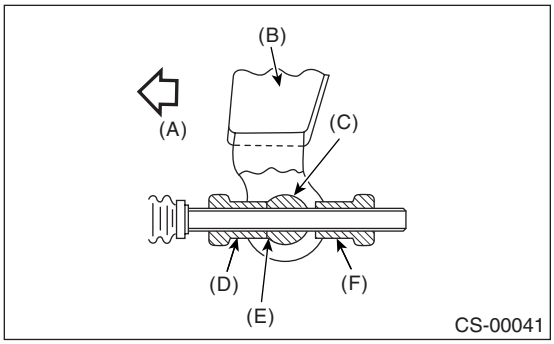


4) Loosen the nut on each side.



(A) Nut A
(B) Nut B

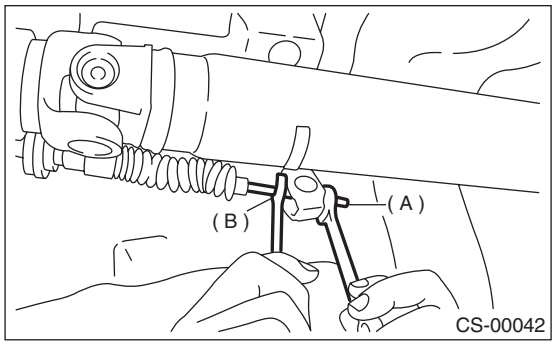
5) Turn the nut B until it lightly touches the connector.



(A) Front side
(B) Select lever
(C) Connector
(D) Nut B
(E) Contact point
(F) Nut A

6) While preventing the nut B from moving with a wrench, tighten the nut A.

Tightening torque:
7.5 N·m (0.76 kgf-m, 5.5 ft-lb)



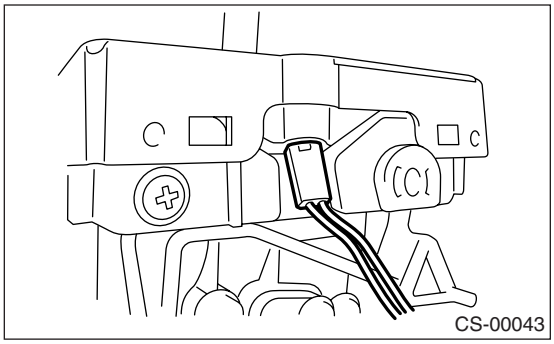
(A) Nut A
(B) Nut B

7) After completion of fitting, make sure that the select lever operates smoothly all across the operating range.
8) Install in the reverse order of removal.

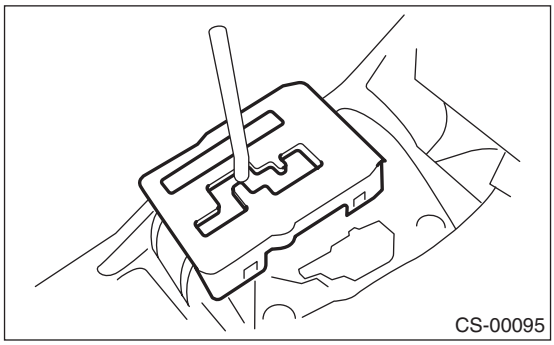
5. AT Shift Lock Solenoid and “P” Range Switch

A: REMOVAL

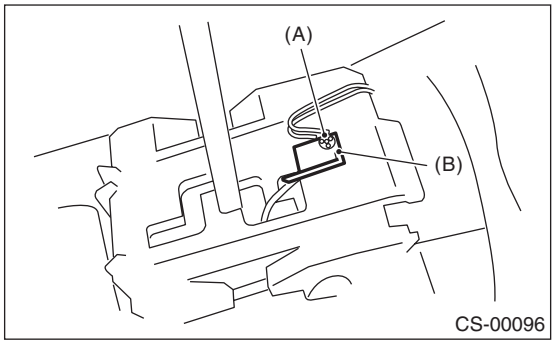
1) Disconnect the ground cable from battery.
2) Remove the console box. <Ref. to EI-45, REMOVAL, Console Box.>
3) Disconnect the connector.
4) Remove the grip.
5) Remove the indicator bulb from indicator cover.


CS-00043

6) Remove the indicator cover.


CS-00095

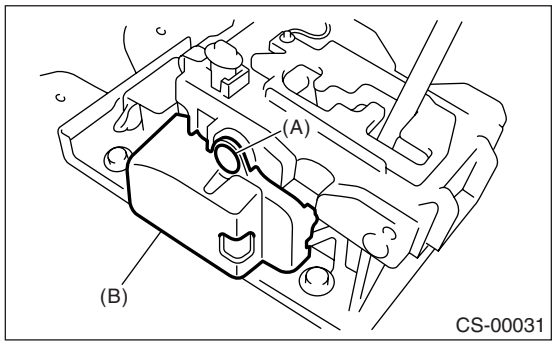
7) Remove the blind.
8) Remove the cushion.
9) Remove the clip, and then remove the “P” range switch. (Except sport shift model)



CS-00096

(A) Clip
(B) “P” range switch

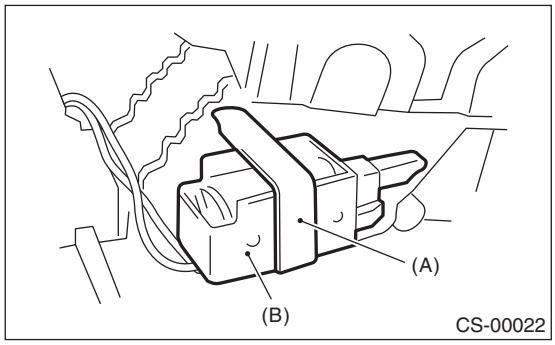
10) Remove the cover.



CS-00031

(A) Clip
(B) Cover

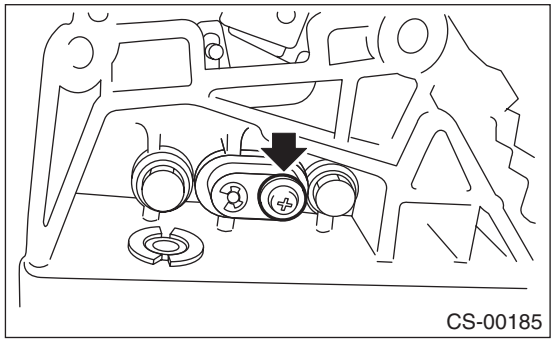
11) Remove the clamp, and then remove the shift lock solenoid.



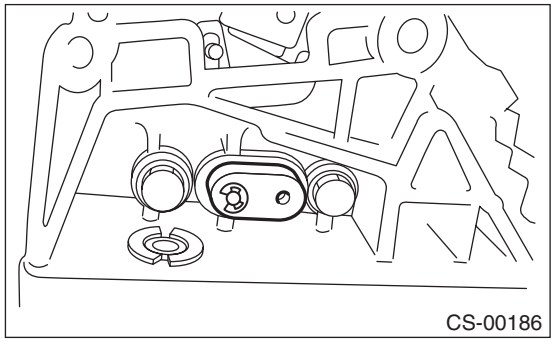
CS-00022

(A) Clamp
(B) Shift lock solenoid

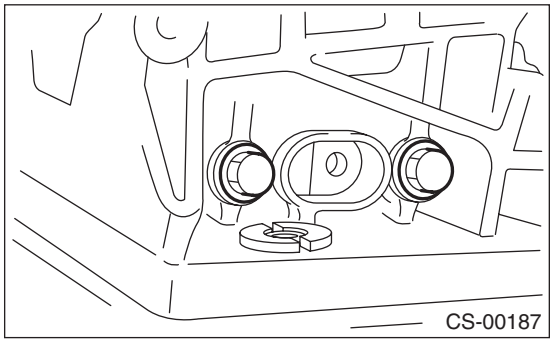
12) Remove the screw. (Sport shift model)


CS-00185

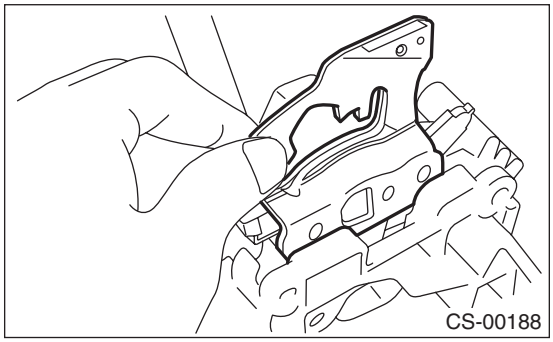
13) Remove the bush. (Sport shift model)


CS-00186

14) Remove the bolt. (Sport shift model)



15) Remove the bracket guide assembly. (Sport shift model)



B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

	Step	Check	Yes	No
1	**CHECK SHIFT LOCK SOLENOID.** Measure the resistance of shift lock solenoid connector terminals. ***Terminals*** ***No. 4 — No. 5:***	Is the resistance 20 to 40 Ω?	Go to step **2.**	Replace the shift lock solenoid and “P” range switch assembly.
2	**CHECK SHIFT LOCK SOLENOID.** Connect the battery with shift lock solenoid connector terminal, operate solenoid. ***Terminals*** ***No. 4 (+) — No. 5 (–):***	Is the shift lock solenoid operating properly?	Go to step **3.**	Replace the shift lock solenoid and “P” range switch assembly.
3	**CHECK “P” RANGE SWITCH.** 1) Move the select lever to “P” range. 2) Measure the resistance between “P” range switch connector terminals.	Is the resistance less than 1 Ω?	Go to step **4.**	Replace the “P” range switch.
4	**CHECK “P” RANGE SWITCH.** 1) Move the select lever to other than “P” range. 2) Measure the resistance between “P” range switch connector terminals.	Is the resistance more than 1 MΩ?	Normal	Replace the “P” range switch.

6. AT Shift Lock Control Module

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the glove box. <Ref. to EI-42, REMOVAL, Glove Box.>
3) Disconnect the connector from AT shift lock control module.
4) Remove the AT shift lock control module.

B: INSTALLATION

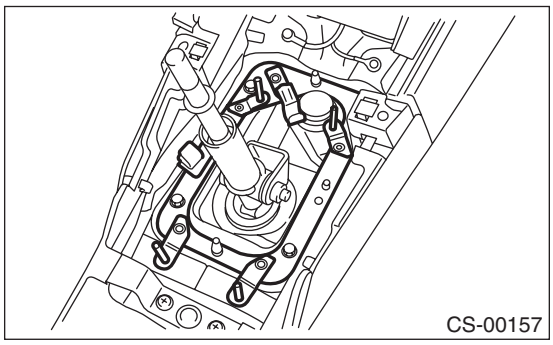
Install in the reverse order of removal.

7. MT Gear Shift Lever

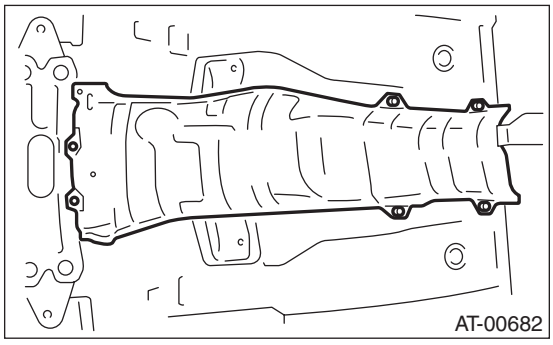
A: REMOVAL

1. 5MT

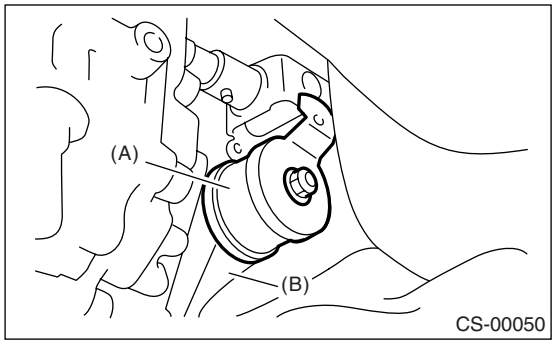
1) Set the vehicle on a lift.
2) Disconnect the ground cable from battery.
3) Remove the gear shift knob.
4) Remove the console box. <Ref. to EI-45, REMOVAL, Console Box.>
5) Remove the plate assembly from body.



6) Lift-up the vehicle.
7) Remove the rear exhaust pipe and muffler.
• Non-turbo model
<Ref. to EX(H4SO)-10, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4SO)-12, REMOVAL, Muffler.>
• Turbo model
<Ref. to EX(H4DOTC)-15, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4DOTC)-16, REMOVAL, Muffler.>
8) Remove the heat shield cover. (If equipped)

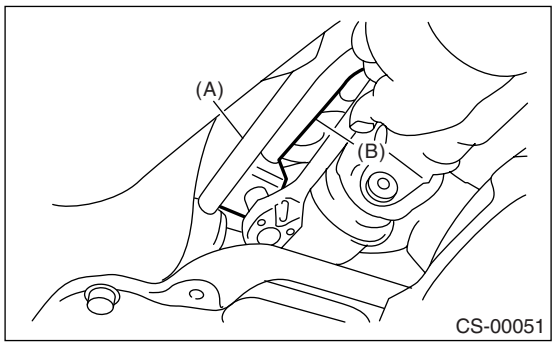


9) Remove the stay from transmission bracket.



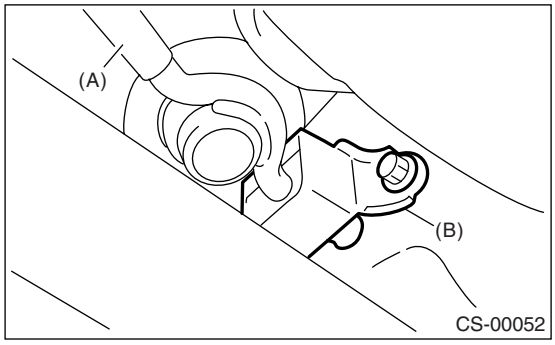
(A) Stay
(B) Transmission bracket

10) Remove the rod from joint.



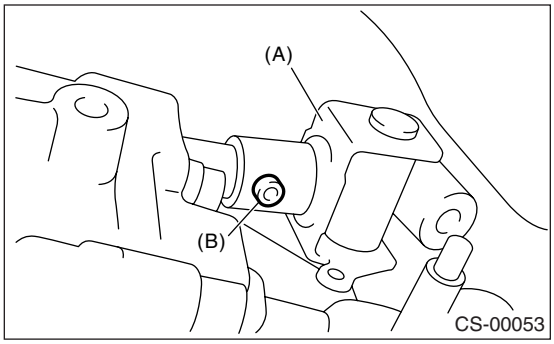
(A) Stay
(B) Rod

11) Remove the cushion rubber from body.



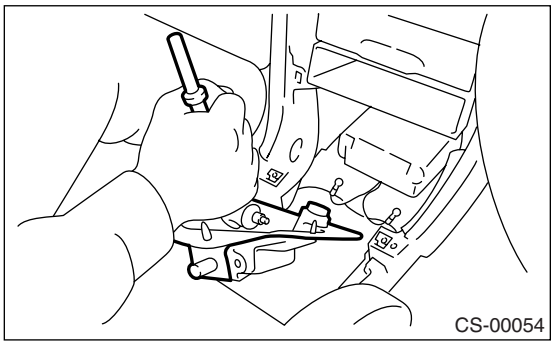
(A) Stay
(B) Cushion rubber

12) Extract the spring pin, and then remove the joint.



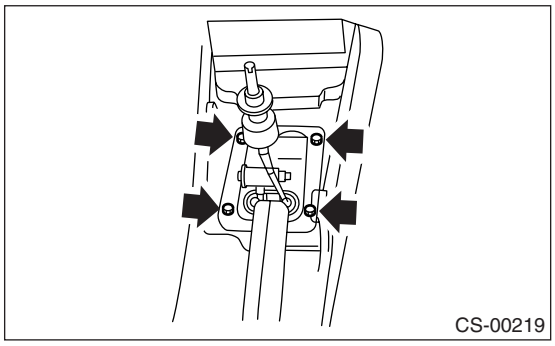
(A) Joint
(B) Spring pin

13) Lower the vehicle.
14) Remove the gear shift lever.

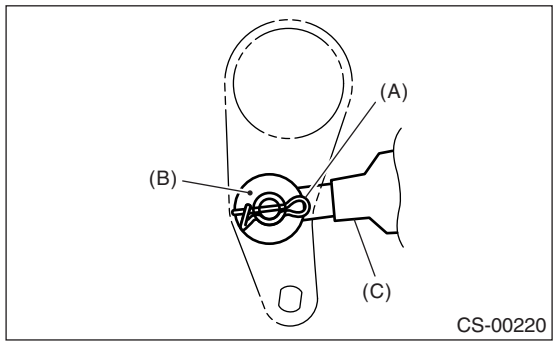


2. 6MT

1) Set the vehicle on a lift.
2) Disconnect the ground cable from battery.
3) Remove the gear shift knob.
4) Remove the console box front. <Ref. to EI-45, REMOVAL, Console Box.>
5) Remove the boot plate from body.



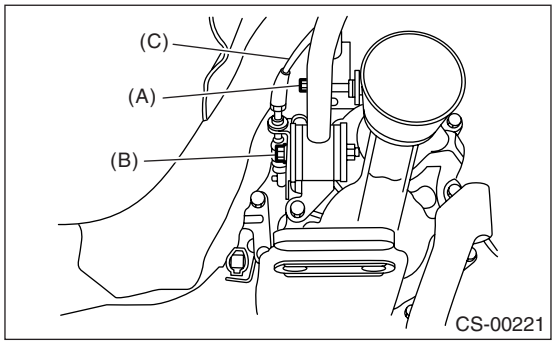
6) Lift-up the vehicle.
7) Remove the under cover.
8) Remove the rear exhaust pipe and muffler. <Ref. to EX(H4DOTC)-15, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4DOTC)-16, REMOVAL, Muffler.>
9) Remove the crossmember. <Ref. to 6MT-34, REMOVAL, Transmission Mounting System.>
10) Remove the snap pin and washer, and then remove the reverse check cable from reverse check lever.



(A) Snap pin
(B) Washer
(C) Reverse check cable

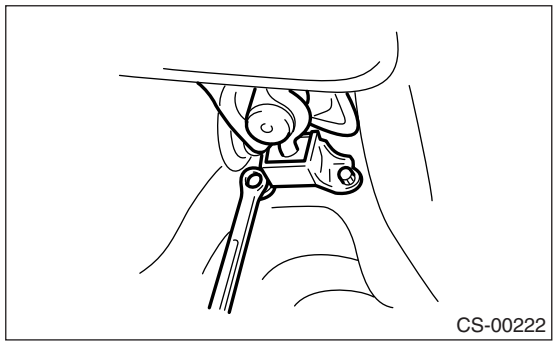
11) Move the transmission to right side, and then remove the joint COMPL, stay bolt and reverse check cable.

NOTE:
If the transmission is not moved, the joint COMPL and stay bolt will contact body and damage may occur.



(A) Joint COMPL bolt
(B) Stay bolt
(C) Reverse check cable

12) Remove the cushion rubber from body.



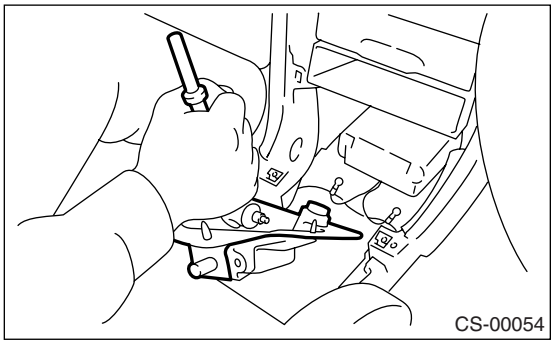
13) Lower the vehicle.
14) Remove the gear shift lever.

B: INSTALLATION

1. 5MT

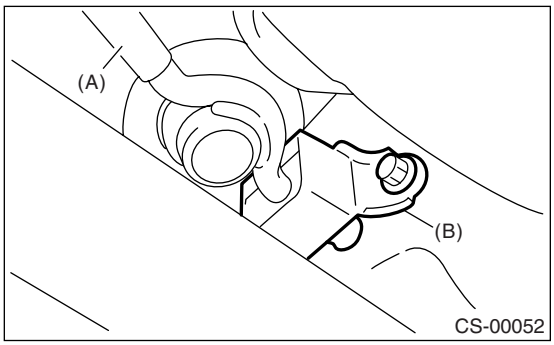
1) Install the joint to the transmission and secure with the spring pin.
2) Insert gear shift lever from room side.

NOTE:
After inserting rod and stay, temporarily put them onto transmission mount.



3) Lift-up the vehicle.
4) Mount the cushion rubber on body.

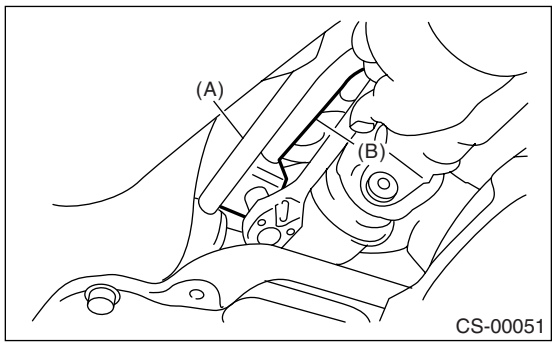
Tightening torque:
18 N·m (1.8 kgf-m, 13.0 ft-lb)



(A) Stay
(B) Cushion rubber

5) Connect the rod to the joint.

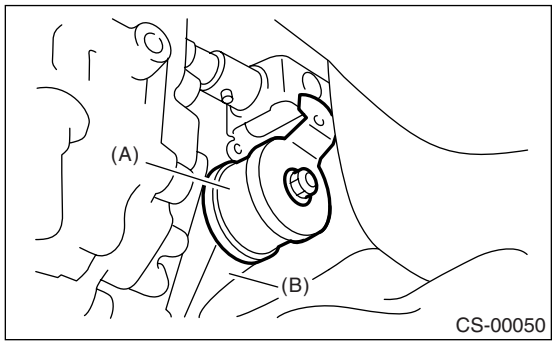
Tightening torque:
18 N·m (1.8 kgf-m, 13.0 ft-lb)



(A) Stay
(B) Rod

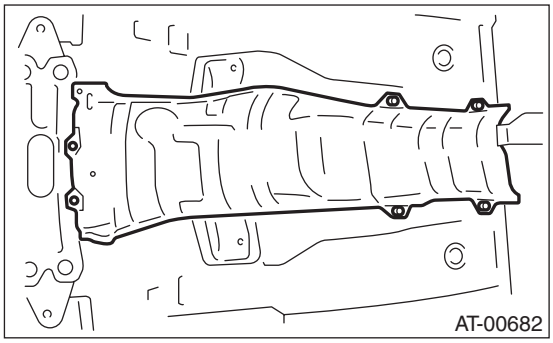
6) Connect the stay to transmission bracket.

Tightening torque:
18 N·m (1.8 kgf-m, 13.0 ft-lb)



(A) Stay
(B) Transmission bracket

7) Install the heat shield cover. (If equipped)



8) Install the rear exhaust pipe and muffler.
- Non-turbo model

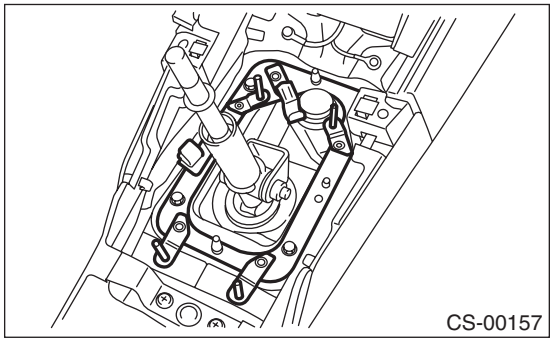
<Ref. to EX(H4SO)-10, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H4SO)-12, INSTALLATION, Muffler.>

- Turbo model

<Ref. to EX(H4DOTC)-15, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H4DOTC)-16, INSTALLATION, Muffler.>

9) Install the plate assembly to body.

Tightening torque:
7.5 N·m (0.76 kgf-m, 5.5 ft-lb)



10) Install console box. <Ref. to EI-45, INSTALLATION, Console Box.>

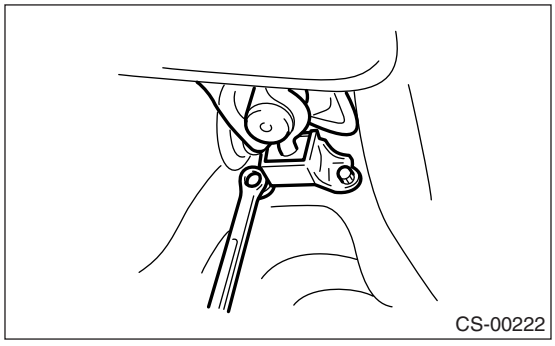
2. 6MT

1) Insert the gear shift lever from room side.

NOTE:
After inserting the rod and stay, temporarily put them onto transmission mount.

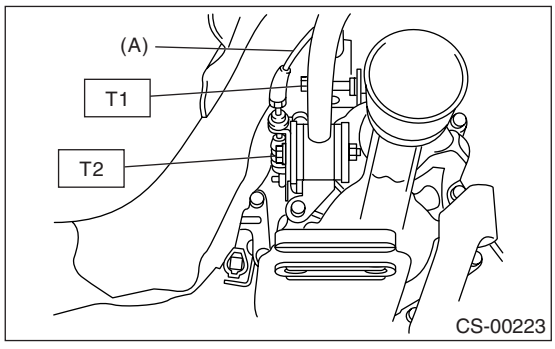
2) Mount the cushion rubber on body.

Tightening torque:
18 N·m (1.8 kgf-m, 13.0 ft-lb)



3) Move the transmission to right side, and then install the joint COMPL and stay.

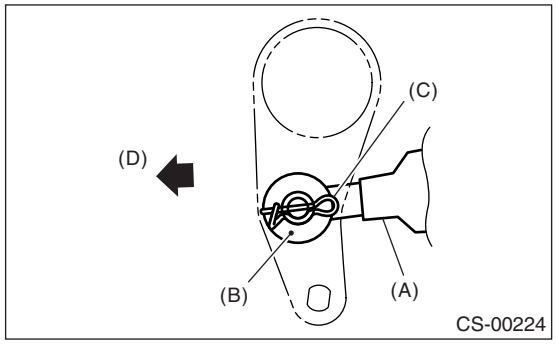
Tightening torque:
T1: 11.8 N·m (1.2 kgf-m, 8.7 ft-lb)
T2: 32 N·m (3.3 kgf-m, 23.6 ft-lb)



(A) Reverse check cable

4) Install the crossmember. <Ref. to 6MT-34, INSTALLATION, Transmission Mounting System.>
5) Install the reverse check cable end, washer and snap pin to reverse check lever.

NOTE:
• Take care to install the snap pin in proper direction.
• Conduct the adjustment of reverse check cable before installation. <Ref. to CS-55, ADJUSTMENT, Reverse Check Cable.>

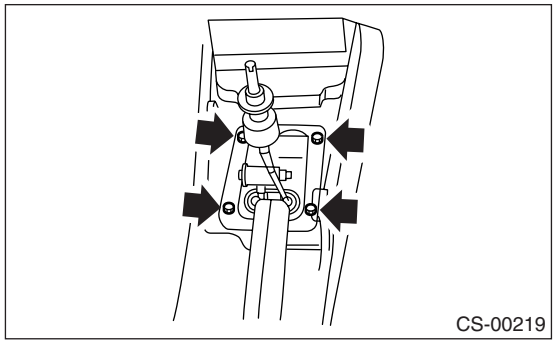


(A) Reverse check cable
(B) Washer
(C) Snap pin
(D) Front side

6) Install the rear exhaust pipe and muffler. <Ref. to EX(H4DOTC)-15, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H4DOTC)-16, INSTALLATION, Muffler.>
7) Install the under cover.
8) Install the boot plate.

NOTE:
Install the inner boot without any twist.

Tightening torque:
7.5 N·m (0.76 kgf-m, 5.5 ft-lb)

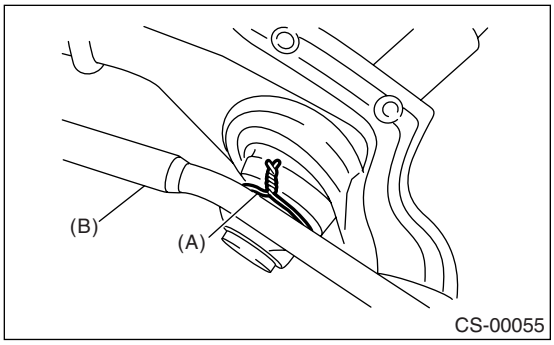


9) Install the console box. <Ref. to EI-45, INSTALLATION, Console Box.>
10) Check that the gear shift is correctly shifted to each gear.

C: DISASSEMBLY

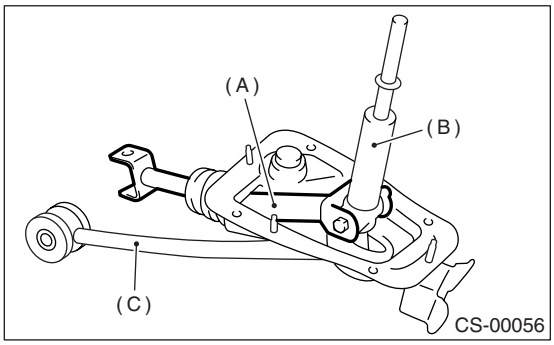
1. 5MT

1) Disassemble the lock wire.



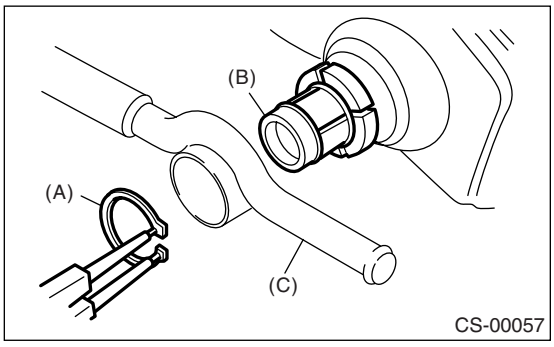
(A) Lock wire
(B) Stay

2) Remove the rod from lever.



(A) Rod
(B) Lever
(C) Stay

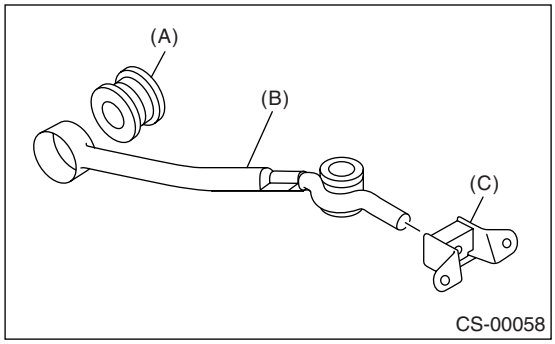
3) Remove the snap ring from bushing B, and then disconnect the stay.



(A) Snap ring
(B) Bushing B
(C) Stay

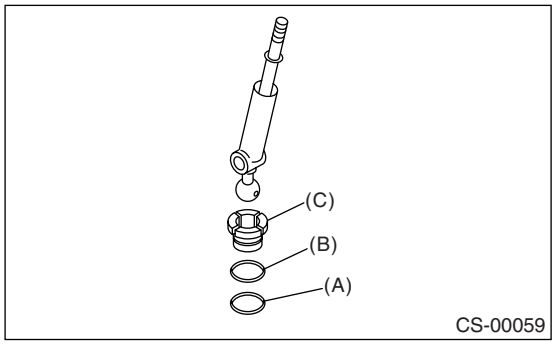
4) Remove the boot from gear shift lever.

5) Remove the bushing and cushion rubber from stay.



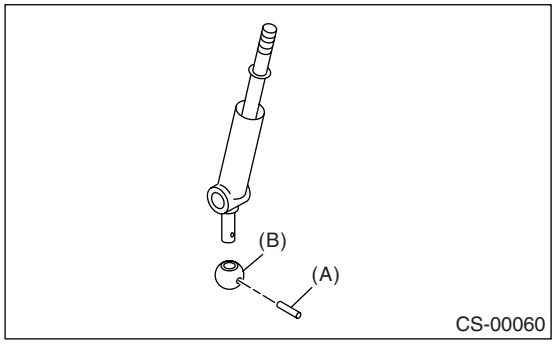
(A) Bushing
(B) Stay
(C) Cushion rubber

6) Remove O-ring, and then disconnect the bushing B.



(A) O-ring
(B) O-ring
(C) Bushing B

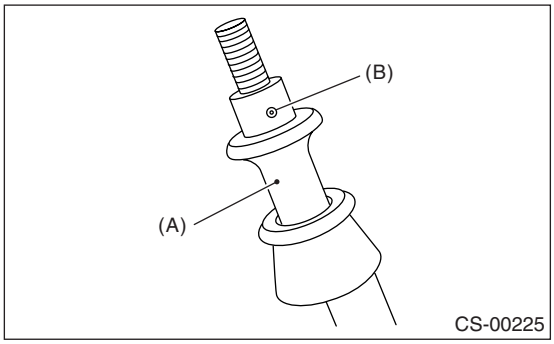
7) Draw out the spring pin, and then remove the bushing A from gear shift lever.



(A) Spring pin
(B) Bushing A

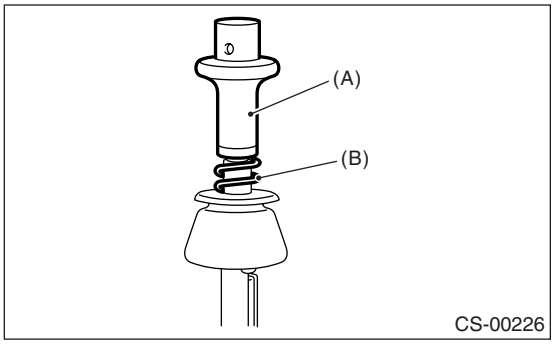
2. 6MT

1) Remove the spring pin from slider.



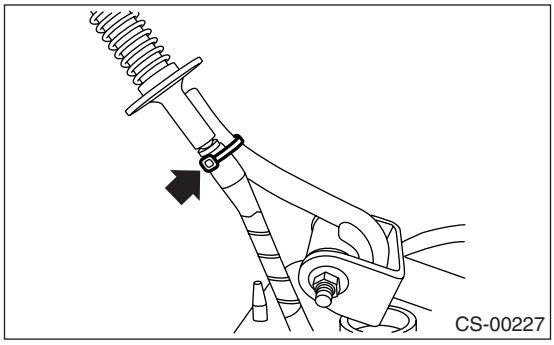
(A) Slider
(B) Spring pin

2) Remove the slider and spring.

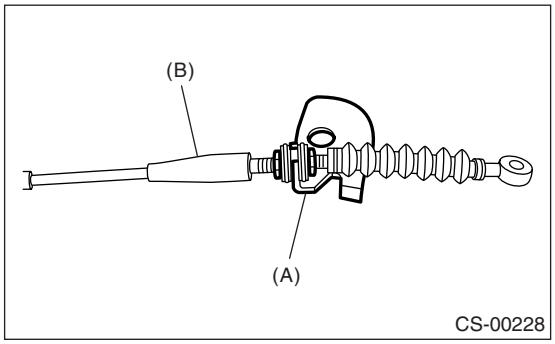


(A) Slider
(B) Spring

3) Cut the band clip.

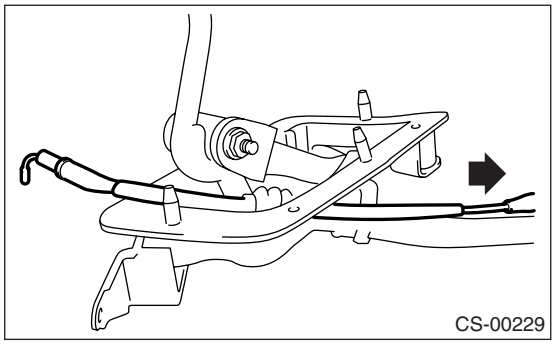


4) Remove the reverse check cable from cable plate.

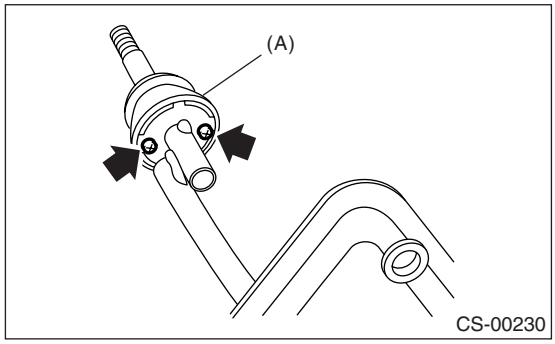


(A) Cable plate
(B) Reverse check cable

5) Remove the reverse check cable from gear shift assembly.



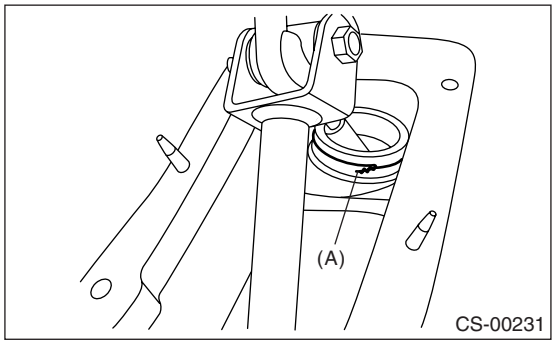
6) Remove the holder and spring seat.



(A) Holder

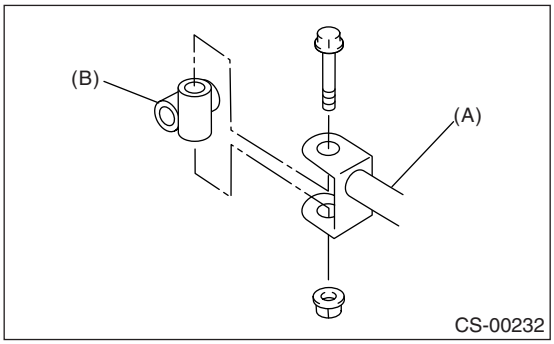
7) Disassemble the lock wire.

NOTE:
Do not reuse the lock wire.



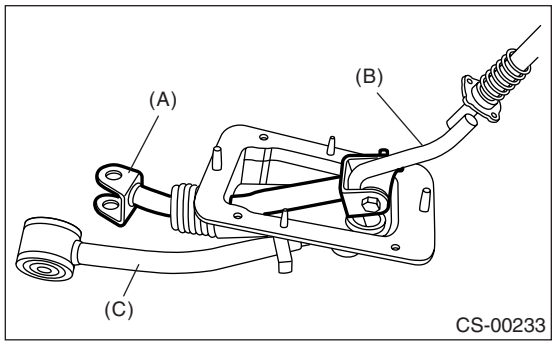
(A) Lock wire

8) Remove the boss from rod.



(A) Rod
(B) Boss

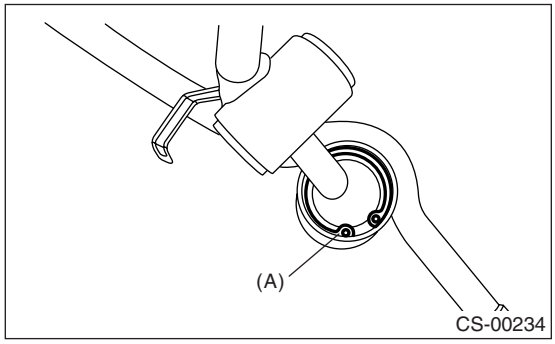
9) Remove the rod from lever.



(A) Rod
(B) Lever
(C) Stay

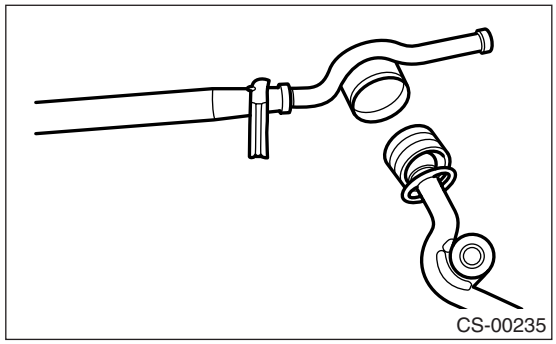
10) Separate the rod and inner boot.

11) Remove the snap ring from stay.

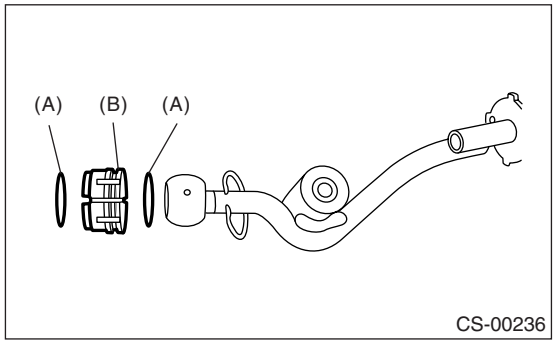


(A) Snap ring

12) Separate the gear shift lever and stay.

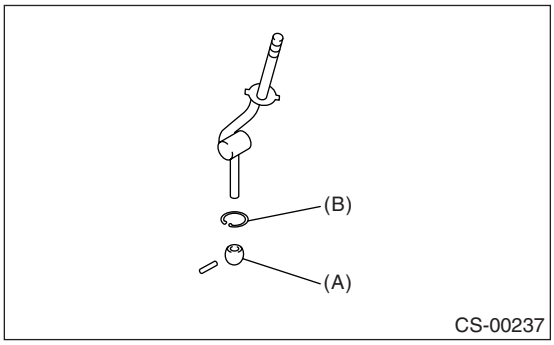


13) Remove the boot and bushing from gear shift lever.



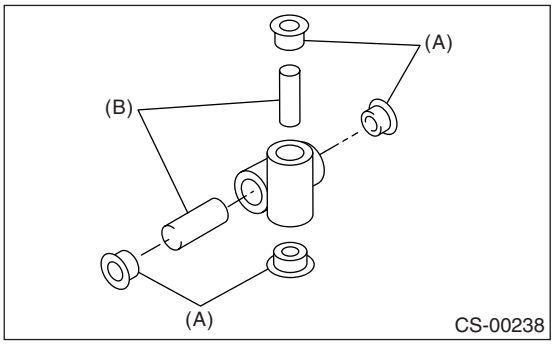
(A) O-ring
(B) Bushing

14) Remove the spring pin, and then remove the bushing and snap ring.



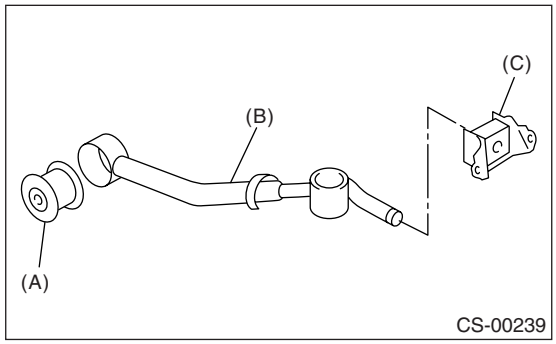
(A) Bushing
(B) Snap ring

15) Remove the bushing and spacer from boss.



(A) Bushing
(B) Spacer

16) Remove the bushing and cushion rubber from stay.

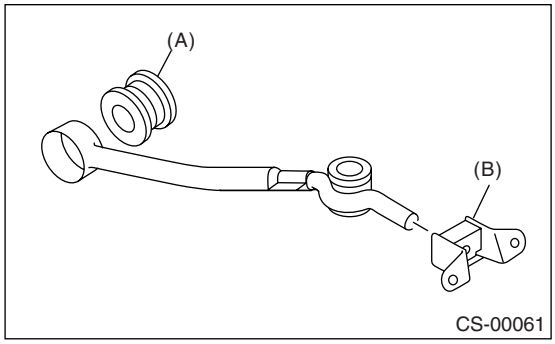


(A) Bushing
(B) Stay
(C) Cushion rubber

D: ASSEMBLY

1. 5MT

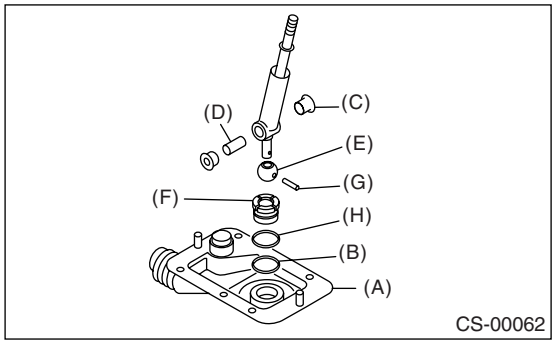
1) Clean all parts before assembly.
2) Mount the bushing and cushion rubber on the stay.



(A) Bushing
(B) Cushion rubber

3) Mount each part; boot, O-ring, bushing A, spacer, bushing B, bushing and spring pin on the gear shift lever.

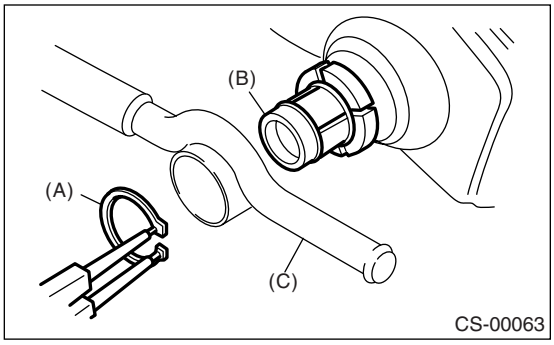
NOTE:
• Always use new O-rings.
• Apply grease [KOPR-KOTE (Part No. 003603001) or equivalent] to the inner and side surfaces of the bushing when installing the spacer.



(A) Boot
(B) O-ring
(C) Bushing
(D) Spacer
(E) Bushing A
(F) Bushing B
(G) Spring pin
(H) O-ring

4) Insert the gear shift lever into the boot hole.

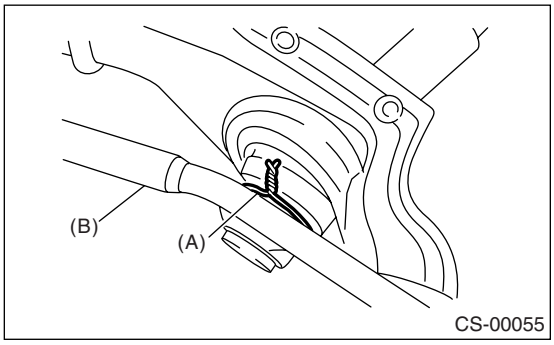
5) Install the snap ring and stay to bushing B.



(A) Snap ring
(B) Bushing B
(C) Stay

6) Tighten with lock wire to the extent that the boot will not come off.

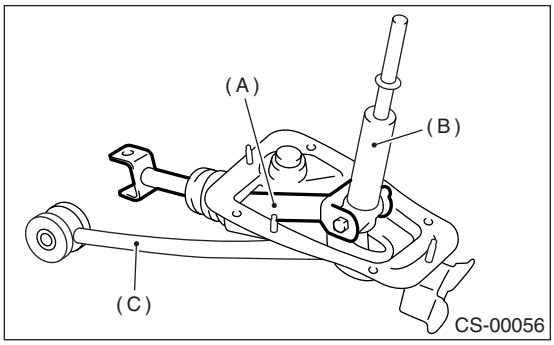
NOTE:
Always use new lock wire.



(A) Lock wire
(B) Stay

7) Insert the rod into the boot hole.
8) Connect rod to lever.

Tightening torque:
11.8 N·m (1.2 kgf-m, 8.7 ft-lb)



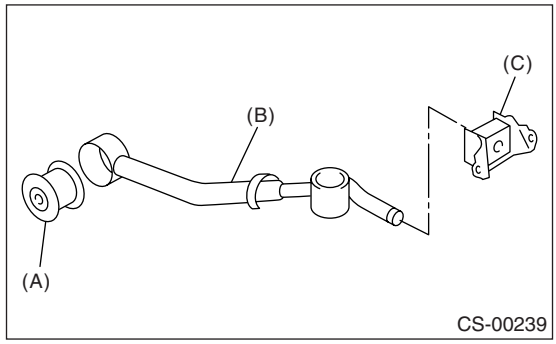
(A) Rod
(B) Lever
(C) Stay

9) Check the swing torque of rod in relation to the gear shift lever.
10) Check that there is no excessive play and that parts move smoothly.

2. 6MT

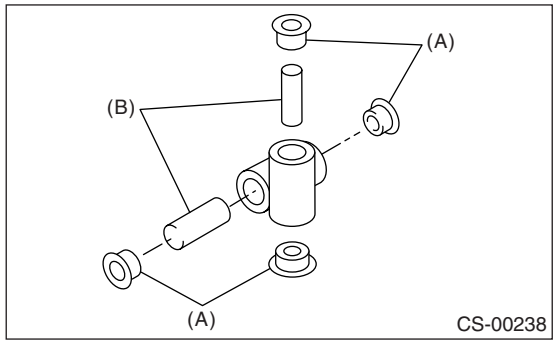
NOTE:
- Clean all parts before assembly.
- Apply NIGTIGHT LYW No.2 grease or equivalent to each parts.

1) Mount the bushing and cushion rubber on the stay.



(A) Bushing
(B) Stay
(C) Cushion rubber

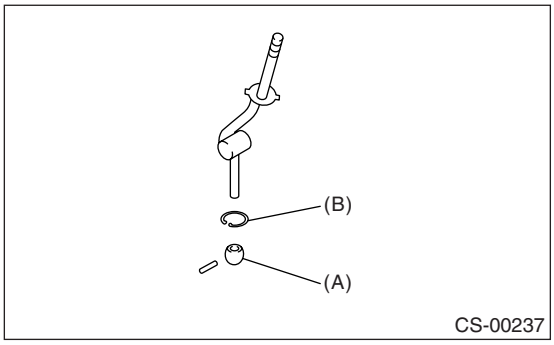
2) Install the bushing and spacer to boss.



(A) Bushing
(B) Spacer

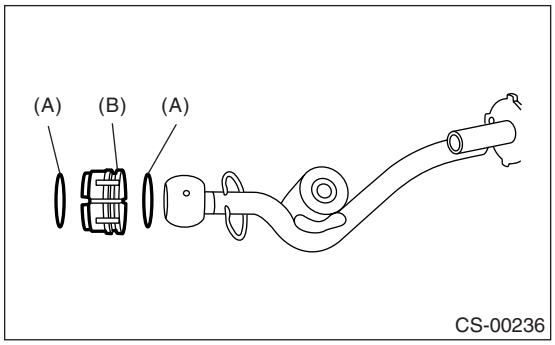
3) Install the snap ring to gear shift lever, and then install the bushing.

NOTE:
Apply grease to the bushing.



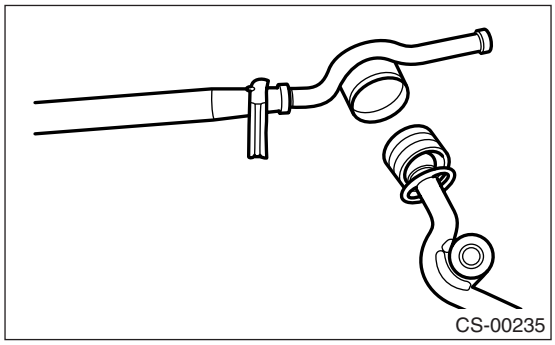
(A) Bushing
(B) Snap ring

4) Apply grease to the bushing and O-ring, and then install to the gear shift lever.

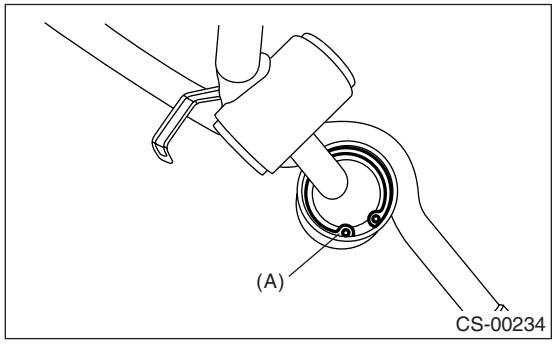


(A) O-ring
(B) Bushing

5) Apply sufficient grease into the boss, and then install the gear shift lever to stay.



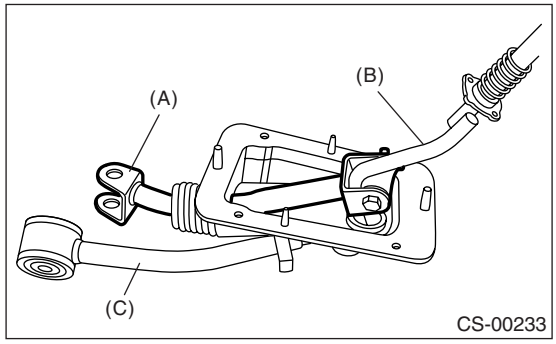
6) Install the washer and snap ring.



(A) Snap ring

7) Insert the gear shift lever and rod into boot hole.
8) Install the rod.

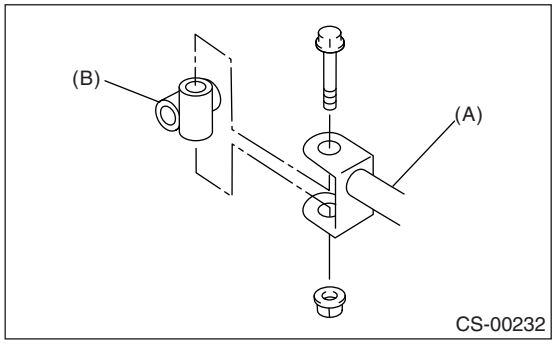
Tightening torque:
11.8 N·m (1.2 kgf-m, 8.7 ft-lb)



(A) Rod
(B) Lever
(C) Stay

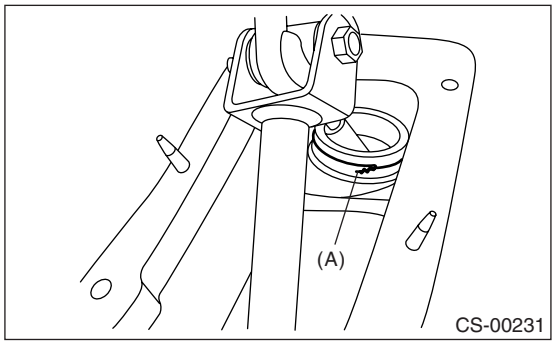
9) Install the boss to rod.

Tightening torque:
11.8 N·m (1.2 kgf-m, 8.7 ft-lb)



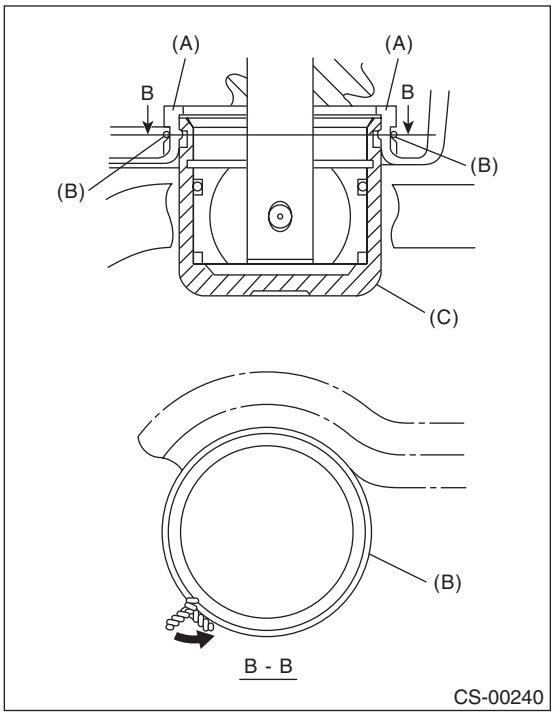
(A) Rod
(B) Boss

10) Install a new lock wire.



(A) Lock wire

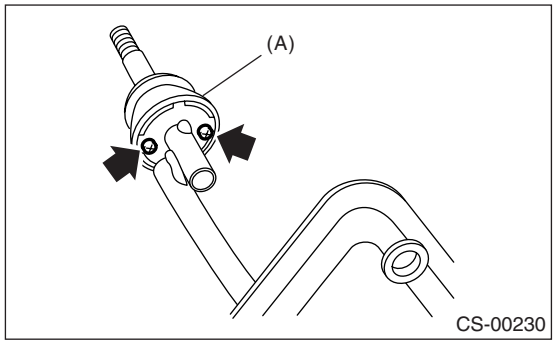
NOTE:
- Install the lock wire to the stay groove.
- Bend the extra wire to same direction of lock wire winding.



(A) Inner boot
(B) Lock wire
(C) Stay

11) Install the holder.

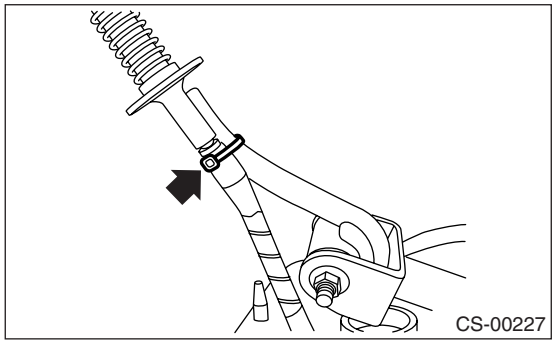
Tightening torque:
1.3 N·m (0.13 kgf-m, 0.96 ft-lb)



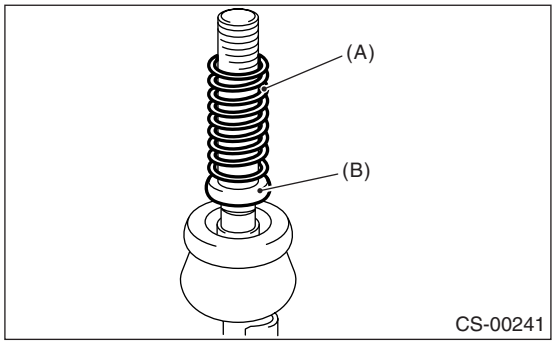
(A) Holder

12) Insert the reverse check cable into boot hole.
13) Insert the reverse check cable into gear shift assembly, and fix with band clip.

NOTE:
- Cut off the extra band clip.
- Make sure that the reverse check cable is inserted into gear shift lever assembly without any clearance.



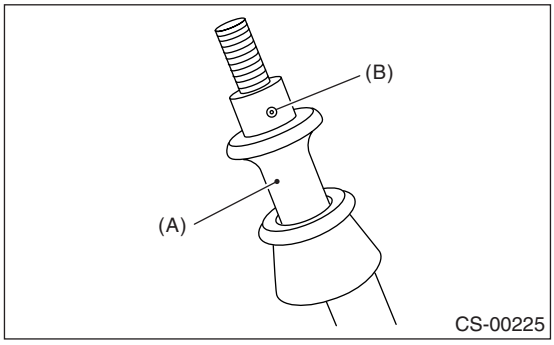
14) Install the seat cushion and spring.



(A) Spring
(B) Seat cushion

15) Fix the slider and reverse check cable end with spring pin.

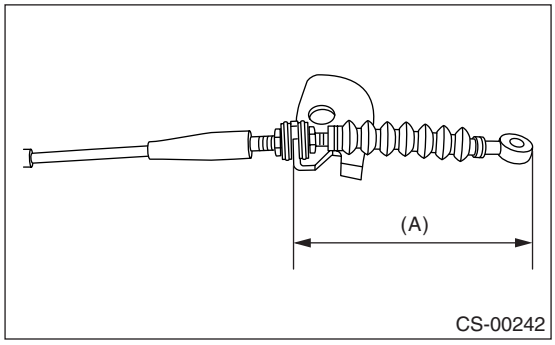
NOTE:
Apply grease to the sliding part of slider.



(A) Slider
(B) Spring pin

16) Adjust the length between end of cable plate and reverse check cable to 84 mm (3.31 in) with cable pulled (with slider lowered), and then tighten the lock nut.

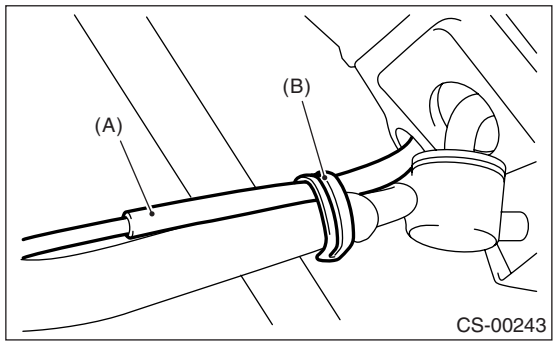
Tightening torque:
6 N·m (0.6 kgf-m, 4.4 ft-lb)



(A) 84 mm (3.31 in)

17) Fix the reverse check cable to clip of stay.

NOTE:
Install the reverse check cable to upper side of stay.

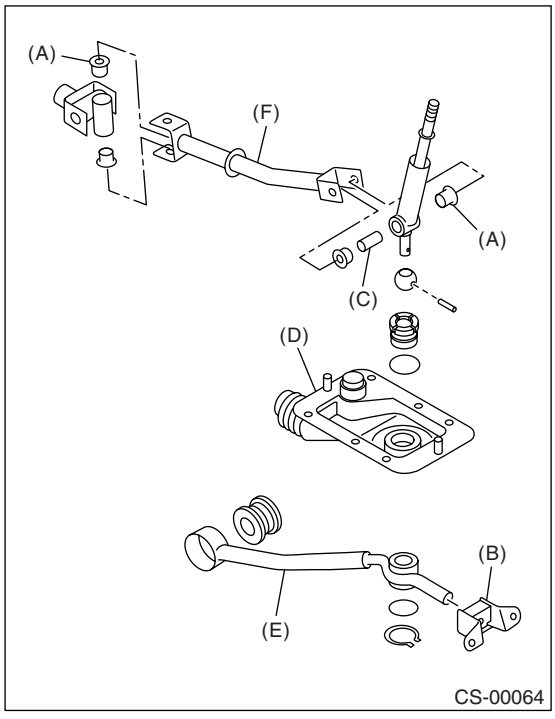


(A) Reverse check cable
(B) Clip

E: INSPECTION

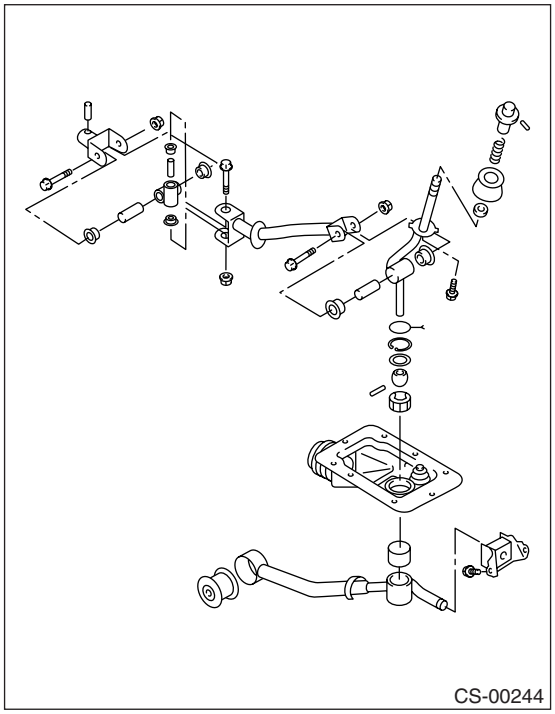
1) Check each part (bushing, cushion rubber, spacer, boot, stay and rod, etc.) for deformation, damage and wear. Repair or replace any defective part. Determine defective parts by comparing with new parts.

- 5MT



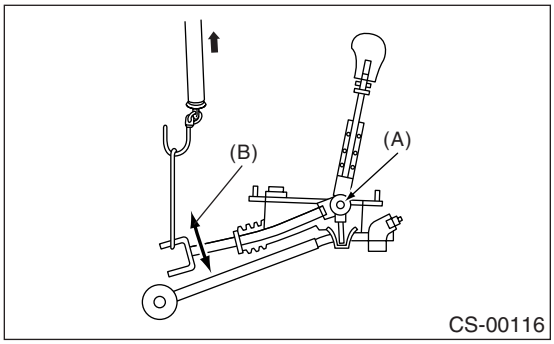
(A) Bushing
(B) Cushion rubber
(C) Spacer
(D) Boot
(E) Stay
(F) Rod

- 6MT



2) Check the swing torque of the rod in relation of the gear shift lever.
If the torque exceeds the specification, replace the bushing or retighten the nuts.

Swing torque:
3.7 N (0.38 kgf, 0.84 lbf) or less

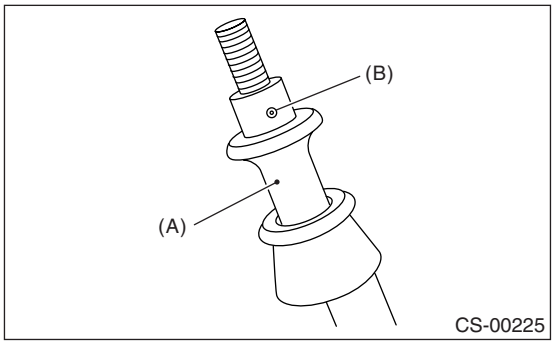


(A) Center of rotation
(B) Swing torque

8. Reverse Check Cable

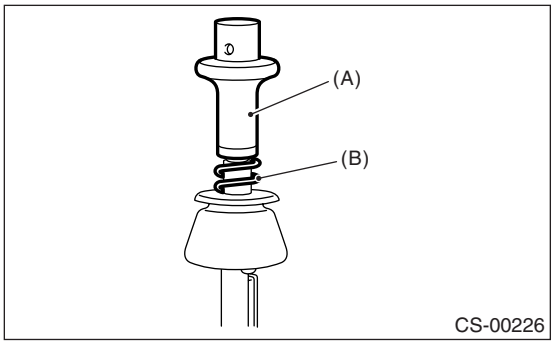
A: REMOVAL

1) Set the vehicle on a lift.
2) Remove the gear shift knob.
3) Remove the console box front. <Ref. to EI-45, REMOVAL, Console Box.>
4) Remove the spring pin from slider.



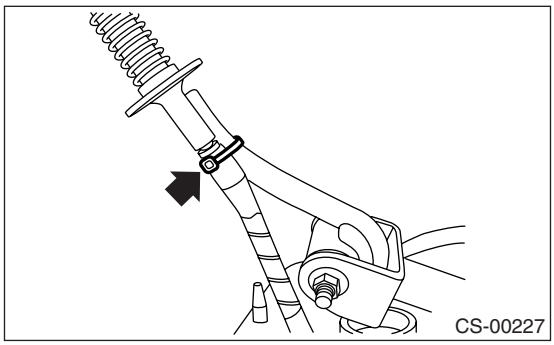
(A) Slider
(B) Spring pin

5) Remove the slider and spring.

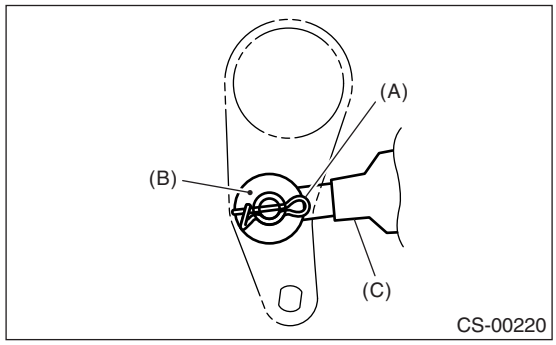


(A) Slider
(B) Spring

6) Cut the band clip, and then separate the reverse check cable from gear shift lever.



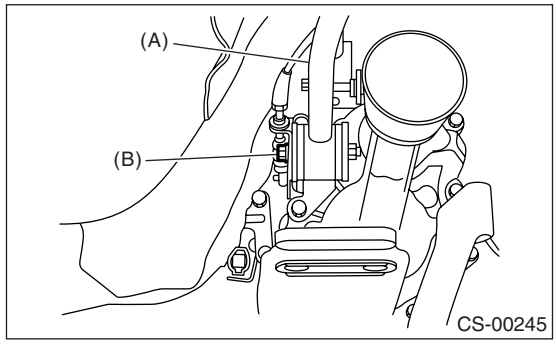
7) Lift-up the vehicle.
8) Remove the under cover.
9) Remove the rear exhaust pipe and muffler. <Ref. to EX(H4DOTC)-15, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4DOTC)-16, REMOVAL, Muffler.>
10) Remove the crossmember. <Ref. to 6MT-34, REMOVAL, Transmission Mounting System.>
11) Remove the snap pin and washer, and then separate the reverse check cable from reverse check lever.



(A) Snap pin
(B) Washer
(C) Reverse check cable

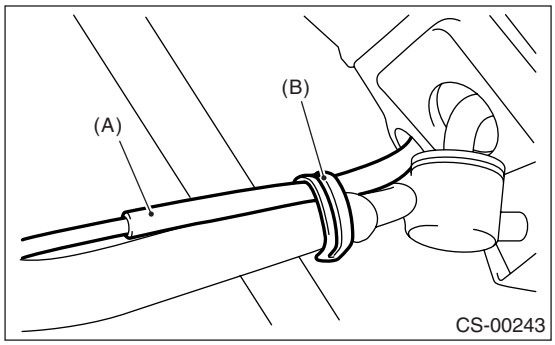
12) Move the transmission to right side, and then remove the stay bolt and reverse check cable.

NOTE:
If the transmission is not moved, the stay bolt will contact body and damage may occur.



(A) Stay
(B) Stay bolt

13) Raise the clip of stay, and then separate the stay and reverse check cable.

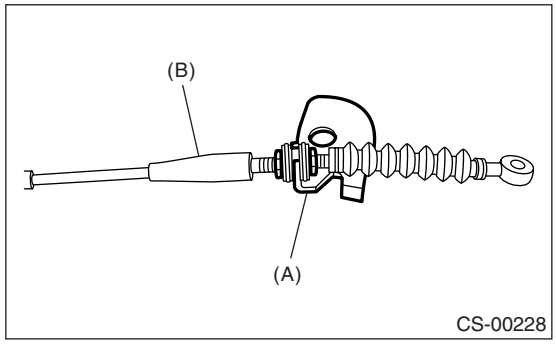


(A) Reverse check cable
(B) Clip

14) Remove the reverse check cable by pulling from underneath the vehicle.

NOTE:
Take care not to damage the inner boot.

15) Loosen the lock nut, then remove the reverse check cable from cable plate.

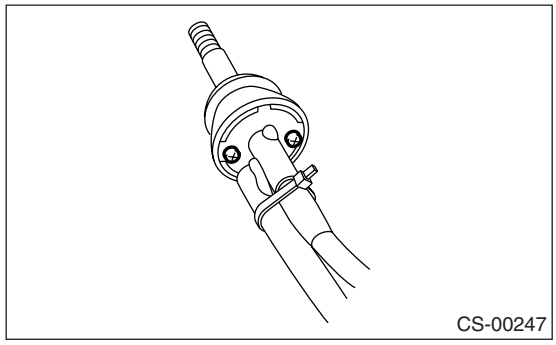


(A) Cable plate
(B) Reverse check cable

B: INSTALLATION

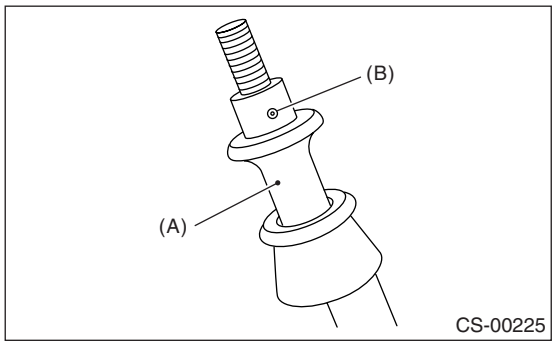
1) Insert the reverse check cable to the hole of inner boots from underneath the vehicle.
2) Insert the reverse check cable to the gear shift lever assembly, then fix with the band clip.

NOTE:
- Cut off the extra band clip.
- Make sure that the reverse check cable is inserted into gear shift lever assembly without any clearance.



3) Fix the slider and reverse check cable end with spring pin.

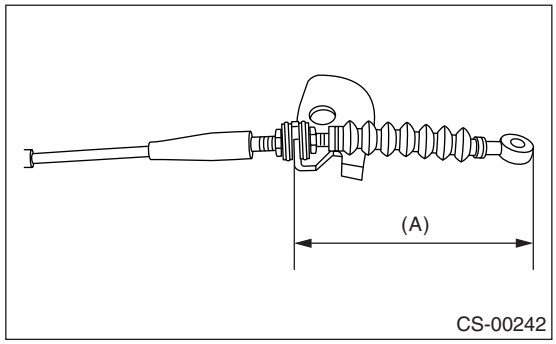
NOTE:
Apply grease to the sliding part of slider.



(A) Slider
(B) Spring pin

4) Adjust the length between end of cable plate and reverse check cable to 84 mm (3.31 in) with cable pulled (with slider lowered), and then tighten the lock nut.

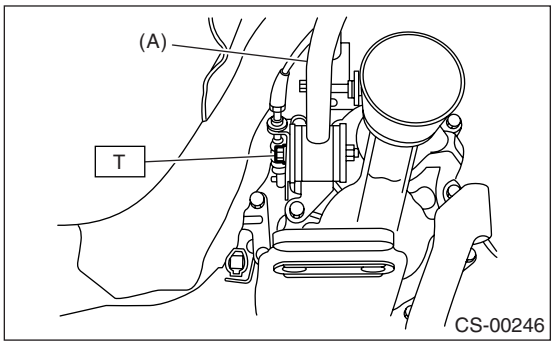
Tightening torque:
6 N·m (0.6 kgf-m, 4.4 ft-lb)



(A) 84 mm (3.31 in)

5) Move the transmission to right side, and then install the stay.

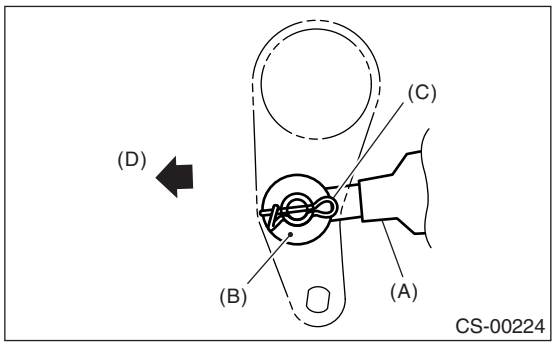
Tightening torque:
T: 32 N·m (3.3 kgf-m, 23.6 ft-lb)



(A) Stay

6) Install the reverse check cable end, washer and snap pin to reverse check lever.

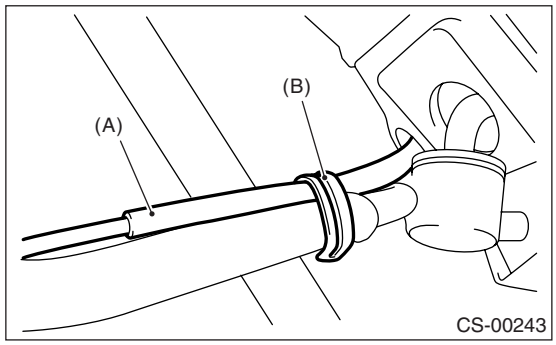
NOTE:
Take care to install the snap pin in proper direction.



(A) Reverse check cable
(B) Washer
(C) Snap pin
(D) Front side

7) Fix the reverse check cable to clip of stay.

NOTE:
Install the reverse check cable to upper side of stay.



(A) Reverse check cable
(B) Clip

8) Install the rear exhaust pipe and muffler. <Ref. to EX(H4DOTC)-15, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H4DOTC)-16, INSTALLATION, Muffler.>
9) Install the console box. <Ref. to EI-45, INSTALLATION, Console Box.>

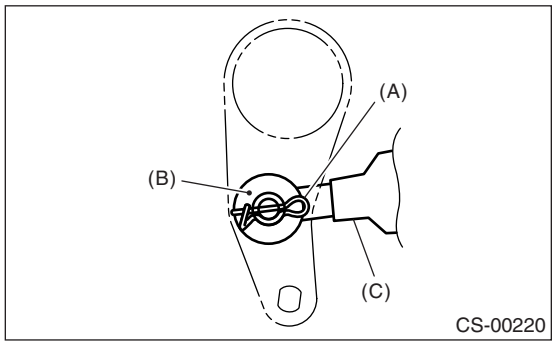
C: INSPECTION

1) Verify whether the slider moves smoothly. If not, adjust the reverse check cable or check damage of slider. <Ref. to CS-55, ADJUSTMENT, Reverse Check Cable.>
2) Check that the gear can be shift to reverse, when the slider is pulled up. If the gear can not be shift to reverse, adjust the reverse check cable. <Ref. to CS-55, ADJUSTMENT, Reverse Check Cable.>
3) Check that the gear can not be shift to reverse, when the slider is not pulled up. If the gear can be shift to reverse, adjust or replace the reverse check cable. <Ref. to CS-55, ADJUSTMENT, Reverse Check Cable.>

D: ADJUSTMENT

1) Set the vehicle on a lift.
2) Remove the under cover.
3) Remove the rear exhaust pipe and muffler. <Ref. to EX(H4DOTC)-15, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4DOTC)-16, REMOVAL, Muffler.>
4) Remove the crossmember. <Ref. to 6MT-34, REMOVAL, Transmission Mounting System.>

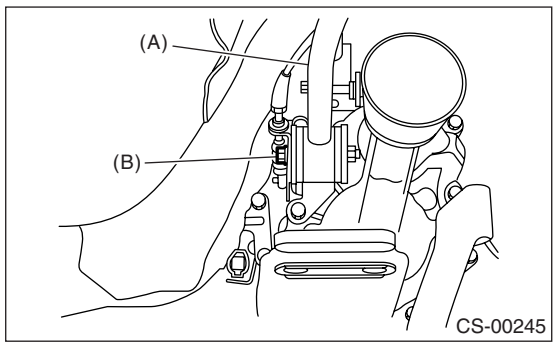
5) Remove the snap pin and washer, and then separate the reverse check cable from reverse check lever.



(A) Snap pin
(B) Washer
(C) Reverse check cable

6) Move the transmission to right side, and then remove the stay bolt and reverse check cable.

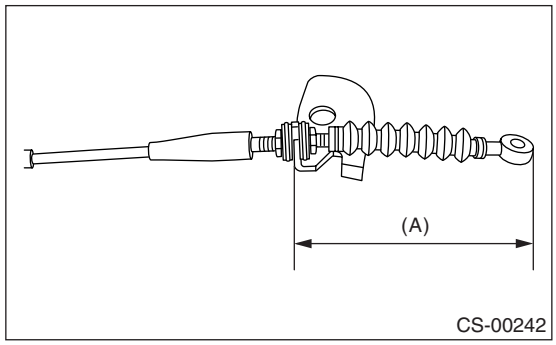
NOTE:
If the transmission is not moved, the stay bolt will contact body and damage may occur.



(A) Stay
(B) Stay bolt

7) Adjust the length between end of cable plate and reverse check cable to 84 mm (3.31 in) with cable pulled (with slider lowered), and then tighten the lock nut.

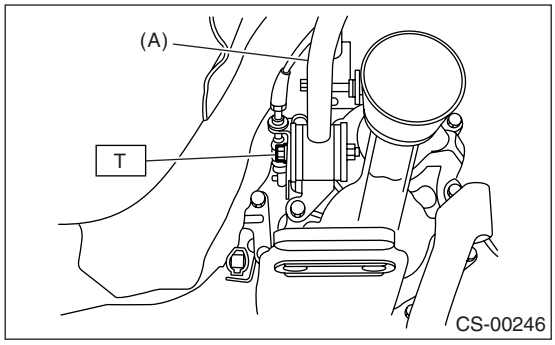
Tightening torque:
6 N·m (0.6 kgf-m, 4.4 ft-lb)



(A) 84 mm (3.31 in)

8) Move the transmission to right side, and then install the stay.

Tightening torque:
T: 32 N·m (3.3 kgf-m, 23.6 ft-lb)

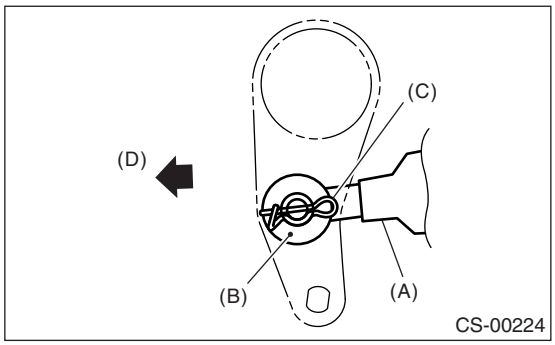


(A) Stay

9) Install the crossmember. <Ref. to 6MT-34, INSTALLATION, Transmission Mounting System.>
10) Install the rear exhaust pipe and muffler. <Ref. to EX(H4DOTC)-15, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H4DOTC)-16, INSTALLATION, Muffler.>

11) Install the reverse check cable end, washer and snap pin to reverse check lever.

NOTE:
Take care to install the snap pin in proper direction.



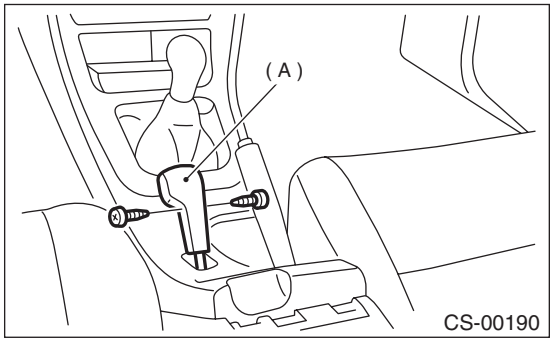
(A) Reverse check cable
(B) Washer
(C) Snap pin
(D) Front side

12) Install the under cover.

9. MT Drive Select Lever

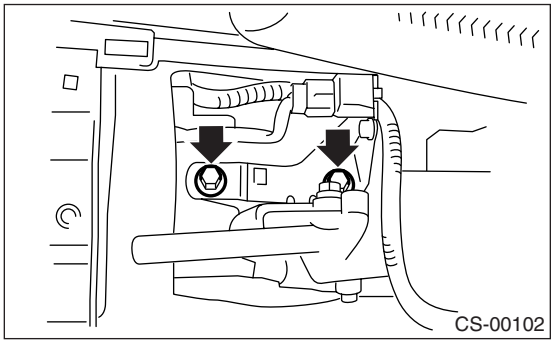
A: REMOVAL

1) Set the drive select lever to HI position.
2) Remove the knob.

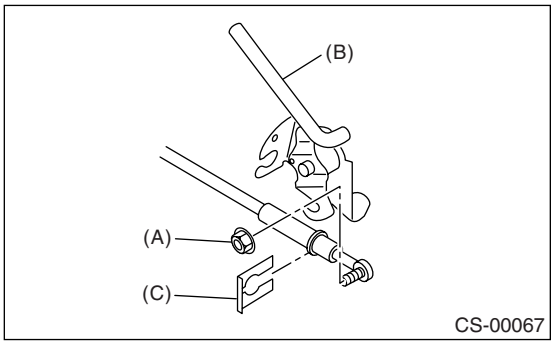


(A) Drive select lever knob

3) Remove the console box. <Ref. to EI-45, REMOVAL, Console Box.>
4) Remove the bolt installing drive select lever assembly on body.



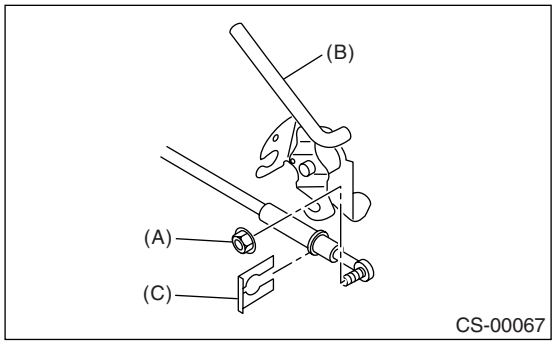
5) Remove the flange nut, clip and then disconnect the cable from lever assembly.



(A) Flange nut
(B) Lever ASSY
(C) Clip

B: INSTALLATION

1) Attach the drive select cable to the lever assembly and secure with the clamp.

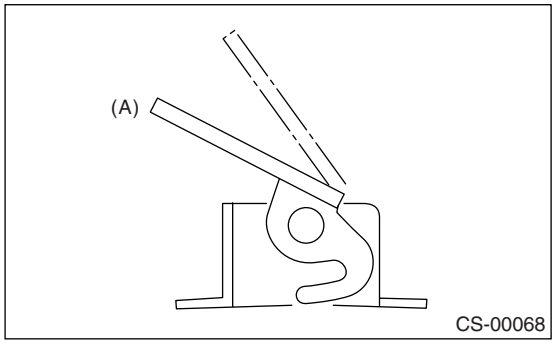


(A) Flange nut
(B) Lever ASSY
(C) Clip

2) Install the drive select lever.

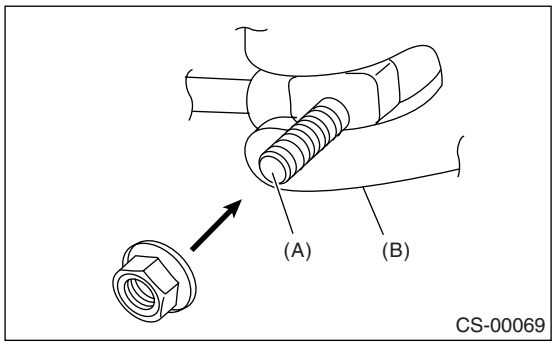
Tightening torque:
18 N·m (1.8 kgf-m, 13.0 ft-lb)

3) Set the drive select lever to HI position.



(A) HI position

4) Be sure to insert the cable end bolt into lever arm slit.



(A) Cable end bolt
(B) Lever arm

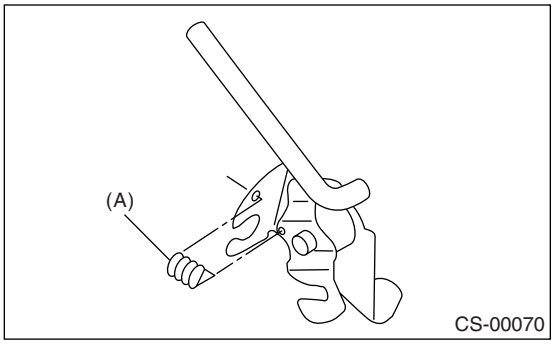
5) Tighten the nut where cable end bolt comes to a stop.

Tightening torque:
18 N·m (1.8 kgf-m, 13.0 ft-lb)

6) Install in the reverse order of removal.

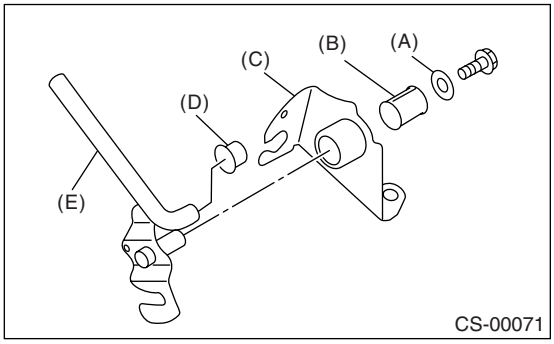
C: DISASSEMBLY

1) Remove the spring.



(A) Spring

2) Remove the lever, cap and bushing.



(A) Washer
(B) Bushing
(C) Plate ASSY
(D) Cushion
(E) Lever ASSY

D: ASSEMBLY

1) Assemble in the reverse order of disassembly.

Tightening torque:
1.6 N·m (0.16 kgf-m, 1.2 ft-lb)

2) Make sure the select lever moves smoothly.

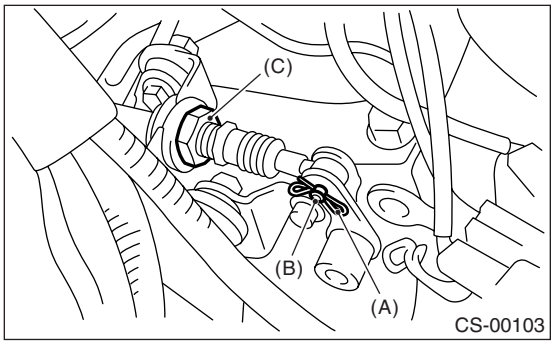
E: INSPECTION

1) Make sure the select lever moves smoothly. If it does not move smoothly, repair or replace it.
2) Make sure the drive select lever is not damaged. If it is damaged, repair or replace it.

10.Drive Select Cable

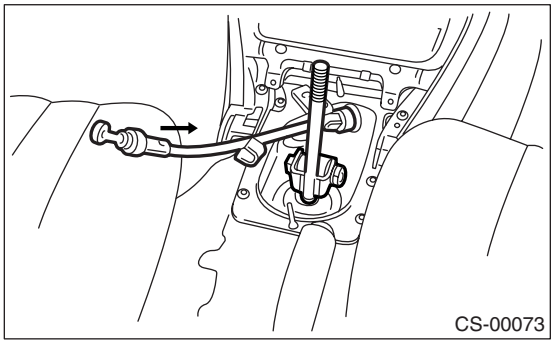
A: REMOVAL

1) Remove the drive select lever. <Ref. to CS-58, REMOVAL, MT Drive Select Lever.>
2) Remove the air cleaner case or air intake duct. <Ref. to IN(H4SO)-5, REMOVAL, Air Cleaner Case.> and <Ref. to IN(H4SO)-6, REMOVAL, Air Intake Duct.>
3) Remove the snap pin and clevis pin.



(A) Snap pin
(B) Clevis pin
(C) Nut

4) Loosen the nut, and then disconnect the cable from cable bracket.
5) Remove the cable from transmission clamp.
6) Remove the console box. <Ref. to EI-45, REMOVAL, Console Box.>
7) Remove cable from the under side of vehicle.



B: INSTALLATION

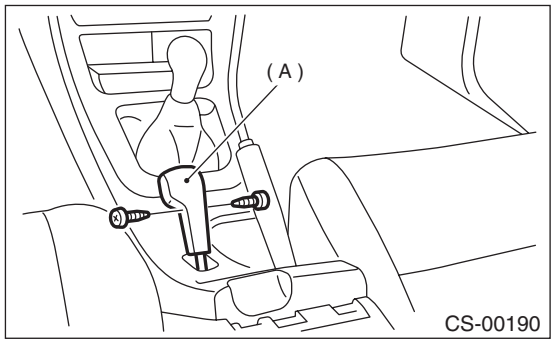
1) Install in the reverse order of removal.
2) Make sure the drive select lever operates properly.

C: INSPECTION

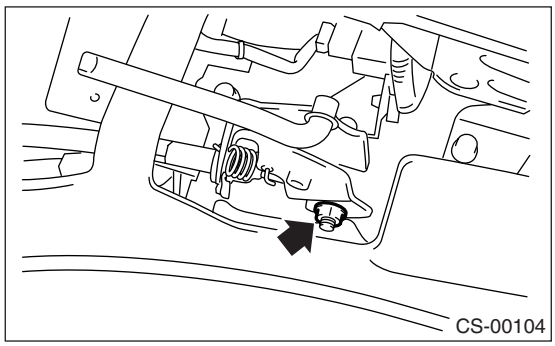
1) Make sure to move the transmission to HI or LO position by moving the drive select lever. If it doesn't, adjust the cable. <Ref. to CS-60, ADJUSTMENT, Drive Select Cable.>
2) Make sure the cable operates smoothly. If it catches or fails to work properly, repair or replace it.
3) Check the cable for damage.

D: ADJUSTMENT

1) Set the drive select lever to HI position.
2) Remove the knob.

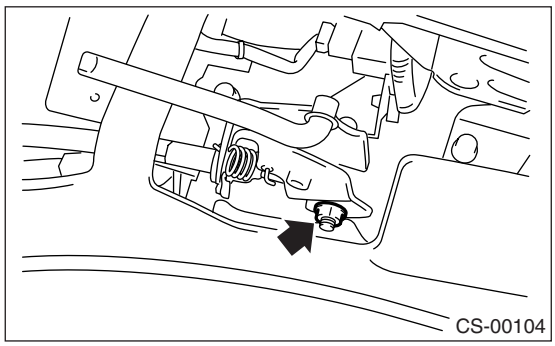


3) Remove the console box. <Ref. to EI-45, REMOVAL, Console Box.>
4) Loosen the nut.



5) Make sure the transmission is in HI position. If isn't, pull on the cable to put transmission in HI position.
6) Tighten the nut in location where the cable end bolt stops naturally.

Tightening torque:
18 N·m (1.8 kgf-m, 13.0 ft-lb)



7) Make sure to move the transmission to HI or LO position by moving the drive select lever. If it doesn't, readjust cable.

11.General Diagnostic Table

A: INSPECTION

Symptom	Possible cause	Remedy
1. Select lever	Starter does not run.	Adjust select cable and inhibitor switch, or inspect circuit.
	Back-up light does not light up.	Adjust select cable and inhibitor switch, or inspect circuit.
	AT shift lock system does not operate normally.	Adjust select cable and inhibitor switch, or inspect circuit.
2. MT gear shift lever (6MT)	Shift into reverse is impossible.	Adjust reverse check cable.
	Shift into reverse is possible without pulling up slider.	Adjust or replace reverse check cable.
	Slider cannot be pulled up. Or slider is pulled up being sticked.	• Inspect reverse check system of transmission. • Adjust or replace reverse check cable.

AUTOMATIC TRANSMISSION

4AT

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1. General Description

A: SPECIFICATION

1. TORQUE CONVERTER CLUTCH

Model	1.6 L	2.0 L Non-turbo	2.5 L	2.0 L Turbo
Type	Symmetric, 3 element, single stage, 2 phase torque converter			
Stall torque ratio	2.2 — 2.4	2.0 — 2.2	1.85 — 2.15	2.05 — 2.35
Nominal diameter	236 mm (9.29 in)		246 mm (9.69 in)	
Stall speed (at sea level)	2,400 — 3,000 rpm	2,200 — 2,700 rpm	2,100 — 2,600 rpm	2,900 — 3,500 rpm
One-way clutch	Sprague type one-way clutch			

2. OIL PUMP

Type	Parachoid constant-displacement pump	
Driving method	Driven by engine	
Number of teeth	Inner rotor	9
	Outer rotor	10

3. TRANSMISSION CONTROL ELEMENT

Type	4-forward, 1-reverse, double-row planetary gears
Multi-plate clutch	3 sets
Multi-plate brake	2 sets
One-way clutch (sprague type)	1 sets

4. TRANSMISSION GEAR RATIO

	Gear ratio
1st	2.785
2nd	1.545
3rd	1.000
4th	0.694
Rev	2.272

5. PLANETARY GEAR AND PLATE

Model	1.6 L	2.0 L Non-turbo	2.5 L	2.0 L Turbo
Tooth number of front sun gear	33			
Tooth number of front pinion	21			
Tooth number of front internal gear	75			
Tooth number of rear sun gear	42			
Tooth number of rear pinion	17			
Tooth number of rear internal gear	75			
Drive plate number of high clutch	3	4		5
Drive plate number of low clutch	4		6	7
Drive plate number of reverse clutch	1	2		
Drive plate number of 2-4 brake	2	3		4
Drive plate number of low & reverse brake	4		6	7

6. SELECTOR POSITION

P (Park)	Transmission in neutral, output member immovable, and engine start possible
R (Reverse)	Transmission in reverse for backing
N (Neutral)	Transmission in neutral and engine start possible
D (Drive)	4-forward, Automatic gear change 1st ←→ 2nd ←→ 3rd ←→ 4th
3 (3rd)	3-forward, Automatic gear change 1st ←→ 2nd ←→ 3rd ← 4th
2 (2nd)	2-forward, Automatic gear change 1st ←→ 2nd ← 3rd ← 4th
1 (1st)	1st gear locked (Deceleration possible 1st ← 2nd ← 3rd ← 4th)
Manual mode (+)	4-forward, Manual gear change (shift up) 1st → 2nd → 3rd → 4th
Manual mode (–)	4-forward, Manual gear change (shift down) 4th → 3rd → 2nd → 1st
Control method	Wire cable

7. HYDRAULIC CONTROL AND LUBRICATION

Type		Electro-hydraulic control [Four forward speed changes by electrical signals of vehicle speed and accelerator (throttle) opening]
Fluid		SUBARU ATF, Idemitsu “Apolloil ATF HP”, Castrol “Transmax J” NOTE: If the ATF above is not available, use DEXRON III.
Fluid capacity	1.6 L FWD model	8.0 — 8.3 ℓ (8.5 — 8.8 US qt, 7.0 — 7.3 Imp qt)
	1.6 L AWD and 2.0 L Non-turbo model	8.4 — 8.7 ℓ (8.9 — 9.2 US qt, 7.4 — 7.7 Imp qt)
	2.5 L and 2.0 L Turbo model	9.3 — 9.6 ℓ (9.8 — 10.1 US qt, 8.2 — 8.4 Imp qt)
Lubrication system		Forced feed lubrication with oil pump
Oil		Automatic transmission fluid (above mentioned)

8. COOLING AND HARNESS

Cooling system	Without ATF cooler (with warmer function)	Liquid-cooled cooler incorporated in radiator
	With ATF cooler (with warmer function)	ATF cooler (with warmer function)
Inhibitor switch		12 poles
Transmission harness		20 poles

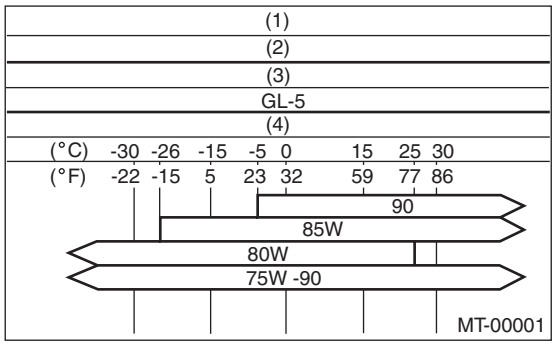
9. TRANSFER

Model	1.6 L and 2.0 L Non-turbo	2.5 L	2.0 L Turbo
Transfer type	Multi-plate transfer (MPT)		Variable torque distribution (VTD)
Drive & driven plate number of transfer clutch	4	5	3
Control method	Electro-hydraulic type		
Lubricant	The same Automatic transmission fluid used in automatic transmission		
Reduction gear ratio	1.000 (53/53)		

10.FINAL REDUCTION

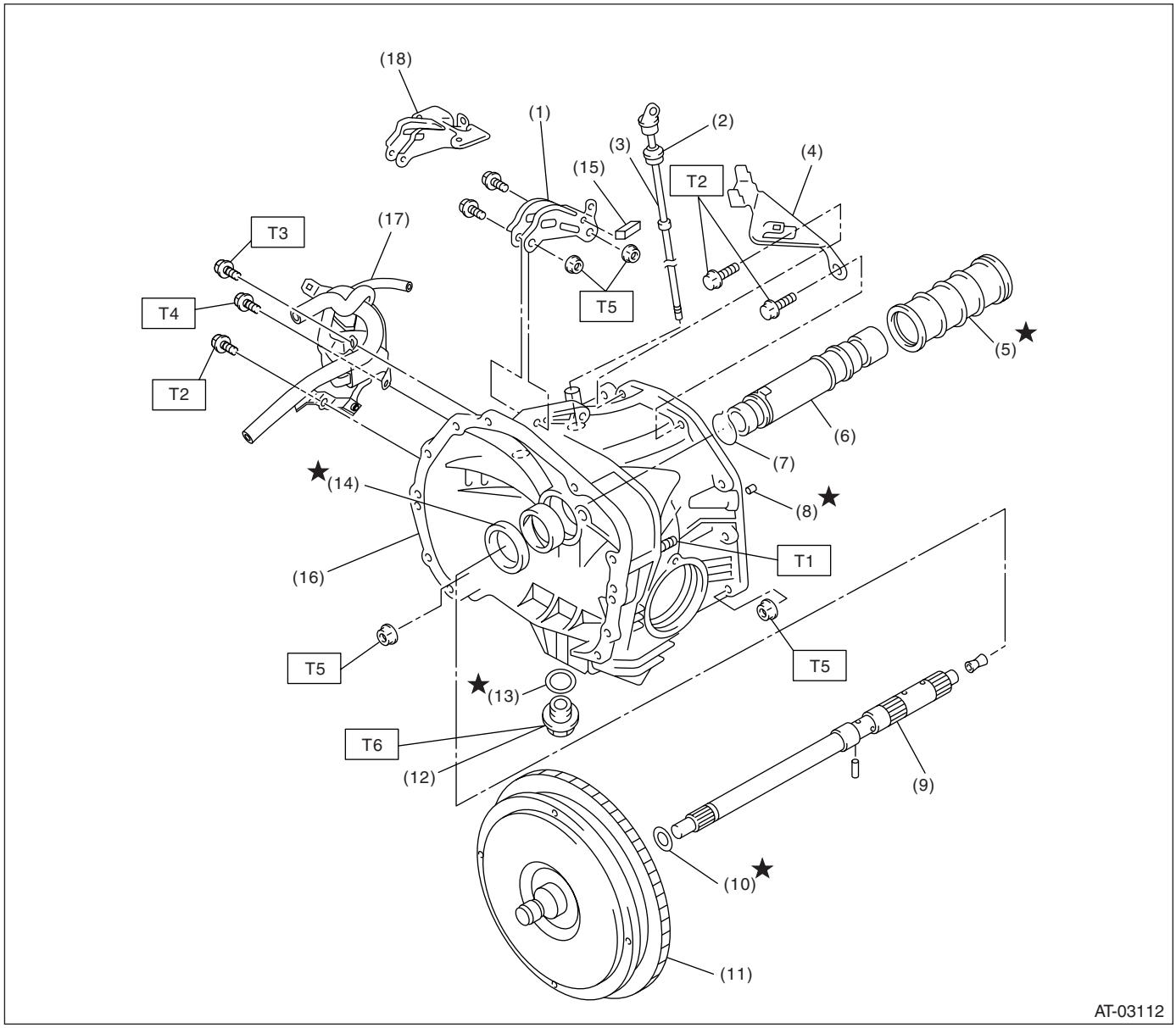
Model	2.0 L Non-turbo, 2.5 L	1.6 L, 2.0 L Turbo
Front final gear ratio	4.111 (37/9)	4.444 (40/9)

11.RECOMMENDED GEAR OIL

Lubrication oil	 (1) Item (2) Front differential gear oil (3) API standard (4) SAE viscosity No. and applicable temperature
Front differential oil capacity	1.1 — 1.3 ℓ (1.2 — 1.4 US qt, 1.0 — 1.1 Imp qt)

B: COMPONENT

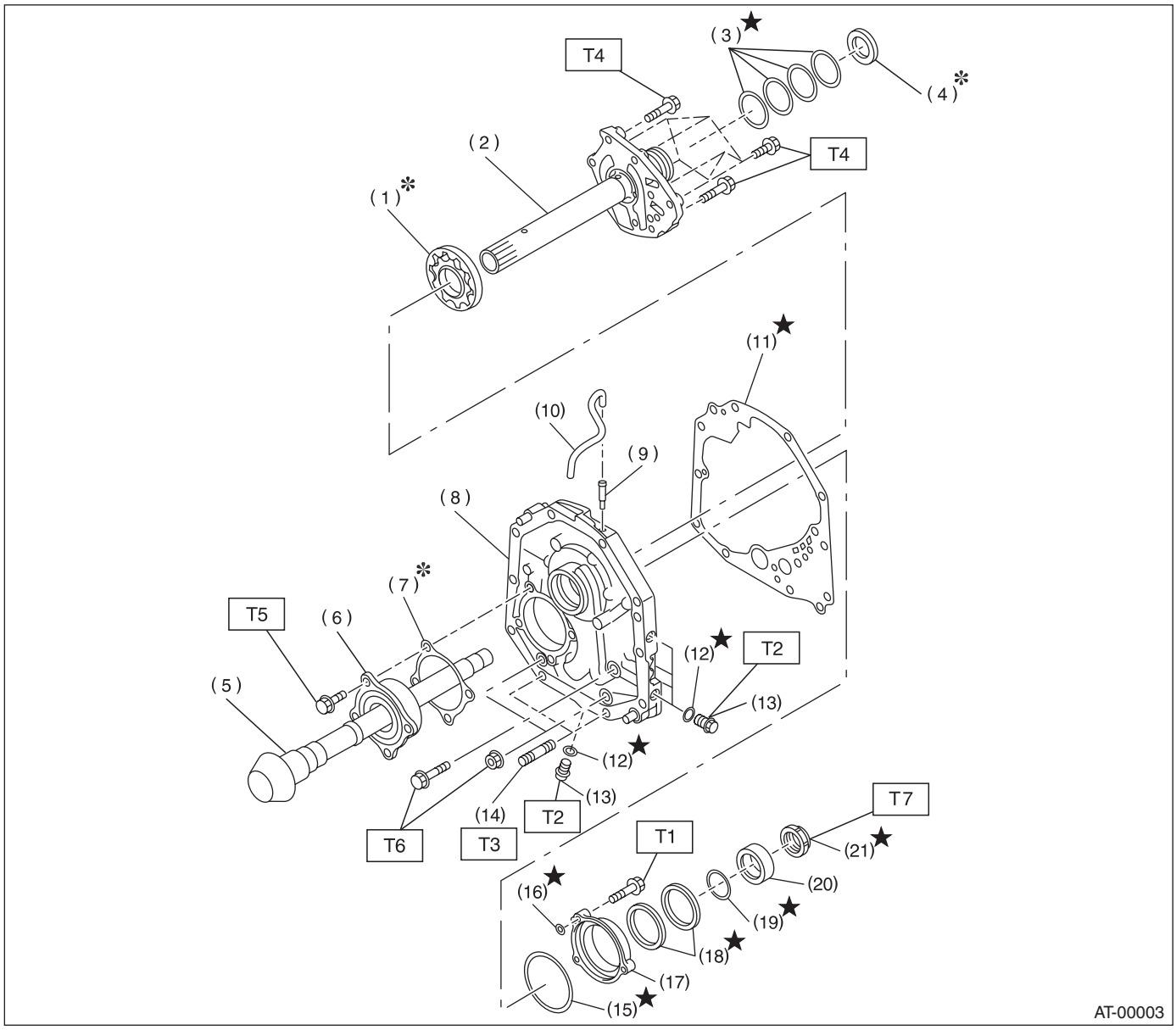
1. TORQUE CONVERTER CLUTCH AND CASE



(1) Pitching stopper bracket (Turbo model)
(2) O-ring
(3) Differential oil level gauge
(4) Stay
(5) Seal pipe
(6) Oil pump shaft
(7) Clip
(8) Rubber seal
(9) Input shaft
(10) O-ring
(11) Torque converter clutch ASSY
(12) Differential gear oil Drain plug
(13) Gasket
(14) Oil seal
(15) Clip (Turbo model)
(16) Torque converter clutch case
(17) ATF cooler (with warmer function) (if equipped)
(18) Pitching stopper bracket (Non-turbo model)

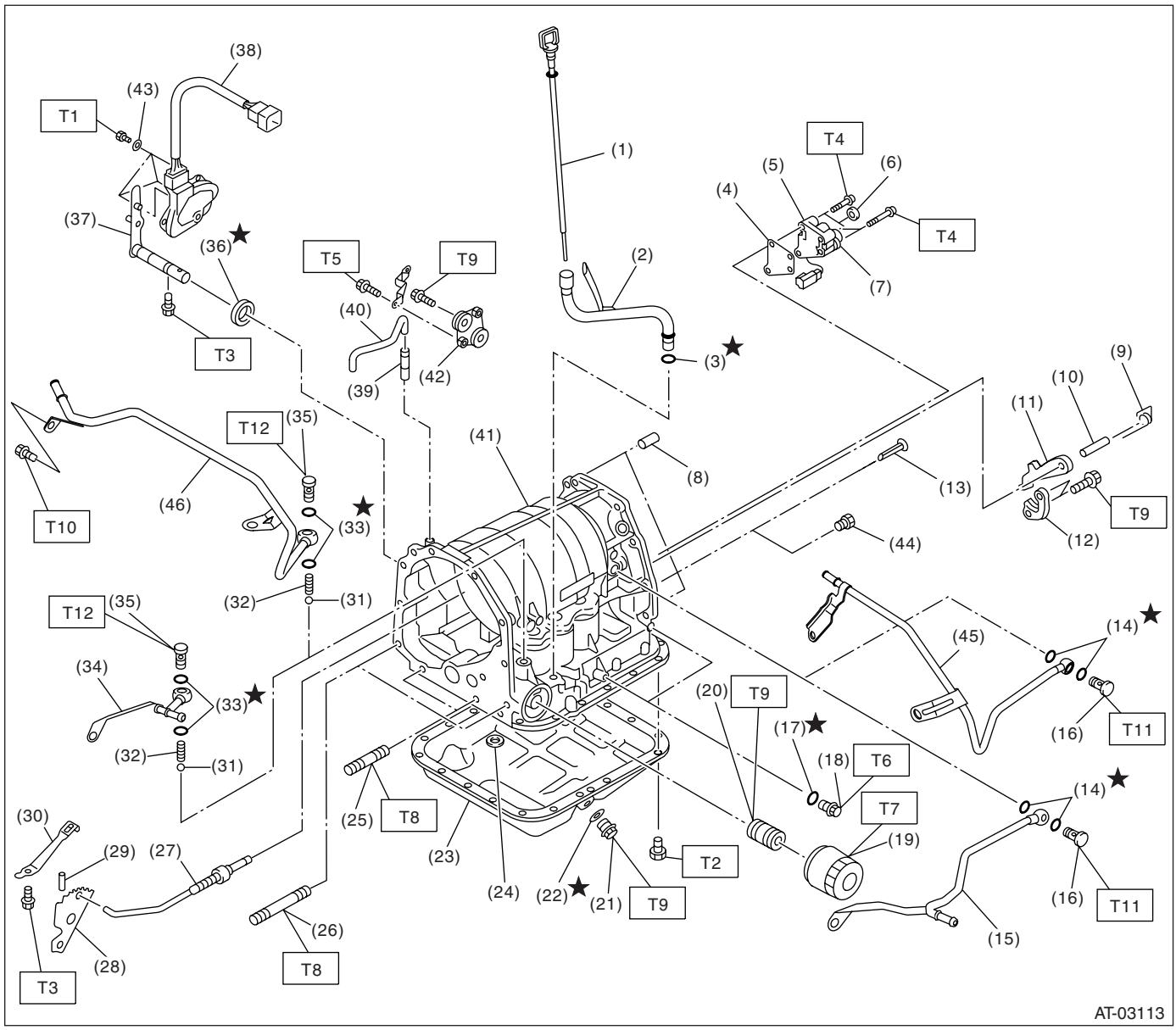
Tightening torque: N·m (kgf-m, ft-lb)
T1: 18 (1.8, 13.0)
T2: 21 (2.1, 15.5)
T3: 23 (2.3, 17.0)
T4: 33 (3.4, 24.3)
T5: 41 (4.2, 30.2)
T6: 44 (4.5, 32.5) (Aluminum gasket)
70 (7.1, 51) (Copper gasket)

2. OIL PUMP



(1)	Oil pump rotor	(11)	Gasket	(21)	Lock nut
(2)	Oil pump cover	(12)	O-ring		
(3)	Seal ring	(13)	Test plug	***Tightening torque: N·m (kgf-m, ft-lb)***	
(4)	Thrust needle bearing	(14)	Stud bolt	***T1:***	***7 (0.7, 5.2)***
(5)	Drive pinion shaft	(15)	O-ring	***T2:***	***13 (1.3, 9.4)***
(6)	Roller bearing	(16)	O-ring	***T3:***	***18 (1.8, 13.0)***
(7)	Shim	(17)	Oil seal retainer	***T4:***	***25 (2.5, 18.1)***
(8)	Oil pump housing	(18)	Oil seal	***T5:***	***40 (4.1, 30)***
(9)	Nipple	(19)	O-ring	***T6:***	***42 (4.3, 31)***
(10)	Air breather hose	(20)	Drive pinion collar	***T7:***	***116 (11.8, 85)***

3. TRANSMISSION CASE AND CONTROL DEVICE

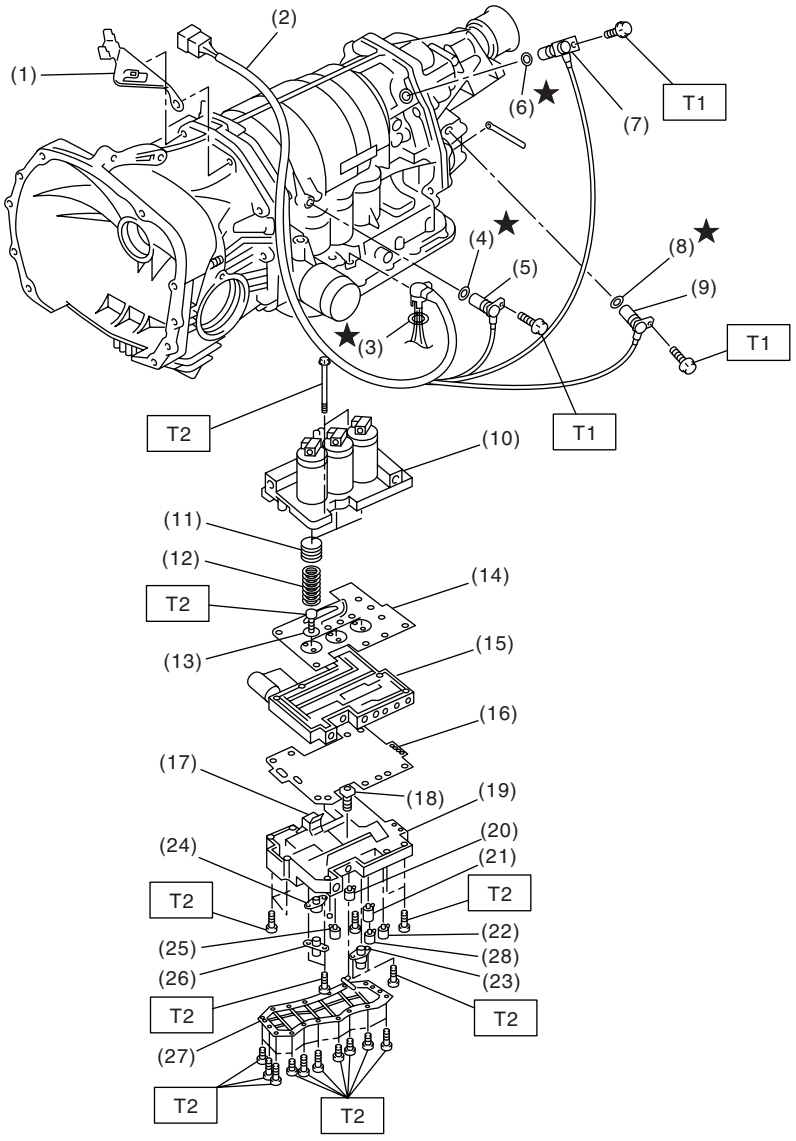


(1) ATF level gauge
(2) Oil charge pipe
(3) O-ring
(4) Transfer valve plate
(5) Transfer valve ASSY
(6) Transfer clutch seal
(7) Transfer duty solenoid
(8) Straight pin
(9) Return spring
(10) Shaft
(11) Parking pawl
(12) Parking support
(13) Inlet filter
(14) Gasket
(15) Inlet pipe without ATF cooler model (with warmer function)
(16) Union screw
(17) O-ring
(18) Test plug
(19) Oil filter
(20) Oil filter stud bolt
(21) Drain plug
(22) Gasket
(23) Oil pan
(24) Magnet
(25) Stud bolt (Short)
(26) Stud bolt (Long)
(27) Parking rod
(28) Manual plate
(29) Spring pin
(30) Detention spring
(31) Ball
(32) Spring
(33) Gasket
(34) Outlet pipe without ATF cooler model (with warmer function)
(35) Union screw
(36) Oil seal
(37) Select lever
(38) Inhibitor switch ASSY
(39) Nipple
(40) Air breather hose
(41) Transmission case
(42) Plate ASSY
(43) Washer
(44) Plug (FWD model)
(45) Inlet pipe (with ATF cooler model (with warmer function))
(46) Outlet pipe (with ATF cooler model (with warmer function))

Tightening torque: N·m (kgf-m, ft-lb)

T1:	***3.4 (0.35, 2.5)***
T2:	***5 (0.5, 3.6)***
T3:	***6 (0.6, 4)***
T4:	***8 (0.8, 5.8)***
T5:	***12 (1.2, 8.7)***
T6:	***13 (1.3, 10)***
T7:	***14 (1.4, 10)***
T8:	***18 (1.8, 13)***
T9:	***25 (2.5, 18.1)***
T10:	***21 (2.1, 15.5)***
T11:	***40 (4.1, 30)***
T12:	***45 (4.6, 33)***

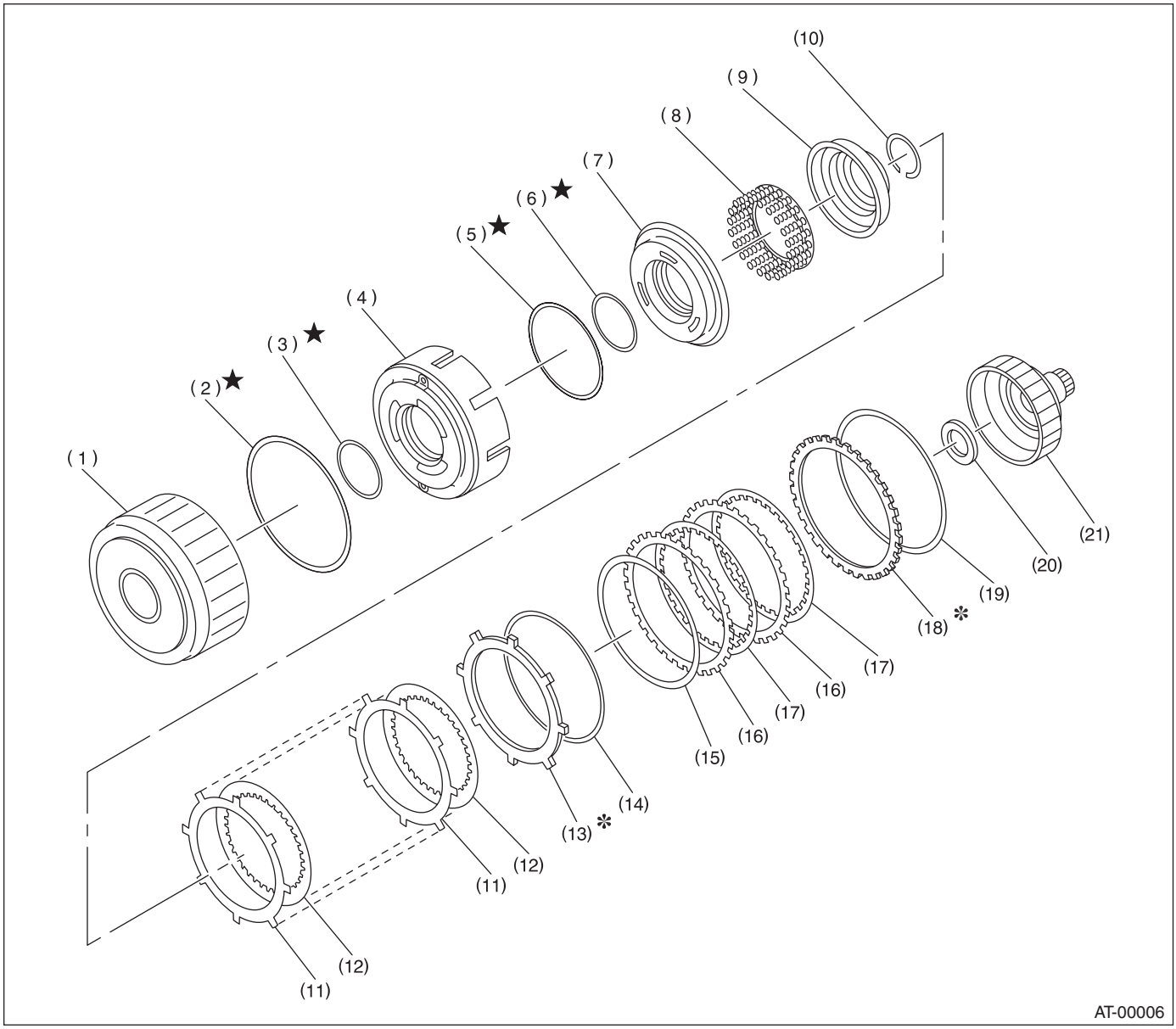
4. CONTROL VALVE AND HARNESS ROUTING



(1) Stay
(2) Transmission harness
(3) O-ring
(4) O-ring
(5) Torque converter turbine speed sensor
(6) O-ring
(7) Front vehicle speed sensor
(8) O-ring
(9) Rear vehicle speed sensor
(10) Upper valve body
(11) Accumulator piston
(12) Accumulator spring
(13) Side plate
(14) Separate plate
(15) Middle valve body
(16) Separate plate
(17) Fluid filter
(18) Fluid filter
(19) Lower valve body
(20) Shift solenoid 2
(21) Shift solenoid 1
(22) 2-4 brake timing solenoid
(23) 2-4 brake duty solenoid
(24) Line pressure duty solenoid
(25) Low clutch timing solenoid
(26) Lock-up duty solenoid
(27) Oil strainer
(28) SPORT shift solenoid (if equipped)

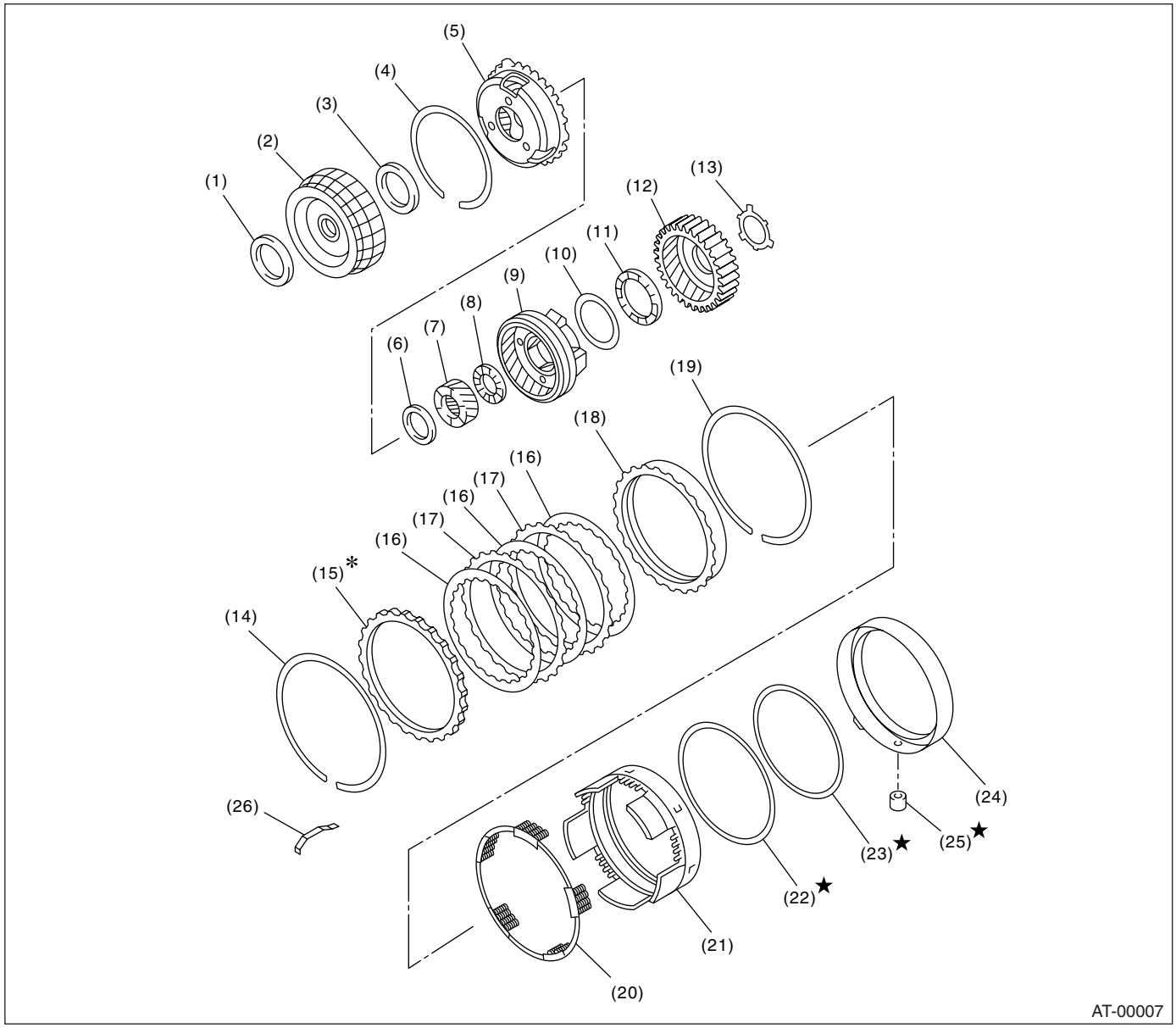
Tightening torque: N·m (kgf-m, ft-lb)
T1: 7 (0.7, 5.2)
T2: 8 (0.8, 5.8)

5. HIGH CLUTCH AND REVERSE CLUTCH



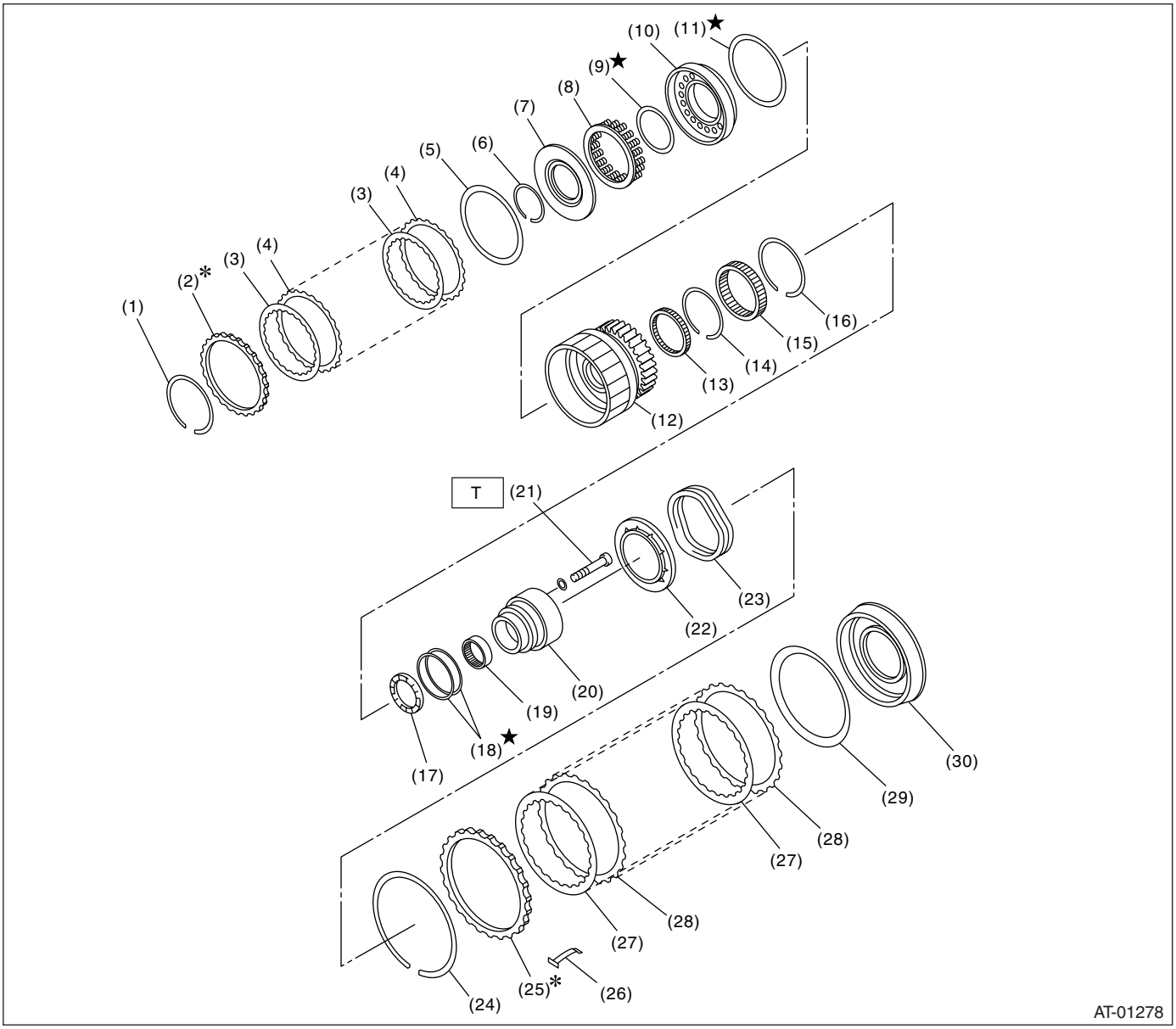
(1)	High clutch drum	(8)	Spring retainer	(15)	Dish plate
(2)	Lip seal	(9)	Cover	(16)	Driven plate (Reverse clutch)
(3)	D-ring	(10)	Snap ring	(17)	Drive plate (Reverse clutch)
(4)	Reverse clutch piston	(11)	Driven plate (High clutch)	(18)	Retaining plate (Reverse clutch)
(5)	D-ring	(12)	Drive plate (High clutch)	(19)	Snap ring
(6)	D-ring	(13)	Retaining plate (High clutch)	(20)	Thrust needle bearing
(7)	High clutch piston	(14)	Snap ring	(21)	High clutch hub

6. PLANETARY GEAR AND 2-4 BRAKE



(1) Thrust needle bearing
(2) Front sun gear
(3) Thrust needle bearing
(4) Snap ring
(5) Front planetary carrier
(6) Thrust needle bearing
(7) Rear sun gear
(8) Thrust needle bearing
(9) Rear planetary carrier
(10) Washer
(11) Thrust needle bearing
(12) Rear internal gear
(13) Washer
(14) Snap ring
(15) Retaining plate
(16) Drive plate
(17) Driven plate
(18) Pressure rear plate
(19) Snap ring
(20) Spring retainer
(21) 2-4 brake piston
(22) D-ring
(23) D-ring
(24) 2-4 brake piston retainer
(25) 2-4 brake seal
(26) Leaf spring

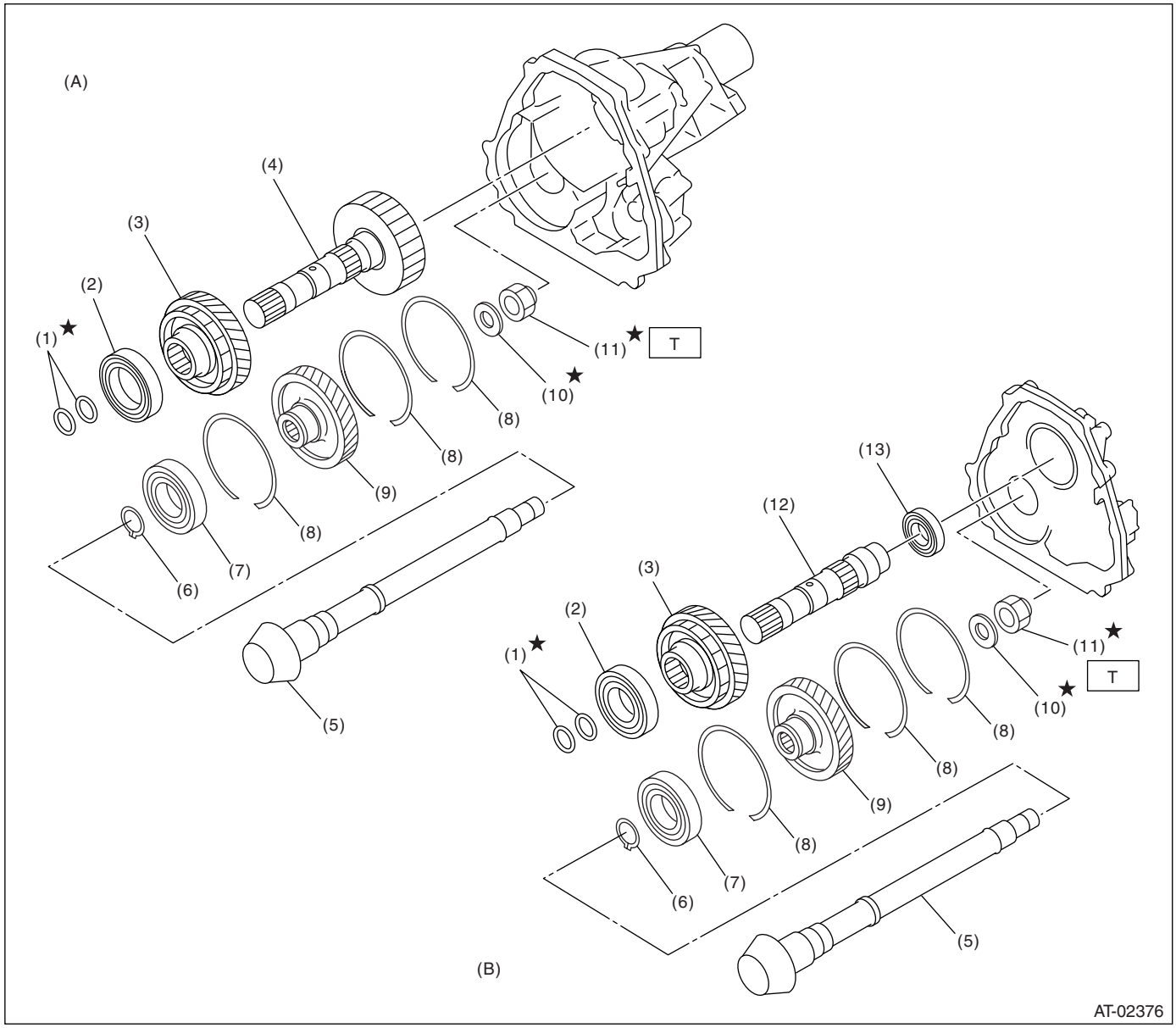
7. LOW CLUTCH AND LOW & REVERSE BRAKE



(1) Snap ring
(2) Retaining plate
(3) Drive plate
(4) Driven plate
(5) Dish plate
(6) Snap ring
(7) Cover
(8) Spring retainer
(9) D-ring
(10) Low clutch piston
(11) D-ring
(12) Low clutch drum
(13) Needle bearing
(14) Snap ring
(15) One-way clutch
(16) Snap ring
(17) Thrust needle bearing
(18) Seal ring
(19) Needle bearing
(20) One-way clutch inner race
(21) Socket bolt
(22) Spring retainer
(23) Return spring
(24) Snap ring
(25) Retaining plate
(26) Leaf spring
(27) Drive plate
(28) Driven plate
(29) Dish plate
(30) Low and reverse brake piston

Tightening torque: N·m (kgf-m, ft-lb)
T: 25 (2.5, 18.1)

8. REDUCTION GEAR WITH NON-TURBO

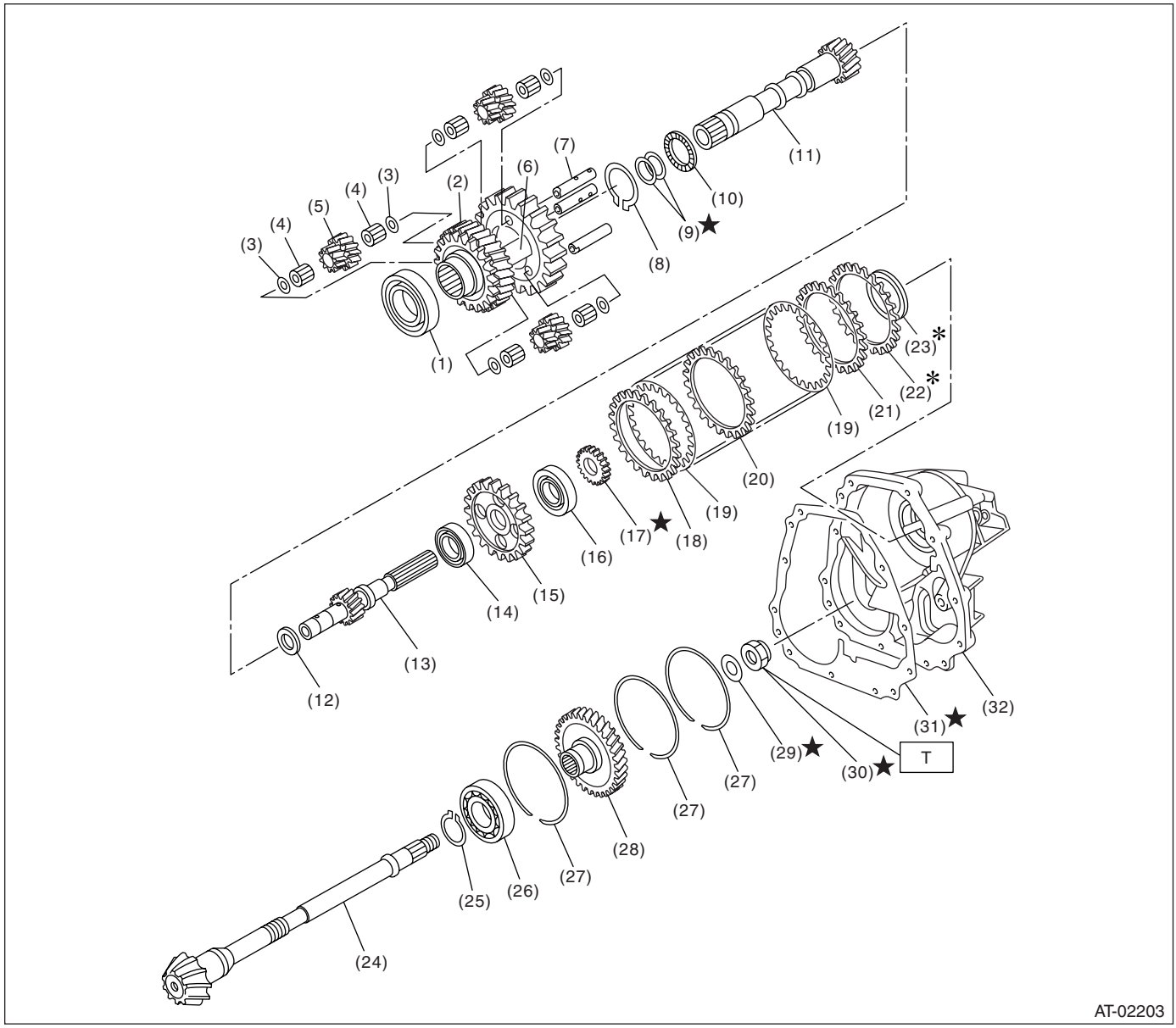


(A) AWD
(B) FWD

(1) Seal ring
(2) Ball bearing
(3) Reduction drive gear
(4) Reduction drive shaft
(5) Drive pinion shaft
(6) Snap ring
(7) Ball bearing
(8) Snap ring
(9) Reduction driven gear
(10) Washer
(11) Lock nut
(12) Reduction drive shaft
(13) Ball bearing

Tightening torque: N·m (kgf-m, ft-lb)
T: 100 (10.2, 73.8)

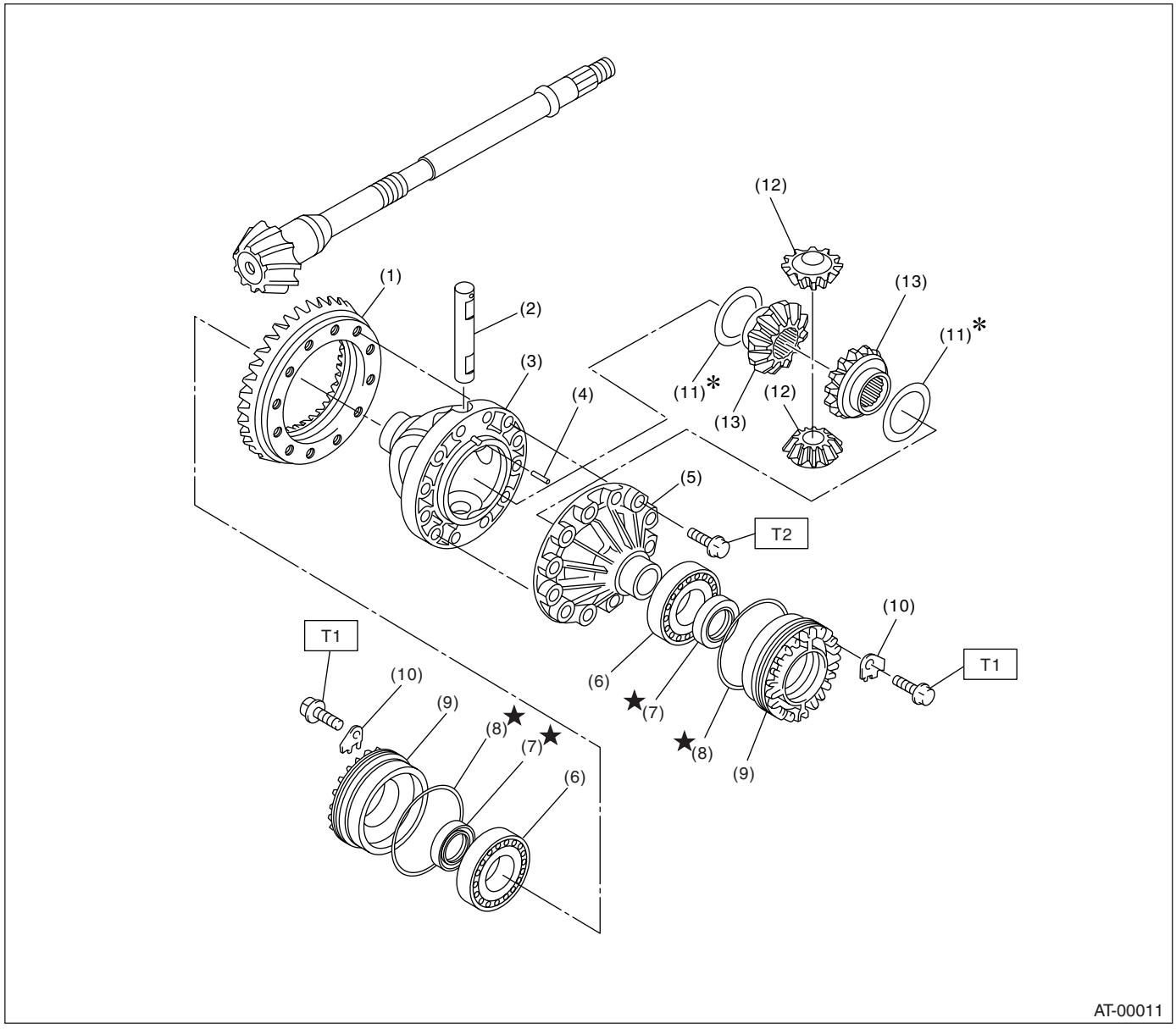
9. REDUCTION GEAR WITH TURBO



(1) Ball bearing
(2) Reduction drive gear
(3) Washer
(4) Needle bearing
(5) Pinion gear
(6) Carrier
(7) Planetary pinion shaft
(8) Snap ring
(9) Seal ring
(10) Thrust needle bearing
(11) Intermediate shaft
(12) Thrust washer
(13) Rear drive shaft
(14) Ball bearing
(15) Multi-plate clutch hub
(16) Ball bearing
(17) Revolution gear
(18) Driven plate (Thick)
(19) Driven plate
(20) Driven plate (Thin)
(21) Driven plate (Thick)
(22) Pressure plate
(23) Rear drive shaft shim
(24) Drive pinion shaft
(25) Snap ring
(26) Ball bearing
(27) Snap ring
(28) Reduction driven gear
(29) Lock washer
(30) Lock nut
(31) Gasket
(32) Extension case

Tightening torque: N·m (kgf-m, ft-lb)
T: 100 (10.2, 73.8)

10.DIFFERENTIAL GEAR

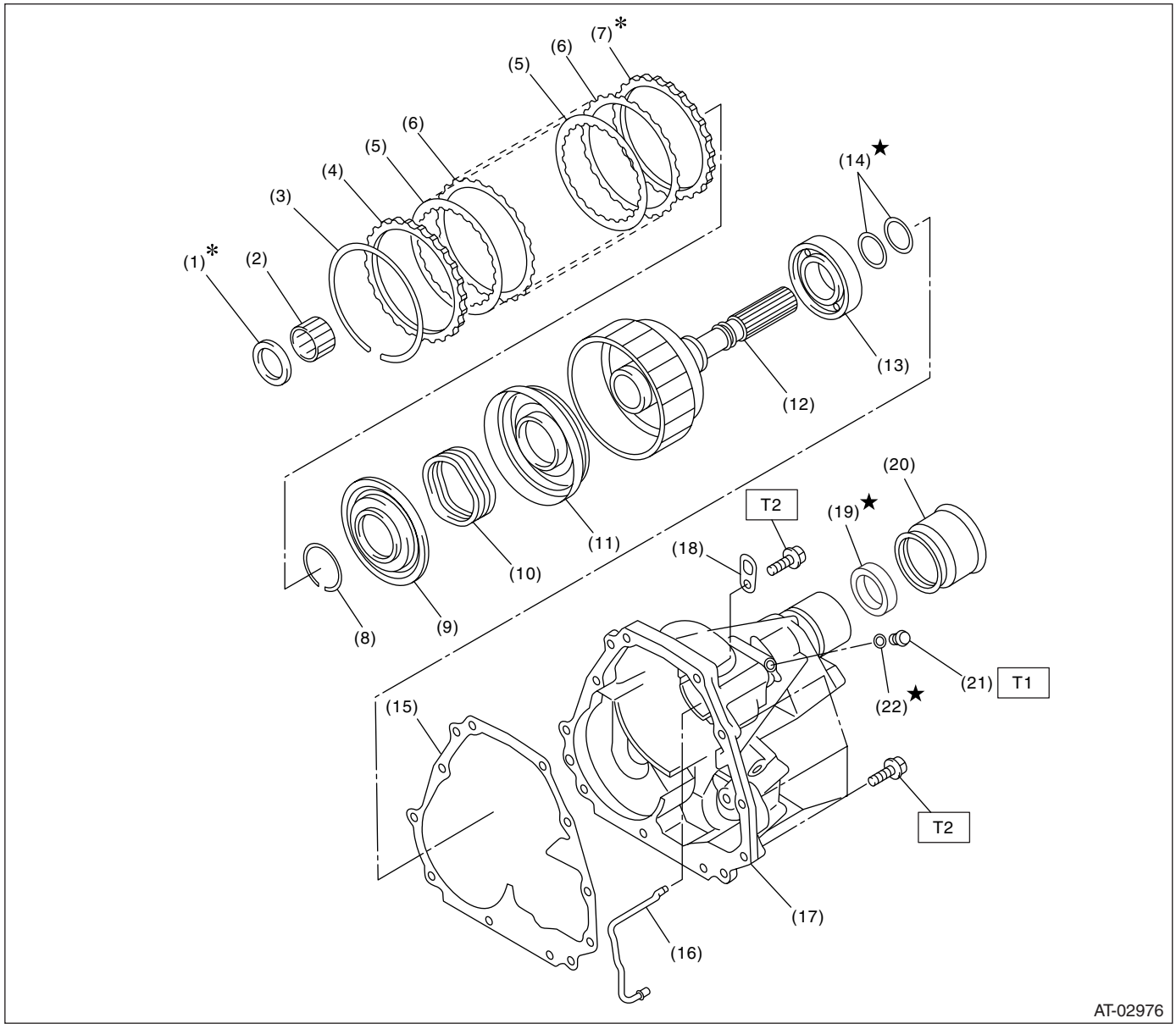


AT-00011

(1) Hypoid driven gear
(2) Pinion shaft
(3) Differential case (RH)
(4) Straight pin
(5) Differential case (LH)
(6) Taper roller bearing
(7) Oil seal
(8) O-ring
(9) Differential side retainer
(10) Lock plate
(11) Washer
(12) Differential bevel pinion
(13) Differential bevel gear

Tightening torque: N·m (kgf-m, ft-lb)
T1: 25 (2.5, 18.1)
T2: 62 (6.3, 45.6)

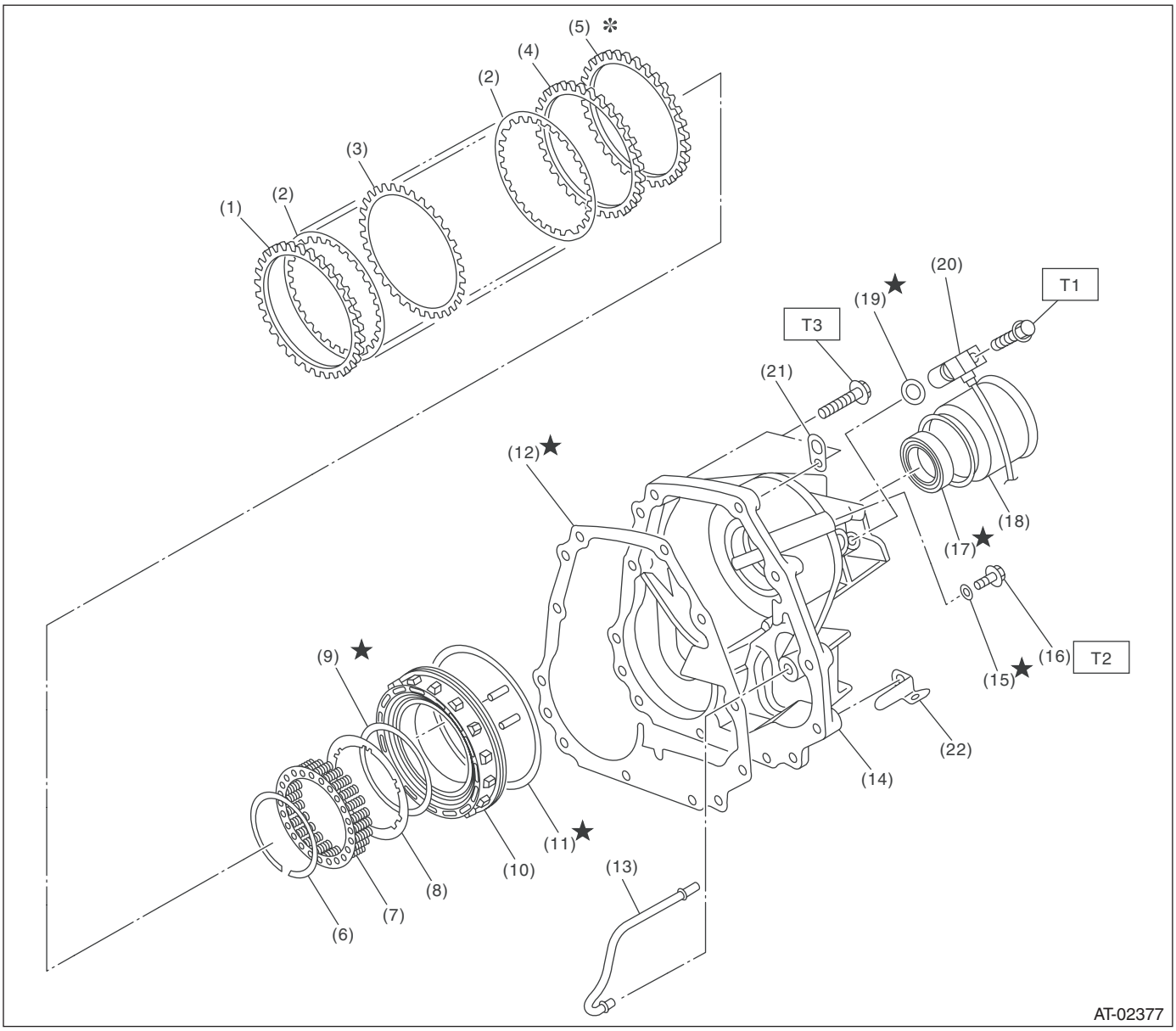
11.TRANSFER AND EXTENSION CASE WITH NON-TURBO



(1) Thrust needle bearing
(2) Needle bearing
(3) Snap ring
(4) Pressure plate
(5) Drive plate
(6) Driven plate
(7) Retaining plate
(8) Snap ring
(9) Transfer piston seal
(10) Return spring
(11) Transfer clutch piston
(12) Rear drive shaft
(13) Ball bearing
(14) Seal ring
(15) Gasket
(16) Transfer clutch pipe
(17) Extension case
(18) Transmission hanger
(19) Oil seal
(20) Dust cover
(21) Test plug
(22) O-ring

Tightening torque: N·m (kgf-m, ft-lb)
T1: 13 (1.3, 9.4)
T2: 25 (2.5, 18.1)

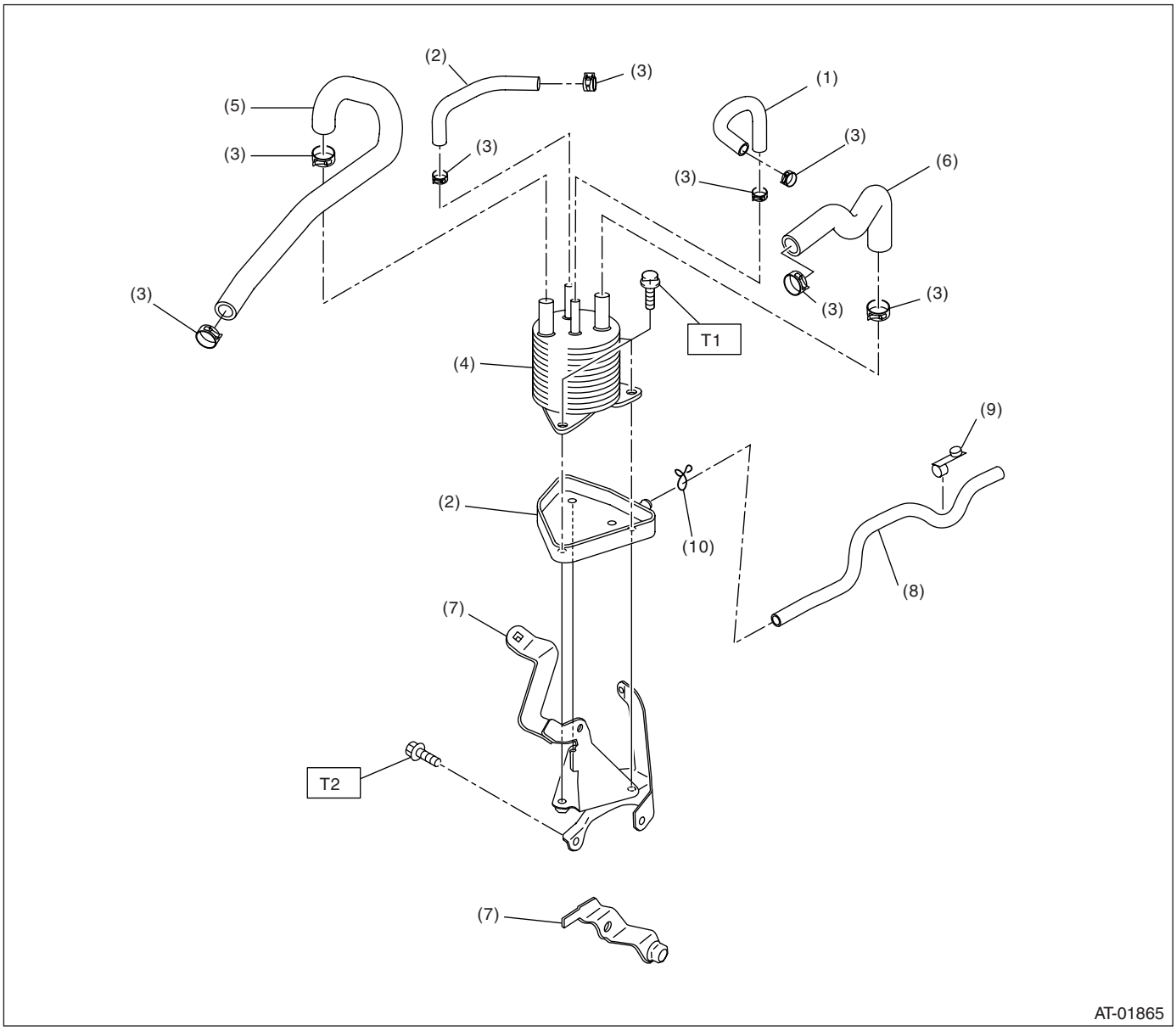
12.TRANSFER AND EXTENSION CASE WITH TURBO



(1) Driven plate (Thick)
(2) Drive plate
(3) Driven plate (Thin)
(4) Driven plate (Thick)
(5) Retaining plate
(6) Snap ring
(7) Spring retainer
(8) Plate
(9) O-ring
(10) Multi-plate clutch piston ASSY
(11) D-ring
(12) Gasket
(13) Multi-plate clutch pipe
(14) Extension case
(15) O-ring
(16) Test plug
(17) Oil seal
(18) Dust cover
(19) O-ring
(20) Rear vehicle speed sensor
(21) Transmission hanger
(22) Harness bracket

Tightening torque: N·m (kgf-m, ft-lb)
T1: 7 (0.7, 5.2)
T2: 13 (1.3, 9.4)
T3: 25 (2.5, 18.1)

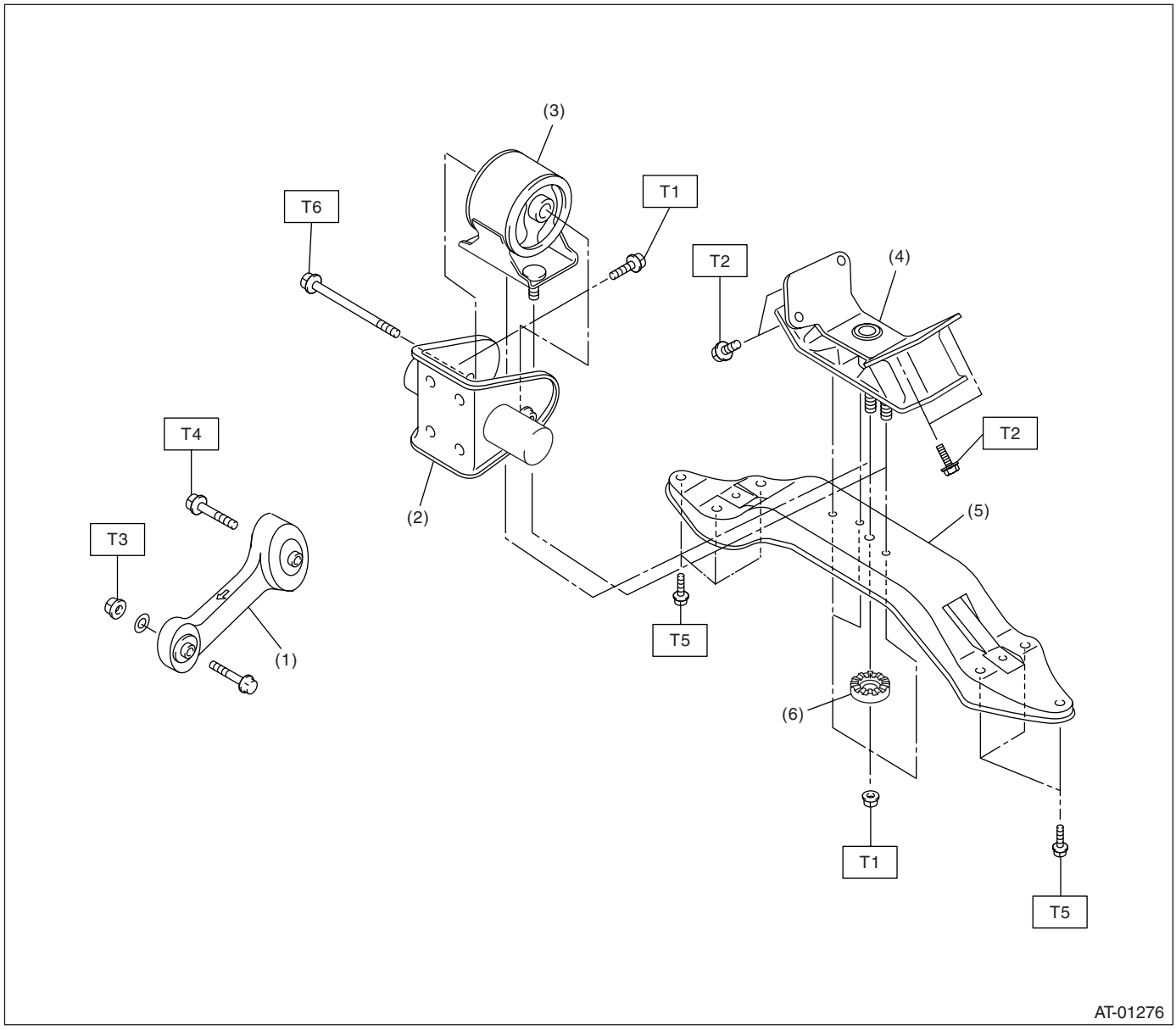
13.ATF COOLER (WITH WARMER FUNCTION)



(1) ATF cooler outlet hose
(2) ATF cooler inlet hose
(3) Hose clamp
(4) ATF cooler ASSY
(5) Engine coolant inlet hose
(6) Engine coolant outlet hose
(7) ATF cooler bracket
(8) Hose
(9) Clip

Tightening torque: N·m (kgf-m, ft-lb)
T1: 23 (2.3, 17.0)
T2: 33 (3.4, 24.3)

14.TRANSMISSION MOUNTING



(1)	Pitching stopper	(4)	Rear cushion rubber (AWD model)	***Tightening torque: N·m (kgf-m, ft-lb)***
(2)	Rear bracket (FWD model)	(5)	Crossmember	***T1: 35 (3.6, 26)***
(3)	Rear cushion rubber (FWD model)	(6)	Stopper	***T2: 39 (4.0, 29)***
				T3: 50 (5.1, 37)
				T4: 58 (5.9, 43)
				T5: 70 (7.1, 51)
				T6: 123 (12.5, 90)

C: CAUTION

• Wear working clothing, including a cap, protective goggles and protective shoes during operation.
• Remove contamination including dirt and corrosion before removal, installation, and disassembly.
• Keep the disassembled parts in order and protect them from dust or dirt.
• Do not place the oil pan with its inner side facing upward until it is installed so as to prevent foreign matter intrusion into valve body.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
• When disassembling the case and other light alloy parts, use a plastic hammer to open. Do not pry it apart with a screwdriver or other tool.
• Be careful not to burn, because each part on the vehicle is hot after running.
• Do not mix gear oil, grease etc. with that of another grade or from other manufacturers.
• Be sure to tighten fasteners including bolts and nuts to the specified torque.
• Place shop jacks or rigid racks at the specified points.
• Apply ATF or gear oil onto sliding or revolution surfaces before installation.
• Replace deformed or otherwise damaged snap rings with new ones.
• Before installing O-rings or oil seals, apply sufficient amount of ATF to avoid damage and deformation.
• Be careful not to incorrectly install or fail to install O-rings, snap rings and other such parts.
• Before securing a part on a vise, place cushioning material such as wood blocks, aluminum plate, or shop cloth between the part and the vis e.
• Avoid damaging the mating surface of the case.
• Before applying sealant, completely remove the old seal.
• When disassembling AT, be sure to use nylon or paper towel, do not use cloth glove and cloth.

D: PREPARATION TOOL

1. SPECIAL TOOLS

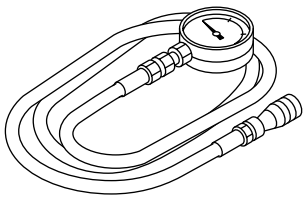
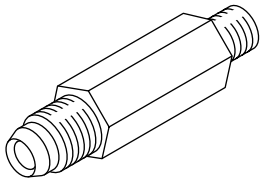
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498575400	498575400	OIL PRESSURE GAUGE ASSY	Used for measuring oil pressure.
 ST-498897200	498897200	ADAPTER	Used oil pump housing when measuring reverse clutch pressure and line pressure.

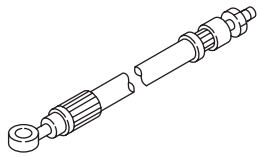
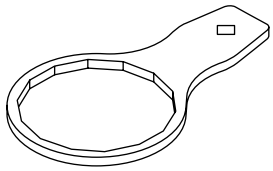
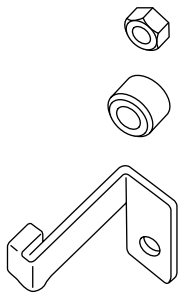
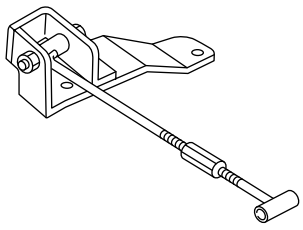
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498897700	498897700	ADAPTER SET	Used for measuring transfer clutch pressure.
 ST-498545400	498545400	FILTER WRENCH	Used for removing and installing ATF filter.
 ST-498277200	498277200	STOPPER SET	Used for removing and installing automatic transmission assembly to engine.
 ST41099AC000	41099AC000	ENGINE SUPPORT ASSY	Used for supporting engine.

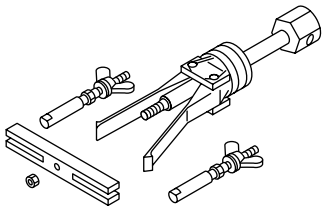
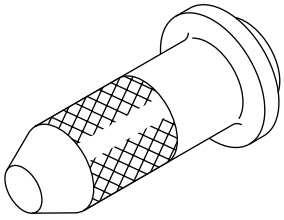
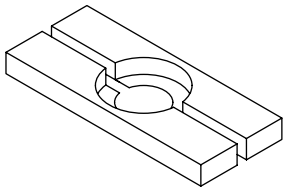
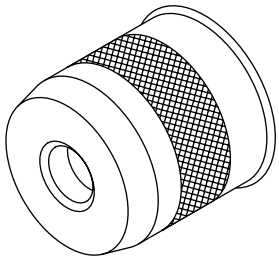
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-398527700	398527700	PULLER ASSY	• Used for removing extension case roller bearing. • Used for removing extension oil seal. • Used for removing front differential side retainer bearing outer race. • Used for removing front differential side retainer bearing outer ball race.
 ST-498057300	498057300	INSTALLER	Used for installing extension oil seal.
 ST-498077000	498077000	REMOVER	Used for removing differential taper roller bearing.
 ST-499247400	499247400	INSTALLER	• Used for installing transfer outer snap ring. • Used with GUIDE (499257300).

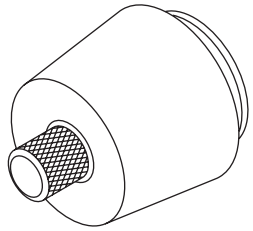
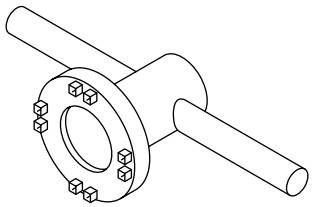
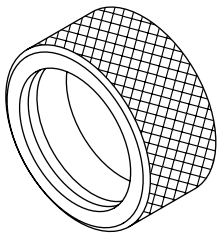
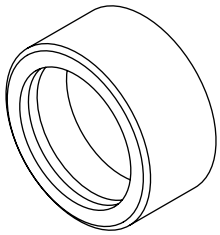
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499257300	499257300	SNAP RING OUTER GUIDE	• Used for installing transfer outer snap ring. • Used with INSTALLER (499247400).
 ST-499787000	499787000	WRENCH ASSY	Used for removing and installing differential side retainer.
 ST-398437700	398437700	DRIFT	Used for installing converter case oil seal.
 ST-398487700	398487700	INSTALLER	Used for installing taper roller bearing of front differential.

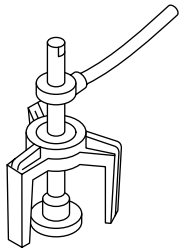
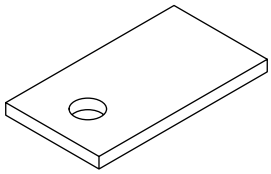
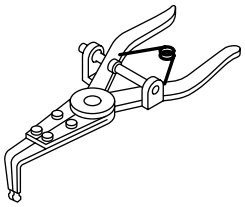
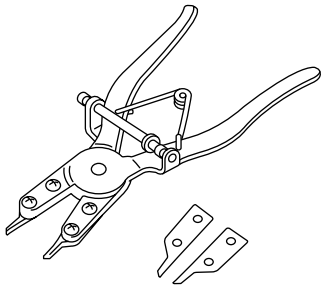
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-398673600	398673600	COMPRESSOR	Used for removing and installing clutch spring.
 ST-498255400	498255400	PLATE	Used for measuring backlash of hypoid gear.
 ST-399893600	399893600	PLIERS	Used for removing and installing clutch spring.
 ST-398663600	398663600	PLIERS	Used for removing and installing snap ring.

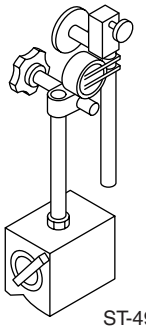
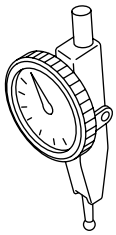
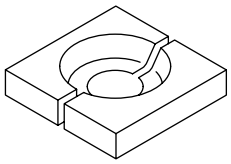
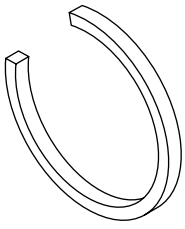
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498247001	498247001	MAGNET BASE	• Used for measuring gear backlash. • Used with DIAL GAUGE (498247100).
 ST-498247100	498247100	DIAL GAUGE	• Used for measuring gear backlash. • Used with MAGNET BASE (498247001).
 ST-498517000	498517000	REPLACER	Used for removing front roller bearing.
 ST-398623600	398623600	SEAT	Used for removing spring of transfer clutch piston.

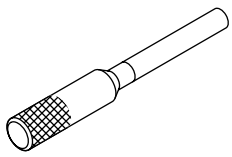
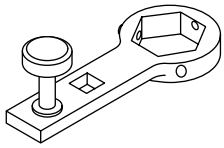
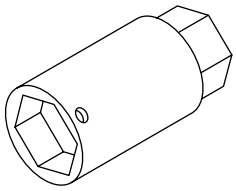
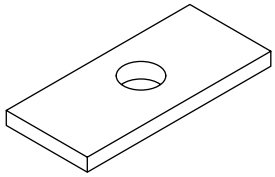
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499267300	499267300	STOPPER PIN	Used for installing inhibitor switch.
 ST-499787700	499787700	WRENCH	Used for removing and installing drive pinion lock nut.
 ST-499787500	499787500	ADAPTER	Used for removing and installing drive pinion lock nut.
 ST-398643600	398643600	GAUGE	Used for measuring total end play, extension end play and drive pinion height.

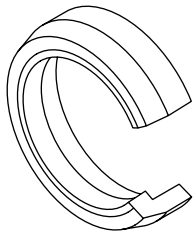
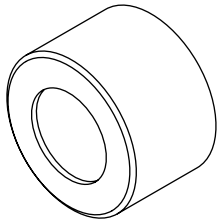
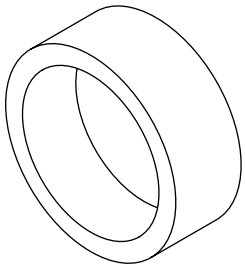
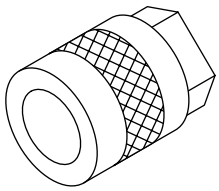
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498627100	498627100	SEAT	Used for holding low clutch piston retainer spring when installing snap ring.
 ST-499577000	499577000	GAUGE	• Used for measuring the transmission case mating surface to the reduction gear end surface. • For MPT model.
 ST-398744300	398744300	PISTON GUIDE	• Use for measuring contact face between multiplate clutch end and transmission. • For VTD model.
 ST-499737000	499737000	PULLER	Used for removing reduction driven gear assembly.

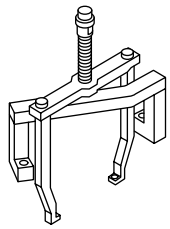
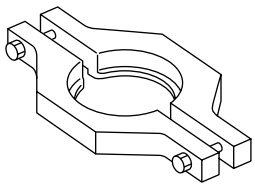
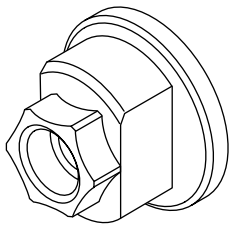
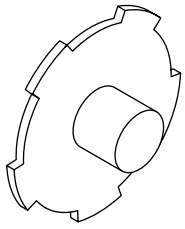
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499737100	499737100	PULLER SET	Used for removing reduction drive gear assembly.
 ST-498077600	498077600	REMOVER	Used for removing ball bearing.
 ST-498937110	498937110	HOLDER	Used for removing and installing drive pinion lock nut.
 ST-498677100	498677100	COMPRESSOR	Used for installing 2-4 brake snap ring.

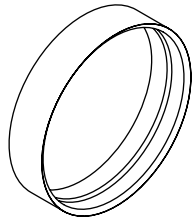
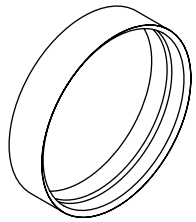
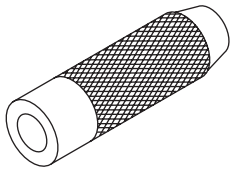
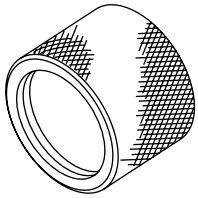
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498437000	498437000	HIGH CLUTCH PISTON GUIDE	Used for installing high clutch piston.
 ST-498437100	498437100	LOW CLUTCH PISTON GUIDE	Used for installing low clutch piston.
 ST-899580100	899580100	INSTALLER	Used for press-fitting the ball bearing for transfer clutch.
 ST18675AA000	18675AA000	DIFFERENTIAL OIL SEAL INSTALLER	Used for installing differential side retainer oil seal.

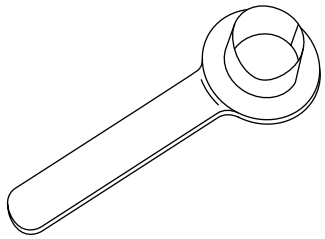
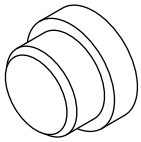
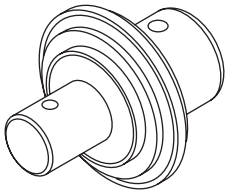
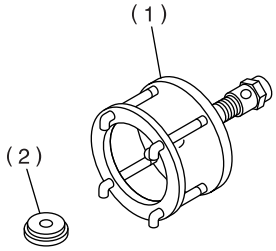
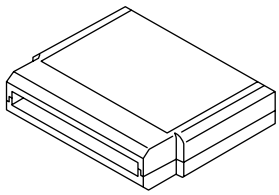
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST28399SA010	28399SA010	OIL SEAL PROTECTOR	Used for installing front drive shaft.
 ST-398497701	398497701	SEAT	Used for installing needle bearing.
 ST-499247300	499247300	INSTALLER	Used for installing drive pinion shaft oil seal.
 ST-899524100	899524100	PULLER SET	• Using the bolt only. • Used with PULLER SET (499737100). • Used with PULLER (499737000). (1) Puller (2) Cap

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18482AA000	18482AA000	CARTRIDGE	Troubleshooting for electrical systems.
ST22771AA030	22771AA030	SUBARU SELECT MONITOR KIT	Troubleshooting for electrical system. • English: 22771AA030 (Without printer) • German: 22771AA070 (Without printer) • French: 22771AA080 (Without printer) • Spanish: 22771AA090 (Without printer)

2. GENERAL PURPOSE TOOLS

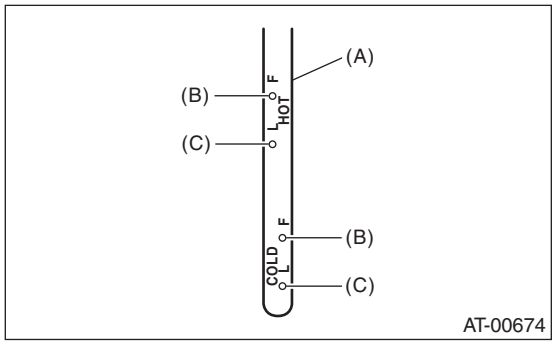
TOOL NAME	REMARKS
Depth gauge	Used for measuring transmission end play.
Thickness gauge	Used for measuring clearances of clutch, brake and oil pump.
Micro meter	Used for measuring thickness of drive pinion.
Spring balance	Used for measuring starting torque of drive pinion.
Circuit tester	Used for measuring resistance and voltage.
TORX® T70	Used for removing and installing differential gear oil drain plug.
Push/pull gauge	Used for measuring low & reverse and high clutch piston stroke.

2. Automatic Transmission Fluid

A: INSPECTION

NOTE:
The level of ATF varies with fluid temperature. Pay attention to the fluid temperature when checking ATF level.

1) Raise the ATF temperature by driving a distance of 5 to 10 km (3 to 6 miles). Otherwise, idle the engine to raise ATF temperature to 70 — 80°C (158 — 176°F) on SUBARU Select Monitor. <Ref. to 4AT(diag)-20, READ CURRENT DATA, OPERATION, Subaru Select Monitor.>
2) Make sure the vehicle is level.
3) After selecting all positions (P, R, N, D, 3, 2, 1), set the select lever in "P" range. Measure the ATF level with the engine idling for one or two minutes.



(A) ATF level gauge
(B) Upper level
(C) Lower level

4) Make sure that ATF level is between the upper level and lower level at HOT side.
If the level is below the lower level, check the ATF for leaks. If there are leaks, it is necessary to repair or replace gasket, oil seals, plugs or other parts.
5) If the ATF level is below the center between upper and lower marks, fill the recommended ATF until the ATF level is found above the center between upper and lower marks.

CAUTION:
• Use care not to exceed the upper level.
• Filling of ATF to the upper level when the transmission is cold will result in overfilling of ATF, causing a transmission failure.

6) Check ATF level after raising ATF temperature to 70 — 80°C (158 — 176°F) by during the distance of 5 to 10 km (3 to 6 miles) or by idling the engine again.

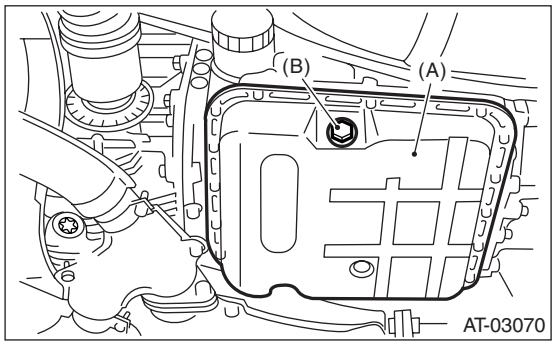
B: REPLACEMENT

1) Lift-up the vehicle.
2) Drain the ATF completely.

CAUTION:
After running the engine or after idling for a long time, the ATF is hot. Be careful not to burn yourself.

3) Check the ATF condition. <Ref. to 4AT-33, CONDITION CHECK, Automatic Transmission Fluid.>
4) Replace with a new gasket, and then tighten the ATF drain plug.

Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)



(A) Oil pan
(B) ATF drain plug

5) Lower the vehicle.
6) Pour ATF into the oil charge pipe.

Recommended fluid:
SUBARU ATF (Part No. K0410Y0700), Idemitsu "Apolloil ATF HP", Castrol "Transmax J".

NOTE:
If the ATF above is not available, use DEXRON III.

Capacity:
Fill the same amount of ATF drained from drain plug hole.

Capacity when transmission is overhauled:
1.6 L FWD model:
8.0 — 8.3 ℓ (8.5 — 8.8 US qt, 7.0 — 7.3 Imp qt)
1.6 L AWD and 2.0 L Non-turbo model:
8.4 — 8.7 ℓ (8.9 — 9.2 US qt, 7.4 — 7.7 Imp qt)
2.5 L and 2.0 L Turbo model:
9.3 — 9.6 ℓ (9.8 — 10.1 US qt, 8.2 — 8.4 Imp qt)

7) Check the level and leaks of ATF.
<Ref. to 4AT-32, INSPECTION, Automatic Transmission Fluid.>

C: CONDITION CHECK

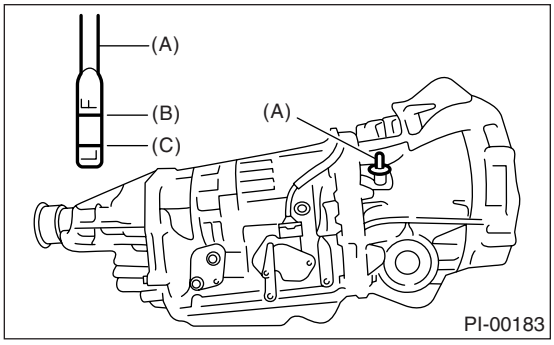
NOTE:
When replacing ATF, check the inside condition of the transmission body by inspecting the drained ATF.

Fluid condition	Trouble and possible cause	Corrective action
Large amount of metallic pieces are found.	Excessive wear of the internal of the transmission body.	Replace ATF and check if AT operates correctly.
Thick and varnish-form fluid.	Burned clutch and etc.	Replace ATF and check AT itself and vehicle for faulty.
Clouded fluid or bubbles are found in fluid.	Water mixed in fluid.	Replace ATF and check the water entering point.

3. Differential Gear Oil

A: INSPECTION

1) Park the vehicle on a level surface.
2) Remove the oil level gauge and wipe it clean.
3) Reinsert the level gauge all the way. Be sure that the level gauge is correctly inserted and in the proper orientation.
4) Remove it again and note the reading. If the differential gear oil level is below the “L” line, fill oil to bring the level up to the “F” line.
5) To prevent overfilling the differential gear oil, do not add oil above the “F” line.



(A) Oil level gauge
(B) Upper level
(C) Lower level

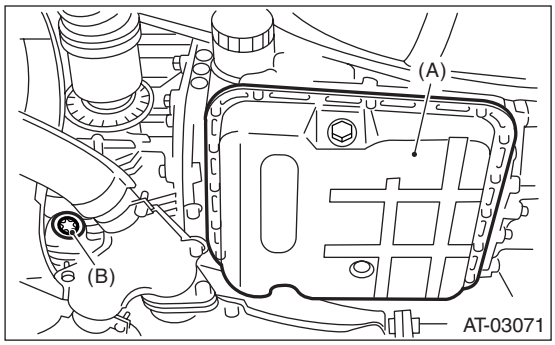
B: REPLACEMENT

1) Lift-up the vehicle.
2) Remove the differential gear oil drain plug using TORX® T70, and then drain the differential gear oil completely.

CAUTION:
• After running the engine or after idling for a long time, the differential gear oil is hot. Be careful not to burn yourself.
• Be careful not to spill the differential gear oil on exhaust pipe to prevent it from emitting smoke or fire. When the differential gear oil is spilled on exhaust pipe, wipe it away completely.

3) Replace the gasket with a new one, and then tighten the differential gear oil drain plug using TORX® T70.

Tightening torque:
70 N·m (7.1 kgf-m, 51.6 ft-lb) (Copper gasket)
44 N·m (4.5 kgf-m, 32.5 ft-lb) (Aluminum gasket)



(A) Oil pan
(B) Differential oil drain plug

4) Lower the vehicle.
5) Pour gear oil into the gauge hole.

Recommended fluid:
<Ref. to RM-3, LUBRICANTS, RECOMMENDED MATERIALS, Recommended Materials.>

Gear oil capacity:
1.1 — 1.3 ℓ (1.2 — 1.4 US qt, 1.0 — 1.1 Imp qt)

6) Check the level of differential gear oil.
<Ref. to 4AT-34, INSPECTION, Differential Gear Oil.>

4. Road Test

A: INSPECTION

1. GENERAL PRECAUTION

Road tests should be conducted to properly diagnose the condition of the automatic transmission.

NOTE:
When performing the test, do not exceed posted speed limit.

2. D RANGE SHIFT FUNCTION

Check shifting between 1st ←→ 2nd ←→ 3rd ←→ 4th while driving on normal city streets.

3. D RANGE SHIFT SHOCK

Check the shock level when shifting up during normal driving.

4. KICK-DOWN FUNCTION

Check kick-down for each gear. Also check the kick-down shock level.

5. ENGINE BRAKE OPERATION

• Check the 3rd gear engine brake when shifting between D ←→ 3rd range while driving in 4th gear of D range [50 to 60 km/h (31 to 37 MPH)].
• Check the 2nd gear engine brake when shifting between 3 ←→ 2 range while driving in the 3 range 3rd gear [40 to 50 km/h (25 to 31 MPH)].
• Check the 1st gear engine brake when shifting between 2 ←→1 range while driving in the 2 range 2nd gear [20 to 30 km/h (12 to 19 MPH)].

6. LOCK-UP FUNCTION

• Check that engine speed does not change sharply when the acclelerator pedal is lightly depressed when driving on flat roads at normal speed in D range.
• Check slip lock-up with following procedure. Subaru Select Monitor is needed for checking. (2.0 L, EC, EK, E2 model)
Before start checking, check that no DTC is displayed using Subaru Select Monitor. When DTC is displayed, perform the collective action with DTC and check that any more DTC is displayed, and then start the checking.
1) Perform the check on flat and straight road or free roller.

NOTE:
• Slip lock-up does not operate when the vehicle is lifted up, because of not occurring surface resistance.
• Also when checking on the free roller, check with depressing the foot brake lightly to make the checking easier, because the surface resistance will be deficient.

2) Connect the Subaru Select Monitor.
3) Check the ATF temperature using Subaru Select Monitor.

NOTE:
• ATF temperature is between 50 — 100°C (122 — 212°F).
• When the temperature is low, warm-up the ATF by running the vehicle or etc.

4) Start the engine, so that the lock-up duty can be read on data display of Subaru Select Monitor.
5) Drive the vehicle at a constant speed of 35 — 40 km/h (22 — 25 MPH).
6) Read the lock-up duty while vehicle is running.

Standard value:
25 — 45%

NOTE:
The value may be lower on the free roller.

• Slip lock-up control is not operating when the lock-up duty is less than 5%, or when the lock-up duty goes down immediately after starts rising. On these cases, improper ATF or deterioration of ATF may be the cause. Check the amount of ATF or replace them, and then recheck it.

7. P RANGE OPERATION

Stop the vehicle on an uphill grade of 5% or more and shift to “P” range. Check that the vehicle does not move when the parking brake is released.

8. UNUSUAL SOUNDS AND VIBRATION

Check for unusual sounds and vibration while driving and during shifting.

9. CLIMBING CONTROL FUNCTION

• Check that the gear remains in 3rd when going up a grade.
• Check that the gear remains in 3rd when applying the brakes while going down a grade.

10.TRANSFER CLUTCH

Check if the tight corner braking occurs when the vehicle is started with steering wheel held at fully turned position. (MPT model)

11.OIL LEAKS

After the driving test, inspect for oil leaks.

5. Stall Test

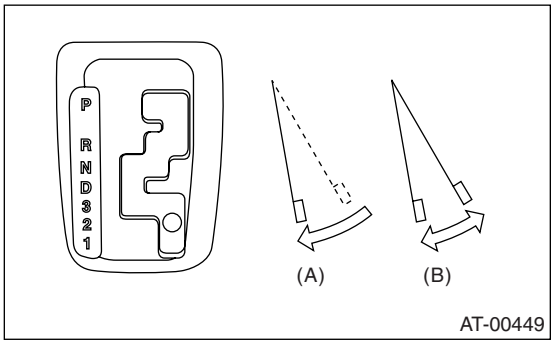
A: INSPECTION

NOTE:
The stall test is of extreme importance in diagnosing the condition of the automatic transmission and the engine. It should be conducted to measure the engine stall speeds in “R” and “2” ranges.

Purposes of the stall test:

- To check the operation of the automatic transmission clutch.
- To check the operation of the torque converter clutch.
- To check engine performance.

1) Check that throttle valve opens fully.
2) Check that engine oil level is correct.
3) Check that coolant level is correct.
4) Check that ATF level is correct.
5) Check that differential gear oil level is correct.
6) Increase ATF temperature to 70 to 80°C (158 to 176°F) by idling the engine for approx. 30 minutes (with select lever set to “N” or “P”).
7) Place the wheel chocks at the front and rear of all wheels and engage the parking brake.
8) Move the manual linkage to ensure it operates properly, and shift the select lever to the “2” range. Turn hold switch ON.
9) While forcibly depressing the foot brake pedal and hold it, gradually depress the accelerator pedal until the engine operates at full throttle.



(A) Brake pedal
(B) Accelerator pedal

10) When the engine speed is stabilized, record that speed quickly and release the accelerator pedal.
11) Shift the select lever to “N” range, and cool down the engine by idling it for more than one minute.
12) If the stall speed in “2” range is higher than specifications, low clutch slipping and 2-4 brake slipping may occur. To identify it, conduct the same test as above in “R” range.

13) Perform the stall tests with the select lever in “D” range. Turn hold switch OFF.

NOTE:
• Do not continue the stall test for MORE THAN 5 SECONDS at a time (from closed throttle, fully open throttle to stall speed reading). Failure to follow this instruction causes the engine oil and ATF to deteriorate and the clutch and brake to be adversely affected.
• Be sure to cool down the engine for at least 1 minute after each stall test with the select lever set in the “P” or “N” range and with the idle speed lower than 1,200 rpm.
• If the stall speed is higher than the specified range, attempt to finish the stall test in as short a time as possible, in order to prevent the automatic transmission from sustaining damage.

Stall speed (at sea level):
1.6 L model: 2,400 — 3,000 rpm
2.0 L Non-turbo model: 2,200 — 2,700 rpm
2.0 L Turbo model: 2,900 — 3,500 rpm
2.5 L model: 2,100 — 2,600 rpm

Stall speed (at sea level)	Position	Cause
Less than specifications	2 (HOLD switch ON), R	• Throttle valve not fully open • Erroneous engine operation • Torque converter clutch’s one-way clutch slipping
Greater than specifications	D	• Line pressure too low • Low clutch slipping • One-way clutch malfunction
	R	• Line pressure too low • Reverse clutch slipping • Low & reverse brake slipping
	2 (HOLD switch ON)	• Line pressure too low • Low clutch slipping • 2-4 brake slipping

6. Time Lag Test

A: INSPECTION

NOTE:
If the select lever is shifted while the engine is idling, there will be a certain time elapse or lag before the shock can be felt. This is used for checking the condition of the low clutch, reverse clutch, low & reverse brake and one-way clutch.

- Perform the test at normal operating fluid temperature 70 to 80°C (158 to 176°F).
- Be sure to allow a 1 minute interval between tests.
- Make three measurements and take the average value.

1) Fully apply the parking brake.
2) Start the engine.
Check the idling speed (A/C OFF).
3) Shift the select lever from “N” to “D” range.
Using a stop watch, measure the time it takes from shifting the lever until the shock is felt.
Time lag: Less than 1.2 seconds
If “N” → “D” time lag is longer than specified:

- Line pressure too low
- Low clutch worn
- One-way clutch not operating properly
- D-ring worn

4) In the same manner, measure the time lag for “N” → “R”.
Time lag: Less than 1.5 seconds
If “N” → “R” time lag is longer than specified:

- Line pressure too low
- Reverse clutch worn
- Low & reverse brake worn
- D-ring worn

7. Line Pressure Test

A: MEASUREMENT

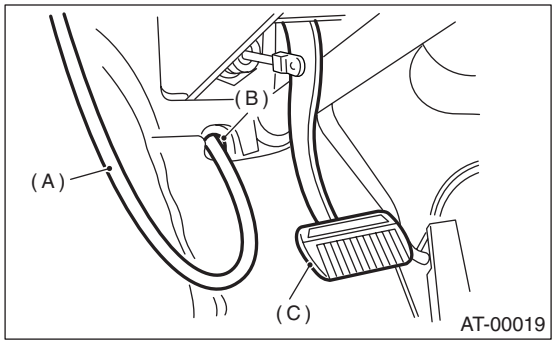
NOTE:
If the clutch or the brake shows a sign of slippage or shifting sensation is not correct, the line pressure should be checked.

• Excessive shocks during upshifting or shifting takes place at a higher point than under normal circumstances, may be due to the line pressure being too high.

• Slippage or inability to operate the vehicle may, in most cases, be due to loss of oil pressure for the operation of the clutch, brake or control valve.

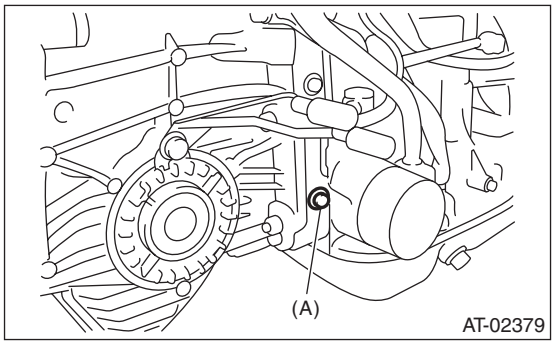
1) Line pressure measurement (under no load)
   (1) Before measuring the line pressure, jack-up all wheels.
   (2) Maintain the temperature of ATF at approx. 70 — 80°C (158 — 176°F) during measurement. (ATF will reach the above temperature after idling the engine for approx. 30 minutes with select lever in “N” or “P”.)
2) Line pressure measurement (under heavy load)
   (1) Before measuring the line pressure, apply both foot and parking brakes with all wheels chocked (Same as for “stall” test conditions).
   (2) Measure the line pressure when select lever is in “R”, “2” (HOLD switch ON) with engine under stall conditions.
   (3) Measure the line pressure within 5 seconds after shifting the select lever to each position. (If line pressure needs to be measured again, allow the engine to idle, and then stop it to cool down for at least one minute.)
   (4) Maintain the temperature of ATF at approx. 70 — 80°C (158 — 176°F) during measurement (ATF will reach the above temperature after idling the engine for approx. 30 minutes with the select lever in “N” or “P”.)
3) Temporarily attach the ST to a suitable place in the driver’s compartment, remove the blind plug located in front of the toe board and pass the hose of the ST to engine compartment.

ST 498575400 OIL PRESSURE GAUGE ASSY



(A) Pressure gauge hose
(B) Hole in toe board (blank cap hole)
(C) Brake pedal

4) Remove the test plug and install the ST instead.
ST 498897200 ADAPTER



(A) Test plug

5) Connect the ST1 with ST2.
ST1 498897200 ADAPTER
ST2 498575400 OIL PRESSURE GAUGE ASSY

6) Check for duty ratio changes by opening and closing the throttle valve using SUBARU Select Monitor.

Standard line pressure			
Range position	Line pressure duty ratio (%)	Throttle position	Line pressure kPa (kgf/cm^2, psi)
2 (HOLD switch ON)	5	Full open	1,130 — 1,275 (11.5 — 13.0, 164 — 185)
R	5	Full open	1,520 — 1,716 (15.5 — 17.5, 220 — 249)
D	95	Full closed	300 — 410 (3.1 — 4.2, 44 — 60)

8. Transfer Clutch Pressure Test

A: INSPECTION

• MPT MODEL

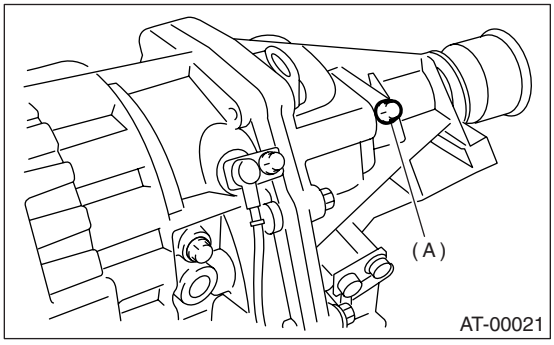
Check the transfer clutch pressure in accordance with the following chart in the same manner as with line pressure. <Ref. to 4AT-39, Line Pressure Test.>

ST 498897700 ADAPTER SET
ST 498575400 OIL PRESSURE GAUGE ASSY

AWD mode: “D” range
FWD mode: “P” range, engine speed 2,000 rpm

If oil pressure is not produced or if it does not change in the AWD mode, the transfer duty solenoid or transfer valve assembly may be malfunctioning. If oil pressure is produced in the FWD mode, the problem is similar to that in the AWD mode.

NOTE:
Before setting in FWD mode, install the spare fuse on FWD mode switch.



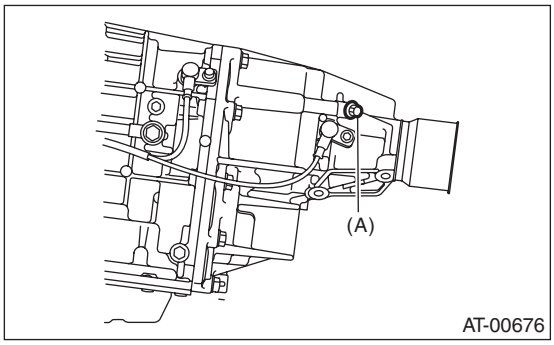
(A) Test plug

NOTE:
If the oil pressure is not produced or if it does not change in the AWD mode, the transfer duty solenoid or transfer valve assembly may be malfunctioning. If the oil pressure is produced in the FWD mode, the problem is similar to that in the AWD mode.

• VTD MODEL

Check transfer clutch pressure using the following chart. <Ref. to 4AT-39, Line Pressure Test.>

ST 498897700 ADAPTER SET
ST 498575400 OIL PRESSURE GAUGE ASSY



(A) Test plug

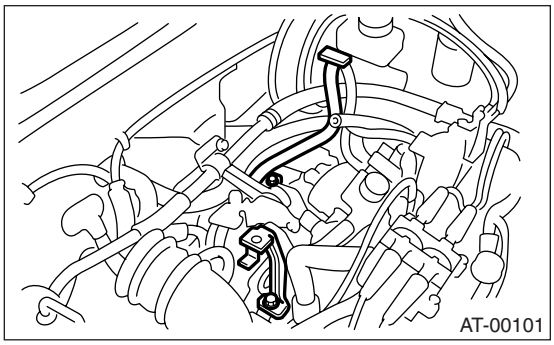
STANDARD TRANSFER CLUTCH PRESSURE:

Range position	ON Duty ratio (%)	Acceleration opening angle (%)	AWD mode Transfer clutch pressure (kPa (kgf/cm^2, psi))	FWD mode Transfer clutch pressure (kPa (kgf/cm^2, psi))
2	95	100 (Fully opens)	910 — 1,070 (9.3 — 10.9, 132 — 155)	—
2	60	Adjust ON Duty ratio to 60%. (Target 10%)	410 — 490 (4.2 — 5.0, 59 — 71)	—
N or P	5	0 (Fully closed)	0	—
2	5	0 (Fully closed)	—	0

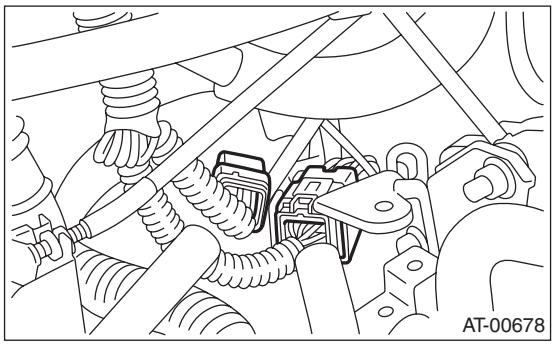
9. Automatic Transmission Assembly

A: REMOVAL

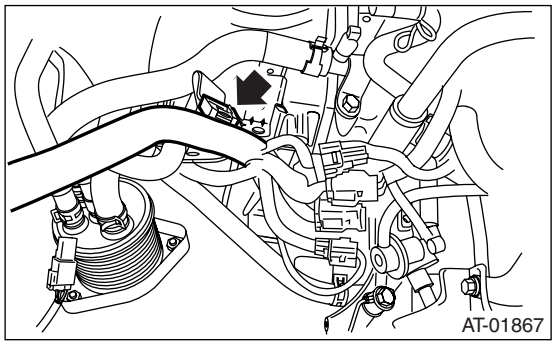
1) Set the vehicle on a lift.
2) Open the front hood fully, and support it with stay.
3) Disconnect the battery ground cable.
4) Remove the air intake duct. (Non-turbo model)
<Ref. to IN(H4SO)-6, REMOVAL, Air Intake Duct.>
5) Remove the air cleaner case or air intake chamber. (Non-turbo model)
<Ref. to IN(H4SO)-5, REMOVAL, Air Cleaner Case.>
6) Remove the intercooler. (Turbo model)
<Ref. to IN(H4DOTC)-12, REMOVAL, Intercooler.>
7) Remove the air cleaner case stay. (Non-turbo model)



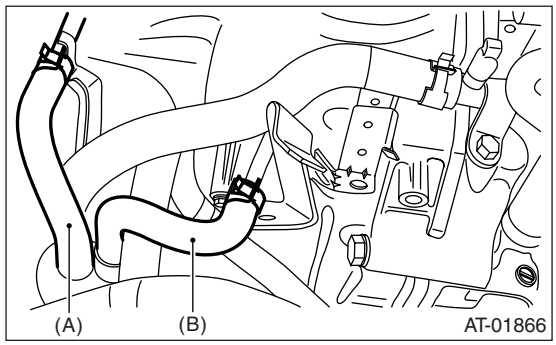
8) Disconnect the following connectors.
(1) Transmission harness connector



(2) Transmission ground terminal
9) Remove the starter.
<Ref. to SC(H4SO)-8, REMOVAL, Starter.>
10) Remove the harness from bracket. (with ATF cooler (with warmer function))

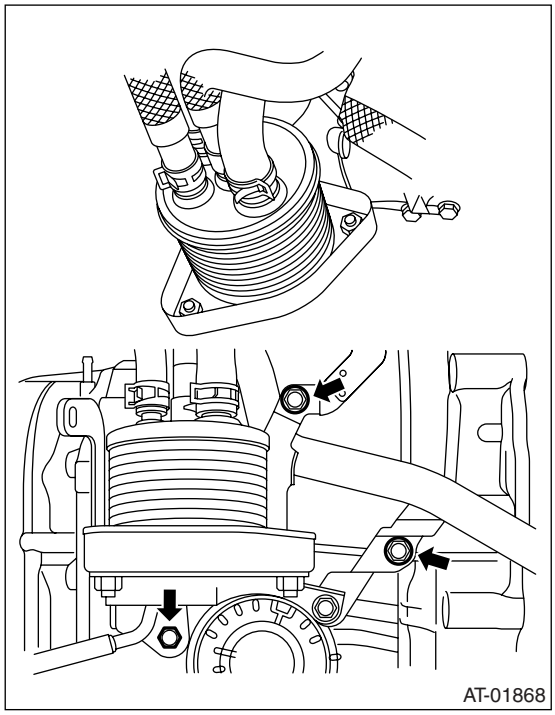


11) Disconnect the ATF cooler hoses from pipes of transmission side, and then remove the oil charger pipe. (with ATF cooler (with warmer function))

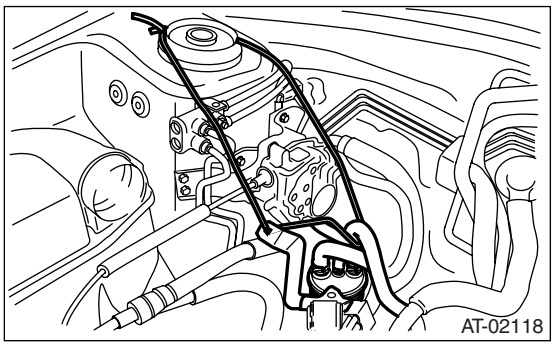


(A) Inlet hose
(B) Outlet hose

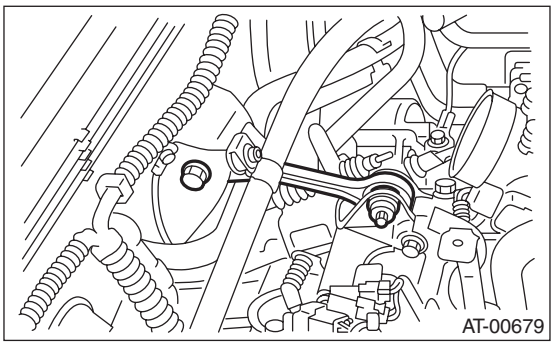
12) Remove the ATF cooler from the transmission body. (with ATF cooler (with warmer function))



13) Disconnect the hose from lower portion of ATF cooler (with warmer function), and then secure the ATF cooler to vehicle using string, etc.



14) Remove the pitching stopper.



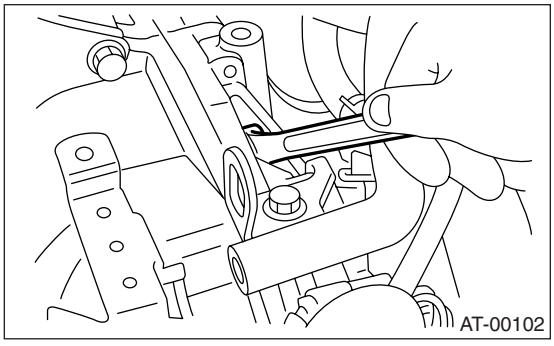
15) Separate the torque converter clutch from drive plate.

(1) Remove the service hole plug.

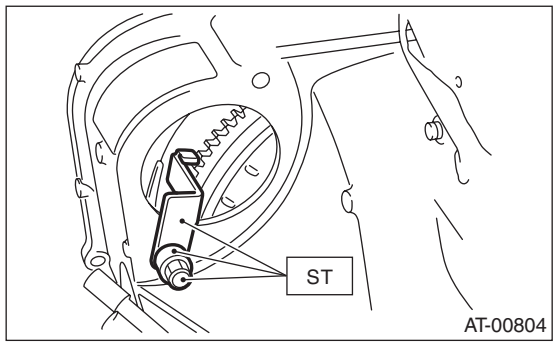
(2) Remove the bolts which hold torque converter clutch to drive plate.

(3) While rotating the engine, remove the other bolts using ST.

CAUTION:
Be careful not to drop the bolts into torque converter clutch housing.

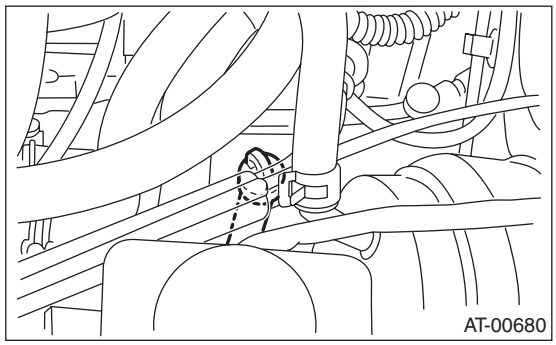


16) Install the ST to converter case.
ST 498277200 STOPPER SET

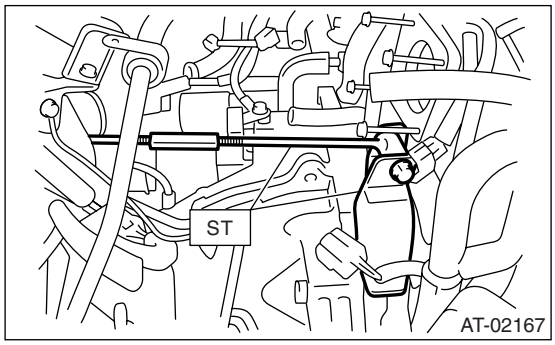


17) Remove the ATF level gauge.

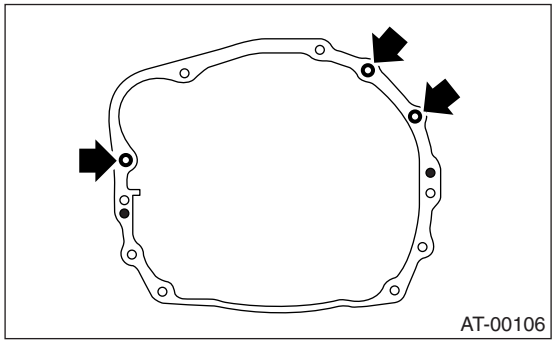
NOTE:
Plug the opening to prevent an entry of foreign particles into transmission fluid.



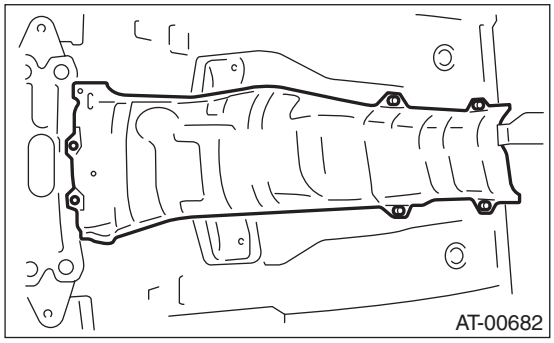
18) Remove the pitching stopper bracket.
19) Set the ST.
ST1 41099AC000 ENGINE SUPPORT ASSY



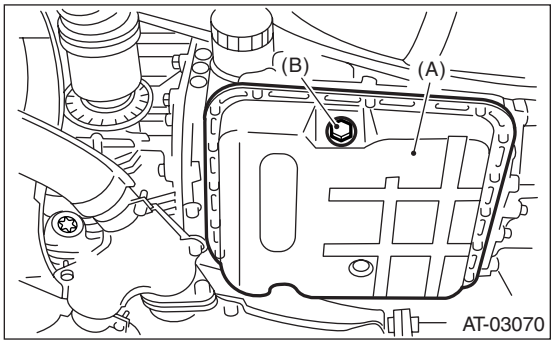
20) Remove the bolt which holds the right upper side of transmission to engine.



21) Lift-up the vehicle.
22) Remove the under cover.
23) Remove the front, center and rear exhaust pipe, and muffler. (Non-turbo model)
<Ref. to EX(H4SO)-6, REMOVAL, Front Exhaust Pipe.>, <Ref. to EX(H4SO)-10, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(H4SO)-12, REMOVAL, Muffler.>
24) Remove the center and rear exhaust pipes, and muffler. (Turbo model)
<Ref. to EX(H4DOTC)-10, REMOVAL, Center Exhaust Pipe.>, <Ref. to EX(H4DOTC)-15, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(H4DOTC)-16, REMOVAL, Muffler.>
25) Remove the heat shield cover. (If equipped)

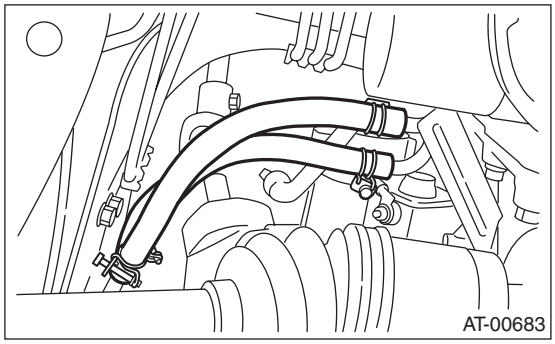


26) Drain ATF to remove the ATF drain plug.



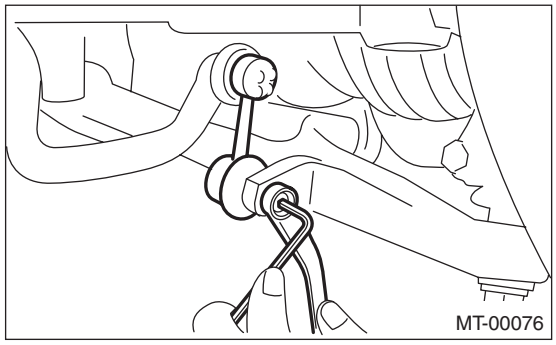
(A) Oil pan
(B) Drain plug

27) Disconnect the ATF cooler hoses from pipes of transmission side, and remove the oil charge pipe.

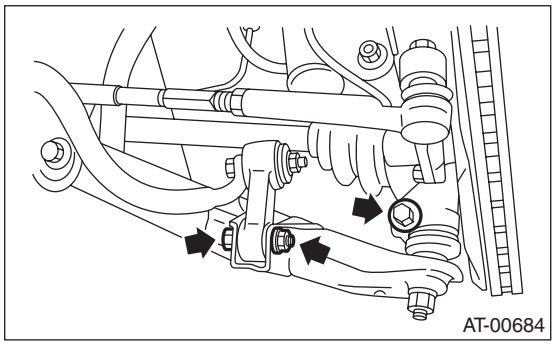


28) Remove the propeller shaft.
<Ref. to DS-17, REMOVAL, Propeller Shaft.>
29) Disconnect the select cable from inhibitor switch and transmission. <Ref. to CS-33, REMOVAL, Select Cable.>
30) Disconnect the stabilizer link from transverse link.
31) Remove the bolt securing ball joint of transverse link to housing.

- SEDAN MODEL



- WAGON MODEL



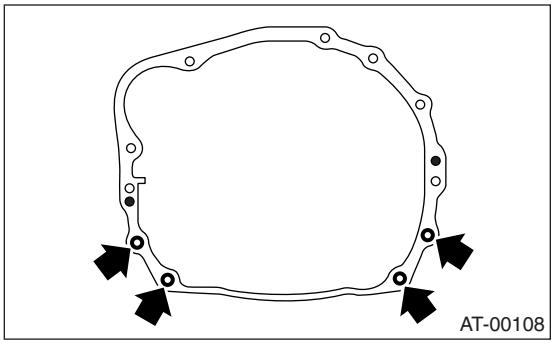
32) Pull out the front drive shaft from transmission.
(1) Using a tire lever or a pinch bar, etc., pull out the front drive shaft until its joint facing to transmission can move smoothly.

NOTE:
Place cloth between tire lever or pinch bar and transmission in order to avoid damaging the side retainer of transmission.

(2) Hold the transmission side joint portion of front drive shaft by hand and extract the housing from the transmission by pressing it outside so as not to stretch the boot.

33) Remove the bolts which hold the clutch housing cover.

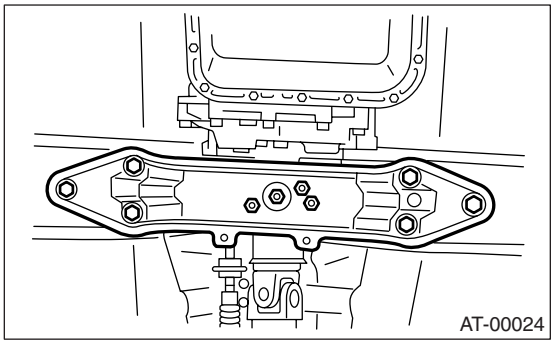
34) Remove the nuts which hold the lower side of transmission to engine.



35) Place the transmission jack under transmission.

NOTE:
Make sure that the support plates of transmission jack don't touch the oil pan.

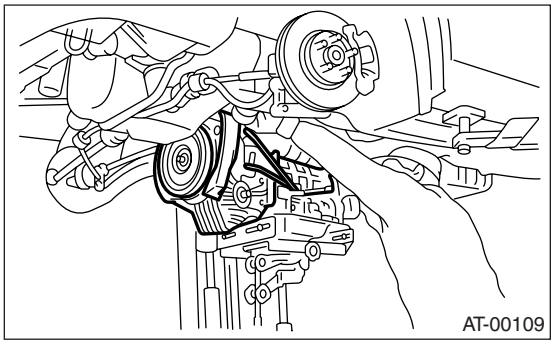
36) Remove the transmission rear crossmember from vehicle.



37) While gradually lowering the transmission jack, fully contract the engine support and tilt the engine rearward.

38) Remove the transmission.

CAUTION:
Remove the transmission and torque converter as a unit away from engine.



39) Separate the transmission assembly and rear cushion rubber.

B: INSTALLATION

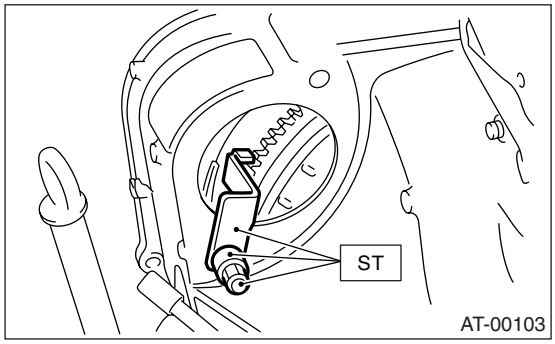
1) Replace the differential side oil seal with new one.

NOTE:
Replacement is not necessary when new oil seal has been installed.

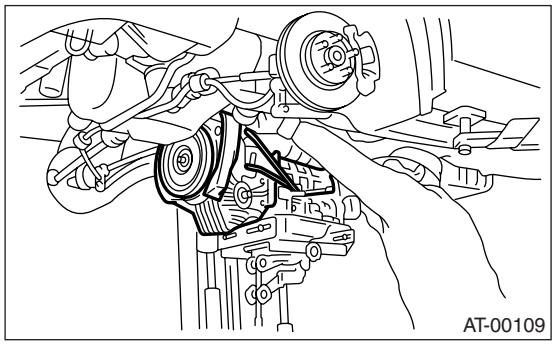
2) Install the rear cushion rubber to transmission assembly.

Tightening torque:
39 N·m (4.0 kgf-m, 29 ft-lb)

3) Install the ST to converter case.
ST 498277200 STOPPER SET



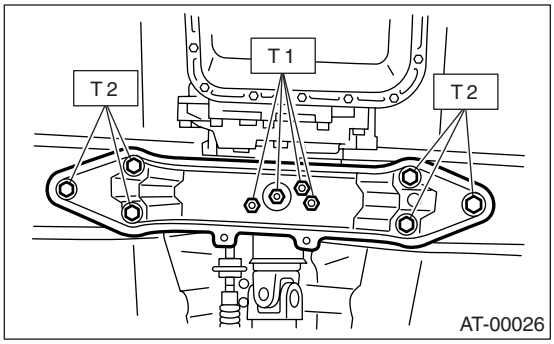
4) Install the transmission onto engine.
(1) Gradually raise the transmission with transmission jack.



(2) Match the transmission to engine.
(3) While gradually lifting the transmission jack, turn the screw of engine support, and then tilt the engine forward.

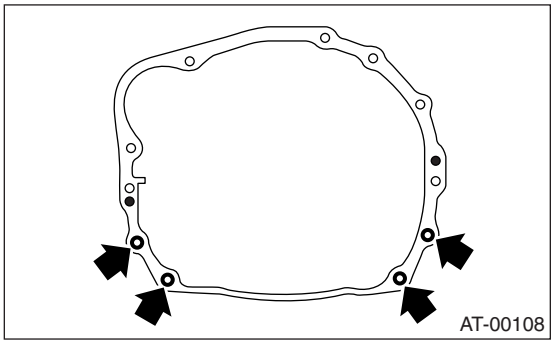
5) Install the transmission rear crossmember.

Tightening torque:
T1: 35 N·m (3.6 kgf-m, 26 ft-lb)
T2: 70 N·m (7.1 kgf-m, 51 ft-lb)



6) Take off the transmission jack.
7) Tighten the nuts and bolts which hold the lower side of transmission to engine.

Tightening torque:
50 N·m (5.1 kgf-m, 37 ft-lb)



8) Tighten the bolt of clutch housing cover.
9) Lower the vehicle.
10) Connect the engine and transmission.
(1) Remove the ST from converter case.

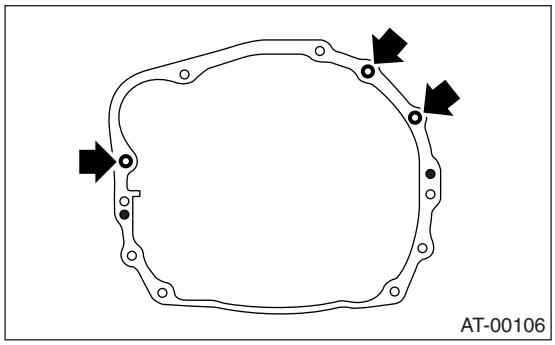
NOTE:
Be careful not to drop the ST into converter case when removing ST.

ST 498277200 STOPPER SET

(2) Install the starter.
<Ref. to SC(H4SO)-8, INSTALLATION, Starter.>

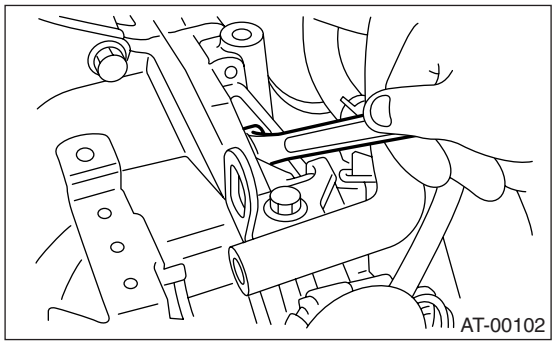
(3) Tighten the bolt which holds the upper side of transmission to engine.

Tightening torque:
50 N·m (5.1 kgf-m, 37 ft-lb)

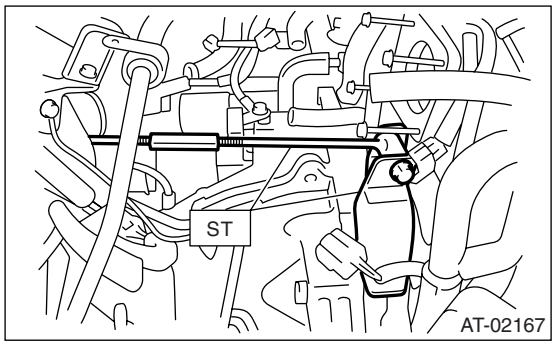


11) Install the torque converter clutch to drive plate.
(1) Tighten the bolts which hold the torque converter clutch to drive plate.
(2) Tighten the other bolts while rotating the engine by using ST.

Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)



(3) Clog the plug onto service hole.
(4) Install the V-belt cover.
12) Remove the ST.

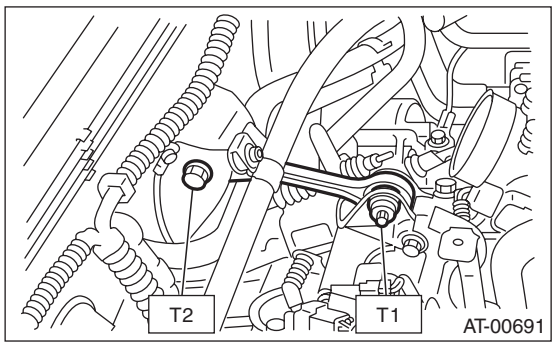


13) Install the pitching stopper bracket.

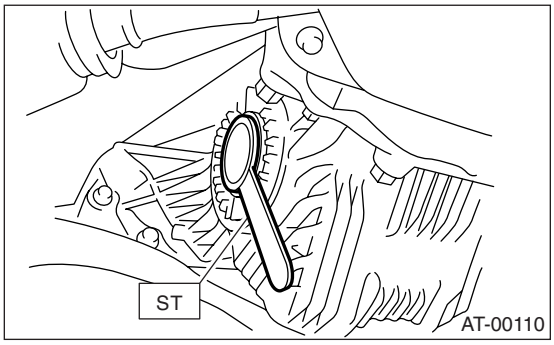
Tightening torque:
41 N·m (4.2 kgf-m, 30.2 ft-lb)

14) Install the pitching stopper.

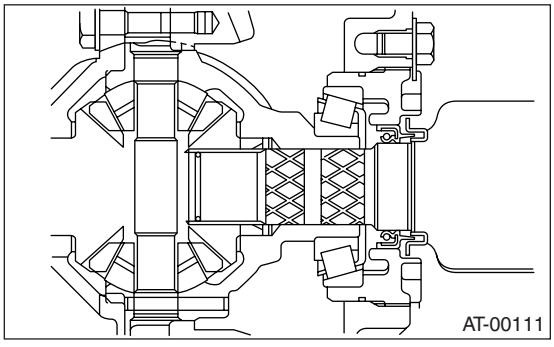
Tightening torque:
T1: 50 N·m (5.1 kgf-m, 37 ft-lb)
T2: 58 N·m (5.9 kgf-m, 43 ft-lb)



15) Lift-up the vehicle.
16) Replace the snap ring of front drive shaft with a new one.
17) Apply grease to the oil seal lips.
18) Install the ST to side retainer.
ST 28399SA010 OIL SEAL PROTECTOR



19) Align the spline of front differential shaft to that of differential bevel gear for insertion, and remove them using ST.
ST 28399SA010 OIL SEAL PROTECTOR
20) Insert the front drive shaft into transmission securely by pressing the front housing from outside.

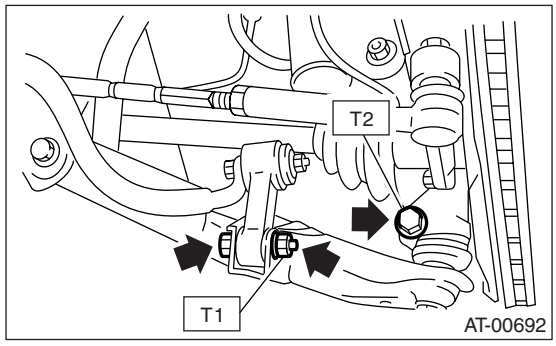


21) Install the ball joint into housing.

22) Connect the stabilizer link to transverse link, and tighten the bolts. (Wagon model)

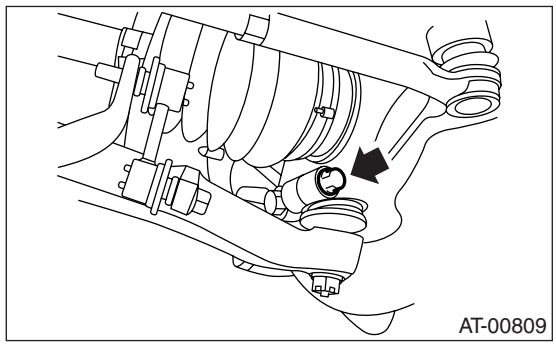
NOTE:
Use a new self-locking nut.

Tightening torque:
T1: 30 N·m (3.1 kgf-m, 22.4 ft-lb)
T2: 50 N·m (5.1 kgf-m, 37 ft-lb)



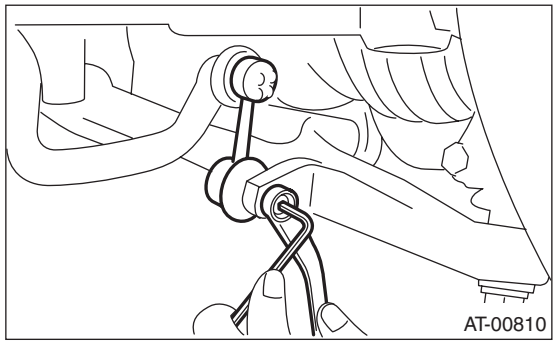
23) Tighten the installing bolts. (Sedan model)

Tightening torque:
50 N·m (5.1 kgf-m, 37 ft-lb)



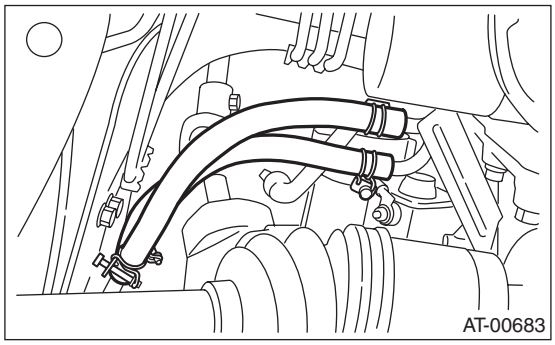
24) Install the stabilizer link to transverse link. (Sedan model)

Tightening torque:
45 N·m (4.6 kgf-m, 33.2 ft-lb)

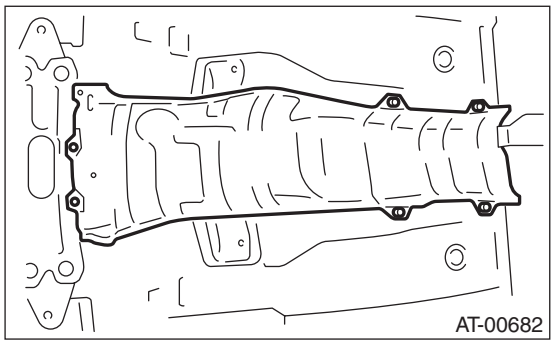


25) Install the select cable onto select lever.
<Ref. to CS-34, INSTALLATION, Select Cable.>

26) Install the oil charge pipe, and connect the ATF cooler hoses to pipe.



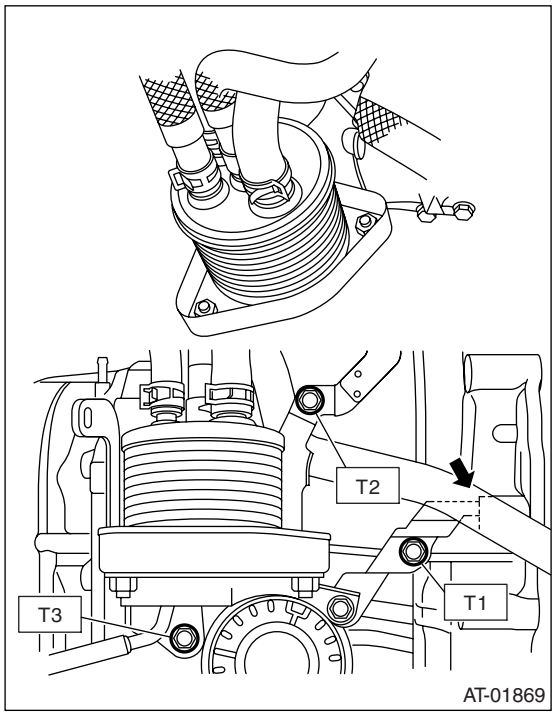
27) Install the propeller shaft.
<Ref. to DS-18, INSTALLATION, Propeller Shaft.>
28) Install the heat shield cover. (If equipped)



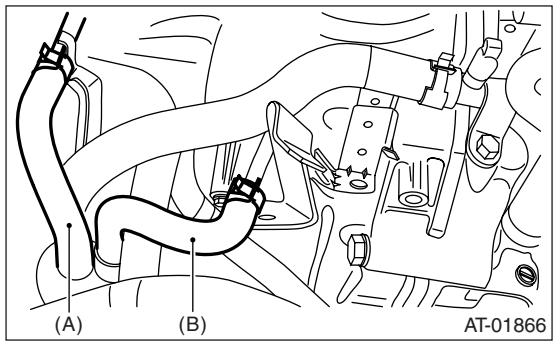
29) Install the ATF cooler assembly bracket to transmission body. (with ATF cooler (with warmer function))

NOTE:
Insert the end of ATF cooler bracket to the hole of converter case.

Tightening torque:
T1: 21 N·m (2.1 kgf-m, 15.5 ft-lb)
T2: 23 N·m (2.3 kgf-m, 17.0 ft-lb)
T3: 33 N·m (3.4 kgf-m, 24.3 ft-lb)

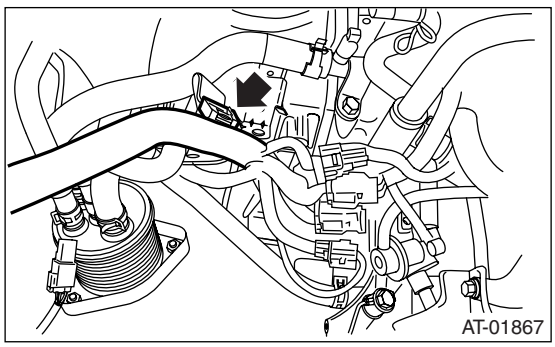


30) Connect the ATF cooler hoses to pipes on transmission side, and then install the oil charge pipe. (with ATF cooler (with warmer function))

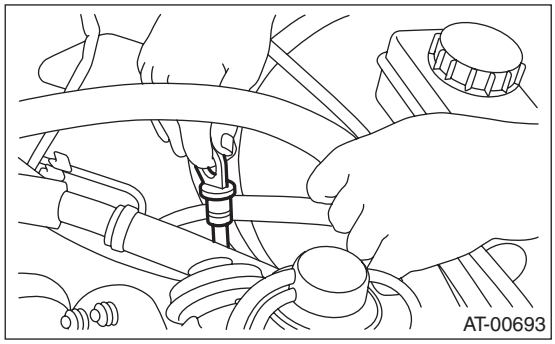


(A) Inlet hose
(B) Outlet hose

31) Install the harness to bracket.



32) Install the rear exhaust pipe and muffler assembly.
Non-turbo model
<Ref. to EX(H4SO)-10, INSTALLATION, Rear Exhaust Pipe.> and <Ref. to EX(H4SO)-12, INSTALLATION, Muffler.>
2.0 L Turbo model
<Ref. to EX(H4DOTC)-15, INSTALLATION, Rear Exhaust Pipe.> and <Ref. to EX(H4DOTC)-16, INSTALLATION, Muffler.>
33) Install the front and center exhaust pipe. (Non-turbo model)
<Ref. to EX(H4SO)-7, INSTALLATION, Front Exhaust Pipe.>
34) Install the center exhaust pipe. (Turbo model)
<Ref. to EX(H4DOTC)-11, INSTALLATION, Center Exhaust Pipe.>
35) Install the under cover.
36) Install the ATF level gauge.



37) Connect the following connectors.
(1) Transmission harness connectors
(2) Transmission ground terminal
38) Install the air cleaner case stay.

Tightening torque:
16 N·m (1.6 kgf-m, 11.6 ft-lb)

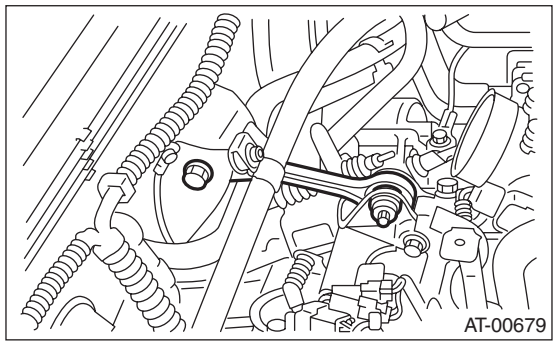
39) Install the air cleaner case or air intake chamber. (Non-turbo model)
<Ref. to IN(H4SO)-5, INSTALLATION, Air Cleaner Case.>
40) Install the air intake duct. (Non-turbo model)
<Ref. to IN(H4SO)-6, INSTALLATION, Air Intake Duct.>
41) Install the intercooler. (Turbo model)
<Ref. to IN(H4DOTC)-12, INSTALLATION, Intercooler.>
42) Connect the battery ground cable.
43) Fill ATF up to the middle of the “COLD” side on level gauge by using the oil charge pipe. <Ref. to 4AT-32, Automatic Transmission Fluid.>
44) Take off the vehicle from lift arms.
45) Check select lever operation.
<Ref. to 4AT-53, INSPECTION, Inhibitor Switch.>
46) Check the ATF level. <Ref. to 4AT-32, Automatic Transmission Fluid.>
47) Check the road test.
<Ref. to 4AT-35, Road Test.>

10. Transmission Mounting System

A: REMOVAL

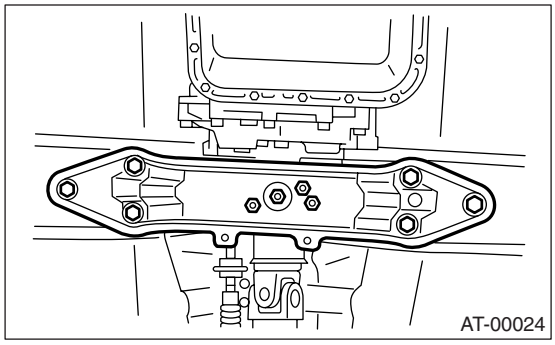
1. PITCHING STOPPER

1) Disconnect the ground cable from battery.
2) Remove the air cleaner case. (2.0 L Non-turbo model)
<Ref. to IN(H4SO)-5, REMOVAL, Air Cleaner Case.>
3) Remove the intercooler. (2.0 L Turbo model)
<Ref. to IN(H4DOTC)-12, REMOVAL, Intercooler.>
4) Remove the pitching stopper.



2. TRANSMISSION REAR CROSSMEMBER AND REAR CUSHION RUBBER

1) Disconnect the ground cable from battery.
2) Lift-up the vehicle.
3) Remove the front, center, rear exhaust pipes and muffler. (Non-turbo model)
<Ref. to EX(H4SO)-6, REMOVAL, Front Exhaust Pipe.>, <Ref. to EX(H4SO)-10, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(H4SO)-12, REMOVAL, Muffler.>
4) Remove the center and rear exhaust pipes, and muffler. (Turbo model)
<Ref. to EX(H4DOTC)-10, REMOVAL, Center Exhaust Pipe.>, <Ref. to EX(H4DOTC)-15, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(H4DOTC)-16, REMOVAL, Muffler.>
5) Remove the heat shield cover. (If equipped)
6) Set the transmission jack under the transmission. Make sure that the support plates of transmission jack don't touch the oil pan.
7) Remove the transmission rear crossmember.



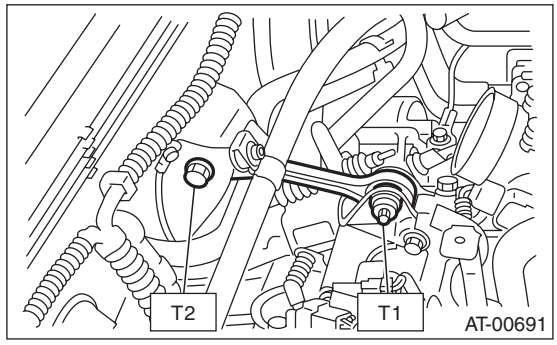
8) Remove the rear cushion rubber.

B: INSTALLATION

1. PITCHING STOPPER

1) Install the pitching stopper.

Tightening torque:
T1: 50 N·m (5.1 kgf-m, 37 ft-lb)
T2: 58 N·m (5.9 kgf-m, 43 ft-lb)



2) Install the air cleaner case. (Non-turbo model)
<Ref. to IN(H4SO)-5, INSTALLATION, Air Cleaner Case.>
3) Remove the intercooler. (Turbo model)
<Ref. to IN(H4DOTC)-12, INSTALLATION, Intercooler.>

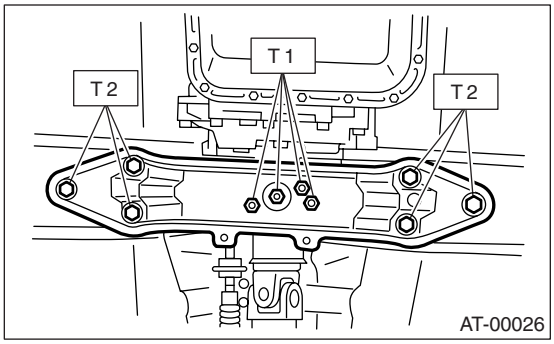
2. TRANSMISSION REAR CROSSMEMBER AND REAR CUSHION RUBBER

1) Install the rear cushion rubber.

Tightening torque:
AWD MODEL
39 N·m (4.0 kgf-m, 29 ft-lb)
FWD MODEL
123 N·m (12.5 kgf-m, 90 ft-lb)

2) Install the crossmember.

Tightening torque:
T1: 35 N·m (3.6 kgf-m, 26 ft-lb)
T2: 70 N·m (7.1 kgf-m, 51 ft-lb)



3) Remove the transmission jack.
4) Install the heat shield cover. (If equipped)
5) Install the front, center, rear exhaust pipes and the muffler. (Non-turbo model)
<Ref. to EX(H4SOw/oOBD)-7, INSTALLATION, Front Exhaust Pipe.>, <Ref. to EX(H4SOw/oOBD)-10, INSTALLATION, Rear Exhaust Pipe.> and <Ref. to EX(H4SOw/oOBD)-11, INSTALLATION, Muffler.>
6) Install center and rear exhaust pipes, and muffler. (Turbo model)
<Ref. to EX(H4DOTC)-11, INSTALLATION, Center Exhaust Pipe.>, <Ref. to EX(H4DOTC)-15, INSTALLATION, Rear Exhaust Pipe.> and <Ref. to EX(H4DOTC)-16, INSTALLATION, Muffler.>

C: INSPECTION

Repair or replace parts if the results of the inspection below are not satisfactory.

1. PITCHING STOPPER

Make sure that the pitching stopper is not bent or damaged. Make sure that the rubber is not stiff, cracked, or otherwise damaged.

2. TRANSMISSION REAR CROSSMEMBER AND REAR CUSHION RUBBER

Make sure that the crossmember is not bent or damaged. Make sure that the cushion rubber is not stiff, cracked, or otherwise damaged.

11.Extension Case Oil Seal

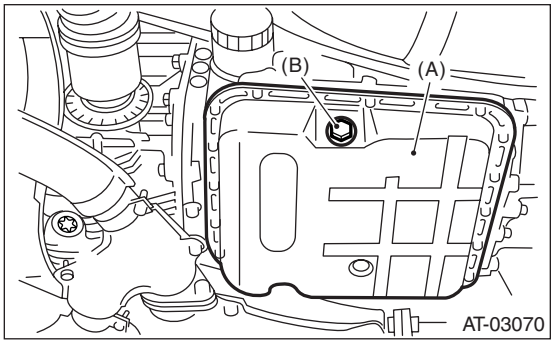
A: INSPECTION

Make sure the ATF does not leak from the joint of transmission and propeller shaft. If so, replace the oil seal. <Ref. to 4AT-51, REPLACEMENT, Extension Case Oil Seal.>

B: REPLACEMENT

1) Clean the transmission exterior.
2) Drain the ATF completely.
3) Replace with a new gasket and tighten the ATF drain plug.

Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)



(A) Oil pan
(B) ATF drain plug

4) Remove the rear exhaust pipe and muffler.
Non-turbo model
<Ref. to EX(H4SOw/oOBD)-10, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(H4SOw/oOBD)-11, REMOVAL, Muffler.> or <Ref. to EX(H4SO)-10, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(H4SO)-12, REMOVAL, Muffler.>
Turbo model
<Ref. to EX(H4DOTC)-15, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(H4DOTC)-16, REMOVAL, Muffler.>
5) Remove the heat shield cover. (If equipped)
6) Remove the propeller shaft. <Ref. to DS-17, REMOVAL, Propeller Shaft.>
7) Using the ST, remove the oil seal.
ST 398527700 PULLER ASSY
8) Using the ST, install the oil seal.
ST 498057300 INSTALLER
9) Install the propeller shaft. <Ref. to DS-18, INSTALLATION, Propeller Shaft.>
10) Install the heat shield cover. (If equipped)
11) Install the rear exhaust pipe and muffler.
Non-turbo model
<Ref. to EX(H4SOw/oOBD)-10, INSTALLATION, Rear Exhaust Pipe.> and <Ref. to EX(H4SOw/oOBD)-11, INSTALLATION, Muffler.> or <Ref. to EX(H4SO)-10, INSTALLATION, Rear Exhaust Pipe.> and <Ref. to EX(H4SO)-12, INSTALLATION, Muffler.>
Turbo model
<Ref. to EX(H4DOTC)-15, INSTALLATION, Rear Exhaust Pipe.> and <Ref. to EX(H4DOTC)-16, INSTALLATION, Muffler.>
12) Pour ATF and check the ATF level. <Ref. to 4AT-32, Automatic Transmission Fluid.>

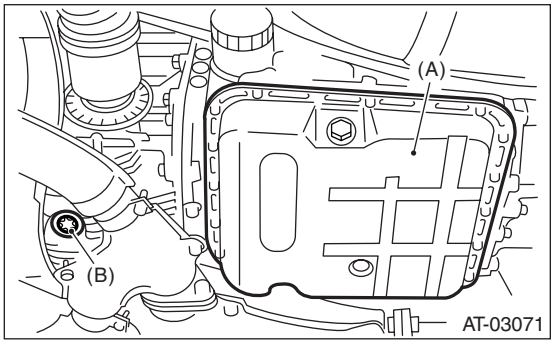
12. Differential Side Retainer Oil Seal

A: INSPECTION

Check the leakage of gear oil from differential side retainer oil seal part. If there is oil leakage, replace the oil seal.

B: REPLACEMENT

1) Lift-up the vehicle.
2) Remove the front exhaust pipe and center exhaust pipe.
(Non-turbo model)
<Ref. to EX(H4SO)-6, REMOVAL, Front Exhaust Pipe.>
(Turbo model)
<Ref. to EX(H4DOTC)-10, REMOVAL, Center Exhaust Pipe.>
3) Drain the differential gear by removing differential gear oil drain plug.

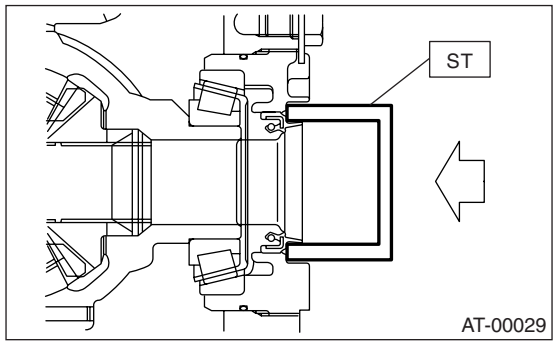


(A) Oil pan
(B) Differential gear oil drain plug

4) Replace new gasket and tighten the differential oil drain plug.

Tightening torque:
70 N·m (7.1 kgf-m, 51 ft-lb) (Copper gasket)
44 N·m (4.5 kgf-m, 32.5 ft-lb) (Aluminum gasket)

5) Separate the front drive shaft from transmission. <Ref. to DS-17, REMOVAL, Propeller Shaft.>
6) Remove the differential side retainer oil seal using driver which wrapped with vinyl tape or etc.
7) Using ST, install the differential side retainer oil seal by slightly tapping with hammer.
ST 18675AA000 DIFFERENTIAL SIDE OIL SEAL INSTALLER



8) Apply oil to the oil seal lips.
9) Using the ST, install the front drive shaft. <Ref. to DS-40, INSTALLATION, Front Drive Shaft.>
ST 28399SA010 OIL SEAL PROTECTOR
10) Install the front exhaust pipe and center exhaust pipe.
(Non-turbo model)
<Ref. to EX(H4SO)-7, INSTALLATION, Front Exhaust Pipe.>
(Turbo model)
<Ref. to EX(H4DOTC)-11, INSTALLATION, Center Exhaust Pipe.>
11) Lower the vehicle.
12) Pour differential gear oil into the gauge hole.

Recommended gear oil:
<Ref. to RM-3, LUBRICANTS, RECOMMENDED MATERIALS, Recommended Materials.>

Differential gear oil capacity:
1.1 — 1.3 ℓ (1.3 — 1.4 US qt, 1.0 — 1.1 Imp qt)

13) Check the gear oil amount. <Ref. to 4AT-34, INSPECTION, Differential Gear Oil.>

13.Inhibitor Switch

A: INSPECTION

When the driving condition or starter motor operation is erroneous, first check the shift linkage for improper operation. If the shift linkage is functioning properly, check the inhibitor switch.

1) Disconnect the inhibitor switch connector.

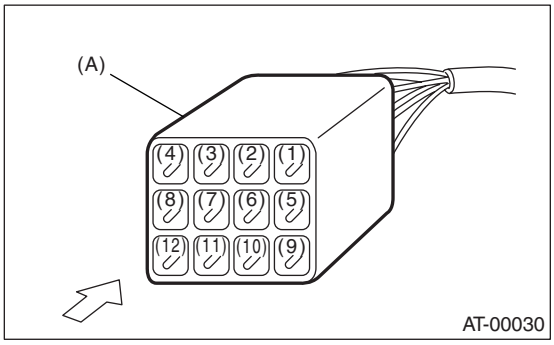
2) Check continuity in inhibitor switch circuits with the select lever moved to each position.

NOTE:

• Also check that continuity in ignition circuit does not exist when the select lever is in “R”, “D”, “3”, “2” and “1” ranges.

• If the inhibitor switch is inoperative, check for poor contact of connector on transmission side.

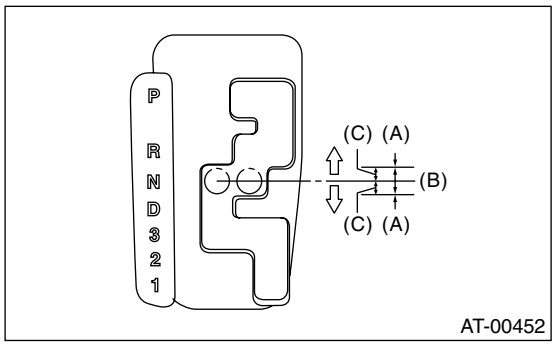
	Position	Pin No.
Signal sent to TCM	P	4 — 3
	R	4 — 2
	N	4 — 1
	D	4 — 8
	3	4 — 7
	2	4 — 6
	1	4 — 5
Ignition circuit	P/N	12 — 11
Back-up light circuit	R	10 — 9



(A) Inhibitor switch connector

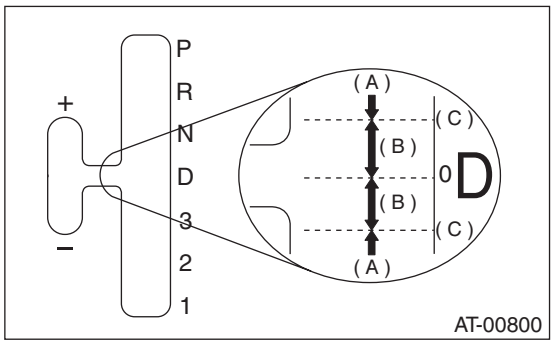
3) Check if there is continuity at equal points when the select lever is turned 1.5° in both directions from “N” range.

If there is continuity in one direction and the continuity in the other or if there is continuity at unequal points, adjust the inhibitor switch. <Ref. to 4AT-54, ADJUSTMENT, Inhibitor Switch.>



(A) Continuity does not exist.
(B) Continuity exists.
(C) 1.5°

• MODEL WITH SPORT SHIFT

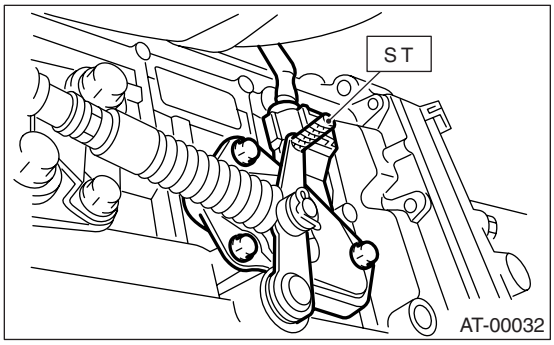


(A) Continuity does not exist.
(B) Continuity exists.
(C) 1.5°

4) Repeat the above checks. If there are abnormalities, adjust the select cable. <Ref. to CS-34, ADJUSTMENT, Select Cable.>

B: ADJUSTMENT

1) Shift the select lever to “N” range.
2) Loosen the three inhibitor switch securing bolts.
3) Insert the ST as vertical as possible into the holes in inhibitor switch lever and switch body.
ST 499267300 STOPPER PIN



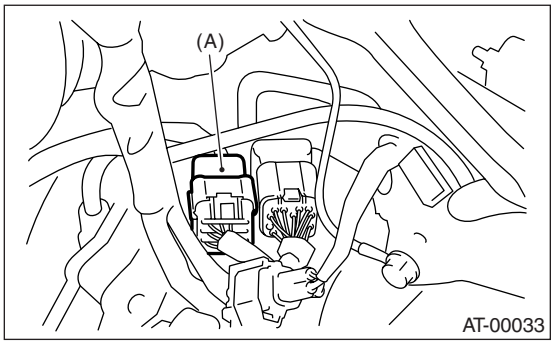
4) Tighten the three inhibitor switch bolts.

Tightening torque:
3.4 N·m (0.35 kgf-m, 2.6 ft-lb)

5) Repate the above checks. If the inhibitor switch is determined to be “faulty”, replace it.

C: REMOVAL

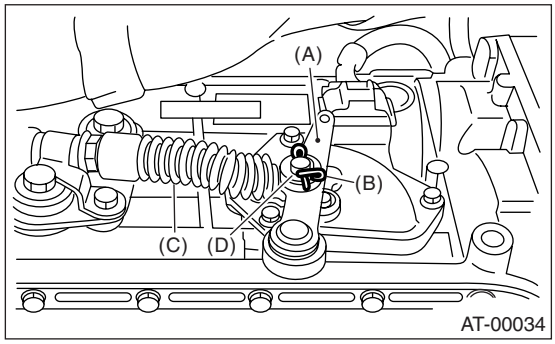
1) Set up the vehicle on a lift.
2) Move the select lever to “N” range.
3) Remove the air cleaner case. (Non-turbo model)
<Ref. to IN(H4SO)-5, REMOVAL, Air Cleaner Case.>
4) Remove the intercooler. (Turbo model)
<Ref. to IN(H4DOTC)-12, REMOVAL, Intercooler.>
5) Disconnect the inhibitor switch connector.



(A) Inhibitor switch

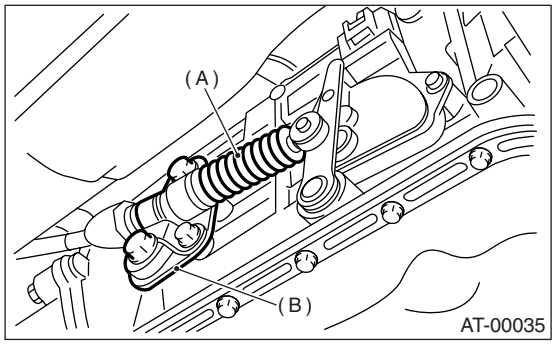
6) Remove the inhibitor switch connector from stay.
7) Lift-up the vehicle.
8) Remove the front and center exhaust pipes.
<Ref. to EX(H4SOw/oOBD)-6, REMOVAL, Front Exhaust Pipe.> or <Ref. to EX(H4SO)-6, REMOVAL, Front Exhaust Pipe.>

9) Remove the snap pin and washer from range select lever.



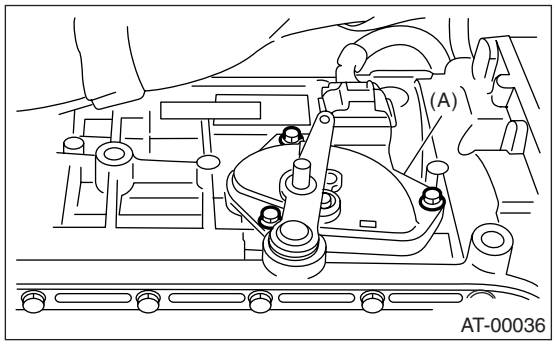
(A) Snap pin
(B) Select cable
(C) Range select lever
(D) Washer

10) Remove the plate assembly from transmission case.



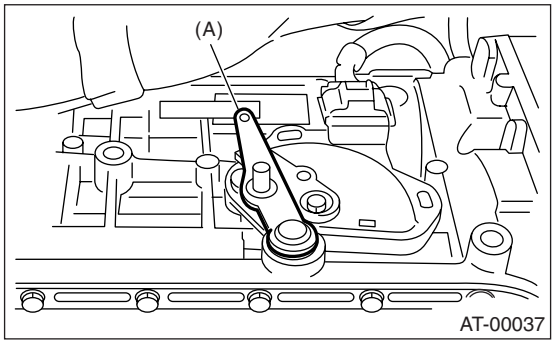
(A) Select cable
(B) Plate ASSY

11) Remove the bolts.



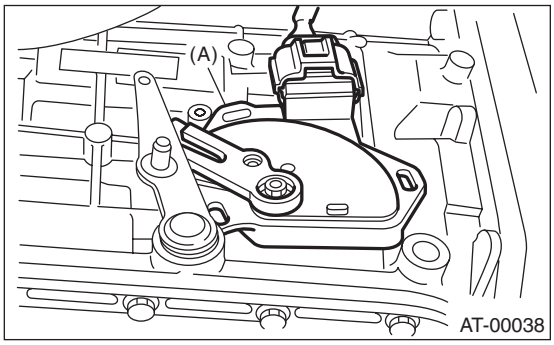
(A) Inhibitor switch

12) Move the range select lever to parking position (left side).



(A) Range select lever

13) Remove the inhibitor switch from transmission.

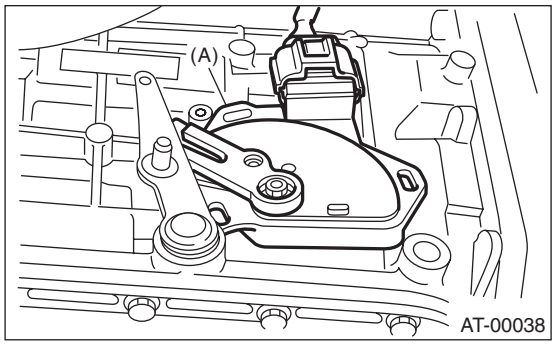


(A) Inhibitor switch

14) Disconnect the inhibitor switch harness connector from inhibitor switch.

D: INSTALLATION

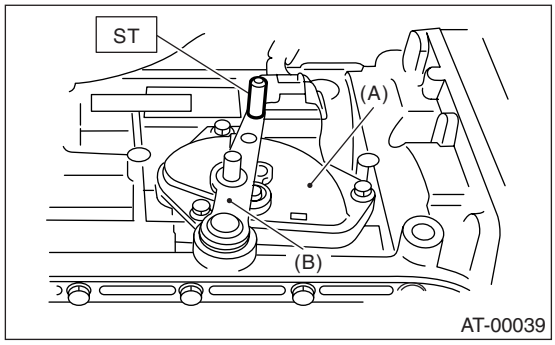
1) Connect the inhibitor switch harness connector to inhibitor switch.
2) Install the inhibitor switch to transmission case.



(A) Inhibitor switch

3) Move the range select lever to neutral position.
4) Using the ST, tighten the bolts of inhibitor switch.
ST 499267300 STOPPER PIN

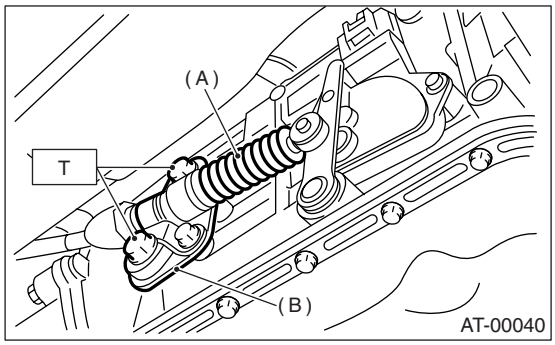
Tightening torque:
3.4 N·m (0.35 kgf-m, 2.6 ft-lb)



(A) Inhibitor switch
(B) Range select lever

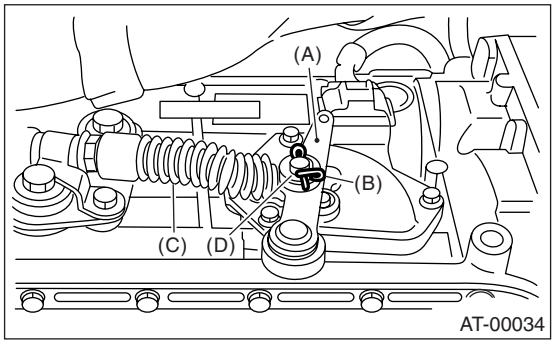
5) Install the select cable to range select lever.
6) Install the plate assembly to transmission.

Tightening torque:
T: 25 N·m (2.5 kgf-m, 18.1 ft-lb)



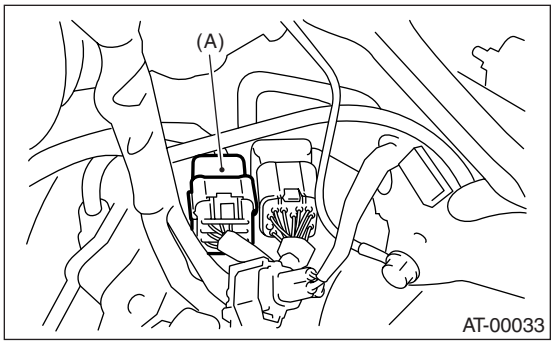
(A) Select cable
(B) Plate ASSY

7) Install the washer and snap pin to range select lever.



(A) Snap ring
(B) Select cable
(C) Range select lever
(D) Washer

8) Install the front and center exhaust pipes. (Non-turbo model)
<Ref. to EX(H4SOw/oOBD)-7, INSTALLATION, Front Exhaust Pipe.> or <Ref. to EX(H4SO)-7, INSTALLATION, Front Exhaust Pipe.>
9) Install the center exhaust pipe. (Turbo model)
<Ref. to EX(H4DOTC)-11, INSTALLATION, Center Exhaust Pipe.>
10) Lower the vehicle.
11) Install the inhibitor switch connector from stay.
12) Connect the inhibitor switch connector.



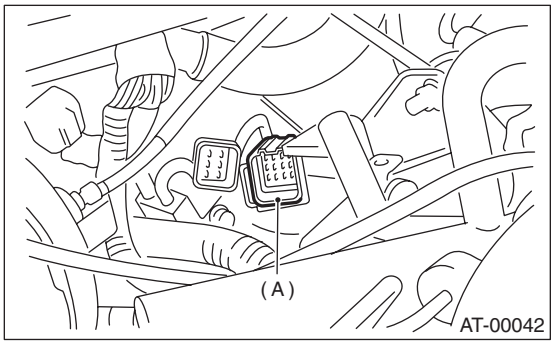
(A) Inhibitor switch connector

13) Install the air cleaner case. (Non-turbo model)
<Ref. to IN(H4SO)-5, INSTALLATION, Air Cleaner Case.>
14) Install the intercooler. (Turbo model)
<Ref. to IN(H4DOTC)-12, INSTALLATION, Intercooler.>
15) Inspect the inhibitor switch. <Ref. to 4AT-53, INSPECTION, Inhibitor Switch.>

14.Front Vehicle Speed Sensor

A: REMOVAL

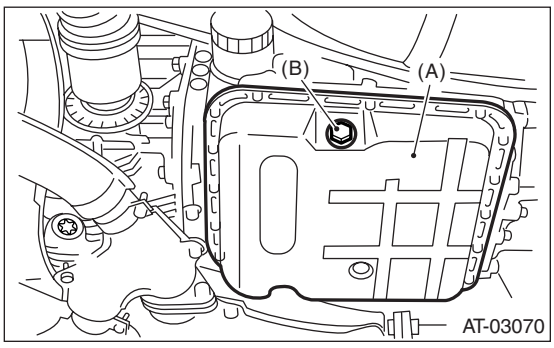
1) Set up the vehicle on a lift.
2) Disconnect the ground cable from battery.
3) Remove the air cleaner case. (Non-turbo model) <Ref. to IN(H4SO)-5, REMOVAL, Air Cleaner Case.>
4) Remove the intercooler. (Turbo model) <Ref. to IN(H4DOTC)-12, REMOVAL, Intercooler.>
5) Disconnect the transmission connector.



(A) Transmission connector

6) Remove the pitching stopper. <Ref. to 4AT-49, REMOVAL, Transmission Mounting System.>
7) Remove the transmission connector from stay.
8) Lift-up the vehicle.
9) Clean the transmission exterior.
10) Drain the ATF completely.
11) Replace with a new gasket and tighten the ATF drain plug.

Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)

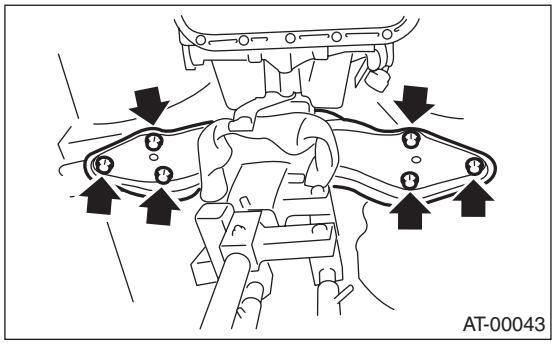


(A) Oil pan
(B) ATF drain plug

12) Remove the front, center, exhaust pipes and muffler. (Non-turbo model)
<Ref. to EX(H4SOw/oOBD)-6, REMOVAL, Front Exhaust Pipe.>, <Ref. to EX(H4SOw/oOBD)-10, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(H4SOw/oOBD)-11, REMOVAL, Muffler.> or <Ref. to EX(H4SO)-6, REMOVAL, Front Exhaust Pipe.>, <Ref. to EX(H4SO)-10, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(H4SO)-12, REMOVAL, Muffler.>
13) Remove the center, rear exhaust pipe and muffler. (Turbo model)
<Ref. to EX(H4DOTC)-10, REMOVAL, Center Exhaust Pipe.>, <Ref. to EX(H4DOTC)-15, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(H4DOTC)-16, REMOVAL, Muffler.>
14) Remove the shield cover. (If equipped)
15) Remove the propeller shaft. <Ref. to DS-17, REMOVAL, Propeller Shaft.>
16) Place the transmission jack under transmission.

NOTE:
Make sure that the support plates of transmission jack don't touch the crossmember.

17) Remove the transmission rear crossmember bolts.



18) Lower the AT jack.

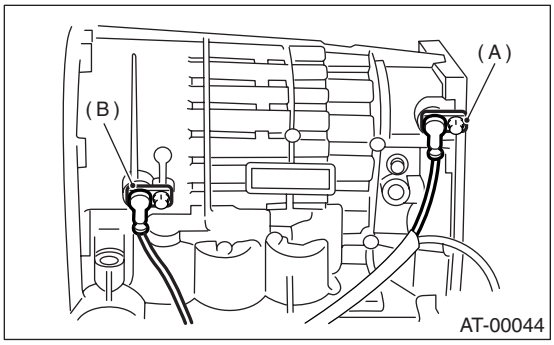
NOTE:
Do not separate the AT jack and transmission.

19) Remove the oil cooler inlet and outlet pipe.

NOTE:
When removing the outlet pipe, be careful not to lose balls and springs used with retaining screws.

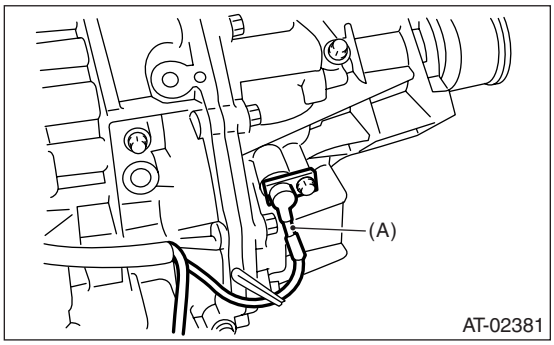
20) Remove the front and rear vehicle speed sensor and torque converter turbine speed sensor.

• Front vehicle speed sensor and torque converter turbine speed sensor



(A) Front vehicle speed sensor
(B) Torque converter turbine speed sensor

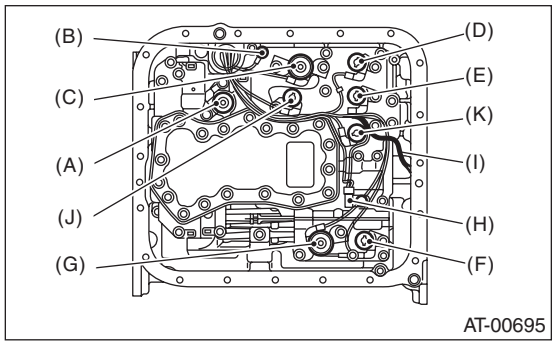
• Rear vehicle speed sensor (AWD MODEL)



(A) Rear vehicle speed sensor

21) Remove the oil pan.

22) Remove the duty solenoid connectors and ATF temperature sensor. Remove the connectors from clip and disconnect the connectors.

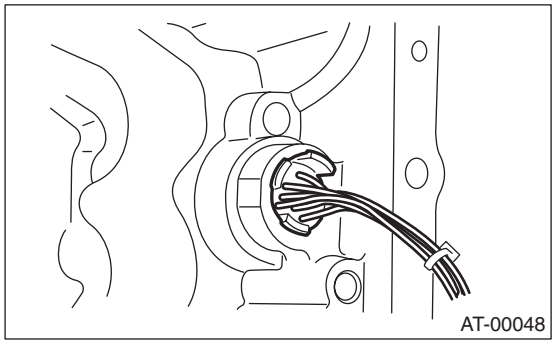


(A) Lock-up duty solenoid (Blue)
(B) Transmission ground
(C) Line pressure duty solenoid (Red)
(D) Shift solenoid 2 (Yellow)
(E) Shift solenoid 1 (Green)
(F) 2-4 brake timing solenoid (Black)
(G) 2-4 brake duty solenoid (Red)
(H) ATF temperature sensor
(I) Transfer duty solenoid (Brown)
(J) Low clutch timing solenoid (Gray)
(K) SPORT shift solenoid (Beige) (If equipped)

23) Remove the harness assembly.

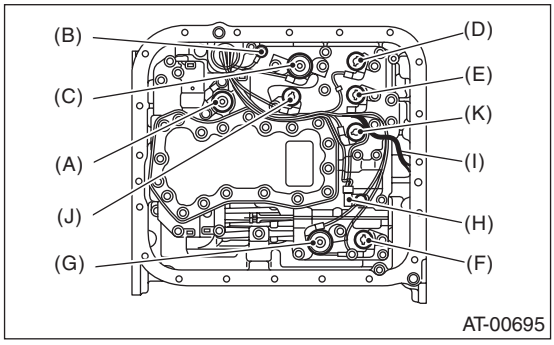
B: INSTALLATION

1) Pass the harness assembly through the hole in the transmission case.



2) Connect the harness connectors.
Connect the connectors of same color, and secure the connectors to valve body using clips.

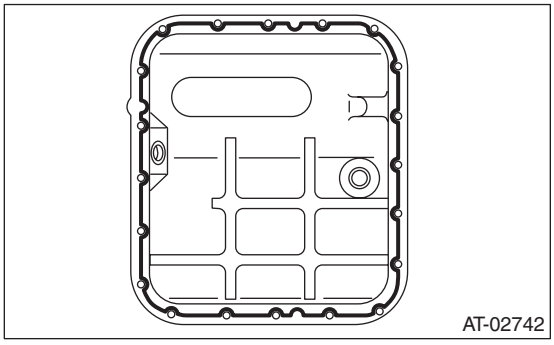
Tightening torque (Transmission ground cable and ATF temperature sensor)
8 N·m (0.8 kgf-m, 5.8 ft-lb)



(A) Lock-up duty solenoid (Blue)
(B) Transmission ground
(C) Line pressure duty solenoid (Red)
(D) Shift solenoid 2 (Yellow)
(E) Shift solenoid 1 (Green)
(F) 2-4 brake timing solenoid (Black)
(G) 2-4 brake duty solenoid (Red)
(H) ATF temperature sensor
(I) Transfer duty solenoid (Brown)
(J) Low clutch timing solenoid (Gray)
(K) SPORT shift solenoid (Beige)

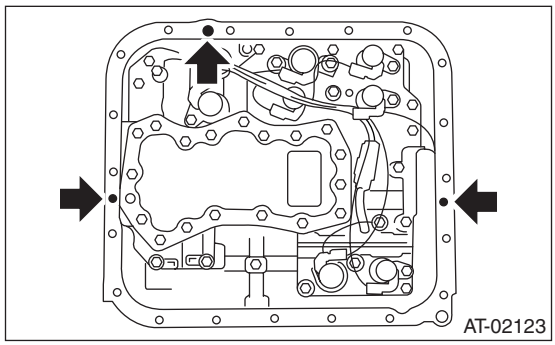
3) Apply proper amount of liquid gasket to the entire oil pan mating surface.

Liquid gasket:
THREE BOND 1217B (Part No. K0877YA020)



4) Apply liquid gasket fully to three holes other than screw holes on transmission case.

Liquid gasket:
THREE BOND 1217B (Part No. K0877YA020)



5) Install the oil pan.

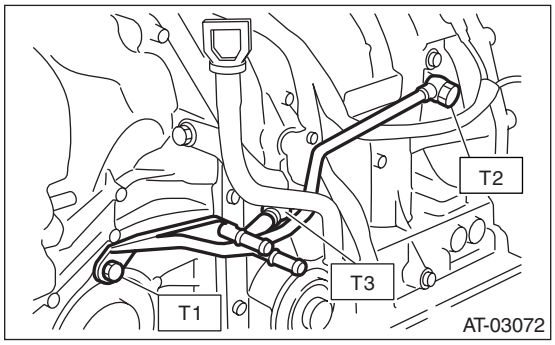
Tightening torque:
5 N·m (0.5 kgf-m, 3.6 ft-lb)

6) Install the front and rear vehicle speed sensor, and also the torque converter turbine speed sensor, and then fasten the harness.

Tightening torque:
7 N·m (0.7 kgf-m, 5.2 ft-lb)

7) Replace a new copper washer, install the oil cooler pipes.

Tightening torque:
T1: 25 N·m (2.5 kgf-m, 18.1 ft-lb)
T2: 40 N·m (4.1 kgf-m, 30 ft-lb)
T3: 44 N·m (4.5 kgf-m, 32.5 ft-lb)



8) Install the transmission rear crossmember bolts.

Tightening torque:
70 N·m (7.1 kgf-m, 51 ft-lb)

9) Install the propeller shaft. <Ref. to DS-18, INSTALLATION, Propeller Shaft.>
10) Install the shield cover. (If equipped)

11) Install the front, center, rear exhaust pipes and muffler. (Non-turbo model)
<Ref. to EX(H4SOw/oOBD)-7, INSTALLATION, Front Exhaust Pipe.>, <Ref. to EX(H4SOw/oOBD)-10, INSTALLATION, Rear Exhaust Pipe.> and <Ref. to EX(H4SOw/oOBD)-11, INSTALLATION, Muffler.> or <Ref. to EX(H4SO)-7, INSTALLATION, Front Exhaust Pipe.>, <Ref. to EX(H4SO)-10, INSTALLATION, Rear Exhaust Pipe.> and <Ref. to EX(H4SO)-12, INSTALLATION, Muffler.>
12) Install the center, rear exhaust pipes and muffler. (Turbo model)
<Ref. to EX(H4DOTC)-11, INSTALLATION, Center Exhaust Pipe.>, <Ref. to EX(H4DOTC)-15, INSTALLATION, Rear Exhaust Pipe.> and <Ref. to EX(H4DOTC)-16, INSTALLATION, Muffler.>
13) Lower the vehicle.
14) Install the transmission connector to the stay.
15) Install the pitching stopper. <Ref. to 4AT-49, INSTALLATION, Transmission Mounting System.>
16) Install the air cleaner case. (Non-turbo model)
<Ref. to IN(H4SO)-5, INSTALLATION, Air Cleaner Case.>
17) Install the intercooler. (Turbo model)
<Ref. to IN(H4DOTC)-12, INSTALLATION, Intercooler.>
18) Pour ATF. <Ref. to 4AT-32, Automatic Transmission Fluid.>
19) Check the ATF level. <Ref. to 4AT-32, Automatic Transmission Fluid.>

15.Rear Vehicle Speed Sensor

A: REMOVAL

When removing the rear vehicle speed sensor, refer to “Front Vehicle Speed Sensor.” <Ref. to 4AT-57, REMOVAL, Front Vehicle Speed Sensor.>

B: INSTALLATION

When installing the rear vehicle speed sensor, refer to “Front Vehicle Speed Sensor.” <Ref. to 4AT-58, INSTALLATION, Front Vehicle Speed Sensor.>

16. Torque Converter Turbine Speed Sensor

A: REMOVAL

When removing the torque converter turbine speed sensor, refer to “Front Vehicle Speed Sensor.” <Ref. to 4AT-57, REMOVAL, Front Vehicle Speed Sensor.>

B: INSTALLATION

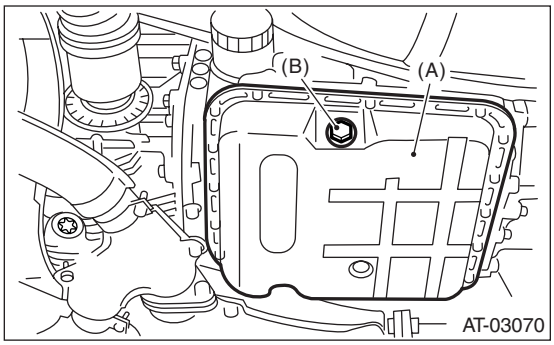
When installing the torque converter turbine speed sensor, refer to “Front Vehicle Speed Sensor.” <Ref. to 4AT-58, INSTALLATION, Front Vehicle Speed Sensor.>

17.Control Valve Body

A: REMOVAL

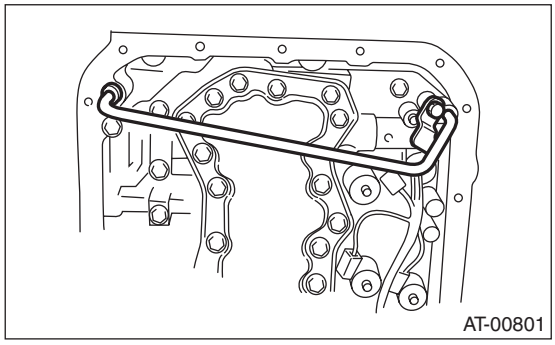
1) Lift-up the vehicle.
2) Clean the transmission exterior.
3) Drain the ATF completely.
4) Replace with a new gasket and tighten the ATF drain plug.

Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)

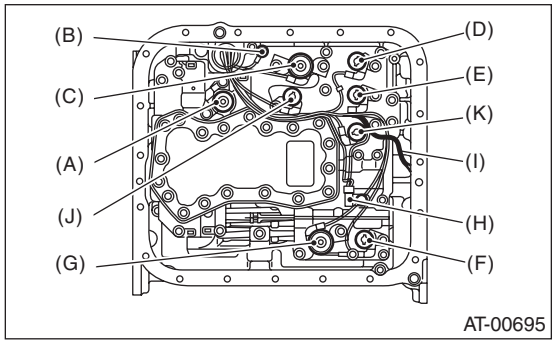


(A) Oil pan
(B) Drain plug

5) Remove the oil pan.
6) Remove and clean the magnet.
7) Remove the old gasket on the oil pan and transmission case completely.
8) Remove the pipe. (if equipped)



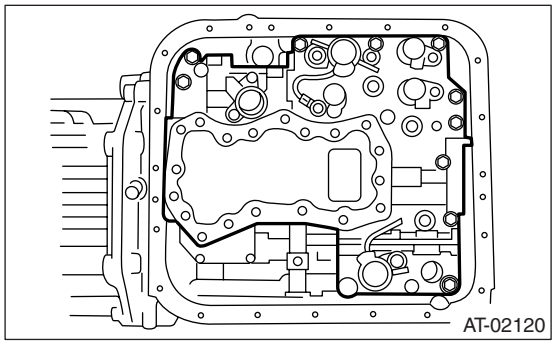
9) Disconnect each solenoid connector and remove ATF temperature sensor from control valve.



(A) Lock-up duty solenoid (Blue)
(B) Transmission ground
(C) Line pressure duty solenoid (Red)
(D) Shift solenoid 2 (Yellow)
(E) Shift solenoid 1 (Green)
(F) 2-4 brake timing solenoid (Black)
(G) 2-4 brake duty solenoid (Red)
(H) ATF temperature sensor
(I) Transfer duty solenoid (Brown)
(J) Low clutch timing solenoid (Gray)
(K) Sport shift solenoid (Beige) (if equipped)

10) Remove the control valve.

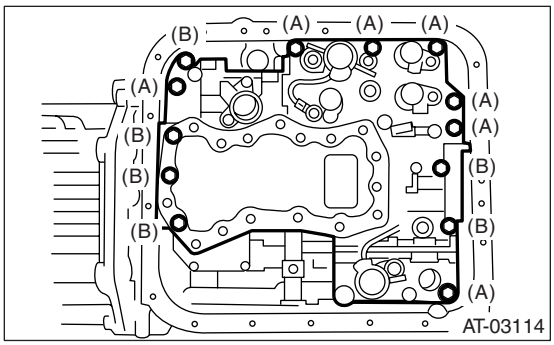
NOTE:
When removing the control valve body, be careful not to interfere with transfer duty solenoid wiring.



B: INSTALLATION

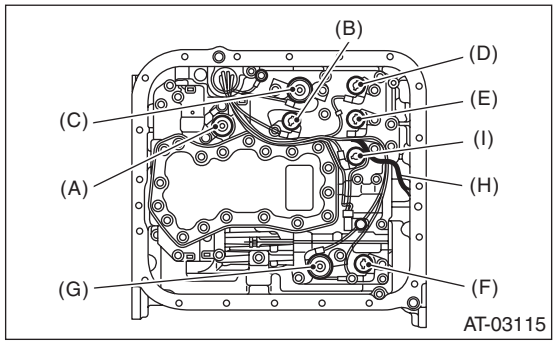
1) Set the range select lever in “N” range.
2) Install the control valve, ATF temperature sensor and ground connectors.

Tightening torque:
8 N·m (0.8 kgf-m, 5.8 ft-lb)



Bolt length mm (in)
(A) 30 (1.18)
(B) 55 (2.17)

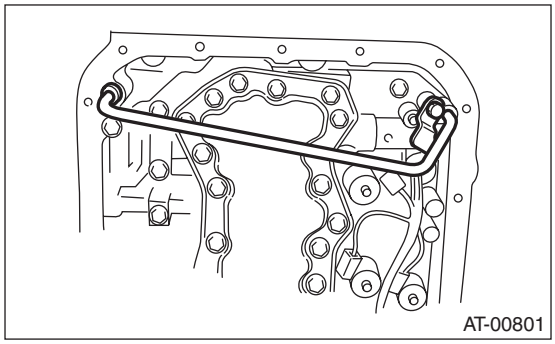
3) Connect all connectors .



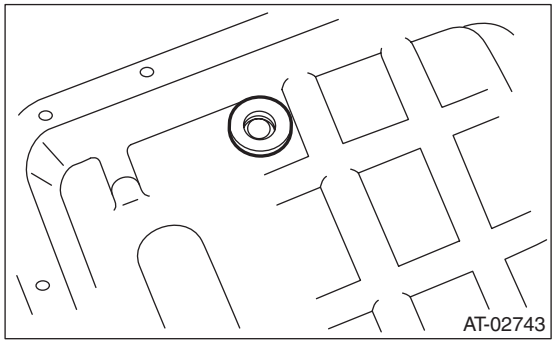
(A) Lock-up duty solenoid (Blue)
(B) Low clutch timing solenoid (Gray)
(C) Line pressure duty solenoid (Red)
(D) Shift solenoid 2 (Yellow)
(E) Shift solenoid 1 (Green)
(F) 2-4 brake timing solenoid (Black)
(G) 2-4 brake duty solenoid (Red)
(H) Transfer duty solenoid (Brown)
(I) Sport shift solenoid (Beige) (if equipped)

4) Install the pipe. (if equipped)

Tightening torque:
8 N·m (0.8 kgf-m, 5.8 ft-lb)

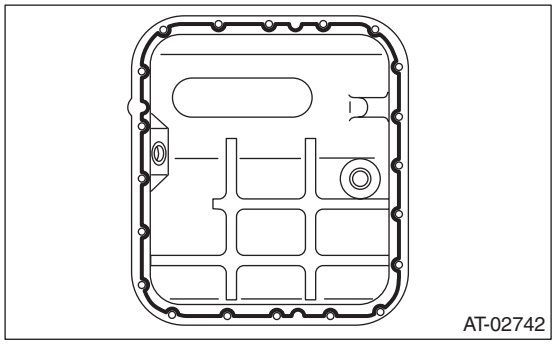


5) Attach the magnet at specified position.



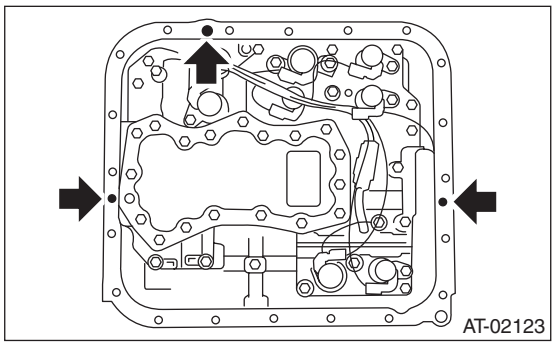
6) Apply proper amount of liquid gasket to the entire oil pan mating surface.

Liquid gasket:
THREE BOND 1217B (Part No. K0877YA020)



7) Apply liquid gasket fully to three holes other than screw holes on transmission case.

Liquid gasket:
THREE BOND 1217B (Part No. K0877YA020)



8) Install the oil pan.

Tightening torque:
5 N·m (0.5 kgf-m, 3.6 ft-lb)

9) Pour ATF into the oil charge pipe.

Recommended fluid:
SUBARU ATF (Part No. K0410Y0700), Idemitsu "Apolloil ATF HP", Castrol "Transmax J".

NOTE:
If the ATF above is not available, use DEXRON III.

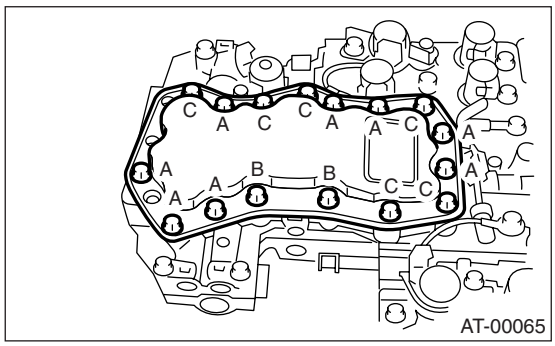
Fluid capacity:
Fill the same amount of fluid drained from drain plug hole.

10) Check the level of ATF.
<Ref. to 4AT-32, Automatic Transmission Fluid.>

C: DISASSEMBLY

1) Remove oil strainer from lower control valve body.

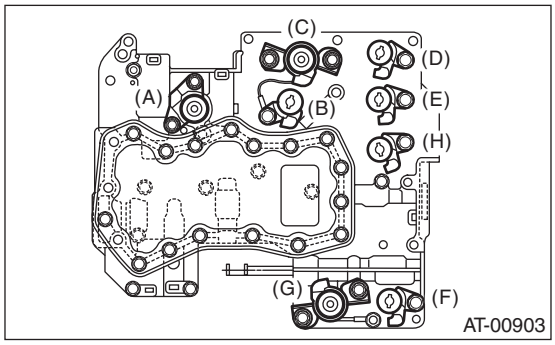
NOTE:
Arrange the removed bolts in good order to assemble in the same place as disassembly, because the bolts length are different.



(A) Short bolt
(B) Middle bolt
(C) Long bolt

2) Remove the duty solenoids, solenoids and sensor from the lower valve body.

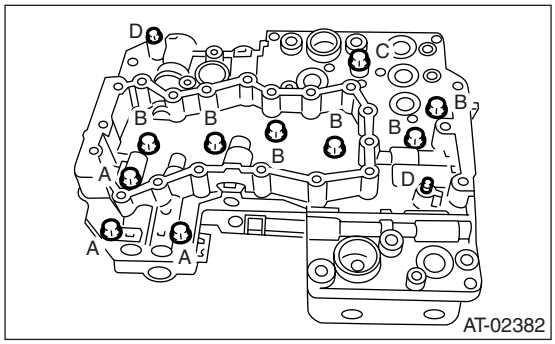
NOTE:
Arrange the removed bolts in good order to assemble in the same place as disassembly, because the bolts length are different.



(A) Lock-up duty solenoid (Blue)
(B) Low clutch timing solenoid (Gray)
(C) Line pressure duty solenoid (Red)
(D) Shift solenoid 1 (Yellow)
(E) Shift solenoid 2 (Green)
(F) 2-4 brake timing solenoid (Black)
(G) 2-4 brake duty solenoid (Red)
(H) Sport shift solenoid (Beige) (if equipped)

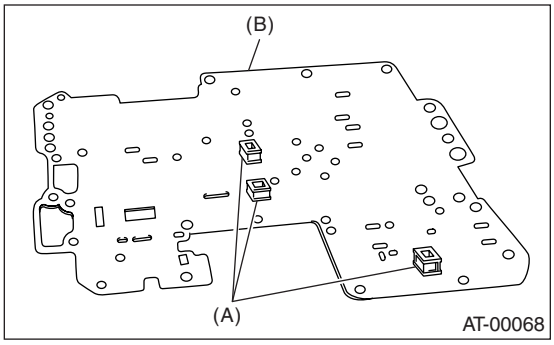
3) Remove the upper-lower valve body tightening bolts.

NOTE:
Arrange the removed bolts in good order to assemble in the same place as disassembly, because the bolts length are different.



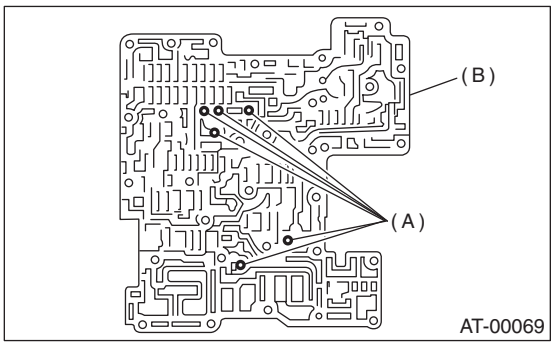
4) Remove the lower valve body.

5) Remove the oil filter and plate.



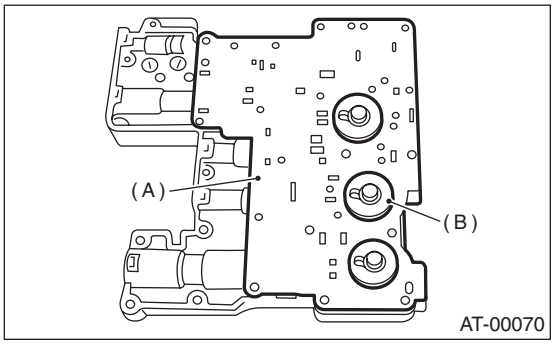
(A) Oil filter
(B) Plate

6) Remove six steel balls from middle valve body.



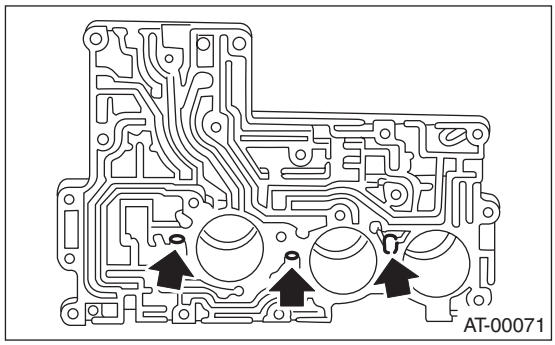
(A) Steel ball
(B) Middle valve body

7) Remove the middle valve body.
8) Remove upper separator plate from middle valve body.

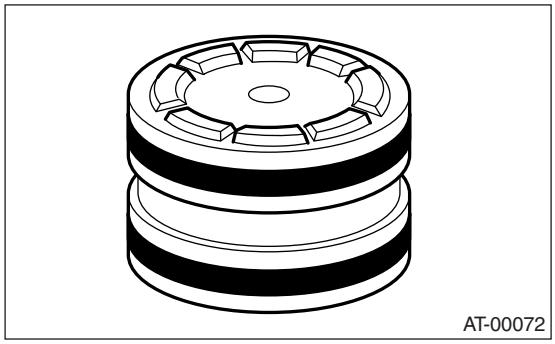


(A) Upper separator plate
(B) Side plate

9) Remove valve springs and four steel balls from upper valve body.
10) Place a shop cloth to the piston removal hole.
11) Using an air compressor, apply air slowly to each piston hole and remove the pistons.

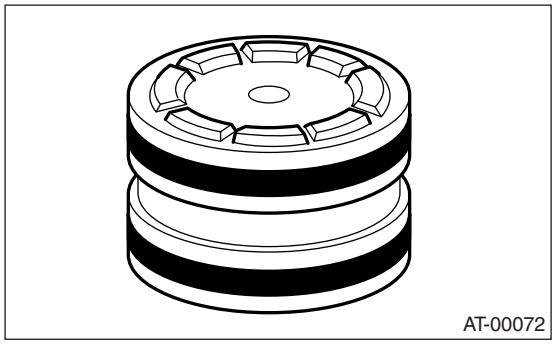


12) Remove the seal ring from piston.

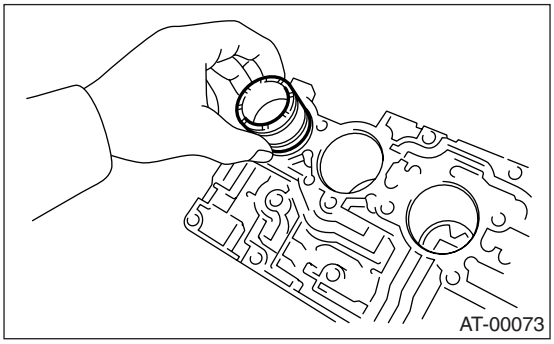


D: ASSEMBLY

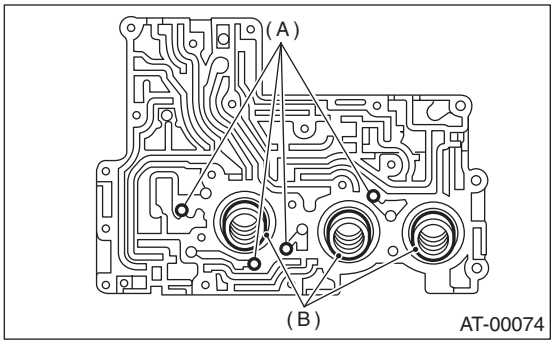
1) Install a new seal ring to piston.



2) Apply ATF to the seal ring.
3) Insert the piston fully into upper valve body.



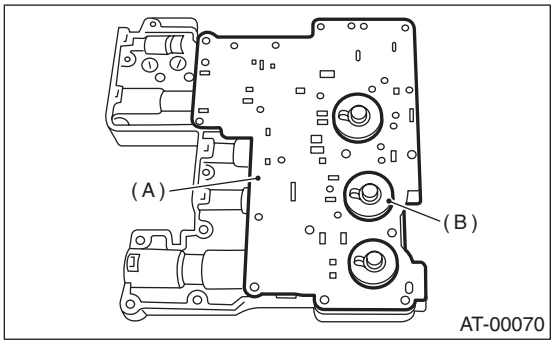
4) Install the spring and four steel balls to specified positions of upper valve body.



(A) Steel ball
(B) Spring

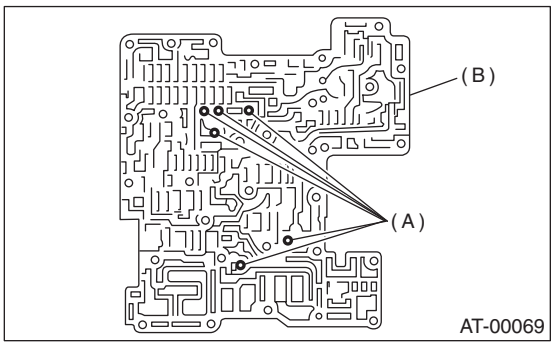
5) Align the hole in side plate with the hole in separator plate, and then install support plate and upper separator plate to middle valve body.

Tightening torque:
8 N·m (0.8 kgf-m, 5.8 ft-lb)



(A) Upper separator plate
(B) Side plate

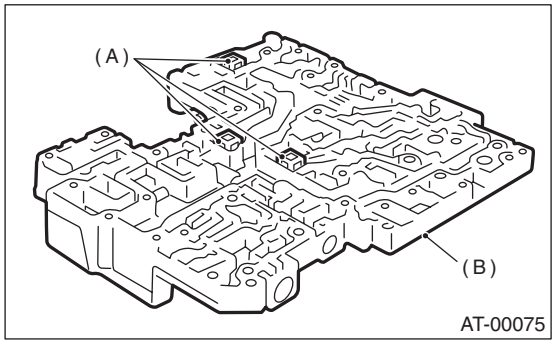
6) Insert six steel balls in their proper positions to middle valve body.



(A) Steel ball
(B) Middle valve body

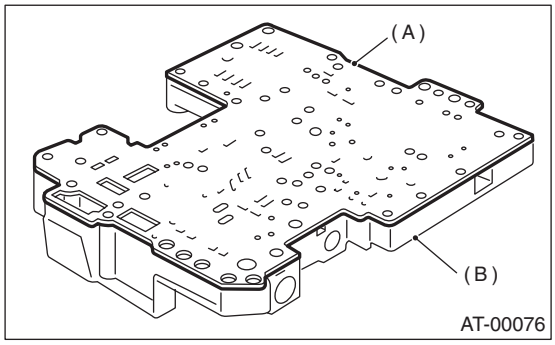
7) Install three filters to lower valve body.

NOTE:
Pay attention to the location of filters.



(A) Strainer
(B) Lower valve body

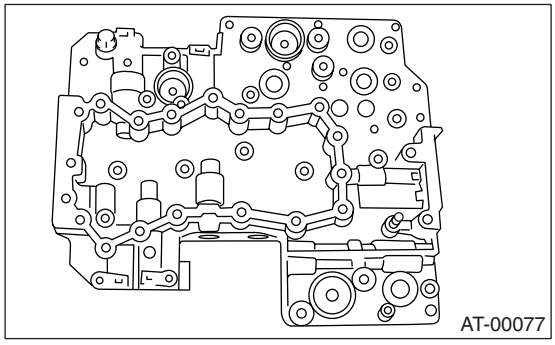
8) Install lower separate plate to lower valve body.



(A) Lower separator plate
(B) Lower valve body

9) Temporarily assemble valve body.

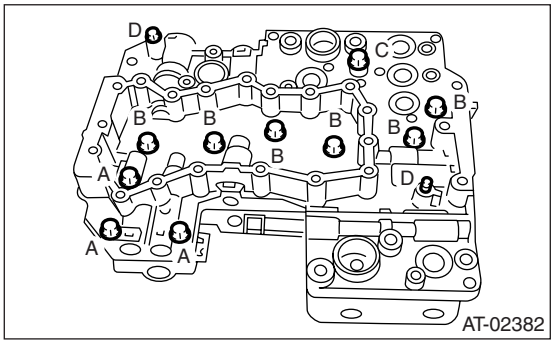
NOTE:
Be careful not to drop the middle valve body and upper body interior steel ball, or the lower body filter.



10) Tighten bolts.

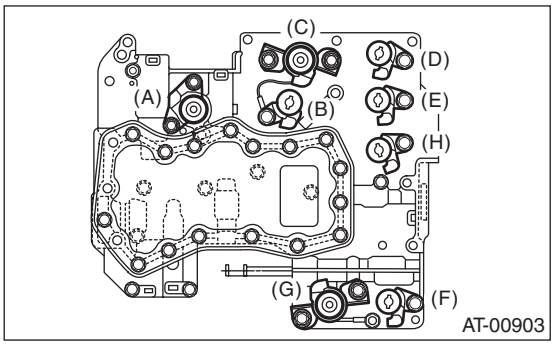
NOTE:
Install the bolts (D) from upper valve body side.

Tightening torque:
8 N·m (0.8 kgf-m, 5.8 ft-lb)



Bolt length mm (in)
(A) 40 (1.57)
(B) 62 (2.44)
(C) 73 (2.87)
(D) 79 (3.11)

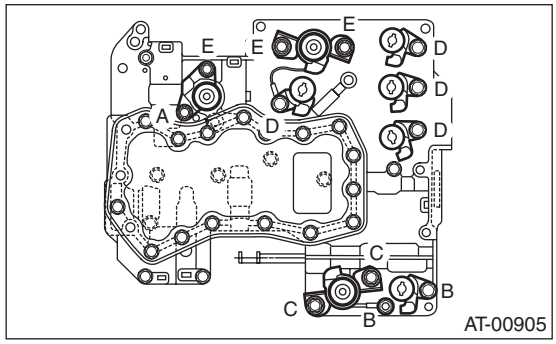
11) Install the solenoids and duty solenoids to specified positions.



(A) Lock-up duty solenoid (Blue)
(B) Low clutch timing solenoid (Gray)
(C) Line pressure duty solenoid (Red)
(D) Shift solenoid 1 (Yellow)
(E) Shift solenoid 2 (Green)
(F) 2-4 brake timing solenoid (Black)
(G) 2-4 brake duty solenoid (Red)
(H) SPORT shift solenoid (Beige) (if equipped)

12) Tighten the bolts and nuts.

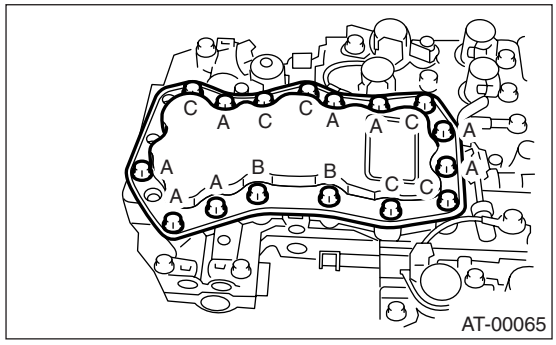
Tightening torque:
8 N·m (0.8 kgf-m, 5.8 ft-lb)



Bolt length mm (in)
(A) 12 (0.47)
(B) 40 (1.57)
(C) 45 (1.77)
(D) 62 (2.44)
(E) 73 (2.87)

13) Install oil strainer to lower valve body.

Tightening torque:
8 N·m (0.8 kgf-m, 5.8 ft-lb)



Bolt length mm (in)
(A) 12 (0.47)
(B) 62 (2.44)
(C) 81 (3.19)

E: INSPECTION

Make sure that each component is free of harmful gouges, cuts, or dust.

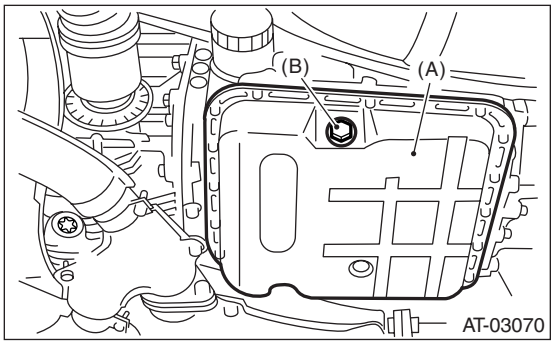
18. Shift Solenoids, Duty Solenoids and ATF Temperature Sensor

A: REMOVAL

1. SHIFT SOLENOIDS AND DUTY SOLENOIDS

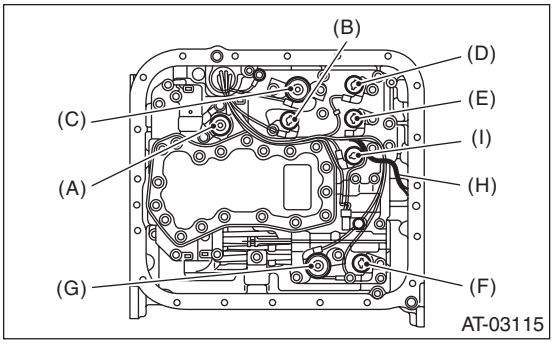
1) Lift-up the vehicle.
2) Clean the transmission exterior.
3) Replace the gasket with a new one, and tighten the drain plug.
4) Drain the ATF completely.

Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)



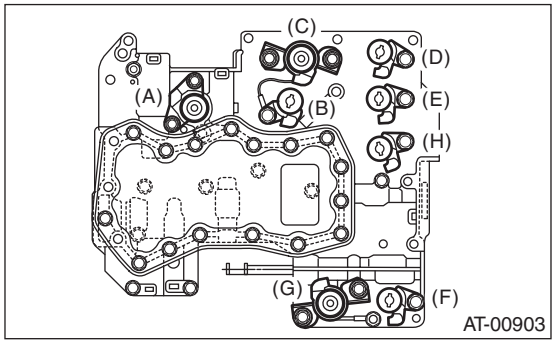
(A) Oil pan
(B) Drain plug

5) Remove the oil pan.
6) Disconnect the solenoid and duty solenoid connectors.



(A) Lock-up duty solenoid (Blue)
(B) Low clutch timing solenoid (Gray)
(C) Line pressure duty solenoid (Red)
(D) Shift solenoid 2 (Yellow)
(E) Shift solenoid 1 (Green)
(F) 2-4 brake timing solenoid (Black)
(G) 2-4 brake duty solenoid (Red)
(H) Transfer duty solenoid (Brown)
(I) SPORT shift solenoid (Beige) (if equipped)

7) Remove the solenoids and duty solenoids.



(A) Lock-up duty solenoid (Blue)
(B) Low clutch timing solenoid (Gray)
(C) Line pressure duty solenoid (Red)
(D) Shift solenoid 2 (Yellow)
(E) Shift solenoid 1 (Green)
(F) 2-4 brake timing solenoid (Black)
(G) 2-4 brake duty solenoid (Red)
(H) SPORT shift solenoid (Beige) (if equipped)

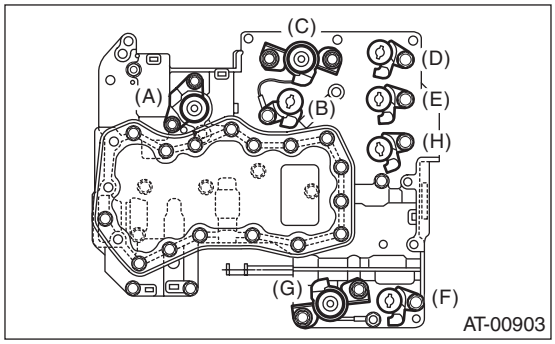
2. ATF TEMPERATURE SENSOR

For removal of ATF temperature sensor, refer to "Front Vehicle Speed Sensor." <Ref. to 4AT-57, REMOVAL, Front Vehicle Speed Sensor.>

B: INSTALLATION

1. SHIFT SOLENOIDS AND DUTY SOLENOIDS

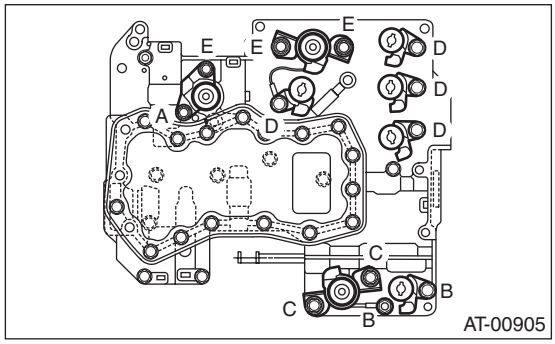
1) Insert solenoid and duty solenoid to specified position.



(A) Lock-up duty solenoid (Blue)
(B) Low clutch timing solenoid (Gray)
(C) Line pressure duty solenoid (Red)
(D) Shift solenoid 2 (Yellow)
(E) Shift solenoid 1 (Green)
(F) 2-4 brake timing solenoid (Black)
(G) 2-4 brake duty solenoid (Red)
(H) SPORT shift solenoid (Beige) (if equipped)

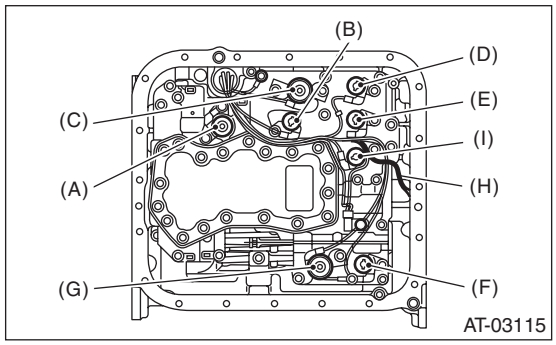
2) Tighten the bolts and nuts.

Tightening torque:
8 N·m (0.8 kgf-m, 5.8 ft-lb)



Bolt length mm (in)
(A) 12 (0.47)
(B) 40 (1.57)
(C) 45 (1.77)
(D) 62 (2.44)
(E) 73 (2.87)

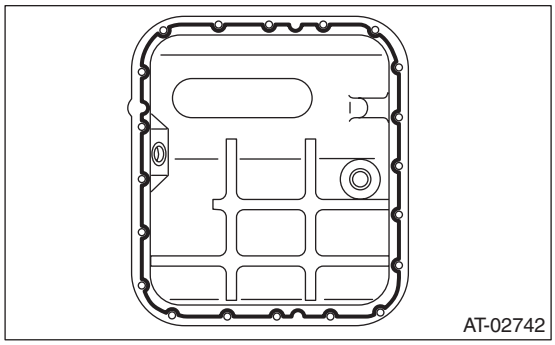
3) Connect the harness connectors.
Connect the connectors of same color, and secure the connectors to valve body using clips.



(A) Lock-up duty solenoid (Blue)
(B) Low clutch timing solenoid (Gray)
(C) Line pressure duty solenoid (Red)
(D) Shift solenoid 2 (Yellow)
(E) Shift solenoid 1 (Green)
(F) 2-4 brake timing solenoid (Black)
(G) 2-4 brake duty solenoid (Red)
(H) Transfer duty solenoid (Brown)
(I) SPORT shift solenoid (Beige) (if equipped)

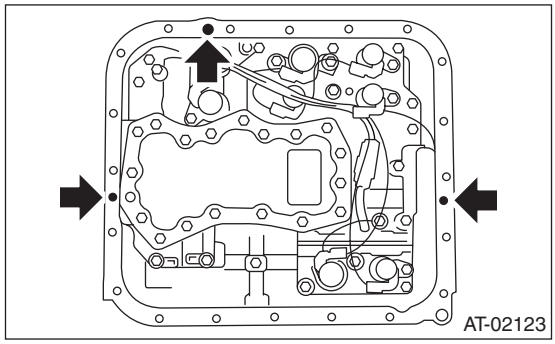
4) Apply proper amount of liquid gasket to the entire oil pan mating surface.

Liquid gasket:
THREE BOND 1217B (Part No. K0877YA020)



5) Apply liquid gasket fully to three holes other than screw holes on transmission case.

Liquid gasket:
THREE BOND 1217B (Part No. K0877YA020)



6) Install the oil pan.

Tightening torque:
5 N·m (0.5 kgf-m, 3.6 ft-lb)

7) Fill ATF. <Ref. to 4AT-32, Automatic Transmission Fluid.>
8) Check the ATF level. <Ref. to 4AT-32, Automatic Transmission Fluid.>

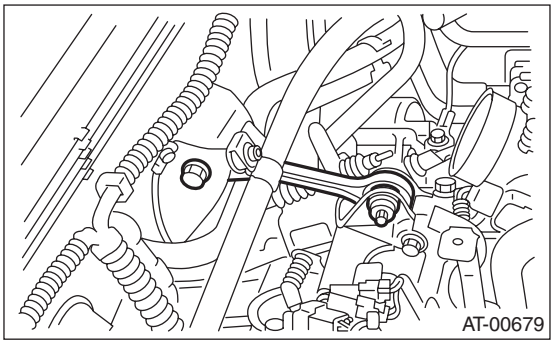
2. ATF TEMPERATURE SENSOR

For installation of ATF temperature sensor, refer to “Front Vehicle Speed Sensor.” <Ref. to 4AT-58, INSTALLATION, Front Vehicle Speed Sensor.>

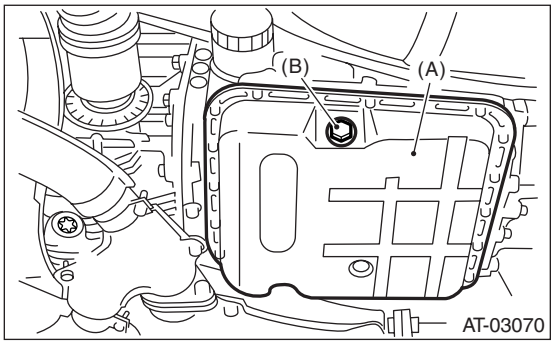
19. Transfer Duty Solenoid and Valve Body

A: REMOVAL

1) Set the vehicle on a lift.
2) Disconnect the ground cable from battery.
3) Remove the air cleaner case. (1.6 L, 2.0 L Non-turbo and 2.5 L models)
<Ref. to IN(H4SO)-5, REMOVAL, Air Cleaner Case.>
4) Remove intercooler. (Turbo model)
<Ref. to IN(H4DOTC)-12, REMOVAL, Intercooler.>
5) Remove the pitching stopper.

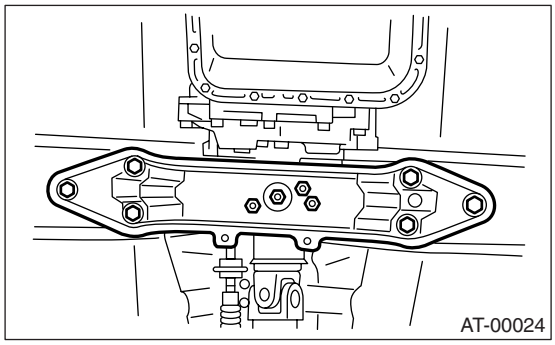


6) Remove the front exhaust pipe with center exhaust pipe. (Non-turbo model)
<Ref. to EX(H4SO)-6, REMOVAL, Front Exhaust Pipe.>
7) Remove center exhaust pipe. (Turbo model)
<Ref. to EX(H4DOTC)-10, REMOVAL, Center Exhaust Pipe.>
8) Remove the rear exhaust pipe and muffler. (Non-turbo model)
<Ref. to EX(H4SO)-10, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(H4SO)-12, REMOVAL, Muffler.>
(Turbo model)
<Ref. to EX(H4DOTC)-15, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(H4DOTC)-16, REMOVAL, Muffler.>
9) Raise the vehicle and drain the ATF.

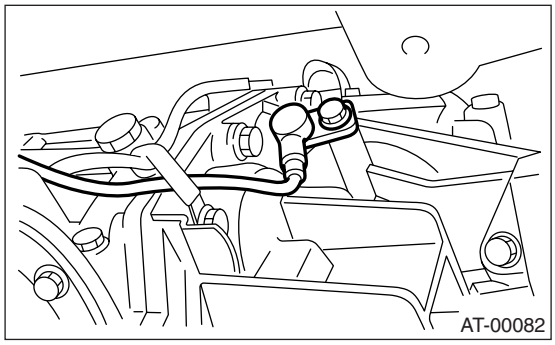


(A) Oil pan
(B) ATF drain plug

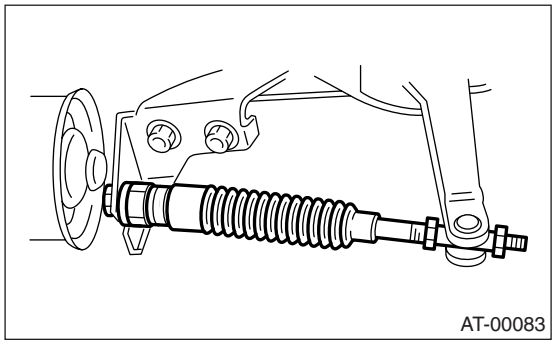
10) Remove the heat shield cover. (If equipped)
11) Remove the propeller shaft. <Ref. to DS-17, REMOVAL, Propeller Shaft.>
12) Remove the transmission rear crossmember.
(1) Support the transmission using a transmission jack and raise slightly.
(2) Remove the bolts and nuts as shown in the figure.



13) Remove the rear vehicle speed sensor.



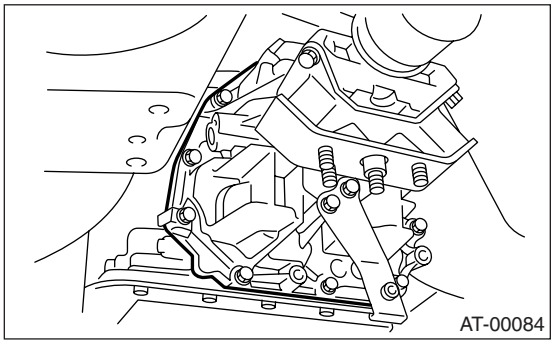
14) Remove the select cable nut.



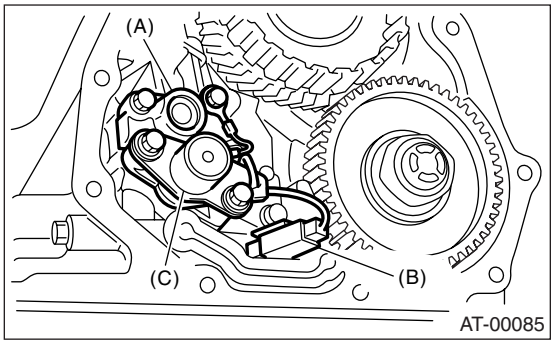
15) Move the select cable so that extension bolts can be removed.
16) Remove the bolts.

17) Remove the extension case.

NOTE:
Use a container to catch oil flowing from extension.



18) Disconnect the transfer duty solenoid connector.
19) Remove the transfer duty solenoid and transfer valve body.



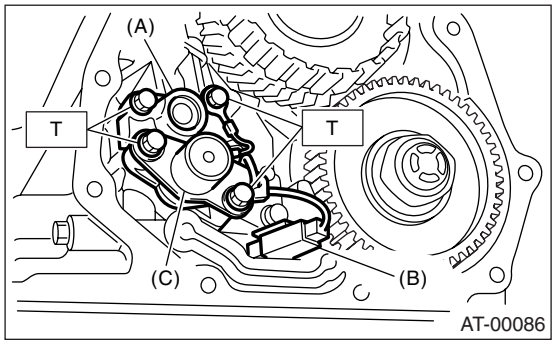
(A) Transfer valve body
(B) Transfer duty solenoid connector
(C) Transfer duty solenoid

B: INSTALLATION

1) Install the transfer duty solenoid and transfer valve body.
(1) Install the transfer duty solenoid and transfer valve body.

Tightening torque:
T: 8 N·m (0.8 kgf-m, 5.8 ft-lb)

(2) Connect the transfer duty solenoid connector.



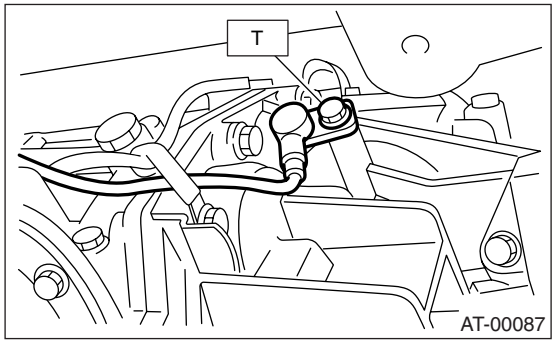
(A) Transfer valve body
(B) Transfer duty solenoid connector
(C) Transfer duty solenoid

2) Install a new gasket and the extension case to transmission case.
(1) Tighten eleven bolts.

Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)

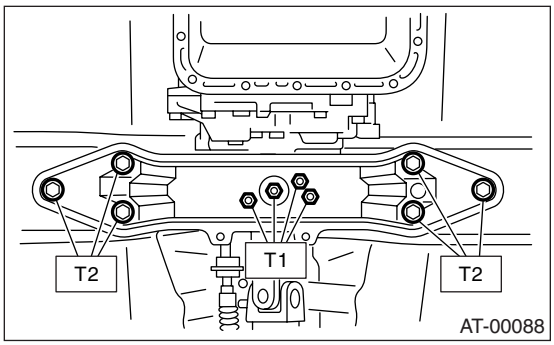
(2) Adjust the select cable. <Ref. to CS-34, ADJUSTMENT, Select Cable.>
3) Install the rear vehicle speed sensor.

Tightening torque:
T: 7 N·m (0.7 kgf-m, 5.2 ft-lb)

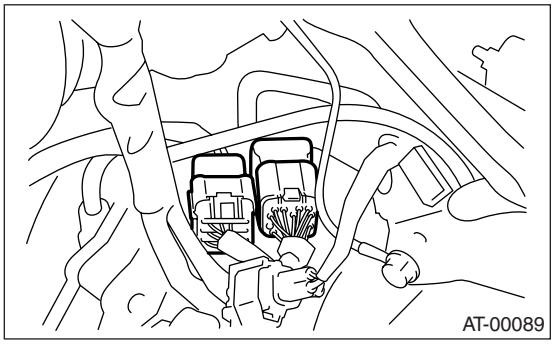


4) Install the transmission rear crossmember.
(1) Tighten the bolts.

Tightening torque:
T1: 35 N·m (3.6 kgf-m, 26 ft-lb)
T2: 70 N·m (7.1 kgf-m, 51 ft-lb)

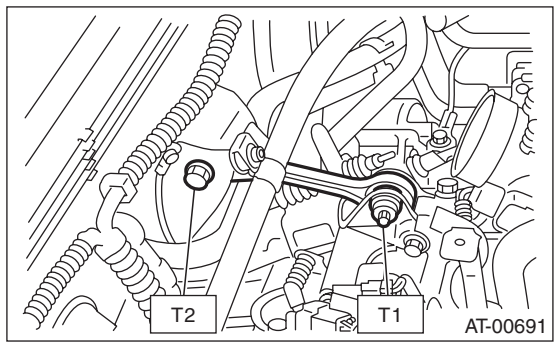


(2) Remove the transmission jack.
5) Install the propeller shaft. <Ref. to DS-18, INSTALLATION, Propeller Shaft.>
6) Install the front, center rear exhaust pipe and muffler. (Non-turbo model)
<Ref. to EX(H4SO)-7, INSTALLATION, Front Exhaust Pipe.>, <Ref. to EX(H4SO)-10, INSTALLATION, Rear Exhaust Pipe.> and <Ref. to EX(H4SO)-12, INSTALLATION, Muffler.>
7) Install center and rear exhaust pipes, and muffler. (Turbo model)
<Ref. to EX(H4DOTC)-11, INSTALLATION, Center Exhaust Pipe.>, <Ref. to EX(H4DOTC)-15, INSTALLATION, Rear Exhaust Pipe.> and <Ref. to EX(H4DOTC)-16, INSTALLATION, Muffler.>
8) Connect the transmission harness connector.



9) Install the pitching stopper.

Tightening torque:
T1: 50 N·m (5.1 kgf-m, 37 ft-lb)
T2: 58 N·m (5.9 kgf-m, 43 ft-lb)



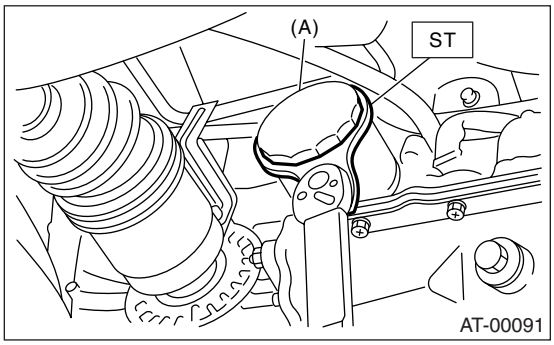
10) Install the air cleaner case. (1.6 L, 2.0 L Non-turbo and 2.5 L models)
<Ref. to IN(H4SO)-5, INSTALLATION, Air Cleaner Case.>
11) Install intercooler. (Turbo model)
<Ref. to IN(H4DOTC)-12, INSTALLATION, Intercooler.>
12) Fill ATF up to the middle of the “COLD” side on level gauge by using the gauge hole. <Ref. to 4AT-32, Automatic Transmission Fluid.>
13) Check the ATF level. <Ref. to 4AT-32, Automatic Transmission Fluid.>

20.ATF Filter

A: REMOVAL

NOTE:
The ATF filter is maintenance free.

1) Lift-up the vehicle.
2) Using ST, remove ATF filter.
ST 498545400 FILTER WRENCH



(A) ATF filter

B: INSTALLATION

1) Get new ATF filter and apply a thin coat of ATF to the oil seal.
2) Install ATF filter. Turn it by hand, being careful not to damage oil seal.
3) Using ST, tighten ATF filter.
Calculate ATF filter torque specifications using the following formula.
$T2 = L2/(L1 + L2) \times T1$
T1: 14 N·m (1.4 kgf-m, 10.1 ft-lb)
[Required torque setting]
T2: Tightening torque
L1: ST length 0.078 m (3.07 in)
L2: Torque wrench length
Example:

Torque wrench length mm (in)	Tightening torque N·m (kgf-m, ft-lb)
100 (3.94)	7.7 (0.79, 5.7)
150 (5.91)	9.0 (0.92, 6.7)
200 (7.87)	10 (1.0, 7.2)

NOTE:
Align ST with torque wrench while tightening ATF filter.

ST 498545400 FILTER WRENCH

4) Add ATF.
5) Inspect level of ATF. <Ref. to 4AT-32, Automatic Transmission Fluid.>

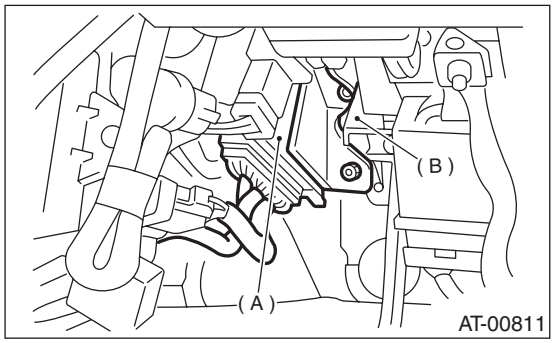
C: INSPECTION

Replace the part if any defect is found from the inspection.
Check for rust, hole, ATF leaks, and other damage.

21.Transmission Control Module (TCM)

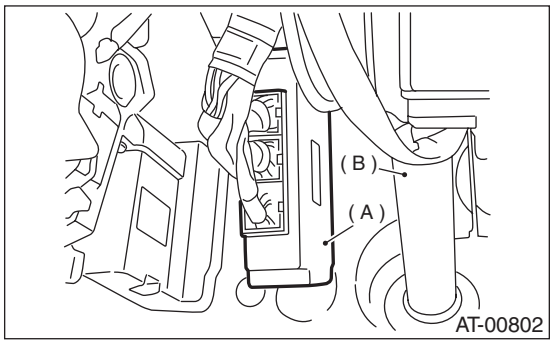
A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the lower cover and then disconnect the connector.
3) Remove the connectors from TCM.
LHD model



(A) Transmission control module (TCM)
(B) Brake pedal

RHD model



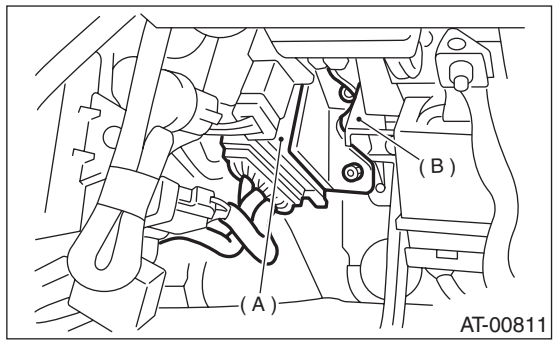
(A) Transmission control module (TCM)
(B) Column shaft

4) Remove the TCM.

B: INSTALLATION

1) Install the TCM.
LHD model

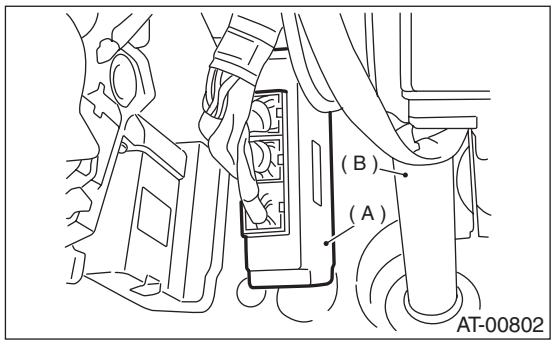
Tightening torque:
7.5 N·m (0.76 kgf-m, 5.5 ft-lb)



(A) Transmission control module (TCM)
(B) Brake pedal

RHD model

Tightening torque:
18 N·m (1.8 kgf-m, 13 ft-lb)



(A) Transmission control module (TCM)
(B) Column shaft

2) Connect the connectors to TCM.
3) Install in the reverse order of removal.

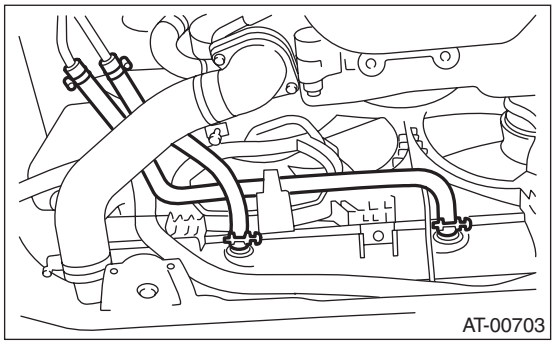
22.ATF Cooler Pipe and Hose

A: REMOVAL

1. EXCEPT FOR WITH ATF COOLER MODEL (WITH WARMER FUNCTION)

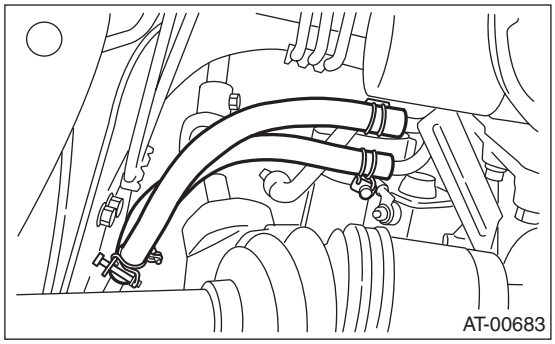
1) Set the vehicle on a lift.
2) Remove battery and washer tank.
3) Lift-up the vehicle.
4) Remove the under cover.
5) Disconnect ATF cooler hose from radiator.

NOTE:
• Do not remove with a screwdriver or other pointed tools.
• When the hose is difficult to remove, wrap a shop cloth around the hose to protect it. Turn it with pliers, and then pull directly out with your hand.

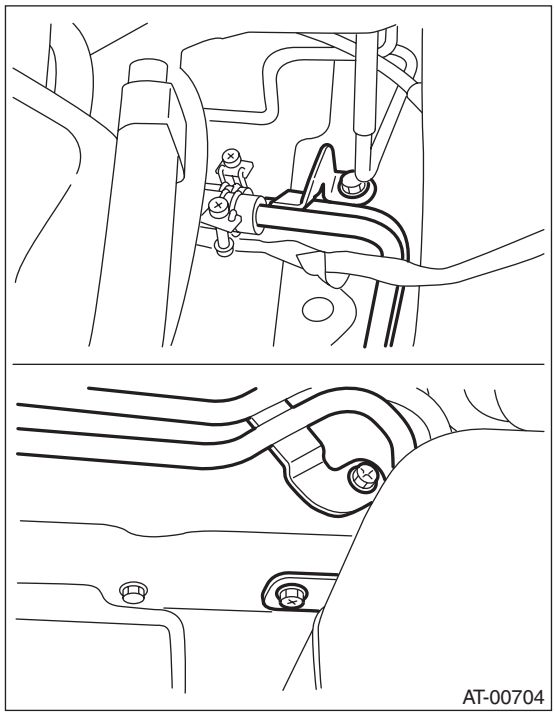


6) Disconnect ATF cooler hoses from pipes.

NOTE:
• Do not remove with a screwdriver or other pointed tools.
• When the hose is difficult to remove, wrap a shop cloth around the hose to protect it. Turn it with pliers, and then pull directly out with your hand.

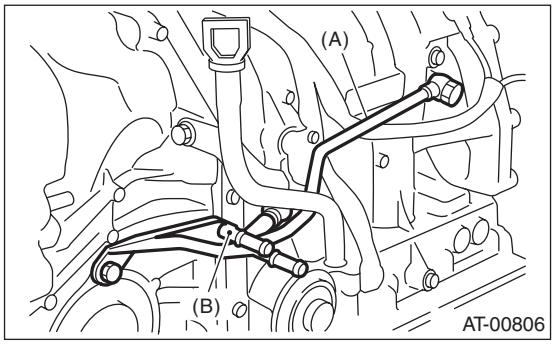


7) Remove ATF cooler pipe from frame.



8) Remove the oil cooler inlet and outlet pipes.

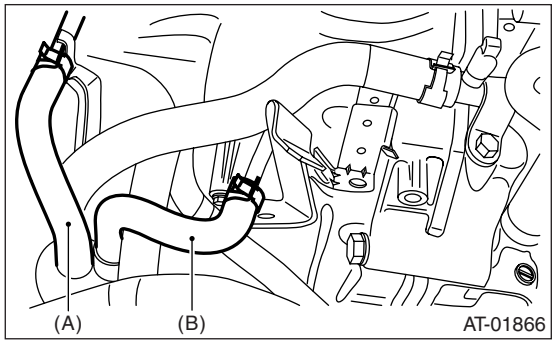
NOTE:
When removing outlet pipe, be careful not to lose ball and spring used with retaining screw.



(A) Inlet pipe
(B) Outlet pipe

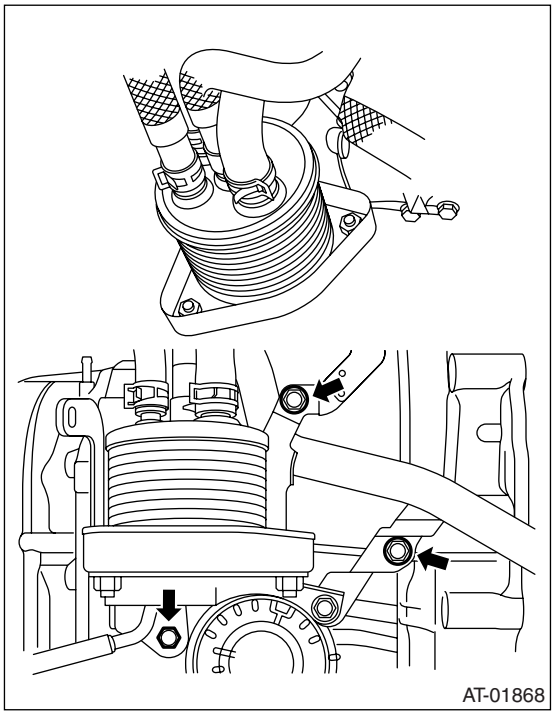
2. WITH ATF COOLER MODEL (WITH WARMER FUNCTION)

1) Set the vehicle on a lift.
2) Remove the air cleaner case. <Ref. to IN(H4SO)-5, REMOVAL, Air Cleaner Case.>
3) Remove the inlet and outlet hoses.



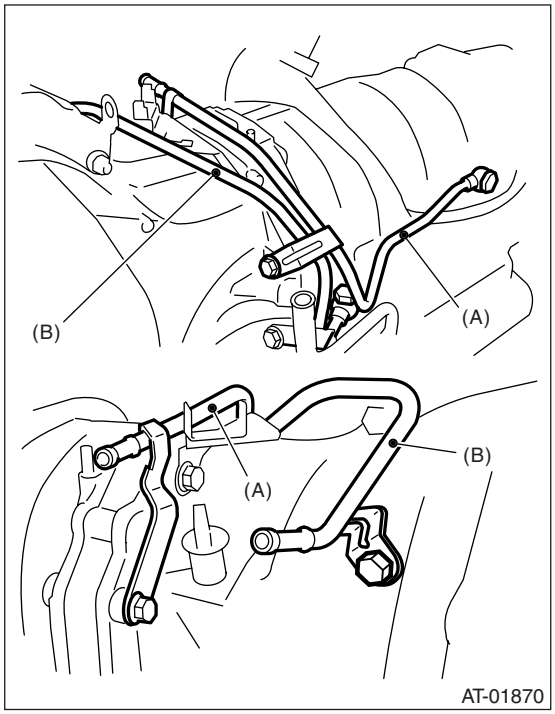
(A) Inlet hose
(B) Outlet hose

4) Disconnect the transmission harness connector and remove it from the stay.
5) Remove the oil charger pipe. <Ref. to 4AT-84, REMOVAL, Oil Charge Pipe.>
6) Remove the ATF cooler assembly and away from the transmission body.



7) Remove the air breather hose. <Ref. to 4AT-83, REMOVAL, Air Breather Hose.>
8) Remove the oil cooler inlet and outlet pipes.

CAUTION:
When disconnecting the outlet pipe, be careful not to lose the ball and spring used with retaining screw.



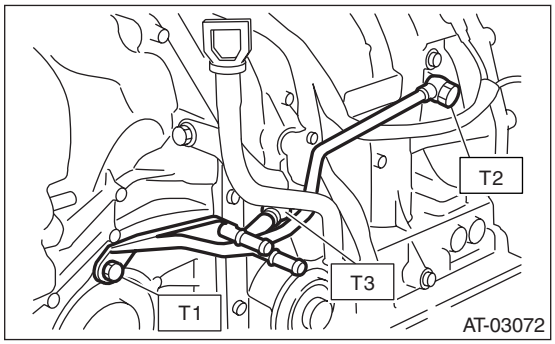
(A) ATF cooler outlet pipe
(B) ATF cooler inlet pipe

B: INSTALLATION

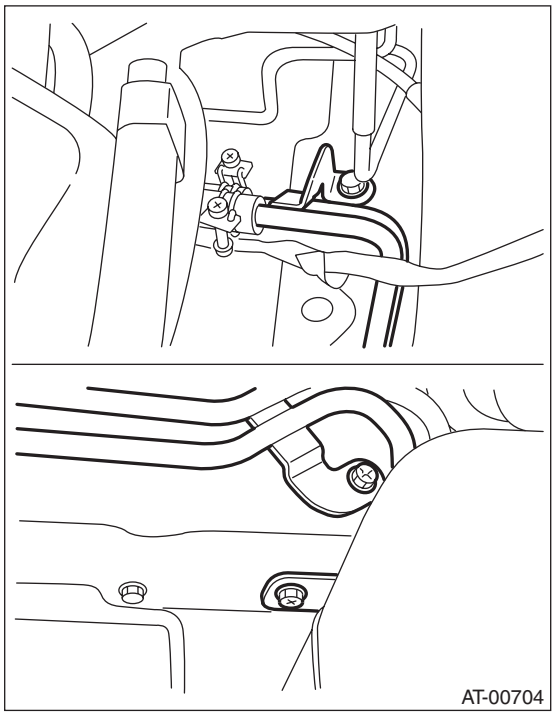
1. EXCEPT FOR WITH ATF COOLER MODEL (WITH WARMER FUNCTION)

1) Install the oil cooler outlet and inlet pipes using a new aluminum washer.

Tightening torque:
T1: 25 N·m (2.5 kgf-m, 18.1 ft-lb)
T2: 40 N·m (4.1 kgf-m, 30 ft-lb)
T3: 44 N·m (4.5 kgf-m, 32.5 ft-lb)

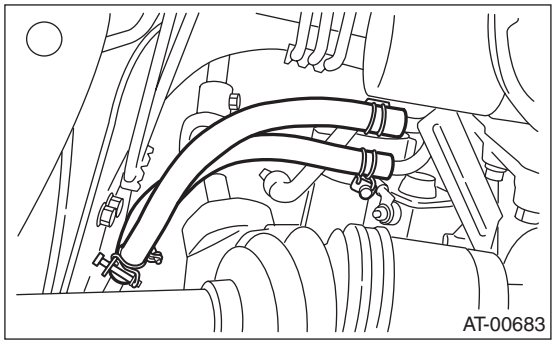


2) Install ATF cooler pipe to frame.



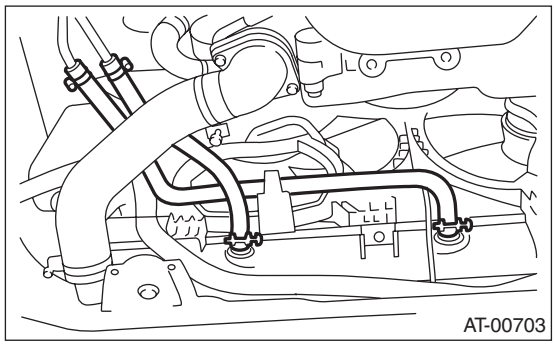
3) Connect ATF cooler hose to pipe transmission side.

NOTE:
• Install so that the hose is not folded over, excessively bent, or twisted.
• Be careful to insert the hose to the specified position.



4) Connect ATF cooler hose to pipe of radiator side.

NOTE:
• Install so that the hose is not folded over, excessively bent, or twisted.
• Be careful to insert the hose to the specified position.



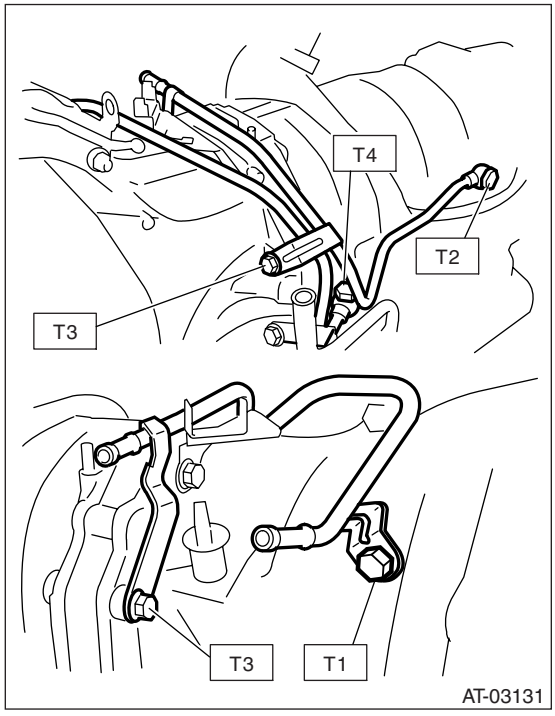
5) Install the under cover.
6) Install battery and washer tank.
7) Fill ATF. <Ref. to 4AT-32, Automatic Transmission Fluid.>

NOTE:
Make sure there are no ATF leaks in joints between the transmission, radiator, pipes, and hoses.

2. WITH ATF COOLER MODEL (WITH WARMER FUNCTION)

1) Install the ATF cooler inlet and outlet pipe with new washer.

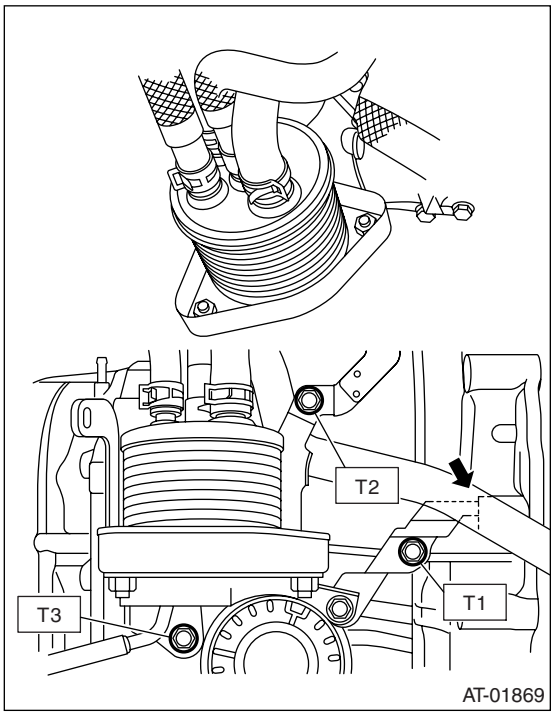
Tightening torque:
T1: 21 N·m (2.1 kgf-m, 15.5 ft-lb)
T2: 40 N·m (4.1 kgf-m, 29.5 ft-lb)
T3: 41 N·m (4.2 kgf-m, 30.2 ft-lb)
T4: 45 N·m (4.6 kgf-m, 33 ft-lb)



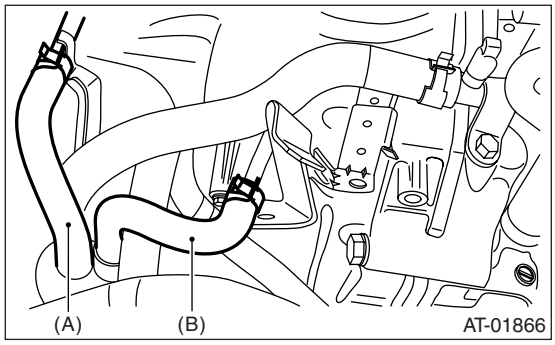
(A) ATF cooler outlet pipe
(B) ATF cooler inlet pipe

2) Install the ATF cooler assembly to transmission.

Tightening torque:
T1: 21 N·m (2.1 kgf-m, 15.5 ft-lb)
T2: 23 N·m (2.3 kgf-m, 17.0 ft-lb)
T3: 33 N·m (3.4 kgf-m, 24.3 ft-lb)



3) Install the oil charger pipe. <Ref. to 4AT-84, INSTALLATION, Oil Charge Pipe.>
4) Install the inlet and outlet hoses.



(A) Inlet hose
(B) Outlet hose

5) Install the inhibitor switch and transmission harness connector to the stay, and connect the harness connector.
6) Install the air breather hose. <Ref. to 4AT-83, INSTALLATION, Air Breather Hose.>
7) Install the air cleaner case. <Ref. to IN(H4SO)-5, INSTALLATION, Air Cleaner Case.>

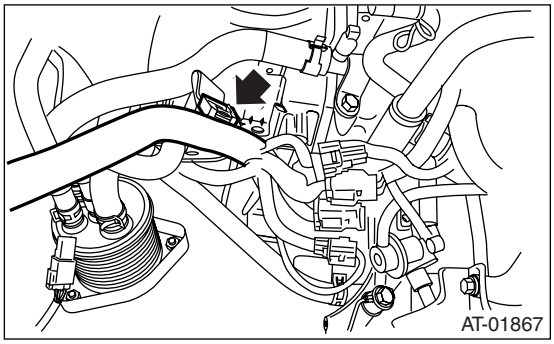
C: INSPECTION

Repair or replace any defective hoses, pipes, clamps, and washers found from the inspection below.
1) Check for ATF leaks in joints between the transmission, radiator, pipes, and hoses.
2) Check for deformed clamps.
3) Lightly bend the hose and check for cracks in the surface and other damage.
4) Pinch the hose with your fingers and check for poor elasticity. Also check for poor elasticity in the parts where the clamp was by pressing with your fingernail.
5) Check for peeling, cracks, and deformation at the tip of the hose.

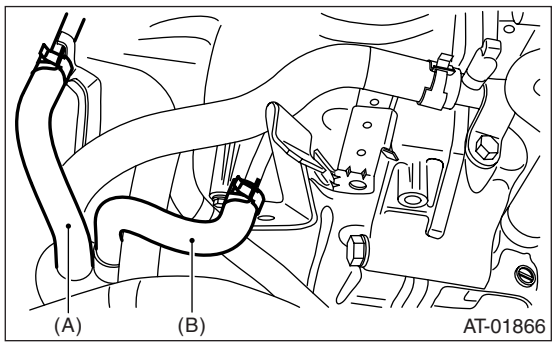
23.ATF Cooler (with warmer function)

A: REMOVAL

1) Drain engine coolant. <Ref. to CO(H4SO)-15, REPLACEMENT, Engine Coolant.>
2) Remove the air cleaner case. <Ref. to IN(H4SO)-5, REMOVAL, Air Cleaner Case.>
3) Remove the harness from bracket.

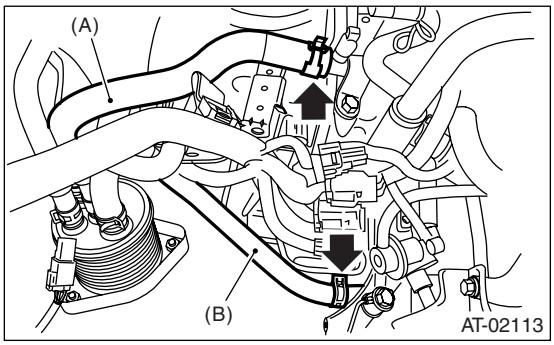


4) Disconnect the hose from pipe of transmission.



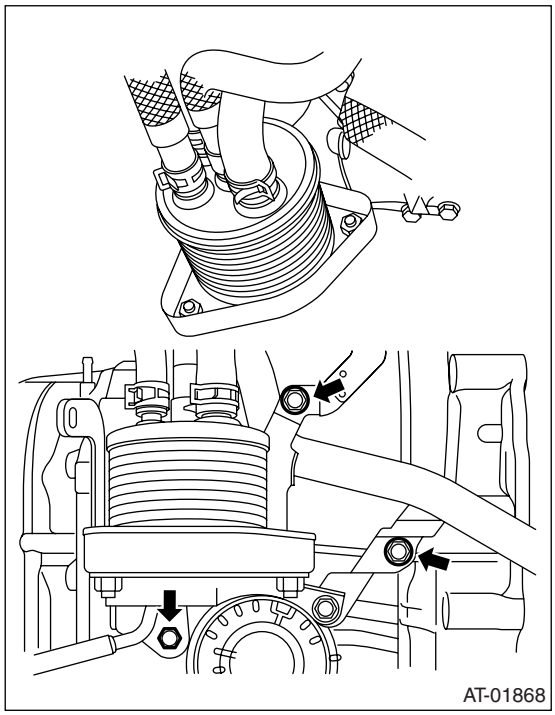
(A) Inlet pipe
(B) Outlet pipe

5) Disconnect the engine coolant inlet hose from cylinder block and the engine coolant outlet hose from upper side of engine.



(A) Outlet hose
(B) Inlet hose

6) Remove the ATF Cooler (with warmer function) from transmission body, and then disconnect the hose located lower of ATF cooler (with warmer function).

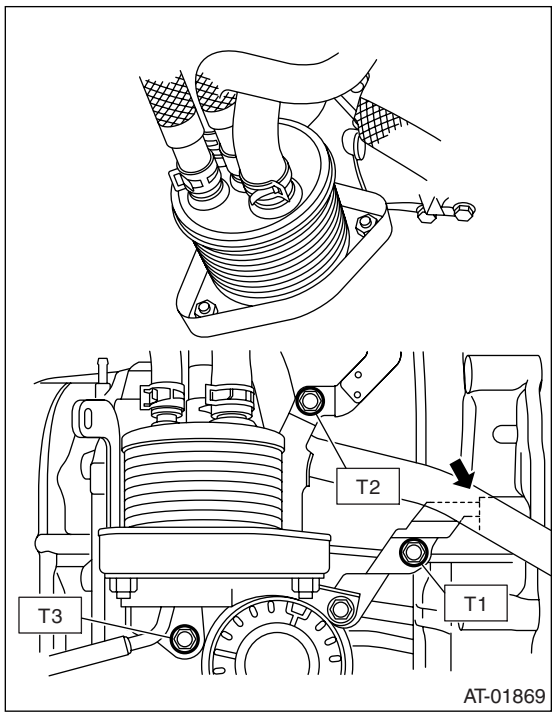


B: INSTALLATION

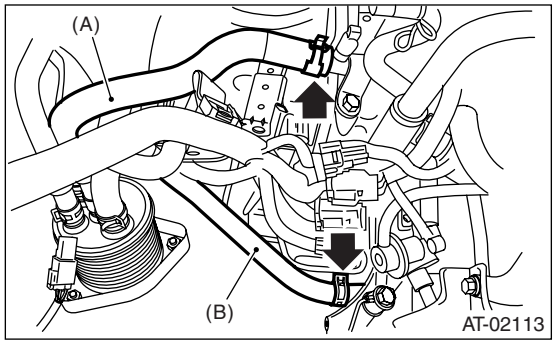
1) Connect the hose to lower side of ATF cooler (with warmer function), and then install the ATF cooler (with warmer function) to transmission body.

NOTE:
Insert the tip of ATF cooler bracket into hole of torque converter case.

Tightening torque:
T1: 21 N·m (2.1 kgf-m, 15.5 ft-lb)
T2: 23 N·m (2.3 kgf-m, 17.0 ft-lb)
T3: 33 N·m (3.4 kgf-m, 24.3 ft-lb)

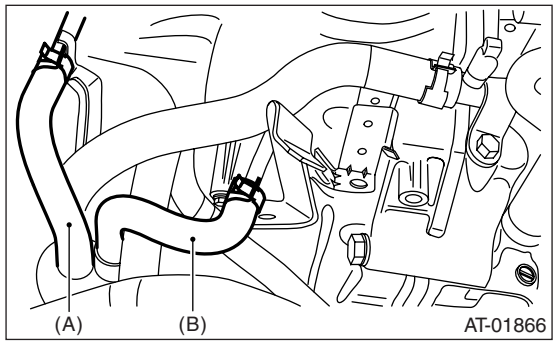


2) Connect the engine coolant inlet hose to cylinder block and the engine coolant outlet hose to upper side of engine.



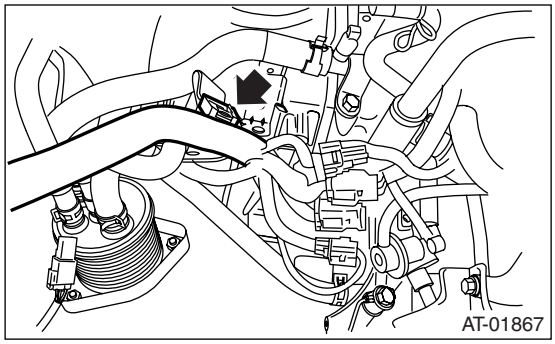
(A) Outlet hose
(B) Inlet hose

3) Connect the hose to pipe on transmission side.



(A) Inlet pipe
(B) Outlet pipe

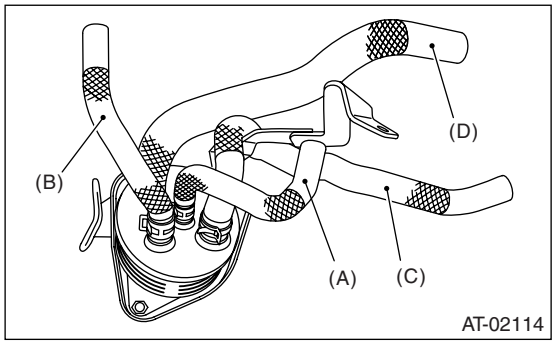
4) Install the harness to bracket.



5) Install the air cleaner case. <Ref. to IN(H4SO)-5, REMOVAL, Air Cleaner Case.>
6) Fill with engine coolant. <Ref. to CO(H4SO)-15, REPLACEMENT, Engine Coolant.>

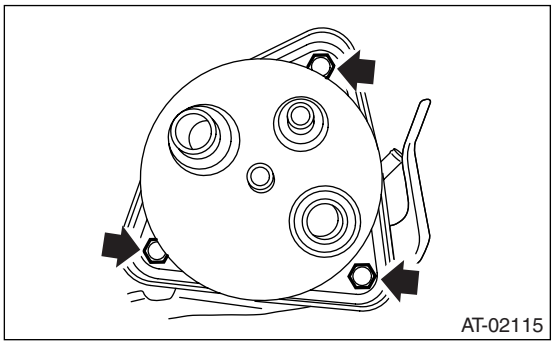
C: DISASSEMBLY

1) Disconnect each connector from ATF cooler (with warmer function).



(A) ATF Outlet hose
(B) ATF Inlet hose
(C) Engine coolant inlet hose
(D) Engine coolant outlet hose

2) Remove the ATF cooler (with warmer function) from bracket.

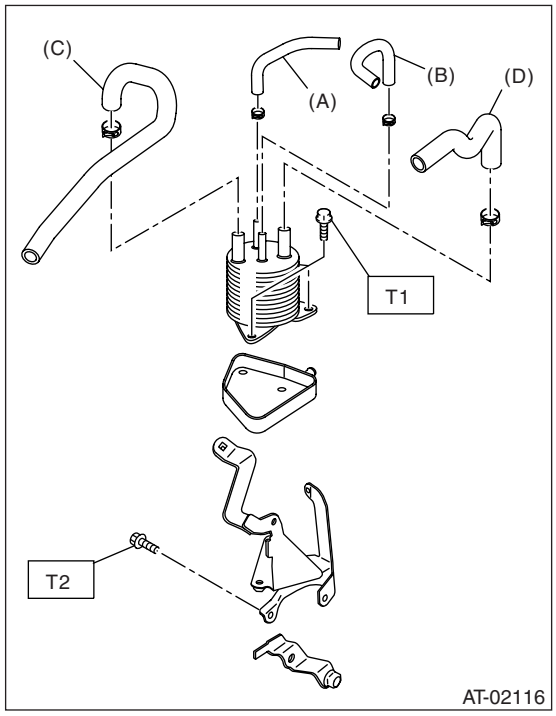


D: ASSEMBLY

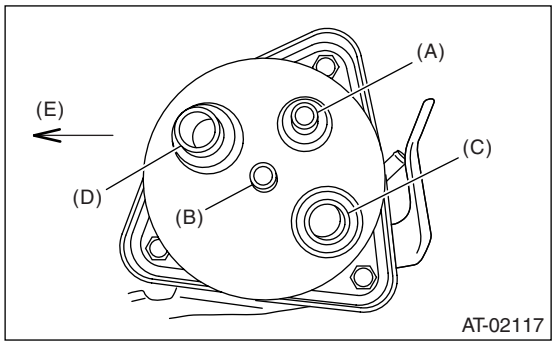
Assemble in the reverse order of disassembly.

CAUTION:
When connecting hose, be careful of its direction.

Tightening torque:
T1: 23 N·m (2.3 kgf-m, 17.0 ft-lb)
T2: 33 N·m (3.4 kgf-m, 24.3 ft-lb)



(A) ATF Inlet hose
(B) ATF Outlet hose
(C) Engine coolant outlet hose
(D) Engine coolant inlet hose



(A) ATF Inlet
(B) ATF Outlet
(C) Engine coolant outlet
(D) Engine coolant inlet
(E) Forward

E: INSPECTION

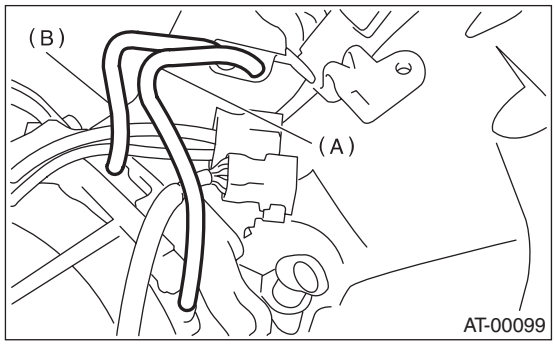
Check the ATF cooler (with warmer function) for damage.

24.Air Breather Hose

A: REMOVAL

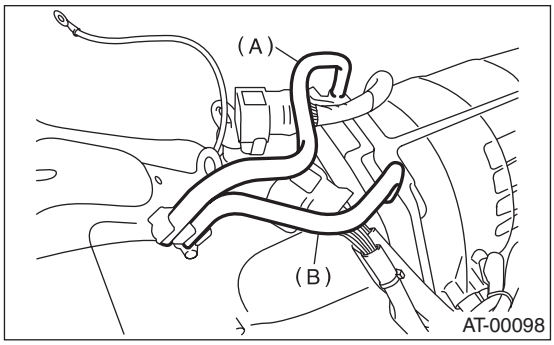
1) Remove the air cleaner case. (2.0 L Non-turbo and 2.5 L models)
<Ref. to IN(H4SO)-5, REMOVAL, Air Cleaner Case.>
2) Remove intercooler. (Turbo model)
<Ref. to IN(H4DOTC)-12, REMOVAL, Intercooler.>
3) Disconnect the air breather hoses.

- NON-TURBO MODEL



(A) Air breather hose (Transmission case)
(B) Air breather hose (Oil pump housing)

- TURBO MODEL

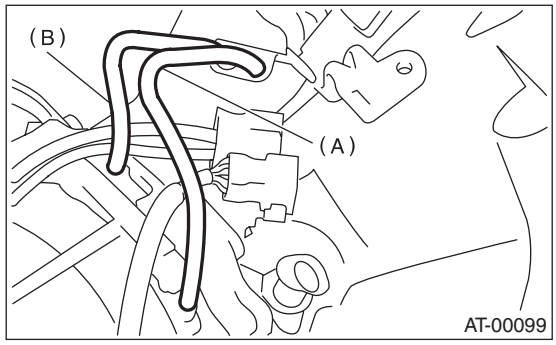


(A) Air breather hose (Transmission case)
(B) Air breather hose (Oil pump housing)

B: INSTALLATION

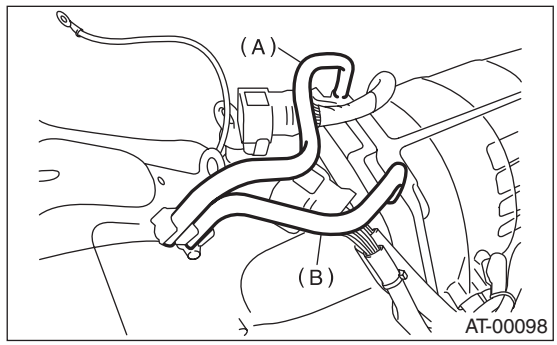
1) Install air breather hoses.

- NON-TURBO MODEL



(A) Air breather hose (Transmission case)
(B) Air breather hose (Oil pump housing)

- TURBO MODEL



(A) Air breather hose (Transmission case)
(B) Air breather hose (Oil pump housing)

2) Install the air cleaner case. (2.0 L Non-turbo and 2.5 L models)
<Ref. to IN(H4SO)-5, INSTALLATION, Air Cleaner Case.>
3) Install intercooler. (Turbo model)
<Ref. to IN(H4DOTC)-12, INSTALLATION, Intercooler.>

C: INSPECTION

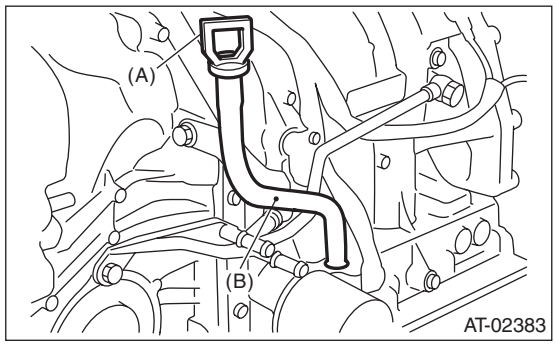
Make sure the hose is not cracked or clogged.

25.Oil Charge Pipe

A: REMOVAL

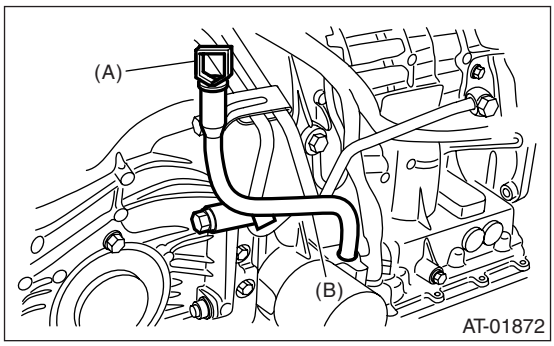
1) Remove the air cleaner case. (2.0 L Non-turbo and 2.5 L models)
<Ref. to IN(H4SO)-5, REMOVAL, Air Cleaner Case.>
2) Remove intercooler. (Turbo model)
<Ref. to IN(H4DOTC)-12, REMOVAL, Intercooler.>
3) Remove the oil charge pipe, and remove the O-ring from the flange face.

- Without ATF cooler (warmer function)



(A) Oil level gauge
(B) Oil charge pipe

- With ATF cooler (warmer function)



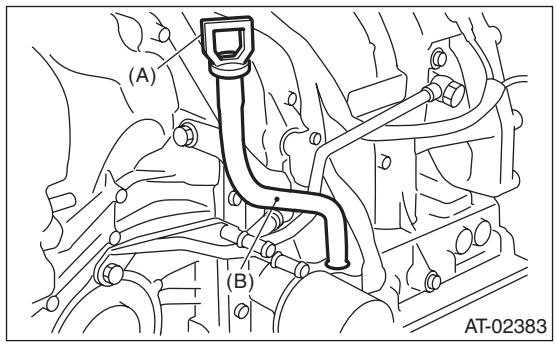
(A) Oil level gauge
(B) Oil charge pipe

B: INSTALLATION

1) Install the oil charge pipe with new O-ring.

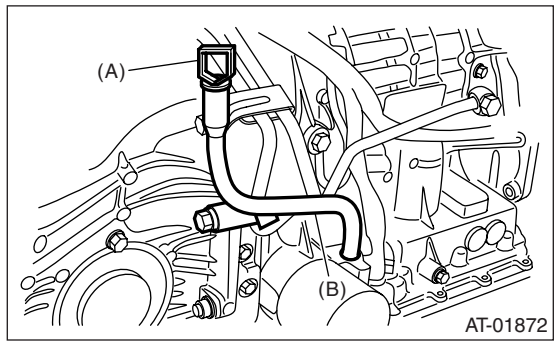
Tightening torque:
41 N·m (4.2 kgf-m, 30.2 ft-lb)

- Without ATF cooler (warmer function)



(A) Oil level gauge
(B) Oil charge pipe

- With ATF cooler (warmer function)



(A) Oil level gauge
(B) Oil charge pipe

2) Install the air cleaner case. (2.0 L Non-turbo and 2.5 L models)
<Ref. to IN(H4SO)-5, INSTALLATION, Air Cleaner Case.>
3) Install intercooler. (Turbo model)
<Ref. to IN(H4DOTC)-12, INSTALLATION, Intercooler.>

C: INSPECTION

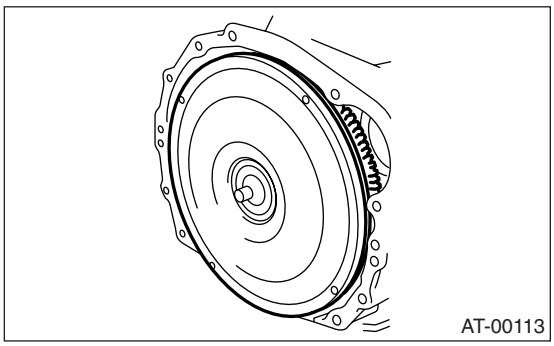
Make sure the oil charge pipe is not deformed or otherwise damaged.

26. Torque Converter Clutch Assembly

A: REMOVAL

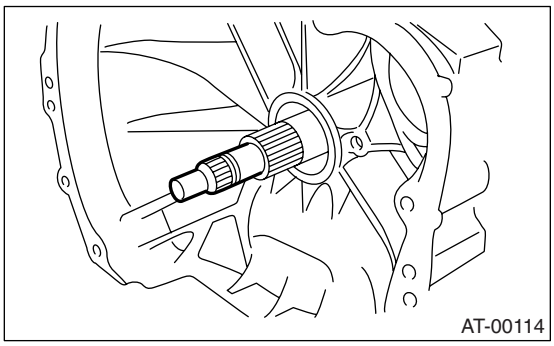
1) Remove the transmission assembly from the vehicle. <Ref. to 4AT-41, REMOVAL, Automatic Transmission Assembly.>
2) Extract the torque converter clutch and oil pump shaft horizontally.

NOTE:
Be careful not to scratch the bushing inside the oil pump shaft.



3) Remove the input shaft.

NOTE:
When the torque converter clutch assembly is removed, the input shaft will come out.

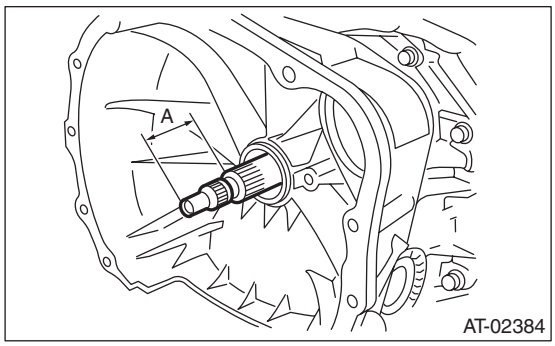


4) Remove the clip from torque converter clutch.

B: INSTALLATION

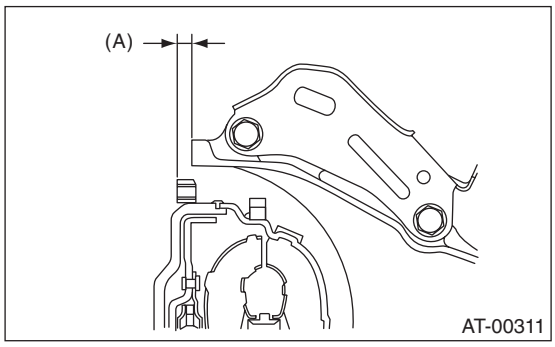
1) Install the clip to torque converter clutch.
2) Install the oil pump shaft to the torque converter clutch, and then check the clip fits securely in its groove.
3) Insert the input shaft while rotating it lightly by hand, and then check the protrusion amount.

Normal protrusion amount A:
50 — 55 mm (1.97 — 2.17 in)



4) Holding the torque converter clutch assembly by hand, carefully install it to the converter case. Be careful not to damage the bushing. Also avoid undue contact between the oil pump shaft bushing and stator shaft portion of the oil pump cover.
5) Rotate the shaft lightly by hand to engage the splines securely.

Dimension A:
1.6 L and 2.0 L Non-turbo model
–1.3 — –1.1 mm (–0.051 — –0.043 in)
2.5 L and 2.0 L Turbo model
2.7 — 2.9 mm (0.106 — 0.114 in)



(A) Dimension A

6) Install the transmission assembly to vehicle. <Ref. to 4AT-44, INSTALLATION, Automatic Transmission Assembly.>

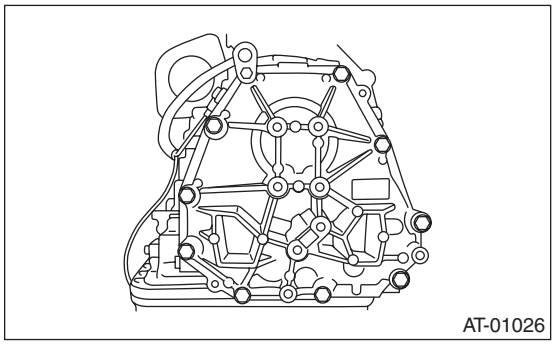
C: INSPECTION

Make sure the ring gear is not damaged and that the protrusion on the edge of the torque converter clutch is not deformed or otherwise damaged.

27.Transmission Cover

A: REMOVAL

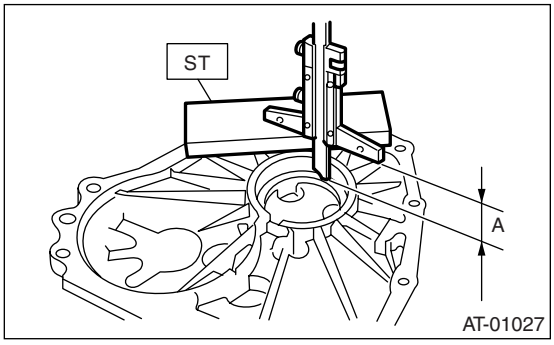
1) Remove transmission cover.



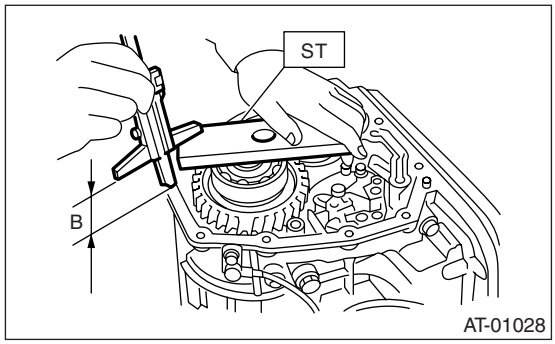
2) Take out shim from transmission cover.

B: INSTALLATION

1) Measure depth “A” from end of transmission cover point at bearing location to ST end surface with ST.
ST 398643600 GAUGE



2) Measure the height “B” from the transmission case mating surface to ST end surface with ST.
ST 398643600 GAUGE



3) Calculation equation:
T = A − B + 0.40 mm (0.015 in)
T: Shim clearance
A: Depth from extension case mating surface to ST end surface.
B: Height from transmission case mating surface to ST end surface.

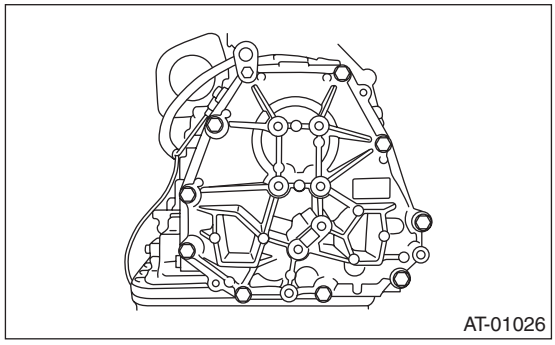
Adjusting shim	
Part No.	Thickness mm (in)
31288AA020	0.15 (0.0059)

4) Attach the selected adjusting shim to transmission cover.
5) Install the transmission cover to the transmission case.

CAUTION:
Be sure to use a new gasket.

6) Tighten bolts to secure the case.

Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)



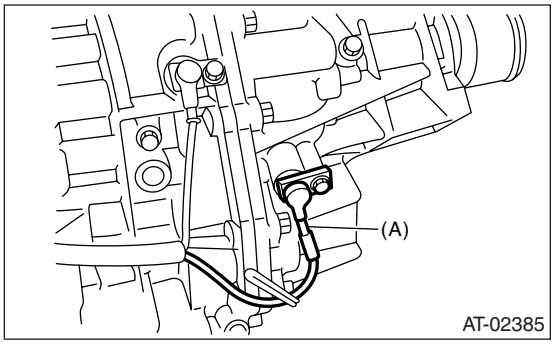
C: INSPECTION

Make sure that the transmission cover has no cracks.

28.Extension Case

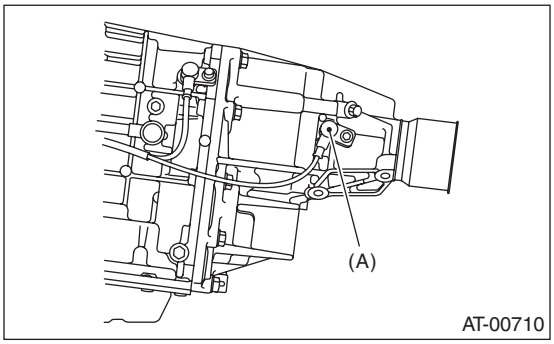
A: REMOVAL

1) Remove the transmission assembly. <Ref. to 4AT-41, REMOVAL, Automatic Transmission Assembly.>
2) Remove rear vehicle speed sensor.
• MPT MODEL



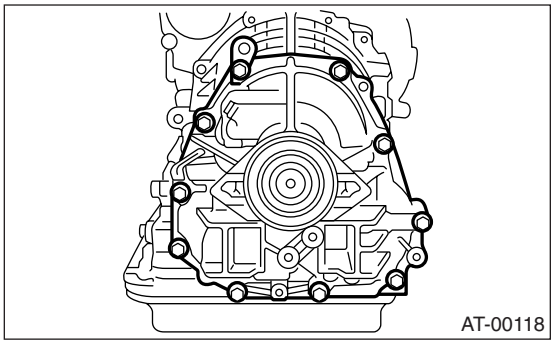
(A) Rear vehicle speed sensor

• VTD MODEL



(A) Rear vehicle speed sensor

3) Separate transmission case and extension case sections.



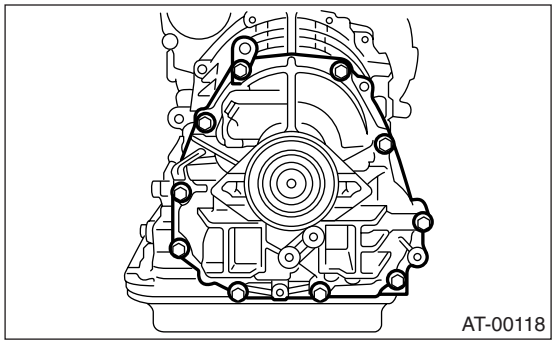
B: INSTALLATION

1) Attach the selected thrust needle bearing to the end surface of reduction drive gear with vaseline.

NOTE:
Install thrust needle bearing in the correct direction.

2) Install new gasket.
3) Install the extension case to the transmission case.
4) Tighten bolts to secure the case.

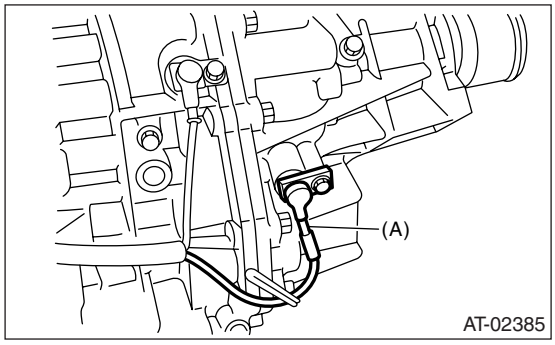
Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)



5) Install the rear vehicle speed sensor.

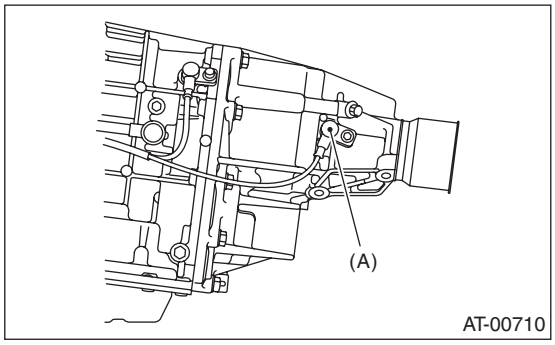
Tightening torque:
7 N·m (0.7 kgf-m, 5.2 ft-lb)

• MPT MODEL



(A) Rear vehicle speed sensor

• VTD MODEL



(A) Rear vehicle speed sensor

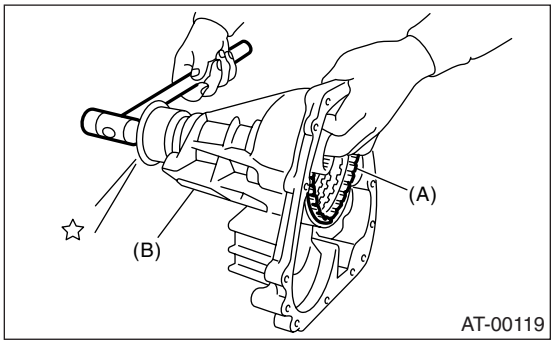
6) Install the transmission assembly. <Ref. to 4AT-44, INSTALLATION, Automatic Transmission Assembly.>

C: DISASSEMBLY

1. MPT MODEL

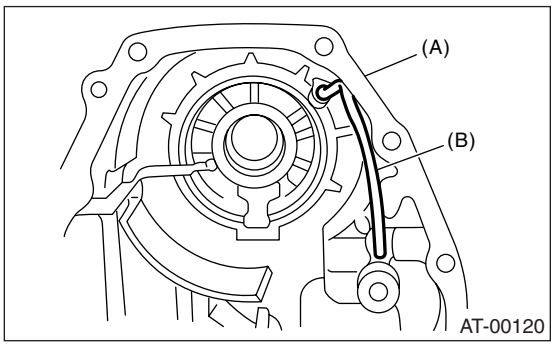
1) Take out the transfer clutch by lightly tapping the end of the rear drive shaft.

NOTE:
Be careful not to damage the oil seal in the extension.



(A) Transfer clutch
(B) Extension case

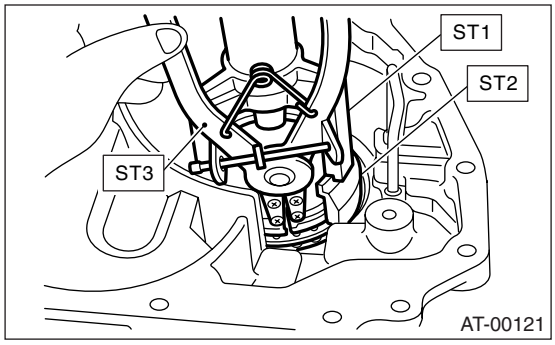
2) Remove the transmission clutch pipe without deforming pipe.



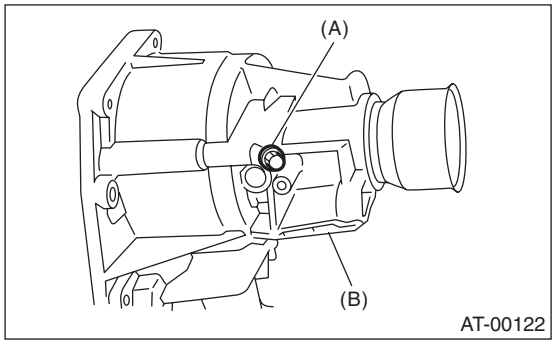
(A) Extension case
(B) Transfer clutch pipe

2. VTD MODEL

1) Remove snap ring using ST1, ST2, ST3 and a press.
ST1 398673600 COMPRESSOR
ST2 498627100 SHEAT
ST3 398663600 PLIERS

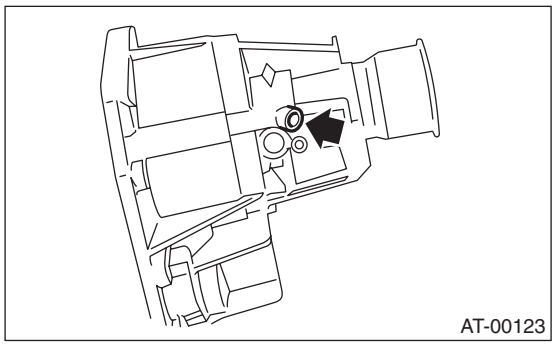


2) Remove test plug.

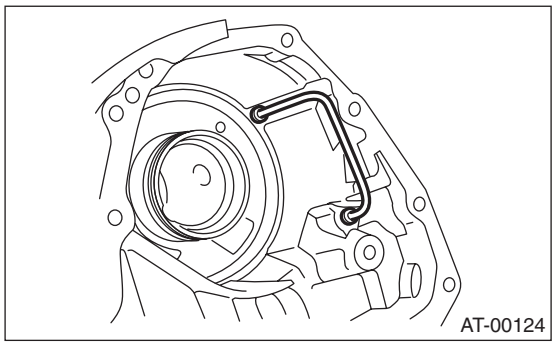


(A) Test plug
(B) Extension case

3) Remove clutch piston using compressed air.



4) Pay attention, not to deform pipe, and remove transfer clutch pipe.

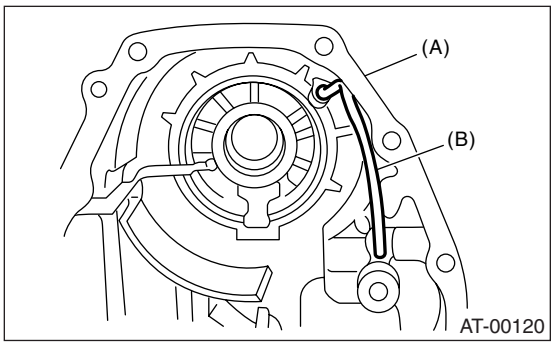


5) Remove the dust cover from the extension case.
6) Remove the oil seal from the extension case.

D: ASSEMBLY

1. MPT MODEL

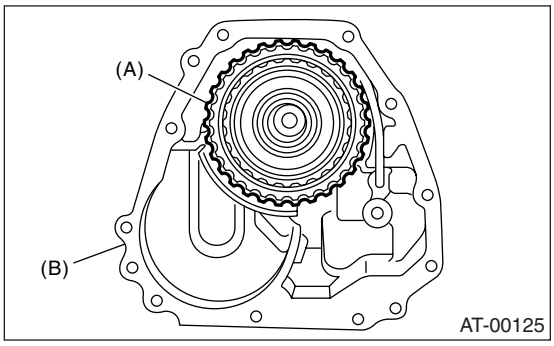
1) Using the ST and a press, press in a new oil seal.
ST 498057300 INSTALLER
2) Press in the dust cover.
3) Install the transfer clutch pipe to extension case without deforming pipe.



(A) Extension case
(B) Transfer clutch pipe

4) Install the transfer clutch assembly to the case.

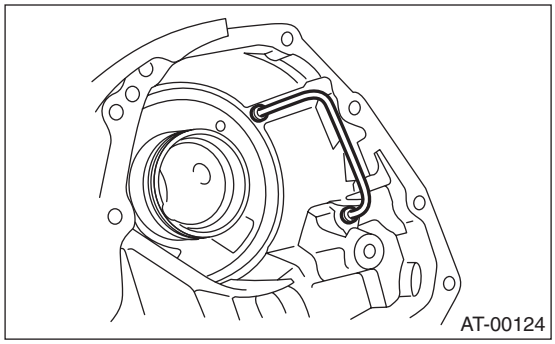
NOTE:
- Be careful not to damage the seal rings.
- Insert the clutch assembly fully into position until the bearing shoulder bottoms.



(A) Transfer clutch
(B) Extension case

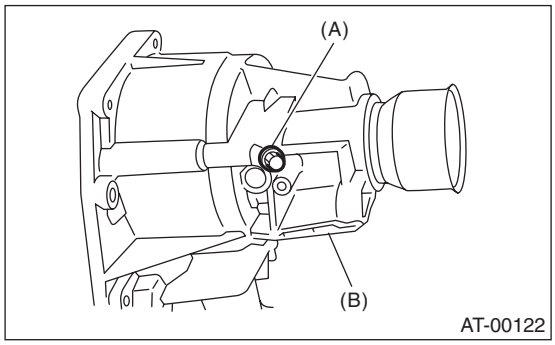
2. VTD MODEL

1) Press new oil seal using ST and a press.
ST 498057300 INSTALLER
2) Press dust cover.
3) Install the transfer clutch pipe onto the extension case, taking care not to deform the pipe.



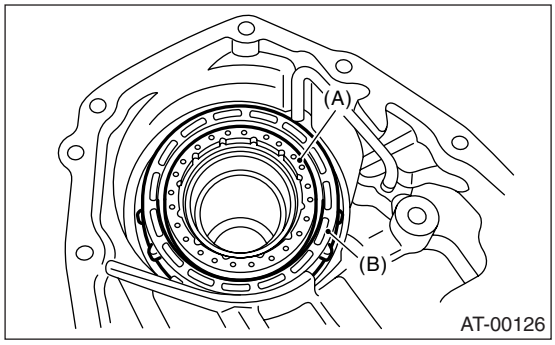
4) Apply ATF to new O-ring and install the test plug.

Tightening torque:
13 N·m (1.3 kgf-m, 10 ft-lb)



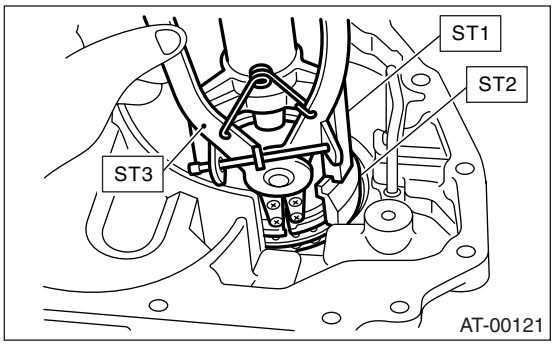
(A) Test plug
(B) Extension case

5) Insert the multi-plate clutch, drive plates, driven plates, and spring retainer.



(A) Spring retainer
(B) Multi-plate clutch (LSD) piston assembly

6) Install the snap ring using special tools 1, 2, and 3.
ST1 398673600 COMPRESSOR
ST2 498627100 SEAT
ST3 398663600 PLIERS



E: INSPECTION

- Use forced air to make sure the transfer pipe and extension case routes are not clogged and do not leak.
- Measure the extension end play and adjust it to within specifications.

MPT model
<Ref. to 4AT-94, MPT MODEL, ADJUSTMENT, Transfer Clutch.>
VTD model
<Ref. to 4AT-95, VTD MODEL, ADJUSTMENT, Transfer Clutch.>

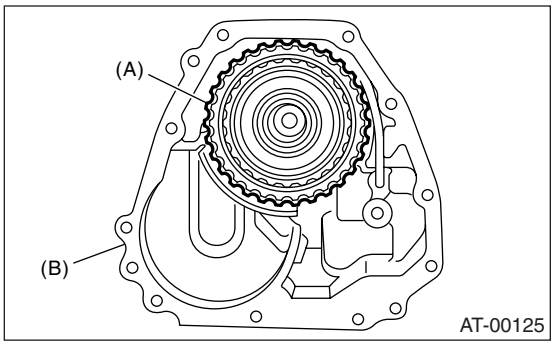
29.Transfer Clutch

A: REMOVAL

1) Remove the transmission assembly from vehicle. <Ref. to 4AT-41, REMOVAL, Automatic Transmission Assembly.>
2) Remove the extension case and remove the transfer clutch. <Ref. to 4AT-87, REMOVAL, Extension Case.> and <Ref. to 4AT-88, DISASSEMBLY, Extension Case.>

B: INSTALLATION

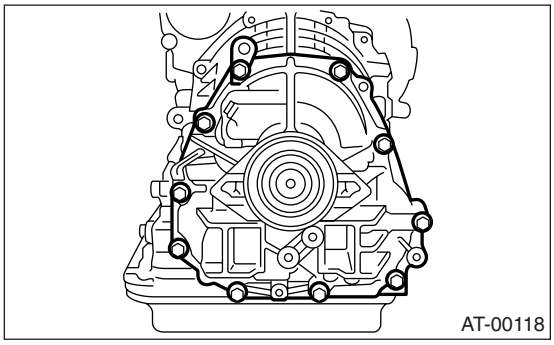
1) Select the thrust needle bearing. <Ref. to 4AT-94, ADJUSTMENT, Transfer Clutch.>
2) Install the transfer clutch assembly to the case.



(A) Transfer clutch
(B) Extension case

3) Replace with a new gasket and tighten bolts to secure the case.

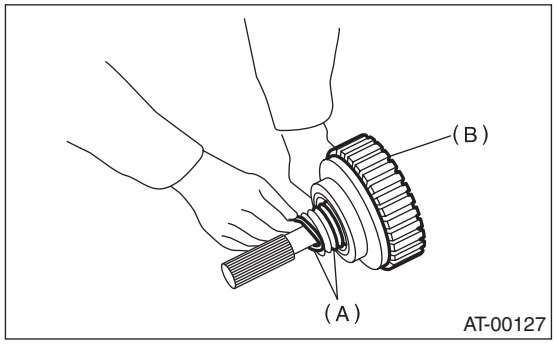
Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)



4) Install the transmission assembly to vehicle. <Ref. to 4AT-44, INSTALLATION, Automatic Transmission Assembly.>

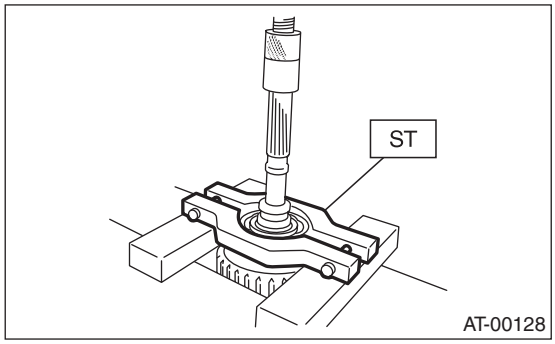
C: DISASSEMBLY

1) Remove the seal ring.

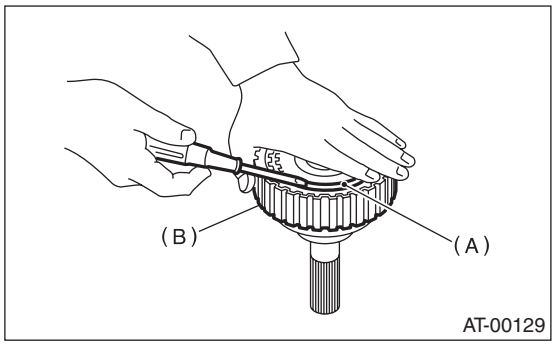


(A) Seal ring
(B) Transfer clutch

2) Using a press and ST, remove the ball bearing.
ST 498077600 REMOVER

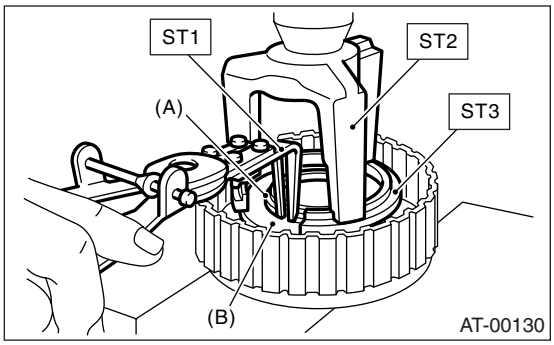


3) Remove the snap ring, and take out the pressure plate, drive plates, and driven plates.



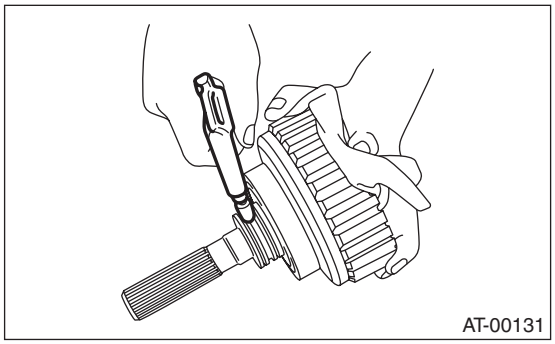
(A) Snap ring
(B) Transfer clutch

4) Remove the snap ring with ST1, ST2 and ST3, and take out the return spring and transfer clutch piston seal.
ST1 399893600 PLIERS
ST2 398673600 COMPRESSOR
ST3 398623600 SEAT



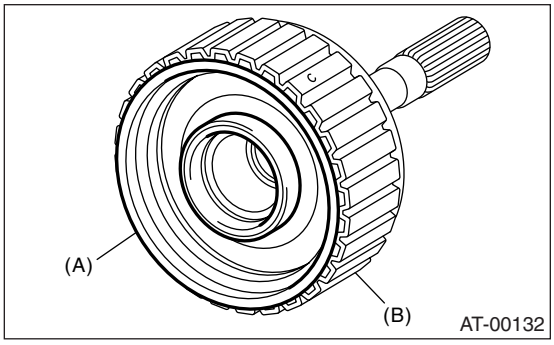
(A) Snap ring
(B) Transfer piston seal

5) Apply compressed air to the rear drive shaft to remove the piston.



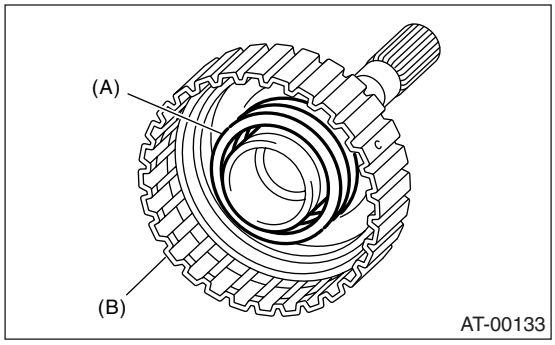
D: ASSEMBLY

1) Install the transfer clutch piston.



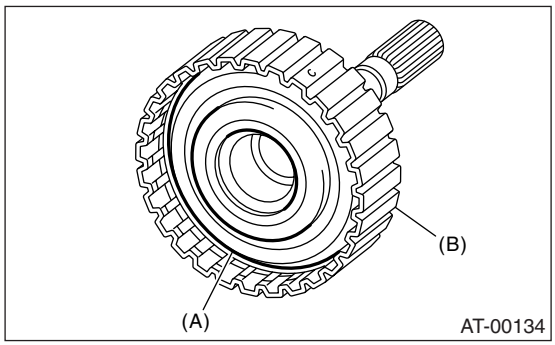
(A) Transfer clutch piston
(B) Rear drive shaft

2) Install return spring to transfer piston.



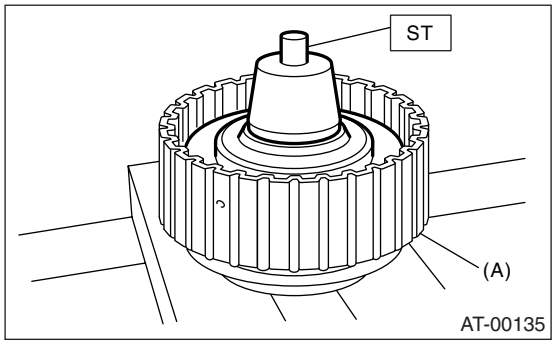
(A) Return spring
(B) Rear drive shaft

3) Apply ATF to the transfer clutch piston seal lip and install it.



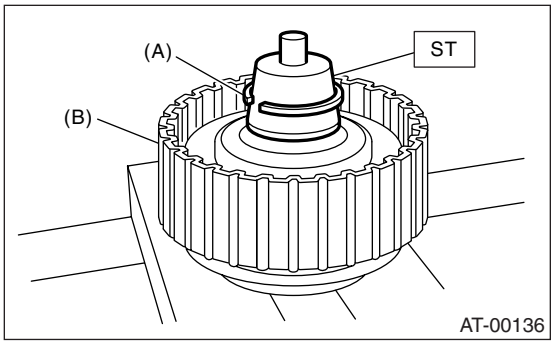
(A) Transfer clutch piston seal
(B) Rear drive shaft

4) Install ST to rear drive shaft.
ST 499257300 SNAP RING OUTER GUIDE



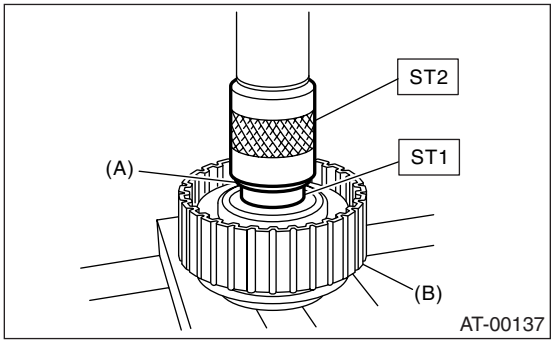
(A) Transfer clutch

5) Install snap ring to ST.
ST 499257300 SNAP RING OUTER GUIDE



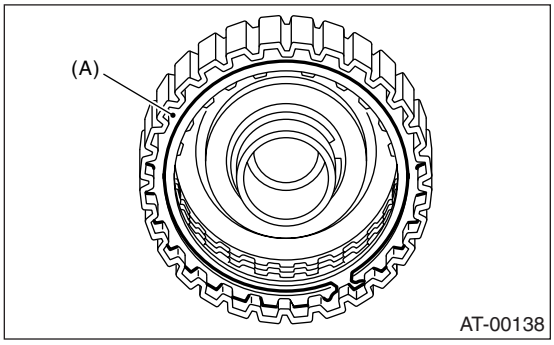
(A) Snap ring
(B) Transfer clutch

6) Using ST1 and ST2, install snap ring to rear drive shaft.
ST1 499257300 SNAP RING OUTER GUIDE
ST2 499247400 INSTALLER



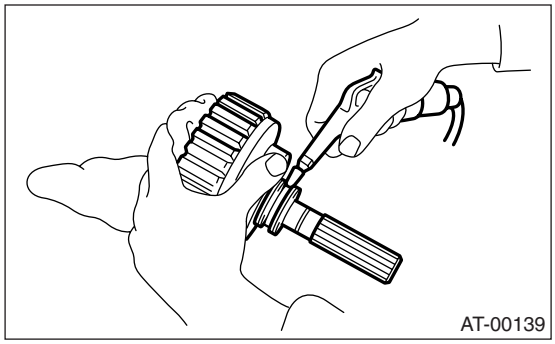
(A) Snap ring
(B) Transfer clutch

7) Install the driven plates, drive plates, pressure plate and snap ring.

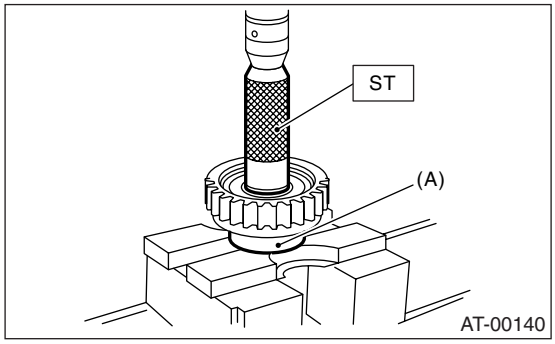


(A) Snap ring

8) Apply compressed air to see if the assembled parts move smoothly.



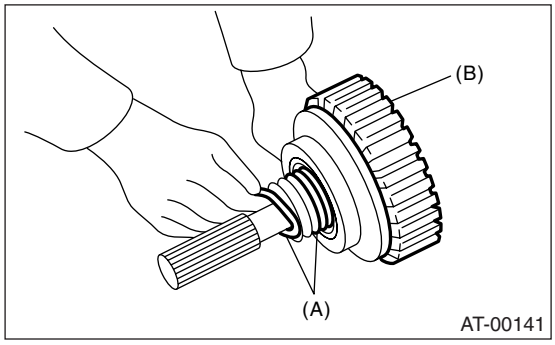
9) Check clearance between snap ring and pressure plate. <Ref. to 4AT-94, INSPECTION, Transfer Clutch.>
10) Press-fit a new ball bearing with ST.
ST 899580100 INSTALLER



(A) Ball bearing

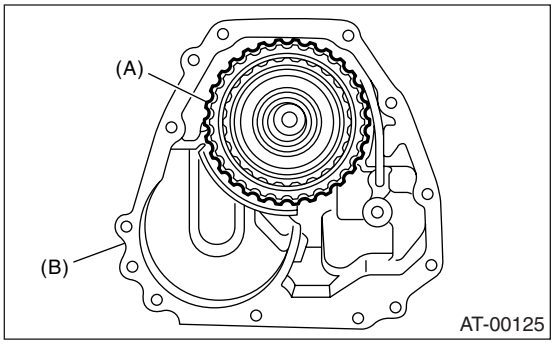
11) Coat a new seal ring with vaseline, and install it in the seal ring groove of the shaft.

NOTE:
Do not expand the seal ring excessively when installing.



(A) Snap ring
(B) Transfer clutch

12) Install the transfer clutch assembly without damaging seal ring.



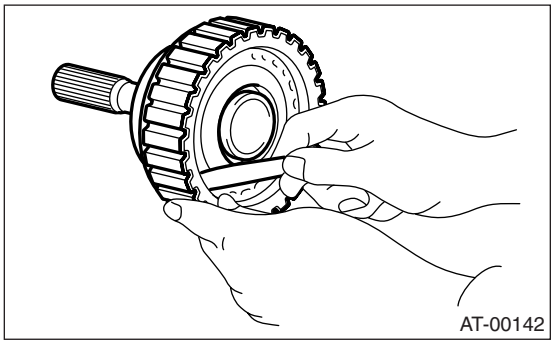
(A) Transfer clutch
(B) Extension case

E: INSPECTION

• Check the drive plate facing for wear and damage.
• Check the snap ring for wear, return spring for permanent set and breakage, and return spring for deformation.
• Check the D-ring for damage.
• Measure the extension end play and adjust it to within specifications.
<Ref. to 4AT-94, ADJUSTMENT, Transfer Clutch.>
1) Inspect clearance between snap ring and pressure plate.
2) Before measuring clearance, place the same thickness of shim on both sides to prevent pressure plate from tilting.
3) If the clearance is not within specification, adjust it by selecting a suitable pressure plate on the transfer clutch piston side. If it exceeds the service limit, replace the drive plate with new one and adjust it within the specification by selecting the pressure plate.

Initial standard:
0.7 — 1.1 mm (0.028 — 0.043 in)

Limit thickness:
1.6 mm (0.063 in)



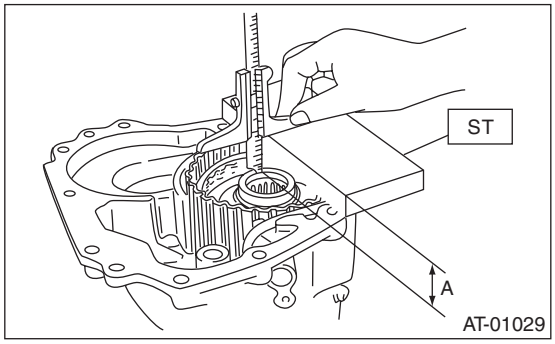
Pressure plates	
Part No.	Thickness mm (in)
31593AA151	3.3 (0.130)
31593AA161	3.7 (0.146)
31593AA171	4.1 (0.161)
31593AA181	4.5 (0.177)

4) Check if the tight corner braking does not occur when the vehicle is started with steering wheel held at fully turned position. If tight corner braking occurs, perform the following procedures.
(1) With the steering wheel held at fully turned position, drive the vehicle in “D” range and with vehicle speed at approx. 5 km/h (3 MPH) in both clockwise and counterclockwise directions for approx. ten times each, while repeating acceleration and braking intermittently.
(2) If the tight corner braking still persists, drive the vehicle again in a circle for several laps.

F: ADJUSTMENT

1. MPT MODEL

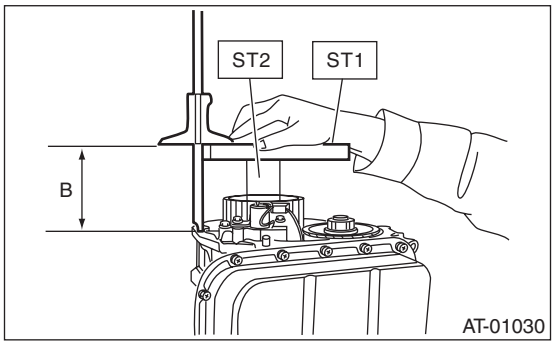
1) Measure distance “A” from the end surface of ST and end of rear drive shaft with ST.
ST 398643600 GAUGE



A: Measured value

2) Measure the distance “B” from the transmission case mating surface to the end surface of ST using ST1 and ST2.
ST1 398643600 GAUGE

ST2 499577000 GAUGE



B: Measured value

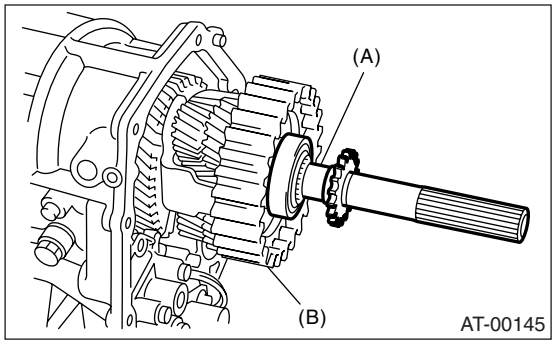
3) Calculation formula:

NOTE:
• Calculate “T”:
T = A − B + 35.4 mm
[T = A − B + 1.3937 in]
T: Thrust needle bearing thickness
A: Distance from the end surface of ST to end of rear drive shaft
B: Distance from the transmission case mating surface to the end surface of ST
Example:
When, A = 33.6 mm (1.3228 in), B = 65.05 mm (2.5610 in)
T = 33.6 − 65.05 + 35.4 = 3.95
[T = 1.3228 − 2.5610 + 1.3937 = 0.1555]
After calculation, the value of “H” becomes 3.95, therefore select bearing thickness of 3.8.
• Calculation formula for “T” is applied when measuring using ST (398643600 GUAGE, 499577000 GUAGE). When not using ST, apply
T = (A − α + 0.45 mm) − (B − β) − H
[T = (A − α + 0.0177 in) − (B − β) − H].
T: Thrust needle bearing thickness
A: Distance from end surface of collar as substitute for ST to end of reduction drive shaft
B: Distance from transmission case mating surface to end surface of collar as substitute for ST
α: Collar thickness used when measuring “A”
β: Collar thickness used when measuring “B”
0.45: Gasket thickness (mm)
H: Shim clearance

Thrust needle bearing	
Part No.	Thickness mm (in)
806536020	3.8 (0.150)
806535030	4.0 (0.157)
806535040	4.2 (0.165)
806535050	4.4 (0.173)
806535060	4.6 (0.181)
806535070	4.8 (0.189)
806535090	5.0 (0.197)

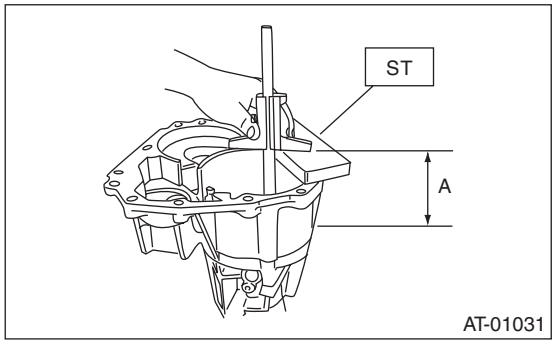
2. VTD MODEL

1) Insert the rear driveshaft into the reduction drive gear and center differential assembly.

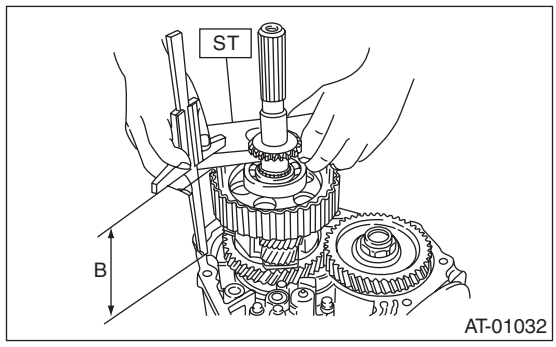


(A) Rear drive shaft
(B) Center differential carrier

2) Using ST, measure the depth “A” between the end surface of ST and rear drive shaft ball bearing outer ring contact surface.
ST 398643600 GAUGE



3) Using ST, measure the distance “B” from the mating surface of transmission case to the end surface of ST.
ST 398643600 GAUGE



B: Measured value

4) Formula:

NOTE:
• Calculation of “T”:
When clearances are 0.05 mm (0.0020 in), select up to four adjusting shims from the table, suitable for clearance value.
When clearances are 0.05 mm (0.0020 in)
T = A − B + 0.40 mm
[T = A − B + 0.0157 in]
When clearances are 0.25 mm (0.0098 in)
T = A − B + 0.20 mm
[T = A − B + 0.0079 in]
T: Shim clearance
A: Depth from the end surface of ST to the rear drive shaft ball bearing outer ring contact surface
B: Height from the transmission case mating surface to the end surface of ST
T: Shim thickness
0.05 — 0.25 mm (0.0020 — 0.0098 in)
Example:
When, A = 90.50 mm (3.5630 in), B = 90.35 mm (3.5571 in)
Calculation for 0.05 mm (0.0020 in) of clearance
T = 90.50 − 90.35 + 0.4 = 0.55
[T = 3.5630 − 3.5571 + 0.0157 = 0.0216]
Calculation when clearance is 0.25 mm (0.0098 in)
T = 90.50 − 90.35 + 0.2 = 0.35
[T = 3.5630 − 3.5571 + 0.0079 = 0.0138]
• Calculation formula for “T” is applied when measuring using ST (398643600 GUAGE). When not using ST, apply
T = (A − α + 0.45 mm) − (B − β) − H
[T = (A − α + 0.0177 in) − (B − β) − H].
T: Thrust needle bearing thickness
A: Distance from end surface of collar as substitute for ST to rear drive shaft ball bearing outer ring contact surface
B: Distance from transmission case mating surface to end surface of collar as substitute for ST
α: Collar thickness used when measuring “A”
β: Collar thickness used when measuring “B”
0.45: Gasket thickness (mm)
H: Shim clearance
After calculation, the value of “T” becomes between 0.35 mm (0.0138 in) and 0.55 mm (0.0216 in), therefore select two shims with thickness of 0.2 mm (0.010 in) or one shim with thickness of 0.5 mm (0.020 in).

Adjusting shim	
Part No.	Thickness mm (in)
33281AA001	0.2 (0.008)
33281AA011	0.5 (0.020)

30.Multi-plate Clutch

A: REMOVAL

Remove multi-plate clutch following the same instructions as for the extension case. <Ref. to 4AT-87, REMOVAL, Extension Case.>

B: INSTALLATION

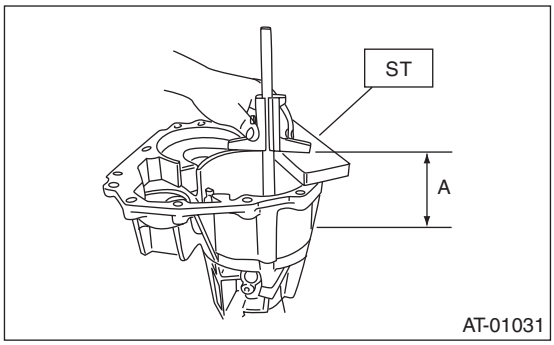
Install multi-plate clutch following the same instructions as for the extension case. <Ref. to 4AT-87, INSTALLATION, Extension Case.>

C: INSPECTION

- Inspect drive plate facing for wear and damage.
- Make sure snap ring is not worn and return spring has no permanent distortion, damage, or deformation.
- Inspect D-ring for damage.
- Measure multi-plate clutch clearance and adjust it to within the specification range. <Ref. to 4AT-97, ADJUSTMENT, Multi-plate Clutch.>

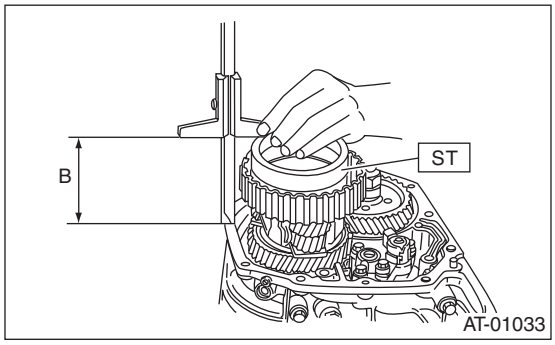
D: ADJUSTMENT

1) Remove drive plate and driven plate from center differential carrier.
2) Using ST, measure depth “A” from the end surface of ST to multi-plate clutch piston.
ST 398643600 GAUGE



A: Measured value

3) Using ST, measure height “B” from transmission case mating surface to ST end surface.
ST 398744300 PISTON GUIDE



B: Measured value

4) Calculation formula
$T = A - B + 0.45$ mm
[$T = A - B + 0.0177$ in]

NOTE:
- Calculation formula for “T” is applied when measuring using ST (398643600 GUAGE, 398744300 GAUGE). When not using ST, apply
$T = (A - \alpha + 0.45\text{ mm}) - (B - \beta)$
[$T = (A - \alpha + 0.0177\text{ in}) - (B - \beta)$].

T: Thrust needle bearing thickness
A: Depth from the end surface of collar as a substitute for ST to multi-plate clutch piston
B: Height from transmission case mating surface to the end surface of collar as a substitute for ST
α: Collar thickness used when measuring “A”
β: Collar thickness used when measuring “B”
0.45: Gasket thickness (mm)
- Measure multi-plate clutch driven and drive plate thickness to find the clearance between measurement value and “T”.

Initial standard:
0.2 — 0.6 mm (0.008 — 0.024 in)

Limit tickness:
1.6 mm (0.063 in)

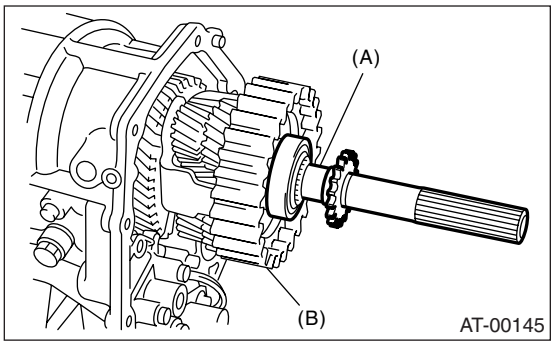
If outside the standard value, replace the plate set (drive and driven plate). Select a multi-plate clutch piston side adjustment plate that will bring clearance within the standard value.

Obtainable driven plates	
Part No.	Thickness mm (in)
31589AA041	1.6 (0.063)
31589AA050	2.0 (0.079)
31589AA060	2.4 (0.094)
31589AA070	2.8 (0.110)

31.Rear Drive Shaft

A: REMOVAL

1) Remove transmission assembly. <Ref. to 4AT-41, REMOVAL, Automatic Transmission Assembly.>
2) Remove rear wheel speed sensor and separate extension case from transmission case. <Ref. to 4AT-87, REMOVAL, Extension Case.>
3) Pull out the rear driveshaft from the center differential assembly.



(A) Rear driveshaft
(B) Center differential carrier

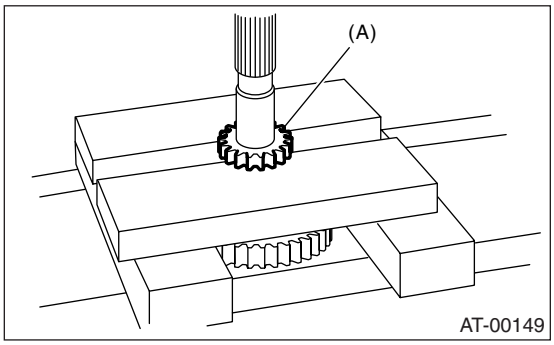
4) Remove drive plate and driven plate.

B: INSTALLATION

1) Select the appropriate shim. <Ref. to 4AT-95, VTD MODEL, ADJUSTMENT, Transfer Clutch.>
2) Install drive plate and driven plate.
3) Insert rear driveshaft into the center differential assembly.
4) Join transmission case and extension case. Install rear wheel speed sensor. <Ref. to 4AT-87, INSTALLATION, Extension Case.>
5) Install transmission assembly. <Ref. to 4AT-44, INSTALLATION, Automatic Transmission Assembly.>

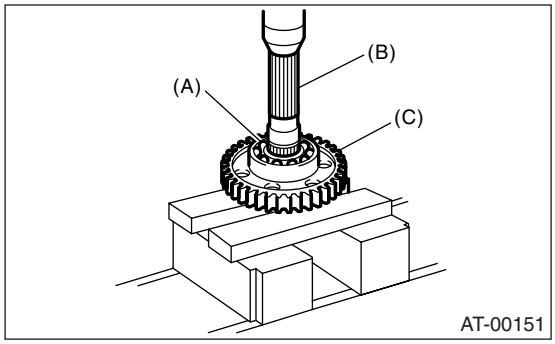
C: DISASSEMBLY

1) Using a press, remove revolution gear.



(A) Revolution gear

2) Using a press, remove the front and rear side ball bearings and clutch hub.

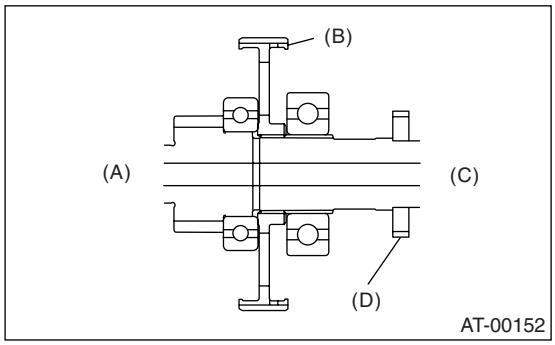


(A) Rear ball bearing
(B) Rear driveshaft
(C) Clutch hub

D: ASSEMBLY

Assemble in the reverse order of disassembly.

NOTE:
• Use a new revolution gear and ball bearings.
• Make sure the clutch hub is oriented in the correct direction.



(A) Front side
(B) Clutch hub
(C) Rear side
(D) Revolution gear

E: INSPECTION

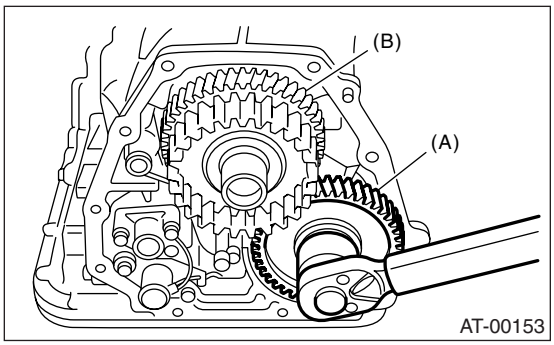
• Inspect parts to make sure there are no holes, cuts, and that they are not dusty.
• Inspect extension end play and adjust it to within the standard value. <Ref. to 4AT-95, VTD MODEL, ADJUSTMENT, Transfer Clutch.>

32.Reduction Driven Gear

A: REMOVAL

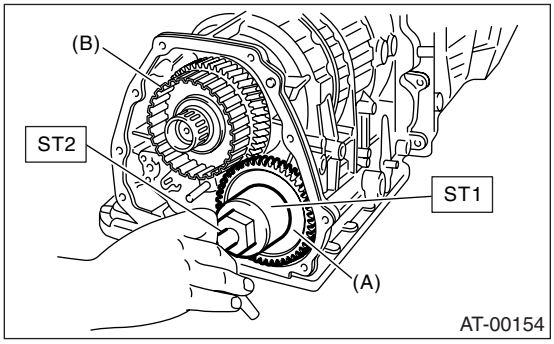
1. MPT MODEL

1) Remove the transmission assembly from the vehicle. <Ref. to 4AT-41, REMOVAL, Automatic Transmission Assembly.>
2) Remove rear vehicle speed sensor, and separate the transmission case and extension case. <Ref. to 4AT-87, REMOVAL, Extension Case.>
3) Set the range select lever to “P”.
4) Straighten the staked portion, and remove the lock nut.



(A) Reduction driven gear
(B) Reduction drive gear

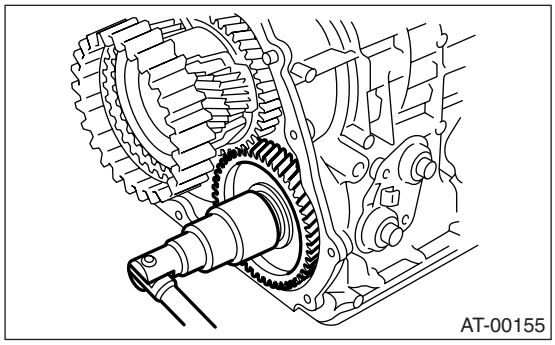
5) Using the ST1 and ST2, extract the reduction driven gear.
ST1 499737000 PULLER
ST2 899524100 PULLER SET



(A) Reduction driven gear
(B) Reduction drive gear

2. VTD MODEL

1) Remove the transmission assembly from the vehicle. <Ref. to 4AT-41, REMOVAL, Automatic Transmission Assembly.>
2) Remove rear vehicle speed sensor, and separate the transmission case and extension case. <Ref. to 4AT-87, REMOVAL, Extension Case.>
3) Remove the rear drive shaft. <Ref. to 4AT-98, REMOVAL, Rear Drive Shaft.>
4) Set the range select lever to “P”.
5) Straighten the staked portion, and remove the lock nut.



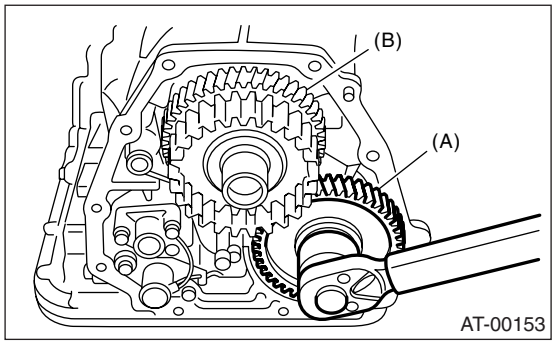
6) Using the ST1 and ST2, extract the reduction driven gear.
ST1 499737000 PULLER
ST2 899524100 PULLER SET
7) Pull out the center differential assembly. <Ref. to 4AT-103, REMOVAL, Center Differential Carrier.>

B: INSTALLATION

1. MPT MODEL

1) Set the select lever to “P” range.
2) Using a plastic hammer, install reduction driven gear assembly and new washer, and tighten new drive pinion lock nut.

Tightening torque:
100 N·m (10.2 kgf-m, 73.8 ft-lb)



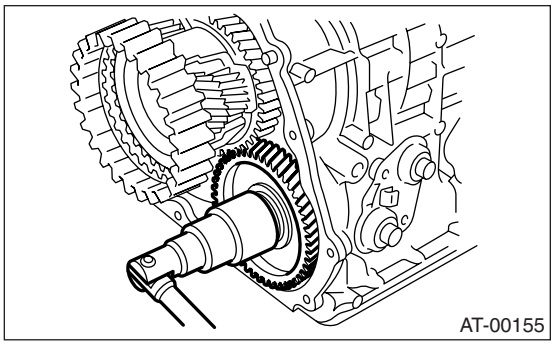
(A) Reduction driven gear
(B) Reduction drive gear

3) After tightening, stake the lock nut securely.
4) Combine the transmission case with the extension case, and install rear vehicle speed sensor. <Ref. to 4AT-87, INSTALLATION, Extension Case.>
5) Install the transmission assembly to vehicle. <Ref. to 4AT-44, INSTALLATION, Automatic Transmission Assembly.>

2. VTD MODEL

1) Set the select lever to "P" range.
2) Using a plastic hammer, install reduction driven gear assembly.
3) Using a plastic hammer, install the center differential assembly.
4) Install a new self-lock nut and a washer.

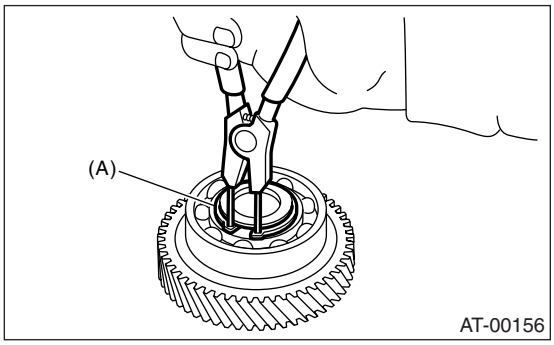
Tightening torque:
100 N·m (10.2 kgf-m, 73.8 ft-lb)



5) After tightening, stake the lock nut securely.
6) Insert the rear drive shaft assembly. <Ref. to 4AT-98, INSTALLATION, Rear Drive Shaft.>
7) Combine the transmission case with the extension case, and install rear vehicle speed sensor. <Ref. to 4AT-87, INSTALLATION, Extension Case.>
8) Install the transmission assembly to vehicle. <Ref. to 4AT-44, INSTALLATION, Automatic Transmission Assembly.>

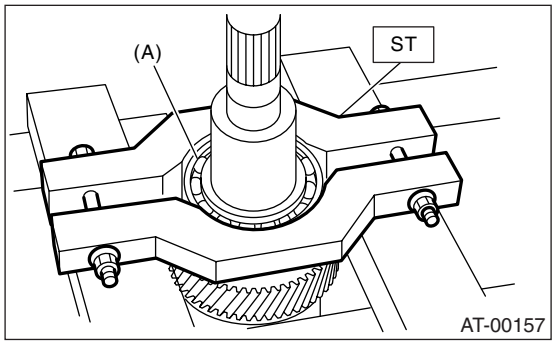
C: DISASSEMBLY

1) Remove snap ring from reduction driven gear.



(A) Snap ring

2) Using ST, remove ball bearing from reduction driven gear.
ST 498077600 REMOVER

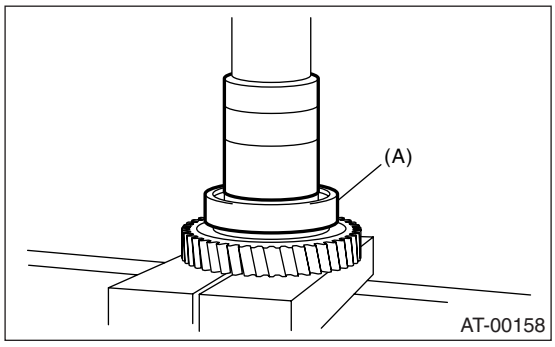


(A) Ball bearing

3) Remove snap ring reduction driven gear.

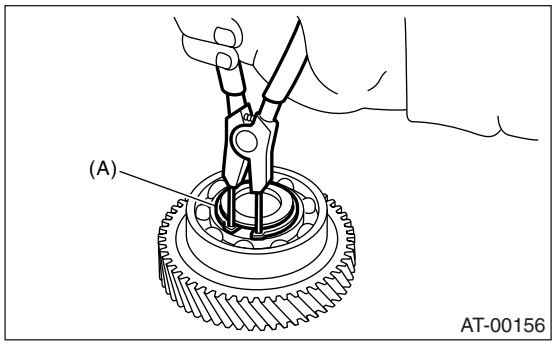
D: ASSEMBLY

1) Install snap ring to reduction driven gear.
2) Using a press, install a new ball bearing to reduction driven gear.



(A) Ball bearing

3) Install snap ring to reduction driven gear.



(A) Snap ring

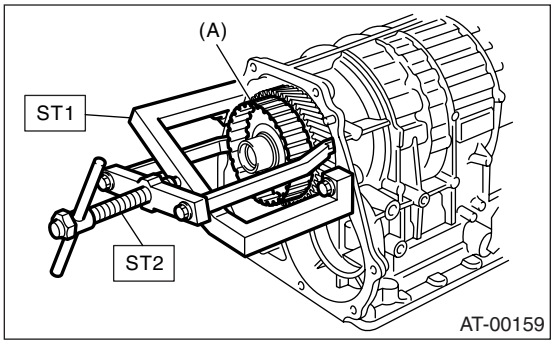
E: INSPECTION

Check ball bearing and gear for dents or damage.

33.Reduction Drive Gear

A: REMOVAL

1) Remove the transmission assembly from the vehicle. <Ref. to 4AT-41, REMOVAL, Automatic Transmission Assembly.>
2) Remove rear vehicle speed sensor, and separate the transmission case and extension case. <Ref. to 4AT-87, REMOVAL, Extension Case.>
3) Remove the reduction driven gear. <Ref. to 4AT-99, REMOVAL, Reduction Driven Gear.>
4) Using ST, extract the reduction drive gear.
ST1 499737100 PULLER SET
ST2 899524100 PULLER SET

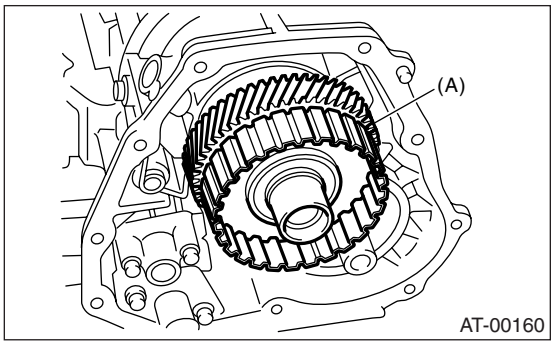


(A) Reduction drive gear

B: INSTALLATION

1) Install the reduction drive gear assembly.

NOTE:
Insert it fully into position until the bearing shoulder bottoms.

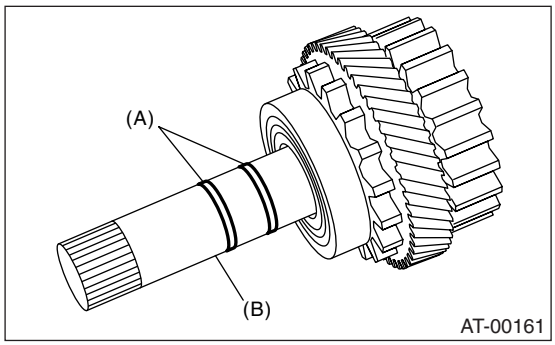


(A) Reduction drive gear

2) Install the reduction driven gear. <Ref. to 4AT-99, INSTALLATION, Reduction Driven Gear.>
3) Combine the transmission case with the extension case, and install rear vehicle speed sensor. <Ref. to 4AT-87, INSTALLATION, Extension Case.>
4) Install the transmission assembly to the vehicle. <Ref. to 4AT-44, INSTALLATION, Automatic Transmission Assembly.>

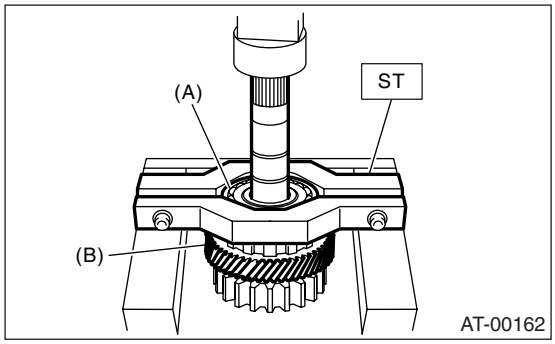
C: DISASSEMBLY

1) Take out the seal rings.



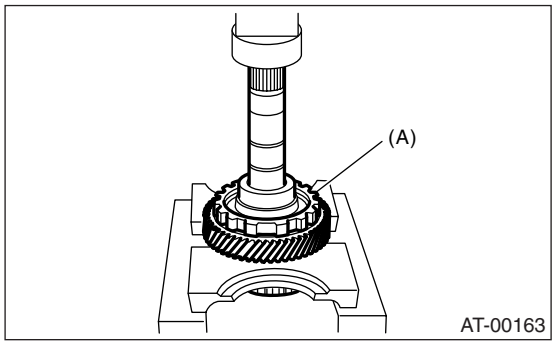
(A) Seal rings
(B) Reduction drive shaft

2) Using ST, remove the ball bearing.
ST 498077600 REMOVER



(A) Ball bearing
(B) Reduction drive gear

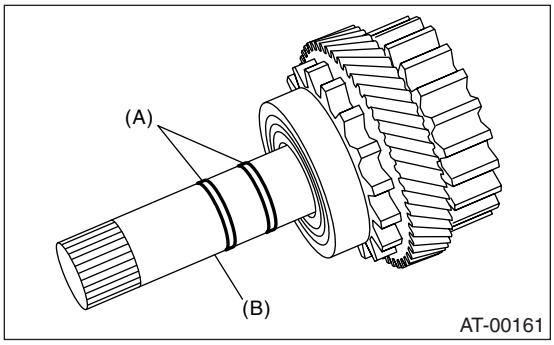
3) Using a press, remove the reduction drive gear.



(A) Reduction drive gear

D: ASSEMBLY

1) Press-fit the reduction drive gear to the shaft.
2) Press-fit the a new ball bearing to the reduction drive gear.
3) Apply vaseline to outer surface of seal ring and shaft groove.
4) Apply ATF to new seal rings and attach them.



(A) Seal rings
(B) Reduction drive shaft

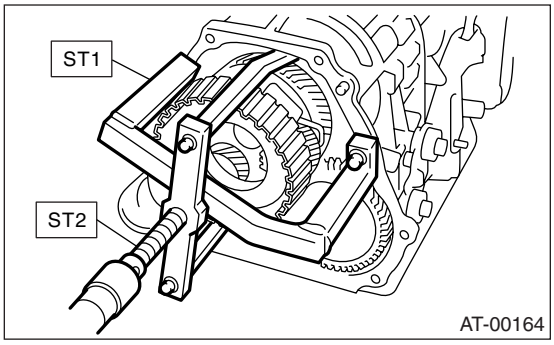
E: INSPECTION

• Rotate bearing by hand, make sure it rotates smoothly.
• Make sure that each component is free of harmful gouges, cuts, or dust.
• Measure the extension end play and adjust it to within specifications. <Ref. to 4AT-94, ADJUSTMENT, Transfer Clutch.>

34.Center Differential Carrier

A: REMOVAL

1) Remove the transmission assembly from vehicle. <Ref. to 4AT-41, REMOVAL, Automatic Transmission Assembly.>
2) Remove the rear wheel speed sensor, and separate the extension case from the transmission case. <Ref. to 4AT-87, REMOVAL, Extension Case.>
3) Pull out the rear driveshaft. <Ref. to 4AT-98, REMOVAL, Rear Drive Shaft.>
4) Using the special tools, pull out the center differential carrier assembly.
ST1 499737100 PULLER SET
ST2 899524100 PULLER SET

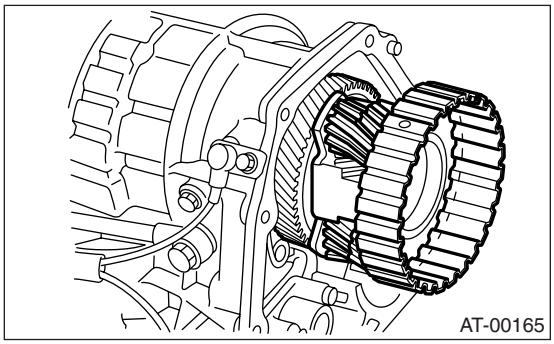


5) Pull out the shim(s) from transmission case.

B: INSTALLATION

1) Install the center differential assembly with the shim(s).

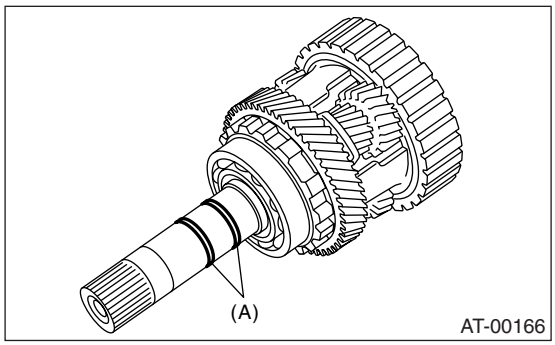
NOTE:
Insert the center differential assembly and shim(s) completely into the bearing shoulder bottom.



2) Insert the rear driveshaft. <Ref. to 4AT-98, INSTALLATION, Rear Drive Shaft.>
3) Connect the transmission case and extension case, and install the rear wheel speed sensor. <Ref. to 4AT-87, INSTALLATION, Extension Case.>
4) Install the transmission assembly onto vehicle. <Ref. to 4AT-44, INSTALLATION, Automatic Transmission Assembly.>

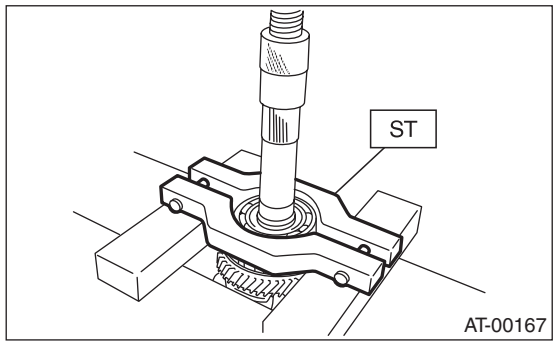
C: DISASSEMBLY

1) Remove the seal rings.

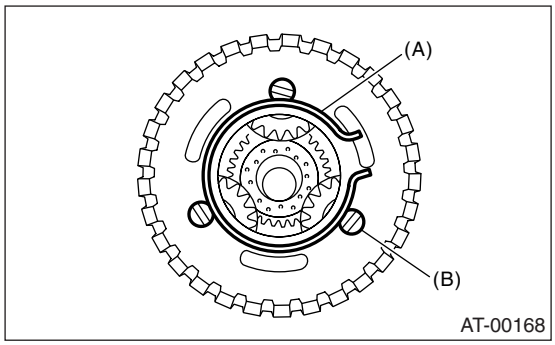


(A) Seal ring

2) Using a press and the special tool, remove the ball bearing.
ST 498077600 REMOVER

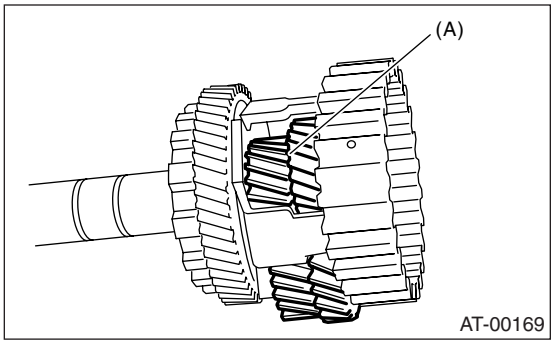


3) Remove the snap ring, and pull out the shaft from the center differential assembly.



(A) Snap ring
(B) Shaft

4) Remove the thrust washers, pinion gears, and washers from the center differential assembly.

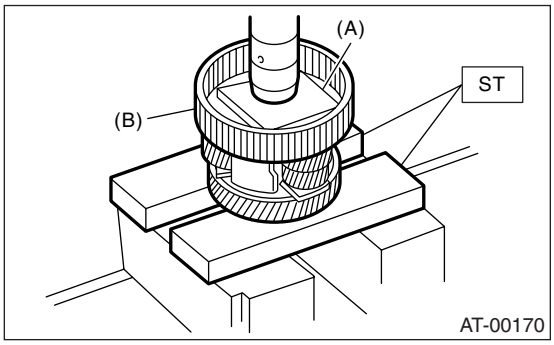


(A) Pinion gear

5) Pull out the intermediate shaft and thrust bearing.

D: ASSEMBLY

1) Install the thrust washer onto the intermediate shaft.
2) Install thrust bearing onto the intermediate shaft.
3) Install the pinion gears and washers.
4) Insert the shaft into the center differential assembly.
5) Install the snap ring.
6) Using a press, install a new ball bearing into the center differential assembly.
ST 498077000 REMOVER



(A) Plate
(B) Center differential carrier

7) Apply Vaseline onto the seal ring outer surface and shaft grooves.
8) Apply ATF to new seal rings and install them.

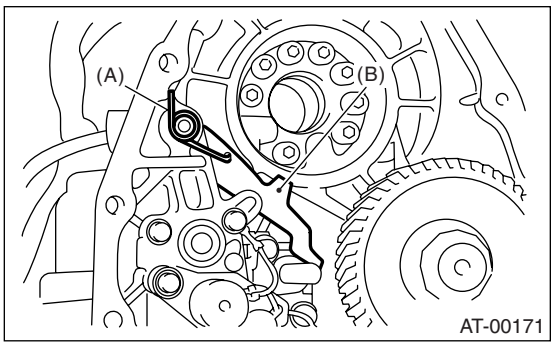
E: INSPECTION

- Check all parts for hole, score, or dirt.
- Check the play of the extension end, and if necessary, adjust it. <Ref. to 4AT-95, VTD MODEL, ADJUSTMENT, Transfer Clutch.>

35.Parking Pawl

A: REMOVAL

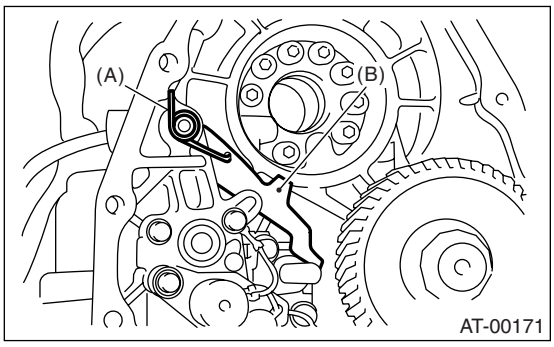
1) Remove the transmission assembly from the vehicle. <Ref. to 4AT-41, REMOVAL, Automatic Transmission Assembly.>
2) Remove rear vehicle speed sensor and separate transmission case and extension case sections. <Ref. to 4AT-87, REMOVAL, Extension Case.>
3) Remove the reduction drive gear. (MPT model) <Ref. to 4AT-101, REMOVAL, Reduction Drive Gear.>
4) Remove the center differential carrier. (VTD model) <Ref. to 4AT-103, REMOVAL, Center Differential Carrier.>
5) Remove the parking pawl, return spring and shaft.



(A) Return spring
(B) Parking pawl

B: INSTALLATION

1) Install the parking pawl, shaft and return spring.



(A) Return spring
(B) Parking pawl

2) Install the reduction drive gear. <Ref. to 4AT-101, INSTALLATION, Reduction Drive Gear.>
3) Install the center differential carrier. (VTD model) <Ref. to 4AT-103, INSTALLATION, Center Differential Carrier.>
4) Install the rear vehicle speed sensor and extension case. <Ref. to 4AT-87, INSTALLATION, Extension Case.>
5) Install the transmission assembly to the vehicle. <Ref. to 4AT-44, INSTALLATION, Automatic Transmission Assembly.>

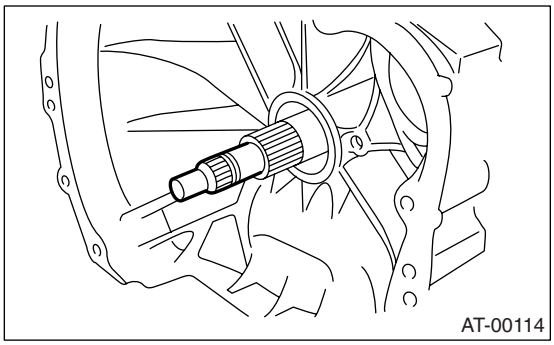
C: INSPECTION

Make sure that the tab of the packing pole on the reduction gear is not worn or otherwise damaged.

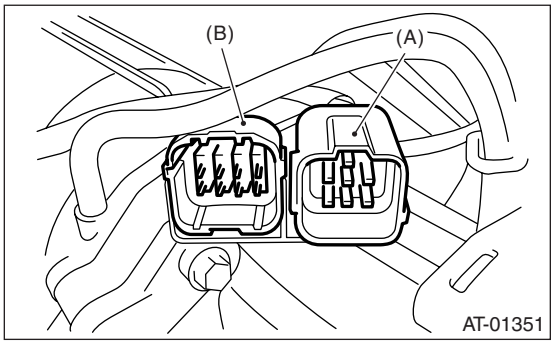
36.Converter Case

A: REMOVAL

1) Remove the transmission assembly from the vehicle. <Ref. to 4AT-41, REMOVAL, Automatic Transmission Assembly.>
2) Extract the torque converter clutch assembly. <Ref. to 4AT-85, REMOVAL, Torque Converter Clutch Assembly.>
3) Remove the input shaft.



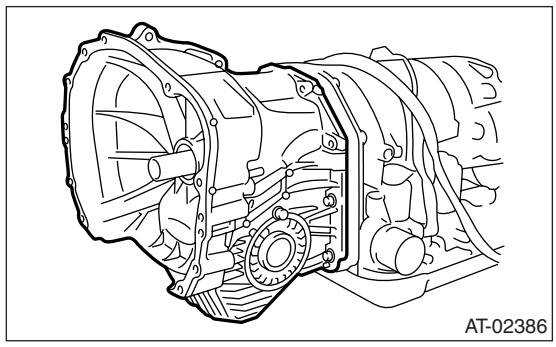
4) Lift-up lever behind the connector and disconnect it from stay.
5) Disconnect inhibitor switch connector from stay.



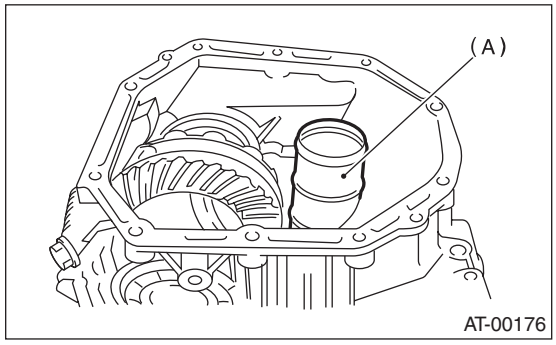
(A) Transmission harness
(B) Inhibitor switch harness

6) Remove the oil charge pipe. <Ref. to 4AT-84, REMOVAL, Oil Charge Pipe.>
7) Remove the oil cooler inlet and outlet pipes. <Ref. to 4AT-76, REMOVAL, ATF Cooler Pipe and Hose.>
8) Lightly tapping the converter case with plastic hammer, separate the transmission case and converter case.

NOTE:
• Be careful not to damage the oil seal and bushing inside the converter case by the oil pump cover.
• Be careful not to lose the rubber seal.



9) Remove the seal pipe if it is attached. (Reusing is not allowed.)

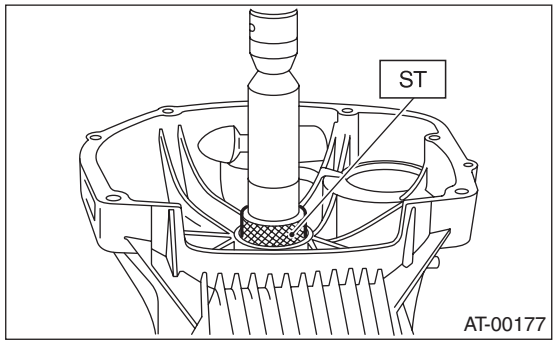


(A) Seal pipe

10) Remove the differential assembly. <Ref. to 4AT-120, REMOVAL, Front Differential Assembly.>
11) Remove the oil seal from converter case.

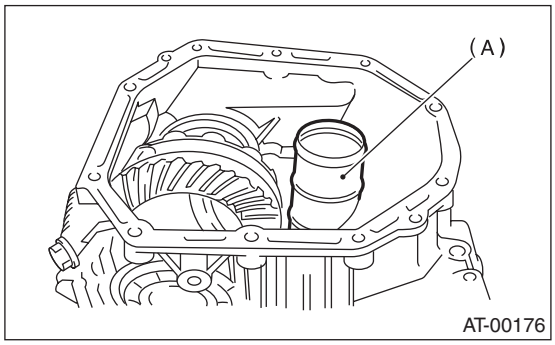
B: INSTALLATION

1) Check the appearance of each component and clean.
2) Force-fit the oil seal to the converter case with ST.
ST 398437700 DRIFT



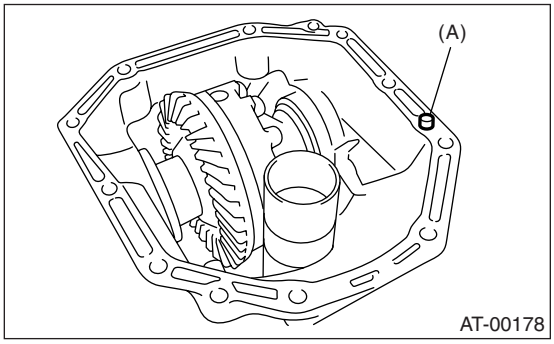
3) Install the differential assembly to the case. <Ref. to 4AT-120, INSTALLATION, Front Differential Assembly.>
4) Install the left and right side retainers. <Ref. to 4AT-124, ADJUSTMENT, Front Differential Assembly.>

5) Install the new seal pipe to the converter case.



(A) Seal pipe

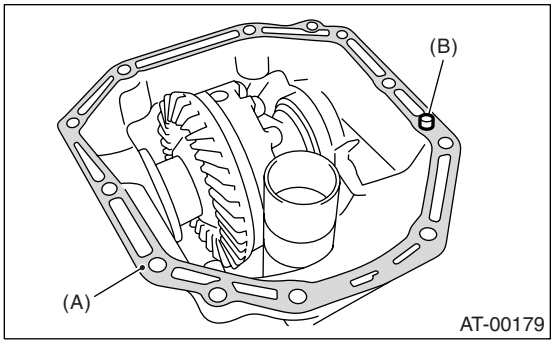
6) Install the rubber seal to the converter case.



(A) Rubber seal

7) Apply proper amount of liquid gasket to the entire converter case mating surface.

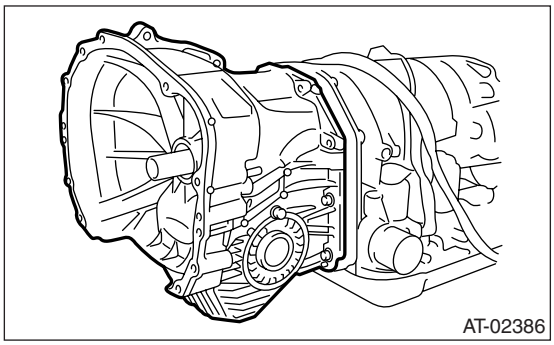
Liquid gasket:
THREE BOND 1215 (Part No. 004403007)



(A) THREE BOND 1215
(B) Rubber seal

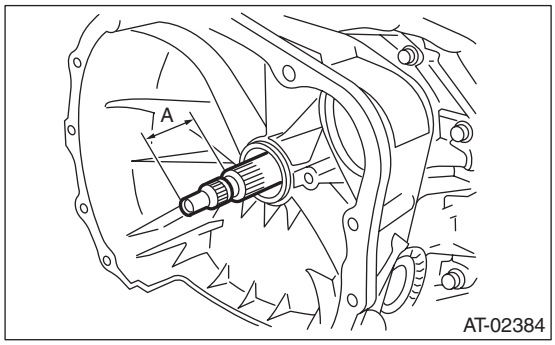
8) Install the converter case assembly without damaging bush and oil seal and secure with six bolts and four nuts.

Tightening torque:
41 N·m (4.2 kgf-m, 30.2 ft-lb)



9) Insert inhibitor switch and transmission connector into stay.
10) Install air breather hose. <Ref. to 4AT-83, INSTALLATION, Air Breather Hose.>
11) Install the oil cooler pipes. <Ref. to 4AT-77, INSTALLATION, ATF Cooler Pipe and Hose.>
12) Install the oil charge pipe with O-ring. <Ref. to 4AT-84, INSTALLATION, Oil Charge Pipe.>
13) Insert the input shaft while rotating it lightly by hand, and then check the protrusion amount.

Normal protrusion amount A:
50 — 55 mm (1.97 — 2.17 in)



14) Install the torque converter clutch assembly. <Ref. to 4AT-85, INSTALLATION, Torque Converter Clutch Assembly.>
15) Install the transmission assembly to the vehicle. <Ref. to 4AT-44, INSTALLATION, Automatic Transmission Assembly.>

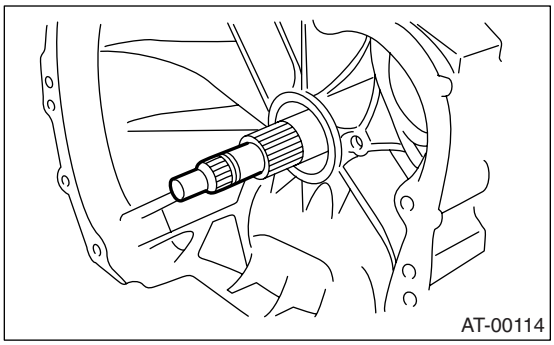
C: INSPECTION

Measure the backlash and adjust to within specifications. <Ref. to 4AT-117, ADJUSTMENT, Drive Pinion Shaft Assembly.>

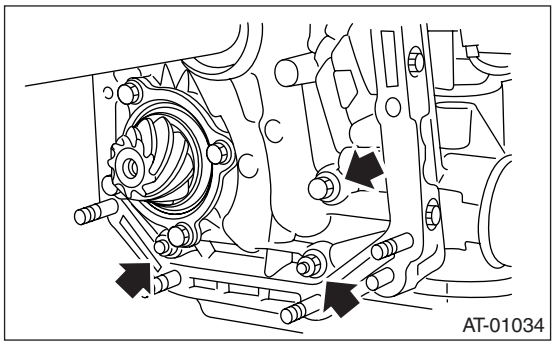
37.Oil Pump Housing

A: REMOVAL

1) Remove the transmission assembly from the vehicle. <Ref. to 4AT-41, REMOVAL, Automatic Transmission Assembly.>
2) Extract the torque converter clutch assembly. <Ref. to 4AT-85, REMOVAL, Torque Converter Clutch Assembly.>
3) Remove the input shaft.

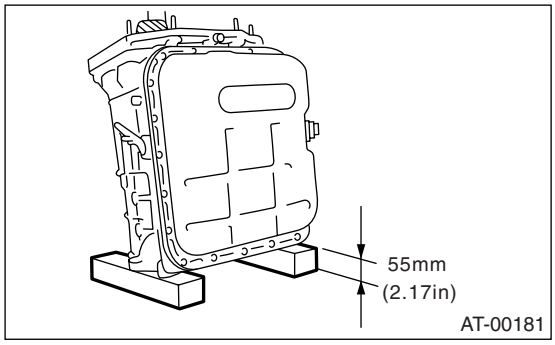


4) Lift-up lever behind the transmission harness connector and disconnect it from stay.
5) Disconnect inhibitor switch connector from stay.
6) Remove the oil charge pipe. <Ref. to 4AT-84, REMOVAL, Oil Charge Pipe.>
7) Remove the oil cooler inlet and outlet pipes. <Ref. to 4AT-76, REMOVAL, ATF Cooler Pipe and Hose.>
8) Separation of converter case and transmission case sections <Ref. to 4AT-106, REMOVAL, Converter Case.>
9) Separate transmission case and extension case sections. <Ref. to 4AT-87, REMOVAL, Extension Case.>
10) Remove the reduction drive gear. (MPT model) <Ref. to 4AT-101, REMOVAL, Reduction Drive Gear.>
11) Remove the center differential carrier. (VTD model) <Ref. to 4AT-103, REMOVAL, Center Differential Carrier.>
12) Remove the reduction driven gear. <Ref. to 4AT-99, REMOVAL, Reduction Driven Gear.>
13) Loosen the oil pump housing mounting bolts.

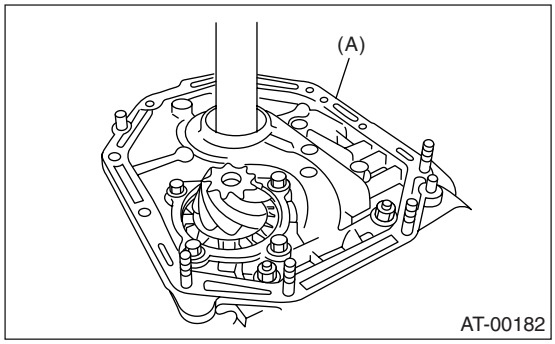


14) Place two wooden blocks on the workbench, and stand the transmission case with its rear end facing down.

NOTE:
• Be careful not to scratch the rear mating surface of the transmission case.
• Note that the parking rod and drive pinion protrude from the mating surface.



15) Remove the oil pump housing and adjusting thrust washer.

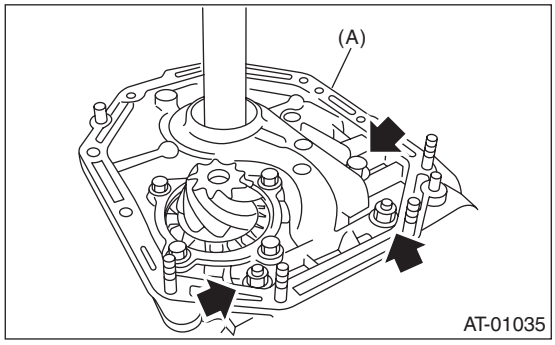


(A) Oil pump housing

B: INSTALLATION

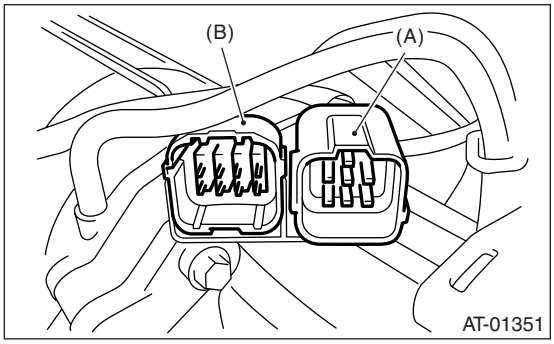
1) Secure the oil pump housing with two nuts and the bolt.

Tightening torque:
42 N·m (4.3 kgf-m, 31 ft-lb)



(A) Oil pump housing

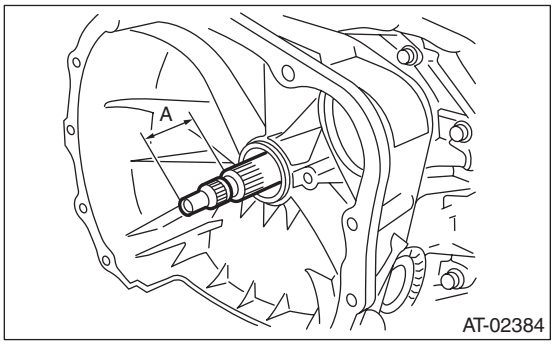
2) Install the converter case assembly to the transmission case assembly. <Ref. to 4AT-85, INSTALLATION, Torque Converter Clutch Assembly.>
3) Install reduction driven gear. <Ref. to 4AT-99, INSTALLATION, Reduction Driven Gear.>
4) Install the reduction drive gear. (MPT model) <Ref. to 4AT-101, INSTALLATION, Reduction Drive Gear.>
5) Install the center differential carrier. (VTD model) <Ref. to 4AT-103, INSTALLATION, Center Differential Carrier.>
6) Combine the extension case with the transmission case, and install vehicle speed sensor 1 (rear). <Ref. to 4AT-87, INSTALLATION, Extension Case.>
7) Insert inhibitor switch and transmission connector into stay.



(A) Transmission harness
(B) Inhibitor switch harness

8) Install the oil cooler pipe. <Ref. to 4AT-77, INSTALLATION, ATF Cooler Pipe and Hose.>
9) Install the oil charge pipe with O-ring. <Ref. to 4AT-84, INSTALLATION, Oil Charge Pipe.>
10) Insert the input shaft while rotating it lightly by hand, and then check the protrusion amount.

Normal protrusion amount A:
50 — 55 mm (1.97 — 2.17 in)

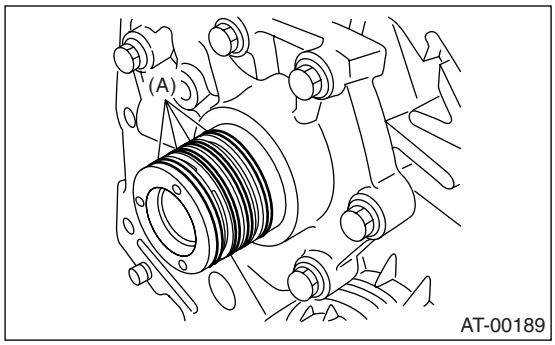


11) Install the torque converter clutch assembly. <Ref. to 4AT-85, INSTALLATION, Torque Converter Clutch Assembly.>
12) Install the transmission assembly to the vehicle. <Ref. to 4AT-44, INSTALLATION, Automatic Transmission Assembly.>

C: DISASSEMBLY

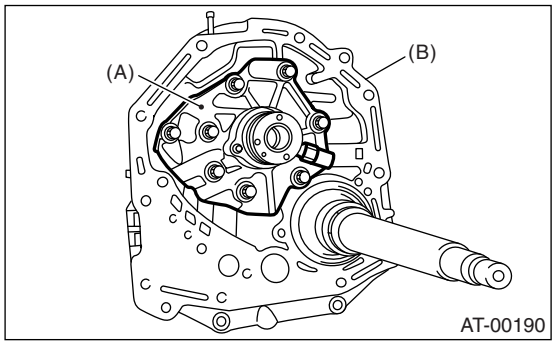
1. OIL PUMP COVER

1) Remove four seal rings.



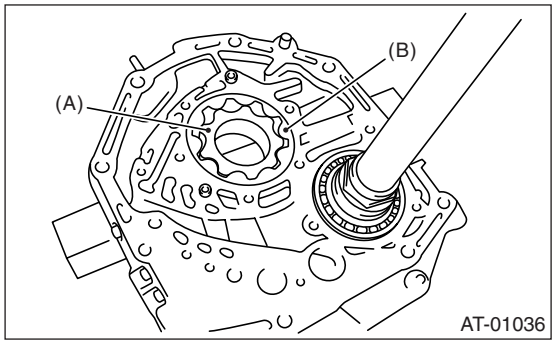
(A) Seal rings

2) Lightly tap the end of the stator shaft to remove the cover.



(A) Oil pump cover
(B) Oil pump housing

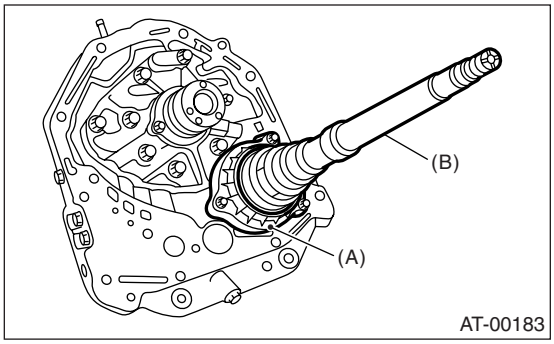
3) Remove the inner and outer rotor.



(A) Inner rotor
(B) Outer rotor

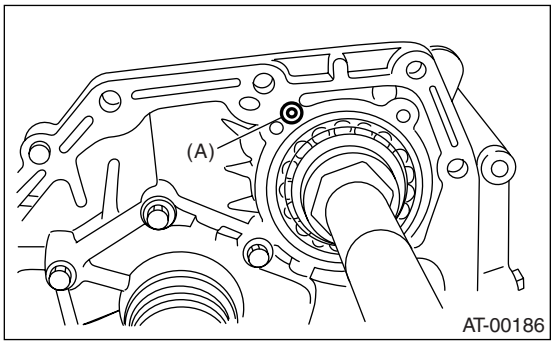
2. OIL SEAL RETAINER

1) Remove the oil seal retainer.



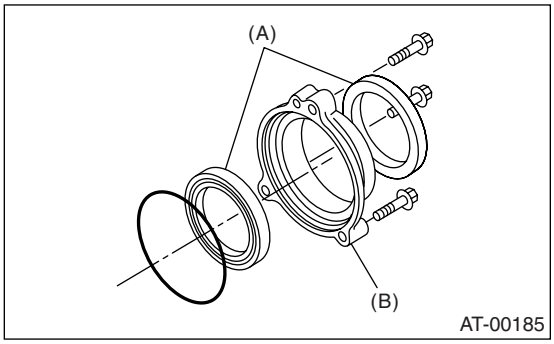
(A) Oil seal retainer
(B) Drive pinion shaft

2) Remove the O-ring.



(A) O-ring

3) Remove the oil seal from oil seal retainer.

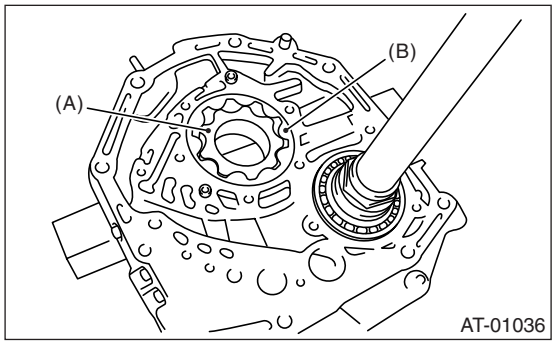


(A) Oil seal
(B) Oil seal retainer

D: ASSEMBLY

1. OIL PUMP COVER

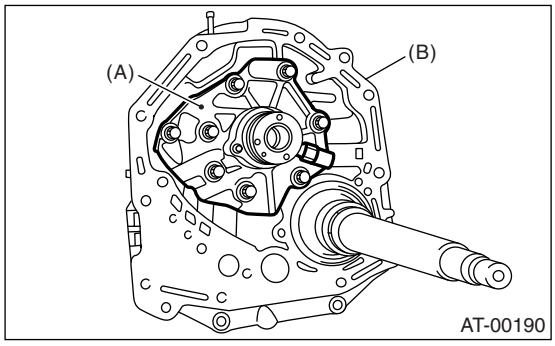
1) Install oil pump rotor assembly to oil pump housing.



(A) Inner rotor
(B) Outer rotor

2) Align both pivots with the pivot holes of the cover, and install the oil pump cover being careful not to apply undue force to the pivots.

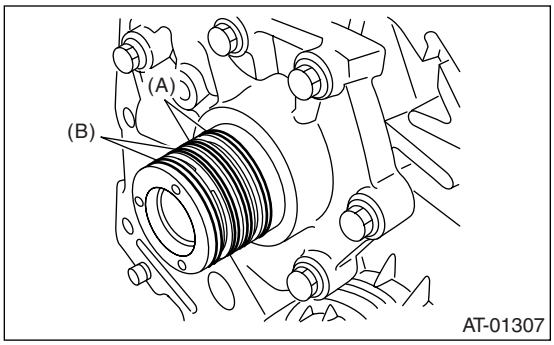
Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)



(A) Oil pump cover
(B) Oil pump housing

3) After assembling, turn the oil pump shaft to check for smooth rotation of the rotor.

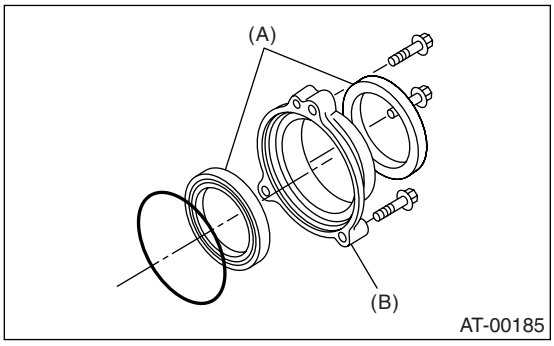
4) Install the oil seal retainer and new seal rings. After adjusting the drive pinion backlash and tooth contact. <Ref. to 4AT-112, ADJUSTMENT, Oil Pump Housing.>



(A) Seal rings (Black)
(B) Seal rings (Brown)

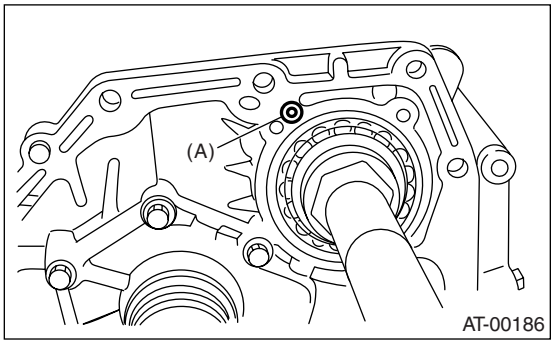
2. OIL SEAL RETAINER

1) Install two new oil seals to the oil seal retainer in proper position using ST.
ST 499247300 INSTALLER



(A) Oil seal
(B) Oil seal retainer

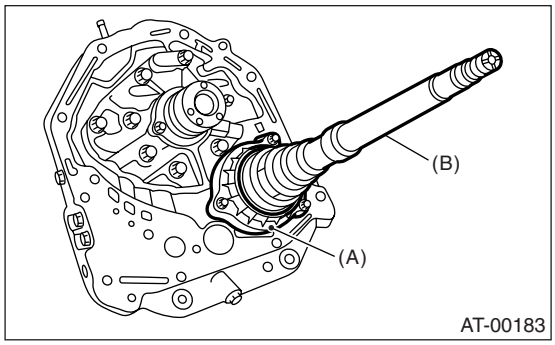
2) Install a new O-ring to the oil seal retainer using vaseline. Install the seal to oil pump housing bore.



(A) O-ring

3) Install the oil seal and secure it using three bolts being careful not to damage oil seal lip.

Tightening torque:
7 N·m (0.7 kgf-m, 5.2 ft-lb)

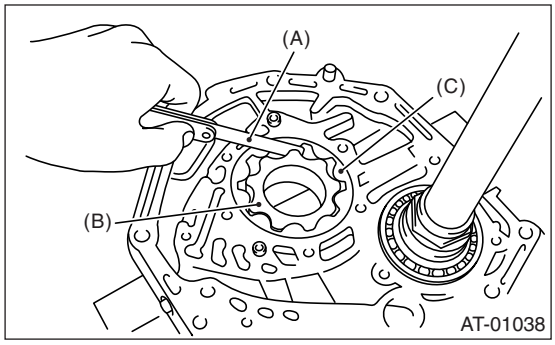


(A) Oil seal retainer
(B) Drive pinion shaft

E: INSPECTION

1) Check seal ring and O-ring oil seal for breaks or damage.
2) Check other parts for dents or abnormalities.
3) Selection of oil pump rotor assembly
(1) Tip clearance
Install inner rotor and outer rotor to oil pump. With rotor gears facing each other, measure crest-to-crest clearance.

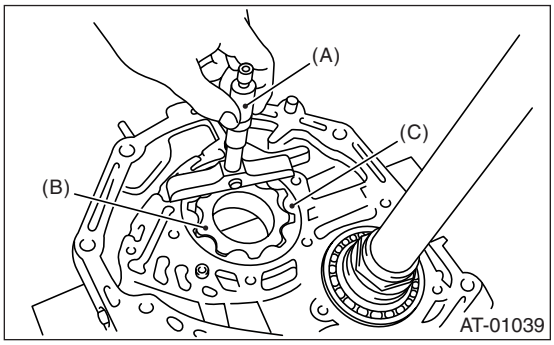
Tip clearance:
0.02 — 0.15 mm (0.0008 — 0.0059 in)



(A) Thickness gauge
(B) Inner rotor
(C) Outer rotor

(2) Side clearance
Set a depth gauge to oil pump housing, then measure oil pump housing-to-rotor clearances.

Side clearance:
0.02 — 0.04 mm (0.0008 — 0.0016 in)



(A) Depth gauge
(B) Inner rotor
(C) Outer rotor

(3) If depth and/or side clearances are outside specifications, replace rotor assembly.
Turbo and 2.0 L non-turbo (EC, EK, E2) model:

Oil pump rotor assembly	
Part No.	Thickness mm (in)
15008AA060	11.37 — 11.38 (0.4476 — 0.4480)
15008AA070	11.38 — 11.39 (0.4480 — 0.4484)
15008AA080	11.39 — 11.40 (0.4484 — 0.4488)

Except turbo and 2.0 L non-turbo (EC, EK, E2) model:

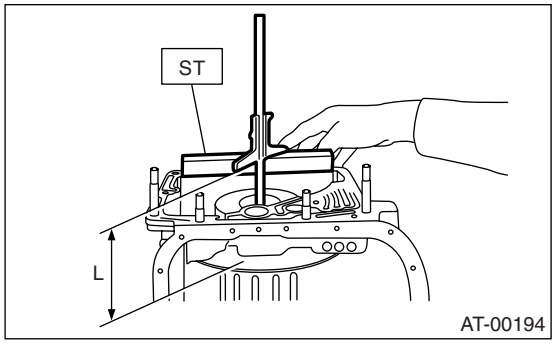
Oil pump rotor assembly	
Part No.	Thickness mm (in)
15008AA100	14.87 — 14.88 (0.5067 — 0.5071)
15008AA110	14.88 — 14.89 (0.5071 — 0.5075)
15008AA120	14.89 — 14.90 (0.5075 — 0.5079)

NOTE:
For EC, EK, E2, refer to “ID”. <Ref. to ID-5, MODEL NUMBER PLATE, IDENTIFICATION, Identification.>

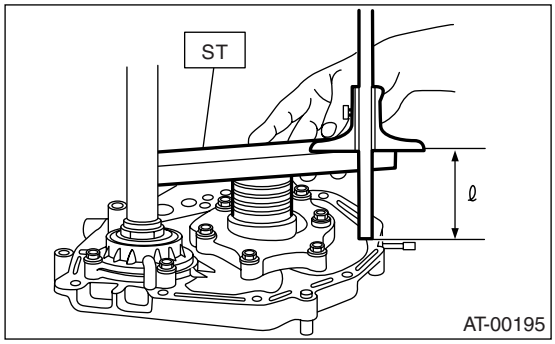
(4) Measure the total end play and adjust to within specifications. <Ref. to 4AT-112, ADJUSTMENT, Oil Pump Housing.>

F: ADJUSTMENT

1) Using ST, measure the distance from the end surface of ST to the recessed portion of the high clutch drum “L”.
ST 398643600 GAUGE

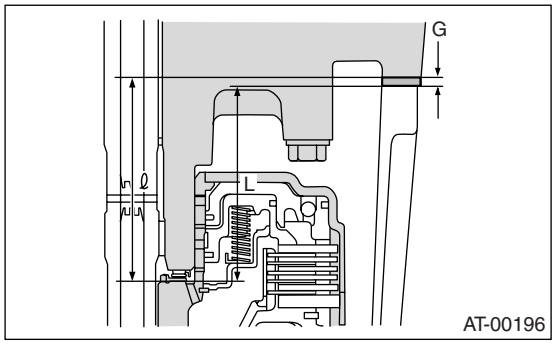


2) Using ST, measure the distance from the oil pump housing mating surface to the end surface of ST.
ST 398643600 GAUGE



3) Calculation of total end play
Select suitable bearing race from among those listed in this table so that clearance C is in the 0.25 to 0.55 mm (0.0098 to 0.0217 in) range.
$C = (L + G) - \ell$

C	Clearance between concave portion of high clutch and end of clutch drum support
L	Length from case mating surface to concave portion of high clutch
G	Gasket thickness [0.28 mm (0.0110 in)]
ℓ	Height from housing mating surface to upper surface of clutch drum support



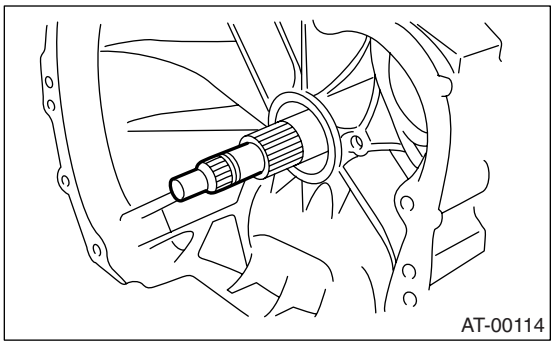
Thrust needle bearing	
Part No.	Thickness mm (in)
806528050	4.1 (0.161)
806528060	4.3 (0.169)
806528070	4.5 (0.177)
806528080	4.7 (0.185)
806528090	4.9 (0.193)
806528100	5.1 (0.201)

4) After completing end play adjustment, insert the bearing race in the recess of the high clutch. Attach the thrust needle bearing to the oil pump cover with vaseline.
5) After correctly installing the new gasket to the case mating surface, carefully install the oil pump housing assembly. Be careful to avoid hitting the drive pinion against the inside of the case.
6) Install both parts with dowel pins aligned. Make sure no clearance exists at the mating surface.

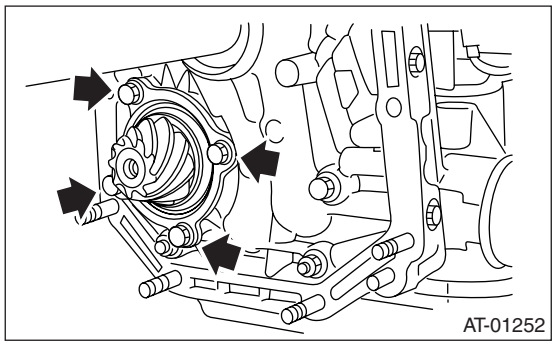
38.Drive Pinion Shaft Assembly

A: REMOVAL

1) Remove the transmission assembly from vehicle. <Ref. to 4AT-41, REMOVAL, Automatic Transmission Assembly.>
2) Extract the torque converter clutch assembly. <Ref. to 4AT-85, REMOVAL, Torque Converter Clutch Assembly.>
3) Remove the input shaft.


AT-00114

4) Lift-up lever behind the transmission harness connector and disconnect it from stay.
5) Disconnect inhibitor switch connector from stay.
6) Disconnect the air breather hose. <Ref. to 4AT-83, REMOVAL, Air Breather Hose.>
7) Remove the oil charge pipe. <Ref. to 4AT-84, REMOVAL, Oil Charge Pipe.>
8) Remove the oil cooler inlet and outlet pipes. <Ref. to 4AT-76, REMOVAL, ATF Cooler Pipe and Hose.>
9) Separation of converter case and transmission case sections <Ref. to 4AT-106, REMOVAL, Converter Case.>
10) Separate transmission case and extension case sections. <Ref. to 4AT-87, REMOVAL, Extension Case.>
11) Remove the reduction drive gear. (MPT model) <Ref. to 4AT-101, REMOVAL, Reduction Drive Gear.>
12) Remove the center differential carrier. (VTD model) <Ref. to 4AT-103, REMOVAL, Center Differential Carrier.>
13) Remove the reduction driven gear.
<Ref. to 4AT-99, REMOVAL, Reduction Driven Gear.>
14) Remove the drive pinion shaft mounting bolt and remove the drive shaft assembly from oil pump housing.

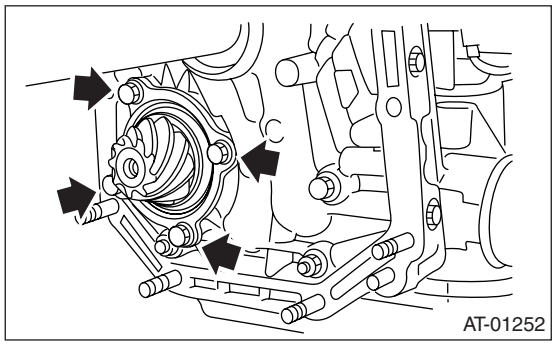

AT-01252

B: INSTALLATION

1) Assemble the drive pinion assembly to the oil pump housing.

NOTE:
- Pay attention not to bend the shim.
- Pay attention not to press the pinion into housing bore.

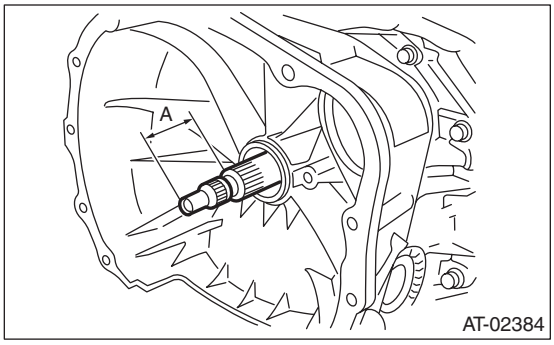
Tightening torque:
40 N·m (4.1 kgf-m, 30 ft-lb)


AT-01252

2) Combine the torque converter case with the transmission case. <Ref. to 4AT-106, INSTALLATION, Converter Case.>
3) Install the reduction driven gear.
<Ref. to 4AT-99, INSTALLATION, Reduction Driven Gear.>
4) Install the reduction drive gear. (MPT model) <Ref. to 4AT-101, INSTALLATION, Reduction Drive Gear.>
5) Install the center differential carrier. (VTD model) <Ref. to 4AT-103, INSTALLATION, Center Differential Carrier.>
6) Combine the extension case with the transmission case, and install vehicle speed sensor 1 (rear). <Ref. to 4AT-87, INSTALLATION, Extension Case.>
7) Insert inhibitor switch and transmission connector into stay.
8) Install the oil cooler inlet and outlet pipes. <Ref. to 4AT-77, INSTALLATION, ATF Cooler Pipe and Hose.>

9) Install the oil charge pipe with O-ring.
10) Insert the input shaft while rotating it lightly by hand, and then check the protrusion amount.

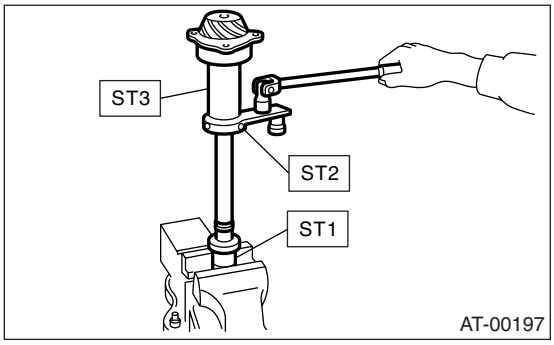
Normal protrusion amount A:
50 — 55 mm (1.97 — 2.17 in)



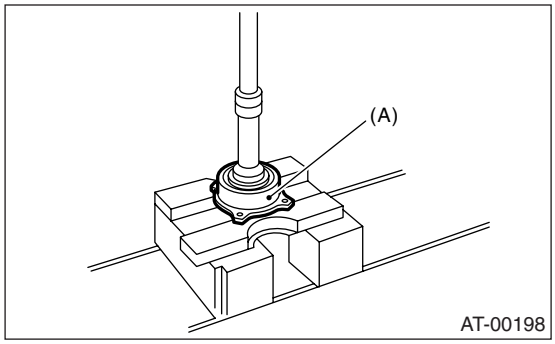
11) Install the torque converter clutch assembly. <Ref. to 4AT-85, INSTALLATION, Torque Converter Clutch Assembly.>
12) Install the transmission assembly to vehicle. <Ref. to 4AT-44, INSTALLATION, Automatic Transmission Assembly.>

C: DISASSEMBLY

1) Straighten the staked portion of the lock nut, and remove the lock nut while locking the rear spline portion of the shaft with ST1 and ST2. Then pull off the drive pinion collar.
ST1 498937110 HOLDER
ST2 499787700 WRENCH
ST3 499787500 ADAPTER

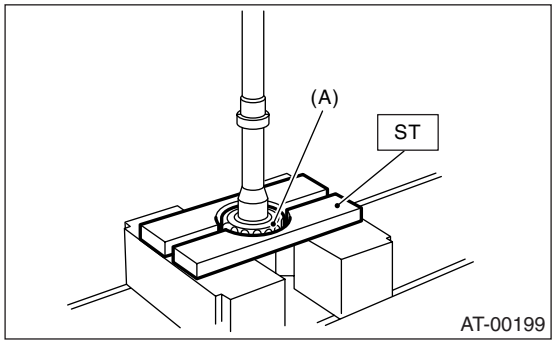


2) Remove the O-ring.
3) Using a press, separate the rear roller bearing and outer race from the shaft.



(A) Outer race

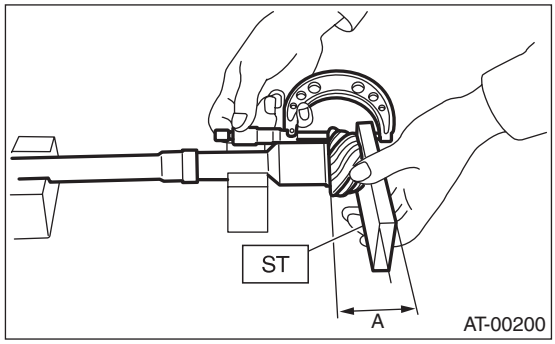
4) Using a press and ST, separate the front roller bearing from the shaft.
ST 498517000 REPLACER



(A) Front roller bearing

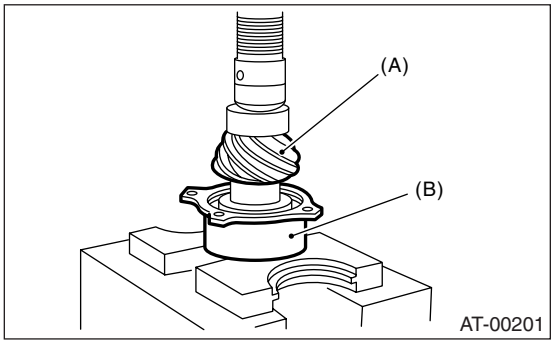
D: ASSEMBLY

1) Measure dimension “A” of the drive pinion shaft.
ST 398643600 GAUGE



2) Using a press, force-fit a new roller bearing in position.

NOTE:
If too much pressure is applied, the roller bearing will not turn easily.



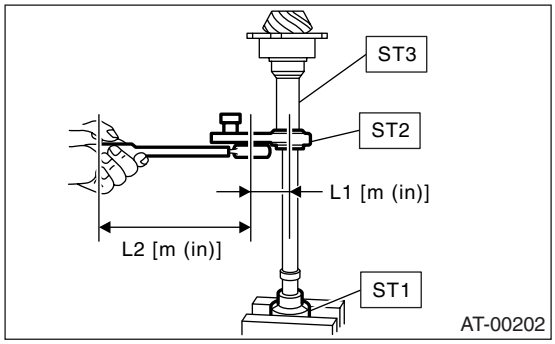
(A) Drive pinion shaft
(B) Roller bearing

3) After fitting a new O-ring to the shaft, attach the drive pinion collar to the shaft.
4) Install the lock washer to drive pinion shaft in proper direction.
5) Tighten a new lock nut with ST1, ST2 and ST3.
Calculate lock washer and lock nut specifications using the following formula.
T2 = L2/(L1 + L2) × T1
T1: 116 N·m (11.8 kgf-m, 85.3 ft-lb)
[Required torque setting]
T2: Tightening torque
L1: ST2 length 0.072 m (2.83 in)
L2: Torque wrench length
Example:

Torque wrench length m (in)	Tightening torque N·m (kgf-m, ft-lb)
0.4 (15.75)	98 (10.0, 72)
0.45 (17.72)	100 (10.2, 73.8)
0.5 (19.69)	101 (10.3, 74.5)
0.55 (21.65)	102 (10.4, 75)

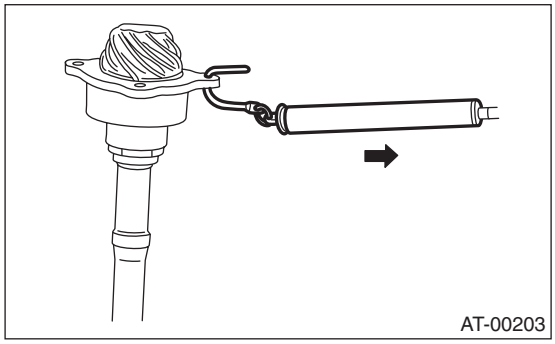
ST1 498937110 HOLDER
ST2 499787700 WRENCH
ST3 499787500 ADAPTER

NOTE:
Install ST2 to torque wrench as straight as possible.

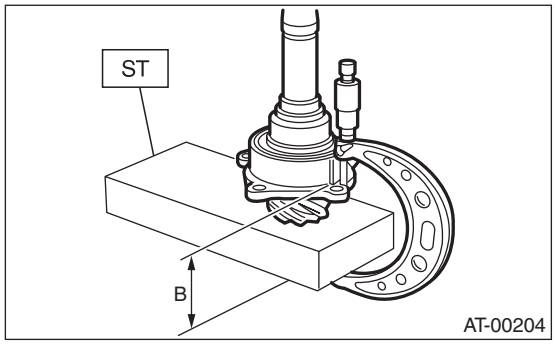


6) Measure the starting torque of the bearing. Make sure the starting torque is within the specified range. If out of the allowable range, replace the roller bearing.

Starting torque:
7.6 — 38.1 N (0.776 — 3.88 kgf, 1.7 — 8.6 lbf)



7) Stake the lock nut securely at two places.
8) Measure dimension “B” of the drive pinion shaft.
ST 398643600 GAUGE



9) The thickness “t” (mm) of the drive pinion shim.
t = 6.5±0.0625 − (B − A)

10) Select three or less shims from following table.

Available drive pinion shims	
Part No.	Thickness mm (in)
31451AA050	0.150 (0.0059)
31451AA060	0.175 (0.0069)
31451AA070	0.200 (0.0079)
31451AA080	0.225 (0.0089)
31451AA090	0.250 (0.0098)
31451AA100	0.275 (0.0108)

E: INSPECTION

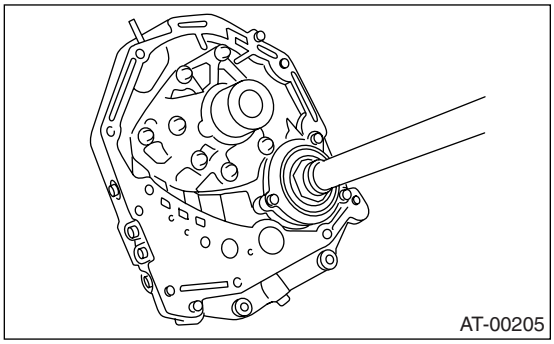
• Make sure that all component parts are free of harmful cuts, gouges, and other faults.
• Adjust the teeth alignment. <Ref. to 4AT-117, ADJUSTMENT, Drive Pinion Shaft Assembly.>

F: ADJUSTMENT

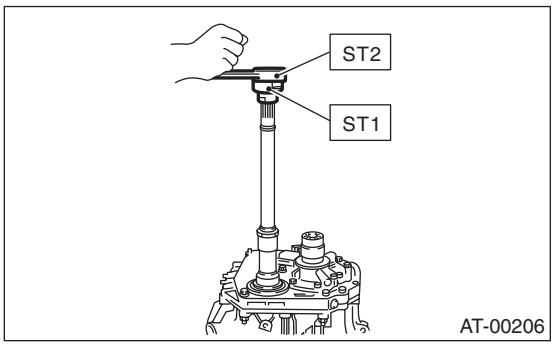
1) Thoroughly remove the liquid gasket from the case mating surface beforehand.
2) Install the oil pump housing assembly to the converter case, and secure evenly by tightening four bolts.

NOTE:
Use an old gasket or an aluminum washer so as not to damage the mating surface of the housing.

Tightening torque:
41 N·m (4.2 kgf-m, 30.2 ft-lb)

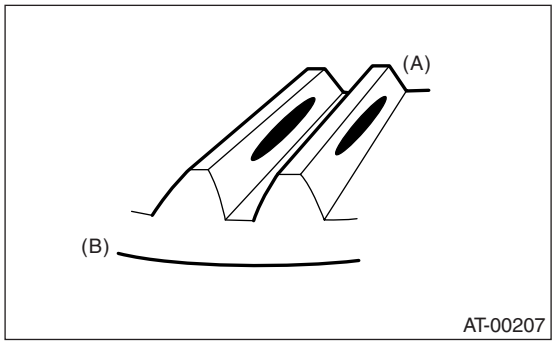

AT-00205

3) Rotate the drive pinion several times with ST1 and ST2.
ST1 498937110 HOLDER
ST2 499787700 WRENCH



AT-00206

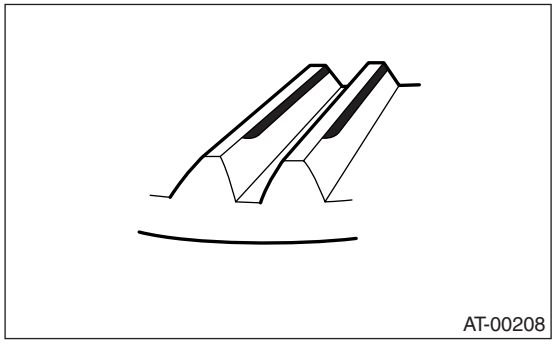
4) Adjust the backlash between drive pinion and hypoid driven gear. <Ref. to 4AT-124, ADJUSTMENT, Front Differential Assembly.>
5) Apply red lead evenly to the surfaces of three or four teeth of the hypoid driven gear. Rotate the drive pinion in the forward and reverse directions several times. Then remove the oil pump housing, and check the tooth contact pattern.
If tooth contact is improper, readjust the backlash or shim thickness. <Ref. to 4AT-124, ADJUSTMENT, Front Differential Assembly.>
• Tooth contact
Checking item:Tooth contact pattern is slightly shifted toward to toe side under no-load rotation. [When loaded, contact pattern moves toward heel.]



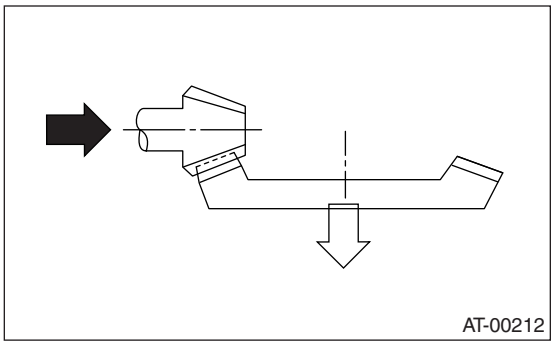
AT-00207

(A) Toe side
(B) Heel side

• Face contact
Checking item: Backlash is too large.
Contact pattern

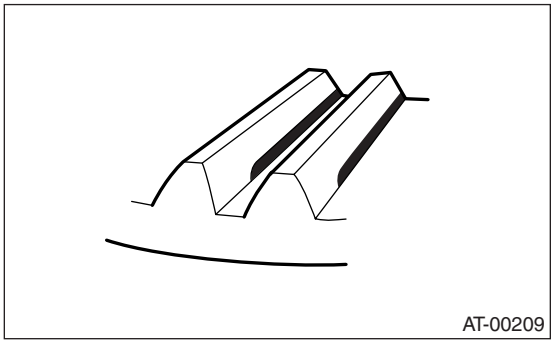

AT-00208

Corrective action: Increase thickness of drive pinion height adjusting shim in order to bring drive pinion close to hypoid driven gear.

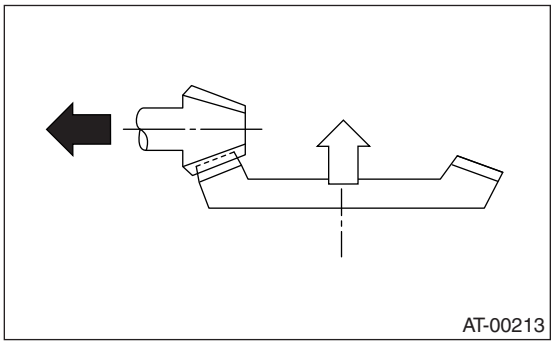


- Flank contact

Checking item: Backlash is too small.
Contact pattern

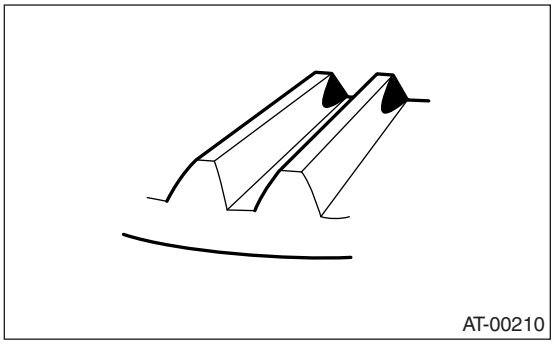


Corrective action: Reduce thickness of drive pinion height adjusting shim in order to move drive pinion away from hypoid driven gear.

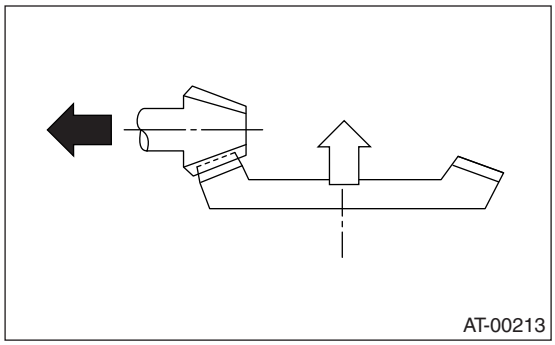


- Toe contact (Inside end contact)

Checking item: Contact areas is small.
Contact pattern

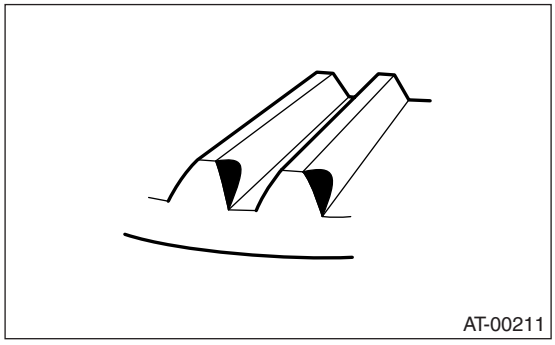


Corrective action: Decrease thickness of drive pinion height adjusting shim in order to move drive pinion away from hypoid driven gear.

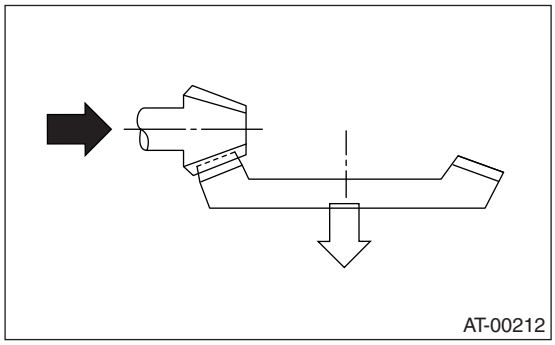


- Heel contact (Outside end contact)

Checking item: Contact areas is small.
Contact pattern

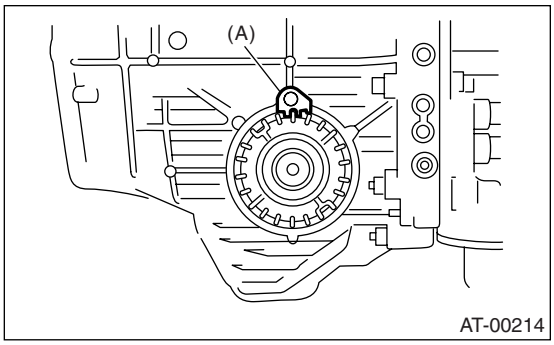


Corrective action: Increase thickness of drive pinion height adjusting shim in order to move drive pinion close to hypoid driven gear.



6) If tooth contact is correct, mark the retainer position and loosen it. After fitting a new O-ring and oil seal, screw in the retainer to the marked position. Then tighten the lock plate to the specified torque.

Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)

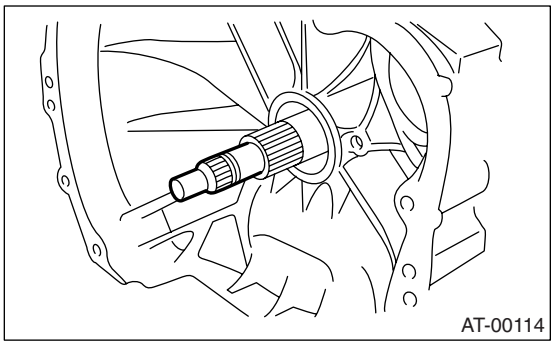


(A) Lock plate

39.Front Differential Assembly

A: REMOVAL

1) Remove the transmission assembly from the vehicle. <Ref. to 4AT-41, REMOVAL, Automatic Transmission Assembly.>
2) Extract the torque converter clutch assembly. <Ref. to 4AT-85, REMOVAL, Torque Converter Clutch Assembly.>
3) Remove the input shaft.



4) Lift-up lever behind the transmission harness connector and disconnect it from stay.
5) Disconnect inhibitor switch from stay.
6) Remove the oil charge pipe. <Ref. to 4AT-84, REMOVAL, Oil Charge Pipe.>
7) Remove the oil cooler inlet and outlet pipes. <Ref. to 4AT-76, REMOVAL, ATF Cooler Pipe and Hose.>
8) Separation of converter case and transmission case. <Ref. to 4AT-106, REMOVAL, Converter Case.>
9) Remove the seal pipe.
10) Remove the differential side retainer with ST.

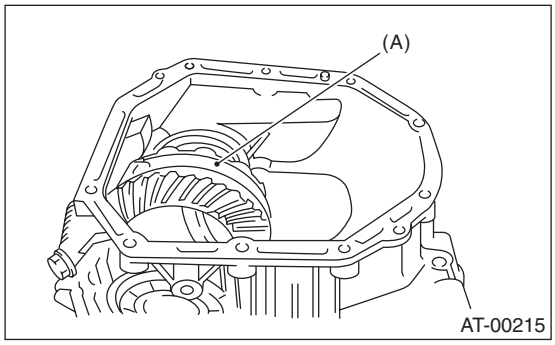
NOTE:
Hold the differential case assembly by hand to avoid damaging retainer mounting hole of the converter case.

ST 499787000 WRENCH ASSY

11) Remove the differential assembly without damaging installation part of retainer.

B: INSTALLATION

1) Install the differential assembly to the case, paying special attention not to damage the inside of the case (particularly, the differential side retainer contact surface).



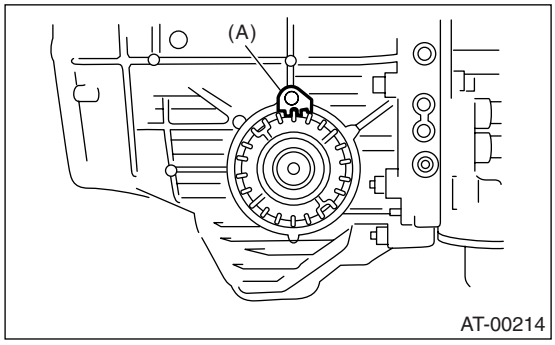
(A) Differential assembly

2) Install the O-rings from left and right side retainer.
3) Using ST, install the side retainers. <Ref. to 4AT-123, ASSEMBLY, Front Differential Assembly.>

ST 499787000 WRENCH ASSY

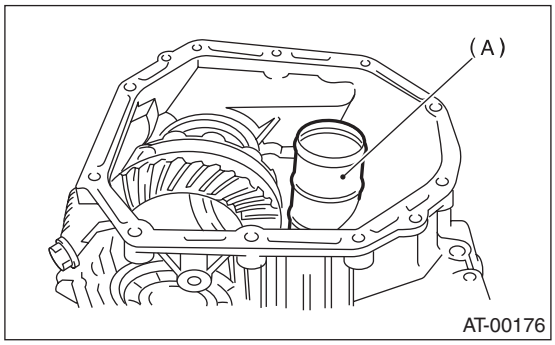
4) Adjust the front differential backlash. <Ref. to 4AT-124, ADJUSTMENT, Front Differential Assembly.>
5) Install the lock plate.

Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)



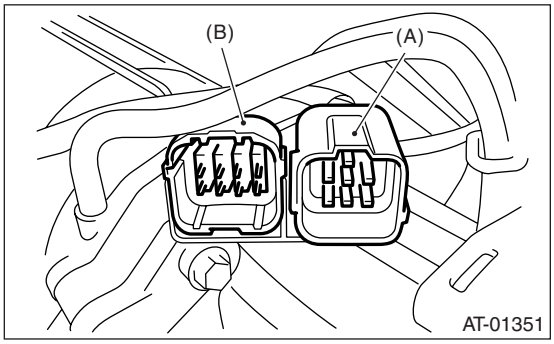
(A) Lock plate

6) Install the new seal pipe to the converter case.



(A) Seal pipe

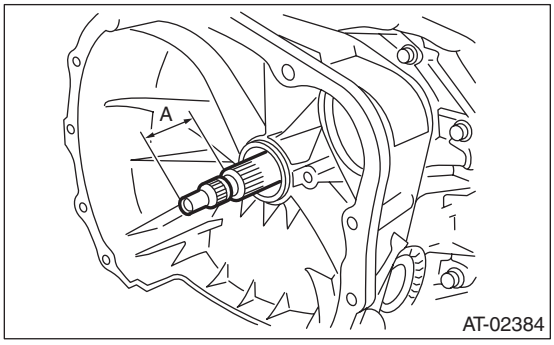
7) Install the converter case to transmission case. <Ref. to 4AT-106, INSTALLATION, Converter Case.>
8) Insert inhibitor switch and transmission connector into stay.



(A) Transmission harness
(B) Inhibitor switch harness

9) Install oil cooler pipes. <Ref. to 4AT-77, INSTALLATION, ATF Cooler Pipe and Hose.>
10) Install the oil charge pipe with O-ring <Ref. to 4AT-84, INSTALLATION, Oil Charge Pipe.>
11) Insert the input shaft while rotating it lightly by hand, and then check the protrusion amount.

Normal protrusion amount A:
50 — 55 mm (1.97 — 2.17 in)

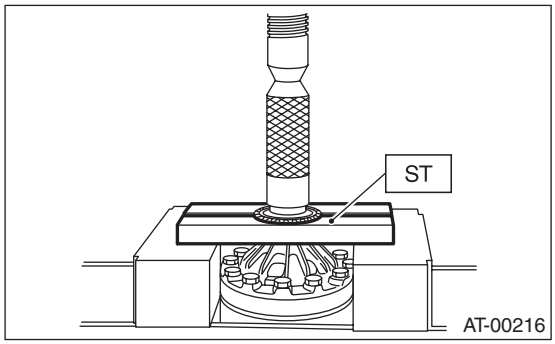


12) Install the torque converter clutch assembly. <Ref. to 4AT-85, INSTALLATION, Torque Converter Clutch Assembly.>
13) Install the transmission assembly to the vehicle. <Ref. to 4AT-44, INSTALLATION, Automatic Transmission Assembly.>

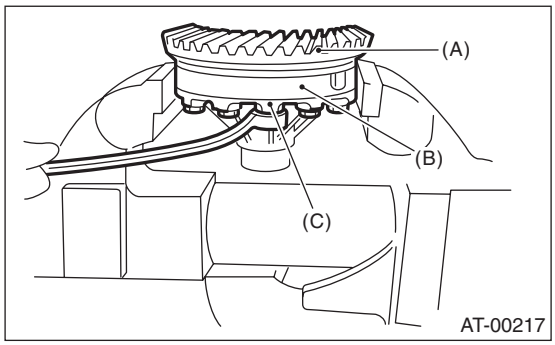
C: DISASSEMBLY

1. DIFFERENTIAL CASE ASSEMBLY

1) Using a press and ST, remove the taper roller bearing.
ST 498077000 REMOVER

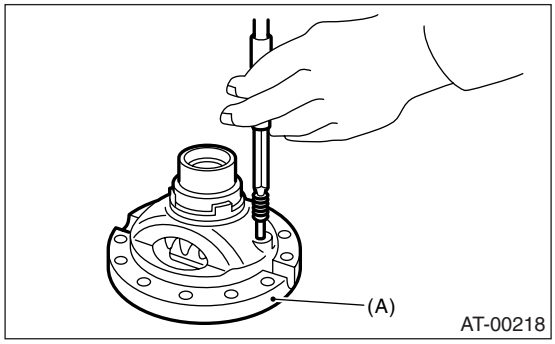


2) Secure the case in a vise and remove the hypoid driven gear tightening bolts, then separate the hypoid driven gear, case (RH) and case (LH).



(A) Hypoid driven gear
(B) Differential case (RH)
(C) Differential case (LH)

3) Pull out the straight pin and shaft, and remove the differential bevel gear, washer, and differential bevel pinion.

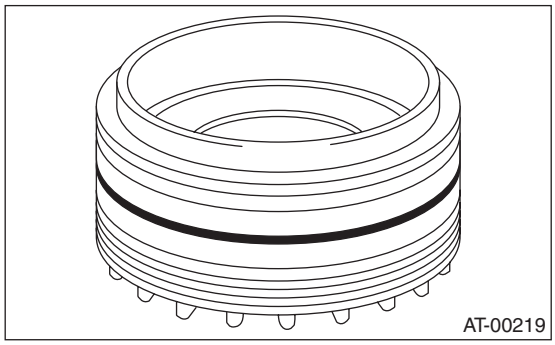


(A) Differential case (RH)

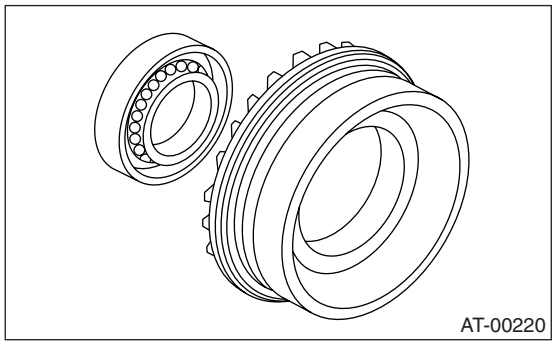
2. SIDE RETAINER

NOTE:
After adjusting the drive pinion backlash and tooth contact, remove and install the oil seal and O-ring.

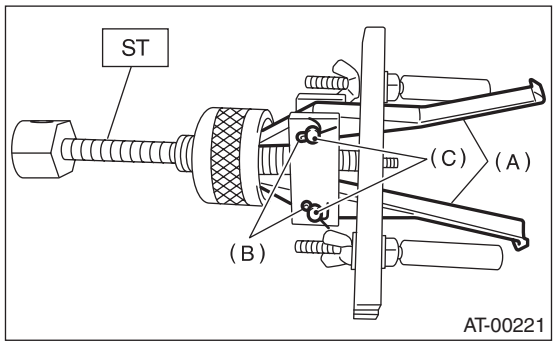
1) Remove O-ring.



2) Remove oil seal.

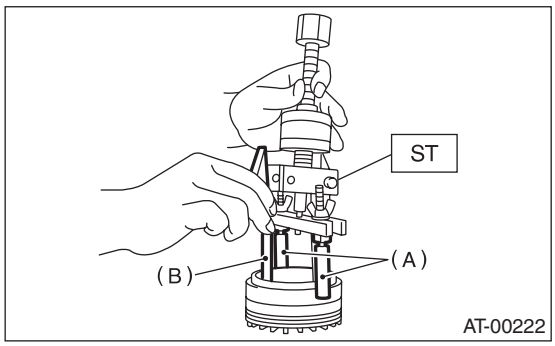


3) Take out either split pin, remove claw.
ST 398527700 PULLER ASSY



(A) Claw
(B) Split pin
(C) Pin

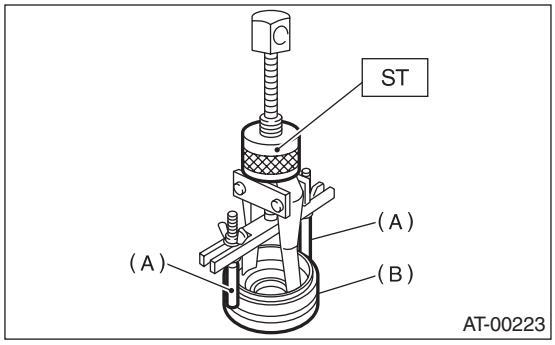
4) Securely attach two claws to outer race, set ST to side retainer.
ST 398527700 PULLER ASSY



(A) Shaft
(B) Claw

5) Return removed claw to the original position, and install pin and split pin.
6) Hold the shaft of ST to avoid removing from side retainer, and then remove the bearing outer race.
ST 398527700 PULLER ASSY

NOTE:
Replace bearing inner and outer races as a single unit.

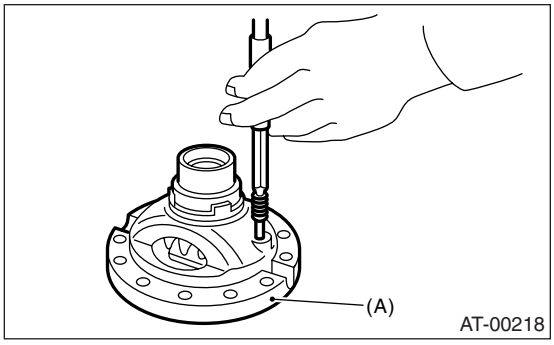


(A) Shaft
(B) Side retainer

D: ASSEMBLY

1. DIFFERENTIAL CASE ASSEMBLY

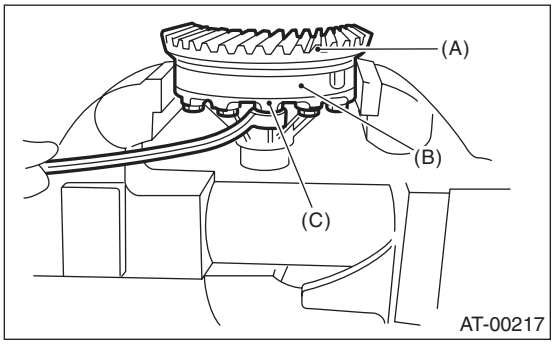
1) Install the washer, differential bevel gear and differential bevel pinion in the differential case (RH). Insert the pinion shaft.
2) Install straight pin from reverse direction.



(A) Differential case (RH)

3) Install the washer and differential bevel gear to the differential case (LH). Then put the case over the differential case (RH), and connect both cases.
4) Install the hypoid driven gear and secure by tightening the bolt.

Standard tightening torque:
62 N·m (6.3 kgf-m, 45.6 ft-lb)

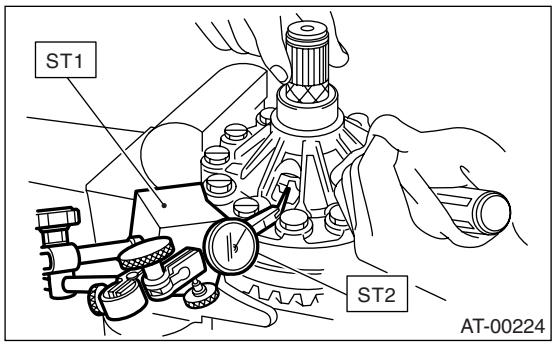


(A) Hypoid driven gear
(B) Differential case (RH)
(C) Differential case (LH)

5) Measurement of backlash (Selection of washer)
(1) Install the SUBARU genuine axle shaft to differential case.
Part No. 38415AA070 AXLE SHAFT
(2) Measure the gear backlash with ST1 and ST2, and insert ST2 through the access window of the case.
ST1 498247001 MAGNET BASE
ST2 498247100 DIAL GAUGE

NOTE:
• Measure the backlash by applying a pinion tooth between two bevel gear teeth.
• Fix bevel pinion gear in place with a screwdriver or similar tool when measuring.

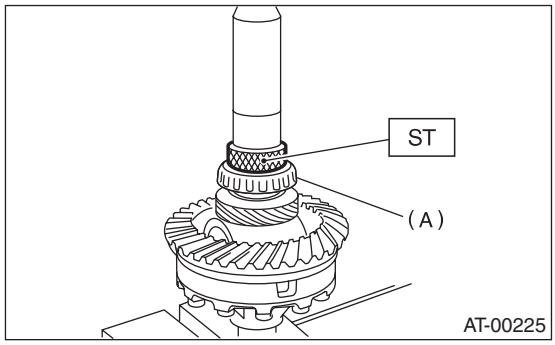
Standard value:
0.13 — 0.18 mm (0.0051 — 0.0071 in)



(3) If backlash is not as specified, select a washer from the table below.

Washer	
Part No.	Thickness mm (in)
803038021	0.95 (0.037)
803038022	1.00 (0.039)
803038023	1.05 (0.041)

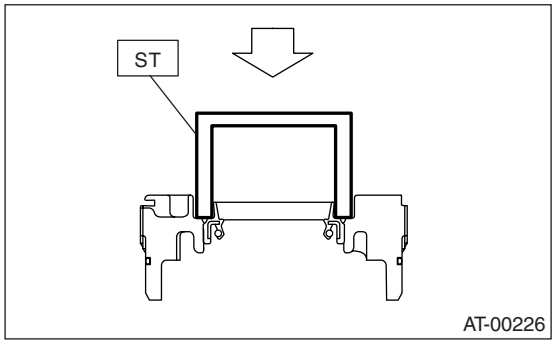
6) Using ST, install taper roller bearing.
ST 398487700 DRIFT



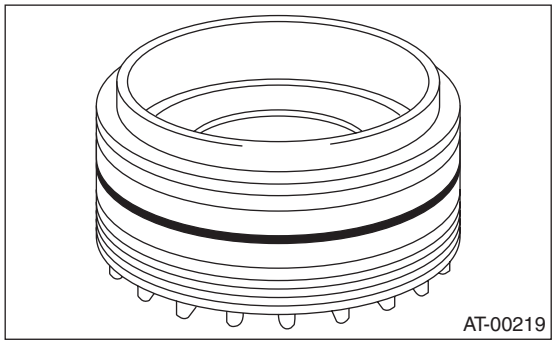
(A) Taper roller bearing

2. SIDE RETAINER

1) Install bearing outer race to side retainer.
2) Install a new oil seal using the ST and hammer.
ST 18675AA000 DIFFERENTIAL SIDE OIL SEAL INSTALLER



3) Apply gear oil to new O-ring and install it.



E: INSPECTION

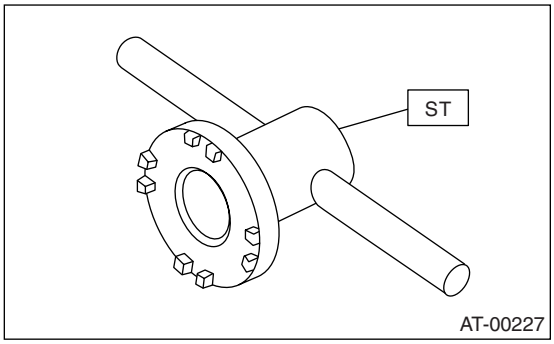
• Check each component for harmful cuts, damage and other faults.
• Measure the backlash and adjust to within specifications.
<Ref. to 4AT-124, ADJUSTMENT, Front Differential Assembly.>

F: ADJUSTMENT

1) Using ST, screw in the retainer until light contact is felt.

NOTE:
Screw in the RH side slightly deeper than the LH side.

ST 499787000 WRENCH ASSY

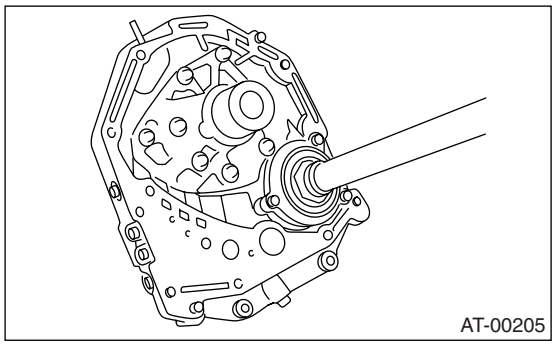


2) Remove the oil pump housing.
3) Thoroughly remove the liquid gasket from the case mating surface beforehand.

4) Install the oil pump housing assembly to the converter case, and secure evenly by tightening four bolts.

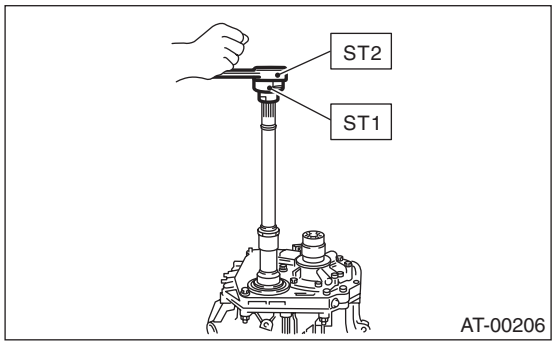
NOTE:
Use an old gasket or an aluminum washer so as not to damage the mating surface of the housing.

Tightening torque:
41 N·m (4.2 kgf-m, 30.2 ft-lb)

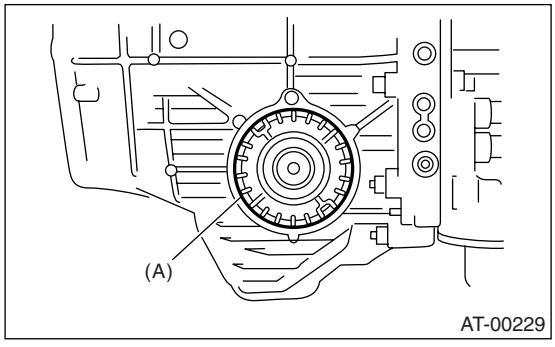


5) Rotate the drive pinion several times with ST1 and ST2.

ST1 498937110 HOLDER
ST2 499787700 WRENCH

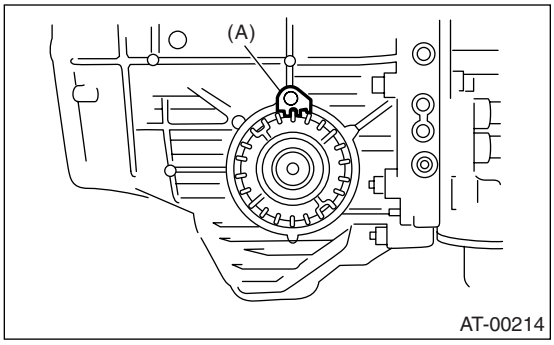


6) Tighten the LH retainer until contact is felt while rotating the shaft. Then loosen the RH retainer. Keep tightening the LH retainer and loosening the RH retainer until the pinion shaft can no longer be turned. This is the “zero” state.



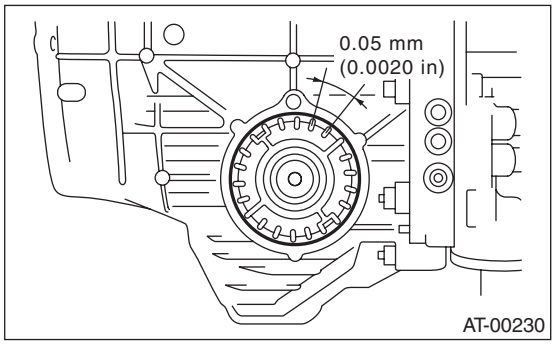
(A) Retainer

7) After the “zero” state is established, back off the LH retainer 3 notches and secure it with the lock plate. Then back off the RH retainer and retighten until it stops. Rotate drive pinion a few times. Tighten the RH retainer 1-3/4 notches further. This sets the preload. Finally, secure the retainer with its lock plate.



(A) Lock plate

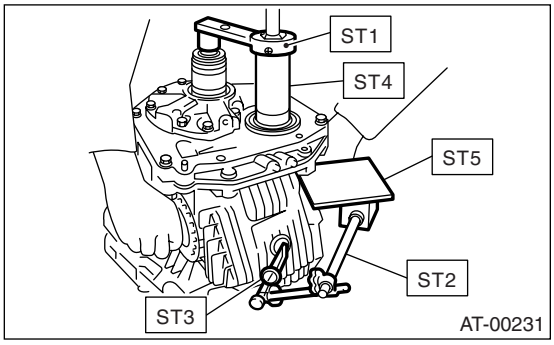
NOTE:
Turning the retainer by one tooth changes the backlash about 0.05 mm (0.0020 in).



8) Turn the drive pinion several rotations with ST1 and check to see if the backlash is within the standard value with ST2, ST3, ST4 and ST5.

ST1	499787700	WRENCH
ST2	498247001	MAGNET BASE
ST3	498247100	DIAL GAUGE
ST4	499787500	ADAPTER
ST5	498255400	PLATE

Backlash:
0.13 — 0.18 mm (0.0051 — 0.0071 in)

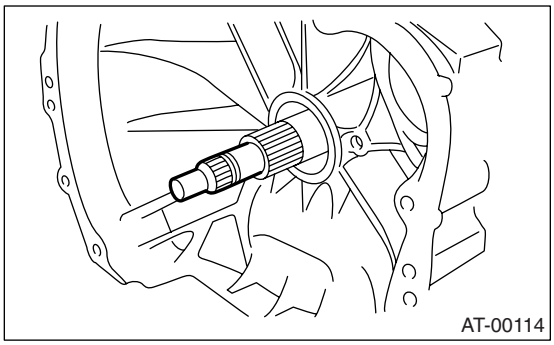


9) Adjust the tooth contact between front differential and drive shaft. <Ref. to 4AT-117, ADJUSTMENT, Drive Pinion Shaft Assembly.>

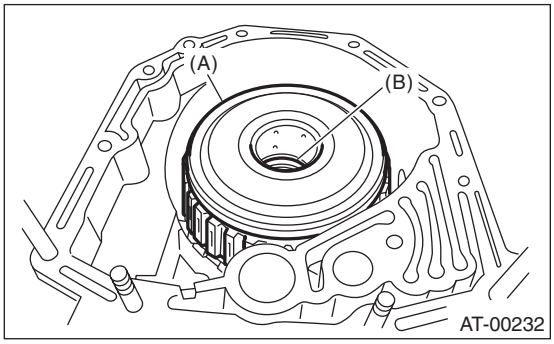
40.AT Main Case

A: REMOVAL

1) Remove the transmission assembly from the vehicle. <Ref. to 4AT-41, REMOVAL, Automatic Transmission Assembly.>
2) Extract the torque converter clutch assembly. <Ref. to 4AT-85, REMOVAL, Torque Converter Clutch Assembly.>
3) Remove the input shaft.

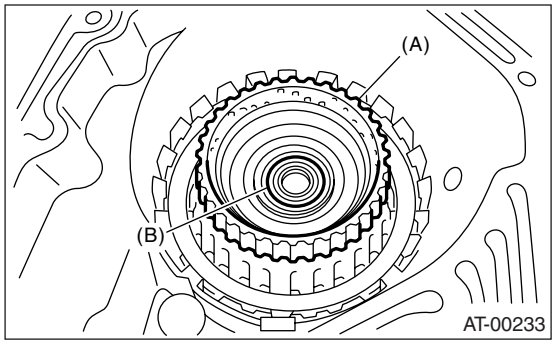


4) Lift-up lever behind the transmission harness connector and disconnect it from stay.
5) Disconnect inhibitor switch connector from stay.
6) Disconnect the air breather hose.
7) Remove the oil charge pipe. <Ref. to 4AT-84, REMOVAL, Oil Charge Pipe.>
8) Remove the oil cooler inlet and outlet pipes. <Ref. to 4AT-76, REMOVAL, ATF Cooler Pipe and Hose.>
9) Separation of converter case and transmission case. <Ref. to 4AT-106, REMOVAL, Converter Case.>
10) Remove the oil pump housing.
<Ref. to 4AT-108, REMOVAL, Oil Pump Housing.>
11) Take out the high clutch, thrust needle bearing and reverse clutch assembly.



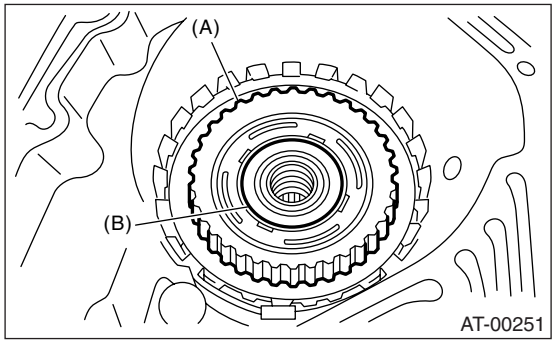
(A) High clutch and reverse clutch assembly
(B) Thrust needle bearing

12) Take out the high clutch hub and the thrust bearing.



(A) High clutch hub
(B) Thrust needle bearing

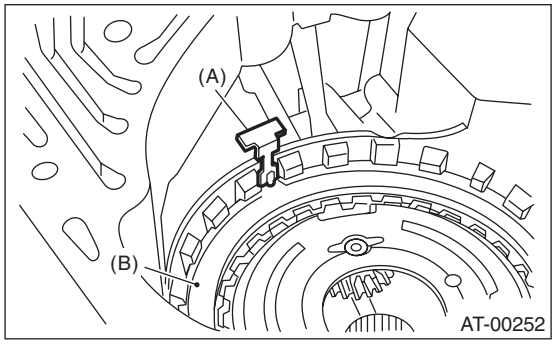
13) Take out the front sun gear and the thrust bearing.



(A) Front sun gear
(B) Thrust needle bearing

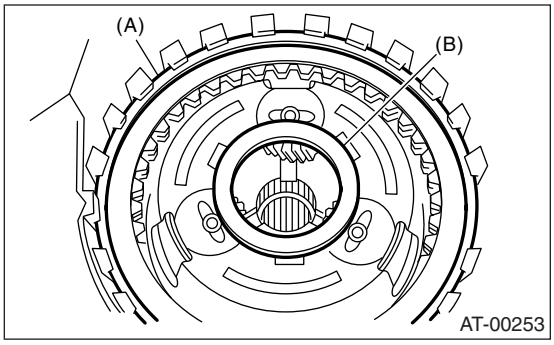
14) Pull out leaf spring without folding.

NOTE:
Remove it while pressing down on lower leaf spring.



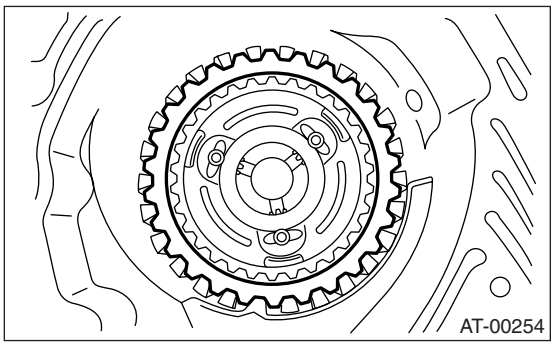
(A) Leaf spring
(B) Retaining plate

15) Remove snap ring and thrust needle bearing.

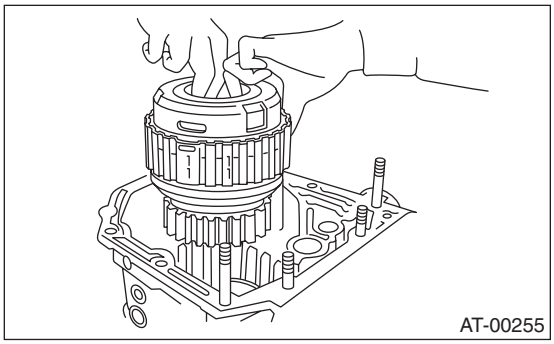


(A) Snap ring
(B) Thrust needle bearing

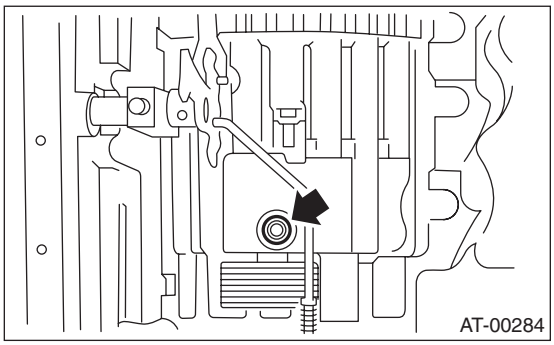
16) Take out retaining plate, drive plate and driven plate of 2-4 brake.



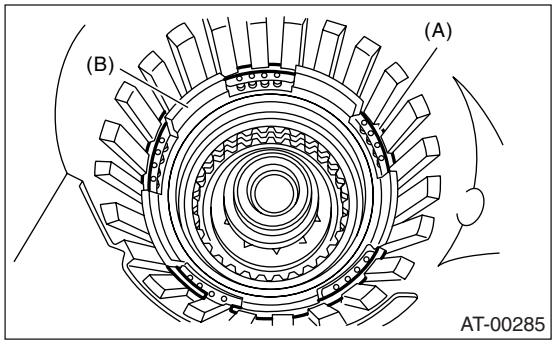
17) Take out the thrust needle bearing, planetary gear assembly and the low clutch assembly.



18) Remove 2-4 brake seal.

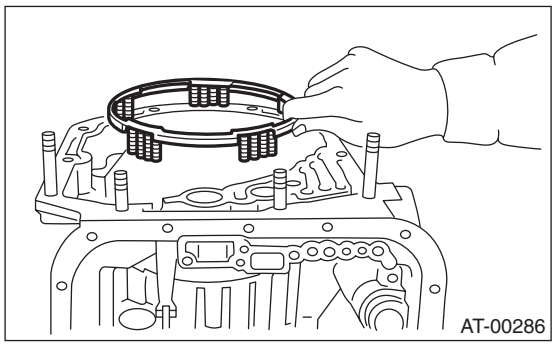


19) Remove snap ring.

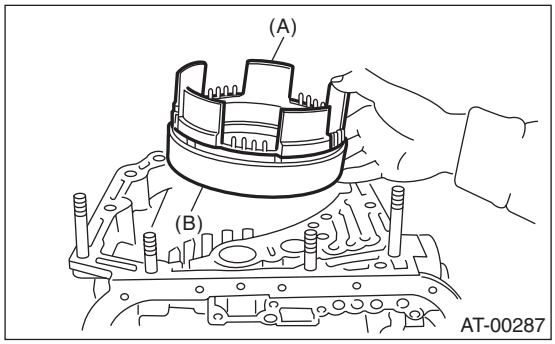


(A) Snap ring
(B) 2-4 brake piston

20) Take out 2-4 brake return spring.

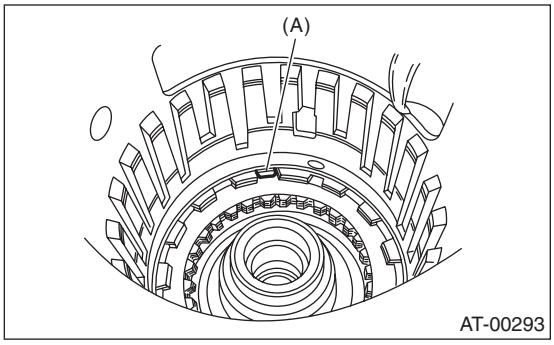


21) Remove the 2-4 brake piston and piston retainer without damaging.



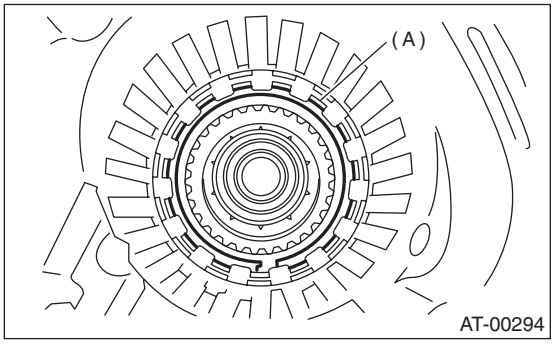
(A) 2-4 brake piston
(B) 2-4 brake piston retainer

22) Pull out the leaf spring without folding.



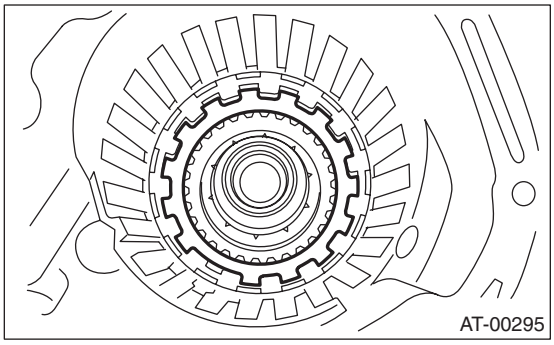
(A) Leaf spring

23) Remove snap ring.

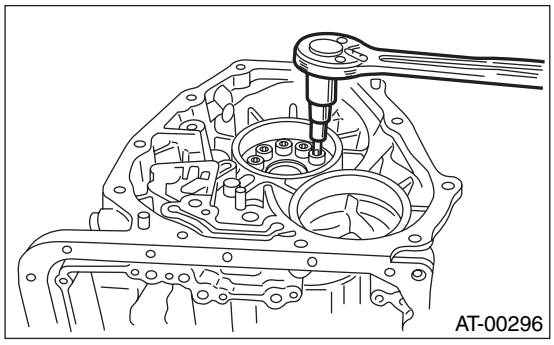


(A) Snap ring

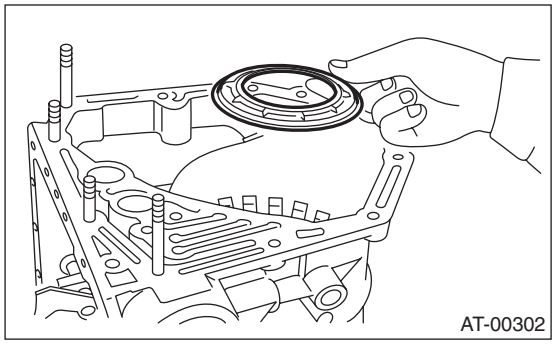
24) Take out retaining plate, drive plate, driven plate and dish plate.



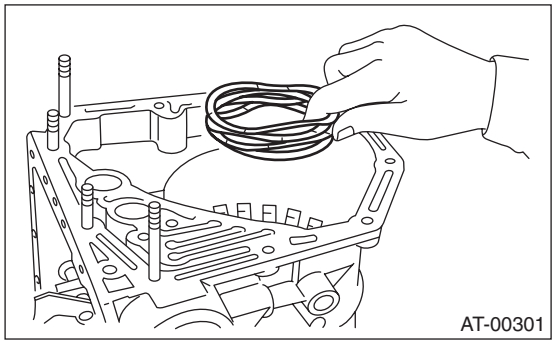
25) Turn the transmission case upside down, and then take out the socket bolts while holding the one-way clutch inner race with hand.



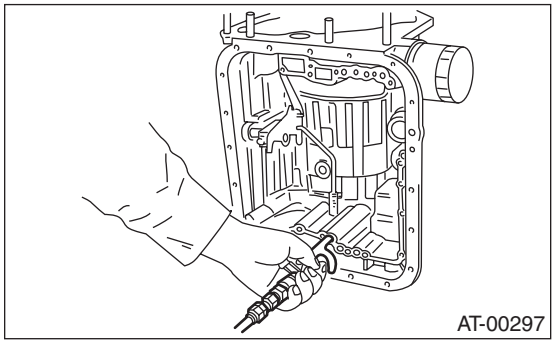
26) Take out the spring retainer.



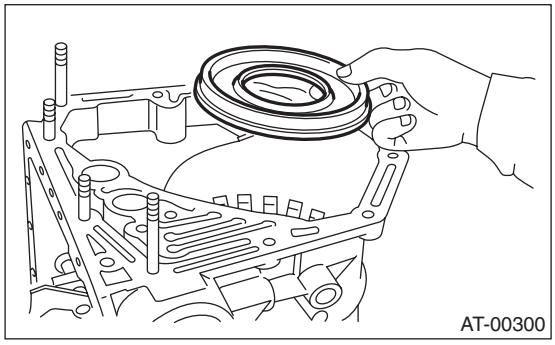
27) Take out the return spring.



28) Apply compressed air.



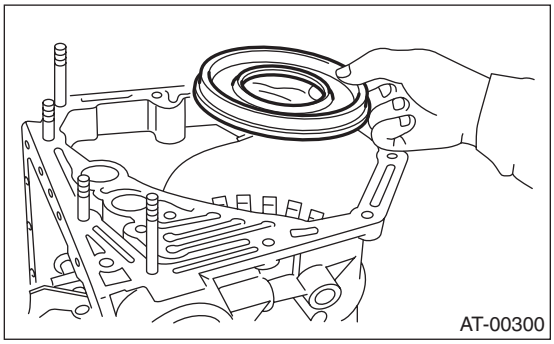
29) Take out the low & reverse piston.



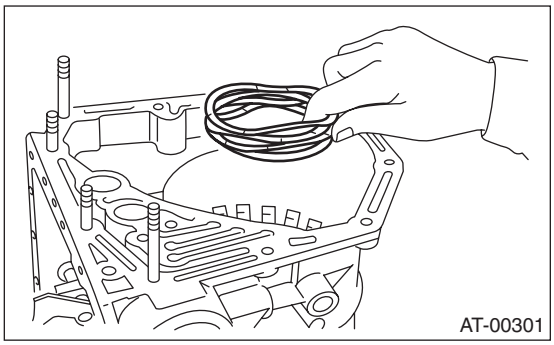
B: INSTALLATION

1) Install the low and reverse piston without tilting.

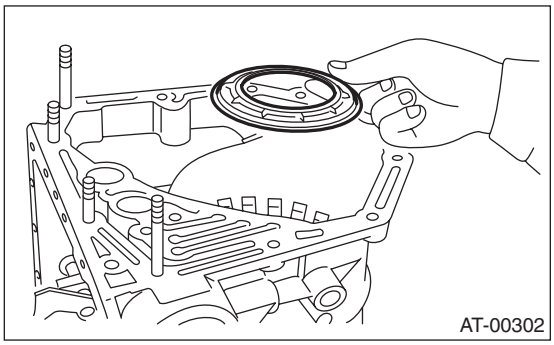
NOTE:
Be careful not to damage the lip seal.



2) Install return spring.



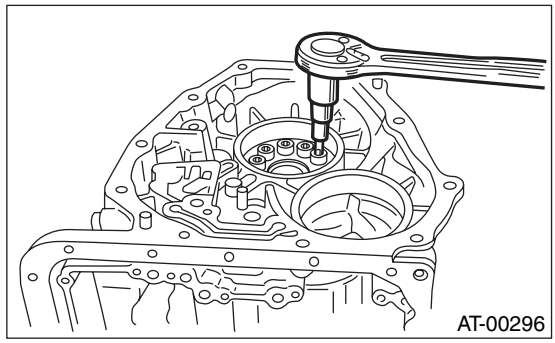
3) Install spring retainer.



4) Install the one-way clutch inner race, spring retainer and return spring.

5) Tighten socket head bolts evenly from the rear side of the transmission case.

Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)



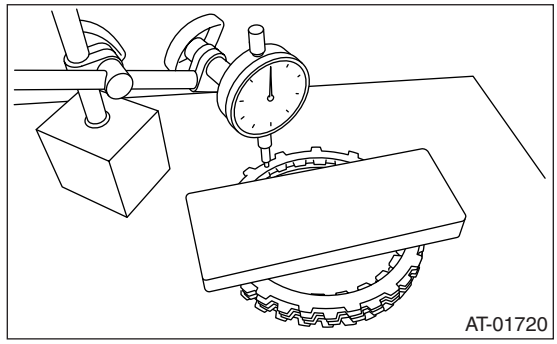
6) Place the front side of transmission body up.
7) Install thrust needle bearing.
8) Place the dish plate, driven plate, drive plate and retaining plate neatly in this order on surface table.
9) Set the micro gauge to retaining plate, and read its scale.

NOTE:
The value, which is read in the gauge at this time, is zero point.

10) Scale and record the weight “Z” of a flat board which will be put on plates.

NOTE:
• Use a stiff flat board which does not bend against load.
• Use a flat board of its weight less than 8.5 kg (18.7 lb).

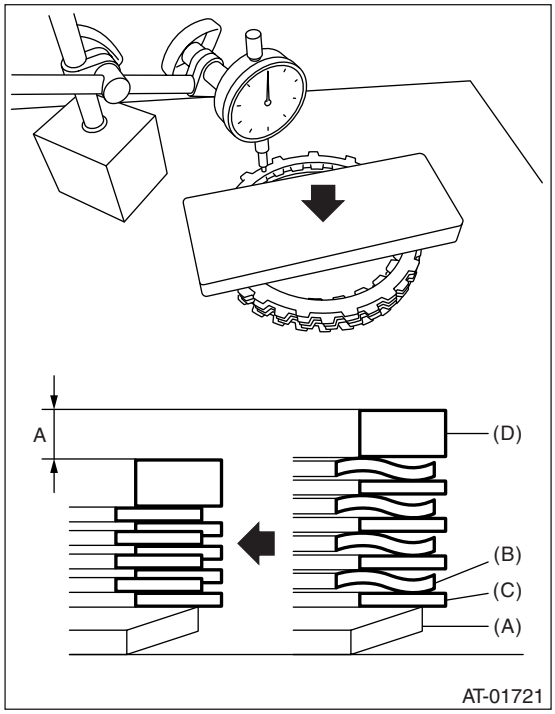
11) Put the flat board on retaining plate.



12) Using the following formula, calculate “N” indicated on the push/pull gauge.
N = 8.5 kg (18.7 lb) − Z
N: Value indicated on push/pull gauge
8.5 kg (18.7 lb): Load applied to clutch plate
Z: Flat board weight

13) Press the center of retaining plate applying force of N with push/pull gauge, and then measure and record the height A. Make more than three measurements at even distance and take the average value.

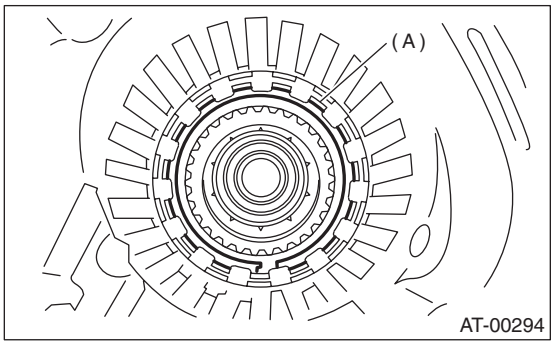
NOTE:
If three points, measure the height every 120°. If four points, measure the height every 90°.



(A) Dish plate
(B) Driven plate
(C) Drive plate
(D) Retaining plate

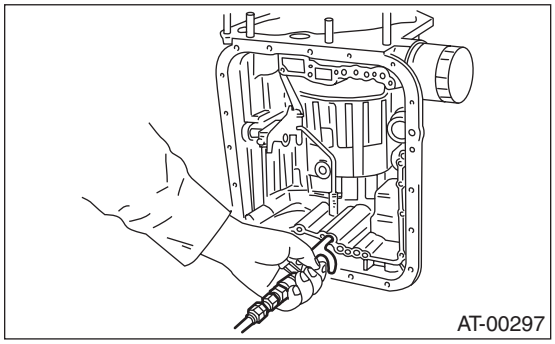
14) Installation of the low & reverse brake:
Install the dish plate, driven plate and retaining plate, and then secure them with snap ring.

NOTE:
Pay attention to the orientation of dish plate.



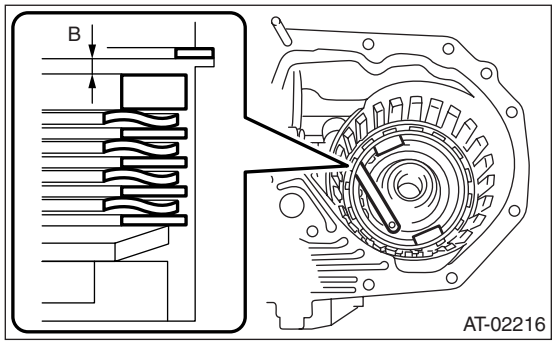
(A) Snap ring

15) Apply compressed air intermittently to check for operation.



16) Place the same thickness of shim on both sides to prevent the plate from tilting, and then measure and record the clearance B.

NOTE:
Do not press the shim downward with excessive force, or else the waveform of drive plates will be broken down.



17) Piston stroke calculation
Select the retaining plate within the specification by calculating with A and B dimensions which have been recorded before. If the calculated value exceeds the service limit, replace the drive plate with a new one and adjust it within the specification.
T = A + B
T: Piston stroke
A: Collapse amount of drive plate
B: Clearance between retaining plate and snap ring

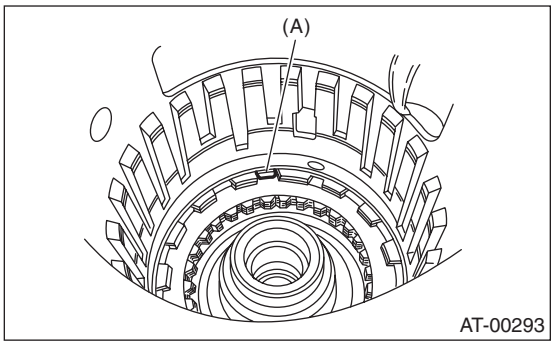
1.6 L and 2.0 SOHC model
Initial standard:
1.85 — 2.35 mm (0.073 — 0.093 in)
Limit thickness:
2.65 mm (0.104 in)

2.5 L SOHC model
Initial standard:
2.40 — 2.90 mm (0.094 — 0.114 in)
Limit thickness:
3.60 mm (0.142 in)

2.0 L DOHC Turbo model
Initial standard:
2.70 — 3.20 mm (0.106 — 0.126 in)
Limit thickness:
3.90 mm (0.154 in)

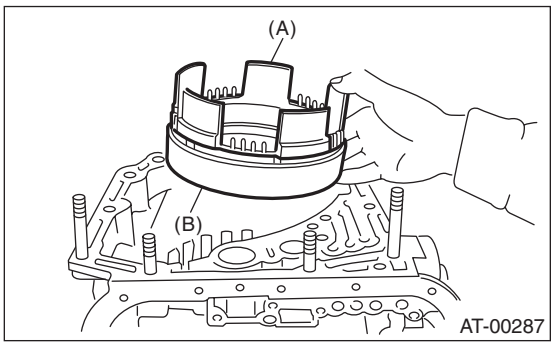
Retaining plates	
Part No.	Thickness mm (in)
31667AA420	3.8 (0.150)
31667AA320	4.1 (0.161)
31667AA330	4.4 (0.173)
31667AA340	4.7 (0.185)
31667AA350	5.0 (0.197)
31667AA360	5.3 (0.209)
31667AA370	5.6 (0.220)
31667AA380	5.9 (0.232)

18) Install the low & reverse brake leaf spring.



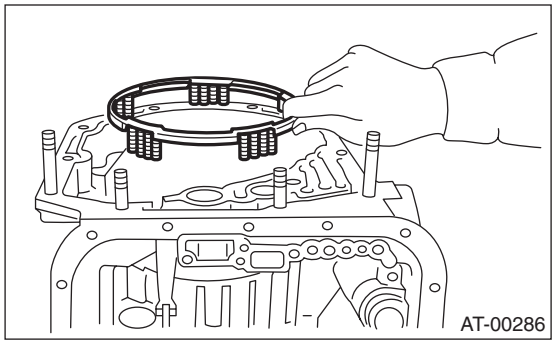
(A) Leaf spring

19) Install the 2-4 brake piston and 2-4 brake retainer by aligning hole of 2-4 brake retainer and hole of transmission case.

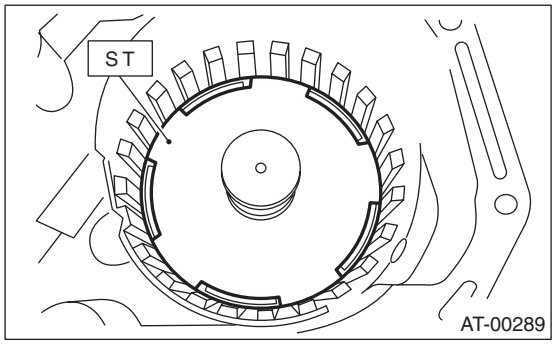


(A) 2-4 brake piston
(B) 2-4 brake piston retainer

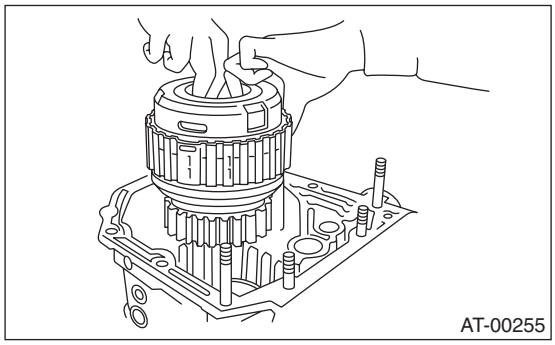
20) Install 2-4 brake piston return spring to transmission case.



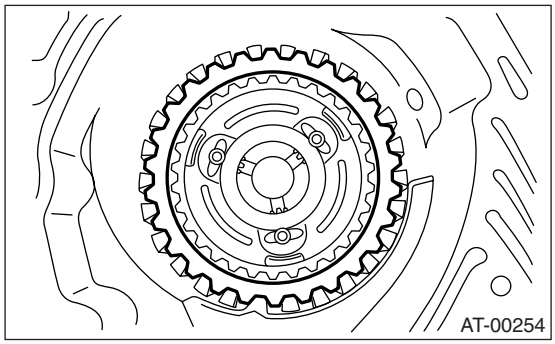
21) Position snap ring in transmission. Using ST, press the snap ring into place.
ST 498677100 COMPRESSOR



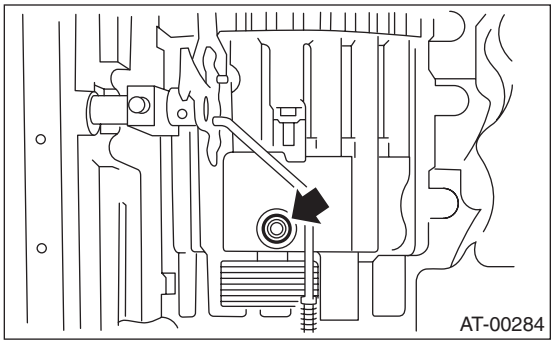
22) Install planetary gear and low clutch assembly to transmission case.
Install carefully while rotating the low clutch and planetary gear assembly slowly paying special attention not to damage the seal ring.



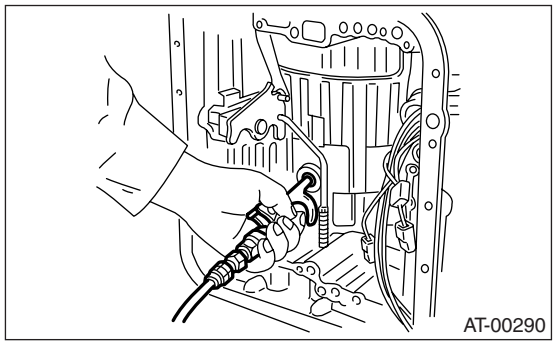
23) Install pressure plate, drive plate, driven plate, retaining plate and snap ring.



24) Install a new 2-4 brake oil seal to transmission case.



25) After all 2-4 brake component parts have been installed, blow in air intermittently and confirm the operation of the brake.

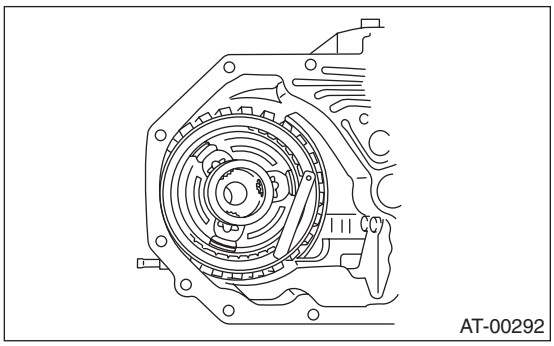


26) Check the clearance between the retaining plate and the snap ring.

NOTE:
Select a retaining plate with a suitable value from the following table, so that the clearance becomes the standard value.
If it exceeds the service limit, replace the drive plate with a new one and adjust it within the specification.

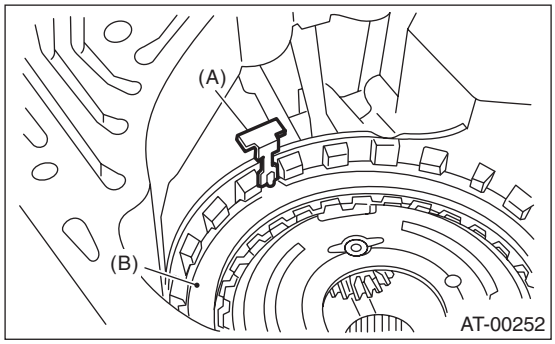
Initial standard:
0.8 — 1.2 mm (0.031 — 0.047 in)

Limit thickness:
1.5 mm (0.059 in)



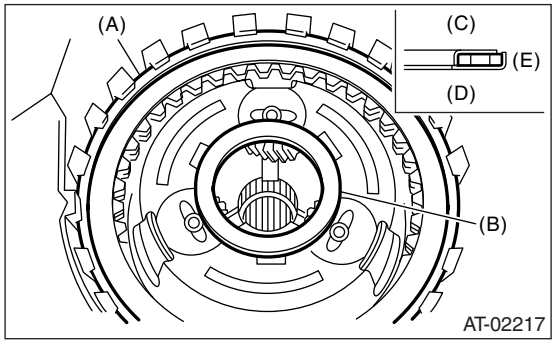
Retaining plates	
Part No.	Thickness mm (in)
31567AA612	5.6 (0.220)
31567AA622	5.8 (0.228)
31567AA632	6.0 (0.236)
31567AA642	6.2 (0.244)
31567AA652	6.4 (0.252)
31567AA662	6.6 (0.260)

27) Be careful not to mistake the location of the leaf spring to be inserted.



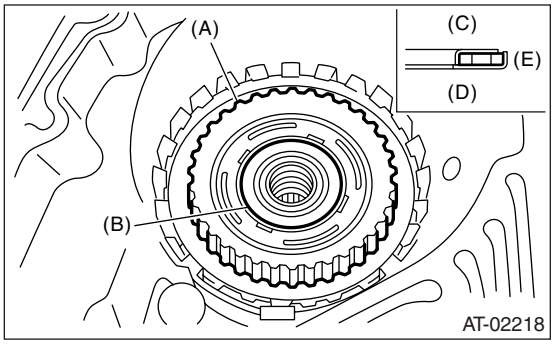
(A) Leaf spring
(B) Retaining plate

28) Install thrust needle bearing in the correct direction.



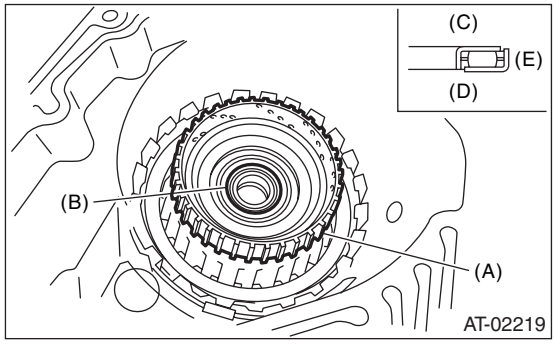
(A) Snap ring
(B) Thrust needle bearing
(C) Upside
(D) Downside
(E) Outside

29) Install front sun gear and thrust needle bearing.



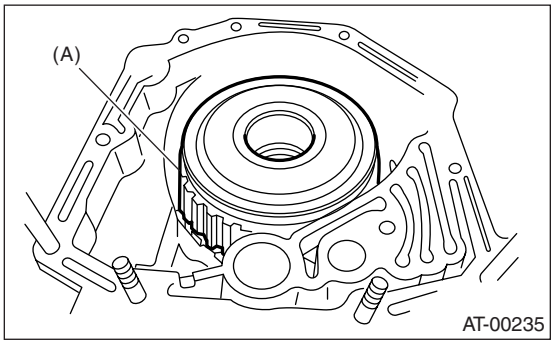
(A) Front sun gear
(B) Thrust needle bearing
(C) Clutch hub side
(D) Front sun gear side
(E) Outside

30) Install the high clutch hub.
Attach the thrust needle bearing to the hub with vaseline and install the hub by correctly engaging the splines of the front planetary carrier.
31) Install the thrust needle bearing in proper direction.



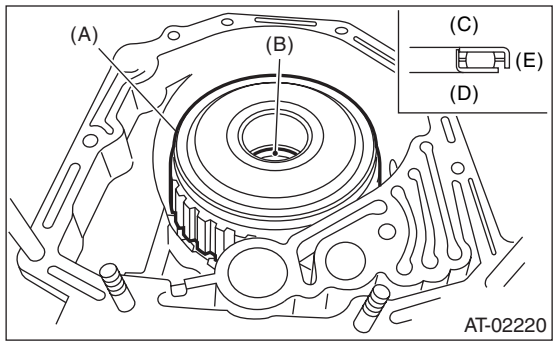
(A) High clutch hub
(B) Thrust needle bearing
(C) Upside
(D) Downside
(E) Outside

32) Install the high clutch assembly.



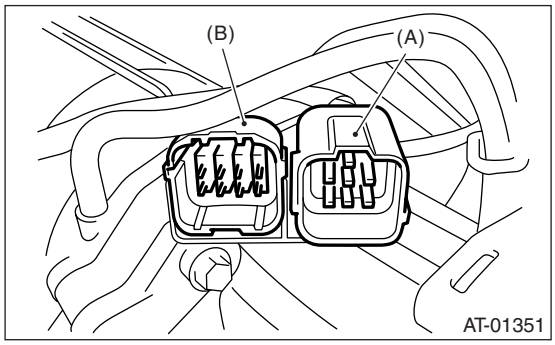
(A) High clutch and reverse clutch assembly

33) Adjust total end play. <Ref. to 4AT-112, ADJUSTMENT, Oil Pump Housing.>
34) Install the thrust needle bearing in proper direction.



(A) High clutch and reverse clutch ASSY
(B) Thrust needle bearing
(C) Upside
(D) Downside
(E) Outside

35) Install the oil pump housing assembly.
36) Install the converter case assembly to the transmission case assembly. <Ref. to 4AT-106, INSTALLATION, Converter Case.>
37) Insert inhibitor switch and transmission connector into stay.
38) Install air breather hose. <Ref. to 4AT-83, INSTALLATION, Air Breather Hose.>

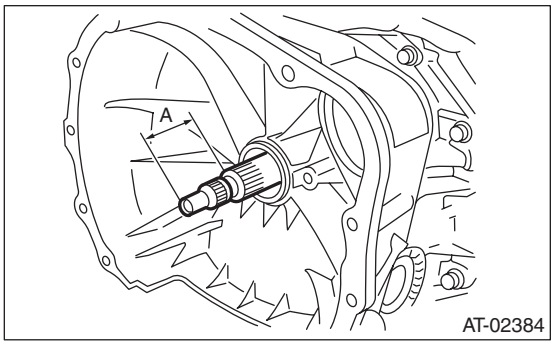


(A) Transmission harness
(B) Inhibitor switch harness

39) Install oil cooler pipes. <Ref. to 4AT-77, INSTALLATION, ATF Cooler Pipe and Hose.>
40) Install the oil charge pipe with O-ring. <Ref. to 4AT-84, INSTALLATION, Oil Charge Pipe.>

41) Insert the input shaft while rotating it lightly by hand, and then check the protrusion amount.

Normal protrusion amount A:
50 — 55 mm (1.97 — 2.17 in)

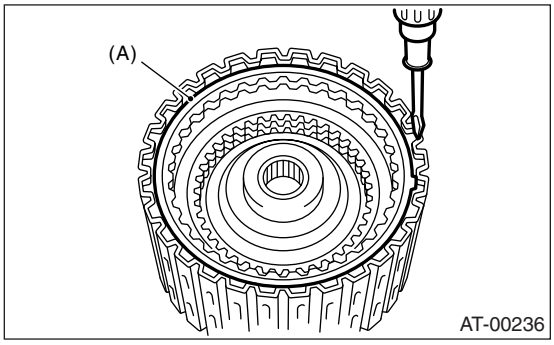


42) Install the torque converter clutch assembly. <Ref. to 4AT-85, INSTALLATION, Torque Converter Clutch Assembly.>
43) Install the transmission assembly to the vehicle. <Ref. to 4AT-44, INSTALLATION, Automatic Transmission Assembly.>

C: DISASSEMBLY

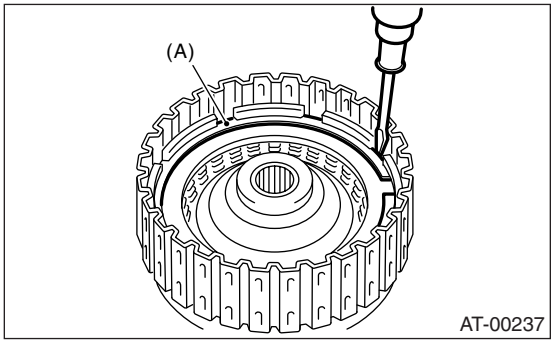
1. HIGH CLUTCH, REVERSE CLUTCH

1) Remove the snap ring, and take out the retaining plate, drive plates, driven plates.



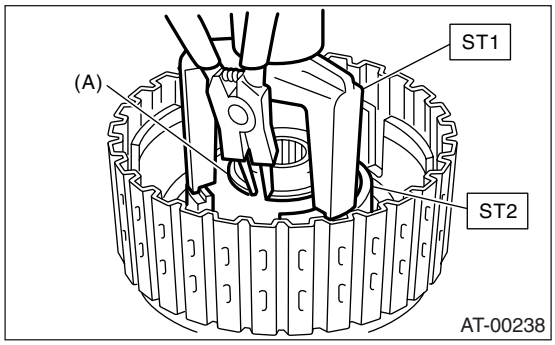
(A) Snap ring

2) Remove snap ring, and take out the retaining plate, drive plates and driven plates.



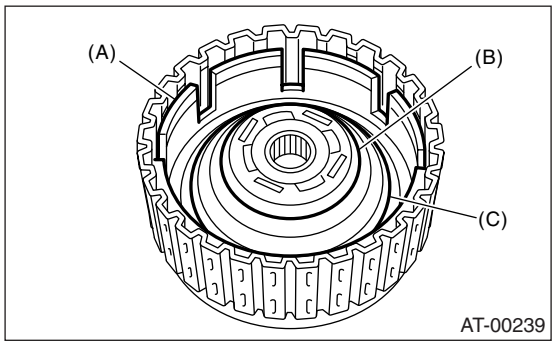
(A) Snap ring

3) Using ST1 and ST2, remove snap ring.
ST1 398673600 COMPRESSOR
ST2 498627100 SEAT



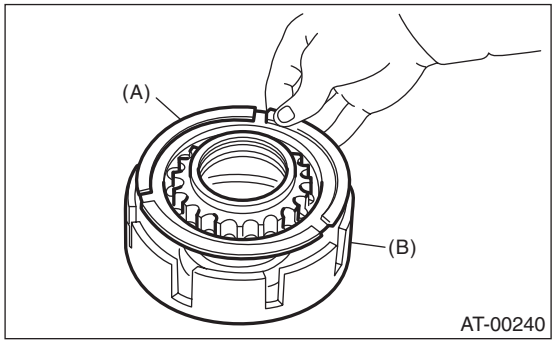
(A) Snap ring

4) Take out clutch cover, spring retainer, high clutch piston and reverse clutch piston.



(A) Reverse clutch piston
(B) Cover
(C) Return spring

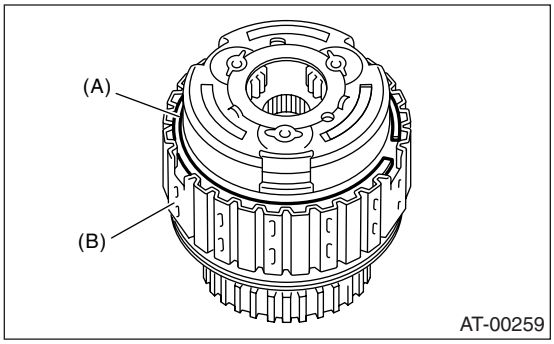
5) Remove seal rings and lip seal from high clutch piston and reverse clutch piston.



(A) High clutch piston
(B) Reverse clutch piston

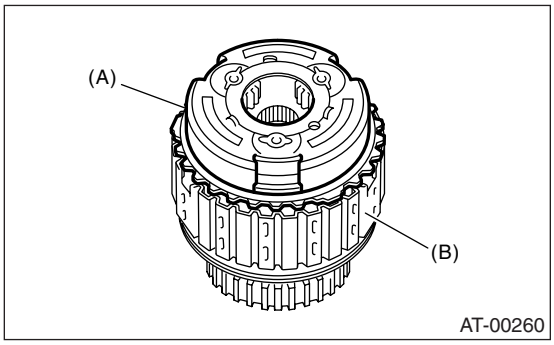
2. PLANETARY GEAR, LOW CLUTCH

1) Remove snap ring from the low clutch drum.



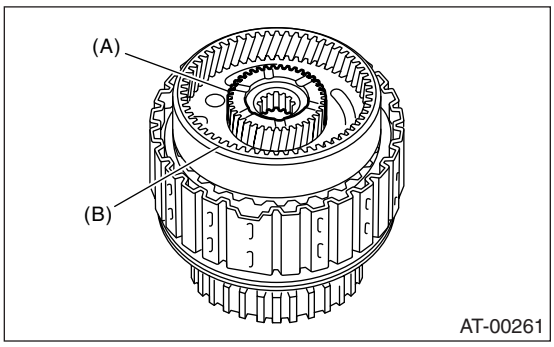
(A) Snap ring
(B) Low clutch drum

2) Take out front planetary carrier.



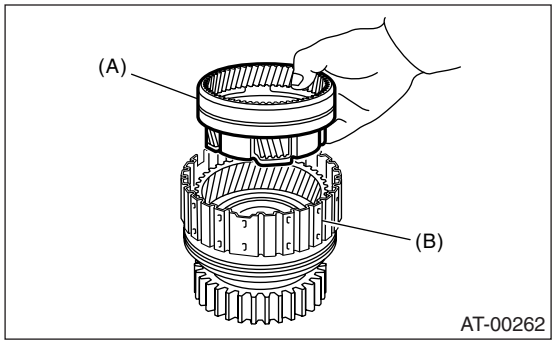
(A) Front planetary carrier
(B) Low clutch drum

3) Take out rear sun gear.



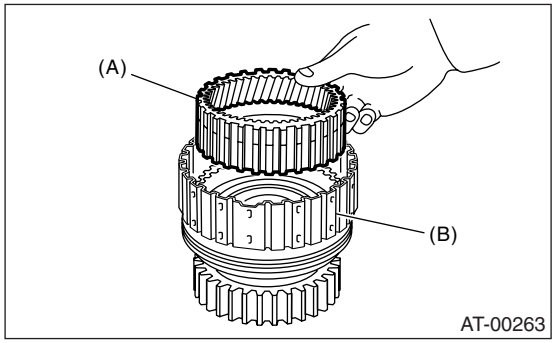
(A) Rear sun gear
(B) Rear planetary carrier

4) Take out rear planetary carrier, washer and thrust needle bearing.



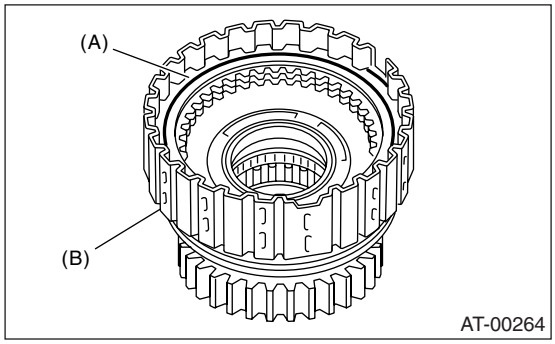
(A) Rear planetary carrier
(B) Low clutch drum

5) Take out rear internal gear.



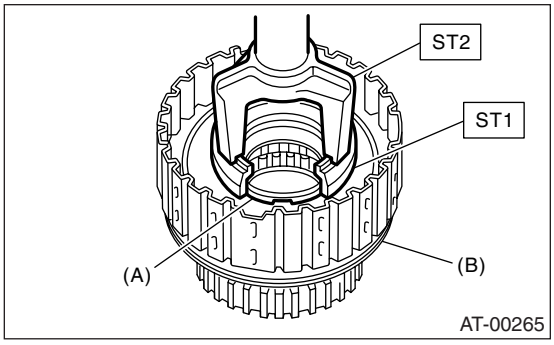
(A) Rear internal gear
(B) Low clutch drum

6) Remove the snap ring from the low clutch drum.



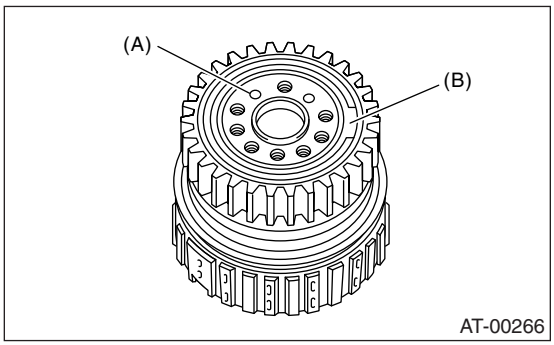
(A) Snap ring
(B) Low clutch drum

7) Compress the spring retainer, and remove the snap ring from the low clutch drum, by using ST1 and ST2.
ST1 498627100 SEAT
ST2 398673600 COMPRESSOR



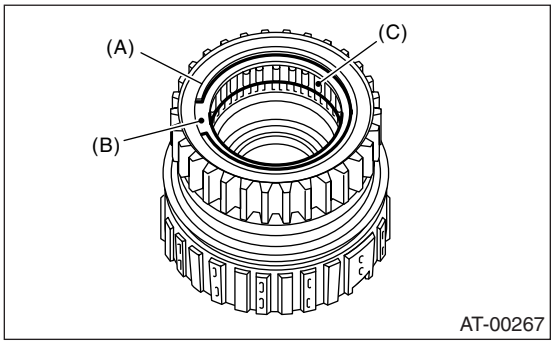
(A) Snap ring
(B) Low clutch drum

8) Remove one-way clutch. <Ref. to 4AT-126, REMOVAL, AT Main Case.>
9) Install the one-way clutch inner race to the low clutch drum, and apply compressed air to remove the low clutch piston.



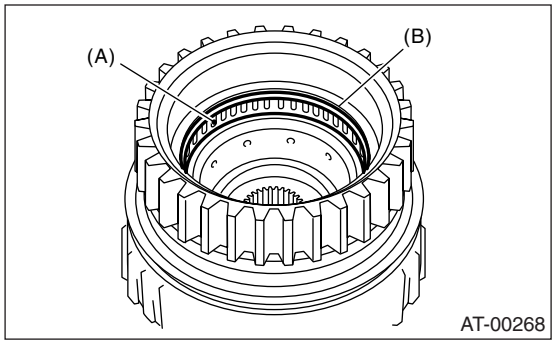
(A) Apply compressed air
(B) One-way clutch inner race

10) Remove the one-way clutch inner race.
11) Remove the one-way clutch after taking out the snap ring.



(A) Snap ring
(B) Plate
(C) One-way clutch

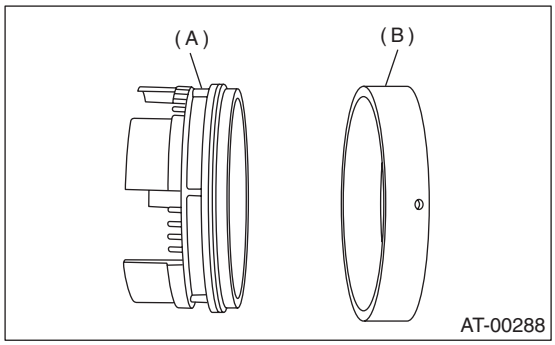
12) Remove the needle bearing after taking out the snap ring.



(A) Needle bearing
(B) Snap ring

3. 2-4 BRAKE

1) Separate 2-4 brake piston and piston retainer.

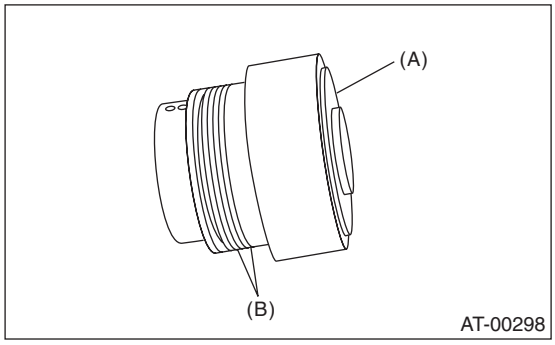


(A) 2-4 brake piston
(B) 2-4 brake piston retainer

2) Remove the D-ring from 2-4 brake piston.

4. ONE-WAY CLUTCH INNER RACE

1) Remove seal rings.

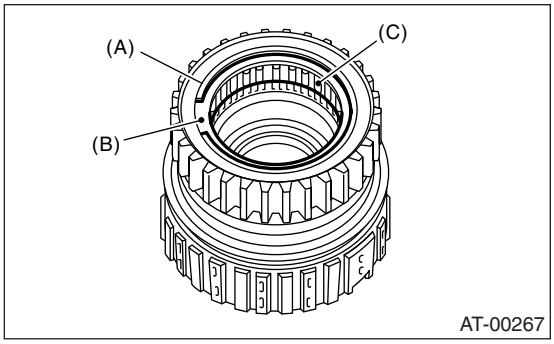


(A) One way clutch inner race
(B) Seal rings

2) Using ST, remove needle bearing.
ST 398527700 PULLER ASSY

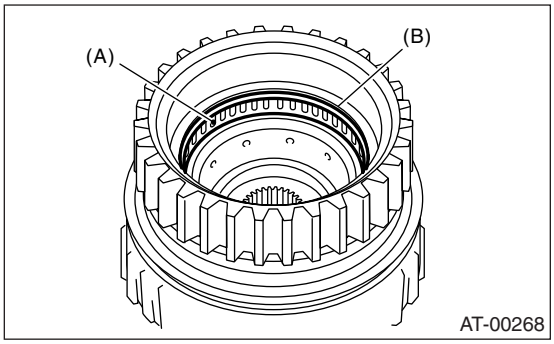
5. ONE-WAY CLUTCH OUTER RACE

1) Remove the one-way clutch after taking out the snap ring.



(A) Snap ring
(B) Plate
(C) One-way clutch

2) Remove the needle bearing after taking out the snap ring.

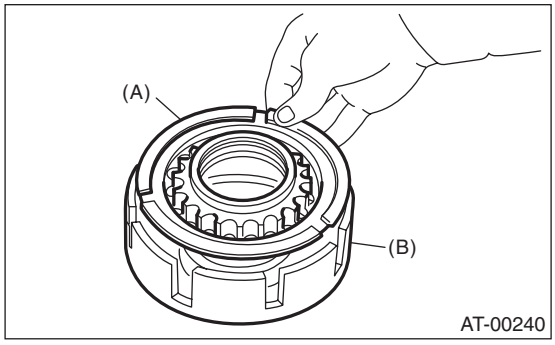


(A) Needle bearing
(B) Snap ring

D: ASSEMBLY

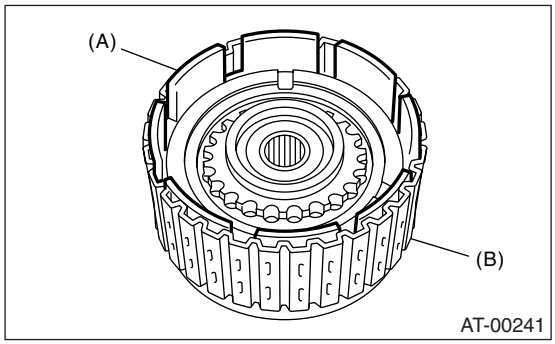
1. HIGH CLUTCH, REVERSE CLUTCH

1) Install seal rings and lip seal to high clutch piston and reverse clutch piston.
2) Install high clutch piston to reverse clutch piston.



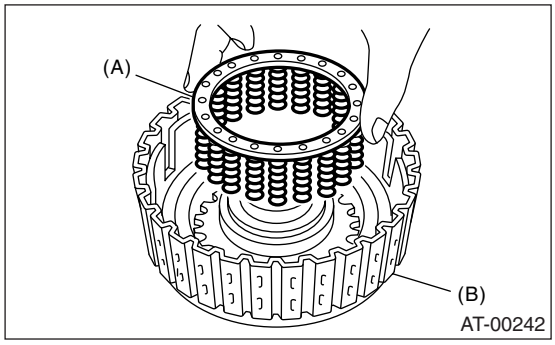
(A) High clutch piston
(B) Reverse clutch piston

3) Install reverse clutch to high clutch drum.
Align the groove on the reverse clutch piston with the groove on the high clutch drum during installation.



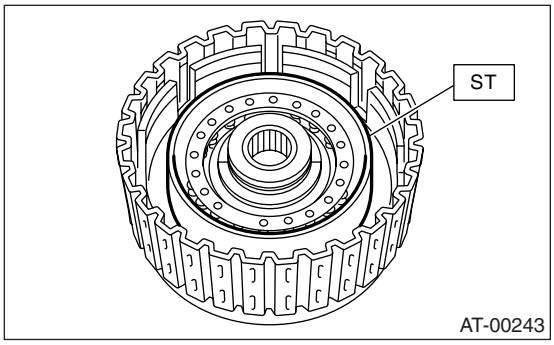
(A) Reverse clutch piston
(B) High clutch drum

4) Install spring retainer to high clutch piston.

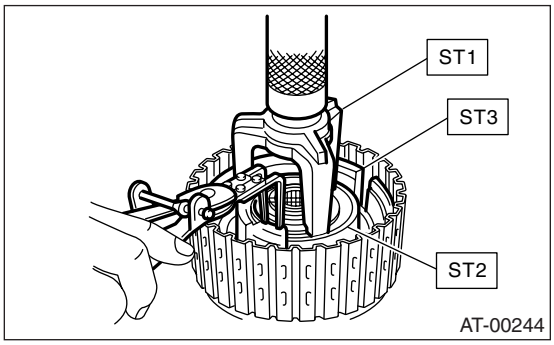


(A) Return spring
(B) High clutch drum

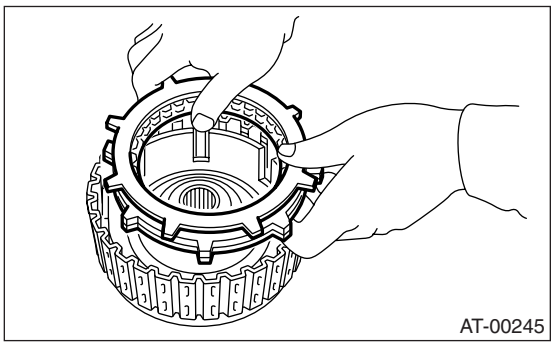
5) Install ST to high clutch piston.
ST 498437000 HIGH CLUTCH PISTON GAUGE



6) Avoid folding the high clutch piston seal, when installing the cover to high clutch piston.
7) Using ST1 and ST2, install snap ring.
ST1 398673600 COMPRESSOR
ST2 498627100 SEAT
ST3 498437000 HIGH CLUTCH PISTON GAUGE

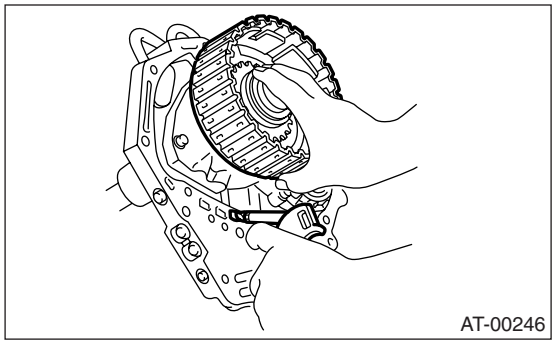


8) Install the thickest driven plate to piston side, and then install the driven plate, drive plate, retaining plate to high clutch drum.



9) Install snap ring to high clutch drum.

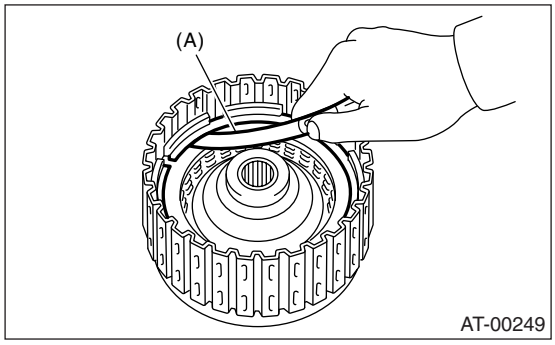
10) Apply compressed air intermittently to check for operation.



11) Measure the clearance between the retaining plate and snap ring (High clutch). At this time, do not press down retaining plate.

Initial standard:
0.8 — 1.1 mm (0.031 — 0.043 in)

Limit thickness:
1.5 mm (0.059 in)

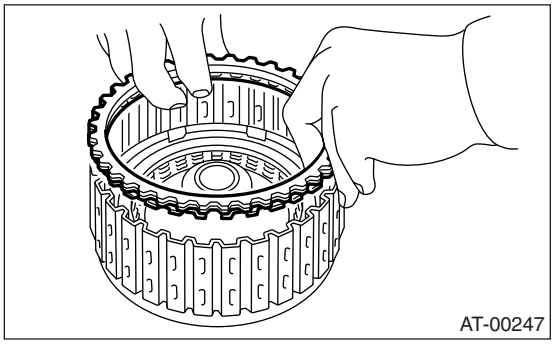


(A) Thickness gauge

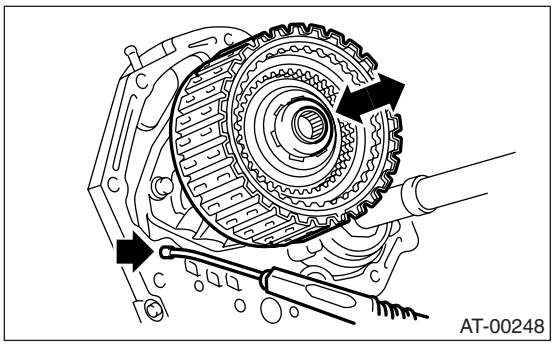
If specified tolerance limits are exceeded, select a suitable high clutch retaining plate. If it exceeds the service limit, replace the drive plate with new one and adjust it within the specification.

High clutch retaining plate	
Part No.	Thickness mm (in)
31567AA710	4.7 (0.185)
31567AA720	4.8 (0.189)
31567AA730	4.9 (0.193)
31567AA740	5.0 (0.197)
31567AA670	5.1 (0.201)
31567AA680	5.2 (0.205)
31567AA690	5.3 (0.209)
31567AA700	5.4 (0.213)

12) Selection of reverse clutch retaining plate.
(1) Install driven plate, drive plate, retaining plate and snap ring.



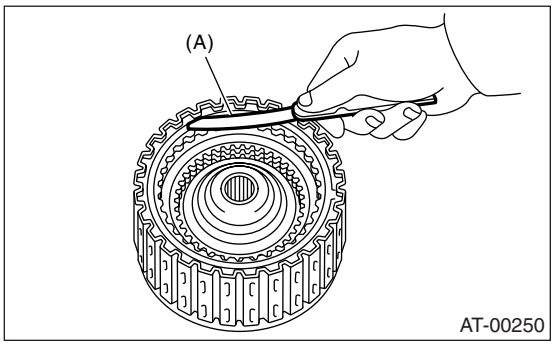
(2) Apply compressed air intermittently to check for operation.



(3) Measure the clearance between the retaining plate and snap ring (Reverse clutch). At this time, do not press down retaining plate.

Initial standard:
0.5 — 0.8 mm (0.020 — 0.031 in)

Limit thickness:
1.2 mm (0.047 in)



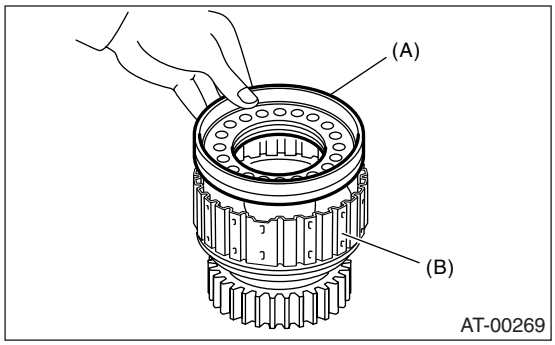
(A) Thickness gauge

If specified tolerance limits are exceeded, select a suitable high clutch retaining plate.
If it exceeds the service limit, replace the drive plate with new one and adjust it within the specification.

Reverse clutch retaining plates	
Part No.	Thickness mm (in)
31567AA910	4.0 (0.157)
31567AA920	4.2 (0.165)
31567AA930	4.4 (0.173)
31567AA940	4.6 (0.181)
31567AA950	4.8 (0.189)
31567AA960	5.0 (0.197)
31567AA970	5.2 (0.205)
31567AA980	5.4 (0.213)

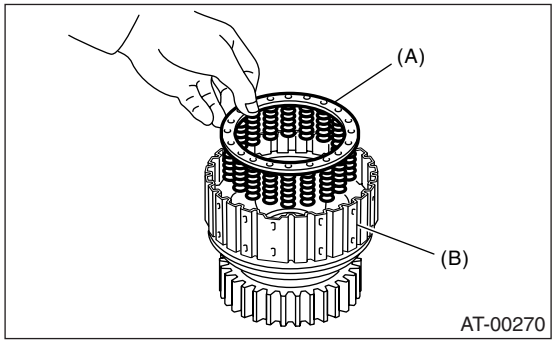
2. PLANETARY GEAR, LOW CLUTCH

1) Install D-ring to low clutch piston.
2) Fit the low clutch piston to the low clutch drum.



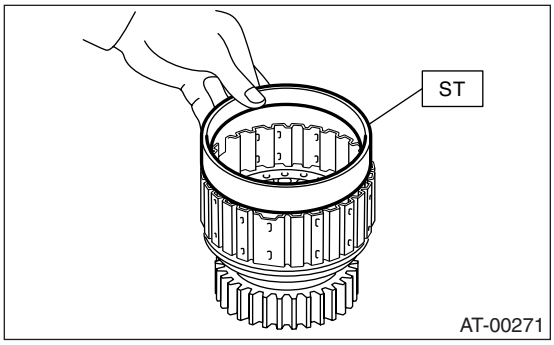
(A) Low clutch piston
(B) Low clutch drum

3) Install spring retainer to low clutch piston.

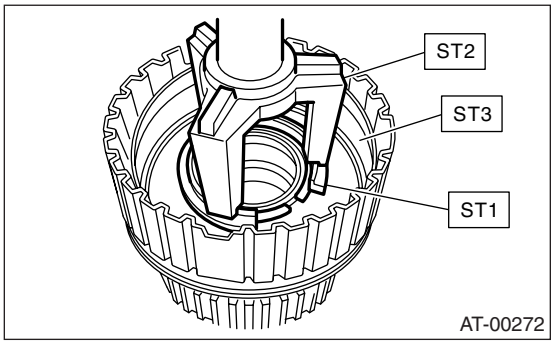


(A) Spring retainer
(B) Low clutch drum

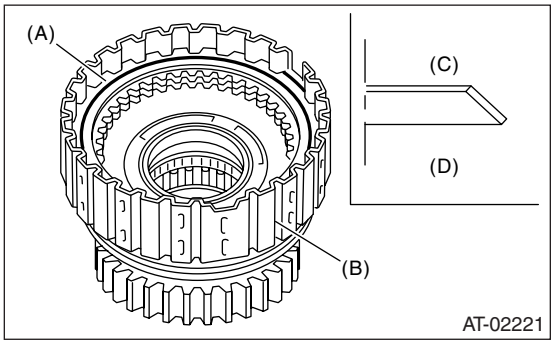
4) Install ST to low clutch drum.
ST 498437100 LOW CLUTCH PISTON GUIDE



5) Set the cover on the piston with a press using ST1 and ST2, and attach the snap ring. At this time, be careful not to fold cover seal during installation.
ST1 498627100 SEAT
ST2 398673600 COMPRESSOR
ST3 498437100 LOW CLUTCH PISTON GUIDE

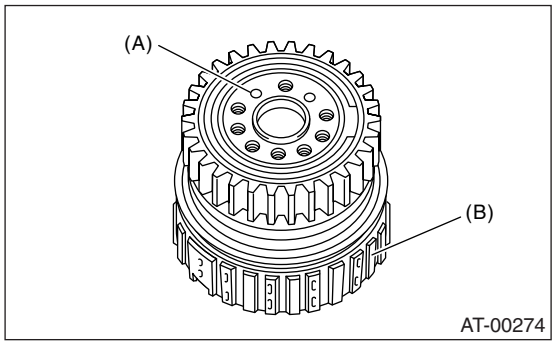


6) Install the dish plate, driven plates, drive plates, and retaining plate, and secure with the snap ring.



(A) Snap ring
(B) Low clutch drum
(C) Dish plate
(D) Low clutch piston side

7) Check the low clutch for operation.
(1) Remove one-way clutch. <Ref. to 4AT-126, REMOVAL, AT Main Case.>
(2) Set the one-way clutch inner race, and apply compressed air for checking.

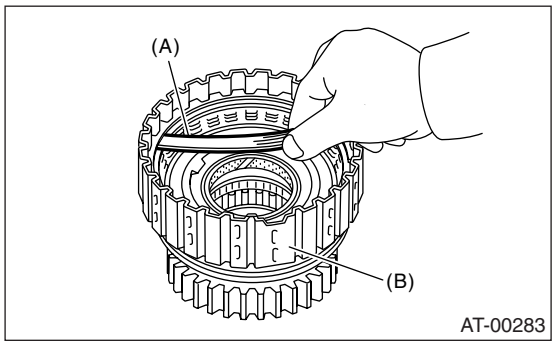


(A) Apply compressed air
(B) Low clutch drum

8) Checking low clutch clearance.
(1) Place the same thickness of shim on both sides to prevent retaining plate from tilting.
(2) Inspect clearance between retaining plate and operation of the low clutch.

Initial standard:
0.7 — 1.1 mm (0.028 — 0.043 in)

Limit thickness:
1.6 mm (0.063 in)

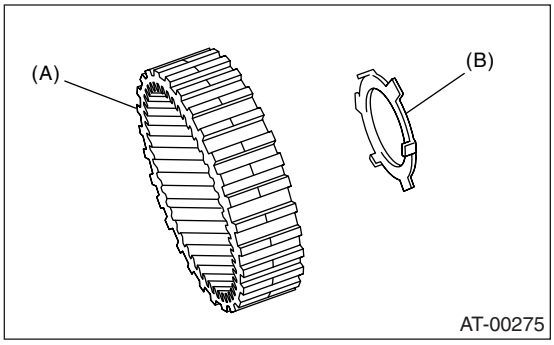


(A) Thickness gauge
(B) Low clutch drum

If the clearance is out of the specified range, select a proper retaining plate so that the standard clearance can be obtained.
If it exceeds the service limit, replace the drive plate with new one and adjust it within the specification.

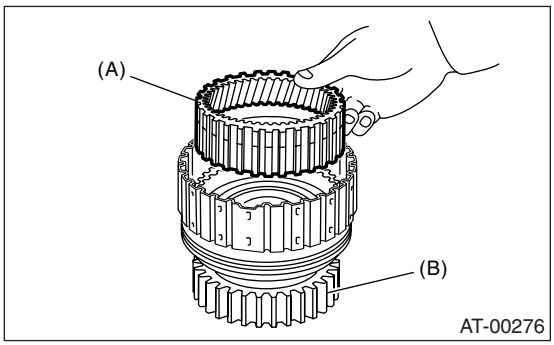
Available retaining plates	
Part No.	Thickness mm (in)
31567AA830	3.8 (0.150)
31567AA840	4.0 (0.157)
31567AA850	4.2 (0.165)
31567AA860	4.4 (0.173)
31567AA870	4.6 (0.181)

9) Install washer to rear internal gear.



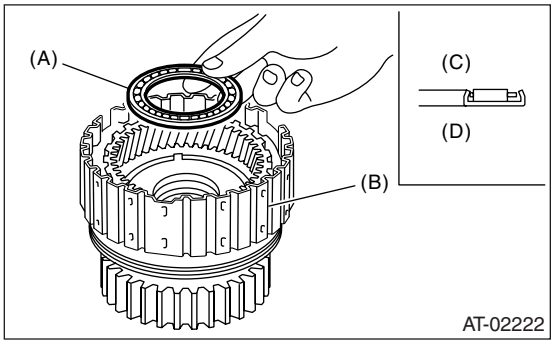
(A) Rear internal gear
(B) Washer

10) Install rear internal gear.



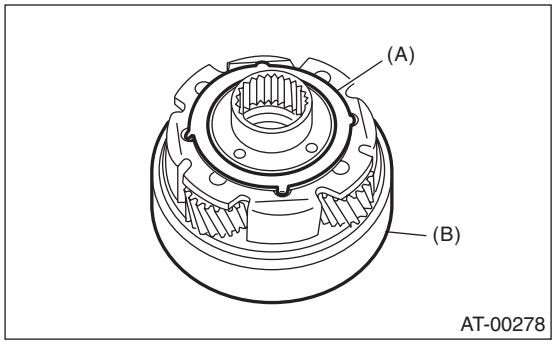
(A) Rear internal gear
(B) Low clutch drum

11) Install thrust needle bearing in the correct direction.



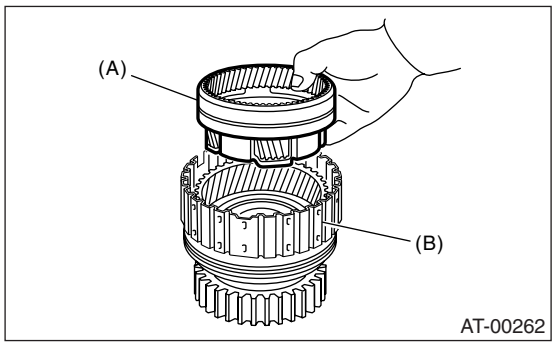
(A) Thrust needle bearing
(B) Low clutch drum
(C) Rear planetary carrier side
(D) One-way clutch side

12) Install the washer by aligning protrusion of washer and hole of rear planetary carrier.



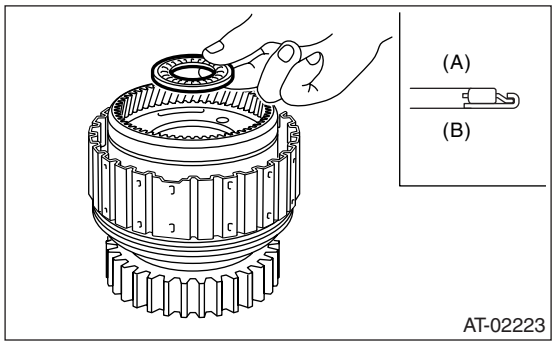
(A) Washer
(B) Rear planetary carrier

13) Install rear planetary carrier to low clutch drum.



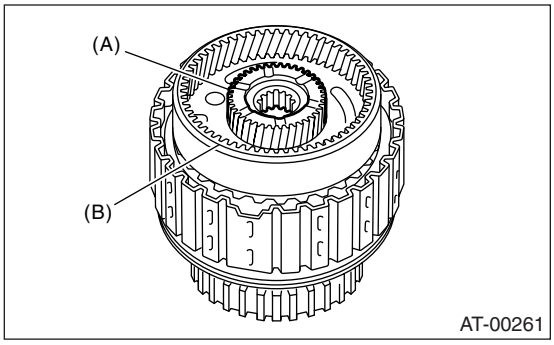
(A) Rear planetary carrier
(B) Low clutch drum

14) Install thrust needle bearing in the correct direction.



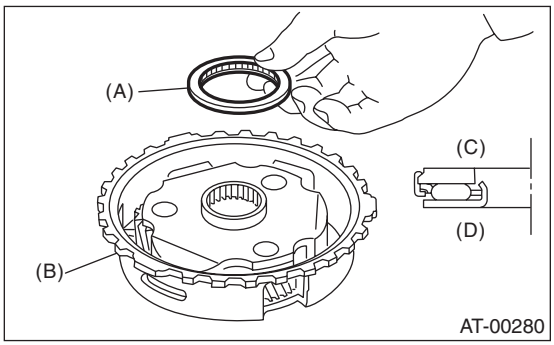
(A) Rear sun gear side
(B) Rear planetary carrier side

15) Install the rear sun gear in proper direction.



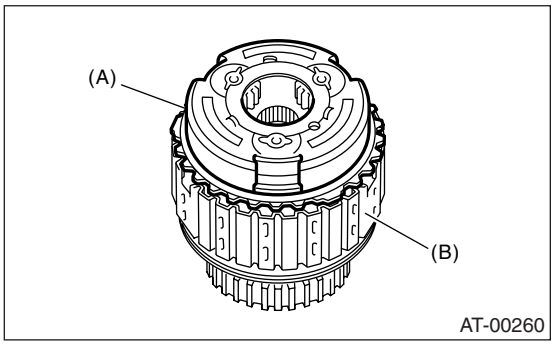
(A) Rear sun gear
(B) Rear planetary carrier

16) Install the thrust needle bearing in proper direction.



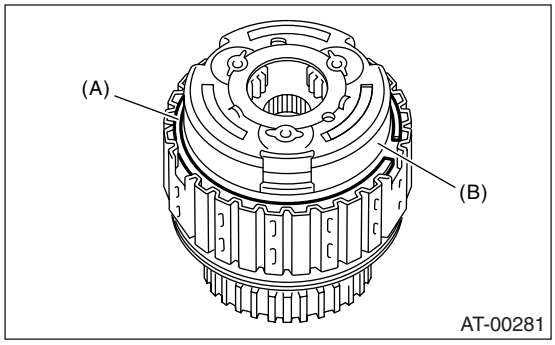
(A) Thrust needle bearing
(B) Front planetary carrier
(C) Rear sun gear side
(D) Front planetary carrier side

17) Install front planetary carrier to low clutch drum.



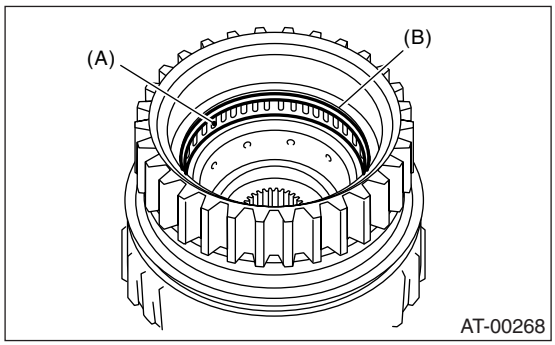
(A) Front planetary carrier
(B) Low clutch drum

18) Install snap ring to low clutch drum.



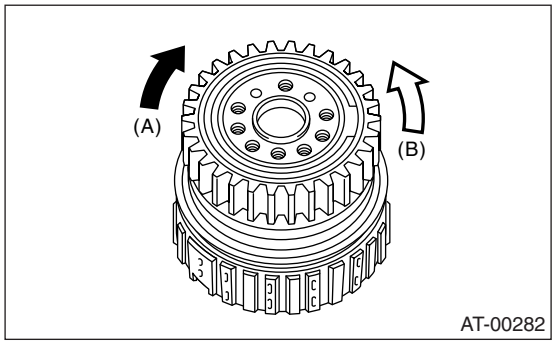
(A) Snap ring
(B) Front planetary carrier

19) Install the needle bearing, and secure with the snap ring.



(A) Needle bearing
(B) Snap ring

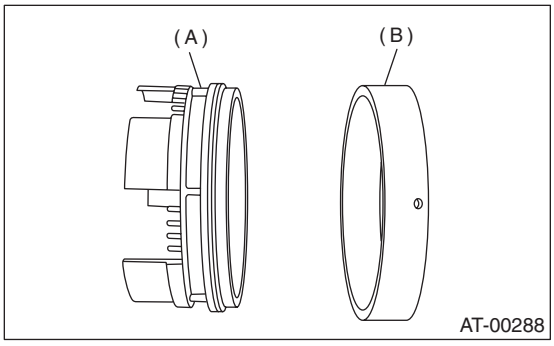
20) Install the one-way clutch and secure with the snap ring.
21) Set the inner race. Make sure that the clutch is locked in the clockwise direction and free in the counterclockwise direction.



(A) Locked
(B) Free

3. 2-4 BRAKE

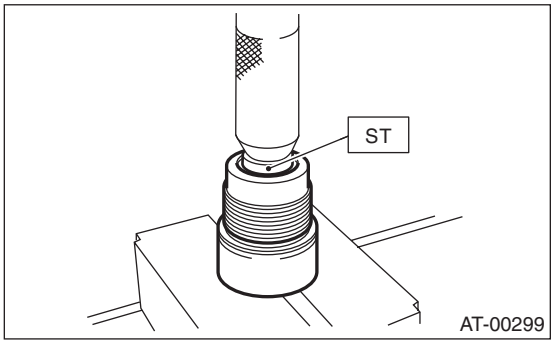
1) Apply ATF to new D-ring and install it to 2-4 brake piston
2) Install 2-4 brake piston to 2-4 brake piston retainer.



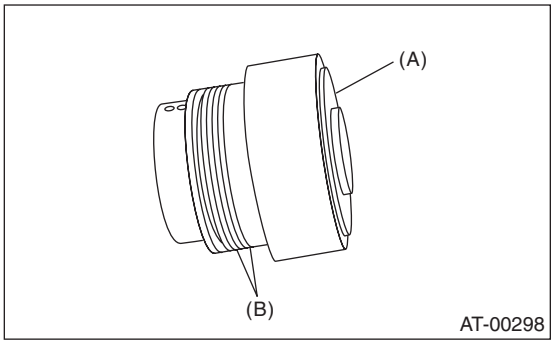
(A) 2-4 brake piston
(B) 2-4 brake piston retainer

4. ONE-WAY CLUTCH INNER RACE

1) Using a press and ST, install the needle bearing to the inner race.
ST 398497701 SEAT



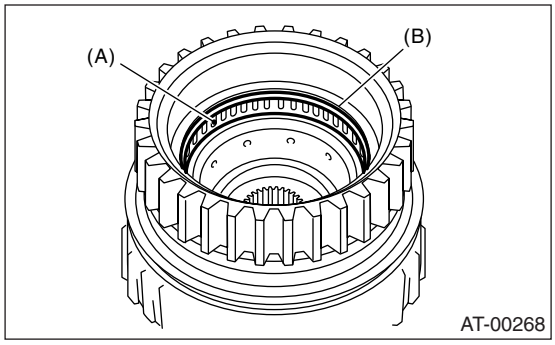
2) Apply vaseline to the groove of the inner race and to the seal ring.
3) Install two seal rings to one-way clutch inner race.



(A) One way clutch inner race
(B) Seal rings

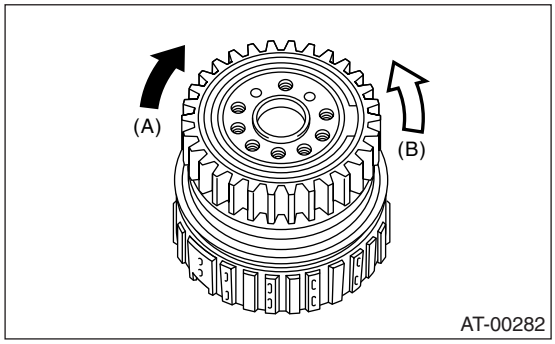
5. ONE-WAY CLUTCH OUTER RACE

1) Install the needle bearing, and secure with the snap ring.



(A) Needle bearing
(B) Snap ring

2) Install the one-way clutch and secure with the snap ring.
3) Set the inner race. Make sure that the clutch is locked in the clockwise direction and free in the counterclockwise direction.



(A) Locked
(B) Free

E: INSPECTION

1. HIGH CLUTCH AND REVERSE CLUTCH

Inspect the following items.
- Drive plate facing for wear and damage
- Discoloration of driven plate (burnt color)
- Snap ring for wear, return spring for setting and breakage, and snap ring retainer for deformation
- Lip seal and D-ring for damage
- Piston and drum check ball for operation
- Adjust total end play. <Ref. to 4AT-112, ADJUSTMENT, Oil Pump Housing.>

2. PLANETARY GEAR AND LOW CLUTCH

Inspect the following items.
- Drive plate facing for wear and damage
- Discoloration of driven plate (burnt color)
- Snap ring for wear, return spring for breakage or setting, and spring retainer for deformation
- Lip seal and D-ring for damage
- Piston check ball for operation
- Measure the total end play and adjust to within specifications.
<Ref. to 4AT-112, ADJUSTMENT, Oil Pump Housing.>

3. 2-4 BRAKE

Inspect the following items.
- Drive plate facing for wear and damage
- Discoloration of driven plate (burnt color)
- Snap ring for wear and spring retainer for deformation
- Lip seal and D-ring for damage
- Measure the total end play and adjust to within specifications. <Ref. to 4AT-112, ADJUSTMENT, Oil Pump Housing.>

4. ONE-WAY CLUTCH

- Make sure the snap ring is not worn and the seal rings are not damaged.
- Measure the total end play and adjust to within specifications. <Ref. to 4AT-112, ADJUSTMENT, Oil Pump Housing.>

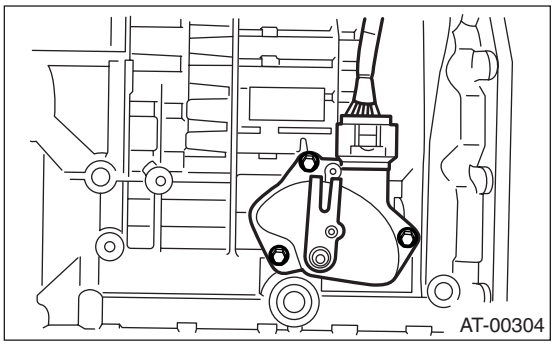
5. LOW AND REVERSE BRAKE

Check for the following.
- Drive plate facing for wear or damage
- Discoloration of driven plate (burnt color)
- Snap ring for wear and spring retainer for deformation

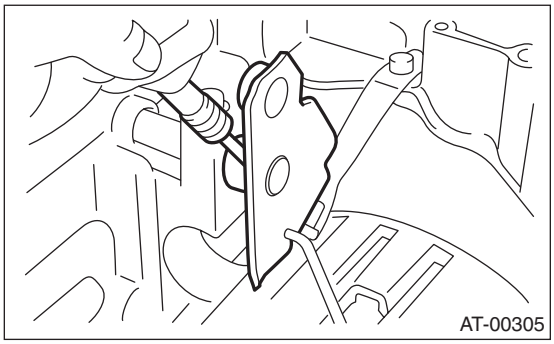
41.Transmission Control Device

A: REMOVAL

1) Remove the transmission assembly from the vehicle. <Ref. to 4AT-41, REMOVAL, Automatic Transmission Assembly.>
2) Extract the torque converter clutch assembly. <Ref. to 4AT-85, REMOVAL, Torque Converter Clutch Assembly.>
3) Remove the input shaft.
4) Lift-up lever behind the transmission harness connector and disconnect it from stay.
5) Disconnect the air breather hoses. <Ref. to 4AT-83, REMOVAL, Air Breather Hose.>
6) Disconnect inhibitor switch connector from stay.
7) Wrap vinyl tape around the nipple attached to the air breather hose.
8) Remove pitching stopper bracket.
9) Remove the inhibitor switch.

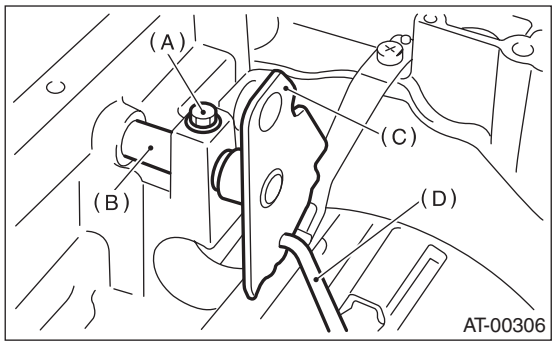


10) Remove control valve body assembly. <Ref. to 4AT-63, REMOVAL, Control Valve Body.>
11) Pull off the straight pin of manual plate.



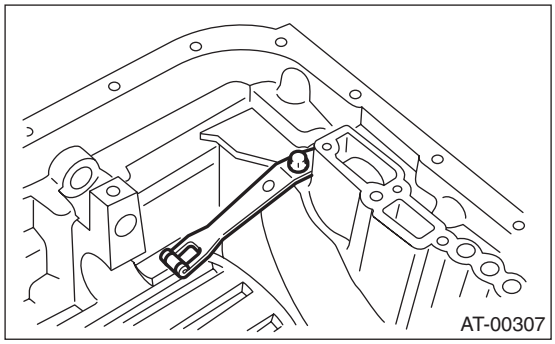
12) Remove bolts securing select lever, then remove select lever, manual plate and parking rod.

NOTE:
Be careful not to damage the lips of the press-fitted oil seal in the case.



(A) Bolt
(B) Range select lever
(C) Manual plate
(D) Parking rod

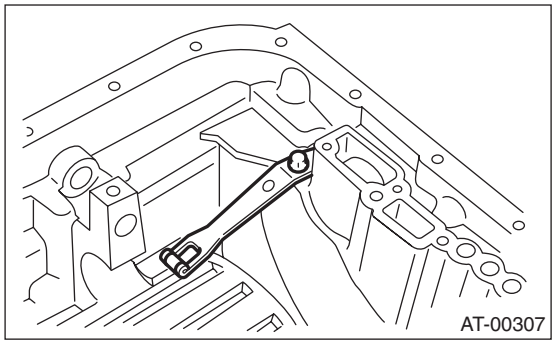
13) Remove the detention spring.



B: INSTALLATION

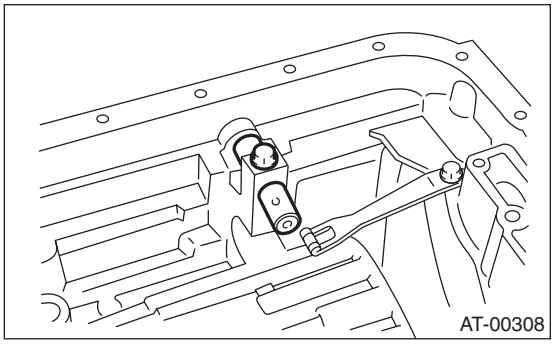
1) Install detention spring to transmission case.

Tightening torque:
6 N·m (0.6 kgf-m, 4.3 ft-lb)

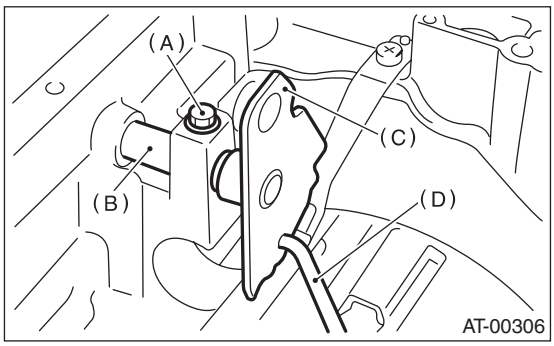


2) Insert range select lever, and tighten bolt.

Tightening torque:
6 N·m (0.6 kgf-m, 4.3 ft-lb)

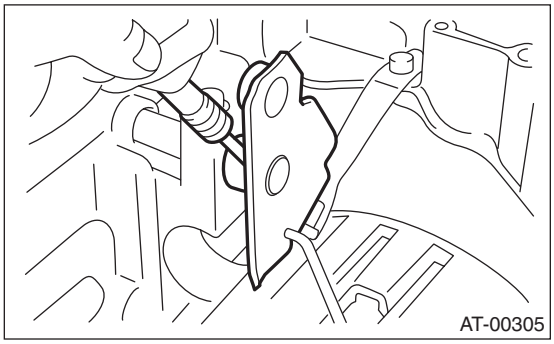


3) Insert manual plate and parking rod.



(A) Bolt
(B) Range select lever
(C) Manual plate
(D) Parking rod

4) Insert spring pin to manual plate.

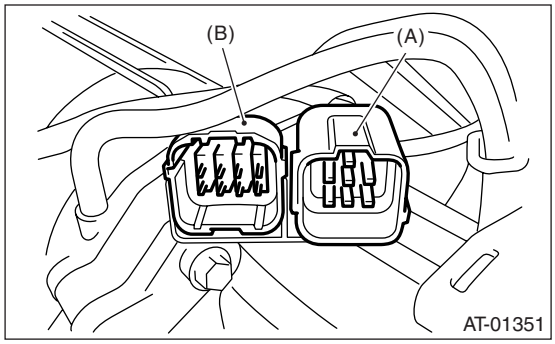


5) Install control valve assembly and oil pan. <Ref. to 4AT-64, INSTALLATION, Control Valve Body.>
6) Turn over the transmission case to its original position.
7) Install pitching stopper bracket.

Tightening torque:
41 N·m (4.2 kgf-m, 30.2 ft-lb)

8) Install inhibitor switch and adjust the inhibitor switch. <Ref. to 4AT-53, Inhibitor Switch.>

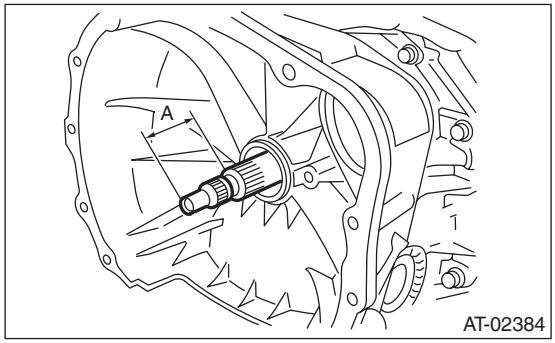
9) Insert inhibitor switch and transmission connector into stay.



(A) Transmission harness
(B) Inhibitor switch harness

10) Install air breather hose. <Ref. to 4AT-83, INSTALLATION, Air Breather Hose.>
11) Insert the input shaft while rotating it lightly by hand, and then check the protrusion amount.

Normal protrusion amount A:
50 — 55 mm (1.97 — 2.17 in)



12) Install the torque converter clutch assembly. <Ref. to 4AT-85, INSTALLATION, Torque Converter Clutch Assembly.>
13) Install the transmission assembly to the vehicle. <Ref. to 4AT-44, INSTALLATION, Automatic Transmission Assembly.>

C: INSPECTION

Make sure the manual lever and detention spring are not worn or otherwise damaged.

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

4AT(diag)

Page

1. Basic Diagnostic Procedure 2
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7. Read Diagnostic Trouble Code (DTC) 23
8. Inspection Mode 24
9. Clear Memory Mode 25
10. Power Indicator Light Display 26
11. Diagnostic Procedure for Subaru Select Monitor Communication 33
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13. Diagnostic Procedure with Diagnostic Trouble Code (DTC) 38
14. Diagnostic Procedure without Diagnostic Trouble Code (DTC) 89
15. General Diagnostic Table 123

1. Basic Diagnostic Procedure

A: PROCEDURE

	Step	Check	Yes	No
1	**CHECK PRE-INSPECTION.** 1) Ask the customer when and how trouble occurred using interview checklist. <Ref. to 4AT(diag)-4, Check List for Interview.> 2) Before performing the diagnosis, inspect following items which might influence the AT problems. • General inspection <Ref. to 4AT(diag)-5, INSPECTION, General Description.> • Disconnection of harness connector • Visual check for harness damage • Oil leak • Stall speed test <Ref. to 4AT-36, Stall Test.> • Line pressure test <Ref. to 4AT-39, Line Pressure Test.> • Transfer clutch pressure test <Ref. to 4AT-40, Transfer Clutch Pressure Test.> • Time lag test <Ref. to 4AT-38, Time Lag Test.> • Road test <Ref. to 4AT-35, Road Test.> • Inhibitor switch <Ref. to 4AT-53, Inhibitor Switch.>	Is the unit that might influence AT problem normal?	Go to step **2.**	Repair or replace each item.
2	**CHECK POWER INDICATOR LIGHT.** Turn the ignition switch to ON.	Does the POWER indicator light illuminate?	Go to step **4.**	Go to step **3.**
3	**CHECK POWER INDICATOR LIGHT.** 1) Turn the ignition switch to OFF. 2) Repair the POWER indicator light circuit or power supply and ground line circuit. <Ref. to 4AT(diag)-26, INSPECTION, Power Indicator Light Display.> 3) Turn the ignition switch to ON. 4) Start the engine.	Is the POWER indicator light blink?	Go to step **4.**	Go to step **5.**
4	**CHECK INDICATION OF DTC.** Calling up the DTC. With Subaru Select Monitor <Ref. to 4AT(diag)-23, OPERATION, Read Diagnostic Trouble Code (DTC).> NOTE: If the communication function of Subaru select monitor cannot be executed normally, check the communication circuit. <Ref. to 4AT(diag)-33, COMMUNICATION FOR INITIALIZING IMPOSSIBLE, Diagnostic Procedure for Subaru Select Monitor Communication.>	Is the DTC displayed?	Go to step **6.** NOTE: Record all DTC.	Go to step **5.**

	Step	Check	Yes	No
5	**PERFORM THE GENERAL DIAGNOSTICS.** 1) Inspect using “Diagnostic Procedure without DTC”. <Ref. to 4AT(diag)-89, Diagnostic Procedure without Diagnostic Trouble Code (DTC).> 2) Inspect using “Symptom Related Diagnostic”. <Ref. to 4AT(diag)-123, General Diagnostic Table.> 3) Perform the clear memory mode. <Ref. to 4AT(diag)-25, OPERATION, Clear Memory Mode.> 4) Perform the inspection mode. <Ref. to 4AT(diag)-24, Inspection Mode.> 5) Calling up the DTC. <Ref. to 4AT(diag)-23, OPERATION, Read Diagnostic Trouble Code (DTC).>	Is the DTC displayed?	Go to step **6.**	Complete the diagnosis.
6	**PERFORM THE DIAGNOSIS.** 1) Inspect using “Diagnostics Chart with DTC”. <Ref. to 4AT(diag)-38, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> NOTE: For DTC table, refer to “List of Diagnostic Trouble Code (DTC)”. <Ref. to 4AT(diag)-36, List of Diagnostic Trouble Code (DTC).> 2) Repair the trouble cause. 3) Perform the clear memory mode. <Ref. to 4AT(diag)-25, OPERATION, Clear Memory Mode.> 4) Perform the inspection mode. <Ref. to 4AT(diag)-24, Inspection Mode.> 5) Calling up the DTC. <Ref. to 4AT(diag)-23, OPERATION, Read Diagnostic Trouble Code (DTC).>	Is the DTC displayed?	Inspect using “Diagnostics Chart with Diagnostic Connector”. <Ref. to 4AT(diag)-38, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Complete the diagnosis.

2. Check List for Interview

A: CHECK

Check the following items when problem has occurred.

NOTE:
Use copies of this page for interviewing customers.

Customer's name			
Date of purchase			
Date of repair			
Trans. model	TRANSMISSION	VIN	
Odometer reading	km/h or miles		
Frequency	❑ Continuous ❑ Intermittent (times a day)		
Weather	❑ Fine ❑ Cloudy ❑ Rainy ❑ Snowy ❑ Various/Others ( )		
Place	❑ High ❑ Suburbs ❑ Inner city ❑ Uphill ❑ Rough road ❑ Others ( )		
Outdoor temperature	❑ Hot ❑ Warm ❑ Cool ❑ Cold		
Vehicle speed	km/h (MPH)		
AT diagnostic indicator light (POWER indicator light)	❑ Continuously lit	❑ Not lit	
Select lever position	❑ P ❑ R ❑ N ❑ D ❑ 3 ❑ 2 ❑ 1		
Driving condition	❑ Not affected ❑ At racing ❑ While decelerating	❑ At starting ❑ While accelerating ❑ While turning (❑ RH / ❑ LH)	❑ While idling ❑ While cruising
POWER switch	❑ ON ❑ OFF		
HOLD switch	❑ ON ❑ OFF		
Symptoms	❑ No up-shift		
	❑ No down-shift		
	❑ No kick down		
	❑ Vehicle does not move (❑ Any position ❑ Particular position)		
	❑ Lock-up malfunction		
	❑ Noise or vibration		
	❑ Shift shock or slip		
	❑ Select lever does not move		
	❑ Others ( )		

3. General Description

A: CAUTION

• Supplemental Restraint System "Airbag"

The airbag system wiring harness is routed near the transmission control module (TCM).

CAUTION:

• All airbag system wiring harness and connectors are colored yellow. Do not use an electrical test equipment on these circuit.

• Be careful not to damage the airbag system wiring harness when performing diagnostics and servicing the TCM.

• Measurement

When measuring the voltage and resistance of ECM, TCM or each sensor, use a tapered pin with diameter of less than 0.64 mm (0.025 in) in order to avoid poor contact. Do not insert the pin more than 0.65 mm (0.026 in).

B: INSPECTION

1. BATTERY

Measure the battery voltage and specific gravity of electrolyte.

Standard voltage: 12 V or more

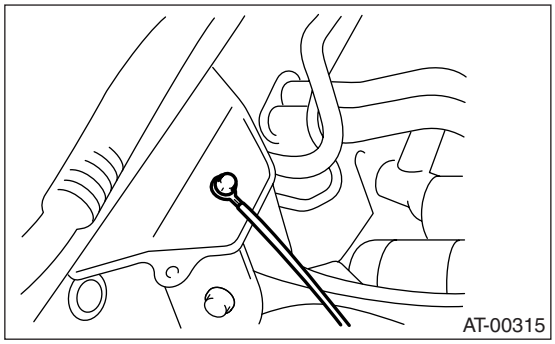
Specific gravity: Above 1.260

2. TRANSMISSION GROUND

Make sure that the ground terminal bolt is tightened securely.

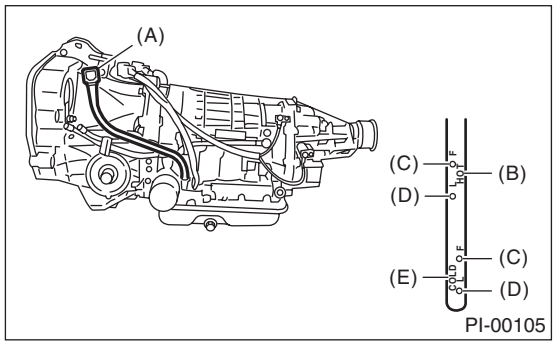
• Chassis side

Tightening torque:
13 N·m (1.3 kgf-m, 9.4 ft-lb)



3. ATF LEVEL

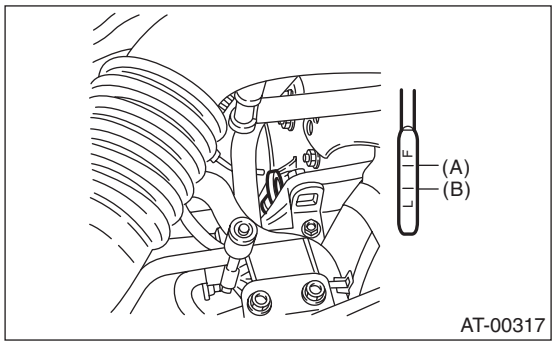
Make sure that ATF level is in the specification. <Ref. to 4AT-32, INSPECTION, Automatic Transmission Fluid.>



(A) Level gauge
(B) "HOT" side
(C) Upper level
(D) Lower level
(E) "COLD" side

4. FRONT DIFFERENTIAL OIL LEVEL

Make sure that the front differential oil level is in specification. <Ref. to 4AT-34, INSPECTION, Differential Gear Oil.>



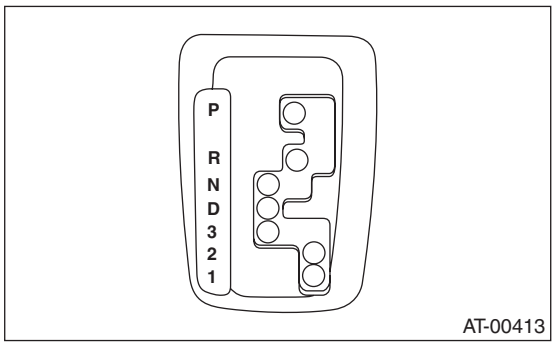
(A) Upper level
(B) Lower level

5. OPERATION OF SHIFT SELECT LEVER

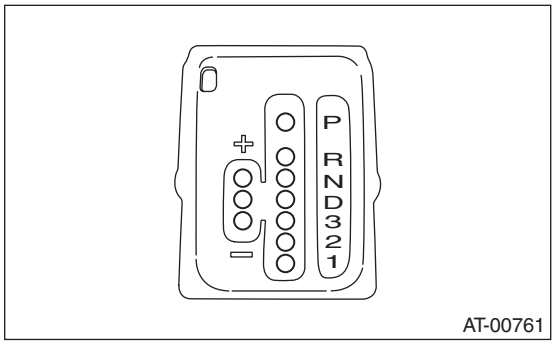
Make sure there is no abnormal noise, dragging or contact pattern in each select lever range.

WARNING:
Stop the engine while checking operation of selector lever.

- Without SPORT shift

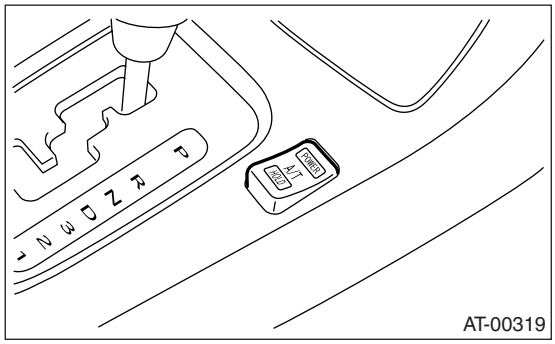


- With SPORT shift



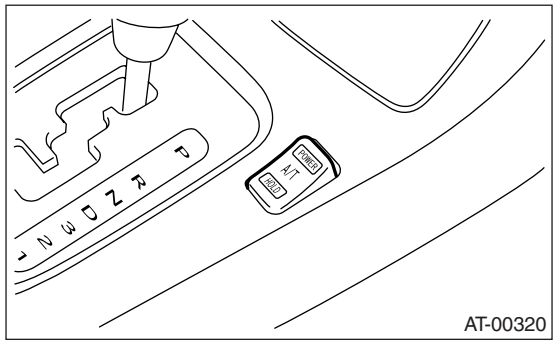
6. POWER SWITCH

Make sure that the POWER indicator light in combination meter comes ON, when turning the POWER switch to ON.



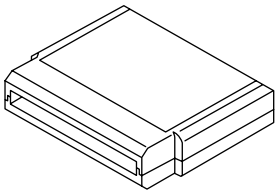
7. HOLD SWITCH

Make sure that the HOLD indicator light in combination meter comes ON, when turning the HOLD switch to ON.



C: PREPARATION TOOL

1. SPECIAL TOOLS

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18482AA000	18482AA000	CARTRIDGE	Used for troubleshooting for electrical systems.
ST22771AA030	22771AA030	SUBARU SELECT MONITOR KIT	Used for troubleshooting for electrical systems. • English: 22771AA030 (Without printer) • German: 22771AA070 (Without printer) • French: 22771AA080 (Without printer) • Spanish: 22771AA090 (Without printer)

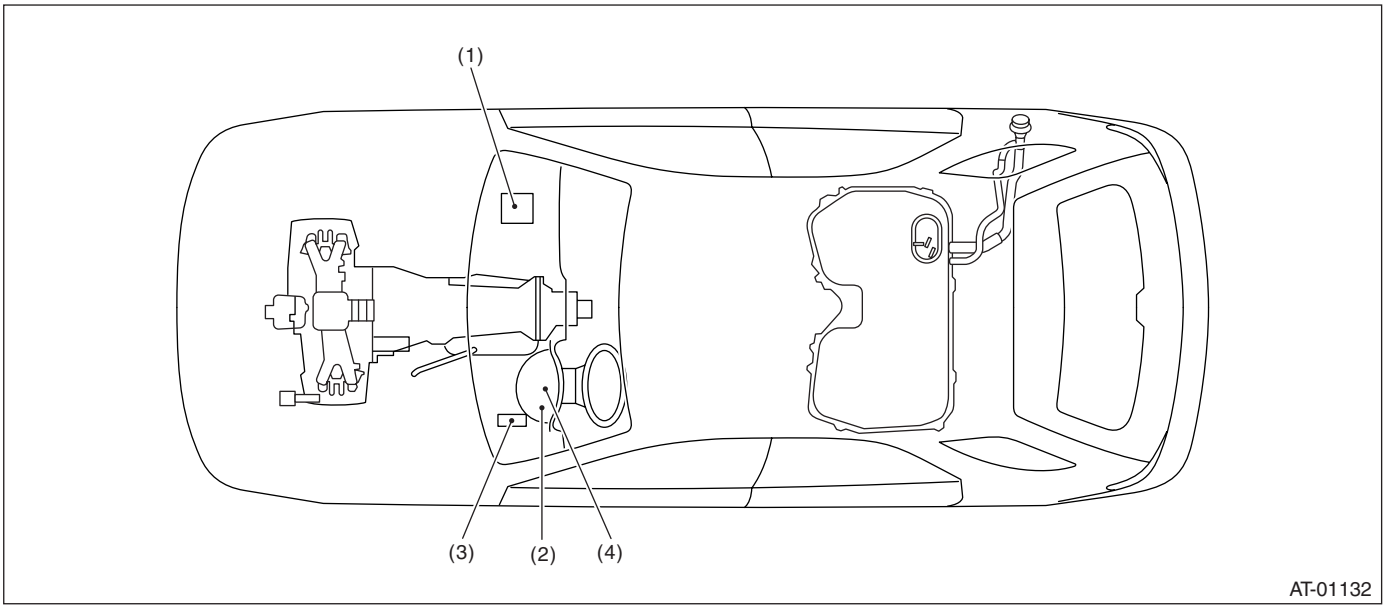
2. GENERAL PURPOSE TOOLS

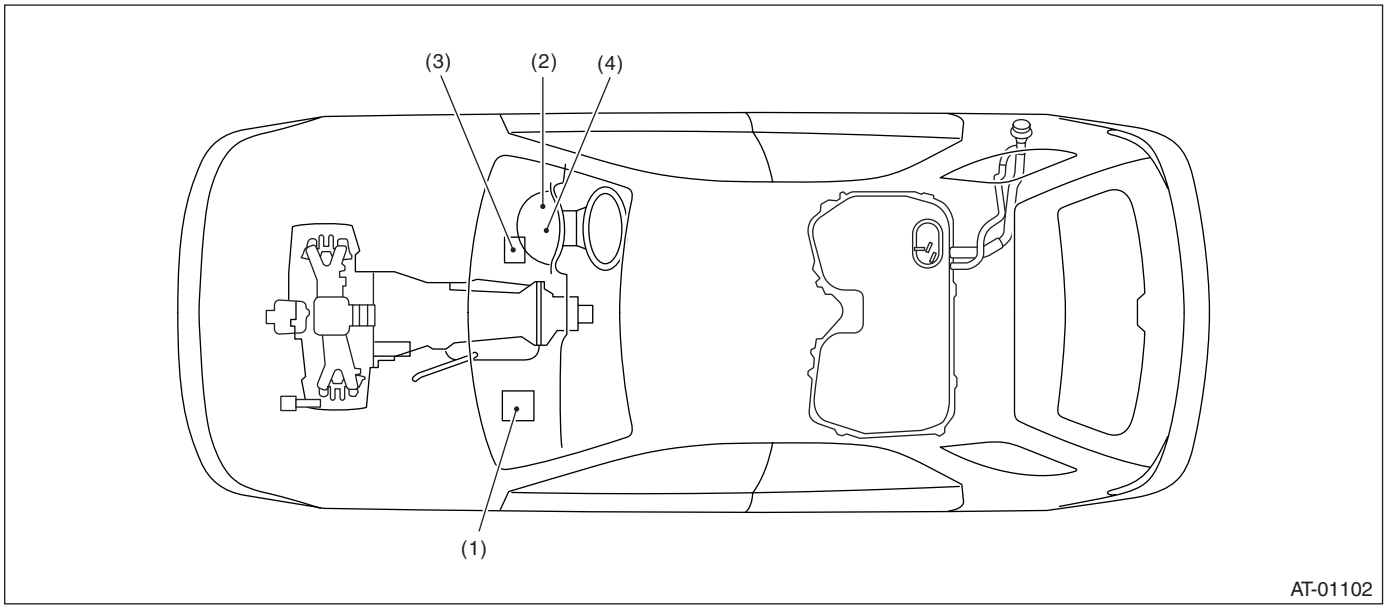
TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance, voltage and ampere.
Oscilloscope	Used for measuring sensor.

4. Electrical Component Location

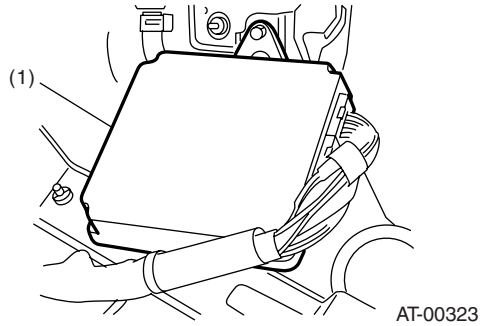
A: LOCATION

1. CONTROL MODULE

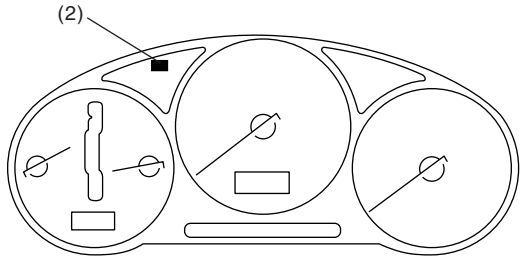




(1) Engine control module (ECM)
(2) POWER indicator light (AT warning light)
(3) Transmission control module (TCM)
(4) Data link connector

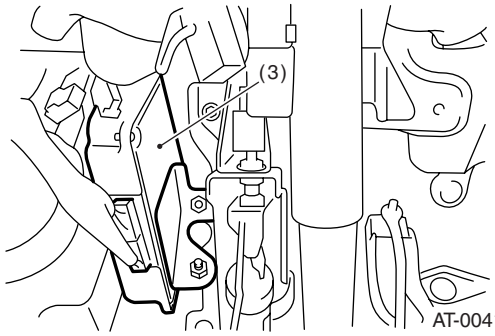


AT-00323



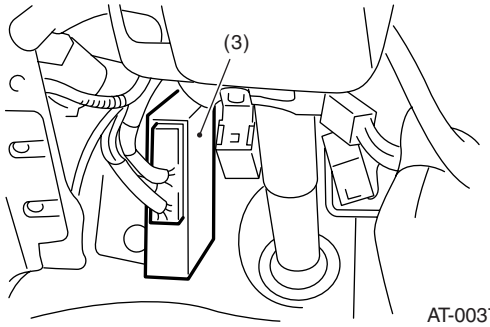
AT-01103

LHD

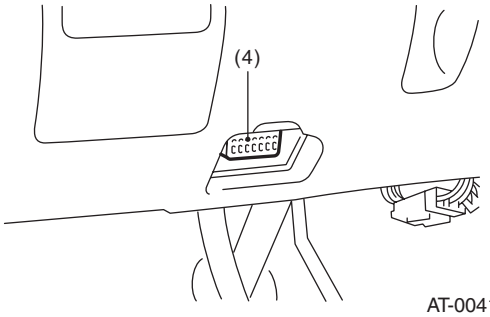


AT-00416

RHD

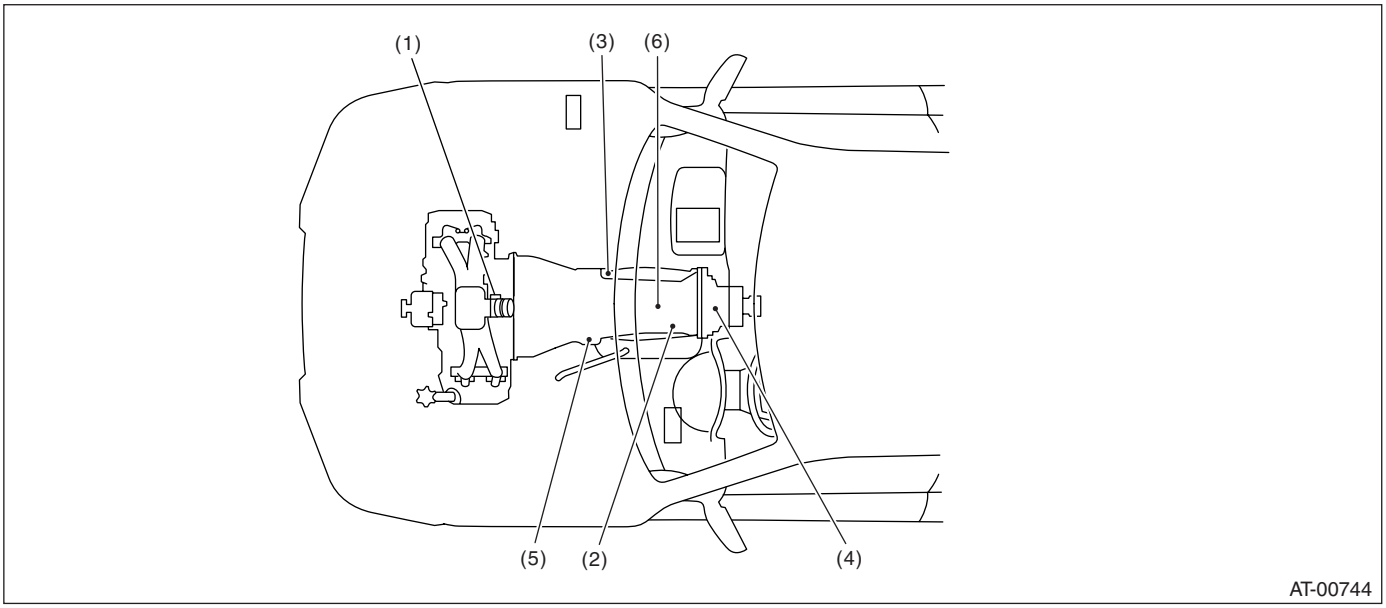


AT-00372

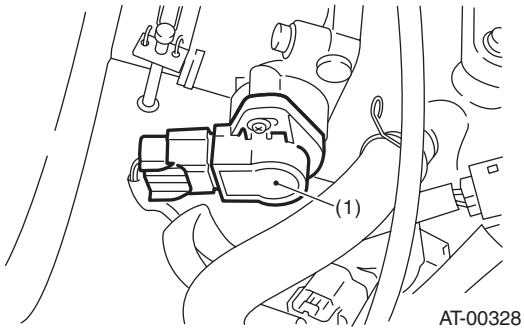


AT-00417

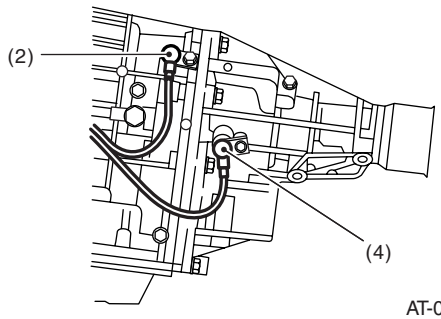
2. SENSOR



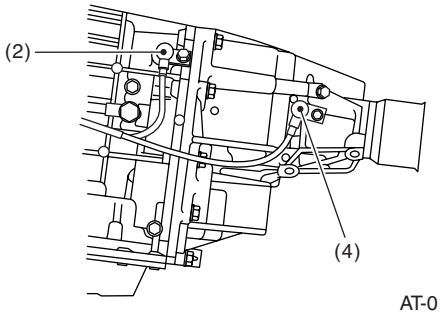
(1) Throttle position sensor
(2) Front vehicle speed sensor
(3) Inhibitor switch
(4) Rear vehicle speed sensor
(5) Torque converter turbine speed sensor
(6) ATF temperature sensor

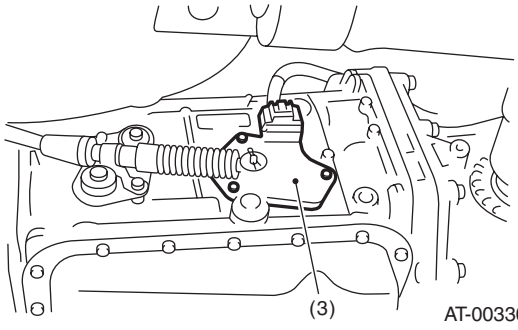


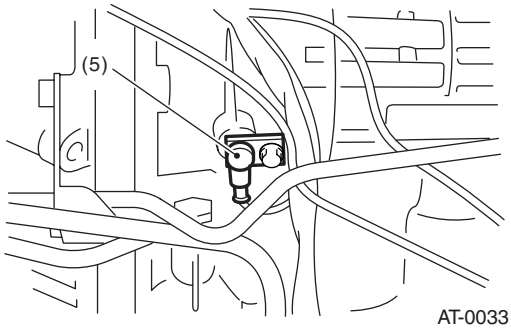
Non-turbo model

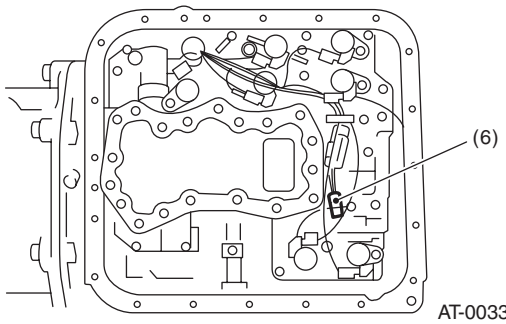


Turbo model

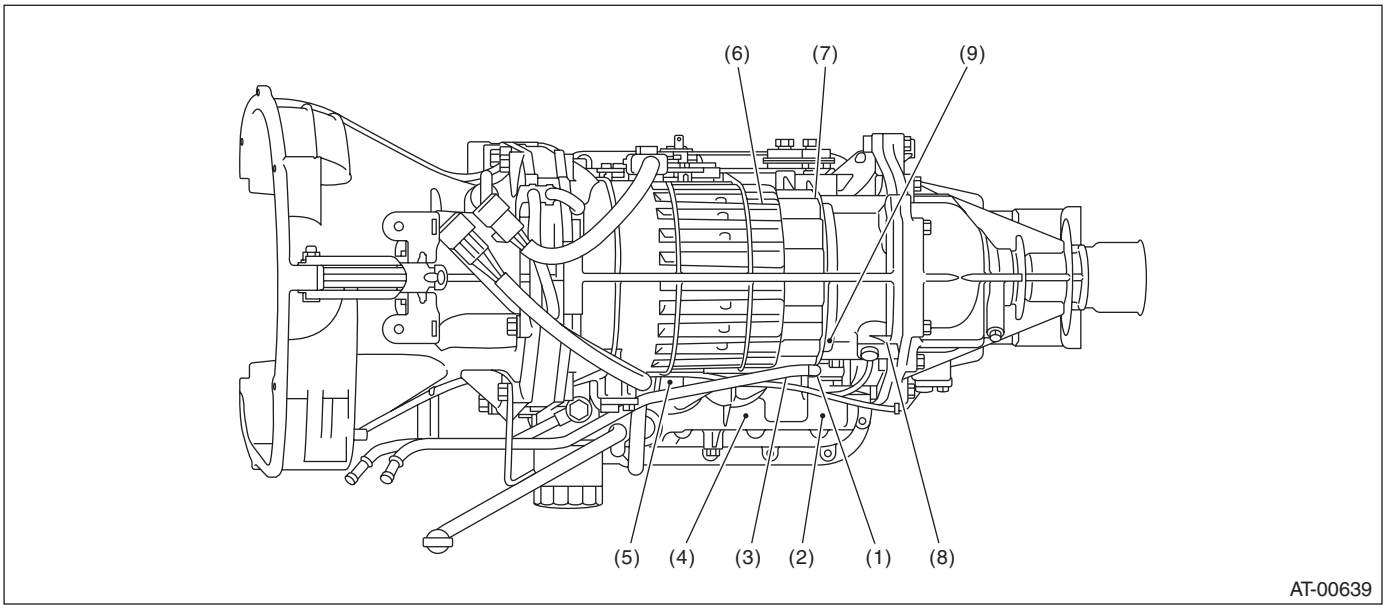




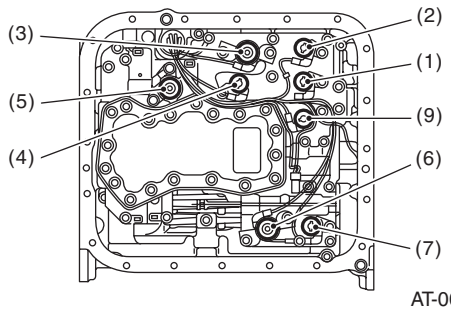


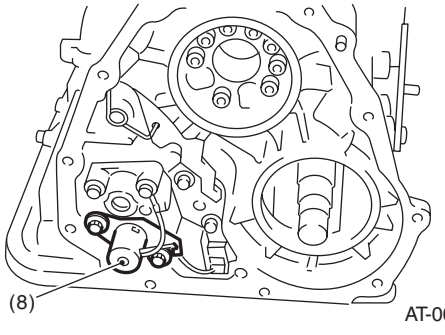


3. SOLENOID



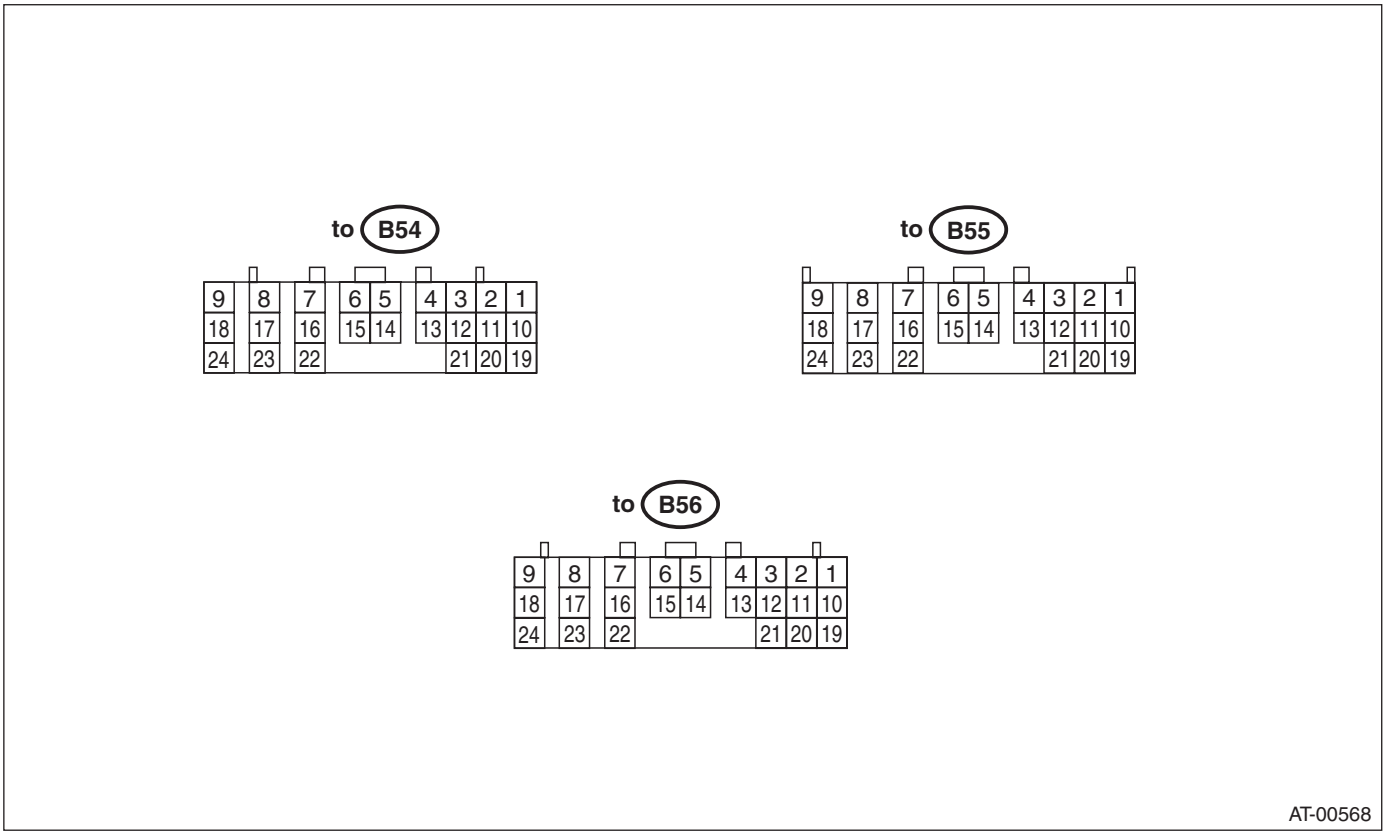
(1) Solenoid 1
(2) Solenoid 2
(3) Line pressure duty solenoid
(4) Low clutch timing solenoid
(5) Lock-up duty solenoid
(6) 2-4 brake duty solenoid
(7) 2-4 brake timing solenoid
(8) Transfer duty solenoid
(9) Sport shift solenoid (with SPORT shift)





5. Transmission Control Module (TCM) I/O Signal

A: ELECTRICAL SPECIFICATION



Check with ignition switch ON.						
Content		Connector No.	Terminal No.	Measuring conditions	Voltage (V)	Resistance to body (ohms)
Back-up power supply		B56	1	Ignition switch OFF	10 — 13	—
Ignition power supply		B54	23	Ignition switch ON (with engine OFF)	10 — 13	—
		B54	24			
Inhibitor switch	"P" range switch	B55	1	Select lever in "P" range	Less than 1	—
				Select lever in any other than "P" range (except "N" range)	More than 8	
	"N" range switch	B55	14	Select lever in "N" range	Less than 1	—
				Select lever in any other than "N" range (except "P" range)	More than 8	
	"R" range switch	B55	3	Select lever in "R" range	Less than 1	—
				Select lever in any other than "R" range	More than 8	
	"D" range switch	B55	4	Select lever in "D" range	Less than 1	—
				Select lever in any other than "D" range	More than 8	
	"3" range switch	B55	5	Select lever in "3" range	Less than 1	—
				Select lever in any other than "3" range	More than 8	

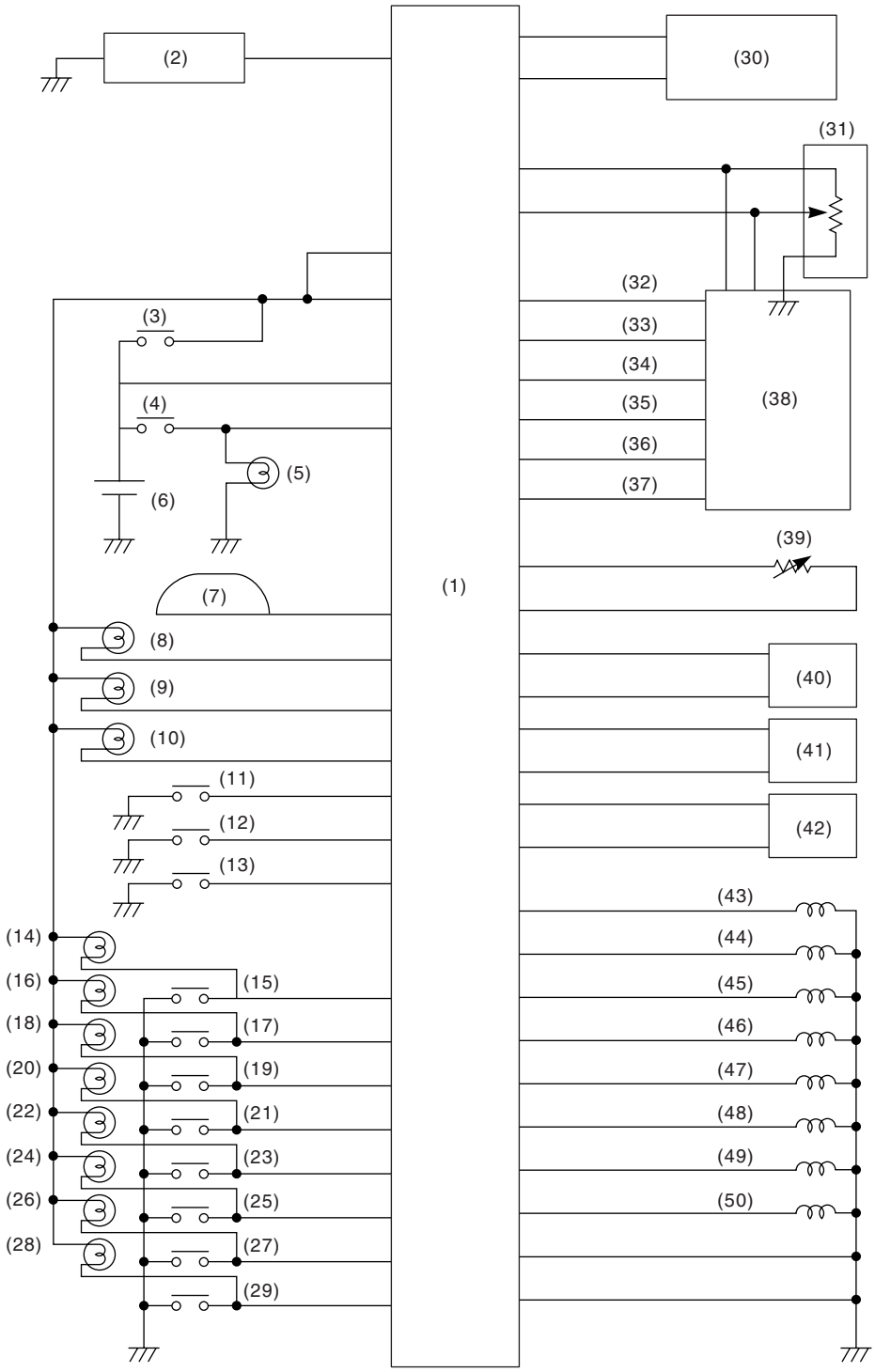
Check with ignition switch ON.						
Content		Connector No.	Terminal No.	Measuring conditions	Voltage (V)	Resistance to body (ohms)
Inhibitor switch	"2" range switch	B55	6	Select lever in "2" range	Less than 1	—
				Select lever in any other than "2" range	More than 8	
	"1" range switch	B55	7	Select lever in "1" range	Less than 1	—
				Select lever in any other than "1" range	More than 8	
Brake switch		B55	12	Brake pedal depressed.	More than 10.5	—
				Brake pedal released.	Less than 1	
Kick-down switch		B55	11	Throttle fully opened.	Less than 1	—
				Throttle fully closed.	More than 6.5	
AT OIL TEMP warning light		B56	10	Light ON	Less than 1	—
				Light OFF	More than 9	
Throttle position sensor		B54	3	Throttle fully closed.	0.2 — 1.0	—
				Throttle fully open.	4.2 — 4.7	
Throttle position sensor power supply		B54	2	Ignition switch ON (with engine OFF)	4.8 — 5.3	—
ATF temperature sensor		B54	11	ATF temperature 20°C (68°F)	1.6 — 2.0	2.1 k — 2.9 k
				ATF temperature 80°C (176°F)	0.4 — 0.9	275 — 375
Rear vehicle speed sensor		B55	24	Vehicle stopped.	0	450 — 650
				Vehicle speed at least 20 km/h (12 MPH)	More than 1 (AC range)	
Front vehicle speed sensor		B55	18	Vehicle stopped.	0	450 — 650
				Vehicle speed at least 20 km/h (12 MPH)	More than 1 (AC range)	
Torque converter turbine speed sensor		B55	8	Engine idling after warm-up. (D range)	0	450 — 650
				Engine idling after warm-up. (N range)	More than 1 (AC range)	
Vehicle speed output signal		B56	17	Vehicle speed at most 10 km/h (6 MPH)	Less than 1 ← → More than 4	—
Engine speed signal		B55	17	Ignition switch ON (with engine OFF)	More than 10.5	—
				Ignition switch ON (with engine ON)	8 — 11	
Cruise set signal		B55	22	When cruise control is set. (SET light ON)	Less than 1	—
				When cruise control is not set. (SET light OFF)	More than 6.5	
Torque control signal 1		B56	5	Ignition switch ON (with engine ON)	More than 4	—
Torque control signal 2		B56	14	Ignition switch ON (with engine ON)	More than 4	—
Torque control cut signal		B55	10	Ignition switch ON	8	—
Intake manifold pressure signal (Non-turbo model)		B54	1	Engine idling after warm-up.	0.4 — 1.6	—
Mass air flow signal (Turbo model)		B54	1	Engine idling after warm-up.	0.9 — 1.4	—
Shift solenoid 1		B54	22	1st or 4th gear	More than 9	10 — 16
				2nd or 3rd gear	Less than 1	

Check with ignition switch ON.					
Content	Connector No.	Terminal No.	Measuring conditions	Voltage (V)	Resistance to body (ohms)
Shift solenoid 2	B54	5	1st or 2nd gear	More than 9	10 — 16
			3rd or 4th gear	Less than 1	
Line pressure duty solenoid	B54	9	Ignition switch ON (with engine OFF) Throttle fully closed after warm-up.	1.5 — 4.0	2.0 — 4.5
			Ignition switch ON (with engine OFF) Throttle fully open after warm-up.	Less than 0.5	
Lock-up duty solenoid	B54	7	When lock up occurs.	More than 8.5	10 — 17
			When lock up is released.	Less than 0.5	
Transfer duty solenoid (Non-turbo model)	B54	6	Fuse on FWD switch	More than 8.5	10 — 17
			Fuse removed from FWD switch (with throttle fully open and with select lever in 1st gear).	Less than 0.5	
Transfer duty solenoid (Turbo model)	B56	6	Throttle fully closed.	Less than 0.5	10 — 17
			Throttle fully open.	More than 8.5	
2-4 brake duty solenoid	B54	18	Throttle fully closed (with engine OFF) after warm-up.	1.5 — 5.0	2.0 — 4.5
			Throttle fully open (with engine OFF) after warm-up.	Less than 0.5	
2-4 brake timing solenoid	B54	16	1st gear	Less than 1	10 — 16
			3rd gear	More than 9	
Low clutch timing solenoid	B54	15	2nd gear	Less than 1	10 — 16
			4th gear	More than 9	
HOLD switch	B55	16	HOLD switch ON	Less than 1	—
			HOLD switch OFF	More than 8	—
POWER switch	B55	23	POWER switch ON	Less than 1	—
			POWER switch OFF	More than 10	—
POWER indicator light	B56	11	Light ON	Less than 1	—
			Light OFF	More than 9	—
FWD switch	B55	20	Fuse removed.	6 — 9.1	—
			Fuse installed.	Less than 1	—
AWD indicator light	B56	2	Fused ON FWD switch	Less than 1	—
			Fuse removed from FWD switch.	More than 9	—
Sensor ground line 1	B54	20	—	0	Less than 1
Sensor ground line 2	B55	9	—	0	Less than 1
System ground line	B56	19	—	0	Less than 1
	B54	21			
Sensor ground line 3	B54	10	—	0	Less than 1
Sensor ground line 4	B54	19	—	0	Less than 1
AT diagnosis signal	B56	21	Ignition switch ON	Less than 1 ← → More than 4	—
Data link signal (Subaru Select Monitor)	B56	15	—	—	—

Check with ignition switch ON.					
Content	Connector No.	Terminal No.	Measuring conditions	Voltage (V)	Resistance to body (ohms)
SPORT shift solenoid (with SPORT shift)	B54	14	SPORT shift activated	More than 8	10 — 16
			SPORT shift deactivated	Less than 1	
Manual mode switch (with SPORT shift)	B55	15	Manual mode switch ON	Less than 1	—
			Manual mode switch OFF	More than 8	
Shift up switch (with SPORT shift)	B55	13	Shift up switch ON	Less than 1	—
			Shift up switch OFF	More than 8	
Shift down switch (with SPORT shift)	B55	12	Shift down switch ON	Less than 1	—
			Shift down switch OFF	More than 8	
Buzzer (with SPORT shift)	B56	2	ON	Less than 1	—
			OFF	More than 8	
Gear position indicator (with SPORT shift)	B56	12	Manual mode OFF	More than 4	—
			Shift down indicator ON	Less than 1	
Gear position indicator (with SPORT shift)	B56	13	Manual mode OFF	More than 4	—
			Manual mode with 4th gear	Less than 1	
Gear position indicator (with SPORT shift)	B56	3	Manual mode OFF	More than 4	—
			Manual mode with 2nd and 3rd gear	Less than 1	
Gear position indicator (with SPORT shift)	B56	4	Manual mode OFF	More than 4	—
			Manual mode with 1st and 3rd gear	Less than 1	

B: WIRING DIAGRAM

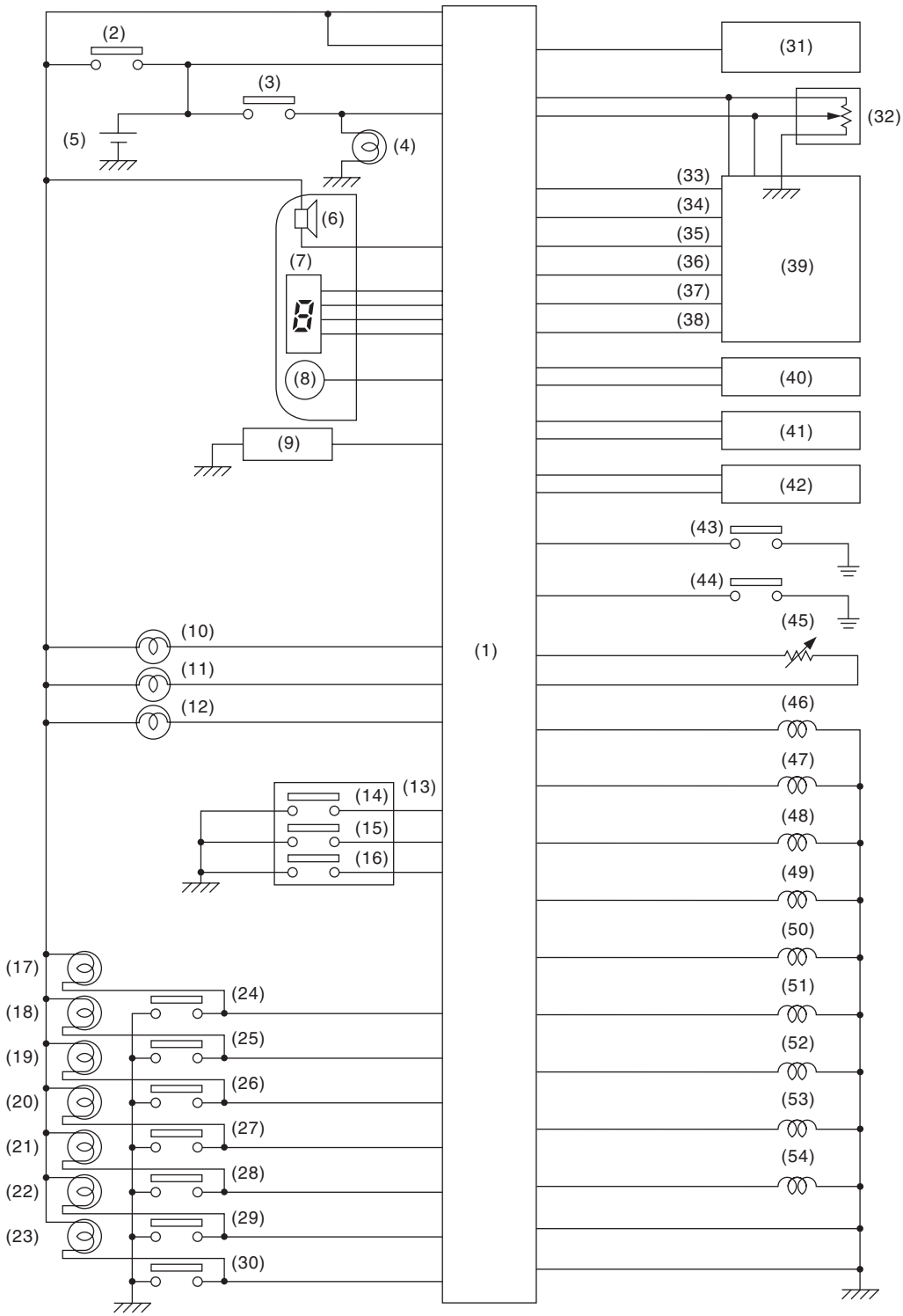
1. WITHOUT SPORT SHIFT



AT-03135

(1) Transmission control module (TCM)
(2) Cruise control module
(3) Ignition switch
(4) Brake switch
(5) Brake light
(6) Battery
(7) Combination meter (Speedometer circuit)
(8) AT OIL TEMP warning light
(9) AWD indicator light
(10) POWER indicator light
(11) FWD switch
(12) POWER switch
(13) Kick-down switch
(14) Hold indicator light
(15) HOLD switch
(16) “P” range indicator light
(17) “P” range switch
(18) “R” range indicator light
(19) “R” range switch
(20) “N” range indicator light
(21) “N” range switch
(22) “D” range indicator light
(23) “D” range switch
(24) “3” range indicator light
(25) “3” range switch
(26) “2” range indicator light
(27) “2” range switch
(28) “1” range indicator light
(29) “1” range switch
(30) Data link connector
(31) Throttle position sensor
(32) Engine speed signal
(33) Torque control cut signal
(34) Torque control signal 2
(35) Torque control signal 1
(36) Intake manifold pressure signal
(37) AT diagnostics signal
(38) Engine control module (ECM)
(39) ATF temperature sensor
(40) Torque converter turbine speed sensor
(41) Rear vehicle speed sensor
(42) Front vehicle speed sensor
(43) Shift solenoid 1
(44) Shift solenoid 2
(45) 2-4 brake timing solenoid
(46) Line pressure duty solenoid
(47) 2-4 brake duty solenoid
(48) Lock-up duty solenoid
(49) Low clutch timing solenoid
(50) Transfer duty solenoid

2. WITH SPORT SHIFT



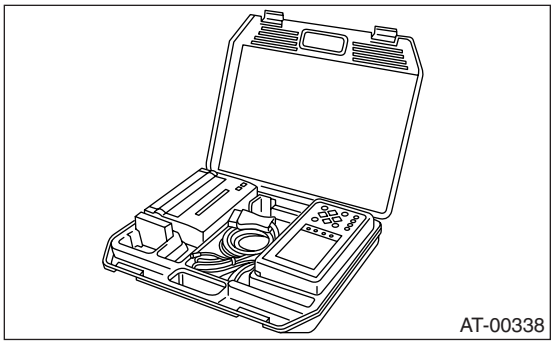
(1) Transmission control module (TCM)
(2) Ignition switch
(3) Brake switch
(4) Brake light
(5) Battery
(6) Buzzer
(7) Gear position indicator
(8) Speedometer
(9) Cruise control module
(10) AT OIL TEMP warning light
(11) POWER indicator light
(12) HOLD indicator light
(13) Select lever
(14) Manual mode switch
(15) Up switch
(16) Down switch
(17) “P” range indicator light
(18) “R” range indicator light
(19) “N” range indicator light
(20) “D” range indicator light
(21) “3” range indicator light
(22) “2” range indicator light
(23) “1” range indicator light
(24) “P” range switch
(25) “R” range switch
(26) “N” range switch
(27) “D” range switch
(28) “3” range switch
(29) “2” range switch
(30) “1” range switch
(31) Data link connector
(32) Throttle position sensor
(33) Engine speed signal
(34) Torque control cut signal
(35) Torque control signal 2
(36) Torque control signal 1
(37) Intake manifold pressure signal
(38) AT diagnosis signal
(39) Engine control module (ECM)
(40) Front vehicle speed sensor
(41) Rear vehicle speed sensor
(42) Torque converter turbine speed sensor
(43) POWER switch
(44) HOLD switch
(45) ATF temperature sensor
(46) Shift solenoid 1
(47) Shift solenoid 2
(48) 2-4 brake timing solenoid
(49) 2-4 brake duty solenoid
(50) Line pressure duty solenoid
(51) Lock-up duty solenoid
(52) Low clutch timing solenoid
(53) Transfer duty solenoid
(54) SPORT shift solenoid

6. Subaru Select Monitor

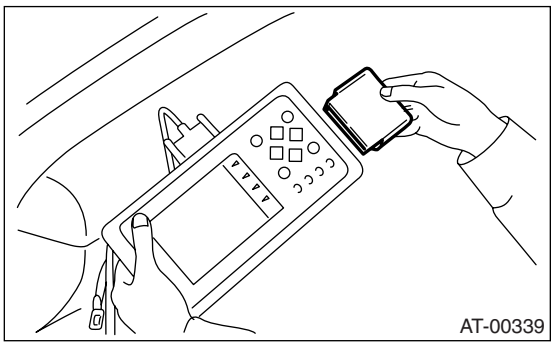
A: OPERATION

1. READ DTC

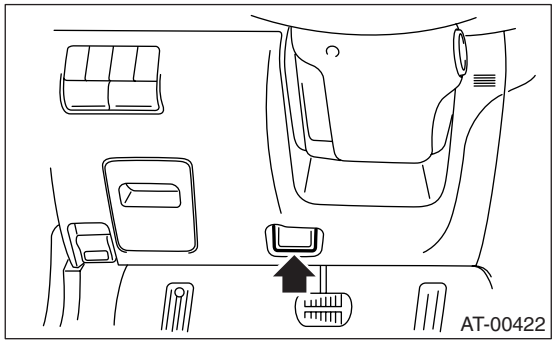
1) Prepare the Subaru Select Monitor kit.



2) Connect the diagnosis cable to Subaru Select Monitor.
3) Insert the cartridge into Subaru Select Monitor. <Ref. to 4AT(diag)-7, PREPARATION TOOL, General Description.>



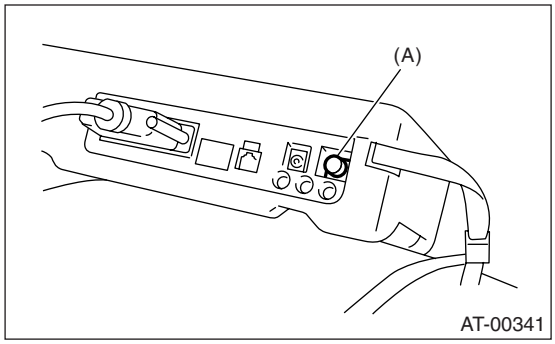
4) Connect the Subaru Select Monitor to data link connector.
   (1) Data link connector located in the lower portion of instrument panel (on driver's side).



   (2) Connect the diagnosis cable to data link connector.

NOTE:
Do not connect scan tools except for Subaru Select Monitor and general scan tool.

5) Turn the ignition switch to ON (engine OFF) and Subaru Select Monitor power switch to ON.



(A) POWER switch

6) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
7) On the «System Selection Menu» display screen, select the {Transmission Control System} and press the [YES] key.
8) Press the [YES] key after the information of transmission type is displayed.
9) On the «Transmission Diagnosis» display screen, select the {DTC Display} and press the [YES] key.
10) On the «DTC Display» display screen, select the {Memorized DTC} and press the [YES] key.

NOTE:
• For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.
• For details concerning the DTC, refer to the List of Diagnostic Trouble Code (DTC). <Ref. to 4AT(diag)-36, List of Diagnostic Trouble Code (DTC).>

2. READ CURRENT DATA

1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Transmission Control System} and press the [YES] key.
3) Press the [YES] key after the information of transmission type is displayed.
4) On the «Transmission Diagnosis» display screen, select the {Current Data Display & Save} and press the [YES] key.
5) On the «Data Display Menu» display screen, select the {Data Display} and press the [YES] key.

6) Using the scroll key, move the display screen up or down until desired data is shown.
• A list of the support data is shown in the following table.

Contents	Display	Unit of measure
Battery voltage	Battery Voltage	V
Rear vehicle speed sensor signal	Rear Wheel Speed	km/h or MPH
Front vehicle speed sensor signal	Front Wheel Speed	km/h or MPH
Engine speed signal	Engine Speed	rpm
Automatic transmission fluid temperature signal	ATF Temp.	°C or °F
Throttle position signal	Throttle Sensor Voltage	V
Gear position	Gear Position	—
Line pressure control duty ratio	Line Pressure Duty Ratio	%
Lock up clutch control duty ratio	Lock Up Duty Ratio	%
Transfer clutch control duty ratio (AWD model)	Transfer Duty Ratio	%
Power supply for throttle position sensor	Throttle Sensor Power	V
Torque converter turbine speed signal	Turbine Revolution Speed	rpm
2-4 brake timing pressure control duty ratio	Brake Clutch Duty Ratio	%
Mass air flow sensor signal (Turbo model)	Air Flow Sensor Voltage	V
Intake manifold pressure sensor voltage (Non-turbo model)	Mani. Pressure Voltage	V
2 wheel drive switch signal (Non-turbo model)	FWD Switch	ON or OFF
Stop lamp switch signal	Stop Light Switch	ON or OFF
Shift up signal (with SPORT shift)	Up Switch	ON or OFF
Shift down signal (with SPORT shift)	Down Switch	ON or OFF
Manual mode signal (with SPORT shift)	Tip Mode Switch	ON or OFF
Cruise control system signal	Cruise Control Signal	ON or OFF
Parking range signal	P Range Signal	ON or OFF
Neutral range signal	N Range Signal	ON or OFF
Reverse range signal	R Range Signal	ON or OFF
Drive range signal	D Range Signal	ON or OFF
3rd range signal	3rd Range Signal	ON or OFF
2nd range signal	2nd Range Signal	ON or OFF
1st range signal	1st Range Signal	ON or OFF
Shift control solenoid A	Shift Solenoid #1	ON or OFF
Shift control solenoid B	Shift Solenoid #2	ON or OFF
Torque control output signal #1	Torque Control Signal 1	ON or OFF
Torque control output signal #2	Torque Control Signal 2	ON or OFF
Torque control cut signal	Torque Control Cut Sig.	ON or OFF
2-4 brake timing control solenoid valve	2-4 Brake Timing Sol.	ON or OFF
Low clutch timing control solenoid valve	Low Clutch Timing Sol.	ON or OFF
SPORT shift solenoid valve (with SPORT shift)	Tip Solenoid	ON or OFF
Automatic transmission diagnosis indicator lamp	Diagnosis Lamp	ON or OFF
Power mode switch signal	Power Mode Switch	ON or OFF
Hold mode switch signal	Hold Mode Switch	ON or OFF
Kick down switch signal	Kick Down Switch	ON or OFF
Automatic transmission fluid temperature lamp	ATF Temperature Lamp	ON or OFF

NOTE:
For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

3. CLEAR MEMORY MODE

1) On the «Main Menu» display screen, select the {2. Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Transmission Control System} and press the [YES] key.
3) Press the [YES] key after the information of transmission type is displayed.
4) On the «Transmission Diagnosis» display screen, select the {Clear Memory} and press the [YES] key.
5) When the “Done” and “Turn Ignition Switch OFF” are shown on display screen, turn the Subaru Select Monitor and ignition switch to OFF.

NOTE:
For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

7. Read Diagnostic Trouble Code (DTC)

A: OPERATION

Refer to Subaru Select Monitor for information about how to obtain and understand DTC. <Ref. to 4AT(diag)-20, OPERATION, Subaru Select Monitor.>

8. Inspection Mode

A: OPERATION

WARNING:
Observe the road traffic law.

Shift the select lever to D range, and drive continuously for 10 seconds or more at 60 km/h (37 MPH).

9. Clear Memory Mode

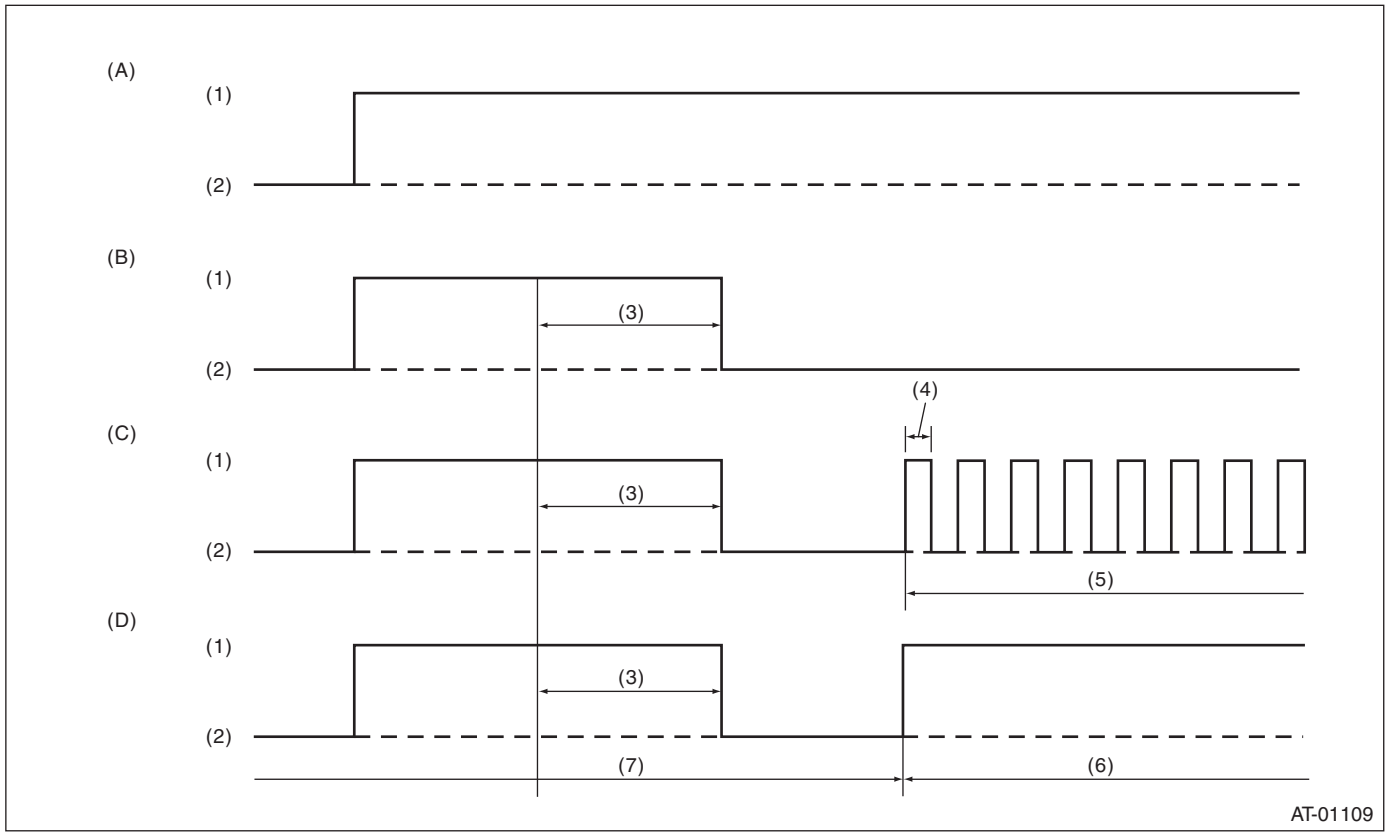
A: OPERATION

Refer to Subaru Select Monitor for information about how to clear DTC.
<Ref. to 4AT(diag)-22, CLEAR MEMORY MODE, OPERATION, Subaru Select Monitor.>

10.Power Indicator Light Display

A: OPERATION

When any on-board diagnostics item is malfunctioning, the display on POWER indicator light blinks from the time malfunction is detected after starting the engine until ignition switch is turned to OFF. The malfunctioning part or unit can be determined by a DTC during on-board diagnostics operation. Problems which occurred previously can also be identified through the memory function. If the POWER indicator does not show a problem (although a problem is occurring), the problem can be determined by checking the performance characteristics of each sensor using subaru select monitor. The indicator signal is as shown in the figure.



(A) Ignition switch (engine OFF)
(B) Normal (engine ON)
(C) Faulty (engine ON)
(D) Normal (POWER switch ON)

(1) ON
(2) OFF
(3) 2 sec.
(4) 0.25 sec.
(5) Blink
(6) POWER switch ON
(7) POWER switch OFF

Perform the inspection when the POWER indicator light does not operate correctly. <Ref. to 4AT(diag)-26, INSPECTION, Power Indicator Light Display.>

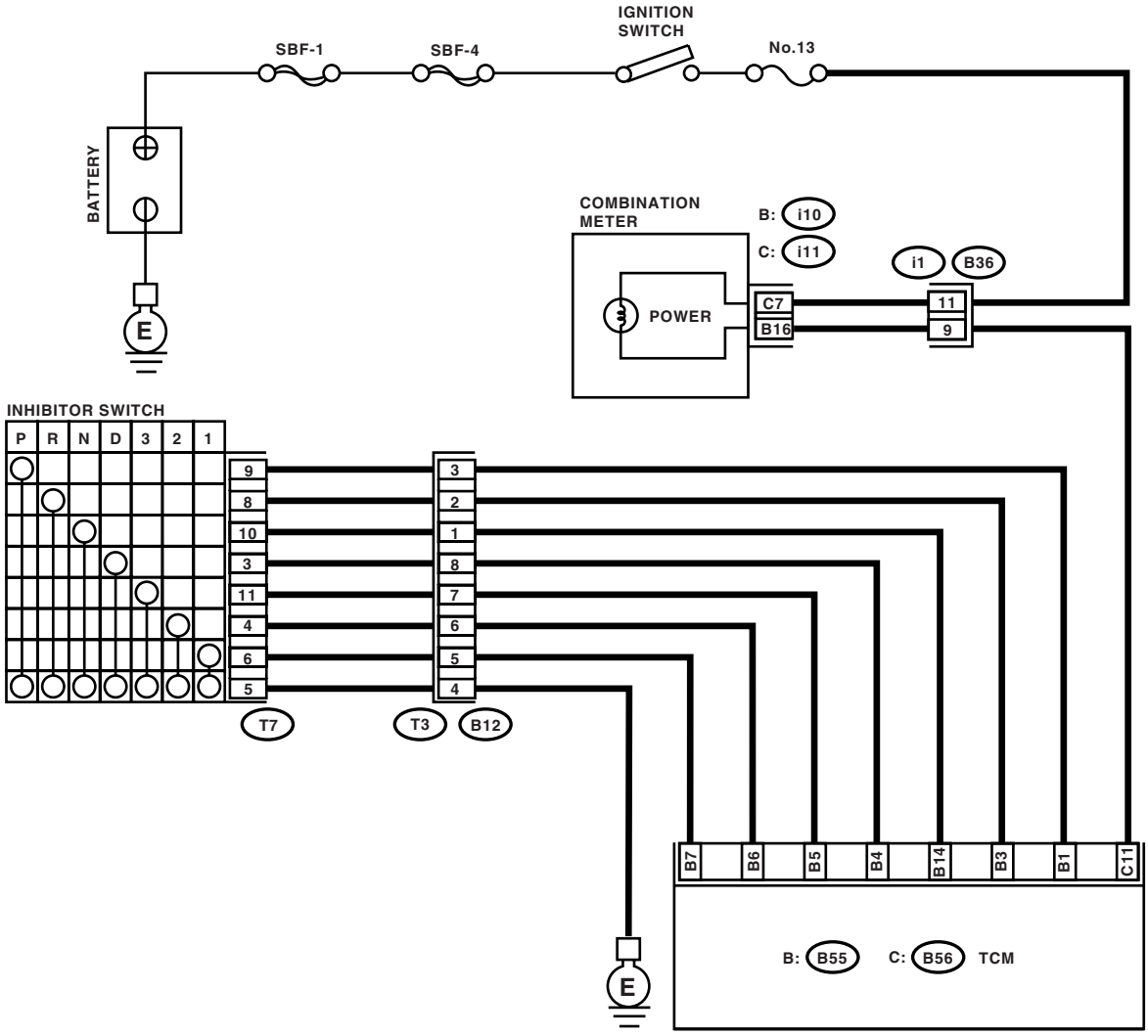
B: INSPECTION

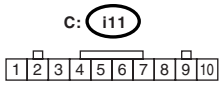
1. CHECK POWER INDICATOR LIGHT

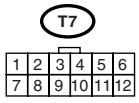
DIAGNOSIS:
The POWER Indicator light circuit is open or shorted.
TROUBLE SYMPTOM:
- When the ignition switch is turned to ON (engine OFF), POWER indicator light does not illuminate.
- When the on-board diagnostics is performed, POWER indicator light remains illuminated.

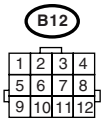
WIRING DIAGRAM:

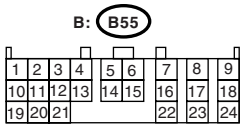
- LHD model

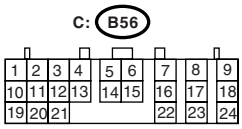


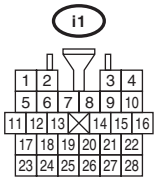


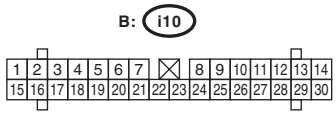












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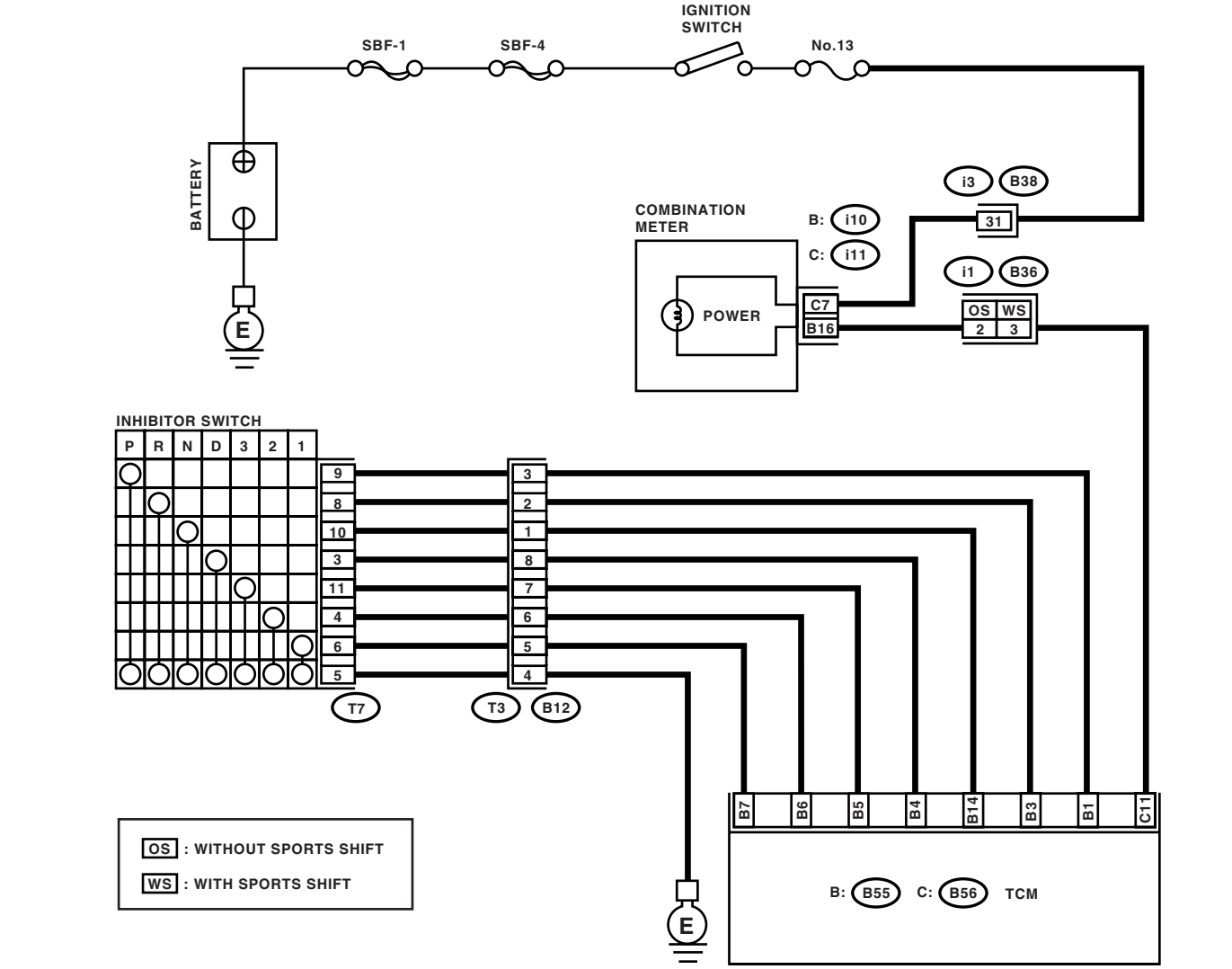
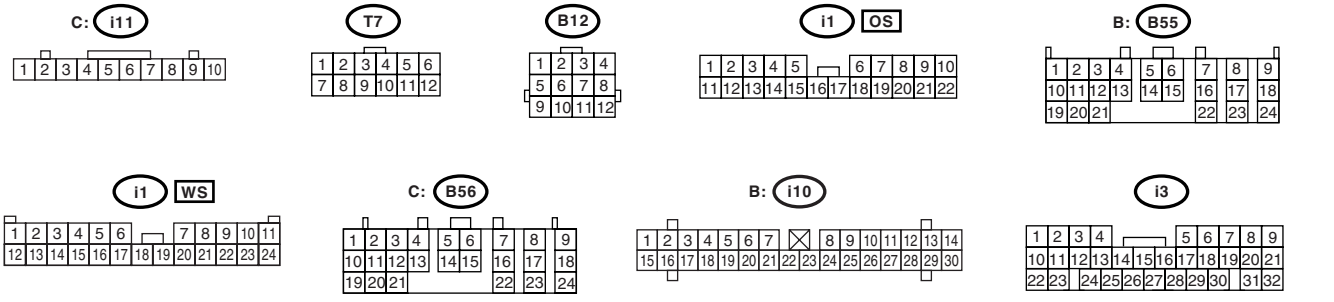
- RHD model





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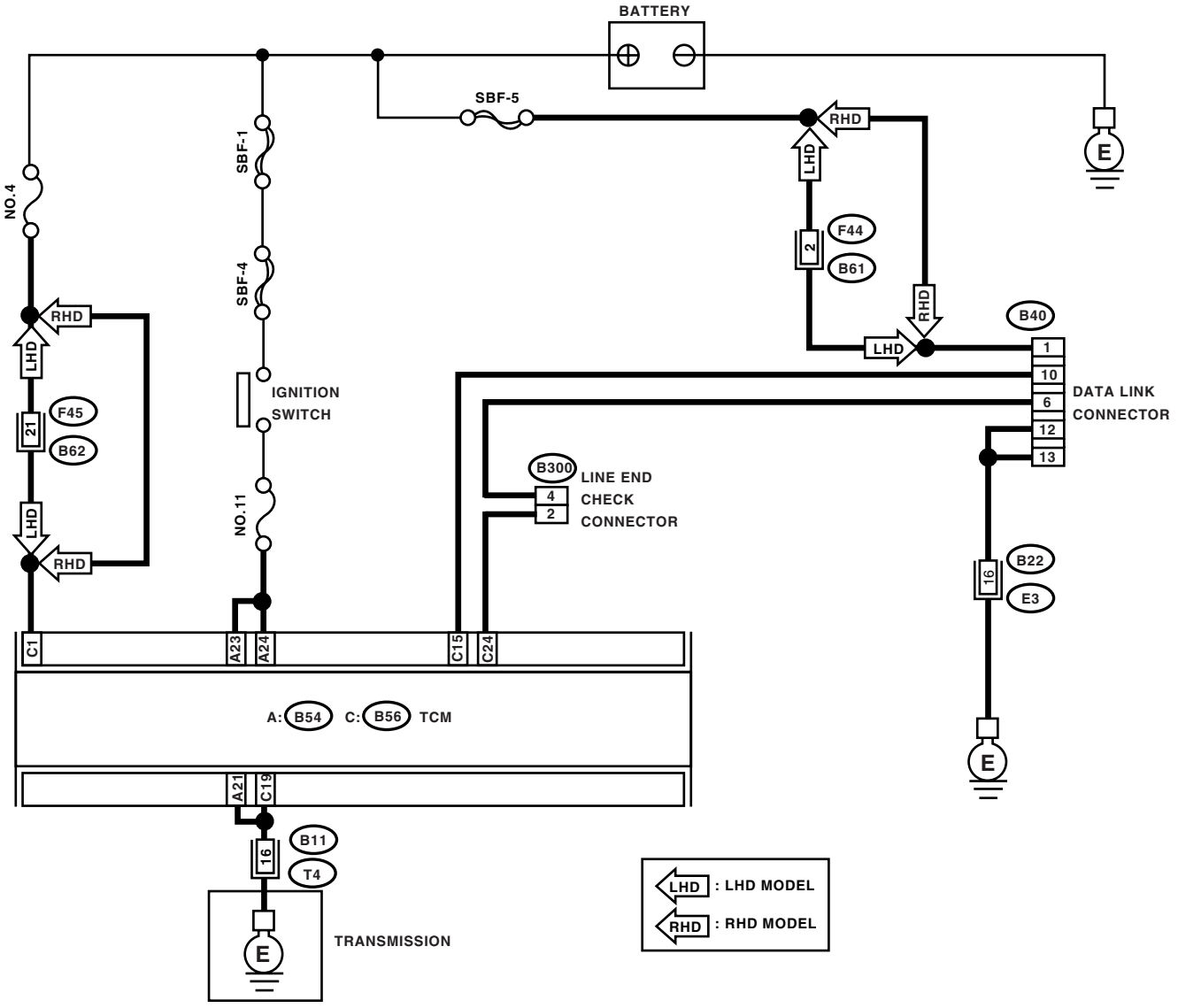
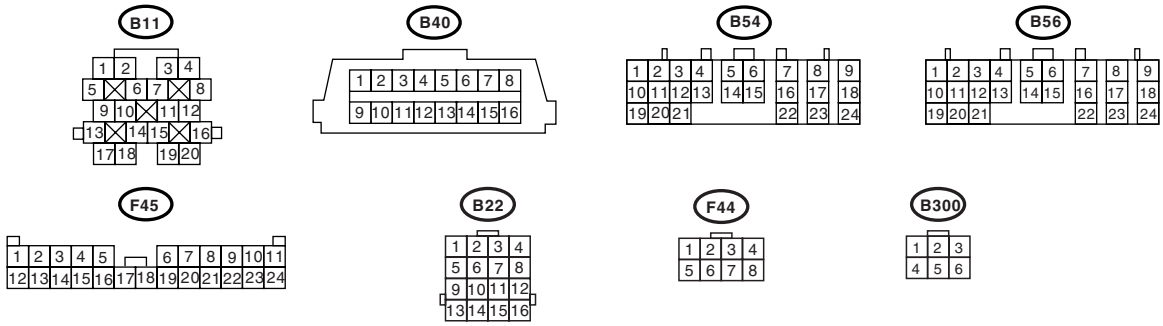
	Step	Check	Yes	No
1	**CHECK INDICATOR LIGHT.** Turn the ignition switch to ON (engine OFF).	Does the POWER indicator light illuminate?	Indicator light cirsuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair the combination meter harness or connector in TCM.	Go to step **2.**
2	**CHECK POWER INDICATOR LIGHT.** 1) Turn the ignition switch to OFF. 2) Remove the combination meter. 3) Remove the POWER indicator light bulb from combination meter.	Is the POWER indicator light bulb OK?	Go to step **3.**	Replace the POWER indicator light bulb.
3	**CHECK FUSE (No. 13).** Remove the fuse (No. 13).	Is the fuse (No. 13) blown out?	Replace the fuse (No. 13). If replaced fuse (No. 13) is blown out easily, repair short circuit in harness between fuse (No. 13) and combination meter.	Go to step **4.**
4	**CHECK HARNESS CONNECTOR BETWEEN COMBINATION METER AND IGNITION SWITCH.** 1) Turn the ignition switch to ON (engine OFF). 2) Measure the voltage between combination meter connector and chassis ground. ***Connector & terminal*** ***(i11) No. 7 (+) — Chassis ground (–):***	Is the voltage more than 9 V?	Go to step **5.**	Repair the open circuit in harness between combination meter and battery.
5	**CHECK COMBINATION METER.** Measure the voltage between combination meter connector and chassis ground. ***Connector & terminal*** ***(i10) No. 16 (+) — Chassis ground (–):***	Is the voltage less than 9 V?	Repair the combination meter. <Ref. to IDI-12, Combination Meter.>	Go to step **6.**
6	**CHECK OPEN CIRCUIT OF HARNESS.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from combination meter connector. 3) Measure the resistance of harness between combination meter and TCM. ***Connector & terminal*** ***(B56) No. 11 — (i10) No. 16:***	Is the resistance less than 1 Ω?	Go to step **7.**	Repair the open circuit in harness between TCM and combination meter, and poor contact in coupling connector.
7	**CHECK SHORT CIRCUIT OF HARNESS.** 1) Disconnect the connector from TCM. 2) Remove the combination meter. 3) Disconnect the connector from combination meter. 4) Measure the resistance of harness connector between TCM and chassis ground. ***Connector & terminal*** ***(B56) No. 11 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **8.**	Repair the short circuit in harness between combination meter connector and TCM connector.

	Step	Check	Yes	No
8	**CHECK INPUT SIGNAL FOR TCM.** 1) Connect the connector to TCM and combination meter. 2) Turn the ignition switch to ON (engine OFF). 3) Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B56) No. 11 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Even if the POWER indicator lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair the harness or connector in TCM.	Check the TCM power supply and ground line. <Ref. to 4AT(diag)-26, INSPECTION, Power Indicator Light Display.>

2. CHECK POWER SUPPLY AND GROUND LINE

WIRING DIAGRAM:





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	Step	Check	Yes	No
1	**CHECK BATTERY TERMINAL.** Turn the ignition switch to OFF.	Is there poor contact at battery terminal?	Repair or tighten the battery terminal.	Go to step **2.**
2	**CHECK POWER SUPPLY OF TCM.** 1) Disconnect the connector from TCM. 2) Turn the ignition switch to ON. 3) Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B56) No. 1 (+) — Chassis ground (−):***	Is the voltage 10 — 13 V?	Go to step **4.**	Go to step **3.**
3	**CHECK FUSE (No. 4).** Remove the fuse (No. 4).	Is the fuse (No. 4) blown out?	Replace the fuse (No. 4). If replaced fuse (No. 4) has blown out easily, repair short circuit in harness between fuse (No. 4) and TCM.	Repair the open circuit in harness between fuse (No. 4) and TCM, or fuse (No. 4) and battery, and poor contact in coupling connector.
4	**CHECK IGNITION POWER SUPPLY CIRCUIT.** 1) Turn the ignition switch to ON (engine OFF). 2) Measure the ignition power supply voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 23 (+) — Chassis ground (−):*** ***(B54) No. 24 (+) — Chassis ground (−):***	Is the voltage 10 — 13 V?	Go to step **6.**	Go to step **5.**
5	**CHECK FUSE (No. 11).** Remove the fuse (No. 11).	Is the fuse (No. 11) blown out?	Replace the fuse (No. 11). If replaced fuse (No. 11) has blown out easily, repair short circuit in harness between fuse (No. 11) and TCM.	Repair the open circuit in harness between fuse (No. 11) and TCM, or fuse (No. 11) and battery, and poor contact in coupling connector.
6	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM and transmission. 3) Measure the resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B56) No. 19 — (B11) No. 16:*** ***(B54) No. 21 — (B11) No. 16:***	Is the resistance less than 1 Ω?	Go to step **7.**	Repair the open circuit in harness between TCM, transmission harness connector, and poor contact in coupling connector.
7	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND TRANSMISSION GROUND.** Measure the resistance of harness between transmission and transmission ground. ***Connector & terminal*** ***(T4) No. 16 — Transmission ground:***	Is the resistance less than 1 Ω?	Go to step **8.**	Repair the open circuit in harness between transmission and transmission ground.
8	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in control module power supply and ground line?	Repair the connector.	Replace the TCM. <Ref. to 4AT-75, Transmission Control Module (TCM).>

11.Diagnostic Procedure for Subaru Select Monitor Communication

A: COMMUNICATION FOR INITIALIZING IMPOSSIBLE

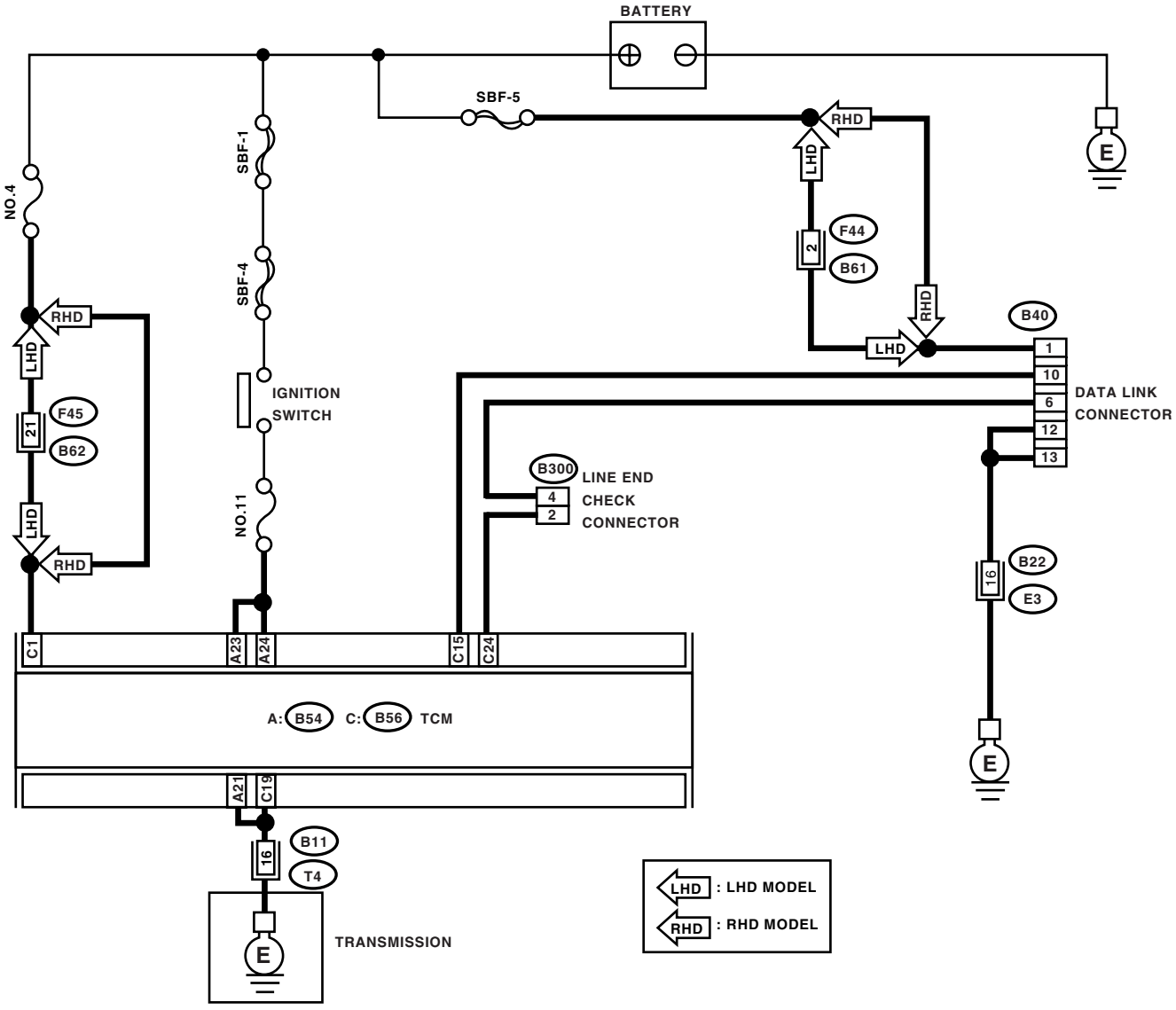
DIAGNOSIS:

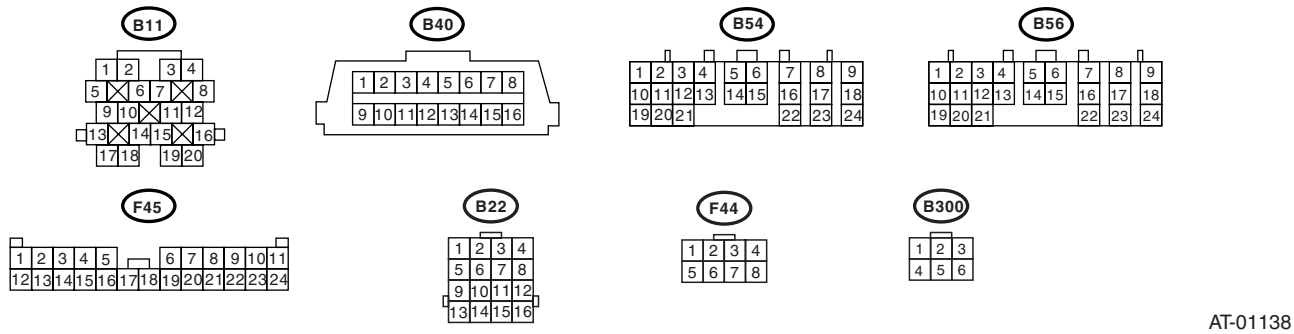
Faulty harness connector

TROUBLE SYMPTOM:

Subaru select monitor communication failure

WIRING DIAGRAM:





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	Step	Check	Yes	No
1	**CHECK INSTALLATION OF TCM CONNECTOR.** Turn the ignition switch to OFF.	Is the TCM connector inserted into TCM?	Go to step **2.**	Insert the TCM connector into TCM.
2	**CHECK SUBARU SELECT MONITOR POWER SUPPLY CIRCUIT.** Measure the voltage between data link connector and chassis ground. ***Connector & terminal*** ***(B40) No. 1 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **3.**	Repair the harness and connector between battery and data link connector, and poor contact in coupling connector.
3	**CHECK SUBARU SELECT MONITOR GROUND CIRCUIT.** Measure the resistance of harness between data link connector and chassis ground. ***Connector & terminal*** ***(B40) No. 12 — Chassis ground:*** ***(B40) No. 13 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the open circuit in harness between data link connector and ground terminal, and poor contact in coupling connector.
4	**CHECK COMMUNICATION OF SUBARU SELECT MONITOR.** 1) Turn the ignition switch to ON. 2) Using the Subaru Select Monitor, check whether communication to engine systems can be executed normally.	Are the name of system displayed on Subaru Select Monitor?	Go to step **9.**	Go to step **5.**
5	**CHECK COMMUNICATION OF SUBARU SELECT MONITOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the TCM connector. 3) Check whether communication to engine systems can be executed normally.	Are the name of system displayed on Subaru Select Monitor?	Go to step **7.**	Go to step **6.**
6	**CHECK COMMUNICATION OF SUBARU SELECT MONITOR.** 1) Turn the ignition switch to OFF. 2) Connect the TCM connector. 3) Disconnect the ECM connector. 4) Check whether communication to transmission systems can be executed normally.	Are the name of system displayed on Subaru Select Monitor?	Inspect the ECM.	Go to step **7.**
7	**CHECK HARNESS CONNECTOR BETWEEN EACH CONTROL MODULE AND DATA LINK CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the TCM and ECM connectors. 3) Measure the resistance between data link connector and chassis ground. ***Connector & terminal*** ***(B40) No. 10 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **8.**	Repair the harness and connector between each control module and data link connector.
8	**CHECK OUTPUT SIGNAL FOR TCM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between TCM and chassis ground. ***Connector & terminal*** ***(B40) No. 10 (+) — Chassis ground (−):***	Is the voltage more than 1 V?	Repair the harness between each control module and data link connector.	Go to step **9.**
9	**CHECK HARNESS/CONNECTOR BETWEEN TCM AND DATA LINK CONNECTOR.** Measure the resistance between TCM connector and data link connector. ***Connector & terminal*** ***(B56) No. 15 — (B40) No. 10:***	Is the resistance less than 0.5 Ω?	Go to step **10.**	Repair the harness and connector between TCM and data link connector.

Step		Check	Yes	No
10	CHECK POOR CONTACT IN CONNECTORS.	Is there poor contact in control module and data link connector?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-75, Transmission Control Module (TCM).>

12.List of Diagnostic Trouble Code (DTC)

A: LIST

DTC	Item	Content of diagnosis	Index
11	Engine speed signal	Detects open or shorted input signal circuit.	<Ref. to 4AT(diag)-38, DTC 11 ENGINE SPEED SIGNAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
23	Mass air flow signal (Turbo model)	Detects open or shorted input signal circuit.	<Ref. to 4AT(diag)-40, DTC 23 MASS AIR FLOW SIGNAL (TURBO MODEL), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
27	ATF temperature sensor	Detects open or shorted input signal circuit.	<Ref. to 4AT(diag)-42, DTC 27 ATF TEMPERATURE SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
31	Throttle position sensor	Detects open or shorted input signal circuit.	<Ref. to 4AT(diag)-45, DTC 31 THROTTLE POSITION SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
33	Front vehicle speed sensor	Detects open or shorted input signal circuit.	<Ref. to 4AT(diag)-49, DTC 33 FRONT VEHICLE SPEED SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
36	Torque converter turbine speed sensor	Detects open or shorted input signal circuit.	<Ref. to 4AT(diag)-53, DTC 36 TORQUE CONVERTER TURBINE SPEED SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
38	Torque control signal	Detects open or shorted input signal circuit.	<Ref. to 4AT(diag)-55, DTC 38 TORQUE CONTROL SIGNAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
45	Intake manifold pressure signal (Non-turbo model)	Detects open or shorted input signal circuit.	<Ref. to 4AT(diag)-57, DTC 45 INTAKE MANIFOLD PRESSURE SIGNAL (NON-TURBO MODEL), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
71	Shift solenoid 1	Detects open or shorted output signal circuit.	<Ref. to 4AT(diag)-59, DTC 71 SHIFT SOLENOID 1, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
72	Shift solenoid 2	Detects open or shorted output signal circuit.	<Ref. to 4AT(diag)-62, DTC 72 SHIFT SOLENOID 2, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
73	Low clutch timing solenoid	Detects open or shorted output signal circuit.	<Ref. to 4AT(diag)-65, DTC 73 LOW CLUTCH TIMING SOLENOID, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
74	2-4 brake timing solenoid	Detects open or shorted output signal circuit.	<Ref. to 4AT(diag)-68, DTC 74 2-4 BRAKE TIMING SOLENOID, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
75	Line pressure duty solenoid	Detects open or shorted output signal circuit.	<Ref. to 4AT(diag)-71, DTC 75 LINE PRESSURE DUTY SOLENOID, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
76	2-4 brake duty solenoid	Detects open or shorted output signal circuit.	<Ref. to 4AT(diag)-74, DTC 76 2-4 BRAKE DUTY SOLENOID, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
77	Lock-up duty solenoid	Detects open or shorted output signal circuit.	<Ref. to 4AT(diag)-77, DTC 77 LOCK-UP DUTY SOLENOID, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
78	SPORT shift solenoid	Detects open or shorted output signal circuit.	<Ref. to 4AT(diag)-80, DTC 78 SPORT SHIFT SOLENOID, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
79	Transfer duty solenoid	Detects open or shorted output signal circuit.	<Ref. to 4AT(diag)-83, DTC 79 TRANSFER DUTY SOLENOID, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC	Item	Content of diagnosis	Index
93	Rear vehicle speed sensor	Detects open or shorted input signal circuit.	<Ref. to 4AT(diag)-86, DTC 93 REAR VEHICLE SPEED SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

13.Diagnostic Procedure with Diagnostic Trouble Code (DTC)

A: DTC 11 ENGINE SPEED SIGNAL

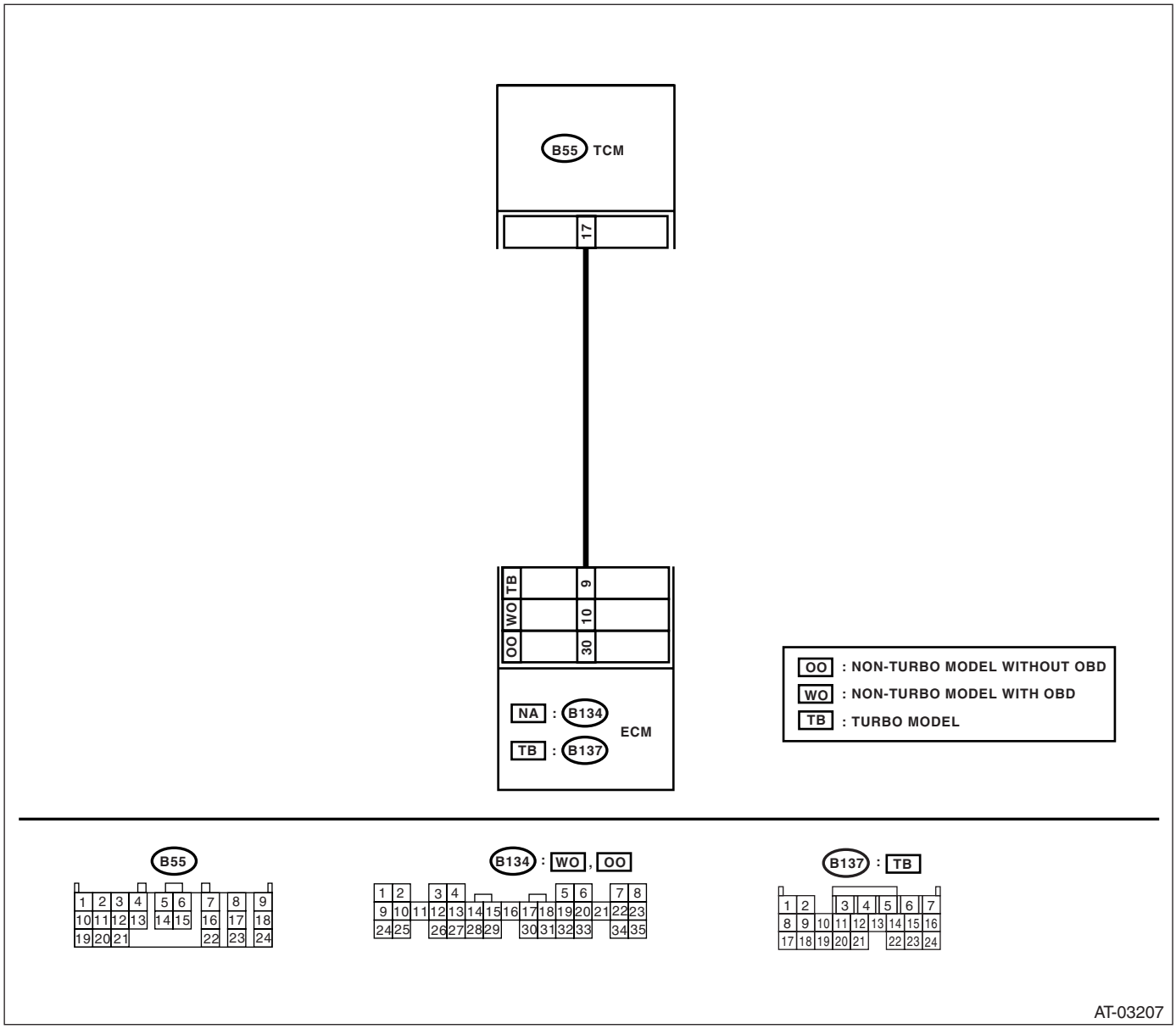
DIAGNOSIS:

The engine speed input signal circuit is open or shorted.

TROUBLE SYMPTOM:

- No lock-up (after engine warm-up).
- The POWER indicator light remains on when vehicle speed is “0”.

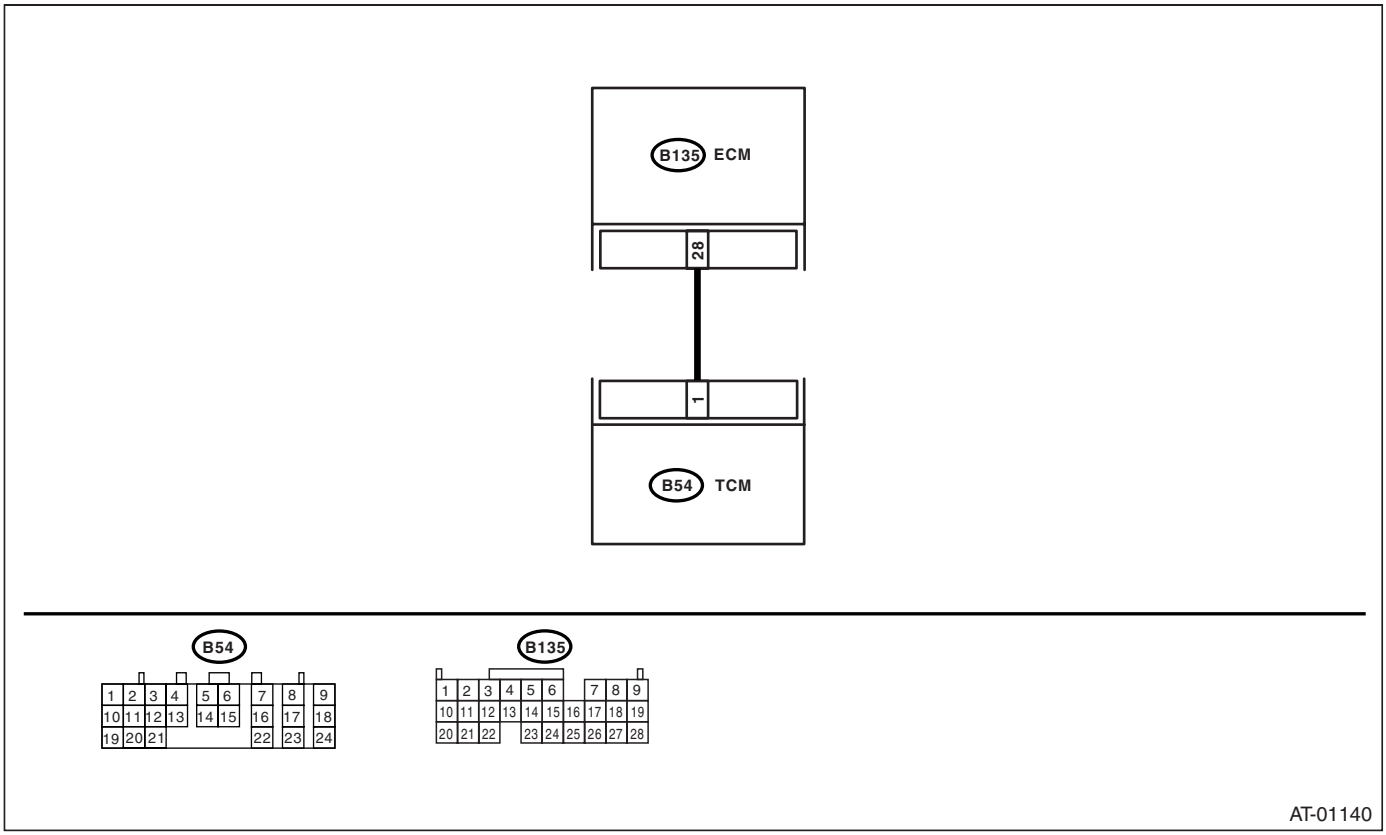
WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and ECM. 3) Measure the resistance of harness between TCM and ECM connector. ***Connector & terminal*** ***NON-TURBO MODEL WITHOUT OBD (B55) No. 17 — (B134) No. 30:*** ***NON-TURBO MODEL WITH OBD (B55) No. 17 — (B134) No. 10:*** ***TURBO MODEL (B55) No. 17 — (B137) No. 9:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the open circuit in harness between TCM and ECM connector.
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.** Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B55) No. 17 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **3.**	Repair the short circuit in harness between TCM and ECM connector.
3	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** 1) Connect the connectors to TCM and ECM. 2) Connect the Subaru Select Monitor to data link connector. 3) Start the engine and turn Subaru Select Monitor power switch to ON. 4) Idle the engine. 5) Read the data of engine speed using Subaru Select Monitor. • Display shows the engine speed signal value sent from ECM.	Is the revolution value same as tachometer reading shown on combination meter?	Even if the POWER indicator blinks, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair the harness or connector in TCM and ECM.	Go to step **4.**
4	**CHECK POOR CONTACT.**	Is there poor contact in engine speed signal circuit?	Repair the poor contact.	Go to step **5.**
5	**CONFIRM DTC 11.**	Replace the ECM with a new one. Does the DTC appear again, after memory has been cleared?	Replace the TCM. <Ref. to 4AT-75, Transmission Control Module (TCM).>	Replace the ECM.

B: DTC 23 MASS AIR FLOW SIGNAL (TURBO MODEL)

DIAGNOSIS:
The input signal circuit of TCM from ECM is open or shorted.
TROUBLE SYMPTOM:
Excessive shift shock.
WIRING DIAGRAM:

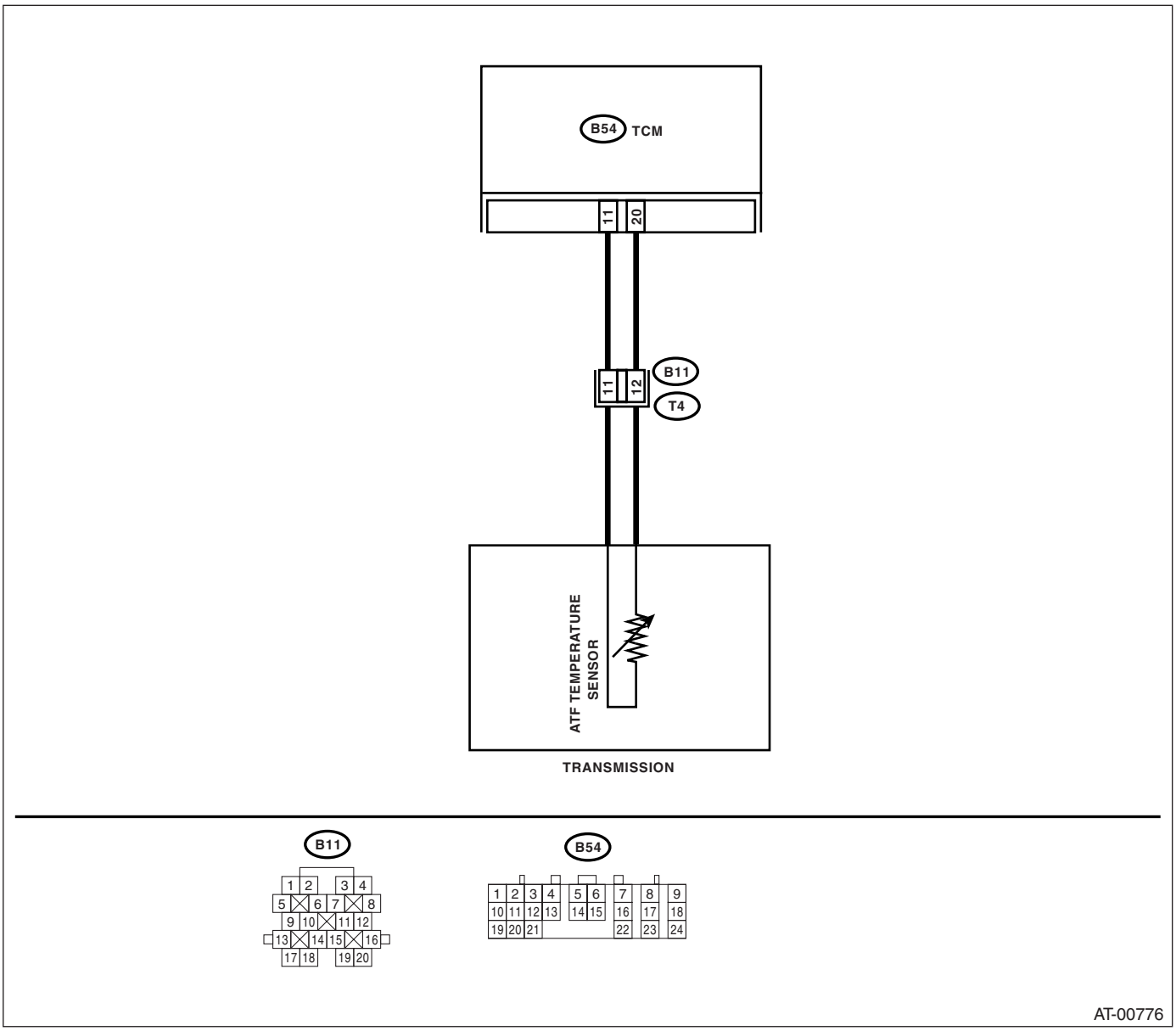


	Step	Check	Yes	No
1	**CHECK ENGINE GROUND TERMINALS AND GROUND CIRCUIT OF ECM.** <Ref. to 4AT(diag)-45, DTC 31 THROTTLE POSITION SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Is there any trouble?	Repair the ground terminal and/or ground circuit of ECM.	Go to step **2.**
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and ECM. 3) Measure the resistance of harness between TCM and ECM connector. ***Connector & terminal*** ***(B54) No. 1 — (B135) No. 28:***	Is the resistance less than 1 Ω?	Go to step **3.**	Repair the open circuit in harness between TCM and ECM connector.
3	**CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.** Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 1 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **4.**	Repair the short circuit in harness between TCM and ECM connector.

	Step	Check	Yes	No
4	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** 1) Connect the connectors to TCM and ECM. 2) Connect the Subaru Select Monitor to data link connector. 3) Start the engine and turn the Subaru Select Monitor power switch to ON. 4) Warm-up the engine until engine coolant temperature is above 80°C (176°F). 5) Idle the engine. 6) Read the data of mass air flow sensor signal using Subaru Select Monitor. • Display shows the mass air flow sensor signal value sent from ECM.	Is the value voltage 0.9 — 1.4 V?	Even if the POWER indicator blinks, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the TCM and ECM.	Go to step **5.**
5	**CHECK POOR CONTACT.**	Is there poor contact in intake manifold pressure signal circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-75, Transmission Control Module (TCM).>

C: DTC 27 ATF TEMPERATURE SENSOR

DIAGNOSIS:
The input signal circuit of TCM to ATF temperature sensor is open or shorted.
TROUBLE SYMPTOM:
Excessive shift shock.
WIRING DIAGRAM:



Step		Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND ATF TEMPERATURE SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission and TCM. 3) Measure the resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B54) No. 20 — (B11) No. 12:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the open circuit in harness between TCM and transmission connector.

	Step	Check	Yes	No
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND ATF TEMPERATURE SENSOR.** Measure the resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B54) No. 11 — (B11) No. 11:***	Is the resistance less than 1 Ω?	Go to step **3.**	Repair the open circuit in harness between TCM and transmission connector.
3	**CHECK HARNESS CONNECTOR BETWEEN TCM AND ATF TEMPERATURE SENSOR.** Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 20 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **4.**	Repair the short circuit in harness between TCM and transmission connector.
4	**CHECK HARNESS CONNECTOR BETWEEN TCM AND ATF TEMPERATURE SENSOR.** Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 11 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **5.**	Repair the short circuit in harness between TCM and transmission connector.
5	**CHECK ATF TEMPERATURE SENSOR.** 1) Turn the ignition switch to OFF. 2) Connect the connectors to transmission and TCM. 3) Turn the ignition switch to ON and start engine. 4) Warm-up the transmission until ATF temperature reaches to 80°C (176°F). NOTE: If ambient temperature is below 0°C (32°F), drive the vehicle until ATF reaches its operating temperature. 5) Disconnect the connector from transmission. 6) Measure the resistance between transmission connector terminals. ***Connector & terminal*** ***(T4) No. 11 — No. 12:***	Is the resistance 300 — 800 Ω?	Go to step **6.**	Replace the ATF temperature sensor. <Ref. to 4AT-69, Shift Solenoids, Duty Solenoids and ATF Temperature Sensor.>
6	**CHECK ATF TEMPERATURE SENSOR.** 1) Turn the ignition switch to ON (engine OFF). 2) Measure the resistance between transmission connector terminals. ***Connector & terminal*** ***(T4) No. 11 — No. 12:***	Does the resistance value increase while ATF temperature decreases?	Go to step **7.**	Replace the ATF temperature sensor. <Ref. to 4AT-69, Shift Solenoids, Duty Solenoids and ATF Temperature Sensor.>
7	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** 1) Connect the connector to transmission. 2) Turn the ignition switch to ON (engine OFF). 3) Using the Subaru Select Monitor, read the data of ATF temperature.	Does the ATF temperature gradually decrease?	Even if the POWER indicator blinks, the circuit has returned to a normal condition at this time. Temporary poor contact of the connector or harness may be the cause. Repair the harness or contact in ATF temperature sensor and transmission connector.	Go to step **8.**

Step		Check	Yes	No
8	CHECK POOR CONTACT.	Is there poor contact in ATF temperature sensor circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-75, Transmission Control Module (TCM).>

D: DTC 31 THROTTLE POSITION SENSOR

DIAGNOSIS:

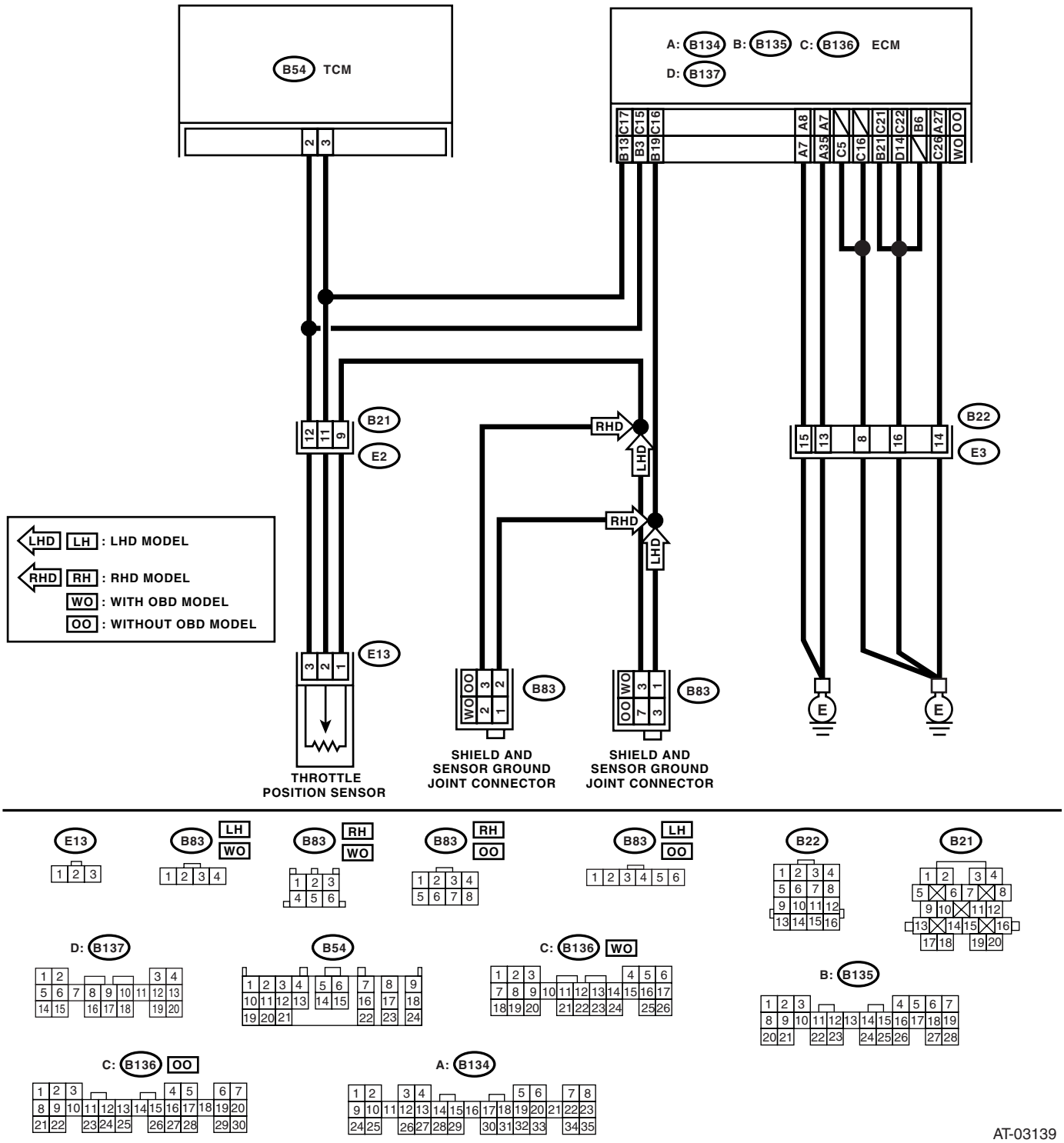
The input signal circuit of throttle position sensor is open or shorted.

TROUBLE SYMPTOM:

- Shift point too high or too low.
- Excessive shift shock.
- Excessive tight corner “braking”.

WIRING DIAGRAM:

- Non-turbo model



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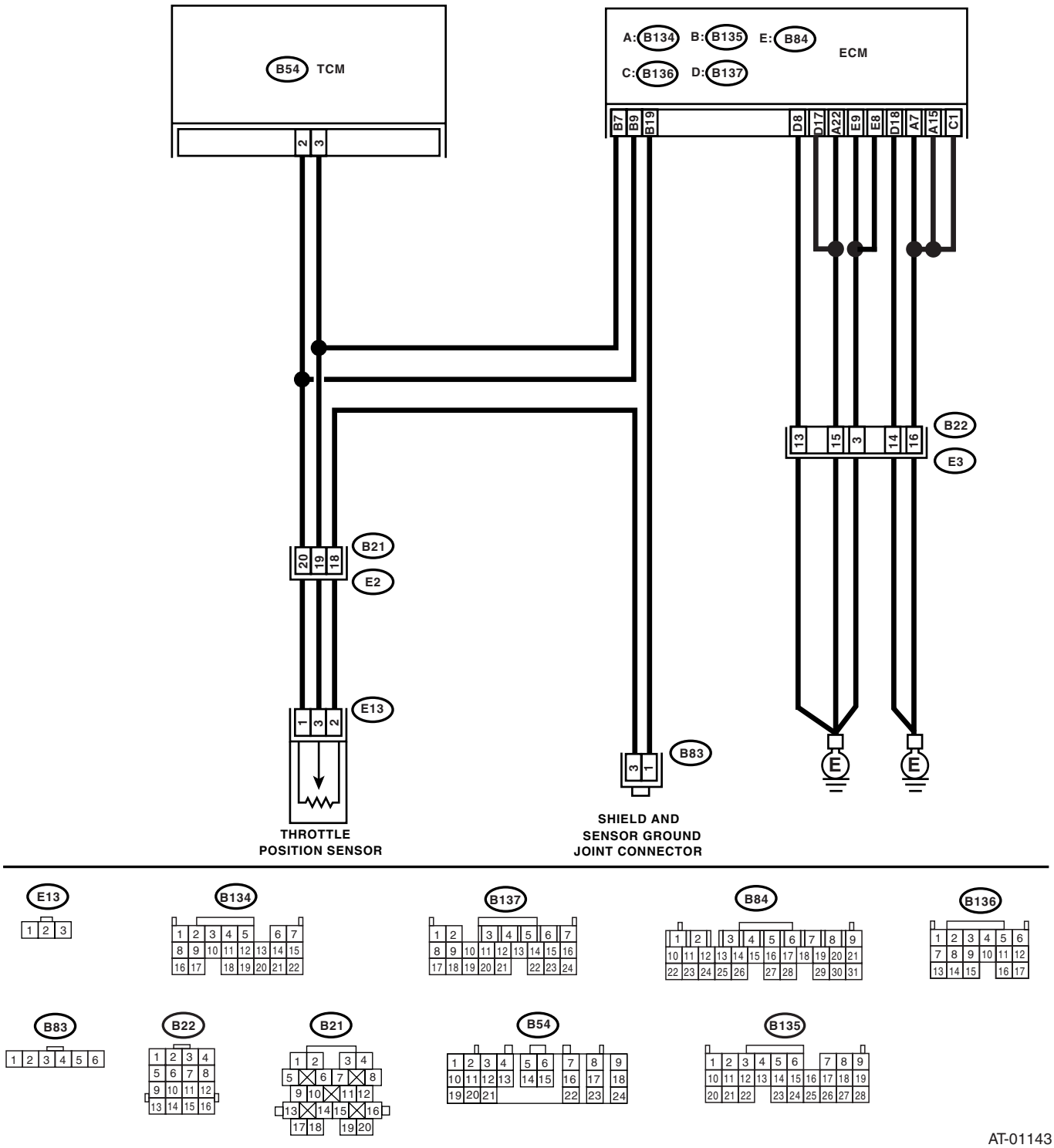
- Turbo model


B54 TCM
2
3
A: B134
B: B135
E: B84
C: B136
D: B137
ECM
B7
B9
B19
D8
D17
A22
E9
E8
D18
A7
A15
C1
B22
13
15
3
14
16
E3
B21
20
19
18
E2
E13
1
3
2
B83
3
1
E
E
THROTTLE POSITION SENSOR
SHIELD AND SENSOR GROUND JOINT CONNECTOR
E13
B134
B137
B84
B136
B83
B22
B21
B54
B135
AT-01143

	Step	Check	Yes	No
1	**CHECK ENGINE GROUND TERMINALS.**	Have engine ground terminals been tightened?	Go to step **2.**	Tighten the engine ground terminals.
2	**CHECK GROUND CIRCUIT OF ECM.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance of harness between ECM and engine ground. ***Connector & terminal*** ***NON-TURBO MODEL WITH OBD*** ***(B134) No. 7 — Engine ground:*** ***(B134) No. 35 — Engine ground:*** ***(B135) No. 21 — Engine ground:*** ***(B136) No. 5 — Engine ground:*** ***(B135) No. 19 — Engine ground:*** ***(B136) No. 26 — Engine ground:*** ***(B137) No. 14 — Engine ground:*** ***NON-TURBO MODEL WITHOUT OBD*** ***(B134) No. 27 — Engine ground:*** ***(B134) No. 8 — Engine ground:*** ***(B134) No. 7 — Engine ground:*** ***(B136) No. 21 — Engine ground:*** ***(B136) No. 22 — Engine ground:*** ***(B135) No. 6 — Engine ground: (RHD MODEL)*** ***TURBO MODEL*** ***(B134) No. 7 — Engine ground:*** ***(B134) No. 15 — Engine ground:*** ***(B134) No. 22 — Engine ground:*** ***(B137) No. 8 — Engine ground:*** ***(B137) No. 17 — Engine ground:*** ***(B137) No. 18 — Engine ground:*** ***(B84) No. 8 — Engine ground:*** ***(B84) No. 9 — Engine ground:*** ***(B136) No. 1 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **3.**	Repair the open circuit in harness between ECM connector and engine grounding terminal.
3	**CHECK THROTTLE POSITION SENSOR.** 1) Disconnect the connector from throttle position sensor. 2) Measure the resistance between throttle position sensor connector receptacle's terminals. ***Terminals*** ***NON-TURBO MODEL*** ***No. 1 — No. 3:*** ***TURBO MODEL*** ***No. 1 — No. 2:***	Is the resistance 3.0 — 4.2 kΩ?	Go to step **4.**	Replace the throttle position sensor.
4	**CHECK THROTTLE POSITION SENSOR.** Measure the resistance between throttle position sensor connector receptacle's terminals. ***Terminals*** ***NON-TURBO MODEL*** ***No. 1 — No. 2:*** ***TURBO MODEL*** ***No. 2 — No. 3:***	Is the resistance 0.35 — 0.5 kΩ?	Go to step **5.**	Replace the throttle position sensor.

	Step	Check	Yes	No
5	**CHECK HARNESS CONNECTOR BETWEEN TCM AND THROTTLE POSITION SENSOR.** 1) Disconnect the connector from TCM. 2) Measure the resistance of harness between TCM and throttle position sensor connector. ***Connector & terminal*** ***NON-TURBO MODEL*** ***(B54) No. 3 — (E13) No. 2:*** ***TURBO MODEL*** ***(B54) No. 3 — (E13) No. 3:***	Is the resistance less than 1 Ω?	Go to step **6.**	Repair the open circuit in harness between TCM and throttle position sensor connector, and poor contact in coupling connector.
6	**CHECK HARNESS CONNECTOR BETWEEN TCM AND THROTTLE POSITION SENSOR.** Measure the resistance of harness between TCM and throttle position sensor connector. ***Connector & terminal*** ***NON-TURBO MODEL*** ***(B54) No. 2 — (E13) No. 3:*** ***TURBO MODEL*** ***(B54) No. 2 — (E13) No. 1:***	Is the resistance less than 1 Ω?	Go to step **7.**	Repair the open circuit in harness between TCM and throttle position sensor connector, and poor contact in coupling connector.
7	**CHECK HARNESS CONNECTOR BETWEEN TCM AND THROTTLE POSITION SENSOR.** Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 3 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **8.**	Repair the short circuit in harness between TCM and throttle position sensor connector.
8	**CHECK HARNESS CONNECTOR BETWEEN TCM AND THROTTLE POSITION SENSOR.** Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 2 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **9.**	Repair the short circuit in harness between TCM and throttle position sensor connector.
9	**CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.** Measure the resistance of harness between TCM and ECM connector. ***Connector & terminal*** ***NON-TURBO MODEL WITHOUT OBD*** ***(B54) No. 3 — (B136) No. 17:*** ***NON-TURBO MODEL WITH OBD*** ***(B54) No. 3 — (B135) No. 13:*** ***TURBO MODEL*** ***(B54) No. 3 — (B135) No. 7:***	Is the resistance less than 1 Ω?	Go to step **10.**	Repair the open circuit in harness between TCM and ECM connector.
10	**CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.** Measure the resistance of harness between TCM and ECM connector. ***Connector & terminal*** ***NON-TURBO MODEL WITHOUT OBD*** ***(B54) No. 2 — (B136) No. 15:*** ***NON-TURBO MODEL WITH OBD*** ***(B54) No. 2 — (B135) No. 3:*** ***TURBO MODEL*** ***(B54) No. 2 — (B135) No. 9:***	Is the resistance less than 1 Ω?	Go to step **11.**	Repair the open circuit in harness between TCM and ECM connector.

	Step	Check	Yes	No
11	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** 1) Connect the connectors to TCM, throttle position sensor and ECM. 2) Connect the Subaru Select Monitor to data link connector. 3) Turn the ignition switch to ON (engine OFF). 4) Turn the Subaru Select Monitor power switch to ON. 5) Throttle fully closed. 6) Read the data of throttle position sensor using Subaru Select Monitor. • Throttle position sensor input signal is indicated.	Is the value voltage 0.2 — 1.0 V?	Go to step **12.**	Go to step **14.**
12	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** Throttle fully open. NOTE: Must be changed correspondingly with the accelerator pedal operation (from “released” to “depressed” position).	Is the value voltage 4.2 — 4.7 V?	Go to step **13.**	Go to step **14.**
13	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR (THROTTLE POSITION SENSOR POWER SUPPLY).** Read the data of throttle position sensor power supply using Subaru Select Monitor. • Throttle position sensor power supply voltage is indicated.	Is the value voltage 4.8 — 5.3 V?	Even if the POWER indicator blinks, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair the harness or connector in throttle position sensor circuit.	Go to step **14.**
14	**CHECK POOR CONTACT.**	Is there poor contact in throttle position sensor circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-75, Transmission Control Module (TCM).>

E: DTC 33 FRONT VEHICLE SPEED SENSOR

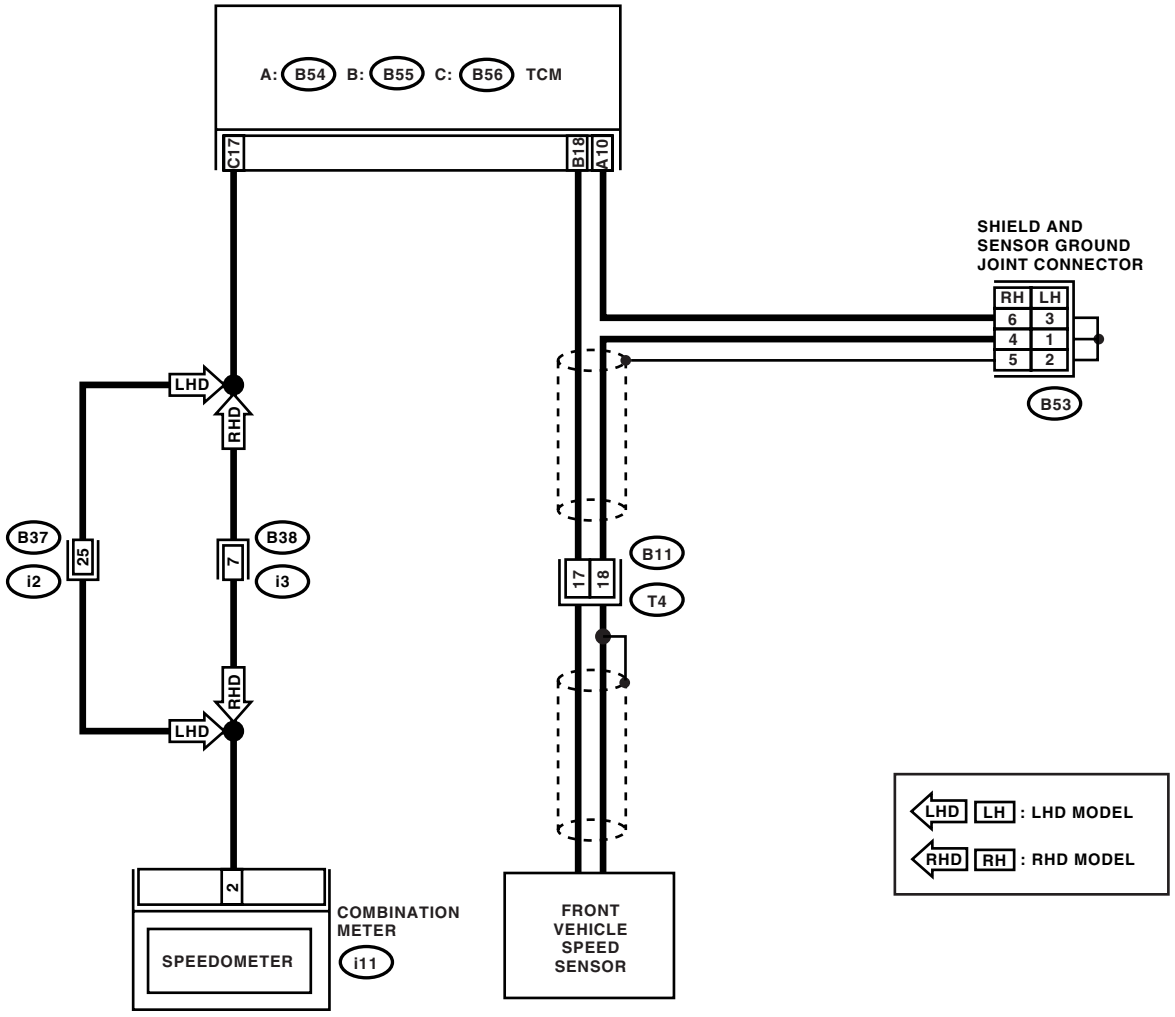
DIAGNOSIS:

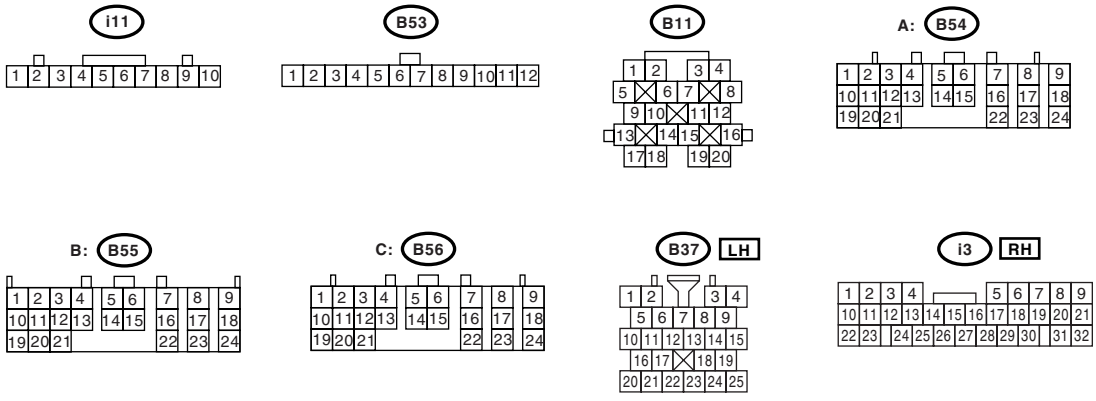
- The vehicle speed signal is abnormal.
- The circuit in combination meter is faulty.
- The harness connector between TCM and vehicle speed sensor is in short or open.

TROUBLE SYMPTOM:

- Erroneous idling.
- Engine stalls.
- Poor driving performance.

WIRING DIAGRAM:





AT-03140

	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM and transmission. 3) Measure the resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B55) No. 18 — (B11) No. 17:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the open circuit in harness between TCM and transmission connector.
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure the resistance of harness between TCM and chassis ground. ***Connector & terminal*** ***(B54) No. 10 — (B11) No. 18:***	Is the resistance less than 1 Ω?	Go to step **3.**	Repair the open circuit in harness between TCM and transmission connector, and poor contact in coupling connector.
3	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure the resistance of harness between TCM and chassis ground. ***Connector & terminal*** ***(B54) No. 10 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **4.**	Repair the short circuit in harness between TCM and transmission connector.
4	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure the resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B55) No. 18 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **5.**	Repair the short circuit in harness between TCM and transmission connector, and poor contact in coupling connector.
5	**CHECK FRONT VEHICLE SPEED SENSOR.** Measure the resistance between transmission connector receptacle's terminals. ***Connector & terminal*** ***(T4) No. 17 — No. 18:***	Is the resistance 450 — 650 Ω?	Go to step **6.**	Replace the front vehicle speed sensor. <Ref. to 4AT-57, Front Vehicle Speed Sensor.>

	Step	Check	Yes	No
6	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** 1) Connect all connectors. 2) Connect the Subaru Select Monitor to data link connector. 3) Lift-up or raise the vehicle and place rigid rack. NOTE: On AWD models, raise all wheels off floor. 4) Turn the ignition switch to ON and turn Subaru Select Monitor power switch to ON. 5) Start the engine. 6) Read the data of vehicle speed using Subaru Select Monitor. • Compare the speedometer with Subaru Select Monitor indications. • Vehicle speed is indicated in “km/h” or “MPH”. 7) Slowly increase the vehicle speed to 60 km/h or 37 MPH. NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS(diag)-27, Clear Memory Mode.>	Does the speedometer indication increase as Subaru Select Monitor data increases?	Even if the POWER indicator blinks, the circuit has returned to a normal condition at this time. A temporary poor connector or harness may be the cause. Repair the harness or connector in front vehicle speed sensor circuit.	Go to step **7.**
7	**CHECK POOR CONTACT.**	Is there poor contact in front vehicle speed sensor circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-75, Transmission Control Module (TCM).>

F: DTC 36 TORQUE CONVERTER TURBINE SPEED SENSOR

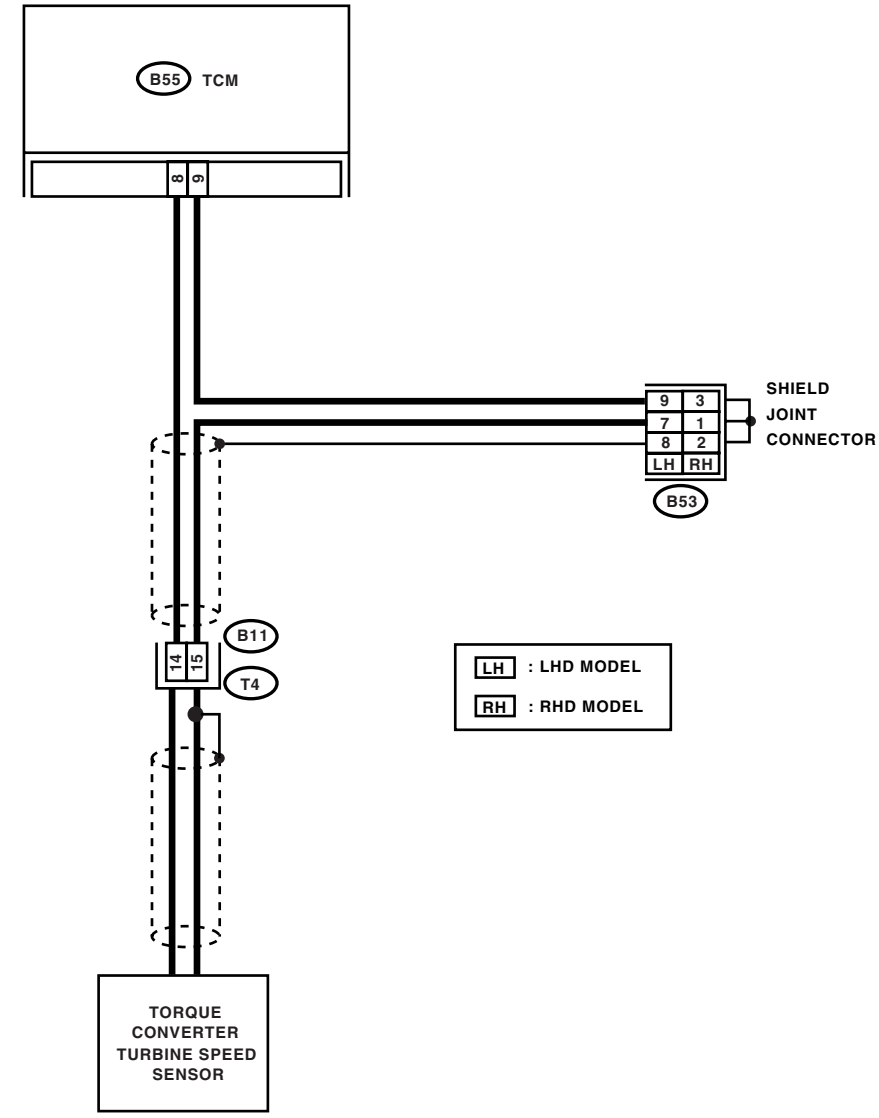
DIAGNOSIS:

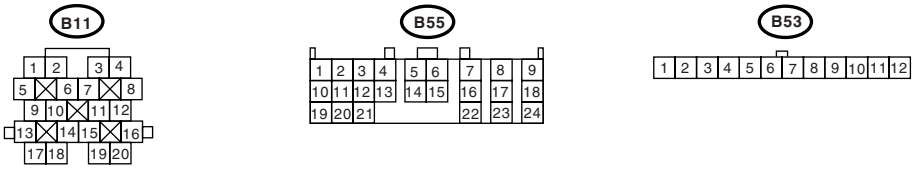
The input signal circuit of TCM is open or shorted.

TROUBLE SYMPTOM:

Excessive shift shock.

WIRING DIAGRAM:



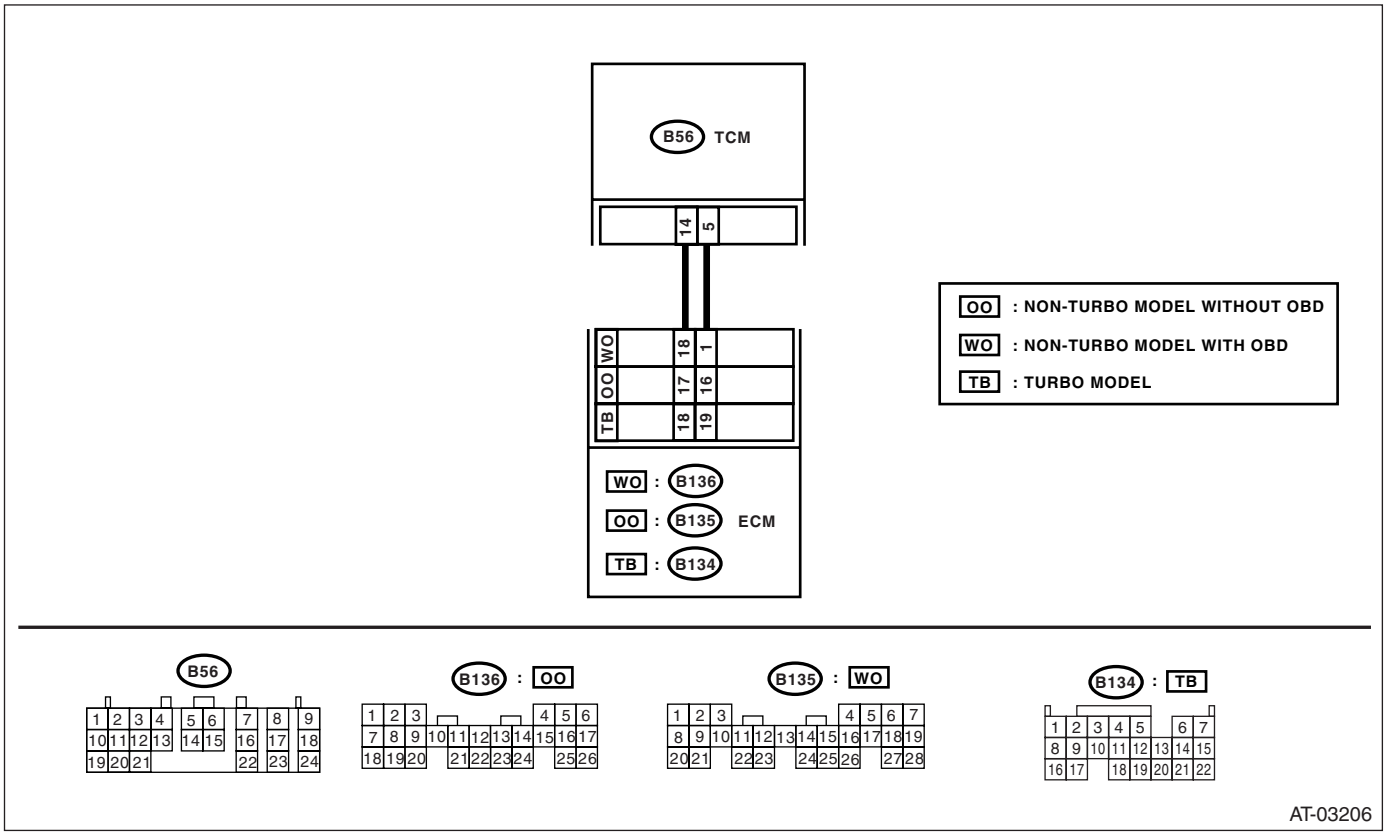


AT-01145

	Step	Check	Yes	No
1	**CHECK TORQUE CONVERTER TURBINE SPEED SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission. 3) Measure the resistance between transmission connector receptacle's terminals. ***Connector & terminal*** ***(T4) No. 14 — No. 15:***	Is the resistance 450 — 650 Ω?	Go to step **2.**	Replace the turbine speed sensor. <Ref. to 4AT-62, Torque Converter Turbine Speed Sensor.>
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Disconnect the connector from TCM. 2) Measure the resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B55) No. 8 — (B11) No. 14:***	Is the resistance less than 1 Ω?	Go to step **3.**	Repair the open circuit in harness between TCM and transmission connector.
3	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure the resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B55) No. 9 — (B11) No. 15:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the open circuit in harness between TCM and transmission connector, and poor contact in coupling connector.
4	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure the resistance of harness between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 9 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **5.**	Repair the short circuit in harness between TCM and transmission connector.
5	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure the resistance of harness between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 8 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **6.**	Repair the short circuit in harness between TCM and transmission connector, and poor contact in coupling connector.
6	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** 1) Connect the connectors to TCM and transmission. 2) Connect the Subaru Select Monitor to data link connector. 3) Turn the ignition switch to ON and turn Subaru Select Monitor power switch to ON. 4) Start the engine. 5) Move the select lever to "P" or "N" range. 6) Read the data of turbine speed using Subaru Select Monitor. • Compare the tachometer with Subaru Select Monitor indications.	Is the revolution value same as the tachometer reading shown on the combination meter?	Even if the POWER indicator blinks, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair the harness or connector in TCM and transmission.	Go to step **7.**
7	**CHECK POOR CONTACT.**	Is there poor contact in torque converter turbine speed sensor circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-75, Transmission Control Module (TCM).>

G: DTC 38 TORQUE CONTROL SIGNAL

DIAGNOSIS:
The signal circuit is open or shorted.
TROUBLE SYMPTOM:
Excessive shift shock.
WIRING DIAGRAM:

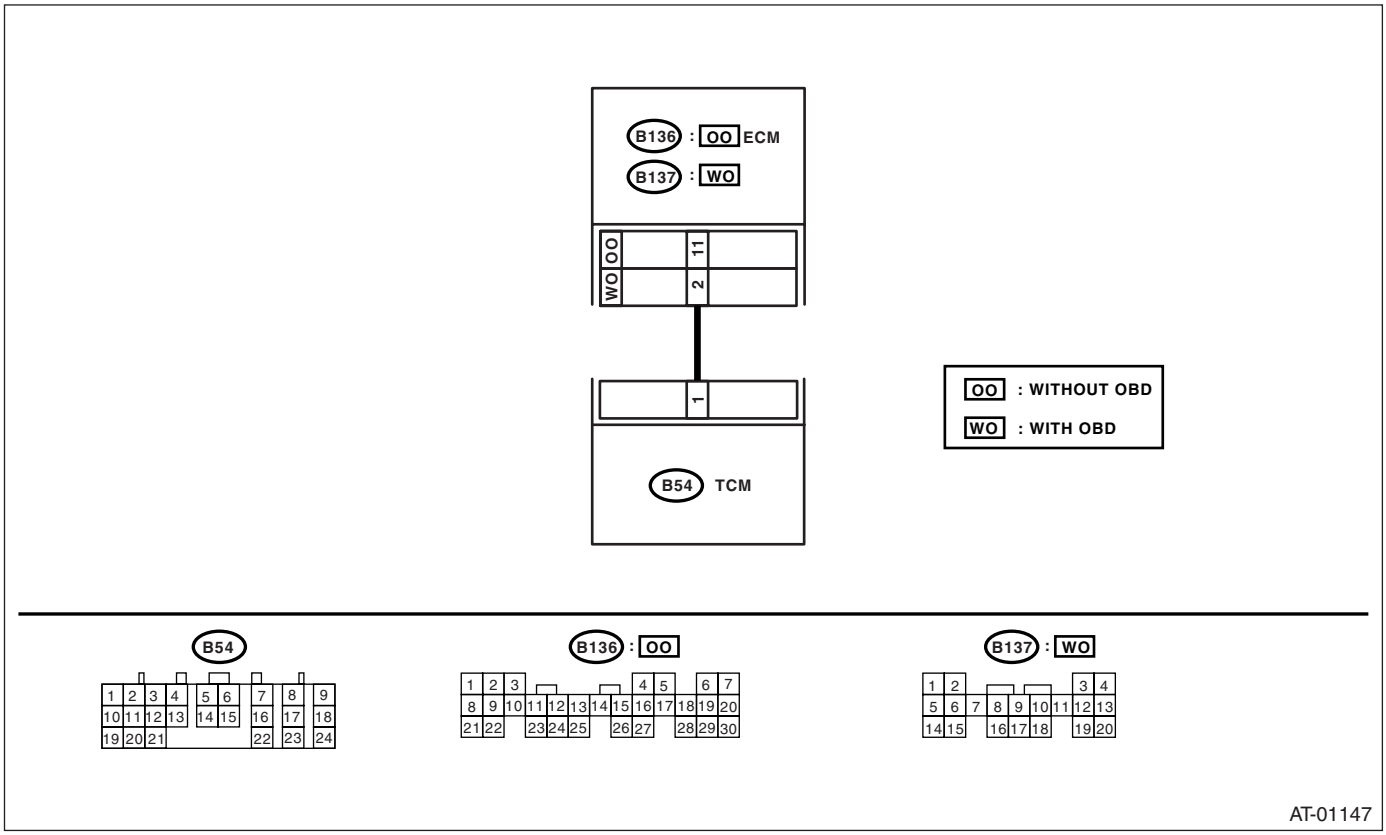


	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and ECM. 3) Measure the resistance of harness between TCM and ECM connector. ***Connector & terminal*** ***NON-TURBO MODEL WITH OBD*** ***(B56) No. 14 — (B136) No. 18:*** ***(B56) No. 5 — (B136) No. 1:*** ***NON-TURBO MODEL WITHOUT OBD*** ***(B56) No. 14 — (B135) No. 17:*** ***(B56) No. 5 — (B135) No. 16:*** ***TURBO MODEL*** ***(B56) No. 14 — (B134) No. 18:*** ***(B56) No. 5 — (B134) No. 19:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the open circuit in harness between TCM and ECM connector.
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.** Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B56) No. 14 — Chassis ground:*** ***(B56) No. 5 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **3.**	Repair the short circuit in harness between TCM and ECM connector.

	Step	Check	Yes	No
3	**CHECK OUTPUT SIGNAL EMITTED FROM TCM.** 1) Connect the connectors to TCM and ECM. 2) Turn the ignition switch to ON (engine OFF). 3) Measure the voltage between TCM connector terminals. ***Connector & terminal*** ***(B56) No. 14 (+) — Chassis ground (–):*** ***(B56) No. 5 (+) — Chassis ground (–):***	Is the voltage more than 4.8 V?	Even if the POWER indicator blinks, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair the harness or connector in TCM and ECM.	Go to step **4.**
4	**CHECK POOR CONTACT.**	Is there poor contact in torque control signal circuit?	Repair the poor contact.	Go to step **5.**
5	**CHECK GROUND LINE BETWEEN TRANSMISSION AND BODY.** Check installing condition of the ground line in transmission and body.	Is there any dirt or rust at the ground line installing point?	Remove dirt and rust.	Go to step **6.**
6	**CHECK GROUND LINE BETWEEN TRANSMISSION AND BODY.** Check installing condition of the ground line in transmission and body. ***Tightening torque:*** ***10 — 16 N·m (1.0 — 1.6 kgf-m, 7.2 — 11.6 ft-lb)***	Is the tightening torque value within specification?	Go to step **7.**	Tighten to the specified torque.
7	**CHECK GROUND LINE INSIDE TRANSMISSION.** 1) Drain the ATF and remove oil pan. 2) Check the tightening torque value of ground line installing bolt. ***Tightening torque:*** ***7 — 9 N·m (0.7 — 0.9 kgf-m, 5.1 — 6.5 ft-lb)***	Is the tightening torque value within specification?	Go to step **8.**	Tighten to the specified torque.
8	**CHECK GROUND CIRCUIT OF ECM.** <Ref. to 4AT(diag)-45, DTC 31 THROTTLE POSITION SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Is there any trouble?	Repair the ground terminal and/or ground circuit of ECM.	Go to step **9.**
9	**RECHECK OUTPUT SIGNAL EMITTED FROM TCM.** Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B56) No. 14 (+) — Chassis ground (–):*** ***(B56) No. 5 (+) — Chassis ground (–):***	Is each voltage more than 4 V?	Replace the TCM. <Ref. to 4AT-75, Transmission Control Module (TCM).>	Replace the ECM.

H: DTC 45 INTAKE MANIFOLD PRESSURE SIGNAL (NON-TURBO MODEL)

DIAGNOSIS:
The input signal circuit of TCM from ECM is open or shorted.
TROUBLE SYMPTOM:
Excessive shift shock.
WIRING DIAGRAM:

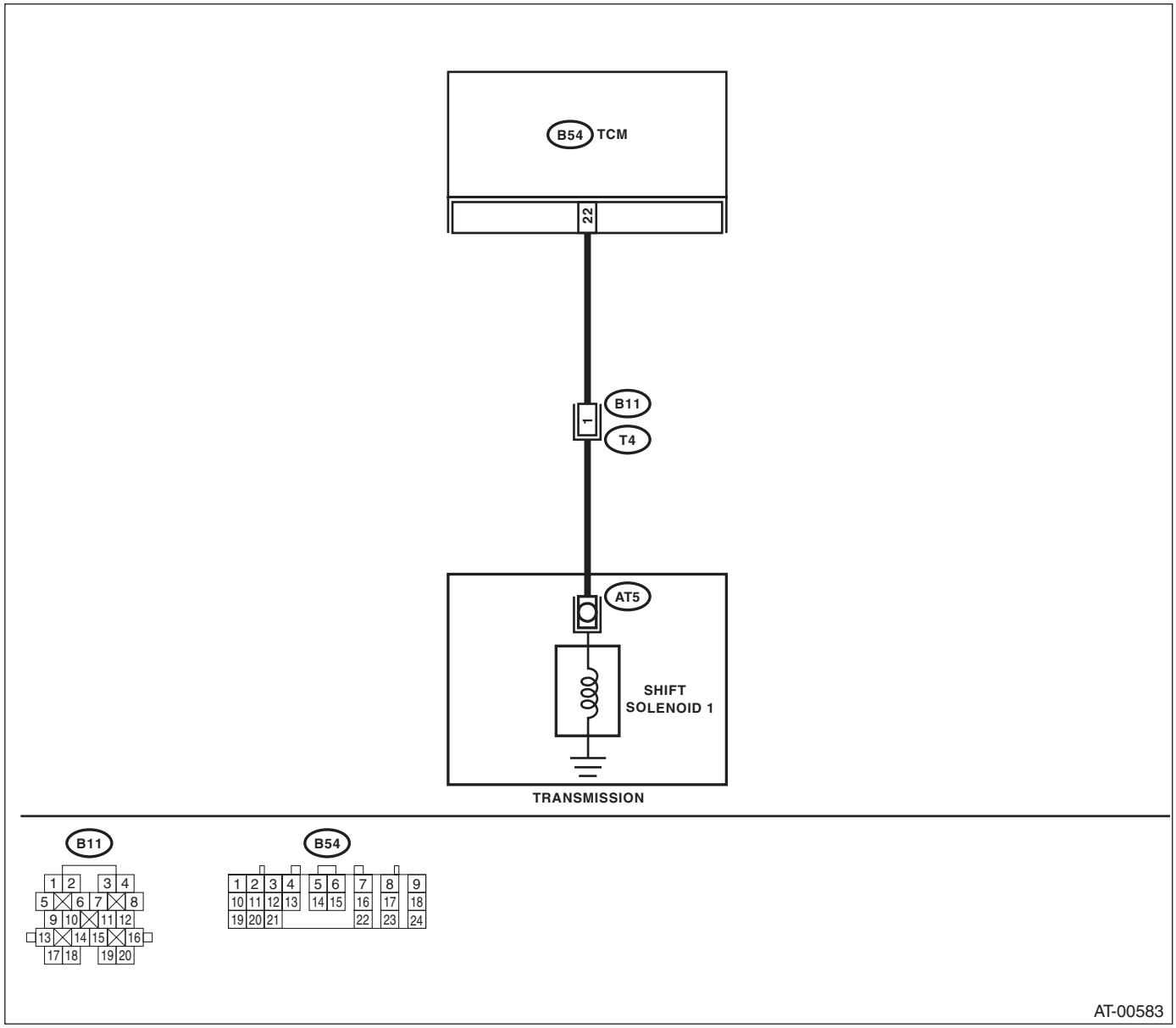


Step		Check	Yes	No
1	**CHECK ENGINE GROUND TERMINALS AND GROUND CIRCUIT OF ECM** <Ref. to 4AT(diag)-45, DTC 31 THROTTLE POSITION SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Is there any trouble?	Repair the ground terminal or ground circuit of ECM.	Go to step **2.**
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and ECM. 3) Measure the resistance of harness between TCM and ECM connector. ***Connector & terminal*** ***NON-TURBO WITHOUT OBD MODEL*** ***(B54) No. 1 — (B136) No. 11:*** ***NON-TURBO WITH OBD MODEL*** ***(B54) No. 1 — (B137) No. 2:***	Is the resistance less than 1 Ω?	Go to step **3.**	Repair the open circuit in harness between TCM and ECM connector.
3	**CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.** Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 1 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **4.**	Repair the short circuit in harness between TCM and ECM connector.

	Step	Check	Yes	No
4	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** 1) Connect the connectors to TCM and ECM. 2) Connect the Subaru Select Monitor to data link connector. 3) Start the engine, and turn Subaru Select Monitor power switch to ON. 4) Warm-up the engine until engine coolant temperature is above 80°C (176°F). 5) Idle the engine. 6) Read the data of intake manifold pressure signal using Subaru Select Monitor. • Display shows the intake manifold pressure signal value sent from ECM.	Is the value voltage 0.4 — 1.6 V?	Even if the POWER indicator blinks, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair the harness or connector in TCM and ECM.	Go to step **5.**
5	**CHECK POOR CONTACT.**	Is there poor contact in intake manifold pressure signal circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-75, Transmission Control Module (TCM).>

I: DTC 71 SHIFT SOLENOID 1

DIAGNOSIS:
The output signal circuit of shift solenoid 1 is open or shorted.
TROUBLE SYMPTOM:
Does not shift.
WIRING DIAGRAM:



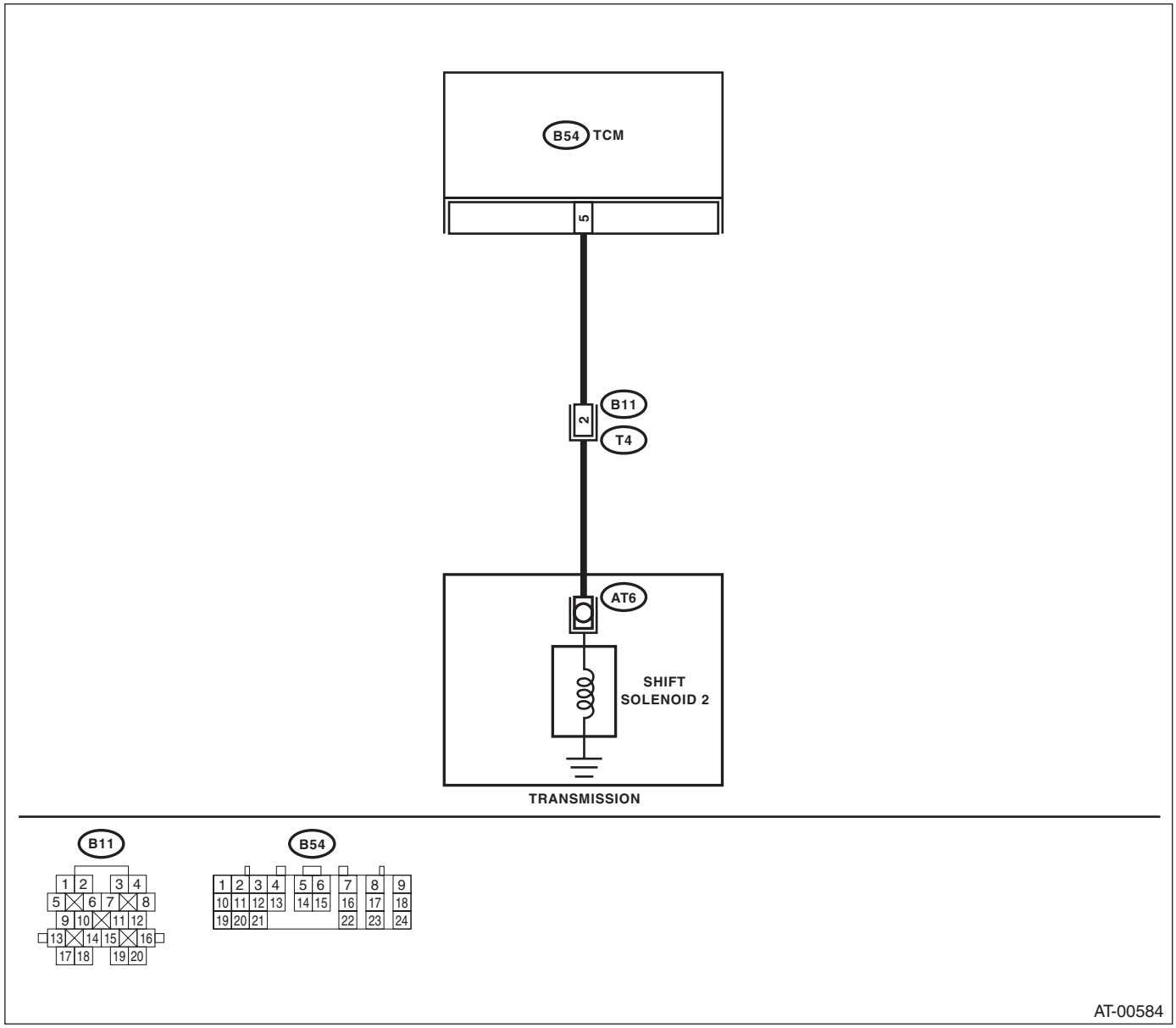
Step		Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM and transmission. 3) Measure the resistance of harness between TCM and shift solenoid 1 connector. ***Connector & terminal*** ***(B54) No. 22 — (B11) No. 1:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the open circuit in harness between TCM and transmission connector.

	Step	Check	Yes	No
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 22 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **3.**	Repair the short circuit in harness between TCM and transmission connector.
3	**CHECK SHIFT SOLENOID 1.** Measure the resistance between transmission connector terminals. ***Connector & terminal*** ***(T4) No. 1 — No. 16:***	Is the resistance 10 — 16 Ω?	Go to step **4.**	Go to step **7.**
4	**CHECK OUTPUT SIGNAL EMITTED FROM TCM.** 1) Connect the connectors to TCM and transmission. 2) Turn the ignition switch to ON (engine OFF). 3) Move the select lever to "D" range. 4) Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 22 (+) — Chassis ground (−):***	Is the voltage more than 9 V?	Go to step **5.**	Go to step **6.**
5	**CHECK OUTPUT SIGNAL EMITTED FROM TCM.** 1) Turn the HOLD mode switch to ON. 2) Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 22 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Even if the POWER indicator blinks, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair the harness or contact in TCM.	Go to step **6.**
6	**CHECK POOR CONTACT.**	Is there poor contact in shift solenoid 1 circuit?	Repair poor contact.	Replace the TCM. <Ref. to 4AT-75, Transmission Control Module (TCM).>
7	**CHECK SHIFT SOLENOID 1 (IN TRANSMISSION).** 1) Remove the transmission connector from bracket. 2) Lift-up or raise the vehicle and support with rigid rack. NOTE: On AWD models, raise all wheels off ground. 3) Drain the ATF. **CAUTION:** **Do not drain the ATF until it cools down.** 4) Remove the oil pan, and disconnect connector from shift solenoid 1. 5) Measure the resistance of shift solenoid 1. ***Terminals*** ***No. 1 — Transmission ground:***	Is the resistance 10 — 16 Ω?	Go to step **8.**	Replace the shift solenoid 1. <Ref. to 4AT-69, Shift Solenoids, Duty Solenoids and ATF Temperature Sensor.>

	Step	Check	Yes	No
8	**CHECK HARNESS CONNECTOR BETWEEN SHIFT SOLENOID 1 AND TRANSMISSION.** Measure the resistance of harness between shift solenoid 1 and transmission connector. ***Connector & terminal*** ***(T4) No. 1 — (AT5) No. 1:***	Is the resistance less than 1 Ω?	Go to step **9.**	Repair the open circuit in harness between shift solenoid 1 and transmission connector.
9	**CHECK HARNESS CONNECTOR BETWEEN SHIFT SOLENOID 1 AND TRANSMISSION.** Measure the resistance of harness between shift solenoid 1 connector and transmission ground. ***Connector & terminal*** ***(T4) No. 1 — Transmission ground:***	Is the resistance more than 1 MΩ?	Even if the POWER indicator blinks, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair the harness or connector in shift solenoid 1 and transmission.	Repair the short circuit harness between shift solenoid 1 and transmission connector.

J: DTC 72 SHIFT SOLENOID 2

DIAGNOSIS:
The output signal circuit of shift solenoid 2 is open or shorted.
TROUBLE SYMPTOM:
Does not shift.
WIRING DIAGRAM:



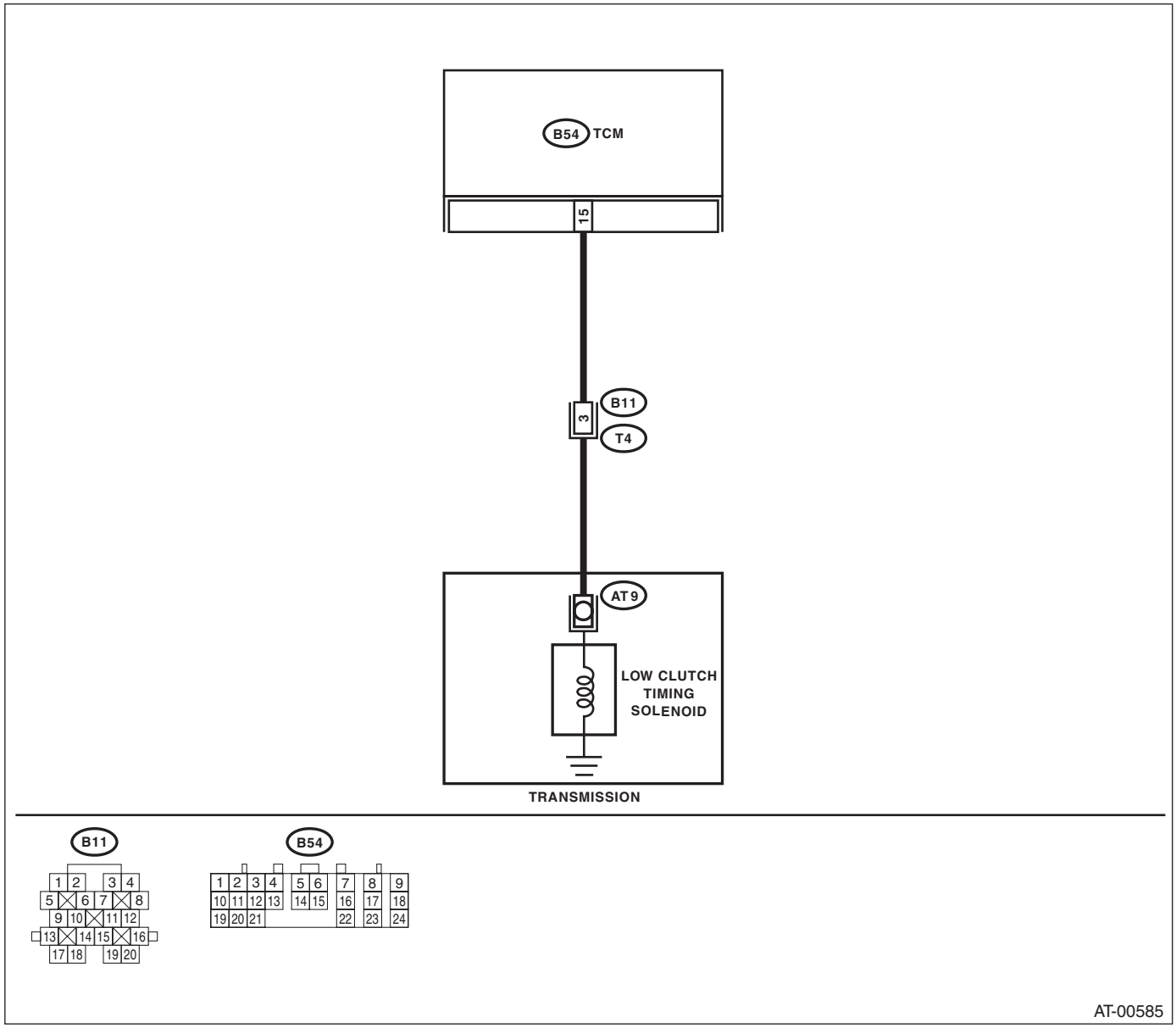
Step		Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM and transmission. 3) Measure the resistance of harness between TCM and shift solenoid 2 connector. ***Connector & terminal*** ***(B54) No. 5 — (B11) No. 2:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the open circuit in harness between TCM and transmission connector.

	Step	Check	Yes	No
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 5 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **3.**	Repair the short circuit in harness between TCM and transmission connector.
3	**CHECK SHIFT SOLENOID 2.** Measure the resistance between transmission connector terminals. ***Connector & terminal*** ***(T4) No. 2 — No. 16:***	Is the resistance 10 — 16 Ω?	Go to step **4.**	Go to step **6.**
4	**CHECK OUTPUT SIGNAL EMITTED FROM TCM.** 1) Connect the connectors to TCM and transmission. 2) Lift-up or raise the vehicle and support with rigid rack. NOTE: On AWD models, raise all wheels off ground. 3) Start the engine and warm-up the transmission until ATF temperature is above 80°C (176°F). NOTE: If ambient temperature is below 0°C (32°F), drive the vehicle until ATF reaches its operating temperature. 4) Move the selector lever to "D" range, and slowly increase vehicle speed to 50 km/h (31 MPH). NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS(diag)-27, Clear Memory Mode.> 5) Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 5 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Even if the POWER indicator blinks, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair the harness or connector in TCM and transmission.	Go to step **5.**
5	**CHECK POOR CONTACT.**	Is there poor contact in shift solenoid 2 circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-75, Transmission Control Module (TCM).>
6	**CHECK SHIFT SOLENOID 2 (IN TRANSMISSION).** 1) Remove the transmission connector from bracket. 2) Drain the ATF. **CAUTION:** **Do not drain the ATF until it cools down.** 3) Remove the oil pan, and disconnect connector from shift solenoid 2. 4) Measure the resistance of shift solenoid 2. ***Connector & terminal*** ***No. 1 — Transmission ground:***	Is the resistance 10 — 16 Ω?	Go to step **7.**	Replace the shift solenoid 2. <Ref. to 4AT-69, Shift Solenoids, Duty Solenoids and ATF Temperature Sensor.>

	Step	Check	Yes	No
7	**CHECK HARNESS CONNECTOR BETWEEN SHIFT SOLENOID 2 AND TRANSMISSION.** Measure the resistance of harness between shift solenoid 2 and transmission connector. ***Connector & terminal*** ***(AT6) No. 1 — (T4) No. 2:***	Is the resistance less than 1 Ω?	Go to step **8.**	Repair the open circuit in harness between shift solenoid 2 and transmission connector.
8	**CHECK HARNESS CONNECTOR BETWEEN SHIFT SOLENOID 2 AND TRANSMISSION.** Measure the resistance of harness between shift solenoid 2 connector and transmission ground. ***Connector & terminal*** ***(T4) No. 2 — Transmission ground:***	Is the resistance more than 1 MΩ?	Even if the POWER indicator blinks, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair the harness or connector in shift solenoid 2 and transmission.	Repair the short circuit harness between shift solenoid 2 and transmission connector.

K: DTC 73 LOW CLUTCH TIMING SOLENOID

DIAGNOSIS:
The output signal circuit of low clutch timing solenoid is open or shorted.
TROUBLE SYMPTOM:
Excessive shift shock.
WIRING DIAGRAM:



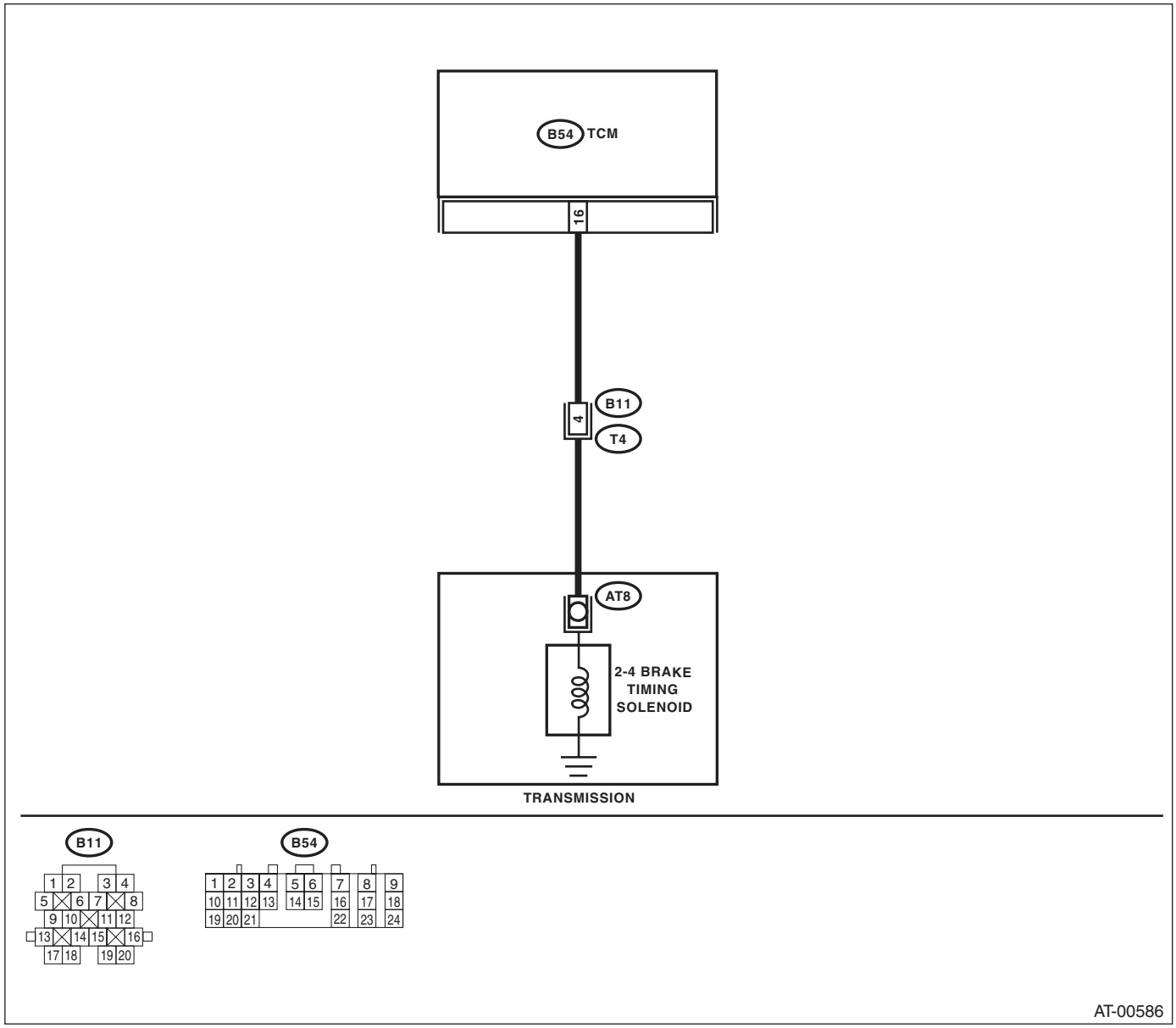
Step		Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM and transmission. 3) Measure the resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B54) No. 15 — (B11) No. 3:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the open circuit in harness between TCM and transmission connector.

	Step	Check	Yes	No
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure the resistance of harness between TCM connector and transmission ground. ***Connector & terminal*** ***(B54) No. 15 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **3.**	Repair the short circuit in harness between TCM and transmission connector.
3	**CHECK LOW CLUTCH TIMING SOLENOID.** Measure the resistance between transmission connector terminals. ***Connector & terminal*** ***(T4) No. 3 — No. 16:***	Is the resistance 10 — 16 Ω?	Go to step **4.**	Go to step **7.**
4	**CHECK OUTPUT SIGNAL EMITTED FROM TCM.** 1) Connect the connectors to TCM and transmission. 2) Turn the ignition switch to ON (engine OFF). 3) Move the select lever to "D" range. 4) Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 15 (+) — Chassis ground (−):***	Is the voltage more than 9 V?	Go to step **5.**	Go to step **6.**
5	**CHECK OUTPUT SIGNAL EMITTED FROM TCM.** 1) Turn the HOLD mode switch to ON. 2) Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 15 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Even if the POWER indicator light blinks, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair the harness or contact in TCM and transmission.	Go to step **6.**
6	**CHECK POOR CONTACT.**	Is there poor contact in low clutch timing solenoid circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-75, Transmission Control Module (TCM).>
7	**CHECK LOW CLUTCH TIMING SOLENOID (IN TRANSMISSION).** 1) Remove the transmission connector from bracket. 2) Lift-up or raise the vehicle and support with rigid rack. NOTE: On AWD models, raise all wheels off ground. 3) Drain the ATF. **CAUTION:** **Do not drain the ATF until it cools down.** 4) Remove the oil pan, and disconnect connector from low clutch timing solenoid. 5) Measure the resistance between low clutch timing solenoid connector and transmission ground. ***Terminals*** ***No. 1 — Transmission ground:***	Is the resistance 10 — 16 Ω?	Go to step **8.**	Replace the low clutch timing solenoid. <Ref. to 4AT-69, Shift Solenoids, Duty Solenoids and ATF Temperature Sensor.>

	Step	Check	Yes	No
8	**CHECK HARNESS CONNECTOR BETWEEN LOW CLUTCH TIMING SOLENOID AND TRANSMISSION.** Measure the resistance of harness between low clutch timing solenoid and transmission connector. ***Connector & terminal*** ***(AT9) No. 1 — (T4) No. 3:***	Is the resistance less than 1 Ω?	Go to step **9.**	Repair the open circuit in harness between low clutch timing solenoid and transmission connector.
9	**CHECK HARNESS CONNECTOR BETWEEN LOW CLUTCH TIMING SOLENOID AND TRANSMISSION.** Measure the resistance of harness between low clutch timing solenoid connector and transmission ground. ***Connector & terminal*** ***(T4) No. 3 — Transmission ground:***	Is the resistance more than 1 MΩ?	Even if the POWER indicator light blinks, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair the harness or connector in low clutch timing solenoid and transmission.	Repair the short circuit harness between low clutch timing solenoid and transmission connector.

L: DTC 74 2-4 BRAKE TIMING SOLENOID

DIAGNOSIS:
The output signal circuit of 2-4 brake timing solenoid is open or shorted.
TROUBLE SYMPTOM:
Excessive shift shock.
WIRING DIAGRAM:



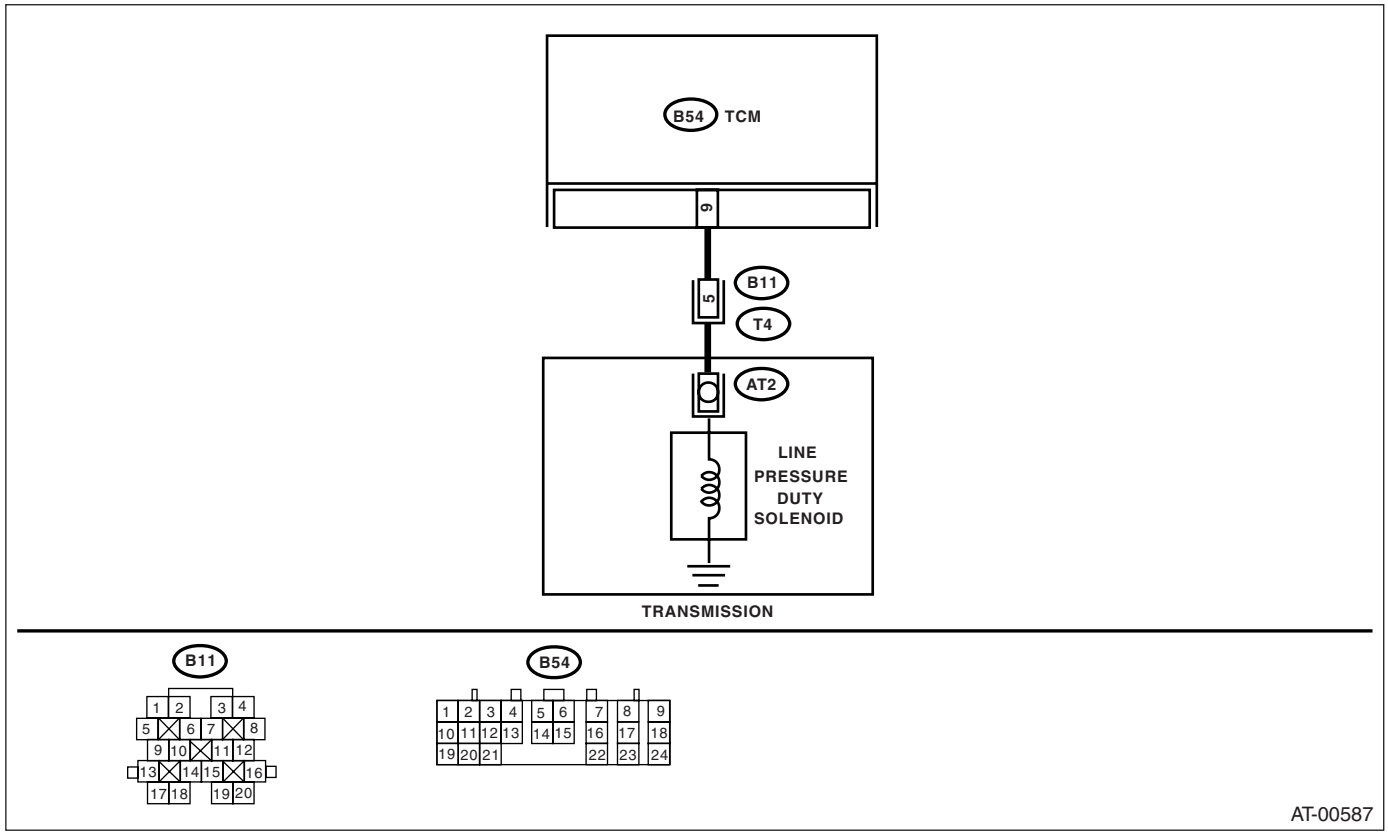
Step		Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM and transmission. 3) Measure the resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B54) No. 16 — (B11) No. 4:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the open circuit in harness between TCM and transmission connector.

	Step	Check	Yes	No
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure the resistance of harness between TCM connector and transmission ground. ***Connector & terminal*** ***(B54) No. 16 — Transmission ground:***	Is the resistance more than 1 MΩ?	Go to step **3.**	Repair the short circuit in harness between TCM and transmission connector.
3	**CHECK 2-4 BRAKE TIMING SOLENOID.** Measure the resistance between transmission connector terminals. ***Connector & terminal*** ***(T4) No. 4 — No. 16:***	Is the resistance 10 — 16 Ω?	Go to step **4.**	Go to step **7.**
4	**CHECK OUTPUT SIGNAL EMITTED FROM TCM.** 1) Connect the connectors to TCM and transmission. 2) Lift-up or raise the vehicle and support with rigid rack. NOTE: On AWD models, raise all wheels off ground. 3) Start the engine and warm-up the transmission until ATF temperature is above 80°C (176°F). NOTE: If ambient temperature is below 0°C (32°F), drive the vehicle until ATF reaches its operating temperature. 4) Move the selector lever to "1" range, and slowly increase vehicle speed to 10 km/h (6 MPH). NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS(diag)-27, Clear Memory Mode.> 5) Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 16 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **5.**	Go to step **6.**
5	**CHECK OUTPUT SIGNAL EMITTED FROM TCM.** 1) Move the selector lever to "D" range, and slowly increase vehicle speed to 65 km/h (40 MPH). NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS(diag)-27, Clear Memory Mode.> 2) Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 16 (+) — Chassis ground (−):***	Is the voltage more than 9 V?	Even if the POWER indicator light blinks, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair the harness or contact in transmission.	Go to step **6.**

	Step	Check	Yes	No
6	**CHECK POOR CONTACT.**	Is there poor contact in 2-4 brake timing solenoid circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-75, Transmission Control Module (TCM).>
7	**CHECK 2-4 BRAKE TIMING SOLENOID (IN TRANSMISSION).** 1) Remove the transmission connector from bracket. 2) Lift-up or raise the vehicle and support with rigid rack. NOTE: On AWD models, raise all wheels off ground. 3) Drain the ATF. **CAUTION:** **Do not drain the ATF until it cools down.** 4) Remove the oil pan, and disconnect connector from 2-4 brake timing solenoid. 5) Measure the resistance of 2-4 brake timing solenoid. ***Terminals*** ***No. 1 — Transmission ground:***	Is the resistance 10 — 16 Ω?	Go to step **8.**	Replace the 2-4 brake timing solenoid. <Ref. to 4AT-69, Shift Solenoids, Duty Solenoids and ATF Temperature Sensor.>
8	**CHECK HARNESS CONNECTOR BETWEEN 2-4 BRAKE TIMING SOLENOID AND TRANSMISSION.** Measure the resistance of harness between 2-4 brake timing solenoid and transmission connector. ***Connector & terminal*** ***(AT8) No. 1 — (T4) No. 4:***	Is the resistance less than 1 Ω?	Go to step **9.**	Repair the open circuit in harness between 2-4 brake timing solenoid and transmission connector.
9	**CHECK HARNESS CONNECTOR BETWEEN 2-4 BRAKE TIMING SOLENOID AND TRANSMISSION.** Measure the resistance of harness between 2-4 brake timing solenoid connector and transmission ground. ***Connector & terminal*** ***(T4) No. 4 — Transmission ground:***	Is the resistance more than 1 MΩ?	Even if the POWER indicator light blinks, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair the harness or connector in 2-4 brake timing solenoid and transmission.	Repair the short circuit harness between 2-4 brake timing solenoid and transmission connector.

M: DTC 75 LINE PRESSURE DUTY SOLENOID

DIAGNOSIS:
The output signal circuit of line pressure duty solenoid is open or shorted.
TROUBLE SYMPTOM:
Excessive shift shock.
WIRING DIAGRAM:



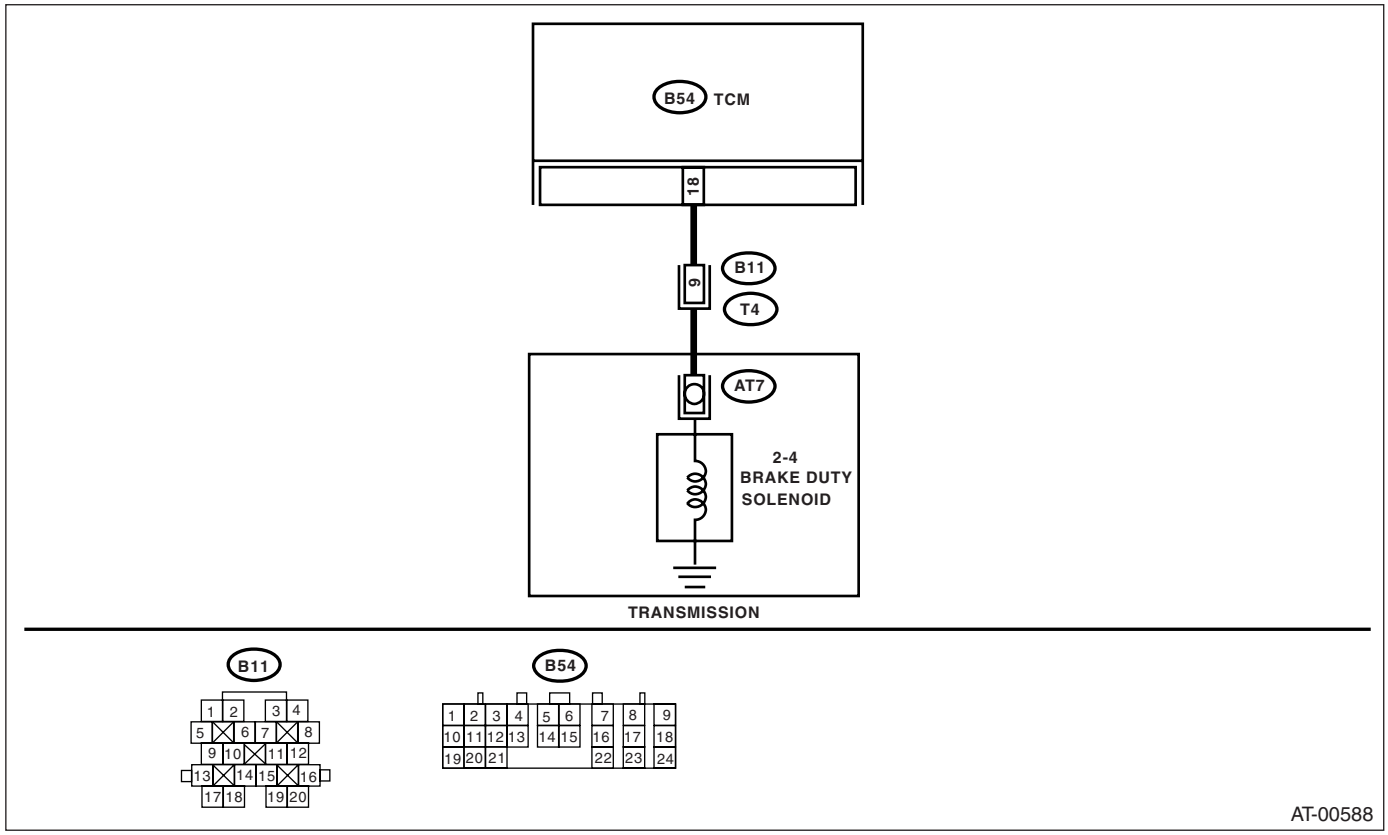
	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission and TCM. 3) Measure the resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B54) No. 9 — (B11) No. 5:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the open circuit in harness between TCM and transmission connector.
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND CHASSIS GROUND.** Measure the resistance of harness between TCM and chassis ground. ***Connector & terminal*** ***(B54) No. 9 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **3.**	Repair the short circuit in harness between TCM and transmission connector.
3	**CHECK LINE PRESSURE DUTY SOLENOID.** Measure the resistance between transmission connector receptacle's terminals. ***Terminals*** ***(T4) No. 5 — No. 16:***	Is the resistance 2.0 — 4.5 Ω?	Go to step **4.**	Go to step **7.**

	Step	Check	Yes	No
4	**CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR.** 1) Connect the connectors to TCM and transmission. 2) Connect the Subaru Select Monitor to data link connector. 3) Start the engine and turn Subaru Select Monitor power switch to ON. 4) Warm-up the transmission until ATF temperature is above 80°C (176°F). NOTE: If ambient temperature is below 0°C (32°F), drive the vehicle until ATF reaches its operating temperature. 5) Stop the engine and turn ignition switch to ON (engine OFF). 6) Move the select lever to "N" range. 7) Throttle is fully closed. • Line pressure duty solenoid is indicated in "%". 8) Read the data of line pressure duty solenoid using Subaru Select Monitor.	Is the value 100%?	Go to step **5.**	Go to step **6.**
5	**CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR.** 1) Turn the ignition switch to ON (engine OFF). 2) Throttle is fully open.	Is the value less than 25%?	Even if the POWER indicator light blinks, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair the harness or connector in transmission.	Go to step **6.**
6	**CHECK POOR CONTACT.**	Is there poor contact in line pressure duty solenoid circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-75, Transmission Control Module (TCM).>
7	**CHECK LINE PRESSURE DUTY SOLENOID (IN TRANSMISSION).** 1) Remove the transmission connector from bracket. 2) Drain the ATF. **CAUTION:** **Do not drain the ATF until it cools down.** 3) Remove the oil pan, and disconnect connector from line pressure duty solenoid. 4) Measure the resistance of line pressure duty solenoid. ***Terminals*** ***No. 1 — Transmission ground:***	Is the resistance 2.0 — 4.5 Ω?	Go to step **8.**	Replace the line pressure duty solenoid. <Ref. to 4AT-69, Shift Solenoids, Duty Solenoids and ATF Temperature Sensor.>

	Step	Check	Yes	No
8	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND LINE PRESSURE DUTY SOLENOID.** Measure the resistance of harness between line pressure duty solenoid and transmission connector. ***Connector & terminal*** ***(T4) No. 5 — (AT2) No. 1:***	Is the resistance less than 1 Ω?	Go to step **9.**	Repair the open circuit in harness between line pressure duty solenoid and transmission connector.
9	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND LINE PRESSURE DUTY SOLENOID.** Measure the resistance of harness between transmission connector and transmission ground. ***Connector & terminal*** ***(T4) No. 5 — Transmission ground:***	Is the resistance more than 1 MΩ?	Even if the POWER indicator light blinks, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair the harness or connector in line pressure duty solenoid and transmission.	Repair the short circuit in harness between line pressure duty solenoid and transmission connector.

N: DTC 76 2-4 BRAKE DUTY SOLENOID

DIAGNOSIS:
The output signal circuit of 2-4 brake duty solenoid is open or shorted.
TROUBLE SYMPTOM:
Excessive shift shock.
WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission and TCM. 3) Measure the resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B54) No. 18 — (B11) No. 9:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the open circuit in harness between TCM and transmission connector.
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND CHASSIS GROUND.** Measure the resistance of harness between TCM and chassis ground. ***Connector & terminal*** ***(B54) No. 18 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **3.**	Repair the short circuit in harness between TCM and transmission connector.
3	**CHECK 2-4 BRAKE DUTY SOLENOID.** Measure the resistance between transmission connector receptacle's terminals. ***Terminals*** ***(T4) No. 9 — No. 16:***	Is the resistance 2.0 — 4.5 Ω?	Go to step **4.**	Go to step **7.**

	Step	Check	Yes	No
4	**CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR.** 1) Connect all connectors. 2) Connect the Subaru Select Monitor to data link connector. 3) Start the engine and turn Subaru Select Monitor power switch to ON. 4) Warm-up the transmission until ATF temperature is above 80°C (176°F). NOTE: If ambient temperature is below 0°C (32°F), drive the vehicle until ATF reaches its operating temperature. 5) Stop the engine and turn ignition switch to ON (engine OFF). 6) Move the select lever to "N" range. 7) Throttle is fully closed. • 2-4 brake duty solenoid is indicated in "%". 8) Read the data of 2-4 brake duty solenoid using Subaru Select Monitor.	Is the value 100%?	Go to step **5.**	Go to step **6.**
5	**CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR.** 1) Turn the ignition switch to ON (engine OFF). 2) Throttle is fully open.	Is the value less than 25%?	Even if the POWER indicator light blinks, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair the harness or connector in TCM and transmission.	Go to step **6.**
6	**CHECK POOR CONTACT.**	Is there poor contact in 2-4 brake duty solenoid circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-75, Transmission Control Module (TCM).>
7	**CHECK 2-4 BRAKE DUTY SOLENOID (IN TRANSMISSION).** 1) Remove the transmission connector from bracket. 2) Drain the ATF. **CAUTION:** **Do not drain the ATF until it cools down.** 3) Remove the oil pan, and disconnect connector from 2-4 brake duty solenoid. 4) Measure the resistance of 2-4 brake duty solenoid. ***Terminals*** ***No. 1 — Transmission ground:***	Is the resistance 2.0 — 4.5 Ω?	Go to step **8.**	Replace the 2-4 brake duty solenoid. <Ref. to 4AT-69, Shift Solenoids, Duty Solenoids and ATF Temperature Sensor.>
8	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND 2-4 BRAKE DUTY SOLENOID.** Measure the resistance of harness between 2-4 brake duty solenoid and transmission connector. ***Connector & terminal*** ***(T4) No. 9 — (AT7) No. 1:***	Is the resistance less than 1 Ω?	Go to step **9.**	Repair the open circuit in harness between 2-4 brake duty solenoid and transmission connector.

	Step	Check	Yes	No
9	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND 2-4 BRAKE DUTY SOLENOID.** Measure the resistance of harness between transmission connector and transmission ground. ***Connector & terminal*** ***(T4) No. 9 — Transmission ground:***	Is the resistance more than 1 MΩ?	Even if the POWER indicator light blinks, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair the harness or connector in line pressure duty solenoid and transmission.	Repair the short circuit in harness between 2-4 brake duty solenoid and transmission connector.

O: DTC 77 LOCK-UP DUTY SOLENOID

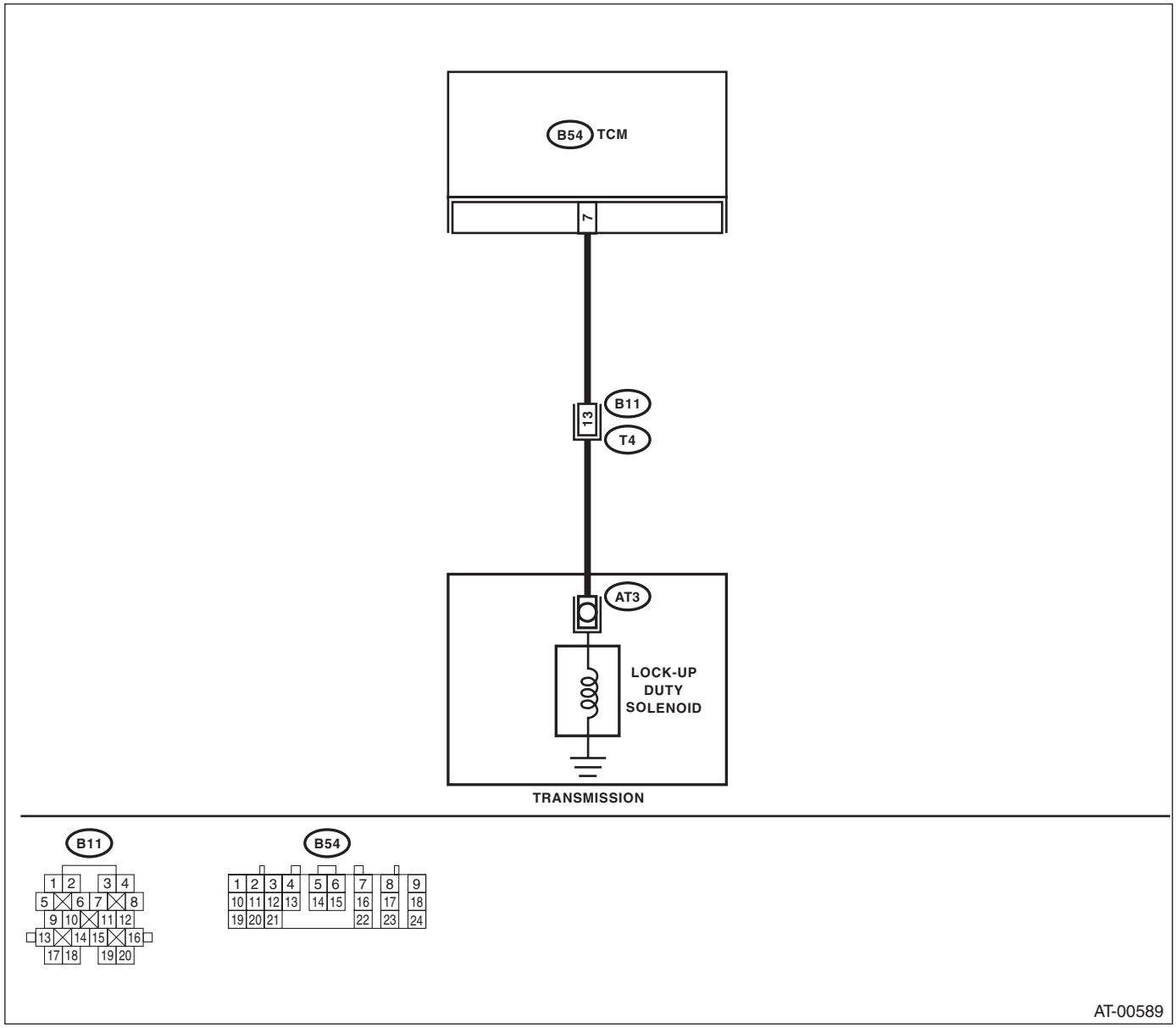
DIAGNOSIS:

The output signal circuit of lock-up duty solenoid is open or shorted.

TROUBLE SYMPTOM:

No “lock-up” (after engine warm-up).

WIRING DIAGRAM:



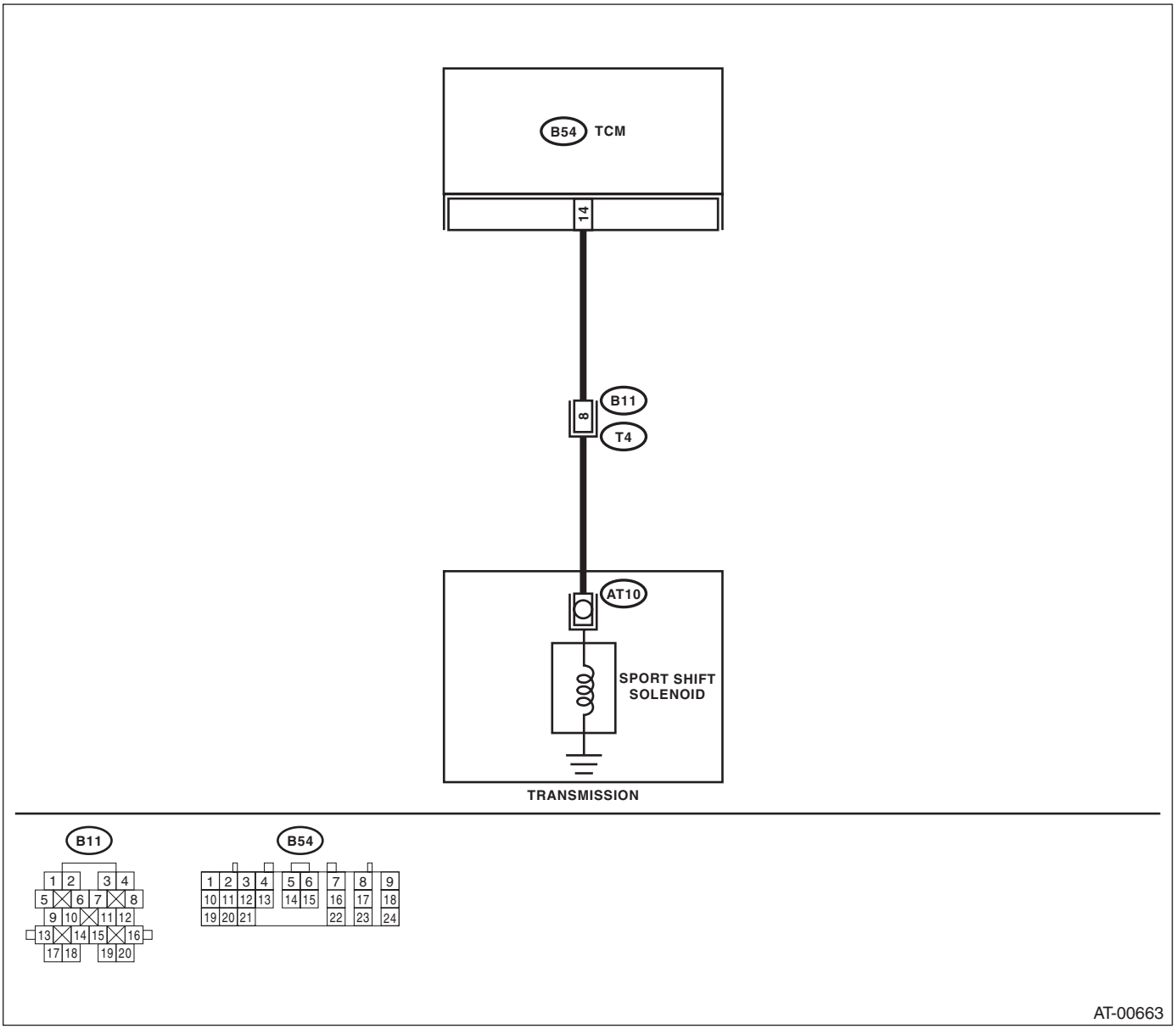
Step	Check	Yes	No
1 CHECK DTC.	Do multiple DTCs appear in the on-board diagnostics test mode?	Go to another DTC.	Go to step **2.**

	Step	Check	Yes	No
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM and transmission. 3) Measure the resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B54) No. 7 — (B11) No. 13:***	Is the resistance less than 1 Ω?	Go to step **3.**	Repair the open circuit in harness between TCM and transmission connector.
3	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure the resistance of harness connector between TCM and chassis ground. ***Connector & terminal*** ***(B54) No. 7 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **4.**	Repair the short circuit in harness between TCM and transmission connector.
4	**CHECK LOCK-UP DUTY SOLENOID.** Measure the resistance between transmission connector receptacle's terminals. ***Connector & terminal*** ***(T4) No. 13 — No. 16:***	Is the resistance 10 — 17 Ω?	Go to step **5.**	Go to step **8.**
5	**CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR.** 1) Connect the connectors to TCM and transmission. 2) Lift-up the vehicle and place rigid rack. NOTE: On AWD models, raise all wheels off ground. 3) Connect the Subaru Select Monitor to data link connector. 4) Start the engine and turn Subaru Select Monitor power switch to ON. 5) Start the engine and warm-up the transmission until ATF temperature is above 80°C (176°F). NOTE: If ambient temperature is below 0°C (32°F), drive the vehicle until ATF reaches its operating temperature. 6) Read the data of lock-up duty solenoid using Subaru Select Monitor. • Lock-up duty solenoid is indicated in "%". 7) Move the selector lever to "D" range and slowly increase vehicle speed to 60 km/h (37 MPH). Wheels will lock-up. NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS(diag)-27, Clear Memory Mode.>	Is the value 95%?	Go to step **6.**	Go to step **7.**

	Step	Check	Yes	No
6	**CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR.** Return the engine to idling speed and move selector lever to "N" range. NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS(diag)-27, Clear Memory Mode.>	Is the value 5%?	Even if the POWER indicator light blinks, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair the harness or connector in TCM and transmission.	Go to step **7.**
7	**CHECK POOR CONTACT.**	Is there poor contact in lock-up duty solenoid circuit?	Repair poor contact.	Replace the TCM. <Ref. to 4AT-75, Transmission Control Module (TCM).>
8	**CHECK LOCK-UP DUTY SOLENOID (IN TRANSMISSION).** 1) Remove the transmission connector from bracket. 2) Drain the ATF. **CAUTION:** **Do not drain the ATF until it cools down.** 3) Remove the oil pan and disconnect connector from lock-up duty solenoid. 4) Measure the resistance of lock-up duty solenoid. ***Terminals*** ***No. 1 — Transmission ground:***	Is the resistance 10 — 17 Ω?	Go to step **9.**	Replace the lock-up duty solenoid. <Ref. to 4AT-69, Shift Solenoids, Duty Solenoids and ATF Temperature Sensor.>
9	**CHECK HARNESS CONNECTOR BETWEEN LOCK-UP DUTY SOLENOID AND TRANSMISSION.** Measure the resistance of harness between lock-up duty solenoid and transmission connector. ***Connector & terminal*** ***(T4) No. 13 — (AT3) No. 1:***	Is the resistance less than 1 Ω?	Go to step **10.**	Repair the open circuit in harness between TCM and transmission connector.
10	**CHECK HARNESS CONNECTOR BETWEEN LOCK-UP DUTY SOLENOID AND TRANSMISSION.** Measure the resistance of harness between transmission connector and transmission ground. ***Connector & terminal*** ***(T4) No. 13 — Transmission ground:***	Is the resistance more than 1 MΩ?	Even if the POWER indicator light blinks, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair the harness or connector in lock-up duty solenoid and transmission.	Repair the short circuit in harness between lock-up duty solenoid and transmission connector.

P: DTC 78 SPORT SHIFT SOLENOID

DIAGNOSIS:
Output signal circuit of SPORT shift solenoid is open or shorted.
TROUBLE SYMPTOM:
Engine brake is effective at “D”, “3”, “2” ranges.
WIRING DIAGRAM:



Step		Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM and transmission. 3) Measure the resistance of harness between TCM and SPORT shift solenoid connector. ***Connector & terminal*** ***(B54) No. 14 — (B11) No. 8:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the open circuit in harness between TCM and transmission connector.

	Step	Check	Yes	No
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 14 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **3.**	Repair the short circuit in harness between TCM and transmission connector.
3	**CHECK SPORT SHIFT SOLENOID.** Measure the resistance between transmission connector terminals. ***Connector & terminal*** ***(T4) No. 8 — No. 16:***	Is the resistance 10 — 16 Ω?	Go to step **4.**	Go to step **7.**
4	**CHECK OUTPUT SIGNAL EMITTED FROM TCM.** 1) Connect the connectors to TCM and transmission. 2) Turn the ignition switch to ON (engine OFF). 3) Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 14 (+) — Chassis ground (−):***	Is the voltage more than 9 V?	Go to step **5.**	Go to step **6.**
5	**CHECK OUTPUT SIGNAL EMITTED FROM TCM.** 1) Turn the ignition switch OFF. 2) Lift-up the vehicle and place rigid rack. NOTE: Raise all wheels off ground. 3) Start the engine, and warm transmission until ATF temperature becomes 80°C (176°F) or more. NOTE: It ambient temperature is below 0°C (32°F), drive the vehicle until ATF reaches its operating temperature. 4) Move the select lever to Manual mode. 5) Increase the speed up to 25 km/h (16 MPH) at 2nd. NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS(diag)-27, Clear Memory Mode.> 6) Shift down to 1st speed, and effectively use engine brake. 7) Measure the voltage between TCM connector and body ground when engine brake is effective. ***Connector & terminal*** ***(B54) No. 14 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Even if “POWER” indicator light blinks, the circuit has returned to a normal condition. A temporary poor contact of the connector or harness may be the cause. Repair the harness or contact in the TCM.	Go to step **6.**
6	**CHECK POOR CONTACT.**	Is there poor contact in SPORT shift solenoid circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-75, Transmission Control Module (TCM).>

	Step	Check	Yes	No
7	**CHECK SHIFT SOLENOID 1 (IN TRANSMISSION).** 1) Remove the transmission connector from bracket. 2) Lift-up or raise the vehicle and support with rigid rack. 3) Drain the automatic transmission fluid. **CAUTION:** **Do not drain the ATF until it cools down.** 4) Remove the oil pan, and disconnect the connector from SPORT shift solenoid. 5) Measure the resistance of SPORT shift solenoid. ***Terminals*** ***No. 1 — Transmission ground:***	Is the resistance 10 — 16 Ω?	Go to step **8.**	Replace the SPORT shift solenoid. <Ref. to 4AT-69, Shift Solenoids, Duty Solenoids and ATF Temperature Sensor.>
8	**CHECK HARNESS CONNECTOR BETWEEN SPORT SHIFT SOLENOID AND TRANSMISSION.** Measure the resistance of harness between shift solenoid 1 and transmission connector. ***Connector & terminal*** ***(AT10) No. 1 — (T4) No. 8:***	Is the resistance less than 1 Ω?	Go to step **9.**	Repair the open circuit in harness between SPORT shift solenoid and transmission connector.
9	**CHECK HARNESS CONNECTOR BETWEEN SPORT SHIFT SOLENOID AND TRANSMISSION.** Measure the resistance of harness between SPORT shift solenoid connector and transmission ground. ***Connector & terminal*** ***(T4) No. 8 — Transmission ground:***	Is the resistance more than 1 MΩ?	Even if “POWER” indicator light blinks, the circuit has returned to a normal condition. A temporary poor contact of the connector or harness may be the cause. Repair the harness or connector in SPORT shift solenoid and transmission.	Repair the short circuit harness between SPORT shift solenoid and transmission connector.

Q: DTC 79 TRANSFER DUTY SOLENOID

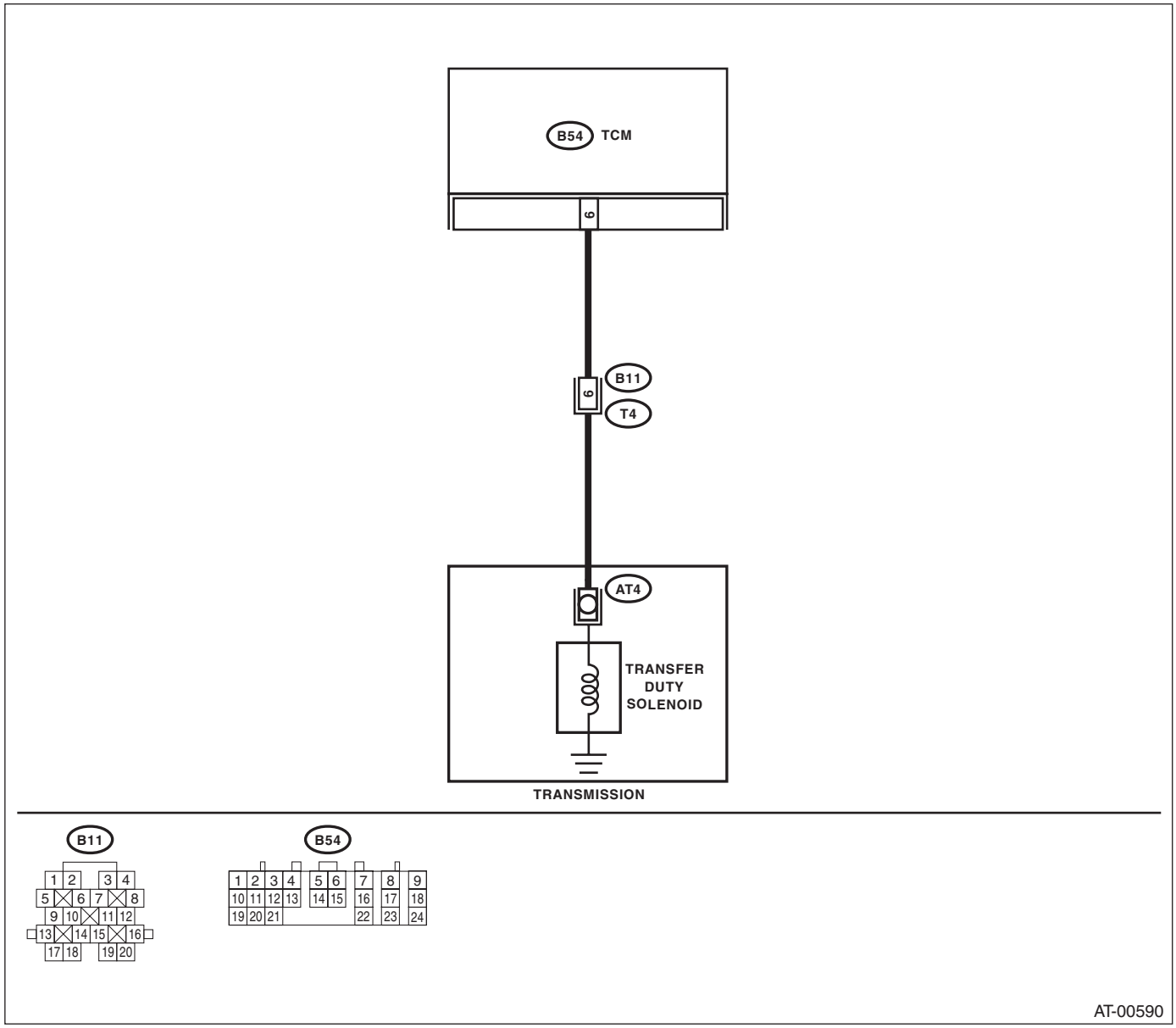
DIAGNOSIS:

The output signal circuit of transfer duty solenoid is open or shorted.

TROUBLE SYMPTOM:

Excessive “braking” in tight corners.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM and transmission. 3) Measure the resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B54) No. 6 — (B11) No. 6:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the open circuit in harness between TCM and transmission connector.
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure the resistance harness connector between TCM and chassis ground. ***Connector & terminal*** ***(B54) No. 6 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **3.**	Repair the short circuit in harness between TCM and transmission connector.
3	**CHECK TRANSFER DUTY SOLENOID.** Measure the resistance of transmission connector. ***Connector & terminal*** ***(T4) No. 6 — No. 16:***	Is the resistance 10 — 17 Ω?	Go to step **4.**	Go to step **7.**
4	**CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR.** 1) Connect the connectors to TCM and transmission. 2) Connect the Subaru Select Monitor to data link connector. 3) Turn the ignition switch to ON (engine OFF) and turn Subaru Select Monitor power switch to ON. 4) Move the select lever to “D” range with throttle fully open (vehicle speed 0 km/h or 0 MPH). 5) Read data of transfer duty solenoid using Subaru Select Monitor. • Transfer duty solenoid is indicated in “%”.	Is the value 80 — 95%?	Go to step **5.**	Go to step **6.**
5	**CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR.** 1) Move the select lever to “N” range with throttle fully closed (vehicle speed 0 km/h or 0 MPH). 2) Read the data of transfer duty solenoid using Subaru Select Monitor. • Transfer duty solenoid is indicated in “%”.	Is the value approx. 5 — 10%?	Even if the POWER indicator light blinks, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair the harness or connector in TCM and transmission.	Go to step **6.**
6	**CHECK POOR CONTACT.**	Is there poor contact in transfer duty solenoid circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-75, Transmission Control Module (TCM).>

	Step	Check	Yes	No
7	**CHECK TRANSFER DUTY SOLENOID (IN TRANSMISSION).** 1) Lift-up the vehicle and place rigid rack. NOTE: On AWD models, raise all wheels off ground. 2) Drain the automatic transmission fluid. **CAUTION:** **Do not drain the ATF until it cools down.** 3) Remove the extension case and disconnect connector from transfer duty solenoid. 4) Measure the resistance of transfer duty solenoid. ***Connector & terminal*** ***(AT4) No. 1 — Transmission ground:***	Is the resistance 10 — 17 Ω?	Go to step **8.**	Replace the transfer duty solenoid.
8	**CHECK HARNESS CONNECTOR BETWEEN TRANSFER DUTY SOLENOID AND TRANSMISSION.** Measure the resistance of harness between transfer duty solenoid and transmission connector. ***Connector & terminal*** ***(T4) No. 6 — (AT4) No. 1:***	Is the resistance less than 1 Ω?	Go to step **9.**	Repair the open circuit in harness between transfer duty solenoid and transmission connector.
9	**CHECK HARNESS CONNECTOR BETWEEN TRANSFER DUTY SOLENOID AND TRANSMISSION.** Measure the resistance of harness between transmission connector and transmission ground. ***Connector & terminal*** ***(T4) No. 6 — Transmission ground:***	Is the resistance more than 1 MΩ?	Even if the POWER indicator light blinks, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair the harness or contact in transfer duty solenoid and transmission.	Repair the short circuit in harness between transfer duty solenoid and transmission connector.

R: DTC 93 REAR VEHICLE SPEED SENSOR

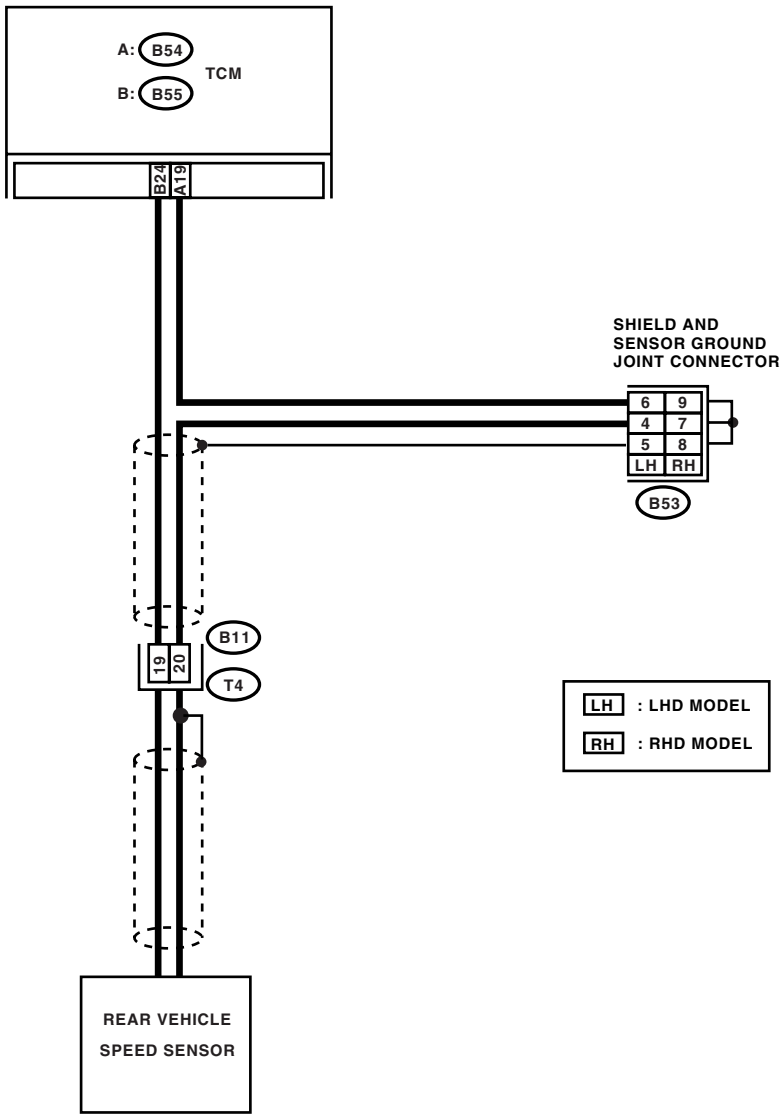
DIAGNOSIS:

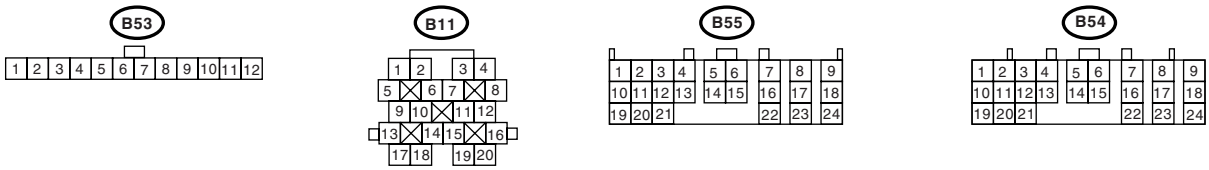
The input signal circuit of TCM is open or shorted.

TROUBLE SYMPTOM:

No lock-up or excessive tight corner “braking”.

WIRING DIAGRAM:





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	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM and transmission. 3) Measure the resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B55) No. 24 — (B11) No. 19:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the open circuit in harness between TCM and transmission connector.
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure the resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B54) No. 19 — (B11) No. 20:***	Is the resistance less than 1 Ω?	Go to step **3.**	Repair the open circuit in harness between TCM and transmission, and poor contact in coupling connector.
3	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure the resistance of harness between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 24 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **4.**	Repair the short circuit in harness between TCM and transmission connector.
4	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure the resistance of harness between TCM and chassis ground. ***Connector & terminal*** ***(B54) No. 19 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **5.**	Repair the short circuit in harness between TCM and transmission connector.
5	**CHECK REAR VEHICLE SPEED SENSOR.** Measure the resistance between transmission connector receptacle's terminals. ***Connector & terminal*** ***(T4) No. 19 — No. 20:***	Is the resistance 450 — 650 Ω?	Go to step **6.**	Replace the rear vehicle speed sensor. <Ref. to 4AT-61, Rear Vehicle Speed Sensor.>

	Step	Check	Yes	No
6	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** 1) Connect the connectors to TCM and transmission. 2) Connect the Subaru Select Monitor to data link connector. 3) Lift-up or raise the vehicle and place rigid rack. NOTE: Raise all wheels off floor. 4) Turn the ignition switch to ON and turn Subaru Select Monitor power switch to ON. 5) Start the engine. 6) Read the data of vehicle speed using Subaru Select Monitor. • Compare the speedometer with Subaru Select Monitor indications. • Vehicle speed is indicated in “km/h” or “MPH”. 7) Slowly increase the vehicle speed to 60 km/h or 37 MPH. NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS(diag)-27, Clear Memory Mode.>	Does the speedometer indication increase as the Subaru Select Monitor data increases?	Even if the POWER indicator light blinks, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair the harness or connector in TCM and transmission.	Go to step **7.**
7	**CHECK POOR CONTACT.**	Is there poor contact in rear vehicle speed sensor circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-75, Transmission Control Module (TCM).>

14.Diagnostic Procedure without Diagnostic Trouble Code (DTC)

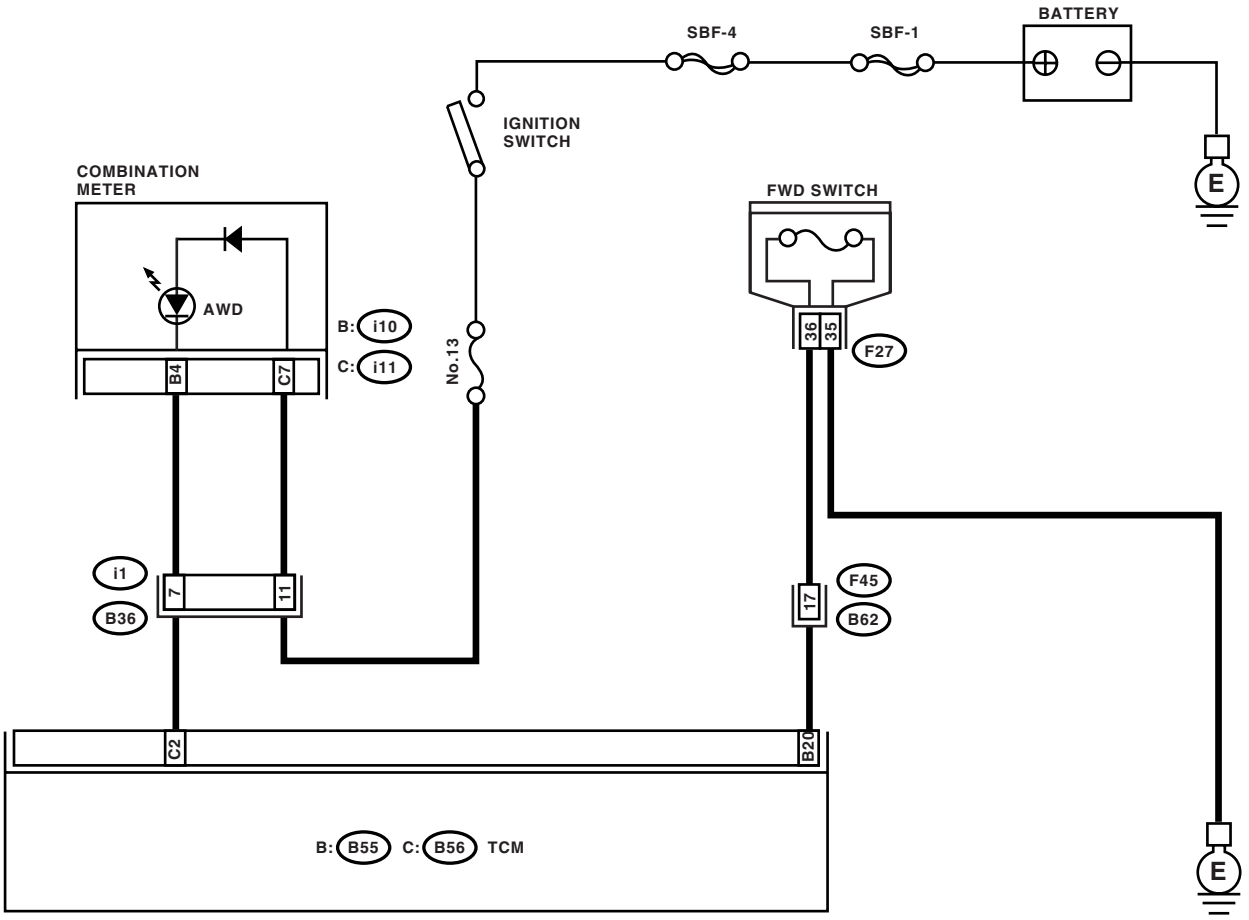
A: CHECK FWD SWITCH

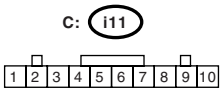
DIAGNOSIS:

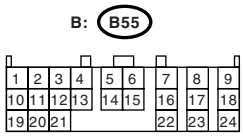
- The LED does not come on even if FWD switch is ON.
- The FWD switch circuit is open or short.

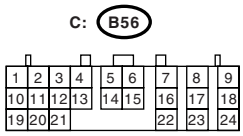
WIRING DIAGRAM:

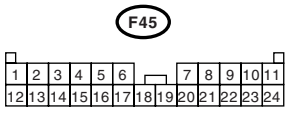
- LHD model

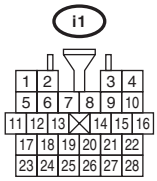


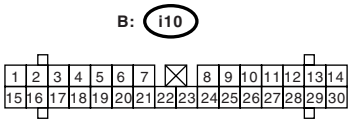


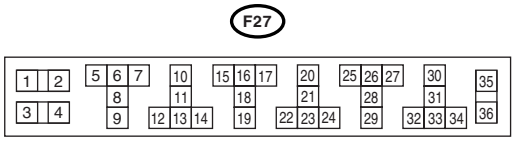












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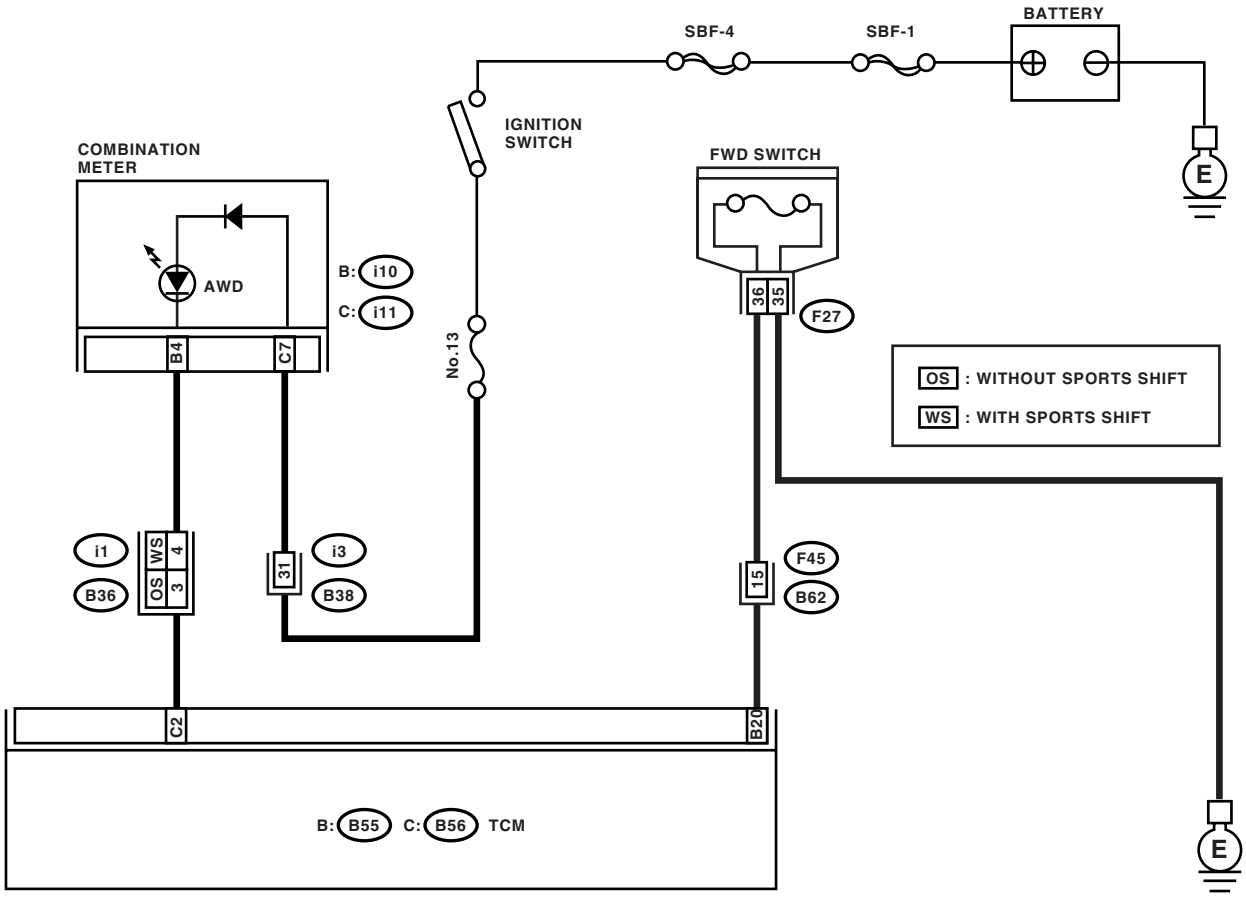
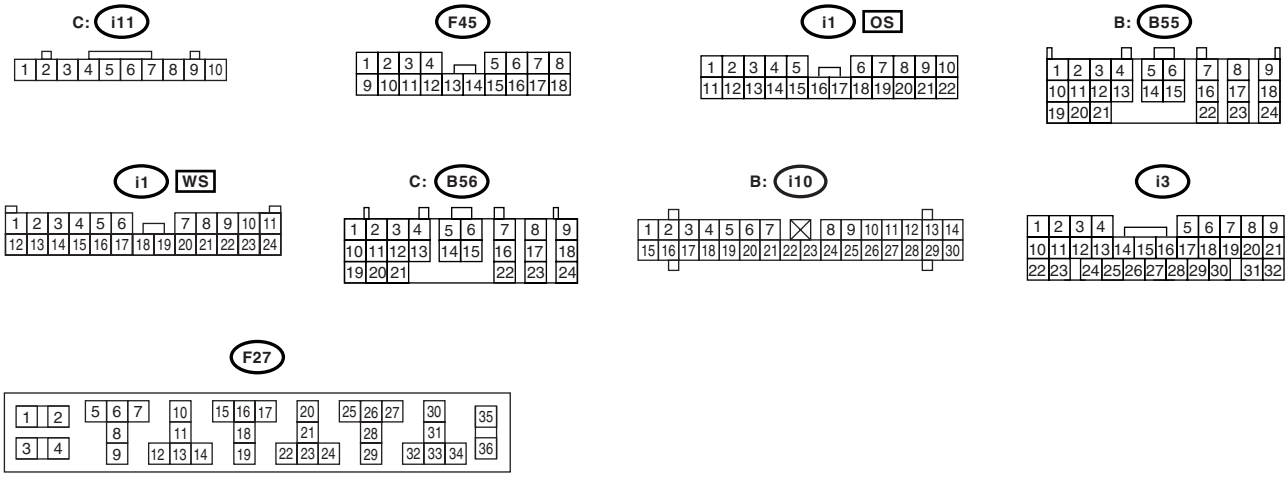
- RHD model





AT-03142

	Step	Check	Yes	No
1	**CHECK VEHICLE.**	Is the target AWD NON-TURBO model?	Go to step **2.**	Go to step CHECK BRAKE SWITCH. <Ref. to 4AT(diag)-93, CHECK BRAKE SWITCH, Diagnostic Procedure without Diagnostic Trouble Code (DTC).>
2	**CHECK FWD SWITCH.**	When the fuse is inserted to FWD switch, does LED light up?	Go to step CHECK BRAKE SWITCH. <Ref. to 4AT(diag)-93, CHECK BRAKE SWITCH, Diagnostic Procedure without Diagnostic Trouble Code (DTC).>	Go to step **3.**
3	**CHECK AWD INDICATOR LIGHT.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM. 3) Turn the ignition switch to ON. 4) Short the circuit between combination meter connector and chassis ground. **CAUTION:** **Be sure to short the circuit through fuse.** ***Connector & terminal*** ***(i10) No. 4 — Chassis ground:***	Does the AWD indicator light illuminate?	Go to step **4.**	Replace the AWD indicator light bulb. <Ref. to IDI-12, Combination Meter.>
4	**CHECK HARNESS CONNECTOR BETWEEN TCM AND FWD SWITCH.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM. 3) Measure the resistance of harness between TCM and FWD switch connector. ***Connector & terminal*** ***(B55) No. 20 — (F27) No. 36:***	Is the resistance less than 1 Ω?	Go to step **5.**	Repair the open circuit in harness between TCM and FWD switch connector.
5	**CHECK HARNESS CONNECTOR BETWEEN FWD SWITCH AND CHASSIS GROUND.** Measure the resistance of harness between FWD switch and chassis ground. ***Connector & terminal*** ***(F27) No. 35 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **6.**	Repair the open circuit in harness between FWD switch connector and chassis ground.
6	**CHECK HARNESS CONNECTOR BETWEEN TCM AND FWD SWITCH.** Measure the resistance of harness connector between TCM and body to make sure that circuit does not short. ***Connector & terminal*** ***(B55) No. 20 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **7.**	Repair the short circuit in harness between TCM and FWD switch connector.
7	**CHECK INPUT SIGNAL FOR TCM.** 1) Turn the ignition switch to OFF. 2) Connect the connector to TCM. 3) Turn the ignition switch to ON. 4) Measure the signal voltage for TCM while installing the fuse to FWD switch connector. ***Connector & terminal*** ***(B55) No. 20 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **8.**	Go to step **12.**

	Step	Check	Yes	No
8	**CHECK INPUT SIGNAL FOR TCM.** Measure the signal voltage for TCM while removing the fuse from FWD switch connector. ***Connector & terminal*** ***(B55) No. 20 (+) — Chassis ground (−):***	Is the voltage 6 — 9.1 V?	Go to step **9.**	Replace the TCM. <Ref. to 4AT-75, Transmission Control Module (TCM).>
9	**CHECK HARNESS CONNECTOR BETWEEN TCM AND COMBINATION METER.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM and combination meter. 3) Measure the resistance of harness between TCM combination meter. ***Connector & terminal*** ***(B56) No. 2 — (i10) No. 4:***	Is the resistance less than 1 Ω?	Go to step **10.**	Repair the open circuit in harness between TCM and combination meter and poor contact in coupling connector.
10	**CHECK HARNESS CONNECTOR BETWEEN TCM AND COMBINATION METER.** Measure the resistance of harness connector between TCM and chassis ground. ***Connector & terminal*** ***(B56) No. 2 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **11.**	Repair the short circuit in harness between TCM and combination meter connector.
11	**CHECK OUTPUT SIGNAL EMITTED FROM TCM.** 1) Turn the ignition switch to OFF. 2) Connect the connector to TCM and combination meter. 3) Turn the ignition switch to ON. 4) Measure the signal voltage for TCM while installing the fuse to FWD switch connector. ***Connector & terminal*** ***(B56) No. 2 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **12.**	Go to step **13.**
12	**CHECK OUTPUT SIGNAL EMITTED FROM TCM.** Measure the signal voltage for TCM while removing the fuse from FWD switch connector. ***Connector & terminal*** ***(B56) No. 2 (+) — Chassis ground (−):***	Is the voltage 6 — 9.1 V?	Go to step **13.**	Replace the TCM. <Ref. to 4AT-75, Transmission Control Module (TCM).>
13	**CHECK POOR CONTACT.**	Is there poor contact in FWD switch circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-75, Transmission Control Module (TCM).>

B: CHECK BRAKE SWITCH

Step		Check	Yes	No
1	**CHECK BRAKE SWITCH.**	When the brake pedal is depressed, does LED light up?	Go to step CHECK CRUISE CONTROL SWITCH. <Ref. to 4AT(diag)-93, CHECK CRUISE CONTROL SWITCH, Diagnostic Procedure without Diagnostic Trouble Code (DTC).>	Check the brake switch circuit. <Ref. to EN(H4SO)(diag)-200, DTC P0703 BRAKE SWITCH “B” CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

C: CHECK CRUISE CONTROL SWITCH

Step		Check	Yes	No
1	**CHECK CRUISE CONTROL SWITCH.**	When the cruise control is set, does LED light up?	Go to step CHECK KICK-DOWN SWITCH. <Ref. to 4AT(diag)-94, CHECK KICK-DOWN SWITCH, Diagnostic Procedure without Diagnostic Trouble Code (DTC).>	Check the cruise control. <Ref. to CC(diag)-27, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

D: CHECK KICK-DOWN SWITCH

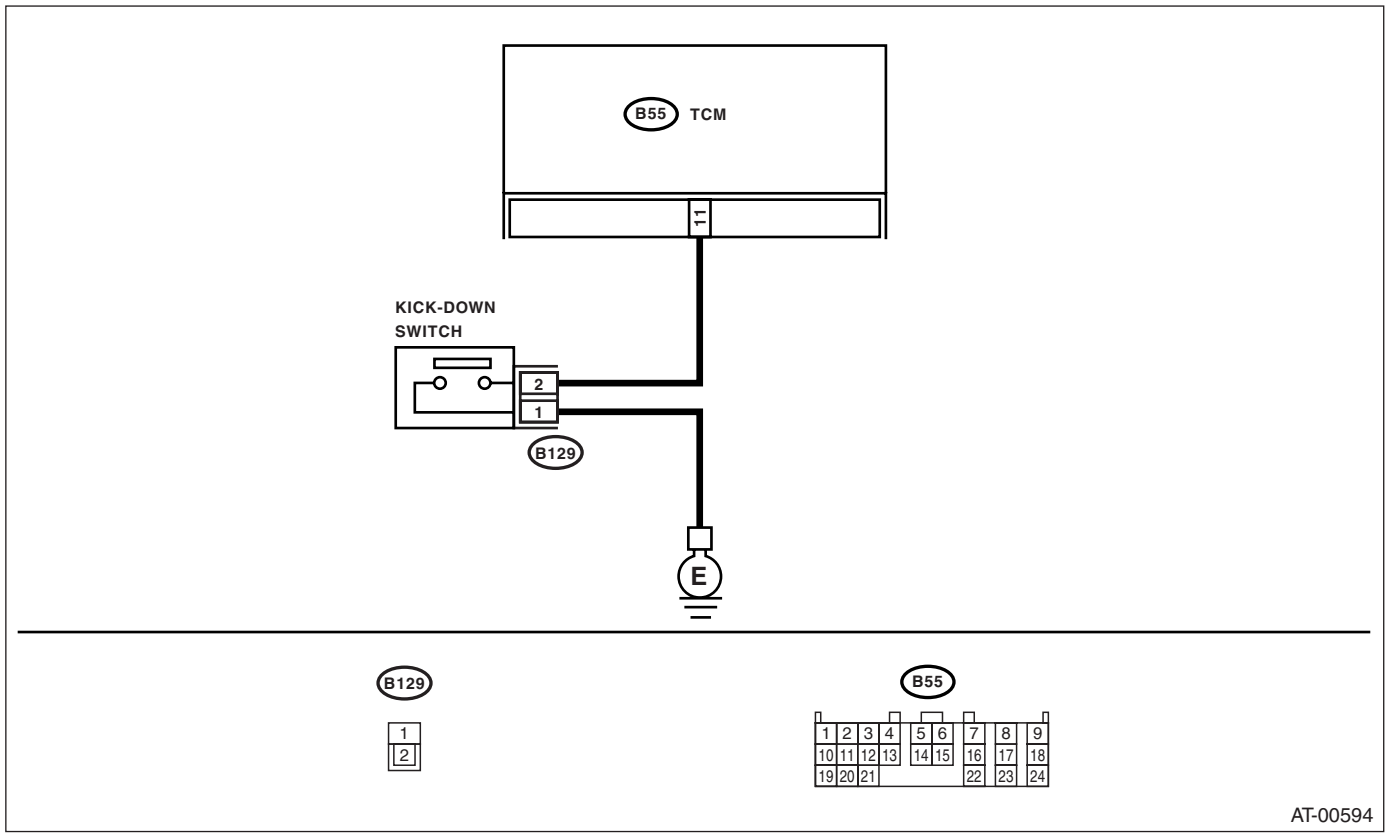
DIAGNOSIS:

- The kick-down switch is OFF when the throttle is partially open or fully closed, but it is not ON when the throttle is fully opened.
- The kick-down switch circuit is open or shorted.

TROUBLE SYMPTOM:

No kick-down occurs (when the throttle is fully opened).

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK KICK-DOWN SWITCH OPERATION.** Display the “Current Data” on Subaru Select Monitor.	When the accelerator pedal is fully depressed, does “ON” displayed?	Go to step CHECK POWER MODE SWITCH. <Ref. to 4AT(diag)-96, CHECK POWER MODE SWITCH, Diagnostic Procedure without Diagnostic Trouble Code (DTC).>	Go to step **2.**
2	**CHECK KICK-DOWN SWITCH GROUND LINE.** 1) Disconnect the connector from kick-down switch. 2) Measure the resistance of harness connector between kick-down switch and chassis ground. ***Connector & terminal*** ***(B129) No. 1 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **3.**	Repair the open circuit in harness between kick-down switch and chassis ground.

	Step	Check	Yes	No
3	**CHECK KICK-DOWN SWITCH.** Measure the resistance for kick-down switch when the accelerator pedal is not depressed. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance less than 1 Ω?	Go to step **4.**	Replace the kick-down switch. <Ref. to SP(H4SO)-4, Accelerator Pedal.>
4	**CHECK KICK-DOWN SWITCH.** Measure the resistance for kick-down switch when the accelerator pedal is not depressed. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance more than 1 MΩ?	Go to step **5.**	Replace the kick-down switch.
5	**CHECK HARNESS CONNECTOR BETWEEN TCM AND KICK-DOWN SWITCH.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from kick-down switch. 3) Measure the resistance of harness connector between TCM and kick-down switch. ***Connector & terminal*** ***(B55) No. 11 — (B129) No. 2:***	Is the resistance less than 1 Ω?	Go to step **6.**	Repair the open circuit in harness between TCM and kick-down switch.
6	**CHECK HARNESS CONNECTOR BETWEEN TCM AND KICK-DOWN SWITCH.** Measure the resistance of harness connector between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 11 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **7.**	Repair the short circuit in harness between TCM and chassis ground.
7	**CHECK INPUT SIGNAL FOR TCM.** 1) Turn the ignition switch to OFF. 2) Connect the connector to kick-down switch. 3) Turn the ignition switch to ON (engine OFF). 4) Measure the signal voltage for TCM when depressing the accelerator pedal. ***Connector & terminal*** ***(B55) No. 11 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **8.**	Go to step **9.**
8	**CHECK INPUT SIGNAL FOR TCM.** Measure the signal voltage for TCM when the accelerator pedal is not depressed. ***Connector & terminal*** ***(B55) No. 11 (+) — Chassis ground (−):***	Is the voltage more than 6.5 V?	A temporary poor contact of the connector and harness may be the cause. Repair the harness and connector in TCM.	Go to step **9.**
9	**CHECK POOR CONTACT.**	Is there poor contact?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-75, Transmission Control Module (TCM).>

E: CHECK POWER MODE SWITCH

DIAGNOSIS:

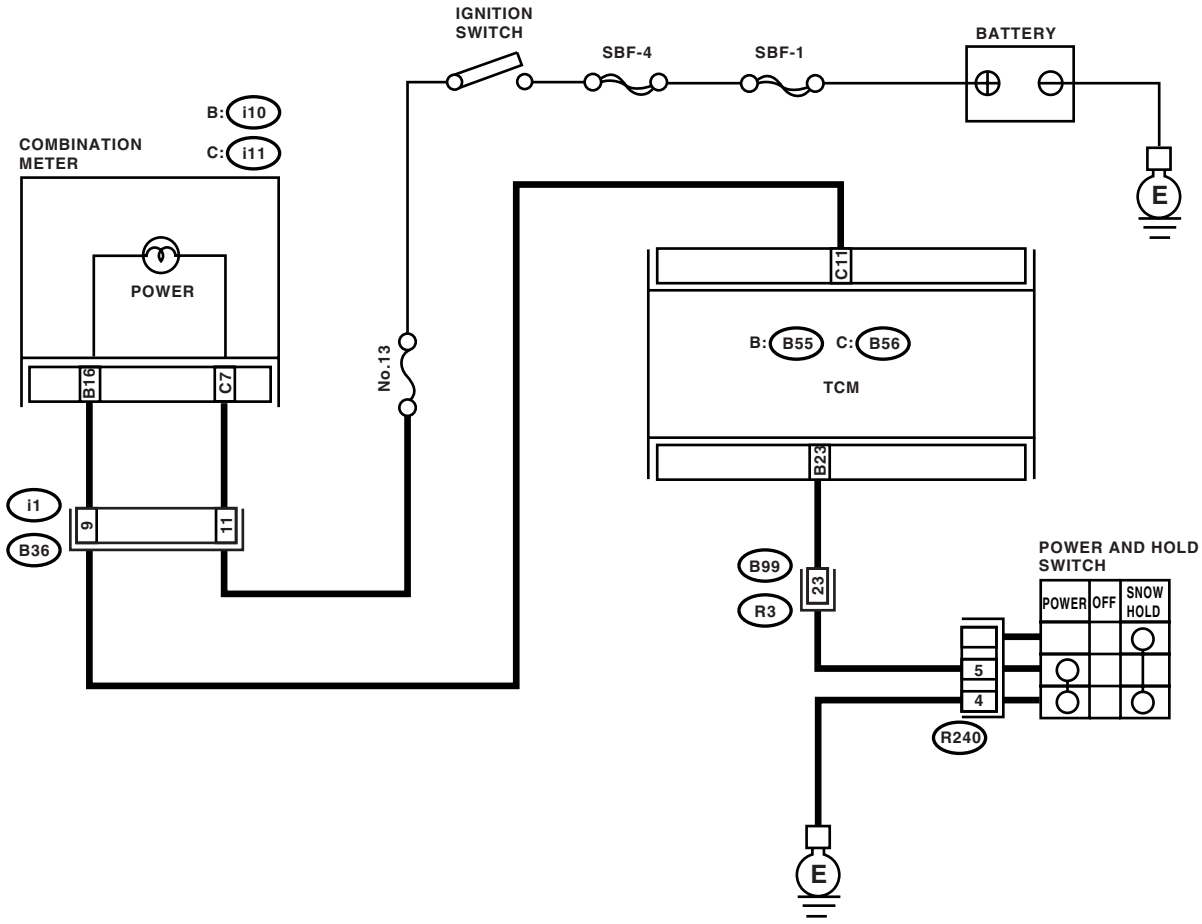
- The LED does not come on when POWER switch is ON.
- The POWER switch circuit is open or shorted.

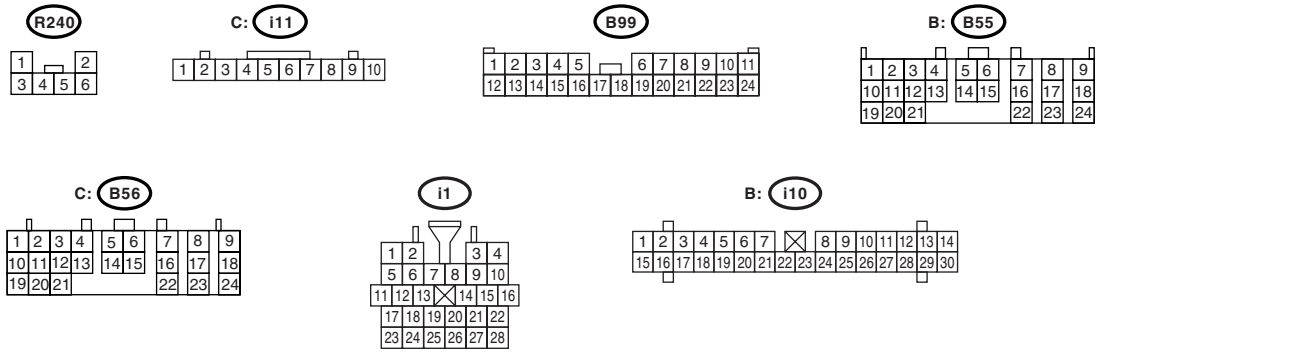
TROUBLE SYMPTOM:

No power mode occurs.

WIRING DIAGRAM:

- LHD model





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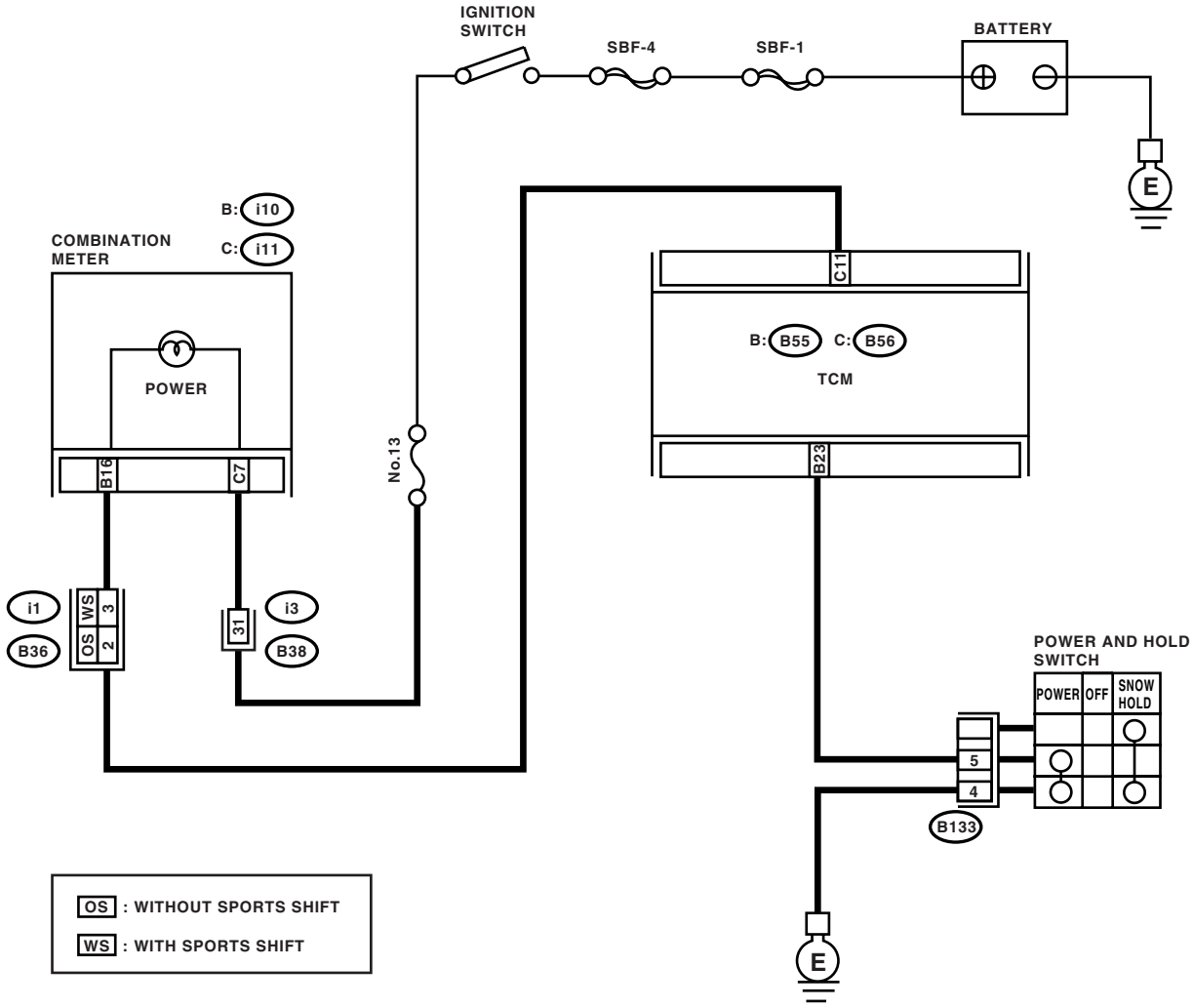
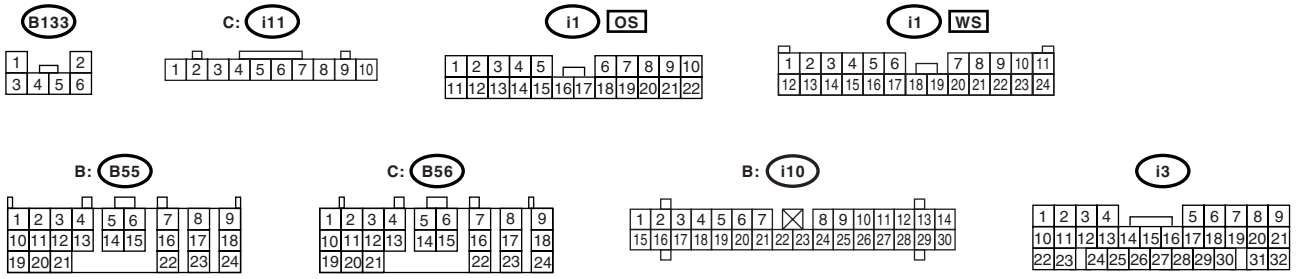
- RHD model





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	Step	Check	Yes	No
1	**CHECK POWER SWITCH OPERATION.**	When the POWER switch is turned to OFF, does LED light up?	Go to step **5.**	Go to step **2.**
2	**CHECK POWER SWITCH OPERATION.**	When the POWER switch is turned to ON, does LED light up?	Go to step CHECK INHIBITOR SWITCH. <Ref. to 4AT(diag)-99, CHECK INHIBITOR SWITCH, Diagnostic Procedure without Diagnostic Trouble Code (DTC).>	Go to step **3.**
3	**CHECK POWER INDICATOR LIGHT.** 1) Turn the ignition switch to OFF. 2) Remove the combination meter. 3) Remove the POWER indicator light bulb from combination meter.	Is the POWER indicator light bulb OK?	Go to step **4.**	Replace the POWER indicator light bulb. <Ref. to IDI-12, Combination Meter.>
4	**CHECK POWER SWITCH GROUND LINE.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from POWER switch. 3) Measure the resistance of harness connector between POWER switch and chassis ground. ***Connector & terminal*** ***RHD model*** ***(B133) No. 4 — Chassis ground:*** ***LHD model*** ***(R240) No. 4 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **5.**	Repair the open circuit in harness between POWER switch and chassis ground.
5	**CHECK POWER SWITCH.** 1) Turn the POWER switch to ON. 2) Measure the resistance between terminals of POWER switch. ***Terminals*** ***No. 5 — No. 4:***	Is the resistance less than 1 Ω?	Go to step **6.**	Replace the POWER switch.
6	**CHECK POWER SWITCH.** 1) Turn the POWER switch to OFF. 2) Measure the resistance between terminals of POWER switch. ***Terminals*** ***No. 5 — No. 4:***	Is the resistance more than 1 MΩ?	Go to step **7.**	Replace the POWER switch.
7	**CHECK HARNESS CONNECTOR BETWEEN TCM AND POWER SWITCH.** Measure the resistance of harness connector between TCM and POWER switch. ***Connector & terminal*** ***RHD model*** ***(B55) No. 23 — (B133) No. 5:*** ***LHD model*** ***(B55) No. 23 — (R240) No. 5:***	Is the resistance less than 1 Ω?	Go to step **8.**	Repair the open circuit in harness between TCM and POWER switch connector.
8	**CHECK HARNESS CONNECTOR BETWEEN TCM AND POWER SWITCH.** Measure the resistance of harness connector between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 23 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **9.**	Repair the short circuit in harness between TCM and POWER switch connector.

	Step	Check	Yes	No
9	**CHECK INPUT SIGNAL FOR TCM.** 1) Connect the connectors to TCM and POWER switch. 2) Turn the ignition switch to ON (engine OFF). 3) Measure the signal voltage for TCM while turning POWER switch to OFF. ***Connector & terminal*** ***(B55) No. 23 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **10.**	Replace the TCM. <Ref. to 4AT-75, Transmission Control Module (TCM).>
10	**CHECK INPUT SIGNAL FOR TCM.** Measure the signal voltage for TCM while turning POWER switch to ON. ***Connector & terminal*** ***(B55) No. 23 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **11.**	Replace the TCM. <Ref. to 4AT-75, Transmission Control Module (TCM).>
11	**CHECK POOR CONTACT.**	Is there poor contact?	Repair the poor contact.	A temporary poor contact of the connector or harness or connector in POWER switch circuit.

F: CHECK INHIBITOR SWITCH

DIAGNOSIS:

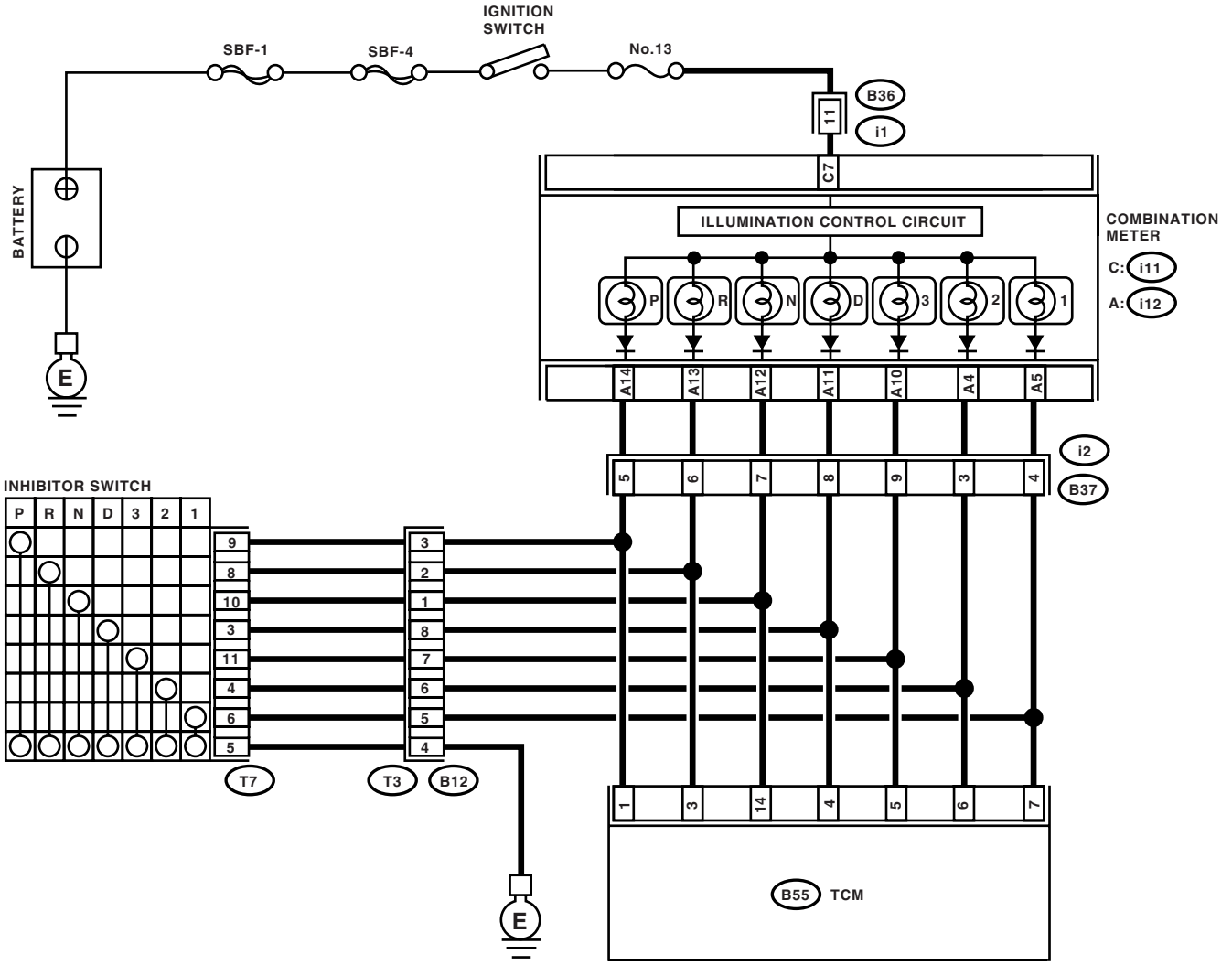
The input signal circuit of inhibitor switch is open or shorted.

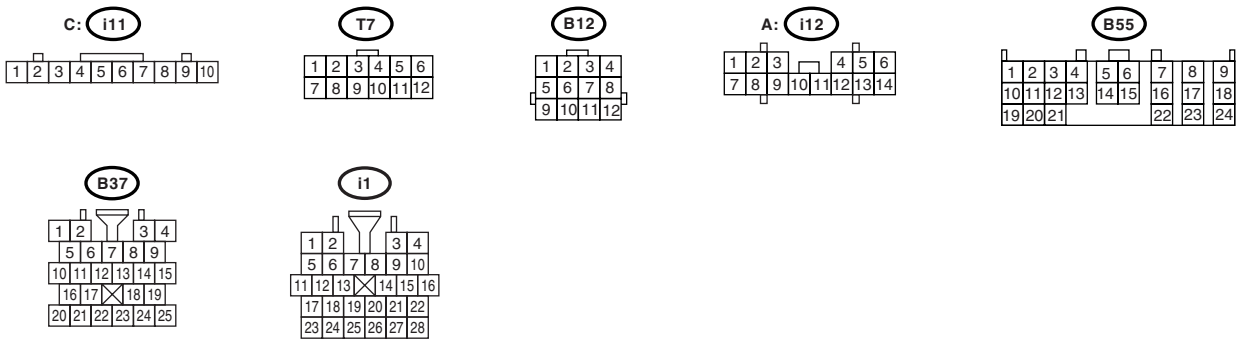
TROUBLE SYMPTOM:

- Shift characteristics are erroneous.
- Engine brake is not effected when selector lever is in “3” range.
- Engine brake is not effected when selector lever is in “2” range.
- Engine brake is not effected when selector lever is in “1” range.

WIRING DIAGRAM:

- LHD model





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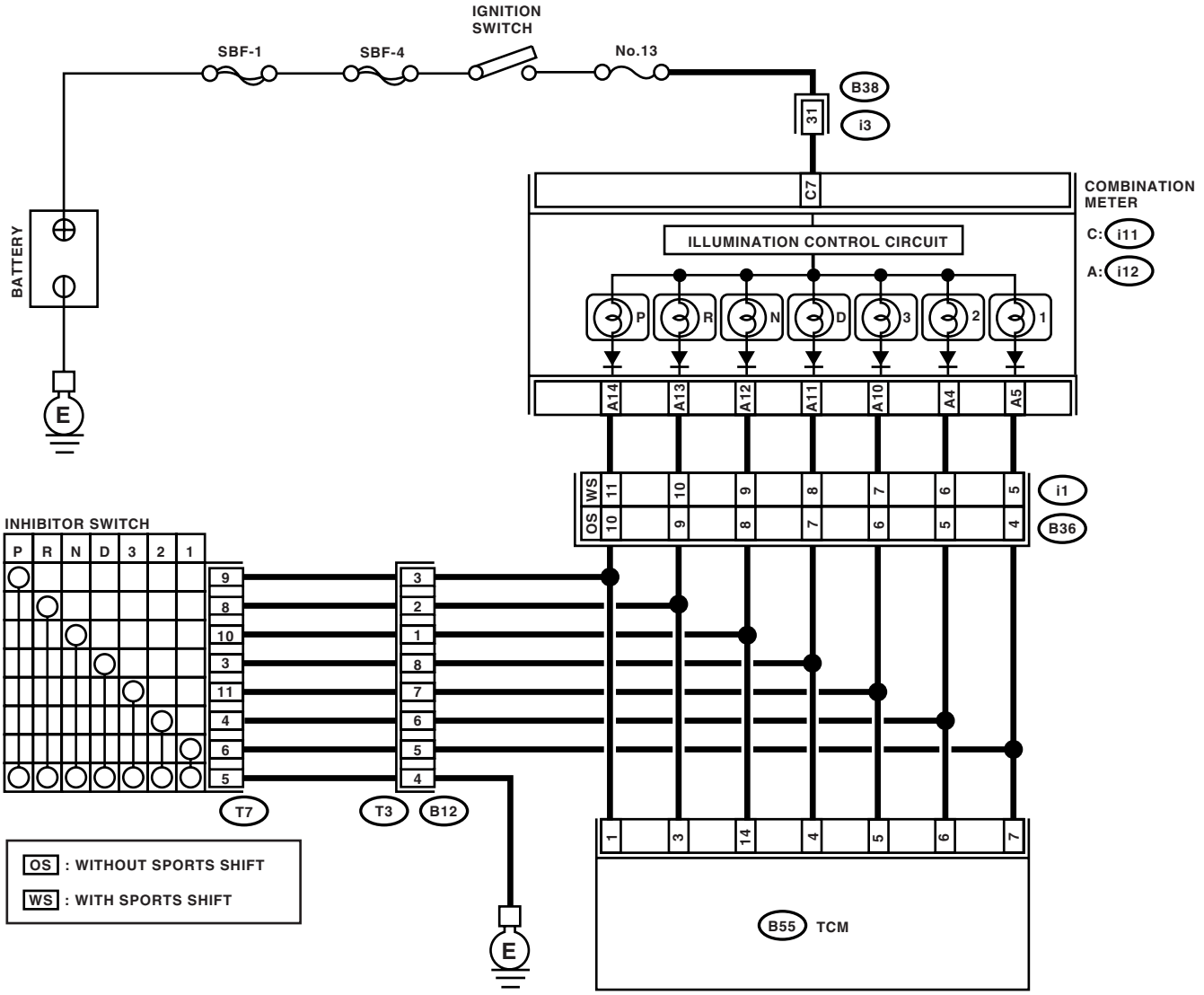
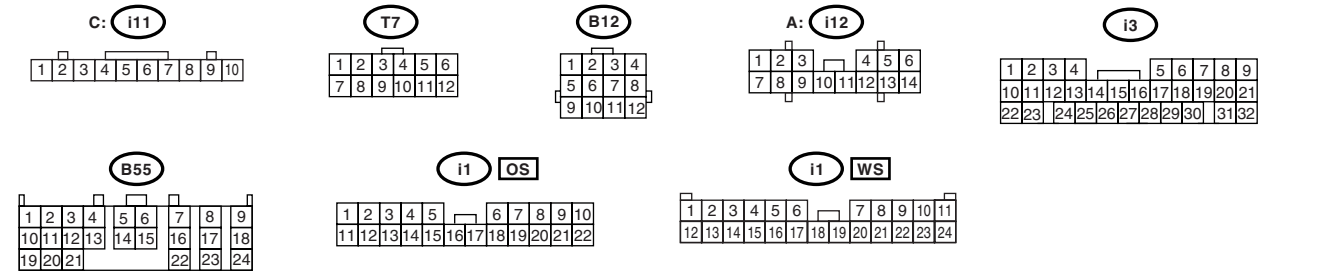
- RHD model





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	Step	Check	Yes	No
1	**CHECK "P" RANGE SWITCH.**	When the "P" range is selected, does LED light up?	Go to step **2.**	Go to step **22.**
2	**CHECK INDICATOR LIGHT.**	Does the combination meter "P" range indicator illuminate?	Go to step **3.**	Go to step **26.**
3	**CHECK "P" RANGE SWITCH.**	When the "R" range is selected, does "P" range LED light up?	Go to step **28.**	Go to step **4.**
4	**CHECK "R" RANGE SWITCH.**	When the "R" range is selected, does LED light up?	Go to step **5.**	Go to step **29.**
5	**CHECK INDICATOR LIGHT.**	Does the combination meter "R" range indicator illuminate?	Go to step **6.**	Go to step **32.**
6	**CHECK "R" RANGE SWITCH.**	When the "N" range is selected, does "R" range LED light up?	Go to step **34.**	Go to step **7.**
7	**CHECK "N" RANGE SWITCH.**	When the "N" range is selected, does LED light up?	Go to step **8.**	Go to step **35.**
8	**CHECK INDICATOR LIGHT.**	Does the combination meter "N" range indicator illuminate?	Go to step **9.**	Go to step **38.**
9	**CHECK "N" RANGE SWITCH.**	When the "D" range is selected, does "N" range LED light up?	Go to step **40.**	Go to step **10.**
10	**CHECK "D" RANGE SWITCH.**	When the "D" range is selected, does LED light up?	Go to step **11.**	Go to step **41.**
11	**CHECK INDICATOR LIGHT.**	Does the combination meter "D" range indicator illuminate?	Go to step **12.**	Go to step **44.**
12	**CHECK "D" RANGE SWITCH.**	When the "3" range is selected, does "D" range LED light up?	Go to step **46.**	Go to step **13.**
13	**CHECK "3" RANGE SWITCH.**	When the "3" range is selected, does LED light up?	Go to step **14.**	Go to step **47.**
14	**CHECK INDICATOR LIGHT.**	Does the combination meter "3" range indicator illuminate?	Go to step **15.**	Go to step **50.**
15	**CHECK "3" RANGE SWITCH.**	When the "2" range is selected, does "3" range LED light up?	Go to step **52.**	Go to step **16.**
16	**CHECK "2" RANGE SWITCH.**	When the "2" range is selected, does LED light up?	Go to step **17.**	Go to step **53.**
17	**CHECK INDICATOR LIGHT.**	Does the combination meter "2" range indicator illuminate?	Go to step **18.**	Go to step **56.**
18	**CHECK "2" RANGE SWITCH.**	When the "1" range is selected, does "2" range LED light up?	Go to step **58.**	Go to step **19.**
19	**CHECK "1" RANGE SWITCH.**	When the "1" range is selected, does LED light up?	Go to step **20.**	Go to step **59.**
20	**CHECK INDICATOR LIGHT.**	Does the combination meter "1" range indicator illuminate?	Go to step **21.**	Go to step **62.**
21	**CHECK "1" RANGE SWITCH.**	When the "2" range is selected, does "1" range LED light UP?	Go to step **64.**	Go to step CHECK HOLD SWITCH. <Ref. to 4AT(diag)-110, CHECK HOLD SWITCH, Diagnostic Procedure without Diagnostic Trouble Code (DTC).>

	Step	Check	Yes	No
22	**CHECK HARNESS CONNECTOR BETWEEN INHIBITOR SWITCH AND CHASSIS GROUND.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from inhibitor switch. 3) Measure the resistance of harness between inhibitor switch and chassis ground. ***Connector & terminal*** ***(T7) No. 5 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **23.**	Repair the open circuit in harness between inhibitor switch connector and chassis ground, and poor contact in coupling connector.
23	**CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and inhibitor switch. 3) Measure the resistance of harness between TCM and inhibitor switch connector. ***Connector & terminal*** ***(B55) No. 1 — (T7) No. 9:***	Is the resistance less than 1 Ω?	Go to step **24.**	Repair the open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.
24	**CHECK INPUT SIGNAL FOR TCM.** 1) Turn the ignition switch to OFF. 2) Connect the connector to TCM and inhibitor switch. 3) Turn the ignition switch to ON. 4) Move the select lever to “P” range. 5) Measure the voltage between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 1 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **25.**	Go to step **65.**
25	**CHECK INPUT SIGNAL FOR TCM.** 1) Position the select lever to any other than “P” range. 2) Measure the voltage between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 1 (+) — Chassis ground (−):***	Is the voltage more than 8 V?	Go to step **65.**	Replace the TCM. <Ref. to 4AT-75, Transmission Control Module (TCM).>
26	**CHECK “P” RANGE INDICATOR LIGHT BULB.** 1) Turn the ignition switch to OFF. 2) Remove the combination meter. 3) Remove the “P” range indicator light bulb from combination meter.	Is the “P” range indicator light bulb OK?	Go to step **27.**	Replace the “P” range indicator light bulb. <Ref. to IDI-12, Combination Meter.>
27	**CHECK HARNESS CONNECTOR BETWEEN TCM AND COMBINATION METER.** 1) Disconnect the connectors from TCM and combination meter. 2) Measure the resistance of harness between TCM and combination meter. ***Connector & terminal*** ***(B55) No. 1 — (i12) No. 14:***	Is the resistance less than 1 Ω?	Go to step **65.**	Repair the open circuit in harness between TCM connector and combination meter, and poor contact in coupling connector.
28	**CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM, inhibitor switch and combination meter. 3) Measure the resistance of harness between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 1 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **29.**	Repair the ground short circuit in “P” range circuit.

	Step	Check	Yes	No
29	**CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and inhibitor switch. 3) Measure the resistance of harness between TCM and inhibitor switch connector. ***Connector & terminal*** ***(B55) No. 3 — (T7) No. 8:***	Is the resistance less than 1 Ω?	Go to step **30.**	Repair the open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.
30	**CHECK INPUT SIGNAL FOR TCM.** 1) Turn the ignition switch to OFF. 2) Connect the connector to TCM and inhibitor switch. 3) Turn the ignition switch to ON. 4) Move the select lever to "R" range. 5) Measure the voltage between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 3 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **31.**	Go to step **65.**
31	**CHECK INPUT SIGNAL FOR TCM.** 1) Position the select lever to any other than "R" range. 2) Measure the voltage between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 3 (+) — Chassis ground (−):***	Is the voltage more than 8 V?	Go to step **65.**	Replace the TCM. <Ref. to 4AT-75, Transmission Control Module (TCM).>
32	**CHECK "R" RANGE INDICATOR LIGHT BULB.** 1) Turn the ignition switch to OFF. 2) Remove the combination meter. 3) Remove the "R" range indicator light bulb from combination meter.	Is "R" range indicator light bulb OK?	Go to step **33.**	Replace the "R" range indicator light bulb. <Ref. to IDI-12, Combination Meter.>
33	**CHECK HARNESS CONNECTOR BETWEEN TCM AND COMBINATION METER.** 1) Disconnect the connectors from TCM and combination meter. 2) Measure the resistance of harness between TCM and combination meter. ***Connector & terminal*** ***(B55) No. 3 — (i12) No. 13:***	Is the resistance less than 1 Ω?	Go to step **65.**	Repair the open circuit in harness between TCM connector and combination meter, and poor contact in TCM connector.
34	**CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM, inhibitor switch and combination meter. 3) Measure the resistance of harness between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 3 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **35.**	Repair the ground short circuit in "R" range circuit.
35	**CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and inhibitor switch. 3) Measure the resistance of harness between TCM and inhibitor switch connector. ***Connector & terminal*** ***(B55) No. 14 — (T7) No. 10:***	Is the resistance less than 1 Ω?	Go to step **36.**	Repair the open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.

	Step	Check	Yes	No
36	**CHECK INPUT SIGNAL FOR TCM.** 1) Turn the ignition switch to OFF. 2) Connect the connector to TCM and inhibitor switch. 3) Turn the ignition switch to ON. 4) Move the select lever to "N" range. 5) Measure the voltage between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 14 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Go to step **37.**	Go to step **65.**
37	**CHECK INPUT SIGNAL FOR TCM.** 1) Position the select lever to any other than "N" range. 2) Measure the voltage between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 14 (+) — Chassis ground (–):***	Is the voltage more than 8 V?	Go to step **65.**	Replace the TCM. <Ref. to 4AT-75, Transmission Control Module (TCM).>
38	**CHECK "N" RANGE INDICATOR LIGHT BULB.** 1) Turn the ignition switch to OFF. 2) Remove the combination meter. 3) Remove the "N" range indicator light bulb from combination meter.	Is the "N" range indicator light bulb OK?	Go to step **39.**	Replace the "N" range indicator light bulb. <Ref. to IDI-12, Combination Meter.>
39	**CHECK HARNESS CONNECTOR BETWEEN TCM AND COMBINATION METER.** 1) Disconnect the connectors from TCM and combination meter. 2) Measure the resistance of harness between TCM and combination meter. ***Connector & terminal*** ***(B55) No. 14 — (i12) No. 12:***	Is the resistance less than 1 Ω?	Go to step **65.**	Repair the open circuit in harness between TCM connector and combination meter, and poor contact in TCM connector.
40	**CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM, inhibitor switch and combination meter. 3) Measure the resistance of harness between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 14 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **41.**	Repair the ground short circuit in "N" range circuit.
41	**CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and inhibitor switch. 3) Measure the resistance of harness between TCM and inhibitor switch connector. ***Connector & terminal*** ***(B55) No. 4 — (T7) No. 3:***	Is the resistance less than 1 Ω?	Go to step **42.**	Repair the open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.
42	**CHECK INPUT SIGNAL FOR TCM.** 1) Turn the ignition switch to OFF. 2) Connect the connector to TCM and inhibitor switch. 3) Turn the ignition switch to ON. 4) Move the select lever to "D" range. 5) Measure the voltage between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 4 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Go to step **43.**	Go to step **65.**

	Step	Check	Yes	No
43	**CHECK INPUT SIGNAL FOR TCM.** 1) Position select lever to any other than "D" range. 2) Measure the voltage between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 4 (+) — Chassis ground (−):***	Is the voltage more than 8 V?	Go to step **65.**	Replace the TCM. <Ref. to 4AT-75, Transmission Control Module (TCM).>
44	**CHECK "D" RANGE INDICATOR LIGHT BULB.** 1) Turn the ignition switch to OFF. 2) Remove the combination meter. 3) Remove the "D" range indicator light bulb from combination meter.	Is the "D" range indicator light bulb OK?	Go to step **45.**	Replace the "D" range indicator light bulb. <Ref. to IDI-12, Combination Meter.>
45	**CHECK HARNESS CONNECTOR BETWEEN TCM AND COMBINATION METER.** 1) Disconnect the connectors from TCM and combination meter. 2) Measure the resistance of harness between TCM and combination meter. ***Connector & terminal*** ***(B55) No. 4 — (i12) No. 11:***	Is the resistance less than 1 Ω?	Go to step **65.**	Repair the open circuit in harness between TCM connector and combination meter, and TCM connector.
46	**CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM, inhibitor switch and combination meter. 3) Measure the resistance of harness between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 4 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **47.**	Repair the ground short circuit in "D" range circuit.
47	**CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM and inhibitor switch. 3) Measure the resistance of harness between TCM and inhibitor switch connector. ***Connector & terminal*** ***(B55) No. 5 — (T7) No. 11:***	Is the resistance less than 1 Ω?	Go to step **48.**	Repair the open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.
48	**CHECK INPUT SIGNAL FOR TCM.** 1) Turn the ignition switch to OFF. 2) Connect the connector to TCM and inhibitor switch. 3) Turn the ignition switch to ON. 4) Move the select lever to "3" range. 5) Measure the voltage between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 5 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **49.**	Go to step **65.**
49	**CHECK INPUT SIGNAL FOR TCM.** 1) Position the select lever to any other than "3" range. 2) Measure the voltage between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 5 (+) — Chassis ground (−):***	Is the voltage more than 8 V?	Go to step **65.**	Replace the TCM. <Ref. to 4AT-75, Transmission Control Module (TCM).>

	Step	Check	Yes	No
50	**CHECK "3" RANGE INDICATOR LIGHT BULB.** 1) Turn the ignition switch to OFF. 2) Remove the combination meter. 3) Remove the "3" range indicator light bulb from combination meter.	Is the "3" range indicator light bulb OK?	Go to step **51.**	Replace the "3" range indicator light bulb. <Ref. to IDI-12, Combination Meter.>
51	**CHECK HARNESS CONNECTOR BETWEEN TCM AND COMBINATION METER.** 1) Disconnect the connectors from TCM and combination meter. 2) Measure the resistance of harness between TCM and combination meter. ***Connector & terminal*** ***(B55) No. 5 — (i12) No. 10:***	Is the resistance less than 1 Ω?	Go to step **65.**	Repair the open circuit in harness between TCM connector and combination meter, and poor contact in TCM connector.
52	**CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM, inhibitor switch and combination meter. 3) Measure the resistance of harness between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 5 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **53.**	Repair the ground short circuit in "3" range circuit.
53	**CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM and inhibitor switch. 3) Measure the resistance of harness between TCM and inhibitor switch connector. ***Connector & terminal*** ***(B55) No. 6 — (T7) No. 4:***	Is the resistance less than 1 Ω?	Go to step **54.**	Repair the open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.
54	**CHECK INPUT SIGNAL FOR TCM.** 1) Turn the ignition switch to OFF. 2) Connect the connector to TCM and inhibitor switch. 3) Turn the ignition switch to ON. 4) Move the select lever to "2" range. 5) Measure the voltage between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 6 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **55.**	Go to step **65.**
55	**CHECK INPUT SIGNAL FOR TCM.** 1) Position the select lever to any other than "2" range. 2) Measure the voltage between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 6 (+) — Chassis ground (−):***	Is the voltage more than 8 V?	Go to step **65.**	Replace the TCM. <Ref. to 4AT-75, Transmission Control Module (TCM).>
56	**CHECK "2" RANGE INDICATOR LIGHT BULB.** 1) Turn the ignition switch to OFF. 2) Remove the combination meter. 3) Remove the "2" range indicator light bulb from combination meter.	Is the "2" range indicator light bulb OK?	Go to step **57.**	Replace the "2" range indicator light bulb. <Ref. to IDI-12, Combination Meter.>

	Step	Check	Yes	No
57	**CHECK HARNESS CONNECTOR BETWEEN TCM AND COMBINATION METER.** 1) Disconnect the connectors from TCM and combination meter. 2) Measure the resistance of harness between TCM and combination meter. ***Connector & terminal*** ***(B55) No. 6 — (i12) No. 4:***	Is the resistance less than 1 Ω?	Go to step **65.**	Repair the open circuit in harness between TCM and combination meter, and poor contact in TCM connector.
58	**CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM, inhibitor switch and combination meter. 3) Measure the resistance of harness between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 6 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **59.**	Repair the ground short circuit in "2" range circuit.
59	**CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and inhibitor switch. 3) Measure the resistance of harness between TCM and inhibitor switch connector. ***Connector & terminal*** ***(B55) No. 7 — (T7) No. 6:***	Is the resistance less than 1 Ω?	Go to step **60.**	Repair the open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.
60	**CHECK INPUT SIGNAL FOR TCM.** 1) Turn the ignition switch to OFF. 2) Connect the connector to TCM and inhibitor switch. 3) Turn the ignition switch to ON. 4) Move the select lever to "1" range. 5) Measure the voltage between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 7 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **61.**	Go to step **65.**
61	**CHECK INPUT SIGNAL FOR TCM.** 1) Position the select lever to any other than "1" range. 2) Measure the voltage between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 7 (+) — Chassis ground (−):***	Is the voltage more than 8 V?	Go to step **65.**	Replace the TCM. <Ref. to 4AT-75, Transmission Control Module (TCM).>
62	**CHECK "1" RANGE INDICATOR LIGHT BULB.** 1) Turn the ignition switch to OFF. 2) Remove the combination meter. 3) Remove the "1" range indicator light bulb from combination meter.	Is the "1" range indicator light bulb OK?	Go to step **63.**	Replace the "1" range indicator light bulb. <Ref. to IDI-12, Combination Meter.>
63	**CHECK HARNESS CONNECTOR BETWEEN TCM AND COMBINATION METER.** 1) Disconnect the connectors from TCM and combination meter. 2) Measure the resistance of harness between TCM and combination meter. ***Connector & terminal*** ***(B55) No. 7 — (i12) No. 5:***	Is the resistance less than 1Ω?	Go to step **65.**	Repair the open circuit in harness between TCM and combination meter, poor contact in TCM connector.

	Step	Check	Yes	No
64	**CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM, inhibitor switch and combination meter. 3) Measure the resistance of harness between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 7 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **65.**	Repair the ground short circuit in "1" range circuit.
65	**CHECK POOR CONTACT.**	Is there poor contact in inhibitor switch circuit?	Repair the poor contact.	Go to step **66.**
66	**CHECK INHIBITOR SWITCH.**	Is the inhibitor switch in specified position?	Replace the TCM.	Adjust the inhibitor switch and select cable. <Ref. to 4AT-54, ADJUSTMENT, Inhibitor Switch.> and <Ref. to CS-33, Select Cable.>

G: CHECK HOLD SWITCH

DIAGNOSIS:

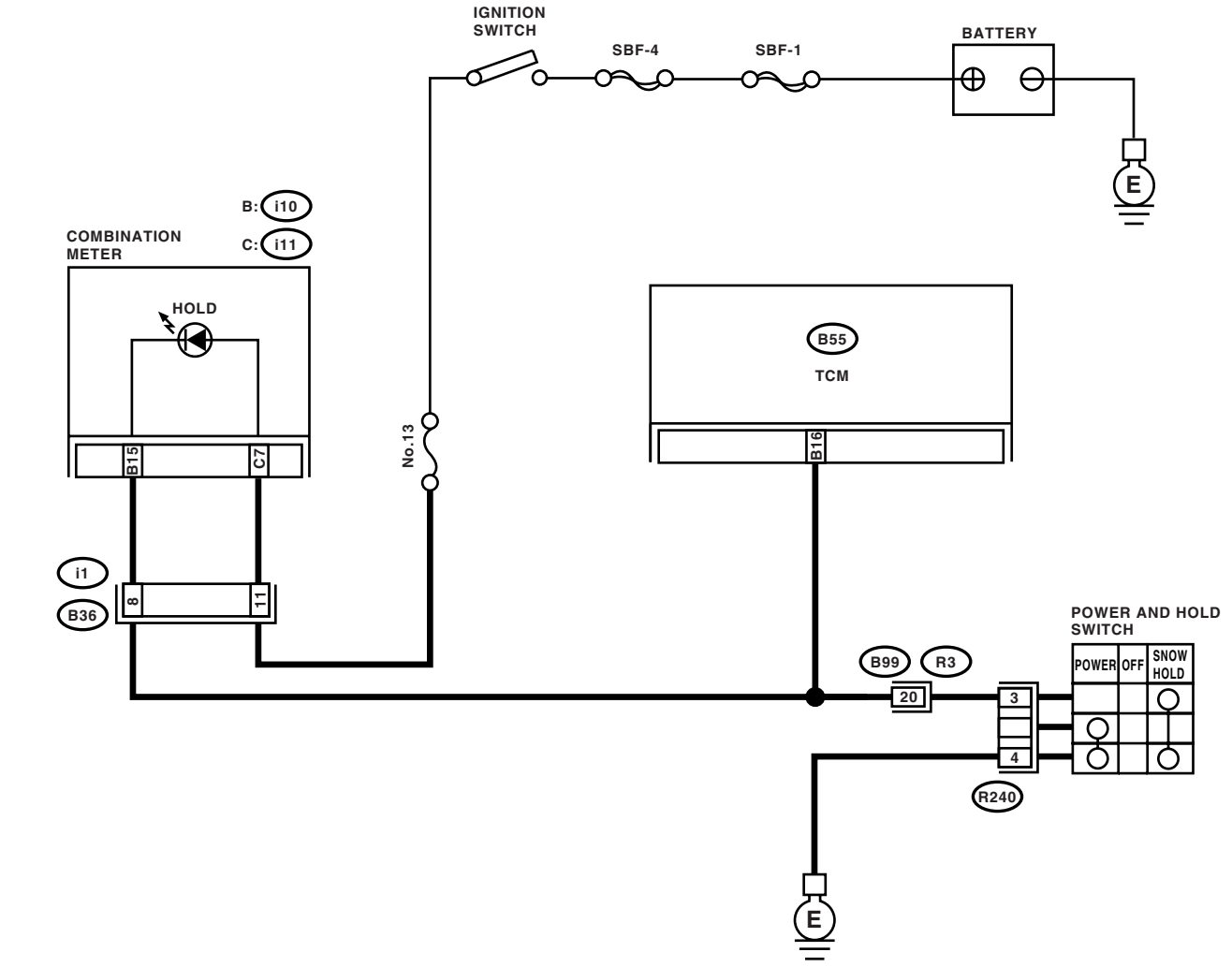
- The LED does not come on when HOLD switch is ON.
- The HOLD switch circuit is open or shorted.

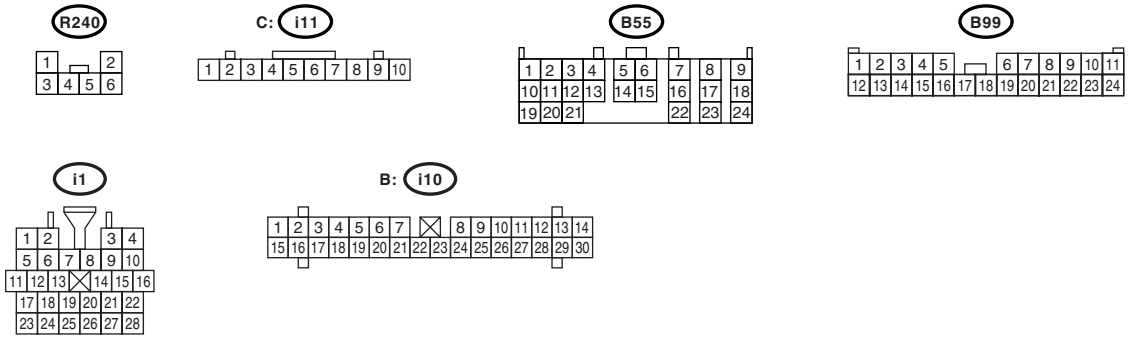
TROUBLE SYMPTOM:

- The 2nd gear is not held.
- Failure of vehicle to start in 2nd gear at “2”, “3”, “D” ranges.

WIRING DIAGRAM:

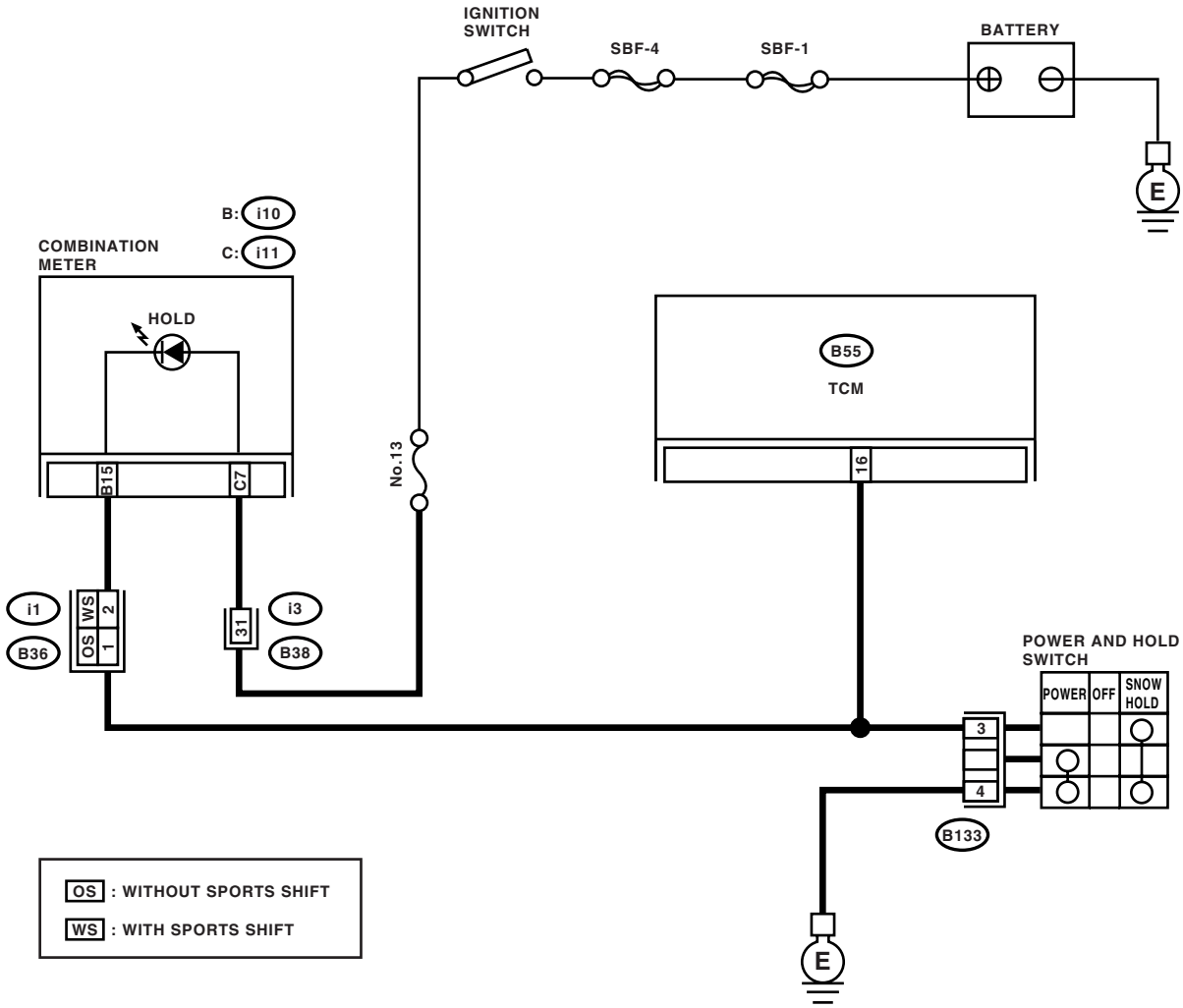
- LHD model

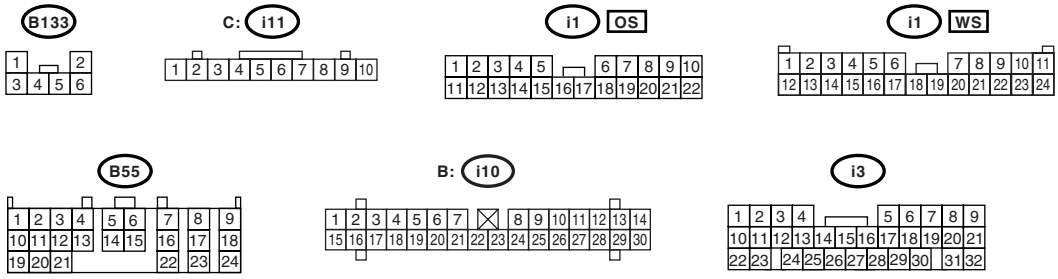




AT-03147

- RHD model





AT-03148

	Step	Check	Yes	No
1	**CHECK HOLD SWITCH OPERATION.**	When the HOLD switch is turned to OFF, does LED light up?	Go to step **5.**	Go to step **2.**
2	**CHECK HOLD SWITCH OPERATION.**	When the HOLD switch is turned to ON, does LED light up?	Go to step CHECK SPORT SHIFT SWITCH. <Ref. to 4AT(diag)-114, CHECK SPORT SHIFT SWITCH, Diagnostic Procedure without Diagnostic Trouble Code (DTC).>	Go to step **3.**
3	**CHECK HOLD INDICATOR LIGHT.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM. 3) Turn the ignition switch to ON. 4) Short the circuit between combination meter connector and chassis ground. **CAUTION:** **Be sure to short the circuit through fuse.** ***Connector & terminal*** ***(i10) No. 15 — Chassis ground:***	Does the HOLD indicator light illuminate?	Go to step **4.**	Replace the HOLD indicator light bulb. <Ref. to IDI-12, Combination Meter.>
4	**CHECK HOLD SWITCH GROUND LINE.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from HOLD switch. 3) Measure the resistance of harness connector between HOLD switch and chassis ground. ***Connector & terminal*** ***RHD model*** ***(B133) No. 4 — Chassis ground:*** ***LHD model*** ***(R240) No. 4 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **5.**	Repair the open circuit in harness between HOLD switch and chassis ground.
5	**CHECK HOLD SWITCH.** 1) Turn the HOLD switch to ON. 2) Measure the resistance between terminals of HOLD switch. ***Terminals*** ***No. 4 — No. 3:***	Is the resistance less than 1 Ω?	Go to step **6.**	Repair the HOLD switch.
6	**CHECK HOLD SWITCH.** 1) Turn the HOLD switch to OFF. 2) Measure the resistance between terminals of HOLD switch. ***Terminals*** ***No. 4 — No. 3:***	Is the resistance more than 1 MΩ?	Go to step **7.**	Repair the HOLD switch.
7	**CHECK HARNESS CONNECTOR BETWEEN TCM AND HOLD SWITCH.** 1) Disconnect the connector TCM and combination meter. 2) Measure the resistance of harness connector between TCM and HOLD switch. ***Connector & terminal*** ***RHD model*** ***(B55) No. 16 — (B133) No. 3:*** ***LHD model*** ***(B55) No. 16 — (R240) No. 3:***	Is the resistance less than 1 Ω?	Go to step **8.**	Repair the open circuit in harness between TCM and HOLD switch connector.

	Step	Check	Yes	No
8	**CHECK HARNESS CONNECTOR BETWEEN TCM AND COMBINATION METER.** Measure the resistance of harness connector TCM and combination meter. ***Connector & terminal*** ***(B55) No. 16 — (i10) No. 15:***	Is the resistance less than 1 Ω?	Go to step **9.**	Repair the open circuit in harness between TCM and combination meter.
9	**CHECK HARNESS CONNECTOR BETWEEN TCM AND HOLD SWITCH.** Measure the resistance of harness connector between TCM and chassis ground to make sure that circuit does not short. ***Connector & terminal*** ***(B55) No. 16 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **10.**	Repair the short circuit in harness between TCM and HOLD switch connector.
10	**CHECK INPUT SIGNAL FOR TCM.** 1) Connect the connectors to TCM and HOLD switch. 2) Turn the ignition switch to ON (engine OFF). 3) Measure the signal voltage for TCM while turning HOLD switch to OFF. ***Connector & terminal*** ***(B55) No. 16 (+) — Chassis ground (−):***	Is the voltage more than 8 V?	Go to step **11.**	Replace the TCM. <Ref. to 4AT-75, Transmission Control Module (TCM).>
11	**CHECK INPUT SIGNAL FOR TCM.** Measure the signal voltage for TCM while turning HOLD switch to ON. ***Connector & terminal*** ***(B55) No. 16 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **12.**	Replace the TCM. <Ref. to 4AT-75, Transmission Control Module (TCM).>
12	**CHECK POOR CONTACT.**	Is there poor contact?	Repair the poor contact.	A temporary poor contact of the connector or harness or connector in HOLD switch circuit.

H: CHECK SPORT SHIFT SWITCH

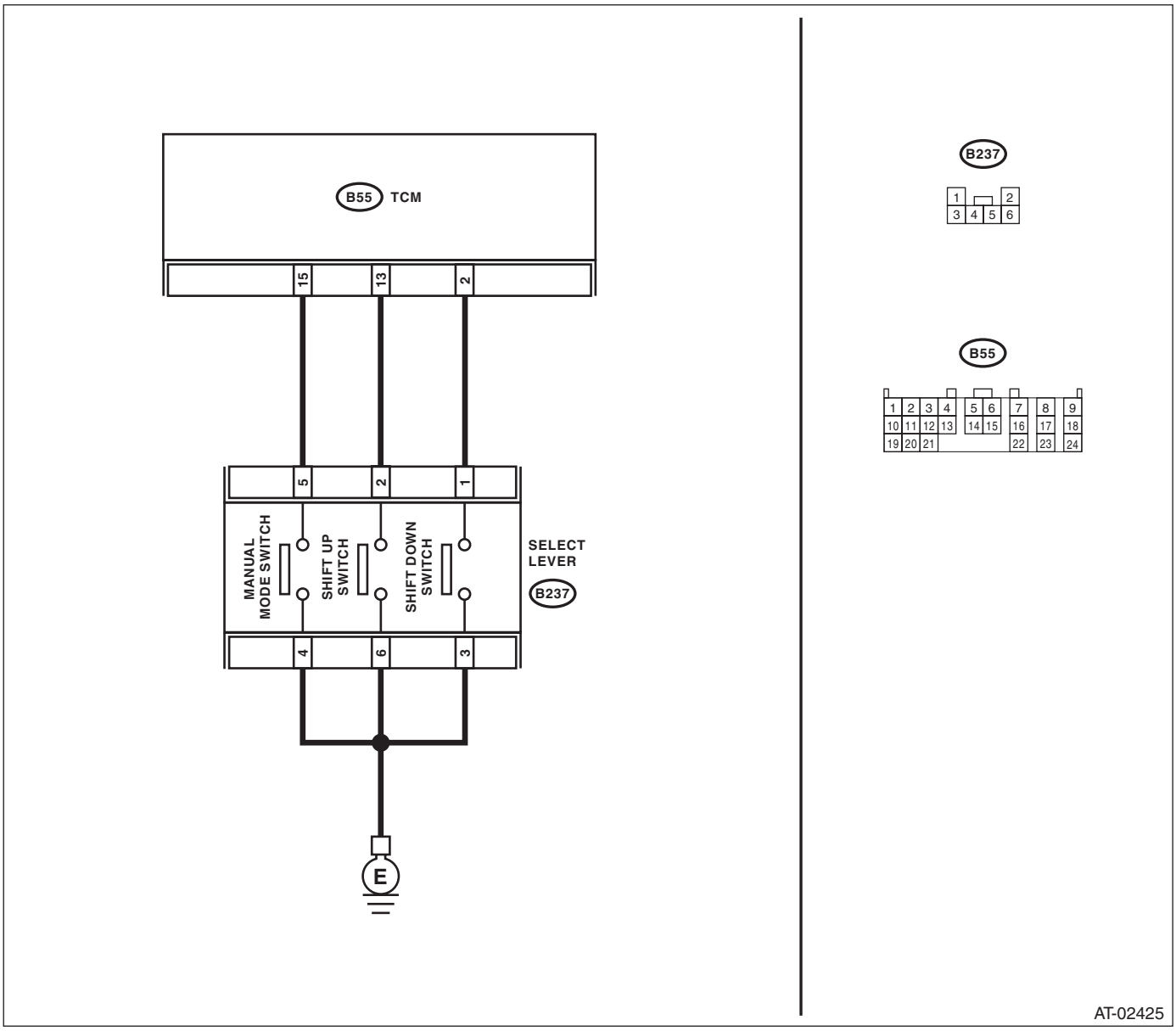
DIAGNOSIS:

The each shift switch input signal circuit is open or shorted.

TROUBLE SYMPTOM:

- No manual mode occurs.
- Does not shift gears in manual mode.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK VEHICLE.**	Is the target model equipped with SPORT shift?	Go to step **2.**	Go to step SYMPTOM RELATED DIAGNOSTIC. <Ref. to 4AT(diag)-123, General Diagnostic Table.>
2	**CHECK MANUAL MODE SWITCH.**	Does the LED light up when select lever is moved to manual mode?	Go to step **3.**	Go to step **5.**
3	**CHECK SHIFT UP SWITCH.**	Does the LED light up when select lever is moved to shift up side?	Go to step **4.**	Go to step **12.**
4	**CHECK SHIFT DOWN SWITCH.**	Does the LED light up when select lever is moved to shift down side?	Go to "Inspection of gear position indicator" procedures. <Ref. to 4AT(diag)-119, CHECK GEAR POSITION INDICATOR, Diagnostic Procedure without Diagnostic Trouble Code (DTC).>	Go to step **19.**
5	**CHECK MANUAL MODE SWITCH GROUND LINE.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from select lever. 3) Measure the resistance of harness between select lever connector and chassis ground. ***Connector & terminal*** ***(B237) No. 4 —- Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **6.**	Repair the open circuit in harness between select lever and chassis ground.
6	**CHECK MANUAL MODE SWITCH.** Measure the resistance between select lever connector terminals. ***Terminals*** ***No. 4 —- No. 5:***	Is the resistance more than 1 MΩ?	Go to step **7.**	Replace the lever plate assembly.
7	**CHECK MANUAL MODE SWITCH.** 1) Shift the select lever to manual mode. 2) Measure the resistance between select lever terminals. ***Terminals*** ***No. 4 — No. 5:***	Is the resistance less than 1 Ω?	Go to step **8.**	Replace the lever plate assembly.
8	**CHECK HARNESS CONNECTOR BETWEEN TCM AND SELECT LEVER.** 1) Disconnect the connector from TCM. 2) Measure the resistance of harness between TCM connector and select lever connector. ***Connector & terminal*** ***(B237) No. 5 — (B55) No. 15:***	Is the resistance less than 1 Ω?	Go to step **9.**	Repair the open circuit in harness between select lever connector and TCM connector and poor contact in coupling connector.

	Step	Check	Yes	No
9	**CHECK HARNESS CONNECTOR BETWEEN TCM AND SELECT LEVER.** 1) Disconnect the connector from TCM. 2) Measure the resistance of harness between select lever connector and chassis ground. ***Connector & terminal*** ***(B237) No. 5 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **10.**	Repair the short circuit in harness between select lever connector and TCM connector.
10	**CHECK INPUT SIGNAL FOR TCM.** 1) Connect the connector to TCM and select lever. 2) Turn the ignition switch to ON. (Engine is stopped.) 3) Move the select lever to normal mode. 4) Measure the signal voltage for TCM. ***Connector & terminal*** ***(B55) No. 15 (+) — Chassis ground (–):***	Is the voltage more than 9 V?	Go to step **11.**	Replace the TCM. <Ref. to 4AT-75, Transmission Control Module (TCM).>
11	**CHECK INPUT SIGNAL FOR TCM.** 1) Move the select lever to manual mode. 2) Measure the signal voltage for TCM. ***Connector & terminal*** ***(B55) No. 15 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair the harness or connector in sport shift switch circuit.	Go to step **26.**
12	**CHECK SHIFT UP SWITCH GROUND LINE.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from select lever. 3) Measure the resistance of harness between select lever connector and chassis ground. ***Connector & terminal*** ***(B237) No. 6 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **13.**	Repair the open circuit in harness between select lever and chassis ground.
13	**CHECK SHIFT UP SWITCH.** Measure the resistance between select lever terminals. ***Terminals*** ***No. 6 — No. 2:***	Is the resistance more than 1 MΩ?	Go to step **14.**	Replace the guide plate assembly.
14	**CHECK SHIFT UP SWITCH.** 1) Shift the select lever to manual mode. 2) Measure the resistance between select lever connector terminals while holding the select lever to shift side. ***Terminals*** ***No. 6 — No. 2:***	Is the resistance less than 1 Ω?	Go to step **15.**	Replace the guide plate assembly.
15	**CHECK HARNESS CONNECTOR BETWEEN TCM AND SELECT LEVER.** 1) Disconnect the connector from TCM. 2) Measure the resistance of harness between TCM connector and select lever connector. ***Connector & terminal*** ***(B237) No. 2 — (B55) No. 13:***	Is the resistance less than 1 Ω?	Go to step **16.**	Repair the open circuit in harness between select lever connector and TCM connector and poor contact in coupling connector.

	Step	Check	Yes	No
16	**CHECK HARNESS CONNECTOR BETWEEN TCM AND SELECT LEVER.** Measure the resistance of harness between select lever connector and chassis ground. ***Connector & terminal*** ***(B237) No. 2 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **17.**	Repair the short circuit in harness between select lever connector and TCM connector.
17	**CHECK INPUT SIGNAL FOR TCM.** 1) Connect the all connectors. 2) Turn the ignition switch to ON. (Engine is stopped.) 3) Measure signal voltage for TCM. ***Connector & terminal*** ***(B55) No. 13 (+) — Chassis ground (−):***	Is the voltage more than 9 V?	Go to step **18.**	Replace the TCM. <Ref. to 4AT-75, Transmission Control Module (TCM).>
18	**CHECK INPUT SIGNAL FOR TCM.** 1) Move the select lever to shift up side. 2) Measure the signal voltage for TCM. ***Connector & terminal*** ***(B55) No. 13 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair the harness or connector in sport shift switch circuit.	Go to step **26.**
19	**CHECK SHIFT DOWN SWITCH GROUND LINE.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from select lever. 3) Measure the resistance of harness between select lever connector and chassis ground. ***Connector & terminal*** ***(B237) No. 3 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **20.**	Repair the open circuit in harness between select lever and chassis ground.
20	**CHECK SHIFT DOWN SWITCH.** Measure the resistance between select lever connector terminals. ***Terminals*** ***No. 3 — No. 1:***	Is the resistance more than 1 MΩ?	Go to step **21.**	Replace the guide plate assembly.
21	**CHECK SHIFT DOWN SWITCH.** 1) Shift the select lever to shift down and hold it. 2) Measure the resistance between select lever connector terminals while holding the select lever to shift down side. ***Terminals*** ***No. 3 — No. 1:***	Is the resistance less than 1 Ω?	Go to step **22.**	Replace the guide plate assembly.
22	**CHECK HARNESS CONNECTOR BETWEEN TCM AND SELECT LEVER.** 1) Disconnect the connector from TCM. 2) Measure the resistance of harness between TCM connector and select lever connector. ***Connector & terminal*** ***(B237) No. 1 — (B55) No. 2:***	Is the resistance less than 1 Ω?	Go to step **23.**	Repair the open circuit in harness between select lever connector and TCM connector and poor contact in coupling connector.

	Step	Check	Yes	No
23	**CHECK HARNESS CONNECTOR BETWEEN TCM AND SELECT LEVER.** 1) Disconnect the select lever connector. 2) Measure the resistance of harness between select lever connector and chassis ground. ***Connector & terminal*** ***(B237) No. 1 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **24.**	Repair the short circuit in harness between select lever connector and TCM connector.
24	**CHECK INPUT SIGNAL FOR TCM.** 1) Connect the all connectors. 2) Turn the ignition switch to ON. (Engine is stopped.) 3) Measure the signal voltage for TCM. ***Connector & terminal*** ***(B55) No. 2 (+) — Chassis ground (−):***	Is the voltage more than 9 V?	Go to step **25.**	Replace the TCM. <Ref. to 4AT-75, Transmission Control Module (TCM).>
25	**CHECK INPUT SIGNAL FOR TCM.** 1) Move the select lever to shift down side. 2) Measure the signal voltage for TCM. ***Connector & terminal*** ***(B55) No. 2 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair the harness or connector in sport shift switch circuit.	Go to step **26.**
26	**CHECK POOR CONTACT.**	Is there poor contact in SPORT shift switch circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-75, Transmission Control Module (TCM).>

I: CHECK GEAR POSITION INDICATOR

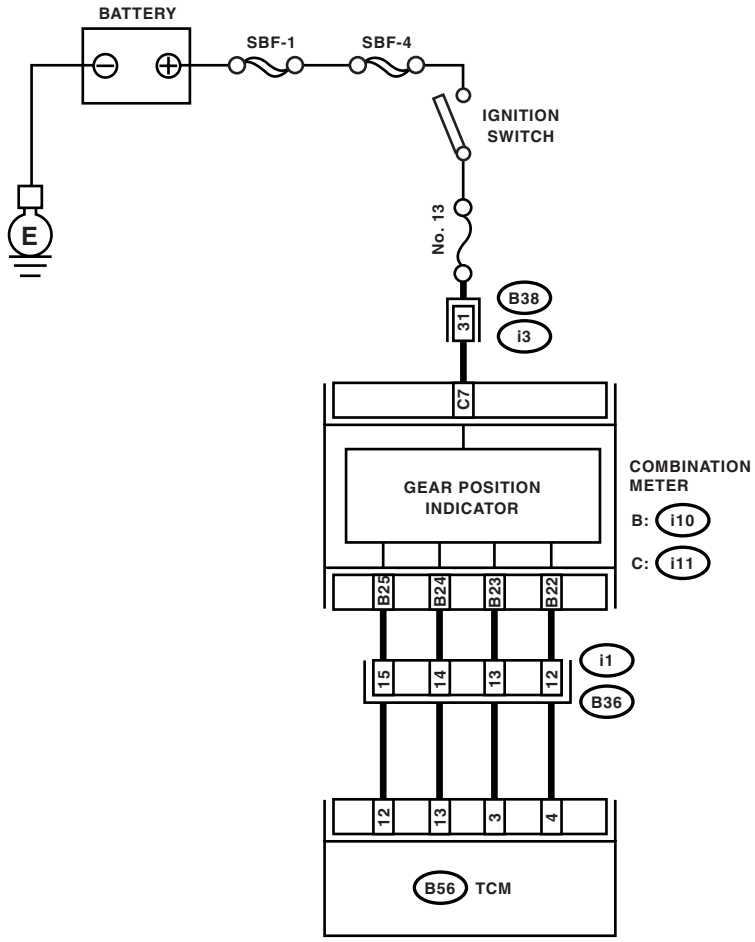
DIAGNOSIS:

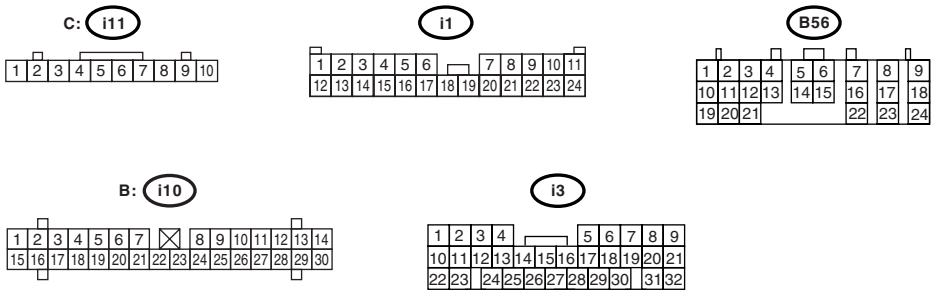
The gear position indicator output signal circuit is open or shorted.

TROUBLE SYMPTOM:

- The gear position indicator does not illuminate or remains illuminated.
- The gear position indicator display does not change.

WIRING DIAGRAM:





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	Step	Check	Yes	No
1	**CHECK GEAR POSITION INDICATOR.**	Does the gear position indicator operate normally when driving in manual mode?	<Ref. to 4AT(diag)-121, CHECK BUZZER, Diagnostic Procedure without Diagnostic Trouble Code (DTC).>	Go to step **2.**
2	**CHECK COMBINATION METER.**	Do the meters and indicators other than gear position indicator operate normally?	Go to step **3.**	Check the combination meter.
3	**CHECK HARNESS CONNECTOR BETWEEN TCM AND COMBINATION METER.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM and combination meter. 3) Measure the resistance of harness between TCM and combination meter. ***Connector & terminal*** ***(B56) No. 3 — (i10) No. 23:*** ***(B56) No. 4 — (i10) No. 22:*** ***(B56) No. 12 — (i10) No. 25:*** ***(B56) No. 13 — (i10)No. 24:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the open circuit in harness between TCM and combination meter connector and poor contact in coupling connector.
4	**CHECK HARNESS CONNECTOR BETWEEN TCM AND COMBINATION METER.** Measure the resistance between TCM and chassis ground. ***Connector & terminal*** ***(B56) No. 3 — Chassis ground:*** ***(B56) No. 4 — Chassisground:*** ***(B56) No. 12 — Chassis ground:*** ***(B56) No. 13 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **5.**	Repair the short circuit in harness between TCM and combination meter connector.
5	**CHECK OUTPUT SIGNAL EMITTED FROM TCM.** 1) Connect the connector to TCM and combination meter. 2) Turn the ignition switch to ON. (Engine is stopped.) 3) Measure the voltage between TCM and chassis ground. ***Connector & terminal*** ***(B56) No. 3 (+) — Chassis ground (−):*** ***(B56)No. 4 (+) — Chassis ground (−):*** ***(B56)No. 12 (+) — Chassis ground (−):*** ***(B56)No. 13 (+) — Chassis ground (−):***	Is the voltage more than 4 V?	Go to step **6.**	Replace the combination meter.
6	**CHECK POOR CONTACT.**	Is there poor contact in gear position indicator circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-75, Transmission Control Module (TCM).>

J: CHECK BUZZER

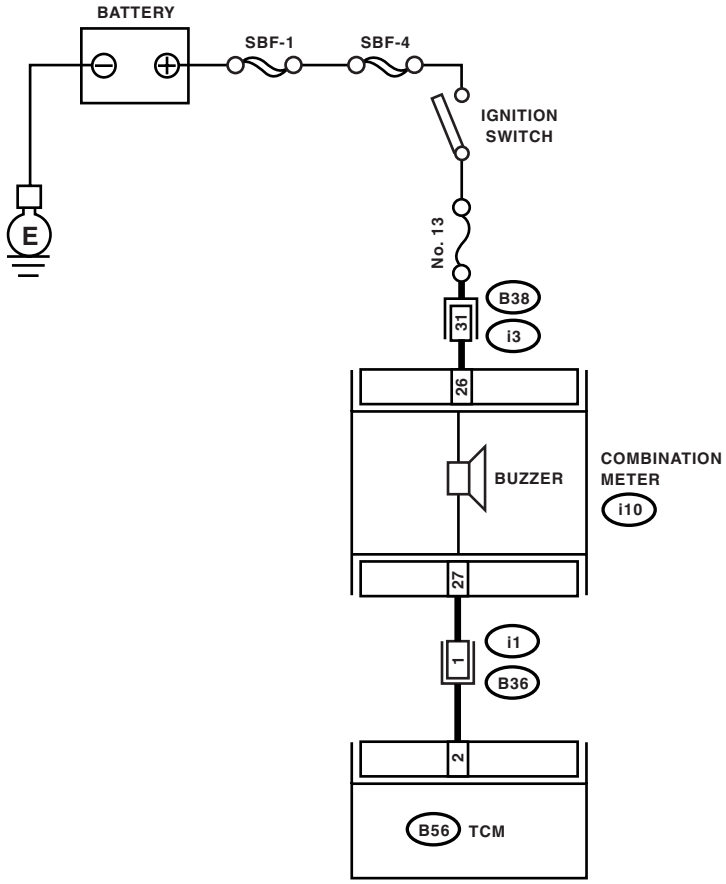
DIAGNOSIS:

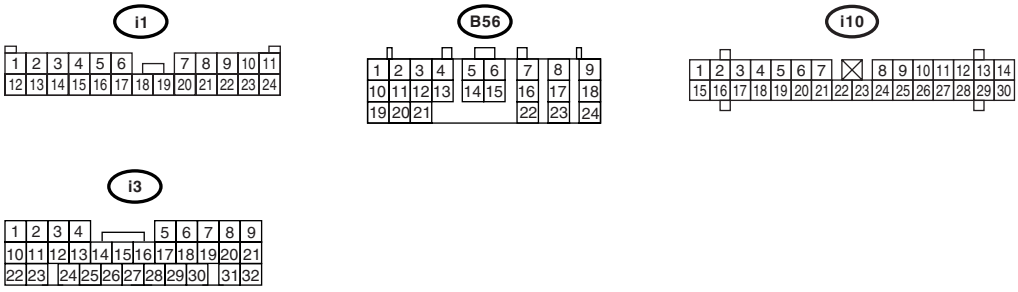
The buzzer output signal circuit is open or shorted.

TROUBLE SYMPTOM:

The buzzer remains sounded.

WIRING DIAGRAM:





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	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN TCM AND COMBINATION METER.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from combination meter and TCM. 3) Measure the resistance between TCM connector and chassis ground. ***Connector & terminal*** ***(B56) No. 2 — Chassis ground:***	Is the resistance more than1 MΩ?	Go to step **2.**	Repair the short circuit in harness between TCM and combination meter connector.
2	**CHECK COMBINATION METER.** 1) Connect the connector to combination meter. 2) Turn the ignition switch to ON. (Engine is stopped.)	Does the buzzer sound?	Replace the combination meter.	Go to step **3.**
3	**CHECK POOR CONTACT.**	Is there poor contact in buzzer circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-75, Transmission Control Module (TCM).>

15.General Diagnostic Table

A: INSPECTION

Symptom	Problem parts
Starter does not rotate when select lever is in “P” or “N” range; starter rotates when select lever is in “R”, “D”, “3” or “2” range.	• Inhibitor switch • Select cable • Select lever • Starter motor and harness
Abnormal noise when select lever is in “P” or “N” range.	• Strainer • Transfer duty solenoid • Oil pump • Drive plate • ATF level too high or too low
Hissing noise occurs during standing start.	• Strainer • ATF level too high or too low
Noise occurs while driving in “D1”.	• Final gear • Planetary gear • Reduction gear • Differential gear oil level too high or too low
Noise occurs while driving in “D2”.	
Noise occurs while driving in “D3”.	• Final gear • Low & reverse brake • Reduction gear • Differential gear oil level too high or too low
Noise occurs while driving in “D4”.	• Final gear • Low & reverse brake • Planetary gear • Reduction gear • Differential gear oil level too high or too low
Engine stalls while shifting from one range to another.	• Control valve • Lock-up damper • Engine performance • Input shaft
Vehicle moves when select lever is in “N” range.	• Low clutch
Shock occurs when select lever is moved from “N” to “D” range.	• TCM • Harness • Control valve • ATF deterioration
Excessive time lag occurs when select lever is moved from “N” to “D” range.	• Control valve • Low clutch • Line pressure duty solenoid • Seal ring • Front gasket transmission case
Shock occurs when select lever is moved from “N” to “R” range.	• TCM • Harness • Control valve • ATF deterioration
Excessive time lag occurs when select lever is moved from “N” to “R” range.	• Control valve • Low & reverse clutch • Reverse clutch • Line pressure duty solenoid • Seal ring • Front gasket transmission case
Vehicle does not start in any shift range (engine stalls).	• Parking brake mechanism • Planetary gear

General Diagnostic Table

Symptom	Problem parts
Vehicle does not start in any shift range (engine revving up).	• Strainer • Line pressure duty solenoid • Control valve • Drive pinion • Hypoid gear • Axle shaft • Differential gear • Oil pump • Input shaft • Output shaft • Planetary gear • Drive plate • ATF level too low • Front gasket transmission case
Vehicle does not start in “R” range only (engine revving up).	• Select cable • Select lever • Control valve • Low & reverse clutch • Reverse clutch
Vehicle does not start in “R” range only (engine stalls).	• Low clutch • 2-4 brake • Planetary gear • Parking brake mechanism
Vehicle does not start in “D”, “3” range only (engine revving up).	• Low clutch • One-way clutch
Vehicle does not start in “D”, “3” or “2” range only (engine revving up).	• Low clutch
Vehicle does not start in “D”, “3” or “2” range only (engine stalls).	• Reverse clutch
Vehicle starts in “R” range only (engine revving up).	• Control valve
Acceleration during standing starts is poor (high stall rpm).	• Control valve • Low clutch • Reverse clutch • ATF level too low • Front gasket transmission case • Differential gear oil level too high or too low
Acceleration during standing starts is poor (low stall rpm).	• Oil pump • Torque converter one-way clutch • Engine performance
Acceleration is poor when select lever is in “D”, “3” or “2” range (normal stall rpm).	• TCM • Control valve • High clutch • 2-4 brake • Planetary gear
Acceleration is poor when select lever is in “R” (normal stall rpm).	• Control valve • High clutch • 2-4 brake • Planetary gear
No shift occurs from 1st to 2nd gear.	• TCM • Rear vehicle speed sensor • Front vehicle speed sensor • Throttle position sensor • Shift solenoid 1 • Control valve • 2-4 brake
No shift occurs from 2nd to 3rd gear.	• TCM • Control valve • High clutch • Shift solenoid 2

Symptom	Problem parts
No shift occurs from 3rd to 4th gear.	• TCM • Shift solenoid 1 • ATF temperature sensor • Control valve • 2-4 brake
Engine brake is not effected when select lever is in “3” range.	• Inhibitor switch • TCM • Throttle position sensor • Control valve
Engine brake is not effected when select lever is in “3” or “2” range.	• Control valve
Engine brake is not effected when select lever is in “1” range.	• Control valve • Low & reverse brake
Shift characteristics are erroneous.	• Inhibitor switch • TCM • Front vehicle speed sensor • Rear vehicle speed sensor • Throttle position sensor • Control valve • Ground earth
No lock-up occurs.	• TCM • Throttle position sensor • ATF temperature sensor • Control valve • Lock-up facing • Engine speed signal
Parking brake is not effected.	• Select cable • Select lever • Parking mechanism
Shift lever cannot be moved or is hard to move from “P” range.	
ATF spurts out.	• ATF level too high
Differential oil spurts out.	• Differential gear oil too high
Differential oil level changes excessively.	• Seal pipe • Double oil seal
Odor is produced from ATF supply pipe.	• High clutch • 2-4 brake • Low & reverse clutch • Reverse clutch • Lock-up facing • ATF deterioration
Shock occurs from 1st to 2nd gear.	• TCM • Throttle position sensor • 2-4 brake duty solenoid • ATF temperature sensor • Line pressure duty solenoid • Control valve • 2-4 brake • ATF deterioration • Engine performance • 2-4 brake timing solenoid
Slippage occurs from 1st to 2nd gear.	• TCM • Throttle position sensor • 2-4 brake duty solenoid • ATF temperature sensor • Line pressure duty solenoid • Control valve • 2-4 brake • 2-4 brake timing solenoid • High clutch

Symptom	Problem parts
Shock occurs from 2nd to 3rd gear.	• TCM • Throttle position sensor • 2-4 brake duty solenoid • ATF temperature sensor • Line pressure duty solenoid • Control valve • High clutch • 2-4 brake • ATF deterioration • Engine performance • 2-4 brake timing solenoid
Slippage occurs from 2nd to 3rd gear.	• TCM • Throttle position sensor • 2-4 brake duty solenoid • ATF temperature sensor • Line pressure duty solenoid • Control valve • High clutch • 2-4 brake • 2-4 brake timing solenoid
Shock occurs from 3rd to 4th gear.	• TCM • Throttle position sensor • 2-4 brake duty solenoid • ATF temperature sensor • Line pressure duty solenoid • Control valve • 2-4 brake timing solenoid • 2-4 brake • ATF deterioration • Engine performance • Low clutch timing solenoid • Low clutch
Slippage occurs from 3rd to 4th gear.	• TCM • Throttle position sensor • 2-4 brake duty solenoid • ATF temperature sensor • Line pressure duty solenoid • Control valve • 2-4 brake • 2-4 brake timing solenoid
Shock occurs when select lever is moved from “3” to “2” range.	• TCM • Throttle position sensor • ATF temperature sensor • Line pressure duty solenoid • Control valve • 2-4 brake duty solenoid • 2-4 brake • ATF deterioration • 2-4 brake timing solenoid
Shock occurs when select lever is moved from “D” to “1” range.	• TCM • Throttle position sensor • ATF temperature sensor • Line pressure duty solenoid • Control valve • ATF deterioration • 2-4 brake duty solenoid • 2-4 brake timing solenoid • Low clutch timing solenoid

Symptom	Problem parts
Shock occurs when select lever is moved from “2” to “1” range.	• TCM • Throttle position sensor • ATF temperature sensor • Line pressure duty solenoid • Control valve • Low & reverse clutch • ATF deterioration • 2-4 brake duty solenoid • 2-4 brake timing solenoid • Low clutch timing solenoid
Shock occurs when accelerator pedal is released at medium speeds.	• TCM • Throttle position sensor • ATF temperature sensor • Line pressure duty solenoid • Control valve • Lock-up damper • Engine performance • 2-4 brake duty solenoid • 2-4 brake timing solenoid • Low clutch timing solenoid
Vibration occurs during straight-forward operation.	• TCM • Lock-up duty solenoid • Lock-up facing • Lock-up damper • HOLD switch
Vibration occurs during turns (tight corner “braking” phenomenon).	• TCM • Front vehicle speed sensor • Rear vehicle speed sensor • Throttle position sensor • ATF temperature sensor • Transfer clutch • Transfer valve • Transfer duty solenoid • ATF deterioration • Harness • HOLD switch
Front wheel slippage occurs during standing starts.	• TCM • Front vehicle speed sensor • FWD switch • Throttle position sensor • ATF temperature sensor • Control valve • Transfer clutch • Transfer valve • Transfer pipe • Transfer duty solenoid
Vehicle is not set in FWD mode.	• TCM • FWD switch • Transfer clutch • Transfer valve • Transfer duty solenoid
Select lever is hard to move.	• Select cable • Select lever • Detente spring • Manual plate
Select lever is too high to move (unreasonable resistance).	• Detente spring • Manual plate

Symptom	Problem parts
Select lever slips out of operation during acceleration or while driving on rough terrain.	• Select cable • Select lever • Detente spring • Manual plate

MANUAL TRANSMISSION AND DIFFERENTIAL

5MT

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1. General Description

A: SPECIFICATION

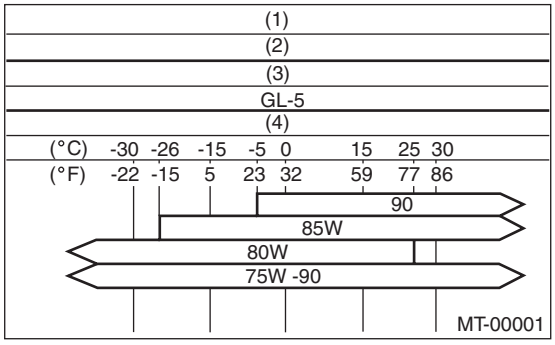
1. MANUAL TRANSMISSION AND DIFFERENTIAL

Model			1.6 L		2.0 L Non-turbo	2.0 L Turbo		2.5 L Non-turbo
			FWD	AWD		Except Australia	Australia	
Type			5-forward speeds with synchromesh and 1-reverse 5×2-forward speeds with synchromesh and 2-reverse*					
Transmission gear ratio		1st	3.454			3.454	3.166	3.454
		2nd	2.062			1.947	1.882	2.062
		3rd	1.448			1.366	1.296	1.448
		4th	1.088			0.972		1.088
		5th	0.825			0.738		0.780
		Reverse	3.333					
Auxiliary transmission gear ratio*		High	—	1.000		—		
		Low	—	1.447		—		
Front reduction gear	Final	Type of gear	Hypoid					
		Gear ratio	4.111		3.900	3.900	4.444	4.111
Rear reduction gear	Transfer	Type of gear	—	Helical				
		Gear ratio	—	1.000		1.100	1.000	
	Final	Type of gear	—	Hypoid				
		Gear ratio	—	4.111	3.900	3.545	4.444	4.111
Front differential	Type and number of gear		Straight bevel gear (Bevel pinion: 2, Bevel gear: 2)					
Center differential	Type and number of gear		—	Straight bevel gear (Bevel pinion: 2, Bevel gear: 2 and viscous coupling)				
Transmission gear oil			GL-5					
Transmission oil capacity			3.3 ℓ (3.5 US qt, 2.9 Imp qt)	3.5 ℓ (3.7 US qt, 3.1 Imp qt) 4.0 ℓ (4.2 US qt, 3.5 Imp qt)*				

*: Dual-range model

2. TRANSMISSION GEAR OIL

Recommended oil



(1) Item
(2) Transmission gear oil
(3) API standard
(4) SAE viscosity No. and applicable temperature

3. TRANSMISSION CASE ASSEMBLY

Drive pinion shim adjustment

Hypoid gear backlash:
0.13 — 0.18 mm (0.0051 — 0.0071 in)

Drive pinion shim			
Part No.	Thickness mm (in)	Part No.	Thickness mm (in)
32295AA031	0.150 (0.0059)	32295AA071	0.250 (0.0098)
32295AA041	0.175 (0.0069)	32295AA081	0.275 (0.0108)
32295AA051	0.200 (0.0079)	32295AA091	0.300 (0.0118)
32295AA061	0.225 (0.0089)	32295AA101	0.500 (0.0197)

Selection of main shaft rear plate

Main shaft rear plate		
Dimension “A” mm (in)	Part No.	Mark
4.00 — 4.13 (0.1575 — 0.1626)	32294AA041	1
3.87 — 3.99 (0.1524 — 0.1571)	32294AA051	2

Snap ring to counter washer clearance:
0.05 — 0.35 mm (0.0020 — 0.0138 in)

Snap ring (Outer-19)	
Part No.	Thickness mm (in)
031319000	1.50 (0.0591)
805019010	1.72 (0.0677)

Input shaft holder adjustment

Dimension “D” mm (in)	Number of shim
52.50 — 53.11 (2.0669 — 2.0909)	—
52.00 — 52.49 (2.0472 — 2.0665)	1
51.26 — 51.99 (2.0181 — 2.0468)	2

4. DRIVE PINION ASSEMBLY

• AWD model

Preload adjustment of thrust bearing

Starting torque:
0.3 — 0.8 N·m (0.03 — 0.08 kgf-m, 0.2 — 0.6 ft-lb)

Adjusting washer No. 1	
Part No.	Thickness mm (in)
803025051	3.925 (0.1545)
803025052	3.950 (0.1555)
803025053	3.975 (0.1565)
803025054	4.000 (0.1575)
803025055	4.025 (0.1585)
803025056	4.050 (0.1594)
803025057	4.075 (0.1604)

Adjusting washer No. 2	
Part No.	Thickness mm (in)
803025059	3.850 (0.1516)
803025054	4.000 (0.1575)
803025058	4.150 (0.1634)

• FWD model

Selection of 1st driven gear

1st driven gear	
Part No.	Outer diameter of bushing mm (in)
32231AA840	42.019 — 42.033 (1.6543 — 1.6548)
32231AA850	42.005 — 42.018 (1.6537 — 1.6543)
32231AA860	41.990 — 42.004 (1.6531 — 1.6537)

5. INPUT SHAFT ASSEMBLY

Snap ring (Outer-28) to ball bearing clearance:
0 — 0.12 mm (0 — 0.0047 in)

Snap ring (Outer-28)	
Part No.	Thickness mm (in)
805028050	2.48 (0.0976)
805028060	2.56 (0.1008)
805028070	2.64 (0.1039)

Snap ring (Inner-68) to bearing clearance:
0 — 0.12 mm (0 — 0.0047 in)

Snap ring (Inner-68)	
Part No.	Thickness mm (in)
805168020	1.84 (0.0724)
805168030	1.92 (0.0756)
805168040	2.00 (0.0787)

6. MAIN SHAFT

Snap ring (Outer-25) to synchronizer hub clearance:
0.060 — 0.100 mm (0.0024 — 0.0039 in)

Snap ring (Outer-25)			
Part No.	Thickness mm (in)	Part No.	Thickness mm (in)
805025051	2.42 (0.0953)	805025055	2.62 (0.1031)
805025052	2.47 (0.0972)	805025056	2.67 (0.1051)
805025053	2.52 (0.0992)	805025057	2.72 (0.1071)
805025054	2.57 (0.1012)	805025058	2.37 (0.0933)

7. REVERSE IDLER GEAR

Adjustment of reverse idler gear position

Reverse idler gear to transmission case (LH) wall clearance:
6.0 — 7.5 mm (0.236 — 0.295 in)

Reverse shifter lever		
Part No.	Mark	Remarks
32820AA070	7	Further from case wall
32820AA080	8	Standard
32820AA090	9	Closer to the case wall

After installing a suitable reverse shifter lever, adjust the clearance using washer.

Reverse idler gear to transmission case wall clearance:
0 — 0.5 mm (0 — 0.020 in)

Washer (20.5 × 26 × t)			
Part No.	Thickness mm (in)	Part No.	Thickness mm (in)
803020151	0.4 (0.016)	803020154	1.9 (0.075)
803020152	1.1 (0.043)	803020155	2.3 (0.091)
803020153	1.5 (0.059)	—	—

8. SHIFTER FORK AND ROD

Select the suitable shifter forks so that both coupling sleeve and reverse driven gear are positioned in the center of their synchromesh mechanisms.

Rod end clearance:
A: 3rd-4th — 5th
0.5 — 1.3 mm (0.020 — 0.051 in)
B: 1st-2nd — 3rd-4th
0.4 — 1.4 mm (0.016 — 0.055 in)

1st-2nd shifter fork		
Part No.	Mark	Remarks
32804AA060	1	Approach to 1st gear by 0.2 mm (0.008 in)
32804AA070	No mark	Standard
32804AA080	3	Approach to 2nd gear by 0.2 mm (0.008 in)

3rd-4th shifter fork		
Part No.	Mark	Remarks
32810AA061	1	Approach to 4th gear by 0.2 mm (0.008 in)
32810AA071	No mark	Standard
32810AA101	3	Approach to 3rd gear by 0.2 mm (0.008 in)

5th shifter fork (Non-turbo model)		
Part No.	Mark	Remarks
32812AA201	7	Approach to 5th gear by 0.2 mm (0.008 in)
32812AA211	No mark	Standard
32812AA221	9	Become distant from 5th gear by 0.2 mm (0.008 in)

5th shifter fork (Turbo model)		
Part No.	Mark	Remarks
32812AA231	7	Approach to 5th gear by 0.2 mm (0.008 in)
32812AA241	No mark	Standard
32812AA251	9	Become distant from 5th gear by 0.2 mm (0.008 in)

9. TRANSFER CASE OR REAR CASE

Neutral position adjustment

Adjustment shim	
Part No.	Thickness mm (in)
32190AA000	0.15 (0.0059)
32190AA010	0.30 (0.0118)

Reverse accent shaft		
Part No.	Mark	Remarks
32188AA130	S	Neutral position is closer to 1st.
32188AA140	T	Standard
32188AA150	U	Neutral position is closer to reverse gear.

Reverse check plate adjustment

Reverse check plate			
Part No.	Mark	Angle θ	Remarks
32189AA000	0	28°	Arm stops closer to 5th gear.
32189AA010	1	31°	Arm stops closer to 5th gear.
33189AA020	2	34°	Arm stops in the center.
32189AA030	3	37°	Arm stops closer to reverse gear.
32189AA040	4	40°	Arm stops closer to reverse gear.

10.EXTENSION ASSEMBLY

Standard protrusion amount of taper roller bearing outer race:
0.2 — 0.3 mm (0.0008 — 0.012 in)

NOTE:
Be sure to set within the standard protrusion amount.

Thrust washer (50 × 61 × t)	
Part No.	Thickness mm (in)
803050060	0.50 (0.0197)
803050061	0.55 (0.0217)
803050062	0.60 (0.0236)
803050063	0.65 (0.0256)
803050064	0.70 (0.0276)
803050065	0.75 (0.0295)
803050066	0.80 (0.0315)
803050067	0.85 (0.0335)
803050068	0.90 (0.0354)
803050069	0.95 (0.0374)
803050070	1.00 (0.0394)
803050071	1.05 (0.0413)
803050072	1.10 (0.0433)
803050073	1.15 (0.0453)
803050074	1.20 (0.0472)
803050075	1.25 (0.0492)
803050076	1.30 (0.0512)
803050077	1.35 (0.0531)
803050078	1.40 (0.0551)
803050079	1.45 (0.0571)

Thrust washer to center differential side clearance:
0.15 — 0.35 mm (0.0059 — 0.0138 in)

Thrust washer	
Part No.	Thickness mm (in)
803036050	0.9 (0.035)
803036054	1.0 (0.039)
803036051	1.1 (0.043)
803036055	1.2 (0.047)
803036052	1.3 (0.051)
803036056	1.4 (0.055)
803036053	1.5 (0.059)
803036057	1.6 (0.063)
803036058	1.7 (0.067)

11.FRONT DIFFERENTIAL

Bevel gear to pinion backlash:
0.13 — 0.18 mm (0.0051 — 0.0071 in)

Washer (38.1 × 50 × t)			
Part No.	Thickness mm (in)	Part No.	Thickness mm (in)
803038021	0.925 — 0.950 (0.0364 — 0.0374)	803038023	1.025 — 1.050 (0.0404 — 0.0413)
803038022	0.975 — 1.000 (0.0384 — 0.0394)	—	—

Pinion shaft to axle drive shaft clearance:
0 — 0.2 mm (0 — 0.008 in)

Snap ring (Outer-28)			
Part No.	Thickness mm (in)	Part No.	Thickness mm (in)
805028011	1.05 (0.0413)	805028012	1.20 (0.0472)

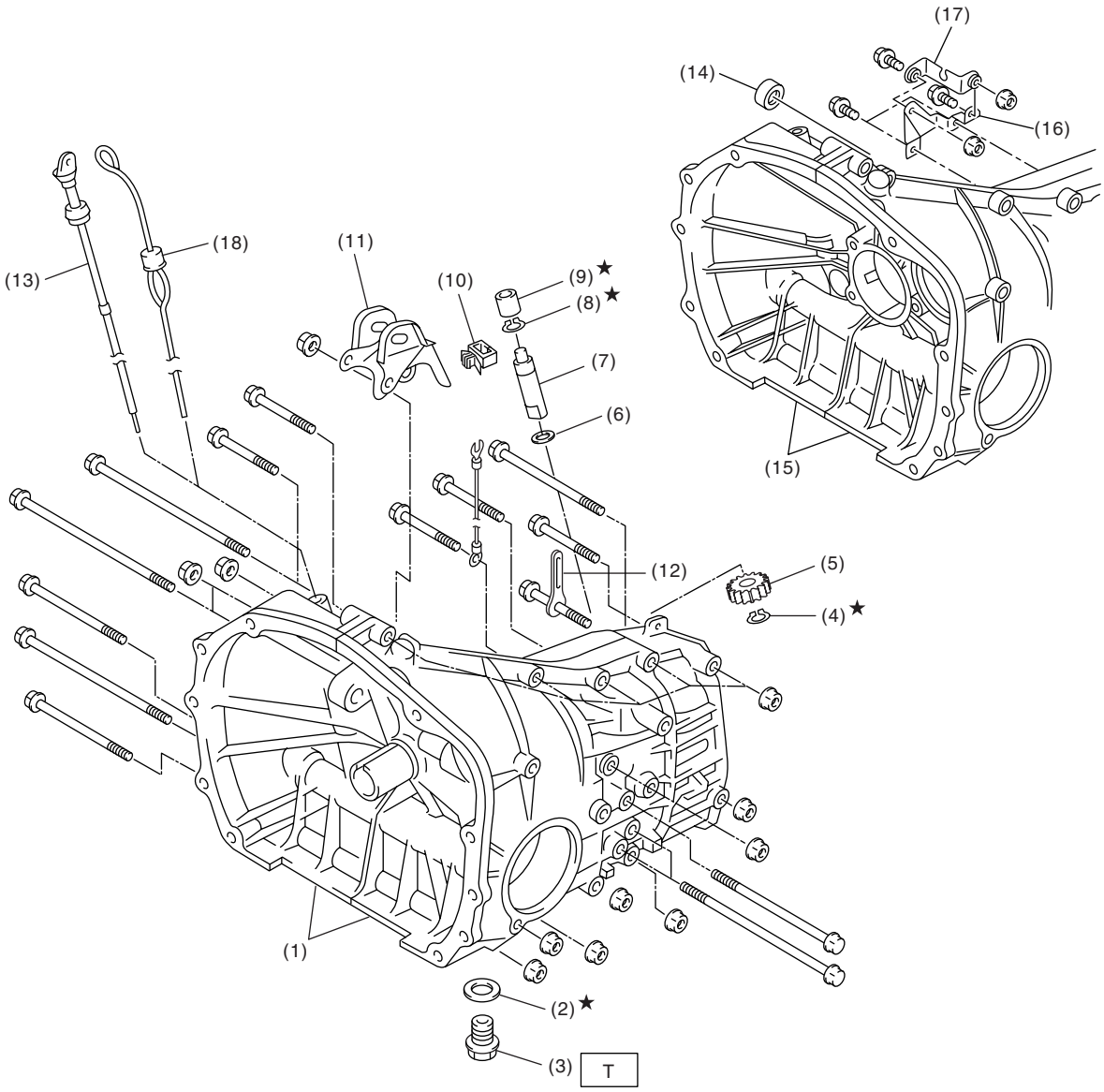
12.TRANSFER DRIVE GEAR

Snap ring (Outer-30) to ball bearing clearance:
0.01 — 0.15 mm (0.0004 — 0.0059 in)

Snap ring (Outer-30)	
Part No.	Thickness mm (in)
805030041	1.53 (0.0602)
805030042	1.65 (0.0650)
805030043	1.77 (0.0697)

B: COMPONENT

1. TRANSMISSION CASE

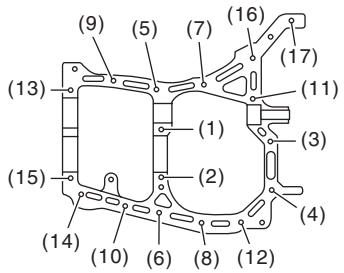


MT-00002

(1) Transmission case ASSY
(2) Gasket
(3) Drain plug
(4) Snap ring (Outer)
(5) Speedometer driven gear
(6) Washer
(7) Speedometer shaft
(8) Snap ring (Outer)
(9) Oil seal
(10) Clamp
(11) Pitching stopper bracket
(12) Clip
(13) Oil level gauge (Non-turbo model)
(14) Oil seal (Dual-range)
(15) Transmission case ASSY (Dual-range)
(16) High-low cable bracket A (Dual-range)
(17) High-low cable bracket B (Dual-range)
(18) Oil level gauge (Turbo model)

Tightening torque: N·m (kgf-m, ft-lb)
T: 70 (7.1, 51)

• Transmission case tightening torque:

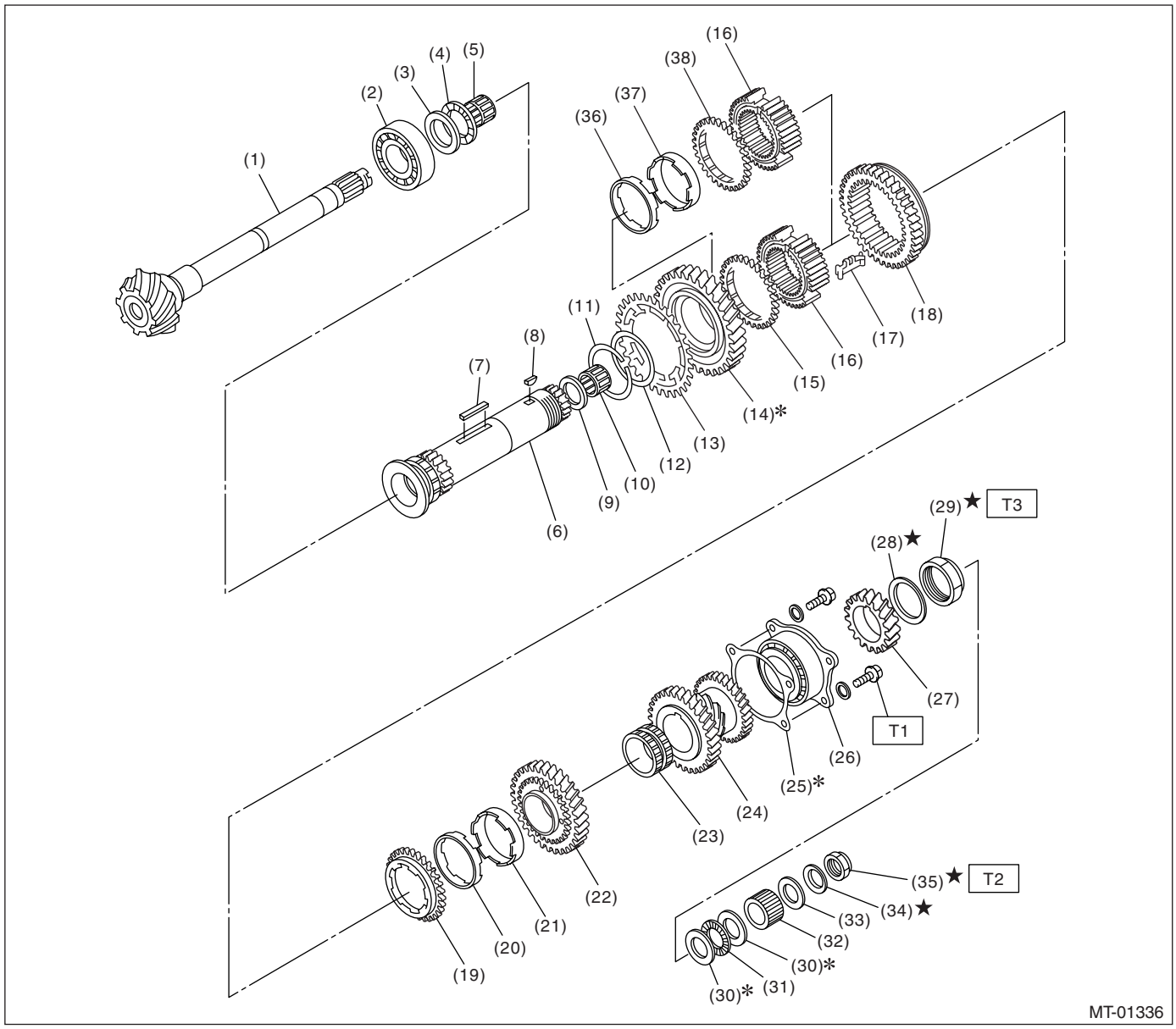


MT-00003

Bolt No.	Bolt size	Tightening torque: N·m (kgf-m, ft-lb)
(5) to (15)	8 mm	25 (2.5, 18.4)
(1) to (4) (16), (17)	10 mm	39 (4.0, 28.9)

2. DRIVE PINION ASSEMBLY

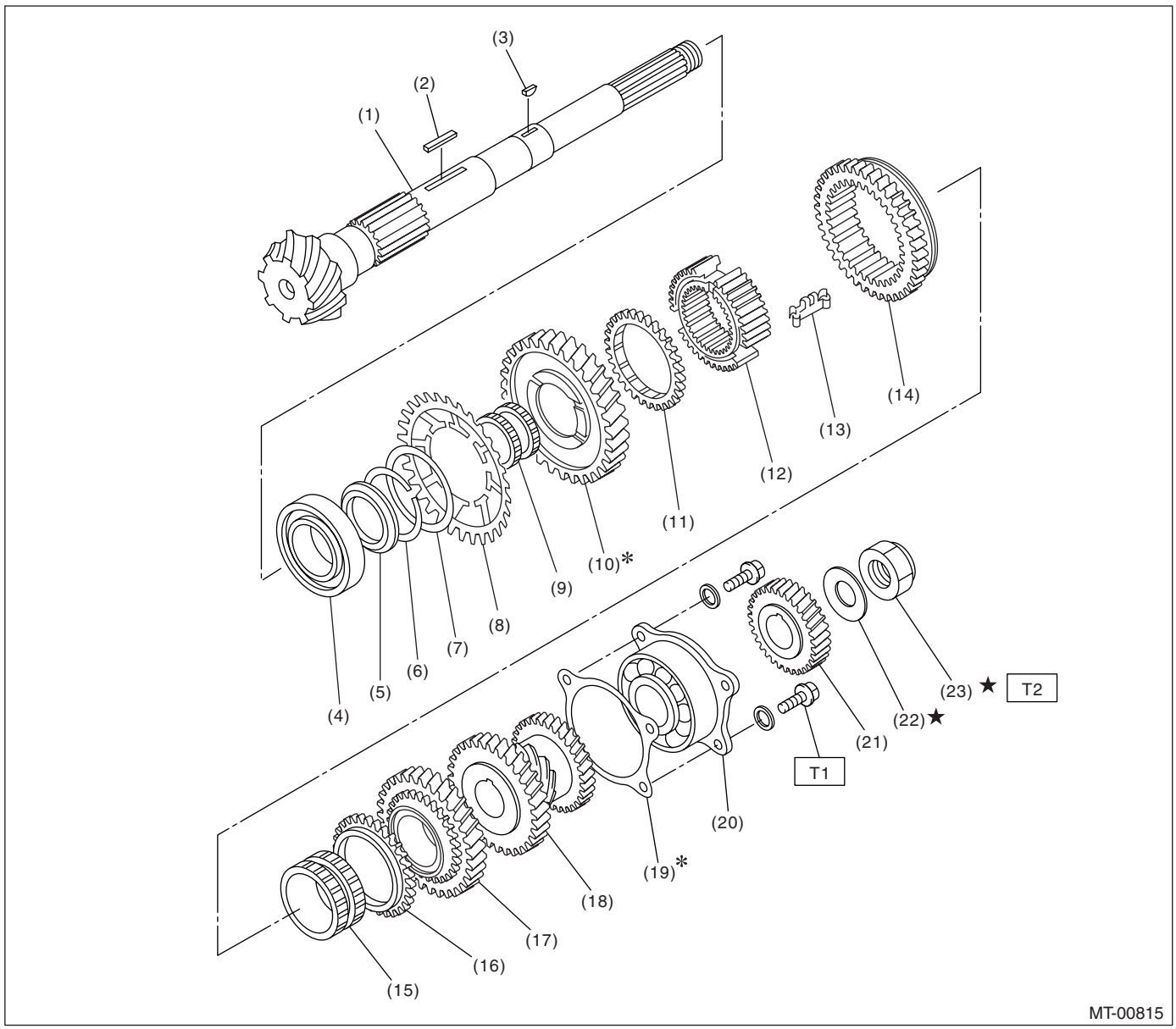
• AWD MODEL



(1) Drive pinion shaft
(2) Roller bearing
(3) Washer
(4) Thrust bearing
(5) Needle bearing
(6) Driven shaft
(7) Key
(8) Woodruff key
(9) Drive pinion collar
(10) Needle bearing
(11) Snap ring (Outer) (2.0 L model)
(12) Washer (2.0 L model)
(13) Sub gear (2.0 L model)
(14) 1st driven gear
(15) Baulk ring
(16) 1st-2nd synchronizer hub
(17) Insert key
(18) Reverse driven gear
(19) Outer baulk ring
(20) Synchro cone
(21) Inner baulk ring
(22) 2nd driven gear
(23) 2nd driven gear bush
(24) 3rd-4th driven gear
(25) Driven pinion shim
(26) Roller bearing
(27) 5th driven gear
(28) Lock washer
(29) Lock nut
(30) Washer
(31) Thrust bearing
(32) Differential bevel gear sleeve
(33) Washer
(34) Lock washer
(35) Lock nut
(36) Inner baulk ring (Turbo model)
(37) Synchro cone (Turbo model)
(38) Outer baulk ring (Turbo model)

Tightening torque: N·m (kgf-m, ft-lb)
T1: 30 (3.1, 22.1)
T2: 120 (12.2, 88.5)
T3: 260 (26.5, 191.7)

• FWD MODEL

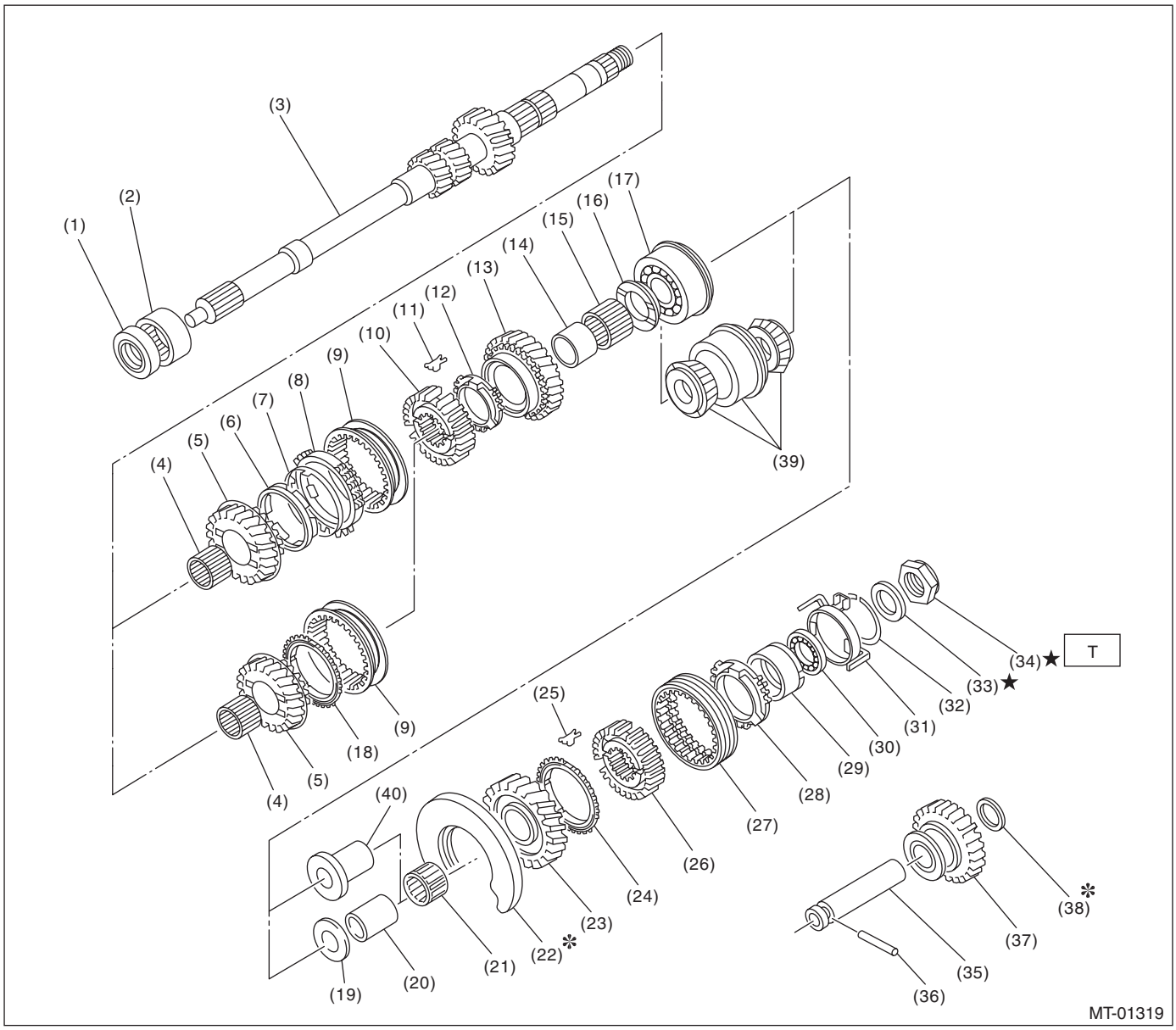


(1) Drive pinion shaft
(2) Key
(3) Woodruff key
(4) Roller bearing
(5) 1st gear trust plate
(6) Outer snap ring
(7) Washer
(8) 1st sub gear
(9) 1st gear bushing
(10) 1st driven gear
(11) 1st baulk ring
(12) 1st-2nd synchronizer hub
(13) Insert key
(14) Reverse driven gear
(15) 2nd gear bushing
(16) 2nd baulk ring
(17) 2nd driven gear
(18) 3rd-4th driven gear
(19) Driven pinion shim
(20) Ball bearing
(21) 5th driven gear
(22) Lock washer
(23) Lock nut

Tightening torque: N·m (kgf-m, ft-lb)
T1: 30 (3.1, 22.1)
T2: 120 (12.2, 88.5)

3. MAIN SHAFT ASSEMBLY

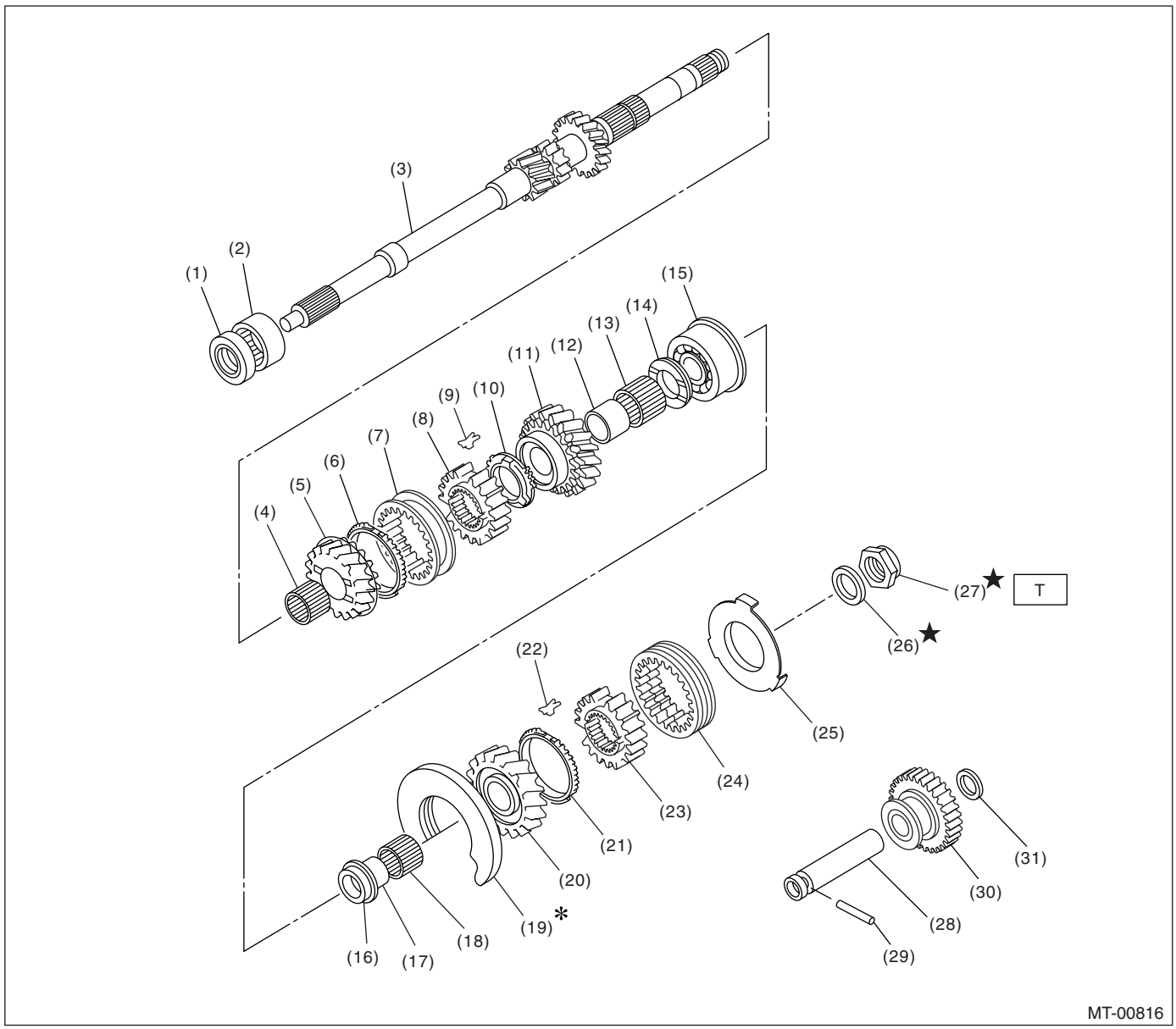
• SINGLE RANGE 2.0 L, 2.5 L MODEL



(1) Oil seal
(2) Needle bearing
(3) Transmission main shaft
(4) Needle bearing
(5) 3rd drive gear
(6) Inner baulk ring (Turbo and 2.5 L model)
(7) 3rd synchro cone (Turbo and 2.5 L model)
(8) Outer baulk ring (Turbo and 2.5 L model)
(9) 3rd-4th coupling sleeve
(10) 3rd-4th synchronizer hub
(11) 3rd-4th shifting insert key
(12) 4th baulk ring
(13) 4th drive gear
(14) 4th needle bearing race
(15) Needle bearing
(16) 4th gear thrust washer
(17) Ball bearing (Non-turbo model)
(18) Baulk ring (Except turbo and 2.5 L model)
(19) 5th gear thrust washer (Non-turbo model)
(20) 5th needle bearing race (Non-turbo model)
(21) Needle bearing
(22) Main shaft rear plate
(23) 5th drive gear
(24) 5th baulk ring
(25) 5th-Rev shifting insert key
(26) 5th-Rev synchronizer hub
(27) 5th-Rev coupling sleeve
(28) Rev baulk ring
(29) Rev synchro cone
(30) Ball bearing
(31) Synchro cone stopper
(32) Snap ring
(33) Lock washer
(34) Lock nut
(35) Reverse idler gear shaft
(36) Straight pin
(37) Reverse idler gear
(38) Washer
(39) Double taper roller bearing (Turbo model)
(40) 5th needle bearing race (Turbo model)

Tightening torque: N·m (kgf-m, ft-lb)
T: 120 (12.2, 88.5)

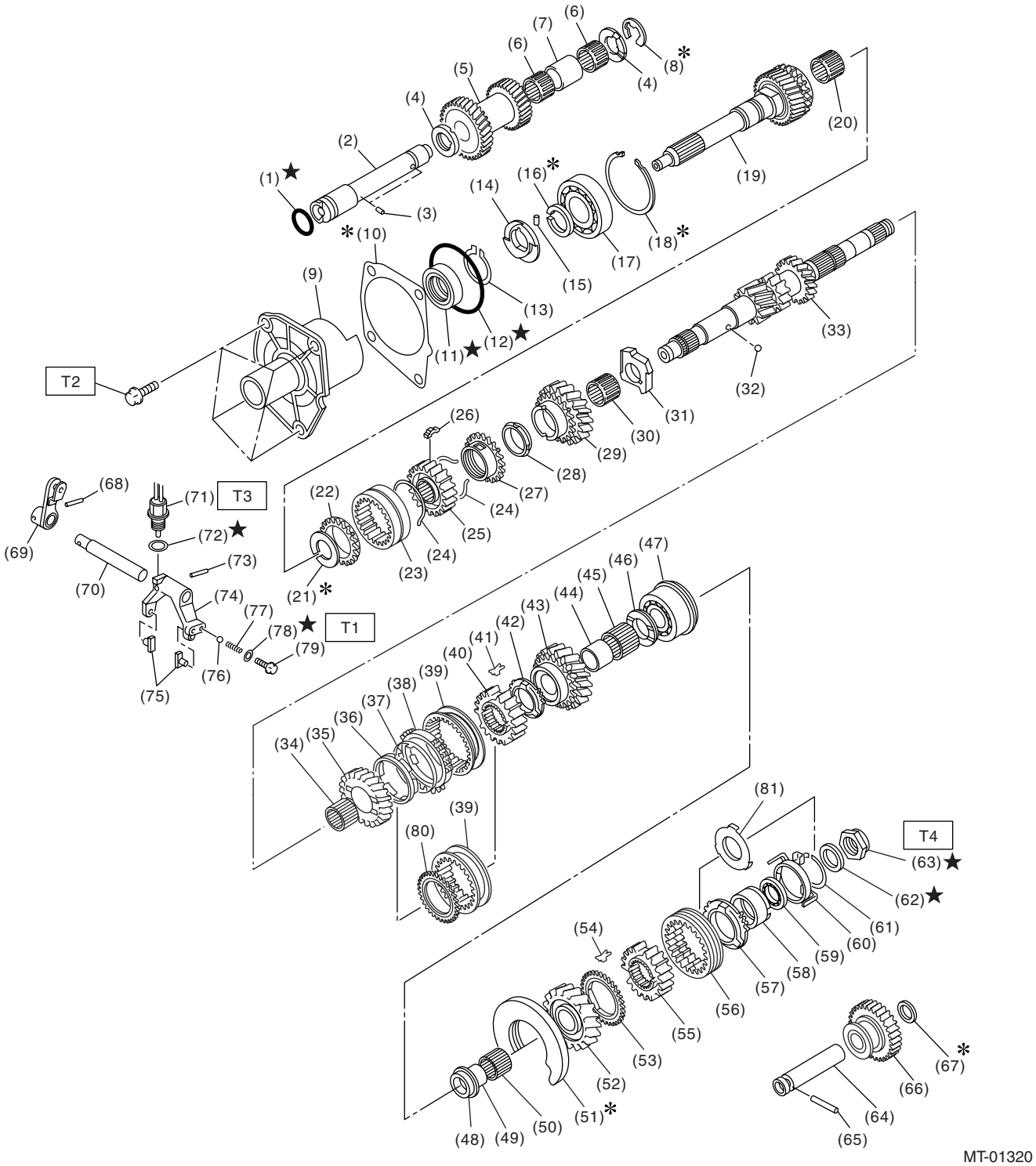
• 1.6 L MODEL



(1) Oil seal
(2) Needle bearing
(3) Transmission main shaft
(4) Needle bearing
(5) 3rd drive gear
(6) 3rd baulk ring
(7) Coupling sleeve
(8) Synchronizer hub
(9) Shifting insert key
(10) 4th baulk ring
(11) 4th drive gear
(12) 4th needle bearing race
(13) Needle bearing
(14) 4th gear thrust washer
(15) Ball bearing
(16) 5th gear thrust washer
(17) 5th needle bearing race
(18) Needle bearing
(19) Main shaft rear plate
(20) 5th drive gear
(21) 5th baulk ring
(22) 5th-Rev shifting insert key
(23) 5th-Rev synchronizer hub
(24) 5th-Rev coupling sleeve
(25) Insert stopper plate
(26) Lock washer
(27) Lock nut
(28) Reverse idler gear shaft
(29) Straight pin
(30) Reverse idler gear
(31) Washer

Tightening torque: N·m (kgf-m, ft-lb)
T: 120 (12.2, 88.5)

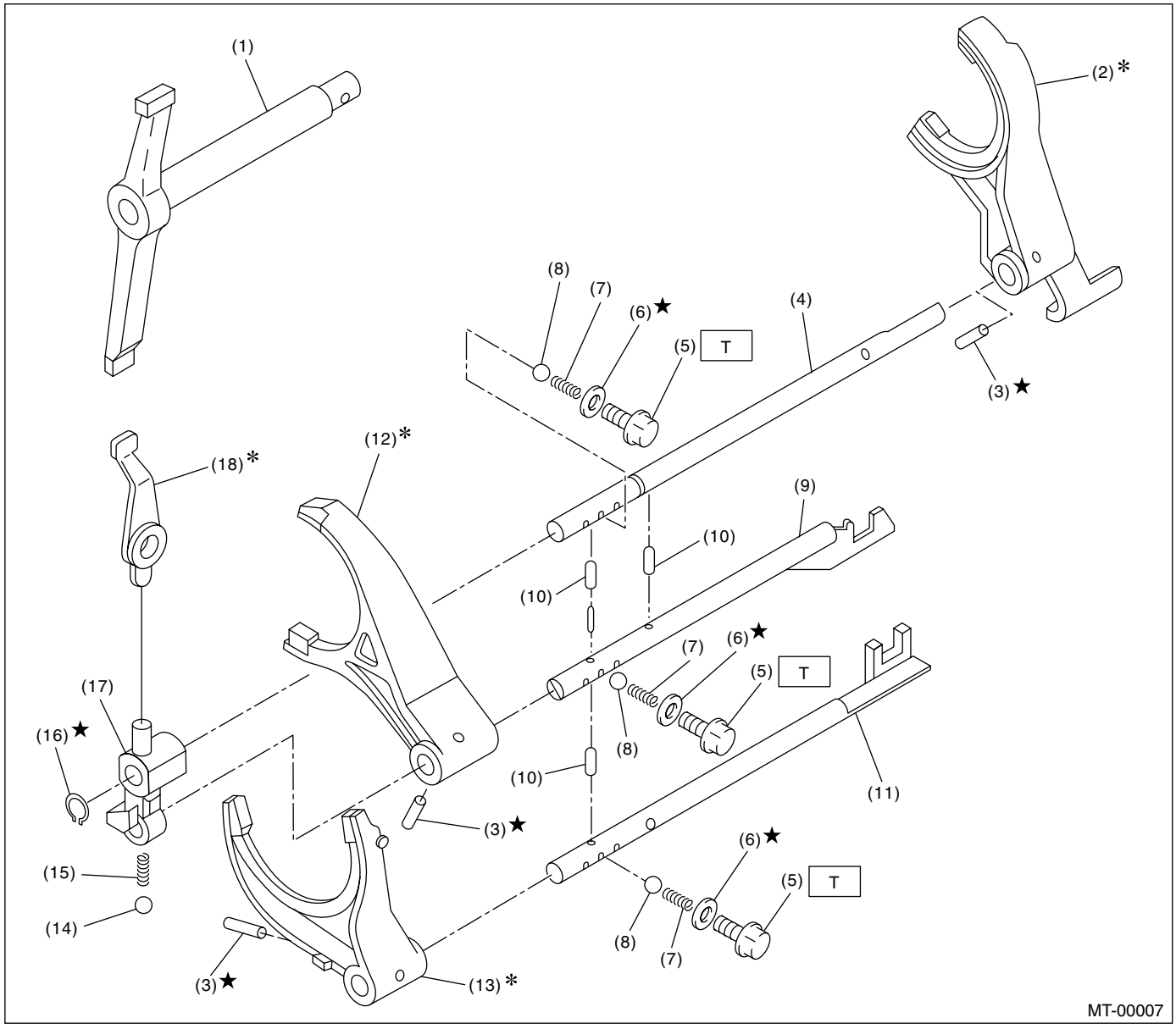
• DUAL RANGE MODEL



(1) O-ring
(2) High-low counter shaft
(3) Knock pin
(4) High-low counter washer
(5) Counter gear
(6) Needle bearing
(7) Counter gear collar
(8) Snap ring (Outer-19)
(9) Input shaft holder
(10) Input shaft shim
(11) Oil seal
(12) O-ring
(13) Snap ring (Outer-28)
(14) Oil squeeze
(15) Straight pin
(16) Snap ring (Outer-28)
(17) Ball bearing
(18) Snap ring (Inner-68)
(19) Input shaft
(20) Needle bearing
(21) Snap ring (Outer-25)
(22) High-low baulk ring
(23) High-low coupling sleeve
(24) High-low synchronizer spring
(25) High-low synchronizer hub
(26) Shifting insert key
(27) High-low baulk ring
(28) Friction damper
(29) Input low gear
(30) Needle bearing
(31) Input low gear spacer
(32) Ball
(33) Main shaft
(34) Needle bearing
(35) 3rd drive gear
(36) Inner baulk ring (2.0 L model)
(37) Synchro cone (2.0 L model)
(38) Outer baulk ring (2.0 L model)
(39) 3rd-4th coupling sleeve
(40) 3rd-4th synchronizer hub
(41) 3rd-4th shifting insert key
(42) 4th baulk ring
(43) 4th drive gear
(44) 4th needle bearing race
(45) Needle bearing
(46) 4th gear thrust washer
(47) Ball bearing
(48) 5th gear thrust washer
(49) 5th needle bearing race
(50) Needle bearing
(51) Main shaft rear plate
(52) 5th drive gear
(53) 5th baulk ring
(54) 5th-Rev shifting insert key
(55) 5th-Rev synchronizer hub
(56) 5th-Rev coupling sleeve
(57) Rev baulk ring
(58) Rev synchro cone
(59) Ball bearing
(60) Synchro cone stopper
(61) Snap ring
(62) Lock washer
(63) Lock nut
(64) Reverse idler gear shaft
(65) Straight pin
(66) Reverse idler gear
(67) Washer
(68) Straight pin
(69) High-low shifter lever
(70) High-low shifter shaft
(71) Low switch
(72) Gasket
(73) Straight pin
(74) High-low shifter fork
(75) High-low shifter piece
(76) Ball
(77) Spring
(78) Gasket
(79) Plug
(80) Baulk ring (1.6 L model)
(81) Insert stopper plate (1.6 L model)

Tightening torque: N·m (kgf-m, ft-lb)
T1: 10 (1.0, 7.4)
T2: 20 (2.0, 14.5)
T3: 25 (2.5, 18.4)
T4: 120 (12.2, 88.5)

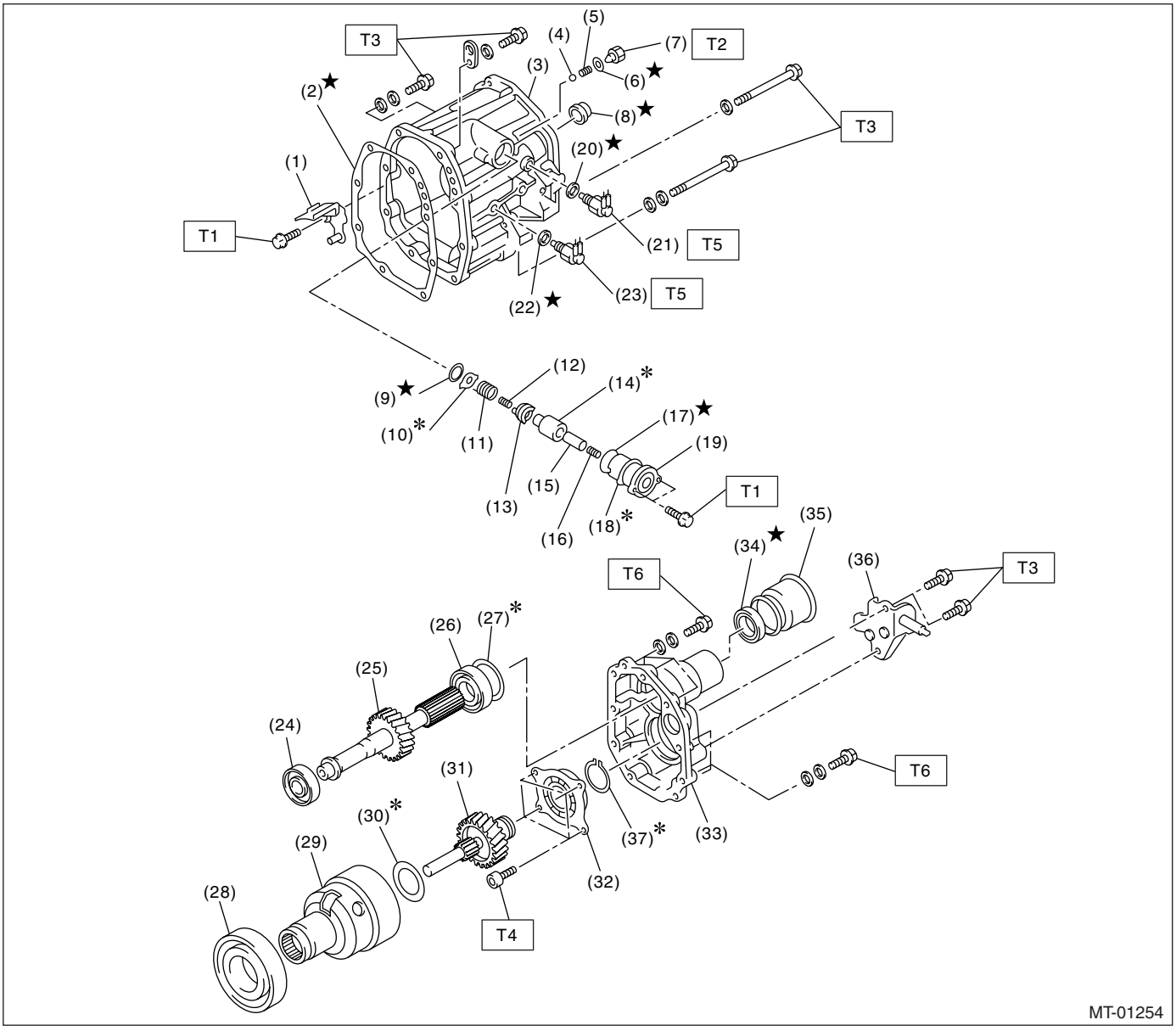
4. SHIFTER FORK AND SHIFTER ROD



(1) Shifter arm
(2) 5th shifter fork
(3) Straight pin
(4) Reverse fork rod
(5) Checking ball plug
(6) Gasket
(7) Checking ball spring
(8) Ball
(9) 3rd-4th fork rod
(10) Interlock plunger
(11) 1st-2nd fork rod
(12) 3rd-4th shifter fork
(13) 1st-2nd shifter fork
(14) Ball
(15) Spring
(16) Snap ring (Outer)
(17) Reverse fork rod arm
(18) Reverse shifter lever

Tightening torque: N·m (kgf-m, ft-lb)
T: 20 (2.0, 14.5)

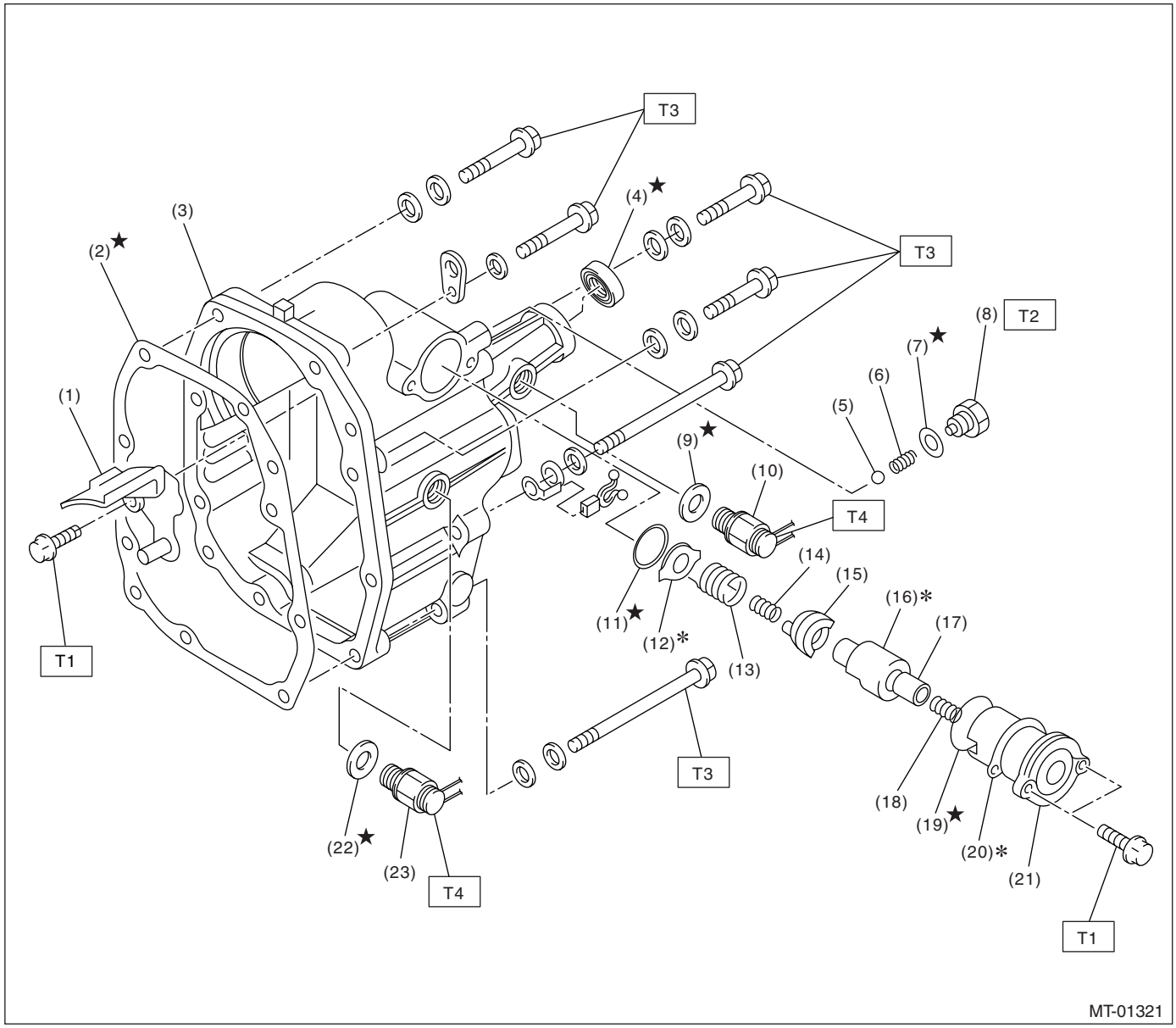
5. TRANSFER CASE AND EXTENSION



(1) Oil guide
(2) Gasket
(3) Transfer case
(4) Ball
(5) Reverse accent spring
(6) Gasket
(7) Plug
(8) Oil seal
(9) Snap ring (Inner)
(10) Reverse check plate
(11) Reverse check spring
(12) Reverse return spring
(13) Reverse check cam
(14) Reverse accent shaft
(15) Return spring cap
(16) Return spring
(17) O-ring
(18) Adjusting select shim
(19) Reverse check sleeve
(20) Gasket
(21) Neutral switch
(22) Gasket
(23) Back-up light switch
(24) Roller bearing
(25) Transfer driven gear
(26) Roller bearing
(27) Adjusting washer
(28) Ball bearing
(29) Center differential
(30) Adjusting washer
(31) Transfer drive gear
(32) Ball bearing
(33) Extension case
(34) Oil seal
(35) Dust cover
(36) Shift bracket
(37) Snap ring

Tightening torque: N·m (kgf-m, ft-lb)
T1: 6.4 (0.65, 4.7)
T2: 10 (1.0, 7.4)
T3: 24.5 (2.5, 18.1)
T4: 26 (2.7, 20)
T5: 32.3 (3.3, 23.8)
T6: 40 (4.1, 29.7)

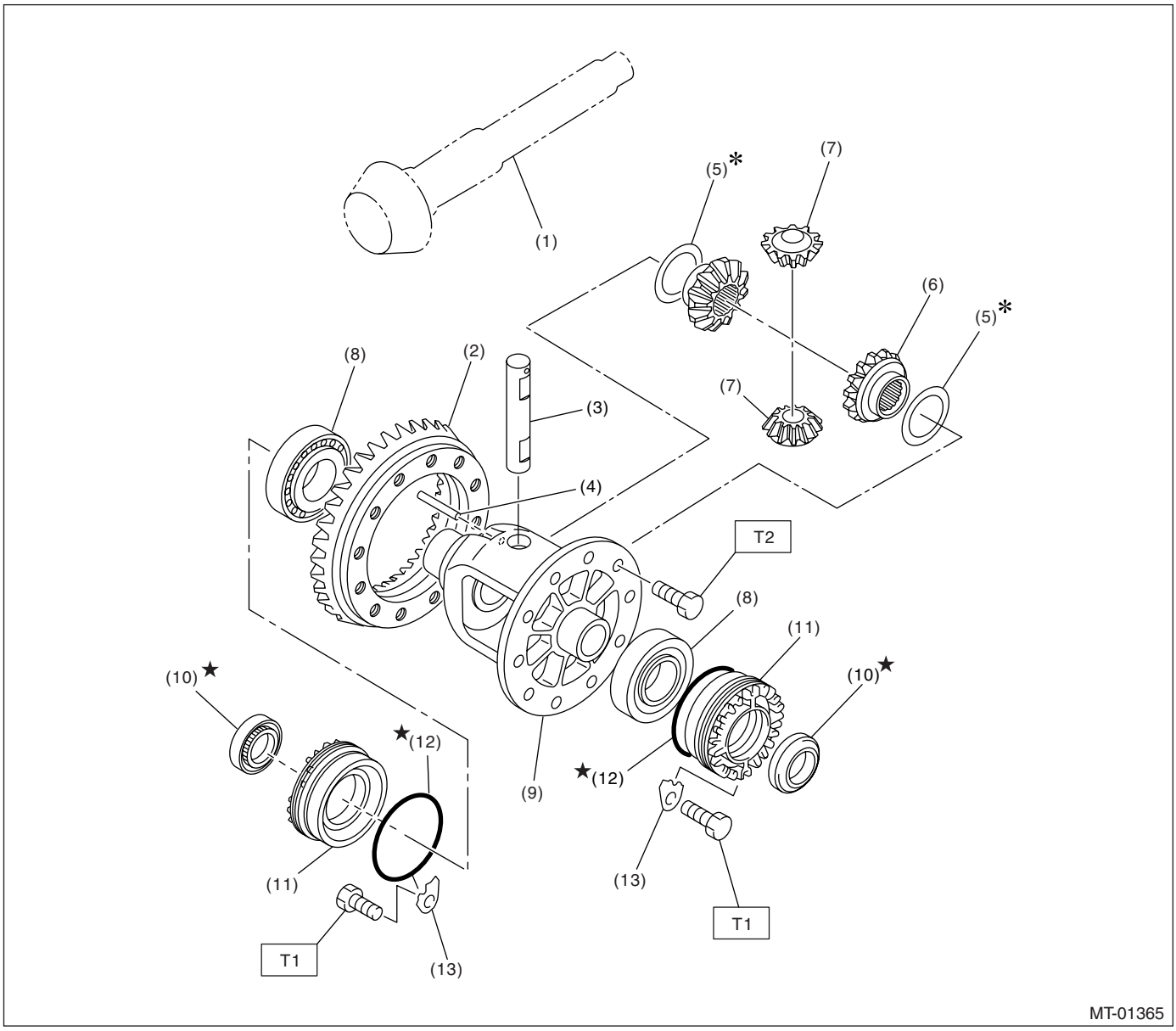
6. REAR CASE



(1) Oil guide
(2) Case gasket
(3) Rear case
(4) Oil seal
(5) Ball
(6) Reverse accent spring
(7) Washer
(8) Plug
(9) Gasket
(10) Neutral switch
(11) Snap ring
(12) Reverse check plate
(13) Reverse check spring
(14) Reverse return spring
(15) Reverse check cam
(16) Reverse accent shaft
(17) Return spring cap
(18) Return spring
(19) O-ring
(20) Adjusting select shim
(21) Reverse check sleeve
(22) Gasket
(23) Back-up light switch

Tightening torque: N·m (kgf-m, ft-lb)
T1: 6.4 (0.65, 4.7)
T2: 10 (1.0, 7.4)
T3: 24.5 (2.5, 18.1)
T4: 32.3 (3.3, 23.8)

7. FRONT DIFFERENTIAL

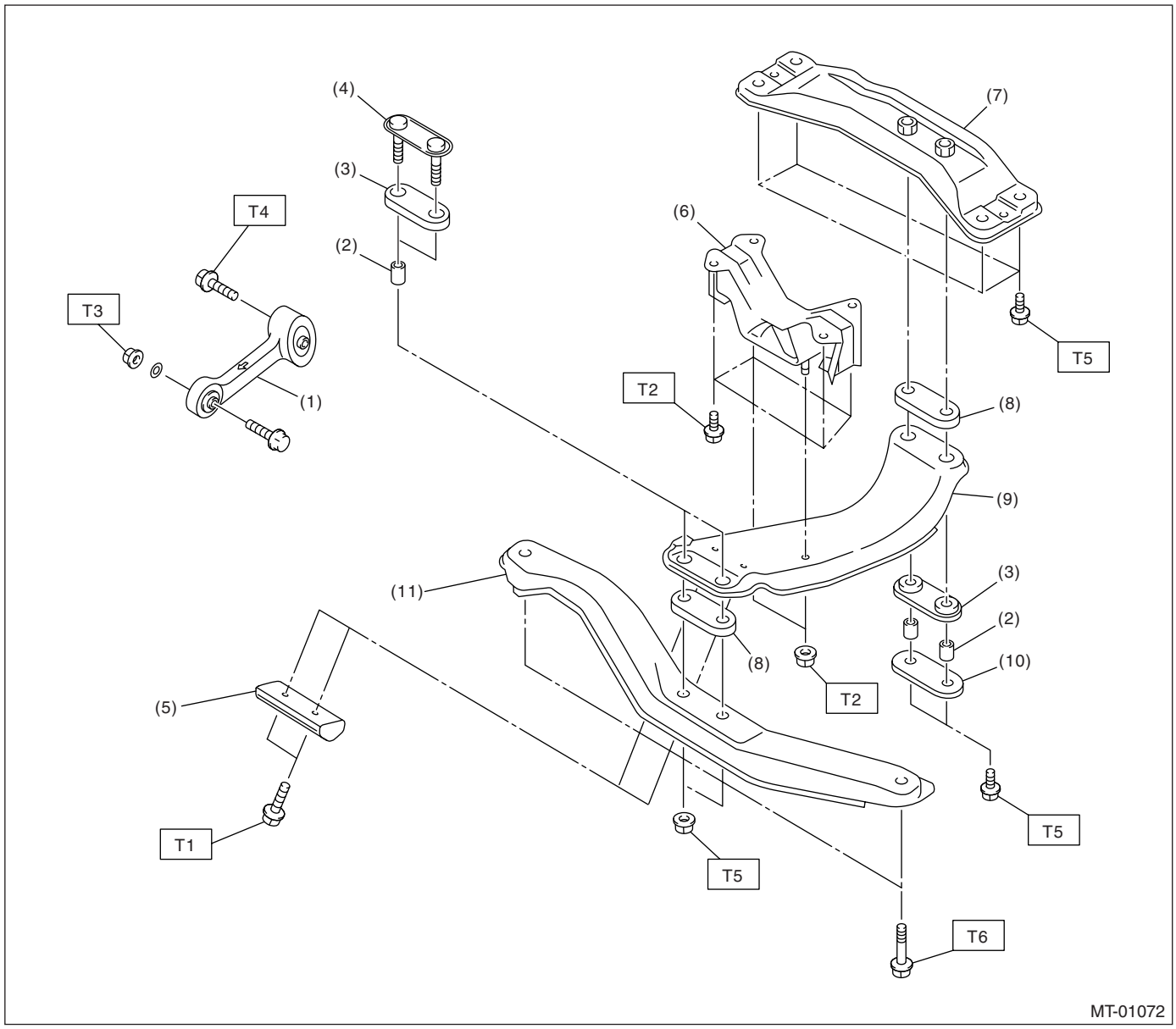


(1) Drive pinion shaft
(2) Hypoid driven gear
(3) Pinion shaft
(4) Straight pin
(5) Washer
(6) Differential bevel gear
(7) Differential bevel pinion
(8) Roller bearing
(9) Differential case
(10) Oil seal
(11) Differential side retainer
(12) O-ring
(13) Retainer lock plate

Tightening torque: N·m (kgf-m, ft-lb)
T1: 24.5 (2.5, 18.1)
T2: 62 (6.3, 45.6)

8. TRANSMISSION MOUNTING

• AWD MODEL

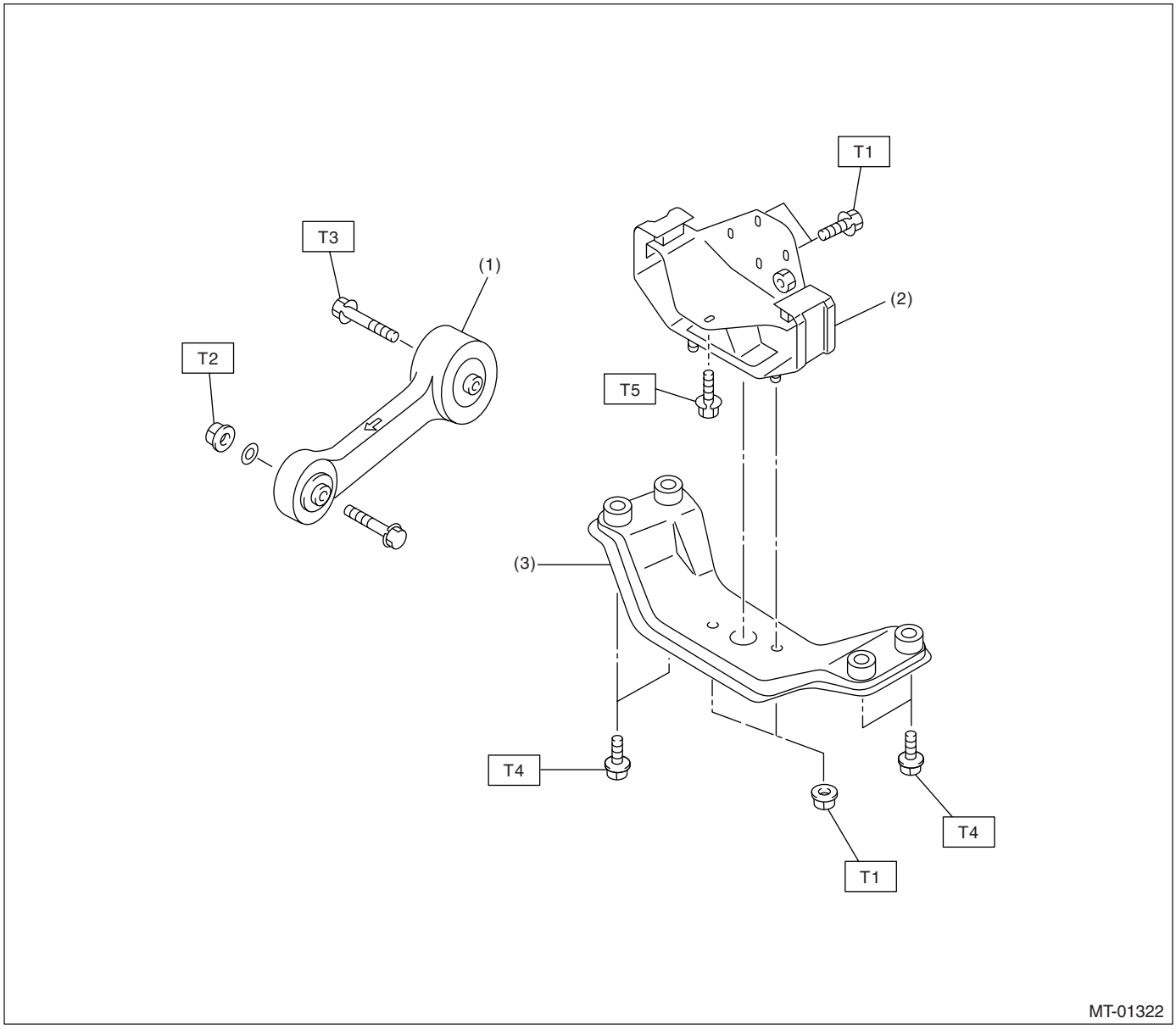


(1)	Pitching stopper	(7)	Rear crossmember
(2)	Spacer	(8)	Cushion D
(3)	Cushion C	(9)	Center crossmember
(4)	Front plate	(10)	Rear plate
(5)	Dynamic damper (Except for Australia 2.5 L model)	(11)	Front crossmember
(6)	Rear cushion rubber		

Tightening torque: N·m (kgf-m, ft-lb)

T1: 7.5 (0.76, 5.5)
T2: 35 (3.6, 26)
T3: 50 (5.1, 37)
T4: 58 (5.9, 43)
T5: 70 (7.1, 51)
T6: 140 (14.3, 103)

• FWD MODEL



(1) Pitching stopper
(2) Rear cushion rubber
(3) Rear crossmember

Tightening torque: N·m (kgf-m, ft-lb)
T1: 35 (3.6, 26)
T2: 50 (5.1, 37)
T3: 58 (5.9, 43)
T4: 70 (7.1, 51)
T5: 123 (12.5, 90.7)

C: CAUTION

• Wear working clothing, including a cap, protective goggles and protective shoes during operation.
• Remove contamination including dirt and corrosion before removal, installation, and disassembly.
• Keep the disassembled parts in order and protect them from dust or dirt.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
• When disassembling the case and other light alloy parts, use a plastic hammer to force it apart. Do not pry it apart with a screwdriver or other tool.
• Be careful not to burn, because each part on the vehicle is hot after running.
• Use specified gear oil, grease etc. or the equivalent. Do not mix gear oil, grease etc. with that of another grade or from other manufacturers.
• Be sure to tighten fasteners including bolts and nuts to the specified torque.
• Place shop jacks or rigid racks at the specified points.
• Apply gear oil onto sliding or revolution surfaces before installation.
• Replace deformed or otherwise damaged snap rings with new ones.
• Before installing O-rings or oil seals, apply sufficient amount of gear oil to avoid damage and deformation.
• Be careful not to incorrectly install or fail to install O-rings, snap rings and other such parts.
• Before securing a part on a vise, place cushioning material such as wood blocks, aluminum plate, or shop cloth between the part and the vise.
• Avoid damaging the mating surface of the case.
• Before applying sealant, completely remove the old seal.

D: PREPARATION TOOL

1. SPECIAL TOOLS

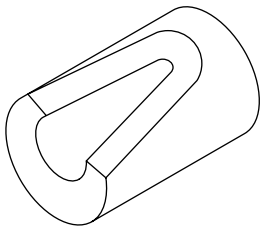
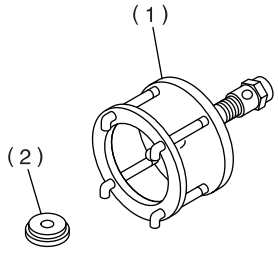
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-399411700	399411700	ACCENT BALL INSTALLER	Used for installing reverse shifter rail arm.
 ST-899524100	899524100	PULLER SET	Used for removing and installing roller bearing (Differential). (1) PULLER (2) ADAPTER

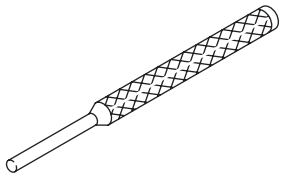
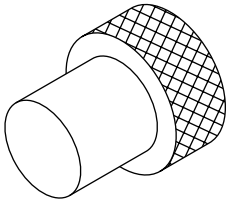
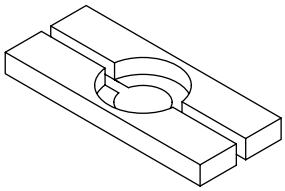
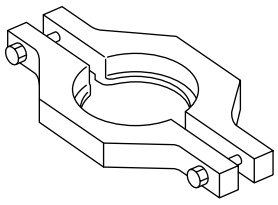
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-398791700	398791700	REMOVER 2	Used for removing and installing spring pin. (6 mm)
 ST-399780104	399780104	WEIGHT	Used for measuring preload on roller bearing.
 ST-498077000	498077000	REMOVER	Used for removing roller bearing of drive pinion shaft.
 ST-498077300	498077300	CENTER DIFFERENTIAL BEARING REMOVER	Used for removing the center differential cover ball bearing.

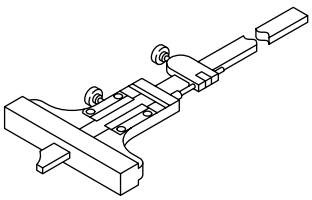
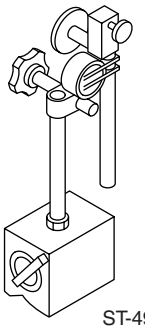
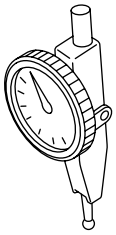
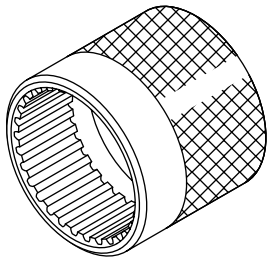
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498147000	498147000	DEPTH GAUGE	Used for adjusting main shaft axial end play.
 ST-498247001	498247001	MAGNET BASE	• Used for measuring backlash between side gear and pinion, and hypoid gear. • Used with DIAL GAUGE (498247100).
 ST-498247100	498247100	DIAL GAUGE	• Used for measuring backlash between side gear and pinion, and hypoid gear. • Used with MAGNET BASE (498247001).
 ST-498427100	498427100	STOPPER	Used for securing the drive pinion shaft assembly and driven gear assembly when removing the drive pinion shaft assembly lock nut.

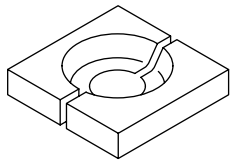
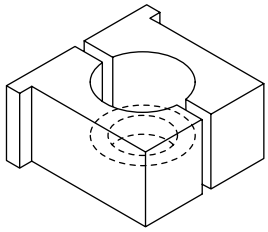
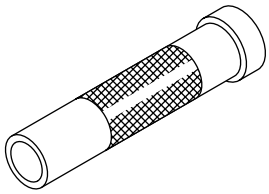
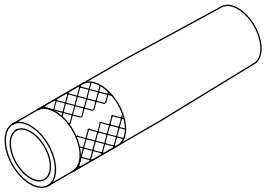
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498517000	498517000	REPLACER	• Used for removing drive pinion thrust plate and roller bearing race. • For FWD.
 ST-498937000	498937000	TRANSMISSION HOLDER	Used for removing and installing transmission main shaft lock nut.
 ST-499277100	499277100	BUSH 1-2 INSTALLER	• Used for installing 1st driven gear thrust plate and 1st-2nd driven gear bush. • Used for installing roller bearing outer races to differential case.
 ST-499277200	499277200	INSTALLER	Used for press-fitting the 2nd driven gear, roller bearings and 5th driven gear onto the driven shaft.

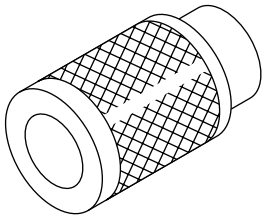
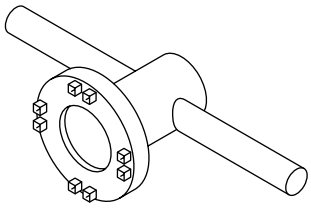
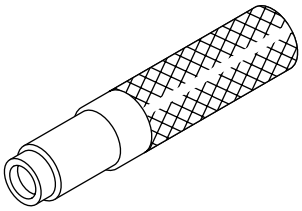
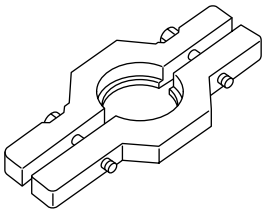
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499757002	499757002	INSTALLER	• Used for installing snap ring (OUT 25) and ball bearing (25 × 26 × 17). • Used for installing bearing cone of transfer driven gear (extension core side).
 ST-499787000	499787000	WRENCH ASSY	Used for removing and installing differential side retainer.
 ST-499827000	499827000	PRESS	Used for installing speedometer oil seal when installing speedometer cable to transmission.
 ST-499857000	499857000	5TH DRIVEN GEAR REMOVER	Used for removing 5th driven gear.

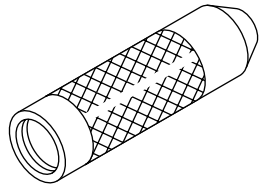
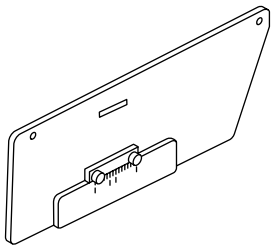
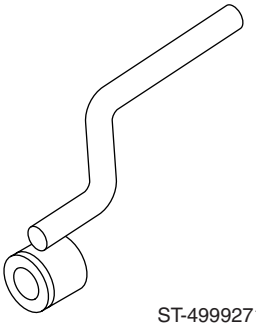
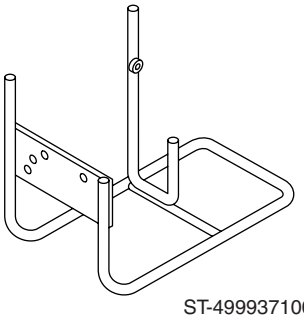
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499877000	499877000	RACE 4-5 INSTALLER	• Used for installing 4th needle bearing race and ball bearing onto transmission main shaft. • Used with REMOVER (899714110).
 ST-499917500	499917500	DRIVE PINION GAUGE ASSY	Used for adjusting drive pinion shim.
 ST-499927100	499927100	HANDLE	Used for fitting transmission main shaft.
 ST-499937100	499937100	TRANSMISSION STAND SET	Stand used for transmission disassembly and assembly.

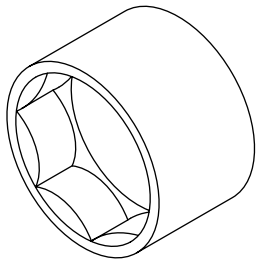
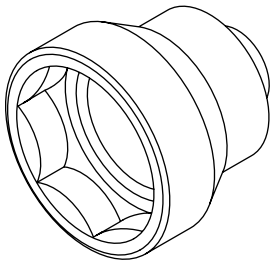
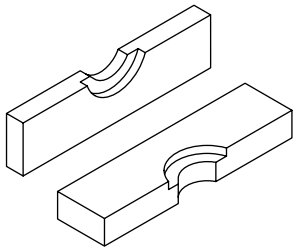
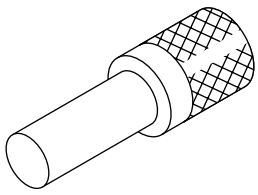
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499987003	499987003	SOCKET WRENCH (35)	Used for removing and installing driven pinion lock nut and main shaft lock nut.
 ST-499987300	499987300	SOCKET WRENCH (50)	Used for removing and installing driven gear assembly lock nut.
 ST-899714110	899714110	REMOVER	Used for fixing transmission main shaft, drive pinion and rear drive shaft.
 ST-899864100	899864100	REMOVER	Used for removing parts on transmission main shaft and drive pinion.

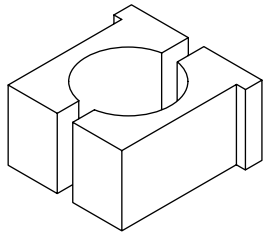
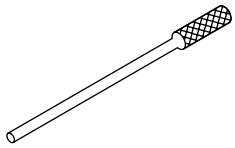
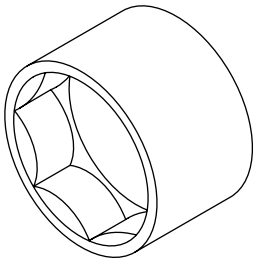
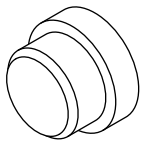
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-899884100	899884100	HOLDER	Used for tightening lock nut on sleeve.
 ST-899904100	899904100	REMOVER	Used for removing and installing straight pin.
 ST-899988608	899988608	SOCKET WRENCH (27)	Used for removing and installing drive pinion lock nut.
 ST-398497701	398497701	ADAPTER	• Used for installing roller bearing onto differential case. • Used with INSTALLER (499277100).

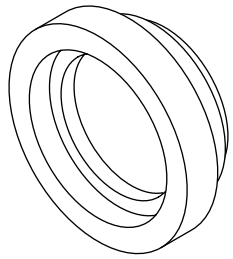
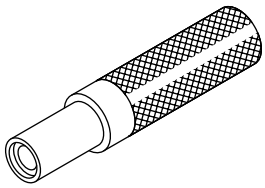
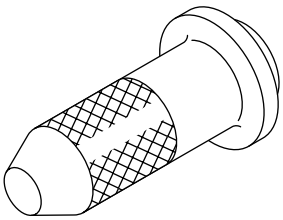
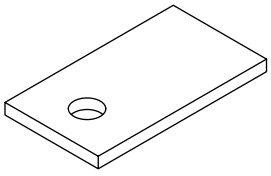
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499587000	499587000	INSTALLER	Used for installing driven gears to driven shaft.
 ST-899824100	899824100	PRESS	Used for installing speedometer shaft oil seal.
 ST-498057300	498057300	INSTALLER	Used for installing extension oil seal.
 ST-498255400	498255400	PLATE	Used for measuring backlash.

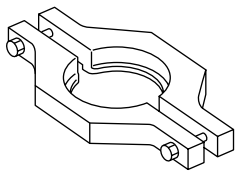
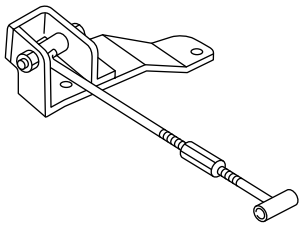
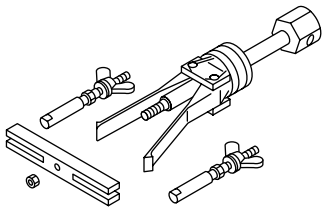
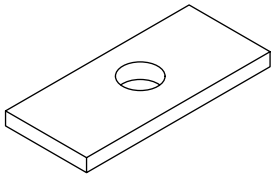
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498077400	498077400	SYNCHRONIZER CONE REMOVER	• Used for removing synchronizer cone of main shaft. • Used for removing 5th driven gear of drive pinion shaft.
 ST41099AC000	41099AC000	ENGINE SUPPORT ASSY	Used for supporting engine.
 ST-398527700	398527700	PULLER ASSY	Used for removing extension case roller bearing.
 ST-398643600	398643600	GAUGE	Used for measuring total end play, extension end play and drive pinion height.

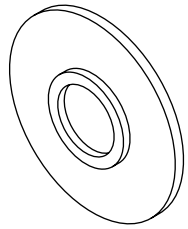
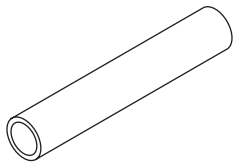
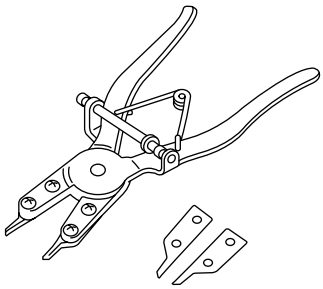
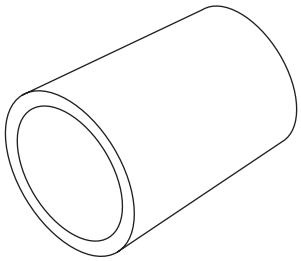
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-398177700	38177700	INSTALLER	• Used for installing bearing cone of transfer driven gear (transfer case side). • Used for installing ball bearing of transfer drive gear.
 ST-398507703	398507703	DUMMY COLLAR	• Used for installing input shaft holder oil seal. • For dual-range model.
 ST-398663600	398663600	PLIERS	• Used for removing and installing input shaft snap ring. • For dual-range model.
 ST-499757001	499757001	SNAP RING GUIDE	• Used for installing snap ring (OUT 25). • For dual-range model.

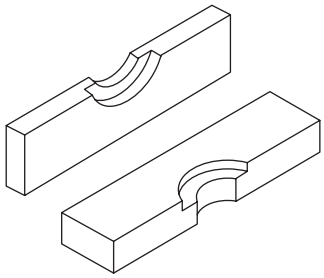
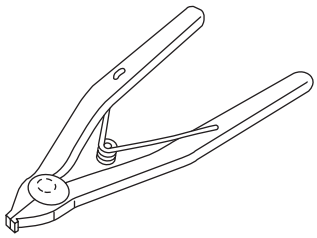
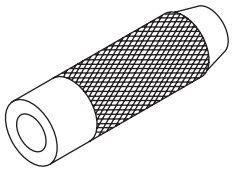
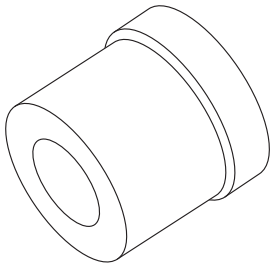
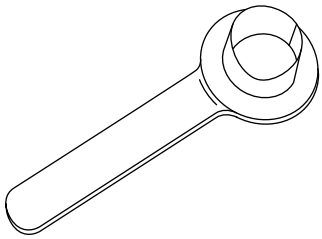
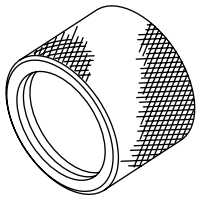
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-899858600	899858600	RETAINER	• Used for removing ball bearing. • For dual-range model.
 ST-899474100	899474100	EXPANDER	• Used for removing and installing snap ring. • For dual-range model.
 ST-899580100	899580100	INSTALLER	• Used when pressing ball bearings into input shaft. • For dual-range model.
 ST-399513600	399513600	INSTALLER	• Used when pressing ball bearings into input shaft. • For dual-range model.

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST28399SA010	28399SA010	FRONT DRIVE SHAFT OIL SEAL PROTECTOR	Used for protecting oil seal from damage when inserting front drive shaft.
 ST18675AA000	18675AA000	DIFFERENTIAL SIDE OIL SEAL INSTALLER	Used for installing differential side retainer oil seal.

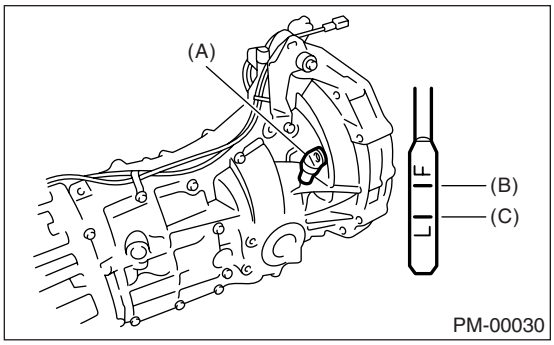
2. GENERAL PURPOSE TOOLS

TOOL NAME	REMARKS
Circuit Tester	Used for measuring resistance, voltage and ampere.
TORX® BIT T70	Used for removing and installing transmission gear oil drain plug.

2. Transmission Gear Oil

A: INSPECTION

1) Park the vehicle on a level surface.
2) Turn the ignition switch to OFF, and then wait until the engine cools.
3) Remove the oil level gauge and wipe it clean.
4) Reinsert the level gauge all the way. Be sure the level gauge is correctly inserted and in the proper direction.
5) Pull out the oil level gauge again and check the oil level on it. If it is below the lower level, add oil through the oil level gauge hole to bring the level up to the upper level.



(A) Oil level gauge
(B) Upper level
(C) Lower level

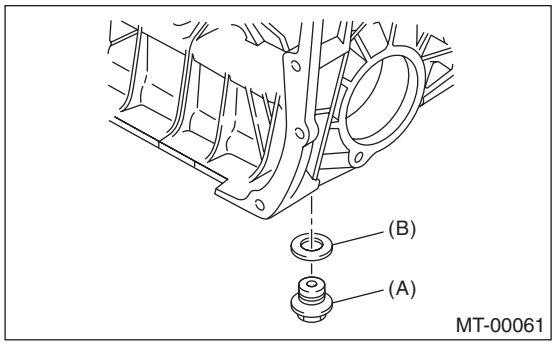
B: REPLACEMENT

1) Pull out the oil level gauge.
2) Lift-up the vehicle.
3) Drain the transmission gear oil completely.

CAUTION:
When idling it for after it runs or a long time, the transmission gear oil is hot. Be careful not to burn yourself.

NOTE:
Tighten the transmission gear oil drain plug after draining the transmission gear oil.

Tightening torque:
70 N·m (7.1 kgf-m, 51 ft-lb)



(A) Drain plug
(B) Gasket

4) Lower the vehicle.
5) Pour gear oil into the gauge hole.

Recommended gear oil:
Use GL-5 or equivalent.

Gear oil capacity:
FWD model
3.3 ℓ (3.5 US qt, 2.9 Imp qt)
AWD model
Single-range model;
3.5 ℓ (3.7 US qt, 3.1 Imp qt)
Dual-range model;
4.0 ℓ (4.2 US qt, 3.5 Imp qt)

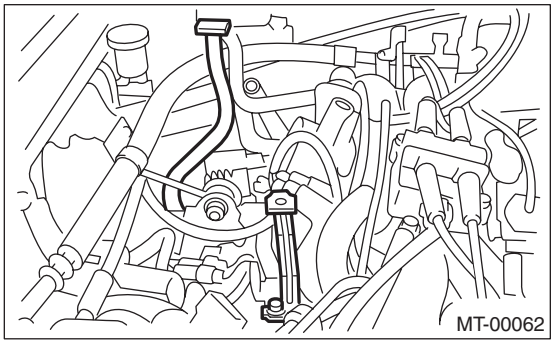
6) Check the level of the transmission gear oil.

NOTE:
The level should be within the specified range marked on the gauge.

3. Manual Transmission Assembly

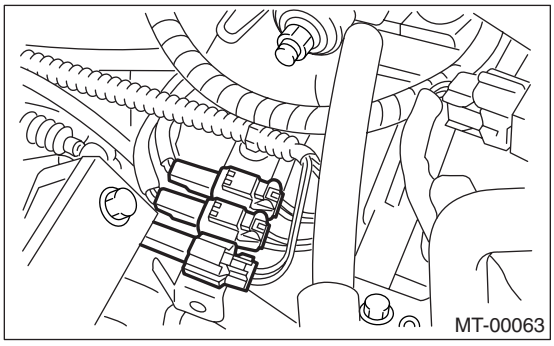
A: REMOVAL

1) Open the front hood fully, and support with stay.
2) Disconnect the ground cable from battery.
3) Remove the air intake duct and cleaner case. (Non-turbo model) <Ref. to IN(H4SO)-6, REMOVAL, Air Intake Duct.> and <Ref. to IN(H4SO)-5, REMOVAL, Air Cleaner Case.>
4) Remove the air cleaner case stay. (Non-turbo model)

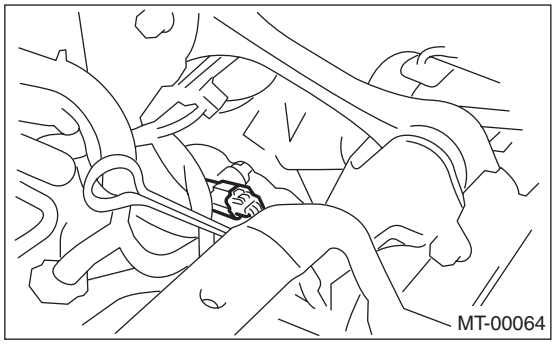


5) Remove the intercooler (Turbo model) <Ref. to IN(H4DOTC)-12, REMOVAL, Intercooler.>
6) Disconnect the following connectors:
(1) Neutral position switch connector
(2) Back-up light switch connector
(3) High-low switch connector (Dual-range model)

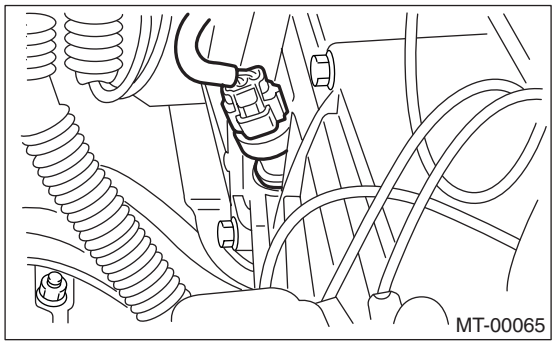
- Non-turbo model



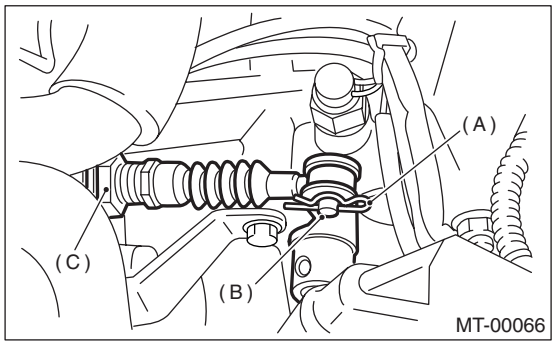
- Turbo model



(4) Vehicle speed sensor



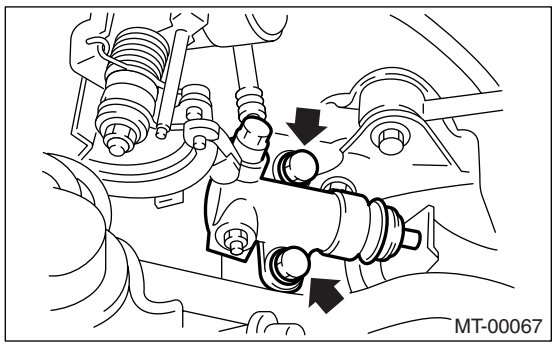
7) Remove the snap pin and clevis pin from drive select cable.
8) Remove the drive select cable on transmission. (Dual-range model)



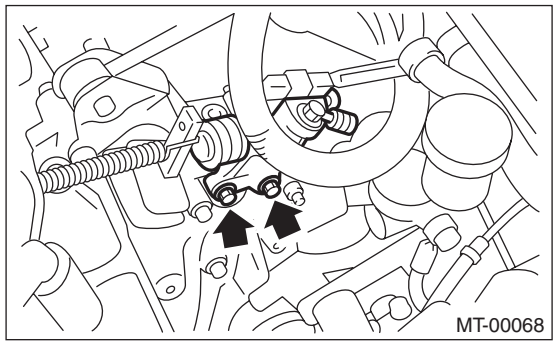
(A) Snap pin
(B) Clevis pin
(C) Drive select cable

9) Remove the starter. <Ref. to SC(H4SO)-8, REMOVAL, Starter.>

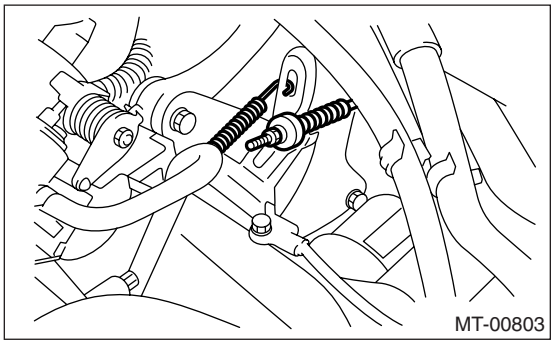
10) Remove the operating cylinder from transmission. (2.0 L and 2.5 L model)
- Non-turbo model



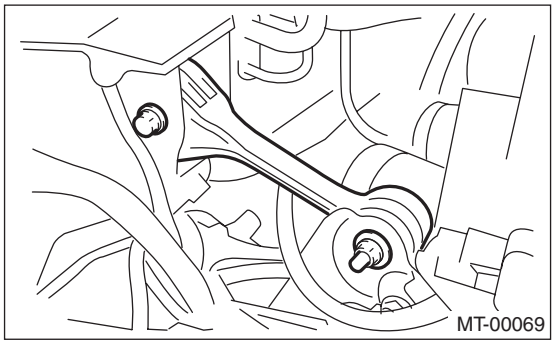
- Turbo model



11) Disconnect the return spring and clutch cable. (1.6 L model)

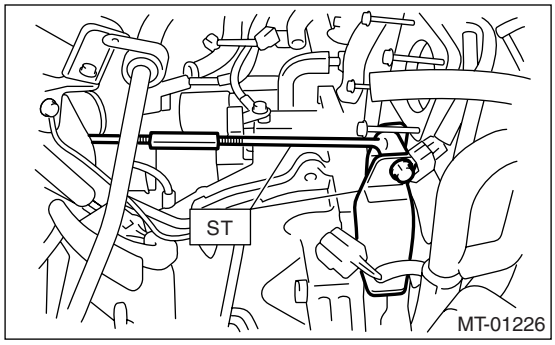


12) Remove the pitching stopper.



13) Set the ST.

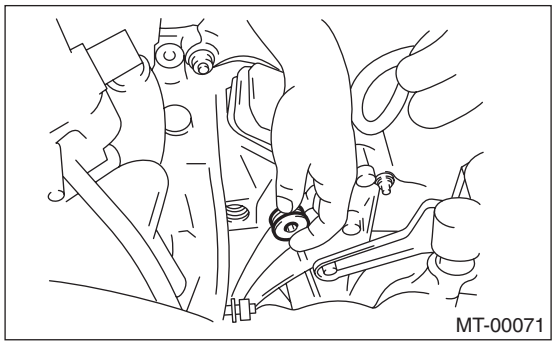
ST 41099AC000 ENGINE SUPPORT ASSY



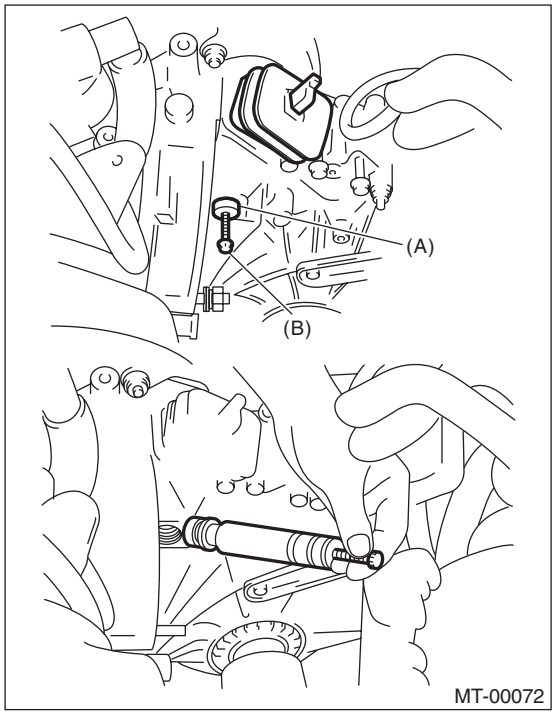
14) Separate the clutch release fork from release bearing. (Turbo model)

(1) Remove the clutch operating cylinder from transmission.

(2) Remove the plug using 10 mm hexagon wrench.



(3) Screw the 6 mm dia. bolt into release fork shaft, and then remove it.

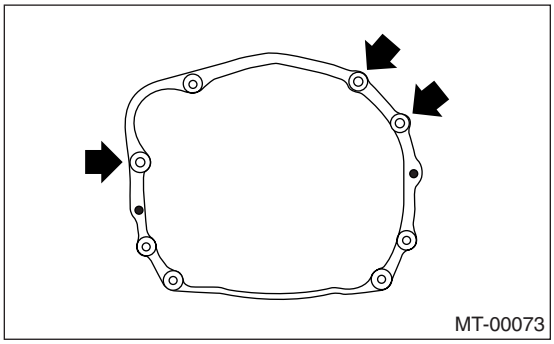


(A) Shaft
(B) Bolt

(4) Raise the release fork and unfasten the release bearing tabs to free release fork.

NOTE:
Step (4) is required to prevent interference with engine when removing the engine from transmission.

15) Remove the bolt which holds the right upper side of transmission to engine.



16) Remove the front and center exhaust pipes. (Non-turbo model) <Ref. to EX(H4SO)-6, REMOVAL, Front Exhaust Pipe.>

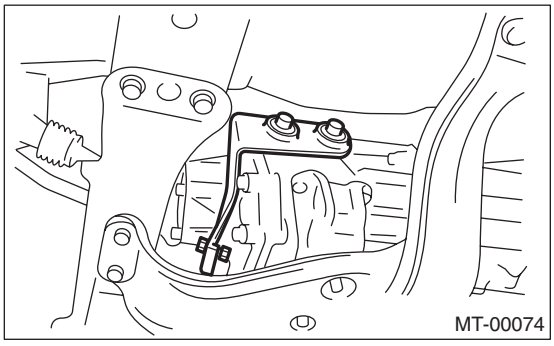
17) Remove the center exhaust pipe. (Turbo model). <Ref. to EX(H4DOTC)-10, REMOVAL, Center Exhaust Pipe.>

18) Remove the rear exhaust pipe and muffler.

CAUTION:
When removing the exhaust pipes, be careful each exhaust pipe does not drop out.

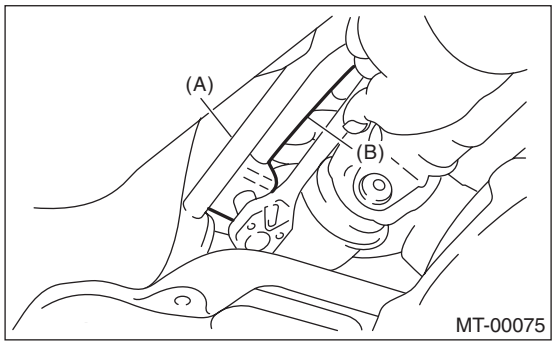
19) Remove the heat shield cover. (If equipped)

20) Remove the hanger bracket from right side of transmission.



21) Remove the propeller shaft. <Ref. to DS-17, REMOVAL, Propeller Shaft.>

22) Remove the gear shift rod and stay from transmission.
(1) Disconnect the stay from transmission.
(2) Disconnect the rod from transmission.

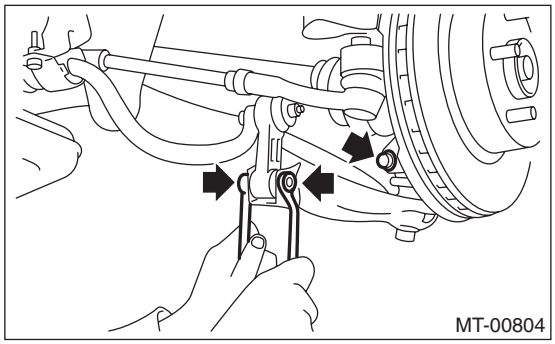


(A) Stay
(B) Rod

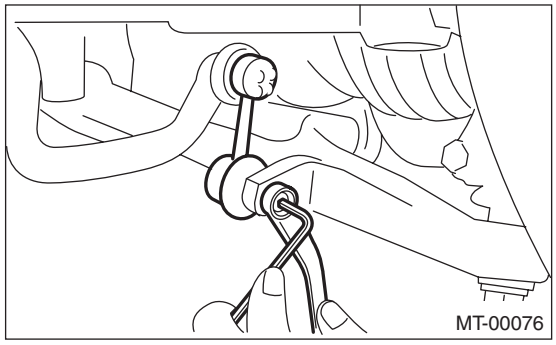
23) Disconnect the stabilizer link from transverse link.

24) Remove the bolt securing ball joint of transverse link to housing.

- Wagon model

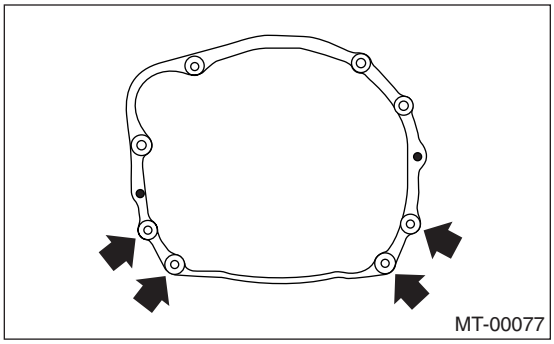


- Sedan model



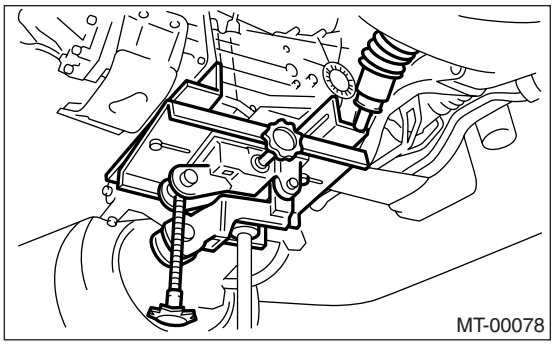
25) Remove the drive shafts. <Ref. to DS-40, REMOVAL, Front Drive Shaft.>

26) Remove the nuts which hold the lower side of transmission to engine.



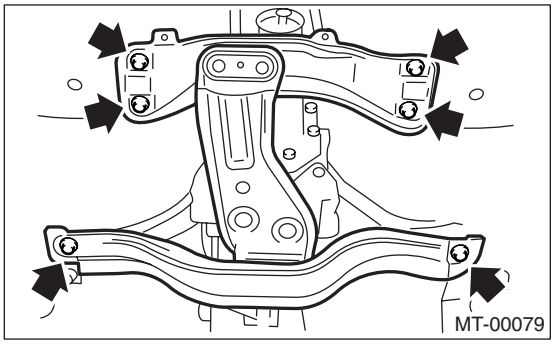
27) Place the transmission jack under transmission.

CAUTION:
Always support the transmission case with a transmission jack.

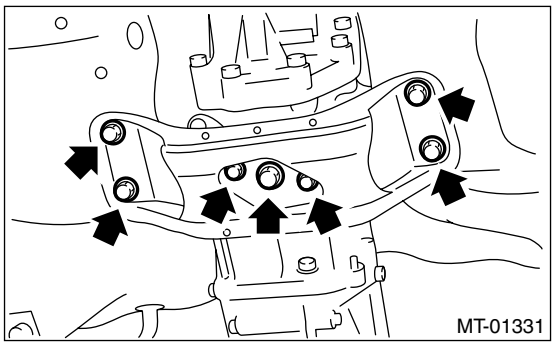


28) Remove the transmission rear crossmember from vehicle.

- AWD model



- FWD model



29) While gradually lowering the transmission jack, fully contact the engine support, and then tilt the engine rearward.

30) Remove the transmission.

NOTE:
Move the transmission jack toward rear until main shaft is withdrawn from clutch cover.

31) Separate the transmission assembly and rear cushion rubber.

B: INSTALLATION

1) Replace the differential side retainer oil seal. <Ref. to 5MT-46, REPLACEMENT, Differential Side Retainer Oil Seal.>

NOTE:
Be sure to replace the differential side retainer oil seal after the procedure of removing the front drive shaft.

2) Install the rear cushion rubber to transmission assembly.

Tightening torque:
35 N·m (3.6 kgf-m, 26 ft-lb)

3) Install the clutch release lever and bearing onto transmission. (Turbo model) <Ref. to CL-26, INSTALLATION, Release Bearing and Lever.>

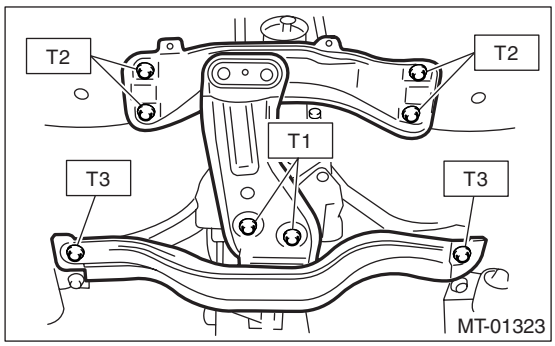
4) Install the transmission onto engine.
   (1) Gradually raise the transmission with transmission jack. Turn the screw of engine support, and then title the engine forward.
   (2) Engage them at splines.

NOTE:
Be careful not to strike the main shaft against clutch cover.

5) Install the transmission rear crossmember.

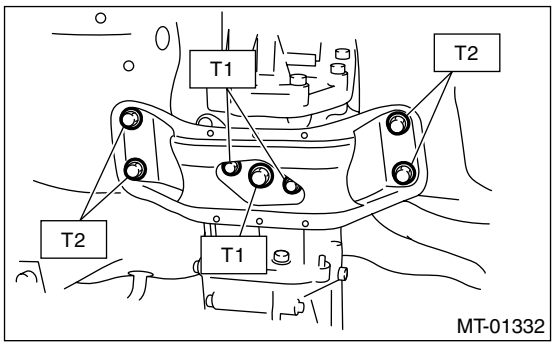
- AWD model

Tightening torque:
T1: 35 N·m (3.6 kgf-m, 26 ft-lb)
T2: 70 N·m (7.1 kgf-m, 51 ft-lb)
T3: 140 N·m (14.3 kgf-m, 103 ft-lb)



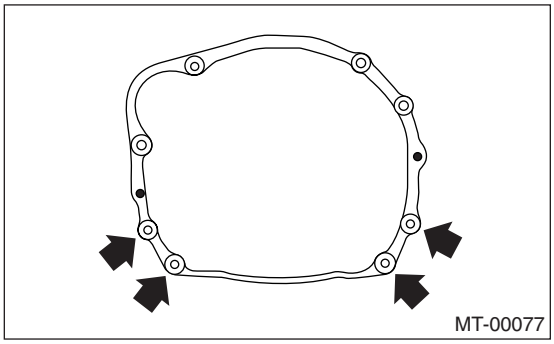
• FWD model

Tightening torque:
T1: 35 N·m (3.6 kgf-m, 26 ft-lb)
T2: 70 N·m (7.1 kgf-m, 51 ft-lb)



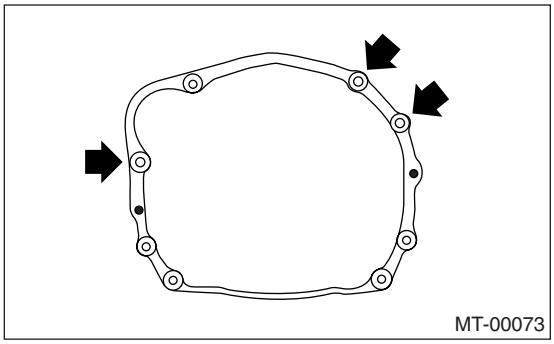
6) Take off the transmission jack.
7) Tighten the nuts which hold the lower side of transmission to engine.

Tightening torque:
50 N·m (5.1 kgf-m, 37 ft-lb)

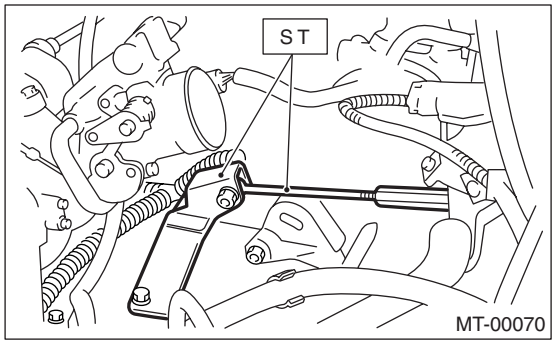


8) Connect the engine and transmission.
(1) Install the starter.
<Ref. to SC(H4SO)-8, INSTALLATION, Starter.>
(2) Tighten the bolt which holds right upper side of transmission to engine.

Tightening torque:
50 N·m (5.1 kgf-m, 37 ft-lb)

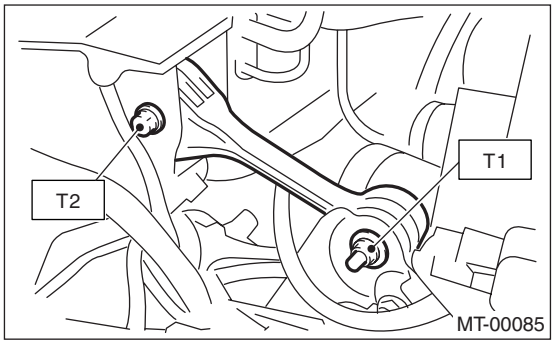


9) Remove the ST.

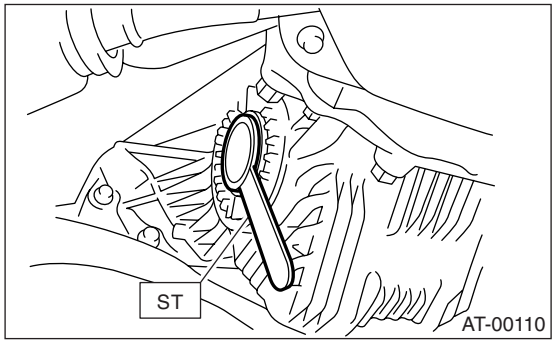


10) Install the pitching stopper.

Tightening torque:
T1: 50 N·m (5.1 kgf-m, 37 ft-lb)
T2: 58 N·m (5.9 kgf-m, 43 ft-lb)

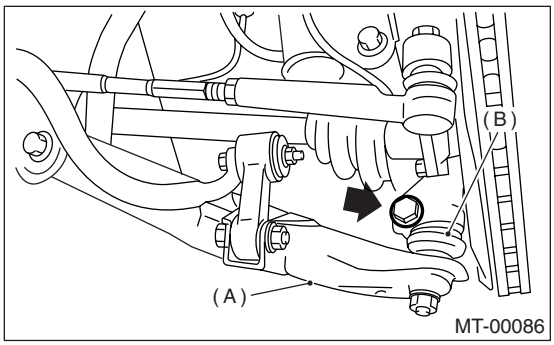


11) Lift-up the vehicle.
12) Install the front drive shaft into transmission.
ST 28399SA010 FRONT DRIVE SHAFT OIL SEAL PROTECTOR



13) Install the ball joints of lower arm into knuckle arm of housing, and tighten the installing bolts.

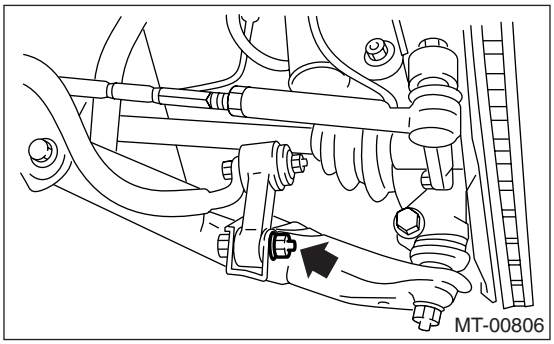
Tightening torque:
49 N·m (5.0 kgf-m, 36 ft-lb)



(A) Transverse link
(B) Ball joint

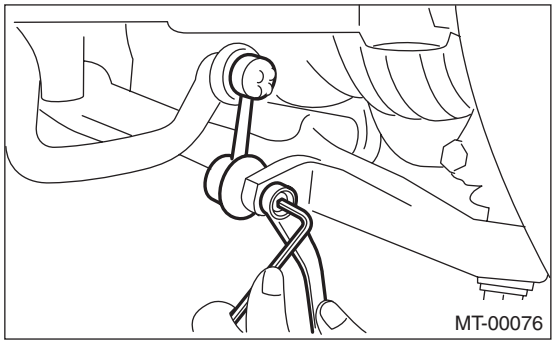
14) Install the stabilizer link from transverse link.
- Wagon model

Tightening torque:
30 N·m (3.1 kgf-m, 22.1 ft-lb)

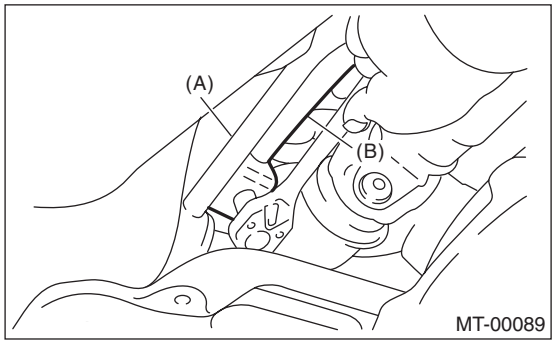


- Sedan model

Tightening torque:
45 N·m (4.6 kgf-m, 33.2 ft-lb)

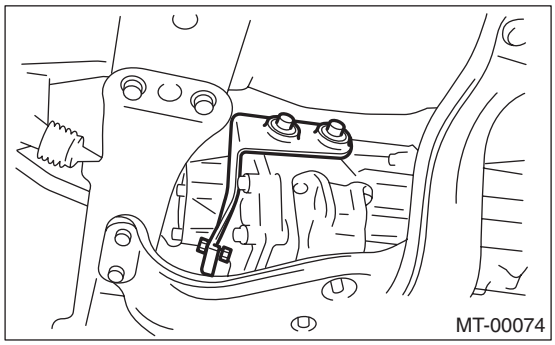


15) Install the gear shift rod and stay.
(1) Install the gear shift rod onto transmission.



(A) Stay
(B) Rod

(2) Install the stay onto transmission.
16) Install the propeller shaft. <Ref. to DS-18, INSTALLATION, Propeller Shaft.>
17) Install the heat shield cover. (If equipped)
18) Install the hanger bracket on right side of transmission.

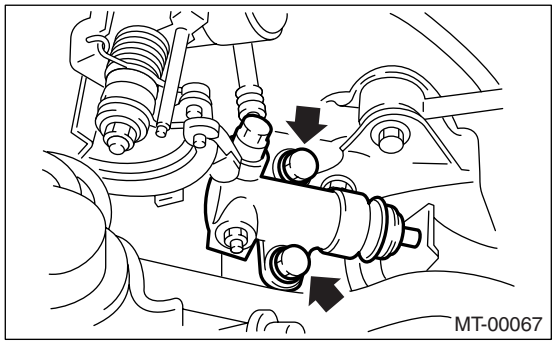


19) Install the rear exhaust pipe and muffler.
20) Install the front exhaust pipe and center exhaust pipe. (Non-turbo model) <Ref. to EX(H4SO)-7, INSTALLATION, Front Exhaust Pipe.>
21) Install the center exhaust pipe. (Turbo model)<Ref. to EX(H4DOTC)-11, INSTALLATION, Center Exhaust Pipe.>
22) Install the under cover.

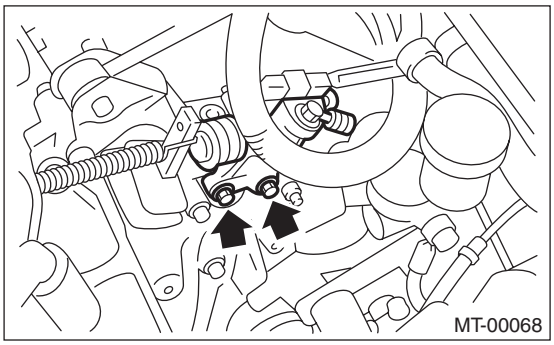
23) Install the operating cylinder. (2.0 L and 2.5 L model)

Tightening torque:
37 N·m (3.8 kgf-m, 27.5 ft-lb)

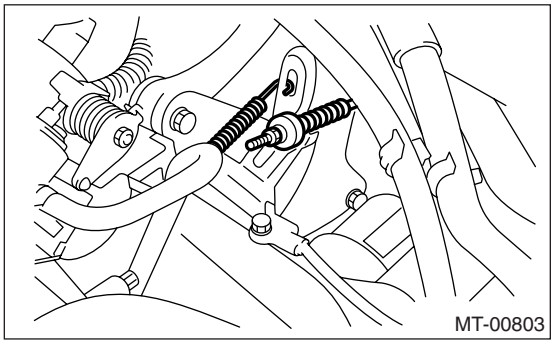
- Non-turbo model



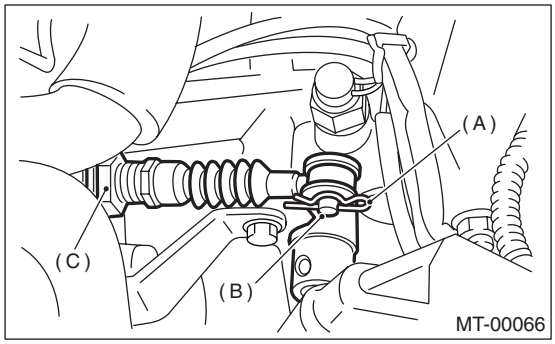
- Turbo model



24) Connect the return spring and clutch cable. (1.6 L model)



25) Install the drive select cable on transmission. (Dual-range model)



(A) Snap pin
(B) Clevis pin
(C) Drive select cable

26) Connect the following connectors:
(1) Transmission ground cable

Tightening torque:
13 N·m (1.3 kgf-m, 9.4 ft-lb)

(2) Vehicle speed sensor connector
(3) Neutral position switch connector
(4) Back-up light switch connector
(5) High-low switch connector (Dual-range model)

27) Install the air cleaner case stay.

Tightening torque:
16 N·m (1.6 kgf-m, 11.6 ft-lb)

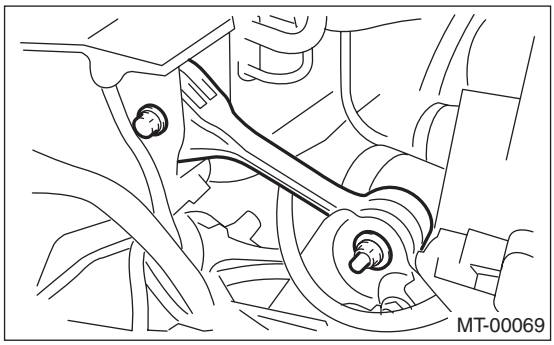
28) Install the air cleaner case and duct.
29) Connect the battery ground cable to battery.
30) Take off the vehicle from lift arms.

4. Transmission Mounting System

A: REMOVAL

1. PITCHING STOPPER

1) Disconnect the ground cable from battery.
2) Remove the air intake duct (Non-turbo model). <Ref. to IN(H4SO)-6, REMOVAL, Air Intake Duct.>
3) Remove the air cleaner case (Non-turbo model). <Ref. to IN(H4SO)-5, REMOVAL, Air Cleaner Case.>
4) Remove the intercooler (Turbo model). <Ref. to IN(H4DOTC)-12, REMOVAL, Intercooler.>
5) Remove the pitching stopper.

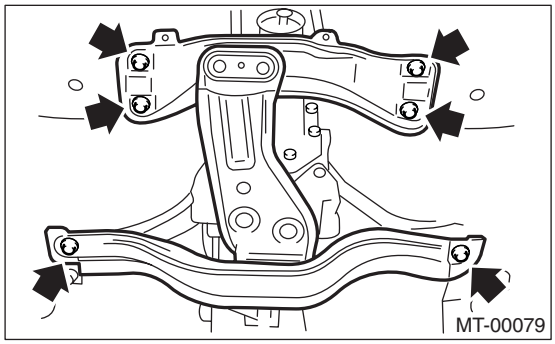


2. CROSSMEMBER AND CUSHION RUBBER

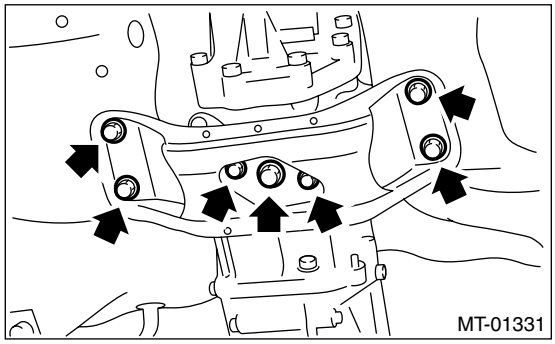
1) Disconnect the ground cable from battery.
2) Lift-up the vehicle.
3) Remove the front and center exhaust pipes. (Non-turbo model)
Without OBD
<Ref. to EX(H4SOw/oOBD)-6, REMOVAL, Front Exhaust Pipe.>
With OBD
<Ref. to EX(H4SO)-6, REMOVAL, Front Exhaust Pipe.>
4) Remove the center exhaust pipe. (Turbo model) <Ref. to EX(H4DOTC)-10, REMOVAL, Center Exhaust Pipe.>
5) Remove the rear exhaust pipe and muffler.
6) Remove the heat shield cover. (If equipped)
7) Set the transmission jack under the transmission body.

CAUTION:
Always support the transmission case with a transmission jack.

8) Remove the rear crossmember.
- AWD model



- FWD model



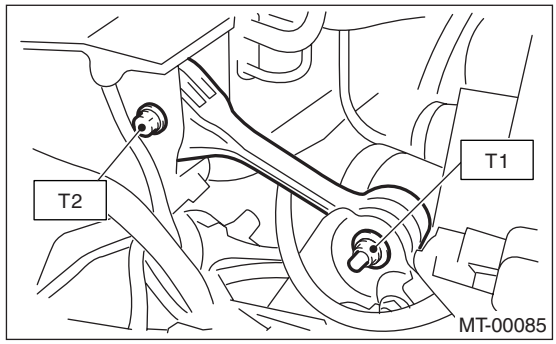
9) Remove the rear cushion rubber.

B: INSTALLATION

1. PITCHING STOPPER

1) Install the pitching stopper.

Tightening torque:
T1: 50 N·m (5.1 kgf-m, 37 ft-lb)
T2: 58 N·m (5.9 kgf-m, 43 ft-lb)



2) Install the air intake duct and cleaner case. (Non-turbo model)
<Ref. to IN(H4SO)-5, INSTALLATION, Air Cleaner Case.> and <Ref. to IN(H4SO)-6, INSTALLATION, Air Intake Duct.>
3) Install the intercooler. (Turbo model)
<Ref. to IN(H4DOTC)-12, INSTALLATION, Intercooler.>
4) Connect the battery ground cable to battery.

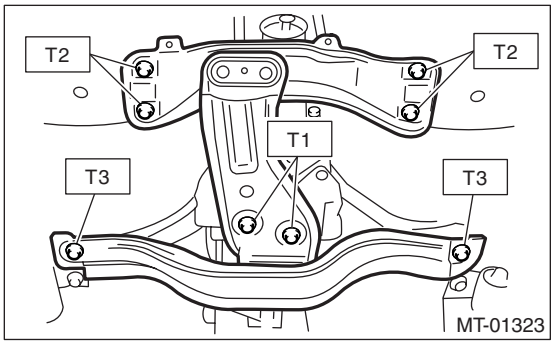
2. CROSSMEMBER AND CUSHION RUBBER

1) Install the rear cushion rubber.

Tightening torque:
AWD model
35 N·m (3.6 kgf-m, 26 ft-lb)
FWD model
123 N·m (12.5 kgf-m, 90.7 ft-lb)

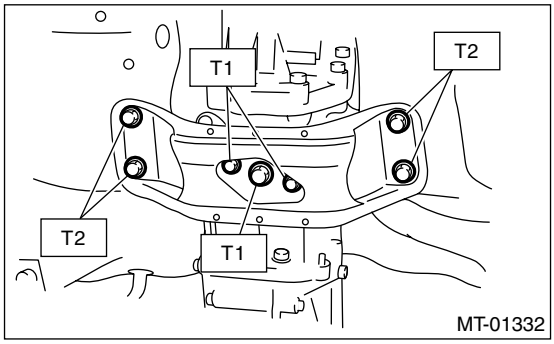
2) Install the rear crossmember.
- AWD model

Tightening torque:
T1: 35 N·m (3.6 kgf-m, 25.8 ft-lb)
T2: 70 N·m (7.1 kgf-m, 51 ft-lb)
T3: 140 N·m (14.3 kgf-m, 103 ft-lb)



- FWD model

Tightening torque:
T1: 35 N·m (3.6 kgf-m, 25.8 ft-lb)
T2: 70 N·m (7.1 kgf-m, 51 ft-lb)



3) Remove the transmission jack.
4) Install the heat shield cover. (If equipped)
5) Install the front and center exhaust pipes. (Non-turbo model)
Without OBD
<Ref. to EX(H4SOw/oOBD)-7, INSTALLATION, Front Exhaust Pipe.>
With OBD
<Ref. to EX(H4SO)-7, INSTALLATION, Front Exhaust Pipe.>
6) Install the center exhaust pipe. (Turbo model)
<Ref. to EX(H4DOTC)-11, INSTALLATION, Center Exhaust Pipe.>
7) Install the rear exhaust pipe and muffler.

C: INSPECTION

Repair or replace parts if the results of the inspection below are not satisfactory.

1. PITCHING STOPPER

Make sure the pitching stopper is not bent or damaged. Make sure the rubber is not stiff, cracked, or otherwise damaged.

2. CROSSMEMBER AND CUSHION RUBBER

Make sure the crossmember is not bent or damaged. Make sure the cushion rubber is not stiff, cracked, or otherwise damaged.

5. Oil Seal

A: INSPECTION

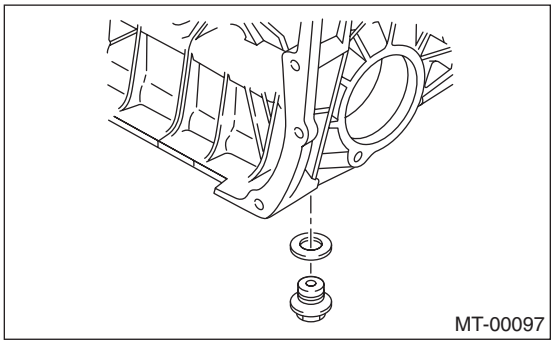
Check the oil seal portion for leakage. If leakage is found, replace the oil seal with a new one, and check propeller shaft.

B: REPLACEMENT

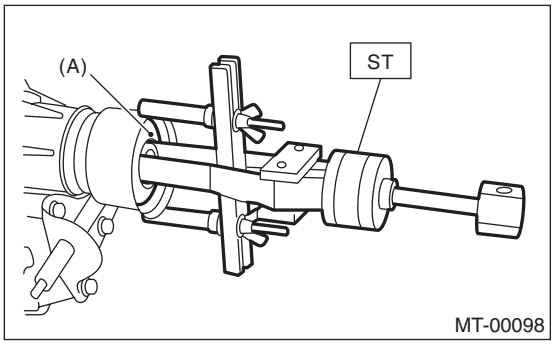
1) Clean the transmission exterior.
2) Drain the gear oil completely.

NOTE:
- Tighten the drain plug after draining gear oil.
- Use a new gasket.

Tightening torque:
70 N·m (7.1 kgf-m, 51 ft-lb)

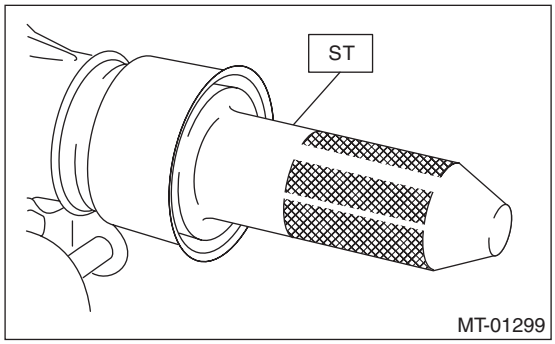


3) Remove the rear exhaust pipe and muffler.
4) Remove the heat shield cover. (If equipped)
5) Remove the propeller shaft. <Ref. to DS-17, REMOVAL, Propeller Shaft.>
6) Using the ST, remove the oil seal.
ST 398527700 PULLER ASSY



(A) Oil seal

7) Using the ST, install the oil seal.
ST 498057300 INSTALLER



8) Install the propeller shaft. <Ref. to DS-18, INSTALLATION, Propeller Shaft.>
9) Install the heat shield cover.
10) Install the rear exhaust pipe and muffler.
11) Pour gear oil and check the oil level. <Ref. to 5MT-35, REPLACEMENT, Transmission Gear Oil.>

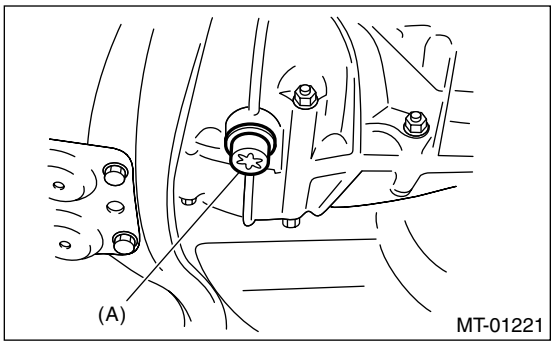
6. Differential Side Retainer Oil Seal

A: INSPECTION

Check leakage of gear oil from the differential side retainer oil seal part. If there is oil leakage, replace with a new oil seal, and check front drive shaft.

B: REPLACEMENT

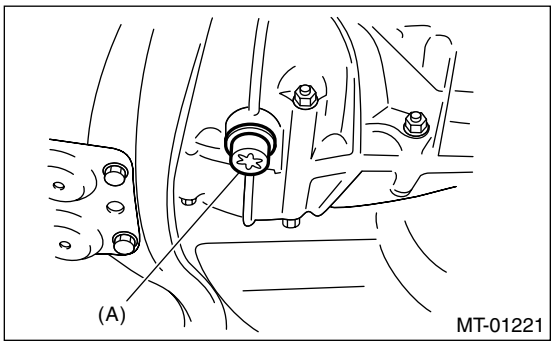
1) Lift-up the vehicle.
2) Drain gear oil from differential oil drain plug.



(A) Differential oil drain plug

3) Replace with a new gasket and tighten the differential oil drain plug.

Tightening torque:
70 N·m (7.1 kgf-m, 51 ft-lb)



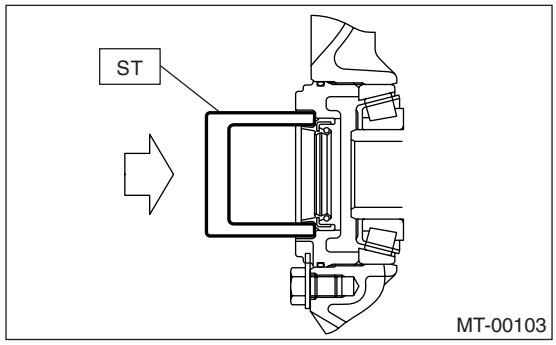
(A) Differential oil drain plug

4) Remove the front and center exhaust pipe.
<Ref. to EX(H4SO)-6, REMOVAL, Front Exhaust Pipe.>
5) Separate the front drive shaft from transmission.
<Ref. to DS-40, REMOVAL, Front Drive Shaft.>
6) Remove the differential side retainer oil seal.

NOTE:
• Be sure to replace the differential side retainer oil seal after the procedure of removing the front drive shaft from transmission.
• When removing the oil seal, using the ST 398527700 PULLER ASSY. Also when using a flat tip screwdriver, be careful not to scratch the differential side retainer.

7) Using the ST, install the differential side retainer by slightly tapping with a plastic hammer.
ST 18675AA000 DIFFERENTIAL SIDE OIL SEAL INSTALLER

NOTE:
Apply oil to the oil seal lips.



8) Install the front drive shaft. <Ref. to DS-40, INSTALLATION, Front Drive Shaft.>
ST 28399SA010 FRONT DRIVE SHAFT OIL SEAL PROTECTOR
9) Install the front and center exhaust pipe.
<Ref. to EX(H4SO)-7, INSTALLATION, Front Exhaust Pipe.>
10) Lower the vehicle.
11) Pour gear oil through the gauge hole. <Ref. to 5MT-35, REPLACEMENT, Transmission Gear Oil.>

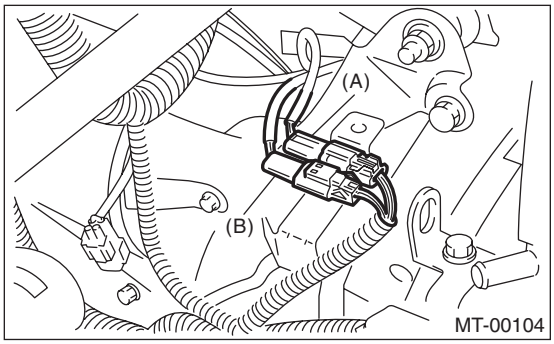
7. Switches and Harness

A: REMOVAL

1. BACK-UP LIGHT AND NEUTRAL POSITION SWITCH

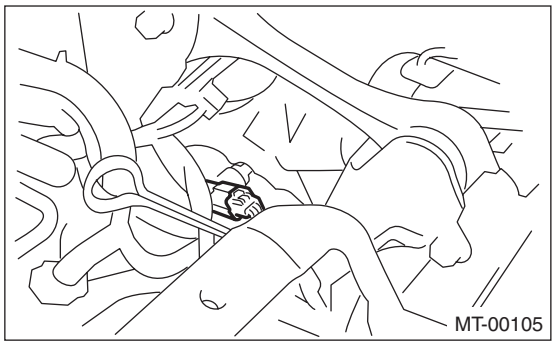
1) Disconnect the ground cable from battery.
2) Remove the air intake duct and cleaner case. (Non-turbo model) <Ref. to IN(H4SO)-5, REMOVAL, Air Cleaner Case.> and <Ref. to IN(H4SO)-6, REMOVAL, Air Intake Duct.>
3) Remove the intercooler (Turbo model). <Ref. to IN(H4DOTC)-12, REMOVAL, Intercooler.>
4) Disconnect the connector of back-up light switch and neutral position switch.

- Non-turbo model

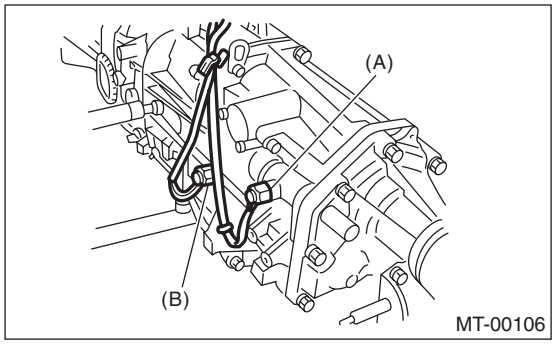


(A) Neutral switch (Brown)
(B) Back-up light switch (Gray)

- Turbo model



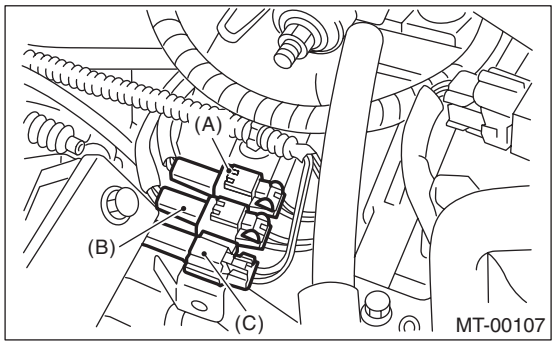
5) Lift-up the vehicle.
6) Remove the back-up light switch and neutral position switch with harness.



(A) Neutral switch (Brown)
(B) Back-up light switch (Gray)

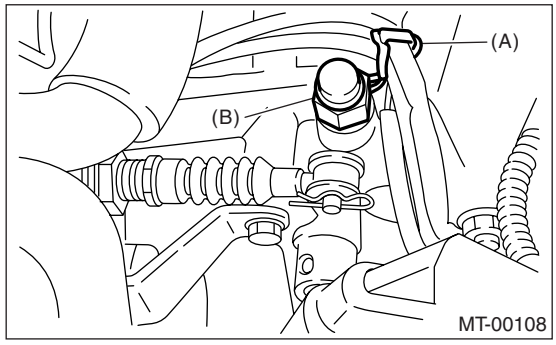
2. HIGH-LOW SWITCH

1) Disconnect the ground cable from battery.
2) Remove the air intake duct and cleaner case. (Non-turbo model) <Ref. to IN(H4SO)-5, REMOVAL, Air Cleaner Case.> and <Ref. to IN(H4SO)-6, REMOVAL, Air Intake Duct.>
3) Disconnect the connector of high-low switch.



(A) Neutral switch (Brown)
(B) Back-up light switch (Gray)
(C) High-low switch (Black)

4) Remove the high-low switch cable from clamp.
5) Remove the high-low switch.



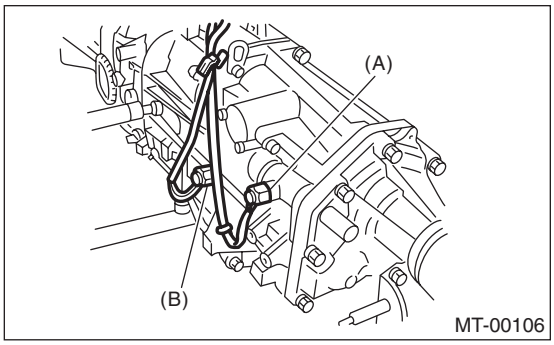
(A) Clamp
(B) High-low switch

B: INSTALLATION

1. BACK-UP LIGHT SWITCH AND NEUTRAL POSITION SWITCH

1) Install the back-up light switch and neutral position switch with harness.

Tightening torque:
32.3 N·m (3.3 kgf-m, 23.8 ft-lb)



(A) Neutral switch
(B) Back-up light switch

2) Connect the connector of back-up light switch and neutral position switch.
3) Install the air intake duct and cleaner case. (Non-turbo model) <Ref. to IN(H4SO)-5, INSTALLATION, Air Cleaner Case.> and <Ref. to IN(H4SO)-6, INSTALLATION, Air Intake Duct.>
4) Install the intercooler. (Turbo model)
<Ref. to IN(H4DOTC)-12, INSTALLATION, Intercooler.>
5) Connect the battery ground cable to battery.

2. HIGH-LOW SWITCH

1) Install the high-low switch.

Tightening torque:
32.3 N·m (3.3 kgf-m, 23.8 ft-lb)

2) Install the high-low switch cable to clamp.
3) Connect the connector of high-low switch.
4) Install the air intake duct and cleaner case. <Ref. to IN(H4SO)-5, INSTALLATION, Air Cleaner Case.> and <Ref. to IN(H4SO)-6, INSTALLATION, Air Intake Duct.>
5) Connect the battery ground cable to battery.

C: INSPECTION

1. BACK-UP LIGHT SWITCH

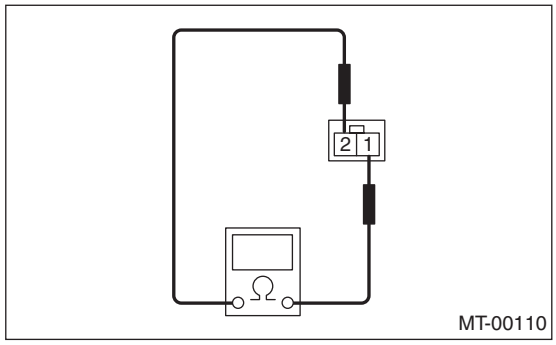
Inspect the back-up light switch. <Ref. to LI-7, INSPECTION, Back-up Light System.>

2. NEUTRAL POSITION SWITCH

1) Turn the ignition switch to OFF.
2) Disconnect the connector of neutral position switch.
3) Measure the resistance between neutral position switch terminals.

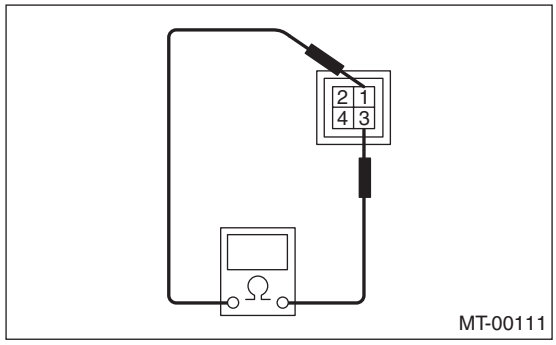
Non-turbo model:

Gear shift position	Terminal No.	Specified resistance
Neutral position	1 and 2	Less than 1 Ω
Other positions		More than 1 MΩ



Turbo model:

Gear shift position	Terminal No.	Specified resistance
Neutral position	1 and 3	Less than 1 Ω
Other positions		More than 1 MΩ

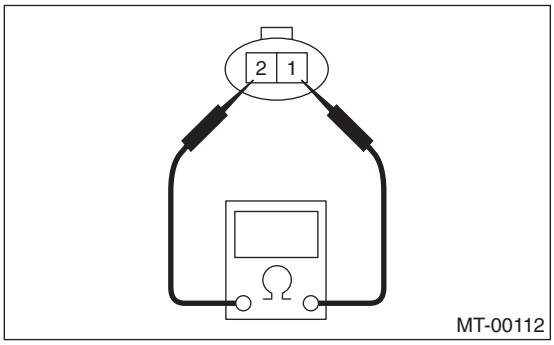


4) Replace defective parts.

3. HIGH-LOW SWITCH

1) Turn ignition switch to OFF.
2) Disconnect connector high-low switch.
3) Measure the resistance between high-low switch terminals.

Gear shift position	Terminal No.	Specified resistance
LO position	1 and 2	Less than 1 Ω
HIGH position		More than 1 MΩ

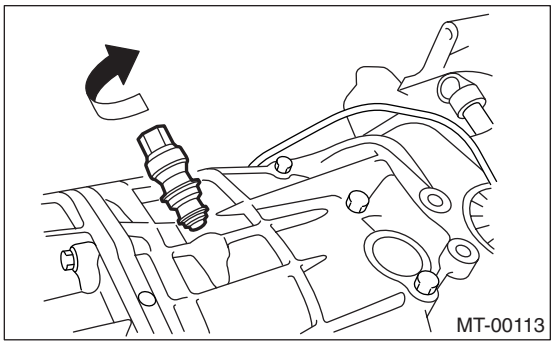


4) Replace defective parts.

8. Vehicle Speed Sensor

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Lift-up the vehicle.
3) Remove the front, center rear exhaust pipes and muffler.
4) Disconnect the connector from vehicle speed sensor.
5) Turn and remove the vehicle speed sensor.



B: INSTALLATION

NOTE:
• Discard the vehicle speed sensor and after removal, replace with a new one.
• Ensure the sensor mounting hole is clean and free of foreign matter.
• Align the tip end of key with key groove on end of speedometer shaft during installation.

1) Hand tighten the vehicle speed sensor.
2) Tighten the vehicle speed sensor using suitable tool.

Tightening torque:
5.9 N·m (0.6 kgf-m, 4.3 ft-lb)

3) Connect the connector to vehicle speed sensor.
4) Install the front, center exhaust pipes and muffler.
5) Lower the vehicle.
6) Connect the battery ground cable to battery.

C: INSPECTION

The vehicle speed sensor can not be inspected as a single unit. Check if speedometer operates normally. If it does not operate normally, inspect the combination meter system. <Ref. to IDI-3, INSPECTION, Combination Meter System.>

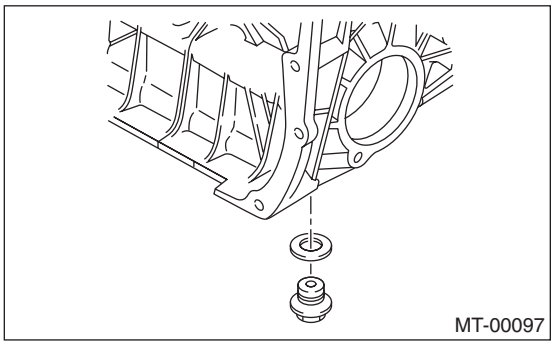
9. Preparation for Overhaul

A: PROCEDURE

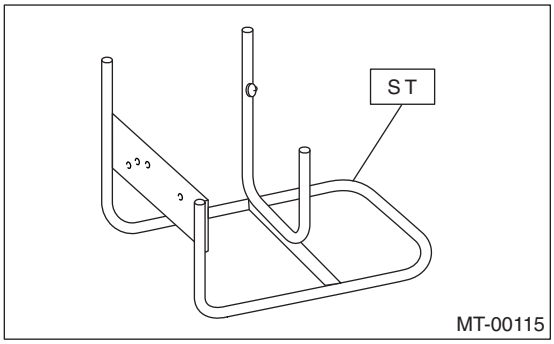
1) Clean oil, grease, dirt and dust from transmission.
2) Remove the drain plug to drain oil. After draining, retighten it as before.

NOTE:
Use a new gasket.

Tightening torque:
70 N·m (7.1 kgf-m, 51 ft-lb)



3) Attach the transmission to ST.
ST 499937100 TRANSMISSION STAND

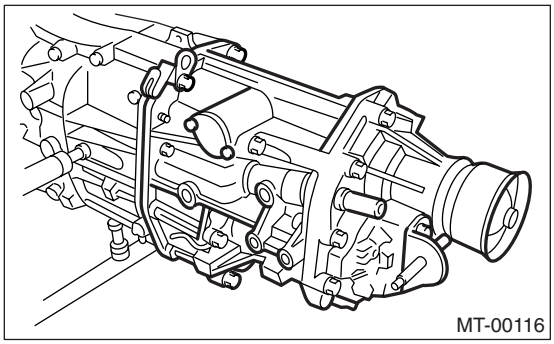


4) Rotating parts should be coated with oil prior to assembly.
5) All disassembled parts, if to be reused, should be reinstalled in the original positions and directions.
6) Gaskets, lock washers and lock nut must be replaced with new ones.
7) Liquid gasket should be used where specified to prevent leakage.

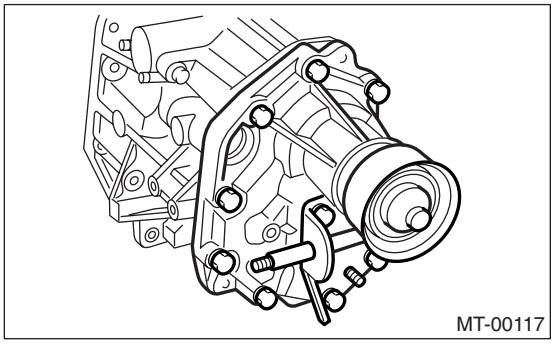
10. Transfer Case and Extension Case Assembly

A: REMOVAL

1) Remove the manual transmission assembly from vehicle. <Ref. to 5MT-36, REMOVAL, Manual Transmission Assembly.>
2) Remove the back-up light switch and neutral position switch. <Ref. to 5MT-47, REMOVAL, Switches and Harness.>
3) Remove the transfer case with extension case assembly.

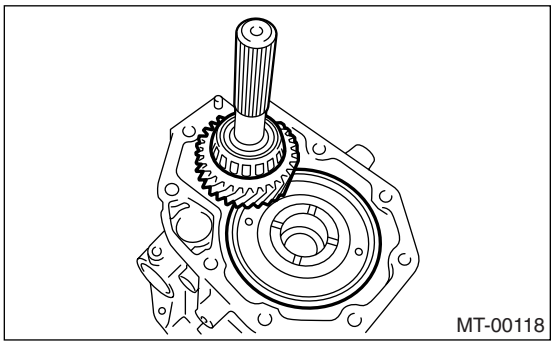

MT-00116

4) Remove the shifter arm.
5) Remove the extension case assembly.

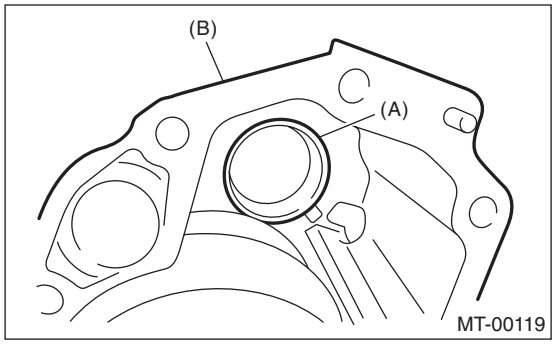

MT-00117

B: INSTALLATION

1) Install the center differential and transfer driven gear into transfer case.


MT-00118

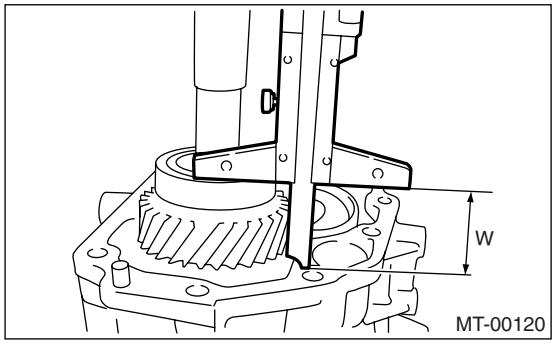
2) Remove the bearing outer race from extension case.



MT-00119

(A) Bearing outer race
(B) Extension case

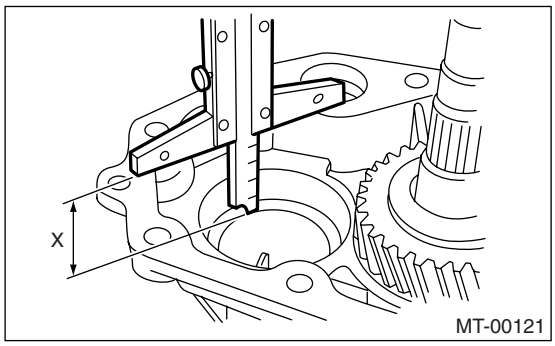
3) While pressing the bearing outer race horizontally, turn the driven shaft ten rotations.
4) Measure the height “W” between transfer case and taper roller bearing on the transfer driven gear.



MT-00120

5) Measure the depth “X”.

NOTE:
Measure with bearing cone and thrust washer removed.



MT-00121

6) Calculate the thrust washer thickness “t” using the following equation:
t = X − W + 0.2 to 0.3 mm (0.008 to 0.012 in)

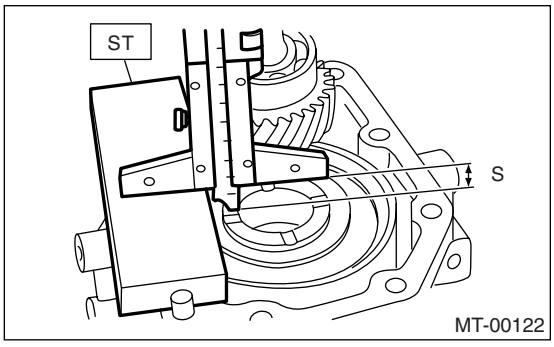
7) Select the nearest washer in the following table:

Standard protrusion amount of taper roller bearing outer race:
0.2 — 0.3 mm (0.008 — 0.012 in)

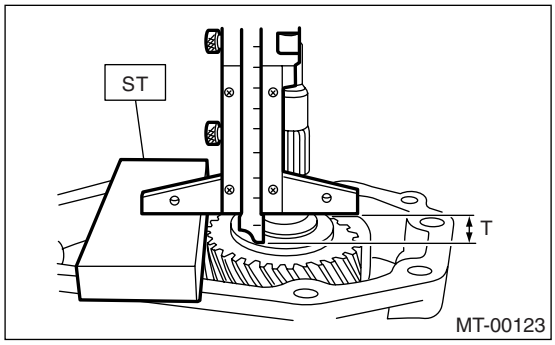
NOTE:
Be sure to set within the standard protrusion amount.

Thrust washer (50 × 61 × t)	
Part No.	Thickness mm (in)
803050060	0.50 (0.0197)
803050061	0.55 (0.0217)
803050062	0.60 (0.0236)
803050063	0.65 (0.0256)
803050064	0.70 (0.0276)
803050065	0.75 (0.0295)
803050066	0.80 (0.0315)
803050067	0.85 (0.0335)
803050068	0.90 (0.0354)
803050069	0.95 (0.0374)
803050070	1.00 (0.0394)
803050071	1.05 (0.0413)
803050072	1.10 (0.0433)
803050073	1.15 (0.0453)
803050074	1.20 (0.0472)
803050075	1.25 (0.0492)
803050076	1.30 (0.0512)
803050077	1.35 (0.0531)
803050078	1.40 (0.0551)
803050079	1.45 (0.0571)

8) Fit the thrust washers on transfer drive shaft.
9) Install the bearing cone into extension case.
10) Measure the depth “S” between transfer case and center differential.
ST 398643600 GAUGE



11) Measure the depth “T” between extension case and transfer drive gear.
ST 398643600 GAUGE



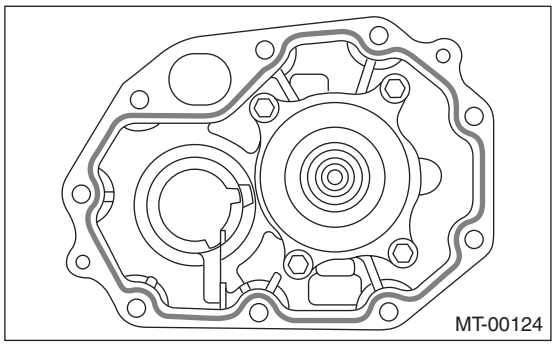
12) Calculate the space “U” using the following equation:
U = {15 mm (0.59 in) – T} – {S – 15 mm (0.59 in)} – 0.15 — 0.35 mm (0.0059 — 0.0138 in)
13) Select the suitable washer in the following table:

Standard clearance:
0.15 — 0.35 mm (0.0059 — 0.0138 in)

Thrust washer	
Part No.	Thickness mm (in)
803036050	0.9 (0.035)
803036054	1.0 (0.039)
803036051	1.1 (0.043)
803036055	1.2 (0.047)
803036052	1.3 (0.051)
803036056	1.4 (0.055)
803036053	1.5 (0.059)
803036057	1.6 (0.063)
803036058	1.7 (0.067)

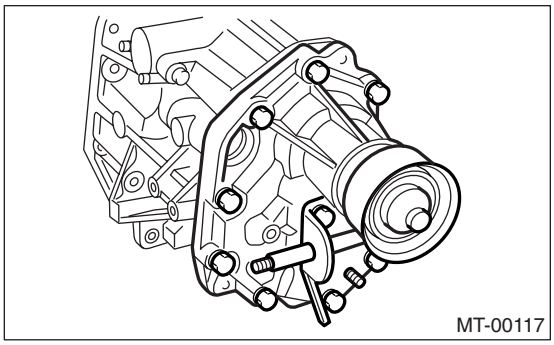
14) Fit the thrust washer on center differential.
15) Apply proper amount of liquid gasket to the transfer case mating surface.

Liquid gasket:
THREE BOND 1215 (Part No. 004403007) or equivalent

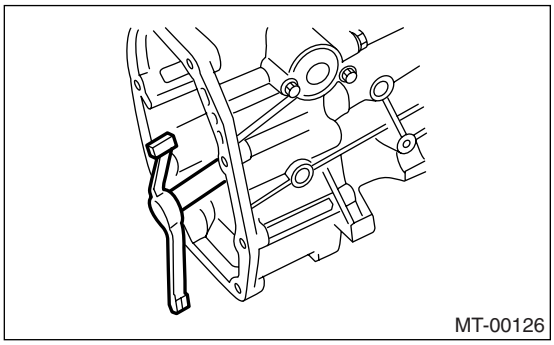


16) Install the extension assembly into transfer case.

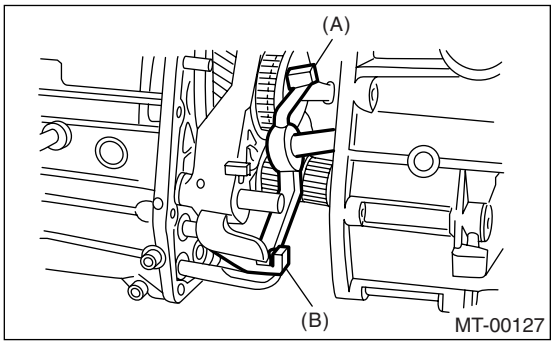
Tightening torque:
40 N·m (4.1 kgf-m, 29.7 ft-lb)


MT-00117

17) Install the shifter arm to transfer case.


MT-00126

18) Hang the shifter arm on 3rd-4th fork rod.

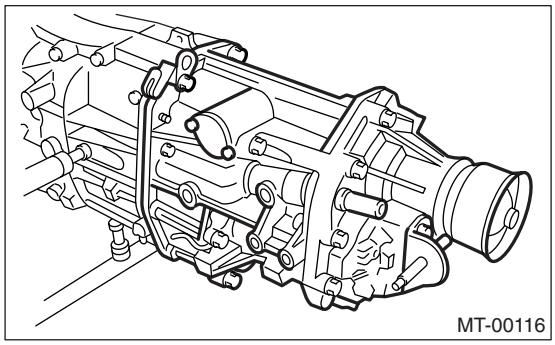


MT-00127

(A) Shifter arm
(B) 3rd-4th fork rod

19) Install the transfer case with extension case assembly to transmission case.

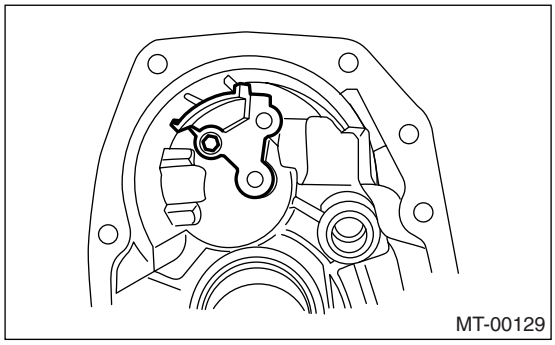
Tightening torque:
24.5 N·m (2.5 kgf-m, 18.1 ft-lb)


MT-00116

C: DISASSEMBLY

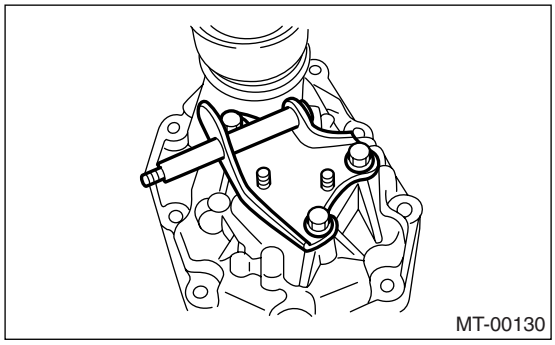
1. TRANSFER CASE

1) Remove the reverse check assembly. <Ref. to 5MT-62, REMOVAL, Reverse Check Sleeve.>
2) Remove the oil guide.


MT-00129

2. EXTENSION CASE

1) Remove the transfer drive gear assembly. <Ref. to 5MT-57, REMOVAL, Transfer Drive Gear.>
2) Remove the shift bracket.


MT-00130

3) Remove the oil seal from extension case. <Ref. to 5MT-45, Oil Seal.>

D: ASSEMBLY

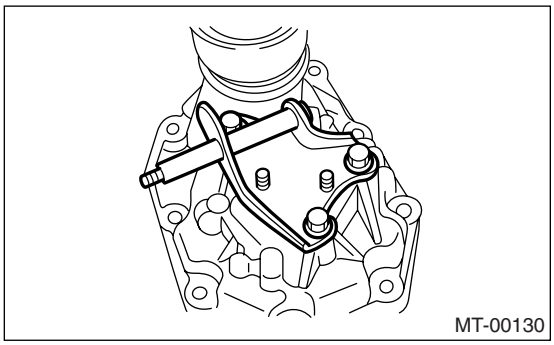
1. EXTENSION CASE

1) Using the ST, install the oil seal to extension case. <Ref. to 5MT-45, Oil Seal.>

NOTE:
Use a new oil seal.

2) Install the shift bracket to extension case.

Tightening torque:
24.5 N·m (2.5 kgf-m, 18.1 ft-lb)

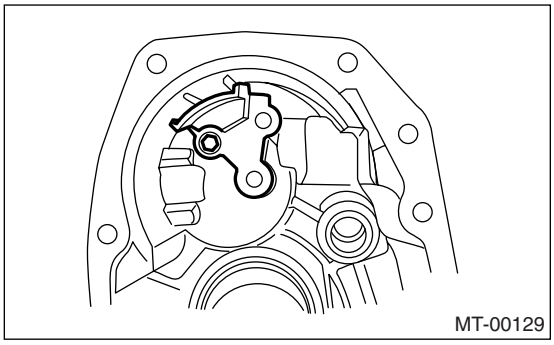

MT-00130

3) Install the transfer drive gear to extension case. <Ref. to 5MT-57, INSTALLATION, Transfer Drive Gear.>

2. TRANSFER CASE

1) Install the oil guide to transfer case.

Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)


MT-00129

2) Install the reverse check sleeve assembly to transfer case. <Ref. to 5MT-62, INSTALLATION, Reverse Check Sleeve.>

11.Rear Case

A: REMOVAL

1) Remove the manual transmission assembly from vehicle. <Ref. to 5MT-36, REMOVAL, Manual Transmission Assembly.>
2) Remove back-up light switch and neutral position switch. <Ref. to 5MT-47, REMOVAL, Switches and Harness.>
3) Remove rear case.

B: INSTALLATION

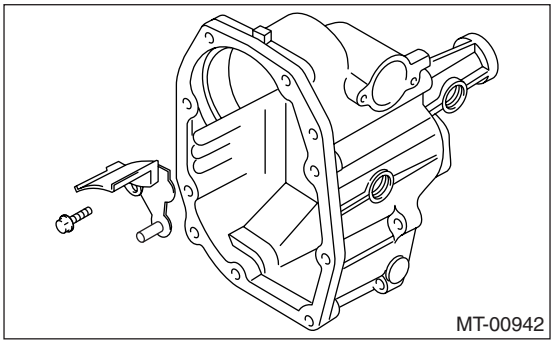
1) Install rear case.

Tightening torque:
24.5 N·m (2.5 kgf-m, 18.1 ft-lb)

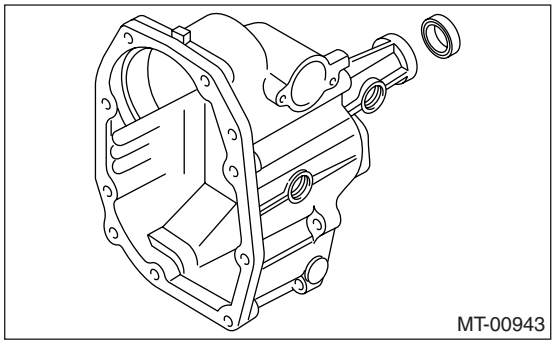
2) Install back-up light switch and neutral position switch. <Ref. to 5MT-48, INSTALLATION, Switches and Harness.>
3) Install the manual transmission assembly to vehicle. <Ref. to 5MT-39, INSTALLATION, Manual Transmission Assembly.>

C: DISASSEMBLY

1) Remove the reverse check assembly. <Ref. to 5MT-62, REMOVAL, Reverse Check Sleeve.>
2) Remove oil guide.


MT-00942

3) Remove oil seal.


MT-00943

D: ASSEMBLY

1) Install oil seal.
2) Install oil guide.

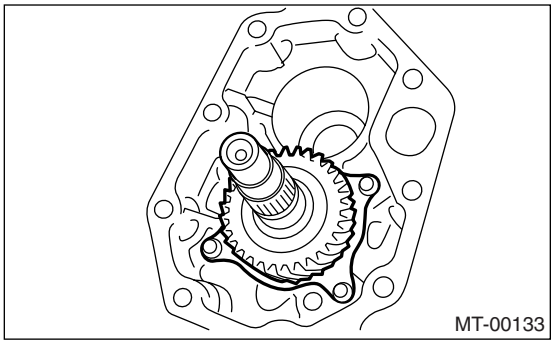
Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)

3) Install the reverse check assembly. <Ref. to 5MT-62, INSTALLATION, Reverse Check Sleeve.>

12.Transfer Drive Gear

A: REMOVAL

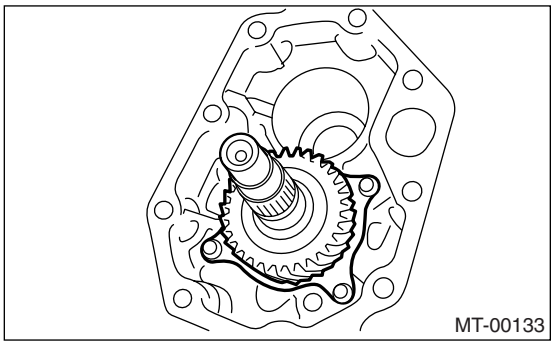
1) Remove the manual transmission assembly from vehicle. <Ref. to 5MT-36, REMOVAL, Manual Transmission Assembly.>
2) Remove the back-up light switch and neutral position switch. <Ref. to 5MT-47, REMOVAL, Switches and Harness.>
3) Remove the transfer case with extension case assembly. <Ref. to 5MT-52, REMOVAL, Transfer Case and Extension Case Assembly.>
4) Remove the extension case assembly.
5) Remove the transfer driven gear.
6) Remove the transfer drive gear.


MT-00133

B: INSTALLATION

1) Install the transfer drive gear.

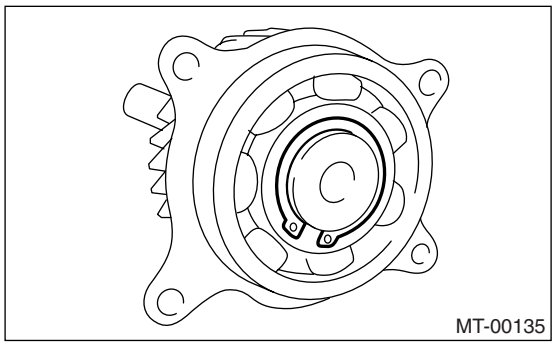
Tightening torque:
26 N·m (2.7 kgf-m, 20 ft-lb)


MT-00133

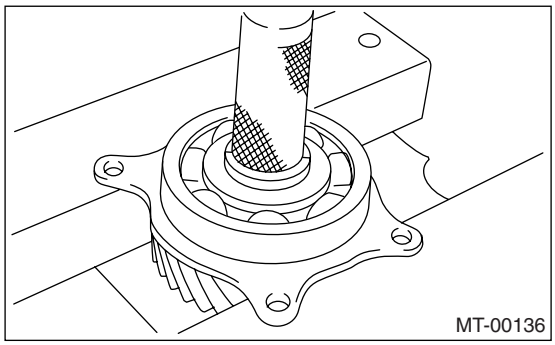
2) Install the transfer driven gear.
3) Install the extension case assembly.
4) Install the transfer case and extension case assembly. <Ref. to 5MT-52, INSTALLATION, Transfer Case and Extension Case Assembly.>
5) Install the back-up light switch and neutral position switch. <Ref. to 5MT-48, INSTALLATION, Switches and Harness.>
6) Install the manual transmission assembly from vehicle. <Ref. to 5MT-39, INSTALLATION, Manual Transmission Assembly.>

C: DISASSEMBLY

1) Remove the snap ring.


MT-00135

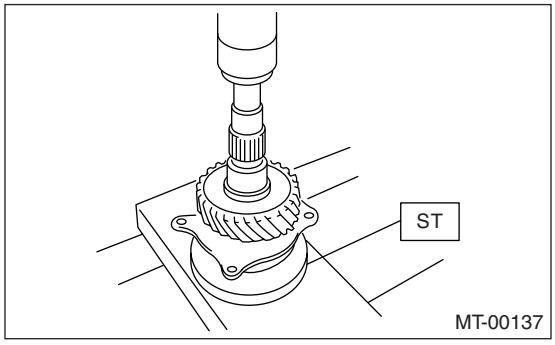
2) Remove the ball bearing.


MT-00136

D: ASSEMBLY

1) Set the ST applying to inner race of bearing and install to drive shaft.
ST 398177700 INSTALLER

NOTE:
Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).



MT-00137

2) Install the snap ring on transfer drive shaft.
3) Check the clearance between snap ring and ball bearing. <Ref. to 5MT-58, INSPECTION, Transfer Drive Gear.>

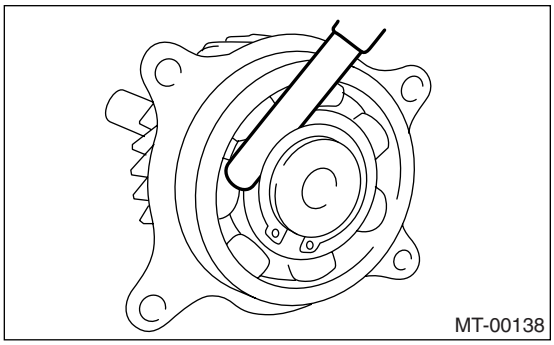
E: INSPECTION

1) Bearings
Replace the bearings in the following cases:
- Broken or rusty bearings
- Worn or damaged
- Bearings that fail to turn smoothly or make abnormal noise when turned after gear oil lubrication.

2) Drive gear
Replace the drive gear in the following cases:
- If their tooth surfaces and shaft are excessively broken or damaged.

3) Measure the clearance between snap ring and inner race of ball bearing with a thickness gauge.

Clearance:
0.01 — 0.15 mm (0.0004 — 0.0059 in)



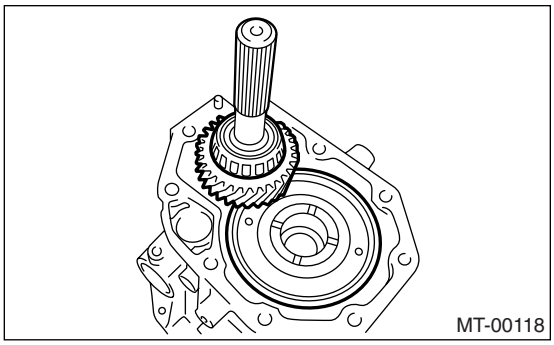
If the measurement is not within specification, select a suitable snap ring.

Snap ring (Outer-30)	
Part No.	Thickness mm (in)
805030041	1.53 (0.0602)
805030042	1.65 (0.0650)
805030043	1.77 (0.0697)

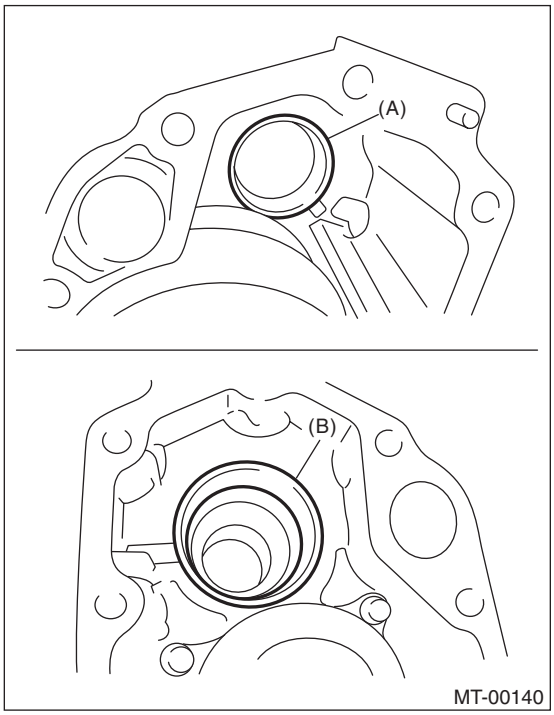
13.Transfer Driven Gear

A: REMOVAL

1) Remove the manual transmission assembly from vehicle. <Ref. to 5MT-36, REMOVAL, Manual Transmission Assembly.>
2) Remove the back-up light switch and neutral position switch. <Ref. to 5MT-47, REMOVAL, Switches and Harness.>
3) Remove the transfer case with extension case assembly. <Ref. to 5MT-52, REMOVAL, Transfer Case and Extension Case Assembly.>
4) Remove the extension case assembly.
5) Remove the transfer driven gear.



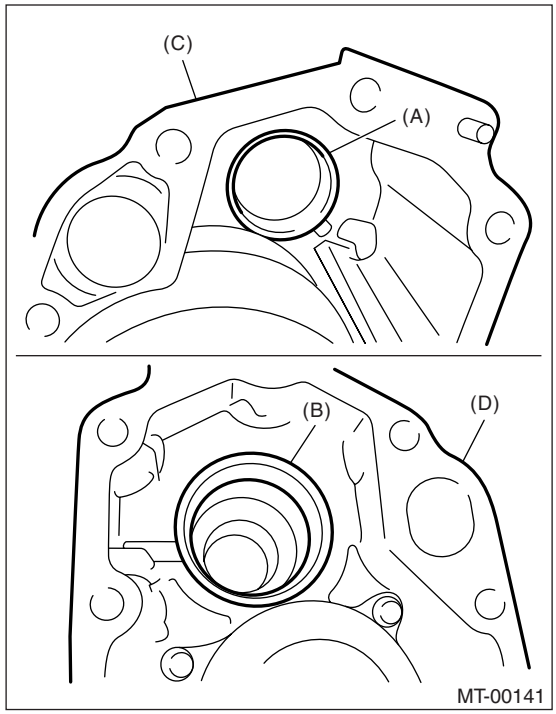
6) Remove the bearing outer race from extension case and transfer case.



(A) Bearing outer race (transfer case)
(B) Bearing outer race (extension case)

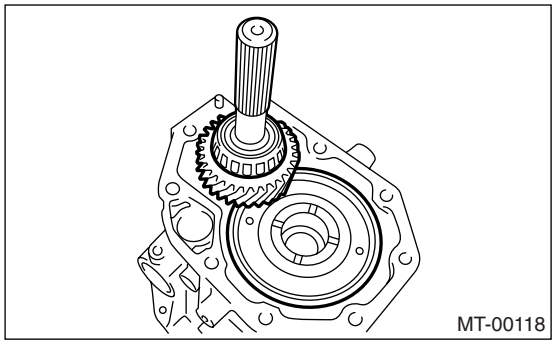
B: INSTALLATION

1) Install the bearing outer race to extension case and transfer case.



(A) Bearing outer race
(B) Bearing outer race
(C) Transfer case
(D) Extension case

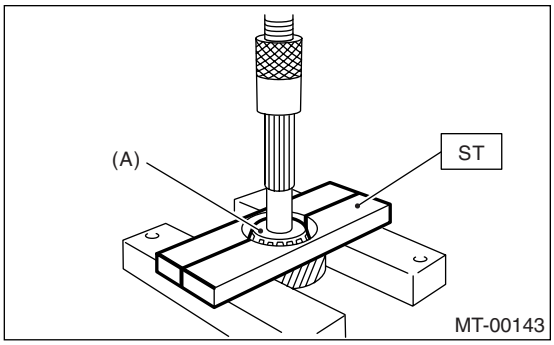
2) Install the transfer driven gear.



3) Install the transfer case and extension case assembly. <Ref. to 5MT-52, INSTALLATION, Transfer Case and Extension Case Assembly.>
4) Install the back-up light switch and neutral position switch. <Ref. to 5MT-48, INSTALLATION, Switches and Harness.>
5) Install the manual transmission assembly to vehicle. <Ref. to 5MT-39, INSTALLATION, Manual Transmission Assembly.>

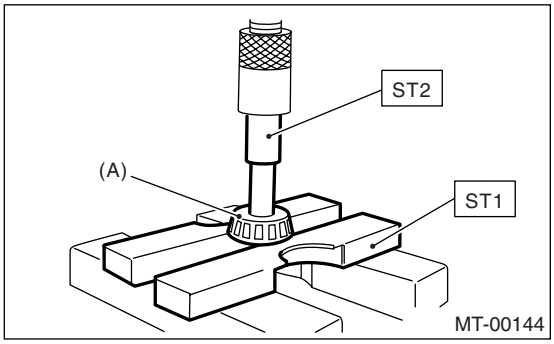
C: DISASSEMBLY

1) Using the ST, remove the roller bearing (extension case side).
ST 498077000 REMOVER



(A) Roller bearing

2) Using the ST1 and ST2, remove the roller bearing (transfer case side).
ST1 498077000 REMOVER
ST2 899864100 REMOVER

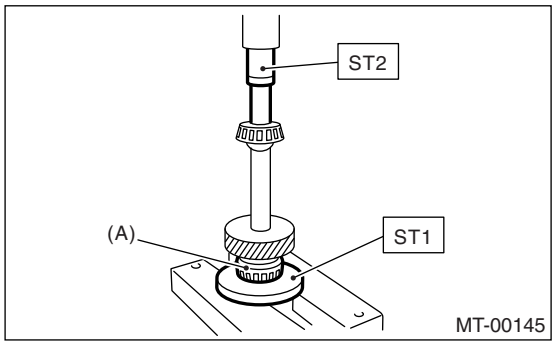


(A) Roller bearing

D: ASSEMBLY

1) Using the ST, install the roller bearing (extension case side).
ST1 398177700 INSTALLER
ST2 899864100 REMOVER

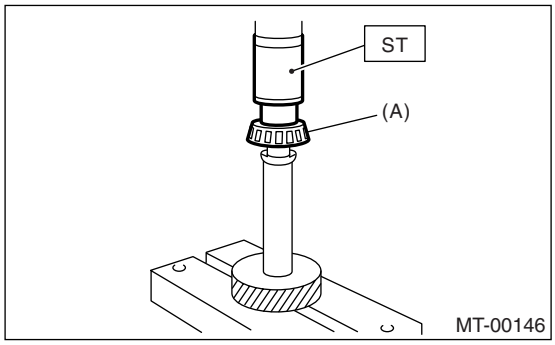
NOTE:
Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).



(A) Roller bearing

2) Using the ST, install the roller bearing (transfer case side).
ST 499757002 INSTALLER

NOTE:
Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).



(A) Roller bearing

E: INSPECTION

1) Bearings
Replace the bearings in the following cases:
- Broken or rusty bearings
- Worn or damaged
- Bearings that fail to turn smoothly or make abnormal noise when turned after gear oil lubrication.

2) Driven gear
Replace the driven gear in the following cases:
- If their tooth surfaces and shaft are excessively broken or damaged.

14.Center Differential

A: REMOVAL

1) Remove the manual transmission assembly from vehicle. <Ref. to 5MT-36, REMOVAL, Manual Transmission Assembly.>
2) Remove the transfer case with extension case assembly. <Ref. to 5MT-52, REMOVAL, Transfer Case and Extension Case Assembly.>
3) Remove the extension case assembly. <Ref. to 5MT-52, REMOVAL, Transfer Case and Extension Case Assembly.>
4) Remove the transfer driven gear. <Ref. to 5MT-59, REMOVAL, Transfer Driven Gear.>
5) Remove the center differential.

B: INSTALLATION

1) Install the center differential into transfer case.
2) Install the transfer driven gear. <Ref. to 5MT-59, INSTALLATION, Transfer Driven Gear.>
3) Install the extension case assembly. <Ref. to 5MT-52, INSTALLATION, Transfer Case and Extension Case Assembly.>
4) Install the transfer case with extension case assembly. <Ref. to 5MT-52, INSTALLATION, Transfer Case and Extension Case Assembly.>
5) Install the back-up light switch and neutral position switch. <Ref. to 5MT-48, INSTALLATION, Switches and Harness.>
6) Install the manual transmission assembly to vehicle. <Ref. to 5MT-39, INSTALLATION, Manual Transmission Assembly.>

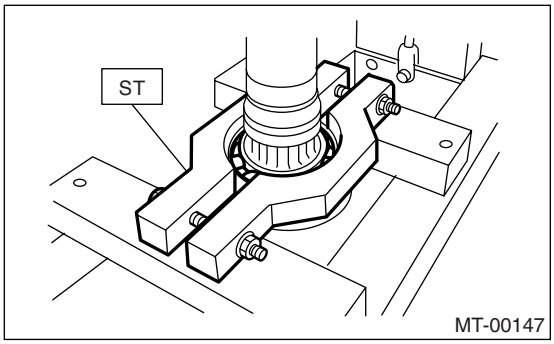
C: DISASSEMBLY

NOTE:
Do not disassemble the center differential because it is a non-disassemble part.

Remove the ball bearing using ST.

NOTE:
Do not reuse the ball bearing.

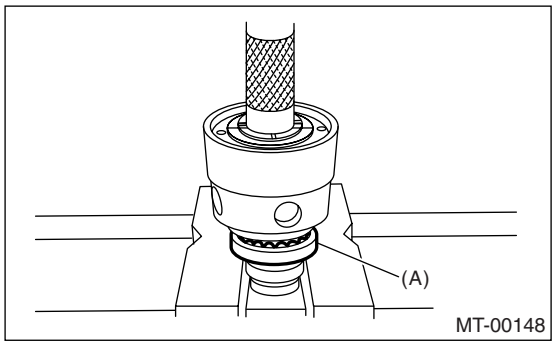
ST 498077300 CENTER DIFFERENTIAL BEARING REMOVER



D: ASSEMBLY

Install the ball bearing to center differential assembly.

NOTE:
Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).



(A) Ball bearing

E: INSPECTION

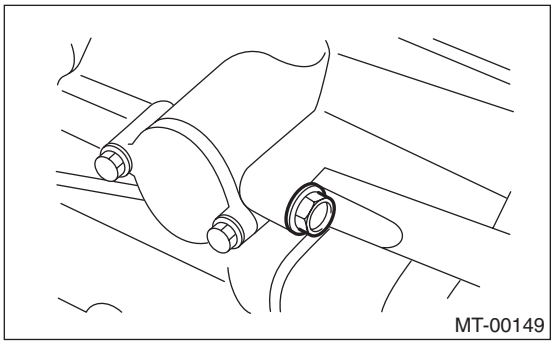
1) Bearings
Replace the bearings in the following cases:
- Broken or rusty bearings
- Worn or damaged
- Bearings that fail to turn smoothly or make abnormal noise when turned after gear oil lubrication.
- Bearings having other defects

2) Center differential
Replace the center differential assembly in the following case:
- Worn or damaged

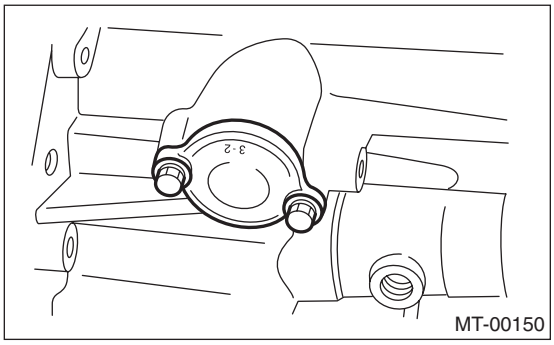
15.Reverse Check Sleeve

A: REMOVAL

1) Remove the manual transmission assembly from vehicle. <Ref. to 5MT-36, REMOVAL, Manual Transmission Assembly.>
2) Remove the transfer case with extension case assembly. <Ref. to 5MT-52, REMOVAL, Transfer Case and Extension Case Assembly.>
3) Remove the shifter arm.
4) Remove the plug, spring, washer and reverse check ball.


MT-00149

5) Remove the reverse check sleeve.

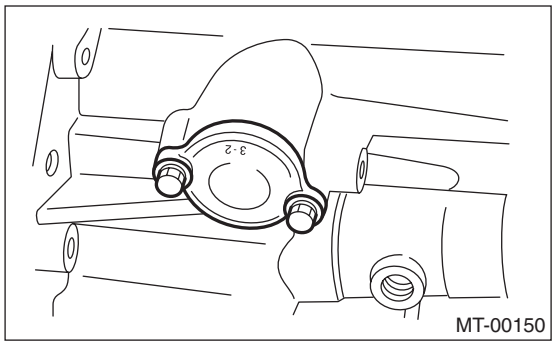


MT-00150

B: INSTALLATION

1) Install the reverse check sleeve.

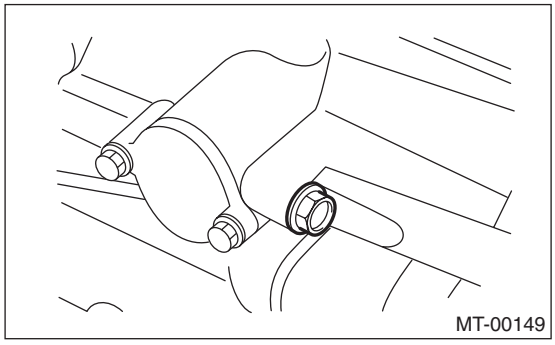
Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



MT-00150

2) Install the ball, spring, washer and plug to transfer case.

Tightening torque:
10 N·m (1.0 kgf-m, 7.4 ft-lb)

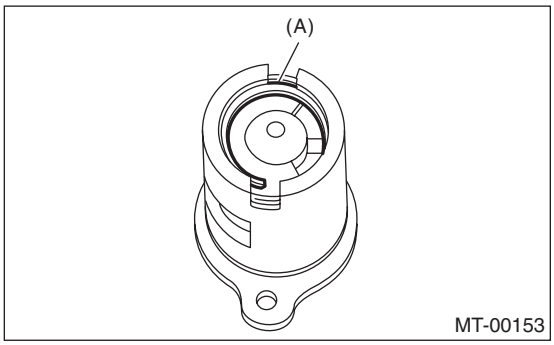

MT-00149

3) Install the shifter arm to transfer case assembly.
4) Install the transfer case with extension case assembly. <Ref. to 5MT-52, INSTALLATION, Transfer Case and Extension Case Assembly.>
5) Install the manual transmission assembly to vehicle. <Ref. to 5MT-39, INSTALLATION, Manual Transmission Assembly.>

C: DISASSEMBLY

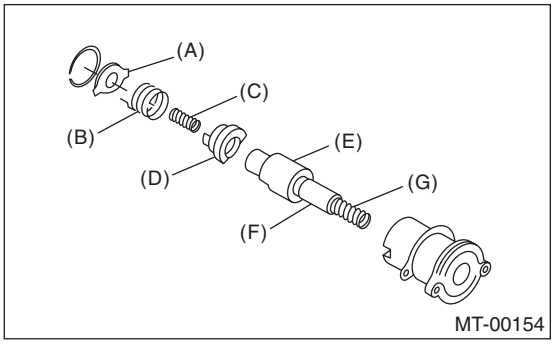
1) Cover the reverse check sleeve with a rag, and remove the snap ring using a screwdriver.

NOTE:
Replace the snap ring with a new one if deformed or weakened.



(A) Snap ring

2) Remove the reverse check plate, reverse check spring, reverse check cam, return spring (5th-Rev), reverse accent shaft, return spring cap and return spring (1st-2nd).



(A) Reverse check plate
(B) Reverse check spring
(C) Return spring (5th-Rev)
(D) Reverse check cam
(E) Reverse accent shaft
(F) Return spring cap
(G) Return spring (1st-2nd)

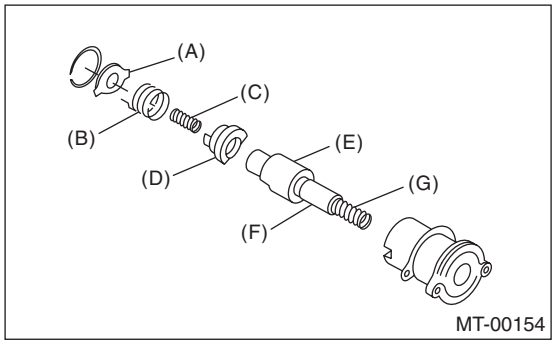
3) Remove the O-ring.

NOTE:
• Reverse check sleeve assembly uses an O-ring which should not be scratched.
• Be careful not to break the adjustment shim placed between reverse check sleeve assembly and case.

D: ASSEMBLY

1) Install the return spring (1st-2nd), return spring cap, reverse accent shaft, check cam, return spring and check spring onto reverse check sleeve.

NOTE:
Be sure the bent section of reverse check spring is positioned in the groove in check cam.

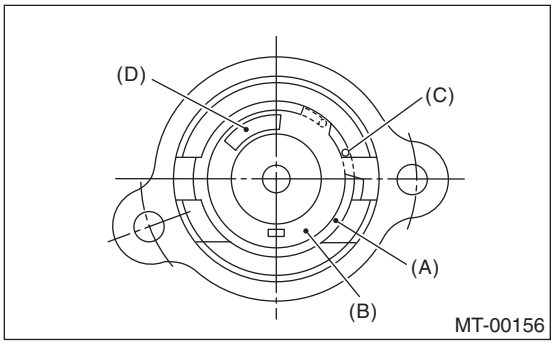


(A) Reverse check plate
(B) Reverse check spring
(C) Return spring (5th-Rev)
(D) Reverse check cam
(E) Reverse accent shaft
(F) Return spring cap
(G) Return spring (1st-2nd)

2) Hook the bent section of reverse check spring over reverse check plate.
3) Rotate the cam so that the protrusion of reverse check cam is at the opening in plate.
4) With the cam held in that position, install the plate onto reverse check sleeve and hold with snap ring.
5) Position the O-ring in groove in sleeve.

E: INSPECTION

• Make sure the cutout section of reverse accent shaft is aligned with the opening in reverse check sleeve.
• Spin the cam by hand for smooth rotation.
• Move the cam and shaft all the way toward plate and release.
If the cam does not return properly, replace the reverse check spring; if shaft does not, check for scratches on the inner surface of sleeve. If sleeve is in good order, replace the spring.



(A) Snap ring
(B) Reverse check plate
(C) Check spring
(D) Check cam

• Select a suitable reverse accent shaft and reverse check plate. <Ref. to 5MT-64, ADJUSTMENT, Reverse Check Sleeve.>

F: ADJUSTMENT

1. NEUTRAL POSITION ADJUSTMENT

1) Shift the gear into 3rd gear position.
2) Shifter arm turns lightly toward the 1st/2nd gear side but heavily toward the reverse gear side because of the function of return spring, until arm contacts the stopper.
3) Make adjustment so that the heavy stroke (reverse side) is a little more than the light stroke (1st/2nd side).
4) To adjust, remove the bolts holding reverse check sleeve assembly to the case, move the sleeve assembly outward, and place adjustment shim between sleeve assembly and case to adjust the clearance.

CAUTION:
Be careful not to break the O-ring when placing shim(s).

NOTE:
• When the shim is removed, the neutral position will move closer to reverse; when shim is added, the neutral position will move closer to 1st gear.
• If the shims alone cannot adjust clearance, replace the reverse accent shaft and re-adjust.

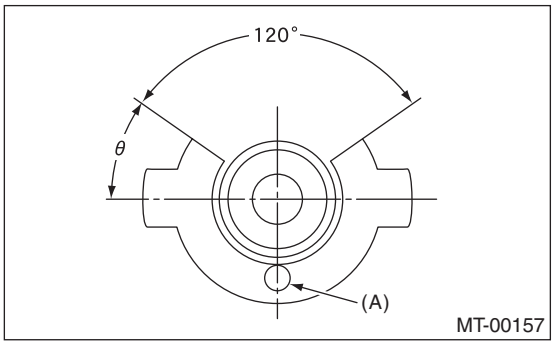
Adjustment shim	
Part No.	Thickness mm (in)
32190AA000	0.15 (0.0059)
32190AA010	0.30 (0.0118)

Reverse accent shaft		
Part No.	Mark	Remarks
32188AA130	S	Neutral position is closer to 1st gear.
32188AA140	T	Standard
32188AA150	U	Neutral position is closer to reverse gear.

2. REVERSE CHECK PLATE ADJUSTMENT

1) Shift the shifter arm to “5th” and then to reverse to see if reverse check mechanism operates properly.
2) Also check to see if the arm returns to neutral when released from reverse position. If the arm does not return properly, replace the reverse check plate.

Reverse check plate			
Part No.	(A): No.	Angle θ	Remarks
32189AA000	0	28°	Arm stops closer to 5th gear.
32189AA010	1	31°	Arm stops closer to 5th gear.
32189AA020	2	34°	Arm stops in the center.
32189AA030	3	37°	Arm stops closer to reverse gear.
32189AA040	4	40°	Arm stops closer to reverse gear.

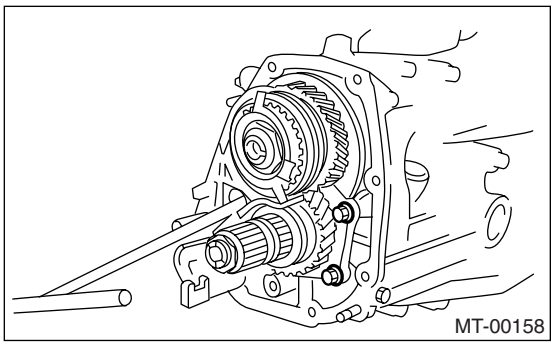


16.Transmission Case

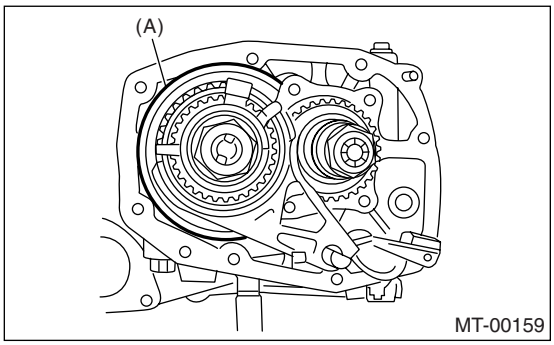
A: REMOVAL

1. SINGLE-RANGE

1) Remove the manual transmission assembly from vehicle. <Ref. to 5MT-36, REMOVAL, Manual Transmission Assembly.>
2) Remove the clutch release lever. <Ref. to CL-26, REMOVAL, Release Bearing and Lever.>
3) Remove the transfer case with extension case assembly. <Ref. to 5MT-52, REMOVAL, Transfer Case and Extension Case Assembly.>
4) Remove the bearing mounting bolts.


MT-00158

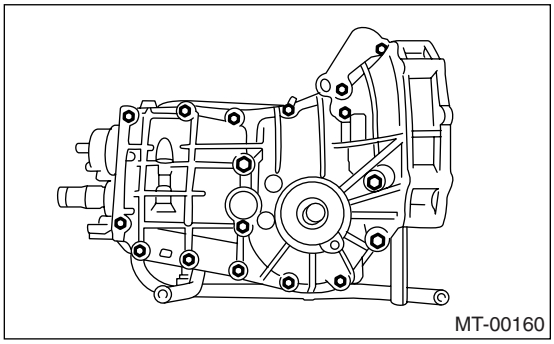
5) Remove the main shaft rear plate.



MT-00159

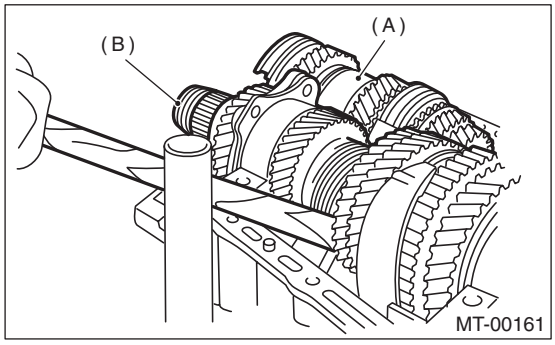
(A) Main shaft rear plate

6) Separate the transmission case into right and left cases by loosening the coupling bolts and nuts.


MT-00160

7) Remove the drive pinion shaft assembly from left side transmission case.

NOTE:
Use a hammer handle, etc. to remove if too tight.

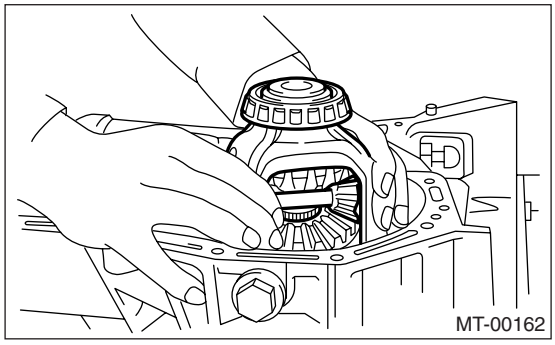


MT-00161

(A) Main shaft assembly
(B) Drive pinion shaft assembly

8) Remove the main shaft assembly.
9) Remove the differential assembly.

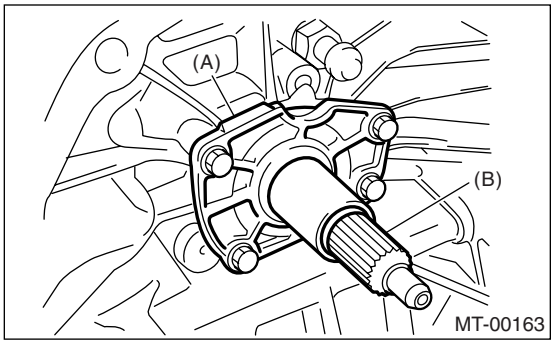
NOTE:
• Be careful not to confuse the right and left roller bearing outer races.
• Be careful not to damage the retainer oil seal.


MT-00162

2. DUAL-RANGE

1) Remove the manual transmission assembly from vehicle. <Ref. to 5MT-36, REMOVAL, Manual Transmission Assembly.>
2) Remove the clutch release lever. <Ref. to CL-26, REMOVAL, Release Bearing and Lever.>
3) Remove the transfer case with extension case assembly. <Ref. to 5MT-52, REMOVAL, Transfer Case and Extension Case Assembly.>

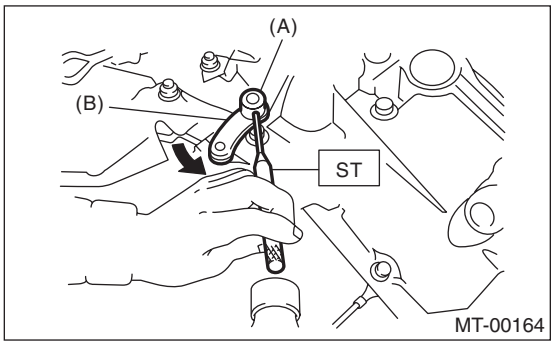
4) Remove the input shaft holder.



(A) Input shaft holder
(B) Input shaft

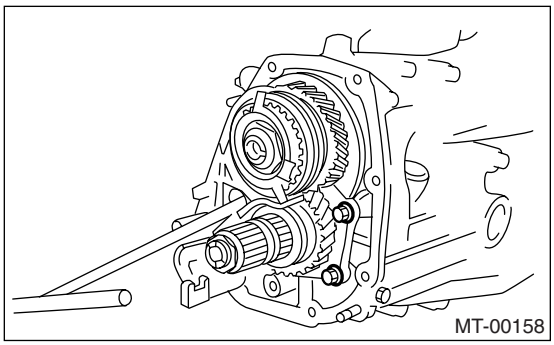
5) Remove the high-low switch. <Ref. to 5MT-47, REMOVAL, Switches and Harness.>
6) Using the ST, drive out the straight pin, and remove high-low shifter lever.
ST 398791700 REMOVER 2

NOTE:
When driving out the straight pin, remove it in the direction that it does not butt against transmission case.

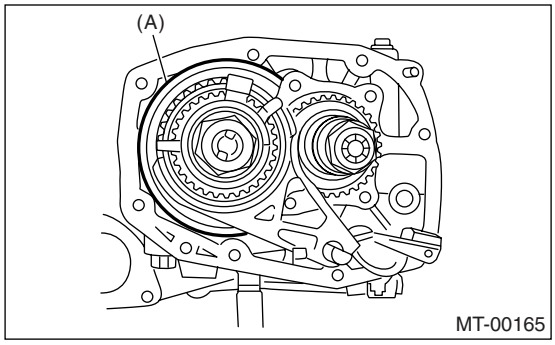


(A) Straight pin
(B) High-low shifter lever

7) Remove the bearing mounting bolts.

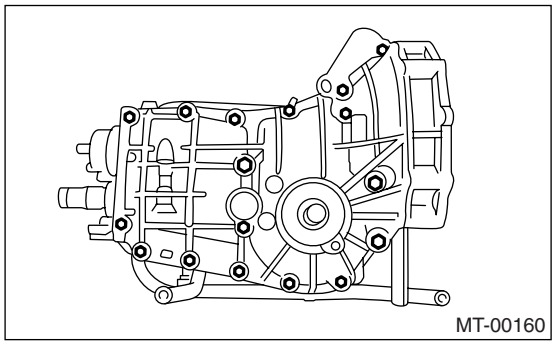


8) Remove the main shaft rear plate.



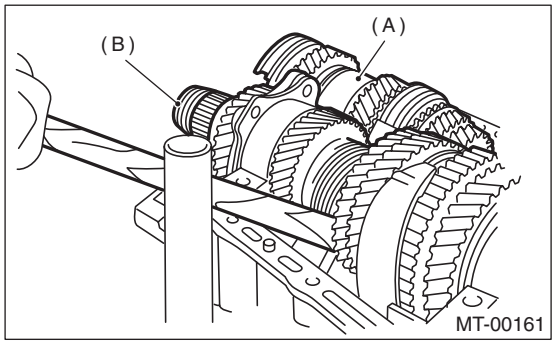
(A) Main shaft rear plate

9) Separate the transmission case into right and left cases by loosening the seventeen coupling bolts and nuts.



10) Remove the drive pinion shaft assembly from left side transmission case.

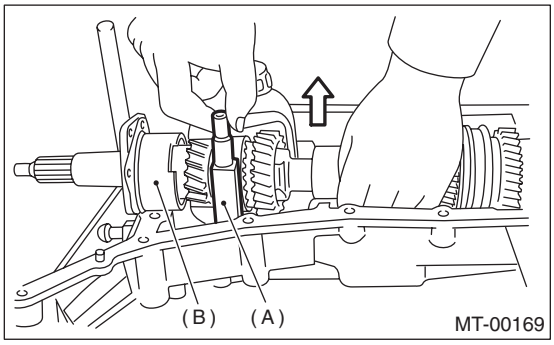
NOTE:
Use a hammer handle, etc. to remove if too tight.



(A) Main shaft assembly
(B) Drive pinion shaft assembly

11) Removing high-low shifter fork:
Raise the main shaft assembly slightly, and remove the high-low shifter fork together with high-low shifter shaft and washer.

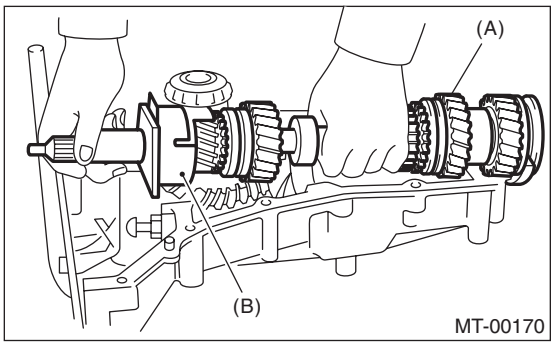
NOTE:
Be careful not to drop the two high-low shifter pieces.



(A) High-low shifter fork
(B) Input shaft ASSY

12) Remove the main shaft assembly and input shaft assembly.

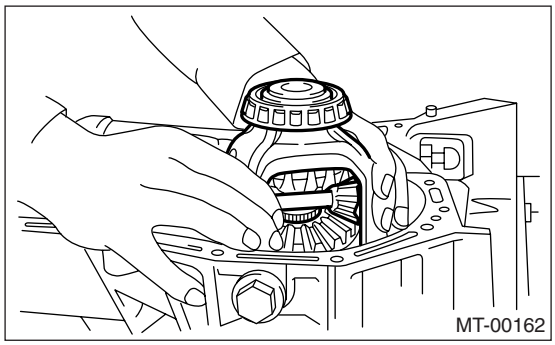
NOTE:
Be careful not to drop the input shaft and main shaft as they are separable.



(A) Main shaft ASSY
(B) Input shaft ASSY

13) Remove the differential assembly.

NOTE:
• Be careful not to confuse the right and left roller bearing outer races.
• Be careful not to damage the retainer oil seal.



B: INSTALLATION

1. SINGLE-RANGE

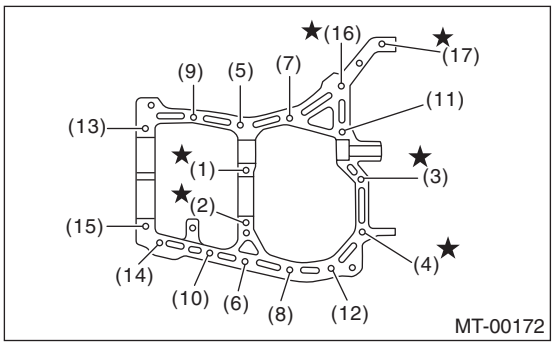
1) Wipe off grease, oil and dust on the mating surfaces of transmission cases with white gasoline.
2) Install the front differential assembly.
3) Install the main shaft assembly.
Install the transmission case knock pin into needle bearing knock pin hole.
4) Install the drive pinion shaft assembly.
Install the transmission case knock pin into roller bearing knock pin hole.
5) Apply liquid gasket, and then put the case right side and left side together.

Liquid gasket:
THREE BOND 1215 (Part No. 004403007) or equivalent

6) Tighten the seventeen bolts with bracket, clip, etc. as shown in the figure.

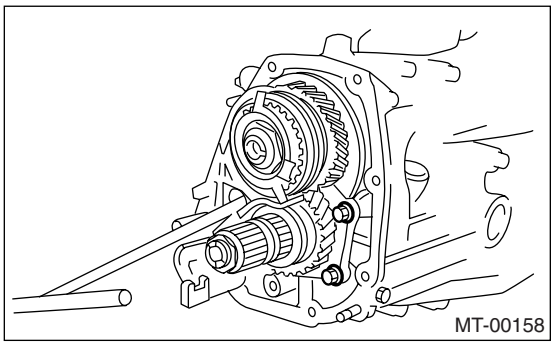
NOTE:
• Insert the bolts from bottom and tighten the nuts at top.
• Put the cases together so that drive pinion shim and input shaft holder shim are not caught up in between.
• Confirm that the speedometer gear is meshed.

Tightening torque:
8 mm bolt
25 N·m (2.5 kgf-m, 18.4 ft-lb)
★ 10 mm bolt
39 N·m (4.0 kgf-m, 28.9 ft-lb)



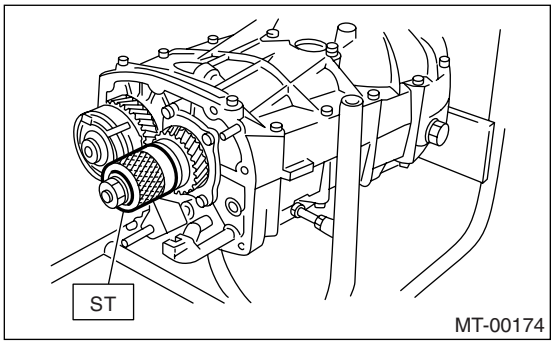
7) Tighten the ball bearing attachment bolts.

Tightening torque:
30 N·m (3.1 kgf-m, 22.1 ft-lb)



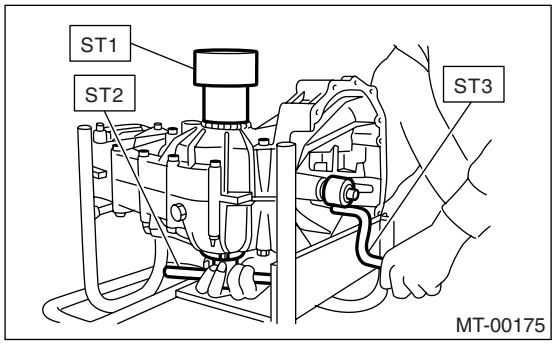
8) Backlash adjustment of hypoid gear and preload adjustment of roller bearing:

NOTE:
Support the drive pinion assembly with ST.
ST 498427100 STOPPER



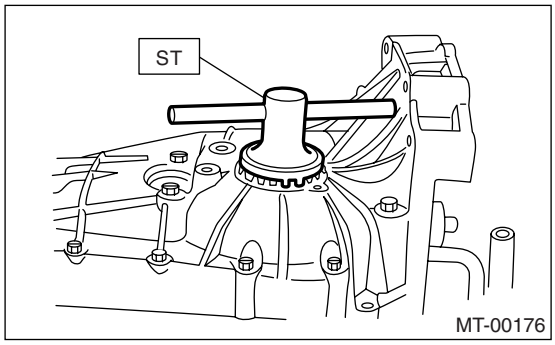
9) Place the transmission with case left side facing downward and put ST1 on bearing cup.

10) Screw the retainer assembly into left case from the bottom using ST2. Fit the ST3 on transmission main shaft. Shift the gear into 4th or 5th and turn the shaft several times. Screw in the retainer while turning ST3 until a slight resistance is felt on ST2. This is the contact point of hypoid gear and drive pinion shaft. Repeat the above sequence several times to ensure the contact point.
ST1 399780104 WEIGHT
ST2 499787000 WRENCH ASSY
ST3 499927100 HANDLE



11) Remove the weight and screw in the retainer without O-ring on upper side and stop at the point where slight resistance is felt.

NOTE:
At this point, the backlash between hypoid gear and drive pinion shaft is zero.
ST 499787000 WRENCH ASSY



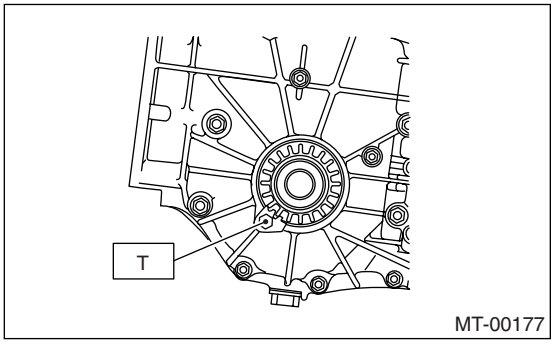
12) Loosen the retainer on the lower side by 3 notches and turn in the retainer on the upper side by the same amount in order to obtain the backlash.
13) Turn in the retainer on the upper side additionally by 1 notch in order to apply preload on taper roller bearing.
14) Install temporarily both the upper and lower lock plates and mark both holder and lock plate for later readjustment.

NOTE:
Install the lock plate upside down if it is hard to install.

15) Turn the transmission main shaft several times while tapping around the retainer lightly with plastic hammer.
16) Inspect and adjust the backlash and tooth contact of hypoid gear. <Ref. to 5MT-107, INSPECTION, Front Differential Assembly.>
17) After checking the tooth contact of hypoid gears, remove the lock plate. Then loosen the retainer until the O-ring groove appears. Fit O-ring into the groove and tighten the retainer to the original position.
Install the lock plate.

NOTE:
• Record how many times the retainer is turned while loosening.
• Carry out this job on both upper and lower retainers.

Tightening torque:
T: 24.5 N·m (2.5 kgf-m, 18.1 ft-lb)



18) Selecting of main shaft rear plate. <Ref. to 5MT-81, ADJUSTMENT, Main Shaft Assembly for Single-Range.>
19) Install the clutch release lever and bearing. <Ref. to CL-26, INSTALLATION, Release Bearing and Lever.>
20) Install the transfer case with extension case assembly. <Ref. to 5MT-52, INSTALLATION, Transfer Case and Extension Case Assembly.>
21) Install the manual transmission assembly into the vehicle. <Ref. to 5MT-39, INSTALLATION, Manual Transmission Assembly.>

2. DUAL-RANGE

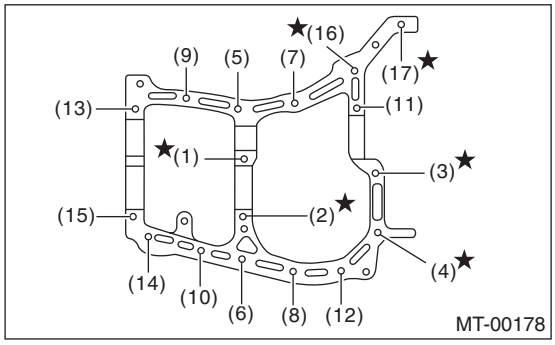
1) Wipe off grease, oil and dust on the mating surfaces of transmission cases with white gasoline.
2) Install the front differential assembly.
3) Install the main shaft assembly and input shaft assembly.
Connect the main shaft assembly and input the shaft assembly, and install needle bearing knock pin hole into transmission case knock pin.
4) Install the drive pinion shaft assembly.
Install the roller bearing knock pin hole into transmission case knock pin.
5) Apply liquid gasket, and then put the case right side and left side together.

Liquid gasket:
THREE BOND 1215 (Part No. 004403007) or equivalent

6) Tighten the seventeen bolts with bracket, clip, etc. as shown in the figure.

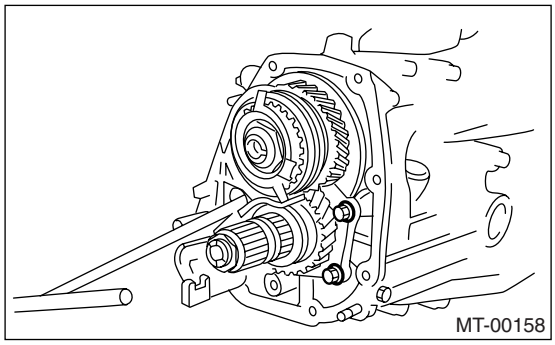
NOTE:
• Insert the bolts from bottom and tighten the nuts at top.
• Put the cases together so that the drive pinion shim and input shaft holder shim are not caught up in between.
• Confirm that the speedometer gear is meshed.

Tightening torque:
8 mm bolt
25 N·m (2.5 kgf-m, 18.4 ft-lb)
★ 10 mm bolt
39 N·m (4.0 kgf-m, 28.9 ft-lb)



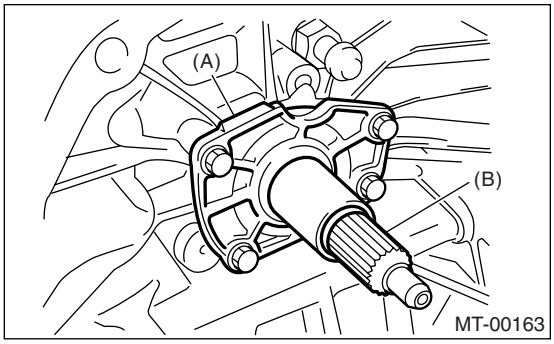
7) Tighten the ball bearing attachment bolts.

Tightening torque:
30 N·m (3.1 kgf-m, 22.1 ft-lb)



8) Tighten the input shaft holder attaching bolts.

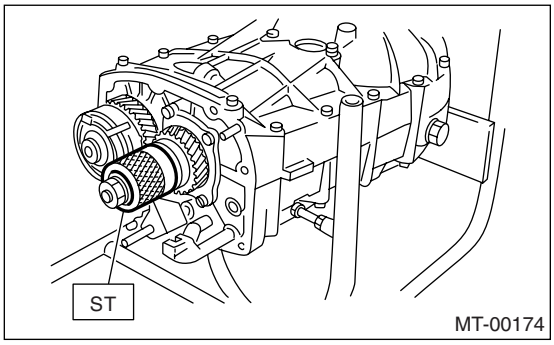
Tightening torque:
20 N·m (2.0 kgf-m, 14.5 ft-lb)



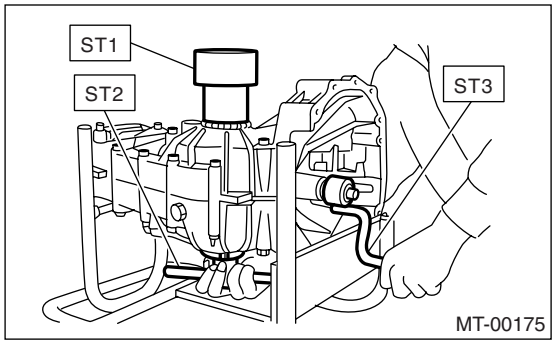
(A) Input shaft holder
(B) Input shaft

9) Backlash adjustment of hypoid gear and preload adjustment of roller bearing

NOTE:
Support the drive pinion assembly with ST.
ST 498427100 STOPPER

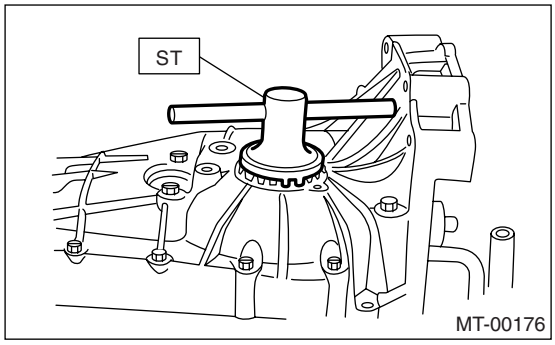


10) Place the transmission with case left side facing downward and put ST1 on bearing cup.
11) Screw the retainer assembly into left case from the bottom using ST2. Fit the ST3 on transmission main shaft. Shift the gear into 4th or 5th and turn the shaft several times. Screw in the retainer while turning ST3 until a slight resistance is felt on ST2. This is the contact point of hypoid gear and drive pinion shaft. Repeat the above sequence several times to ensure the contact point.
ST1 399780104 WEIGHT
ST2 499787000 WRENCH ASSY
ST3 499927100 HANDLE



12) Remove the weight and screw in the retainer without O-ring on upper side and stop at the point where slight resistance is felt.

NOTE:
At this point, the backlash between hypoid gear and drive pinion shaft is zero.
ST 499787000 WRENCH ASSY



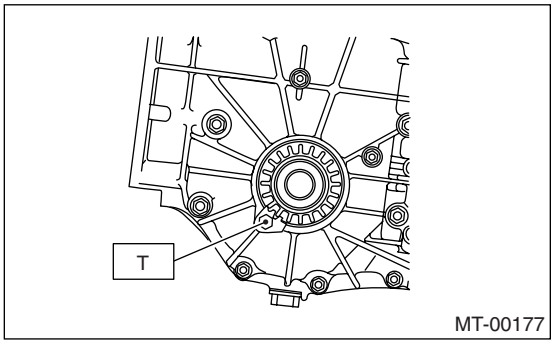
13) Loosen the retainer on the lower side by 3 notches and turn in the retainer on the upper side by the same amount in order to obtain the backlash.
14) Turn in the retainer on the upper side additionally by 1 notch in order to apply preload on taper roller bearing.
15) Install temporarily both the upper and lower lock plates and mark both holder and lock plate for later readjustment.

NOTE:
Install the lock plate upside down if it is hard to install.

16) Turn the transmission main shaft several times while tapping around the retainer lightly with plastic hammer.
17) Inspect and adjust the backlash and tooth contact of hypoid gear. <Ref. to 5MT-107, INSPECTION, Front Differential Assembly.>
18) After checking the tooth contact of hypoid gears, remove the lock plate. Then loosen the retainer until the O-ring groove appears. Fit O-ring into the groove and tighten the retainer to the original position.
Install the lock plate.

NOTE:
• Record how many times the retainer is turned while loosening.
• Carry out this job on both upper and lower retainers.

Tightening torque:
T: 24.5 N·m (2.5 kgf-m, 18.1 ft-lb)



19) Selection of main shaft rear plate <Ref. to 5MT-81, ADJUSTMENT, Main Shaft Assembly for Single-Range.>
20) Install the transfer case with extension case assembly. <Ref. to 5MT-52, INSTALLATION, Transfer Case and Extension Case Assembly.>
21) Install the clutch release lever and bearing. <Ref. to CL-26, INSTALLATION, Release Bearing and Lever.>
22) Install the manual transmission assembly into the vehicle. <Ref. to 5MT-39, INSTALLATION, Manual Transmission Assembly.>

C: INSPECTION

Check the transmission case for cracks, damage, and oil leaks.

17.Main Shaft Assembly for Single-Range

A: REMOVAL

1) Remove the manual transmission assembly from vehicle. <Ref. to 5MT-36, REMOVAL, Manual Transmission Assembly.>
2) Remove the transfer case with extension case assembly. <Ref. to 5MT-52, REMOVAL, Transfer Case and Extension Case Assembly.>
3) Remove the transmission case. <Ref. to 5MT-52, REMOVAL, Transfer Case and Extension Case Assembly.>
4) Remove the drive pinion shaft assembly. <Ref. to 5MT-92, REMOVAL, Drive Pinion Shaft Assembly.>
5) Remove the main shaft assembly.

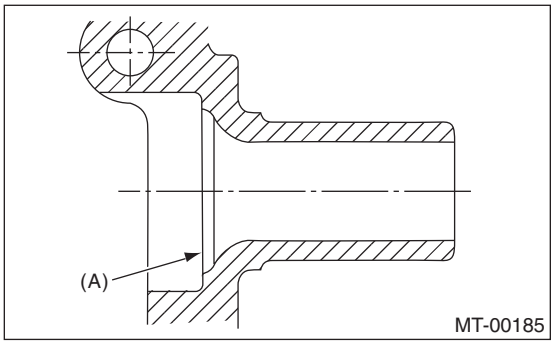
B: INSTALLATION

1) Install the needle bearing and oil seal onto the front of transmission main shaft assembly.

NOTE:
• Wrap the clutch splined section with vinyl tape to prevent damage to oil seal.
• Apply grease (Unilube #2 or equivalent) to the sealing lip of oil seal.
• Use a new one.

2) Install the needle bearing outer race knock pin hole into transmission case knock pin.

NOTE:
Align the end face of seal with surface (A) when installing oil seal.



3) Install the drive pinion assembly. <Ref. to 5MT-92, INSTALLATION, Drive Pinion Shaft Assembly.>
4) Install the transmission case. <Ref. to 5MT-67, INSTALLATION, Transmission Case.>
5) Install the transfer case with extension case assembly. <Ref. to 5MT-52, INSTALLATION, Transfer Case and Extension Case Assembly.>
6) Install the manual transmission assembly to vehicle. <Ref. to 5MT-39, INSTALLATION, Manual Transmission Assembly.>

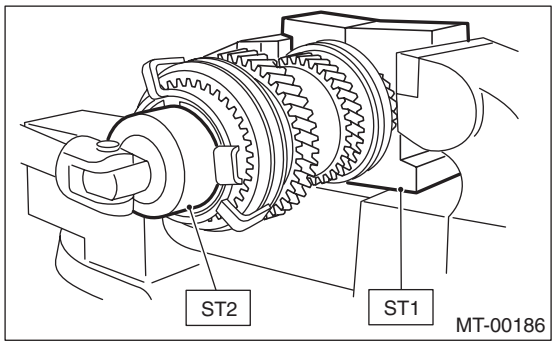
C: DISASSEMBLY

1. AWD MODEL

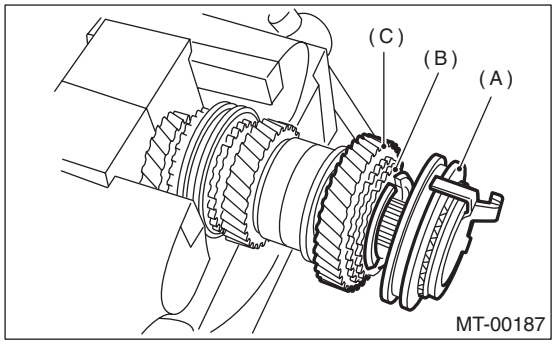
1) Put vinyl tape around the main shaft splines to protect oil seal from damage. Then pull out the oil seal and needle bearing by hand.
2) Remove the lock nut from transmission main shaft assembly.

NOTE:
Remove the caulking before removing lock nut.

ST1 499987000 TRANSMISSION HOLDER
ST2 498937003 SOCKET WRENCH (35)

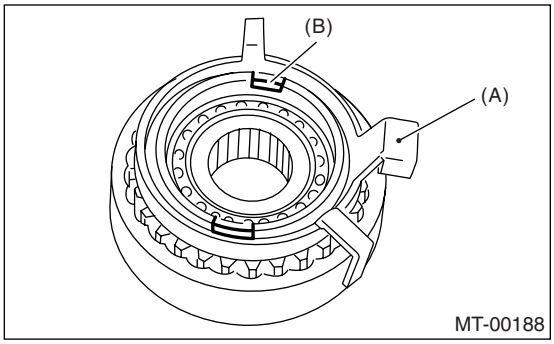


3) Remove the 5th-Rev sleeve and hub assembly, baulk ring, 5th drive gear and needle bearing.



(A) 5th-Rev sleeve and hub ASSY
(B) Baulk ring
(C) 5th drive gear

4) Remove the snap ring and synchro cone stopper from 5th-Rev sleeve and hub assembly.

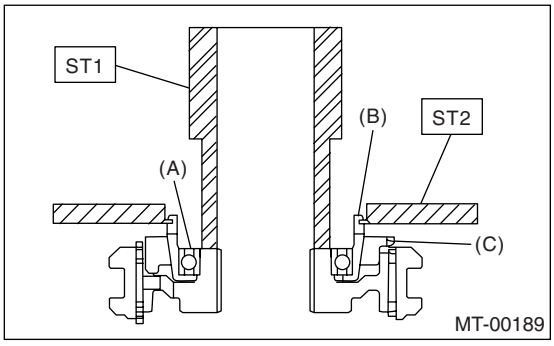


(A) Synchro cone stopper
(B) Snap ring

5) Using the ST1, ST2 and a press, remove the ball bearing, synchro cone and baulk ring (Rev).

NOTE:
• Replace the sleeve and hub with new ones. Do not attempt to disassemble because they must engage at a specified point. If they should be disassembled, mark engagement point on splines beforehand.
• Do not reuse the ball bearing.

ST1 499757002 INSTALLER
ST2 498077400 SYNCHRO CONE REMOVER

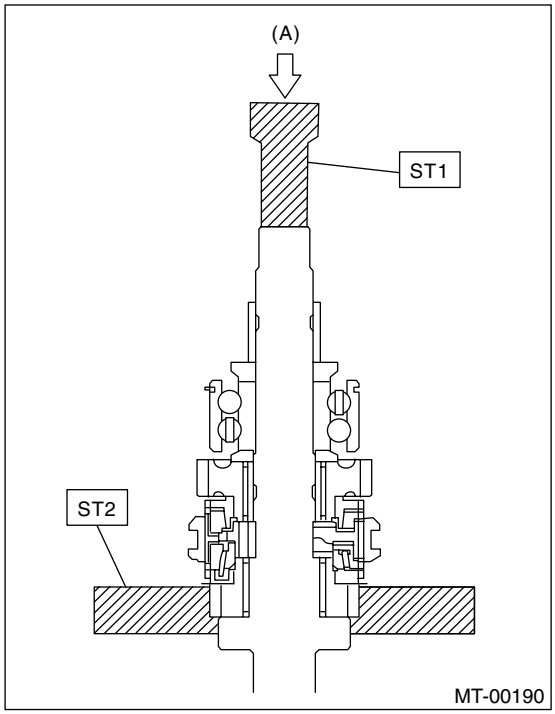


(A) Ball bearing
(B) Synchro cone
(C) Baulk ring

6) Using the ST1 and ST2, remove rest of the parts.

NOTE:
Replace the sleeve and hub with new ones. Do not attempt to disassemble because they must engage at a specified point. If they should be disassembled, mark engagement point on splines beforehand.

ST1 899864100 REMOVER
ST2 899714110 REMOVER



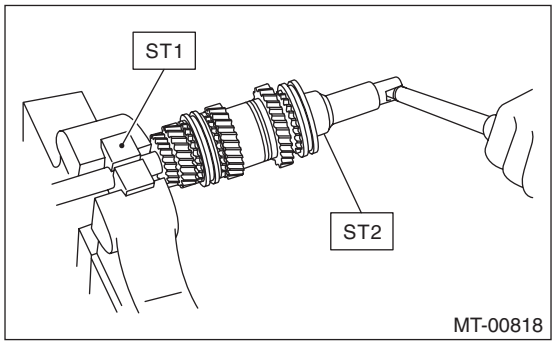
(A) Press

2. FWD MODEL

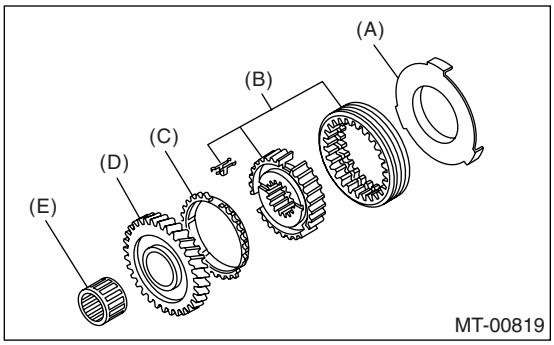
1) Put vinyl tape around main shaft splines to protect oil seal from damage. Then pull out oil seal and needle bearing by hand.
2) Remove lock nut.

NOTE:
Remove caulking before taking off lock nut.

ST1 498937000 TRANSMISSION HOLDER
ST2 499987003 SOCKET WRENCH (35)



3) Remove the insert stopper plate, sleeve and hub assembly No. 2, baulk ring, 5th drive gear and needle bearing.

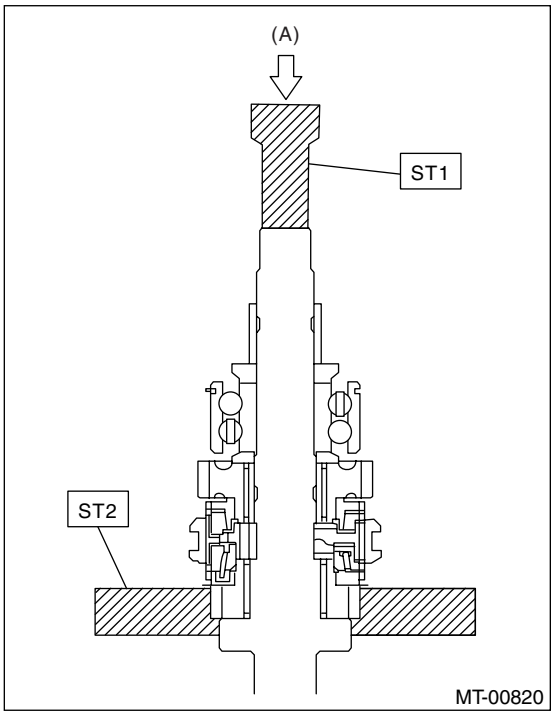


(A) Insert stopper plate
(B) Sleeve and hub ASSY No. 2
(C) Baulk ring
(D) 5th drive gear
(E) Needle bearing

4) Using ST1, ST2 and a press, remove the rest of parts.

NOTE:
Replace sleeve and hub with ones. Do not attempt to disassemble because they must engage at a specified point. If they should be disassembled, mark engagement point on splines before hand.

ST1 899864100 REMOVER
ST2 899714110 REMOVER



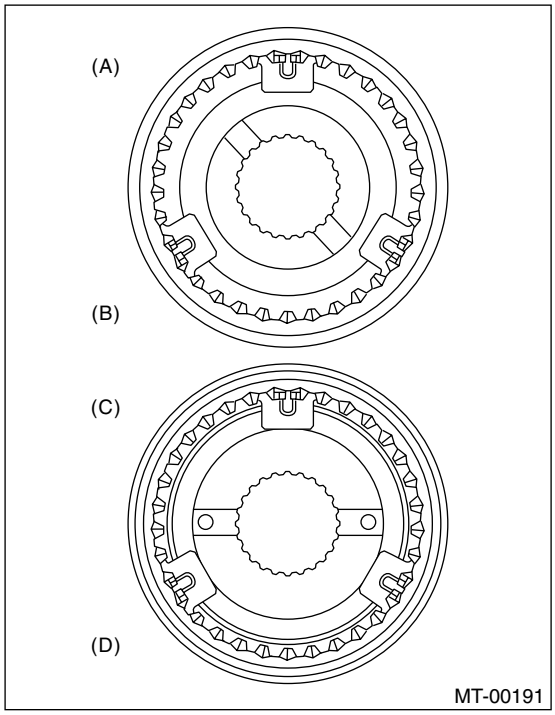
(A) Press

D: ASSEMBLY

1. AWD NON-TURBO MODEL

1) Assemble when each sleeve and hub assembly are disassembled.

NOTE:
Position the open ends of spring 120° apart.



(A) 3rd-4th hub ASSY
(B) 3rd gear side
(C) 5th-Rev hub ASSY
(D) 5th gear side

2) Install the 3rd drive gear, baulk ring, sleeve and hub assembly for 3rd needle bearing on transmission main shaft.

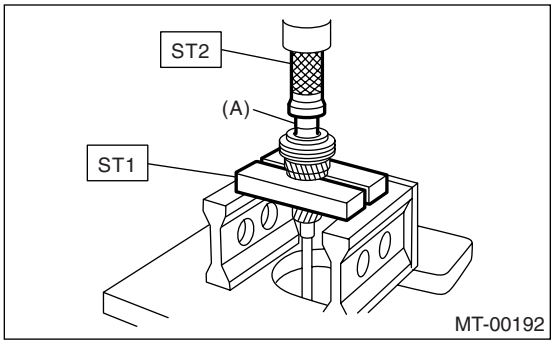
NOTE:
Align the groove in baulk ring with shifting insert.

3) Install the 4th needle bearing race onto transmission main shaft using ST1, ST2 and a press.

NOTE:
Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

ST1 899714110 REMOVER

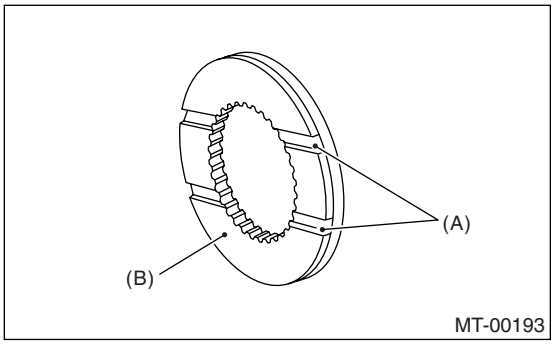
ST2 499877000 RACE 4-5 INSTALLER



(A) 4th needle bearing race

4) Install the baulk ring, needle bearing, 4th drive gear and 4th gear thrust washer to transmission main shaft.

NOTE:
Align the baulk ring and gear & hub assembly with key groove.

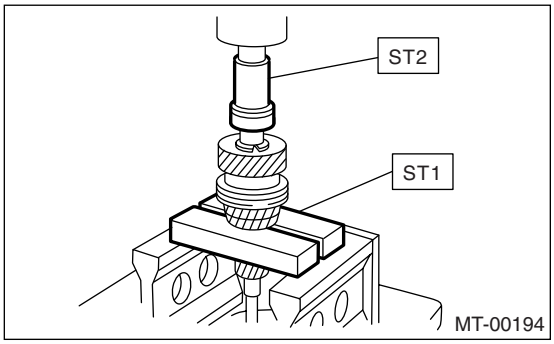


(A) Groove
(B) 4th gear side

5) Drive the ball bearing onto the rear section of transmission main shaft using ST1, ST2 and a press.

NOTE:
Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

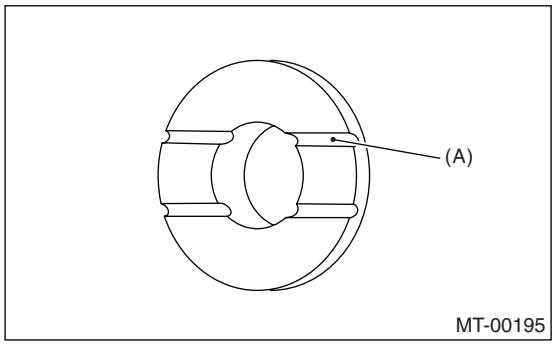
ST1 899714110 REMOVER
ST2 499877000 RACE 4-5 INSTALLER



6) Using the ST1 and ST2, install the 5th gear thrust washer and 5th needle bearing race onto the rear section of transmission main shaft.

NOTE:
- Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).
- Face the thrust washer in correct direction.

ST1 899714110 REMOVER
ST2 499877000 RACE 4-5 INSTALLER

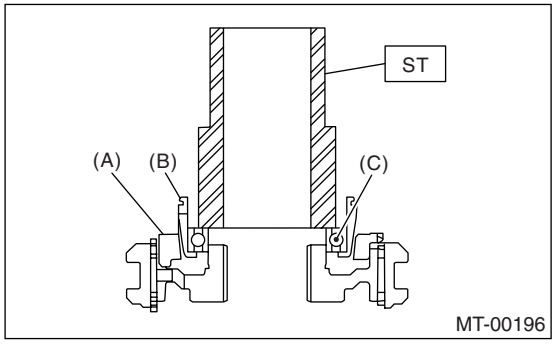


(A) Face this surface to 5th gear side.

7) Install the bearing onto synchro cone.
8) Install the baulk ring and synchro cone onto 5th-Rev sleeve and hub assembly using ST and a press.

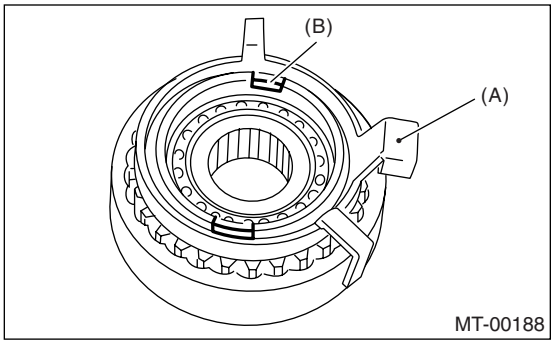
NOTE:
- Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).
- Use a new ball bearing.
- After press fitting, make sure the synchro cone rotates freely.

ST 499757002 INSTALLER



(A) Baulk ring
(B) Synchro cone
(C) Ball bearing

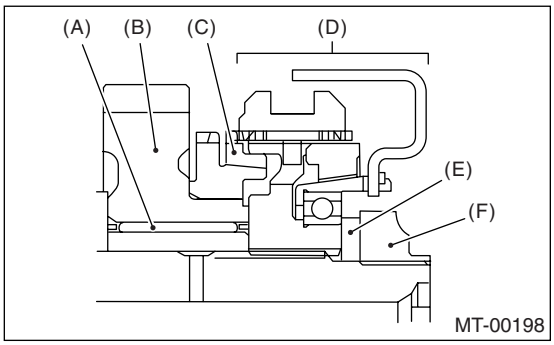
9) Install the synchro cone stopper and snap ring to 5th-Rev sleeve and hub assembly.



(A) Synchro cone stopper
(B) Snap ring

10) Install rest of the parts to the rear section of transmission main shaft.

NOTE:
Align the groove in baulk ring with shifting insert.



(A) Needle bearing
(B) 5th drive gear
(C) Baulk ring
(D) 5th-Rev sleeve and hub ASSY
(E) Lock washer
(F) Lock nuts

11) Tighten the lock nuts to the specified torque using ST1 and ST2.

NOTE:
Secure the lock nuts in two places after tightening.

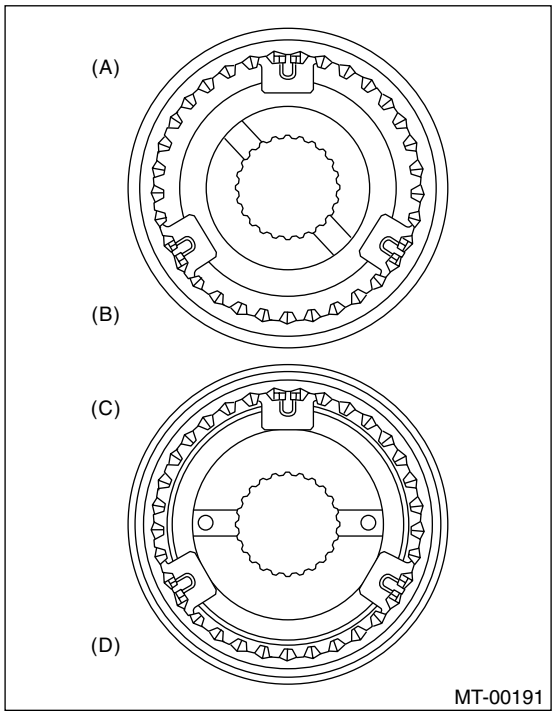
ST1 499987003 SOCKET WRENCH (35)
ST2 498937000 TRANSMISSION HOLDER

Tightening torque:
120 N·m (12.2 kgf-m, 88.5 ft-lb)

2. AWD TURBO MODEL

1) Assemble each sleeve and hub assembly.

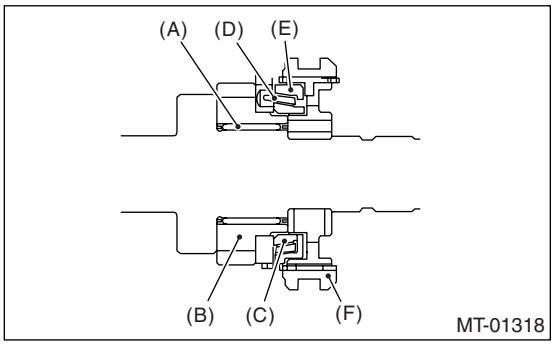
NOTE:
Position the open ends of spring 120° apart.



(A) 3rd-4th hub ASSY
(B) 3rd gear side
(C) 5th-Rev hub ASSY
(D) 5th gear side

2) Install the 3rd drive gear, outer baulk ring, synchro cone, inner baulk ring, sleeve and hub assembly for 3rd needle bearing on transmission main shaft.

NOTE:
Align the groove in baulk ring with shifting insert.

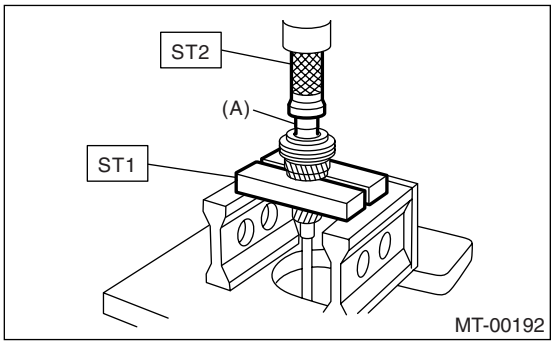


(A) 3rd needle bearing
(B) 3rd drive gear
(C) Inner baulk ring
(D) Synchro cone
(E) Outer baulk ring
(F) Sleeve and hub ASSY

3) Install the 4th needle bearing race onto transmission main shaft using ST1, ST2 and a press.

NOTE:
Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

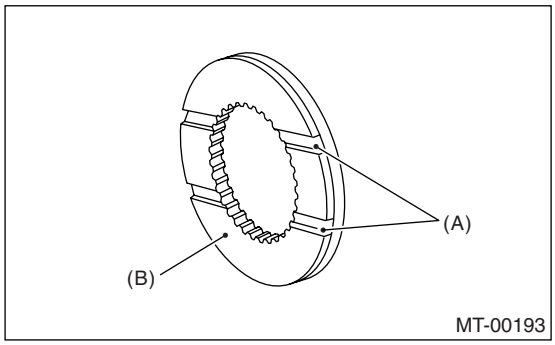
ST1 899714110 REMOVER
ST2 499877000 RACE 4-5 INSTALLER



(A) 4th needle bearing race

4) Install the baulk ring, needle bearing, 4th drive gear and 4th gear thrust washer to transmission main shaft.

NOTE:
Align the baulk ring and gear & hub assembly with key groove.

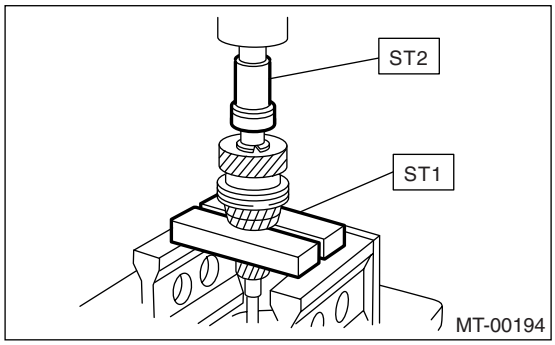


(A) Groove
(B) 4th gear side

5) Drive the ball bearing onto the rear section of transmission main shaft using ST1, ST2 and a press.

NOTE:
Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

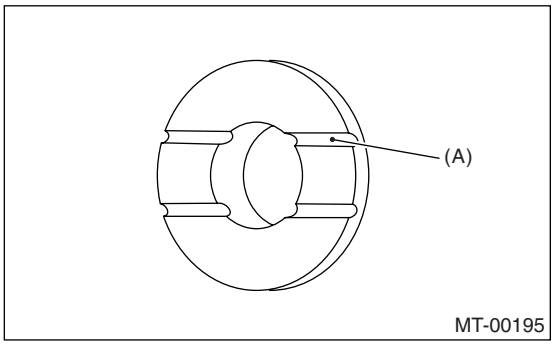
ST1 899714110 REMOVER
ST2 499877000 RACE 4-5 INSTALLER



6) Using the ST1 and ST2, install the 5th gear thrust washer and 5th needle bearing race onto the rear section of transmission main shaft.

NOTE:
- Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).
- Face the thrust washer in correct direction.

ST1 899714110 REMOVER
ST2 499877000 RACE 4-5 INSTALLER

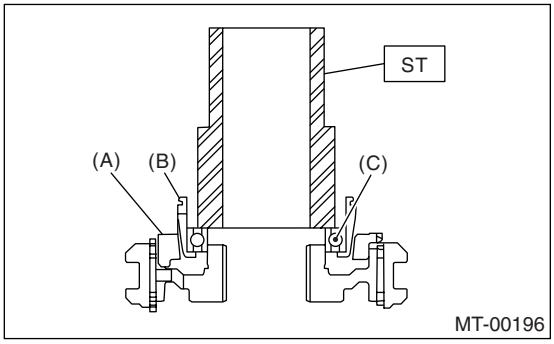


(A) Face this surface to 5th gear side.

7) Install the bearing onto synchro cone.
8) Install the baulk ring and synchro cone onto 5th-Rev sleeve and hub assembly using ST and a press.

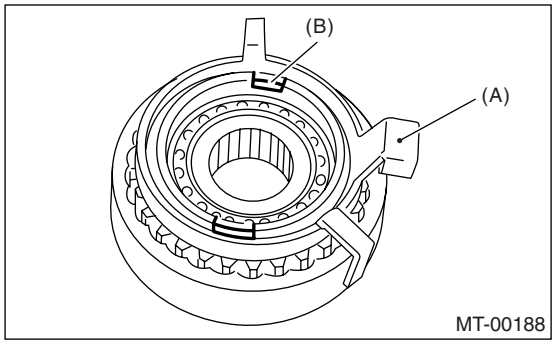
NOTE:
- Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).
- Use a new ball bearing.
- After press fitting, make sure the synchro cone rotates freely.

ST 499757002 INSTALLER



(A) Baulk ring
(B) Synchro cone
(C) Ball bearing

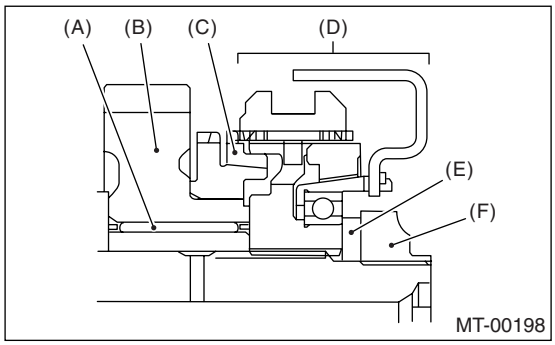
9) Install the synchro cone stopper and snap ring to 5th-Rev sleeve and hub assembly.



(A) Synchro cone stopper
(B) Snap ring

10) Install the rest parts to the rear section of transmission main shaft.

NOTE:
Align the groove in baulk ring with shifting insert.



(A) Needle bearing
(B) 5th drive gear
(C) Baulk ring
(D) 5th-Rev sleeve and hub ASSY
(E) Lock washer
(F) Lock nuts

11) Tighten the new lock nuts to the specified torque using ST1 and ST2.

ST1 499987003 SOCKET WRENCH (35)
ST2 498937000 TRANSMISSION HOLDER

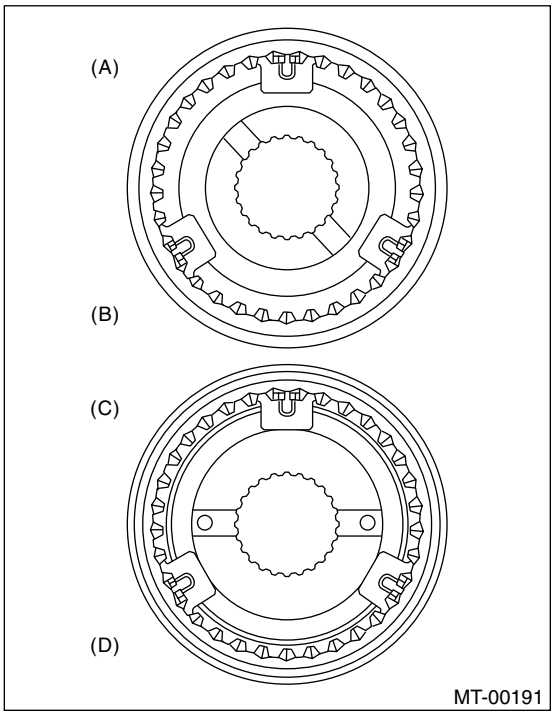
Tightening torque:
120 N·m (12.2 kgf-m, 88.5 ft-lb)

12) Secure the lock nuts in two places.

3. FWD MODEL

1) Assemble sleeve and hub assembly for 3rd-4th and 5th-Rev.

NOTE:
Position open ends of spring 120 apart.

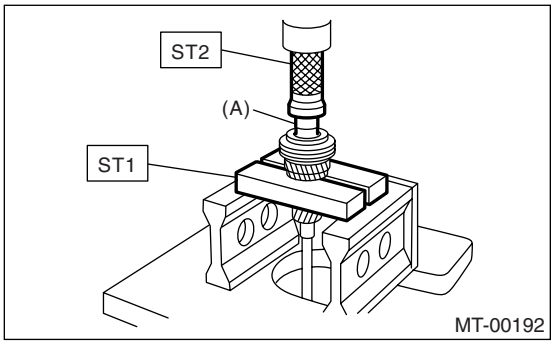


(A) 3rd-4th hub ASSY
(B) 3rd gear side
(C) 5th-Rev hub ASSY
(D) 5th gear side

2) Install 3rd drive gear, baulk ring and sleeve and hub assembly for 3rd-4th needle bearing (32 × 36 × 25.7) on transmission main shaft.

NOTE:
Align groove in baulk ring with shifting insert.

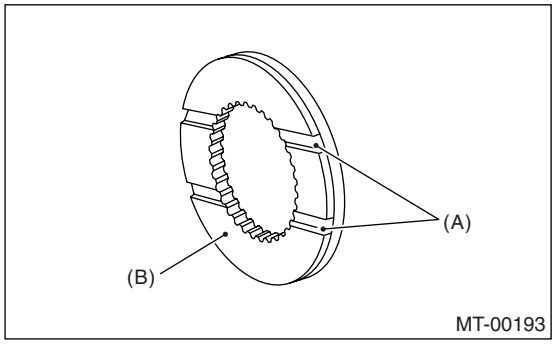
3) Install 4th needle bearing race onto transmission main shaft using ST1, ST2 and a press.
ST1 899714110 REMOVER
ST2 499877000 RACE 4-5 INSTALLER



(A) 4th needle bearing

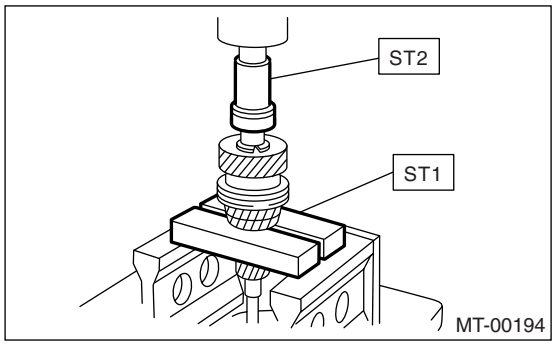
4) Install baulk ring, needle bearing (32 × 30 × 25.7), 4th drive gear and 4th gear thrust washer to transmission main shaft.

NOTE:
Face thrust washer in the correct direction.



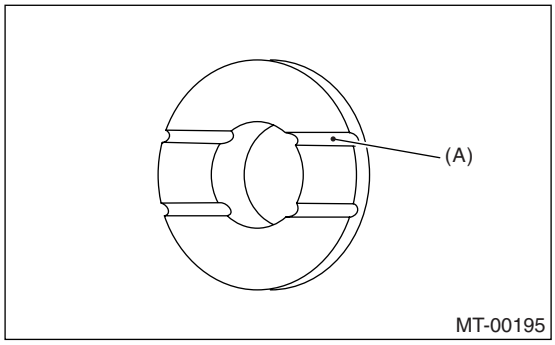
(A) Groove
(B) 4th gear side

5) Drive ball bearing onto the rear section of transmission main shaft using ST1, ST2 and a press.
ST1 899714110 REMOVER
ST2 499877000 RACE 4-5 INSTALLER



6) Using the same tools as in step 5) above, install the following parts onto the rear section of transmission main shaft.

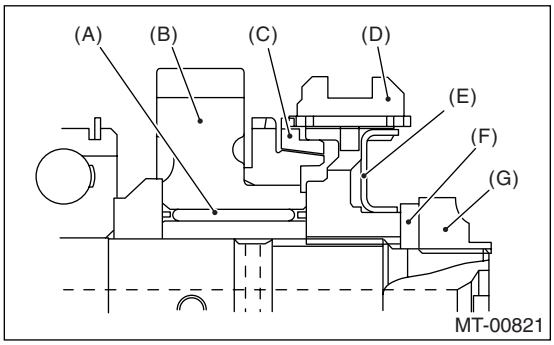
NOTE:
Face thrust washer in the correct direction.
ST1 899714110 REMOVER
ST2 499877000 RACE 4-5 INSTALLER



(A) Face this surface to 5th gear side.

7) Install the following parts to the rear section transmission main shaft.
ST1 499987003 SOCKET WRENCH (35)
ST2 498937000 TRANSMISSION HOLDER

NOTE:
• Align groove in baulk ring with shifting insert.
• Be sure to fit pawl of insert stopper plate into 4 mm (0.16 in) dia. hole in the boss section of synchronizer hub.



(A) Needle bearing
(B) 5th drive gear
(C) Baulk ring
(D) Sleeve and hub ASSY
(E) Insert stopper plate
(F) Lock washer
(G) Lock nut

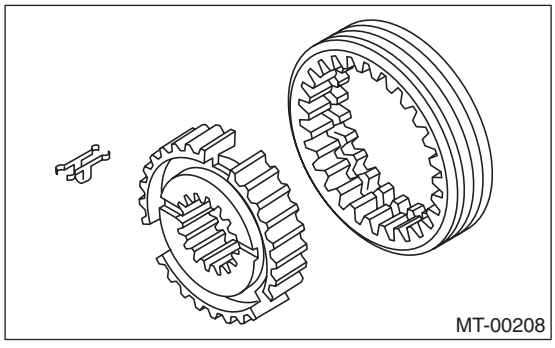
8) Tighten lock nuts (22 × 13) to the specified torque using ST.
ST 498937000 TRANSMISSION HOLDER

Tightening torque:
120 N·m (12.2 kgf-m, 88.5 ft-lb)

9) Secure lock nuts in two places.

E: INSPECTION

Disassembled parts should be washed clean first and then inspected carefully.
1) Bearings
Replace the bearings in the following cases:
• Bearings whose balls, outer races and inner races are broken or rusty.
• Worn bearings
• Bearings that fail to turn smoothly or make abnormal noise when turned after gear oil lubrication.
• Bearings having other defects
2) Bushing (each gear)
Replace the bushing in the following cases:
• When the sliding surface is damaged or abnormally worn.
• When the inner wall is abnormally worn.
3) Gears
• Replace the gears with new ones if their tooth surfaces are broken, damaged, or excessively worn.
• Correct or replace if the cone that contacts the baulk ring is rough or damaged.
• Correct or replace if the inner surface or end face is damaged.
4) Baulk ring
Replace the ring in the following cases:
• When the inner surface and end face are damaged.
• When the ring inner surface is abnormally or partially worn down.
• When the contact surface of the synchronizer ring insert is scored or abnormally worn down.
5) Shifting insert key
Replace the insert if deformed, excessively worn, or defective in any way.



6) Oil seal
Replace the oil seal if the lip is deformed, hardened, damaged, worn, or defective in any way.
7) O-ring
Replace the O-ring if the sealing face is deformed, hardened, damaged, worn, or defective in any way.
8) Gearshift mechanism
Repair or replace the gearshift mechanism if excessively worn, bent, or defective in any way.

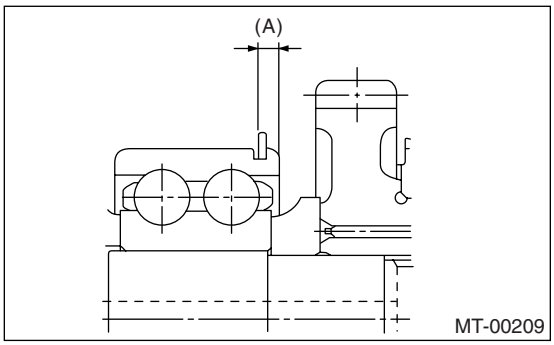
F: ADJUSTMENT

Selection of main shaft rear plate:
Using the ST, measure the amount (A) of ball bearing protrusion from transmission main case surface and select the proper plate in the following table:

NOTE:
Before measuring, tap the end of main shaft with a plastic hammer lightly in order to make the clearance zero between the main case surface and the moving flange of bearing.

ST 498147000 DEPTH GAUGE

Dimension (A) mm (in)	Part No.	Mark
4.00 — 4.13 (0.1575 — 0.1626)	32294AA041	1
3.87 — 3.99 (0.1524 — 0.1571)	32294AA051	2



18.Main Shaft Assembly for Dual-Range

A: REMOVAL

1) Remove the manual transmission assembly from vehicle. <Ref. to 5MT-36, REMOVAL, Manual Transmission Assembly.>
2) Remove the transfer case with extension case assembly. <Ref. to 5MT-52, REMOVAL, Transfer Case and Extension Case Assembly.>
3) Remove the transmission case. <Ref. to 5MT-65, REMOVAL, Transmission Case.>
4) Remove the drive pinion shaft assembly. <Ref. to 5MT-92, REMOVAL, Drive Pinion Shaft Assembly.>
5) Remove the main shaft assembly and input shaft assembly.

B: INSTALLATION

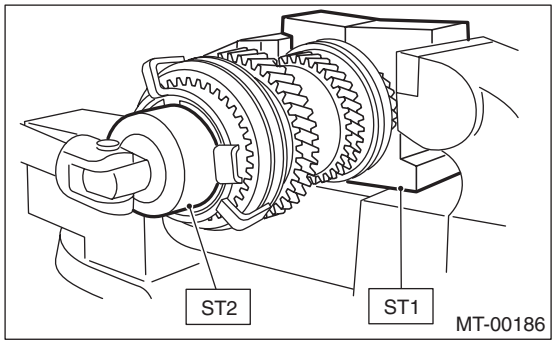
1) Install the needle bearing onto the front of transmission main shaft assembly.
2) Connect the main shaft assembly and input shaft assembly.
3) Install the needle bearing outer race knock pin hole into transmission case knock pin.
4) Install the drive pinion assembly. <Ref. to 5MT-92, INSTALLATION, Drive Pinion Shaft Assembly.>
5) Install the transmission case. <Ref. to 5MT-67, INSTALLATION, Transmission Case.>
6) Install the transfer case with extension case assembly. <Ref. to 5MT-52, INSTALLATION, Transfer Case and Extension Case Assembly.>
7) Install the manual transmission assembly to vehicle. <Ref. to 5MT-39, INSTALLATION, Manual Transmission Assembly.>

C: DISASSEMBLY

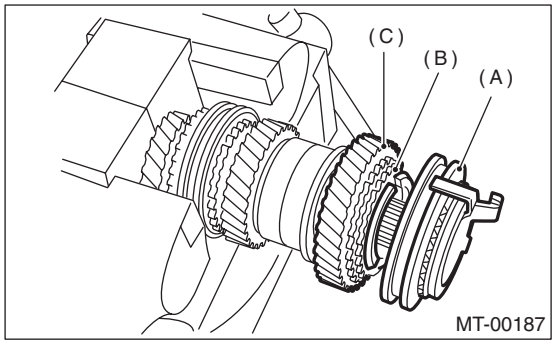
1) Put vinyl tape around the main shaft splines to protect oil seal from damage. Then pull out the oil seal and needle bearing by hand.
2) Remove the lock nut from transmission main shaft assembly.

NOTE:
Remove the caulking before taking off lock nut.

ST1 498937000 TRANSMISSION HOLDER
ST2 499987003 SOCKET WRENCH (35)

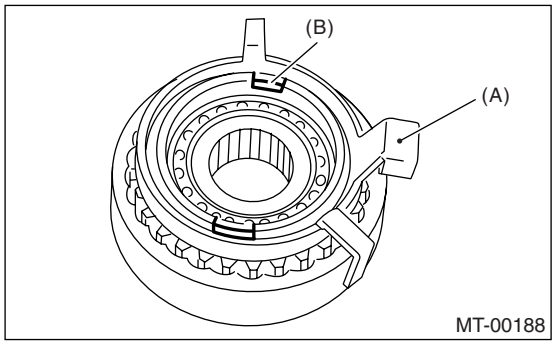


3) Remove the 5th-Rev sleeve and hub assembly, baulk ring, 5th drive gear and needle bearing.



(A) 5th-Rev sleeve and hub ASSY
(B) Baulk ring
(C) 5th drive gear

4) Remove the snap ring and synchro cone stopper from 5th-Rev sleeve and hub assembly.

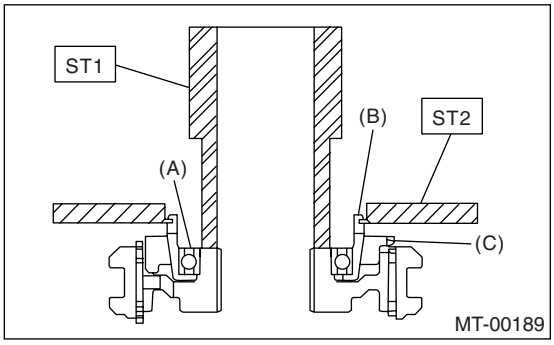


(A) Synchro cone stopper
(B) Snap ring

5) Using the ST1, ST2 and a press, remove the ball bearing, synchro cone and baulk ring (Rev).

NOTE:
• Replace the sleeve and hub with new ones. Do not attempt to disassemble because they must engage at a specified point. If they should be disassembled, mark engagement point on splines beforehand.
• Do not reuse the ball bearing.

ST1 499757002 INSTALLER
ST2 498077400 SYNCHRO CONE REMOVER

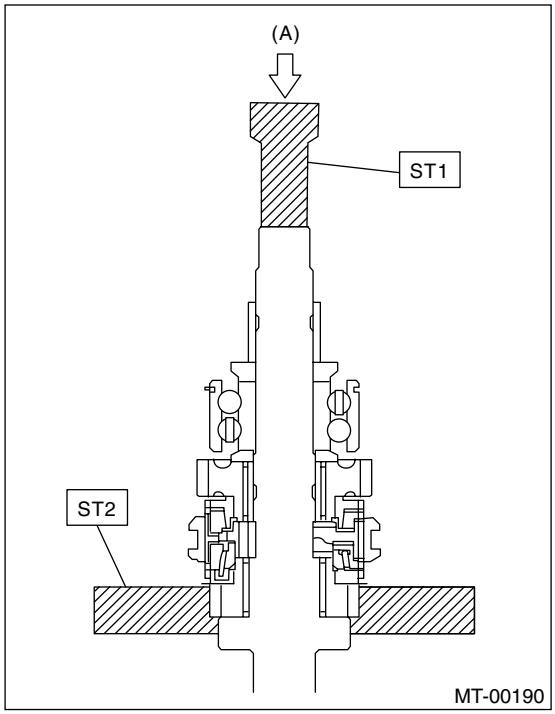


(A) Ball bearing
(B) Synchro cone
(C) Baulk ring

6) Using the ST1 and ST2, remove rest of the parts.

NOTE:
Replace the sleeve and hub with new ones. Do not attempt to disassemble because they must engage at a specified point. If they should be disassembled, marking engagement point on splines beforehand.

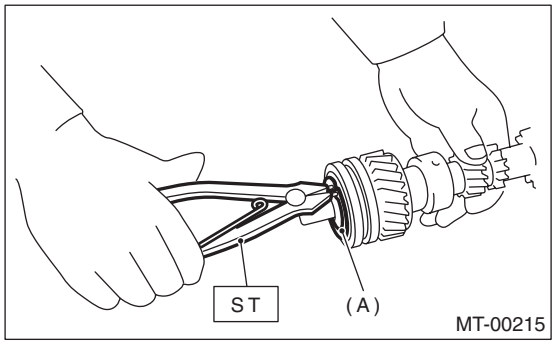
ST1 899864100 REMOVER
ST2 899714110 REMOVER



(A) Press

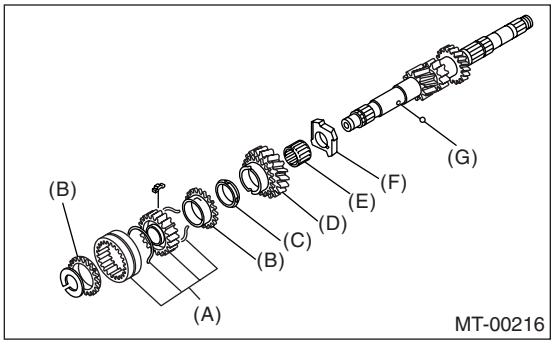
7) Remove the snap ring from main shaft.

ST 899474100 EXPANDER



(A) Snap ring

8) Remove rest of the parts.

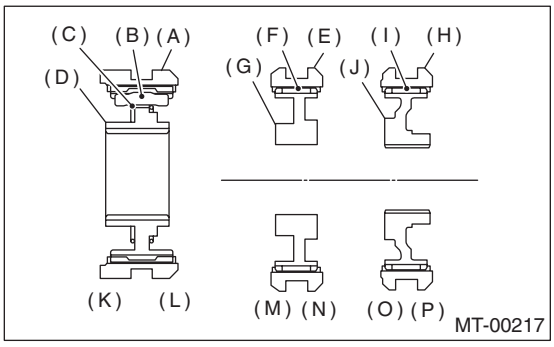


(A) Sleeve and hub ASSY
(B) High-low baulk ring
(C) Friction damper
(D) Low input gear
(E) Needle bearing
(F) Input low gear spacer
(G) Ball

D: ASSEMBLY

1) Assemble when each sleeve and hub assembly are disassembled.

NOTE:
Position the open ends of spring 120° apart.

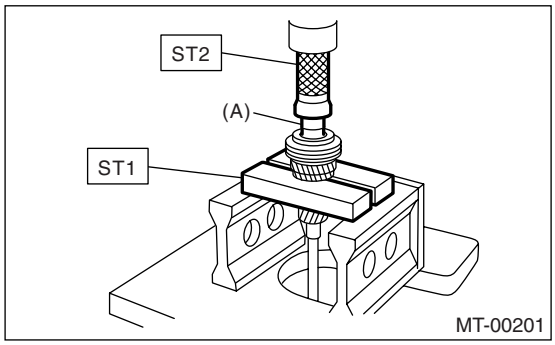


(A) High-low coupling sleeve
(B) Shifting insert
(C) High-low synchronizer spring
(D) High-low synchronizer hub
(E) Sleeve
(F) Insert key
(G) 3rd-4th synchronizer hub
(H) Sleeve
(I) Insert key
(J) 5th-Rev synchronizer hub
(K) High side
(L) Low side
(M) 3rd side
(N) 4th side
(O) 5th side
(P) Rev side

2) Install the 3rd drive gear, baulk ring, sleeve and hub assembly for 3rd-4th needle bearing on transmission main shaft.

NOTE:
Align the groove in baulk ring with shifting insert.

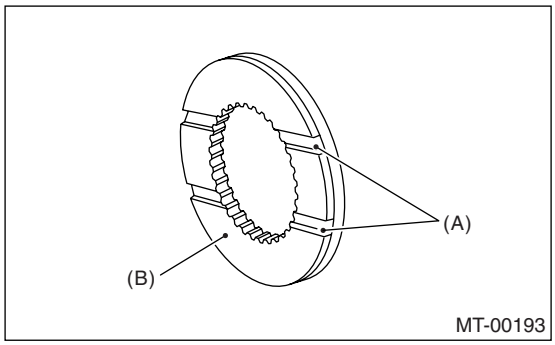
3) Install the 4th needle bearing race onto transmission main shaft using ST1, ST2 and a press.
ST1 899714110 REMOVER
ST2 499877000 RACE 4-5 INSTALLER



(A) 4th needle bearing race

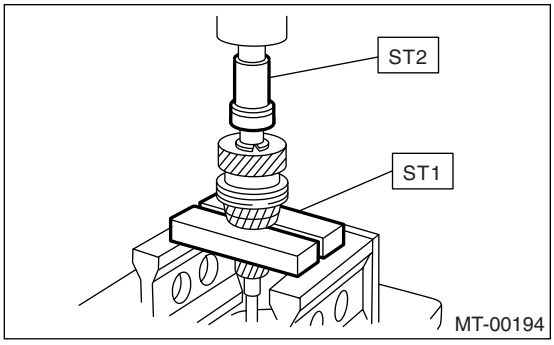
4) Install the baulk ring, needle bearing, 4th drive gear and 4th gear thrust washer to transmission main shaft.

NOTE:
Face the thrust washer in correct direction.



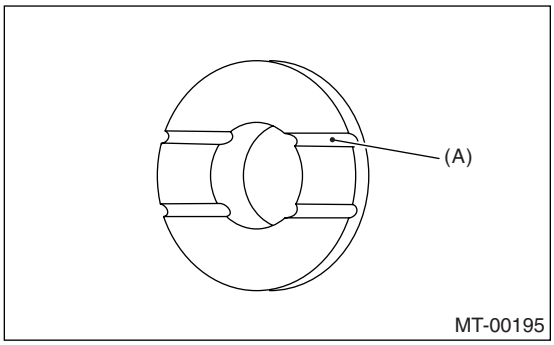
(A) Groove
(B) 4th gear side

5) Drive the ball bearing onto the rear section of transmission main shaft using ST1, ST2 and a press.
ST1 899714110 REMOVER
ST2 499877000 RACE 4-5 INSTALLER



6) Using the ST1 and ST2, install the 5th gear thrust washer and 5th needle bearing race onto the rear section of transmission main shaft.

NOTE:
Face the thrust washer in correct direction.
ST1 899714110 REMOVER
ST2 499877000 RACE 4-5 INSTALLER

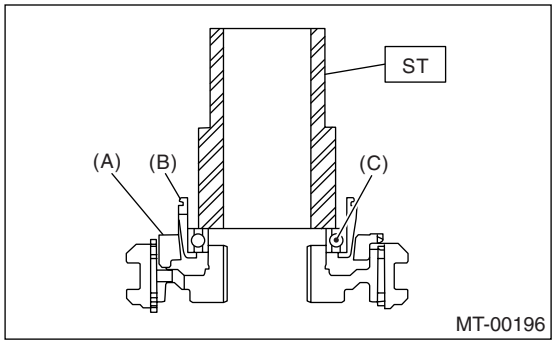


(A) Face this surface to 5th gear side.

7) Install the bearing onto synchro cone.
8) Install the baulk ring and synchro cone onto 5th-Rev sleeve and hub assembly using ST and a press.

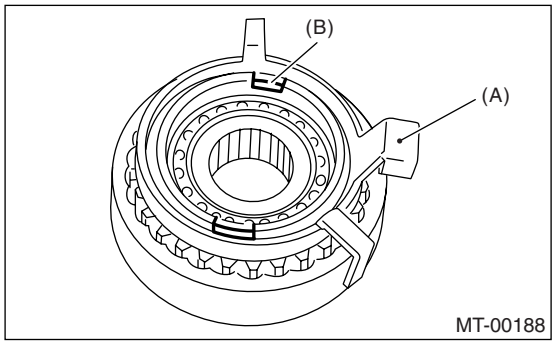
NOTE:
- Use a new ball bearing.
- After press fitting, make sure the synchro cone rotates freely.

ST 499757002 INSTALLER



(A) Baulk ring
(B) Synchro cone
(C) Ball bearing

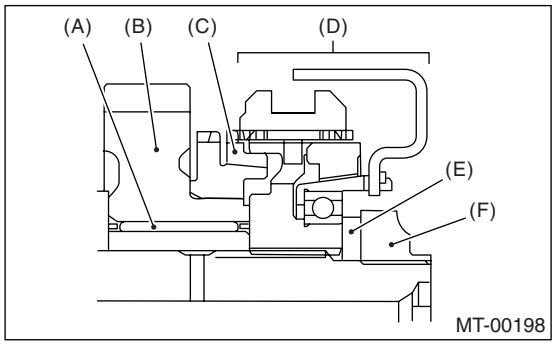
9) Install the synchro cone stopper and snap ring to 5th-Rev sleeve and hub assembly.



(A) Synchro cone stopper
(B) Snap ring

10) Install rest of the parts to the rear section of transmission main shaft.

NOTE:
Align the groove in baulk ring with shifting insert.



(A) Needle bearing
(B) 5th drive gear
(C) Baulk ring
(D) 5th-Rev sleeve and hub ASSY
(E) Lock washer
(F) Lock nuts

11) Tighten the lock nuts to the specified torque using ST1 and ST2.

NOTE:
Secure the lock nuts in two places after tightening.

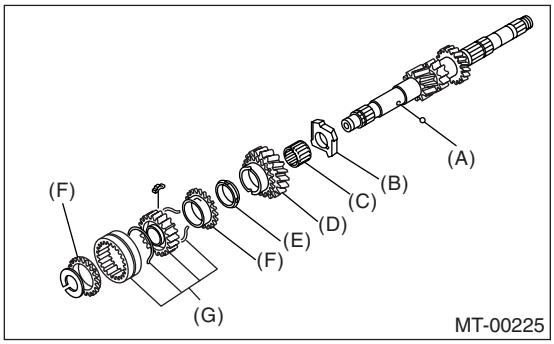
ST1 499987003 SOCKET WRENCH (35)
ST2 498937000 TRANSMISSION HOLDER

Tightening torque:
120 N·m (12.2 kgf-m, 88.5 ft-lb)

12) Install the needle bearing on main shaft.
13) Install rest of the parts to the front section of transmission main shaft.

NOTE:
Be careful not to damage the graded section of transmission main shaft when installing the needle bearing.

NOTE:
- Face the grooved side toward input gear.
- Align the high-low baulk ring's groove with shifting insert.



(A) Ball
(B) Input low gear spacer
(C) Needle bearing
(D) Low input gear
(E) Friction damper
(F) High-low baulk ring
(G) Sleeve and hub ASSY

14) Install a new snap ring to the rod section of transmission main shaft using ST1 and ST2.

NOTE:
Select a suitable outer snap ring so that axial clearance between snap ring and hub is held within 0.060 to 0.100 mm (0.0024 to 0.0039 in).

ST1 499757002 INSTALLER
ST2 499757001 SNAP RING GUIDE

Snap ring	
Part No.	Thickness mm (in)
805025051	2.42 (0.0953)
805025052	2.47 (0.0972)
805025053	2.52 (0.0992)
805025054	2.57 (0.1012)
805025055	2.62 (0.1031)
805025056	2.67 (0.1051)
805025057	2.72 (0.1071)
805025058	2.37 (0.0933)

E: INSPECTION

Disassembled parts should be washed clean first and then inspected carefully.
1) Bearings
Replace the bearings in the following cases:
- Bearings whose balls, outer races and inner races are broken or rusty.
- Worn bearings
- Bearings that fail to turn smoothly or make abnormal noise when turned after gear oil lubrication.
- Bearings having other defects

2) Bushing (each gear)
Replace the bushing in the following cases:
- When the sliding surface is damaged or abnormally worn.
- When the inner wall is abnormally worn.

3) Gears
- Replace the gears with new ones if their tooth surfaces are broken, damaged, or excessively worn.
- Correct or replace if the cone that contacts the baulk ring is rough or damaged.
- Correct or replace if the inner surface or end face is damaged.

4) Baulk ring
Replace the ring in the following cases:
- When the inner surface and end face are damaged.
- When the ring inner surface is abnormally or partially worn down.
- When the contact surface of the synchronizer ring insert is scored or abnormally worn down.

5) Shifting insert key
Replace the insert if deformed, excessively worn, or defective in any way.
6) Oil seal
Replace the oil seal if the lip is deformed, hardened, damaged, worn, or defective in any way.
7) O-ring
Replace the O-ring if the sealing face is deformed, hardened, damaged, worn, or defective in any way.
8) Gearshift mechanism
Repair or replace the gearshift mechanism if excessively worn, bent, or defective in any way.

F: ADJUSTMENT

Choose the main shaft rear plate. <Ref. to 5MT-81, ADJUSTMENT, Main Shaft Assembly for Single-Range.>

19.Input Shaft Assembly

A: REMOVAL

1) Remove the manual transmission assembly from vehicle. <Ref. to 5MT-36, REMOVAL, Manual Transmission Assembly.>
2) Remove the transfer case with extension case assembly. <Ref. to 5MT-52, REMOVAL, Transfer Case and Extension Case Assembly.>
3) Remove the transmission case. <Ref. to 5MT-65, REMOVAL, Transmission Case.>
4) Remove the drive pinion shaft assembly. <Ref. to 5MT-92, REMOVAL, Drive Pinion Shaft Assembly.>
5) Remove the main shaft assembly and input shaft assembly.

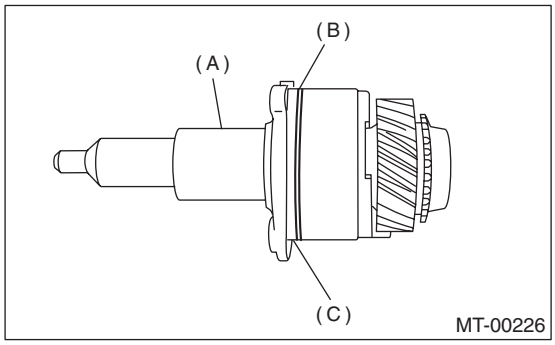
B: INSTALLATION

1) Install the needle bearing onto the front of transmission main shaft assembly.
2) Connect the main shaft assembly and input shaft assembly.
3) Install the needle bearing outer race knock pin hole into transmission case knock pin.
4) Install the drive pinion assembly. <Ref. to 5MT-92, INSTALLATION, Drive Pinion Shaft Assembly.>
5) Install the transmission case. <Ref. to 5MT-67, INSTALLATION, Transmission Case.>
6) Install the transfer case with extension case assembly. <Ref. to 5MT-52, INSTALLATION, Transfer Case and Extension Case Assembly.>
7) Install the manual transmission assembly on vehicle. <Ref. to 5MT-39, INSTALLATION, Manual Transmission Assembly.>

C: DISASSEMBLY

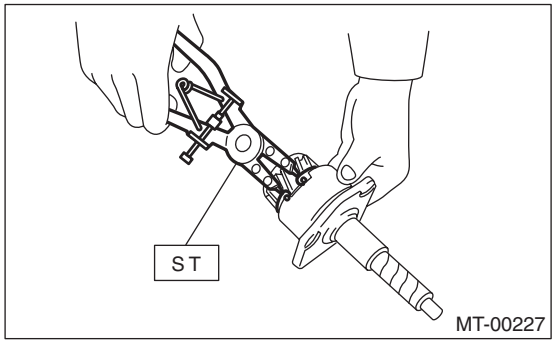
1) Remove the O-ring from input shaft holder. Also, remove the input shaft holder shim.

NOTE:
- Use a new O-ring.
- Number of shims used varies from zero to two.

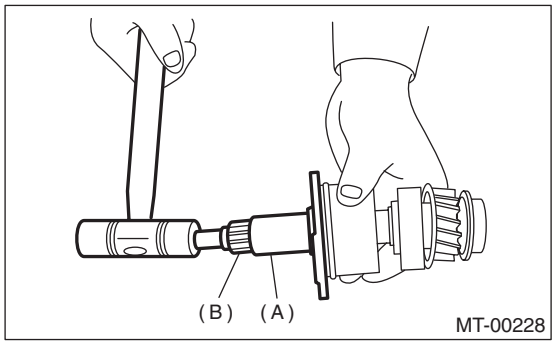


(A) Input shaft holder
(B) O-ring
(C) Input shaft holder shim

2) Put vinyl tape around the input shaft splines to protect oil seal from damage.
3) Remove the inner snap ring.
ST 398663600 PLIERS

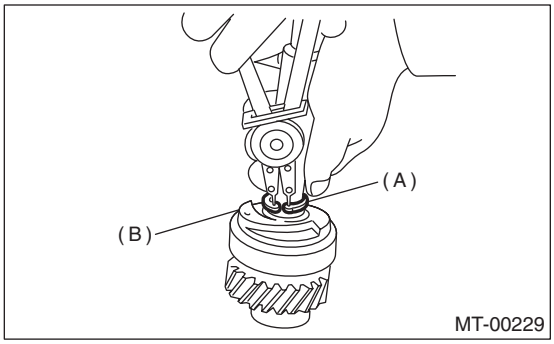


4) Hold the input shaft holder stationary and remove the input shaft by tapping its end with a plastic hammer.



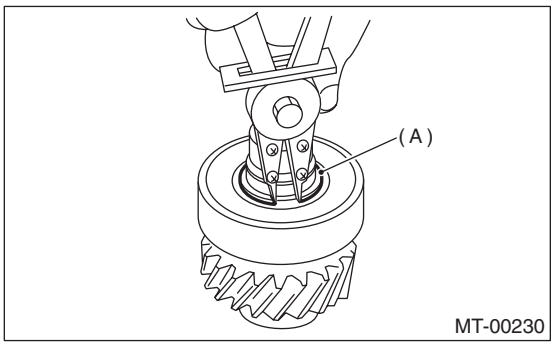
(A) Input shaft holder
(B) Input shaft

5) Remove the outer snap ring. Then remove the oil squeeze plate and straight pin.



(A) Snap ring
(B) Oil squeeze plate

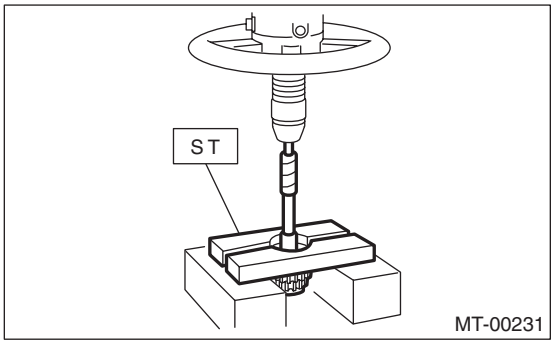
6) Remove the snap ring.



(A) Snap ring

7) Using a press and ST, remove the ball bearing.

NOTE:
Remove the inner snap ring before pressing.
ST 498077000 REMOVER

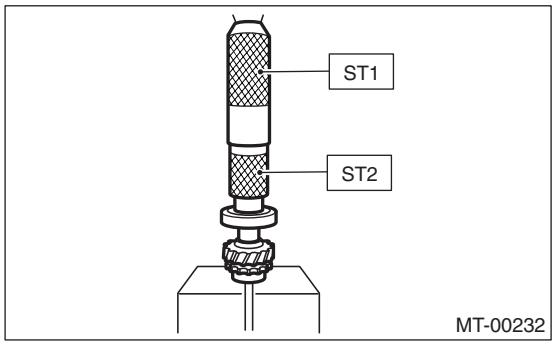


8) Remove the oil seal from input shaft holder.

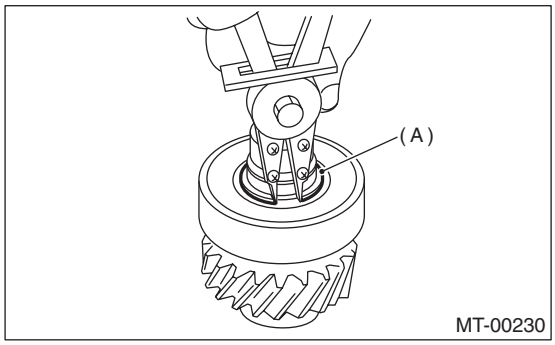
D: ASSEMBLY

1) Install the ball bearing onto input shaft.

NOTE:
Place the snap ring between input shaft gear and ball bearing beforehand. Use the table at 8) as a guide in selecting a suitable snap ring.
ST1 899580100 INSTALLER
ST2 399513600 INSTALLER

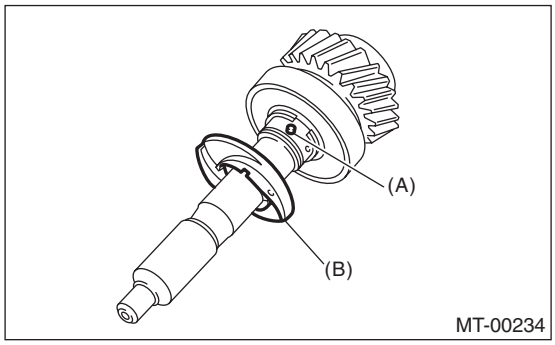


2) Install the snap ring on input shaft.



(A) Snap ring

3) Inspect the clearance between ball bearing and snap ring. <Ref. to 5MT-90, INSPECTION, Input Shaft Assembly.>
4) Install the straight pin and oil squeeze plate to input shaft.



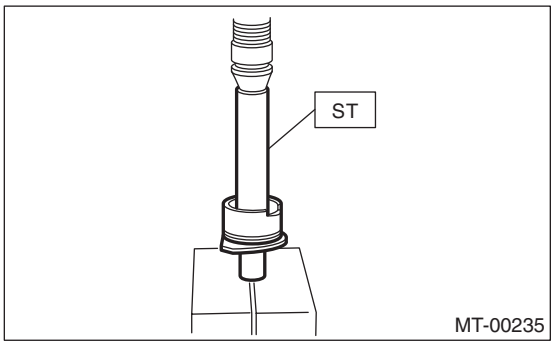
(A) Straight pin
(B) Oil squeeze plate

5) Install the snap ring.

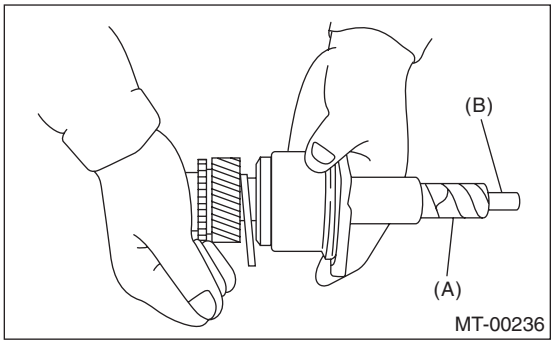
6) Drive the oil seal into input shaft holder.

NOTE:
Apply a coat of grease to sealing lips before installing oil seal.

ST 398507703 DUMMY COLLAR



7) Wind vinyl tape around the shaft splines and insert input shaft into holder by lightly tapping it by hand.

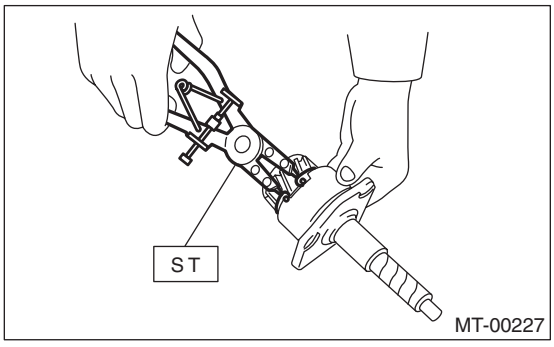


(A) Vinyl tape
(B) Input shaft

8) Install the snap ring to input shaft holder.

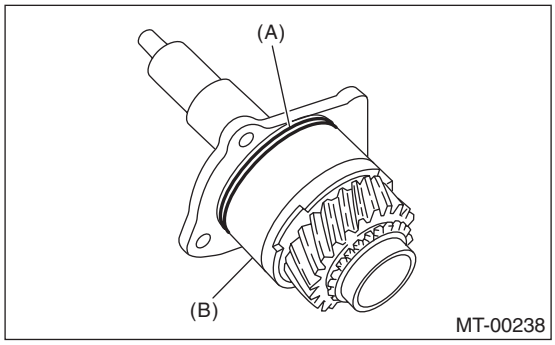
NOTE:
Select a suitable snap ring so that clearance between snap ring and bearing is held within 0 to 0.12 mm (0 to 0.0047 in).

ST 398663600 PLIERS



Snap ring	
Part No.	Thickness mm (in)
805168020	1.84 (0.0724)
805168030	1.92 (0.0756)
805168040	2.00 (0.0787)

9) Install a new O-ring to input shaft holder.



(A) O-ring
(B) Input shaft holder

E: INSPECTION

Disassembled parts should be washed clean first and then inspected carefully.

1) Bearings

Replace the bearings in the following cases:

- Bearings whose balls, outer races and inner races are broken or rusty.
- Worn bearings
- Bearings that fail to turn smoothly or make abnormal noise when turned after gear oil lubrication.
- Bearings having other defects

2) Gears

- Replace the gears with new ones if their tooth surfaces are broken, damaged, or excessively worn.
- Correct or replace if the cone that contacts the baulk ring is rough or damaged.
- Correct or replace if the inner surface or end face is damaged.

3) Oil seal

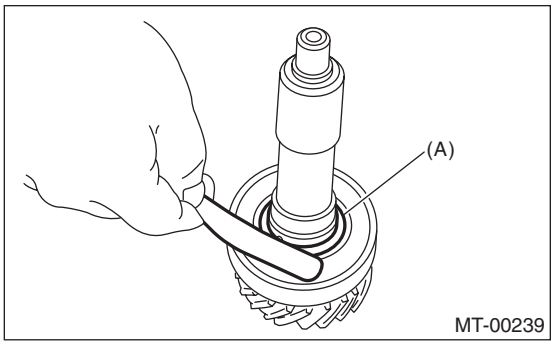
Replace the oil seal if the lip is deformed, hardened, damaged, worn, or defective in any way.

4) O-ring

Replace the O-ring if the sealing face is deformed, hardened, damaged, worn, or defective in any way.

5) Measure the clearance between snap ring and ball bearing using thickness gauge.

Clearance:
0 — 0.12 mm (0 — 0.0047 in)



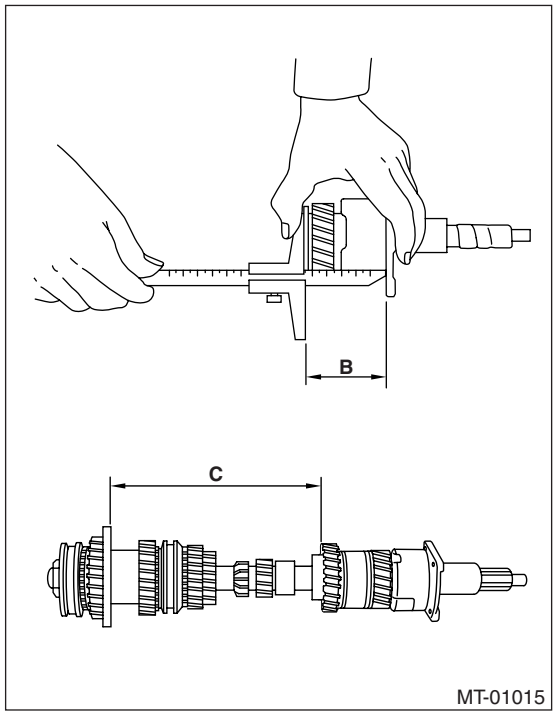
(A) Snap ring

If the measurement is not within specification, select a suitable snap ring.

Snap ring	
Part No.	Thickness mm (in)
805028050	2.48 (0.0976)
805028060	2.56 (0.1008)
805028070	2.64 (0.1039)

F: ADJUSTMENT

1) Place transmission main shaft assembly and input shaft on transmission main case without shim.
2) The proper number of shim can be determined as follows:
D = A − (B + C)
A: Main case length (353 mm (13.90 in)
B: Input shaft complete length
C: Main shaft assembly length



NOTE:
The thickness of shim is 0.45 to 0.55 mm (0.0177 to 0.0217 in).

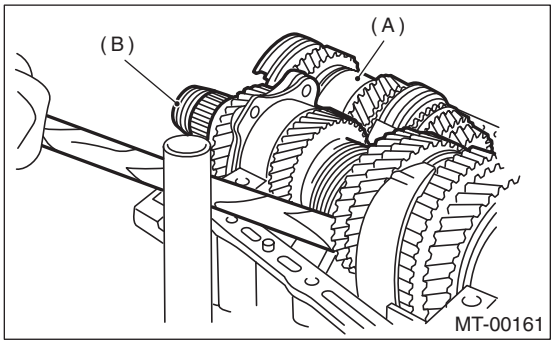
Dimension “D” mm (in)	Number of shims
52.50 — 53.11 (2.0669 — 2.0909)	—
52.00 — 52.49 (2.0472 — 2.0665)	1
51.26 — 51.99 (2.0181 — 2.0468)	2

20.Drive Pinion Shaft Assembly

A: REMOVAL

1) Remove the manual transmission assembly from vehicle. <Ref. to 5MT-36, REMOVAL, Manual Transmission Assembly.>
2) Remove the transfer case with extension case assembly. <Ref. to 5MT-52, REMOVAL, Transfer Case and Extension Case Assembly.>
3) Remove the transmission case. <Ref. to 5MT-65, REMOVAL, Transmission Case.>
4) Remove the drive pinion shaft assembly.

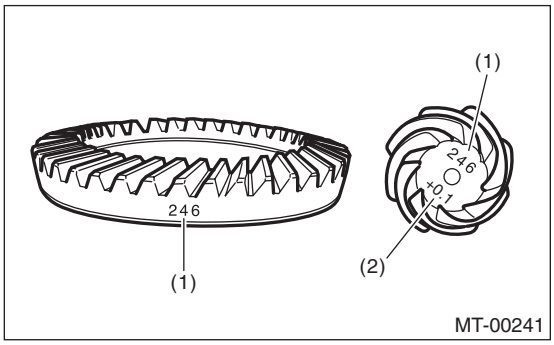
NOTE:
Use a hammer handle, etc. to remove if too tight.



(A) Main shaft assembly
(B) Drive pinion shaft assembly

B: INSTALLATION

1) Remove the differential assembly.
2) Alignment marks/numbers on hypoid gear set:
The upper number on drive pinion is the match number for combining it with hypoid driven gear. The lower number is error margin of machining. If no lower number is shown, the value is zero. The number on hypoid driven gear indicates a number for combination with drive pinion.

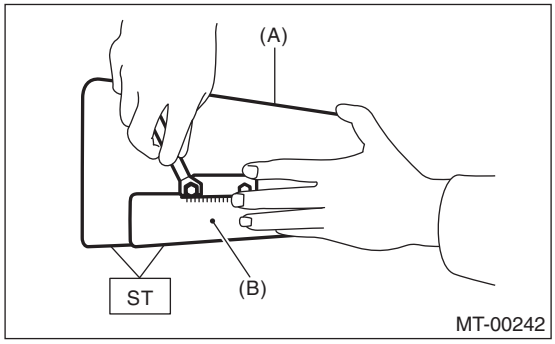


(1) Match number
(2) Error margin of machining

3) Place the drive pinion shaft assembly on right hand transmission main case without shim and tighten the bearing mounting bolts.
4) Inspection and adjustment of ST:

NOTE:
• Loosen the two bolts and adjust so that the scale indicates 0.5 correctly when the plate end and the scale end are on the same level.
• Tighten the two bolts.

ST 499917500 DRIVE PINION GAUGE ASSY



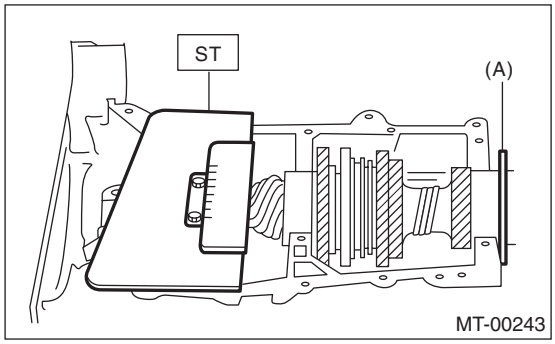
(A) Plate
(B) Scale

5) Position the ST by inserting the knock pin of ST into the knock hole in transmission case.

ST 499917500 DRIVE PINION GAUGE ASSY

6) Slide the drive pinion gauge scale with finger tip and read the value at the point where it matches with the end face of drive pinion.

ST 499917500 DRIVE PINION GAUGE ASSY



(A) Adjust clearance to zero without shim.

7) The thickness of shim shall be determined by adding the value indicated on drive pinion to the value indicated on ST. (Add if the number on drive pinion is prefixed by + and subtract if the number is prefixed by −.)

ST 499917500 DRIVE PINION GAUGE ASSY

8) Select one to three shims from the next table for the value determined as described above and take a shim thickness which is closest to the indicated value.

Drive pinion shim	
Part No.	Thickness mm (in)
32295AA031	0.150 (0.0059)
32295AA041	0.175 (0.0069)
32295AA051	0.200 (0.0079)
32295AA061	0.225 (0.0089)
32295AA071	0.250 (0.0098)
32295AA081	0.275 (0.0108)
32295AA091	0.300 (0.0118)
32295AA101	0.500 (0.0197)

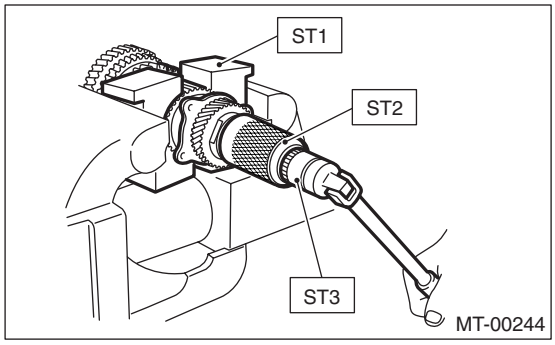
9) Install the differential assembly. <Ref. to 5MT-104, INSTALLATION, Front Differential Assembly.>
10) Set the transmission main shaft assembly and drive pinion assembly in position. (So there is no clearance between the two when moved all the way to the front). Inspect the suitable 1st-2nd, 3rd-4th and 5th shifter fork so that coupling sleeve and reverse driven gear are positioned in the center of their synchronizing mechanisms. <Ref. to 5MT-101, INSPECTION, Drive Pinion Shaft Assembly.>
11) Install the transmission case. <Ref. to 5MT-67, INSTALLATION, Transmission Case.>
12) Install the transfer case with extension case assembly. <Ref. to 5MT-52, INSTALLATION, Transfer Case and Extension Case Assembly.>
13) Install the manual transmission assembly to vehicle. <Ref. to 5MT-36, Manual Transmission Assembly.>

C: DISASSEMBLY

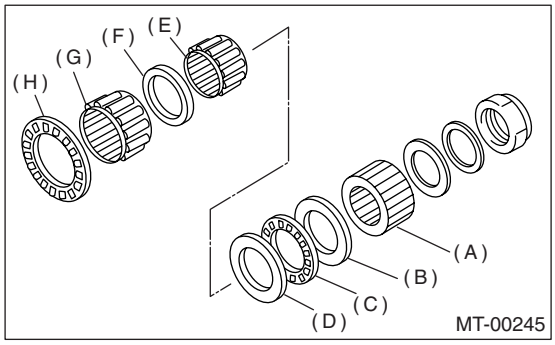
1. AWD MODEL

NOTE:
Attach a cloth to the end of driven shaft (on the frictional side of thrust needle bearing) to prevent damage during disassembly or reassembly.

1) Straighten the lock nut at staked portion. Remove the lock nut using ST1, ST2 and ST3.
ST1 899884100 HOLDER
ST2 498427100 STOPPER
ST3 899988608 SOCKET WRENCH (27)



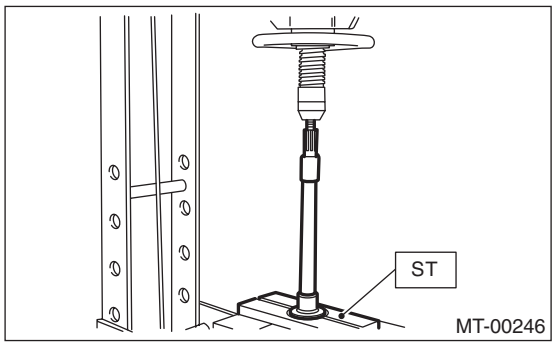
2) Withdraw the drive pinion from driven shaft. Remove the differential bevel gear sleeve, adjusting washer No. 1, adjusting washer No. 2, thrust bearing, needle bearing, drive pinion collar, needle bearing and thrust bearing.



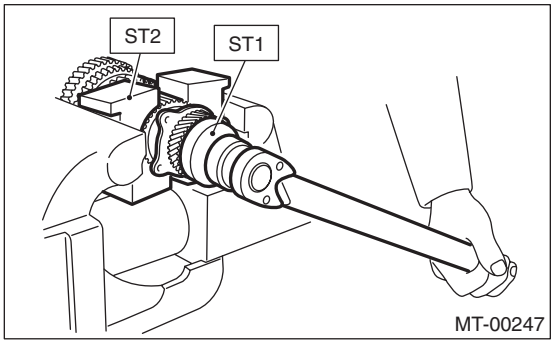
(A) Differential bevel gear sleeve
(B) Washer No. 1 (25 × 37.5 × t)
(C) Thrust bearing (25 × 37.5 × 3)
(D) Washer No. 2 (25 × 37.5 × 4)
(E) Needle bearing (25 × 30 × 20)
(F) Drive pinion collar
(G) Needle bearing (30 × 37 × 23)
(H) Thrust bearing (33 × 50 × 3)

3) Remove the roller bearing and washer using ST and press.

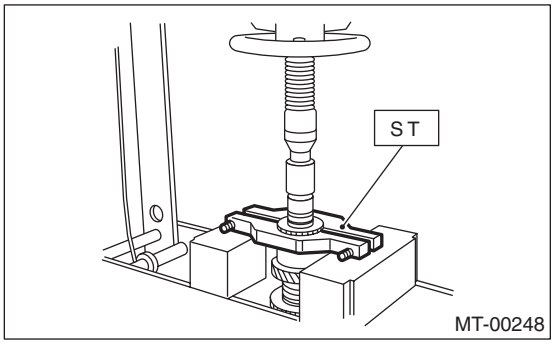
NOTE:
Do not reuse the roller bearing.
ST 498077000 REMOVER



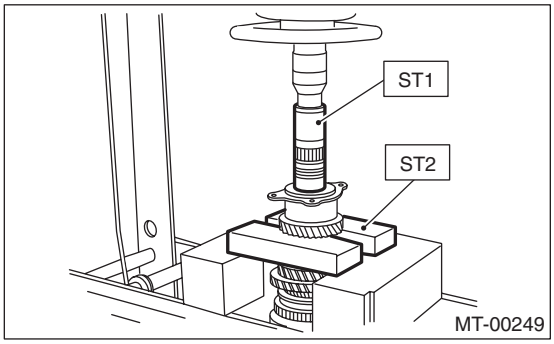
4) Straighten the lock nut at staked portion. Remove the lock nut using ST1 and ST2.
ST1 499987300 SOCKET WRENCH (50)
ST2 899884100 HOLDER



5) Remove the 5th driven gear using ST.
ST 499857000 5TH DRIVEN GEAR REMOVER

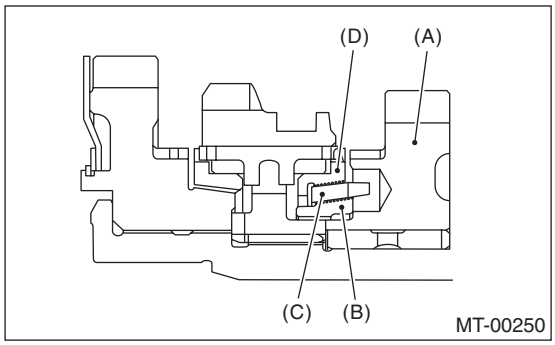


6) Remove the woodruff key.
7) Remove the roller bearing, 3rd-4th driven gear using ST1 and ST2.
ST1 499757002 INSTALLER
ST2 899714110 REMOVER



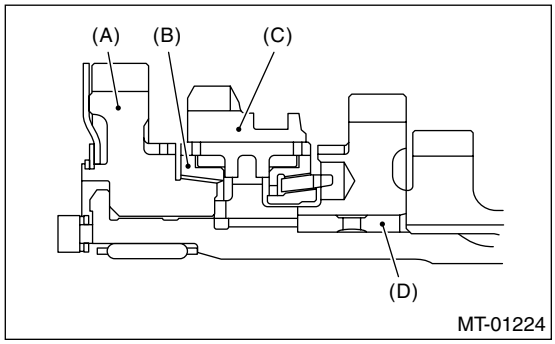
8) Remove the key.

9) Remove the 2nd driven gear, inner baulk ring, synchro cone and outer baulk ring. (Except 1.6 L model)



(A) 2nd driven gear
(B) Inner baulk ring
(C) Synchro cone
(D) Outer baulk ring

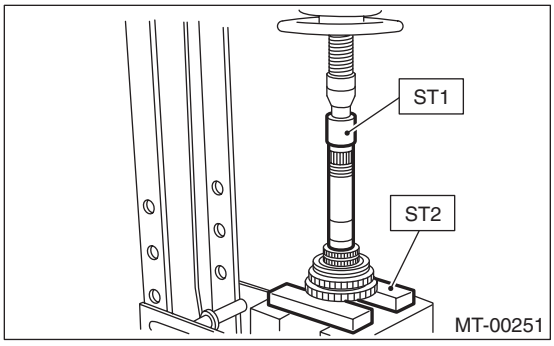
10) Remove the 2nd driven gear assembly. (1.6 L model)
11) Remove the 1st driven gear, 2nd gear bushing, gear and hub using ST1 and ST2. (Except turbo model)



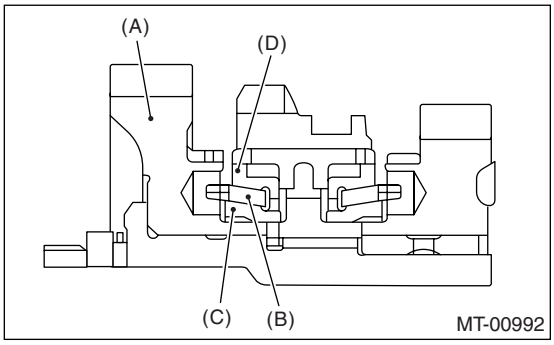
(A) 1st driven gear
(B) Inner baulk ring
(C) Hub
(D) 2nd gear bushing

NOTE:
Replace the gear and hub if necessary. Do not attempt to disassemble if at all possible because they must engage at a specified point. If they should be disassembled, mark engagement point beforehand.

ST1 499757002 INSTALLER
ST2 899714110 REMOVER

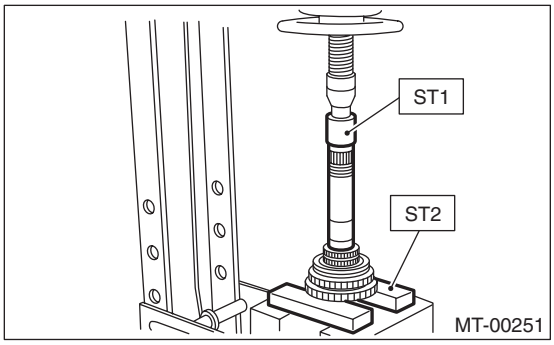


12) Remove the 1st driven gear, inner baulk ring, synchro cone, outer baulk ring, 2nd gear bushing, gear and hub using ST1 and ST2. (Turbo model)



(A) 1st driven gear
(B) Inner baulk ring
(C) Synchro cone
(D) Outer baulk ring

NOTE:
Replace the gear and hub if necessary. Do not disassemble because they must engage at a specified point. If they have to be disassembled, mark the engaging point on the spline beforehand.
ST1 499757002 INSTALLER
ST2 899714110 REMOVER

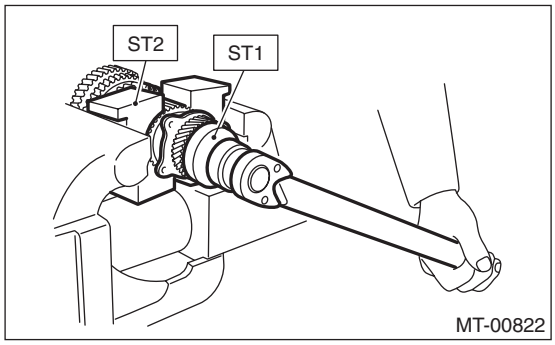


13) Remove the sub gear for 1st driven gear. (Except turbo model)

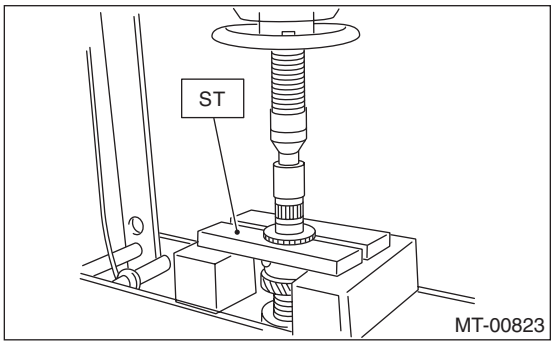
2. FWD MODEL

1) Loosen lock nut using ST1 and ST2.
ST1 499987003 SOCKETWRENCH (35)
ST2 899884100 HOLDER

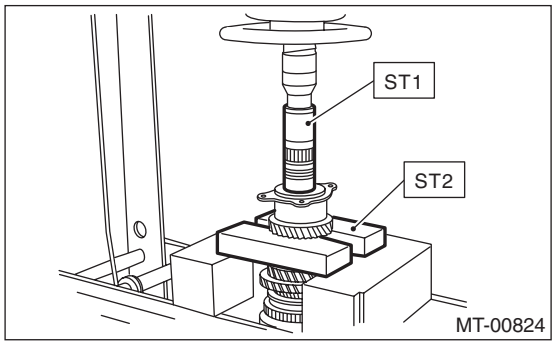
NOTE:
Remove caulking before taking off lock nut.



2) Remove 5th driven gear using ST and press.
ST 498077000 REMOVER

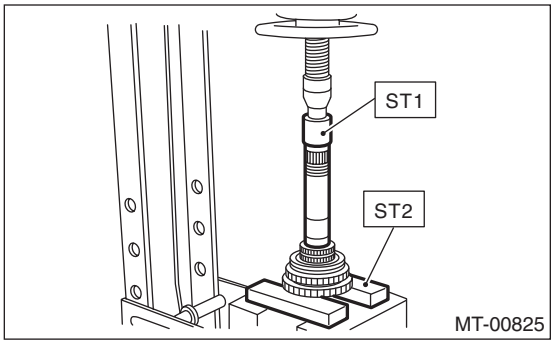


3) Remove woodruff key.
4) Remove roller bearing and 3rd-4th driven gear using ST1 and ST2.
ST1 499757002 INSTALLER
ST2 899714110 REMOVER



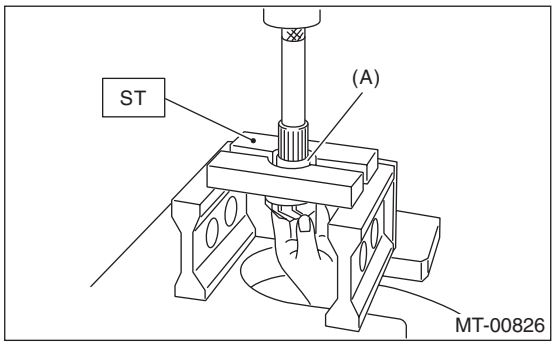
5) Remove 2nd driven gear assembly.
6) Remove 3rd-4th driven gear key.

7) Remove 1st driven gear, 2nd gear bushing and gear & hub assembly using ST1 and ST2.
Replace gear and hub if necessary. Do not attempt to disassemble if at all possible because they must engage at a specified point. If they have to be disassembled, mark the engaging point beforehand.
ST1 499757002 INSTALLER
ST2 899714110 REMOVER



8) Remove 1st gear bushing, 1st driven gear thrust plate and roller bearing using ST and press.
ST 498517000 REPLACER

CAUTION:
Replace roller bearing (41 × 71 × 23) with a new one if this disassembly is performed.



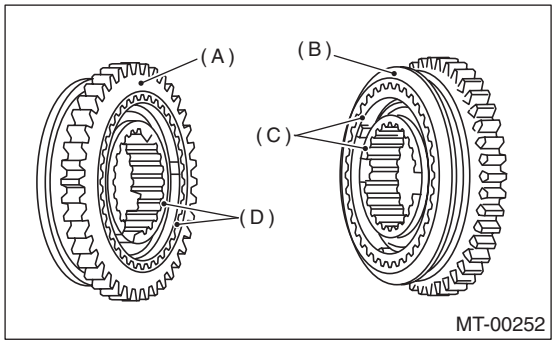
(A) 1st gear bushing

D: ASSEMBLY

1. AWD MODEL

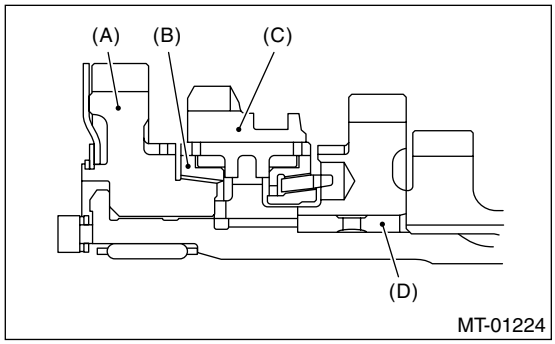
1) Install the sleeve and hub assembly by matching alignment marks.

NOTE:
Use a new gear and hub assembly, if gear or hub have been replaced.



(A) 1st gear side
(B) 2nd gear side
(C) Flush surface
(D) Stepped surface

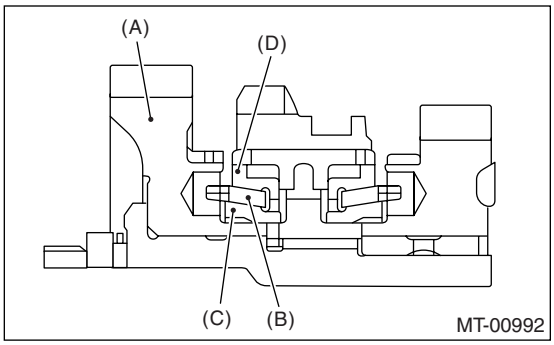
2) Install the washer, snap ring and sub gear to 1st driven gear. (1.6 L, 2.0 L model)
3) Install the 1st driven gear, 1st baulk ring, gear and hub assembly onto driven shaft.



(A) 1st driven gear
(B) 1st baulk ring
(C) Gear and hub ASSY
(D) 2nd gear bushing

NOTE:
• Take care to install the gear and hub assembly in proper direction.
• Align the baulk ring and gear & hub assembly with key groove.

4) Install the 1st driven gear, inner baulk ring, synchro cone, outer baulk ring, gear and hub assembly onto driven shaft. (Turbo model)



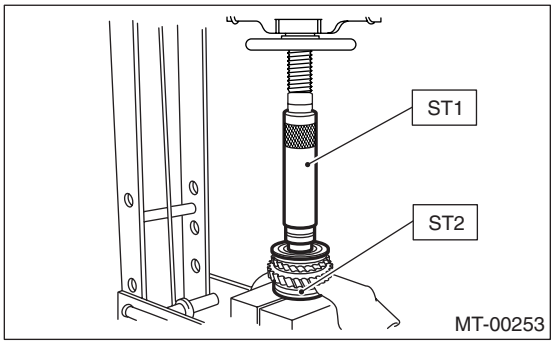
(A) 1st driven gear
(B) Inner baulk ring
(C) Synchro cone
(D) Outer baulk ring

NOTE:
• Take care to install the gear and hub assembly in proper direction.
• Align the baulk ring and gear and hub assembly with key groove.

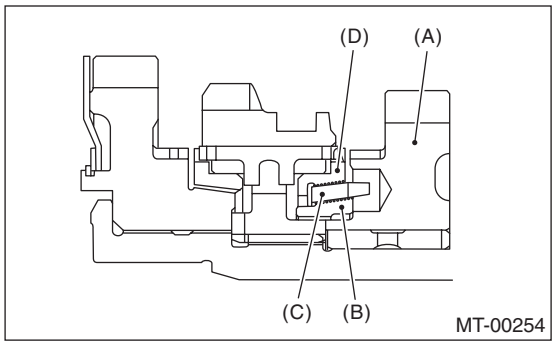
5) Install the 2nd driven gear bushing onto driven shaft using ST1, ST2 and press.

NOTE:
• Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).
• Attach a cloth to the end of driven shaft to prevent damage.
• When press fitting, align the oil holes of shaft and bush.

ST1 499277200 INSTALLER
ST2 499587000 INSTALLER



6) Install the 2nd driven gear, inner baulk ring, synchro cone, outer baulk ring and insert onto driven shaft. (Except 1.6 L model)

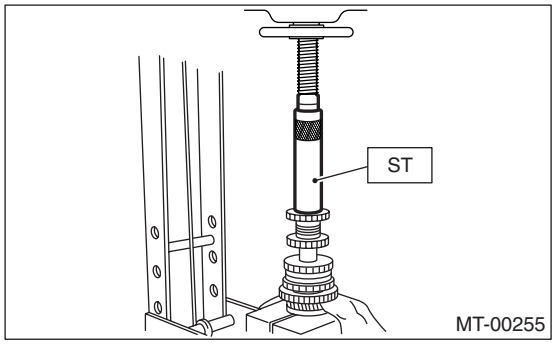


(A) 2nd driven gear
(B) Inner baulk ring
(C) Synchro cone
(D) Outer baulk ring

7) Install the 2nd driven gear, 1st-2nd bulk ring and insert onto driven shaft. (1.6 L model)
8) After installing the key on driven shaft, install the 3rd-4th driven gear using ST and press.

NOTE:
• Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).
• Align the groove in baulk ring with insert.

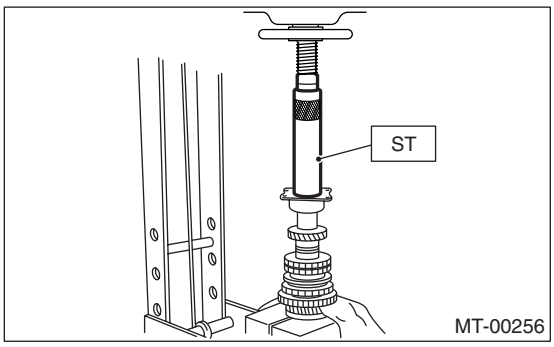
ST 499277200 INSTALLER



9) Install a set of roller bearings onto the driven shaft using ST and press.

NOTE:
Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

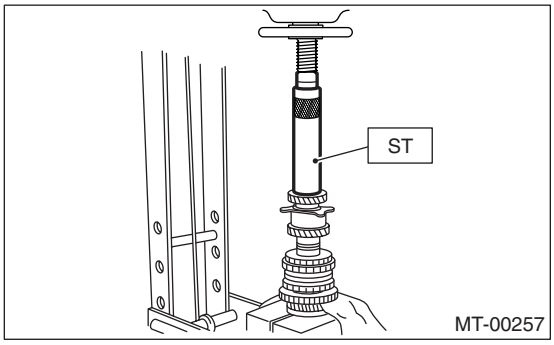
ST 499277200 INSTALLER



10) Position the woodruff key in groove on the rear of driven shaft. Install the 5th driven gear onto driven shaft using ST and press.

NOTE:
Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

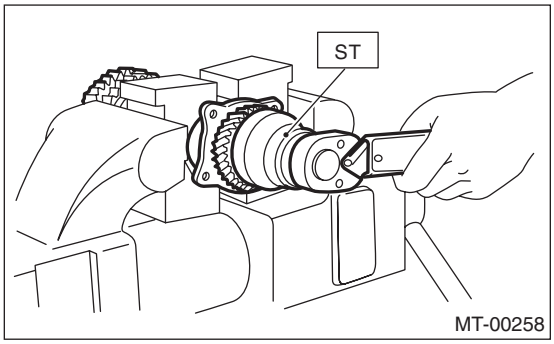
ST 499277200 INSTALLER



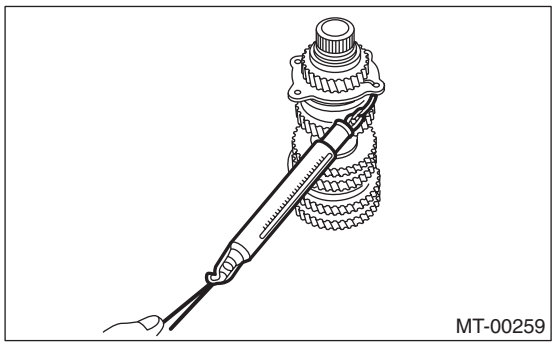
11) Install the lock washer. Install the lock nut and tighten to the specified torque using ST.

ST 499987300 SOCKET WRENCH (50)

Tightening torque:
260 N·m (26.5 kgf-m, 191.7 ft-lb)

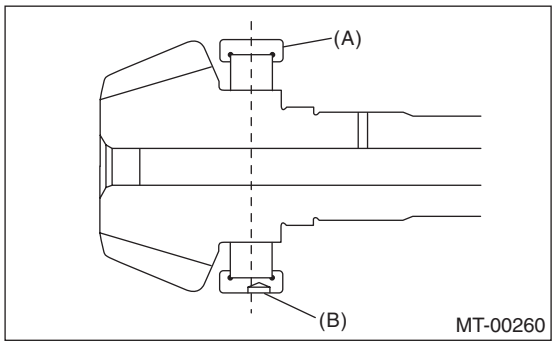


NOTE:
- Stake the lock nut at two points.
- Using the spring balancer, check that starting torque of roller bearing is 0.1 to 1.5 N (0.01 to 0.15 kgf, 0.02 to 0.33 lbf).



12) Install the roller bearing onto drive pinion.

NOTE:
When installing the roller bearing, note its directions (front and rear) because the knock pin hole in outer race is offset.

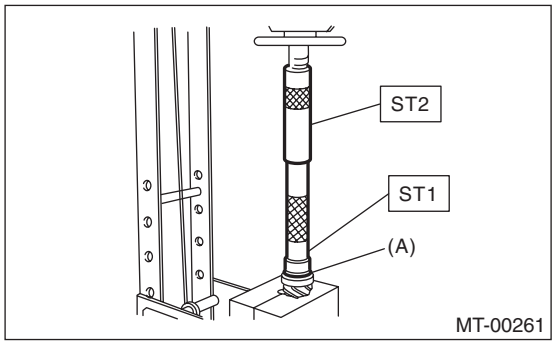


(A) Roller bearing
(B) Knock pin hole

13) Install the washer using ST1, ST2 and press.

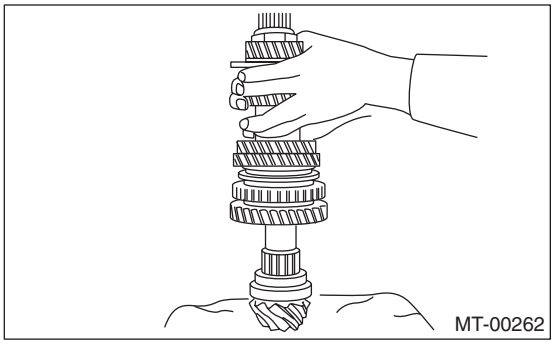
NOTE:
- Discard the old lock nuts, replace with new ones.
- Secure the lock nut in four places.

ST1 499277100 BUSH 1-2 INSTALLER
ST2 499277200 INSTALLER



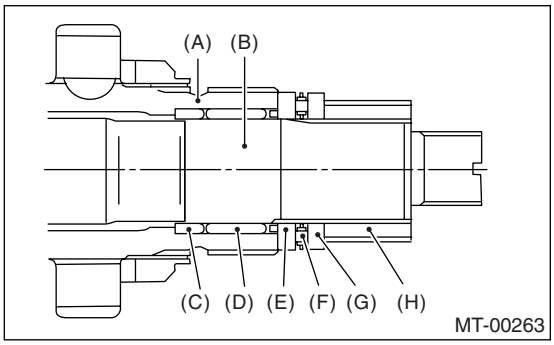
(A) Washer

14) Install the thrust bearing and needle bearing. Install the driven shaft assembly.



15) Install the drive pinion collar, needle bearing, adjusting washer No. 2, thrust bearing, adjusting washer No. 1 and differential bevel gear sleeve in that order.

NOTE:
Be careful because the spacer must be installed in proper direction.

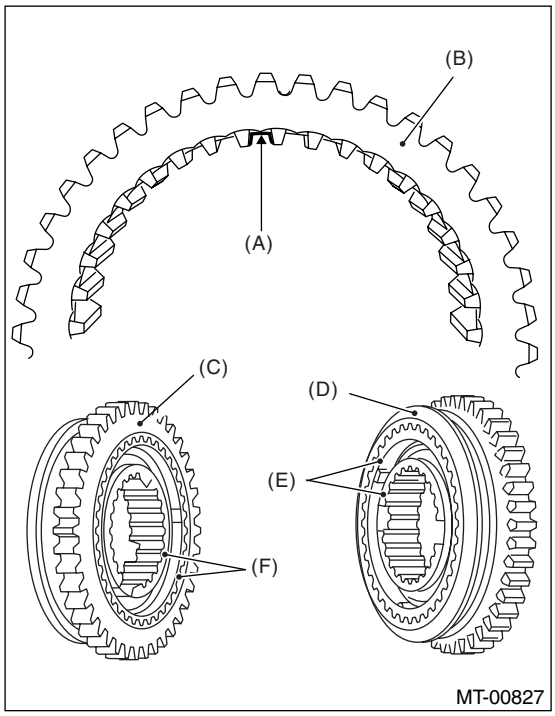


(A) Driven shaft
(B) Drive shaft
(C) Drive pinion collar
(D) Needle bearing (25 × 30 × 20)
(E) Washer No. 2 (25 × 36 × 4)
(F) Thrust bearing (25 × 37.5 × 3)
(G) Washer No. 1 (25 × 36 × t)
(H) Differential bevel gear sleeve

2. FWD MODEL

1) Assemble gear and hub assembly.

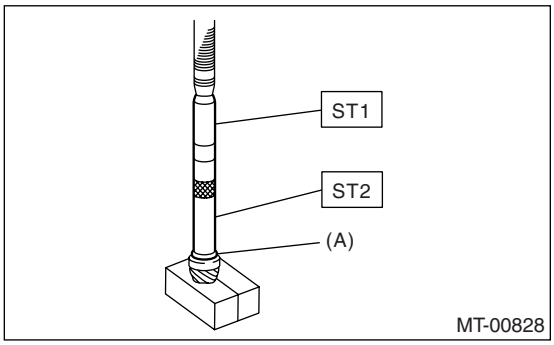
NOTE:
• Use new gear and hub assembly, if gear or hub have been replaced.
• Be sure the insert keys are correctly located in the insert key grooves inside the reverse driven gear.



(A) Key grooves
(B) Reverse driven gear
(C) 1st driven gear side
(D) 2nd driven gear side
(E) Flush surface
(F) Stepped surface

2) Drive roller
bearing onto drive pinion shaft and 1st driven gear thrust washer using ST1 and ST2.
ST1 499877000 RACE 4-5 INSTALLER
ST2 499277100 BUSH 1-2 INSTALLER

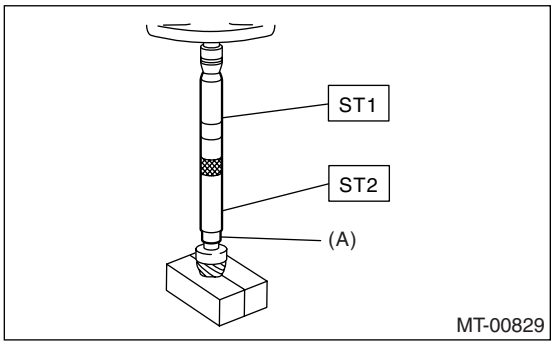
CAUTION:
Use new roller bearing, 1st gear thrust washer.



(A) Thrust washer

3) Install 1st-2nd driven gear bushing onto drive pinion shaft.

NOTE:
Bushing may be installed with either side up.
ST1 499877000 RACE 4-5 INSTALLER
ST2 499277100 BUSH 1-2 INSTALLER



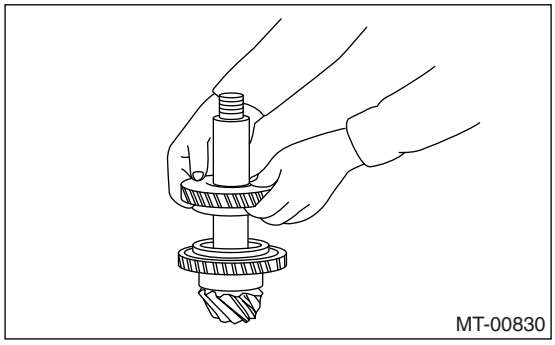
(A) 1st-2nd driven gear bushing

4) Measure outside diameter of 1st driven gear bushing to determine suitable 1st driven gear.

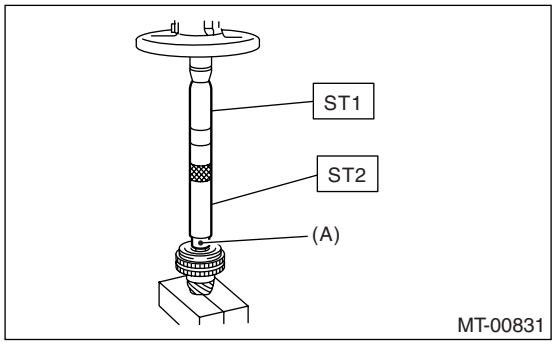
1st driven gear	
Part number	Outer diameter of bushing mm (in)
32231AA841	42.019 — 42.033 (1.6543 — 1.6548)
32231AA851	42.005 — 42.018 (1.6537 — 1.6543)
32231AA861	41.990 — 42.004 (1.6531 — 1.6537)

5) Install 1st driven gear, 1st-2nd balk ring and gear and hub assembly (already assembled in previous step) to drive pinion shaft by hand.

NOTE:
Align ring groove with insert.



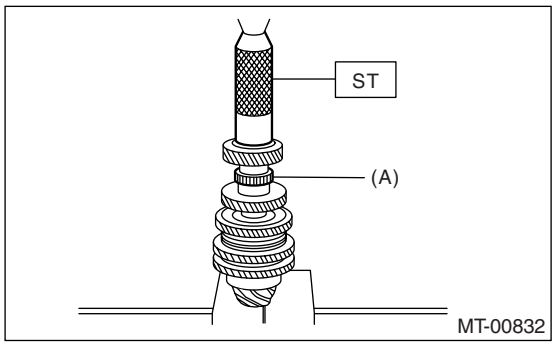
6) Install 1st-2nd driven gear bushing to drive pinion shaft using ST1 and ST2.
ST1 499877000 RACE 4-5 INSTALLER
ST2 499277100 BUSH 1-2 INSTALLER



(A) 1st-2nd driven gear bushing

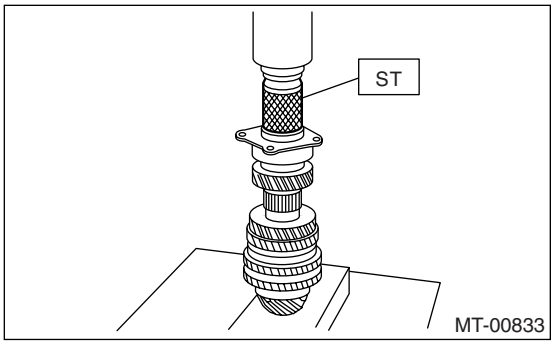
7) Install 2nd driven gear and 1st-2nd balk ring to drive pinion shaft by hand.
8) Install key into the groove on drive pinion shaft and install 3rd-4th driven gear.

NOTE:
Ball bearing may be installed without using the tool. There should be no problem.
ST 499877000 RACE 4-5 INSTALLER



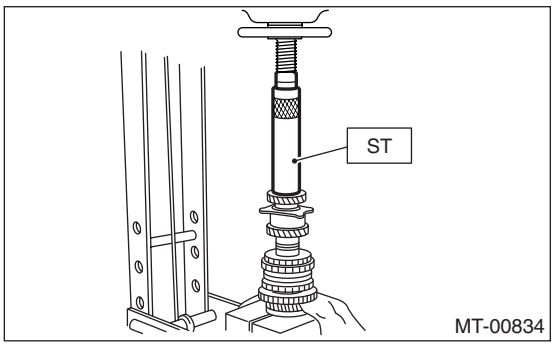
(A) 3rd-4th driven gear

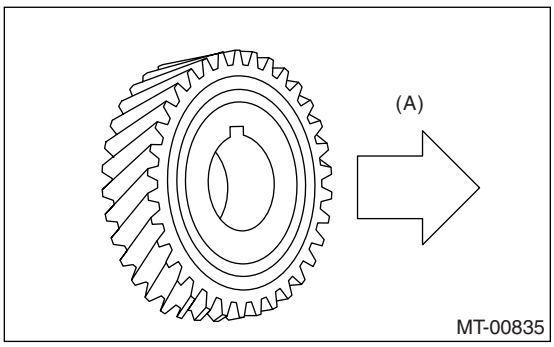
9) Install ball bearing (29 × 74 × 38) on drive pinion shaft with ST.
ST 499277100 BUSH 1-2 INSTALLER



10) Position woodruff key in groove on the rear of drive pinion shaft. Install 5th driven gear onto drive shaft using ST and press.
ST 499277100 INSTALLER

CAUTION:
- **Face 5th driven gear in the correct direction.**
- **Be careful not to dislocate woodruff key while installing 5th driven gear.**



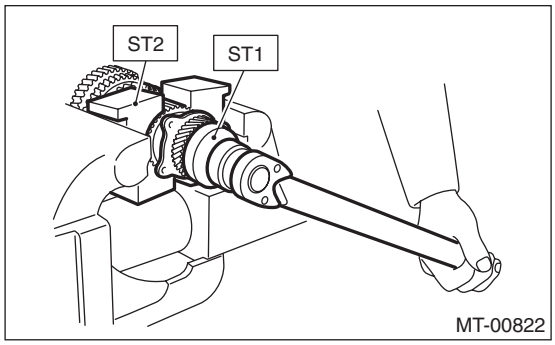


(A) Rear

11) Install lock washer and tighten lock nut to the specified torque using ST1 and ST2.
ST1 499987003 SOCKETWRENCH (35)
ST2 899884100 HOLDER

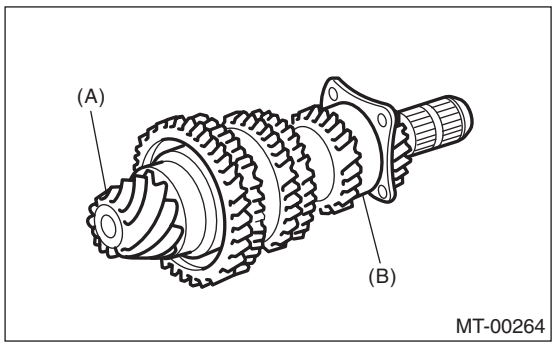
CAUTION:
- **Discard old lock nuts, replace with new ones.**
- **Secure lock nut in four places.**

Tightening torque:
120 N·m (12.2 kgf-m, 88.5 ft-lb)



E: INSPECTION

Disassembled parts should be washed clean first and then inspected carefully.
1) Bearings
Replace the bearings in the following cases:
- Bearings whose balls, outer races and inner races are broken or rusty.
- Worn bearings
- Bearings that fail to turn smoothly or make abnormal noise when turned after gear oil lubrication.
- The ball bearing on the rear side of the drive pinion shaft should be checked for smooth rotation before the drive pinion assembly is disassembled. In this case, because a preload is working on the bearing, its rotation feels like it is slightly dragging unlike the other bearings.



(A) Drive pinion shaft
(B) Ball bearing

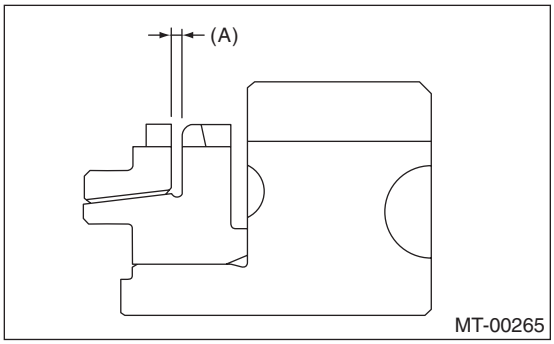
- Bearings having other defects

2) Bushing (each gear)
Replace the bushing in the following cases:
- When the sliding surface is damaged or abnormally worn.
- When the inner wall is abnormally worn.

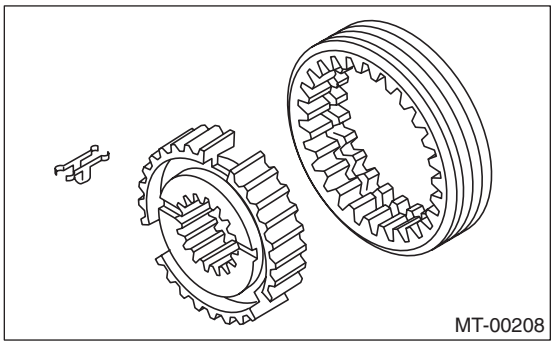
3) Gears
- Replace the gears with new ones if their tooth surfaces are broken, damaged, or excessively worn.
- Correct or replace if the cone that contacts the baulk ring is rough or damaged.

• Correct or replace if the inner surface or end face is damaged.
4) Baulk ring
Replace the ring in the following cases:
• When the inner surface and end face are damaged.
• When the ring inner surface is abnormally or partially worn down.
• If the gap between the end faces of the ring and the gear splined part is excessively small when the ring is pressed against the cone.

Clearance (A):
0.5 — 1.0 mm (0.020 — 0.040 in)



• When the contact surface of the synchronizer ring insert is scored or abnormally worn down.
5) Shifting insert key
Replace the insert if deformed, excessively worn, or defective in any way.

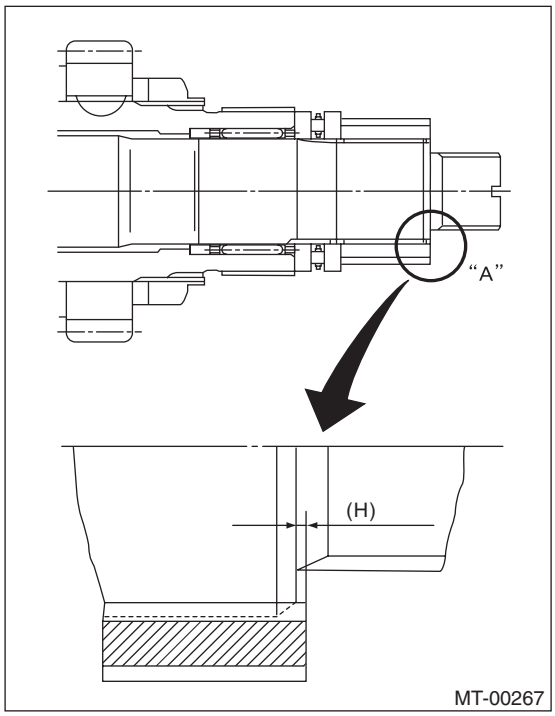


6) Oil seal
Replace the oil seal if the lip is deformed, hardened, damaged, worn, or defective in any way.
7) O-ring
Replace the O-ring if the sealing face is deformed, hardened, damaged, worn, or defective in any way.

F: ADJUSTMENT

1. THRUST BEARING PRELOAD

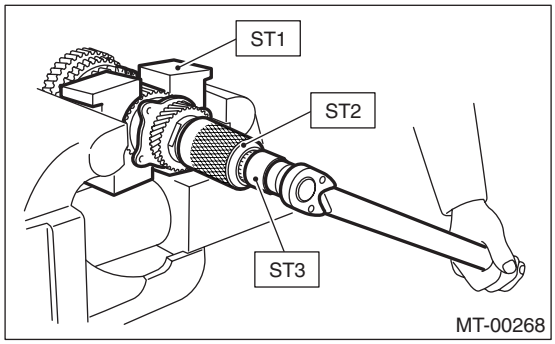
1) After completing the preceding steps 1) through 3), select the adjusting washer No. 1 so that dimension (H) is zero through visual check. Position the washer (18.3 × 30 × 4) and lock washer (18 × 30 × 2) and install the lock nut (18 × 13.5).



2) Using the ST1, ST2 and ST3, tighten the lock nut to specified torque.

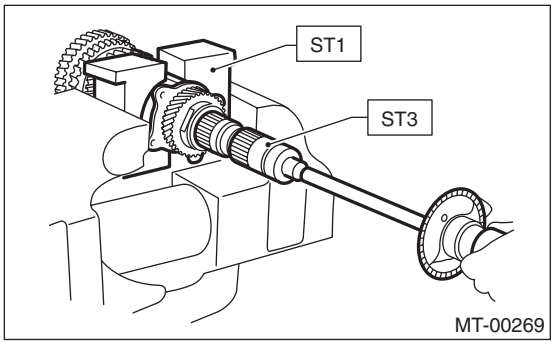
ST1	899884100	HOLDER
ST2	498427100	STOPPER
ST3	899988608	SOCKET WRENCH (27)

Tightening torque:
120 N·m (12.2 kgf-m, 88.5 ft-lb)

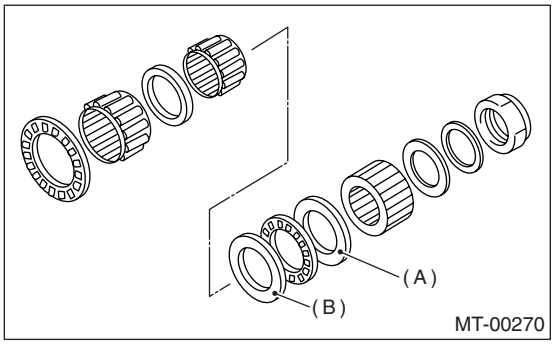


3) After removing the ST2, measure the starting torque using torque driver.
ST1 899884100 HOLDER
ST3 899988608 SOCKET WRENCH (27)

Starting torque:
0.3 — 0.8 N·m (0.03 — 0.08 kgf-m, 0.2 — 0.6 ft-lb)



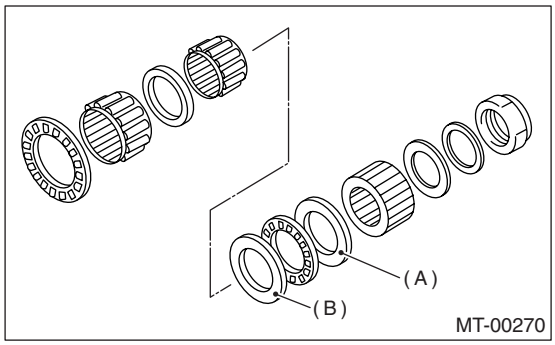
4) If the starting torque is not within specified limit, select a new adjusting washer No. 1 and recheck starting torque.



(A) Adjusting washer No. 1
(B) Adjusting washer No. 2

Adjusting washer No. 1	
Part No.	Thickness mm (in)
803025051	3.925 (0.1545)
803025052	3.950 (0.1555)
803025053	3.975 (0.1565)
803025054	4.000 (0.1575)
803025055	4.025 (0.1585)
803025056	4.050 (0.1594)
803025057	4.075 (0.1604)

5) If the specified starting torque range cannot be obtained when a No. 1 adjusting washer is used, then select a suitable No. 2 adjusting washer from those listed in the following table. Repeat steps 1) through 4) to adjust starting torque.



(A) Adjusting washer No. 1
(B) Adjusting washer No. 2

Starting torque	Dimension H	Washer No. 2
Low	Small	Select thicker one.
High	Large	Select thinner one.

Adjusting washer No. 2	
Part No.	Thickness mm (in)
803025059	3.850 (0.1516)
803025054	4.000 (0.1575)
803025058	4.150 (0.1634)

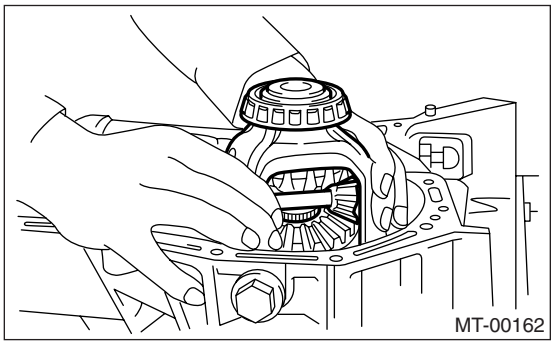
6) Recheck that the starting torque is within specified range, then clinch the lock nut at four positions.

21.Front Differential Assembly

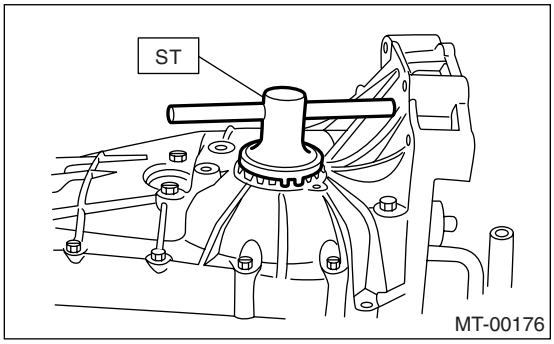
A: REMOVAL

1) Remove the manual transmission assembly from vehicle. <Ref. to 5MT-36, REMOVAL, Manual Transmission Assembly.>
2) Remove the transfer case with extension case assembly. <Ref. to 5MT-52, REMOVAL, Transfer Case and Extension Case Assembly.>
3) Remove the transmission case. <Ref. to 5MT-65, REMOVAL, Transmission Case.>
4) Remove the drive pinion shaft assembly. <Ref. to 5MT-92, REMOVAL, Drive Pinion Shaft Assembly.>
5) Remove the main shaft assembly.
Single-range model
<Ref. to 5MT-72, REMOVAL, Main Shaft Assembly for Single-Range.>
Dual-range model
<Ref. to 5MT-82, REMOVAL, Main Shaft Assembly for Dual-Range.>
6) Remove the differential assembly.

NOTE:
• Be careful not to confuse the right and left roller bearing outer races.
• Be careful not to damage the retainer oil seal.



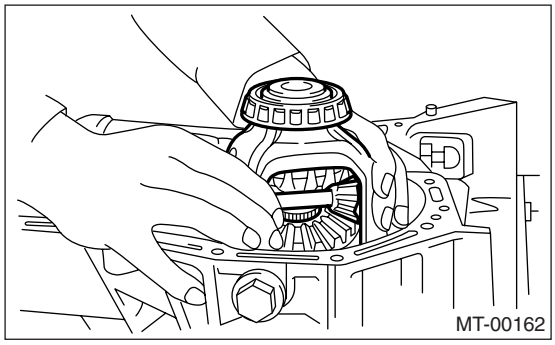
7) Remove the differential side retainers using ST.
ST 499787000 WRENCH ASSY



B: INSTALLATION

1) Install the differential side retainers using ST.
ST 499787000 WRENCH ASSY
2) Install the bearing outer race to transmission case.
3) Install the differential assembly.

NOTE:
Be careful not to fold the sealing lip of oil seal.

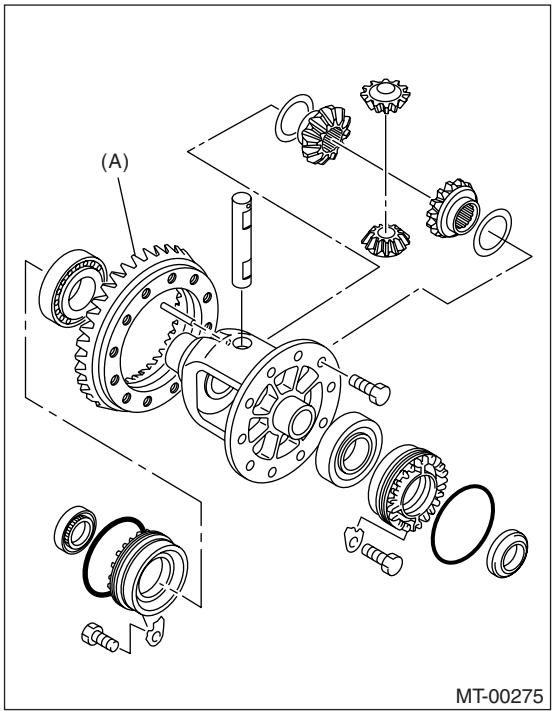


4) Install the main shaft assembly.
Single-range model
<Ref. to 5MT-72, INSTALLATION, Main Shaft Assembly for Single-Range.>
Dual-range model
<Ref. to 5MT-82, INSTALLATION, Main Shaft Assembly for Dual-Range.>
5) Install the drive pinion assembly. <Ref. to 5MT-92, INSTALLATION, Drive Pinion Shaft Assembly.>
6) Install the transmission case. <Ref. to 5MT-67, INSTALLATION, Transmission Case.>
7) Install the transfer case with extension case assembly. <Ref. to 5MT-52, INSTALLATION, Transfer Case and Extension Case Assembly.>
8) Install the manual transmission assembly to vehicle. <Ref. to 5MT-39, INSTALLATION, Manual Transmission Assembly.>

C: DISASSEMBLY

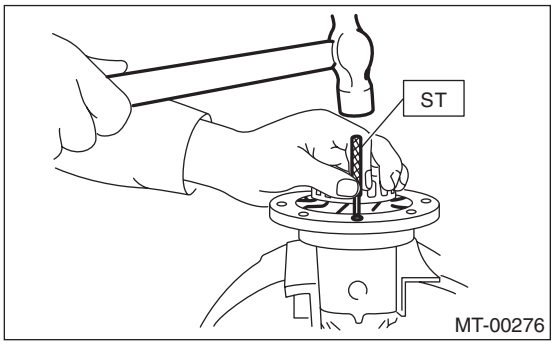
1. DIFFERENTIAL CASE ASSEMBLY

1) Loosen the twelve bolts and remove the hypoid driven gear.

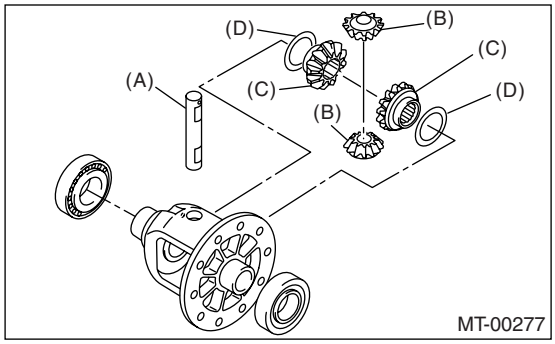


(A) Hypoid driven gear

2) Drive out the straight pin from differential assembly toward hypoid driven gear.
ST 899904100 REMOVER

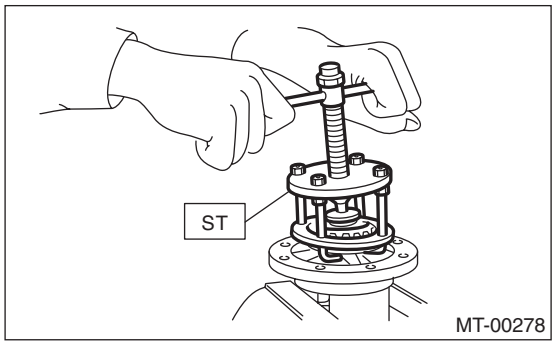


3) Pull out the pinion shaft, and remove the differential bevel pinion and gear and washer.



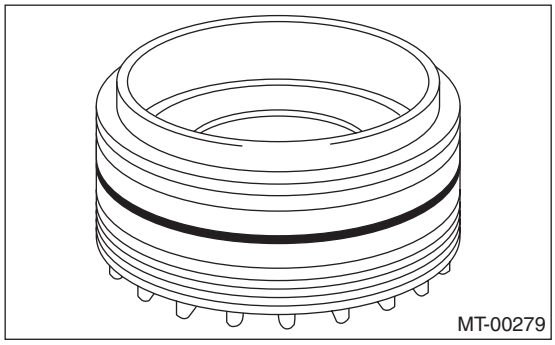
(A) Pinion shaft
(B) Bevel pinion
(C) Bevel gear
(D) Washer

4) Remove the roller bearing using ST.
ST 899524100 PULLER SET



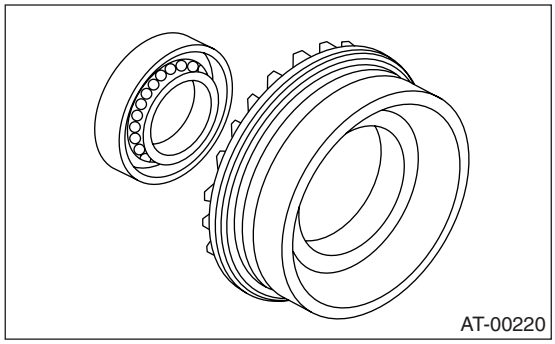
2. SIDE RETAINER

1) Remove the O-ring.



2) Remove the oil seal.

NOTE:
Do not reuse the oil seal. Prepare a new oil seal.

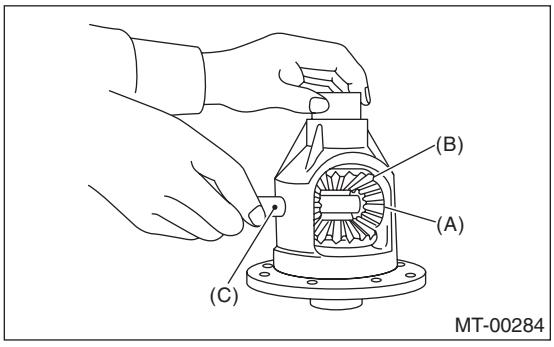


D: ASSEMBLY

1. DIFFERENTIAL CASE ASSEMBLY

1) Install the bevel gear and bevel pinion together with washers, and insert pinion shaft.

NOTE:
Face the chamfered side of washer toward gear.



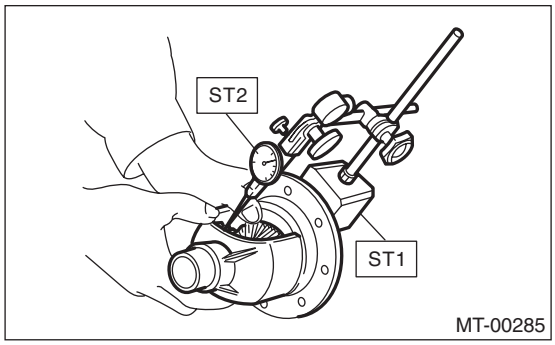
(A) Bevel pinion
(B) Bevel gear
(C) Pinion shaft

2) Measure the backlash between bevel gear and pinion. If it is not within specifications, install a suitable washer to adjust it. <Ref. to 5MT-108, ADJUSTMENT, Front Differential Assembly.>

NOTE:
Be sure the pinion gear tooth contacts adjacent gear teeth during measurement.

ST1 498247001 MAGNET BASE
ST2 498247100 DIAL GAUGE

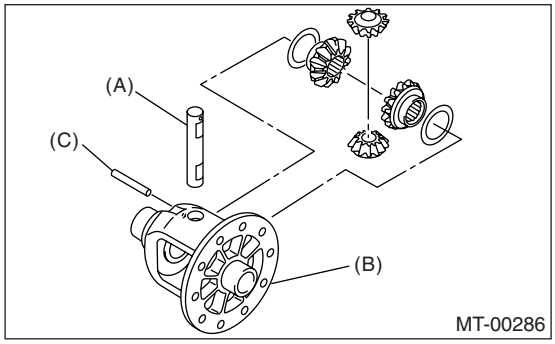
Standard backlash:
0.13 — 0.18 mm (0.0051 — 0.0071 in)



3) Align the pinion shaft and differential case at their holes, and drive the straight pin into holes from the hypoid driven gear side, using ST.

NOTE:
Lock the straight pin after installing.

ST 899904100 REMOVER

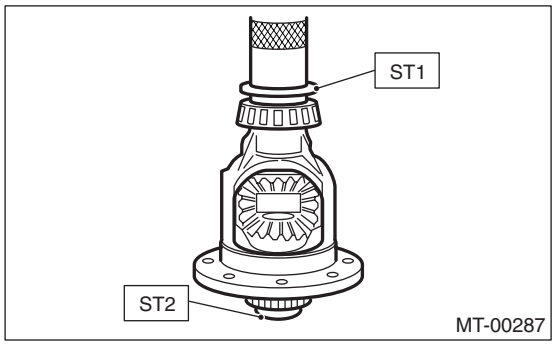


(A) Pinion shaft
(B) Differential case
(C) Straight pin

4) Install the roller bearing to differential case.

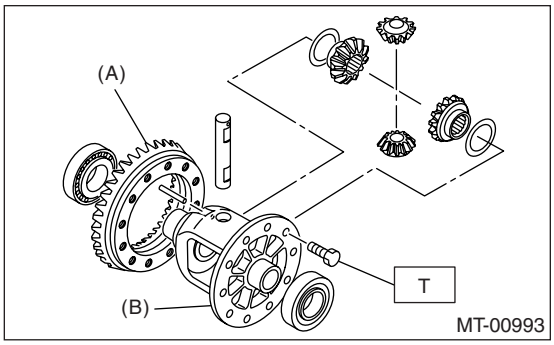
NOTE:
• Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).
• Be careful because the roller bearing outer races are used as a set.

ST1 499277100 BUSH 1-2 INSTALLER
ST2 398497701 ADAPTER



5) Install the hypoid driven gear to differential case using twelve bolts.

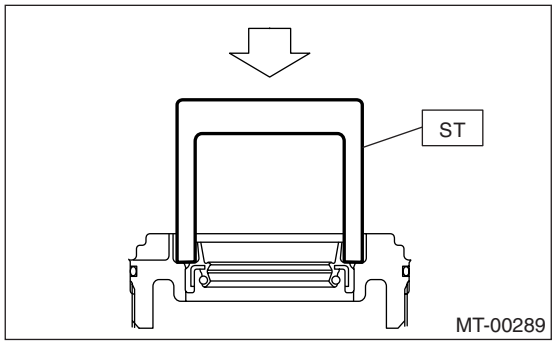
Tightening torque:
T: 62 N·m (6.3 kgf-m, 45.6 ft-lb)



(A) Hypoid driven gear
(B) Differential case

2. SIDE RETAINER

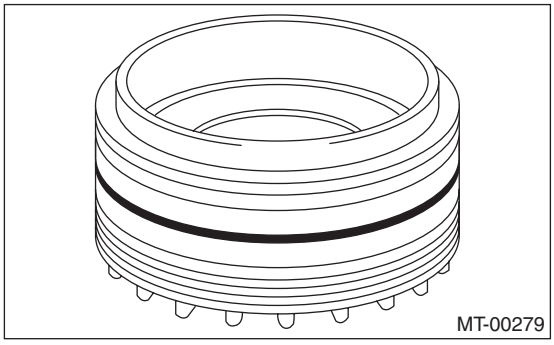
1) Install a new oil seal.
ST 18675AA000 DIFFERENTIAL SIDE OIL SEAL INSTALLER



NOTE:
• For press-fitting of oil seal to retainer, make tapping with plastic hammer etc.
• Do not use press.

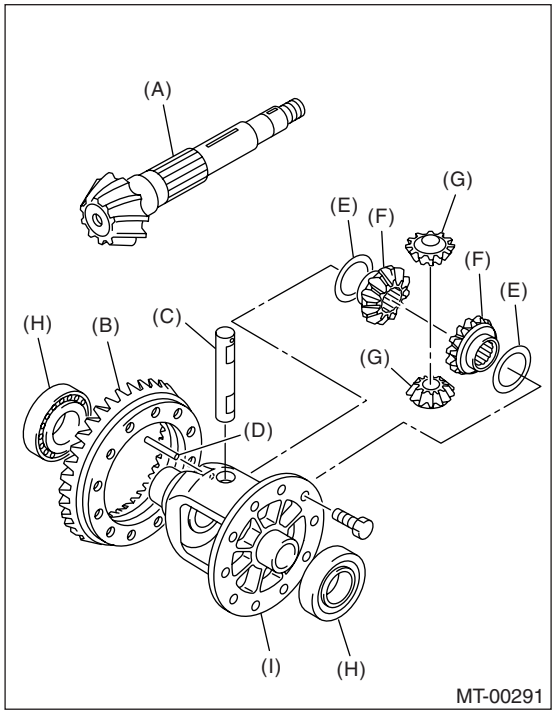
2) Install a new O-ring.

NOTE:
Do not stretch or damage the O-ring.



E: INSPECTION

Repair or replace the differential gear in the following cases:
• The hypoid drive gear and drive pinion shaft tooth surface are damaged, excessively worn, or seized.
• The roller bearing on the drive pinion shaft has a worn or damaged roller path.
• There is damage, wear, or seizure of the differential bevel pinion, differential bevel gear, washer, pinion shaft, and straight pin.
• The differential case has worn or damaged sliding surfaces.



(A) Drive pinion shaft
(B) Hypoid driven gear
(C) Pinion shaft
(D) Straight pin
(E) Washer
(F) Differential bevel gear
(G) Differential bevel pinion
(H) Roller bearing
(I) Differential case

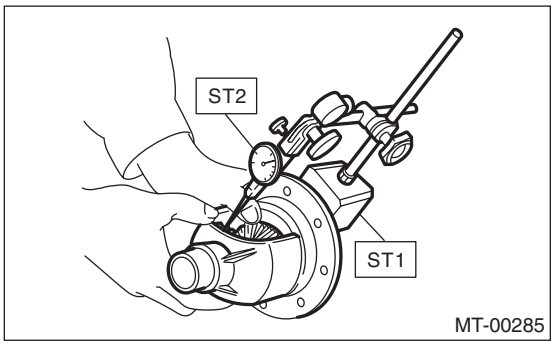
1. BEVEL PINION GEAR BACKLASH

Measure the backlash between bevel gear and pinion. If it is not within specifications, install a suitable washer to adjust it.

NOTE:
Be sure the pinion gear tooth contacts adjacent gear teeth during measurement.

ST1 498247001 MAGNET BASE
ST2 498247100 DIAL GAUGE

Standard backlash:
0.13 — 0.18 mm (0.0051 — 0.0071 in)



2. HYPOID GEAR BACKLASH

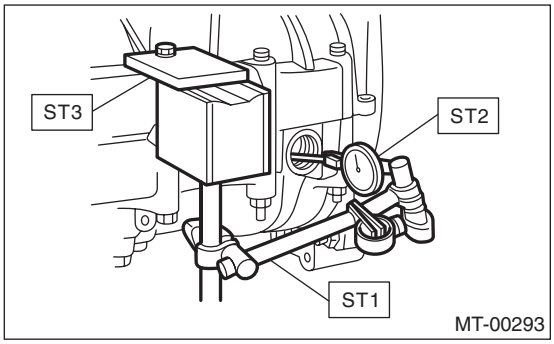
1) Set the ST1, ST2 and ST3. Insert the needle through transmission oil drain plug hole so that the needle comes in contact with the tooth surface at a right angle and check the backlash.

ST1 498247001 MAGNET BASE
ST2 498247100 DIAL GAUGE
ST3 498255400 PLATE

2) Install the SUBARU genuine axle shafts to both side, rotate in the inversion direction so that the gauge contact with the tooth surface and read the dial gauge.

Part No. 38415AA100 AXLE SHAFT

Backlash:
0.13 — 0.18 mm (0.0051 — 0.0071 in)

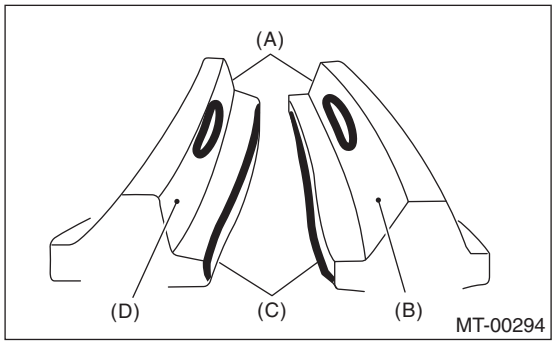


NOTE:
If the backlash is outside specified range, adjust it by turning the holder in right side case.

3. TOOTH CONTACT OF HYPOID GEAR

Check the tooth contact of hypoid gear as follows: Apply a uniform thin coat of red lead on both tooth surfaces of 3 or 4 teeth of the hypoid gear. Move the hypoid gear back and forth by turning the transmission main shaft until a definite contact pattern is developed on hypoid gear, and judge whether face contact is correct. If it is inaccurate, make adjustment. <Ref. to 5MT-108, ADJUSTMENT, Front Differential Assembly.>

- Tooth contact is correct.



(A) Toe
(B) Coast side
(C) Heel
(D) Drive side

F: ADJUSTMENT

1. BEVEL PINION GEAR BACKLASH

1) Disassemble the front differential. <Ref. to 5MT-104, REMOVAL, Front Differential Assembly.>
2) Select a differential washer from the table and install.

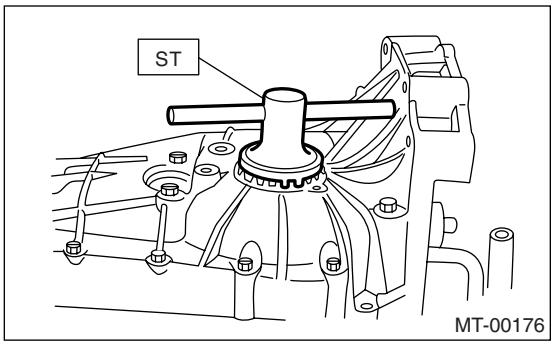
Washer	
Part No.	Thickness mm (in)
803038021	0.925 — 0.950 (0.0364 — 0.0374)
803038022	0.975 — 1.000 (0.0384 — 0.0394)
803038023	1.025 — 1.050 (0.0404 — 0.0413)

3) Adjust until the specified value is obtained.

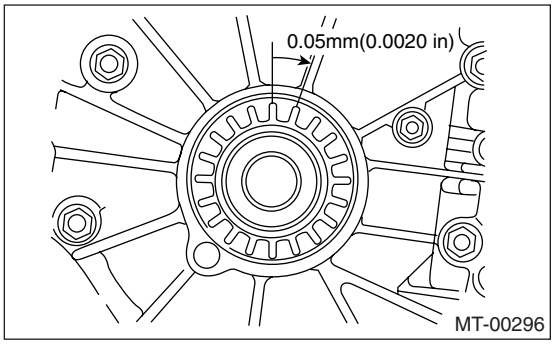
Standard backlash:
0.13 — 0.18 mm (0.0051 — 0.0071 in)

2. HYPOID GEAR BACKLASH

Adjust backlash by turning the holder in right side case.
ST 499787000 WRENCH ASSY

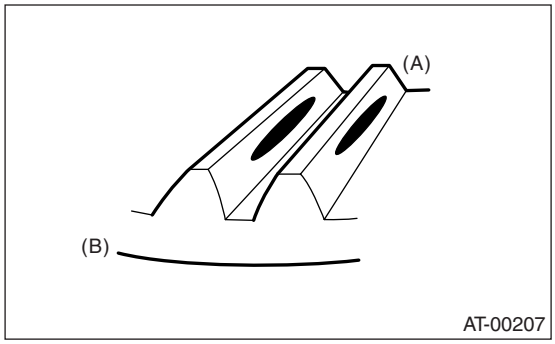


NOTE:
Each time holder rotates one tooth, backlash changes by 0.05 mm (0.0020 in).



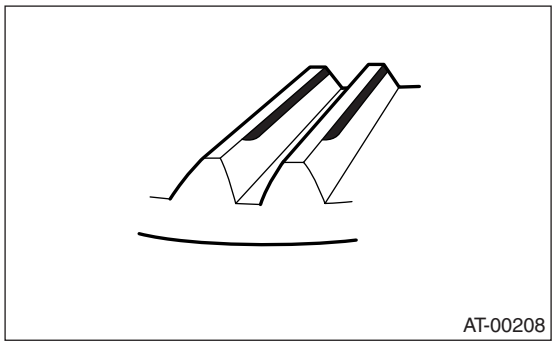
3. TOOTH CONTACT OF HYPOID GEAR

1) Adjust until the tooth contact is correct.
2) Check and adjust the tooth contact with following.
• Tooth contact
Checking item:Tooth contact pattern is slightly shifted toward to toe side under no-load rotation. [When loaded, contact pattern moves toward heel.]

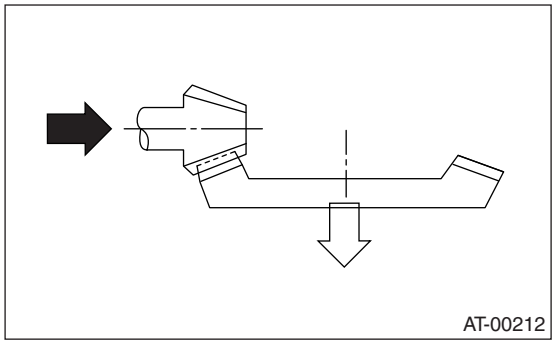


(A) Toe side
(B) Heel side

• Face contact
Checking item: Backlash is too large.
Contact pattern



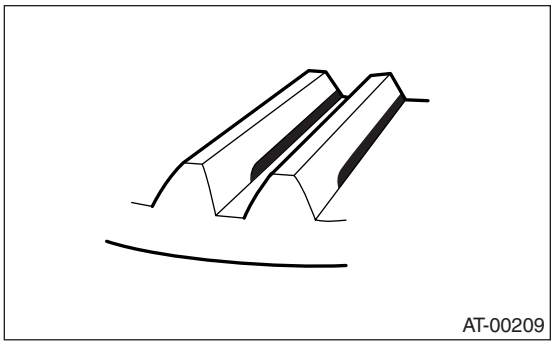
Corrective action: Reduce thickness of drive pinion shim in order to bring drive pinion close to driven gear.



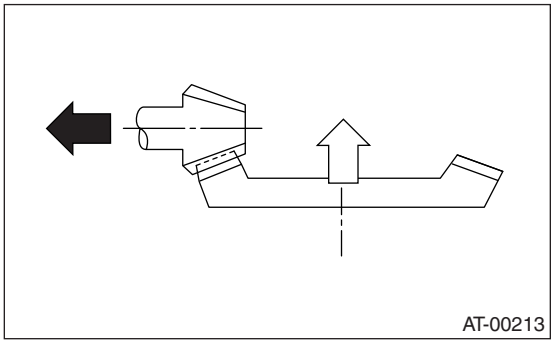
• Flank contact

Checking item: Backlash is too small.

Contact pattern



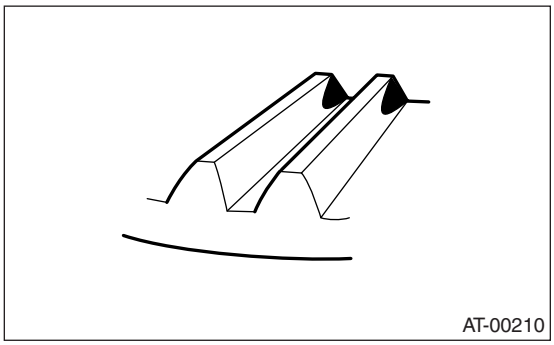
Corrective action: Increase thickness of drive pinion shim in order to move drive pinion away from driven gear.



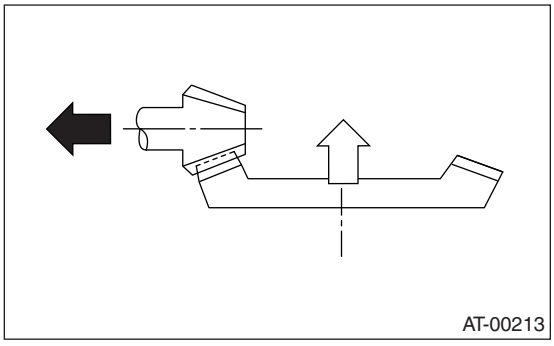
• Toe contact (Inside end contact)

Checking item: Contact areas is small.

Contact pattern



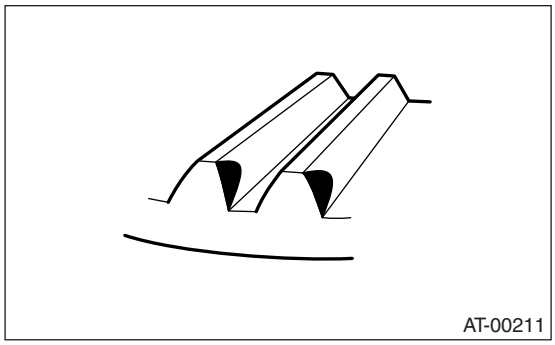
Corrective action: Increase thickness of drive pinion shim in order to bring drive pinion close to driven gear.



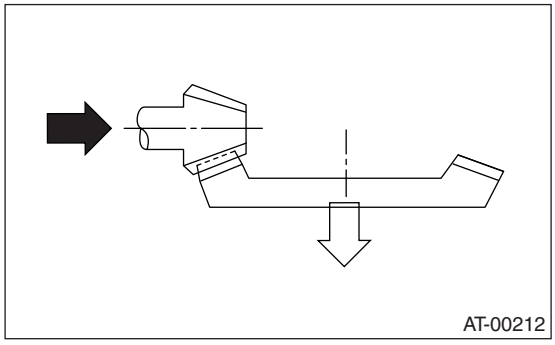
• Heel contact (Outside end contact)

Checking item: Contact areas is small.

Contact pattern



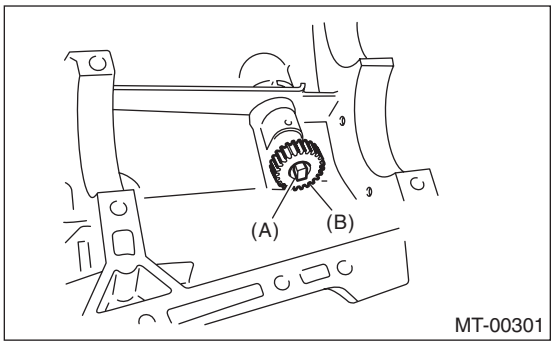
Corrective action: Reduce thickness of drive pinion shim in order to move drive pinion away from driven gear.



22.Speedometer Gear

A: REMOVAL

1) Remove the manual transmission assembly from vehicle. <Ref. to 5MT-36, REMOVAL, Manual Transmission Assembly.>
2) Remove the back-up light switch and neutral position switch. <Ref. to 5MT-47, REMOVAL, Switches and Harness.>
3) Remove the transfer case with extension case assembly. <Ref. to 5MT-52, REMOVAL, Transfer Case and Extension Case Assembly.>
4) Remove the transmission case. <Ref. to 5MT-65, REMOVAL, Transmission Case.>
5) Remove the vehicle speed sensor. <Ref. to 5MT-50, REMOVAL, Vehicle Speed Sensor.>
6) Remove the outer snap ring and pull out speedometer driven gear. Next, remove the oil seal, speedometer shaft and washer.



(A) Outer snap ring
(B) Speedometer driven gear

B: INSTALLATION

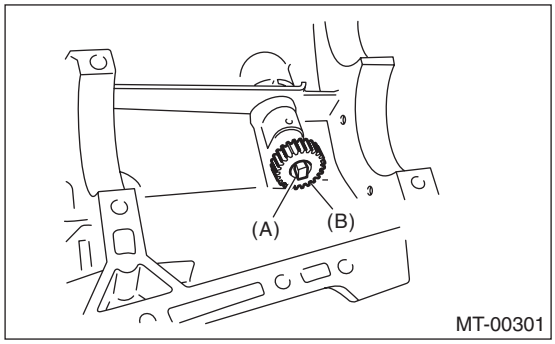
1) Install the washer and speedometer shaft, and press fit the oil seal with ST.

NOTE:
Use a new oil seal, if it has been removed.

ST 899824100 or 499827000 PRESS

2) Install the vehicle speed sensor. <Ref. to 5MT-50, INSTALLATION, Vehicle Speed Sensor.>
3) Install the speedometer driven gear and snap ring.

NOTE:
Use a new snap ring, if it has been removed.



(A) Outer snap ring
(B) Speedometer driven gear

4) Install the transmission case. <Ref. to 5MT-67, INSTALLATION, Transmission Case.>
5) Install the transfer case with extension case assembly. <Ref. to 5MT-52, INSTALLATION, Transfer Case and Extension Case Assembly.>
6) Install the back-up light switch and neutral position switch. <Ref. to 5MT-48, INSTALLATION, Switches and Harness.>
7) Install the manual transmission assembly to vehicle. <Ref. to 5MT-39, INSTALLATION, Manual Transmission Assembly.>

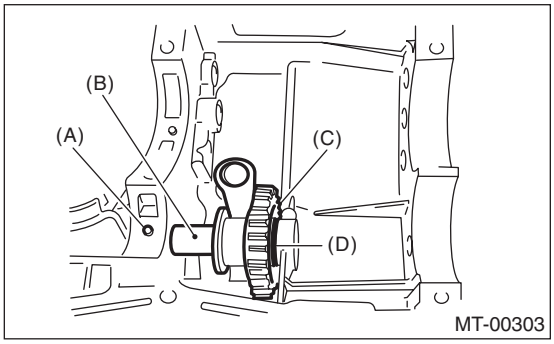
C: INSPECTION

Check the speedometer gear, oil seal and speedometer shaft for damage. Replace if damaged.

23.Reverse Idler Gear

A: REMOVAL

1) Remove the manual transmission assembly from vehicle. <Ref. to 5MT-36, REMOVAL, Manual Transmission Assembly.>
2) Remove the back-up light switch and neutral position switch. <Ref. to 5MT-47, REMOVAL, Switches and Harness.>
3) Remove the transfer case with extension case assembly. <Ref. to 5MT-52, REMOVAL, Transfer Case and Extension Case Assembly.>
4) Remove the transmission case. <Ref. to 5MT-65, REMOVAL, Transmission Case.>
5) Remove the drive pinion shaft assembly. <Ref. to 5MT-92, REMOVAL, Drive Pinion Shaft Assembly.>
6) Remove the main shaft assembly.
Single-range model<Ref. to 5MT-72, REMOVAL, Main Shaft Assembly for Single-Range.>
Dual-range model<Ref. to 5MT-82, REMOVAL, Main Shaft Assembly for Dual-Range.>
7) Remove the differential assembly. <Ref. to 5MT-104, REMOVAL, Front Differential Assembly.>
8) Remove the shifter forks and rods. <Ref. to 5MT-114, REMOVAL, Shifter Fork and Rod.>
9) Pull out the straight pin, and remove the idler gear shaft, reverse idler gear and washer.



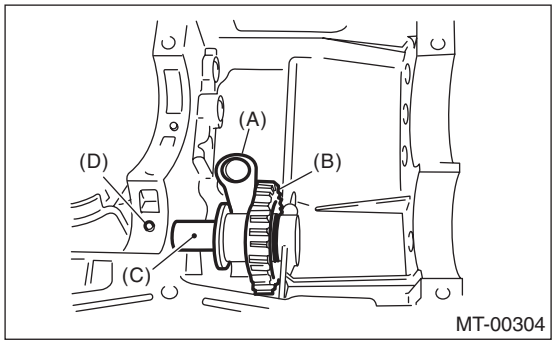
(A) Straight pin
(B) Idler gear shaft
(C) Idler gear
(D) Washer

10) Remove the reverse shifter lever.

B: INSTALLATION

1) Install the reverse shifter lever, reverse idler gear and reverse idler gear shaft, and secure with straight pin.

NOTE:
Be sure to install the reverse idler shaft from rear side.



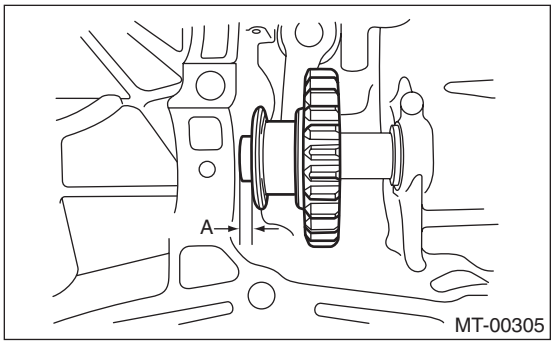
(A) Reverse shifter lever
(B) Reverse idler gear
(C) Reverse idler gear shaft
(D) Straight pin

2) Inspect and adjust the clearance between reverse idler gear and transmission case wall. <Ref. to 5MT-112, INSTALLATION, Reverse Idler Gear.> and <Ref. to 5MT-113, ADJUSTMENT, Reverse Idler Gear.>
3) Install the shifter forks and rods. <Ref. to 5MT-114, INSTALLATION, Shifter Fork and Rod.>
4) Install the differential assembly. <Ref. to 5MT-104, INSTALLATION, Front Differential Assembly.>
5) Install the main shaft assembly.
Single-range model<Ref. to 5MT-72, INSTALLATION, Main Shaft Assembly for Single-Range.>
Dual-range model<Ref. to 5MT-82, INSTALLATION, Main Shaft Assembly for Dual-Range.>
6) Install the drive pinion shaft assembly. <Ref. to 5MT-92, INSTALLATION, Drive Pinion Shaft Assembly.>
7) Install the transmission case. <Ref. to 5MT-67, INSTALLATION, Transmission Case.>
8) Install the transfer case with extension case assembly. <Ref. to 5MT-52, INSTALLATION, Transfer Case and Extension Case Assembly.>
9) Install the back-up light switch and neutral position switch. <Ref. to 5MT-48, INSTALLATION, Switches and Harness.>
10) Install the manual transmission assembly to vehicle. <Ref. to 5MT-39, INSTALLATION, Manual Transmission Assembly.>

C: INSPECTION

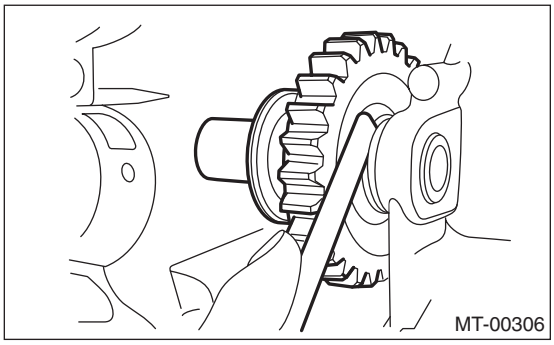
1) Move the reverse shifter rod toward the reverse side. Inspect the clearance between reverse idler gear and transmission case wall.
If out of specification, select the appropriate reverse shifter lever and adjust.

Clearance A:
6.0 — 7.5 mm (0.236 — 0.295 in)



2) After installing a suitable reverse shifter lever, shift into neutral. Inspect the clearance between reverse idler gear and transmission case wall.
If out of specification, select the appropriate washer and adjust.

Clearance:
0 — 0.5 mm (0 — 0.020 in)

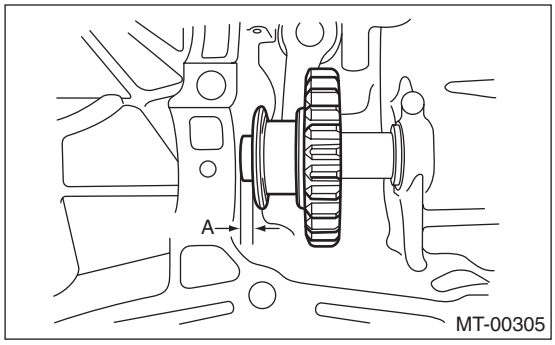


3) Check the reverse idler gear and shaft for damage. Replace if damaged.

D: ADJUSTMENT

1) Select the appropriate reverse shifter lever from the table below, and adjust until the gap between the reverse idler gear and transmission case wall is within specification.

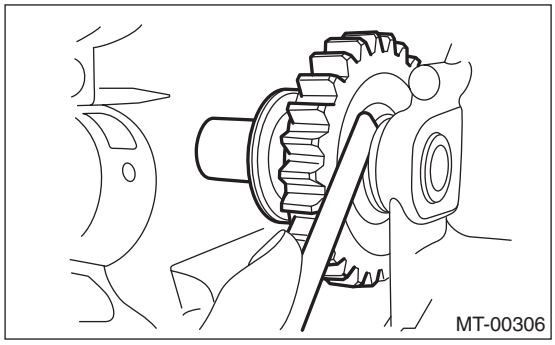
Clearance A:
6.0 — 7.5 mm (0.236 — 0.295 in)



Reverse shifter lever		
Part No.	Mark	Remarks
32820AA070	7	Further from case wall
32820AA080	8	Standard
32820AA090	9	Closer to case wall

2) Select the appropriate washer from the table below, and adjust until the gap between the reverse idler gear and transmission case wall is within specification.

Clearance:
0 — 0.5 mm (0 — 0.020 in)

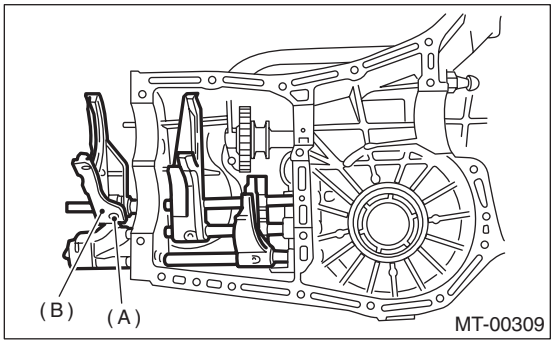


Washer	
Part No.	Thickness mm (in)
803020151	0.4 (0.016)
803020152	1.1 (0.043)
803020153	1.5 (0.059)
803020154	1.9 (0.075)
803020155	2.3 (0.091)

24.Shifter Fork and Rod

A: REMOVAL

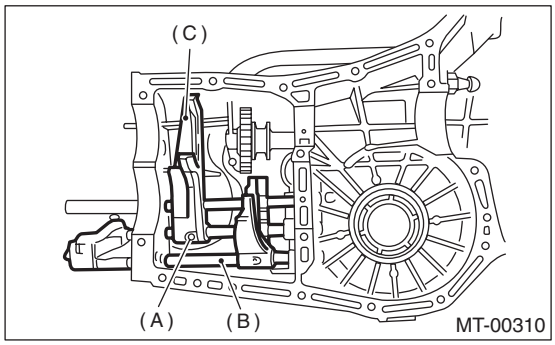
1) Remove the manual transmission assembly from vehicle. <Ref. to 5MT-36, REMOVAL, Manual Transmission Assembly.>
2) Remove the back-up light switch and neutral position switch. <Ref. to 5MT-47, REMOVAL, Switches and Harness.>
3) Remove the transfer case with extension case assembly. <Ref. to 5MT-52, REMOVAL, Transfer Case and Extension Case Assembly.>
4) Remove the transmission case. <Ref. to 5MT-65, REMOVAL, Transmission Case.>
5) Remove the drive pinion shaft assembly. <Ref. to 5MT-92, REMOVAL, Drive Pinion Shaft Assembly.>
6) Remove the main shaft assembly.
Single-range model<Ref. to 5MT-72, REMOVAL, Main Shaft Assembly for Single-Range.>
Dual-range model<Ref. to 5MT-82, REMOVAL, Main Shaft Assembly for Dual-Range.>
7) Remove the differential assembly. <Ref. to 5MT-104, REMOVAL, Front Differential Assembly.>
8) Drive out the straight pin with ST, and 5th shifter fork.
ST 398791700 REMOVER



(A) Straight pin
(B) 5th shifter fork

9) Remove the plugs, springs and checking balls.
10) Drive out the straight pin, and pull out 3-4 fork rod and shifter fork.

NOTE:
When removing the rod, keep other rods in neutral. Also, when pulling out the straight pin, remove it toward the inside of case so that it does not hit against the case.



(A) Straight pin
(B) 3-4 fork rod
(C) Shifter fork

11) Drive out the straight pin, and pull out 1-2 fork rod and shifter fork.
12) Remove the outer snap ring, and pull out the reverse shifter rod arm from reverse fork rod. Then take out the ball, spring and interlock plunger from rod.
And then remove the rod.

NOTE:
When pulling out the reverse shifter rod arm, be careful not to let the ball pop out of arm.

13) Remove the reverse shifter lever.

B: INSTALLATION

1) Install the reverse arm fork spring, ball and interlock plunger to reverse fork rod arm. Insert the reverse fork rod into hole in reverse fork rod arm, and hold it with outer snap ring using ST.

NOTE:
Apply grease to plunger to prevent it from falling.
ST 399411700 ACCENT BALL INSTALLER
2) Position the ball, spring and new gasket in reverse shifter rod hole, on left side transmission case, and tighten the checking ball plug.
3) Install the 1-2 fork rod into 1-2 shifter fork via the hole on the rear of transmission case.
4) Align the holes in rod and fork, and new drive straight pin into these holes using ST.

NOTE:
- Set other rods to neutral.
- Make sure the interlock plunger is on the 3-4 fork rod side.

ST 398791700 REMOVER

5) Install the interlock plunger onto 3-4 fork rod.

NOTE:
Apply a coat of grease to plunger to prevent it from falling.

6) Install the 3-4 fork rod into 3-4 shifter fork via the hole on the rear of transmission case.

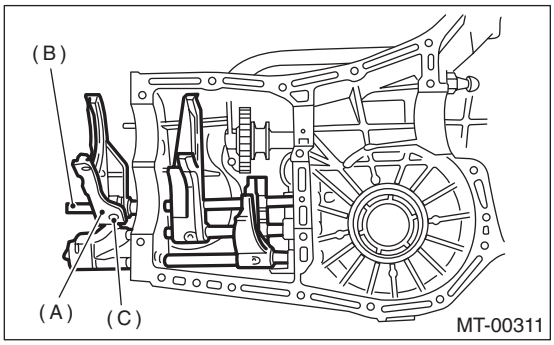
7) Align the holes in rod and fork, and new drive straight pin into these holes.

NOTE:
- Set the reverse fork rod to neutral.
- Make sure the interlock plunger (installing before) is on the reverse fork rod side.

ST 398791700 REMOVER

8) Install the 5th shifter fork onto the rear of reverse fork rod. Align holes in the two parts and new drive straight pin into place.

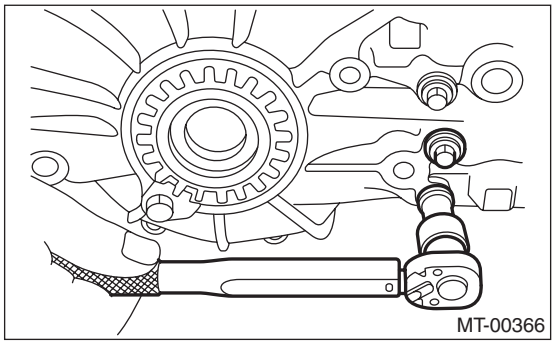
ST 398791700 REMOVER



(A) 5th shifter fork
(B) Reverse fork rod
(C) Straight pin

9) Position the balls, checking ball springs and new gaskets into 3-4 and 1-2 rod holes, and install plugs.

Tightening torque:
20 N·m (2.0 kgf-m, 14.5 ft-lb)



10) Install the differential assembly. <Ref. to 5MT-104, INSTALLATION, Front Differential Assembly.>

11) Install the main shaft assembly.
Single-range model <Ref. to 5MT-72, INSTALLATION, Main Shaft Assembly for Single-Range.>
Dual-range model <Ref. to 5MT-82, INSTALLATION, Main Shaft Assembly for Dual-Range.>

12) Install the drive pinion shaft assembly. <Ref. to 5MT-92, INSTALLATION, Drive Pinion Shaft Assembly.>

13) Install the transmission case. <Ref. to 5MT-67, INSTALLATION, Transmission Case.>

14) Install the transfer case with extension case assembly. <Ref. to 5MT-52, INSTALLATION, Transfer Case and Extension Case Assembly.>

15) Install the back-up light switch and neutral position switch. <Ref. to 5MT-48, INSTALLATION, Switches and Harness.>

16) Install the manual transmission assembly to vehicle. <Ref. to 5MT-39, INSTALLATION, Manual Transmission Assembly.>

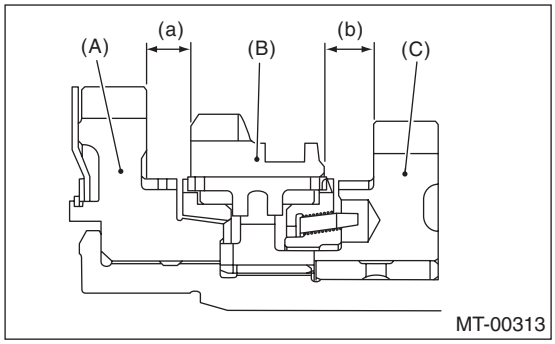
C: INSPECTION

1) Check the shift shaft and shift rod for damage. Replace if damaged.

2) Gearshift mechanism:
Repair or replace the gearshift mechanism if excessively worn, bent, or defective in any way.

3) Inspect the clearance between 1st, 2nd driven gear and reverse driven gear. If any clearance is not within specifications, replace the shifter fork as required.

Clearance (a) and (b):
9.5 mm (0.374 in)

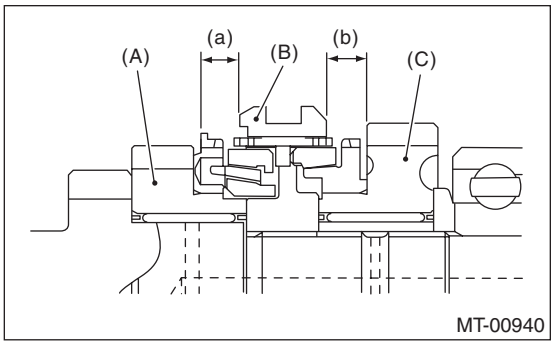


(A) 1st driven gear
(B) Reverse driven gear
(C) 2nd driven gear

1st-2nd shifter fork		
Part No.	Mark	Remarks
32804AA060	1	Approach to 1st gear by 0.2 mm (0.008 in).
32804AA070	No mark	Standard
32804AA080	3	Become distant from 2nd gear by 0.2 mm (0.008 in).

4) Inspect the clearance between 3rd, 4th drive gear and coupling sleeve. If any clearance is not within specifications, replace the shifter fork as required.

Clearance (a) and (b):
9.3 mm (0.366 in)

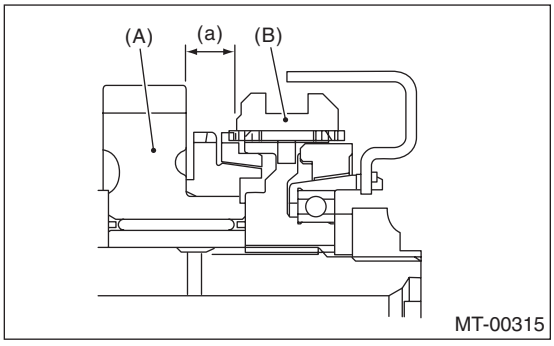


(A) 3rd drive gear
(B) Coupling sleeve
(C) 4th drive gear

3rd-4th shifter fork		
Part No.	Mark	Remarks
32810AA061	1	Approach to 4th gear by 0.2 mm (0.008 in).
32810AA071	No mark	Standard
32810AA101	3	Become distant from 3rd gear by 0.2 mm (0.008 in).

5) Inspect the clearance between 5th drive gear and coupling sleeve. If any clearance is not within specifications, replace the shifter fork as required.

Clearance (a):
9.3 mm (0.366 in)



(A) 5th drive gear
(B) Coupling sleeve

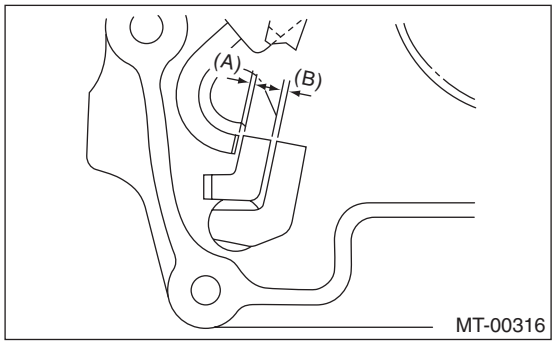
5th shifter fork (Non-turbo)		
Part No.	Mark	Remarks
32812AA201	7	Approach to 5th gear by 0.2 mm (0.008 in).
32812AA211	No mark	Standard
32812AA221	9	Become distant from 5th gear by 0.2 mm (0.008 in).

5th shifter fork (Turbo)		
Part No.	Mark	Remarks
32812AA231	7	Approach to 5th gear by 0.2 mm (0.008 in).
32812AA241	No mark	Standard
32812AA251	9	Become distant from 5th gear by 0.2 mm (0.008 in).

6) Inspect the rod end clearances (A) and (B). If any clearance is not within specifications, replace the rod or fork as required.

Clearance (A):
3rd-4th to 5th:
0.5 — 1.3 mm (0.020 — 0.051 in)

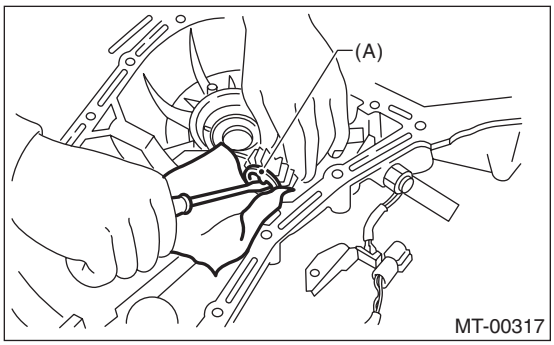
Clearance (B):
1st-2nd to 3rd-4th:
0.4 — 1.4 mm (0.016 — 0.055 in)



25.Counter Gear

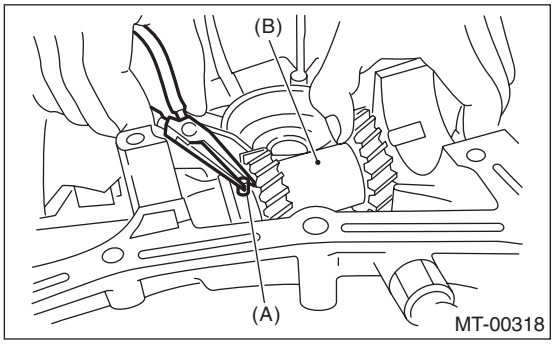
A: REMOVAL

1) Remove the manual transmission assembly from vehicle. <Ref. to 5MT-36, REMOVAL, Manual Transmission Assembly.>
2) Remove the transfer case with extension case assembly. <Ref. to 5MT-52, REMOVAL, Transfer Case and Extension Case Assembly.>
3) Remove the transmission case. <Ref. to 5MT-65, REMOVAL, Transmission Case.>
4) Move the counter gear shaft until it touches transmission case, and remove the snap ring with a suitable tool.



(A) Snap ring

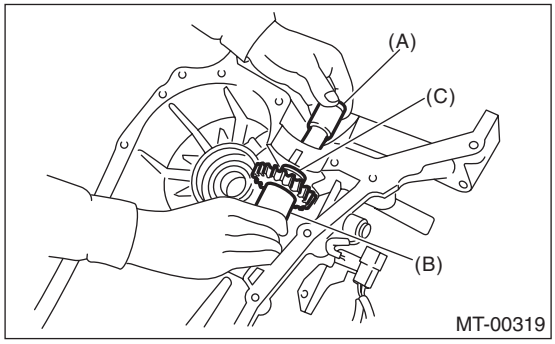
5) Slide the washer at rear of high-low counter shaft, and remove the straight pin from counter shaft.



(A) Straight pin
(B) Counter gear

6) Remove the counter shaft from transmission case, taking care not to drop the counter gear and two washers.

NOTE:
- Be careful not to damage the O-ring.
- Be careful not to drop the straight pin on front side.
- Be careful not to drop the two needle bearings and collar contained in counter gear.



(A) Counter shaft
(B) Counter gear
(C) Washers

B: INSTALLATION

1) Install the O-ring and straight pin onto counter gear shaft.
2) Install the following parts in main case (Right-side), and push the shaft perfectly into case.
- Counter gear shaft
- Two counter gear washers
- Two needle bearings
- Counter gear collar
- Counter gear
- Straight pin
- Snap ring

3) Install the transmission case. <Ref. to 5MT-67, INSTALLATION, Transmission Case.>
4) Install the transfer case with extension case assembly. <Ref. to 5MT-52, INSTALLATION, Transfer Case and Extension Case Assembly.>
5) Install the manual transmission assembly on vehicle. <Ref. to 5MT-39, INSTALLATION, Manual Transmission Assembly.>

NOTE:
- Make sure that the cut-out end surface of counter gear shaft does not protrude above the end surface of the case.
- Position the cut-out portion of counter gear shaft.

C: INSPECTION

1) After installing the snap ring, measure the clearance between snap ring and counter washer.

Clearance:
0.05 — 0.35 mm (0.0020 — 0.0138 in)

2) If the clearance is out of measured value, select a snap ring and install to put clearance within measured value. <Ref. to 5MT-118, ADJUSTMENT, Counter Gear.>

D: ADJUSTMENT

Selection of snap ring:
If the measurement is not within specification, select suitable snap ring.

Snap ring	
Part No.	Thickness mm (in)
031319000	1.50 (0.0591)
805019010	1.72 (0.0677)

26.General Diagnostic Table

A: INSPECTION

1. MANUAL TRANSMISSION

Symptom	Possible cause	Remedy
1. Gears are difficult to intermesh. NOTE: The cause for difficulty in shifting gears can be classified into two kinds: one is malfunction of the gear shift system and the other is malfunction of the transmission. However, if the operation is heavy and engagement of the gears is difficult, defective clutch disengagement may also be responsible. Check whether the clutch is correctly functioning, before checking the gear shift system and transmission.	(a) Worn, damaged or burred chamfer of internal spline of sleeve and reverse driven gear	Replace.
	(b) Worn, damaged or burred chamfer of spline of gears	Replace.
	(c) Worn or scratched bushings	Replace.
	(d) Incorrect contact between synchronizer ring and gear cone or wear	Correct or replace.
2. Gear slips out. • Gear slips out when coasting on rough road. • Gear slips out during acceleration.	(a) Defective pitching stopper adjustment	Adjust.
	(b) Loose engine mounting bolts	Tighten or replace.
	(c) Worn fork shifter, broken shifter fork rail spring	Replace.
	(d) Worn or damaged ball bearing	Replace.
	(e) Excessive clearance between splines of synchronizer hub and synchronizer sleeve	Replace.
	(f) Worn tooth step of synchronizer hub (responsible for slip-out of 3rd gear)	Replace.
	(g) Worn 1st driven gear and driven shaft	Replace.
	(h) Worn 2nd driven gear and bushing	Replace.
	(i) Worn 3rd drive gear and needle bearing	Replace.
	(j) Worn 4th drive gear and needle bearing	Replace.
	(k) Worn reverse idler gear and bushing	Replace.
3. Unusual noise comes from transmission. NOTE: If an unusual noise is heard when the vehicle is parked with its engine idling and if the noise ceases when the clutch is disengaged, it may be considered that the noise comes from the transmission.	(a) Insufficient or improper lubrication	Lubricate or replace with specified oil.
	(b) Worn or damaged gears and bearings NOTE: If the trouble is only wear of the tooth surfaces, merely a high roaring noise will occur at high speeds, but if any part is broken, rhythmical knocking sound will be heard even at low speeds.	Replace.

2. DIFFERENTIAL

Symptom	Possible cause	Remedy
1. Broken differential (case, gear, bearing, etc.) NOTE: Abnormal noise will develop and finally it will become impossible to continue to run due to broken pieces obstructing the gear revolution.	(a) Insufficient or improper oil	Disassemble the differential and replace broken components and at the same time check other components for any trouble, and replace if necessary.
	(b) Use of vehicle under severe conditions such as excessive load and improper use of clutch	Readjust the bearing preload and backlash and face contact of gears.
	(c) Improper adjustment of taper roller bearing	Adjust.
	(d) Improper adjustment of drive pinion and hypoid driven gear	Adjust.
	(e) Excessive backlash due to worn differential side gear, washer or differential pinion vehicle under severe operating conditions.	Add recommended oil to specified level. Do not use the vehicle under severe operating conditions.
	(f) Loose hypoid driven gear clamping bolts	Tighten.
2. Differential and hypoid gear noises Troubles of the differential and hypoid gear always appear as noise problems. Therefore noise is the first indication of the trouble. However noises from the engine, muffler, tire, exhaust gas, bearing, body, etc. are easily mistaken for the differential noise. Pay special attention to the hypoid gear noise because it is easily confused with other gear noises. There are the following four kinds of noises. • Gear noise when driving: If noise increases as vehicle speed increases it may be due to insufficient gear oil, incorrect gear engagement, damaged gears, etc. • Gear noise when coasting: Damaged gears due to maladjusted bearings and incorrect shim adjustment • Bearing noise when driving or when coasting: Cracked, broken or damaged bearings • Noise which mainly occurs when turning: Unusual noise from differential side gear, differential pinion, differential pinion shaft, etc.	(a) Insufficient oil	Lubricate.
	(b) Improper adjustment of hypoid driven gear and drive pinion	Check tooth contact.
	(c) Worn teeth of hypoid driven gear and drive pinion	Replace as a set. Readjust the bearing preload.
	(d) Loose roller bearing	Readjust the hypoid driven gear to drive pinion backlash and check tooth contact.
	(e) Distorted hypoid driven gear or differential case	Replace.
	(f) Worn washer and differential pinion shaft	Replace.

MANUAL TRANSMISSION AND DIFFERENTIAL

6MT

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1. General Description

A: SPECIFICATION

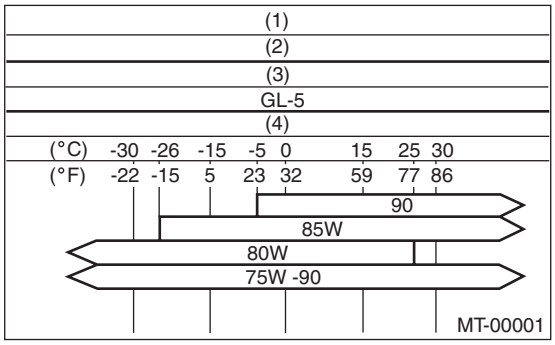
1. MANUAL TRANSMISSION AND FRONT DIFFERENTIAL

Item			Without Driver's Control Center Differential	With Driver's Control Center Differential
Type			6-forward speeds and 1-reverse	
Transmission gear ratio		1st	3.636	
		2nd	2.375	
		3rd	1.761	
		4th	1.346	
		5th	0.971 [1.062]	
		6th	0.756 [0.842]	
		Reverse	3.545	
Front reduction gear	Final	Type of gear	Hypoid	
		Gear ratio	3.900	
Rear reduction gear	Transfer	Type of gear	Helical	
		Gear ratio	1.100 [1.000]	
	Final	Type of gear	Hypoid	
		Gear ratio	3.545 [3.900]	
Front differential	Type		SURETRAC®	Herical
Center differential	Type and number of gear		Straight bevel gear (Bevel pinion: 2, Bevel gear: 2 and viscous coupling)	Planetary gear (Internal gear 1, pinion gear 6, sun gear 1 and electromagnetic pressure variable control multiplate clutch)
Transmission gear oil			GL-5	
Transmission gear oil capacity			4.1 ℓ (4.3 US qt, 3.6 Imp qt)	

[ ]: Australia model

2. TRANSMISSION GEAR OIL

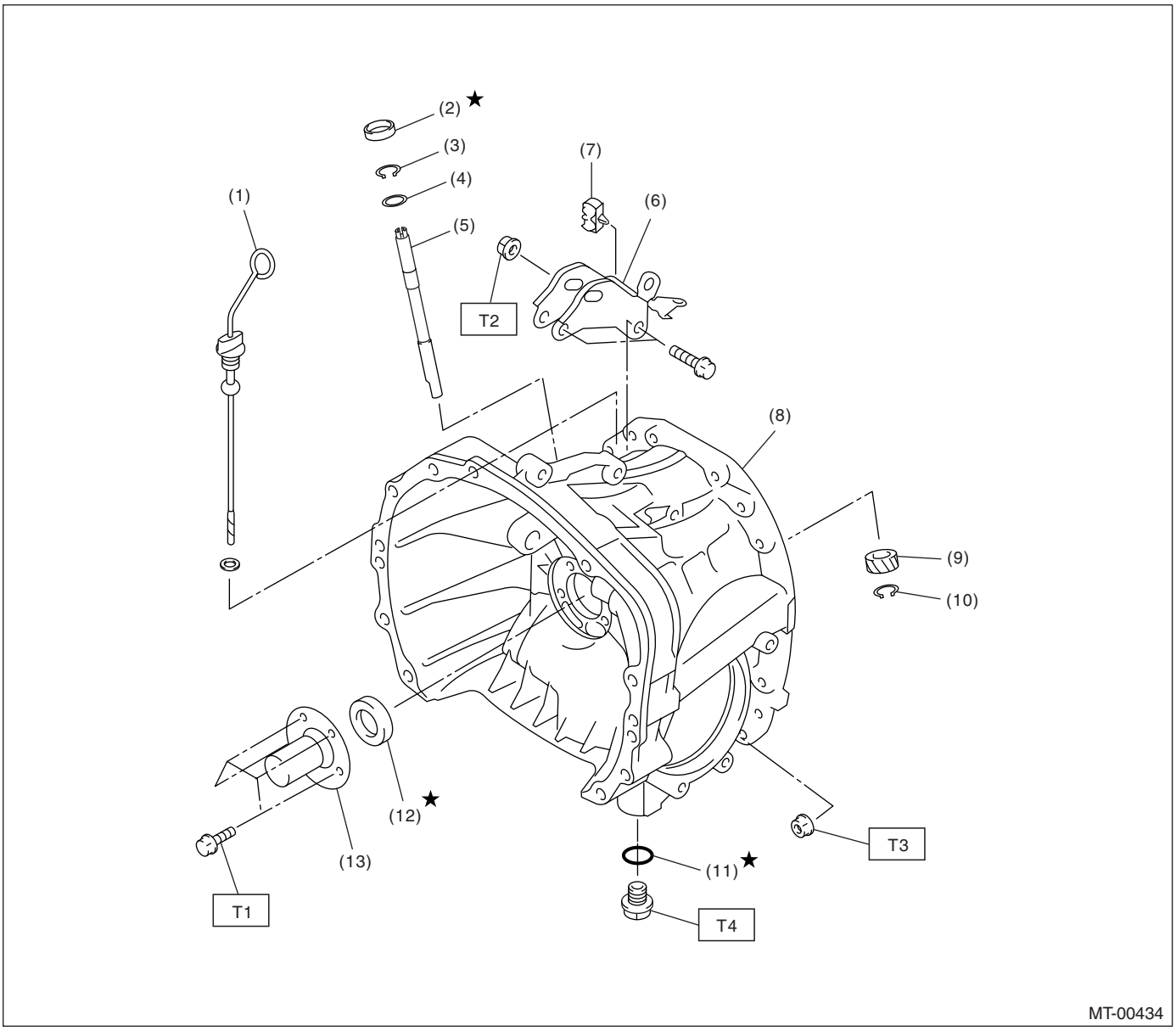
Recommended oil



(1) Item
(2) Transmission gear oil
(3) API standard
(4) SAE viscosity No. and applicable temperature

B: COMPONENT

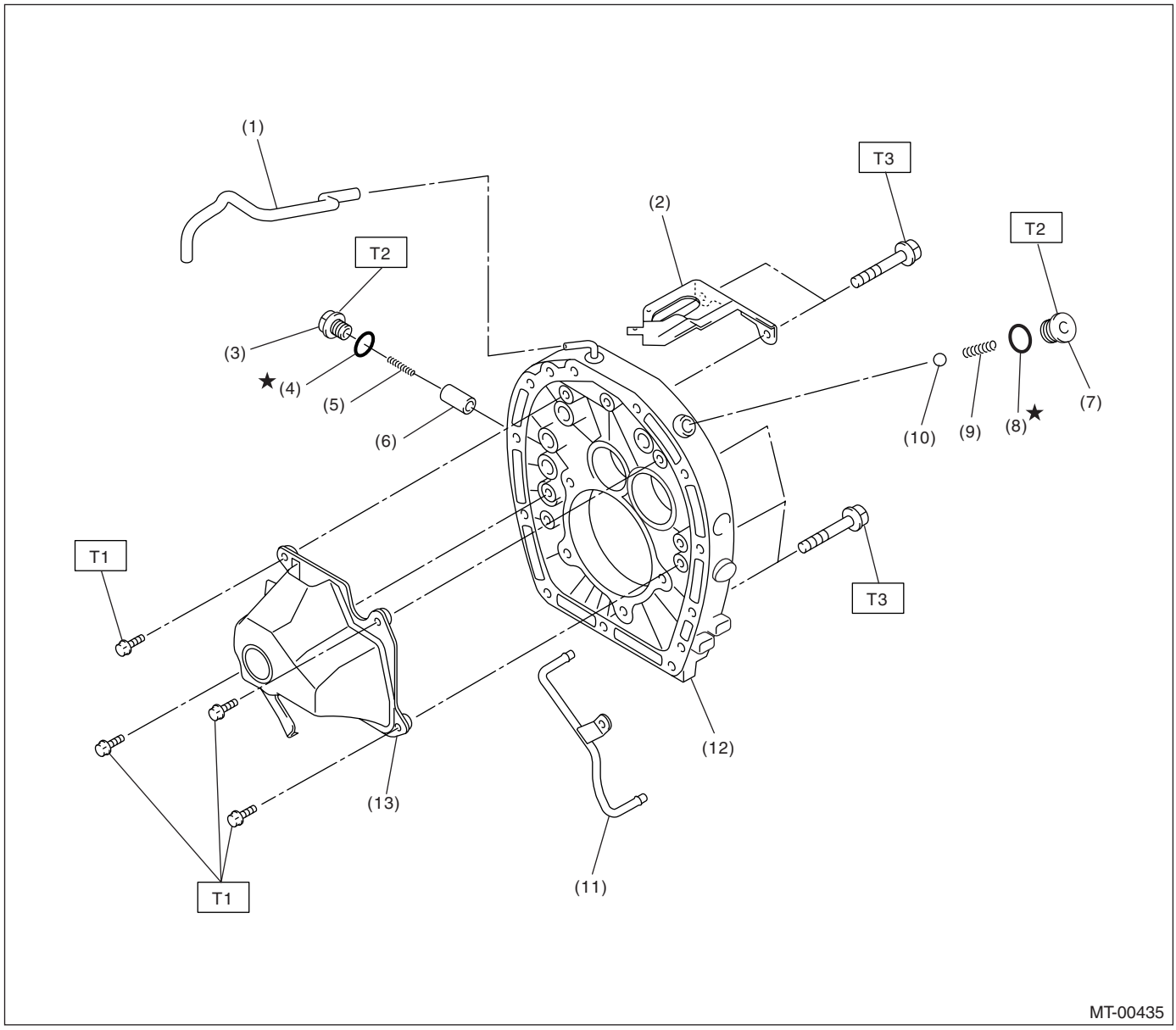
1. CLUTCH HOUSING



(1)	Oil level gauge	(8)	Clutch housing
(2)	Oil seal	(9)	Speedometer driven gear
(3)	Snap ring	(10)	Snap ring
(4)	Washer	(11)	Gasket
(5)	Speedometer driven gear shaft	(12)	Oil seal
(6)	Pitching stopper bracket	(13)	Clutch release bearing guide
(7)	Clip		

Tightening torque: N·m (kgf-m, ft-lb)
T1: 6.4 (0.65, 4.7)
T2: 41 (4.2, 30.2)
T3: 50 (5.1, 36.9)
T4: 70 (7.1, 51.6)

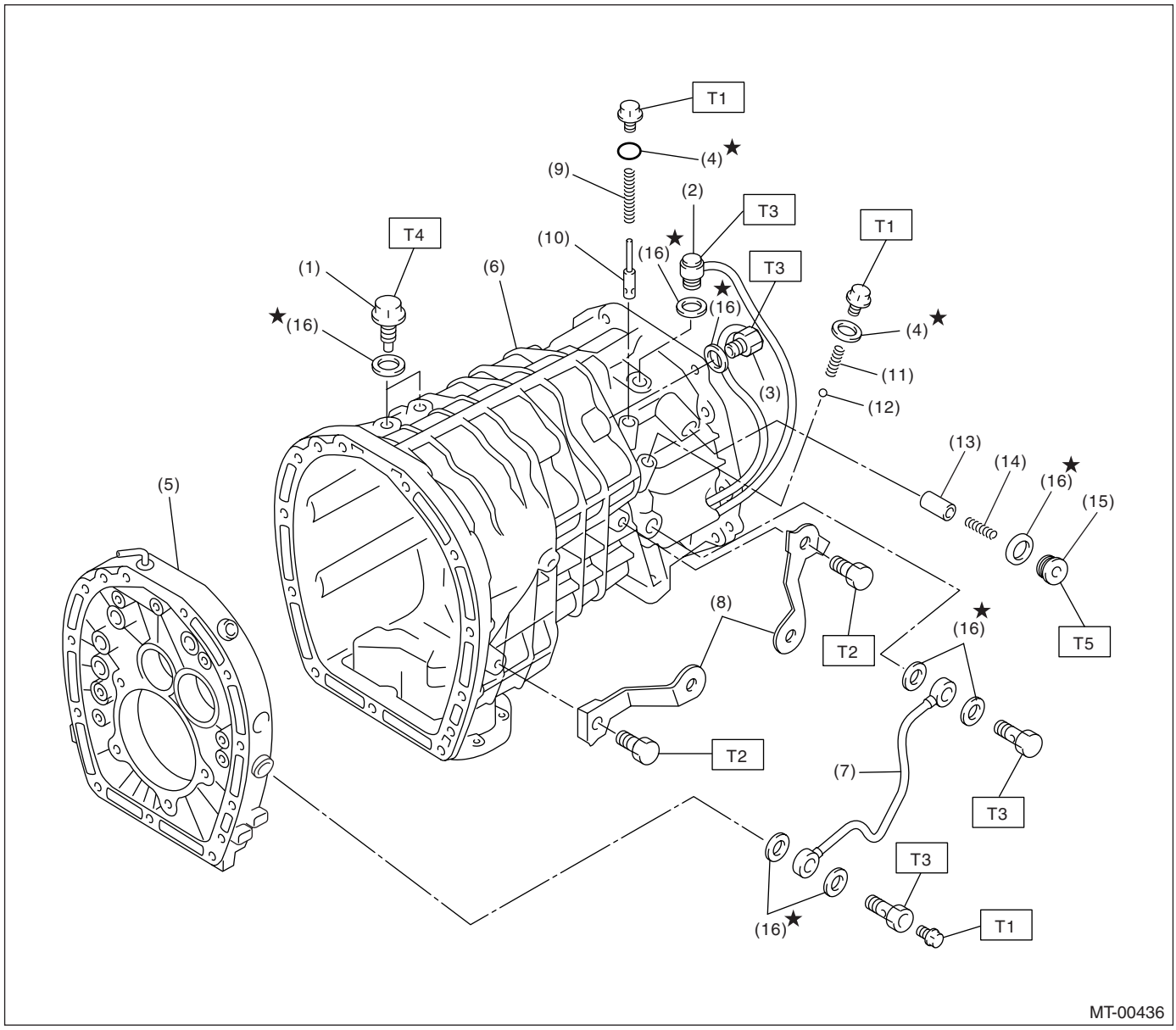
2. ADAPTER PLATE



(1) Breather hose
(2) Transmission harness stay
(3) Plug
(4) Gasket
(5) Spring
(6) Plunger
(7) Plug
(8) Gasket
(9) Spring
(10) Ball
(11) Lubrication pipe
(12) Adapter plate
(13) Oil chamber

Tightening torque: N·m (kgf-m, ft-lb)
T1: 6.4 (0.65, 4.7)
T2: 37 (3.8, 27.3)
T3: 50 (5.1, 36.9)

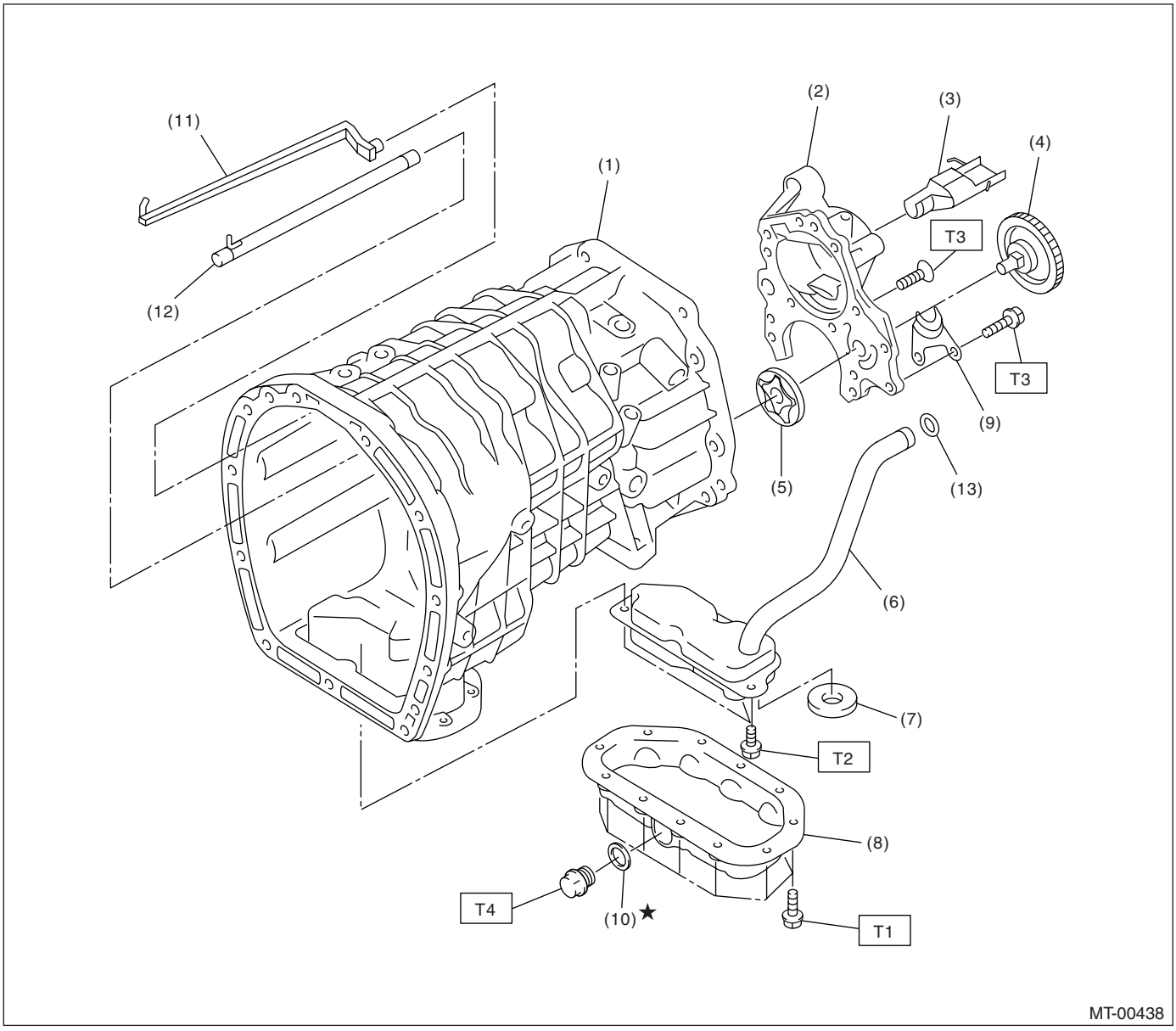
3. TRANSMISSION CASE



(1)	Pilot bolt	(9)	Return spring
(2)	Neutral switch	(10)	Pressure relief valve
(3)	Back-up light switch	(11)	Return spring
(4)	O-ring	(12)	Ball
(5)	Adapter plate	(13)	Plunger
(6)	Transmission case	(14)	Spring
(7)	Oil pipe	(15)	Plug
(8)	Harness bracket	(16)	Gasket

Tightening torque: N·m (kgf-m, ft-lb)
T1: 13 (1.3, 9.6)
T2: 16 (1.6, 11.8)
T3: 32 (3.3, 23.6)
T4: 34 (3.5, 25.1)
T5: 41 (4.2, 30.2)

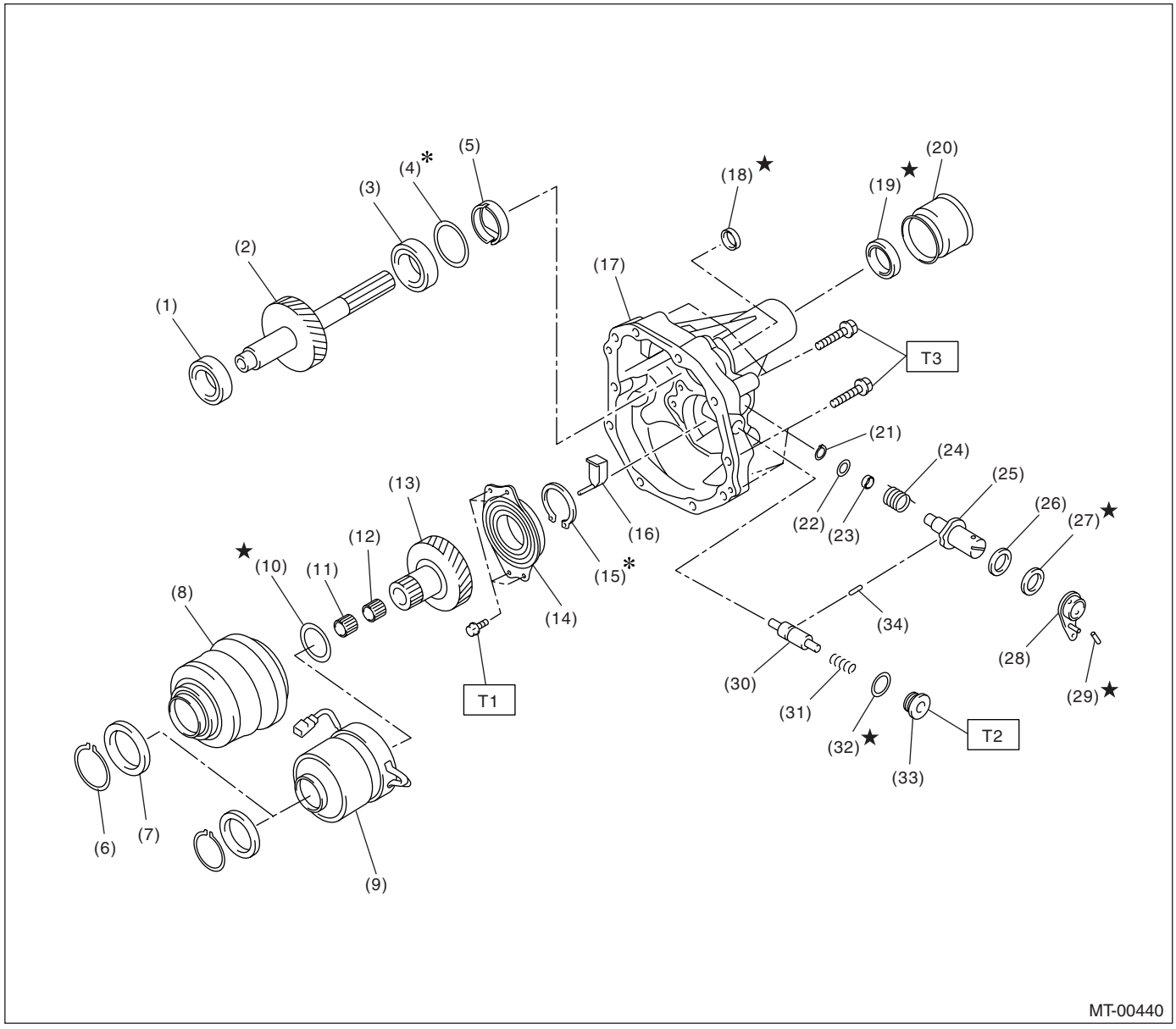
4. OIL PAN AND OIL PUMP



(1)	Transmission case	(8)	Oil pan
(2)	Oil pump cover	(9)	Plate
(3)	Oil guide	(10)	Gasket
(4)	Oil pump driven gear ASSY	(11)	Oil guide
(5)	Oil pump rotor ASSY	(12)	Oil pipe
(6)	Strainer ASSY	(13)	O-ring
(7)	Magnet		

Tightening torque: N·m (kgf-m, ft-lb)
T1: 6.4 (0.65, 4.7)
T2: 10 (1.0, 7.4)
T3: 25 (2.5, 18.1)
T4: 44 (4.5, 32.5)

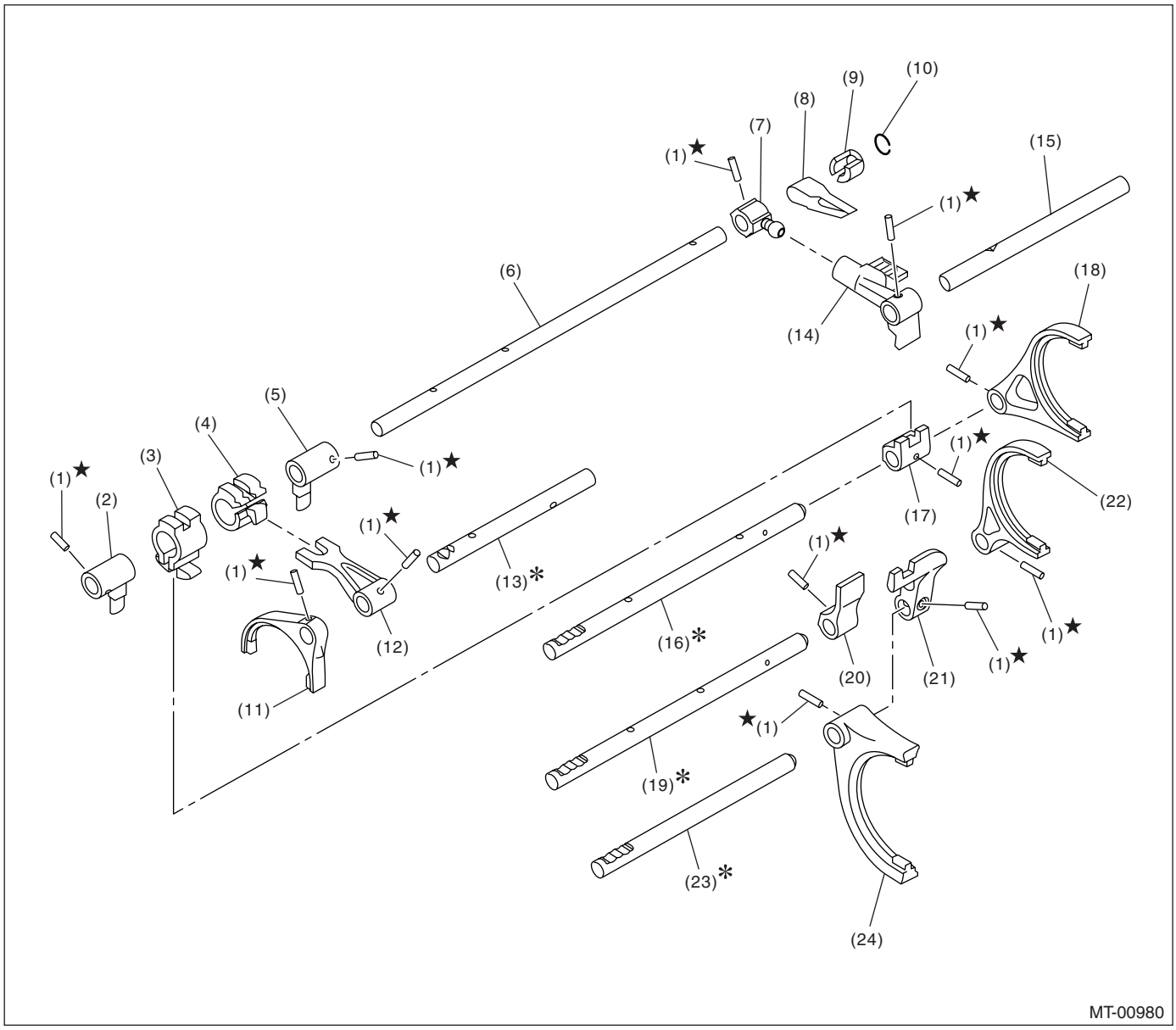
5. EXTENSION CASE AND CENTER DIFFERENTIAL



(1) Taper roller bearing
(2) Transfer driven gear
(3) Taper roller bearing
(4) Shim
(5) Oil plate
(6) Snap ring
(7) Oil pump drive gear
(8) Center differential
(9) Center differential (Driver's control center differential model)
(10) Shim
(11) Needle bearing
(12) Needle bearing
(13) Transfer drive gear
(14) Ball bearing (with flange)
(15) Snap ring
(16) Extension guide
(17) Extension case
(18) Oil seal
(19) Oil seal
(20) Dust cover
(21) Snap ring
(22) Washer
(23) Bush
(24) Spring
(25) Reverse check shaft
(26) Ball bearing
(27) Oil seal
(28) Reverse check lever COMPL
(29) Straight pin
(30) Reverse check plug
(31) Spring
(32) Gasket
(33) Plug
(34) Plunger

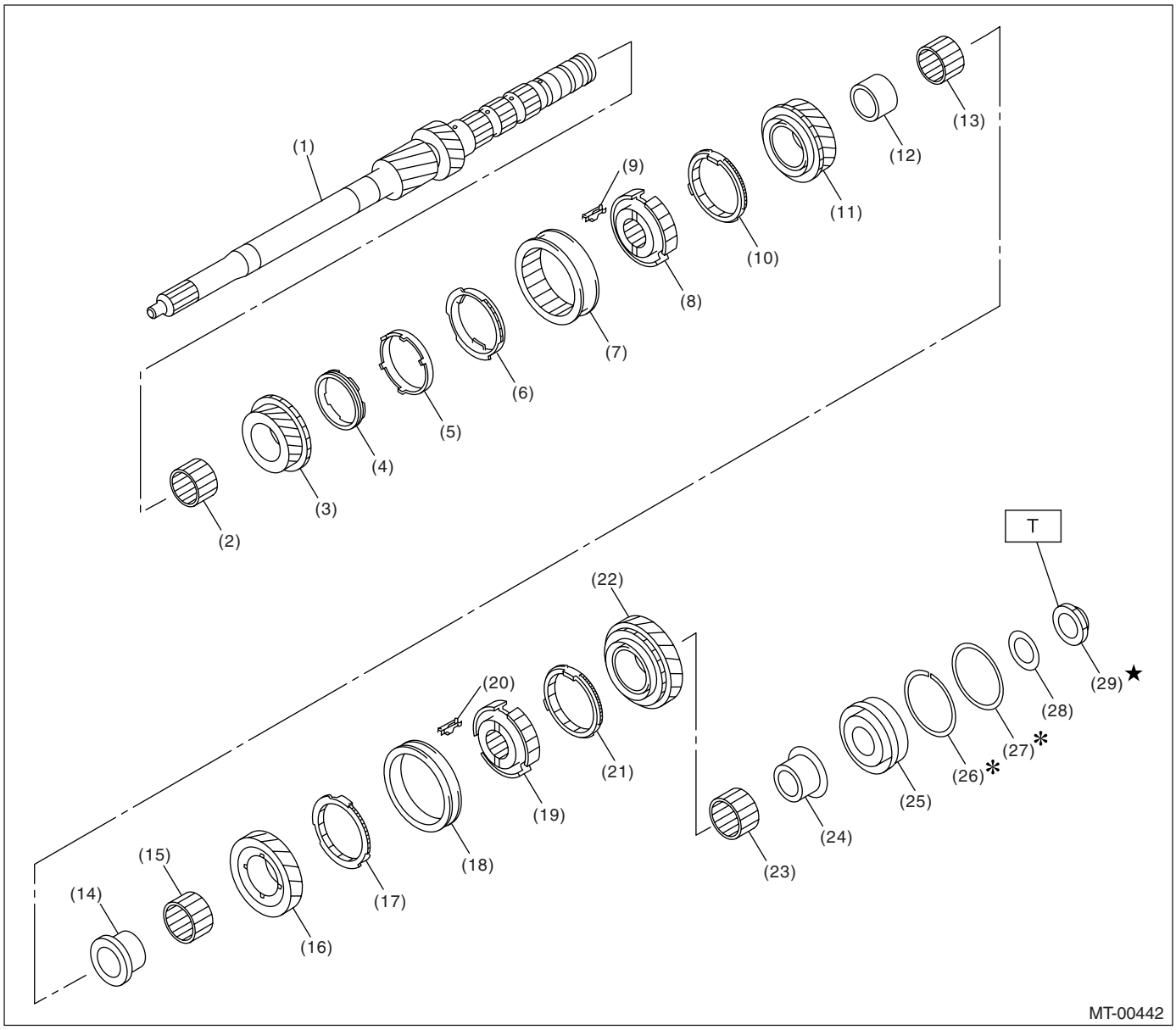
Tightening torque: N·m (kgf-m, ft-lb)
T1: 25 (2.5, 18.1)
T2: 41 (4.2, 30.2)
T3: 48 (4.9, 35.4)

6. SHIFTER FORK AND FORK ROD



(1)	Spring pin	(9)	Support	(17)	5th-6th shifter arm
(2)	Interlock arm	(10)	Snap ring	(18)	5th-6th fork COMPL
(3)	Interlock block	(11)	Reverse fork COMPL	(19)	3rd-4th fork rod
(4)	Reverse interlock block	(12)	Reverse shifter arm	(20)	3rd-4th shifter arm
(5)	Interlock arm	(13)	Reverse fork rod	(21)	1st-2nd shifter arm
(6)	Striking rod	(14)	Selector arm	(22)	3rd-4th fork COMPL
(7)	Selector arm No. 2	(15)	Shifter arm shaft	(23)	1st-2nd fork rod
(8)	Neutral set spring	(16)	5th-6th fork rod	(24)	1st-2nd fork COMPL

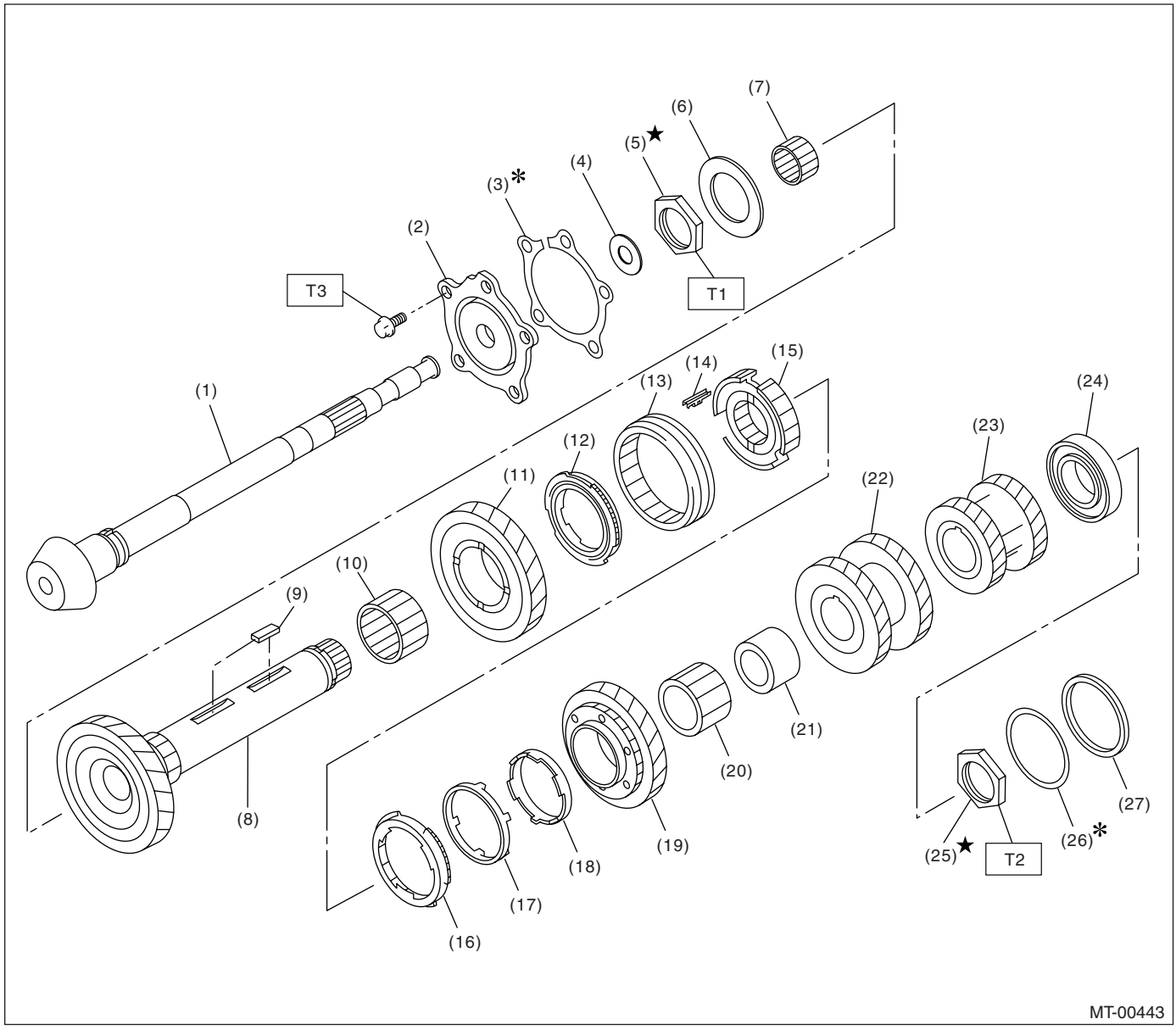
7. MAIN SHAFT ASSY



(1) Main shaft
(2) Needle bearing
(3) 3rd drive gear
(4) Inner baulk ring
(5) Synchro cone
(6) Outer baulk ring
(7) 3rd-4th sleeve
(8) 3rd-4th hub
(9) Shifting insert key
(10) 4th baulk ring
(11) 4th gear
(12) 4th bush
(13) Needle bearing
(14) 5th bush
(15) Needle bearing
(16) 5th drive gear
(17) 5th baulk ring
(18) 5th-6th sleeve
(19) 5th-6th hub
(20) Shifting insert key
(21) 6th baulk ring
(22) 6th drive gear
(23) Needle bearing
(24) 6th bush
(25) Taper roller bearing
(26) Snap ring
(27) Washer
(28) Washer
(29) Lock nut

Tightening torque: N·m (kgf-m, ft-lb)
T: 392 (40.0, 289)

8. DRIVE PINION AND DRIVEN SHAFT ASSY



(1) Drive pinion shaft
(2) Taper roller bearing
(3) Shim
(4) Washer
(5) Lock nut
(6) Thrust bearing
(7) Needle bearing
(8) Driven shaft
(9) Key
(10) Needle bearing
(11) 1st driven gear
(12) 1st synchro ring ASSY
(13) 1st-2nd sleeve
(14) Shifting insert
(15) 1st-2nd hub
(16) Outer baulk ring
(17) Synchro cone
(18) Inner baulk ring
(19) 2nd driven gear
(20) Needle bearing
(21) 2nd bush
(22) 3rd-4th driven gear
(23) 5th-6th driven gear
(24) Ball bearing
(25) Lock nut
(26) Shim
(27) Collar

Tightening torque: N·m (kgf-m, ft-lb)

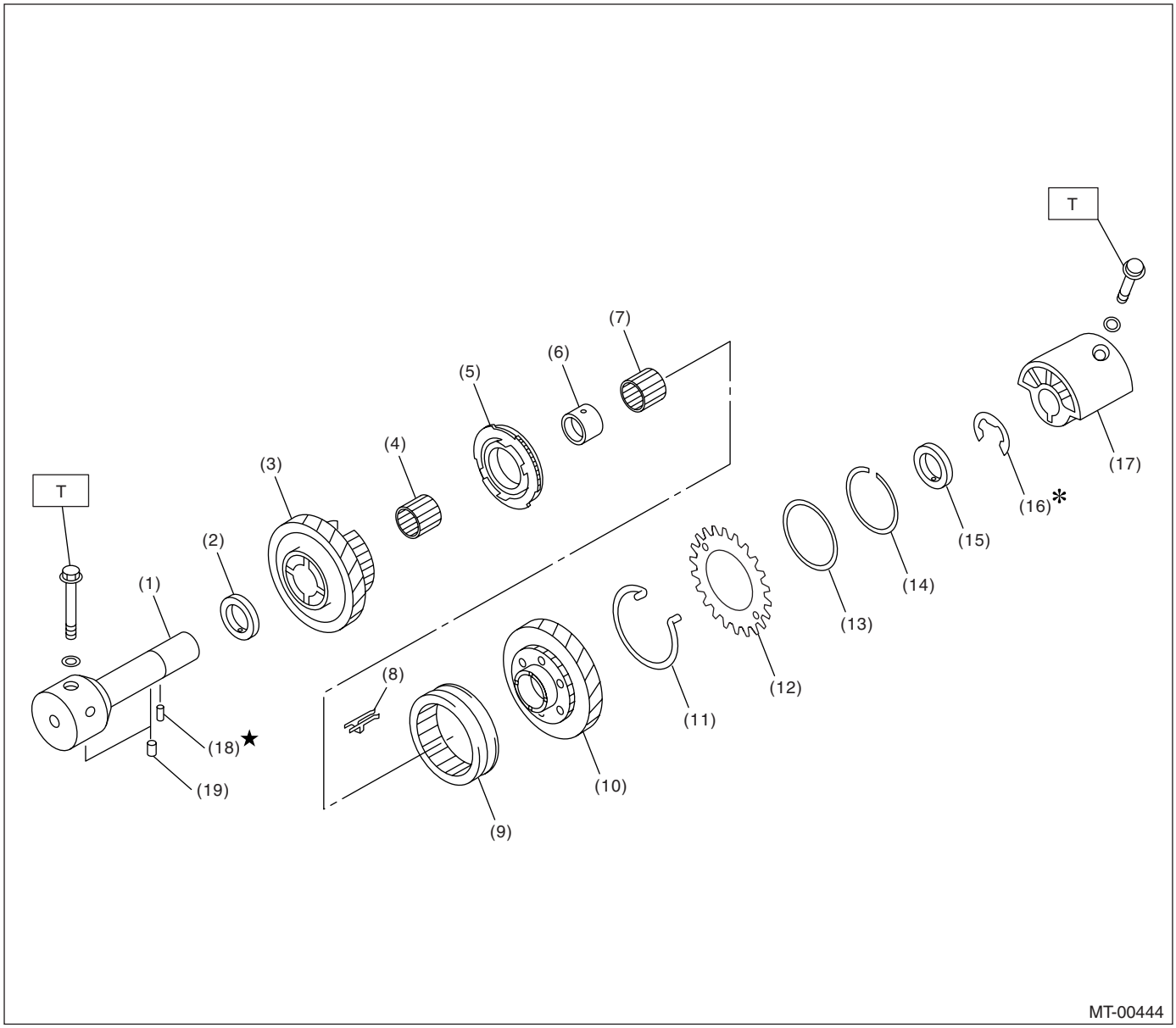
T1: 285 (29.1, 210)
**** 265 (27.0, 195)***

T2: 570 (58.1, 420)
**** 530 (54.0, 391)***

T3: 54 (5.5, 40)

* Tightening torque when ST used.

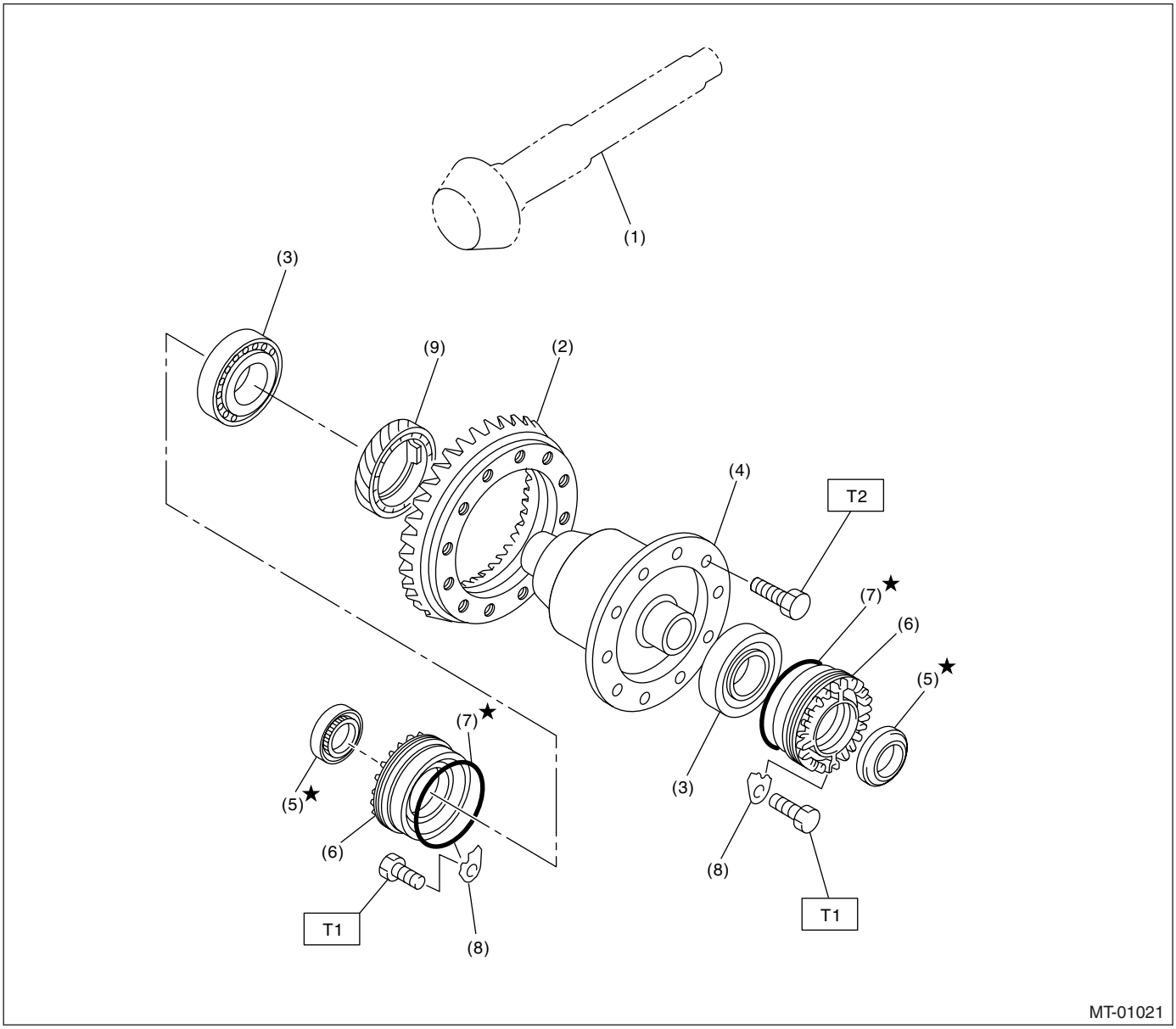
9. REVERSE IDLER GEAR ASSY



(1) Base COMPL
(2) Washer
(3) Reverse idler gear No. 2
(4) Needle bearing
(5) Reverse idler synchro set
(6) Reverse idler gear bush
(7) Needle bearing
(8) Shifting insert key
(9) Reverse coupling sleeve
(10) Reverse idler gear
(11) Spring
(12) Sub gear
(13) Friction plate
(14) Snap ring
(15) Washer
(16) Snap ring
(17) Reverse idler holder
(18) Spring pin
(19) Knock pin

Tightening torque: N·m (kgf-m, ft-lb)
T: 25 (2.5, 18.1)

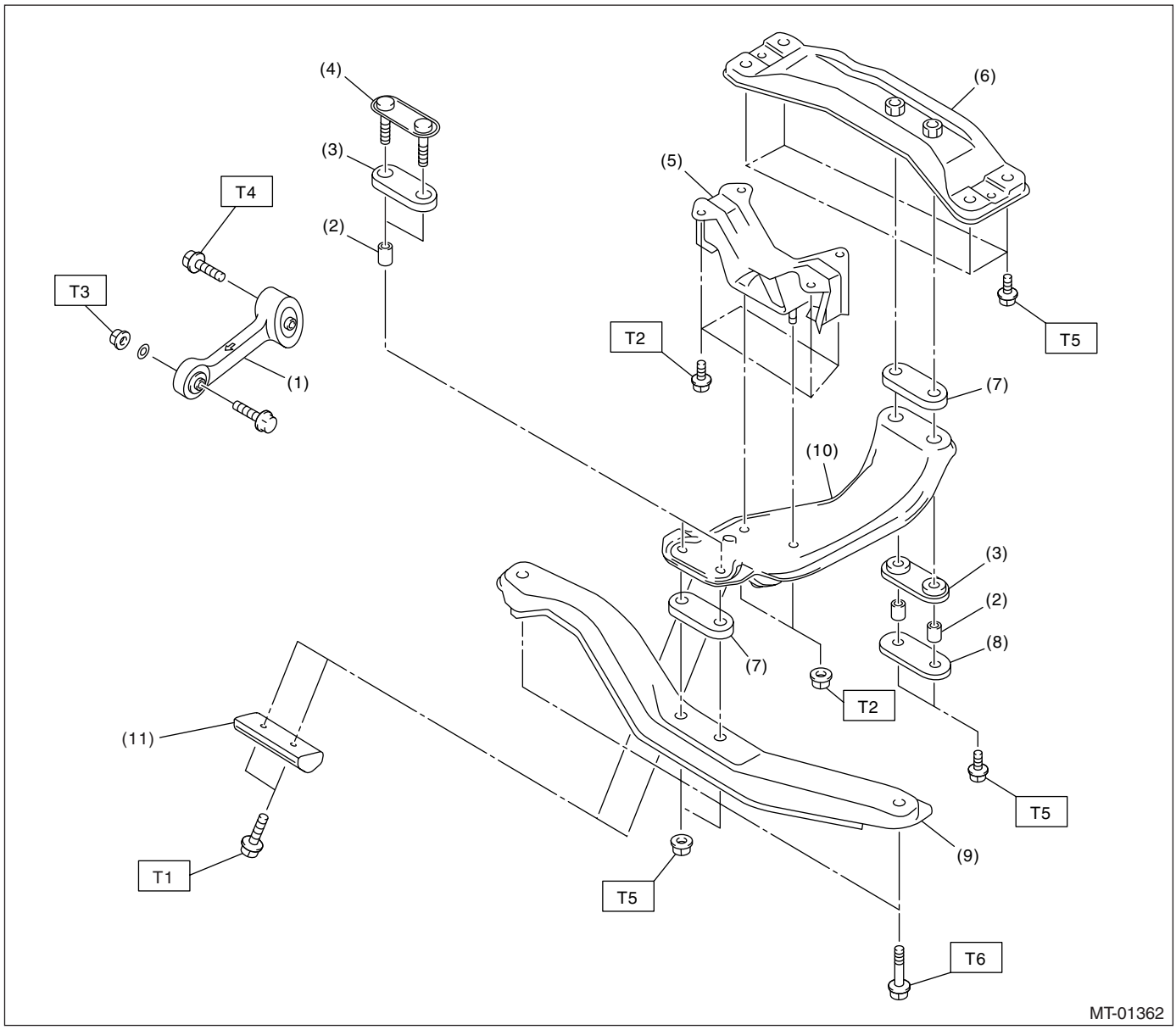
10.FRONT DIFFERENTIAL WITH LSD



(1) Drive pinion shaft
(2) Hypoid driven gear
(3) Roller bearing
(4) Differential case ASSY
(5) Oil seal
(6) Differential side retainer
(7) O-ring
(8) Retainer lock plate
(9) Speedometer drive gear

Tightening torque: N·m (kgf-m, ft-lb)
T1: 25 (2.5, 18.1)
T2: 69 (7.0, 50.9)

11.TRANSMISSION MOUNTING



(1)	Pitching stopper	(8)	Rear plate
(2)	Spacer	(9)	Front crossmember
(3)	Cushion C	(10)	Center crossmember
(4)	Front plate	(11)	Dynamic damper
(5)	Rear cushion rubber		
(6)	Rear crossmember		
(7)	Cushion D		

Tightening torque: N·m (kgf-m, ft-lb)

T1: 7.5 (0.76, 5.5)
T2: 35 (3.6, 25.8)
T3: 50 (5.1, 36.9)
T4: 58 (5.9, 42.8)
T5: 70 (7.1, 51.6)
T6: 140 (14.3, 103)

C: CAUTION

• Wear working clothing, including a cap, protective goggles and protective shoes during operation.
• Remove contamination including dirt and corrosion before removal, installation, and disassembly.
• Keep the disassembled parts in order and protect them from dust or dirt.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
• When disassembling the case and other light alloy parts, use a plastic hammer to force it apart. Do not pry it apart with a screwdriver or other tool.
• Be careful not to burn, because each part on the vehicle is hot after running.
• Use SUBARU genuine gear oil, grease etc. or the equivalent. Do not mix gear oil, grease etc. with that of another grade or from other manufacturers.
• Be sure to tighten fasteners including bolts and nuts to the specified torque.
• Place shop jacks or rigid racks at the specified points.
• Apply gear oil onto sliding or revolution surfaces before installation.
• Replace deformed or otherwise damaged snap rings with new ones.
• Before installing O-rings or oil seals, apply sufficient amount of gear oil to avoid damage and deformation.
• Be careful not to incorrectly install or fail to install O-rings, snap rings and other such parts.
• Before securing a part on a vise, place cushioning material such as wood blocks, aluminum plate, or shop cloth between the part and the vise.
• Avoid damaging the mating surface of the case.
• Before applying sealant, completely remove the old seal.

D: PREPARATION TOOL

1. SPECIAL TOOLS

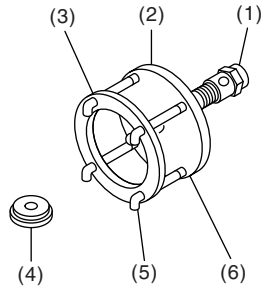
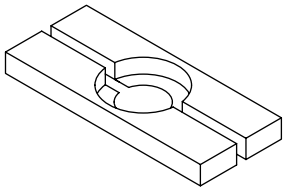
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-399527700	399527700	PULLER SET	Used for removing and installing roller bearing (Differential). (1) BOLT (2) PULLER (3) HOLDER (4) ADAPTER (5) BOLT (6) NUT
 ST-498515700	498515700	REMOVER	Used for removing roller bearing of drive pinion shaft.

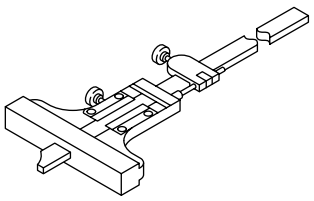
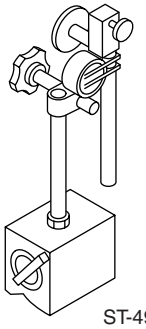
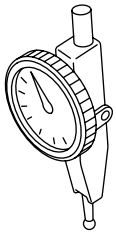
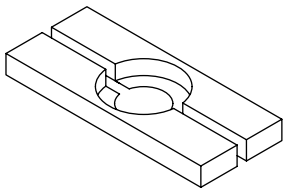
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498147000	498147000	DEPTH GAUGE	Used for adjusting main shaft axial end play.
 ST-498247001	498247001	MAGNET BASE	• Used for measuring backlash between side gear and pinion, and hypoid gear. • Used with DIAL GAUGE (498247100).
 ST-498247100	498247100	DIAL GAUGE	• Used for measuring backlash between side gear and pinion, and hypoid gear. • Used with MAGNET BASE (498247001).
 ST-498077000	498077000	REMOVER	Used for removing differential taper roller bearing.

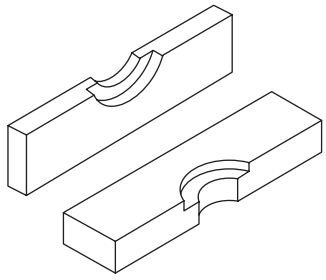
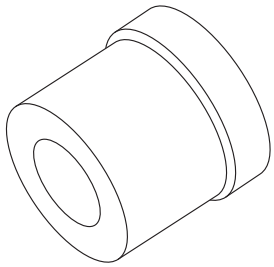
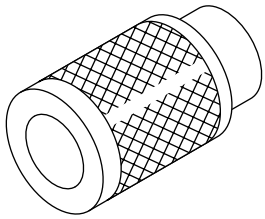
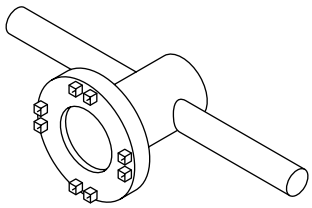
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-899858600	899858600	REMOVER	Used for removing roller bearing.
 ST-399513600	399513600	INSTALLER	Used for installing oil seal.
 ST-499757002	499757002	INSTALLER	Used for installing bearing cone of transfer driven gear (extension core side).
 ST-499787000	499787000	WRENCH ASSY	Used for removing and installing differential side retainer (right side).

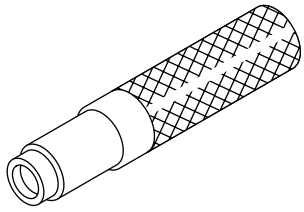
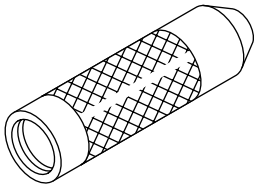
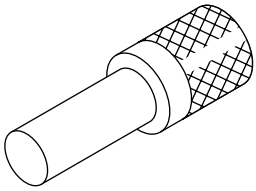
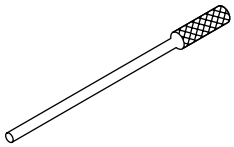
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499827000	499827000	PRESS	Used for installing speedometer oil seal when installing speedometer cable to transmission.
 ST-499877000	499877000	RACE 4-5 INSTALLER	Used for disassembling driven shaft and transfer driven gear.
 ST-899864100	899864100	REMOVER	Used for removing parts on transmission main shaft and drive pinion.
 ST-899904100	899904100	REMOVER	Used for removing and installing straight pin.

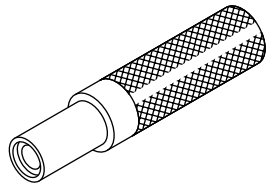
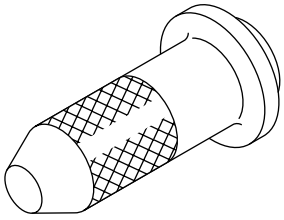
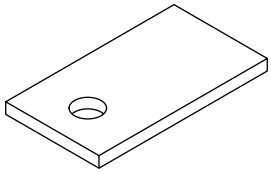
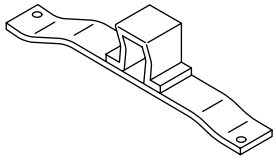
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-899824100	899824100	PRESS	Used for installing speedometer shaft oil seal.
 ST-498057300	498057300	INSTALLER	Used for installing extension oil seal.
 ST-498255400	498255400	PLATE	Used for measuring backlash.
 ST41099AA010	41099AA010	ENGINE SUPPORT BRACKET	• Used for supporting engine. • Used with ENGINE SUPPORT (41099AA020).

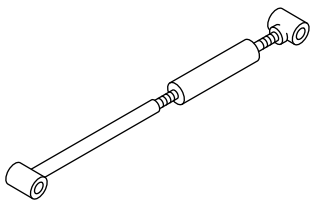
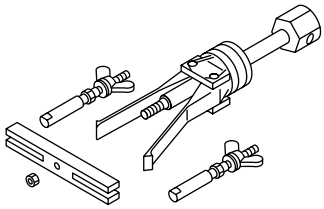
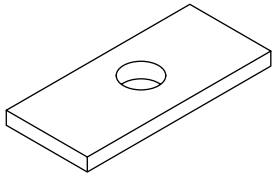
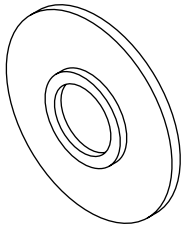
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST41099AA020	41099AA020	ENGINE SUPPORT	• Used for supporting engine. • Used with ENGINE SUPPORT BRACKET (41099AA010).
 ST-398527700	398527700	PULLER ASSY	Used for removing extension case oil seal and clutch housing oil seal.
 ST-499575500	499575500	GAUGE	Used for measuring total end play, extension end play and drive pinion height.
 ST-398177700	398177700	INSTALLER	Used for assembling main shaft.

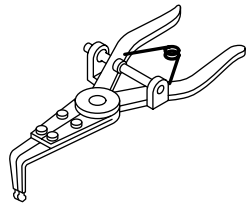
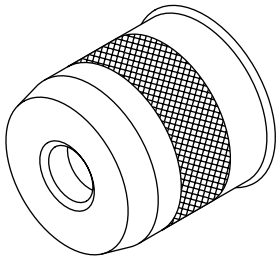
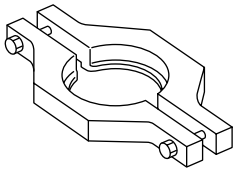
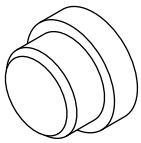
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-399893600	399893600	PLIERS	• Used for removing and installing neutral set spring. • Used with CLAW (18756AA000).
 ST-499247400	499247400	INSTALLER	Used for installing transfer drive gear ball bearing.
 ST-498077610	498077610	REMOVER	Used for removing speedometer drive gear.
 ST-398497701	398497701	SEAT	Used for installing transfer drive gear ball bearing.

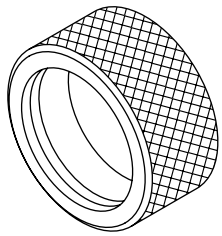
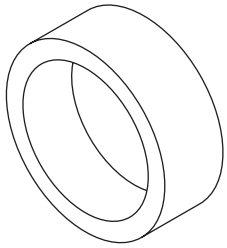
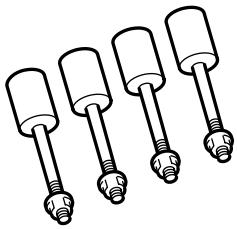
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-398437700	398437700	DRIFT	Used for installing front differential side bearing.
 ST-498745600	498745600	INSTALLER	Used for installing oil pump drive gear.
 ST18632AA000	18632AA000	STAND ASSY	Used for disassembling and assembling transmission.
ST18671AA000	18671AA000	OIL SEAL GUIDE	• Used for installing oil seal to reverse check. • Used with INSTALLER (18657AA010).

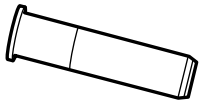
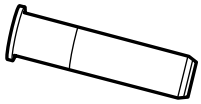
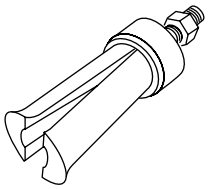
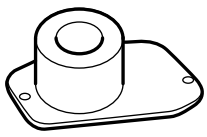
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18657AA010	18657AA010	INSTALLER	• Used for installing oil seal to reverse check. • Used with OIL SEAL GUIDE (18671AA000).
 ST18657AA000	18657AA000	INSTALLER	Used for installing oil seal to shift rod.
 ST18758AA000	18758AA000	PULLER	Used for removing extension taper roller bearing outer race.
 ST18831AA000	18831AA000	GAUGE	Used for measuring extension taper roller bearing.

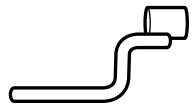
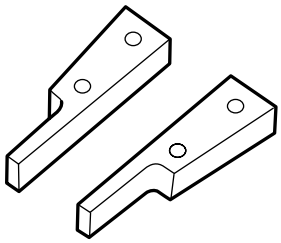
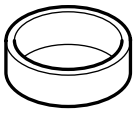
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18631AA000	18631AA000	HANDLE	Used for measuring front differential backlash.
 ST18756AA000	18756AA000	CLAW	• Used for installing and removing neutral set spring. • Used with PLIERS (399893600).
 ST18754AA000	18754AA000	REMOVER	Used for removing each parts of driven gear.
ST18757AA000	18757AA000	STRAIGHT PIN REMOVER	Used for installing reverse idler gear.

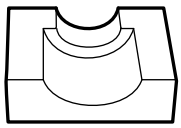
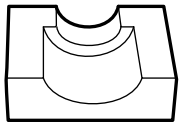
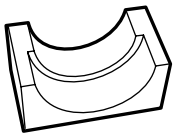
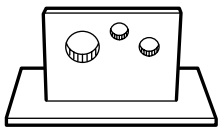
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18665AA000	18665AA000	HOLDER	• Used for installing and removing main shaft lock nut. • Used with BASE (18664AA000).
 ST18666AA000	18666AA000	HOLDER	• Used for installing and removing driven shaft lock nut. • Used with BASE (18664AA000).
 ST18667AA000	18667AA000	HOLDER	• Used for installing and removing drive pinion shaft lock nut. • Used with BASE (18664AA000).
 ST18664AA000	18664AA000	BASE	• Used for installing and removing main shaft lock nut. • Used for installing and removing drive pinion shaft lock nut. • Used for installing and removing driven shaft lock nut.

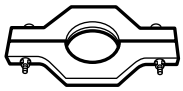
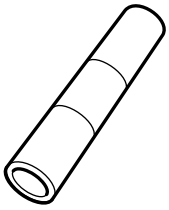
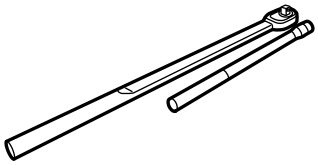
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
ST18722AA000	18722AA000	REMOVER	Used for disassembling main shaft. (TY856WB···model)
 ST18722AA010	18722AA010	REMOVER	Used for disassembling main shaft. (TY856WN···model)
 ST18651AA000	18651AA000	INSTALLER	Used for assembling main shaft.
 ST18852AA000	18852AA000	TORQUE WRENCH	• Used for tightening main shaft lock nut. • Used for tightening drive pinion shaft lock nut. • Used for tightening driven shaft lock nut.

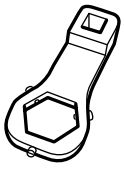
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
ST18668AA000	18668AA000	PUNCH	Used for caulking main shaft lock nut.
ST18669AA000	18669AA000	PUNCH	Used for caulking driven shaft lock nut.
ST18670AA000	18670AA000	PUNCH	Used for caulking drive pinion shaft lock nut.
 ST18620AA000	18620AA000	ADAPTER WRENCH	Used for installing and removing driven gear shaft lock nut.

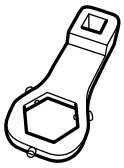
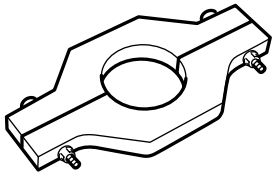
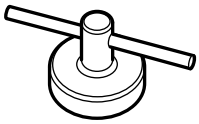
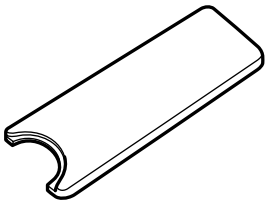
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18621AA000	18621AA000	ADAPTER WRENCH	Used for installing and removing drive pinion shaft lock nut.
 ST18723AA000	18723AA000	REMOVER	Used for disassembling the driven shaft.
 ST18630AA000	18630AA000	WRENCH ASSY	Used for removing and installing differential side retainer (left side).
 ST18672AA000	18672AA000	GUIDE CLIP	Used for installing reverse idler gear snap ring.

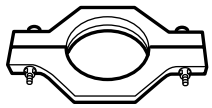
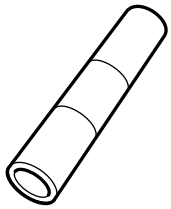
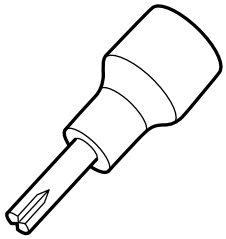
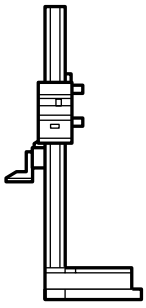
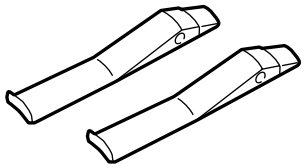
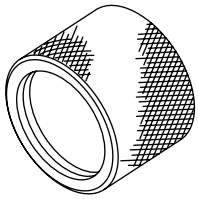
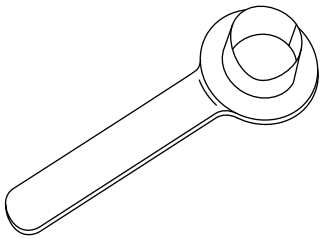
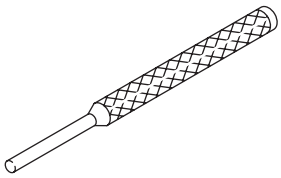
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18720AA000	18720AA000	REMOVER	Used for disassembling main shaft.
 ST18654AA000	18654AA000	INSTALLER	Used for assembling driven shaft.
 ST18663AA000	18663AA000	SOCKET	Used for installing and removing oil pump cover.
 ST18853AA000	18853AA000	HEIGHT GAUGE	Used for selecting shift rod.

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18760AA000	18760AA000	CLAW	• Used for removing front side retainer bearing outer race. • Used with PULLER ASSEMBLY (398527700).
 ST18675AA000	18675AA000	DIFFERENTIAL SIDE OIL SEAL INSTALLER	Used for installing differential side retainer oil seal.
 ST28399SA010	28399SA010	OIL SEAL PROTECTOR	Used for protecting oil seal when installing front drive shaft.
 ST-398791700	398791700	REMOVER	Used for installing and removing spring pin (6 mm).

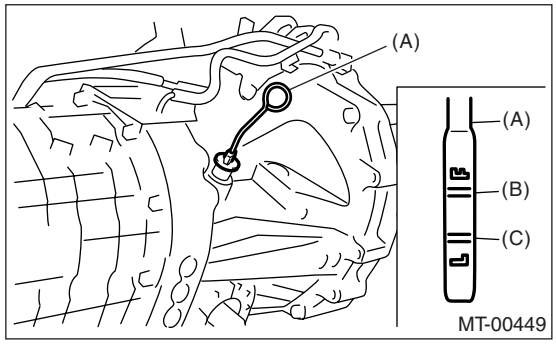
2. GENERAL PURPOSE TOOLS

TOOL NAME	REMARKS
Circuit Tester	Used for measuring resistance, voltage and ampere.

2. Transmission Gear Oil

A: INSPECTION

1) Park the vehicle on a level surface.
2) Turn the ignition switch to OFF, and wait until the engine cools.
3) Remove the oil level gauge and wipe it clean.
4) Reinsert the level gauge all the way. Be sure that the level gauge is correctly inserted and in the proper direction.
5) Pull out the oil level gauge again and check the oil level on it. If it is below the lower level, add oil through the oil level gauge hole to bring the level up to the upper level.



(A) Oil level gauge
(B) Upper level
(C) Lower level

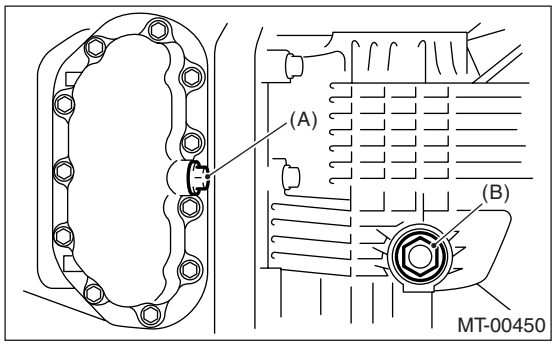
B: REPLACEMENT

1) Pull out the oil level gauge.
2) Lift-up the vehicle.
3) Remove the transmission under cover.
4) Drain the transmission gear oil completely.

CAUTION:
Directly after the vehicle has been running or idling engine long time, the transmission gear oil is hot. Be careful not to burn yourself.

NOTE:
• Tighten the transmission gear oil drain plug after draining transmission gear oil.
• Use a new gasket.

Tightening torque:
Oil pan side
44 N·m (4.5 kgf-m, 32.5 ft-lb)
Clutch housing side
70 N·m (7.1 kgf-m, 51.6 ft-lb)



(A) Drain plug (Oil pan side)
(B) Drain plug (Clutch housing side)

5) Lower the vehicle.
6) Pour gear oil into the gauge hole.

Recommended gear oil:
Use GL-5 or equivalent.

Gear oil capacity:
4.1 ℓ (4.3 US qt, 3.6 Imp qt)

7) Check the level of the transmission gear oil.

NOTE:
• When inserting the level gauge into transmission gear, align the protrusion on the side of the top part of the level gauge with the notch in the gauge hole.
• The gear oil level should be within the specified range marked on the level gauge.

3. Oil Seal

A: INSPECTION

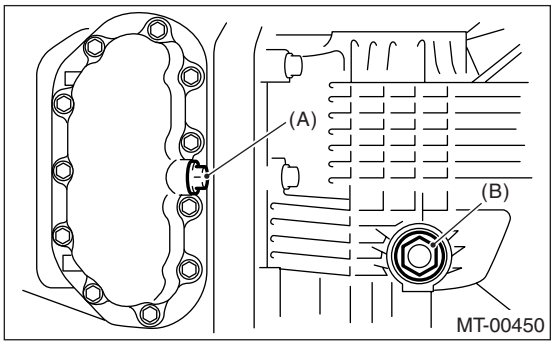
Inspect for oil leakage from the oil seal. Replace the oil seal if the lips is deformed, hardened, damaged, worn or defective if any and inspect the propeller shaft.

B: REPLACEMENT

1) Clean the transmission exterior.
2) Drain the gear oil completely.

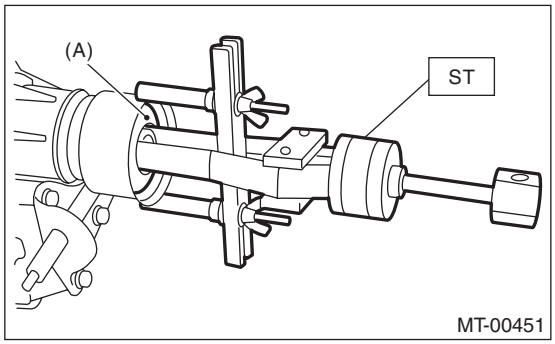
NOTE:
- Tighten the drain plug after draining gear oil.
- Always use a new gasket.

Tightening torque:
Oil pan side
44 N·m (4.5 kgf-m, 32.5 ft-lb)
Clutch housing side
70 N·m (7.1 kgf-m, 51.6 ft-lb)



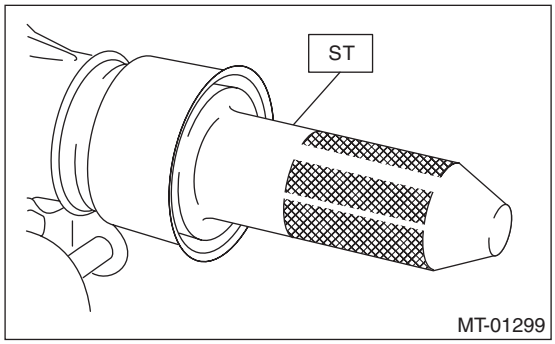
(A) Drain plug (Oil pan side)
(B) Drain plug (Clutch housing side)

3) Remove the rear exhaust pipe and muffler.
4) Remove the propeller shaft. <Ref. to DS-17, REMOVAL, Propeller Shaft.>
5) Using the ST, remove the oil seal.
ST 398527700 PULLER ASSY



(A) Oil seal

6) Using the ST, install the oil seal.
ST 498057300 INSTALLER



7) Install the propeller shaft. <Ref. to DS-18, INSTALLATION, Propeller Shaft.>
8) Install the rear exhaust pipe and muffler.
9) Pour gear oil and check the oil level. <Ref. to 6MT-30, REPLACEMENT, Transmission Gear Oil.>

4. Differential Side Retainer Oil Seal

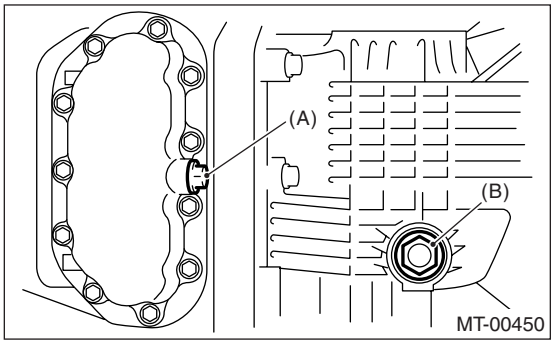
A: INSPECTION

Check the leakage of gear oil from differential side retainer oil seal part. If there is oil leakage, replace the oil seal and check the front drive shaft.

B: REPLACEMENT

1) Lift-up the vehicle.
2) Remove the front and center exhaust pipes. <Ref. to EX(H4DOTC)-8, REMOVAL, Front Exhaust Pipe.>
3) Remove the drain plug of transmission gear oil, and drain the transmission gear oil completely.

CAUTION:
• Directly after the vehicle has been running or the engine has been long idle running, the transmission gear oil is hot. Be careful not to burn yourself.
• Be careful not to spill the transmission gear oil on exhaust pipe to prevent it from emitting smoke or fire. When the differential gear oil is spilled on exhaust pipe, wipe it away completely.



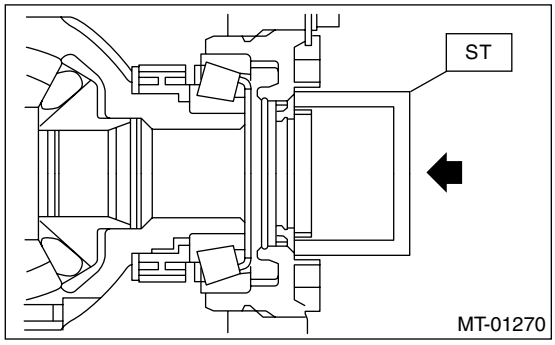
(A) Drain plug (Oil pan side)
(B) Drain plug (Clutch housing side)

4) Tighten the drain plug of transmission gear oil.

NOTE:
Use a new gasket.

Tightening torque:
Oil pan side
44 N·m (4.5 kgf-m, 32.5 ft-lb)
Clutch housing side
70 N·m (7.1 kgf-m, 51.6 ft-lb)

5) Separate the front drive shaft from transmission. <Ref. to DS-40, REMOVAL, Front Drive Shaft.>
6) Remove the differential side retainer oil seal using driver wrapped with vinyl tape or etc.
7) Using the ST, install the differential side retainer by slightly tapping with hammer.
ST 18675AA000 DIFFERENTIAL SIDE OIL SEAL INSTALLER



8) Apply gear oil to the oil seal lips.
9) Install the front drive shaft. <Ref. to DS-40, INSTALLATION, Front Drive Shaft.>
10) Install the front and center exhaust pipes. <Ref. to EX(H4DOTC)-8, INSTALLATION, Front Exhaust Pipe.>
11) Lower the vehicle.
12) Pour the transmission gear oil from the gauge hole.

Recommended gear oil:
<Ref. to 6MT-2, TRANSMISSION GEAR OIL, SPECIFICATION, General Description.>

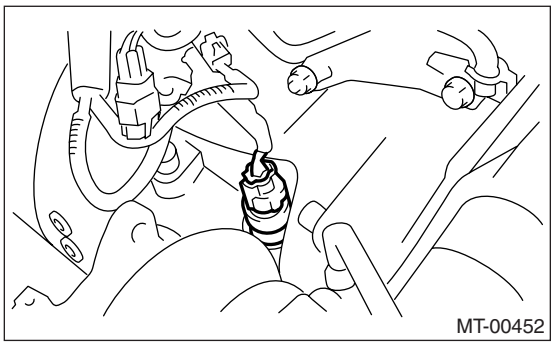
Gear oil capacity:
4.1 ℓ (4.3 US qt, 3.6 Imp qt)

13) Check the transmission gear oil amount. <Ref. to 6MT-30, INSPECTION, Transmission Gear Oil.>

5. Vehicle Speed Sensor

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the intercooler. <Ref. to IN(H4DOTC)-12, REMOVAL, Intercooler.>
3) Disconnect the vehicle speed sensor connector.



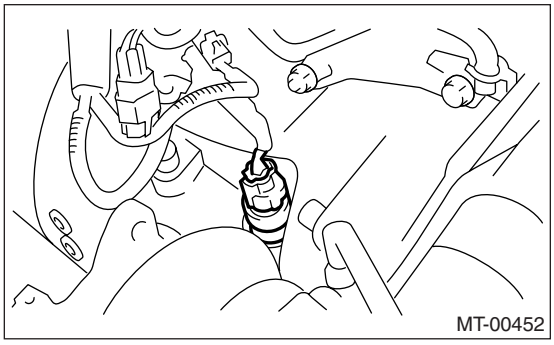
4) Remove the vehicle speed sensor.

B: INSTALLATION

1) Align the tip end of vehicle speed sensor key with key groove on the end of speedometer shaft, and then install it.

Tightening torque:
5.9 N·m (0.6 kgf-m, 4.4 ft-lb)

NOTE:
• Ensure the sensor mounting hole is clean and free of foreign matter.
• Replace the vehicle speed sensor with a new one.



2) Connect the connector to vehicle speed sensor.
3) Install the intercooler. <Ref. to IN(H4DOTC)-12, INSTALLATION, Intercooler.>

C: INSPECTION

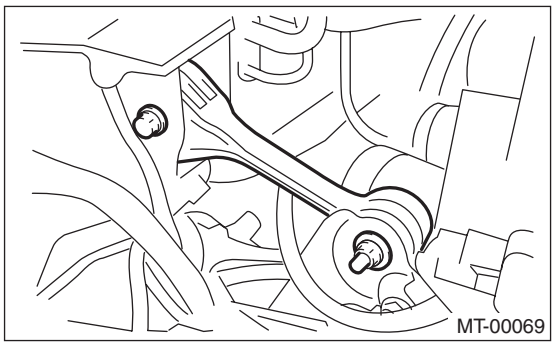
Inspect that the speedometer is normally operated, because vehicle speed sensor cannot be inspected as single part. If it is not normally operated, inspect the combination meter system. <Ref. to IDI-3, INSPECTION, Combination Meter System.>

6. Transmission Mounting System

A: REMOVAL

1. PITCHING STOPPER

1) Disconnect the ground cable from battery.
2) Remove the intercooler. <Ref. to IN(H4DOTC)-12, REMOVAL, Intercooler.>
3) Remove the pitching stopper.

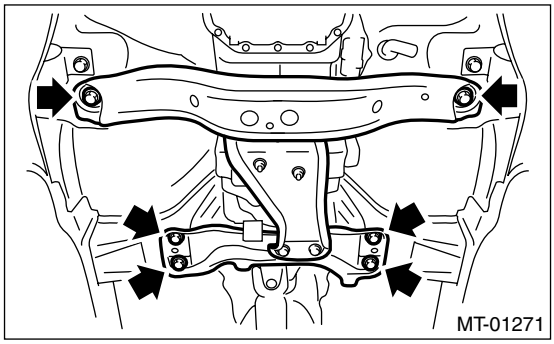


2. CROSSMEMBER AND CUSHION RUBBER

1) Disconnect the ground cable from battery.
2) Jack-up the vehicle and support it with sturdy racks.
3) Remove the center exhaust pipe. <Ref. to EX(H4DOTC)-10, REMOVAL, Center Exhaust Pipe.>
4) Remove the rear exhaust pipe and muffler.
5) Remove the heat shield cover.
6) Set the transmission jack under the transmission body.

CAUTION:
Always support the transmission case with a transmission jack.

7) Remove the rear crossmember.



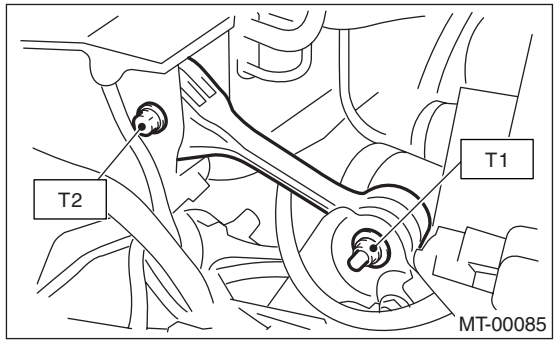
8) Remove the rear cushion rubber.

B: INSTALLATION

1. PITCHING STOPPER

1) Install the pitching stopper.

Tightening torque:
T1: 50 N·m (5.1 kgf-m, 36.9 ft-lb)
T2: 58 N·m (5.9 kgf-m, 42.8 ft-lb)



2) Install the intercooler.
<Ref. to IN(H4DOTC)-12, INSTALLATION, Intercooler.>
3) Connect the battery ground cable to battery.

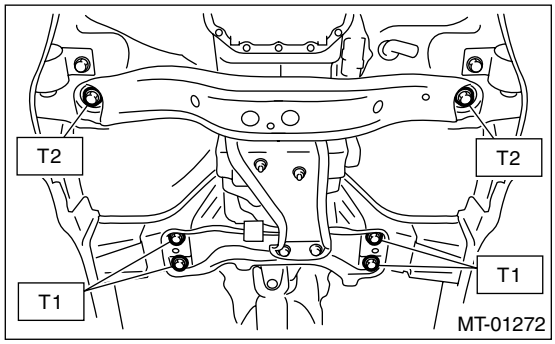
2. CROSSMEMBER AND CUSHION RUBBER

1) Install the rear cushion rubber.

Tightening torque:
35 N·m (3.6 kgf-m, 25.8 ft-lb)

2) Install the crossmember.

Tightening torque:
T1: 70 N·m (7.1 kgf-m, 51.6 ft-lb)
T2: 140 N·m (14.3 kgf-m, 103 ft-lb)



3) Remove the transmission jack.
4) Install the center exhaust pipe. <Ref. to EX(H4DOTC)-11, INSTALLATION, Center Exhaust Pipe.>
5) Install the rear exhaust pipe and muffler.

C: INSPECTION

Repair or replace parts if the results of the inspection below are not satisfactory.

1. PITCHING STOPPER

Make sure that the pitching stopper is not bent or damaged. Make sure that the rubber is not stiff, cracked, or otherwise damaged.

2. CROSSMEMBER AND CUSHION RUBBER

Make sure that the crossmember is not bent or damaged. Make sure that the cushion rubber is not stiff, cracked, or otherwise damaged.

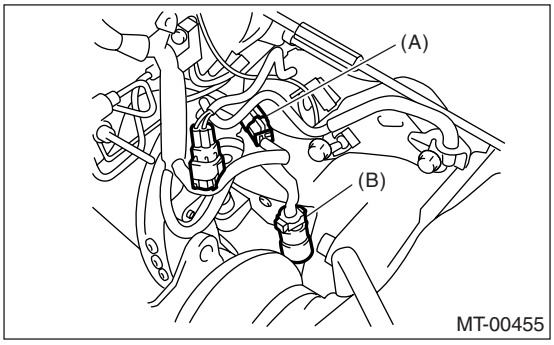
7. Manual Transmission Assembly

A: REMOVAL

1) Set the vehicle on a lift, and then open the front hood and support with hood stay.

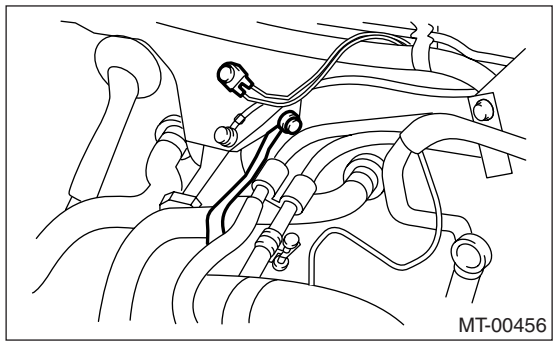
NOTE:
Set the hood stay to its specified hole.

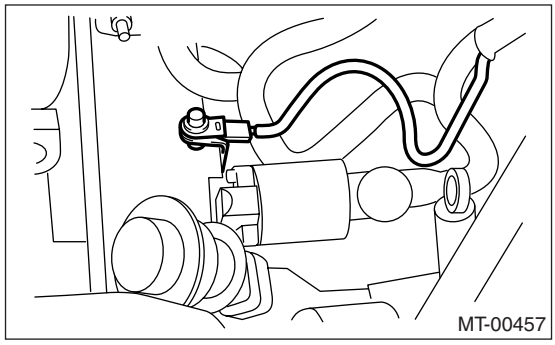
2) Remove the front wheel.
3) Disconnect the ground cable from battery.
4) Remove the intercooler assembly. <Ref. to IN(H4DOTC)-12, REMOVAL, Intercooler.>
5) Lift-up the vehicle, and then remove the under cover.
6) Remove the steering universal joint. <Ref. to PS-29, REMOVAL, Universal Joint.>
7) Lower the vehicle and disconnect the connector located on upper side of transmission.



(A) Transmission connector
(B) Vehicle speed sensor connector

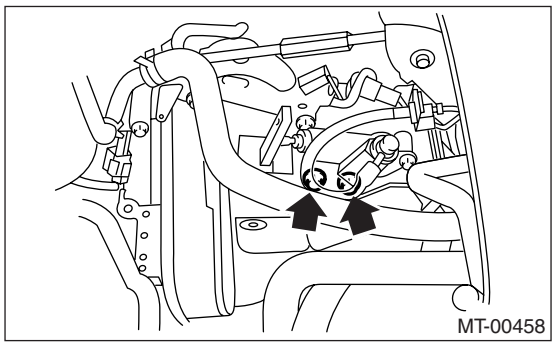
8) Disconnect the ground cable at upper side of transmission case and body.





9) Remove the starter assembly. <Ref. to SC(H4SO)-8, REMOVAL, Starter.>
10) Remove the clutch operating cylinder.

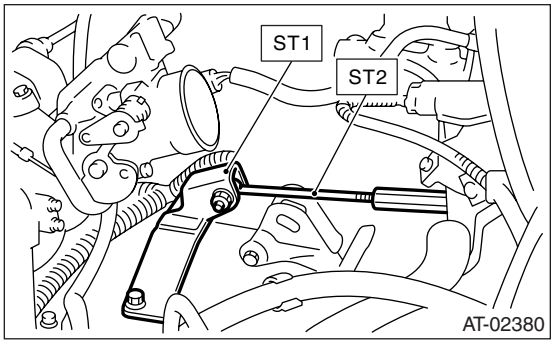
NOTE:
Hang the removed operating cylinder with wire.



11) Remove the clutch release shaft.
(1) Remove the plug with hexagon wrench.
(2) Install a 6 mm (0.24 in) bolt to the release shaft, then pull out the release shaft.
(3) Lift up the release fork, and then remove it from the release bearing claw. Pull it to the engine side and set it free.
12) Remove the pitching stopper, and then remove the pitching stopper bracket.

13) Set the ST.

ST1 41099AA010 ENGINE SUPPORT BRACKET
ST2 41099AA020 ENGINE SUPPORT

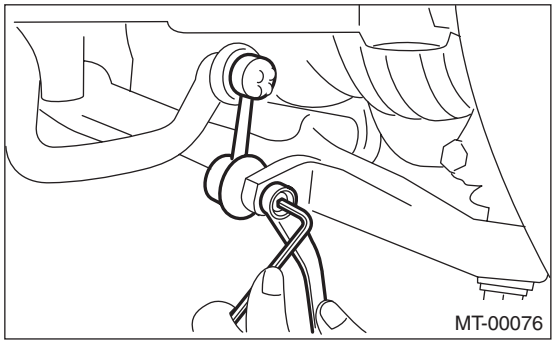


14) Remove the center and rear exhaust pipe and muffler. <Ref. to EX(H4DOTC)-10, REMOVAL, Center Exhaust Pipe.> , <Ref. to EX(H4DOTC)-15, REMOVAL, Rear Exhaust Pipe.>, <Ref. to EX(H4DOTC)-14, REMOVAL, Joint Pipe.>

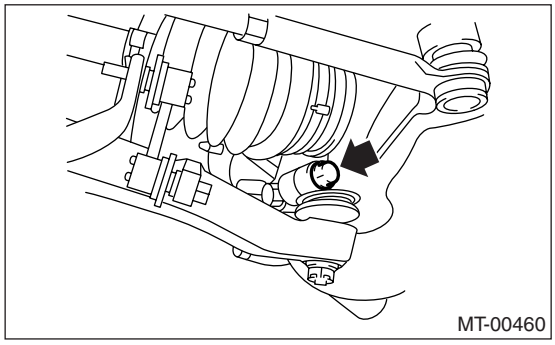
15) Drain the transmission gear oil. <Ref. to 6MT-30, REPLACEMENT, Transmission Gear Oil.>

16) Remove the propeller shaft. <Ref. to DS-17, REMOVAL, Propeller Shaft.>

17) Remove the front stabilizer bolt.

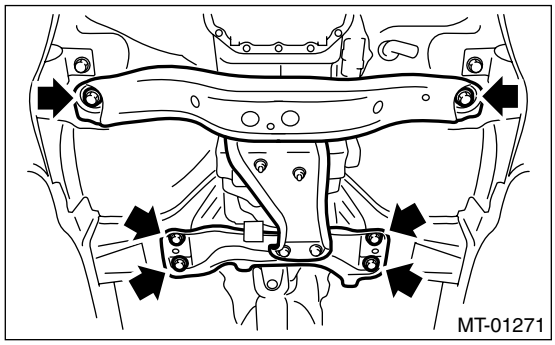


18) Remove the ball joint of transverse link from housing.



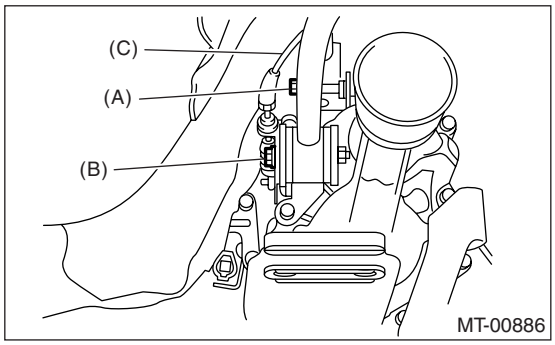
19) Remove the front drive shaft. <Ref. to DS-40, REMOVAL, Front Drive Shaft.>

20) Set the transmission jack under the transmission, then remove the front crossmember and rear crossmember.



21) Move the transmission to right side, then remove the joint COMPL, stay bolt and reverse check cable.

NOTE:
If the transmission is not moved, the joint COMPL and stay bolt will contact body and damage may occur.

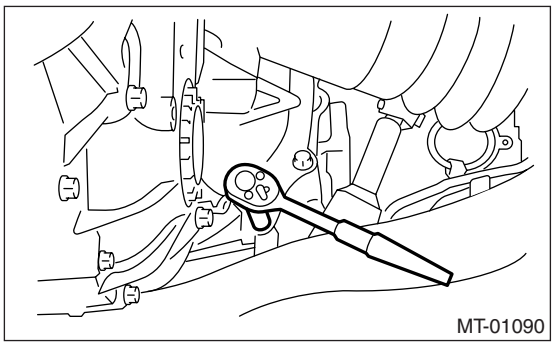


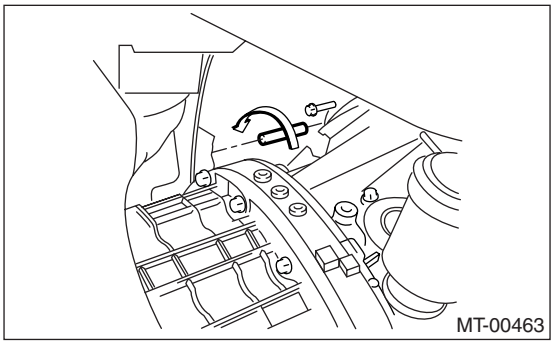
(A) Joint COMPL bolt
(B) Stay bolt
(C) Reverse check cable

22) Remove the fixing bolt of engine and transmission, then remove the transmission from vehicle.

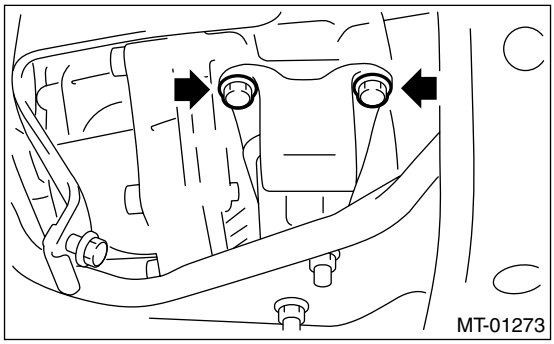
NOTE:
• Rotate the ST (ENGINE SUPPORT ASSY) counterclockwise (to shorter the ST) and lower the rear side of engine to facilitate removal.
• Take care not to contact the transmission with body when pulling backward to remove.

• Remove carefully. The clutch pipe and breather pipe may interfere each other.





23) Remove the crossmember from transmission.



B: INSTALLATION

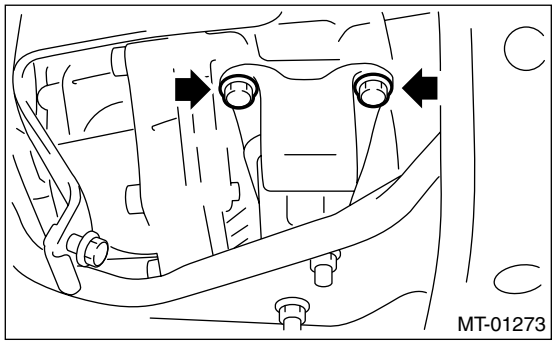
1) Replace the differential side oil seals with new ones. <Ref. to 6MT-32, REPLACEMENT, Differential Side Retainer Oil Seal.>

NOTE:
When already equipped with the new oil seal, there is necessity for exchange.

2) Set the release fork, release bearing and release shaft to transmission. <Ref. to CL-26, INSTALLATION, Release Bearing and Lever.>

3) Install the crossmember to transmission.

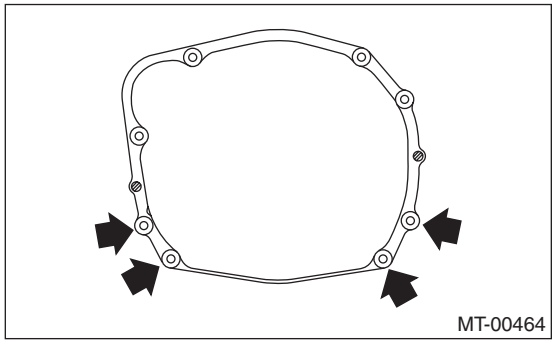
Tightening torque:
35 N·m (3.6 kgf-m, 25.8 ft-lb)



4) Install the transmission.

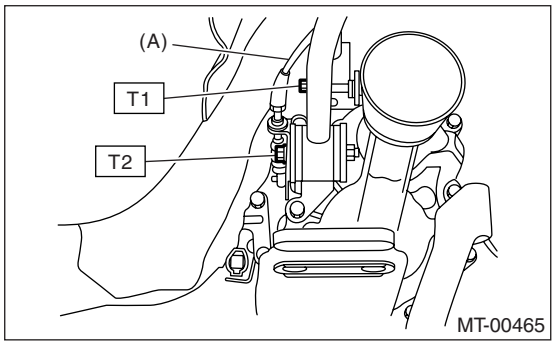
NOTE:
• Make sure the main shaft spline part is inserted completely.
• Make sure the rear side of engine is lowered.

Tightening torque:
50 N·m (5.1 kgf-m, 36.9 ft-lb)



5) Move the transmission to the right side, then install the joint COMPL bolt, stay bolt and reverse check cable.

Tightening torque:
T1: 11.8 N·m (1.2 kgf-m, 8.7 ft-lb)
T2: 32 N·m (3.3 kgf-m, 23.6 ft-lb)

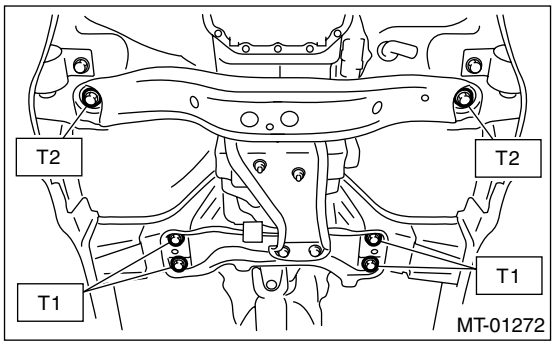


(A) Reverse check cable

6) Install the front crossmember and rear crossmember.

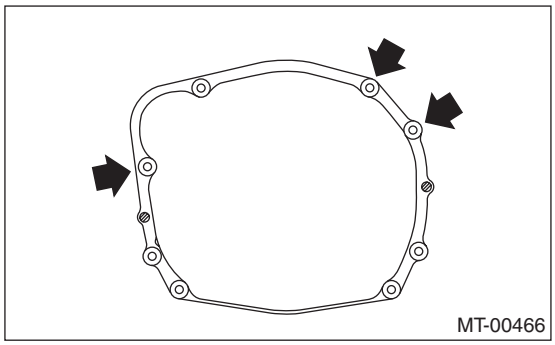
NOTE:
Rotate the ST (ENGINE SUPPORT ASSY) turn buckle clockwise (make longer the ST) and lift up the rear side of engine to facilitate installation.

Tightening torque:
T1: 70 N·m (7.1 kgf-m, 51.6 ft-lb)
T2: 140 N·m (14.3 kgf-m, 103 ft-lb)



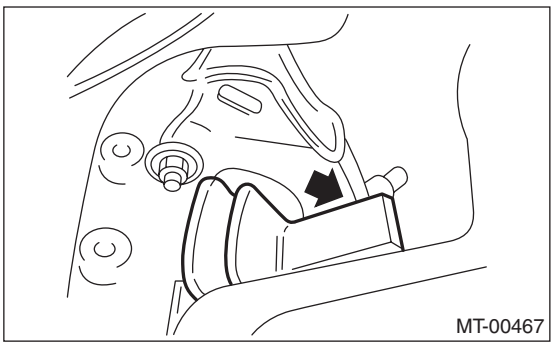
7) Lower the vehicle and install the fixing bolt.

Tightening torque:
50 N·m (5.1 kgf-m, 36.9 ft-lb)



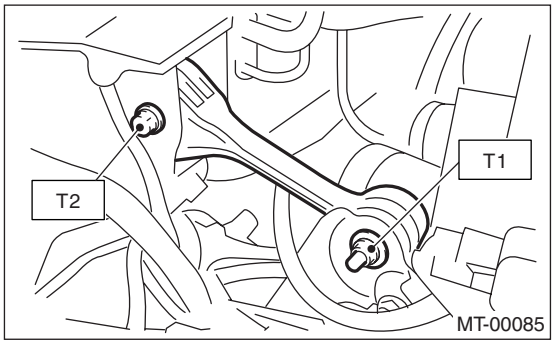
8) Make sure the release bearing is installed completely.

NOTE:
• Push the release fork to operating cylinder side until you hear a “click” sound. Pull the release fork to engine side. Setting is completed if the release fork does not contact case.
• Make sure the boot cover is firmly set.



9) Install the pitching stopper bracket, and then install the pitching stopper.

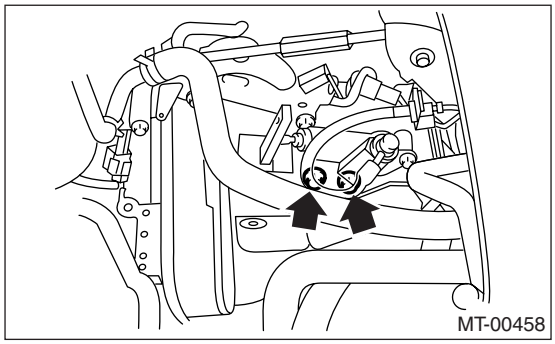
Tightening torque:
T1: 50 N·m (5.1 kgf-m, 36.9 ft-lb)
T2: 58 N·m (5.9 kgf-m, 42.8 ft-lb)



10) Install the clutch operating cylinder.

Tightening torque:
41 N·m (4.2 kgf-m, 30.2 ft-lb)

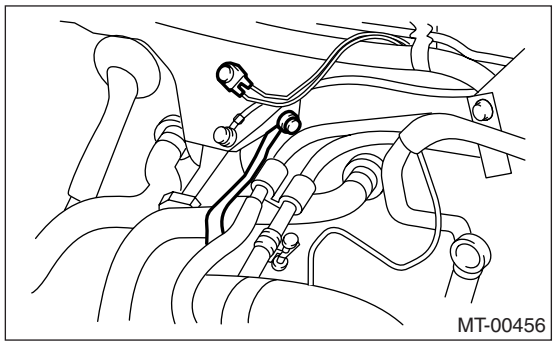
NOTE:
Check that the clutch hose is routed properly.

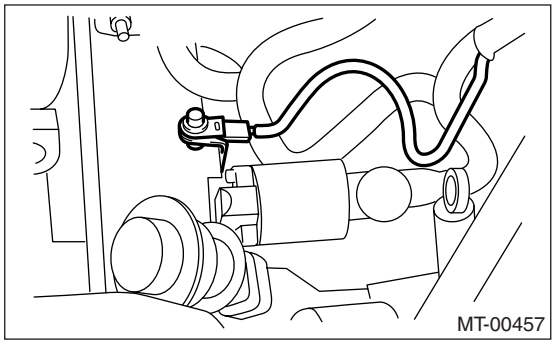


11) Install the starter assembly.

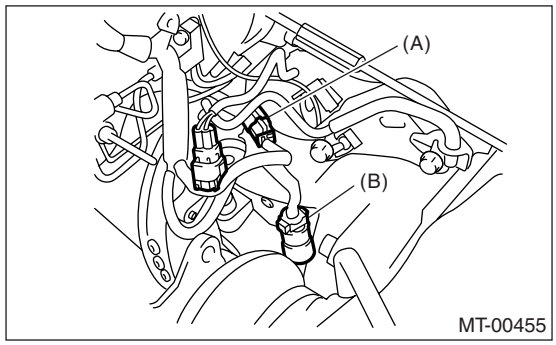
Tightening torque:
50 N·m (5.1 kgf-m, 36.9 ft-lb)

12) Install the transmission and body ground cable.





13) Connect the connector located on the upper side of transmission.

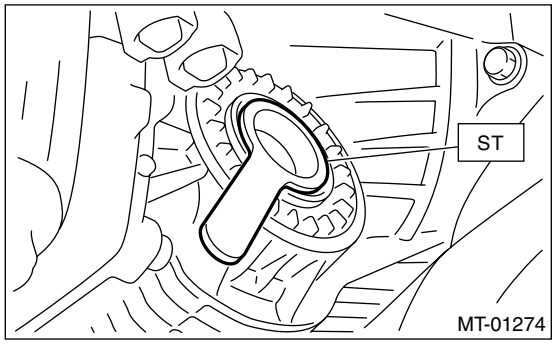


(A) Vehicle speed sensor connector
(B) Transmission connector

14) Lift-up the vehicle.
15) Apply grease to the oil seal lips.
16) Set the ST to the side retainer.
ST 28399SA010 OIL SEAL PROTECTOR
17) Install the front drive shaft into transmission.

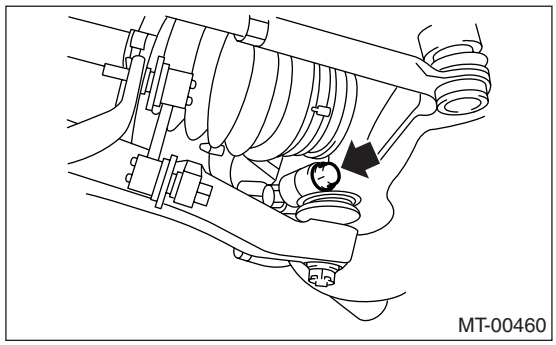
NOTE:
Replace the circlip of drive shaft with a new one.

18) Install the front drive shaft into transmission, remove the ST and insert the drive shaft securely.
ST 28399SA010 OIL SEAL PROTECTOR



19) Install the ball joint of transverse link to housing.

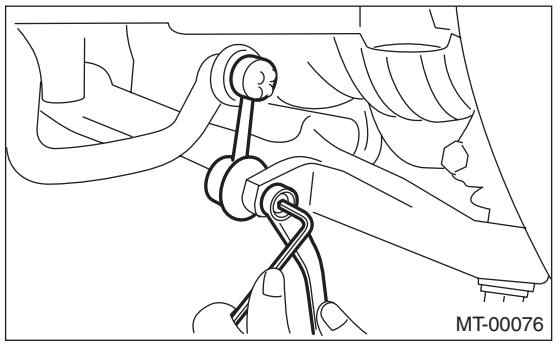
Tightening torque:
50 N·m (5.1 kgf-m, 36.9 ft-lb)



20) Install the stabilizer nut.

Tightening torque:
45 N·m (4.6 kgf-m, 33.2 ft-lb)

NOTE:
Discard the loosened self-locking nut and replace with a new one.



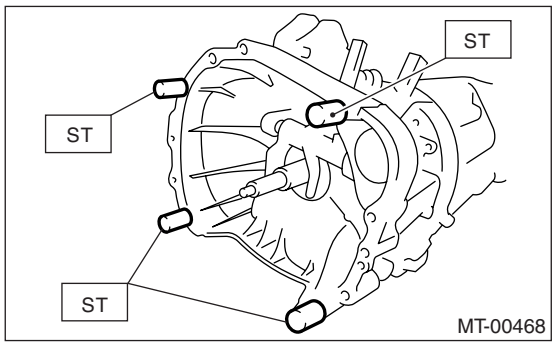
21) Install the propeller shaft. <Ref. to DS-18, INSTALLATION, Propeller Shaft.>
22) Install the center exhaust pipe. <Ref. to EX(H4DOTC)-11, INSTALLATION, Center Exhaust Pipe.>

23) Install the rear exhaust pipe and muffler. <Ref. to EX(H4DOTC)-15, INSTALLATION, Rear Exhaust Pipe.> , <Ref. to EX(H4DOTC)-14, INSTALLATION, Joint Pipe.>
24) Install the universal joint. <Ref. to PS-29, INSTALLATION, Universal Joint.>
25) Install the under cover.
26) Install the intercooler assembly. <Ref. to IN(H4DOTC)-12, INSTALLATION, Intercooler.>
27) Pour gear oil into the gauge hole. <Ref. to 6MT-30, REPLACEMENT, Transmission Gear Oil.>
28) Connect the battery ground cable to battery.

8. Preparation for Overhaul

A: PROCEDURE

1) Clean oil, grease, dirt and dust from transmission.
2) Attach the transmission to ST.
ST 18632AA000 STAND ASSY

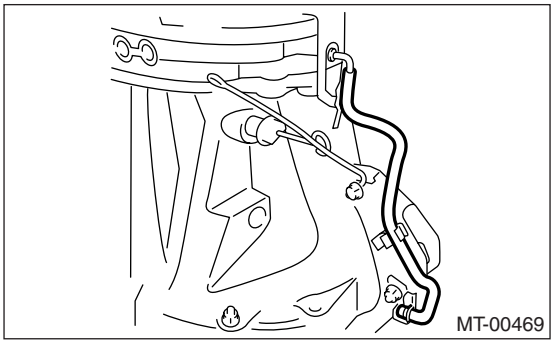


3) Rotating parts should be coated with oil prior to assembly.
4) All disassembled parts, if to be reused, should be reinstalled in the original positions and directions.
5) Gaskets, lock washers and lock nut must be replaced with new ones.
6) Liquid gasket should be used where specified to prevent leakage.

9. Air Breather Hose

A: REMOVAL

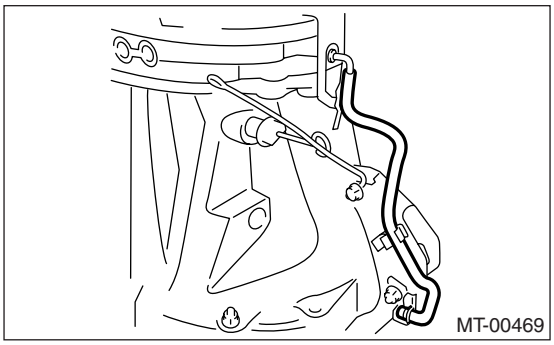
Disconnect the air breather hose.



B: INSTALLATION

Install the air breather hose.

NOTE:
When installing the hose, make sure that it is not bent or twist.



C: INSPECTION

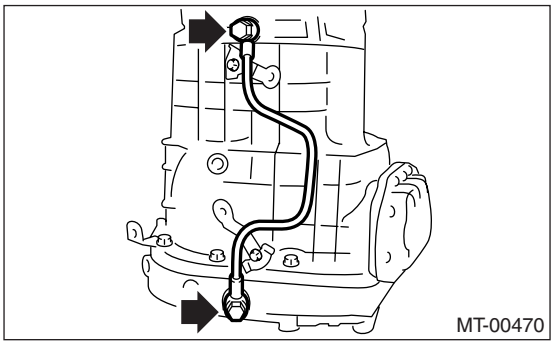
Make sure the hose is not cracked or clogged.

10.Oil Pipe

A: REMOVAL

Remove the oil pipe.

NOTE:
Use a new gasket.

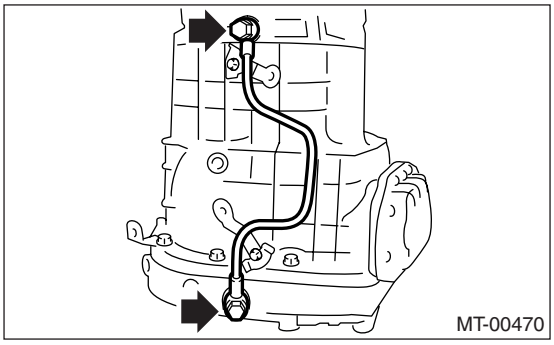


B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Use a new gasket.

Tightening torque:
32 N·m (3.3 kgf-m, 23.6 ft-lb)



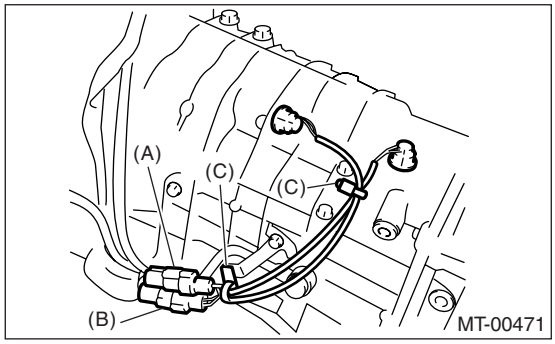
C: INSPECTION

1) Make sure there is no damage on pipe. If there is damage, replace the pipe.
2) Check the joint parts of pipe for oil leakage. If there is oil leakage, replace the gasket.

11.Back-up Light Switch

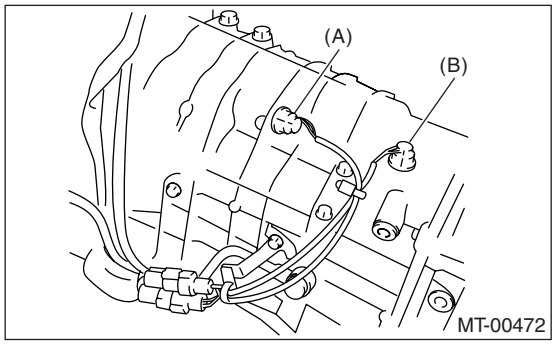
A: REMOVAL

1) Remove the manual transmission assembly from vehicle. <Ref. to 6MT-36, REMOVAL, Manual Transmission Assembly.>
2) Disconnect the back-up light switch connector.



(A) Back-up light switch connector (White)
(B) Neutral position switch connector (Black)
(C) Clip

3) Remove the back-up light switch.

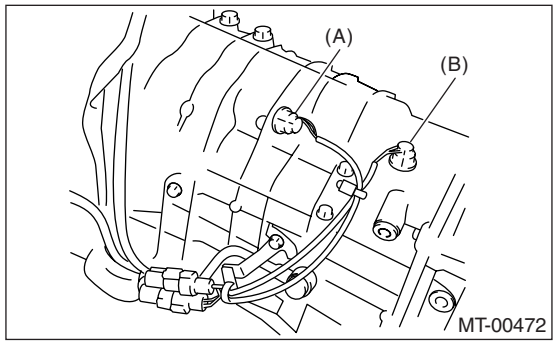


(A) Back-up light switch
(B) Neutral position switch

B: INSTALLATION

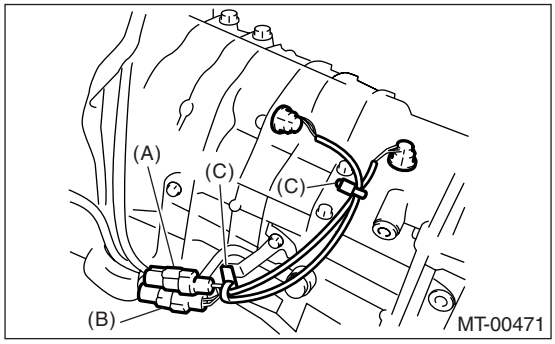
1) Install the back-up light switch.

Tightening torque:
32 N·m (3.3 kgf-m, 23.6 ft-lb)



(A) Back-up light switch
(B) Neutral position switch

2) Connect the back-up light switch connector.

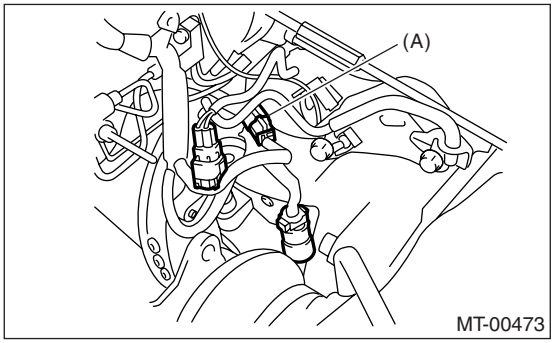


(A) Back-up light switch connector (White)
(B) Neutral position switch connector (Black)
(C) Clip

3) Install the manual transmission assembly to vehicle. <Ref. to 6MT-38, INSTALLATION, Manual Transmission Assembly.>

C: INSPECTION

1) Disconnect the ground cable from battery.
2) Remove the intercooler. <Ref. to IN(H4DOTC)-12, REMOVAL, Intercooler.>
3) Disconnect the transmission harness and chassis harness.

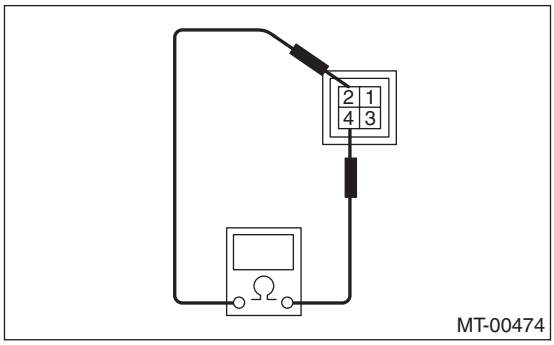


(A) Transmission connector

4) Measure the resistance between back-up light switch terminals. If it is not within specifications, replace the back-up light switch.

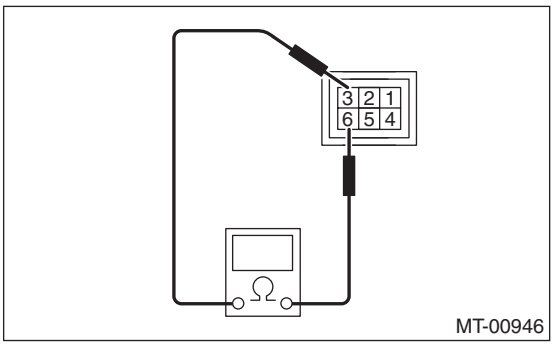
- Model without Drive's Control Center Differential

Gear shift position	Terminal No.	Specified resistance
Back-up position	2 and 4	Less than 1 Ω
Other positions		More than 1 MΩ



- Model with Drive's Control Center Differential

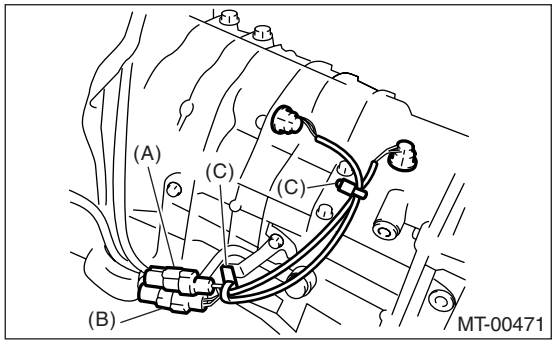
Gear shift position	Terminal No.	Specified resistance
Back-up position	3 and 6	Less than 1 Ω
Other positions		More than 1 MΩ



12.Neutral Position Switch

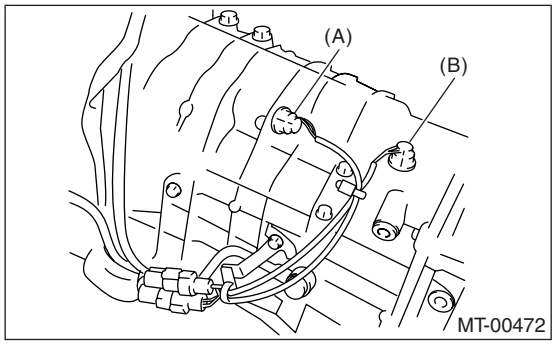
A: REMOVAL

1) Remove the manual transmission assembly from vehicle. <Ref. to 6MT-36, REMOVAL, Manual Transmission Assembly.>
2) Disconnect the neutral position switch connector and clip.



(A) Back-up light switch connector (White)
(B) Neutral position switch connector (Black)
(C) Clip

3) Remove the neutral position switch.

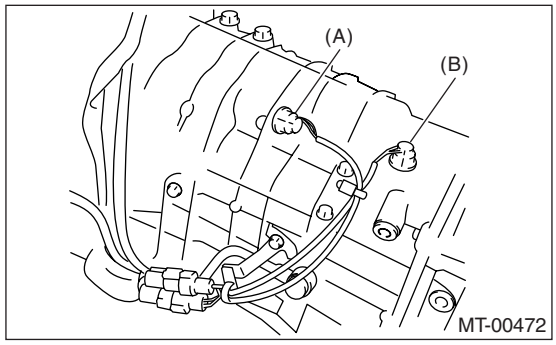


(A) Back-up light switch
(B) Neutral position switch

B: INSTALLATION

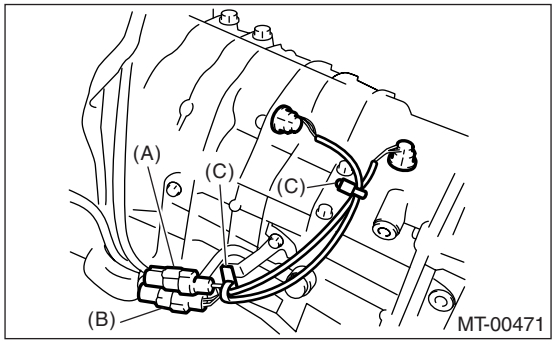
1) Install the neutral position switch.

Tightening torque:
32 N·m (3.3 kgf-m, 23.6 ft-lb)



(A) Back-up light switch
(B) Neutral position switch

2) Connect the neutral position switch connector and clip.

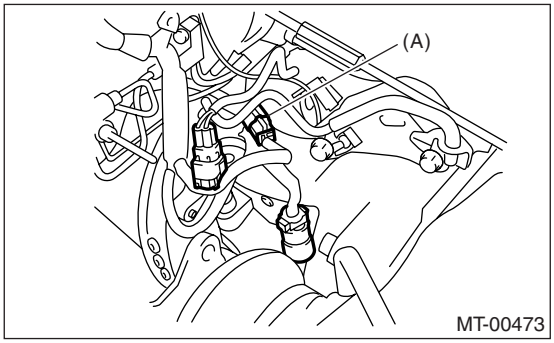


(A) Back-up light switch connector (White)
(B) Neutral position switch connector (Black)
(C) Clip

3) Install the manual transmission assembly to vehicle. <Ref. to 6MT-38, INSTALLATION, Manual Transmission Assembly.>

C: INSPECTION

1) Disconnect the ground cable from battery.
2) Remove the intercooler. <Ref. to IN(H4DOTC)-12, REMOVAL, Intercooler.>
3) Disconnect the transmission harness and chassis harness.

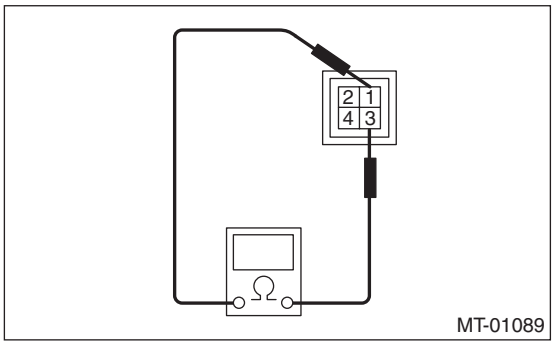


(A) Transmission connector

4) Measure the resistance between neutral position switch terminals. If it is not within specifications, replace the neutral position switch.

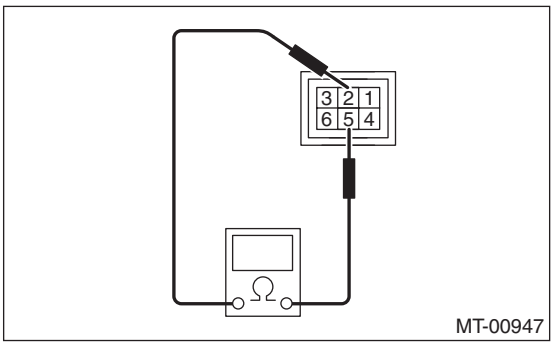
- Model without Drive's Control Center Differential

Gear shift position	Terminal No.	Specified resistance
Neutral position	1 and 3	Less than 1 Ω
Other positions		More than 1 MΩ



- Model with Drive's Control Center Differential

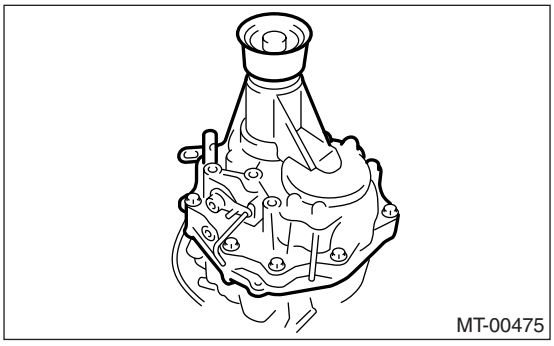
Gear shift position	Terminal No.	Specified resistance
Neutral position	2 and 5	Less than 1 Ω
Other positions		More than 1 MΩ



13.Extension Case

A: REMOVAL

1) Remove the manual transmission assembly from vehicle. <Ref. to 6MT-36, REMOVAL, Manual Transmission Assembly.>
2) Prepare the transmission for overhaul. <Ref. to 6MT-42, Preparation for Overhaul.>
3) Remove the extension case.

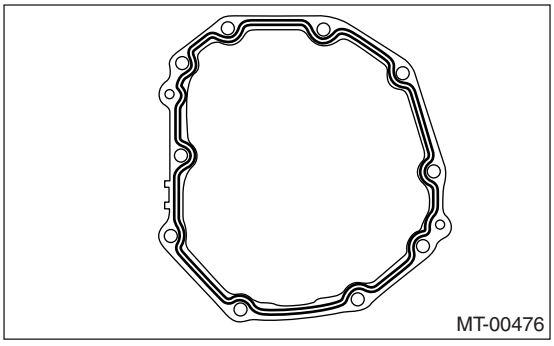


4) Completely remove the remaining liquid gasket from the extension case and transmission case.

B: INSTALLATION

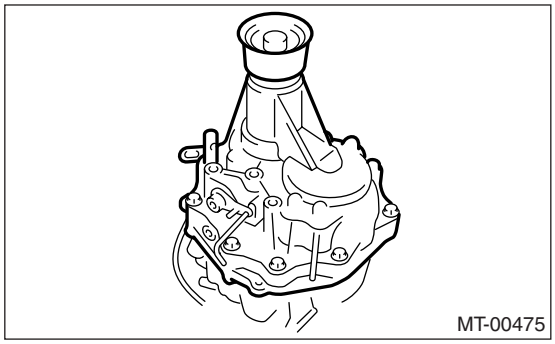
1) Select the transfer driven gear thrust washer, and then install it to extension case. <Ref. to 6MT-51, ADJUSTMENT, Extension Case.>
2) Apply oil lightly to the outer periphery of bearing cone, and then install it to extension case.
3) Select the thrust washer of transfer drive gear, and then install it to center differential.
4) Apply liquid gasket to the transmission case.

Liquid gasket:
THREE BOND 1215 (Part No. 004403007) or equivalent

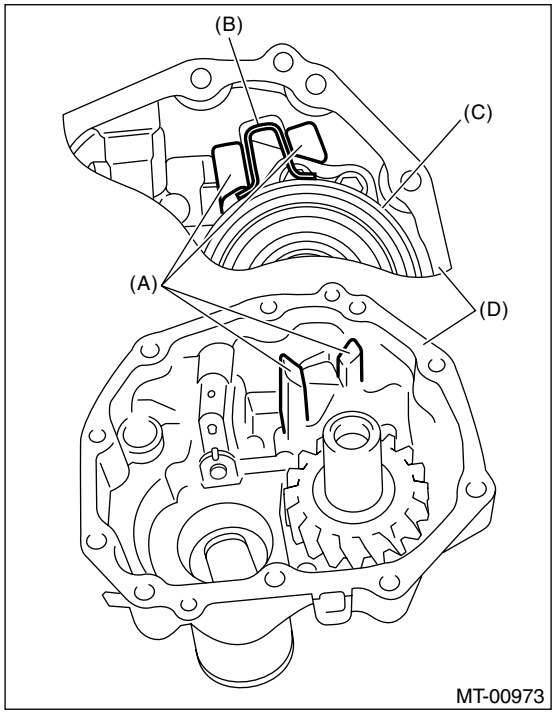


5) Install the extension case.

Tightening torque:
48 N·m (4.9 kgf-m, 35.4 ft-lb)



NOTE:
For model with Driver's Control Center Differential, insert the stopper portion of center differential between extension guides.

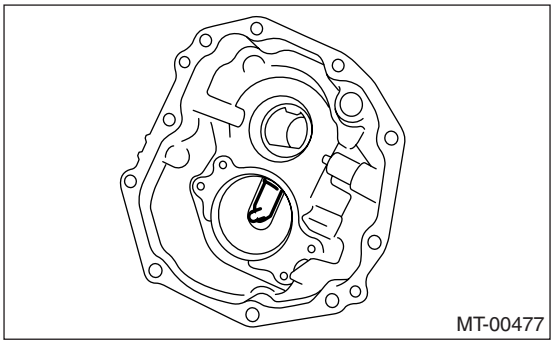


(A) Extension guides
(B) Stopper
(C) Center differential
(D) Extension case

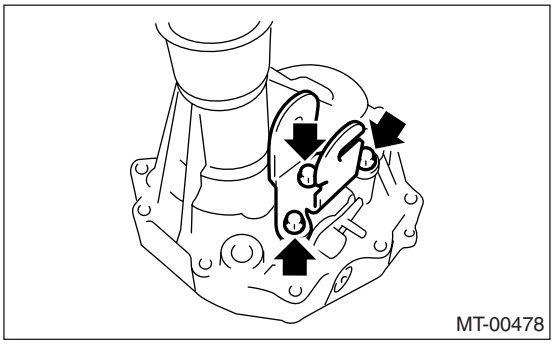
6) Install the manual transmission assembly to vehicle. <Ref. to 6MT-38, INSTALLATION, Manual Transmission Assembly.>

C: DISASSEMBLY

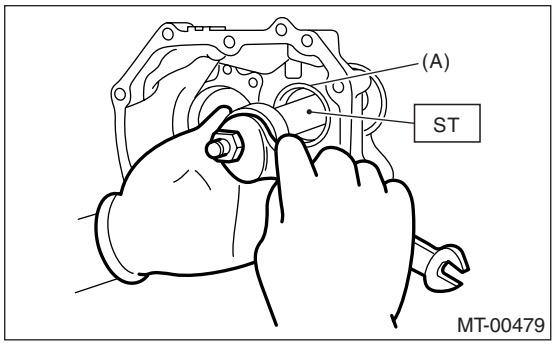
1) Remove the transfer drive gear. <Ref. to 6MT-58, REMOVAL, Transfer Drive Gear.>
2) Remove the extension guide.



3) Remove the shift bracket.

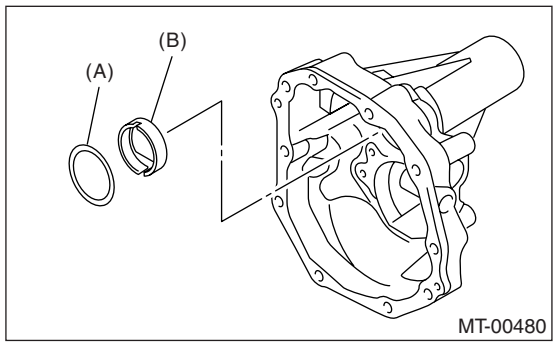


4) Using the ST, remove the bearing cone.
ST 18758AA000 PULLER



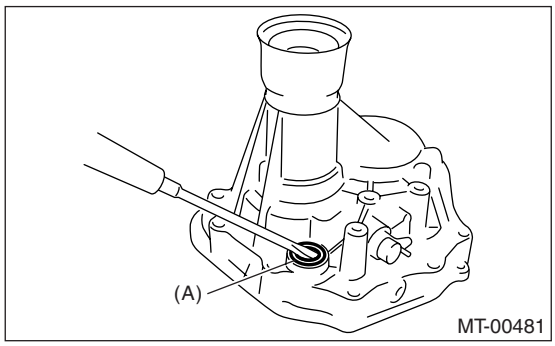
(A) Bearing cone

5) Remove the thrust washer and oil plate.



(A) Thrust washer
(B) Oil plate

6) Remove the shifter arm oil seal.

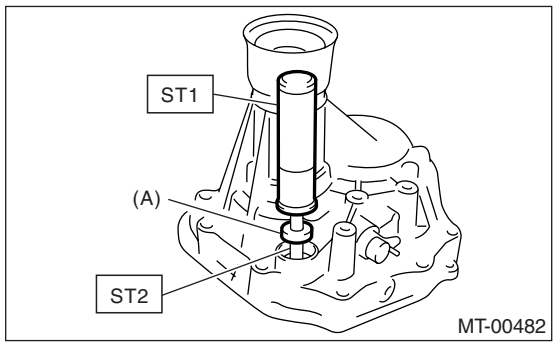


(A) Oil seal

7) Remove the reverse checking system. <Ref. to 6MT-55, REMOVAL, Reverse Check System.>
8) Remove the extension oil seal. <Ref. to 6MT-31, REPLACEMENT, Oil Seal.>

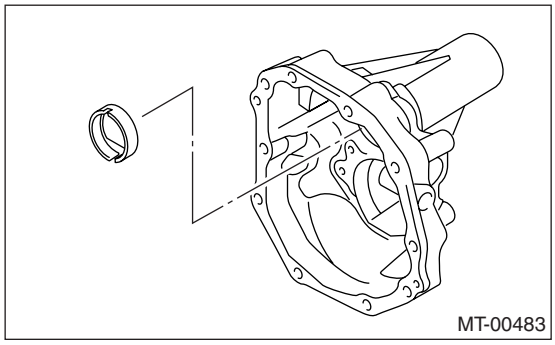
D: ASSEMBLY

1) Install the reverse checking system. <Ref. to 6MT-56, INSTALLATION, Reverse Check System.>
2) Install the extension case oil seal. <Ref. to 6MT-31, REPLACEMENT, Oil Seal.>
3) Using the ST, install the shifter arm oil seal.
ST1 18657AA000 INSTALLER
ST2 18671AA000 OIL SEAL GUIDE



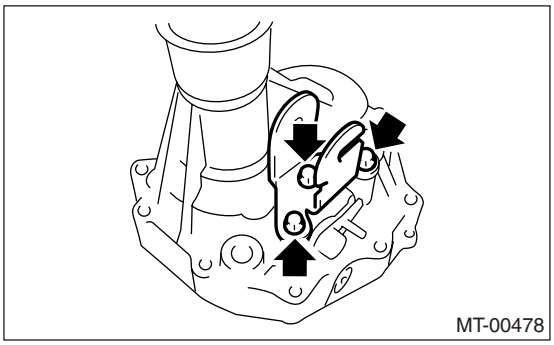
(A) Oil seal

4) Install the oil plate.



5) Select the bearing thrust washer, and then install it to extension case. <Ref. to 6MT-51, ADJUSTMENT, Extension Case.>
6) Apply oil lightly to the outer periphery of bearing cone, and then install it to extension case.
7) Install the shift bracket.

Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)



8) Install the extension guide, and then install the transfer driven gear. <Ref. to 6MT-58, INSTALLATION, Transfer Drive Gear.>

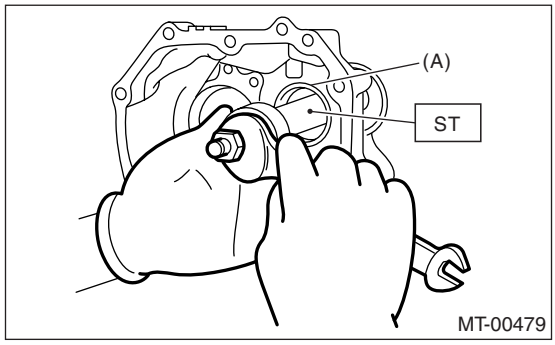
E: INSPECTION

1) Make sure there is no damage or crack on extension case. If there is damage or crack, replace the extension case.
2) Check each oil seal and joint part of extension case and transmission case for oil leakage. If there is oil leakage, replace the oil seal and liquid gasket.

F: ADJUSTMENT

1. TRANSFER DRIVEN GEAR BEARING THRUST WASHER ADJUSTMENT

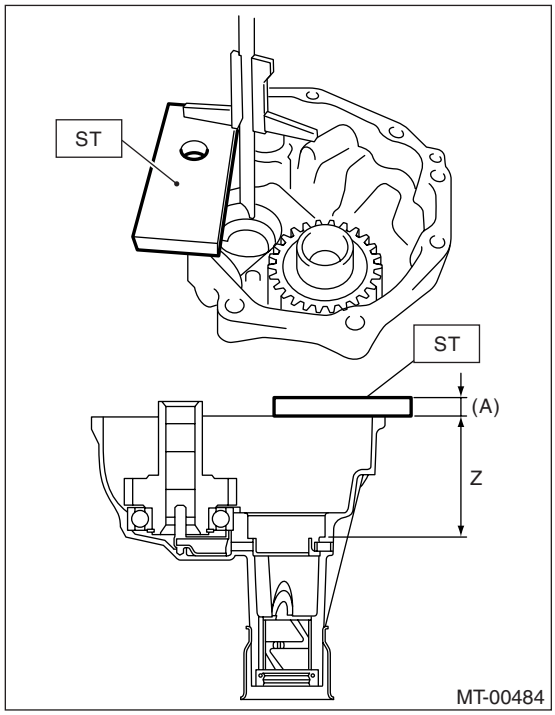
1) Using the ST, remove the bearing cone from extension case.
ST 18758AA000 PULLER



(A) Bearing cone

2) Remove the thrust washer.
3) Measure the depth “Z” between end of extension case and contact point of bearing cone.
ST 499575500 GAUGE

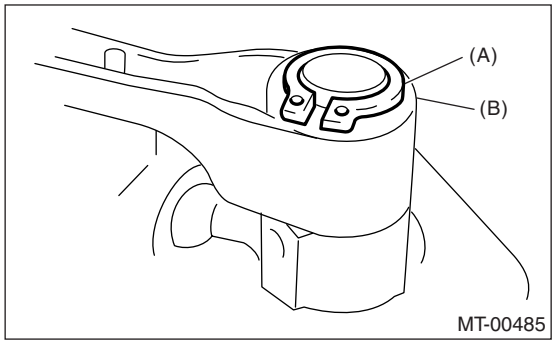
NOTE:
To measure the depth “Z”, subtract the thickness of ST [15 mm (0.59 in)] from the measured value.



(A) 15 mm (0.59 in)

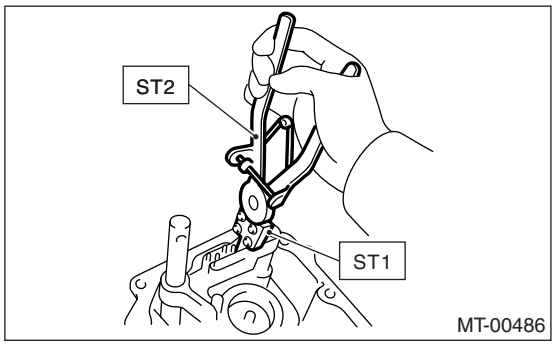
4) Remove the transfer driven gear. <Ref. to 6MT-60, REMOVAL, Transfer Driven Gear.>
5) Remove the center differential. <Ref. to 6MT-62, REMOVAL, Center Differential.>

6) Remove the snap ring and support from selector arm part.

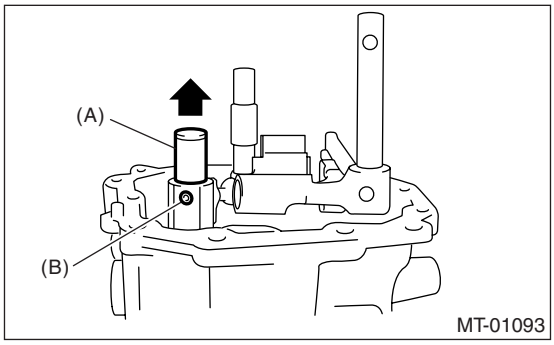


(A) Snap ring
(B) Support

7) Using the ST, remove the neutral set spring and support.
ST1 18756AA000 CLAW
ST2 399893600 PLIERS

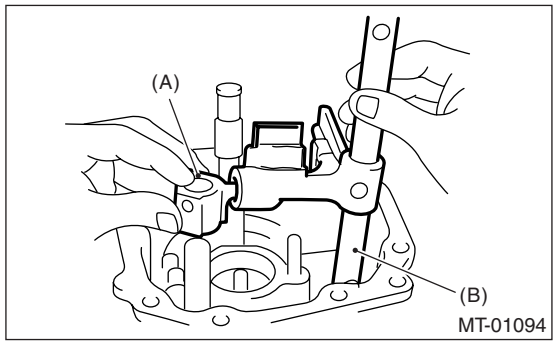


8) Lift-up the striking rod and remove spring pin.



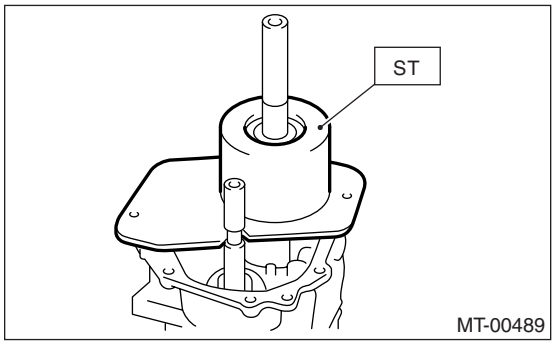
(A) Striking rod
(B) Spring pin

9) Remove the selector arm No. 2 and shifter arm.

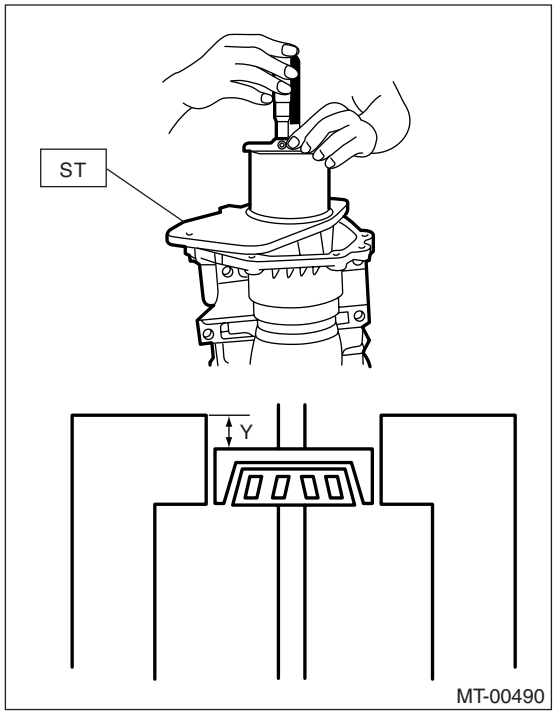


(A) Selector arm No. 2
(B) Shifter arm

10) Install the bearing cone to transfer driven gear.
11) Set the ST.
ST 18831AA000 GAUGE



12) Rotate the transfer driven gear approx. ten times to get the bearing accustomed.
13) Measure the depth “Y” between end of ST and bearing cone.
ST 18831AA000 GAUGE



14) Calculate the value "t" of transfer driven gear bearing thrust washer using the following equation.
t = Z − (100 − Y) − { −0.04 to 0.11 mm (−0.0016 to 0.0043 in)}

t mm (in)	Thickness of transfer driven gear bearing thrust washer.
Y mm (in)	Depth from end of ST to bearing cone.
Z mm (in)	Depth from end of extension case to contact point of bearing cone.
−0.04 — 0.11 mm (−0.0016 — 0.0043 in)	Standard clearance between thrust washer and taper roller bearing.
100 mm (3.94 in)	Height of ST.

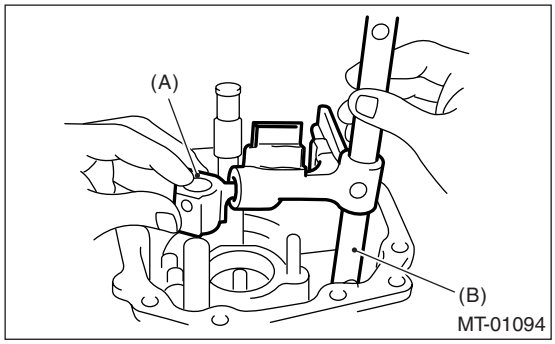
15) Select the nearest thrust washer from the following table, according to the calculated value "t".

Standard clearance between thrust washer and taper roller bearing:
−0.04 — 0.11 mm (−0.0016 — 0.0043 in)

NOTE:
Make clearance within standard.

Thrust washer (50 × 61 × t)	
Part No.	Thickness t mm (in)
803050060	0.50 (0.0197)
803050062	0.60 (0.0236)
803050064	0.70 (0.0276)
803050066	0.80 (0.0315)
803050068	0.90 (0.0354)
803050070	1.00 (0.0394)
803050072	1.10 (0.0433)
803050074	1.20 (0.0472)
803050076	1.30 (0.0512)
803050078	1.40 (0.0551)

16) Install the selector arm No. 2 and shifter arm.

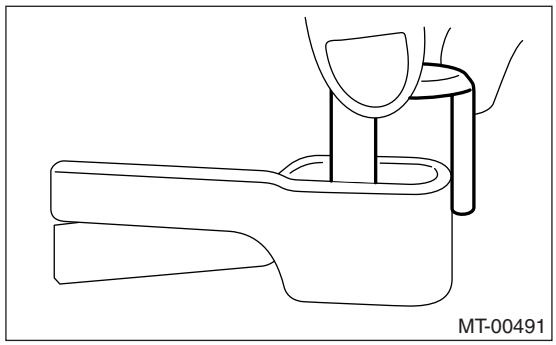


(A) Selector arm No. 2
(B) Shifter arm

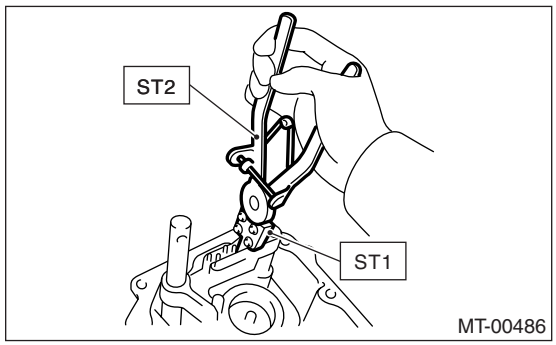
17) Install a new spring pin.

18) Install the support to neutral set spring.

NOTE:
Make sure to install the support in proper direction.



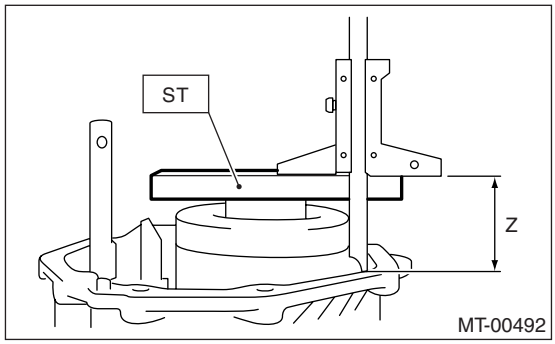
19) Using the ST, install the neutral set spring and support.
ST1 18756AA000 CLAW
ST2 399893600 PLIERS



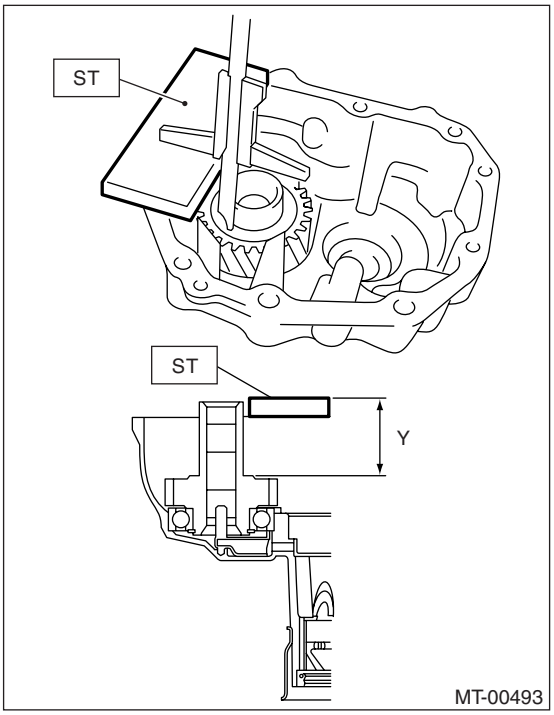
20) Install the snap ring.
21) Install the center differential.

2. SELECTING THE TRANSFER DRIVE GEAR THRUST WASHER

1) Measure the height "Z" between end of transmission case and end of ST.
ST 499575500 GAUGE



2) Measure the depth “Y” between end of ST and transfer drive gear.
ST 499575500 GAUGE



3) Calculate the value “t” of transfer drive gear thrust washer using the following equation.
t = {Y − 15 mm (0.59 in)} − {Z − 15 mm (0.59 in)} − 0.45 to 0.65 mm (0.018 to 0.026 in)

t mm (in)	Thickness of transfer drive gear thrust washer
Y mm (in)	Depth from end of ST to transfer drive gear
Z mm (in)	Height from end of transmission case to the end of ST
0.45 — 0.65 mm (0.018 — 0.026 in)	Standard clearance between thrust washer and transfer drive gear.
15 mm (0.59 in)	Thickness of ST

4) Select the nearest thrust washer from the following table, according to the calculated value “t”.

Standard clearance between thrust washer and transfer drive gear:
0.45 — 0.65 mm (0.018 — 0.026 in)

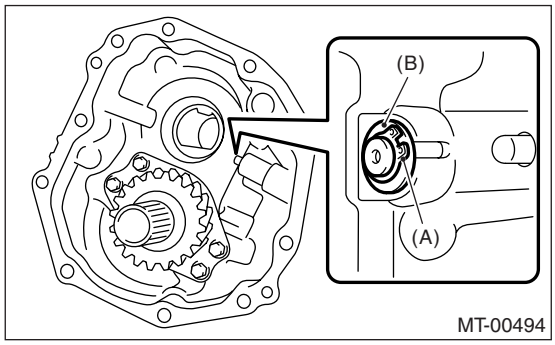
Thrust washer (36.3 × 52 × t)	
Part No.	Thickness mm (in)
803036070	0.80 (0.0315)
803036071	0.95 (0.0374)
803036072	1.10 (0.0433)
803036073	1.25 (0.0492)
803036074	1.40 (0.0551)
803036075	0.65 (0.0256)

5) Install the selected thrust washer.

14.Reverse Check System

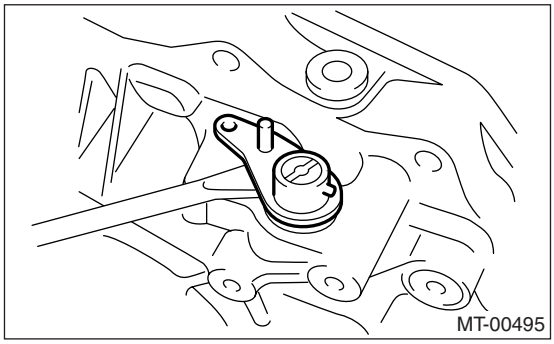
A: REMOVAL

1) Remove the manual transmission assembly from vehicle. <Ref. to 6MT-36, REMOVAL, Manual Transmission Assembly.>
2) Prepare the transmission for overhaul. <Ref. to 6MT-42, Preparation for Overhaul.>
3) Remove the extension case. <Ref. to 6MT-49, REMOVAL, Extension Case.>
4) Remove the snap ring and washer from reverse check shaft.



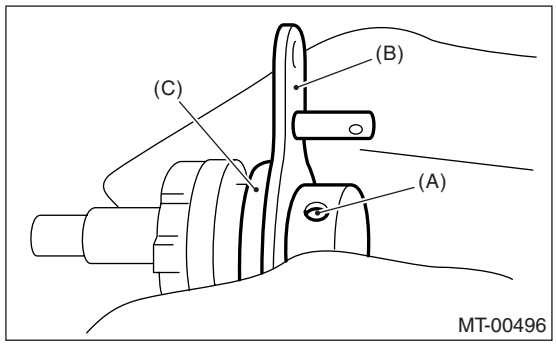
(A) Snap ring
(B) Washer

5) Remove the reverse check shaft and spring from extension case.



6) Remove the spring pin, and then remove the reverse check lever and oil seal from reverse check shaft.

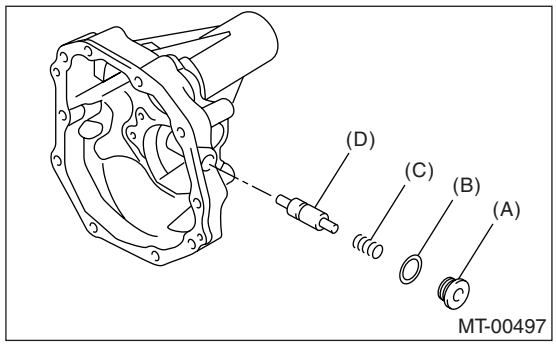
NOTE:
Do not reuse the oil seal.



(A) Spring pin
(B) Reverse check lever
(C) Oil seal

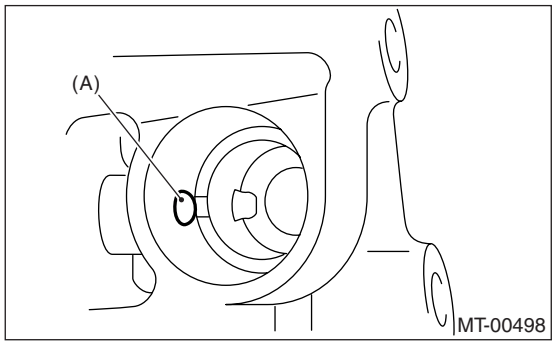
7) Remove the plug from extension case, then remove the gasket, spring and reverse check plug.

NOTE:
Do not reuse the gasket.



(A) Plug
(B) Gasket
(C) Spring
(D) Reverse check plug

8) Remove the reverse lock plunger.

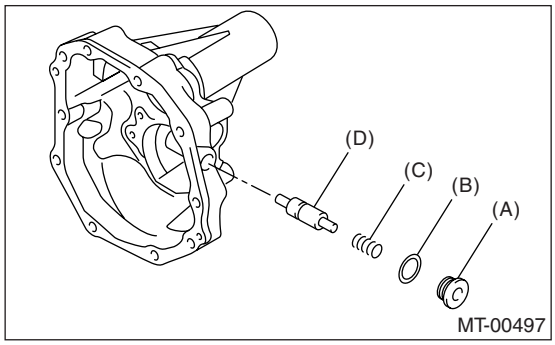


(A) Reverse lock plunger

B: INSTALLATION

1) Insert the reverse lock plunger.
2) Install in the order of reverse check plug, spring, gasket and plug.

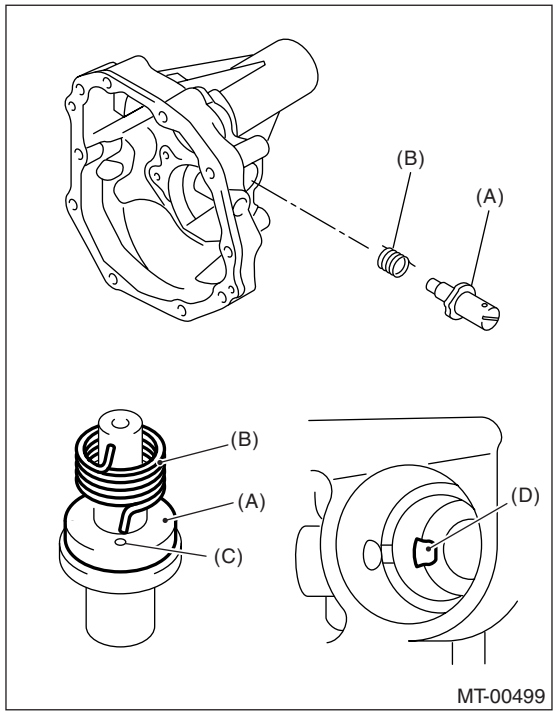
Tightening torque:
41 N·m (4.2 kgf-m, 30.2 ft-lb)



(A) Plug
(B) Gasket
(C) Spring
(D) Reverse check plug

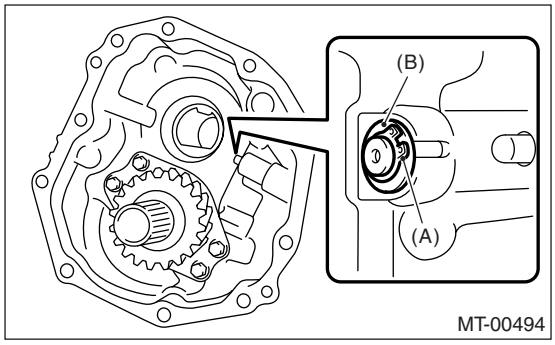
3) Install the spring and reverse check shaft to extension case.

NOTE:
Be sure the spring end aligns with the hole of reverse check shaft and cutout portion of extension case.



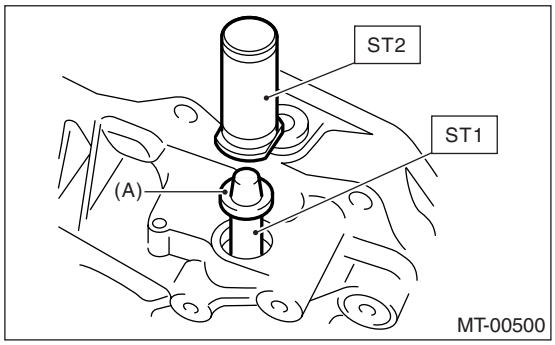
(A) Reverse check shaft
(B) Spring
(C) Hole
(D) Cutout portion

4) Install the washer and snap ring.



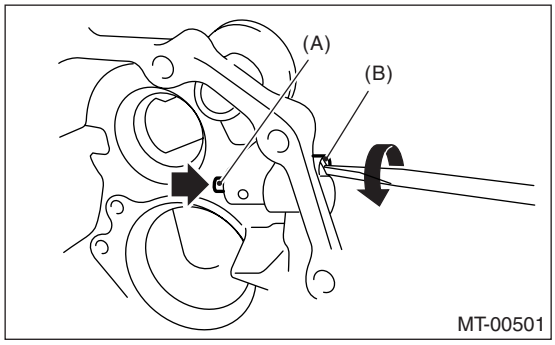
(A) Snap ring
(B) Washer

5) Set the ST1 to reverse check shaft. Install a new oil seal, then press with ST2.
ST1 18671AA000 OIL SEAL GUIDE
ST2 18657AA010 INSTALLER



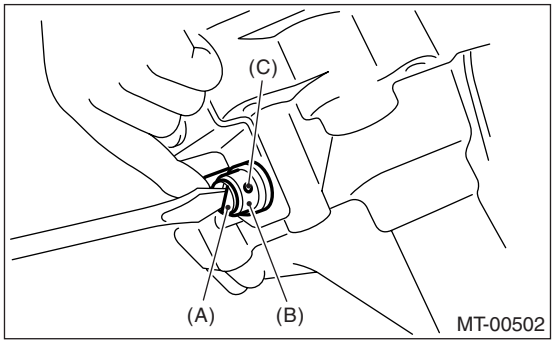
(A) Oil seal

6) Insert the reverse check lever, then rotate the reverse check shaft until the plunger can be pushed in first.



(A) Plunger
(B) Reverse check shaft

7) Align the hole of reverse check lever and reverse check shaft, then install the spring pin.



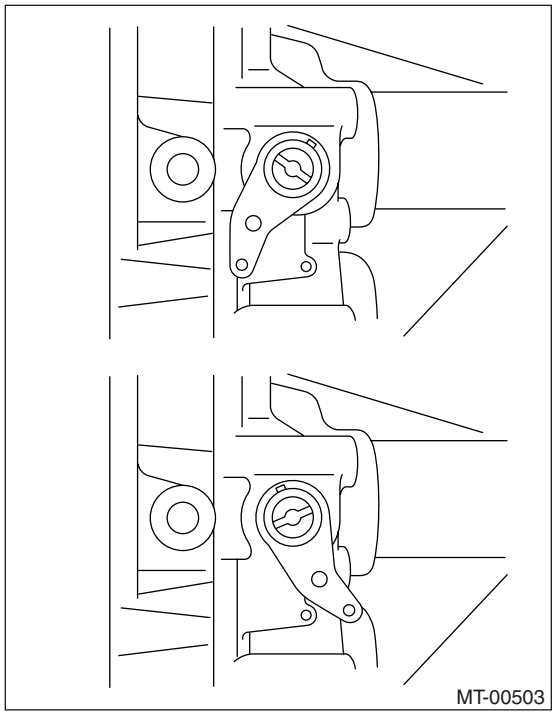
(A) Reverse check shaft
(B) Reverse check lever
(C) Hole

8) Make sure the reverse check operates correctly. <Ref. to 6MT-57, INSPECTION, Reverse Check System.>

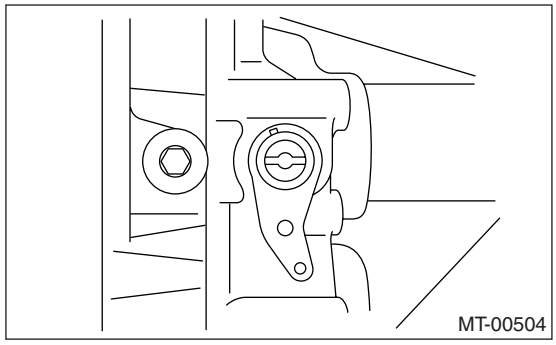
9) Install the extension case. <Ref. to 6MT-49, INSTALLATION, Extension Case.>
10) Install the manual transmission assembly to vehicle. <Ref. to 6MT-38, INSTALLATION, Manual Transmission Assembly.>

C: INSPECTION

1) Make sure there is no damage on each parts.
2) Make sure the reverse check lever operates smoothly.
3) Make sure there is no oil leakage on oil seal part of reverse check shaft. If there is oil leakage, replace the oil seal.
4) Inspect the reverse check operation.
(1) The plunger can be pushed or the gear can be shifted to reverse, when reverse check lever is in the following position.



(2) The plunger cannot be pushed or the gear cannot be shifted to reverse, when reverse check lever is in the following position.

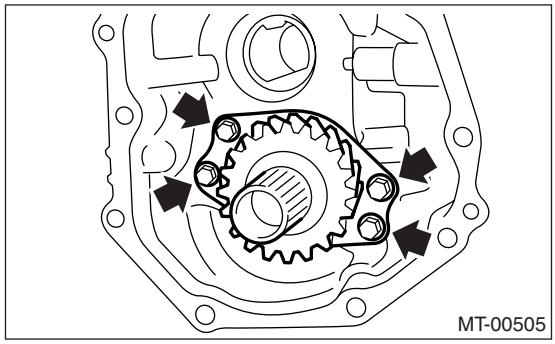


5) If not as specified, reassemble the reverse check system.

15.Transfer Drive Gear

A: REMOVAL

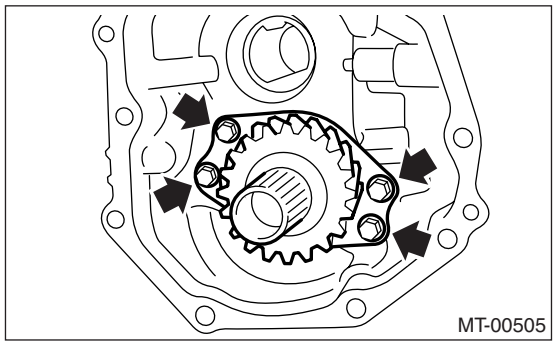
1) Remove the manual transmission assembly from vehicle. <Ref. to 6MT-36, REMOVAL, Manual Transmission Assembly.>
2) Prepare the transmission for overhaul. <Ref. to 6MT-42, Preparation for Overhaul.>
3) Remove the extension case. <Ref. to 6MT-49, REMOVAL, Extension Case.>
4) Remove the transfer drive gear.



B: INSTALLATION

1) Install the transfer drive gear.

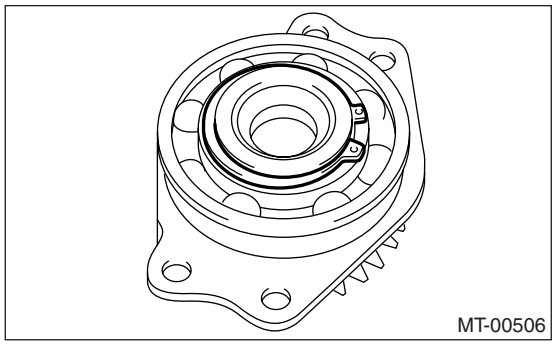
Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)



2) If the ball bearing, transfer drive gear or snap ring is replaced, select the transfer drive gear thrust washer. <Ref. to 6MT-50, ASSEMBLY, Extension Case.>
3) Install the extension case. <Ref. to 6MT-49, INSTALLATION, Extension Case.>
4) Install the manual transmission assembly to vehicle. <Ref. to 6MT-38, INSTALLATION, Manual Transmission Assembly.>

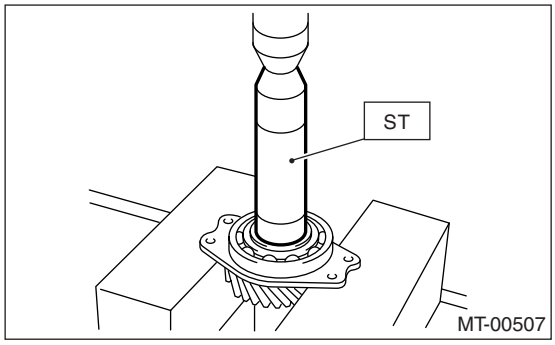
C: DISASSEMBLY

1) Remove the snap ring.



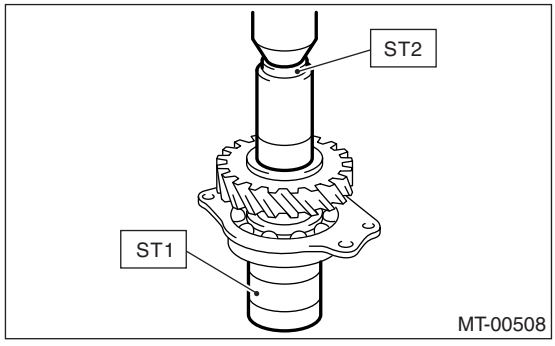
2) Using the ST, remove the ball bearing.
ST 499877000 RACE 4-5 INSTALLER

NOTE:
Do not reuse the ball bearing.

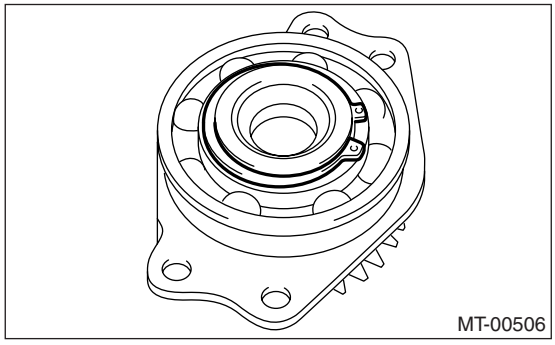


D: ASSEMBLY

1) Using the ST, install the ball bearing.
ST1 499247400 INSTALLER
ST2 398497701 SEAT



2) Install the snap ring.



3) Inspect the clearance between snap ring and ball bearing. <Ref. to 6MT-59, INSPECTION, Transfer Drive Gear.>

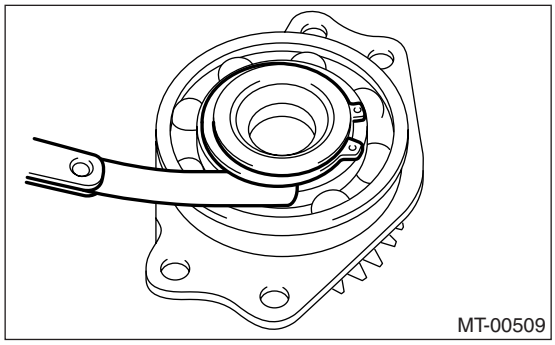
E: INSPECTION

1) Bearings
Replace the bearings in the following cases.
- Broken or rusty bearings
- Worn or damaged
- Bearings that fail to turn smoothly or make abnormal noise.

2) Drive gear
Replace the drive gear in the following cases.
- If their tooth surface and shaft are excessively broken or damaged.

3) Measure the clearance between snap ring and inner race of ball bearing with a thickness gauge.

Standard clearance between snap ring and inner race:
0 — 0.15 mm (0 — 0.0059 in)



4) If the measurement is not within specifications, select suitable snap ring.

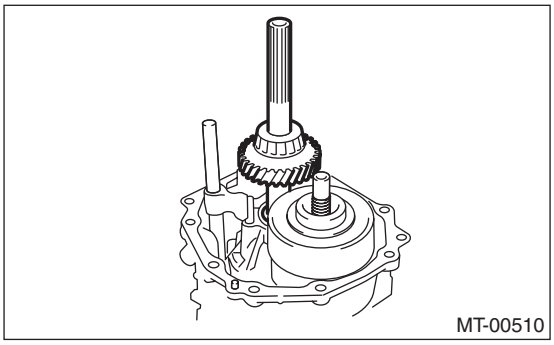
Thrust washer	
Part No.	Thickness mm (in)
805045050	1.76 (0.069)
805045060	1.88 (0.074)
805045070	2.00 (0.079)

After replacement of the snap ring, inspect the clearance again.

16.Transfer Driven Gear

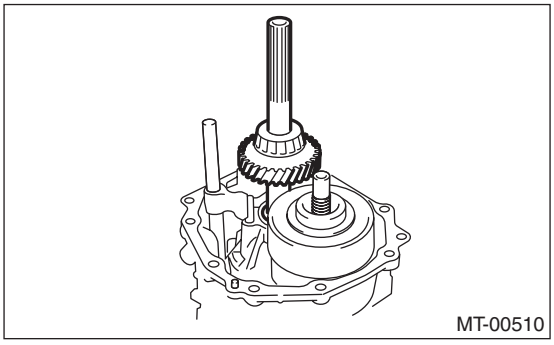
A: REMOVAL

1) Remove the manual transmission assembly from vehicle. <Ref. to 6MT-36, REMOVAL, Manual Transmission Assembly.>
2) Prepare the transmission for overhaul. <Ref. to 6MT-42, Preparation for Overhaul.>
3) Remove the extension case. <Ref. to 6MT-49, REMOVAL, Extension Case.>
4) Remove the transfer driven gear.



B: INSTALLATION

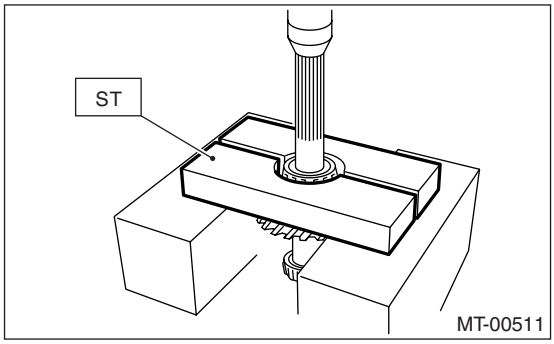
1) Install the transfer driven gear.



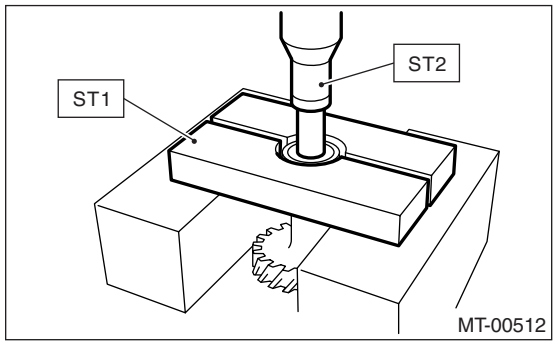
2) If the bearing or transfer driven gear is replaced, select the transfer driven thrust washer. <Ref. to 6MT-51, ADJUSTMENT, Extension Case.>
3) Install the extension case. <Ref. to 6MT-49, INSTALLATION, Extension Case.>
4) Install the manual transmission assembly to vehicle. <Ref. to 6MT-38, INSTALLATION, Manual Transmission Assembly.>

C: DISASSEMBLY

1) Using the ST, remove the roller bearing of extension case side.
ST 498515700 REMOVER



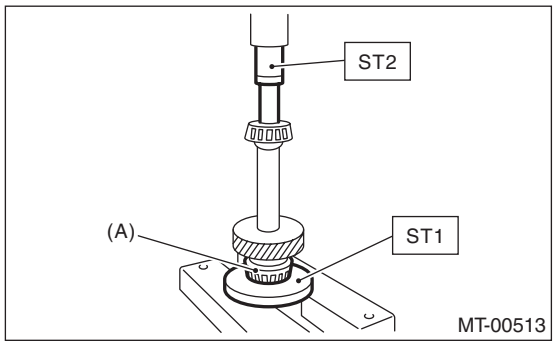
2) Using the ST, remove the roller bearing of transmission case side.
ST1 899858600 REMOVER
ST2 899864100 REMOVER



D: ASSEMBLY

1) Using the ST, install the roller bearing of extension case side.
ST1 398177700 INSTALLER
ST2 899864100 REMOVER

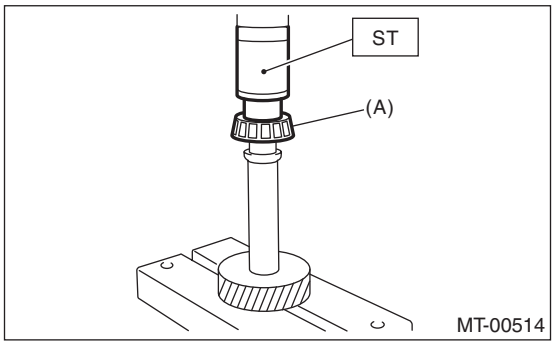
CAUTION:
Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).



(A) Roller bearing

2) Using the ST, install the roller bearing of transmission case side.
ST 499757002 INSTALLER

CAUTION:
Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).



(A) Roller bearing

E: INSPECTION

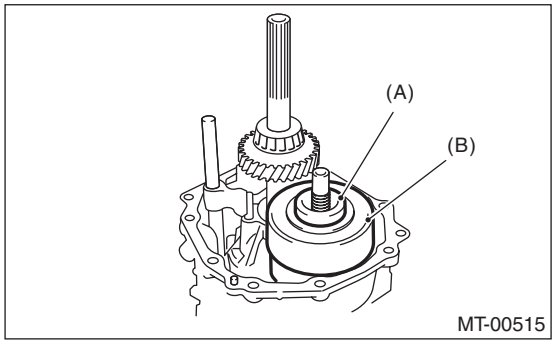
1) Bearings
Replace the bearing in following cases.
- Broken or rusty bearings
- Worn or damaged
- Bearings that fail to turn smoothly or make abnormal noise when turned after gear oil lubrication.

2) Driven gear
Replace the driven gear in following case.
- If their tooth surfaces and shaft are excessively broken or damaged.

17.Center Differential

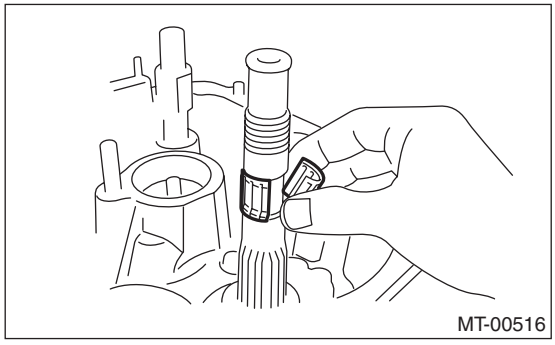
A: REMOVAL

1) Remove the manual transmission case assembly from vehicle. <Ref. to 6MT-36, REMOVAL, Manual Transmission Assembly.>
2) Prepare the transmission for overhaul. <Ref. to 6MT-42, Preparation for Overhaul.>
3) Remove the extension case. <Ref. to 6MT-49, REMOVAL, Extension Case.>
4) Remove the transfer driven gear. <Ref. to 6MT-60, REMOVAL, Transfer Driven Gear.>
5) Disconnect the connector from center differential. (Model with Drive's Control Center Differential)
6) Remove the thrust washer and center differential.



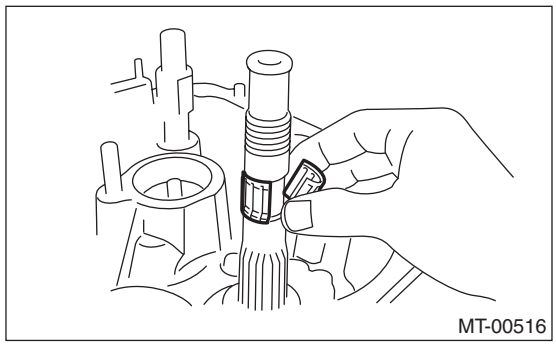
(A) Thrust washer
(B) Center differential

7) Remove the needle bearing.

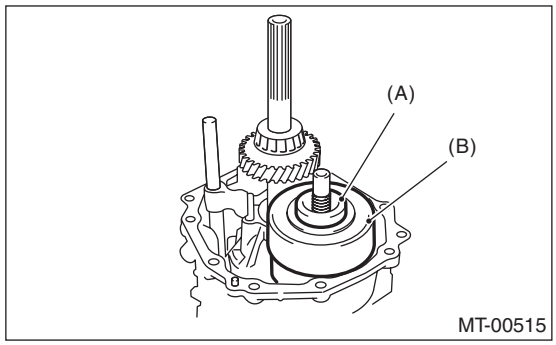


B: INSTALLATION

1) Install the needle bearing.



2) Install the thrust washer and center differential.



(A) Thrust washer
(B) Center differential

3) Connect the connector from center differential, and secure it to oil guide.
4) If replacing the center differential, select the transfer drive gear and thrust washer and install. <Ref. to 6MT-51, ADJUSTMENT, Extension Case.>
5) Install the transfer driven gear. <Ref. to 6MT-60, INSTALLATION, Transfer Driven Gear.>
6) Install the extension case. <Ref. to 6MT-49, INSTALLATION, Extension Case.>
7) Install the manual transmission case assembly to vehicle. <Ref. to 6MT-38, INSTALLATION, Manual Transmission Assembly.>

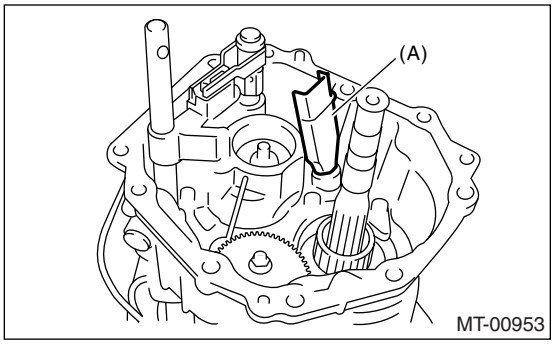
C: INSPECTION

Make sure there is no damage on the center differential. Replace if damaged.

18.Oil Pump

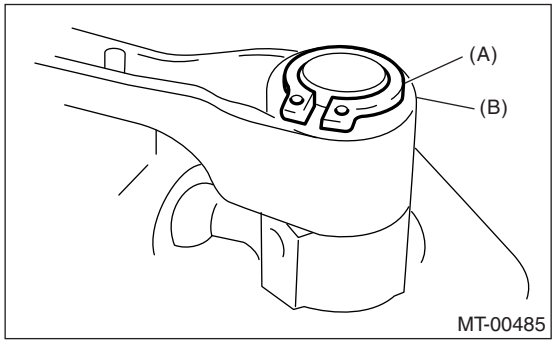
A: REMOVAL

1) Remove the manual transmission assembly from vehicle. <Ref. to 6MT-36, REMOVAL, Manual Transmission Assembly.>
2) Prepare the transmission for overhaul. <Ref. to 6MT-42, Preparation for Overhaul.>
3) Remove the extension case. <Ref. to 6MT-49, REMOVAL, Extension Case.>
4) Remove the transfer driven gear. <Ref. to 6MT-60, REMOVAL, Transfer Driven Gear.>
5) Remove the center differential. <Ref. to 6MT-62, REMOVAL, Center Differential.>
6) Remove the oil guide.



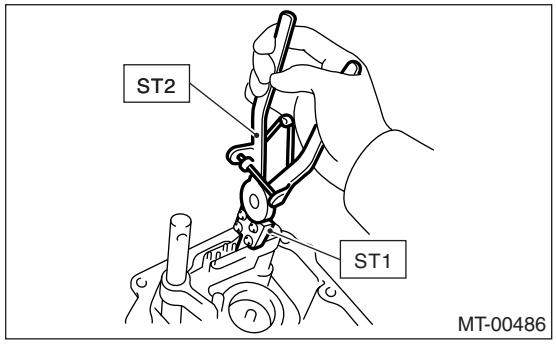
(A) Oil guide

7) Remove the snap ring.

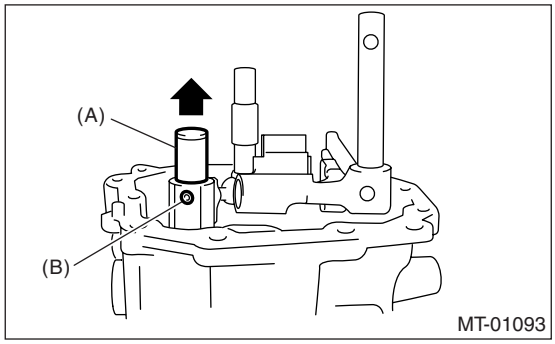


(A) Snap ring
(B) Support

8) Using the ST, remove the neutral set spring and support.
ST1 18756AA000 CLAW
ST2 399893600 PLIERS

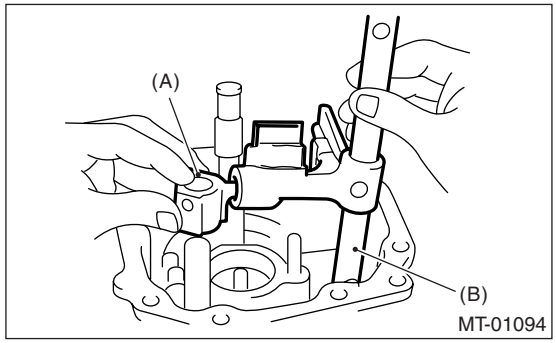


9) Raise the striking rod up, and then remove the spring pin.



(A) Striking rod
(B) Spring pin

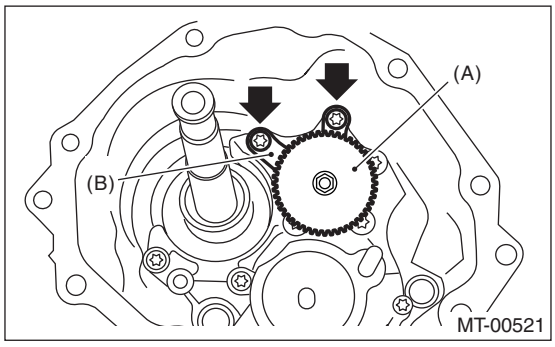
10) Remove the selector arm No. 2 and shifter arm.



(A) Selector arm No. 2
(B) Shifter arm

11) Remove the oil pump shaft assembly and plate.

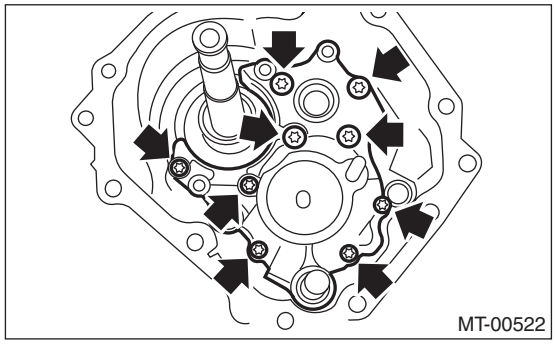
NOTE:
Remove the bolts using ST, because tool may break if general tool is used.
ST 18663AA000 SOCKET



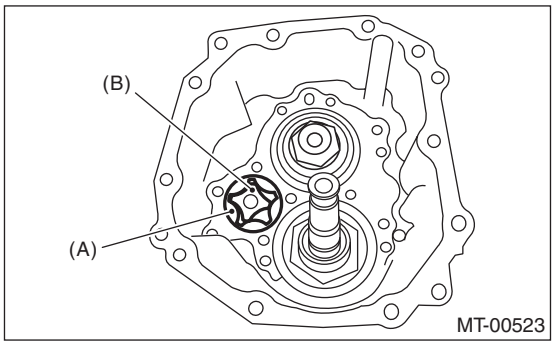
(A) Oil pump shaft assembly
(B) Plate

12) Remove the oil pump cover assembly.

NOTE:
Remove the bolts using ST, because tool may break if general tool is used.
ST 18663AA000 SOCKET



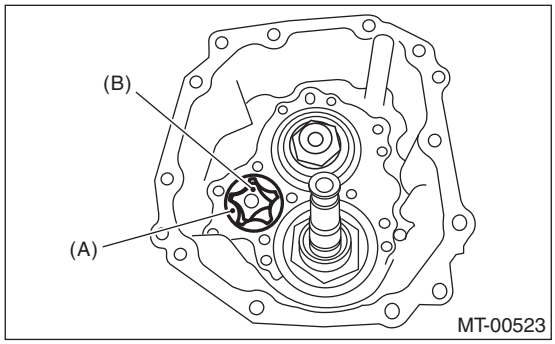
13) Remove the thrust washer on main shaft part.
14) Remove the oil pump rotor.



(A) Outer rotor
(B) Inner rotor

B: INSTALLATION

1) Apply oil to the outer periphery of outer rotor, then install to transmission case.

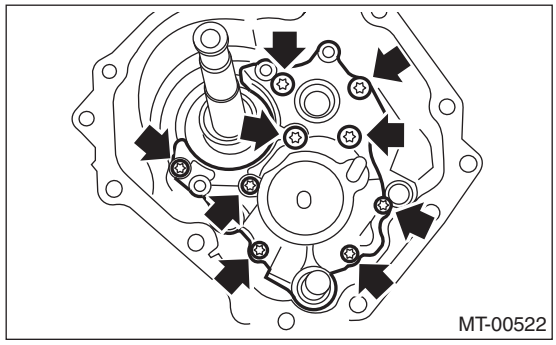


(A) Outer rotor
(B) Inner rotor

2) Install the thrust washer to main shaft part.
3) Install the oil pump cover assembly.

Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)

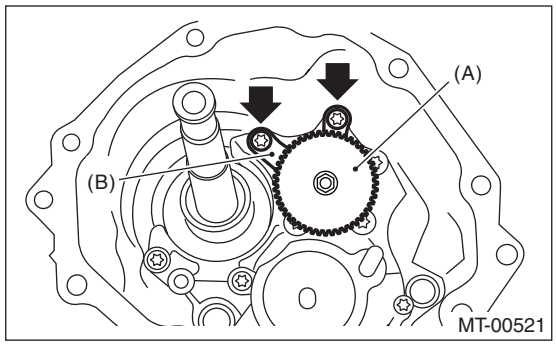
ST 18663AA000 SOCKET



4) Install the oil pump shaft assembly and plate.

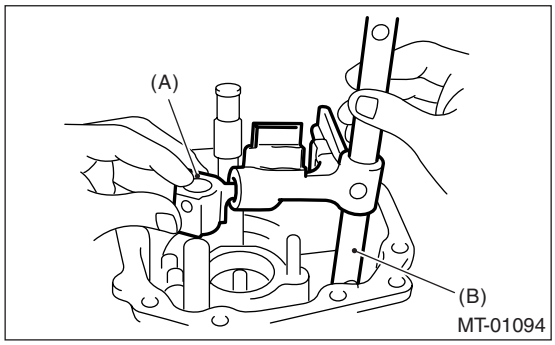
Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)

ST 18663AA000 SOCKET



(A) Oil pump shaft assembly
(B) Plate

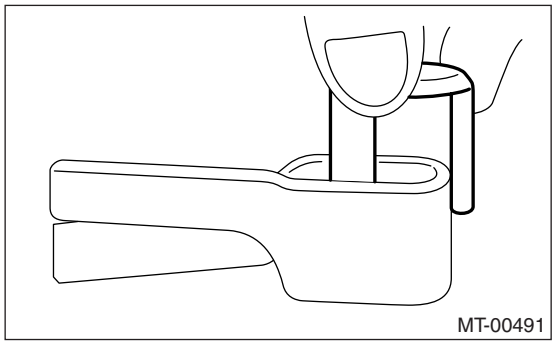
5) If replacing the oil pump cover assembly, select the transfer driven gear and thrust washer, then install them to the extension case. <Ref. to 6MT-51, ADJUSTMENT, Extension Case.>
6) Install the selector arm No. 2 and shifter arm.



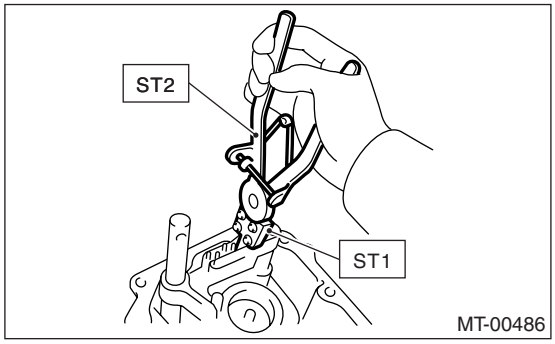
(A) Selector arm No. 2
(B) Shift arm

7) Install a new spring pin.
8) Install the support to neutral set spring.

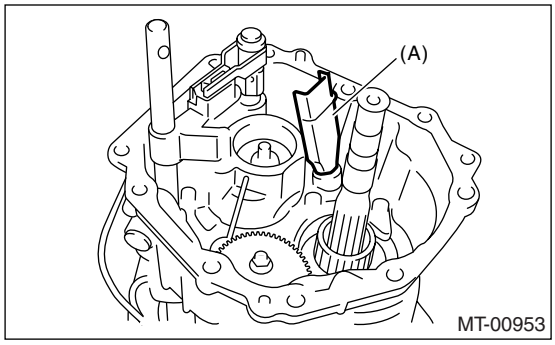
NOTE:
Make sure to install the support in proper direction.



9) Using the ST, install the neutral set spring and support.
ST1 18756AA000 CLAW
ST2 399893600 PLIERS



10) Install the snap ring.
11) Install the oil guide.



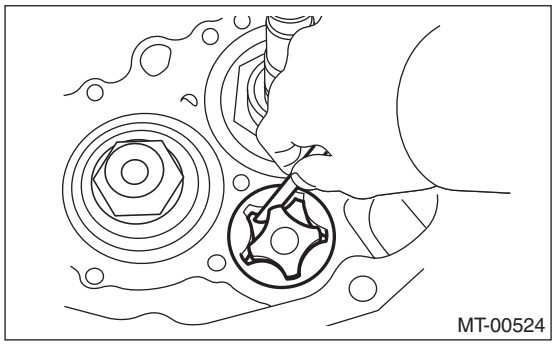
(A) Oil guide

12) Install the center differential. <Ref. to 6MT-62, INSTALLATION, Center Differential.>
13) Install the transfer driven gear. <Ref. to 6MT-60, INSTALLATION, Transfer Driven Gear.>
14) Install the extension case. <Ref. to 6MT-49, INSTALLATION, Extension Case.>
15) Install the manual transmission assembly to vehicle. <Ref. to 6MT-38, INSTALLATION, Manual Transmission Assembly.>

C: INSPECTION

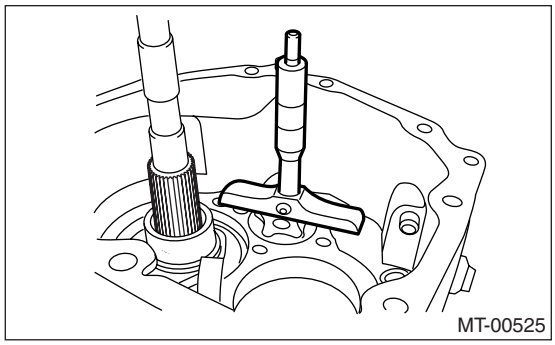
1) Make sure there is no damage on the inner rotor and outer rotor. Replace the inner rotor and outer rotor as assembly if damaged.
2) Clearance at tip Install the inner rotor and outer rotor to transmission case. Align tip of the inner rotor and outer rotor, then measure the clearance. Replace the inner rotor and outer rotor as a set if clearance exceeds specification.

Specification of clearance at tip:
Less than 0.15 mm (0.0059 in)



3) Side clearance Measure to the transmission case and rotor. Replace the inner rotor and outer rotor as a set if clearance exceeds specification.

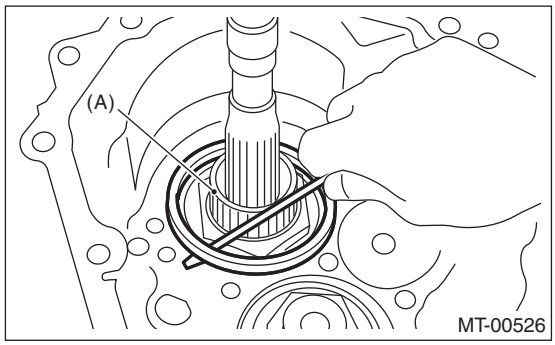
Specification of side clearance:
0.03 — 0.10 mm (0.0012 — 0.0039 in)



19.Transmission Case

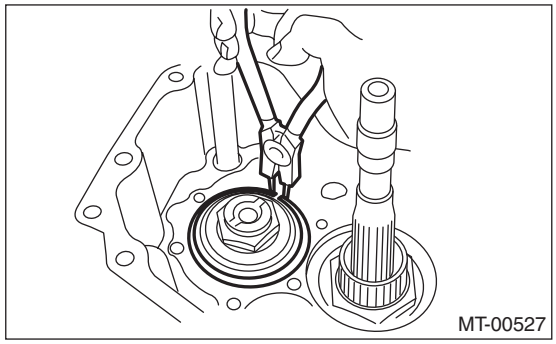
A: REMOVAL

1) Remove the manual transmission assembly from vehicle. <Ref. to 6MT-36, REMOVAL, Manual Transmission Assembly.>
2) Prepare the transmission for overhaul. <Ref. to 6MT-42, Preparation for Overhaul.>
3) Remove the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-44, REMOVAL, Oil Pipe.>, <Ref. to 6MT-47, REMOVAL, Neutral Position Switch.> , <Ref. to 6MT-45, REMOVAL, Back-up Light Switch.>
4) Remove the extension case. <Ref. to 6MT-49, REMOVAL, Extension Case.>
5) Remove the transfer driven gear. <Ref. to 6MT-60, REMOVAL, Transfer Driven Gear.>
6) Remove the center differential. <Ref. to 6MT-62, REMOVAL, Center Differential.>
7) Remove the oil pump. <Ref. to 6MT-63, REMOVAL, Oil Pump.>
8) Remove the shim and spacer of driven gear assembly.

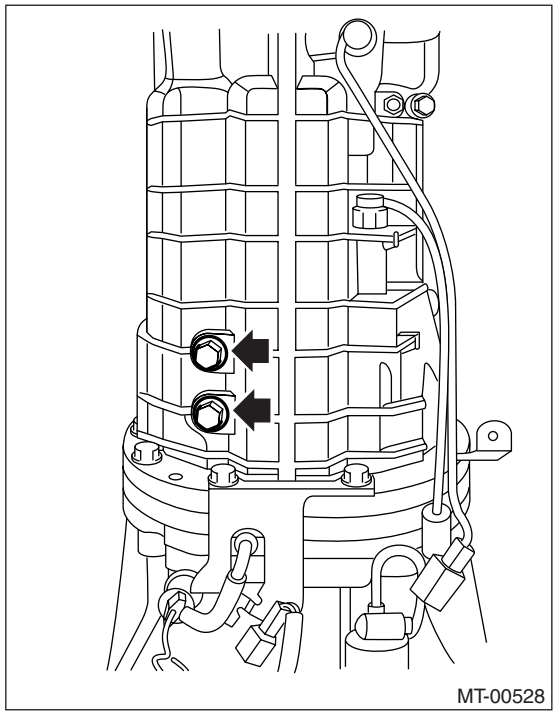


(A) Driven gear assembly

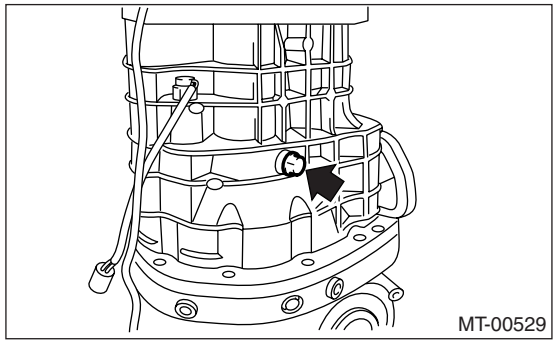
9) Remove the snap ring.



10) Remove the pilot bolt.

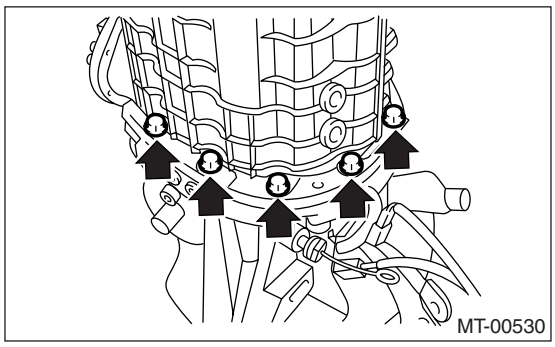


11) Remove the holder reverse bolt.



12) Remove the transmission case.

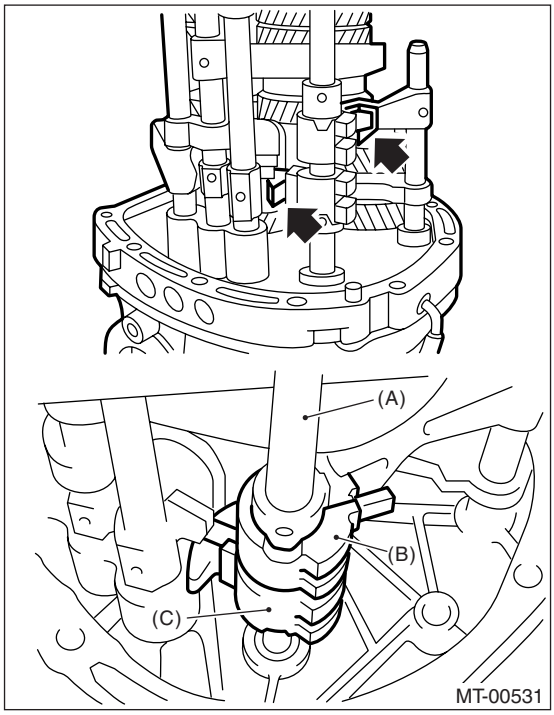
NOTE:
If the oil guide catches on shift fork, the transmission case may be difficult to be removed. Move the oil guide and oil pipe to remove. Do not pull the transmission case by force.



13) Completely remove the remaining liquid gasket on transmission case and adapter plate.

B: INSTALLATION

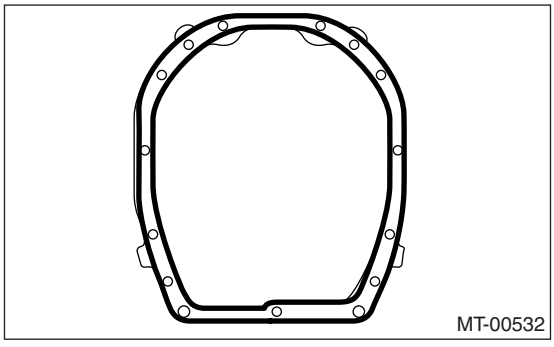
1) Make sure that each shifter fork and interlock block is shifted to neutral position. If not, shift to neutral position.



(A) Striking rod
(B) Reverse interlock block
(C) Interlock block

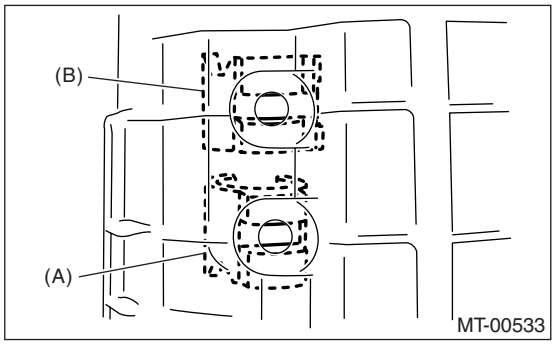
2) Apply liquid gasket to the adapter plate.

Liquid gasket:
THREE BOND 1215 (Part No. 004403007) or equivalent



3) Install the transmission case.

4) Make sure the interlock block and reverse interlock block are aligned in neutral position by inspecting through the pilot bolt installation hole. If not aligned, remove the transmission case, then shift each shifter fork and interlock block to neutral position.



(A) Interlock block
(B) Reverse interlock block

5) Using a new gasket, install the pilot bolts temporarily.
6) Tighten the transmission case with bolts and nuts.

Tightening torque:
50 N·m (5.1 kgf-m, 36.9 ft-lb)

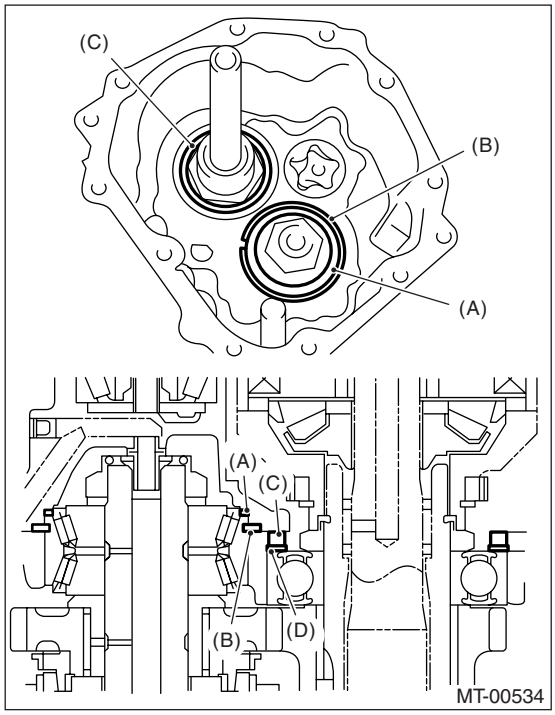
7) Tighten the pilot bolts.

Tightening torque:
34 N·m (3.5 kgf-m, 25.1 ft-lb)

8) Tighten the holder reverse bolt.

Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)

9) Install the snap ring, washer and collar of driven gear assembly.

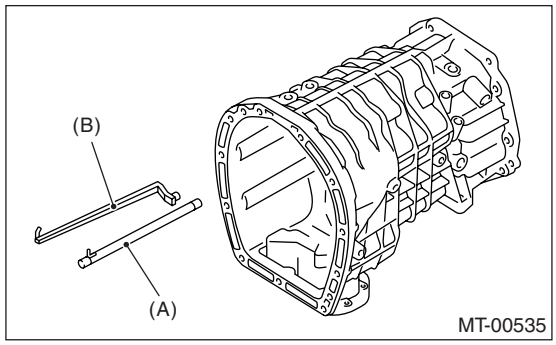


(A) Washer
(B) Snap ring
(C) Collar
(D) Washer

10) Install the oil pump. <Ref. to 6MT-64, INSTALLATION, Oil Pump.>
11) Install the center differential. <Ref. to 6MT-62, INSTALLATION, Center Differential.>
12) Install the transfer driven gear. <Ref. to 6MT-60, INSTALLATION, Transfer Driven Gear.>
13) Install the extension case. <Ref. to 6MT-49, INSTALLATION, Extension Case.>
14) Install the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-44, INSTALLATION, Oil Pipe.>, <Ref. to 6MT-47, INSTALLATION, Neutral Position Switch.> , <Ref. to 6MT-45, INSTALLATION, Back-up Light Switch.>
15) Install the manual transmission assembly to vehicle. <Ref. to 6MT-38, INSTALLATION, Manual Transmission Assembly.>

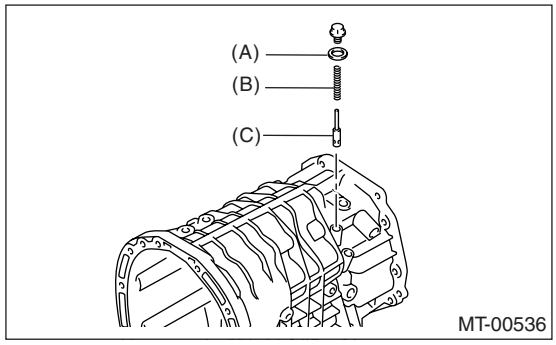
C: DISASSEMBLY

1) Remove the oil pipe and oil guide.



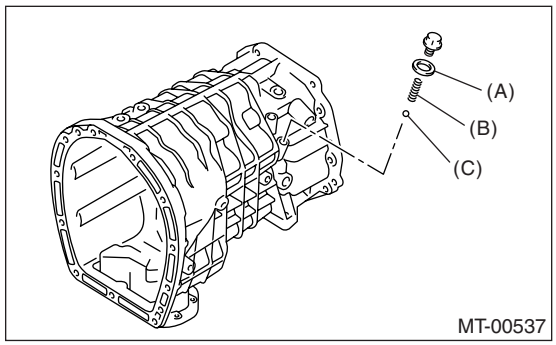
(A) Oil pipe
(B) Oil guide

2) Remove the bolt, and then remove the O-ring, relief spring and pressure relief valve.



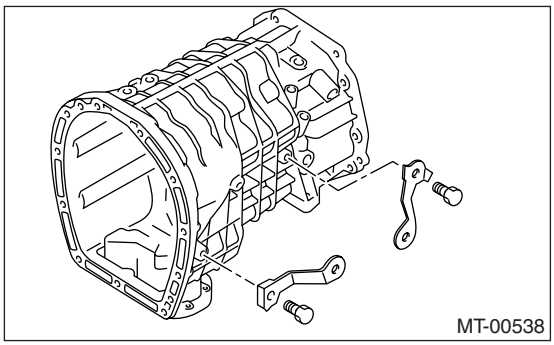
(A) O-ring
(B) Return spring
(C) Pressure relief valve

3) Remove the bolt, and then remove the O-ring, return spring and ball.

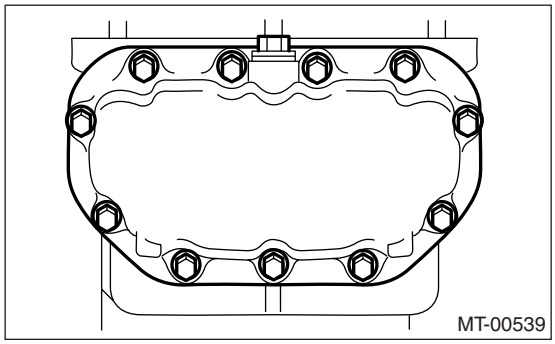


(A) O-ring
(B) Return spring
(C) Ball

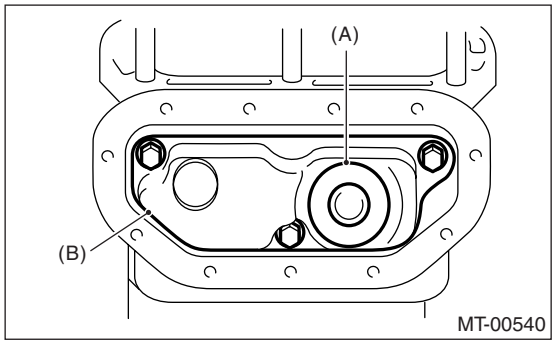
4) Remove the harness bracket.



5) Remove the oil pan.



6) Completely remove the remaining liquid gasket on transmission case and oil pan.
7) Remove the oil pan magnet, and then remove the oil strainer.

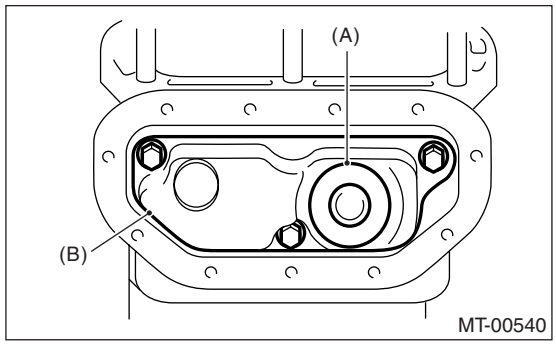


(A) Oil pan magnet
(B) Oil strainer

D: ASSEMBLY

1) Install the oil strainer and magnet.

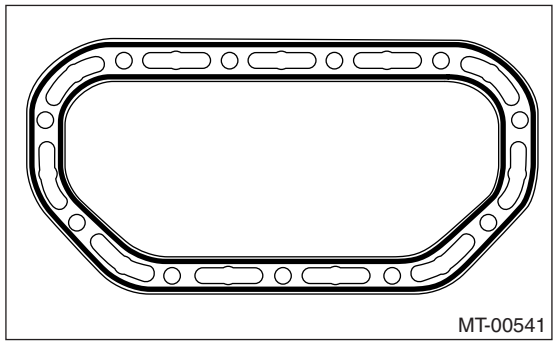
Tightening torque:
10 N·m (1.0 kgf-m, 7.4 ft-lb)



(A) Oil pan magnet
(B) Oil strainer

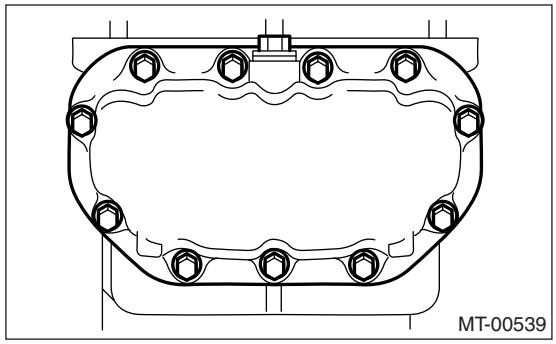
2) Apply liquid gasket to the oil pan.

Liquid gasket:
THREE BOND 1215 (Part No. 004403007) or equivalent



3) Install the oil pan.

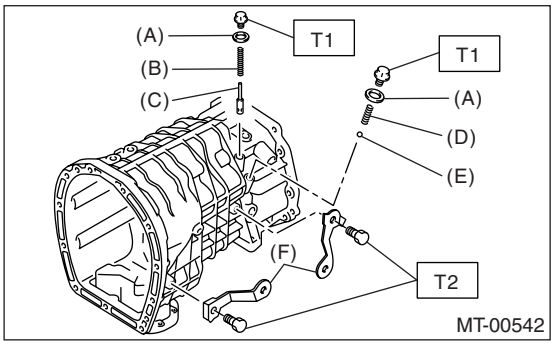
Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



4) Install the pressure relief valve, return spring and new O-ring.

5) Install the ball, valve spring and new O-ring.

Tightening torque:
T1: 13 N·m (1.3 kgf-m, 9.6 ft-lb)
T2: 16 N·m (1.6 kgf-m, 11.8 ft-lb)



(A) O-ring
(B) Return spring
(C) Pressure relief valve
(D) Return spring
(E) Ball
(F) Harness bracket

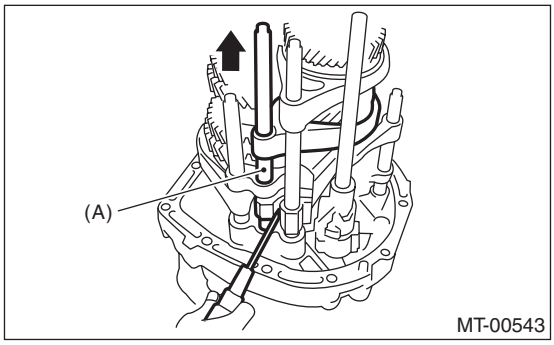
E: INSPECTION

1) Completely remove with shop cloth if sludge is adhered to the oil pan magnet.
2) Make sure there is no clog on the oil strainer. If clogged, remove clog or replace the oil strainer.
3) Make sure there is no damage on each parts. Replace damaged parts with new parts.

20.Main Shaft Assembly

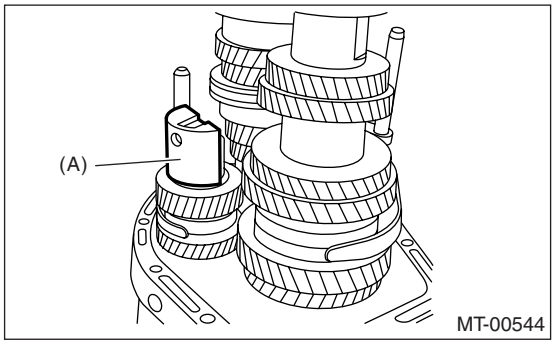
A: REMOVAL

1) Remove the manual transmission assembly from vehicle. <Ref. to 6MT-36, REMOVAL, Manual Transmission Assembly.>
2) Prepare the transmission for overhaul. <Ref. to 6MT-42, Preparation for Overhaul.>
3) Remove the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-44, REMOVAL, Oil Pipe.>, <Ref. to 6MT-47, REMOVAL, Neutral Position Switch.> , <Ref. to 6MT-45, REMOVAL, Back-up Light Switch.>
4) Remove the extension case. <Ref. to 6MT-49, REMOVAL, Extension Case.>
5) Remove the transfer driven gear. <Ref. to 6MT-60, REMOVAL, Transfer Driven Gear.>
6) Remove the center differential. <Ref. to 6MT-62, REMOVAL, Center Differential.>
7) Remove the oil pump. <Ref. to 6MT-63, REMOVAL, Oil Pump.>
8) Remove the transmission case. <Ref. to 6MT-67, REMOVAL, Transmission Case.>
9) Remove the striking rod.
10) Using a screwdriver, shift to 4th gear position.



(A) 3rd-4th shift rod

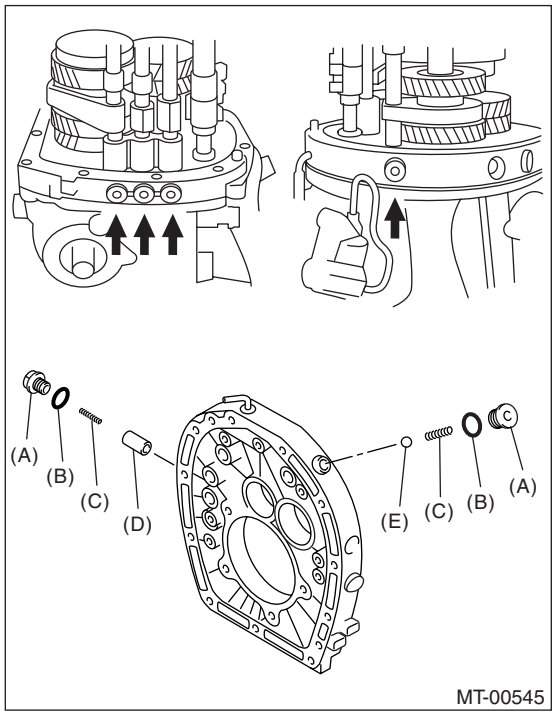
11) Remove the reverse idler holder.



(A) Reverse idler holder

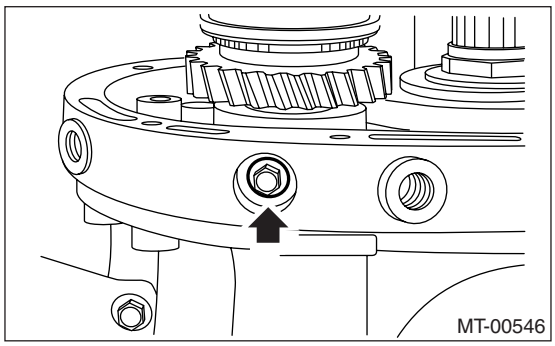
12) Remove all plug, gasket, spring, plunger and ball from adapter plate.

NOTE:
Use a new gasket.



(A) Plug
(B) Gasket
(C) Spring
(D) Plunger
(E) Ball

13) Remove the bolt and gasket installing reverse idler shaft.

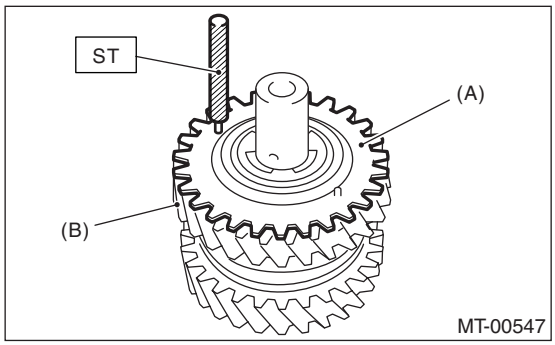


14) Press the main shaft assembly, driven gear assembly, reverse idler gear and each shifter fork, then remove from the adapter plate at once.

NOTE:
Two people should do the work.

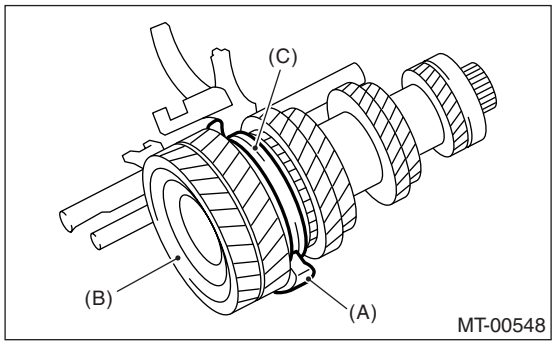
B: INSTALLATION

1) Adjust the 3rd-4th, and 5th-6th shifter fork rod. <Ref. to 6MT-119, ADJUSTMENT, Shifter Fork and Rod.>
2) Turn the sub gear counterclockwise for approx. three teeth. Align the sub gear and reverse idler gear hole, then insert the ST.
ST 18757AA000 STRAIGHT PIN REMOVER



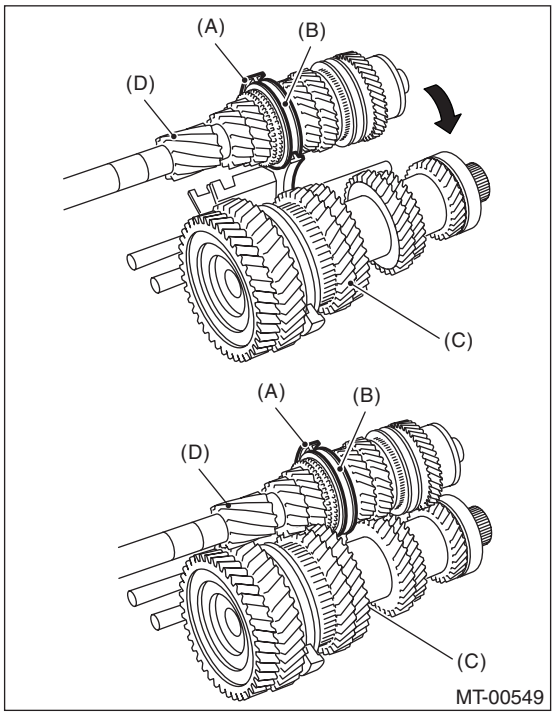
(A) Sub gear
(B) Reverse idler gear

3) Install the driven gear assembly to 1st-2nd shifter fork assembly.



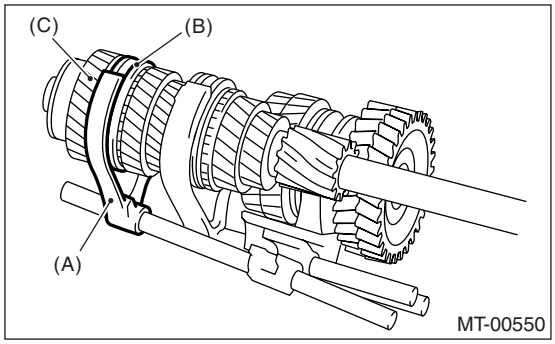
(A) 1st-2nd shifter fork
(B) Driven gear assembly
(C) 1st-2nd sleeve

4) Install the main shaft assembly to 3rd-4th shifter fork, and then assemble to driven gear assembly.



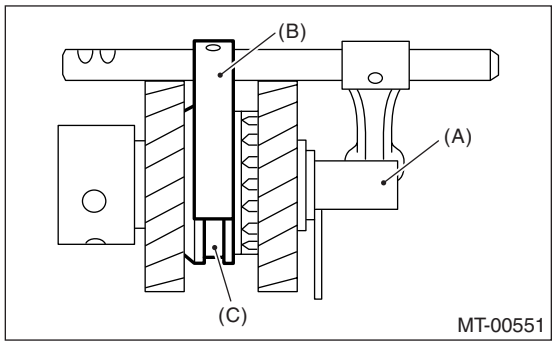
(A) 3rd-4th shifter fork
(B) 3rd-4th sleeve
(C) Driven gear assembly
(D) Main shaft assembly

5) Install the 5th-6th shifter fork assembly to main shaft assembly.



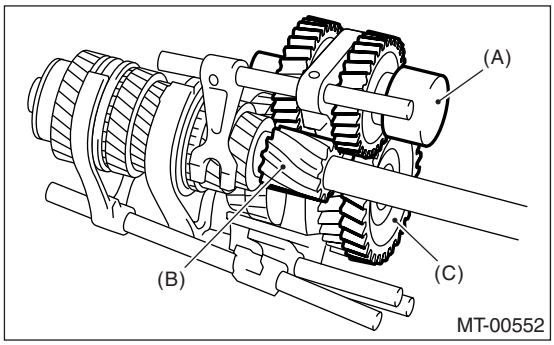
(A) 5th-6th shifter fork
(B) 5th-6th sleeve
(C) Main shaft assembly

6) Install the reverse shifter fork assembly to reverse idler gear assembly.



(A) Reverse idler gear assembly
(B) Reverse shifter fork
(C) Reverse sleeve

7) Install the reverse idler gear assembly.



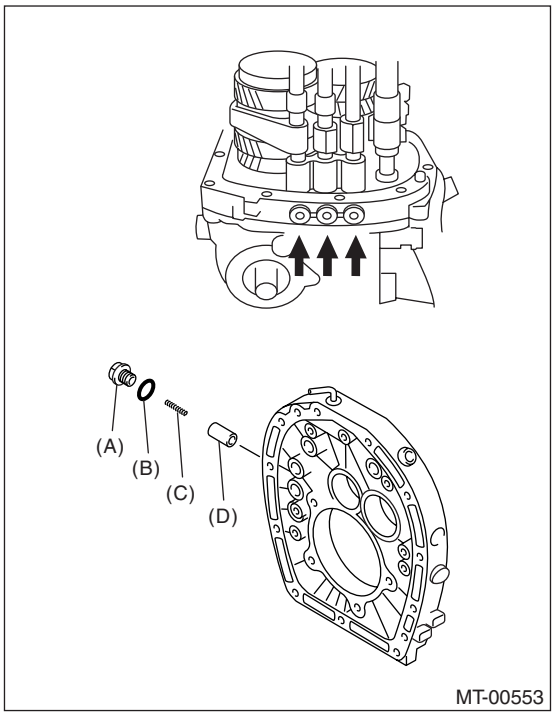
(A) Reverse idler gear assembly
(B) 1st drive gear
(C) Reverse gear

8) Install the thrust bearing of driven gear assembly.
9) Press each shifter fork, main shaft assembly, driven gear assembly and reverse idler gear assembly, then install to the adapter plate at once.

NOTE:
Two people should do the work.

10) Install the plunger, spring, new gasket and plug.

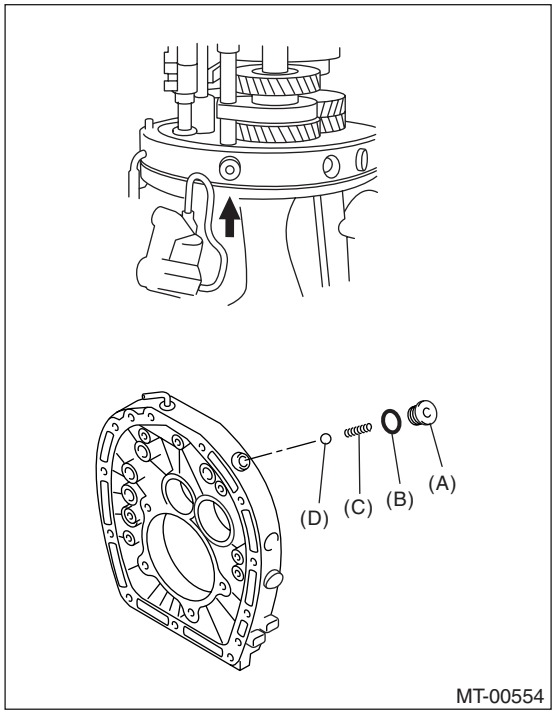
Tightening torque:
37 N·m (3.8 kgf-m, 27.3 ft-lb)



(A) Plug
(B) Gasket
(C) Spring
(D) Plunger

11) Install the ball, spring, new gasket and plug.

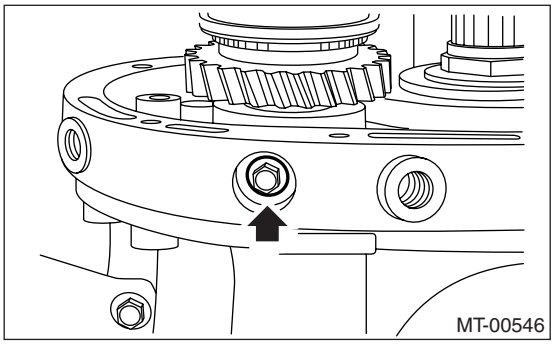
Tightening torque:
37 N·m (3.8 kgf-m, 27.3 ft-lb)



(A) Plug
(B) Gasket
(C) Spring
(D) Ball

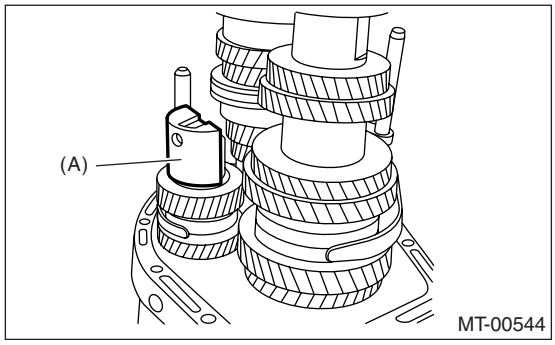
12) Install the bolt and new gasket.

Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)



13) Using a screwdriver, shift to 4th gear position.

14) Install the reverse idler holder



(A) Reverse idler holder

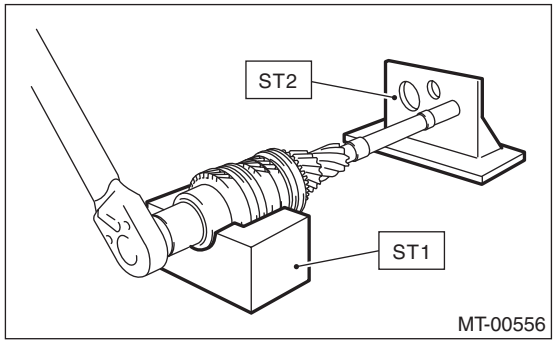
15) Install the striking rod.
16) Install the transmission case. <Ref. to 6MT-68, INSTALLATION, Transmission Case.>
17) Install the selected main shaft snap ring and washer.
18) Install the oil pump. <Ref. to 6MT-64, INSTALLATION, Oil Pump.>
19) Install the center differential. <Ref. to 6MT-62, INSTALLATION, Center Differential.>
20) Install the transfer driven gear. <Ref. to 6MT-60, INSTALLATION, Transfer Driven Gear.>
21) Install the extension case. <Ref. to 6MT-49, INSTALLATION, Extension Case.>
22) Install the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-44, INSTALLATION, Oil Pipe.>, <Ref. to 6MT-47, INSTALLATION, Neutral Position Switch.> , <Ref. to 6MT-45, INSTALLATION, Back-up Light Switch.>
23) Install the manual transmission assembly to vehicle. <Ref. to 6MT-38, INSTALLATION, Manual Transmission Assembly.>

C: DISASSEMBLY

NOTE:
Each sleeve and hub engage at a specified point. Mark an engagement point on the sleeve and hub before disassembly.

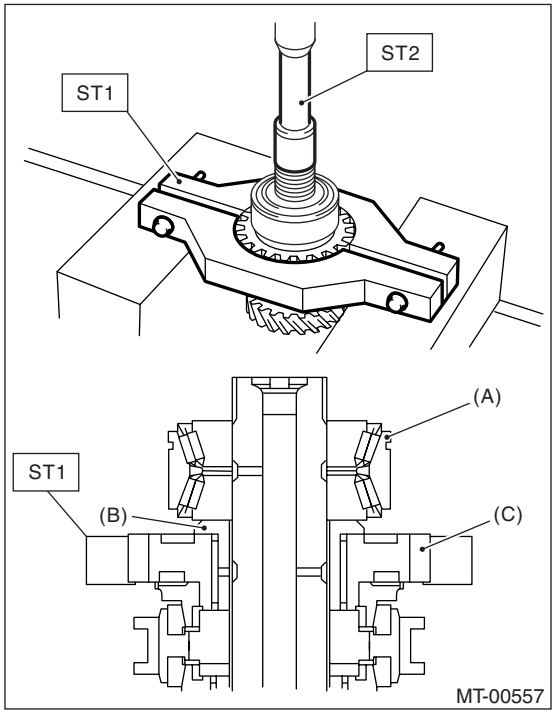
1) Secure the ST on workbench.
ST 18664AA000 BASE
2) Lift the caulking of lock nut.
3) Set the main shaft assembly on ST, then remove the lock nut and washer.
ST1 18665AA000 HOLDER
ST2 18664AA000 BASE

NOTE:
Use a 38 mm socket wrench.



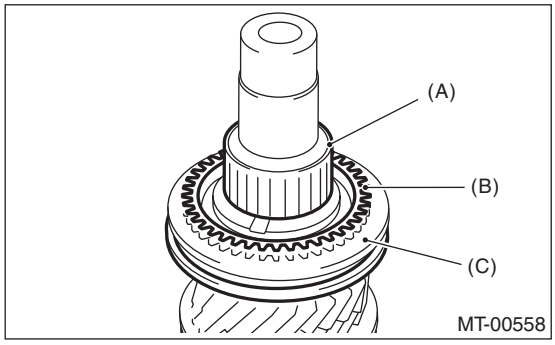
4) Remove the main shaft assembly from ST.

5) Set the ST1 on 6th drive gear, then remove the taper roller bearing, bush and 6th drive gear using press.
ST1 18722AA000 REMOVER (TY856WB···model)
ST1 18722AA010 REMOVER (TY856WN···model)
ST2 899864100 REMOVER



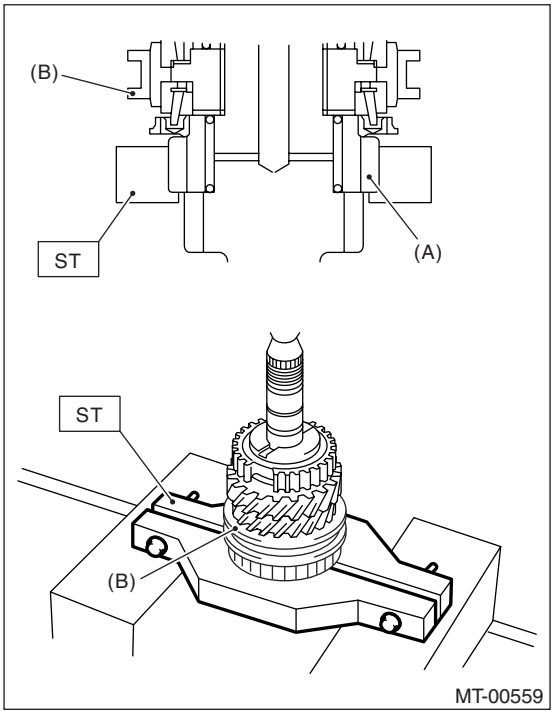
(A) Taper roller bearing
(B) Bush
(C) 6th drive gear

6) Remove the 5th-6th sleeve, 6th needle bearing and 6th baulk ring.



(A) Needle bearing
(B) 6th baulk ring
(C) 5th-6th sleeve

7) Set the ST on 3rd drive gear, then remove each part using press.
ST 18720AA000 REMOVER

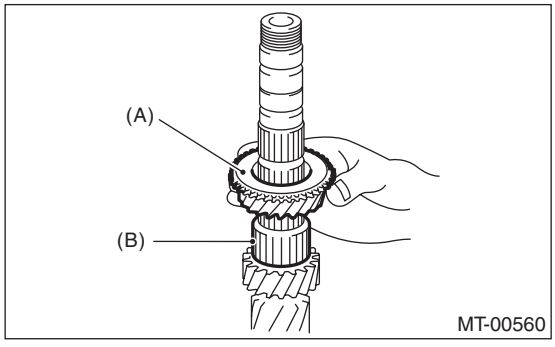


(A) 3rd drive gear
(B) 3rd-4th sleeve

D: ASSEMBLY

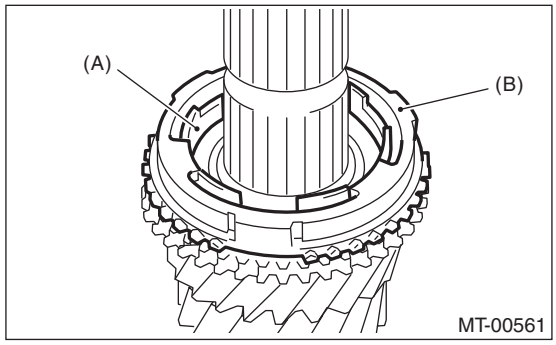
NOTE:
Replace the following parts as a set.
- Sleeve and hub
- Outer baulk ring, 3rd synchro cone and inner baulk ring
- Taper roller bearing

1) Sufficiently apply gear oil to the main shaft, 3rd needle bearing and inner periphery of 3rd drive gear.
2) Install the 3rd needle bearing and 3rd drive gear to main shaft.



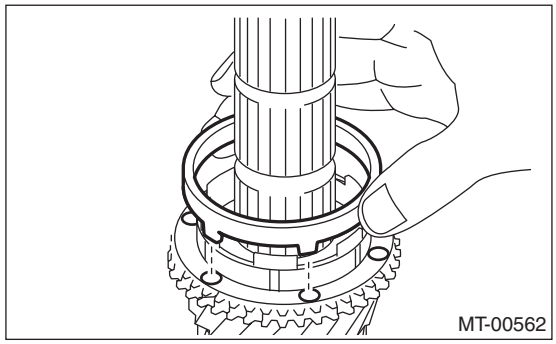
(A) 3rd drive gear
(B) 3rd needle bearing

3) Install the inner baulk ring, 3rd synchro cone and outer baulk ring.

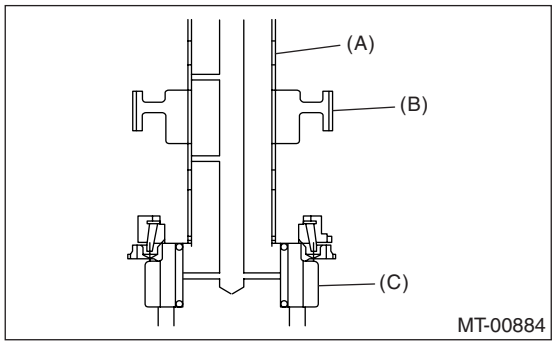


(A) Inner baulk ring
(B) Outer baulk ring

NOTE:
Install the 3rd synchro cone, by aligning protrusion portions of the 3rd synchro cone with 3rd drive gear hole portion.

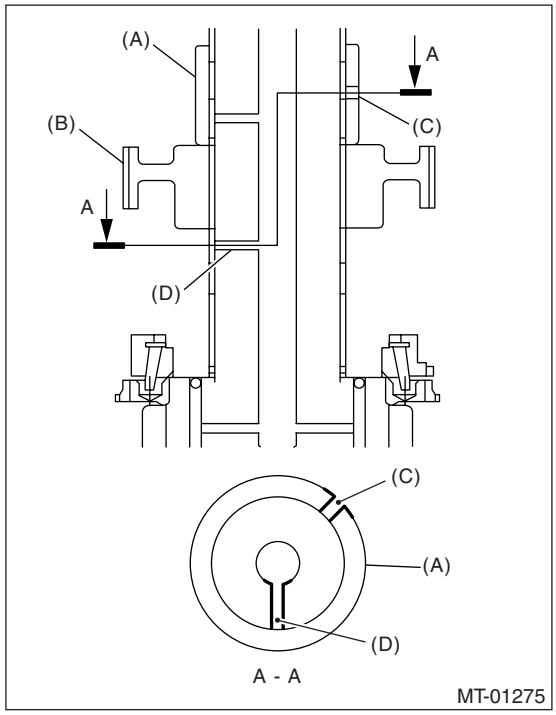


4) Install the 3rd-4th hub and 4th bush.
(1) Set to the main shaft, taking care of 3rd-4th hub installing direction.



(A) Main shaft
(B) 3rd-4th hub
(C) 3rd drive gear

(2) Set to the main shaft, taking care not to overlap the main shaft oil hole and 4th bush oil hole.



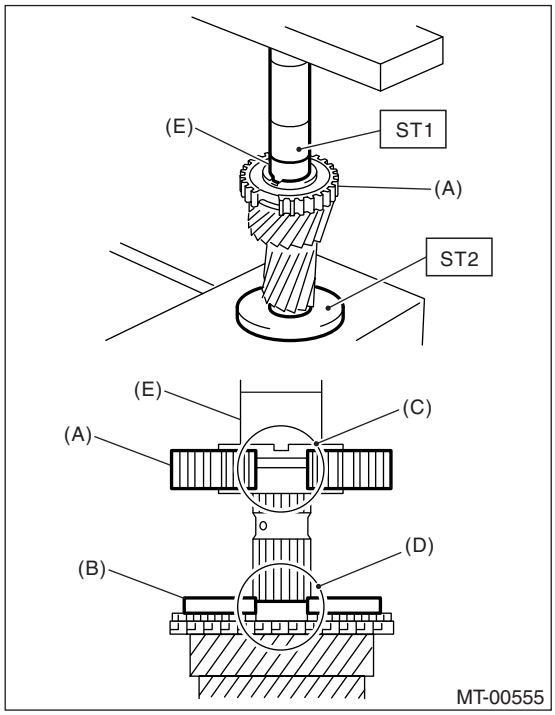
(A) 4th bush
(B) 3rd-4th hub
(C) 4th bush oil hole
(D) Main shaft oil hole

(3) Using the ST, press in the 3rd-4th hub and 4th bush at once.

ST1 18651AA000 INSTALLER
ST2 398177700 INSTALLER

CAUTION:
Do not apply pressure in excess of 40 kN (4.0 ton, 4.4 US ton, 3.9 Imp ton).

NOTE:
When pressing in 3rd-4th hub and 4th bush, align the protrusion portion of outer baulk ring and cutout portion of 3rd-4th bush by moving the outer baulk ring.

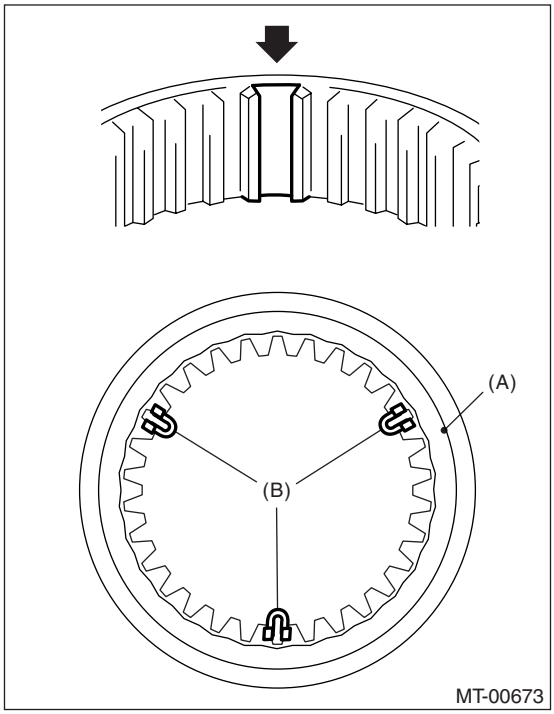


(A) 3rd-4th hub
(B) Outer baulk ring
(C) Cutout portion of 3rd-4th hub
(D) Protrusion portion of outer baulk ring
(E) 4th bush

5) Make sure the 3rd drive gear is smoothly turned by hand. If not, reassemble.

6) Install the 3rd-4th shifting insert key in proper place of 3rd-4th sleeve.

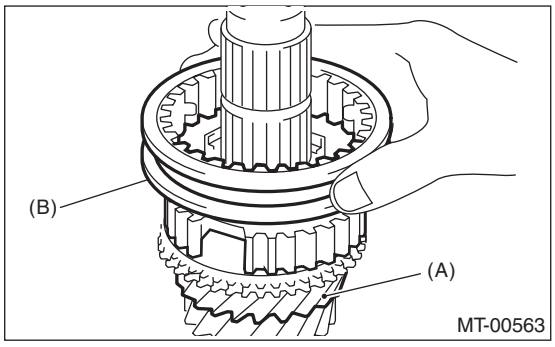
NOTE:
Angle of each shifting insert key is 120 apart.



(A) 3rd-4th sleeve
(B) 3rd-4th shifting insert key

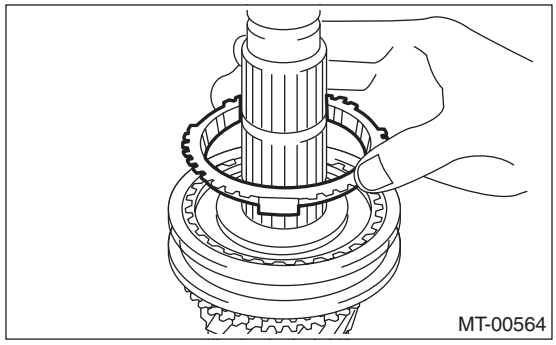
7) Install the 3rd-4th sleeve to 3rd-4th hub.

NOTE:
- 3rd-4th sleeve has a groove for identification.
- Install the 3rd-4th sleeve with groove facing to 3rd drive gear side.

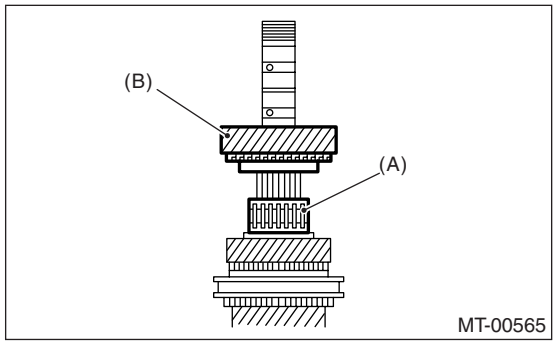


(A) 3rd drive gear
(B) Groove (single line) for identification of 3rd-4th sleeve

8) Install the 4th baulk ring.

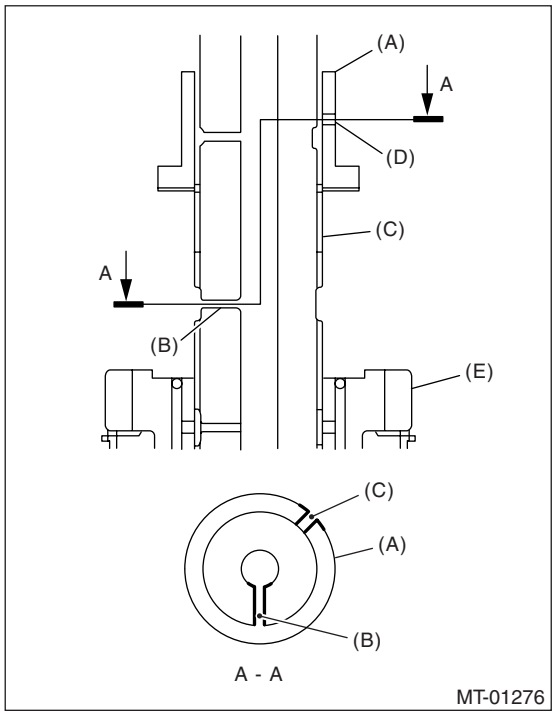


9) Sufficiently apply gear oil to the main shaft, 4th needle bearing and inner periphery of 4th drive gear.
10) Install the 4th needle bearing and 4th drive gear.



(A) 4th needle bearing
(B) 4th drive gear

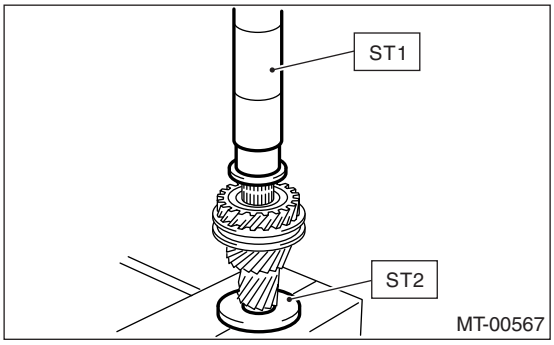
11) Install the 5th bush.
(1) Set to the main shaft, taking care not to overlap the main shaft oil hole and 5th bush oil hole.



(A) 5th bush
(B) Main shaft oil hole
(C) Main shaft
(D) 5th bush oil hole
(E) 4th drive gear

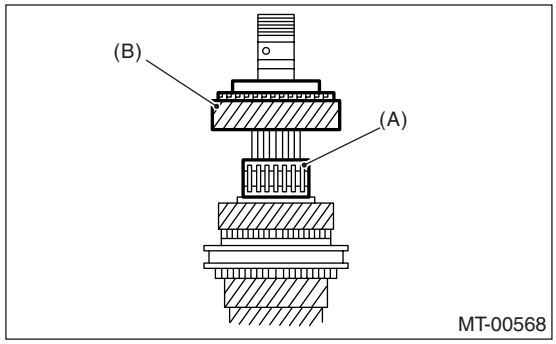
(2) Using the ST, press in the 5th bush.
ST1 18651AA000 INSTALLER
ST2 398177700 INSTALLER

CAUTION:
Do not apply pressure in excess of 40 kN (4.0 ton, 4.4 US ton, 3.9 Imp ton).



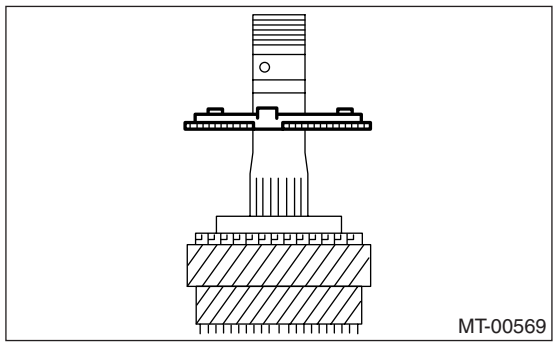
12) Make sure the 4th drive gear is smoothly turned by hand. If not, reassemble.
13) Sufficiently apply gear oil to the main shaft, 5th needle bearing and inner periphery of 5th drive gear.

14) Install the 5th needle bearing and 5th drive gear.

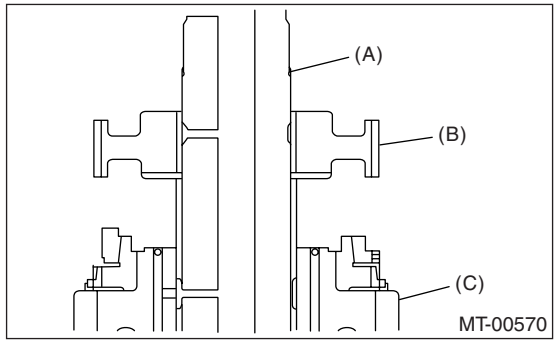


(A) 5th needle bearing
(B) 5th drive gear

15) Install the 5th baulk ring.



16) Install the 5th-6th hub.
(1) Set to the main shaft, taking care of 5th-6th hub installing direction.

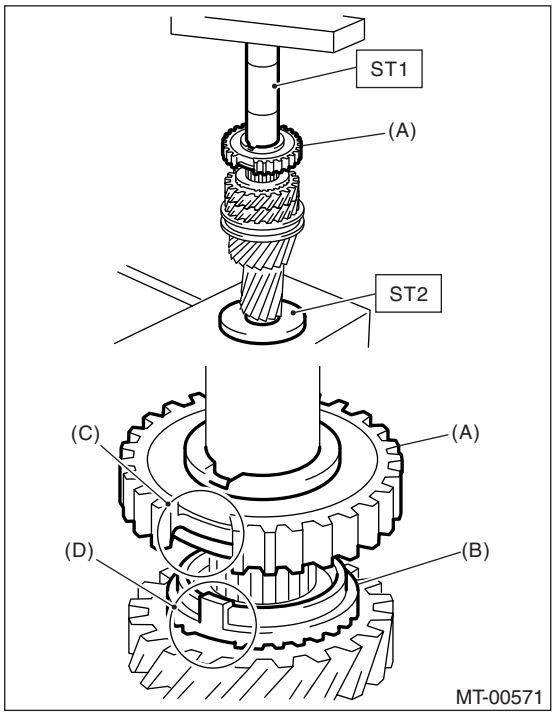


(A) Main shaft
(B) 5th-6th hub
(C) 5th drive gear

(2) Using the ST, press in the 5th-6th hub.
ST1 18651AA000 INSTALLER
ST2 398177700 INSTALLER

CAUTION:
Do not apply pressure in excess of 40 kN (4.0 ton, 4.4 US ton, 3.9 Imp ton).

NOTE:
When pressing in 5th-6th hub, align the protrusion portion of outer baulk ring and cutout portion of 5th-6th bush by moving the outer baulk ring.

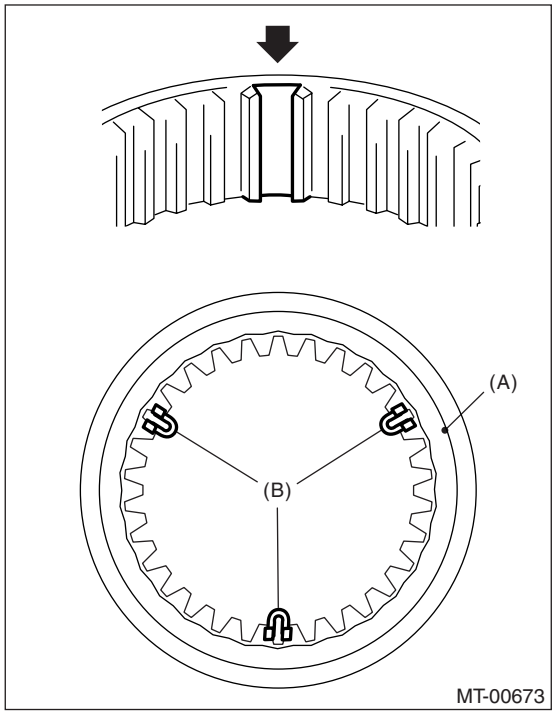


(A) 5th-6th hub
(B) Outer baulk ring
(C) Cutout portion of 5th-6th hub
(D) Protrusion portion of outer baulk ring

17) Make sure the 5th drive gear is smoothly turned by hand. If not, reassemble.

18) Install the 5th-6th shifting insert key in proper place of 5th-6th sleeve.

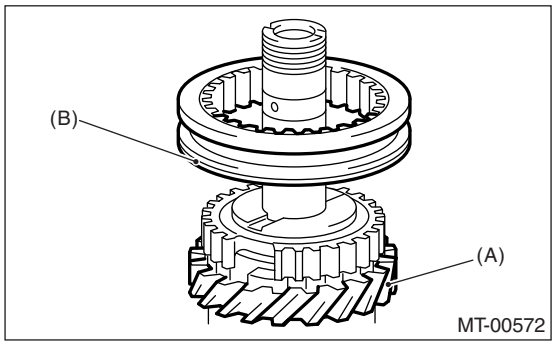
NOTE:
Angle of each shifting insert key is 120 apart.



(A) 5th-6th sleeve
(B) Shifting insert key

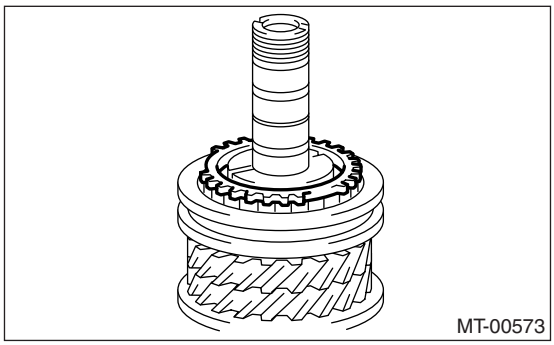
19) Install the 5th-6th sleeve to 5th-6th hub.

NOTE:
• 5th-6th sleeve has two grooves for identification.
• Install the 5th-6th sleeve with the groove facing to 5th drive gear side.

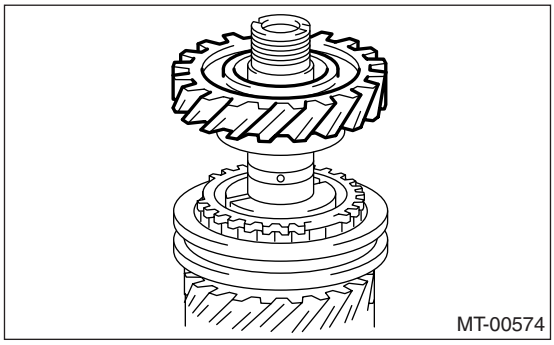


(A) 5th drive gear
(B) Groove (2 lines) for identification of 5th-6th sleeve

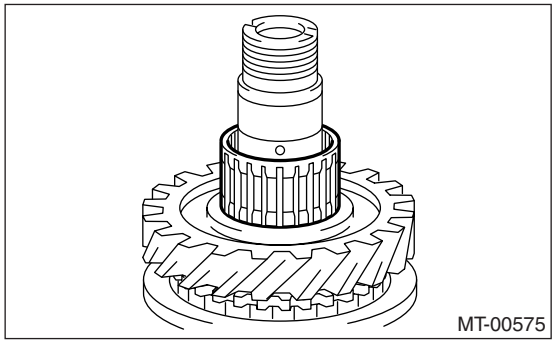
20) Install the 6th baulk ring.



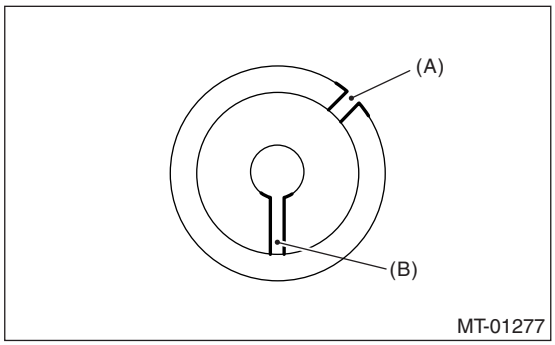
21) Sufficiently apply gear oil to the main shaft, 6th needle bearing and inner periphery of 6th drive gear.
22) Install the 6th drive gear.



23) Install the 6th needle bearing.



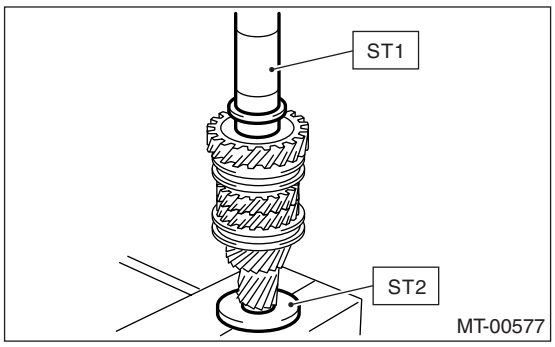
24) Set the 6th bush to main shaft, taking care not to overlap the 6th bush oil hole and main shaft oil hole.



(A) 6th bush oil hole
(B) Main shaft oil hole

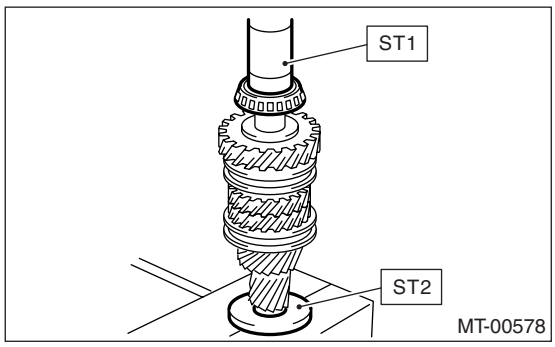
25) Using the ST, install the 6th bush.
ST1 18651AA000 INSTALLER
ST2 398177700 INSTALLER

CAUTION:
Do not apply pressure in excess of 40 kN (4.0 ton, 4.4 US ton, 3.9 Imp ton).



26) Make sure the 6th drive gear is smoothly turned by hand. If not, reassemble.
27) Using the ST, install the inner bearing inner race.
ST1 18651AA000 INSTALLER
ST2 398177700 INSTALLER

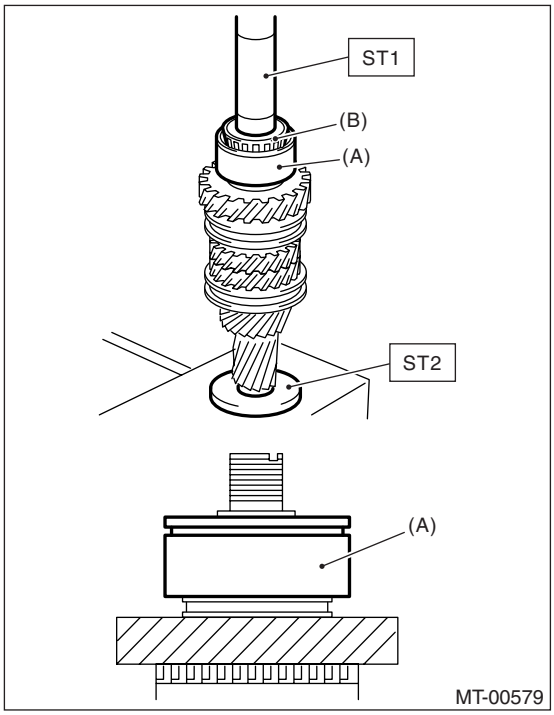
CAUTION:
Do not apply pressure in excess of 40 kN (4.0 ton, 4.4 US ton, 3.9 Imp ton).



28) Using the ST, install the retainer and outer bearing inner race.
ST1 18651AA000 INSTALLER
ST2 398177700 INSTALLER

CAUTION:
Do not apply pressure in excess of 40 kN (4.0 ton, 4.4 US ton, 3.9 Imp ton).

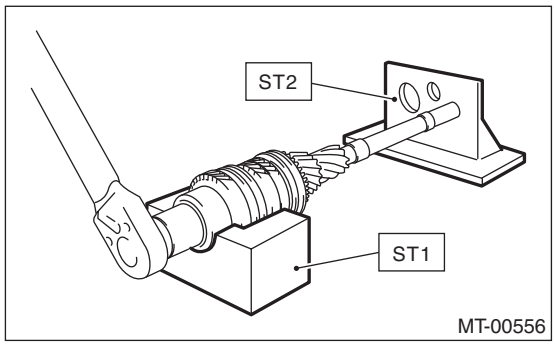
NOTE:
• Make sure to install the retainer in proper direction.
• Press in until there is no backlash in retainer and where bearing is smoothly turned by hand.



(A) Retainer
(B) Outer bearing inner race

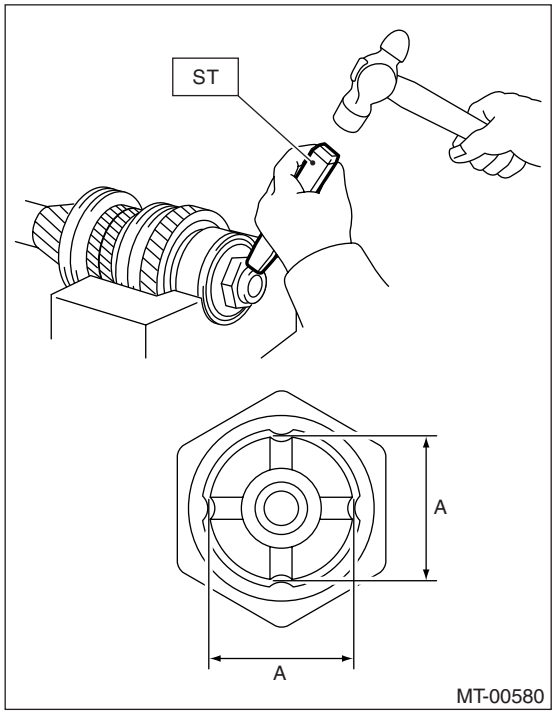
29) Make sure the taper roller bearing is smoothly turned by hand. If not, replace the taper roller bearing as a set and reassemble.
30) Install the lock washer and new lock nut.
31) Set the main shaft assembly to ST, then tighten the lock nut.
ST1 18665AA000 HOLDER
ST2 18664AA000 BASE

Tightening torque:
392 N·m (40.0 kgf-m, 289 ft-lb)



32) Using the ST, caulk four portions on the lock nut to obtain dimension A 27±0.3 mm (1.06±0.01 in).
ST 18668AA000 PUNCH

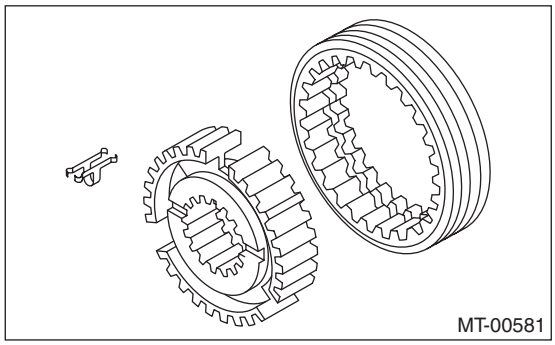
NOTE:
Do not damage the caulking portion of lock nut. Replace with new lock nut if the caulking portion is cracked.



E: INSPECTION

Disassembled parts should be washed clean first and then inspected carefully.
1) Bearing
Replace the bearings in the following cases.
• Worn, rusted and damaged bearing
• Bearings that fail to turn smoothly or make abnormal noise when turned
• Bearings having other defects
2) Bushing (each gear)
Replace the bushings in the following case.
• When the sliding surface is damaged or abnormally worn.
3) Gears
Replace the gears in the following cases.
• Gear teeth surfaces are broken or excessively worn.
• Parts that contact the baulk ring is damaged.
• The inner surface of gear is damaged.
4) Baulk ring, synchro cone
Replace the baulk ring and synchro cone in the following case.
• Worn, rusted and damaged baulk ring

5) Shifting insert key
Replace the shifting insert key if deformed, excessively worn or defective in any way.



F: ADJUSTMENT

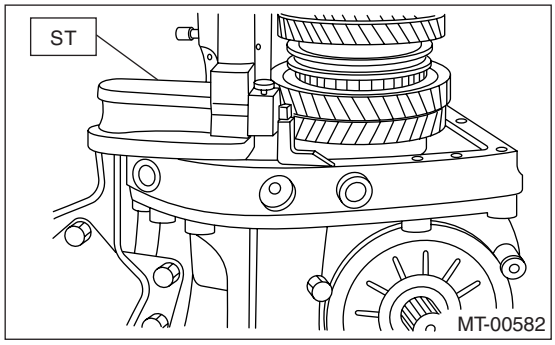
1. SELECTION OF MAIN SHAFT SNAP RING AND WASHER

NOTE:
Perform the following procedures when.
- Replacing the 1st to 6th driven gear.
- Replacing the 1st and 2nd synchro ring assembly.
- Replacing the ball bearing.
- Replacing the adapter plate.
- Replacing the driven shaft.

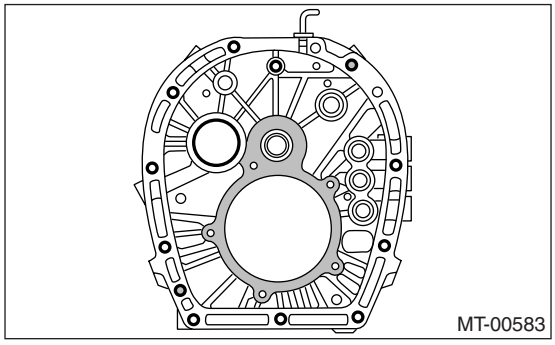
1) Insert the drive pinion assembly in adapter plate.

NOTE:
Make sure the thrust bearing outer race is not removed and drive pinion is not lift-up.

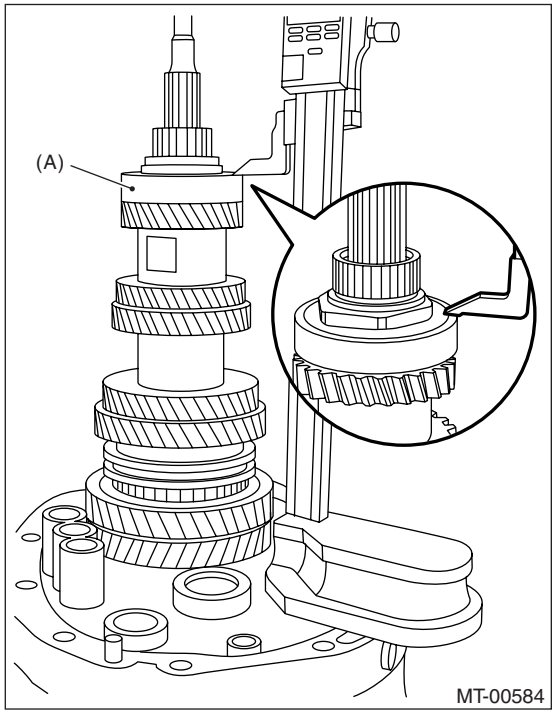
2) Set the height gauge to adapter plate. Lower the indicator of height gauge to mating surface of adapter plate and case, then set to zero point.
ST 18853AA000 HEIGHT GAUGE



NOTE:
- Remove the remaining gasket on edge surface with scraper, since the adapter plate is base point of measurement.
- Do not place the height gauge on shaded area in the figure during measurement.

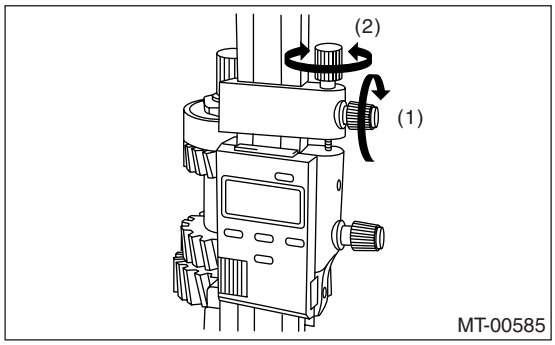


3) Measure the height to edge surface of ball bearing (height A1).



(A) Ball bearing

NOTE:
Set the indicator of height gauge near measuring object, then lock the dial (1) as shown in the figure. Turn dial (2) to set the indicator to edge surface of bearing.



Measure five points of the ball bearing turning every approx. 120. Round off each two upper and lower measurement value. Use the remaining center value as measurement value.

4) According to measurement value, select the snap ring and washer from the following table.

Snap ring

A1: mm (in)	Part No.	Thickness: mm (in)
270.83 — 271.40 (10.66 — 10.69)	805072010	1.65 (0.065)
271.41 — 271.98 (10.69 — 10.71)	805072011	1.95 (0.077)
271.99 — 272.56 (10.71 — 10.73)	805072012	2.25 (0.089)

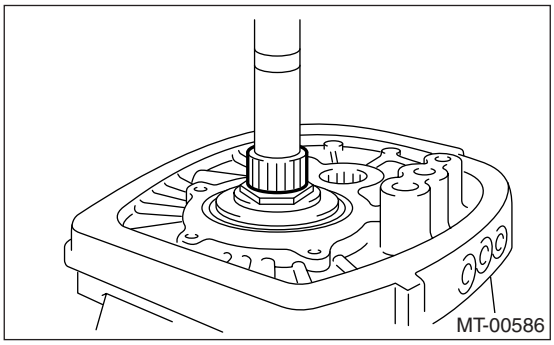
Washer

A1: mm (in)	Part No.	Thickness: mm (in)
270.83 — 271.40 (10.66 — 10.69)	803067012	1.6 (0.063)
271.41 — 271.98 (10.69 — 10.71)	803067011	1.3 (0.051)
271.99 — 272.56 (10.71 — 10.73)	803067010	1.0 (0.039)

21.Driven Gear Assembly

A: REMOVAL

1) Remove the manual transmission assembly from vehicle. <Ref. to 6MT-36, REMOVAL, Manual Transmission Assembly.>
2) Prepare the transmission for overhaul. <Ref. to 6MT-42, Preparation for Overhaul.>
3) Remove the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-44, REMOVAL, Oil Pipe.>, <Ref. to 6MT-47, REMOVAL, Neutral Position Switch.> , <Ref. to 6MT-45, REMOVAL, Back-up Light Switch.>
4) Remove the extension case. <Ref. to 6MT-49, REMOVAL, Extension Case.>
5) Remove the transfer driven gear. <Ref. to 6MT-60, REMOVAL, Transfer Driven Gear.>
6) Remove the center differential. <Ref. to 6MT-62, REMOVAL, Center Differential.>
7) Remove the oil pump. <Ref. to 6MT-63, REMOVAL, Oil Pump.>
8) Remove the transmission case. <Ref. to 6MT-67, REMOVAL, Transmission Case.>
9) Remove the driven gear assembly. <Ref. to 6MT-72, REMOVAL, Main Shaft Assembly.>
10) Remove the 1st needle bearing.

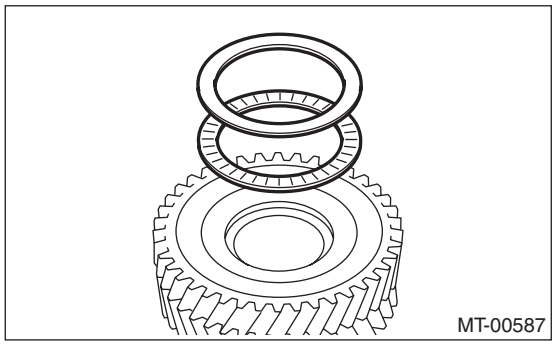


11) Remove the thrust needle bearing.

B: INSTALLATION

1) Adjust the main shaft snap ring. <Ref. to 6MT-84, ADJUSTMENT, Main Shaft Assembly.>
2) Adjust the 1st-2nd shifter rod. <Ref. to 6MT-119, ADJUSTMENT, Shifter Fork and Rod.>
3) Install the thrust needle bearing.

NOTE:
Make sure to install the thrust needle bearing in proper direction.



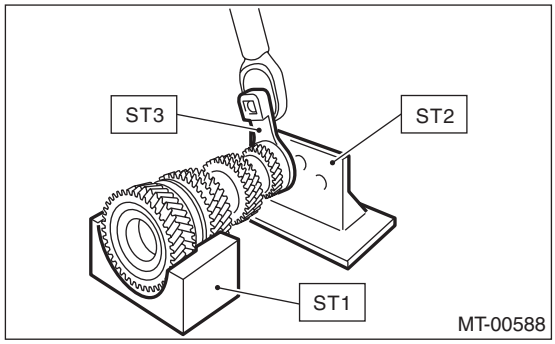
4) Install the 1st needle bearing.
5) Install the driven gear assembly. <Ref. to 6MT-73, INSTALLATION, Main Shaft Assembly.>
6) Install the transmission case. <Ref. to 6MT-68, INSTALLATION, Transmission Case.>
7) Adjust backlash at axial direction of driven gear assembly. <Ref. to 6MT-93, ADJUSTMENT, Driven Gear Assembly.>
8) Install the oil pump. <Ref. to 6MT-64, INSTALLATION, Oil Pump.>
9) Install the center differential. <Ref. to 6MT-62, INSTALLATION, Center Differential.>
10) Install the transfer driven gear. <Ref. to 6MT-60, INSTALLATION, Transfer Driven Gear.>
11) Install the extension case. <Ref. to 6MT-49, INSTALLATION, Extension Case.>
12) Install the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-44, INSTALLATION, Oil Pipe.>, <Ref. to 6MT-47, INSTALLATION, Neutral Position Switch.> , <Ref. to 6MT-45, INSTALLATION, Back-up Light Switch.>
13) Install the manual transmission assembly to vehicle. <Ref. to 6MT-38, INSTALLATION, Manual Transmission Assembly.>

C: DISASSEMBLY

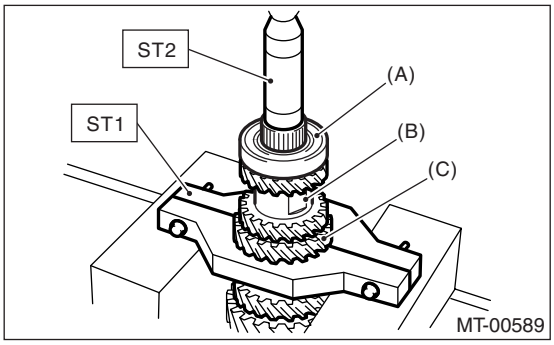
NOTE:
Each sleeve and hub engage at a specified point. Mark an engagement point on the sleeve and hub before disassembly.

1) Secure the ST on workbench.
ST 18664AA000 BASE
2) Lift the caulking of lock nut.

3) Install the ST3 to lock nut, set the driven gear assembly on ST, then remove the lock nut and washer.
ST1 18666AA000 HOLDER
ST2 18664AA000 BASE
ST3 18620AA000 ADAPTER WRENCH

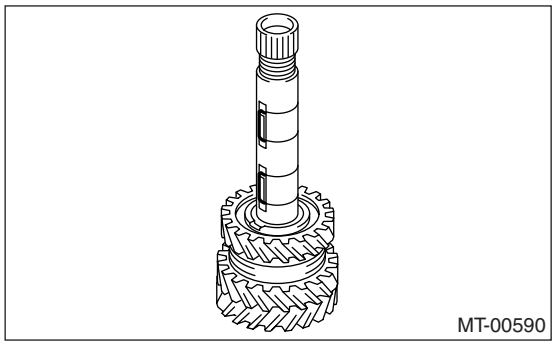


4) Install the ST1 to 4th gear, then remove the ball bearing, 5th-6th driven gear and 3rd-4th driven gear.
ST1 18723AA000 REMOVER
ST2 499877000 RACE 4-5 INSTALLER

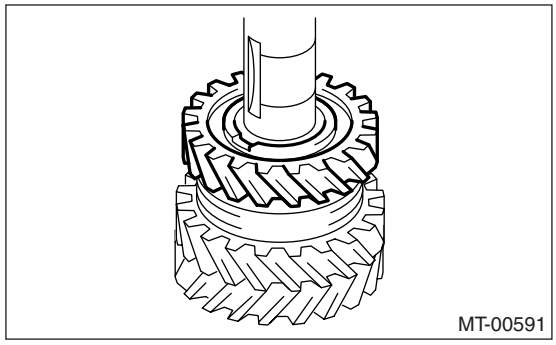


(A) Ball bearing
(B) 5th-6th driven gear
(C) 3rd-4th driven gear

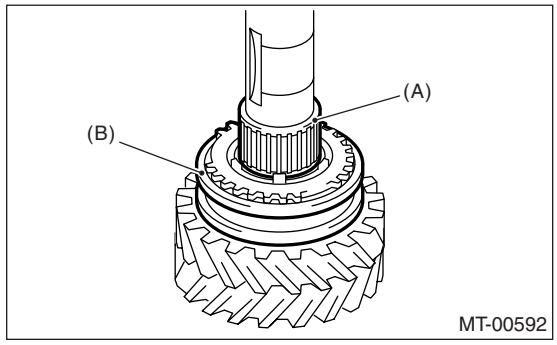
5) Remove the driven gear key.



6) Remove the 2nd gear.

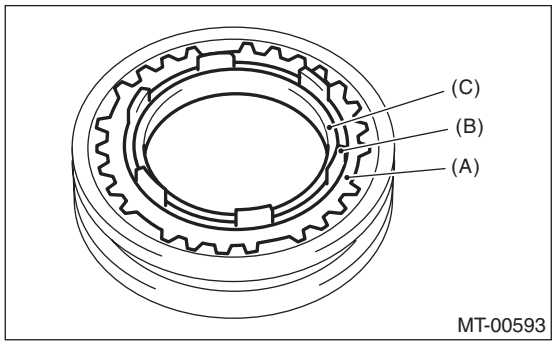


7) Remove the needle bearing and 1st-2nd sleeve.



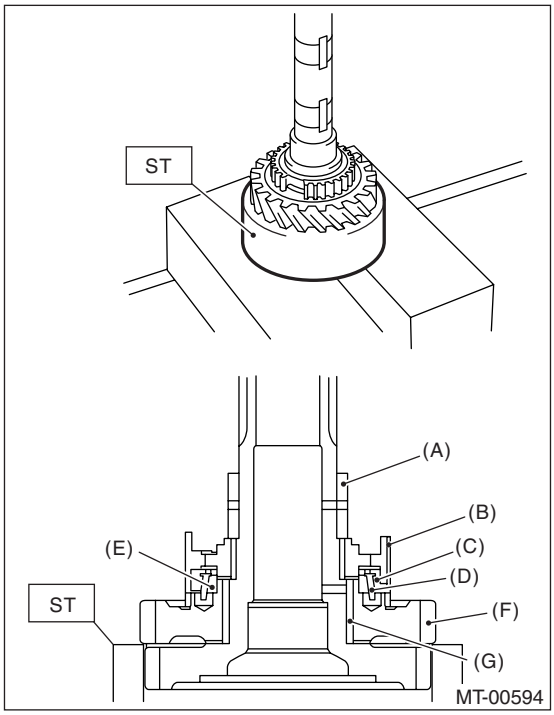
(A) Needle bearing
(B) 1st-2nd sleeve

8) Remove the outer baulk ring, 2nd synchro cone and inner baulk ring.



(A) Outer baulk ring
(B) 2nd synchro cone
(C) Inner baulk ring

9) Using the ST, remove each parts.
ST 18754AA000 REMOVER

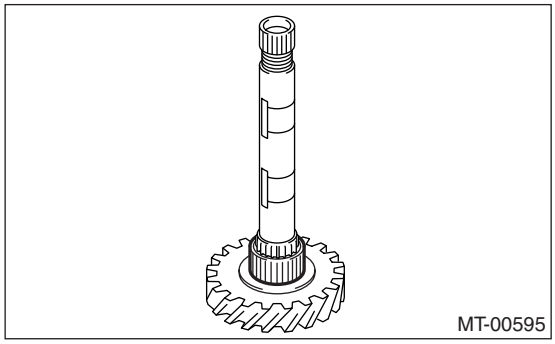


(A) 2nd bush
(B) 1st-2nd hub
(C) Outer baulk ring
(D) 1st synchro cone
(E) Inner baulk ring
(F) 1st driven gear
(G) 1st needle bearing

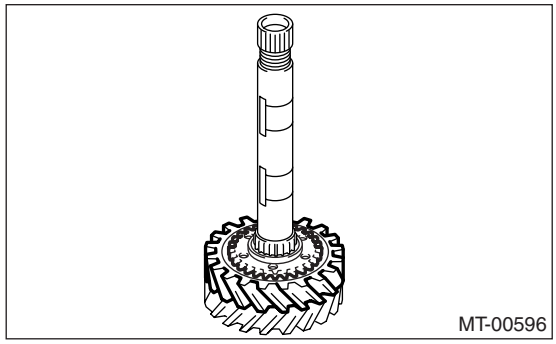
D: ASSEMBLY

NOTE:
Replace the following parts as a set.
• Sleeve and hub
• Outer baulk ring, 1st synchro cone, inner baulk ring
• Outer baulk ring, 2nd synchro cone, inner baulk ring

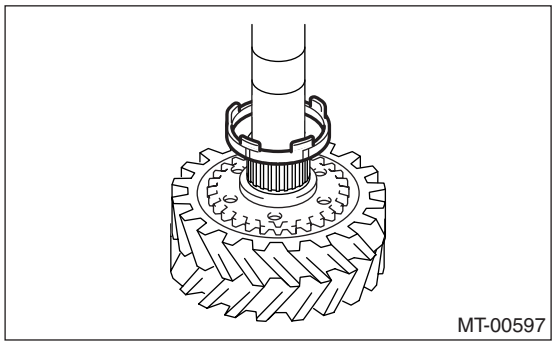
1) Sufficiently apply gear oil to the drive shaft, 1st needle bearing and inner periphery of 1st driven gear.
2) Install the 1st needle bearing.



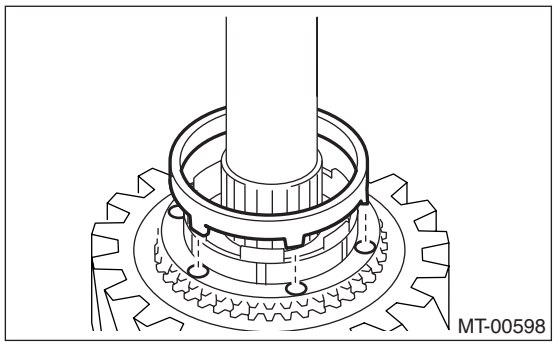
3) Install the 1st driven gear to driven shaft.



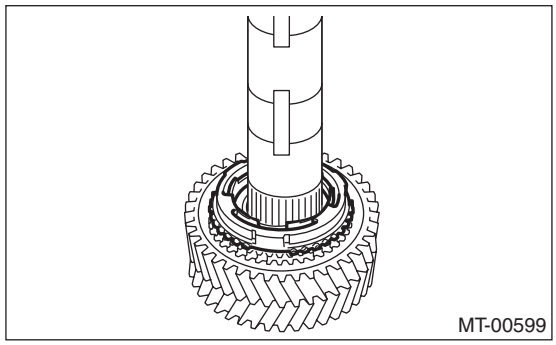
4) Install the inner baulk ring.



5) Align protrusion portions of the 1st synchro cone to the holes of 1st drive gear to install.

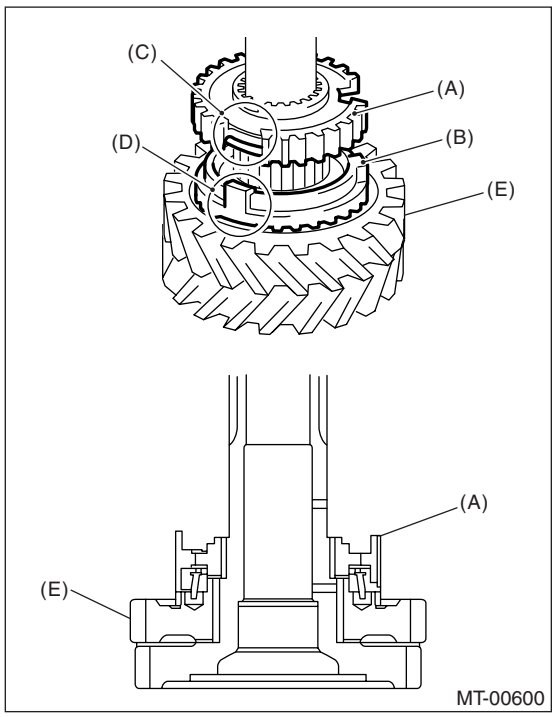


6) Install the outer baulk ring.



7) Install the 1st-2nd hub.

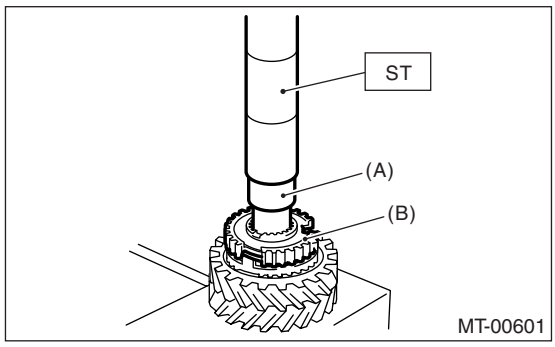
NOTE:
• Align the protrusion portion of outer baulk ring and cutout portion of 1st-2nd hub, then install.
• Make sure to install the 1st-2nd hub in proper direction.



(A) 1st-2nd hub
(B) Outer baulk ring
(C) Cutout portion of 1st-2nd hub
(D) Protrusion portion of outer baulk ring
(E) 1st driven gear

8) Using the ST, install the 2nd hub.
ST 18654AA000 INSTALLER

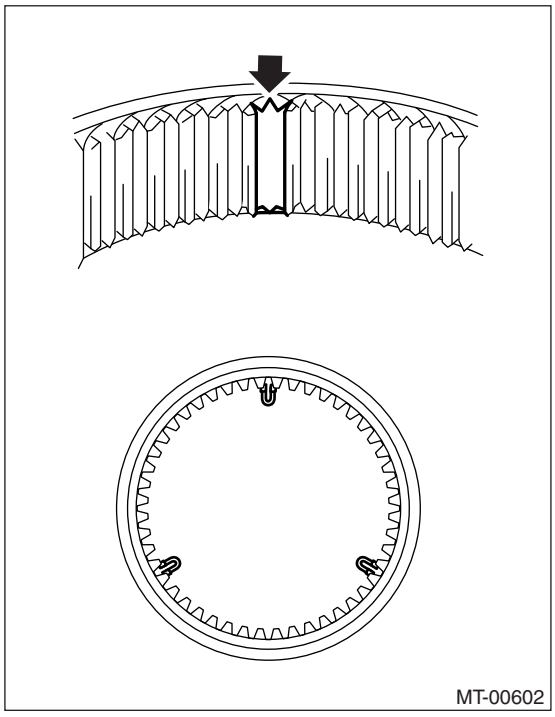
CAUTION:
Do not apply pressure in excess of 40 kN (4.0 ton, 4.4 US ton, 3.9 Imp ton).



(A) 2nd bush
(B) 1st-2nd hub

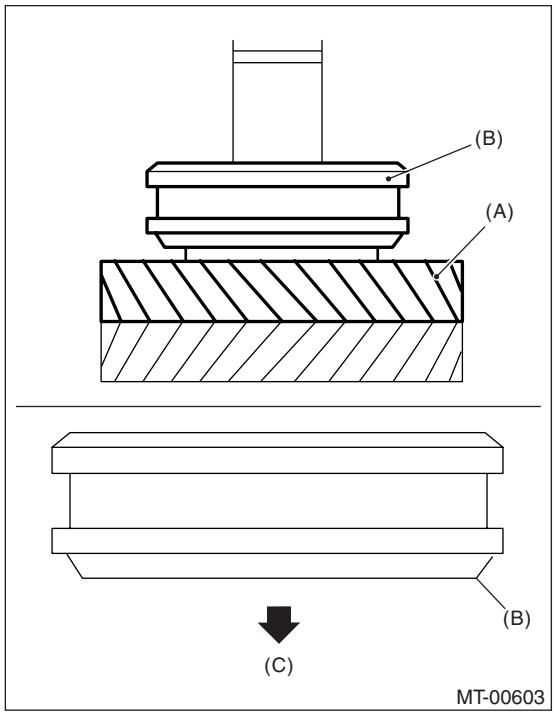
9) Make sure the 1st drive gear is smoothly turned by hand. If not, reassemble.
10) Install the shifting insert key in proper place of 1st-2nd sleeve.

NOTE:
Angle of each shifting insert key is 120 apart.



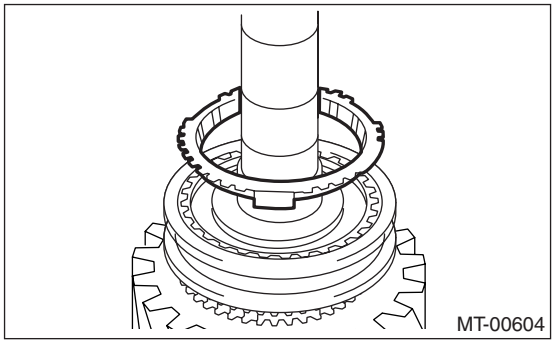
11) Install the 1st-2nd sleeve to 1st-2nd hub.

NOTE:
Make sure to install the 1st-2nd sleeve in proper direction.

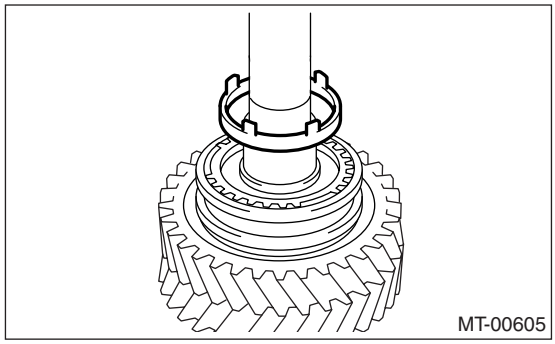


(A) 1st driven gear
(B) 1st-2nd sleeve
(C) 1st driven gear side

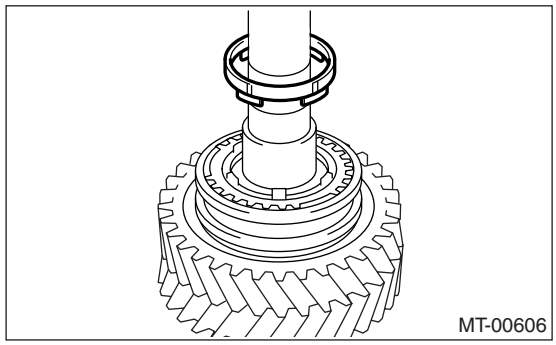
12) Install the outer baulk ring.



13) Install the 2nd synchro cone.

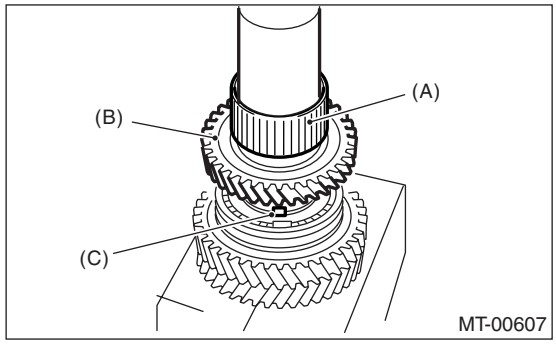


14) Install the inner baulk ring.



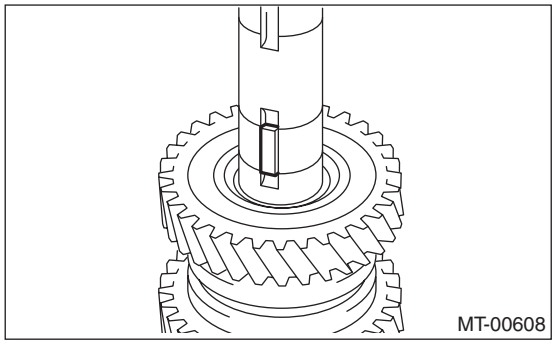
15) Sufficiently apply gear oil to the bush, 2nd needle bearing and inner periphery of 2nd drive gear.
16) Install the 2nd needle bearing and 2nd driven gear.

NOTE:
Align the protrusion portion of 2nd synchro cone with 2nd driven gear hole, then install.



(A) 2nd needle bearing
(B) 2nd driven gear
(C) Protrusion portion of 2nd synchro cone

17) Install the key.

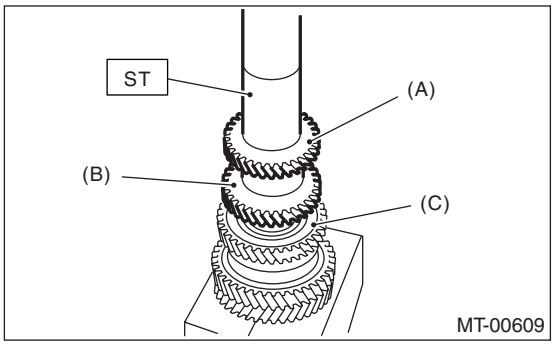


18) Using the ST, install the 3rd-4th driven gear.
ST 18654AA000 INSTALLER

CAUTION:
Do not apply pressure in excess of 40 kN (4.0 ton, 4.4 US ton, 3.9 Imp ton).

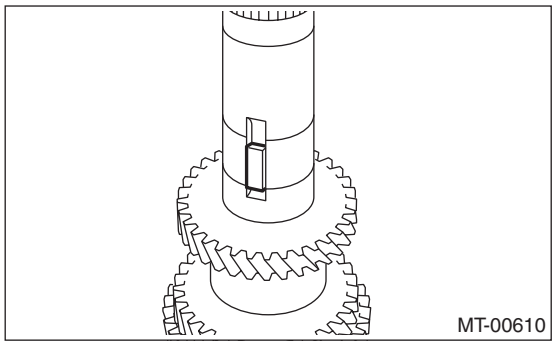
NOTE:
• Make sure to install the 3rd-4th driven gear in proper direction.

• Align the groove of 3rd-4th driven gear with key.



(A) 4th gear
(B) 3rd gear
(C) 2nd gear

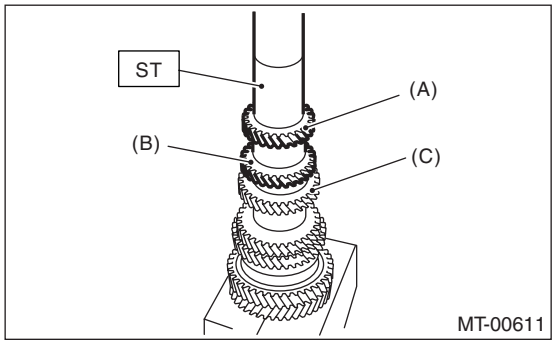
19) Make sure the 2nd driven gear is smoothly turned by hand. If not, reassemble.
20) Install the key.



21) Using the ST, install the 5th-6th driven gear.
ST 18654AA000 INSTALLER

CAUTION:
• Do not apply pressure in excess of 40 kN (4.0 ton, 4.4 US ton, 3.9 Imp ton).

NOTE:
• Make sure to install the 5th-6th driven gear in proper direction.
• Align the groove of 5th-6th driven gear with key.

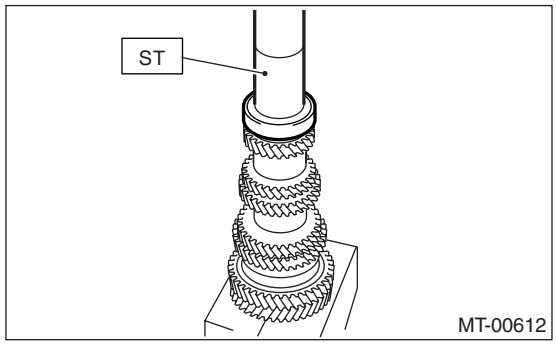


(A) 6th gear
(B) 5th gear
(C) 4th gear

22) Using the ST, install the ball bearing.
ST 18654AA000 INSTALLER

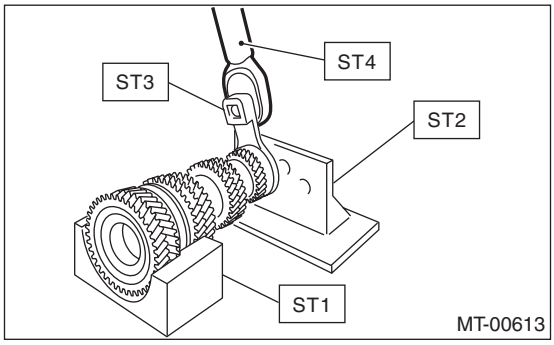
CAUTION:
Do not apply pressure in excess of 40 kN (4.0 ton, 4.4 US ton, 3.9 Imp ton).

NOTE:
Make sure to install the ball bearing in proper direction.



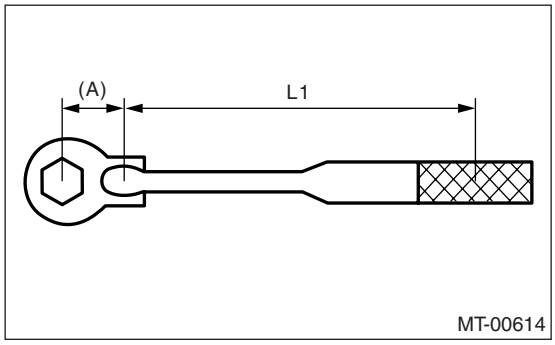
23) Make sure the ball bearing is smoothly turned by hand. If not, reassemble.
24) Install a new lock nut.
25) Install the ST3 to lock nut, then install the ST to driven gear assembly and tighten lock nut.
ST1 18666AA000 HOLDER
ST2 18664AA000 BASE
ST3 18620AA000 ADAPTER WRENCH
ST4 18852AA000 TORQUE WRENCH

Tightening torque:
530 N·m (54.0 kgf-m, 391 ft-lb)



NOTE:
If torque wrench except ST4 is used, calculate the following equation, then tighten the lock nut.
T=L1/(0.1 + L1)570

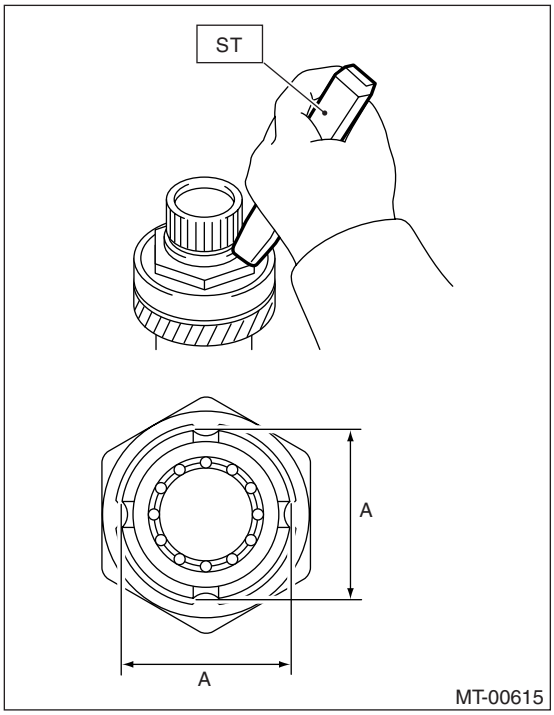
T N·m (kgf-m, ft-lb)	Setting value of torque wrench
L1 m (in)	Torque wrench length
0.1 m (3.94 in)	ST length
570 N·m (58.1 kgf-m, 420 ft-lb)	Tightening torque of lock nut



(A) 0.1 m (3.94 in)

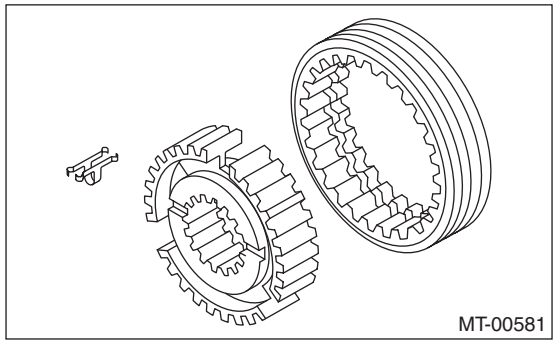
26) Using the ST, caulk four portions on the lock nut to obtain dimension A 44±0.5 mm (1.73±0.02 in).
ST1 18669AA000 PUNCH

NOTE:
Do not damage the caulking portion of lock nut. Replace with new lock nut if the caulking portion is cracked.



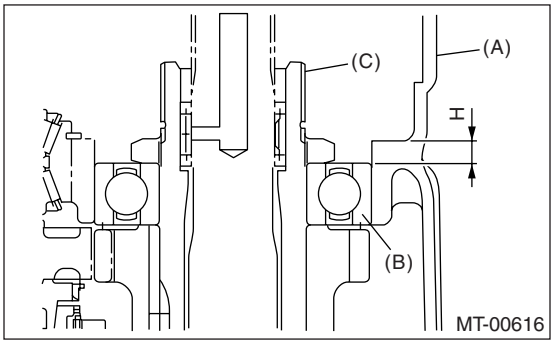
E: INSPECTION

Disassembled parts should be washed clean first and then inspected carefully.
1) Bearing
Replace the bearings in the following cases.
• Worn, rusted and damaged bearing
• Bearings that fail to turn smoothly or make abnormal noise when turned
• Bearings having other defects
2) Bushing (each gear)
Replace the bushings in the following case.
• When the sliding surface is damaged or abnormally worn.
3) Gears
Replace the gears in the following cases.
• Gear teeth surfaces are broken or excessively worn.
• Parts that contact the baulk ring is damaged.
• The inner surface of gear is damaged.
4) Baulk ring, synchro cone
Replace the baulk ring and synchro cone in the following case:
• Worn, rusted and damaged baulk ring
5) Shifting insert key
Replace the shifting insert key if deformed, excessively worn or defective in any way.



F: ADJUSTMENT

1) Measure length “H”, which is from transmission case and oil pump cover mating surface to ball bearing edge.



(A) Transmission case
(B) Ball bearing
(C) Driven gear assembly

2) Using the following equation, calculate the washer thickness of driven gear assembly.
T=H − {5.8±0.05 mm (0.23±0.002 in)} − {0.1 to 0.3 mm (0.0039 to 0.0118 in)}

t	Thickness of washer
H	Length from transmission case and oil pump cover mating surface to ball bearing edge
5.8±0.05 mm (0.23±0.002 in)	Thickness of collar
0.1 to 0.3 mm (0.0039 to 0.0118 in)	Backlash specification at axial direction of driven gear assembly

3) Select 0 to 3 washers from the following table to adjust backlash closest to specification.

Backlash specification at axial direction of driven gear assembly:
0.1 — 0.3 mm (0.0039 — 0.0118 in)

Washer	
Part No.	Thickness t mm (in)
803072030	0.15 (0.0059)
803072031	0.30 (0.0118)
803072032	0.45 (0.0177)
803072033	0.60 (0.0236)

22.Reverse Idler Gear

A: REMOVAL

1) Remove the manual transmission assembly from vehicle. <Ref. to 6MT-36, REMOVAL, Manual Transmission Assembly.>
2) Prepare the transmission for overhaul. <Ref. to 6MT-42, Preparation for Overhaul.>
3) Remove the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-44, REMOVAL, Oil Pipe.>, <Ref. to 6MT-47, REMOVAL, Neutral Position Switch.> , <Ref. to 6MT-45, REMOVAL, Back-up Light Switch.>
4) Remove the extension case. <Ref. to 6MT-49, REMOVAL, Extension Case.>
5) Remove the transfer driven gear. <Ref. to 6MT-60, REMOVAL, Transfer Driven Gear.>
6) Remove the center differential. <Ref. to 6MT-62, REMOVAL, Center Differential.>
7) Remove the oil pump. <Ref. to 6MT-63, REMOVAL, Oil Pump.>
8) Remove the transmission case. <Ref. to 6MT-67, REMOVAL, Transmission Case.>
9) Remove the reverse idler gear assembly. <Ref. to 6MT-72, REMOVAL, Main Shaft Assembly.>

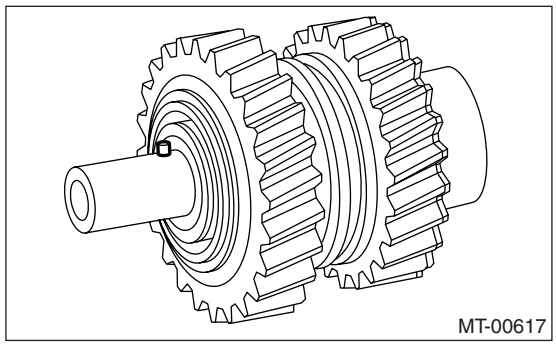
B: INSTALLATION

1) Select the reverse fork rod. <Ref. to 6MT-119, ADJUSTMENT, Shifter Fork and Rod.>
2) Install the reverse idler gear assembly. <Ref. to 6MT-73, INSTALLATION, Main Shaft Assembly.>
3) Install the transmission case. <Ref. to 6MT-68, INSTALLATION, Transmission Case.>
4) Install the oil pump. <Ref. to 6MT-64, INSTALLATION, Oil Pump.>
5) Install the center differential. <Ref. to 6MT-62, INSTALLATION, Center Differential.>
6) Install the transfer driven gear. <Ref. to 6MT-60, INSTALLATION, Transfer Driven Gear.>
7) Install the extension case. <Ref. to 6MT-49, INSTALLATION, Extension Case.>
8) Install the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-44, INSTALLATION, Oil Pipe.>, <Ref. to 6MT-47, INSTALLATION, Neutral Position Switch.> , <Ref. to 6MT-45, INSTALLATION, Back-up Light Switch.>
9) Install the manual transmission assembly to vehicle. <Ref. to 6MT-38, INSTALLATION, Manual Transmission Assembly.>

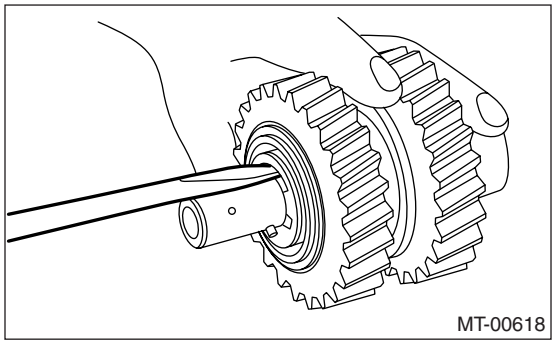
C: DISASSEMBLY

NOTE:
The sleeve and reverse gear engage at a specified point. Mark an engagement point on the sleeve and hub before disassembly.

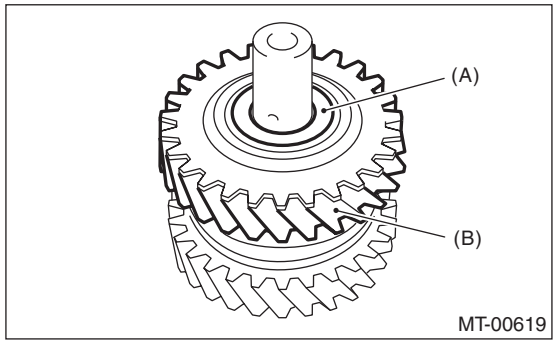
1) Remove the spring pin.



2) Remove the snap ring.

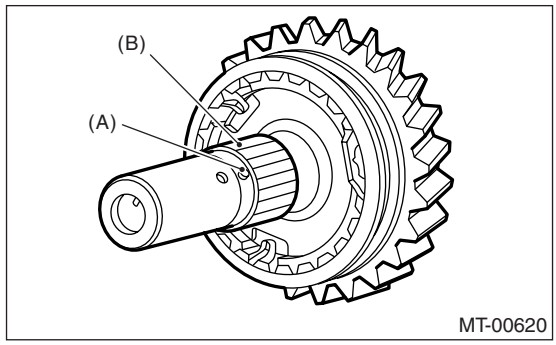


3) Remove the washer and reverse idler gear.



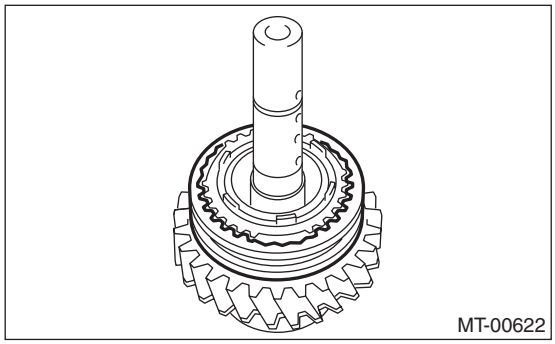
(A) Washer
(B) Reverse idler gear

4) Remove the knock pin and reverse idler gear needle bearing.

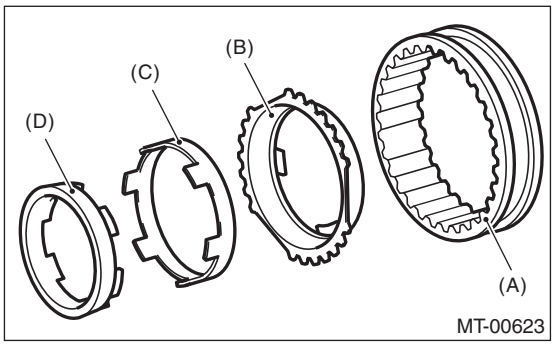


(A) Knock pin
(B) Reverse idler gear needle bearing

5) Remove the collar.
6) Remove the reverse sleeve.

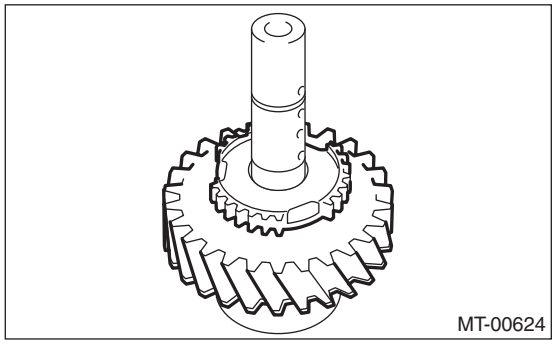


7) Remove the outer baulk ring, reverse synchro cone and inner baulk ring from reverse sleeve.

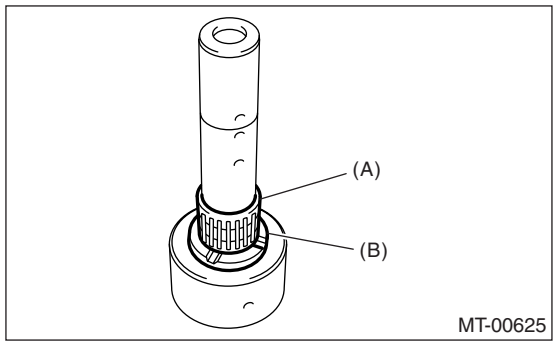


(A) Reverse sleeve
(B) Outer baulk ring
(C) Reverse synchro cone
(D) Inner baulk ring

8) Remove the reverse idler gear No. 2.

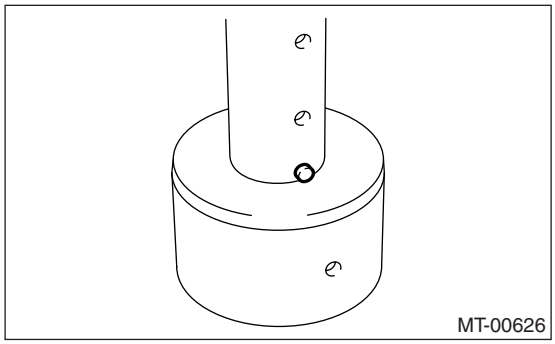


9) Remove the washer and needle bearing.

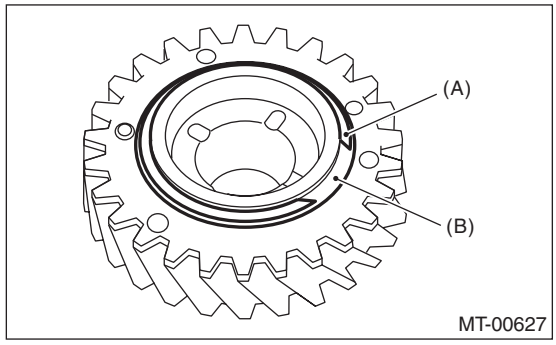


(A) Needle bearing
(B) Washer

10) Remove the knock pin.

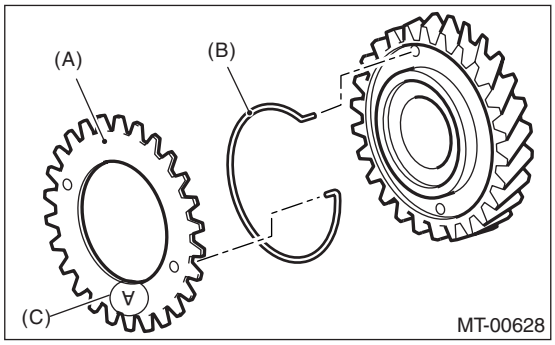


11) Remove the snap ring and friction plate from reverse gear.



(A) Snap ring
(B) Friction plate

12) Remove the sub gear and spring.

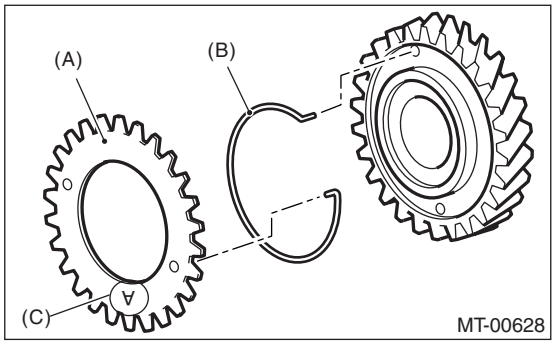


(A) Sub gear
(B) Spring
(C) Punch mark (mark A)

D: ASSEMBLY

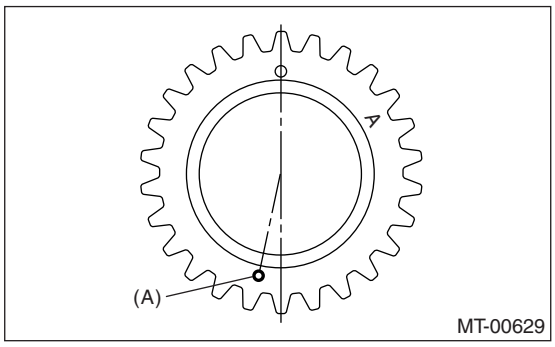
1) Install the sub gear and spring.

NOTE:
• Install the spring with white marking on hook part facing to sub gear side.
• Install the sub gear with punch mark (mark A) facing outside.



(A) Sub gear
(B) Spring
(C) Punch mark (mark A)

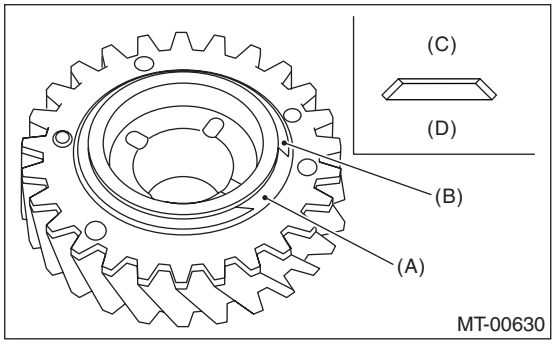
• Install the spring and sub gear, taking care to install the sub gear installation hole in proper direction.



(A) Installation hole

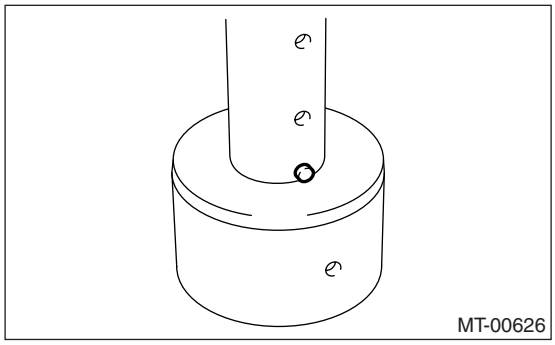
2) Install the friction plate and snap ring.

NOTE:
Make sure to install the friction plate in proper direction.



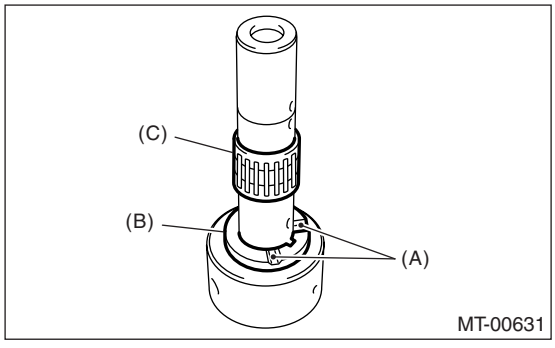
(A) Friction plate
(B) Snap ring
(C) Snap ring side
(D) Sub gear side

3) Sufficiently apply gear oil to the shaft, needle bearing and inner periphery of reverse drive gear.
4) Install the knock pin.



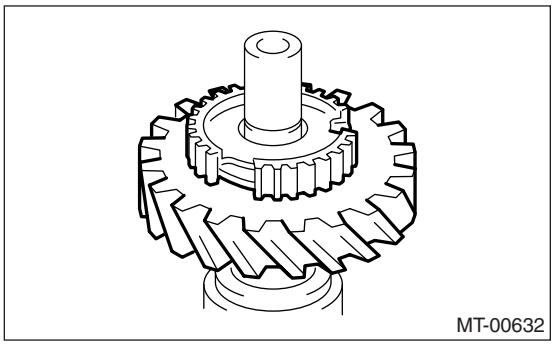
5) Install the washer and needle bearing.

NOTE:
Install the washer with groove facing to reverse idler gear.



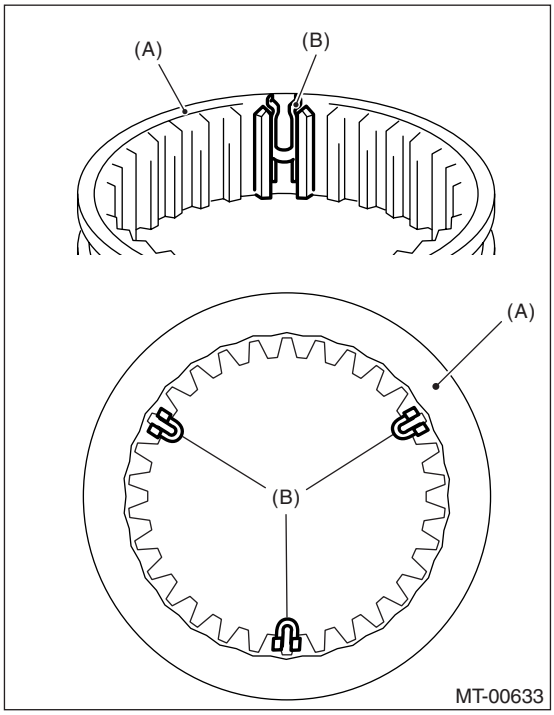
(A) Groove
(B) Washer
(C) Needle bearing

6) Install the reverse idler gear No. 2.



7) Install the shifting insert key in proper place of reverse sleeve.

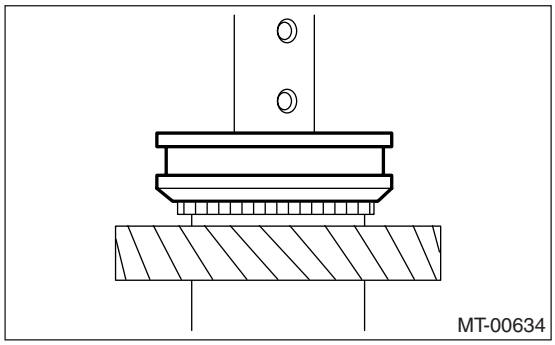
NOTE:
Angle of each shifting insert key is 120 apart.



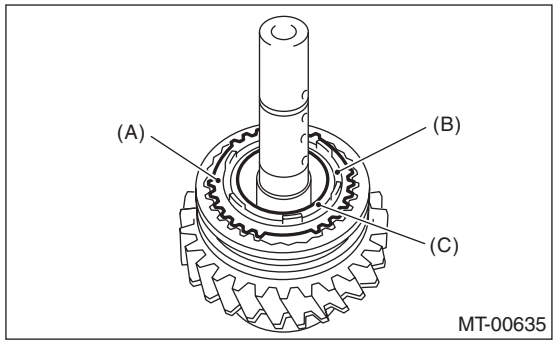
(A) Reverse sleeve
(B) Shifting insert key

8) Install the reverse sleeve to reverse idler gear No. 2.

NOTE:
Make sure to install the reverse sleeve in proper direction.

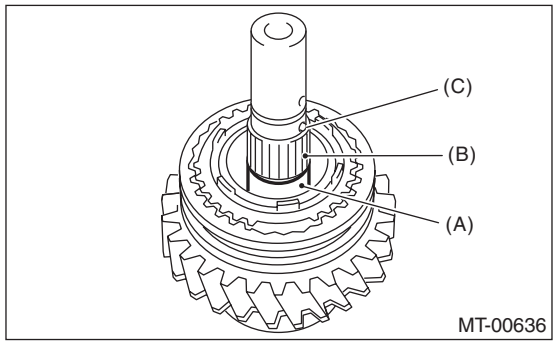


9) Sufficiently apply gear oil to the collar, needle bearing and inner periphery of reverse drive gear.
10) Install the outer baulk ring, reverse synchro cone and inner baulk ring.



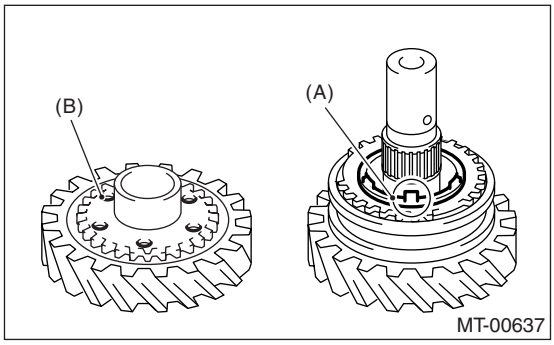
(A) Outer baulk ring
(B) Reverse synchro cone
(C) Inner baulk ring

11) Install the collar and needle bearing, then install the knock pin.



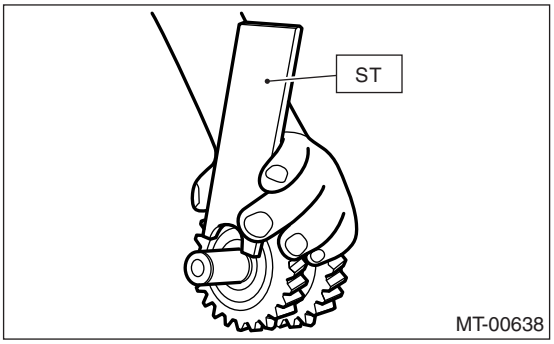
(A) Collar
(B) Needle bearing
(C) Knock pin

12) Align the protrusion portion of reverse synchro cone with reverse idler gear hole, then install the reverse idler gear.



(A) Protrusion portion of reverse synchro cone
(B) Reverse idler gear hole

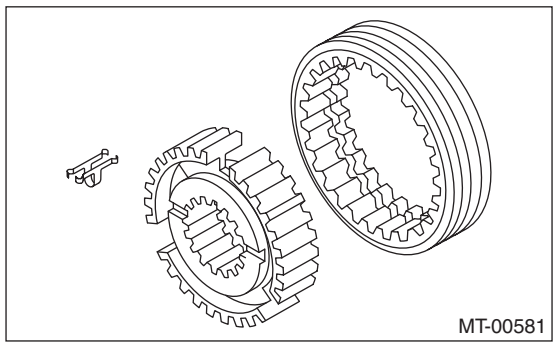
13) Install the washer with groove facing to reverse idler gear.
14) Using the ST, install the snap ring.
ST 18672AA000 GUIDE CLIP



15) Inspect and adjust the clearance between snap ring and washer. <Ref. to 6MT-98, INSPECTION, Reverse Idler Gear.>
16) Install a new spring pin.

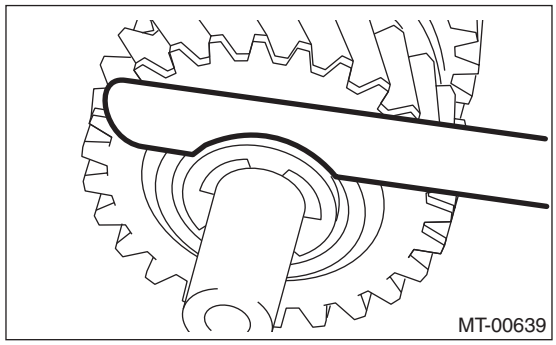
E: INSPECTION

Disassembled parts should be washed clean first and then inspected carefully.
1) Bearings
Replace the bearings in the following cases.
• Worn, rusted and damaged bearing
• Bearings that fail to turn smoothly or make abnormal noise when turned
• Bearings having other defects
2) Bushing (each gear)
Replace the bushings in the following case:
• When the sliding surface is damaged or abnormally worn.
3) Gears
Replace the gears in the following cases:
• The gear teeth surfaces are broken or excessively worn.
• The parts that contact the baulk ring is damaged.
• The inner surface of gear is damaged.
4) Baulk ring, synchro cone
Replace the baulk ring and synchro cone in the following case:
• Worn, rusted and damaged baulk ring
5) Shifting insert key
Replace the shifting insert key if deformed, excessively worn or defective in any way.



6) Inspect the clearance between snap ring and washer.

Specification of clearance:
0.1 — 0.3 mm (0.0039 — 0.0118 in)



Select and replace the snap ring from the following table if clearance is out of specification.

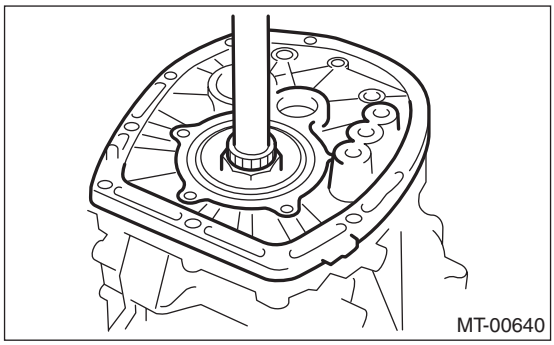
Snap ring	
Parts No.	Thickness mm (in)
031319000	1.50 (0.059)
805019030	1.60 (0.062)
805019010	1.72 (0.068)

Inspect the clearance again after replacing snap ring.

23.Drive Pinion Shaft Assembly

A: REMOVAL

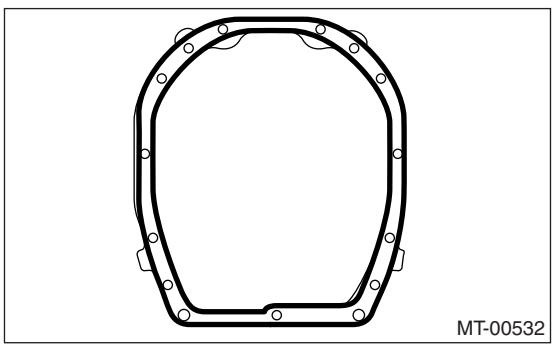
1) Remove the manual transmission assembly from vehicle. <Ref. to 6MT-36, REMOVAL, Manual Transmission Assembly.>
2) Prepare the transmission for overhaul. <Ref. to 6MT-42, Preparation for Overhaul.>
3) Remove the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-44, REMOVAL, Oil Pipe.>, <Ref. to 6MT-47, REMOVAL, Neutral Position Switch.> , <Ref. to 6MT-45, REMOVAL, Back-up Light Switch.>
4) Remove the extension case. <Ref. to 6MT-49, REMOVAL, Extension Case.>
5) Remove the transfer driven gear. <Ref. to 6MT-60, REMOVAL, Transfer Driven Gear.>
6) Remove the center differential. <Ref. to 6MT-62, REMOVAL, Center Differential.>
7) Remove the oil pump. <Ref. to 6MT-63, REMOVAL, Oil Pump.>
8) Remove the transmission case. <Ref. to 6MT-67, REMOVAL, Transmission Case.>
9) Remove each gear assembly. <Ref. to 6MT-72, REMOVAL, Main Shaft Assembly.>
10) Remove the drive pinion shaft assembly.


MT-00640

B: INSTALLATION

1) Completely remove the remaining gasket on drive plate and clutch housing.
2) Apply liquid gasket to the clutch housing.

Liquid gasket:
THREE BOND 1215 (Part No. 004403007) or equivalent

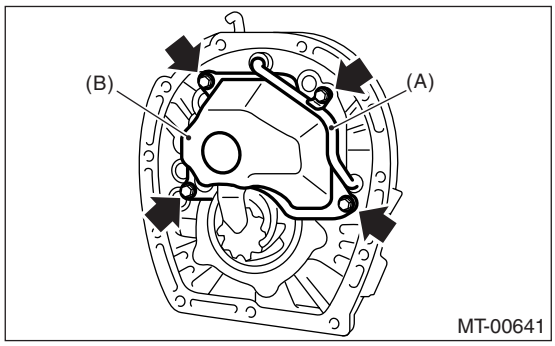

MT-00532

3) Install each gear assembly. <Ref. to 6MT-73, INSTALLATION, Main Shaft Assembly.>
4) Install the transmission case. <Ref. to 6MT-68, INSTALLATION, Transmission Case.>
5) Install the oil pump. <Ref. to 6MT-64, INSTALLATION, Oil Pump.>
6) Install the center differential. <Ref. to 6MT-62, INSTALLATION, Center Differential.>
7) Install the transfer driven gear. <Ref. to 6MT-60, INSTALLATION, Transfer Driven Gear.>
8) Install the extension case. <Ref. to 6MT-49, INSTALLATION, Extension Case.>
9) Install the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-44, INSTALLATION, Oil Pipe.>, <Ref. to 6MT-47, INSTALLATION, Neutral Position Switch.> , <Ref. to 6MT-45, INSTALLATION, Back-up Light Switch.>
10) Install the manual transmission assembly to vehicle. <Ref. to 6MT-38, INSTALLATION, Manual Transmission Assembly.>

C: DISASSEMBLY

NOTE:
Replace the drive pinion shaft as a set with hypoid driven gear.

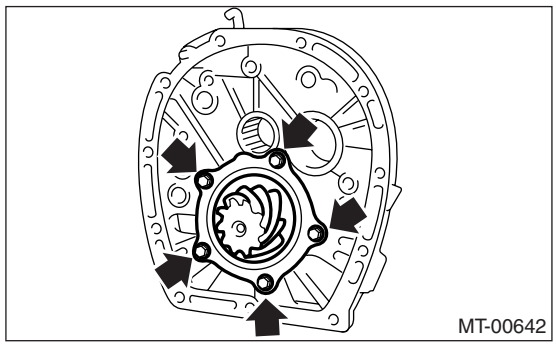
1) Remove the pipe and oil chamber.



MT-00641

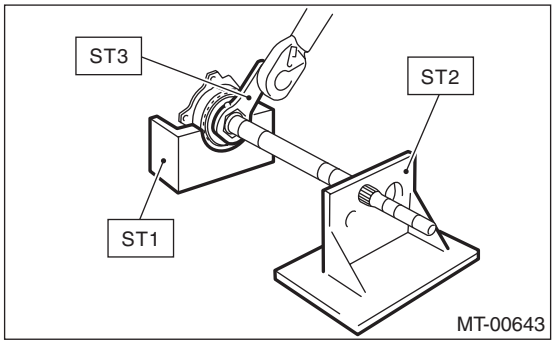
(A) Pipe
(B) Oil chamber

2) Remove the drive pinion shaft and shim from adapter plate.

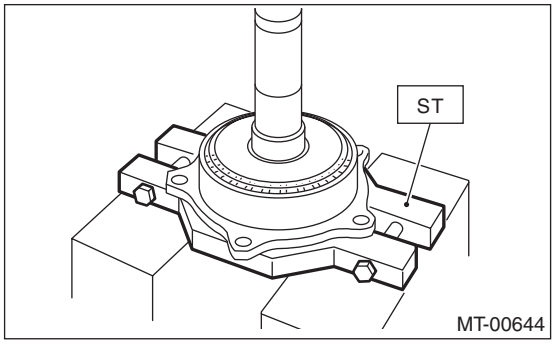

MT-00642

3) Secure the ST on workbench.
ST 18664AA000 BASE
4) Lift the caulking of lock nut.

5) Install the ST3 to lock nut, then set drive pinion shaft to ST. Remove the lock nut and washer.
ST1 18667AA000 HOLDER
ST2 18664AA000 BASE
ST3 18621AA000 ADAPTER WRENCH



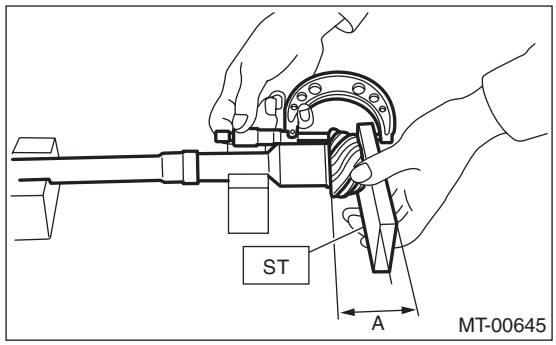
6) Using the ST, remove the taper roller bearing assembly.
ST 18723AA000 REMOVER



D: ASSEMBLY

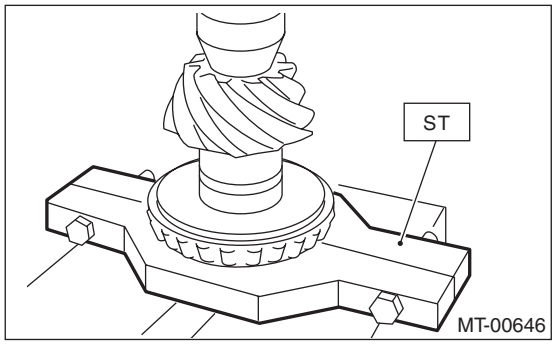
1) Using the ST, measure dimension A of drive pinion.

NOTE:
Note dimension A for selection of drive pinion shim.
ST 499575500 GAUGE



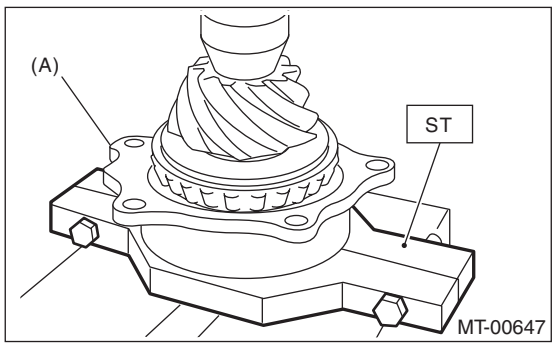
2) Install the inner bearing inner race to drive pinion shaft using ST and press.
ST 18723AA000 REMOVER

CAUTION:
Do not apply pressure in excess of 40 kN (4.0 ton, 4.4 US ton, 3.9 Imp ton).



3) Install the retainer and outer bearing inner race to drive pinion shaft using ST and press.
ST 18723AA000 REMOVER

NOTE:
Press to the point where bearing is turned smoothly without slack.



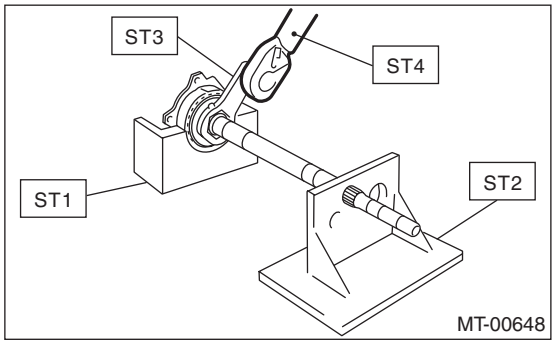
(A) Retainer

4) Install the washer and new lock nut.

5) Set the ST to drive pinion, then tighten the lock nut.
ST1 18667AA000 HOLDER
ST2 18664AA000 BASE
ST3 18621AA000 ADAPTER WRENCH
ST4 18852AA000 TORQUE WRENCH

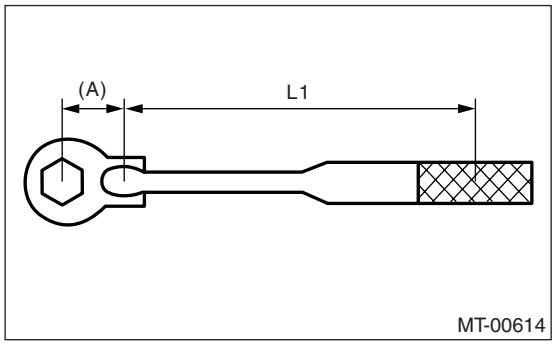
NOTE:
Tighten with the ST and torque wrench straight-lined.

Tightening torque:
265 N·m (27.0 kgf-m, 195 ft-lb)



NOTE:
• If torque wrench except ST4 is used, calculate the following equation, then tighten the lock nut.
Tighten with the ST and torque wrench straight-lined.
T=L1/(0.1 + L1)285

T N·m (kgf-m, ft-lb)	Setting value of torque wrench
L1 m (in)	Torque wrench length
0.1 m (3.94 in)	ST length
285 N·m (29.0 kgf-m, 210 ft-lb)	Tightening torque of lock nut

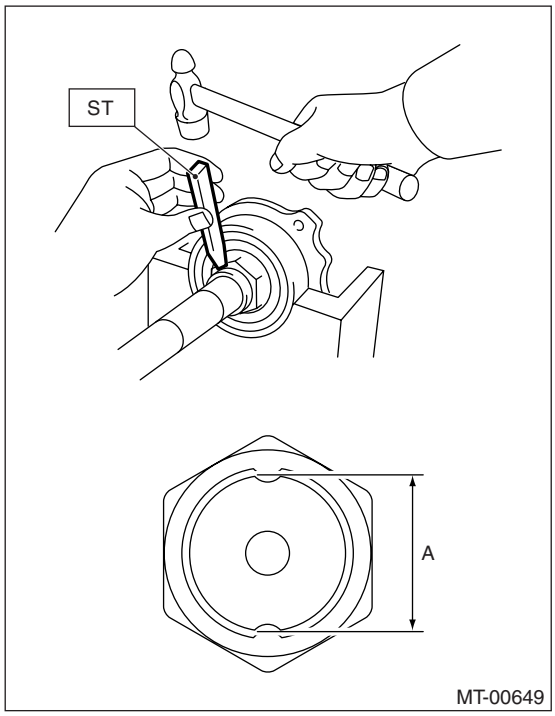


(A) 0.1 m (3.94 in)

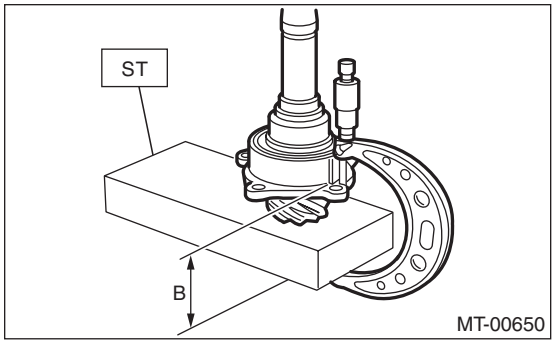
6) Measure the starting torque. <Ref. to 6MT-102, INSPECTION, Drive Pinion Shaft Assembly.>

7) Using the ST, caulk two portions on the lock nut to obtain dimension A 37±0.5 mm (1.46±0.02 in).
ST 18670AA000 PUNCH

NOTE:
Do not damage the caulking portion of lock nut. Replace with new lock nut if the caulking portion is cracked.



8) Using the ST, measure dimension B of the drive pinion.
ST 499575500 GAUGE



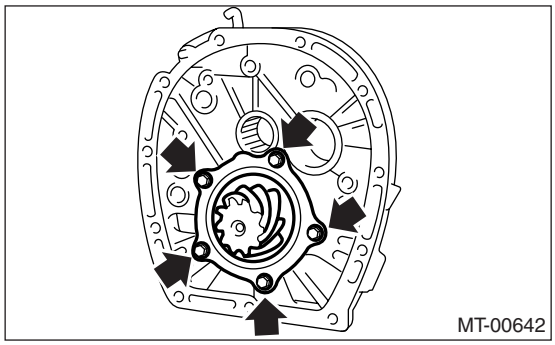
9) Calculate the following equation, then select one or two pieces of drive pinion shim from the table below.
6.5±0.0625 mm – (B – A) [0.26±0.0025 in – (B – A)]

NOTE:
A: Measured value from step 1).
B: Measured value from step 8).

Drive pinion shim	
Part No.	Thickness mm (in)
32295AA270	0.15 (0.0059)
32295AA280	0.175 (0.0069)
32295AA290	0.20 (0.0079)
32295AA300	0.225 (0.0089)
32295AA310	0.25 (0.0098)
32295AA320	0.275 (0.0108)

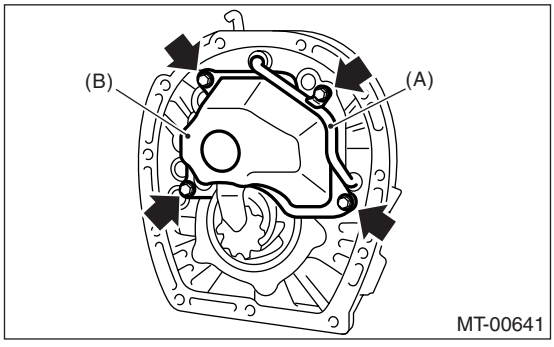
10) Apply gear oil to the side face of taper roller bearing, then install the drive pinion shaft and selected shim to adapter plate.

Tightening torque:
54 N·m (5.5 kgf-m, 40 ft-lb)



11) Install the oil chamber and pipe.

Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)

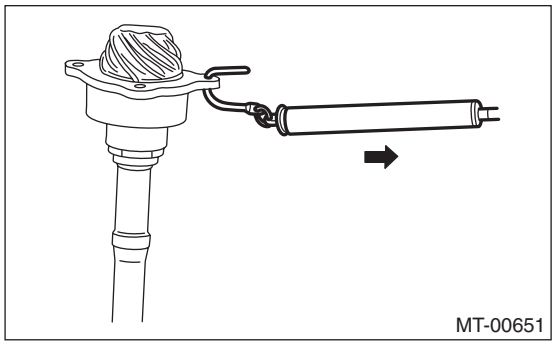


(A) Pipe
(B) Oil chamber

E: INSPECTION

1) Using the spring balancer, measure the starting torque. If the starting torque is out of specification, replace the taper roller bearing.

Starting torque:
0 — 0.95 N (0 — 0.097 kgf, 0 — 0.21 lbf)



2) Gears
Replace the gears in the following case.
• Gear teeth surfaces are broken or excessively worn.

3) Bearings
Replace the bearings in the following cases.
• Worn, rusted and damaged bearing
• Bearings that fail to turn smoothly or make abnormal noise when turned

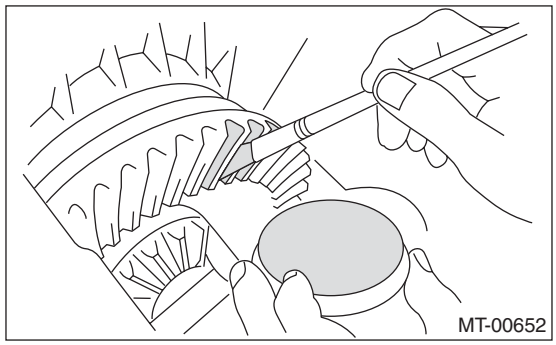
4) Adapter plate
Replace the adapter plate in the following cases.
• Worn, rusted and damaged bearing
• Damaged adapter plate

5) Make sure the pipe and pipe chamber is not damaged or clogged. Repair or replace if damaged or clogged.

F: ADJUSTMENT

1) Inspect and adjust the backlash between hypoid driven gear and drive pinion. <Ref. to 6MT-110, HYPOID GEAR BACKLASH, ADJUSTMENT, Front Differential Assembly.>

2) Apply a uniform thin coat of red lead on both teeth surfaces of three or four teeth of the hypoid driven gear.

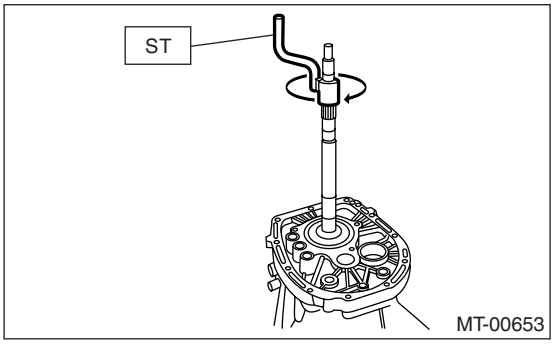


3) Install the drive pinion shaft assembly to clutch housing, then tighten at least four bolts.

NOTE:
Install with the liquid gasket remaining to prevent the mating surface of clutch housing and adapter plate from damaging.

Tightening torque:
50 N·m (5.1 kgf-m, 36.9 ft-lb)

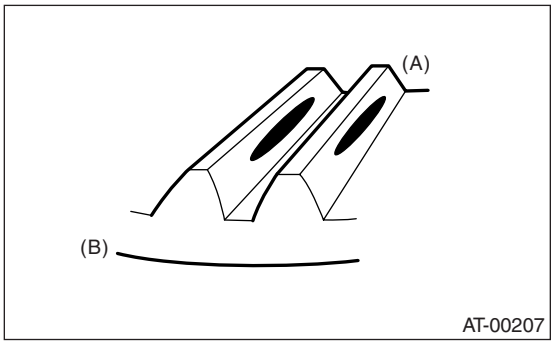
4) Using the ST, rotate several times.
ST 18631AA000 HANDLE



5) Remove the drive pinion shaft assembly, and then check tooth contact. If it is inaccurate, adjust the backlash or thickness of shim.

- Tooth contact

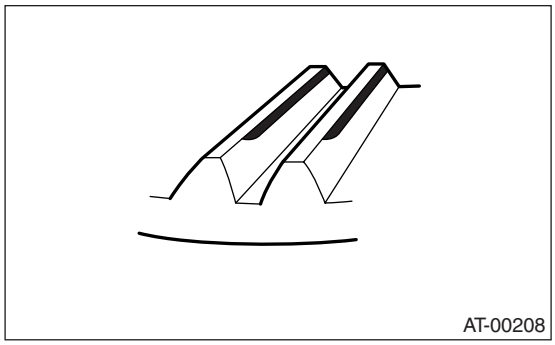
Checking item:Tooth contact pattern is slightly shifted toward to toe side under no-load rotation. [When loaded, contact pattern moves toward heel.]



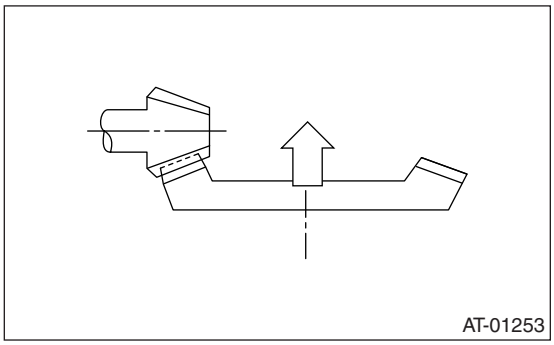
(A) Toe side
(B) Heel side

- Face contact

Checking item: Backlash is too large.
Contact pattern

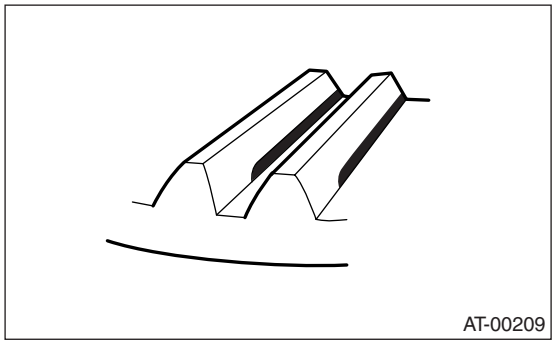


Corrective action: Verify the backlash again, and then adjust it.

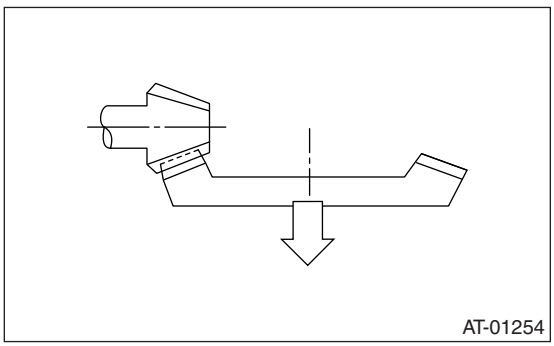


- Flank contact

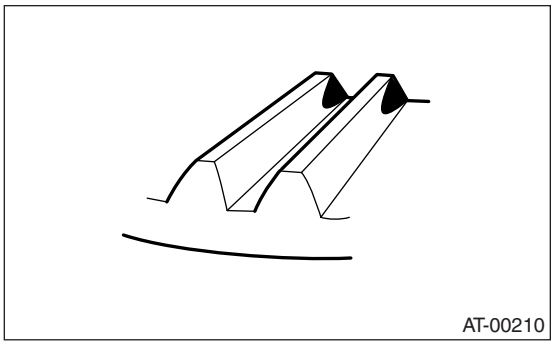
Checking item: Backlash is too small.
Contact pattern



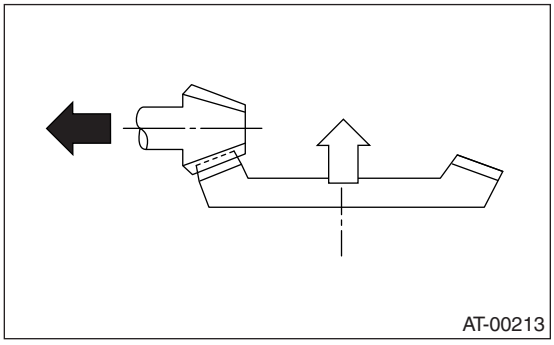
Corrective action: Verify the backlash again, and then adjust it.



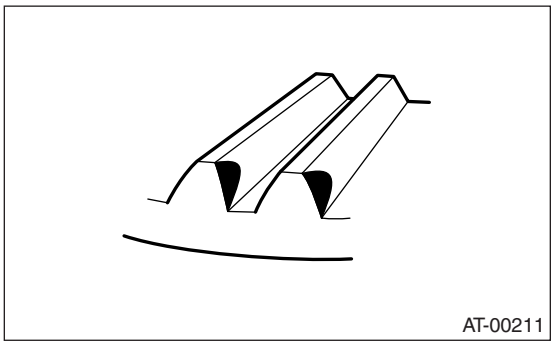
• Toe contact (Inside end contact)
Checking item: Contact areas is small.
Contact pattern



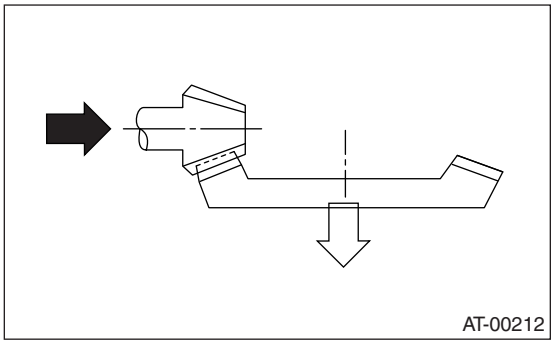
Corrective action: Reduce thickness of drive pinion shim in order to move drive pinion away from hypoid driven gear.



• Heel contact (Outside end contact)
Checking item: Contact areas is small.
Contact pattern



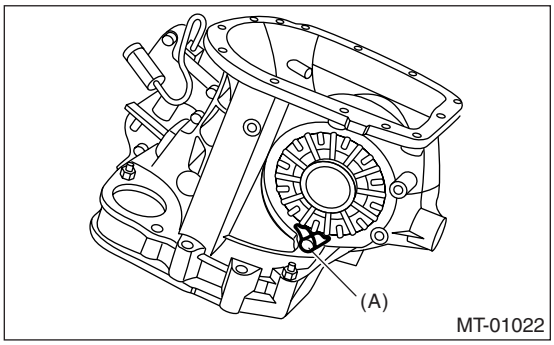
Corrective action: Increase thickness of drive pinion shim in order to bring drive pinion close to hypoid driven gear.



24.Front Differential Assembly

A: REMOVAL

1) Remove the manual transmission assembly. <Ref. to 6MT-36, REMOVAL, Manual Transmission Assembly.>
2) Prepare the transmission for overhaul. <Ref. to 6MT-42, Preparation for Overhaul.>
3) Remove the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-44, REMOVAL, Oil Pipe.>, <Ref. to 6MT-47, REMOVAL, Neutral Position Switch.> , <Ref. to 6MT-45, REMOVAL, Back-up Light Switch.>
4) Remove the extension case. <Ref. to 6MT-49, REMOVAL, Extension Case.>
5) Remove the transfer driven gear. <Ref. to 6MT-60, REMOVAL, Transfer Driven Gear.>
6) Remove the center differential. <Ref. to 6MT-62, REMOVAL, Center Differential.>
7) Remove the oil pump. <Ref. to 6MT-63, REMOVAL, Oil Pump.>
8) Remove the transmission case. <Ref. to 6MT-67, REMOVAL, Transmission Case.>
9) Remove each gear assembly. <Ref. to 6MT-72, REMOVAL, Main Shaft Assembly.>
10) Remove the drive pinion shaft assembly. <Ref. to 6MT-99, REMOVAL, Drive Pinion Shaft Assembly.>
11) Remove the lock plates on both side.

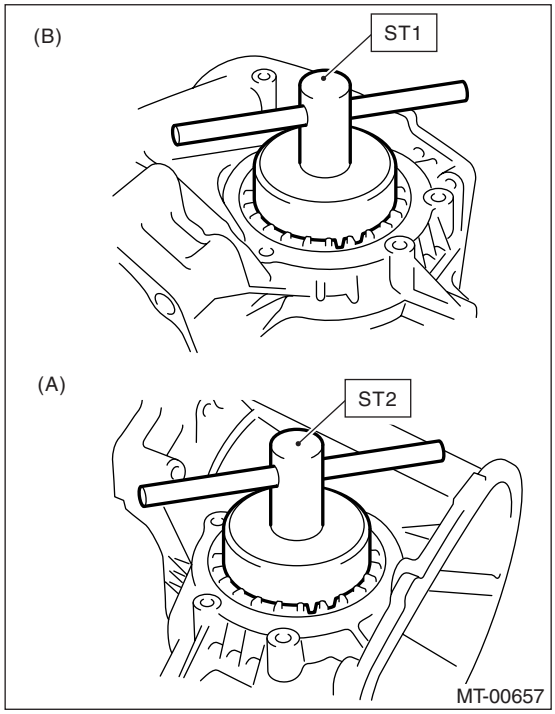


(A) Lock plate

12) Using the ST, remove the differential side retainer on both side.

ST1	499787000	WRENCH ASSY (RIGHT SIDE)
ST2	18630AA000	WRENCH ASSY (LEFT SIDE)

NOTE:
Be careful not to damage the part of clutch case where the retainer is to be installed.



(A) Left side
(B) Right side

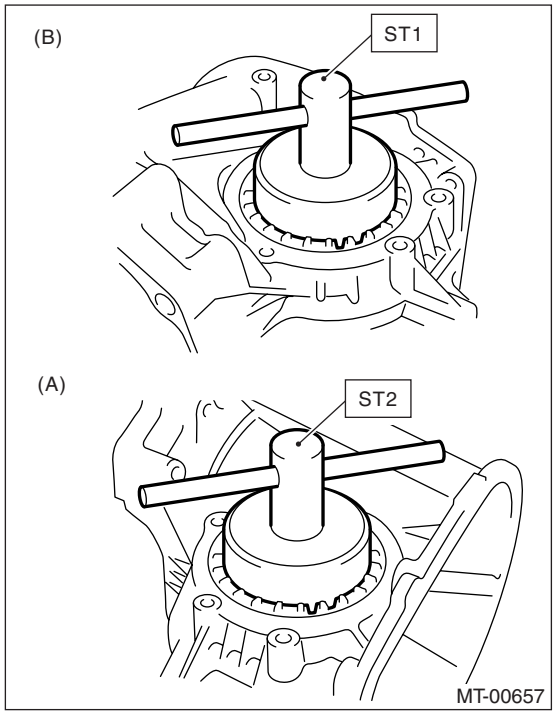
13) Remove the front differential.

B: INSTALLATION

1) Install the differential assembly into clutch housing.
2) Apply oil to the threaded portion part of side retainer.
3) Remove the O-ring from side retainer of both side.
4) Using the ST, install the differential side retainer to both side.

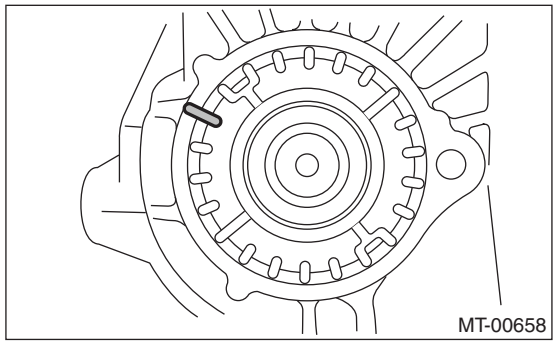
ST1	499787000	WRENCH ASSY (RIGHT SIDE)
ST2	18630AA000	WRENCH ASSY (LEFT SIDE)

NOTE:
Be careful not to damage the oil seal.



(A) Left side
(B) Right side

5) Check and adjust the hypoid gear backlash. <Ref. to 6MT-109, HYPOID GEAR BACKLASH, INSPECTION, Front Differential Assembly.>
6) Check and adjust the tooth contact. <Ref. to 6MT-102, ADJUSTMENT, Drive Pinion Shaft Assembly.>
7) Mark an engagement point on the right and left side retainer and clutch housing.



8) Remove the differential side retainer from both side.

NOTE:
Note the rotating number of time till removal, when removing the side retainer.

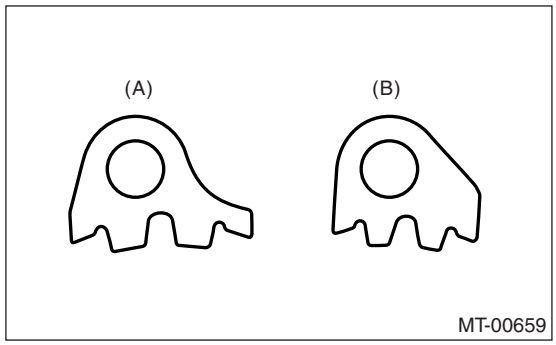
9) Install a new O-ring to side retainer of both side.
10) Install the differential side retainer to both side.

NOTE:
Install the side retainer by screwing in the same rotating number of time till removal, and then align the mark.

11) Install the lock plate.

Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)

NOTE:
Be careful not to confuse right and left lock plate.

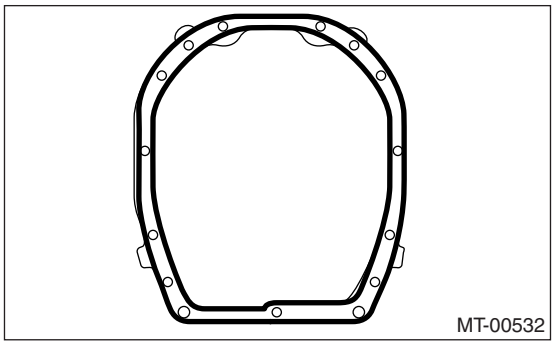


(A) Left
(B) Right

12) Completely remove the remaining gasket from the clutch housing and adapter plate.

13) Apply liquid gasket to the clutch housing.

Liquid gasket:
THREE BOND 1215 (Part No. 004403007) or equivalent

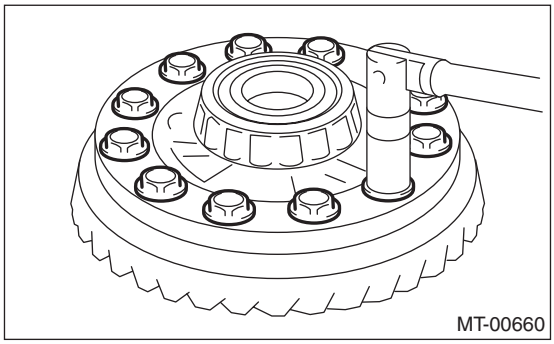


14) Install the drive pinion shaft assembly. <Ref. to 6MT-99, INSTALLATION, Drive Pinion Shaft Assembly.>
15) Install each gear assembly at once. <Ref. to 6MT-73, INSTALLATION, Main Shaft Assembly.>
16) Install the transmission case. <Ref. to 6MT-68, INSTALLATION, Transmission Case.>
17) Install the oil pump. <Ref. to 6MT-64, INSTALLATION, Oil Pump.>
18) Install the center differential. <Ref. to 6MT-62, INSTALLATION, Center Differential.>
19) Install the transfer driven gear. <Ref. to 6MT-60, INSTALLATION, Transfer Driven Gear.>
20) Install the extension case. <Ref. to 6MT-49, INSTALLATION, Extension Case.>
21) Install the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-44, INSTALLATION, Oil Pipe.>, <Ref. to 6MT-47, INSTALLATION, Neutral Position Switch.> , <Ref. to 6MT-45, INSTALLATION, Back-up Light Switch.>
22) Install the manual transmission assembly to vehicle. <Ref. to 6MT-38, INSTALLATION, Manual Transmission Assembly.>

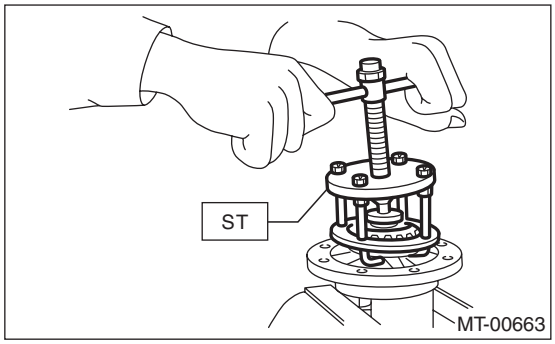
C: DISASSEMBLY

1. DIFFERENTIAL CASE

1) Secure the differential assembly on a vise, and then remove the hypoid driven gear.

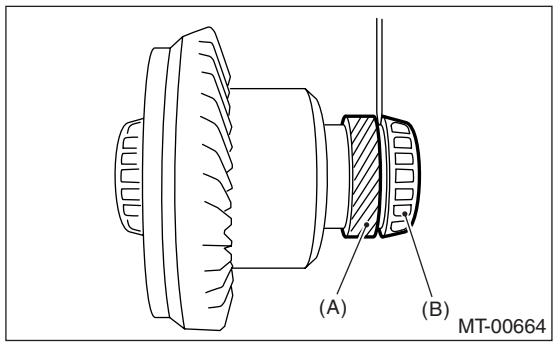


2) Using the ST, remove the hypoid driven gear side bearing.
ST 399527700 PULLER SET



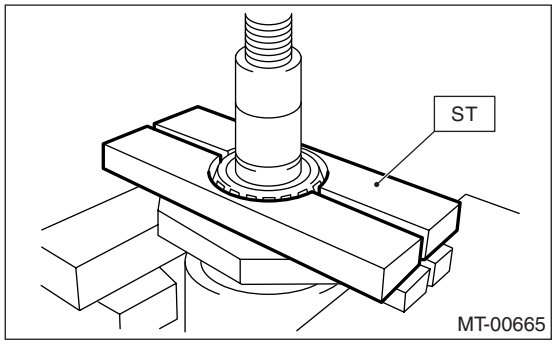
3) Using a screw driver, make clearance of 2 — 3 mm (0.079 — 0.118 in) between the speedometer drive gear and roller bearing.

NOTE:
Be careful not to damage the differential case.



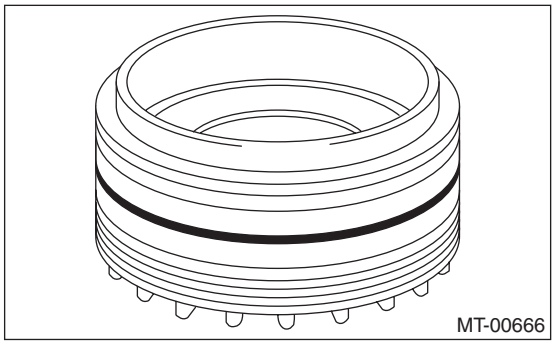
(A) Speedometer drive gear
(B) Roller bearing

4) Using the ST, remove the roller bearing.
ST 498077000 REMOVER

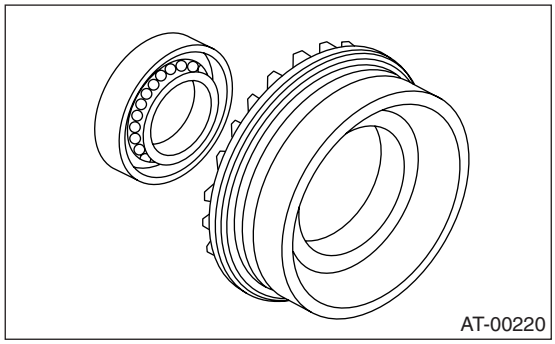


2. SIDE RETAINER

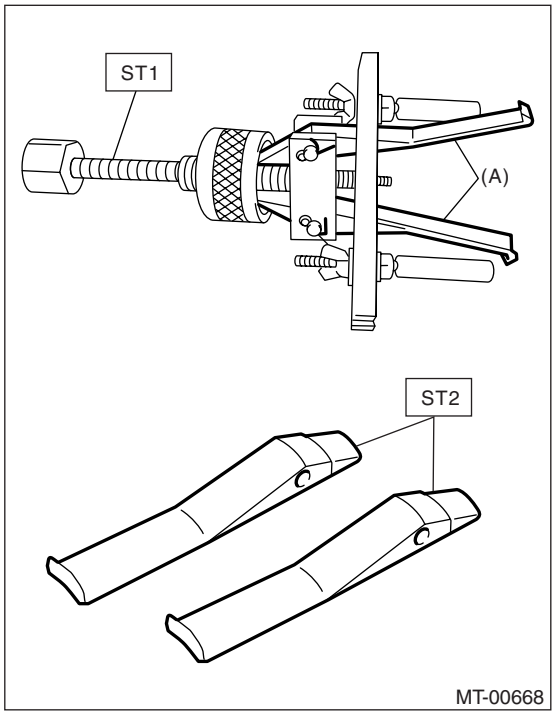
1) Remove the O-ring from side retainer.



2) Remove the oil seal from side retainer.

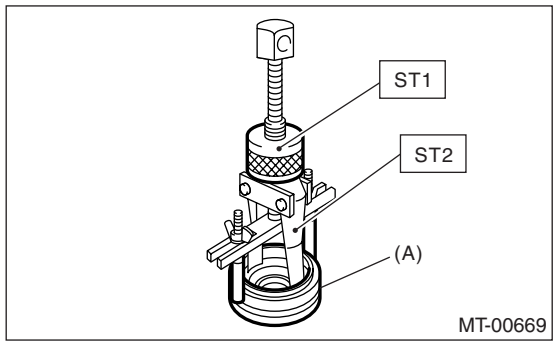


3) Remove the claw of ST1, and then install the claw of ST2.
ST1 398527700 PULLER ASSY
ST2 18760AA000 CLAW



(A) Claw

4) Remove the bearing outer race from side retainer.
ST1 398527700 PULLER ASSY
ST2 18760AA000 CLAW



(A) Side retainer

D: ASSEMBLY

1. DIFFERENTIAL CASE

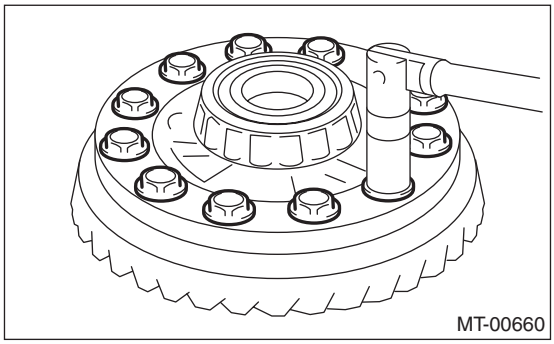
1) Using the ST, install a new speedometer drive gear and right and left side bearing inner race to differential case.
ST1 398437700 DRIFT
ST2 398497701 SEAT

CAUTION:
Do not apply pressure in excess of 20 kN (2.0 ton, 2.2 US ton, 2.0 Imp ton).

NOTE:
Always replace the inner race and outer race as a set.

2) Install the hypoid driven gear to differential case.

Tightening torque:
69 N·m (7.0 kgf-m, 50.9 ft-lb)

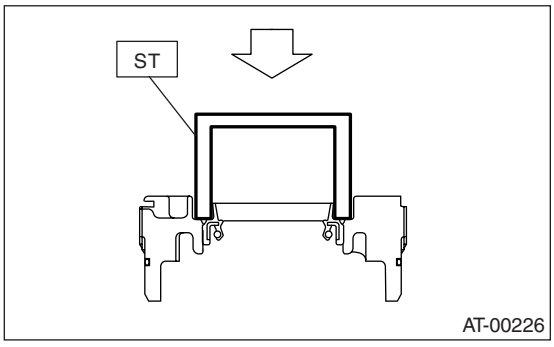

MT-00660

2. SIDE RETAINER

NOTE:
Install the oil seal and O-ring of side retainer after the adjustment of backlash and tooth contact.

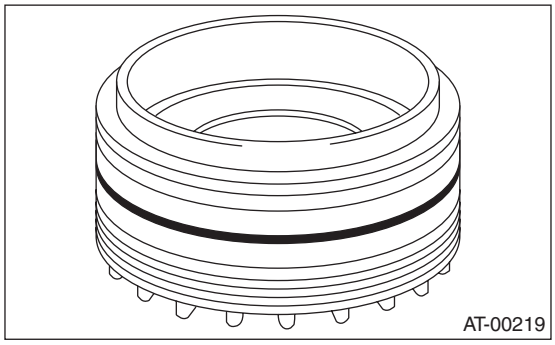
1) Install the bearing outer race to side retainer.
2) Fit a new oil seal using ST.
ST 18675AA000 DIFFERENTIAL SIDE OIL SEAL INSTALLER

NOTE:
Apply oil to the oil seal lips.



AT-00226

3) Install a new O-ring.


AT-00219

E: INSPECTION

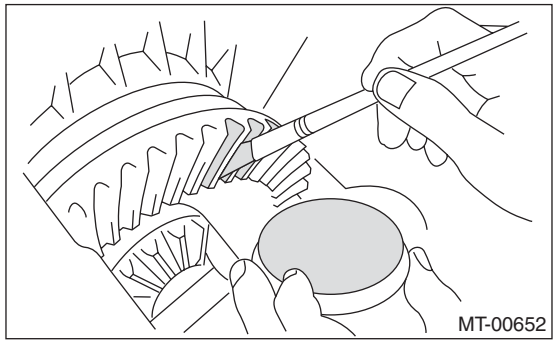
Repair or replace the front differential in following cases.
- Each gear is damaged, seized, or excessively worn.
- Sliding surfaces of the differential case is damaged, seized or excessively worn.
- Bearings and bearings part is damaged, rusted or worn.
- Bearings that fail to turn smoothly or make abnormal noise when turned.

1. HYPOID GEAR BACKLASH

Check the hypoid gear backlash. If it is not within specifications, adjust it. <Ref. to 6MT-110, HYPOID GEAR BACKLASH, ADJUSTMENT, Front Differential Assembly.>

2. TOOTH CONTACT OF HYPOID GEAR

1) Be sure the hypoid gear backlash is within specifications. If it is not within specifications, adjust it. <Ref. to 6MT-110, HYPOID GEAR BACKLASH, ADJUSTMENT, Front Differential Assembly.>
2) Apply a uniform thin coat of red lead on both tooth surfaces of three or four teeth of the hypoid driven gear.


MT-00652

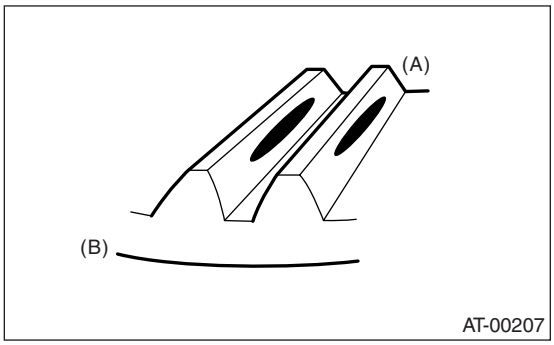
3) Install the drive pinion shaft assembly, and then secure with four bolts.

NOTE:
Use the old gasket and washer to prevent the mating surface of housing from damaging.

Tightening torque:
50 N·m (5.1 kgf-m, 36.9 ft-lb)

4) Rotate the drive pinion shaft to right and left for several times.
5) Remove the drive pinion shaft assembly, and then check tooth contact. If tooth contact is inaccurate, adjust it. <Ref. to 6MT-102, ADJUSTMENT, Drive Pinion Shaft Assembly.>
- Correct tooth contact.

NOTE:
Under no load, tooth contacts 50—60% from center to toe side (tooth contact shifts to heel side when driving).



(A) Toe side
(B) Heel side

F: ADJUSTMENT

1. HYPOID GEAR BACKLASH

1) Install the right and left side retainer.
ST1 499787000 WRENCH ASSY (RIGHT SIDE)
ST2 18630AA000 WRENCH ASSY (LEFT SIDE)

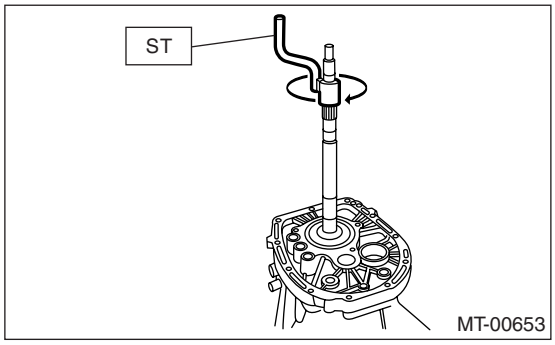
NOTE:
Screw in the right side retainer a bit further than left side.

2) Install the drive pinion shaft assembly, and then secure with four bolts.

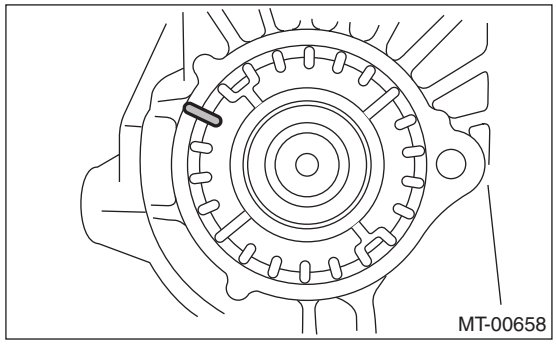
NOTE:
Use the old gasket and washer to prevent the mating surface of housing from damaging.

Tightening torque:
50 N·m (5.1 kgf-m, 36.9 ft-lb)

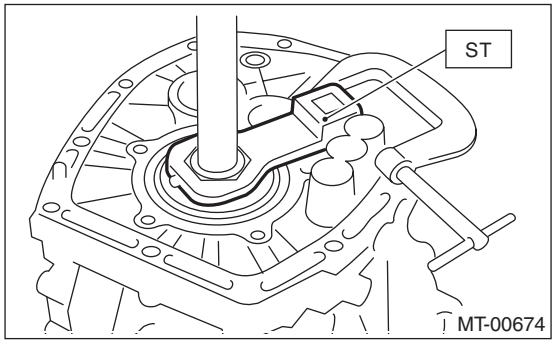
3) Using the ST, screw in the left side retainer until the drive pinion and hypoid driven gear contacts lightly. Then loosen the right side retainer.
ST1 499787000 WRENCH ASSY (RIGHT SIDE)
ST2 18630AA000 WRENCH ASSY (LEFT SIDE)
4) Using the ST, rotate the drive pinion shaft several times.
ST 18631AA000 HANDLE



5) Repeat step 3) and 4) until the left side retainer can not be rotated. For the right side retainer, screw in until the inner race and outer race contacts lightly. This condition is “0” backlash.
6) Mark an engagement point on the right and left side retainer and clutch housing.

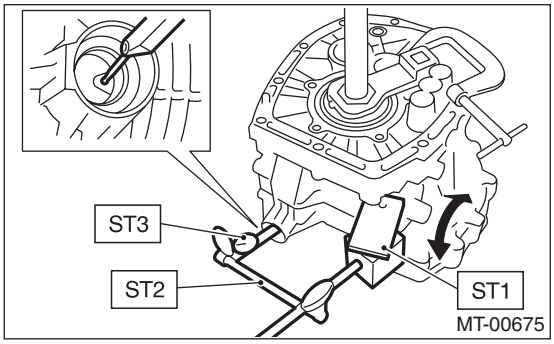


7) Return the left side retainer for three teeth, and screw in the right side retainer for three teeth.
8) Using the ST, secure the drive pinion shaft.
ST 18621AA000 ADAPTER WRENCH



9) Install the SUBARU genuine axle shafts to both sides of front differential.
Parts No. 38415AA000 AXLE SHAFT
10) After rotating the drive pinion shaft several times, measure the hypoid gear backlash using the ST.
ST1 498255400 PLATE
ST2 498247001 MAGNET BASE
ST3 498247100 DIAL GAUGE

Hypoid gear backlash:
0.13 — 0.18 mm (0.0051 — 0.0071 in)



11) If the backlash is out of specification, adjust it by turning the right and left side retainers.
12) Screw in the right side retainer for further 1.75 teeth.

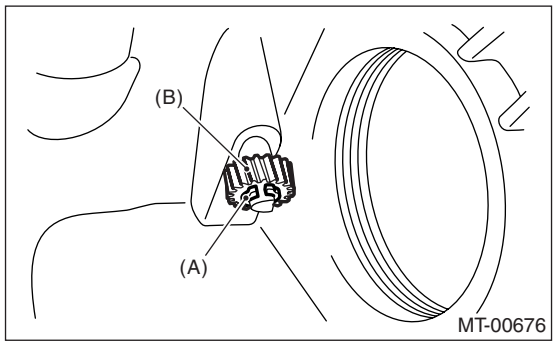
2. TOOTH CONTACT OF HYPOID GEAR

Refer to the section of drive pinion shaft for checking of tooth contact. <Ref. to 6MT-109, TOOTH CONTACT OF HYPOID GEAR, INSPECTION, Front Differential Assembly.>

25.Speedometer Gear

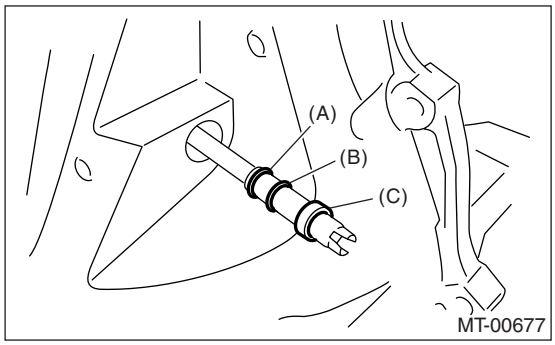
A: REMOVAL

1) Remove the manual transmission assembly from vehicle. <Ref. to 6MT-36, REMOVAL, Manual Transmission Assembly.>
2) Prepare the transmission for overhaul. <Ref. to 6MT-42, Preparation for Overhaul.>
3) Remove the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-44, REMOVAL, Oil Pipe.>, <Ref. to 6MT-47, REMOVAL, Neutral Position Switch.> , <Ref. to 6MT-45, REMOVAL, Back-up Light Switch.>
4) Remove the extension case. <Ref. to 6MT-49, REMOVAL, Extension Case.>
5) Remove the transfer driven gear. <Ref. to 6MT-60, REMOVAL, Transfer Driven Gear.>
6) Remove the center differential. <Ref. to 6MT-62, REMOVAL, Center Differential.>
7) Remove the oil pump. <Ref. to 6MT-63, REMOVAL, Oil Pump.>
8) Remove the transmission case. <Ref. to 6MT-67, REMOVAL, Transmission Case.>
9) Remove each gear assembly. <Ref. to 6MT-72, REMOVAL, Main Shaft Assembly.>
10) Remove the drive pinion shaft assembly. <Ref. to 6MT-99, REMOVAL, Drive Pinion Shaft Assembly.>
11) Remove the front differential assembly. <Ref. to 6MT-105, REMOVAL, Front Differential Assembly.>
12) Remove the vehicle speed sensor. <Ref. to 6MT-33, REMOVAL, Vehicle Speed Sensor.>
13) Remove the snap ring, and then remove the speedometer driven gear.



(A) Snap ring
(B) Speedometer driven gear

14) Remove the speedometer driven gear shaft from clutch housing.
15) Remove the oil seal, speedometer driven gear shaft and washer.

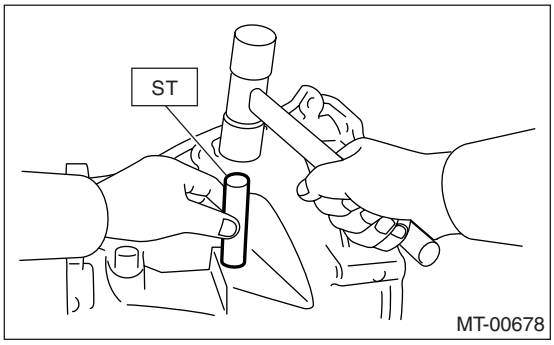


(A) Washer
(B) Snap ring
(C) Oil seal

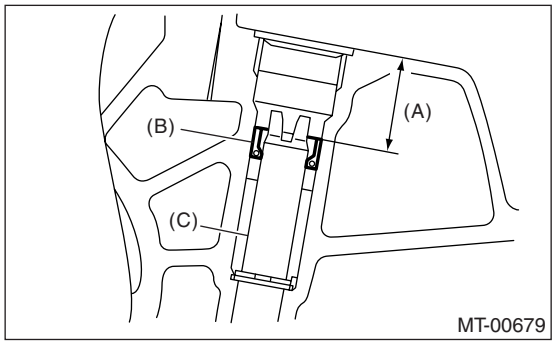
16) Remove the snap ring from speedometer driven gear shaft.

B: INSTALLATION

1) Install the oil seal, washer and snap ring to speedometer driven gear shaft.
2) Insert the speedometer driven gear shaft. Using the ST, press the oil seal.
ST 899824100 or 499827000 PRESS

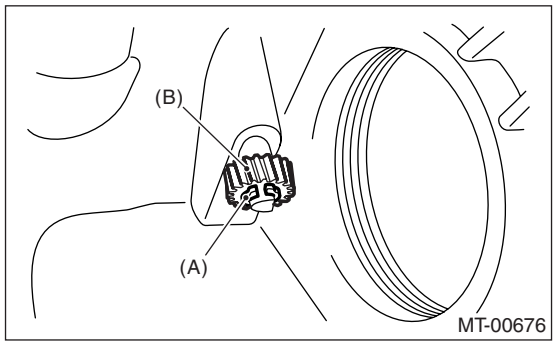


NOTE:
• Use a new oil seal.
• Insert the oil seal approx. 24 mm (0.94 in) from the edge of clutch case.



(A) Approx. 24 mm (0.94 in)
(B) Oil seal
(C) Speedometer driven gear shaft

3) Install the speedometer driven gear and snap ring.



(A) Snap ring
(B) Speedometer driven gear

4) Install the vehicle speed sensor. <Ref. to 6MT-33, INSTALLATION, Vehicle Speed Sensor.>
5) Install the front differential assembly. <Ref. to 6MT-106, INSTALLATION, Front Differential Assembly.>
6) Install the drive pinion shaft assembly. <Ref. to 6MT-99, INSTALLATION, Drive Pinion Shaft Assembly.>
7) Install each gear assembly at once. <Ref. to 6MT-73, INSTALLATION, Main Shaft Assembly.>
8) Install the transmission case. <Ref. to 6MT-68, INSTALLATION, Transmission Case.>
9) Install the oil pump. <Ref. to 6MT-64, INSTALLATION, Oil Pump.>
10) Install the center differential. <Ref. to 6MT-62, INSTALLATION, Center Differential.>
11) Install the transfer driven gear. <Ref. to 6MT-60, INSTALLATION, Transfer Driven Gear.>
12) Install the extension case. <Ref. to 6MT-49, INSTALLATION, Extension Case.>
13) Install the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-44, INSTALLATION, Oil Pipe.>, <Ref. to 6MT-47, INSTALLATION, Neutral Position Switch.> , <Ref. to 6MT-45, INSTALLATION, Back-up Light Switch.>
14) Install the manual transmission assembly to vehicle. <Ref. to 6MT-38, INSTALLATION, Manual Transmission Assembly.>

26.Shifter Fork and Rod

A: REMOVAL

1) Remove the manual transmission assembly from vehicle. <Ref. to 6MT-36, REMOVAL, Manual Transmission Assembly.>
2) Prepare the transmission for overhaul. <Ref. to 6MT-42, Preparation for Overhaul.>
3) Remove the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-44, REMOVAL, Oil Pipe.>, <Ref. to 6MT-47, REMOVAL, Neutral Position Switch.> , <Ref. to 6MT-45, REMOVAL, Back-up Light Switch.>
4) Remove the extension case. <Ref. to 6MT-49, REMOVAL, Extension Case.>
5) Remove the transfer driven gear. <Ref. to 6MT-60, REMOVAL, Transfer Driven Gear.>
6) Remove the center differential. <Ref. to 6MT-62, REMOVAL, Center Differential.>
7) Remove the oil pump. <Ref. to 6MT-63, REMOVAL, Oil Pump.>
8) Remove the transmission case. <Ref. to 6MT-67, REMOVAL, Transmission Case.>
9) Remove each gear assembly. <Ref. to 6MT-72, REMOVAL, Main Shaft Assembly.>

B: INSTALLATION

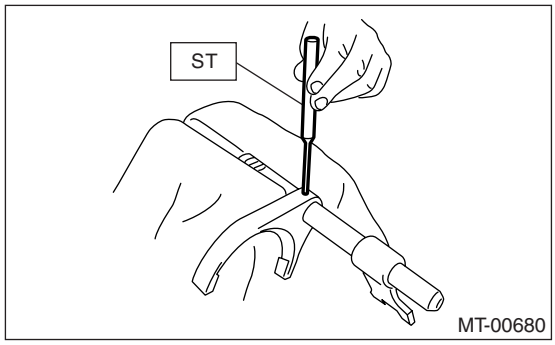
1) Install each gear assembly at once. <Ref. to 6MT-73, INSTALLATION, Main Shaft Assembly.>
2) Install the transmission case. <Ref. to 6MT-68, INSTALLATION, Transmission Case.>
3) Install the oil pump. <Ref. to 6MT-64, INSTALLATION, Oil Pump.>
4) Install the center differential. <Ref. to 6MT-62, INSTALLATION, Center Differential.>
5) Install the transfer driven gear. <Ref. to 6MT-60, INSTALLATION, Transfer Driven Gear.>
6) Install the extension case. <Ref. to 6MT-49, INSTALLATION, Extension Case.>
7) Install the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-44, INSTALLATION, Oil Pipe.>, <Ref. to 6MT-47, INSTALLATION, Neutral Position Switch.> , <Ref. to 6MT-45, INSTALLATION, Back-up Light Switch.>
8) Install the manual transmission assembly to vehicle. <Ref. to 6MT-38, INSTALLATION, Manual Transmission Assembly.>

C: DISASSEMBLY

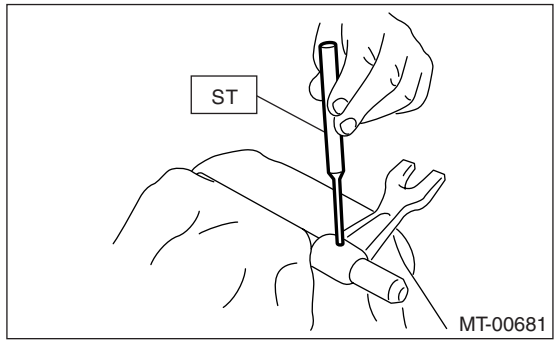
NOTE:
Discard the removed spring pin and replace with a new one.

1. REVERSE SHIFTER FORK

1) Using the ST, remove the reverse fork.
ST 398791700 REMOVER

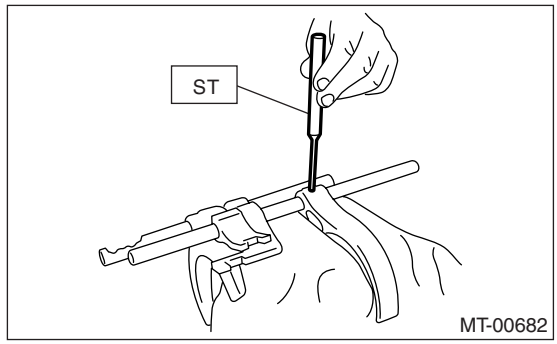


2) Using the ST, remove the reverse shifter arm.
ST 398791700 REMOVER

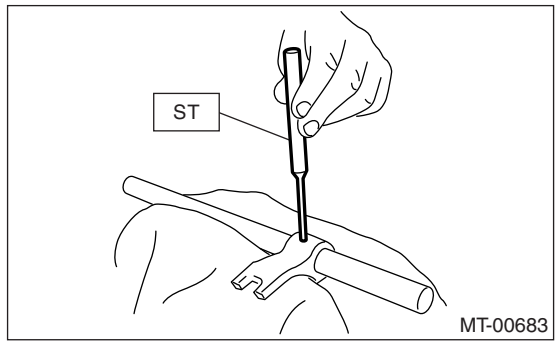


2. 1st-2nd, 3rd-4th SHIFTER FORK

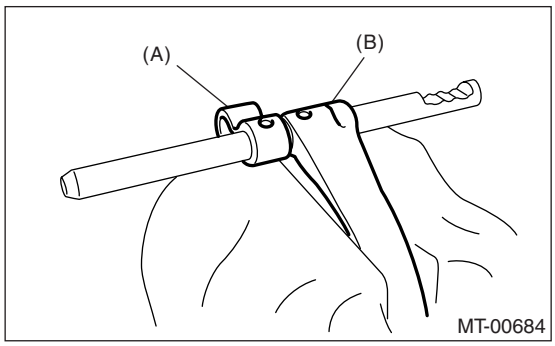
1) Using the ST, remove the 3rd-4th shifter fork.
ST 398791700 REMOVER



2) Using the ST, remove the 3rd-4th shifter arm.
ST 398791700 REMOVER



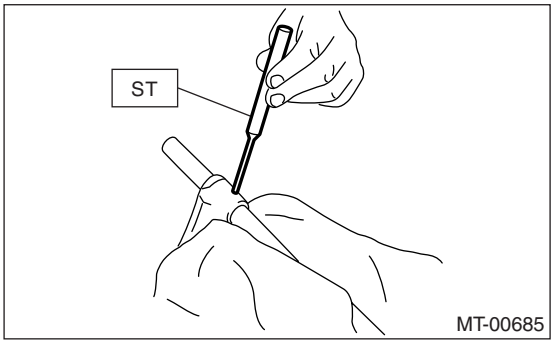
3) Using the ST, remove the 1st-2nd shifter arm and 1st-2nd shifter fork.
ST 398791700 REMOVER



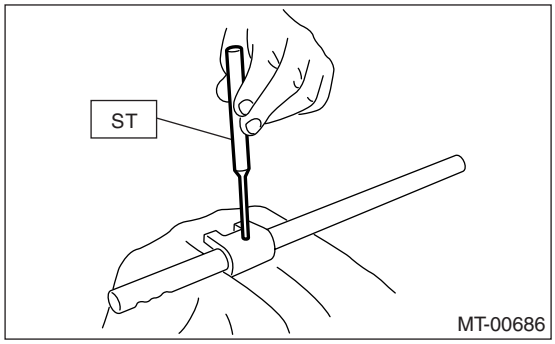
(A) 1st-2nd shifter arm
(B) 1st-2nd shifter fork

3. 5th-6th SHIFTER FORK

1) Using the ST, remove the 5th-6th shifter fork.
ST 398791700 REMOVER

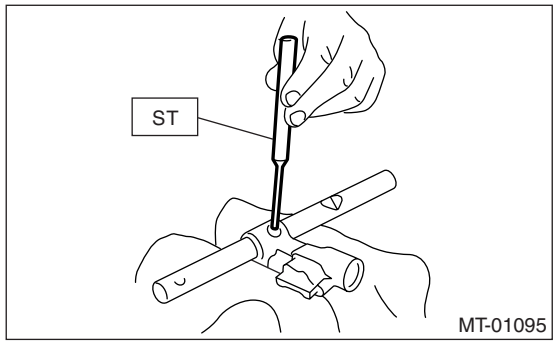


2) Using the ST, remove the 5th-6th shifter arm.
ST 398791700 REMOVER



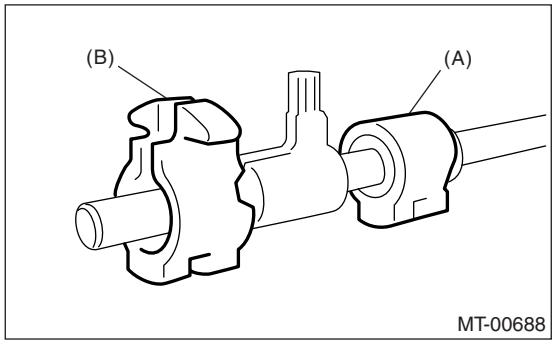
4. SHIFT ARM SHAFT

Using the ST, remove the selector arm.
ST 398791700 REMOVER



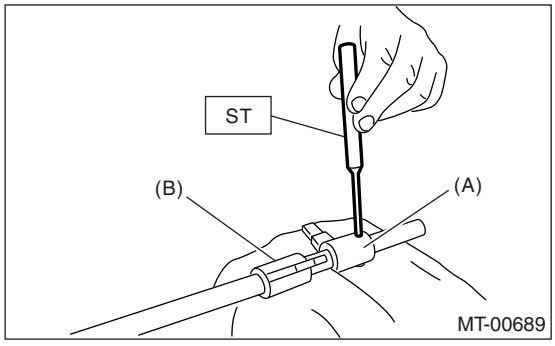
5. STRIKING ROD

1) Remove the reverse interlock block and interlock block from striking rod.



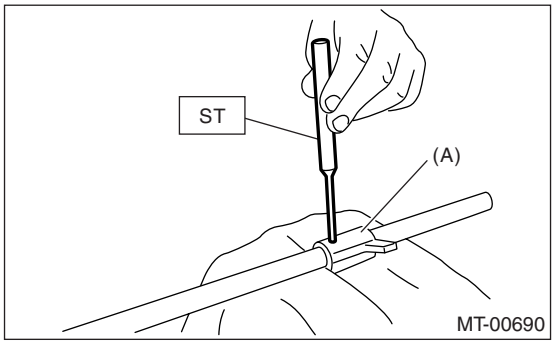
(A) Reverse interlock block
(B) Interlock block

2) Using the ST, remove the reverse interlock arm.
ST 398791700 REMOVER



(A) Reverse interlock arm
(B) Interlock arm

3) Using the ST, remove the interlock arm.
ST 398791700 REMOVER



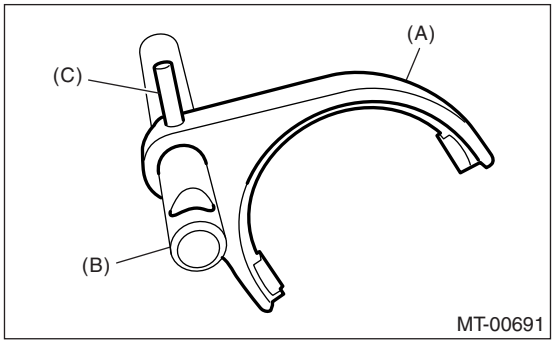
(A) Interlock arm

D: ASSEMBLY

1. REVERSE SHIFTER FORK

1) Using the ST, install the reverse fork.
ST 398791700 REMOVER

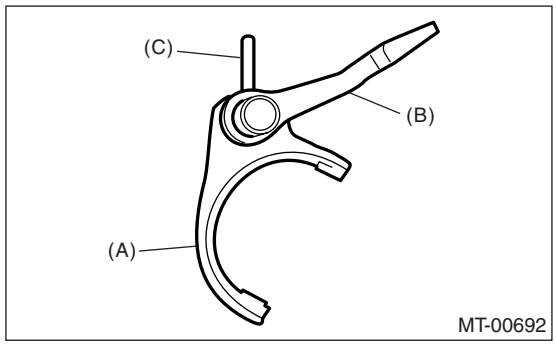
NOTE:
Make sure to install the reverse fork and rod in proper direction.



(A) Reverse fork
(B) Reverse fork rod
(C) Spring pin

2) Using the ST, install the reverse arm.
ST 398791700 REMOVER

NOTE:
Make sure to install the reverse arm and rod in proper direction.

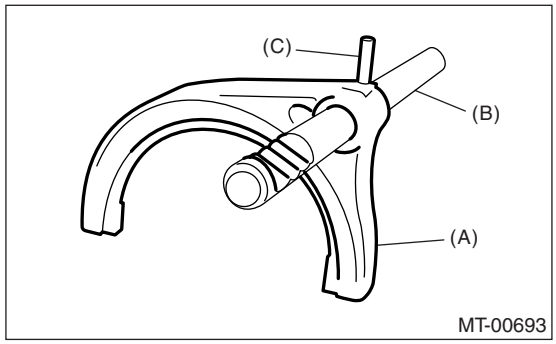


(A) Reverse fork
(B) Reverse shifter arm
(C) Spring pin

2. 1st-2nd, 3rd-4th SHIFTER FORK

1) Using the ST, install the 1st-2nd shifter fork.
ST 398791700 REMOVER

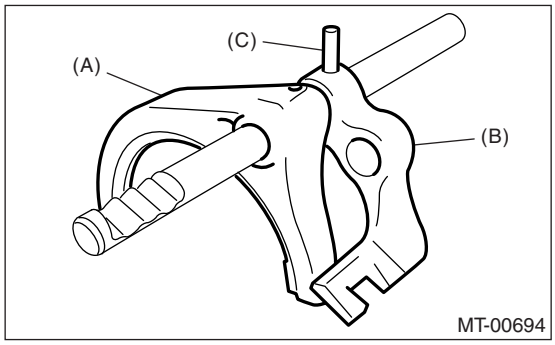
NOTE:
Make sure to install the 1st-2nd shifter fork and rod in proper direction.



(A) 1st-2nd shifter fork
(B) 1st-2nd fork rod
(C) Spring pin

2) Using the ST, install the 1st-2nd shifter arm.
ST 398791700 REMOVER

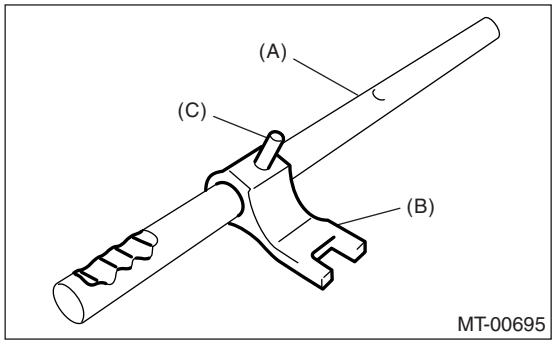
NOTE:
Make sure to install the 1st-2nd shifter arm and fork in proper direction.



(A) 1st-2nd shifter fork
(B) 1st-2nd shifter arm
(C) Spring pin

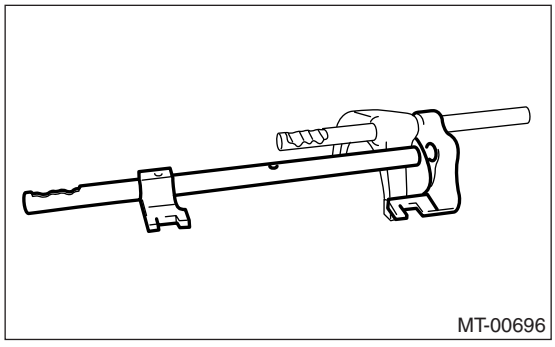
3) Using the ST, install the 3rd-4th shifter arm.
ST 398791700 REMOVER

NOTE:
Make sure to install the 3rd-4th shifter arm and rod in proper direction.



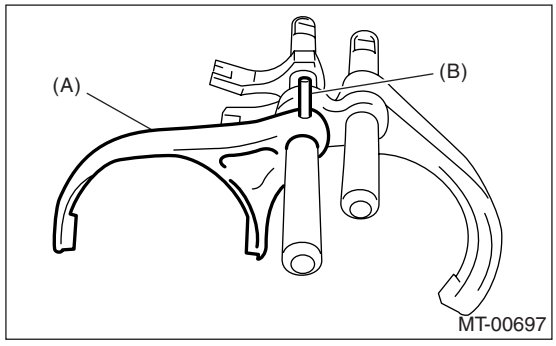
(A) 3rd-4th fork rod
(B) 3rd-4th shifter arm
(C) Spring pin

4) Install the 3rd-4th fork rod into 1st-2nd shifter arm.



5) Using the ST, install the 3rd-4th shifter fork.
ST 398791700 REMOVER

NOTE:
Make sure to install the 3rd-4th shifter fork in proper direction.

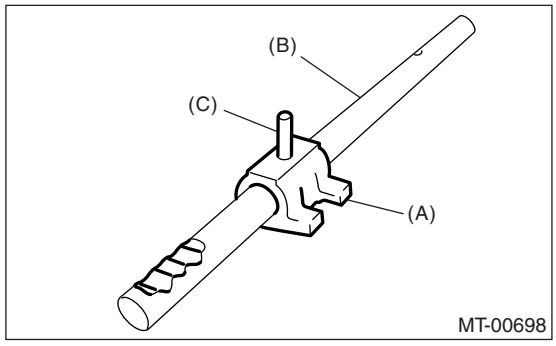


(A) 3rd-4th shifter fork
(B) Spring pin

3. 5th-6th SHIFTER FORK

1) Using ST, install the 5th-6th shifter arm.
ST 398791700 REMOVER

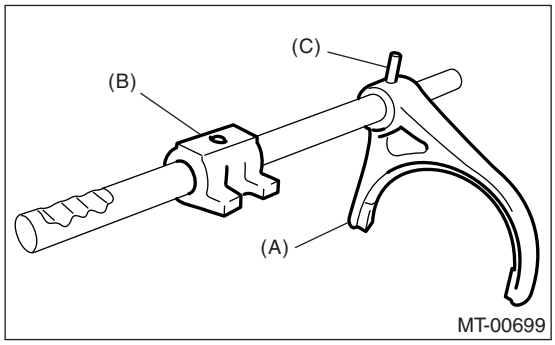
NOTE:
Make sure to install the 5th-6th shifter arm and rod in proper direction.



(A) 5th-6th shifter arm
(B) 5th-6th fork rod
(C) Spring pin

2) Using the ST, install the 5th-6th shifter fork.
ST 398791700 REMOVER

NOTE:
Make sure to install the 5th-6th shifter fork and arm in proper direction.

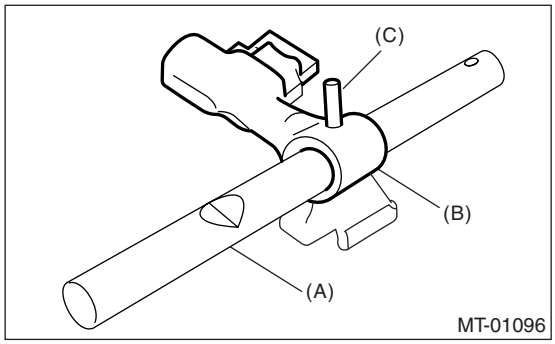


(A) 5th-6th shifter fork
(B) 5th-6th shifter arm
(C) Spring pin

4. SHIFT ARM SHAFT

Using the ST, install the selector arm.
ST 398791700 REMOVER

NOTE:
Make sure to install the selector arm and shaft in proper direction.

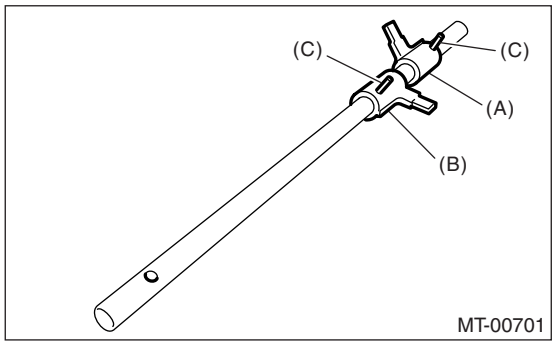


(A) Shifter arm shaft
(B) Selector arm
(C) Spring pin

5. STRIKING ROD

1) Using the ST, install the reverse interlock arm and interlock arm.
ST 398791700 REMOVER

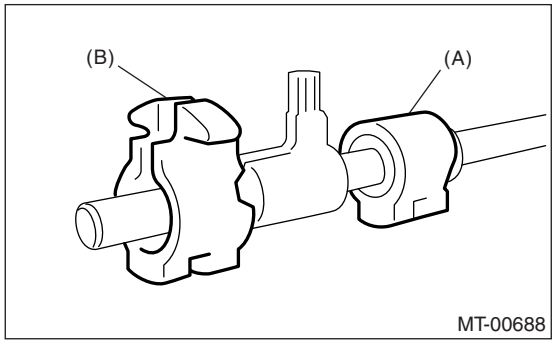
NOTE:
• Make sure to install the reverse interlock arm and rod in proper direction.
• Make sure to install the interlock arm and rod in proper direction.



(A) Reverse interlock arm
(B) Interlock arm
(C) Spring pin

2) Install the reverse interlock block and interlock block to striking rod.

NOTE:
Make sure to install the reverse interlock block and interlock block in proper direction.



(A) Reverse interlock block
(B) Interlock block

E: INSPECTION

1) Check the shift shaft and shift rod for damage. Replace if damaged.
2) Repair or replace the gearshift mechanism if excessively worn, bent, or defective in any way.

F: ADJUSTMENT

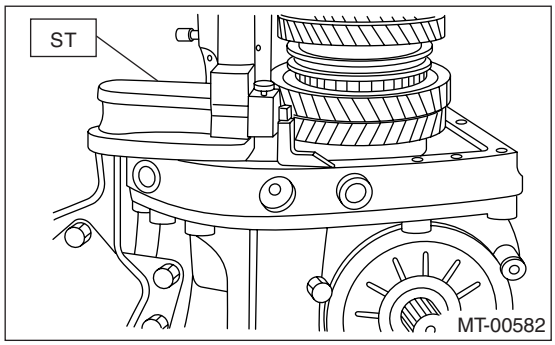
1. SELECTION OF 1st-2nd FORK ROD

NOTE:
Perform the following procedures when:
- Replacing the 1st, 2nd driven gear.
- Replacing the 1st, 2nd synchro ring assembly.
- Replacing the adapter plate.
- Replacing the driven shaft.
- Replacing the 1st-2nd hub, sleeve assembly.

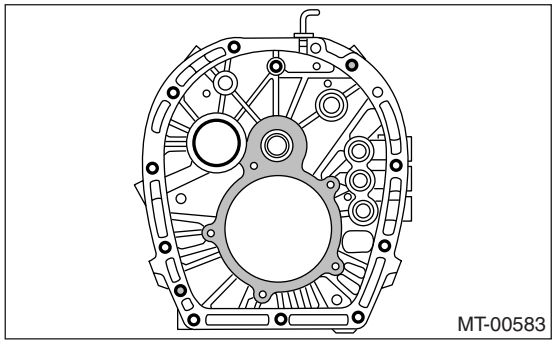
1) Insert the drive pinion assembly in adapter plate.

NOTE:
Make sure the thrust bearing outer race is not removed and drive pinion is not lift-up.

2) Set the height gauge to adapter plate. Lower the indicator of height gauge to mating surface of adapter plate and case, then set to zero point.
ST 18853AA000 HEIGHT GAUGE

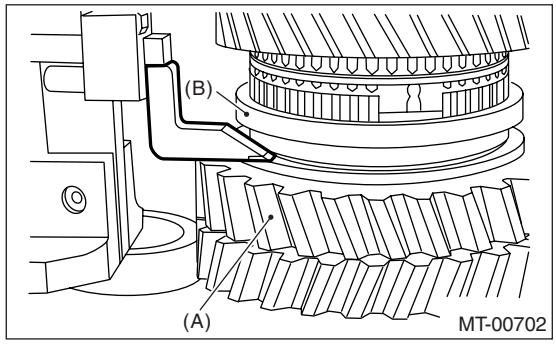


NOTE:
- Remove the remaining gasket on edge surface with scraper, since the adapter plate is base point of measurement.
- Do not place the height gauge on shaded area in the figure during measurement.



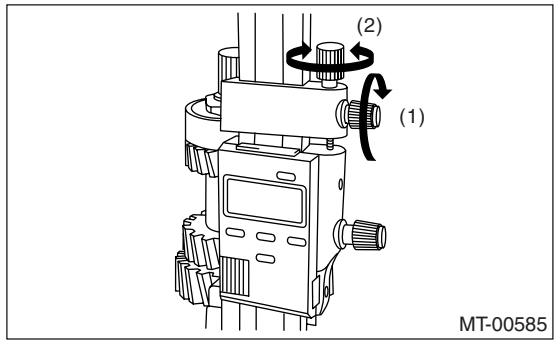
3) Select the main shaft snap ring. <Ref. to 6MT-84, ADJUSTMENT, Main Shaft Assembly.>

4) Shift the 1st-2nd sleeve to 1st driven gear side, then press down to the stopper and measure “B1”.

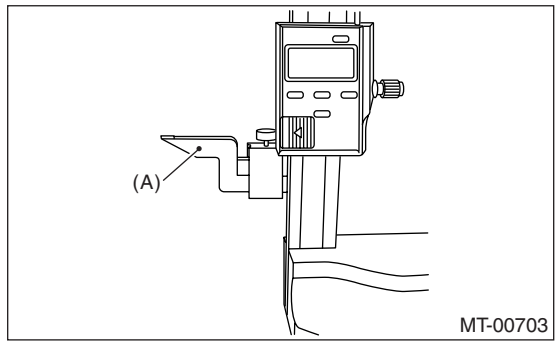


(A) 1st driven gear
(B) 1st-2nd sleeve

NOTE:
- Set the indicator of height gauge near measuring object, then lock the dial (1) as shown in the figure. Turn dial (2) to set the indicator to edge surface of sleeve 1st side.
- Measure five points of the sleeve turning every approx. 72°. Round off each two upper and lower measurement value. Use the remaining center value as measurement value.

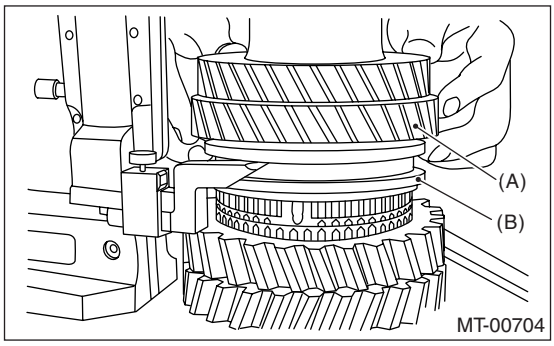


5) Set the height gauge indicator upside down.



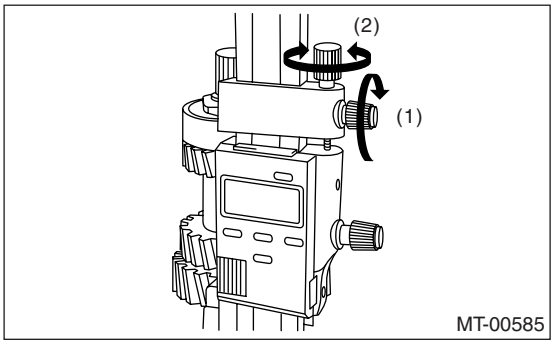
(A) Indicator

6) Shift the 1st-2nd sleeve to 2nd driven gear side, then press up to the stopper and measure “B2”.



(A) 2nd driven gear
(B) 1st-2nd sleeve

NOTE:
• Set the indicator of height gauge near measuring object, then lock the dial (1) as shown in the figure. Turn dial (2) to set the indicator to edge surface of sleeve 2nd side.
• Perform the measuring procedure with two people, and measure the sleeve lifted up straight.
• Measure five points of the sleeve turning every approx. 72° apart. Round off each two upper and lower measurement value. Use the remaining center value as measurement value.

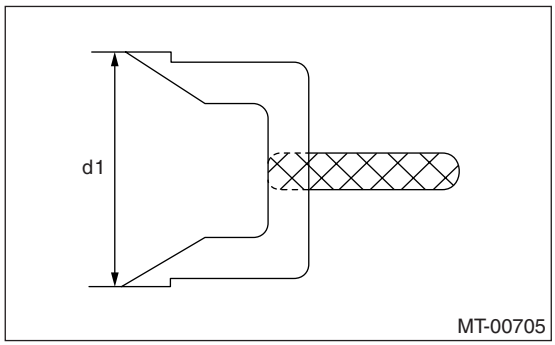


7) According to both measurements, calculate the 1st-2nd sleeve neutral position. Select the fork rod which applies to the calculated value from following equation.

Equation: T = (B1 + B2) / 2

T: 1st-2nd sleeve center position
B1: Height from adapter plate edge to sleeve edge when shifted to 1st gear.
B2: Height from adapter plate edge to sleeve edge when shifted to 2nd gear. [measurement value + 55 mm (2.17 in)]

NOTE:
The indicator is installed upside down compared to the setting procedure of zero point. Add d1 [fixing value: 55 mm (2.17 in)] from the following figure to “B2”, to obtain measurement value of “B2”.

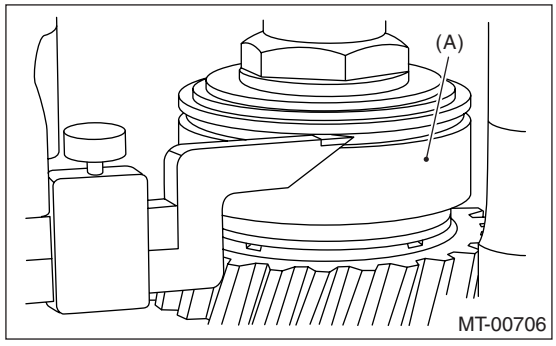


T mm (in)	Lot No. (Mark)
62.93 — 63.23 (2.4776 — 2.4894)	32801AA111 (1)
63.23 — 63.53 (2.4894 — 2.5012)	32801AA131 (None)
63.53 — 63.83 (2.5012 — 2.5130)	32801AA141 (2)

2. SELECTION OF 3rd-4th FORK ROD

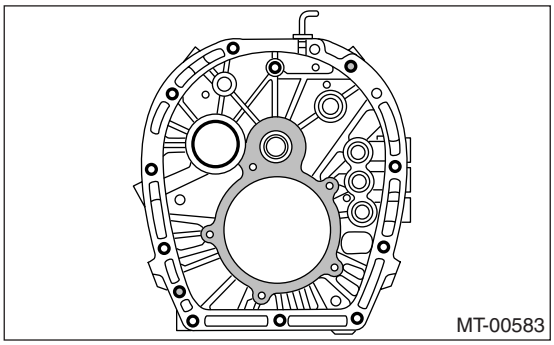
NOTE:
Perform the following procedures when:
• Replacing the main shaft.
• Replacing the 3rd, 3rd to 6th drive gear and bush.
• Replacing the 3rd, 3rd to 6th synchro assembly.
• Replacing the 3rd-4th hub, sleeve assembly.

1) Insert the main shaft assembly in adapter plate.
2) Set the height gauge to adapter plate. Lower the indicator of height gauge to upper surface of snap ring groove, on the upper side of main rear bearing, then set to zero point.
ST 18853AA000 HEIGHT GAUGE

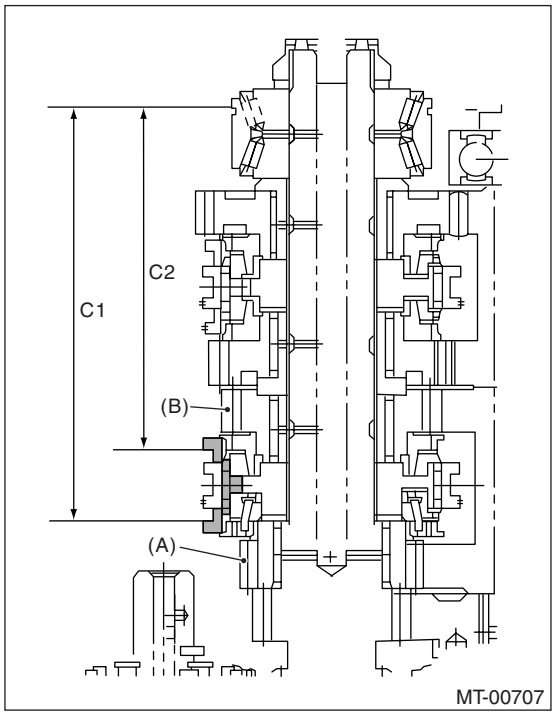


(A) Ball bearing

NOTE:
• Remove the remaining gasket on edge surface with scraper, since the height gauge is set on adapter plate during measurement.
• Do not put the height gauge on shaded area in the figure during the measurement.

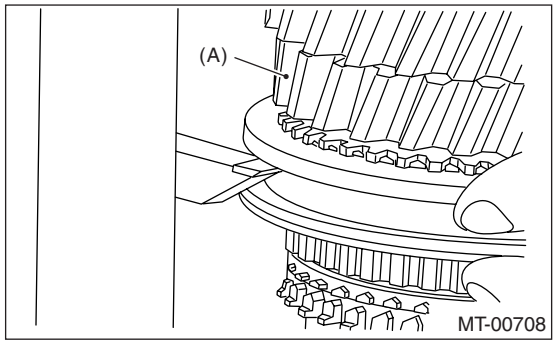


3) Using the height gauge, measure “C1” and “C2” shown in the figure.



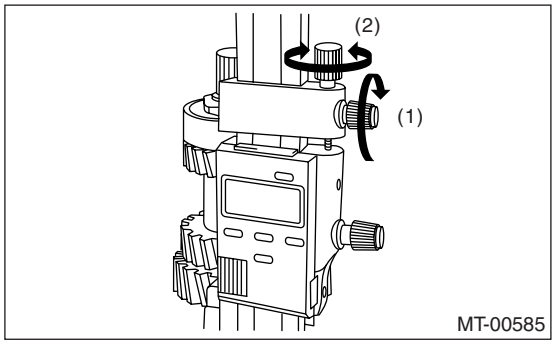
(A) 3rd drive gear
(B) 4th drive gear

(1) Shift the 3rd-4th sleeve to 4th gear side, then press up to the stopper and measure “C2”.

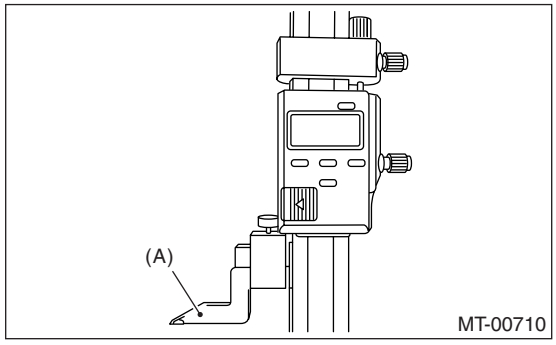


(A) 4th drive gear

NOTE:
• Set the indicator of height gauge near measuring object, then lock the dial (1) as shown in the figure.
• Turn dial (2) to set the indicator to edge surface of sleeve 4th side.
• Perform the measuring procedure with two people, and measure the sleeve lifted up straight.
• Measure five points of the sleeve turning every approx. 72°. Round off each two upper and lower measurement value. Use the remaining center value as measurement value.

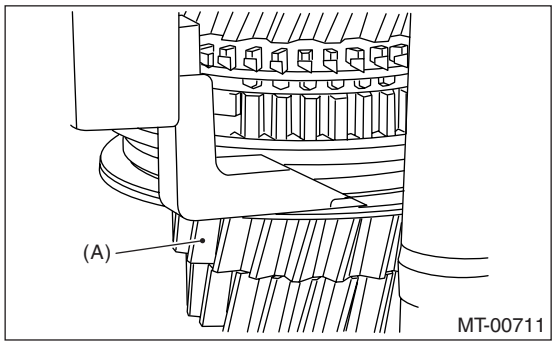


(2) Set the height gauge indicator upside down.



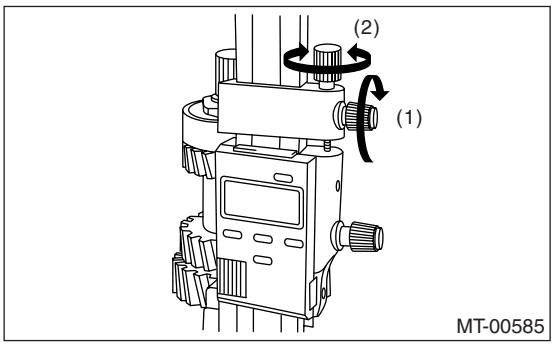
(A) Indicator

(3) Shift the 3rd-4th sleeve to 3rd drive gear side, then press down to the stopper and measure “C1”.



(A) 3rd drive gear

NOTE:
• Set the indicator of height gauge near measuring object, then lock the dial (1) as shown in the figure. Turn dial (2) to set the indicator to edge surface of sleeve 3rd side.
• Measure five points of the sleeve turning every approx. 72°. Round off each two upper and lower measurement value. Use the remaining center value as measurement value.

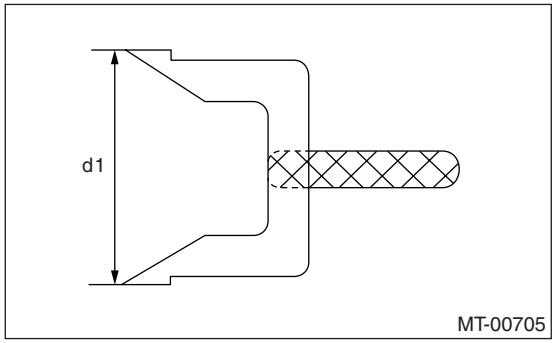


4) According to both measurements, calculate the 3rd-4th sleeve neutral position. Select the fork rod which applies to the calculated value from following equation.

Equation: T = (C1 + C2) / 2

T: 3rd-4th sleeve center position
C1: Length from main shaft rear bearing snap ring groove to sleeve edge when shifted to 3rd gear. [measurement value +55 mm (2.17 in)]
C2: Length from main shaft rear bearing snap ring groove to sleeve edge when shifted to 4th gear.

NOTE:
The indicator is installed upside down compared to the setting procedure of zero point. Add d1 [fixing value: 55 mm (2.17 in)] from the following figure to “C1”, to obtain measurement value of “C1”.



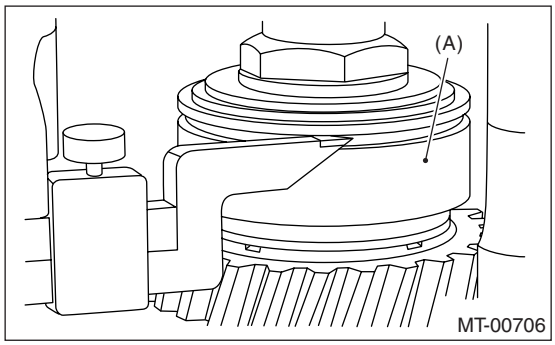
T mm (in)	Lot No. (Mark)		
	M.SFT Snap ring 805072010 [t=1.65 mm (0.065 in)]	M.SFT Snap ring 805072011 [t=1.95 mm (0.077 in)]	M.SFT Snap ring 805072012 [t=2.25 mm (0.089 in)]
137.22 — 137.52 (5.4024 — 5.4142)	32809AA171 (None)	32809AA181 (2)	32809AA191 (4)
137.52 — 137.82 (5.4142 — 5.4260)	32809AA161 (1)	32809AA171 (None)	32809AA181 (2)
137.82 — 138.12 (5.4260 — 5.4379)	32809AA141 (3)	32809AA161 (1)	32809AA171 (None)

T = Thickness

3. SELECTION OF 5th-6th FORK ROD

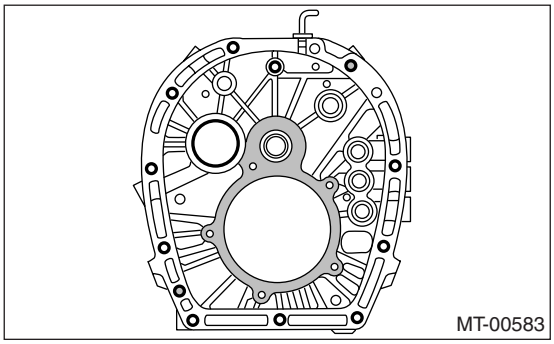
NOTE:
Perform the following procedures when:
- Replacing the main shaft.
- Replacing the 3rd to 6th drive gear and bush.
- Replacing the 3rd to 6th synchro ring assembly.
- Replacing the 3rd-4th hub, sleeve assembly.
- Replacing the 5th-6th hub, sleeve assembly.

1) Insert the main shaft assembly in adapter plate.
2) Set the height gauge to adapter plate. Lower the indicator of height gauge to upper surface of snap ring groove, or the upper side of main rear bearing. Then set to zero point.
ST 18853AA000 HEIGHT GAUGE

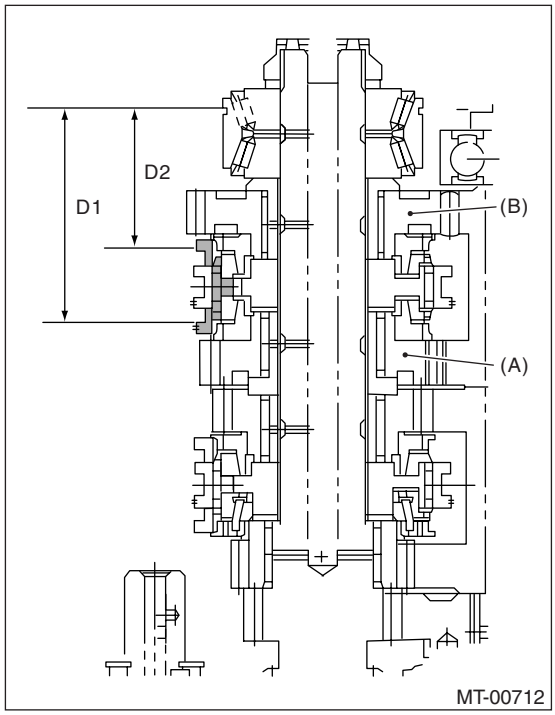


(A) Ball bearing

NOTE:
- Remove the remaining gasket on edge surface with scraper, since the height gauge is set on adapter plate during measurement.
- Do not place the height gauge on shaded area in the figure during the measurement.

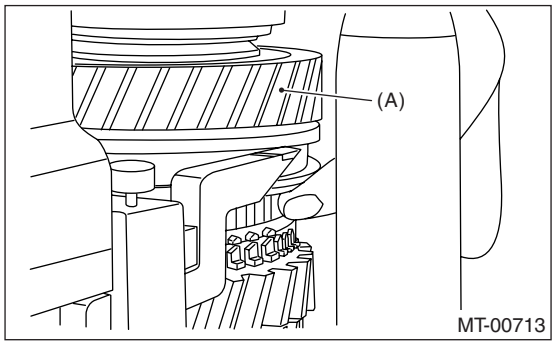


3) Using the height gauge, measure “D1” and “D2” shown in the figure.



(A) 5th main gear
(B) 6th main gear

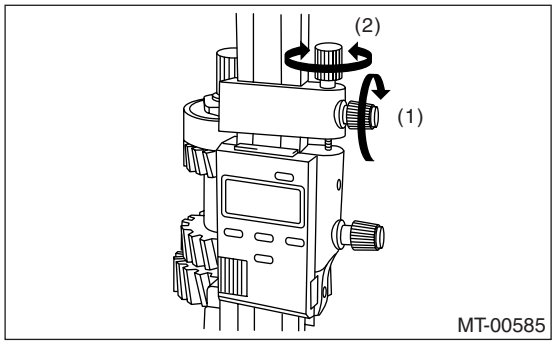
(1) Shift the 5th-6th sleeve to 6th main gear side, then press up to the stopper and measure “D2”.



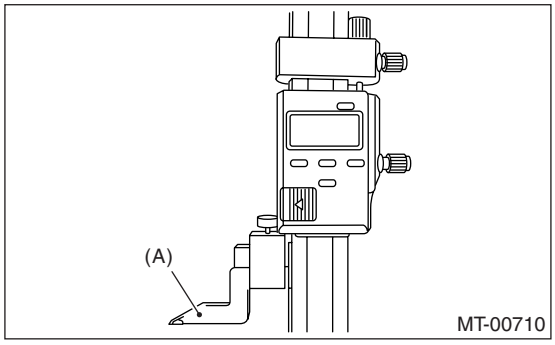
(A) 6th main gear

NOTE:
- Set the indicator of height gauge near measuring object, then lock the dial (1) as shown in the figure. Turn dial (2) to set the indicator to edge surface of sleeve 6th side.
- Perform the measuring procedure with two people, and measure the sleeve lifted up straight.

• Measure five points of the sleeve turning every approx. 72°. Round off each two upper and lower measurement value. Use the remaining center value as measurement value.

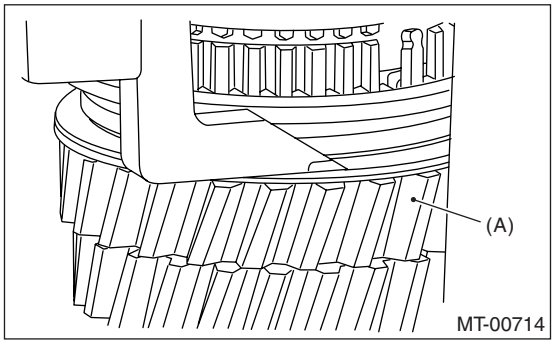


(2) Set the height gauge indicator upside down.



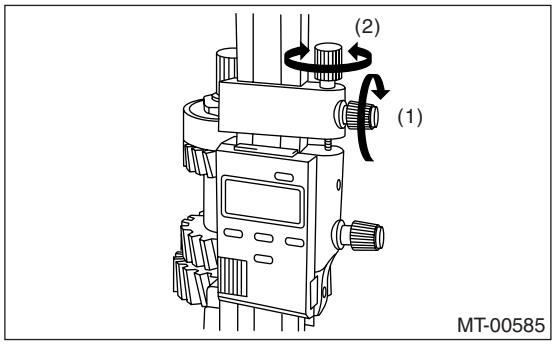
(A) Indicator

(3) Shift the 5th-6th sleeve to 5th main gear side, then press down to the stopper and measure “D1”.



(A) 5th main gear

NOTE:
• Set the indicator of height gauge near measuring object, then lock the dial (1) as shown in the figure. Turn dial (2) to set the indicator to edge surface of sleeve 5th side.
• Measure five points of the sleeve turning every approx. 72°. Round off each two upper and lower measurement value. Use the remaining center value as measurement value.

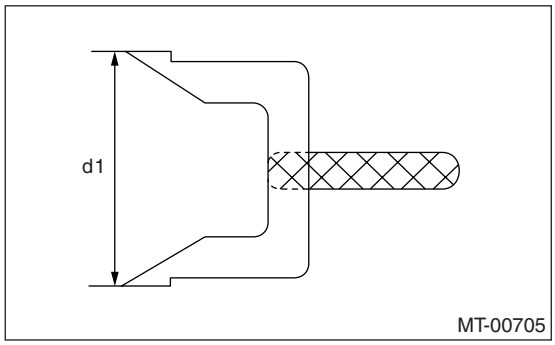


4) According to both measurements, calculate the 5th-6th sleeve neutral position. Select the fork rod, which applies to the calculated value from following equation.

Equation: T = (D1 + D2) / 2

T: 5th-6th sleeve center position
D1: Length from the shaft rear bearing snap ring groove to sleeve groove edge when shifted to 5th gear. [measurement value + 55 mm (2.17 in)]
D2: Length from main shaft rear bearing snap ring groove to sleeve groove edge when shifted to 6th gear.

NOTE:
The indicator is installed upside down compared to the setting procedure of zero point. Add d1 [fixing value: 55 mm (2.17 in)] from the following figure to “D1”, to obtain measurement value of “D1”.



T mm (in)	Lot No. (Mark)		
	M.SFT Snap ring 805072010 [t=1.65 mm (0.065 in)]	M.SFT Snap ring 805072011 [t=1.95 mm (0.077 in)]	M.SFT Snap ring 805072012 [t=2.25 mm (0.089 in)]
64.12 — 64.42 (2.5244 — 2.5362)	32945AA021 (None)	32945AA031 (2)	32945AA041 (4)
64.42 — 64.72 (2.5362 — 2.5480)	32945AA011 (1)	32945AA021 (None)	32945AA031 (2)
64.72 — 65.02 (2.5480 — 2.5598)	32945AA001 (3)	32945AA011 (1)	32945AA021 (None)

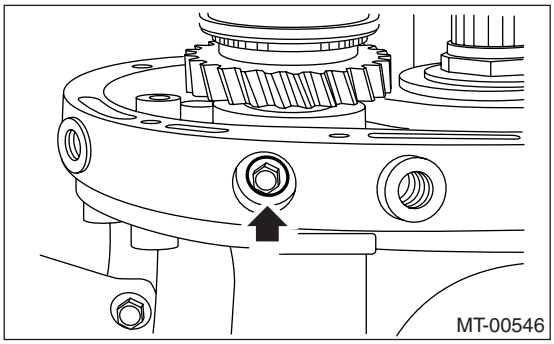
T = Thickness

4. SELECTION OF REVERSE FORK ROD

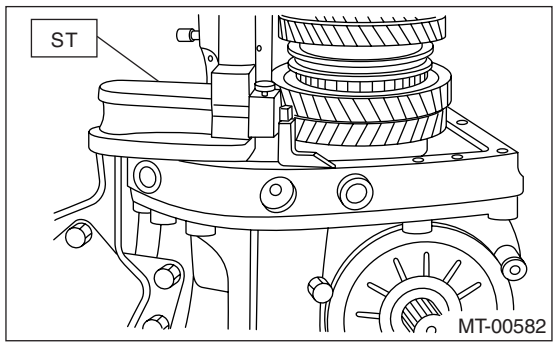
NOTE:
Perform the following procedures when.
- Replacing the reverse idler gear.
- Replacing the reverse idler gear No. 2.
- Replacing the adapter plate.
- Replacing the base.

1) Insert the reverse idler gear assembly in adapter plate.
2) Tighten the base COMPL fixing bolt.

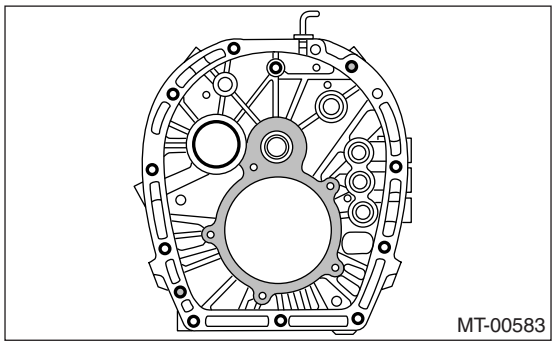
Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)



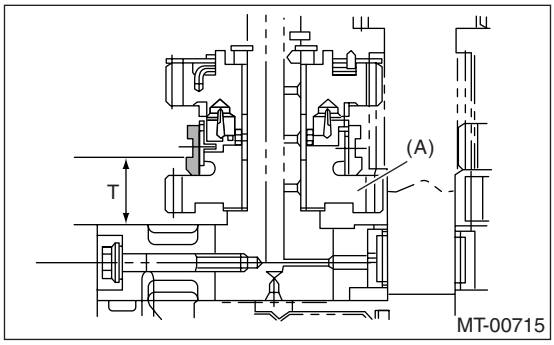
3) Set the height gauge to adapter plate. Lower the indicator of height gauge to mating surface of adapter plate and case, then set to zero point.
ST 18853AA000 HEIGHT GAUGE



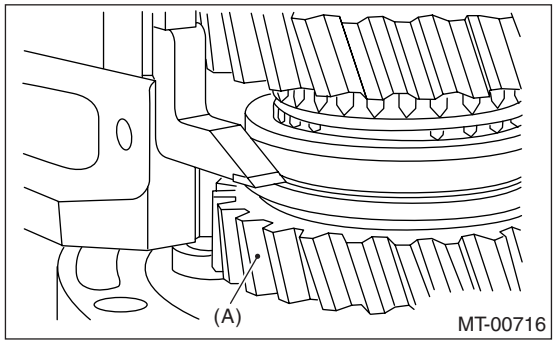
NOTE:
- Remove the remaining gasket on edge surface with scraper, since the adapter plate is base point of measurement.
- Do not place the height gauge on shaded area in the figure during measurement.



4) Press the reverse sleeve to reverse side idler gear No. 2, then measure "T".

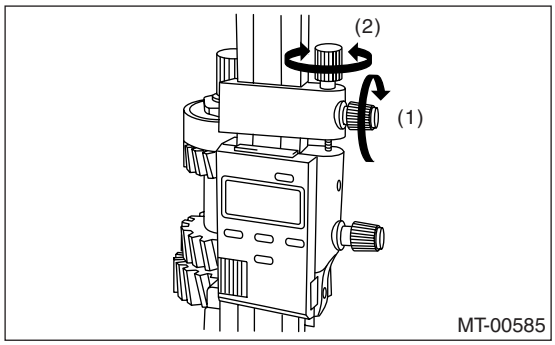


(A) Reverse idler gear No. 2



(A) Reverse idler gear No. 2

NOTE:
• Set the indicator of height gauge near measuring object, then lock the dial (1) as shown in the figure. Turn dial (2) to set the indicator to edge surface of reverse sleeve side.
• Measure five points of the sleeve turning every approx. 72°. Round off each two upper and lower measurement value. Use the remaining center value as measurement value.



5) According to measurement, calculate the reverse sleeve neutral position. Select the fork rod which applies to the calculated value from following equation.

Equation: T + 4.8 mm (0.189 in)

T + 4.8 mm (0.189 in) mm (in)	Lot No. (Mark)
33.50 — 33.80 (1.3189 — 1.3307)	32816AA110 (1)
33.80 — 34.10 (1.3307 — 1.3425)	32816AA130 (None)
34.10 — 34.40 (1.3425 — 1.3543)	32816AA140 (2)

T = Thickness

27.Clutch Housing

A: REMOVAL

1) Remove the manual transmission assembly from vehicle. <Ref. to 6MT-36, REMOVAL, Manual Transmission Assembly.>
2) Prepare the transmission for overhaul. <Ref. to 6MT-42, Preparation for Overhaul.>
3) Remove the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-44, REMOVAL, Oil Pipe.>, <Ref. to 6MT-47, REMOVAL, Neutral Position Switch.> , <Ref. to 6MT-45, REMOVAL, Back-up Light Switch.>
4) Remove the extension case. <Ref. to 6MT-49, REMOVAL, Extension Case.>
5) Remove the transfer driven gear. <Ref. to 6MT-60, REMOVAL, Transfer Driven Gear.>
6) Remove the center differential. <Ref. to 6MT-62, REMOVAL, Center Differential.>
7) Remove the oil pump. <Ref. to 6MT-63, REMOVAL, Oil Pump.>
8) Remove the transmission case. <Ref. to 6MT-67, REMOVAL, Transmission Case.>
9) Remove each gear assembly. <Ref. to 6MT-72, REMOVAL, Main Shaft Assembly.>
10) Remove the drive pinion shaft assembly. <Ref. to 6MT-99, REMOVAL, Drive Pinion Shaft Assembly.>
11) Remove the front differential assembly. <Ref. to 6MT-105, REMOVAL, Front Differential Assembly.>
12) Remove the vehicle speed sensor. <Ref. to 6MT-33, REMOVAL, Vehicle Speed Sensor.>
13) Remove the speedometer gear. <Ref. to 6MT-112, REMOVAL, Speedometer Gear.>

B: INSTALLATION

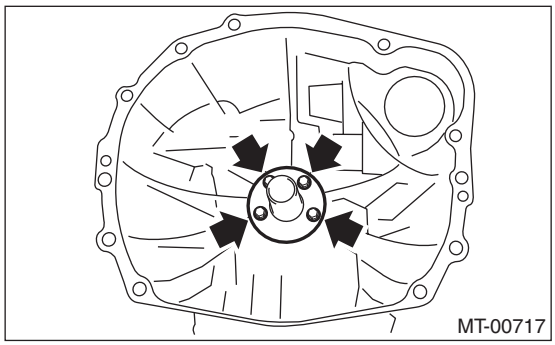
1) Install the pitching stopper bracket.

Tightening torque:
41 N·m (4.2 kgf-m, 30.2 ft-lb)

2) Install the speedometer gear. <Ref. to 6MT-113, INSTALLATION, Speedometer Gear.>
3) Install the vehicle speed sensor. <Ref. to 6MT-33, INSTALLATION, Vehicle Speed Sensor.>
4) Install the front differential assembly. <Ref. to 6MT-106, INSTALLATION, Front Differential Assembly.>
5) Install the drive pinion shaft assembly. <Ref. to 6MT-99, INSTALLATION, Drive Pinion Shaft Assembly.>
6) Install each gear assembly at once. <Ref. to 6MT-73, INSTALLATION, Main Shaft Assembly.>
7) Install the transmission case. <Ref. to 6MT-68, INSTALLATION, Transmission Case.>
8) Install the oil pump. <Ref. to 6MT-64, INSTALLATION, Oil Pump.>
9) Install the center differential. <Ref. to 6MT-62, INSTALLATION, Center Differential.>
10) Install the transfer driven gear. <Ref. to 6MT-60, INSTALLATION, Transfer Driven Gear.>
11) Install the extension case. <Ref. to 6MT-49, INSTALLATION, Extension Case.>
12) Install the oil pipe, neutral position switch, back-up light switch and harness. <Ref. to 6MT-44, INSTALLATION, Oil Pipe.>, <Ref. to 6MT-47, INSTALLATION, Neutral Position Switch.> , <Ref. to 6MT-45, INSTALLATION, Back-up Light Switch.>
13) Install the manual transmission assembly to vehicle. <Ref. to 6MT-38, INSTALLATION, Manual Transmission Assembly.>

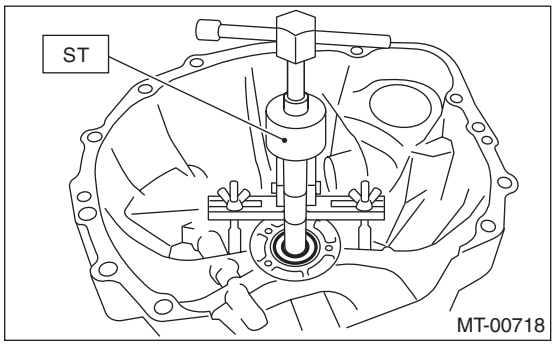
C: DISASSEMBLY

1) Remove the clutch release bearing guide.



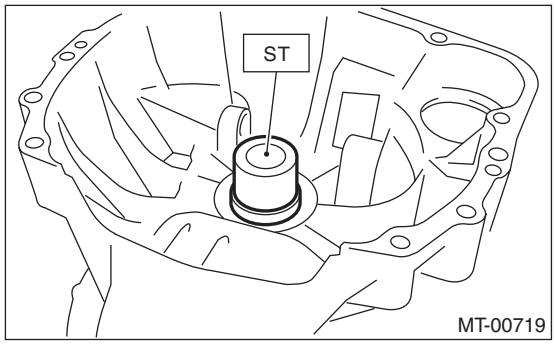
2) Remove the oil seal.
ST 398527700 PULLER ASSY

NOTE:
Do not reuse the oil seal.



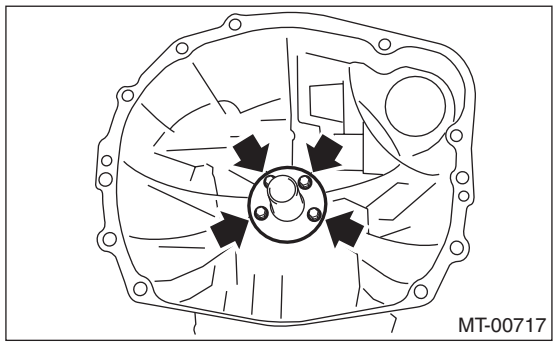
D: ASSEMBLY

1) Install the oil seal into clutch housing without damaging.
ST 399513600 INSTALLER



2) Install the clutch release bearing guide.

Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



E: INSPECTION

1) Make sure there is no damage or crack on the clutch housing. Replace the clutch housing with a new one if there is excessive damage.
2) Check the clutch housing for gear oil leakage. If there is oil leakage, repair or replace the leakage part.

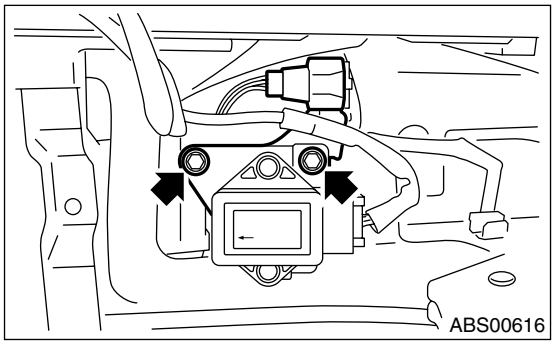
28. Yaw Rate and Lateral G Sensor

A: REMOVAL

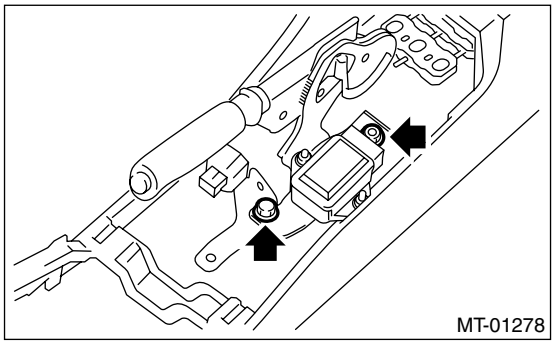
1) Disconnect the ground cable from battery.
2) Remove the console cover. <Ref. to EI-45, Console Box.>
3) Disconnect the connector from yaw rate and lateral G sensor.
4) Remove the yaw rate and lateral G sensor from body.

CAUTION:
Do not drop or bump the yaw rate and lateral G sensor.

LHD model



RHD model



B: INSTALLATION

Install in the reverse order of removal.

CAUTION:
Do not drop or bump the yaw rate and lateral G sensor.

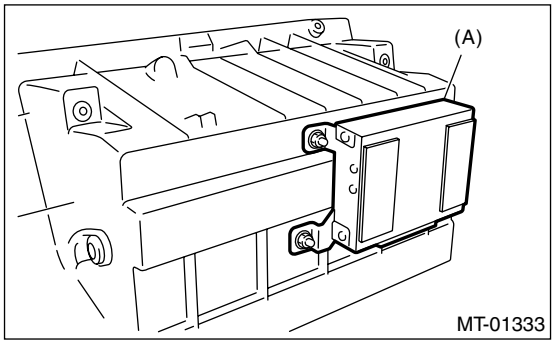
Tightening torque:
18 N·m (1.8 kgf-m, 13.0 ft-lb)

29. Driver's Control Center Differential Control Module

A: REMOVAL

1. LHD MODEL

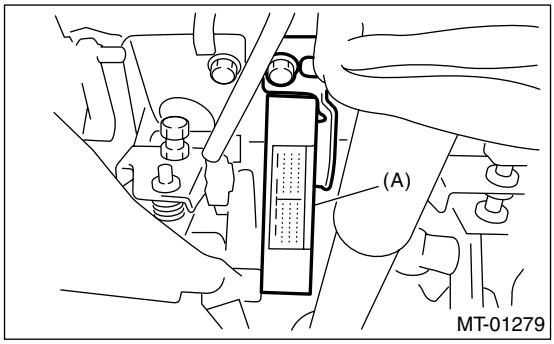
1) Remove the ground cable from battery.
2) Remove the glove box. <Ref. to EI-42, REMOVAL, Glove Box.>
3) Disconnect the connector after removing the bolt from the inside of glove box, and then remove the control module.



(A) Driver's control center differential control module

2. RHD MODEL

1) Remove the ground cable from battery.
2) Remove the instrument panel lower cover. <Ref. to EI-46, REMOVAL, Instrument Panel Assembly.>
3) Remove the driver's control center differential control module.



(A) Driver's control center differential control module

B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
18 N·m (1.8 kgf-m, 13.0 ft-lb)

30.General Diagnostic Table

A: INSPECTION

1. MANUAL TRANSMISSION

Symptom	Possible cause	Remedy
1. Gears are difficult to intermesh. NOTE: The cause for difficulty in shifting gears can be classified into two kinds: one is malfunction of the gear shift system and the other is malfunction of the transmission. However, if the operation is heavy and engagement of the gears is difficult, defective clutch disengagement may also be responsible. Check whether the clutch is correctly functioning, before checking the gear shift system and transmission.	(a) Worn, damaged or burred chamfer of internal spline of sleeve and reverse driven gear	Replace.
	(b) Worn, damaged or burred chamfer of spline of gears	Replace.
	(c) Worn or scratched bushings	Replace.
	(d) Incorrect contact between synchronizer ring and gear cone or wear	Correct or replace.
2. Gear slips out. • Gear slips out when coasting on rough road. • Gear slips out during acceleration.	(a) Defective pitching stopper adjustment	Adjust.
	(b) Loose engine mounting bolts	Tighten or replace.
	(c) Worn fork shifter, broken shifter fork rail spring	Replace.
	(d) Worn or damaged ball bearing	Replace.
	(e) Excessive clearance between splines of synchronizer hub and synchronizer sleeve	Replace.
	(f) Worn tooth step of synchronizer hub (responsible for slip-out of 3rd gear)	Replace.
	(g) Worn 1st driven gear, needle bearing and race	Replace.
	(h) Worn 2nd driven gear, needle bearing and race	Replace.
	(i) Worn 3rd drive gear and bushing	Replace.
	(j) Worn 4th drive gear and bushing	Replace.
	(k) Worn 5th drive gear and bushing	Replace.
	(l) Worn 6th drive gear and bushing	Replace.
	(m) Worn reverse idler gear and bushing	Replace.
3. Unusual noise comes from transmission. NOTE: If an unusual noise is heard when the vehicle is parked with its engine idling and if the noise ceases when the clutch is disengaged, it may be considered that the noise comes from the transmission.	(a) Insufficient or improper lubrication	Lubricate or replace with specified oil.
	(b) Worn or damaged gears and bearings NOTE: If the trouble is only wear of the tooth surfaces, merely a high roaring noise will occur at high speeds, but if any part is broken, rhythmical knocking sound will be heard even at low speeds.	Replace.

2. DIFFERENTIAL

Symptom	Possible cause	Remedy
1. Broken differential (case, gear, bearing, etc.) NOTE: Abnormal noise will develop and finally it will become impossible to continue to run due to broken pieces obstructing the gear revolution.	(a) Insufficient or improper oil	Disassemble differential and replace broken components and at the same time check other components for any trouble, and replace if necessary.
	(b) Use of vehicle under severe conditions such as excessive load and improper use of clutch	Readjust bearing preload and backlash and face contact of gears.
	(c) Improper adjustment of taper roller bearing	Adjust.
	(d) Improper adjustment of drive pinion and hypoid driven gear	Adjust.
	(e) Excessive backlash due to worn differential side gear, washer or differential pinion vehicle under severe operating conditions.	Add recommended oil to specified level. Do not use vehicle under severe operating conditions.
	(f) Loose hypoid driven gear clamping bolts	Tighten.
2. Differential and hypoid gear noises Troubles of the differential and hypoid gear always appear as noise problems. Therefore noise is the first indication of the trouble. However noises from the engine, muffler, tire, exhaust gas, bearing, body, etc. are easily mistaken for the differential noise. Pay special attention to the hypoid gear noise because it is easily confused with other gear noises. There are the following four kinds of noises. • Gear noise when driving: If noise increases as the vehicle speed increases it may be due to insufficient gear oil, incorrect gear engagement, damaged gears, etc. • Gear noise when coasting: Damaged gears due to maladjusted bearings and incorrect shim adjustment • Bearing noise when driving or when coasting: Cracked, broken or damaged bearings • Noise which mainly occurs when turning: Unusual noise from the differential side gear, differential pinion, differential pinion shaft, etc.	(a) Insufficient oil	Lubricate.
	(b) Improper adjustment of hypoid driven gear and drive pinion	Check tooth contact.
	(c) Worn teeth of hypoid driven gear and drive pinion	Replace as a set. Readjust bearing preload.
	(d) Loose roller bearing	Readjust hypoid driven gear to drive pinion backlash and check tooth contact.
	(e) Distorted hypoid driven gear or differential case	Replace.
	(f) Worn washer and differential pinion shaft	Replace.

MANUAL TRANSMISSION AND DIFFERENTIAL (DIAGNOSTICS)

6MT(diag)

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1. Basic Diagnostic Procedure

A: PROCEDURE

	Step	Check	Yes	No
1	**CHECK PRE-INSPECTION.** 1) Ask the customer when and how trouble occurred using the check list for interview. <Ref. to 6MT(diag)-4, Check List for Interview.> 2) Before performing diagnosis, inspect the unit which might influence the driver's control center differential. <Ref. to 6MT(diag)-5, INSPECTION, General Description.>	Is unit that might influence the driver's control center differential problem normal?	Go to step **2.**	Repair the faulty unit.
2	**CALLING UP THE DTC.** Check the DTC. <Ref. to 6MT(diag)-23, WITH SUBARU SELECT MONITOR, OPERATION, Read Diagnostic Trouble Code (DTC).> NOTE: • For DTC, refer to "List of Diagnostic Trouble Code (DTC)". <Ref. to 6MT(diag)-28, List of Diagnostic Trouble Code (DTC).> • If the communication function of the Subaru Select Monitor cannot be executed normally, check the communication circuit.	Is the DTC called up?	Go to step **3.** NOTE: Record all DTC.	Go to step **4.**
3	**PERFORM THE DIAGNOSIS.** 1) Inspect and repair the all DTC using "Diagnostic Procedure with Diagnostic Trouble Code (DTC)". <Ref. to 6MT(diag)-30, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> NOTE: For DTC, refer to "List of Diagnostic Trouble Code (DTC)". <Ref. to 6MT(diag)-28, List of Diagnostic Trouble Code (DTC).> 2) Start the engine. 3) Read the DTC using Subaru Select Monitor. <Ref. to 6MT(diag)-23, WITH SUBARU SELECT MONITOR, OPERATION, Read Diagnostic Trouble Code (DTC).>	Is the DTC displayed?	Record all DTC, and inspect using "Diagnostic Procedure with Diagnostic Trouble Code (DTC)" <Ref. to 6MT(diag)-30, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> Repeat "PERFORM THE DIAGNOSIS" until normal code called up.	Go to step **4.**
4	**READ THE DTC WITH COMBINATION METER.** Check DTC with combination meter. <Ref. to 6MT(diag)-23, READ DIAGNOSTIC TROUBLE CODE (DTC) WITH DIAGNOSTIC INDICATOR LIGHT., OPERATION, Read Diagnostic Trouble Code (DTC).> NOTE: For details concerning DTCs refer to the "List of Diagnostic Trouble Code (DTC)". <Ref. to 6MT(diag)-28, List of Diagnostic Trouble Code (DTC).>	Is the DTC called up?	Go to step **5.** NOTE: Record all DTC.	Inspect using "Can not calling up DTC". NOTE: After the inspection, read the DTC again.

	Step	Check	Yes	No
5	**PERFORM THE DIAGNOSIS.** 1) Inspect and repair the all DTC using “Diagnostic Procedure with Diagnostic Trouble Code (DTC)”. <Ref. to 6MT(diag)-30, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> NOTE: For DTC, refer to “List of Diagnostic Trouble Code (DTC)”. <Ref. to 6MT(diag)-28, List of Diagnostic Trouble Code (DTC).> 2) Perform the inspection mode. <Ref. to 6MT(diag)-25, Inspection Mode.>	Is the DTC displayed?	Record all DTC, and inspect using “Diagnostic Procedure with Diagnostic Trouble Code (DTC)” <Ref. to 6MT(diag)-30, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> Repeat “PERFORM THE DIAGNOSIS” until normal code called up.	Inspect using “General Diagnostic Table”.

2. Check List for Interview

A: CHECK

Check the following items when problem has occurred.

NOTE:
Use copies of this page for interviewing customers.

Customer's name			
Date of purchase			
Date of repair			
Trans. model	TRANSMISSION	VIN	
Odometer reading	km or miles		
Frequency	❑ Continuous ❑ Intermittent (times a day)		
Weather	❑ Fine ❑ Cloudy ❑ Rainy ❑ Snowy ❑ Various/Others ( )		
Place	❑ High ❑ Suburbs ❑ Inner city ❑ Uphill ❑ Rough road ❑ Others ( )		
Outdoor temperature	❑ Hot ❑ Warm ❑ Cool ❑ Cold		
Vehicle speed	km/h (MPH)		
Driver's control center differential indicator light	❑ Flashing	❑ Except flashing	
Driving condition	❑ Not affected ❑ While decelerating	❑ At starting ❑ While accelerating	❑ While turning (❑ RH / ❑ LH) ❑ While cruising
Symptoms	❑ No change to AUTO or MANUAL		
	❑ No change of front and rear torque distribution		
	❑ No change to differential free		
	❑ No change to differential lock		
	❑ Tight cornering condition is occurred in AUTO or MANUAL mode with differential free		
	❑ Noise or vibration		
	❑ Others ( )		

3. General Description

A: CAUTION

Supplemental restraint system airbag wiring harness is routed near the driver's control center differential control module.

CAUTION:

• All airbag system wiring harness and connectors are colored yellow. Do not use the electrical test equipment on these circuits.

• Be careful not to damage the airbag system wiring harness when performing diagnostics and servicing the driver's control center differential control module.

• When measuring the voltage or resistance of each control unit or each sensor, use a tapered pin with diameter of less than 0.64 mm (0.025 in) in order to avoid poor contact. Do not insert the pin with diameter of more than 0.65 mm (0.026 in).

B: INSPECTION

1. POWER SUPPLY

1) Measure battery voltage and specific gravity of electrolyte.

Standard of voltage: More than 12 V

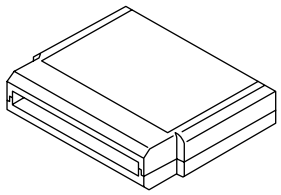
Standard of gravity: More than 1.260

2) Check the condition of fuse.

3) Check the condition of harness and harness connector.

C: PREPARATION TOOL

1. SPECIAL TOOL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18482AA000	18482AA000	CARTRIDGE	Used for troubleshooting for electrical system.
ST22771AA030	22771AA030	SUBARU SELECT MONITOR KIT	Used for troubleshooting for electrical system. • English 22771AA030 (Without Printer) • German 22771AA070 (Without Printer) • French 22771AA080 (Without Printer) • Spanish 22771AA090 (Without Printer)

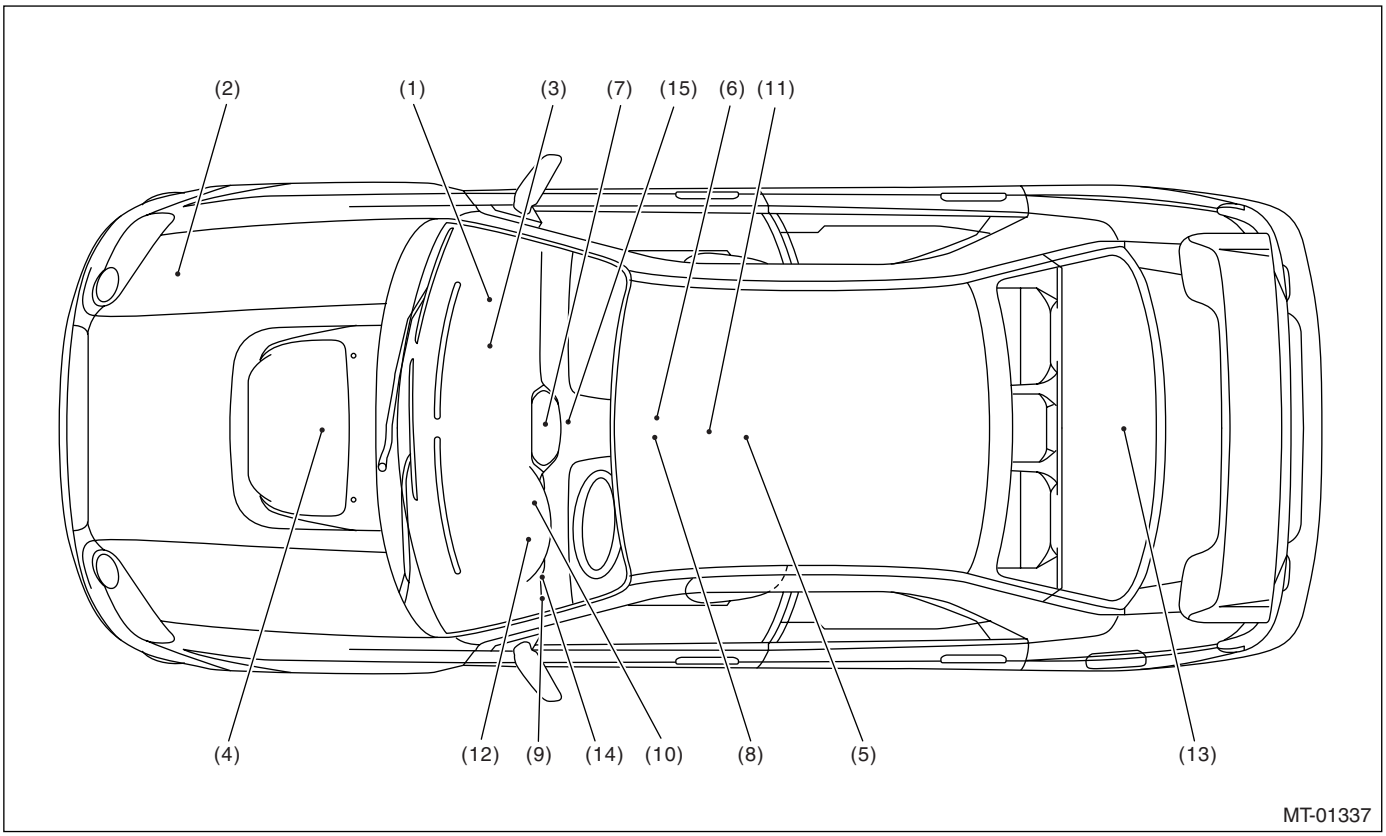
2. GENERAL TOOL

TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance, voltage and ampere.
Oscilloscope	Used for measuring sensor.

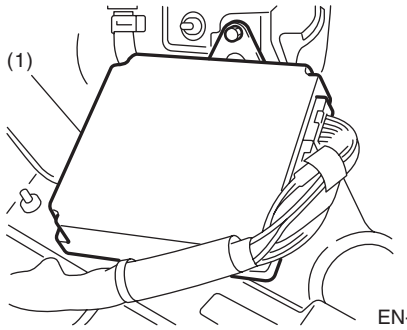
4. Electrical Component Location

A: LOCATION

1. LHD MODEL



(1) Engine control module (ECM)
(2) ABS control module & hydraulic control unit (ABSCM&H/U)
(3) Driver's control center differential control module
(4) Throttle position sensor
(5) Yaw rate & lateral G sensor
(6) Center differential control dial
(7) Center differential
(8) Manual mode switch
(9) Driver's control center differential relay
(10) Driver's control center differential indicator light (driver's control center differential diagnostic indicator light)
(11) Parking brake switch
(12) Brake light switch
(13) Rear differential oil temperature switch
(14) Data link connector
(15) Neutral position switch



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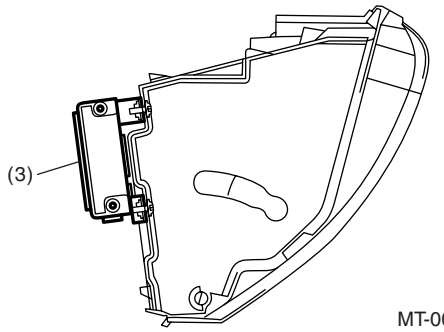

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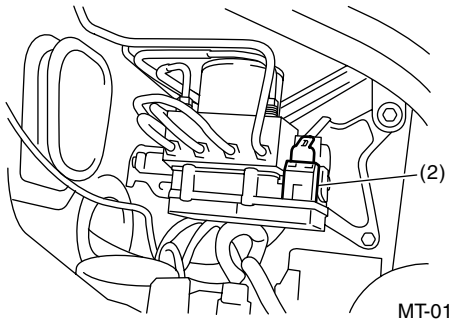

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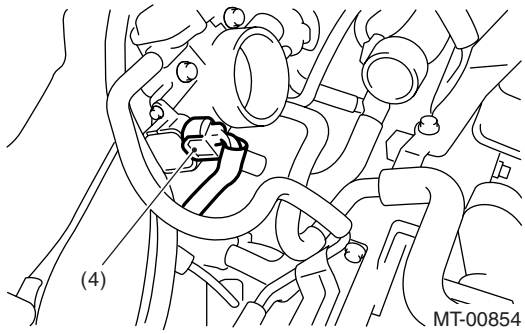

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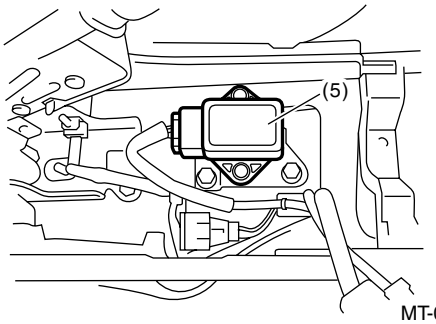

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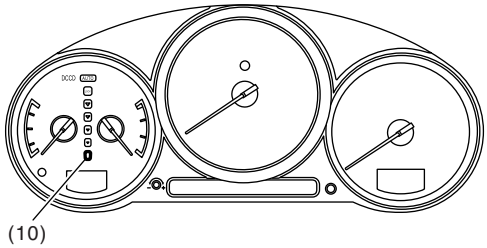

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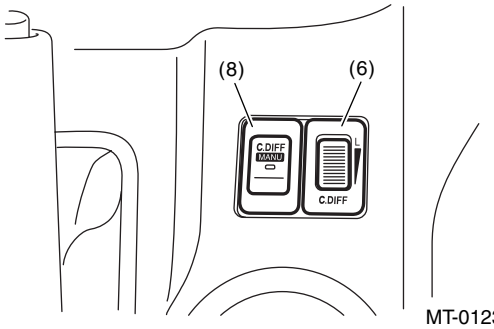

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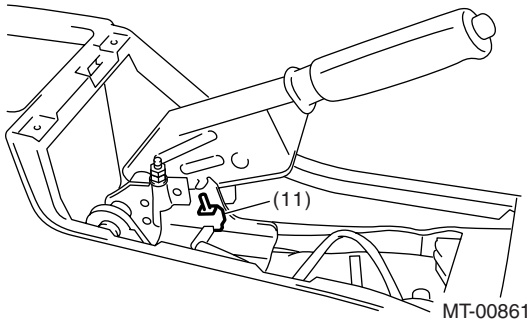

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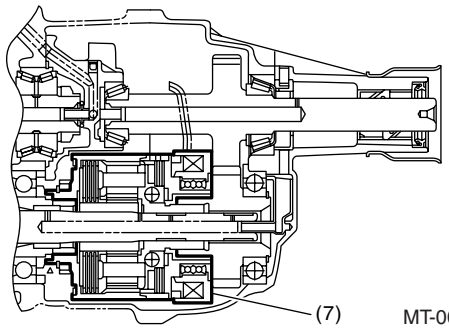

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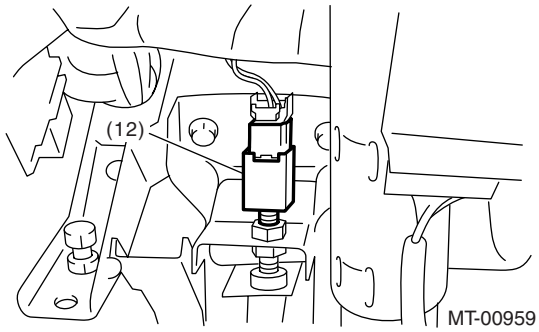

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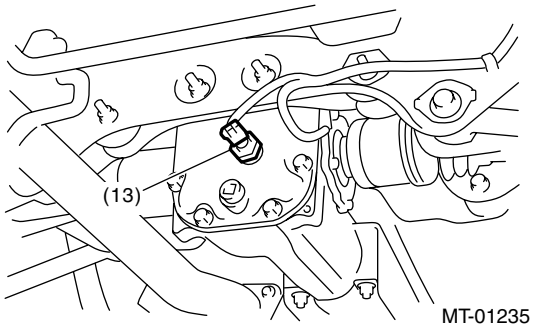

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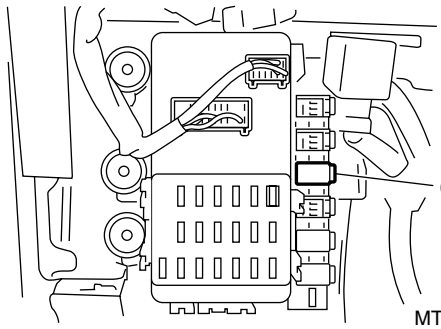

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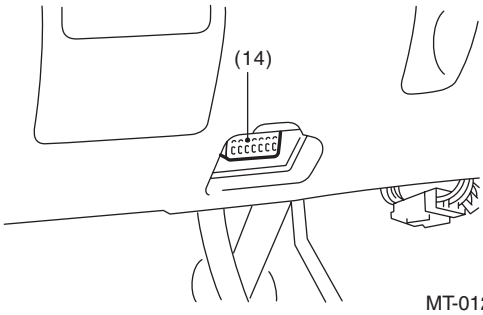

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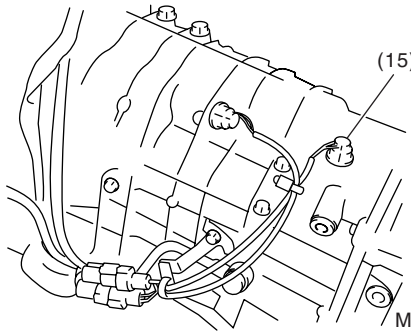
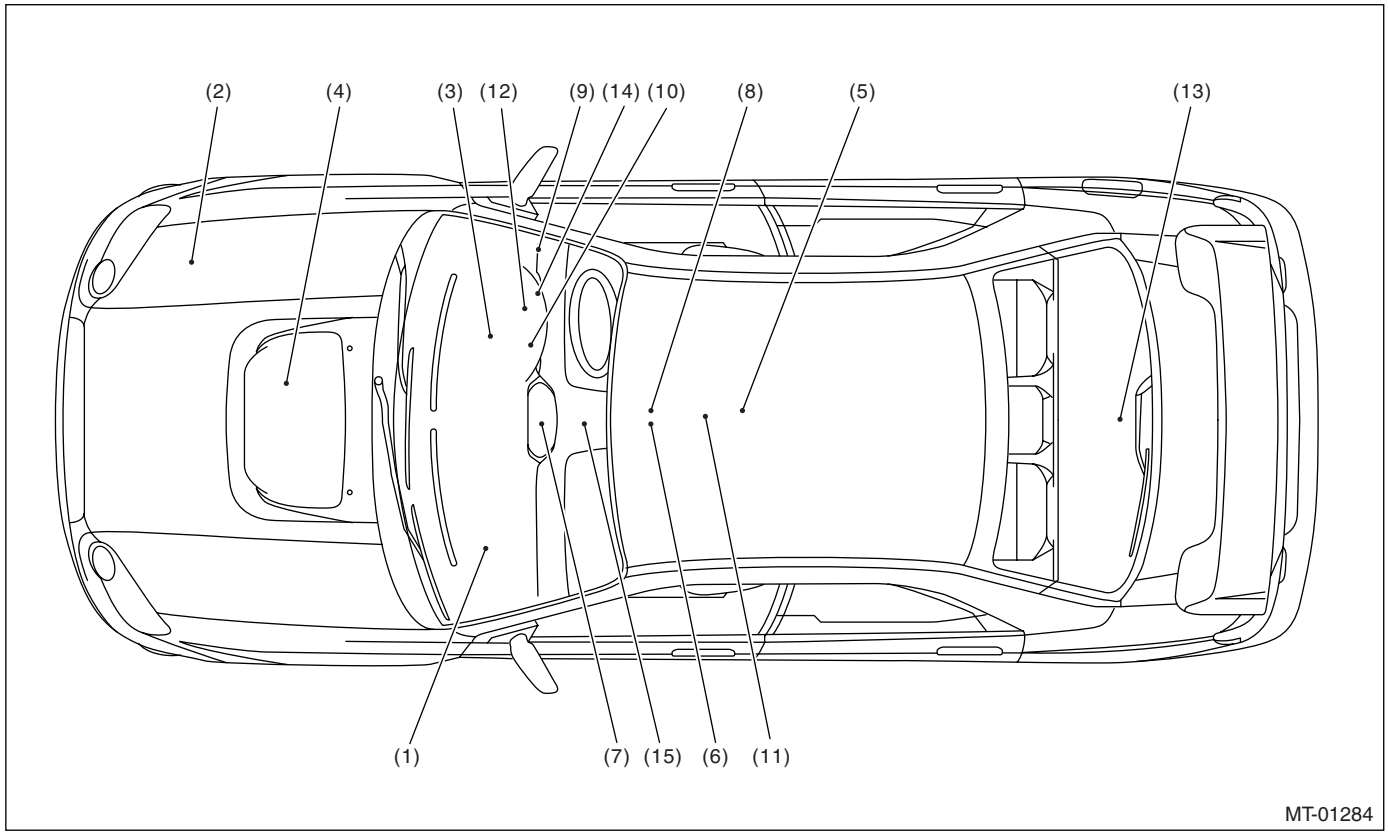
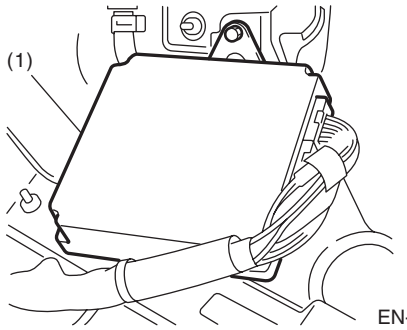


MT-01234

2. RHD MODEL



(1) Engine control module (ECM)
(2) ABS control module & hydraulic control unit (ABSCM&H/U)
(3) Driver's control center differential control module
(4) Throttle position sensor
(5) Yaw rate & lateral G sensor
(6) Center differential control dial
(7) Center differential
(8) Manual mode switch
(9) Driver's control center differential relay
(10) Driver's control center differential indicator light (driver's control center differential diagnostic indicator light)
(11) Parking brake switch
(12) Brake light switch
(13) Rear differential oil temperature switch
(14) Data link connector
(15) Neutral position switch



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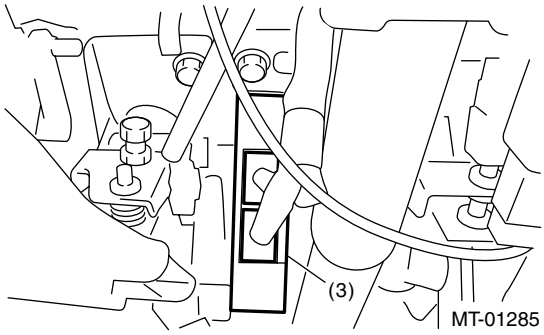

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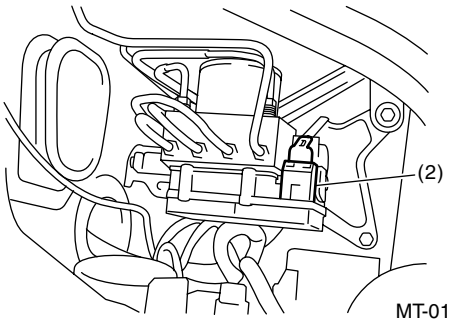

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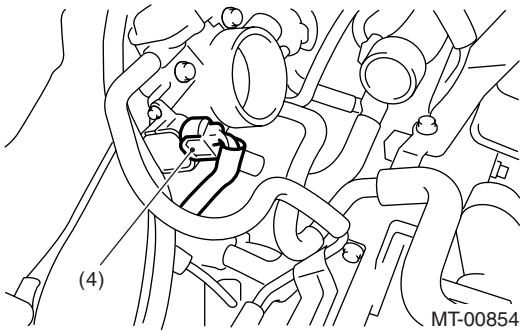

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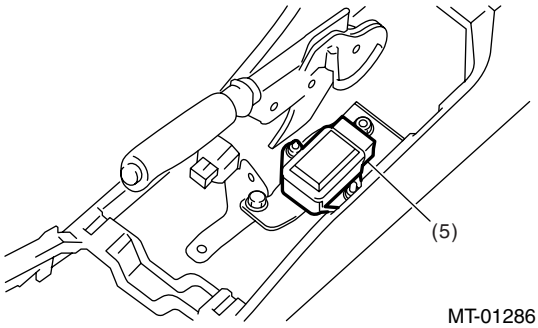

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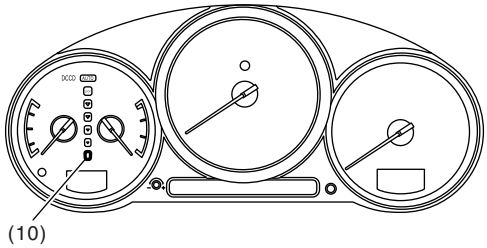
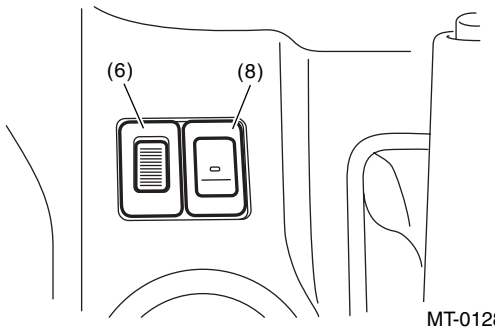


MT-00860



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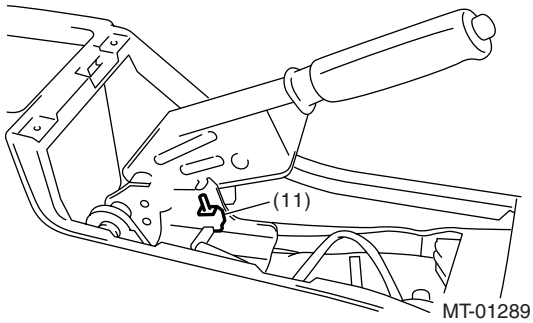

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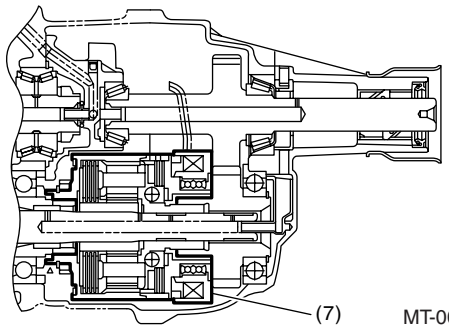

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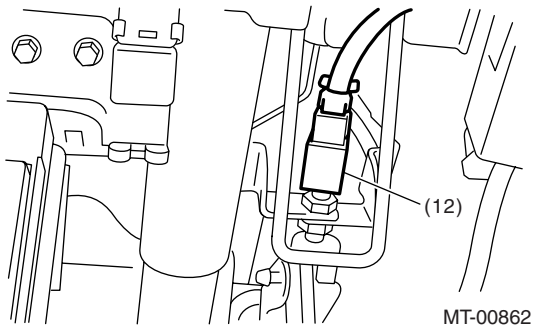

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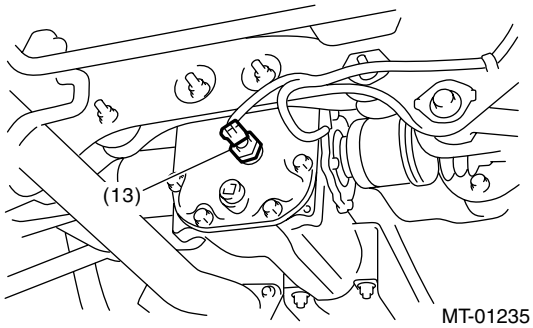
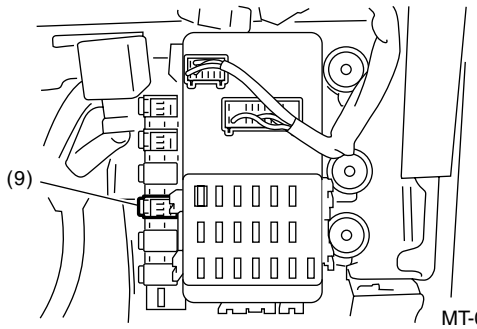


MT-01235



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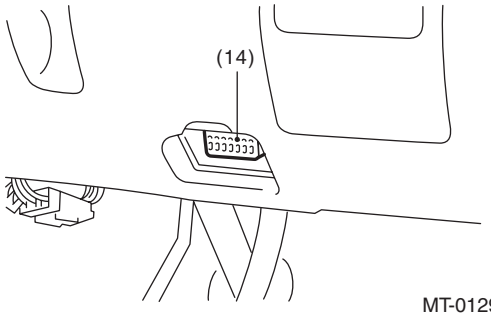

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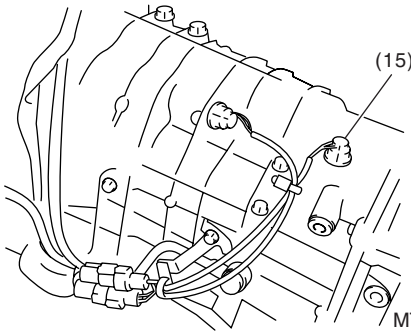
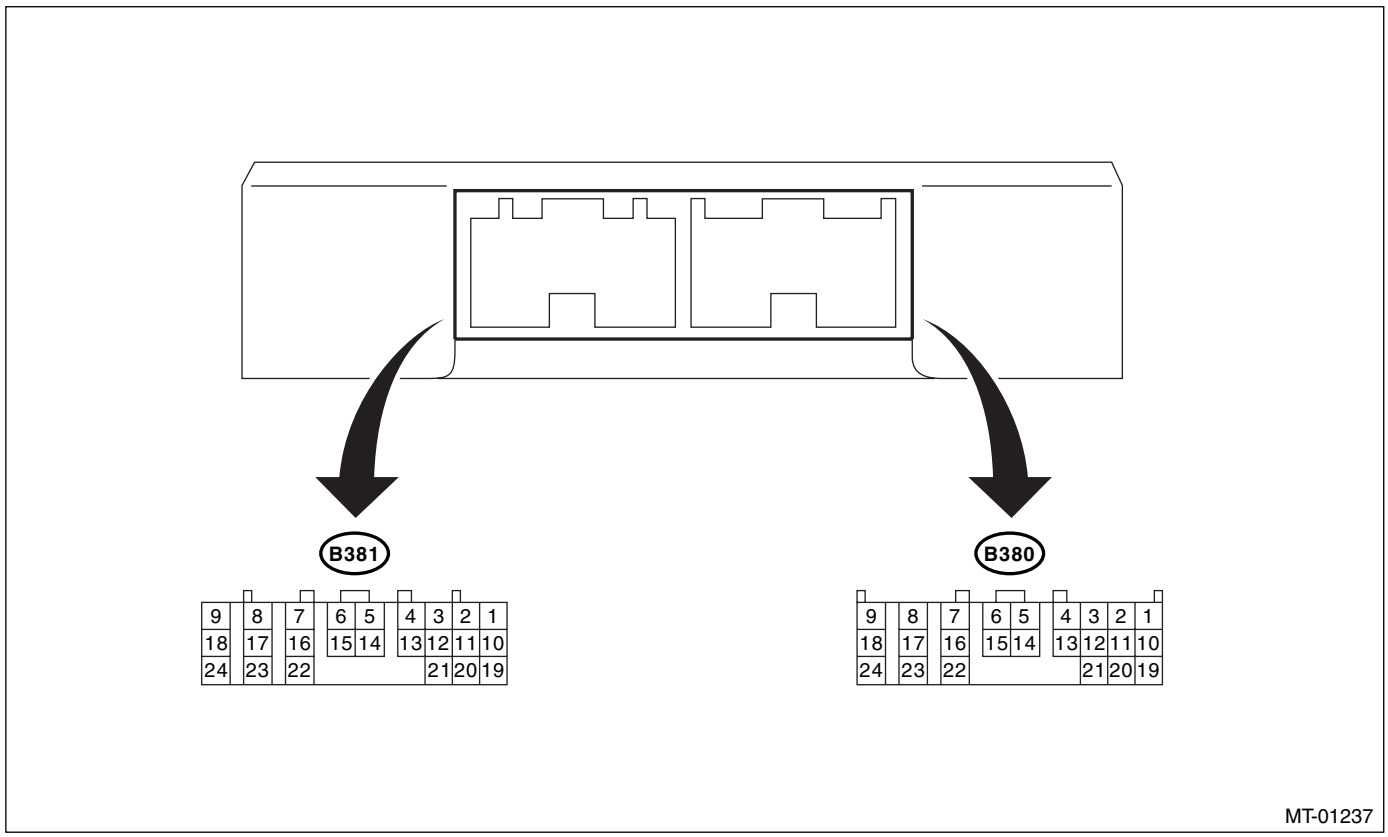


MT-01234

5. Driver's Control Center Differential Control Module I/O Signal

A: ELECTRICAL SPECIFICATION

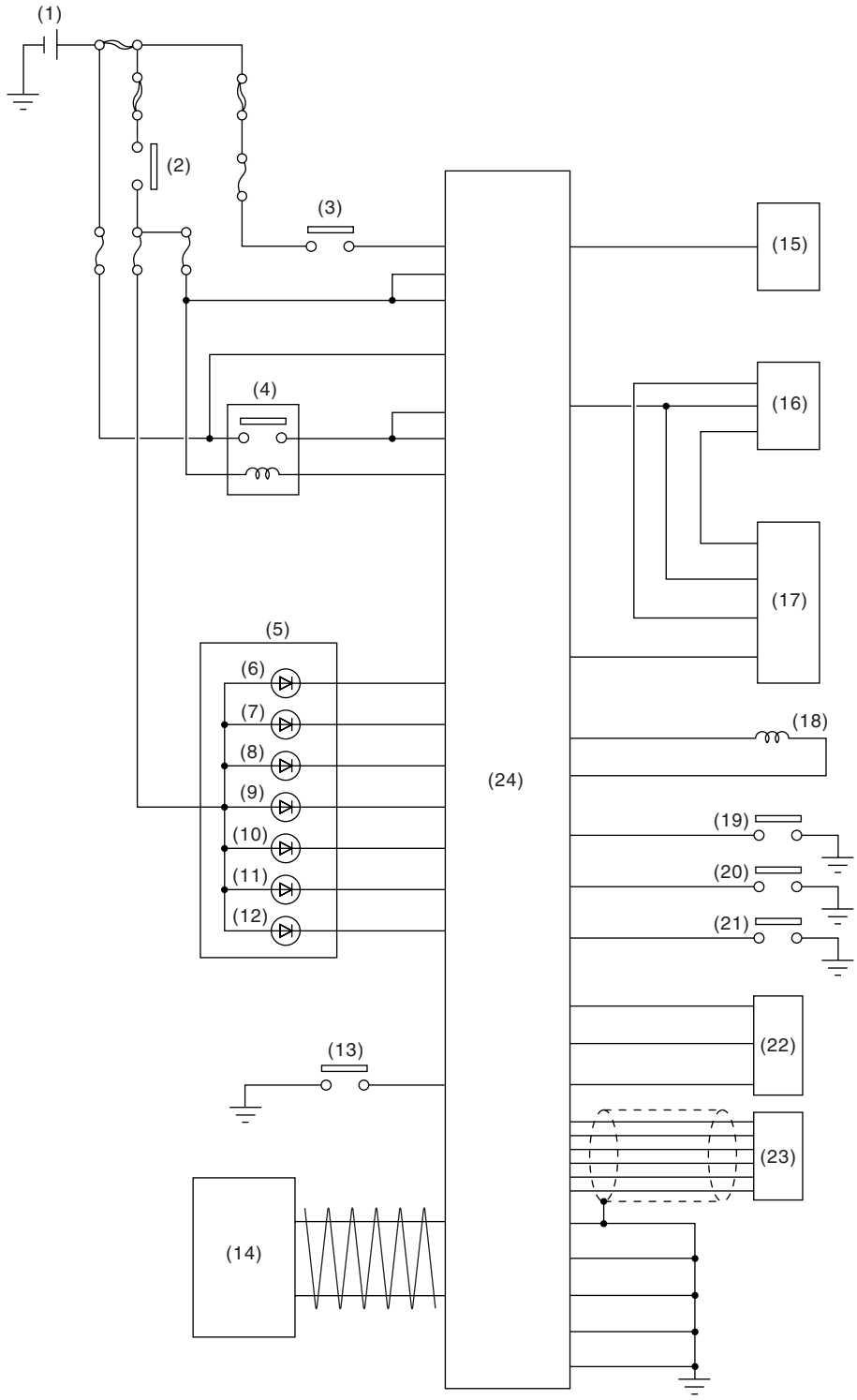


Check with ignition switch ON.					
Content	Connector No.	Terminal No.	Measuring conditions	Voltage (V)	To body resistance (ohm)
Back-up power supply	B381	17	Ignition switch ON or OFF	10 — 13	—
Ignition power supply	B381	5	Ignition switch ON (engine OFF)	10 — 13	—
	B381	6			—
Driver's control center differential power supply	B381	7			—
	B381	8			—
Driver's control center differential relay	B381	10	Ignition switch ON	Less than 1	—
Throttle position sensor	B380	2	Accelerator pedal is released.	0.4 — 0.8	—
			Accelerator pedal is fully depressed.	3.9 — 4.1	
Center differential control dial power supply	B380	23	Ignition switch ON	Approx. 5	—
Center differential control dial ground line	B381	14	Ignition switch ON	0	—
Center differential control dial input signal	B380	3	When differential is locked	Approx. 5	—
			When differential is free	Less than 0.5	

Check with ignition switch ON.					
Content	Connector No.	Terminal No.	Measuring conditions	Voltage (V)	To body resistance (ohm)
Driver's control center differential output	B381	9	When differential is locked (When driver's control center differential indicator light is in differential lock)	6.0 — 7.0	1.0 — 2.0 (between connector terminals)
			When differential is free (When parking brake is applied)	Less than 0.5	
Driver's control center differential ground line	B381	24	When differential is free	Less than 0.5	
Parking brake switch	B380	5	When parking brake is applied	Less than 0.4	—
			When parking brake is released	More than 8	
Driver's control center differential indicator light (Lock ratio 0%)	B381	4	When illuminates	Less than 1	—
			When turned off	More than 8	
Driver's control center differential indicator light (Lock ratio 15%)	B381	3	When illuminates	Less than 1	—
			When turned off	More than 8	
Driver's control center differential indicator light (Lock ratio 35%)	B381	2	When illuminates	Less than 1	—
			When turned off	More than 8	
Driver's control center differential indicator light (Lock ratio 65%)	B381	1	When illuminates	Less than 1	—
			When turned off	More than 8	
Driver's control center differential indicator light (Lock ratio 85%)	B381	13	When illuminates	Less than 1	—
			When turned off	More than 8	
Driver's control center differential indicator light (Lock ratio 100%)	B381	12	When illuminates	Less than 1	—
			When turned off	More than 8	
AUTO indicator light	B381	11	When illuminates	Less than 1	—
			When turned off	More than 8	
Stop light switch	B380	4	Brake pedal depressed.	More than 8	—
			Brake pedal released.	Less than 1	
Rear differential oil temperature switch	B380	14	Rear differential oil temperature switch OFF	More than 8	—
			Rear differential oil temperature switch ON	Less than 0.4	
Manual mode switch	B380	13	Switch is released	More than 4.3	—
			Switch is depressed	Less than 0.1	
Data link signal (Subaru Select Monitor)	B380	9	—	—	—
					—
Driver's control center differential control module ground line	B381	16	—	0	—
	B381	22			—
	B381	23			—
	B380	20			—
	B381	15			—

Check with ignition switch ON.						
Content		Connector No.	Terminal No.	Measuring conditions	Voltage (V)	To body resistance (ohm)
Yaw rate & lateral G sensor	Input (lateral G sensor)	B380	1	Ignition switch ON (When vehicle on the level)	2.35 — 2.65 When vehicle on the level	—
	Battery voltage	B380	22	Ignition switch ON	more than 8	—
	Input (Yaw rate sensor)	B380	10	Ignition switch ON (engine OFF, when stopped, ABS is in normal condition)	Waveform <Ref. to 6MT(diag)-16, WAVEFORM, MEASUREMENT, Driver's Control Center Differential Control Module I/O Signal.>	—
	Standard (Yaw rate sensor)	B380	19	Ignition switch ON	2.1 — 2.9	—
	Test	B380	21	Ignition switch ON (engine OFF, when stopped, ABS is in normal condition)	Waveform <Ref. to 6MT(diag)-16, WAVEFORM, MEASUREMENT, Driver's Control Center Differential Control Module I/O Signal.>	—
	Ground	B380	11	—	—	—
CAN communication signal		B380	18	Ignition switch ON	Pulse signal	—
		B380	24			—
Neutral position switch		B380	15	Neutral	less than 1	—
				Except neutral	more than 8	—
Engine speed signal		B380	6	Ignition switch ON (engine OFF)	less than 1	
				Ignition switch ON (engine ON)	Less than 1 ←→ More than 8	

B: WIRING DIAGRAM

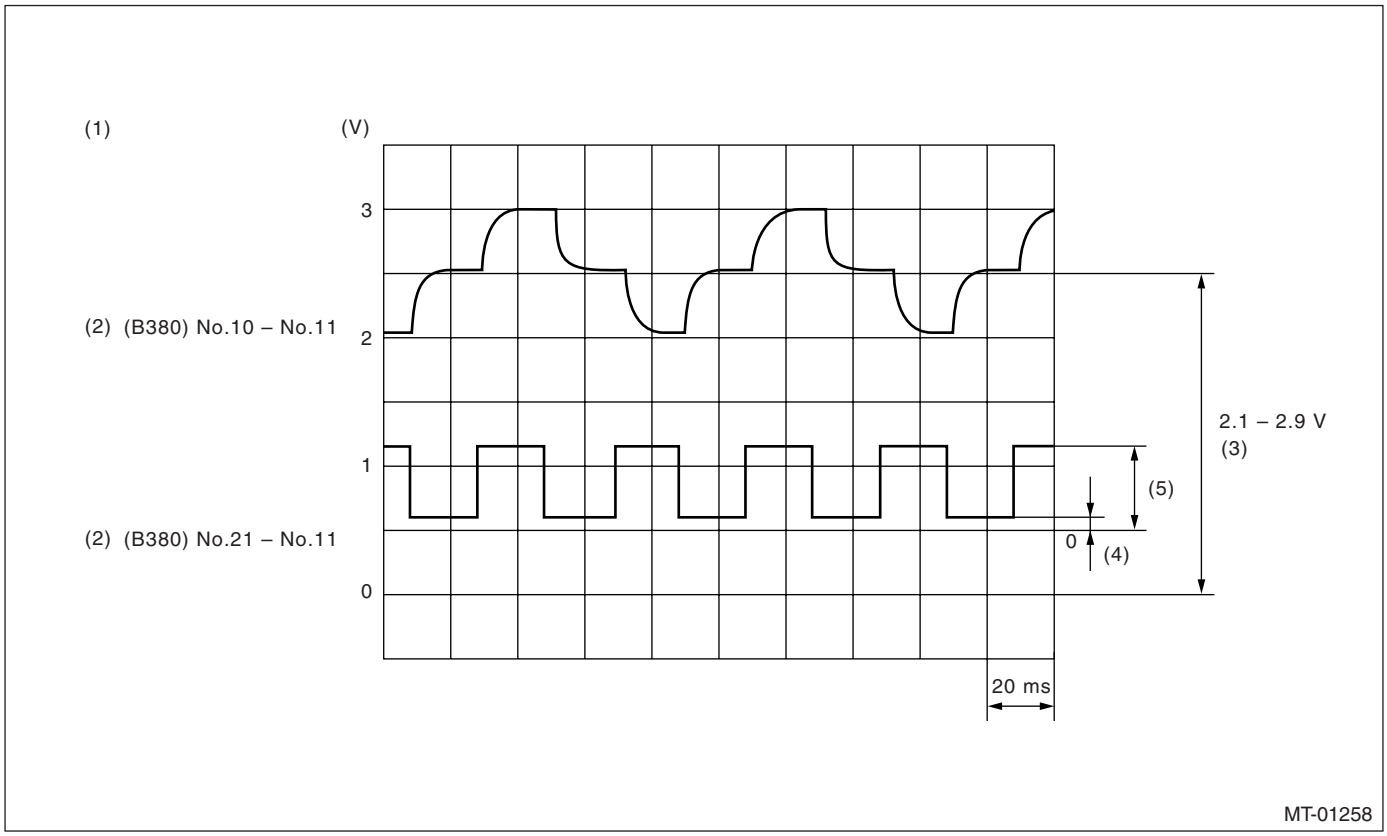


(1) Battery
(2) Ignition relay
(3) Stop light switch
(4) Driver's control center differential relay
(5) Combination meter
(6) Driver's control center differential indicator light (Lock ratio 0%)
(7) Driver's control center differential indicator light (Lock ratio 15%)
(8) Driver's control center differential indicator light (Lock ratio 35%)
(9) Driver's control center differential indicator light (Lock ratio 65%)
(10) Driver's control center differential indicator light (Lock ratio 85%)
(11) Driver's control center differential indicator light (Lock ratio 100%)
(12) AUTO indicator light
(13) Neutral position switch
(14) ABS control module & hydraulic control unit (ABSCM&H/U)
(15) Data link connector
(16) Throttle position sensor
(17) Engine control module (ECM)
(18) Driver's control center differential
(19) Parking brake switch
(20) Manual mode switch
(21) Rear differential oil temperature switch
(22) Center differential control dial
(23) Yaw rate & lateral G sensor
(24) Driver's control center differential control module

C: MEASUREMENT

Measure input and output signal voltage.

1. WAVEFORM



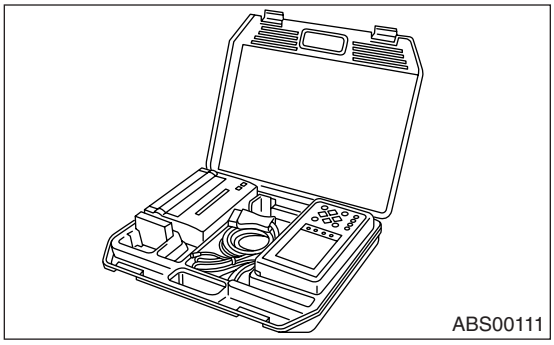
(1) Yaw rate sensor
(2) Terminal No.
(3) Vehicle is at a standstill. (engine OFF, ABS is in normal condition)
(4) Less than 1 V
(5) Approx. 6 V

6. Subaru Select Monitor

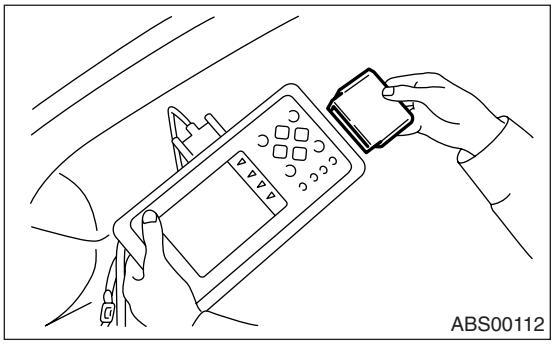
A: OPERATION

1. READ DIAGNOSTIC TROUBLE CODE (DTC)

1) Prepare the Subaru Select Monitor kit. <Ref. to 6MT(diag)-5, SPECIAL TOOL, PREPARATION TOOL, General Description.>

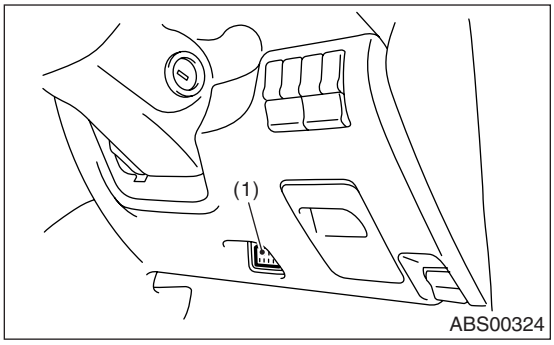


2) Connect the diagnosis cable to Subaru Select Monitor.
3) Insert the cartridge to Subaru Select Monitor. <Ref. to 6MT(diag)-5, SPECIAL TOOL, PREPARATION TOOL, General Description.>



4) Connect the Subaru Select Monitor to data link connector.

(1) Data link connector is located in the lower portion of the instrument panel (on the driver's side).

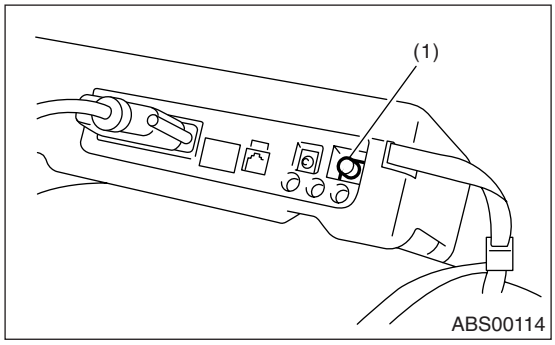


(1) Data link connector

(2) Connect the diagnosis cable to data link connector.

CAUTION:
Do not connect the scan tools except for Subaru Select Monitor.

5) Turn the ignition switch to ON (engine OFF) and turn the Subaru Select Monitor power switch to ON.



(1) Power switch

6) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
7) On the «System Selection Menu» display screen, select the {Transmission Control System} and press the [YES] key.
8) Press the [YES] key after the {Center Differential Control} is displayed.
9) On the «Transmission Diagnosis» display screen, select the {Diagnostic Code(s) Display} and press the [YES] key.

NOTE:
• For details concerning operation procedure, refer to the "SUBARU SELECT MONITOR OPERATION MANUAL".
• For details concerning DTCs, refer to the "List of Diagnostic Trouble Code (DTC)". <Ref. to 6MT(diag)-28, List of Diagnostic Trouble Code (DTC).>

10) If transmission and Subaru Select Monitor cannot communicate, check the communication circuit. <Ref. to 6MT(diag)-20, COMMUNICATION FOR INITIALIZING IMPOSSIBLE, INSPECTION, Subaru Select Monitor.>
11) On the «Check DTC» display screen, select the {Latest Code} or {Memory Code} and press the [Yes] key.

Display	Contents to be monitored
Latest	Indicate the latest DTC on the Subaru Select Monitor display.
Memory Code	Indicate the latest DTC in previous trouble on the Subaru Select Monitor display.

2. READ CURRENT DATA

1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Transmission Control System} and press the [YES] key.
3) Press the [YES] key after the {Center Differential Control} is displayed.
4) On the «Transmission Diagnosis» screen, select the {Current Data Display & Save}, and then press the [YES] key.
5) On the «Data Display Menu» screen, select the data display style and press the [YES] key.
6) Using a scroll key, move the display screen up or down until necessary data is shown.
• A list of the support data is shown in the following table.

Display	Contents to be monitored	Unit of measure
Lateral G Sensor	Lateral G sensor voltage is displayed.	V
C-diff. SW Voltage	Center differential switch voltage is displayed.	V
C-Diff. Real Current	Actual current of center differential is displayed.	A
C-Diff. Indicate Current	Set current of center differential is displayed.	A
FR Wheel Speed	Wheel speed detected by front ABS wheel speed sensor RH is displayed.	km/h or MPH
FL Wheel Speed	Wheel speed detected by front ABS wheel speed sensor LH is displayed.	km/h or MPH
RR Wheel Speed	Wheel speed detected by rear ABS wheel speed sensor RH is displayed.	km/h or MPH
RL Wheel Speed	Wheel speed detected by rear ABS wheel speed sensor LH is displayed.	km/h or MPH
Throttle Sensor Voltage	Throttle position sensor voltage is displayed.	V
Yaw rate sensor voltage	Voltage detected by yaw rate sensor is displayed.	V
Yaw rate & G sensor ref. V	Reference voltage of yaw rate & lateral G sensor is displayed.	V
Engine Speed	Current engine speed is displayed.	rpm
ABS Signal	ON/OFF of ABS signal is displayed.	ON or OFF
Stop Light SW	ON/OFF of stop light switch is displayed.	ON or OFF
RR-Diff. Oil Temp SW	ON/OFF of rear differential oil temperature switch is displayed.	ON or OFF
Module Identification Signal	ON/OFF of module identification signal is displayed.	ON or OFF
Center Diff. Lamp 1	ON/OFF of center differential light 1 is displayed.	ON or OFF
Center Diff. Lamp 2	ON/OFF of center differential light 2 is displayed.	ON or OFF
Center Diff. Lamp 3	ON/OFF of center differential light 3 is displayed.	ON or OFF
Center Diff. Lamp 4	ON/OFF of center differential light 4 is displayed.	ON or OFF
Center Diff. Lamp 5	ON/OFF of center differential light 5 is displayed.	ON or OFF
Center Diff. Lamp 6	ON/OFF of center differential light 6 is displayed.	ON or OFF
Parking Position Switch	ON/OFF of parking switch is displayed.	ON or OFF
Center Diff. Relay	ON/OFF of center differential relay is displayed.	ON or OFF
AUTO/MANUAL Mode Switch	ON/OFF of AUTO/MANUAL mode change switch is displayed.	ON or OFF
AUTO Mode Lamp	ON/OFF of AUTO mode light is displayed.	ON or OFF
Neutral Position Switch	Neutral switch condition (neutral/except neutral) is displayed.	ON or OFF

NOTE:
For details concerning operation procedure, refer to the “SUBARU SELECT MONITOR OPERATION MANUAL”.

3. CLEAR MEMORY MODE

1) On the «Main Menu» display screen, select the {2. Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Transmission Control System} and press the [YES] key.
3) Press the [YES] key after the {Center Differential Control} is displayed.
4) On the «Transmission Diagnosis» display screen, select the {Clear Memory} and press the [YES] key.

Display	Contents to be monitored
Is a memory clearance performed?	Function of clearing DTC.

5) When “Done” and “Turn ignition switch OFF” are shown on the display screen, turn the Subaru Select Monitor power switch and ignition switch to OFF.

NOTE:
For details concerning operation procedure, refer to the “SUBARU SELECT MONITOR OPERATION MANUAL”.

4. FREEZE FRAME DATA

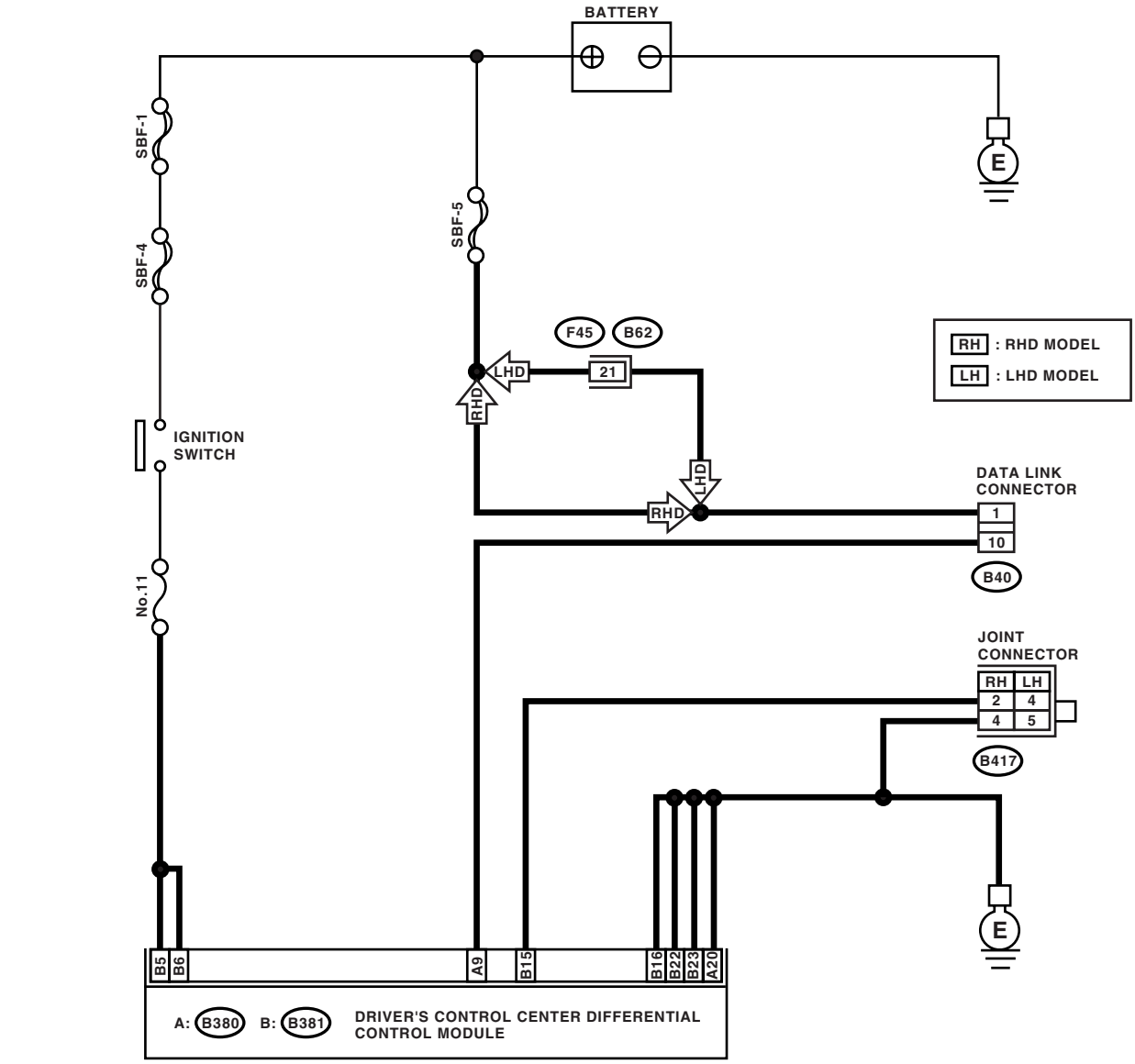
NOTE:
• Data stored at the time of trouble occurrence is shown on display.
• Each time trouble occurs, the latest information is stored in the freeze frame data in memory.
• Freeze frame data will be memorized up to seven.

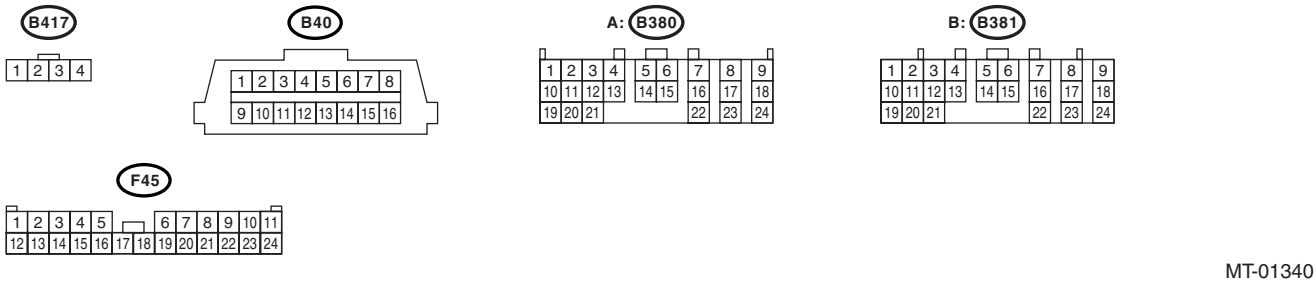
DTC	Content	Contents be monitored
P1700	Throttle position sensor	Throttle position sensor circuit condition is displayed.
P1720	DCCD CAN system circuit	CAN communication circuit condition is displayed.
P1721	DCCD engine rpm signal system	Engine speed signal circuit condition is displayed.
P1759	Lateral G sensor	Lateral G sensor circuit condition is displayed.
P1764	Yaw rate sensor system circuit	Yaw rate sensor circuit condition is displayed.
P1765	Yaw rate side G sensor reference system circuit	Yaw rate reference circuit condition is displayed.
P1875	Center differential	Center differential circuit condition is displayed.

B: INSPECTION

1. COMMUNICATION FOR INITIALIZING IMPOSSIBLE

DETECTING CONDITION:
Faulty harness connector.
TROUBLE SYMPTOM:
Communication is impossible between driver's control center differential control module and Subaru Select Monitor.
WIRING DIAGRAM:





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	Step	Check	Yes	No
1	**CHECK IGNITION SWITCH.**	Does the ignition switch turn to ON?	Go to step **2.**	Turn the ignition switch to ON, and select transmission mode using Subaru Select Monitor.
2	**CHECK BATTERY.** 1) Turn the ignition switch to OFF. 2) Measure the battery voltage.	Is the voltage more than 10 V?	Go to step **3.**	Charge or replace the battery.
3	**CHECK BATTERY TERMINAL.**	Is there poor contact at battery terminal?	Repair or tighten the battery terminal.	Go to step **4.**
4	**CHECK INSTALLATION OF DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE CONNECTOR.** Turn the ignition switch to OFF.	Is the driver's control center differential control module connector inserted into driver's control center differential control module until it is locked by clamps?	Go to step **5.**	Insert driver's control center differential control module connector into driver's control center differential control module.
5	**CHECK SUBARU SELECT MONITOR COMMUNICATION.** 1) Turn the ignition switch to ON. 2) Using Subaru Select Monitor, check whether communication to other system can be executed normally.	Is the system name displayed on Subaru Select Monitor?	Go to step **9.**	Go to step **6.**
6	**CHECK SUBARU SELECT MONITOR COMMUNICATION.** 1) Turn the ignition switch to OFF. 2) Disconnect the driver's control center differential control module connector. 3) Turn the ignition switch to ON. 4) Check whether communication to other systems can be executed normally.	Is the system name displayed on Subaru Select Monitor?	Replace driver's control center differential control module.	Go to step **7.**
7	**CHECK HARNESS CONNECTOR BETWEEN EACH CONTROL MODULE AND DATA LINK CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect driver's control center differential control module connector, ECM connector and ABSCM connector. 3) Measure the resistance between data link connector and chassis ground. ***Connector & terminal*** ***(B40) No. 10 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **8.**	Repair harness and connector between each control module and data link connector.
8	**CHECK OUTPUT SIGNAL FOR DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE.** 1) Turn the ignition switch to ON. 2) Measure the voltage between data link connector and chassis ground. ***Connector & terminal*** ***(B40) No. 10 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **9.**	Repair harness and connector between each control module and data link connector.

	Step	Check	Yes	No
9	**CHECK HARNESS CONNECTOR BETWEEN DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE AND DATA LINK CONNECTOR.** 1) Turn the ignition switch OFF. 2) Disconnect the driver's control center differential control module connector. 3) Measure the resistance between driver's control center differential control module connector and data link connector. ***Connector & terminal*** ***(B380) No. 9 — (B40) No. 10:***	Is the resistance less than 1 Ω?	Go to step **10.**	Repair harness and connector between driver's control center differential control module and data link connector.
10	**CHECK POWER SUPPLY CIRCUIT.** 1) Turn the ignition switch to ON. (engine OFF) 2) Measure the ignition power supply voltage between driver's control center differential control module connector and chassis ground. ***Connector & terminal*** ***(B381) No. 5 (+) — Chassis ground (–):*** ***(B381) No. 6 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **11.**	Repair open circuit in harness between driver's control center differential control module and battery.
11	**CHECK HARNESS CONNECTOR BETWEEN DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE AND CHASSIS GROUND.** 1) Turn the ignition switch to OFF. 2) Measure the resistance of harness between driver's control center differential control module and chassis ground. ***Connector & terminal*** ***(B380) No. 20 — Chassis ground:*** ***(B381) No. 15 — Chassis ground:*** ***(B381) No. 16 — Chassis ground:*** ***(B381) No. 22 — Chassis ground:*** ***(B381) No. 23 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **12.**	Repair open circuit in harness between driver's control center differential control module and inhibitor side connector, and poor contact in coupling connector.
12	**CHECK POOR CONTACT IN CONNECTOR.**	Is there poor contact in control module power supply, ground circuit and data link connector?	Repair the connector.	Replace the driver's control center differential control module.

7. Read Diagnostic Trouble Code (DTC)

A: OPERATION

1. READ DIAGNOSTIC TROUBLE CODE (DTC) WITH DIAGNOSTIC INDICATOR LIGHT.

NOTE:
Perform the following step 4) to 8) within 30 sec.

1) Securely apply the parking brake.
2) Set the center differential control dial to differential free.
3) Start the engine.
4) Set the center differential control dial to differential lock.
5) Release the parking brake.
6) Set the center differential control dial to differential free.
7) Securely apply the parking brake.
8) Repeat the step 4) to 7) for twice.

NOTE:
Repeat the step from the beginning when diagnostic indicator light does not blink.

9) Execute inspection mode. <Ref. to 6MT(diag)-25, Inspection Mode.>

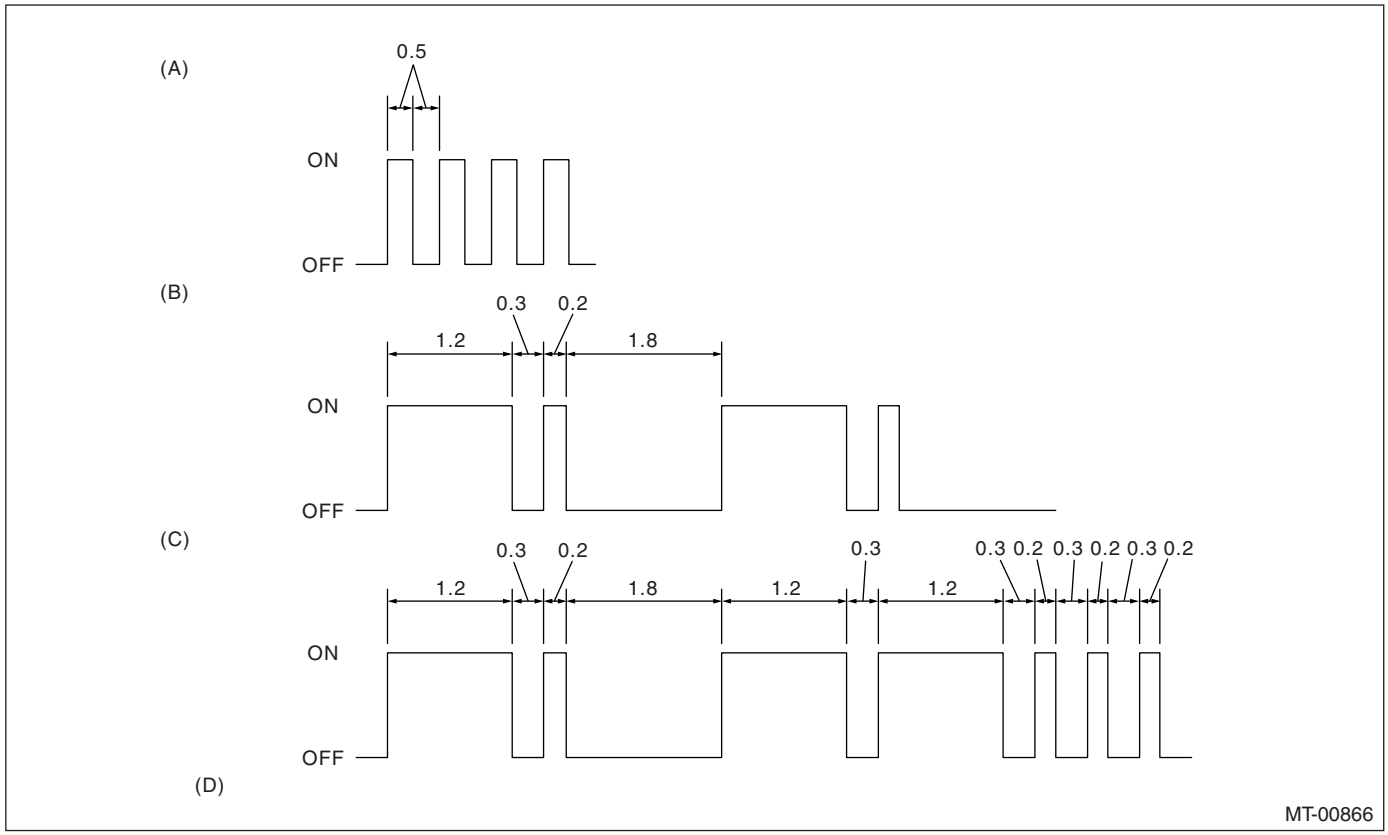
NOTE:
Refer to “HOW TO READ DIAGNOSTIC TROUBLE CODE (DTC)” for reading DTC. <Ref. to 6MT(diag)-24, HOW TO READ DIAGNOSTIC TROUBLE CODE (DTC), OPERATION, Read Diagnostic Trouble Code (DTC).>

2. WITH SUBARU SELECT MONITOR

Detail procedure for reading DTC, refer to “SUBARU SELECT MONITOR”. <Ref. to 6MT(diag)-17, Subaru Select Monitor.>

3. HOW TO READ DIAGNOSTIC TROUBLE CODE (DTC)

DTC for faulty part is indicated by blinking of driver's control center differential indicator. Long blink (1.2 sec.) means ten's place, short blink (0.2 sec.) means one's place.



(A) Normal code
(B) DTC 11
(C) DTC 11 and 23
(D) Unit: Seconds

NOTE:
- The codes which are memorized in control module, and the codes which are appeared to inform the trouble to driver in normal driving condition; are only "21", "22", "23", "25", "26", "27" and "28".
- For details of DTC, refer to "List of Diagnostic Trouble Code (DTC)". <Ref. to 6MT(diag)-28, List of Diagnostic Trouble Code (DTC).>

8. Inspection Mode

A: PROCEDURE

WARNING:
Observe the road traffic law.

1) Call up the Self-diagnosis diagnostic trouble code (DTC). <Ref. to 6MT(diag)-23, READ DIAGNOSTIC TROUBLE CODE (DTC) WITH DIAGNOSTIC INDICATOR LIGHT., OPERATION, Read Diagnostic Trouble Code (DTC).>
2) A brake pedal is stepped on and a brake pedal is returned.
3) Operate the Manual mode switch once or more, and then set to Manual mode.
4) Turn the center differential control dial to differential lock and then wait three seconds.
5) With the vehicle parked, shift the gear position to 1st then neutral.

9. Clear Memory Mode

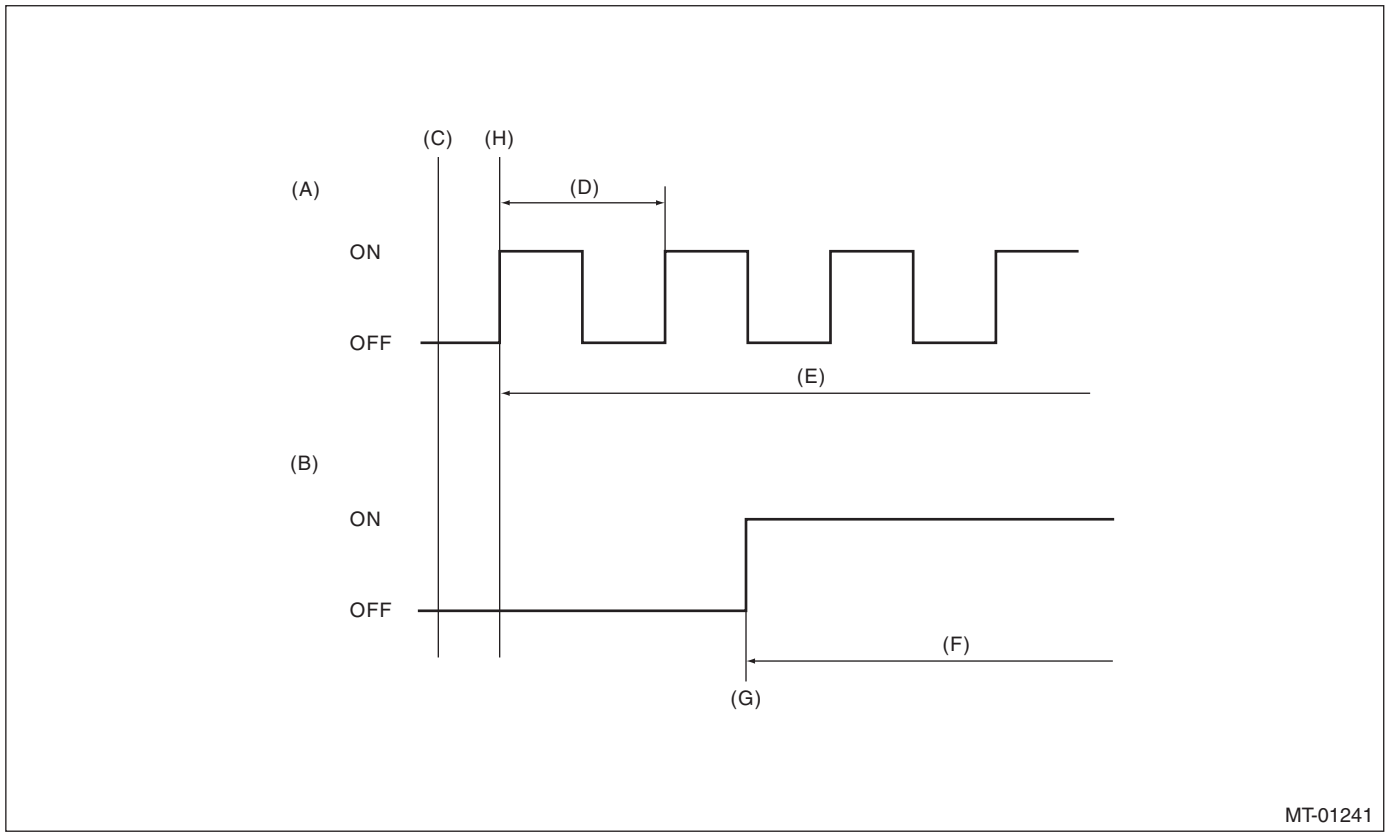
A: OPERATION

Detail procedure for clearing DTCs, refer to “SUBARU SELECT MONITOR”. <Ref. to 6MT(diag)-17, Subaru Select Monitor.>

10.Driver's Control Center Differential Indicator Light Display

A: INSPECTION

When the malfunction occurs on part or unit, the control module performs self diagnosis and driver's control center differential indicator light (at the bottom differential free light) keep blinking until detect the malfunction and the ignition switch is turned to OFF. Faulty part or unit can be identified by calling up DTC.
Indicator display is as shown in the figure.



(A) Faulty
(B) Normal
(C) Ignition switch ON
(D) 1 sec.
(E) Blink
(F) Driver's control center differential indicator light illuminates
(G) Set manual mode dial to differential free position
(H) Malfunction is detected

11.List of Diagnostic Trouble Code (DTC)

A: LIST

1. SUBARU SELECT MONITOR DISPLAY

DTC	Connect	Content of diagnosis	Index
P1700	Throttle Position Sensor Circuit	Throttle position circuit is open or shorted.	<Ref. to 6MT(diag)-38, DTC P1700 THROTTLE POSITION SENSOR CIRCUIT MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1720	DCCD CAN system circuit	CAN communication circuit is open or shorted.	<Ref. to 6MT(diag)-42, DTC P1720 DCCD CAN SYSTEM CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1721	DCCD engine rpm signal system circuit	Engine speed signal circuit is open or shorted.	<Ref. to 6MT(diag)-45, DTC P1721 DCCD ENGINE RPM SIGNAL SYSTEM CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1759	Lateral Acceleration Sensor Circuit	Lateral G sensor circuit is open or shorted.	<Ref. to 6MT(diag)-48, DTC P1759 LATERAL ACCELERATION SENSOR CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1764	Yaw rate sensor system circuit	Yaw rate sensor circuit is open or shorted.	<Ref. to 6MT(diag)-51, DTC P1764 YAW RATE SENSOR SYSTEM CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1765	Yaw rate side G sensor reference system circuit	Yaw rate reference circuit is open or shorted.	<Ref. to 6MT(diag)-55, DTC P1765 YAW RATE SIDE G SENSOR REFERENCE SYSTEM CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1875	Circuit of Center Diff.	Driver's control center differential circuit is open or shorted.	<Ref. to 6MT(diag)-58, DTC P1875 CIRCUIT OF CENTER DIFF., Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

2. COMBINATION METER INDICATOR LIGHT

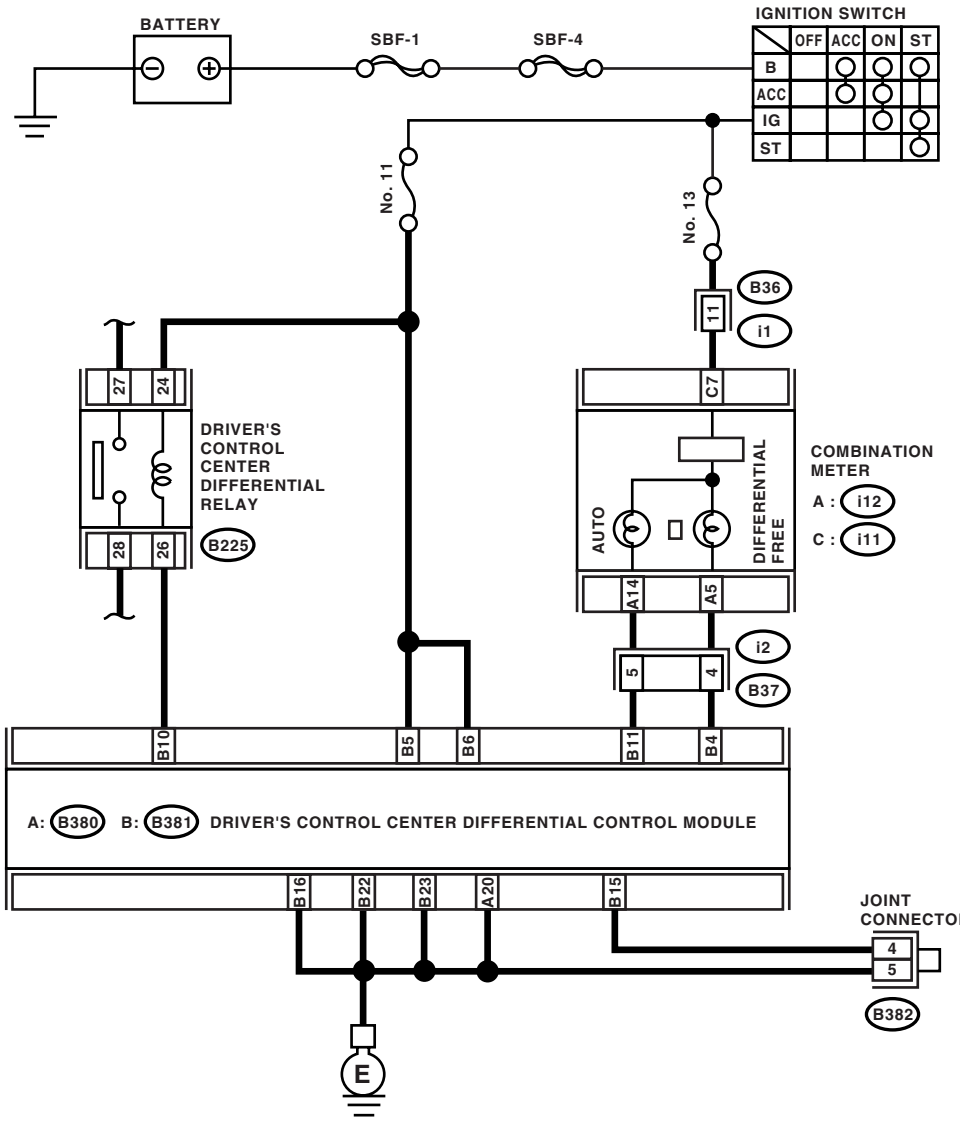
DTC	Connect	Content of diagnosis	Index
21	Throttle Position Sensor	Throttle position circuit is open or shorted.	<Ref. to 6MT(diag)-38, DTC P1700 THROTTLE POSITION SENSOR CIRCUIT MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
22	Lateral Acceleration Sensor Circuit	Lateral G sensor circuit is open or shorted.	<Ref. to 6MT(diag)-48, DTC P1759 LATERAL ACCELERATION SENSOR CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
23	Circuit of Center Diff.	Driver's control center differential circuit is open or shorted.	<Ref. to 6MT(diag)-58, DTC P1875 CIRCUIT OF CENTER DIFF., Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
24	Center differential control dial	Center differential control dial circuit is open or shorted.	<Ref. to 6MT(diag)-66, DTC 24 CHECK CENTER DIFFERENTIAL CONTROL DIAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
25	DCCD CAN system circuit	CAN communication circuit is open or shorted.	<Ref. to 6MT(diag)-42, DTC P1720 DCCD CAN SYSTEM CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
26	DCCD engine rpm signal system	Engine speed signal circuit is open or shorted.	<Ref. to 6MT(diag)-45, DTC P1721 DCCD ENGINE RPM SIGNAL SYSTEM CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
27	Yaw rate side G sensor reference system circuit	Yaw rate reference circuit is open or shorted.	<Ref. to 6MT(diag)-51, DTC P1764 YAW RATE SENSOR SYSTEM CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
28	Yaw rate sensor system circuit	Yaw rate sensor circuit is open or shorted.	<Ref. to 6MT(diag)-55, DTC P1765 YAW RATE SIDE G SENSOR REFERENCE SYSTEM CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
31	Manual mode switch	Manual mode switch circuit is open or shorted.	<Ref. to 6MT(diag)-68, DTC 31 MANUAL MODE SWITCH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
32	Parking brake switch	Parking brake switch circuit is open or shorted.	<Ref. to 6MT(diag)-73, DTC 32 CHECK PARKING BREAK SWITCH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
33	Stop light switch	Brake switch circuit is open or shorted.	<Ref. to 6MT(diag)-76, DTC 33 STOP LIGHT SWITCH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
37	Neutral position switch	Neutral position switch circuit is open or shorted.	<Ref. to 6MT(diag)-78, DTC 37 NEUTRAL POSITION SWITCH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

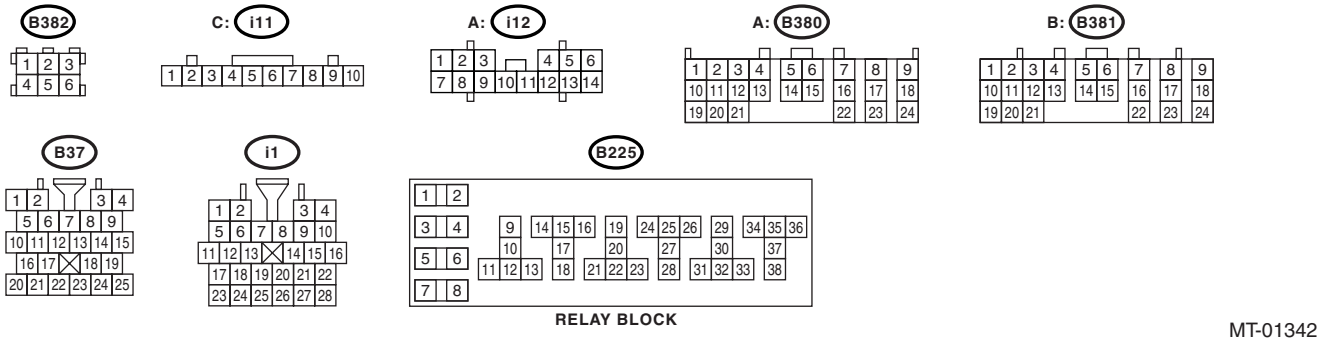
12.Diagnostic Procedure with Diagnostic Trouble Code (DTC)

A: DTC CANNOT BE CALLED UP

WIRING DIAGRAM:

- LHD model





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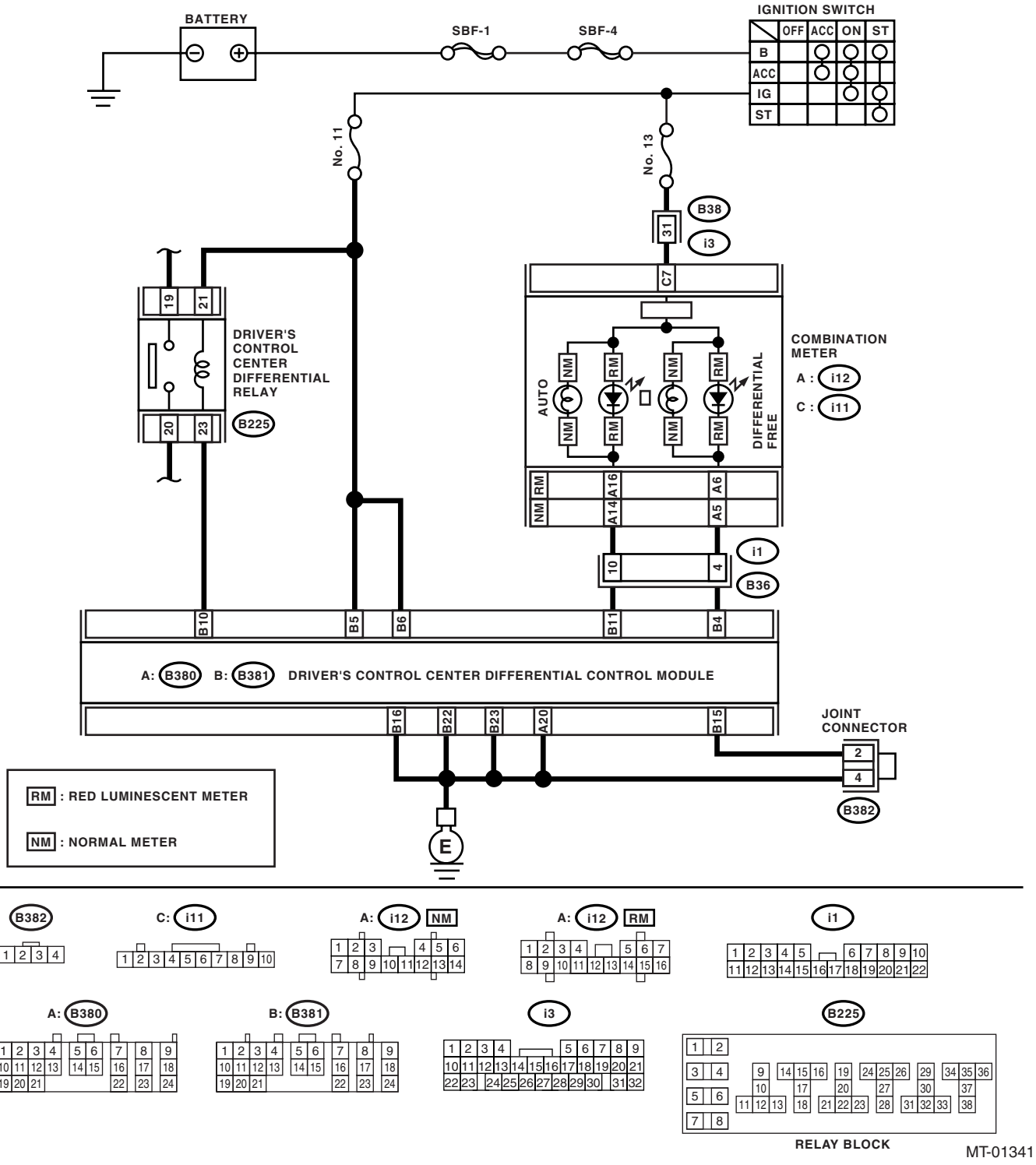
- RHD model



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	Step	Check	Yes	No
1	**CHECK THE AUTO INDICATOR LIGHT.** Turn the ignition switch to ON.	Does the AUTO indicator light illuminate?	Go to step **5.**	Go to step **2.**
2	**CHECK THE GROUND CIRCUIT OF DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from driver's control center differential control module. 3) Measure the resistance between driver's control center differential control module harness connector and chassis ground. ***Connector & terminal*** ***(B380) No. 20 — Chassis ground:*** ***(B381) No. 15 — Chassis ground:*** ***(B381) No. 16 — Chassis ground:*** ***(B381) No. 22 — Chassis ground:*** ***(B381) No. 23 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **3.**	Repair the open circuit of driver's control center differential control module ground circuit.
3	**CHECK FUSE (No. 11).** Remove the fuse (No. 11).	Is the fuse (No. 11) is blown out?	Replace fuse (No.11). If the replaced fuse (No.11) is blown out easily, repair short circuit in harness between fuse (No.11) and driver's control center differential control module.	Go to step **4.**
4	**CHECK IGNITION POWER SUPPLY CIRCUIT OF DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE.** 1) Turn the ignition switch to ON. (engine OFF) 2) Measure the voltage between driver's control center differential control module and chassis ground. ***Connector & terminal*** ***(B381) No. 5 (+) — Chassis ground (−):*** ***(B381) No. 6 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **5.**	Repair the open circuit in harness between fuse (No. 11) and driver's control center differential control module, or fuse (No. 11) and battery.
5	**CHECK MANUAL MODE SWITCH.** 1) Turn the ignition switch to OFF. 2) Connect all connectors. 3) Turn the ignition switch to ON. 4) Push the manual mode switch to enter the manual mode.	Is the manual mode obtained?	Go to step **6.**	Repair the switch. <Ref. to 6MT(diag)-68, DTC 31 MANUAL MODE SWITCH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
6	**CHECK DRIVER'S CONTROL CENTER DIFFERENTIAL INDICATOR LIGHT.** Operate the center differential control dial.	Does the center differential indicator light illuminate according to center differential control dial?	Go to step **8.**	Go to step **7.**
7	**CHECK THE CENTER DIFFERENTIAL CONTROL DIAL** <Ref. to 6MT(diag)-66, DTC 24 CHECK CENTER DIFFERENTIAL CONTROL DIAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Is the center differential control dial circuit normal?	Go to step **8.**	Repair it.

	Step	Check	Yes	No
8	**CHECK THE PARKING BRAKE SWITCH** <Ref. to 6MT(diag)-73, DTC 32 CHECK PARKING BREAK SWITCH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Is the parking brake switch circuit normal?	Go to step **9.**	Repair it.
9	**READ THE DTC.** Read the DTC. <Ref. to 6MT(diag)-23, OPERATION, Read Diagnostic Trouble Code (DTC).>	Is the DTC called up?	Go back to the Basic Diagnostic Procedure. <Ref. to 6MT(diag)-2, PROCEDURE, Basic Diagnostic Procedure.>	Go to step **10.**
10	**CHECK THE DRIVER'S CONTROL CENTER DIFFERENTIAL INDICATOR LIGHT.** 1) Turn the ignition switch to OFF. 2) Disconnect harness connector from combination meter. 3) Turn the ignition switch to ON. (engine OFF) 4) Short between the combination meter harness connector and chassis ground. ***Connector & terminal*** ***Normal meter*** ***(i12) No. 5 — Chassis ground:*** ***Red-luminescent meter*** ***(i12) No. 6 — Chassis ground:***	Does the lowest light of driver's control center differential indicator illuminate?	Go to step **13.**	Go to step **11.**
11	**CHECK SPECIFICATIONS.**	Is the meter red luminescent meter?	Check the combination meter.	Go to step **12.**
12	**CHECK BULB.** 1) Remove the combination meter. 2) Remove the bulb.	Is the bulb OK?	Check the combination meter and repair poor contact in harness between battery and combination meter or connector.	Replace the bulb.
13	**CHECK THE HARNESS BETWEEN COMBINATION METER AND DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE.** 1) Turn the ignition switch to OFF. 2) Disconnect the harness connector from driver's control center differential control module. 3) Measure the resistance of harness between combination meter harness connector and driver's control center differential control module harness connector. ***Connector & terminal*** ***Normal meter*** ***(i12) No. 5 — (B381) No. 4:*** ***Red-luminescent meter*** ***(i12) No. 6 — (B381) No. 4:***	Is the resistance less than 1 Ω?	Go to step **14.**	Repair the open circuit and connector of harness between combination meter harness connector and driver's control center differential control module harness connector.

	Step	Check	Yes	No
14	**CHECK THE HARNESS BETWEEN COMBINATION METER AND DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE.** Measure the resistance of harness between driver's control center differential control module harness connector and chassis ground. ***Connector & terminal*** ***(B381) No. 4 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **15.**	Repair the short of harness between combination meter harness connector and driver's control center differential control module harness connector.
15	**CHECK THE POOR CONTACT IN HARNESS CONNECTOR**	Is there any poor contact in harness connectors of each circuit?	Repair the poor contact.	Replace the driver's control center differential control module.

B: CHECK REAR DIFFERENTIAL OIL TEMPERATURE SWITCH

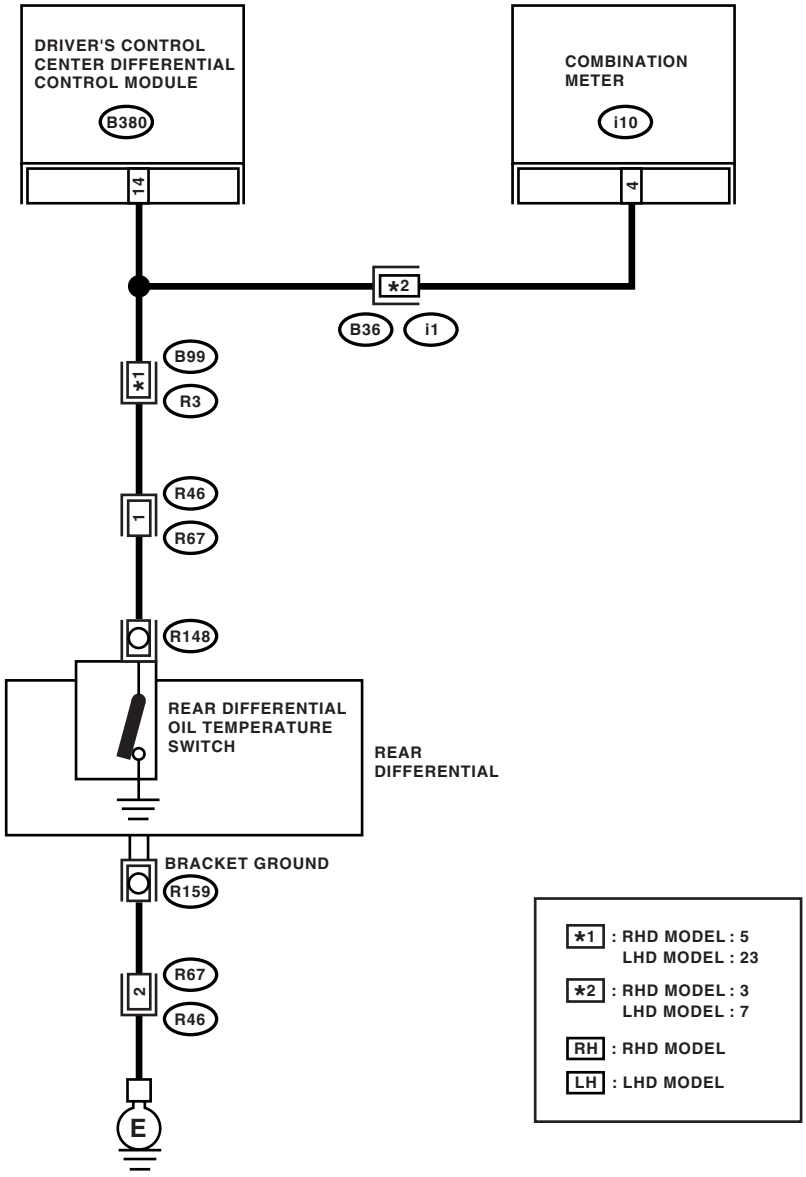
DIAGNOSIS:

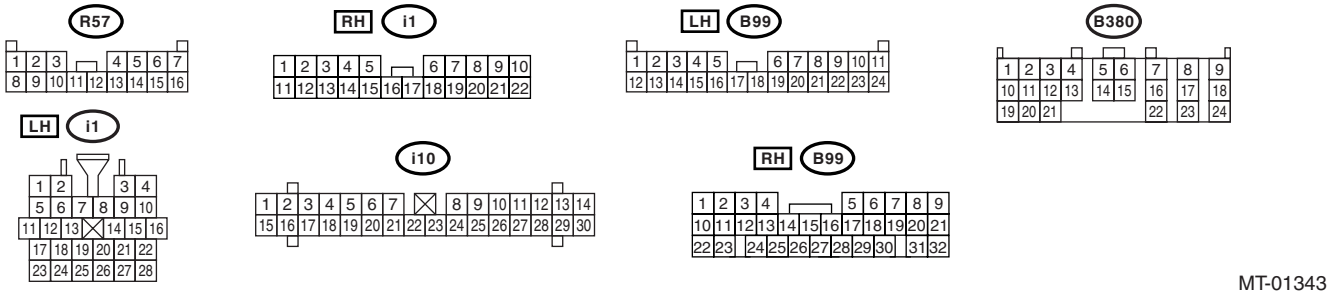
Input signal circuit of rear differential oil temperature switch is open or shorted.

TROUBLE SYMPTOM:

- Center differential stays free.
- Handling tends to oversteer.
- Rear differential oil temperature switch warning light illuminates.

WIRING DIAGRAM:





MT-01343

	Step	Check	Yes	No
1	**CHECK REAR DIFFERENTIAL OIL TEMPERATURE SWITCH WARNING LIGHT CIRCUIT.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector of driver's control center differential control module harness connector. 3) Turn the ignition switch to ON. (engine OFF) 4) Measure the voltage of rear differential oil temperature switch. ***Connector & terminal*** ***(B380) No. 14 (+) — Chassis ground (–):***	Is the voltage less than 0.4 V?	Go to step **7.**	Go to step **2.**
2	**CHECK THE HARNESS BETWEEN DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE AND COMBINATION METER.** 1) Turn the ignition switch to OFF. 2) Disconnect the harness connector from the combination meter. 3) Disconnect the connector from the rear differential oil temperature switch. 4) Measure the resistance between combination meter and driver's control center differential control module harness connector. ***Connector & terminal*** ***(B380) No. 14 — (i10) No. 4:***	Is the resistance less than 1 Ω?	Go to step **3.**	Repair the open circuit between driver's control center differential control module and combination meter.
3	**CHECK THE HARNESS BETWEEN DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE AND REAR DIFFERENTIAL OIL TEMPERATURE SWITCH.** Measure the resistance between driver's control center differential control module harness connector and rear differential oil temperature switch harness connector. ***Connector & terminal*** ***(B380) No. 14 — (R148) No. 1:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the open circuit between driver's control center differential control module and rear differential oil temperature switch.
4	**CHECK REAR DIFFERENTIAL OIL TEMPERATURE SWITCH GROUND CIRCUIT.** 1) Disconnect the harness connector from bracket ground of rear differential. 2) Measure the resistance between the rear differential oil temperature switch ground harness connector and chassis ground. ***Connector & terminals*** ***(R159) No. 1 — Chassis ground:***	Is the resistance more than 1 MΩ?	Repair the open circuit of rear differential oil temperature switch ground circuit and poor contact of harness connector.	Go to step **5.**
5	**CHECK REAR DIFFERENTIAL OIL TEMPERATURE SWITCH.** Measure the resistance between rear differential oil temperature switch terminal and rear differential oil temperature switch body. ***Terminals*** ***No. 1 — Rear differential oil temperature switch body:***	Is the resistance less than 1 Ω?	Go to step **6.**	Replace the rear differential oil temperature switch.
6	**CHECK REAR DIFFERENTIAL OIL TEMPERATURE SWITCH WARNING LIGHT.** 1) Turn the ignition switch to ON. 2) Short between the combination meter harness connector and chassis ground. ***Terminals*** ***(i10) No. 4 (+) — Chassis ground (–):***	Does the rear differential oil temperature switch warning light turn OFF?	Go to step **7.**	Replace the combination meter.

Step		Check	Yes	No
7	CHECK POOR CONTACT.	Is there any poor contact in the circuit of rear differential oil temperature switch?	Repair the poor contact.	Replace the driver's control center differential control module.

C: DTC P1700 THROTTLE POSITION SENSOR CIRCUIT MALFUNCTION

DIAGNOSIS:

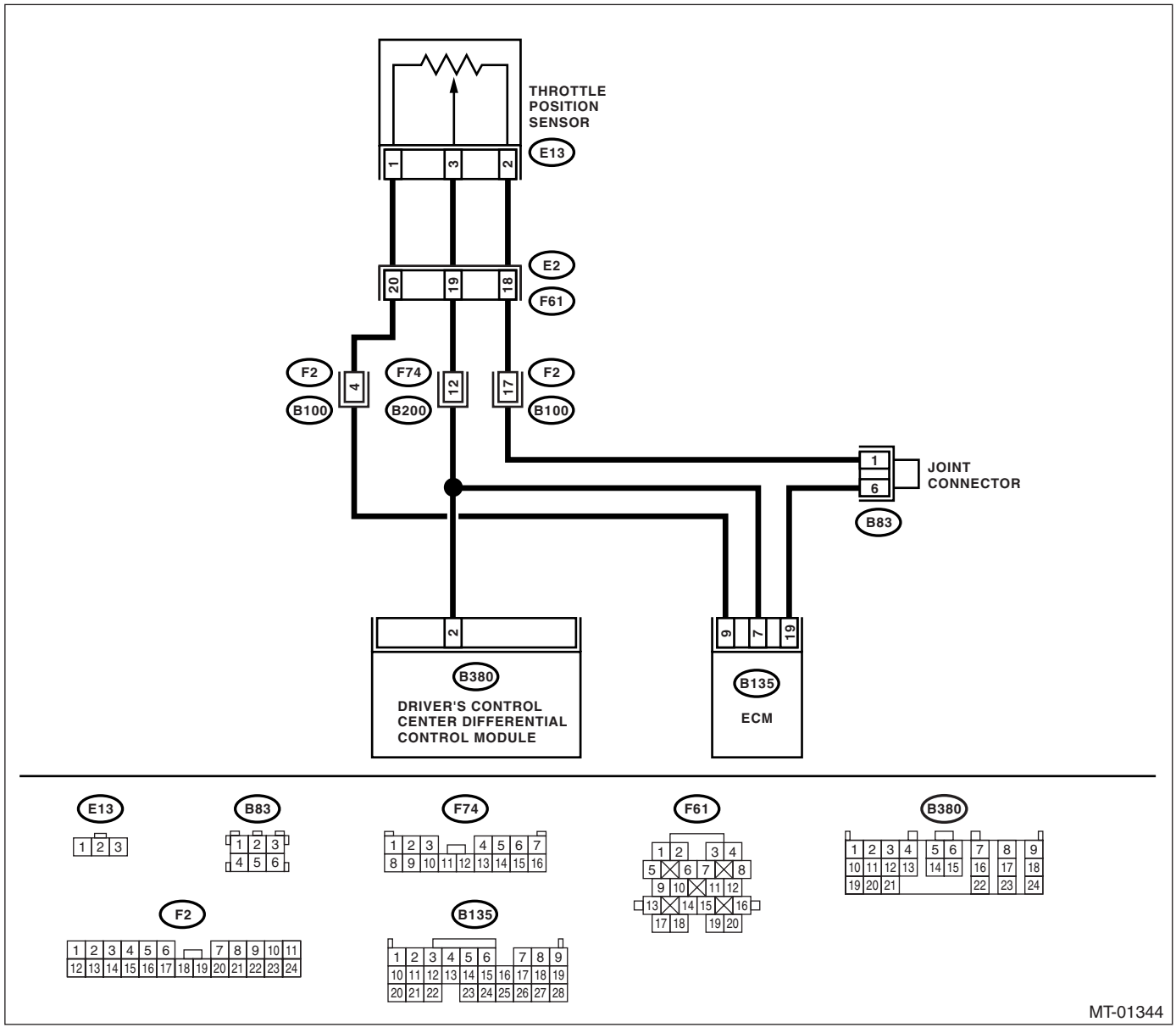
The throttle position sensor input signal circuit is open or shorted.

TROUBLE SYMPTOM:

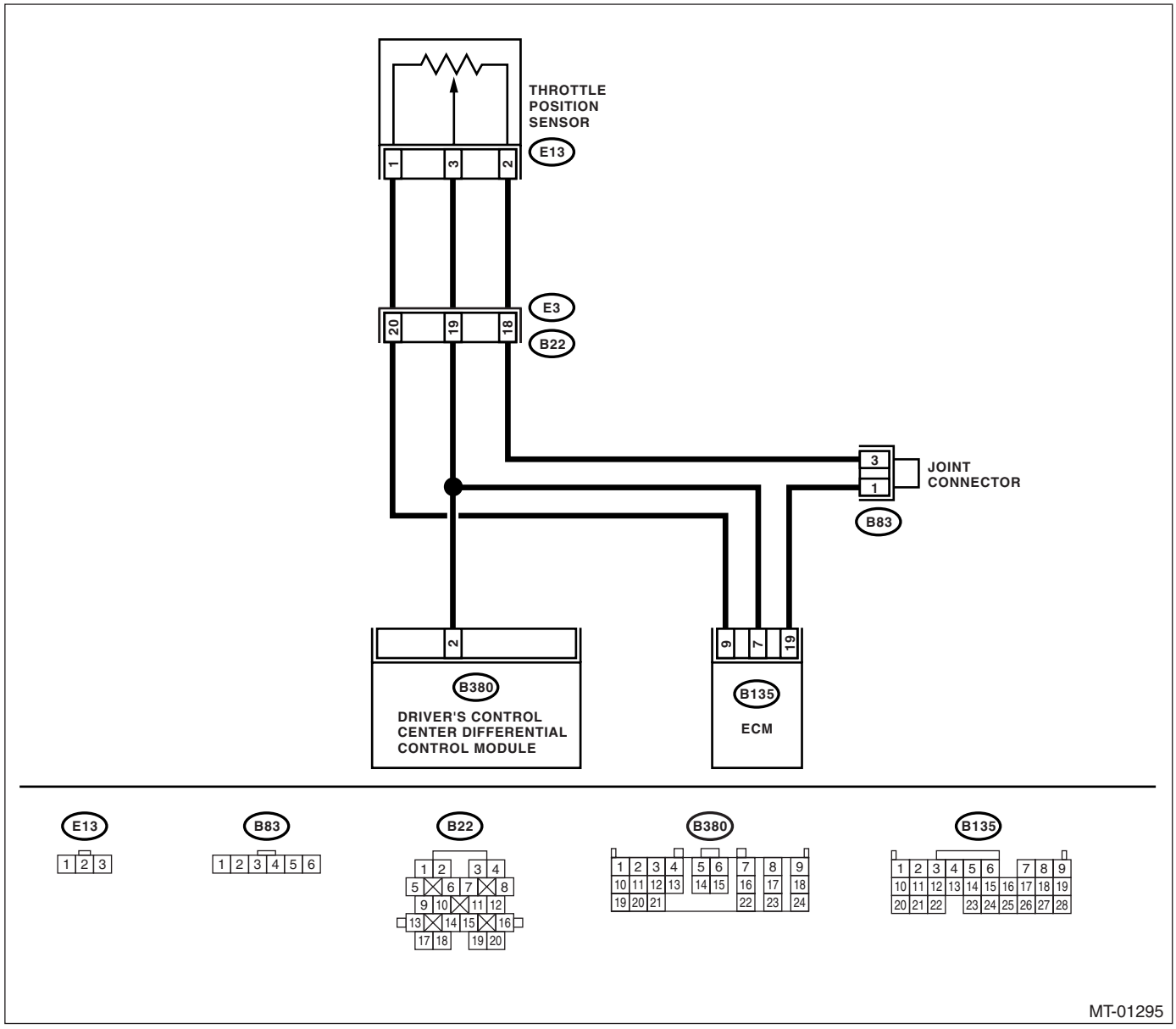
- Tight corner braking condition occurs.
- Handling tends to oversteer.

WIRING DIAGRAM:

- LHD model



- RHD model


THROTTLE POSITION SENSOR
E13
1
3
2
E3
B22
20
19
18
3
1
JOINT CONNECTOR
B83
2
9
7
19
B380
DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE
B135
ECM
E13
B83
B22
B380
B135
MT-01295

	Step	Check	Yes	No
1	**CHECK DTC.**	Is the DTC displayed on engine self diagnosis test mode?	Check with referring to DTC section of engine. <Ref. to EN(H4DOTC)(diag)-72, LIST, List of Diagnostic Trouble Code (DTC).>	Go to step **2.**
2	**CHECK THE HARNESS BETWEEN DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE AND THROTTLE POSITION SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the harness connector of driver's control center differential control module, ECM and throttle position sensor. 3) Measure the resistance of harness between driver's control center differential control module harness connector and throttle position sensor. ***Connector & terminal*** ***(E13) No. 3 — (B380) No. 2:***	Is the resistance less than 1 Ω?	Go to step **3.**	Repair the open circuit of harness between driver's control center differential control module and throttle position sensor.
3	**CHECK THE HARNESS BETWEEN DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE AND THROTTLE POSITION SENSOR.** Measure the resistance of harness between driver's control center differential control module harness connector and chassis ground. ***Connector & terminal*** ***(B380) No. 2 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **4.**	Repair the short circuit of harness between driver's control center differential control module and throttle position sensor and ECM.
4	**CHECK INPUT SIGNAL OF DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE.** 1) Connect all connectors. 2) Connect the Subaru Select Monitor to data link connector. 3) Turn the ignition switch to ON (engine OFF), and Subaru Select Monitor power switch to ON. 4) Read the data of throttle signal using Subaru Select Monitor. Check the measured value is within specification without depressing the accelerator pedal.	Is the data 0.4 — 0.8 V?	Go to step **5.**	Go to step **6.**
5	**CHECK INPUT SIGNAL OF DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE.** 1) Fully depress the accelerator pedal. 2) Read the data of throttle signal using Subaru Select Monitor. Check the measured value is within specification the accelerator pedal depressed.	Is the data 3.9 — 4.1 V?	Go to step **9.**	Go to step **6.**
6	**CHECK THROTTLE POSITION SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector of throttle position sensor. 3) Measure the resistance of throttle position sensor. ***Terminal*** ***No. 1 — No. 2:***	Is the resistance 3.0 k — 4.2 kΩ?	Go to step **7.**	Replace the throttle position sensor.

	Step	Check	Yes	No
7	**CHECK THROTTLE POSITION SENSOR.** Measure the resistance of throttle position sensor. ***Terminal*** ***No. 2 — No. 3:***	Is the resistance 0.35 k — 0.5 kΩ?	Go to step **8.**	Replace the throttle position sensor.
8	**CHECK THE POOR CONTACT.**	Is there any poor contact in throttle position sensor circuit?	Repair the poor contact.	Go to step **9.**
9	**CHECK DTC.** 1) Perform the “clear memory”. <Ref. to 6MT(diag)-26, Clear Memory Mode.> 2) Read the DTC using Subaru Select Monitor. <Ref. to 6MT(diag)-23, Read Diagnostic Trouble Code (DTC).>	Is the DTC P1700 displayed?	Replace the driver’s control center differential control module.	Go to step **10.**
10	**DETECTING CHECK FOR OTHER DTC**	Is there any DTC other than P1700 displayed?	Perform the diagnosis according to DTC.	Throttle position sensor circuit is in normal condition. Temporary poor contact occurs. Repair the harness or connector between driver’s control center differential control module, throttle position sensor and ECM.

D: DTC P1720 DCCD CAN SYSTEM CIRCUIT

DIAGNOSIS:

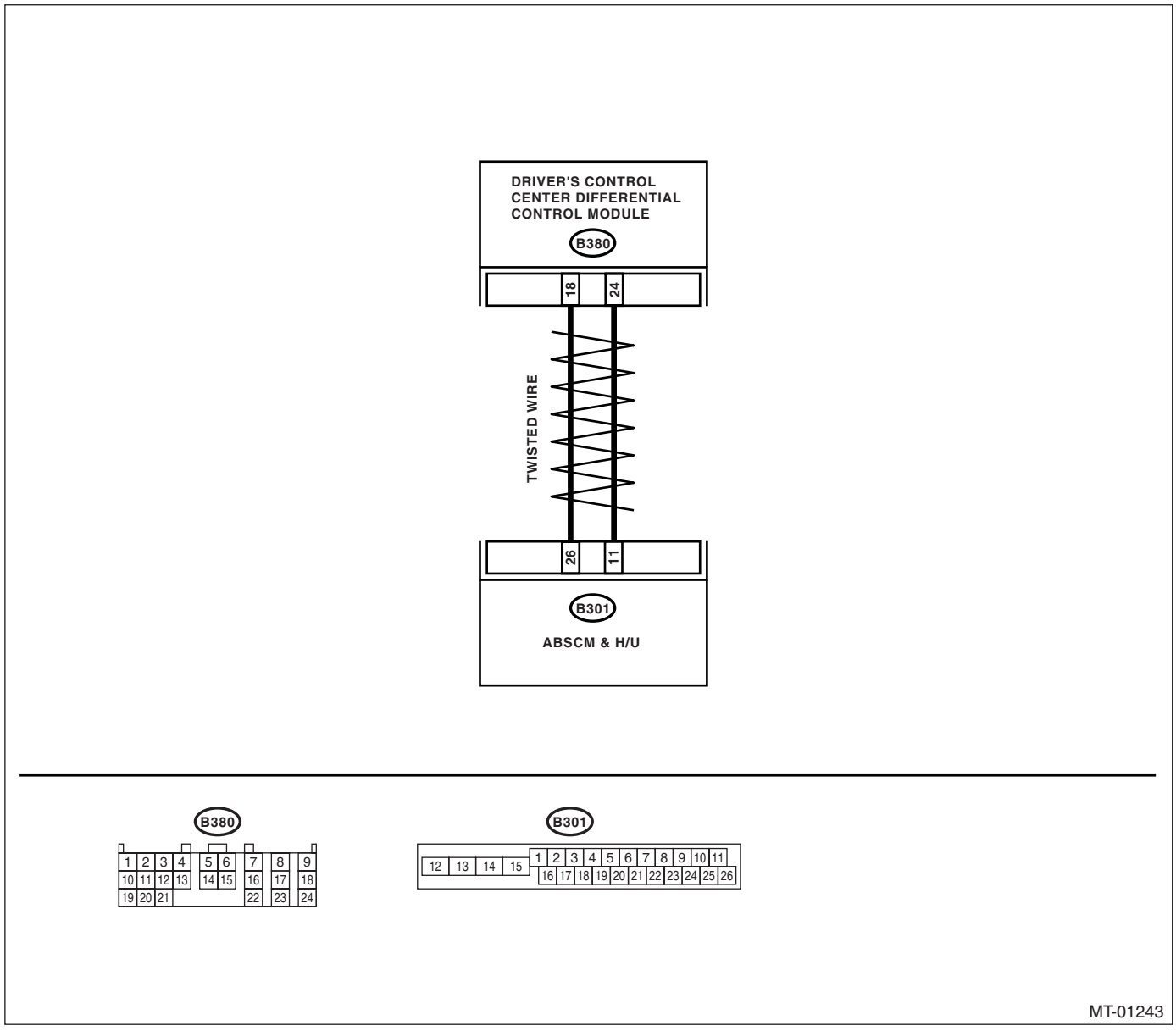
Open or short circuit in CAN communication circuit

TROUBLE SYMPTOM:

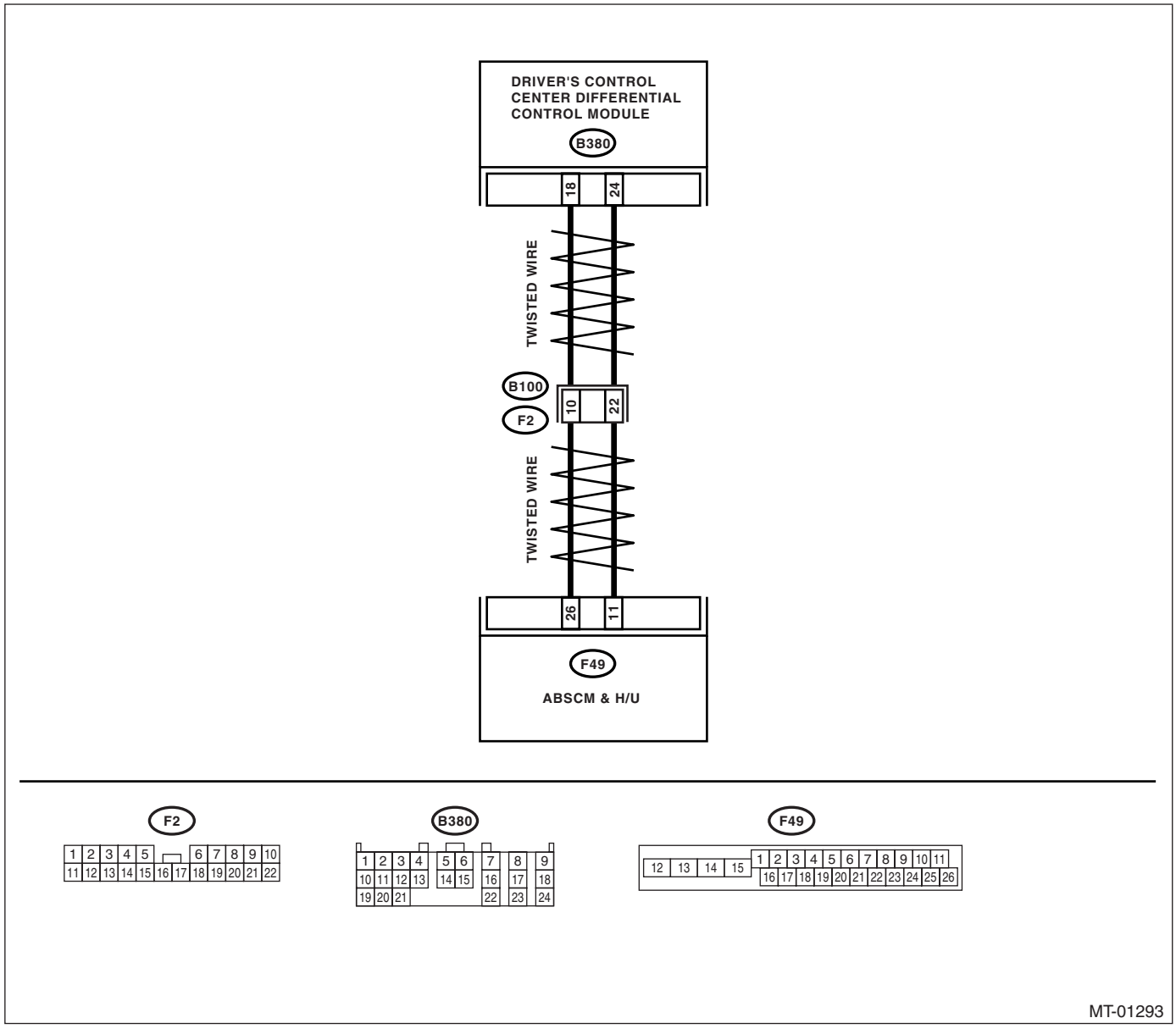
- Tight corner braking phenomenon is occurred.
- ABS does not operate.
- ABS warning light illuminates.

WIRING DIAGRAM:

- LHD model



- RHD model


DRIVER'S CONTROL
CENTER DIFFERENTIAL
CONTROL MODULE
B380
18
24
TWISTED WIRE
B100
F2
10
22
TWISTED WIRE
26
11
F49
ABSCM & H/U
F2
1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16 17 18 19 20 21 22
B380
1 2 3 4 5 6 7 8 9
10 11 12 13 14 15 16 17 18
19 20 21 22 23 24
F49
12 13 14 15 1 2 3 4 5 6 7 8 9 10 11
16 17 18 19 20 21 22 23 24 25 26
MT-01293

	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE AND ABSCM.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from driver's control center differential control module and ABSCM&H/U. 3) Measure the resistance of harness connector between driver's control center differential control module and ABSCM&H/U. ***Connector & terminal*** ***LHD model*** ***(B380) No. 18 — (B301) No. 26:*** ***(B380) No. 24 — (B301) No. 11:*** ***RHD model*** ***(B380) No. 18 — (F49) No. 26:*** ***(B380) No. 24 — (F49) No. 11:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the open circuit or poor contact in harness between driver's control center differential control module and ABSCM&H/U.
2	**CHECK HARNESS CONNECTOR BETWEEN DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE AND ABSCM.** Measure the resistance between driver's control center differential control module and chassis ground. ***Connector & terminal*** ***(B380) No. 18 — Chassis ground:*** ***(B380) No. 24 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **3.**	Repair the short circuit in harness between driver's control center differential control module and ABSCM&H/U.
3	**CHECK HARNESS CONNECTOR BETWEEN DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE AND ABSCM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between driver's control center differential control module connector and chassis ground. ***Connector & terminal*** ***(B380) No. 18 (+) — Chassis ground (−):*** ***(B380) No. 24 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **4.**	Repair the short circuit in harness between driver's control center differential control module and ABSCM&H/U.
4	**CHECK POOR CONTACT.**	Is there poor contact in CAN communication circuit?	Repair the poor contact.	Go to step **5.**
5	**CHECK ABSCM.** 1) Turn the ignition switch to OFF. 2) Connect all the connectors. 3) Clear DTCs. 4) Check DTC of ABSCM.	Is the DTC of CAN communication circuit displayed on Subaru Select Monitor?	Replace the driver's control center differential control module. <Ref. to 6MT-130, Driver's Control Center Differential Control Module.>	Check ABSCM.

E: DTC P1721 DCCD ENGINE RPM SIGNAL SYSTEM CIRCUIT

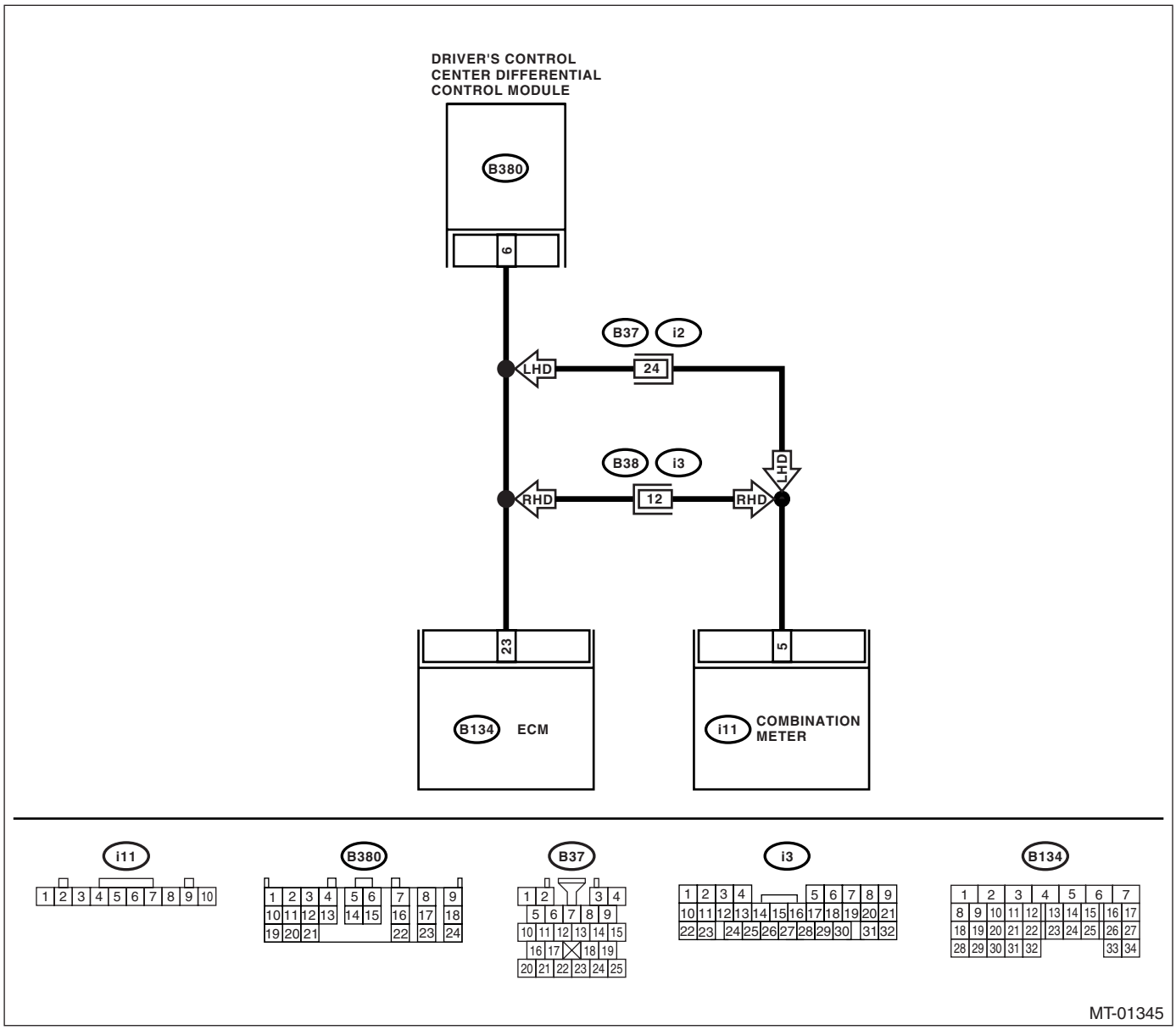
DIAGNOSIS:

Driver's control center differential open or short in engine speed output signal circuit

TROUBLE SYMPTOM:

The tendency of oversteer occurred when high speed cornering.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE AND ECM.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from driver's control center differential control module, Combination Meter and ECM. 3) Measure the resistance of harness connector between driver's control center differential control module and ECM. ***Connector & terminal*** ***(B380) No. 6 — (B134) No. 23:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the open circuit in harness between driver's control center differential control module and ECM.
2	**CHECK HARNESS CONNECTOR BETWEEN DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE AND ECM.** Measure the resistance between driver's control center differential control module and chassis ground. ***Connector & terminal*** ***(B380) No. 6 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **3.**	Repair the short circuit in harness between driver's control center differential control module, ECM and combination meter.
3	**CHECK HARNESS CONNECTOR BETWEEN DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE AND ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between driver's control center differential control module and chassis ground. ***Connector & terminal*** ***(B380) No. 6 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **4.**	Repair the short circuit in harness between driver's control center differential control module, ECM and combination meter.
4	**CHECK INPUT SIGNAL FOR DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE.** 1) Turn the ignition switch to OFF. 2) Connect all connectors. 3) Start the engine and let it idle.	Does the tachometer in the combination meter operate?	Go to step **5.**	Check ECM.
5	**CHECK INPUT SIGNAL FOR DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE.** 1) Turn the ignition switch to OFF. 2) Connect the Subaru Select Monitor to data link connector. 3) Start the engine and Subaru Select Monitor power switch to ON. 4) Idle the engine. 5) Read the data of engine speed using Subaru Select Monitor.	Is the revolution value about the same as tachometer reading shown in the combination meter?	Go to step **7.**	Go to step **6.**
6	**CHECK POOR CONTACT.**	Is there poor contact in engine speed signal circuit?	Repair the poor contact.	Go to step **7.**
7	**CHECK DTC.** Perform the inspection mode and read DTC.	Is the DTC 26 displayed?	Replace the driver's control center differential control module. <Ref. to 6MT-130, Driver's Control Center Differential Control Module.>	Go to step **8.**

Step		Check	Yes	No
8	**CHECK ANY OTHER DIAGNOSTIC TROUBLE CODES (DTCs) APPEARANCE.**	Is there any DTC other than DTC 26 displayed?	Rerform the diagnosis according to DTC	Even if the center differential indicator light (differential free position) blinks, the circuit is in normal condition. Temporary poor contact occurs. Repair the harness or connector between driver's control center differential control module, ECM and combination meter.

F: DTC P1759 LATERAL ACCELERATION SENSOR CIRCUIT

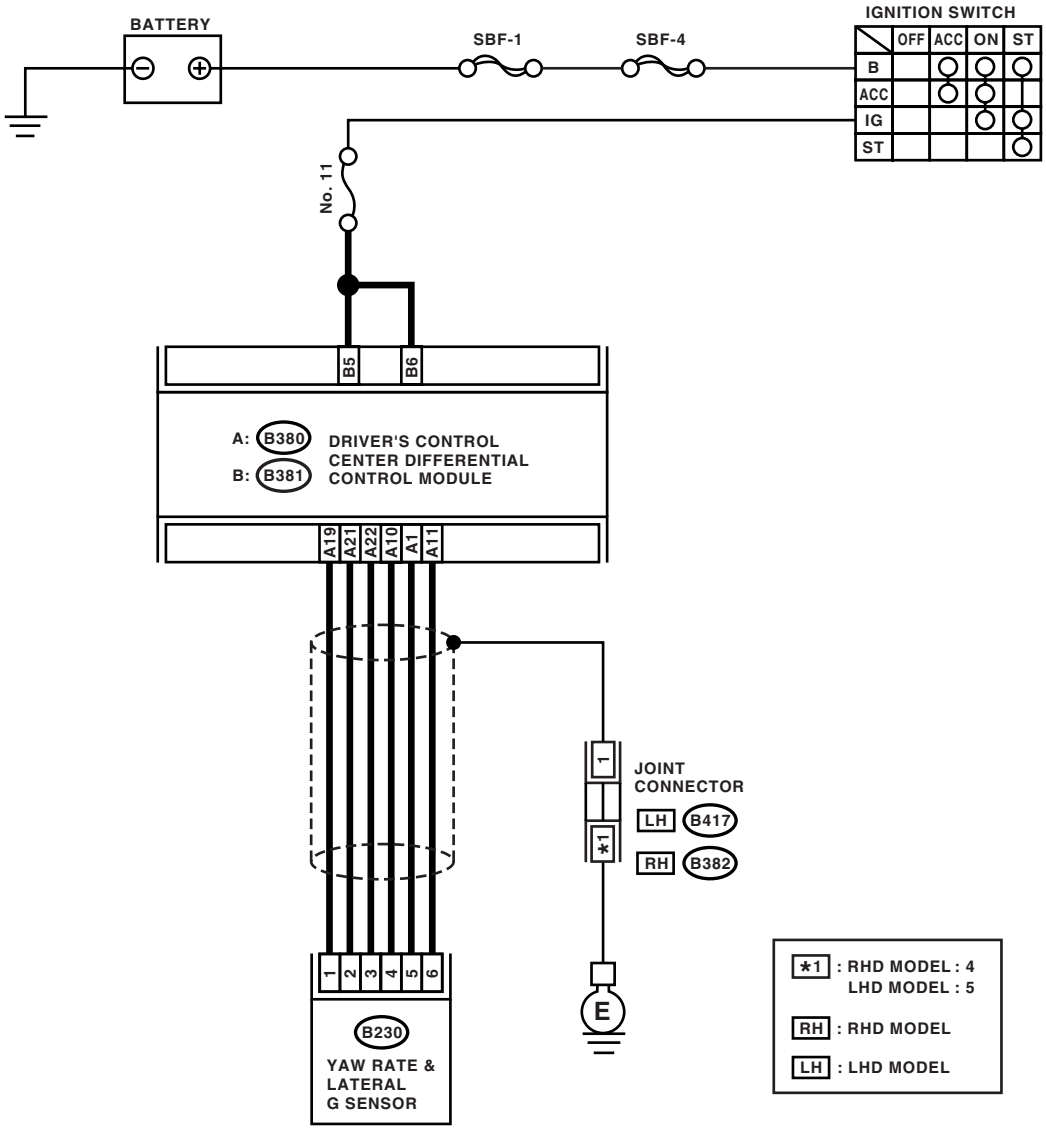
DIAGNOSIS:

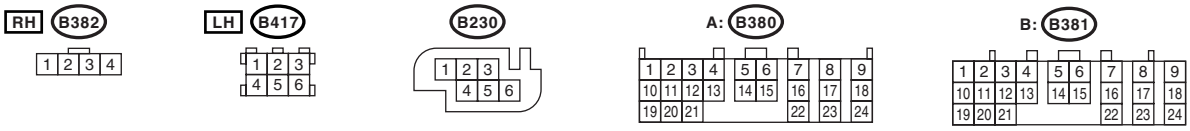
Open or short in lateral G sensor circuit

TROUBLE SYMPTOM:

The tendency of understeer occurred when high speed cornering.

WIRING DIAGRAM:





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	Step	Check	Yes	No
1	**CHECK YAW RATE & LATERAL G SENSOR VOLTAGE.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from yaw rate & lateral G sensor. 3) Turn the ignition switch to ON. (engine OFF) 4) Measure the voltage between yaw rate & lateral G sensor harness connector and Chassis ground. ***Connector & terminal*** ***(B230) No. 3 (+) — Chassis ground (–):***	Is the voltage more than 12 V?	Go to step **4.**	Go to step **2.**
2	**CHECK OUTPUT SIGNAL OF DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE.** Measure the voltage between driver's control center differential control module and chassis ground. ***Connector & terminal*** ***(B380) No. 22 (+) — Chassis ground (–):***	Is the voltage more than 12 V?	Repair the open circuit in harness between driver's control center differential control module and yaw rate & lateral G sensor.	Go to step **3.**
3	**CHECK DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE POWER SUPPLY VOLTAGE.** Measure the voltage between driver's control center differential control module harness connector and chassis ground. ***Connector & terminal*** ***(B381) No. 5 (+) — Chassis ground (–):*** ***(B381) No. 6 (+) — Chassis ground (–):***	Is the voltage more than 12 V?	Go to step **10.**	Check the harness connectors between driver's control center differential control module power supply circuit, battery and driver's control center differential control module, and replace or charge the battery.
4	**CHECK YAW RATE & LATERAL G SENSOR GROUND CIRCUIT.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from driver's control center differential control module. 3) Measure the resistance between driver's control center differential control module and yaw rate & lateral G sensor. ***Connector & terminal*** ***(B380) No. 11 — (B230) No. 6:***	Is the resistance less than 1 Ω?	Go to step **5.**	Repair the open circuit in harness between driver's control center differential control module and yaw rate & lateral G sensor.
5	**CHECK YAW RATE & LATERAL G SENSOR GROUND CIRCUIT.** Measure the resistance between driver's control center differential control module connector and Chassis ground. ***Connector & terminal*** ***(B380) No. 11 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **6.**	Repair the short circuit in harness between driver's control center differential control module and yaw rate & lateral G sensor.
6	**CHECK HARNESS CONNECTOR BETWEEN DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE AND YAW RATE & LATERAL G SENSOR.** Measure the resistance between driver's control center differential control module and yaw rate & lateral G sensor. ***Connector & terminal*** ***(B380) No. 1 — (B230) No. 5:***	Is the resistance less than 1 Ω?	Go to step **7.**	Repair the open circuit in harness between driver's control center differential control module and yaw rate & lateral G sensor.

	Step	Check	Yes	No
7	**CHECK HARNESS CONNECTOR BETWEEN DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE AND YAW RATE & LATERAL G SENSOR.** Measure the resistance between driver's control center differential control module harness connector and Chassis ground. ***Connector & terminal*** ***(B380) No. 1 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **8.**	Repair the short circuit in harness between driver's control center differential control module and yaw rate & lateral G sensor.
8	**CHECK LATERAL G SENSOR.** 1) Turn the ignition switch to OFF. 2) Connect all the connectors. 3) Connect the Subaru Select Monitor to data link connector. 4) Turn the ignition switch to ON, and Subaru Select Monitor power switch to ON. 5) Read the data of "Lateral G sensor" using Subaru Select Monitor. <Ref. to 6MT(diag)-18, READ CURRENT DATA, OPERATION, Subaru Select Monitor.>	Is the data 2.35 — 2.65 V?	Go to step **11.**	Go to step **9.**
9	**CHECK LATERAL G SENSOR.** Measure the voltage yaw rate & lateral G sensor connector. ***Connector & terminal*** ***(B230) No. 5 (+) — (B230) No. 6 (–):***	Is the voltage 2.35 — 2.65 V?	Go to step **10.**	Replace the yaw rate & lateral G sensor.
10	**CHECK POOR CONTACT.**	Is there poor contact in lateral G sensor circuit?	Repair the poor contact.	Go to step **11.**
11	**CHECK DTC.** 1) Perform the "clear memory". <Ref. to 6MT(diag)-26, Clear Memory Mode.> 2) Start the engine. 3) Read the DTC using Subaru Select Monitor. <Ref. to 6MT(diag)-23, Read Diagnostic Trouble Code (DTC).>	Is the DTC P1759 displayed?	Replace the driver's control center differential control module.	Go to step **12.**
12	**CHECK FOR OTHER DTC ON DISPLAY.**	Is there any DTC other than P1759 displayed?	Perform the diagnosis according to DTC.	Lateral G sensor circuit is in normal condition. Temporary poor contact occurs. Repair the harness or connector between driver's control center differential control module and yaw rate & lateral G sensor.

G: DTC P1764 YAW RATE SENSOR SYSTEM CIRCUIT

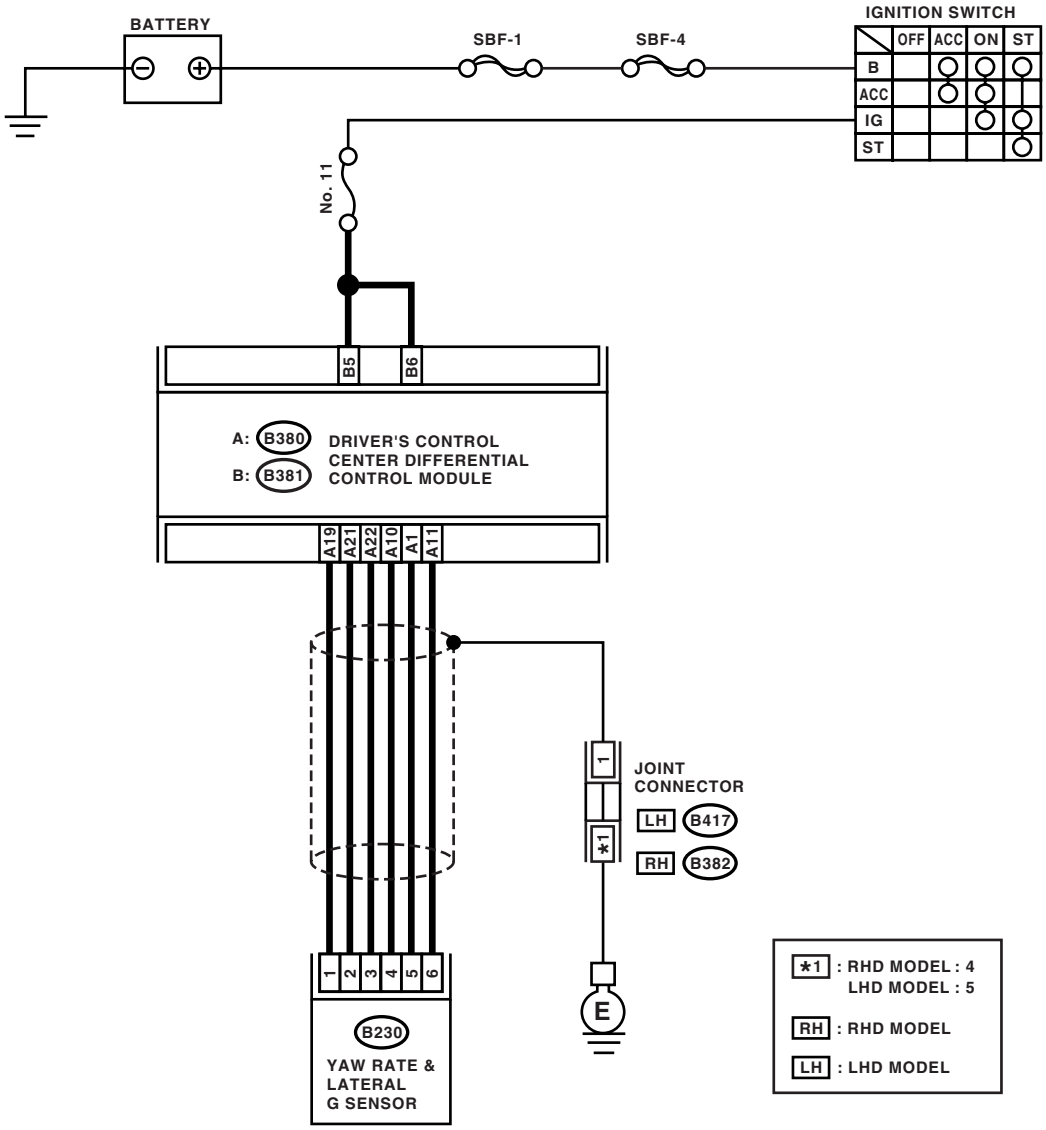
DIAGNOSIS:

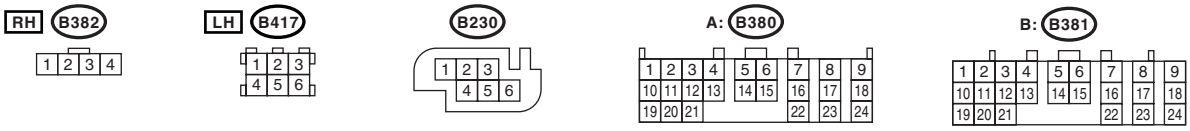
Open or short in yaw rate sensor circuit

TROUBLE SYMPTOM:

The tendency of understeer occurred when high speed cornering.

WIRING DIAGRAM:





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	Step	Check	Yes	No
1	**CHECK YAW RATE & LATERAL G SENSOR POWER SUPPLY.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from yaw rate & lateral G sensor. 3) Turn the ignition switch to ON. (engine OFF) 4) Measure the voltage between yaw rate & lateral G sensor and chassis ground. ***Connector & terminal*** ***(B230) No. 3 (+) — Chassis ground (–):***	Is the voltage more than 12 V?	Go to step **4.**	Go to step **2.**
2	**CHECK DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE POWER SUPPLY OUTPUT.** Measure the voltage between driver's control center differential control module and chassis ground. ***Connector & terminal*** ***(B380) No. 22 (+) — Chassis ground (–):***	Is the voltage more than 12 V?	Repair the open circuit in harness between driver's control center differential control module and yaw rate & lateral G sensor.	Go to step **3.**
3	**CHECK DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE POWER SUPPLY VOLTAGE.** Measure the voltage between driver's control center differential control module harness connector and chassis ground. ***Connector & terminal*** ***(B381) No. 5 (+) — Chassis ground (–):*** ***(B381) No. 6 (+) — Chassis ground (–):***	Is the voltage more than 12 V?	Go to step **11.**	Check the harness connectors between driver's control center differential control module power supply circuit, battery and driver's control center differential control module, and replace or charge the battery.
4	**CHECK YAW RATE & LATERAL G SENSOR GROUND CIRCUIT.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from driver's control center differential control module. 3) Measure the resistance between driver's control center differential control module and yaw rate & lateral G sensor. ***Connector & terminal*** ***(B380) No. 11 — (B230) No. 6:***	Is the resistance less than 1 Ω?	Go to step **5.**	Repair the open circuit in harness between driver's control center differential control module and yaw rate & lateral G sensor.
5	**CHECK YAW RATE & LATERAL G SENSOR GROUND CIRCUIT.** Measure the resistance between driver's control center differential control module and chassis ground. ***Connector & terminal*** ***(B380) No. 11 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **6.**	Repair the short circuit in harness between driver's control center differential control module and yaw rate & lateral G sensor.
6	**CHECK DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE AND YAW RATE & LATERAL G SENSOR GROUND CIRCUIT.** Measure the resistance between driver's control center differential control module and yaw rate & lateral G sensor. ***Connector & terminal*** ***(B380) No. 10 — (B230) No. 4:***	Is the resistance less than 1 Ω?	Go to step **7.**	Repair the open circuit in harness between driver's control center differential control module and yaw rate & lateral G sensor.

	Step	Check	Yes	No
7	**CHECK DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE AND YAW RATE & LATERAL G SENSOR GROUND CIRCUIT.** Measure the resistance between driver's control center differential control module and chassis ground. ***Connector & terminal*** ***(B380) No. 10 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **8.**	Repair the short circuit in harness between driver's control center differential control module and yaw rate & lateral G sensor.
8	**CHECK INPUT SIGNAL FOR DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE.** 1) Connect all the connectors. 2) Connect the Subaru Select Monitor to vehicle. 3) Turn the ignition switch to ON. 4) Subaru Select Monitor power switch to ON. 5) Read the data of "Yaw rate sensor voltage" using Subaru Select Monitor. <Ref. to 6MT(diag)-17, OPERATION, Subaru Select Monitor.>	Is the voltage of 2.0 V ←→2.5 V ←→ 3.0 V displayed?	Go to step **12.**	Go to step **9.**
9	**CHECK OUTPUT SIGNAL OF DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE.** 1) Turn the ignition switch to OFF. 2) Check the oscilloscope signal pattern between driver's control center differential control module connector terminals. ***Connector & terminal*** ***Positive lead: (B380) No. 21*** ***Ground lead: (B380) No. 11*** 3) Turn the ignition switch to ON.	Is the oscilloscope pattern the same waveform as shown in the figure? <Ref. to 6MT(diag)-16, WAVEFORM, MEASUREMENT, Driver's Control Center Differential Control Module I/O Signal.>	Go to step **10.**	Replace the driver's control center differential control module.
10	**CHECK OUTPUT SIGNAL OF YAW RATE & LATERAL G SENSOR.** 1) Turn the ignition switch to OFF. 2) Check the oscilloscope signal pattern between driver's control center differential control module connector terminals. ***Connector & terminal*** ***Positive lead: (B380) No. 10*** ***Ground lead: (B380) No. 11*** 3) Turn the ignition switch to ON.	Is the oscilloscope pattern the same waveform as shown in the figure? <Ref. to 6MT(diag)-16, WAVEFORM, MEASUREMENT, Driver's Control Center Differential Control Module I/O Signal.>	Go to step **11.**	Replace the yaw rate & lateral G sensor.
11	**CHECK POOR CONTACT.**	Is there poor contact in yaw rate sensor circuit?	Repair the poor contact.	Go to step **12.**
12	**CHECK DTC.** 1) Perform the "clear memory". <Ref. to 6MT(diag)-26, Clear Memory Mode.> 2) Start the engine. 3) Read the DTC using Subaru Select Monitor. <Ref. to 6MT(diag)-23, Read Diagnostic Trouble Code (DTC).>	Is the DTC P1764 displayed?	Replace the driver's control center differential control module.	Go to step **13.**

Step		Check	Yes	No
13	DETECTING CHECK FOR OTHER DTC.	Is there any DTC other than P1764 displayed?	Perform the diagnosis according to DTC.	Yaw rate sensor circuit is in normal condition. Temporary poor contact occurs. Repair the harness or connector between driver's control center differential control module and yaw rate & lateral G sensor.

H: DTC P1765 YAW RATE SIDE G SENSOR REFERENCE SYSTEM CIRCUIT

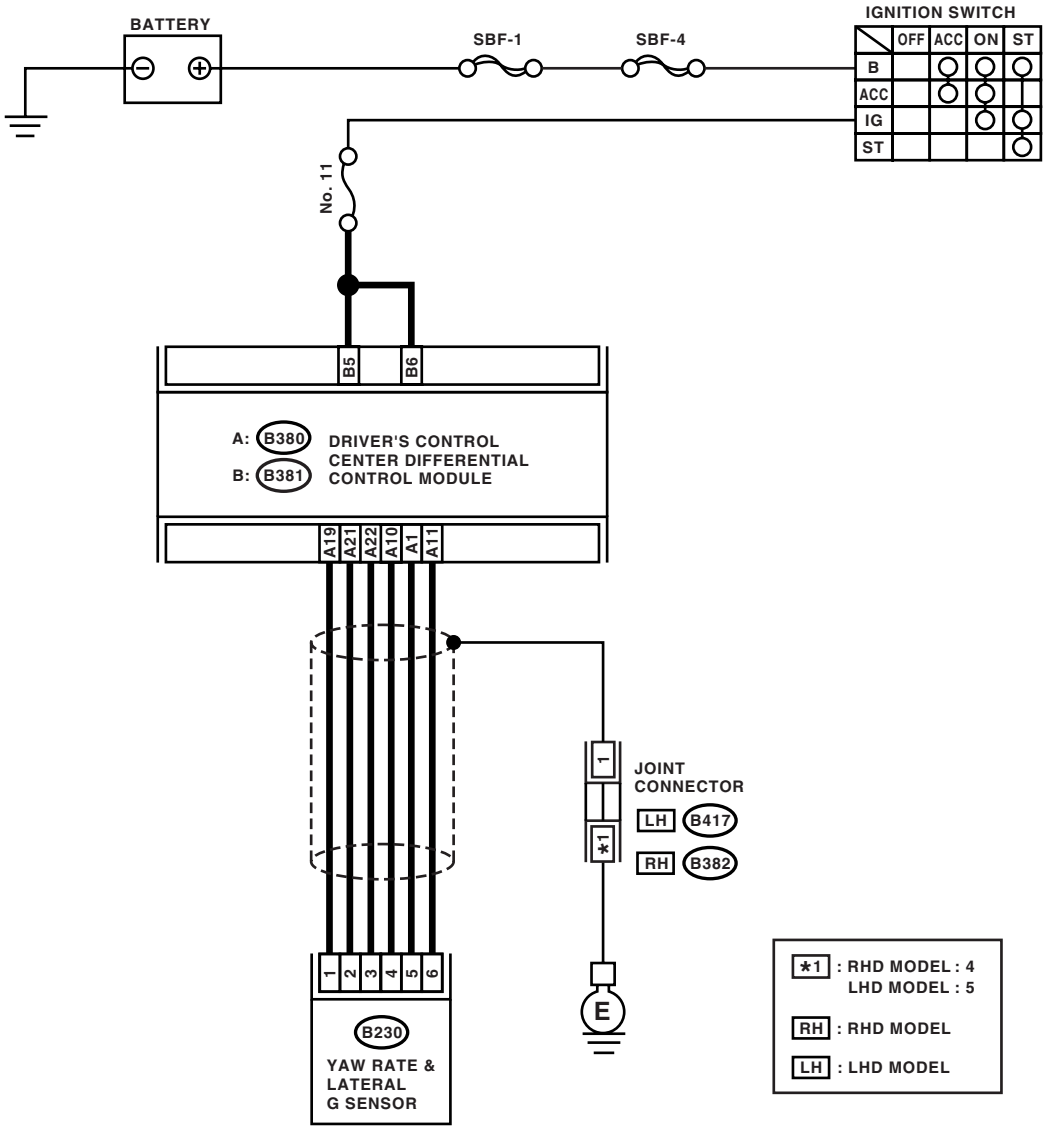
DIAGNOSIS:

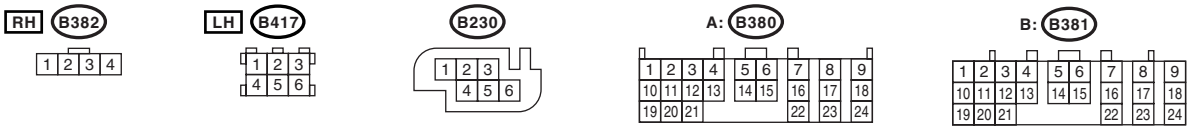
Open or short in yaw rate & lateral G sensor reference circuit

TROUBLE SYMPTOM:

The tendency of understeer occurred when high speed cornering.

WIRING DIAGRAM:





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	Step	Check	Yes	No
1	**CHECK YAW RATE & LATERAL G SENSOR VOLTAGE.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from yaw rate & lateral G sensor. 3) Turn the ignition switch to ON. (engine OFF) 4) Measure the voltage between yaw rate & lateral G sensor harness connector and chassis ground. ***Connector & terminal*** ***(B230) No. 3 (+) — Chassis ground (–):***	Is the voltage more than 12 V?	Go to step **4.**	Go to step **2.**
2	**CHECK DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE VOLTAGE.** Measure the voltage between driver's control center differential control module harness connector and chassis ground. ***Connector & terminal*** ***(B380) No. 22 (+) — Chassis ground (–):***	Is the voltage more than 12 V?	Repair the open circuit in harness between driver's control center differential control module and yaw rate & lateral G sensor.	Go to step **3.**
3	**CHECK DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE POWER SUPPLY VOLTAGE.** Measure the voltage between driver's control center differential control module harness connector and chassis ground. ***Connector & terminal*** ***(B381) No. 5 (+) — Chassis ground (–):*** ***(B381) No. 6 (+) — Chassis ground (–):***	Is the voltage more than 12 V?	Go to step **10.**	Check the harness connectors between driver's control center differential control module power supply circuit, battery and driver's control center differential control module, and replace or charge the battery.
4	**CHECK YAW RATE & LATERAL G SENSOR GROUND CIRCUIT.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from driver's control center differential control module. 3) Measure the resistance between driver's control center differential control module harness connector and yaw rate & lateral G sensor. ***Connector & terminal*** ***(B380) No. 11 — (B230) No. 6:***	Is the resistance less than 1 Ω?	Go to step **5.**	Repair the open circuit in harness between driver's control center differential control module and yaw rate & lateral G sensor.
5	**CHECK YAW RATE & LATERAL G SENSOR GROUND CIRCUIT.** Measure the resistance between driver's control center differential control module harness connector and Chassis groundn. ***Connector & terminal*** ***(B380) No. 11 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **6.**	Repair the short circuit in harness between driver's control center differential control module and yaw rate & lateral G sensor.

	Step	Check	Yes	No
6	**CHECK HARNESS CONNECTOR BETWEEN DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE AND YAW RATE & LATERAL G SENSOR.** Measure the resistance between driver's control center differential control module harness connector and yaw rate & lateral G sensor. ***Connector & terminal*** ***(B380) No. 19 — (B230) No. 1:***	Is the resistance less than 1 Ω?	Go to step **7.**	Repair the open circuit in harness between driver's control center differential control module and yaw rate & lateral G sensor.
7	**CHECK HARNESS CONNECTOR BETWEEN DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE AND YAW RATE & LATERAL G SENSOR.** Measure the resistance between driver's control center differential control module harness connector and Chassis ground. ***Connector & terminal*** ***(B380) No. 19 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **8.**	Repair the short circuit in harness between driver's control center differential control module and yaw rate & lateral G sensor.
8	**CHECK LATERAL G SENSOR.** 1) Turn the ignition switch to OFF. 2) Connect all the connectors. 3) Connect the Subaru Select Monitor to data link connector. 4) Turn the ignition switch to ON, and Subaru Select Monitor power switch to ON. Read the data of "Yaw rate & G sensor ref. V" using Subaru Select Monitor. <Ref. to 6MT(diag)-18, READ CURRENT DATA, OPERATION, Subaru Select Monitor.>	Is the data 2.1 — 2.9 V?	Go to step **11.**	Go to step **9.**
9	**CHECK YAW RATE & LATERAL G SENSOR.** Measure the driver's control center differential control module harness connector voltage. ***Connector & terminal*** ***(B380) No. 19 (+) — No. 20 (−):***	Is the voltage 2.1 — 2.9 V?	Go to step **10.**	Replace the yaw rate & lateral G sensor.
10	**CHECK POOR CONTACT.**	Is there poor contact in yaw rate & lateral G sensor reference circuit?	Repair the poor contact.	Go to step **11.**
11	**CHECK DTC.** 1) Perform the "clear memory". <Ref. to 6MT(diag)-26, Clear Memory Mode.> 2) Start the engine. 3) Read the DTC using Subaru Select Monitor. <Ref. to 6MT(diag)-23, Read Diagnostic Trouble Code (DTC).>	Is the DTC P1765 displayed?	Replace the driver's control center differential control module.	Go to step **12.**
12	**DETECTING CHECK FOR OTHER DTC.**	Is there any DTC other than P1765 displayed?	Perform the diagnosis according to DTC.	Lateral G sensor circuit is in normal condition. Temporary poor contact occurs. Repair the harness or connector between driver's control center differential control module and yaw rate & lateral G sensor.

I: DTC P1875 CIRCUIT OF CENTER DIFF.

DIAGNOSIS:

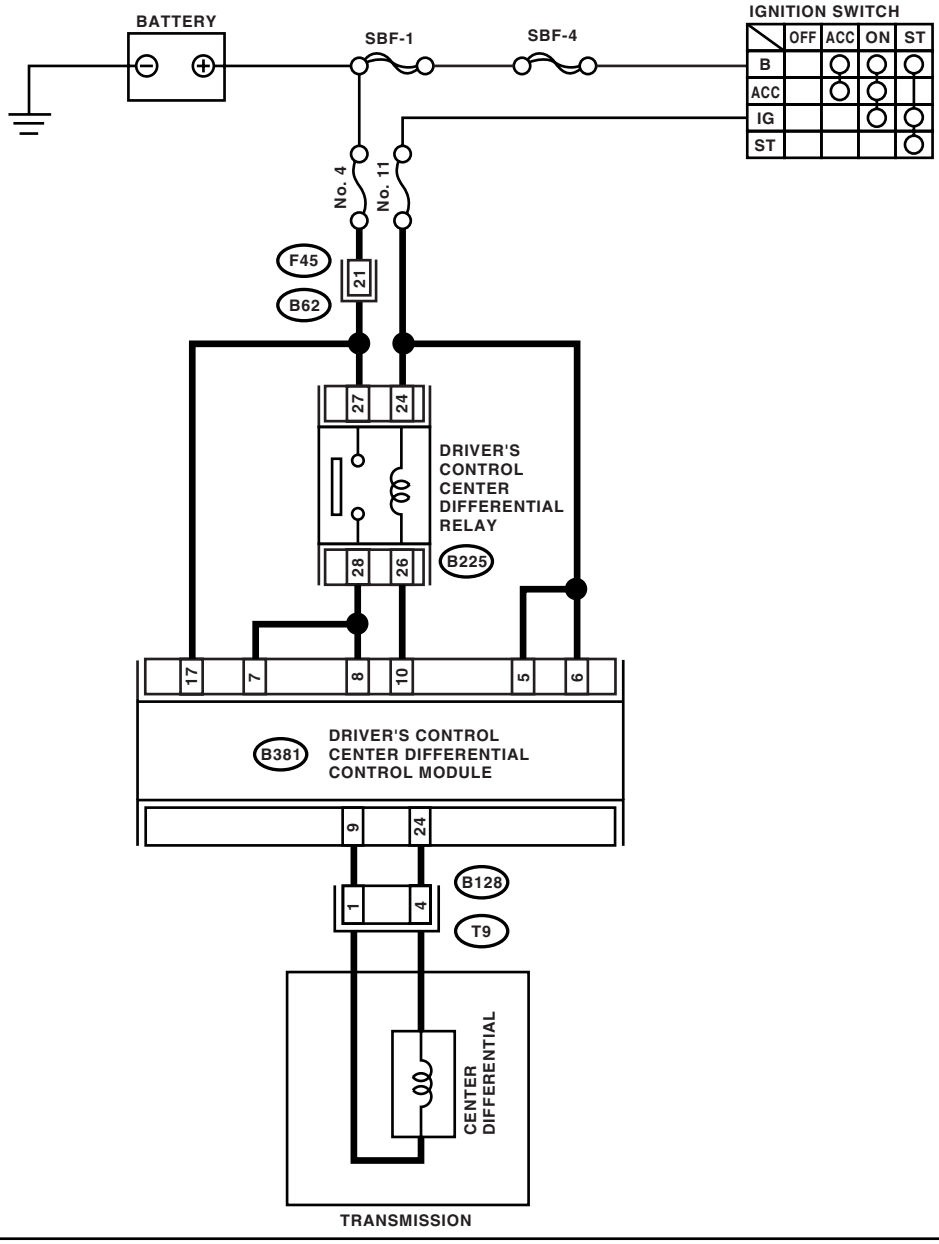
Output signal circuit of center differential is open or shorted.

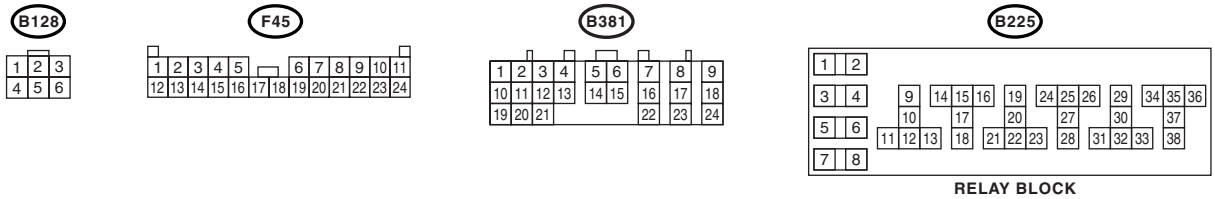
TROUBLE SYMPTOM:

- Center differential does not operate.
- Lock ratio of center differential does not variation, or malfunction occurs.
- Tight corner braking condition occurs.
- Handling tends to oversteer.
- The tendency of understeer occurred when high speed cornering.

WIRING DIAGRAM:

- LHD model





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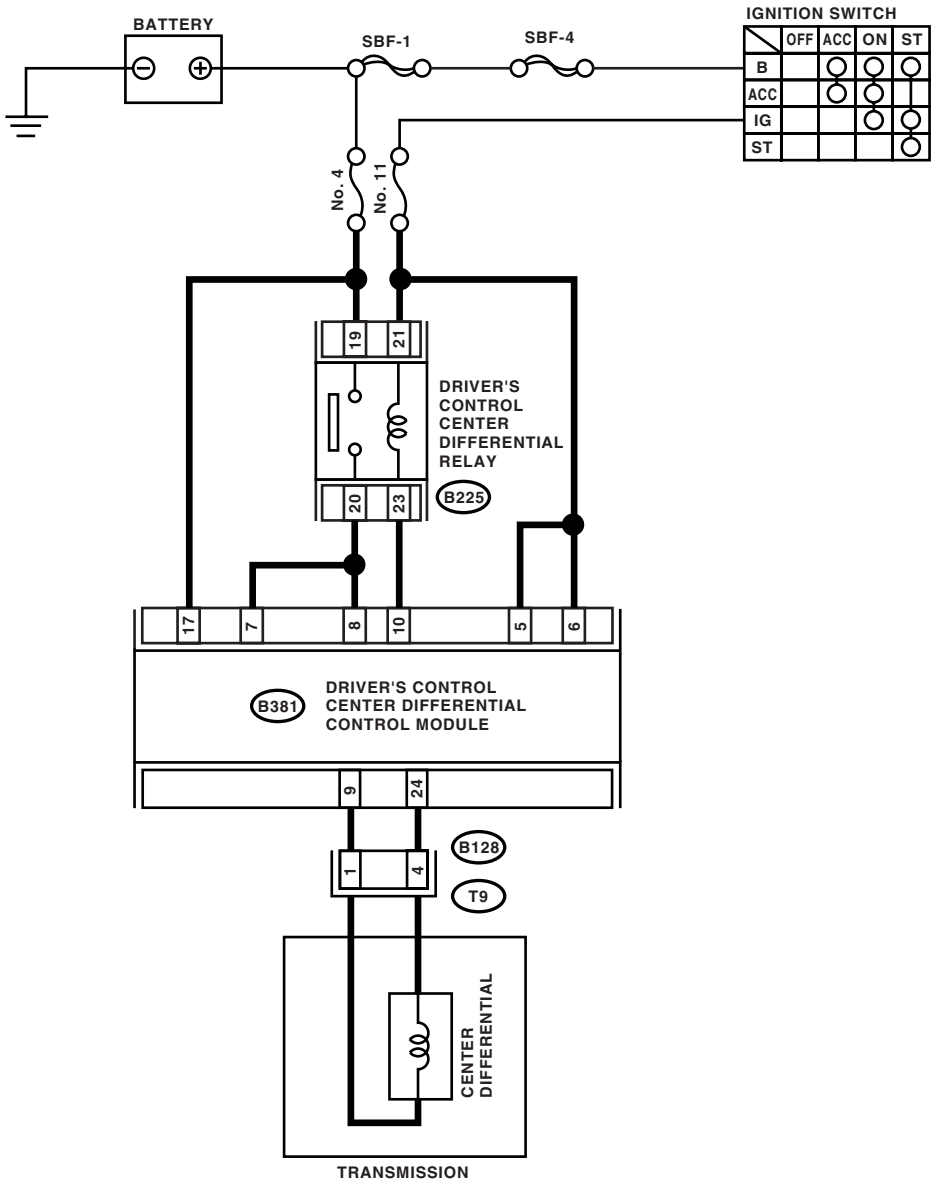
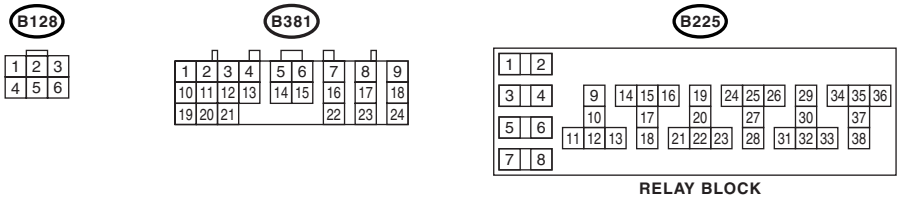
- RHD model





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	Step	Check	Yes	No
1	**CHECK THE HARNESS BETWEEN DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE AND TRANSMISSION HARNESS.** 1) Turn the ignition switch to OFF. 2) Disconnect the harness connector of driver's control center differential control module. 3) Disconnect the transmission harness connector and bulk harness connector. 4) Measure the resistance of harness between driver's control center differential control module harness connector and transmission harness connector. ***Connector & terminal*** ***(B381) No. 9 — (B128) No. 1:*** ***(B381) No. 24 — (B128) No. 4:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the open circuit of bulk harness between driver's control center differential control module and transmission harness.
2	**CHECK THE HARNESS BETWEEN DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE AND TRANSMISSION HARNESS.** Measure the resistance between driver's control center differential control module harness connector and chassis ground. ***Connector & terminal*** ***(B381) No. 9 — Chassis ground:*** ***(B381) No. 24 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **3.**	Repair the short circuit of bulk harness between driver's control center differential control module and transmission harness.
3	**CHECK THE CENTER DIFFERENTIAL.** Measure the resistance between transmission harness connector terminals. ***Connector & terminals*** ***(T9) No. 1 — No. 4:***	Is the resistance 1.0 — 2.0 Ω?	Go to step **4.**	Replace the center differential.
4	**CHECK THE OUTPUT SIGNAL OF DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE.** 1) Connect all the harness connectors. 2) Turn the ignition switch to ON. (engine OFF) 3) Release the parking brake. 4) Set the driver's control center differential to manual mode by pressing manual mode switch. 5) Set the center differential control dial to differential lock. 6) Measure the voltage between driver's control center differential control module and harness connector. ***Connector & terminal*** ***(B381) No. 9 (+) — (B381) No. 24 (–):***	Is the voltage 6.0 — 7.0 V?	Go to step **5.**	Go to step **6.**

	Step	Check	Yes	No
5	**CHECK THE OUTPUT SIGNAL OF DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE.** 1) Turn the center differential control dial from differential lock to differential free position. 2) Measure the voltage between driver's control center differential control module and harness connector. ***Connector & terminal*** ***(B381) No. 9 (+) — (B381) No. 24 (–):***	Does the voltage change smoothly?	Circuit is already returned to normal condition this time though the indicator blink illuminates. A temporary poor connector or harness may be the case. Repair the poor contact in connector or harness of driver's control center differential control module and transmission harness. Check the poor contact in power supply circuit, too.	Go to step **6.**
6	**CHECK FUSE (No. 4).** Remove the fuse (No. 4).	Is the fuse (No. 4) is blown out?	Replace fuse (No.4). If the replaced fuse (No.4) is blown out easily, repair short circuit in harness between fuse (No.4) and driver's control center differential control module.	Go to step **7.**
7	**CHECK POWER SUPPLY CIRCUIT OF DRIVER'S CONTROL CENTER DIFFERENTIAL RELAY.** 1) Fuse installation. 2) Turn the ignition switch to OFF. 3) Disconnect the harness connector of driver's control center differential relay. 4) Measure the voltage between driver's control center differential relay harness connector and chassis ground. ***Connector & terminal*** ***LHD model*** ***(B225) No. 27 (+) — Chassis ground (–):*** ***RHD model*** ***(B225) No. 19 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **8.**	Repair the open or short circuit between fuse (No. 4) and driver's control center differential relay, battery.
8	**CHECK IGNITION POWER SUPPLY CIRCUIT OF DRIVER'S CONTROL CENTER DIFFERENTIAL RELAY.** 1) Turn the ignition switch to ON. 2) Measure the voltage between driver's control center differential relay and chassis ground. ***Connector & terminal*** ***LHD model*** ***(B225) No. 24 (+) — Chassis ground (–):*** ***RHD model*** ***(B225) No. 21 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **9.**	Repair the open circuit between fuse (No. 11) and driver's control center differential relay, battery.

	Step	Check	Yes	No
9	**CHECK HARNESS BETWEEN DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE AND DRIVER'S CONTROL CENTER DIFFERENTIAL RELAY.** 1) Turn the ignition switch to OFF. 2) Disconnect the driver's control center differential control module connector. 3) Measure the resistance of harness between driver's control center differential control module connector and driver's control center differential relay harness connector. ***Connector & terminal*** ***LHD model*** ***(B381) No. 7 — (B225) No. 28:*** ***(B381) No. 8 — (B225) No. 28:*** ***(B381) No. 10 — (B225) No. 26:*** ***RHD model*** ***(B381) No. 7 — (B225) No. 20:*** ***(B381) No. 8 — (B225) No. 20:*** ***(B381) No. 10 — (B225) No. 23:***	Is the resistance less than 1 Ω?	Go to step **10.**	Repair the open circuit between driver's control center differential module connector and driver's control center differential relay.
10	**CHECK HARNESS BETWEEN DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE AND DRIVER'S CONTROL CENTER DIFFERENTIAL RELAY.** Measure the resistance of harness between driver's control center differential control module connector and chassis ground. ***Connector & terminal*** ***(B381) No. 7 — Chassis ground:*** ***(B381) No. 8 — Chassis ground:*** ***(B381) No. 10 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **11.**	Repair the short circuit between driver's control center differential control module connector and driver's control center differential relay connector.
11	**CHECK DRIVER'S CONTROL CENTER DIFFERENTIAL RELAY.** Measure the resistance between driver's control center differential relay terminals. ***Terminals*** ***LHD model*** ***(B225) No. 27 — No. 28:*** ***RHD model*** ***(B225) No. 19 — No. 20:***	Is the resistance more than 1 MΩ?	Go to step **12.**	Replace the driver's control center differential relay.
12	**CHECK DRIVER'S CONTROL CENTER DIFFERENTIAL RELAY.** Connect the driver's control center differential relay terminals of battery positive and negative terminals as follows, and then measure the resistance between driver's control center differential relay terminals. ***Positive terminal*** ***LHD model: (B225) No. 24*** ***RHD model: (B225) No. 21*** ***Negative terminal*** ***LHD model: (B225) No. 26*** ***RHD model: (B225) No. 23*** ***Terminals*** ***LHD model*** ***(B225) No. 27 — No. 28:*** ***RHD model*** ***(B225) No. 19 — No. 20:***	Is the resistance less than 1 Ω?	Go to step **13.**	Replace the driver's control center differential relay.

	Step	Check	Yes	No
13	**CHECK IGNITION POWER SUPPLY CIRCUIT FOR DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL UNIT.** 1) Connect all the connectors. 2) Turn the ignition switch to ON. 3) Measure the voltage between driver's control center differential control unit and chassis ground. ***Connector & terminal*** ***(B381) No. 10 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Go to step **14.**	Go to step **17.**
14	**CHECK IGNITION POWER SUPPLY CIRCUIT FOR DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL UNIT.** Measure the voltage between driver's control center differential control unit and chassis ground. ***Connector & terminal*** ***(B381) No. 7 (+) — Chassis ground (–):*** ***(B381) No. 8 (+) — Chassis ground (–):***	Is the voltage more than 8 V?	Go to step **15.**	Go to step **17.**
15	**CHECK CENTER DIFFERENTIAL.** 1) Turn the ignition switch to OFF. 2) Connect the Subaru Select Monitor to the data link connector. 3) Turn the ignition switch and Subaru Select Monitor power switch to ON. 4) Set the driver's control center differential to manual mode by pressing manual mode switch. 5) Release the parking brake. 6) Set the center differential control dial to lock position. 7) Read the data of "center differential indicate current" and "center differential Real current" using Subaru Select Monitor.	Are both of the "center differential indicate current" and "center differential Real current" approx. 4.3 — 4.5A?	Go to step **16.**	Go to step **17.**
16	**CHECK CENTER DIFFERENTIAL.** 1) Operate the center differential control dial so that the "2A" is displayed for "center differential indicate current" on the Subaru Select Monitor. 2) Read the data of "center differential Real current" using Subaru Select Monitor.	Is the "center differential Real current" almost same as "center differential indicate current"?	Go to step **18.**	Go to step **17.**
17	**CHECK POOR CONTACT IN HARNESS CONNECTOR.**	Is there poor contact in harness connector?	Repair the poor contact.	Go to step **18.**
18	**CHECK DTC.** 1) Perform the "Clear memory". <Ref. to 6MT(diag)-26, Clear Memory Mode.> 2) Perform the "Inspection mode". 3) Read the DTC using Subaru Select Monitor. <Ref. to 6MT(diag)-23, Read Diagnostic Trouble Code (DTC).>	Is P1875 displayed?	Replace the driver's control center differential control module.	Go to step **19.**

Step		Check	Yes	No
19	CHECK OTHER DTC DETECTION.	Is any DTC except P1875 displayed?	Diagnose according to DTC.	The center differential circuit is in normal condition. A temporary poor contact of connector or harness may be the cause. Repair harness or connector in driver's control center differential circuit.

J: DTC 24 CHECK CENTER DIFFERENTIAL CONTROL DIAL

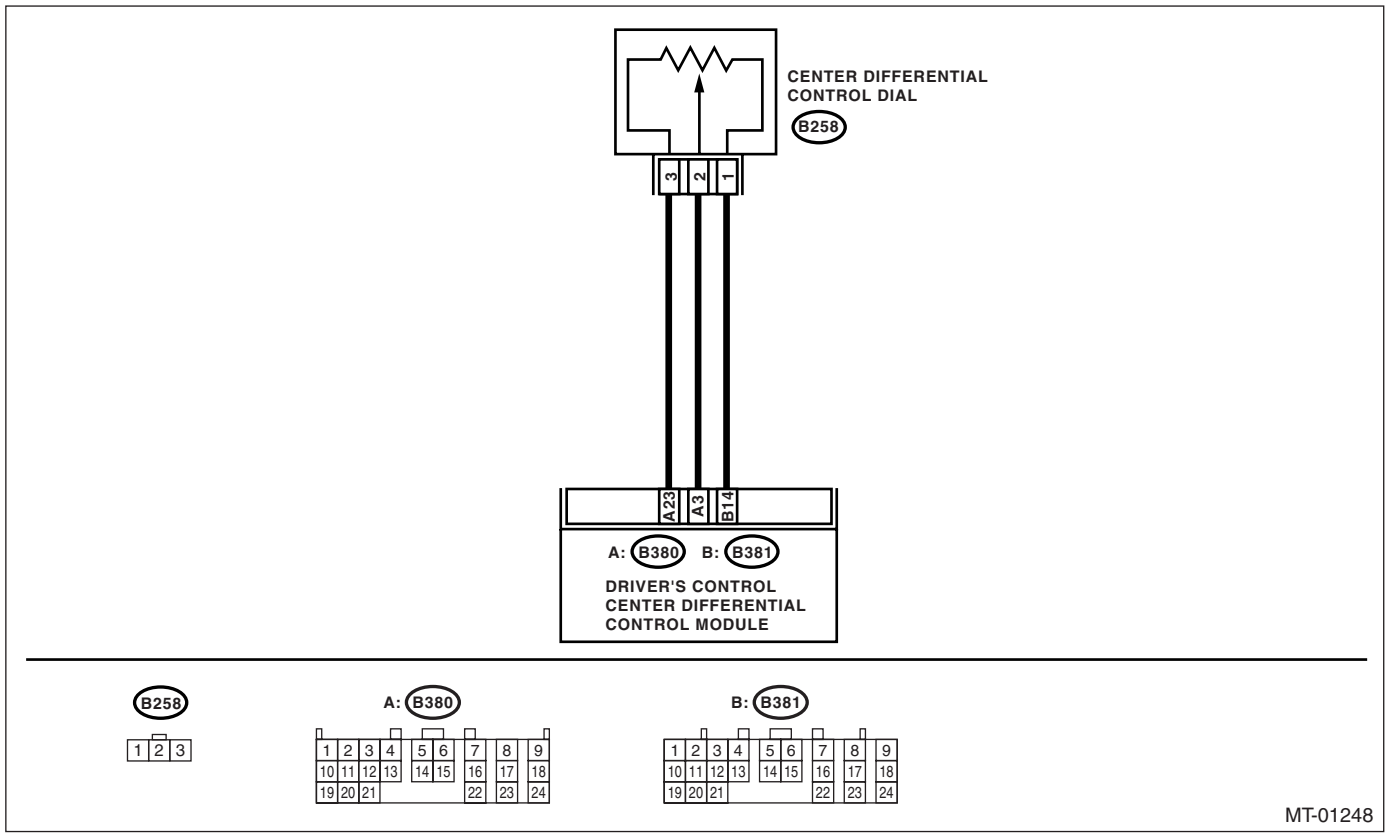
DIAGNOSIS:

Input signal circuit of center differential control dial is open or shorted.

TROUBLE SYMPTOM:

- Indicator light does not operate though setting the center differential control dial.
- Torque characteristics do not change.

WIRING DIAGRAM:



Step		Check	Yes	No
1	**CHECK THE HARNESS BETWEEN DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE AND CENTER DIFFERENTIAL CONTROL DIAL.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector of driver's control center differential control module and center differential control dial. 3) Measure the resistance of harness between driver's control center differential control module and center differential control dial harness connector. ***Connector & terminal*** ***(B380) No. 3 — (B258) No. 2:*** ***(B380) No. 23 — (B258) No. 3:*** ***(B381) No. 14 — (B258) No. 1:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the open circuit between driver's control center differential control module and center differential control dial.

	Step	Check	Yes	No
2	**CHECK THE HARNESS BETWEEN DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE AND CENTER DIFFERENTIAL CONTROL DIAL.** Measure the resistance between driver's control center differential control module harness connector and chassis ground. ***Connector & terminal*** ***(B380) No. 3 — Chassis ground:*** ***(B380) No. 23 — Chassis ground:*** ***(B381) No. 14 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **4.**	Repair the short circuit between driver's control center differential control module and center differential control dial.
3	**CHECK DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE INPUT SIGNAL.** 1) Connect all the connectors. 2) Connect the Subaru Select Monitor to data link connector. 3) Turn the ignition switch to ON, and the Subaru Select Monitor power switch to ON. 4) Read the data of "C-diff. SW voltage" using Subaru Select Monitor.	Does the voltage lower smoothly when rotating the dial from differential lock to differential free position?	Go to step **7.**	Go to step **4.**
4	**CHECK THE CENTER DIFFERENTIAL CONTROL DIAL.** 1) Turn the ignition switch to OFF. 2) Remove the center differential control dial. 3) Measure the resistance between center differential control dial connectors. ***Terminals*** ***No. 1 — No. 3:***	Is the resistance 7.5 — 12.5 kΩ?	Go to step **5.**	Replace the driver's control dial.
5	**CHECK THE CENTER DIFFERENTIAL CONTROL DIAL.** Measure the resistance between center differential control dial connectors. ***Terminals*** ***No. 1 — No. 2:***	Dose the resistance change smoothly when setting the dial from differential lock to differential free?	Go to step **6.**	Replace the center differential control dial.
6	**CHECK THE OUTPUT POWER SUPPLY OF DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE.** 1) Connect all the harness connectors. 2) Turn the ignition switch to ON. (engine OFF) 3) Measure the voltage driver's control center differential control module harness connector. ***Connector & terminal*** ***(B380) No. 23 (+) — (B381) No. 14 (–)***	Is the voltage approx. 5 V?	Go to step **7.**	Replace the driver's control center differential control module.
7	**CHECK POOR CONTACT.**	Is there poor contact in center differential control dial circuit?	Repair the poor contact.	Center differential control dial circuit is in normal condition. Temporary poor contact occurs. Repair the harness or connector between driver's control center differential control module and driver's control center differential.

K: DTC 31 MANUAL MODE SWITCH

DIAGNOSIS:

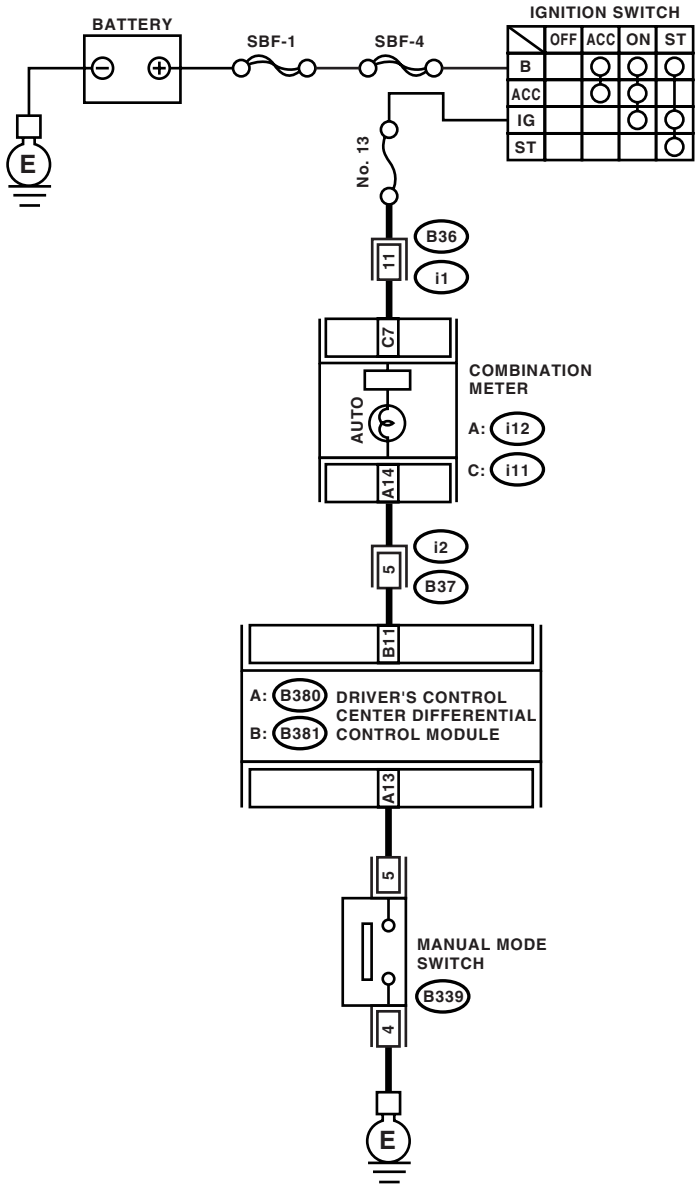
Input signal circuit of manual mode switch circuit is open or shorted.

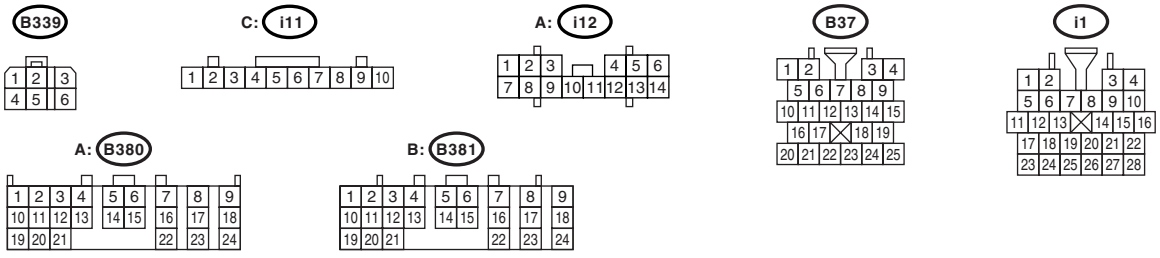
TROUBLE SYMPTOM:

- Driver's control center differential can not be manual mode. Or can not be auto mode.
- AUTO indicator does not illuminate, or does not go off.

WIRING DIAGRAM:

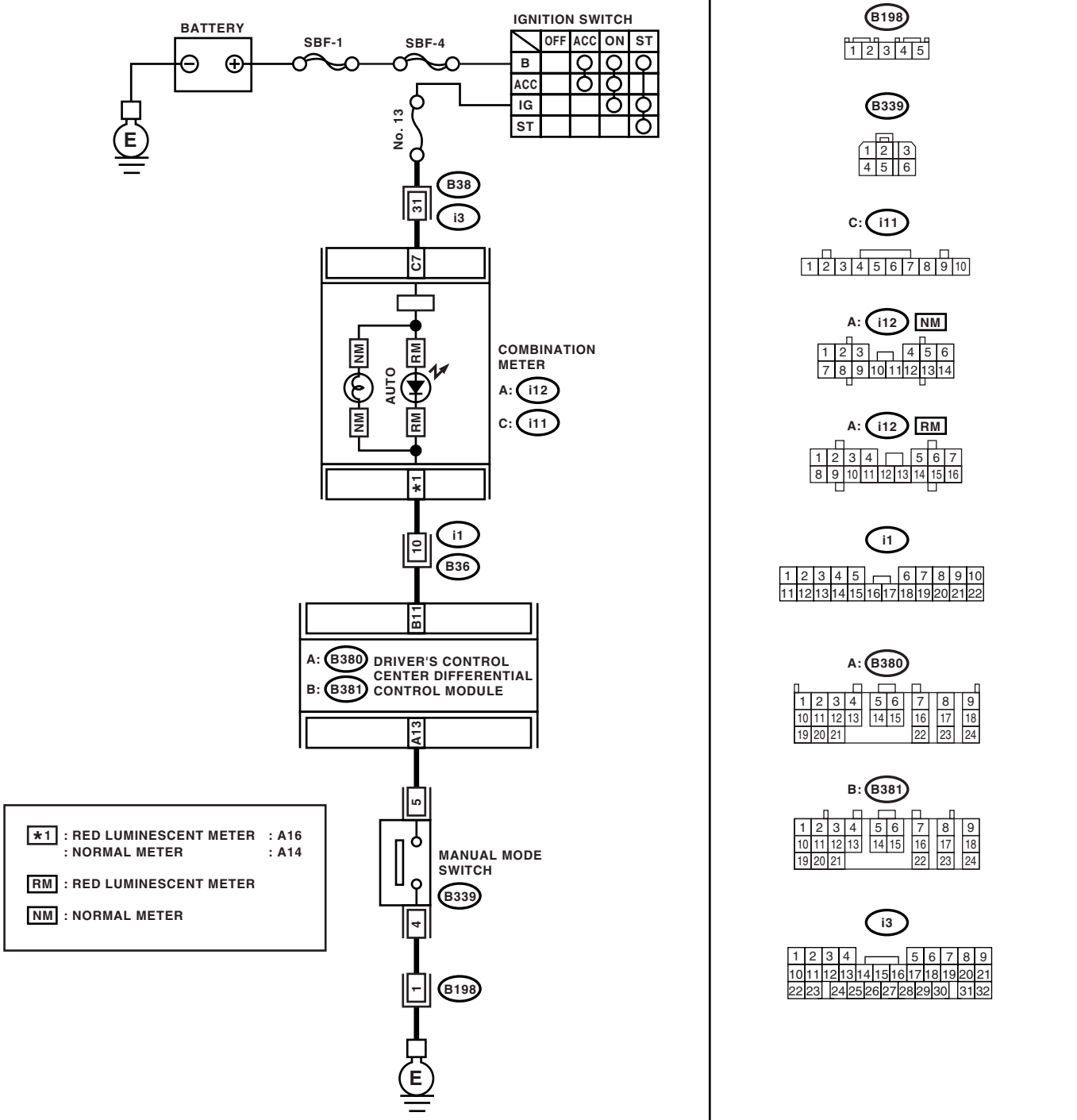
- LHD model





MT-01349

- RHD model



MT-01350

	Step	Check	Yes	No
1	**CHECK OPERATION OF MANUAL MODE SWITCH.** Set the manual mode switch to auto mode.	Does the AUTO indicator light in combination meter illuminate?	Go to step **8.**	Go to step **2.**
2	**CHECK AUTO INDICATOR LIGHT.** 1) Turn the ignition switch to OFF. 2) Disconnect the harness connector of driver's control center differential control module. 3) Turn the ignition switch to ON. (engine OFF) 4) Short between the driver's control center differential control module and chassis ground. **CAUTION:** **Be sure to short the circuit through fuse.** ***Connector & terminal*** ***(B381) No. 11 — Chassis ground:***	Does the AUTO indicator light in combination meter illuminate?	Replace the driver's control center differential control module.	Go to step **3.**
3	**CHECK POWER SUPPLY OF COMBINATION METER.** 1) Turn the ignition switch to OFF. 2) Disconnect the harness connector of combination meter. 3) Turn the ignition switch to ON. (engine OFF) 4) Measure the voltage between combination meter harness connector and chassis ground. ***Connector & terminal*** ***(i11) No. 7 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **4.**	Check and repair the open and short of harness between battery and combination meter, and poor contact of harness connector.
4	**CHECK THE HARNESS BETWEEN COMBINATION METER AND DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE.** 1) Turn the ignition switch to OFF. 2) Disconnect the harness connector of combination meter. 3) Measure the resistance between combination meter harness connector and driver's control center differential control module harness connector. ***Connector & terminal*** ***Normal meter*** ***(i12) No. 14 — (B381) No. 11:*** ***Red-luminescent meter*** ***(i12) No. 16 — (B381) No. 11:***	Is the resistance less than 1 Ω?	Go to step **5.**	Repair the open circuit of harness between combination meter harness connector and driver's control center differential control module harness connector, and poor contact of harness connector.
5	**CHECK THE HARNESS BETWEEN COMBINATION METER AND DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE.** Measure the resistance between driver's control center differential control module harness connector and chassis ground. ***Connector & terminal*** ***(B381) No. 11 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **6.**	Repair the short circuit of harness between combination meter harness connector and driver's control center differential control module harness connector.
6	**CHECK HARNESS CONNECTOR POOR CONTACT.**	Is there any poor contact in the circuit between combination meter and driver's control module?	Repair the poor contact.	Go to step **7.**

	Step	Check	Yes	No
7	**CHECK AUTO INDICATOR LIGHT.** 1) Connect the harness connector of combination meter. 2) Turn the ignition switch to ON. 3) Short between the driver's control center differential control module harness connector and chassis ground. **CAUTION:** **Be sure to short the circuit through fuse.** ***Connector & terminal*** ***(B381) No. 11 — Chassis ground:***	Does the AUTO indicator light light up?	Replace the driver's control center differential control module.	Replace the combination meter.
8	**CHECK GROUND CIRCUIT OF MANUAL MODE SWITCH.** 1) Turn the ignition switch to OFF. 2) Disconnect the manual mode switch connector. 3) Measure the resistance between manual mode switch harness connector and chassis ground. ***Connector & terminal*** ***(B339) No. 4 — Chassis ground:***	Is the resistance more than 1 MΩ?	Repair the open circuit of harness between manual mode switch harness connector and chassis ground.	Go to step **9.**
9	**CHECK THE HARNESS BETWEEN DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE AND MANUAL MODE SWITCH.** 1) Disconnect the driver's control center differential control module harness connector. 2) Measure the resistance of harness between driver's control center differential control module and manual mode switch. ***Connector & terminal*** ***(B380) No. 13 — (B339) No. 5:***	Is the resistance less than 1 Ω?	Go to step **10.**	Repair the open circuit of harness between driver's control center differential control module and manual mode switch.
10	**CHECK THE HARNESS BETWEEN DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE AND MANUAL MODE SWITCH.** Measure the resistance of harness between driver's control center differential control module and chassis ground. ***Connector & terminal*** ***(B380) No. 13 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **11.**	Repair the short circuit of harness between driver's control center differential control module and manual mode switch.
11	**CHECK THE MANUAL MODE SWITCH.** 1) Remove the manual mode switch. 2) Measure the resistance of between manual mode switch connectors. ***Terminals*** ***No. 4 — No. 5:***	Is the resistance more than 1 MΩ?	Go to step **12.**	Replace the manual mode switch.
12	**CHECK THE MANUAL MODE SWITCH.** 1) Keep depressing the manual mode switch. 2) Measure the resistance of between manual mode switch connectors. ***Terminals*** ***No. 4 — No. 5:***	Is the resistance less than 1 Ω?	Go to step **13.**	Replace the manual mode switch.

	Step	Check	Yes	No
13	**CHECK THE INPUT SIGNAL OF DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE.** 1) Install the manual mode switch. 2) Connect the harness connector of driver's control center differential control module. 3) Connect the Subaru Select Monitor to data link connector. 4) Turn the ignition switch to ON. (engine OFF) 5) Subaru Select Monitor power switch to ON. 6) Read the data of AUTO/MANUAL mode switch signal using Subaru Select Monitor.	Is the data OFF?	Go to step **14.**	Go to step **15.**
14	**CHECK THE INPUT SIGNAL OF DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE.** 1) Keep depressing the manual mode switch. 2) Read the data of AUTO/MANUAL mode switch signal using Subaru Select Monitor.	Is the data ON?	Go to step **16.**	Go to step **15.**
15	**CHECK POOR CONTACT IN HARNESS CONNECTOR.**	Is there any poor contact in manual mode switch circuit?	Repair the poor contact.	Go to step **16.**
16	**CHECK DTC.** Read the DTC from combination meter. <Ref. to 6MT(diag)-23, Read Diagnostic Trouble Code (DTC).>	Is the DTC 31 displayed?	Replace the driver's control center differential control module.	Go to step **17.**
17	**DETECTING CHECK FOR OTHER DTC.**	Is there any DTC other than 31 displayed?	Perform the diagnosis according to DTC.	Manual mode switch circuit is in normal condition. Temporary poor contact occurs. Repair the harness or connector between driver's control center differential control module, manual mode switch and chassis ground.

L: DTC 32 CHECK PARKING BREAK SWITCH

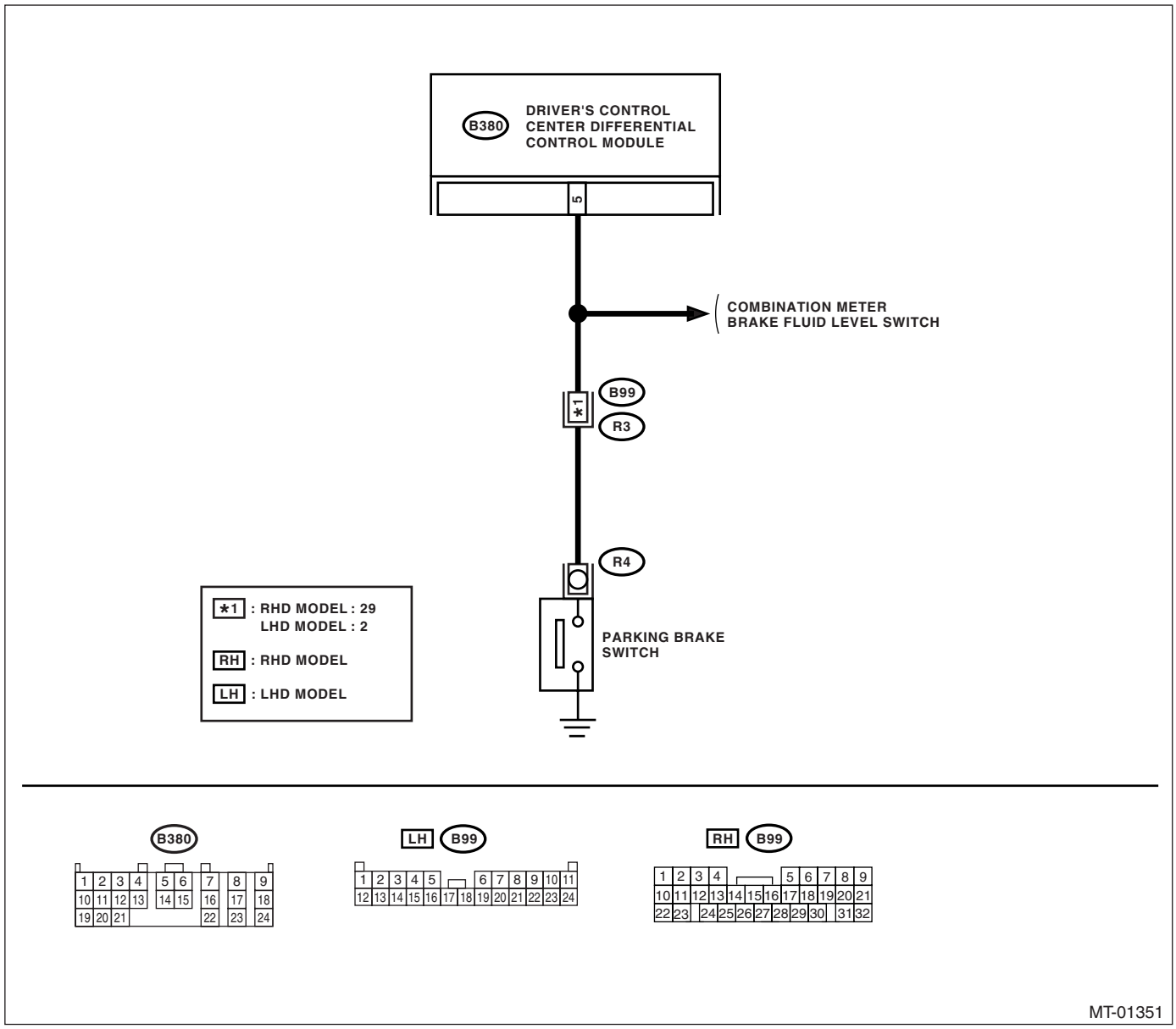
DIAGNOSIS:

Input signal circuit of parking brake switch is open or shorted.

TROUBLE SYMPTOM:

- Differential does not tend to be free though apply the parking brake.
- Differential stays free by releasing the parking brake.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK THE PARKING BRAKE SWITCH CIRCUIT.** 1) Turn the ignition switch to ON. 2) Start the engine. 3) Apply the parking brake.	Does the parking brake warning light illuminate?	Go to step **2.**	Check the parking pilot & brake fluid warning light circuit.
2	**CHECK THE PARKING BRAKE SWITCH CIRCUIT.** Release the parking brake.	Does the parking brake warning light turn OFF?	Go to step **3.**	Check the brake fluid level, parking pilot & brake fluid level warning light circuit and ABS circuit.
3	**CHECK THE HARNESS BETWEEN DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE AND PARKING BRAKE SWITCH.** 1) Turn the ignition switch to OFF. 2) Disconnect the harness connector of driver's control center differential control module, combination meter and parking brake switch. 3) Measure the resistance between driver's control center differential control module and parking brake switch. ***Connector & terminal*** ***(B380) No. 5 — (R4) No. 1:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the open circuit of harness and poor contact of connector.
4	**CHECK THE HARNESS BETWEEN DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE AND PARKING BRAKE SWITCH.** Measure the resistance between driver's control center differential control module harness connector and chassis ground. ***Connector & terminal*** ***(B380) No. 5 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **5.**	Repair the short circuit of harness.
5	**CHECK THE INPUT SIGNAL OF DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE.** 1) Connect all the harness connectors. 2) Connect the Subaru Select Monitor to data link connector. 3) Turn the ignition switch to ON, and Subaru Select Monitor power switch to ON. 4) Release the parking brake. 5) Read the data of parking switch signal using Subaru Select Monitor.	Is the data OFF?	Go to step **6.**	Replace the driver's control center differential control module.
6	**CHECK THE INPUT SIGNAL OF DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE.** 1) Apply the parking brake. 2) Read the data of parking switch signal using Subaru Select Monitor.	Is the data ON?	Go to step **7.**	Replace the driver's control center differential control module.

Step		Check	Yes	No
7	**CHECK POOR CONTACT IN HARNESS CONNECTOR.**	Is there any poor contact in harness connector of parking brake circuit?	Repair the poor contact of harness connector.	The parking brake switch circuit is in normal condition. A temporary poor contact of connector or harness may be the cause. Repair the harness connectors between driver's control center differential control module, brake fluid level switch, ABS unit, combination meter and parking brake switch. Also check the brake fluid level.

M: DTC 33 STOP LIGHT SWITCH

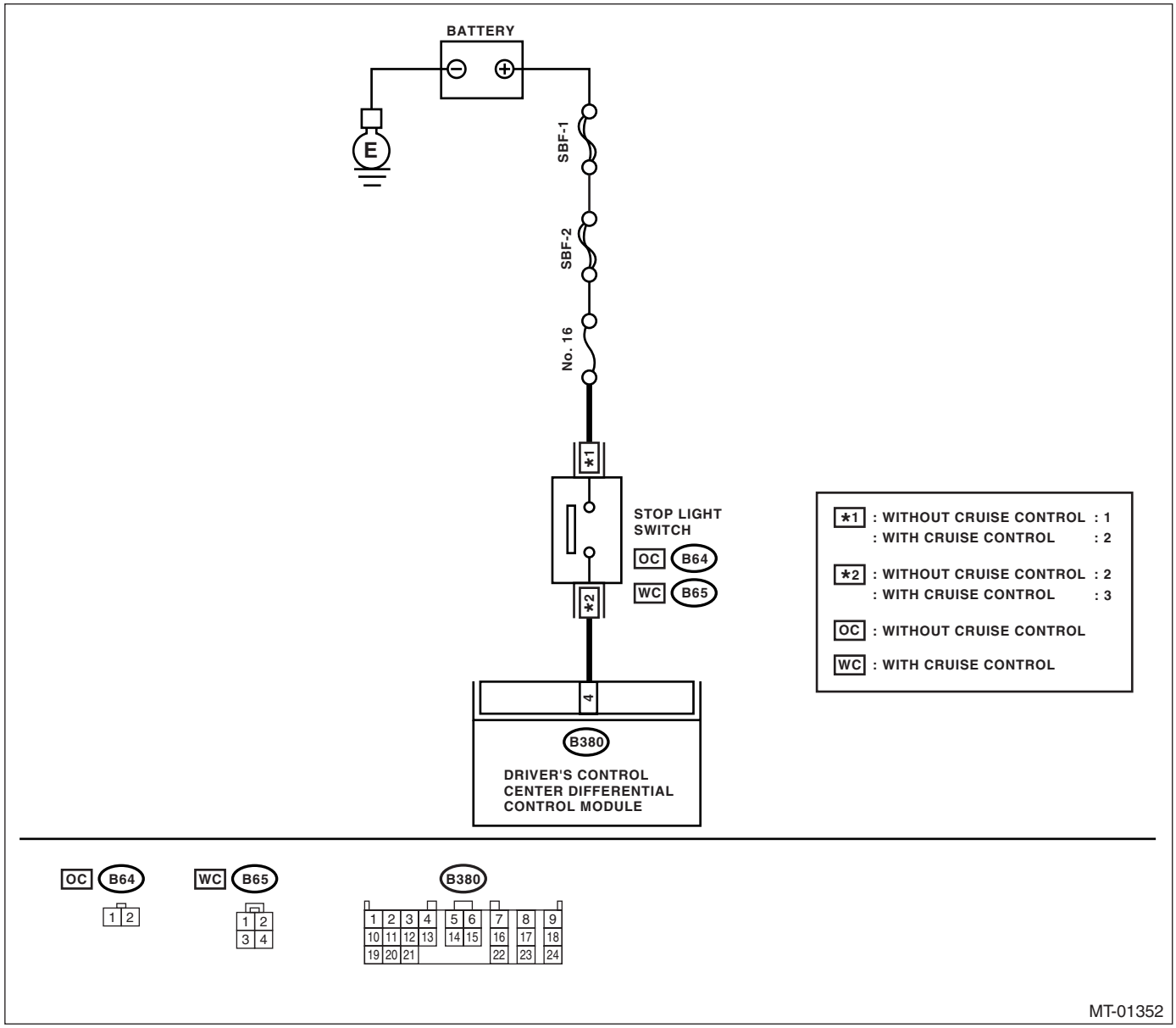
DIAGNOSIS:

Open or short circuit in stop light switch circuit

TROUBLE SYMPTOM:

ABS does not operate.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK DTC.**	Is the stop light switch related DTC displayed during ABS self-diagnosis test mode?	Check according to ABS DTC.	Go to step **2.**
2	**CHECK DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE.** 1) Turn the ignition switch to OFF. 2) Connect the Subaru Select Monitor to data link connector. 3) Turn the ignition switch to ON, and Subaru Select Monitor power switch to ON. 4) Read the data of "Stop Light SW" using Subaru Select Monitor.	Is the "OFF" displayed?	Go to step **3.**	Replace the driver's control center differential control module.
3	**CHECK DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE.** 1) Drepress the brake pedal and hold it. 2) Read the data of "Stop Light SW" using Subaru Select Monitor.	Is the "ON" displayed?	Go to step **6.**	Go to step **4.**
4	**CHECK INPUT SIGNAL FOR DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE.** 1) Turn the ignition switch to OFF. 2) Disconnect the harness connector of driver's control center differential control module. 3) Drepress the brake pedal and hold it. 4) Measure the voltage between driver's control center differential control module and chassis ground. ***Connector & terminal*** ***(B380) No. 4 (+) — Chassis ground (−):***	Is the voltage more than 8 V?	Go to step **5.**	Repair the open circuit in harness between driver's control center differential control module and stop light switch.
5	**CHECK POOR CONTACT.**	Is there poor contact in stop light switch circuit?	Repair the poor contact in harness connector.	Go to step **6.**
6	**CHECK DTC.** Read the DTC from combination meter. <Ref. to 6MT(diag)-23, Read Diagnostic Trouble Code (DTC).>	Is the DTC 33 displayed?	Replace the driver's control center differential control module.	Go to step **7.**
7	**CHECK FOR OTHER DTC ON DISPLAY.**	Is there any DTC other than 33 displayed?	Perform the diagnosis according to DTC.	Stop light switch circuit is in normal condition. Temporary poor contact occurs. Repair the harness or connector between driver's control center differential control module and stop light switch.

N: DTC 37 NEUTRAL POSITION SWITCH

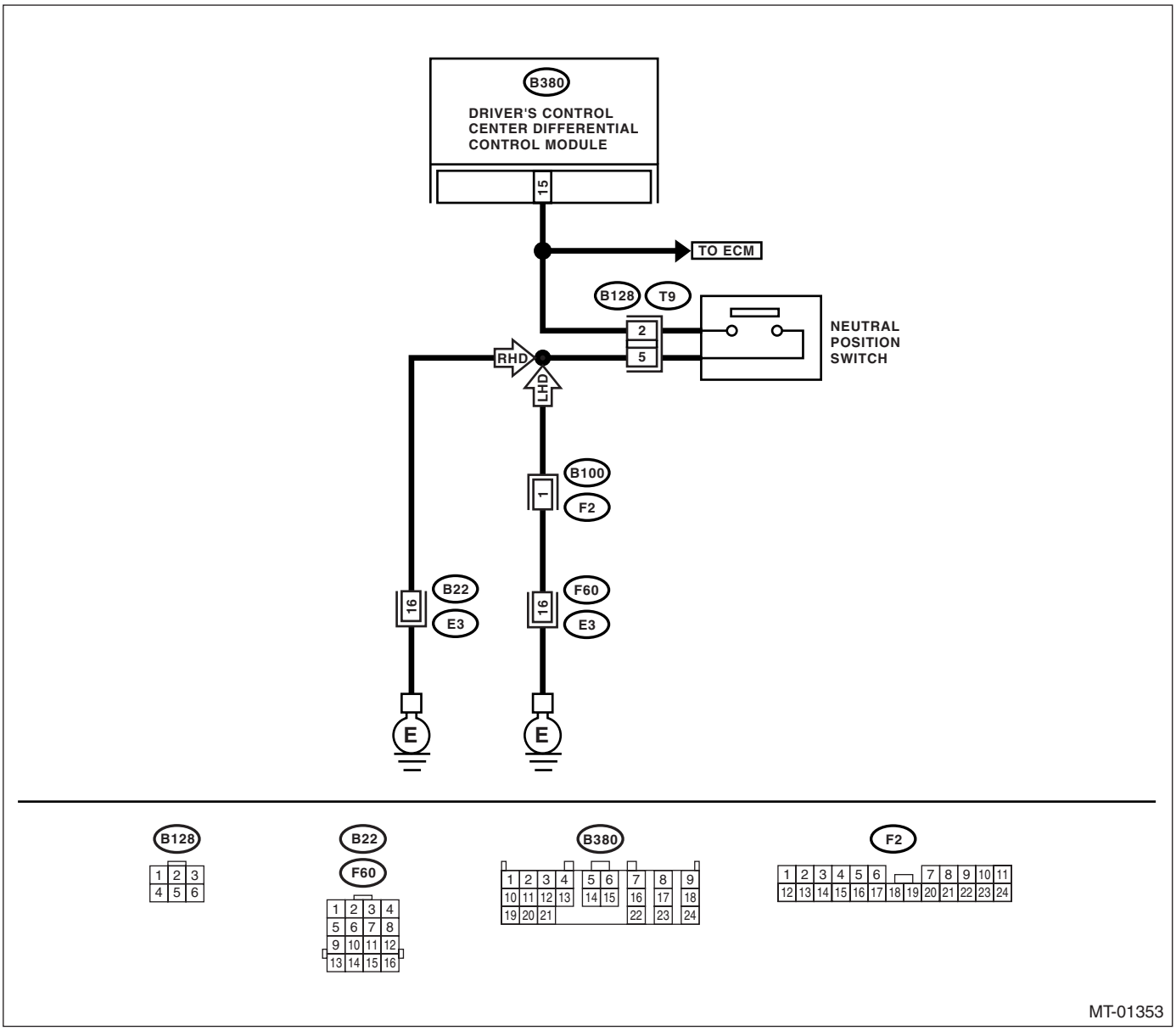
DIAGNOSIS:

Open or short in neutral position switch circuit

TROUBLE SYMPTOM:

- Handling tende to oversteer.
- The tendency of understeer occurred when high speed cornering.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE AND NEUTRAL POSITION SWITCH.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from driver's control center differential control module, ECM and neutral position switch. 3) Measure the resistance between driver's control center differential control module and neutral position switch. ***Connector & terminal*** ***(B380) No. 15 — (B128) No. 2:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the open circuit in harness between neutral position switch connector and driver's control differential control module.
2	**CHECK HARNESS BETWEEN DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE AND NEUTRAL POSITION SWITCH.** Measure the resistance between driver's control center differential control module connector and Chassis ground. ***Connector & terminal*** ***(B380) No. 15 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **3.**	Repair the short circuit in harness between neutral position switch, driver's control center differential control module and ECM.
3	**CHECK HARNESS BETWEEN DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE AND ENGINE GROUND.** Measure the resistance between neutral position switch connector and Engine ground. ***Connector & terminal*** ***(B128) No. 5 — Engine ground:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the open circuit in harness between neutral position switch connector and Engine ground.
4	**CHECK NEUTRAL POSITION SWITCH.** 1) Move the shift lever to "N". 2) Measure the resistance between transmission harness connector terminals. ***Connector & terminal*** ***(T9) No. 2 — No. 5:***	Is the resistance less than 1 Ω?	Go to step **5.**	Replace the neutral position switch.
5	**CHECK NEUTRAL POSITION SWITCH.** 1) Move the shift lever to other than "N". 2) Measure the resistance between transmission harness connector terminals. ***Connector & terminal*** ***(T9) No. 2 — No. 5:***	Is the resistance more than 1 MΩ?	Go to step **6.**	Replace the neutral position switch.
6	**CHECK INPUT SIGNAL FOR DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE.** 1) Connect all the connectors. 2) Turn the ignition switch to ON. 3) Subaru Select Monitor power switch to ON. 4) Move the shift lever to "N". 5) Read the data of "Neutral Position switch" using Subaru Select Monitor.	Is the "ON" displayed?	Go to step **7.**	Go to step **8.**
7	**CHECK INPUT SIGNAL FOR DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE.** 1) Move the shift lever to other than "N". 2) Read the data of "Neutral Position switch" using Subaru Select Monitor.	Is the "OFF" displayed?	Go to step **9.**	Go to step **8.**
8	**CHECK POOR CONTACT.**	Is there any poor contact in neutral position switch circuit?	Repair the poor contact.	Go to step **9.**

	Step	Check	Yes	No
9	**CHECK DTC.** Read the DTC from combination meter. <Ref. to 6MT(diag)-23, Read Diagnostic Trouble Code (DTC).>	Is DTC 33 displayed?	Replace the driver's control center differential control unit.	Go to step **10.**
10	**CHECK OTHER DTC DETECTION.**	Is any DTC except DTC 33 displayed?	Diagnose according to DTC.	The neutral position switch circuit is in normal condition. A temporary poor contact of connector or harness may be the cause. Repair harness or connector in neutral position switch circuit.

13.General Diagnostic Table

A: INSPECTION

Symptom	Abnormal units/parts
Tight corner braking condition	• ABSCM&H/U • ABS wheel speed sensor • Throttle position sensor • CAN communication • ECM • Center differential • Center differential control dial • Manual mode switch • Tire/Wheel • Driver's control center differential control module
Tendency to oversteer	• Throttle position sensor • ECM • Center differential control dial • Manual mode switch • Tire/Wheel • Driver's control center differential control module • Center differential • Driver's control center differential relay • Rear differential oil temperature switch • Neutral position switch
Tendency to understeer at high speed cornering	• Yaw rate & lateral G sensor • Center differential • ECM • Engine speed signal • Neutral position switch
No change in the center differential torque character	• Center differential control dial • Driver's control center differential relay • Center differential • Driver's control center differential control module
Driver's control center differential indicator does not operate	• Combination meter • Driver's control center differential control module
Driver's control center differential indicator does not operate though setting the center differential control dial	• Center differential control dial • Combination meter • Driver's control center differential control module
No change to AUTO or MANUAL	• Manual mode switch • Combination meter • Driver's control center differential control module
AUTO indicator light does not illuminate	• Manual mode switch • Combination meter • Driver's control center differential control module
Differential does not become free, or stays free	• Parking brake switch • Center differential • Manual mode switch • Center differential control dial • Rear differential • Tire/Wheel • Driver's control center differential relay • Rear differential oil temperature switch • Driver's control center differential control module
ABS does not operation	• ABSCM&H/U • CAN communication • Stop light switch • Driver's control center differential control module

Symptom	Abnormal units/parts
Differential does not become lock, or stays lock	• ABSCM&H/U • ABS wheel speed sensor • Throttle position sensor • ECM • Center differential • Center differential control dial • Manual mode switch • Tire/Wheel • Driver's control center differential control module • Driver's control center differential relay

CLUTCH SYSTEM

CL

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1. General Description

A: SPECIFICATION

Model			1.6 L	2.0 L NON-TURBO	2.0 L TURBO	2.5 L
Clutch cover	Type		Push type		Pull type	Push type
	Diaphragm set load	kgf (lbf)	450 (992)		800 (1,764)	550 (1,213)
Clutch disc	Facing material		Woven (Non asbestos)			
	O.D. × I.D. × thickness	mm (in)	225 × 150 × 3.5 (8.86 × 5.91 × 0.138)		230 × 150 × 3.5 (9.06 × 5.91 × 0.138)	228.6 × 155 × 6.7 (9.00 × 6.10 × 0.264)
	Spline O.D.	mm (in)	25.2 (0.992), (No. of teeth: 24)			
Clutch release lever ratio			3.0	1.6	1.7	1.6
Release bearing			Grease-packed self-aligning			
Clutch pedal	Full stroke	mm (in)	130 — 135 (5.12 — 5.31)			
	Free play	mm (in)	10 — 20 (0.39 — 0.79)	4 — 11 (0.16 — 0.43)		
Release lever	Stroke	mm (in)	24 — 26 (0.94 — 1.02)	13.3 — 14.7 (0.524 — 0.579)		
	Play at release lever center	mm (in)	3 — 4 (0.12 — 0.16)	—		
Clutch disc	Depth of rivet head mm (in)	Standard	1.6 — 2.25 (0.063 — 0.089)		Flywheel side: 1.35 — 1.95 (0.053 — 0.077) Clutch cover side: 1.65 — 2.25 (0.065 — 0.089)	1.3 — 1.9 (0.051 — 0.075)
		Limit of sinking	0.3 (0.012)			
	Limit for deflection	mm (in)	0.8 (0.031) at R = 107 (4.21)	0.8 (0.031) at R = 110 (4.33)		1.0 (0.039) at R = 110 (4.33)

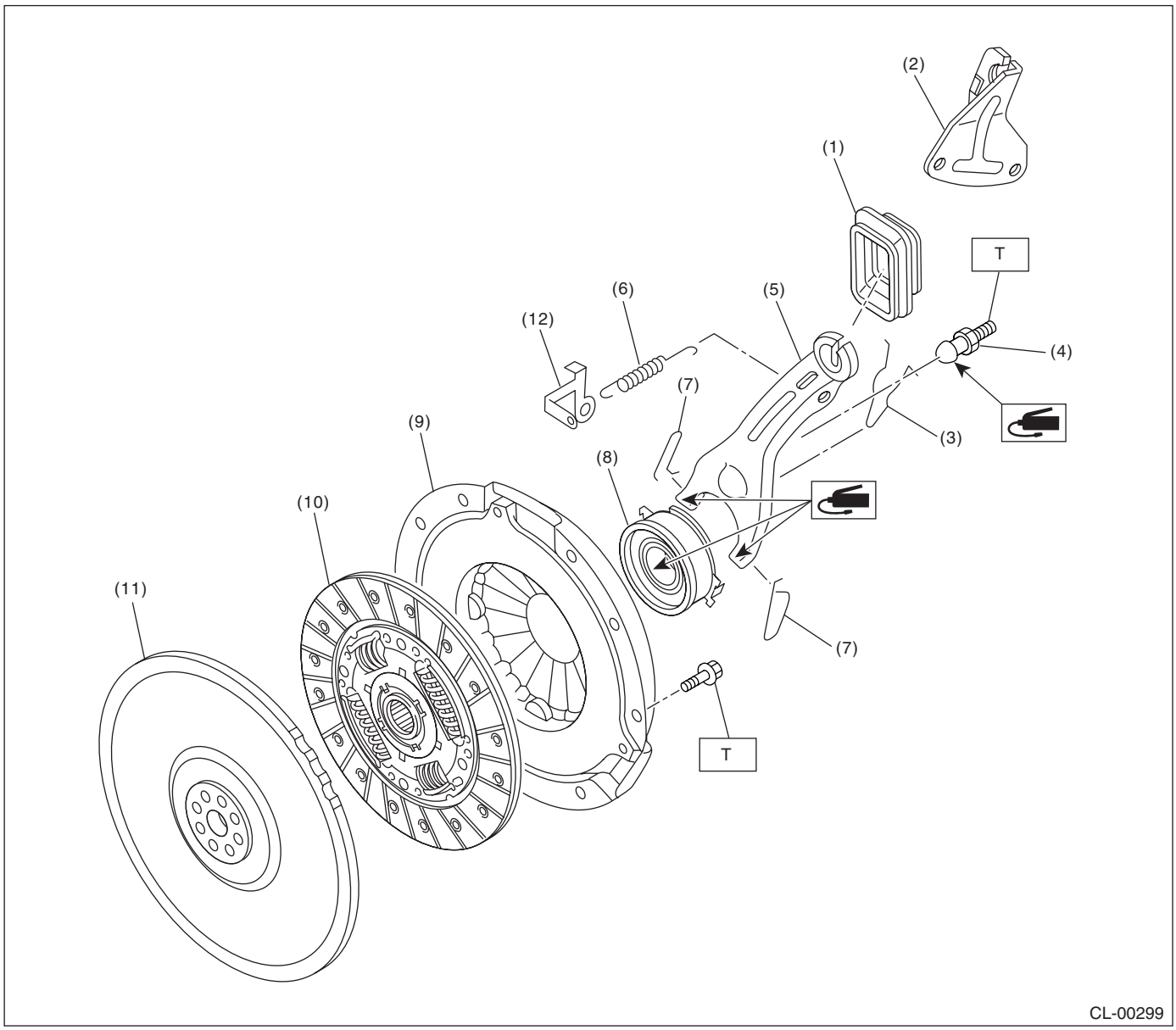
Model			2.0 L TURBO STi
Clutch cover	Type		Pull type
	Diaphragm set load	kgf (lbf)	930 (2,050)
Clutch disc	Facing material		Woven (Non asbestos)
	O.D. × I.D. × thickness	mm (in)	Flywheel side: 240 × 160 × 3.2 (9.45 × 6.30 × 0.126) Clutch cover side: 240 × 160 × 3.5 (9.45 × 6.30 × 0.138)
	Spline O.D.	mm (in)	25.2 (0.992), (No. of teeth: 24)
Clutch release lever ratio			1.7
Release bearing			Grease-packed self-aligning
Clutch pedal	Full stroke	mm (in)	130 — 135 (5.12 — 5.31)
	Free play	mm (in)	3 — 13 (0.12 — 0.51)
Release lever	Stroke	mm (in)	13.3 — 14.7 (0.524 — 0.579)
	Play at release lever center	mm (in)	—
Clutch disc	Depth of rivet head mm (in)	Standard	Flywheel side: 1.35 — 1.95 (0.053 — 0.077) Clutch cover side: 1.65 — 2.25 (0.065 — 0.089)
		Limit of sinking	0.3 (0.012)
	Limit for deflection	mm (in)	0.8 (0.031) at R = 110 (4.33)

I.D.: Inner diameter O.D.: Outer diameter

B: COMPONENT

1. CLUTCH ASSEMBLY

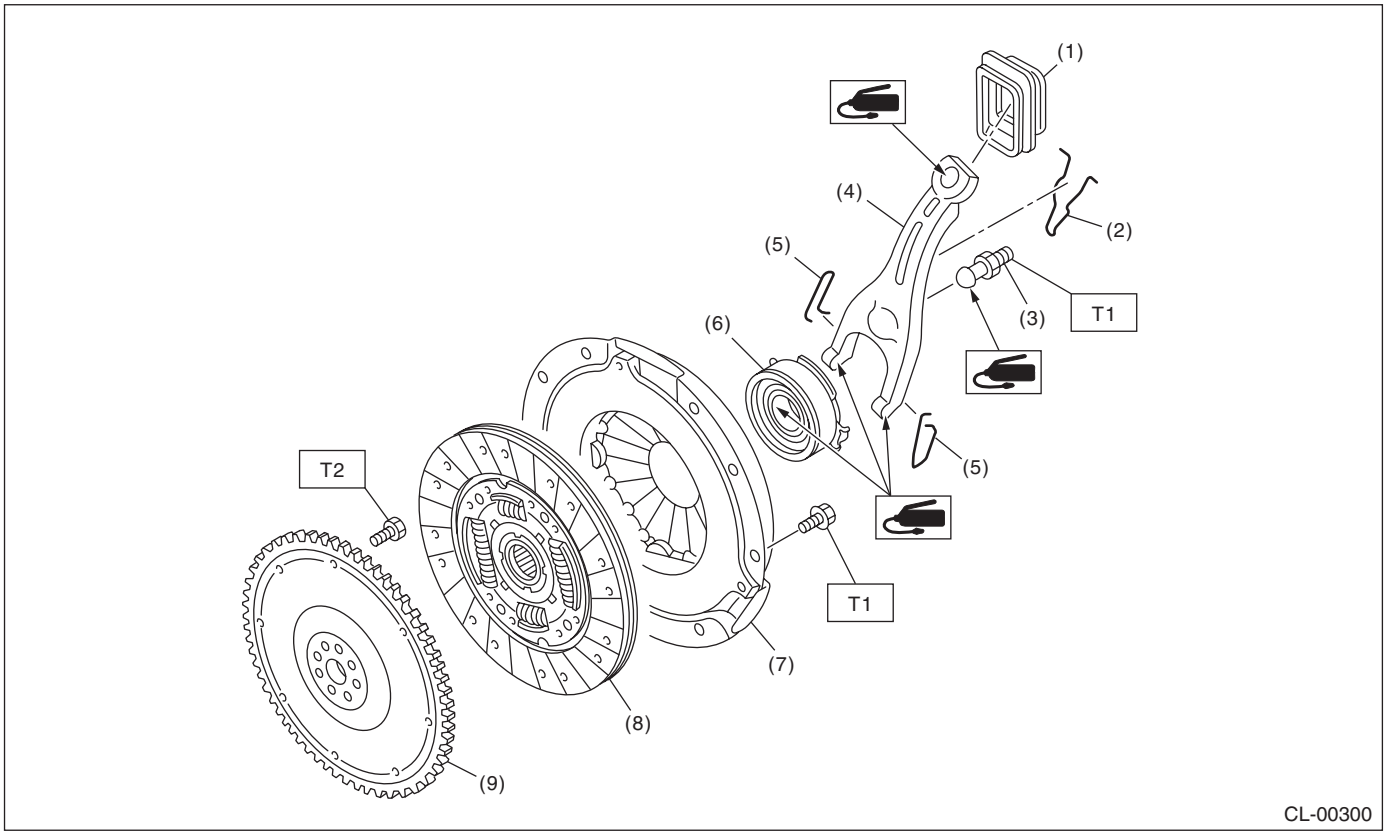
• 1.6 L MODEL



(1) Dust cover
(2) Clutch cable bracket
(3) Retainer spring
(4) Pivot
(5) Clutch release lever
(6) Return spring
(7) Clip
(8) Clutch release bearing
(9) Clutch cover
(10) Clutch disk
(11) Flywheel
(12) Clutch return spring bracket

Tightening torque: N·m (kgf-m, ft-lb)
T: 16 (1.6, 11.8)

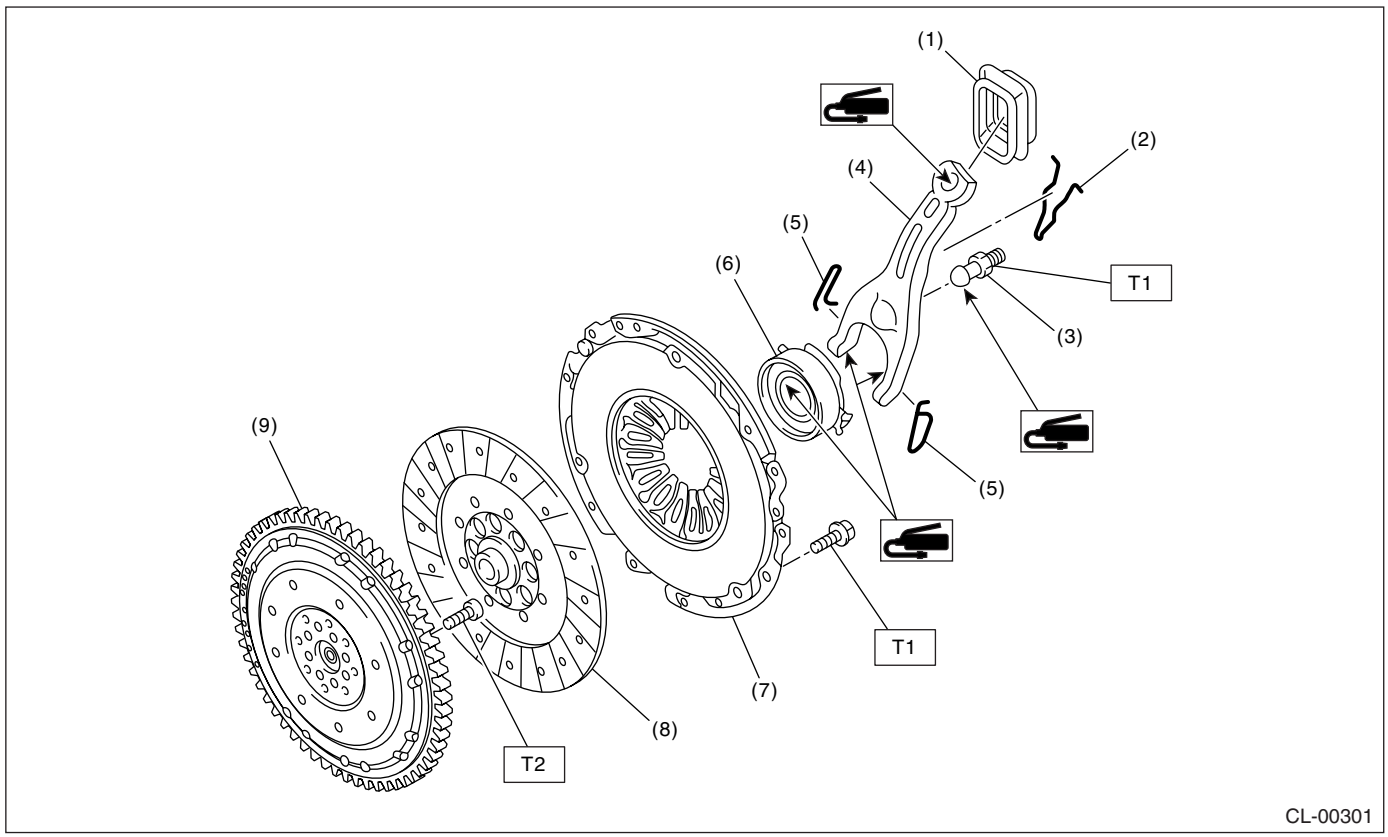
• 2.0 L NON-TURBO MODEL



(1) Dust cover
(2) Retainer spring
(3) Pivot
(4) Clutch release lever
(5) Clip
(6) Clutch release bearing
(7) Clutch cover
(8) Clutch disc
(9) Flywheel

Tightening torque: N·m (kgf-m, ft-lb)
T1: 16 (1.6, 11.8)
T2: 72 (7.3, 52.8)

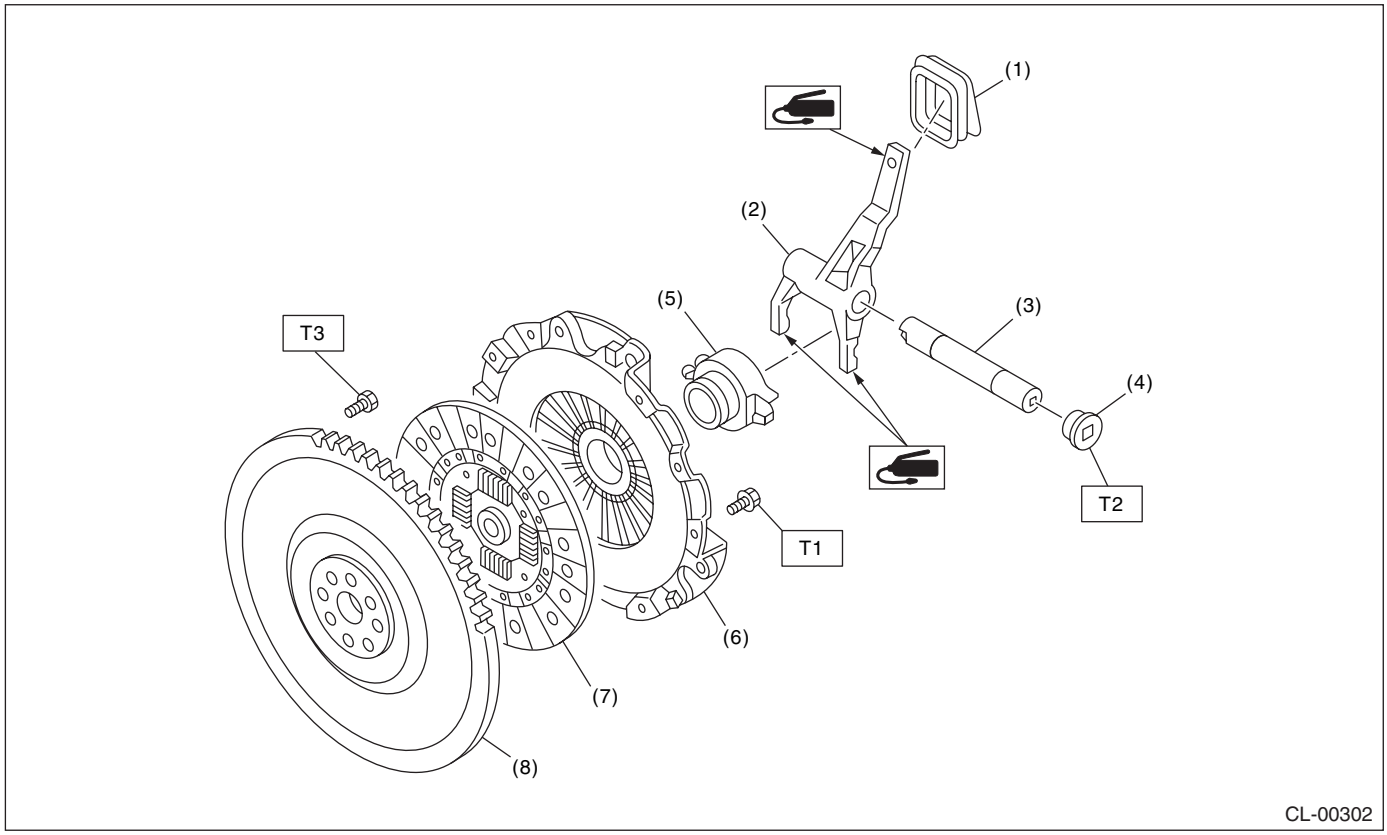
• 2.5 L MODEL



(1) Dust cover
(2) Retainer spring
(3) Pivot
(4) Release lever
(5) Clip
(6) Release bearing
(7) Clutch cover
(8) Clutch disc
(9) Dual mass flywheel

Tightening torque: N·m (kgf-m, ft-lb)
T1: 16 (1.6, 11.8)
T2: 72 (7.3, 52.8)

• TURBO MODEL

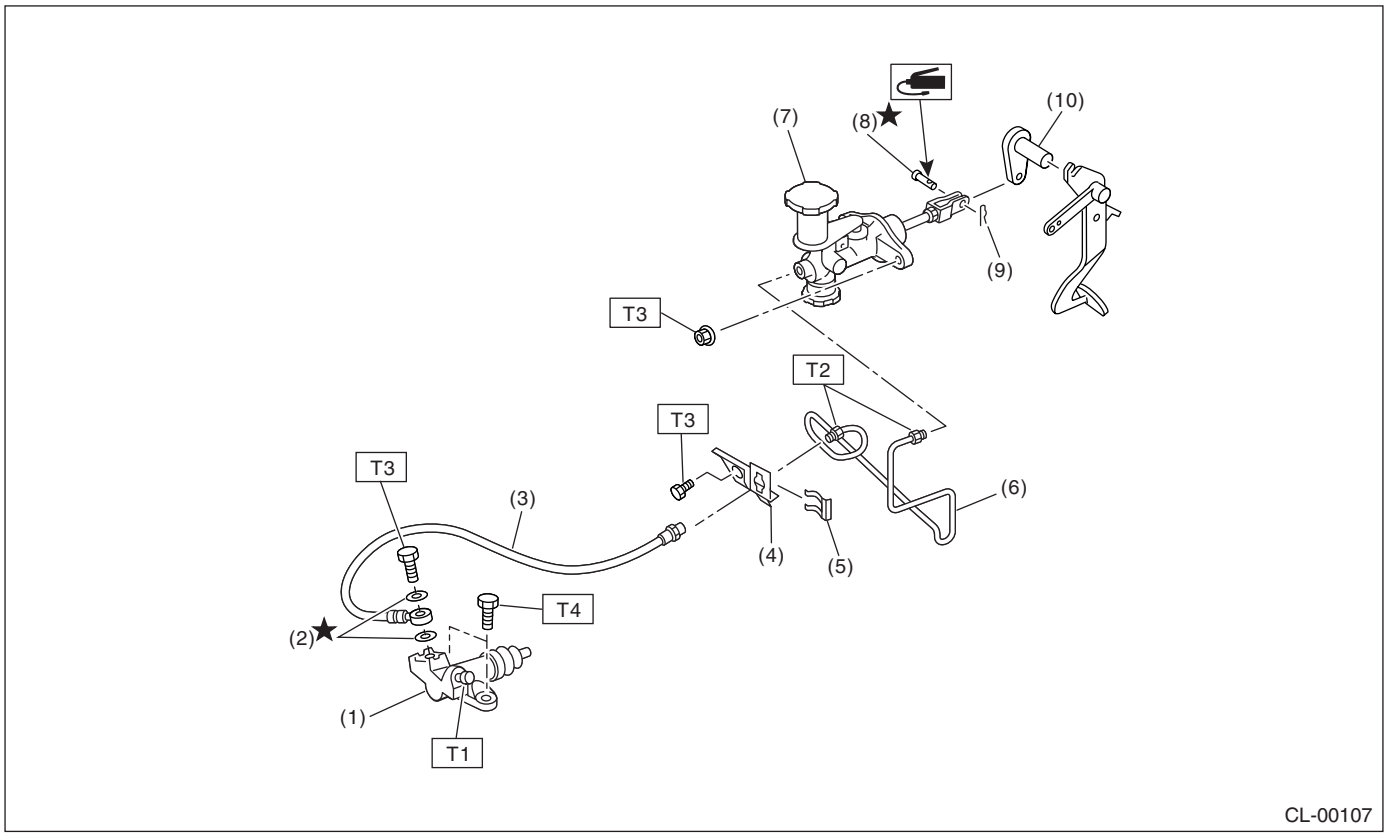


(1)	Dust cover	(5)	Clutch release bearing
(2)	Clutch release lever	(6)	Clutch cover
(3)	Clutch release lever shaft	(7)	Clutch disc
(4)	Plug	(8)	Flywheel

Tightening torque: N·m (kgf-m, ft-lb)
T1: 16 (1.6, 11.8)
T2: 44 (4.5, 32.5)
T3: 72 (7.3, 52.8) (Except STi model)
75 (7.4, 55.3) (STi model)

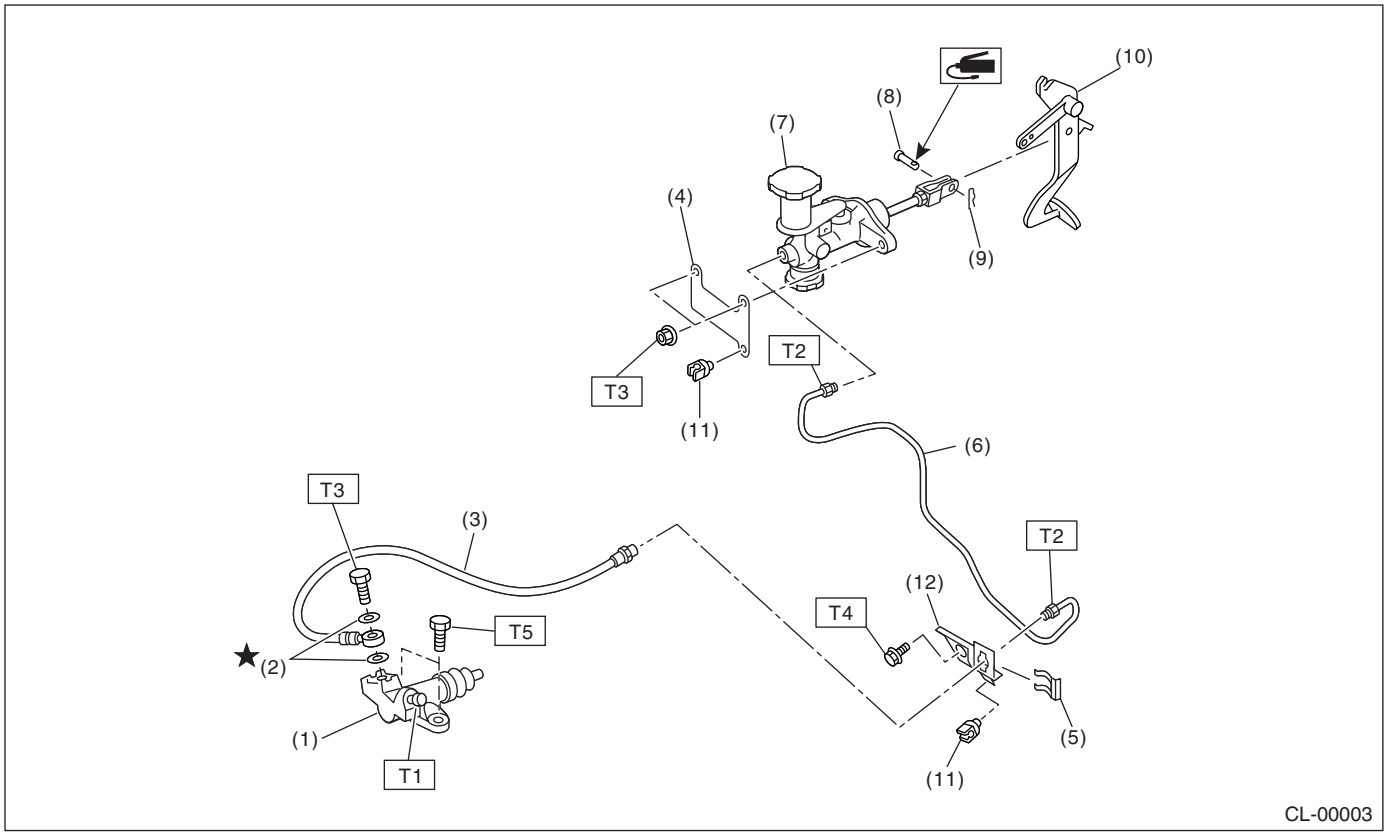
2. CLUTCH PIPE AND HOSE

• LHD NON-TURBO MODEL



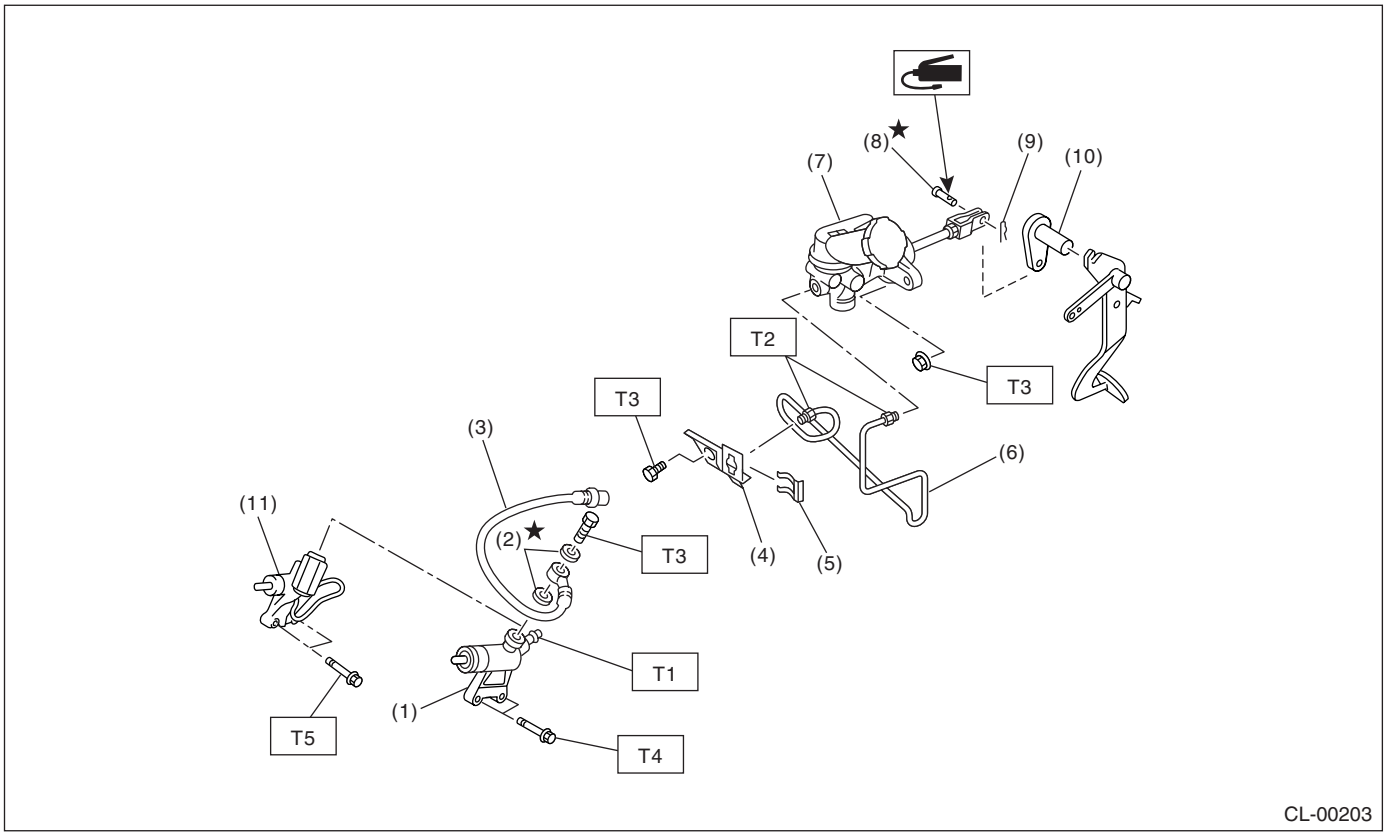
(1)	Operating cylinder	(6)	Pipe	***Tightening torque: N·m (kgf-m, ft-lb)***
(2)	Washer	(7)	Master cylinder ASSY	***T1: 8 (0.8, 5.8)***
(3)	Clutch hose	(8)	Clevis pin	***T2: 15 (1.5, 10.8)***
(4)	Bracket	(9)	Snap pin	***T3: 18 (1.8, 13.0)***
(5)	Clip	(10)	Lever	***T4: 37 (3.8, 27.5)***

• RHD NON-TURBO MODEL



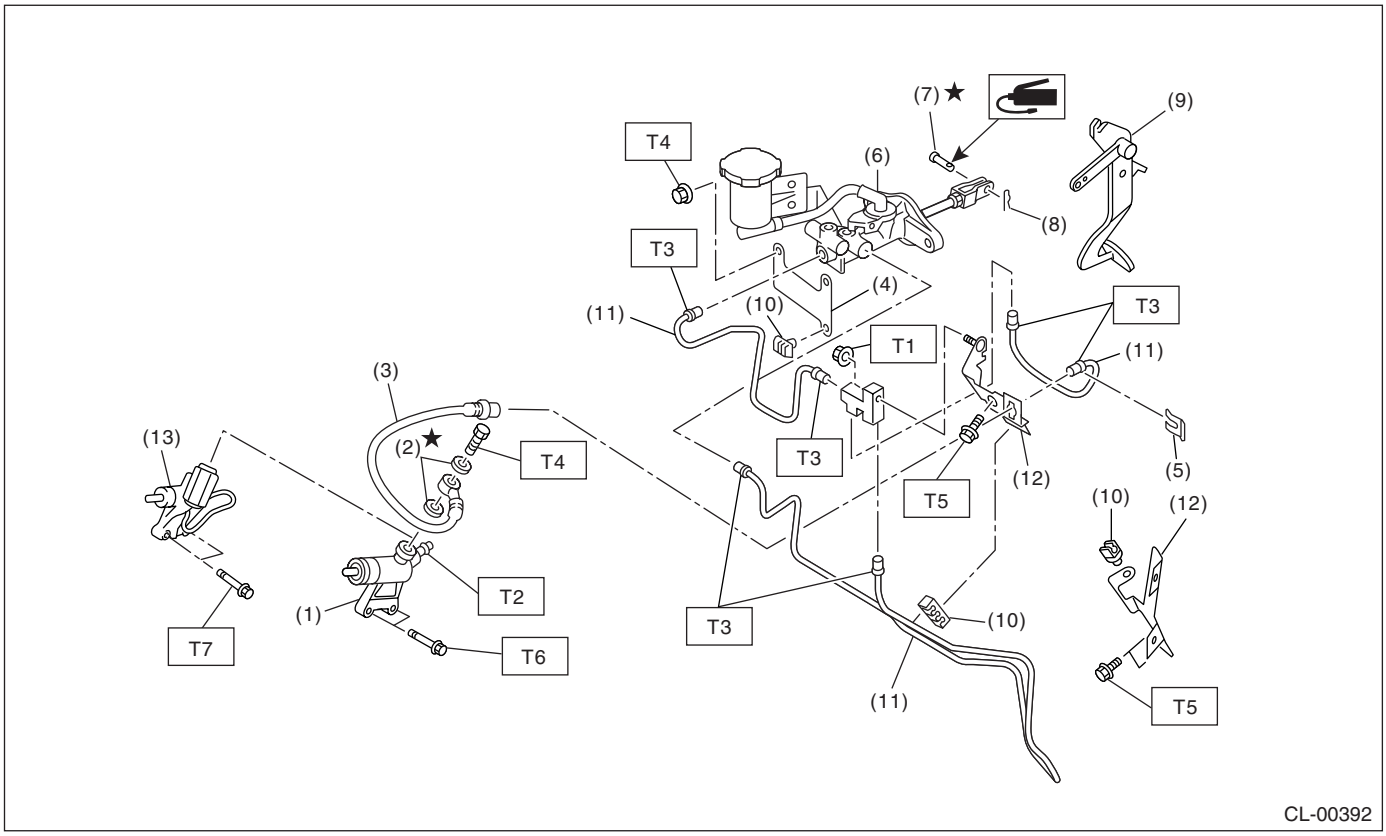
(1)	Operating cylinder	(7)	Master cylinder ASSY	***Tightening torque: N·m (kgf-m, ft-lb)***
(2)	Washer	(8)	Clevis pin	***T1: 8 (0.8, 5.8)***
(3)	Clutch hose	(9)	Snap pin	***T2: 15 (1.5, 10.8)***
(4)	Bracket	(10)	Pedal	***T3: 18 (1.8, 13.0)***
(5)	Clip	(11)	Clamp	***T4: 25 (2.5, 18.1)***
(6)	Clutch pipe	(12)	Bracket	***T5: 37 (3.8, 27.5)***

• LHD TURBO MODEL



(1)	Operating cylinder (Except STi model)	(6)	Pipe	***Tightening torque: N·m (kgf-m, ft-lb)***
(2)	Washer	(7)	Master cylinder ASSY	***T1: 8 (0.8, 5.8)***
(3)	Clutch hose	(8)	Clevis pin	***T2: 15 (1.5, 10.8)***
(4)	Bracket	(9)	Snap pin	***T3: 18 (1.8, 13.0)***
(5)	Clip	(10)	Lever	***T4: 37 (3.8, 27.5)***
		(11)	Operating cylinder (STi model)	***T5: 41 (4.2, 30.2)***

• RHD TURBO MODEL

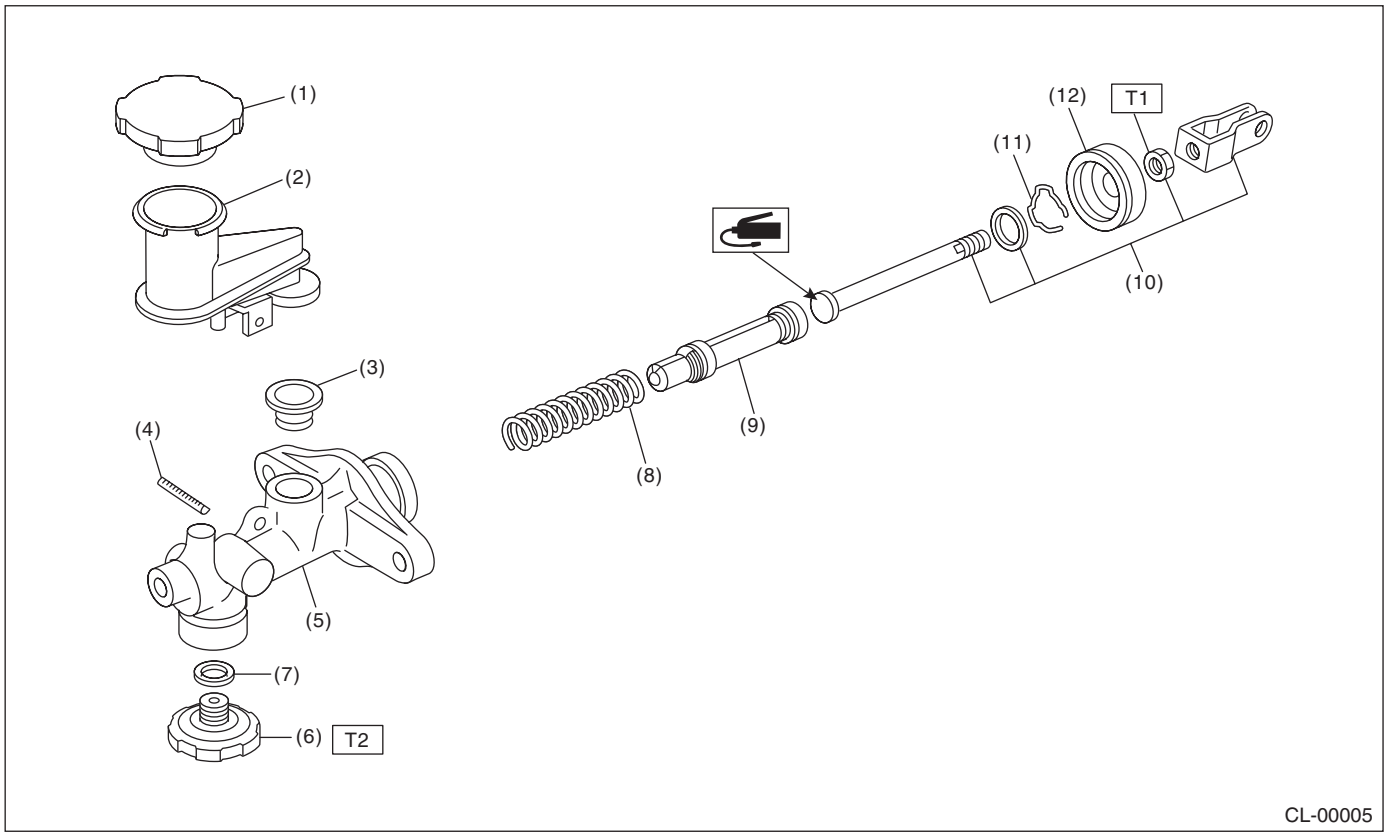


(1)	Operating cylinder (Except STi model)	(8)	Snap pin
(2)	Washer	(9)	Pedal
(3)	Clutch hose	(10)	Clamp
(4)	Bracket	(11)	Clutch pipe
(5)	Clip	(12)	Bracket
(6)	Master cylinder ASSY	(13)	Operating cylinder (STi model)
(7)	Clevis pin		

Tightening torque: N·m (kgf-m, ft-lb)
T1: 7.5 (0.76, 5.53)
T2: 8 (0.8, 5.8)
T3: 15 (1.5, 10.8)
T4: 18 (1.8, 13.0)
T5: 25 (2.5, 18.1)
T6: 37 (3.8, 27.5)
T7: 41 (4.2, 30.2)

3. MASTER CYLINDER

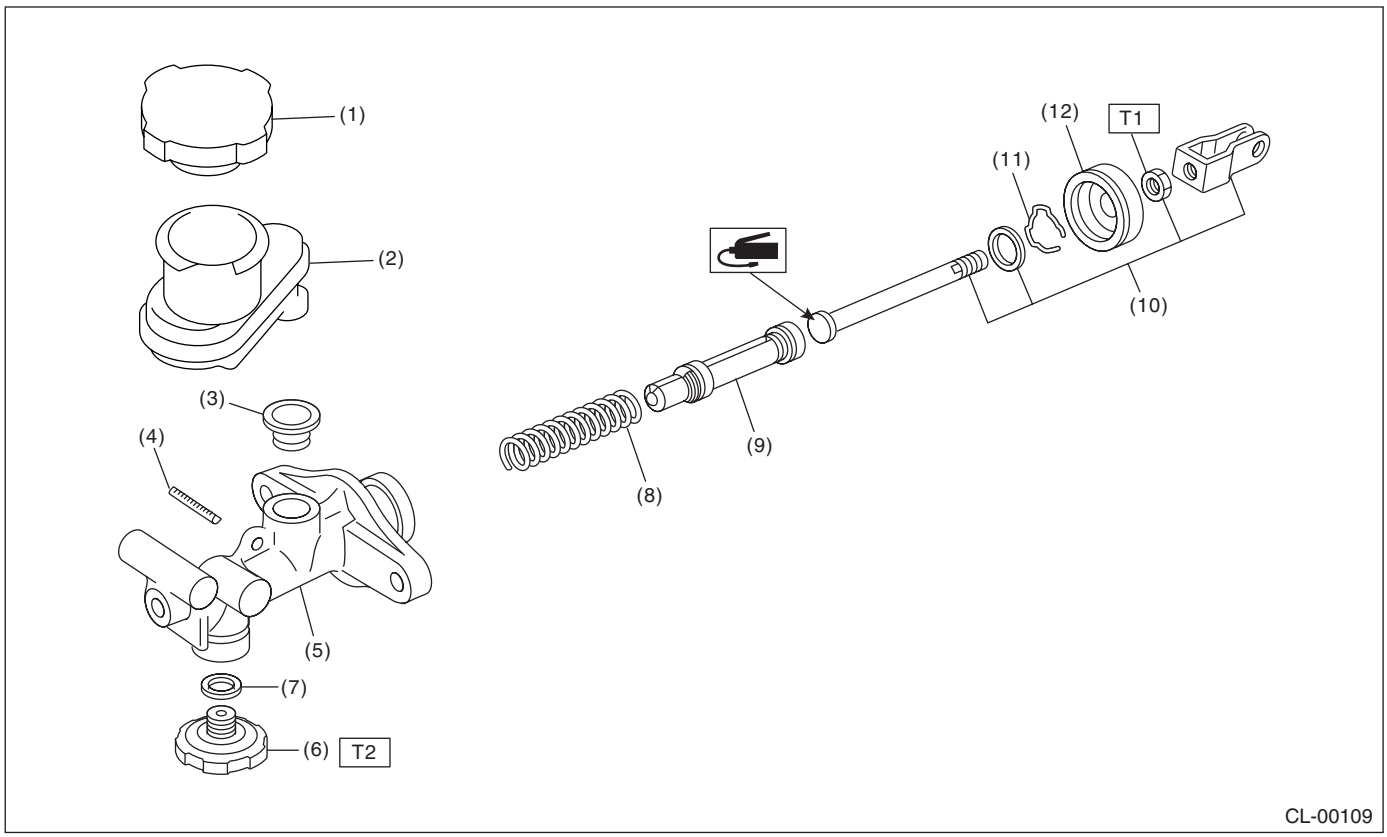
• NON-TURBO MODEL



(1)	Reservoir cap	(7)	Gasket
(2)	Reservoir tank	(8)	Return spring
(3)	Oil seal	(9)	Piston
(4)	Straight pin	(10)	Push rod
(5)	Master cylinder	(11)	Piston stop ring
(6)	Clutch damper	(12)	Cylinder boot

Tightening torque: N·m (kgf-m, ft-lb)
T1: 10 (1.0, 7)
T2: 46.6 (4.75, 34.4)

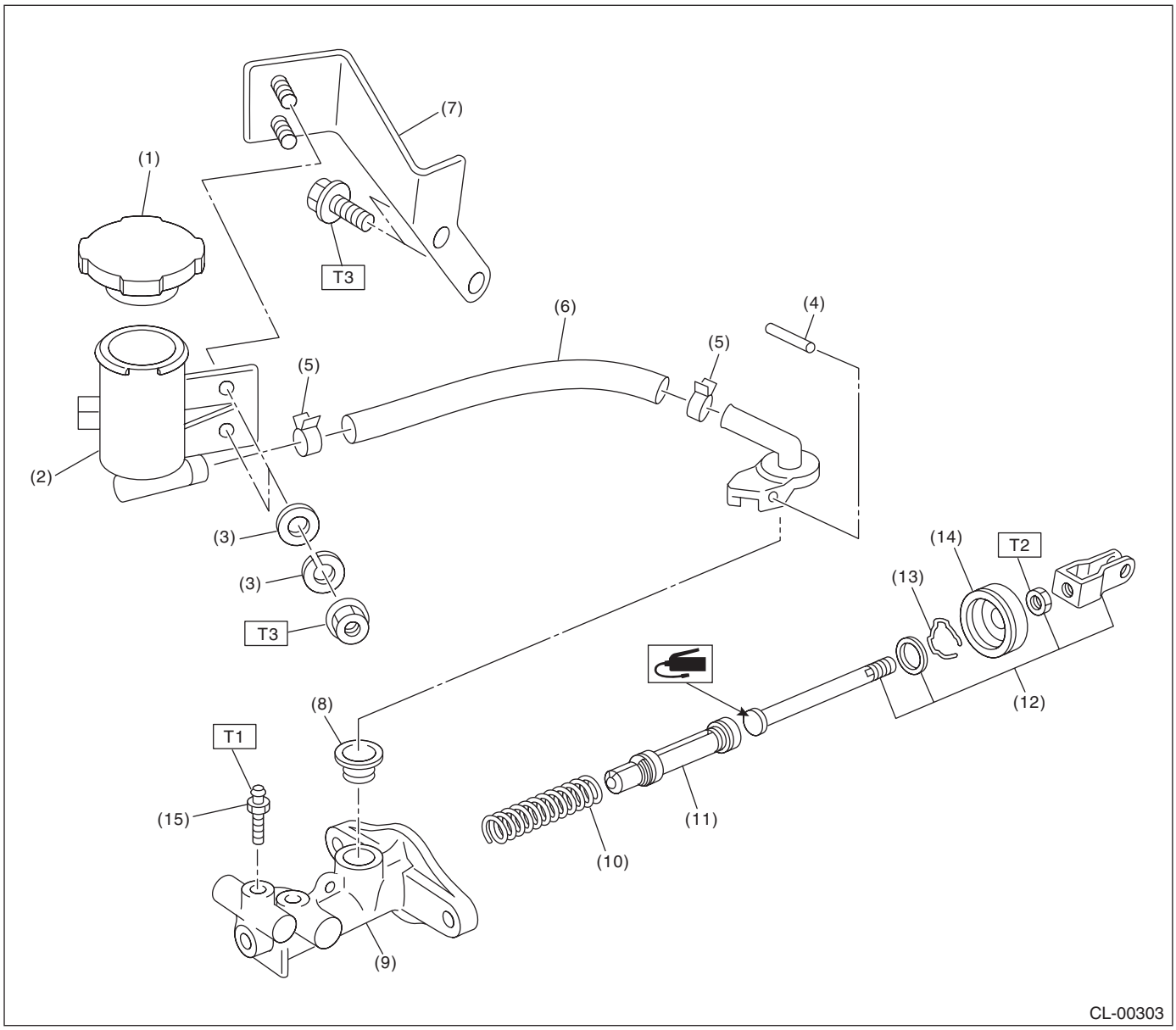
• LHD TURBO MODEL



(1) Reservoir cap
(2) Reservoir tank
(3) Oil seal
(4) Straight pin
(5) Master cylinder
(6) Clutch damper
(7) Gasket
(8) Return spring
(9) Piston
(10) Push rod
(11) Piston stop ring
(12) Cylinder boot

Tightening torque: N·m (kgf-m, ft-lb)
T1: 10 (1.0, 7)
T2: 46.6 (4.75, 34.4)

• RHD TURBO MODEL

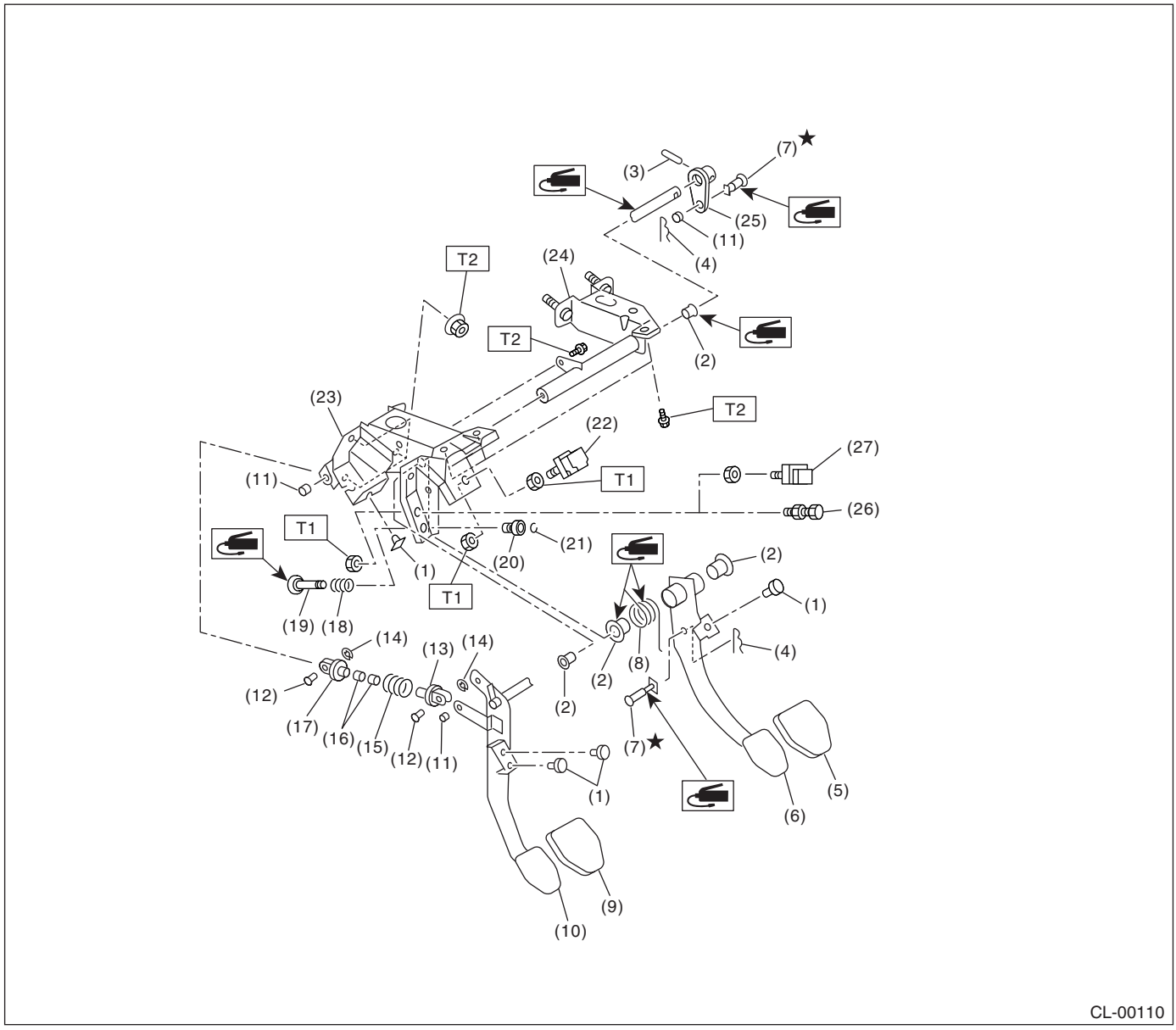


(1) Reservoir cap
(2) Reservoir tank
(3) Washer
(4) Straight pin
(5) Clip
(6) Hose
(7) Reservoir tank bracket
(8) Oil seal
(9) Master cylinder
(10) Return spring
(11) Piston
(12) Push rod
(13) Piston stop ring
(14) Cylinder boot
(15) Bleeder screw

Tightening torque: N·m (kgf-m, ft-lb)
T1: 8 (0.8, 5.8)
T2: 10 (1.0, 7)
T3: 18 (1.8, 13.0)

4. CLUTCH PEDAL

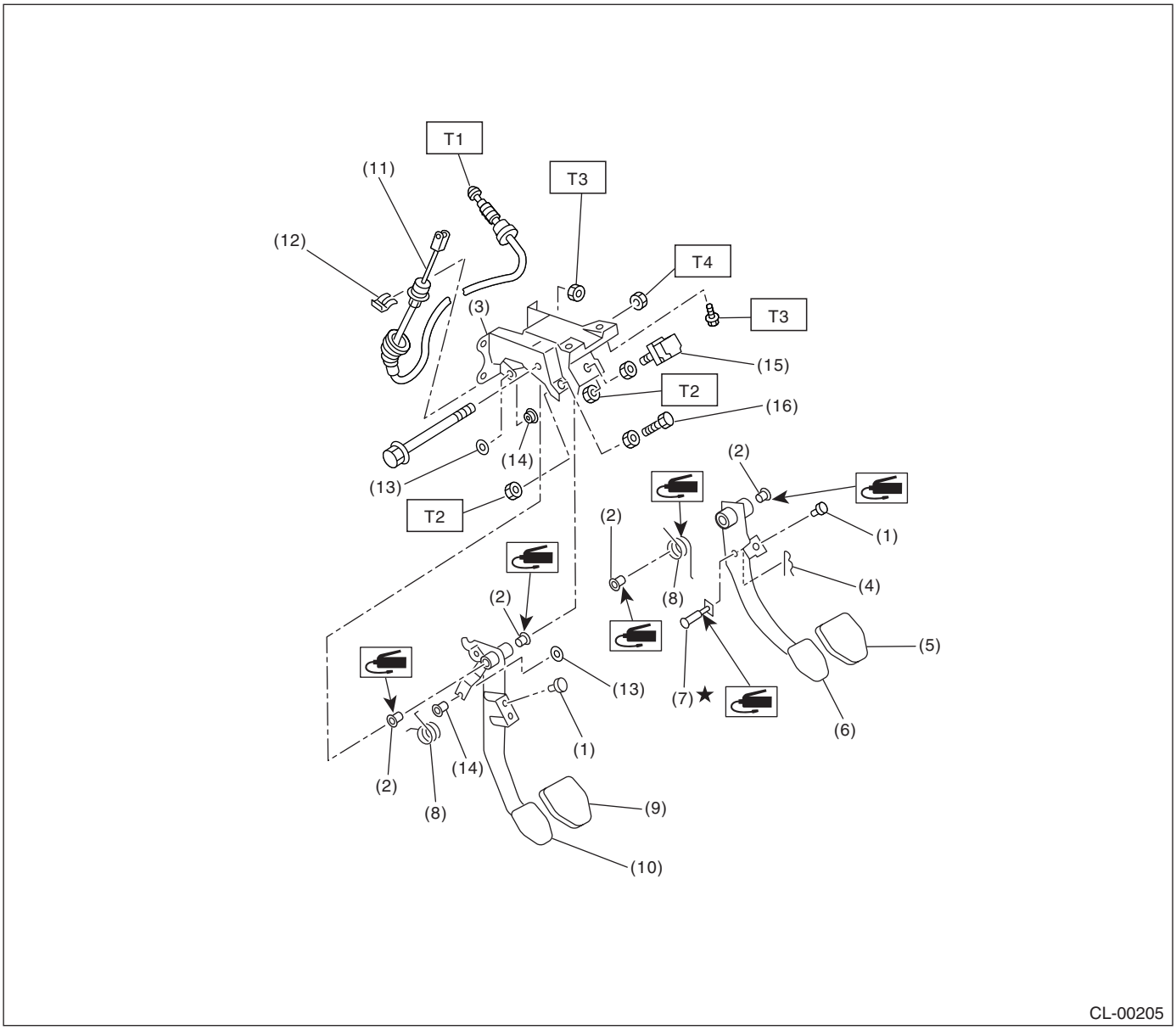
• LHD 2.0 L MODEL



(1) Stopper
(2) Bushing
(3) Spring pin
(4) Snap pin
(5) Brake pedal pad
(6) Brake pedal
(7) Clevis pin
(8) Brake pedal spring
(9) Clutch pedal pad
(10) Clutch pedal
(11) Bushing C
(12) Clutch clevis pin
(13) Assist rod A
(14) Clip
(15) Assist spring
(16) Assist bushing
(17) Assist rod B
(18) Spring A
(19) Rod
(20) Bushing B
(21) Clip
(22) Stop light switch
(23) Pedal bracket
(24) Clutch master cylinder bracket
(25) Lever
(26) Adjust bolt
(27) Clutch switch (With cruise control)

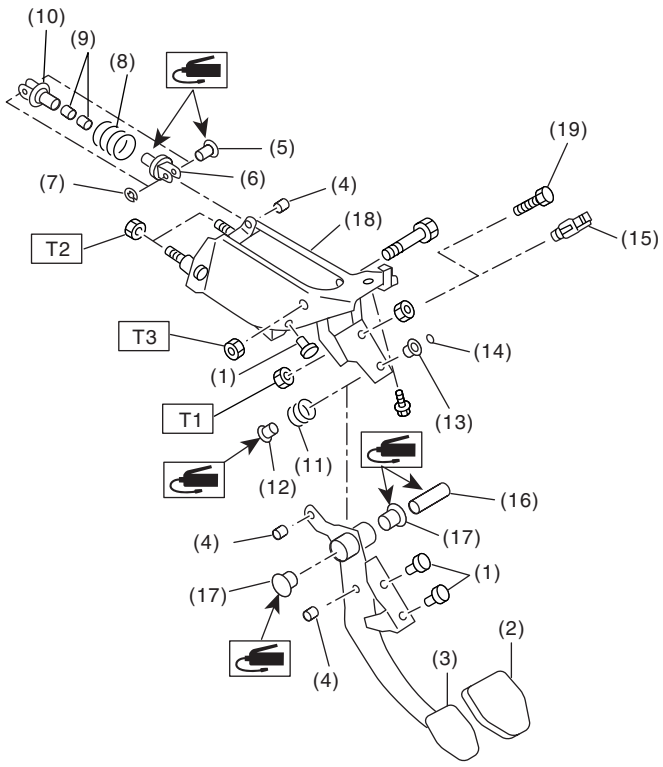
Tightening torque: N·m (kgf-m, ft-lb)
T1: 8 (0.8, 5.8)
T2: 18 (1.8, 13.0)

• LHD 1.6 L MODEL



(1)	Stopper	(9)	Clutch pedal pad	***Tightening torque: N·m (kgf-m, ft-lb)***	
(2)	Bushing	(10)	Clutch pedal	***T1:***	***6 (0.6, 4.4)***
(3)	Clutch pedal bracket	(11)	Clutch cable	***T2:***	***8 (0.8, 5.8)***
(4)	Snap pin	(12)	Clutch cable clamp	***T3:***	***18 (1.8, 13.0)***
(5)	Brake pedal pad	(13)	Clip	***T4:***	***30 (3.1, 22.4)***
(6)	Brake pedal	(14)	Spring assist		
(7)	Clevis pin	(15)	Stop light switch		
(8)	Spring	(16)	Adjust bolt		

• RHD 2.0 L AND 2.5 L MODEL

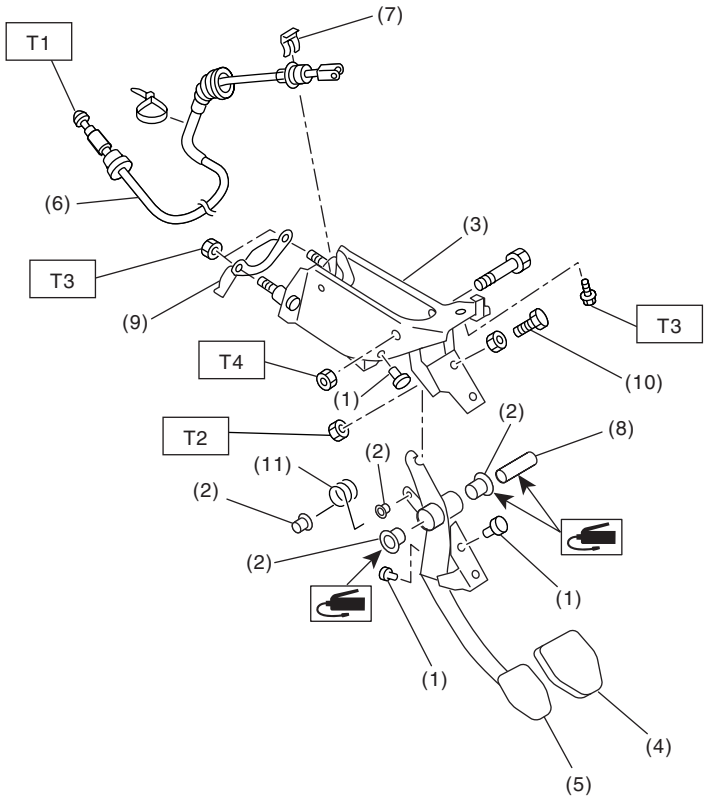


CL-00111

(1) Stopper
(2) Clutch pedal pad
(3) Clutch pedal
(4) Bushing
(5) Clutch clevis pin
(6) Assist rod A
(7) Clip
(8) Assist spring
(9) Assist bushing
(10) Assist rod B
(11) Spring A
(12) Rod S
(13) Bushing B
(14) O-ring
(15) Clutch switch (With cruise control)
(16) Spacer
(17) Bushing
(18) Clutch pedal bracket

Tightening torque: N·m (kgf-m, ft-lb)	
T1:	*8 (0.8, 5.8)*
T2:	*18 (1.8, 13.0)*
T3:	*30 (3.1, 22.4)*

• RHD 1.6 L MODEL



CL-00206

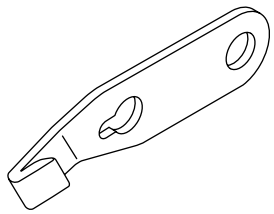
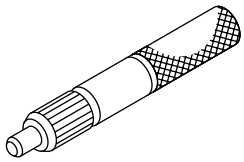
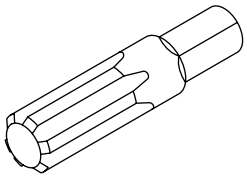
(1)	Stopper	(7)	Clutch cable clamp	***Tightening torque: N·m (kgf-m, ft-lb)***
(2)	Bushing	(8)	Spacer	***T1: 6 (0.6, 4.4)***
(3)	Clutch pedal bracket	(9)	Bracket	***T2: 8 (0.8, 5.8)***
(4)	Clutch pedal pad	(10)	Adjust bolt	***T3: 18 (1.8, 13.0)***
(5)	Clutch pedal	(11)	Spring	***T4: 30 (3.1, 22.4)***
(6)	Clutch cable			

C: CAUTION

• Wear working clothing, including a cap, protective goggles and protective shoes during operation.
• Remove contamination including dirt and corrosion before removal, installation or disassembly.
• Keep the disassembled parts in order and protect them from dust or dirt.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly, and replacement.
• Be careful not to burn, because each part on the vehicle is hot after running.
• Use specified fluid, grease etc. or the equivalent. Do not mix fluid, grease etc. with that of another grade or from other manufacturers.
• Be sure to tighten fasteners including bolts and nuts to the specified torque.
• Place shop jacks or rigid racks at the specified points.
• Apply grease onto sliding or revolution surfaces before installation.
• Before installing O-rings or snap rings, apply sufficient amount of fluid to avoid damage and deformation.
• Before securing a part on a vise, place cushioning material such as wood blocks, aluminum plate, or shop cloth between the part and the vise.
• Keep fluid away from the vehicle body. If any fluid contacts the vehicle body, immediately flush the area with water.

D: PREPARATION TOOL

1. SPECIAL TOOLS

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498497100	498497100	CRANKSHAFT STOPPER	Used for stopping rotation of flywheel when loosening tightening bolt, etc.
 ST-499747100	499747100	CLUTCH DISC GUIDE	Used when installing clutch disc to flywheel.
 ST-499057000	499057000	TORX PLUS®	• Used for removing flywheel (Dual mass flywheel type). • For 2.5 L model.

2. GENERAL PURPOSE TOOLS

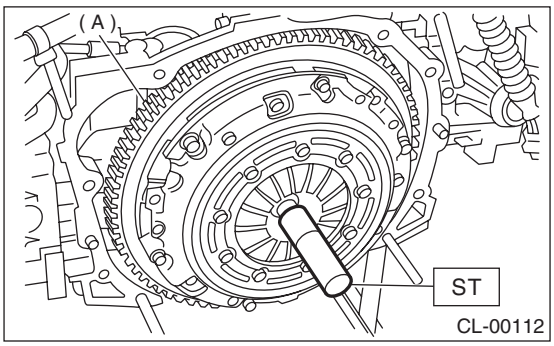
TOOL NAME	REMARKS
Circuit Tester	Used for measuring resistance, voltage and ampere.
Dial Gauge	Used for measuring clutch disk run-out.
Depth Gauge	Used for measuring clutch disk wear.

2. Clutch Disc and Cover

A: REMOVAL

1. 2.5 L MODEL

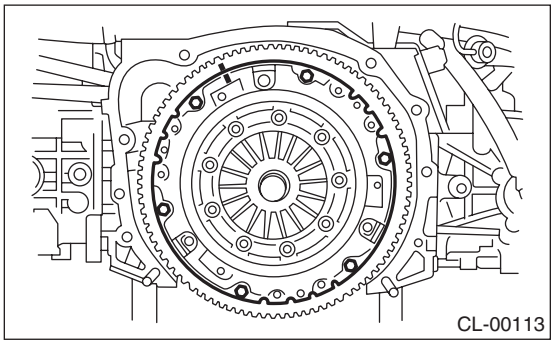
1) Remove the transmission assembly from vehicle body. <Ref. to 5MT-36, REMOVAL, Manual Transmission Assembly.>
2) Install the ST on flywheel.
ST 499747100 CLUTCH DISC GUIDE



(A) Dual mass flywheel

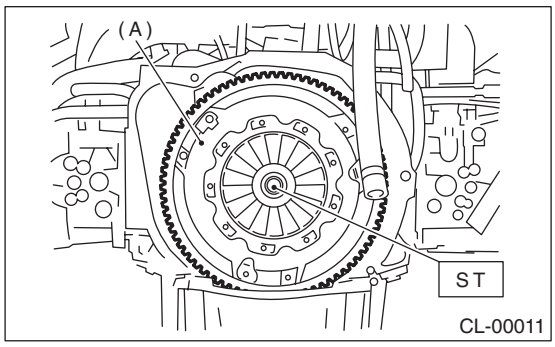
3) Remove the clutch cover and clutch disc.

NOTE:
• Take care not to allow oil on the clutch disc facing.
• Do not disassemble either the clutch cover or clutch disc.
• Put match marks to the flywheel and clutch cover before removing the clutch cover.



2. EXCEPT 2.5 L MODEL

1) Remove the transmission assembly from vehicle body. <Ref. to 5MT-36, REMOVAL, Manual Transmission Assembly.>
2) Install the ST on flywheel.
ST 499747100 CLUTCH DISC GUIDE



(A) Clutch cover

3) Remove the clutch cover and clutch disc.

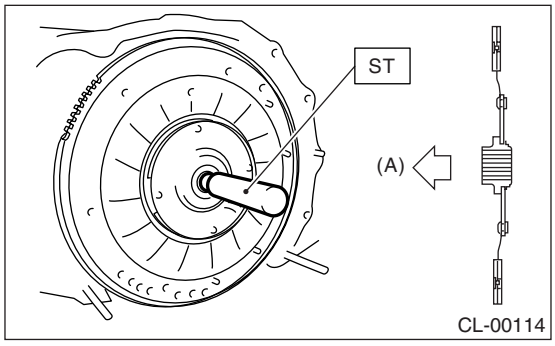
NOTE:
• Take care not to allow oil on the clutch disc facing.
• Do not disassemble either the clutch cover or clutch disc.
• Put match marks to the flywheel and clutch cover before removing the clutch cover.

B: INSTALLATION

1. 2.5 L MODEL

1) Insert the ST into clutch disc and install them on the flywheel by inserting the ST end into pilot bearing.

NOTE:
When installing the clutch disc, be careful to its direction.
ST 499747100 CLUTCH DISC GUIDE

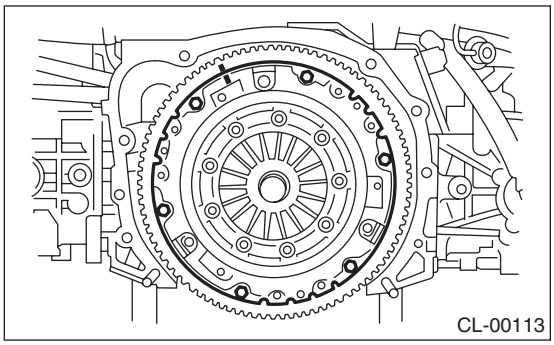


(A) Flywheel side

2) Install the clutch cover on flywheel and tighten the bolts to specified torque.

NOTE:
• Align match marks when reassemble.
• Note the front and rear of the clutch disc when installing.
• Tighten the clutch cover installing bolts gradually. Each bolt should be tightened to the specified torque in a crisscross fashion.

Tightening torque:
16 N·m (1.6 kgf-m, 11.8 ft-lb)

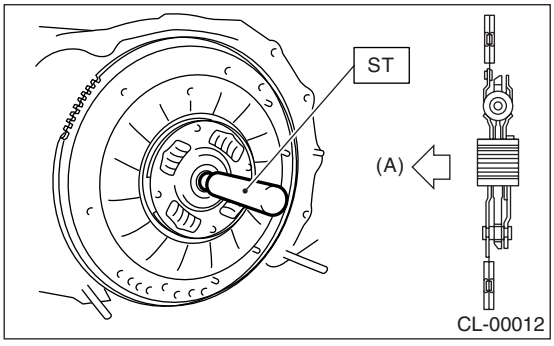


3) Remove the ST.
ST 499747100 CLUTCH DISC GUIDE
4) Install the transmission assembly. <Ref. to 5MT-39, INSTALLATION, Manual Transmission Assembly.>

2. EXCEPT 2.5 L MODEL

1) Insert the ST into clutch disc and install them on the flywheel by inserting the ST end into pilot bearing.

NOTE:
When installing the clutch disc, be careful to its direction.
ST 499747100 CLUTCH DISC GUIDE

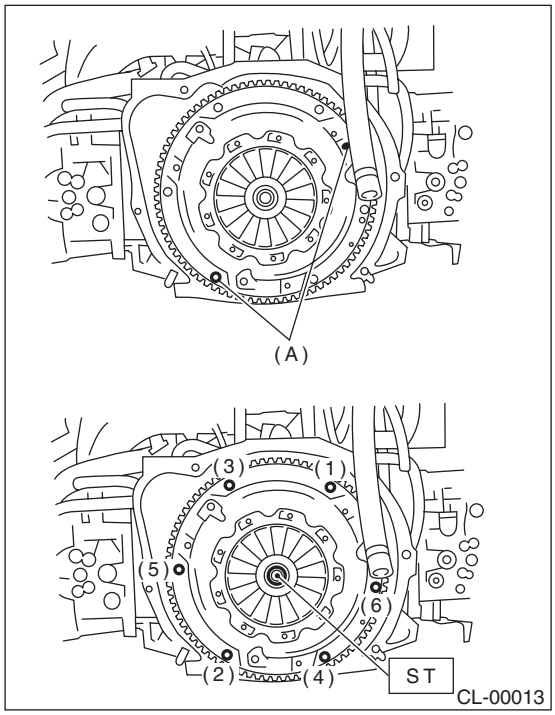


(A) Flywheel side

2) Install the clutch cover on flywheel and tighten the bolts to specified torque.

NOTE:
• When reinstalling, align the match marks.
• When installing the clutch cover on flywheel without the match marks, position the clutch cover so that there is a gap of 120° or more between “0” marks on the flywheel and clutch cover. (“0” marks indicate the directions of residual unbalance.)
• Note the front and rear of the clutch disc when installing.
• Temporarily tighten the bolts by hand. Each bolt should be tightened to the specified torque in a crisscross fashion.

Tightening torque:
16 N·m (1.6 kgf-m, 11.8 ft-lb)



(A) “0” marks (Paint)

3) Remove the ST.
ST 499747100 CLUTCH DISC GUIDE
4) Install the transmission assembly. <Ref. to 5MT-39, INSTALLATION, Manual Transmission Assembly.>

C: INSPECTION

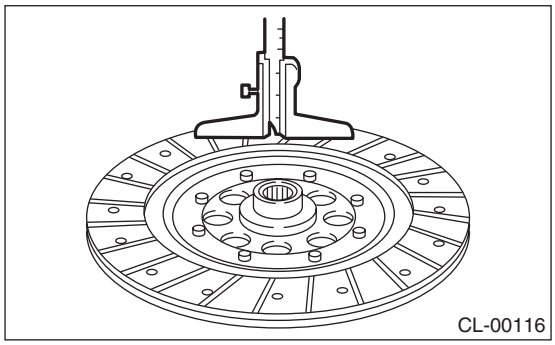
1. CLUTCH DISC

1) Facing wear
Measure the depth of rivet head from the surface of facing. Replace if facings are worn locally or worn down to less than the specified value.

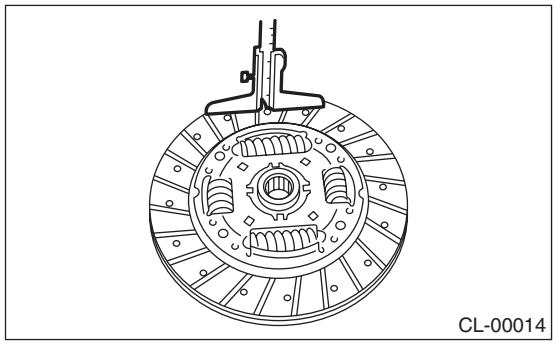
Depth of rivet head:
Limit of sinking
0.3 mm (0.012 in)

NOTE:
Do not wash the clutch disc with any cleaning fluid.

- 2.5 L MODEL

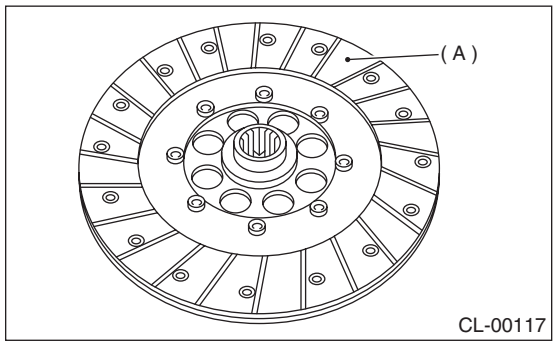


- Except 2.5 L MODEL



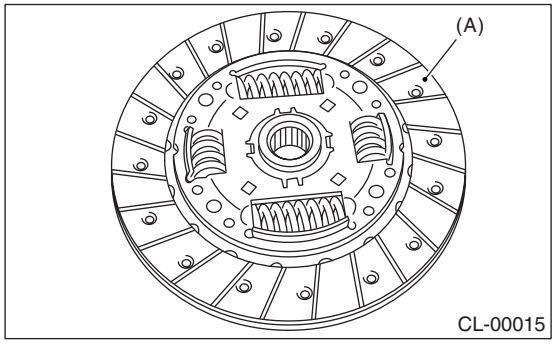
2) Hardened facing
Correct by using emery paper or replace.
3) Oil soakage on facing
Replace the clutch disc and inspect the transmission front oil seal, transmission case mating surface, engine rear oil seal and other points for oil leakage.

- 2.5 L MODEL



(A) Clutch facing

- Except 2.5 L MODEL

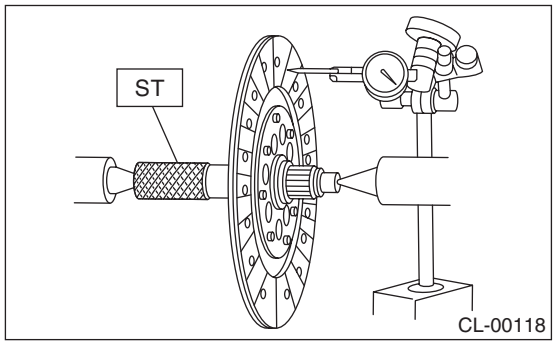


(A) Clutch facing

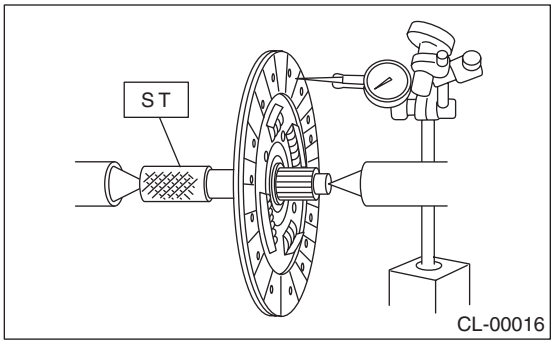
4) Deflection on facing
If deflection exceeds the specified value at the outer circumference of facing, repair or replace.
ST 499747100 CLUTCH DISC GUIDE

Limit for deflection:
1.6 L model
0.8 mm (0.031 in) at R = 107 mm (4.21 in)
2.0 L model
0.8 mm (0.031 in) at R = 110 mm (4.33 in)
2.5 L model
1.0 mm (0.039 in) at R = 110 mm (4.33 in)

- 2.5 L MODEL

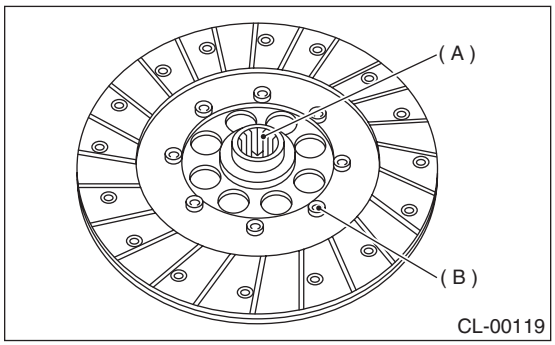


• Except 2.5 L MODEL

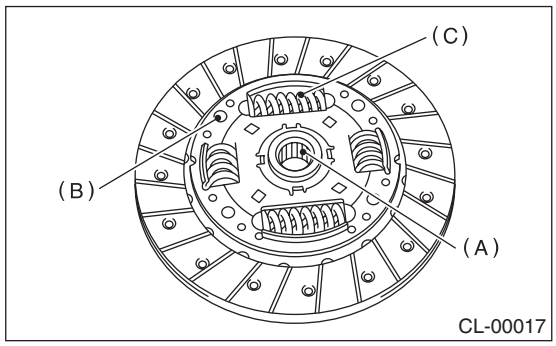


5) Worn spline, loose rivets and torsion spring failure, and replace defective parts.

• 2.5 L MODEL



• Except 2.5 L MODEL



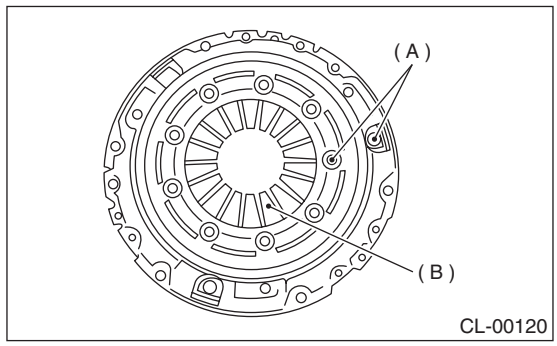
(A) Spline
(B) Rivet
(C) Torsion spring

2. CLUTCH COVER

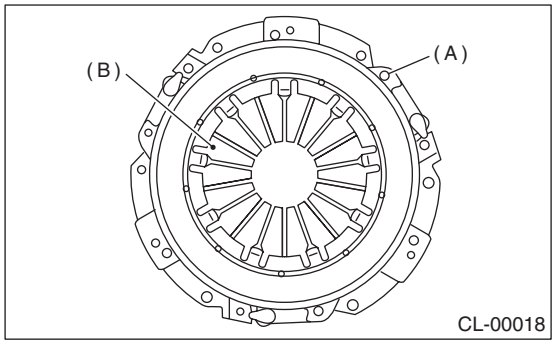
NOTE:
Visually check for the following items without disassembling, and replace or repair if defective.

1) Loose thrust rivet.
2) Damaged or worn bearing contact area at center of diaphragm spring.

• 2.5 L MODEL



• Except 2.5 L MODEL



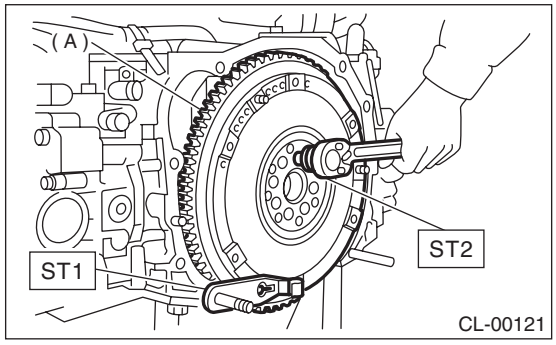
(A) Thrust rivet
(B) Diaphragm spring

3. Flywheel

A: REMOVAL

1. 2.5 L MODEL

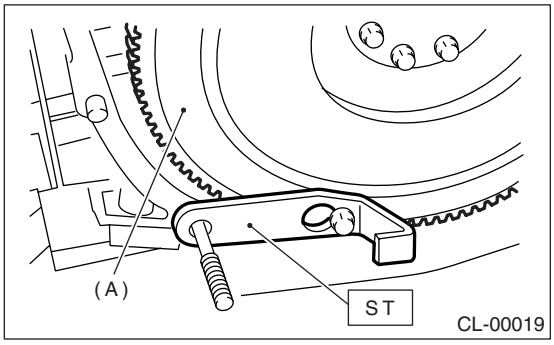
1) Remove the transmission assembly. <Ref. to 5MT-36, REMOVAL, Manual Transmission Assembly.>
2) Remove the clutch cover and clutch disc. <Ref. to CL-20, REMOVAL, Clutch Disc and Cover.>
3) Remove the flywheel using ST1 and ST2.
ST1 498497100 CRANKSHAFT STOPPER
ST2 499057000 TORX PLUS®



(A) Flywheel

2. EXCEPT 2.5 L MODEL

1) Remove the transmission assembly. <Ref. to 5MT-36, REMOVAL, Manual Transmission Assembly.>
2) Remove the clutch cover and clutch disc. <Ref. to CL-20, REMOVAL, Clutch Disc and Cover.>
3) Using the ST, remove the flywheel.
ST 498497100 CRANKSHAFT STOPPER

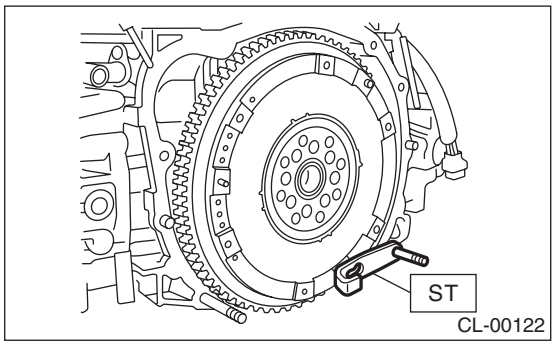


(A) Flywheel

B: INSTALLATION

1. 2.5 L MODEL

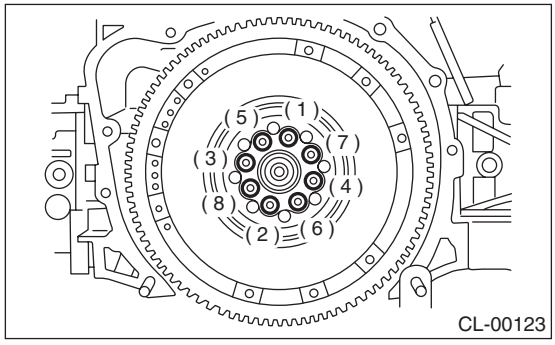
1) Install the flywheel and ST.
ST 498497100 CRANKSHAFT STOPPER



2) Tighten the flywheel attaching bolts to the specified torque.
ST 499057000 TORX PLUS®

NOTE:
Tighten the flywheel installing bolts gradually. Each bolt should be tightened to the specified torque in a crisscross fashion.

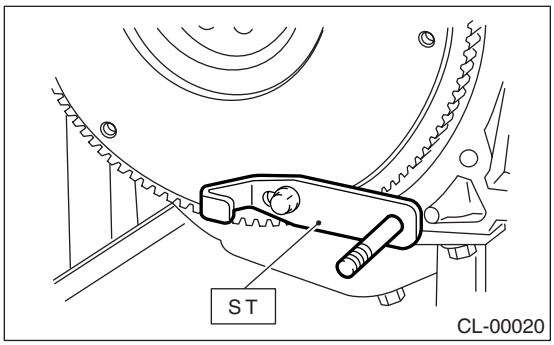
Tightening torque:
72 N·m (7.3 kgf-m, 52.8 ft-lb)



3) Install the clutch disc and cover. <Ref. to CL-20, 2.5 L MODEL, INSTALLATION, Clutch Disc and Cover.>
4) Install the transmission assembly. <Ref. to 5MT-39, INSTALLATION, Manual Transmission Assembly.>

2. EXCEPT 2.5 L MODEL

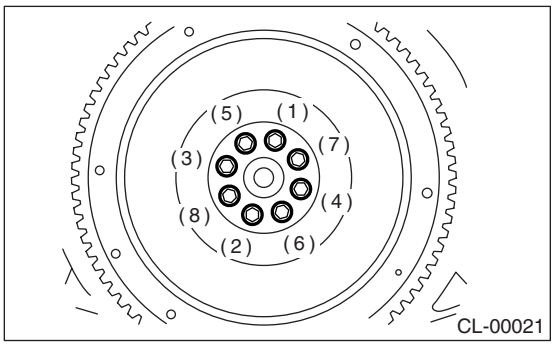
1) Install the flywheel and ST.
ST 498497100 CRANKSHAFT STOPPER



2) Tighten the flywheel attaching bolts to the specified torque.

NOTE:
Tighten the flywheel installing bolts gradually. Each bolt should be tightened to the specified torque in a crisscross fashion.

Tightening torque:
Except STi model
72 N·m (7.3 kgf-m, 52.8 ft-lb)
STi model
75 N·m (7.4 kgf-m, 55.3 ft-lb)



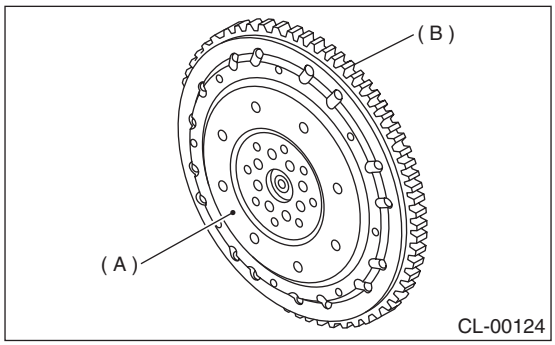
3) Install the clutch disc and cover. <Ref. to CL-21, EXCEPT 2.5 L MODEL, INSTALLATION, Clutch Disc and Cover.>
4) Install the transmission assembly. <Ref. to 5MT-39, INSTALLATION, Manual Transmission Assembly.>

C: INSPECTION

CAUTION:
Since this bearing is grease sealed and is of a non-lubrication type, do not wash with gasoline or any solvent.

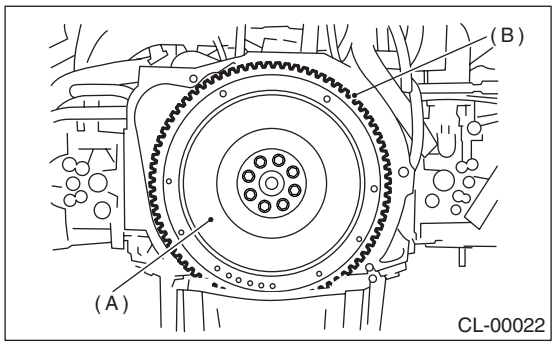
1) Damage of facing and ring gear
If defective, replace the flywheel.

- 2.5 L MODEL



(A) Flywheel
(B) Ring gear

- Except 2.5 L MODEL



(A) Flywheel
(B) Ring gear

2) Smoothness of rotation
Rotate the ball bearing applying pressure in thrust direction.
3) If noise or excessive play is noted, replace the flywheel.

4. Release Bearing and Lever

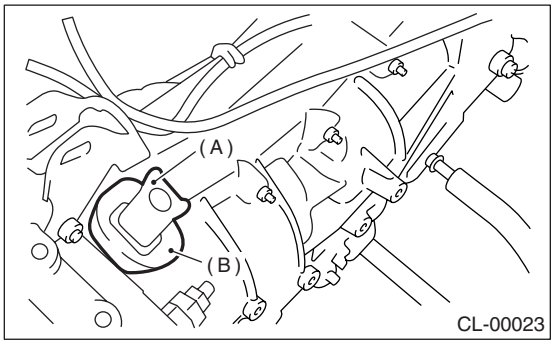
A: REMOVAL

1. NON-TURBO MODEL

1) Remove the transmission assembly from vehicle body.
<Ref. to 5MT-36, REMOVAL, Manual Transmission Assembly.>
2) Remove the two clips from clutch release lever and remove the release bearing.

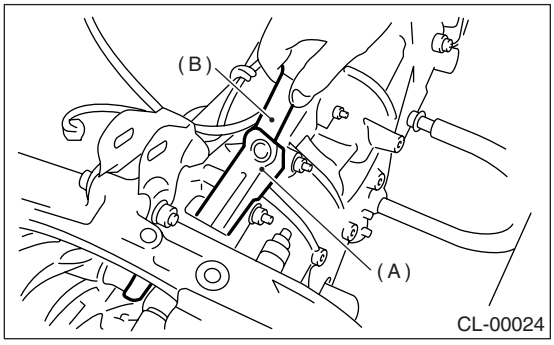
CAUTION:
Be careful not to deform clips.

3) Remove the dust cover.



(A) Clutch release lever
(B) Dust cover

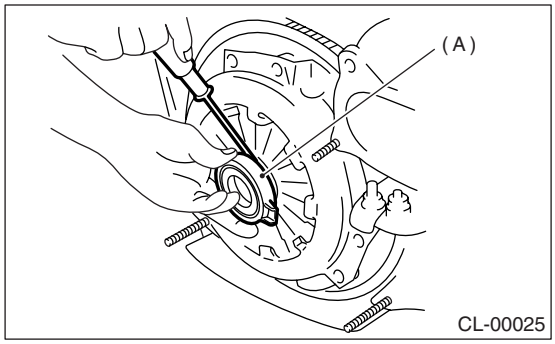
4) Remove the release lever retainer spring from release lever pivot with a screwdriver by accessing it through clutch housing release lever hole. Then remove the release lever.



(A) Clutch release lever
(B) Screwdriver

2. TURBO MODEL

1) Remove the transmission assembly from vehicle body. <Ref. to 5MT-36, REMOVAL, Manual Transmission Assembly.>
2) Remove the clutch release lever from transmission.
3) Put the clutch release bearing in engine side.
4) Remove the clutch release bearing from the clutch cover using flat-type screwdriver.



(A) Clutch release bearing

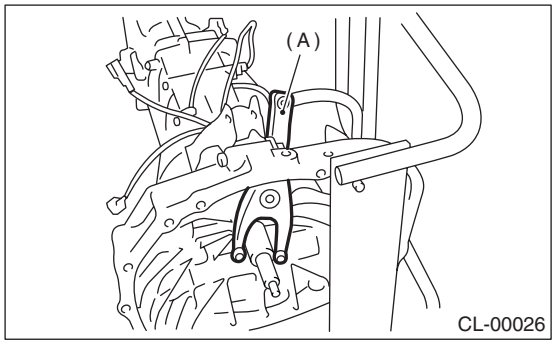
B: INSTALLATION

1. NON-TURBO MODEL

NOTE:
Before or during assembling, lubricate the following points with a light coat of grease.
- Contact surface of lever and pivot
- Contact surface of lever and bearing
- Transmission main shaft spline (Use grease containing molybdenum disulphide.)

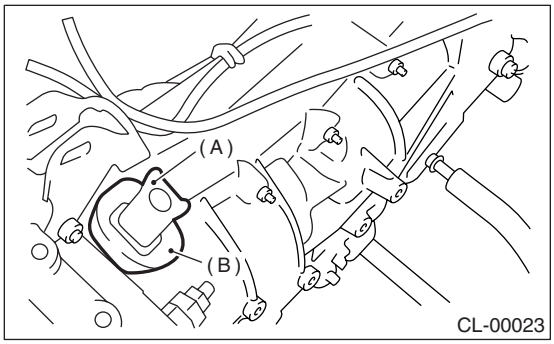
1) While pushing the release lever to pivot and twisting it to both sides, fit the retainer spring onto the constricted portion of pivot.

NOTE:
- Apply grease (KOPR-KOTE: Part No. 003603001) to the contact point of release lever and operating cylinder.
- Confirm that the retainer spring is securely fitted by observing it through the main case hole.



(A) Release lever

2) Install the release bearing and fasten it with two clips.
3) Install the dust cover.

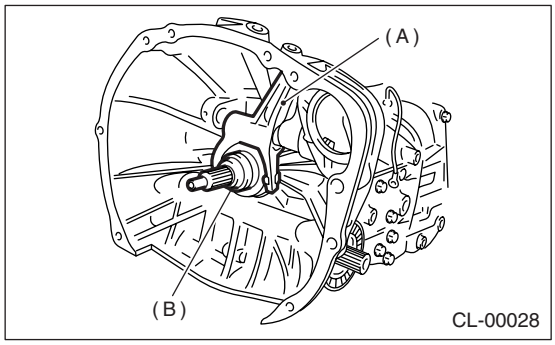


(A) Release lever
(B) Dust cover

4) Install the transmission assembly.
<Ref. to 5MT-39, INSTALLATION, Manual Transmission Assembly.>

2. TURBO MODEL

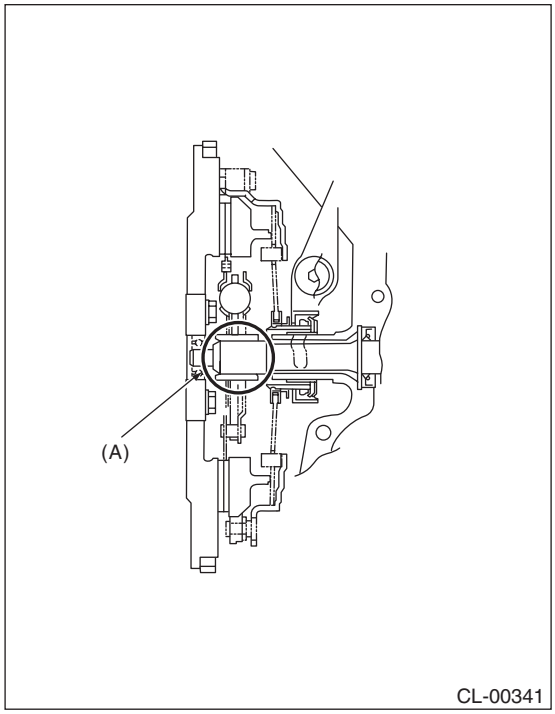
1) Install the release bearing on transmission.
2) Insert the release fork into release bearing tab.



(A) Release fork
(B) Release bearing

3) Apply grease to the specified points.

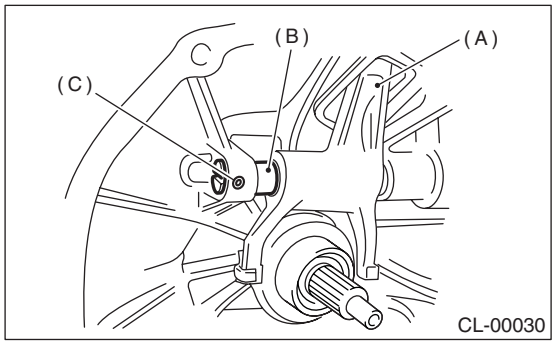
Grease:
NICHIMOLY N-130



(A) Spline

4) Insert the release fork shaft into release fork.

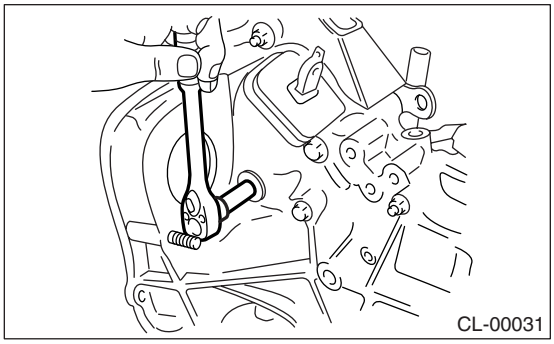
NOTE:
Make sure the cutout portion of release fork shaft contacts spring pin.



(A) Release fork
(B) Release shaft
(C) Spring pin

5) Tighten the plug.

Tightening torque:
44 N·m (4.5 kgf-m, 32.5 ft-lb)



6) Install the transmission assembly. <Ref. to 5MT-39, INSTALLATION, Manual Transmission Assembly.>

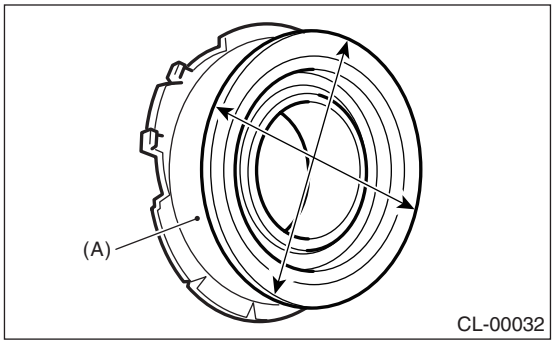
C: INSPECTION

1. RELEASE BEARING

NOTE:
Since this bearing is grease sealed and is of a non-lubrication type, do not wash with gasoline or any solvent when servicing the clutch.

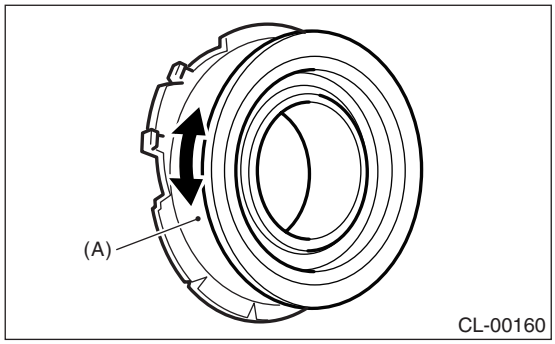
1) Check the bearing for smooth movement by applying force in the radial direction.

Radial direction stroke:
1.4 mm (0.055 in)



(A) Bearing case

2) Check the bearing for smooth rotation by applying pressure in the thrust direction.

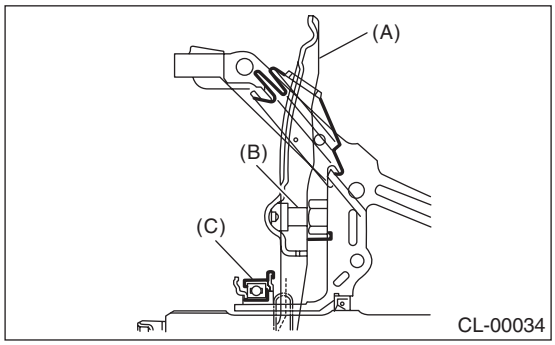


(A) Bearing case

3) Check wear and damage of the bearing case surface contacting with lever.

2. RELEASE LEVER

1) Check the lever pivot portion and the point of contact with release bearing case for wear.



(A) Clutch release lever
(B) Pivot
(C) Clutch release bearing

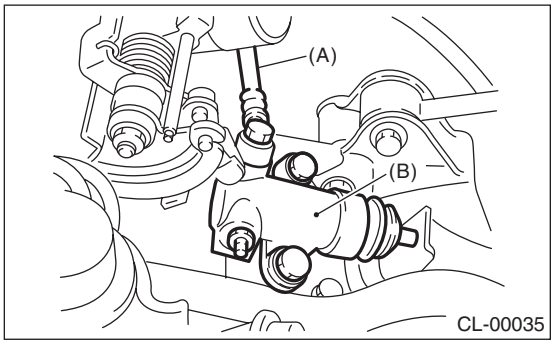
5. Operating Cylinder

A: REMOVAL

1) Remove the air cleaner case and air intake duct (Non-turbo model). <Ref. to IN(H4SO)-5, REMOVAL, Air Cleaner Case.> and <Ref. to IN(H4SO)-6, REMOVAL, Air Intake Duct.>
2) Remove the intercooler (Turbo model). <Ref. to IN(H4DOTC)-12, REMOVAL, Intercooler.>
3) Remove the clutch hose from operating cylinder.

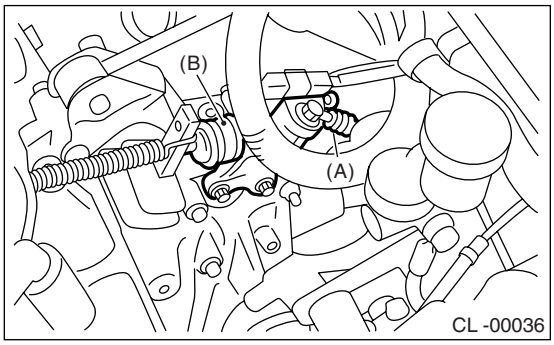
CAUTION:
Cover the hose joint to prevent clutch fluid from flowing out.

- NON-TURBO MODEL



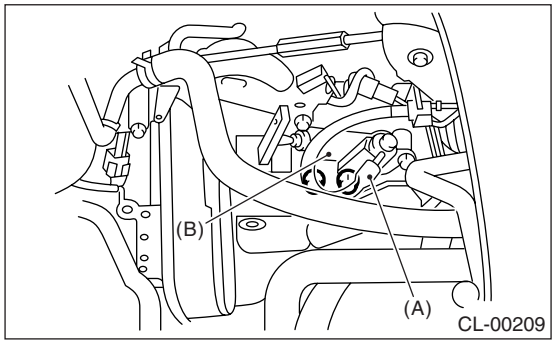
(A) Clutch hose
(B) Operating cylinder

- TURBO MODEL (Except STi model)



(A) Clutch hose
(B) Operating cylinder

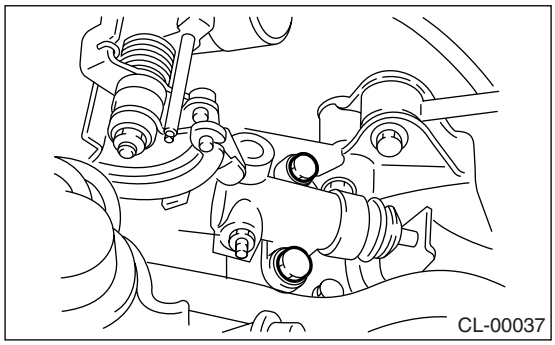
- STi MODEL



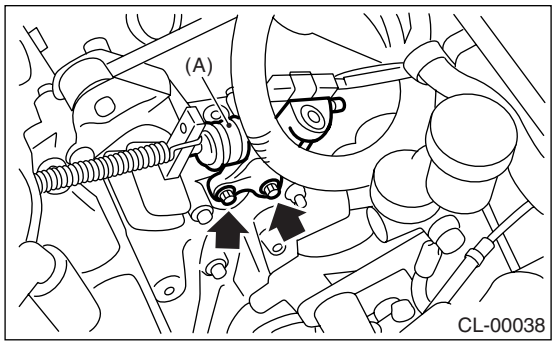
(A) Clutch hose
(B) Operating cylinder

4) Remove the operating cylinder from transmission.

- NON-TURBO MODEL

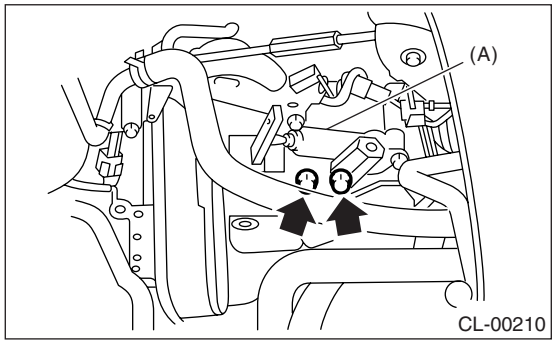


- TURBO MODEL (Except STi model)



(A) Operating cylinder

• STi MODEL



(A) Operating cylinder

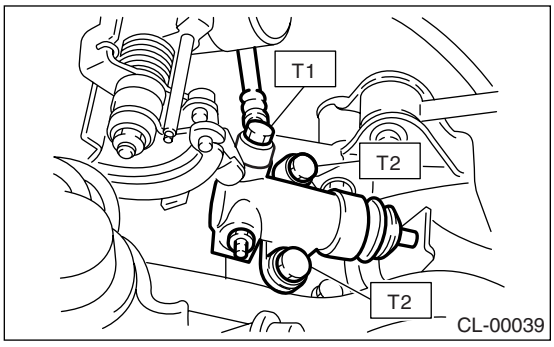
B: INSTALLATION

1) Install in the reverse order of removal.

NOTE:
Before installing the operating cylinder, apply grease (KOPR-KOTE: Part No. 003603001) to contact point of the release lever and operating cylinder.

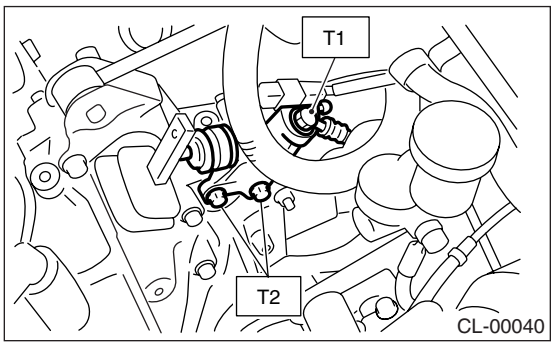
• NON-TURBO MODEL

Tightening torque:
T1: 18 N·m (1.8 kgf-m, 13.0 ft-lb)
T2: 37 N·m (3.8 kgf-m, 27.5 ft-lb)



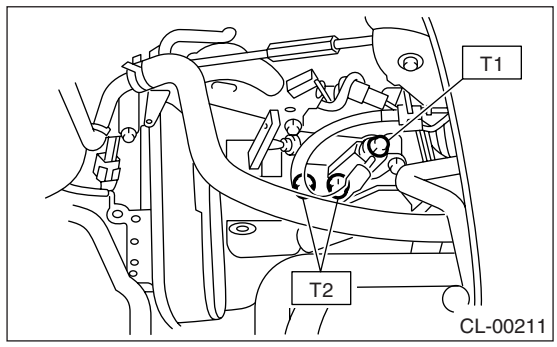
• TURBO MODEL (Except STi model)

Tightening torque:
T1: 18 N·m (1.8 kgf-m, 13.0 ft-lb)
T2: 37 N·m (3.8 kgf-m, 27.5 ft-lb)

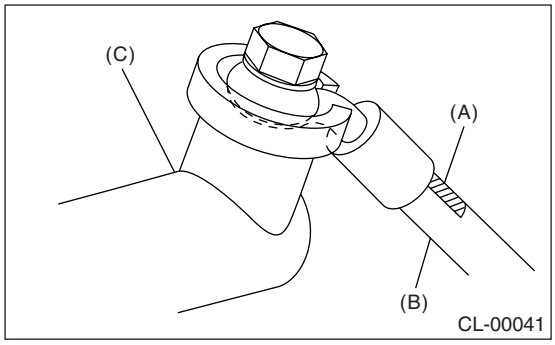


• STi MODEL

Tightening torque:
T1: 18 N·m (1.8 kgf-m, 13.0 ft-lb)
T2: 41 N·m (4.2 kgf-m, 30.2 ft-lb)



NOTE:
• Be sure to install the clutch hose with the mark side facing upward.
• Be careful not to twist the clutch hose during installation.



(A) Marking
(B) Clutch hose
(C) Operating cylinder

2) After bleeding air from the operating cylinder, ensure that clutch operates properly.
<Ref. to CL-37, Clutch Fluid Air Bleeding.>

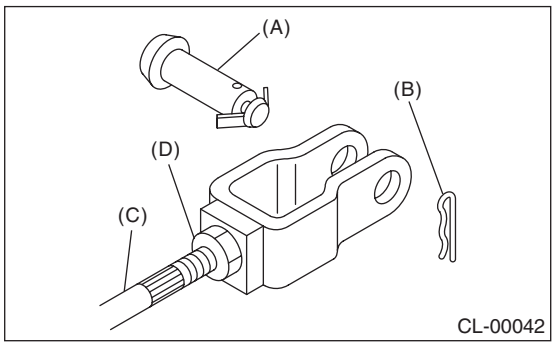
C: INSPECTION

1) Check the operating cylinder for damage. If operating cylinder is damaged, replace it.
2) Check the operating cylinder for fluid leakage or damage on boot. If any leakage or damage is found, replace the operating cylinder.

6. Master Cylinder

A: REMOVAL

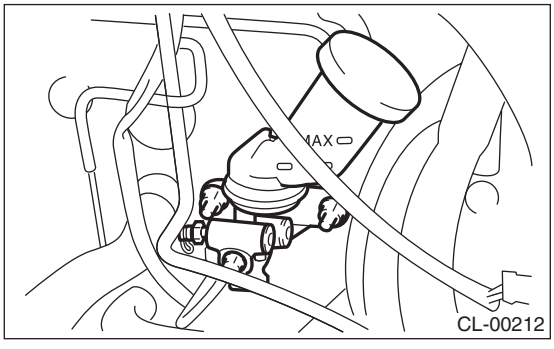
1) Thoroughly drain the brake fluid from reservoir tank.
2) Remove the snap pin, clevis pin and separate the push rod of master cylinder from clutch pedal.



(A) Clevis pin
(B) Snap pin
(C) Push rod
(D) Lock nut

3) Remove the air cleaner case and air intake duct (Non-turbo model). <Ref. to IN(H4SO)-5, REMOVAL, Air Cleaner Case.> and <Ref. to IN(H4SO)-6, REMOVAL, Air Intake Duct.>
4) Remove the intercooler (Turbo model). <Ref. to IN(H4DOTC)-12, REMOVAL, Intercooler.>
5) Remove the clutch pipe from master cylinder.
6) Remove the master cylinder with reservoir tank.

CAUTION:
Be extremely careful not to spill brake fluid. Brake fluid spilt on the vehicle body will harm the paint surface; if any fluid contacts the vehicle body, immediately flush the area with water.

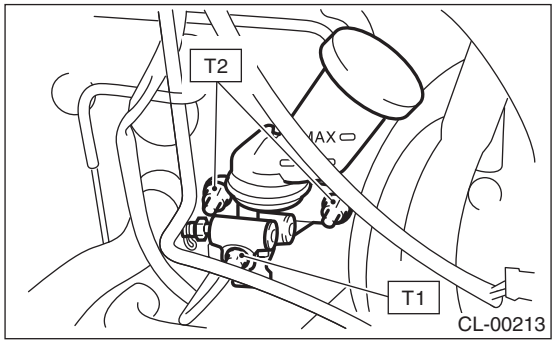


B: INSTALLATION

1) Install the master cylinder to body, and install the clutch pipe to master cylinder.

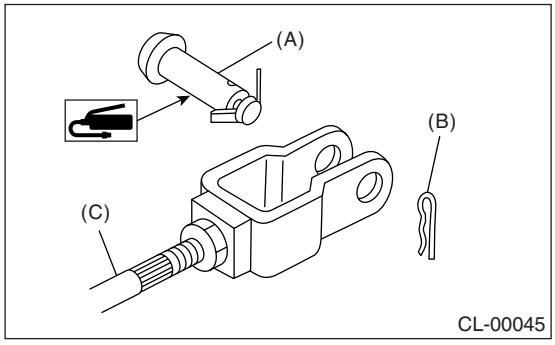
NOTE:
Check that the pipe is routed properly.

Tightening torque:
T1: 15 N·m (1.5 kgf-m, 10.8 ft-lb)
T2: 18 N·m (1.8 kgf-m, 13.0 ft-lb)



2) Connect the push rod of master cylinder to clutch pedal, and install the clevis pin and snap pin.

NOTE:
Apply grease to the clevis pin.



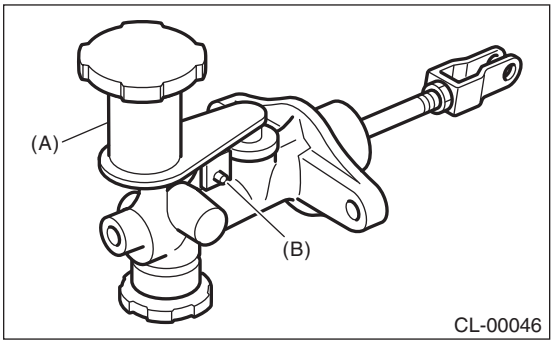
(A) Clevis pin
(B) Snap pin
(C) Push rod

3) After bleeding air from the system, ensure that clutch operates properly.
<Ref. to CL-37, Clutch Fluid Air Bleeding.>
4) Install the air cleaner case and air intake duct (Non-turbo model). <Ref. to IN(H4SO)-5, INSTALLATION, Air Cleaner Case.> and <Ref. to IN(H4SO)-6, INSTALLATION, Air Intake Duct.>
5) Install the intercooler (Turbo model). <Ref. to IN(H4DOTC)-12, INSTALLATION, Intercooler.>

C: DISASSEMBLY

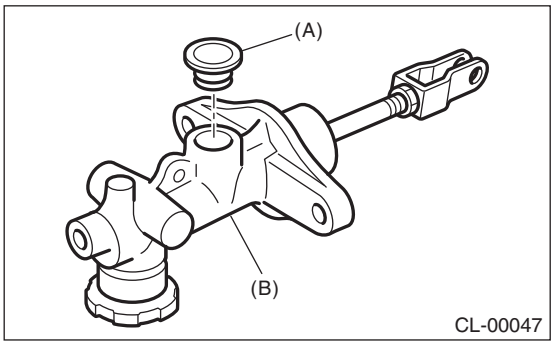
1. EXCEPT RHD TURBO MODEL

1) Remove the straight pin and reservoir tank.



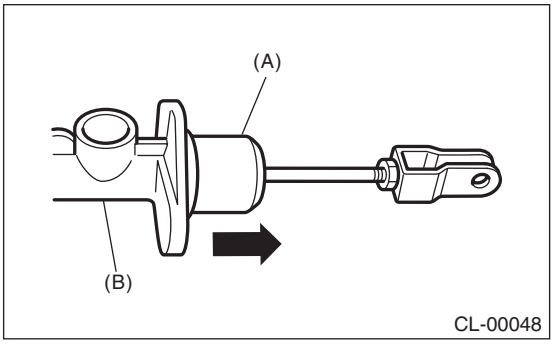
(A) Reservoir tank
(B) Straight pin

2) Remove the oil seal.



(A) Oil seal
(B) Master cylinder

3) Move the cylinder boot backward.



(A) Cylinder boot
(B) Master cylinder

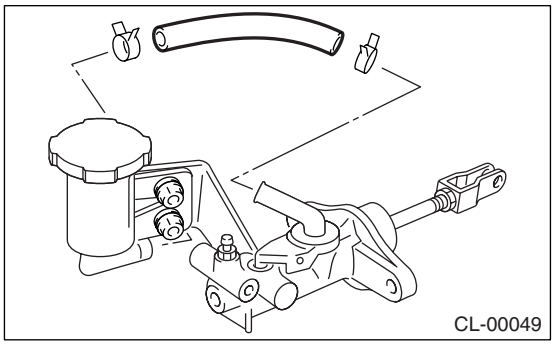
4) Remove the piston stop ring.

CAUTION:
Be careful when removing the piston stop ring to prevent the rod, washer, piston and return spring from flying out.

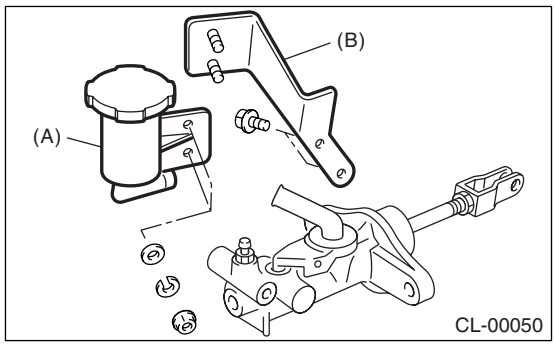
5) Remove the clutch damper.

2. RHD TURBO MODEL

1) Remove the hose.

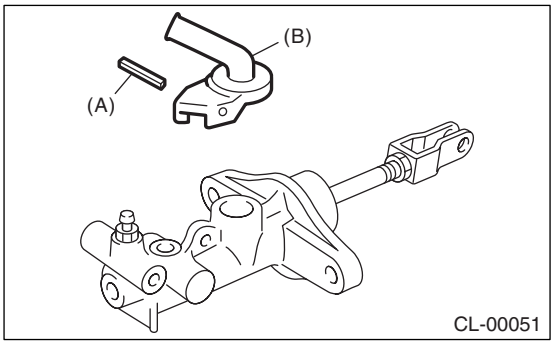


2) Remove the reservoir tank and bracket.



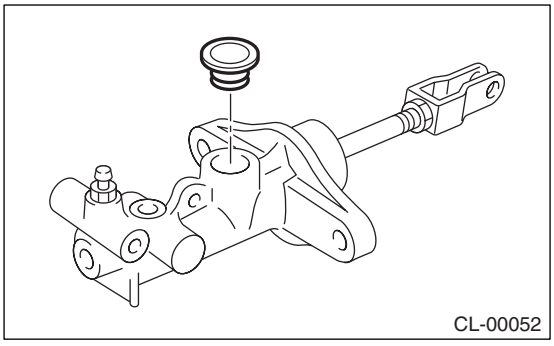
(A) Reservoir tank
(B) Bracket

3) Remove the straight pin and adapter.

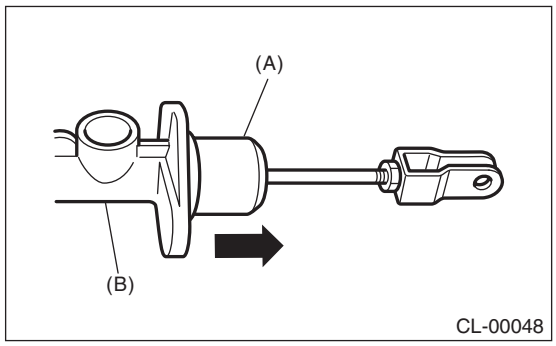


(A) Straight pin
(B) Adapter

4) Remove the oil seal.



5) Move the cylinder boot backward.



(A) Cylinder boot
(B) Master cylinder

6) Remove the piston stop ring.

CAUTION:
Be careful when removing the piston stop ring to prevent the rod, washer, piston and return spring from flying out.

7) Remove the air bleeder.

D: ASSEMBLY

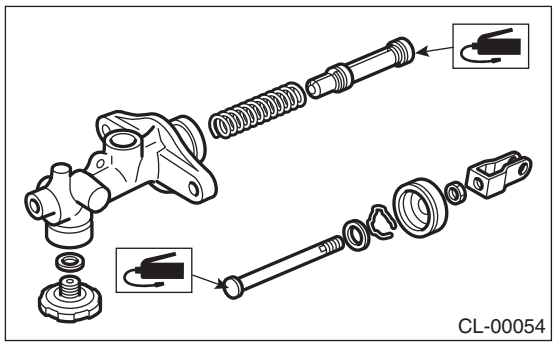
1. EXCEPT RHD TURBO MODEL

1) Install the clutch damper.

Tightening torque:
46.6 N·m (4.75 kgf-m, 34.4 ft-lb)

2) Apply a coat of grease to the contacting surfaces of the push rod and piston before installation.

Grease:
SILICONE GREASE G40M (Part No. 004404003)



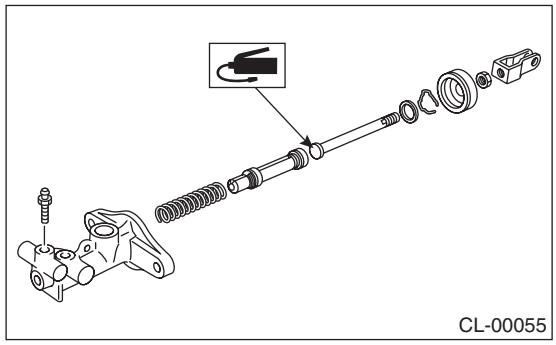
3) To assemble the master cylinder, reverse the sequence of disassembly procedure.

Tightening torque:
10 N·m (1.0 kgf-m, 7 ft-lb)

2. RHD TURBO MODEL

1) Apply a coat of grease to the contacting surfaces of the push rod and piston before installation.

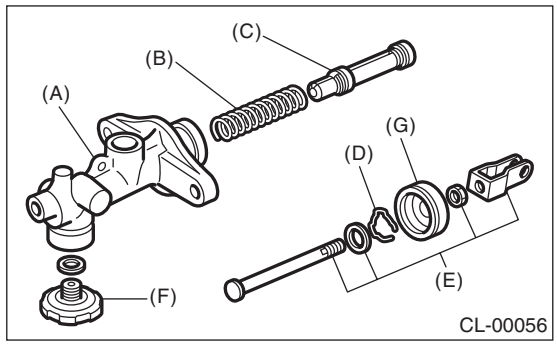
Grease:
SILICONE GREASE G40M (Part No. 004404003)



2) Assemble in the reverse order of disassemble.

E: INSPECTION

If any damage, deformation, wear, swelling, rust or other faults are found on the cylinder, piston, push rod, fluid reservoir, return spring, gasket, clutch damper, cylinder boot and hose replace the faulty part.



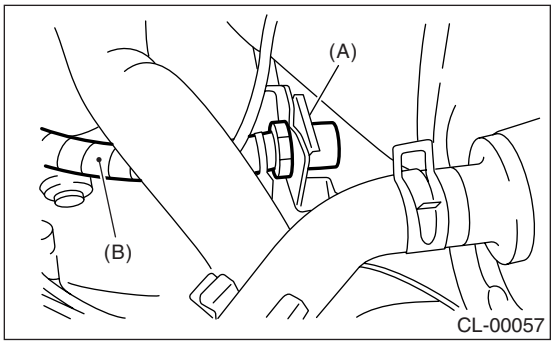
(A) Master cylinder body
(B) Return spring
(C) Piston
(D) Piston stop ring
(E) Rod ASSY
(F) Clutch damper
(G) Cylinder boot

7. Clutch Pipe and Hose

A: REMOVAL

1. EXCEPT RHD TURBO MODEL

1) Remove the air cleaner case and air intake duct.
2) Drain the clutch fluid. <Ref. to CL-36, Clutch Fluid.>
3) Remove the clutch pipe from the clutch hose and master cylinder.
4) Pull out the clamp, then remove the clutch hose from bracket.

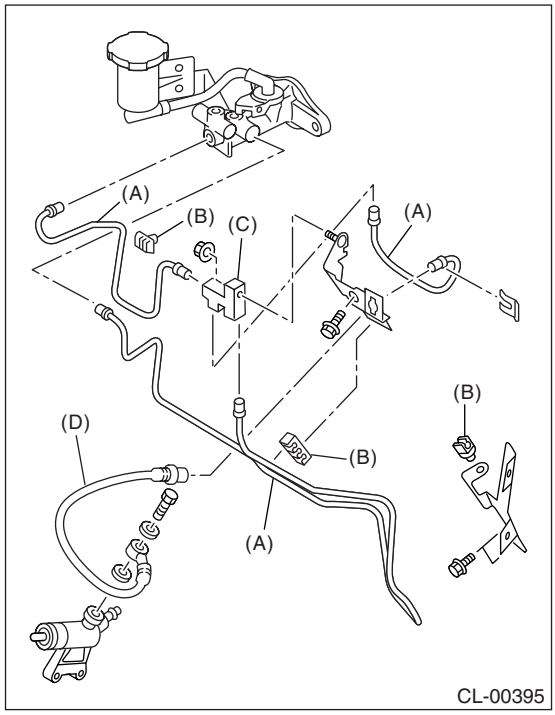


(A) Clamp
(B) Clutch hose

5) Remove the hose from operating cylinder.
6) Remove the bracket.

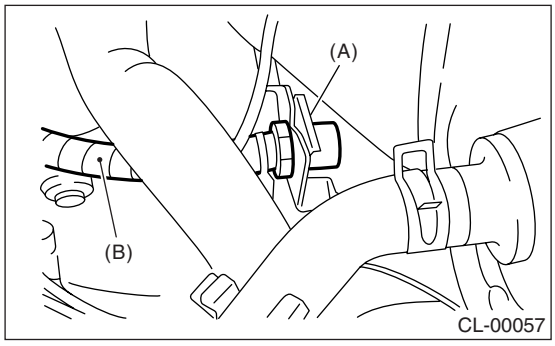
2. RHD TURBO MODEL

1) Remove the intercooler. <Ref. to IN(H4DOTC)-12, REMOVAL, Intercooler.>
2) Drain the clutch fluid. <Ref. to CL-36, Clutch Fluid.>
3) Remove the clutch pipe from the master cylinder, connector and clutch hose.



(A) Clutch pipe
(B) Clip
(C) Connector
(D) Clutch hose

4) Pull out the clamp, then remove the clutch hose from bracket.



(A) Clamp
(B) Clutch hose

5) Remove the connector.
6) Remove the bracket.

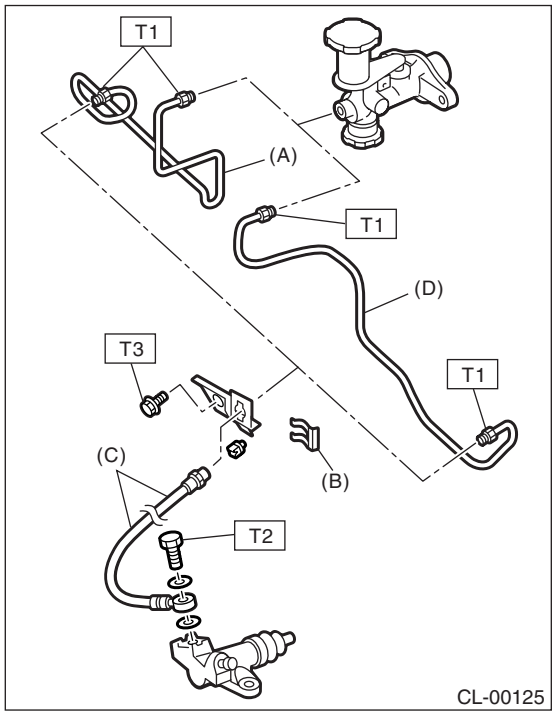
B: INSTALLATION

1. EXCEPT RHD TURBO MODEL

Install in the reverse order of removal.

NOTE:
Bleed the clutch fluid. <Ref. to CL-37, Clutch Fluid Air Bleeding.>

Tightening torque:
T1: 15 N·m (1.5 kgf-m, 10.8 ft-lb)
T2: 18 N·m (1.8 kgf-m, 13.0 ft-lb)
T3: 25 N·m (2.5 kgf-m, 18.1 ft-lb) (RHD NON-TURBO model)
18 N·m (1.8 kgf-m, 13.0 ft-lb) (LHD model)



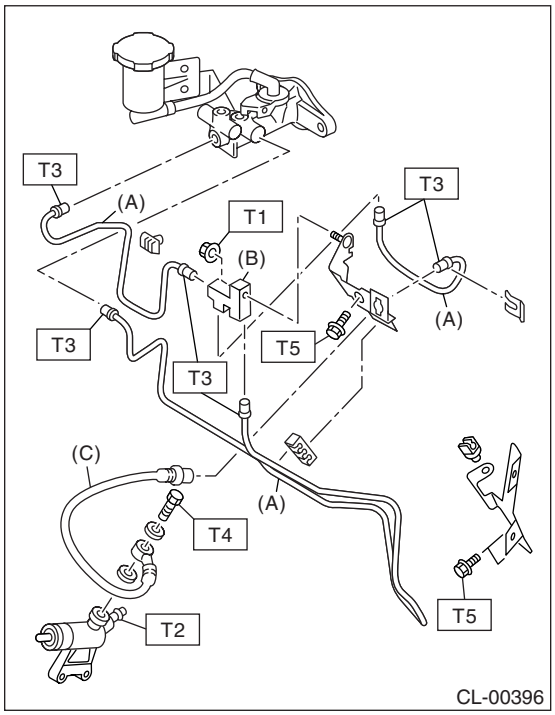
(A) Clutch pipe (LHD model)
(B) Clip
(C) Clutch hose
(D) Clutch pipe (RHD model)

2. RHD TURBO MODEL

Install in the reverse order of removal.

NOTE:
Bleed the clutch fluid. <Ref. to CL-37, Clutch Fluid Air Bleeding.>

Tightening torque:
T1: 7.5 N·m (0.76 kgf-m, 5.53 ft-lb)
T2: 8 N·m (0.8 kgf-m, 5.8 ft-lb)
T3: 15 N·m (1.5 kgf-m, 10.8 ft-lb)
T4: 18 N·m (1.8 kgf-m, 13.0 ft-lb)
T5: 25 N·m (2.5 kgf-m, 18.1 ft-lb)



(A) Clutch pipe
(B) Connector
(C) Clutch hose

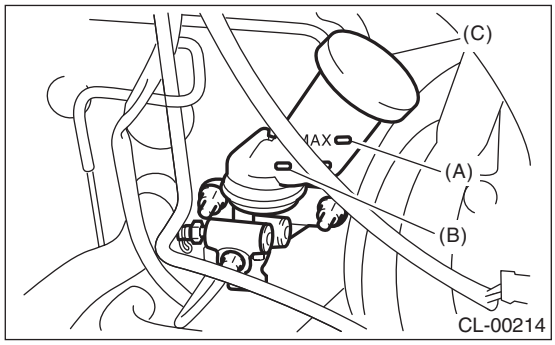
C: INSPECTION

Check the pipes and hoses for cracks, breakage, or damage. Check the joints for fluid leakage. If any cracks, breakage, damage, or leakage is found, repair or replace the applicable pipe or hose.

8. Clutch Fluid

A: INSPECTION

1) Park the vehicle on a level surface.
2) Inspect the fluid level using scale on the outside of the reservoir tank. If the level is below “MIN”, add fluid to bring it up to “MAX”, and also inspect for leakage.



(A) Max. level
(B) Min. level
(C) Reservoir tank

B: REPLACEMENT

CAUTION:
• The FMVSS No. 116, or DOT3 fresh brake fluid must be used.
• Cover the bleeder with waste cloth, when loosening it, to prevent brake fluid from being splashed over surrounding parts.
• Avoid mixing different brands of brake fluid to prevent degrading the quality of the fluid.
• Be careful not to allow dirt or dust to get into the reservoir tank.

NOTE:
• During bleeding operation, keep the clutch reservoir tank filled with brake fluid to eliminate entry of air.
• Clutch pedal operating must be very slow.
• For convenience and safety, it is advisable to have two men working.
• The amount of brake fluid required is approx. 70 mℓ (2.4 US fl oz, 2.5 Imp fl oz) for total clutch system.

1) Remove the air cleaner case and air duct.
2) Either jack-up the vehicle and place a rigid rack under it, or lift-up the vehicle.
3) Draw out the brake fluid from reservoir tank with syringe.
4) Refill the reservoir tank with recommended brake fluid.

Recommended brake fluid:
FMVSS No. 116, or DOT3 fresh brake fluid

5) Drain fluid in the same method as air bleeding.
6) Refill the brake fluid before reservoir tank becomes empty, and drain contaminated fluid again.
7) Repeat the above procedure until the contaminated fluid is completely drained.

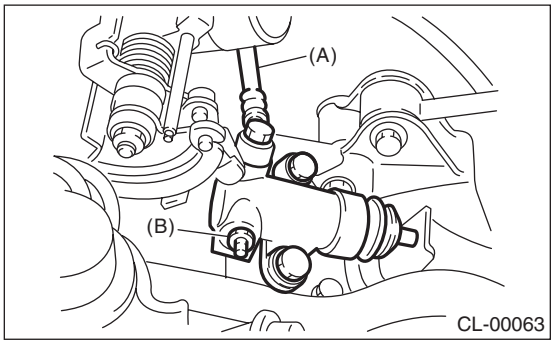
9. Clutch Fluid Air Bleeding

A: PROCEDURE

1. NON-TURBO MODEL

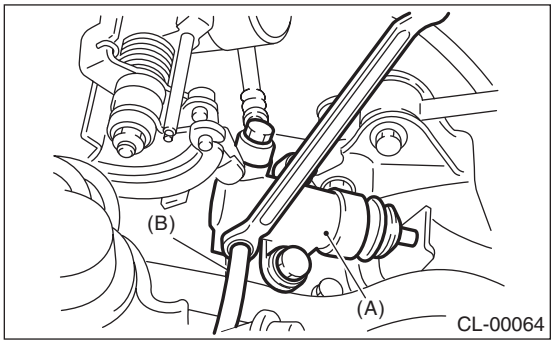
NOTE:
Bleed air from the oil line with help of a co-worker.

1) Remove the air cleaner case and air intake duct. <Ref. to IN(H4SO)-5, REMOVAL, Air Cleaner Case.> and <Ref. to IN(H4SO)-6, REMOVAL, Air Intake Duct.>
2) Fit one end of a vinyl tube into the air bleeder of operating cylinder and put the other end into a brake fluid container.



(A) Clutch hose
(B) Air bleeder

3) Slowly depress the clutch pedal and keep it depressed. Then open the air bleeder to discharge air together with the fluid.
Release the air bleeder for 1 or 2 seconds. Next, with the bleeder closed, slowly release the clutch pedal.



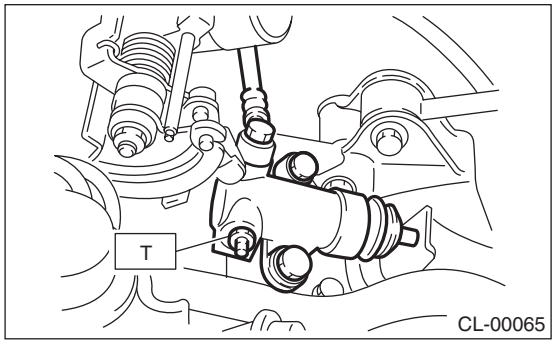
(A) Operating cylinder
(B) Vinyl tube

4) Repeat these steps until there are no more air bubbles in the vinyl tube.

CAUTION:
Cover the bleeder with waste cloth when loosening it, to prevent brake fluid from being splashed over surrounding parts.

5) Tighten the air bleeder.

Tightening torque:
T: 8 N·m (0.8 kgf-m, 5.8 ft-lb)

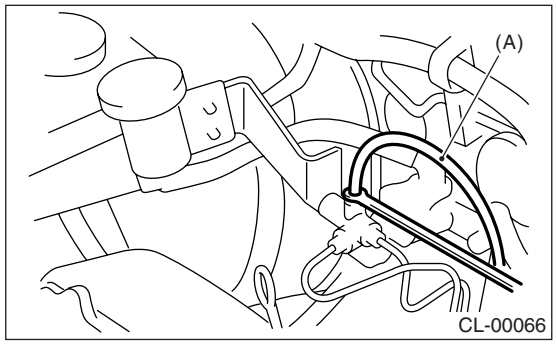


6) After depressing the clutch pedal, make sure that there are no leaks evident in the entire system.
7) After bleeding air from the system, ensure that clutch operates properly.

2. TURBO MODEL

NOTE:
Bleed air from the oil line with help of a co-worker.

1) Remove the intercooler. <Ref. to IN(H4DOTC)-12, REMOVAL, Intercooler.>
2) Fit one end of a vinyl tube into the air bleeder of master cylinder and put the air bleeder of other end into a brake fluid container. (RHD turbo model)
3) Slowly depress the clutch pedal and keep it depressed. Then open the air bleeder to discharge air together with the fluid. Release the air bleeder for 1 or 2 seconds. Next, with the bleeder closed, slowly release the clutch pedal. (RHD turbo model)



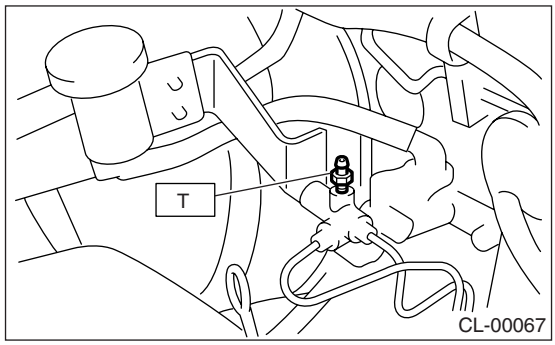
(A) Vinyl tube

4) Repeat these steps until there are no more air bubbles in the vinyl tube. (RHD turbo model)

CAUTION:
Cover the bleeder with waste cloth when loosening to prevent brake fluid from being splashed over surrounding parts.

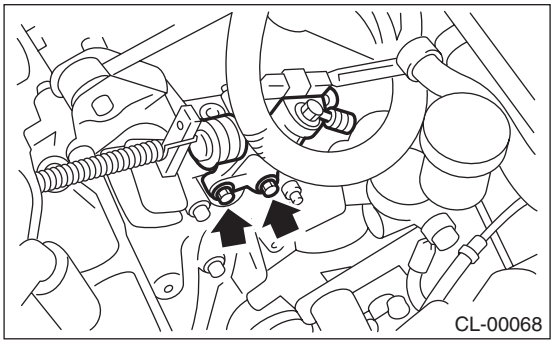
5) Tighten the air bleeder. (RHD turbo model)

Tightening torque:
T: 8 N·m (0.8 kgf-m, 5.8 ft-lb)

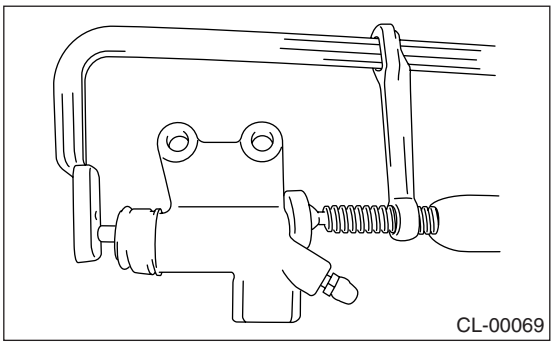


6) Remove the operating cylinder.

NOTE:
Do not remove the clutch hose.

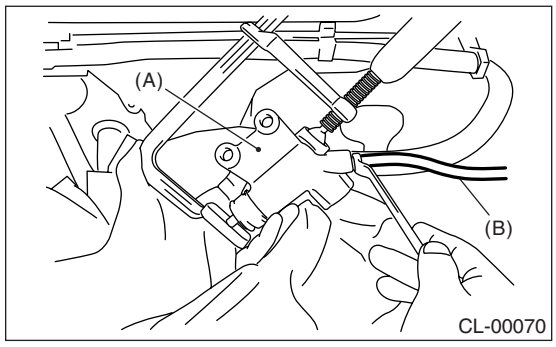


7) Fix the piston with clamp to avoid the piston from jumping out.



8) Fit one end of a vinyl tube into the air bleeder of operating cylinder and put the other end into a brake fluid container.
9) Slowly depress the clutch pedal and keep it depressed. Then open the air bleeder to discharge air together with the fluid.
Release the air bleeder for 1 or 2 seconds. Next, with the bleeder closed, slowly release the clutch pedal.

NOTE:
Set the air breather screw part higher than tip of operating cylinder when performing this procedure.



(A) Operating cylinder
(B) Vinyl tube

10) Repeat these steps until there are no more air bubbles in the vinyl tube.

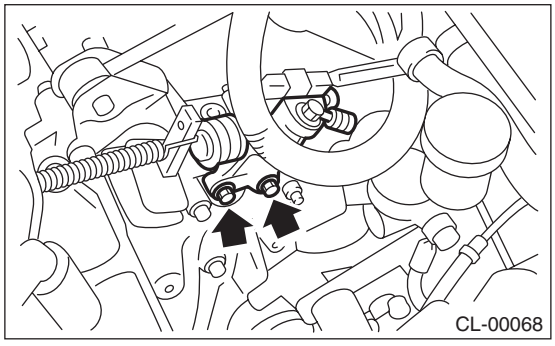
CAUTION:
Cover the bleeder with waste cloth when loosening it, to prevent brake fluid from being splashed over surrounding parts.

11) Tighten the air bleeder.

Tightening torque:
8 N·m (0.8 kgf-m, 5.8 ft-lb)

12) Install the operating cylinder.

Tightening torque:
37 N·m (3.8 kgf-m, 27.5 ft-lb) (Except STi model)
41 N·m (4.2 kgf-m, 30.2 ft-lb) (STi model)



13) After depressing the clutch pedal, make sure that there are no leaks evident in the entire system.
14) After bleeding air from the system, ensure that clutch operates properly.
15) Install the intercooler. <Ref. to IN(H4DOTC)-12, INSTALLATION, Intercooler.>

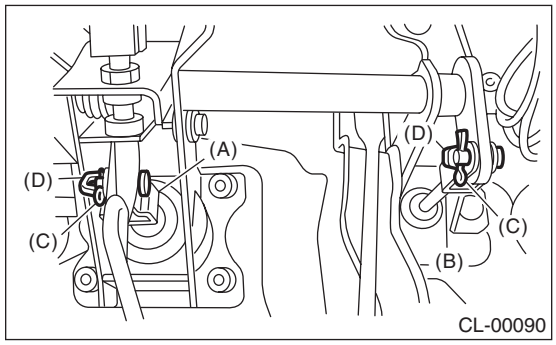
10.Clutch Pedal

A: REMOVAL

1. LHD MODEL

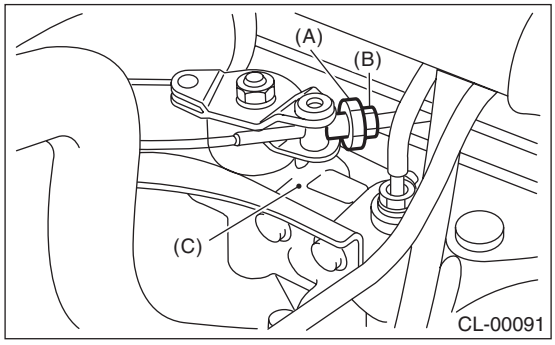
• Except 1.6 L MODEL

1) Remove the steering column. <Ref. to PS-31, REMOVAL, Tilt Steering Column.>
2) Disconnect the connectors from stop light and clutch switches.
3) Remove the snap pins which secure lever to push rod and operating rod.
4) Remove the clevis pins which secure lever to push rod and operating rod.



(A) Operating rod
(B) Push rod
(C) Snap pin
(D) Clevis pin

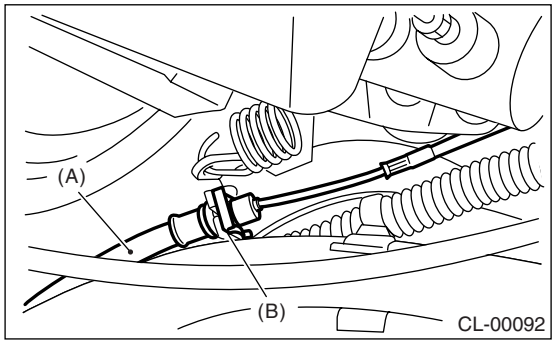
5) Remove the air cleaner case and intake duct. <Ref. to IN(H4SO)-5, REMOVAL, Air Cleaner Case.> and <Ref. to IN(H4SO)-6, REMOVAL, Air Intake Duct.>
6) Remove the PHV adjusting nut and lock nut. (Model with hill holder)



(A) Adjusting nut
(B) Lock nut
(C) PHV

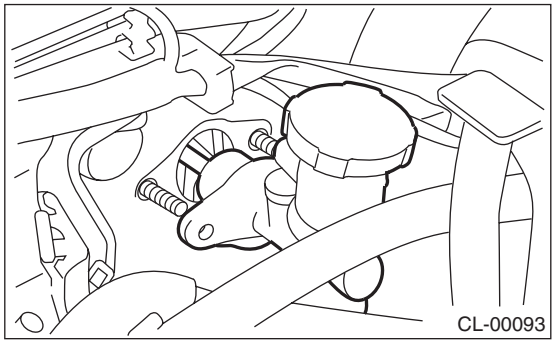
7) Remove the cable clamp, and disconnect the PHV cable from PHV. (Model with hill holder)

CAUTION:
Carefully protect the boot and inner cable from damage when disconnecting the PHV cable.



(A) PHV cable
(B) Clamp

8) Remove the nut which secures clutch master cylinder.

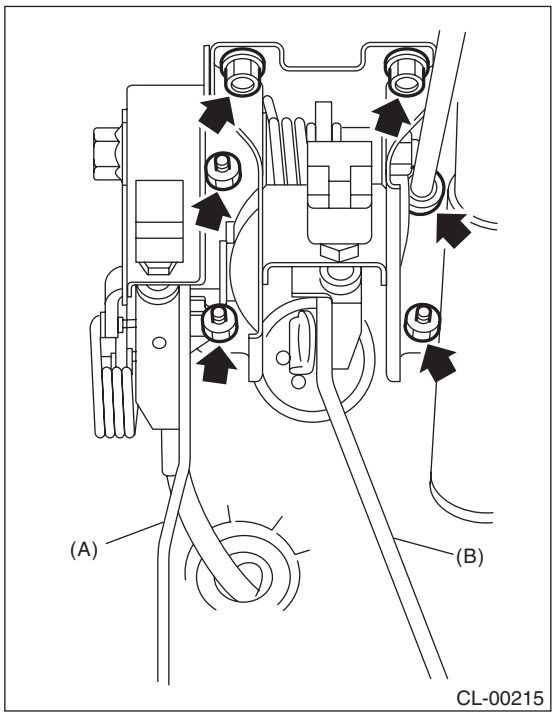


9) Remove the bolts and nuts which secure brake and clutch pedals, and remove the pedal assembly.

• 1.6 L MODEL

1) Disconnect the ground cable from battery.
2) Remove the air cleaner case and air intake duct. <Ref. to IN(H4SO)-5, REMOVAL, Air Cleaner Case.> and <Ref. to IN(H4SO)-6, REMOVAL, Air Intake Duct.>
3) Disconnect the clutch cable from release lever.
4) Remove the instrument panel lower cover.
5) Disconnect the operating rod of brake pedal.
6) Remove the electrical connectors (for stop light switch, etc.)

7) Remove the bolts and nuts which secure brake and clutch pedals, and remove pedal bracket and clutch cable as a unit.

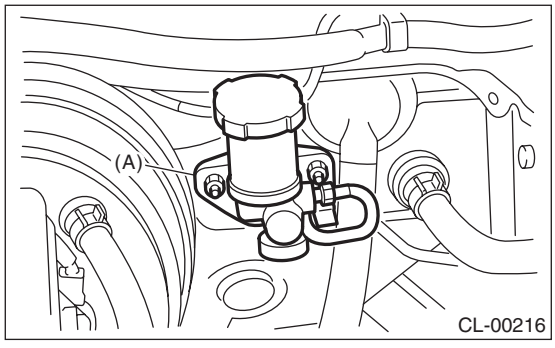


(A) Clutch pedal
(B) Brake pedal

8) Disconnect the clutch cable from clutch pedal.

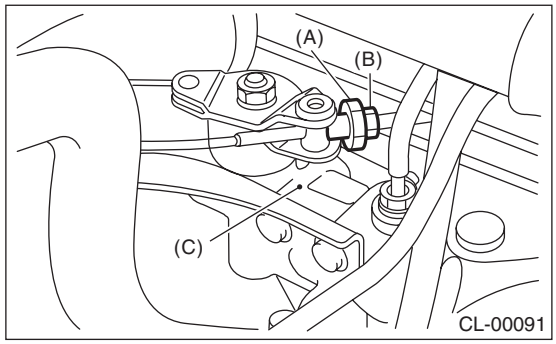
2. RHD MODEL

1) Disconnect the ground cable from battery.
2) Disconnect the connector from clutch. (Model with cruise control)
3) Remove the instrument panel lower cover.
4) Remove the snap pin and clevis pin that join push rod and clutch pedal. (Except 1.6 L model)
5) Remove the master cylinder mounting nuts. (Except 1.6 L model)



(A) Master cylinder

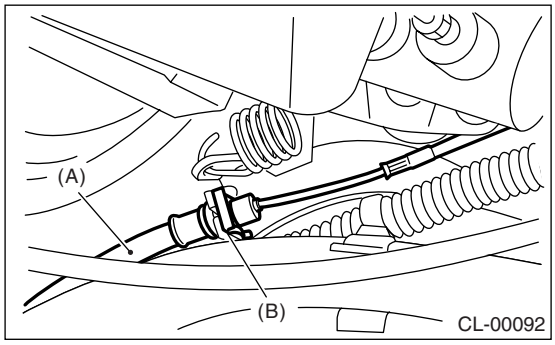
6) Remove the PHV adjusting nut and lock nut. (Model with hill holder)



(A) Adjusting nut
(B) Lock nut
(C) PHV

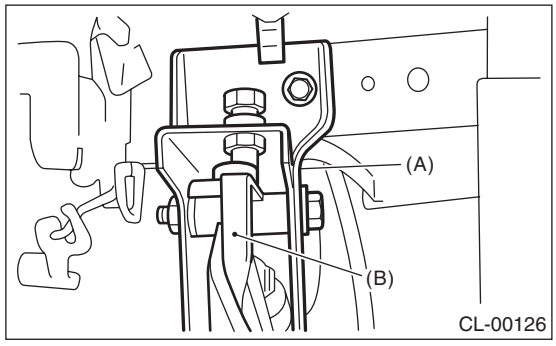
7) Remove the cable clamp and disconnect the PHV cable from PHV. (Model with hill holder)

CAUTION:
Carefully protect the boot and inner cable from damage when disconnecting the PHV cable.



(A) PHV cable
(B) Clamp

8) Disconnect the clutch cable from release lever. (1.6 L model)
9) Remove the clutch pedal and bracket as a unit.



(A) Clutch pedal bracket
(B) Clutch pedal

10) Depress the clutch pedal, then disconnect the clutch cable from clutch pedal. (1.6 L model)

B: INSTALLATION

1) Install in the reverse order of removal.

CAUTION:
• If the cable clamp is damaged, replace it with a new one.
• Never fail to cover the outer cable end with boot.
• Be careful not to kink the accelerator cable.
• Always use new clevis pins.

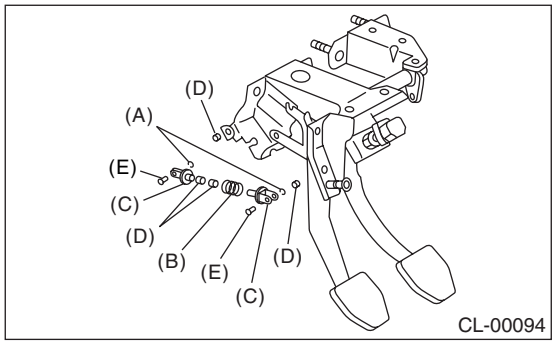
2) Adjust the clutch pedal after installation. <Ref. to CL-44, ADJUSTMENT, Clutch Pedal.>
3) Adjust the PHV cable. (Model with hill holder) <Ref. to BR-77, ADJUSTMENT, Hill Holder.>

C: DISASSEMBLY

1. LHD MODEL

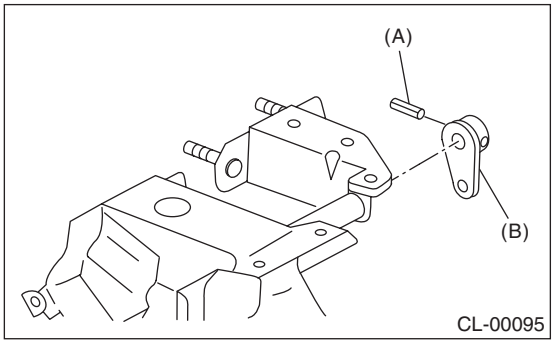
• Except 1.6 L MODEL

1) Remove the clips, assist spring, rod and bushing.



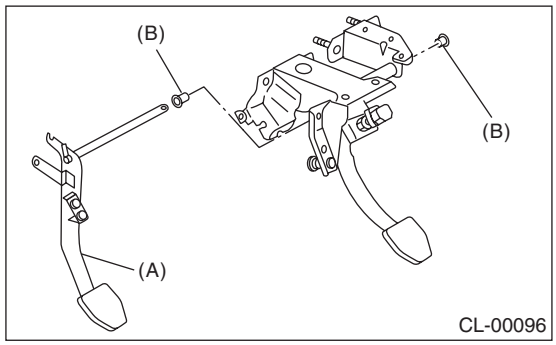
(A) Clip
(B) Assist spring
(C) Assist rod
(D) Bushing
(E) Clevis pin

2) Remove the spring pin and lever.



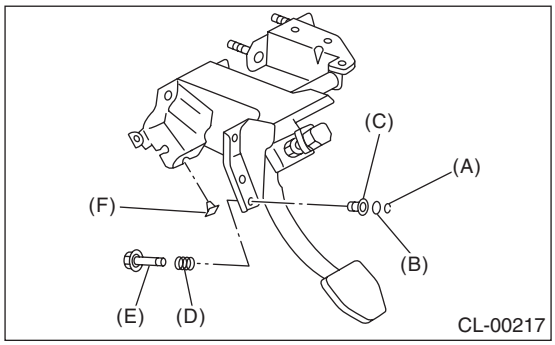
(A) Pin
(B) Lever

3) Remove the clutch pedal and bushings.



(A) Clutch pedal
(B) Bushing

4) Remove the stopper, clip, O-ring, rod S, and then remove the spring and bushing S.

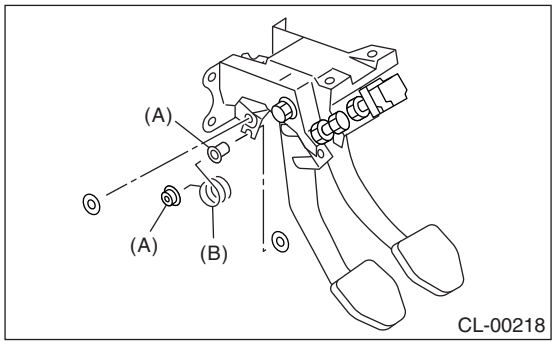


(A) Clip
(B) O-ring
(C) Bushing S
(D) Spring S
(E) Rod S
(F) Stopper

5) Remove the stoppers from clutch pedal.
6) Remove the clutch pedal pad. (Non-turbo model)

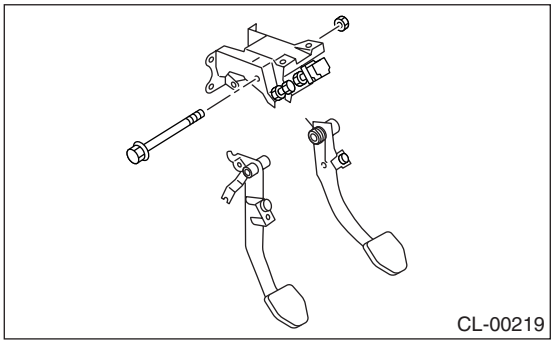
• 1.6 L MODEL

1) Remove the clip, and then remove the spring assist and spring.

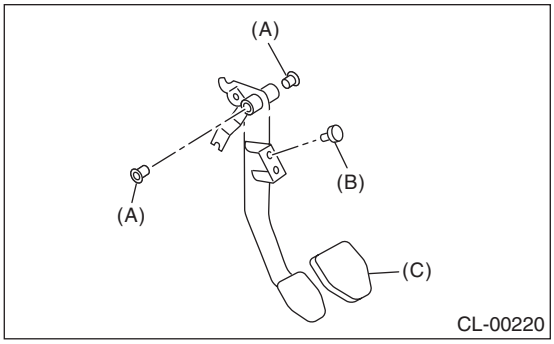


(A) Spring assist
(B) Spring

2) Remove the clutch pedal and brake pedal.



3) Remove the bushing, stopper and clutch pedal pad.



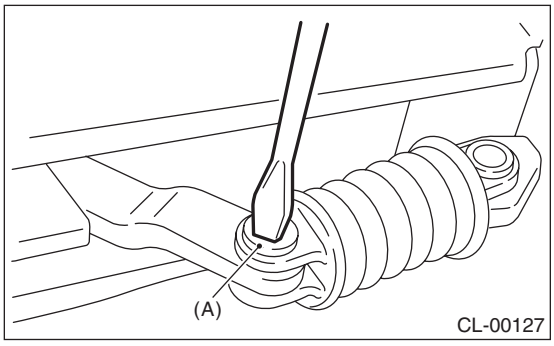
(A) Bushing
(B) Stopper
(C) Clutch pedal pad

4) Remove the adjuster bolt.

2. RHD MODEL

• Except 1.6 L MODEL

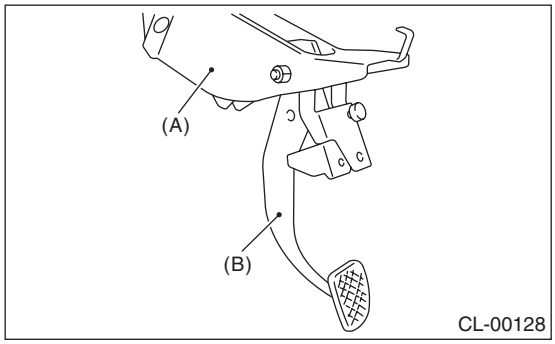
1) Remove the clutch switch. (Model with cruise control)
2) Remove the clip, then pull out the clevis pin.



(A) Clevis pin

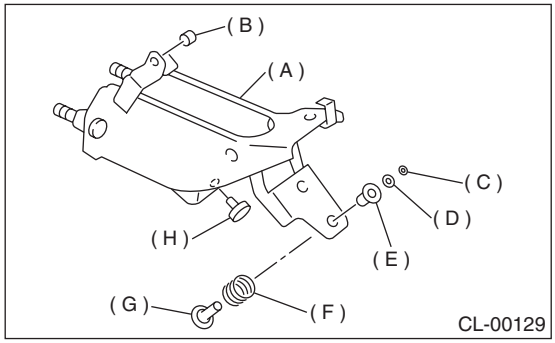
3) Remove the assist rod, spring and bushing.

4) Remove the clutch pedal from clutch pedal bracket.



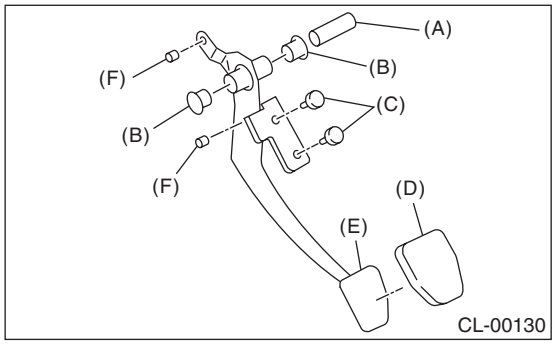
(A) Clutch pedal bracket
(B) Clutch pedal

5) Remove the following parts (B to H) from clutch pedal bracket (A) as shown in the figure.



(A) Clutch pedal bracket
(B) Bushing C
(C) Clip
(D) O-ring
(E) Bushing S
(F) Spring S
(G) Rod S
(H) Bushing

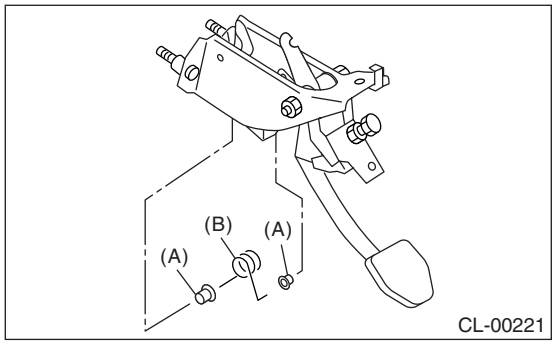
6) Remove the spacer, bushing and pedal pad from clutch pedal.



(A) Spacer
(B) Bushing
(C) Bushing
(D) Pedal pad
(E) Clutch pedal
(F) Bushing C

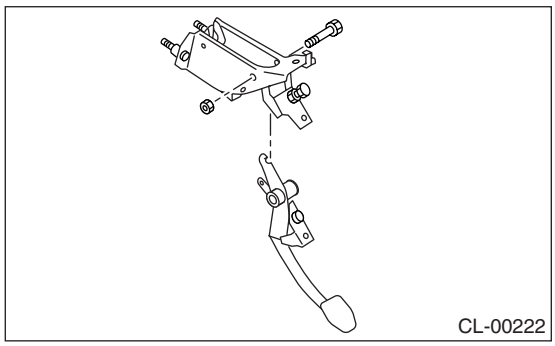
• 1.6 L MODEL

1) Remove the spring and bushing.

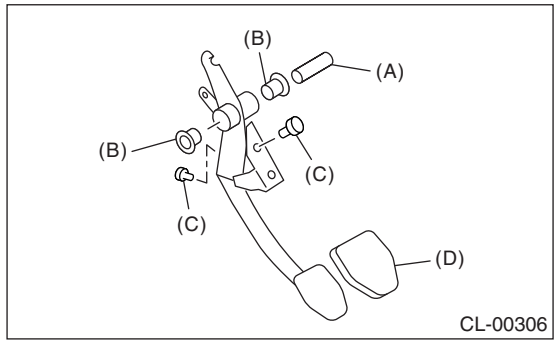


(A) Bushing
(B) Spring

2) Remove the clutch pedal.



3) Remove the spacer, bushing, stopper and clutch pedal pad.



(A) Spacer
(B) Bushing
(C) Stopper
(D) Clutch pedal pad

4) Remove the adjust bolt and stopper.

D: ASSEMBLY

1. LHD MODEL

1) Attach the stopper, etc. to pedal bracket temporarily.
2) Clean inside of bores of clutch pedal and brake pedal, apply grease, and set bushings into bores.
3) Align bores of pedal bracket, clutch pedal and brake pedal, attach the brake pedal return spring, assist rods, spring, and bushing. (Except 1.6 L model)

NOTE:
Clean up inside of bushings and apply grease before installing the spacer.

4) Align the bores of pedal bracket, clutch pedal and brake pedal, then attach the brake pedal, bushings, spring and clutch cable. (1.6 L model)
5) Install the hill holder cable to clutch pedal. (Model with hill holder)

2. RHD MODEL

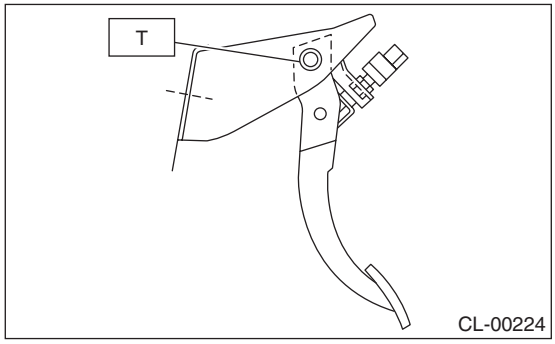
1) Clean and apply grease to the hole of sliding portion between clutch pedal and bushing.
2) Install the pad, stopper, spacer and bushings to clutch pedal.

NOTE:
Clean up inside of bushings and apply grease before installing the spacer.

3) Install the rod S, spring S, bushing S, O-ring, clip, bushing, clutch switch and bushing C to clutch pedal bracket. (Except 1.6 L model)
4) Install the pedal assembly, stopper, adjust rod, clutch cable, bushings and spring to clutch pedal bracket.

5) Install the clutch pedal to pedal bracket.

Tightening torque:
T: 30 N·m (3.1 kgf-m, 22.4 ft-lb)



6) Install the assist rod, bushing and assist spring to clutch pedal and pedal bracket.
7) Install the PHV cable to clutch pedal. (Model with hill holder).

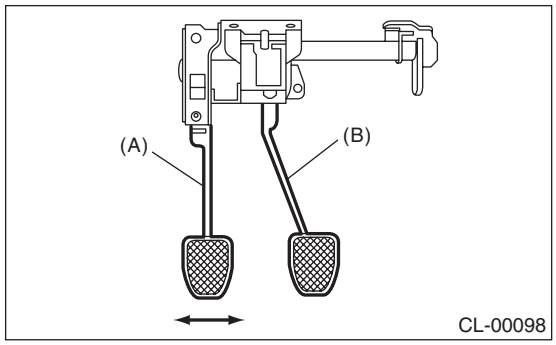
E: INSPECTION

1. CLUTCH PEDAL

Move the clutch pedal pads in the lateral direction with a force of approximately 10 N (1 kgf, 2 lbf) to ensure pedal play is in specified range.

CAUTION:
If excessive movement is noted, replace the bushings with new ones.

Play of clutch pedal:
Service limit
5.0 mm (0.197 in) or less



(A) Clutch pedal
(B) Brake pedal

F: ADJUSTMENT

1. CLUTCH PEDAL

• Except 1.6 L MODEL

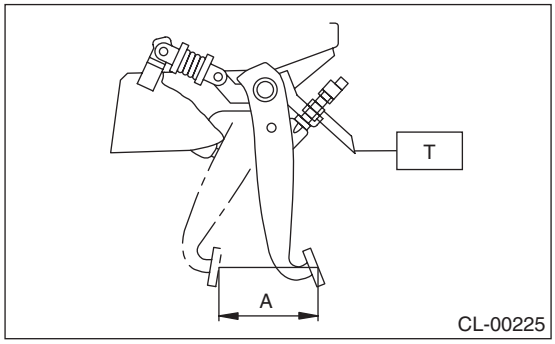
1) Turn the lock nuts until clutch pedal full stroke length is within specifications.

CAUTION:
Do not attempt to turn the clutch switch to adjust clutch pedal full stroke length.

NOTE:
If lock nuts cannot adjust the clutch pedal full stroke length to specifications, turn the master cylinder push rod to adjust it.

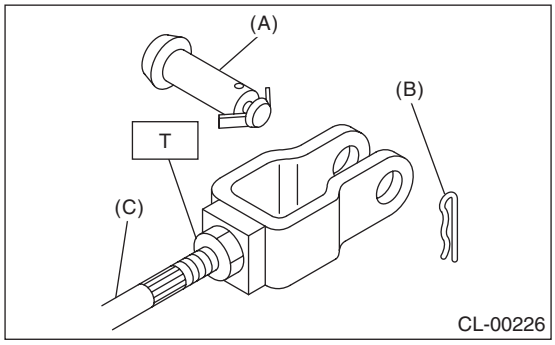
Specified clutch pedal full stroke A:
130 — 135 mm (5.12 — 5.31 in)

Tightening torque (Clutch switch lock nut):
T: 8 N·m (0.8 kgf-m, 5.8 ft-lb)



2) Turn the master cylinder push rod so that clevis pin moves to the left and then to the right. Clevis pin must move without resistance while it is rattling.

Tightening torque (Push rod lock nut):
T: 10 N·m (1.0 kgf-m, 7 ft-lb)

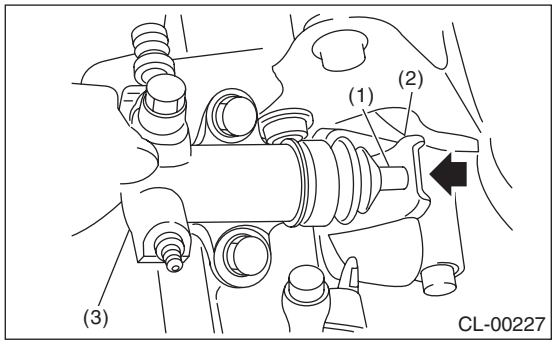


(A) Clevis pin
(B) Snap pin
(C) Push rod

3) Depress and release the clutch pedal two to three times to ensure that clutch pedal and release fork operates smoothly. If the clutch pedal and release fork do not operate smoothly, bleed air from the clutch hydraulic system. <Ref. to CL-37, Clutch Fluid Air Bleeding.>
4) Measure the clutch pedal full stroke length again to ensure that it is within specifications. If it is not, repeat adjustment procedures again from the beginning.

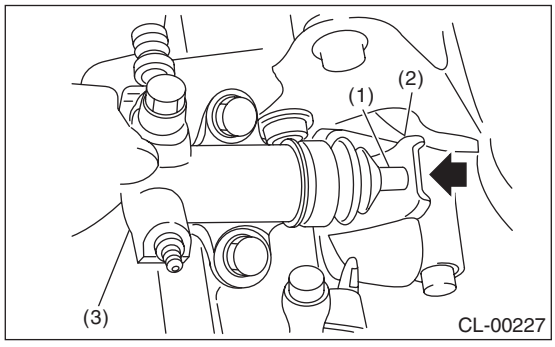
Specified clutch pedal full stroke:
130 — 135 mm (5.12 — 5.31 in)

5) Move the clevis pin to the left and then to the right. It should move without resistance while it is rattling. If resistance is felt, repeat adjustment procedures again from the beginning.
6) Push the release lever until operating cylinder push rod retracts. Ensure that clutch fluid level in reservoir tank increases. If the clutch fluid level increases, hydraulic the clutch is properly adjusted; if fluid level does not increase or push rod does not retract, replace the master cylinder with a new one. <Ref. to CL-31, Master Cylinder.>



(1) Push rod
(2) Release lever
(3) Operating cylinder

7) Push the release lever until operating cylinder push rod retracts. Check that the clutch fluid level in reservoir tank increases.

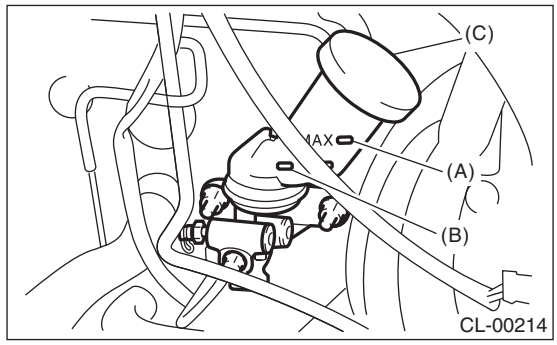


(1) Push rod
(2) Release lever
(3) Operating cylinder

8) If the clutch fluid level increases, hydraulic clutch play is correct.
9) If the clutch fluid level does not increase or push rod does not retract, clutch pedal must be readjusted.

10) Check the fluid level on the outside of the reservoir tank. If the level is below “MIN”, add clutch fluid to bring it up to “MAX”.

Recommended clutch fluid:
FMVSS No. 116, or DOT 3 fresh brake fluid

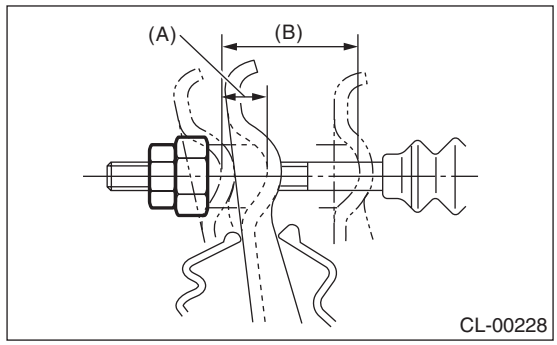


(A) Max. level
(B) Min. level
(C) Reservoir tank

• 1.6 L MODEL

1) Disconnect the ground cable from battery.
2) Remove the air cleaner case and air intake duct. <Ref. to IN(H4SO)-5, REMOVAL, Air Cleaner Case.> and <Ref. to IN(H4SO)-6, REMOVAL, Air Intake Duct.>
3) Remove the release lever return spring from lever.
4) Loosen the lock nut.
5) Adjust the spherical nut of the lever end so that the play and full stroke is within the specified value (center of spherical nut).

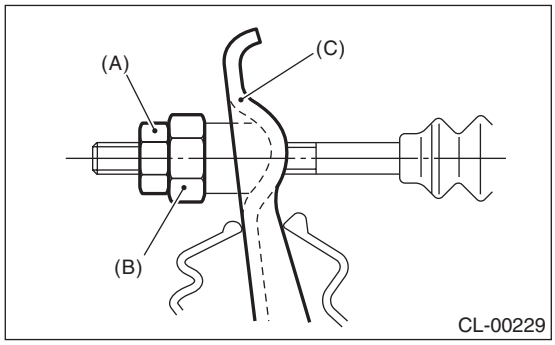
CAUTION:
Take care not to twist the cable during adjustment.
Play: 3 — 4 mm (0.12 — 0.16 in)
Full stroke: 24 — 26 mm (0.94 — 1.02 in)



(A) Play
(B) Full stroke

6) Upon completion of adjustment, securely lock the spherical nut with lock nut.

Tightening torque:
6 N·m (0.6 kgf-m, 4.4 ft-lb)



(A) Lock nut
(B) Spherical nut
(C) Clutch release lever

7) Install the return spring on lever.

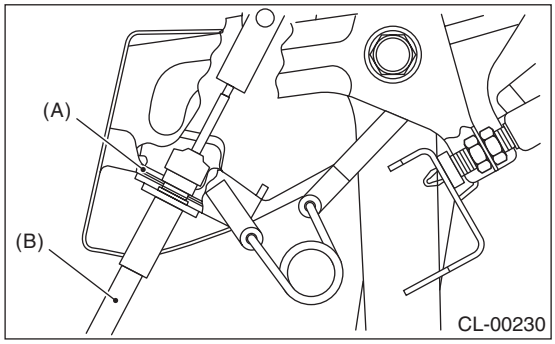
NOTE:
Hook the long hook side of the return spring with the lever.

8) Depress the clutch pedal to assure there is no abnormality in the clutch system.
9) Install the air cleaner case and air intake duct. <Ref. to IN(H4SO)-5, INSTALLATION, Air Cleaner Case.> and <Ref. to IN(H4SO)-6, INSTALLATION, Air Intake Duct.>

11.Clutch Cable

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the air cleaner case and air intake duct. <Ref. to IN(H4SO)-5, REMOVAL, Air Cleaner Case.> and <Ref. to IN(H4SO)-6, REMOVAL, Air Intake Duct.>
3) Disconnect the clutch cable from release lever.
4) Depress the clutch pedal to the floor.
5) Remove the clutch cable clamp from pedal bracket.



(A) Clamp
(B) Clutch cable

6) Remove the clutch cable from body.

B: INSTALLATION

1) Clean the clutch pedal fitting hole, and apply grease. Connect the clutch cable to body.
2) Fit the clutch pedal to pedal bolt, and connect the clutch cable to bracket with clamp.
3) Connect the clutch cable end to pedal end.
4) Connect the clutch cable to release lever.
5) Install the grommet to toe board.
6) Adjust the cable after installation. <Ref. to CL-44, ADJUSTMENT, Clutch Pedal.>
7) Install the air cleaner case and air intake duct. <Ref. to IN(H4SO)-5, INSTALLATION, Air Cleaner Case.> and <Ref. to IN(H4SO)-6, INSTALLATION, Air Intake Duct.>

C: INSPECTION

Check the removed cable and replace if damaged, rusty, or malfunctioning.
1) Check for smooth operation of the cable.
2) Check the inner cable for damage and rust.
3) Check the outer cable for damage, bends, and cracks.
4) Check the boot for damage, cracks, and deterioration.

12.Clutch Switch

A: REMOVAL

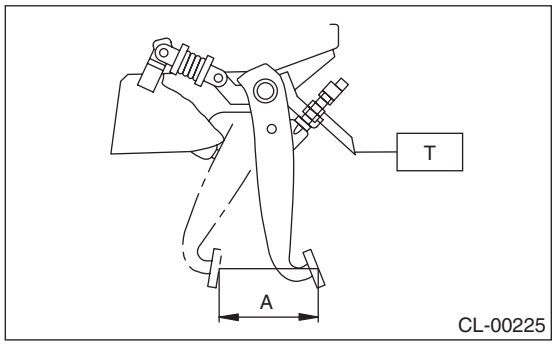
1) Disconnect the ground cable from battery.
2) Disconnect the connector from clutch switch.
3) Remove the clutch switch.

B: INSTALLATION

1) Move the clevis pin of the push rod right and left and hold where it moves smoothly, then measure stroke of clutch pedal.

Specified clutch pedal full stroke A:
130 — 135 mm (5.12 — 5.31 in)

Tightening torque:
T: 8 N·m (0.8 kgf-m, 5.8 ft-lb)

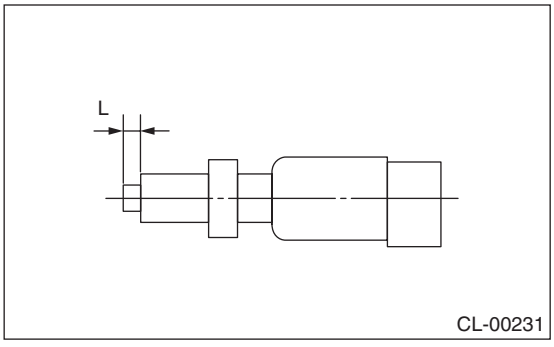


2) If the clutch pedal stroke is out of specification, adjust the stroke. <Ref. to CL-44, ADJUSTMENT, Clutch Pedal.>
3) Connect clutch switch connector.

C: INSPECTION

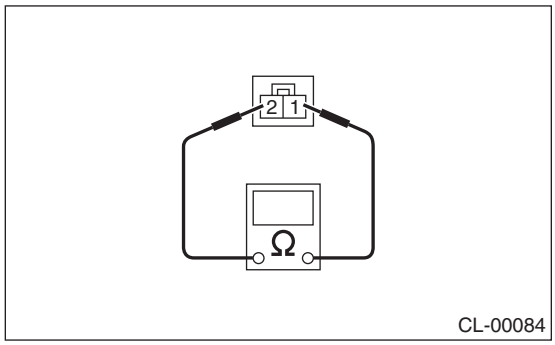
1) If the clutch switch does not operate properly (or if it does not stop at the specified position), replace with a new one.

Specified position L:
$2^{+1.5}_{0}$ mm ($0.079^{+0.059}_{0}$ in)



2) Check the clutch switch continuity. If continuity is not as specified, replace the switch.
(1) Disconnect the clutch switch connector.
(2) Measure the resistance between 1 and 2 of switch terminal.

Condition	Terminal No.	Specified registance
When clutch pedal depressed	No. 1 — No. 2	Less than 1 Ω
When clutch pedal not depressed	No. 1 — No. 2	More than 1 MΩ



13.General Diagnostic Table

A: INSPECTION

1. CLUTCH

Symptom	Possible cause	Corrective
1. Clutch slippage. It is hard to perceive clutch slippage in the early stage, but pay attention to the following symptoms • Engine speed up when shifting. • High speed driving is impossible; especially rapid acceleration impossible and vehicle speed does not increase in proportion to an increase in engine speed. • Power falls, particularly when ascending a slope, and there is a smell of burning of the clutch facing. • Method of testing: Put the vehicle in stationary condition with parking brake fully applied. Disengage the clutch and shift the transmission gear into the first. Gradually allow the clutch to engage while gradually increasing the engine speed. The clutch function is satisfactory if the engine stalls. However, the clutch is slipping if the vehicle does not start off and the engine does not stall.	(a) Clutch facing smeared by oil	Replace.
	(b) Worn clutch facing	Replace.
	(c) Deteriorated diaphragm spring	Replace.
	(d) Distorted pressure plate or flywheel	Correct or replace.
	(e) Defective release bearing holder	Correct or replace.
2. Clutch drags. As a symptom of this trouble, a harsh scratching noise develops and control becomes quite difficult when shifting gears. The symptom becomes more apparent when shifting into the first gear. However, because much trouble of this sort is due to defective synchronization mechanism, carry out the test as described after. • Method of testing: <Ref. to CL-49, CLUTCH, INSPECTION, General Diagnostic Table.> It may be judged as insufficient disengagement of clutch if any noise occurs during this test.	(a) Worn or rusty clutch disc hub spline	Replace the clutch disc.
	(b) Excessive deflection of clutch disc facing	Correct or replace.
	(c) Seized crankshaft pilot needle bearing	Replace.
	(d) Cracked clutch disc facing	Replace.
	(e) Stuck clutch disc (smeared by oil or water)	Replace.
3. Clutch chatters. Clutch chattering is an unpleasant vibration to the whole body when the vehicle is just started with clutch partially engaged.	(a) Adhesion of oil on the facing	Replace the clutch disc.
	(b) Weak or broken torsion spring	Replace the clutch disc.
	(c) Defective facing contact or excessive disc wear	Replace the defective clutch disc.
	(d) Warped pressure plate or flywheel	Correct or replace.
	(e) Loose disc rivets	Replace the clutch disc.
	(f) Loose engine mounting	Retighten or replace the mounting.
	(g) Improper adjustment of pitching stopper	Adjustment.
4. Noisy clutch Examine whether the noise is generated when the clutch is disengaged, engaged, or partially engaged.	(a) Broken, worn or unlubricated release bearing	Replace the release bearing.
	(b) Insufficient lubrication of pilot bearing	Apply grease.
	(c) Loose clutch disc hub	Replace the clutch disc.
	(d) Loose torsion spring retainer	Replace the clutch disc.
	(e) Deteriorated or broken torsion spring	Replace the clutch disc.

Symptom	Possible cause	Corrective
5. Clutch grabs. When starting the vehicle with the clutch partially engaged, the clutch engages suddenly and the vehicle jumps instead of making a smooth start.	(a) Grease or oil on facing	Replace the clutch disc.
	(b) Deteriorated cushioning spring	Replace the clutch disc.
	(c) Worn or rusted spline of clutch disc or main shaft	Take off rust, apply grease or replace the clutch disc or main shaft.
	(d) Deteriorated or broken torsion spring	Replace the clutch disc.
	(e) Loose engine mounting	Retighten or replace the mounting.
	(f) Deteriorated diaphragm spring	Replace.

2. CLUTCH PEDAL

Trouble	Corrective action
Insufficient pedal play	Adjust pedal play.
Clutch pedal free play insufficient	Adjust pedal free play.
Excessively worn and damaged pedal shaft and/or bushing	Replace the bushing and/or shaft with a new one.

3. DIAGNOSTIC DIAGRAM OF CLUTCH DRAG

	Step	Check	Yes	No
1	**CHECK GEAR NOISE.** 1) Start the engine. 2) Disengage the clutch and shift quickly from neutral to reverse in idling condition.	Is there any abnormal noise from the transmission gear?	Go to step **2.**	Clutch is normal.
2	**CHECK GEAR NOISE.** Disengage the clutch at idle and shift from neutral to reverse within 0.5 — 1.0 seconds.	Is there any abnormal noise from the transmission gear?	Go to step **3.**	Defective transmission or excessive clutch drag torque. Inspect the pilot bearing, clutch disc, transmission and clutch disc hub spline.
3	**CHECK GEAR NOISE.** 1) Disengage the clutch at idle and shift from neutral to reverse within 0.5 — 1.0 seconds. 2) With the clutch disengaged, shift from neutral to reverse, reverse to neutral several times.	Is there any abnormal noise from the transmission gear?	Defect in clutch disengaging. Inspect the clutch disc, clutch cover, clutch release, and clutch pedal free play.	Clutch and flywheel seizure. Inspect the clutch disc, spline of clutch disc hub.

CHASSIS SECTION

FRONT SUSPENSION	FS
REAR SUSPENSION	RS
WHEEL AND TIRE SYSTEM	WT
DIFFERENTIALS	DI
TRANSFER CASE	TC
DRIVE SHAFT SYSTEM	DS
ABS	ABS
ABS (DIAGNOSTICS)	ABS(diag)
ABS (5.3i) (DIAGNOSTICS)	ABS (5.3i) (diag)
BRAKE	BR
PARKING BRAKE	PB
POWER ASSISTED SYSTEM (POWER STEERING)	PS

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

FUJI HEAVY INDUSTRIES LTD. G1880GE5

FRONT SUSPENSION

FS

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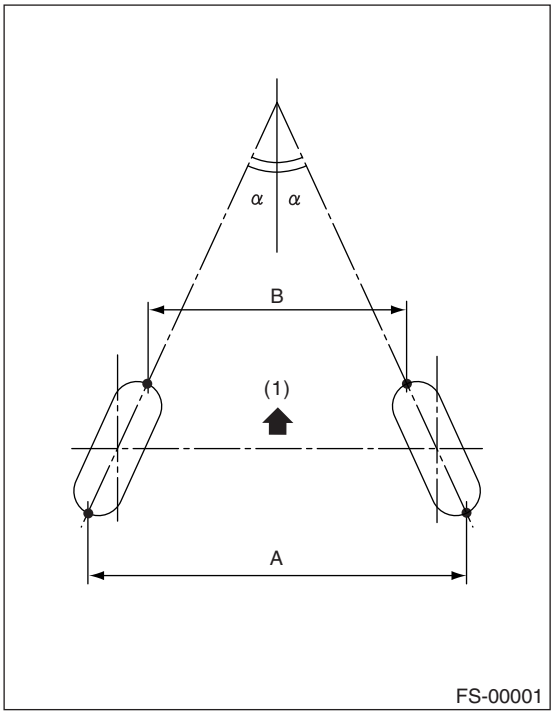
1. General Description

A: SPECIFICATION

	Model	Sedan			Wagon		OUT-BACK
		Non-turbo	Turbo	STi	Non-turbo	Turbo	
Front	Camber (tolerance: ±0°45′ adjustment standard: ±0°30′)	−0°15′	−0°25′	−0°25′	−0°10′	−0°20′	−0°05′
	Caster (Referential Value)	3°25′	3°35′	4°45′	3°25′	3°35′	3°25′
	Toe-in	Tolerance: 0±3 mm (0±0.12 in), Toe angle (The sum of both wheels): 0°±15′ Adjustment standard: 0±2 mm (0±0.08 in), Toe angle (The sum of both wheels): 0°±10′					
	Kingpin anglet (Referential Value)	14°20′	14°50′	14°35′	13°30′	13°45′	13°20′
	Wheel arch height [tolerance: +12/−24 mm (+0.47/−0.94 in)]	406 mm (15.98 in)	396 mm (15.59 in)	396 mm (15.59 in)	397 mm (15.63 in)	387 mm (15.24 in)	402 mm (15.83 in)
	Diameter of stabilizer	20 mm (0.79 in)	20 mm (0.79 in)	20 mm (0.79 in)	20 mm (0.79 in)	20 mm (0.79 in)	20 mm (0.79 in)
Rear	Camber (tolerance: ±0°45′ adjustment standard: ±0°30′)	−1°25′	−1°30′	−1°30′	−1°15′	−1°20′	−1°10′
	Toe-in	Tolerance: 0±3 mm (0±0.12 in), Toe angle (The sum of both wheels): 0°±15′ Adjustment standard: 0±2 mm (0±0.08 in), Toe angle (The sum of both wheels): 0°±10′					
	Thrust angle	Tolerance: ±0°30′, Adjustment standard: 0°±20′					
	Wheel arch height [tolerance: +12/−24 mm (+0.47/−0.94 in)]	381 mm (15.0 in)	376 mm (14.80 in)	373 mm (14.69 in)	381 mm (15.0 in)	376 mm (14.80 in)	386 mm (15.20 in)
	Diameter of stabilizer	*1	20 mm (0.79 in)	20 mm (0.79 in)	*2	17 mm (0.67 in)	—

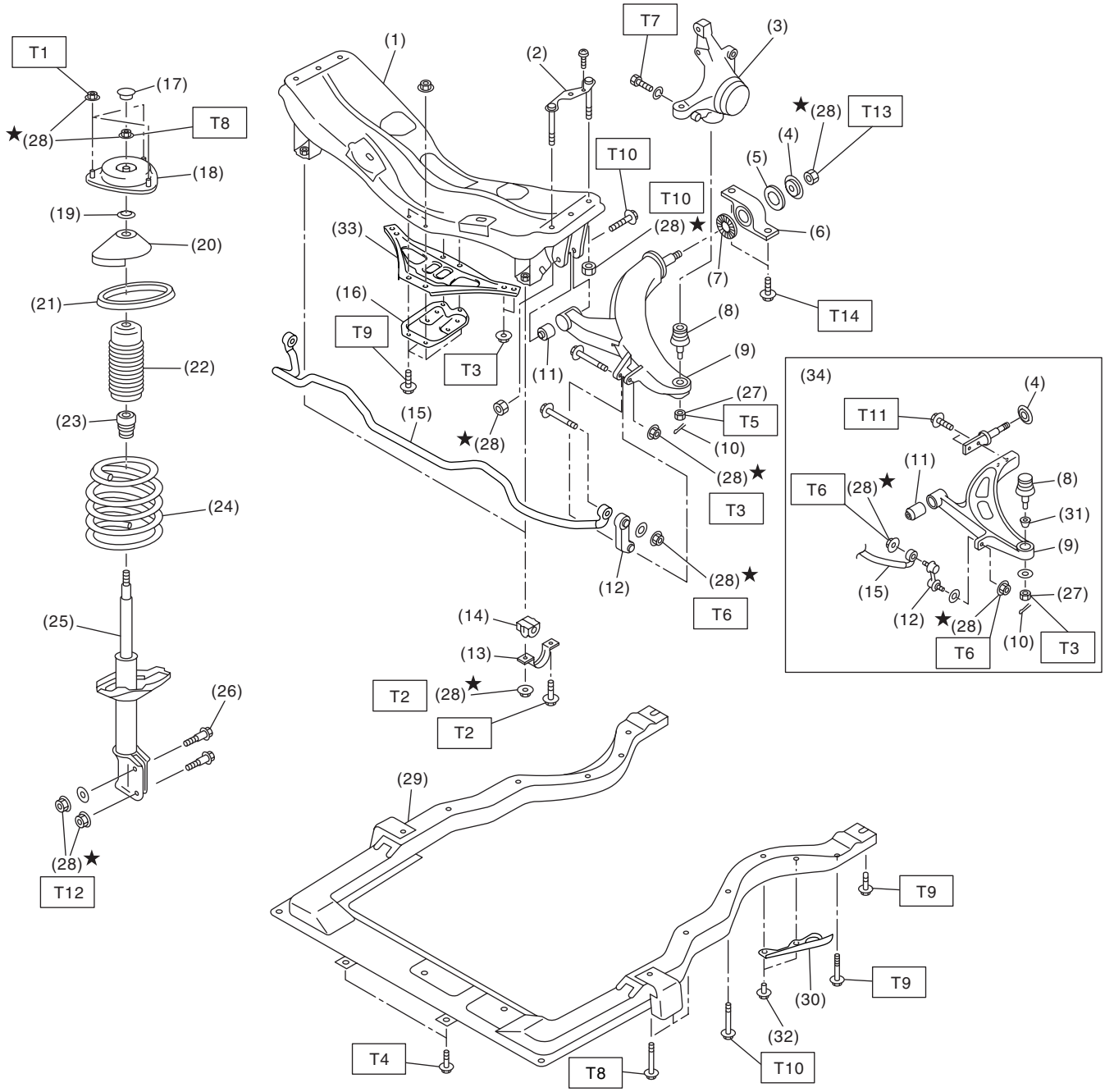
*1 RS, GX (Model with 205 tire): 17 mm (0.67 in)
Except RS, GX (Model with 205 tire): None
*2 GX (Model with 205 tire): 17 mm (0.67 in)
Except GX (Model with 205 tire): None

NOTE:
• Front and rear toe-in and front camber can be adjusted. If toe-in or camber exceeds tolerance, adjust toe-in and camber to the adjustment standard.
• The other items indicated in the specification table cannot be adjusted. If the other items exceeds specifications, check suspension parts and connections for deformities, and replace with new ones as required.



(1) Front
A – B = Positive: Toe-in, Negative: Toe-out
α = Each toe angle

B: COMPONENT



FS-00189

(1) Front crossmember
(2) Bolt ASSY
(3) Housing
(4) Washer
(5) Stopper rubber (Rear)
(6) Rear bushing
(7) Stopper rubber (Front)
(8) Ball joint
(9) Transverse link
(10) Cotter pin
(11) Front bushing
(12) Stabilizer link
(13) Clamp
(14) Bushing
(15) Stabilizer
(16) Jack-up plate (NA model)
(17) Dust seal
(18) Strut mount
(19) Spacer
(20) Upper spring seat
(21) Rubber seat
(22) Dust cover
(23) Helper
(24) Coil spring
(25) Damper strut
(26) Adjusting bolt
(27) Castle nut
(28) Self-locking nut
(29) Sub frame
(30) Cover
(31) Boss
(32) Clip
(33) Jack-up plate (Turbo model and STi model)
(34) Sedan turbo model

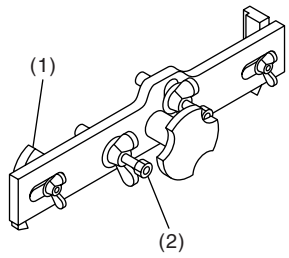
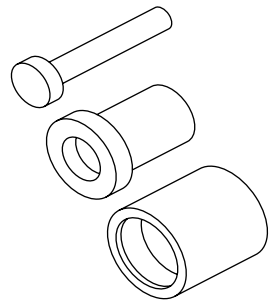
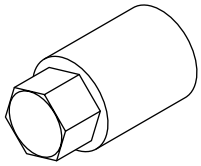
Tightening torque: N·m (kgf-m, ft-lb)	
T1:	*20 (2.0, 14.5)*
T2:	*25 (2.5, 18.1)*
T3:	*30 (3.1, 22)*
T4:	*34 (3.5, 25)*
T5:	*40 (4.1, 30)*
T6:	*45 (4.6, 33)*
T7:	*50 (5.1, 37)*
T8:	*55 (5.6, 41)*
T9:	*70 (7.1, 52)*
T10:	*95 (9.7, 70)*
T11:	*155 (15.8, 114)*
T12:	*175 (17.8, 129)*
T13:	*186 (19.0, 137)*
T14:	*250 (25.5, 184)*

C: CAUTION

• Wear working clothing, including a cap, protective goggles, and protective shoes during operation.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly, and replacement.
• Use SUBARU genuine grease etc. or the equivalent. Do not mix grease etc. with that of another grade or from other manufacturers.
• Before securing a part on a vise, place cushioning material such as wood blocks, aluminum plate, or shop cloth between the part and the vise.
• Be sure to tighten fasteners including bolts and nuts to the specified torque.
• Place shop jacks or rigid racks at the specified points.

D: PREPARATION TOOL

1. SPECIAL TOOLS

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-927380002	927380002	ADAPTER	Used as an adapter for camber & caster gauge when measuring camber and caster. (1) 28199AC000 PLATE (2) 28199AC010 BOLT
 ST-927680000	927680000	INSTALLER & REMOVER SET	Used for replacing transverse link bushing.
 ST-927760000	927760000	STRUT MOUNT SOCKET	Used for disassembling and assembling strut and shock mount.

2. GENERAL PURPOSE TOOLS

TOOL NAME	REMARKS
Alignment gauge	Used for wheel alignment measurement.
Turning radius gauge	Used for wheel alignment measurement.
Toe-in gauge	Used for toe-in measurement.
Dial gauge	Used for damper strut measurement.
Coil spring compressor	Used for strut disassembly/assembly.

2. Wheel Alignment

A: INSPECTION

Check the following items before taking wheel alignment measurement.
Check items before taking wheel alignment measurement:

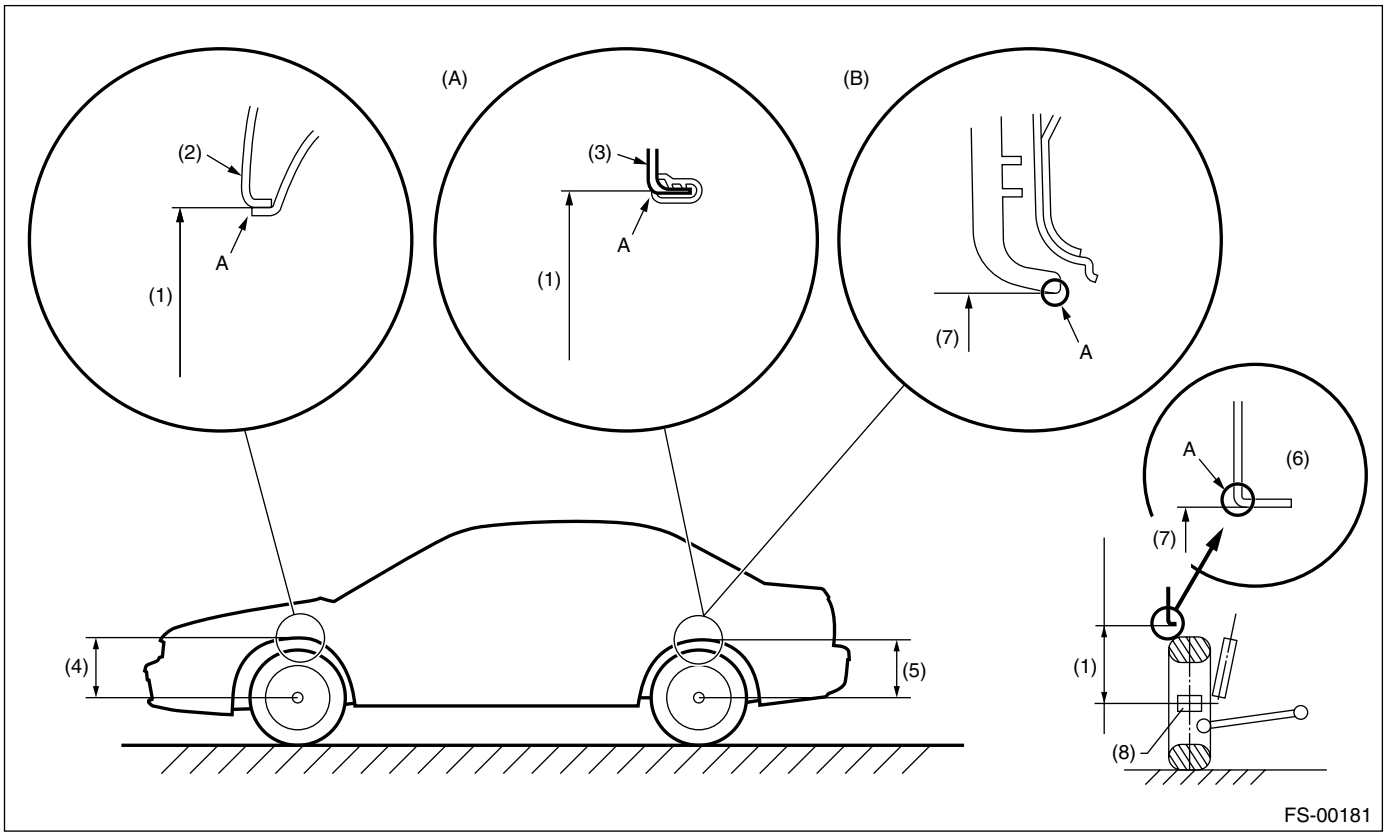
- tire air pressure
- unbalanced right and left tire wear, size difference
- tire run-out
- ball joint excessive play, wear
- tie rod end excessive play, wear
- wheel bearing excessive play
- right and left wheel base imbalance
- steering link part deformed, excessive play
- suspension part deformed, excessive play

Check, adjust and/or measure the wheel alignment in accordance with procedures indicated in the figure:

Wheel arch height (Front and rear) <Ref. to FS-8, WHEEL ARCH HEIGHT, INSPECTION, Wheel Alignment.>
↓
Camber (Front and rear) <Ref. to FS-9, CAMBER, INSPECTION, Wheel Alignment.>
↓
Caster (Front) <Ref. to FS-10, CASTER, INSPECTION, Wheel Alignment.>
↓
Steering angle <Ref. to FS-10, STEERING ANGLE, INSPECTION, Wheel Alignment.>
↓
Front wheel toe-in <Ref. to FS-11, FRONT WHEEL TOE-IN, INSPECTION, Wheel Alignment.>
↓
Rear wheel toe-in <Ref. to FS-11, REAR WHEEL TOE-IN, INSPECTION, Wheel Alignment.>
↓
Thrust angle <Ref. to FS-13, THRUST ANGLE, INSPECTION, Wheel Alignment.>

1. WHEEL ARCH HEIGHT

1) Set the vehicle on a level surface.
2) Set the vehicle to “curb weight” conditions. (Empty luggage compartment, install spare tire, jack, service tools, and top up fuel tank.)
3) Set the steering wheel in a straight line, then remove the vehicle straight ahead more than 5 m (16 ft) to settle the suspension.
4) Suspend the thread from wheel arch (point “A” in figure below) to determine a point directly above center of wheel.
5) Measure the distance between measuring point “A” and center of wheel.



(A) Except STi model
(B) STi model

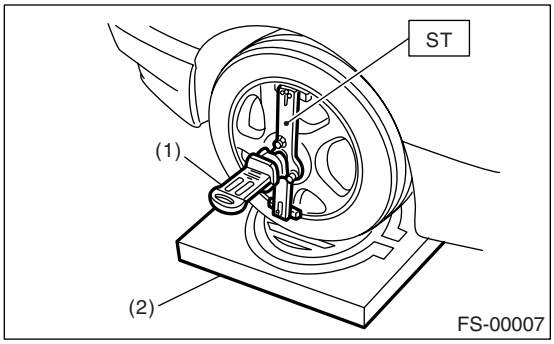
(1) Wheel arch height
(2) Front fender
(3) Rear quarter
(4) Front wheel arch height
(5) Rear wheel arch height
(6) Flange bend line
(7) Measuring point
(8) End of spindle

Model		Specified wheel arch height mm (in) (tolerance: $^{+12}_{-24}$ mm ($^{+0.47}_{-0.94}$ in))	
		Non-turbo	Turbo
Sedan	Front	406 (15.98)	396 (15.59)
	Rear	381 (15.0)	376 (14.80)
Wagon	Front	397 (15.63)	387 (15.24)
	Rear	381 (15.0)	376 (14.80)
OUTBACK	Front	402 (15.83)	—
	Rear	386 (15.20)	—
STi	Front	—	396 (15.59)
	Rear	—	373 (14.69)

2. CAMBER

• Inspection

1) Place the front wheel on turning radius gauge. Make sure ground contacting surfaces of front and rear wheels are set at the same height.
2) Set the ST into the center of wheel, and then install the wheel alignment gauge.
ST 927380002 ADAPTER



(1) Alignment gauge
(2) Turning radius gauge

3) Follow the wheel alignment gauge operation manual to measure camber angle.

Model		Camber (Differences between RH and LH: 45′ or less)
Sedan	Non-turbo	−0°15′±0°45′
	Turbo	−0°25′±0°45′
Wagon	Non-turbo	−0°10′±0°45′
	Turbo	−0°20′±0°45′
OUTBACK		−0°05′±0°45′

• Front Camber Adjustment

1) When adjusting the camber, adjust it to the following value.

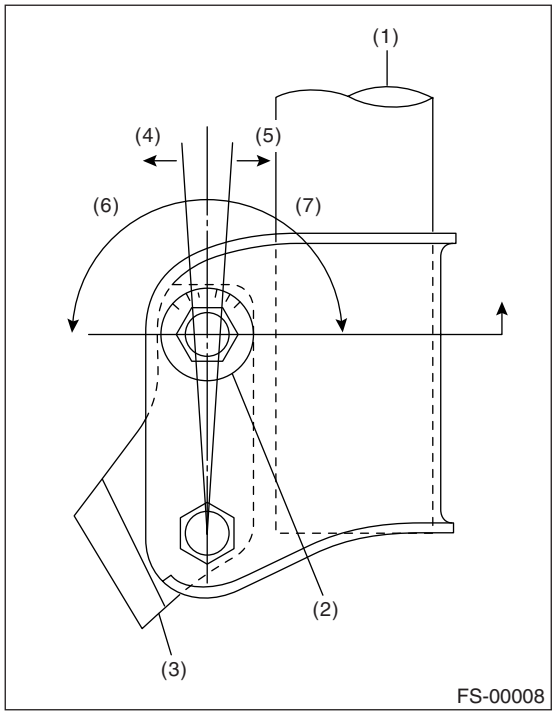
Model		Camber (Differences between RH and LH: 45′ or less)
Sedan	Non-turbo	−0°15′±0°30′
	Turbo	−0°25′±0°30′
Wagon	Non-turbo	−0°10′±0°30′
	Turbo	−0°20′±0°30′
OUTBACK		−0°05′±0°30′

2) Loosen the two self-locking nuts located at lower front portion of strut.

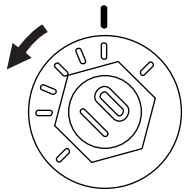
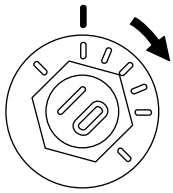
NOTE:
When adjusting bolt needs to be loosened or tightened, hold its head with a wrench and turn self-locking nut.

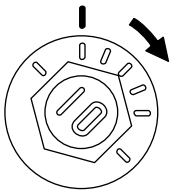
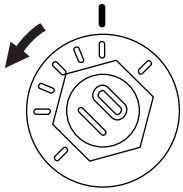
3) Turn the camber adjusting bolt so that camber is set at the specification.

NOTE:
Moving the adjusting bolt by one scale graduation changes camber by approx. 0°15′.



(1) Strut
(2) Adjusting bolt
(3) Housing
(4) Outer
(5) Inner
(6) Camber is increased.
(7) Camber is decreased.

Camber is increased.	
Rotate camber adjusting bolt LH counterclockwise.	Rotate camber adjusting bolt RH clockwise.
 FS-00009	 FS-00010

Camber is decreased.	
Rotate camber adjusting bolt LH clockwise.	Rotate camber adjusting bolt RH counterclockwise.
 FS-00010	 FS-00009

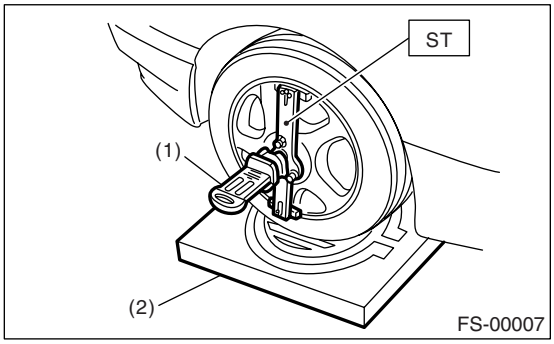
4) Tighten the new two self-locking nuts.

Tightening torque:
175 N·m (17.8 kgf-m, 129 ft-lb)

3. CASTER

• Inspection

1) Place the front wheel on turning radius gauge. Make sure ground contacting surfaces of front and rear wheels are set at the same height.
2) Set the ST into center of wheel, and then install the wheel alignment gauge.
ST 927380002 ADAPTER



(1) Alignment gauge
(2) Turning radius gauge

3) Follow the wheel alignment gauge operation manual to measure caster angle.

NOTE:
Refer to “SPECIFICATION” for caster values. <Ref. to FS-2, SPECIFICATION, General Description.>

4. STEERING ANGLE

• Inspection

1) Place the vehicle on a turning radius gauge.
2) While depressing the brake pedal, turn the steering wheel fully to the right and left. With the steering wheel held at each fully turned position, measure both the inner and outer wheel steering angle.

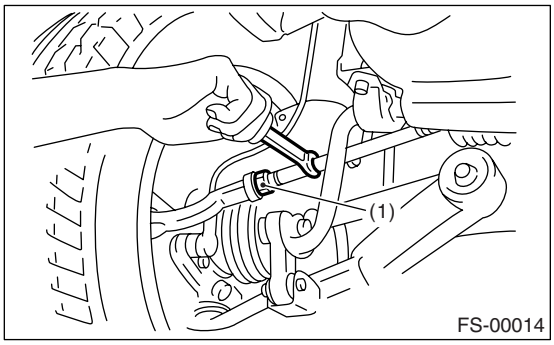
Steering angle:

Model	Turbo and OUTBACK	Others
Inner wheel	34.5°±1.5°	37.3°±1.5°
Outer wheel	30.3°±1.5°	32.4°±1.5°

• Adjustment

1) Turn the tie-rod to adjust steering angle of both inner and outer wheels.
2) Check the toe-in.

NOTE:
Correct the boot if it is twisted.



(1) Lock nut

5. FRONT WHEEL TOE-IN

• Inspection

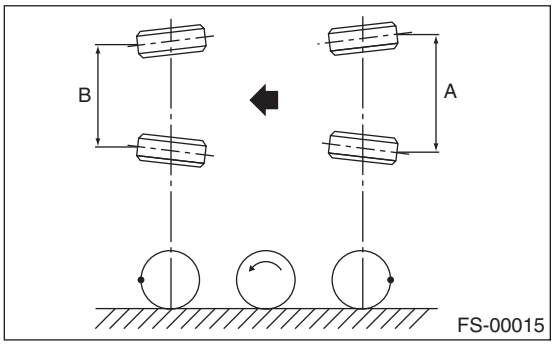
Toe-in:
0±3 mm (0±0.12 in) (Tolerance)

1) Set the toe-in gauge to rear sides of right and left front tires at height corresponding to center of spindle.
2) Mark each right and left tires at height corresponding to center of spindle and measure the distance “A” between marks.
3) Move the vehicle forward to rotate wheels 180°.

NOTE:
Whenever rotating the wheels, drive the vehicle forward.

4) Measure the distance “B” between right and left marks. Toe-in can then be obtained by the following equation:

A − B = Toe-in

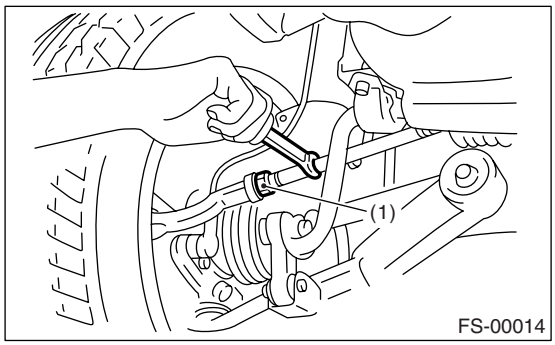


• Adjustment

When adjusting the toe-in, adjust it to the following value.

Toe-in:
0±2 mm (0±0.08 in) (Adjustment standard)

1) Make sure that the right and left steering angles are within specified value.
2) Loosen the right and left side steering tie-rods lock nuts.
3) Turn the right and left tie rods equal amounts until the toe-in is at the specification.
Both the right and left tie-rods are right-hand threaded. To increase toe-in, turn both tie-rods clockwise equal amounts (as viewed from inside of the vehicle).



(1) Lock nut

4) Tighten the tie-rod lock nut.

Tightening torque:
83 N·m (8.5 kgf-m, 61.5 ft-lb)

NOTE:
Correct the tie-rod boot, if it is twisted.

6. REAR WHEEL TOE-IN

• Inspection

Toe-in:
0±3 mm (0±0.12 in) (Tolerance)

For rear toe-in inspection procedure, refer to FRONT WHEEL TOE-IN procedure.
<Ref. to FS-11, FRONT WHEEL TOE-IN, INSPECTION, Wheel Alignment.>

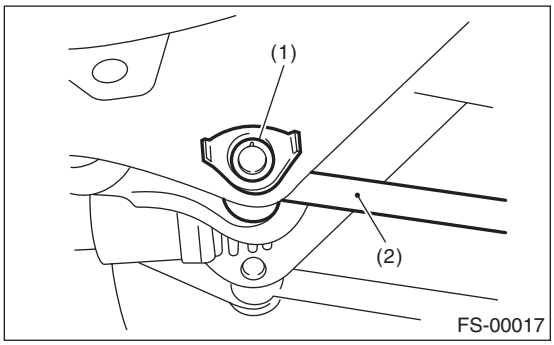
• Adjustment

When adjusting the toe-in, adjust it to the following value.

Toe-in:
0±2 mm (0±0.08 in) (Adjustment standard)

1) Loosen the self-locking nut on inner side of link rear.

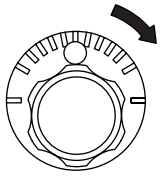
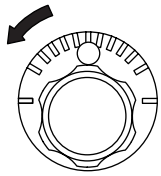
NOTE:
When loosening or tightening the adjusting bolt, hold the bolt head and turn self-locking nut.

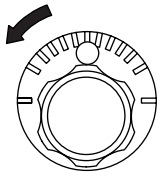
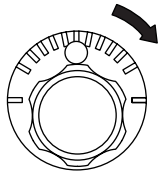


(1) Adjusting bolt
(2) Link rear

2) Turn the adjusting bolt head until toe-in is at the specification.

NOTE:
When the right and left wheels are adjusted for toe-in at the same time, the movement of one scale graduation changes toe-in by approx. 1.8 mm (0.07 in).

Toe-in is increased.	
Rotate camber adjusting bolt LH clockwise.	Rotate camber adjusting bolt RH counterclockwise.
 FS-00018	 FS-00019

Toe-in is decreased.	
Rotate camber adjusting bolt LH counterclockwise.	Rotate camber adjusting bolt RH clockwise.
 FS-00019	 FS-00018

3) Tighten a new self-locking nut.

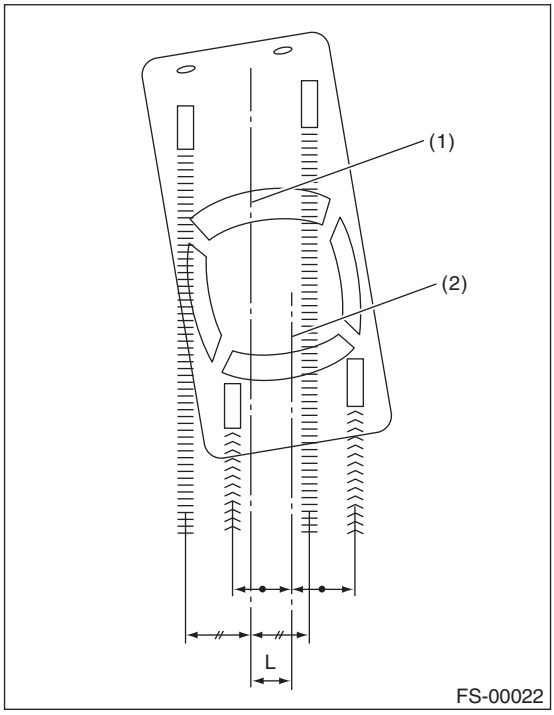
Tightening torque:
100 N·m (10.2 kgf-m, 74 ft-lb)

7. THRUST ANGLE

• Inspection

1) Position the vehicle on a level surface.
2) Move the vehicle 3 to 4 m (10 to 13 ft) directly forward.
3) Determine the center lines of loci of both front and rear axles.
4) Measure the distance "L" between center lines of loci of the axles.

Thrust angle:
0°±30′ (Tolerance)
Less than 30′ when "L" is less than 23 mm (0.9 in).

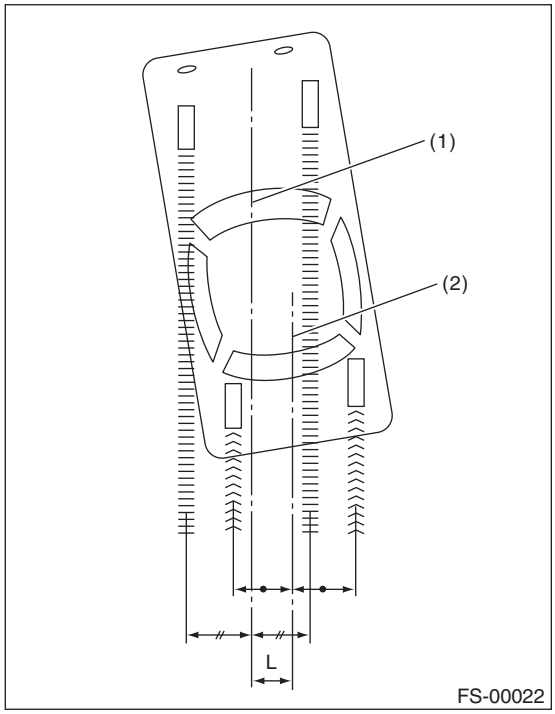


(1) Center line of loci (front axle)
(2) Center line of loci (rear axle)

• Adjustment

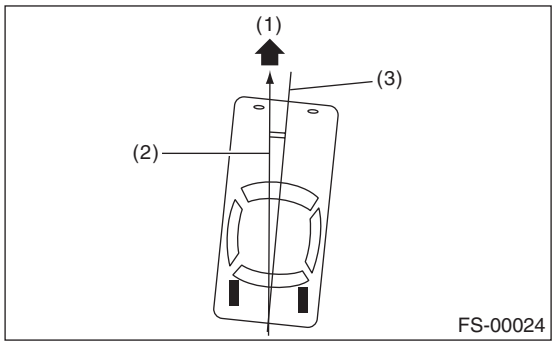
1) Make the thrust angle adjustments by turning toe-in adjusting bolts of rear suspension equally in the same direction.
2) When one rear wheel is adjusted in a toe-in direction, adjust the other rear wheel equally in toe-out direction, in order to make thrust angle adjustment.
3) When the right and left adjusting bolts are turned incrementally by one graduation in the same direction, the thrust angle will change approx. 16′ ["L" is almost equal to 12 mm (0.472 in)].

Thrust angle:
0°±20′ (Adjustment standard)
Less than 20′ when "L" is less than 15 mm (0.6 in).



(1) Center line of loci (front axle)
(2) Center line of loci (rear axle)

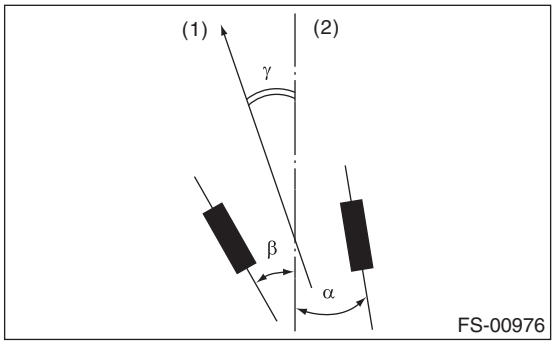
NOTE:
Thrust angle refers to a mean value of right and left rear wheel toe angles in relation to the vehicle body center line. Vehicle is driven straight in the thrust angle direction while swinging in the oblique direction depending on the degree of the mean thrust angle.



(1) Front
(2) Thrust angle
(3) Body center line

Thrust angle: r = (α − β)/2

α: Right rear wheel toe-in angle
β: Left rear wheel toe-in angle
Here, use only positive toe-in values from each wheel to substitute for α and β in the equation.



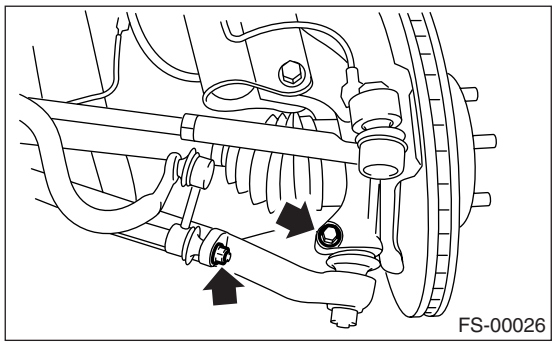
(1) Front
(2) Body center line

3. Front Transverse Link

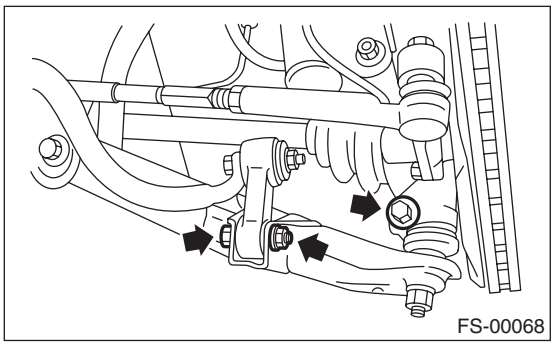
A: REMOVAL

1) Set the vehicle on a lift.
2) Lift-up the vehicle and remove the wheel.
3) Remove the sub frame.
4) Disconnect the stabilizer link from transverse link.
5) Remove the bolt securing ball joint of transverse link to housing.

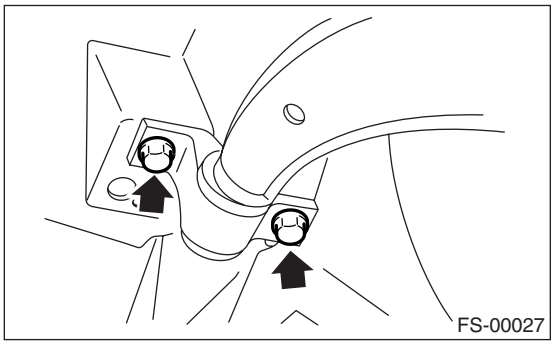
SEDAN MODEL:



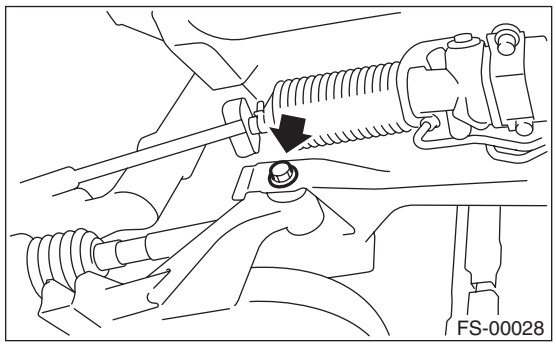
WAGON MODEL:



6) Remove the nut (do not remove bolt) securing transverse link to crossmember.
7) Remove the two bolts securing bushing bracket of transverse link to the vehicle body at rear bushing location.



8) Extract the ball joint from housing.
9) Remove the bolt securing transverse link to crossmember, and then extract the transverse link from crossmember.



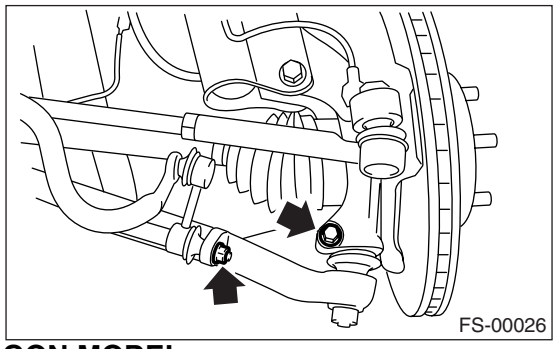
B: INSTALLATION

1) Temporarily tighten the two bolts used to secure rear bushing of transverse link to body.

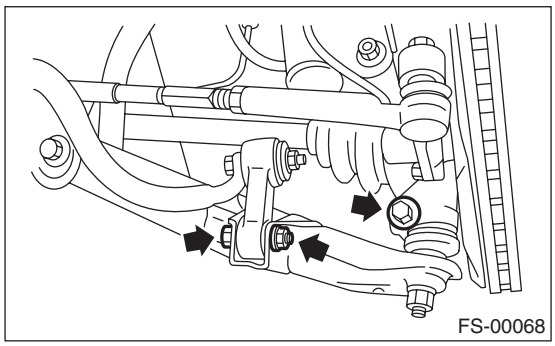
NOTE:
These bolts should be tightened to such an extent that they can still move back and forth in the oblong shaped hole in the bracket (which holds the bushing).

2) Install the bolts used to connect transverse link to crossmember and temporarily tighten with a new self-locking nut.
3) Insert the ball joint into housing.
4) Connect the stabilizer link to transverse link, and then temporarily tighten a new self-locking nut.

SEDAN MODEL:



WAGON MODEL:



5) Tighten the following points in the order shown below when tires are in full contact with the ground and vehicle is curb weight.

(1) Transverse link and stabilizer

Tightening torque:
Sedan model:
45 N·m (4.6 kgf-m, 33 ft-lb)
Wagon model:
30 N·m (3.1 kgf-m, 22 ft-lb)

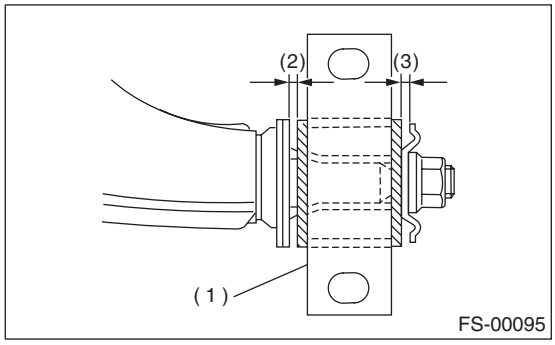
(2) Transverse link and crossmember

Tightening torque:
95 N·m (9.7 kgf-m, 70 ft-lb)

(3) Transverse link rear bushing and body

Tightening torque:
250 N·m (25.5 kgf-m, 184 ft-lb)

NOTE:
Move the rear bushing back and forth until transverse link-to-rear bushing clearance is established (as indicated in the figure) before tightening.



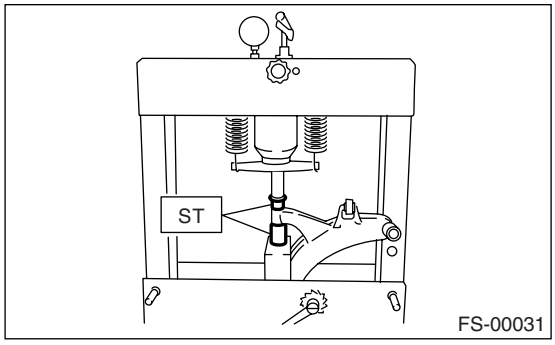
(1) Rear bushing
(2) 1 mm (0.04 in)
(3) 1.5 mm (0.059 in)

6) Check the wheel alignment and adjust if necessary.

C: DISASSEMBLY

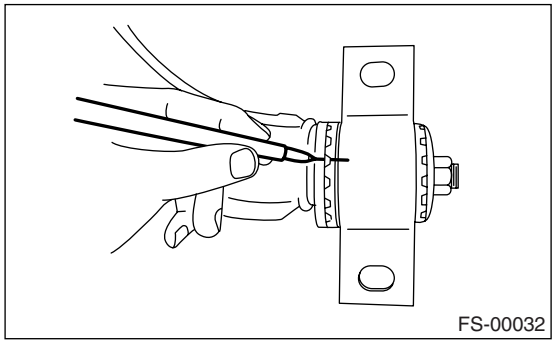
1. FRONT BUSHING

Using the ST, press the front bushing out of place.
ST 927680000 INSTALLER & REMOVER SET



2. REAR BUSHING

1) Scribe an aligning mark on the transverse link and rear bushing.
2) Loosen the nut, and then remove the rear bushing.

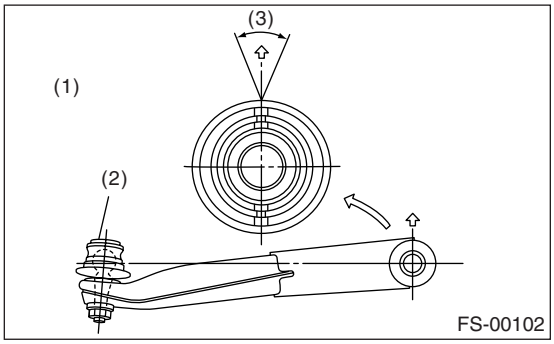


D: ASSEMBLY

1. FRONT BUSHING

Assemble in the reverse order of disassembly.

CAUTION:
Install the front bushing in correct direction, as shown in the figure.



(1) Face bushing toward center of ball joint
(2) Ball joint
(3) ±3°

2. REAR BUSHING

1) Install the rear bushing to transverse link, and then align the aligning marks scribed on the two.
2) Tighten the new self-locking nut.

NOTE:
While holding the rear bushing so as not to change position of aligning marks, tighten the self-locking nut.

Tightening torque:
186 N·m (19.0 kgf-m, 137 ft-lb)

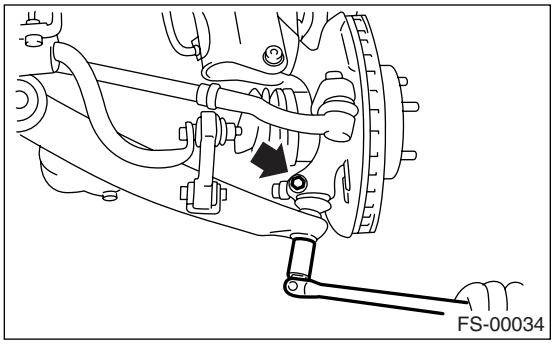
E: INSPECTION

1) Check the transverse link for wear, damage and cracks, and correct or replace if defective.
2) Check the bushings for cracks, fatigue or damage.
3) Check the rear bushing for oil leaks.

4. Front Ball Joint

A: REMOVAL

1) Remove the wheel.
2) Pull out the cotter pin from ball stud, remove the castle nut, and extract the ball stud from transverse link.
3) Remove the bolt securing ball joint to housing.



4) Extract the ball joint from housing.

B: INSTALLATION

1) Install the ball joint onto housing.

Tightening torque (Bolt):
50 N·m (5.1 kgf-m, 37 ft-lb)

CAUTION:
Do not apply grease to tapered portion of ball stud.

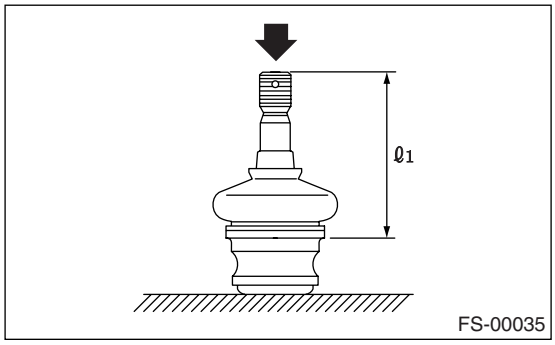
2) Connect the ball joint to transverse link.

Tightening torque (Castle nut):
Sedan turbo model:
30 N·m (3.1 kgf-m, 22 ft-lb)
Except sedan turbo model:
40 N·m (4.1 kgf-m, 30 ft-lb)

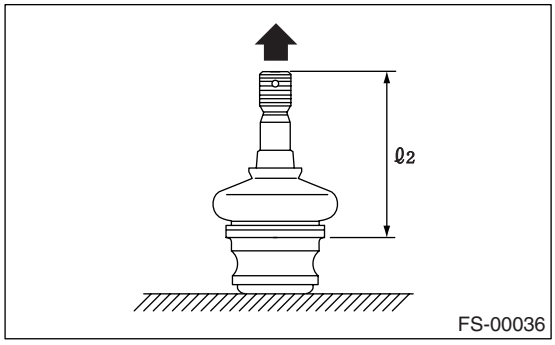
3) Retighten the castle nut further within 60° until a slot in castle nut is aligned with the hole in ball stud end, then insert a new cotter pin and bend it around castle nut.
4) Install the front wheel.

C: INSPECTION

1) Measure the play of ball joint by the following procedures. Replace with a new one when the play exceeds specified value.
(1) With 686 N (70 kgf, 154 lbf) loaded in direction shown in the figure, measure the dimension ℓ_1.



(2) With 686 N (70 kgf, 154 lbf) loaded in opposite direction shown in the figure, measure the dimension ℓ_2.



(3) Calculate plays from the following formula.
$S = \ell_2 - \ell_1$
(4) When plays are larger than the following value, replace with a new one.

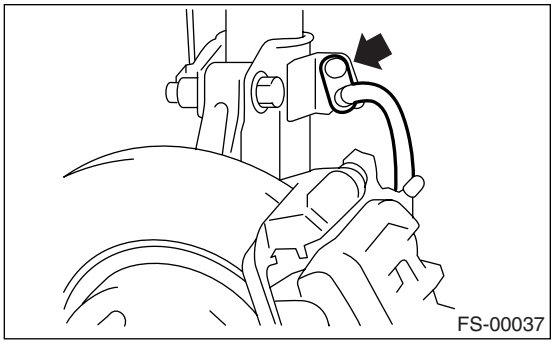
FRONT BALL JOINT
Specified play for replacement S:
Less than 0.3 mm (0.012 in)

2) When the play is smaller than specified value, visually inspect the dust cover.
3) The ball joint and cover that have been removed must be checked for wear, damage or cracks, and any defective part must be replaced.
4) If the dust cover is damaged, replace with a new ball joint.

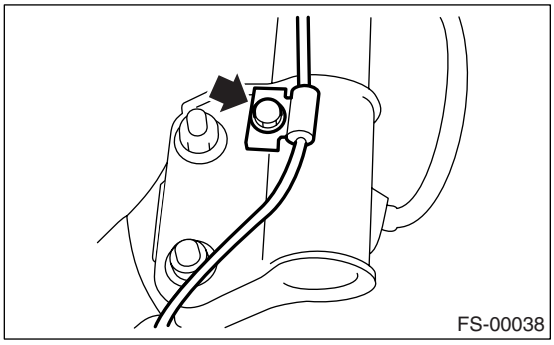
5. Front Strut

A: REMOVAL

1) Remove the wheel.
2) Remove the bolt securing the brake hose from strut.



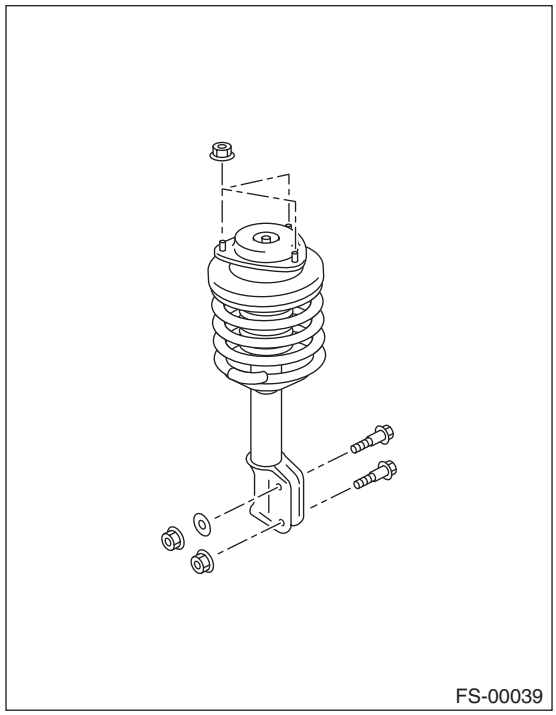
3) Scribe an alignment mark on the camber adjusting bolt which secures the strut to housing.
4) Remove the bolt securing ABS wheel speed sensor harness.



5) Remove the two bolts securing housing to strut.

NOTE:
While holding the head of adjusting bolt, loosen self-locking nut.

6) Remove the three nuts securing the strut mount to body.



B: INSTALLATION

1) Install the strut mount at upper side of strut to body, and then tighten with the nuts.

Tightening torque:
20 N·m (2.0 kgf-m, 14.5 ft-lb)

2) Position the aligning mark on camber adjustment bolt with aligning mark on lower side of strut. Install the strut to housing with a new self-locking nut.

NOTE:
While holding the head of adjusting bolt, tighten the self-locking nut.

Tightening torque:
175 N·m (17.8 kgf-m, 129 ft-lb)

3) Install the ABS wheel speed sensor harness to strut.

Tightening torque:
33 N·m (3.4 kgf-m, 24.3 ft-lb)

4) Install the bolts which secure the brake hose to strut.

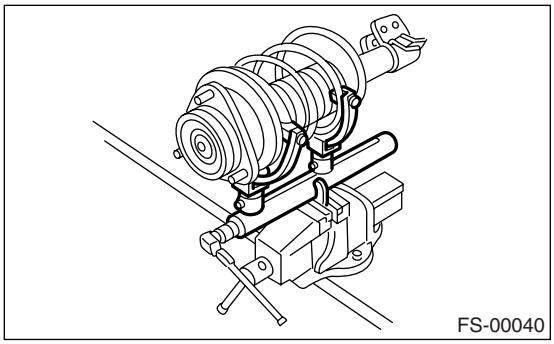
Tightening torque:
32 N·m (3.3 kgf-m, 23.6 ft-lb)

5) Install the wheels.

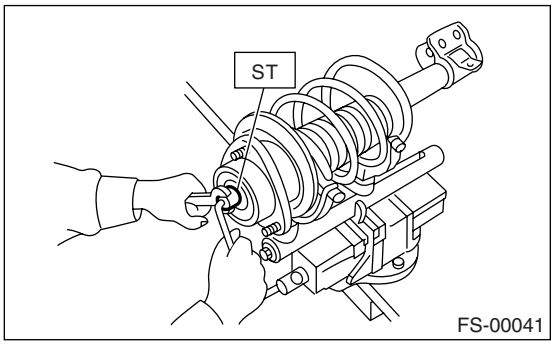
NOTE:
Check the wheel alignment and adjust if necessary.

C: DISASSEMBLY

1) Using a coil spring compressor, compress the coil spring.



2) Using the ST, remove the self-locking nut.
ST 927760000 STRUT MOUNT SOCKET



3) Remove the strut mount, upper spring seat and rubber seat from strut.
4) Gradually decreasing the compression force of compressor, and then remove the coil spring.
5) Remove the dust cover and helper spring.

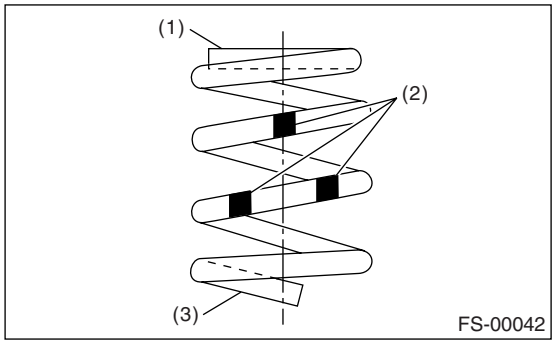
D: ASSEMBLY

1) Before installing the coil spring, strut mount, etc., on strut, check for the presence of air in the damping force generating mechanism of strut since air prevents proper damping force from being produced.
2) Checking for the presence of air
   (1) Place the strut vertically with piston rod facing up.
   (2) Move the piston rod to center of its entire stroke.
   (3) While holding the piston rod end with fingertips, move the rod up and down.
   (4) If the piston rod moves at least 10 mm (0.39 in) in the former step, purge air from the strut.
3) Air purging procedure
   (1) Place the strut vertically with piston rod facing up.
   (2) Fully extend the piston rod.
   (3) With the piston rod fully extended, place the piston rod side down. The strut must stand vertically.
   (4) Fully contract the piston rod.
   (5) Repeat three or four times from first step.

NOTE:
After completely purging air from strut, be sure to place the strut with piston rod facing up. If it is laid down, check for entry of air in the strut as outlined under “Checking for the presence of air”.

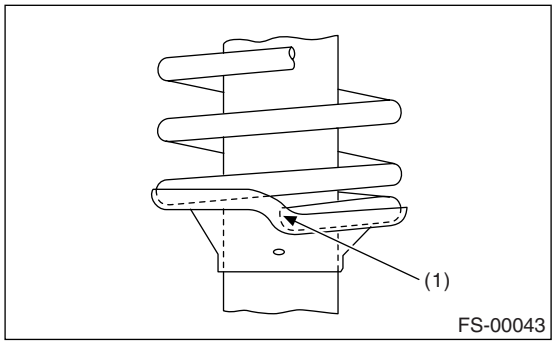
4) Using a coil spring compressor, compress the coil spring.

NOTE:
Make sure that the installing direction of coil spring is as shown in the figure.



(1) Flat (top side)
(2) Identification paint
(3) Inclined (bottom side)

5) Set the coil spring correctly so that its end face fits well into the spring seat as shown in the figure.

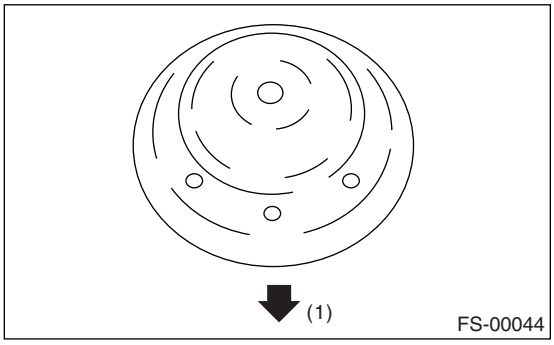


(1) Coil spring end face

6) Install the helper and dust cover to the piston rod.

7) Pull the piston rod fully upward, and install the rubber seat and spring seat.

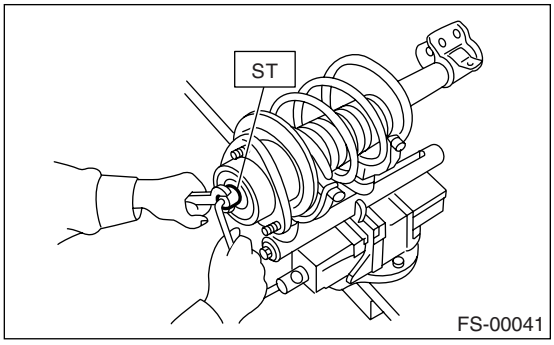
NOTE:
Ensure that the upper spring seat is positioned as shown in the figure.



(1) Outside of body

8) Install the strut mount to the piston rod, and then tighten a new self-locking nut temporarily.
9) Using a hexagon wrench to prevent strut rod from turning, tighten the self-locking nut with ST.
ST 927760000 STRUT MOUNT SOCKET

Tightening torque:
55 N·m (5.6 kgf-m, 41 ft-lb)



10) Loosen the coil spring carefully.

E: INSPECTION

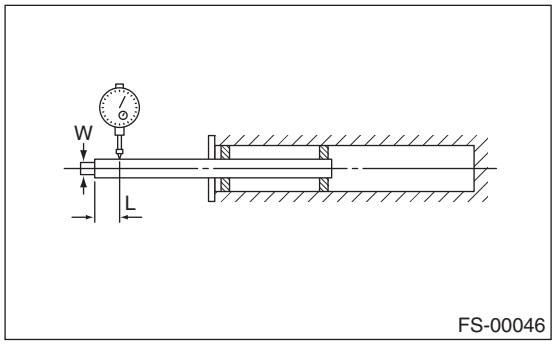
Check the disassembled parts for cracks, damage and wear, and replace with new parts if defective.

1. DAMPER STRUT

1) Check for oil leakage.
2) Move the piston rod up and down to check that it operates smoothly without any binding.
3) Play of piston rod

- Measure the play as follows:

Fix outer shell and fully extend the rod. Set a dial gauge at the end of rod: L [10 mm (0.39 in)], then apply a force of W [20 N (2 kgf, 4 lbf)] to threaded portion. With the force of 20 N (2 kgf, 4 lbf) applied, read dial gauge indication: P_1. Apply a force of 20 N (2 kgf, 4 lbf) in the opposite direction of “W”, then read dial gauge indication: P_2.



Limit of play ($P_1 + P_2$):
0.8 mm (0.031 in)

If the play is greater than limit, replace the strut.

2. STRUT MOUNT

Check the rubber part for creep, cracks and deterioration, and replace it with a new one if defective.

3. DUST COVER

If any cracks or damage are found, replace it with a new one.

4. COIL SPRING

One having permanent strain should be replaced with a new one. When the vehicle posture is uneven, although there are no considerable reasons like tire puncture, uneven loading, etc., check the coil spring for its free length referring to specifications, cracks, etc., and replace it with a new one if defective.

5. HELPER

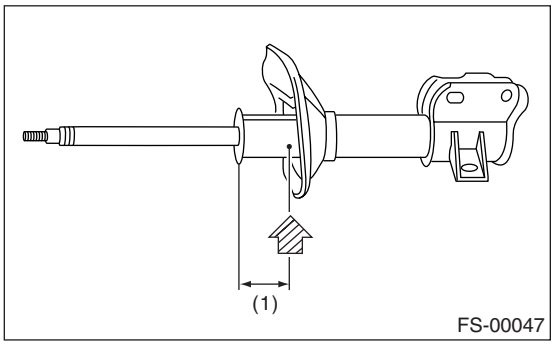
Replace it with a new one if cracked or damaged.

F: DISPOSAL

1. EXCEPT STi MODEL

CAUTION:
• Before handling gas filled struts, be sure to wear goggles to protect eyes from gas, oil and filings.
• Do not disassemble the strut damper or place into a fire.
• Drill holes before disposing of gas filled struts.

1) Place the gas filled strut on a flat and level surface with piston rod fully extended.
2) Using a 2 to 3 mm (0.08 to 0.12 in) dia. drill, make holes in areas shown in the figure.

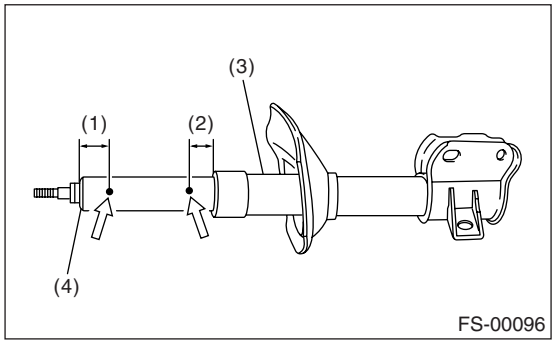


(1) 40 mm (1.57 in)

2. STi MODEL

CAUTION:
• Before handling gas filled struts, be sure to wear goggles to protect eyes from gas, oil and filings.
• Do not disassemble the strut damper or place into a fire.
• Drill holes before disposing of gas filled struts.

1) Place the gas filled strut on a flat and level surface with damping tube fully extended.
2) Using a 2 to 3 mm (0.08 to 0.12 in) dia. drill, make holes in (1), and then make a hole in (2).



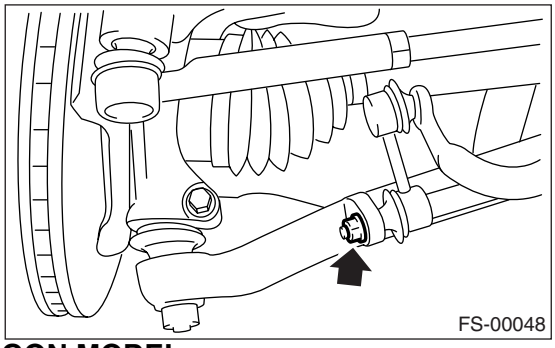
(1) 20 mm (0.78 in)
(2) 10 mm (0.39 in)
(3) Strut
(4) Damping tube

6. Front Stabilizer

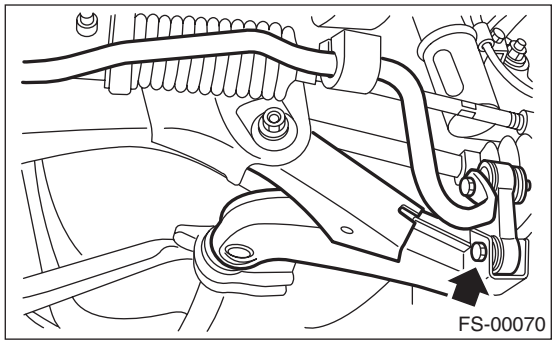
A: REMOVAL

1) Jack-up the front part of the vehicle and support it with rigid racks.
2) Remove the jack-up plate from lower part of crossmember.
3) Remove the sub frame.
4) Remove the nut which secures stabilizer link to front transverse link.

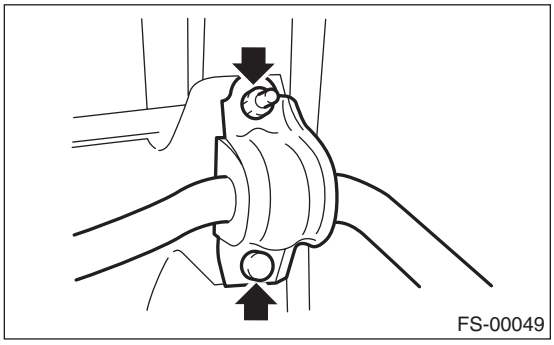
SEDAN MODEL:



WAGON MODEL:



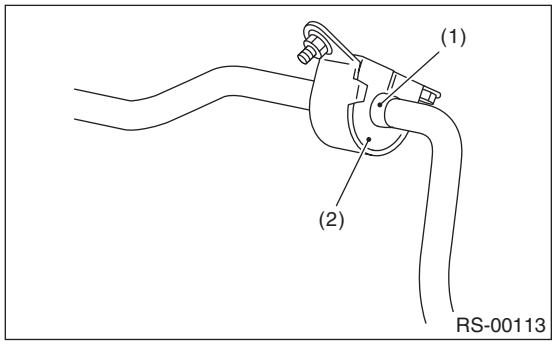
5) Remove the bolts which secure stabilizer to crossmember.



B: INSTALLATION

1) Install in the reverse order of removal.

NOTE:
• Install the bushing (on front crossmember side) while aligning it with paint mark on stabilizer.
• Ensure that bushing and stabilizer have the same identification colors when installing.



(1) Mark stamped on stabilizer
(2) Bushing identification color

2) Always tighten the bushing location when tires are in full contact with the ground and vehicle is curb weight.

Tightening torque:
Jack-up plate to crossmember:
70 N·m (7.1 kgf-m, 52 ft-lb)
Stabilizer link to front transverse link (Sedan model):
45 N·m (4.6 kgf-m, 33 ft-lb)
Stabilizer link to front transverse link (Wagon model):
30 N·m (3.1 kgf-m, 22 ft-lb)
Stabilizer to crossmember:
25 N·m (2.5 kgf-m, 18.1 ft-lb)

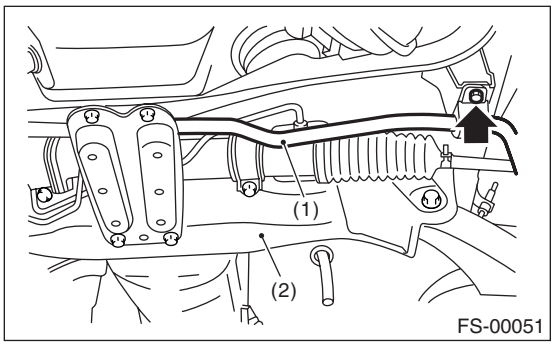
C: INSPECTION

1) Check the bushing for cracks, fatigue or damage.
2) Check the stabilizer link for deformities, cracks, or damage, and bushing for protrusions from the hole of stabilizer link.

7. Front Crossmember

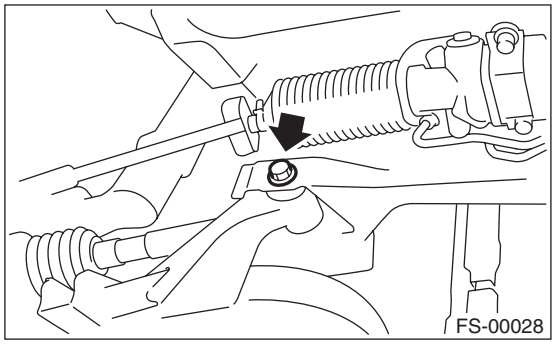
A: REMOVAL

1) Disconnect the ground cable from battery.
2) Lift-up the vehicle, and then remove the front wheels.
3) Remove the sub frame.
4) Remove both the stabilizer and jack-up plate.



(1) Front stabilizer
(2) Front crossmember

5) Disconnect the tie-rod end from housing.
6) Remove the front exhaust pipe.
7) Remove the front transverse link from front crossmember and body.



8) Remove the nuts attaching engine mount cushion rubber to crossmember.
9) Remove the steering universal joint.
10) Disconnect the power steering pipe from steering gear box.
11) Lift the engine by approx. 10 mm (0.39 in) by using chain block.
12) Support the crossmember with a jack, remove nuts securing crossmember to body and lower the crossmember gradually along with steering gearbox.

CAUTION:
When removing the crossmember downward, be careful that tie-rod end does not interfere with SFJ boot.

B: INSTALLATION

1) Install in the reverse order of removal.

NOTE:
Always tighten the bushing when tires are in full contact with the ground and vehicle is curb weight.

Tightening torque:
Transverse link bushing to crossmember:
95 N·m (9.7 kgf-m, 70 ft-lb) (Tighten bolt)
Stabilizer to bushing:
25 N·m (2.5 kgf-m, 18.1 ft-lb)
Tie-rod end to housing:
27.0 N·m (2.75 kgf-m, 19.9 ft-lb)
Front cushion rubber to crossmember:
85 N·m (8.7 kgf-m, 62.7 ft-lb)
Universal joint to pinion shaft:
24 N·m (2.4 kgf-m, 17.4 ft-lb)
Crossmember to body:
105 N·m (10.7 kgf-m, 77 ft-lb)

2) Purge air from the power steering system.
3) Check the wheel alignment and adjust if necessary.

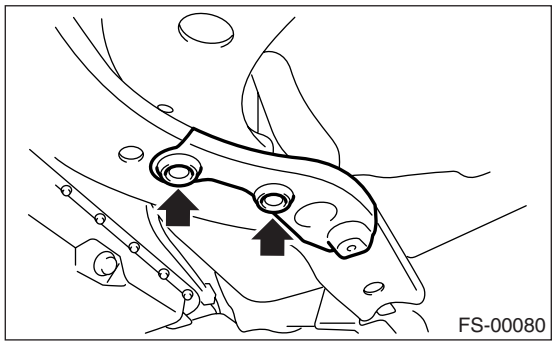
C: INSPECTION

Check the crossmember for wear, damage and cracks, and correct or replace if defective.

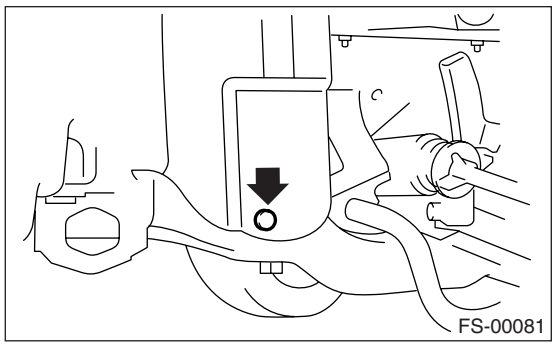
8. Sub Frame

A: REMOVAL

1) Lift-up the vehicle.
2) Remove the under cover.
3) Remove the bolt cover.

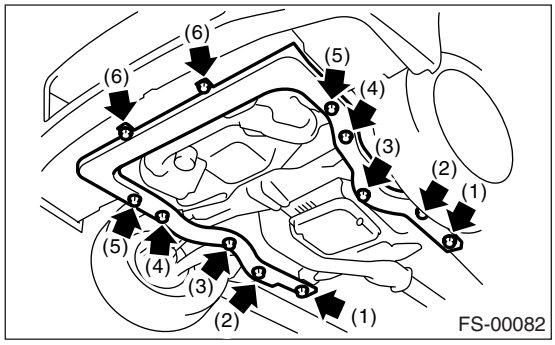


4) Remove the clip.



5) Remove the sub frame.

NOTE:
Loosen bolt (1) and leave a few threads caught, then remove the bolts in the order of (2), (3), (4), (5), and (6).



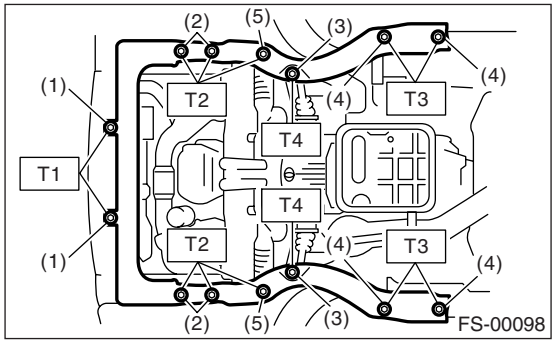
(4) Only for STi

B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Replace the M12 bolt with a new one.

Tightening torque:
T1: 34 N·m (3.5 kgf-m, 25 ft-lb)
T2: 55 N·m (5.6 kgf-m, 41 ft-lb)
T3: 70 N·m (7.1 kgf-m, 52 ft-lb)
T4: 95 N·m (9.7 kgf-m, 70 ft-lb)

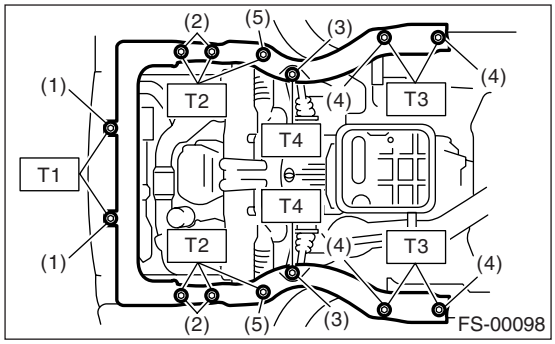


(1) M8 bolt
(2) M12 bolt (with wax)
(3) M12 bolt (with oil)
(4) M10 bolt
(5) M12 bolt (Only for STi)

C: INSPECTION

1) Check that there is no damage and distortion at the sub frame.
2) Check that the bolts are tightened with the specified torque. If there is looseness, tighten to the specified torque.

Tightening torque:
T1: 34 N·m (3.5 kgf-m, 25 ft-lb)
T2: 55 N·m (5.6 kgf-m, 41 ft-lb)
T3: 70 N·m (7.1 kgf-m, 52 ft-lb)
T4: 95 N·m (9.7 kgf-m, 70 ft-lb)

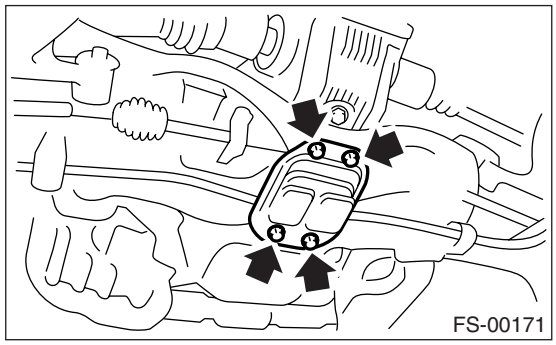


(1) M8 bolt
(2) M12 bolt
(3) M12 bolt
(4) M10 bolt
(5) M12 bolt (Only for STi)

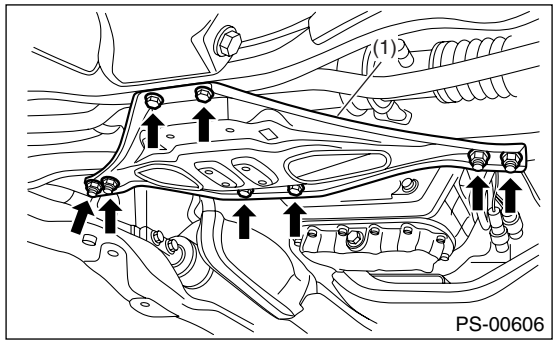
9. Jack-up Plate

A: REMOVAL

1) Set the vehicle on a lift.
2) Lift-up the vehicle.
3) Remove the under cover.
4) Remove the jack-up plate.



5) Remove the two nuts at both ends of arm respectively.



B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
Jack-up plate to crossmember:
70 N·m (7.1 kgf-m, 52 ft-lb)

Turbo model

Tightening torque:
Jack-up plate and both side of support arm to crossmember:
30 N·m (3.1 kgf-m, 22 ft-lb)

C: INSPECTION

Check the front support arm for wear, damage and cracks, and correct or replace if defective.

10.General Diagnostic Table

A: INSPECTION

1. IMPROPER VEHICLE POSTURE OR IMPROPER WHEEL ARCH HEIGHT

Possible causes	Countermeasures
(1) Permanent distortion or breakage of coil spring	Replace.
(2) Unsmooth operation of damper strut and/or shock absorber	Replace.
(3) Installation of wrong strut and/or shock absorber	Replace with proper parts.
(4) Installation of wrong coil spring	Replace with proper parts.

2. POOR RIDE COMFORT

1) Large rebound shock
2) Rocking of the vehicle continues too long after running over bump and/or hump.
3) Large shock in bumping

Possible causes	Countermeasures
(1) Breakage of coil spring	Replace.
(2) Overinflating pressure of tire	Adjust.
(3) Improper wheel arch height	Adjust or replace the coil springs with new ones.
(4) Fault in operation of damper strut and/or shock absorber	Replace.
(5) Damage or deformation of strut mount and/or shock absorber mount	Replace.
(6) Unsuitability of maximum and/or minimum length of damper strut and/or shock absorber	Replace with proper parts.
(7) Deformation or loss of bushing	Replace.
(8) Deformation or damage of helper in strut assembly and/or shock absorber	Replace.
(9) Oil leakage of damper strut and/or shock absorber	Replace.

3. NOISE

Possible causes	Countermeasures
(1) Wear or damage of damper strut and/or shock absorber component parts	Replace.
(2) Loosening of suspension link installing bolt	Retighten to the specified torque.
(3) Deformation or loss of bushing	Replace.
(4) Unsuitability of maximum and/or minimum length of damper strut and/or shock absorber	Replace with proper parts.
(5) Breakage of coil spring	Replace.
(6) Wear or damage of ball joint	Replace.
(7) Deformation of stabilizer clamp	Replace.

REAR SUSPENSION

RS

Page

1. General Description 2
2. Wheel Alignment 9
3. Rear Stabilizer 10
4. Rear Trailing Link 11
5. Rear Strut 15
6. Lateral Link 16
7. Rear Crossmember 20
8. General Diagnostic Table 21

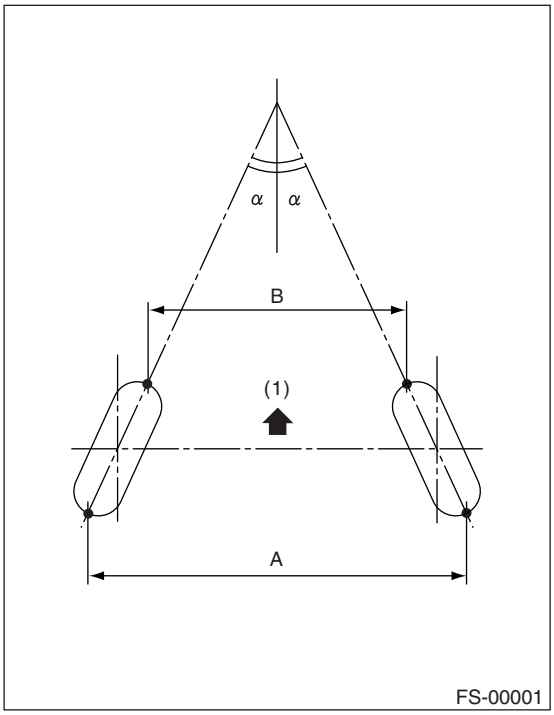
1. General Description

A: SPECIFICATION

Model	Sedan			Wagon		OUTBACK
	Non-turbo	Turbo	STi	Non-turbo	Turbo	
Camber (Tolerance: ±0°45′ Adjustment standard: ±0°30′)	−1°25′	−1°30′	−1°30′	−1°15′	−1°20′	−1°10′
Toe-in	Tolerance: 0±3 mm (0±0.12 in), Toe angle (The sum of both wheels): ±0°15′ Tolerance: 0±2 mm (0±0.08 in), Toe angle (The sum of both wheels): ±0°10′					
Wheel arch height [Tolerance: +12/−24 mm (+0.47/−0.94 in)]	381 mm (15.0 in)	376 mm (14.80 in)	373 mm (14.69 in)	381 mm (15.0 in)	376 mm (14.80 in)	386 mm (15.20 in)
Thrust angle	Tolerance: ±0°30′, Adjustment standard: ±0°20′					
Diameter of stabilizer	*1	20 mm (0.79 in)	20 mm (0.79 in)	*2	17 mm (0.67 in)	—

*1 RS, GX (Model with 205 tire): 17 mm (0.67 in)
Except RS, GX (Model with 205 tire): None
*2 GX (Model with 205 tire): 17 mm (0.67 in)
Except GX (Model with 205 tire): None

NOTE:
• Front and rear toe-in and front camber can be adjusted. If toe-in or camber exceeds tolerance, adjust toe-in and camber to the adjustment standard.
• The other items indicated in the specification table cannot be adjusted. If the other items exceed specifications, check suspension parts and connections for deformities; replace with new ones as required.

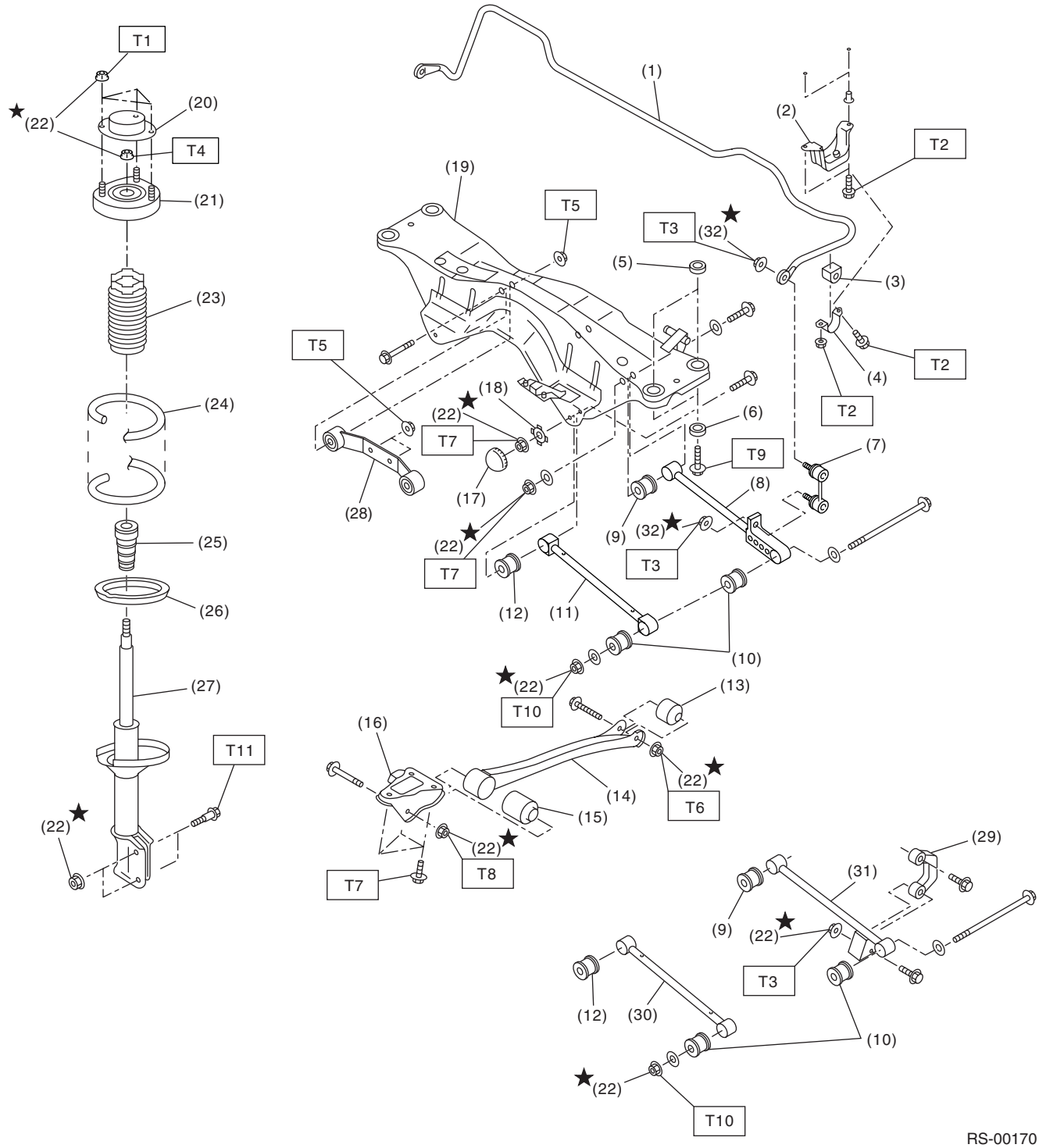


(1) Front
A − B = Positive: Toe-in, Negative: Toe-out
α = Each toe angle

B: COMPONENT

1. REAR SUSPENSION

• AWD MODEL

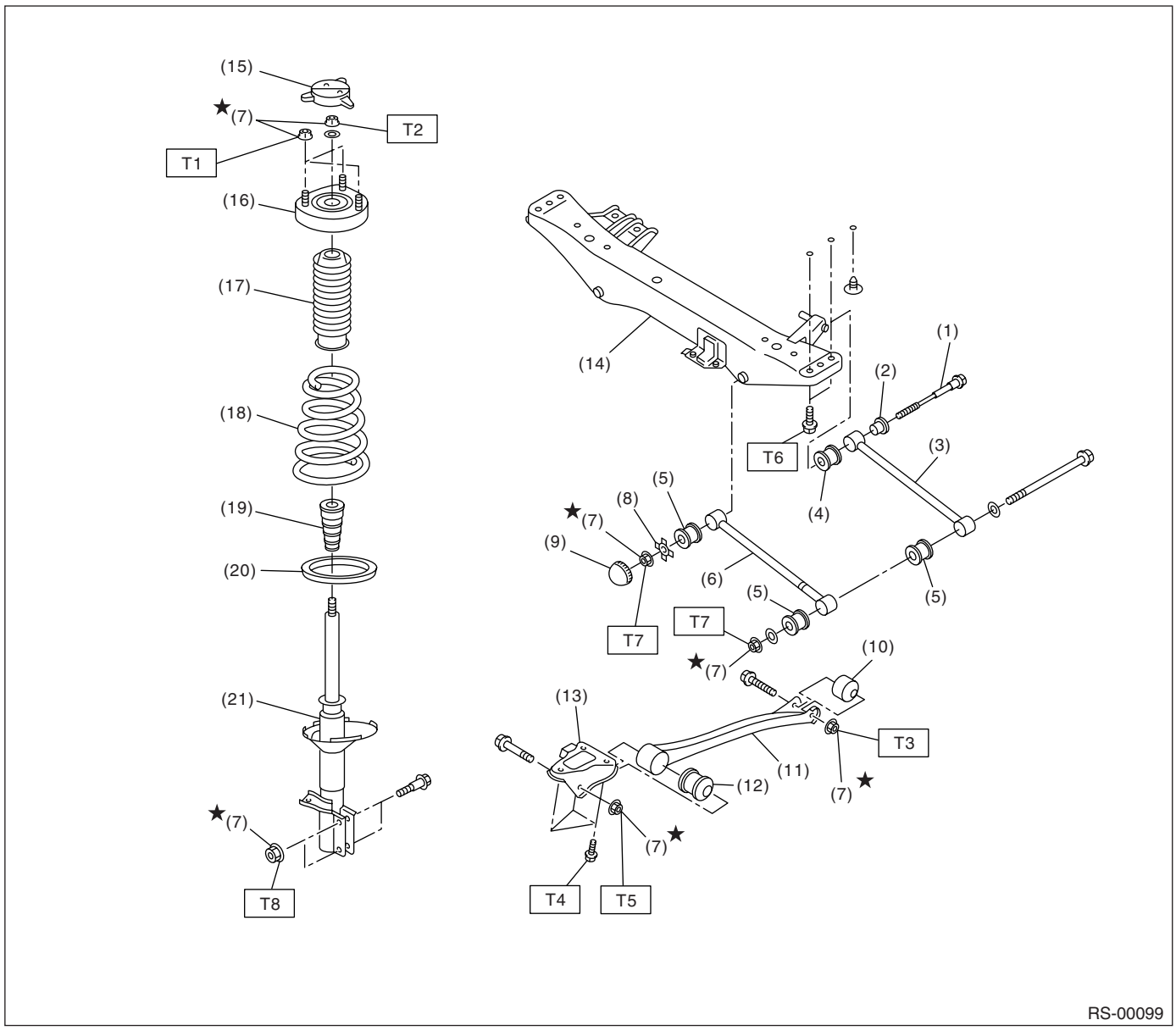


(1) Stabilizer
(2) Stabilizer bracket
(3) Stabilizer bushing
(4) Clamp
(5) Floating bushing
(6) Stopper
(7) Stabilizer link (STi model)
(8) Rear lateral link (STi model)
(9) Bushing (C)
(10) Bushing (A)
(11) Front lateral link (STi model)
(12) Bushing (B)
(13) Trailing link rear bushing
(14) Trailing link
(15) Trailing link front bushing
(16) Trailing link bracket
(17) Cap (Protection)
(18) Washer
(19) Rear crossmember
(20) Strut mount cap
(21) Strut mount
(22) Self-locking nut
(23) Dust cover
(24) Coil spring
(25) Helper
(26) Lower rubber seat
(27) Damper strut
(28) Rear differential member rear
(29) Stabilizer link (Except STi model)
(30) Front lateral link (Except STi model)
(31) Rear lateral link (Except STi model)
(32) Flange nut

Tightening torque: N·m (kgf-m, ft-lb)

T1:	***20 (2.0, 14.5)***
T2:	***25 (2.5, 18.1)***
T3:	***45 (4.6, 33.2)***
T4:	***60 (6.1, 44)***
T5:	***70 (7.1, 52)***
T6:	***90 (9.2, 66)***
T7:	***100 (10.2, 74)***
T8:	***115 (11.7, 85)***
T9:	***130 (13.3, 96)***
T10:	***140 (14.3 103)***
T11:	***200 (20.0, 145)***

• FWD model



(1) Adjusting bolt
(2) Adjusting wheel
(3) Rear lateral link
(4) Bushing (D)
(5) Bushing (A)
(6) Front lateral link
(7) Self-locking nut
(8) Washer
(9) Cap (Protection)
(10) Trailing link rear bushing
(11) Trailing link
(12) Trailing link front bushing
(13) Trailing link bracket
(14) Rear crossmember
(15) Strut mount cap
(16) Strut mount
(17) Dust cover
(18) Coil spring
(19) Helper
(20) Lower rubber seat
(21) Damper strut

Tightening torque: N·m (kgf-m, ft-lb)
T1: 20 (2.0, 14.5)
T2: 55 (5.6, 41)
T3: 90 (9.2, 66)
T4: 100 (10.2, 74)
T5: 115 (11.7, 85)
T6: 130 (13.3, 96)
T7: 140 (14.3, 104)
T8: 200 (20.4, 148)

C: CAUTION

• Wear working clothing, including a cap, protective goggles, and protective shoes during operation.
• Before disposing shock absorbers, be sure to bleed gas completely. Also, do not throw away in fire.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly, and replacement.
• Use SUBARU genuine grease etc. or the equivalent. Do not mix grease etc. with that of another grade or from other manufacturers.
• Be sure to tighten fasteners including bolts and nuts to the specified torque.
• Place shop jacks or rigid racks at the specified points.
• Before securing a part on a vise, place cushioning material such as wood blocks, aluminum plate, or shop cloth between the part and the vise.

D: PREPARATION TOOL

1. SPECIAL TOOLS

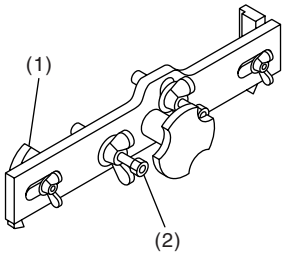
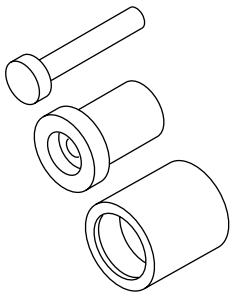
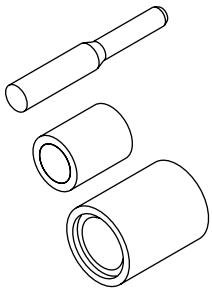
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-927380002	927380002	ADAPTER	Used as an adapter for camber & caster gauge when measuring camber and caster. (1) 28199AC000 PLATE (2) 28199AC010 BOLT
 ST-927720000	927720000	INSTALLER & REMOVER	Used for replacing front bushing.
 ST-927730000	927730000	INSTALLER & REMOVER	Used for replacing rear bushing.

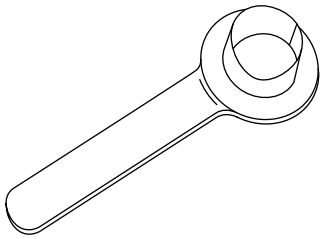
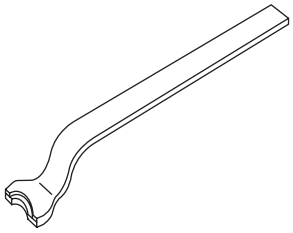
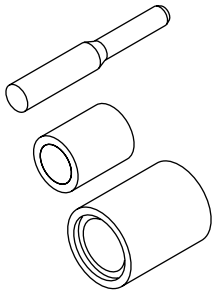
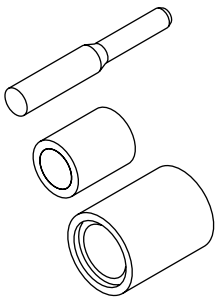
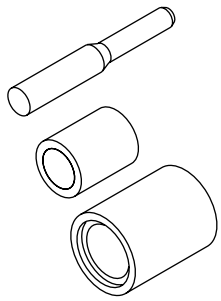
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST28099PA090	28099PA090	OIL SEAL PROTECTOR	• Used for installing rear drive shaft to rear differential. • For protecting oil seal.
 ST28099PA100	28099PA100	REMOVER	Used for removing DOJ.
 ST-927710000	927710000	INSTALLER & REMOVER	Used for replacing lateral link bushing.
 ST-927700000	927700000	INSTALLER & REMOVER	Used for replacing lateral link bushing.

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-927690000	927690000	INSTALLER & REMOVER	Used for replacing lateral link bushing.

2. GENERAL PURPOSE TOOLS

TOOL NAME	REMARKS
Alignment gauge	Used for wheel alignment measurement.
Turning radius gauge	Used for wheel alignment measurement.
Toe -in gauge	Used for toe-in measurement.
Transmission jack	Used for suspension assembly/disassembly.
Bearing puller	Used for removing bushings.
Coil spring compressor	Used for strut assembly/disassembly.

2. Wheel Alignment

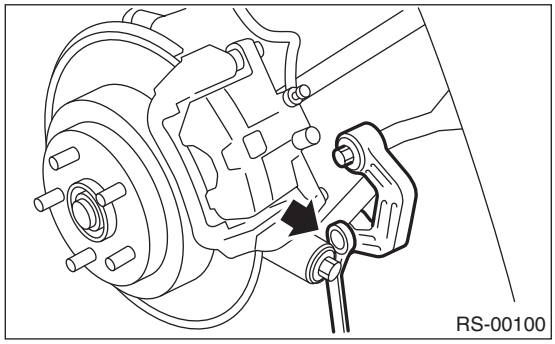
A: INSPECTION

NOTE:
Front and rear wheel alignment must be simultaneously measured and/or adjusted. Follow the procedure in “FS” section “Wheel Alignment” for measurement and/or adjustment of wheel alignment. <Ref. to FS-7, INSPECTION, Wheel Alignment.>

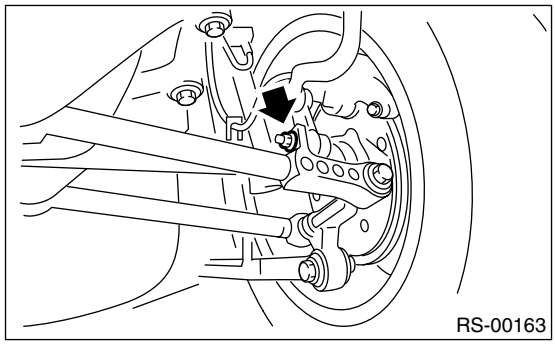
3. Rear Stabilizer

A: REMOVAL

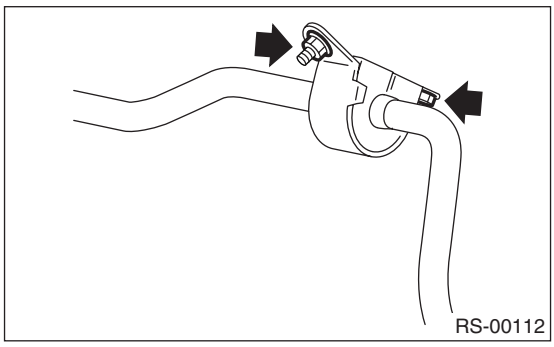
1) Lift-up the vehicle.
2) Remove the stabilizer link.
• Except STi MODEL



• STi MODEL



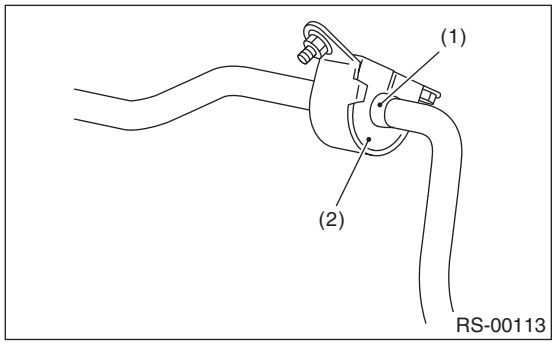
3) Remove the bolt and nut which secure the stabilizer to stabilizer bracket.



B: INSTALLATION

1) Install in the reverse order of removal.

NOTE:
• Install the stabilizer bushing while aligning it with paint mark on stabilizer.
• Ensure the stabilizer bushing and stabilizer have the same identification colors when installing.



(1) Mark painted on stabilizer
(2) Bushing identification color

2) Always tighten the stabilizer bushing location when tires are in full contact with the ground and the vehicle is curb weight.

Tightening torque:
Stabilizer link to rear lateral link
45 N·m (4.6 kgf-m, 33.2 ft-lb)
Stabilizer to stabilizer bracket
25 N·m (2.5 kgf-m, 18.1 ft-lb)

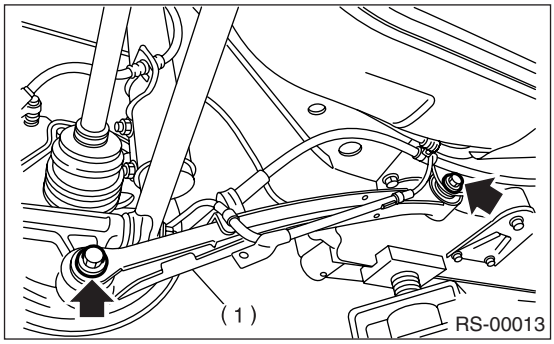
C: INSPECTION

1) Check the bushing for cracks, fatigue or damage.
2) Check the stabilizer links for deformities, cracks, or damage, and bushing for protrusions from the hole of stabilizer link.

4. Rear Trailing Link

A: REMOVAL

1) Loosen the rear wheel nuts.
2) Lift-up the vehicle, and then remove the rear wheels.
3) Remove both the rear parking brake clamp and ABS wheel speed sensor harness.
4) Remove the bolt which secures the trailing link to trailing link bracket.



(1) Trailing link

5) Remove the bolt which secures the trailing link to rear housing.

B: INSTALLATION

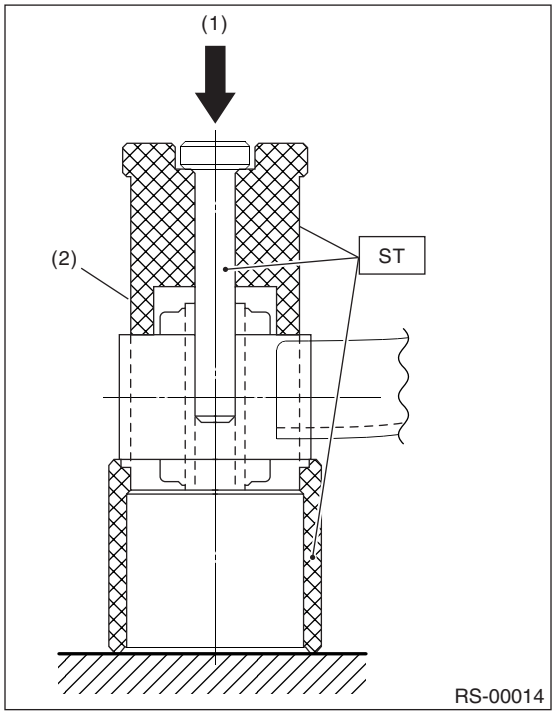
1) Install in the reverse order of removal.
2) Always tighten the bushing location when tires are in full contact with the ground and the vehicle is at curb weight condition.

NOTE:
Check the wheel alignment and adjust if necessary.

C: DISASSEMBLY

1. FRONT BUSHING

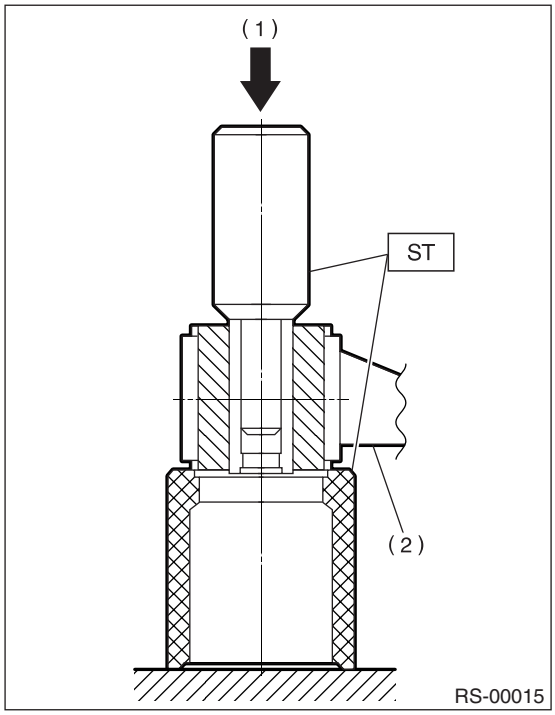
Using the ST, press the front bushing out of place.
ST 927720000 INSTALLER & REMOVER SET



(1) Press
(2) Trailing link

2. REAR BUSHING

Using the ST, press the rear bushing out of place.
ST 927730000 INSTALLER & REMOVER SET



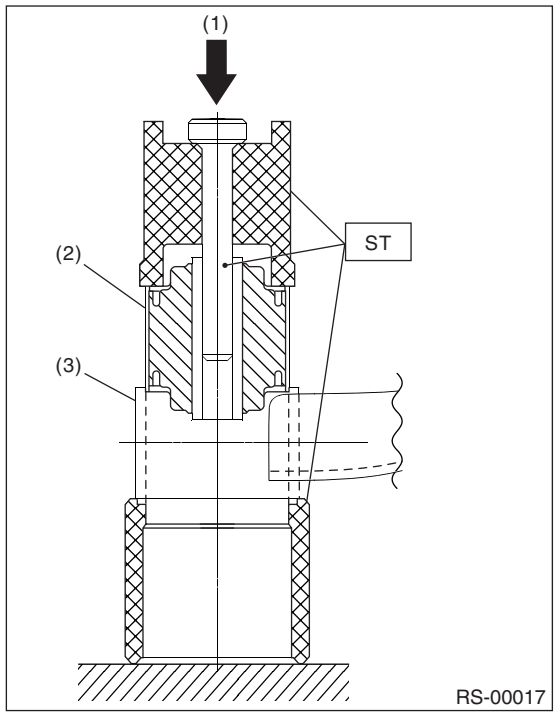
(1) Press
(2) Housing

D: ASSEMBLY

1. FRONT BUSHING

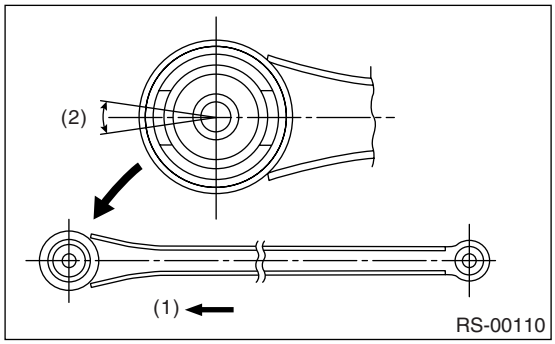
Using the ST, press the bushing into trailing link.
ST 927720000 INSTALLER & REMOVER SET

CAUTION:
Turn the ST plunger upside down and press it until the plunger end surface contacts the trailing link end surface.



(1) Press
(2) Front bushing
(3) Trailing link

CAUTION:
Install the front bushing in the proper direction, as shown in the figure.



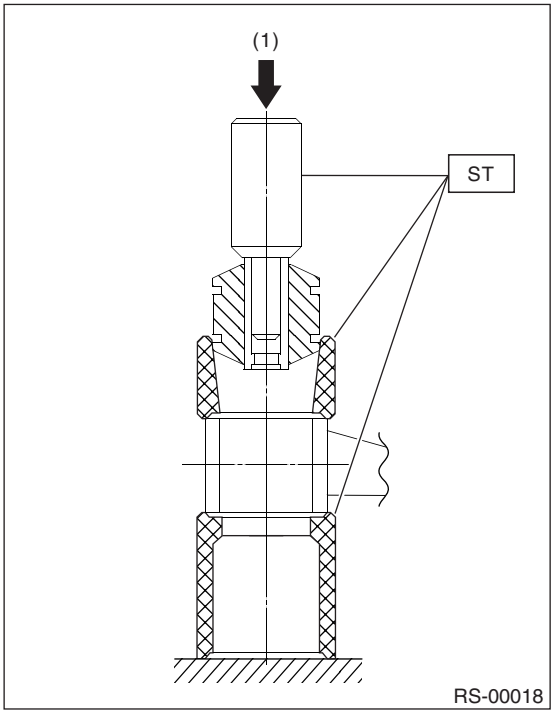
(1) Front
(2) ±5°

2. REAR BUSHING

1) Using the ST, press the bushing into trailing link.
ST 927730000 INSTALLER & REMOVER SET

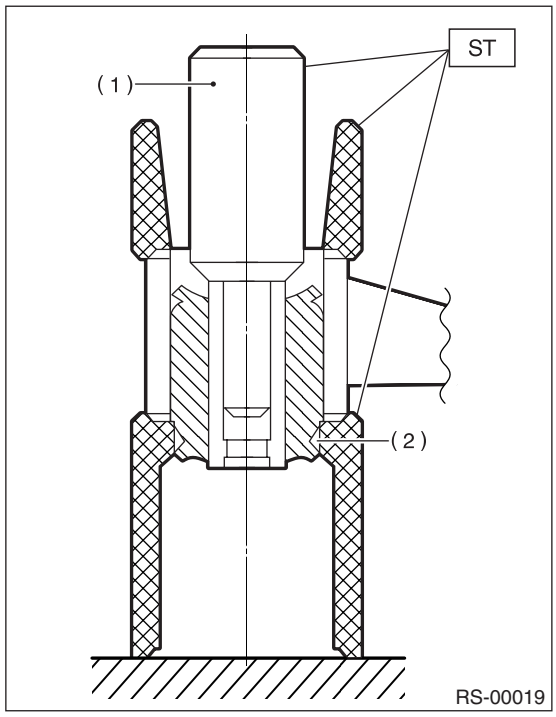
NOTE:
If it is difficult to press the bushing into trailing link, apply water-diluted TIRE LUBE to the inner surface of ST as a lubricant.

Specified lubricant:
TIRE LUBE: water = 1 : 3



(1) Press

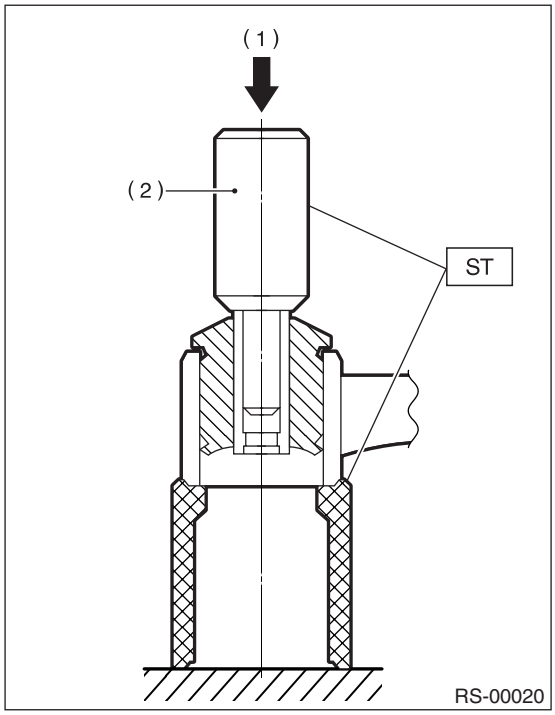
2) Press the ST plunger until the bushing flange protrudes beyond trailing link.
ST 927730000 INSTALLER & REMOVER SET



(1) Plunger
(2) Flange

3) Turn the trailing link upside down. Press the ST plunger in the opposite direction that outlines in the former procedure until bushing is correctly positioned in trailing link.

ST 927730000 INSTALLER & REMOVER SET



(1) Press
(2) Plunger

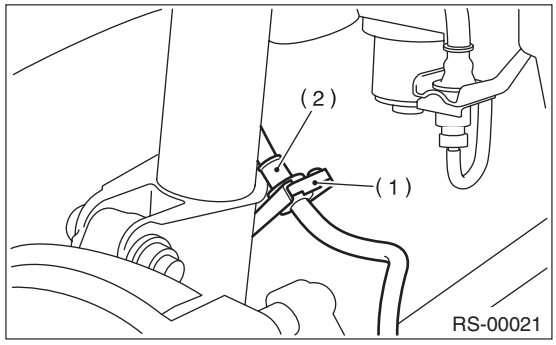
E: INSPECTION

Check the trailing links for bends, corrosion or damage.

5. Rear Strut

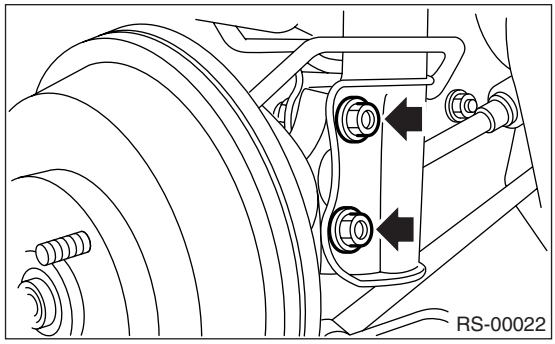
A: REMOVAL

1) Remove the rear seat cushion and backrest. (Sedan model)
2) Remove the strut cap of quarter trim. (Wagon model)
3) Loosen the rear wheel nuts.
4) Lift-up the vehicle, and remove rear wheels.
5) Remove the brake hose clip, and then remove the brake hose from rear strut.



(1) Brake hose clip
(2) Brake hose

6) Remove the bolts which secure the rear strut to housing.



7) Remove the nuts securing strut mount to body.

B: INSTALLATION

1) Secure the strut mount to vehicle body using a new self-locking nut.

Tightening torque:
20 N·m (2.0 kgf-m, 14.5 ft-lb)

2) Secure the rear strut to housing using a new self-locking nut.

Tightening torque:
200 N·m (20.0 kgf-m, 145 ft-lb)

3) Install the brake hose to lower side of strut, then insert the brake hose clip.

CAUTION:
• Check the hose clip is positioned properly.
• Check the brake hose for twisting, or excessive tension.
• Do not subject the ABS wheel speed sensor harness to excessive tension.

4) Lower the vehicle and tighten wheel nut.

Tightening torque:
90 N·m (9.2 kgf-m, 66 ft-lb)

5) Install the rear seat backrest and rear seat cushion. (Sedan model)
6) Install the strut cap to rear quarter trim. (Wagon model)

NOTE:
Check the wheel alignment and adjust if necessary.

C: DISASSEMBLY

For disassembly of rear strut, refer to procedures outlined under front strut as a guide. <Ref. to FS-20, DISASSEMBLY, Front Strut.>

D: ASSEMBLY

Refer to Front Strut as a guide for assembly procedures. <Ref. to FS-20, ASSEMBLY, Front Strut.>

E: INSPECTION

Refer to Front Strut as a guide for inspection procedures. <Ref. to FS-21, INSPECTION, Front Strut.>

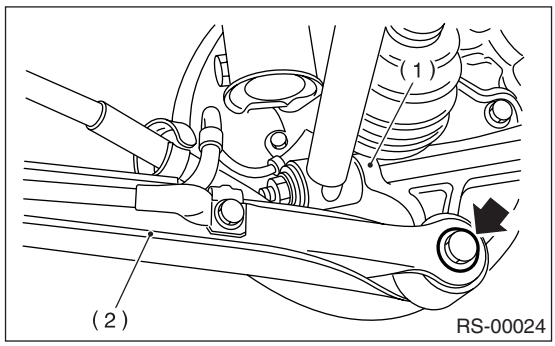
F: DISPOSAL

Refer to Front Strut as a guide for disposal procedures. <Ref. to FS-22, DISPOSAL, Front Strut.>

6. Lateral Link

A: REMOVAL

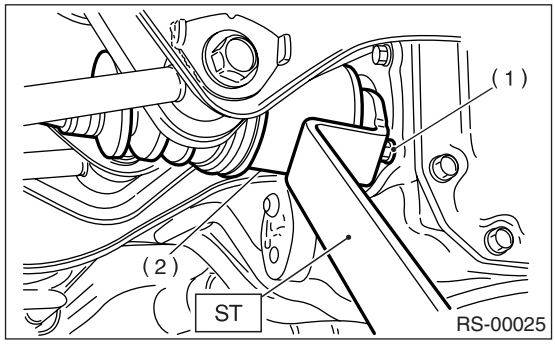
1) Loosen the wheel nuts. Lift-up the vehicle and remove wheel.
2) Remove the stabilizers.
3) Remove the ABS wheel speed sensor harness from trailing link.
4) Remove the bolt securing trailing link to rear housing.



(1) Rear housing
(2) Trailing link

5) Remove the bolts which secure the lateral link assembly to rear housing.
6) Remove the DOJ from rear differential using ST. (T-type)
ST 28099PA100 DRIVE SHAFT REMOVER

NOTE:
The side spline shaft circlip comes out together with the shaft.

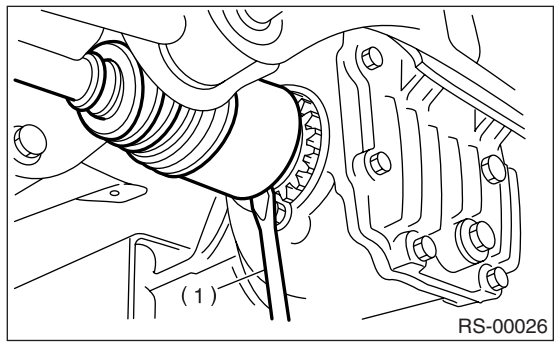


(1) Bolt
(2) DOJ

CAUTION:
Be careful not to damage the side bearing retainer. Always use bolt (1) shown in the figure, as supporting point for ST during removal.

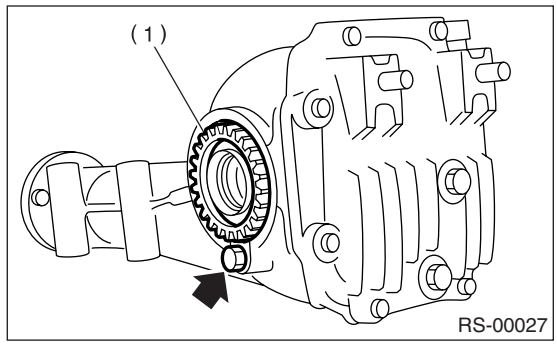
7) Remove the DOJ from rear differential using tire lever. (VA-type)

NOTE:
The side spline shaft circlip comes out together with the shaft.



(1) Tire lever

CAUTION:
When removing the DOJ from rear differential, fit tire lever to the bolt as shown in the figure so as not to damage axle shaft holder.



(1) Axle shaft holder

8) Scribe an alignment mark on the rear lateral link adjusting bolt and crossmember.
9) Remove the bolts securing front and rear lateral links to crossmember, detach lateral links.

CAUTION:
To loosen the adjusting bolt, always loosen the nut while holding head of adjusting bolt.

B: INSTALLATION

Install in the reverse order of removal. Observe the following instructions.

- Installation of DOJ to differential: <Ref. to DS-49, INSTALLATION, Rear Drive Shaft.>

CAUTION:

- **Replace the self-locking nut and DOJ circlip with new ones.**
- **Always use the special tool not to allow the DOJ splines to damage the side oil seal.**

ST 28099PA090 OIL SEAL PROTECTOR

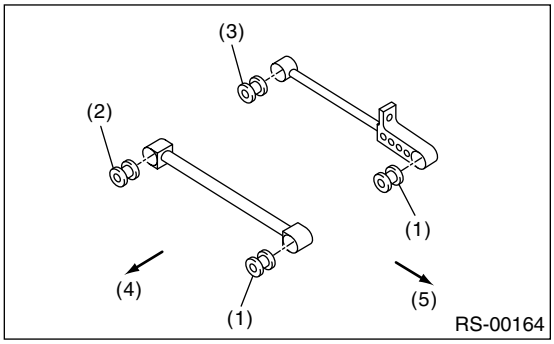
- **Always tighten the bushing location when tires are in full contact with the ground and vehicle is curb weight.**
- **Secure the bolt head and tighten the nut when installing the adjusting bolt.**

NOTE:
Check the wheel alignment and adjust if necessary.

C: DISASSEMBLY

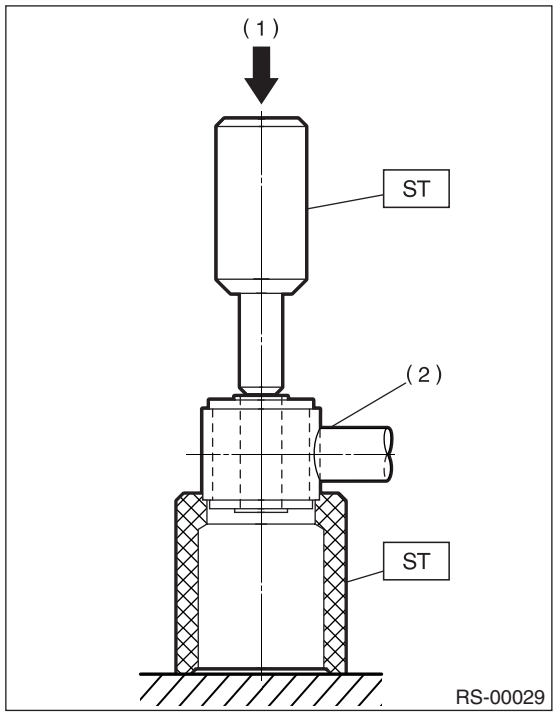
1) Using the following table as a guide, verify the type of bushings.
2) Select the ST according to type of bushings used.

Bushing	ST: INSTALLER & REMOVER SET
Bushing A	927700000
Bushing B	927690000
Bushing C	927700000
Bushing D	927710000



(1) Bushing A
(2) FWD: Bushing A, AWD: Bushing B
(3) FWD: Bushing D, AWD: Bushing C
(4) Front
(5) Outside of body

3) Using the ST, press the bushing out of place.



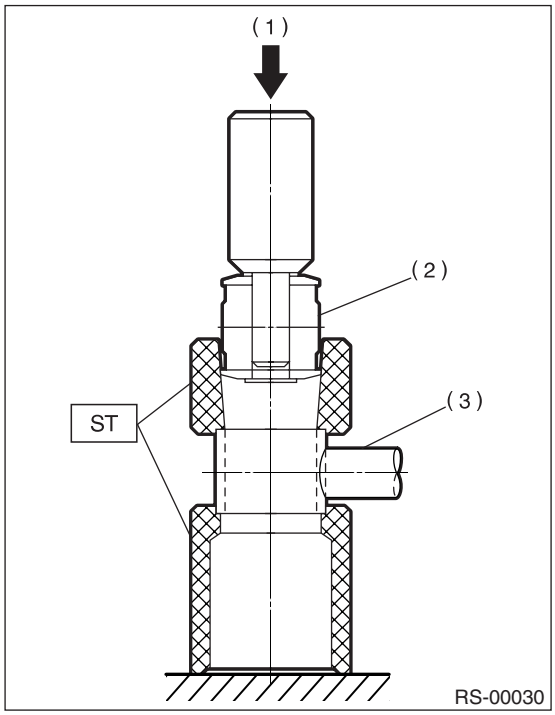
(1) Press
(2) Lateral link

D: ASSEMBLY

1) Use the same ST that was used during disassembly.
2) If it is difficult to press the bushing into trailing link, apply water-diluted TIRE LUBE to the inner surface of ST as a lubricant.

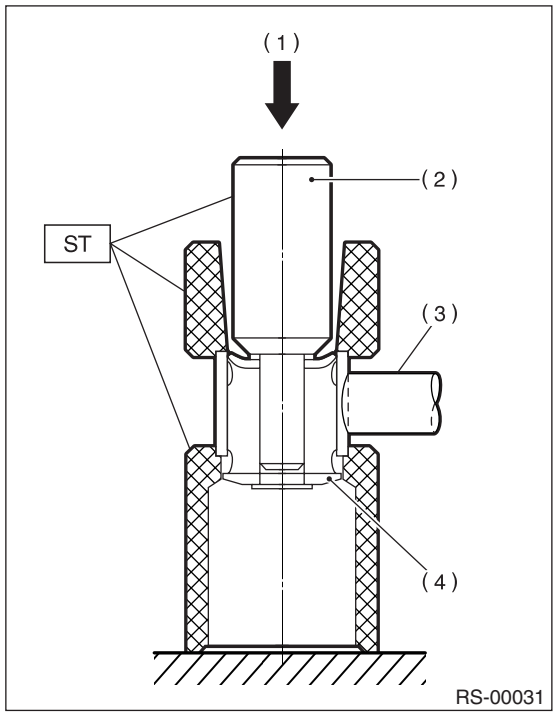
Specified lubricant:
TIRE LUBE: water = 1 : 3

3) Using the ST, press the bushing into place.



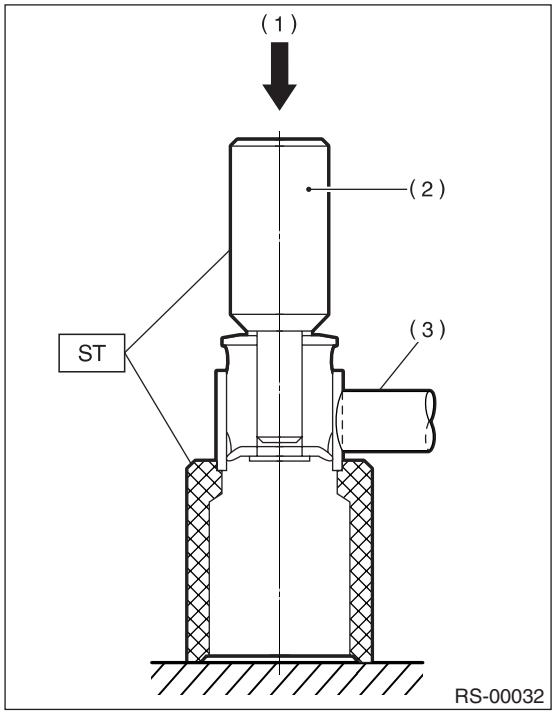
(1) Press
(2) Bushing
(3) Lateral link

4) Press the ST plunger until bushing flange protrudes beyond lateral link.



(1) Press
(2) Plunger
(3) Lateral link
(4) Flange

5) Turn the lateral link upside down. Press the ST plunger in opposite direction that outlined in the former procedure until bushing is correctly positioned in trailing link.



(1) Press
(2) Plunger
(3) Lateral link

E: INSPECTION

Visually check the lateral links for damage or bends.

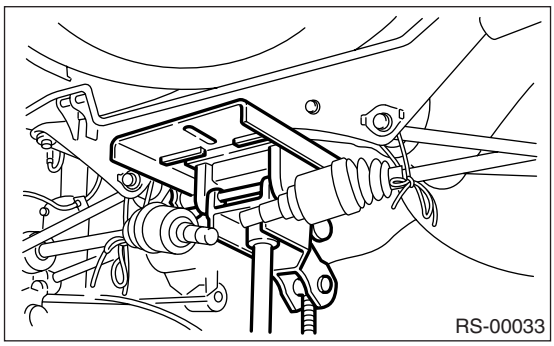
7. Rear Crossmember

A: REMOVAL

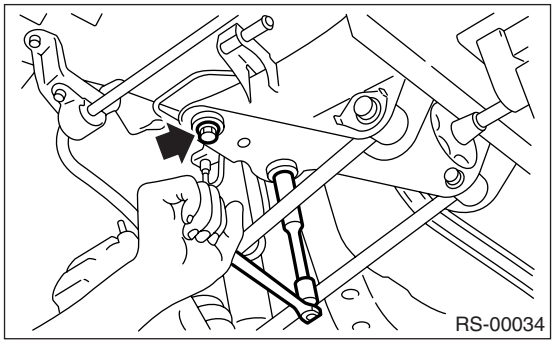
1. AWD MODEL

CAUTION:
Do not subject the ABS wheel speed sensor harness to excessive tension.

1) Separate the front exhaust pipe and rear exhaust pipe.
2) Remove the rear exhaust pipe and muffler.
3) Remove the rear differential.
T-type
<Ref. to DI-27, REMOVAL, Rear Differential (T-type).>
VA-type
<Ref. to DI-54, REMOVAL, Rear Differential (VA-type).>
4) Place the transmission jack under rear crossmember.


RS-00033

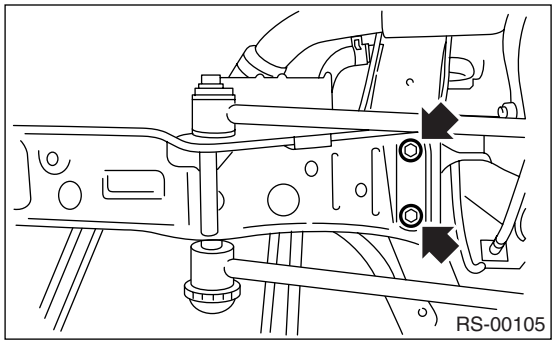
5) Remove the bolts securing crossmember to vehicle body, and then remove the crossmember.


RS-00034

6) Scribe an alignment mark on the rear lateral link cam bolt and crossmember.
7) Remove the front and rear lateral links by loosening nuts.

2. FWD MODEL

1) Remove the bolts which secure the lateral link assembly to rear housing.
2) Remove the rear exhaust pipe and muffler.
3) Remove the heat shield cover.
4) Remove the bolt securing crossmember to body, and then remove the crossmember.


RS-00105

B: INSTALLATION

1. AWD MODEL

CAUTION:
Discard the loosened self-locking nut and replace it with a new one.

NOTE:
Always secure the bolt head and tighten the nut when tightening the adjusting bolt.

1) Install in the reverse order of removal.
2) For installation and tightening torque of rear differential;
T-type
<Ref. to DI-29, INSTALLATION, Rear Differential (T-type).>
VA-type
<Ref. to DI-56, INSTALLATION, Rear Differential (VA-type).>
3) Always tighten the rubber bushing when tires are in full contact with the ground and vehicle is curb weight.
4) Check the wheel alignment and adjust if necessary.

2. FWD MODEL

CAUTION:
Discard the loosened self-locking nut and replace it with a new one.

NOTE:
Always secure the bolt head and tighten the nut when tightening adjusting bolt.

1) Install in the reverse order of removal.
2) Always tighten the rubber bushing when tires are in full contact with the ground and vehicle is curb weight.
3) Check the wheel alignment and adjust if necessary.

C: INSPECTION

Check the removed parts for wear, damage and cracks, and correct or replace if defective.

8. General Diagnostic Table

A: INSPECTION

1. IMPROPER VEHICLE POSTURE OR IMPROPER WHEEL ARCH HEIGHT

Possible causes	Countermeasures
(1) Permanent distortion or breakage of coil spring	Replace.
(2) Unsmooth operation of damper strut or shock absorber	Replace.
(3) Installation of wrong strut or shock absorber	Replace with proper parts.
(4) Installation of wrong coil spring	Replace with proper parts.

2. POOR RIDE COMFORT

1) Large rebound shock
2) Rocking of the vehicle continues too long after running over bump and/or hump
3) Large shock in bumping

Possible causes	Countermeasures
(1) Breakage of coil spring	Replace.
(2) Overinflating pressure of tire	Adjust.
(3) Improper wheel arch height	Adjust or replace the coil springs with new ones.
(4) Fault in operation of damper strut or shock absorber	Replace.
(5) Damage or deformation of strut mount or shock absorber mount	Replace.
(6) Unsuitability of maximum or minimum length of damper strut or shock absorber	Replace with proper parts.
(7) Deformation or loss of bushing	Replace.
(8) Deformation or damage of helper in strut assembly or shock absorber	Replace.
(9) Oil leakage of damper strut or shock absorber	Replace.

3. NOISE

Possible causes	Countermeasures
(1) Wear or damage of damper strut or shock absorber component parts	Replace.
(2) Loosening of suspension link installing bolt	Retighten to the specified torque.
(3) Deformation or loss of bushing	Replace.
(4) Unsuitability of maximum or minimum length of damper strut or shock absorber	Replace with proper parts.
(5) Breakage of coil spring	Replace.
(6) Wear or damage of ball joint	Replace.
(7) Deformation of stabilizer clamp	Replace.

WHEEL AND TIRE SYSTEM

WT

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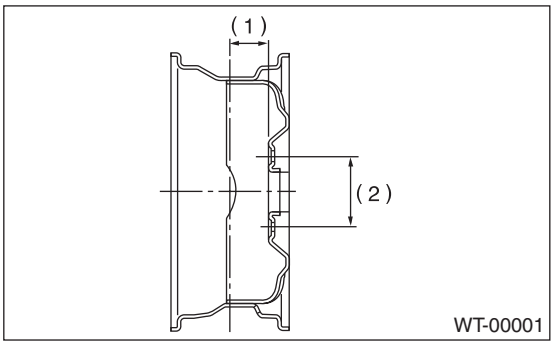
3.	Steel Wheel	5
4.	Aluminum Wheel	6
5.	Wheel Balancing	7
6.	“T-type” Tire	8
7.	Full Wheel Cap	9
8.	General Diagnostic Table	10

1. General Description

A: SPECIFICATION



(1) Offset
(2) P.C.D.

Specifications		Tire size	Rim size	Rim offset mm (in)	P.C.D. mm (in)
Front and rear	BASE, TS	185/70R14 88H	14 × 5 1/2JJ	55 (2.17)	100 (3.94)
	GX	195/60R15 88H	15 × 6JJ		
		205/50R16 87V	16 × 6 1/2JJ		
	RS	205/50R16 87V	16 × 6 1/2JJ		
	WRX	215/45R17 87W	17 × 7JJ		
	STi	225/45R17 90W	17 × 8JJ	53 (2.09)	114.3 (4.50)
	OBK	P205/55R16 89V	16 × 6 1/2JJ	55 (2.17)	100 (3.94)
T-type tire		T125/70D15 95M	15 × 4T	53 (2.09)	
		T135/70D16 100M	16 × 4T	50 (1.97)	
		T135/70D17 102M	17 × 4T	40 (1.57)	114.3 (4.50)

Specifications		Tire size	Tire air pressure kPa (kgf/cm^2, psi)	
			Light load	Full load
Front and rear	BASE, TS	185/70R14 88H	Fr : 220 (2.2, 32) Rr : 200 (2.0, 29)	Fr : 220 (2.2, 32) Rr : 220 (2.2, 32)
	GX	195/60R15 88H		
		205/50R16 87V		
	RS	205/50R16 87V	Fr : 220 (2.2, 32) Rr : 200 (2.0, 29)	
	WRX	215/45R17 87W	Fr : 230 (2.3, 33) Rr : 220 (2.2, 32)	
	STi	225/45R17 90W	Fr : 230 (2.3, 33) Rr : 190 (1.9, 28)	
	OBK	P205/55R16 89V	Fr : 220 (2.2, 32) Rr : 200 (2.0, 29)	
T-type tire		T125/70D15 95M	420 (4.2, 60)	
		T135/70D16 100M		
		T135/70D17 102M		

NOTE:
- “T-type” tire is a spare tire for temporary use.
- Depending on destination, standard size tire or T-type tire is equipped as spare tire.
- At trailer towing, rear inflation pressure is 250 kPa (2.5 kgf/cm^2, 36 psi).

1. SERVICE DATA

Item	Axial runout	Radial runout
Steel wheel	1.5 mm (0.059 in)	
Aluminum wheel	1.0 mm (0.039 in)	

2. ADJUSTING PARTS

Wheel balance	Standard	Service limit
Dynamic unbalance	Less than 5 g (0.18 oz)	

Balance weight part number (For steel wheel)	Weight
28101TC000	5 g (0.18 oz)
28101SA060	10 g (0.35 oz)
28101SA070	15 g (0.53 oz)
28101SA080	20 g (0.71 oz)
28101SA090	25 g (0.88 oz)
723141340	30 g (1.06 oz)
723141350	35 g (1.23 oz)
723141360	40 g (1.41 oz)
723141370	45 g (1.59 oz)
723241380	50 g (1.76 oz)
723241580	55 g (1.94 oz)
723241590	60 g (2.12 oz)

Balance weight part number (For aluminum wheel)	Weight
28101SA000	5 g (0.18 oz)
28101SA010	10 g (0.35 oz)
28101SA020	15 g (0.53 oz)
28101SA030	20 g (0.71 oz)
28101SA040	25 g (0.88 oz)
23141GA512	30 g (1.06 oz)
23141GA522	35 g (1.23 oz)
23141GA532	40 g (1.41 oz)
23141GA542	45 g (1.59 oz)
23141GA552	50 g (1.76 oz)
—	55 g (1.94 oz)
23141GA572	60 g (2.12 oz)

B: PREPARATION TOOL

1. GENERAL PURPOSE TOOLS

TOOL NAME	REMARKS
Air pressure gauge	Used for measuring tire air pressure.
Dial gauge	Used for measuring wheel runout.
Wheel balancer	Used for adjusting wheel balance.

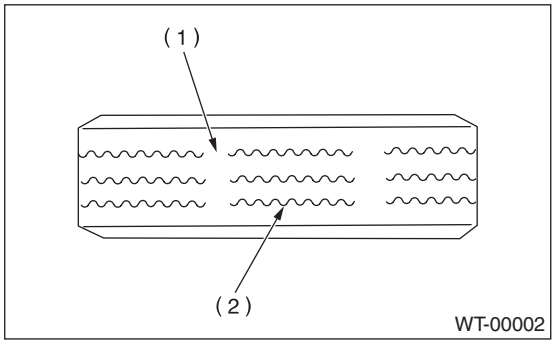
2. Tire

A: INSPECTION

1) Take stone, glass, nail etc. off from tread groove.
2) Replace the tire if as follows.

CAUTION:
When replacing a tire, make sure to use only the same size, construction and load range tire as originally installed.

(1) When a large crack on the side wall, damage or a crack on tread are found.
(2) When the “tread wear indicator” appears as a solid band across the tread.

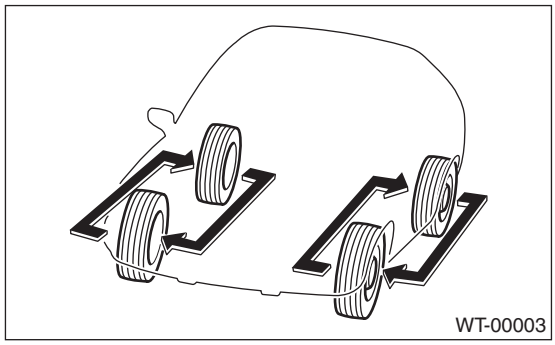


(1) Tread wear indicator
(2) Tire tread

3) When a crack on tire valve is found, replace the tire valve.

1. TIRE ROTATION

Rotate tires periodically (10,000 km/6,200 miles) as shown in the figure, in order to prevent them from uneven wear and to prolong their life.



3. Steel Wheel

A: REMOVAL

1) Apply parking brake, and position the select lever to “P” or “LOW”.
2) Set jacks or a lift to the specified point, and support the vehicle with its tire slightly contacting the floor.
3) Loosen the wheel nuts.
4) Raise the vehicle until its wheels take off the ground using a jack or a lift.
5) Remove the wheel nuts and wheels.

NOTE:
• While removing the wheels, prevent the hub bolts from damage.
• Place the wheels with their outer sides facing upward to prevent the wheels from damage.

B: INSTALLATION

1) Remove dirt from the mating surface of wheel and brake rotor.
2) Attach the wheel to hub by aligning the wheel bolt hole with hub bolt.
3) Temporarily attach the wheel nuts to hub bolts. (In the case of aluminum wheel, use SUBARU genuine wheel nut for aluminum wheel.)
4) Manually tighten the nuts making sure the wheel hub hole is aligned correctly to guide portion of hub.
5) Tighten the wheel nuts in a diagonal selection to specified torque. Use a wheel nut wrench.

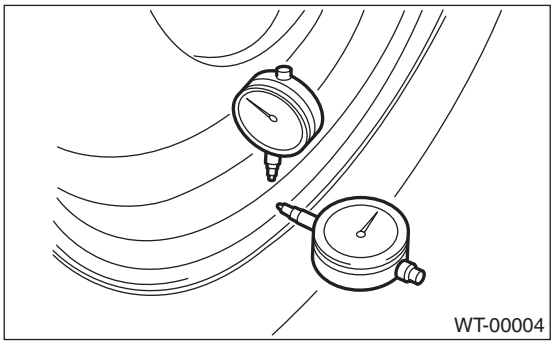
Wheel nut tightening torque:
90 N·m (9.2 kgf-m, 66.4 ft-lb)

CAUTION:
• Tighten the wheel nuts in two or three steps by gradually increasing the torque and working diagonally, until the specified torque is reached. For drum brake models, excess tightening of wheel nuts may cause wheels to “judder”.
• Do not depress the wrench with foot; Always use both hands when tightening.
• Make sure the bolt, nut and nut seating surface of the wheel are free from oils.

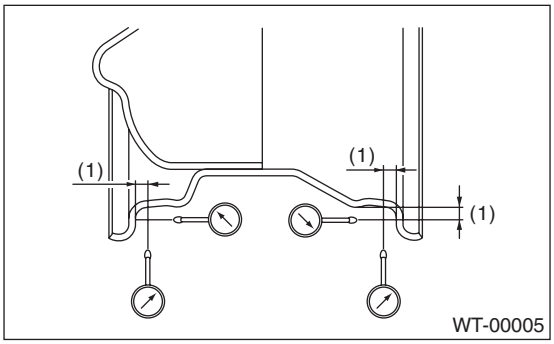
6) If a wheel is removed for replacement or for repair of a puncture, retighten the wheel nuts to the specified torque after running 1,000 km (600 miles).

C: INSPECTION

1) Deformation or damage on the rim can cause air leakage. Check the rim flange for deformation, crack or damage, and repair or replace as necessary.
2) Jack-up the vehicle until wheels clear the floor.
3) Slowly rotate the wheel to check the rim “runout” using a dial gauge.



Axial runout limit	Radial runout limit
1.5 mm (0.059 in)	



(1) Approx. 7 mm (0.28 in)

4) If the rim runout exceeds specifications, remove the tire from rim and check runout while attaching the dial gauge to positions shown in the figure.
5) If the measured runout still exceeds specifications, replace the wheel.

4. Aluminum Wheel

A: REMOVAL

Refer to Steel Wheel for removal procedure of aluminum wheels. <Ref. to WT-5, REMOVAL, Steel Wheel.>

B: INSTALLATION

Refer to Steel Wheel for installation procedure of aluminum wheels. <Ref. to WT-5, INSTALLATION, Steel Wheel.>

C: INSPECTION

Refer to Steel Wheel for inspection procedure of aluminum wheels. <Ref. to WT-5, INSPECTION, Steel Wheel.>

Rim runout:

Axial runout limit	Radial runout limit
1.0 mm (0.039 in)	

D: CAUTION

Aluminum wheels are easily scratched. To maintain their appearance and safety, do the following:
1) Do not damage the aluminum wheels during removal, installation, wheel balancing, etc. After removing the aluminum wheels, place them on a rubber mat, etc.
2) While the vehicle is being driven, be careful not to ride over sharp obstacles or allow the aluminum wheels to contact the shoulder of road.
3) When installing a tire chain, be sure to install it properly not to have slack; otherwise it may hit the wheel while driving.
4) When washing the aluminum wheel, use neutral synthetic detergent and water. Avoid using the cleanser including abrasive, hard brushes or an automatic car washer.

5. Wheel Balancing

A: REPLACEMENT

1) Remove the balance weights.
2) Using wheel balancer, measure the wheel balance.
3) Select a weight close to the value measured by wheel balancer.

Balance weight part number (For steel wheel)	Weight
28101TC000	5 g (0.18 oz)
28101SA060	10 g (0.35 oz)
28101SA070	15 g (0.53 oz)
28101SA080	20 g (0.71 oz)
28101SA090	25 g (0.88 oz)
723141340	30 g (1.06 oz)
723141350	35 g (1.23 oz)
723141360	40 g (1.41 oz)
723141370	45 g (1.59 oz)
723241380	50 g (1.76 oz)
723241580	55 g (1.94 oz)
723241590	60 g (2.12 oz)

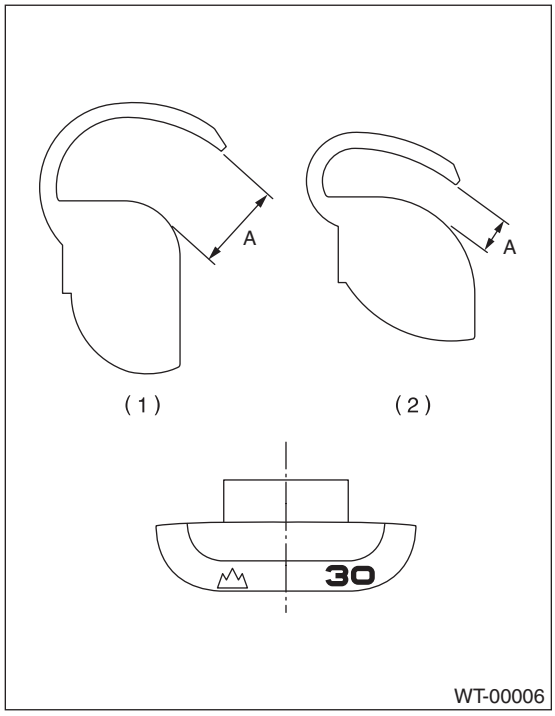
Balance weight part number (For aluminum wheel)	Weight
28101SA000	5 g (0.18 oz)
28101SA010	10 g (0.35 oz)
28101SA020	15 g (0.53 oz)
28101SA030	20 g (0.71 oz)
28101SA040	25 g (0.88 oz)
23141GA512	30 g (1.06 oz)
23141GA522	35 g (1.23 oz)
23141GA532	40 g (1.41 oz)
23141GA542	45 g (1.59 oz)
23141GA552	50 g (1.76 oz)
—	55 g (1.94 oz)
23141GA572	60 g (2.12 oz)

4) Install the selected weight to the point designated by wheel balancer.
5) Using wheel balancer, measure the wheel balance again. Check the wheel balance is correctly adjusted.

B: INSPECTION

1) Proper wheel balance may be lost if the tire is repaired or if it wears. Check the tire for dynamic balance, and repair as necessary.
2) To check for dynamic balance, use a wheel balancer. Drive in the balance weight on both the top and rear sides of rim.
3) Some types of balancer can cause damage to the wheel. Use an appropriate balancer when adjusting the wheel balance.
4) Use genuine balance weights.

NOTE:
• 55 g (1.94 oz) weight used with the aluminum wheel is not available.
• Balance weights are available for use with any of 14- to 17-inch wheels.



(1) Weight for aluminum wheel
(2) Weight for steel wheel

Service limit A:

Weight for steel wheel;
5 g (0.18 oz) — 25 g (0.88 oz) 2.0 mm (0.08 in)
30 g (1.06 oz) or more 1.8 mm (0.07)

Weight for aluminum wheel;
5 g (0.18 oz) — 25 g (0.88 oz) 5.0 mm (0.20 in)
30 g (1.06 oz) or more 4.5 mm (0.177 in)

6. "T-type" Tire

A: NOTE

"T-type" tire for temporary use is prepared as a spare tire.

CAUTION:
• Do not use a tire chain with the "T-type" tire. Because of the smaller tire size, a tire chain will not fit properly and will result in damage to the vehicle and the tire.
• Do not drive at a speed greater than 80 km/h (50 MPH).
• Drive as slowly as possible and avoid passing over bumps.

B: REPLACEMENT

Refer to Removal and Installation of Steel Wheel for removal/installation of "T-type" tires. <Ref. to WT-5, Steel Wheel.>

CAUTION:
Replace with a conventional tire as soon as possible since the "T-type" tire is only for temporary use.

C: INSPECTION

1) Check the tire inflation pressure.

Specification:
420 kPa (4.2 kgf/cm^2, 60 psi)

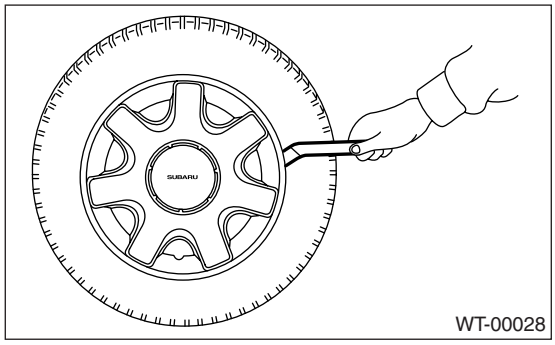
2) Take stones, glass, nails, etc. out of the tread groove.
3) Check the tires for deformation, cracks, partial or over limit wear.

CAUTION:
Replace the tire with a new one.

7. Full Wheel Cap

A: REMOVAL

Pry off the full wheel cap with a wheel cap remover inserted between openings on cap.



B: INSTALLATION

Align the valve hole in wheel cap with the valve on wheel and secure the wheel cap by tapping four points by hand.

C: INSPECTION

1) Check the wheels for missing wheel caps.
2) Check the pawls of wheel caps for damage or bend.
3) Check the wheel caps for cracks.

8. General Diagnostic Table

A: INSPECTION

Symptom	Possible cause	Corrective action
Wheel wobble.	Improperly inflated tire	Adjust the tire pressure.
	Uneven wear	Check the tire referring to Abnormal tire wear in this table, carry out the procedure and replace the tire.
	Wheel alignment	Check the wheel alignments. <Ref. to FS-7, INSPECTION, Wheel Alignment.>
	Front strut	Check the front strut. <Ref. to FS-21, INSPECTION, Front Strut.>
	Rear strut	Check the rear strut. <Ref. to RS-15, INSPECTION, Rear Strut.>
	Front axle	Check the front axle. <Ref. to DS-25, INSPECTION, Front Axle.>
	Rear axle	Check the rear axle. <Ref. to DS-36, INSPECTION, Rear Axle [AWD Model].> <Ref. to DS-38, INSPECTION, Rear Axle [FWD Model].>
Vehicle is abnormally out of balance.	Improperly inflated tire	Adjust the tire pressure.
	Uneven wear	Check the tire referring to Abnormal tire wear in this table, carry out the procedure and replace the tire.
	Front stabilizer	Check the front stabilizer. <Ref. to FS-23, INSPECTION, Front Stabilizer.>
	Wheel alignment	Check the wheel alignments. <Ref. to FS-7, INSPECTION, Wheel Alignment.>
Abnormal wheel vibration	Improperly inflated tire	Adjust the tire pressure.
	Uneven wear	Check the tire referring to Abnormal tire wear in this table, carry out the procedure and replace the tire.
	Improper wheel balancing	Check the wheel balance. <Ref. to WT-7, INSPECTION, Wheel Balancing.>
	Front axle	Check the front axle. <Ref. to DS-25, INSPECTION, Front Axle.>
	Rear axle	Check the rear axle. <Ref. to DS-36, INSPECTION, Rear Axle [AWD Model].> <Ref. to DS-38, INSPECTION, Rear Axle [FWD Model].>
Abnormal tire wear	Improperly inflated tire	Adjust the tire pressure.
	Improper wheel balancing	Check the wheel balance. <Ref. to WT-7, INSPECTION, Wheel Balancing.>
	Wheel alignment	Check the wheel alignments. <Ref. to FS-7, INSPECTION, Wheel Alignment.>

DIFFERENTIALS

DI

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1. General Description

A: SPECIFICATION

1. REAR DIFFERENTIAL

When replacing a rear differential assembly, select the correct one according to the following table.

NOTE:
Using the different rear differential assembly causes the drive line and tires to “drag” or emit abnormal noise.

MODEL	1.6 L		2.0 L	
	AT	MT	AT	MT
Rear differential type	VA-type model without LSD			T-type model without LSD
Identification	XP	XN		EG
Type of gear	Hypoid gear			
Gear ratio (Number of gear teeth)	4.444 (40/9)	4.111 (37/9)		3.900 (39/10)
Oil capacity	0.7 — 0.9 ℓ (0.7 — 1.0 US qt, 0.6 — 0.8 Imp qt)			
Rear differential gear oil	GL-5 (75W-90)			

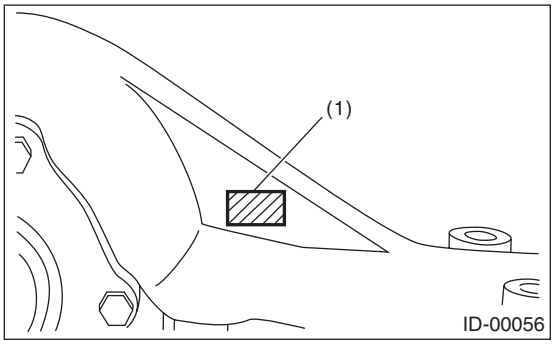
MODEL	2.5 L		2.0 L Turbo		
	AT	MT	AT	MT	
	Australia			Except Australia	Australia
Rear differential type	T-type model with LSD				
LSD type	Viscous coupling		SURETRAC®	Viscous coupling	SURETRAC®
Identification	EJ		EM	EF	EM
Type of gear	Hypoid gear				
Gear ratio (Number of gear teeth)	4.111 (37/9)		4.444 (40/9)	3.545 (39/11)	4.444 (40/9)
Oil capacity	0.7 — 0.9 ℓ (0.7 — 1.0 US qt, 0.6 — 0.8 Imp qt)				
Rear differential gear oil	GL-5 (75W-90)				

MODEL	2.0 L Turbo STi			
	6MT			
	Except Australia	Australia	Except Australia	Australia
Rear differential type	T-type model with LSD			
LSD type	SURETRAC®		Mechanical	
Identification	HJ	HG	HS	HW
Type of gear	Hypoid gear			
Gear ratio (Number of gear teeth)	3.545 (39/11)	3.900 (39/10)	3.545 (39/11)	3.900 (39/10)
Oil capacity	0.9 — 1.12 (1.0 — 1.2 US qt, 0.8 — 1.0 Imp qt)			
Rear differential gear oil	GL-5 (75W-90)		GL-5 (90)	

2. IDENTIFICATION

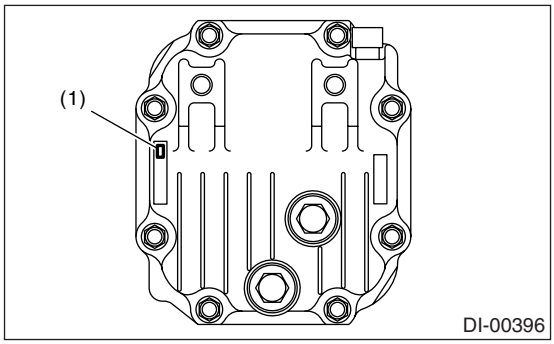
Identification label positions are shown in the following figures. For details concerning identification, refer to “ID” section.

- T-type



(1) Identification

- VA-type



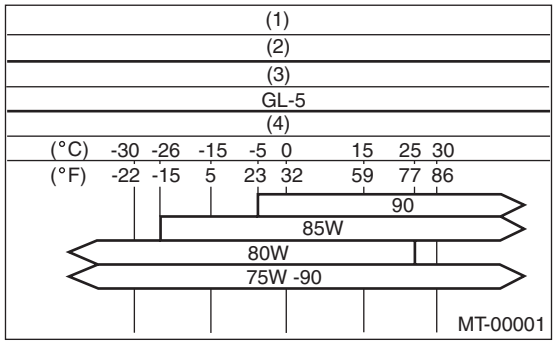
(1) Identification

3. REAR DIFFERENTIAL GEAR OIL

NOTE:
Use gear oil for the mechanical LSD for mechanical LSD model.

Recommended oil
Model without mechanical LSD:
GL-5 (75W-90)
Model with mechanical LSD:
GL-5 (90)

CAUTION:
Each oil manufacturer has its base oil and additives. Thus, do not mix two or more brands.



(1) Item
(2) Differential gear oil
(3) API Standard
(4) SAE viscosity No. and application temperature

4. SERVICE DATA

Front and rear bearing preload at companion flange bolt hole N (kgf, lbf)	New bearing	T-type	Except STi model	18.1 — 38.8 (1.8 — 4.0, 4.1 — 8.7)
			STi model	24.1 — 38.6 (2.5 — 3.9, 5.4 — 8.7)
		VA-type		12.7 — 32.4 (1.3 — 3.3, 2.9 — 7.3)
Side gear backlash mm (in)		T-type		0.10 — 0.20 (0.0039 — 0.0079)
		VA-type		0.05 — 0.15 (0.0020 — 0.0059)
Side bearing standard width mm (in)				20.00 (0.7874)
Hypoid driven gear to drive pinion backlash mm (in)		T-type		0.10 — 0.20 (0.0039 — 0.0079)
		VA-type		0.10 — 0.15 (0.0039 — 0.0059)
Hypoid driven gear runout on its back surface (T-type) mm (in)				0.05 (0.0020)

5. ADJUSTING PARTS

• VA-type

Front and rear bearing preload at companion flange bolt hole N (kgf, lbf)	New bearing	12.7 — 32.4 (1.3 — 3.3, 2.9 — 7.3)
Preload adjusting spacer	Part No.	Length mm (in)
	32288AA040	52.3 (2.059)
	32288AA050	52.5 (2.067)
	31454AA100	52.6 (2.071)
	32288AA060	52.7 (2.075)
	31454AA110	52.8 (2.079)
	32288AA070	52.9 (2.083)
	31454AA120	53.0 (2.087)
	32288AA080	53.1 (2.091)
	32288AA090	53.3 (2.098)
Preload adjusting washer	Part No.	Thickness mm (in)
	38336AA000	1.500 (0.0591)
	38336AA120	1.513 (0.0596)
	38336AA010	1.525 (0.0600)
	38336AA130	1.538 (0.0606)
	38336AA020	1.550 (0.0610)
	38336AA140	1.563 (0.0615)
	38336AA030	1.575 (0.0620)
	38336AA150	1.588 (0.0625)
	38336AA040	1.600 (0.0630)
	38336AA160	1.613 (0.0635)
	38336AA050	1.625 (0.0640)
	38336AA170	1.638 (0.0645)
	38336AA060	1.650 (0.0650)
	38336AA180	1.663 (0.0655)
	38336AA070	1.675 (0.0659)
	38336AA190	1.688 (0.0665)
	38336AA080	1.700 (0.0669)
	38336AA200	1.713 (0.0674)
	38336AA090	1.725 (0.0679)
	38336AA210	1.738 (0.0684)
	38336AA100	1.750 (0.0689)
	38336AA220	1.763 (0.0694)
	38336AA110	1.775 (0.0699)
Pinion height adjusting shim	Part No.	Thickness mm (in)
	32295AA200	0.150 (0.0059)
	32295AA210	0.175 (0.0069)
	32295AA220	0.200 (0.0079)
	32295AA230	0.225 (0.0089)
	32295AA240	0.250 (0.0098)
	32295AA250	0.275 (0.0108)
Side gear backlash mm (in)	0.05 — 0.15 (0.0020 — 0.0059)	

Side gear thrust washer	Part No.	Length mm (in)
	803135011	0.925 — 0.950 (0.0364 — 0.0374)
	803135012	0.950 — 0.975 (0.0374 — 0.0384)
	803135013	0.975 — 1.000 (0.0384 — 0.0394)
	803135014	1.000 — 1.025 (0.0394 — 0.0404)
	803135015	1.025 — 1.050 (0.0404 — 0.0413)
Hypoid driven gear to drive pinion backlash mm (in)	Limit	0.10 — 0.15 (0.0039 — 0.0059)

• T-type

Front and rear bearing preload at companion flange bolt hole N (kgf, lbf)	New bearing	18.1 — 38.8 (1.8 — 4.0, 4.1 — 8.7)
Preload adjusting spacer	Part No.	Length mm (in)
	383695201	56.2 (2.213)
	383695202	56.4 (2.220)
	383695203	56.6 (2.228)
	383695204	56.8 (2.236)
	383695205	57.0 (2.244)
	383695206	57.2 (2.252)
Preload adjusting washer	Part No.	Length mm (in)
	383705200	2.59 (0.1020)
	383715200	2.57 (0.1012)
	383725200	2.55 (0.1004)
	383735200	2.53 (0.0996)
	383745200	2.51 (0.0988)
	383755200	2.49 (0.0980)
	383765200	2.47 (0.0972)
	383775200	2.45 (0.0965)
	383785200	2.43 (0.0957)
	383795200	2.41 (0.0949)
	383805200	2.39 (0.0941)
	383815200	2.37 (0.0933)
	383825200	2.35 (0.0925)
	383835200	2.33 (0.0917)
	383845200	2.31 (0.0909)

Pinion height adjusting shim		Part No.	Thickness mm (in)
		383495200	3.09 (0.1217)
		383505200	3.12 (0.1228)
		383515200	3.15 (0.1240)
		383525200	3.18 (0.1252)
		383535200	3.21 (0.1264)
		383545200	3.24 (0.1276)
		383555200	3.27 (0.1287)
		383565200	3.30 (0.1299)
		383575200	3.33 (0.1311)
		383585200	3.36 (0.1323)
		383595200	3.39 (0.1335)
		383605200	3.42 (0.1346)
		383615200	3.45 (0.1358)
		383625200	3.48 (0.1370)
		383635200	3.51 (0.1382)
		383645200	3.54 (0.1394)
		383655200	3.57 (0.1406)
		383665200	3.60 (0.1417)
		383675200	3.63 (0.1429)
		383685200	3.66 (0.1441)
Side gear backlash	mm (in)	0.1 — 0.2 (0.0039 — 0.0079)	
Side gear thrust washer (Model without LSD)		Part No.	Thickness mm (in)
		383445201	0.75 — 0.80 (0.0295 — 0.0315)
		383445202	0.80 — 0.85 (0.0315 — 0.0335)
		383445203	0.85 — 0.90 (0.0335 — 0.0354)
Side bearing standard width	mm (in)	—	20.00 (0.7874)
Side bearing retainer shim		Part No.	Thickness mm (in)
		383475201	0.20 (0.0079)
		383475202	0.25 (0.0098)
		383475203	0.30 (0.0118)
		383475204	0.40 (0.0157)
		383475205	0.50 (0.0197)
Hypoid driven gear to drive pinion backlash	mm (in)	Limit	0.10 — 0.20 (0.0039 — 0.0079)
Hypoid driven gear runout on its back surface	mm (in)		0.05 (0.0020)

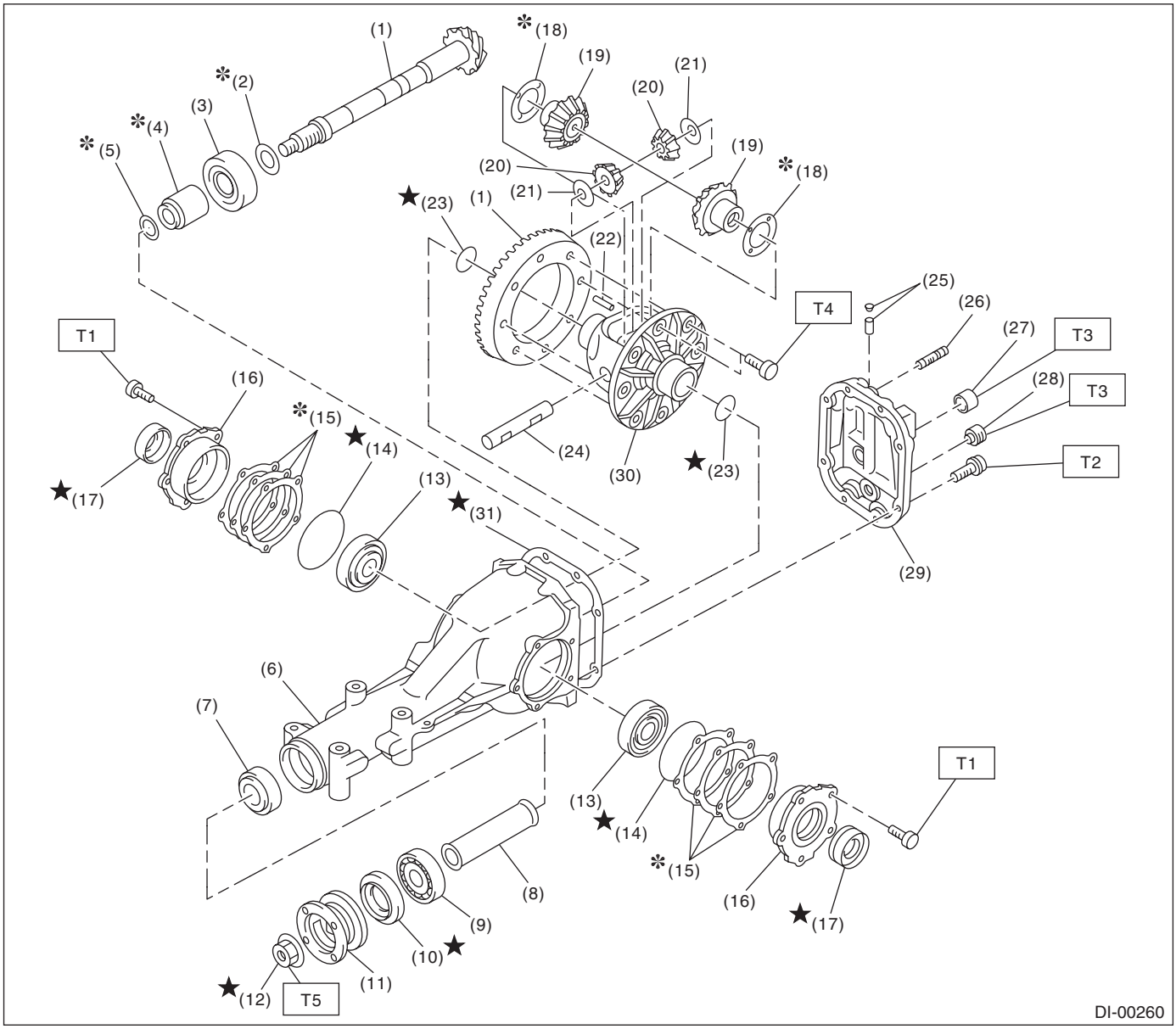
• STi model

Front and rear bearing preload at companion flange bolt hole	N (kgf, lbf)	24.1 — 38.6 (2.5 — 3.9, 5.4 — 8.7)	
Preload adjusting spacer		Part No.	Length mm (in)
		31454AA130	52.2 (2.055)
		31454AA140	52.4 (2.063)
		31454AA150	52.6 (2.071)
		31454AA160	52.8 (2.079)
		31454AA170	53.0 (2.087)
		31454AA180	53.2 (2.094)

Preload adjusting washer	Part No.	Length mm (in)
	383705200	2.59 (0.1020)
	383715200	2.57 (0.1012)
	383725200	2.55 (0.1004)
	383735200	2.53 (0.0996)
	383745200	2.51 (0.0988)
	383755200	2.49 (0.0980)
	383765200	2.47 (0.0972)
	383775200	2.45 (0.0965)
	383785200	2.43 (0.0957)
	383795200	2.41 (0.0949)
	383805200	2.39 (0.0941)
	383815200	2.37 (0.0933)
	383825200	2.35 (0.0925)
	383835200	2.33 (0.0917)
	383845200	2.31 (0.0909)
Pinion height adjusting shim	Part No.	Length mm (in)
	38336AA230	3.09 (0.1217)
	38336AA240	3.12 (0.1228)
	38336AA250	3.15 (0.1240)
	38336AA260	3.18 (0.1252)
	38336AA270	3.21 (0.1264)
	38336AA280	3.24 (0.1276)
	38336AA290	3.27 (0.1287)
	38336AA300	3.30 (0.1299)
	38336AA310	3.33 (0.1311)
	38336AA320	3.36 (0.1323)
	38336AA330	3.39 (0.1335)
	38336AA340	3.42 (0.1346)
	38336AA350	3.45 (0.1358)
	38336AA360	3.48 (0.1370)
	38336AA370	3.51 (0.1382)
	38336AA380	3.54 (0.1394)
	38336AA390	3.57 (0.1406)
	38336AA400	3.60 (0.1417)
	38336AA410	3.63 (0.1429)
	38336AA420	3.66 (0.1441)
Side bearing standard width mm (in)	20.00 (0.7874)	
Side bearing retainer shim	Part No.	Thickness mm (in)
	383475201	0.20 (0.0079)
	383475202	0.25 (0.0098)
	383475203	0.30 (0.0118)
	383475204	0.40 (0.0157)
	383475205	0.50 (0.0197)
Hypoid driven gear to drive pinion backlash mm (in)	Limit	0.10 — 0.20 (0.0039 — 0.0079)
Hypoid driven gear runout on its back surface mm (in)		0.05 (0.0020)

B: COMPONENT

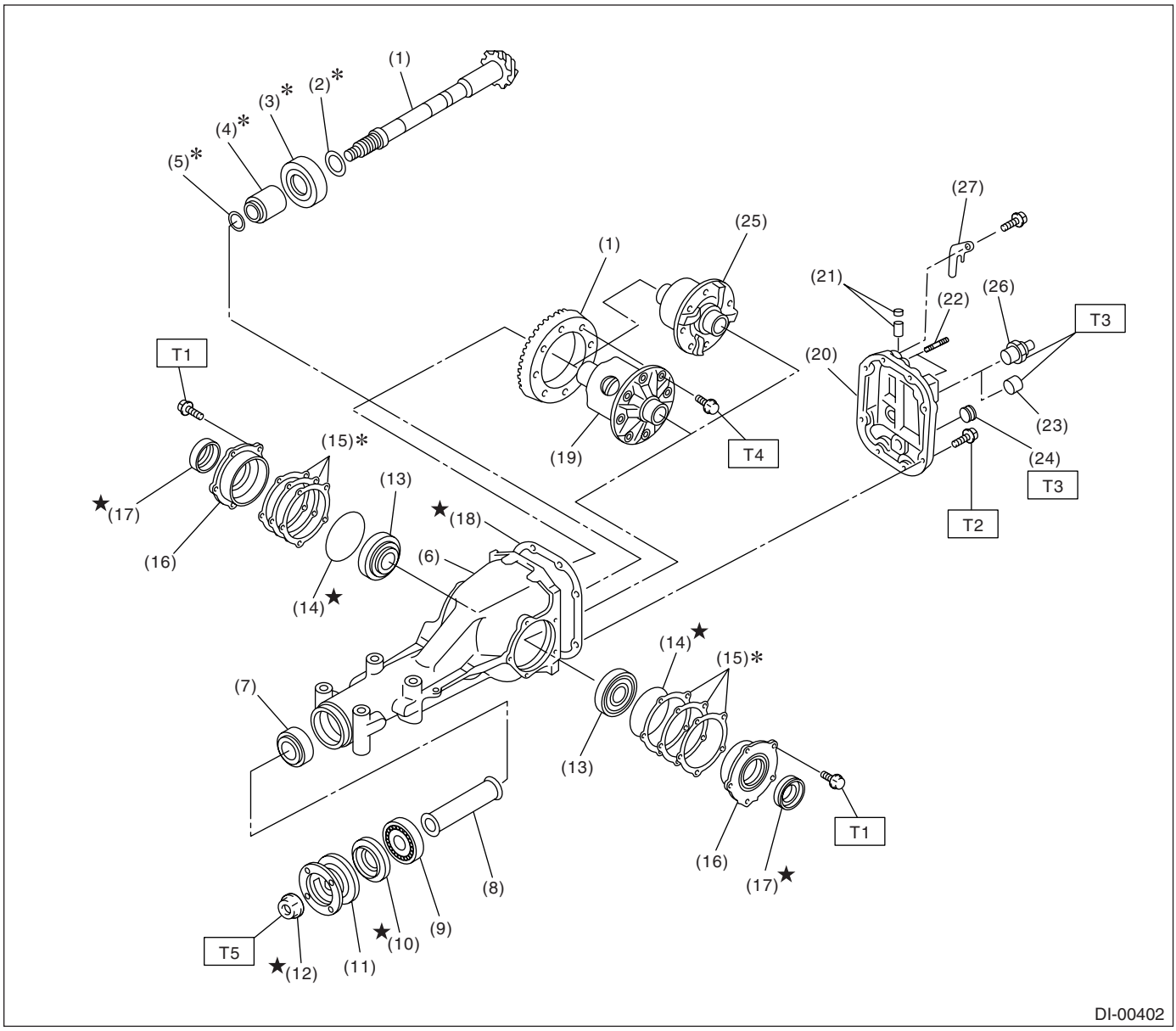
1. REAR DIFFERENTIAL FOR T-TYPE WITHOUT LSD



(1)	Hypoid driven gear and drive pinion set	(13)	Side bearing	(26)	Stud bolt
		(14)	O-ring	(27)	Oil filler plug
(2)	Pinion height adjusting shim	(15)	Side bearing retainer shim	(28)	Oil drain plug
(3)	Rear bearing	(16)	Side bearing retainer	(29)	Rear cover
(4)	Bearing preload adjusting spacer	(17)	Side oil seal	(30)	Differential case
(5)	Bearing preload adjusting washer	(18)	Side gear thrust washer	(31)	Gasket
(6)	Differential carrier	(19)	Side gear		
(7)	Front bearing	(20)	Pinion mate gear		
(8)	Spacer	(21)	Pinion mate gear washer		
(9)	Pilot bearing	(22)	Pinion shaft lock pin		
(10)	Front oil seal	(23)	Circlip		
(11)	Companion flange	(24)	Pinion mate shaft		
(12)	Self-locking nut	(25)	Air breather cap		

Tightening torque: N·m (kgf-m, ft-lb)	
T1:	*10.3 (1.05, 7.6)*
T2:	*29 (3.0, 21.7)*
T3:	*49 (5.0, 36.2)*
T4:	*105 (10.7, 77.4)*
T5:	*181 (18.5, 134)*

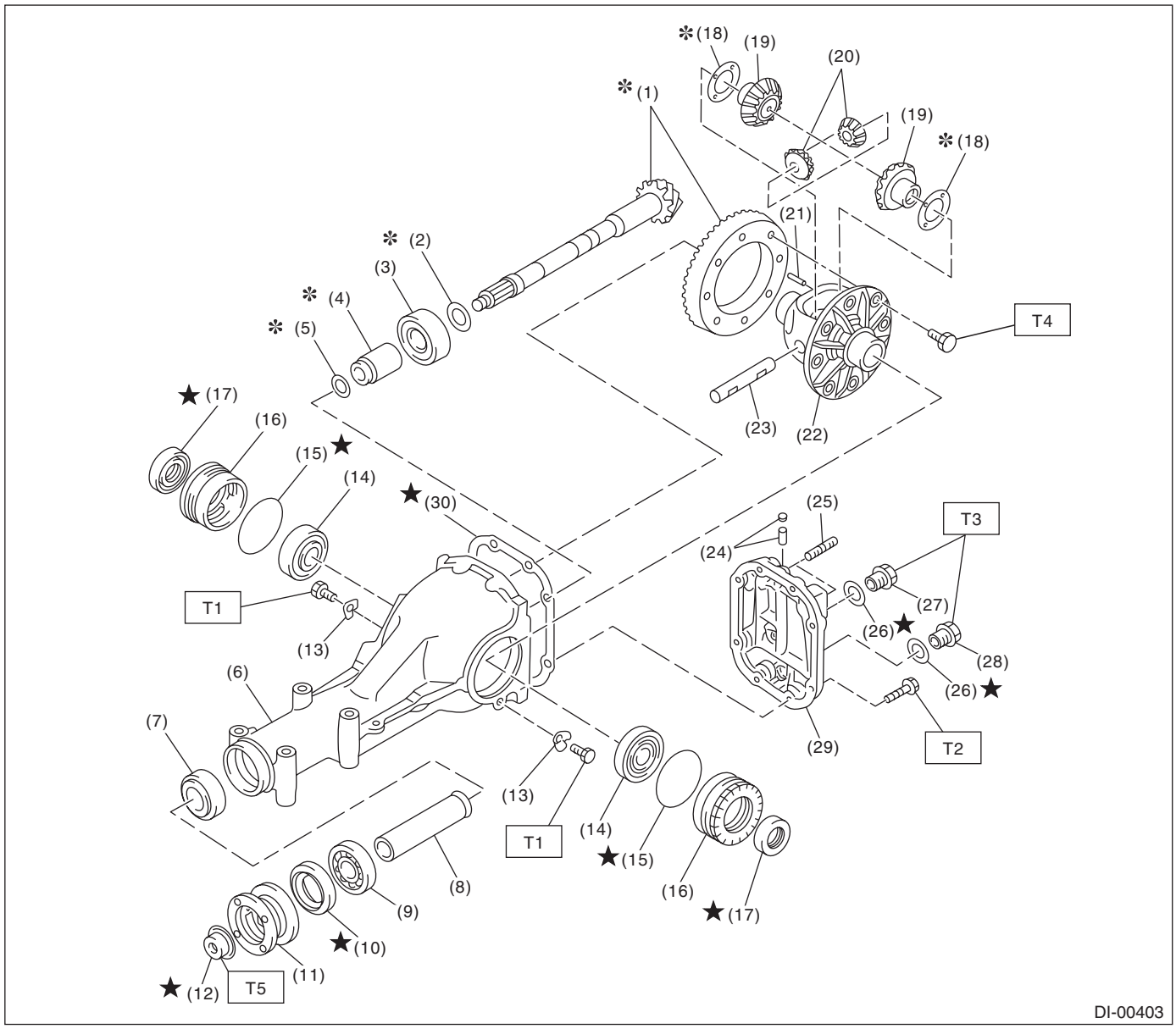
2. REAR DIFFERENTIAL FOR T-TYPE WITH LSD



(1) Hypoid driven gear and drive pinion set
(2) Pinion height adjusting shim
(3) Rear bearing
(4) Bearing preload adjusting spacer
(5) Bearing preload adjusting washer
(6) Differential carrier
(7) Front bearing
(8) Collar
(9) Pilot bearing
(10) Front oil seal
(11) Companion flange
(12) Self-locking nut
(13) Side bearing
(14) O-ring
(15) Side bearing retainer shim
(16) Side bearing retainer
(17) Side oil seal
(18) Gasket
(19) Differential case (Viscous coupling type or mechanical LSD model)
(20) Rear cover
(21) Air breather cap
(22) Stud bolt
(23) Oil filler plug
(24) Oil drain plug
(25) Differential case (SURETRAC® LSD model)
(26) Oil filler plug (mechanical LSD model)
(27) Stay ground (mechanical LSD model)

Tightening torque: N·m (kgf-m, ft-lb)
T1: 10.3 (1.05, 7.6)
T2: 29 (3.0, 21.7) (Except STi model)
44 (4.5, 32.5) (STi model)
T3: 49 (5.0, 36.2)
T4: 105 (10.7, 77.4)
T5: 181 (18.5, 134)

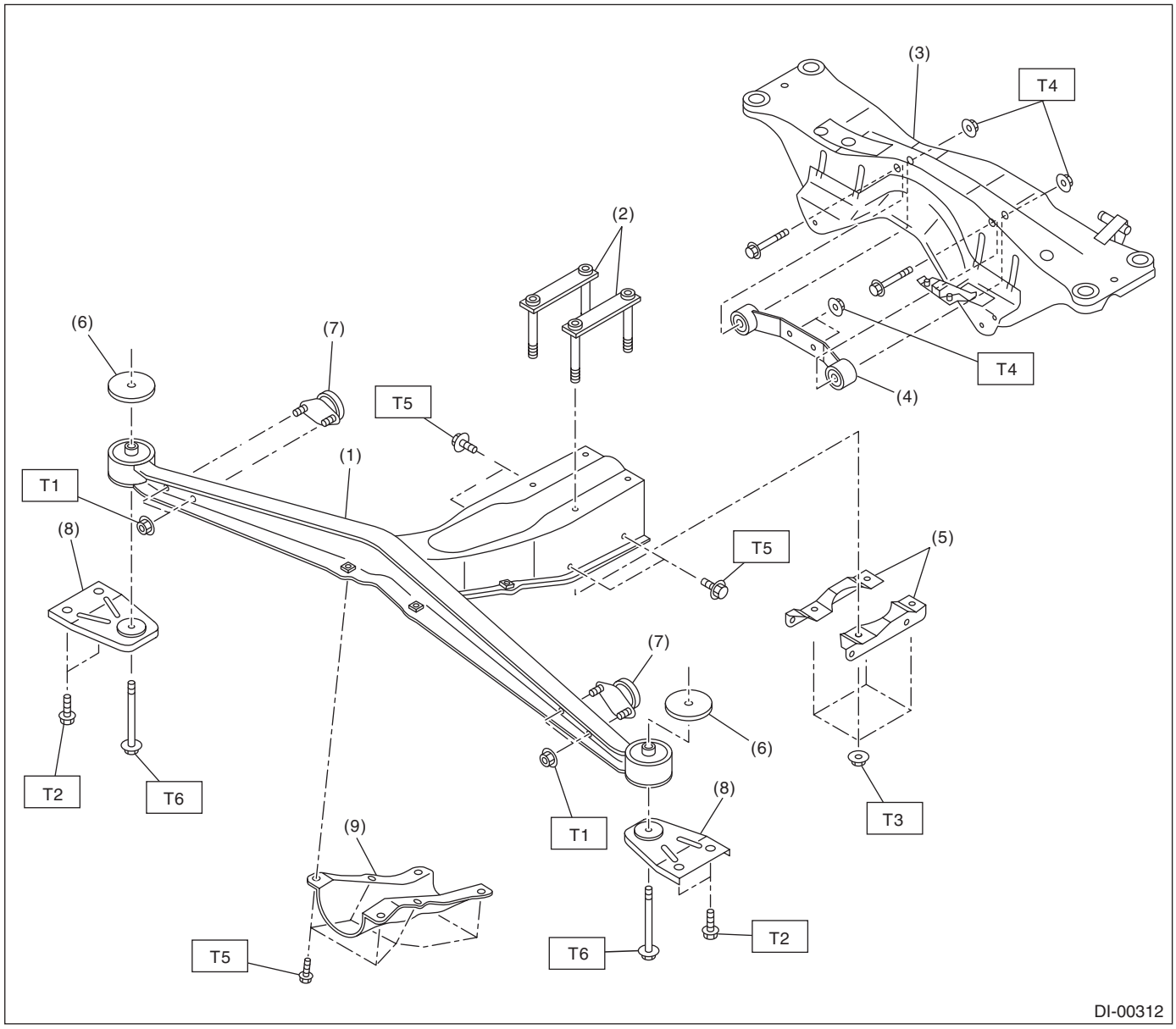
3. REAR DIFFERENTIAL FOR VA-TYPE



(1) Hypoid driven gear and drive pinion set
(2) Pinion height adjusting shim
(3) Rear bearing
(4) Bearing preload adjusting spacer
(5) Bearing preload adjusting washer
(6) Differential carrier
(7) Front bearing
(8) Collar
(9) Pilot bearing
(10) Front oil seal
(11) Companion flange
(12) Self-locking nut
(13) Lock plate
(14) Side bearing
(15) O-ring
(16) Axle shaft holder
(17) Side oil seal
(18) Side gear thrust washer
(19) Side gear
(20) Pinion mate gear
(21) Pinion shaft lock pin
(22) Differential case
(23) Pinion mate shaft
(24) Air breather cap
(25) Stud bolt
(26) Gasket
(27) Oil filler plug
(28) Oil drain plug
(29) Rear cover
(30) Gasket

Tightening torque: N·m (kgf-m, ft-lb)
T1: 25 (2.5, 18.1)
T2: 25 (2.5, 18.1)
T3: 34 (3.5, 25.3)
T4: 62 (6.3, 45.6)
T5: 191 (19.5, 141)

4. REAR DIFFERENTIAL MOUNTING SYSTEM



(1) Differential front member
(2) Plate
(3) Crossmember
(4) Differential rear member
(5) Differential mount lower bracket
(6) Stopper
(7) Dynamic damper
(8) Differential mount bracket
(9) Differential mount front cover

Tightening torque: N·m (kgf-m, ft-lb)
T1: 20 (2.0, 14.5)
T2: 33 (3.4, 24.3)
T3: 50 (5.1, 36.9)
T4: 70 (7.1, 51.6)
T5: 90 (9.2, 66.4)
T6: 100 (10.2, 73.8)

C: CAUTION

- Wear working clothing, including a cap, protective goggles and protective shoes during operation.
- Remove contamination including dirt and corrosion before removal, installation or disassembly.
- Keep the disassembled parts in order and protect them from dust or dirt.
- Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly, and replacement.
- Be careful not to burn, because each part on the vehicle is hot after running.
- Use specified gear oil, grease etc. or the equivalent. Do not mix gear oil, grease etc. with that of another grade or from other manufacturers.
- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or rigid racks at the specified points.
- Apply gear oil onto sliding or revolution surfaces before installation.
- Before installing O-rings or snap rings, apply sufficient amount of gear oil to avoid damage and deformation.
- Before securing a part on a vise, place cushioning material such as wood blocks, aluminum plate, or shop cloth between the part and the vise.
- Avoid damaging the mating face of the case.

D: PREPARATION TOOL

1. SPECIAL TOOLS

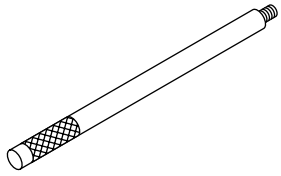
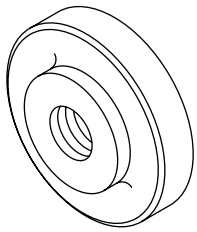
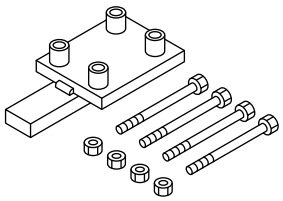
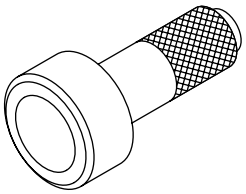
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-398477701	398477701	HANDLE	Used for installing front and rear bearing cone.
 ST-398477702	398477702	DRIFT	Used press-fitting the bearing cone of differential carrier (rear).
 ST-398217700	398217700	ATTACHMENT SET	Stand for rear differential carrier disassembly and assembly.
 ST-498447120	498447120	INSTALLER	Used for installing front oil seal.

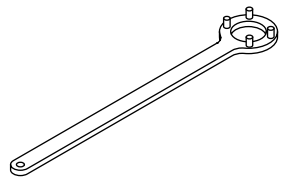
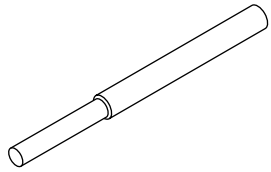
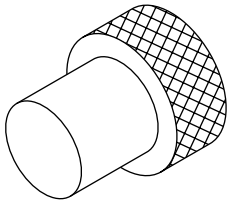
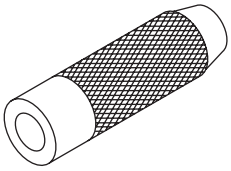
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498427200	498427200	FLANGE WRENCH	• Used for stopping rotation of companion flange when loosening and tightening self-lock nut. • For T-type. (Except STi model with mechanical LSD)
 ST-398467700	398467700	DRIFT	Used for removing pinion, pilot bearing and front bearing cone.
 ST-399780104	399780104	WEIGHT	Used for installing front bearing cone, pilot bearing companion flange.
 ST-899580100	899580100	INSTALLER	Used for press-fitting the front bearing cone, pilot bearing.

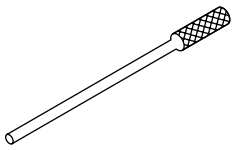
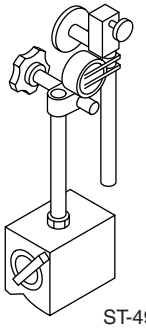
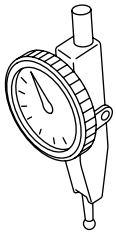
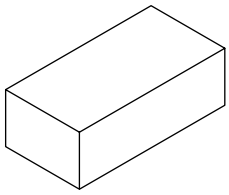
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-899904100	899904100	STRAIGHT PIN REMOVER	Used for driving out differential pinion shaft lock pin.
 ST-498247001	498247001	MAGNET BASE	• Used for measuring backlash between side gear and pinion, and hypoid gear. • Used with DIAL GAUGE (498247100).
 ST-498247100	498247100	DIAL GAUGE	• Used measuring backlash between side gear and pinion, hypoid gear. • Used with MAGNET BASE (498247001).
 ST-398507704	398507704	BLOCK	Used for adjusting pinion height and preload.

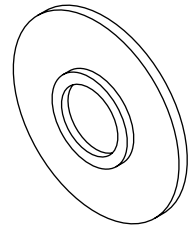
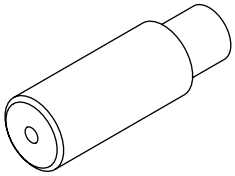
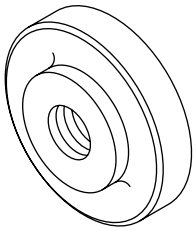
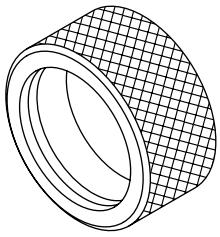
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-398177700	398177700	INSTALLER	• Used for installing rear bearing cone. • For T-type.
 ST-398457700	398457700	ATTACHMENT	• Used for removing side bearing retainer. • For T-type.
 ST-398477703	398477703	DRIFT2	• Used for press-fitting the bearing race (rear) of differential carrier. • For T-type.
 ST-398437700	398437700	DRIFT	• Used for installing side oil seal. • For T-type.

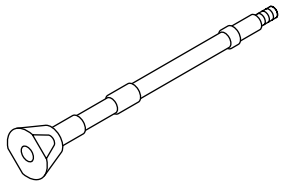
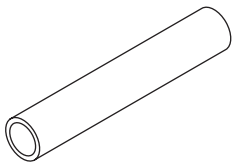
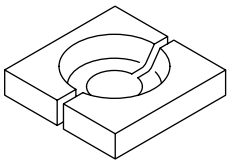
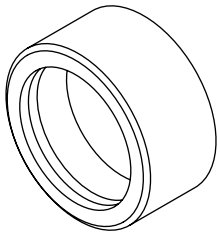
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-398507702	398507702	DUMMY SHAFT	• Used for adjusting pinion height and preload. • For T-type.
 ST-398507703	398507703	DUMMY COLLAR	• Used for adjusting pinion height and preload. • For T-type.
 ST-398517700	398517700	REPLACER	• Used for removing rear bearing cone. • For T-type.
 ST-398487700	398487700	DRIFT	• Used for press-fitting the side bearing cone. • For T-type.

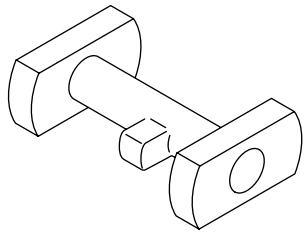
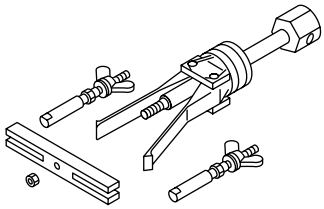
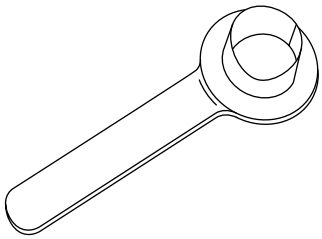
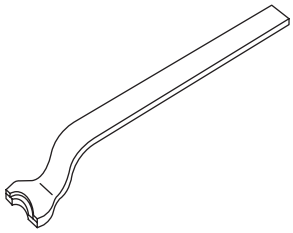
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-398507701	398507701	DIFFERENTIAL CARRIER GAUGE	• Used for adjusting pinion height. • For T-type.
 ST-398527700	398527700	PULLER ASSY	• Used for removing front oil seal. • Used for removing side bearing cup.
 ST28099PA090	28099PA090	OIL SEAL PROTECTOR	• Used for installing rear drive shaft into rear differential. • For protecting oil seal.
 ST28099PA100	28099PA100	DRIVE SHAFT REMOVER	• Used for removing rear drive shaft from rear differential. • For T-type.

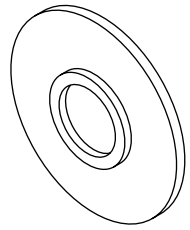
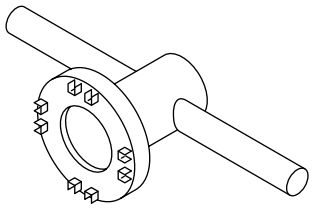
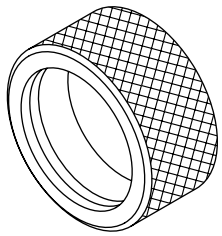
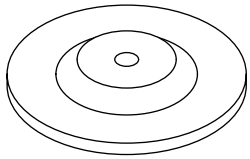
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498175500	498175500	INSTALLER	• Used for installing rear bearing cone. • For VA-type.
 ST-499785500	499785500	WRENCH ASSY	• Used for removing and installing side oil seal holder. • For VA-type.
 ST-498447100	498447100	INSTALLER	• Used for installing oil seal. • For VA-type.
 ST-399520105	399520105	SEAT	• Used for removing side bearing cone. • Used with PULLER SET (899524100). • For VA-type.

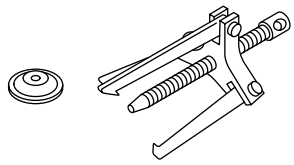
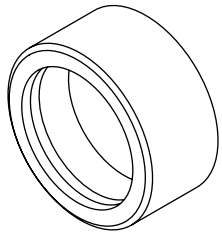
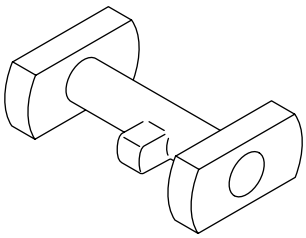
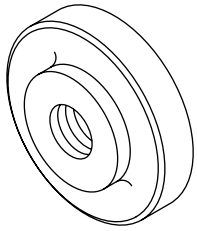
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-399703600	399703600	PULLER ASSY	Used for removing companion flange.
 ST-498485400	498485400	DRIFT	• Used for installing side bearing cone. • For VA-type.
 ST-498505501	498505501	DIFFERENTIAL CARRIER GAUGE	• Used for adjusting pinion height. • For VA-type.
 ST-498447110	498447110	DRIFT	• Used for press-fitting the bearing race (front) of differential carrier. • For VA-type.

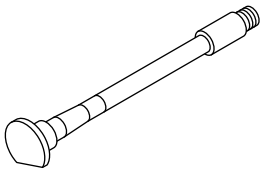
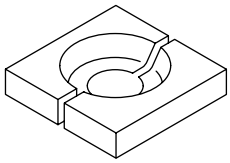
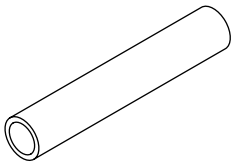
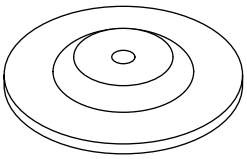
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498447150	498447150	DUMMY SHAFT	• Used for adjusting pinion height and Pre-load. • For VA-type.
 ST-498515500	498515500	REPLACER	• Used for removing rear bearing cone. • For VA-type.
 ST32285AA000	32285AA000	DUMMY COLLAR	• Used for adjusting pinion height and pre-load. • For VA-type.
 ST-499705404	499705404	SEAT	• Used for removing side bearing race. • Used with PULLER ASSY (499705401). • For VA-type.

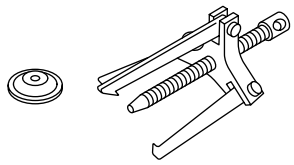
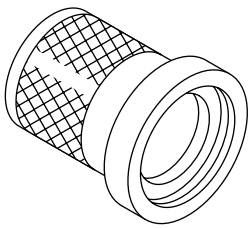
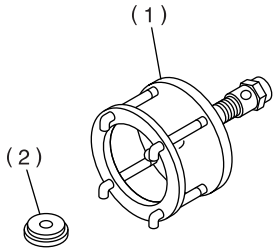
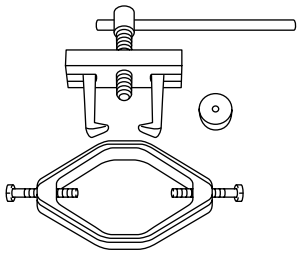
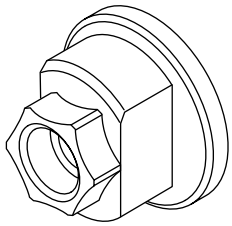
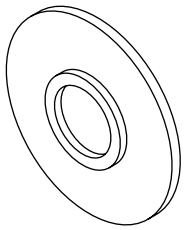
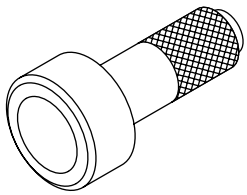
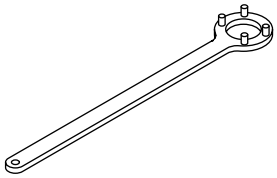
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499705401	499705401	PULLER ASSY	• Used for removing side bearing race. • Used with SEAT (499705404). • For VA-type.
 ST-899874100	899874100	INSTALLER	Used for installing companion flange.
 ST-899524100	899524100	PULLER SET	• Used for removing side bearing cone of differential. • For VA-type. (1) Puller (2) Cap
 ST18759AA000	18759AA000	PULLER ASSY	• Used for removing side bearing cone of differential. • For T-type.

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498937110	498937110	HOLDER DRIVE PINION (This special tool is used for current automatic transmission.)	• Used for installing pilot bearing. • For T-type. (STi model)
 ST18674AA000	18674AA000	INSTALLER	• Used for installing rear bearing cone. • For T-type. (STi model)
 ST-398417700	398417700	DRIFT (This special tool was prepared for the vehicles of 92MY and before.)	Used for installing side bearing race.
 ST18633AA000	18633AA000	WRENCH COMPL	• Used for stopping rotation of companion flange when loosening and tightening self-lock nut. • For T-type. (STi model with mechanical LSD)

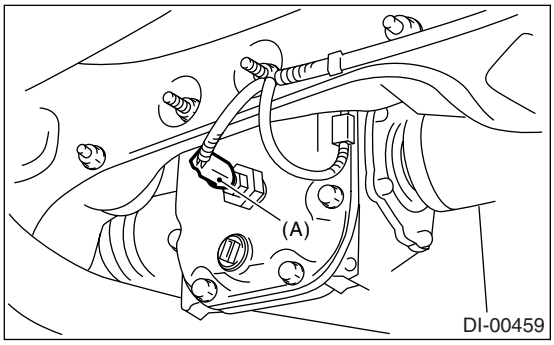
2. GENERAL PURPOSE TOOLS

TOOL NAME	REMARKS
Transmission jack	Used for assembly/disassembly of rear differential.
Puller	Used for removal of side bearing retainer.
Thickness gauge	Used for measuring clearance.
Tire lever	Used for removal of rear drive shaft. (VA-type)

2. Differential Gear Oil

A: INSPECTION

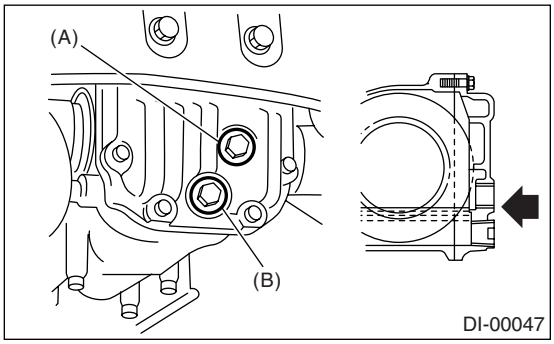
1) Disconnect the oil temperature switch connector (Mechanical LSD model).



(A) Connector

2) Remove the filler plug or oil temperature switch, and then check the gear oil. If it is contaminated or deteriorated, replace the gear oil. <Ref. to DI-24, REPLACEMENT, Differential Gear Oil.>

3) Check the gear oil level is up to the bottom part of filler bolt or oil temperature switch. If the level is low, make sure the no oil leak, and then refill up to the bottom of filler bolt.

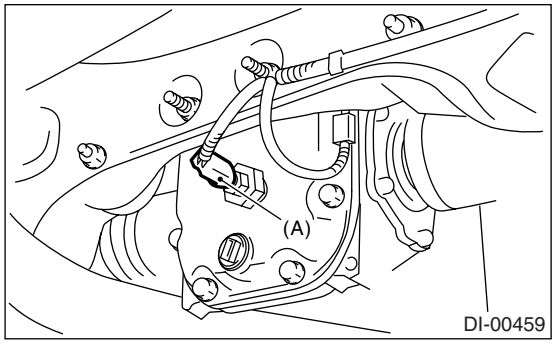


(A) Filler plug
(B) Drain plug

B: REPLACEMENT

1) Jack-up the vehicle and support it with sturdy racks.

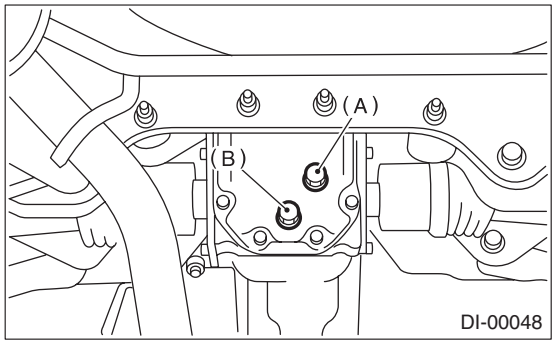
2) Disconnect the oil temperature switch connector (Mechanical LSD model).



(A) Connector

3) Remove the oil drain plug and filler plug or oil temperature switch, and drain the gear oil.

CAUTION:
Be careful not to burn, because gear oil becomes extremely hot after running.



(A) Filler plug
(B) Drain plug

4) Tighten the oil drain plug.

NOTE:
• Apply liquid gasket to the drain plug or oil temperature switch for T-type.
• Use a new aluminum gasket for VA-type.

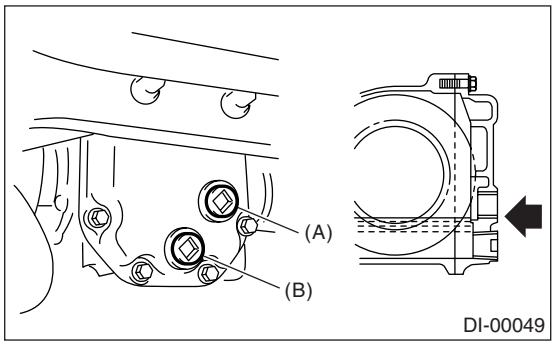
Liquid gasket:
THREE BOND 1105 (Part No. 004403010) or equivalent

Tightening torque:
T-type
49 N·m (5.0 kgf-m, 36.2 ft-lb)
VA-type
34 N·m (3.5 kgf-m, 25.3 ft-lb)

5) Fill the differential carrier with gear oil to the upper plug level.

NOTE:
• Carefully refill oil while watching the level. Excess or insufficient oil must be avoided.
• Use gear oil for the mechanical LSD for mechanical LSD model.

Oil capacity:
Except STi model:
0.7 — 0.9 ℓ (0.7 — 1.0 US qt, 0.6 — 0.8 Imp qt)
STi model:
0.9 — 1.1 ℓ (1.0 — 1.2 US qt, 0.8 — 1.0 Imp qt)



(A) Filler plug
(B) Drain plug

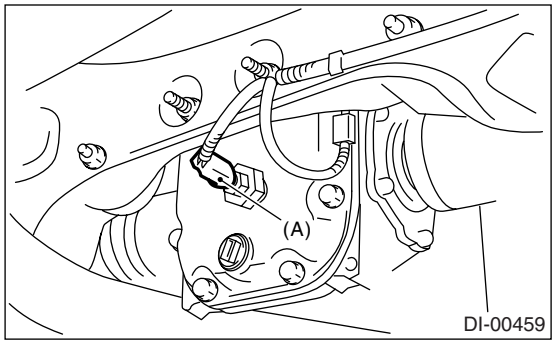
6) Install the filler plug or oil temperature switch.

NOTE:
• Apply liquid gasket to the filler plug or oil temperature switch for T-type.
• Use a new aluminum gasket for VA-type.

Liquid gasket:
THREE BOND 1105 (Part No. 004403010) or equivalent

Tightening torque:
T-type
49 N·m (5.0 kgf-m, 36.2 ft-lb)
VA-type
34 N·m (3.5 kgf-m, 25.3 ft-lb)

7) Connect the oil temperature switch connector (Mechanical LSD model).



(A) Connector

3. Front Differential Assembly

A: NOTE

1. AT MODEL

For front differential of automatic transmission, refer to “AT” section. <Ref. to 4AT-120, Front Differential Assembly.>

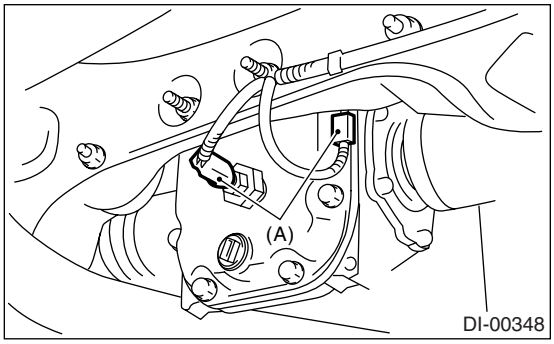
2. MT MODEL

For front differential of manual transmission, refer to “5MT” or “6MT” section. <Ref. to 5MT-104, Front Differential Assembly.> or <Ref. to 6MT-105, Front Differential Assembly.>

4. Rear Differential (T-type)

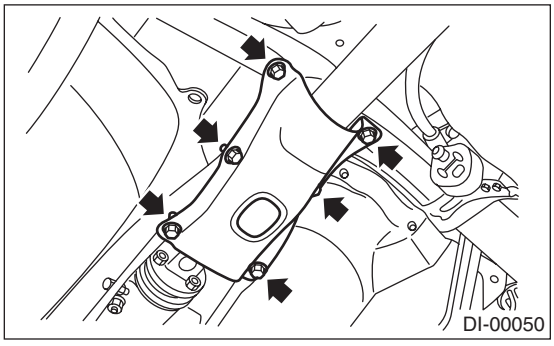
A: REMOVAL

1) Set the vehicle on a lift.
2) Disconnect the ground cable from battery.
3) Move the select lever or gear shift lever to “N”.
4) Release the parking brake.
5) Loosen the wheel nuts.
6) Jack-up the vehicle and support it with sturdy racks.
7) Remove the wheels.
8) Disconnect the connector from oil temperature switch. (Mechanical LSD model)



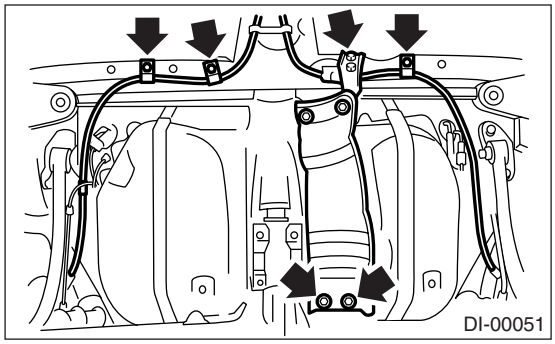
(A) Connector

9) Remove the rear exhaust pipe and muffler.
Non-turbo model without OBD
<Ref. to EX(H4SOw/oOBD)-10, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(H4SOw/oOBD)-11, INSTALLATION, Muffler.>
Non-turbo model with OBD
<Ref. to EX(H4SO)-10, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(H4SO)-12, REMOVAL, Muffler.>
Turbo model
<Ref. to EX(H4DOTC)-15, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(H4DOTC)-16, REMOVAL, Muffler.>
10) Remove the heat shield cover. (If equipped)
11) Remove the front cover of rear differential mount.

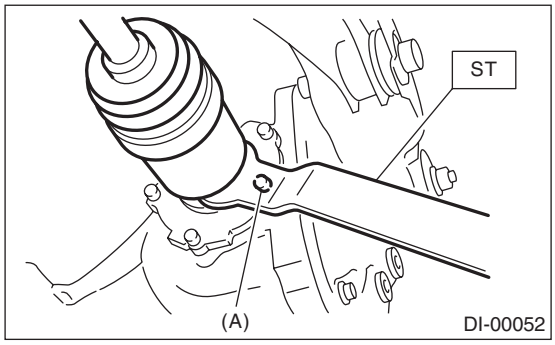


12) Remove the propeller shaft. <Ref. to DS-17, REMOVAL, Propeller Shaft.>

13) Remove the clamps and bracket of parking brake cable.

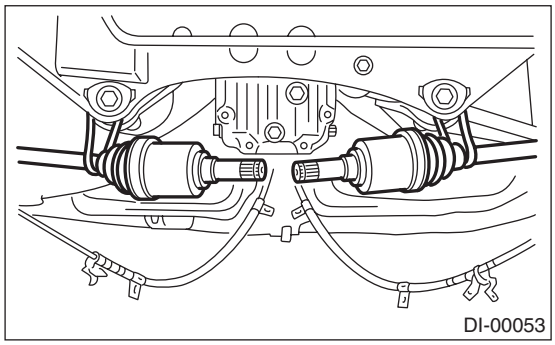


14) Remove the DOJ of rear drive shaft from rear differential using ST. <Ref. to DI-71, REPLACEMENT, Rear Differential Side Oil Seal.>
ST 28099PA100 DRIVE SHAFT REMOVER

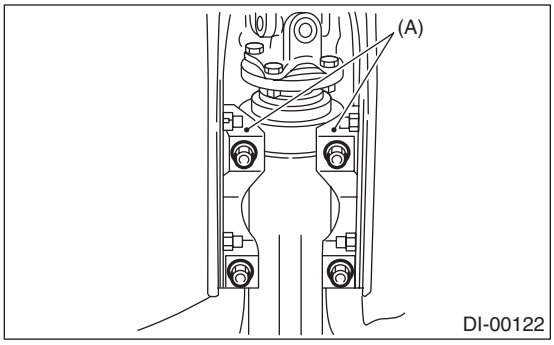


(A) Bolt

15) Secure the rear drive shaft to rear crossmember using wire.

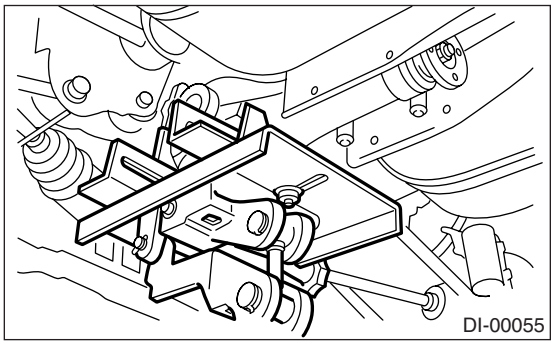


16) Remove the lower bracket.

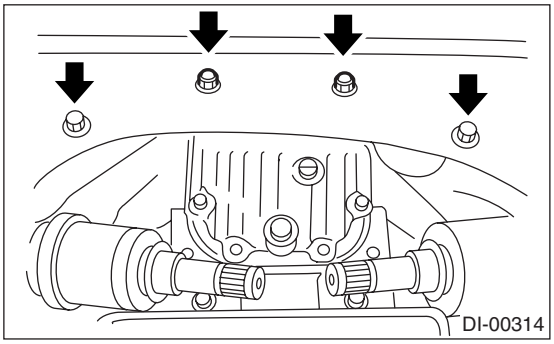


(A) Lower bracket

17) Support the rear differential with transmission jack.

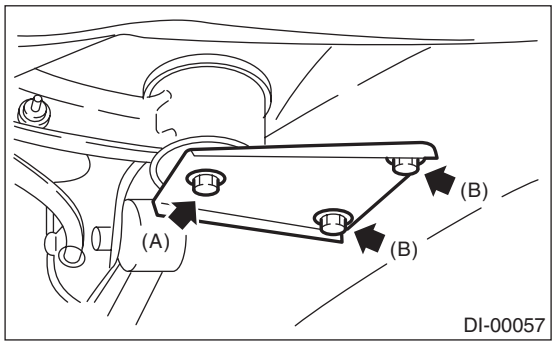


18) Remove the self-locking nuts and bolts.



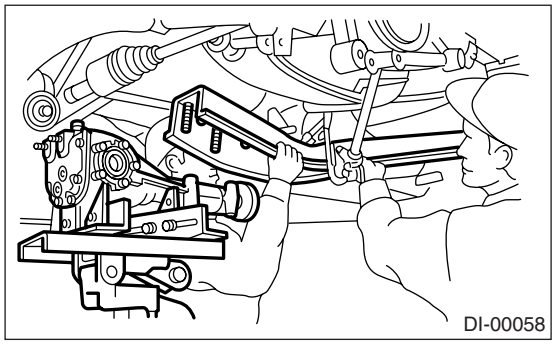
19) Remove the bolts which secure the rear differential front member to body.
Loosen the bolt A first, then remove the bolts B.

NOTE:
Support the front member with use of a helper to prevent it from dropping.

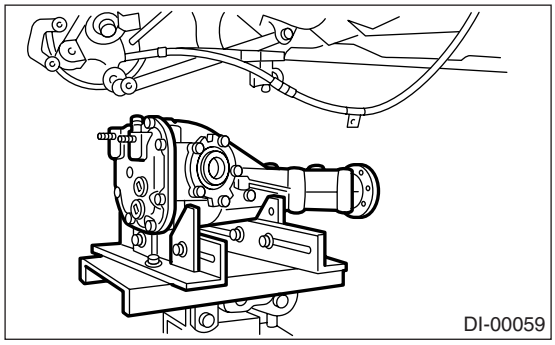


(A) Bolt A
(B) Bolt B

20) Remove the bolt A.
21) While slowly lowering the transmission jack, move the rear differential forward and remove front member from vehicle.



22) Remove the rear differential from vehicle.



B: INSTALLATION

Install in the reverse order of removal.

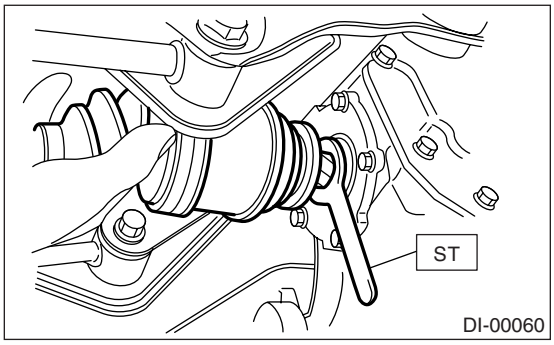
1) Install the air breather cap tapping with a plastic hammer.

NOTE:
Be sure to install a new air breather cap.

2) Position the front member on body by passing it under the parking brake cable and securing to rear differential.

NOTE:
When installing the rear differential front member, do not confuse the installation sequence of the upper and lower stoppers.

3) Install the DOJ of drive shaft into rear differential. <Ref. to DI-71, REPLACEMENT, Rear Differential Side Oil Seal.>
ST 28099PA090 OIL SEAL PROTECTOR



4) Installing procedure hereafter is in the reverse order of removal.

5) After installation, fill the differential carrier with gear oil to the filler plug level. <Ref. to DI-24, Differential Gear Oil.>

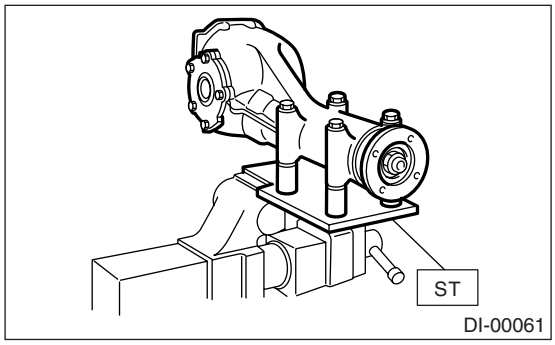
C: DISASSEMBLY

1. EXCEPT STi MODEL

To detect the real cause of trouble, inspect the following items before disassembling.

- Tooth contact of hypoid driven gear and pinion, and backlash
- Runout of hypoid driven gear at its back surface
- Turning resistance of drive pinion

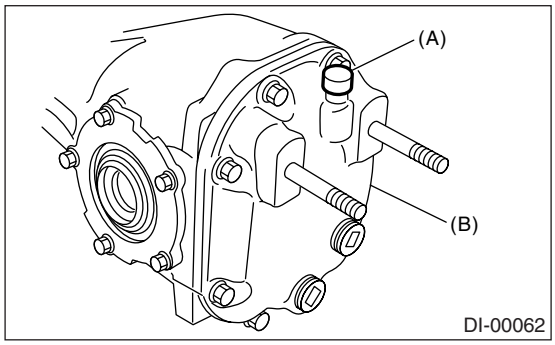
1) Set the ST on vise and install the differential assembly to ST.
ST 398217700 ATTACHMENT SET



2) Drain the gear oil by removing the plug.

3) Remove the air breather cap.

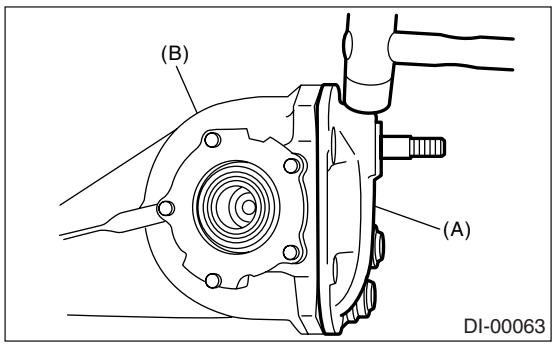
NOTE:
- Do not attempt to remove the air breather cap unless necessary.
- When removing the air breather cap, replace the air breather cap with a new one.



(A) Air breather cap
(B) Rear cover

4) Remove the bolts, and then remove the rear cover.

NOTE:
Remove it by tapping with plastic hammer.

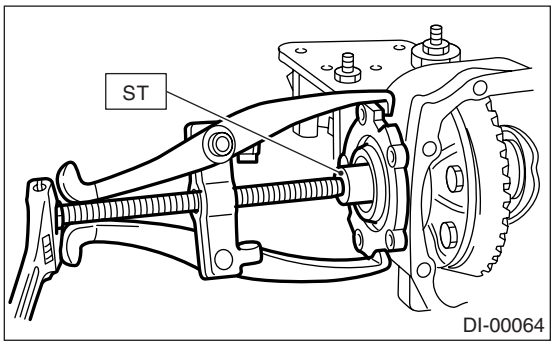


(A) Rear cover
(B) Differential carrier

5) Make right and left side bearing retainers in order to identify them at reassembly. Remove the side bearing retainer attaching bolts, set the ST to differential case, and extract right and left side bearing retainers with a puller.

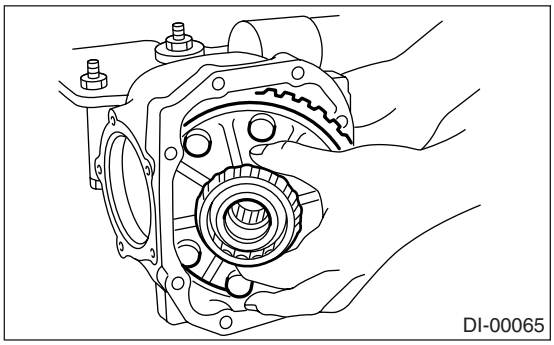
NOTE:
Each shim, which is installed to adjust the side bearing preload, should be kept together with its mating retainer.

ST 398457700 ATTACHMENT



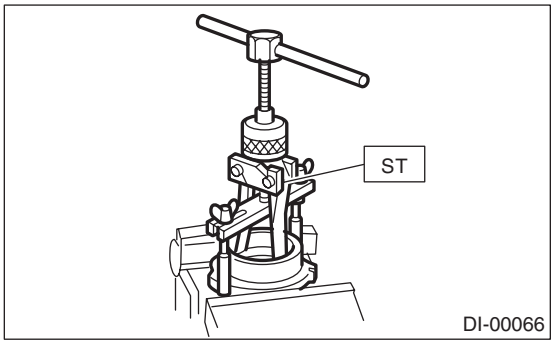
6) Pull out the differential case assembly from differential carrier.

NOTE:
Be careful not to hit the teeth against the case.



7) When replacing the side bearing, pull the bearing cup from side bearing retainer using ST.

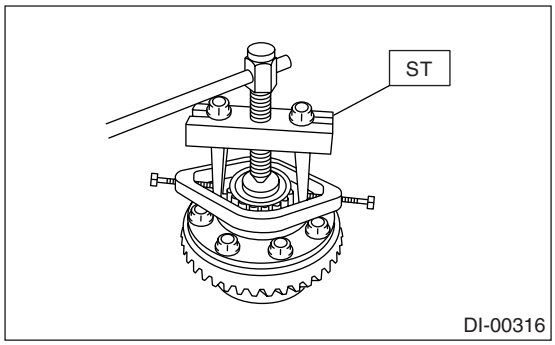
ST 398527700 PULLER ASSY



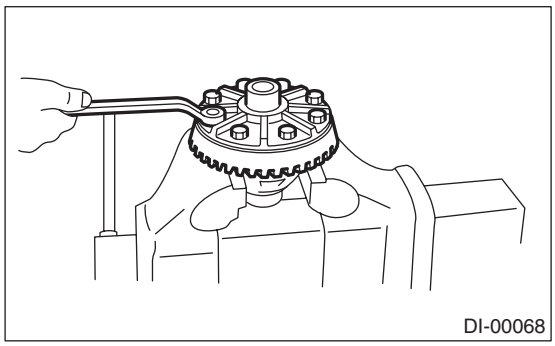
8) Extract the bearing cone with ST.

NOTE:
- Do not attempt to disassemble the parts unless necessary.
- Set the puller so that its claws catch the edge of bearing cone.
- Never mix up the right and left hand bearing races and cones.

ST 18759AA000 PULLER ASSY



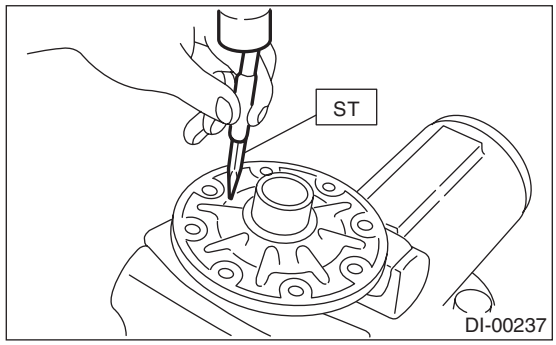
9) Remove the hypoid driven gear by loosening the hypoid driven gear bolts.



10) Drive out the pinion shaft lock pin from hypoid driven gear side. (Model without LSD)

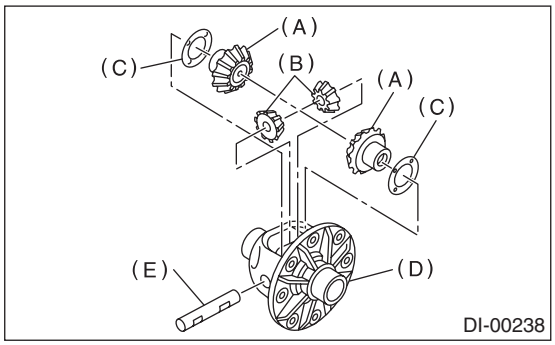
NOTE:
The lock pin is staked at the pin hole end on the differential carrier; do not drive it out forcibly before unstaking it.

ST 899904100 STRAIGHT PIN REMOVER



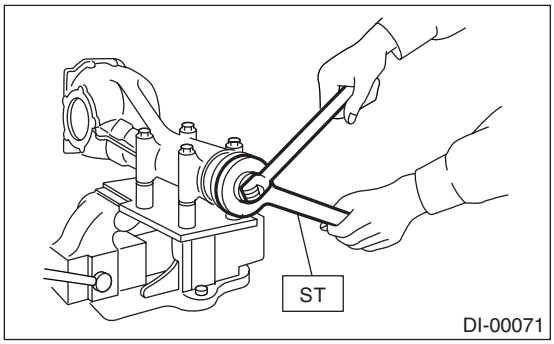
11) Draw out the pinion mate shaft and remove the pinion mate gears, side gears and thrust washers. (Model without LSD)

NOTE:
The gears as well as thrust washers should be marked or kept separated right and left, front and rear.

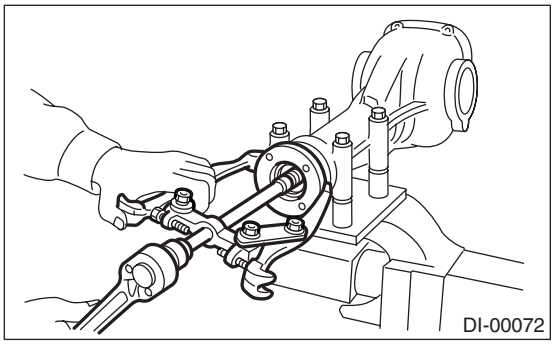


(A) Side gear
(B) Pinion mate gear
(C) Thrust washer
(D) Differential case
(E) Pinion mate shaft

12) Hold the companion flange with ST and remove the drive pinion nut.
ST 498427200 FLANGE WRENCH

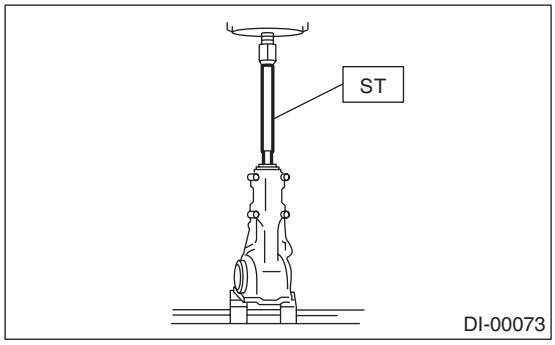


13) Extract the companion flange with a puller.



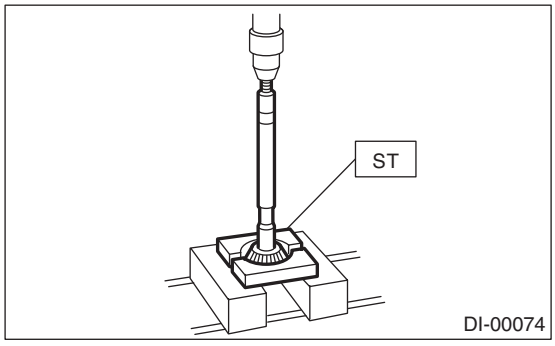
14) Press the end of drive pinion shaft and extract it together with the rear bearing cone, preload adjusting spacer and washer.

NOTE:
Hold the drive pinion so as not to drop it.
ST 398467700 DRIFT

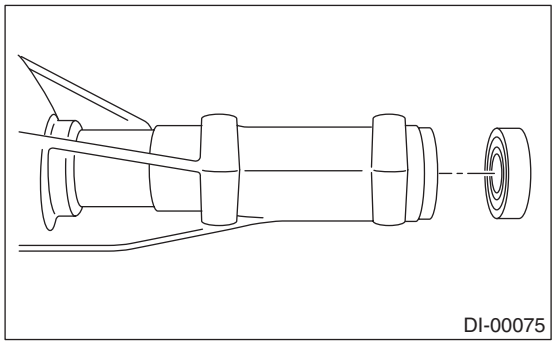


15) Remove the rear bearing cone from drive pinion by supporting the cone with ST.

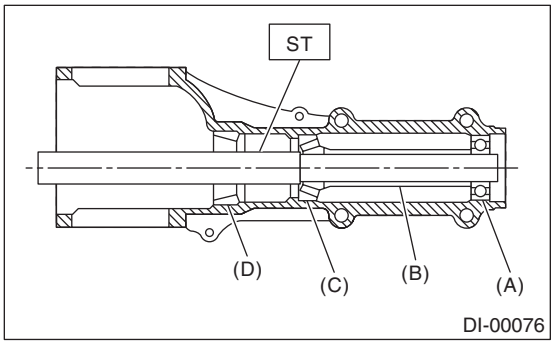
NOTE:
Place the replacer so that its center-recessed side faces the pinion gear.
ST 398517700 REPLACER



16) Remove the front oil seal from differential carrier using ST.
ST 398527700 PULLER ASSY

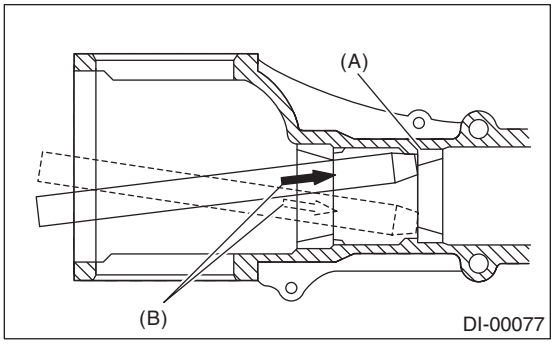


17) Remove the pilot bearing together with front bearing cone and spacer using ST.
ST 398467700 DRIFT



(A) Pilot bearing
(B) Spacer
(C) Front bearing
(D) Rear bearing cup

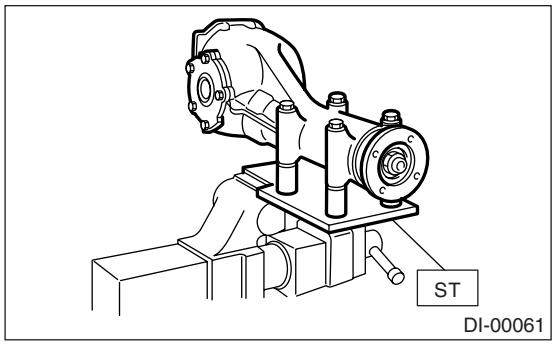
18) When replacing the bearings, hit out the front bearing cup and rear bearing cup in this order out of case by using a brass bar.



(A) 2 cutouts along diagonal lines
(B) Hit out alternately with brass bar.

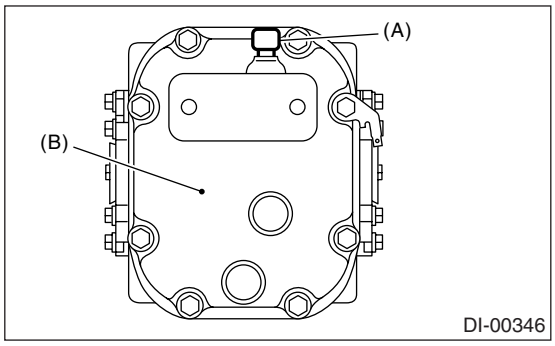
2. STi MODEL

To detect the real cause of trouble, inspect the following items before disassembling.
• Tooth contact of hypoid driven gear and pinion, and backlash
• Runout of hypoid driven gear at its back surface
• Turning resistance of drive pinion
1) Set the ST on vise and install the differential assembly to ST.
ST 398217700 ATTACHMENT



2) Drain the gear oil by removing the plug.
3) Remove the air breather cap.

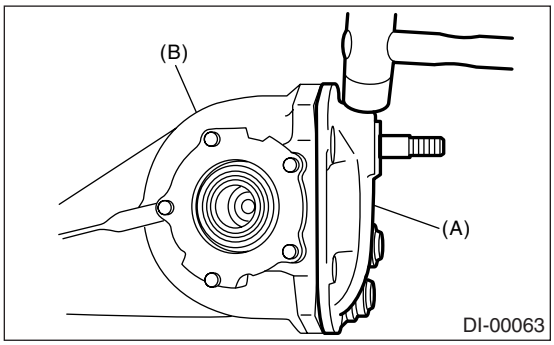
NOTE:
• Do not attempt to remove the air breather cap unless necessary.
• When removing the air breather cap, replace the air breather cap with a new one.



(A) Air breather cap
(B) Rear cover

4) Remove the bolts, and then remove the rear cover.

NOTE:
Remove it by tapping with plastic hammer.

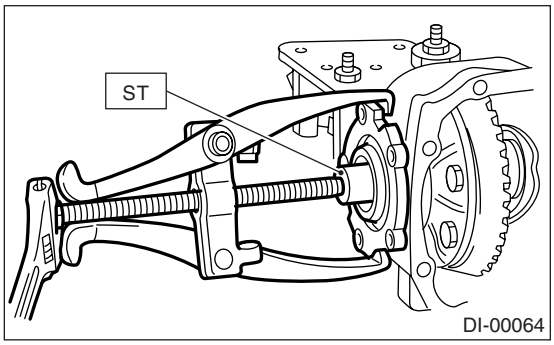


(A) Rear cover
(B) Differential carrier

5) Make right and left side bearing retainers in order to identify them at reassembly. Remove the side bearing retainer attaching bolts, set the ST to differential case, and extract right and left side bearing retainers with a puller.

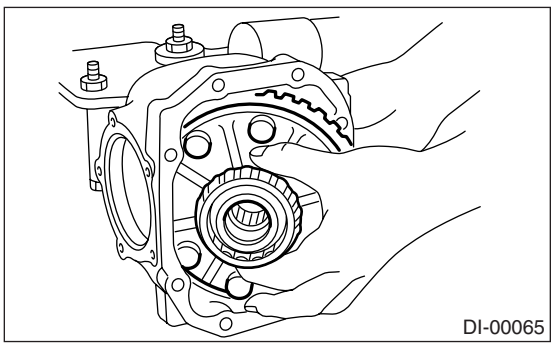
NOTE:
Each shim, which is installed to adjust the side bearing preload, should be kept together with its mating retainer.

ST 398457700 ATTACHMENT



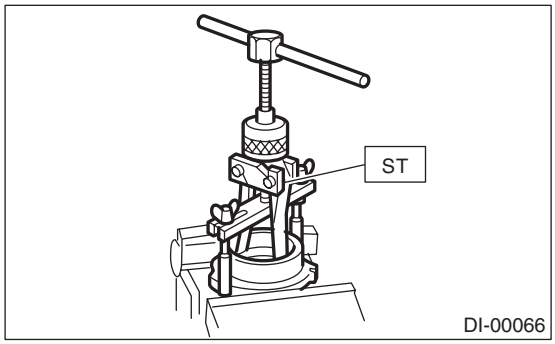
6) Pull out the differential case assembly from differential carrier.

NOTE:
Be careful not to hit the teeth against the case.



7) When replacing the side bearing, pull the bearing cup from side bearing retainer using ST.

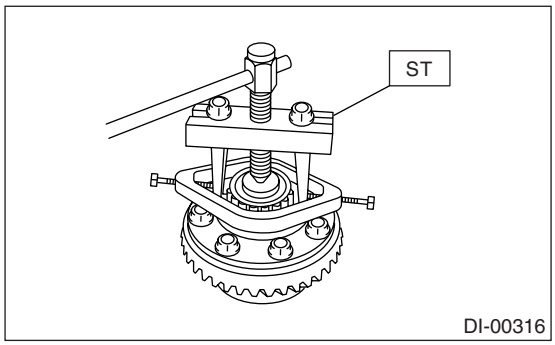
ST 398527700 PULLER ASSY



8) Extract the bearing cone with ST.

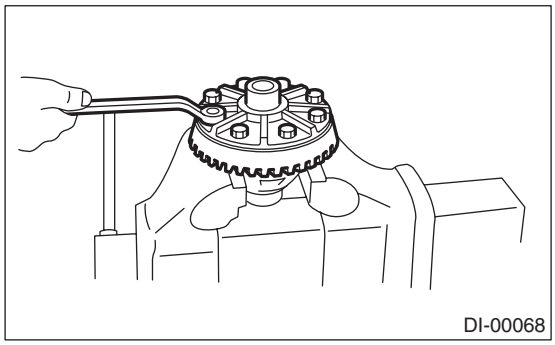
NOTE:
• Do not attempt to disassemble the parts unless necessary.
• Set the puller so that its claws catch the edge of bearing cone.
• Never mix up the right and left hand bearing races and cones.

ST 18759AA000 PULLER ASSY

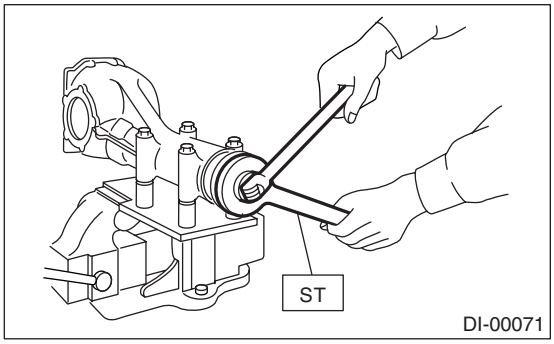


9) Remove the hypoid driven gear by loosening the hypoid driven gear bolts.

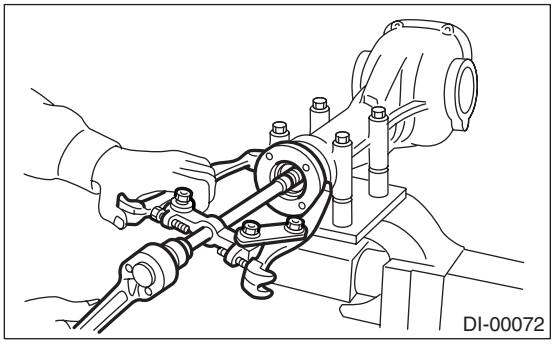
NOTE:
Do not disassemble the differential case.



10) Hold the companion flange with ST and remove the drive pinion nut.
ST (MODEL WITH MECHANICAL LSD)
18633AA000 WRENCH COMPL
ST (MODEL WITHOUT MECHANICAL LSD)
498427200 FLANGE WRENCH

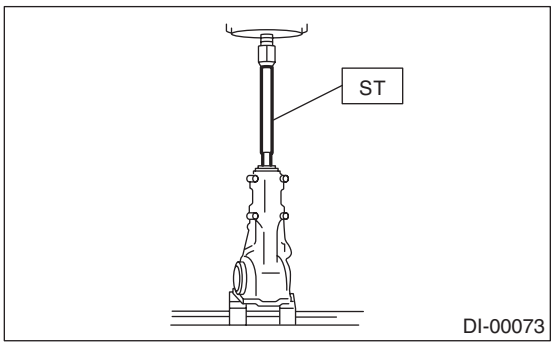


11) Extract the companion flange with a puller.

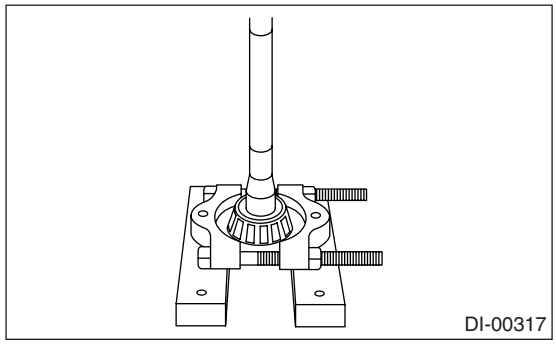


12) Press the end of drive pinion shaft and extract it together with the rear bearing cone, preload adjusting spacer and washer.

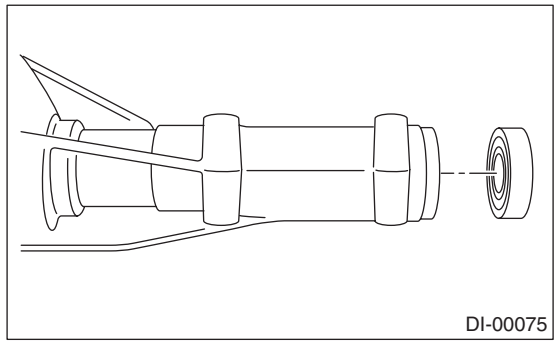
NOTE:
Hold the drive pinion so as not to drop it.
ST 398467700 DRIFT



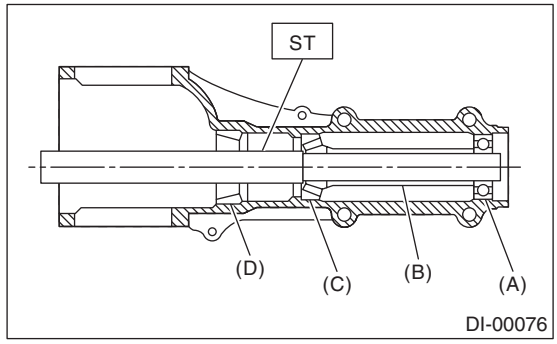
13) Remove the rear bearing cone from drive pinion.



14) Remove the front oil seal from differential carrier using ST.
ST 398527700 PULLER ASSY

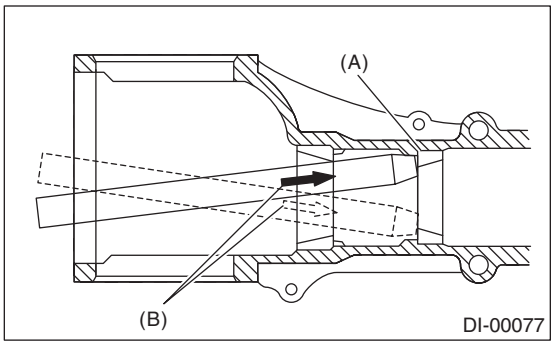


15) Remove the pilot bearing together with front bearing cone using ST.
ST 398467700 DRIFT



(A) Pilot bearing
(B) Spacer
(C) Front bearing
(D) Rear bearing cup

16) When replacing the bearings, tap the front bearing cup and rear bearing cup in this order out of case by using a brass bar.

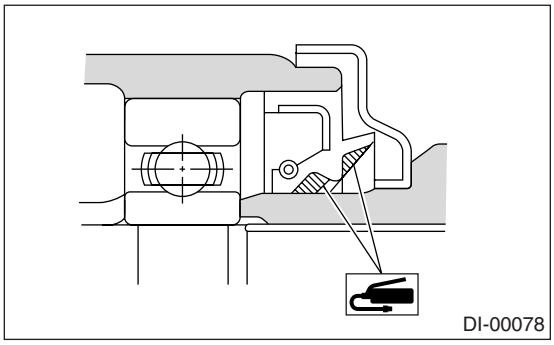


(A) 2 cutouts along diagonal lines
(B) Hit out alternately with brass bar.

D: ASSEMBLY

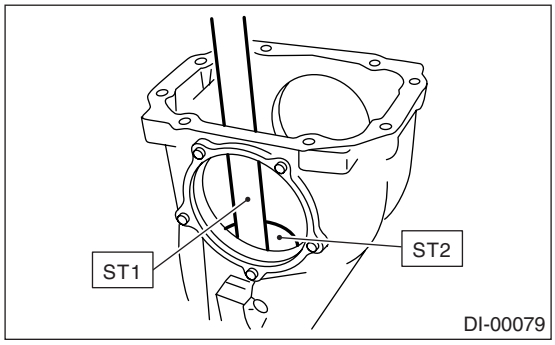
1. EXCEPT STi MODEL

NOTE:
• Assemble in the reverse order of disassembling.
• Check and adjust each part during assembly.
• Keep the shims and washers in order, so that they are not improperly installed.
• Thoroughly clean the surfaces on which the shims, washers and bearings are to be installed.
• Apply gear oil when installing the bearings and thrust washers.
• Be careful not to mix up the right and left hand races of the bearings.
• Use a new O-ring and gasket.
• Replace the oil seal with a new one at every disassembly. Apply chassis grease between the lips when installing the oil seal.
• Be careful not to mix up the right and left hand oil seal.



1) Adjusting preload for front and rear bearings
Adjust the bearing preload with spacer and washer between front and rear bearings. Pinion height adjusting washer are not affected by this adjustment. The adjustment must be carried out without oil seal inserted.

(1) Press the front and rear bearing race into differential carrier using ST1 and ST2.
ST1 398477701 HANDLE
ST2 398477703 DRIFT 2

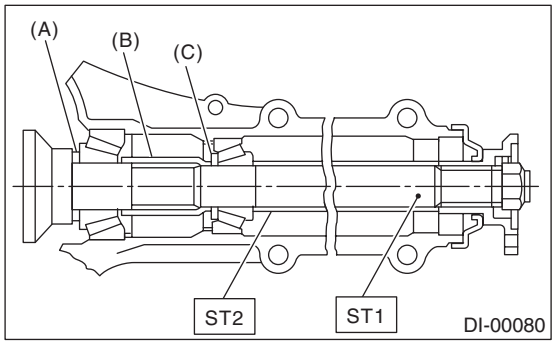


(2) Install the front bearing race to differential carrier using ST1 and ST2.
ST1 398477701 HANDLE
ST2 398477703 DRIFT 2

(3) Insert the ST1 into carrier with pinion height adjusting washer and rear bearing cone fitted onto it.

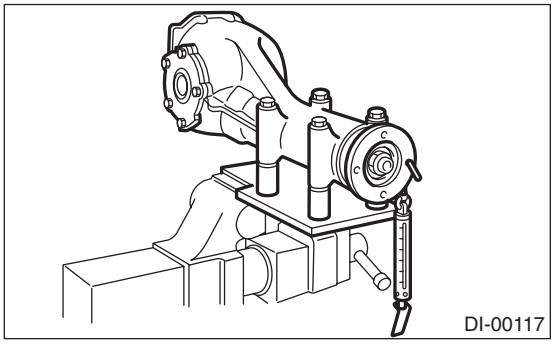
NOTE:
• If tooth contact (Drive pinion, Hypoid driven gear) is normal in the inspection before disassembling, verify that the washer is not deformed, and then reuse the used washer.
• Use a new rear bearing cone.

(4) Then install the preload adjusting spacer and washer, front bearing cone, ST2, companion flange, and washer and drive pinion nut.
ST1 398507702 DUMMY SHAFT
ST2 398507703 DUMMY COLLAR



(A) Pinion height adjusting shim
(B) Preload adjusting spacer
(C) Preload adjusting washer

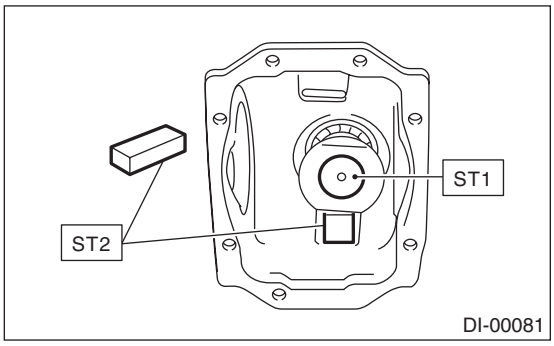
(5) Turn the ST1 with hand to make bearing fitted, and tighten the self-locking nut while measuring the preload with spring balance. Select the preload adjusting washer and spacer so that the specified preload is obtained when nut is tightened to the specified torque.



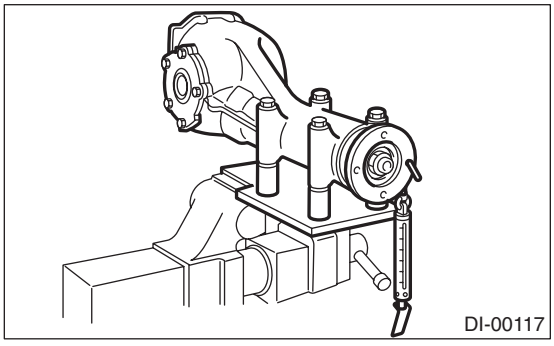
NOTE:
- Use a new lock nut.
- Be careful not to give excessive preload.
- When tightening the drive pinion nut, lock ST1 with ST2 as shown in the figure.
- Measure the preload in direction of tangent to flange.

ST1 398507702 DUMMY SHAFT
ST2 398507704 BLOCK

Tightening torque:
181 N·m (18.5 kgf-m, 134 ft-lb)



Front and rear bearing preload
For new bearing: 18.1 — 38.8 N (1.8 — 4.0 kgf, 4.1 — 8.7 lbf) at companion flange bolt hole



	Part No.	Thickness mm (in)
Preload adjusting washer	383705200	2.59 (0.1020)
	383715200	2.57 (0.1012)
	383725200	2.55 (0.1004)
	383735200	2.53 (0.0996)
	383745200	2.51 (0.0988)
	383755200	2.49 (0.0980)
	383765200	2.47 (0.0972)
	383775200	2.45 (0.0965)
	383785200	2.43 (0.0957)
	383795200	2.41 (0.0949)
	383805200	2.39 (0.0941)
	383815200	2.37 (0.0933)
	383825200	2.35 (0.0925)
	383835200	2.33 (0.0917)
	383845200	2.31 (0.0909)
Preload adjusting spacer	Part No.	Length mm (in)
	383695201	56.2 (2.213)
	383695202	56.4 (2.220)
	383695203	56.6 (2.228)
	383695204	56.8 (2.236)
	383695205	57.0 (2.244)
	383695206	57.2 (2.252)

2) Adjusting drive pinion height
Adjust the drive pinion height with shim installed between the rear bearing cone and back of pinion gear.

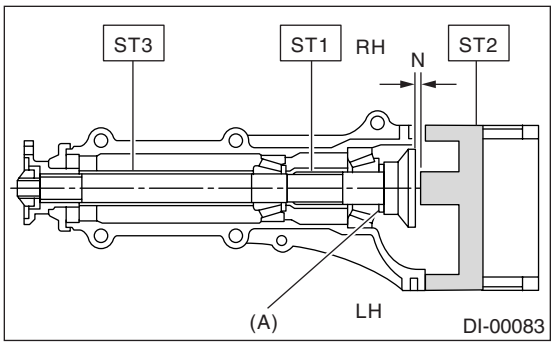
(1) Install the ST2.

Front and rear bearing preload
For new bearing: 18.1 — 38.8 N (1.8 — 4.0 kgf, 4.1 — 8.7 lbf) at companion flange bolt hole

NOTE:
At this time, install a pinion height adjusting shim which is temporarily selected or the same as that used before. Measure and record the thickness.

ST1 398507702 DUMMY SHAFT
ST2 398507701 DIFFERENTIAL CARRIER GAUGE

ST3 398507703 DUMMY COLLAR

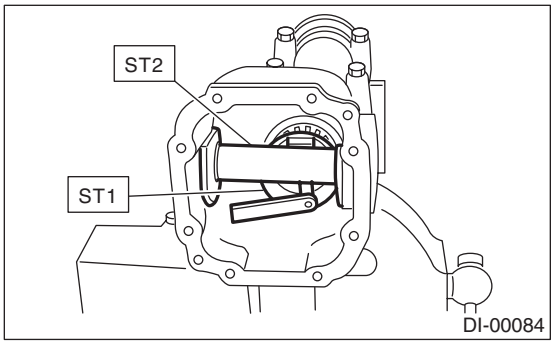


(A) Pinion height adjusting shim

(2) Measure the clearance N between the end of ST2 and end surface of ST1 by using a thickness gauge.

NOTE:
Make sure there is no clearance between the case and ST2.

ST1 398507702 DUMMY SHAFT
ST2 398507701 DIFFERENTIAL CARRIER GAUGE



(3) Obtain the thickness of pinion height adjusting shim to be inserted from the following formula, and replace the temporarily installed shim with this one.

$T = To + N - (H \times 0.01) - 0.20$ mm (0.0079 in)

NOTE:
Use copies of this page.

T	Thickness of pinion height adjusting shim mm (in)	
To	Thickness of shim temporarily inserted mm (in)	
N	Reading of thickness gauge mm (in)	
H	Figure marked on drive pinion head	
Memo:		

(Example of calculation)

To = 2.20 mm (0.0866 in) + 1.20 mm (0.0472 in) = 3.40 mm (0.1339 in)

N = 0.23 mm (0.0090 in)

H = + 1

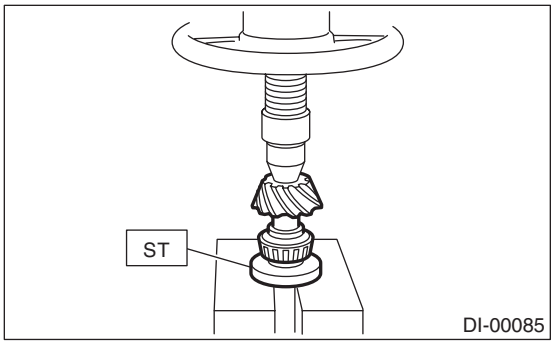
T = 3.40 mm (0.1339 in) + 0.23 mm (0.0090 in) − 0.01 − 0.20 mm (0.0079 in) = 3.42 mm (0.1346 in)

Result: Thickness = 3.42 mm

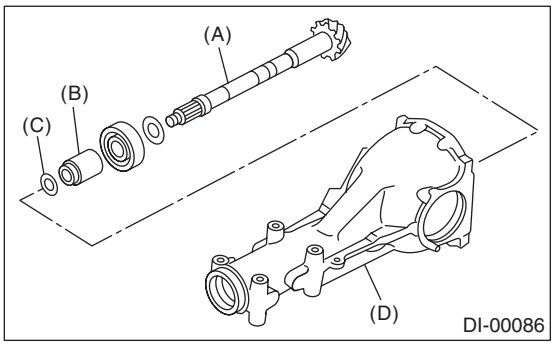
Therefore use the shim 383605200.

Pinion height adjusting shim	
Part No.	Thickness mm (in)
383495200	3.09 (0.1217)
383505200	3.12 (0.1228)
383515200	3.15 (0.1240)
383525200	3.18 (0.1252)
383535200	3.21 (0.1264)
383545200	3.24 (0.1276)
383555200	3.27 (0.1287)
383565200	3.30 (0.1299)
383575200	3.33 (0.1311)
383585200	3.36 (0.1323)
383595200	3.39 (0.1335)
383605200	3.42 (0.1346)
383615200	3.45 (0.1358)
383625200	3.48 (0.1370)
383635200	3.51 (0.1382)
383645200	3.54 (0.1394)
383655200	3.57 (0.1406)
383665200	3.60 (0.1417)
383675200	3.63 (0.1429)
383685200	3.66 (0.1441)

3) Install the selected pinion height adjusting shim on drive pinion, and press the rear bearing cone into position with ST.
ST 398177700 INSTALLER

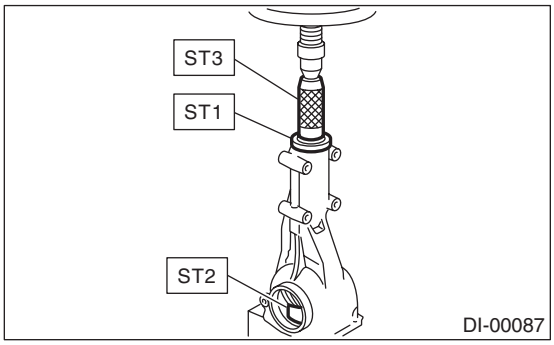


4) Insert the drive pinion into differential carrier, install the previously selected bearing preload adjusting spacer and washer.

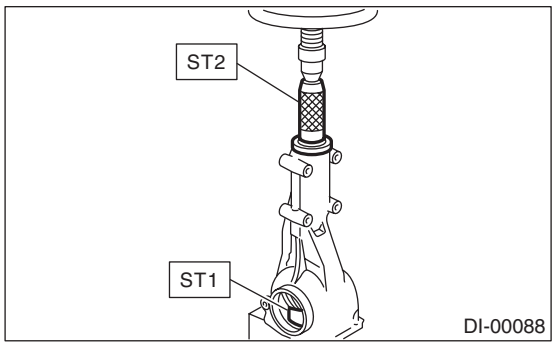


(A) Drive pinion
(B) Bearing adjusting spacer
(C) Washer
(D) Differential carrier

5) Press-fit the front bearing cone into case with ST1, ST2 and ST3.
ST1 398507703 DUMMY COLLAR
ST2 399780104 WEIGHT
ST3 899580100 INSTALLER



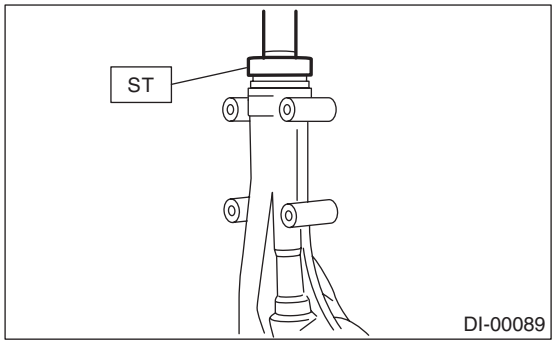
6) Insert the spacer, then press-fit the pilot bearing with ST1 and ST2.
ST1 399780104 WEIGHT
ST2 899580100 INSTALLER



7) Fit a new oil seal with ST.

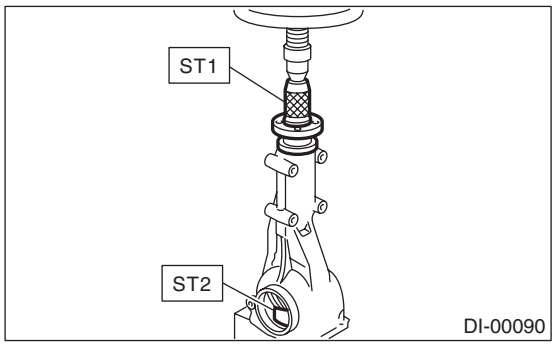
NOTE:
• Press-fit until the end of oil seal is 1 mm (0.04 in) inward from end of carrier.
• Apply grease between the oil seal lips.

ST 498447120 INSTALLER



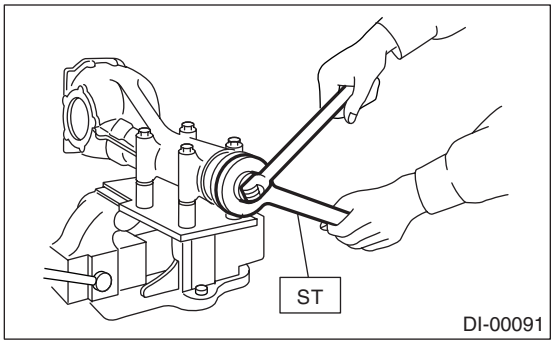
8) Press-fit the companion flange with ST1 and ST2.

NOTE:
Be careful not to damage the bearing.
ST1 899874100 INSTALLER
ST2 399780104 WEIGHT



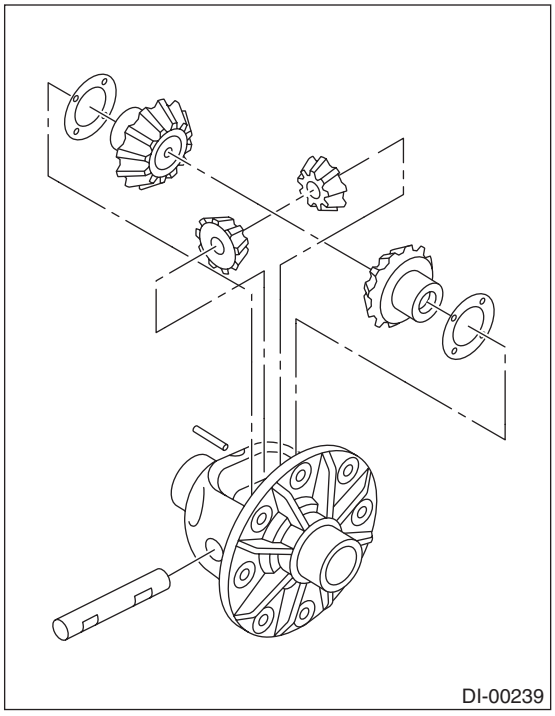
9) Install a new self-locking nut. Then tighten it with the ST.
ST 498427200 FLANGE WRENCH

Tightening torque:
181 N·m (18.5 kgf-m, 134 ft-lb)



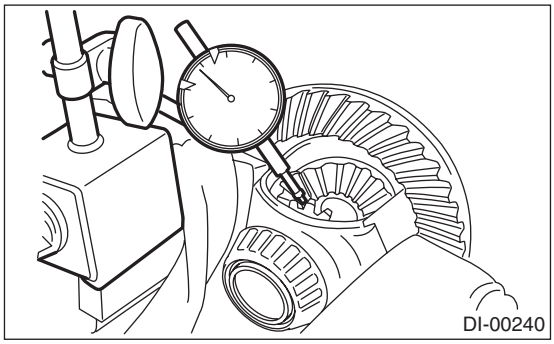
10) Assembling differential case
Install the side gears and pinion mate gears, with their thrust washers and pinion mate shaft, into differential case. (Model without LSD)

NOTE:
• Apply gear oil on both sides of the washer and on the side gear shaft before installing.
• Insert the pinion mate shaft into the differential case by aligning the lock pin holes.



(1) Measure the side gear backlash.

Side gear backlash:
0.10 — 0.20 mm (0.0039 — 0.0079 in)



(2) Adjust the backlash as specified by selecting the side gear thrust washer.

Side gear thrust washer	
Part No.	Thickness mm (in)
383445201	0.75 — 0.80 (0.0295 — 0.0315)
383445202	0.80 — 0.85 (0.0315 — 0.0335)
383445203	0.85 — 0.90 (0.0335 — 0.0354)

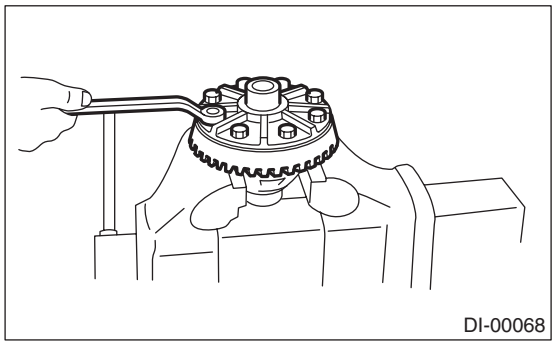
(3) Check the condition of rotation after applying oil to the gear tooth surfaces and thrust washer surfaces.
(4) After inserting the pinion shaft lock pin into differential case, stake both sides of the hole to prevent pin from falling off.

11) Apply Lock Tite to bolt thread and install the hypoid driven gear on differential case.

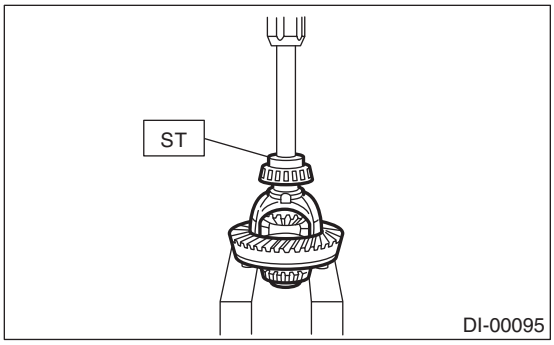
Lock Tite:
THREE BOND 1324 (Part No. 004403042) or equivalent

NOTE:
Tighten diagonally while tapping the bolt heads.

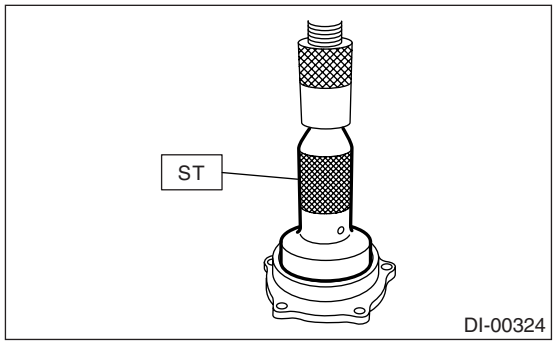
Tightening torque:
105 N·m (10.7 kgf-m, 77.4 ft-lb)



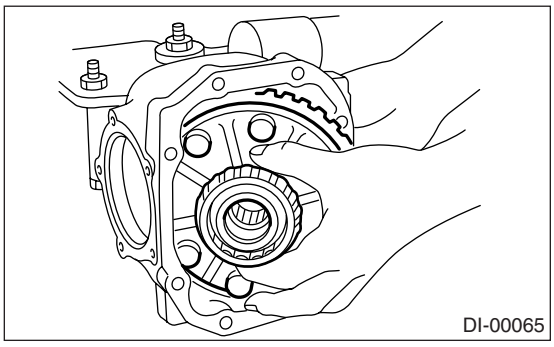
12) Press the side bearing into differential case using ST.
ST 398487700 DRIFT



13) Press the side bearing outer race into bearing retainer using ST.
ST 398417700 DRIFT



14) Adjusting side bearing retainer shims
(1) The driven gear backlash and side bearing preload can be determined by the side bearing retainer shim thickness.
(2) Install the differential case assembly into differential carrier in the reverse order of disassembly.



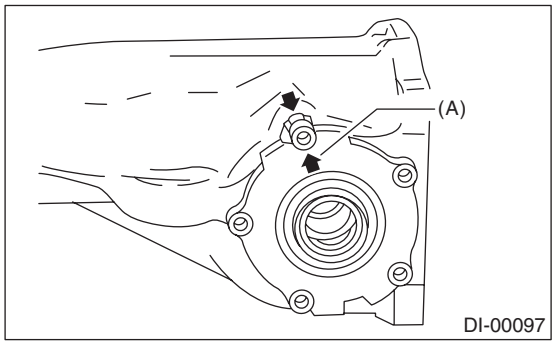
(3) Install the side retainer shims and O-rings to the right and left retainers from which they were removed.

NOTE:
• Replace the broken or cracked O-ring with new one.
• Replace the broken or corroded side retainer shim with a new one of same thickness.

Side bearing retainer shim	
Part No.	Thickness mm (in)
383475201	0.20 (0.0079)
383475202	0.25 (0.0098)
383475203	0.30 (0.0118)
383475204	0.40 (0.0157)
383475205	0.50 (0.0197)

(4) Align the arrow mark on differential carrier with the mark on side retainer during installation.

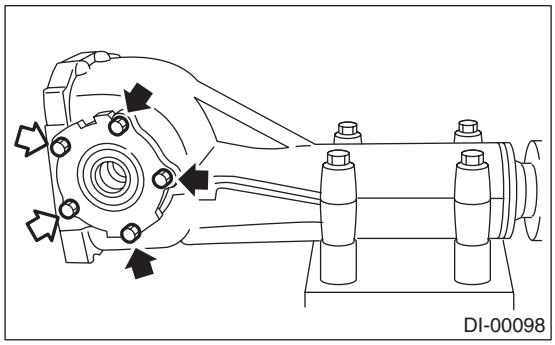
NOTE:
Be careful that side bearing outer race is not damaged by bearing roller.



(A) Arrow mark

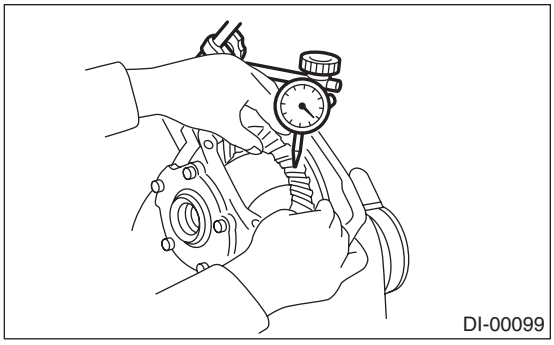
(5) Tighten the side bearing retainer bolts.

Tightening torque:
10.3 N·m (1.05 kgf-m, 7.6 ft-lb)



(6) Measure the hypoid driven gear-to-drive pinion backlash. Set the magnet base on differential carrier. Align the contact point of dial gauge with tooth face of hypoid driven gear, and move the hypoid driven gear while holding drive pinion still. Read the value indicated on dial gauge.

Backlash:
0.10 — 0.20 mm (0.0039 — 0.0079 in)

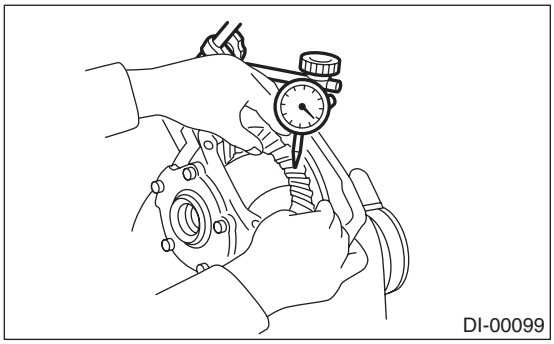


(7) At the same time, measure the total preload of drive pinion. Compared with the resistance when differential case is not installed, if the total preload is not within specification, adjust the thickness of side bearing retainer shims, increasing/reducing by an even amount at a time.

Total preload:
20.7 — 54.4 N (2.1 — 5.5 kgf, 4.7 — 12.2 lbf)

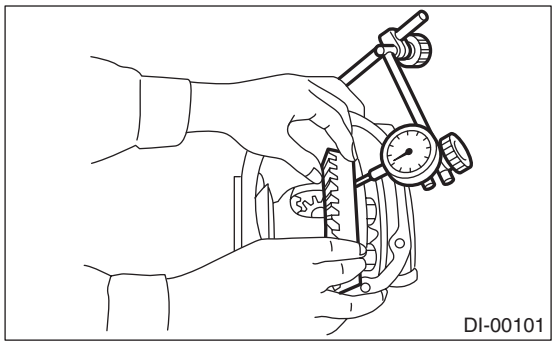
15) Re-check the hypoid driven gear-to-pinion backlash.

Backlash:
0.10 — 0.20 mm (0.0039 — 0.0079 in)



16) Check the hypoid driven gear runout on its back surface, and make sure that pinion and hypoid driven gear rotate smoothly.
If the hypoid driven gear runout on its back surface exceed the specification, verify that there is any foreign material between hypoid driven gear and differential case, and they are not deformed.

Limit of runout:
0.05 mm (0.0020 in)

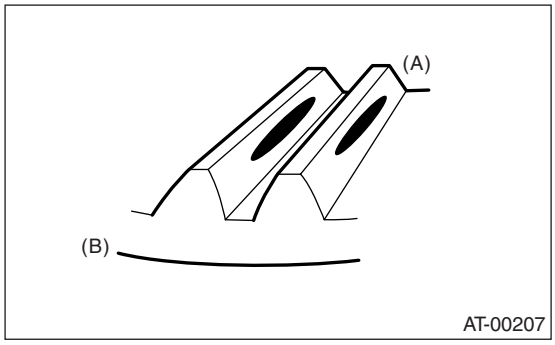


17) Checking and adjusting tooth contact of hypoid driven gear
(1) Apply an even coat of red lead on both sides of three or four teeth on the hypoid driven gear. Check the contact pattern after rotating the hypoid driven gear several revolutions back and forth until a definite contact pattern appears on the hypoid driven gear.
(2) When the contact pattern is incorrect, readjust according to the instructions given in "TOOTH CONTACT PATTERN".

NOTE:
Be sure to wipe off red lead completely after adjustment is completed.

- Correct tooth contact

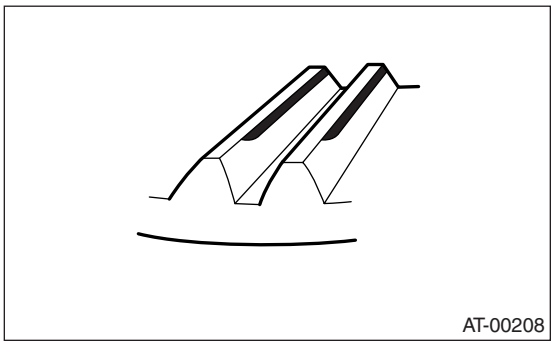
Checking item: Tooth contact pattern is slightly shifted toward to toe side under no-load rotation. (When loaded, contact pattern moves toward heel)



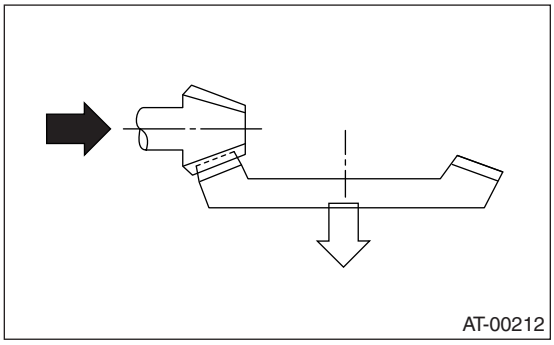
(A) Toe side
(B) Heel side

- Face contact

Checking item: Backlash is too large.
Contact pattern

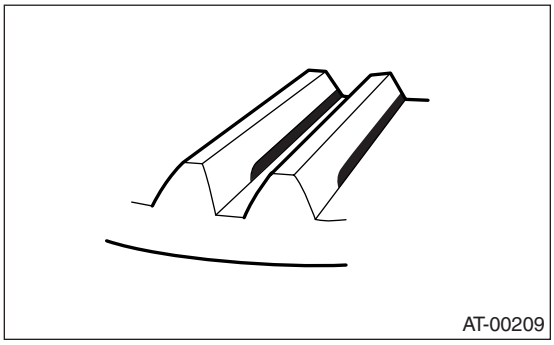


Corrective action: Increase thickness of drive pinion height adjusting shim in order to bring drive pinion close to hypoid driven gear.

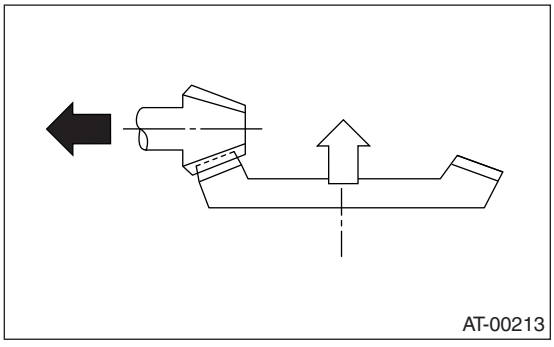


- Flank contact

Checking item: Backlash is too small.
Contact pattern

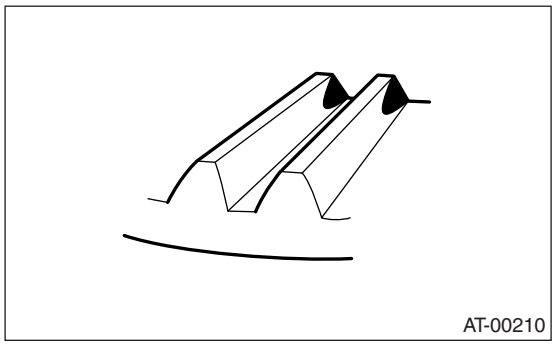


Corrective action: Reduce thickness of drive pinion height adjusting shim in order to move drive pinion away from hypoid driven gear.

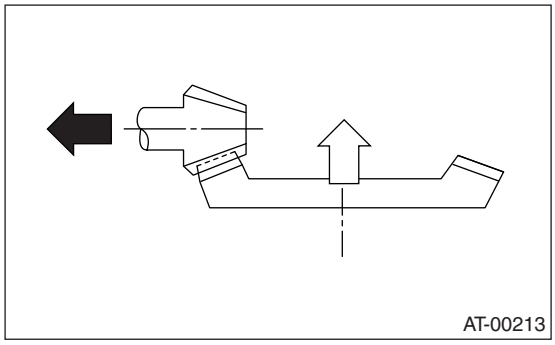


- Toe contact (Inside end contact)

Checking item: Contact area is small.
Contact pattern

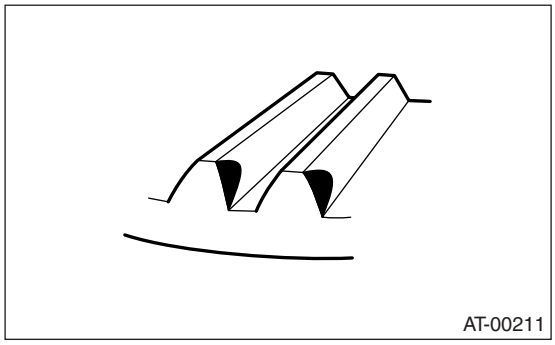


Corrective action: Reduce thickness of drive pinion height adjusting shim in order to move drive pinion away from hypoid driven gear.

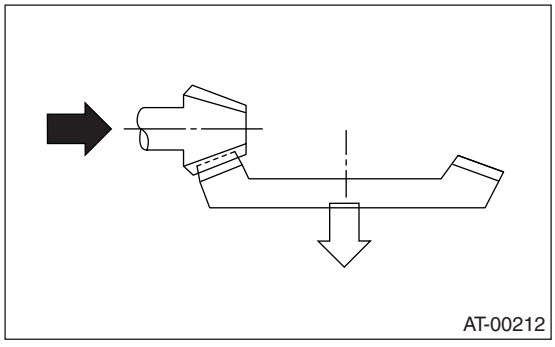


- Heel contact (Outside end contact)

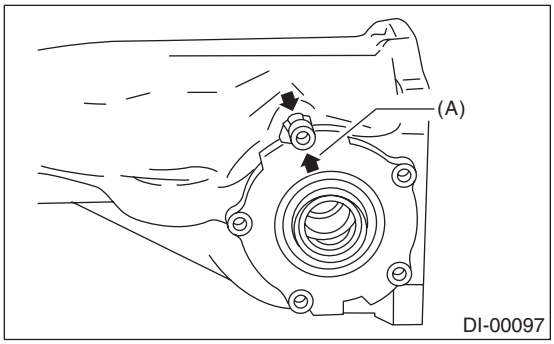
Checking item: Contact area is small.
Contact pattern



Corrective action: Increase thickness of drive pinion height adjusting shim in order to bring drive pinion close to hypoid driven gear.



18) If proper tooth contact is not obtained, once again adjust the drive pinion height by changing RH and LH side bearing retainer shims and the hypoid gear backlash.
19) Remove the side bearing retainers on right and left side.
20) Install new O-rings to side bearing retainers on right and left side.
21) Install the oil seals to the right and left side bearing retainers. <Ref. to DI-71, REPLACEMENT, Rear Differential Side Oil Seal.>
22) Align the arrow mark on differential carrier with the mark on side retainer during installation.

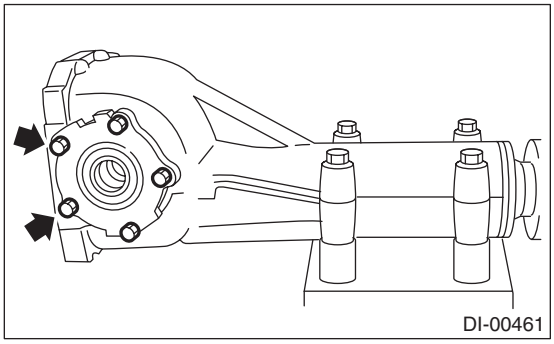


(A) Arrow mark

23) Apply liquid gasket to the bolt of arrow and install the side bearing retainer.

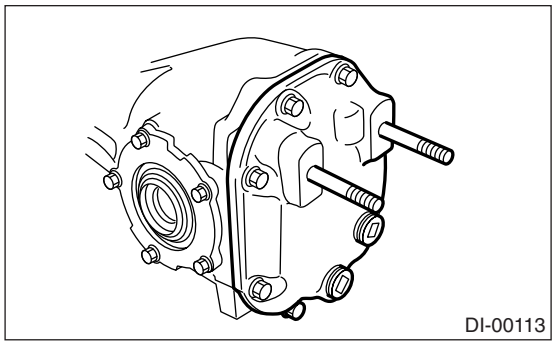
Liquid gasket:
THREE BOND 1105 (Part No. 004403010) or equivalent

Tightening torque:
10.3 N·m (1.05 kgf-m, 7.6 ft-lb)



24) Install the new gasket and rear cover and tighten the bolts to specified torque.

Tightening torque:
29 N·m (3.0 kgf-m, 21.7 ft-lb)

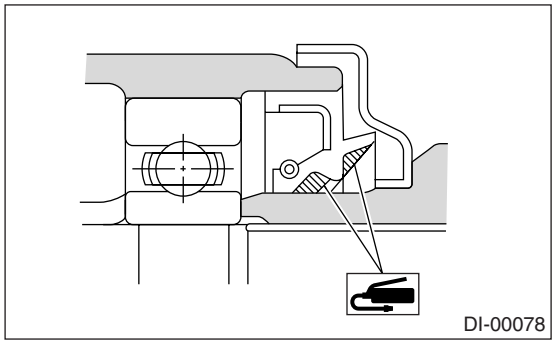


25) Install the breather cap.
26) Install the drain plug and filler plug.

Tightening torque:
49 N·m (5.0 kgf-m, 36.2 ft-lb)

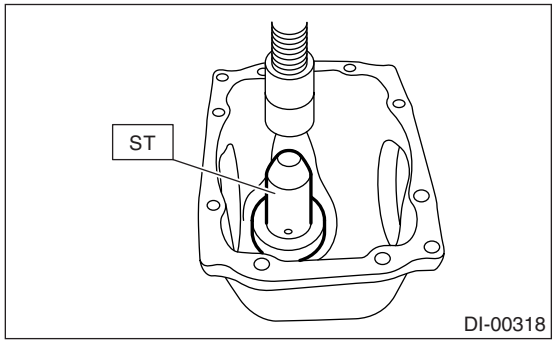
2. STi MODEL

1) Precautions for assembling
• Assemble in the reverse order of disassembling.
• Check and adjust each part during assembly.
• Keep the shims and washers in order, so that they are not improperly installed.
• Thoroughly clean the surfaces on which the shims, washers and bearings are to be installed.
• Apply gear oil when installing the bearings and thrust washers.
• Be careful not to mix up the right and left hand races of the bearings.
• Replace the oil seal with a new one at every disassembly. Apply chassis grease between the lips when installing the oil seal.

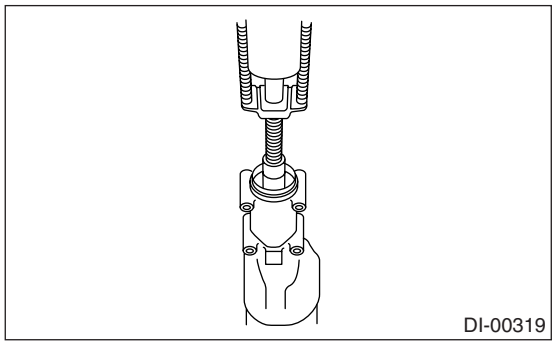


• Adjust the bearing preload with spacer and washer between front and rear bearings. Pinion height adjusting shim are not affected by this adjustment. The adjustment must be carried out without oil seal inserted.

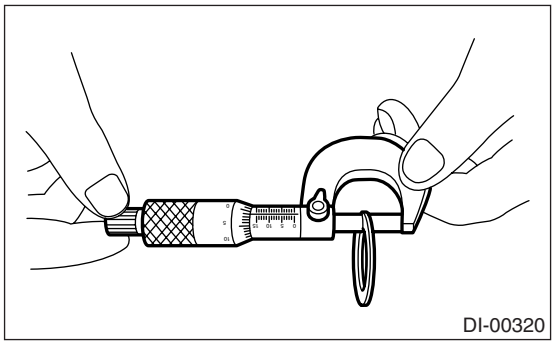
2) Press-fit the rear bearing race into differential carrier using ST.
ST 398417700 DRIFT



3) Press-fit the front bearing race into differential carrier using ST.
ST 398477702 DRIFT

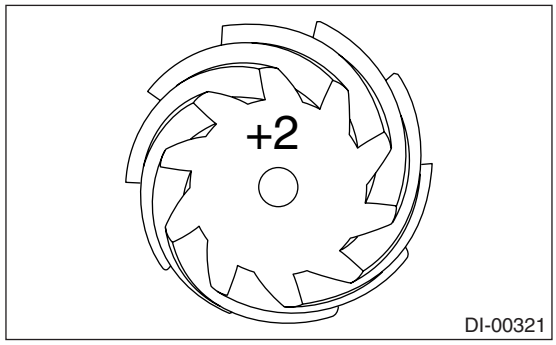


4) Pinion height adjusting shim selection.
(1) Measure the thickness of inserted pinion height adjusting shim.



(2) Read the punch mark of installed drive pinion gear and new one.

NOTE:
If there is no punch mark, it means 0 (zero).



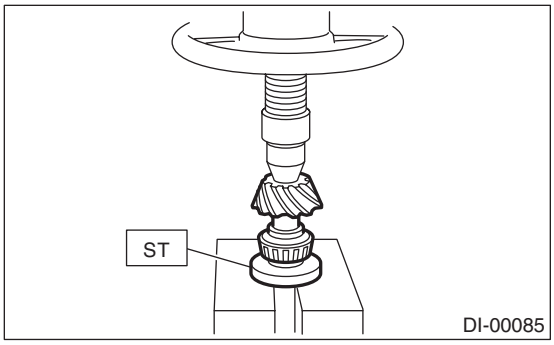
(3) Obtain the thickness of pinion height adjust shim to be inserted from the following formula, and replace the inserted shim with this one.
$T = T1 + (T2 \times 0.01 - T3 \times 0.01)$

T mm (in)	Thickness of selected pinion height adjusting shim.
T1 mm (in)	Thickness of inserted pinion height adjusting shim.
T2 mm	Punch mark number on installed drive pinion gear.
T3 mm	Punch mark number on new drive pinion gear.

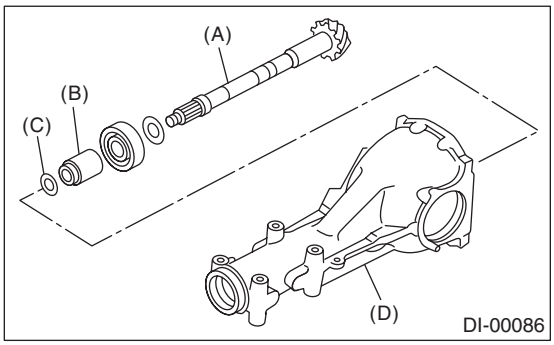
(Example of calculation)
T1 = 3.30 mm (0.1299 in), T2 = +2, T3 = −1
$T = 3.30$ mm (0.1299 in) + $\{(2 \times 0.01) - (-1 \times 0.01)\} = 3.33$ mm (0.1311 in)
Result: Thickness = 3.33 mm (0.1311 in)
Therefore use the shim 38336AA310.

Pinion height adjusting shim	
Part No.	Thickness T mm (in)
38336AA230	3.09 (0.1217)
38336AA240	3.12 (0.1228)
38336AA250	3.15 (0.1240)
38336AA260	3.18 (0.1252)
38336AA270	3.21 (0.1264)
38336AA280	3.24 (0.1276)
38336AA290	3.27 (0.1287)
38336AA300	3.30 (0.1299)
38336AA310	3.33 (0.1311)
38336AA320	3.36 (0.1323)
38336AA330	3.39 (0.1335)
38336AA340	3.42 (0.1346)
38336AA350	3.45 (0.1358)
38336AA360	3.48 (0.1370)
38336AA370	3.51 (0.1382)
38336AA380	3.54 (0.1394)
38336AA390	3.57 (0.1406)
38336AA400	3.60 (0.1417)
38336AA410	3.63 (0.1429)
38336AA420	3.66 (0.1441)

5) Install the selected pinion height adjusting shim on drive pinion, and press-fit the rear bearing cone into position with ST.
ST 18674AA000 INSTALLER

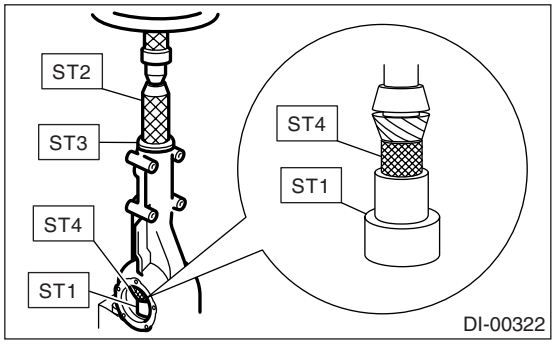


6) Insert the drive pinion into differential carrier, install the previously selected bearing preload adjusting spacer and washer.



(A) Drive pinion
(B) Bearing preload adjusting spacer
(C) Bearing preload adjusting washer
(D) Differential carrier

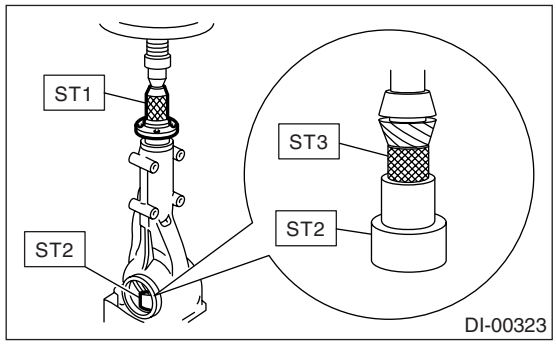
7) Insert the spacer, then press-fit the pilot bearing with STs.
ST1 399780104 WEIGHT
ST2 899580100 INSTALLER
ST3 398507703 DUMMY COLLER
ST4 498937110 HOLDER DRIVE PINION



8) Press-fit the companion flange with ST1, ST2 and ST3.

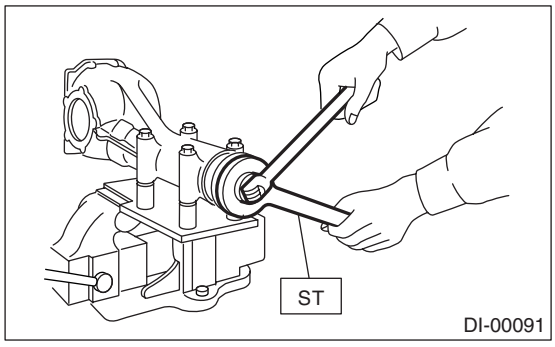
NOTE:
Be careful not to damage the bearing.

ST1 899874100 INSTALLER
ST2 399780104 WEIGHT
ST3 498937110 HOLDER DRIVE PINION



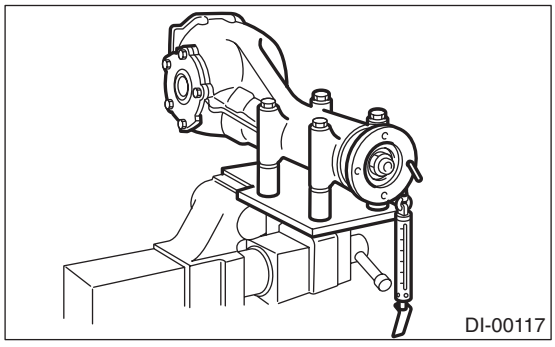
9) Install the self-locking nut. Then tighten it with the ST.
ST (MODEL WITH MECHANICAL LSD)
18633AA000 WRENCH COMPL
ST (MODEL WITHOUT MECHANICAL LSD)
498427200 FLANGE WRENCH

Tightening torque:
181 N·m (18.5 kgf-m, 134 ft-lb)



10) Rotate the drive pinion shaft more than ten times to accustom each taper roller bearing, and then measure the preload.

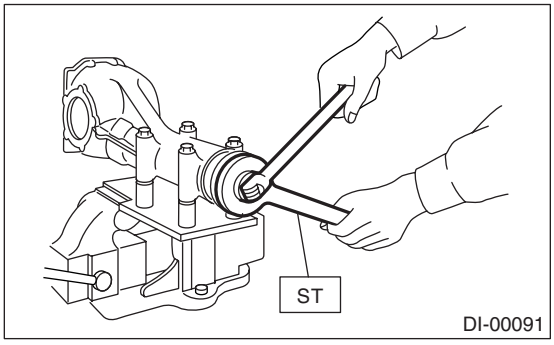
Bearing preload:
24.1 — 38.6 N (2.46 — 3.94 kgf, 5.42 — 9.68 lbf)



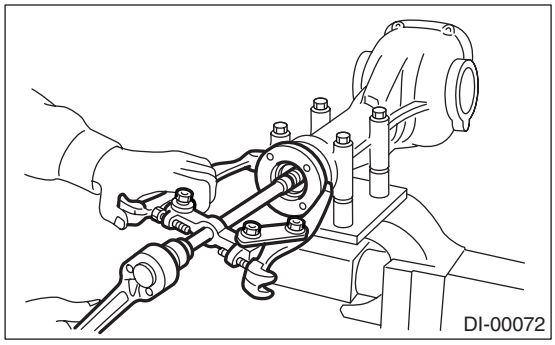
11) If bearing preload is out of specification, adjust to specification by selecting preload adjusting washer and spacer from the following table.

	Part No.	Thickness mm (in)
Preload adjusting washer	383705200	2.59 (0.1020)
	383715200	2.57 (0.1012)
	383725200	2.55 (0.1004)
	383735200	2.53 (0.0996)
	383745200	2.51 (0.0988)
	383755200	2.49 (0.0980)
	383765200	2.47 (0.0972)
	383775200	2.45 (0.0965)
	383785200	2.43 (0.0957)
	383795200	2.41 (0.0949)
	383805200	2.39 (0.0941)
	383815200	2.37 (0.0933)
	383825200	2.35 (0.0925)
	383835200	2.33 (0.0917)
	383845200	2.31 (0.0909)
	Part No.	Length mm (in)
Preload adjusting spacer	31454AA130	52.2 (2.055)
	31454AA140	52.4 (2.063)
	31454AA150	52.6 (2.071)
	31454AA160	52.8 (2.079)
	31454AA170	53.0 (2.087)
	31454AA180	53.2 (2.094)

12) Hold the companion flange with ST and remove the self-lock nut.
ST (MODEL WITH MECHANICAL LSD)
18633AA000 WRENCH COMPL
ST (MODEL WITHOUT MECHANICAL LSD)
498427200 FLANGE WRENCH



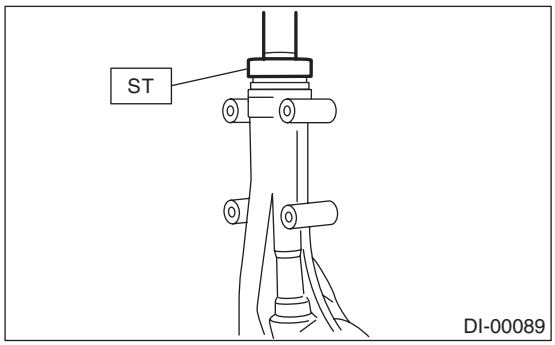
13) Extract the companion flange with a puller.



14) Fit a new oil seal with ST.

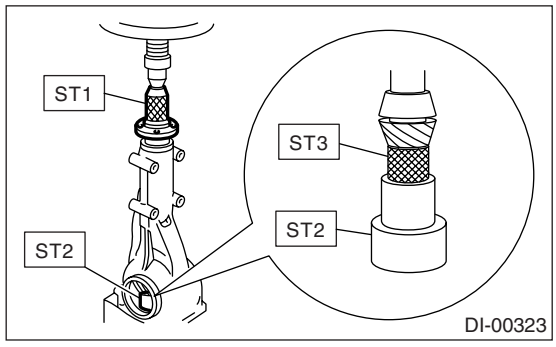
NOTE:
• Press-fit until the end of oil seal is 1 mm (0.04 in) inward from end of carrier.
• Apply grease between the oil seal lips.

ST 498447120 INSTALLER



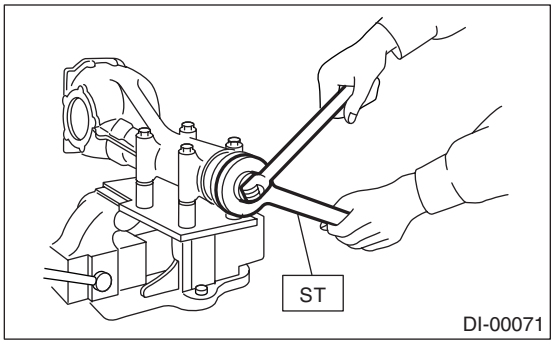
15) Press-fit the companion flange with ST1, ST2 and ST3.
ST1 899874100 INSTALLER
ST2 399780104 WEIGHT
ST3 498937110 HOLDER DRIVE PINION

NOTE:
Be careful not to damage the bearing.



16) Install the self-lock nut. Then tighten it with the ST.
ST (MODEL WITH MECHANICAL LSD)
18633AA000 WRENCH COMPL

ST (MODEL WITHOUT MECHANICAL LSD)
498427200 FLANGE WRENCH

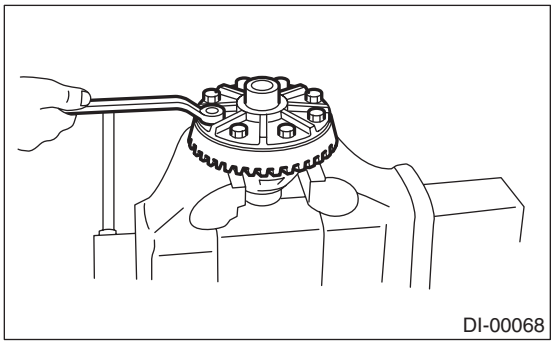


17) Apply Lock Tite to bolt threads, and install the hypoid driven gear on differential case.

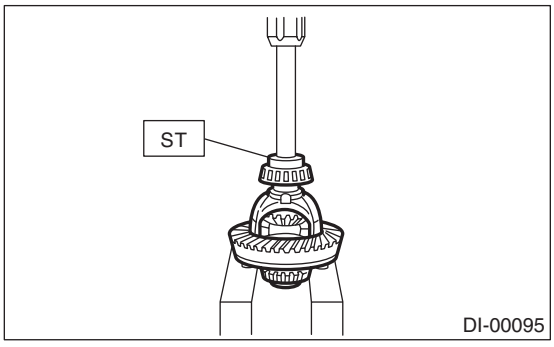
Lock Tite:
THREE BOND 1324 (Part No.004403042) or equivalent

NOTE:
Tighten diagonally while tapping the bolt heads.

Tightening torque:
105 N·m (10.7 kgf-m, 77.4 ft-lb)

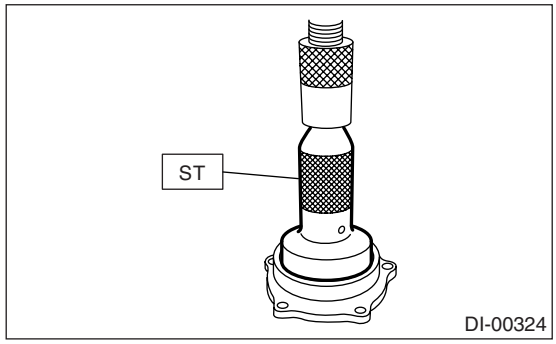


18) Press-fit the side bearing onto differential case with ST.
ST 398487700 DRIFT



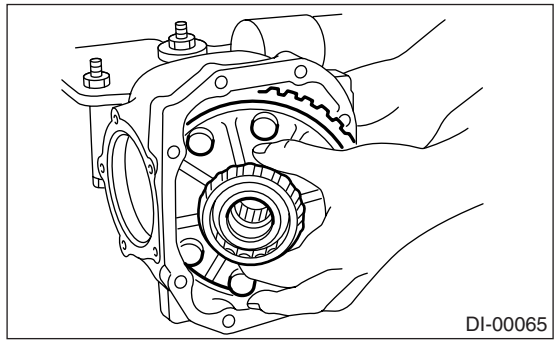
19) Assembling side retainer.
(1) Press-fit the side bearing outer race with press and ST.

ST 398417700 DRIFT



(2) Install the oil seal. <Ref. to DI-71, REPLACEMENT, Rear Differential Side Oil Seal.>

20) Adjusting side bearing retainer shims
(1) The driven gear backlash and side bearing preload can be determined by the side bearing retainer shim thickness.
(2) Install the differential case assembly into differential carrier in the reverse order of disassembly.



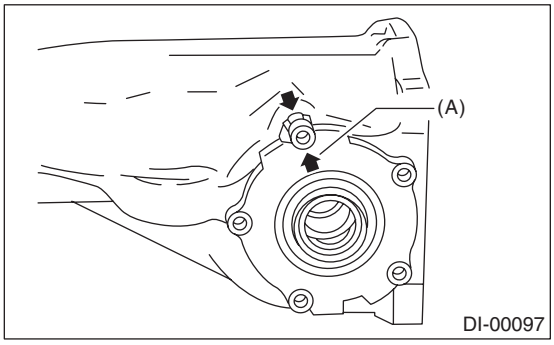
(3) Install the side retainer shims to the right and left retainers from which they were removed.

NOTE:
Replace the broken or corroded side retainer shim with a new one of same thickness.

Side bearing retainer shim	
Part No.	Thickness mm (in)
383475201	0.20 (0.0079)
383475202	0.25 (0.0098)
383475203	0.30 (0.0118)
383475204	0.40 (0.0157)
383475205	0.50 (0.0197)

(4) Align the arrow mark on differential carrier with the mark on side retainer during installation.

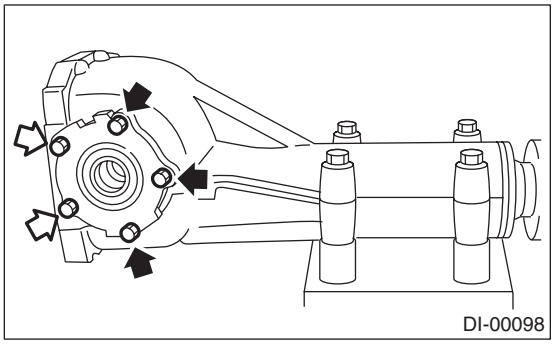
NOTE:
Be careful that side bearing outer race is not damaged by bearing roller.



(A) Arrow mark

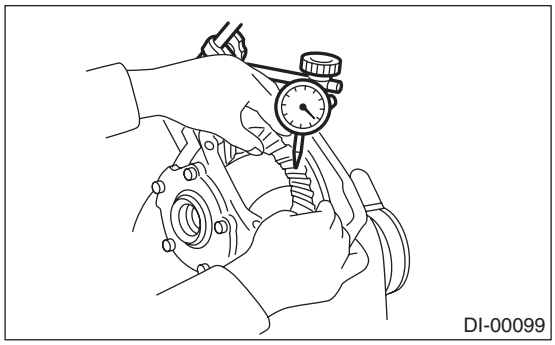
(5) Tighten the side bearing retainer bolts.

Tightening torque:
10.3 N·m (1.05 kgf-m, 7.6 ft-lb)



(6) Measure the hypoid driven gear-to-drive pinion backlash. Set the magnet base on differential carrier. Align the contact point of dial gauge with tooth face of hypoid driven gear, and move the hypoid driven gear while holding drive pinion still. Read the value indicated on dial gauge.
If the backlash exceeds 0.2 mm (0.08 in), reduce the thickness of shim on the back face of hypoid driven gear and increase the thickness of shim on the tooth face of hypoid driven gear. If the backlash is less than 0.1 mm (0.004 in), increase the thickness of shim on the back face of hypoid driven gear and reduce the thickness of shim on the tooth face of hypoid driven gear.

Backlash:
0.10 — 0.20 mm (0.0039 — 0.0079 in)

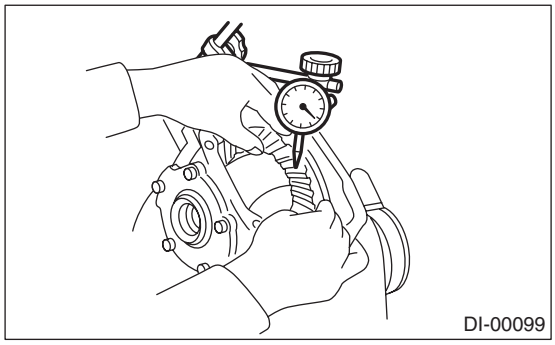


(7) At the same time, measure the total preload of drive pinion. Compared with the resistance when differential case is not installed, if the total preload is not within the specified range, readjust side bearing retainer shims, increasing/reducing by an even amount at a time.

Total preload:
27.0 — 53.9 N (2.75 — 5.50 kgf, 6.07 — 12.12 lbf)

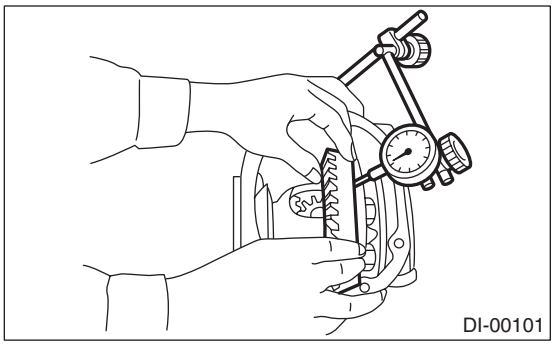
21) Re-check the hypoid driven gear-to-pinion backlash.

Backlash:
0.10 — 0.20 mm (0.0039 — 0.0079 in)



22) Check the hypoid driven gear runout on its back surface, and make sure that pinion and hypoid driven gear rotate smoothly.
If the hypoid driven gear runout on its back surface exceed the specification, verify that there is any foreign material between hypoid driven gear and differential case, and they are not deformed.

Limit of runout:
0.05 mm (0.0020 in)

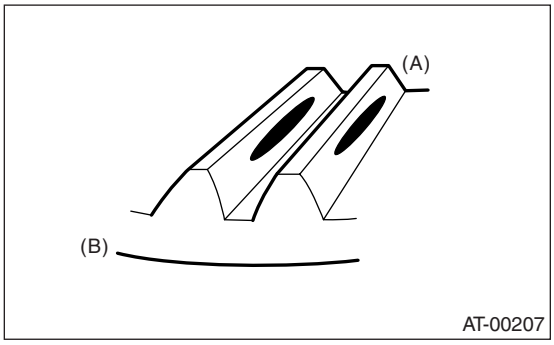


23) Checking and adjusting tooth contact of hypoid driven gear
(1) Apply an even coat of red lead on both sides of three or four teeth on the hypoid driven gear. Check the contact pattern after rotating the hypoid driven gear several revolutions back and forth until a definite contact pattern appears on the hypoid driven gear.
(2) When the contact pattern is incorrect, readjust according to the instructions given in "TOOTH CONTACT PATTERN".

NOTE:
Be sure to wipe off red lead completely after adjustment is completed.

- Correct tooth contact

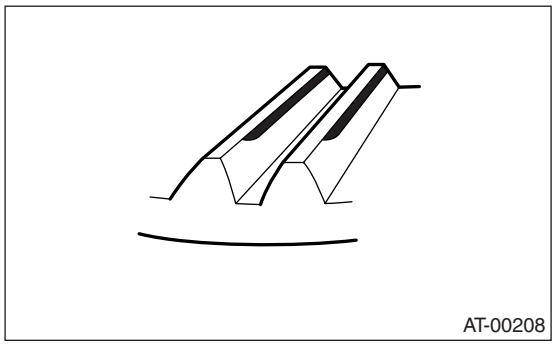
Checking item: Tooth contact pattern is slightly shifted toward to toe side under no-load rotation. (When loaded, contact pattern moves toward heel)



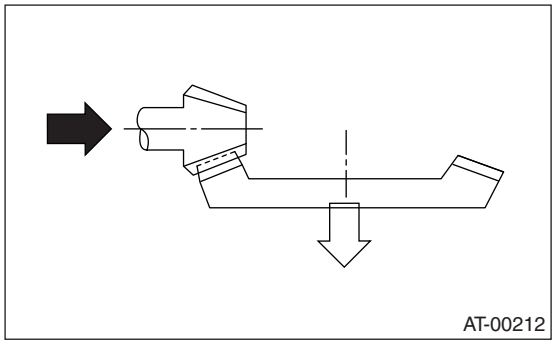
(A) Toe side
(B) Heel side

- Face contact

Checking item: Backlash is too large.
Contact pattern

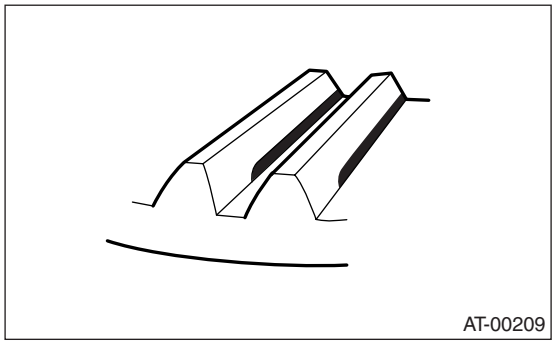


Corrective action: Increase thickness of drive pinion height adjusting shim in order to bring drive pinion close to hypoid driven gear.

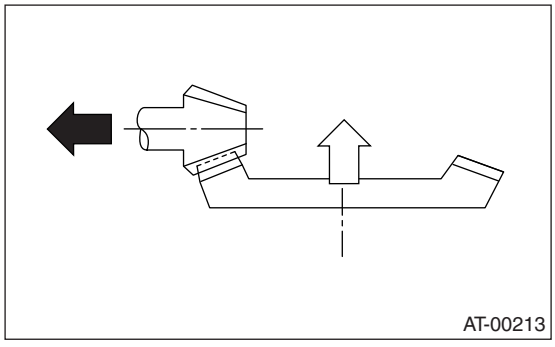


- Flank contact

Checking item: Backlash is too small.
Contact pattern



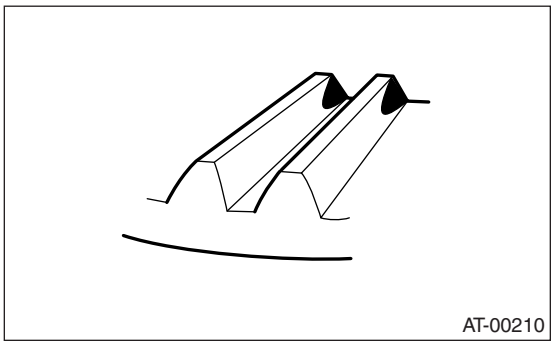
Corrective action: Reduce thickness of drive pinion height adjusting shim in order to move drive pinion away from hypoid driven gear.



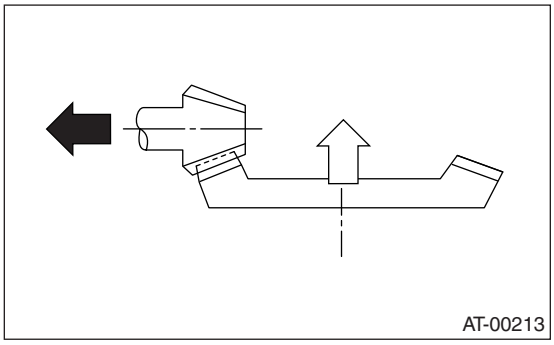
• Toe contact (Inside end contact)

Checking item: Contact area is small.

Contact pattern



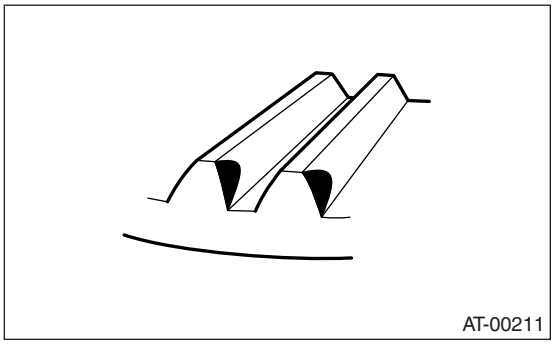
Corrective action: Reduce thickness of drive pinion height adjusting shim in order to move drive pinion away from hypoid driven gear.



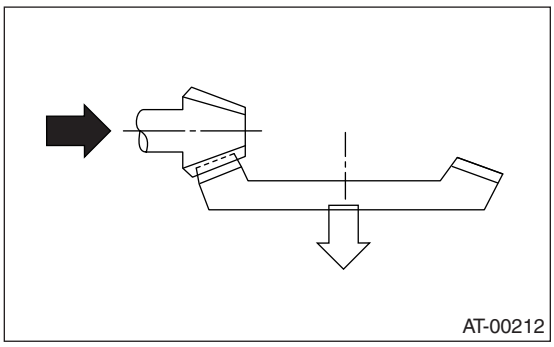
• Heel contact (Outside end contact)

Checking item: Contact area is small.

Contact pattern



Corrective action: Increase thickness of drive pinion height adjusting shim in order to bring drive pinion close to hypoid driven gear.



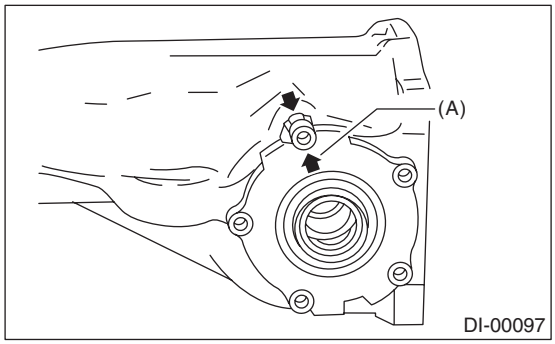
24) If proper tooth contact is not obtained, once again adjust the drive pinion height by changing RH and LH side bearing retainer shims and the hypoid gear backlash.

25) Remove the side bearing retainers on right and left side.

26) Install new O-rings to side bearing retainers on right and left side.

27) Install the oil seals to the right and left side bearing retainers. <Ref. to DI-71, REPLACEMENT, Rear Differential Side Oil Seal.>

28) Align the arrow mark on differential carrier with the mark on side retainer during installation.

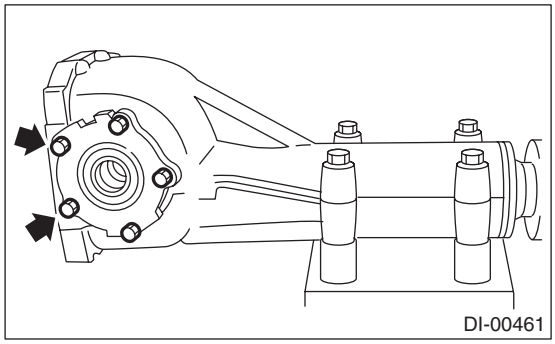


(A) Arrow mark

29) Apply liquid gasket bolt of arrow and install the side bearing retainer.

Liquid gasket:
THREE BOND 1105 (Part No. 004403010) or equivalent

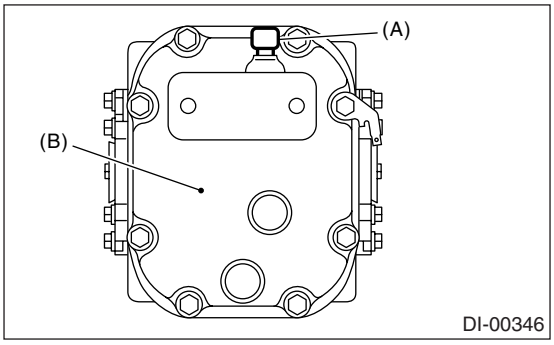
Tightening torque:
10.3 N·m (1.05 kgf-m, 7.6 ft-lb)



30) Install the new gasket and rear cover and tighten the bolts to specified torque.

Tightening torque:
44 N·m (4.5 kgf-m, 32.5 ft-lb)

31) Install new breather cap.



(A) Air breather cap
(B) Rear cover

32) Install the drain plug and filler plug or oil temperature sensor.

Tightening torque:
49 N·m (5.0 kgf-m, 36.2 ft-lb)

E: INSPECTION

Wash all the disassembled parts clean, and examine them for wear, damage, or other defects. Repair or replace defective parts as necessary.

1) Hypoid driven gear and drive pinion

• If abnormal tooth contact is evident, find out the cause and adjust to give correct tooth contact at assembly. Replace the gear if excessively worn or incapable of adjustment.

• If crack, score, or seizure is evident, replace as a set. Slight damage of tooth can be corrected by oil stone or the like.

2) Side gear and pinion mate gear

• Replace if crack, score, or other defects are evident on tooth surface.

• Replace if thrust washer contacting surface is worn or seized. Slight damage of the surface can be corrected by oil stone or the like.

3) Bearing

Replace if seizure, peeling, wear, rust, dragging during rotation, abnormal noise or other defect is evident.

4) Thrust washers of side gear and pinion mate gear

Replace if seizure, flaw, abnormal wear or other defect is evident.

5) Oil seal

Replace if deformed or damaged, and at every disassembling.

6) Differential carrier

Replace if the bearing bores are worn or damaged.

7) Differential case

Replace if its sliding surfaces are worn or cracked.

8) Companion flange

Replace if the oil seal lip contacting surfaces have flaws.

9) Rear differential oil temperature switch (mechanical LSD model)

If the results of the following inspections are not satisfactory, replace rear differential temperature sensor.

(1) At room temperature, check for continuity between the sensor terminal and body.

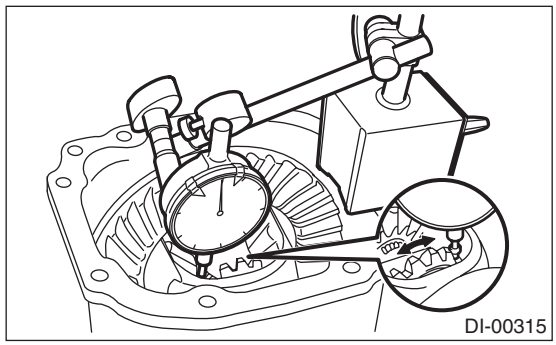
(2) Soak the sensor in oil, then raise the oil temperature. Check that the continuity is cut off when the oil temperature is between 144°C (291°F) and 156°C (313°F). Then, check that the continuity resumes by the time the oil temperature drops to 135°C (275°F).

1. SIDE GEAR BACKLASH

Using a dial gauge, check the backlash of the side gear.

Side gear backlash:
0.1 — 0.2 mm (0.004 — 0.008 in)

If the side gear backlash is not within the specification, adjust clearance as specified by selecting the side gear thrust washer.

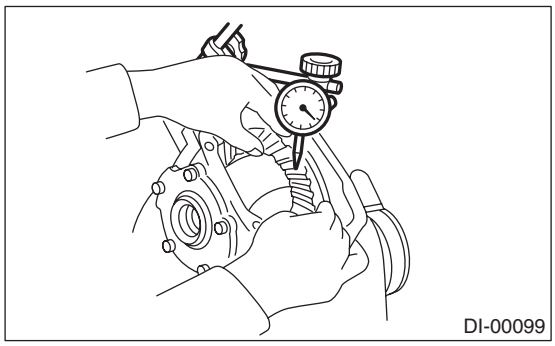


2. HYPOID DRIVEN GEAR BACKLASH

Using a dial gauge, check the backlash of the hypoid driven gear.

Hypoid driven gear backlash:
0.1 — 0.2 mm (0.004 — 0.008 in)

If the hypoid driven gear backlash is not within the specification, adjust the side bearing preload or repair if necessary.

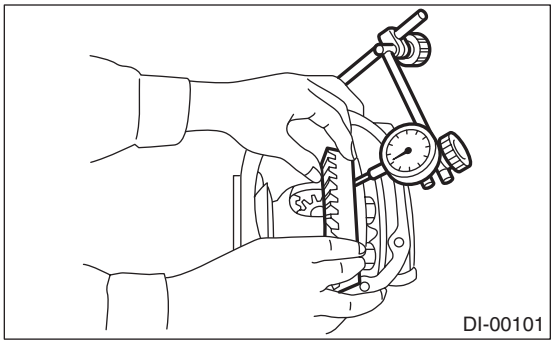


3. HYPOID DRIVEN GEAR RUNOUT

Using a dial gauge, check the hypoid driven gear runout.

Hypoid driven gear runout:
0.05 mm (0.0020 in)

If the hypoid driven gear runout exceeds 0.05 mm (0.0020 in), replace the hypoid driven gear.


DI-00101

4. TOOTH CONTACT BETWEEN HYPOID DRIVEN GEAR AND DRIVE PINION

Inspect the tooth contact between hypoid driven gear and driven pinion. <Ref. to DI-35, ASSEMBLY, Rear Differential (T-type).>

5. TOTAL PRELOAD

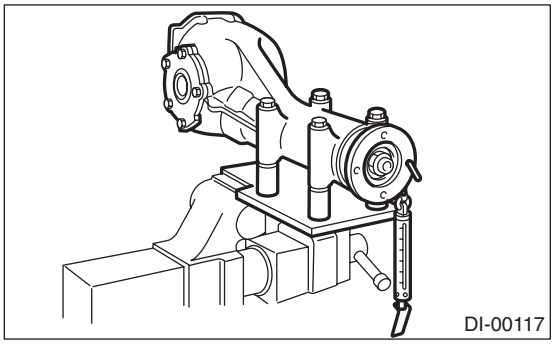
Using a gauge, check the turning resistance increase.

Total preload:

Except STi model:
20.7 — 54.4 N (2.1 — 5.5 kgf, 4.7 — 12.2 lbf)

STi model:
27.0 — 53.9 N (2.75 — 5.50 kgf, 6.07 — 12.12 lbf)

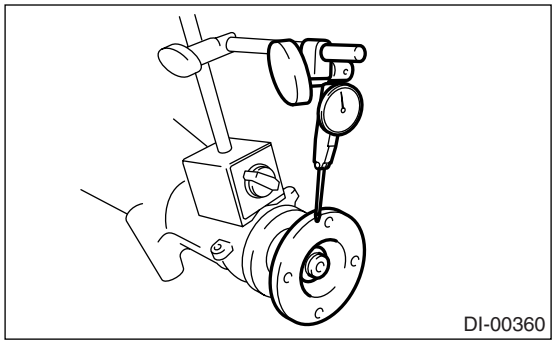
If the total preload is not within the specification, adjust the side bearing retainer shims.


DI-00117

6. COMPANION FLANGE

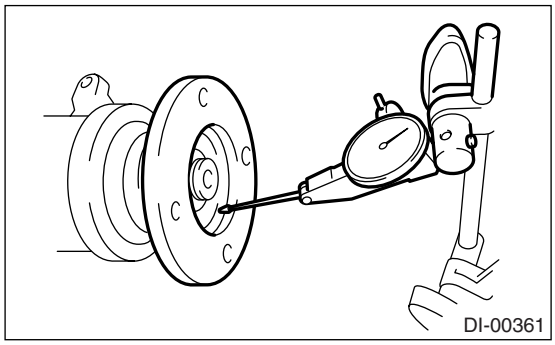
1) If rust or dirt is attached to the companion flange, remove them.
2) Set a dial gauge at a companion flange surface (mating surface of propeller shaft and companion flange), and then measure the companion flange runout.

Limit of runout:
0.08 mm (0.0031 in)


DI-00360

3) Set the gauge inside of the companion flange, and measure the runout.

Limit of runout:
0.08 mm (0.0031 in)


DI-00361

4) If either runout exceeds the limit, move the phase of companion flange and drive pinion 90° each, and find the point where the runout is within the limit.
5) If the runout exceeds the limit after changing the phase, replace the companion flange and recheck the runout.
6) If the runout exceeds the limit after replacing the companion flange, the drive pinion may be assembled incorrectly or bearing is faulty.

F: ADJUSTMENT

1. SIDE GEAR BACKLASH

Adjust the side gear backlash. <Ref. to DI-35, ASSEMBLY, Rear Differential (T-type).>

2. HYPOID DRIVEN GEAR BACKLASH

Adjust the hypoid driven gear backlash. <Ref. to DI-35, ASSEMBLY, Rear Differential (T-type).>

3. TOOTH CONTACT BETWEEN HYPOID DRIVEN GEAR AND DRIVE PINION

Adjust the tooth contact between hypoid driven gear and drive pinion gear. <Ref. to DI-35, ASSEMBLY, Rear Differential (T-type).>

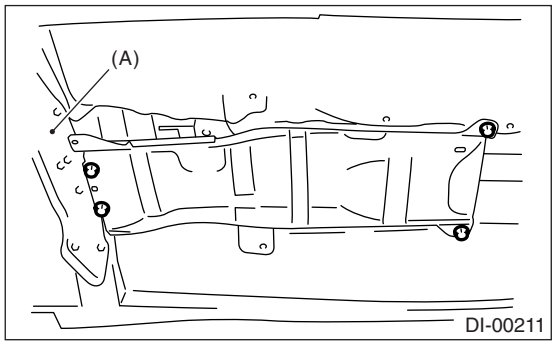
4. TOTAL PRELOAD

Adjust the side bearing shim. <Ref. to DI-35, ASSEMBLY, Rear Differential (T-type).>

5. Rear Differential (VA-type)

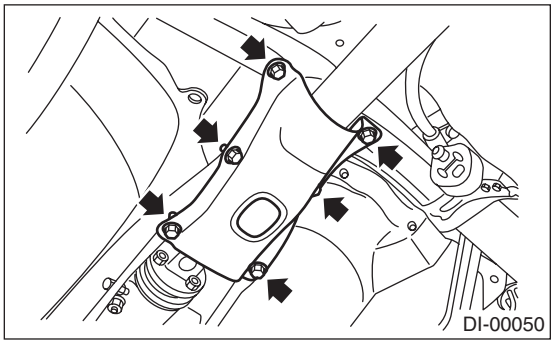
A: REMOVAL

1) Set the vehicle on a lift.
2) Disconnect the ground cable from battery.
3) Move the select lever or gear shift lever to “N”.
4) Release the parking brake.
5) Loosen the wheel nuts.
6) Lift-up the vehicle.
7) Remove the wheels.
8) Remove the rear exhaust pipe and muffler.
Non-turbo model without OBD
<Ref. to EX(H4SOw/oOBD)-10, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(H4SOw/oOBD)-11, REMOVAL, Muffler.>
Non-turbo model with OBD
<Ref. to EX(H4SO)-10, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(H4SO)-12, REMOVAL, Muffler.>
9) Remove the heat shield cover.



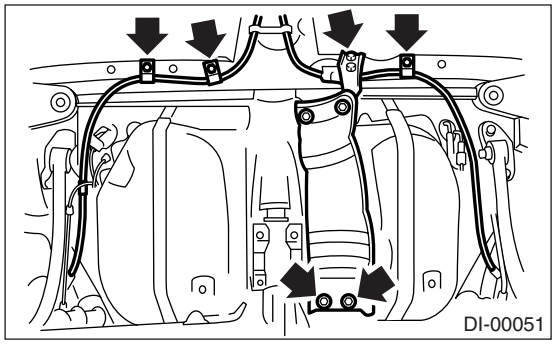
(A) Transmission mounting

10) Remove the front cover of rear differential mount.

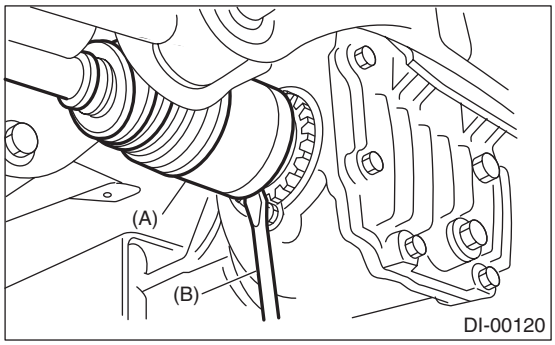


11) Remove the propeller shaft. <Ref. to DS-17, REMOVAL, Propeller Shaft.>

12) Remove the clamps and bracket of parking brake cable.

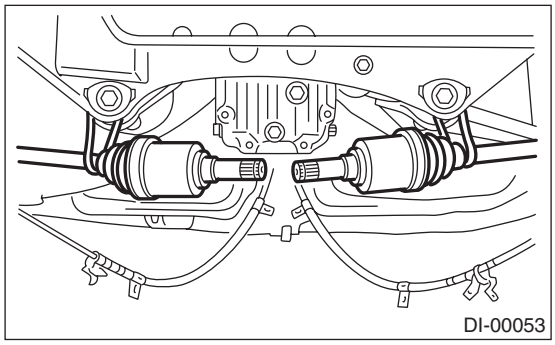


13) Remove the DOJ of rear drive shaft from rear differential. <Ref. to DI-71, REPLACEMENT, Rear Differential Side Oil Seal.>

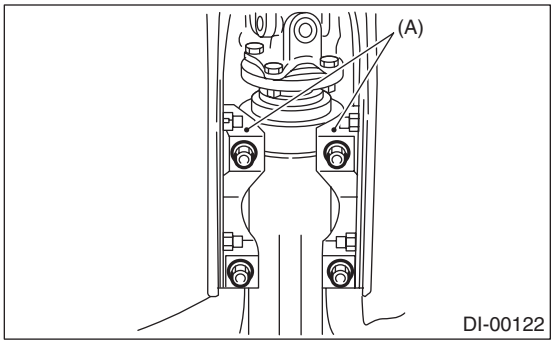


(A) DOJ
(B) Tire lever

14) Secure the rear drive shaft to rear crossmember using wire.

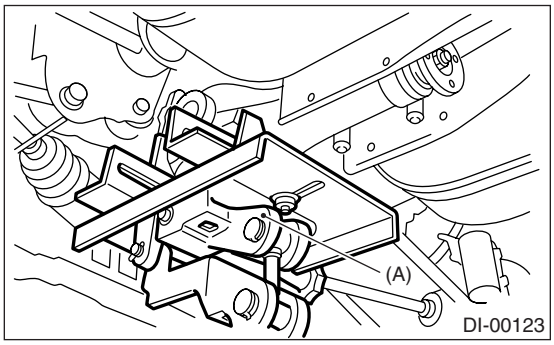


15) Remove the lower bracket.



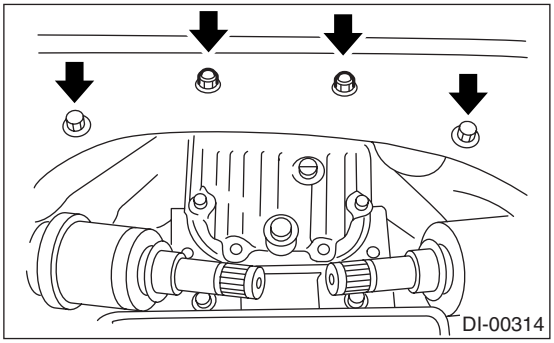
(A) Lower bracket

16) Support the rear differential with transmission jack.



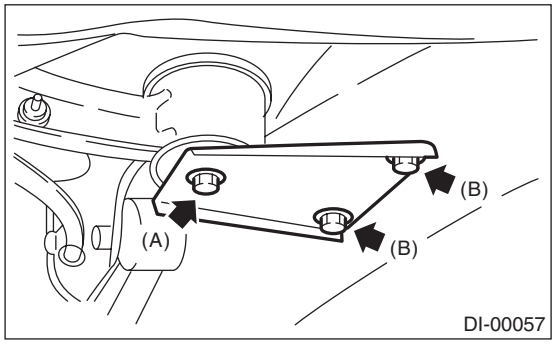
(A) Transmission jack

17) Remove the self-locking nuts and bolts.



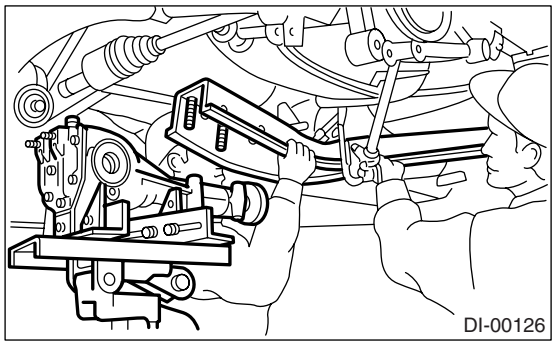
18) Remove the bolts which secure the rear differential front member to bolts B.

NOTE:
Support the front member with use of a helper to prevent it from dropping.

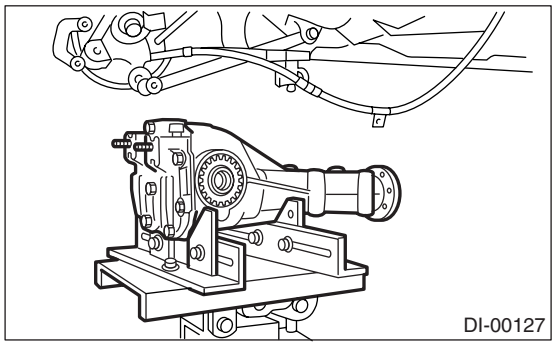


(A) Bolt A
(B) Bolt B

19) Remove the bolt A.
20) While slowly lowering the transmission jack, move the rear differential forward, and then remove the bolts from rear crossmember.
21) Remove the front member from vehicle.



22) Remove the rear differential from vehicle.



B: INSTALLATION

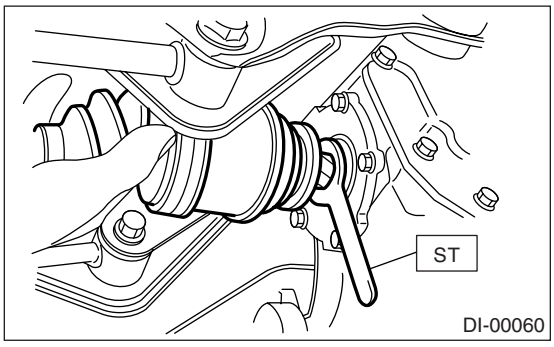
Install in the reverse order of removal.

1) Position the front member on body by passing it under the parking brake cable and securing to rear differential.

NOTE:
When installing the rear differential front member, do not confuse the installation sequence of the upper and lower stoppers.

2) Install the DOJ of rear drive shaft into rear differential. <Ref. to DI-71, REPLACEMENT, Rear Differential Side Oil Seal.>

ST 28099PA090 OIL SEAL PROTECTOR



3) Install in the reverse order of removal.

4) After installation, fill the differential carrier with gear oil to the upper plug level. <Ref. to DI-26, Front Differential Assembly.>

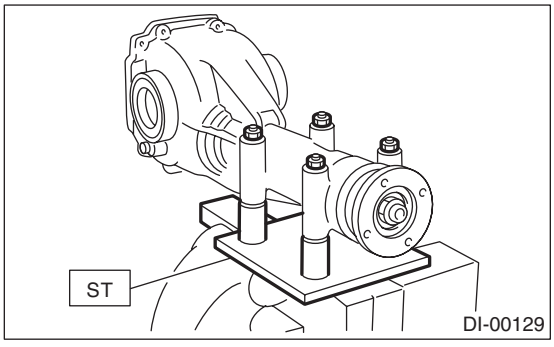
C: DISASSEMBLY

To detect the real cause of trouble, inspect the following items before disassembling.

- Tooth contact of hypoid driven gear and pinion, and backlash
- Runout of hypoid driven gear at its back surface
- Total preload of drive pinion

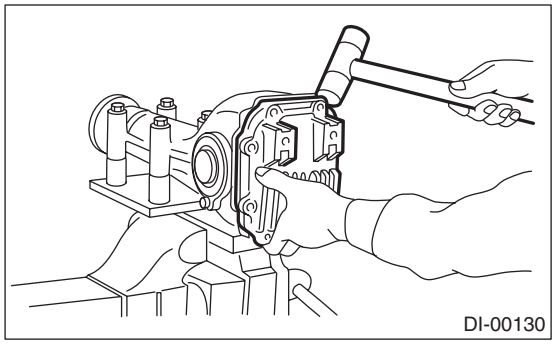
1) Set the ST on vise and install the differential assembly to ST.

ST 398217700 ATTACHMENT SET



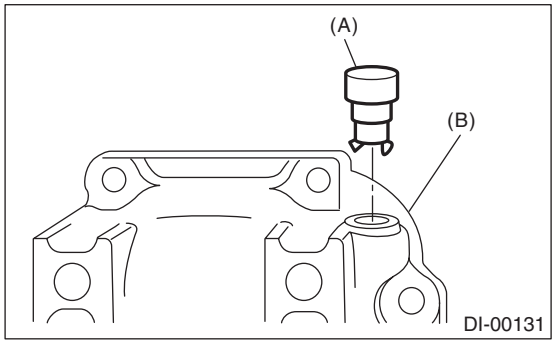
2) Drain the gear oil by removing the plug.

3) Remove the rear cover by loosening the retaining bolts.



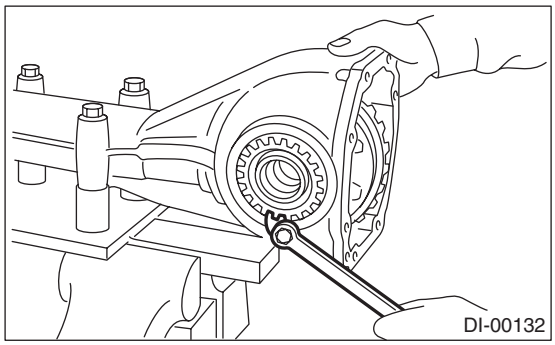
4) Replace the air breather cap.

NOTE:
Do not attempt to replace the air breather cap unless necessary.

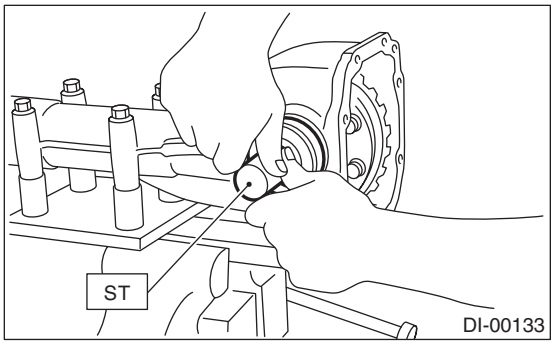


(A) Air breather cap
(B) Rear cover

5) Remove the right and left lock plates.

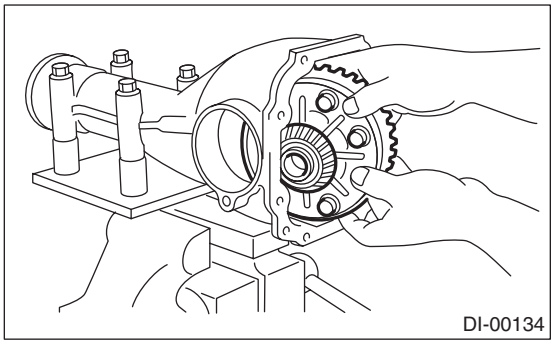


6) Remove the right and left holders with ST.
ST 499785500 WRENCH ASSY

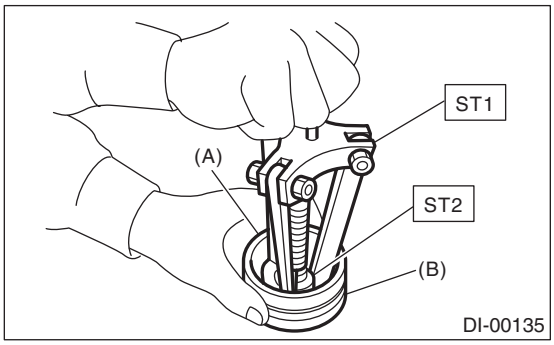


7) Pull out the differential assembly from differential case.

NOTE:
Be careful not to hit the teeth against the case.



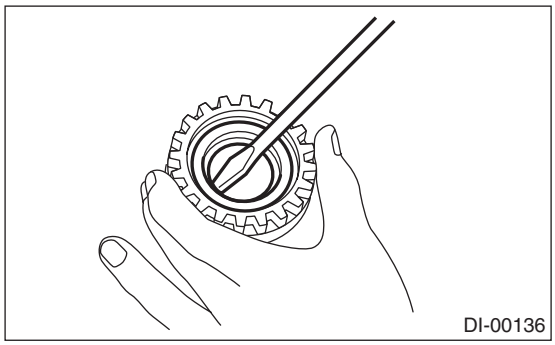
8) Remove the bearing race from right and left holders with ST1 and ST2.
ST1 499705401 PULLER ASSY
ST2 499705404 SEAT



(A) Bearing race
(B) Holder

9) Remove the oil seal from right and left holders using screwdriver.

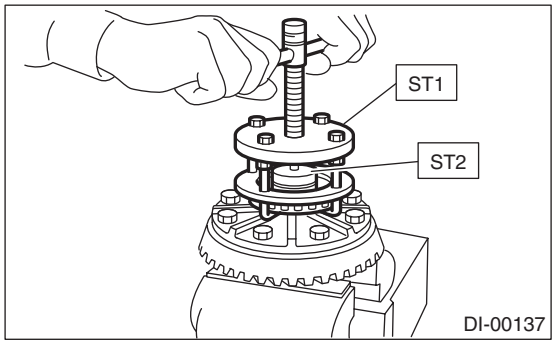
NOTE:
Perform this operation only when changing oil seal.



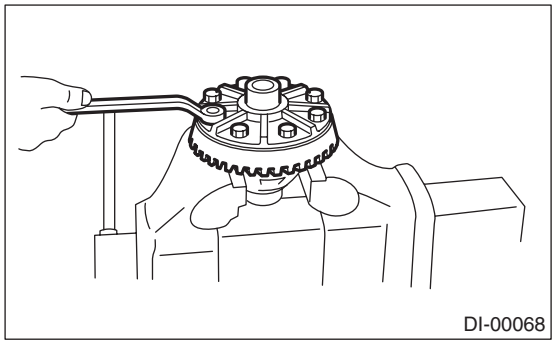
10) Extract the bearing cone with ST1 and ST2.

NOTE:
• Do not attempt to disassemble the parts unless necessary.
• Set the Puller so that its claws catch the edge of bearing cone.
• Never mix up the right and left hand bearing races and cones.

ST1 899524100 PULLER SET
ST2 399520105 SEAT



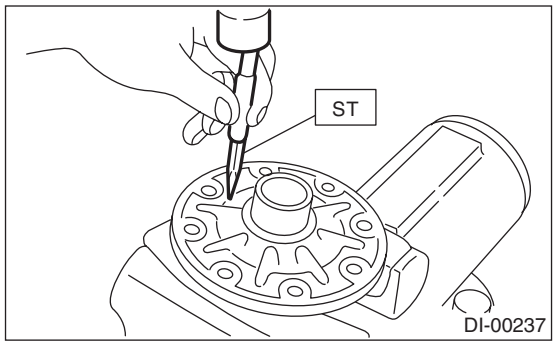
11) Remove the hypoid driven gear by loosening the hypoid driven gear bolts.



12) Drive out the pinion shaft lock pin from hypoid driven gear side.

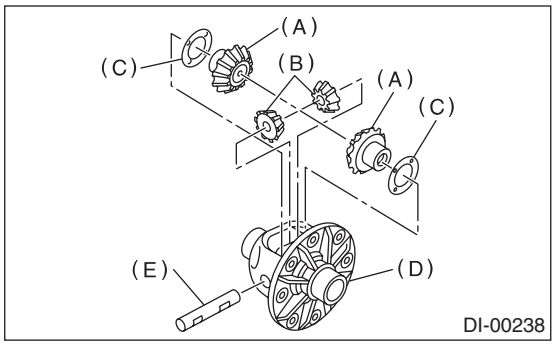
NOTE:
The lock pin is staked at the pin hole end on the differential case; do not drive it out forcibly before unstaking it.

ST 899904100 STRAIGHT PIN REMOVER



13) Draw out the pinion mate shaft and remove the pinion mate gears, side gears and thrust washers.

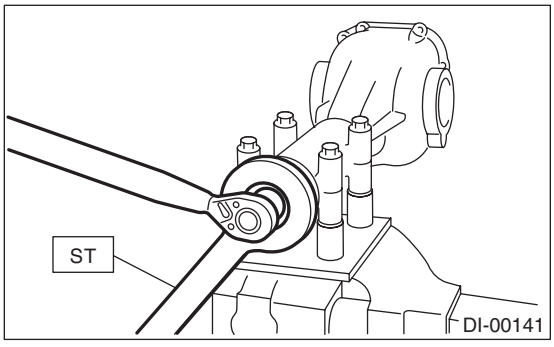
NOTE:
The gears as well as thrust washers should be marked or kept separated right and left, front and rear.



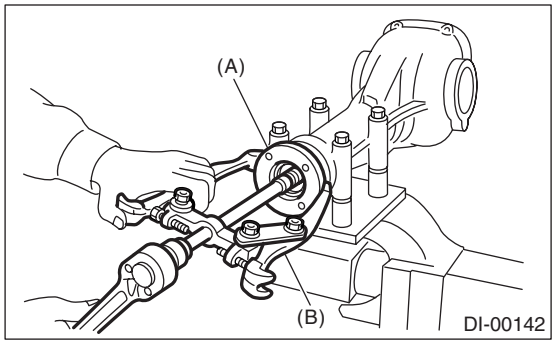
(A) Side gear
(B) Pinion mate gear
(C) Thrust washer
(D) Differential case
(E) Pinion mate shaft

14) Hold the companion flange with ST and remove the self-locking nut.

ST 498427200 FLANGE WRENCH



15) Extract the companion flange with a puller.

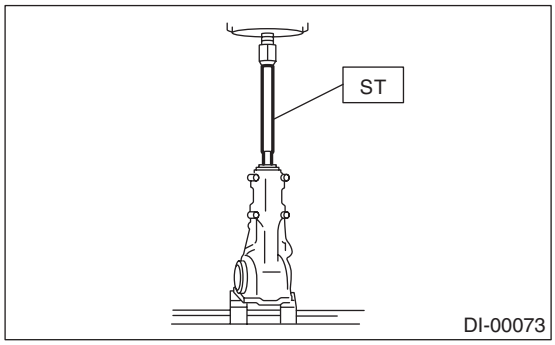


(A) Companion flange
(B) Puller

16) Press the end of drive pinion shaft and extract it together with the rear bearing cone, pinion height adjusting shim and washer.

NOTE:
Hold the drive pinion so as not to drop it.

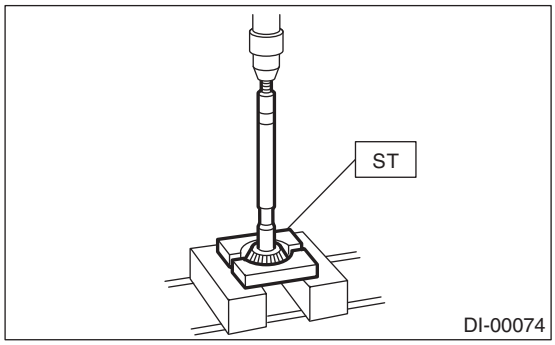
ST 398467700 DRIFT



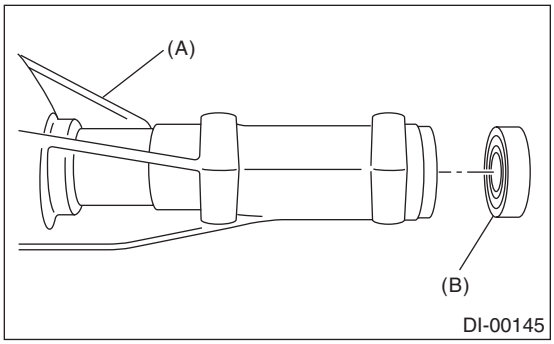
17) Remove the rear bearing cone from drive pinion by supporting the cone with ST.

NOTE:
Place the replacer so that its center-recessed side faces the pinion gear.

ST 498515500 REPLACER

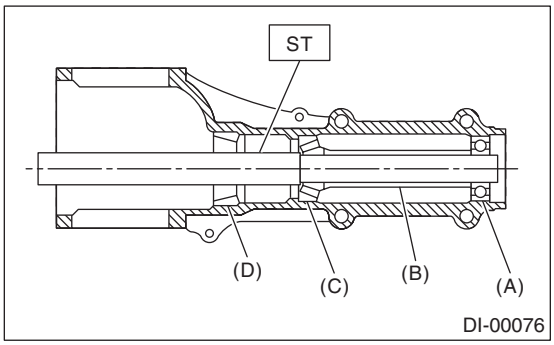


18) Remove the front oil seal from differential carrier using ST.
ST 398527700 PULLER ASSY



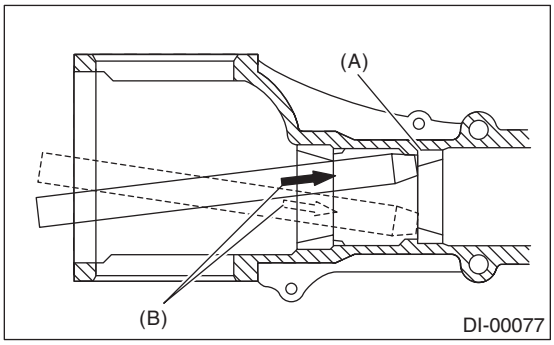
(A) Differential carrier
(B) Front oil seal

19) Remove the pilot bearing together with front bearing cone and spacer using ST.
ST 398467700 DRIFT



(A) Pilot bearing
(B) Spacer
(C) Front bearing
(D) Rear bearing cup

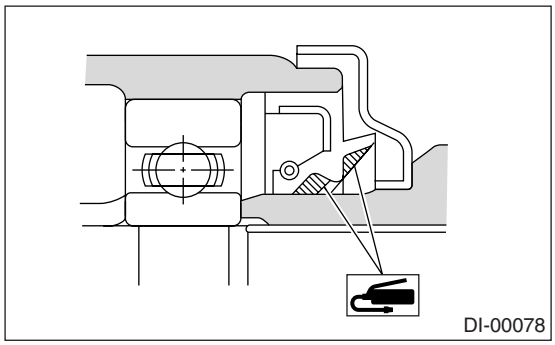
20) When replacing the bearings, tap the front bearing cup and rear bearing cup in this order out of case by using a brass bar.



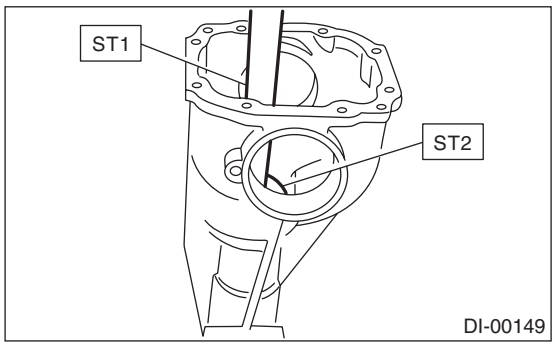
(A) 2 cutouts along diagonal lines
(B) Tap alternately with brass bar.

D: ASSEMBLY

NOTE:
- Assemble in the reverse order of disassembling.
- Check and adjust each part during assembly.
- Use a newgasket.
- Keep the shims and washers in order, so that they are not improperly installed.
- Thoroughly clean the surfaces on which the shims, washers and bearings are to be installed.
- Apply gear oil when installing the bearings and thrust washers.
- Be careful not to mix up the right and left hand races of the bearings.
- Replace the oil seal and O-ring with a new one at every disassembly. Apply chassis grease between the lips when installing the oil seal.
- Be careful not to mix up the differential oil seal RH and LH.



1) Adjust the preload for front and rear bearings.
Adjust the bearing preload with spacer and washer between front and rear bearings. Pinion height adjusting washer are not affected by this adjustment. The adjustment must be carried out without oil seal inserted.
(1) Press the rear bearing race into differential carrier using ST1 and ST2.
ST1 398477701 HANDLE
ST2 398477702 DRIFT
(2) Press the rear bearing race into differential carrier using ST1 and ST2.
ST1 398477701 HANDLE
ST2 498447110 DRIFT



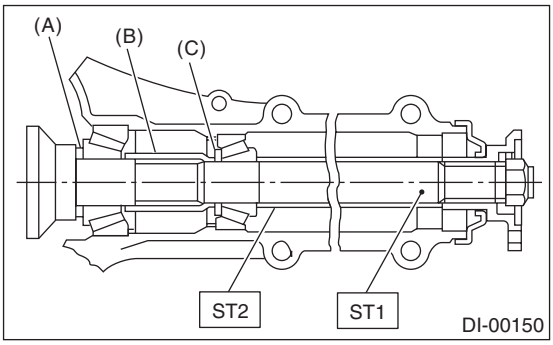
(3) Install the front bearing race to differential carrier using ST1 and ST2.
ST1 398477701 HANDLE
ST2 398447110 DRIFT

(4) Insert new front bearing cone.

(5) Insert the ST1 into case with pinion height adjusting shim and new rear bearing cone fitted onto it.

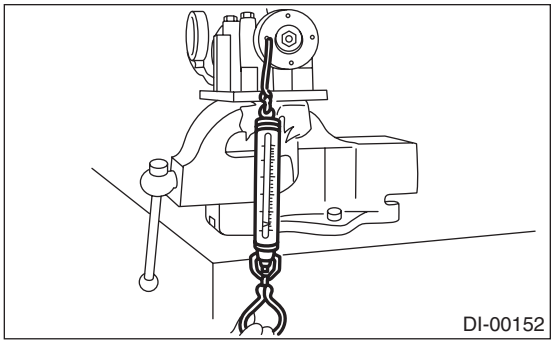
NOTE:
Re-use the used washer if not deformed.

(6) Then install the preload adjusting spacer and washer, front bearing cone, ST2, companion flange, and washer and self-locking nut.
ST1 498447150 DUMMY SHAFT
ST2 32285AA000 DUMMY COLLAR



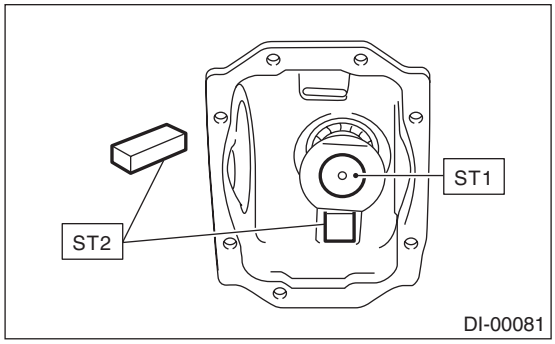
(A) Pinion height adjusting shim
(B) Preload adjusting spacer
(C) Preload adjusting washer

(7) Turn the ST1 with hand to make bearing fitted, and tighten the self locking nut while measuring the preload with spring balance. Select the preload adjusting washer and spacer so that the specified preload is obtained when nut is tightened to the specified torque.



NOTE:
• Use a new self-locking nut.
• Measure the preload in direction of tangent to flange.
• Be careful not to give excessive preload.
• When tightening the self locking nut, lock ST1 with ST2 as shown in the figure.
ST1 498447150 DUMMY SHAFT
ST2 398507704 BLOCK

Tightening torque:
191 N·m (19.5 kgf-m, 141 ft-lbf)



Front and rear bearing preload
For new bearing: 12.7 — 32.4 N (1.3 — 3.3 kgf, 2.9 — 7.3 lbf) at companion flange bolt hole

	Part No.	Thickness mm (in)
Preload adjusting washer	38336AA000	1.500 (0.0591)
	38336AA120	1.513 (0.0596)
	38336AA010	1.525 (0.0600)
	38336AA130	1.538 (0.0606)
	38336AA020	1.550 (0.0610)
	38336AA140	1.563 (0.0615)
	38336AA030	1.575 (0.0620)
	38336AA150	1.588 (0.0625)
	38336AA040	1.600 (0.0630)
	38336AA160	1.613 (0.0635)
	38336AA050	1.625 (0.0640)
	38336AA170	1.638 (0.0645)
	38336AA060	1.650 (0.0650)
	38336AA180	1.663 (0.0655)
	38336AA070	1.675 (0.0659)
	38336AA190	1.688 (0.0665)
	38336AA080	1.700 (0.0669)
	38336AA200	1.713 (0.0674)
	38336AA090	1.725 (0.0679)
	38336AA210	1.738 (0.0684)
	38336AA100	1.750 (0.0689)
	38336AA220	1.763 (0.0694)
	38336AA110	1.775 (0.0699)
	Part No.	Length mm (in)
Preload adjusting spacer	32288AA040	52.3 (2.059)
	32288AA050	52.5 (2.067)
	31454AA100	52.6 (2.071)
	32288AA060	52.7 (2.075)
	31454AA110	52.8 (2.079)
	32288AA070	52.9 (2.083)
	31454AA120	53.0 (2.087)
	32288AA080	53.1 (2.091)
	32288AA090	53.3 (2.098)

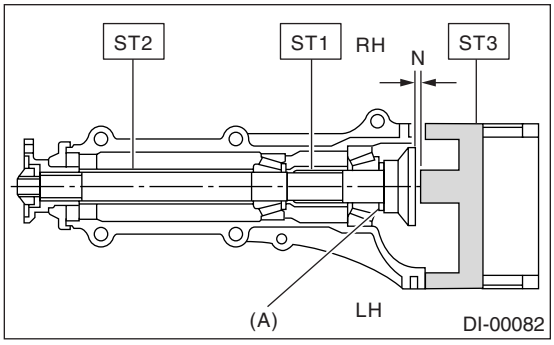
2) Adjusting drive pinion height
Adjust the drive pinion height with shim installed between the rear bearing cone and back of pinion gear.

(1) Install the ST3.

Front and rear bearing preload
For new bearing: 12.7 — 32.4 N (1.3 — 3.3 kgf, 2.9 — 7.3 lbf) at companion flange bolt hole

NOTE:
At this time, install the pinion height adjusting shim which is temporarily selected or same as that used before.

ST1 498447150 DUMMY SHAFT
ST2 32285AA000 DUMMY COLLAR
ST3 498505501 DIFFERENTIAL CARRIER GAUGE

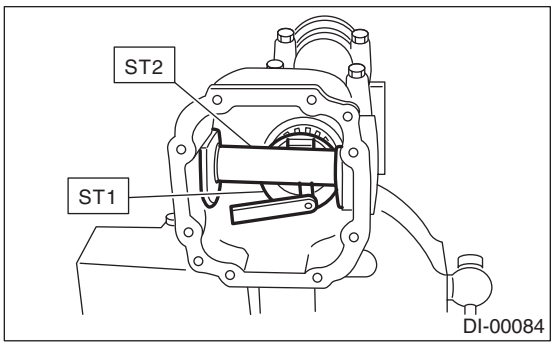


(A) Pinion height adjusting shim

(2) Measure the clearance N between the end of ST3 and end surface of ST1 by using a thickness gauge.

NOTE:
Make sure there is no clearance between the case and ST3.

ST1 498447150 DUMMY SHAFT
ST2 498505501 DIFFERENTIAL CARRIER GAUGE



(3) Obtain the thickness of pinion height adjusting shim to be inserted from the following formula, and replace the temporarily installed shim with this one.

NOTE:
Use 1 to 3 shims as required for adjustment.

T = To + N − 0.05 mm (0.0020 in)

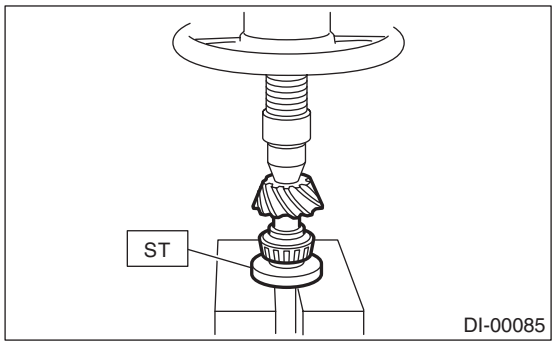
where
T = Thickness of pinion height adjusting shim mm (in)
To = Thickness of shim originally installed mm (in)
N = Reading of thickness gauge mm (in)
H = Figure marked on drive pinion head

(Example of calculation)
To = 0.15 mm (0.0059 in)
N = 0.1 mm (0.0039 in)
T = 0.15 mm (0.0059 in) + 0.1 mm (0.0039 in) − 0.05 mm (0.0020 in) = 0.2 mm (0.0079 in)
Result: Thickness = 0.2 mm (0.0079 in)
Therefore use the 32295AA220.

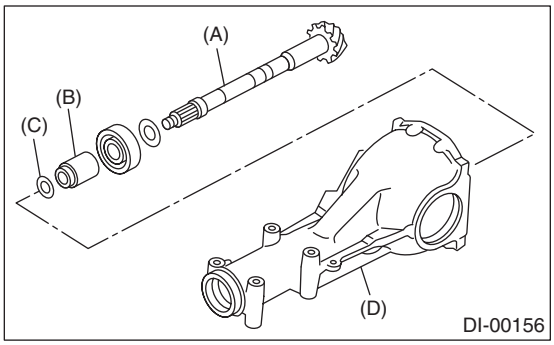
Pinion height adjusting shim	
Part No.	Thickness mm (in)
32295AA200	0.150 (0.0059)
32295AA210	0.175 (0.0069)
32295AA220	0.200 (0.0079)
32295AA230	0.225 (0.0089)
32295AA240	0.250 (0.0098)
32295AA250	0.275 (0.0108)

3) Install the selected pinion height adjusting shim on drive pinion, and press the rear bearing cone into position with ST.

ST 498175500 INSTALLER

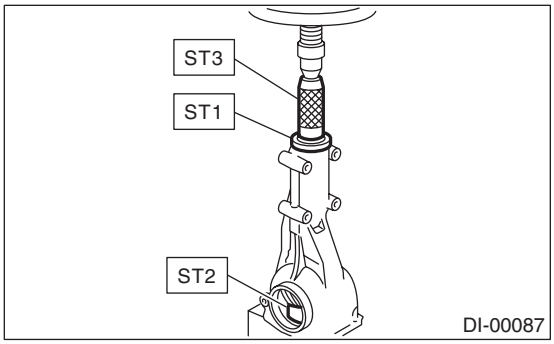


4) Insert the drive pinion into differential carrier, install the previously selected bearing preload adjusting spacer and washer.

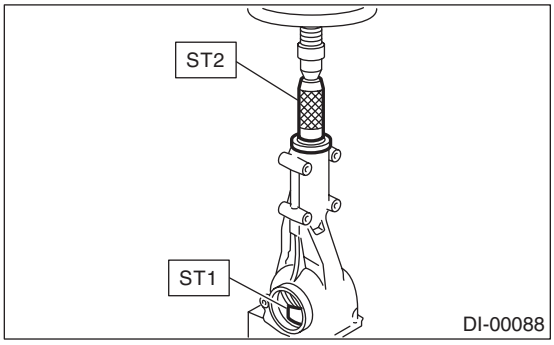


(A) Drive pinion
(B) Bearing preload adjusting spacer
(C) Bearing preload adjusting washer
(D) Differential carrier

5) Press-fit the front bearing cone into carrier with ST1, ST2 and ST3.
ST1 32285AA000 DUMMY COLLAR
ST2 399780104 WEIGHT
ST3 899580100 INSTALLER



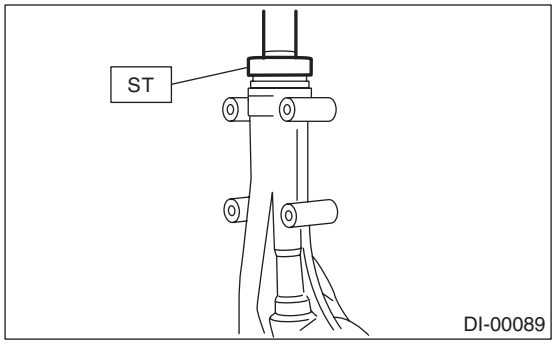
6) Insert the spacer, then press-fit the pilot bearing with ST1 and ST2.
ST1 399780104 WEIGHT
ST2 899580100 INSTALLER



7) Fit a new oil seal with ST.

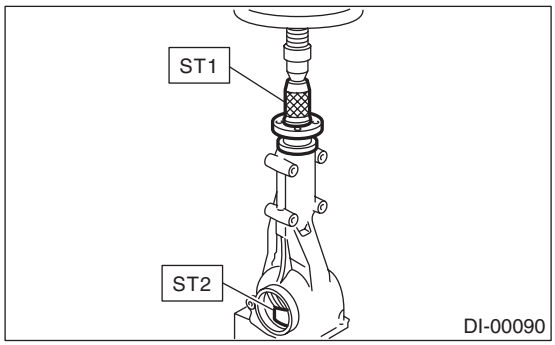
NOTE:
• Press-fit until the end of oil seal is 1 mm (0.04 in) inward from end of carrier.
• Apply grease between the oil seal lips.

ST 498447120 INSTALLER



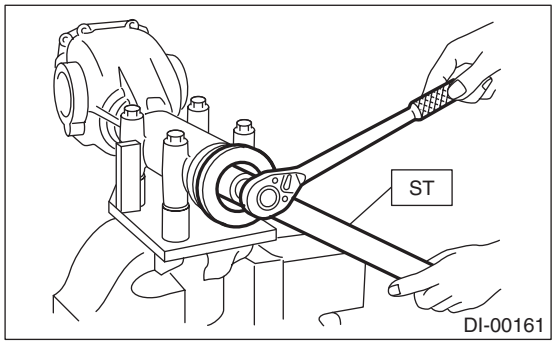
8) Press-fit the companion flange with ST1 and ST2.

NOTE:
Be careful not to damage the bearing.
ST1 899874100 INSTALLER
ST2 399780104 WEIGHT



9) Install the self-locking nut. Then tighten it with the ST.
ST 498427200 FLANGE WRENCH

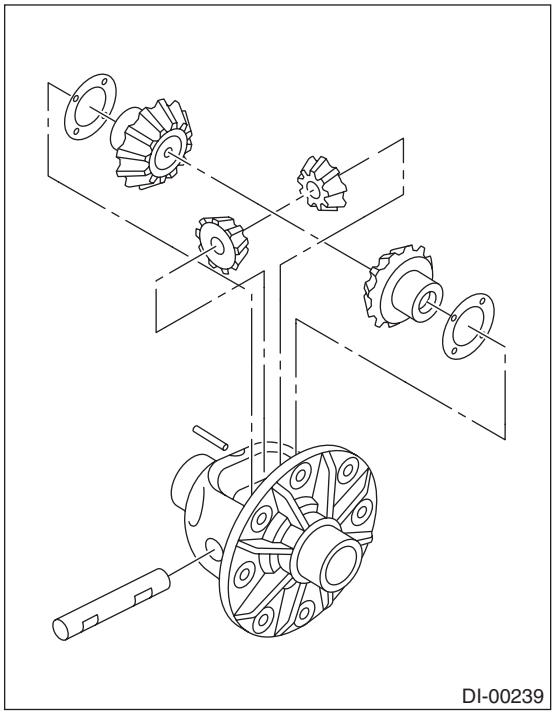
Tightening torque:
191 N·m (19.5 kgf-m, 141 ft-lb)



10) Assembling differential case
Install the side gears and pinion mate gears, with their thrust washers and pinion mate shaft, into differential case.

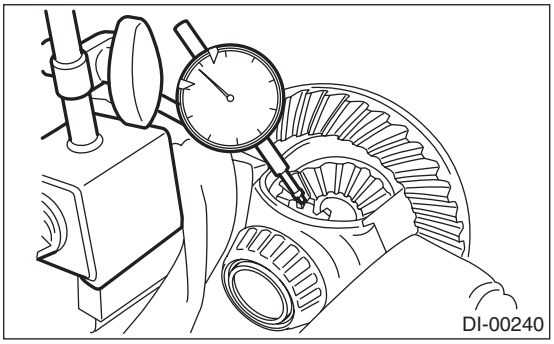
NOTE:
• Apply gear oil on both sides of the washer and on the side gear shaft before installing.

• Insert the pinion mate shaft into the differential case by aligning the lock pin holes.



(1) Measure the side gear backlash.

Side gear backlash:
0.05 — 0.15 mm (0.0020 — 0.0059 in)



(2) Adjust the side gear backlash as specified by selecting the side gear thrust washer.

Side gear thrust washer	
Part No.	Thickness mm (in)
803135011	0.925 — 0.950 (0.0364 — 0.0374)
803135012	0.950 — 0.975 (0.0374 — 0.0384)
803135013	0.975 — 1.000 (0.0384 — 0.0394)
803135014	1.000 — 1.025 (0.0394 — 0.0404)
803135015	1.025 — 1.050 (0.0404 — 0.0413)

(3) Check the condition of rotation after applying oil to the gear tooth surfaces and thrust surfaces.

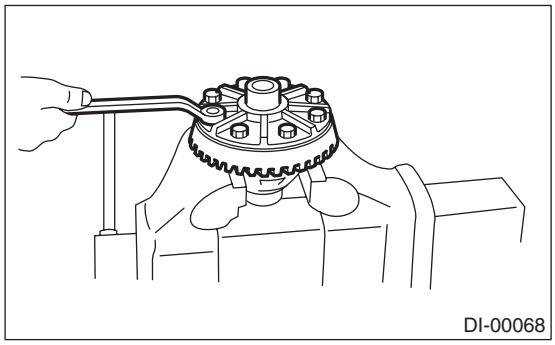
(4) After driving in the pinion shaft lock pin, stake both sides of the hole to prevent pin from falling off.

11) Apply Lock Tite to bolt threads, and Install the hypoid driven gear on differential case.

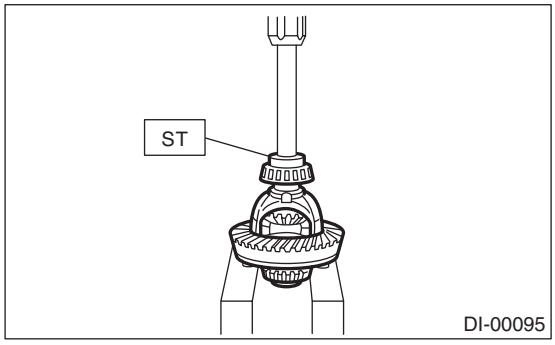
Lock Tite:
THREE BOND 1324 (Part No. 004403042) or equivalent

NOTE:
Tighten diagonally while tapping the bolt heads.

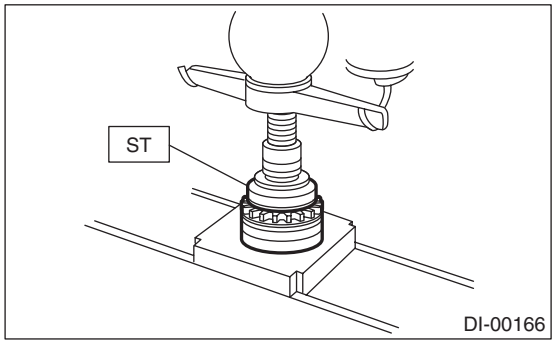
Tightening torque:
62 N·m (6.3 kgf-m, 45.6 ft-lb)



12) Press the side bearing cone onto differential case with ST.
ST 498485400 DRIFT

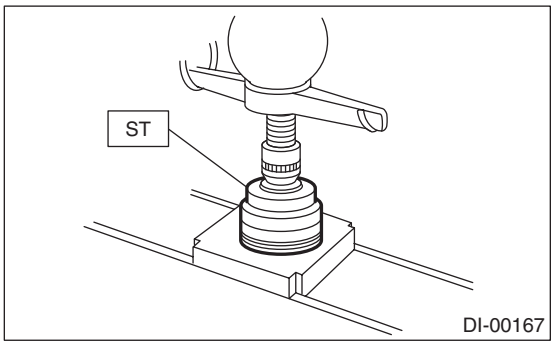


13) Assemble holders.
(1) Install the oil seal into right and left holders.
ST 498447100 INSTALLER

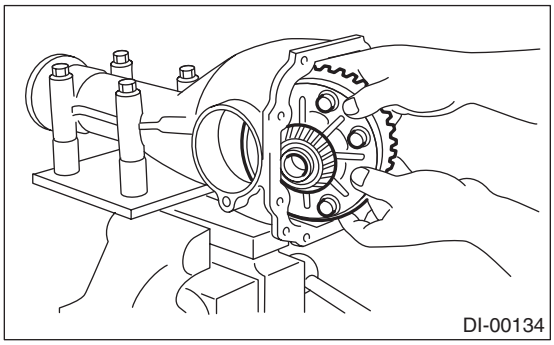


(2) Install the bearing race into right and left holders.
ST 398477702 DRIFT

CAUTION:
Make sure that the oil seal, bearing outer race and cone are properly assembled.



(3) Install the differential case assembly into differential carrier in the reverse order of disassembly.

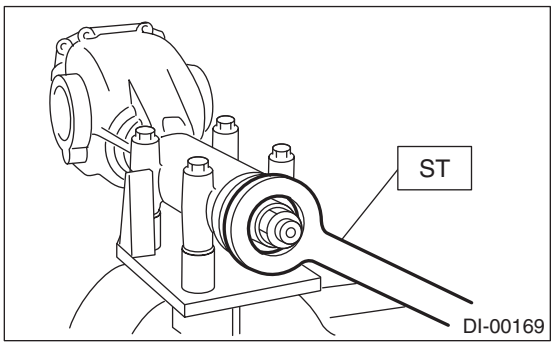


(4) Temporally tighten the side holder RH and LH in differential carrier, to install.

14) Perform the backlash adjustment of hypoid driven gear set and preload adjustment of differential side bearing.

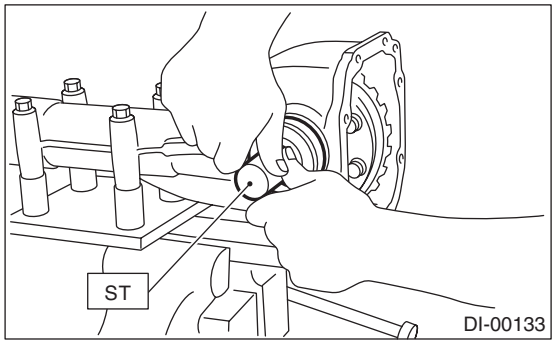
(1) Turn the drive pinion with ST for better fitting of differential side bearing.

ST 498427200 FLANGE WRENCH



(2) Screw in the side (left-side) holder until light contact is made with ST.

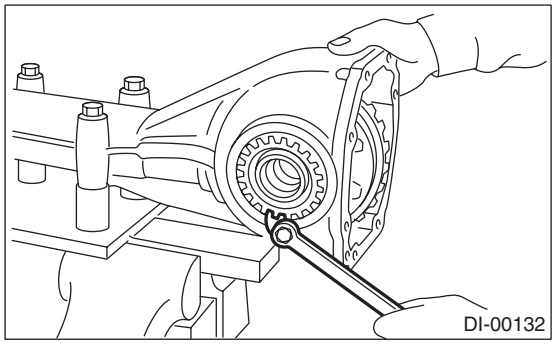
ST 499785500 WRENCH ASSY



(3) Back off the side (left-side) holder approx. 1 1/2 teeth of holder, and tighten the left-side holder by approx. 2 teeth (approx. 1 1/2 + 1/2 teeth). [Back off amount of side (left-side) holder + 1/2 tooth.]
This + 1/2 tooth gives preload.

(4) Temporarily tighten the lock plate.

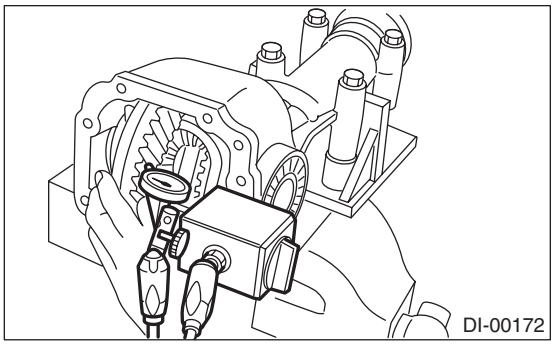
NOTE:
Turn over the lock plate to displace the holder 1/2 tooth.



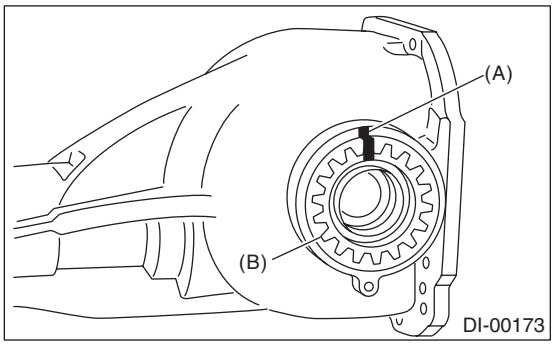
(5) Measure the hypoid driven gear-to-drive pinion backlash. Set the magnet base on differential carrier. Align the contact point of dial gauge with tooth face of hypoid driven gear, and move the hypoid driven gear while holding drive pinion still. Read the value indicated on dial gauge.

NOTE:
If measured backlash is not within specified range, repeat the procedures for hypoid driven gear set backlash adjustment and differential side bearing preload adjustment.

Backlash:
0.10 — 0.15 mm (0.0039 — 0.0059 in)



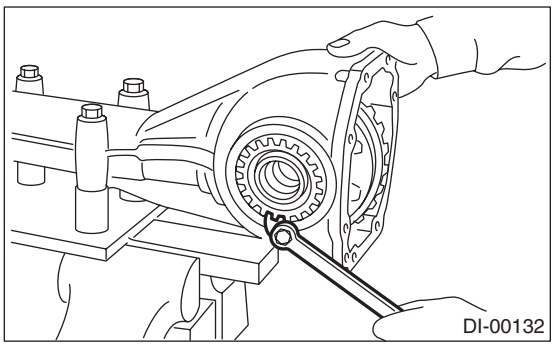
15) Draw a matching mark on both differential carrier and holder. Remove the holder one side at a time.
Replace in the original position after inserting an O-ring and applying grease to threaded portion.



(A) Matching mark
(B) Holder

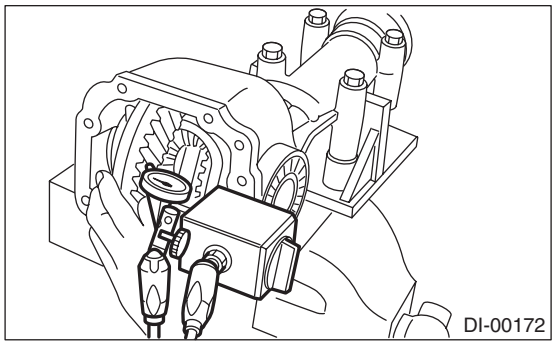
16) Tighten the bolt of lock plate to specified torque.

Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)



17) Re-check the hypoid driven gear-to-pinion backlash.

Backlash:
0.10 — 0.15 mm (0.0039 — 0.0059 in)

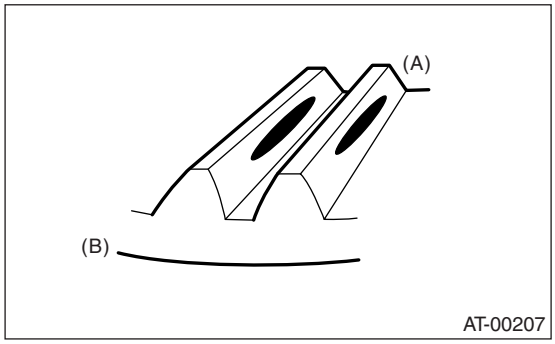


18) Checking and adjusting tooth contact of hypoid driven gear.
(1) Apply an even coat of red lead on both sides of three or four teeth on the hypoid driven gear. Check the contact pattern after rotating the hypoid driven gear several revolutions back and forth until a definite contact pattern appears on the hypoid driven gear.
(2) When the contact pattern is incorrect, readjust according to the instructions given in "TOOTH CONTACT PATTERN".

NOTE:
Be sure to wipe off red lead completely after adjustment is completed.

- Correct tooth contact

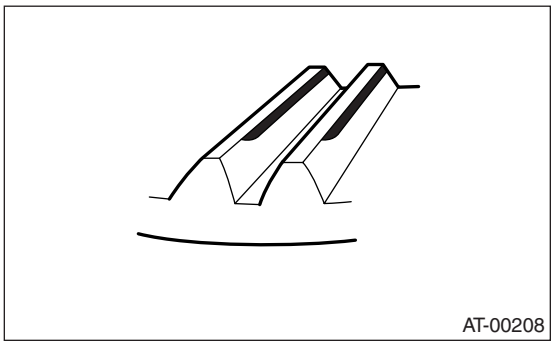
Checking item: Tooth contact pattern is slightly shifted toward to toe side under no-load rotation. (When loaded, contact pattern moves toward heel)



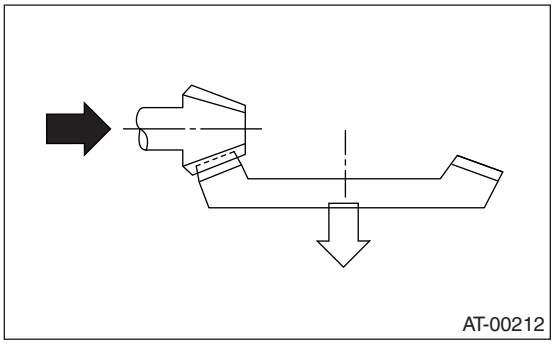
(A) Toe side
(B) Heel side

- Face contact

Checking item: Backlash is too large.
Contact pattern

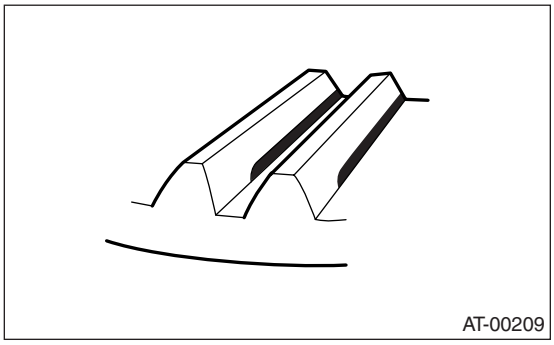


Corrective action: Increase thickness of drive pinion height adjusting shim in order to bring drive pinion close to hypoid driven gear.

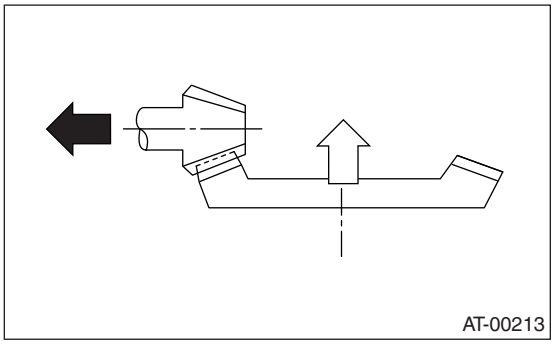


- Flank contact

Checking item: Backlash is too small.
Contact pattern

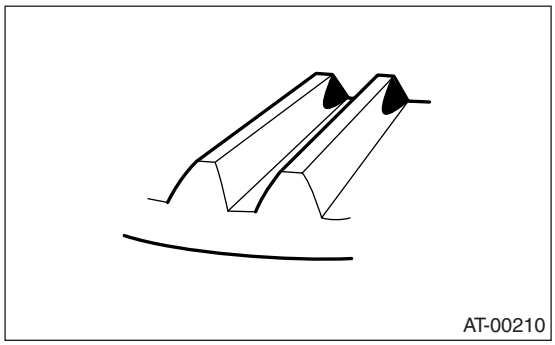


Corrective action: Reduce thickness of drive pinion height adjusting shim in order to move drive pinion away from hypoid driven gear.

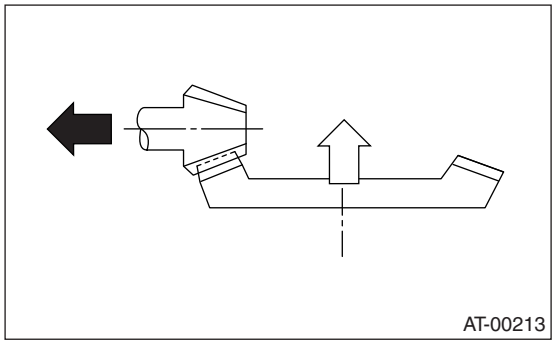


- Toe contact (Inside end contact)

Checking item: Contact area is small.
Contact pattern

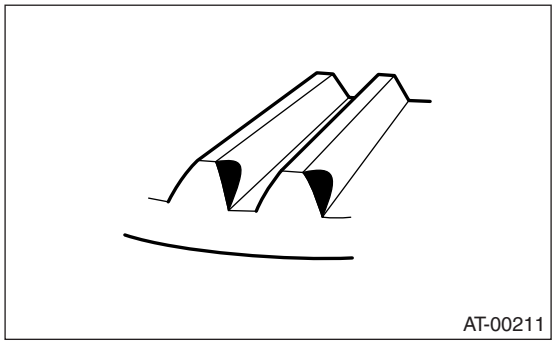


Corrective action: Reduce thickness of drive pinion height adjusting shim in order to move drive pinion away from hypoid driven gear.

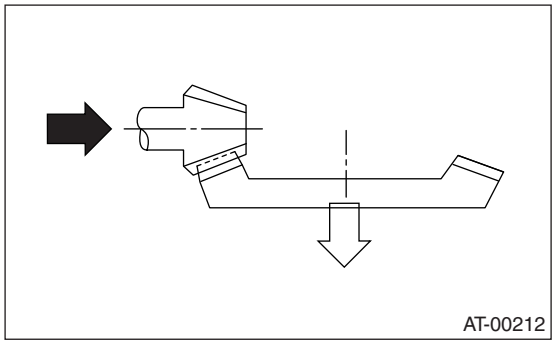


- Heel contact (Outside end contact)

Checking item: Contact area is small.
Contact pattern

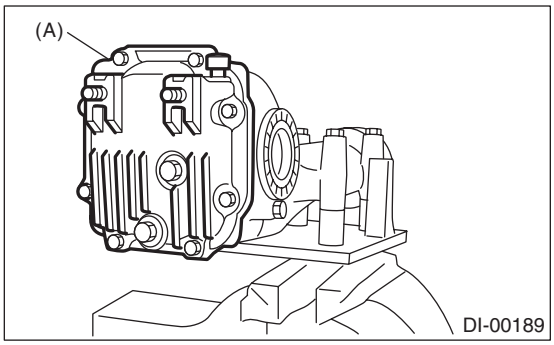


Corrective action: Increase thickness of drive pinion height adjusting shim in order to bring drive pinion close to hypoid driven gear.



19) If proper tooth contact is not obtained, once again adjust the drive pinion height and the differential side bearing preload (already mentioned) and the hypoid gear backlash.
20) Install the rear cover and tighten the bolts to specified torque.

Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)



(A) Rear cover

E: INSPECTION

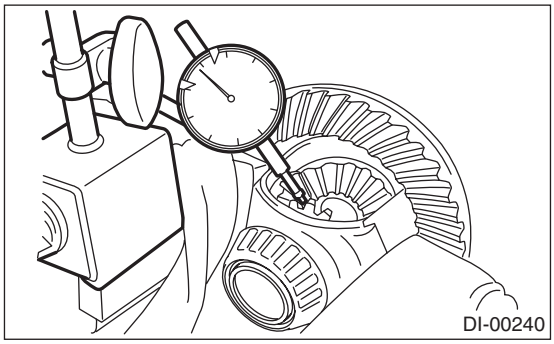
Wash all the disassembled parts clean, and examine them for wear, damage, or other defects. Repair or replace defective parts as necessary.
1) Hypoid driven gear and drive pinion
• If abnormal tooth contact is evident, find out the cause and adjust to give correct tooth contact at assembly. Replace the gear if excessively worn or incapable of adjustment.
• If crack, score, or seizure is evident, replace as a set. Slight damage of tooth can be corrected by oil stone or the like.
2) Side gear and pinion mate gear
• Replace if crack, score, or other defects are evident on tooth surface.
• Replace if thrust washer contacting surface is worn or seized. Slight damage of the surface can be corrected by oil stone or the like.
3) Bearing
Replace if seizure, peeling, wear, rust, dragging during rotation, abnormal noise or other defect is evident.
4) Thrust washers of side gear and pinion mate gear
Replace if seizure, flaw, abnormal wear or other defect is evident.
5) Oil seal
Replace if deformed or damaged, and at every disassembling.
6) Differential carrier
Replace if the bearing bores are worn or damaged.
7) Differential case
Replace if its sliding surfaces are worn or cracked.
8) Companion flange
Replace if the oil seal lip contacting surfaces have flaws.

1. SIDE GEAR BACKLASH

Using a dial gauge, check the backlash of the side gear.

Side gear backlash:
0.05 — 0.15 mm (0.0020 — 0.0059 in)

If the side gear backlash is not within the specification, adjust the side gear backlash as specified by selecting the side gear thrust washer.

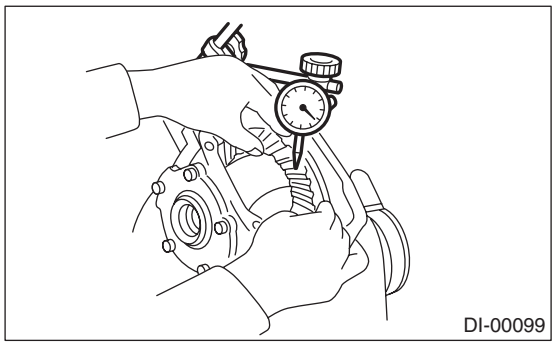


2. HYPOID DRIVEN GEAR BACKLASH

Using a dial gauge, check the backlash of the hypoid driven gear.

Hypoid driven gear backlash:
0.10 — 0.15 mm (0.0039 — 0.0059 in)

If the hypoid driven gear backlash is not within the specification, adjust the side bearing preload or repair if necessary.



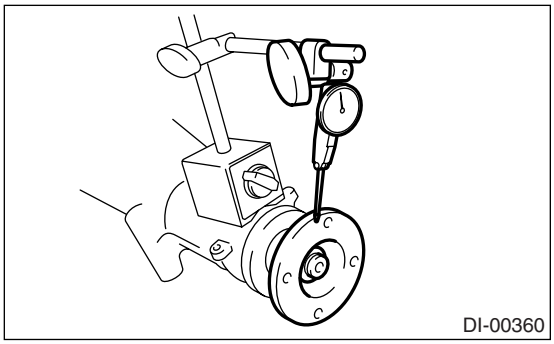
3. TOOTH CONTACT BETWEEN HYPOID DRIVEN GEAR AND DRIVE PINION

Inspect the tooth contact between hypoid driven gear and drive pinion.
<Ref. to DI-59, ASSEMBLY, Rear Differential (VA-type).>

4. COMPANION FLANGE

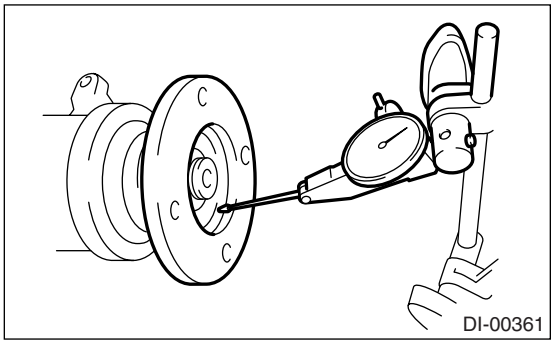
1) If rust or dirt is attached to the companion flange, remove them.
2) Set a dial gauge at a companion flange surface (mating surface of propeller shaft and companion flange), and then measure the companion flange runout.

Limit of runout:
0.08 mm (0.003 in)


DI-00360

3) Set the gauge inside of the companion flange, and measure the runout.

Limit of runout:
0.08 mm (0.003 in)


DI-00361

4) If either runout exceeds the limit, move the phase of companion flange and drive pinion 90° each, and find the point that the runout is within the limit.
5) If the runout exceeds the limit after changing the phase, replace the companion flange and recheck the runout.
6) If the runout exceeds the limit after replacing the companion flange, the drive pinion may be assembled incorrectly or bearing is faulty.

F: ADJUSTMENT

1. SIDE GEAR BACKLASH

Adjust the side gear backlash.
<Ref. to DI-59, ASSEMBLY, Rear Differential (VA-type).>

2. HYPOID DRIVEN GEAR BACKLASH

Adjust the hypoid driven gear backlash.
<Ref. to DI-59, ASSEMBLY, Rear Differential (VA-type).>

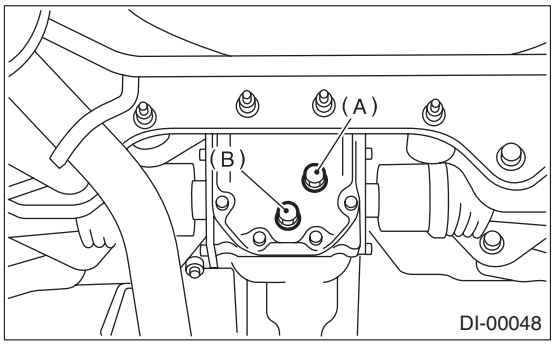
3. TOOTH CONTACT BETWEEN HYPOID DRIVEN GEAR AND DRIVE PINION

Adjust the tooth contact between hypoid driven gear and drive pinion gear.
<Ref. to DI-59, ASSEMBLY, Rear Differential (VA-type).>

6. Rear Differential Front Oil Seal

A: REPLACEMENT

1) Disconnect the ground cable from battery.
2) Move the select lever or gear shift lever to “N”.
3) Release the parking brake.
4) Remove the oil drain plug, and drain the gear oil. <Ref. to DI-24, Differential Gear Oil.>



(A) Filler plug
(B) Drain plug

5) Install the oil drain plug.

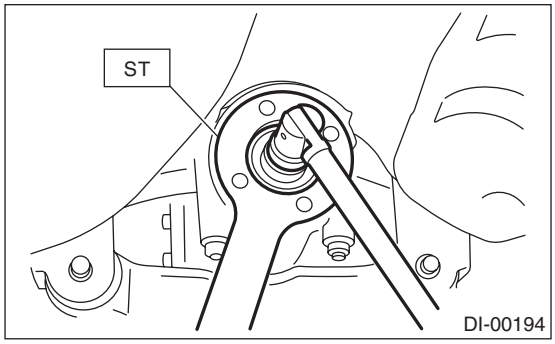
NOTE:
- Apply liquid gasket to the drain plug for T-type.

Liquid gasket:
THREE BOND 1105 (Part No. 004403010) or equivalent.

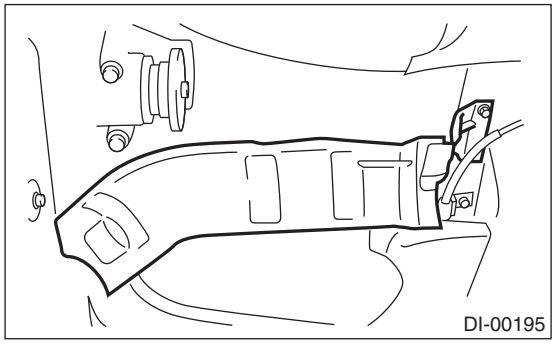
- Use a new aluminum gasket for VA-type.

Tightening torque:
T-type;
49 N·m (5.0 kgf-m, 36.2 ft-lb)
VA-type;
34 N·m (3.5 kgf-m, 25.3 ft-lb)

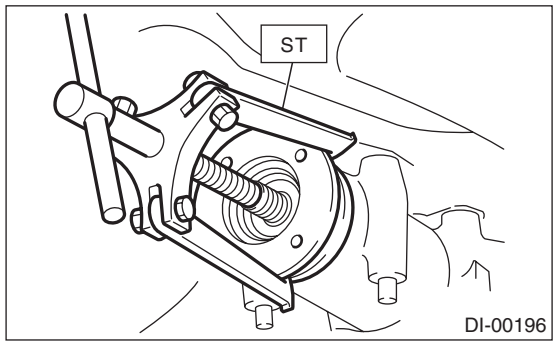
6) Jack-up the vehicle and support with sturdy racks.
7) Remove the rear exhaust pipe and muffler.
8) Remove the propeller shaft from body. <Ref. to DS-17, REMOVAL, Propeller Shaft.>
9) Remove the self-locking nut while holding the companion flange with ST.
ST (MODEL WITH MECHANICAL LSD)
18633AA000 WRENCH COMPL
ST (MODEL WITHOUT MECHANICAL LSD)
498427200 FLANGE WRENCH



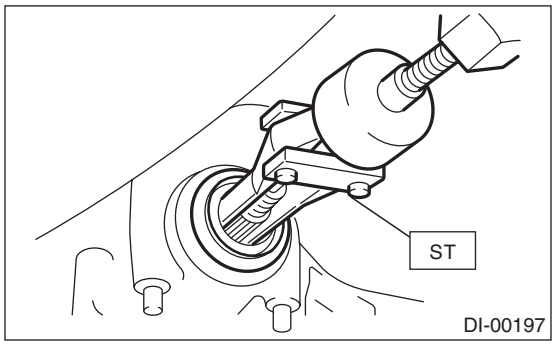
10) Remove the tank cover.



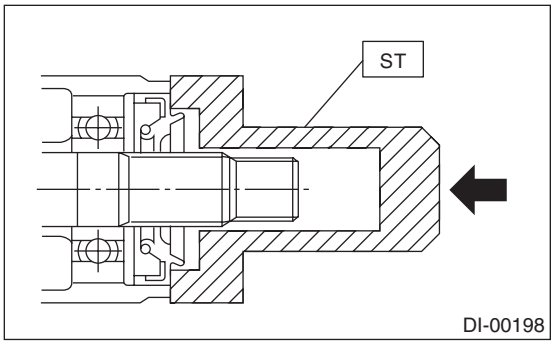
11) Extract the companion flange using ST.
ST 399703600 PULLER ASSY



12) Remove the oil seal using ST.
ST 398527700 PULLER ASSY



13) Fit a new oil seal using ST.
ST 498447120 INSTALLER



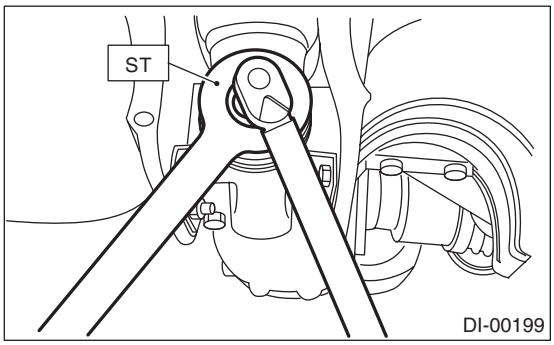
14) Install the companion flange.

NOTE:
Use a plastic hammer to install the companion flange.

15) Tighten the self-locking nut within the specified torque range so that the preload of companion flange becomes the same as that before replacing oil seal.
ST (MODEL WITH MECHANICAL LSD)
18633AA000 WRENCH COMPL
ST (MODEL WITHOUT MECHANICAL LSD)
498427200 FLANGE WRENCH

NOTE:
Use a new self-locking nut.

Tightening torque:
T-type:
181 N·m (18.5 kgf-m, 134 ft-lb)
VA-type:
191 N·m (19.5 kgf-m, 141 ft-lb)



16) Hereafter, reassemble in the reverse order of disassembly.
17) After installing, refill the gear oil to the bottom of filler plug hole. <Ref. to DI-24, Differential Gear Oil.>

7. Rear Differential Side Oil Seal

A: INSPECTION

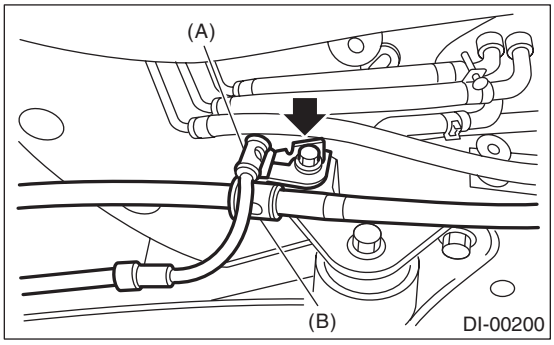
Make sure that there is no oil leakage from side oil seal.
If there is any oil leakage, replace the oil seal.

B: REPLACEMENT

1. T-TYPE

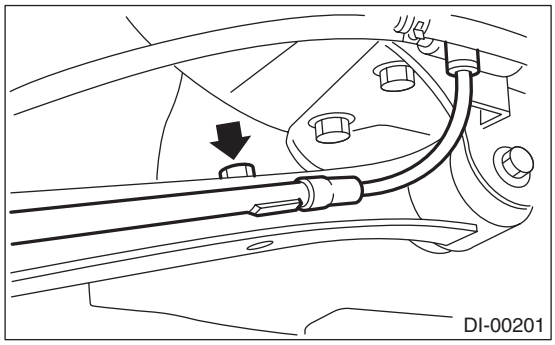
1) Disconnect the ground cable from battery.
2) Move the select lever or gear shift lever to “N”.
3) Loosen both wheel nuts.
4) Release the parking brake.
5) Jack-up the vehicle and support it with rigid racks.
6) Remove the wheels.
7) Remove the rear exhaust pipe and muffler.
Non-turbo model without OBD
<Ref. to EX(H4SOw/oOBD)-10, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(H4SOw/oOBD)-11, REMOVAL, Muffler.>
Non-turbo model with OBD
<Ref. to EX(H4SO)-10, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(H4SO)-12, REMOVAL, Muffler.>
Turbo model
<Ref. to EX(H4DOTC)-15, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(H4DOTC)-16, REMOVAL, Muffler.>
8) Remove the DOJ of rear drive shaft from rear differential.

(1) Remove the ABS wheel speed sensor cable clamp and parking brake cable clamp from bracket.

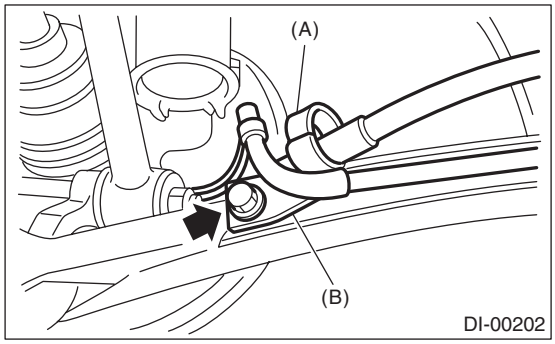


(A) ABS wheel speed sensor cable clamp
(B) Parking brake cable clamp

(2) Remove the ABS wheel speed sensor cable clamp from trailing link.

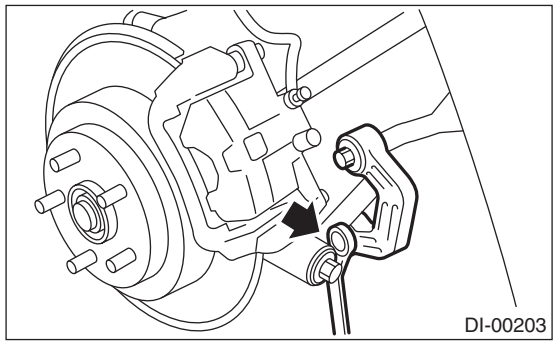


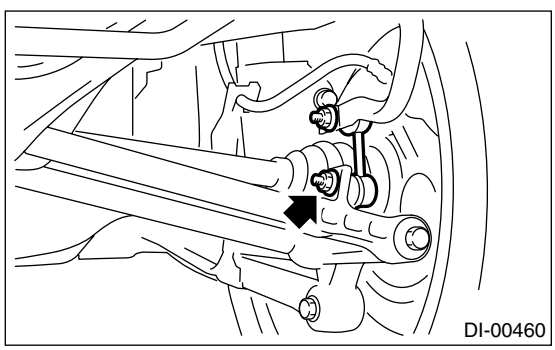
(3) Remove the ABS wheel speed sensor cable clamp and parking brake cable guide from trailing link.



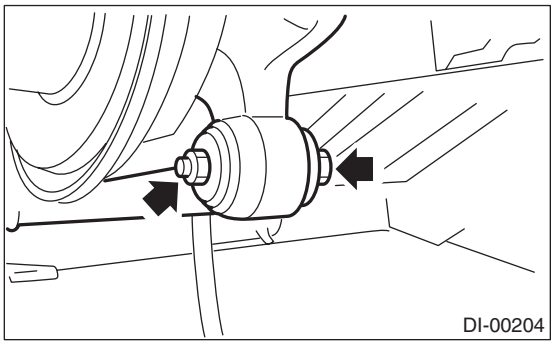
(A) Parking brake cable guide
(B) ABS wheel speed sensor cable clamp

(4) Remove the rear stabilizer link.

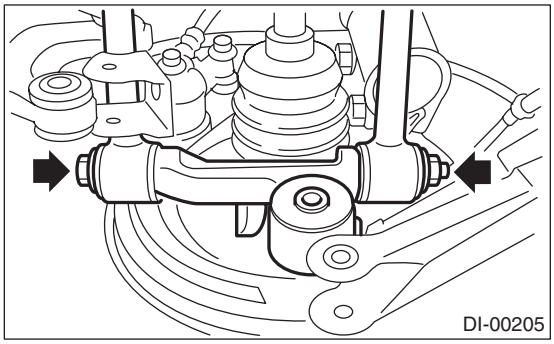




(5) Remove the bolts which secure trailing link to housing.



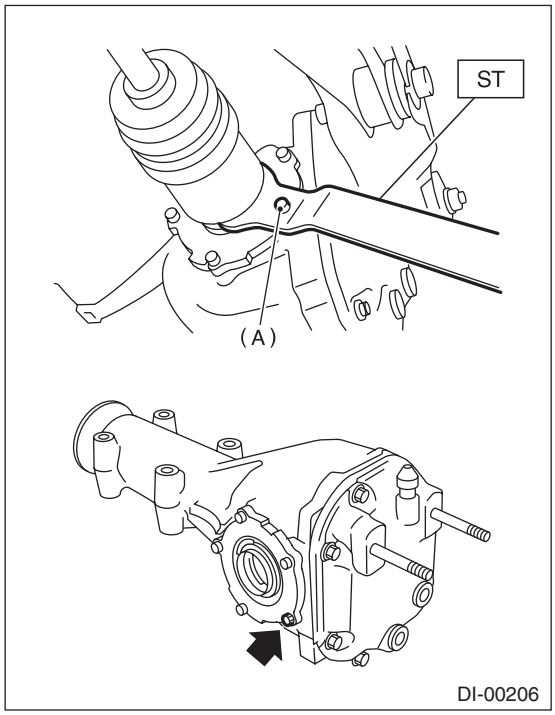
(6) Remove the bolts which secure the front and rear lateral link to rear housing.



(7) Remove the DOJ from the rear differential by using ST.

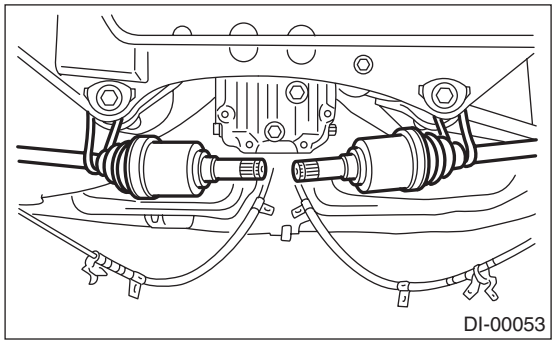
NOTE:
When removing the DOJ from rear differential, fit ST to the bolts as shown in the figure so as not to damage the side bearing retainer.

ST 208099PA100 DRIVE SHAFT REMOVER

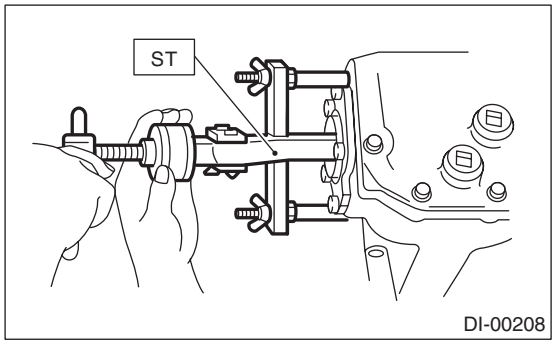


(A) Bolt

9) Suspend the rear drive shaft to the rear cross-member using wire.



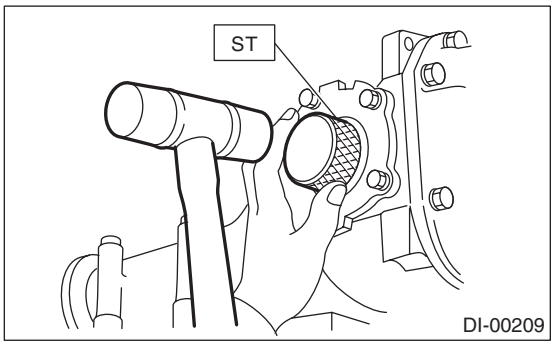
10) Remove the oil seal using ST.
ST 398527700 PULLER ASSY



11) Drive in a new side oil seal using ST.

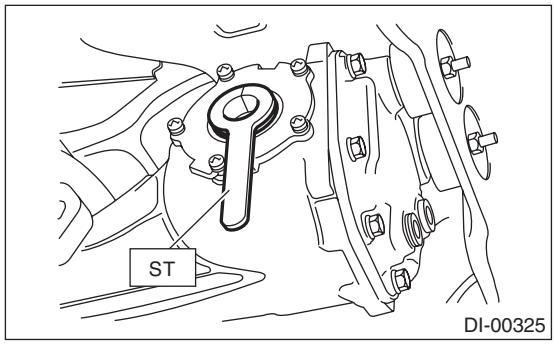
NOTE:
Apply chassis grease between the oil seal lips.

ST 398437700 DRIFT



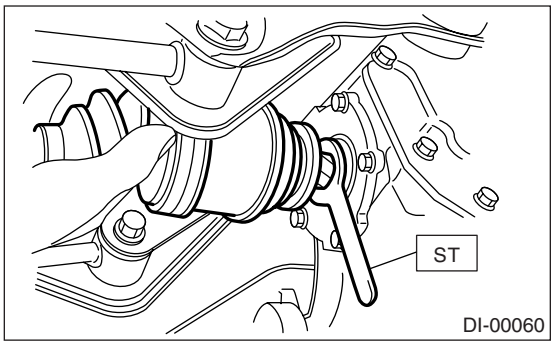
12) Insert the DOJ into rear differential.
(1) Install the ST to rear differential.

ST 28099PA090 OIL SEAL PROTECTOR



(2) Install the spline shaft until the spline portion is inside the side oil seal using ST.

ST 28099PA090 OIL SEAL PROTECTOR



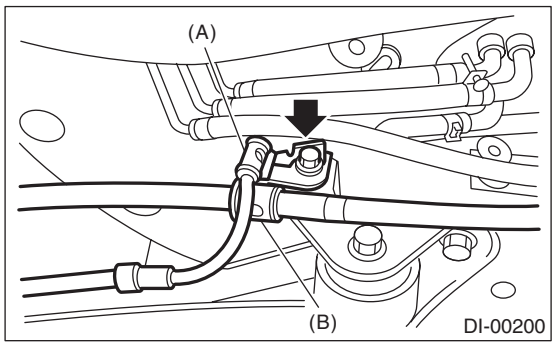
(3) Remove the ST.

ST 28099PA090 OIL SEAL PROTECTOR

13) Hereafter, reassemble in the reverse order of disassembly.

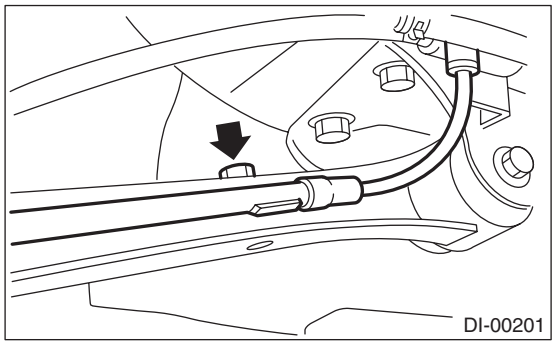
2. VA-TYPE

1) Disconnect the ground cable from battery.
2) Move the select lever or gear shift lever to “N”.
3) Loosen both wheel nuts.
4) Release the parking brake.
5) Jack-up the vehicle and support it with rigid racks.
6) Remove the wheels.
7) Remove the rear exhaust pipe and muffler.
Non-turbo model without OBD
<Ref. to EX(H4SOw/oOBD)-10, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(H4SOw/oOBD)-11, REMOVAL, Muffler.>
Non-turbo model with OBD
<Ref. to EX(H4SO)-10, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(H4SO)-12, REMOVAL, Muffler.>
8) Remove the DOJ of rear drive shaft from rear differential.
(1) Remove the ABS wheel speed sensor cable clamp and parking brake cable clamp from bracket.

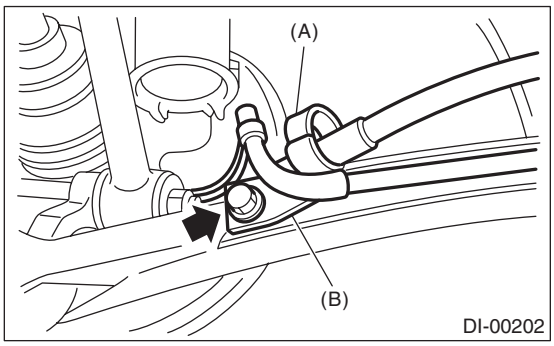


(A) ABS wheel speed sensor cable clamp
(B) Parking brake cable clamp

(2) Remove the ABS wheel speed sensor cable clamp from trailing link.

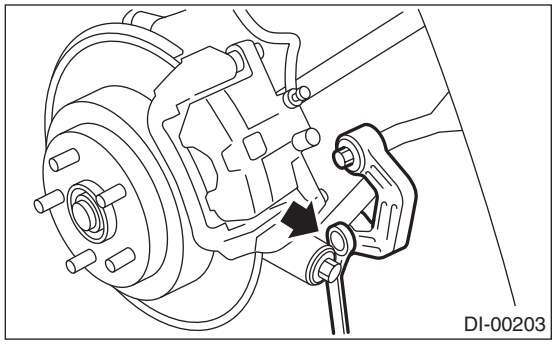


(3) Remove the ABS wheel speed sensor cable clamp and parking brake cable guide from trailing link.

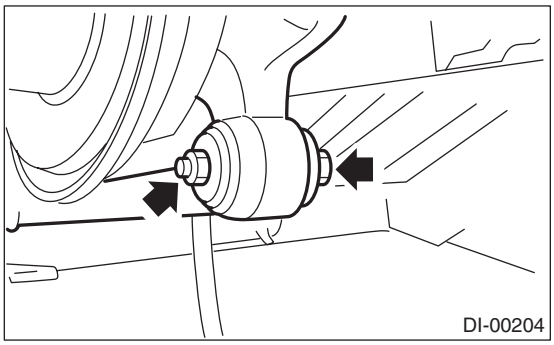


(A) Parking brake cable guide
(B) ABS wheel speed sensor cable clamp

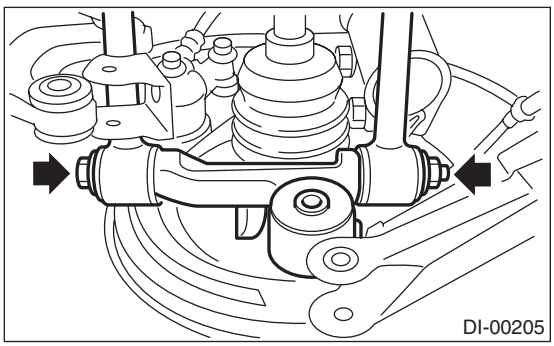
(4) Remove the rear stabilizer link.



(5) Remove the bolts which secure the trailing link to housing.

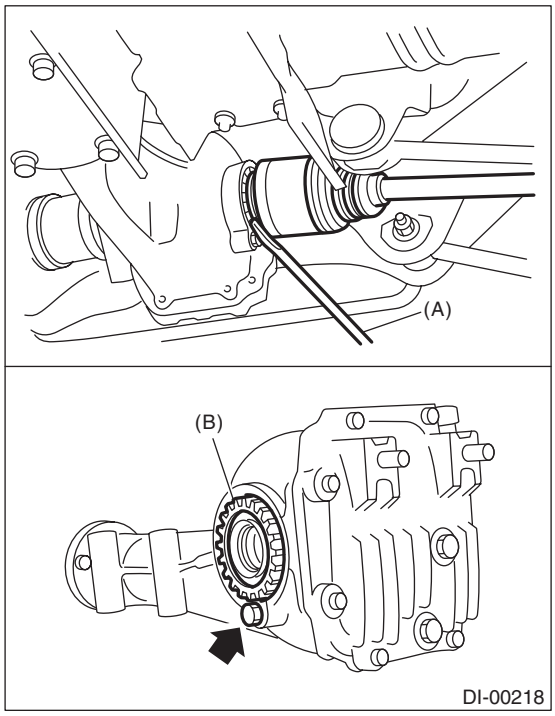


(6) Remove the bolts which secure the front and rear lateral link to rear housing.



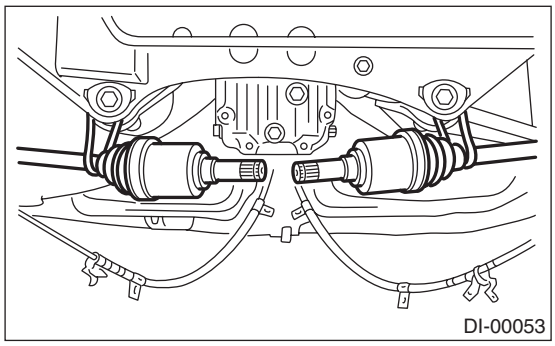
(7) Remove the DOJ from the rear differential using tire lever.

NOTE:
• When removing the DOJ from rear differential, fit tire lever to the bolt as shown in the figure so as not to damage the axle shaft holder.
• The side spline shaft circlip comes out together with the shaft.

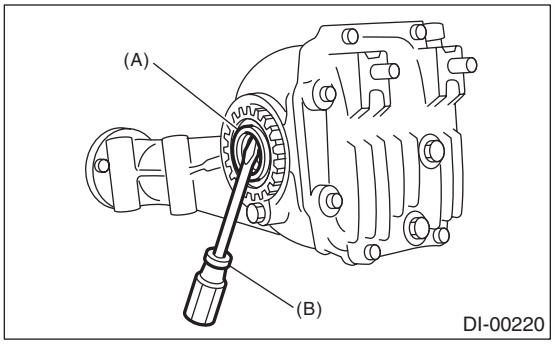


(A) Tire lever
(B) Axle shaft holder

9) Suspend the rear drive shaft to rear crossmember using wire.



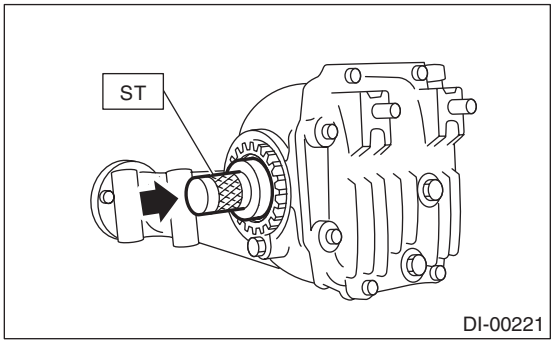
10) Remove the oil seal with screwdriver.



(A) Side oil seal
(B) Screwdriver

11) Drive in a new side oil seal using ST.

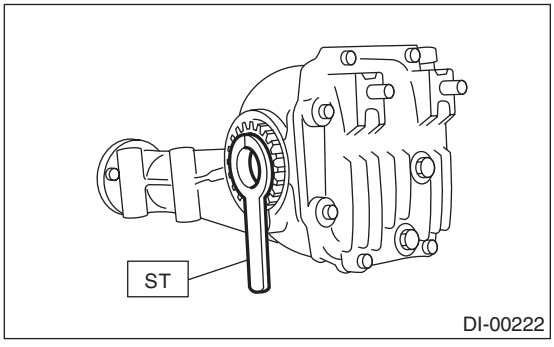
NOTE:
Apply chassis grease between the oil seal lips.
ST 498447100 INSTALLER



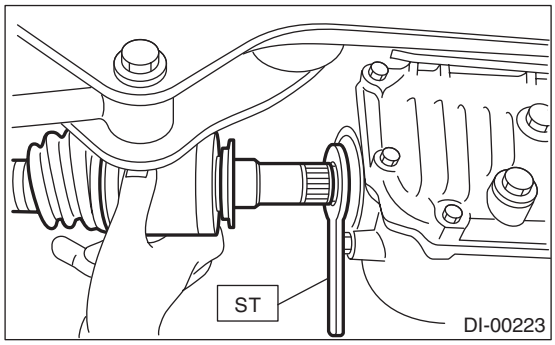
12) Insert the DOJ into rear differential.

NOTE:
Before inserting, replace the circlip at the end of spline shaft with a new one.

(1) Install the ST to rear differential.
ST 28099PA090 OIL SEAL PROTECTOR



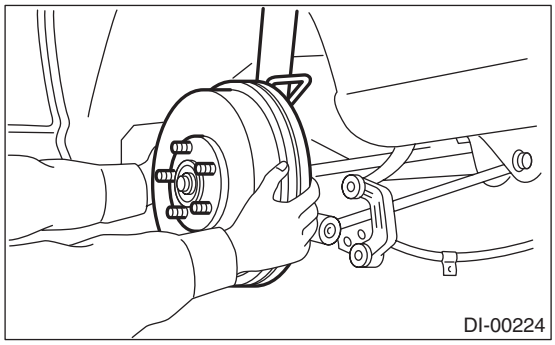
(2) Install the spline shaft until the spline portion is inside the side oil seal.



(3) Remove the ST.
ST 28099PA090 OIL SEAL PROTECTOR

(4) Completely insert the DOJ into rear differential by pressing rear housing.

NOTE:
Make sure that the oil seal lip is not folded over inward.



13) Hereafter, reassemble in the reverse order of disassembly.

8. Rear Differential Member

A: REMOVAL

1) Set the vehicle on a lift.
2) Disconnect the ground cable from battery.
3) Move the selector lever or gear shift lever to “N”.
4) Release the parking brake.
5) Loosen the wheel nuts.
6) Jack-up the vehicle and support it with study racks.
7) Remove the wheels.
8) Remove the rear exhaust pipe and muffler.
Non-turbo model without OBD
<Ref. to EX(H4SOw/oOBD)-10, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(H4SOw/oOBD)-11, REMOVAL, Muffler.> Non-turbo model with OBD<Ref. to EX(H4SO)-10, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(H4SO)-12, REMOVAL, Muffler.> Turbo model<Ref. to EX(H4DOTC)-15, REMOVAL, Rear Exhaust Pipe.> and <Ref. to EX(H4DOTC)-16, REMOVAL, Muffler.>
9) Remove the rear differential front member.

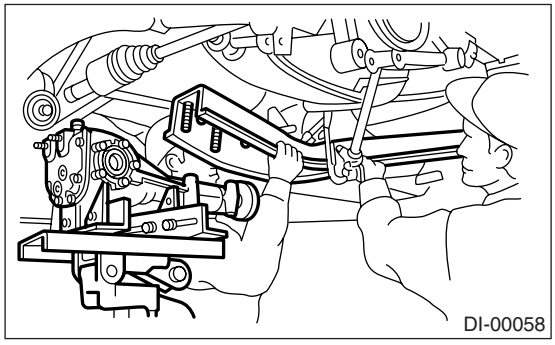
NOTE:
When removing the rear differential front member, work the removal procedure as rear differential. T-type<Ref. to DI-27, REMOVAL, Rear Differential (T-type).> VA-type<Ref. to DI-54, REMOVAL, Rear Differential (VA-type).>

10) Remove the differential rear member.

B: INSTALLATION

Install in the reverse order of removal.
1) Position the front member on body by passing it under the parking brake cable and securing to rear differential.

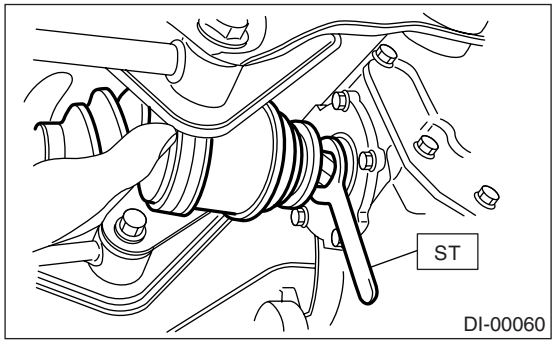
NOTE:
When installing the rear differential front member, do not confuse the installation sequence of the stopper.



2) Insert the DOJ of rear drive shaft into rear differential. <Ref. to DI-71, REPLACEMENT, Rear Differential Side Oil Seal.>

NOTE:
Before inserting, replace the differential side oil seal with a new one.

ST 28099PA090 OIL SEAL PROTEXTOR



3) Hereafter, install in the reverse order of removal.

C: INSPECTION

1) Check the rear differential member for damage, bend, or corrosion.
If damage, bend, or corrosion is excessive, replace the rear differential member.
2) Check the bushings of rear differential member for cracking, hardening, or damage.
If cracking, hardening, or damage is excessive, replace the rear differential member.

9. General Diagnostic Table

A: INSPECTION

Symptom or trouble	Possible cause	Remedy
1. Oil leakage	(1) Worn, scratched, or incorrectly seated front or side oil seal. Scored, battered, or excessively worn sliding surface of companion flange.	Repair or replace.
	(2) Clogged or damaged air breather.	Clean, repair or replace.
	(3) Loose bolts on differential spindle or side retainer, or incorrectly fitted O-ring.	Tighten the bolts to specified torque. Replace the O-ring.
	(4) Loose rear cover attaching bolts or damaged gasket.	Tighten the bolts to specified torque. Replace the gasket and apply liquid packing.
	(5) Loose oil filler or drain plug.	Retighten and apply liquid packing.
	(6) Wear, damage or incorrectly fitting for spindle, side retainer and oil seal.	Repair or replace.
2. Seizure NOTE: Seized or damaged parts should be replaced, and also other parts should be thoroughly checked for any defect and should be repaired or replaced as required.	(1) Insufficient backlash for hypoid gear.	Readjust or replace.
	(2) Excessive preload for side, rear, or front bearing.	Readjust or replace.
	(3) Insufficient or improper oil used.	Replace the seized part and fill with specified oil to specified level.
3. Damage NOTE: Damaged parts should be replaced, and also other parts should be thoroughly checked for any defect and should be repaired or replaced as required.	(1) Improper backlash for hypoid gear.	Replace.
	(2) Insufficient or excessive preload for side, rear, or front bearing.	Readjust or replace.
	(3) Excessive backlash for differential gear.	Replace the gear or thrust washer.
	(4) Loose bolts and nuts such as hypoid driven gear bolt.	Retighten.
	(5) Damage due to overloading.	Replace.
4. Noises when starting or shifting gears NOTE: Noises may be caused by differential assembly, universal joint, wheel bearing, etc. Find out what is actually making noise before disassembly.	(1) Excessive backlash for hypoid gear.	Readjust.
	(2) Excessive backlash for differential gear.	Replace the gear or thrust washer.
	(3) Insufficient preload for front or rear bearing.	Readjust.
	(4) Loose drive pinion nut.	Tighten to specified torque.
	(5) Loose bolts and nuts such as side bearing retainer attaching bolt.	Tighten to specified torque.
5. Noises when cornering	(1) Damaged differential gear.	Replace.
	(2) Excessive wear or damage of thrust washer.	Replace.
	(3) Broken pinion mate shaft.	Replace.
	(4) Seized or damaged side bearing.	Replace.

General Diagnostic Table

Symptom or trouble	Possible cause	Remedy
6. Gear noises NOTE: Since noises from engine, muffler, transmission, propeller shaft, wheel bearings, tires, and body are sometimes mistaken for noises from differential assembly, be careful in checking them. Inspection methods to locate noises include coasting, accelerating, cruising, and jacking-up all four wheels. Perform these inspections according to condition of trouble. When listening to noises, shift gears into four wheel drive and fourth speed position, trying to pick up only differential noise.	(1) Improper tooth contact of hypoid gear.	Readjust or replace the hypoid gear set.
	(2) Improper backlash for hypoid gear.	Readjust.
	(3) Scored or chipped teeth of hypoid gear.	Replace the hypoid gear set.
	(4) Seized hypoid gear.	Replace the hypoid gear set.
	(5) Improper preload for front or rear bearings.	Readjust.
	(6) Seized, scored, or chipped front or rear bearing.	Replace.
	(7) Seized, scored, or chipped side bearing.	Replace.
	(8) Vibrating differential carrier.	Replace.

TRANSFER CASE

TC

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1. General Description

A: NOTE

For general description, refer to “4AT”, “5MT” or “6MT” section.
4AT model:
<Ref. to 4AT-2, General Description.>
5MT model:
<Ref. to 5MT-2, General Description.>
6MT model:
<Ref. to 6MT-2, General Description.>

2. Transfer Case and Extension Case Assembly

A: NOTE

For removal, installation and inspection work, refer to “5MT” or “6MT” section.
5MT model:
<Ref. to 5MT-52, Transfer Case and Extension Case Assembly.>
6MT model:
<Ref. to 6MT-49, Extension Case.>

3. Transfer Clutch

A: NOTE

For removal, installation and inspection work, refer to “4AT” section. <Ref. to 4AT-91, Transfer Clutch.>

4. Extension Case

A: NOTE

For removal, installation and inspection work, refer to “4AT” section. <Ref. to 4AT-87, Extension Case.>

5. Oil Seal

A: NOTE

For removal, installation and inspection work, refer to “4AT”, “5MT” or “6MT” section.
4AT model:
<Ref. to 4AT-51, Extension Case Oil Seal.>
5MT model:
<Ref. to 5MT-45, Oil Seal.>
6MT model:
<Ref. to 6MT-31, Oil Seal.>

6. Transfer Drive Gear

A: NOTE

For removal, installation and inspection work, refer to “5MT” or “6MT” section.
5MT model:
<Ref. to 5MT-57, Transfer Drive Gear.>
6MT model:
<Ref. to 6MT-58, Transfer Drive Gear.>

7. Transfer Driven Gear

A: NOTE

For removal, installation and inspection work, refer to “5MT” or “6MT” section.
5MT model:
<Ref. to 5MT-59, Transfer Driven Gear.>
6MT model:
<Ref. to 6MT-60, Transfer Driven Gear.>

8. Reduction Drive Gear

A: NOTE

For removal, installation and inspection work, refer to “4AT” section. <Ref. to 4AT-101, Reduction Drive Gear.>

9. Reduction Driven Gear

A: NOTE

For removal, installation and inspection work, refer to “4AT” section. <Ref. to 4AT-99, Reduction Driven Gear.>

10.Center Differential

A: NOTE

For removal, installation and inspection work, refer to “5MT” or “6MT” section.
5MT model:
<Ref. to 5MT-61, Center Differential.>
6MT model:
<Ref. to 6MT-62, Center Differential.>

11. Transfer Clutch Pressure Test

A: NOTE

For inspection work, refer to “4AT” section. <Ref. to 4AT-40, Transfer Clutch Pressure Test.>

12. Transfer Duty Solenoid and Valve Body

A: NOTE

For removal, installation and inspection work, refer to “4AT” section. <Ref. to 4AT-71, Transfer Duty Solenoid and Valve Body.>

DRIVE SHAFT SYSTEM

DS

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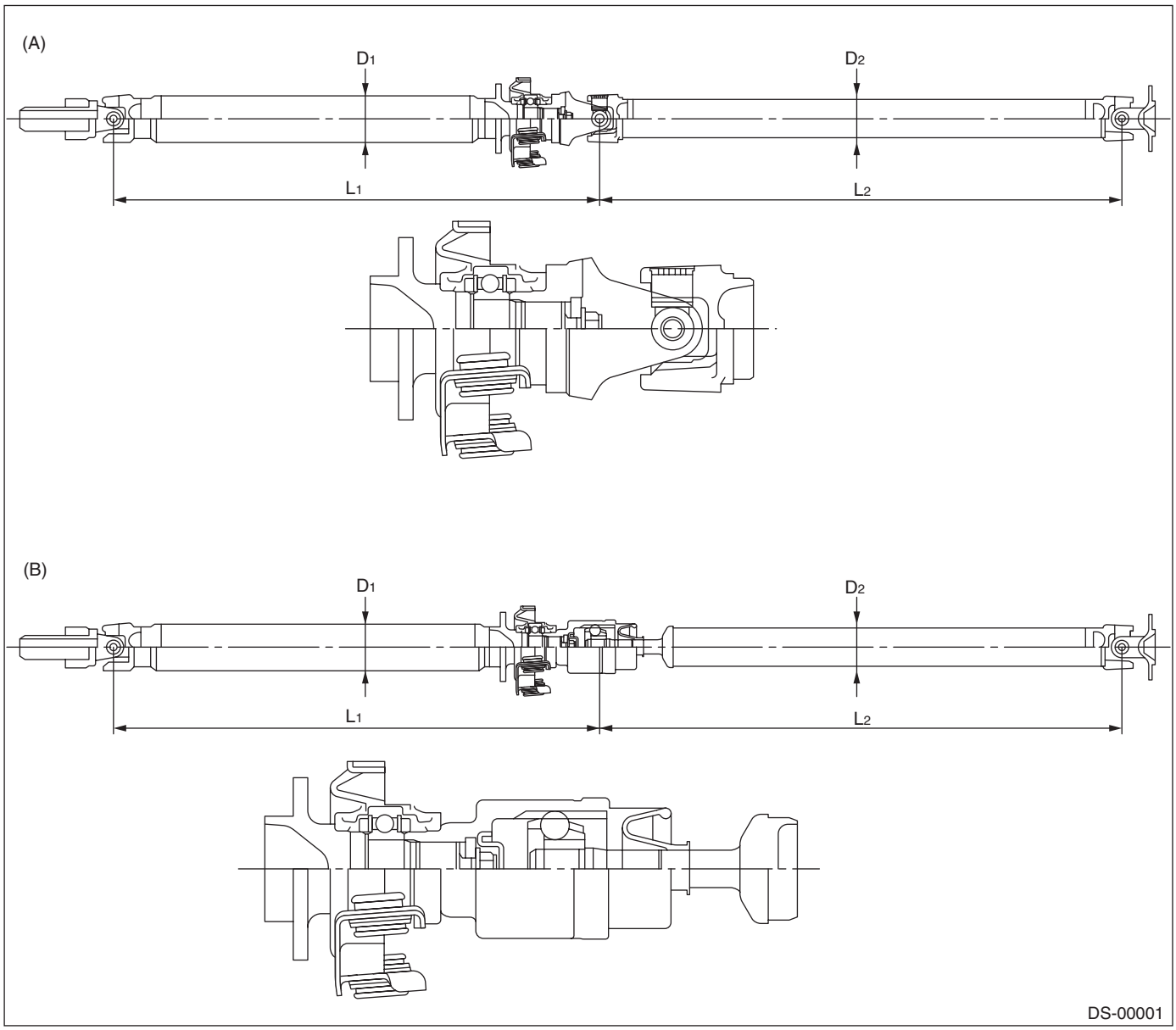
1. General Description

A: SPECIFICATION

1. PROPELLER SHAFT

Model		Non-turbo	Turbo (except STi)	STi	STi★
Propeller shaft type		UJ	DOJ	UJ	UJ
Front propeller shaft Joint-to-joint length: L_1 mm (in)	AT	584 (22.99)	579 (22.79)	—	
	MT	643 (25.32)	638 (25.12)	584 (22.99)	574 (22.60)
Rear propeller shaft Joint-to-joint length: L_2 mm (in)		708 (27.87)	713 (28.07)	708 (27.87)	706 (27.80)
Outer diameter of tube: mm (in)	D_1	63.5 (2.500)			70 (2.756)
	D_2	57.0 (2.244)			

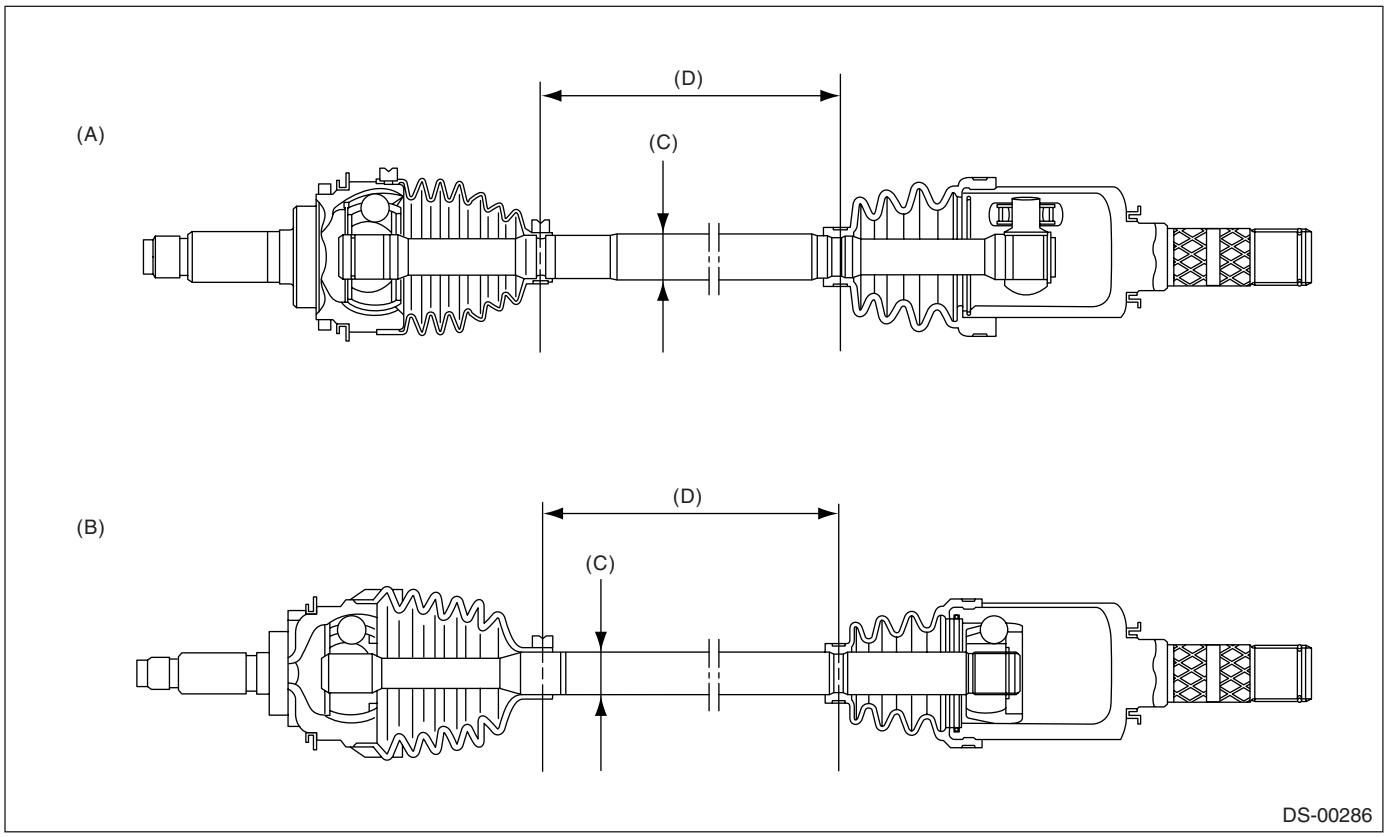
★ : With driver's control center differential



(A) UJ type (B) DOJ type

2. FRONT DRIVE SHAFT ASSEMBLY

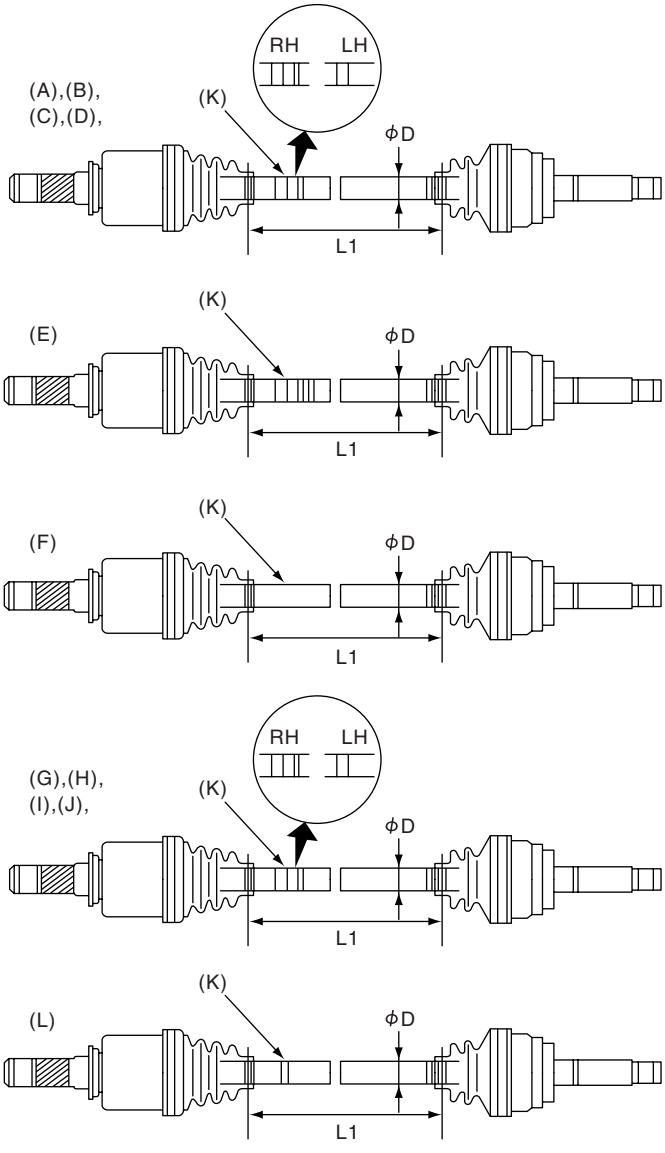
Model		Type of drive shaft	Axle diameter ϕ D mm (in)	Axle length L mm (in)	Identification color of inboard side boot band
Sedan	Non-turbo, Turbo AT	EBJ+PTJ	26 (1.02)	338.8 (13.34)	Large dia. white color
	Turbo MT (except STi)	EBJ+PTJ	28 (1.10)	338.8 (13.34)	Large dia. orange color
	Turbo MT (STi)	BJ+DOJ	28 (1.10)	295.6 (11.64)	Solid color
Wagon	Non-turbo, Turbo AT	EBJ+PTJ	26 (1.02)	329.6 (12.98)	Large dia. red color
	Turbo MT	EBJ+PTJ	28 (1.10)	329.6 (12.98)	Large dia. blue color



(A) EBJ+PTJ
(B) BJ+DOJ
(C) Axle diameter D
(D) Axle length L

3. REAR DRIVE SHAFT ASSEMBLY

Model	Type of drive shaft		No. of identification protrusion on shaft	L1 mm (in)	ϕ D mm (in)	Identification color of inboard side boot band
Sedan turbo (except STi)	A	EBJ+DOJ	2	363 (14.29)	24 (0.94)	Large dia. red color
	B	EBJ+DOJ	1	353 (13.90)	24 (0.94)	
Sedan 2.0 L Non-turbo MT	C	BJ+DOJ	2	368 (14.49)	23 (0.91)	Large dia. white color
	D	BJ+DOJ	1	358 (14.09)	23 (0.91)	
Sedan 1.6 L, 2.0 L Non-turbo AT	E	BJ+DOJ	3	363 (14.29)	24 (0.94)	Large dia. pink color
Wagon 1.6 L, 2.0 L Non-turbo AT	F	BJ+DOJ	None	355 (13.98)	24 (0.94)	Large dia. orange color
Wagon turbo	G	EBJ+DOJ	2	353 (13.90)	24 (0.94)	Small dia. red color
	H	EBJ+DOJ	1	343 (13.50)	24 (0.94)	
Wagon 2.0 L Non-turbo MT	I	BJ+DOJ	2	358 (14.09)	23 (0.91)	Small dia. white color
	J	BJ+DOJ	1	348 (13.70)	23 (0.91)	
Sedan turbo (STi)	L	BJ+DOJ	None	316 (12.44)	25 (0.98)	Solid color

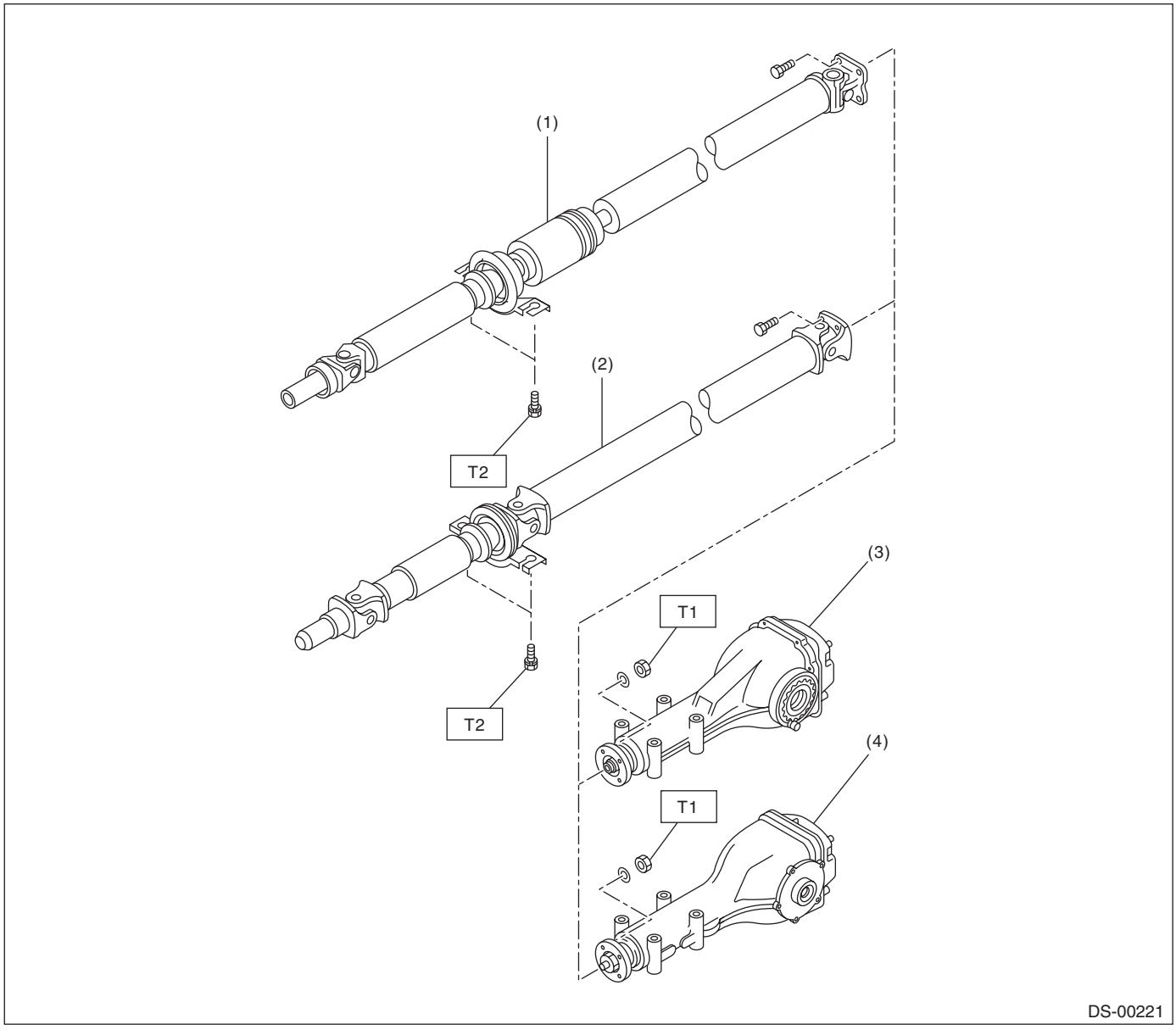


DS-00201

(A) EBJ+DOJ sedan RH
(B) EBJ+DOJ sedan LH
(C) BJ+DOJ sedan R160RH
(D) BJ+DOJ sedan R160LH
(E) BJ+DOJ sedan R152R/L
(F) BJ+DOJ wagon R152R/L
(G) EBJ+DOJ wagon RH
(H) EBJ+DOJ wagon LH
(I) BJ+DOJ wagon R160RH
(J) BJ+DOJ wagon R160LH
(K) Identification protrusion
(L) EBJ+EDJ R180 RH/LH

B: COMPONENT

1. PROPELLER SHAFT

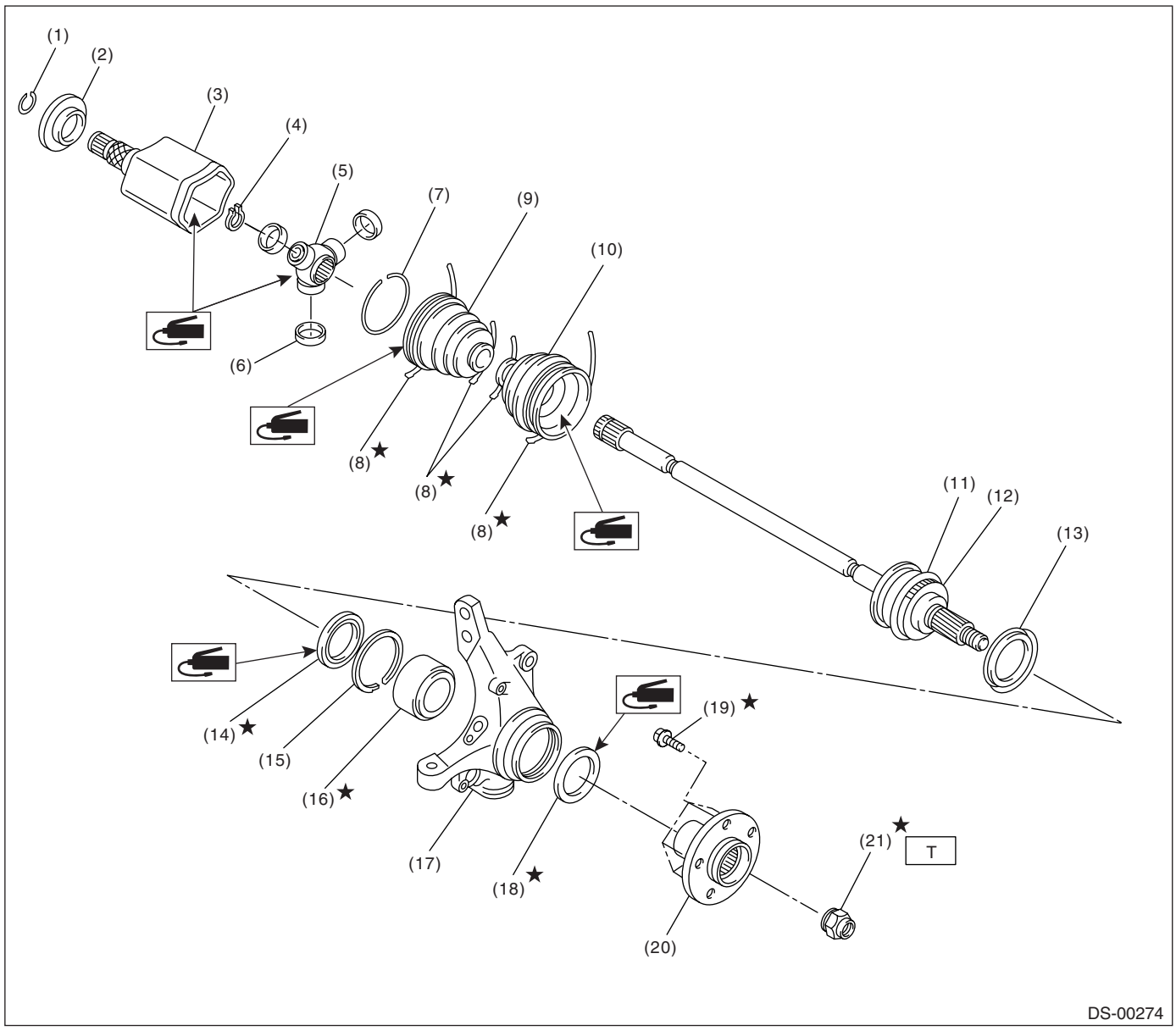


(1) Propeller shaft (DOJ type)
(2) Propeller shaft (UJ type)
(3) Rear differential (VA-type)
(4) Rear differential (T-type)

Tightening torque: N·m (kgf-m, ft-lb)
T1: 31 (3.2, 22.9)
T2: 52 (5.3, 38.3)

2. FRONT AXLE

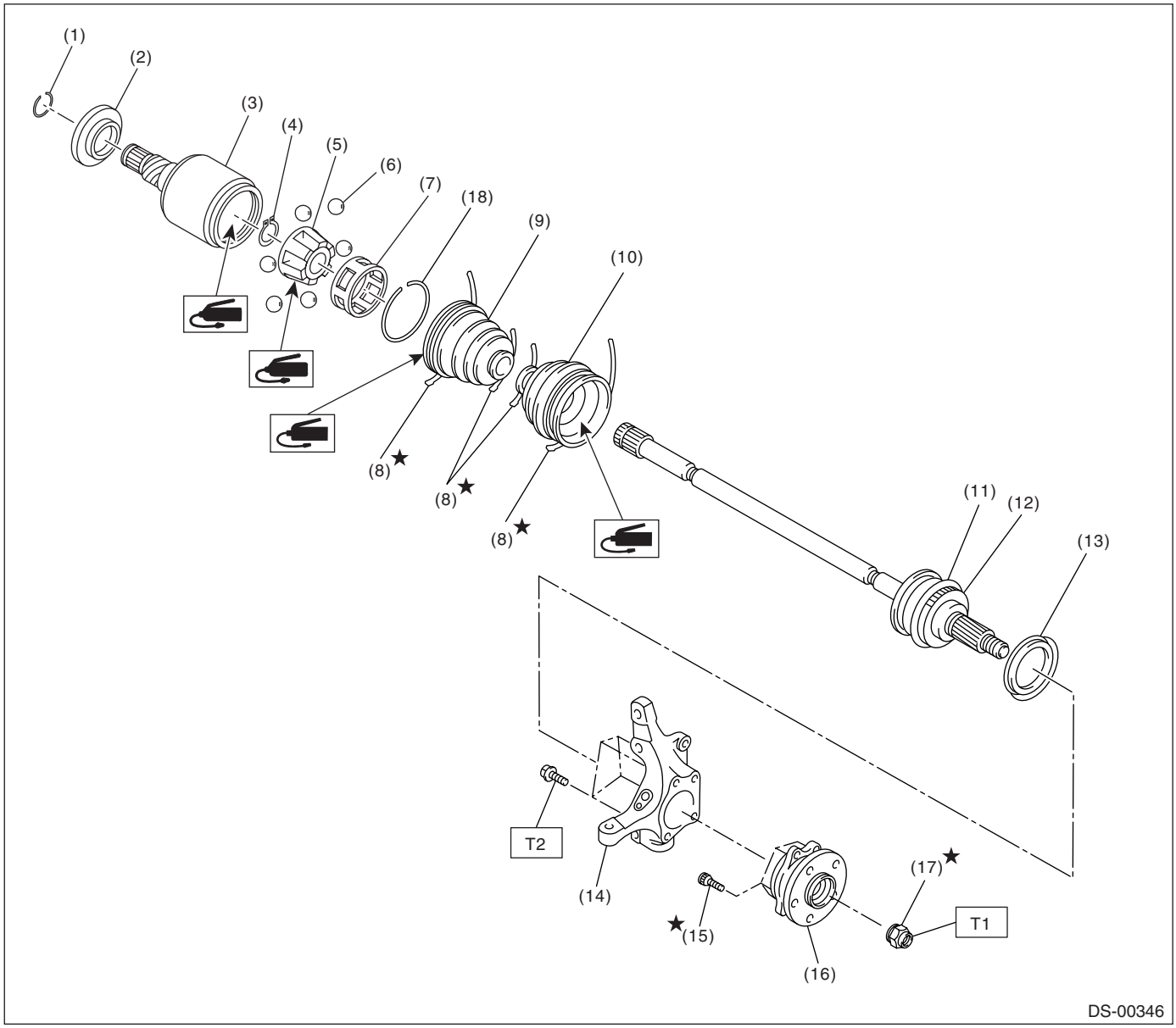
- Except STi model



(1) Circlip
(2) Baffle plate (PTJ)
(3) Outer race (PTJ)
(4) Snap ring
(5) Trunnion
(6) Free ring
(7) Snap ring
(8) Boot band
(9) Boot (PTJ)
(10) Boot (EBJ)
(11) EBJ ASSY
(12) Tone wheel (with ABS)
(13) Baffle plate
(14) Oil seal (IN)
(15) Snap ring
(16) Bearing
(17) Housing
(18) Oil seal (OUT)
(19) Hub bolt
(20) Hub
(21) Axle nut

Tightening torque: N·m (kgf-m, ft-lb)
T: 220 (22.4, 162)

- STi model

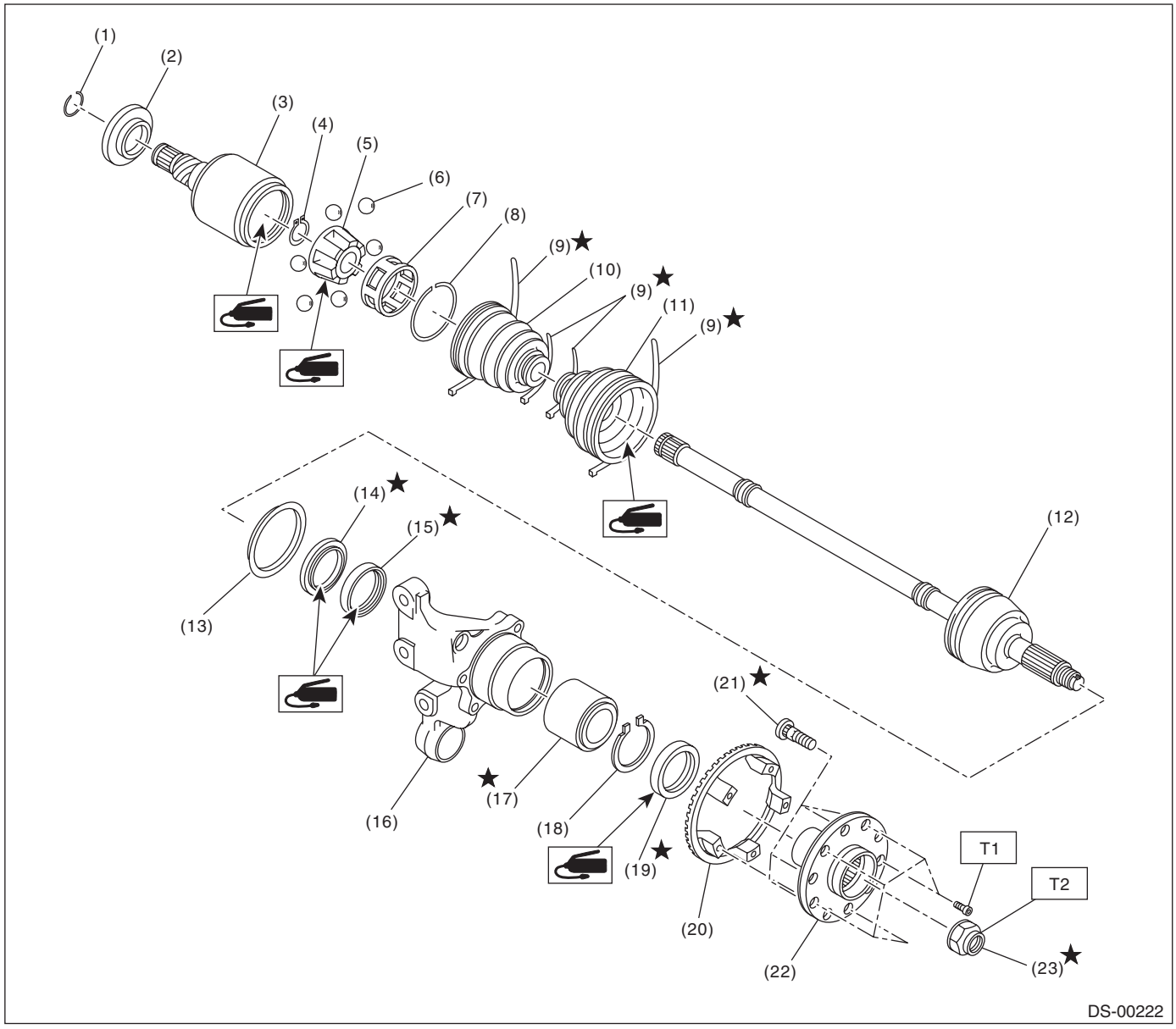


(1) Circlip
(2) Baffle plate
(3) Outer race (DOJ)
(4) Snap ring
(5) Inner race
(6) Ball
(7) Cage
(8) Boot band
(9) Boot (DOJ)
(10) Boot (BJ)
(11) BJ ASSY
(12) Tone wheel
(13) Baffle plate
(14) Housing
(15) Hub bolt
(16) Front unit bearing
(17) Axle nut
(18) Snap ring

Tightening torque: N·m (kgf-m, ft-lb)
T1: 220 (22.4, 162)
T2: 65 (6.6, 48.0)

3. REAR AXLE

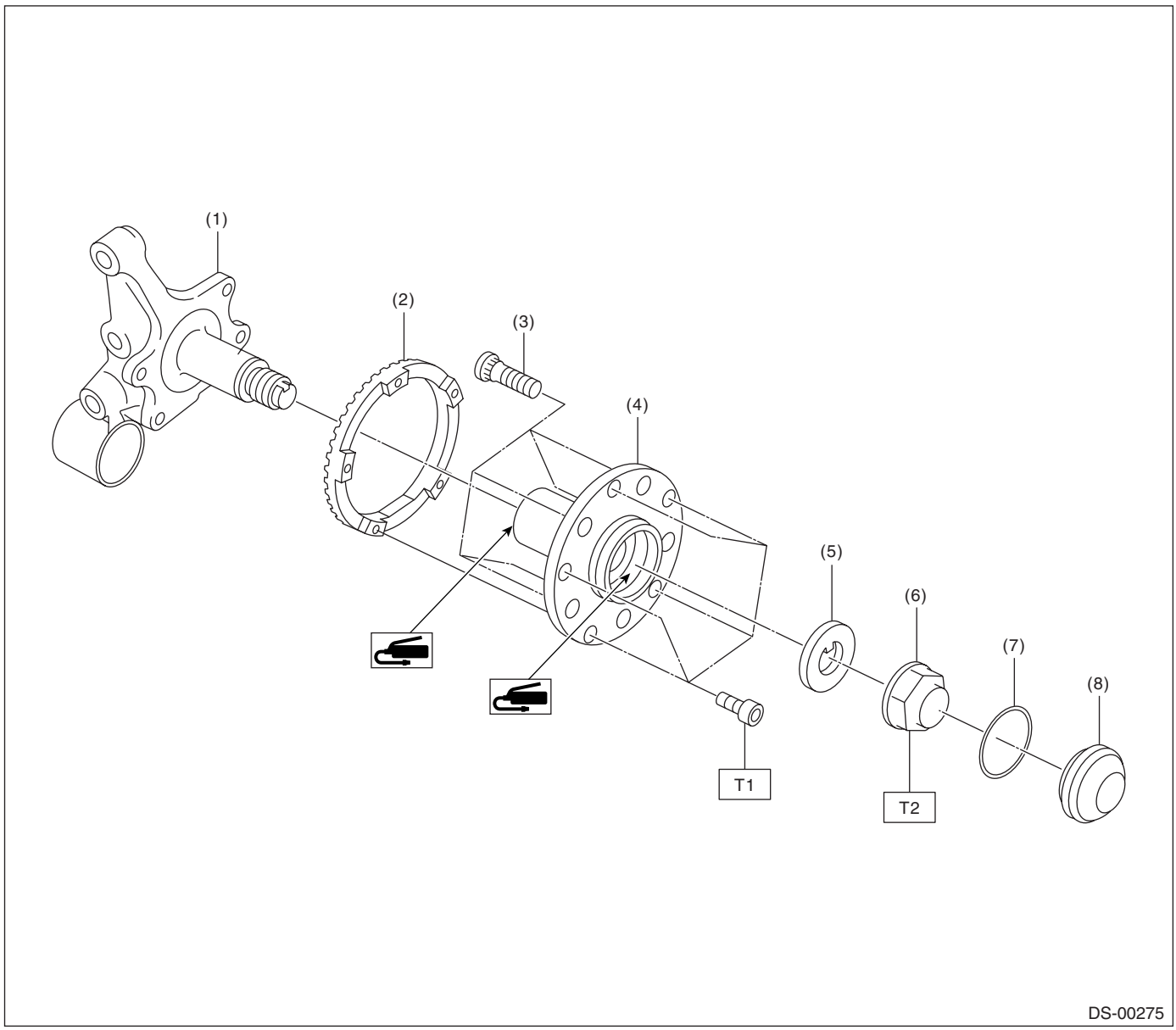
- AWD model



(1) Circlip
(2) Baffle plate (DOJ)
(3) Outer race (DOJ)
(4) Snap ring
(5) Inner race
(6) Ball
(7) Cage
(8) Snap ring
(9) Boot band
(10) Boot (DOJ)
(11) Boot (BJ or EBJ)
(12) Non-turbo: BJ ASSY
Turbo: EBJ ASSY
(13) Baffle plate
(14) Inner oil seal 2
(15) Inner oil seal
(16) Housing
(17) Bearing
(18) Snap ring
(19) Oil seal (OUT)
(20) Tone wheel
(21) Hub bolt
(22) Hub
(23) Axle nut

Tightening torque: N·m (kgf-m, ft-lb)
T1: 13 (1.3, 9.4)
T2: 190 (19.4, 140)

- FWD model



(1) Rear spindle
(2) Tone wheel
(3) Hub bolt
(4) Hub
(5) Washer
(6) Axle nut
(7) O-ring
(8) Hub cap

Tightening torque: N·m (kgf-m, ft-lb)
T1: 13 (1.3, 9.4)
T2: 190 (19.4, 140)

C: CAUTION

• Wear working clothing, including a cap, protective goggles and protective shoes during operation.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly, and replacement.
• Remove contamination including dirt and corrosion before removal, installation or disassembly.
• Keep the disassembled parts in order and protect them from dust or dirt.
• Be careful not to burn, because each part on the vehicle is hot after running.
• Be sure to tighten fasteners including bolts and nuts to the specified torque.
• Place shop jacks or rigid racks at the specified points.
• Use SUBARU genuine grease etc. or the equivalent. Do not mix grease etc. with that of another grade or from other manufacturers.
• Apply grease onto sliding or revolution surfaces before installation.
• Before installing snap rings, apply sufficient amount of grease to avoid damage and deformation.
• Before securing a part on a vise, place cushioning material such as wood blocks, aluminum plate, or shop cloth between the part and the vise.

D: PREPARATION TOOL

1. SPECIAL TOOLS

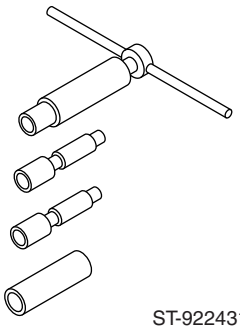
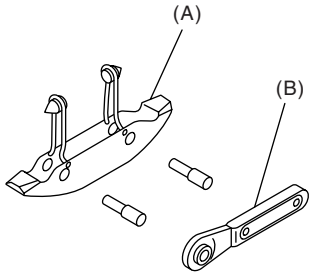
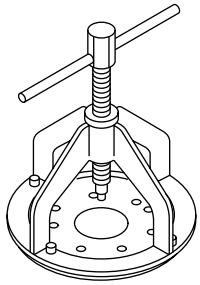
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-922431000	922431000	AXLE SHAFT INSTALLER	• Used for installing axle shaft into housing. • Used with ADAPTER (927390000).
 ST-925091000	925091000	BAND TIGHTENING TOOL	Used for tightening boot band. (A) Jig for band (B) Ratchet wrench
 ST-926470000	926470000	AXLE SHAFT PULLER	• Used for removing axle shaft. • Used with AXLE SHAFT PULLER PLATE (28099PA110).

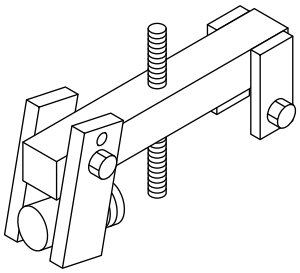
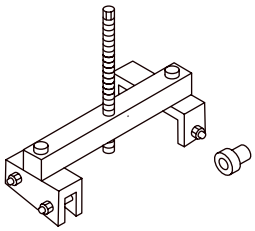
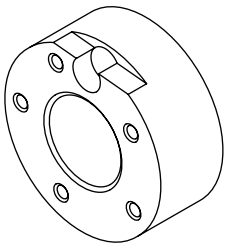
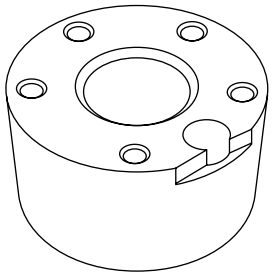
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-927060000	927060000	HUB REMOVER	• Used for removing front hub (Except STi model). • Used with HUB STAND (927080000).
 ST-927420000	927420000	HUB REMOVER	• Used for removing rear hub. • Used with HUB STAND (927080000 or 28099PA080).
 ST-927080000	927080000	HUB STAND	Used for disassembling and assembling hub bolt in hub (Except STi model).
 ST28099PA080	28099PA080	HUB STAND	Used for disassembling and assembling hub bolt in hub (STi model).

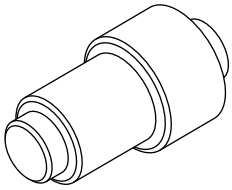
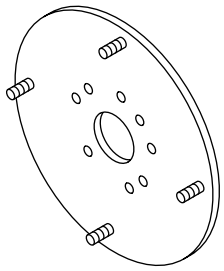
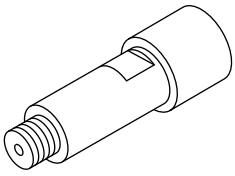
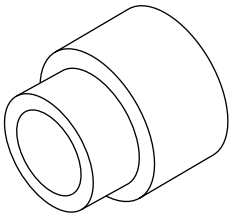
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-927100000	927100000	BEARING PULLER	• Used for disassembling and assembling front housing bearing (Except STi model). • Used with HOUSING STAND (927400000).
 ST28099PA110	28099AP110	AXLE SHAFT PULLER PLATE	Used with AXLE SHAFT PULLER (926470000).
 ST-927390000	927390000	ADAPTER	Used as an adapter for AXLE SHAFT INSTALLER (922431000).
 ST-927400000	927400000	HOUSING STAND	• Used for disassembling and assembling front housing bearing (Except STi model). • Used with BEARING PULLER (927100000).

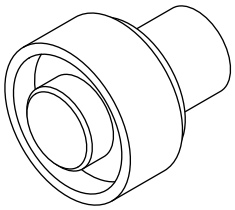
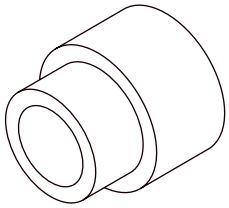
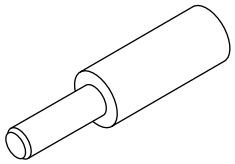
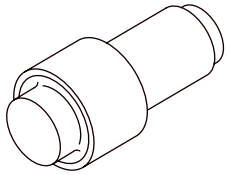
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-927410000	927410000	OIL SEAL INSTALLER	• Used for installing oil seal into front housing (Except STi model). • Used with HOUSING STAND (927400000).
 ST-927430000	927430000	HOUSING STAND	Used for disassembling and assembling rear housing bearing (Except STi model).
 ST-927120000	927120000	HUB INSTALLER	Used for installing front hub (Except STi model).
 ST-927440000	927440000	BEARING REMOVER	• Used for disassembling and assembling rear wheel bearing (Except STi model). • Used with HOUSING STAND (927430000).

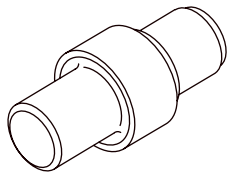
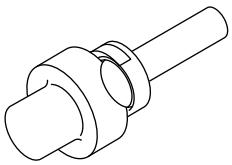
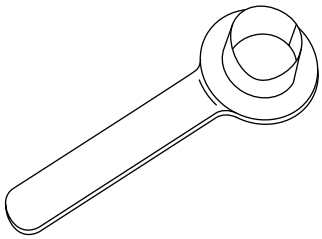
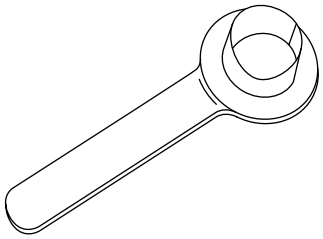
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-927460000	927460000	OIL SEAL INSTALLER	• Used for installing outer oil seal (Except STi model). • Used with HOUSING STAND (927430000).
 ST-927450000	927450000	HUB INSTALLER	• Used for pressing hub bearing into hub (Except STi model). • Used with HUB STAND (927080000).
 ST28099PA090	28099PA090	OIL SEAL PROTECTOR	• Used for installing rear drive shaft into rear differential. • For protecting oil seal.
 ST28399SA010	28399SA010	OIL SEAL PROTECTOR	• Used for installing front drive shaft to transmission. • For protecting oil seal.

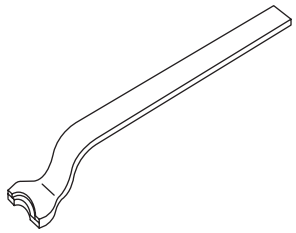
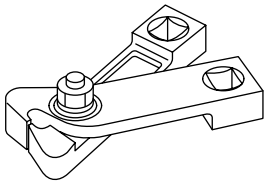
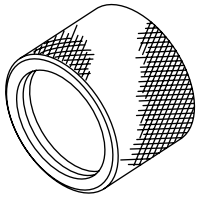
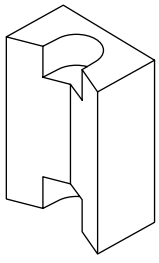
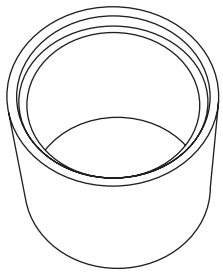
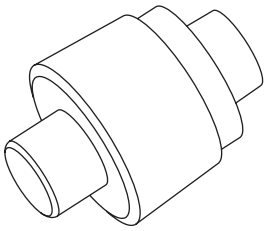
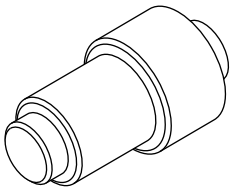
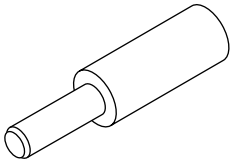
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST28099PA100	28099PA100	DRIVE SHAFT REMOVER	Used for removing rear drive shaft from rear differential.
 ST28099AC000	28099AC000	BOOT BAND PLIERS	Used for tightening front BJ boot band.
 ST18675AA000	18675AA000	DIFFERENTIAL SIDE OIL SEAL INSTALLER	Used for installing differential side retainer oil seal.
 ST28399AG000	28399AG000	HUB STAND	Used for extracting hub bolt. (STi model)

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST28099PA060	28099PA060	HOUSING STAND	Used for disassembling and assembling rear housing bearing. (STi model)
 ST28099PA070	28099PA070	OIL SEAL INSTALLER	• Used for press-fitting the rear housing oil seal. (STi model) • Used with HOUSING STAND (28099PA060).
 ST-927100000	927100000	BEARING INSTALLER	• Used for disassembling and assembling rear wheel bearing. (STi model) • Used with HOUSING STAND (28099PA060).
 ST-927120000	927120000	HUB INSTALLER	• Used for installing rear hub. (STi model) • Used with HUB STAND (28099PA060).

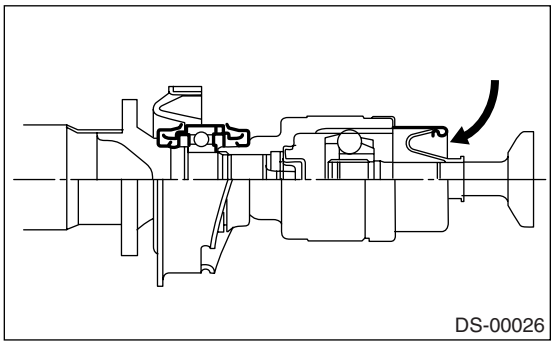
2. GENERAL PURPOSE TOOLS

TOOL NAME	REMARKS
Puller	Used for removing ball joint from knuckle arm.
Dial gauge	Used for inspecting propeller shaft run-out.
Snap ring pliers	Used for installing and removing snap ring.
Pinch bar	Used for removing drive shaft.

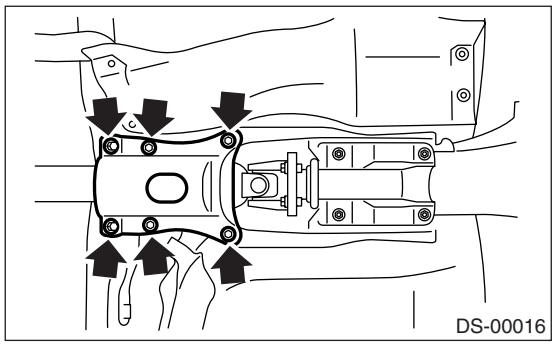
2. Propeller Shaft

A: REMOVAL

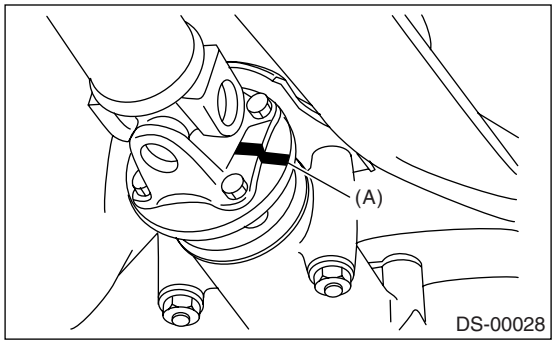
NOTE:
• Before removing the propeller shaft, wrap the metal parts with a cloth or rubber material.
• In case of DOJ type, before removing the propeller shaft, wrap the metal parts (installed at the rubber boot of center DOJ) with a cloth or rubber material, as shown in the figure. Rubber boot may be damaged due to interference with adjacent metal parts while bending the DOJ during removal.


DS-00026

1) Disconnect the ground cable from battery.
2) Move the select lever or gear shift lever to “N”.
3) Release the parking brake.
4) Jack-up the vehicle and support it with sturdy racks.
5) Remove the center exhaust pipes.
6) Remove the rear exhaust pipe and muffler.
7) Remove the differential mount front cover.


DS-00016

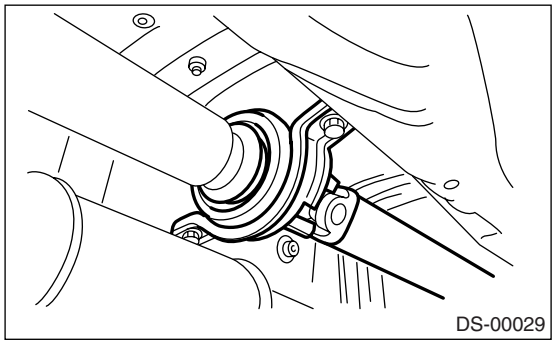
8) Make matching marks on affected parts before removal.



DS-00028

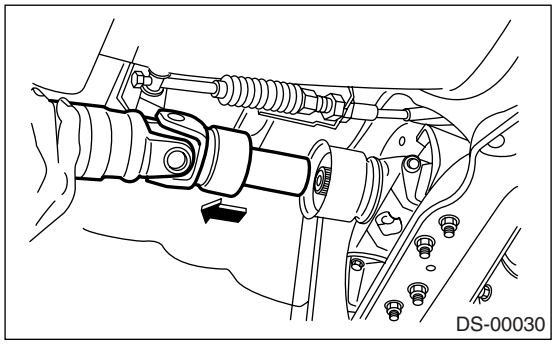
(A) Matching mark

9) Remove the three bolts which hold the propeller shaft to rear differential.
10) Remove the remaining bolt.
11) Remove the two bolts which hold the center bearing to vehicle body.


DS-00029

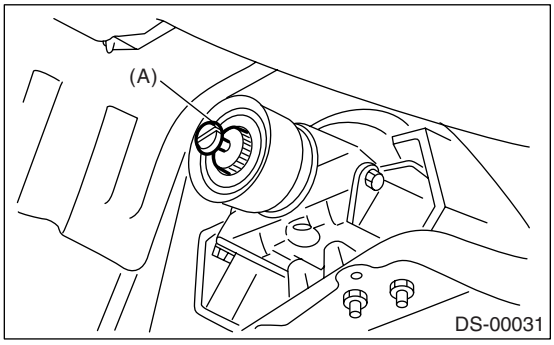
12) Remove the propeller shaft from transmission.

CAUTION:
• Be careful not to damage the oil seals and frictional surface of sleeve yoke.
• Cover the center exhaust pipe with a cloth to keep off any ATF or oil spilled from transmission when removing the propeller shaft.


DS-00030

13) Install the extension cap to transmission.

NOTE:
If the extension cap is not available, place a vinyl bag over opening and fasten it with string to prevent gear oil or ATF from leaking.

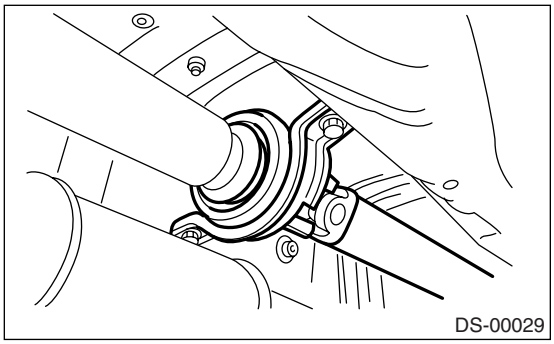


(A) Extension cap

B: INSTALLATION

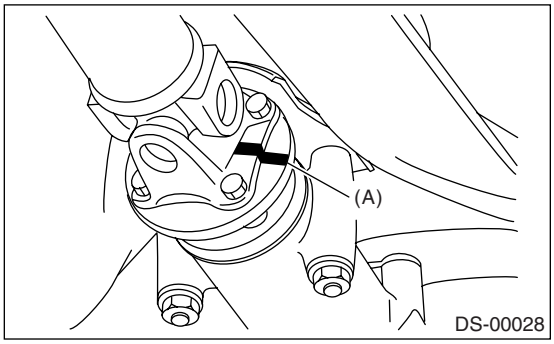
1) Insert the sleeve yoke into transmission, and then attach the center bearing to body.

Tightening torque:
52 N·m (5.3 kgf-m, 38.3 ft-lb)



2) Align the matching marks, and then connect the flange yoke and rear differential.

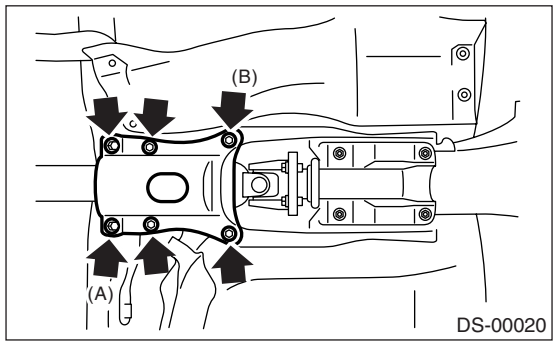
Tightening torque:
31 N·m (3.2 kgf-m, 22.9 ft-lb)



(A) Matching mark

3) Using new bolts, install the differential mount front cover.
(1) Temporarily tighten the bolt (A) while pushing cover forward.
(2) Tighten the bolt (B) to specified torque.
(3) Tighten the bolt (A) to specified torque.
(4) Tighten the remaining bolts to specified torque.

Tightening torque:
90 N·m (9.2 kgf-m, 66 ft-lb)



4) Install the center exhaust pipes.
5) Install the rear exhaust pipe and muffler.

C: INSPECTION

NOTE:
Do not disassemble the propeller shaft. Check the following and replace if necessary.

1) Tube surfaces for dents or cracks
2) Splines for deformation or abnormal wear
3) Joints for non-smooth operation or abnormal noise
4) Center bearing for free play, noise or non-smooth operation
5) Oil seals for abnormal wear or damage
6) Center bearing for breakage

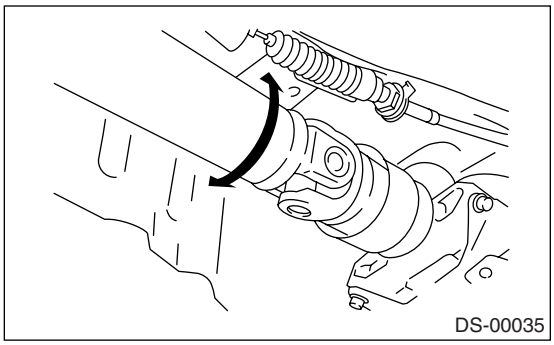
Check the following points with propeller shaft installed in vehicle.

1. JOINTS AND CONNECTIONS

1) Remove the center exhaust pipes.
2) Remove the heat shield cover.
3) Check for any looseness of the yoke flange mounting bolts which connect to rear differential and center bearing bracket mounting bolts.

2. SPLINES AND BEARING LOCATIONS

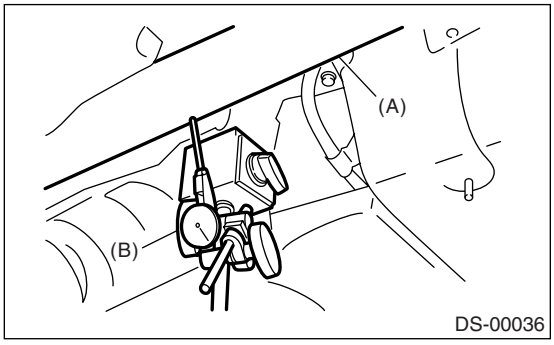
1) Remove the center exhaust pipes.
2) Remove the rear exhaust pipe and muffler.
3) Remove the heat shield cover.
4) Turn the propeller shaft by hand to see if abnormal free play exists at splines. Also move the yokes to see if abnormal free play exists at spiders and bearings.



3. RUNOUT OF PROPELLER SHAFT

1) Remove the center exhaust pipes.
2) Remove the rear exhaust pipe and muffler.
3) Remove the heat shield cover.
4) Set the dial gauge with its indicator stem at center of propeller shaft tube.
5) Turn the propeller shaft slowly by hands to check for “runout” of propeller shaft.

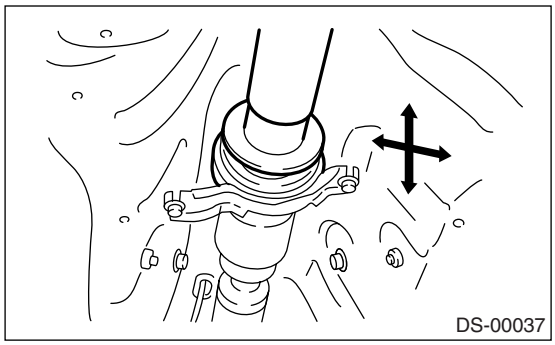
Runout:
Limit 0.6 mm (0.024 in)



(A) Propeller shaft
(B) Dial gauge

4. CENTER BEARING FREE PLAY

1) Remove the front and center exhaust pipes.
2) Remove the rear exhaust pipe and muffler.
3) Remove the heat shield cover.
4) Move the propeller shaft near center bearing up and down, and left and right with your hand to check for any abnormal bearing free play.

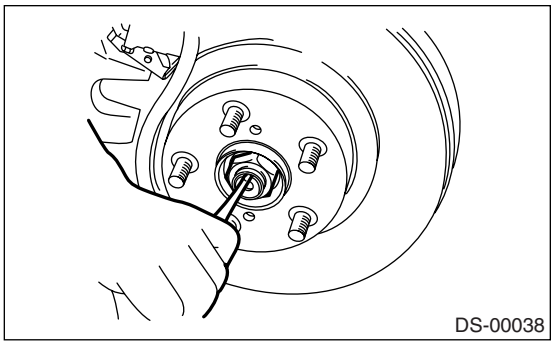


3. Front Axle

A: REMOVAL

1. EXCEPT STi MODEL

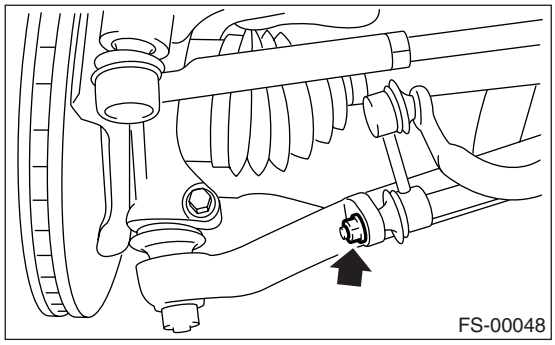
1) Lift-up the vehicle and remove the front wheels.
2) Unlock the axle nut.



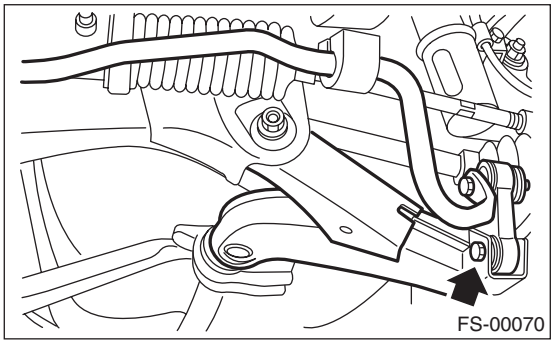
3) Remove the axle nut using a socket wrench while depressing the brake pedal.

CAUTION:
Remove the axle nut with vehicle weight not applied on axle. Failure to follow this rule may damage the wheel bearings.

4) Remove the stabilizer link.
SEDAN:



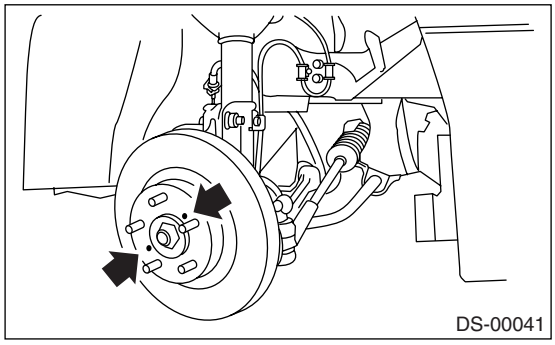
WAGON:



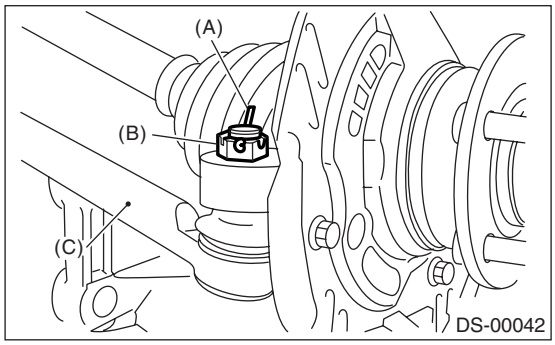
5) Remove the disc brake caliper from housing, and suspend it from strut using a wire.

6) Remove the disc rotor from hub.

NOTE:
If the disc rotor seizes up within hub, drive disc rotor out by installing an 8-mm bolt in screw hole on rotor.

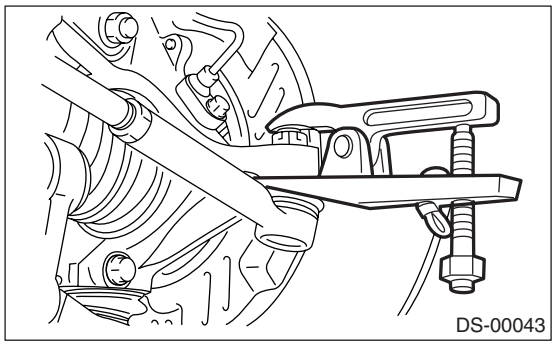


7) Remove the cotter pin and castle nut which secure tie-rod end to housing knuckle arm.

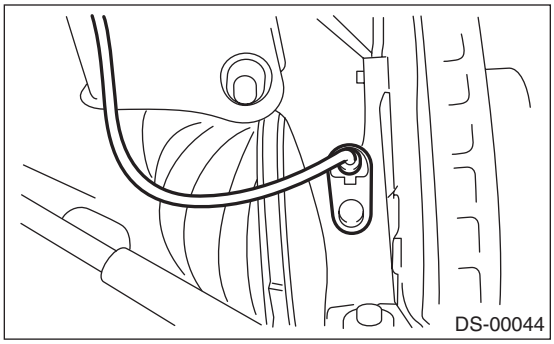


(A) Cotter pin
(B) Castle nut
(C) Tie-rod

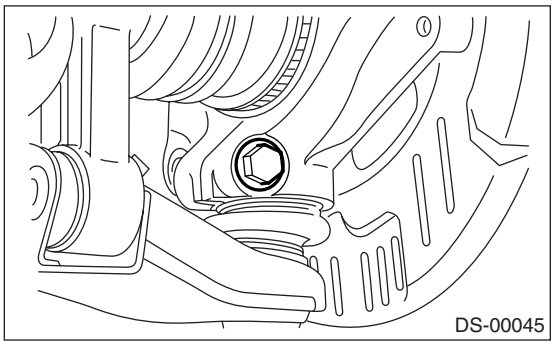
8) Using a puller, remove the tie-rod ball joint from knuckle arm.



9) Remove the ABS wheel speed sensor assembly and harness.



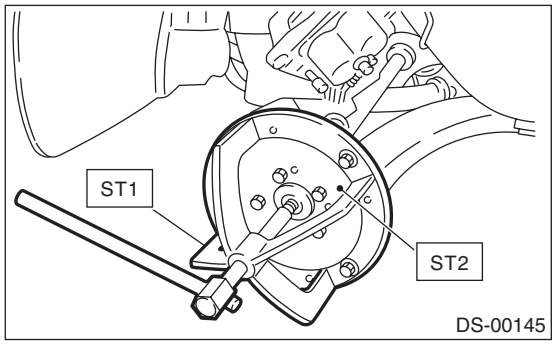
10) Remove the transverse link ball joint from housing.



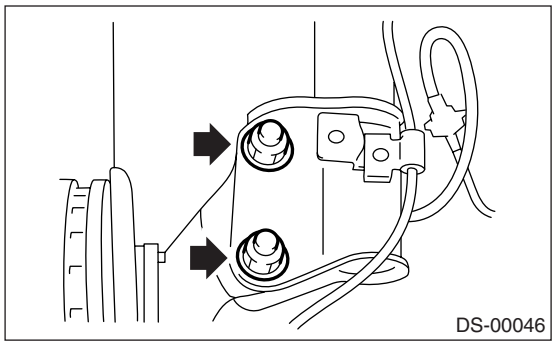
11) Remove the front drive shaft assembly from hub. If it is hard to remove, use the STs.

ST1	926470000	AXLE SHAFT PULLER
ST2	28099PA110	AXLE SHAFT PULLER PLATE

CAUTION:
• Be sure to replace the differential side retainer oil seal at transmission side with a new one when removing the front drive shaft.
• Suspend the front drive shaft to vehicle body using a wire.



12) After scribing an alignment mark on the camber adjusting bolt head, remove the bolts which connect the housing and strut, and disconnect the housing from strut.



2. STi MODEL

NOTE:
• When remove the housing, refer to Front Axle REMOVAL Except for STi model. <Ref. to DS-20, EXCEPT STi MODEL, REMOVAL, Front Axle.>
• When remove the hub bearing, refer to Hub Unit Bearing REMOVAL. <Ref. to DS-26, REMOVAL, Front Hub Unit Bearing.>

B: INSTALLATION

1) Temporarily tighten the front axle to front strut.
2) Insert the front drive shaft into front axle.
3) Temporarily tighten the axle nut.
4) Install the transverse link ball joint to housing.

Tightening torque:
50 N·m (5.1 kgf-m, 37 ft-lb)

5) While aligning the alignment mark on the camber adjusting bolt head, tighten the housing and strut using a new self-locking nut.

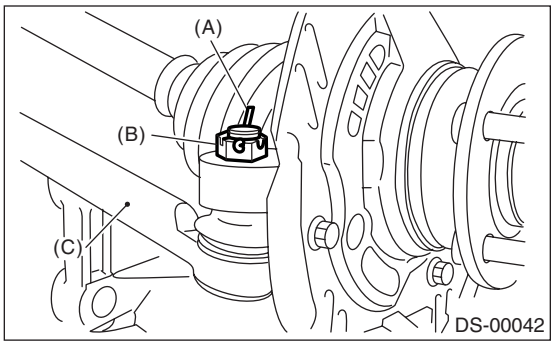
Tightening torque:
175 N·m (17.8 kgf-m, 129 ft-lb)

6) Connect the tie-rod end ball joint to the knuckle arm with a castle nut.

Tightening torque:
27.0 N·m (2.75 kgf-m, 19.9 ft-lb)

CAUTION:
When connecting, do not hit the cap at bottom of tie-rod with hammer.

7) Tighten the castle nut to specified torque and tighten further within 60° until the pin hole is aligned with the slot in nut. Bend the cotter pin to lock.



(A) Cotter pin
(B) Castle nut
(C) Tie-rod

8) Install the disc rotor on hub.
9) Install the disc brake caliper on housing.

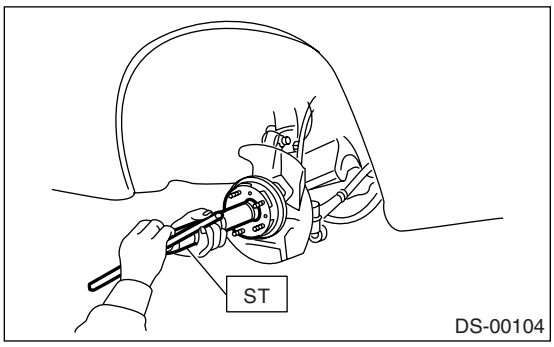
Tightening torque:
80 N·m (8.2 kgf-m, 59 ft-lb)

10) Connect the stabilizer link.

Tightening torque:
45 N·m (4.6 kgf-m, 33 ft-lb)

CAUTION:
Use a new self-locking nut.

11) Using the ST1 and ST2, pull the front drive shaft into place.
ST1 922431000 AXLE SHAFT INSTALLER
ST2 927390000 ADAPTER

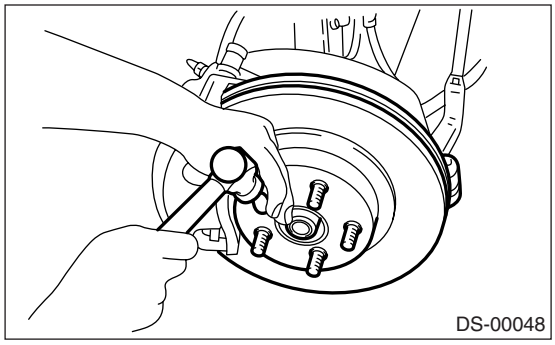


12) While depressing the brake pedal, tighten a new axle nut to specified torque and lock it securely.

Tightening torque:
220 N·m (22.4 kgf-m, 162 ft-lb)

CAUTION:
Be sure to tighten the axle nut to specified torque. Do not overtighten it as this may damage the wheel bearing.

13) After tightening the axle nut, lock it securely.



14) Install the ABS wheel speed sensor on housing.

Tightening torque:
32 N·m (3.3 kgf-m, 23.9 ft-lb)

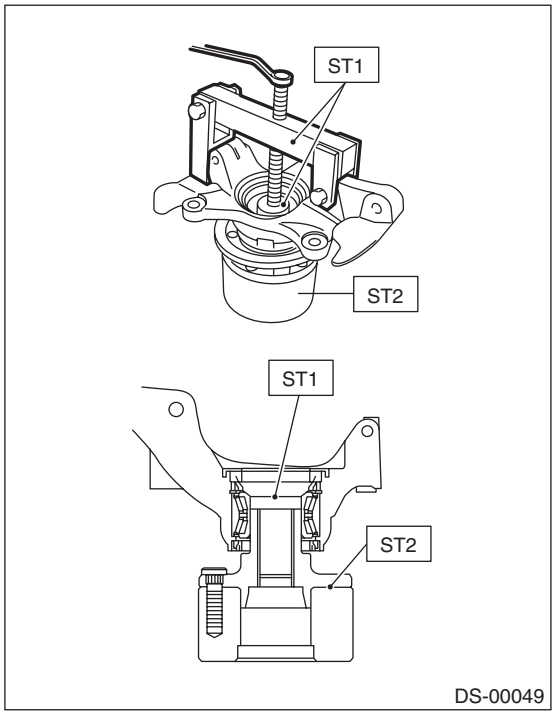
15) Install the wheel and tighten the wheel nuts to specified torque.

Tightening torque:
90 N·m (9.2 kgf-m, 66 ft-lb)

C: DISASSEMBLY

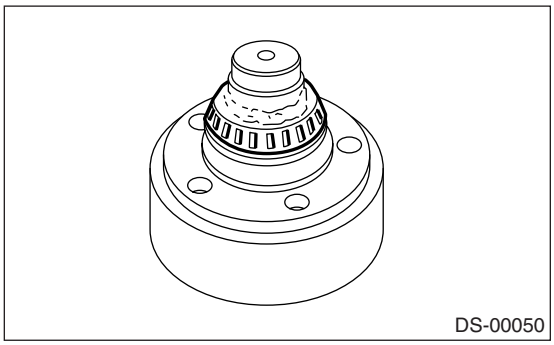
1. EXCEPT STi MODEL

1) Using the ST1, support the housing and hub securely.
2) Attach the ST2 to housing and drive the hub out.
ST1 927060000 HUB REMOVER
ST2 927080000 HUB STAND



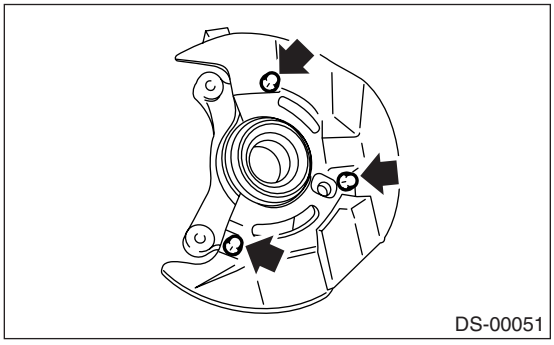
If the inner bearing race remains in hub, remove it with a suitable tool (commercially available).

NOTE:
Be careful not to scratch the polished area of hub.


DS-00050

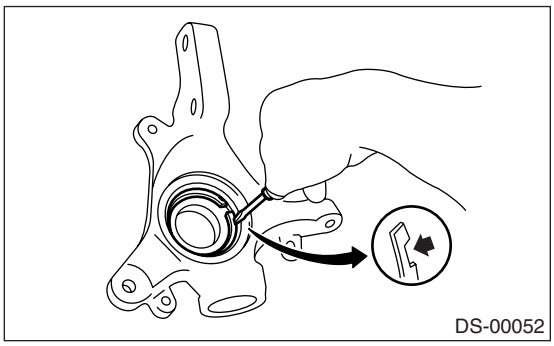
CAUTION:
Do not reuse the bearing if the hub was removed.

3) Remove the disc cover from housing.

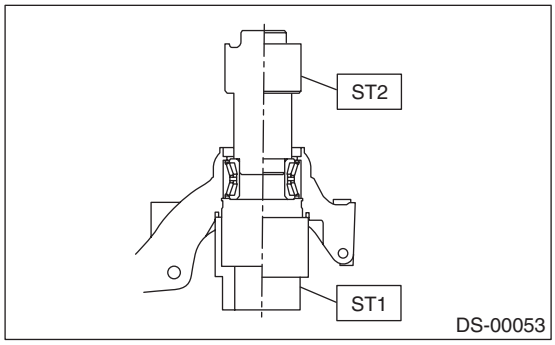

DS-00051

4) Using a standard screwdriver, remove the outer and inner oil seals.
5) Using a flat tip screwdriver, remove the snap ring.

NOTE:
Be careful not to damage the housing at removal.

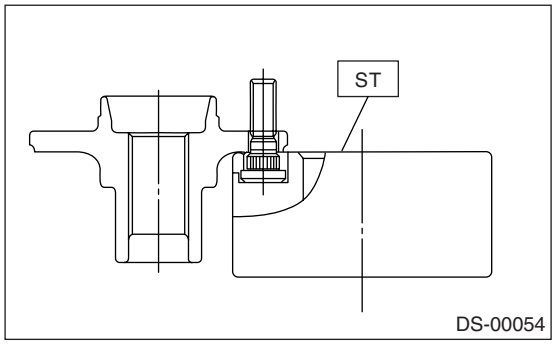

DS-00052

6) Using the ST1, support the housing securely.
7) Using the ST2, hold the inner race to drive out the outer race of bearing.
ST1 927400000 HOUSING STAND
ST2 927100000 BEARING PULLER



DS-00053

8) Using the ST and a hydraulic press, drive the hub bolts out.
ST 927080000 HUB STAND



DS-00054

2. STi MODEL

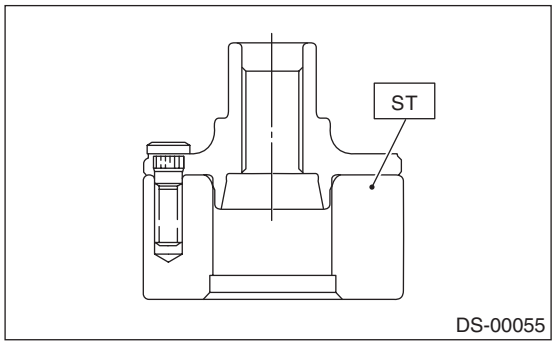
Disassemble the front hub unit bearing. <Ref. to DS-27, DISASSEMBLY, Front Hub Unit Bearing.>

D: ASSEMBLY

1. EXCEPT STi MODEL

NOTE:
When the hub is to be removed from housing, replace the bearing set and oil seal with new ones.

1) Attach the hub to ST securely.
ST 927080000 HUB STAND



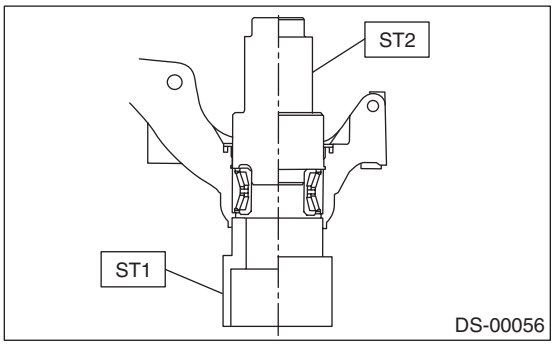
DS-00055

2) Using a hydraulic press, press new hub bolts until their seating surfaces contact the hub.

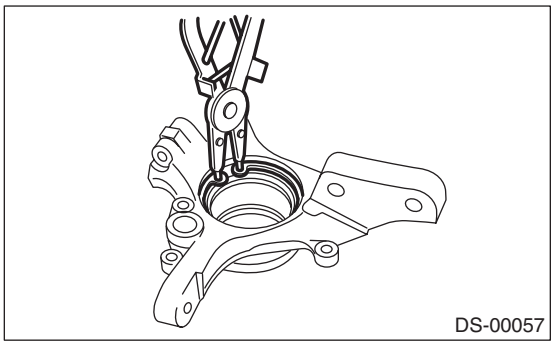
NOTE:
Use 12 mm (0.47 in) dia. holes in HUB STAND to prevent bolts from tilting.

3) Clean dust or foreign particles from inside of housing.
4) Using the ST1 and ST2, press a new bearing into place.
ST1 927400000 HOUSING STAND
ST2 927100000 BEARING PULLER

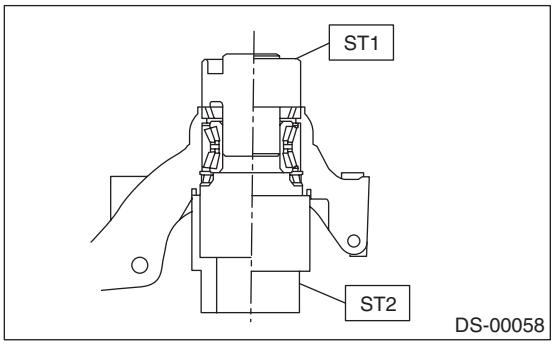
NOTE:
• Always press the outer race when installing the bearing.
• Be careful not to remove the plastic lock from inner race when installing the bearing.



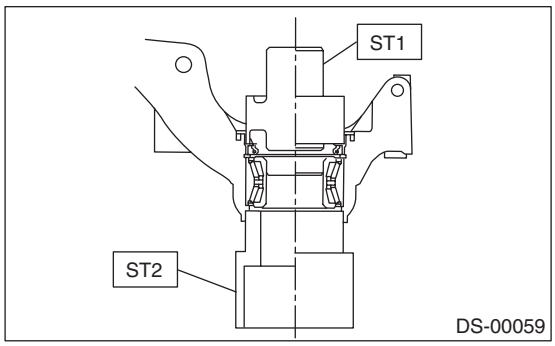
5) Using pliers, install the snap ring firmly.



6) Using the ST1 and ST2, press the outer oil seal until it contacts the bottom of housing.
ST1 927410000 OIL SEAL INSTALLER
ST2 927400000 HOUSING STAND



7) Using the ST1 and ST2, press the inner oil seal until it contacts the circlip.
ST1 927410000 OIL SEAL INSTALLER
ST2 927400000 HOUSING STAND



8) Invert the ST and housing.
ST 927400000 HOUSING STAND
9) Apply sufficient grease to the oil seal lip.

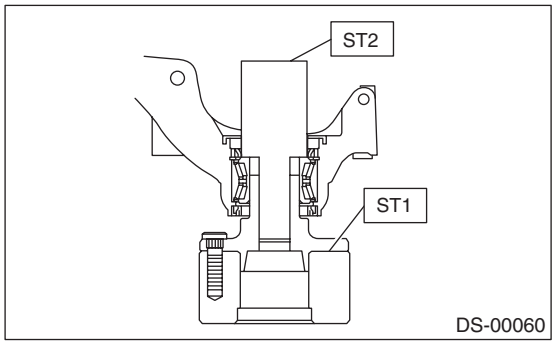
Specified grease:
SHELL 6459N

NOTE:
• If specified grease is not available, remove the bearing grease and apply Auto Rex A instead.
• Do not mix different types of grease.

10) Install the disc cover to housing with three bolts.

Tightening torque:
18 N·m (1.8 kgf-m, 13.0 ft-lb)

11) Attach the hub to ST1 securely.
12) Clean dust or foreign particles from the polished surface of hub.
13) Using the ST2, press the bearing into hub by driving the inner race.
ST1 927080000 HUB STAND
ST2 927120000 HUB INSTALLER

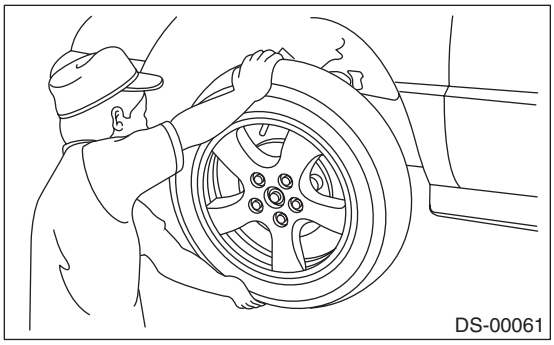


2. STi MODEL

Assembly the front hub unit bearing. <Ref. to DS-27, ASSEMBLY, Front Hub Unit Bearing.>

E: INSPECTION

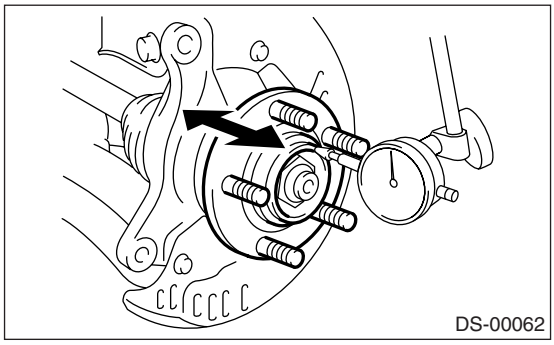
1) Moving the front tire up and down by hand, check there is no backlash in bearing, and check the wheel rotates smoothly.


DS-00061

2) Inspect the lean of axis direction using a dial gauge. Replace the hub bearing if the load range exceeds the limitation.

Limit:

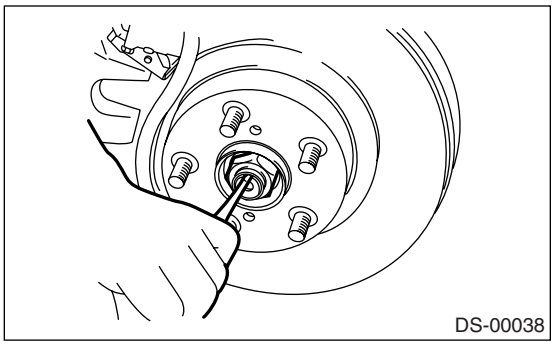
Maximum: 0.05 mm (0.0020 in)


DS-00062

4. Front Hub Unit Bearing

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Lift-up the vehicle and remove the front wheels.
3) Unlock the axle nut.

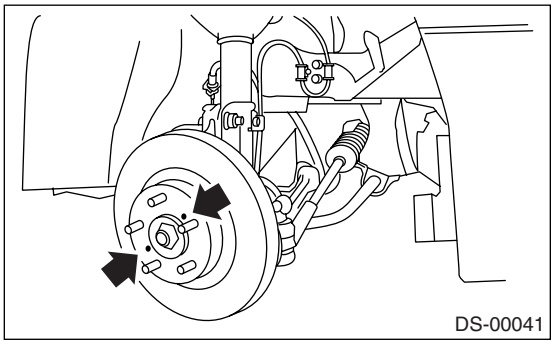


4) Remove the axle nut using a socket wrench while depressing the brake pedal.

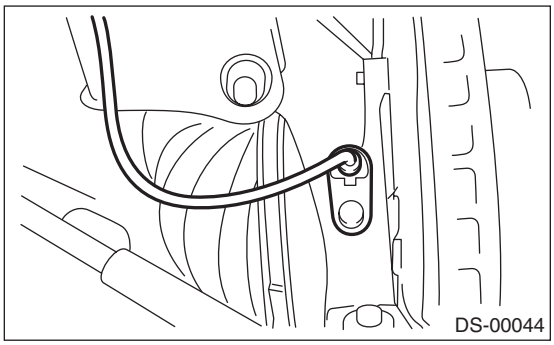
CAUTION:
Remove the wheel before loosening the axle nut. Failure to follow this rule may damage the wheel bearings.

5) Remove the disc brake caliper from housing, and suspend it from strut using a wire.
6) Remove the disc rotor from hub.

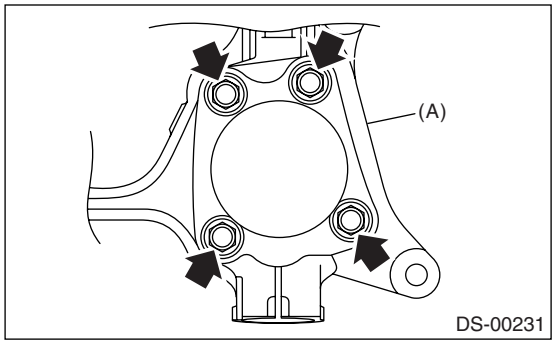
NOTE:
If the disc rotor seizes up within hub, drive disc rotor out by installing an 8-mm bolt in screw hole on rotor.



7) Remove the ABS wheel speed sensor assembly and harness.



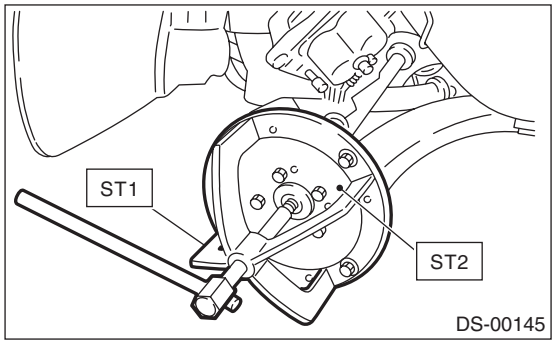
8) Remove four bolts from housing.



(A) Housing

9) Remove the front hub unit bearing. If it is hard to remove, use STs.

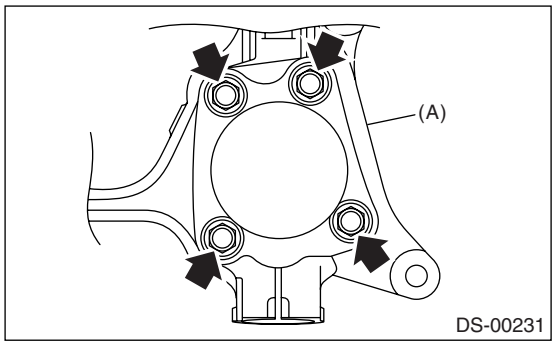
ST1	926470000	AXLE SHAFT PULLER
ST2	28099PA110	AXLE SHAFT PULLER PLATE



B: INSTALLATION

1) Tighten the front hub unit bearing to the housing with four bolts.

Tightening torque:
65 N·m (6.6 kgf-m, 48 ft-lb)



(A) Housing

2) Install the front drive shaft. <Ref. to DS-40, INSTALLATION, Front Drive Shaft.>
3) Tighten the axle nut temporarily.
4) Install the disc rotor on hub.

5) Install the disc brake caliper on the housing.

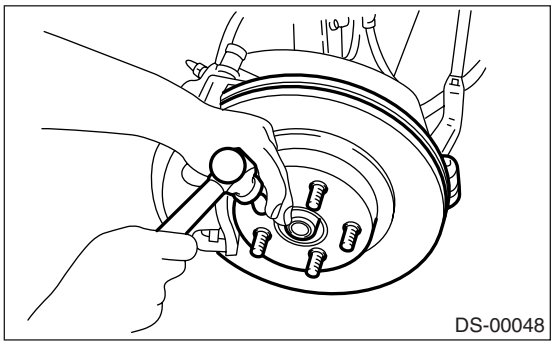
Tightening torque:
78 N·m (8.0 kgf-m, 57.9 ft-lb)

6) While depressing the brake pedal, tighten a new axle nut (olive color) to specified torque and lock it securely.

Tightening torque:
220 N·m (22.4 kgf-m, 162 ft-lb)

CAUTION:
• Install the wheel after installation of the axle nut. Failure to follow this rule may damage the wheel bearing.
• Be sure to tighten the axle nut to specified torque. Do not overtighten it as this may damage wheel bearing.

7) After tightening the axle nut, lock it securely.



8) Install the ABS wheel speed sensor on housing.

Tightening torque:
33 N·m (3.4 kgf-m, 24.3 ft-lb)

9) Install the wheel and tighten the wheel nuts to specified torque.

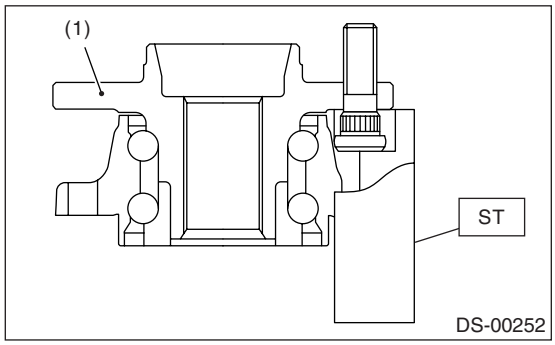
Tightening torque:
90 N·m (9.2 kgf-m, 66 ft-lb)

C: DISASSEMBLY

Using the ST and a hydraulic press, drive hub bolts out.
ST 28399AG000 HUB STAND

CAUTION:
• Be careful not to hammer the hub bolts. This may deform the hub.
• Do not reuse the hub bolt.

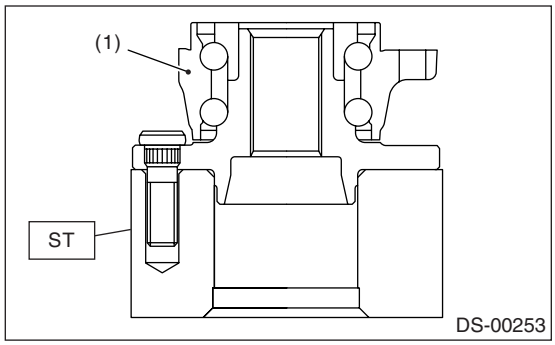
NOTE:
Since the hub unit bearing can not be disassembled, only hub bolts can be removed.



(1) Front hub unit bearing

D: ASSEMBLY

1) Attach the hub to ST securely.
ST 28099PA080 HUB STAND



(1) Front hub unit bearing

2) Using a press, press new hub bolts until their seating surfaces contact the hub.

NOTE:
Use 12 mm (0.47 in) dia. holes in HUB STAND to prevent bolts from tilting.

E: INSPECTION

Refer to “FRONT AXLE” for inspection procedures. <Ref. to DS-25, INSPECTION, Front Axle.>

CAUTION:
If there is any fault in the bearing, replace hub unit bearing.

5. Rear Axle [AWD Model]

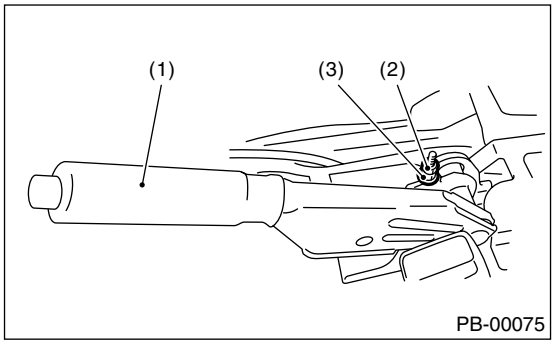
A: REMOVAL

1. DISC BRAKE

1) Disconnect the ground cable from battery.
2) Lift-up the vehicle, and remove the rear wheel.
3) Unlock the axle nut.
4) Remove the axle nut using a socket wrench with parking brake applied.

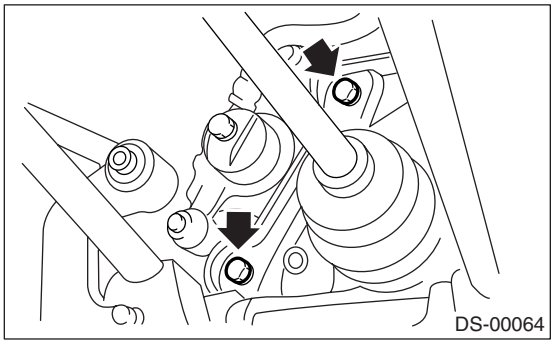
CAUTION:
Remove the axle nut with vehicle weight not applied on axle. Failure to follow this rule may damage the wheel bearings.

5) Return the parking brake lever and loosen the adjusting nut.



(1) Parking brake lever
(2) Lock nut
(3) Adjusting nut

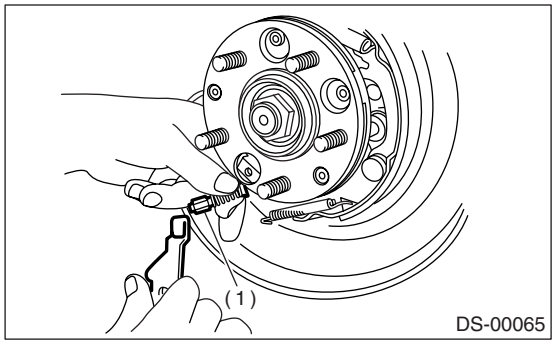
6) Remove the disc brake caliper from back plate, and suspend it from strut using a piece of wire.



7) Remove the disc rotor from hub.

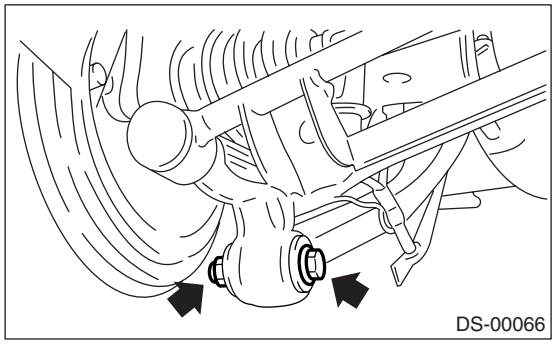
NOTE:
If the disc rotor seizes up within hub, drive it out by installing an 8-mm bolt into bolt hole in disc rotor.

8) Disconnect the parking brake cable end.

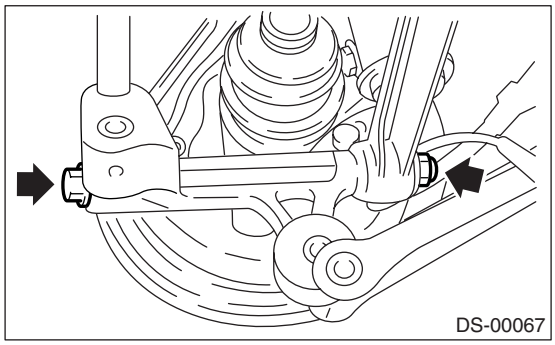


(1) Cable end

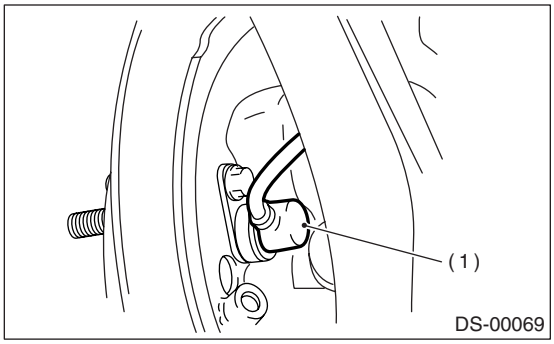
9) Disconnect the rear stabilizer from rear lateral link.
10) Remove the bolts which secure the trailing link assembly to rear housing.



11) Remove the bolts which secure the lateral assembly to rear housing.



12) Remove the rear ABS wheel speed sensor from back plate.

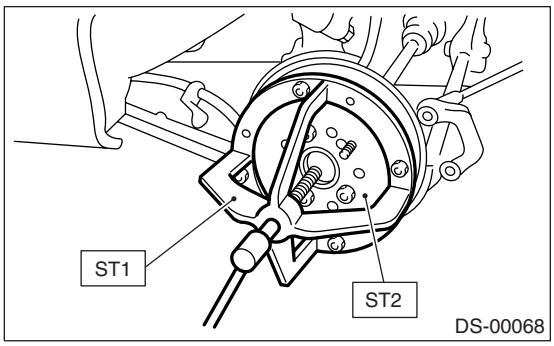


(1) ABS wheel speed sensor

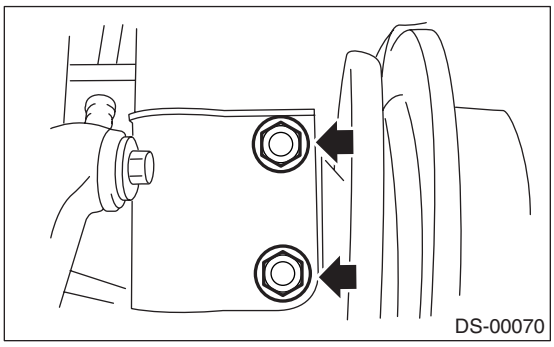
13) Disengage the BJ from housing splines, and then remove the rear drive shaft assembly.
If it is hard to remove, use the STs.

ST1	926470000	AXLE SHAFT PULLER
ST2	28099PA110	AXLE SHAFT PULLER PLATE

NOTE:
• Be careful not to damage the oil seal lip when removing the rear drive shaft.
• When the rear drive shaft is to be replaced, also replace the inner oil seal with a new one.



14) Remove the bolts which secure the rear housing to strut, and separate the two.

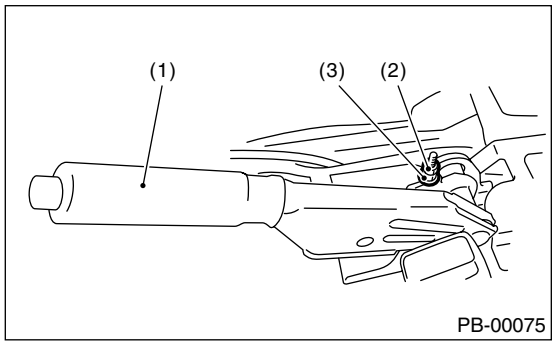


2. DRUM BRAKE

1) Disconnect the ground cable from battery.
2) Lift-up the vehicle, and remove the rear wheel cap and wheels.
3) Unlock the axle nut.
4) Remove the axle nut using a socket wrench.

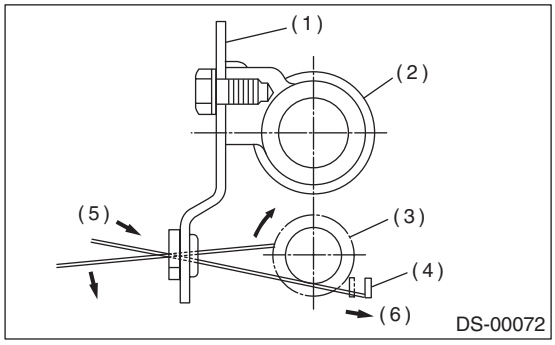
CAUTION:
Be sure to loosen and retighten the axle nut after removing the wheel from vehicle. Failure to follow this rule may damage the wheel bearings.

5) Return the parking brake lever and loosen the adjusting nut.



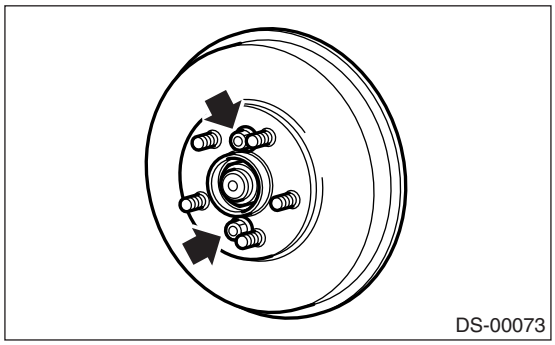
(1) Parking brake lever
(2) Lock nut
(3) Adjusting nut

6) Remove the brake drum from hub.
7) If it is difficult to remove the brake drum, remove the adjusting hole cover from back plate, and then turn the adjusting screw using a flat tip screwdriver until the brake shoe separates from drum.

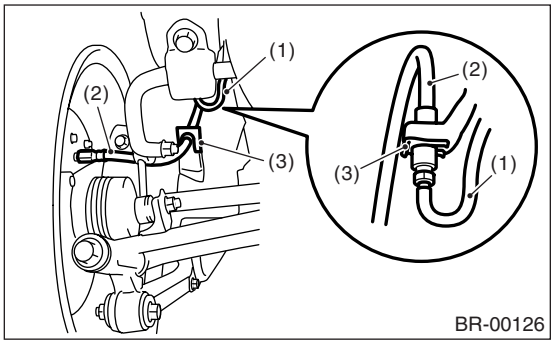


(1) Back plate
(2) Wheel cylinder
(3) Adjuster ASSY pawls
(4) Adjusting lever
(5) Tightening direction
(6) Push

NOTE:
If the brake drum is difficult to remove, drive it out by installing two 8-mm bolts into bolt hole in brake drum.

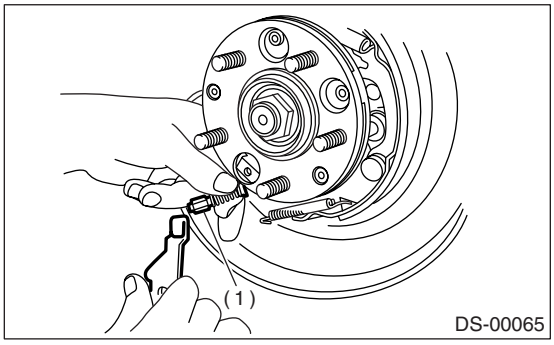


8) Remove the brake hose clamp from the rear strut portion, and separate the brake hose.



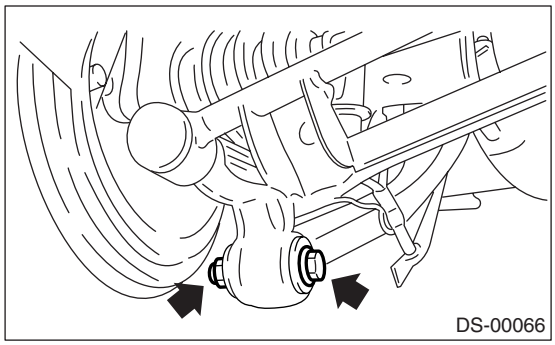
(1) Brake pipe
(2) Brake hose
(3) Brake hose clamp

9) Cover the open end of brake pipe with vinyl sheet or equivalent to prevent brake fluid from spilling.
10) Disconnect the parking brake cable end.

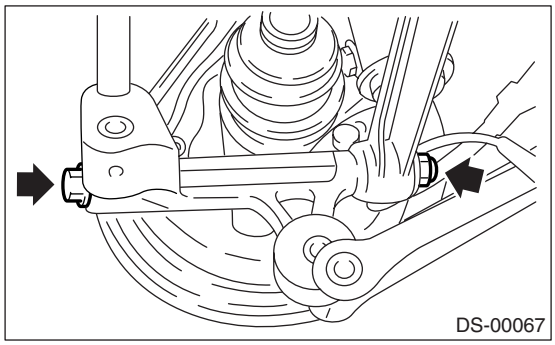


(1) Cable end

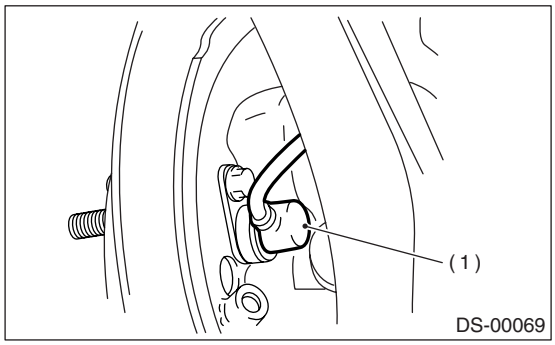
11) Disconnect the rear stabilizer from rear lateral link. Remove the bolts which secure the trailing link assembly to rear housing.



12) Remove the bolts which secure the lateral link assembly to rear housing.



13) Remove the rear ABS wheel speed sensor from back plate.



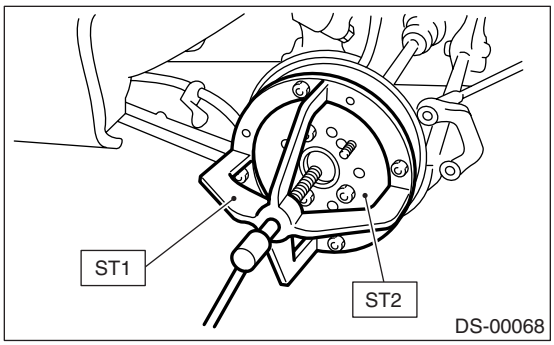
(1) ABS wheel speed sensor

14) Disengage the BJ from housing splines, and remove the rear drive shaft assembly.
If it is hard to remove, use the STs.

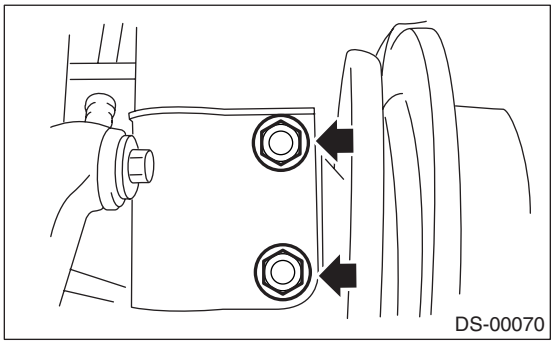
ST1	926470000	AXLE SHAFT PULLER
ST2	28099PA110	AXLE SHAFT PULLER PLATE

CAUTION:
• Be careful not to damage the oil seal lip when removing the rear drive shaft.

• When the rear drive shaft is to be replaced, also replace the inner oil seal with a new one.



15) Remove the bolts which secure the rear housing to strut, and separate the two.



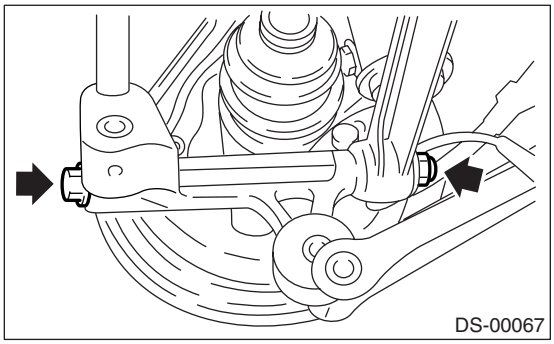
B: INSTALLATION

1. DISC BRAKE

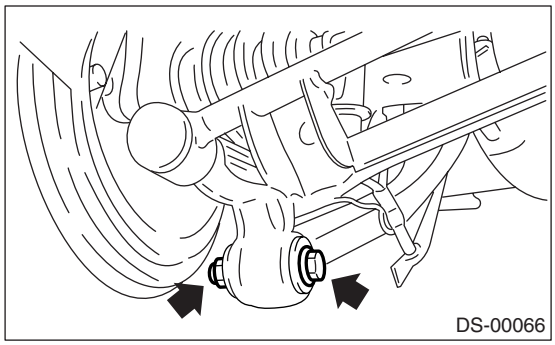
1) Temporarily tighten the rear axle to strut.
2) Insert the rear drive shaft into rear axle.

NOTE:
Be careful not to damage the inner oil seal lip.

3) Temporarily tighten the axle nut.
4) Using a new self-locking nut, temporarily tighten the rear housing assembly and lateral link assembly.



5) Using a new self-locking nut, temporarily tighten the rear housing assembly and trailing link assembly.



6) Tighten the rear housing assembly and strut assembly using a new self-locking nut.

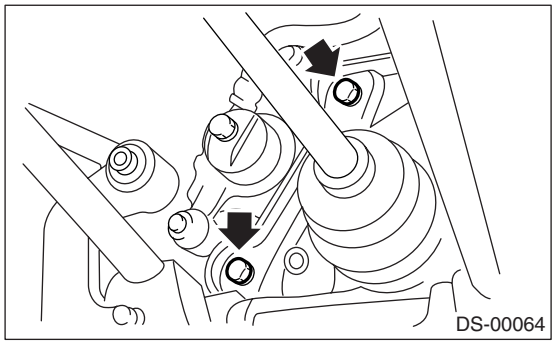
Tightening torque:
196 N·m (20 kgf-m, 145 ft-lb)

7) Using a new self-locking nut, install the rear stabilizer and rear lateral link.

Tightening torque:
44 N·m (4.5 kgf-m, 32.5 ft-lb)

8) Connect the parking brake cable to parking brake.
9) Install the disc rotor on rear housing assembly.
10) Install the disc brake caliper on back plate.

Tightening torque:
52 N·m (5.3 kgf-m, 38.3 ft-lb)

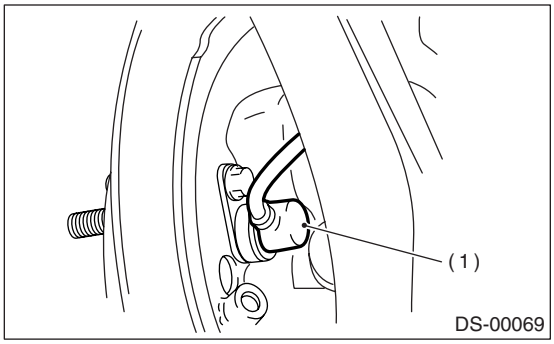


11) Adjust the parking brake lever stroke by turning the adjuster.
12) While applying the parking brake, tighten a new axle nut using a socket wrench. Lock the axle nut after tightening.

Tightening torque:
190 N·m (19.4 kgf-m, 140 ft-lb)

CAUTION:
Do not overtighten it as this may damage the wheel bearing.

13) Install rear ABS wheel speed sensor.



(1) ABS wheel speed sensor

14) Install the wheel and tighten the wheel nuts to specified torque.

Tightening torque:
90 N·m (9.2 kgf-m, 66 ft-lb)

15) Make the tires contact the ground fully.

CAUTION:
Make the tires contact the ground fully and the vehicle be in curb weight whenever carrying out the tightening of bush portions.

16) Tighten the installation bolt of rear housing assembly and lateral link assembly.

Tightening torque:
137 N·m (14 kgf-m, 101 ft-lb)

17) Tighten the installation bolt of rear housing assembly and trailing link assembly.

Tightening torque:
90 N·m (9.2 kgf-m, 66 ft-lb)

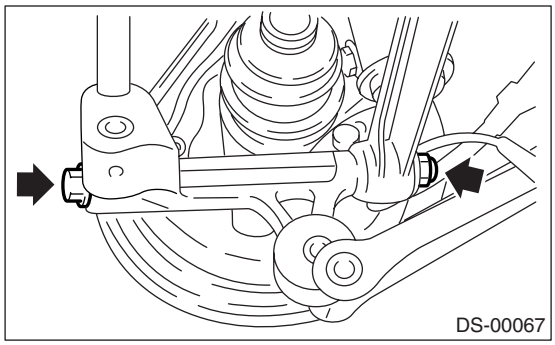
2. DRUM BRAKE

1) Using a new self-locking nut, temporarily tighten the rear axle to strut.
2) Insert the rear drive shaft to rear axle.

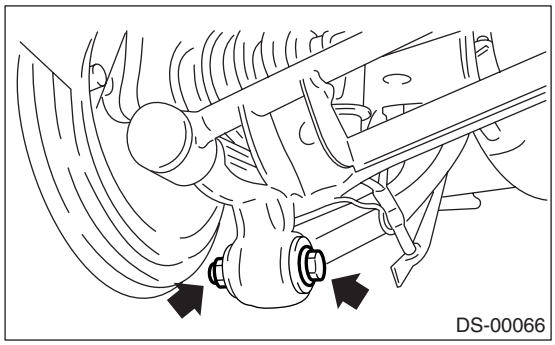
NOTE:
Be careful not to damage the inner oil seal lip.

3) Using a new axle nut, temporarily tighten the rear drive shaft.

4) Using a new self-locking nut, temporarily tighten the rear housing assembly and lateral link assembly.



5) Using a new self-locking nut, temporarily tighten the rear housing assembly and trailing link assembly.



6) Tighten the rear housing assembly and strut assembly using a new self-locking nut.

Tightening torque:
196 N·m (20 kgf-m, 145 ft-lb)

7) Using a new self-locking nut, install the rear stabilizer and rear lateral link.

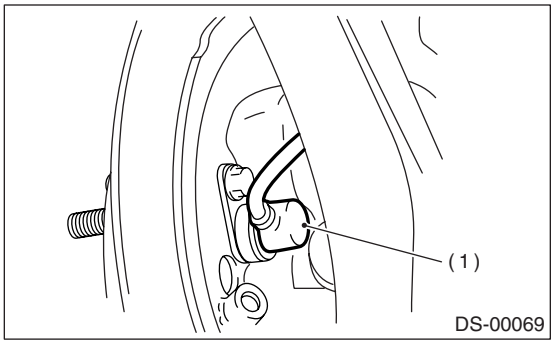
Tightening torque:
44 N·m (4.5 kgf-m, 32.5 ft-lb)

8) Connect the parking brake cable to parking brake.
9) Clean the brake pipe connection. Using a flare-nut wrench, connect the brake pipe to wheel cylinder.
10) Connect the parking brake cable to lever.
11) Install the brake drum on rear housing assembly.
12) Adjust the parking lever stroke. <Ref. to PB-5, ADJUSTMENT, Parking Brake Lever.>
13) Apply parking brake, tighten the axle nut using a socket wrench. Lock the axle nut after tightening.

Tightening torque:
190 N·m (19.4 kgf-m, 140 ft-lb)

CAUTION:
Do not overtighten it as this may damage the wheel bearing.

14) Connect the rear ABS wheel speed sensor to back plate.



(1) ABS wheel speed sensor

15) Bleed the air from brake system. <Ref. to BR-61, REPLACEMENT, Brake Fluid.>
16) Install the wheel and tighten the wheel nuts to specified torque.

Tightening torque:
90 N·m (9.2 kgf-m, 66 ft-lb)

17) Make the tires contact the ground fully.

CAUTION:
Make the tires contact the ground fully and the vehicle be in curb weight whenever carrying out the tightening of bush portions.

18) Tighten the installation bolt of rear housing assembly and lateral link assembly.

Tightening torque:
137 N·m (14 kgf-m, 101 ft-lb)

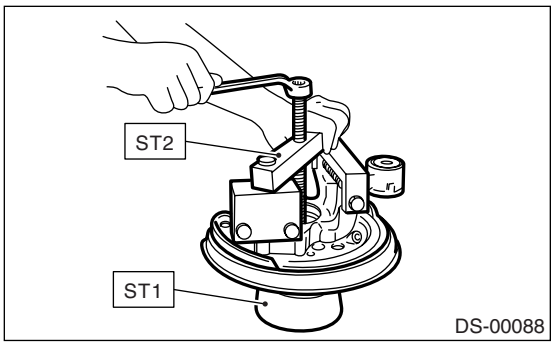
19) Tighten the installation bolt of rear housing assembly and trailing link assembly.

Tightening torque:
90 N·m (9.2 kgf-m, 66 ft-lb)

C: DISASSEMBLY

1) Using the ST1 and ST2, remove the hub from rear housing.

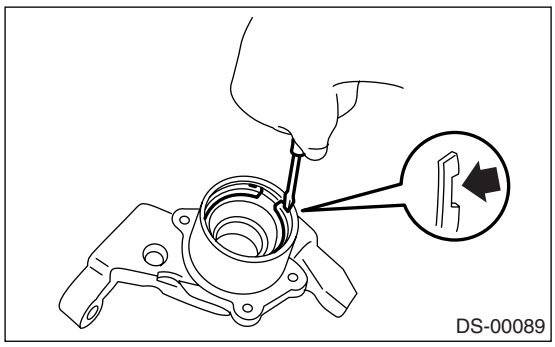
ST1	927080000	HUB STAND (Except STi model)
ST1	28099PA080	HUB STAND (STi model)
ST2	927420000	HUB REMOVER



2) Remove the back plate from rear housing.

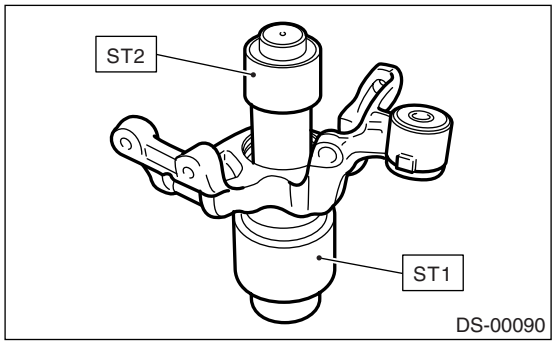
3) Using a standard screwdriver, remove the outer and inner oil seals.
4) Using a flat tip screwdriver, remove the snap ring.

NOTE:
Be careful not to damage the housing at removal.



5) Using the ST1 and ST2, remove the bearing by pressing the inner race.

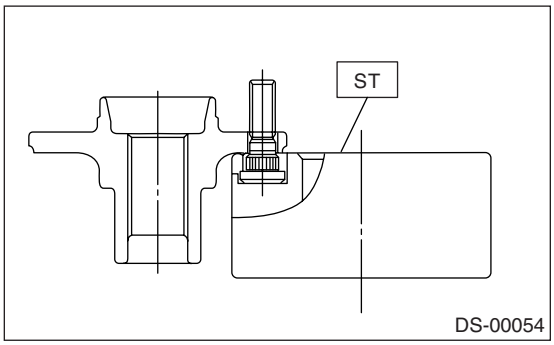
ST1	927430000	HOUSING STAND (Except STi model)
ST1	28099PA060	HOUSING STAND (STi model)
ST2	927440000	BEARING REMOVER (Except STi model)
ST2	927100000	BEARING INSTALLER (STi model)



6) Remove the tone wheel bolts, and then remove the tone wheel from hub (Model with ABS).
7) Using the ST, press the hub bolt out.

ST	927080000	HUB STAND (Except STi model)
ST	28099PA080	HUB STAND (STi model)

CAUTION:
Be careful not to hammer the hub bolts. This may deform the hub.



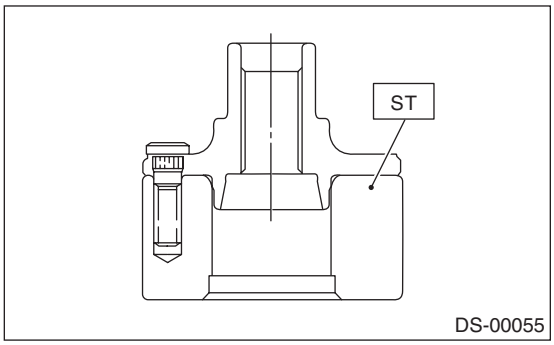
D: ASSEMBLY

NOTE:
When the hub is to be removed from housing, replace the bearing set and oil seal with new ones.

1) Using the ST, press the new hub bolt into place.

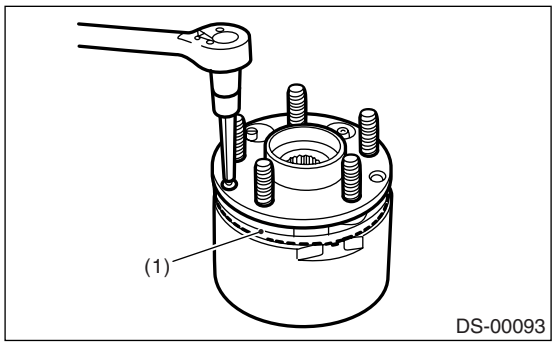
NOTE:
- Ensure the hub bolt closely contacts the hub.
- Use a 12 mm (0.47 in) hole in the ST to prevent the hub bolt from tilting during installation.

ST	927080000	HUB STAND (Except STi model)
ST	28099PA080	HUB STAND (STi model)



2) Remove foreign particles (dust, rust, etc.) from mating surfaces of the hub tone wheel, and then install the tone wheel to hub (Model with ABS).

NOTE:
- Ensure the tone wheel closely contacts the hub.
- Be careful not to damage the tone wheel teeth.

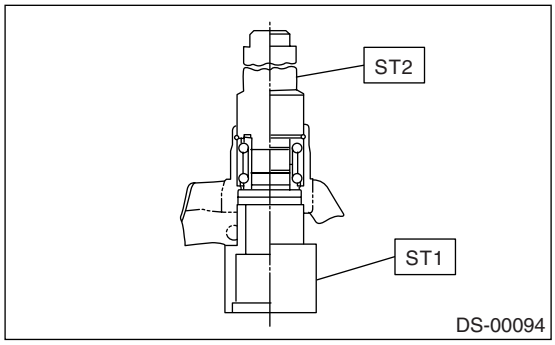


(1) Tone wheel

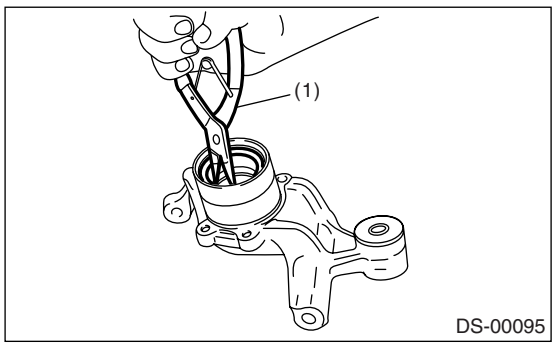
3) Clean the housing interior completely. Using the ST1 and ST2, press the bearing into housing.

ST1	927430000	HOUSING STAND (Except STi model)
ST1	28099PA060	HOUSING STAND (STi model)
ST2	927440000	BEARING REMOVER (Except STi model)
ST2	927100000	BEARING INSTALLER (STi model)

NOTE:
- Always press the outer race when installing the bearing.
- Be careful not to remove the plastic lock from inner race when installing the bearing.



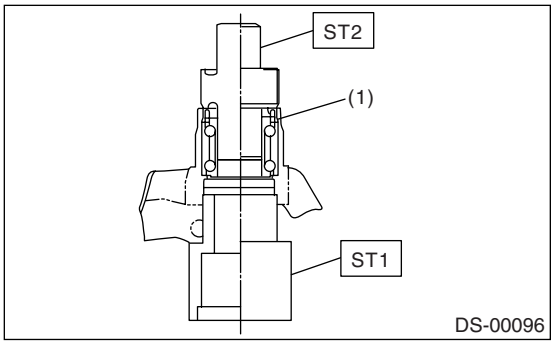
4) Using pliers, install the snap ring firmly.



(1) Pliers

5) Using the ST1 and ST2, press the outer oil seal until it comes in contact with snap ring.

ST1	927430000	HOUSING STAND (Except STi model)
ST1	28099PA060	HOUSING STAND (STi model)
ST2	927460000	OIL SEAL INSTALLER (Except STi model)
ST2	28099PA070	OIL SEAL INSTALLER (STi model)

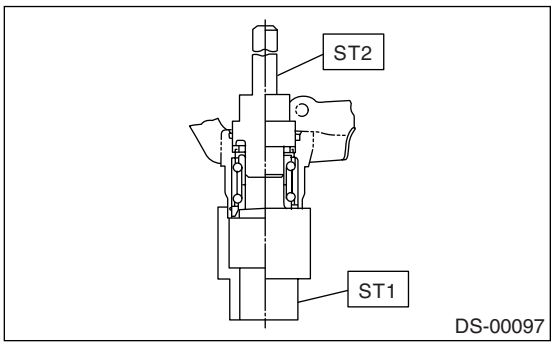


(1) Snap ring

6) Invert both ST1 and housing.

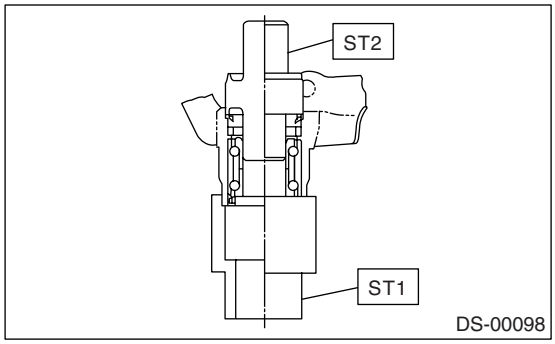
7) Using the ST2, press the inner oil seal into housing until it touches the bottom.

ST1	927430000	HOUSING STAND (Except STi model)
ST1	28099PA060	HOUSING STAND (STi model)
ST2	927460000	OIL SEAL INSTALLER (Except STi model)
ST2	28099PA070	OIL SEAL INSTALLER (STi model)



8) Using the ST1 and ST2, press the sub seal into place.

ST1	927430000	HOUSING STAND (Except STi model)
ST1	28099PA060	HOUSING STAND (STi model)
ST2	927460000	OIL SEAL INSTALLER (Except STi model)
ST2	28099PA070	OIL SEAL INSTALLER (STi model)



9) Apply sufficient grease to oil seal lip.

Specified grease:
SHELL 6459N

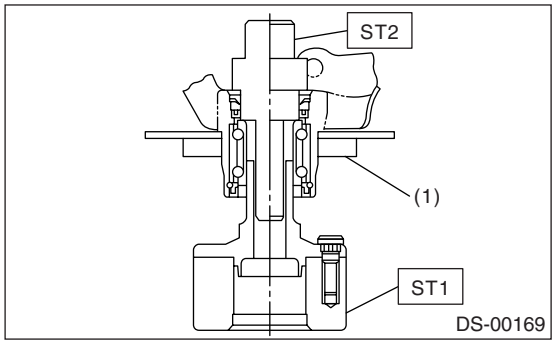
NOTE:
• If specified grease is not available, remove the bearing grease and apply Auto Rex A instead.
• Do not mix different types of grease.

10) Install the back plate to rear housing.

Tightening torque:
52 N·m (5.3 kgf-m, 38.3 ft-lb)

11) Using the ST1 and ST2, press the bearing into hub.

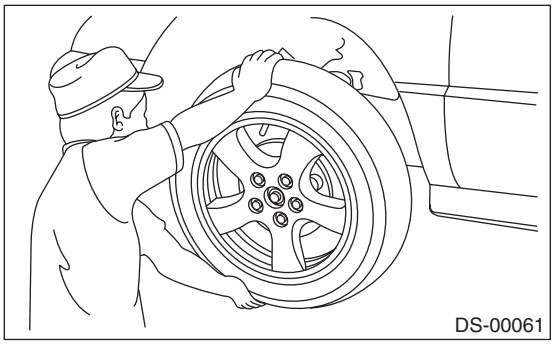
ST1	927080000	HUB STAND (Except STi model)
ST1	28099PA080	HUB STAND (STi model)
ST2	927450000	HUB INSTALLER (Except STi model)
ST2	927120000	HUB INSTALLER (STi model)



(1) Back plate

E: INSPECTION

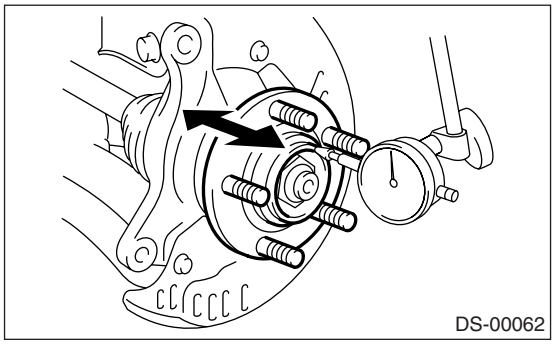
1) Moving the rear tire up and down by hand, check there is no backlash in bearing, and check the wheel rotates smoothly.



2) Inspect the lean of axis direction using a dial gauge. Replace the hub bearing if the load range exceeds the limitation.

Limit:

Maximum: 0.05mm (0.0020 in)



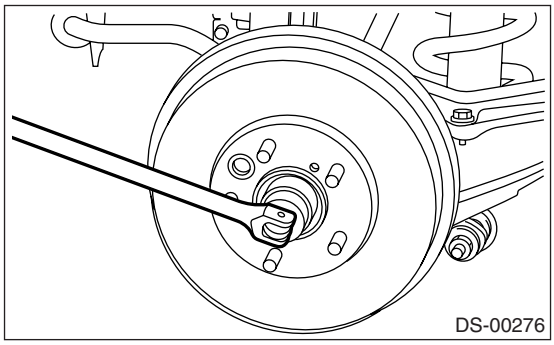
6. Rear Axle [FWD Model]

A: REMOVAL

CAUTION:
Remove the axle nut with vehicle weight not applied on axle. Failure to follow this rule may damage the wheel bearings.

1) Apply the parking brake.
2) Lift-up the vehicle and remove the rear wheel.
3) Release the caulking of axle nut.
4) Remove the axle nut by socket wrench of 32 mm.

CAUTION:
Remove the axle nut with wheel removed.



5) Release the parking brake, loosen the adjuster.
6) Remove the drum brake from hub. <Ref. to BR-49, REMOVAL, Rear Drum Brake Drum.>
7) Using a flare nut wrench, disconnect the brake pipe from wheel cylinder.

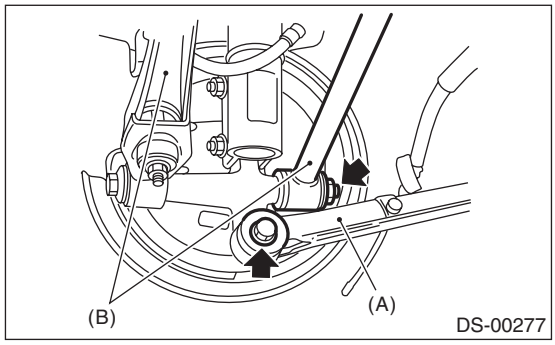
CAUTION:
Cover the brake pipe connection to protect it from dust.

8) Separate the rear spindle from lateral link assembly.

CAUTION:
Do not reuse the self-locking nut.

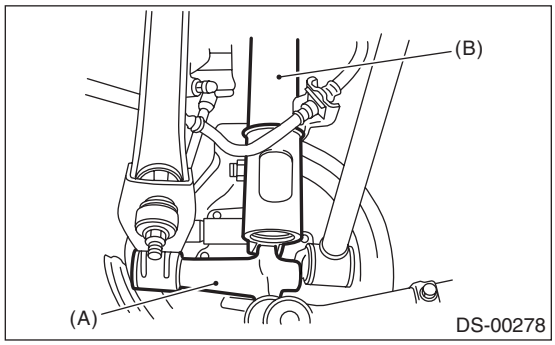
9) Separate the rear spindle from trailing link assembly.

CAUTION:
Do not reuse the self-locking nut.



(A) Trailing link
(B) Lateral link

10) Remove the bolt which combines the rear spindle and strut assembly, and then remove the rear spindle, back plate and hub unit as a unit.



(A) Rear spindle
(B) Strut ASSY

B: INSTALLATION

1) Combine the rear spindle assembly and strut assembly.

Tightening torque:
196 N·m (20 kgf-m, 145 ft-lb)

CAUTION:
Use a new self-locking nut.

2) Combine the rear spindle assembly and trailing link assembly.

Tightening torque:
90 N·m (9.2 kgf-m, 66 ft-lb)

CAUTION:
Use a new self-locking nut.

3) Combine the rear spindle assembly and lateral link assembly.

Tightening torque:
140 N·m (14.3 kgf-m, 103 ft-lb)

4) Clean the brake pipe connection, and then connect the brake pipe to wheel cylinder using a flare nut wrench.

Tightening torque:
15 N·m (1.5 kgf-m, 10.8 ft-lb)

5) Connect the cable end of parking brake cable. <Ref. to PB-7, INSTALLATION, Parking Brake Cable.>
6) Install the drum brake to rear spindle.
7) Tighten the axle nut using a socket wrench of 32 mm, then caulk the axle nut.

Tightening torque:
200 N·m (20.0 kgf-m, 145 ft-lb)

8) Install the O-ring to cap flange portion, and then tap the hub cap by plastic hammer to install it.

CAUTION:
- **Do not tap directly by copper hammer.**
- **If O-ring has scratches, replace it with a new one.**
- **If hub cap has deformed flange, replace it.**

9) Install the wheel and wheel cap.

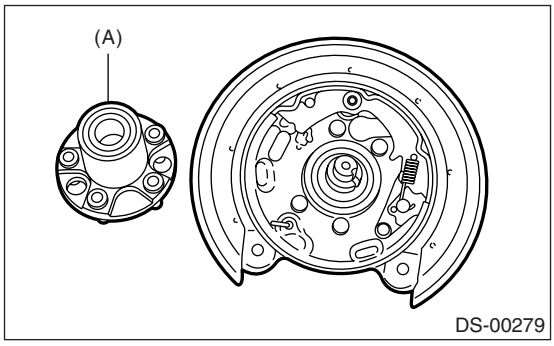
Tightening torque:
90 N·m (9.2 kgf-m, 66 ft-lb)

10) Connect the battery ground cable to battery.
11) Bleed air from brake system. <Ref. to BR-63, PROCEDURE, Air Bleeding.>
12) Adjust the stroke of parking brake lever. <Ref. to PB-5, ADJUSTMENT, Parking Brake Lever.>

C: DISASSEMBLY

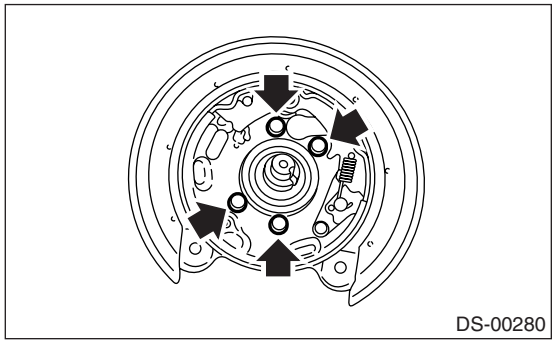
CAUTION:
Disassembly the rear axle only when rattling, dragging, noise or etc. are found on bearing.

1) Remove the hub unit from rear spindle.



(A) Hub unit

2) Remove the drum brake assembly or parking brake assembly from rear spindle.



D: ASSEMBLY

1) Completely remove away dust and foreign material on polished surface and mounting surface of rear spindle to drum brake assembly
2) Install the drum brake assembly or parking brake assembly to rear spindle.

Tightening torque:
53 N·m (5.3 kgf-m, 39.1 ft-lb)

3) Fill grease to oil seal at rear side of hub unit.

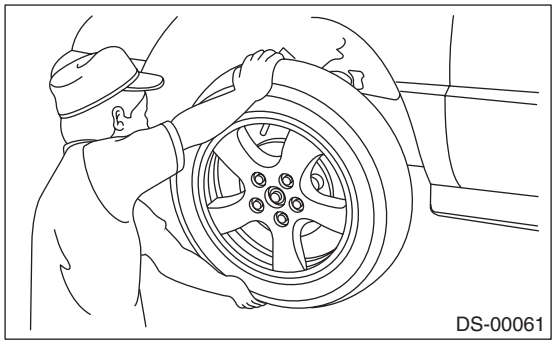
Grease:
Shell 6459N

4) Install the hub unit to rear spindle and hold them with washer and axle nut temporarily.

CAUTION:
Use a new axle nut.

E: INSPECTION

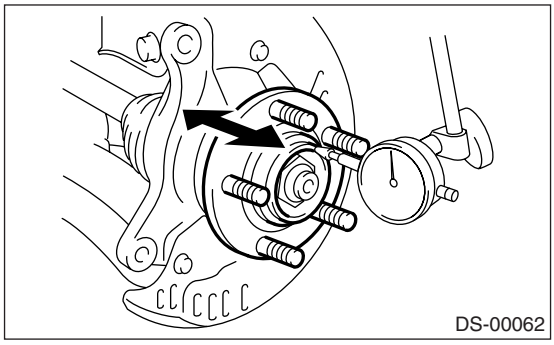
1) Moving the rear tire up and down by hand, check there is no backlash in bearing, and check the wheel rotates smoothly.



2) Inspect the lean of axis direction using a dial gauge. Replace the hub bearing if the load range exceeds the limitation.

Limit:

Maximum: 0.05 mm (0.0020 in)



7. Front Drive Shaft

A: REMOVAL

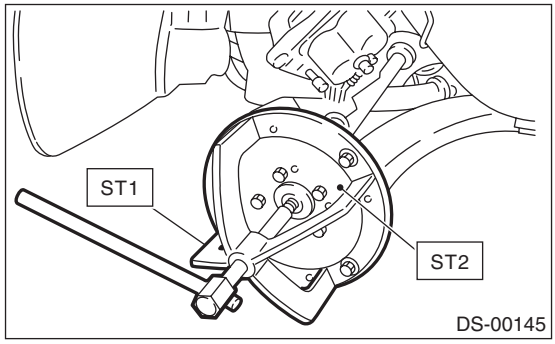
1) Jack-up the vehicle, support it with rigid racks, and then remove the wheels.
2) Raise the caulking portion of axle nut.
3) Depress the brake pedal and remove the axle nut using a socket wrench.

CAUTION:
Be sure to loosen the axle nut after removing the wheel from vehicle. Failure to follow this rule may damage the wheel bearings.

4) Remove the stabilizer link from transverse link.
5) Disconnect the transverse link from housing.
6) Remove the front drive shaft assembly. If it is hard to remove, use the ST1 and ST2.

ST1 926470000 AXLE SHAFT PULLER
ST2 28099PA110 AXLE SHAFT PULLER PLATE

CAUTION:
• Be careful not to damage the oil seal lip and tone wheel when removing the front drive shaft.
• When the front drive shaft is to be replaced, also replace the inner oil seal.



7) Remove the front drive shaft from transmission using bar.

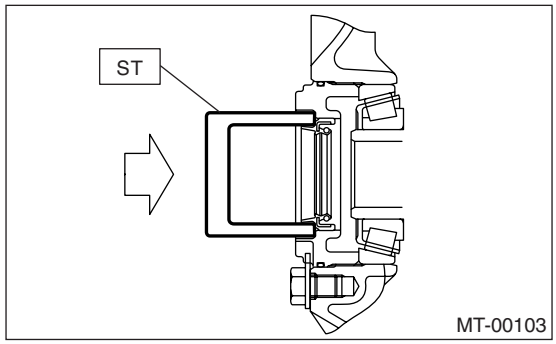
CAUTION:
Be careful not to damage the holder portion.

B: INSTALLATION

1) Using the ST, replace the differential side retainer oil seal with a new one.

ST 18675AA000 DIFFERENTIAL SIDE OIL SEAL INSTALLER

NOTE:
After pulling out the drive shaft, be sure to replace with a new oil seal.

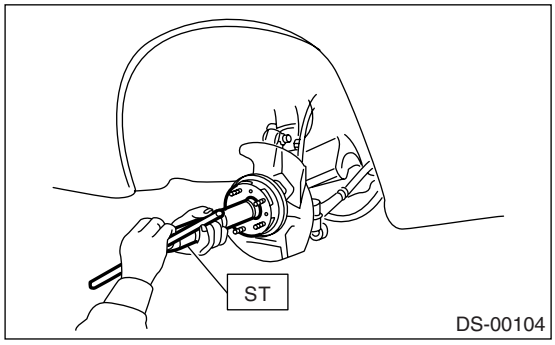


2) Insert the EBJ into hub splines.

CAUTION:
Be careful not to damage the inner oil seal lip and tone wheel.

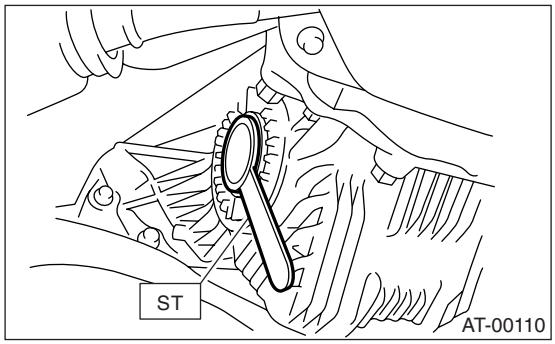
3) Using the ST1 and ST2, pull the drive shaft into place.

ST1 922431000 AXLE SHAFT INSTALLER
ST2 927390000 ADAPTER



4) Tighten the axle nut temporarily.
5) Using the ST, install the front drive shaft to transmission.

ST 28399SA010 OIL SEAL PROTECTOR



6) Connect the transverse link to housing.

Tightening torque:
49 N·m (5.0 kgf-m, 36 ft-lb)

7) Install the stabilizer bracket.

8) While depressing the brake pedal, tighten the axle nut to specified torque.

Tightening torque:
220 N·m (22.4 kgf-m, 162 ft-lb)

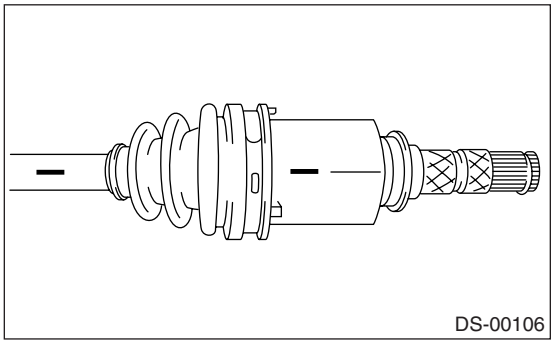
CAUTION:
• Always tighten the axle nut before installing wheel on vehicle. If the tire is installed and comes in contact with ground when axle nut is loose, wheel bearings may be damaged.
• Be sure to tighten the axle nut to specified torque. Do not overtighten it as this may damage the wheel bearing.

9) After tightening the axle nut, caulk and lock it.

C: DISASSEMBLY

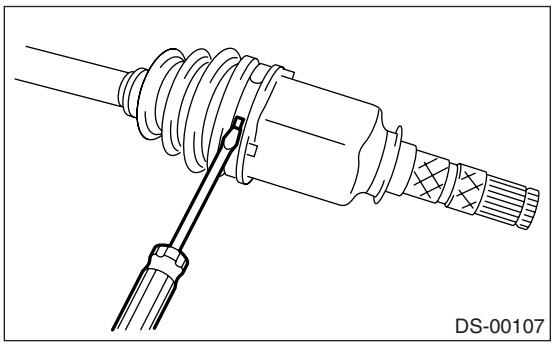
1. EBJ+PTJ TYPE

1) Place alignment marks on shaft and outer race.

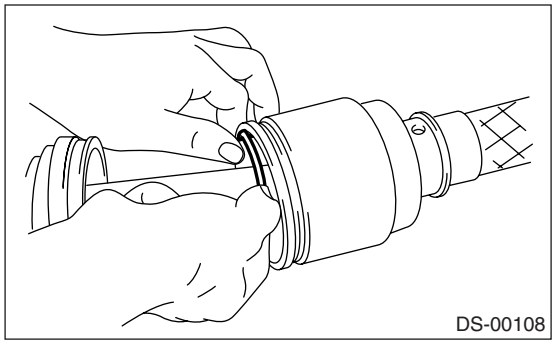

DS-00106

2) Remove the PTJ boot band and boot.

CAUTION:
Be careful not to damage the boot.


DS-00107

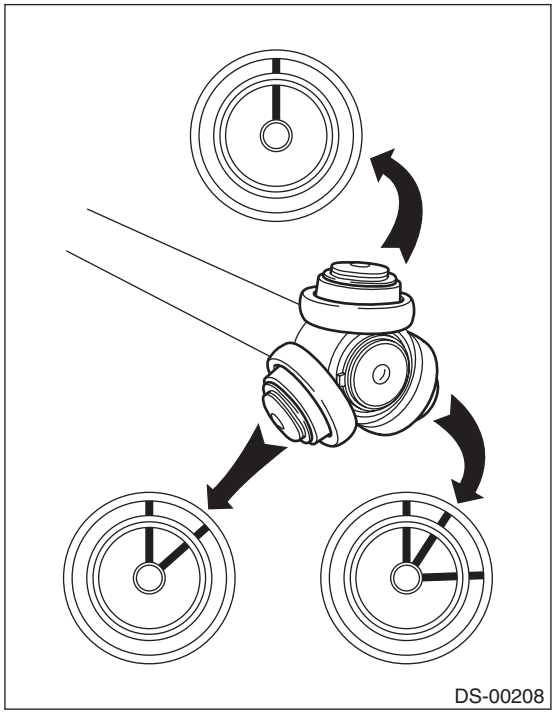
3) Remove the circlip from PTJ outer race using a screwdriver.


DS-00108

4) Remove the PTJ outer race from shaft assembly.
5) Wipe off the grease.

CAUTION:
The grease is a special grease. Do not confuse with other greases.

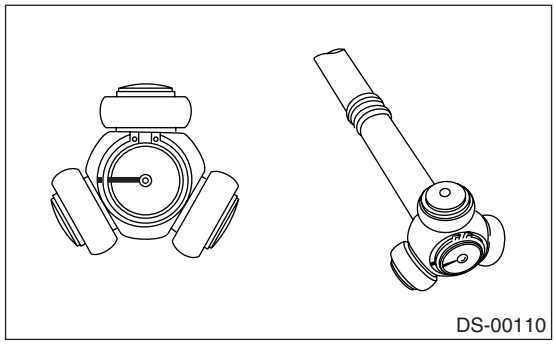
6) Place alignment marks on free ring and trunnion.


DS-00208

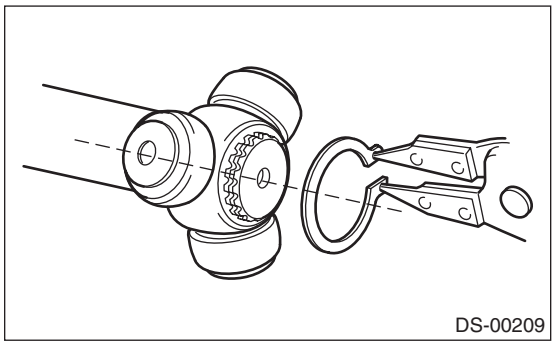
7) Remove the free ring from trunnion.

CAUTION:
Be careful with the free ring position.

8) Place an alignment mark on trunnion and shaft.


DS-00110

9) Remove the snap ring and trunnion.


DS-00209

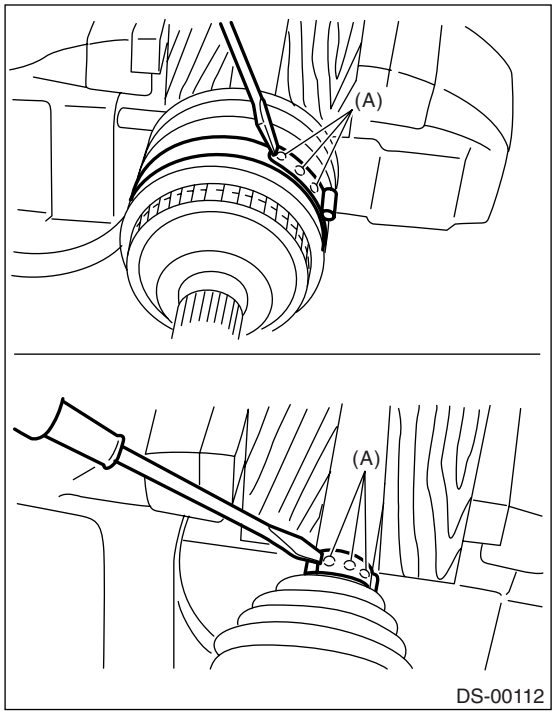
CAUTION:
Be sure to wrap the shaft splines with vinyl tape to prevent the boot from scratches.

10) Remove the PTJ boot.

11) Place the drive shaft in a vise between wooden blocks.

CAUTION:
Do not place the drive shaft directly in a vise; use wooden block.

12) Raise the boot band claws by means of screwdriver and hammer.

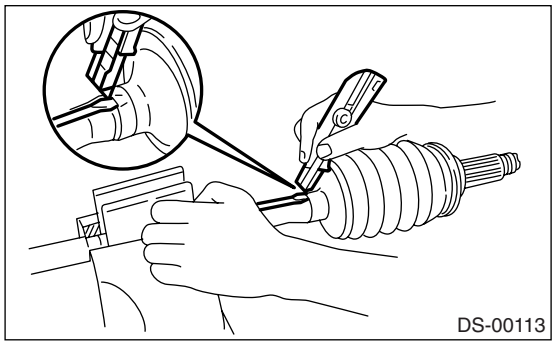


DS-00112

(A) Boot band claws

13) Cut and remove the boot.

CAUTION:
The boot must be replaced with a new one whenever it is removed.

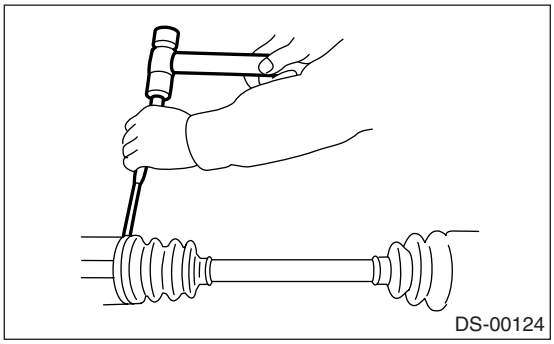

DS-00113

NOTE:
Further disassembly of axle is impossible because the EBJ cannot be disassembled.

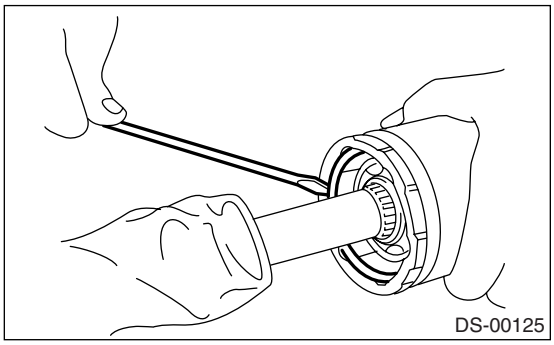
2. BJ+DOJ TYPE

1) Straighten the bent claw of larger end of DOJ boot.

2) Loosen the band by means of screwdriver or pliers with care of not damaging boot.

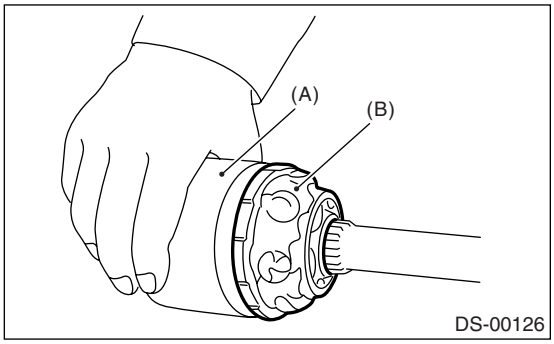


3) Remove the boot band on the small end of DOJ boot in the same manner.
4) Remove the larger end of DOJ boot from DOJ outer race.
5) Pry and remove the round circlip located at neck of DOJ outer race with a screwdriver.



6) Take out the DOJ outer race from shaft assembly.
7) Wipe off the grease, and then take out the balls.

NOTE:
• The grease is a special grease (grease for constant velocity joint). Do not confuse with other greases.
• Disassemble with exercising care not to lose balls (6 pcs).



(A) Outer race
(B) Grease

8) To remove the cage from inner race, turn the cage by a half pitch to the track groove of inner race, and shift the cage.
9) Remove the snap ring, which fixes the inner race to shaft, by using pliers.
10) Take out the DOJ inner race.
11) Take off the DOJ cage from shaft and remove the DOJ boot.
12) Wrap the shaft splines with vinyl tape.
13) Remove the BJ boot in the same procedure as DOJ boot.

NOTE:
Further disassembly of axle is impossible because the BJ cannot be disassembled.

D: ASSEMBLY

1. EBJ+PTJ TYPE

NOTE:
Use specified grease.

EBJ side:
NTG2218-M (Part No. 28395AG010)

PTJ side:
NSG301 (Part No. 28395AG020)

1) Place the EBJ boot and small boot band on EBJ side of shaft.

CAUTION:
Be sure to wrap the shaft splines with vinyl tape to prevent the boot from scratches.

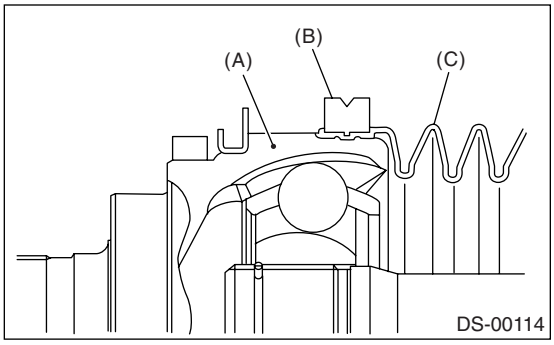
2) Place the drive shaft in a vise.

CAUTION:
Do not place the drive shaft directly in a vise; use wooden blocks.

3) Apply a coat of specified grease [60 to 70 g (2.12 to 2.47 oz)] to EBJ.
4) Apply an even coat of specified grease [20 to 30 g (0.71 to 1.06 oz)] to entire inner surface of boot. Also apply grease to shaft.

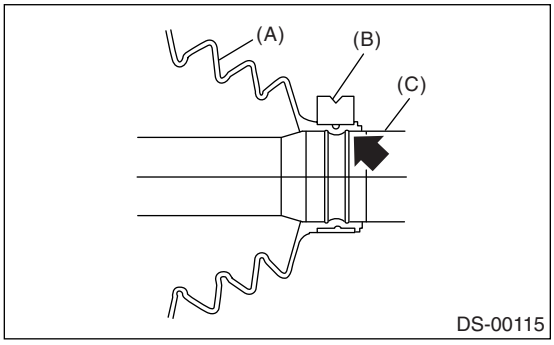
NOTE:
EBJ installation surface of EBJ boot shall be cleaned so as to be free from grease and other substances.

5) Install the boot projecting portion to EBJ groove.



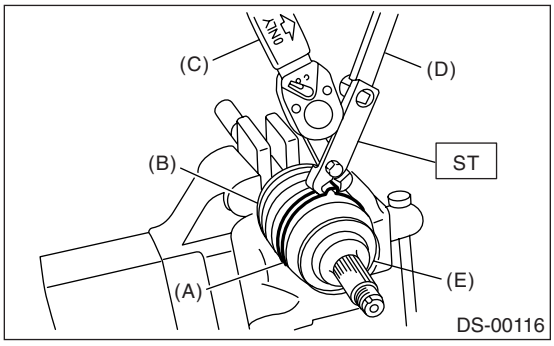
(A) EBJ
(B) Large boot band
(C) Boot

6) Set the large boot band in place.
7) Install the boot projecting portion to shaft groove.



(A) Boot
(B) Small boot band
(C) Shaft

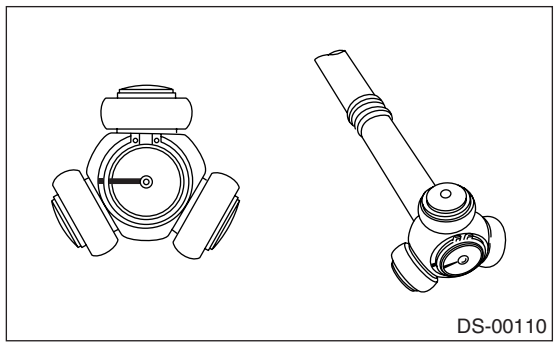
8) Tighten the boot bands using the ST, torque wrench and socket flex handle.
ST 28099AC000 BOOT BAND PLIER



(A) Large boot band
(B) Boot
(C) Torque wrench
(D) Socket flex handle
(E) EBJ

Tightening torque:
Large boot band
157 N·m (16.0 kgf-m, 116 ft-lb) or more
Small boot band
133 N·m (13.6 kgf-m, 98 ft-lb) or more

9) Place the PTJ boot at the center of shaft.
10) Align the alignment marks, and then install the trunnion on shaft.

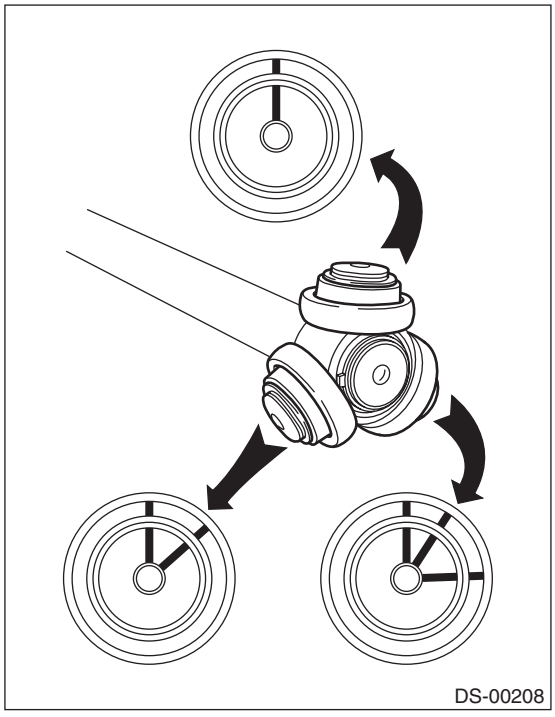


11) Install the snap ring to shaft.

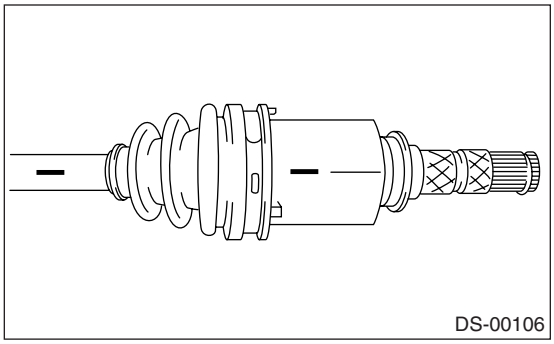
CAUTION:
Confirm that the snap ring is completely fitted in shaft groove.

12) Fill 100 to 110 g (3.53 to 3.88 oz) of specified grease into the interior of PTJ outer race.
13) Apply a coat of specified grease to free ring and trunnion.
14) Align the alignment marks on free ring and trunnion, and then install the free ring.

CAUTION:
Be careful with the free ring position.



15) Align the alignment marks on shaft and outer race, and then install the outer race.



16) Install the circlip in the groove on PTJ outer race.

CAUTION:
Pull the shaft lightly and assure the circlip is completely fitted in groove.

17) Apply an even coat of the specified grease 30 to 40 g (1.06 to 1.41 oz) to the entire inner surface of boot.

18) Install the PTJ boot taking care not to twist it.

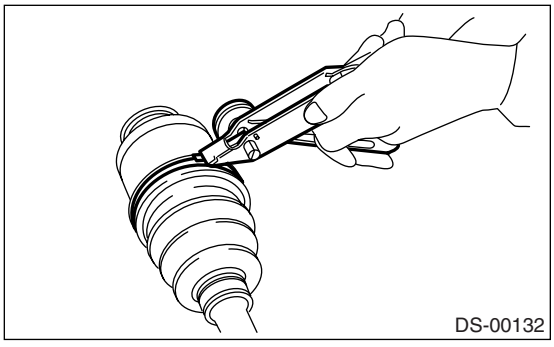
CAUTION:
• PTJ installation surface of PTJ boot shall be cleaned so as to be free from grease and other substances.
• When installing the PTJ boot, position the outer race of PTJ at center of its travel.

19) Put a new band through the clip and wind twice in alignment with band groove of boot.

20) Tighten the band by using the ST.

ST 925091000 BAND TIGHTENING TOOL

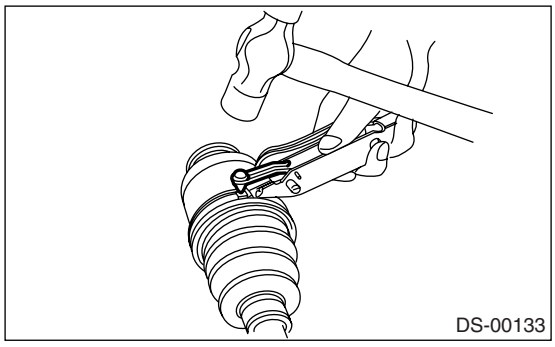
NOTE:
Tighten the band until it cannot be moved by hand.



21) Tap on the clip with punch provided at the end of ST.

ST 925091000 BAND TIGHTENING TOOL

CAUTION:
Tap to an extent that the boot underneath is not damaged.



22) Cut off the band with an allowance of about 10 mm (0.39 in) left from clip, and bend this allowance over clip.

CAUTION:
Be careful so that the end of band is in close contact with clip.

23) Extend and retract the SFJ to provide equal grease coating.

2. BJ+DOJ TYPE

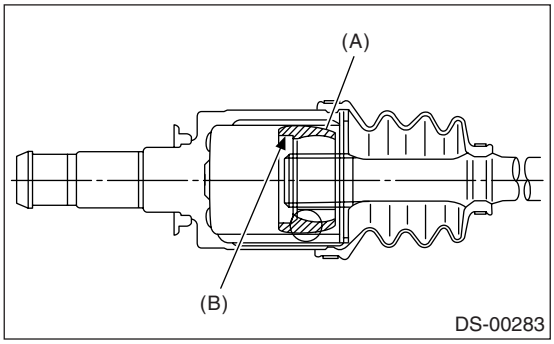
NOTE:
Use specified grease.

BJ side:
NTG2218-M (Part No. 28395AG030)

DOJ side:
NKG205 (Part No. 28495AG010)

1) Install the BJ boot in specified position, and fill it with 60 to 70 g (2.12 to 2.47 oz) of specified grease.
2) Place the DOJ boot at the center of shaft.
3) Wrap the shaft splines with vinyl tape.
4) Insert the DOJ cage onto shaft.

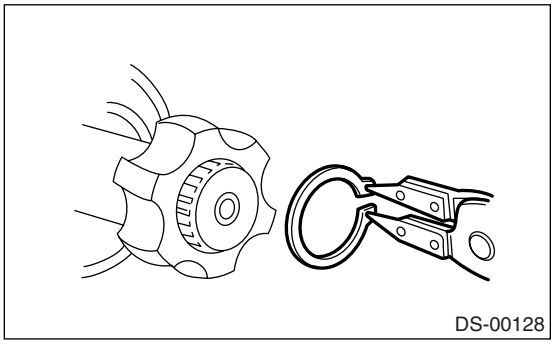
NOTE:
Insert the cage with cut-out portion facing the shaft end, since the cage has an orientation.



(A) Cage
(B) Cut-out portion

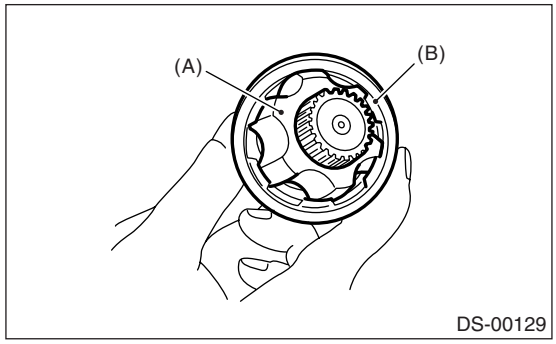
5) Install the DOJ inner race on shaft, and fit the snap ring with pliers.

NOTE:
Confirm the snap ring is completely fitted in shaft groove.


DS-00128

6) Install the cage, which was previously fitted, to inner race fixed upon shaft.

NOTE:
Fit the cage with protruded part aligned with the track on inner race, and then turn by a half pitch.

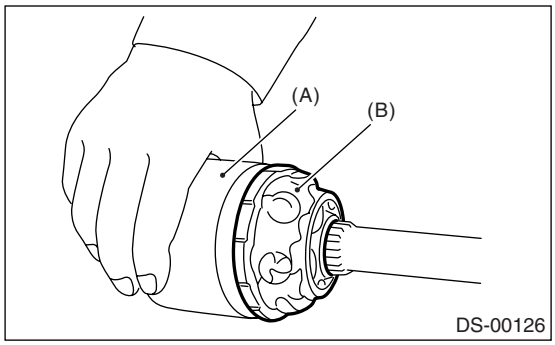


DS-00129

(A) Inner race
(B) Cage

7) Fill 80 to 90 g (2.82 to 3.17 oz) of specified grease into the interior of DOJ outer race.
8) Apply a coat of specified grease to cage pocket and six balls.
9) Insert six balls into cage pocket.

10) Align the outer race track and ball positions and place in the part where shaft, inner race, cage and balls are previously installed, and then fit the outer race.

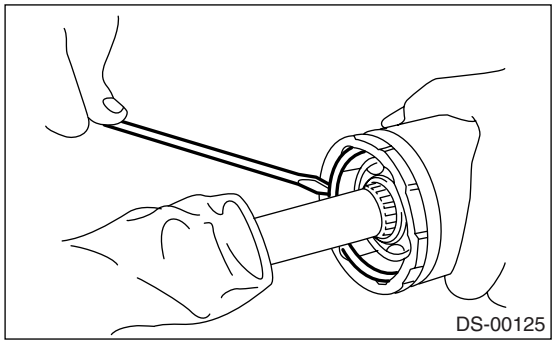


DS-00126

(A) Outer race
(B) Grease

11) Install the circlip in the groove on DOJ outer race.

NOTE:
• Assure the balls, cage and inner race are completely fitted in the outer race of DOJ.
• Exercise care not to place the matched position of circlip in ball groove of outer race.
• Pull the shaft lightly and assure that the circlip is completely fitted in groove.


DS-00125

12) Apply an even coat of the specified grease [20 to 30 g (0.71 to 1.06 oz)] to the entire inner surface of boot. Also apply grease to shaft.
13) Install the DOJ boot taking care not to twist it.

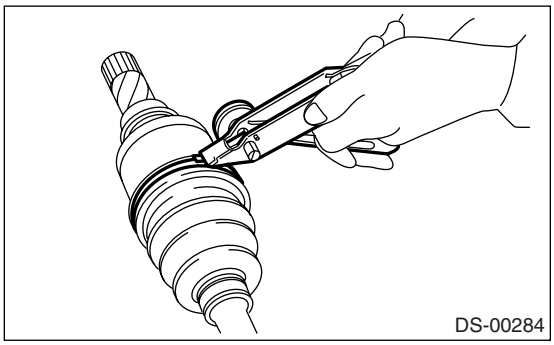
NOTE:
• Inside of the larger end of DOJ boot and boot groove shall be cleaned so as to be free from grease and other substances.
• When installing the DOJ boot, position the outer race of DOJ at center of its travel.

14) Put a new band through the clip and wind twice in alignment with band groove of boot.

NOTE:
When tightening the boot, exercise care so that air within boot is appropriate.

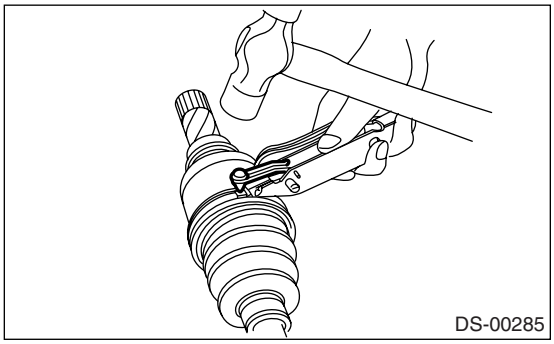
15) Tighten the band using the ST.
ST 925091000 BAND TIGHTENING TOOL

NOTE:
Tighten the band until it cannot be moved by hand.



16) Tap on the clip with the punch provided at the end of ST.
ST 925091000 BAND TIGHTENING TOOL

NOTE:
Tap to an extent that the boot underneath is not damaged.



17) Cut off the band with an allowance of about 10 mm (0.39 in) left from clip, and bend this allowance over the clip.

NOTE:
Be careful so that the end of band is in close contact with clip.

18) Fix up the boot on BJ in the same manner.
19) Extend and retract the DOJ to provide equal grease coating.

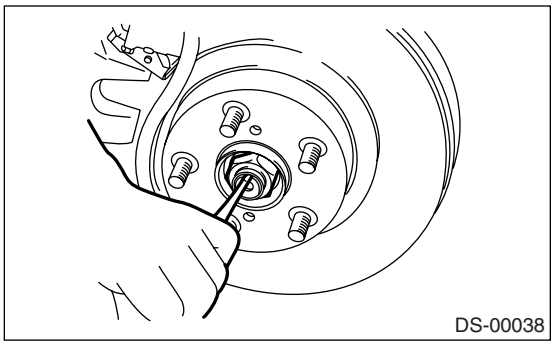
E: INSPECTION

Check the removed parts for damage, wear, corrosion etc. If faulty, repair or replace.
1) DOJ (Double Offset Joint)
Check seizure, corrosion, damage, wear and excessive play.
2) PTJ (Pillow tripod Joint)
Check seizure, corrosion, damage and excessive play.
3) Shaft
Check excessive bending, twisting, damage and wear.
4) EBJ (High-efficiency compact ball fixed joint)
Check seizure, corrosion, damage and excessive play.
5) Boot
Check for wear, warping, breakage or scratches.
6) Grease
Check for discoloration or fluidity.

8. Rear Drive Shaft

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Lift-up the vehicle, and remove the rear wheel.
3) Unlock the axle nut.

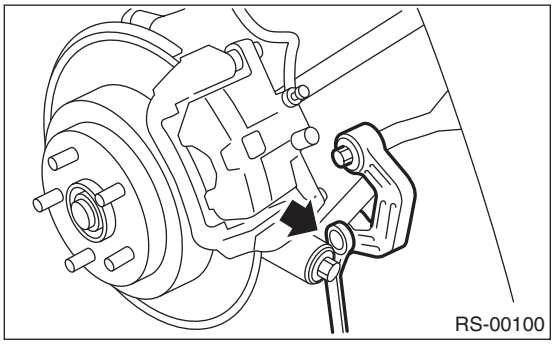


4) Remove the axle nut using a socket wrench with parking brake applied.

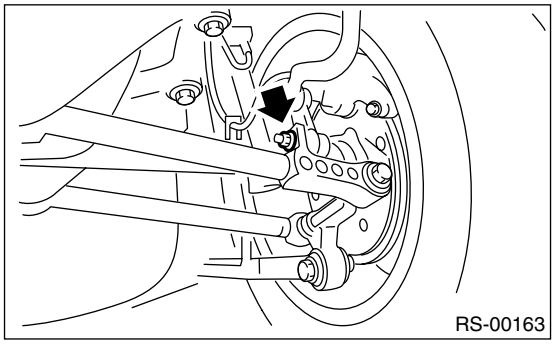
CAUTION:
Remove the axle nut with vehicle weight not applied on axle.

5) Disconnect the stabilizer link.

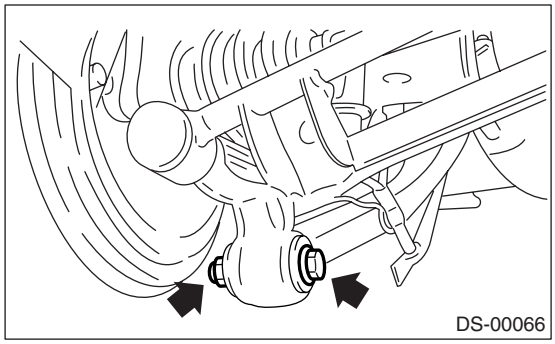
- Except STi model



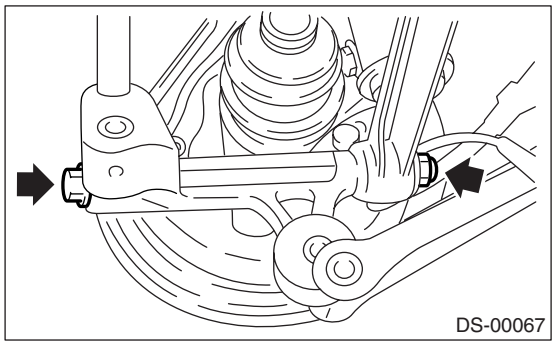
- STi model



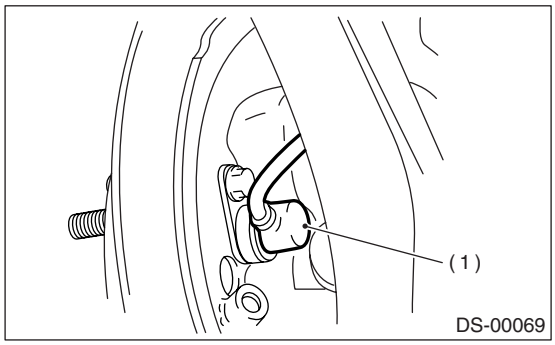
6) Remove the bolt which secures the trailing link to housing.



7) Remove the bolts which secure the front lateral link and rear lateral link to housing.



8) Remove the rear ABS wheel speed sensor from back plate.



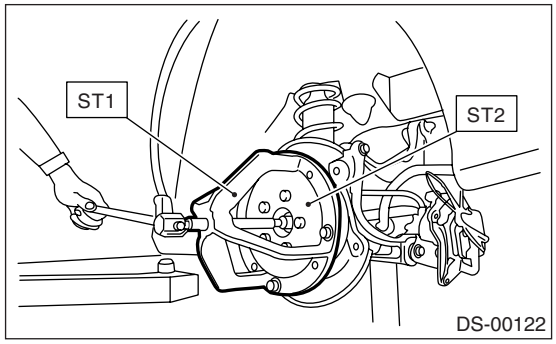
(1) ABS wheel speed sensor

9) Remove the rear drive shaft from rear axle. If it is hard to remove, remove the brake disk rotor using the ST1 and ST2.

ST1	926470000	AXLE SHAFT PULLER
ST2	28099PA110	AXLE SHAFT PULLER PLATE

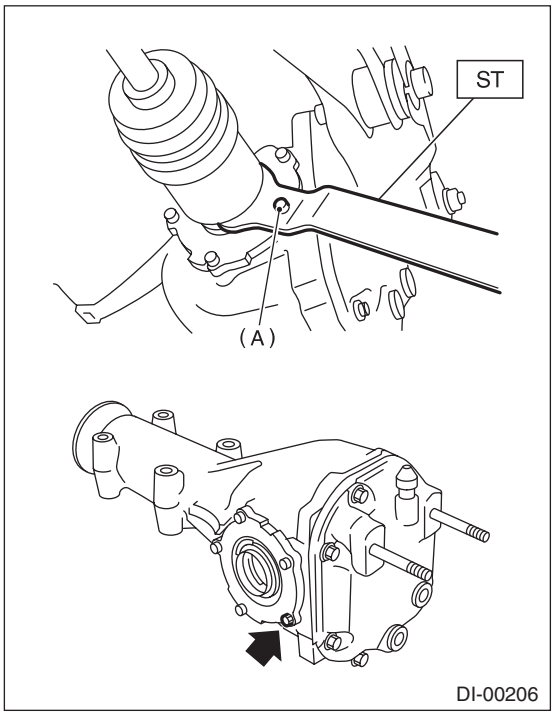
CAUTION:
• Do not hammer the drive shaft when removing.

- **Do not damage the oil seal and tone wheel.**



10) Remove the rear drive shaft from rear differential using the ST.
ST 28099PA100 DRIVE SHAFT REMOVER

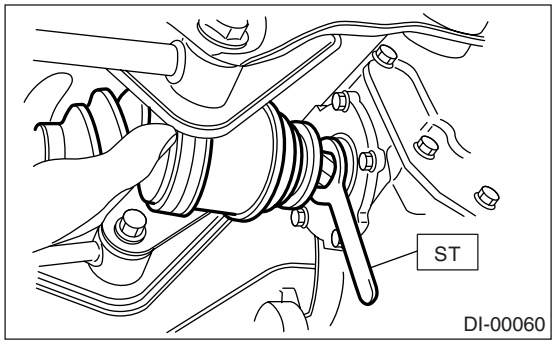
NOTE:
Fit the ST to the bolt (A) as shown in the figure to avoid damage on the side bearing retainer.



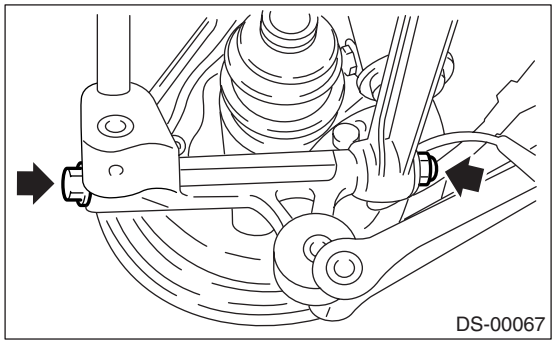
(A) Bolt

B: INSTALLATION

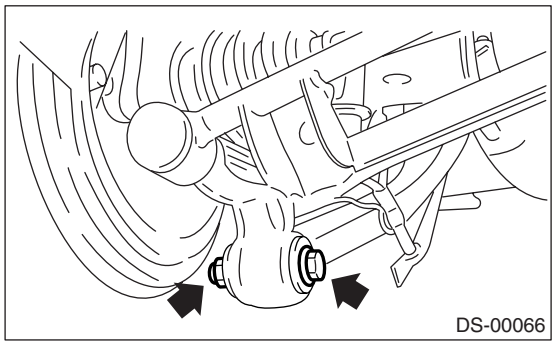
1) Insert the rear drive shaft into rear axle.
2) Temporarily tighten the axle nut.
3) Install the rear drive shaft to rear differential using the ST.
ST 28099PA090 OIL SEAL PROTECTOR



4) Temporarily tighten the front lateral link and rear lateral link to housing using a new self-locking nuts.



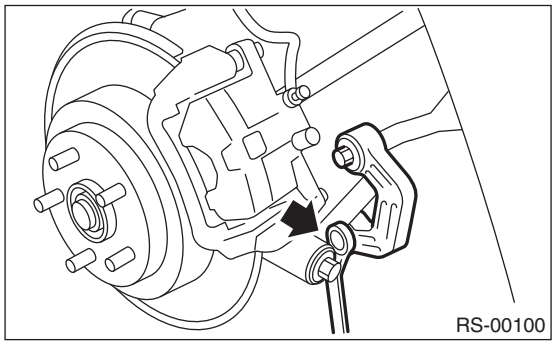
5) Temporarily tighten the trailing link to housing using a new self-locking nut.



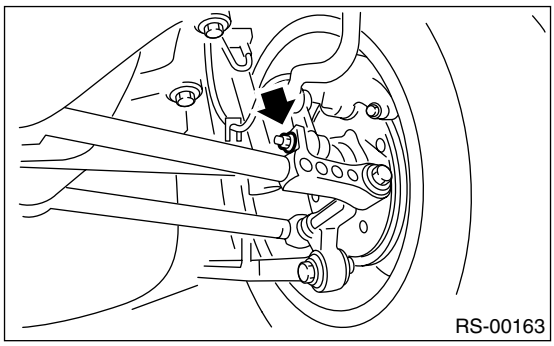
6) Install the stabilizer link.

Tightening torque:
45 N·m (4.6 kgf-m, 33 ft-lb)

- Except STi model

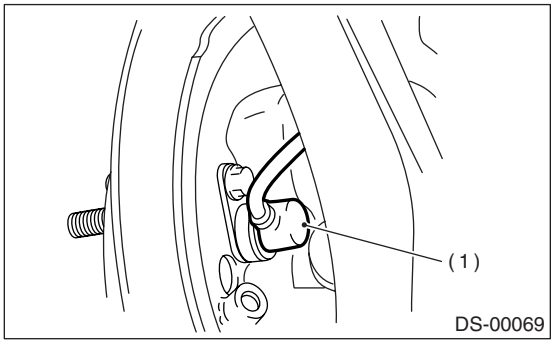


- STi model



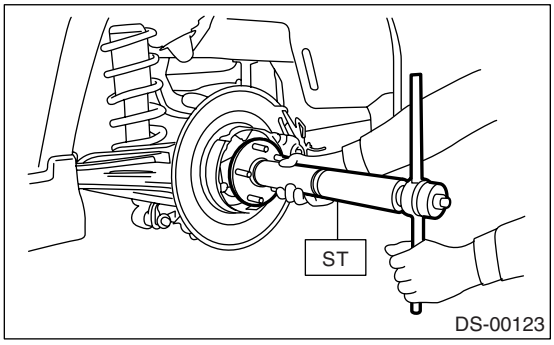
7) Install the ABS wheel speed sensor.

Tightening torque:
32 N·m (3.3 kgf-m, 24 ft-lb)



(1) ABS wheel speed sensor

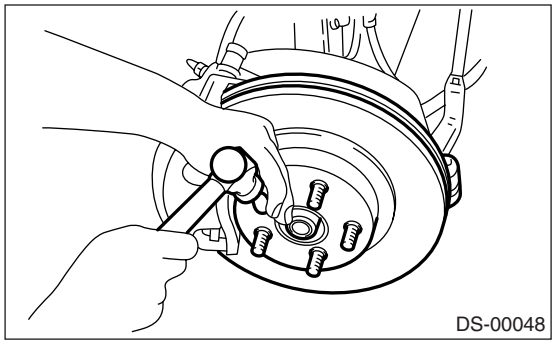
8) Using the ST1 and ST2, pull the rear drive shaft into place.
ST1 922431000 AXLE SHAFT INSTALLER
ST2 927390000 ADAPTER



9) Tighten a new axle nut to the specified torque with parking brake applied.

Tightening torque:
190 N·m (19.4 kgf-m, 140 ft-lb)

10) Lock the axle nut.



11) Install the wheel.

Tightening torque:
90 N·m (9.2 kgf-m, 66 ft-lb)

12) Make the tires contact the ground fully.

CAUTION:
Make the tires contact the ground fully and the vehicle be in curb weight whenever carrying out the tightening of bush portions.

13) Tighten the installation bolt of rear housing assembly and lateral link assembly.

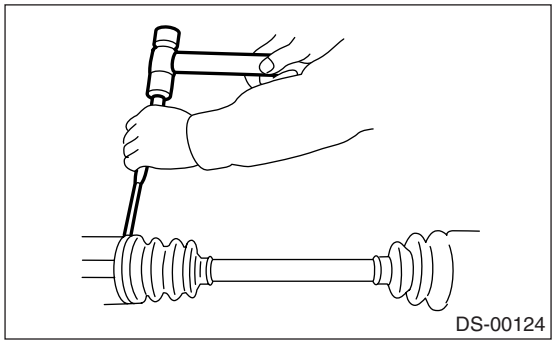
Tightening torque:
140 N·m (14.3 kgf-m, 103 ft-lb)

14) Tighten the installation bolt of rear housing assembly and trailing link assembly.

Tightening torque:
90 N·m (9.2 kgf-m, 66 ft-lb)

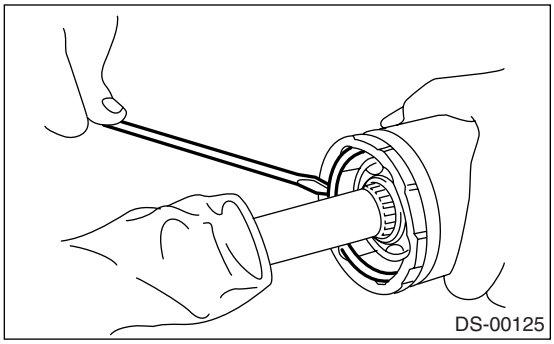
C: DISASSEMBLY

1) Straighten the bent claw of larger end of DOJ boot.
2) Loosen the band by means of screwdriver or pliers with care of not damaging boot.



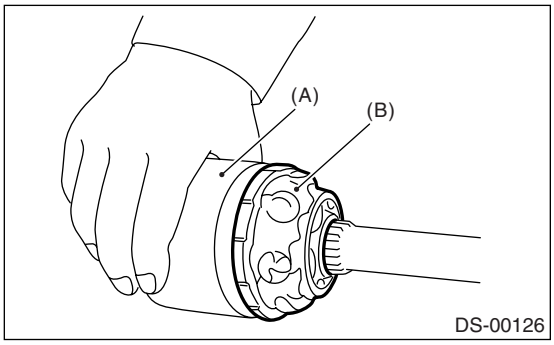
3) Remove the boot band on the small end of DOJ boot in the same manner.
4) Remove the larger end of DOJ boot from DOJ outer race.

5) Pry and remove the round circlip located at neck of DOJ outer race with a screwdriver.


DS-00125

6) Take out the DOJ outer race from shaft assembly.
7) Wipe off the grease, and then take out the balls.

NOTE:
• The grease is a special grease (grease for constant velocity joint). Do not confuse with other greases.
• Disassemble with exercising care not to lose balls (6 pcs).



DS-00126

(A) Outer race
(B) Grease

8) To remove the cage from inner race, turn the cage by a half pitch to the track groove of inner race, and shift the cage.
9) Remove the snap ring, which fixes the inner race to shaft, by using pliers.
10) Take out the DOJ inner race.
11) Take off the DOJ cage from shaft and remove the DOJ boot.
12) Wrap the shaft splines with vinyl tape.
13) Remove the BJ boot or EBJ boot in the same procedure as DOJ boot.

NOTE:
Further disassembly of axle is impossible because the BJ and EBJ cannot be disassembled.

D: ASSEMBLY

NOTE:
Use specified grease.

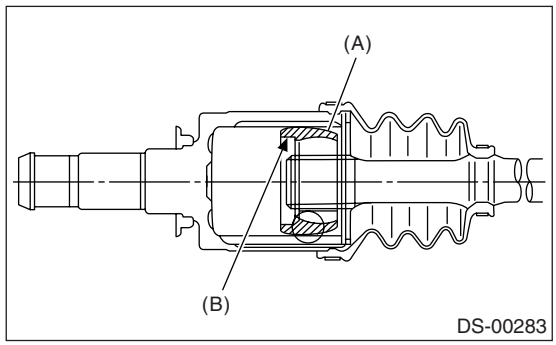
EBJ side:
NTG2218-M (Part No. 28395AG010)

BJ side:
NKG708 (Part No. 28495AE000)

DOJ side:
NKG205 (Part No. 28495AG010, 28495AG000)

1) Install the BJ boot or EBJ boot in specified position, and fill it with 60 to 70 g (2.12 to 2.47 oz) of specified grease.
2) Place the DOJ boot at the center of shaft.
3) Wrap the shaft splines with vinyl tape.
4) Insert the DOJ cage onto shaft.

NOTE:
Insert the cage with cut-out portion facing the shaft end, since the cage has an orientation.

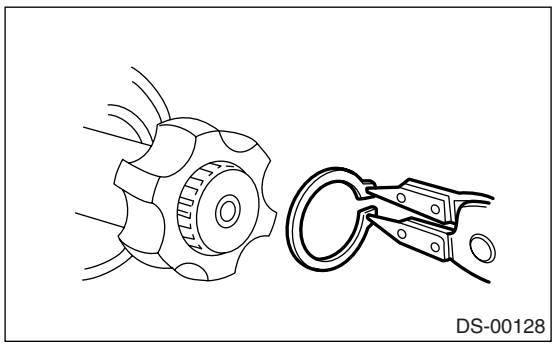


DS-00283

(A) Cage
(B) Cut-out portion

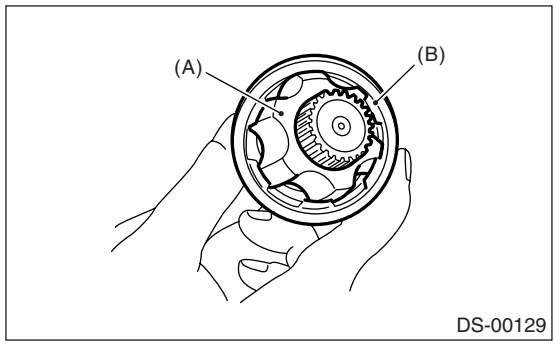
5) Install the DOJ inner race on shaft, and fit the snap ring with pliers.

NOTE:
Confirm the snap ring is completely fitted in shaft groove.


DS-00128

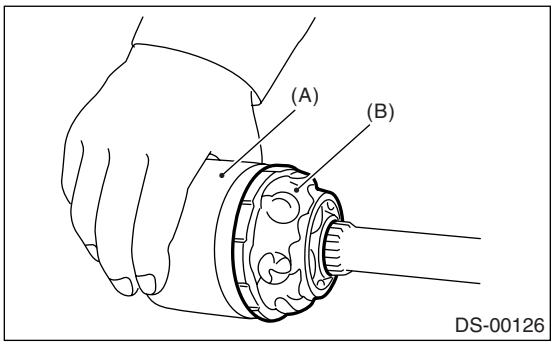
6) Install the cage, which was previously fitted, to inner race fixed upon shaft.

NOTE:
Fit the cage with protruded part aligned with the track on inner race, and then turn by a half pitch.



(A) Inner race
(B) Cage

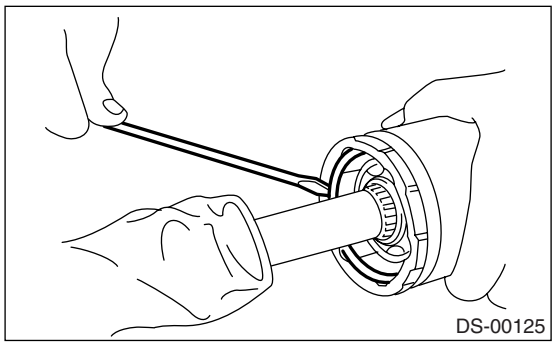
7) Fill 80 to 90 g (2.82 to 3.17 oz) of specified grease into the interior of DOJ outer race.
8) Apply a coat of specified grease to cage pocket and six balls.
9) Insert six balls into cage pocket.
10) Align the outer race track and ball positions and place in the part where shaft, inner race, cage and balls are previously installed, and then fit the outer race.



(A) Outer race
(B) Grease

11) Install the circlip in the groove on DOJ outer race.

NOTE:
• Assure the balls, cage and inner race are completely fitted in the outer race of DOJ.
• Exercise care not to place the matched position of circlip in ball groove of outer race.
• Pull the shaft lightly and assure that the circlip is completely fitted in groove.



12) Apply an even coat of the specified grease [20 to 30 g (0.71 to 1.06 oz)] to the entire inner surface of boot. Also apply grease to shaft.
13) Install the DOJ boot taking care not to twist it.

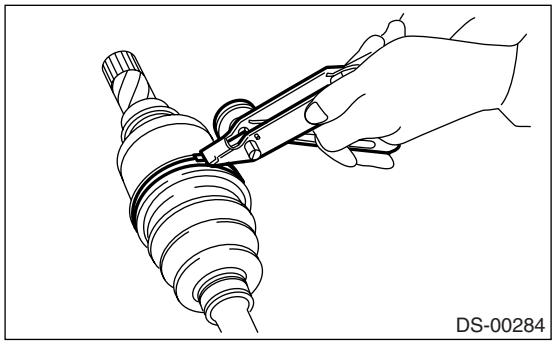
NOTE:
• Inside of the larger end of DOJ boot and boot groove shall be cleaned so as to be free from grease and other substances.
• When installing the DOJ boot, position the outer race of DOJ at center of its travel.

14) Put a new band through the clip and wind twice in alignment with band groove of boot.

NOTE:
When tightening the boot, exercise care so that air within boot is appropriate.

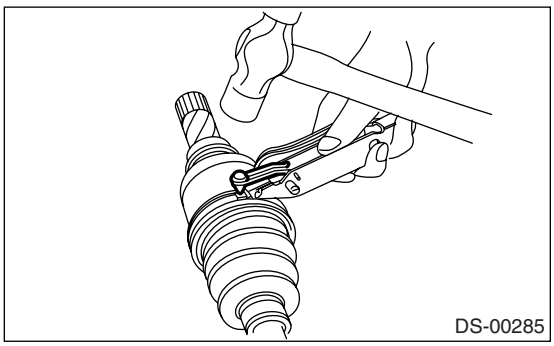
15) Tighten the band using the ST.
ST 925091000 BAND TIGHTENING TOOL

NOTE:
Tighten the band until it cannot be moved by hand.



16) Tap on the clip with the punch provided at the end of ST.
ST 925091000 BAND TIGHTENING TOOL

NOTE:
Tap to an extent that the boot underneath is not damaged.



17) Cut off the band with an allowance of about 10 mm (0.39 in) left from clip, and bend this allowance over the clip.

NOTE:
Be careful so that the end of band is in close contact with clip.

18) Fix up the boot on BJ in the same procedure.
19) Extend and retract the DOJ to provide equal grease coating.

E: INSPECTION

Check the removed parts for damage, wear, corrosion, etc. If faulty, repair or replace.
1) DOJ (Double Offset Joint)
Check seizure, corrosion, damage, wear and excessive play.
2) Shaft
Check excessive bending, twisting, damage and wear.
3) BJ (Bell Joint)
Check seizure, corrosion, damage and excessive play.
4) EBJ (High-efficiency compact ball fixed joint)
Check seizure, corrosion, damage and excessive play.
5) Boot
Check for wear, warping, breakage or scratches.
6) Grease
Check for discoloration or fluidity.

9. General Diagnostic Table

A: INSPECTION

NOTE:
Vibration while cruising may be caused by an unbalanced tire, improper tire inflation pressure, improper wheel alignment, etc.

Symptom	Possible cause	Corrective action
Noise or vibration from propeller shaft	Center bearing	Check the center bearing. <Ref. to DS-19, CENTER BEARING FREE PLAY, INSPECTION, Propeller Shaft.>
	Runout of propeller shaft	Check the vibration of propeller shaft. <Ref. to DS-19, RUNOUT OF PROPELLER SHAFT, INSPECTION, Propeller Shaft.>
	Loose or free play of connection	Check joint and connector. <Ref. to DS-18, JOINTS AND CONNECTIONS, INSPECTION, Propeller Shaft.>
		Check splines and bearing. <Ref. to DS-19, SPLINES AND BEARING LOCATIONS, INSPECTION, Propeller Shaft.>
Abnormal wheel vibration	Wheel is out of balance.	Check the wheel balance. <Ref. to WT-7, INSPECTION, Wheel Balancing.>
	Front wheel alignment	Check the front wheel alignment. <Ref. to FS-7, INSPECTION, Wheel Alignment.>
	Rear wheel alignment	Check the rear wheel alignment. <Ref. to RS-9, INSPECTION, Wheel Alignment.>
	Front strut	Check the front strut. <Ref. to FS-21, INSPECTION, Front Strut.>
	Rear strut	Check the rear strut. <Ref. to RS-15, INSPECTION, Rear Strut.>
	Front drive shaft	Check the front drive shaft. <Ref. to DS-47, INSPECTION, Front Drive Shaft.>
	Rear drive shaft	Check the rear drive shaft. <Ref. to DS-53, INSPECTION, Rear Drive Shaft.>
	Front axle	Check the front axle. <Ref. to DS-25, INSPECTION, Front Axle.>
	Front hub unit bearing	Check the front hub unit bearing. <Ref. to DS-25, INSPECTION, Front Axle.>
	Rear axle	Check the rear axle. <Ref. to DS-36, INSPECTION, Rear Axle [AWD Model].> <Ref. to DS-38, INSPECTION, Rear Axle [FWD Model].>
Noise from the underbody	Wheel is out of balance.	Check the wheel balance. <Ref. to WT-7, INSPECTION, Wheel Balancing.>
	Front wheel alignment	Check the front wheel alignment. <Ref. to FS-7, INSPECTION, Wheel Alignment.>
	Rear wheel alignment	Check the rear wheel alignment. <Ref. to RS-9, INSPECTION, Wheel Alignment.>
	Front strut	Check the front strut. <Ref. to FS-21, INSPECTION, Front Strut.>
	Rear strut	Check the rear strut. <Ref. to RS-15, INSPECTION, Rear Strut.>

ABS

		Page
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6.	Front Tone Wheel	23
7.	Rear Tone Wheel	24
8.	G Sensor	25
9.	Lateral G Sensor	27
10.	Yaw Rate and Lateral G Sensor	29

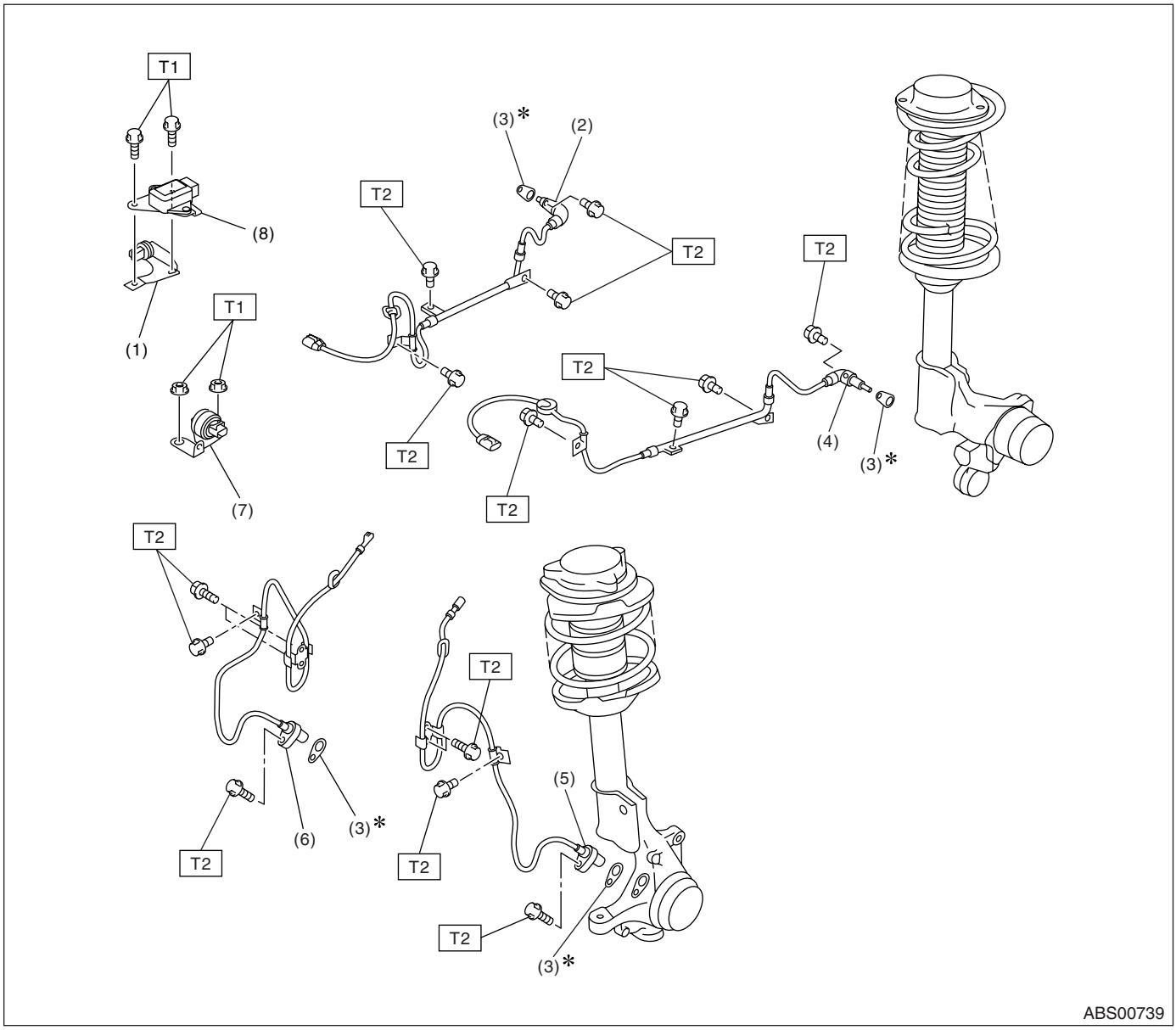
1. General Description

A: SPECIFICATION

Item				Specification or remarks
ABS wheel speed sensor	ABS wheel speed sensor gap		Front	0.3 — 0.8 mm (0.012 — 0.031 in)
			Rear	0.7 — 1.2 mm (0.028 — 0.047 in)
	ABS wheel speed sensor resistance		Front	1.25±0.25 kΩ
			Rear	1.15±0.115 kΩ
	Marks of harness	Front	RH	White
			LH	Yellow
		Rear	RH	Light blue
			LH	Brown
G sensor	G sensor voltage			2.3±0.2 V
Lateral G sensor (STi model)	Lateral G sensor voltage			2.5±0.2 V
ABSCM&H/U marks	FWD			MA
	AWD	AT model		MB
		MT model (Except Sedan STi model)		MC
		MT model (Sedan STi model without driver's control center differential auto)		CX
		MT model (Sedan STi model with driver's control center differential auto)		MD

B: COMPONENT

1. SENSOR

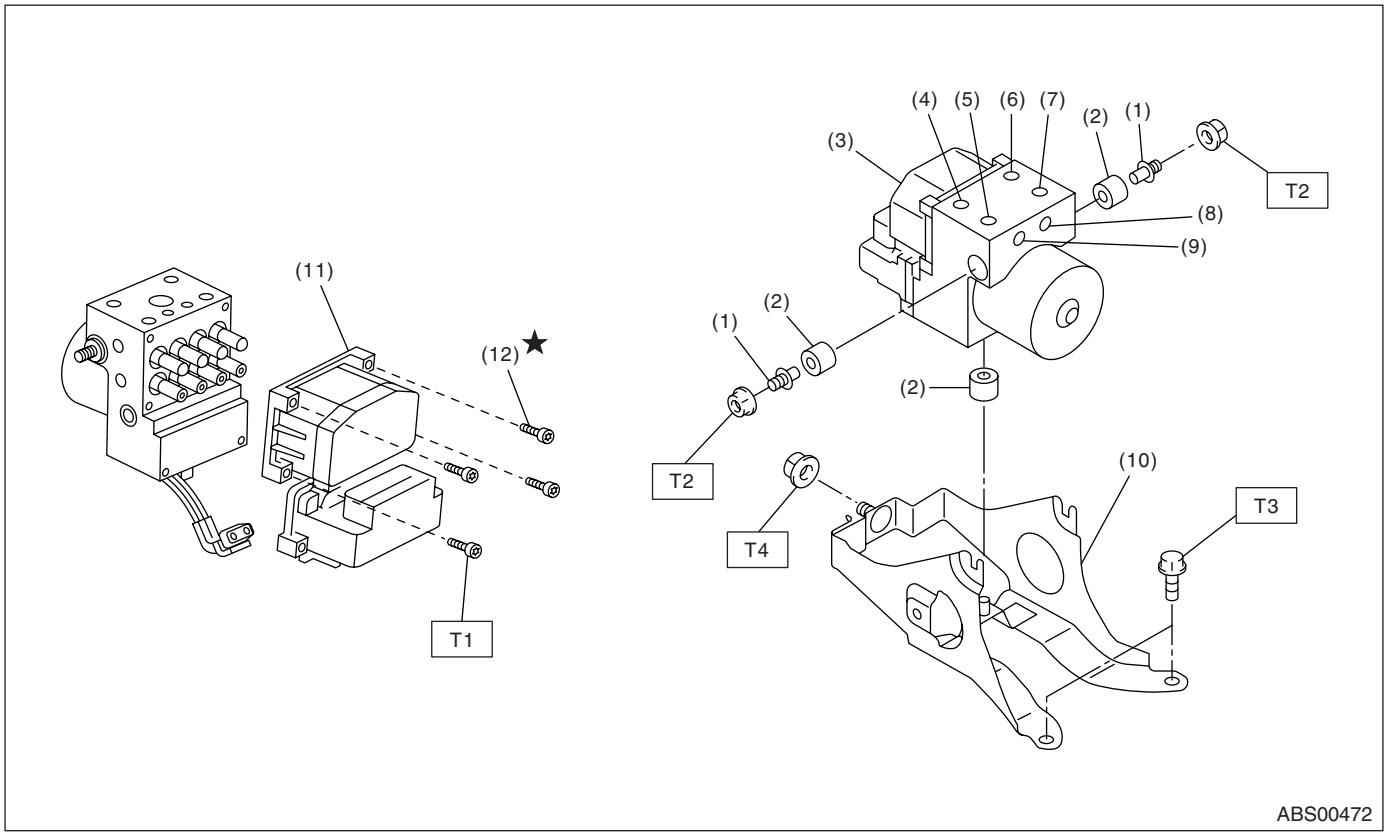


(1) G sensor
(2) Rear ABS wheel speed sensor RH
(3) Adjusting spacer
(4) Rear ABS wheel speed sensor LH
(5) Front ABS wheel speed sensor LH
(6) Front ABS wheel speed sensor RH
(7) Lateral G sensor (STi model without driver's control center differential auto)
(8) Yaw rate and leteral G sensor (STi model with driver's control center differential auto)

Tightening torque: N·m (kgf-m, ft-lb)
T1: 18 (1.8, 13.0)
T2: 33 (3.3, 24)

2. ABS CONTROL MODULE AND HYDRAULIC CONTROL UNIT (ABSCM&H/U)

• STi MODEL WITHOUT DRIVER'S CONTROL CENTER DIFFERENTIAL AUTO

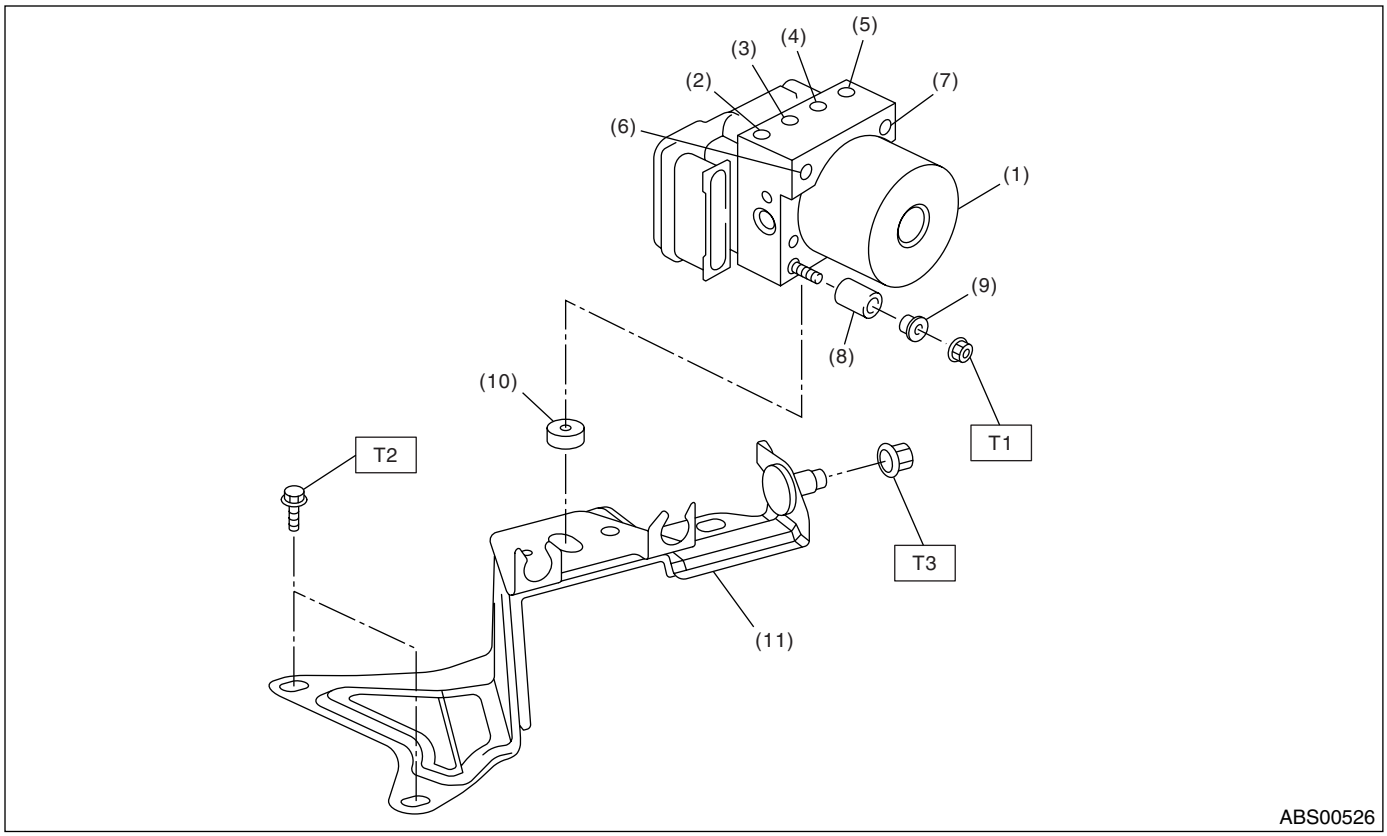


(1)	Stud bolt	(7)	Primary inlet	
(2)	Damper	(8)	Rear-LH outlet	
(3)	ABS control module and hydraulic control unit (ABSCM&H/U)	(9)	Rear-RH outlet	
		(10)	Bracket	
(4)	Front-LH outlet	(11)	ABS control module (ABSCM)	
(5)	Secondary inlet	(12)	Screw	
(6)	Front-RH outlet			

Tightening torque: N·m (kgf-m, ft-lb)

T1: 2.65 (0.27, 1.95)
T2: 18 (1.8, 13.0)
T3: 33 (3.3, 24)
T4: 38 (3.8, 27.5)

• EXCEPT STi MODEL WITHOUT DRIVER'S CONTROL CENTER DIFFERENTIAL AUTO



(1)	ABS control module and hydraulic control unit (ABSCM&H/U)	(6)	Primary inlet
(2)	Front outlet RH	(7)	Secondary inlet
(3)	Rear outlet LH	(8)	Damper
(4)	Rear outlet RH	(9)	Spacer
(5)	Front outlet LH	(10)	Damper
		(11)	Bracket

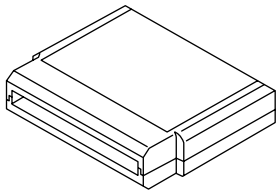
Tightening torque: N·m (kgf-m, ft-lb)
T1: 7.5 (0.76, 5.5)
T2: 33 (3.3, 24)
T3: 38 (3.8, 27.5)

C: CAUTION

• Wear work clothing, including a cap, protective goggles and protective shoes during operation.
• Before disconnecting electrical connectors of sensors or units, be sure to disconnect the ground cable from battery.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly, and replacement.
• Be careful not to burn, because each part in the vehicle is hot after running.
• Be sure to tighten fasteners including bolts and nuts to the specified torque.
• Place shop jacks or rigid racks at the specified points.

D: PREPARATION TOOL

1. SPECIAL TOOLS

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18482AA000	18482AA000	CARTRIDGE	Troubleshooting for electrical systems.
ST22771AA030	22771AA030	SUBARU SELECT MONITOR KIT	Troubleshooting for electrical systems. • English: 22771AA030 (Without printer) • German: 22771AA070 (Without printer) • French: 22771AA080 (Without printer) • Spanish: 22771AA090 (Without printer)

2. GENERAL PURPOSE TOOLS

TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance, voltage and ampere.
Pressure gauge	Used for measuring oil pressure.
Oscilloscope	Used for measuring sensor.
TORX® BIT E5	Used for ABSCM removal. (Except STi model without driver's control center differential auto)
TORX® BIT T20	Used for ABSCM removal. (STi model without driver's control center differential auto)

2. ABS Control Module and Hydraulic Control Unit (ABSCM&H/U)

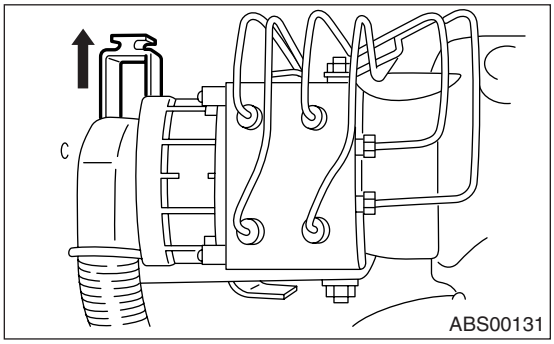
A: REMOVAL

1. STi MODEL WITHOUT DRIVER'S CONTROL CENTER DIFFERENTIAL AUTO

1) Disconnect the ground cable from battery.
2) Remove the air intake duct from engine compartment to facilitate removal of ABSCM&H/U.
3) Use compressed air to get rid of water around the ABSCM&H/U.

NOTE:
Contact will be insufficient if the terminal gets wet.

4) Remove the ground cable from ABSCM&H/U.
5) Pull off the lock of ABSCM&H/U connector to remove it.



6) Disconnect the connector from ABSCM&H/U.

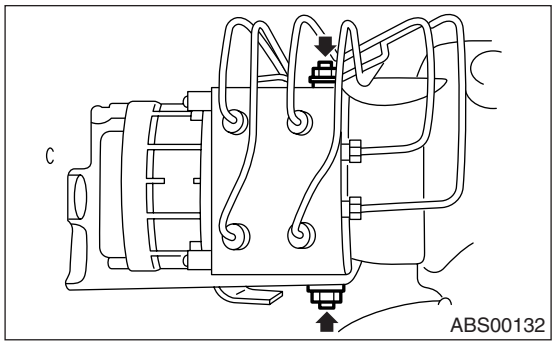
CAUTION:
Do not pull the harness when disconnecting the connector.

7) Unlock the harness clip.
8) Disconnect the brake pipes from ABSCM&H/U.
9) Wrap the brake pipes with vinyl bag to avoid spilling brake fluid on vehicle body.

CAUTION:
Brake fluid spilt on the vehicle body will harm the painted surface; wash away quickly with water if spilt.

10) Remove the ABSCM&H/U from engine compartment.

CAUTION:
- **Do not drop or bump the ABSCM&H/U.**
- **Do not turn the ABSCM&H/U upside down or place it on its side.**
- **Be careful to prevent foreign particles from getting into ABSCM&H/U.**
- **Do not let water get into the connector.**



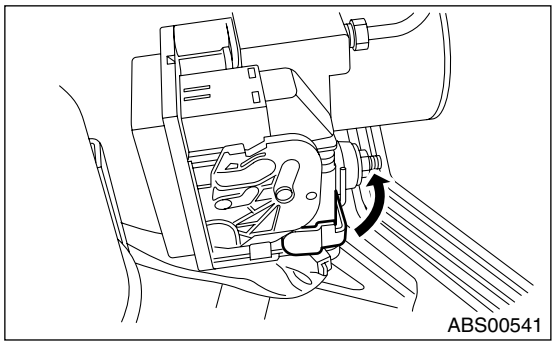
2. EXCEPT STi MODEL WITHOUT DRIVER'S CONTROL CENTER DIFFERENTIAL AUTO

1) Disconnect the ground cable from battery.
2) Remove the air intake duct and air cleaner case from the engine compartment to facilitate removal of ABSCM&H/U. <Ref. to IN(H4SO)-5, REMOVAL, Air Cleaner Case.> <Ref. to IN(H4SO)-6, REMOVAL, Air Intake Duct.> <Ref. to IN(H4DOTC)-9, REMOVAL, Air Cleaner Case.> <Ref. to IN(H4DOTC)-10, REMOVAL, Air Intake Duct.>
3) Use compressed air to get rid of water around the ABSCM&H/U.

NOTE:
Contact will be insufficient if the terminal gets wet.

4) Disconnect the ABSCM&H/U connector pulling up the lock lever.

CAUTION:
Do not pull the harness when disconnecting connector.



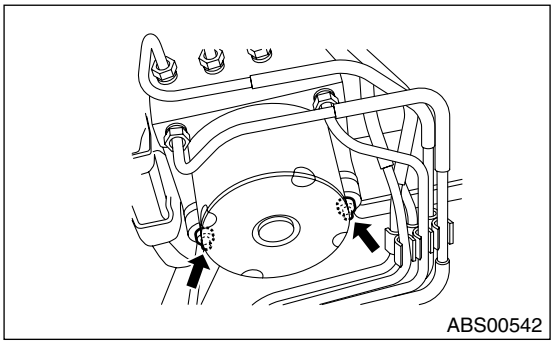
5) Remove the harness clip.
6) Disconnect the brake pipes from ABSCM&H/U.
7) Wrap the brake pipe using a vinyl bag not to spill the brake fluid on the vehicle body.

CAUTION:
When brake fluid is attached to the vehicle body, wash it off with water and wipe the water.

8) Remove the nuts and remove the ABSCM&H/U.

CAUTION:
- **Do not drop or bump the ABSCM&H/U.**

• Do not turn ABSCM&H/U upside down or place it sideways for storage.
• Be careful that no foreign objects are mixed in ABSCM&H/U.
• Be careful that no water enters inside the connectors.



9) Remove the ABSCM&H/U bracket.

B: INSTALLATION

1. STi MODEL WITHOUT DRIVER'S CONTROL CENTER DIFFERENTIAL AUTO

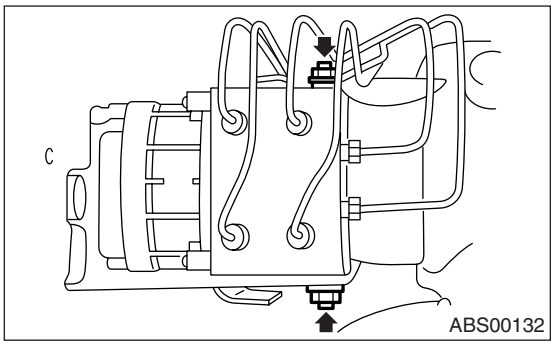
1) Install the ABSCM&H/U bracket.

Tightening torque:
33 N·m (3.3 kgf-m, 24 ft-lb)

2) Apply a coat of grease (Nippeco LT or GB) to the bracket attaching bolt.
3) Align the width across flat portion of ABSCM& H/U side stud bolt with the bolt hole groove on bracket, and then install the ABSCM&H/U.

NOTE:
Confirm the specification mark of ABSCM&H/U.

Tightening torque:
18 N·m (1.8 kgf-m, 13.0 ft-lb)



4) Connect the brake pipes to their correct ABSCM&H/U connections.

Tightening torque:
15 N·m (1.5 kgf-m, 10.8 ft-lb)

5) Using the cable clip, secure the ABSCM&H/U harness to bracket.
6) Connect the connector to ABSCM&H/U.

NOTE:
• Be sure to remove all foreign matter from inside of the connector before connecting.
• Ensure the ABSCM&H/U connector is securely locked.

7) Connect the ground cable to ABSCM&H/U, and then apply grease.
8) Install the air intake duct.
9) Bleed air from the brake system.

2. EXCEPT STi MODEL WITHOUT DRIVER'S CONTROL CENTER DIFFERENTIAL AUTO

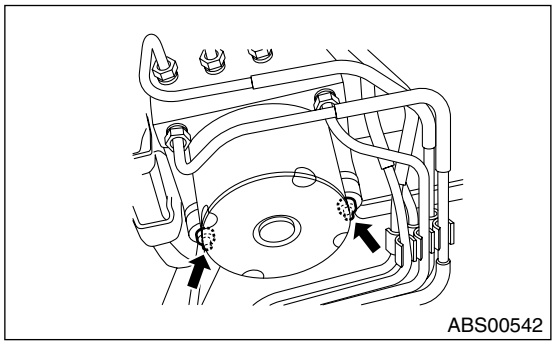
1) Install the ABSCM&H/U bracket.

Tightening torque:
33 N·m (3.3 kgf-m, 24 ft-lb)

2) Install the ABSCM&H/U aligning the groove of damper on ABSCM&H/U side with the pawl of bracket.

NOTE:
Check the identification mark of ABSCM&H/U.

Tightening torque:
7.5 N·m (0.76 kgf-m, 5.5 ft-lb)



3) Connect the brake pipes to their correct ABSCM&H/U connections.

Tightening torque:
15 N·m (1.5 kgf-m, 10.8 ft-lb)

4) Using the cable clip, secure the ABSCM&H/U harness to bracket.
5) Connect the connector to ABSCM&H/U.

NOTE:
• Be sure to remove all foreign matter from inside of the connector before connecting.
• Ensure that the ABSCM&H/U connector is securely locked.

6) Connect the ground cable to ABSCM&H/U, and then apply anti-corrosive wax.

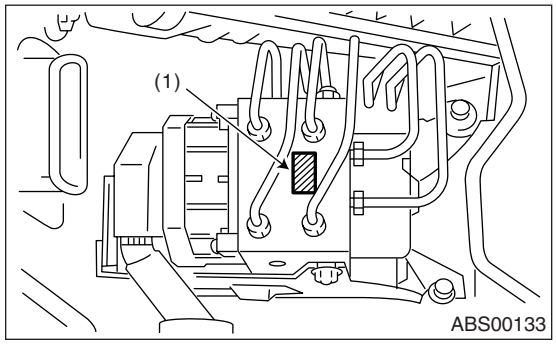
Tightening torque:
13 N·m (1.3 kgf-m, 9.6 ft-lb)

7) Install the air cleaner case and air intake duct. <Ref. to IN(H4SO)-5, INSTALLATION, Air Cleaner Case.> <Ref. to IN(H4SO)-6, INSTALLATION, Air Intake Duct.> <Ref. to IN(H4DOTC)-9, INSTALLATION, Air Cleaner Case.> <Ref. to IN(H4DOTC)-10, INSTALLATION, Air Intake Duct.>
8) Bleed air from the brake system.

C: INSPECTION

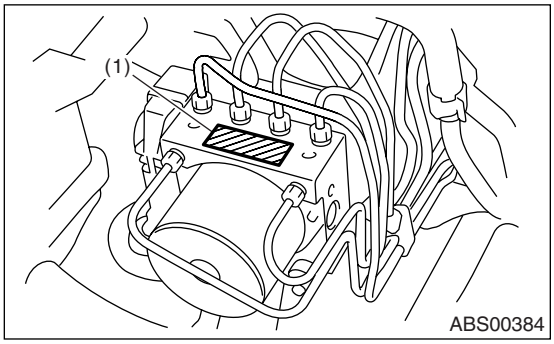
1) Check the connected and fixed condition of connector.
2) Check specifications of the mark with ABSCM&H/U.
Refer to “SPECIFICATION” for identification mark. <Ref. to ABS-2, SPECIFICATION, General Description.>

• STi model without driver’s control differential auto



(1) Mark

• Except STi model without driver’s control differential auto



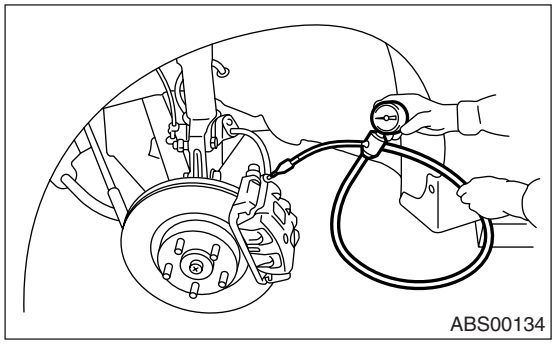
(1) Mark

1. CHECKING THE HYDRAULIC UNIT ABS OPERATION BY PRESSURE GAUGE

1) Lift-up the vehicle and remove the wheels.
2) Disconnect the air bleeder screws from the FL and FR caliper bodies.
3) Connect two pressure gauges to the FL and FR caliper bodies.

CAUTION:
• Pressure gauges used exclusively for brake fluid must be used.
• Do not employ pressure gauge previously used for transmission since the piston seal is expanded which may lead to malfunction of the brake.

NOTE:
Wrap sealing tape around the pressure gauge.



4) Bleed air from the pressure gauges.
5) Perform the ABS sequence control.
<Ref. to ABS-14, ABS Sequence Control.>
6) When the hydraulic unit begins to work, and first the FL side performs decompression, holding, and compression, and then the FR side performs decompression, holding, and compression.
7) Read values indicated on the pressure gauge and check if the fluctuation of the values between decompression and compression meets the standard values. Also check if any irregular brake pedal tightness is felt.

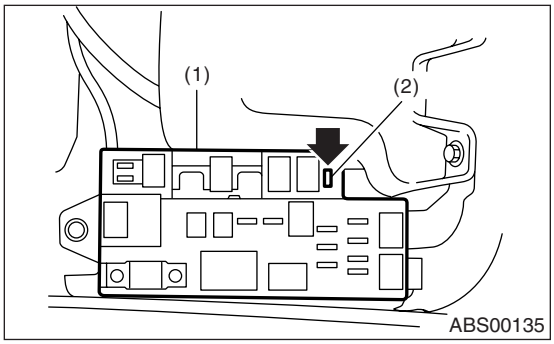
	Front wheel	Rear wheel
Initial value	3,500 kPa (36 kgf/cm^2, 511 psi)	3,500 kPa (36 kgf/cm^2, 511 psi)
Decompressed	500 kPa (5 kgf/cm^2, 73 psi) or less	500 kPa (5 kgf/cm^2, 73 psi) or less
Compressed	3,500 kPa (36 kgf/cm^2, 511 psi) or more	3,500 kPa (36 kgf/cm^2, 511 psi) or more

8) Remove the pressure gauges from the FL and FR caliper bodies.
9) Remove the air bleeder screws from the RL and RR caliper bodies.
10) Connect the air bleeder screws to the FL and FR caliper bodies.
11) Connect two pressure gauges to the RL and RR caliper bodies.
12) Bleed air from the pressure gauges and the FL and FR caliper bodies.
13) Perform the ABS sequence control.
<Ref. to ABS-14, ABS Sequence Control.>

14) When the hydraulic unit begins to work, at first the RR side performs decompression, holding, and compression, and then the RL side performs decompression, holding, and compression.
15) Read values indicated on the pressure gauges and check if they meet the standard value.
16) After checking, remove the pressure gauges from caliper bodies.
17) Connect the air bleeder screws to RL and RR caliper bodies.
18) Bleed air from the brake line.

2. CHECKING THE HYDRAULIC UNIT ABS OPERATION WITH BRAKE TESTER

1) In the case of AWD AT without VTD models, install a spare fuse with the FWD connector in the main fuse box to simulate FWD models.

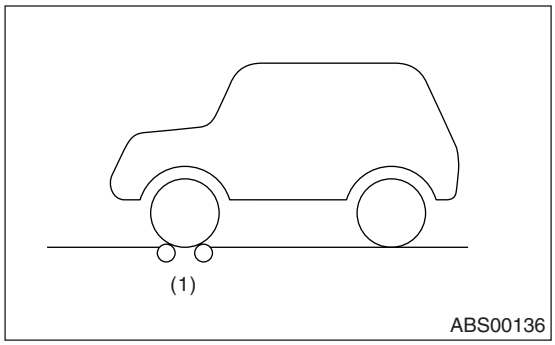


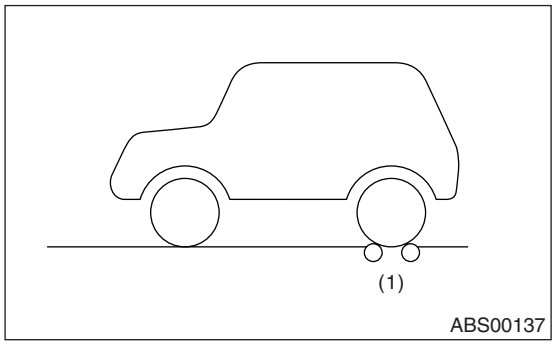
(1) Main fuse box
(2) FWD connector

NOTE:
Since the MT model and AT VTD model cannot cut off the AWD circuit forcibly, set the wheels other than measured one onto free rollers.

2) Prepare for operating the ABS sequence control.
<Ref. to ABS-14, ABS Sequence Control.>

3) Set the front wheels or rear wheels on the brake tester and set the select lever's position at "N" range.





(1) Brake tester

4) Operate the brake tester.
5) Perform the ABS sequence control.
<Ref. to ABS-14, ABS Sequence Control.>
6) Hydraulic unit begins to work; and check the following working sequence.
(1) The FL wheel performs decompression, holding, and compression in sequence, and subsequently the FR wheel repeats the cycle.
(2) The RR wheel performs decompression, holding, and compression in sequence, and subsequently the RL wheel repeats the cycle.
7) Read values indicated on the brake tester and check if the fluctuation of values, when decompressed and compressed, meets the standard values.

	Front wheel	Rear wheel
Initial value	1,000 N (102 kgf, 225 lbf)	1,000 N (102 kgf, 225 lbf)
Decompressed	500 N (51 kgf, 112 lbf) or less	500 N (51 kgf, 112 lbf) or less
Compressed	1,000 N (102 kgf, 225 lbf) or more	1,000 N (102 kgf, 225 lbf) or more

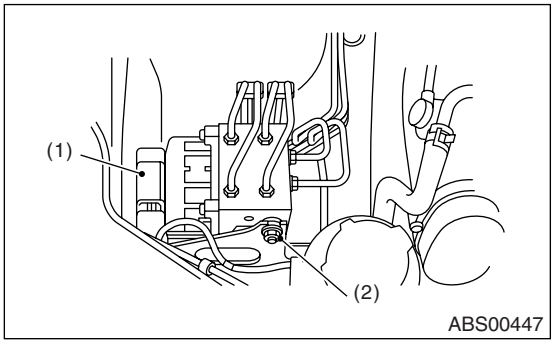
8) After checking, also check if any irregular brake pedal tightness is felt.

D: REPLACEMENT

1. STi MODEL WITHOUT DRIVER'S CONTROL CENTER DIFFERENTIAL AUTO

• ABSCM (ABS CONTROL MODULE)

1) Disconnect the ground cable from battery.
2) Disconnect the ABSCM harness connector.
3) Remove the bracket mounting nut of ABSCM&H/U.



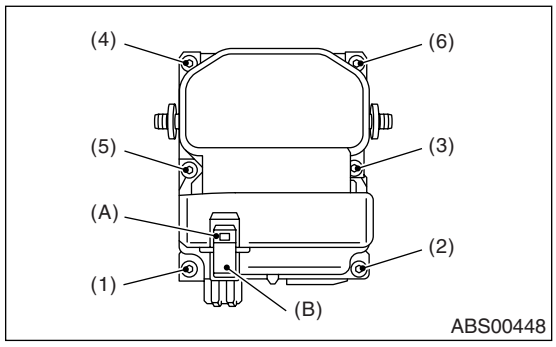
(1) ABSCM harness connector
(2) Bracket mounting nut

4) Leaving the brake pipe connected, raise the ABSCM&H/U for approx. 5 cm (2.0 in) from bracket.

CAUTION:
Do not deform the brake pipe.

5) Unlock the motor power supply connector lock, and disconnect the connector.
6) Using TORX® BIT T20, remove the screws (1), (2), (3), (4), (5), (6) in this order.

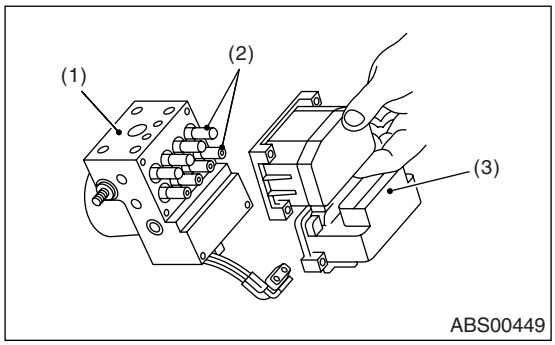
CAUTION:
Do not reuse the screw.



(A) Motor power supply connector lock
(B) Motor power supply connector

7) Remove the ABSCM from H/U.

CAUTION:
• Do not pry the ABSCM out, extract it straight out against H/U.
• Do not reuse the seal of ABSCM.



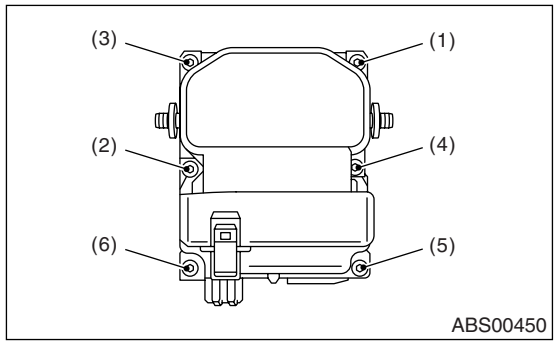
(1) H/U
(2) Valve
(3) ABSCU

8) Check that H/U seal surface is free from dust and damages.

CAUTION:
• If damage is found on seal surface, replace the H/U.
• Do not apply compressed air to ABSCM&H/U for cleaning.

9) Install ABSCM straight for ward on to H/U, being careful not to scratch the valve.
10) Temporarily tighten the six new screws by hand.
11) Using TORX® BIT T20, tighten the screws (1), (2), (3), (4), (5), (6) in this order.

Tightening torque:
2.65 N·m (0.27 kgf-m, 1.95 ft-lb)



12) Make sure no clearance exists at the mating surface of ABSCM and H/U.
13) Connect the motor power supply connector to ABSCM.

CAUTION:
Securely connect the connector until connector lock sound is heard.

14) Attach the ABSCM&H/U to bracket, and then tighten with nuts.

Tightening torque:
18 N·m (1.8 kgf-m, 13.0 ft-lb)

15) Connect the ABSCM harness connector.

16) Connect the battery ground cable to battery.
17) Turn the ignition key to ON. Check the ABS warning light turns on normally, then off.
18) Check that correct information (model year, drive system, transmission type) is displayed on the initial screen by connecting Subaru Select Monitor.
19) Start the engine and move the car to accelerate to more than 20 km/h (12.4 MPH). Check the ABS warning light dose not turn on.
20) If any abnormal is found during the work of step 17) to 19), repair according to the procedure of relevant failure in “ABS (DIAGNOSTICS)” section.

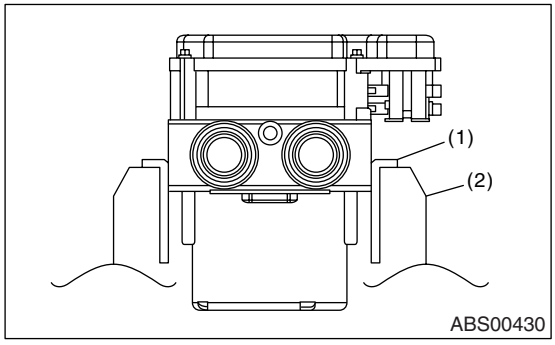
2. EXCEPT STi MODEL WITHOUT DRIVER'S CONTROL CENTER DIFFERENTIAL AUTO

• ABSCM (ABS CONTROL MODULE)

CAUTION:
• Because the seal of ABSCM cannot be replaced, do not pull or peel it with lifting up.
• Because the screw part of H/U deteriorates in every replacement procedure, do not perform the replacement more than five times on it. When the malfunction is found though the replacement that performed is less than five times, replace the H/U body.
• Use new screws for installation of ABSCM.
• When the sealing surface of ABSCM or H/U is dirty or damaged and it cannot be removed or repaired, replace it with new one.

1) Remove the ABSCM&H/U. <Ref. to ABS-7, REMOVAL, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>
2) To prevent entering foreign matter and brake fluid leakage, plug the oil pressure port of ABSCM&H/U using screw plug and etc.
3) Set the pump motor part of removed ABSCM&H/U faces down in the vise.

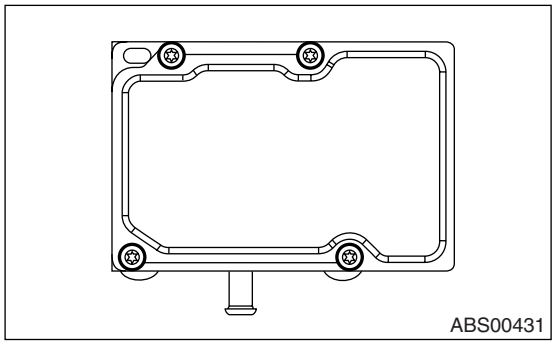
NOTE:
Before securing a part on a vice, place cushioning material such as wood blocks, aluminum plate or cloth between the part and vice.



(1) Aluminum plate or etc.
(2) Vise

4) Using TORX® BIT E5, remove the four screws of ABSCM.

NOTE:
Always use new screws.



5) Slowly remove the ABSCM upward from H/U.

NOTE:
To prevent damaging of coil part, remove the ABSCM straightly from H/U.

6) Ensure there are no dirt or damage on sealing surface of H/U.

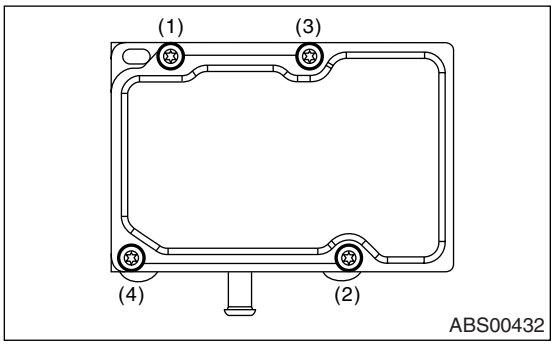
CAUTION:
• Do not clean the ABSCM & H/U with applying compressed air.
• Do not repair the damages of H/U sealing surface using file or metal scraper. To remove the sealing, use resin scraper. Do not use the chemical materials (thinner and etc.).

7) Position the coil of new ABSCM to align H/U valve.
8) To prevent deforming of ABSCM housing cover, hold the corner of ABSCM and install it to the H/U without tilting.

9) Using TORX® BIT E5, tighten the screws stepwise in the order of (1) through (4).

CAUTION:
Always use new screws.

Tightening torque:
1.5 N·m (0.15 kgf-m, 1.1 ft-lb)



10) Check that there is no foreign matter in aligning part between ABSCM and H/U.
11) Using TORX® BIT E5, tighten the screws stepwise in the order of (1) through (4) again.

Tightening torque:
3 N·m (0.3 kgf-m, 2.2 ft-lb)

12) Check that there is no clearance in aligning part between ABSCM and H/U.
13) Install the ABSCM&H/U to vehicle. <Ref. to ABS-8, INSTALLATION, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>

3. ABS Sequence Control

A: OPERATION

1) Under the ABS sequence control, after the hydraulic unit solenoid valve is driven, the operation of the hydraulic unit can be checked by means of the brake tester or pressure gauge.
2) ABS sequence control can be started by Subaru Select Monitor.

1. ABS SEQUENCE CONTROL WITH SUBARU SELECT MONITOR

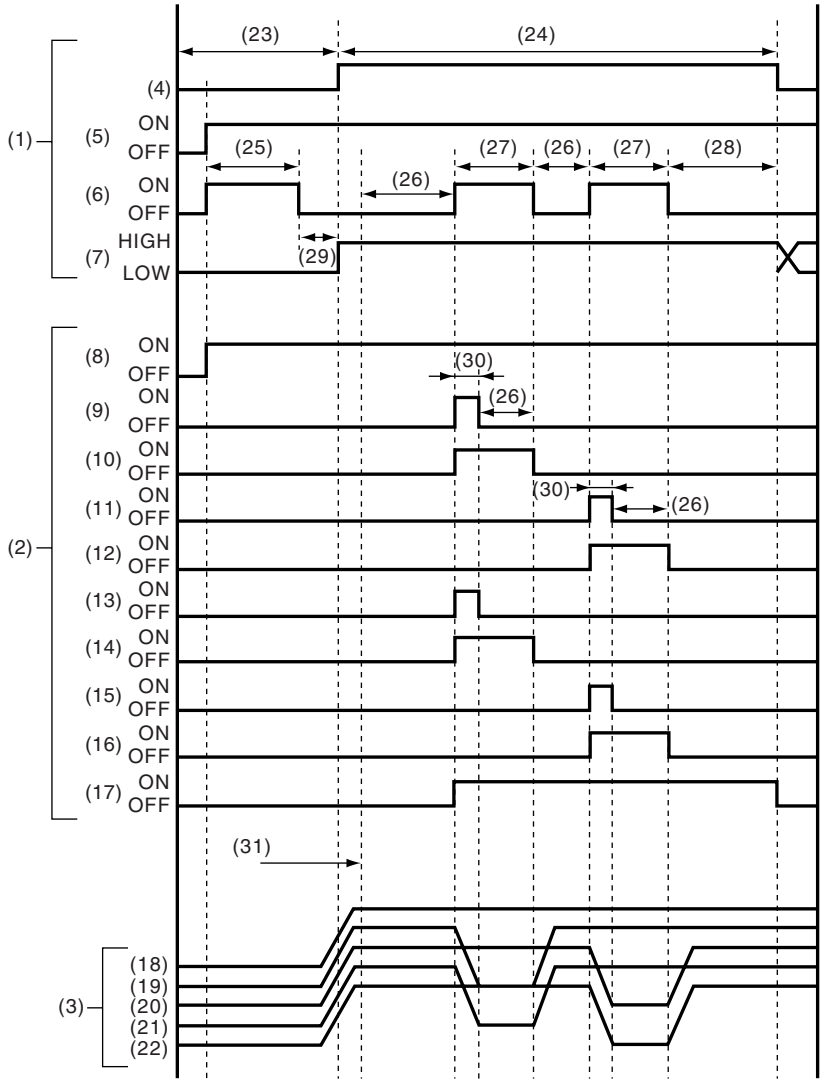
NOTE:
In the event of any trouble, the sequence control may not be operative. In such a case, perform the diagnosis. <Ref. to ABS(diag)-2, PROCEDURE, Basic Diagnostic Procedure.>

1) Connect the Subaru Select Monitor to data link connector under driver's seat instrument panel lower cover.
2) Turn the ignition switch to ON.
3) Turn the Subaru Select Monitor power switch to ON.
4) Put the Subaru Select Monitor to "BRAKE CONTROL" mode.
5) When "Function check sequence" is selected, 'ABS sequence control' will start.
6) When the message "Press Brake Pedal with braking force of 100 to 150 kgf" is displayed, perform the followings.
   (1) When using the brake tester, depress the brake pedal with braking force of 981 N (100 kgf, 221 lbf).
   (2) When using the pressure gauge, depress the brake pedal so as to make the pressure gauge indicate 3,432 kPa (35 kgf/cm^2 , 498 psi).

CAUTION:
Do not depress the clutch pedal in case of vehicle with hill holder.

7) When the message "Press YES" is displayed, press the YES key.
8) The braking system in operation is displayed on Subaru Select Monitor.

2. CONDITIONS FOR ABS SEQUENCE CONTROL



(1) Operational guide line of sequence control
(2) Operational pattern of sequence control
(3) Operational pressure of sequence control
(4) Speed of all wheels
(5) Ignition key switch
(6) ABS warning light
(7) Stop light switch
(8) Valve relay
(9) FL outlet valve
(10) FL inlet valve
(11) FR outlet valve
(12) FR inlet valve
(13) RR outlet valve
(14) RR inlet valve
(15) RL outlet valve
(16) RL inlet valve
(17) Pump motor
(18) Pressure of master cylinder
(19) Pressure of FL wheel cylinder
(20) Pressure of FR wheel cylinder
(21) Pressure of RR wheel cylinder
(22) Pressure of RL wheel cylinder
(23) 4 km/h (2 MPH) or less
(24) 10 km/h (6 MPH) or less
(25) 2.0 seconds
(26) 1.0 second
(27) 1.4 seconds
(28) 0.6 seconds
(29) Within 0.5 seconds
(30) 0.4 seconds
(31) Point A

NOTE:
When the Subaru Select Monitor is used, control operation starts at point A. (However, the brake light switch must be ON before point A.)

- HIGH means high voltage.
- LOW means low voltage.

B: SPECIFICATION

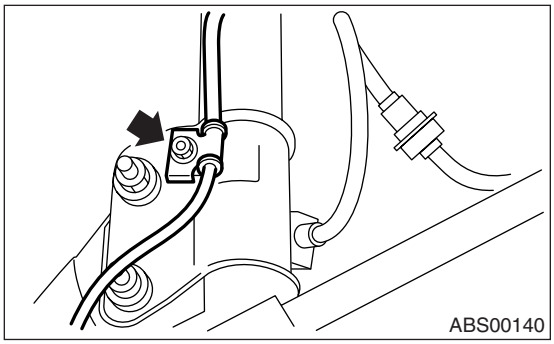
1. CONDITIONS FOR COMPLETION OF ABS SEQUENCE CONTROL

When the following conditions develop, the ABS sequence control stops and ABS operation is returned to the normal control mode.
1) When the speed of at least one wheel reaches 10 km/h (6 MPH).
2) When the brake pedal is released during sequence control and the braking lamp switch is set to off.
3) After completion of the sequence control.
4) When malfunction is detected.

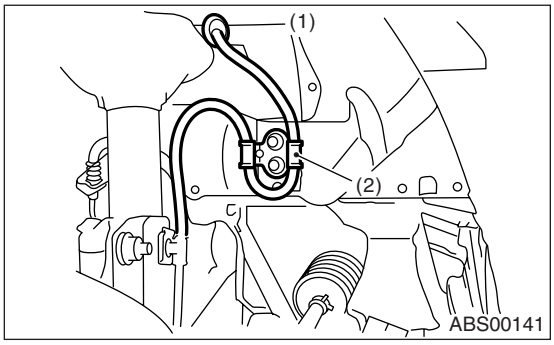
4. Front ABS Wheel Speed Sensor

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Disconnect the front ABS wheel speed sensor connector located next to the front strut mounting house in engine compartment. Pull the connector out from grommet hole to tire side.
3) Remove the bolts which secure the sensor harness to strut.



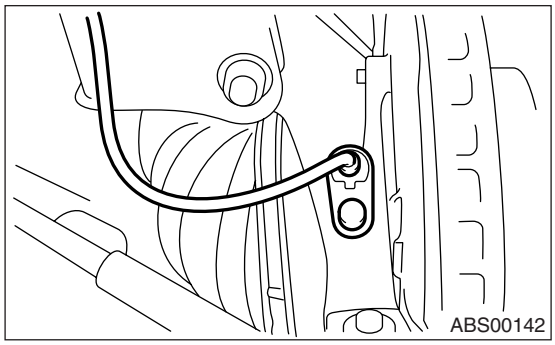
4) Remove the bolts which secure the sensor harness to body.



(1) To front ABS wheel speed sensor connector
(2) Bracket

5) Remove the bolts which secure the front ABS wheel speed sensor to housing, and remove the front ABS wheel speed sensor.

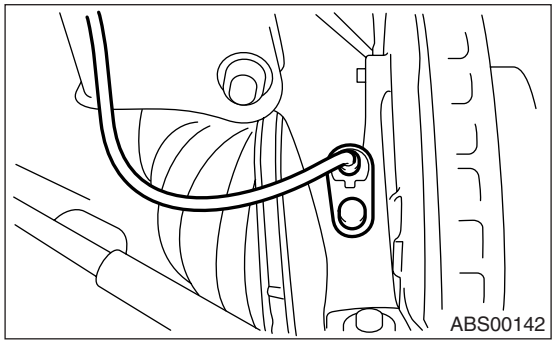
CAUTION:
• Be careful not to damage the pole piece located at tip of the sensor and teeth faces during removal.
• Do not pull the sensor harness during removal.



B: INSTALLATION

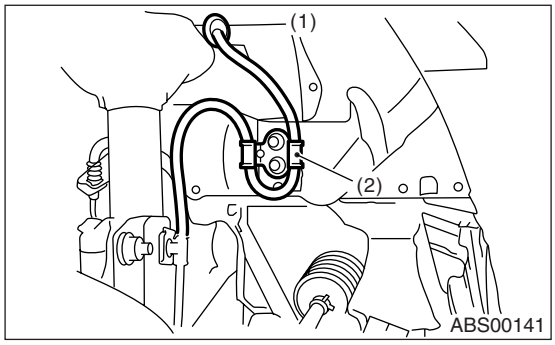
1) Temporarily install the front ABS wheel speed sensor on housing.

CAUTION:
Be careful not to strike the ABS wheel speed sensor's pole piece against tone wheel and adjacent metal parts during installation.



2) Install the front ABS wheel speed sensor on strut and wheel apron bracket.

Tightening torque:
33 N·m (3.3 kgf-m, 24 ft-lb)

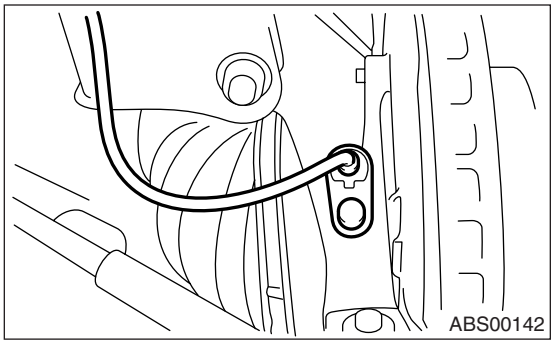


(1) To front ABS wheel speed sensor connector
(2) Bracket

3) Check the ABS wheel speed sensor gap. <Ref. to ABS-18, SENSOR GAP, INSPECTION, Front ABS Wheel Speed Sensor.> After standard clearance is obtained, tighten the ABS wheel speed sensor on housing to specified torque.
If the clearance is outside specification, readjust using spacer (Part No. 26755AA000).

ABS wheel speed sensor standard clearance:
0.3 — 0.8 mm (0.012 — 0.031 in)

Tightening torque:
33 N·m (3.3 kgf-m, 24 ft-lb)



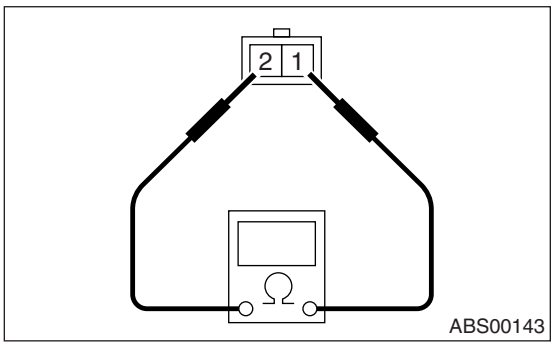
NOTE:
• Check the marks on the harness and make sure that no kink exists. (RH: White, LH: Yellow)
• Make sure the harness is not pulled and does not contact to suspension or body when steering wheel is turned.

4) After confirmation of the ABS wheel speed sensor clearance, connect the connector to ABS wheel speed sensor.
5) Connect the battery ground cable to battery.

C: INSPECTION

1. ABS WHEEL SPEED SENSOR

1) Check the pole piece of ABS wheel speed sensor for foreign particles or damage. If necessary, clean the pole piece or replace ABS wheel speed sensor.
2) Measure the ABS wheel speed sensor resistance.
If the resistance is outside standard value, replace the ABS wheel speed sensor with a new one.

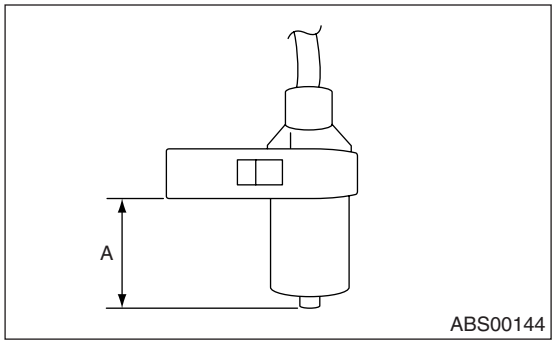


Terminal No.	Standard
1 and 2	1.25±0.25 kΩ

NOTE:
Check the ABS wheel speed sensor cable for discontinuity. If necessary, replace with a new one.

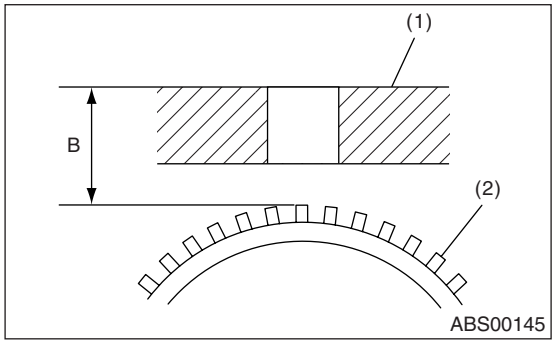
2. SENSOR GAP

1) Measure the distance “A” between ABS wheel speed sensor surface and sensor pole face.



2) Measure the distance “B” between surface where the front axle housing meets the ABS wheel speed sensor, and the tone wheel.

NOTE:
Measure so that the gauge touches the tone wheel teeth top.



(1) Axle housing
(2) Tone wheel

3) Find the gap between the ABS wheel speed sensor pole face and the surface of the tone wheel teeth by putting the measured values in the formula below and calculating.
ABS wheel speed sensor clearance = B − A

ABS wheel speed sensor standard clearance:
0.3 — 0.8 mm (0.012 — 0.031 in)

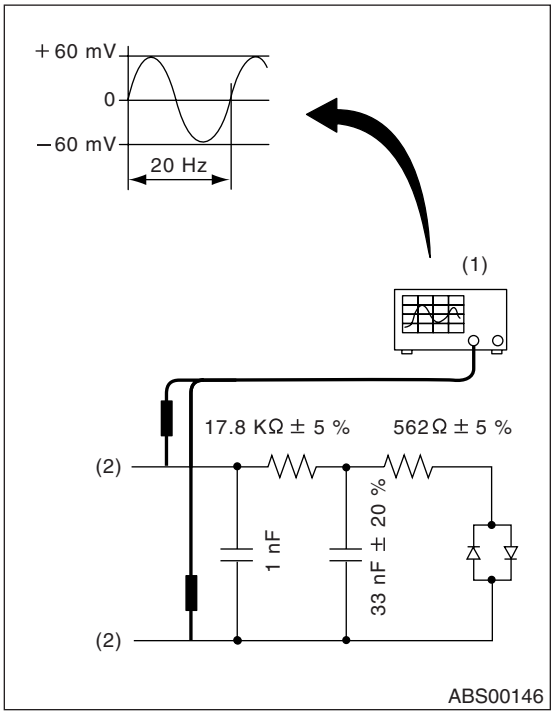
NOTE:
If the clearance is out of specification, readjust using spacer (Part No. 26755AA000).

3. OUTPUT VOLTAGE

Output voltage can be checked by the following method. Install the resistor and condenser, then rotate the wheel about 2.75 km/h (2 MPH) or equivalent.

Output voltage specification:
0.12 to 1 V (at 20 Hz)

NOTE:
Regarding terminal No., please refer to item 1. ABS WHEEL SPEED SENSOR. <Ref. to ABS-18, ABS WHEEL SPEED SENSOR, INSPECTION, Front ABS Wheel Speed Sensor.>



(1) Oscilloscope
(2) Terminal

D: ADJUSTMENT

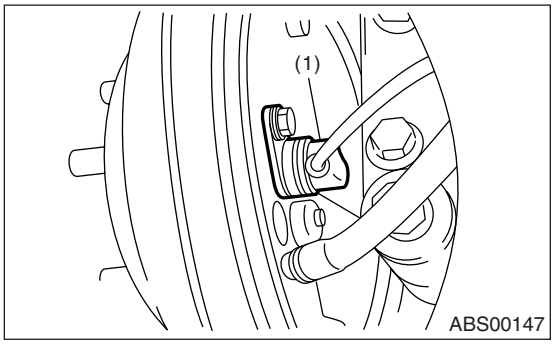
Adjust the gap using spacer (Part No. 26755A000).

5. Rear ABS Wheel Speed Sensor

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Lift-up the vehicle.
3) Remove the rear seat and disconnect the rear ABS wheel speed sensor connector. Pull the connector out from grommet hole to under floor.
4) Remove the rear sensor harness bracket from the rear trailing link and bracket.
5) Remove the rear ABS wheel speed sensor from back plate.

CAUTION:
• Be careful not to damage the pole piece located at tip of the sensor and teeth faces during removal.
• Do not pull the sensor harness during removal.



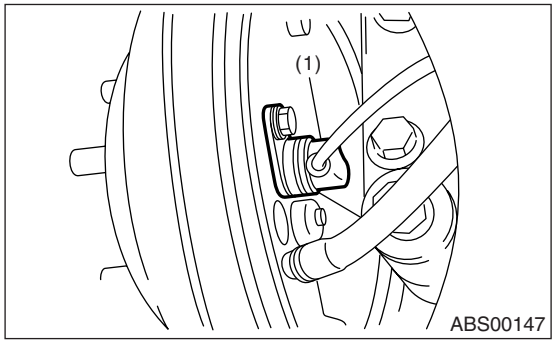
(1) Rear ABS wheel speed sensor

6) Remove the rear tone wheel while removing the hub from housing and hub assembly. <Ref. to DS-28, REMOVAL, Rear Axle [AWD Model].> <Ref. to DS-37, REMOVAL, Rear Axle [FWD Model].>

B: INSTALLATION

1) Install the rear tone wheel on hub, then rear housing on hub. <Ref. to DS-34, ASSEMBLY, Rear Axle [AWD Model].> <Ref. to DS-38, ASSEMBLY, Rear Axle [FWD Model].>
2) Temporarily install the rear ABS wheel speed sensor on back plate.

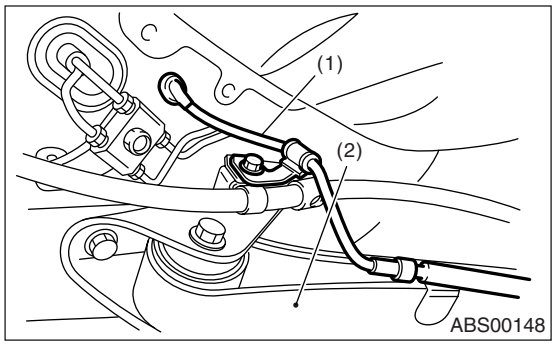
CAUTION:
Be careful not to strike the ABS wheel speed sensor's pole piece against tone wheel and adjacent metal parts during installation.



(1) Rear ABS wheel speed sensor

3) Install the rear drive shaft to rear housing and rear differential spindle. <Ref. to DS-31, INSTALLATION, Rear Axle [AWD Model].> <Ref. to DS-37, INSTALLATION, Rear Axle [FWD Model].>
4) Install the rear sensor harness on rear trailing link.

Tightening torque:
33 N·m (3.3 kgf-m, 24 ft-lb)



(1) Rear sensor harness
(2) Trailing link

5) Check the ABS wheel speed sensor gap. <Ref. to ABS-21, SENSOR GAP, INSPECTION, Rear ABS Wheel Speed Sensor.> After standard clearance is obtained, tighten the ABS wheel speed sensor on back plate to specified torque.
If the clearance is outside specification, readjust using spacer (Part No. 26755AA000).

ABS wheel speed sensor standard clearance:
0.7 — 1.2 mm (0.028 — 0.047 in)

Tightening torque:
33 N·m (3.3 kgf-m, 24 ft-lb)

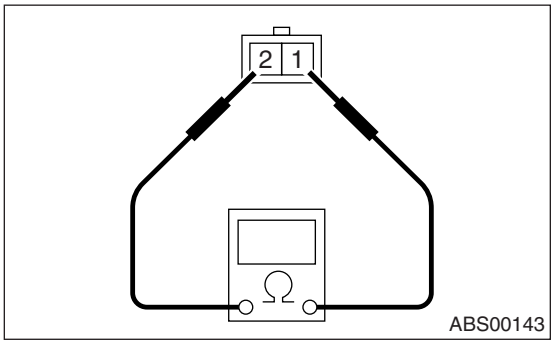
NOTE:
Check the marks on the harness and make sure no kink exists. (RH: Light blue, LH: Brown)

6) After confirmation of the ABS wheel speed sensor clearance, connect the connector to ABS wheel speed sensor.
7) Connect the battery ground cable to battery.

C: INSPECTION

1. ABS WHEEL SPEED SENSOR

1) Check the pole piece of ABS wheel speed sensor for foreign particles or damage. If necessary, clean the pole piece or replace ABS wheel speed sensor.
2) Measure the ABS wheel speed sensor resistance.
If resistance is out of standard value, replace the ABS wheel speed sensor with a new one.



Terminal No.	Standard
1 and 2	1.15±0.115 kΩ

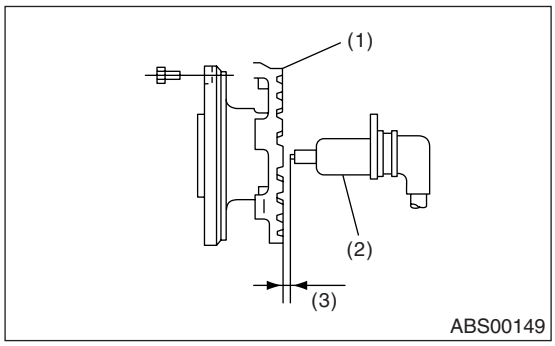
NOTE:
Check the ABS wheel speed sensor cable for discontinuity. If necessary, replace with a new one.

2. SENSOR GAP

1) Measure the clearance between tone wheel and ABS wheel speed sensor at whole periphery.

NOTE:
If clearance is narrow, adjust by using spacer (Part No. 26755AA000).
If clearance is wide, check the outputted voltage then replace the ABS wheel speed sensor or tone wheel if the outputted voltage is outside specification.

ABS wheel speed sensor clearance:
0.7 — 1.2 mm (0.028 — 0.047 in)



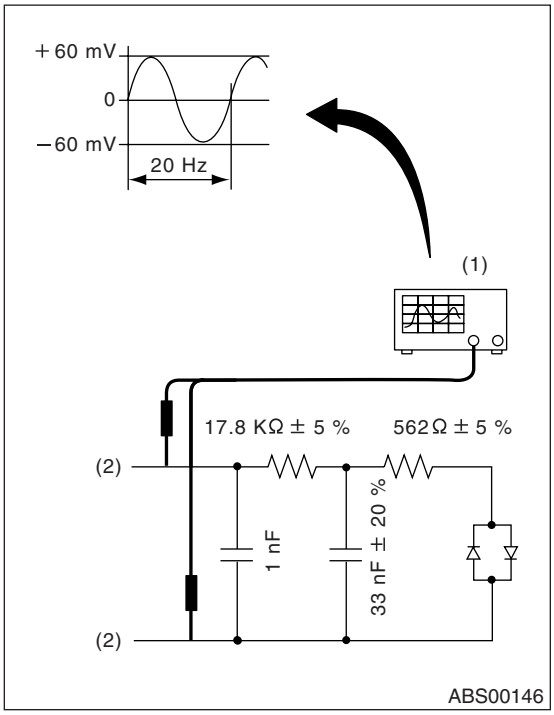
(1) Tone wheel
(2) ABS wheel speed sensor
(3) Sensor gap

3. OUTPUT VOLTAGE

Output voltage can be checked by the following method. Install the resistor and condenser, then rotate the wheel about 2.75 km/h (2 MPH) or equivalent.

Output voltage specification:
0.12 — 1 V (at 20 Hz)

NOTE:
Regarding terminal No., please refer to item 1. ABS WHEEL SPEED SENSOR. <Ref. to ABS-21, ABS WHEEL SPEED SENSOR, INSPECTION, Rear ABS Wheel Speed Sensor.>



(1) Oscilloscope
(2) Terminal

D: ADJUSTMENT

Adjust the gap using spacer (Part No. 26755AA000).

6. Front Tone Wheel

A: REMOVAL

Refer to Front Drive Shaft, because front tone wheel is integrated with front drive shaft.
<Ref. to DS-40, REMOVAL, Front Drive Shaft.>

B: INSTALLATION

Refer to Front Drive Shaft, because front tone wheel is integrated with front drive shaft.
<Ref. to DS-40, INSTALLATION, Front Drive Shaft.>

C: INSPECTION

Visually check the tone wheel's teeth (44 pieces) for cracks or dents. If necessary, replace the tone wheel with a new one.

NOTE:
Replace the BJ assembly with a new one as a single unit if there are any defects found on tone wheel is unitized with BJ assembly of drive shaft.

7. Rear Tone Wheel

A: REMOVAL

Refer to Rear Axle, because the rear tone wheel is installed to rear hub.
<Ref. to DS-28, REMOVAL, Rear Axle [AWD Model].> <Ref. to DS-37, REMOVAL, Rear Axle [FWD Model].>

B: INSTALLATION

Refer to Rear Axle, because the rear tone wheel is installed to rear hub.
<Ref. to DS-31, INSTALLATION, Rear Axle [AWD Model].> <Ref. to DS-37, INSTALLATION, Rear Axle [FWD Model].>

C: INSPECTION

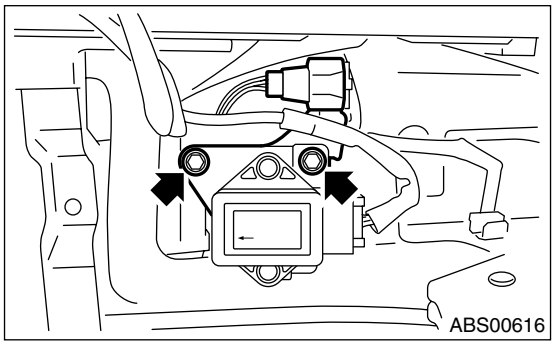
Visually check the tone wheel's teeth (44 pieces) for cracks or dents. If necessary, replace the tone wheel with a new one.

8. G Sensor

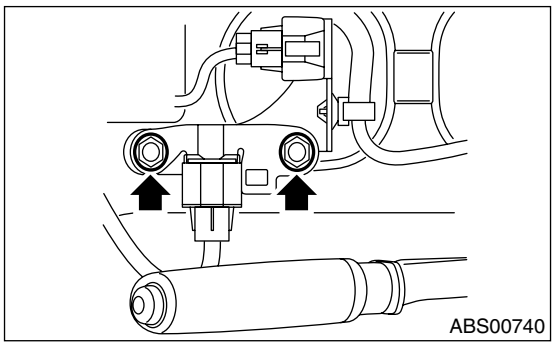
A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the console cover.
<Ref. to EI-45, REMOVAL, Console Box.>
3) Disconnect the connector from G sensor.
4) Remove the G sensor from body.

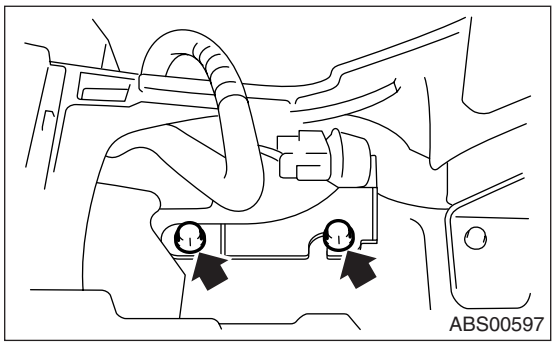
CAUTION:
- **Do not drop or bump the G sensor.**
- **G sensor and the bracket are integrated into one unit. Therefore, do not disassemble it.**
- STi model with driver's control center differential



- STi LHD model without driver's control center differential



- Other models



B: INSTALLATION

Install in the reverse order of removal.

CAUTION:
Do not drop or bump the G sensor.

Tightening torque:
18 N·m (1.8 kgf-m, 13.0 ft-lb)

C: INSPECTION

	Step	Check	Yes	No
1	**CHECK SUBARU SELECT MONITOR.**	Do you have a SUBARU SELECT MONITOR?	Go to step **5.**	Go to step **2.**
2	**CHECK G SENSOR.** 1) Turn the ignition switch to OFF. 2) Remove the G sensor from vehicle. 3) Connect the connector to G sensor. 4) Turn the ignition switch to ON. 5) Measure the voltage between G sensor connector terminals. ***Connector & terminal*** ***(B292) No. 2 (+) — No. 3 (−):***	Is the voltage 2.3±0.2 V when G sensor is horizontal?	Go to step **3.**	Replace the G sensor.
3	**CHECK G SENSOR.** Measure the voltage between G sensor connector terminals. ***Connector & terminal*** ***(B292) No. 2 (+) — No. 3 (−):***	Is the voltage 3.9±0.2 V when G sensor is inclined forwards to 90°?	Go to step **4.**	Replace the G sensor.
4	**CHECK G SENSOR.** Measure the voltage between G sensor connector terminals. ***Connector & terminal*** ***(B292) No. 2 (+) — No. 3 (−):***	Is the voltage 0.7±0.2 V when G sensor is inclined backwards to 90°?	G sensor is normal.	Replace the G sensor.
5	**CHECK G SENSOR.** 1) Turn the ignition switch to OFF. 2) Connect the Subaru Select Monitor to data link connector. 3) Turn the Subaru Select Monitor into {BRAKE CONTROL} mode. 4) Set the display in the {Current Data Display & Save} mode. 5) Read the G sensor output value.	Is the indicated reading −1.2 — 1.2 m/s^2 when the vehicle is in horizontal position?	Go to step **6.**	Replace the G sensor.
6	**CHECK G SENSOR.** 1) Remove the console box. 2) Remove the G sensor from vehicle. (Do not disconnect the connector.) 3) Read the Subaru Select Monitor display.	Is the indicated reading 8.1 — 11.2 m/s^2 when G sensor is inclined forwards to 90°?	Go to step **7.**	Replace the G sensor.
7	**CHECK G SENSOR.** Read the Subaru Select Monitor display.	Is the indicated reading −8.1 — −11.2 m/s^2 when G sensor is inclined backwards to 90°?	G sensor is normal.	Replace the G sensor.

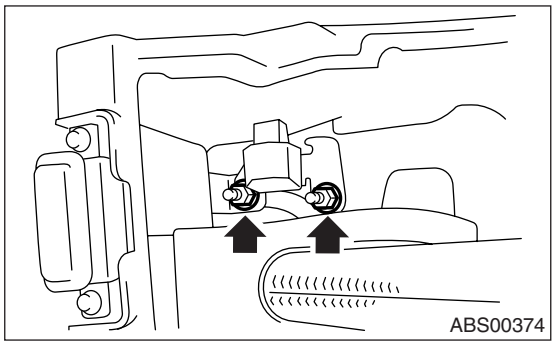
9. Lateral G Sensor

A: REMOVAL

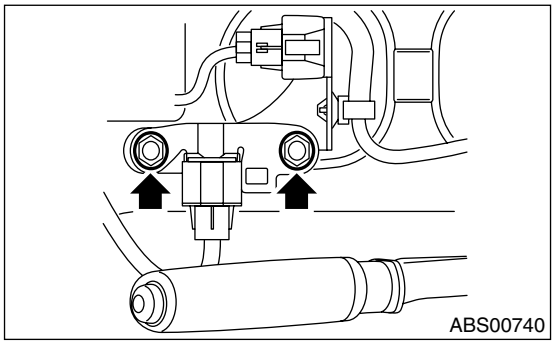
1) Disconnect the ground cable from battery.
2) Remove the console cover.
<Ref. to EI-45, REMOVAL, Console Box.>
3) Disconnect the connector from lateral G sensor.
4) Remove the lateral G sensor from vehicle.

CAUTION:
Do not drop or bump the lateral G sensor.

• STi RHD model without driver's control center differential auto



• STi LHD model without driver's control center differential auto



B: INSTALLATION

Install in the reverse order of removal.

CAUTION:
Do not drop or bump the lateral G sensor.

Tightening torque:
18 N·m (1.8 kgf-m, 13.0 ft-lb)

C: INSPECTION

	Step	Check	Yes	No
1	**CHECK SUBARU SELECT MONITOR.**	Do you have a SUBARU SELECT MONITOR?	Go to step **5.**	Go to step **2.**
2	**CHECK LATERAL G SENSOR.** 1) Turn the ignition switch to OFF. 2) Remove the lateral G sensor from vehicle. 3) Connect the connector to lateral G sensor. 4) Turn the ignition switch to ON. 5) Measure the voltage between lateral G sensor connector terminals. ***Connector & terminal*** ***(B257) No. 2 (+) — No. 3 (−):***	Is the voltage 2.5±0.2 V when lateral G sensor is horizontal?	Go to step **3.**	Replace the lateral G sensor.
3	**CHECK LATERAL G SENSOR.** Measure the voltage between lateral G sensor connector terminals. ***Connector & terminal*** ***(B257) No. 2 (+) — No. 3 (−):***	Is the voltage 3.5±0.2 V when lateral G sensor is inclined forwards to 90°?	Go to step **4.**	Replace the lateral G sensor.
4	**CHECK LATERAL G SENSOR.** Measure the voltage between lateral G sensor connector terminals. ***Connector & terminal*** ***(B257) No. 2 (+) — No. 3 (−):***	Is the voltage 1.5±0.2 V when lateral G sensor is inclined backwards to 90°?	Lateral G sensor is normal.	Replace the lateral G sensor.
5	**CHECK LATERAL G SENSOR.** 1) Turn the ignition switch to OFF. 2) Connect the Subaru Select Monitor to data link connector. 3) Turn the Subaru Select Monitor into {BRAKE CONTROL} mode. 4) Set the display in the {Current Data Display & Save} mode. 5) Read the lateral G sensor output value.	Is the indicated reading −2.0 — 2.0 m/s^2 when the vehicle is in horizontal position?	Go to step **6.**	Replace the lateral G sensor.
6	**CHECK LATERAL G SENSOR.** 1) Remove the console box. 2) Remove the lateral G sensor from vehicle. (Do not disconnect the connector.) 3) Read the Subaru Select Monitor display.	Is the indicated reading 7.8 — 11.8 m/s^2 when lateral G sensor is inclined forwards to 90°?	Go to step **7.**	Replace the lateral G sensor.
7	**CHECK LATERAL G SENSOR.** Read the Subaru Select Monitor display.	Is the indicated reading −7.8 — −11.8 m/s^2 when lateral G sensor is inclined backwards to 90°?	Lateral G sensor is normal.	Replace the lateral G sensor.

10. Yaw Rate and Lateral G Sensor

A: REMOVAL

For removal procedure of the yaw rate & lateral G sensor, refer to “6MT” section. <Ref. to 6MT-129, REMOVAL, Yaw Rate and Lateral G Sensor.>

B: INSTALLATION

For installation procedure of the yaw rate & lateral G sensor, refer to “6MT” section. <Ref. to 6MT-129, INSTALLATION, Yaw Rate and Lateral G Sensor.>

ABS (DIAGNOSTICS)

ABS(diag)

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1. Basic Diagnostic Procedure

A: PROCEDURE

NOTE:
This section is specified for non-turbo model, turbo model and STi driver's control center differential (with auto).

CAUTION:
Remove foreign matters (dust, water, oil, etc.) from the ABSCM&H/U connector during removal and installation.

NOTE:
- To check harness for broken wires or short circuits, shake trouble spot or connector.
- Refer to "Check List for Interview". <Ref. to ABS(diag)-4, Check List for Interview.>

	Step	Check	Yes	No
1	**CHECK PRE-INSPECTION.** 1) Ask the customer when and how the trouble occurred using interview checklist. <Ref. to ABS(diag)-4, Check List for Interview.> 2) Before performing diagnostics, check the component which might affect ABS problems. <Ref. to ABS(diag)-8, INSPECTION, General Description.>	Is the component that might influence the ABS problem normal?	Go to step **2.**	Repair or replace each unit.
2	**CHECK DTC.** 1) Turn the ignition switch to OFF. 2) Connect the Subaru Select Monitor to data link connector. 3) Turn the ignition switch to ON and Subaru Select Monitor power switch to ON. NOTE: If the communication function of the Subaru Select Monitor cannot be executed normally, check the communication circuit. <Ref. to ABS(diag)-19, COMMUNICATION FOR INITIALIZING IMPOSSIBLE, INSPECTION, Subaru Select Monitor.> 4) Read the DTC. <Ref. to ABS(diag)-25, OPERATION, Read Diagnostic Trouble Code (DTC).> 5) Record all DTCs and Freeze Frame Data.	Is DTC displayed?	Go to step **4.**	Go to step **3.**
3	**PERFORM THE GENERAL DIAGNOSTICS.** 1) Inspect using "General Diagnostic Table". <Ref. to ABS(diag)-86, General Diagnostic Table.> 2) Perform clear memory mode. <Ref. to ABS(diag)-18, CLEAR MEMORY MODE, OPERATION, Subaru Select Monitor.> 3) Perform the inspection mode. <Ref. to ABS(diag)-26, Inspection Mode.> 4) Read the DTC. <Ref. to ABS(diag)-16, READ DIAGNOSTIC TROUBLE CODE (DTC), OPERATION, Subaru Select Monitor.> Check the DTC does not displayed.	Does the ABS warning light go off after turning the ignition switch to ON?	Finish the diagnosis.	Check in accordance with "Diagnostic Procedure for ABS". <Ref. to ABS(diag)-21, NO TROUBLE CODE, INSPECTION, Subaru Select Monitor.>

Step		Check	Yes	No
4	**PERFORM THE DIAGNOSIS.** 1) Refer to the “List of Diagnostic Trouble Code (DTC)”. <Ref. to ABS(diag)-38, LIST, List of Diagnostic Trouble Code (DTC).> 2) Fix the wrong part. 3) Perform clear memory mode. <Ref. to ABS(diag)-18, CLEAR MEMORY MODE, OPERATION, Subaru Select Monitor.> 4) Perform the inspection mode. <Ref. to ABS(diag)-26, Inspection Mode.> 5) Read the DTC. <Ref. to ABS(diag)-16, READ DIAGNOSTIC TROUBLE CODE (DTC), OPERATION, Subaru Select Monitor.>	Is DTC displayed?	Repeat step 1 to 4 until DTC is not shown.	Finish the diagnosis.

2. Check List for Interview

A: CHECK

Check the following items about the vehicle's state.

1. STATE OF ABS WARNING LIGHT

ABS warning light comes on.	❑ Always ❑ Sometimes ❑ Only once ❑ Not come on • When / how long does it come on?		
Ignition key position	❑ LOCK ❑ ACC ❑ ON (before starting engine) ❑ START ❑ ON (after Engine starting, engine is running) ❑ ON (after Engine starting, engine is at a standstill)		
Timing	❑ Immediately after turning the ignition to ON ❑ Immediately after turning the ignition to START		
	❑ When accelerating	—	km/h
		—	MPH
	❑ When driving at a constant speed	km/h	MPH
	❑ When decelerating	—	km/h
		—	MPH
	❑ When turning to the right	Steering angle:	deg
		Steering time:	Sec.
	❑ When turning to the left	Steering angle:	deg
		Steering time:	Sec.
	❑ When operating other electrical parts		
	• Parts name: • Operating condition:		

2. STATE OF BRAKE WARNING LIGHT

Brake warning light comes on.	❑ Always ❑ Sometimes ❑ Only once ❑ Not come on ❑ When pulling the parking brake lever up. ❑ When releasing the parking brake lever down. • When / how long does it come on?		
Ignition key position	❑ LOCK ❑ ACC ❑ ON (before starting engine) ❑ START ❑ ON (after Engine starting, engine is running) ❑ ON (after Engine starting, engine is at a standstill)		
Timing	❑ Immediately after turning the ignition to ON ❑ Immediately after turning the ignition to START		
	❑ When accelerating	—	km/h
		—	MPH
	❑ When driving at a constant speed	km/h	MPH
	❑ When decelerating	—	km/h
		—	MPH
	❑ When turning to the right	Steering angle:	deg
		Steering time:	Sec.
	❑ When turning to the left	Steering angle:	deg
		Steering time:	Sec.
	❑ When operating other electrical parts		
	• Parts name: • Operating condition:		

3. SYMPTOMS

ABS operating condition	❑ Does not move.		
	❑ Operates only when applying an abrupt brake.	Vehicle speed:	km/h
			MPH
	• How to step on brake pedal:		
	a) Operating time:		Sec.
	b) Operating noise: ❑ Occurs. / ❑ Does not occur.		
	• What kind of noise?	❑ Knocking ❑ Gong gong ❑ Bong ❑ Buzz ❑ Gong gong buzz ❑ Others:	
	c) Reaction force of brake pedal		
		❑ Stick ❑ Weak pedal resistance ❑ Strong pedal resistance ❑ Others:	
Behavior of vehicle	a) Directional stability cannot be obtained or the steering refuses to work when applying brakes: ❑ Yes / ❑ No		
	• When:	❑ When turning to the right ❑ When turning to the left ❑ When spinning ❑ Others:	
	b) Directional stability cannot be obtained or the steering refuses to work when accelerating: ❑ Yes / ❑ No		
	• When:	❑ When turning to the right ❑ When turning to the left ❑ When spinning ❑ Others:	
	c) Poor brake performance: ❑ Yes / ❑ No		
	• What kind:	❑ Long braking/stopping distance ❑ Brakes lock or drag ❑ Long pedal stroke ❑ Pedal sticks. ❑ Others:	
	d) Poor acceleration: ❑ Yes / ❑ No		
	• What kind:	❑ Not accelerate ❑ Engine stalls. ❑ Others:	
	e) Occurrence of vibration: ❑ Yes / ❑ No		
	• Where • What kind:		
	f) Occurrence of noise: ❑ Yes / ❑ No		
	• Where • What kind:		
	g) Other troubles occurred: ❑ Yes / ❑ No		
	• What kind:		

4. CONDITIONS UNDER WHICH TROUBLE OCCURS

Environment	a) Weather	❑ Fine ❑ Cloudy ❑ Rainy ❑ Snowy ❑ Others:
	b) Ambient temperature	°C (°F)
	c) Road	❑ Inner city ❑ Suburbs ❑ Highway ❑ Local street ❑ Uphill ❑ Downhill ❑ Paved road ❑ Gravel road ❑ Muddy road ❑ Sandy place ❑ Others:
	d) Road surface	❑ Dried ❑ Wet ❑ Covered with fresh snow ❑ Covered with hardened snow ❑ Frozen slope ❑ Others:
Condition	a) Brakes	Deceleration: G
		❑ Intermittent / ❑ Temporary
	b) Accelerator	Acceleration: G
		❑ Intermittent / ❑ Temporary
	c) Vehicle speed	km/h | MPH
		❑ Advancing ❑ When accelerating ❑ When decelerating ❑ At low speed ❑ When turning ❑ Others:
	d) Tire inflation pressure	Front RH tire: kPa
		Front LH tire: kPa
		Rear RH tire: kPa
		Rear LH tire: kPa
	e) Degree of wear	Front RH tire:
		Front LH tire:
		Rear RH tire:
		Rear LH tire:
	f) Genuine parts are used.: ❑ Yes / ❑ No	
	g) Tire chain is attached.: ❑ Yes / ❑ No	
	h) T-type tire is used.: ❑ Yes / ❑ No	
	i) Condition of suspension alignment:	
	j) Loading state:	
	k) Repair parts are used.: ❑ Yes / ❑ No	
	• Contents:	
	l) Others:	

3. General Description

A: CAUTION

1. SUPPLEMENTAL RESTRAINT SYSTEM "AIRBAG"

Airbag system wiring harness is routed near the ABS wheel speed sensor and ABSCM&H/U.

CAUTION:
• All airbag system wiring harness and connectors are colored yellow. Do not use the electrical test equipment on these circuits.
• Be careful not to damage the airbag system wiring harness when servicing the ABS wheel speed sensor and ABSCM&H/U.

B: INSPECTION

Before performing diagnosis, check the following items which might affect ABS problems.

1. BATTERY

Measure battery voltage and check electrolyte.

Standard voltage: 12 V or more

Specific gravity: More than 1.260

2. GROUND

Check the ABS ground (LHD: (B302), RHD: (F64)) bolt, tightening torque.

Tightening torque:
13 N·m (1.3 kgf-m, 9.6 ft-lb)

3. BRAKE FLUID

1) Check the brake fluid level.
2) Check the brake fluid for leaks.

4. HYDRAULIC UNIT

Check the hydraulic unit.
• With brake tester <Ref. to ABS-10, CHECKING THE HYDRAULIC UNIT ABS OPERATION WITH BRAKE TESTER, INSPECTION, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>
• Without brake tester <Ref. to ABS-9, CHECKING THE HYDRAULIC UNIT ABS OPERATION BY PRESSURE GAUGE, INSPECTION, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>

5. BRAKE DRAG

Check for brake drag.

6. BRAKE PAD AND ROTOR

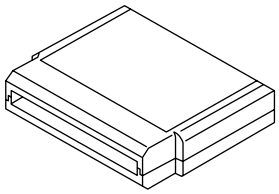
Check the brake pad and rotor.
• FRONT<Ref. to BR-27, INSPECTION, Front Brake Pad.> <Ref. to BR-30, INSPECTION, Front Disc Rotor.>
• REAR <Ref. to BR-38, INSPECTION, Rear Brake Pad.> <Ref. to BR-40, INSPECTION, Rear Disc Rotor.>

7. TIRE

Check the tire specifications, tire wear and air pressure. <Ref. to WT-2, SPECIFICATION, General Description.>

C: PREPARATION TOOL

1. SPECIAL TOOL

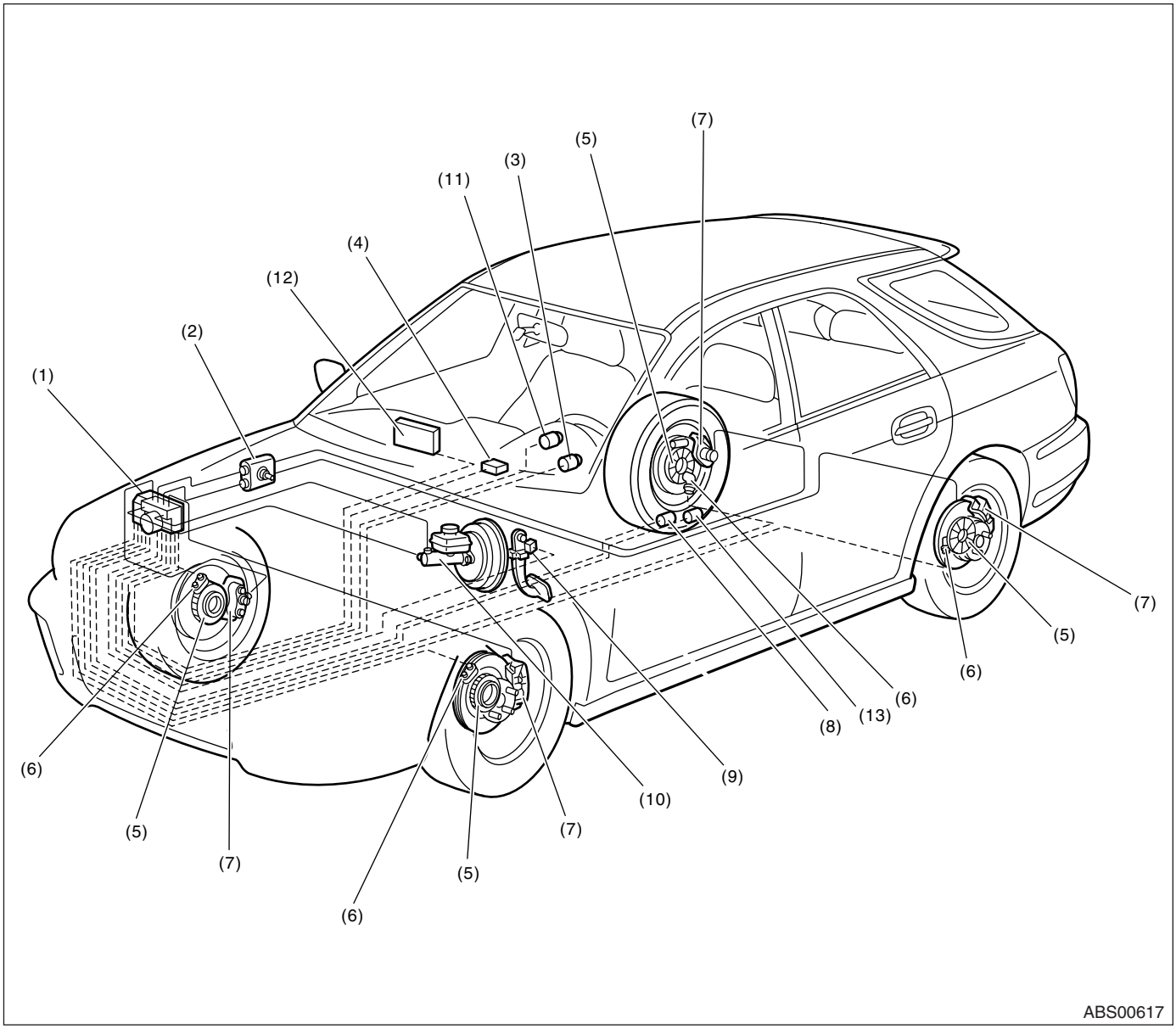
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18482AA000	18482AA000	CARTRIDGE	Troubleshooting for electrical systems.
ST22771AA030	22771AA030	SUBARU SELECT MONITOR KIT	Troubleshooting for electrical systems. • English: 22771AA030 (Without printer) • German: 22771AA070 (Without printer) • French: 22771AA080 (Without printer) • Spanish: 22771AA090 (Without printer)

2. GENERAL PURPOSE TOOL

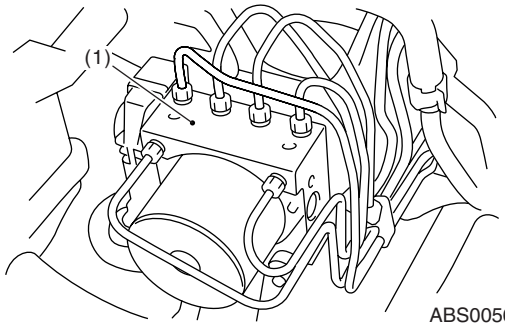
TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance, voltage and amperage.
Oscilloscope	Used for measuring sensor.

4. Electrical Component Location

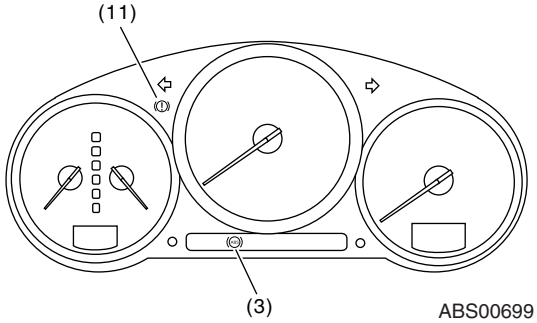
A: LOCATION



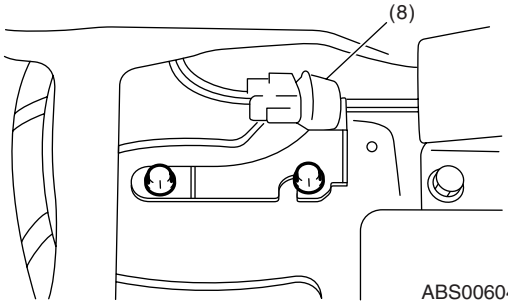
(1) ABS control module and hydraulic control unit (ABSCM&H/U)
(2) Connector
(3) ABS warning light
(4) Data link connector (for Subaru Select Monitor)
(5) Tone wheel
(6) ABS wheel speed sensor
(7) Caliper body
(8) G sensor
(9) Stop light switch
(10) Master cylinder
(11) Brake and EBD warning light
(12) Driver's control center differential control module (STi model)
(13) Yaw rate & lateral G sensor (STi model)



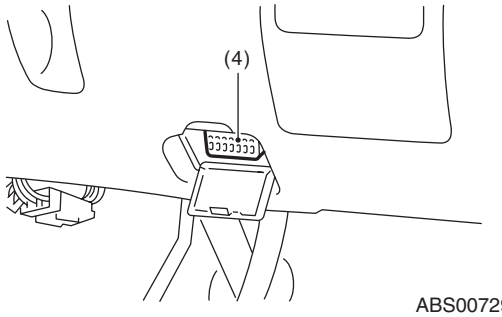
ABS00563



ABS00699

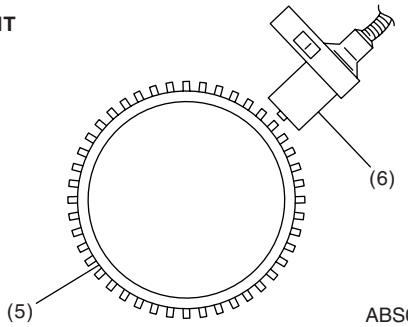


ABS00604



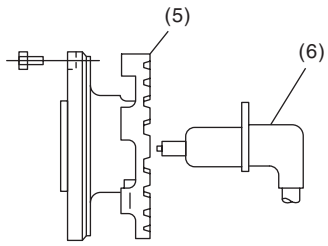
ABS00729

FRONT

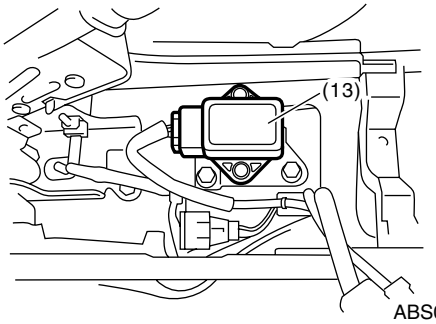


ABS00728

REAR



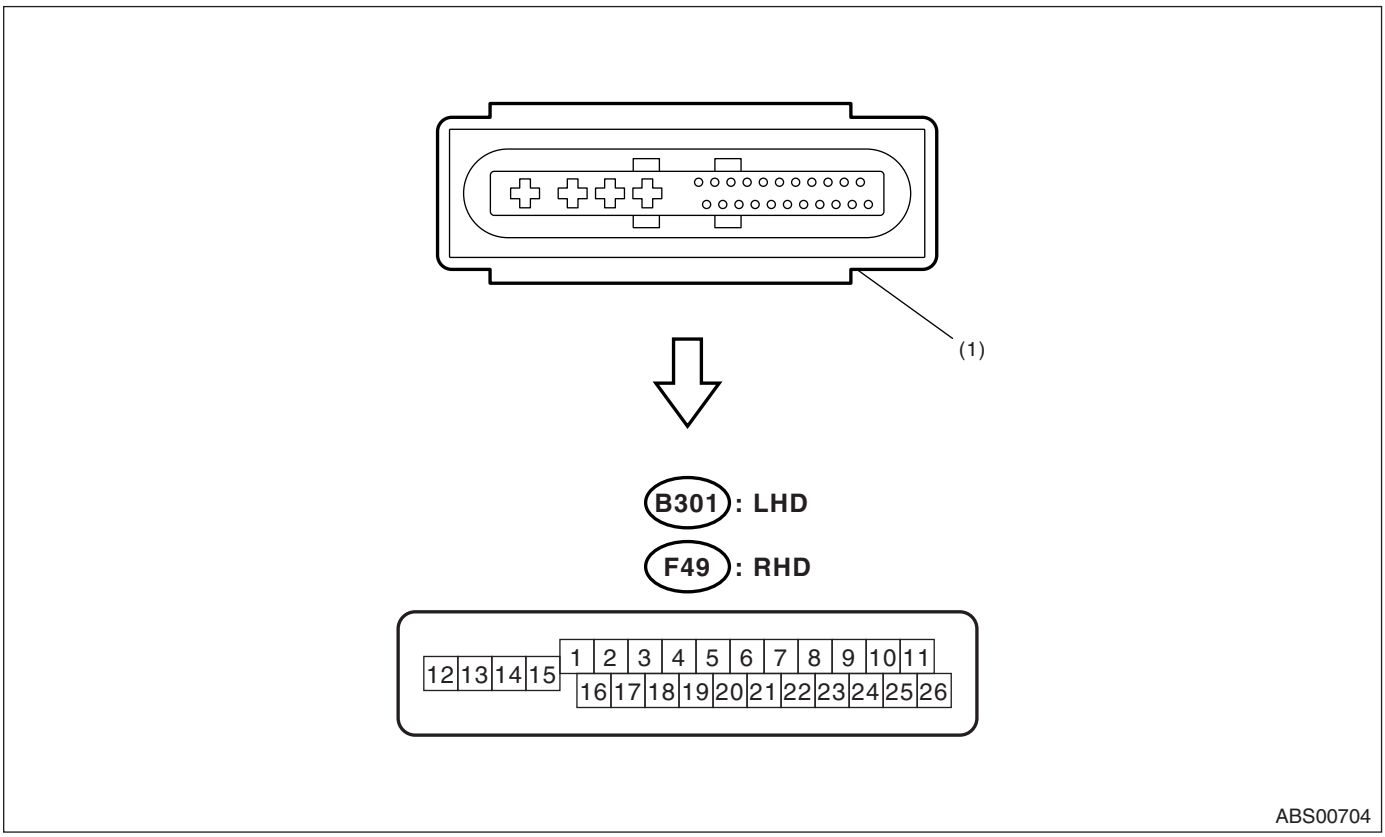
ABS00726



ABS00651

5. Control Module I/O Signal

A: ELECTRICAL SPECIFICATION



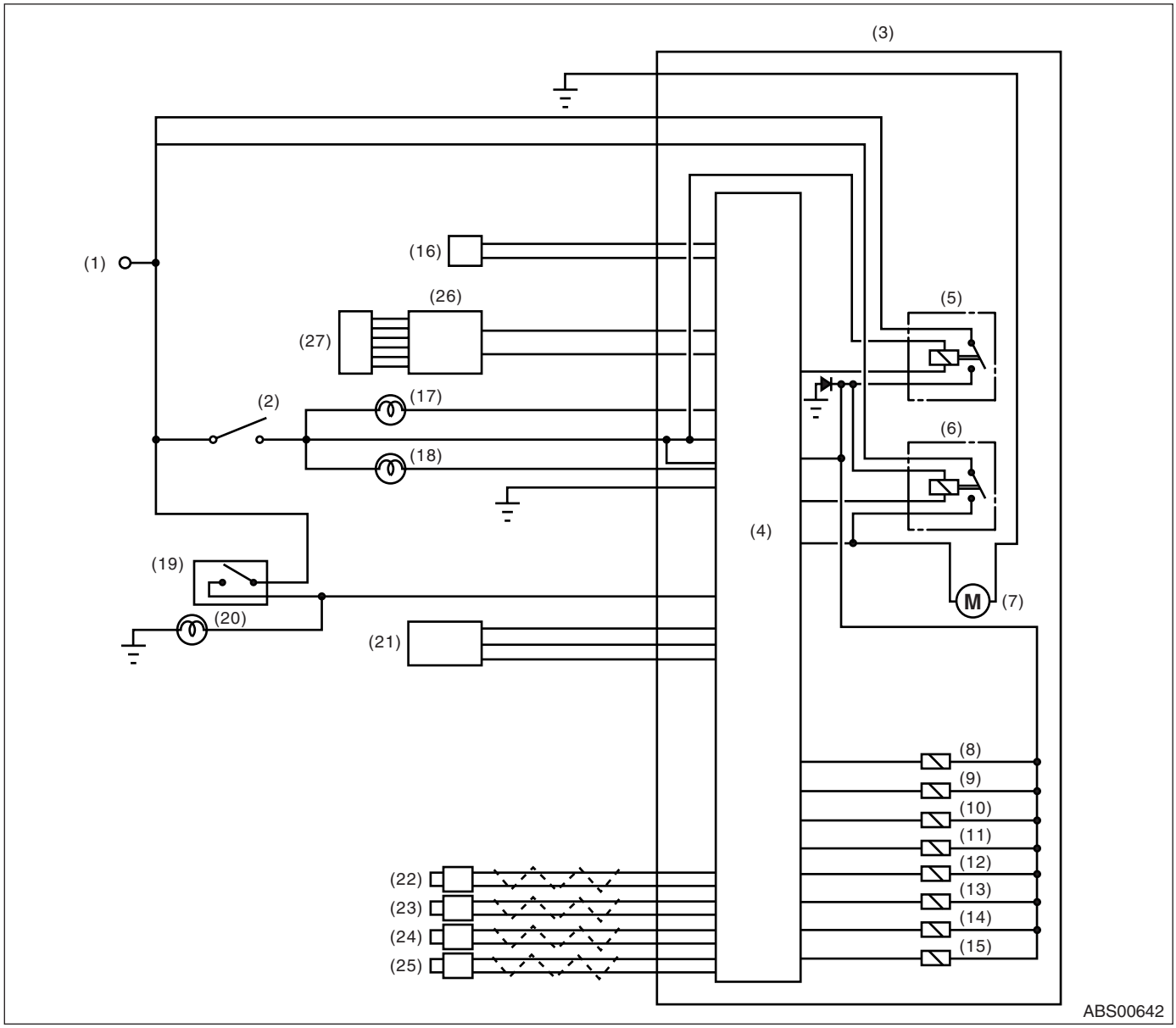
(1) ABS control module and hydraulic control unit (ABSCM&H/U) connector

NOTE:
- Terminal numbers in ABSCM&H/U connector are as shown in the figure.
- ABS warning light is illuminates when the connector is removed from ABSCM&H/U.

Description			Terminal No. (+) — (–)	Input/Output signal Measured value and measuring conditions
ABS wheel speed sensor (Wheel speed sensor)	Front LH wheel	Ground	16	—
		Signal	1 — 16	When the 20 Hz. 0.12 — 1 V
	Front RH wheel	Ground	5	—
		Signal	6 — 5	When the 20 Hz. 0.12 — 1 V
	Rear LH wheel	Ground	2	—
		Signal	3 — 2	When the 20 Hz. 0.12 — 1 V
	Rear RH wheel	Ground	4	—
		Signal	19 — 4	When the 20 Hz. 0.12 — 1 V
CAN communication line (+)			26	2.5 — 1.5 V pulse signal
CAN communication line (–)			11	3.5 — 2.5 V pulse signal
Valve relay power supply *1			14 — 15	10 — 15 V
Motor relay power supply *1			13 — 15	10 — 15 V
G sensor	Power supply		24 — 10	4.75 — 5.25 V
	Ground		10	—
	Output		21 — 10	2.1 — 2.5 V when the vehicle is on a level surface
Stop light switch *1			20 — 15	Less than 1.5 V when the stop light is OFF; otherwise, 10 — 15 V when the stop light is ON.
ABS warning light			22 — 15	After turning the ignition switch to ON, 10 — 15 V during 1.5 seconds and less than 1.5 V after 1.5 seconds passed.
Brake warning light (EBD warning light)			8 — 15	After turning the ignition switch to ON, 10 — 15 V during 1.5 seconds and less than 1.5 V after 1.5 seconds passed.
Subaru Select Monitor			7 — 15	Less than 1.5 V when no data is received. 0 ←→ 12 V pulse (in communication)
Power supply *1			18 — 15	When the ignition switch is ON, 10 — 15 V.
Grounding line			15	—
Grounding line			12	—

*1: Measure the I/O signal voltage after removing the connector from the ABSCM&H/U terminal.

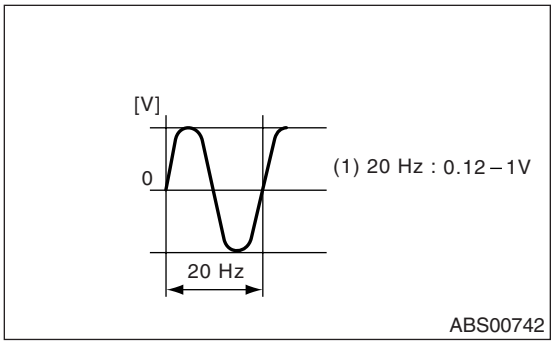
B: WIRING DIAGRAM



(1) Battery
(2) Ignition switch
(3) ABS control module and hydraulic control unit (ABSCM&H/U)
(4) ABS control module
(5) Valve relay
(6) Motor relay
(7) Motor
(8) Front inlet solenoid valve LH
(9) Front outlet solenoid valve LH
(10) Front inlet solenoid valve RH
(11) Front outlet solenoid valve RH
(12) Rear inlet solenoid valve LH
(13) Rear outlet solenoid valve LH
(14) Rear inlet solenoid valve RH
(15) Rear outlet solenoid valve RH
(16) Data link connector
(17) ABS warning light
(18) Brake warning light
(19) Stop light switch
(20) Stop light
(21) G sensor
(22) Front ABS wheel speed sensor LH
(23) Front ABS wheel speed sensor RH
(24) Rear ABS wheel speed sensor LH
(25) Rear ABS wheel speed sensor RH
(26) Driver's control center differential control module (STi model)
(27) Yaw rate & lateral G sensor (STi model)

C: WAVEFORM

ABS wheel speed sensor wave form



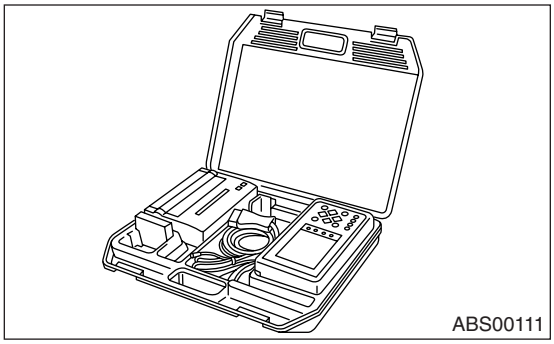
(1) Standard output voltage

6. Subaru Select Monitor

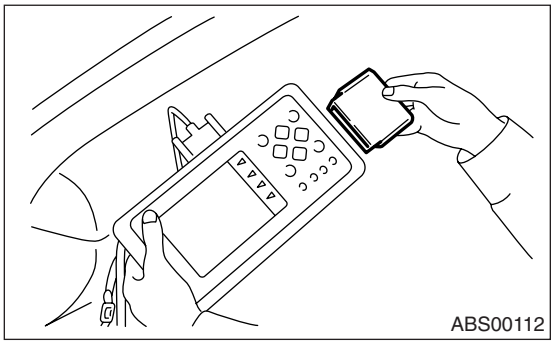
A: OPERATION

1. READ DIAGNOSTIC TROUBLE CODE (DTC)

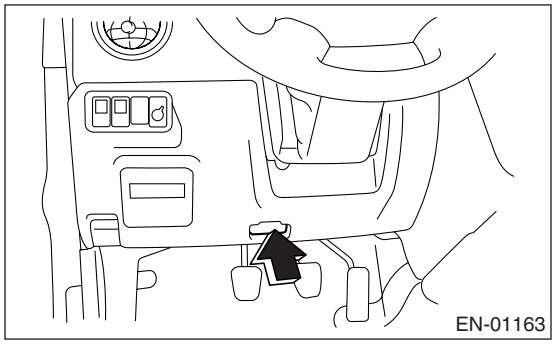
1) Prepare the Subaru Select Monitor kit.



2) Connect the diagnosis cable to Subaru Select Monitor.
3) Insert the cartridge into Subaru Select Monitor. <Ref. to ABS(diag)-9, SPECIAL TOOL, PREPARATION TOOL, General Description.>



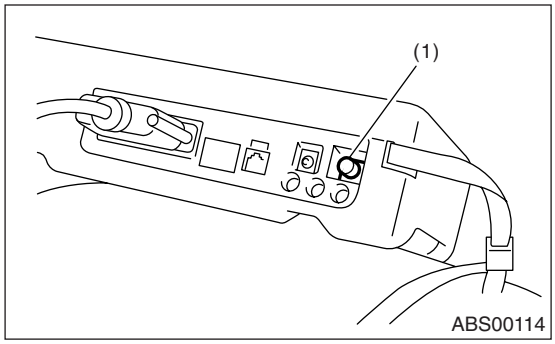
4) Connect the Subaru Select Monitor to data link connector.
(1) Data link connector located in the lower portion of instrument panel (on the driver's side).



(2) Connect the diagnosis cable to data link connector.

CAUTION:
Do not connect the scan tools except for Subaru Select Monitor and general scan tool.

5) Turn the ignition switch to ON (engine OFF) and Subaru Select Monitor power switch to ON.



(1) Power switch

6) On the «Main Menu» display screen, select the {Each System Check} and press [YES] key.
7) On the «System Selection Menu» display screen, select the {Brake Control System} and press [YES] key.
8) Press the [YES] key after the information of engine type is displayed.
9) On the «ABS Diagnosis» display screen, select the {DTC Display} and press [YES] key.
10) On the «DTC Display» display screen, select the {Current DTC} or {History DTC} and press [YES] key.

NOTE:
• For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.
• For detailed concerning the DTC, refer to the LIST OF DTC. <Ref. to ABS(diag)-38, List of Diagnostic Trouble Code (DTC).>
• A maximum of 3 DTCs are displayed in order of occurrence.
• If a particular DTC is not properly stored in memory (due to a drop in ABSCM&H/U power supply, etc.) when a problem occurs, the DTC, followed by a question mark "?", appears on the Subaru Select Monitor display. This shows it may be an unreliable reading.

Display screen	Contents to be monitored
Latest	The most recent DTC appears on Subaru Select Monitor display.
Old	The second most recent DTC appears on Subaru Select Monitor display.
Older	The third most recent DTC appears on Subaru Select Monitor display.
Reference	DTC issued after elapse of a specified period of time.

2. READ CURRENT DATA

1) On the «Main Menu» display screen, select the {Each System Check} and press «YES» key.
2) On the «System Selection Menu» display screen, select the {Brake Control System} and press «YES» key.
3) Press the «YES» key after the information of ABS type is displayed.
4) On the «Brake Control Diagnosis» display screen, select the {Current Data Display & Save} and press «YES» key.
5) On the «Data Display Menu» display screen, select the {Data Display} and press «YES» key.
6) Using the scroll key, move the display screen up or down until desired data is shown.
• A list of the support data is shown in the following table.

Display screen	Contents to be monitored	Unit of measure
FR Wheel Speed	Wheel speed detected by Front ABS wheel speed sensor RH is displayed	km/h or MPH
FL Wheel Speed	Wheel speed detected by Front ABS wheel speed sensor LH is displayed	km/h or MPH
RR Wheel Speed	Wheel speed detected by Rear ABS wheel speed sensor RH is displayed	km/h or MPH
RL Wheel Speed	Wheel speed detected by Rear ABS wheel speed sensor LH is displayed	km/h or MPH
Stop Light Switch	Stop light switch signal	ON or OFF
G Sensor Output Signal	Vehicle acceleration detected by analog G sensor is displayed.	m/s (m/s^2)
Lateral G Sensor Output Signal	Lateral G detected by Lateral G sensor is displayed in voltage. (STi model)	m/s (m/s^2)
Valve Relay Signal	Valve Relay Signal	ON or OFF
ABS Warning Lamp	ON operation of ABS warning light is displayed.	ON or OFF
EBD Warning Light	ON operation of EBD warning light is displayed.	ON or OFF
Motor Relay Monitor	Monitor voltage of motor relay is displayed.	V
IG power supply voltage	Voltage supplied to ABSCM&H/U is displayed.	V
ABS Control Flag	ABS control condition is displayed.	ON or OFF
ABS OK B Signal	ABS system normal/abnormal is displayed.	OK or NG

NOTE:
For detailed operation procedure, refer to the “SUBARU SELECT MONITOR OPERATION MANUAL”.

3. CLEAR MEMORY MODE

1) On the «Main Menu» display screen, select the {2. Each System Check} and press «YES» key.
2) On the «System Select Menu» display screen, select the {Brake System} and press «YES» key.
3) Press the «YES» key after the information of engine type is displayed.
4) On the «Brake Control Diagnosis» display screen, select the {Clear Memory} and press «YES» key.

Display screen	Contents to be monitored
Clear memory?	Function of clearing DTC.

5) When the “Done” and “turn ignition switch to OFF” are shown on display screen, turn the Subaru Select Monitor power switch and ignition switch to OFF.

NOTE:
For detailed operation procedure, refer to the “SUBARU SELECT MONITOR OPERATION MANUAL”.

4. ABS SEQUENCE CONTROL

Display screen	Contents to be monitored	Index No.
ABS sequence control	Perform ABS sequence control by operating valve and pump motor sequentially.	<Ref. to ABS-14, ABS Sequence Control.>

5. FREEZE FRAME DATA

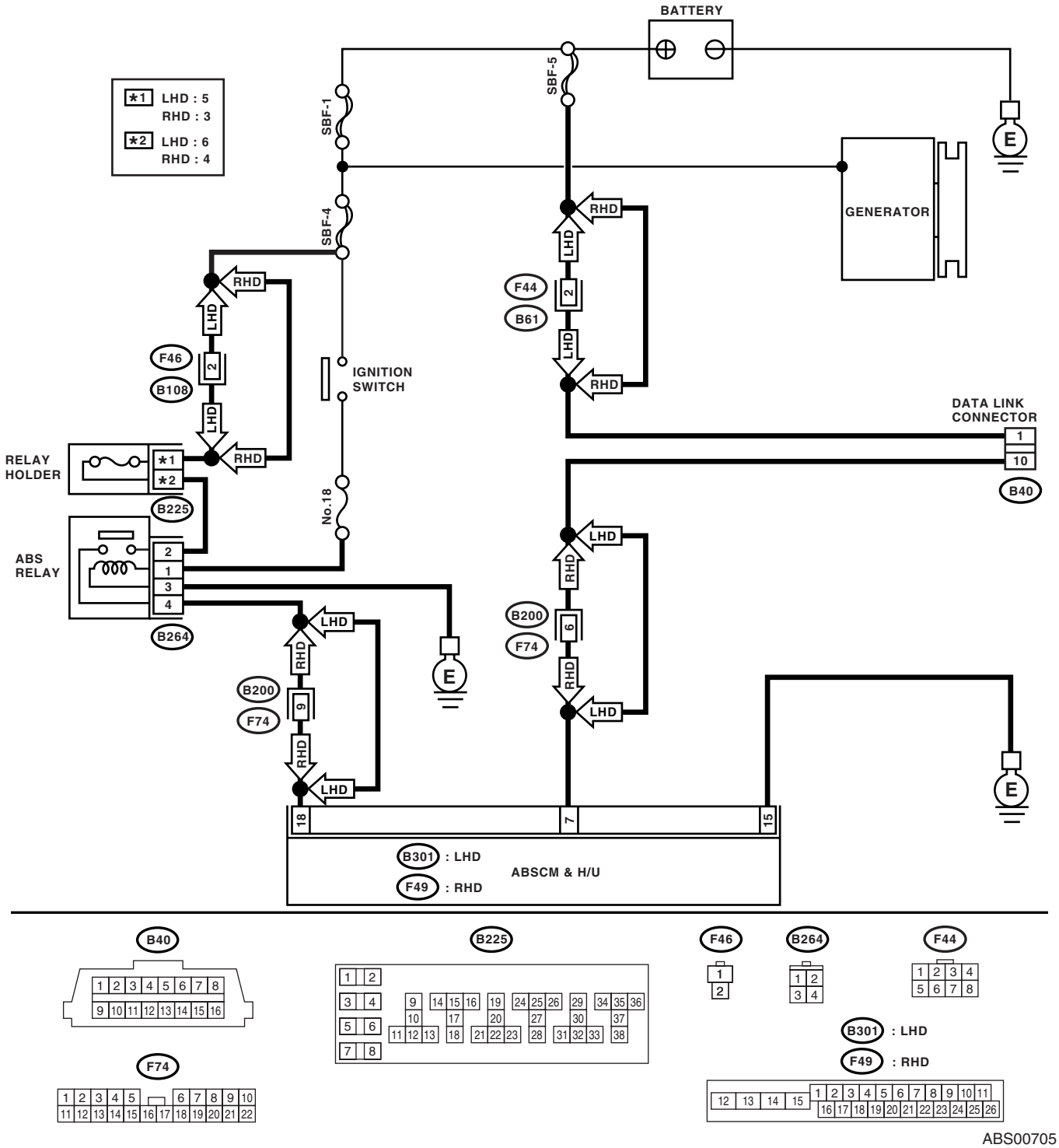
NOTE:
• Data stored at the time of trouble occurrence is shown on display.
• Each time trouble occurs, the latest information is stored in the freeze frame data in memory.
• Freeze frame data will be memorized maximum to three.
• If freeze frame data is not properly stored in memory (due to a drop in ABSCM power supply, etc.), a DTC, preceded by a question mark “?”, appears on the Subaru Select Monitor display. This shows it may be an unreliable reading.

Display screen	Contents to be monitored
FR wheel speed	Wheel speed detected by Front ABS wheel speed sensor RH is displayed in km/h or mile/h.
FL wheel speed	Wheel speed detected by Front ABS wheel speed sensor LH is displayed in km/h or mile/h.
RR wheel speed	Wheel speed detected by Rear ABS wheel speed sensor RH is displayed in km/h or mile/h.
RL wheel speed	Wheel speed detected by Rear ABS wheel speed sensor LH is displayed in km/h or mile/h.
IG power voltage	Power (in volts) supplied to ABSCM& H/U appears on the Subaru Select Monitor display.
G sensor output voltage	Voltage equivalent to vehicle acceleration detected by analog G sensor is displayed.
Lateral G sensor output voltage	Voltage equivalent to Lateral G detected by analog Lateral G sensor is displayed.
Motor relay monitor	Motor relay operation monitor signal
Stop light switch	Stop light switch signal
ABS operation signal	ABS operation signal
Power Supply Failure	Occurrence of abnormal voltage during malfunction is displayed.
Vehicle speed	Vehicle speed is displayed.

B: INSPECTION

1. COMMUNICATION FOR INITIALIZING IMPOSSIBLE

DETECTING CONDITION:
Faulty harness connector
TROUBLE SYMPTOM:
Communication cannot be executed between ABS and Subaru select monitor.
WIRING DIAGRAM:



ABS00705

	Step	Check	Yes	No
1	**CHECK IGNITION SWITCH.**	Is the ignition switch turned to ON?	Go to step **2.**	Turn the ignition switch to ON, and select ABS mode using Subaru Select Monitor.
2	**CHECK BATTERY.** 1) Turn the ignition switch to OFF. 2) Measure the battery voltage.	Is the voltage more than 11 V?	Go to step **3.**	Charge or replace the battery.
3	**CHECK BATTERY TERMINAL.**	Is there poor contact at battery terminal?	Repair or tighten the battery terminal.	Go to step **4.**
4	**CHECK COMMUNICATION OF SUBARU SELECT MONITOR.** 1) Turn the ignition switch to ON. 2) Using the Subaru Select Monitor, check whether communication to other system can be executed normally.	Are the name and year of system displayed on Subaru Select Monitor?	Go to step **8.**	Go to step **5.**
5	**CHECK COMMUNICATION OF SUBARU SELECT MONITOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the ABSCM&H/U connector. 3) Turn the ignition switch to ON. 4) Check whether communication to other systems can be executed normally.	Are the name and year of system displayed on Subaru Select Monitor?	Replace the ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **6.**
6	**CHECK HARNESS CONNECTOR BETWEEN EACH CONTROL MODULE AND DATA LINK CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the ABSCM&H/U, ECM and TCM connectors. 3) Measure the resistance between data link connector and chassis ground. ***Connector & terminal*** ***(B40) No. 10 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **7.**	Repair the harness and connector between each control module and data link connector.
7	**CHECK OUTPUT SIGNAL FOR ABSCM& H/U.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ABSCM&H/U and chassis ground. ***Connector & terminal*** ***(B40) No. 10 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **8.**	Repair the harness and connector between each control module and data link connector.
8	**CHECK HARNESS/CONNECTOR BETWEEN ABSCM&H/U AND DATA LINK CONNECTOR.** Measure the resistance between ABSCM&H/U connector and data link connector. ***Connector & terminal*** ***LHD :*** ***(B301) No. 7 — (B40) No. 10:*** ***RHD :*** ***(F49) No. 7 — (B40) No. 10:***	Is the resistance less than 0.5 Ω?	Go to step **9.**	Repair the harness and connector between ABSCM&H/U and data link connector.
9	**CHECK INSTALLATION OF ABSCM&H/U CONNECTOR.** Turn the ignition switch to OFF.	Is the ABSCM&H/U connector inserted into ABSCM&H/U until the clamp locks onto it?	Go to step **10.**	Insert the ABSCM&H/U connector into ABSCM&H/U.

	Step	Check	Yes	No
10	**CHECK POWER SUPPLY CIRCUIT.** 1) Turn the ignition switch to ON (engine OFF). 2) Measure the ignition power supply voltage between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***LHD :*** ***(B301) No. 18 (+) — Chassis ground (−):*** ***RHD :*** ***(F49) No. 18 (+) — Chassis ground (−):***	Is the voltage 10 — 15 V?	Go to step **11.**	Repair the open circuit in harness between ABSCM&H/U and battery.
11	**CHECK HARNESS CONNECTOR BETWEEN ABSCM&H/U AND CHASSIS GROUND.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ABSCM&H/U and transmission. 3) Measure the resistance of harness between ABSCM&H/U and chassis ground. ***Connector & terminal*** ***LHD :*** ***(B301) No. 15 — Chassis ground:*** ***RHD :*** ***(F49) No. 15 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **12.**	Repair the open circuit in harness between ABSCM&H/U and inhibitor side connector, and poor contact in coupling connector.
12	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in control module power supply, ground line and data link connector?	Repair the connector.	Replace the ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>

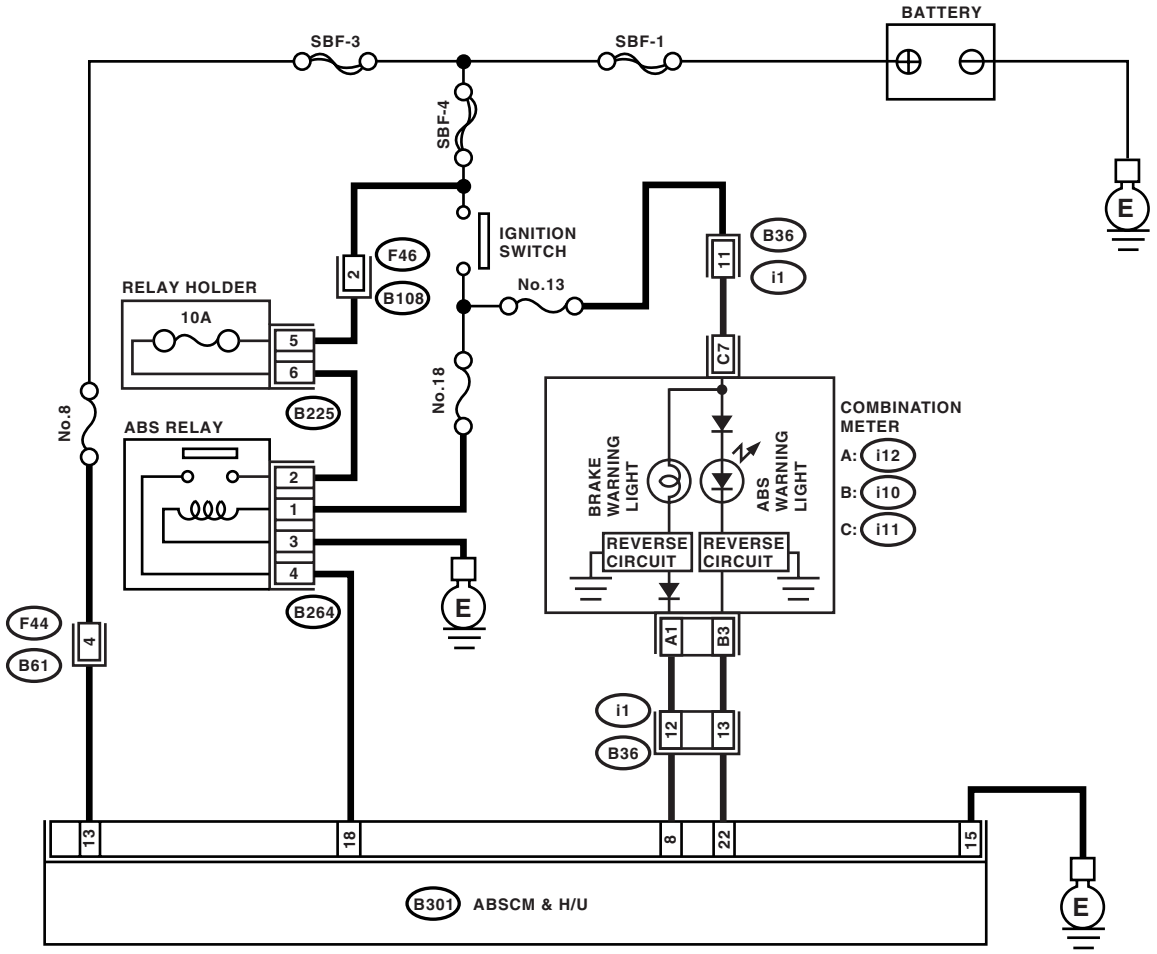
2. NO TROUBLE CODE

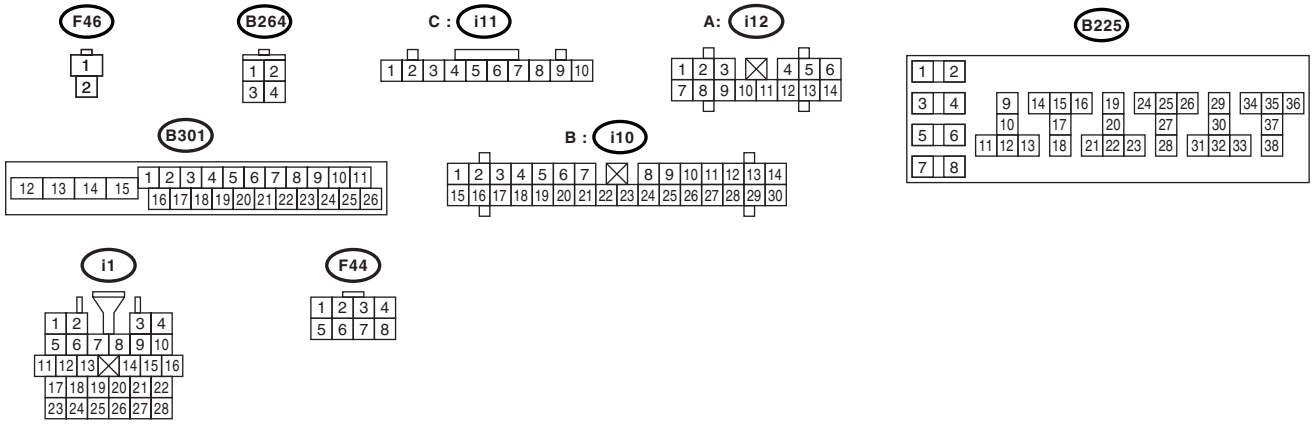
DETECTING CONDITION:
ABS warning light circuit is shorted.
TROUBLE SYMPTOM:
- ABS warning light remains on.
- “NO TROUBLE CODE” displayed on the Subaru Select Monitor.

NOTE:
When the ABS warning light is OFF and “NO TROUBLE CODE” is displayed on Subaru Select Monitor, the system is in normal condition.

WIRING DIAGRAM:

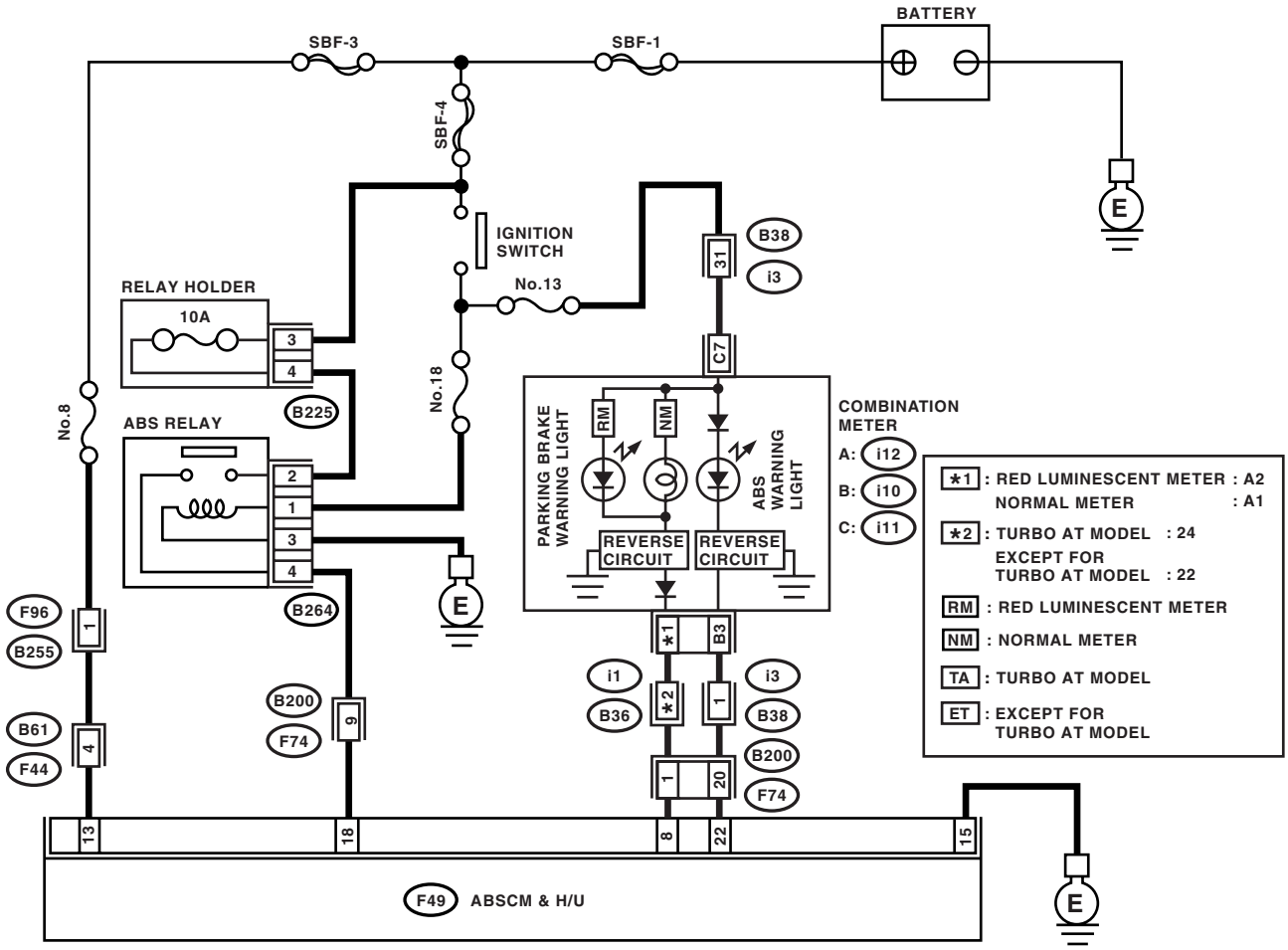
- LHD model

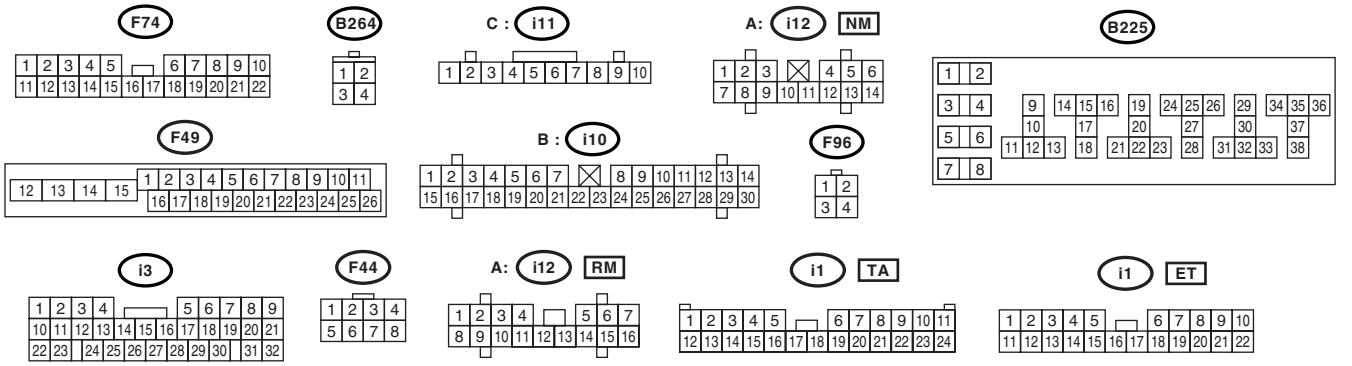




ABS00706

- RHD model





ABS00707

	Step	Check	Yes	No
1	**DATA CHECK SUBARU SELECT MONITOR.** 1) Select {Current Data Display & Save} in Subaru Select Monitor. 2) Read the condition of “ABS warning light”.	Is “ON” indicated?	Replace the ABSCM only. <Ref. to ABS-11, REPLACEMENT, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **2.**
2	**CHECK WIRING HARNESS.** Measure the resistance between ABSCM connector and combination meter connector. ***Connector & terminal*** ***LHD :*** ***(i10) No. 3 — (B301) No. 22:*** ***RHD :*** ***(i10) No. 3 — (F49) No. 22:***	Is the resistance less than 0.5 Ω?	Go to step **3.**	Repair harness and connector between ABSCM&H/U and combination meter connector.
3	**CHECK POOR CONTACT IN CONNECTOR.**	Is there poor contact in ABSCM connector and combination meter connector?	Repair the connector.	Check the combination meter.

7. Read Diagnostic Trouble Code (DTC)

A: OPERATION

Refer to “SUBARU SELECT MONITOR” for details about reading of DTCs. <Ref. to ABS(diag)-16, Subaru Select Monitor.>

8. Inspection Mode

A: PROCEDURE

WARNING:
Observe the road traffic law.

Reproduce the malfunction occurrence condition as possible.
Drive the vehicle at a speed more than 40 km/h (25 MPH) for at least 1 minute.

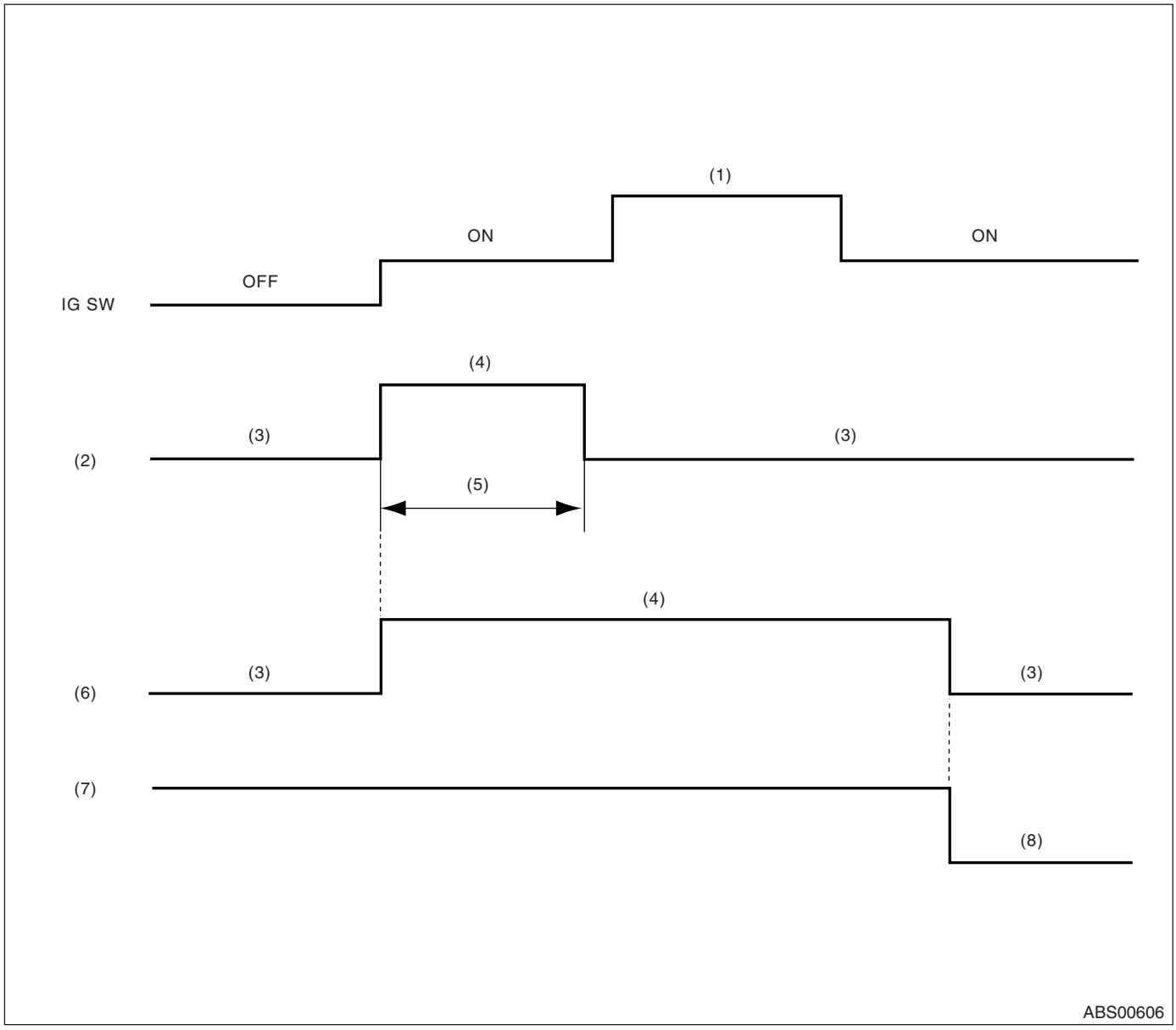
9. Clear Memory Mode

A: OPERATION

Refer to “SUBARU SELECT MONITOR” for details about how to clear DTC. <Ref. to ABS(diag)-16, Subaru Select Monitor.>

10.ABS Warning Light / Brake Warning Light Illumination Pattern

A: INSPECTION



(1)	Start	(4)	Illuminates	(7)	Parking brake
(2)	ABS warning light	(5)	About 2 sec.	(8)	Release
(3)	Go off	(6)	Brake warning light (EBD warning light)		

1) When the ABS warning light does not illuminate in accordance with this illumination pattern, there must be an electrical malfunction.
2) When the ABS warning light remains constantly OFF, repair the ABS warning light circuit or diagnosis circuit.

NOTE:
Even though the ABS warning light does not go out about 2 seconds after it illuminates, the ABS system operates normally when the warning light goes out while driving at approx. 12 km/h (7 MPH). However, the ABS system do not work while ABS warning light is illuminated.

B: ABS WARNING LIGHT DOES NOT COME ON

DETECTING CONDITION:

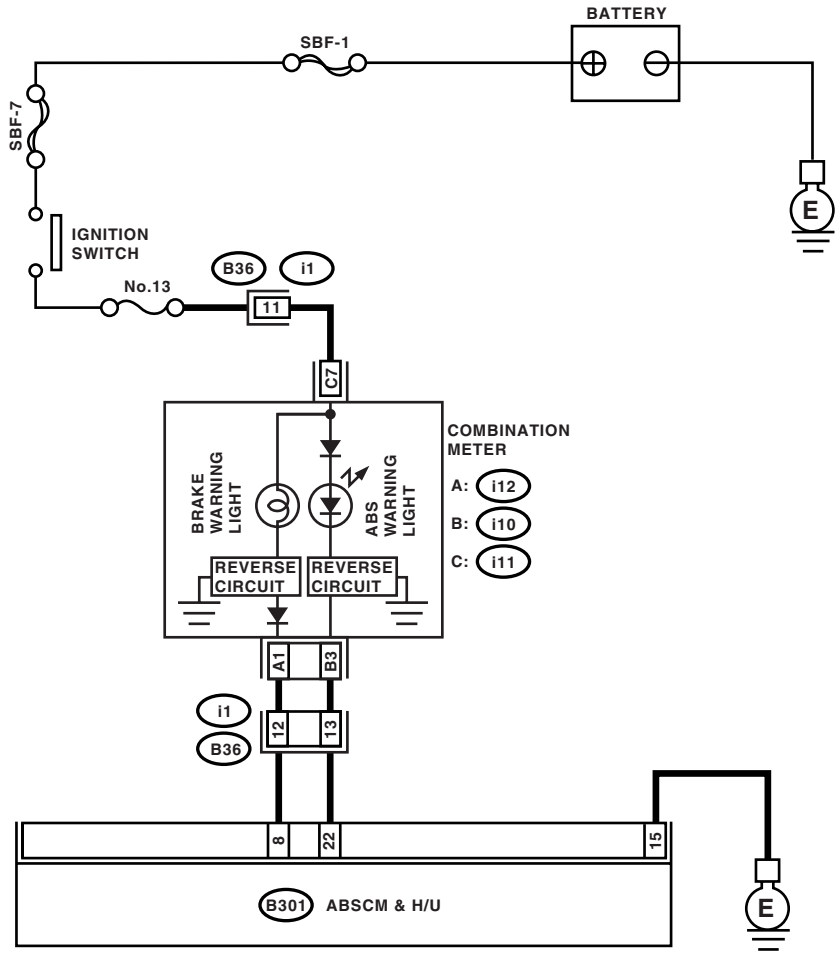
- Defective combination meter
- Defective harness

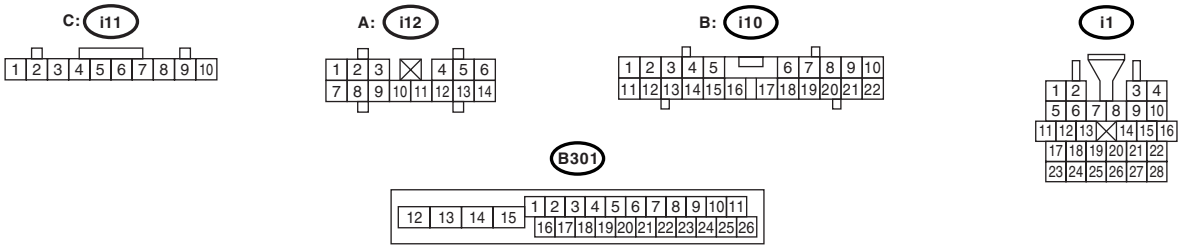
TROUBLE SYMPTOM:

When the ignition switch is turned to ON (engine OFF), ABS warning light does not come on.

WIRING DIAGRAM:

- LHD model

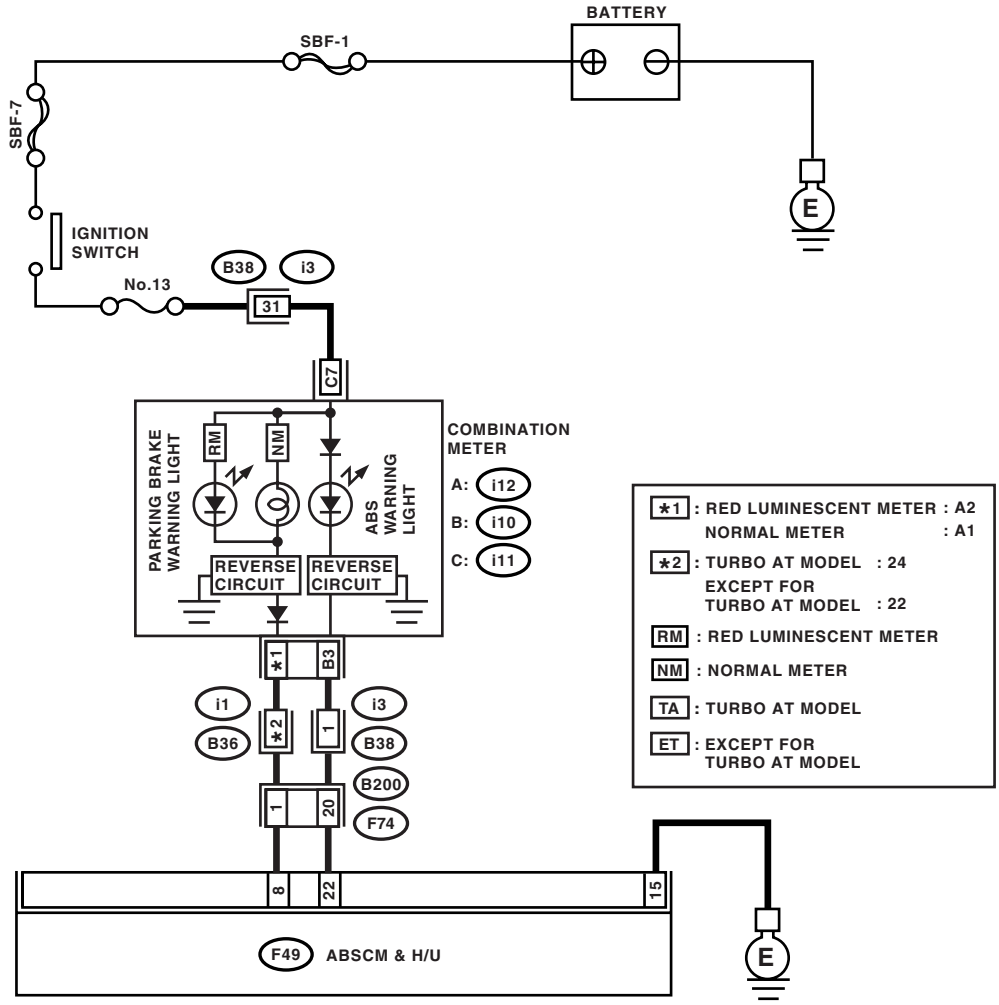


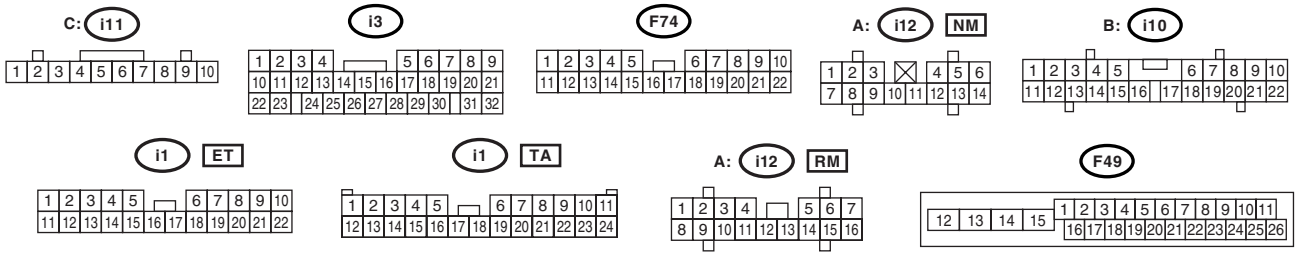


ABS00708

ABS Warning Light / Brake Warning Light Illumination Pattern

- RHD model





ABS00709

ABS Warning Light / Brake Warning Light Illumination Pattern

	Step	Check	Yes	No
1	**CHECK ILLUMINATION OF OTHER LIGHTS.** Turn the ignition switch to ON. (engine OFF)	Do other warning lights illuminate?	Go to step **2.**	Check the combination meter.
2	**READ DTC.** Read the DTC. <Ref. to ABS(diag)-25, Read Diagnostic Trouble Code (DTC).>	Is DTC displayed?	Perform the diagnosis according to DTC.	Go to step **3.**
3	**CHECK GROUND SHORT OF HARNESS.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ABSCM&H/U. 3) Disconnect the connector (i10) from the combination meter. 4) Measure the resistance between ABSCM connector and chassis ground. ***Connector & terminal*** ***LHD :*** ***(B301) No. 22 — Chassis ground:*** ***RHD :*** ***(F49) No. 22 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **4.**	Repair harness and connector between ABSCM&H/U and combination meter connector.
4	**CHECK ABSCM.** 1) Connect the connector to the ABSCM&H/U. 2) Turn the ignition to ON. 3) Immediately after turning ignition switch to ON (within 1.5 seconds), measure the resistance of harness between the combination meter connector and chassis ground. ***Connector & terminal*** ***(i10) No. 3 — Chassis ground:***	Is the resistance more than 1 MΩ?	Check the combination meter.	Replace the ABSCM only. <Ref. to ABS-11, REPLACEMENT, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>

C: ABS WARNING LIGHT DOES NOT GO OFF

DETECTING CONDITION:

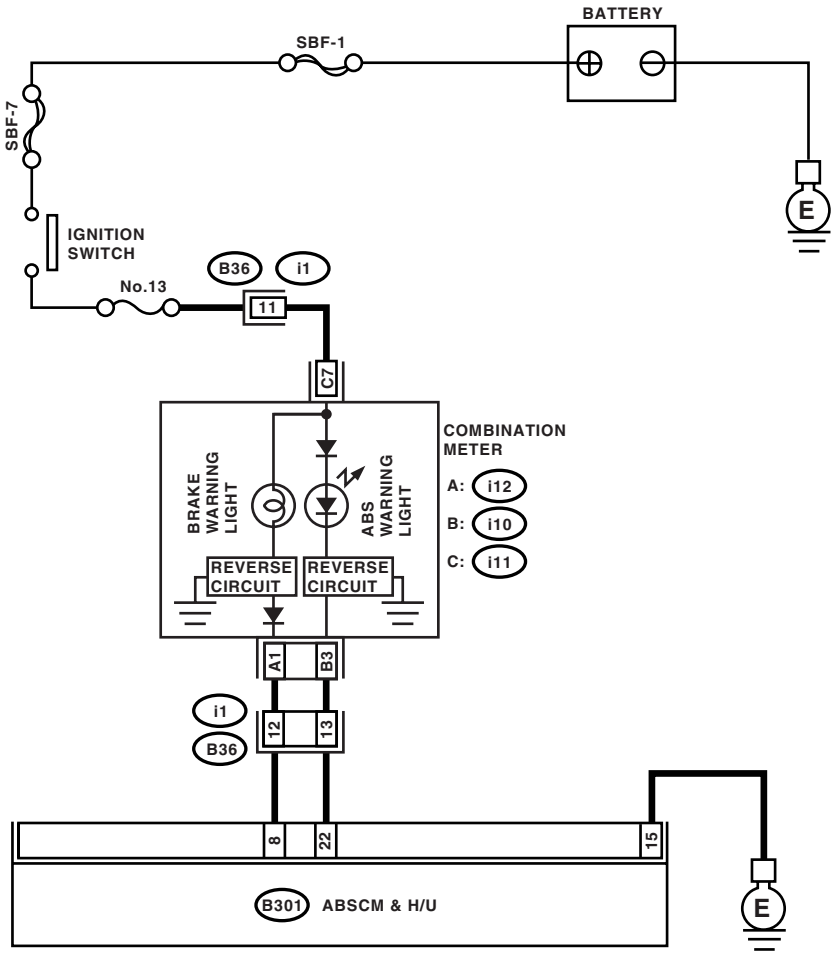
- Defective combination meter
- Open in harness

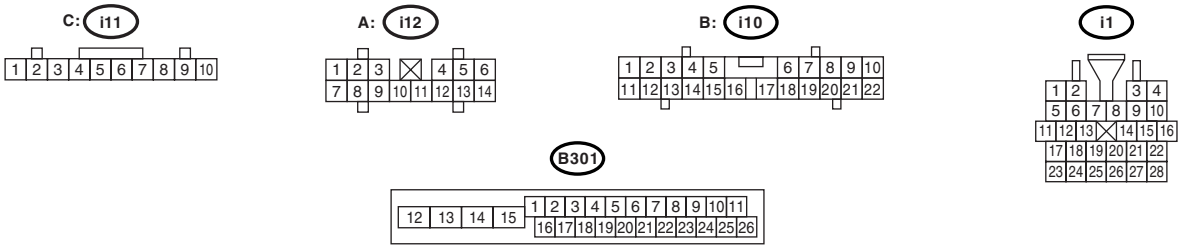
TROUBLE SYMPTOM:

When starting the engine, the ABS warning light is kept on.

WIRING DIAGRAM:

- LHD model

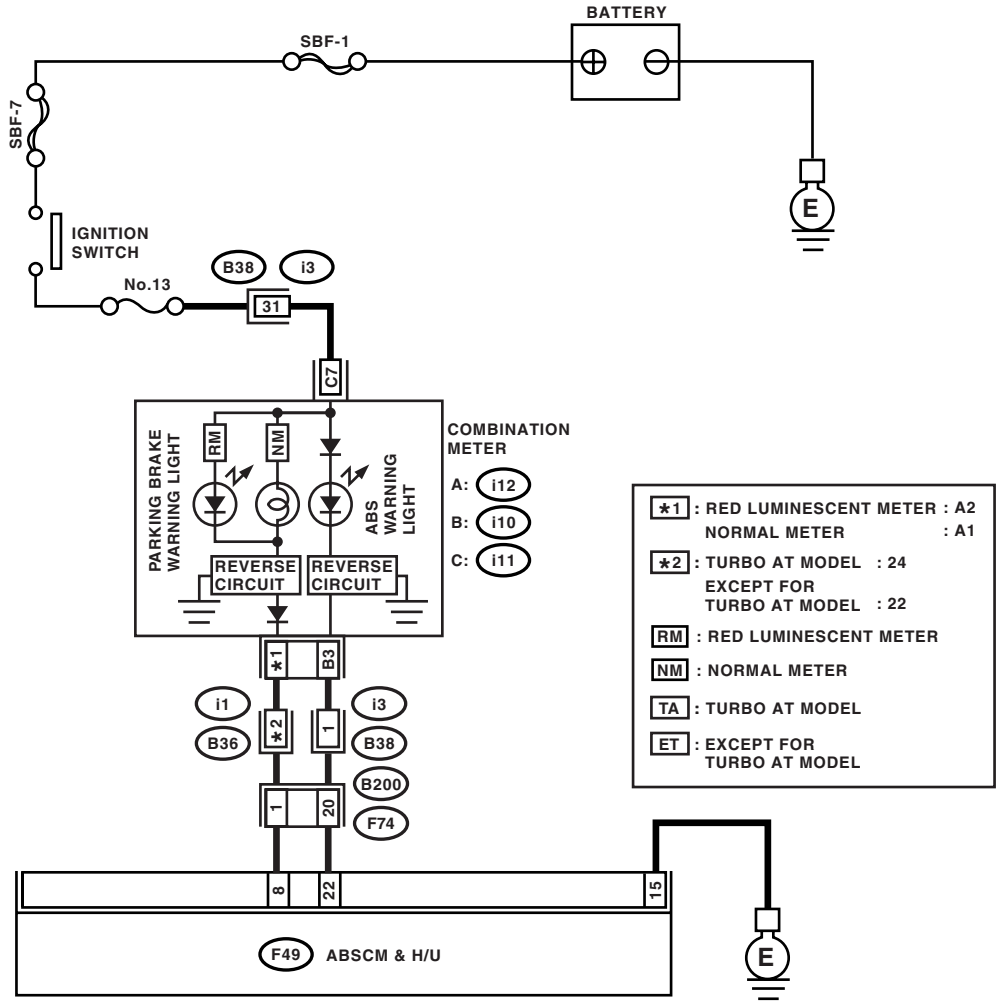


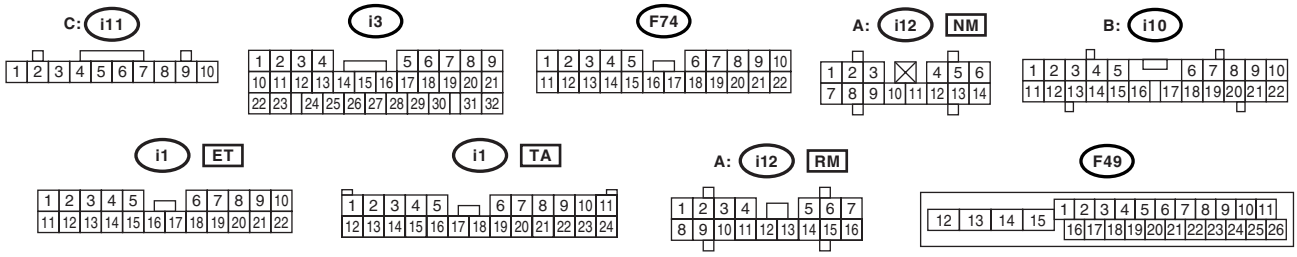


ABS00708

ABS Warning Light / Brake Warning Light Illumination Pattern

- RHD model





ABS00709

ABS Warning Light / Brake Warning Light Illumination Pattern

	Step	Check	Yes	No
1	**READ DTC.** Read the DTC. <Ref. to ABS(diag)-25, Read Diagnostic Trouble Code (DTC).>	Is DTC displayed?	Perform the diagnosis according to DTC.	Go to step **2.**
2	**CHECK WIRING HARNESS.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ABSCM&H/U. 3) Disconnect the connector (i10) from the combination meter. 4) Measure the resistance between ABSCM connector and combination meter connector. ***Connector & terminal*** ***LHD :*** ***(B301) No. 22 — (i10) No. 3:*** ***RHD :*** ***(F49) No. 22 — (i10) No. 3:***	Is the resistance less than 0.5 Ω?	Go to step **3.**	Repair harness and connector between ABSCM&H/U and combination meter connector.
3	**CHECK POOR CONTACT IN CONNECTOR.** Check poor contact in all connectors.	Is there poor contact?	Repair the connector.	Go to step **4.**
4	**CHECK ABSCM.** 1) Connect the connector to the ABSCM&H/U. 2) Turn the ignition switch to ON. 3) Measure the resistance between combination meter connector and chassis ground. ***Connector & terminal*** ***(i10) No. 3 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Check the combination meter.	Replace the ABSCM only. <Ref. to ABS-11, REPLACEMENT, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>

D: BRAKE WARNING LIGHT DOES NOT GO OFF

DETECTING CONDITION:

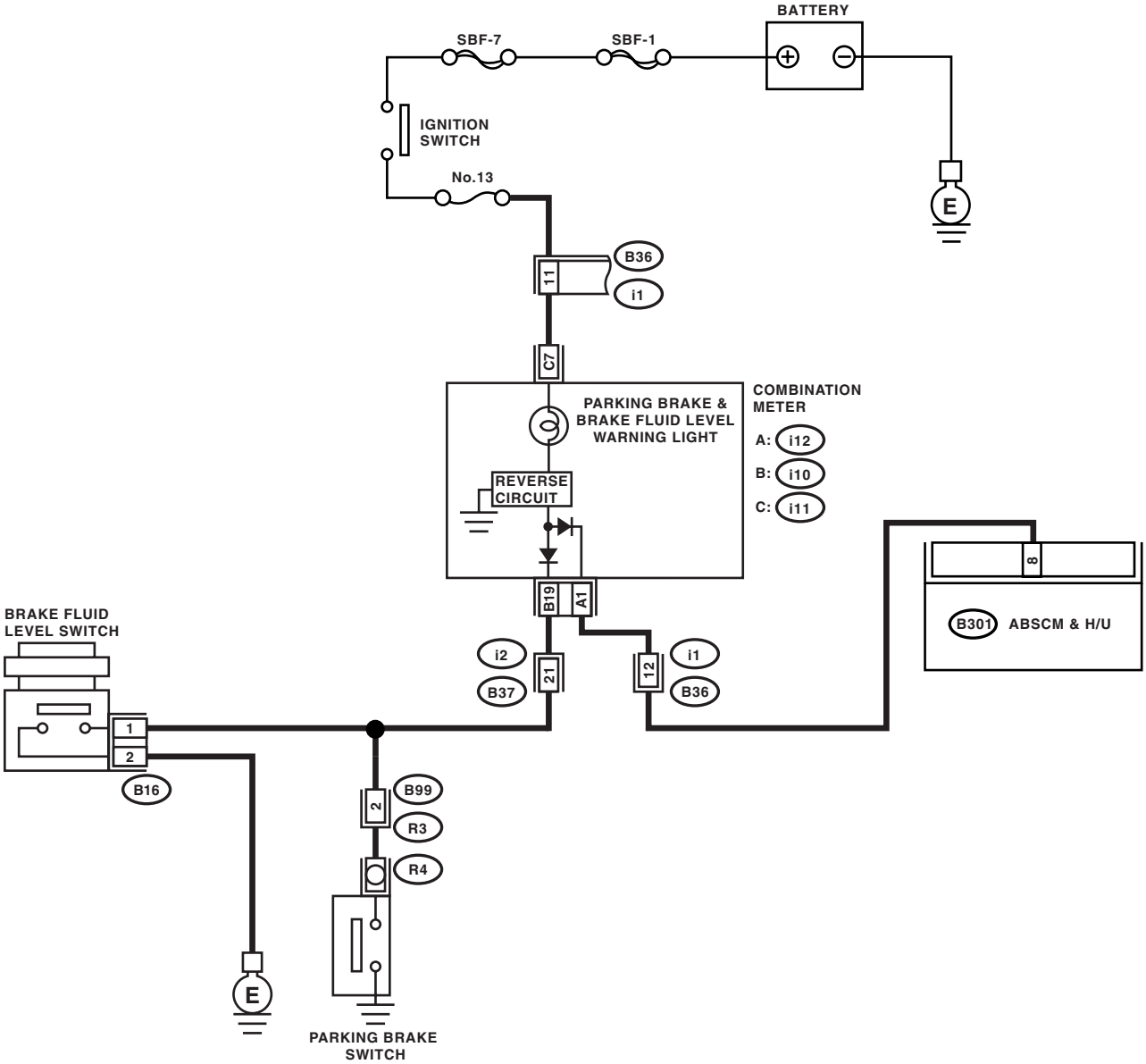
- Brake warning light circuit is shorted.
- Defective sensor/connector

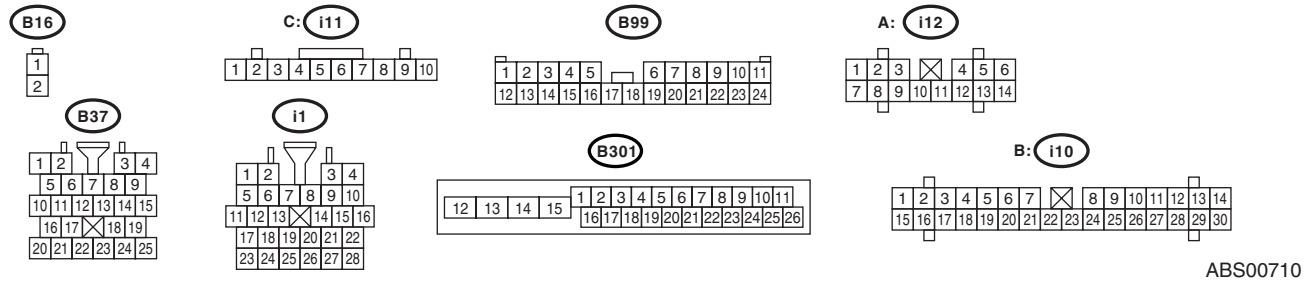
TROUBLE SYMPTOM:

After starting the engine, the brake warning light is kept on though the parking lever is released.

WIRING DIAGRAM:

- LHD model

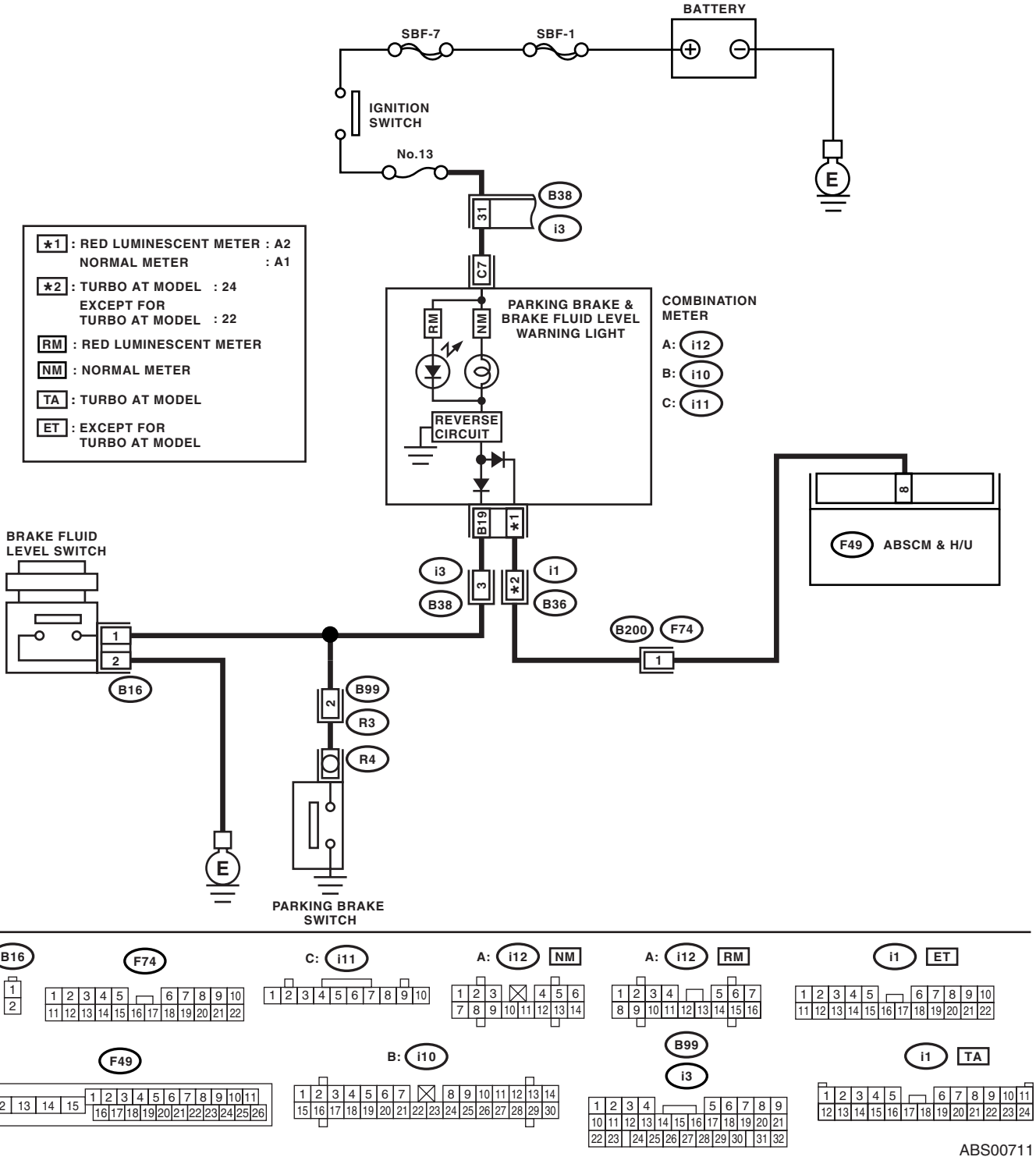




ABS00710

ABS Warning Light / Brake Warning Light Illumination Pattern

- RHD model



ABS00711

Step		Check	Yes	No
1	**CHECK INSTALLATION OF ABSCM&H/U CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Check that the ABSCM&H/U connector is inserted to ABSCM&H/U until the clamp locks onto it.	Is the connector correctly inserted?	Go to step **2.**	Insert the ABSCM&H/U connector until the clamp locks onto it.

	Step	Check	Yes	No
2	**READ DTC.** Read the DTC. <Ref. to ABS(diag)-25, Read Diagnostic Trouble Code (DTC).>	Is DTC displayed?	Perform the diagnosis according to DTC.	Go to step **3.**
3	**CHECK THE BRAKE FLUID AMOUNT.** Check the amount of brake fluid in the reservoir tank of master cylinder.	Is the amount of brake fluid between the lines of MAX and MIN?	Go to step **4.**	Replenish brake fluid to the specified value.
4	**CHECK BRAKE FLUID LEVEL SWITCH.** 1) Disconnect the level switch connector (B16) from master cylinder. 2) Measure the resistance of brake fluid switch terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance more than 1 MΩ?	Go to step **5.**	Replace the master cylinder.
5	**CHECK PARKING BRAKE SWITCH.** 1) Disconnect the connector (R4) from parking brake switch. 2) Release the parking brake. 3) Measure the resistance between parking brake switch terminal and chassis ground.	Is the resistance more than 1 MΩ?	Go to step **6.**	Replace the parking brake switch.
6	**CHECK GROUND SHORT OF HARNESS.** 1) Disconnect the connector (i10) from combination meter. 2) Measure the resistance between combination meter connector and chassis ground. ***Connector & terminal*** ***(i10) No. 19 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **7.**	Repair the harness connector between combination meter and parking brake switch.
7	**CHECK HARNESS.** 1) Disconnect the connector from ABSCM&H/U. 2) Disconnect the connector (i12) from the combination meter. 3) Measure the resistance between ABSCM&H/U connector and combination meter connector. ***Connector & terminal*** ***LHD :*** ***(B301) No. 8 — (i12) No. 1:*** ***RHD (red luminescent meter) :*** ***(F49) No. 8 — (i12) No. 2:*** ***RHD (normal meter) :*** ***(F49) No. 8 — (i12) No. 1:***	Is the resistance less than 0.5 Ω?	Go to step **8.**	Repair harness between ABSCM&H/U and combination meter connector.
8	**CHECK POOR CONTACT IN CONNECTOR.** Check poor contact in all connectors.	Is there poor contact?	Repair the connector.	Go to step **9.**
9	**CHECK ABSCM.** 1) Connect the connector to the ABSCM&H/U. 2) Turn the ignition switch to ON. 3) Measure the resistance between combination meter connector and chassis ground. ***Connector & terminal*** ***LHD :*** ***(i12) No. 1 — Chassis ground:*** ***RHD (red luminescent meter) :*** ***(i12) No. 2 — Chassis ground:*** ***RHD (normal meter) :*** ***(i12) No. 1 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Check the combination meter.	Replace the ABSCM only. <Ref. to ABS-11, REPLACEMENT, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>

11.List of Diagnostic Trouble Code (DTC)

A: LIST

DTC	Display screen	Contents of diagnosis	Index No.
—	Communication for initializing impossible	Subaru Select Monitor communication failure	<Ref. to ABS(diag)-19, COMMUNICATION FOR INITIALIZING IMPOSSIBLE, INSPECTION, Subaru Select Monitor.>
—	No DTC	Although no DTC appears on the Subaru Select Monitor display, the ABS warning light remains on.	<Ref. to ABS(diag)-21, NO TROUBLE CODE, INSPECTION, Subaru Select Monitor.>
21	Open or short circuit in Front ABS wheel speed sensor RH circuit	Open or short circuit in Front ABS wheel speed sensor RH circuit	<Ref. to ABS(diag)-40, DTC 21 OPEN OR SHORT CIRCUIT IN FRONT RIGHT ABS WHEEL SPEED SENSOR CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
22	Front ABS wheel speed sensor RH abnormal signal	Front ABS wheel speed sensor RH abnormal signal	<Ref. to ABS(diag)-47, DTC 22 FRONT RIGHT ABNORMAL ABS WHEEL SPEED SENSOR SIGNAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
23	Open or short circuit in Front ABS wheel speed sensor LH circuit	Open or short circuit in Front ABS wheel speed sensor LH circuit	<Ref. to ABS(diag)-40, DTC 23 OPEN OR SHORT CIRCUIT IN FRONT LEFT ABS WHEEL SPEED SENSOR CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
24	Front ABS wheel speed sensor LH abnormal signal	Front ABS wheel speed sensor LH abnormal signal	<Ref. to ABS(diag)-47, DTC 24 FRONT LEFT ABNORMAL ABS WHEEL SPEED SENSOR SIGNAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
25	Open or short circuit in Rear ABS wheel speed sensor RH circuit	Open or short circuit in Rear ABS wheel speed sensor RH circuit	<Ref. to ABS(diag)-40, DTC 25 OPEN OR SHORT CIRCUIT IN REAR RIGHT ABS WHEEL SPEED SENSOR CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
26	Rear ABS wheel speed sensor RH abnormal signal	Rear ABS wheel speed sensor RH abnormal signal	<Ref. to ABS(diag)-47, DTC 26 REAR RIGHT ABNORMAL ABS WHEEL SPEED SENSOR SIGNAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
27	Open or short circuit in Rear ABS wheel speed sensor LH circuit	Open or short circuit in Rear ABS wheel speed sensor LH circuit	<Ref. to ABS(diag)-41, DTC 27 OPEN OR SHORT CIRCUIT IN REAR LEFT ABS WHEEL SPEED SENSOR CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
28	Rear ABS wheel speed sensor LH abnormal signal	Rear ABS wheel speed sensor LH abnormal signal	<Ref. to ABS(diag)-48, DTC 28 REAR LEFT ABNORMAL ABS WHEEL SPEED SENSOR SIGNAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
29	Abnormal ABS wheel speed sensor signal on any one of four sensor	Abnormal ABS wheel speed sensor signal on any one of four	<Ref. to ABS(diag)-54, DTC 29 ABNORMAL ABS WHEEL SPEED SENSOR SIGNAL ON ANY ONE OF FOUR SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
31	Front inlet valve RH malfunction	Front inlet valve RH malfunction	<Ref. to ABS(diag)-59, DTC 31 FRONT RIGHT INLET VALVE MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
32	Front outlet valve RH malfunction	Front outlet valve RH malfunction	<Ref. to ABS(diag)-61, DTC 32 FRONT RIGHT OUTLET VALVE MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
33	Front inlet valve LH malfunction	Front inlet valve LH malfunction	<Ref. to ABS(diag)-59, DTC 33 FRONT LEFT INLET VALVE MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
34	Front outlet valve LH malfunction	Front outlet valve LH malfunction	<Ref. to ABS(diag)-61, DTC 34 FRONT LEFT OUTLET VALVE MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
35	Rear inlet valve RH malfunction	Rear inlet valve RH malfunction	<Ref. to ABS(diag)-59, DTC 35 REAR RIGHT INLET VALVE MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC	Display screen	Contents of diagnosis	Index No.
36	Rear outlet valve RH malfunction	Rear outlet valve RH malfunction	<Ref. to ABS(diag)-61, DTC 36 REAR RIGHT OUTLET VALVE MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
37	Rear inlet valve LH malfunction	Rear inlet valve LH malfunction	<Ref. to ABS(diag)-59, DTC 37 REAR LEFT INLET VALVE MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
38	Rear outlet valve LH malfunction	Rear outlet valve LH malfunction	<Ref. to ABS(diag)-62, DTC 38 REAR LEFT OUTLET VALVE MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
41	ABS control module malfunction	ABSCM&H/U malfunction	<Ref. to ABS(diag)-65, DTC 41 ABS CONTROL MODULE MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
42	Power supply voltage failure	Power voltage malfunction	<Ref. to ABS(diag)-66, DTC 42 POWER VOLTAGE MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
47	Improper CAN Communication	CAN communication circuit failure	<Ref. to ABS(diag)-83, DTC 47 IMPROPER CAN COMMUNICATION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
51	Valve relay malfunction	Valve relay malfunction	<Ref. to ABS(diag)-69, DTC 51 VALVE RELAY MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
52	Motor and Motor Relay	Motor/motor relay on failure	<Ref. to ABS(diag)-71, DTC 52 MOTER/MOTER RELAY MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
54	Stop light switch signal circuit malfunction	Stop light switch signal circuit malfunction	<Ref. to ABS(diag)-74, DTC 54 STOP LIGHT SWITCH SIGNAL CIRCUIT MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
56	Longitudinal G Sensor malfunction	Faulty G sensor output voltage or output signal	<Ref. to ABS(diag)-76, DTC 56 G SENSOR OUTPUT VOLTAGE OR OUTPUT SIGNAL MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
73	Lateral G Sensor malfunction	Faulty Lateral G sensor output voltage or output signal	<Ref. to ABS(diag)-80, DTC 73 LATERAL G SENSOR OUTPUT VOLTAGE OR OUTPUT SIGNAL MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

12.Diagnostic Procedure with Diagnostic Trouble Code (DTC)

A: DTC 21 OPEN OR SHORT CIRCUIT IN FRONT RIGHT ABS WHEEL SPEED SENSOR CIRCUIT

NOTE:
For the diagnostic procedure, refer to DTC 27. <Ref. to ABS(diag)-41, DTC 27 OPEN OR SHORT CIRCUIT IN REAR LEFT ABS WHEEL SPEED SENSOR CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

B: DTC 23 OPEN OR SHORT CIRCUIT IN FRONT LEFT ABS WHEEL SPEED SENSOR CIRCUIT

NOTE:
For the diagnostic procedure, refer to DTC 27. <Ref. to ABS(diag)-41, DTC 27 OPEN OR SHORT CIRCUIT IN REAR LEFT ABS WHEEL SPEED SENSOR CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

C: DTC 25 OPEN OR SHORT CIRCUIT IN REAR RIGHT ABS WHEEL SPEED SENSOR CIRCUIT

NOTE:
For the diagnostic procedure, refer to DTC 27. <Ref. to ABS(diag)-41, DTC 27 OPEN OR SHORT CIRCUIT IN REAR LEFT ABS WHEEL SPEED SENSOR CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

D: DTC 27 OPEN OR SHORT CIRCUIT IN REAR LEFT ABS WHEEL SPEED SENSOR CIRCUIT

DIAGNOSIS:

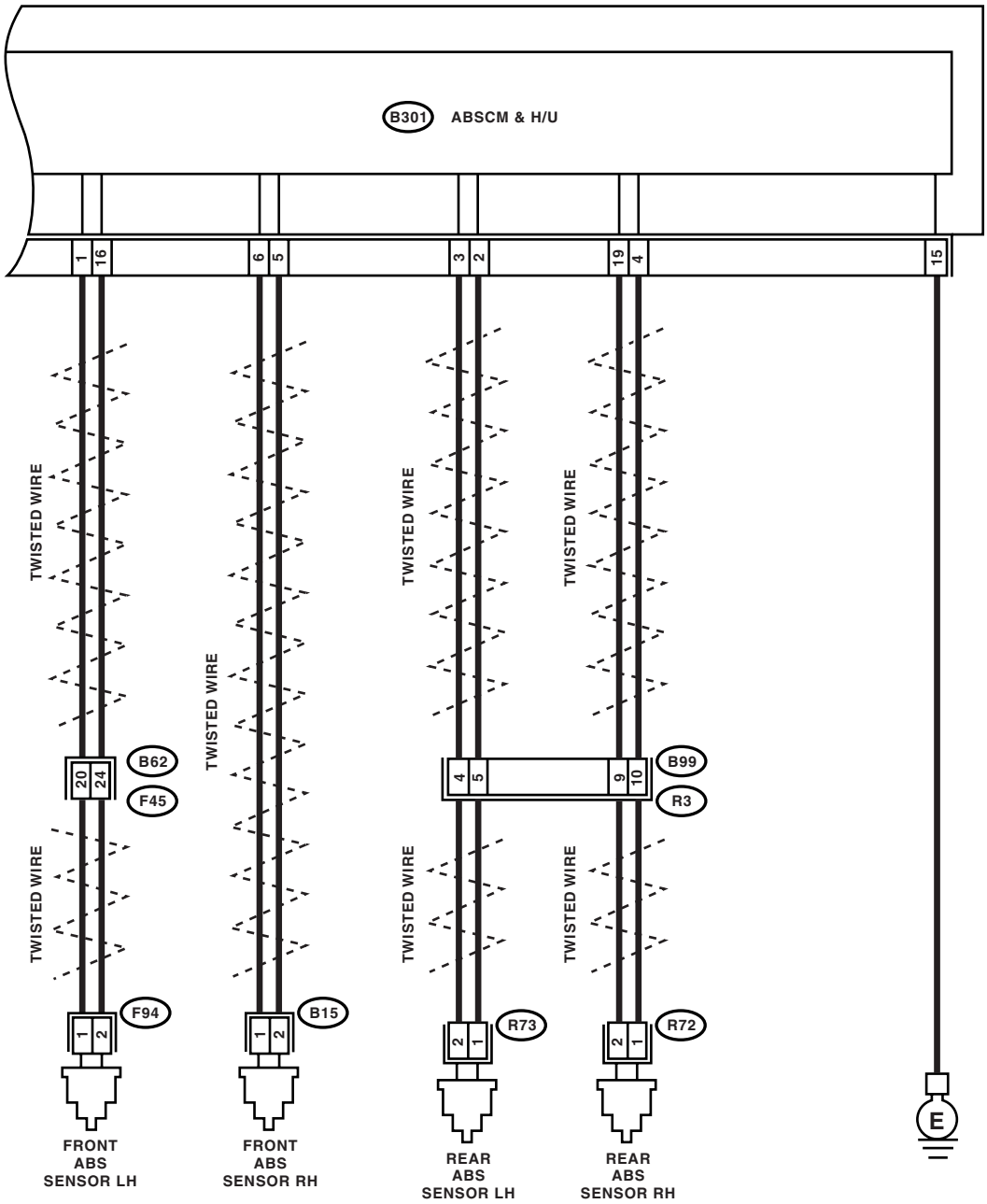
- Faulty ABS wheel speed sensor (Broken wire, input voltage too high)
- Faulty harness connector

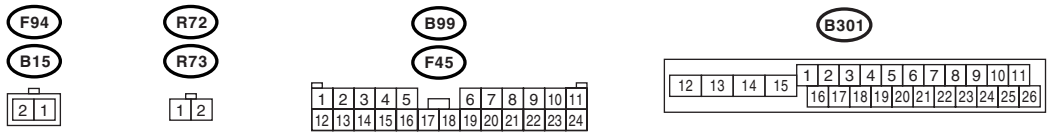
TROUBLE SYMPTOM:

ABS does not operate.

WIRING DIAGRAM:

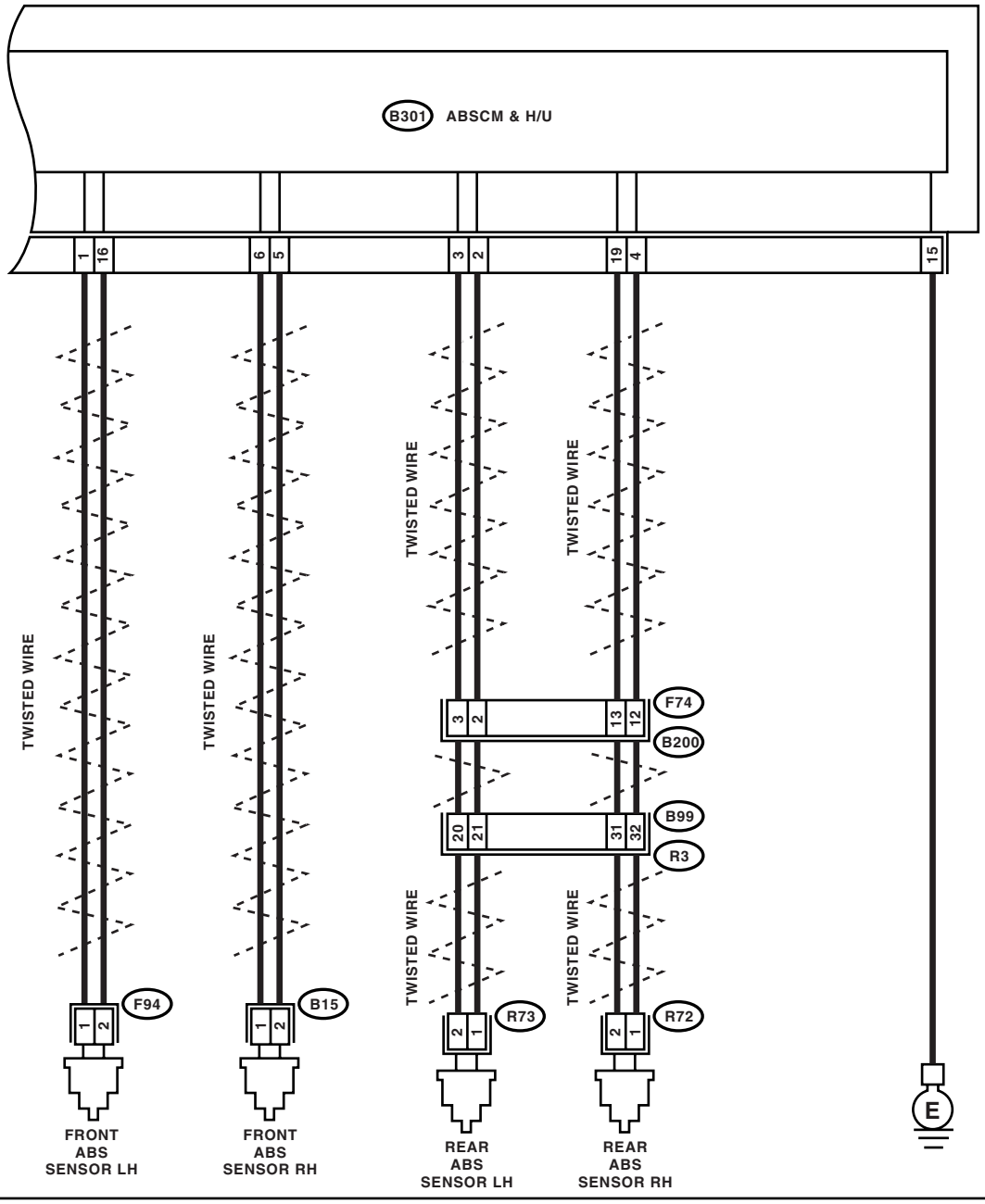
- LHD model

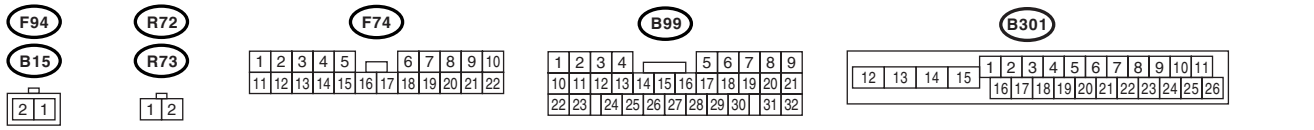




ABS00712

- RHD model





ABS00713

	Step	Check	Yes	No
1	**CHECK OUTPUT OF ABS WHEEL SPEED SENSOR USING SUBARU SELECT MONITOR.** 1) Select “Current data display & Save” on the Subaru Select Monitor. 2) Read the ABS wheel speed sensor output corresponding to faulty system in the Subaru Select Monitor data display mode.	Does the speed indicated on display change in response to speedometer reading during acceleration/deceleration when the steering wheel is in straight-ahead position?	Go to step **2.**	Go to step **8.**
2	**CHECK INSTALLATION OF ABS WHEEL SPEED SENSOR.**	Are the ABS wheel speed sensor installation bolts tightened 33 N·m (3.3 kgf-m, 24 ft-lb)?	Go to step **3.**	Tighten the ABS wheel speed sensor installation bolts securely.
3	**CHECK ABS WHEEL SPEED SENSOR GAP.** Measure the tone wheel to ABS wheel speed sensor piece gap over entire perimeter of the wheel.	Is the gap as following value? Front wheel: 0.3 — 0.8 mm (0.012 — 0.031 in), Rear wheel: 0.7 — 1.2 mm (0.028 — 0.047 in)	Go to step **4.**	Adjust the gap. NOTE: Adjust the gap using spacers (Part No. 26755AA000). If the spacers cannot correct gap, replace worn sensor or worn tone wheel.
4	**CHECK TONE WHEEL RUNOUT.** Measure the tone wheel runout.	Is the runout less than 0.05 mm (0.0020 in)?	Go to step **5.**	Replace the tone wheel. Front: <Ref. to ABS-23, Front Tone Wheel.> Rear: <Ref. to ABS-24, Rear Tone Wheel.>
5	**CHECK POOR CONTACT IN CONNECTORS.** Turn the ignition switch to OFF.	Is there poor contact in connectors between ABSCM&H/U and ABS wheel speed sensor?	Repair the connector.	Go to step **6.**
6	**CHECK ABSCM&H/U.** 1) Connect all connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read out the DTC.	Is the same DTC as in the current diagnosis still being output?	Replace the ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **7.**
7	**CHECK ANY OTHER DTC APPEARANCE.**	Are other DTCs being output?	Proceed with the diagnosis corresponding to DTC.	A temporary poor contact. NOTE: Check the harness and connectors between ABSCM&H/U and ABS wheel speed sensor.

	Step	Check	Yes	No
8	**CHECK ABS WHEEL SPEED SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ABS wheel speed sensor. 3) Measure the resistance of ABS wheel speed sensor connector terminals while shaking the harness lightly. ***Terminals*** ***Front RH No. 1 — No. 2:*** ***Front LH No. 1 — No. 2:*** ***Rear RH No. 1 — No. 2:*** ***Rear LH No. 1 — No. 2:***	Is the resistance as following value? Front: 1 — 1.5 kΩ, Rear: 1.025 — 1.265 kΩ	Go to step **9.**	Replace the ABS wheel speed sensor. Front: <Ref. to ABS-17, Front ABS Wheel Speed Sensor.> Rear: <Ref. to ABS-20, Rear ABS Wheel Speed Sensor.>
9	**CHECK BATTERY SHORT OF ABS WHEEL SPEED SENSOR.** 1) Disconnect the connector from ABSCM&H/U. 2) Measure the voltage between ABS wheel speed sensor and chassis ground. ***Terminals*** ***Front RH No. 1 (+) — Chassis ground (−):*** ***Front LH No. 1 (+) — Chassis ground (−):*** ***Rear RH No. 1 (+) — Chassis ground (−):*** ***Rear LH No. 1 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **10.**	Replace the ABS wheel speed sensor. Front: <Ref. to ABS-17, Front ABS Wheel Speed Sensor.> Rear: <Ref. to ABS-20, Rear ABS Wheel Speed Sensor.>
10	**CHECK BATTERY SHORT OF ABS WHEEL SPEED SENSOR.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ABS wheel speed sensor and chassis ground. ***Terminals*** ***Front RH No. 1 (+) — Chassis ground (−):*** ***Front LH No. 1 (+) — Chassis ground (−):*** ***Rear RH No. 1 (+) — Chassis ground (−):*** ***Rear LH No. 1 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **11.**	Replace the ABS wheel speed sensor. Front: <Ref. to ABS-17, Front ABS Wheel Speed Sensor.> Rear: <Ref. to ABS-20, Rear ABS Wheel Speed Sensor.>
11	**CHECK HARNESS/CONNECTOR BETWEEN ABSCM&H/U AND ABS WHEEL SPEED SENSOR.** 1) Turn the ignition switch to OFF. 2) Connect the connector to ABS wheel speed sensor. 3) Measure the resistance between ABSCM&H/U connector terminals. ***Connector & terminal*** ***LHD :*** ***DTC 21*** ***(B301) No. 6 — No. 5:*** ***DTC 23*** ***(B301) No. 1 — No. 16:*** ***DTC 25*** ***(B301) No. 19 — No. 4:*** ***DTC 27*** ***(B301) No. 3 — No. 2:*** ***RHD :*** ***DTC 21*** ***(F49) No. 6 — No. 5:*** ***DTC 23*** ***(F49) No. 1 — No. 16:*** ***DTC 25*** ***(F49) No. 19 — No. 4:*** ***DTC 27*** ***(F49) No. 3 — No. 2:***	Is the resistance as following value? Front: 1 — 1.5 kΩ , Rear: 1.025 — 1.265 kΩ	Go to step **12.**	Repair the harness/connector between ABSCM&H/U and ABS wheel speed sensor.

	Step	Check	Yes	No
12	**CHECK BATTERY SHORT OF HARNESS.** Measure the voltage between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***LHD :*** ***DTC 21*** ***(B301) No. 6 (+) — Chassis ground (–):*** ***DTC 23*** ***(B301) No. 1 (+) — Chassis ground (–):*** ***DTC 25*** ***(B301) No. 19 (+) — Chassis ground (–):*** ***DTC 27*** ***(B301) No. 3 (+) — Chassis ground (–):*** ***RHD :*** ***DTC 21*** ***(F49) No. 6 (+) — Chassis ground (–):*** ***DTC 23*** ***(F49) No. 1 (+) — Chassis ground (–):*** ***DTC 25*** ***(F49) No. 19 (+) — Chassis ground (–):*** ***DTC 27*** ***(F49) No. 3 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Go to step **13.**	Repair the harness between ABSCM&H/U and ABS wheel speed sensor.
13	**CHECK BATTERY SHORT OF HARNESS.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***LHD :*** ***DTC 21*** ***(B301) No. 6 (+) — Chassis ground (–):*** ***DTC 23*** ***(B301) No. 1 (+) — Chassis ground (–):*** ***DTC 25*** ***(B301) No. 19 (+) — Chassis ground (–):*** ***DTC 27*** ***(B301) No. 3 (+) — Chassis ground (–):*** ***RHD :*** ***DTC 21*** ***(F49) No. 6 (+) — Chassis ground (–):*** ***DTC 23*** ***(F49) No. 1 (+) — Chassis ground (–):*** ***DTC 25*** ***(F49) No. 19 (+) — Chassis ground (–):*** ***DTC 27*** ***(F49) No. 3 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Go to step **14.**	Repair the harness between ABSCM&H/U and ABS wheel speed sensor.
14	**CHECK INSTALLATION OF ABS WHEEL SPEED SENSOR.**	Are the ABS wheel speed sensor installation bolts tightened 33 N·m (3.3 kgf-m, 24 ft-lb)?	Go to step **15.**	Tighten the ABS wheel speed sensor installation bolts securely.
15	**CHECK ABS WHEEL SPEED SENSOR GAP.** Measure the tone wheel to ABS wheel speed sensor piece gap over entire perimeter of the wheel.	Is the gap as following value? Front wheel: 0.3 — 0.8 mm (0.012 — 0.031 in), Rear wheel: 0.7 — 1.2 mm (0.028 — 0.047 in)	Go to step **16.**	Adjust the gap. NOTE: Adjust the gap using spacers (Part No. 26755AA000). If the spacers cannot correct gap, replace worn sensor or worn tone wheel.

	Step	Check	Yes	No
16	**CHECK TONE WHEEL RUNOUT.** Measure the tone wheel runout.	Is the runout less than 0.05 mm (0.0020 in)?	Go to step **17.**	Replace the tone wheel. Front: <Ref. to ABS-23, Front Tone Wheel.> Rear: <Ref. to ABS-24, Rear Tone Wheel.>
17	**CHECK GROUND SHORT OF ABS WHEEL SPEED SENSOR.** 1) Turn the ignition switch to ON. 2) Measure the resistance between ABS wheel speed sensor and chassis ground. ***Terminals*** ***Front RH No. 1 — Chassis ground:*** ***Front LH No. 1 — Chassis ground:*** ***Rear RH No. 1 — Chassis ground:*** ***Rear LH No. 1 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **18.**	Replace the ABS wheel speed sensor and ABSCM&H/U. Front: <Ref. to ABS-17, Front ABS Wheel Speed Sensor.> Rear: <Ref. to ABS-20, Rear ABS Wheel Speed Sensor.> and<Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>
18	**CHECK GROUND SHORT OF HARNESS.** 1) Turn the ignition switch to OFF. 2) Connect the connector to ABS wheel speed sensor. 3) Measure the resistance between ABSCM&H/U connector terminal and chassis ground. ***Connector & terminal*** ***LHD :*** ***DTC 21*** ***(B301) No. 6 — Chassis ground:*** ***DTC 23*** ***(B301) No. 1 — Chassis ground:*** ***DTC 25*** ***(B301) No. 19 — Chassis ground:*** ***DTC 27*** ***(B301) No. 3 — Chassis ground:*** ***RHD :*** ***DTC 21*** ***(F49) No. 6 — Chassis ground:*** ***DTC 23*** ***(F49) No. 1 — Chassis ground:*** ***DTC 25*** ***(F49) No. 19 — Chassis ground:*** ***DTC 27*** ***(F49) No. 3 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **19.**	Repair the harness between ABSCM&H/U and ABS wheel speed sensor. And replace the ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>
19	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in connectors between ABSCM&H/U and ABS wheel speed sensor?	Repair the connector.	Go to step **20.**
20	**CHECK ABSCM&H/U.** 1) Connect all connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read out the DTC.	Is the same DTC as in current diagnosis still being output?	Replace the ABSCM&H/U.	Go to step **21.**

Step		Check	Yes	No
21	CHECK ANY OTHER DTC APPEARANCE.	Are other DTCs being output?	Proceed with the diagnosis corresponding to DTC.	A temporary poor contact. NOTE: Check the harness and connectors between ABSCM&H/U and ABS wheel speed sensor.

E: DTC 22 FRONT RIGHT ABNORMAL ABS WHEEL SPEED SENSOR SIGNAL

NOTE:
For the diagnostic procedure, refer to DTC 28. <Ref. to ABS(diag)-48, DTC 28 REAR LEFT ABNORMAL ABS WHEEL SPEED SENSOR SIGNAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

F: DTC 24 FRONT LEFT ABNORMAL ABS WHEEL SPEED SENSOR SIGNAL

NOTE:
For the diagnostic procedure, refer to DTC 28. <Ref. to ABS(diag)-48, DTC 28 REAR LEFT ABNORMAL ABS WHEEL SPEED SENSOR SIGNAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

G: DTC 26 REAR RIGHT ABNORMAL ABS WHEEL SPEED SENSOR SIGNAL

NOTE:
For the diagnostic procedure, refer to DTC 28. <Ref. to ABS(diag)-48, DTC 28 REAR LEFT ABNORMAL ABS WHEEL SPEED SENSOR SIGNAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

H: DTC 28 REAR LEFT ABNORMAL ABS WHEEL SPEED SENSOR SIGNAL

DIAGNOSIS:

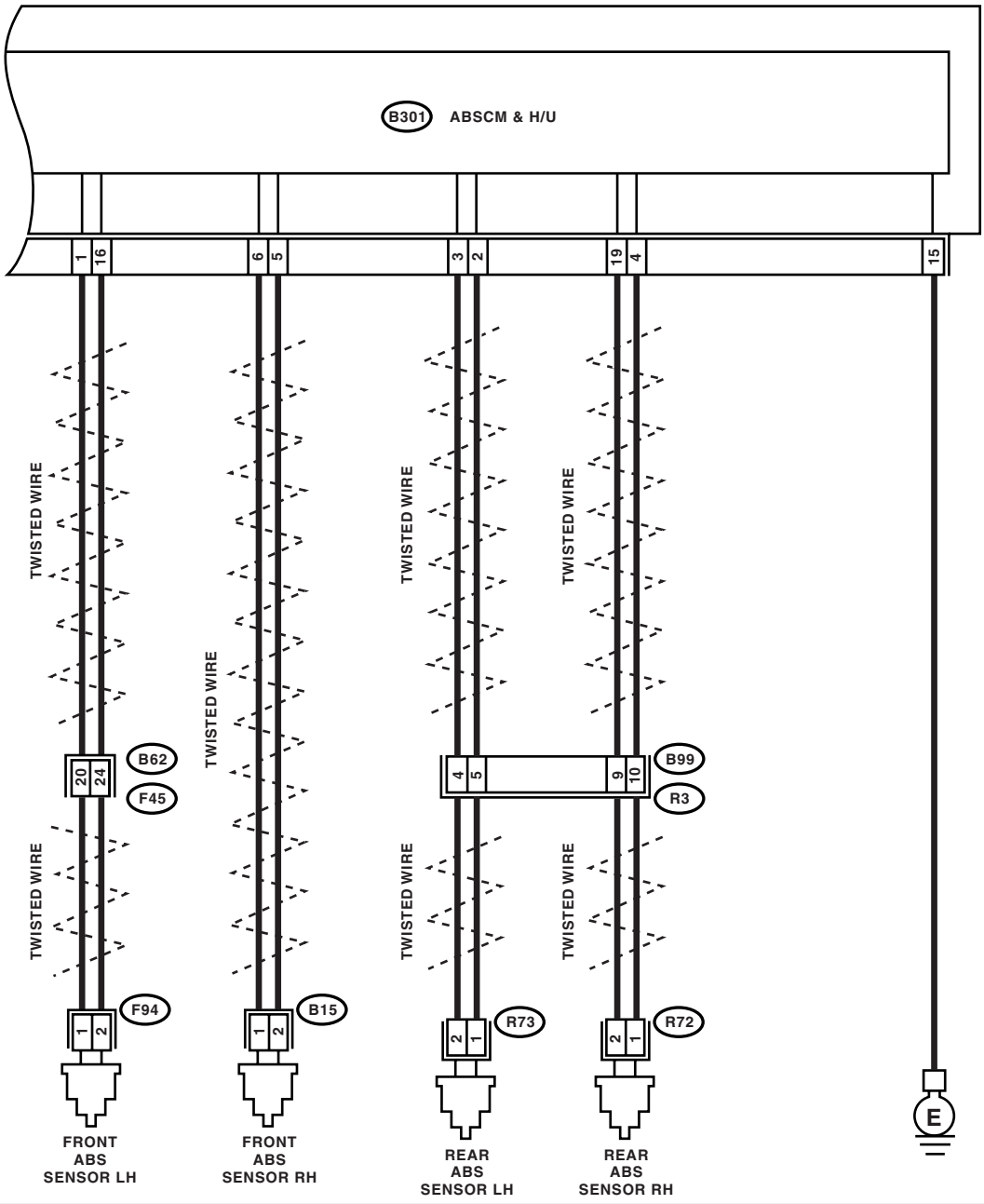
- Faulty ABS wheel speed sensor signal (noise, irregular signal, etc.)
- Faulty harness/connector

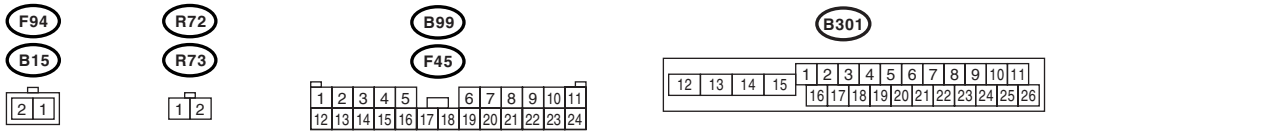
TROUBLE SYMPTOM:

ABS does not operate.

WIRING DIAGRAM:

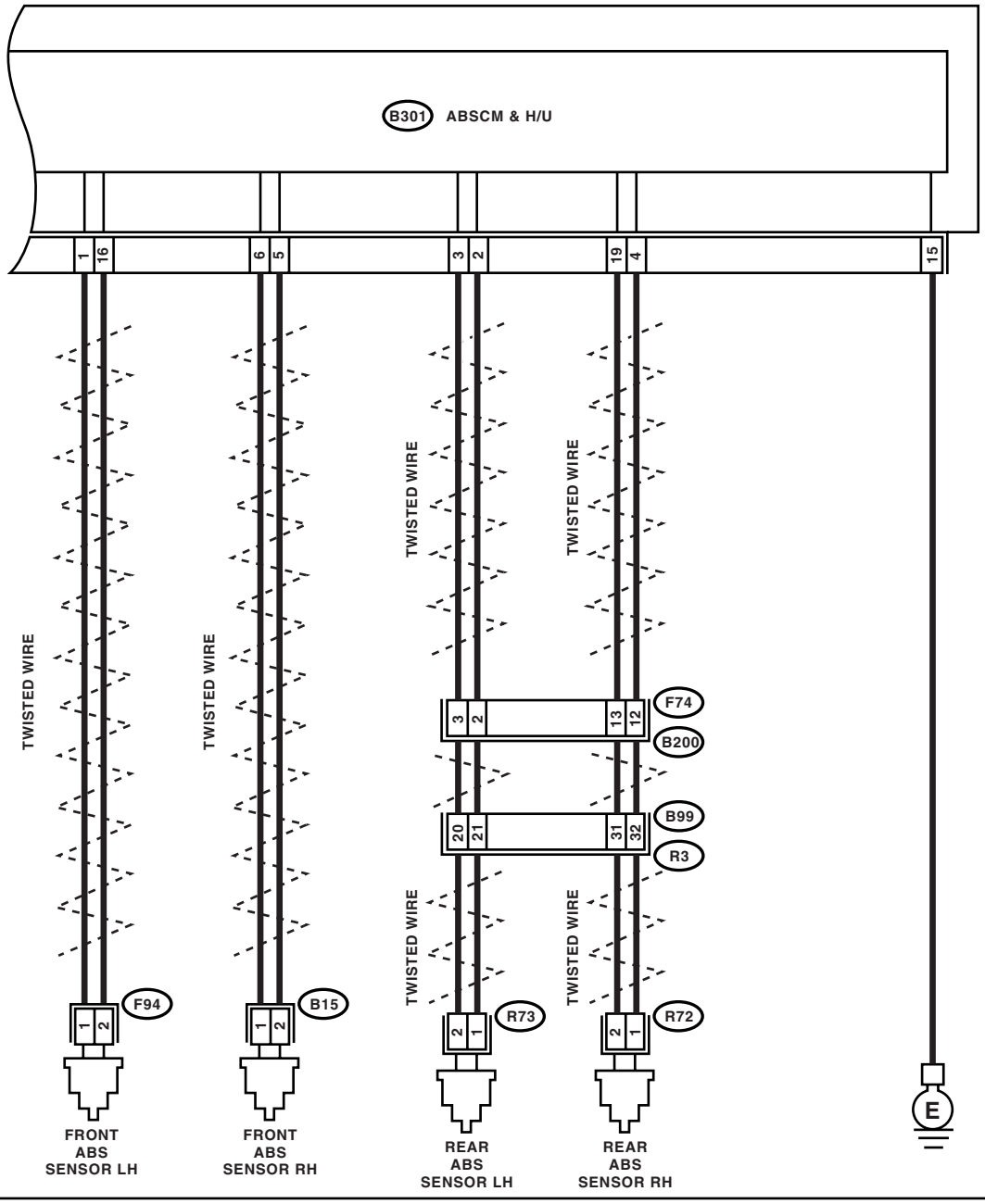
- LHD model

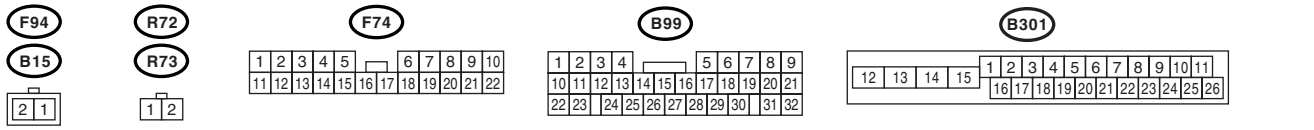




ABS00712

- RHD model





ABS00713

	Step	Check	Yes	No
1	**CHECK OUTPUT OF ABS WHEEL SPEED SENSOR USING SUBARU SELECT MONITOR.** 1) Select “Current data display & Save” on the Subaru Select Monitor. 2) Read the ABS wheel speed sensor output corresponding to faulty system in the Subaru Select Monitor data display mode.	Does the speed indicated on display change in response to speedometer reading during acceleration/deceleration when the steering wheel is in straight-ahead position?	Go to step **2.**	Go to step **7.**
2	**CHECK POOR CONTACT IN CONNECTORS.** Turn the ignition switch to OFF.	Is there poor contact in connectors between ABSCM&H/U and ABS wheel speed sensor?	Repair the connector.	Go to step **3.**
3	**CHECK SOURCES OF SIGNAL NOISE.**	Is the car phone or wireless transmitter properly installed?	Go to step **4.**	Properly install the car phone or wireless transmitter.
4	**CHECK SOURCES OF SIGNAL NOISE.**	Are noise sources (such as an antenna) installed near the sensor harness?	Install the noise sources apart from sensor harness.	Go to step **5.**
5	**CHECK ABSCM&H/U.** 1) Connect all connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read out the DTC.	Is the same DTC as in the current diagnosis still being output?	Replace the ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **6.**
6	**CHECK ANY OTHER DTC APPEARANCE.**	Are other DTCs being output?	Proceed with the diagnosis corresponding to DTC.	A temporary noise interference.
7	**CHECK INSTALLATION OF ABS WHEEL SPEED SENSOR.**	Are the ABS wheel speed sensor installation bolts tightened 33 N·m (3.3 kgf-m, 24 ft-lb)?	Go to step **8.**	Tighten the ABS wheel speed sensor installation bolts securely.
8	**CHECK ABS WHEEL SPEED SENSOR GAP.** Measure the tone wheel to ABS wheel speed sensor piece gap over entire perimeter of wheel.	Is the gap as following value? Front wheel: 0.3 — 0.8 mm (0.012 — 0.031 in), Rear wheel: 0.7 — 1.2 mm (0.028 — 0.047 in)	Go to step **9.**	Adjust the gap. NOTE: Adjust the gap using spacer (Part No. 26755AA000). If the spacers cannot correct gap, replace worn sensor or worn tone wheel.
9	**PREPARE OSCILLOSCOPE.**	Is an oscilloscope available?	Go to step **10.**	Go to step **11.**

	Step	Check	Yes	No
10	**CHECK ABS WHEEL SPEED SENSOR SIGNAL.** 1) Raise all four wheels off ground. 2) Turn the ignition switch to OFF. 3) Connect the oscilloscope to the connector. 4) Turn the ignition switch to ON. 5) Rotate the wheels and measure voltage at specified frequency. <Ref. to ABS(diag)-15, WAVEFORM, Control Module I/O Signal.> NOTE: When this inspection is completed, the ABSCM&H/U sometimes stores DTC 29 or DTC 56. ***Connector & terminal*** ***LHD :*** ***DTC 22*** ***(B15) No. 1 (+) — No. 2 (–):*** ***DTC 24*** ***(B62) No. 20 (+) — No. 24 (–):*** ***DTC 26*** ***(B99) No. 10 (+) — No. 9 (–):*** ***DTC 28*** ***(B99) No. 5 (+) — No. 4 (–):*** ***RHD :*** ***DTC 22*** ***(B15) No. 1 (+) — No. 2 (–):*** ***DTC 24*** ***(F94) No. 1 (+) — No. 2 (–):*** ***DTC 26*** ***(F74) No. 12 (+) — No. 13 (–):*** ***DTC 28*** ***(F74) No. 2 (+) — No. 3 (–):***	Is the waveform pattern on oscilloscope as shown in the figure?	Go to step **14.**	Go to step **11.**
11	**CHECK CONTAMINATION OF ABS WHEEL SPEED SENSOR OR TONE WHEEL.** Remove the disc rotor or drum from hub in accordance with DTC.	Is the ABS wheel speed sensor piece or tone wheel contaminated by dirt or other foreign matter?	Thoroughly remove dirt or other foreign matter.	Go to step **12.**
12	**CHECK DAMAGE OF ABS WHEEL SPEED SENSOR OR TONE WHEEL.**	Are there broken or damaged in the ABS wheel speed sensor piece or tone wheel?	Go to step **13.**	Replace the ABS wheel speed sensor or tone wheel. Front: <Ref. to ABS-17, Front ABS Wheel Speed Sensor.> Rear:<Ref. to ABS-20, Rear ABS Wheel Speed Sensor.> and Front: <Ref. to ABS-23, Front Tone Wheel.> Rear: <Ref. to ABS-24, Rear Tone Wheel.>
13	**CHECK TONE WHEEL RUNOUT.** Measure the tone wheel runout.	Is the runout less than 0.05 mm (0.0020 in)?	Go to step **14.**	Replace the tone wheel. Front:<Ref. to ABS-23, Front Tone Wheel.> Rear: <Ref. to ABS-24, Rear Tone Wheel.>

	Step	Check	Yes	No
14	**CHECK RESISTANCE OF ABS WHEEL SPEED SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ABS wheel speed sensor. 3) Measure the resistance between ABS wheel speed sensor connector terminals while shaking the harness lightly. ***Terminals*** ***Front RH No. 1 — No. 2:*** ***Front LH No. 1 — No. 2:*** ***Rear RH No. 1 — No. 2:*** ***Rear LH No. 1 — No. 2:***	Is the resistance as following value? Front: 1 — 1.5 kΩ, Rear: 1.025 — 1.265 kΩ	Go to step **15.**	Replace the ABS wheel speed sensor. Front: <Ref. to ABS-17, Front ABS Wheel Speed Sensor.> Rear: <Ref. to ABS-20, Rear ABS Wheel Speed Sensor.>
15	**CHECK GROUND SHORT OF ABS WHEEL SPEED SENSOR.** Measure the resistance between ABS wheel speed sensor and chassis ground. ***Terminals*** ***Front RH No. 1 — Chassis ground:*** ***Front LH No. 1 — Chassis ground:*** ***Rear RH No. 1 — Chassis ground:*** ***Rear LH No. 1 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **16.**	Replace the ABS wheel speed sensor. Front: <Ref. to ABS-17, Front ABS Wheel Speed Sensor.> Rear: <Ref. to ABS-20, Rear ABS Wheel Speed Sensor.>
16	**CHECK HARNESS/CONNECTOR BETWEEN ABSCM&H/U AND ABS WHEEL SPEED SENSOR.** 1) Connect the connector to ABS wheel speed sensor. 2) Disconnect the connector from ABSCM&H/U. 3) Measure the resistance at ABSCM&H/U connector terminals. ***Connector & terminal*** ***LHD :*** ***DTC 22*** ***(B301) No. 6 — No. 5:*** ***DTC 24*** ***(B301) No. 1 — No. 16:*** ***DTC 26*** ***(B301) No. 19 — No. 4:*** ***DTC 28*** ***(B301) No. 3 — No. 2:*** ***RHD :*** ***DTC 22*** ***(F49) No. 6 — No. 5:*** ***DTC 24*** ***(F49) No. 1 — No. 16:*** ***DTC 26*** ***(F49) No. 19 — No. 4:*** ***DTC 28*** ***(F49) No. 3 — No. 2:***	Is the resistance as following value? Front: 1 — 1.5 kΩ, Rear: 1.025 — 1.265 kΩ	Go to step **17.**	Repair the harness/connector between ABSCM&H/U and ABS wheel speed sensor.

	Step	Check	Yes	No
17	**CHECK GROUND SHORT OF HARNESS.** Measure the resistance between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***LHD :*** ***DTC 22*** ***(B301) No. 6 — Chassis ground:*** ***DTC 24*** ***(B301) No. 1 — Chassis ground:*** ***DTC 26*** ***(B301) No. 19 — Chassis ground:*** ***DTC 28*** ***(B301) No. 3 — Chassis ground:*** ***RHD :*** ***DTC 22*** ***(F49) No. 6 — Chassis ground:*** ***DTC 24*** ***(F49) No. 1 — Chassis ground:*** ***DTC 26*** ***(F49) No. 19 — Chassis ground:*** ***DTC 28*** ***(F49) No. 3 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **18.**	Repair the harness/connector between ABSCM&H/U and ABS wheel speed sensor.
18	**CHECK GROUND CIRCUIT OF ABSCM&H/U.** Measure the resistance between ABSCM&H/U and chassis ground. ***Connector & terminal*** ***(B301) No. 15 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **19.**	Repair the ABSCM&H/U ground harness.
19	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in connectors between ABSCM&H/U and ABS wheel speed sensor?	Repair the connector.	Go to step **20.**
20	**CHECK SOURCES OF SIGNAL NOISE.**	Is the car phone or the wireless transmitter properly installed?	Go to step **21.**	Properly install the car phone or wireless transmitter.
21	**CHECK SOURCES OF SIGNAL NOISE.**	Are noise sources (such as an antenna) installed near the sensor harness?	Install the noise sources apart from sensor harness.	Go to step **22.**
22	**CHECK ABSCM&H/U.** 1) Connect all connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read out the DTC.	Is the same DTC as in the current diagnosis still being output?	Replace the ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **23.**

Step		Check	Yes	No
23	CHECK ANY OTHER DTC APPEARANCE.	Are other DTCs being output?	Proceed with the diagnosis corresponding to DTC.	A temporary noise interference. NOTE: Although the ABS warning light remains illuminating at this point, this is a normal condition. Vehicle must be driven at approx. 12 km/h (7.46 MPH) or faster to turn off ABS warning light. Make sure that the ABS warning light goes off after driving vehicle.

I: DTC 29 ABNORMAL ABS WHEEL SPEED SENSOR SIGNAL ON ANY ONE OF FOUR SENSOR

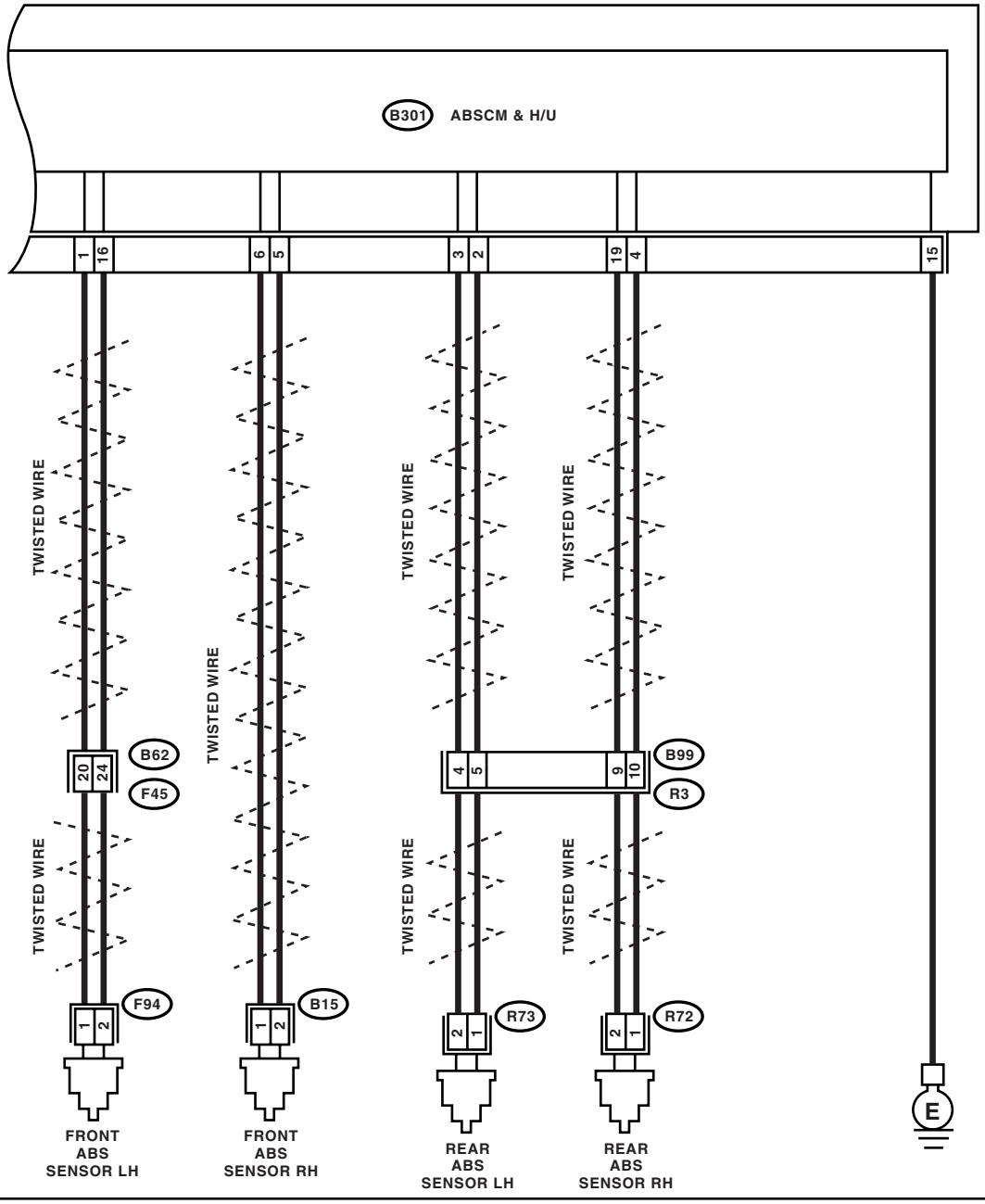
DIAGNOSIS:
- Faulty ABS wheel speed sensor signal (noise, irregular signal, etc.)
- Faulty tone wheel
- Wheels turning freely for a long time

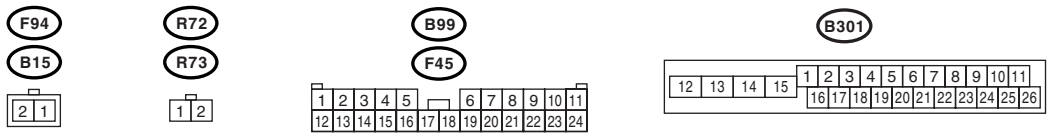
TROUBLE SYMPTOM:
- ABS does not operate.
- EBD does not operate.

NOTE:
In addition to the ABS warning light, brake warning light illuminates.

WIRING DIAGRAM:

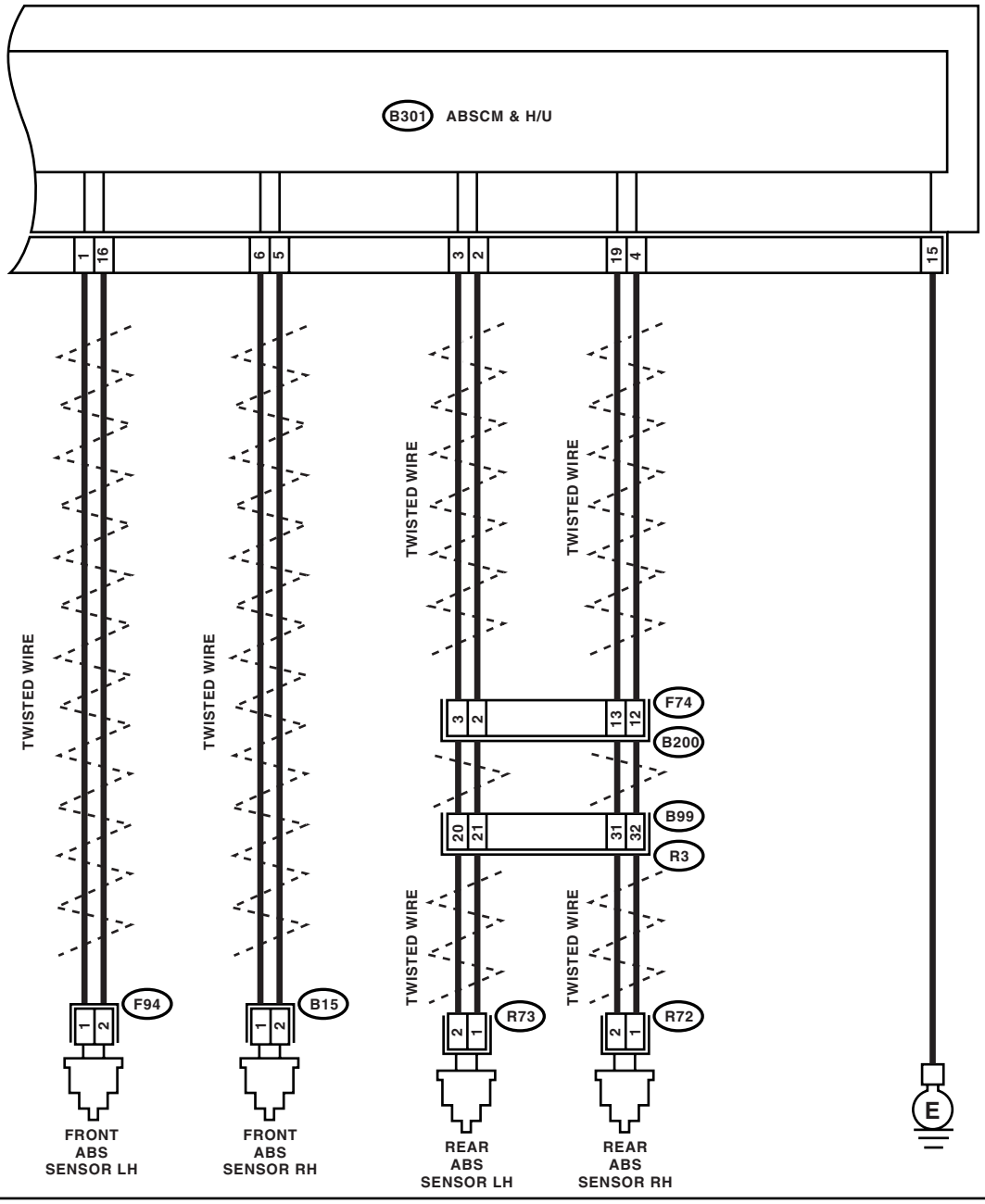
- LHD model

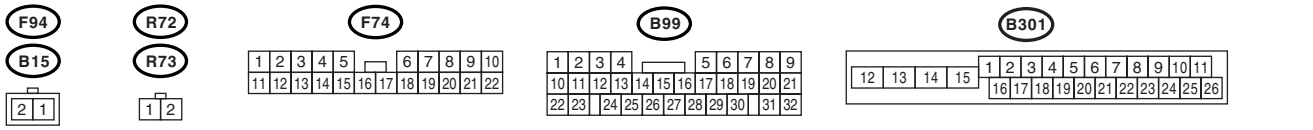




ABS00712

- RHD model





ABS00713

	Step	Check	Yes	No
1	**CHECK IF THE WHEELS HAVE TURNED FREELY FOR A LONG TIME.**	Is the wheels have been turned freely for more than one minute, such as when vehicle is jacked-up, under full-lock cornering or the tires not in contact with road surface?	The ABS is normal. Erase the DTC. NOTE: When the wheels turn freely for a long time, such as when vehicle is towed or jacked-up, or when steering wheel is continuously turned all way, this DTC may sometimes occur.	Go to step **2.**
2	**CHECK TIRE SPECIFICATIONS.** Turn the ignition switch to OFF.	Are the tire specifications correct?	Go to step **3.**	Replace the tire.
3	**CHECK WEAR OF TIRE.**	Is the tire worn excessively?	Replace the tire.	Go to step **4.**
4	**CHECK TIRE PRESSURE.**	Is the tire pressure correct?	Go to step **5.**	Adjust the tire pressure.
5	**CHECK INSTALLATION OF ABS WHEEL SPEED SENSOR.**	Are the ABS wheel speed sensor installation bolts tightened 33 N·m (3.3 kgf-m, 24 ft-lb)?	Go to step **6.**	Tighten the ABS wheel speed sensor installation bolts securely.
6	**CHECK ABS WHEEL SPEED SENSOR GAP.** Measure the tone wheel to ABS wheel speed sensor piece gap over entire perimeter of the wheel.	Is the gap as following value? Front wheel: 0.3 — 0.8 mm (0.012 — 0.031 in), Rear wheel: 0.7 — 1.2 mm (0.028 — 0.047 in)	Go to step **7.**	Adjust the gap. NOTE: Adjust the gap using spacer (Part No. 26755AA000). If the spacers cannot correct gap, replace worn sensor or worn tone wheel.
7	**PREPARE OSCILLOSCOPE.**	Is an oscilloscope available?	Go to step **8.**	Go to step **9.**

	Step	Check	Yes	No
8	**CHECK ABS WHEEL SPEED SENSOR SIGNAL.** 1) Raise all four wheels off ground. 2) Turn the ignition switch to OFF. 3) Connect the oscilloscope to the connector. 4) Turn the ignition switch to ON. 5) Rotate the wheels and measure voltage at specified frequency. <Ref. to ABS(diag)-15, WAVEFORM, Control Module I/O Signal.> NOTE: When this inspection is completed, ABSCM& H/U sometimes stores the DTC 29. ***Connector & terminal*** ***LHD :*** ***Front RH*** ***(B15) No. 1 (+) — No. 2 (–):*** ***Front LH*** ***(B62) No. 20 (+) — No. 24 (–):*** ***Rear RH*** ***(B99) No. 10 (+) — No. 9 (–):*** ***Rear LH*** ***(B99) No. 5 (+) — No. 4 (–):*** ***RHD :*** ***Front RH*** ***(B15) No. 1 (+) — No. 2 (–):*** ***Front LH*** ***(F94) No. 1 (+) — No. 2 (–):*** ***Rear RH*** ***(F74) No. 12 (+) — No. 13 (–):*** ***Rear LH*** ***(F74) No. 2 (+) — No. 3 (–):***	Is the waveform pattern on oscilloscope as shown in the figure?	Go to step **12.**	Go to step **9.**
9	**CHECK CONTAMINATION OF ABS WHEEL SPEED SENSOR OR TONE WHEEL.** Remove the disc rotor or drum from hub.	Is the ABS wheel speed sensor piece or tone wheel contaminated by dirt or other foreign matter?	Thoroughly remove dirt or other foreign matter.	Go to step **10.**
10	**CHECK DAMAGE OF ABS WHEEL SPEED SENSOR OR TONE WHEEL.**	Are there broken or damaged teeth in the ABS wheel speed sensor piece or tone wheel?	Replace the ABS wheel speed sensor or tone wheel. Front: <Ref. to ABS-17, Front ABS Wheel Speed Sensor.> Rear: <Ref. to ABS-20, Rear ABS Wheel Speed Sensor.> and Front: <Ref. to ABS-23, Front Tone Wheel.> Rear: <Ref. to ABS-24, Rear Tone Wheel.>	Go to step **11.**
11	**CHECK TONE WHEEL RUNOUT.** Measure the tone wheel runout.	Is the runout less than 0.05 mm (0.0020 in)?	Go to step **12.**	Replace the tone wheel. Front: <Ref. to ABS-23, Front Tone Wheel.> Rear: <Ref. to ABS-24, Rear Tone Wheel.>

	Step	Check	Yes	No
12	**CHECK ABSCM&H/U.** 1) Turn the ignition switch to OFF. 2) Connect all connectors. 3) Erase the memory. 4) Perform the inspection mode. 5) Read out the DTC.	Is the same DTC as in the current diagnosis still being output?	Replace the ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **13.**
13	**CHECK ANY OTHER DTC APPEARANCE.**	Are other DTCs being output?	Proceed with the diagnosis corresponding to DTC.	A temporary poor contact.

J: DTC 31 FRONT RIGHT INLET VALVE MALFUNCTION

NOTE:
For the diagnostic procedure, refer to DTC 37. <Ref. to ABS(diag)-59, DTC 37 REAR LEFT INLET VALVE MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

K: DTC 33 FRONT LEFT INLET VALVE MALFUNCTION

NOTE:
For the diagnostic procedure, refer to DTC 37. <Ref. to ABS(diag)-59, DTC 37 REAR LEFT INLET VALVE MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

L: DTC 35 REAR RIGHT INLET VALVE MALFUNCTION

NOTE:
For the diagnostic procedure, refer to DTC 37. <Ref. to ABS(diag)-59, DTC 37 REAR LEFT INLET VALVE MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

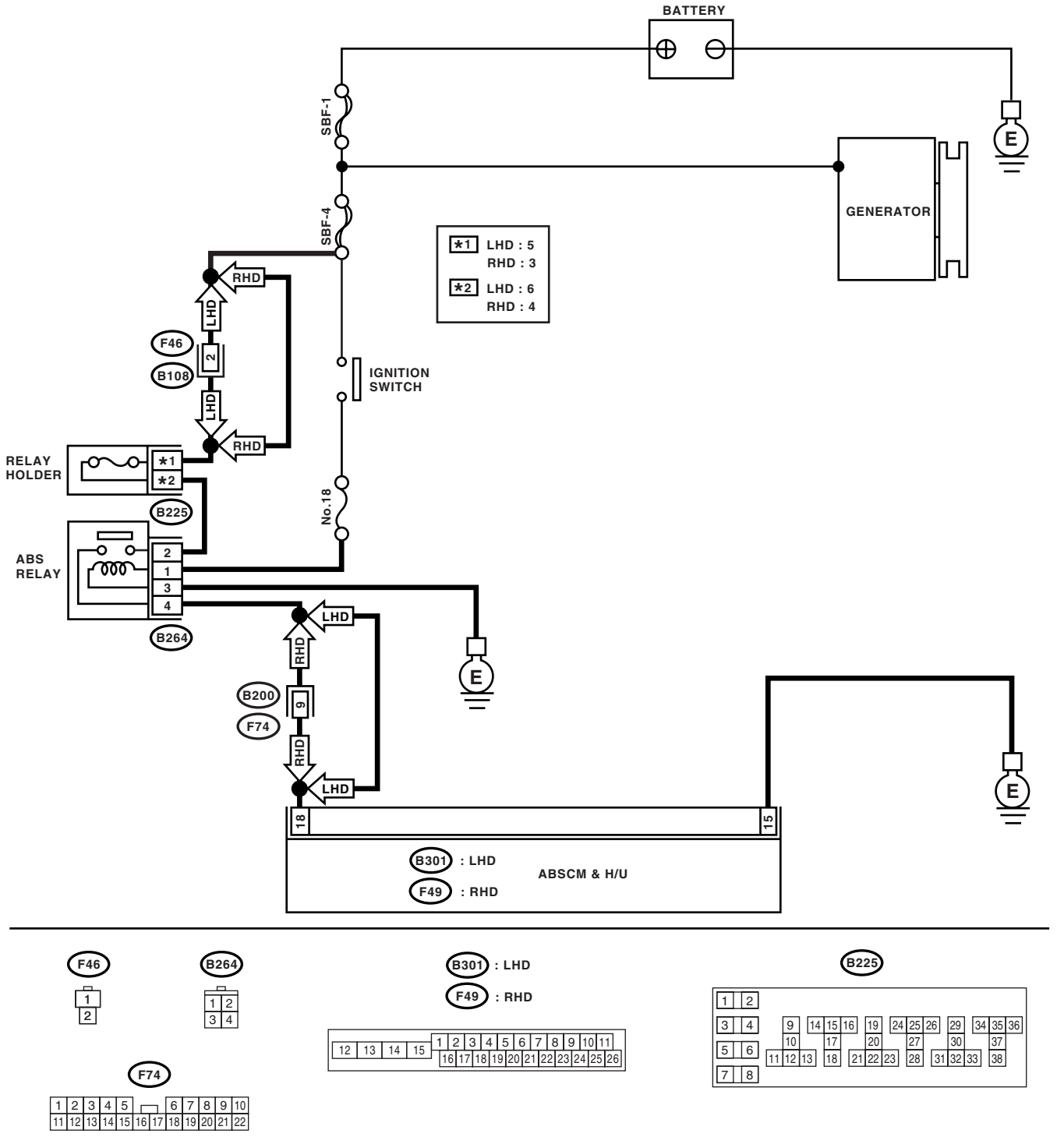
M: DTC 37 REAR LEFT INLET VALVE MALFUNCTION

DIAGNOSIS:
- Faulty harness/connector
- Faulty inlet solenoid valve

TROUBLE SYMPTOM:
- ABS does not operate.
- EBD does not operate.

NOTE:
In addition to the ABS warning light, brake warning light illuminates.

WIRING DIAGRAM:



ABS00714

	Step	Check	Yes	No
1	**CHECK INPUT VOLTAGE OF ABSCM&H/U.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ABSCM&H/U. 3) Run the engine at idle. 4) Measure the voltage between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***LHD :*** ***(B301) No. 18 (+) — Chassis ground (−):*** ***RHD :*** ***(F49) No. 18 (+) — Chassis ground (−):***	Is the voltage 10 — 15 V?	Go to step **2.**	Repair the harness connector between battery, ignition switch and ABSCM&H/U.
2	**CHECK GROUND CIRCUIT OF ABSCM&H/U.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***LHD :*** ***(B301) No. 15 — Chassis ground:*** ***RHD :*** ***(F49) No. 15 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **3.**	Repair the ABSCM&H/U ground harness.
3	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in connectors between generator, battery and ABSCM&H/U?	Repair the connector.	Go to step **4.**
4	**CHECK ABSCM&H/U.** 1) Connect all connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read out the DTC.	Is the same DTC as in the current diagnosis still being output?	Replace the ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **5.**
5	**CHECK ANY OTHER DTC APPEARANCE.**	Are other DTCs being output?	Proceed with the diagnosis corresponding to DTC.	A temporary poor contact.

N: DTC 32 FRONT RIGHT OUTLET VALVE MALFUNCTION

NOTE:
For the diagnostic procedure, refer to DTC 38. <Ref. to ABS(diag)-62, DTC 38 REAR LEFT OUTLET VALVE MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

O: DTC 34 FRONT LEFT OUTLET VALVE MALFUNCTION

NOTE:
For the diagnostic procedure, refer to DTC 38. <Ref. to ABS(diag)-62, DTC 38 REAR LEFT OUTLET VALVE MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

P: DTC 36 REAR RIGHT OUTLET VALVE MALFUNCTION

NOTE:
For the diagnostic procedure, refer to DTC 38. <Ref. to ABS(diag)-62, DTC 38 REAR LEFT OUTLET VALVE MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

Q: DTC 38 REAR LEFT OUTLET VALVE MALFUNCTION

DIAGNOSIS:

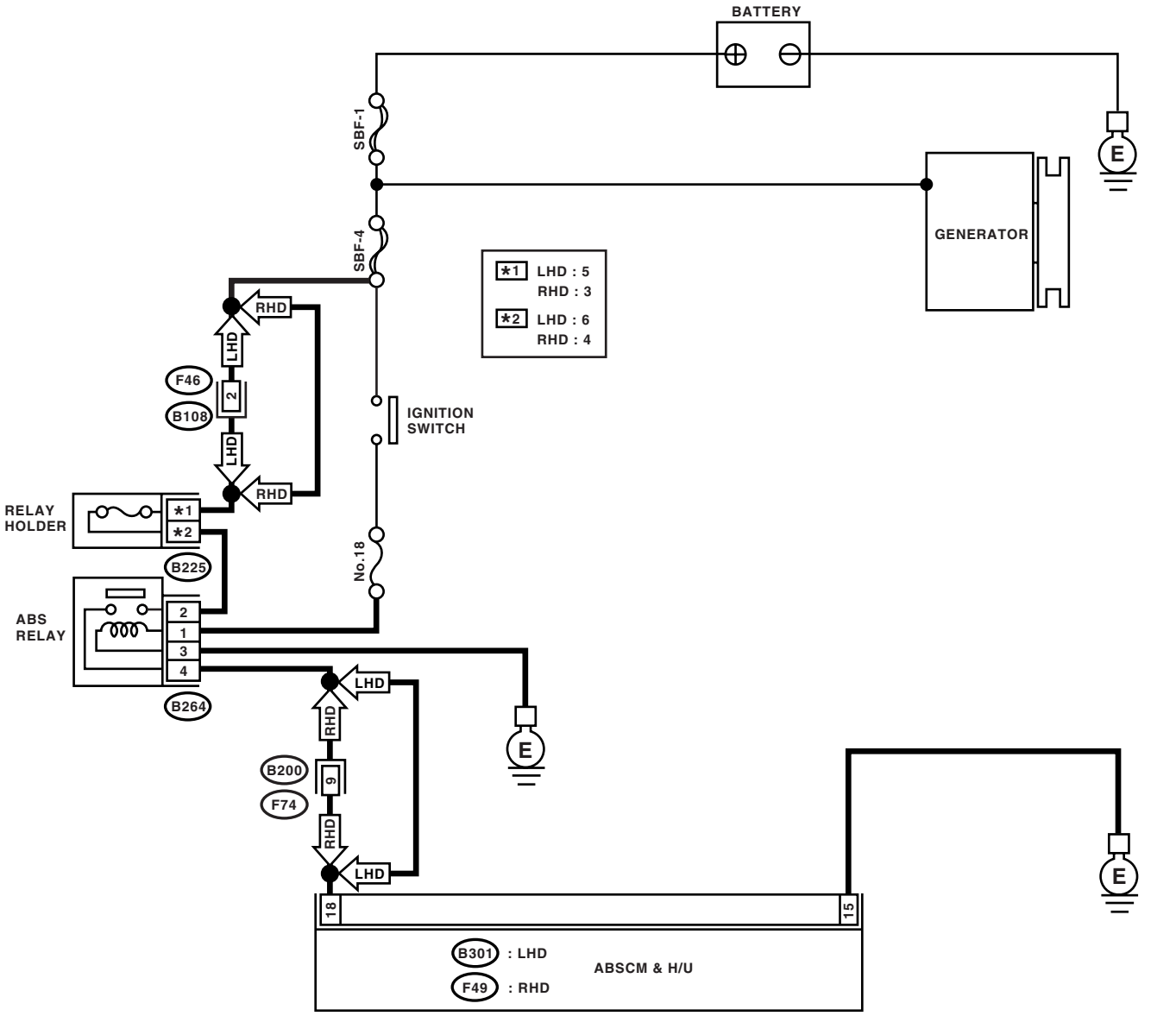
- Faulty harness/connector
- Faulty outlet solenoid valve

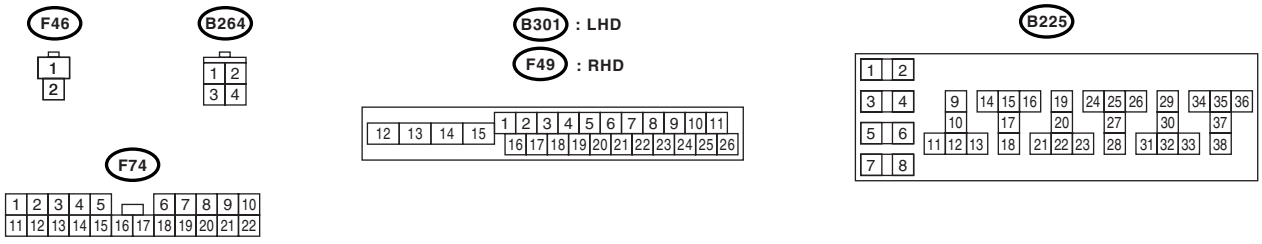
TROUBLE SYMPTOM:

- ABS does not operate.
- EBD does not operate.

NOTE:
In addition to the ABS warning light, brake warning light illuminates.

WIRING DIAGRAM:





ABS00714

	Step	Check	Yes	No
1	**CHECK INPUT VOLTAGE OF ABSCM&H/U.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ABSCM&H/U. 3) Run the engine at idle. 4) Measure the voltage between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***LHD :*** ***(B301) No. 18 (+) — Chassis ground (−):*** ***RHD :*** ***(F49) No. 18 (+) — Chassis ground (−):***	Is the voltage 10 — 15 V?	Go to step **2.**	Repair the harness connector between battery, ignition switch and ABSCM&H/U.
2	**CHECK GROUND CIRCUIT OF ABSCM&H/U.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***LHD :*** ***(B301) No. 15 — Chassis ground:*** ***RHD :*** ***(F49) No. 15 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **3.**	Repair the ABSCM&H/U ground harness.
3	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in connectors between generator, battery and ABSCM&H/U?	Repair the connector.	Go to step **4.**
4	**CHECK ABSCM&H/U.** 1) Connect all connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read out the DTC.	Is the same DTC as in the current diagnosis still being output?	Replace the ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **5.**
5	**CHECK ANY OTHER DTC APPEARANCE.**	Are other DTCs being output?	Proceed with the diagnosis corresponding to DTC.	A temporary poor contact.

R: DTC 41 ABS CONTROL MODULE MALFUNCTION

DIAGNOSIS:

Faulty ABSCM&H/U

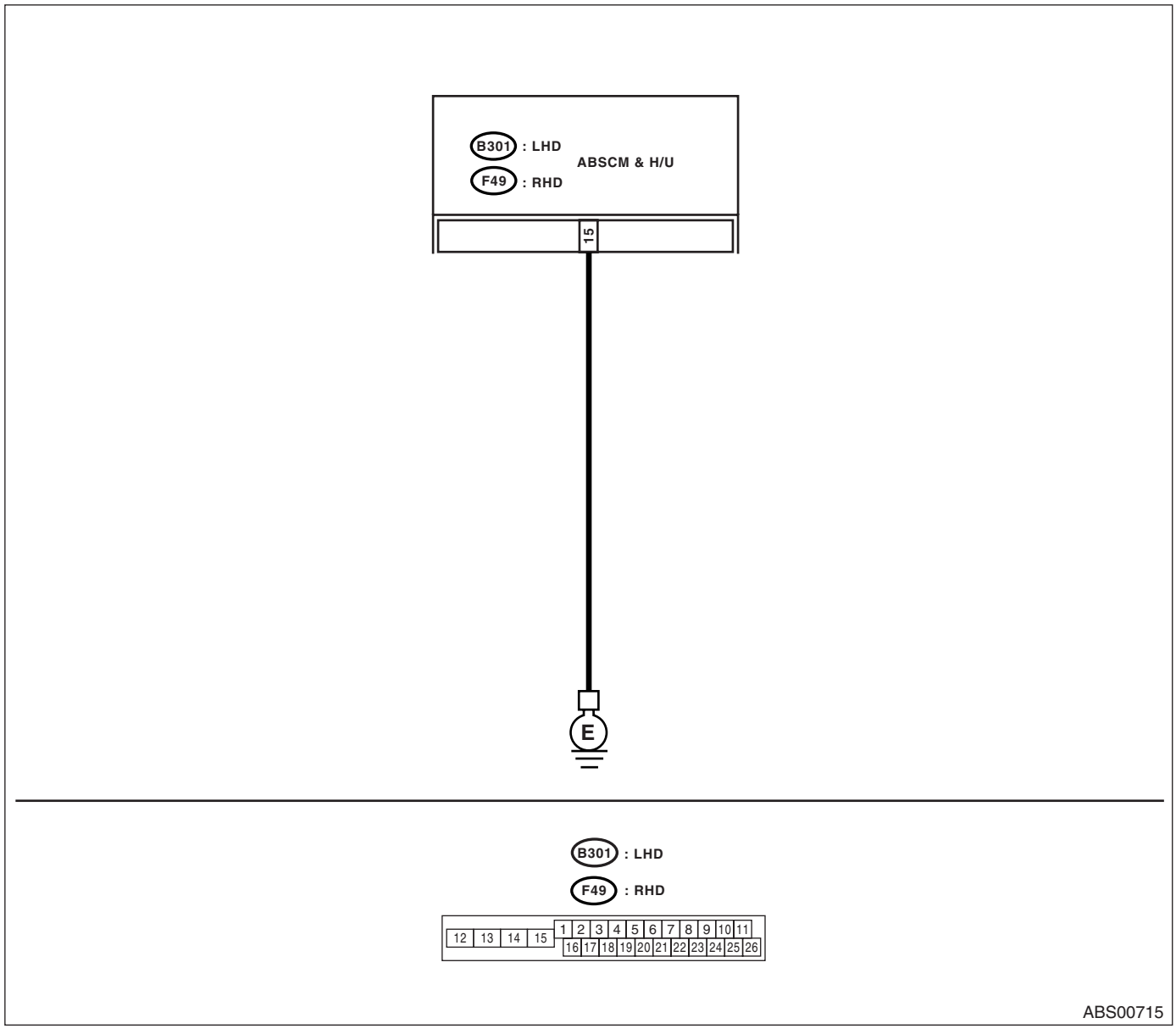
TROUBLE SYMPTOM:

- ABS does not operate.
- EBD does not operate.

NOTE:

In addition to the ABS warning light, brake warning light illuminates.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK GROUND CIRCUIT OF ABSCM&H/U.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ABSCM&H/U. 3) Measure the resistance between ABSCM&H/U and chassis ground. ***Connector & terminal*** ***LHD :*** ***(B301) No. 15 — Chassis ground:*** ***RHD :*** ***(F49) No. 15 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **2.**	Repair the ABSCM&H/U ground harness.
2	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in connectors between battery, ignition switch and ABSCM&H/U?	Repair the connector.	Go to step **3.**
3	**CHECK SOURCES OF SIGNAL NOISE.**	Is the car phone or wireless transmitter properly installed?	Go to step **4.**	Properly install the car phone or wireless transmitter.
4	**CHECK SOURCES OF SIGNAL NOISE.**	Are noise sources (such as an antenna) installed near the sensor harness?	Install the noise sources apart from sensor harness.	Go to step **5.**
5	**CHECK ABSCM&H/U.** 1) Turn the ignition switch to OFF. 2) Connect all connectors. 3) Erase the memory. 4) Perform the inspection mode. 5) Read out the DTC.	Is the same DTC as in current diagnosis still being output?	Replace the ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **6.**
6	**CHECK ANY OTHER DTC APPEARANCE.**	Are other DTCs being output?	Proceed with the diagnosis corresponding to DTC.	A temporary poor contact.

S: DTC 42 POWER VOLTAGE MALFUNCTION

DIAGNOSIS:

Power voltage of the ABSCM&H/U is too low or too high.

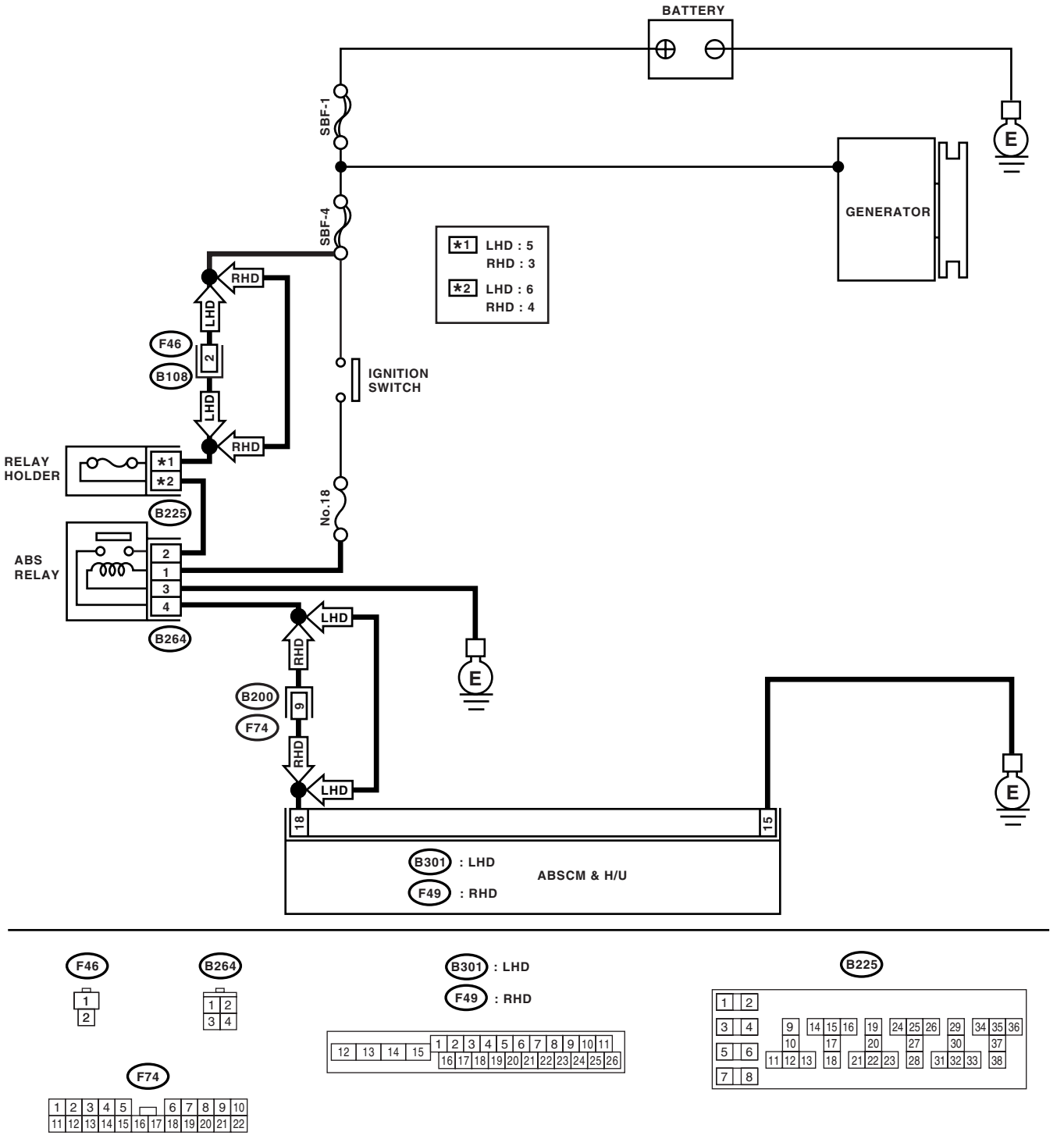
TROUBLE SYMPTOM:

- ABS does not operate.
- EBD may not operate.

NOTE:

If EBD does not operate, brake warning light comes on as well as ABS warning light. Both warning lights go off on the recovery of voltage.

WIRING DIAGRAM:



ABS00714

	Step	Check	Yes	No
1	**CHECK GENERATOR.** 1) Start the engine. 2) Idle after warm-up. 3) Measure the voltage between generator B terminal and chassis ground. ***Terminals*** ***Generator B terminal (+) — Chassis ground (−):***	Is the voltage 10 — 17 V?	Go to step **2.**	Repair the generator. <Ref. to SC(H4SO)-14, Generator.>
2	**CHECK BATTERY TERMINAL.** Turn the ignition switch to OFF.	Are the positive and negative battery terminals tightly clamped?	Go to step **3.**	Tighten the clamp of terminal.
3	**CHECK INPUT VOLTAGE OF ABSCM&H/U.** 1) Disconnect the connector from ABSCM&H/U. 2) Run the engine at idle. 3) Operate the electric load applying devices, such as the headlight, A/C, and defogger. 4) Measure the voltage between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***LHD :*** ***(B301) No. 18 (+) — Chassis ground (−):*** ***RHD :*** ***(F49) No. 18 (+) — Chassis ground (−):***	Is the voltage 10 — 17 V?	Go to step **4.**	Repair the harness connector between battery, ignition switch and ABSCM&H/U.
4	**CHECK GROUND CIRCUIT OF ABSCM&H/U.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***LHD :*** ***(B301) No. 15 — Chassis ground:*** ***RHD :*** ***(F49) No. 15 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **5.**	Repair the ABSCM&H/U ground harness.
5	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in connectors between generator, battery and ABSCM&H/U?	Repair the connector.	Go to step **6.**
6	**CHECK ABSCM&H/U.** 1) Connect all connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read out the DTC.	Is the same DTC as in the current diagnosis still being output?	Replace the ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **7.**
7	**CHECK ANY OTHER DTC APPEARANCE.**	Are other DTCs being output?	Proceed with the diagnosis corresponding to DTC.	A temporary poor contact.

T: DTC 51 VALVE RELAY MALFUNCTION

DIAGNOSIS:

Faulty valve relay

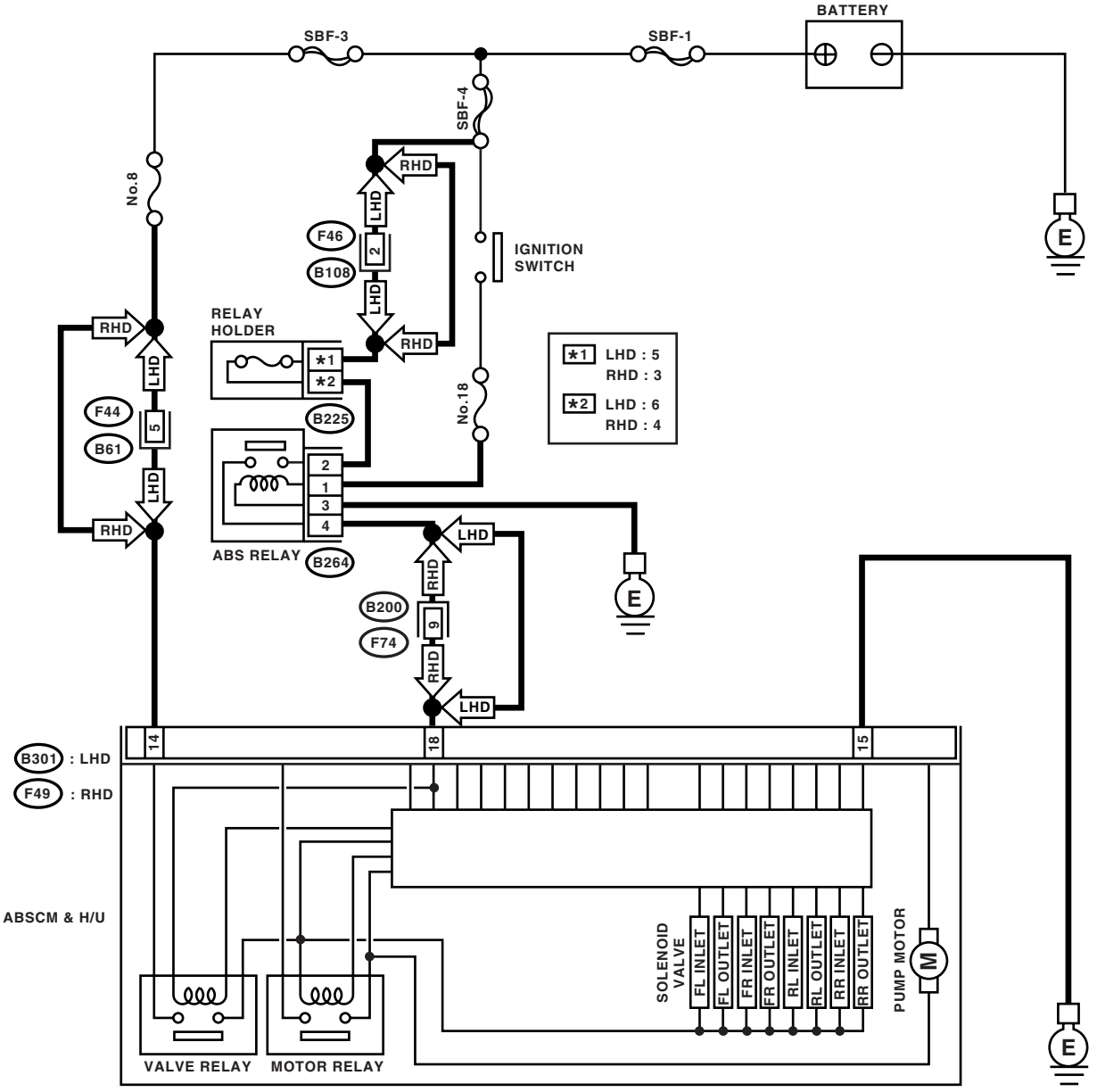
TROUBLE SYMPTOM:

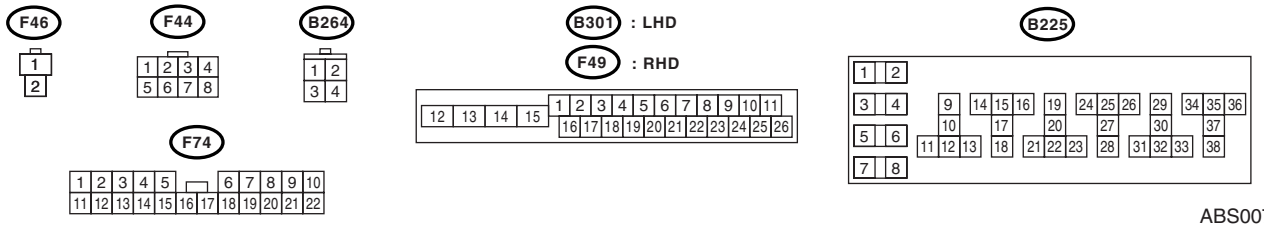
- ABS does not operate.
- EBD does not operate depending on the trouble contents.

NOTE:

In addition to the ABS warning light, brake warning light illuminates.

WIRING DIAGRAM:





ABS00716

	Step	Check	Yes	No
1	**CHECK INPUT VOLTAGE OF ABSCM&H/U.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ABSCM&H/U. 3) Run the engine at idle. 4) Measure the voltage between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***LHD :*** ***(B301) No. 18 (+) — Chassis ground (−):*** ***(B301) No. 14 (+) — Chassis ground (−):*** ***RHD :*** ***(F49) No. 18 (+) — Chassis ground (−):*** ***(F49) No. 14 (+) — Chassis ground (−):***	Is the voltage 10 — 15 V?	Go to step **2.**	Repair the harness connector between battery and ABSCM&H/U.
2	**CHECK GROUND CIRCUIT OF ABSCM&H/U.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***LHD :*** ***(B301) No. 15 — Chassis ground:*** ***RHD :*** ***(F49) No. 15 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **3.**	Repair the ABSCM&H/U ground harness.
3	**CHECK VALVE RELAY IN ABSCM&H/U.** Measure the resistance between ABSCM&H/U terminals. ***Terminals*** ***No. 14 — No. 15:***	Is the resistance more than 1 MΩ?	Go to step **4.**	Replace the ABSCM only. <Ref. to ABS-11, REPLACEMENT, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>
4	**CHECK POOR CONTACT IN CONNECTOR.**	Is there poor contact in connector between generator, battery and ABSCM&H/U?	Repair the connector.	Go to step **5.**
5	**CHECK ABSCM&H/U.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the ABSCM only. <Ref. to ABS-11, REPLACEMENT, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **6.**
6	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the DTC using “List of Diagnostic Trouble Code (DTC)”. <Ref. to ABS(diag)-38, List of Diagnostic Trouble Code (DTC).>	Temporary poor contact occurs.

U: DTC 52 MOTER/MOTER RELAY MALFUNCTION

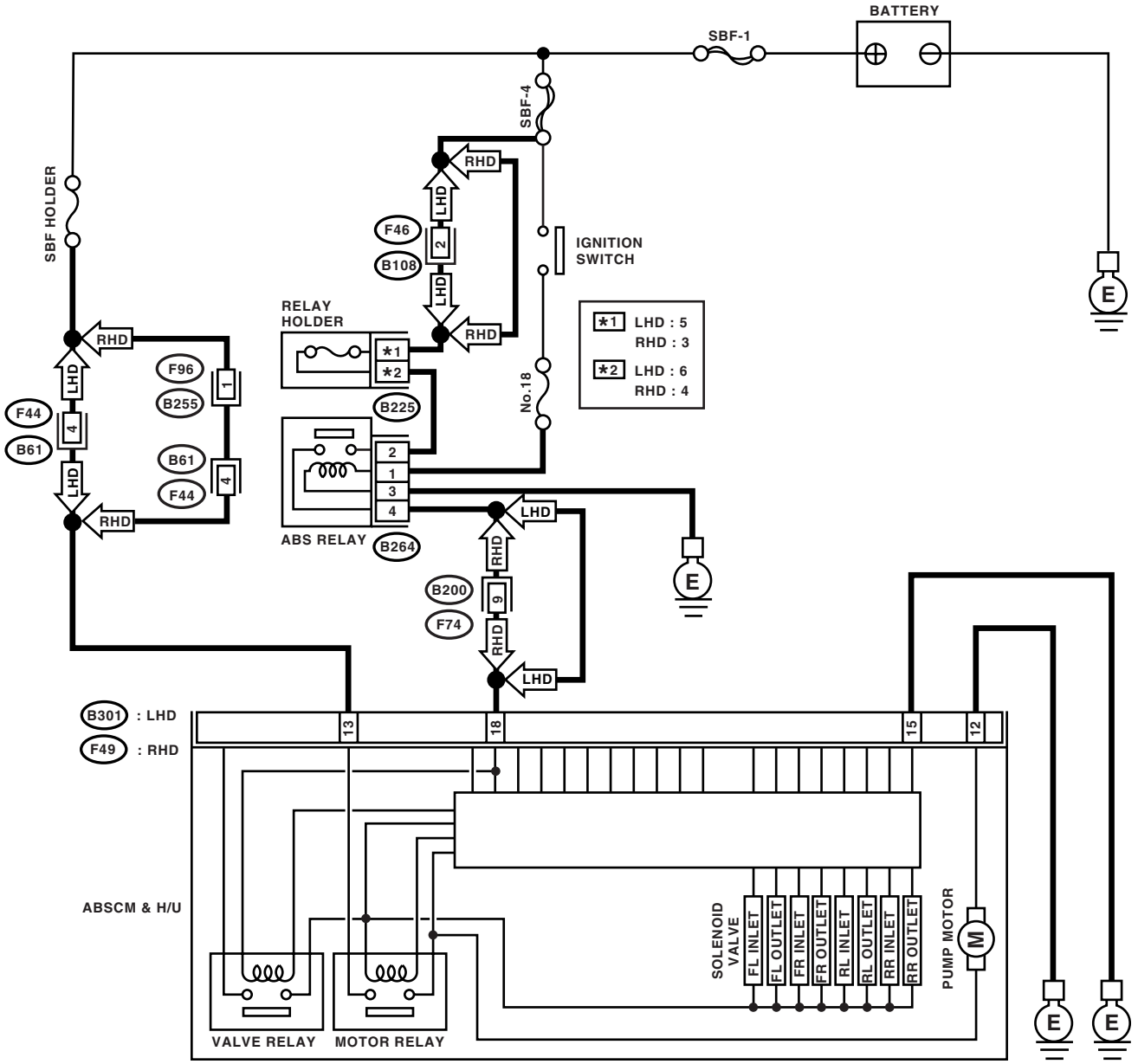
DIAGNOSIS:

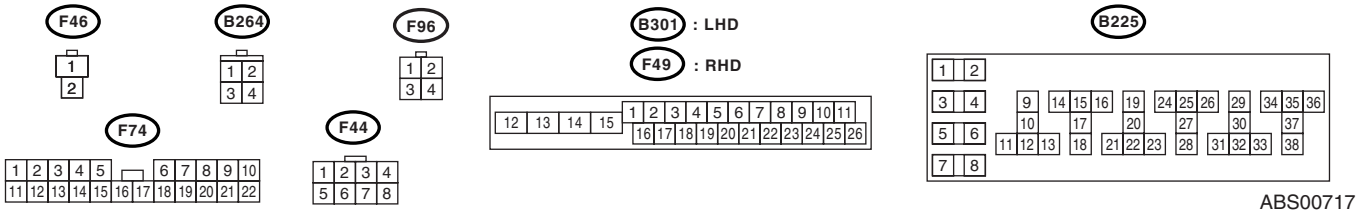
- Faulty motor
- Faulty motor relay
- Faulty harness connector
- Loose motor ground bolt

TROUBLE SYMPTOM:

- ABS does not operate.
- EBD does not operate.

WIRING DIAGRAM:





ABS00717

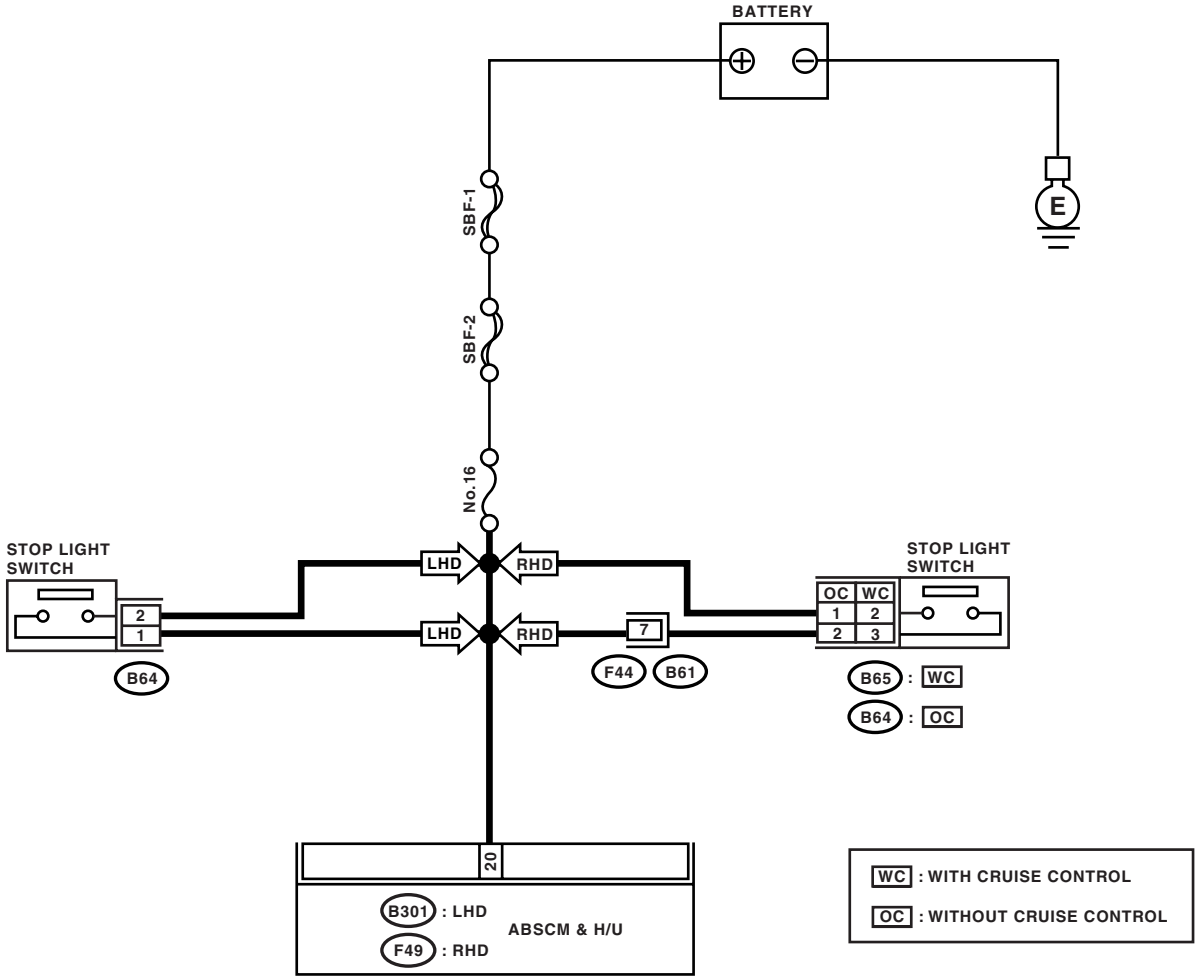
	Step	Check	Yes	No
1	**CHECK INPUT VOLTAGE OF ABSCM&H/U.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ABSCM&H/U. 3) Turn the ignition switch to ON. 4) Measure the voltage between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***LHD :*** ***(B301) No. 13 (+) — Chassis ground (–):*** ***RHD :*** ***(F49) No. 13 (+) — Chassis ground (–):***	Is the voltage 10 — 15 V?	Go to step **2.**	Repair the harness/connector between battery and ABSCM&H/U and check fuse SBF8.
2	**CHECK GROUND CIRCUIT OF MOTOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***LHD :*** ***(B301) No. 12 — Chassis ground:*** ***RHD :*** ***(F49) No. 12 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **3.**	Repair the ABSCM&H/U ground harness.
3	**CHECK INPUT VOLTAGE OF ABSCM&H/U.** 1) Run the engine at idle. 2) Measure the voltage between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***LHD :*** ***(B301) No. 18 (+) — Chassis ground (–):*** ***RHD :*** ***(F49) No. 18 (+) — Chassis ground (–):***	Is the voltage 10 — 15 V?	Go to step **4.**	Repair the harness connector between battery, ignition switch and ABSCM&H/U.
4	**CHECK GROUND CIRCUIT OF ABSCM&H/U.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***LHD :*** ***(B301) No. 15 — Chassis ground:*** ***RHD :*** ***(F49) No. 15 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **5.**	Repair the ABSCM&H/U ground harness.
5	**CHECK POOR CONTACT IN CONNECTORS.** Turn the ignition switch to OFF.	Is there poor contact in connector between generator, battery and ABSCM&H/U?	Repair the connector.	Go to step **6.**
6	**CHECK ABSCM&H/U.** 1) Connect all connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read out the DTC.	Is the same DTC as in current diagnosis still being output?	Replace the ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **7.**
7	**CHECK ANY OTHER DTC APPEARANCE.**	Are other DTCs being output?	Proceed with the diagnosis corresponding to DTC.	A temporary poor contact.

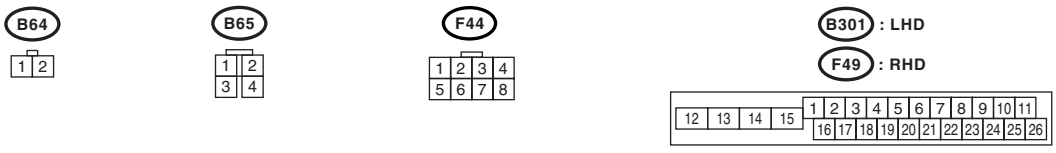
V: DTC 54 STOP LIGHT SWITCH SIGNAL CIRCUIT MALFUNCTION

DIAGNOSIS:

Faulty stop light switch

WIRING DIAGRAM:



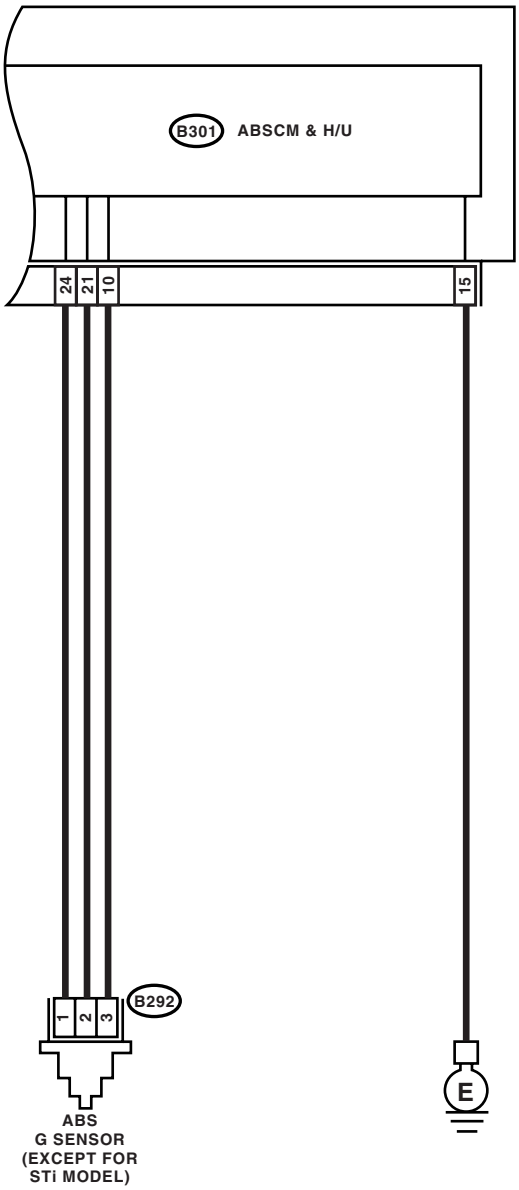


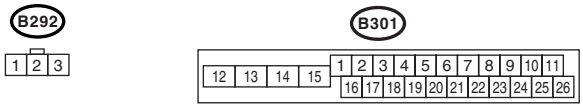
ABS00718

	Step	Check	Yes	No
1	**CHECK OUTPUT OF STOP LIGHT SWITCH USING SUBARU SELECT MONITOR.** 1) Select “Current data display & Save” on the Subaru Select Monitor. 2) Release the brake pedal. 3) Read the stop light switch signal in Subaru Select Monitor data display.	Is “OFF” indicated?	Go to step **2.**	Go to step **3.**
2	**CHECK OUTPUT OF STOP LIGHT SWITCH USING SUBARU SELECT MONITOR.** 1) Depress the brake pedal. 2) Read the stop light switch signal in Subaru Select Monitor data display.	Is “ON” indicated?	Go to step **5.**	Go to step **3.**
3	**CHECK IF STOP LIGHTS COME ON.** Depress the brake pedal.	Do the stop lights turn on?	Go to step **4.**	Repair the stop lights circuit.
4	**CHECK OPEN CIRCUIT IN HARNESS.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ABSCM&H/U. 3) Depress the brake pedal. 4) Measure the voltage between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***LHD :*** ***(B301) No. 20 (+) — Chassis ground (−):*** ***RHD :*** ***(F49) No. 20 (+) — Chassis ground (−):***	Is the voltage 10 — 15 V?	Go to step **5.**	Repair the harness between stop light switch and ABSCM&H/U connector.
5	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in connector between stop light switch and ABSCM&H/U?	Repair the connector.	Go to step **6.**
6	**CHECK ABSCM&H/U.** 1) Connect all connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read out the DTC.	Is the same DTC as in current diagnosis still being output?	Replace the ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **7.**
7	**CHECK ANY OTHER DTC APPEARANCE.**	Are other DTCs being output?	Proceed with the diagnosis corresponding to DTC.	A temporary poor contact.

W: DTC 56 G SENSOR OUTPUT VOLTAGE OR OUTPUT SIGNAL MALFUNCTION

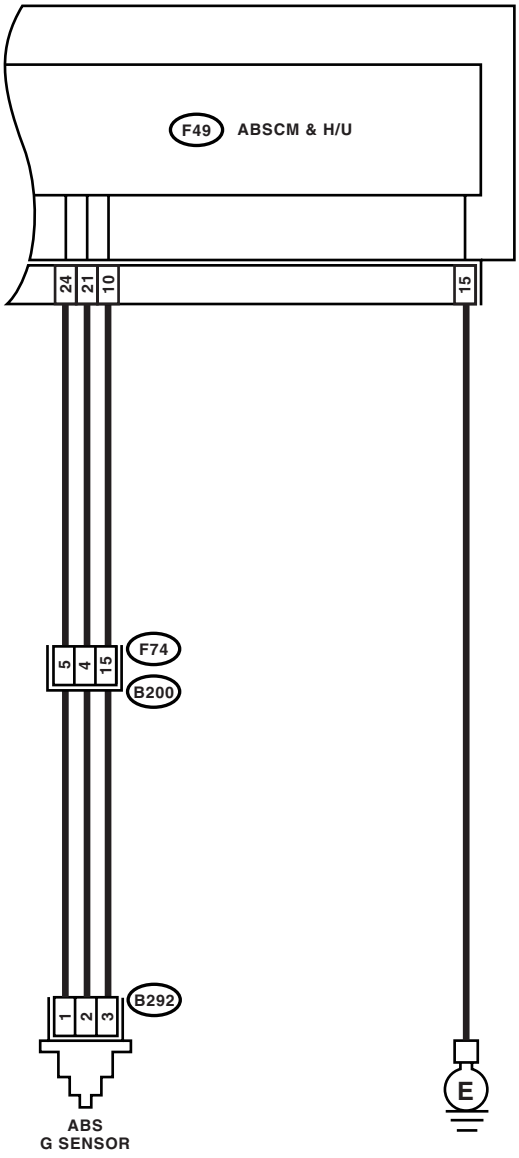
DIAGNOSIS:
Faulty G sensor output voltage
TROUBLE SYMPTOM:
ABS does not operate.
WIRING DIAGRAM:
- LHD model

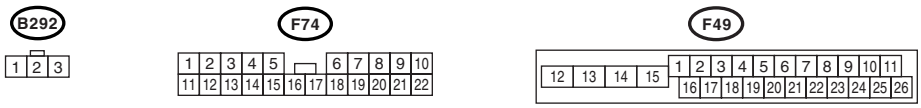




ABS00719

- RHD model





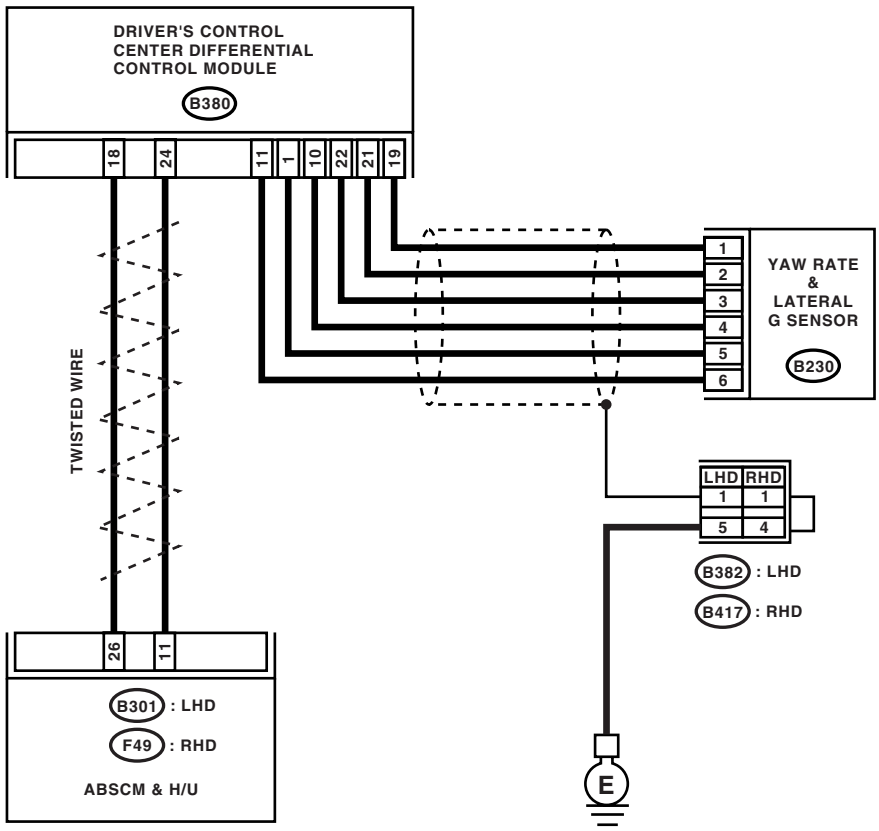
ABS00720

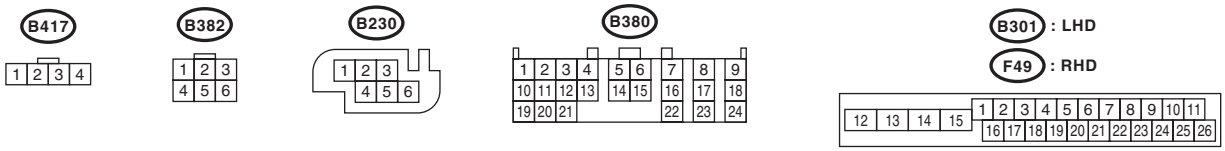
	Step	Check	Yes	No
1	**WHETHER A WHEEL TURNED FREELY OR NOT.**	Have the wheels been turned freely when the vehicle is lifted up or drove on a rolling road?	ABS is normal. Erase the memory.	Go to step **2.**
2	**CHECK OUTPUT OF G SENSOR USING SUBARU SELECT MONITOR.** 1) Select {Current Data Display & Save} in Subaru Select Monitor. 2) Read the G sensor output on Subaru Select Monitor.	Is the reading indicated on display –1.2 — 1.2 m/s^2 when G sensor is horizontal?	Go to step **3.**	Go to step **6.**
3	**CHECK POOR CONTACT IN CONNECTOR.**	Is there poor contact in connector between ABSCM&H/U and G sensor?	Repair the connector.	Go to step **4.**
4	**CHECK ABSCM&H/U.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the ABSCM only. <Ref. to ABS-11, REPLACEMENT, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **5.**
5	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the DTC using “List of Diagnostic Trouble Code (DTC)”. <Ref. to ABS(diag)-38, List of Diagnostic Trouble Code (DTC).>	Temporary poor contact occurs.
6	**CHECK INPUT VOLTAGE OF G SENSOR.** 1) Turn the ignition switch to OFF. 2) Remove the console box. 3) Remove the G sensor from vehicle. (Do not disconnect connector.) 4) Turn the ignition switch to ON. 5) Measure the voltage between G sensor connector terminals. ***Connector & terminal*** ***(B292) No. 1 (+) — No. 3 (–):***	Is the voltage 4.75 — 5.25 V?	Go to step **7.**	Repair the harness connector between G sensor and ABSCM&H/U.
7	**CHECK OPEN CIRCUIT IN G SENSOR OUTPUT HARNESS AND GROUND HARNESS.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ABSCM&H/U. 3) Measure the resistance between ABSCM&H/U connector terminals. ***Connector & terminal*** ***LHD :*** ***(B301) No. 10 — No. 21:*** ***RHD :*** ***(F49) No. 10 — No. 21:***	Is the resistance 1.8 — 2.4 kΩ?	Go to step **8.**	Repair the harness connector between G sensor and ABSCM&H/U.
8	**CHECK GROUND SHORT IN G SENSOR OUTPUT HARNESS.** 1) Disconnect the connector from G sensor. 2) Measure the resistance between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***LHD :*** ***(B301) No. 21 — Chassis ground:*** ***RHD :*** ***(F49) No. 21 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **9.**	Repair the harness between G sensor and ABSCM&H/U.

	Step	Check	Yes	No
9	**CHECK G SENSOR.** 1) Connect the connector to G sensor. 2) Connect the connector to ABSCM&H/U. 3) Turn the ignition switch to ON. 4) Measure the voltage between G sensor connector terminals. ***Connector & terminal*** ***(B292) No. 2 (+) — No. 3 (–):***	Is the voltage 2.1 — 2.5 V when G sensor is on a level?	Go to step **10.**	Replace G sensor. <Ref. to ABS-25, G Sensor.>
10	**CHECK G SENSOR.** Measure the voltage between G sensor connector terminals. ***Connector & terminal*** ***(B292) No. 2 (+) — No. 3 (–):***	Is the voltage 3.6 — 4.1 V when G sensor is inclined forwards to 90°?	Go to step **11.**	Replace G sensor. <Ref. to ABS-25, G Sensor.>
11	**CHECK G SENSOR.** Measure the voltage between G sensor connector terminals. ***Connector & terminal*** ***(B292) No. 2 (+) — No. 3 (–):***	Is the voltage 0.5 — 1.0 V when G sensor is inclined backward to 90°?	Go to step **12.**	Replace G sensor. <Ref. to ABS-25, G Sensor.>
12	**CHECK POOR CONTACT IN CONNECTOR.** Turn the ignition switch to OFF.	Is there poor contact in connector between ABSCM&H/U and G sensor?	Repair the connector.	Go to step **13.**
13	**CHECK ABSCM&H/U.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the ABSCM only. <Ref. to ABS-11, REPLACEMENT, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **14.**
14	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the DTC using “List of Diagnostic Trouble Code (DTC)”. <Ref. to ABS(diag)-38, List of Diagnostic Trouble Code (DTC).>	Temporary poor contact occurs.

X: DTC 73 LATERAL G SENSOR OUTPUT VOLTAGE OR OUTPUT SIGNAL MALFUNCTION

DIAGNOSIS:
Faulty Lateral G sensor output voltage
TROUBLE SYMPTOM:
ABS does not operate.
WIRING DIAGRAM:





ABS00721

	Step	Check	Yes	No
1	**CHECK ALL FOUR WHEELS FOR FREE TURNING.**	Have the wheels been turned freely such as when vehicle is lifted up, or operated on a rolling road?	The ABS is normal. Erase the DTC.	Go to step **2.**
2	**CHECK OUTPUT OF YAW RATE & LATERAL G SENSOR USING SUBARU SELECT MONITOR.** 1) Select “Current data display & Save” on the Subaru Select Monitor. 2) Read the Subaru Select Monitor display.	Is the lateral G sensor output on monitor display −1.5 — 1.5 m/s^2 when the vehicle is in horizontal position?	Go to step **3.**	Go to step **8.**
3	**CHECK OUTPUT OF YAW RATE & LATERAL G SENSOR USING SUBARU SELECT MONITOR.** 1) Turn the ignition switch to OFF. 2) Remove the console box. 3) Remove the yaw rate & lateral G sensor from vehicle. (Do not disconnect the connector.) 4) Turn the ignition switch to ON. 5) Select “Current data display & Save” on the Subaru Select Monitor. 6) Read the Subaru Select Monitor display.	Is the voltage 6.8 — 12.8 m/s^2 when lateral G sensor is inclined right to 90°?	Go to step **4.**	Replace the yaw rate & lateral G sensor. <Ref. to 6MT-129, Yaw Rate and Lateral G Sensor.>
4	**CHECK OUTPUT OF YAW RATE & LATERAL G SENSOR USING SUBARU SELECT MONITOR.** Read the Subaru Select Monitor display.	Is the voltage −6.8 — −12.8 m/s^2 when lateral G sensor is inclined left to 90°?	Go to step **5.**	Replace the yaw rate & lateral G sensor. <Ref. to 6MT-129, Yaw Rate and Lateral G Sensor.>
5	**CHECK POOR CONTACT IN CONNECTORS.** Turn the ignition switch to OFF.	Is there poor contact in connector between driver’s control center differential control module and yaw rate & lateral G sensor?	Repair the connector.	Go to step **6.**
6	**CHECK ABSCM&H/U.** 1) Connect all connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read out the DTC.	Is the same DTC as in current diagnosis still being output?	Replace the ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **7.**
7	**CHECK ANY OTHER DTC APPEARANCE.**	Are other DTCs being output?	Proceed with the diagnosis corresponding to DTC.	A temporary poor contact.
8	**CHECK OPEN CIRCUIT IN YAW RATE & LATERAL G SENSOR OUTPUT HARNESS AND GROUND HARNESS.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from driver’s control center differential control module. 3) Measure the resistance between driver’s control center differential control module connector terminals. ***Connector & terminal (B380) No. 1 — No. 11:***	Is the resistance 4.3 — 4.9 kΩ?	Go to step **9.**	Repair the harness/connector between yaw rate & lateral G sensor and ABSCM&H/U.

	Step	Check	Yes	No
9	**CHECK GROUND SHORT OF HARNESS.** Measure the resistance between driver's control center differential control module connector and chassis ground. ***Connector & terminal*** ***(B380) No. 11 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **10.**	Repair the harness between yaw rate & lateral G sensor and driver's control center differential control module. Replace the driver's control center differential control module. <Ref. to 6MT-130, Driver's Control Center Differential Control Module.>
10	**CHECK YAW RATE & LATERAL G SENSOR.** 1) Remove the console box. 2) Remove the yaw rate & lateral G sensor from vehicle. 3) Connect the connector to yaw rate & lateral G sensor. 4) Connect the connector to ABSCM&H/U. 5) Turn the ignition switch to ON. 6) Measure the voltage between yaw rate & lateral G sensor connector terminals. ***Connector & terminal*** ***(B230) No. 5 (+) — No. 6 (−):***	Is the voltage 2.1 — 2.5 V when yaw rate & lateral G sensor is in horizontal position?	Go to step **11.**	Replace the yaw rate & lateral G sensor. <Ref. to 6MT-129, Yaw Rate and Lateral G Sensor.>
11	**CHECK YAW RATE & LATERAL G SENSOR.** Measure the voltage between yaw rate & lateral G sensor connector terminals. ***Connector & terminal*** ***(B230) No. 5 (+) — No. 6 (−):***	Is the voltage 3.3 — 3.7 V when yaw rate & lateral G sensor is inclined right to 90°?	Go to step **12.**	Replace the lateral G sensor. <Ref. to 6MT-129, Yaw Rate and Lateral G Sensor.>
12	**CHECK YAW RATE & LATERAL G SENSOR.** Measure the voltage between yaw rate & lateral G sensor connector terminals. ***Connector & terminal*** ***(B230) No. 5 (+) — No. 6 (−):***	Is the voltage 0.5 — 0.9 V when yaw rate & lateral G sensor is inclined left to 90°?	Go to step **13.**	Replace the lateral G sensor. <Ref. to 6MT-129, Yaw Rate and Lateral G Sensor.>
13	**CHECK ABSCM&H/U.** 1) Turn the ignition switch to OFF. 2) Connect all connectors. 3) Erase the memory. 4) Perform the inspection mode. 5) Read out the DTC.	Is the same DTC as in current diagnosis still being output?	Replace the ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **14.**
14	**CHECK ANY OTHER DTC APPEARANCE.**	Are other DTCs being output?	Proceed with the diagnosis corresponding to DTC.	A temporary poor contact.

Y: DTC 47 IMPROPER CAN COMMUNICATION

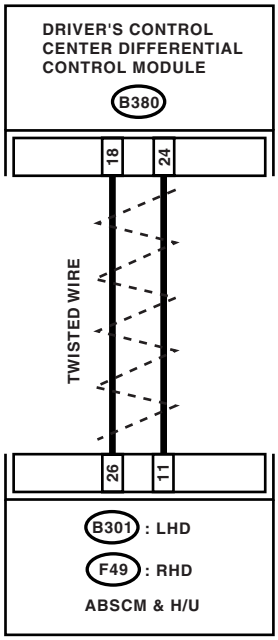
DIAGNOSIS:

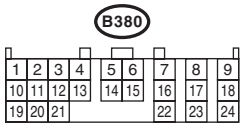
CAN communication circuit is damaged or shorted.

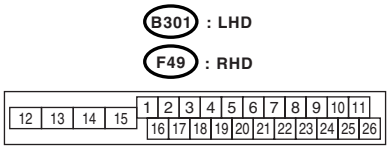
TROUBLE SYMPTOM:

ABS does not operate.

WIRING DIAGRAM:







ABS00724

	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN ABSCM AND DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE.** 1) Turn the ignition switch to ON. 2) Disconnect the connector from ABSCM and driver's control center differential control module. 3) Measure the resistance of harness connector between ABSCM and driver's control center differential control module. ***Connector & terminal*** ***LHD:*** ***(B301) No. 26 — (B380) No. 18:*** ***(B301) No. 11 — (B380) No. 24:*** ***RHD:*** ***(F49) No. 26 — (B380) No. 18:*** ***(F49) No. 11 — (B380) No. 24:***	Is the resistance less than 0.5 Ω?	Go to step **2.**	Repair or replace the harness connector between ABSCM and driver's control center differential control module.
2	**CHECK GROUND SHORT OF HARNESS CONNECTOR BETWEEN ABSCM AND DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE.** Measure the resistance between ABSCM connector and chassis ground. ***Connector & terminal*** ***LHD:*** ***(B301) No. 26 — Chassis ground:*** ***(B301) No. 11 — Chassis ground:*** ***RHD:*** ***(F49) No. 26 — Chassis ground:*** ***(F49) No. 11 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **3.**	Repair or replace the harness connector between ABSCM and driver's control center differential control module.
3	**CHECK BATTERY SHORT OF HARNESS CONNECTOR BETWEEN ABSCM AND DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE.** 1) Turn the ignition switch to ON. 2) Measure the resistance between ABSCM connector and chassis ground. ***Connector & terminal*** ***LHD:*** ***(B301) No. 26 (+) — Chassis ground (−):*** ***(B301) No. 11 (+) — Chassis ground (−):*** ***RHD:*** ***(F49) No. 26 (+) — Chassis ground (−):*** ***(F49) No. 11 (+) — Chassis ground (−):***	Is the voltage less than 0.5 V?	Go to step **4.**	Repair or replace the harness connector between ABSCM and driver's control center differential control module.
4	**CHECK ABSCM.** 1) Turn the ignition switch to OFF. 2) Connect the connector to ABSCM. 3) Measure the resistance between driver's control center differential control module connector terminals. ***Connector & terminal*** ***(B380) No. 18 — (B380) No. 24:***	Is the resistance 120 ± 6 Ω?	Go to step **6.**	Go to step **5.**
5	**CHECK POOR CONTACT IN ABSCM CONNECTOR.**	Is there poor contact?	Repair poor contact in ABSCM connector.	Replace the ABSCM. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>

	Step	Check	Yes	No
6	**CHECK DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE.** 1) Connect the connector to driver's control differential control module. 2) Disconnect the connector from ABSCM. 3) Measure the resistance between ABSCM connector terminals. ***Connector & terminal*** ***LHD:*** ***(B301) No. 11 — No. 26:*** ***RHD:*** ***(F49) No. 11 — No. 26:***	Is the resistance 120 ± 6 Ω?	Go to step **8.**	Go to step **7.**
7	**CHECK POOR CONTACT IN DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE CONNECTOR.**	Is there poor contact?	Repair poor contact in driver's control center differential control module connector.	Replace the driver's control center differential control module. <Ref. to 6MT-130, Driver's Control Center Differential Control Module.>
8	**CHECK DTC.**	Is DTC 47 detected?	Replace the ABSCM. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **9.**
9	**CHECK DTC P1720 INDICATION FOR DRIVER'S CONTROL CENTER DIFFERENTIAL AUTO SYSTEM.**	Is DTC P1720 displayed?	Replace the driver's control center differential control module. <Ref. to 6MT-130, Driver's Control Center Differential Control Module.>	Replace the ABSCM. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>

13.General Diagnostic Table

A: INSPECTION

Symptom		Probable faulty units/parts
Vehicle instability during braking	Vehicle pulls to either side.	• ABSCM&H/U (solenoid valve) • ABS wheel speed sensor • Brake (caliper & piston, pads) • Wheel alignment • Tire specifications, tire wear and air pressures • Incorrect wiring or piping connections • Road surface (uneven, camber)
	Vehicle spins.	• ABSCM&H/U (solenoid valve) • ABS wheel speed sensor • Brake (pads) • Tire specifications, tire wear and air pressures • Incorrect wiring or piping connections
Poor braking	Long braking/stopping distance	• ABSCM&H/U (solenoid valve) • Brake (pads) • Air in brake line • Tire specifications, tire wear and air pressures • Incorrect wiring or piping connections
	Wheel locks.	• ABSCM&H/U (solenoid valve, motor) • ABS wheel speed sensor • Incorrect wiring or piping connections
	Brake dragging	• ABSCM&H/U (solenoid valve) • ABS wheel speed sensor • Master cylinder • Brake (caliper & piston) • Parking brake • Axle & wheels • Brake pedal play
	Long brake pedal stroke	• Air in brake line • Brake pedal play
	Vehicle pitching	• Suspension play or fatigue (reduced damping) • Incorrect wiring or piping connections • Road surface (uneven)
	Unstable or uneven braking	• ABSCM&H/U (solenoid valve) • ABS wheel speed sensor • Brake (caliper & piston, pads) • Tire specifications, tire wear and air pressures • Incorrect wiring or piping connections • Road surface (uneven)
Vibration and/or noise (while driving on slippery roads)	Excessive pedal vibration	• Incorrect wiring or piping connections • Road surface (uneven)
	Noise from ABSCM&H/U	• ABSCM&H/U (mount bushing) • ABS wheel speed sensor • Brake piping
	Noise from front of vehicle	• ABSCM&H/U (mount bushing) • ABS wheel speed sensor • Master cylinder • Brake (caliper & piston, pads, rotor) • Brake piping • Brake booster & check valve • Suspension play or fatigue
	Noise from rear of vehicle	• ABS wheel speed sensor • Brake (caliper & piston, pads, rotor) • Parking brake • Brake piping • Suspension play or fatigue

ABS (5.3i)(DIAGNOSTICS)

ABS(5.3i)(diag)

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1. Basic Diagnostic Procedure

A: PROCEDURE

NOTE:
This section is specified for STi model with driver's control center differential (without auto).

CAUTION:
Remove foreign matter (dust, water, etc.) from the ABSCM&H/U connector during removal and installation.

NOTE:
- To check the harness for broken wires or short circuits, shake it while holding it or the connector.
- Check list for interview <Ref. to ABS(5.3i)(diag)-4, Check List for Interview.>

	Step	Check	Yes	No
1	**CHECK PRE-INSPECTION.** 1) Ask the customer when and how trouble occurred using interview checklist. <Ref. to ABS(5.3i)(diag)-4, Check List for Interview.> 2) Before performing diagnosis, inspect the unit which might influence the ABS problem. <Ref. to ABS(5.3i)(diag)-8, INSPECTION, General Description.>	Is the component that might influence the ABS problem normal?	Go to step **2.**	Repair or replace each unit.
2	**CHECK DTC.** 1) Turn the ignition switch to OFF. 2) Connect the Subaru Select Monitor to data link connector. 3) Turn the ignition switch to ON and Subaru Select Monitor power switch to ON. NOTE: If the communication function of Subaru Select Monitor cannot be executed normally, check communication circuit. <Ref. to ABS(5.3i)(diag)-19, COMMUNICATION FOR INITIALIZING IMPOSSIBLE, INSPECTION, Subaru Select Monitor.> 4) Read the DTC on Subaru Select Monitor. <Ref. to ABS(5.3i)(diag)-17, READ CURRENT DATA, OPERATION, Subaru Select Monitor.> 5) Record all DTCs and freeze frame data.	Is DTC displayed on Subaru Select Monitor?	Go to step **4.**	Go to step **3.**
3	**PERFORM THE GENERAL DIAGNOSTICS.** 1) Inspect using "General Diagnostics Table". <Ref. to ABS(5.3i)(diag)-121, General Diagnostic Table.> 2) Perform the clear memory mode. <Ref. to ABS(5.3i)(diag)-18, CLEAR MEMORY MODE, OPERATION, Subaru Select Monitor.> 3) Perform the inspection mode. <Ref. to ABS(5.3i)(diag)-26, Inspection Mode.> 4) Read the DTC. <Ref. to ABS(5.3i)(diag)-16, READ DIAGNOSTIC TROUBLE CODE (DTC), OPERATION, Subaru Select Monitor.> Check the DTC does not displayed.	Does the ABS warning light go off after turning the ignition switch to ON?	Finish the diagnosis.	Inspect using diagnostics procedure for no trouble code. <Ref. to ABS(5.3i)(diag)-21, NO TROUBLE CODE, INSPECTION, Subaru Select Monitor.>

Step		Check	Yes	No
4	**PERFORM THE DIAGNOSIS.** 1) For the DTC list, refer to “List of Diagnostics Trouble Code (DTC)”. <Ref. to ABS(5.3i)(diag)-39, LIST, List of Diagnostic Trouble Code (DTC).> 2) Repair trouble cause. 3) Perform the clear memory mode. <Ref. to ABS(5.3i)(diag)-18, CLEAR MEMORY MODE, OPERATION, Subaru Select Monitor.> 4) Perform the inspection mode. <Ref. to ABS(5.3i)(diag)-26, Inspection Mode.> 5) Read DTC on Subaru Select Monitor. <Ref. to ABS(5.3i)(diag)-16, READ DIAGNOSTIC TROUBLE CODE (DTC), OPERATION, Subaru Select Monitor.>	Is DTC displayed on Subaru Select Monitor?	Inspect using diagnostics procedure with Subaru Select Monitor. <Ref. to ABS(5.3i)(diag)-42, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Finish the diagnosis.

2. Check List for Interview

A: CHECK

Check the following items about the vehicle's state.

1. STATE OF ABS WARNING LIGHT

ABS warning light comes on.	❑ Always ❑ Sometimes ❑ Only once ❑ Does not come on • When / how long does it come on?:		
Ignition key position	❑ LOCK ❑ ACC ❑ ON (before starting engine) ❑ START ❑ On after engine starting (Engine is running) ❑ On after engine starting (Engine is at a standstill)		
Timing	❑ Immediately after turning the ignition to ON. ❑ Immediately after turning the ignition to START.		
	❑ When accelerating	to	km/h
		to	MPH
	❑ When driving at a constant speed	km/h	MPH
	❑ When decelerating	to	km/h
		to	MPH
	❑When turning to right	Steering angle:	deg
		Steering time:	sec
	❑ When turning to left	Steering angle:	deg
		Steering time:	sec
	❑ When operating other electrical parts		
	• Parts name: • Operating condition:		

2. STATE OF BRAKE WARNING LIGHT

Brake warning light comes on.	❑ Always ❑ Sometimes ❑ Only once ❑ Does not come on ❑ When pulling the parking brake lever up ❑ When releasing the parking brake lever down • When / how long does it come on?		
Ignition key position	❑ LOCK ❑ ACC ❑ ON (before starting engine) ❑ START ❑ On (after engine starting, engine is running) ❑ On (after engine starting, engine is at a standstill)		
Timing	❑ Immediately after turning the ignition to ON. ❑ Immediately after turning the ignition to START.		
	❑ When accelerating	to	km/h
		to	MPH
	❑ When driving at a constant speed	km/h	MPH
	❑ When decelerating	to	km/h
		to	MPH
	❑When turning to right	Steering angle:	deg
		Steering time:	sec
	❑ When turning to left	Steering angle:	deg
		Steering time:	sec
	❑ When operating other electrical parts		
	• Parts name: • Operating condition:		

3. SYMPTOMS

<table>
<tr><td rowspan="8">ABS operating condition</td><td colspan="2">❑ Performs no work.</td></tr>
<tr><td>❑ Operates only when abruptly applying brakes.</td><td>Vehicle speed: km/h
MPH</td></tr>
<tr><td colspan="2">• How to step on brake pedal:</td></tr>
<tr><td>a) Operating time:</td><td>sec</td></tr>
<tr><td colspan="2">b) Operating noise: ❑ Occurs / ❑ Does not occur</td></tr>
<tr><td>• What kind of noise?</td><td>❑ Knock
❑ Gong gong
❑ Bong
❑ Buzz
❑ Gong gong buzz
❑ Others:</td></tr>
<tr><td colspan="2">c) Reaction force of brake pedal</td></tr>
<tr><td></td><td>❑ Stick
❑ Weak pedal resistance
❑ Strong pedal resistance
❑ Others:</td></tr>
<tr><td rowspan="15">Behavior of vehicle</td><td colspan="2">a) Directional stability cannot be obtained or steering refuses to work when applying brakes:
❑ Yes / ❑ No</td></tr>
<tr><td>• When:</td><td>❑ Vehicle turns to right
❑ Vehicle turns to left
❑ Spins
❑ Others:</td></tr>
<tr><td colspan="2">b) Directional stability cannot be obtained or steering refuses to work when accelerating:
❑ Yes / ❑ No</td></tr>
<tr><td>• When:</td><td>❑ Vehicle turns to right
❑ Vehicle turns to left
❑ Spins
❑ Others:</td></tr>
<tr><td colspan="2">c) Poor brake performance: ❑ Yes / ❑ No</td></tr>
<tr><td>• What kind:</td><td>❑ Braking distance is long
❑ Brakes lock or drag
❑ Pedal stroke is long
❑ Pedal sticks
❑ Others:</td></tr>
<tr><td colspan="2">d) Poor acceleration: ❑ Yes / ❑ No</td></tr>
<tr><td>• What kind:</td><td>❑ Fails to accelerate
❑ Engine stalls
❑ Others:</td></tr>
<tr><td colspan="2">e) Occurrence of vibration: ❑ Yes / ❑ No</td></tr>
<tr><td colspan="2">• Where
• What kind:</td></tr>
<tr><td colspan="2">f) Occurrence of abnormal noise: ❑ Yes / ❑ No</td></tr>
<tr><td colspan="2">• Where
• What kind:</td></tr>
<tr><td colspan="2">g) Occurrence of other phenomena: ❑ Yes / ❑ No</td></tr>
<tr><td colspan="2">• What kind:</td></tr>
</table>

4. CONDITIONS UNDER WHICH TROUBLE OCCURS

Environment	a) Weather	❑ Fine ❑ Cloudy ❑ Rainy ❑ Snowy ❑ Various/Others:
	b) Ambient temperature	°C (°F)
	c) Road	❑ Inner city ❑ Suburbs ❑ Highway ❑ General road ❑ Ascending slope ❑ Descending slope ❑ Paved road ❑ Gravel road ❑ Muddy road ❑ Sandy place ❑ Others:
	d) Road surface	❑ Dry ❑ Wet ❑ New-fallen snow ❑ Compressed snow ❑ Frozen slope ❑ Others:
Condition	a) Brakes	Deceleration: G
		❑ Intermittent / ❑ Temporary
	b) Accelerator	Acceleration: G
		❑ Intermittent / ❑ Temporary
	c) Vehicle speed	km/h | MPH
		❑ Advancing ❑ Accelerating ❑ Reducing speed ❑ Low speed ❑ Turning ❑ Others:
	d) Tire inflation pressure	Front RH tire: kPa
		Front LH tire: kPa
		Rear RH tire: kPa
		Rear LH tire: kPa
	e) Degree of wear	Front RH tire:
		Front LH tire:
		Rear RH tire:
		Rear LH tire:
	f) Genuine parts are used.: ❑ Yes / ❑ No	
	g) Tire chain is attached.: ❑ Yes / ❑ No	
	h) T-type tire is used.: ❑ Yes / ❑ No	
	i) Condition of suspension alignment:	
	j) Loading state:	
	k) Repair parts are used.: ❑ Yes / ❑ No	
	• Contents:	
	l) Others:	

3. General Description

A: CAUTION

1. SUPPLEMENTAL RESTRAINT SYSTEM "AIRBAG"

Airbag system wiring harness is routed near the ABS wheel speed sensor, ABS control module and hydraulic control unit.

CAUTION:
• All airbag system wiring harness and connectors are colored yellow. Do not use electrical test equipment on these circuit.
• Be careful not to damage the airbag system wiring harness when servicing the ABS wheel speed sensor, ABS control module and hydraulic control unit.

B: INSPECTION

Before performing diagnostics, check the following items which might affect ABS problems:

1. BATTERY

Measure the battery voltage and specific gravity of electrolyte.

Standard voltage: 12 V or more

Specific gravity: More than 1.260

2. GROUND

Check the ABS ground bolt, tightening torque.

Chassis ground:
RHD (F64)
LHD (B302)

Tightening torque:
13 N·m (1.3 kgf-m, 9.4 ft-lb)

3. BRAKE FLUID

1) Check the brake fluid level.
2) Check the brake fluid leakage.

4. HYDRAULIC UNIT

Check the hydraulic unit.
• With brake tester <Ref. to ABS-10, CHECKING THE HYDRAULIC UNIT ABS OPERATION WITH BRAKE TESTER, INSPECTION, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>
• Without brake tester <Ref. to ABS-9, CHECKING THE HYDRAULIC UNIT ABS OPERATION BY PRESSURE GAUGE, INSPECTION, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>

5. BRAKE DRAG

Check for brake drag.

6. BRAKE PAD AND ROTOR

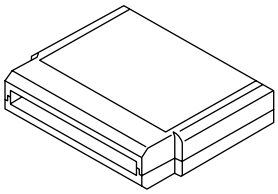
Check the brake pad and rotor.
• Front <Ref. to BR-27, INSPECTION, Front Brake Pad.> and <Ref. to BR-30, INSPECTION, Front Disc Rotor.>
• Rear <Ref. to BR-38, INSPECTION, Rear Brake Pad.> and <Ref. to BR-40, INSPECTION, Rear Disc Rotor.> or <Ref. to BR-48, INSPECTION, Rear Drum Brake Shoe.> and <Ref. to BR-49, INSPECTION, Rear Drum Brake Drum.>

7. TIRE

Check the tire specifications, tire wear and air pressure. <Ref. to WT-2, SPECIFICATION, General Description.>

C: PREPARATION TOOL

1. SPECIAL TOOLS

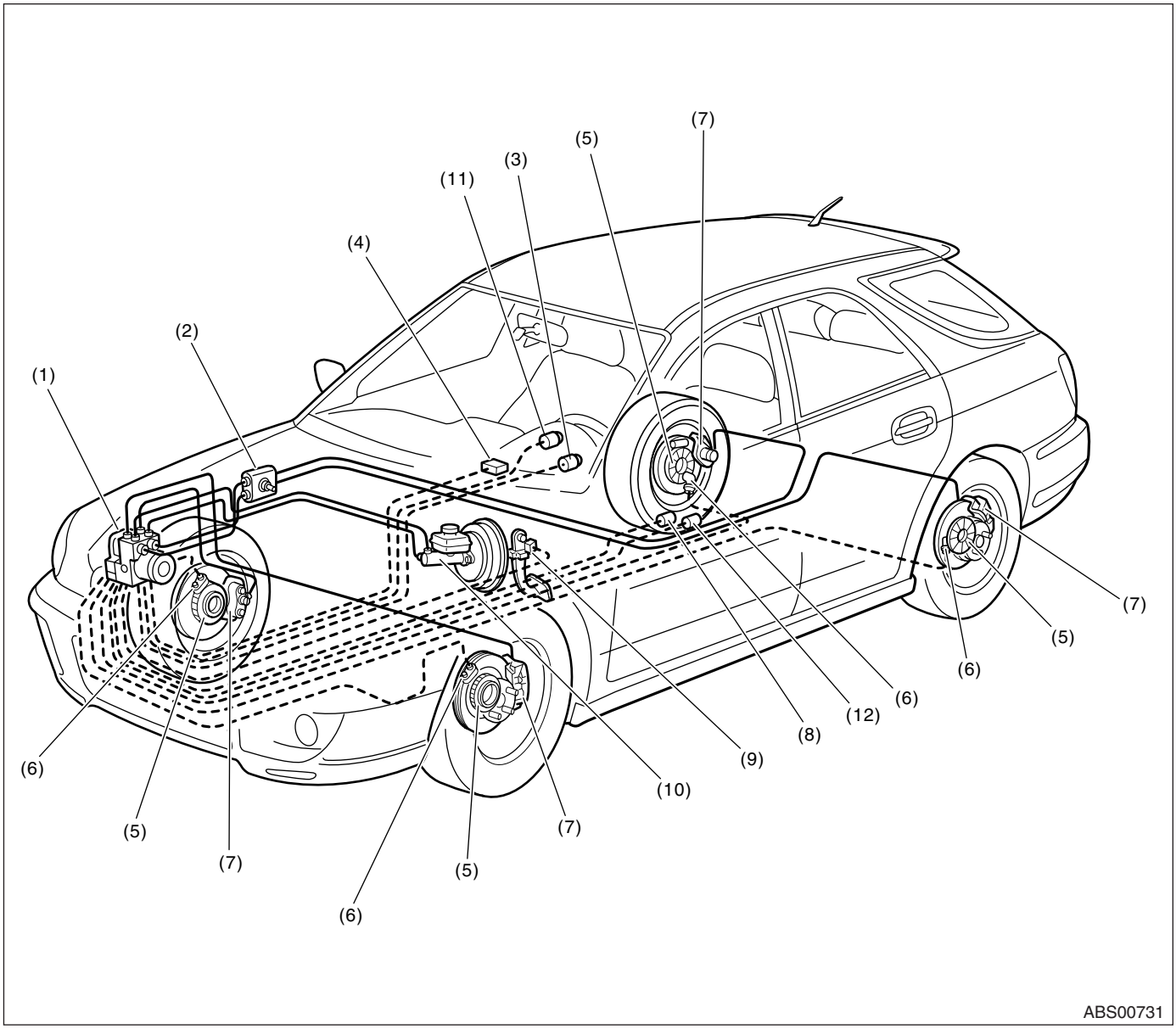
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18482AA000	18482AA000	CARTRIDGE	Used for troubleshooting for electrical systems.
ST22771AA030	22771AA030	SUBARU SELECT MONITOR KIT	Used for troubleshooting for electrical systems. • English: 22771AA030 (Without printer) • German: 22771AA070 (Without printer) • French: 22771AA080 (Without printer) • Spanish: 22771AA090 (Without printer)

2. GENERAL PURPOSE TOOLS

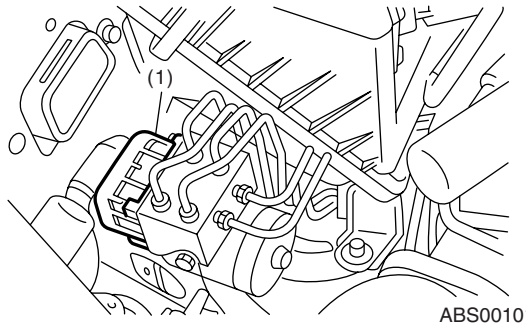
TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance, voltage and amperage.
Oscilloscope	Used for measuring sensor.

4. Electrical Component Location

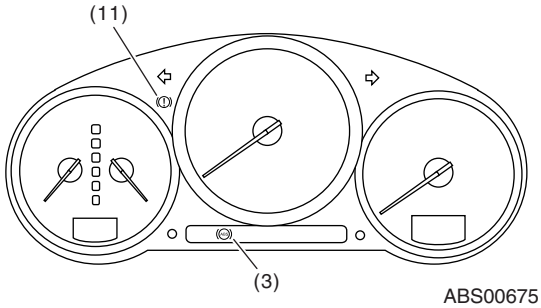
A: LOCATION



(1) ABS control unit and hydraulic control unit (ABSCM&H/U)
(2) Connector
(3) ABS warning light
(4) Data link connector (for Subaru Select Monitor)
(5) Tone wheel
(6) ABS wheel speed sensor
(7) Caliper body
(8) G sensor
(9) Stop light switch
(10) Master cylinder
(11) Brake and EBD warning light
(12) Lateral G sensor



ABS00101



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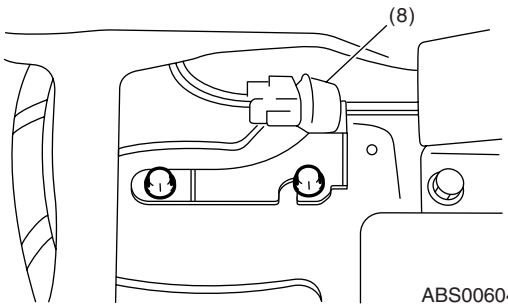

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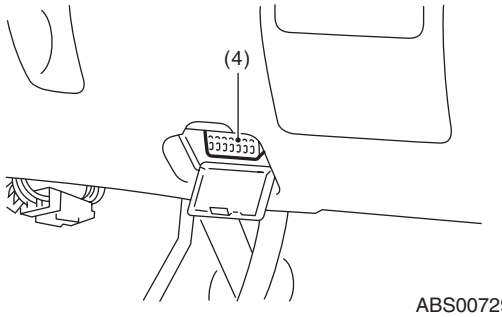
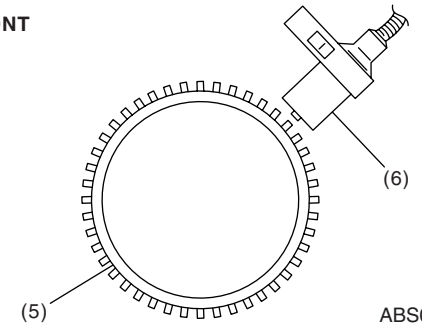


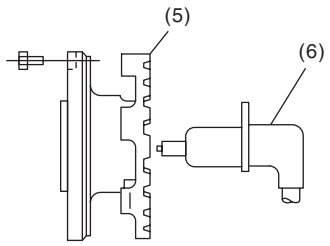
ABS00729

FRONT

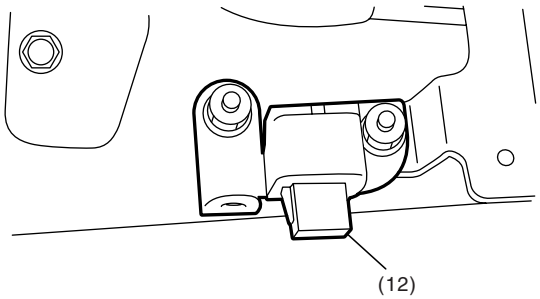


ABS00728

REAR



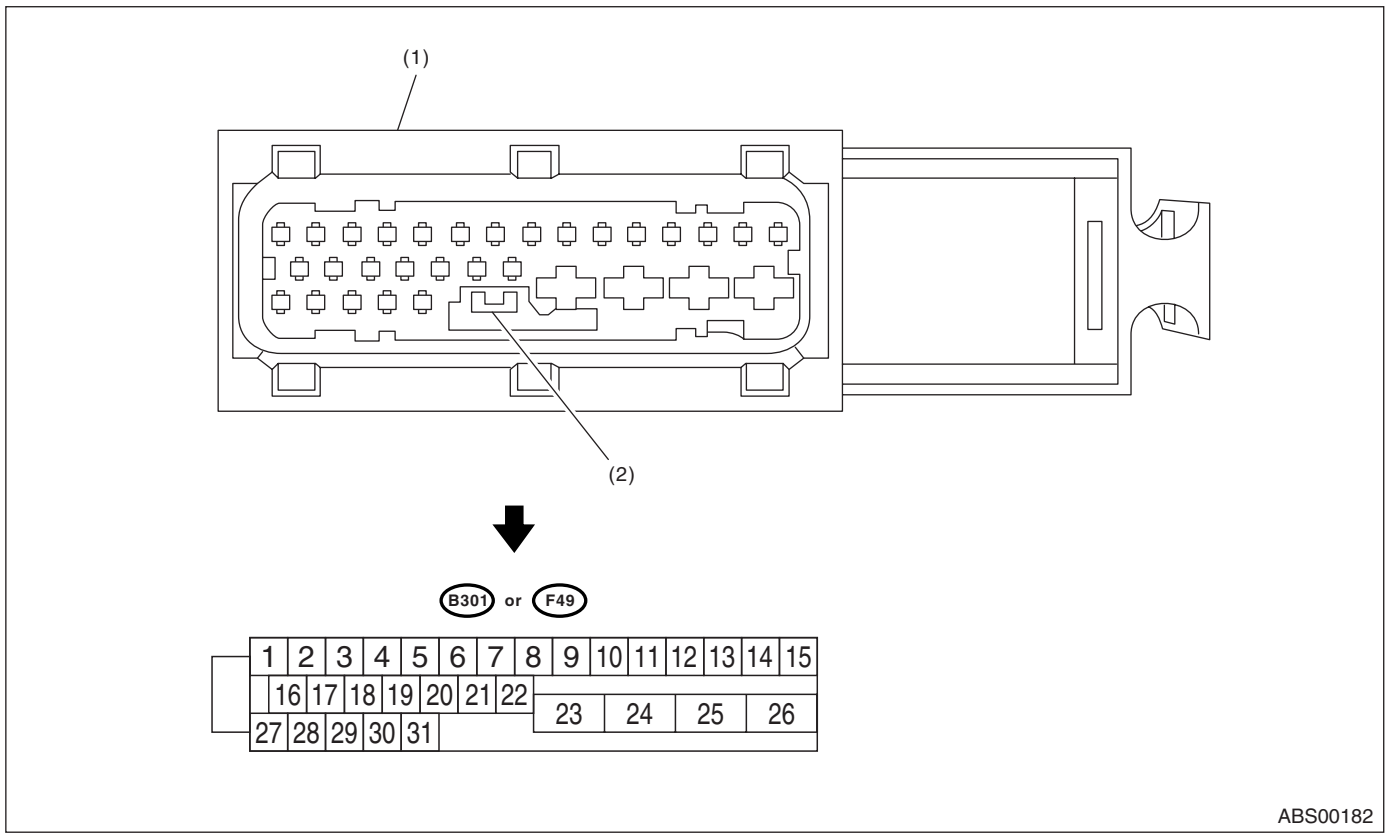
ABS00726



ABS00727

5. Control Module I/O Signal

A: ELECTRICAL SPECIFICATION



(1) ABS control module and hydraulic control unit (ABSCM&H/U) connector
(2) Connector switch

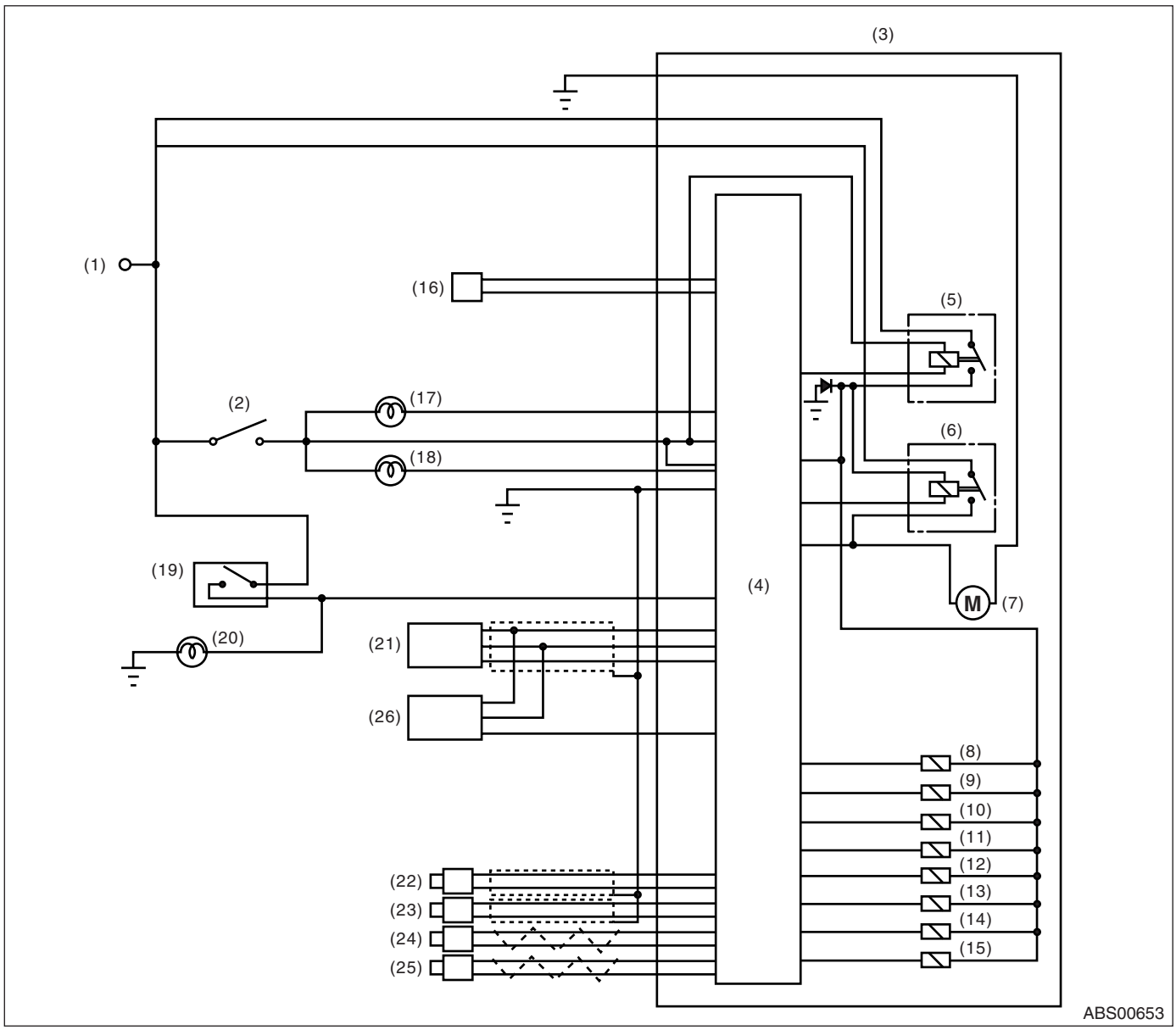
NOTE:
• The terminal numbers in ABS control module and hydraulic control unit connector are as shown in the figure.
• When the connector is removed from ABSCM&H/U, the connector switch closes the circuit between terminal No. 22 and No. 23. The ABS warning light illuminates.

Control Module I/O Signal

Contents		Terminal No. (+) — (−)	Input/Output signal Measured value and measuring conditions
ABS wheel speed sensor*2 (Wheel speed sensor)	Front left wheel	9 — 10	0.12 — 1 V (When it is 20 Hz.)
	Front right wheel	11 — 12	
	Rear left wheel	7 — 8	
	Rear right wheel	14 — 15	
Valve relay power supply*1		24 — 23	10 — 15 V
Motor relay power supply*1		25 — 23	10 — 15 V
G sensor*2	Power supply	30 — 28	4.75 — 5.25 V
	Ground	28	—
	Output	6 — 28	2.1 — 2.5 V when vehicle is in horizontal position.
Lateral G sensor	Power supply	30 — 28	4.75 — 5.25 V
	Ground	28	—
	Output	29 — 28	2.3 — 2.7 V when vehicle is in horizontal position.
Stop light switch*1		2 — 23	Less than 1.5 V when the stop light is OFF and, 10 — 15 V when the stop light is ON.
ABS warning light*2		22 — 23	Less than 1.5 V within 1.5 seconds immediately after ignition switch has been turned to ON, and 10 — 15 V after 1.5 seconds has elapsed.
Brake warning light*2 (EBD warning light)		21 — 23	Less than 1.5 V within 1.5 seconds immediately after ignition switch has been turned to ON, and 10 — 15 V after 1.5 seconds has elapsed.
Subaru Select Monitor*2	Data is received.	20 — 23	Less than 1.5 V when no data is received.
	Data is sent.	5 — 23	4.75 — 5.25 V when no data is sent.
Power supply*1		1 — 23	10 — 15 V when ignition switch is ON.
Grounding line		23	—
Grounding line		26	—

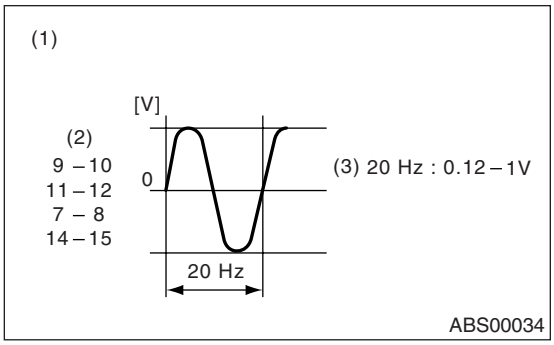
*1: Measure the I/O signal voltage after removing the connector from the ABSCM&H/U terminal.
*2: Measure the I/O signal voltage at connector (F2).

B: WIRING DIAGRAM



(1) Battery
(2) Ignition
(3) ABS control module and hydraulic control unit (ABSCM&H/U)
(4) ABS control module
(5) Valve relay
(6) Motor relay
(7) Motor
(8) Front inlet solenoid valve LH
(9) Front outlet solenoid valve LH
(10) Front inlet solenoid valve RH
(11) Front outlet solenoid valve RH
(12) Rear inlet solenoid valve LH
(13) Rear outlet solenoid valve LH
(14) Rear inlet solenoid valve RH
(15) Rear outlet solenoid valve RH
(16) Data link connector
(17) Brake and EBD warning light
(18) ABS warning light
(19) Stop light switch
(20) Stop light
(21) G sensor
(22) Front ABS wheel speed sensor LH
(23) Front ABS wheel speed sensor RH
(24) Rear ABS wheel speed sensor LH
(25) Rear ABS wheel speed sensor RH
(26) Lateral G sensor

C: WAVEFORM



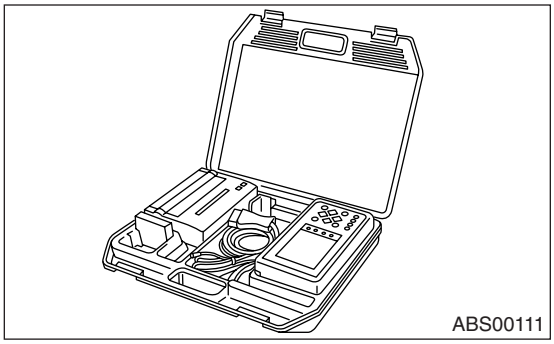
(1) ABS wheel speed sensor
(2) Terminal No.
(3) Standard output voltage

6. Subaru Select Monitor

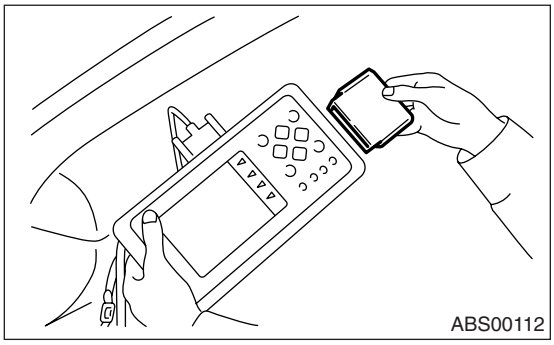
A: OPERATION

1. READ DIAGNOSTIC TROUBLE CODE (DTC)

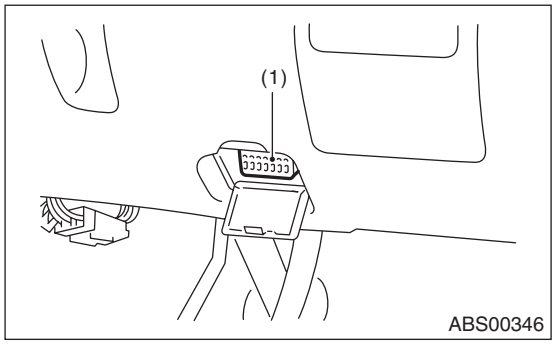
1) Prepare the Subaru Select Monitor kit.



2) Connect the diagnosis cable to Subaru Select Monitor.
3) Insert the cartridge into Subaru Select Monitor. <Ref. to ABS(5.3i)(diag)-9, SPECIAL TOOLS, PREPARATION TOOL, General Description.>



4) Connect the Subaru Select Monitor to data link connector.
(1) Data link connector located in the lower portion of instrument panel (on the driver's side).

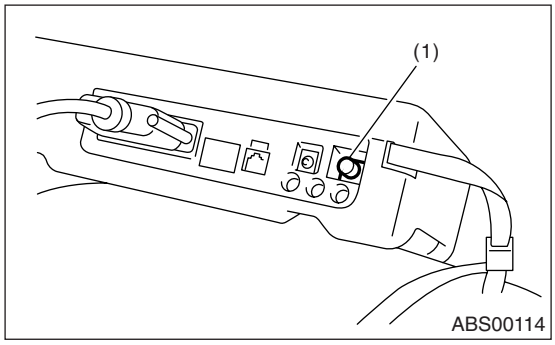


(1) Data link connector

(2) Connect the diagnosis cable to data link connector.

CAUTION:
Do not connect the scan tools except for Subaru Select Monitor and general scan tool.

5) Turn the ignition switch to ON (engine OFF) and Subaru Select Monitor power switch to ON.



(1) Power switch

6) On the «Main Menu» display screen, select the {Each System Check} and press [YES] key.
7) On the «System Selection Menu» display screen, select the {Brake Control System} and press [YES] key.
8) Press the [YES] key after the information of ABS type is displayed.
9) On the «ABS Diagnosis» display screen, select the {Diagnostic Code(s) Display} and press [YES] key.
10) On the «Diagnostic Code(s) Display» display screen, select the {Current Diagnostic Code(s)} or {History Diagnostic Code(s)} and press [YES] key.

NOTE:
• For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.
• For detailed concerning the DTC, refer to the LIST OF DIAGNOSTICS TROUBLE CODE (DTC). <Ref. to ABS(5.3i)(diag)-39, List of Diagnostic Trouble Code (DTC).>
• A maximum of 3 DTCs are displayed in order of occurrence.
• If a particular DTC is not properly stored in memory (due to a drop in ABSCM&H/U power supply, etc.) when a problem occurs, the DTC, followed by a question mark "?", appears on the Subaru Select Monitor display. This shows it may be an unreliable reading.

Display	Contents to be monitored
Current	Indicate the latest DTC on the Subaru Select Monitor display.
Old	Indicate the latest DTC in previous trouble on the Subaru Select Monitor display.
Older	Indicate the latest DTC in second previous trouble on the Subaru Select Monitor display.
Before 3	Indicate the latest DTC in third previous trouble on the Subaru Select Monitor display.

2. READ CURRENT DATA

1) On the «Main Menu» display screen, select the {Each System Check} and press «YES» key.
2) On the «System Selection Menu» display screen, select the {Brake Control System} and press «YES» key.
3) Press the «YES» key after the information of ABS type is displayed.
4) On the «Brake Control Diagnosis» display screen, select the {Current Data Display & Save} and press «YES» key.
5) On the «Data Display Menu» display screen, select the {Data Display} and press «YES» key.
6) Using the scroll key, move the display screen up or down until desired data is shown.
• A list of the support data is shown in the following table.

Display screen	Contents to be monitored	Unit of measure
FR Wheel Speed Signal	Wheel speed detected by Front ABS wheel speed sensor RH is displayed	km/h or MPH
FL Wheel Speed Signal	Wheel speed detected by Front ABS wheel speed sensor LH is displayed	km/h or MPH
RR Wheel Speed Signal	Wheel speed detected by Rear ABS wheel speed sensor RH is displayed	km/h or MPH
RL Wheel Speed Signal	Wheel speed detected by Rear ABS wheel speed sensor LH is displayed	km/h or MPH
Stop Light Switch	Stop light switch signal	ON or OFF
Stop Light Switch	Stop light switch monitor voltage is displayed.	V
Longitudinal G Sensor	Voltage equivalent to vehicle acceleration detected by analog G sensor is displayed.	V
Lateral G Sensor	Lateral G detected by Lateral G sensor is displayed in voltage.	V
Valve Relay Signal	Valve Relay Signal	ON or OFF
Motor Relay Signal	Motor Relay Signal	ON or OFF
ABS Warning Lamp	ON operation of ABS warning light is displayed.	ON or OFF
EBD Warning Light	ON operation of EBD warning light is displayed.	ON or OFF
Motor Relay Monitor	Operating condition of motor relay is displayed.	ON or OFF
Valve Relay Monitor	Operating condition of the valve relay is displayed.	ON or OFF
CCM Signal	ABS operation signal from ABS control module to TCM	ON or OFF

NOTE:
For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

3. CLEAR MEMORY MODE

1) On the «Main Menu» display screen, select the {2. Each System Check} and press «YES» key.
2) On the «System Select Menu» display screen, select the {Brake System} and press «YES» key.
3) Press the «YES» key after the information of engine type is displayed.
4) On the «Brake Control Diagnosis» display screen, select the {Clear Memory} and press «YES» key.

Display screen	Contents to be monitored
Clear memory?	Function of clearing DTC.

5) When the “Done” and “Turn Ignition Switch OFF” are shown on display screen, turn the Subaru Select Monitor power switch and ignition switch to OFF.

NOTE:
For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

4. ABS SEQUENCE CONTROL

Display screen	Contents to be monitored	Index No.
ABS sequence control	Perform ABS sequence control by operating valve and pump motor sequentially.	<Ref. to ABS-14, ABS Sequence Control.>

5. FREEZE FRAME DATA

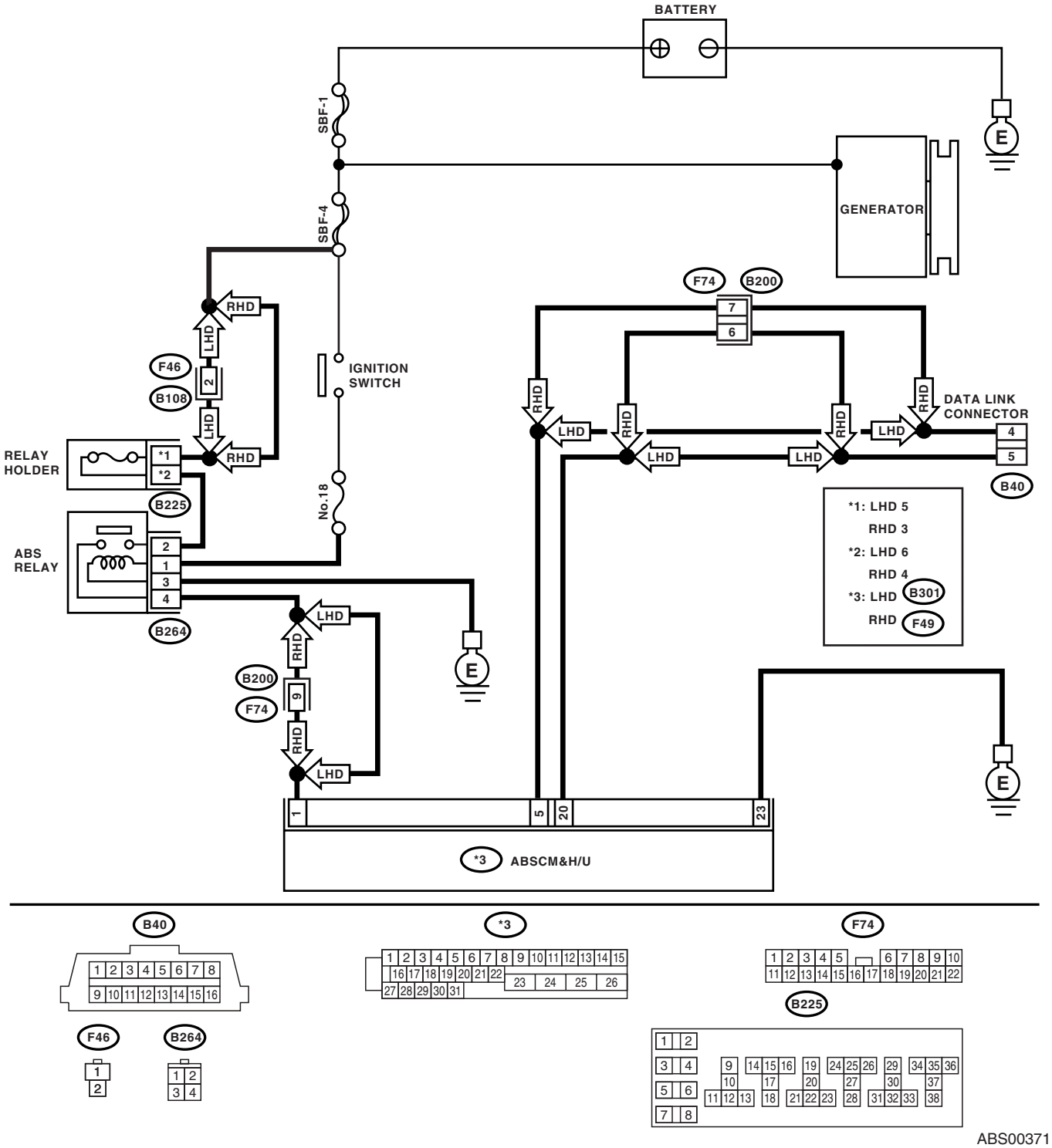
NOTE:
• Data stored at the time of trouble occurrence is shown on display.
• Each time trouble occurs, the latest information is stored in the freeze frame data in memory.
• Freeze frame data will be memorized maximum to three.
• If freeze frame data is not properly stored in memory (due to a drop in ABSCM power supply, etc.), a DTC, preceded by a question mark “?”, appears on the Subaru Select Monitor display. This shows it may be an unreliable reading.

Display screen	Contents to be monitored
FR Wheel Speed	Wheel speed detected by Front ABS wheel speed sensor RH is displayed in km/h or mile/h.
FL Wheel Speed	Wheel speed detected by Front ABS wheel speed sensor LH is displayed in km/h or mile/h.
RR Wheel Speed	Wheel speed detected by Rear ABS wheel speed sensor RH is displayed in km/h or mile/h.
RL Wheel Speed	Wheel speed detected by Rear ABS wheel speed sensor LH is displayed in km/h or mile/h.
IG power supply voltage	Power (in volts) supplied to ABSCM& H/U appears on the Subaru Select Monitor display.
Longitudinal G Sensor	Voltage equivalent to vehicle acceleration detected by analog G sensor is displayed.
Lateral G sensor	Voltage equivalent to lateral G detected by analog lateral G sensor is displayed.
Motor Relay Monitor	Motor relay operation monitor signal
Stop Light Switch	Stop light switch signal
ABS Operation Signal	ABS operation signal
Condition of Malfunction	Displays if the malfunction has occurred to ABS only, or to ABS and EBD.

B: INSPECTION

1. COMMUNICATION FOR INITIALIZING IMPOSSIBLE

DIAGNOSIS:
Faulty harness connector
TROUBLE SYMPTOM:
Communication can not be executed between ABS and Subaru Select Monitor.
WIRING DIAGRAM:



ABS00371

	Step	Check	Yes	No
1	**CHECK IGNITION SWITCH.**	Is the ignition switch turned to ON?	Go to step **2.**	Turn the ignition switch to ON, and select ABS mode using Subaru Select Monitor.
2	**CHECK BATTERY.** 1) Turn the ignition switch to OFF. 2) Measure the battery voltage.	Is the voltage more than 11 V?	Go to step **3.**	Charge or replace the battery.
3	**CHECK BATTERY TERMINAL.**	Is there poor contact at battery terminal?	Repair or tighten the battery terminal.	Go to step **4.**
4	**CHECK COMMUNICATION OF SUBARU SELECT MONITOR.** 1) Turn the ignition switch to ON. 2) Using the Subaru Select Monitor, check whether communication to other system can be executed normally.	Are the name and year of system displayed on Subaru Select Monitor?	Go to step **8.**	Go to step **5.**
5	**CHECK COMMUNICATION OF SUBARU SELECT MONITOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the ABSCM&H/U connector. 3) Turn the ignition switch to ON. 4) Check whether communication to other systems can be executed normally.	Are the name and year of system displayed on Subaru Select Monitor?	Replace the ABSCM only. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **6.**
6	**CHECK HARNESS CONNECTOR BETWEEN EACH CONTROL MODULE AND DATA LINK CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the ABSCM&H/U, ECM and driver's control center differential control module connectors. 3) Measure the resistance between data link connector and chassis ground. ***Connector & terminal*** ***(B40) No. 5 — Chassis ground:*** ***(B40) No. 4 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **7.**	Repair the harness and connector between each control module and data link connector.
7	**CHECK OUTPUT SIGNAL FOR ABSCM& H/U.** 1) Turn the ignition switch to ON. 2) Measure the voltage between data link connector and chassis ground. ***Connector & terminal*** ***(B40) No. 5 (+) — Chassis ground (−):*** ***(B40) No. 4 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **8.**	Repair the harness and connector between each control module and data link connector.
8	**CHECK HARNESS/CONNECTOR BETWEEN ABSCM&H/U AND DATA LINK CONNECTOR.** Measure the resistance between ABSCM&H/U connector and data link connector. ***Connector & terminal*** ***LHD:*** ***(B301) No. 20 — (B40) No. 5:*** ***(B301) No. 5 — (B40) No. 4:*** ***RHD:*** ***(F49) No. 20 — (B40) No. 5:*** ***(F49) No. 5 — (B40) No. 4:***	Is the resistance less than 0.5 Ω?	Go to step **9.**	Repair the harness and connector between ABSCM&H/U and data link connector.

	Step	Check	Yes	No
9	**CHECK INSTALLATION OF ABSCM&H/U CONNECTOR.** Turn the ignition switch to OFF.	Is the ABSCM&H/U connector inserted into ABSCM&H/U until the clamp locks onto it?	Go to step **10.**	Insert the ABSCM&H/U connector into ABSCM&H/U.
10	**CHECK POWER SUPPLY CIRCUIT.** 1) Turn the ignition switch to ON (engine OFF). 2) Measure the ignition power supply voltage between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***LHD:*** ***(B301) No. 1 (+) — Chassis ground (−):*** ***RHD:*** ***(F49) No. 1 (+) — Chassis ground (−):***	Is the voltage 10 to 15 V?	Go to step **11.**	Repair the open circuit in harness between ABSCM&H/U and battery.
11	**CHECK HARNESS CONNECTOR BETWEEN ABSCM&H/U AND CHASSIS GROUND.** 1) Turn the ignition switch to OFF. 2) Measure the resistance of harness between ABSCM&H/U and chassis ground. ***Connector & terminal*** ***LHD:*** ***(B301) No. 23 — Chassis ground:*** ***RHD:*** ***(F49) No. 23 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **12.**	Repair open circuit in the ABSCM&H/U ground harness.
12	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in control module power supply, ground line and data link connector?	Repair the connector.	Replace the ABSCM only. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>

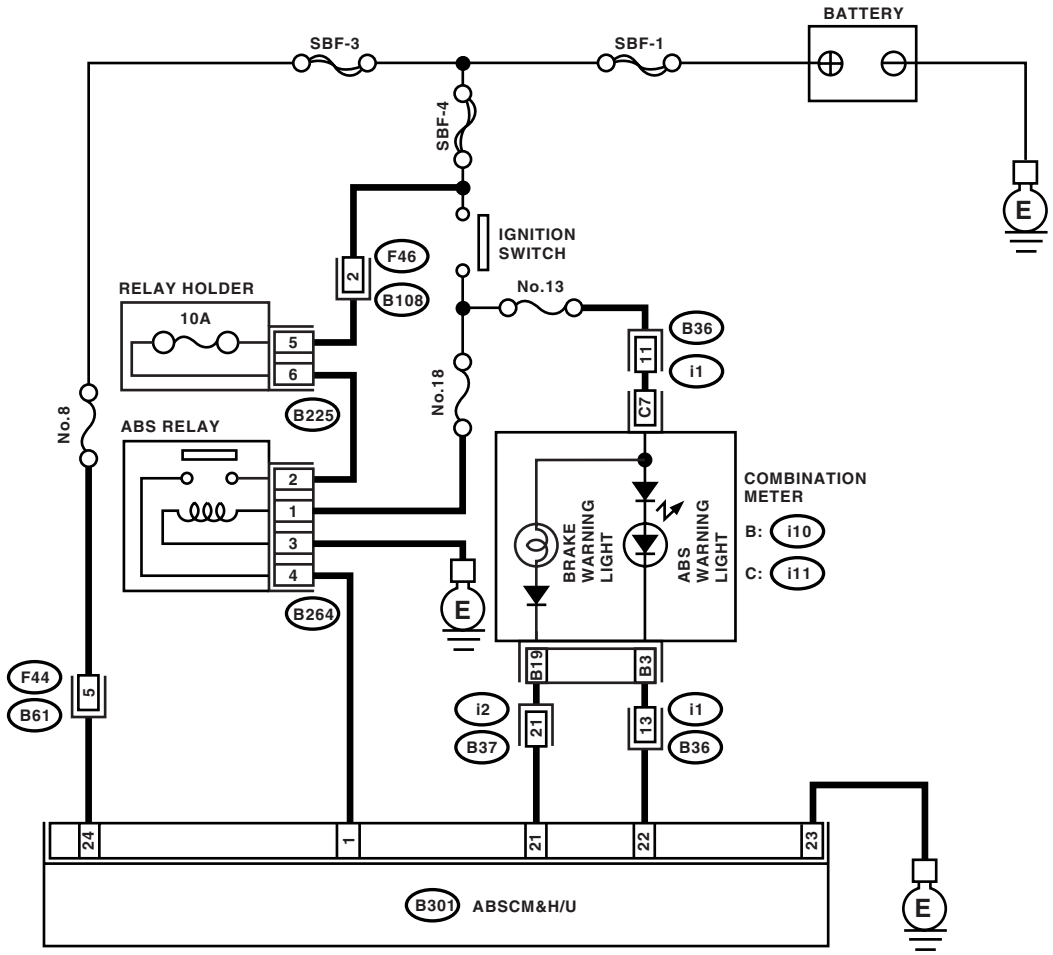
2. NO TROUBLE CODE

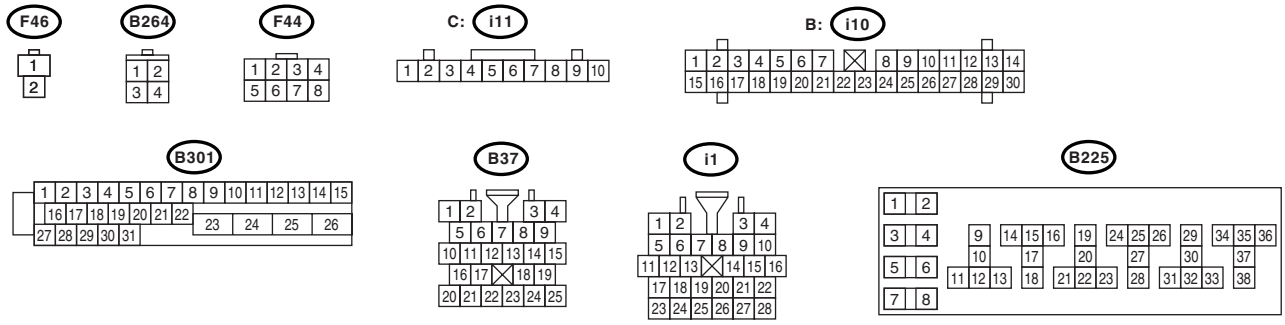
DIAGNOSIS:
ABS warning light circuit is shorted.
TROUBLE SYMPTOM:
- ABS warning light remains on.
- NO TROUBLE CODE displayed on the Subaru Select Monitor.

NOTE:
When the ABS warning light is OFF and “NO TROUBLE CODE” is displayed on Subaru Select Monitor, the system is in normal condition.

WIRING DIAGRAM:

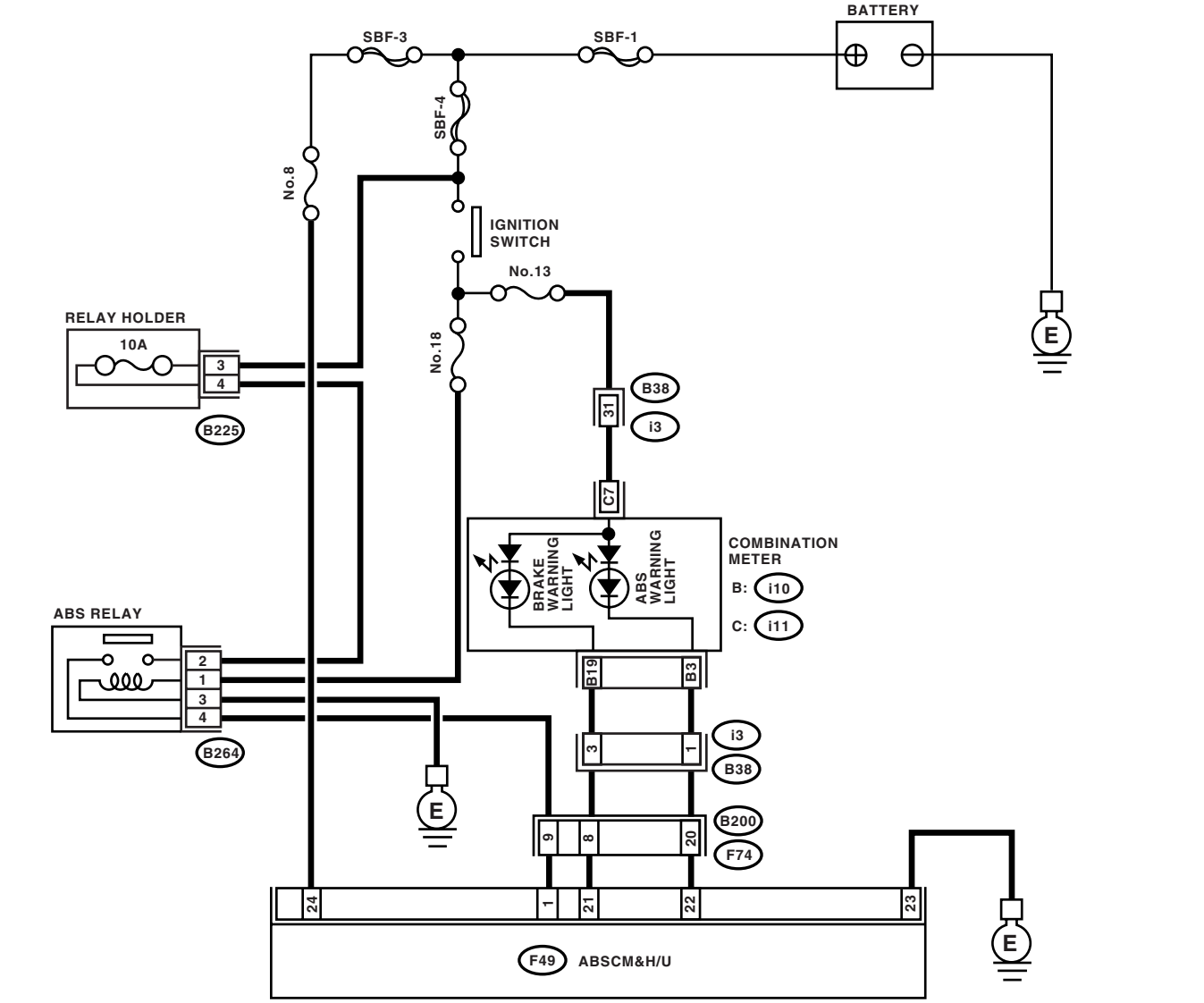
- LHD model

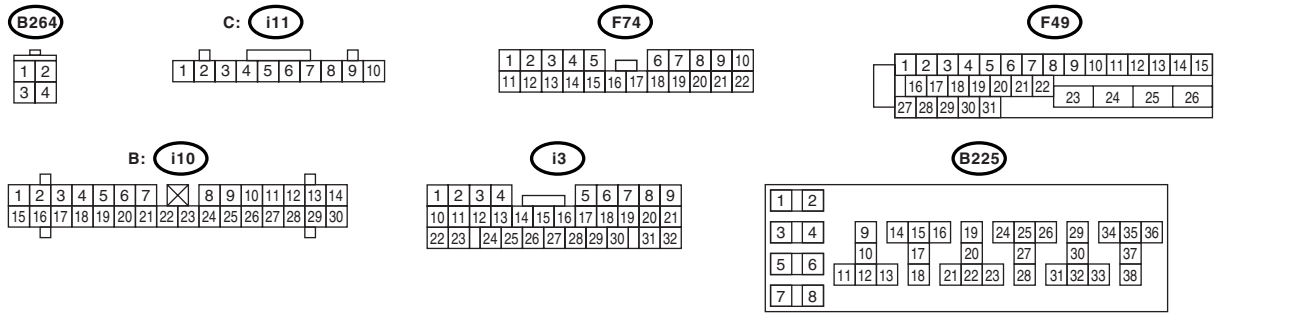




ABS00736

- RHD model





ABS00735

	Step	Check	Yes	No
1	**CHECK TERMINAL AT ABSCM&H/U.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ABSCM&H/U. NOTE: For detail of connector switch, refer to following. <Ref. to ABS(5.3i)(diag)-12, ELECTRICAL SPECIFICATION, Control Module I/O Signal.>	Is there any damage on projection which switches connector switch?	Go to step **2.**	Replace the ABSCM only. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>
2	**CHECK ABSCM&H/U.** Measure the resistance between ABSCM&H/U terminals. ***Terminals*** ***No. 22 — No. 23:***	Is the resistance more than 1 MΩ?	Go to step **3.**	Replace the ABSCM only. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>
3	**CHECK WIRING HARNESS.** Measure the resistance between connector and chassis ground. ***Connector & terminal*** ***LHD:*** ***(B301) No. 22 — Chassis ground:*** ***RHD:*** ***(F49) No. 22 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **4.**	Repair open circuit in the ABSCM&H/U ground harness.
4	**CHECK WIRING HARNESS.** 1) Connect the connector to ABSCM&H/U. 2) Disconnect the connector (i10) from combination meter. 3) Measure the resistance between connector (i10) and chassis ground. ***Connector & terminal*** ***(i10) No. 3 — Chassis ground:***	Is the resistance more than 1 MΩ?	Repair the combination meter. <Ref. to IDI-12, Combination Meter.>	Repair the ground short circuit of harness between ABSCM&H/U connector and combination meter connector.

7. Read Diagnostic Trouble Code (DTC)

A: OPERATION

Refer to SUBARU SELECT MONITOR for information about how to obtain and understand DTCs. <Ref. to ABS(5.3i)(diag)-16, Subaru Select Monitor.>

8. Inspection Mode

A: OPERATION

WARNING:
Observe the road traffic law.

Reproduce the condition under which the problem has occurred as much as possible.
Drive the vehicle at a speed more than 40 km/h (25 MPH) for at least 1 minute.

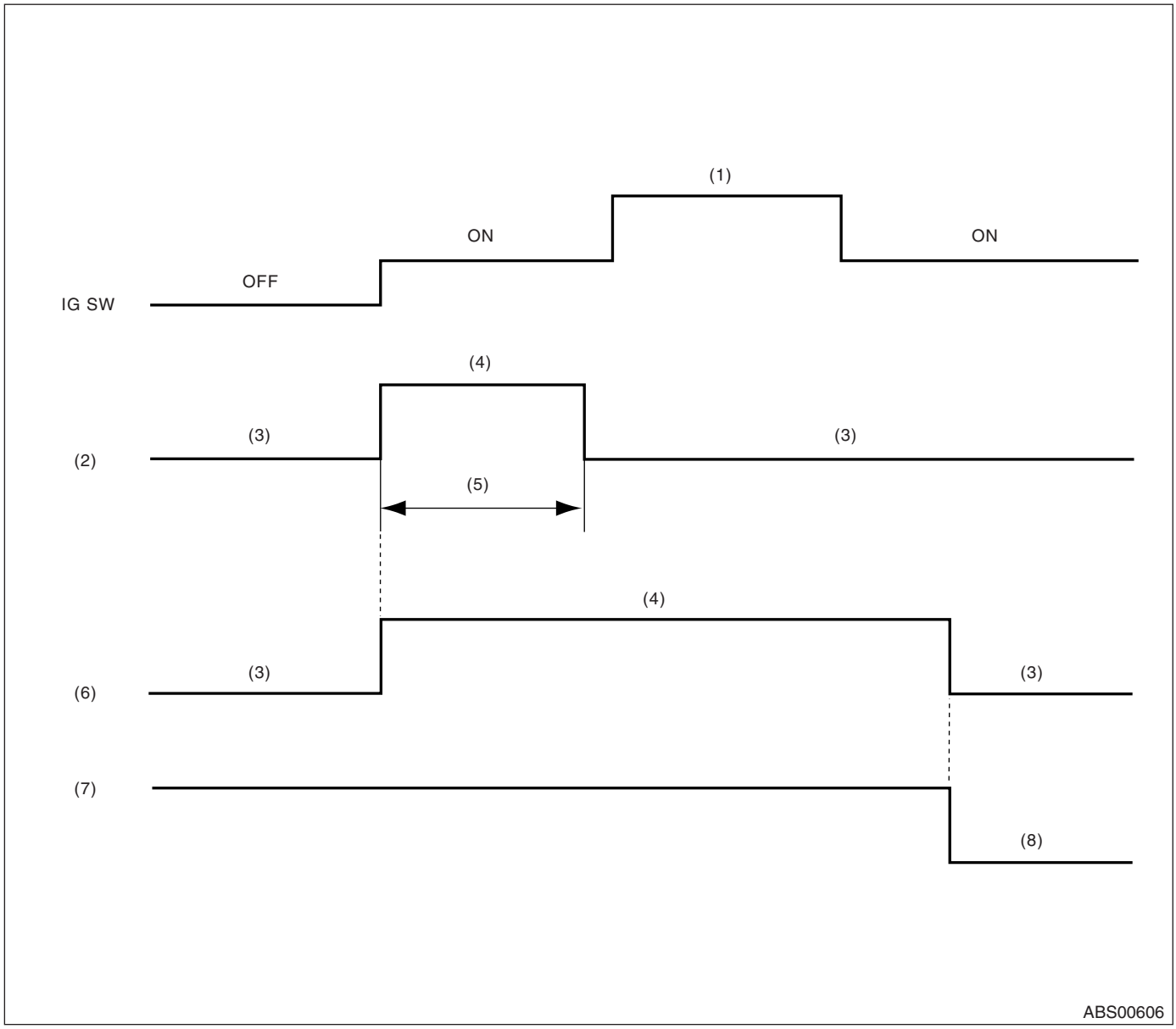
9. Clear Memory Mode

A: OPERATION

Refer to SUBARU SELECT MONITOR for information about how to clear DTC. <Ref. to ABS(5.3i)(diag)-16, Subaru Select Monitor.>

10.ABS Warning Light / Brake Warning Light Illumination Pattern

A: INSPECTION



(1) START
(2) ABS warning light
(3) Go off
(4) Illuminates
(5) Approx. 2 sec.
(6) Brake warning light (EBD warning light)
(7) Parking brake
(8) Release

1) When the ABS warning light does not illuminate in accordance with this illumination pattern, there must be an electrical malfunction.
2) When the ABS warning light remains constantly OFF, repair the ABS warning light circuit or diagnosis circuit.

NOTE:
Even though the ABS warning light does not go out approx. 2 seconds after it illuminates, the ABS system operates normally when the warning light goes out while driving at approx. 12 km/h (7 MPH). However, the Anti-lock brakes do not work while ABS warning light is illuminated.

B: ABS WARNING LIGHT DOES NOT COME ON

DIAGNOSIS:

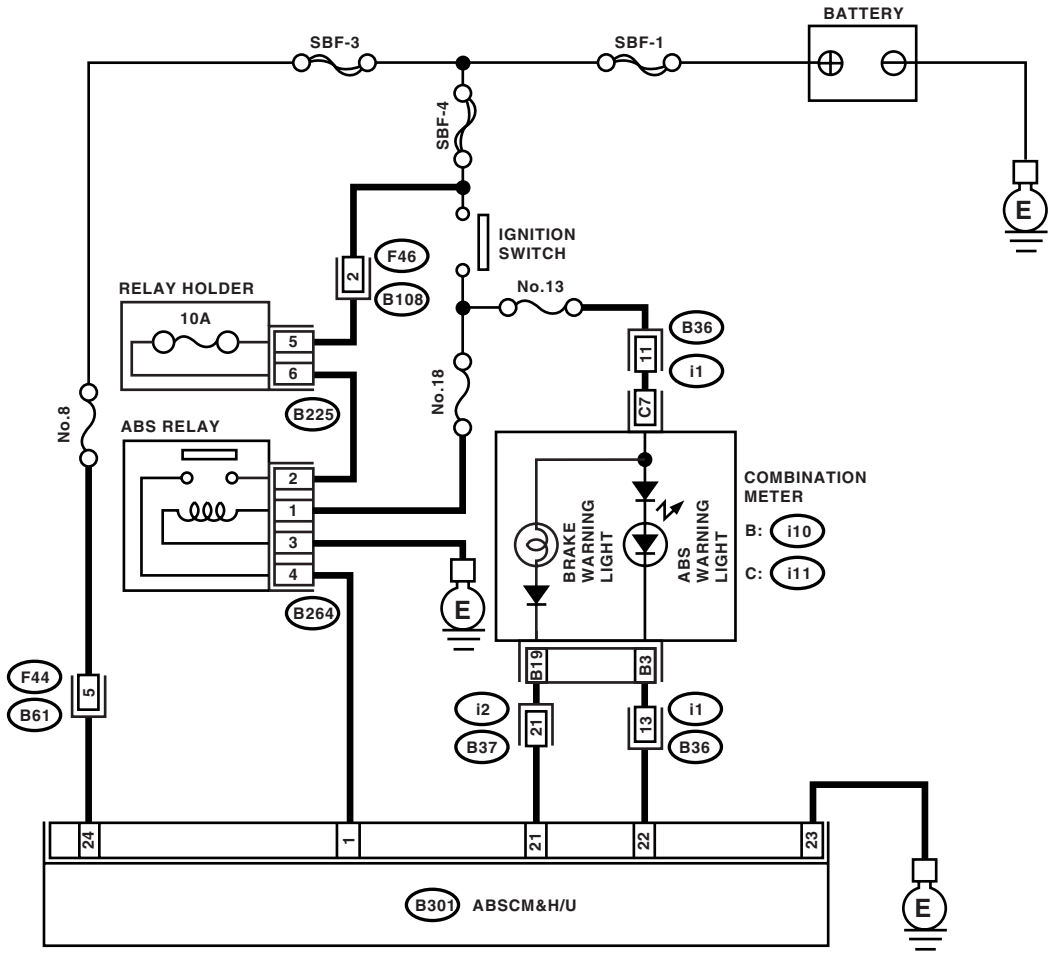
ABS warning light circuit is open or shorted.

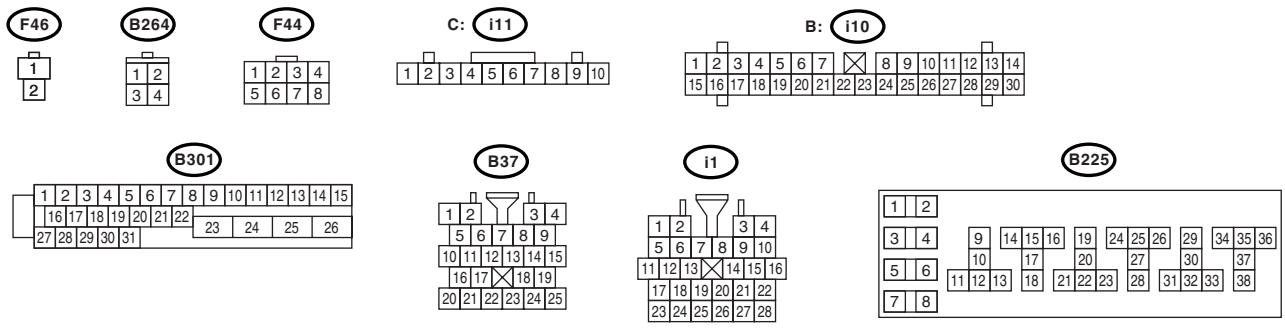
TROUBLE SYMPTOM:

When the ignition switch is turned to ON (engine OFF), ABS warning light does not come on.

WIRING DIAGRAM:

- LHD model

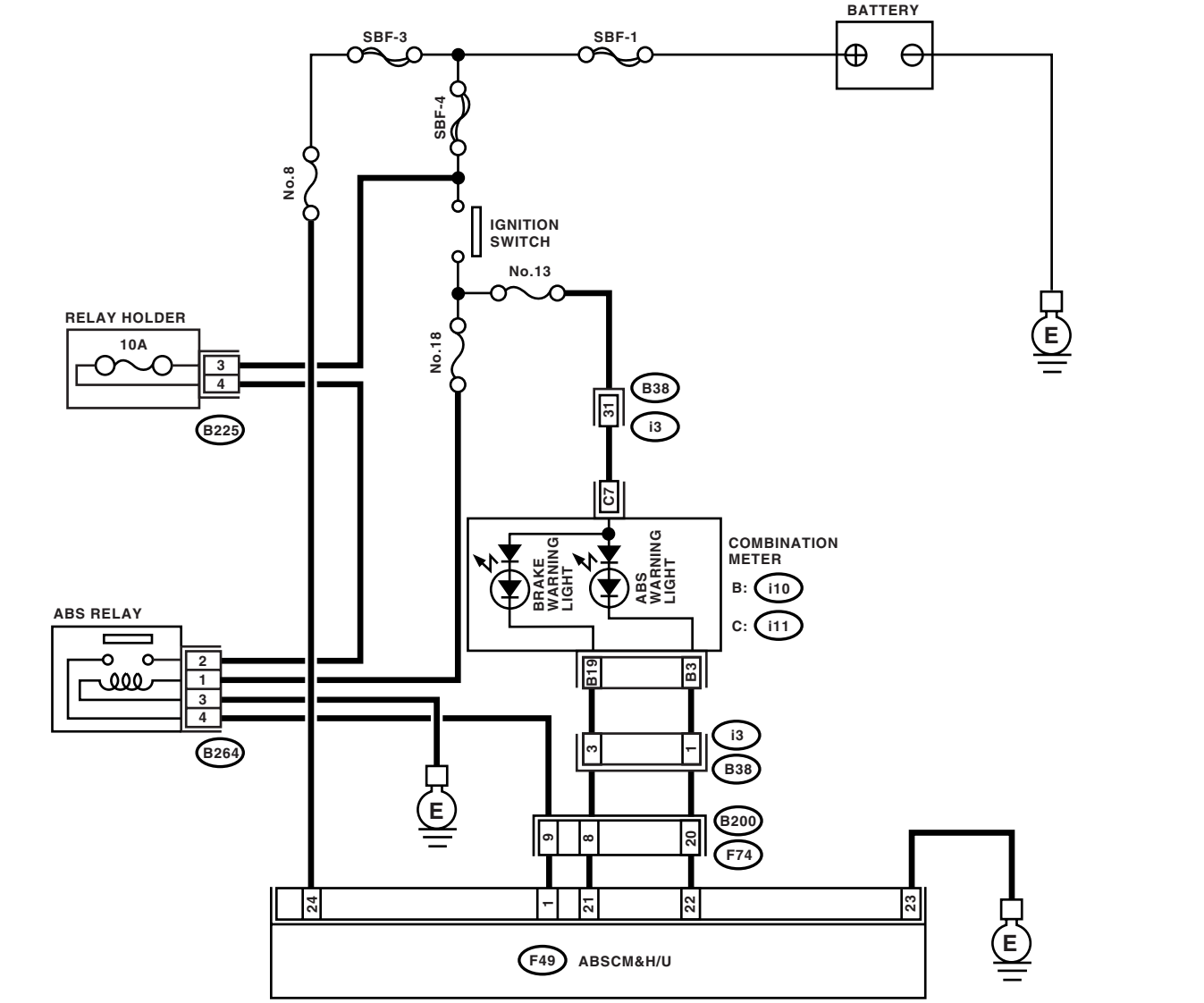


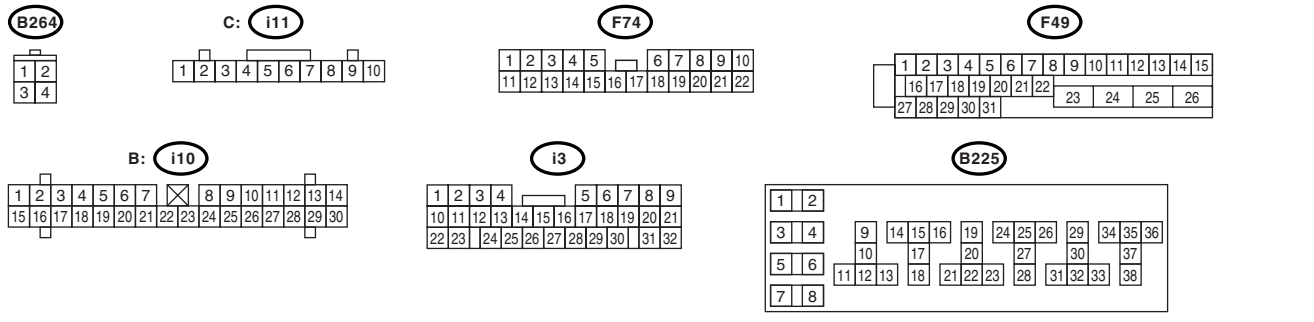


ABS00736

ABS Warning Light / Brake Warning Light Illumination Pattern

- RHD model





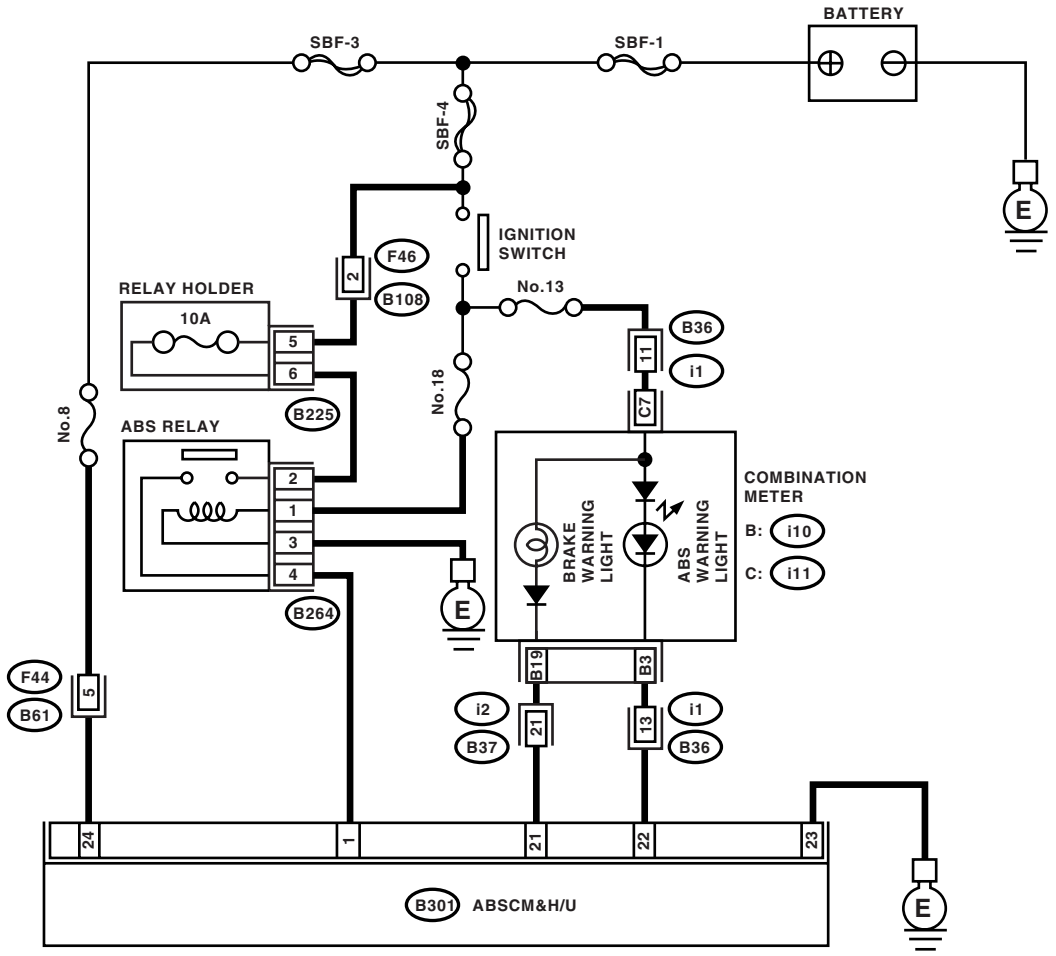
ABS00735

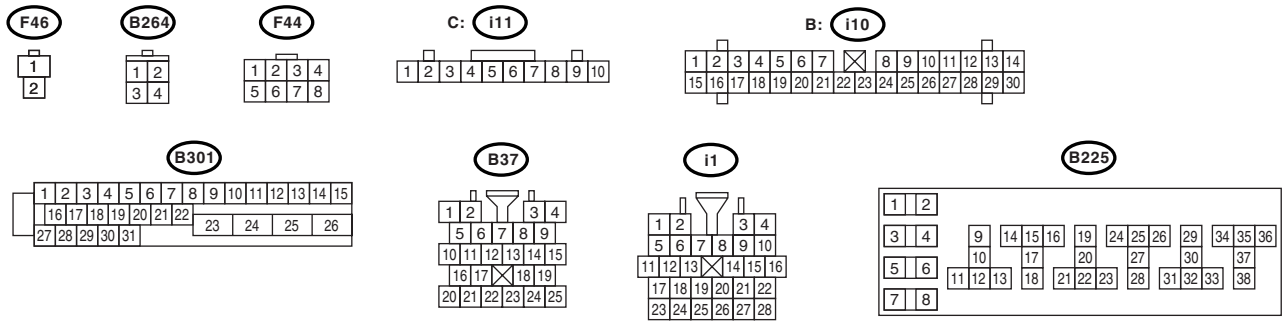
ABS Warning Light / Brake Warning Light Illumination Pattern

	Step	Check	Yes	No
1	**CHECK IF OTHER WARNING LIGHTS TURN ON.** Turn the ignition switch to ON (engine OFF).	Are other warning lights turned on?	Go to step **2.**	Repair the combination meter. <Ref. to IDI-12, Combination Meter.>
2	**READ DTC.** Read the DTC. <Ref. to ABS(5.3i)(diag)-25, Read Diagnostic Trouble Code (DTC).>	Is DTC displayed?	Perform the diagnosis according to DTC.	Go to step **3.**
3	**CHECK ABSCM.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ABSCM&H/U. 3) Turn the ignition to ON.	Does the ABS warning lights illuminate?	Go to step **4.**	Replace the ABSCM only. <Ref. to ABS-11, REPLACEMENT, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>
4	**CHECK GROUND CIRCUIT OF ABSCM&H/U.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between ABSCM connector and chassis ground. ***Connector & terminal*** ***LHD:*** ***(B301) No. 23 — Chassis ground:*** ***RHD:*** ***(F49) No. 23 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **5.**	Repair the open circuit in the ABSCM&H/U ground harness.
5	**CHECK WIRING HARNESS.** 1) Disconnect the connector (i10) from combination meter. 2) Measure the resistance between ABSCM connector and combination meter connector. ***Connector & terminal*** ***LHD:*** ***(B301) No. 22 — (i10) No. 3:*** ***RHD:*** ***(F49) No. 22 — (i10) No. 3:***	Is the resistance less than 0.5 Ω?	Repair the combination meter. <Ref. to IDI-12, Combination Meter.>	Repair open circuit in the harness/connector, between ABSCM&H/U and combination meter.

C: ABS WARNING LIGHT DOES NOT GO OFF

DIAGNOSIS:
ABS warning light circuit is open or shorted.
TROUBLE SYMPTOM:
When starting the engine ABS warning light is kept ON.
WIRING DIAGRAM:
- LHD model

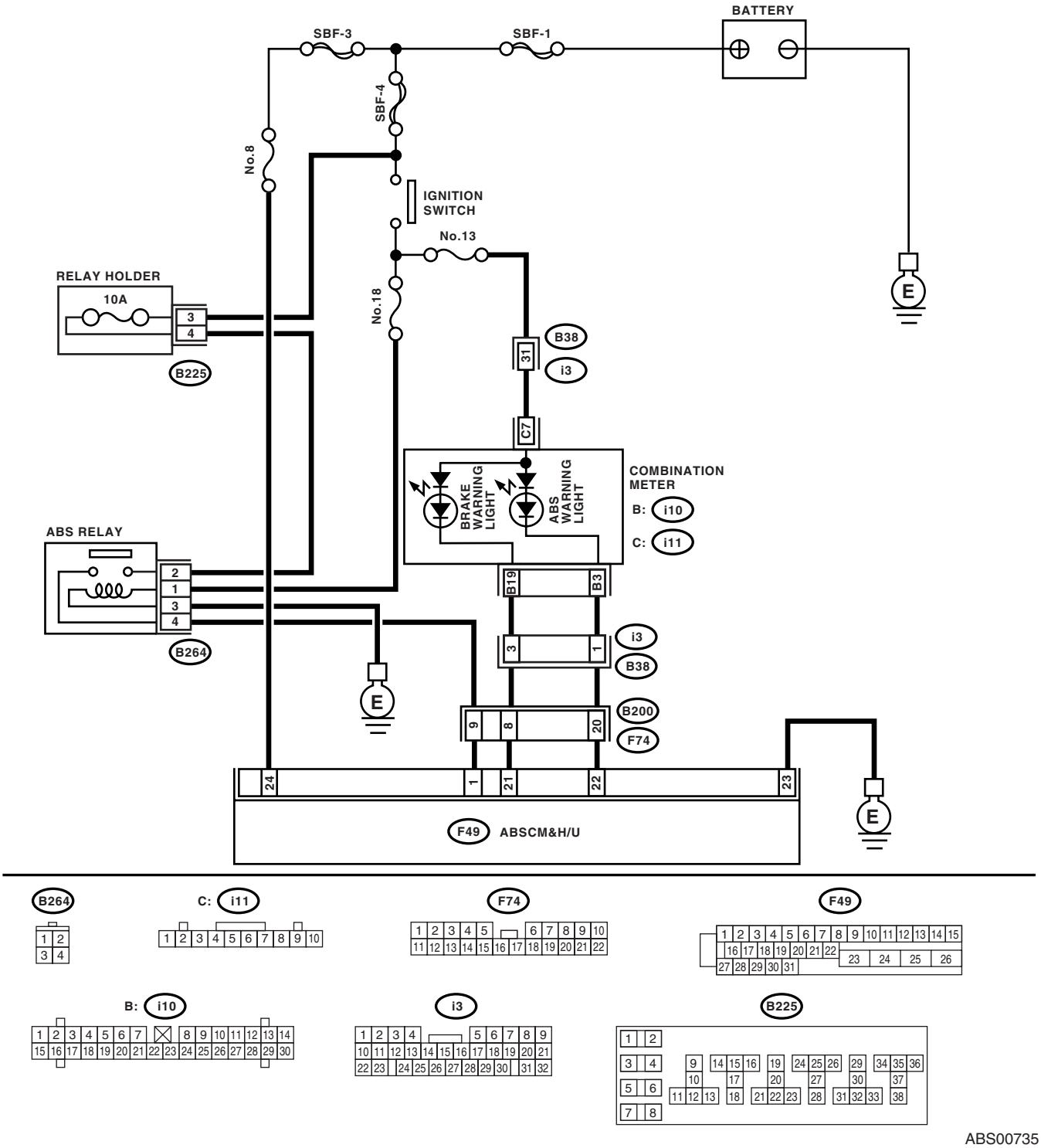




ABS00736

ABS Warning Light / Brake Warning Light Illumination Pattern

- RHD model



ABS00735

	Step	Check	Yes	No
1	**CHECK INSTALLATION OF ABSCM&H/U CONNECTOR.** Turn the ignition switch to OFF.	Is the ABSCM&H/U connector inserted into ABSCM&H/U until the clamp locks onto it?	Go to step **2.**	Insert the ABSCM&H/U connector into ABSCM&H/U until the clamp locks onto it.
2	**READ DTC.** Read the DTC. <Ref. to ABS(5.3i)(diag)-25, Read Diagnostic Trouble Code (DTC).>	Is DTC displayed?	Perform the diagnosis according to DTC.	Go to step **3.**
3	**CHECK GENERATOR.** 1) Start the engine. 2) Idle the engine. 3) Measure the voltage between generator and chassis ground. ***Terminal*** ***Generator B terminal (+) — Chassis ground (−):***	Is the voltage 10 — 15 V?	Go to step **4.**	Repair the generator. <Ref. to SC(H4SO)-14, Generator.>
4	**CHECK BATTERY TERMINAL.** Turn the ignition switch to OFF.	Is there poor contact at battery terminal?	Repair or tighten the battery terminal.	Go to step **5.**
5	**CHECK POWER SUPPLY OF ABSCM.** 1) Disconnect the connector from ABSCM&H/U. 2) Start the engine. 3) Idle the engine. 4) Measure the voltage between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***LHD:*** ***(B301) No. 1 (+) — Chassis ground (−):*** ***RHD:*** ***(F49) No. 1 (+) — Chassis ground (−):***	Is the voltage 10 — 15 V?	Go to step **6.**	Repair the ABSCM&H/U power supply unit.
6	**CHECK PROJECTION AT ABSCM&H/U.** Turn the ignition switch to OFF. NOTE: For detail of connector switch, refer to following. <Ref. to ABS(5.3i)(diag)-12, ELECTRICAL SPECIFICATION, Control Module I/O Signal.>	Is there any damage on projection which switches connector switch?	Replace the ABSCM only. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **7.**
7	**CHECK ABSCM&H/U.** Measure the resistance between ABSCM&H/U terminals. ***Terminal*** ***No. 22 — No. 23:***	Is the resistance more than 1 MΩ?	Go to step **8.**	Replace the ABSCM only. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>
8	**CHECK WIRING HARNESS.** 1) On LHD model, disconnect the connector (i1) from connector (B36). On RHD model, disconnect the connector (i3) from connector (B38). 2) On LHD model, measure the resistance between connector (B36) and chassis ground. On RHD model, measure the resistance between connector (B38) and chassis ground. ***Connector & terminal*** ***LHD:*** ***(B36) No. 13 — Chassis ground:*** ***RHD:*** ***(F38) No. 1 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **9.**	Repair the harness.

	Step	Check	Yes	No
9	**CHECK WIRING HARNESS.** 1) Connect the connector to ABSCM&H/U. 2) Disconnect the connector (i10) from combination meter. 3) Measure the resistance between connector (i10) and chassis ground. ***Connector & terminal*** ***(i10) No. 3 — Chassis ground:***	Is the resistance more than 1 MΩ?	Repair the combination meter. <Ref. to IDI-12, Combination Meter.>	Repair the ground short of harness between ABSCM&H/U connector and combination meter connector.

D: BRAKE WARNING LIGHT DOES NOT GO OFF

DIAGNOSIS:

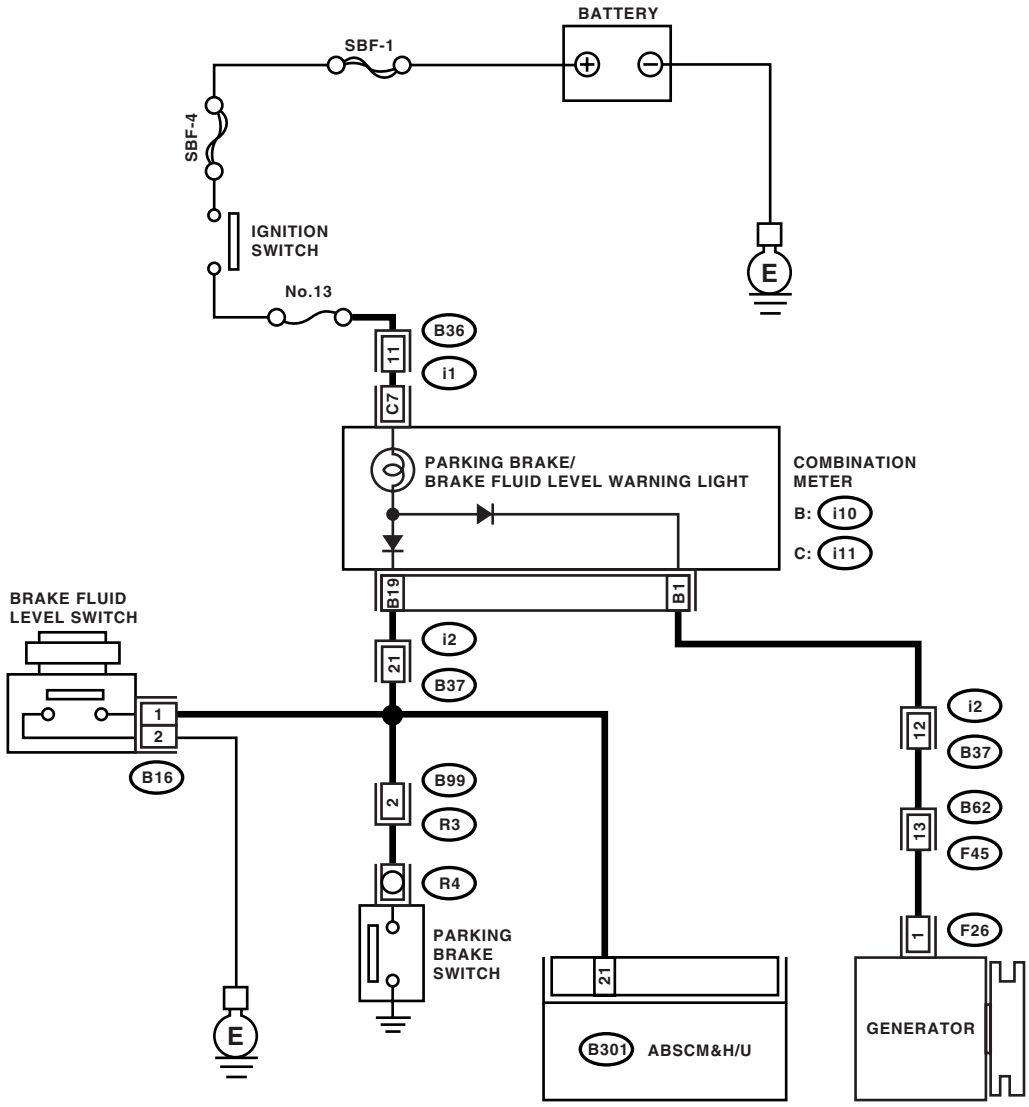
- Brake warning light circuit is shorted.
- Faulty sensor/connector

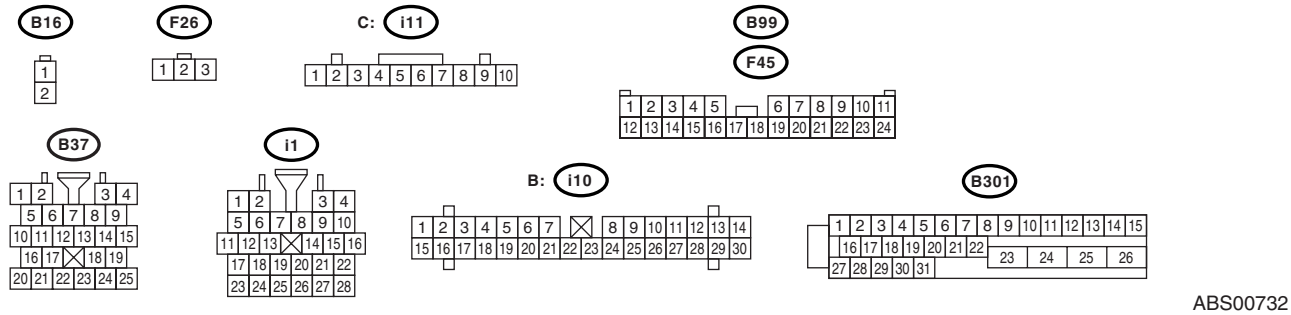
TROUBLE SYMPTOM:

After starting the engine, brake warning light is kept ON, even if the parking brake lever has been released.

WIRING DIAGRAM:

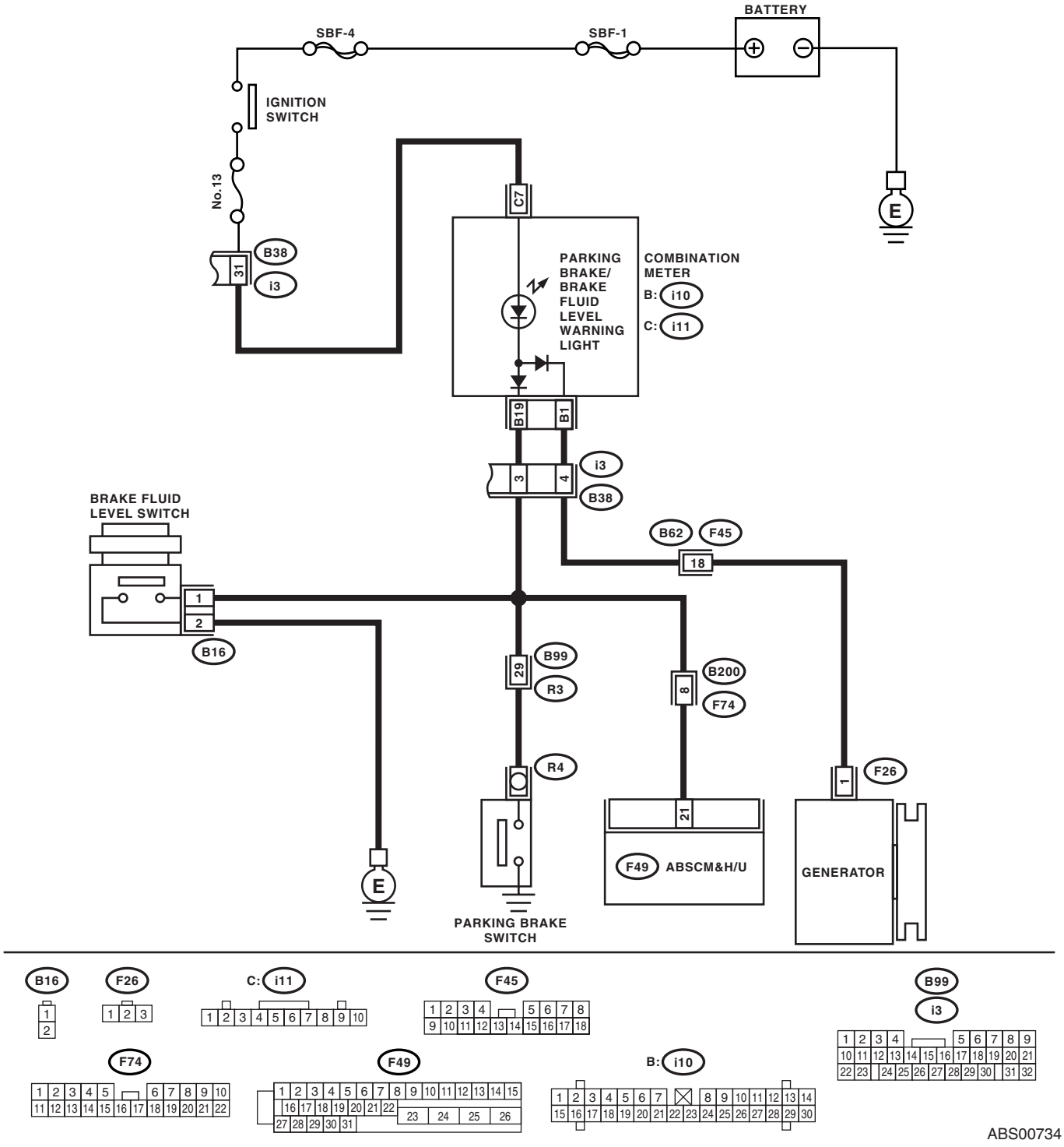
- LHD model





ABS00732

- RHD model


BATTERY
SBF-4
SBF-1
IGNITION SWITCH
No.13
B38
i3
C7
PARKING BRAKE/ BRAKE FLUID LEVEL WARNING LIGHT
COMBINATION METER
B: i10
C: i11
B19
B1
i3
B38
BRAKE FLUID LEVEL SWITCH
B16
B62
F45
18
B99
R3
29
B200
F74
8
R4
F26
1
21
F49 ABSCM&H/U
GENERATOR
E
PARKING BRAKE SWITCH
B16
F26
C: i11
F45
B99
i3
F74
F49
B: i10
ABS00734

	Step	Check	Yes	No
1	**CHECK BRAKE FLUID AMOUNT.** Check the amount of brake fluid in reservoir tank of master cylinder.	Is the brake fluid amount between “MAX” line and “MIN” line?	Go to step **2.**	Fill the brake fluid to specified amount.
2	**CHECK BRAKE FLUID LEVEL SWITCH.** 1) Disconnect the level switch connector (B16) from master cylinder. 2) Measure the resistance of master cylinder terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance more than 1 MΩ?	Go to step **3.**	Replace the master cylinder.
3	**CHECK PARKING BRAKE SWITCH.** 1) Disconnect the connector (R4) from parking brake switch. 2) Release the parking brake switch. 3) Measure the resistance between parking brake switch terminal and chassis ground.	Is the resistance more than 1 MΩ?	Go to step **4.**	Replace the parking brake switch.
4	**CHECK GROUND SHORT OF HARNESS.** 1) Disconnect the connector form ABSCM & H/U. 2) Disconnect the connector (F26) from generator. 3) Turn the ignition switch to ON.	Does the brake warning light go off?	Go to step **5.**	Repair the ground short of harness.
5	**CHECK POOR CONTACT IN ABSCM & H/U.**	Is there poor contact in ABSCM & H/U connector?	Repair the connector.	Replace the ABSCM only. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>

11.List of Diagnostic Trouble Code (DTC)

A: LIST

DTC	Sub code No.	Display screen	Contents of diagnosis	Index No.
—	—	Communication for initializing impossible	Select monitor communication failure	<Ref. to ABS(5.3i)(diag)-19, COMMUNICATION FOR INITIALIZING IMPOSSIBLE, INSPECTION, Subaru Select Monitor.>
—	—	No trouble code	Although no trouble code appears on the Subaru Select Monitor display, the ABS warning light remains on.	<Ref. to ABS(5.3i)(diag)-21, NO TROUBLE CODE, INSPECTION, Subaru Select Monitor.>
21	4A02	Open or short circuit in Front ABS wheel speed sensor RH circuit	Open or short circuit in Front ABS wheel speed sensor RH circuit	<Ref. to ABS(5.3i)(diag)-42, DTC 21 OPEN OR SHORT CIRCUIT IN FRONT RIGHT ABS WHEEL SPEED SENSOR CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
22	48C5, 4945 48E5, 4845 4905, 4885	Front ABS wheel speed sensor RH abnormal signal	Front ABS wheel speed sensor RH abnormal signal	<Ref. to ABS(5.3i)(diag)-50, DTC 22 FRONT RIGHT ABNORMAL ABS WHEEL SPEED SENSOR SIGNAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
23	4202	Open or short circuit in Front ABS wheel speed sensor LH circuit	Open or short circuit in Front ABS wheel speed sensor LH circuit	<Ref. to ABS(5.3i)(diag)-42, DTC 23 OPEN OR SHORT CIRCUIT IN FRONT LEFT ABS WHEEL SPEED SENSOR CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
24	40C5, 4145 40E5, 4045 4105, 4085	Front ABS wheel speed sensor LH abnormal signal	Front ABS wheel speed sensor LH abnormal signal	<Ref. to ABS(5.3i)(diag)-50, DTC 24 FRONT LEFT ABNORMAL ABS WHEEL SPEED SENSOR SIGNAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
25	4602	Open or short circuit in Rear ABS wheel speed sensor RH circuit	Open or short circuit in Rear ABS wheel speed sensor RH circuit	<Ref. to ABS(5.3i)(diag)-42, DTC 25 OPEN OR SHORT CIRCUIT IN REAR RIGHT ABS WHEEL SPEED SENSOR CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
26	44C5, 4545 44E5, 4445 4505, 4485	Rear ABS wheel speed sensor RH abnormal signal	Rear ABS wheel speed sensor RH abnormal signal	<Ref. to ABS(5.3i)(diag)-50, DTC 26 REAR RIGHT ABNORMAL ABS WHEEL SPEED SENSOR SIGNAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
27	4E02	Open or short circuit in Rear ABS wheel speed sensor LH circuit	Open or short circuit in Rear ABS wheel speed sensor LH circuit	<Ref. to ABS(5.3i)(diag)-43, DTC 27 OPEN OR SHORT CIRCUIT IN REAR LEFT ABS WHEEL SPEED SENSOR CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
28	4CC5, 4D45 4CE5, 4C45 4D05, 4C85	Rear ABS wheel speed sensor LH abnormal signal	Rear ABS wheel speed sensor LH abnormal signal	<Ref. to ABS(5.3i)(diag)-51, DTC 28 REAR LEFT ABNORMAL ABS WHEEL SPEED SENSOR SIGNAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
29	5080 50C0	Abnormal ABS wheel speed sensor signal on any one of four sensor	Abnormal ABS wheel speed sensor signal on any one of four	<Ref. to ABS(5.3i)(diag)-58, DTC 29 ABNORMAL ABS WHEEL SPEED SENSOR SIGNAL ON ANY ONE OF FOUR SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
31	3200	Front inlet valve RH malfunction	Front inlet valve RH malfunction	<Ref. to ABS(5.3i)(diag)-63, DTC 31 FRONT RIGHT INLET VALVE MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
32	3600	Front outlet valve RH malfunction	Front outlet valve RH malfunction	<Ref. to ABS(5.3i)(diag)-65, DTC 32 FRONT RIGHT OUTLET VALVE MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
33	2200	Front inlet valve LH malfunction	Front inlet valve LH malfunction	<Ref. to ABS(5.3i)(diag)-63, DTC 33 FRONT LEFT INLET VALVE MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

List of Diagnostic Trouble Code (DTC)

DTC	Sub code No.	Display screen	Contents of diagnosis	Index No.
34	2600	Front outlet valve LH malfunction	Front outlet valve LH malfunction	<Ref. to ABS(5.3i)(diag)-65, DTC 34 FRONT LEFT OUTLET VALVE MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
35	2A00	Rear inlet valve RH malfunction	Rear inlet valve RH malfunction	<Ref. to ABS(5.3i)(diag)-63, DTC 35 REAR RIGHT INLET VALVE MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
36	2E00	Rear outlet valve RH malfunction	Rear outlet valve RH malfunction	<Ref. to ABS(5.3i)(diag)-65, DTC 36 REAR RIGHT OUTLET VALVE MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
37	3A00	Rear inlet valve LH malfunction	Rear inlet valve LH malfunction	<Ref. to ABS(5.3i)(diag)-63, DTC 37 REAR LEFT INLET VALVE MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
38	3E00	Rear outlet valve LH malfunction	Rear outlet valve LH malfunction	<Ref. to ABS(5.3i)(diag)-66, DTC 38 REAR LEFT OUTLET VALVE MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
41	02A0, 0040, 0020, 02C0, 00E0, 0340, 0140, 0160, 0280, 0080, 0300	ABS control module malfunction	ABS control module and hydraulic control unit malfunction	<Ref. to ABS(5.3i)(diag)-69, DTC 41 ABS CONTROL MODULE MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
42	5A00	Power supply voltage too low	Power supply voltage too low	<Ref. to ABS(5.3i)(diag)-70, DTC 42 POWER SUPPLY VOLTAGE TOO LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	5A80	Power supply voltage too high	Power supply voltage too high	<Ref. to ABS(5.3i)(diag)-72, DTC 42 POWER SUPPLY VOLTAGE TOO HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
51	0C80 0EA0	Valve relay malfunction	Valve relay malfunction	<Ref. to ABS(5.3i)(diag)-75, DTC 51 VALVE RELAY MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	0C40	Valve relay ON failure	Valve relay ON failure	<Ref. to ABS(5.3i)(diag)-77, DTC 51 VALVE RELAY ON FAILURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
52	10A1	Open circuit in motor relay circuit	Open circuit in motor relay circuit	<Ref. to ABS(5.3i)(diag)-79, DTC 52 OPEN CIRCUIT IN MOTOR RELAY CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	10E1	Motor relay ON failure	Motor relay ON failure	<Ref. to ABS(5.3i)(diag)-81, DTC 52 MOTOR RELAY ON FAILURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	10C1	Motor malfunction	Motor malfunction	<Ref. to ABS(5.3i)(diag)-83, DTC 52 MOTOR MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
54	5600	Stop light switch signal circuit malfunction	Stop light switch signal circuit malfunction	<Ref. to ABS(5.3i)(diag)-85, DTC 54 STOP LIGHT SWITCH SIGNAL CIRCUIT MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
56	7600	Open or short circuit in G sensor circuit	Open or short circuit in G sensor circuit	<Ref. to ABS(5.3i)(diag)-87, DTC 56 OPEN OR SHORT CIRCUIT IN G SENSOR CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	7580	Battery short in G sensor circuit	Battery short in G sensor circuit	<Ref. to ABS(5.3i)(diag)-91, DTC 56 BATTERY SHORT IN G SENSOR CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	7540	Abnormal G sensor high μ output	Abnormal G sensor high μ output	<Ref. to ABS(5.3i)(diag)-96, DTC 56 ABNORMAL G SENSOR HIGH μ OUTPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	7500	Detection of G sensor stick	Detection of G sensor stick	<Ref. to ABS(5.3i)(diag)-100, DTC 56 DETECTION OF G SENSOR STICK, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC	Sub code No.	Display screen	Contents of diagnosis	Index No.
73	7A00	Open or short circuit in lateral G sensor circuit	Open or short circuit in lateral G sensor circuit	<Ref. to ABS(5.3i)(diag)-104, DTC 73 OPEN OR SHORT CIRCUIT IN LATERAL G SENSOR CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	7980	Battery short in lateral G sensor circuit	Battery short in lateral G sensor circuit	<Ref. to ABS(5.3i)(diag)-108, DTC 73 BATTERY SHORT IN LATERAL G SENSOR CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	7940	Abnormal lateral G sensor high μ output	Abnormal lateral G sensor high μ output	<Ref. to ABS(5.3i)(diag)-113, DTC 73 ABNORMAL LATERAL G SENSOR HIGH μ OUTPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	7900	Detection of lateral G sensor stick	Detection of lateral G sensor stick	<Ref. to ABS(5.3i)(diag)-117, DTC 73 DETECTION OF LATERAL G SENSOR STICK, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

12.Diagnostic Procedure with Diagnostic Trouble Code (DTC)

A: DTC 21 OPEN OR SHORT CIRCUIT IN FRONT RIGHT ABS WHEEL SPEED SENSOR CIRCUIT

NOTE:
For the diagnostic procedure, refer to DTC 27. <Ref. to ABS(5.3i)(diag)-43, DTC 27 OPEN OR SHORT CIRCUIT IN REAR LEFT ABS WHEEL SPEED SENSOR CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

B: DTC 23 OPEN OR SHORT CIRCUIT IN FRONT LEFT ABS WHEEL SPEED SENSOR CIRCUIT

NOTE:
For the diagnostic procedure, refer to DTC 27. <Ref. to ABS(5.3i)(diag)-43, DTC 27 OPEN OR SHORT CIRCUIT IN REAR LEFT ABS WHEEL SPEED SENSOR CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

C: DTC 25 OPEN OR SHORT CIRCUIT IN REAR RIGHT ABS WHEEL SPEED SENSOR CIRCUIT

NOTE:
For the diagnostic procedure, refer to DTC 27. <Ref. to ABS(5.3i)(diag)-43, DTC 27 OPEN OR SHORT CIRCUIT IN REAR LEFT ABS WHEEL SPEED SENSOR CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

D: DTC 27 OPEN OR SHORT CIRCUIT IN REAR LEFT ABS WHEEL SPEED SENSOR CIRCUIT

DIAGNOSIS:

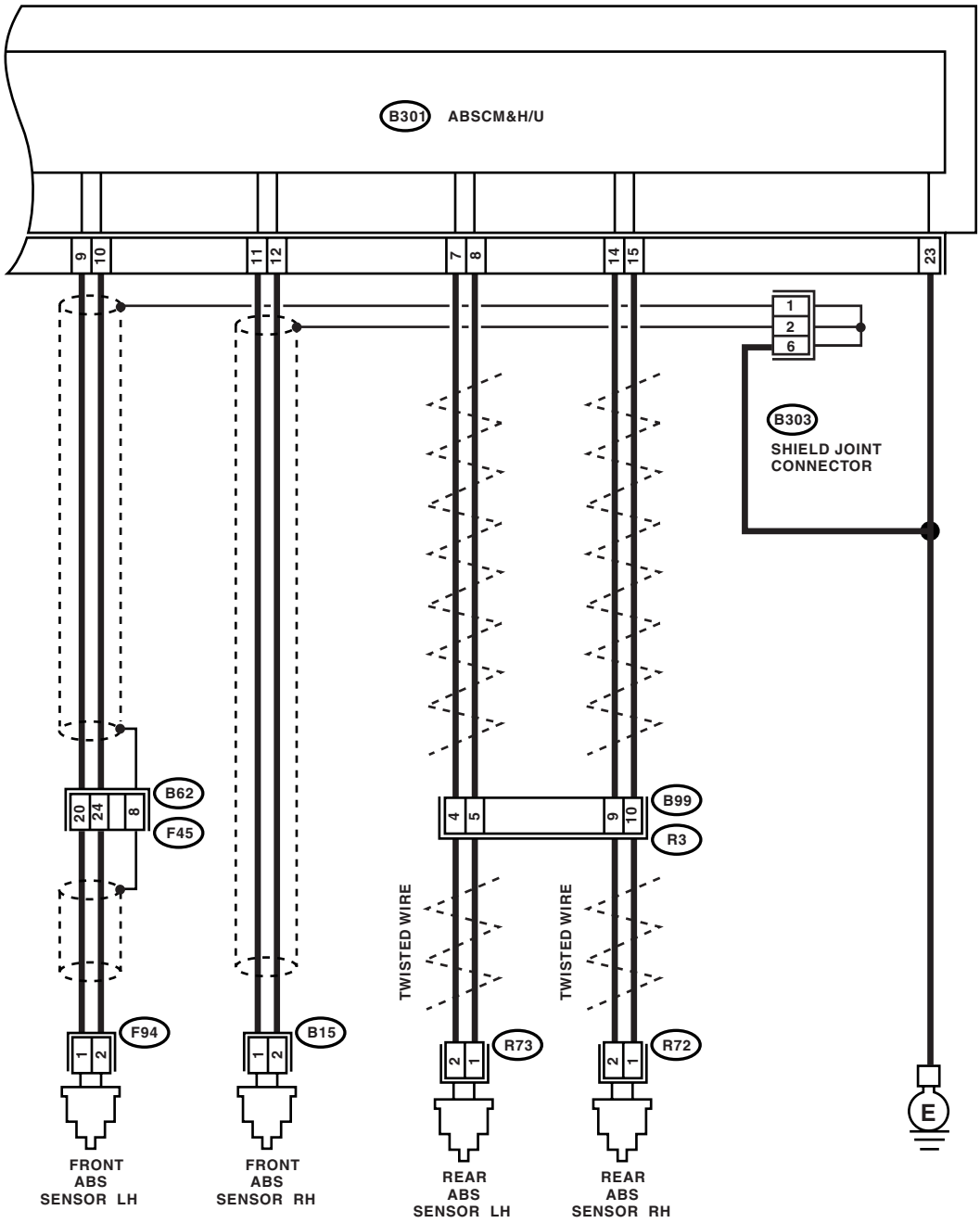
- Faulty ABS wheel speed sensor (Broken wire, input voltage too high)
- Faulty harness connector

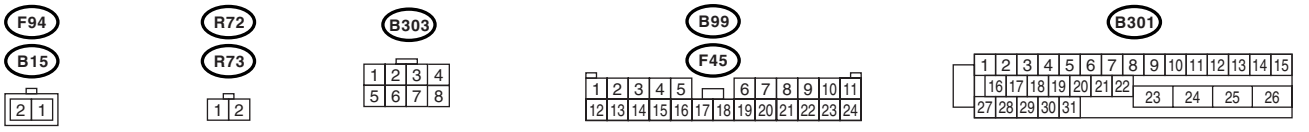
TROUBLE SYMPTOM:

ABS does not operate.

WIRING DIAGRAM:

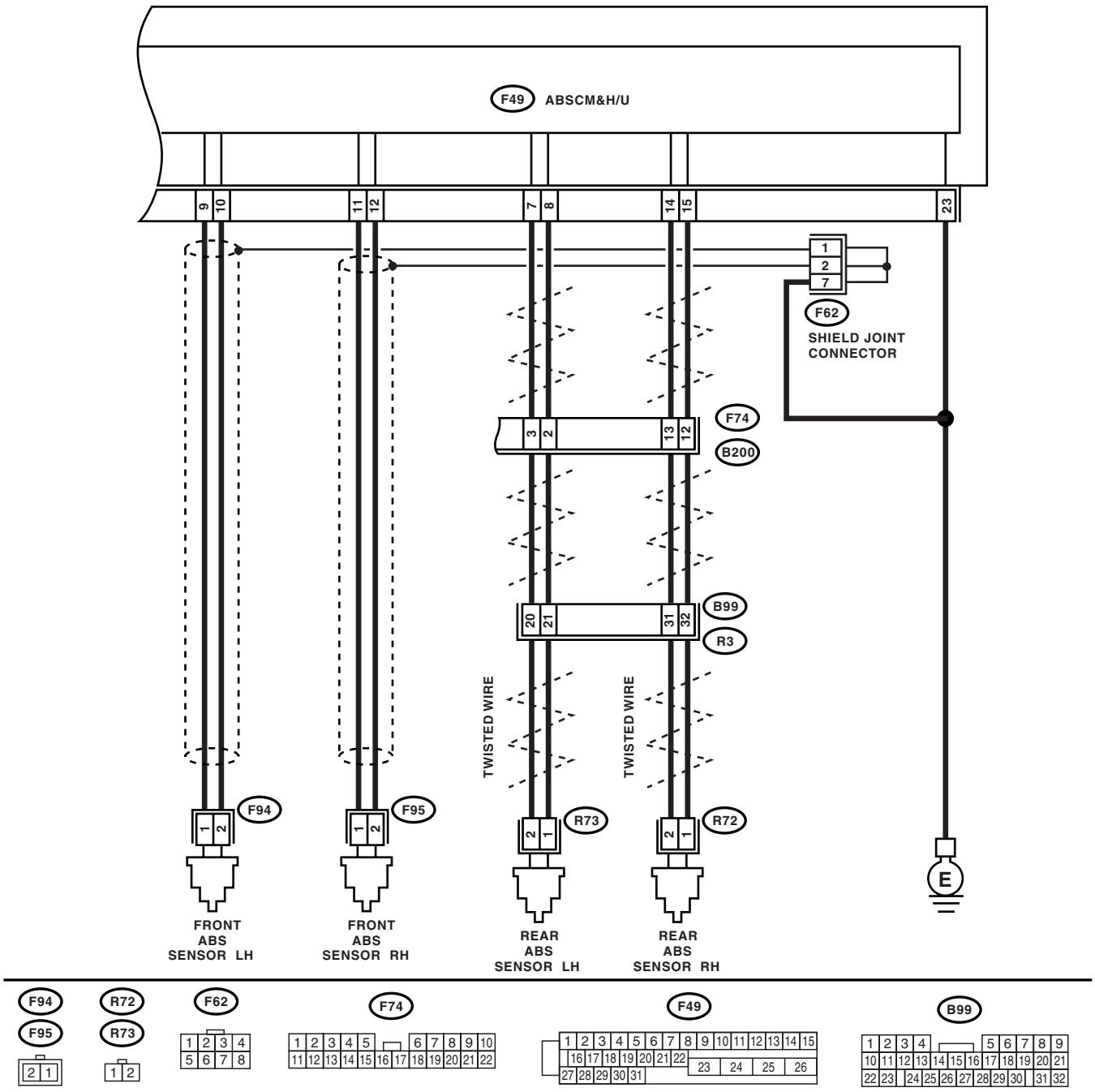
- LHD model





ABS00743

- RHD model



ABS00354

	Step	Check	Yes	No
1	**CHECK OUTPUT OF ABS WHEEL SPEED SENSOR USING SUBARU SELECT MONITOR.** 1) Select “Current data display & Save” on the Subaru Select Monitor. 2) Read the ABS wheel speed sensor output corresponding to faulty system in the Subaru Select Monitor data display mode.	Does the speed indicated on display change in response to speedometer reading during acceleration or deceleration when the steering wheel is in straight-ahead position?	Go to step **2.**	Go to step **8.**
2	**CHECK INSTALLATION OF ABS WHEEL SPEED SENSOR.**	Are the ABS wheel speed sensor installation bolts tightened 33 N·m (3.3 kgf-m, 24 ft-lb)?	Go to step **3.**	Tighten the ABS wheel speed sensor installation bolts securely.
3	**CHECK ABS WHEEL SPEED SENSOR GAP.** Measure the tone wheel to ABS wheel speed sensor piece gap over entire perimeter of the wheel.	Is the gap as following value? Front wheel: 0.3 — 0.8 mm (0.012 — 0.031 in) /Rear wheel: 0.7 — 1.2 mm (0.028 — 0.047 in)	Go to step **4.**	Adjust the gap. NOTE: Adjust the gap using spacers (Part No. 26755AA000). If the spacers cannot correct gap, replace worn sensor or worn tone wheel.
4	**CHECK TONE WHEEL RUNOUT.** Measure the tone wheel runout.	Is the runout less than 0.05 mm (0.0020 in)?	Go to step **5.**	Replace the tone wheel. Front: <Ref. to ABS-23, Front Tone Wheel.> Rear: <Ref. to ABS-24, Rear Tone Wheel.>
5	**CHECK POOR CONTACT IN CONNECTORS.** Turn the ignition switch to OFF.	Is there poor contact in connectors between ABSCM&H/U and ABS wheel speed sensor?	Repair the connector.	Go to step **6.**
6	**CHECK ABSCM&H/U.** 1) Connect all connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read out the DTC.	Is the same DTC as in the current diagnosis still being output?	Replace the ABSCM only. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **7.**
7	**CHECK ANY OTHER DIAGNOSTIC TROUBLE CODES (DTCs) APPEARANCE.**	Are other DTCs being output?	Proceed with the diagnosis corresponding to DTC.	A temporary poor contact. NOTE: Check the harness and connectors between ABSCM&H/U and ABS wheel speed sensor.

	Step	Check	Yes	No
8	**CHECK ABS WHEEL SPEED SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ABS wheel speed sensor. 3) Measure the resistance of ABS wheel speed sensor connector terminals while shaking the harness lightly. ***Terminals*** ***Front RH No. 1 — No. 2:*** ***Front LH No. 1 — No. 2:*** ***Rear RH No. 1 — No. 2:*** ***Rear LH No. 1 — No. 2:***	Is the resistance as following value? Front: 1 — 1.5 kΩ / Rear: 1.025 — 1.265 kΩ	Go to step **9.**	Replace the ABS wheel speed sensor. Front: <Ref. to ABS-17, Front ABS Wheel Speed Sensor.> Rear: <Ref. to ABS-20, Rear ABS Wheel Speed Sensor.>
9	**CHECK BATTERY SHORT OF ABS WHEEL SPEED SENSOR.** 1) Disconnect the connector from ABSCM& H/U. 2) Measure the voltage between ABS wheel speed sensor and chassis ground. ***Terminals*** ***Front RH No. 1 (+) — Chassis ground (−):*** ***Front LH No. 1 (+) — Chassis ground (−):*** ***Rear RH No. 1 (+) — Chassis ground (−):*** ***Rear LH No. 1 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **10.**	Replace the ABS wheel speed sensor. Front: <Ref. to ABS-17, Front ABS Wheel Speed Sensor.> Rear: <Ref. to ABS-20, Rear ABS Wheel Speed Sensor.>
10	**CHECK BATTERY SHORT OF ABS WHEEL SPEED SENSOR.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ABS wheel speed sensor and chassis ground. ***Terminals*** ***Front RH No. 1 (+) — Chassis ground (−):*** ***Front LH No. 1 (+) — Chassis ground (−):*** ***Rear RH No. 1 (+) — Chassis ground (−):*** ***Rear LH No. 1 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **11.**	Replace the ABS wheel speed sensor. Front: <Ref. to ABS-17, Front ABS Wheel Speed Sensor.> <Ref. to ABS-20, Rear ABS Wheel Speed Sensor.>

	Step	Check	Yes	No
11	**CHECK HARNESS/CONNECTOR BETWEEN ABSCM&H/U AND ABS WHEEL SPEED SENSOR.** 1) Turn the ignition switch to OFF. 2) Connect the connector to ABS wheel speed sensor. 3) Measure the resistance between ABSCM&H/U connector terminals. ***Connector & terminal*** ***DTC 21*** ***LHD:*** ***(B301) No. 11 — No. 12:*** ***RHD:*** ***(F49) No. 11 — No. 12:*** ***DTC 23*** ***LHD:*** ***(B301) No. 9 — No. 10:*** ***RHD:*** ***(F49) No. 9 — No. 10:*** ***DTC 25*** ***LHD:*** ***(B301) No. 14 — No. 15:*** ***RHD:*** ***(F49) No. 14 — No. 15:*** ***DTC 27*** ***LHD:*** ***(B301) No. 7 — No. 8:*** ***RHD:*** ***(F49) No. 7 — No. 8:***	Is the resistance as following value? Front: 1 — 1.5 kΩ / Rear: 1.025 — 1.265 kΩ	Go to step **12.**	Repair the harness/connector between ABSCM&H/U and ABS wheel speed sensor.
12	**CHECK BATTERY SHORT OF HARNESS.** Measure the voltage between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***DTC 21*** ***LHD:*** ***(B301) No. 11 (+) — Chassis ground (–):*** ***RHD:*** ***(F49) No. 11 (+) — Chassis ground (–):*** ***DTC 23*** ***LHD:*** ***(B301) No. 9 (+) — Chassis ground (–):*** ***RHD:*** ***(F49) No. 9 (+) — Chassis ground (–):*** ***DTC 25*** ***LHD:*** ***(B301) No. 14 (+) — Chassis ground (–):*** ***RHD:*** ***(F49) No. 14 (+) — Chassis ground (–):*** ***DTC 27*** ***LHD:*** ***(B301) No. 7 (+) — Chassis ground (–):*** ***RHD:*** ***(F49) No. 7 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Go to step **13.**	Repair the harness between ABSCM&H/U and ABS wheel speed sensor.

	Step	Check	Yes	No
13	**CHECK BATTERY SHORT OF HARNESS.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***DTC 21*** ***LHD:*** ***(B301) No. 11 (+) — Chassis ground (–):*** ***RHD:*** ***(F49) No. 11 (+) — Chassis ground (–):*** ***DTC 23*** ***LHD:*** ***(B301) No. 9 (+) — Chassis ground (–):*** ***RHD:*** ***(F49) No. 9 (+) — Chassis ground (–):*** ***DTC 25*** ***LHD:*** ***(B301) No. 14 (+) — Chassis ground (–):*** ***RHD:*** ***(F49) No. 14 (+) — Chassis ground (–):*** ***DTC 27*** ***LHD:*** ***(B301) No. 7 (+) — Chassis ground (–):*** ***RHD:*** ***(F49) No. 7 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Go to step **14.**	Repair the harness between ABSCM&H/U and ABS wheel speed sensor.
14	**CHECK INSTALLATION OF ABS WHEEL SPEED SENSOR.**	Are the ABS wheel speed sensor installation bolts tightened 33 N·m (3.3 kgf-m, 24 ft-lb)?	Go to step **15.**	Tighten the ABS wheel speed sensor installation bolts securely.
15	**CHECK ABS WHEEL SPEED SENSOR GAP.** Measure the tone wheel to ABS wheel speed sensor piece gap over entire perimeter of the wheel.	Is the gap as following value? Front wheel: 0.3 — 0.8 mm (0.012 — 0.031 in) /Rear wheel: 0.7 — 1.2 mm (0.028 — 0.047 in)	Go to step **16.**	Adjust the gap. NOTE: Adjust the gap using spacers (Part No. 26755AA000). If the spacers cannot correct gap, replace worn sensor or worn tone wheel.
16	**CHECK TONE WHEEL RUNOUT.** Measure the tone wheel runout.	Is the runout less than 0.05 mm (0.0020 in)?	Go to step **17.**	Replace the tone wheel. Front: <Ref. to ABS-23, Front Tone Wheel.> Rear: <Ref. to ABS-24, Rear Tone Wheel.>

	Step	Check	Yes	No
17	**CHECK GROUND SHORT OF ABS WHEEL SPEED SENSOR.** 1) Turn the ignition switch to ON. 2) Measure the resistance between ABS wheel speed sensor and chassis ground. ***Terminals*** ***Front RH No. 1 — Chassis ground:*** ***Front LH No. 1 — Chassis ground:*** ***Rear RH No. 1 — Chassis ground:*** ***Rear LH No. 1 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **18.**	Replace the ABS wheel speed sensor and ABSCM&H/U. Front: <Ref. to ABS-17, Front ABS Wheel Speed Sensor.> Rear: <Ref. to ABS-20, Rear ABS Wheel Speed Sensor.> and <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>
18	**CHECK GROUND SHORT OF HARNESS.** 1) Turn the ignition switch to OFF. 2) Connect the connector to ABS wheel speed sensor. 3) Measure the resistance between ABSCM&H/U connector terminal and chassis ground. ***Connector & terminal*** ***DTC 21*** ***LHD:*** ***(B301) No. 11 — Chassis ground:*** ***RHD:*** ***(F49) No. 11 — Chassis ground:*** ***DTC 23*** ***LHD:*** ***(B301) No. 9 — Chassis ground:*** ***RHD:*** ***(F49) No. 9 — Chassis ground:*** ***DTC 25*** ***LHD:*** ***(B301) No. 14 — Chassis ground:*** ***RHD:*** ***(F49) No. 14 — Chassis ground:*** ***DTC 27*** ***LHD:*** ***(B301) No. 7 — Chassis ground:*** ***RHD:*** ***(F49) No. 7 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **19.**	Repair the harness between ABSCM&H/U and ABS wheel speed sensor. And replace the ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>
19	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in connectors between ABSCM&H/U and ABS wheel speed sensor?	Repair the connector.	Go to step **20.**
20	**CHECK ABSCM&H/U.** 1) Connect all connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read out the DTC.	Is the same DTC as in current diagnosis still being output?	Replace the ABSCM only.	Go to step **21.**

Step		Check	Yes	No
21	**CHECK ANY OTHER DIAGNOSTIC TROUBLE CODES (DTCs) APPEARANCE.**	Are other DTCs being output?	Proceed with the diagnosis corresponding to DTC.	A temporary poor contact. NOTE: Check the harness and connectors between ABSCM&H/U and ABS wheel speed sensor.

E: DTC 22 FRONT RIGHT ABNORMAL ABS WHEEL SPEED SENSOR SIGNAL

NOTE:
For the diagnostic procedure, refer to DTC 28. <Ref. to ABS(5.3i)(diag)-51, DTC 28 REAR LEFT ABNORMAL ABS WHEEL SPEED SENSOR SIGNAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

F: DTC 24 FRONT LEFT ABNORMAL ABS WHEEL SPEED SENSOR SIGNAL

NOTE:
For the diagnostic procedure, refer to DTC 28. <Ref. to ABS(5.3i)(diag)-51, DTC 28 REAR LEFT ABNORMAL ABS WHEEL SPEED SENSOR SIGNAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

G: DTC 26 REAR RIGHT ABNORMAL ABS WHEEL SPEED SENSOR SIGNAL

NOTE:
For the diagnostic procedure, refer to DTC 28. <Ref. to ABS(5.3i)(diag)-51, DTC 28 REAR LEFT ABNORMAL ABS WHEEL SPEED SENSOR SIGNAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

H: DTC 28 REAR LEFT ABNORMAL ABS WHEEL SPEED SENSOR SIGNAL

DIAGNOSIS:

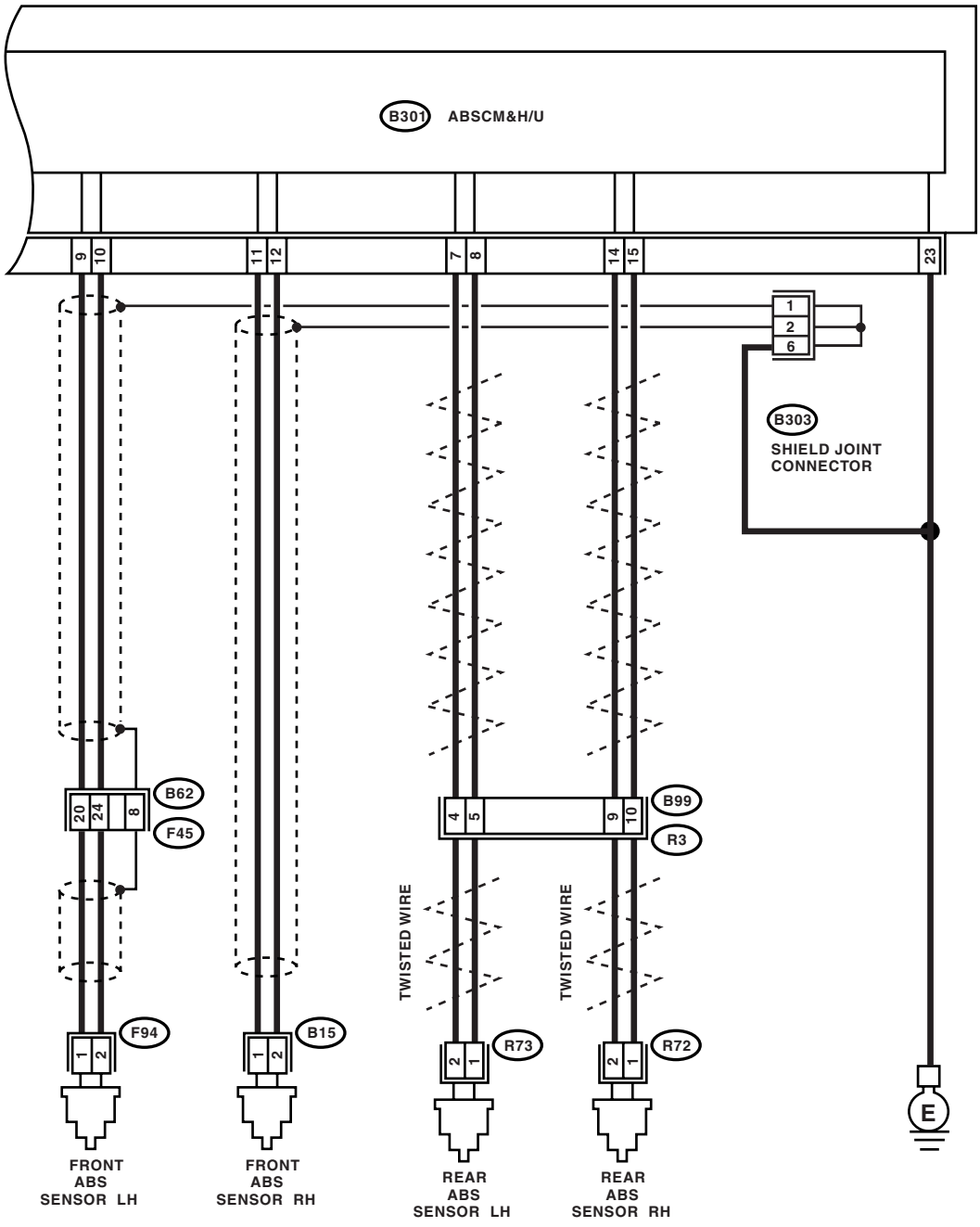
- Faulty ABS wheel speed sensor signal (noise, irregular signal, etc.)
- Faulty harness connector

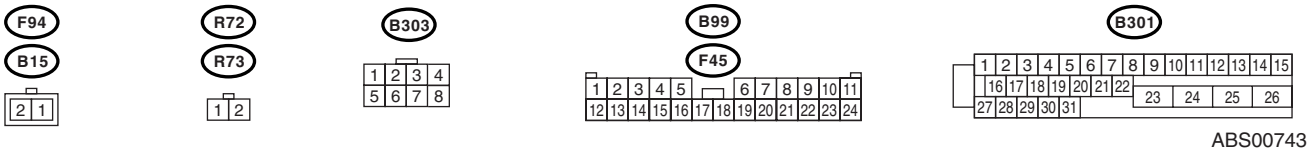
TROUBLE SYMPTOM:

ABS does not operate.

WIRING DIAGRAM:

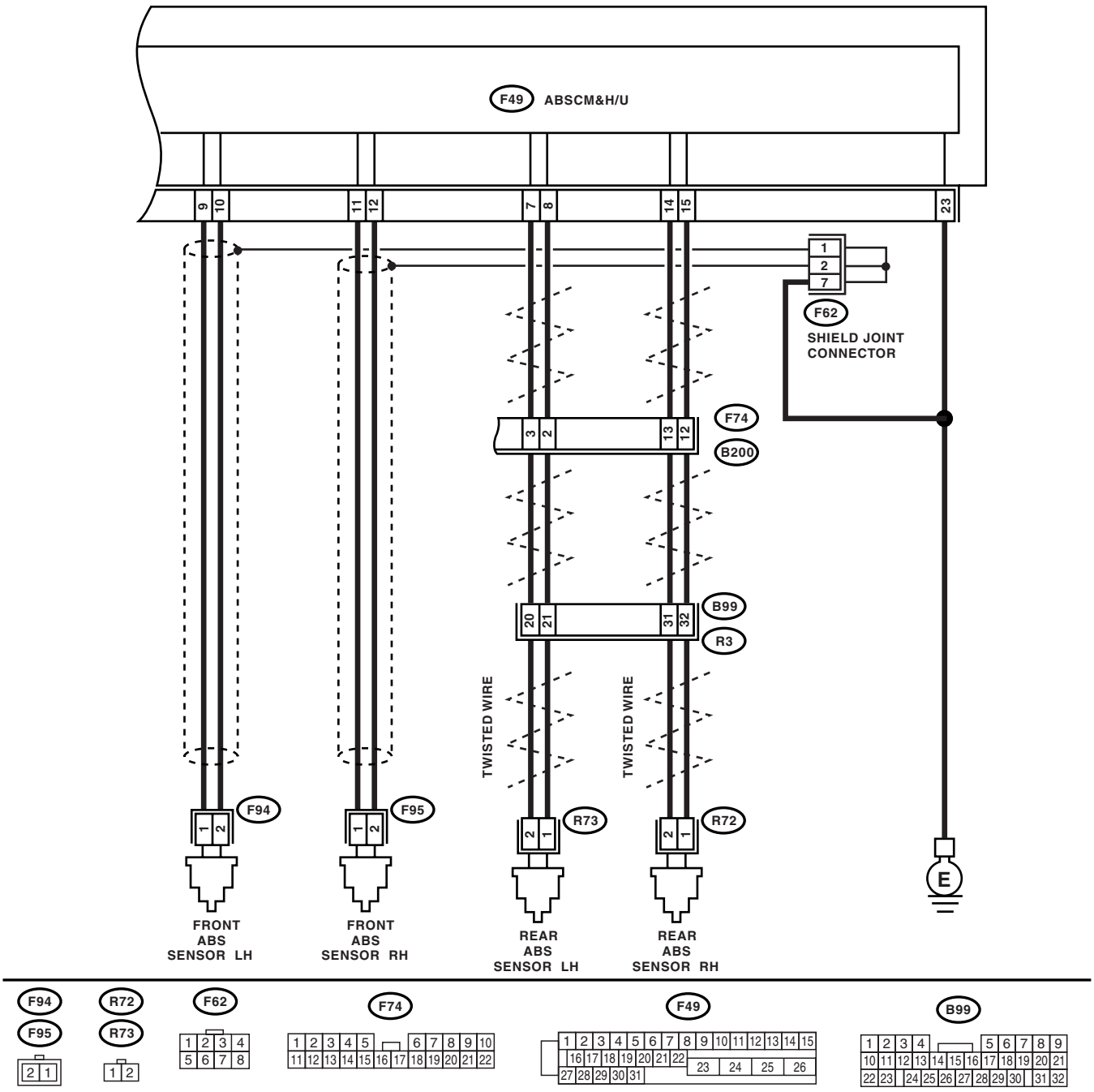
- LHD model





ABS00743

- RHD model



ABS00354

	Step	Check	Yes	No
1	**CHECK OUTPUT OF ABS WHEEL SPEED SENSOR USING SUBARU SELECT MONITOR.** 1) Select “Current data display & Save” on the Subaru Select Monitor. 2) Read the ABS wheel speed sensor output corresponding to faulty system in the Subaru Select Monitor data display mode.	Does the speed indicated on display change in response to speedometer reading during acceleration or deceleration when the steering wheel is in straight-ahead position?	Go to step **2.**	Go to step **8.**
2	**CHECK POOR CONTACT IN CONNECTORS.** Turn the ignition switch to OFF.	Is there poor contact in connectors between ABSCM&H/U and ABS wheel speed sensor?	Repair the connector.	Go to step **3.**
3	**CHECK SOURCES OF SIGNAL NOISE.** Make sure the radio wave device and electric components are installed correctly.	Are the radio wave device and electric components installed correctly?	Go to step **4.**	Install the radio wave device and electric components properly.
4	**CHECK SOURCES OF SIGNAL NOISE.**	Are noise sources (such as an antenna) installed near the sensor harness?	Install the noise sources apart from sensor harness.	Go to step **5.**
5	**CHECK SHIELD CIRCUIT.** 1) Turn the ignition switch to OFF. 2) Connect all connectors. 3) Measure the resistance between shield connector and chassis ground. ***Connector & terminal*** ***DTC 22*** ***LHD:*** ***(B303) No. 2 — Chassis ground:*** ***RHD:*** ***(F62) No. 2 — Chassis ground:*** ***DTC 24*** ***LHD:*** ***(B303) No. 1 — Chassis ground:*** ***RHD:*** ***(F62) No. 1 — Chassis ground:*** NOTE: If the DTC is 26, 28: Go to YES.	Is the resistance less than 0.5 Ω?	Go to step **6.**	Repair the shield harness.
6	**CHECK ABSCM&H/U.** 1) Connect all connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read out the DTC.	Is the same DTC as in the current diagnosis still being output?	Replace the ABSCM only. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **7.**
7	**CHECK ANY OTHER DIAGNOSTIC TROUBLE CODES (DTCs) APPEARANCE.**	Are other DTCs being output?	Proceed with the diagnosis corresponding to DTC.	A temporary noise interference.
8	**CHECK INSTALLATION OF ABS WHEEL SPEED SENSOR.**	Are the ABS wheel speed sensor installation bolts tightened 33 N·m (3.3 kgf-m, 24 ft-lb)?	Go to step **9.**	Tighten the ABS wheel speed sensor installation bolts securely.

	Step	Check	Yes	No
9	**CHECK ABS WHEEL SPEED SENSOR GAP.** Measure the tone wheel to ABS wheel speed sensor piece gap over entire perimeter of wheel.	Is the gap as following value? Front wheel: 0.3 — 0.8 mm (0.012 — 0.031 in) /Rear wheel: 0.7 — 1.2 mm (0.028 — 0.047 in)	Go to step **10.**	Adjust the gap. NOTE: Adjust the gap using spacer (Part No. 26755AA000). If the spacers cannot correct gap, replace worn sensor or worn tone wheel.
10	**PREPARE OSCILLOSCOPE.**	Is an oscilloscope available?	Go to step **11.**	Go to step **12.**
11	**CHECK ABS WHEEL SPEED SENSOR SIGNAL.** 1) Raise all four wheels off ground. 2) Turn the ignition switch to OFF. 3) Connect the oscilloscope to the connector. 4) Turn the ignition switch to ON. 5) Rotate the wheels and measure voltage at specified frequency. <Ref. to ABS(5.3i)(diag)-15, WAVEFORM, Control Module I/O Signal.> NOTE: When this inspection is completed, the ABSCM&H/U sometimes stores DTC 29 or DTC 56. ***Connector & terminal*** ***DTC 22*** ***LHD:*** ***(B15) No. 1 (+) — No. 2 (–):*** ***RHD:*** ***(F95) No. 1 (+) — No. 2 (–):*** ***DTC 24*** ***LHD:*** ***(B62) No. 20 (+) — No. 24 (–):*** ***RHD:*** ***(F94) No. 1 (+) — No. 2 (–):*** ***DTC 26*** ***LHD:*** ***(B99) No. 10 (+) — No. 9 (–):*** ***RHD:*** ***(B99) No. 32 (+) — No. 31 (–):*** ***DTC 28*** ***LHD:*** ***(B99) No. 5 (+) — No. 4 (–):*** ***RHD:*** ***(B99) No. 21 (+) — No. 20 (–):***	Is an oscilloscope pattern smooth, as shown in the figure?	Go to step **15.**	Go to step **12.**
12	**CHECK CONTAMINATION OF ABS WHEEL SPEED SENSOR OR TONE WHEEL.** Remove the disc rotor or drum from hub in accordance with DTC.	Is the ABS wheel speed sensor piece or tone wheel contaminated by dirt or other foreign matter?	Thoroughly remove dirt or other foreign matter.	Go to step **13.**

	Step	Check	Yes	No
13	**CHECK DAMAGE OF ABS WHEEL SPEED SENSOR OR TONE WHEEL.**	Are there broken or damaged in the ABS wheel speed sensor piece or tone wheel?	Go to step **14.**	Replace the ABS wheel speed sensor or tone wheel. Front: <Ref. to ABS-17, Front ABS Wheel Speed Sensor.> Rear: <Ref. to ABS-20, Rear ABS Wheel Speed Sensor.> and Front: <Ref. to ABS-23, Front Tone Wheel.> Rear: <Ref. to ABS-24, Rear Tone Wheel.>
14	**CHECK TONE WHEEL RUNOUT.** Measure the tone wheel runout.	Is the runout less than 0.05 mm (0.0020 in)?	Go to step **15.**	Replace the tone wheel. Front: <Ref. to ABS-23, Front Tone Wheel.> Rear: <Ref. to ABS-24, Rear Tone Wheel.>
15	**CHECK RESISTANCE OF ABS WHEEL SPEED SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ABS wheel speed sensor. 3) Measure the resistance between ABS wheel speed sensor connector terminals while shaking the harness lightly. ***Terminal*** ***Front RH No. 1 — No. 2:*** ***Front LH No. 1 — No. 2:*** ***Rear RH No. 1 — No. 2:*** ***Rear LH No. 1 — No. 2:***	Is the resistance as following value? Front: 1 — 1.5 kΩ / Rear: 1.025 — 1.265 kΩ	Go to step **16.**	Replace the ABS wheel speed sensor. Front: <Ref. to ABS-17, Front ABS Wheel Speed Sensor.> Rear: <Ref. to ABS-20, Rear ABS Wheel Speed Sensor.>
16	**CHECK GROUND SHORT OF ABS WHEEL SPEED SENSOR.** Measure the resistance between ABS wheel speed sensor and chassis ground. ***Terminal*** ***Front RH No. 1 — Chassis ground:*** ***Front LH No. 1 — Chassis ground:*** ***Rear RH No. 1 — Chassis ground:*** ***Rear LH No. 1 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **17.**	Replace the ABS wheel speed sensor. Front: <Ref. to ABS-17, Front ABS Wheel Speed Sensor.> Rear: <Ref. to ABS-20, Rear ABS Wheel Speed Sensor.>

	Step	Check	Yes	No
17	**CHECK HARNESS CONNECTOR BETWEEN ABSCM&H/U AND ABS WHEEL SPEED SENSOR.** 1) Connect the connector to ABS wheel speed sensor. 2) Disconnect the connector from ABSCM&H/U. 3) Measure the resistance at ABSCM&H/U connector terminals. ***Connector & terminal*** ***DTC 22*** ***LHD:*** ***(B301) No. 11 — No. 12:*** ***RHD:*** ***(F49) No. 11 — No. 12:*** ***DTC 24*** ***LHD:*** ***(B301) No. 9 — No. 10:*** ***RHD:*** ***(F49) No. 9 — No. 10:*** ***DTC 26*** ***LHD:*** ***(B301) No. 14 — No. 15:*** ***RHD:*** ***(F49) No. 14 — No. 15:*** ***DTC 28*** ***LHD:*** ***(B301) No. 7 — No. 8:*** ***RHD:*** ***(F49) No. 7 — No. 8:***	Is the resistance as following value? Front: 1 — 1.5 kΩ / Rear: 1.025 — 1.265 kΩ	Go to step **18.**	Repair the harness connector between ABSCM&H/U and ABS wheel speed sensor.
18	**CHECK GROUND SHORT OF HARNESS.** Measure the resistance between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***DTC 22*** ***LHD:*** ***(B301) No. 11 — Chassis ground:*** ***RHD:*** ***(F49) No. 11 — Chassis ground:*** ***DTC 24*** ***LHD:*** ***(B301) No. 9 — Chassis ground:*** ***RHD:*** ***(F49) No. 9 — Chassis ground:*** ***DTC 26*** ***LHD:*** ***(B301) No. 14 — Chassis ground:*** ***RHD:*** ***(F49) No. 14 — Chassis ground:*** ***DTC 28*** ***LHD:*** ***(B301) No. 7 — Chassis ground:*** ***RHD:*** ***(F49) No. 7 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **19.**	Repair the harness connector between ABSCM&H/U and ABS wheel speed sensor.

	Step	Check	Yes	No
19	**CHECK GROUND CIRCUIT OF ABSCM&H/U.** Measure the resistance between ABSCM&H/U and chassis ground. ***Connector & terminal*** ***LHD:*** ***(B301) No. 23 — Chassis ground:*** ***RHD:*** ***(F49) No. 23 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **20.**	Repair the ABSCM&H/U ground harness.
20	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in connectors between ABSCM&H/U and ABS wheel speed sensor?	Repair the connector.	Go to step **21.**
21	**CHECK SOURCES OF SIGNAL NOISE.** Make sure the radio wave device and electric components are installed correctly.	Are the radio wave device and electric components installed correctly?	Go to step **22.**	Install the radio wave device and electric components properly.
22	**CHECK SOURCES OF SIGNAL NOISE.**	Are noise sources (such as an antenna) installed near the sensor harness?	Install the noise sources apart from sensor harness.	Go to step **23.**
23	**CHECK SHIELD CIRCUIT.** 1) Connect all connectors. 2) Measure the resistance between shield connector and chassis ground. ***Connector & terminal*** ***DTC 22*** ***LHD:*** ***(B303) No. 2 — Chassis ground:*** ***RHD:*** ***(F62) No. 2 — Chassis ground:*** ***DTC 24*** ***LHD:*** ***(B303) No. 1 — Chassis ground:*** ***RHD:*** ***(F62) No. 1 — Chassis ground:*** NOTE: If the DTC is 26, 28: Go to YES.	Is the resistance less than 0.5 Ω?	Go to step **24.**	Repair the shield harness.
24	**CHECK ABSCM&H/U.** 1) Connect all connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read out the DTC.	Is the same DTC as in the current diagnosis still being output?	Replace the ABSCM only. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **25.**
25	**CHECK ANY OTHER DIAGNOSTIC TROUBLE CODES (DTCs) APPEARANCE.**	Are other DTCs being output?	Proceed with the diagnosis corresponding to DTC.	A temporary noise interference. NOTE: Although the ABS warning light remains illuminating at this point, this is a normal condition. Vehicle must be driven at approx. 12 km/h (7.46 MPH) or faster to turn off ABS warning light. Make sure that the ABS warning light goes off after driving vehicle.

I: DTC 29 ABNORMAL ABS WHEEL SPEED SENSOR SIGNAL ON ANY ONE OF FOUR SENSOR

DIAGNOSIS:

- Faulty ABS wheel speed sensor signal (noise, irregular signal, etc.)
- Faulty tone wheel
- Wheels turning freely for a long time

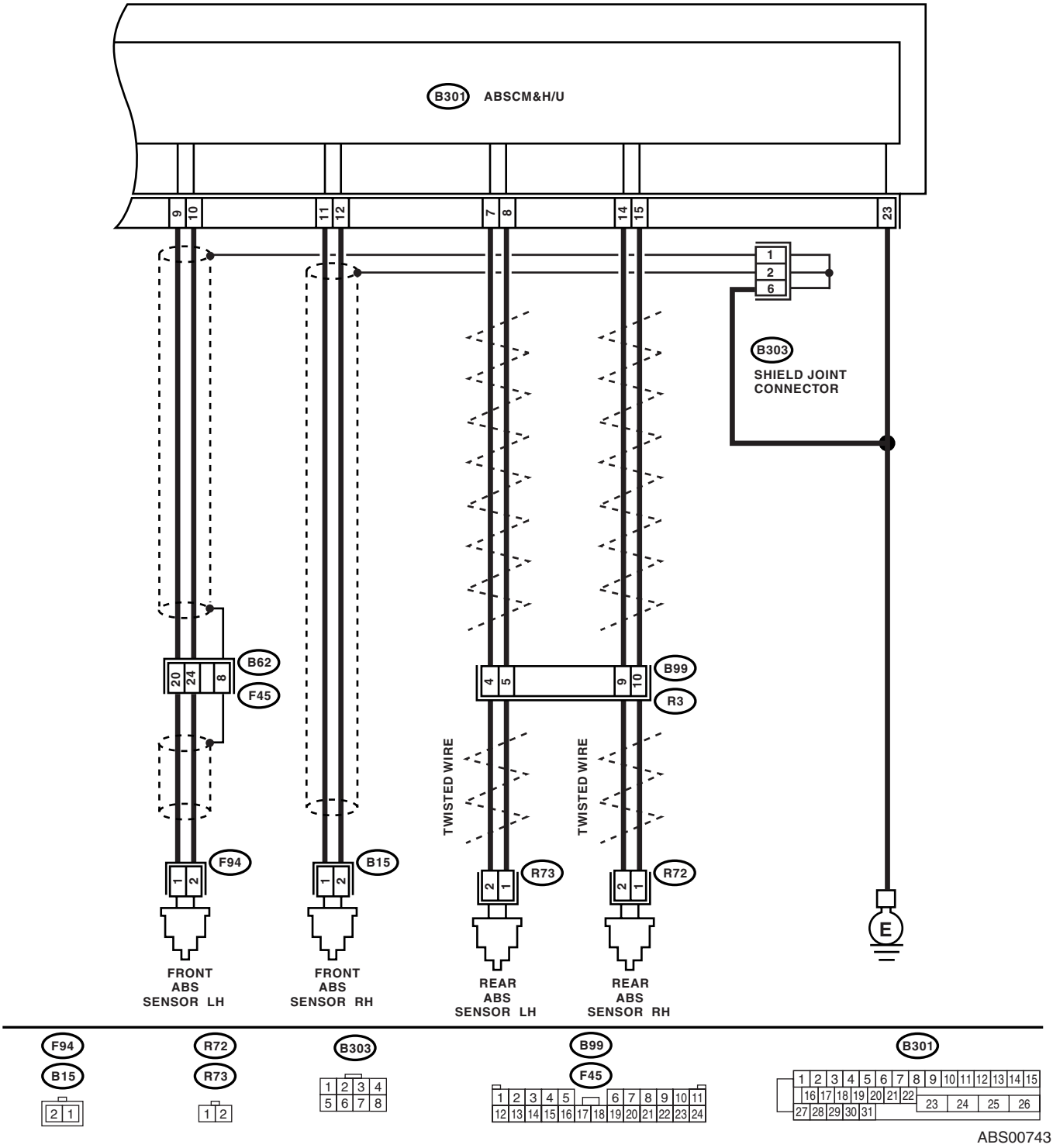
TROUBLE SYMPTOM:

- ABS does not operate.
- EBD does not operate.

NOTE:
In addition to the ABS warning light, brake warning light illuminates.

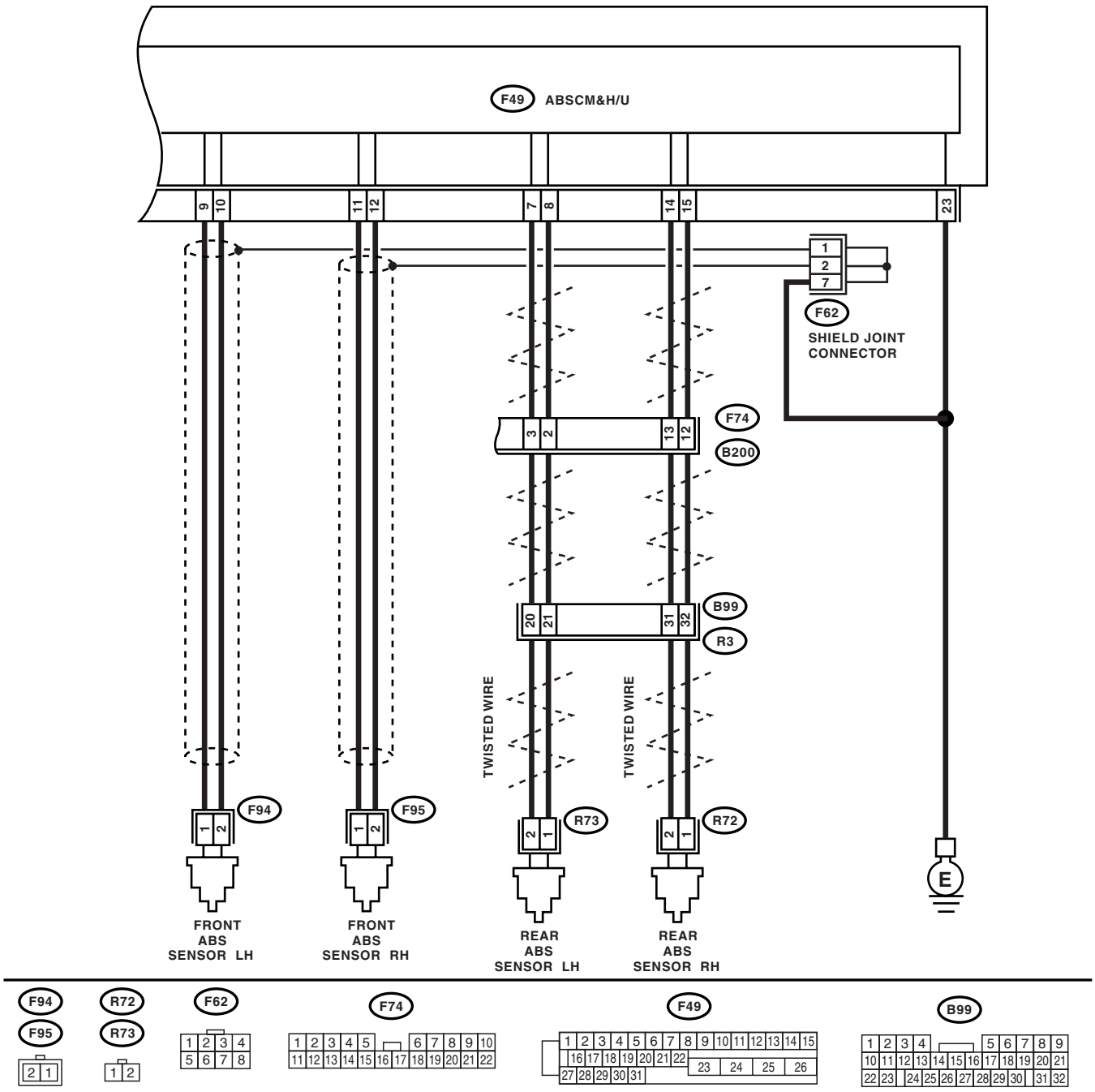
WIRING DIAGRAM:

- LHD model



ABS00743

- RHD model



ABS00354

	Step	Check	Yes	No
1	**CHECK IF THE WHEELS HAVE TURNED FREELY FOR A LONG TIME.**	Check if the wheels have been turned freely for more than one minute, such as when vehicle is jacked-up, under full-lock cornering or when tire is not in contact with road surface.	The ABS is normal. Erase the DTC. NOTE: When the wheels turn freely for a long time, such as when vehicle is towed or jacked-up, or when steering wheel is continuously turned all way, this trouble code may sometimes occur.	Go to step **2.**
2	**CHECK TIRE SPECIFICATIONS.**	Are the tire specifications correct?	Go to step **3.**	Replace the tire.
3	**CHECK WEAR OF TIRE.**	Is the tire worn excessively?	Replace the tire.	Go to step **4.**
4	**CHECK TIRE PRESSURE.**	Is the tire pressure correct?	Go to step **5.**	Adjust the tire pressure.
5	**CHECK INSTALLATION OF ABS WHEEL SPEED SENSOR.**	Are the ABS wheel speed sensor installation bolts tightened 33 N·m (3.3 kgf-m, 24 ft-lb)?	Go to step **6.**	Tighten the ABS wheel speed sensor installation bolts securely.
6	**CHECK ABS WHEEL SPEED SENSOR GAP.** Measure the tone wheel to ABS wheel speed sensor piece gap over entire perimeter of the wheel.	Is the gap as following value? Front wheel: 0.3 — 0.8 mm (0.012 — 0.031 in) /Rear wheel: 0.7 — 1.2 mm (0.028 — 0.047 in)	Go to step **7.**	Adjust the gap. NOTE: Adjust the gap using spacer (Part No. 26755AA000). If the spacers cannot correct gap, replace worn sensor or worn tone wheel.
7	**PREPARE OSCILLOSCOPE.**	Is an oscilloscope available?	Go to step **8.**	Go to step **9.**

	Step	Check	Yes	No
8	**CHECK ABS WHEEL SPEED SENSOR SIGNAL.** 1) Raise all four wheels off ground. 2) Turn the ignition switch to OFF. 3) Connect the oscilloscope. 4) Turn the ignition switch to ON. 5) Rotate the wheels and measure voltage at specified frequency. <Ref. to ABS(5.3i)(diag)-15, WAVEFORM, Control Module I/O Signal.> NOTE: When this inspection is completed, ABSCM& H/U sometimes stores the DTC 29. ***Connector & terminal*** ***Front RH*** ***LHD:*** ***(B15) No. 1 (+) — No. 2 (–):*** ***RHD:*** ***(F95) No. 1 (+) — No. 2 (–):*** ***Front LH*** ***LHD:*** ***(B62) No. 20 (+) — No. 24 (–):*** ***RHD:*** ***(F94) No. 1 (+) — No. 2 (–):*** ***Rear RH*** ***LHD:*** ***(B99) No. 10 (+) — No. 9 (–):*** ***RHD:*** ***(B99) No. 32 (+) — No. 31 (–):*** ***Rear LH*** ***LHD:*** ***(B99) No. 5 (+) — No. 4 (–):*** ***RHD:*** ***(B99) No. 21 (+) — No. 22 (–):***	Is an oscilloscope pattern smooth, as shown in the figure? <Ref. to ABS(5.3i)(diag)-15, WAVEFORM, Control Module I/O Signal.>	Go to step **12.**	Go to step **9.**
9	**CHECK CONTAMINATION OF ABS WHEEL SPEED SENSOR OR TONE WHEEL.** Remove the disc rotor or drum from hub.	Is the ABS wheel speed sensor piece or tone wheel contaminated by dirt or other foreign matter?	Thoroughly remove dirt or other foreign matter.	Go to step **10.**
10	**CHECK DAMAGE OF ABS WHEEL SPEED SENSOR OR TONE WHEEL.**	Are there broken or damaged teeth in the ABS wheel speed sensor piece or tone wheel?	Replace the ABS wheel speed sensor or tone wheel. Front: <Ref. to ABS-17, Front ABS Wheel Speed Sensor.> Rear: <Ref. to ABS-20, Rear ABS Wheel Speed Sensor.> and Front: <Ref. to ABS-23, Front Tone Wheel.> Rear: <Ref. to ABS-24, Rear Tone Wheel.>	Go to step **11.**
11	**CHECK TONE WHEEL RUNOUT.** Measure the tone wheel runout.	Is the runout less than 0.05 mm (0.0020 in)?	Go to step **12.**	Replace the tone wheel. Front: <Ref. to ABS-23, Front Tone Wheel.> Rear: <Ref. to ABS-24, Rear Tone Wheel.>

	Step	Check	Yes	No
12	**CHECK ABSCM&H/U.** 1) Turn the ignition switch to OFF. 2) Connect all connectors. 3) Erase the memory. 4) Perform the inspection mode. 5) Read out the DTC.	Is the same DTC as in the current diagnosis still being output?	Replace the ABSCM only. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **13.**
13	**CHECK ANY OTHER DIAGNOSTIC TROUBLE CODES (DTCs) APPEARANCE.**	Are other DTCs being output?	Proceed with the diagnosis corresponding to DTC.	A temporary poor contact.

J: DTC 31 FRONT RIGHT INLET VALVE MALFUNCTION

NOTE:
For the diagnostic procedure, refer to DTC 37. <Ref. to ABS(5.3i)(diag)-63, DTC 37 REAR LEFT INLET VALVE MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

K: DTC 33 FRONT LEFT INLET VALVE MALFUNCTION

NOTE:
For the diagnostic procedure, refer to DTC 37. <Ref. to ABS(5.3i)(diag)-63, DTC 37 REAR LEFT INLET VALVE MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

L: DTC 35 REAR RIGHT INLET VALVE MALFUNCTION

NOTE:
For the diagnostic procedure, refer to DTC 37. <Ref. to ABS(5.3i)(diag)-63, DTC 37 REAR LEFT INLET VALVE MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

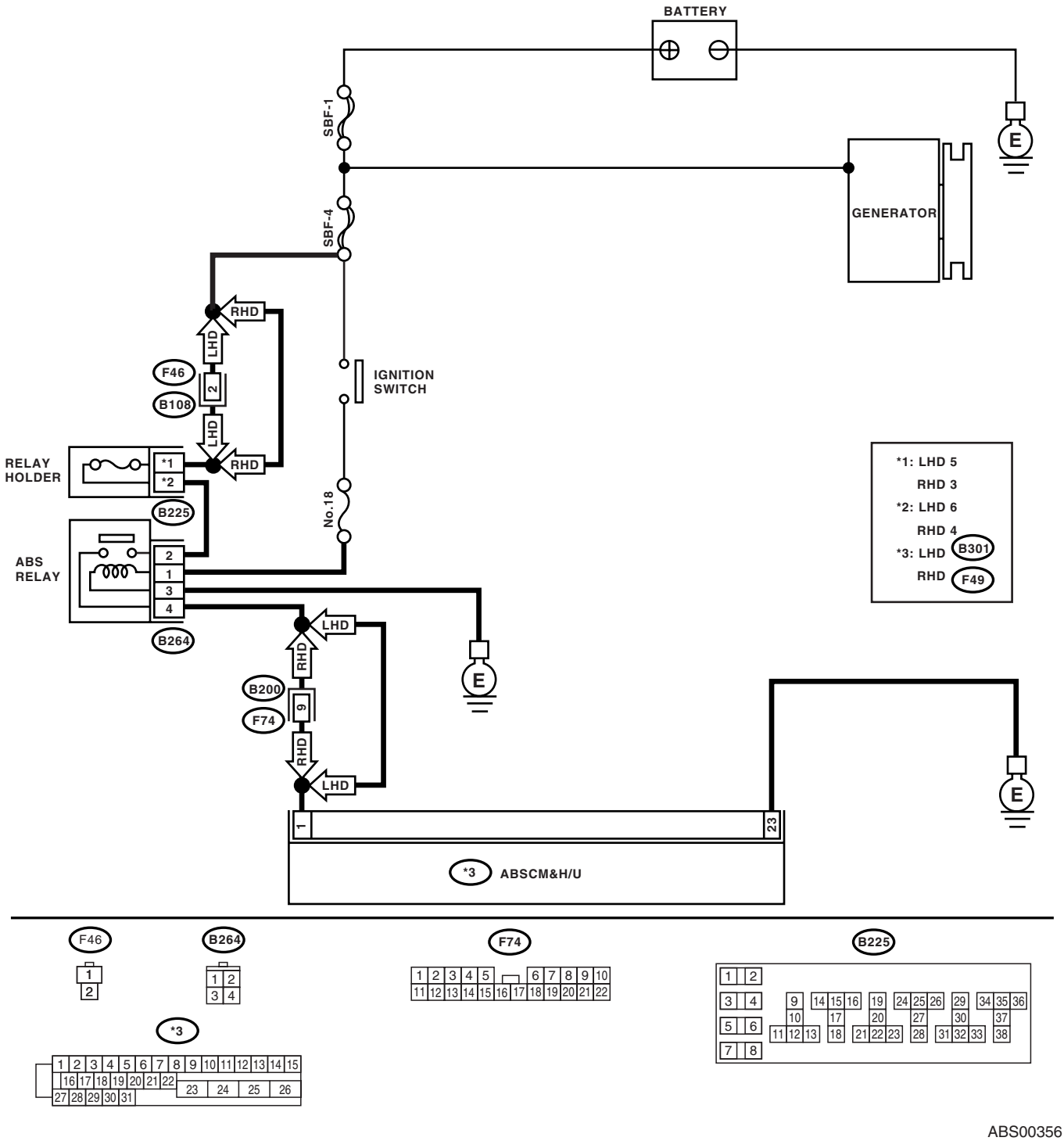
M: DTC 37 REAR LEFT INLET VALVE MALFUNCTION

DIAGNOSIS:
- Faulty harness connector
- Faulty inlet solenoid valve

TROUBLE SYMPTOM:
- ABS does not operate.
- EBD does not operate.

NOTE:
In addition to the ABS warning light, brake warning light illuminates.

WIRING DIAGRAM:



ABS00356

	Step	Check	Yes	No
1	**CHECK INPUT VOLTAGE OF ABSCM&H/U.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ABSCM&H/U. 3) Run the engine at idle. 4) Measure the voltage between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***LHD:*** ***(B301) No. 1 (+) — Chassis ground (–):*** ***RHD:*** ***(F49) No. 1 (+) — Chassis ground (–):***	Is the voltage 10 — 15 V?	Go to step **2.**	Repair the harness connector between battery, ignition switch and ABSCM&H/U.
2	**CHECK GROUND CIRCUIT OF ABSCM&H/U.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***LHD:*** ***(B301) No. 23 — Chassis ground:*** ***RHD:*** ***(F49) No. 23 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **3.**	Repair the ABSCM&H/U ground harness.
3	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in connectors between generator, battery and ABSCM&H/U?	Repair the connector.	Go to step **4.**
4	**CHECK ABSCM&H/U.** 1) Connect all connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read out the DTC.	Is the same DTC as in the current diagnosis still being output?	Replace the ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **5.**
5	**CHECK ANY OTHER DIAGNOSTIC TROUBLE CODES (DTCs) APPEARANCE.**	Are other DTCs being output?	Proceed with the diagnosis corresponding to DTC.	A temporary poor contact.

N: DTC 32 FRONT RIGHT OUTLET VALVE MALFUNCTION

NOTE:
For the diagnostic procedure, refer to DTC 38. <Ref. to ABS(5.3i)(diag)-66, DTC 38 REAR LEFT OUTLET VALVE MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

O: DTC 34 FRONT LEFT OUTLET VALVE MALFUNCTION

NOTE:
For the diagnostic procedure, refer to DTC 38. <Ref. to ABS(5.3i)(diag)-66, DTC 38 REAR LEFT OUTLET VALVE MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

P: DTC 36 REAR RIGHT OUTLET VALVE MALFUNCTION

NOTE:
For the diagnostic procedure, refer to DTC 38. <Ref. to ABS(5.3i)(diag)-66, DTC 38 REAR LEFT OUTLET VALVE MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

Q: DTC 38 REAR LEFT OUTLET VALVE MALFUNCTION

DIAGNOSIS:

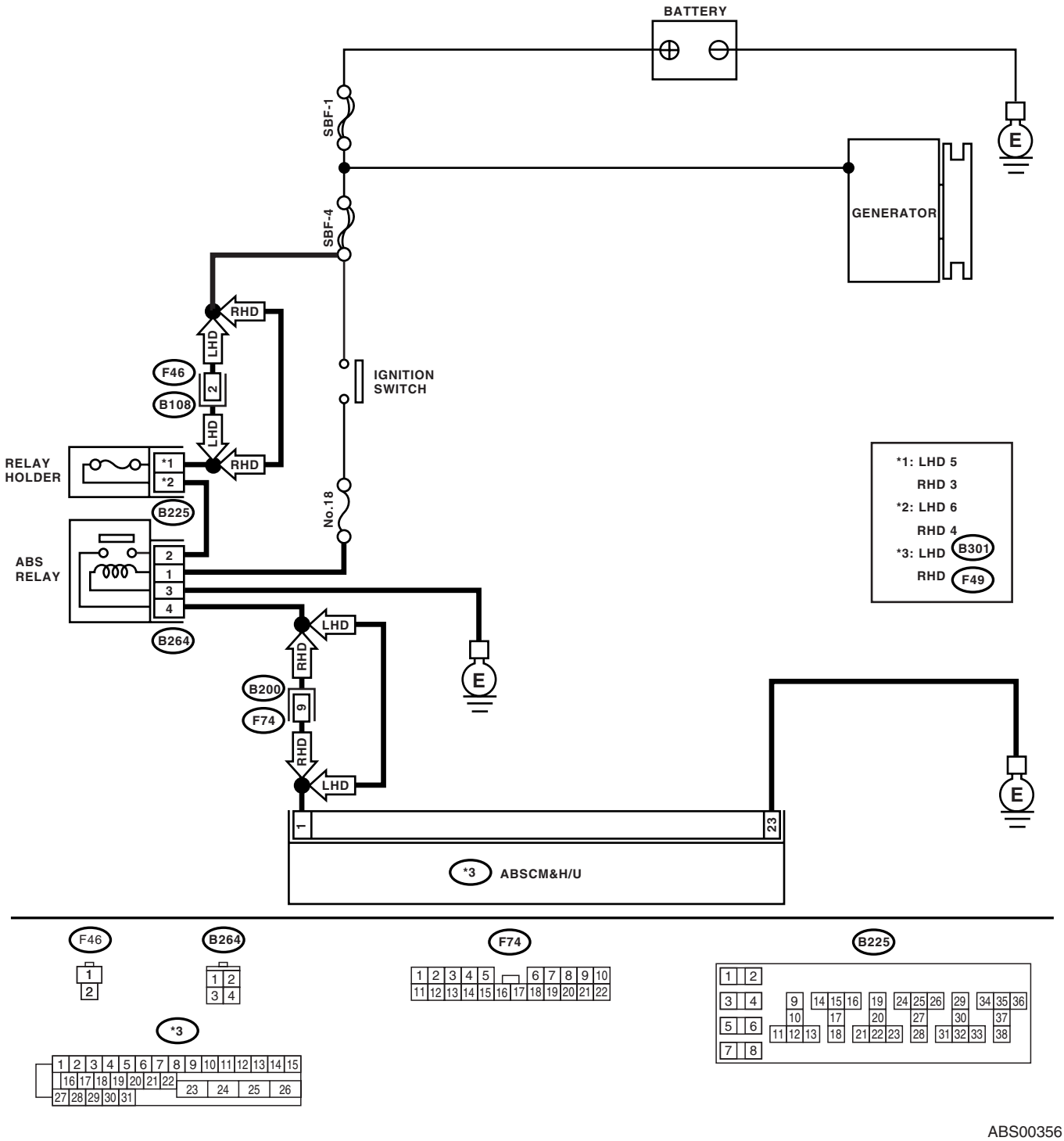
- Faulty harness connector
- Faulty outlet solenoid valve

TROUBLE SYMPTOM:

- ABS does not operate.
- EBD does not operate.

NOTE:
In addition to the ABS warning light, brake warning light illuminates.

WIRING DIAGRAM:



ABS00356

	Step	Check	Yes	No
1	**CHECK INPUT VOLTAGE OF ABSCM&H/U.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ABSCM&H/U. 3) Run the engine at idle. 4) Measure the voltage between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***LHD:*** ***(B301) No. 1 (+) — Chassis ground (–):*** ***RHD:*** ***(F49) No. 1 (+) — Chassis ground (–):***	Is the voltage 10 — 15 V?	Go to step **2.**	Repair the harness connector between battery, ignition switch and ABSCM&H/U.
2	**CHECK GROUND CIRCUIT OF ABSCM&H/U.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***LHD:*** ***(B301) No. 23 — Chassis ground:*** ***RHD:*** ***(F49) No. 23 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **3.**	Repair the ABSCM&H/U ground harness.
3	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in connectors between generator, battery and ABSCM&H/U?	Repair the connector.	Go to step **4.**
4	**CHECK ABSCM&H/U.** 1) Connect all connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read out the DTC.	Is the same DTC as in the current diagnosis still being output?	Replace the ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **5.**
5	**CHECK ANY OTHER DIAGNOSTIC TROUBLE CODES (DTCs) APPEARANCE.**	Are other DTCs being output?	Proceed with the diagnosis corresponding to DTC.	A temporary poor contact.

R: DTC 41 ABS CONTROL MODULE MALFUNCTION

DIAGNOSIS:

Faulty ABSCM&H/U

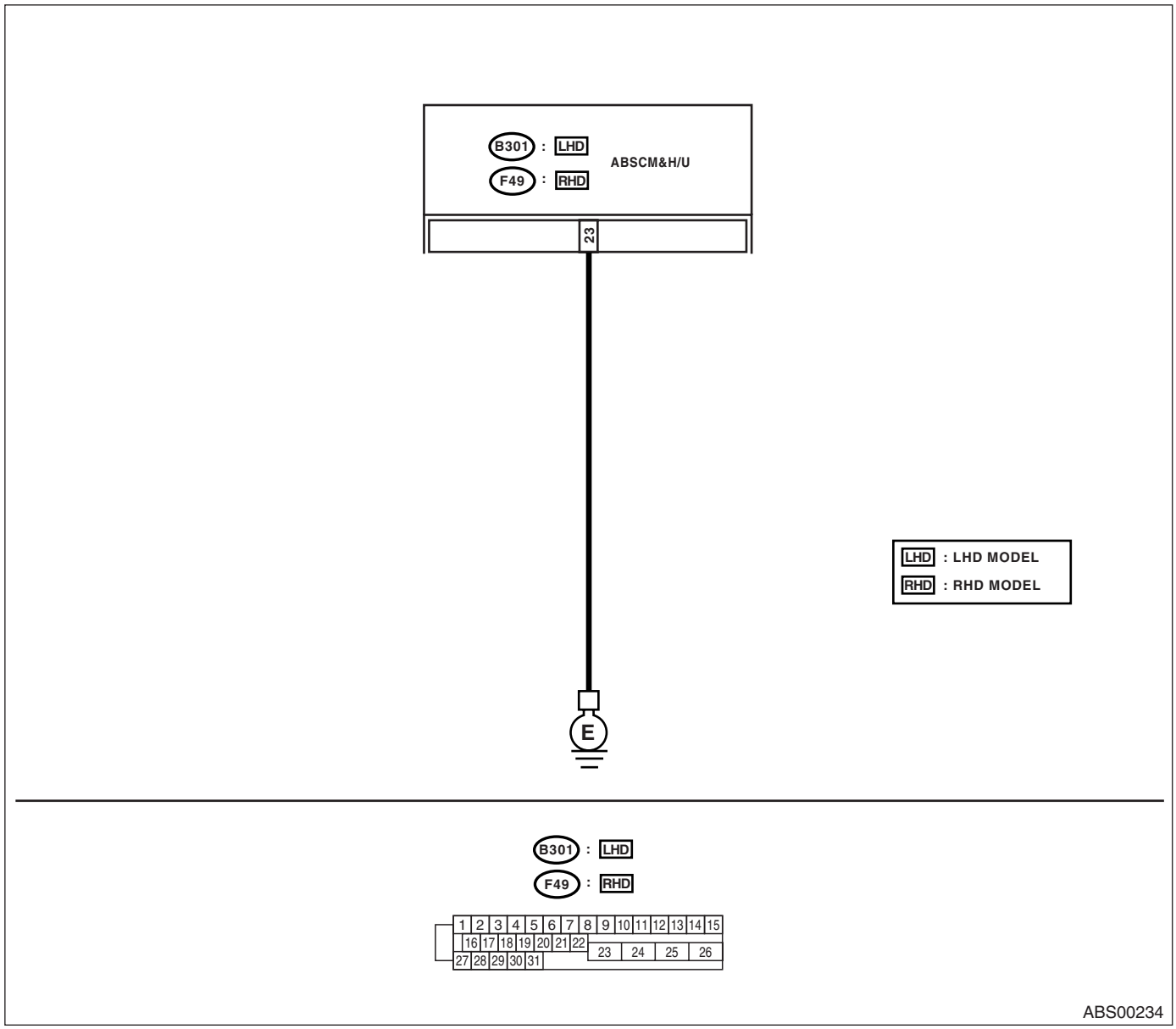
TROUBLE SYMPTOM:

- ABS does not operate.
- EBD does not operate.

NOTE:

In addition to the ABS warning light, brake warning light illuminates.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK GROUND CIRCUIT OF ABSCM&H/U.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ABSCM&H/U. 3) Measure the resistance between ABSCM&H/U and chassis ground. ***Connector & terminal*** ***LHD:*** ***(B301) No. 23 — Chassis ground:*** ***RHD:*** ***(F49) No. 23 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **2.**	Repair the ABSCM&H/U ground harness.
2	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in connectors between battery, ignition switch and ABSCM&H/U?	Repair the connector.	Go to step **3.**
3	**CHECK SOURCES OF SIGNAL NOISE.**	Is the car telephone or wireless transmitter properly installed?	Go to step **4.**	Properly install the car telephone or wireless transmitter.
4	**CHECK SOURCES OF SIGNAL NOISE.**	Are noise sources (such as an antenna) installed near the sensor harness?	Install the noise sources apart from sensor harness.	Go to step **5.**
5	**CHECK ABSCM&H/U.** 1) Turn the ignition switch to OFF. 2) Connect all connectors. 3) Erase the memory. 4) Perform the inspection mode. 5) Read out the DTC.	Is the same DTC as in current diagnosis still being output?	Replace the ABSCM only. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **6.**
6	**CHECK ANY OTHER DIAGNOSTIC TROUBLE CODES (DTCs) APPEARANCE.**	Are other DTCs being output?	Proceed with the diagnosis corresponding to DTC.	A temporary poor contact.

S: DTC 42 POWER SUPPLY VOLTAGE TOO LOW

DIAGNOSIS:

Power source voltage of the ABSCM&H/U is low.

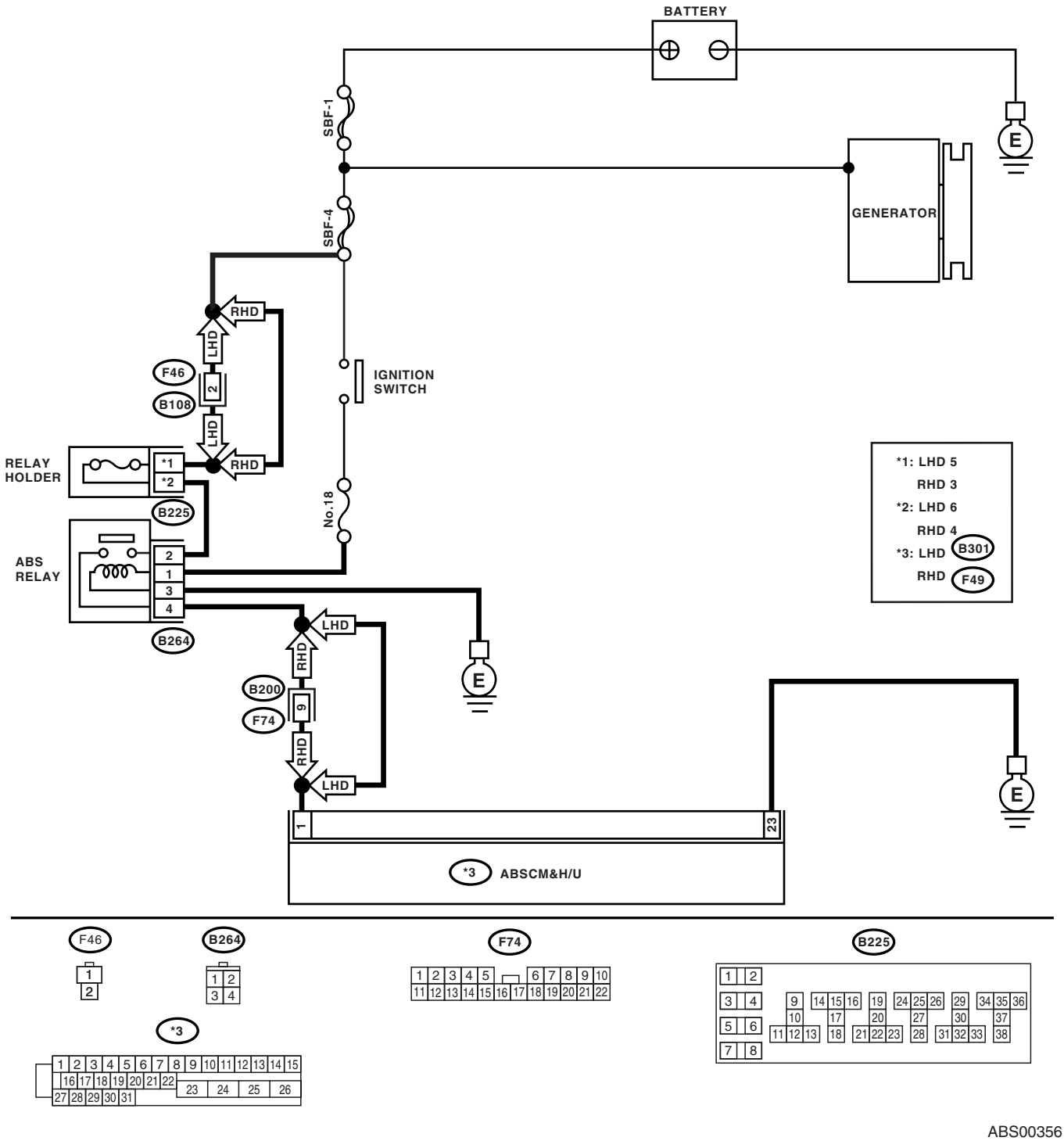
TROUBLE SYMPTOM:

- ABS does not operate.
- EBD may not operate.

NOTE:

In addition to the ABS warning light, brake warning light illuminates temporarily when the EBD does not operate. Both warning lights go off on the recovery of voltage.

WIRING DIAGRAM:



ABS00356

	Step	Check	Yes	No
1	**CHECK GENERATOR.** 1) Start the engine. 2) Idle after warm-up. 3) Measure the voltage between generator B terminal and chassis ground. ***Terminal*** ***Generator B terminal (+) — Chassis ground (−):***	Is the voltage 10 — 17 V?	Go to step **2.**	Repair the generator. <Ref. to SC(H4SO)-14, Generator.>
2	**CHECK BATTERY TERMINAL.** Turn the ignition switch to OFF.	Are the positive and negative battery terminals tightly clamped?	Go to step **3.**	Tighten the clamp of terminal.
3	**CHECK INPUT VOLTAGE OF ABSCM&H/U.** 1) Disconnect the connector from ABSCM&H/U. 2) Run the engine at idle. 3) Operate the electric load applying devices, such as the headlight, A/C, and defogger. 4) Measure the voltage between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***LHD:*** ***(B301) No. 1 (+) — Chassis ground (−):*** ***RHD:*** ***(F49) No. 1 (+) — Chassis ground (−):***	Is the voltage 10 — 17 V?	Go to step **4.**	Repair the harness connector between battery, ignition switch and ABSCM&H/U.
4	**CHECK GROUND CIRCUIT OF ABSCM&H/U.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***LHD:*** ***(B301) No. 23 — Chassis ground:*** ***RHD:*** ***(F49) No. 23 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **5.**	Repair the ABSCM&H/U ground harness.
5	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in connectors between generator, battery and ABSCM&H/U?	Repair the connector.	Go to step **6.**
6	**CHECK ABSCM&H/U.** 1) Connect all connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read out the DTC.	Is the same DTC as in the current diagnosis still being output?	Replace the ABSCM only. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **7.**
7	**CHECK ANY OTHER DIAGNOSTIC TROUBLE CODES (DTCs) APPEARANCE.**	Are other DTCs being output?	Proceed with the diagnosis corresponding to DTC.	A temporary poor contact.

T: DTC 42 POWER SUPPLY VOLTAGE TOO HIGH

DIAGNOSIS:

Power source voltage of the ABSCM&H/U is high.

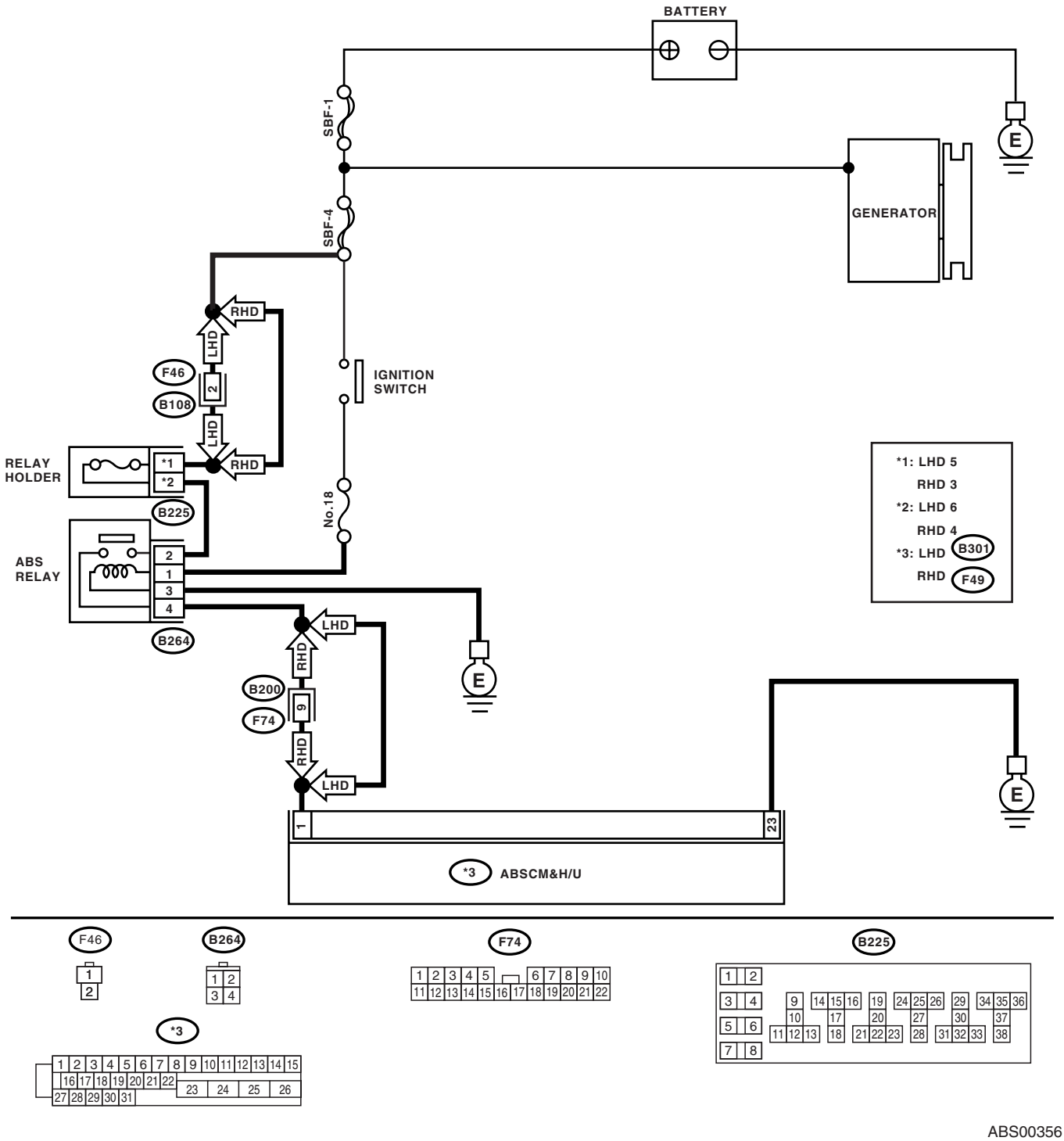
TROUBLE SYMPTOM:

- ABS does not operate.
- EBD may not operate.

NOTE:

In addition to the ABS warning light, brake warning light illuminates temporarily when the EBD does not operate. Both warning lights go off on the recovery of voltage.

WIRING DIAGRAM:



ABS00356

	Step	Check	Yes	No
1	**CHECK GENERATOR.** 1) Start the engine. 2) Idle after warm-up. 3) Measure the voltage between generator B terminal and chassis ground. ***Terminal*** ***Generator B terminal (+) — Chassis ground (−):***	Is the voltage 10 — 17 V?	Go to step **2.**	Repair the generator. <Ref. to SC(H4SO)-14, Generator.>
2	**CHECK BATTERY TERMINAL.** Turn the ignition switch to OFF.	Are the positive and negative battery terminals tightly clamped?	Go to step **3.**	Tighten the clamp of terminal.
3	**CHECK INPUT VOLTAGE OF ABSCM&H/U.** 1) Disconnect the connector from ABSCM&H/U. 2) Run the engine at idle. 3) Operate the electric load applying devices, such as the headlight, A/C, and defogger. 4) Measure the voltage between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***LHD:*** ***(B301) No. 1 (+) — Chassis ground (−):*** ***RHD:*** ***(F49) No. 1 (+) — Chassis ground (−):***	Is the voltage 10 — 17 V?	Go to step **4.**	Repair the harness connector between battery, ignition switch and ABSCM&H/U.
4	**CHECK GROUND CIRCUIT OF ABSCM&H/U.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***LHD:*** ***(B301) No. 23 — Chassis ground:*** ***RHD:*** ***(F49) No. 23 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **5.**	Repair the ABSCM&H/U ground harness.
5	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in connectors between generator, battery and ABSCM&H/U?	Repair the connector.	Go to step **6.**
6	**CHECK ABSCM&H/U.** 1) Connect all connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read out the DTC.	Is the same DTC as in the current diagnosis still being output?	Replace the ABSCM only. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **7.**
7	**CHECK ANY OTHER DIAGNOSTIC TROUBLE CODES (DTCs) APPEARANCE.**	Are other DTCs being output?	Proceed with the diagnosis corresponding to DTC.	A temporary poor contact.

U: DTC 51 VALVE RELAY MALFUNCTION

DIAGNOSIS:

Faulty valve relay

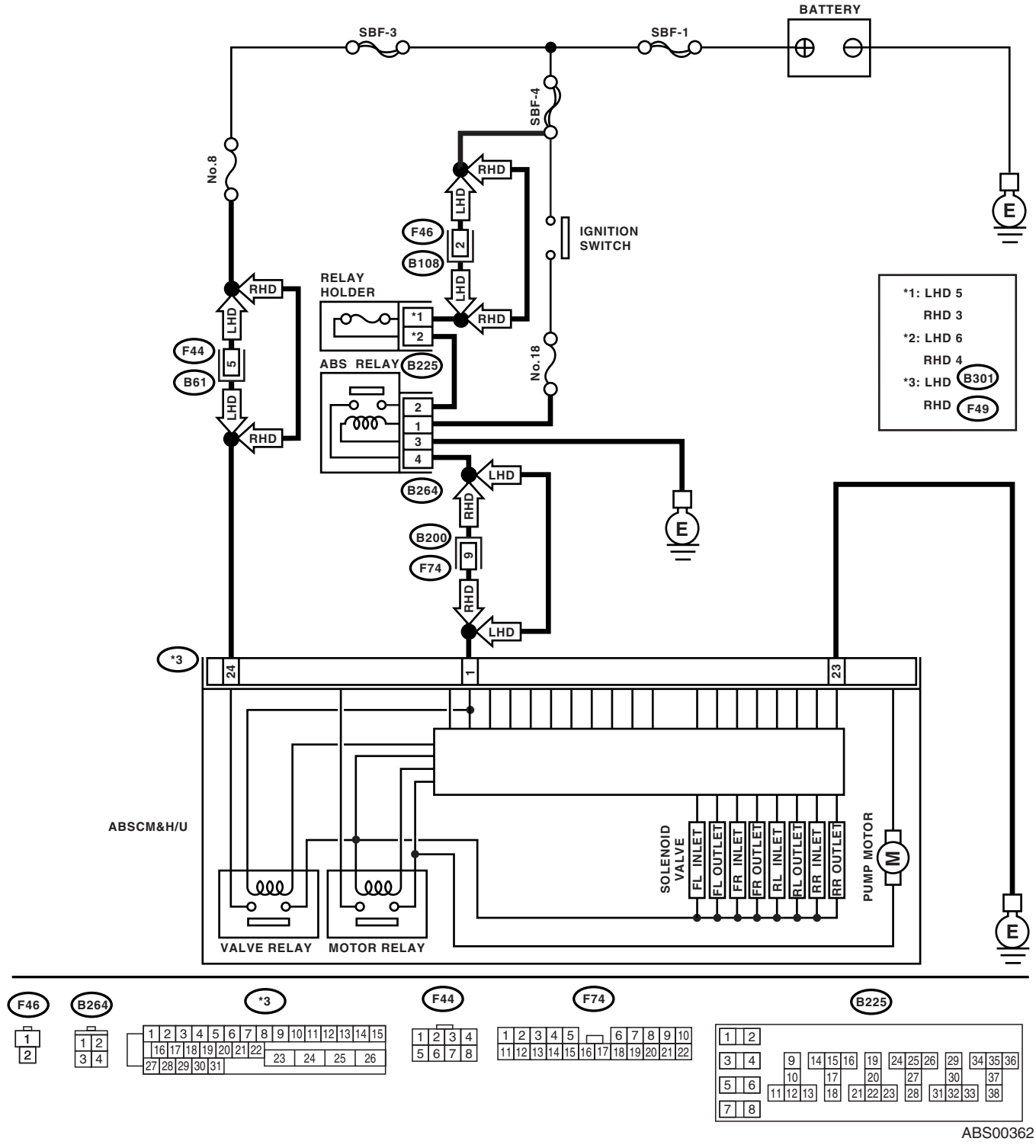
TROUBLE SYMPTOM:

- ABS does not operate.
- EBD may not operate.

NOTE:

In addition to the ABS warning light, brake warning light illuminates when the EBD does not operate.

WIRING DIAGRAM:

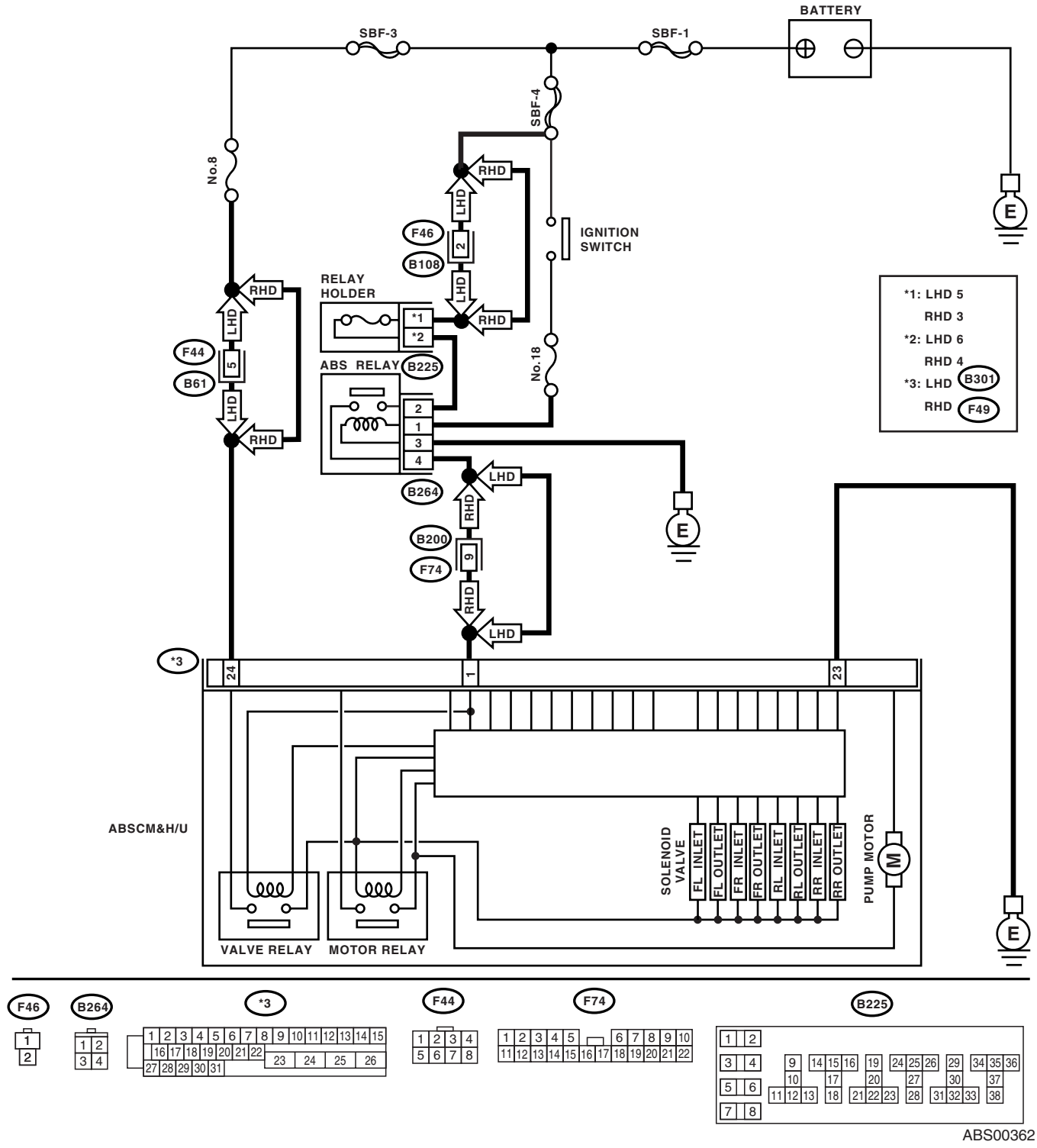


ABS00362

	Step	Check	Yes	No
1	**CHECK INPUT VOLTAGE OF ABSCM&H/U.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ABSCM&H/U. 3) Run the engine at idle. 4) Measure the voltage between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***LHD:*** ***(B301) No. 1 (+) — Chassis ground (−):*** ***(B301) No. 24 (+) — Chassis ground (−):*** ***RHD:*** ***(F49) No. 1 (+) — Chassis ground (−):*** ***(F49) No. 24 (+) — Chassis ground (−):***	Is the voltage 10 — 15 V?	Go to step **2.**	Repair the harness connector between battery and ABSCM&H/U.
2	**CHECK GROUND CIRCUIT OF ABSCM&H/U.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***LHD:*** ***(B301) No. 23 — Chassis ground:*** ***RHD:*** ***(F49) No. 23 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **3.**	Repair the ABSCM&H/U ground harness.
3	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in connectors between generator, battery and ABSCM&H/U?	Repair the connector.	Go to step **4.**
4	**CHECK ABSCM&H/U.** 1) Connect all connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read out the DTC.	Is the same DTC as in current diagnosis still being output?	Replace the ABSCM only. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **5.**
5	**CHECK ANY OTHER DIAGNOSTIC TROUBLE CODES (DTCs) APPEARANCE.**	Are other DTCs being output?	Proceed with the diagnosis corresponding to DTC.	A temporary poor contact.

V: DTC 51 VALVE RELAY ON FAILURE

DIAGNOSIS:
Faulty valve relay
TROUBLE SYMPTOM:
ABS does not operate.
WIRING DIAGRAM:



ABS00362

	Step	Check	Yes	No
1	**CHECK VALVE RELAY IN ABSCM&H/U.** 1) Disconnect the connector from ABSCM&H/U. 2) Measure the resistance between ABSCM&H/U terminals. ***Terminals*** ***No. 23 — No. 24:***	Is the resistance more than 1 MΩ?	Go to step **2.**	Replace the ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>
2	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in connectors between generator, battery and ABSCM&H/U?	Repair the connector.	Go to step **3.**
3	**CHECK ABSCM&H/U.** 1) Connect all connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read out the DTC.	Is the same DTC as in current diagnosis still being output?	Replace the ABSCM only. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **4.**
4	**CHECK ANY OTHER DIAGNOSTIC TROUBLE CODES (DTCs) APPEARANCE.**	Are other DTCs being output?	Proceed with the diagnosis corresponding to DTC.	A temporary poor contact.

W: DTC 52 OPEN CIRCUIT IN MOTOR RELAY CIRCUIT

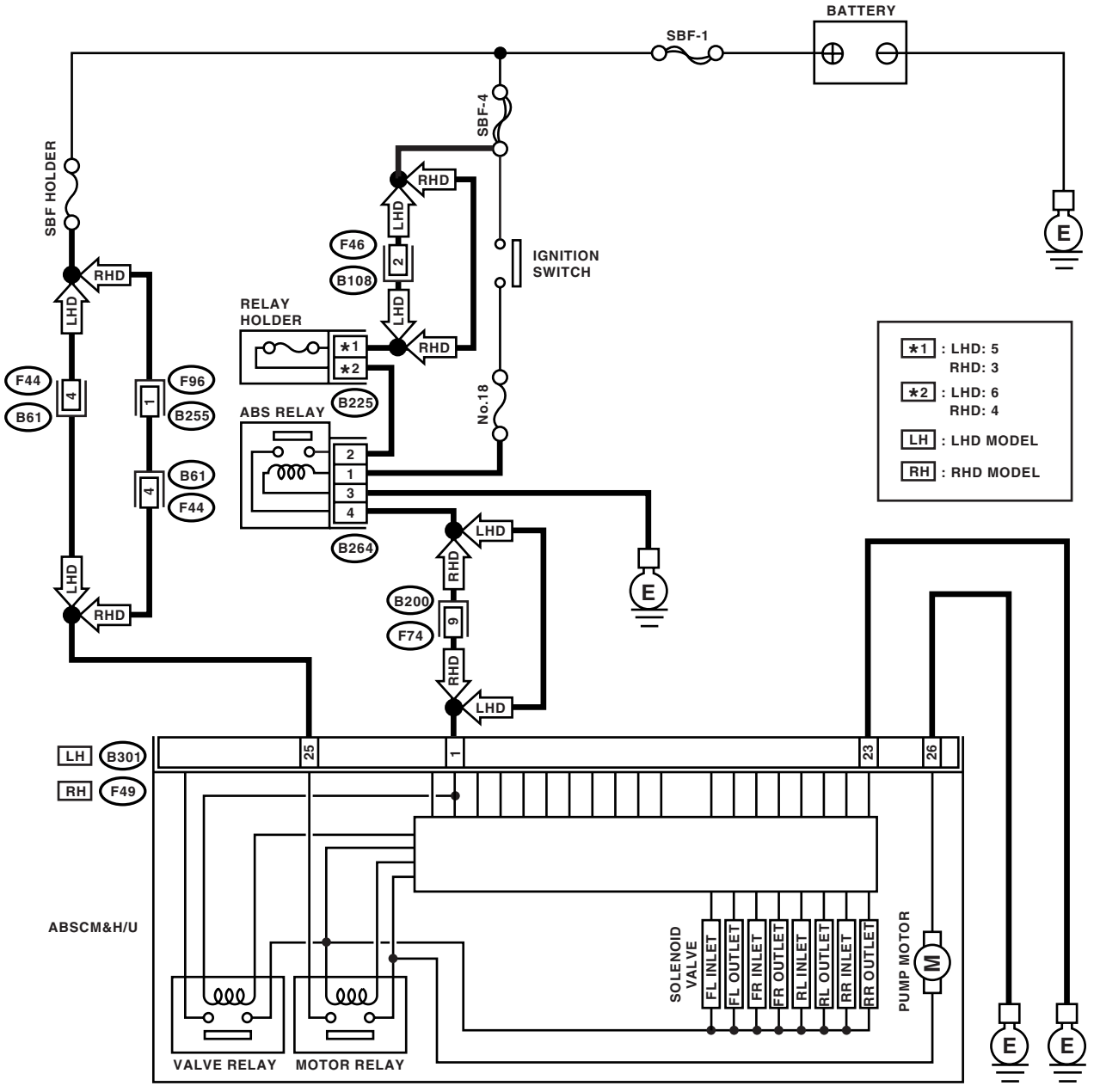
DIAGNOSIS:

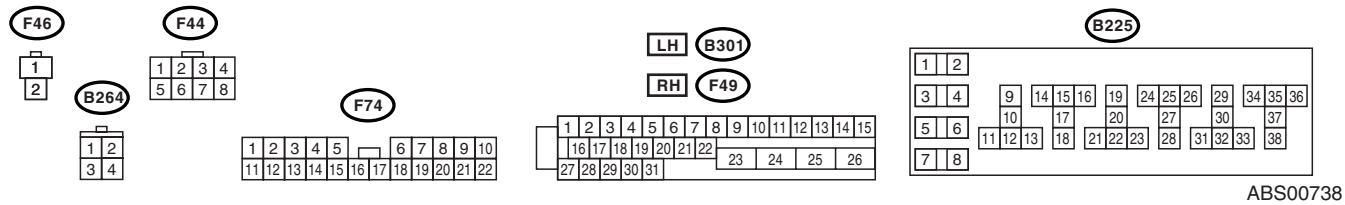
- Faulty motor
- Faulty motor relay
- Faulty harness connector

TROUBLE SYMPTOM:

ABS does not operate.

WIRING DIAGRAM:





ABS00738

	Step	Check	Yes	No
1	**CHECK INPUT VOLTAGE OF ABSCM&H/U.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ABSCM&H/U. 3) Turn the ignition switch to ON. 4) Measure the voltage between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***LHD:*** ***(B301) No. 25 (+) — Chassis ground (−):*** ***RHD:*** ***(F49) No. 25 (+) — Chassis ground (−):***	Is the voltage 10 — 15 V?	Go to step **2.**	Repair the harness connector between battery and ABSCM&H/U and check fuse SBF8.
2	**CHECK GROUND CIRCUIT OF MOTOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***LHD:*** ***(B301) No. 26 — Chassis ground:*** ***RHD:*** ***(F49) No. 26 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **3.**	Repair the ABSCM&H/U ground harness.
3	**CHECK POOR CONTACT IN CONNECTORS.** Turn the ignition switch to OFF.	Is there poor contact in connector between generator, battery and ABSCM&H/U?	Repair the connector.	Go to step **4.**
4	**CHECK ABSCM&H/U.** 1) Connect all connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read out the DTC.	Is the same DTC as in current diagnosis still being output?	Replace the ABSCM only. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **5.**
5	**CHECK ANY OTHER DIAGNOSTIC TROUBLE CODES (DTCs) APPEARANCE.**	Are other DTCs being output?	Proceed with the diagnosis corresponding to DTC.	A temporary poor contact.

X: DTC 52 MOTOR RELAY ON FAILURE

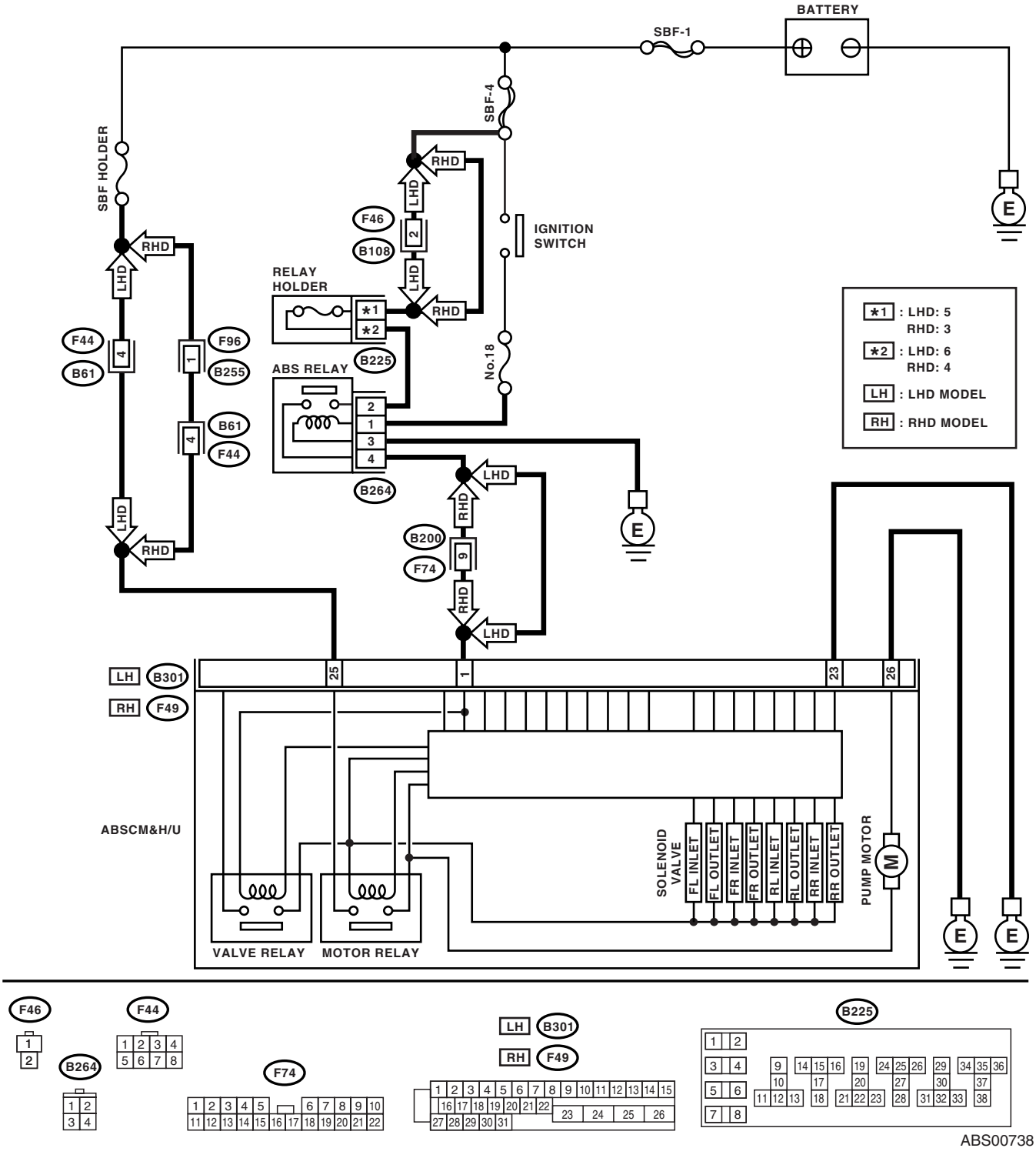
DIAGNOSIS:

- Faulty motor
- Faulty motor relay
- Faulty harness connector

TROUBLE SYMPTOM:

ABS does not operate.

WIRING DIAGRAM:



ABS00738

	Step	Check	Yes	No
1	**CHECK MOTOR RELAY IN ABSCM&H/U.** 1) Disconnect the connector from ABSCM&H/U. 2) Measure the resistance between ABSCM&H/U terminals. ***Terminals*** ***No. 25 — No. 26:***	Is the resistance more than 1 MΩ?	Go to step **2.**	Replace the ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>
2	**CHECK POOR CONTACT IN CONNECTORS.** Turn the ignition switch to OFF.	Is there poor contact in connector between generator, battery and ABSCM&H/U?	Repair the connector.	Go to step **3.**
3	**CHECK ABSCM&H/U.** 1) Connect all connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read out the DTC.	Is the same DTC as in current diagnosis still being output?	Replace the ABSCM only. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **4.**
4	**CHECK ANY OTHER DIAGNOSTIC TROUBLE CODES (DTCs) APPEARANCE.**	Are other DTCs being output?	Proceed with the diagnosis corresponding to DTC.	A temporary poor contact. NOTE: Although the ABS warning light remains illuminating at this point, this is a normal condition. Vehicle must be driven at approx. 12 km/h (7.46 MPH) or faster to turn off ABS warning light. Make sure that the ABS warning light goes off after driving vehicle.

Y: DTC 52 MOTOR MALFUNCTION

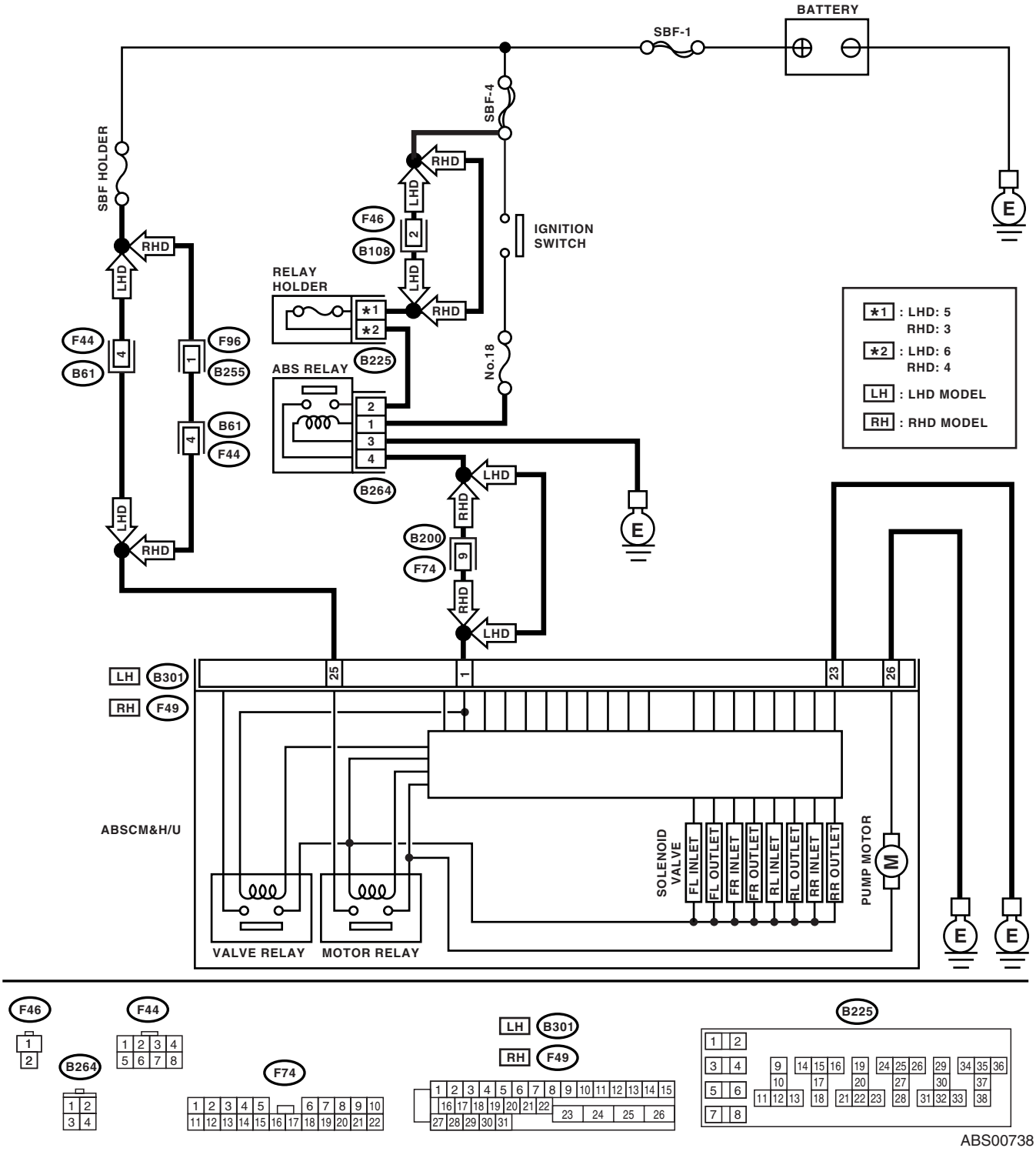
DIAGNOSIS:

- Faulty motor
- Faulty motor relay
- Faulty harness connector

TROUBLE SYMPTOM:

ABS does not operate.

WIRING DIAGRAM:

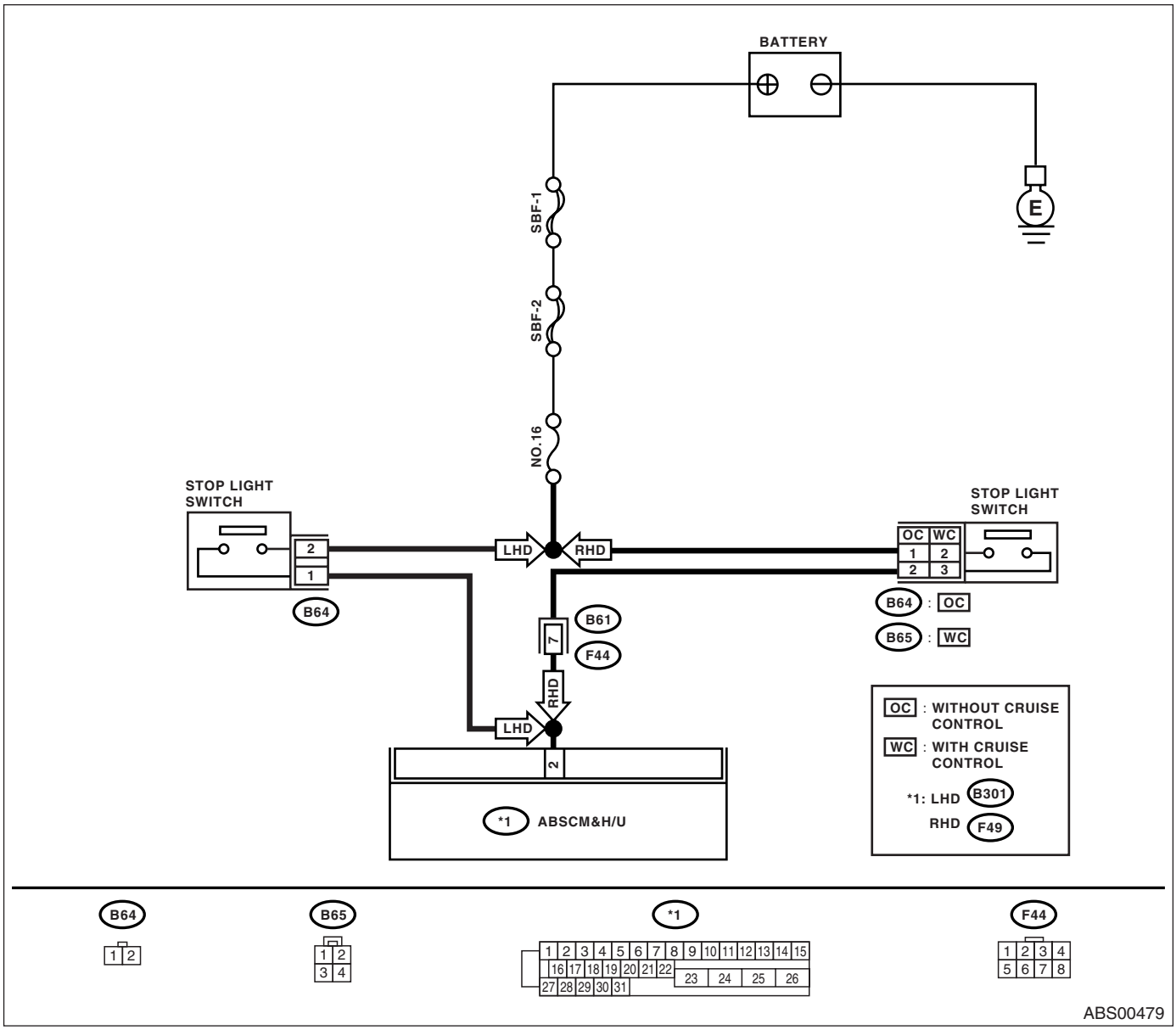


ABS00738

	Step	Check	Yes	No
1	**CHECK INPUT VOLTAGE OF ABSCM&H/U.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ABSCM&H/U. 3) Turn the ignition switch to ON. 4) Measure the voltage between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***LHD:*** ***(B301) No. 25 (+) — Chassis ground (–):*** ***RHD:*** ***(F49) No. 25 (+) — Chassis ground (–):***	Is the voltage 10 — 15 V?	Go to step **2.**	Repair the harness connector between battery and ABSCM&H/U and check fuse SBF8.
2	**CHECK GROUND CIRCUIT OF MOTOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***LHD:*** ***(B301) No. 26 — Chassis ground:*** ***RHD:*** ***(F49) No. 26 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **3.**	Repair the ABSCM&H/U ground harness.
3	**CHECK INPUT VOLTAGE OF ABSCM&H/U.** 1) Run the engine at idle. 2) Measure the voltage between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***LHD:*** ***(B301) No. 1 (+) — Chassis ground (–):*** ***RHD:*** ***(F49) No. 1 (+) — Chassis ground (–):***	Is the voltage 10 — 15 V?	Go to step **4.**	Repair the harness connector between battery, ignition switch and ABSCM&H/U.
4	**CHECK GROUND CIRCUIT OF ABSCM&H/U.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***LHD:*** ***(B301) No. 23 — Chassis ground:*** ***RHD:*** ***(F49) No. 23 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **5.**	Repair the ABSCM&H/U ground harness.
5	**CHECK POOR CONTACT IN CONNECTORS.** Turn the ignition switch to OFF.	Is there poor contact in connector between generator, battery and ABSCM&H/U?	Repair the connector.	Go to step **6.**
6	**CHECK ABSCM&H/U.** 1) Connect all connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read out the DTC.	Is the same DTC as in current diagnosis still being output?	Replace the ABSCM&H/U. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **7.**
7	**CHECK ANY OTHER DIAGNOSTIC TROUBLE CODES (DTCs) APPEARANCE.**	Are other DTCs being output?	Proceed with the diagnosis corresponding to DTC.	A temporary poor contact.

Z: DTC 54 STOP LIGHT SWITCH SIGNAL CIRCUIT MALFUNCTION

DIAGNOSIS:
Faulty stop light switch
TROUBLE SYMPTOM:
ABS does not operate.
WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK OUTPUT OF STOP LIGHT SWITCH USING SUBARU SELECT MONITOR.** 1) Select “Current data display & Save” on the Subaru Select Monitor. 2) Release the brake pedal. 3) Read the stop light switch output in Subaru Select Monitor data display.	Is the reading indicated on monitor display less than 1.5 V?	Go to step **2.**	Go to step **3.**
2	**CHECK OUTPUT OF STOP LIGHT SWITCH USING SUBARU SELECT MONITOR.** 1) Depress the brake pedal. 2) Read the stop light switch output in Subaru Select Monitor data display.	Is the reading indicated on monitor display 10 — 15 V?	Go to step **5.**	Go to step **3.**
3	**CHECK IF STOP LIGHTS COME ON.** Depress the brake pedal.	Do the stop lights turn on?	Go to step **4.**	Repair the stop lights circuit.
4	**CHECK OPEN CIRCUIT IN HARNESS.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ABSCM&H/U. 3) Depress the brake pedal. 4) Measure the voltage between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***LHD:*** ***(B301) No. 2 (+) — Chassis ground (−):*** ***RHD:*** ***(F49) No. 2 (+) — Chassis ground (−):***	Is the voltage 10 — 15 V?	Go to step **5.**	Repair the harness between stop light switch and ABSCM&H/U connector.
5	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in connector between stop light switch and ABSCM&H/U?	Repair the connector.	Go to step **6.**
6	**CHECK ABSCM&H/U.** 1) Connect all connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read out the DTC.	Is the same DTC as in current diagnosis still being output?	Replace the ABSCM only. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **7.**
7	**CHECK ANY OTHER DIAGNOSTIC TROUBLE CODES (DTCs) APPEARANCE.**	Are other DTCs being output?	Proceed with the diagnosis corresponding to DTC.	A temporary poor contact.

AA:DTC 56 OPEN OR SHORT CIRCUIT IN G SENSOR CIRCUIT

DIAGNOSIS:

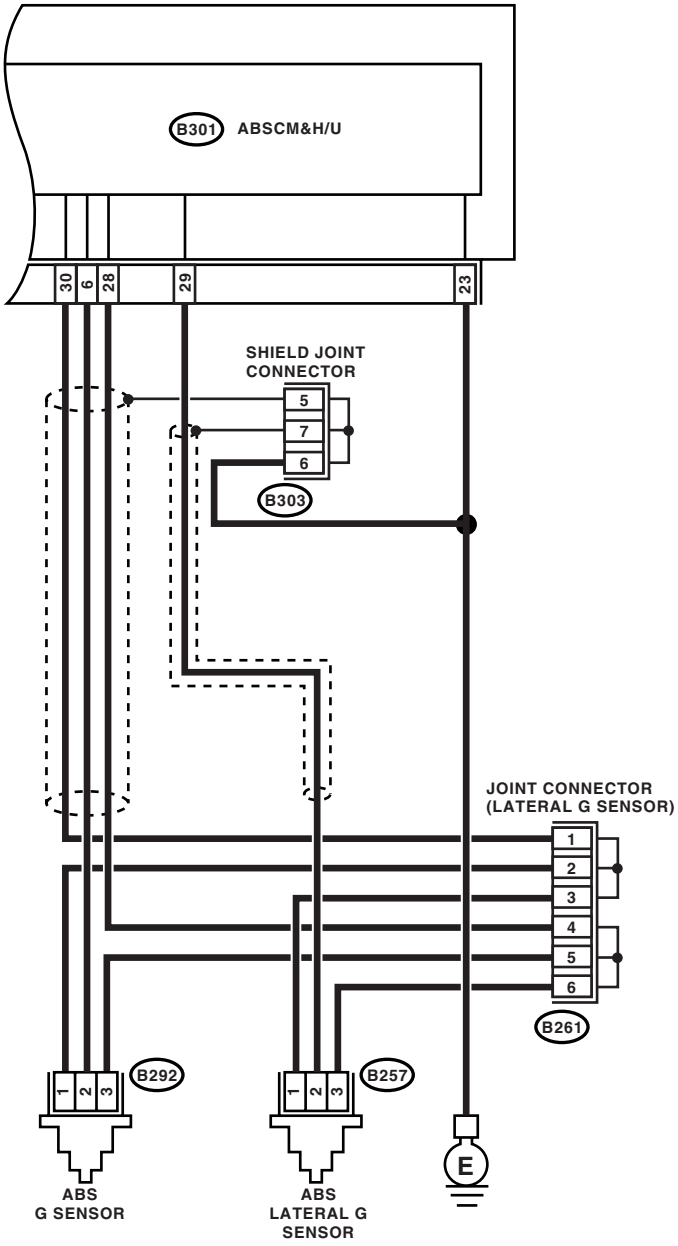
Faulty G sensor output voltage

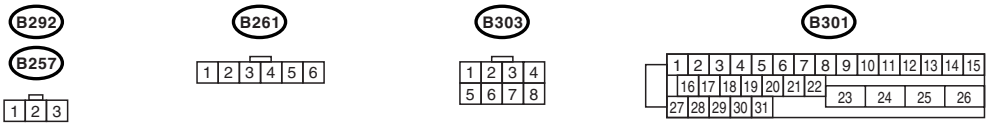
TROUBLE SYMPTOM:

ABS does not operate.

WIRING DIAGRAM:

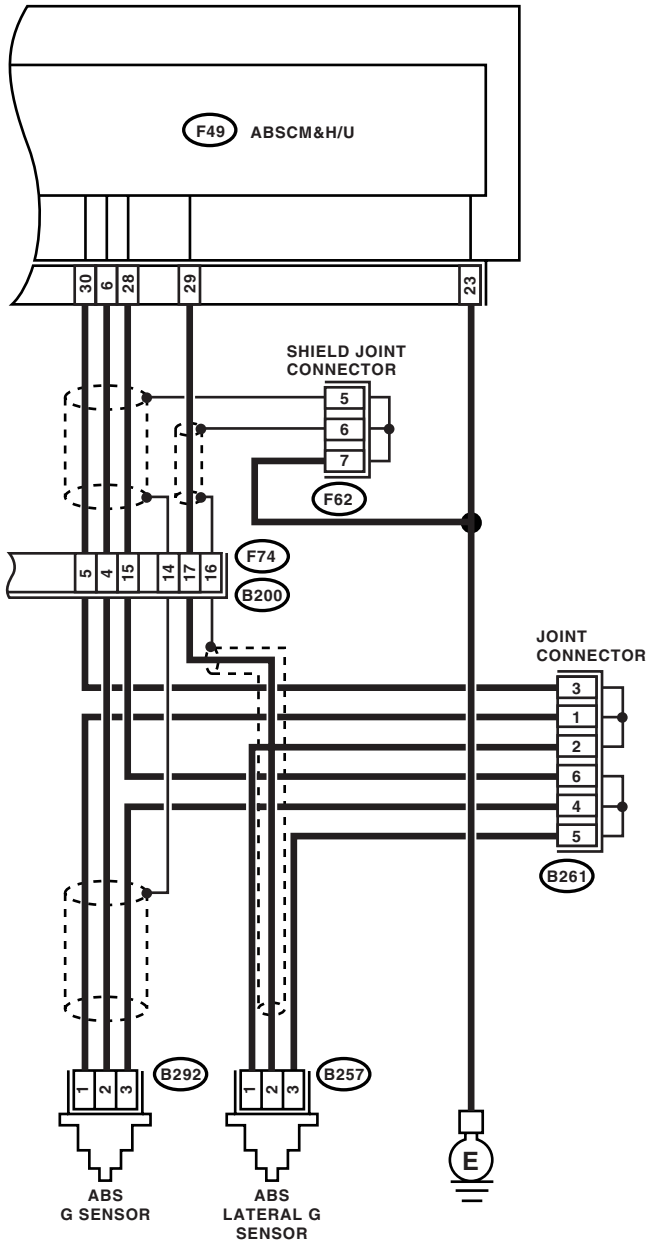
- LHD model

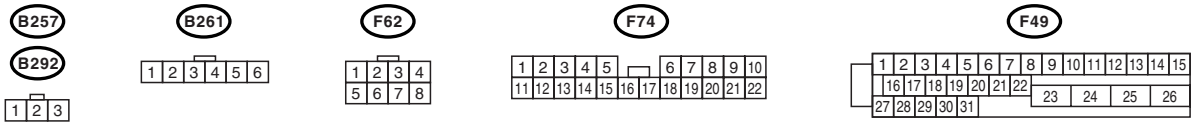




ABS00737

- RHD model





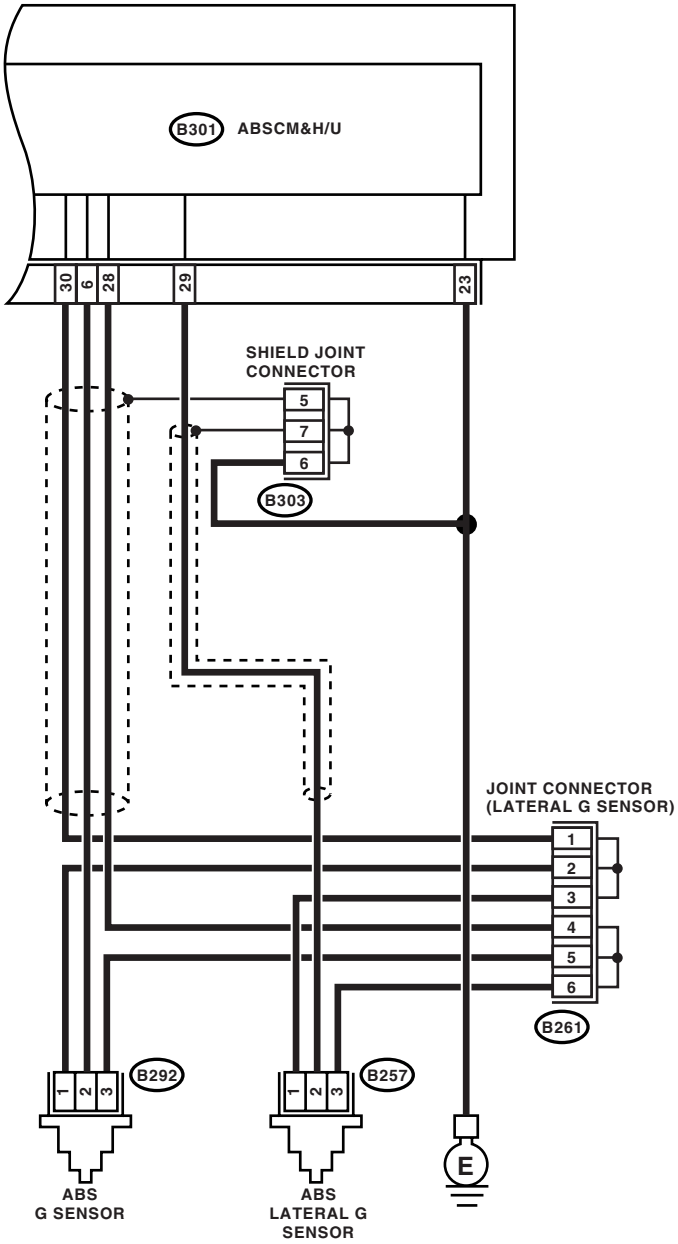
ABS00733

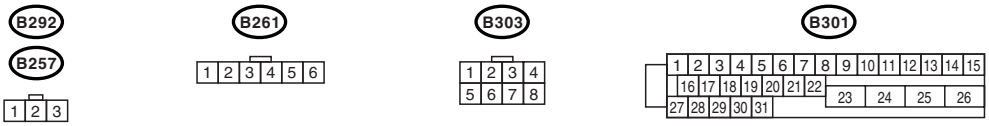
	Step	Check	Yes	No
1	**CHECK OUTPUT OF G SENSOR USING SUBARU SELECT MONITOR.** 1) Select "Current data display & Save" on the Subaru Select Monitor. 2) Read the G sensor output in Subaru Select Monitor data display.	Is the G sensor output on monitor display 2.1 — 2.5 V when G sensor is in horizontal position?	Go to step **2.**	Go to step **5.**
2	**CHECK POOR CONTACT IN CONNECTORS.** Turn the ignition switch to OFF.	Is there poor contact in connector between ABSCM&H/U and G sensor?	Repair the connector.	Go to step **3.**
3	**CHECK ABSCM&H/U.** 1) Connect all connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read out the DTC.	Is the same DTC as in the current diagnosis still being output?	Replace the ABSCM only. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **4.**
4	**CHECK ANY OTHER DIAGNOSTIC TROUBLE CODES (DTCs) APPEARANCE.**	Are other DTCs being output?	Proceed with the diagnosis corresponding to DTC.	A temporary poor contact.
5	**CHECK INPUT VOLTAGE OF G SENSOR.** 1) Turn the ignition switch to OFF. 2) Remove the console box. 3) Remove the G sensor from vehicle. (Do not disconnect connector.) 4) Turn the ignition switch to ON. 5) Measure the voltage between G sensor connector terminals. ***Connector & terminal*** ***(B292) No. 1 (+) — No. 3 (−):***	Is the voltage 4.75 — 5.25 V?	Go to step **6.**	Repair the harness connector between G sensor and ABSCM&H/U.
6	**CHECK OPEN CIRCUIT IN G SENSOR OUTPUT HARNESS AND GROUND HARNESS.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ABSCM&H/U. 3) Measure the resistance between ABSCM&H/U connector terminals. ***Connector & terminal*** ***LHD:*** ***(B301) No. 6 — No. 28:*** ***RHD:*** ***(F49) No. 6 — No. 28:***	Is the resistance 5.0 — 5.6 kΩ?	Go to step **7.**	Repair the harness connector between G sensor and ABSCM&H/U.
7	**CHECK GROUND SHORT IN G SENSOR OUTPUT HARNESS.** 1) Disconnect the connector from G sensor. 2) Measure the resistance between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***LHD:*** ***(B301) No. 6 — Chassis ground:*** ***RHD:*** ***(F49) No. 6 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **8.**	Repair the harness between G sensor and ABSCM&H/U.
8	**CHECK G SENSOR.** 1) Connect the connector to G sensor. 2) Connect the connector to ABSCM&H/U. 3) Turn the ignition switch to ON. 4) Measure the voltage between G sensor connector terminals. ***Connector & terminal*** ***(B292) No. 2 (+) — No. 3 (−):***	Is the voltage 2.1 — 2.5 V when G sensor is in horizontal position?	Go to step **9.**	Replace the G sensor. <Ref. to ABS-25, G Sensor.>

	Step	Check	Yes	No
9	**CHECK G SENSOR.** Measure the voltage between G sensor connector terminals. ***Connector & terminal*** ***(B292) No. 2 (+) — No. 3 (–):***	Is the voltage 3.7 — 4.1 V when G sensor is inclined forwards to 90°?	Go to step **10.**	Replace the G sensor. <Ref. to ABS-25, G Sensor.>
10	**CHECK G SENSOR.** Measure the voltage between G sensor connector terminals. ***Connector & terminal*** ***(B292) No. 2 (+) — No. 3 (–):***	Is the voltage 0.5 — 0.9 V when G sensor is inclined backwards to 90°?	Go to step **11.**	Replace the G sensor. <Ref. to ABS-25, G Sensor.>
11	**CHECK POOR CONTACT IN CONNECTORS.** Turn the ignition switch to OFF.	Is there poor contact in connector between ABSCM&H/U and G sensor?	Repair the connector.	Go to step **12.**
12	**CHECK ABSCM&H/U.** 1) Connect all connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read out the DTC.	Is the same DTC as in current diagnosis still being output?	Replace the ABSCM only. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **13.**
13	**CHECK ANY OTHER DIAGNOSTIC TROUBLE CODES (DTCs) APPEARANCE.**	Are other DTCs being output?	Proceed with the diagnosis corresponding to DTC.	A temporary poor contact.

AB:DTC 56 BATTERY SHORT IN G SENSOR CIRCUIT

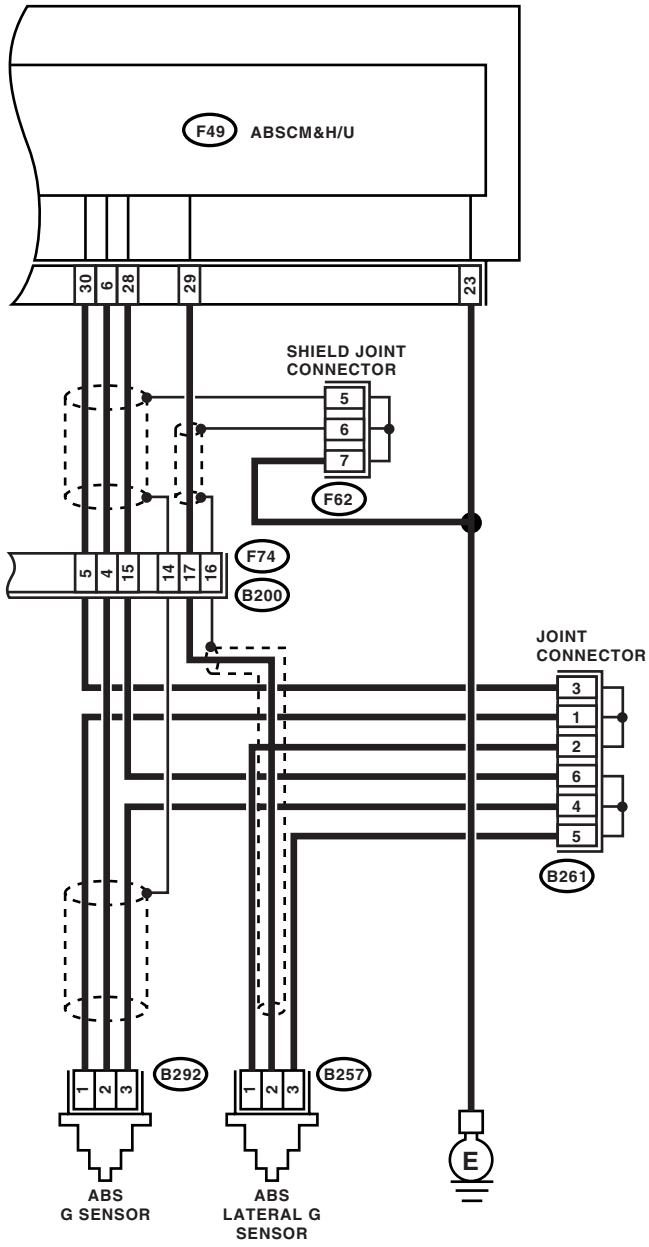
DIAGNOSIS:
Faulty G sensor output voltage
TROUBLE SYMPTOM:
ABS does not operate.
WIRING DIAGRAM:
- LHD model

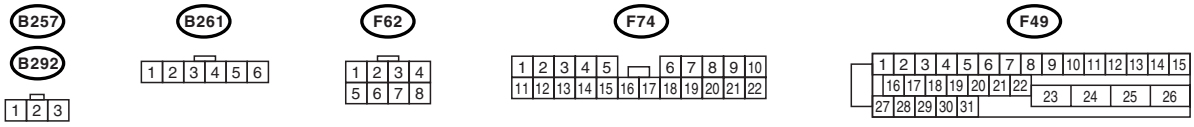




ABS00737

- RHD model





ABS00733

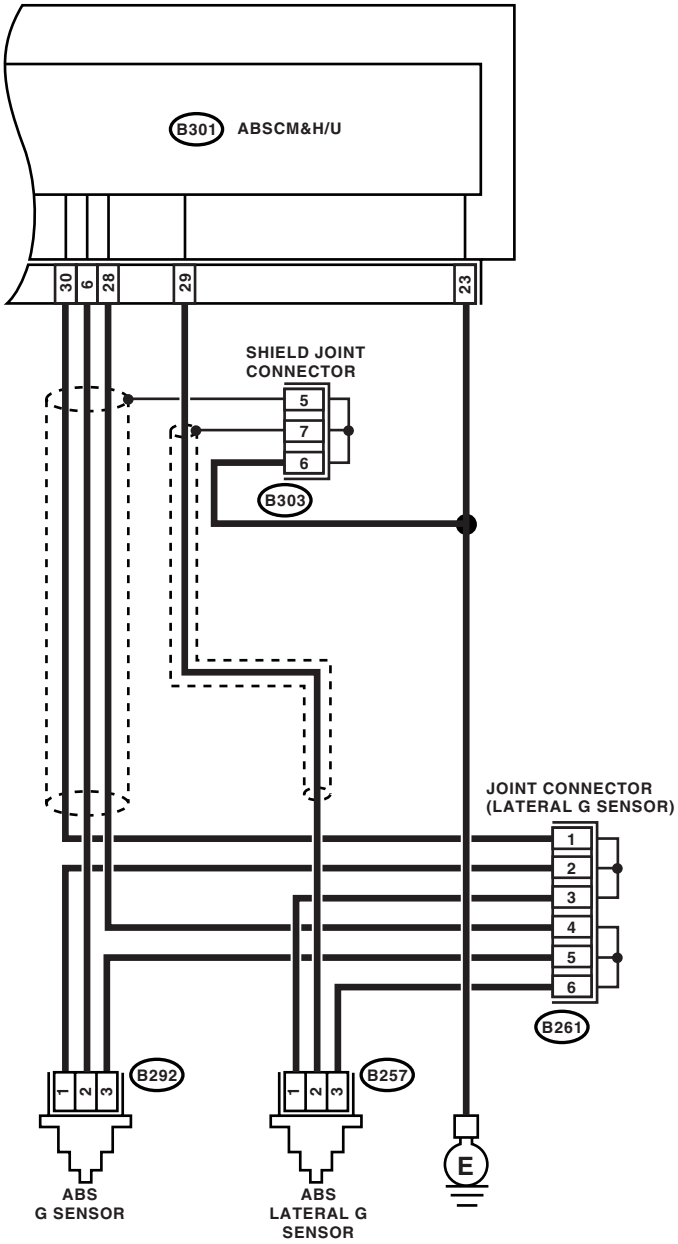
	Step	Check	Yes	No
1	**CHECK OUTPUT OF G SENSOR USING SUBARU SELECT MONITOR.** 1) Select “Current data display & Save” on the Subaru Select Monitor. 2) Read the G sensor output in Subaru Select Monitor data display.	Is the voltage 2.1 — 2.5 V when G sensor is in horizontal position?	Go to step **2.**	Go to step **5.**
2	**CHECK POOR CONTACT IN CONNECTORS.** Turn the ignition switch to OFF.	Is there poor contact in connector between ABSCM&H/U and G sensor?	Repair the connector.	Go to step **3.**
3	**CHECK ABSCM&H/U.** 1) Connect all connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read out the DTC.	Is the same DTC as in current diagnosis still being output?	Replace the ABSCM only. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **4.**
4	**CHECK ANY OTHER DIAGNOSTIC TROUBLE CODES (DTCs) APPEARANCE.**	Are other DTCs being output?	Proceed with the diagnosis corresponding to DTC.	A temporary poor contact.
5	**CHECK FREEZE FRAME DATA.** 1) Select “Freeze frame data” on the Subaru Select Monitor. 2) Read front right wheel speed on the Subaru Select Monitor display.	Is the front right wheel speed on monitor display 0 km/h (0 MPH)?	Go to step **6.**	Go to step **16.**
6	**CHECK FREEZE FRAME DATA.** Read front left wheel speed on the Subaru Select Monitor display.	Is the front left wheel speed on monitor display 0 km/h (0 MPH)?	Go to step **7.**	Go to step **16.**
7	**CHECK FREEZE FRAME DATA.** Read rear right wheel speed on the Subaru Select Monitor display.	Is the rear right wheel speed on monitor display 0 km/h (0 MPH)?	Go to step **8.**	Go to step **16.**
8	**CHECK FREEZE FRAME DATA.** Read rear left wheel speed on the Subaru Select Monitor display.	Is the rear left wheel speed on monitor display 0 km/h (0 MPH)?	Go to step **9.**	Go to step **16.**
9	**CHECK FREEZE FRAME DATA.** Read G sensor output on the Subaru Select Monitor display.	Is the G sensor output on monitor display more than 3.65 V?	Go to step **10.**	Go to step **16.**
10	**CHECK OPEN CIRCUIT IN G SENSOR OUTPUT HARNESS AND GROUND HARNESS.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ABSCM&H/U. 3) Measure the resistance between ABSCM&H/U connector terminals. ***Connector & terminal*** ***LHD:*** ***(B301) No. 6 — No. 28:*** ***RHD:*** ***(F49) No. 6 — No. 28:***	Is the resistance 5.0 — 5.6 kΩ?	Go to step **11.**	Repair the harness/connector between G sensor and ABSCM&H/U.

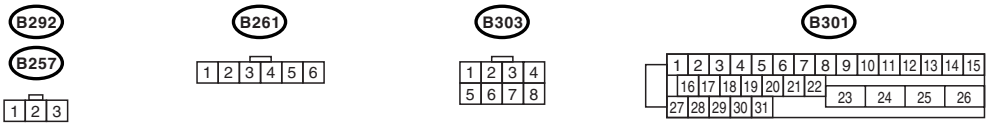
	Step	Check	Yes	No
11	**CHECK BATTERY SHORT OF HARNESS.** 1) Turn the ignition switch to OFF. 2) Remove the console box. 3) Disconnect the connector from G sensor. 4) Disconnect the connector from ABSCM&H/U. 5) Measure the voltage between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***LHD:*** ***(B301) No. 6 (+) — Chassis ground (−):*** ***RHD:*** ***(F49) No. 6 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **12.**	Repair the harness between G sensor and ABSCM&H/U.
12	**CHECK BATTERY SHORT OF HARNESS.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***LHD:*** ***(B301) No. 6 (+) — Chassis ground (−):*** ***RHD:*** ***(F49) No. 6 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **13.**	Repair the harness between G sensor and ABSCM&H/U.
13	**CHECK POOR CONTACT IN CONNECTORS.** Turn the ignition switch to OFF.	Is there poor contact in connector between ABSCM&H/U and G sensor?	Repair the connector.	Go to step **14.**
14	**CHECK ABSCM&H/U.** 1) Connect all connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read out the DTC.	Is the same DTC as in current diagnosis still being output?	Replace the ABSCM only. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **15.**
15	**CHECK ANY OTHER DIAGNOSTIC TROUBLE CODES (DTCs) APPEARANCE.**	Are other DTCs being output?	Proceed with the diagnosis corresponding to DTC.	A temporary poor contact.
16	**CHECK INPUT VOLTAGE OF G SENSOR.** 1) Turn the ignition switch to OFF. 2) Remove the console box. 3) Remove the G sensor from vehicle. (Do not disconnect connector.) 4) Turn the ignition switch to ON. 5) Measure the voltage between G sensor connector terminals. ***Connector & terminal*** ***(B292) No. 1 (+) — No. 3 (−):***	Is the voltage 4.75 — 5.25 V?	Go to step **17.**	Repair the harness connector between G sensor and ABSCM&H/U.
17	**CHECK OPEN CIRCUIT IN G SENSOR OUTPUT HARNESS AND GROUND HARNESS.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ABSCM&H/U. 3) Measure the resistance between ABSCM&H/U connector terminals. ***Connector & terminal*** ***LHD:*** ***(B301) No. 6 — No. 28:*** ***RHD:*** ***(F49) No. 6 — No. 28:***	Is the resistance 5.0 — 5.6 kΩ?	Go to step **18.**	Repair the harness connector between G sensor and ABSCM&H/U.

	Step	Check	Yes	No
18	**CHECK G SENSOR.** 1) Connect the connector to G sensor. 2) Connect the connector to ABSCM&H/U. 3) Turn the ignition switch to ON. 4) Measure the voltage between G sensor connector terminals. ***Connector & terminal*** ***(B292) No. 2 (+) — No. 3 (–):***	Is the voltage 2.1 — 2.5 V when G sensor is in horizontal position?	Go to step **19.**	Replace the G sensor. <Ref. to ABS-25, G Sensor.>
19	**CHECK G SENSOR.** Measure the voltage between G sensor connector terminals. ***Connector & terminal*** ***(B292) No. 2 (+) — No. 3 (–):***	Is the voltage 3.7 — 4.1 V when G sensor is inclined forwards to 90°?	Go to step **20.**	Replace the G sensor. <Ref. to ABS-25, G Sensor.>
20	**CHECK G SENSOR.** Measure the voltage between G sensor connector terminals. ***Connector & terminal*** ***(B292) No. 2 (+) — No. 3 (–):***	Is the voltage 0.5 — 0.9 V when G sensor is inclined backwards to 90°?	Go to step **21.**	Replace the G sensor. <Ref. to ABS-25, G Sensor.>
21	**CHECK POOR CONTACT IN CONNECTORS.** Turn the ignition switch to OFF.	Is there poor contact in connector between ABSCM&H/U and G sensor?	Repair the connector.	Go to step **22.**
22	**CHECK ABSCM&H/U.** 1) Connect all connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read out the DTC.	Is the same DTC as in current diagnosis still being output?	Replace the ABSCM only. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **23.**
23	**CHECK ANY OTHER DIAGNOSTIC TROUBLE CODES (DTCs) APPEARANCE.**	Are other DTCs being output?	Proceed with the diagnosis corresponding to DTC.	A temporary poor contact.

AC:DTC 56 ABNORMAL G SENSOR HIGH μ OUTPUT

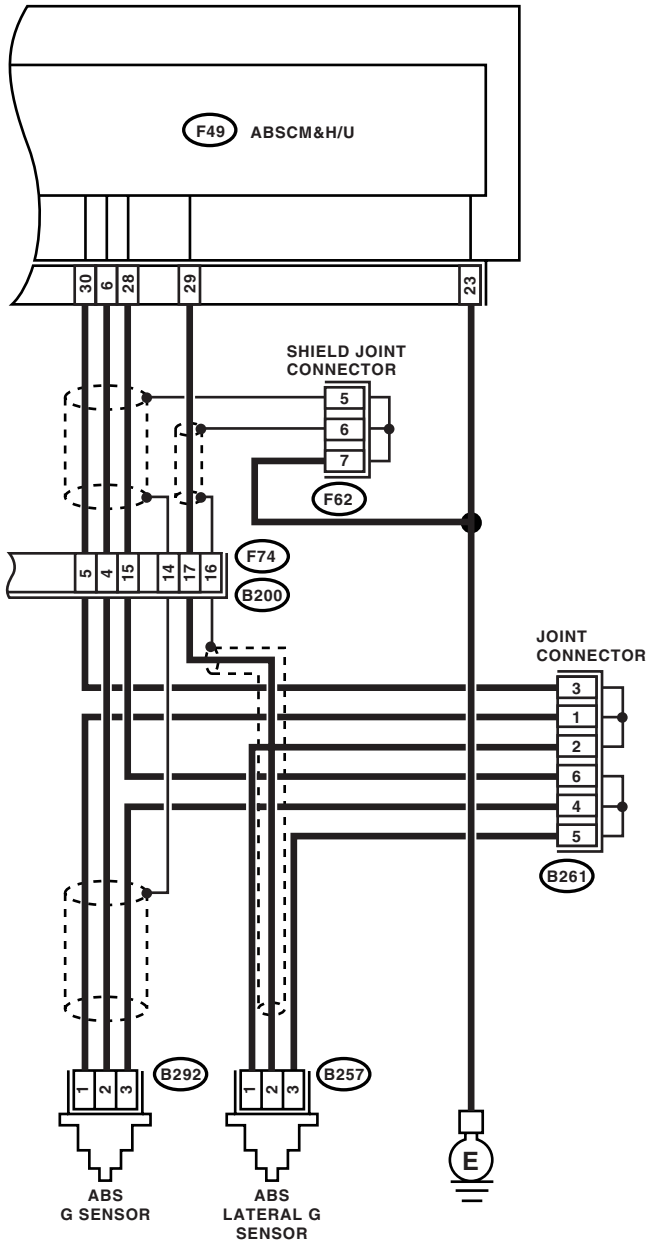
DIAGNOSIS:
Faulty G sensor output voltage
TROUBLE SYMPTOM:
ABS does not operate.
WIRING DIAGRAM:
- LHD model

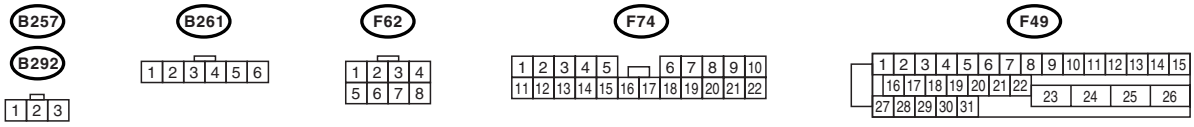




ABS00737

- RHD model





ABS00733

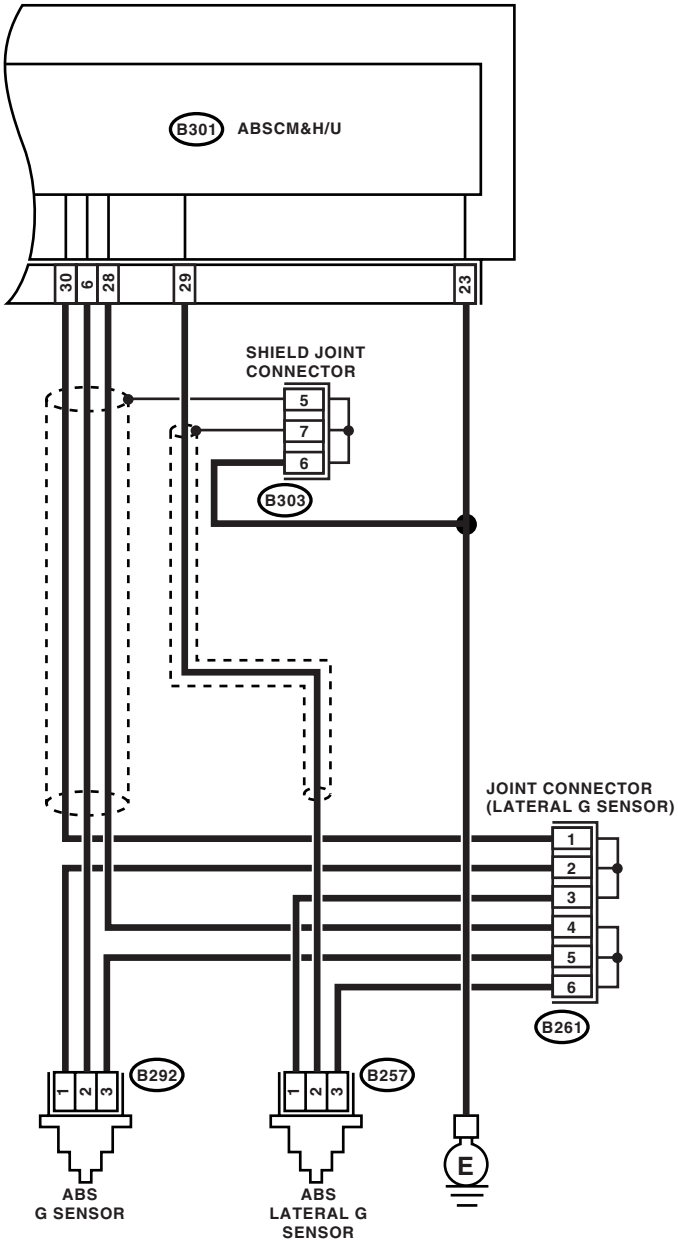
	Step	Check	Yes	No
1	**CHECK OUTPUT OF G SENSOR USING SUBARU SELECT MONITOR.** 1) Select “Current data display & Save” on the Subaru Select Monitor. 2) Read G sensor output on the Subaru Select Monitor display.	Is the voltage 2.1 — 2.5 V when G sensor is in horizontal position?	Go to step **2.**	Go to step **5.**
2	**CHECK POOR CONTACT IN CONNECTORS.** Turn the ignition switch to OFF.	Is there poor contact in connector between ABSCM&H/U and G sensor?	Repair the connector.	Go to step **3.**
3	**CHECK ABSCM&H/U.** 1) Connect all connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read out the DTC.	Is the same DTC as in current diagnosis still being output?	Replace the ABSCM only. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **4.**
4	**CHECK ANY OTHER DIAGNOSTIC TROUBLE CODES (DTCs) APPEARANCE.**	Are other DTCs being output?	Proceed with the diagnosis corresponding to DTC.	A temporary poor contact.
5	**CHECK OPEN CIRCUIT IN G SENSOR OUTPUT HARNESS AND GROUND HARNESS.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ABSCM&H/U. 3) Measure the resistance between ABSCM&H/U connector terminals. ***Connector & terminal*** ***LHD:*** ***(B301) No. 6 — No. 28:*** ***RHD:*** ***(F49) No. 6 — No. 28:***	Is the resistance 5.0 — 5.6 kΩ?	Go to step **6.**	Repair the harness connector between G sensor and ABSCM&H/U.
6	**CHECK GROUND SHORT OF HARNESS.** Measure the resistance between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***LHD:*** ***(B301) No. 28 — Chassis ground:*** ***RHD:*** ***(F49) No. 28 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **7.**	Repair the harness between G sensor and ABSCM&H/U. Replace the ABSCM only. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>
7	**CHECK G SENSOR.** 1) Remove the console box. 2) Remove the G sensor from vehicle. 3) Connect the connector to G sensor. 4) Connect the connector to ABSCM&H/U. 5) Turn the ignition switch to ON. 6) Measure the voltage between G sensor connector terminals. ***Connector & terminal*** ***(B292) No. 2 (+) — No. 3 (−):***	Is the voltage 2.1 — 2.5 V when G sensor is in horizontal position?	Go to step **8.**	Replace the G sensor. <Ref. to ABS-25, G Sensor.>
8	**CHECK G SENSOR.** Measure the voltage between G sensor connector terminals. ***Connector & terminal*** ***(B292) No. 2 (+) — No. 3 (−):***	Is the voltage 3.7 — 4.1 V when G sensor is inclined forwards to 90°?	Go to step **9.**	Replace the G sensor. <Ref. to ABS-25, G Sensor.>

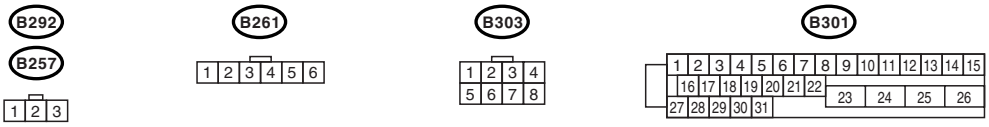
	Step	Check	Yes	No
9	**CHECK G SENSOR.** Measure the voltage between G sensor connector terminals. ***Connector & terminal (B292) No. 2 (+) — No. 3 (−):***	Is the voltage 0.5 — 0.9 V when G sensor is inclined backwards to 90°?	Go to step **10.**	Replace the G sensor. <Ref. to ABS-25, G Sensor.>
10	**CHECK ABSCM&H/U.** 1) Turn the ignition switch to OFF. 2) Connect all connectors. 3) Erase the memory. 4) Perform the inspection mode. 5) Read out the DTC.	Is the same DTC as in current diagnosis still being output?	Replace the ABSCM only. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **11.**
11	**CHECK ANY OTHER DIAGNOSTIC TROUBLE CODES (DTCs) APPEARANCE.**	Are other DTCs being output?	Proceed with the diagnosis corresponding to DTC.	A temporary poor contact.

AD:DTC 56 DETECTION OF G SENSOR STICK

DIAGNOSIS:
Faulty G sensor output voltage
TROUBLE SYMPTOM:
ABS does not operate.
WIRING DIAGRAM:

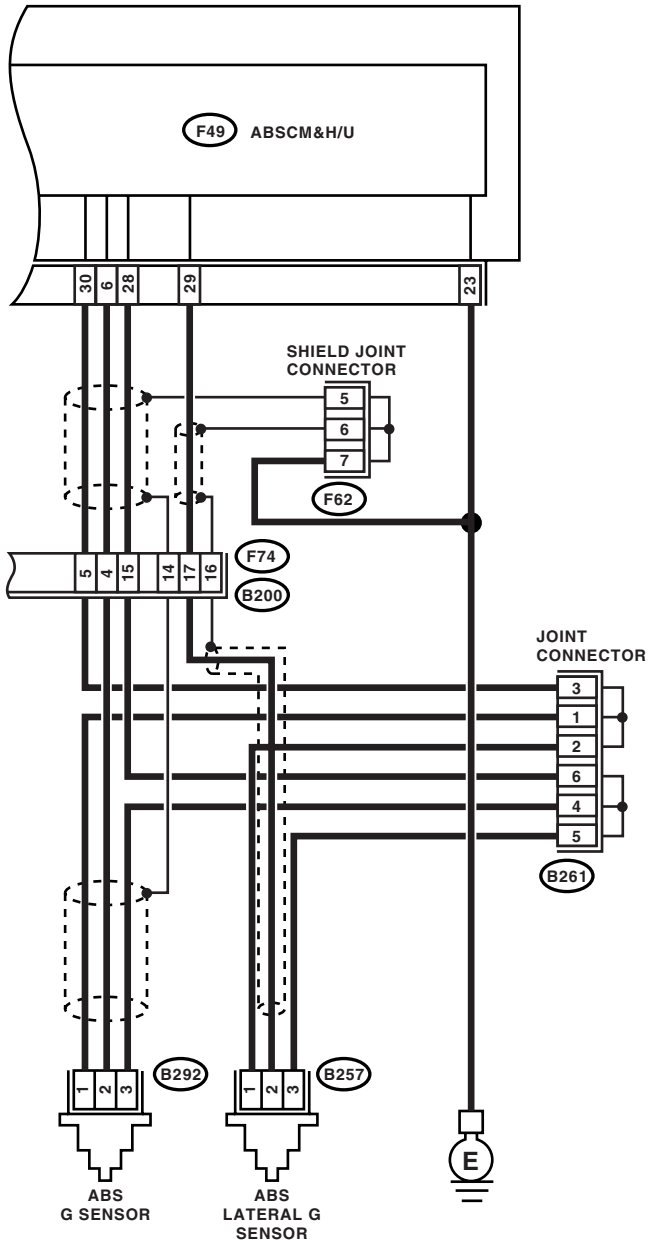
- LHD model

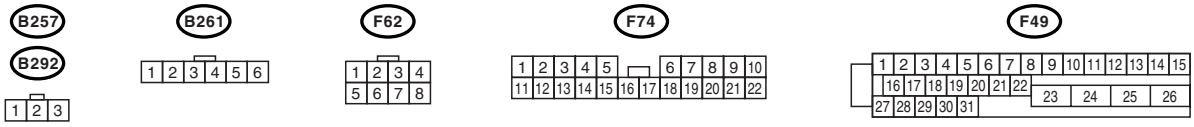




ABS00737

- RHD model





ABS00733

	Step	Check	Yes	No
1	**CHECK ALL FOUR WHEELS FOR FREE TURNING.**	Have the wheels been turned freely such as when vehicle is lifted up, or operated on a rolling road?	The ABS is normal. Erase the DTC.	Go to step **2.**
2	**CHECK OUTPUT OF G SENSOR USING SUBARU SELECT MONITOR.** 1) Select “Current data display & Save” on the Subaru Select Monitor. 2) Read the Subaru Select Monitor display.	Is the G sensor output on monitor display 2.1 — 2.5 V when the vehicle is in horizontal position?	Go to step **3.**	Go to step **8.**
3	**CHECK OUTPUT OF G SENSOR USING SUBARU SELECT MONITOR.** 1) Turn the ignition switch to OFF. 2) Remove the console box. 3) Remove the G sensor from vehicle. (Do not disconnect the connector.) 4) Turn the ignition switch to ON. 5) Select “Current data display & Save” on the Subaru Select Monitor. 6) Read the Subaru Select Monitor display.	Is the voltage 3.7 — 4.1 V when G sensor is inclined forwards to 90°?	Go to step **4.**	Replace the G sensor. <Ref. to ABS-25, G Sensor.>
4	**CHECK OUTPUT OF G SENSOR USING SUBARU SELECT MONITOR.** Read the Subaru Select Monitor display.	Is the voltage 0.5 — 0.9 V when G sensor is inclined backwards to 90°?	Go to step **5.**	Replace the G sensor. <Ref. to ABS-25, G Sensor.>
5	**CHECK POOR CONTACT IN CONNECTORS.** Turn the ignition switch to OFF.	Is there poor contact in connector between ABSCM&H/U and G sensor?	Repair the connector.	Go to step **6.**
6	**CHECK ABSCM&H/U.** 1) Connect all connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read out the DTC.	Is the same DTC as in current diagnosis still being output?	Replace the ABSCM only. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **7.**
7	**CHECK ANY OTHER DIAGNOSTIC TROUBLE CODES (DTCs) APPEARANCE.**	Are other DTCs being output?	Proceed with the diagnosis corresponding to DTC.	A temporary poor contact.
8	**CHECK OPEN CIRCUIT IN G SENSOR OUTPUT HARNESS AND GROUND HARNESS.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ABSCM&H/U. 3) Measure the resistance between ABSCM&H/U connector terminals. ***Connector & terminal*** ***LHD:*** ***(B301) No. 6 — No. 28:*** ***RHD:*** ***(F49) No. 6 — No. 28:***	Is the resistance 5.0 — 5.6 kΩ?	Go to step **9.**	Repair the harness connector between G sensor and ABSCM&H/U.
9	**CHECK G SENSOR.** 1) Remove the console box. 2) Remove the G sensor from vehicle. 3) Connect the connector to G sensor. 4) Connect the connector to ABSCM&H/U. 5) Turn the ignition switch to ON. 6) Measure the voltage between G sensor connector terminals. ***Connector & terminal*** ***(B292) No. 2 (+) — No. 3 (−):***	Is the voltage 2.1 — 2.5 V when G sensor is in horizontal position?	Go to step **10.**	Replace the G sensor. <Ref. to ABS-25, G Sensor.>

	Step	Check	Yes	No
10	**CHECK G SENSOR.** Measure the voltage between G sensor connector terminals. ***Connector & terminal*** ***(B292) No. 2 (+) — No. 3 (–):***	Is the voltage 3.7 — 4.1 V when G sensor is inclined forwards to 90°?	Go to step **11.**	Replace the G sensor. <Ref. to ABS-25, G Sensor.>
11	**CHECK G SENSOR.** Measure the voltage between G sensor connector terminals. ***Connector & terminal*** ***(B292) No. 2 (+) — No. 3 (–):***	Is the voltage 0.5 — 0.9 V when G sensor is inclined backwards to 90°?	Go to step **12.**	Replace the G sensor. <Ref. to ABS-25, G Sensor.>
12	**CHECK ABSCM&H/U.** 1) Turn the ignition switch to OFF. 2) Connect all connectors. 3) Erase the memory. 4) Perform the inspection mode. 5) Read out the DTC.	Is the same DTC as in current diagnosis still being output?	Replace the ABSCM only. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **13.**
13	**CHECK ANY OTHER DIAGNOSTIC TROUBLE CODES (DTCs) APPEARANCE.**	Are other DTCs being output?	Proceed with the diagnosis corresponding to DTC.	A temporary poor contact.

AE:DTC 73 OPEN OR SHORT CIRCUIT IN LATERAL G SENSOR CIRCUIT

DIAGNOSIS:

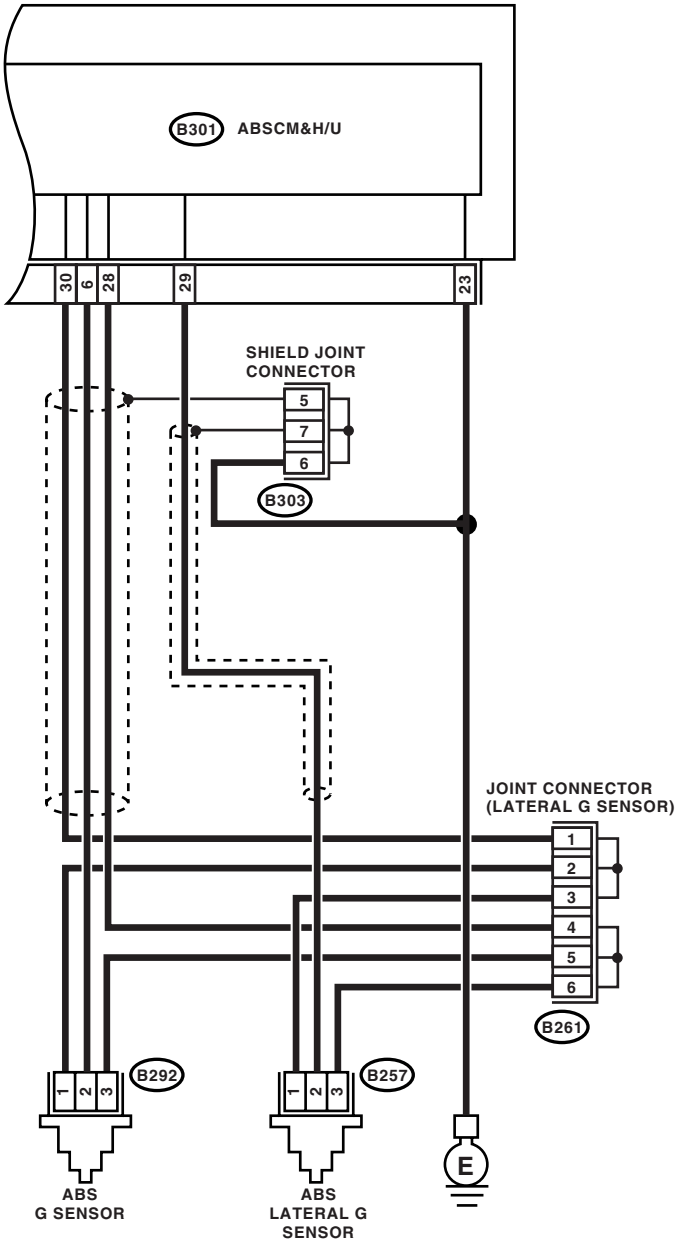
Faulty lateral G sensor output voltage

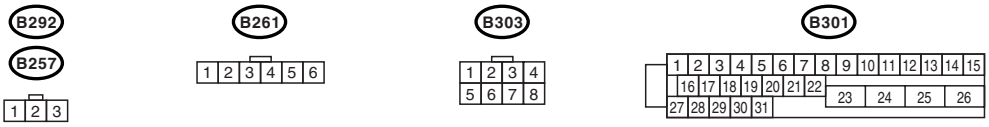
TROUBLE SYMPTOM:

ABS does not operate.

WIRING DIAGRAM:

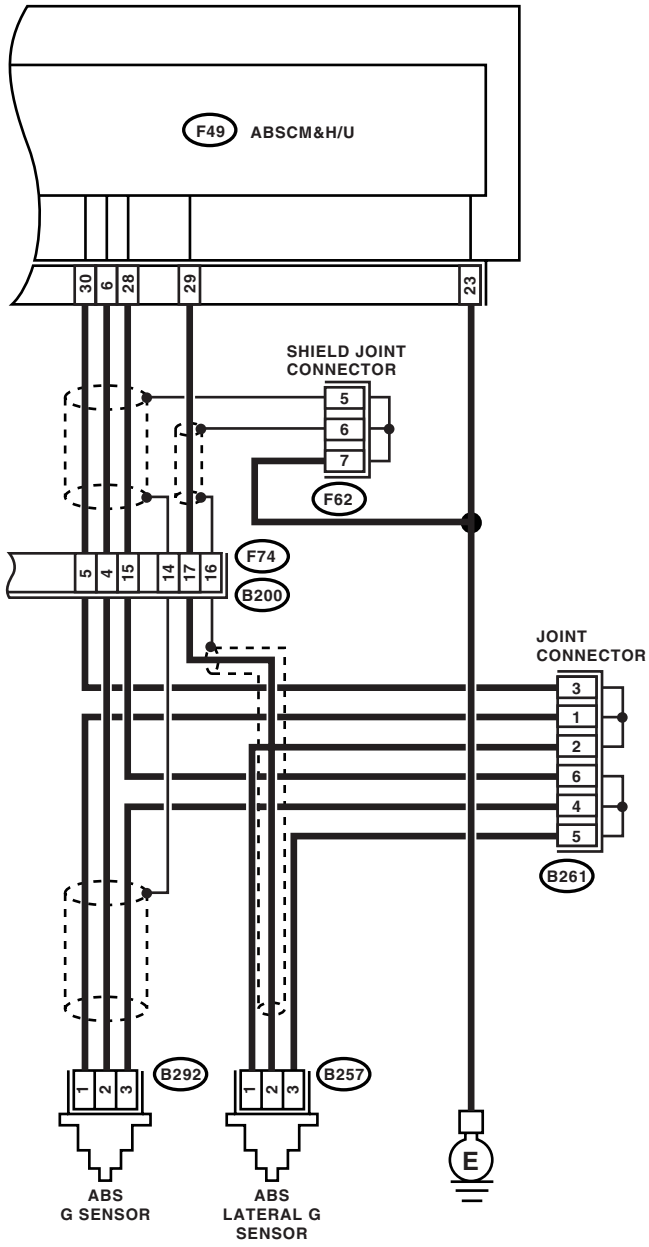
- LHD model

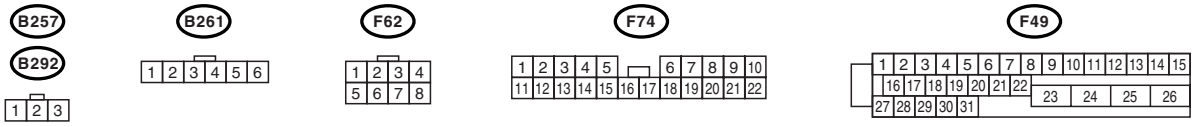




ABS00737

- RHD model





ABS00733

	Step	Check	Yes	No
1	**CHECK OUTPUT OF LATERAL G SENSOR USING SUBARU SELECT MONITOR.** 1) Select “Current data display & Save” on the Subaru Select Monitor. 2) Read the lateral G sensor output in Subaru Select Monitor data display.	Is the lateral G sensor output on monitor display 2.3 — 2.7 V when lateral G sensor is in horizontal position?	Go to step **2.**	Go to step **5.**
2	**CHECK POOR CONTACT IN CONNECTORS.** Turn the ignition switch to OFF.	Is there poor contact in connector between ABSCM&H/U and lateral G sensor?	Repair the connector.	Go to step **3.**
3	**CHECK ABSCM&H/U.** 1) Connect all connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read out the DTC.	Is the same DTC as in the current diagnosis still being output?	Replace the ABSCM only. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **4.**
4	**CHECK ANY OTHER DIAGNOSTIC TROUBLE CODES (DTCs) APPEARANCE.**	Are other DTCs being output?	Proceed with the diagnosis corresponding to DTC.	A temporary poor contact.
5	**CHECK INPUT VOLTAGE OF LATERAL G SENSOR.** 1) Turn the ignition switch to OFF. 2) Remove the console box. 3) Remove the lateral G sensor from vehicle. (Do not disconnect connector.) 4) Turn the ignition switch to ON. 5) Measure the voltage between lateral G sensor connector terminals. ***Connector & terminal*** ***(B257) No. 1 (+) — No. 3 (−):***	Is the voltage 4.75 — 5.25 V?	Go to step **6.**	Repair the harness connector between lateral G sensor and ABSCM&H/U.
6	**CHECK OPEN CIRCUIT IN LATERAL G SENSOR OUTPUT HARNESS AND GROUND HARNESS.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ABSCM&H/U. 3) Measure the resistance between ABSCM&H/U connector terminals. ***Connector & terminal*** ***LHD:*** ***(B301) No. 28 — No. 30:*** ***RHD:*** ***(F49) No. 29 — No. 28:***	Is the resistance 5.0 — 5.6 kΩ?	Go to step **7.**	Repair the harness connector between lateral G sensor and ABSCM&H/U.
7	**CHECK GROUND SHORT IN LATERAL G SENSOR OUTPUT HARNESS.** 1) Disconnect the connector from lateral G sensor. 2) Measure the resistance between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***LHD:*** ***(B301) No. 29 — Chassis ground:*** ***RHD:*** ***(F49) No. 29 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **8.**	Repair the harness between lateral G sensor and ABSCM&H/U.

	Step	Check	Yes	No
8	**CHECK LATERAL G SENSOR.** 1) Connect the connector to lateral G sensor. 2) Connect the connector to ABSCM&H/U. 3) Turn the ignition switch to ON. 4) Measure the voltage between lateral G sensor connector terminals. ***Connector & terminal*** ***(B257) No. 2 (+) — No. 3 (–):***	Is the voltage 2.1 — 2.5 V when lateral G sensor is in horizontal position?	Go to step **9.**	Replace the lateral G sensor. <Ref. to ABS-27, Lateral G Sensor.>
9	**CHECK LATERAL G SENSOR.** Measure the voltage between lateral G sensor connector terminals. ***Connector & terminal*** ***(B257) No. 2 (+) — No. 3 (–):***	Is the voltage 3.3 — 3.7 V when lateral G sensor is inclined right to 90°?	Go to step **10.**	Replace the lateral G sensor. <Ref. to ABS-27, Lateral G Sensor.>
10	**CHECK LATERAL G SENSOR.** Measure the voltage between Lateral G sensor connector terminals. ***Connector & terminal*** ***(B257) No. 2 (+) — No. 3 (–):***	Is the voltage 0.5 — 0.9 V when Lateral G sensor is inclined left to 90°?	Go to step **11.**	Replace the Lateral G sensor. <Ref. to ABS-27, Lateral G Sensor.>
11	**CHECK POOR CONTACT IN CONNECTORS.** Turn the ignition switch to OFF.	Is there poor contact in connector between ABSCM&H/U and lateral G sensor?	Repair the connector.	Go to step **12.**
12	**CHECK ABSCM&H/U.** 1) Connect all connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read out the DTC.	Is the same DTC as in current diagnosis still being output?	Replace the ABSCM only. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **13.**
13	**CHECK ANY OTHER DIAGNOSTIC TROUBLE CODES (DTCs) APPEARANCE.**	Are other DTCs being output?	Proceed with the diagnosis corresponding to DTC.	A temporary poor contact.

AF:DTC 73 BATTERY SHORT IN LATERAL G SENSOR CIRCUIT

DIAGNOSIS:

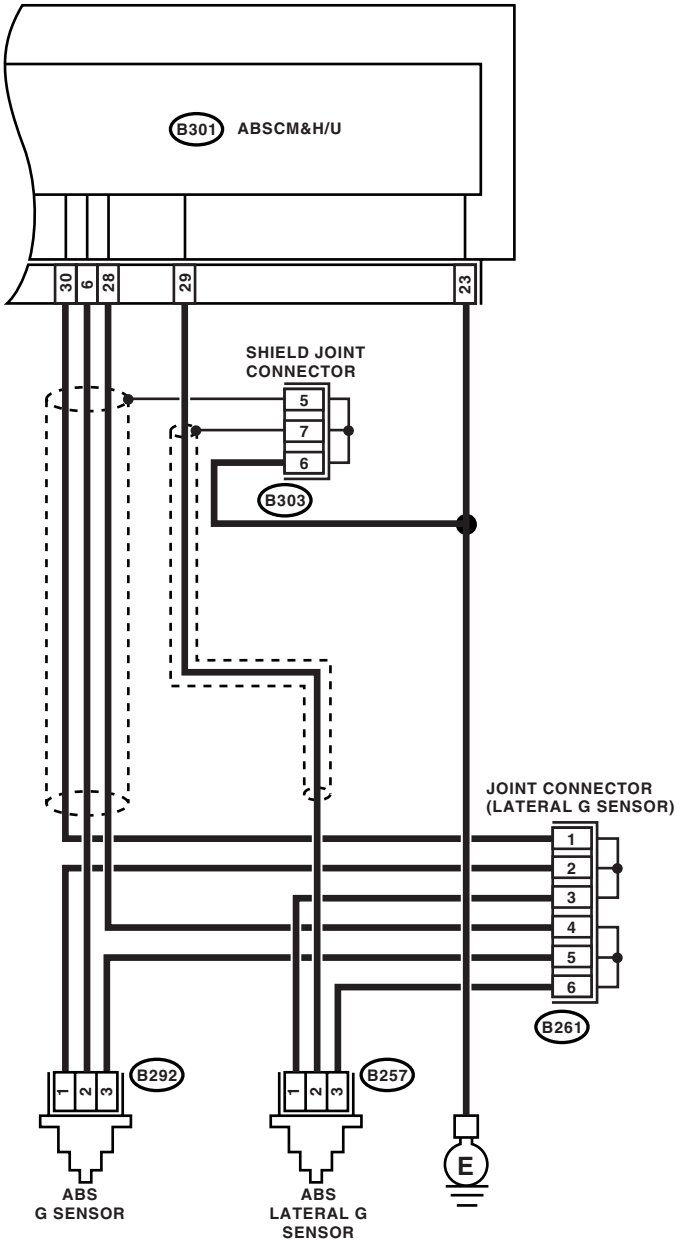
Faulty lateral G sensor output voltage

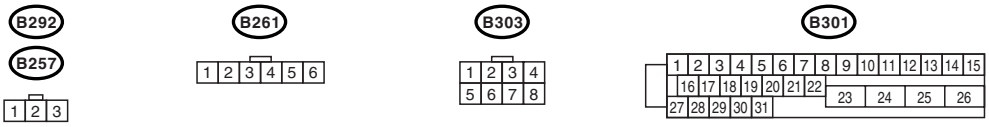
TROUBLE SYMPTOM:

ABS does not operate.

WIRING DIAGRAM:

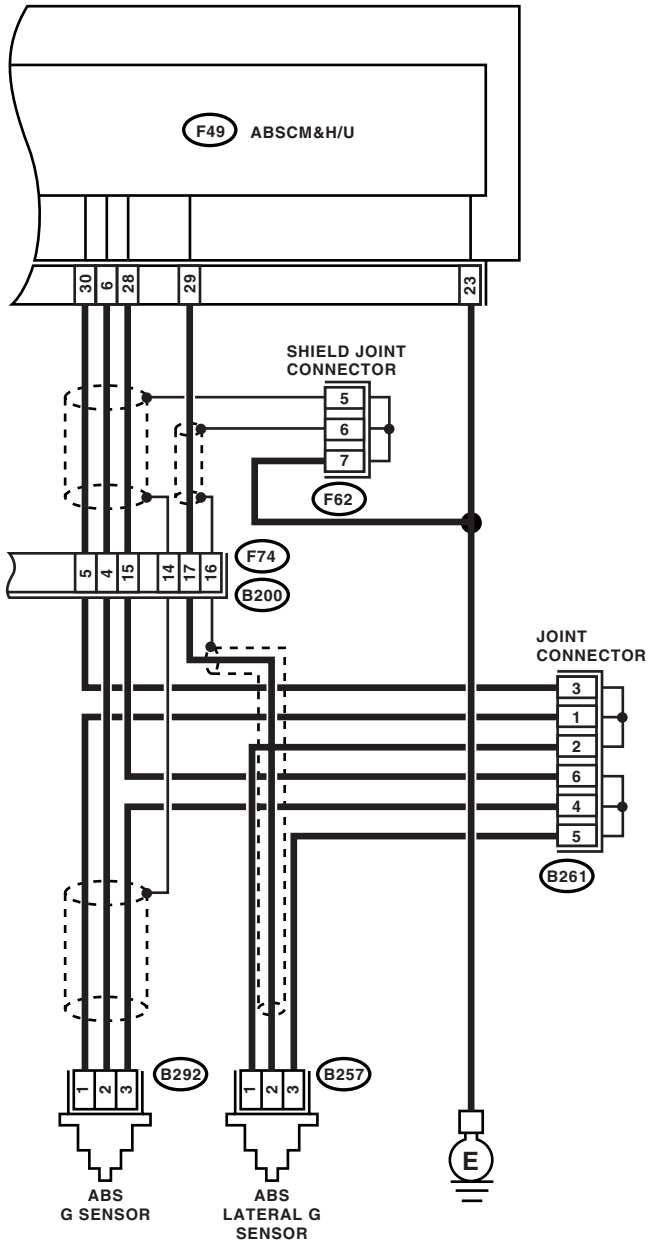
- LHD model

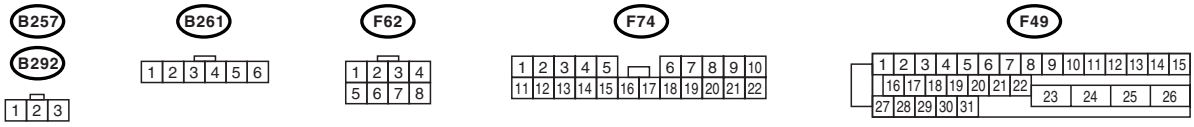




ABS00737

- RHD model





ABS00733

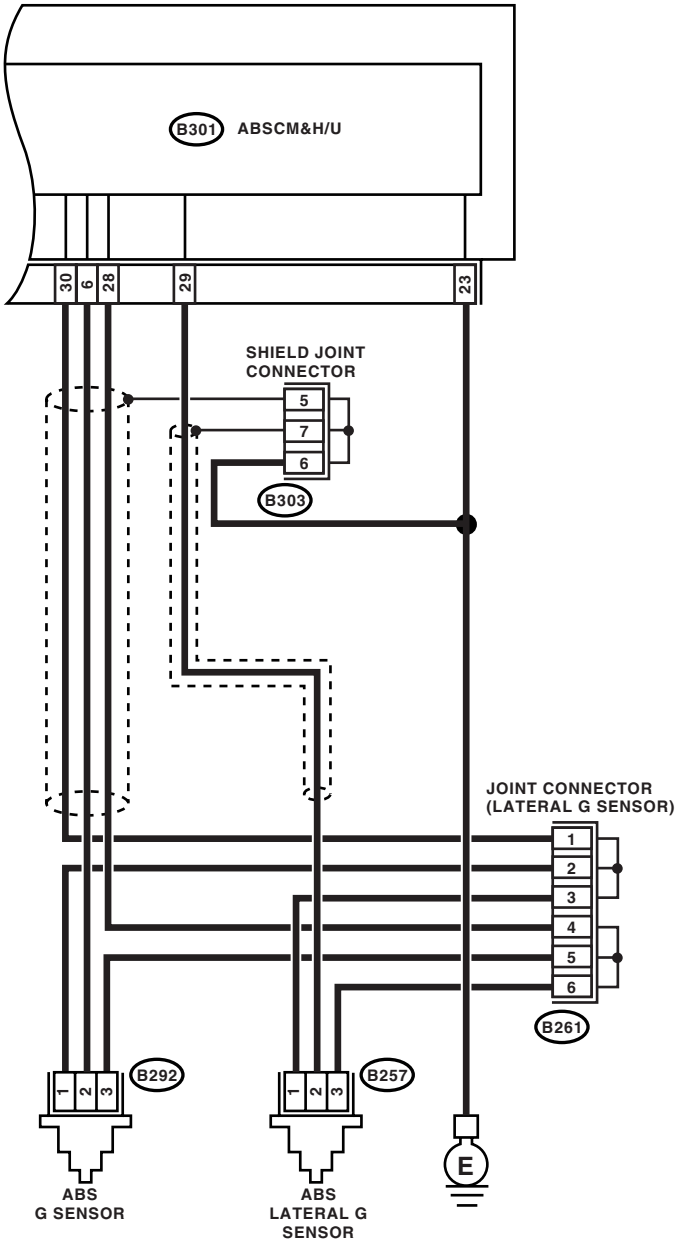
	Step	Check	Yes	No
1	**CHECK OUTPUT OF LATERAL G SENSOR USING SUBARU SELECT MONITOR.** 1) Select “Current data display & Save” on the Subaru Select Monitor. 2) Read the lateral G sensor output in Subaru Select Monitor data display.	Is the voltage 2.3 — 2.7 V when lateral G sensor is in horizontal position?	Go to step **2.**	Go to step **5.**
2	**CHECK POOR CONTACT IN CONNECTORS.** Turn the ignition switch to OFF.	Is there poor contact in connector between ABSCM&H/U and lateral G sensor?	Repair the connector.	Go to step **3.**
3	**CHECK ABSCM&H/U.** 1) Connect all connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read out the DTC.	Is the same DTC as in current diagnosis still being output?	Replace the ABSCM only. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **4.**
4	**CHECK ANY OTHER DIAGNOSTIC TROUBLE CODES (DTCs) APPEARANCE.**	Are other DTCs being output?	Proceed with the diagnosis corresponding to DTC.	A temporary poor contact.
5	**CHECK FREEZE FRAME DATA.** 1) Select “Freeze frame data” on the Subaru Select Monitor. 2) Read front right wheel speed on the Subaru Select Monitor display.	Is the front right wheel speed on monitor display 0 km/h (0 MPH)?	Go to step **6.**	Go to step **16.**
6	**CHECK FREEZE FRAME DATA.** Read front left wheel speed on the Subaru Select Monitor display.	Is the front left wheel speed on monitor display 0 km/h (0 MPH)?	Go to step **7.**	Go to step **16.**
7	**CHECK FREEZE FRAME DATA.** Read rear right wheel speed on the Subaru Select Monitor display.	Is the rear right wheel speed on monitor display 0 km/h (0 MPH)?	Go to step **8.**	Go to step **16.**
8	**CHECK FREEZE FRAME DATA.** Read rear left wheel speed on the Subaru Select Monitor display.	Is the rear left wheel speed on monitor display 0 km/h (0 MPH)?	Go to step **9.**	Go to step **16.**
9	**CHECK FREEZE FRAME DATA.** Read lateral G sensor output on the Subaru Select Monitor display.	Is the lateral G sensor output on monitor display more than 3.65 V?	Go to step **10.**	Go to step **16.**
10	**CHECK OPEN CIRCUIT IN LATERAL G SENSOR OUTPUT HARNESS AND GROUND HARNESS.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ABSCM&H/U. 3) Measure the resistance between ABSCM&H/U connector terminals. ***Connector & terminal*** ***LHD:*** ***(B301) No. 29 — No. 28:*** ***RHD:*** ***(F49) No. 29 — No. 28:***	Is the resistance 5.0 — 5.6 kΩ?	Go to step **11.**	Repair the harness connector between lateral G sensor and ABSCM&H/U.

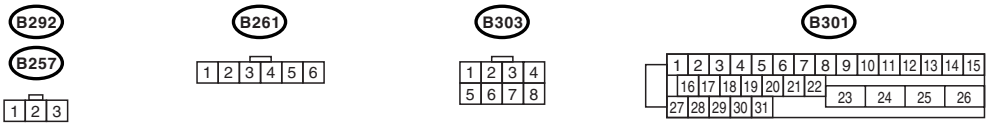
	Step	Check	Yes	No
11	**CHECK BATTERY SHORT OF HARNESS.** 1) Turn the ignition switch to OFF. 2) Remove the console box. 3) Disconnect the connector from lateral G sensor. 4) Disconnect the connector from ABSCM&H/U. 5) Measure the voltage between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***LHD:*** ***(B301) No. 29 (+) — Chassis ground (−):*** ***RHD:*** ***(F49) No. 29 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **12.**	Repair the harness between lateral G sensor and ABSCM&H/U.
12	**CHECK BATTERY SHORT OF HARNESS.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***LHD:*** ***(B301) No. 29 (+) — Chassis ground (−):*** ***RHD:*** ***(F49) No. 29 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **13.**	Repair the harness between lateral G sensor and ABSCM&H/U.
13	**CHECK POOR CONTACT IN CONNECTORS.** Turn the ignition switch to OFF.	Is there poor contact in connector between ABSCM&H/U and lateral G sensor?	Repair the connector.	Go to step **14.**
14	**CHECK ABSCM&H/U.** 1) Connect all connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read out the DTC.	Is the same DTC as in current diagnosis still being output?	Replace the ABSCM only. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **15.**
15	**CHECK ANY OTHER DIAGNOSTIC TROUBLE CODES (DTCs) APPEARANCE.**	Are other DTCs being output?	Proceed with the diagnosis corresponding to DTC.	A temporary poor contact.
16	**CHECK INPUT VOLTAGE OF LATERAL G SENSOR.** 1) Turn the ignition switch to OFF. 2) Remove the console box. 3) Remove the lateral G sensor from vehicle. (Do not disconnect connector.) 4) Turn the ignition switch to ON. 5) Measure the voltage between lateral G sensor connector terminals. ***Connector & terminal*** ***(B257) No. 1 (+) — No. 3 (−):***	Is the voltage 4.75 — 5.25 V?	Go to step **17.**	Repair the harness connector between lateral G sensor and ABSCM&H/U.
17	**CHECK OPEN CIRCUIT IN LATERAL G SENSOR OUTPUT HARNESS AND GROUND HARNESS.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ABSCM&H/U. 3) Measure the resistance between ABSCM&H/U connector terminals. ***Connector & terminal*** ***LHD:*** ***(B301) No. 29 — No. 28:*** ***RHD:*** ***(F49) No. 29 — No. 28:***	Is the resistance 5.0 — 5.6 kΩ?	Go to step **18.**	Repair the harness connector between lateral G sensor and ABSCM&H/U.

	Step	Check	Yes	No
18	**CHECK LATERAL G SENSOR.** 1) Connect the connector to lateral G sensor. 2) Connect the connector to ABSCM&H/U. 3) Turn the ignition switch to ON. 4) Measure the voltage between lateral G sensor connector terminals. ***Connector & terminal*** ***(B257) No. 2 (+) — No. 3 (–):***	Is the voltage 2.1 — 2.5 V when lateral G sensor is in horizontal position?	Go to step **19.**	Replace the lateral G sensor. <Ref. to ABS-27, Lateral G Sensor.>
19	**CHECK LATERAL G SENSOR.** Measure the voltage between lateral G sensor connector terminals. ***Connector & terminal*** ***(B257) No. 2 (+) — No. 3 (–):***	Is the voltage 3.3 — 3.7 V when lateral G sensor is inclined right to 90°?	Go to step **20.**	Replace the lateral G sensor. <Ref. to ABS-27, Lateral G Sensor.>
20	**CHECK LATERAL G SENSOR.** Measure the voltage between lateral G sensor connector terminals. ***Connector & terminal*** ***(B257) No. 2 (+) — No. 3 (–):***	Is the voltage 0.5 — 0.9 V when lateral G sensor is inclined left to 90°?	Go to step **21.**	Replace the lateral G sensor. <Ref. to ABS-27, Lateral G Sensor.>
21	**CHECK POOR CONTACT IN CONNECTORS.** Turn the ignition switch to OFF.	Is there poor contact in connector between ABSCM&H/U and lateral G sensor?	Repair the connector.	Go to step **22.**
22	**CHECK ABSCM&H/U.** 1) Connect all connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read out the DTC.	Is the same DTC as in current diagnosis still being output?	Replace the ABSCM only. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **23.**
23	**CHECK ANY OTHER DIAGNOSTIC TROUBLE CODES (DTCs) APPEARANCE.**	Are other DTCs being output?	Proceed with the diagnosis corresponding to DTC.	A temporary poor contact.

AG:DTC 73 ABNORMAL LATERAL G SENSOR HIGH μ OUTPUT

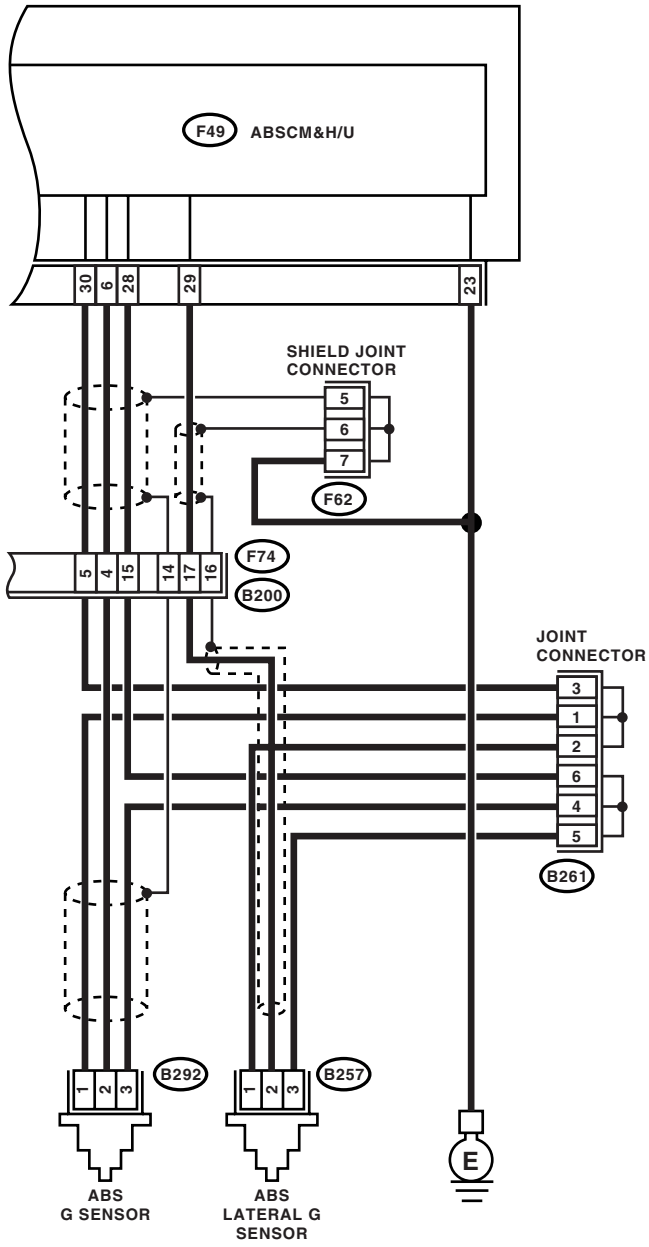
DIAGNOSIS:
Faulty lateral G sensor output voltage
TROUBLE SYMPTOM:
ABS does not operate.
WIRING DIAGRAM:
- LHD model

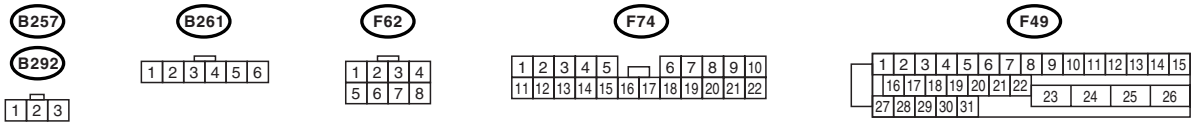




ABS00737

- RHD model





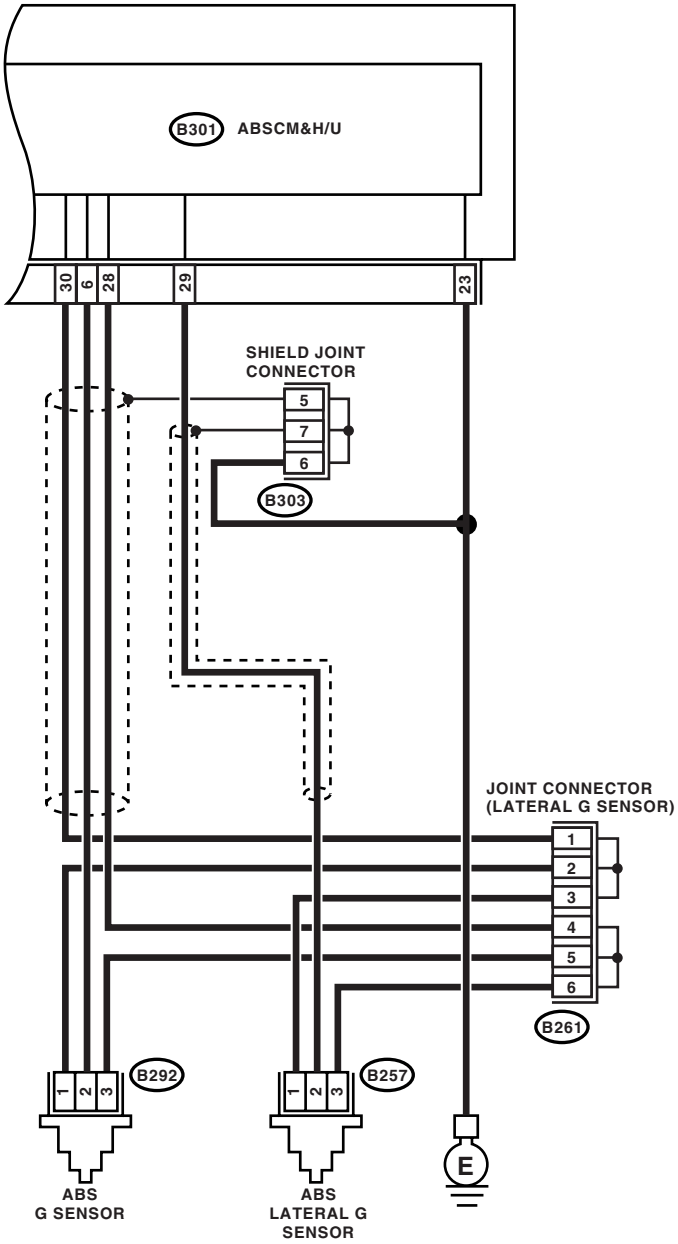
ABS00733

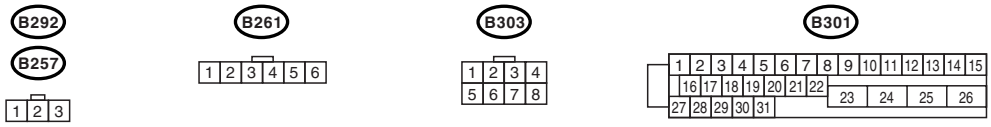
	Step	Check	Yes	No
1	**CHECK OUTPUT OF LATERAL G SENSOR USING SUBARU SELECT MONITOR.** 1) Select “Current data display & Save” on the Subaru Select Monitor. 2) Read lateral G sensor output on the Subaru Select Monitor display.	Is the voltage 2.3 — 2.7 V when lateral G sensor is in horizontal position?	Go to step **2.**	Go to step **5.**
2	**CHECK POOR CONTACT IN CONNECTORS.** Turn the ignition switch to OFF.	Is there poor contact in connector between ABSCM&H/U and lateral G sensor?	Repair the connector.	Go to step **3.**
3	**CHECK ABSCM&H/U.** 1) Connect all connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read out the DTC.	Is the same DTC as in current diagnosis still being output?	Replace the ABSCM only. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **4.**
4	**CHECK ANY OTHER DIAGNOSTIC TROUBLE CODES (DTCs) APPEARANCE.**	Are other DTCs being output?	Proceed with the diagnosis corresponding to DTC.	A temporary poor contact.
5	**CHECK OPEN CIRCUIT IN LATERAL G SENSOR OUTPUT HARNESS AND GROUND HARNESS.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ABSCM&H/U. 3) Measure the resistance between ABSCM&H/U connector terminals. ***Connector & terminal*** ***LHD:*** ***(B301) No. 29 — No. 28:*** ***RHD:*** ***(F49) No. 29 — No. 28:***	Is the resistance 5.0 — 5.6 kΩ?	Go to step **6.**	Repair the harness connector between lateral G sensor and ABSCM&H/U.
6	**CHECK GROUND SHORT OF HARNESS.** Measure the resistance between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***LHD:*** ***(B301) No. 28 — Chassis ground:*** ***RHD:*** ***(F49) No. 28 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **7.**	Repair the harness between lateral G sensor and ABSCM&H/U. Replace the ABSCM only. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>
7	**CHECK LATERAL G SENSOR.** 1) Remove the console box. 2) Remove the lateral G sensor from vehicle. 3) Connect the connector to lateral G sensor. 4) Connect the connector to ABSCM&H/U. 5) Turn the ignition switch to ON. 6) Measure the voltage between lateral G sensor connector terminals. ***Connector & terminal*** ***(B257) No. 2 (+) — No. 3 (−):***	Is the voltage 2.1 — 2.5 V when lateral G sensor is in horizontal position?	Go to step **8.**	Replace the lateral G sensor. <Ref. to ABS-27, Lateral G Sensor.>
8	**CHECK LATERAL G SENSOR.** Measure the voltage between lateral G sensor connector terminals. ***Connector & terminal*** ***(B257) No. 2 (+) — No. 3 (−):***	Is the voltage 3.3 — 3.7 V when lateral G sensor is inclined right to 90°?	Go to step **9.**	Replace the lateral G sensor. <Ref. to ABS-27, Lateral G Sensor.>

	Step	Check	Yes	No
9	**CHECK LATERAL G SENSOR.** Measure the voltage between lateral G sensor connector terminals. ***Connector & terminal (B257) No. 2 (+) — No. 3 (−):***	Is the voltage 0.5 — 0.9 V when lateral G sensor is inclined left to 90°?	Go to step **10.**	Replace the lateral G sensor. <Ref. to ABS-27, Lateral G Sensor.>
10	**CHECK ABSCM&H/U.** 1) Turn the ignition switch to OFF. 2) Connect all connectors. 3) Erase the memory. 4) Perform the inspection mode. 5) Read out the DTC.	Is the same DTC as in current diagnosis still being output?	Replace the ABSCM only. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **11.**
11	**CHECK ANY OTHER DIAGNOSTIC TROUBLE CODES (DTCs) APPEARANCE.**	Are other DTCs being output?	Proceed with the diagnosis corresponding to DTC.	A temporary poor contact.

AH:DTC 73 DETECTION OF LATERAL G SENSOR STICK

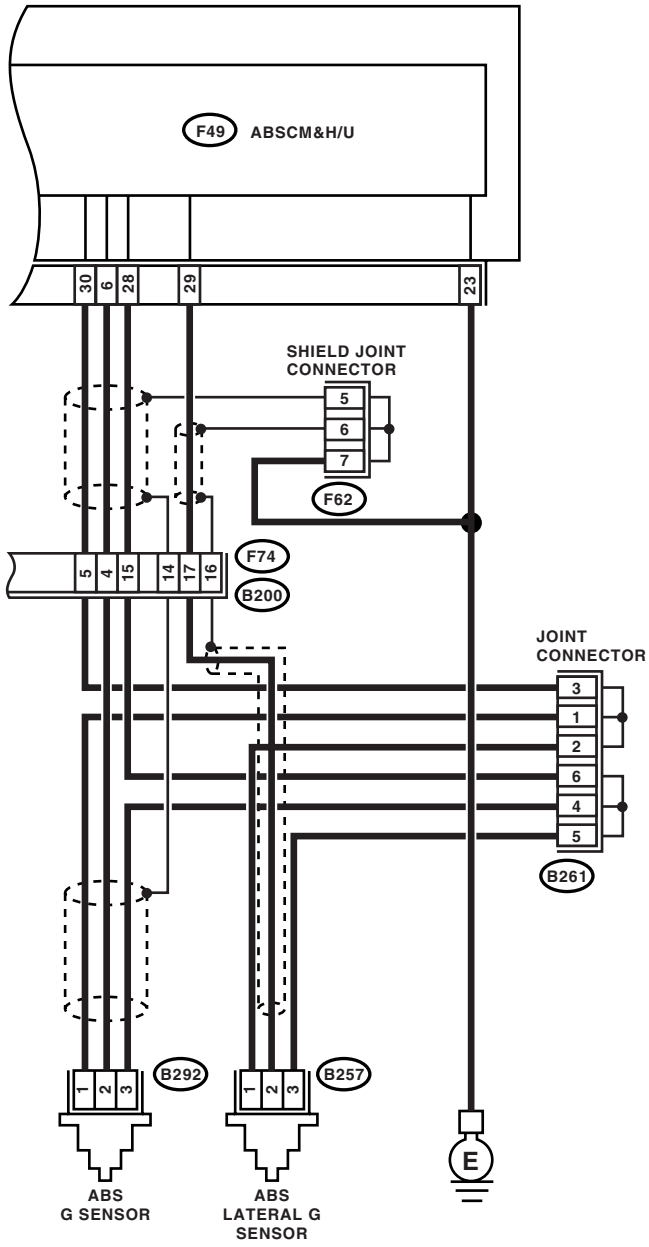
DIAGNOSIS:
Faulty lateral G sensor output voltage
TROUBLE SYMPTOM:
ABS does not operate.
WIRING DIAGRAM:
- LHD model

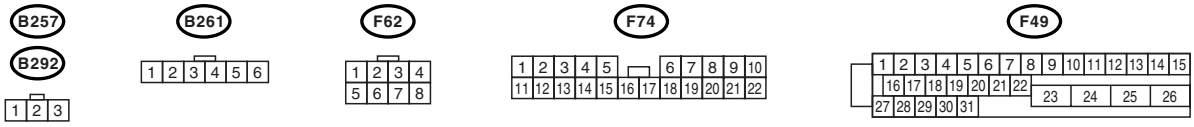




ABS00737

- RHD model





ABS00733

	Step	Check	Yes	No
1	**CHECK ALL FOUR WHEELS FOR FREE TURNING.**	Have the wheels been turned freely such as when vehicle is lifted up, or operated on a rolling road?	The ABS is normal. Erase the DTC.	Go to step **2.**
2	**CHECK OUTPUT OF LATERAL G SENSOR USING SUBARU SELECT MONITOR.** 1) Select "Current data display & Save" on the Subaru Select Monitor. 2) Read the Subaru Select Monitor display.	Is the lateral G sensor output on monitor display 2.3 — 2.7 V when the vehicle is in horizontal position?	Go to step **3.**	Go to step **8.**
3	**CHECK OUTPUT OF LATERAL G SENSOR USING SUBARU SELECT MONITOR.** 1) Turn the ignition switch to OFF. 2) Remove the console box. 3) Remove the lateral G sensor from vehicle. (Do not disconnect the connector.) 4) Turn the ignition switch to ON. 5) Select "Current data display & Save" on the Subaru Select Monitor. 6) Read the Subaru Select Monitor display.	Is the voltage 3.3 — 3.7 V when lateral G sensor is inclined right to 90°?	Go to step **4.**	Replace the lateral G sensor. <Ref. to ABS-27, Lateral G Sensor.>
4	**CHECK OUTPUT OF LATERAL G SENSOR USING SUBARU SELECT MONITOR.** Read the Subaru Select Monitor display.	Is the voltage 0.5 — 0.9 V when lateral G sensor is inclined left to 90°?	Go to step **5.**	Replace the lateral G sensor. <Ref. to ABS-27, Lateral G Sensor.>
5	**CHECK POOR CONTACT IN CONNECTORS.** Turn the ignition switch to OFF.	Is there poor contact in connector between ABSCM&H/U and lateral G sensor?	Repair the connector.	Go to step **6.**
6	**CHECK ABSCM&H/U.** 1) Connect all connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read out the DTC.	Is the same DTC as in current diagnosis still being output?	Replace the ABSCM only. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **7.**
7	**CHECK ANY OTHER DIAGNOSTIC TROUBLE CODES (DTCs) APPEARANCE.**	Are other DTCs being output?	Proceed with the diagnosis corresponding to DTC.	A temporary poor contact.
8	**CHECK OPEN CIRCUIT IN LATERAL G SENSOR OUTPUT HARNESS AND GROUND HARNESS.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ABSCM&H/U. 3) Measure the resistance between ABSCM&H/U connector terminals. ***Connector & terminal*** ***LHD:*** ***(B301) No. 29 — No. 28:*** ***RHD:*** ***(F49) No. 29 — No. 28:***	Is the resistance 5.0 — 5.6 kΩ?	Go to step **9.**	Repair the harness connector between lateral G sensor and ABSCM&H/U.
9	**CHECK LATERAL G SENSOR.** 1) Remove the console box. 2) Remove the lateral G sensor from vehicle. 3) Connect the connector to lateral G sensor. 4) Connect the connector to ABSCM&H/U. 5) Turn the ignition switch to ON. 6) Measure the voltage between lateral G sensor connector terminals. ***Connector & terminal*** ***(B257) No. 2 (+) — No. 3 (−):***	Is the voltage 2.1 — 2.5 V when lateral G sensor is in horizontal position?	Go to step **10.**	Replace the lateral G sensor. <Ref. to ABS-27, Lateral G Sensor.>

	Step	Check	Yes	No
10	**CHECK LATERAL G SENSOR.** Measure the voltage between lateral G sensor connector terminals. ***Connector & terminal (B257) No. 2 (+) — No. 3 (–):***	Is the voltage 3.3 — 3.7 V when lateral G sensor is inclined right to 90°?	Go to step **11.**	Replace the lateral G sensor. <Ref. to ABS-27, Lateral G Sensor.>
11	**CHECK LATERAL G SENSOR.** Measure the voltage between lateral G sensor connector terminals. ***Connector & terminal (B257) No. 2 (+) — No. 3 (–):***	Is the voltage 0.5 — 0.9 V when lateral G sensor is inclined left to 90°?	Go to step **12.**	Replace the lateral G sensor. <Ref. to ABS-27, Lateral G Sensor.>
12	**CHECK ABSCM&H/U.** 1) Turn the ignition switch to OFF. 2) Connect all connectors. 3) Erase the memory. 4) Perform the inspection mode. 5) Read out the DTC.	Is the same DTC as in current diagnosis still being output?	Replace the ABSCM only. <Ref. to ABS-7, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **13.**
13	**CHECK ANY OTHER DIAGNOSTIC TROUBLE CODES (DTCs) APPEARANCE.**	Are other DTCs being output?	Proceed with the diagnosis corresponding to DTC.	A temporary poor contact.

13.General Diagnostic Table

A: INSPECTION

Symptom		Probable faulty units/parts
Vehicle instability during braking	Vehicle pulls to either side.	• ABSCM&H/U (solenoid valve) • ABS wheel speed sensor • Brake (caliper, piston and pads) • Wheel alignment • Tire specifications, tire wear and air pressures • Incorrect wiring or piping connections • Road surface (uneven, camber)
	Vehicle spins.	• ABSCM&H/U (solenoid valve) • ABS wheel speed sensor • Brake (pads) • Tire specifications, tire wear and air pressures • Incorrect wiring or piping connections
Poor braking	Long braking/stopping distance	• ABSCM&H/U (solenoid valve) • Brake (pads) • Air in brake line • Tire specifications, tire wear and air pressures • Incorrect wiring or piping connections
	Wheel locks.	• ABSCM&H/U (solenoid valve, motor) • ABS wheel speed sensor • Incorrect wiring or piping connections
	Brake dragging	• ABSCM&H/U (solenoid valve) • ABS wheel speed sensor • Master cylinder • Brake (caliper and piston) • Parking brake • Axle and wheels • Brake pedal play
	Long brake pedal stroke	• Air in brake line • Brake pedal play
	Vehicle pitching	• Suspension play or fatigue (reduced damping) • Incorrect wiring or piping connections • Road surface (uneven)
	Unstable or uneven braking	• ABSCM&H/U (solenoid valve) • ABS wheel speed sensor • Brake (caliper, piston and pads) • Tire specifications, tire wear and air pressures • Incorrect wiring or piping connections • Road surface (uneven)
Vibration and/or noise (while driving on slippery roads)	Excessive pedal vibration	• Incorrect wiring or piping connections • Road surface (uneven)
	Noise from ABSCM&H/U	• ABSCM&H/U (mount bushing) • ABS wheel speed sensor • Brake piping
	Noise from front of vehicle	• ABSCM&H/U (mount bushing) • ABS wheel speed sensor • Master cylinder • Brake (caliper, piston, pads and rotor) • Brake piping • Brake booster and check valve • Suspension play or fatigue
	Noise from rear of vehicle	• ABS wheel speed sensor • Brake (caliper, piston, pads and rotor) • Parking brake • Brake piping • Suspension play or fatigue

BRAKE

BR

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1. General Description

A: SPECIFICATION

Model		BASE, TS	GX, RS, OBK	WRX	STi
Front disc brake	Size	14 inch type	15 inch type	16 inch type	17 inch type
	Type	Disc (Floating type, ventilated)		Disc (Fixed type, ventilated)	
	Effective disc diameter	210 mm (8.27 in)	228 mm (8.98 in)	255 mm (10.04 in)	268 mm (10.55 in)
	Disc thickness × Outer diameter	24 × 260 mm (0.94 × 10.24 in)	24 × 277 mm (0.94 × 10.91 in)	24 × 294 mm (0.94 × 11.57 in)	30 × 326 mm (1.18 × 12.83 in)
	Effective cylinder diameter	57.2 mm (2.252 in)	42.8 mm (1.685 in) × 2	40.4 mm (1.591 in) × 4	40.0 mm × 2, 46.0 mm × 2 (1.575 in × 2, 1.811 in × 2)
	Pad dimensions (length × width × thickness)	115.0 × 44.3 × 11.0 mm (4.528 × 1.744 × 0.433 in)	117.8 × 50.5 × 11.0 mm (4.638 × 1.988 × 0.433 in)	116.0 × 47.7 × 10.0 mm (4.567 × 1.878 × 0.394 in)	129.8 × 60.5 × 9.2 mm (5.110 × 2.382 × 0.362 in)
	Clearance adjustment	Automatic adjustment			
Rear disc brake	Size	—	14 inch type	15 inch type	17 inch type
	Type	—	Disc (Floating type)	Disc (Fixed type, ventilated)	
	Effective disc diameter	—	230 mm (9.06 in)	261 mm (10.28 in)	268 mm (10.55 in)
	Disc thickness × Outer diameter	—	10 × 266 mm (0.39 × 10.47 in)	18 × 290 mm (0.71 × 11.42 in)	20 × 316 mm (0.79 × 12.44 in)
	Effective cylinder diameter	—	38.1 mm (1.500 in)		36.0 mm (1.417 in)
	Pad dimensions (length × width × thickness)	—	89.4 × 33.7 × 9.0 mm (3.520 × 1.327 × 0.354 in)	71.8 × 35.0 × 11.5 mm (2.827 × 1.378 × 0.453 in)	74.8 × 45.0 × 9.0 mm (2.945 × 1.772 × 0.354 in)
	Clearance adjustment	—	Automatic adjustment		
Rear drum brake	Type	Drum (Leading-Trailing type)	—	—	—
	Effective drum diameter	228.6 mm (9 in)	—	—	—
	Effective cylinder diameter	17.5 mm (0.689 in)	—	—	—
	Lining dimensions (length × width × thickness)	218.8 × 35.0 × 4.1 mm (8.61 × 1.378 × 0.161 in)	—	—	—
	Clearance adjustment	Automatic adjustment	—	—	—
Master cylinder	Type	Tandem			
	Effective diameter	23.81 mm (0.9374 in) [25.4 mm (1 in)]	26.99 mm (1-1/16 in)		
	Reservoir type	Sealed type			
	Brake fluid reservoir capacity	205 cm^3 (12.51 cu in)			
Brake booster	Type	Vacuum suspended			
	Effective diameter	230 mm (9.06 in) [180 + 205 mm (7.09 + 8.07 in)]	205 + 230 mm (8.07 + 9.06 in)		

Model		BASE, TS	GX, RS, OBK	WRX	STi
* Proportioning valve	Split point	1,961 kPa (20 kgf/cm^2, 285 psi)	—		
	Reduce ratio	0.4	—		
Brake line		Dual circuit system			
Brake fluid **CAUTION:** **• Avoid mixing brake fluid of different brands to prevent the fluid performance from degrading.** **• When brake fluid is supplemented, be careful not to allow any dust into the reservoir.** **• Use fresh DOT3 brake fluid when replacing or refilling the fluid.**		FMVSS No. 116, DOT3			

[ ]: Model with ABS.
*: Model without ABS.

NOTE:
Refer to “PB section” for parking brake SPECIFICATIONS. <Ref. to PB-2, SPECIFICATION, General Description.>

ITEM			STANDARD	SERVICE LIMIT
Front brake	Pad thickness	14″, 15″	11 mm (0.43 in)	1.5 mm (0.059 in)
		16″	10 mm (0.39 in)	1.5 mm (0.059 in)
		17″	9.2 mm (0.362 in)	1.2 mm (0.047 in)
	Disc thickness	Except 17″	24 mm (0.94 in)	22 mm (0.87 in)
		17″	30 mm (1.18 in)	28 mm (1.10 in)
	Disc runout		—	0.075 mm (0.0030 in)
Rear brake (Disc type)	Pad thickness	14″	9.0 mm (0.354 in)	1.5 mm (0.059 in)
		15″	11.5 mm (0.452 in)	1.5 mm (0.059 in)
		17″	9.0 mm (0.354 in)	1.2 mm (0.047 in)
	Disc thickness	14″	10 mm (0.39 in)	8.5 mm (0.335 in)
		15″	18 mm (0.71 in)	16 mm (0.63 in)
		17″	20 mm (0.79 in)	18 mm (0.71 in)
	Disc runout		—	0.07 mm (0.0028 in)
Rear brake (Drum type)	Inside diameter		228.6 mm (9 in)	230.6 mm (9.08 in)
	Lining thickness		4.1 mm (0.161 in)	1.5 mm (0.059 in)
Rear brake (Disc type parking) (Except STi model)	Inside diameter		170 mm (6.69 in)	171 mm (6.73 in)
	Lining thickness		3.2 mm (0.126 in)	1.5 mm (0.059 in)
Rear brake (Disc type parking) (STi model)	Inside diameter		190 mm (7.48 in)	191 mm (7.52 in)
	Lining thickness		3.2 mm (0.126 in)	1.5 mm (0.059 in)
Parking brake	Lever stroke		7 to 8 notches/196 N (20 kgf, 44 lbf)	

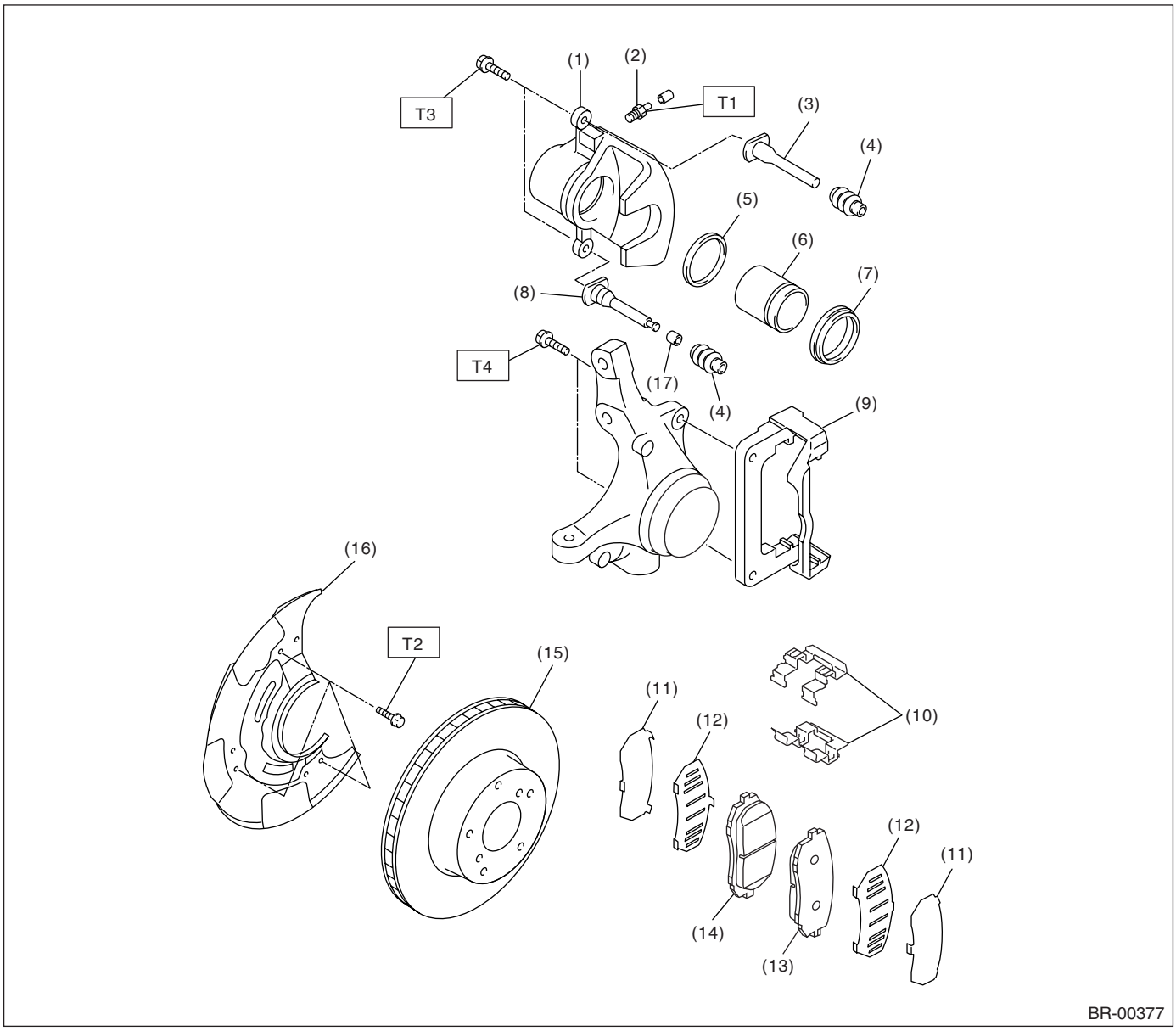
		Brake pedal force	Fluid pressure				
			BASE, TS		GX, RS, OBK	WRX	STi
			Without ABS	With ABS			
Brake booster	Brake fluid pressure without engine running	147 N (15 kgf, 33 lbf)	686 kPa (7 kgf/cm^2, 100 psi)	588 kPa (6 kgf/cm^2, 85 psi)	588 kPa (6 kgf/cm^2, 85 psi)		
		294 N (30 kgf, 66 lbf)	1,961 kPa (20 kgf/cm^2, 284 psi)	1,667 kPa (17 kgf/cm^2, 242 psi)	1,471 kPa (15 kgf/cm^2, 213 psi)		
	Brake fluid pressure with engine running and vacuum at 66.7 kPa (500 mmHg, 19.69 inHg)	147 N (15 kgf, 33 lbf)	5,786 kPa (59 kgf/cm^2, 839 psi)	5,982 kPa (61 kgf/cm^2, 868 psi)	5,296 kPa (54 kgf/cm^2, 768 psi)	4,707 kPa (48 kgf/cm^2, 683 psi)	4,021 kPa (41 kgf/cm^2, 583 psi)
		294 N (30 kgf, 66 lbf)	7,649 kPa (78 kgf/cm^2, 1,109 psi)	8,434 kPa (86 kgf/cm^2, 1,223 psi)	9,120 kPa (93 kgf/cm^2, 1,323 psi)		8,336 kPa (85 kgf/cm^2, 1,209 psi)

Brake pedal	Free play	1 — 3 mm (0.04 — 0.12 in) [Depress brake pedal pad with a force of less than 10 N (1 kgf, 2 lbf).]

B: COMPONENT

1. FRONT DISC BRAKE

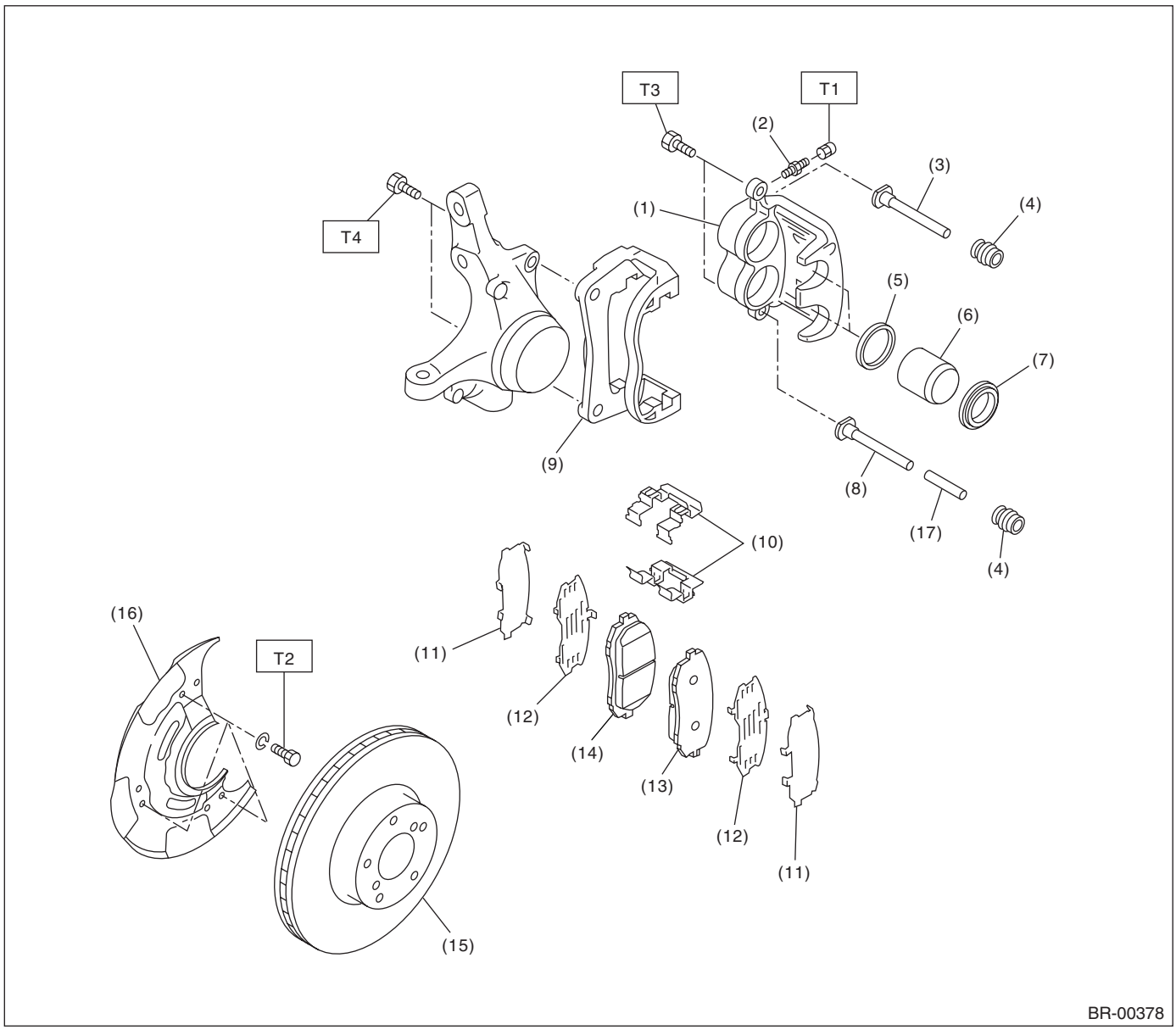
• 14 INCH TYPE



(1) Caliper body
(2) Air bleeder screw
(3) Guide pin (Green)
(4) Pin boot
(5) Piston seal
(6) Piston
(7) Piston boot
(8) Lock pin (Yellow)
(9) Support
(10) Pad clip
(11) Outer shim
(12) Inner shim
(13) Pad (Outside)
(14) Pad (Inside)
(15) Disc rotor
(16) Disc cover
(17) Bushing

Tightening torque: N·m (kgf-m, ft-lb)
T1: 8 (0.8, 5.8)
T2: 18 (1.8, 13.3)
T3: 37 (3.8, 27.5)
T4: 80 (8.2, 59)

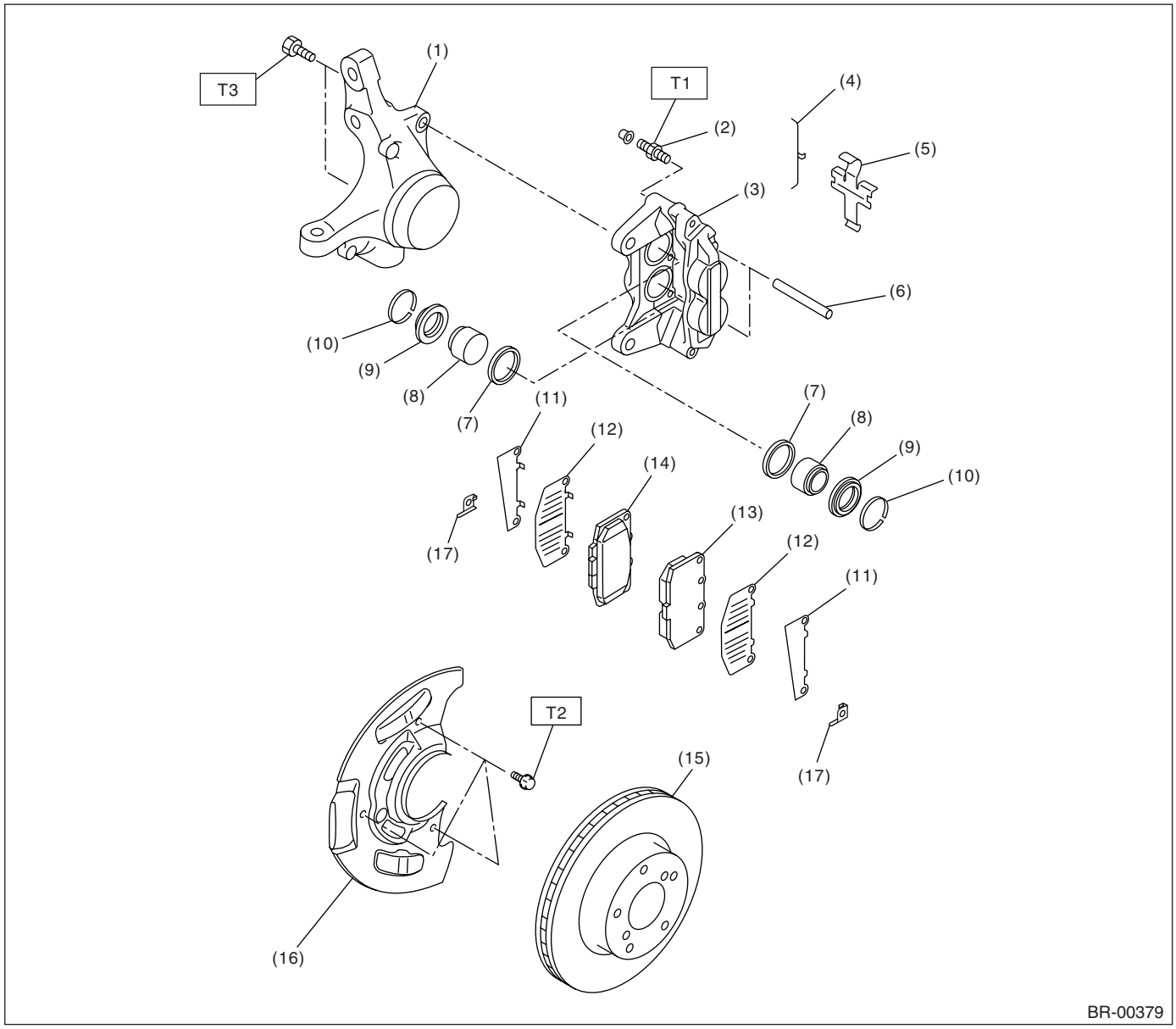
• 15 INCH TYPE



(1) Caliper body
(2) Air bleeder screw
(3) Guide pin (Green)
(4) Pin boot
(5) Piston seal
(6) Piston
(7) Piston boot
(8) Lock pin (Yellow)
(9) Support
(10) Pad clip
(11) Outer shim
(12) Inner shim
(13) Pad (Outside)
(14) Pad (Inside)
(15) Disc rotor
(16) Disc cover
(17) Bushing

Tightening torque: N·m (kgf-m, ft-lb)
T1: 8 (0.8, 5.8)
T2: 18 (1.8, 13.3)
T3: 26.5 (2.7, 19.6)
T4: 80 (8.2, 59)

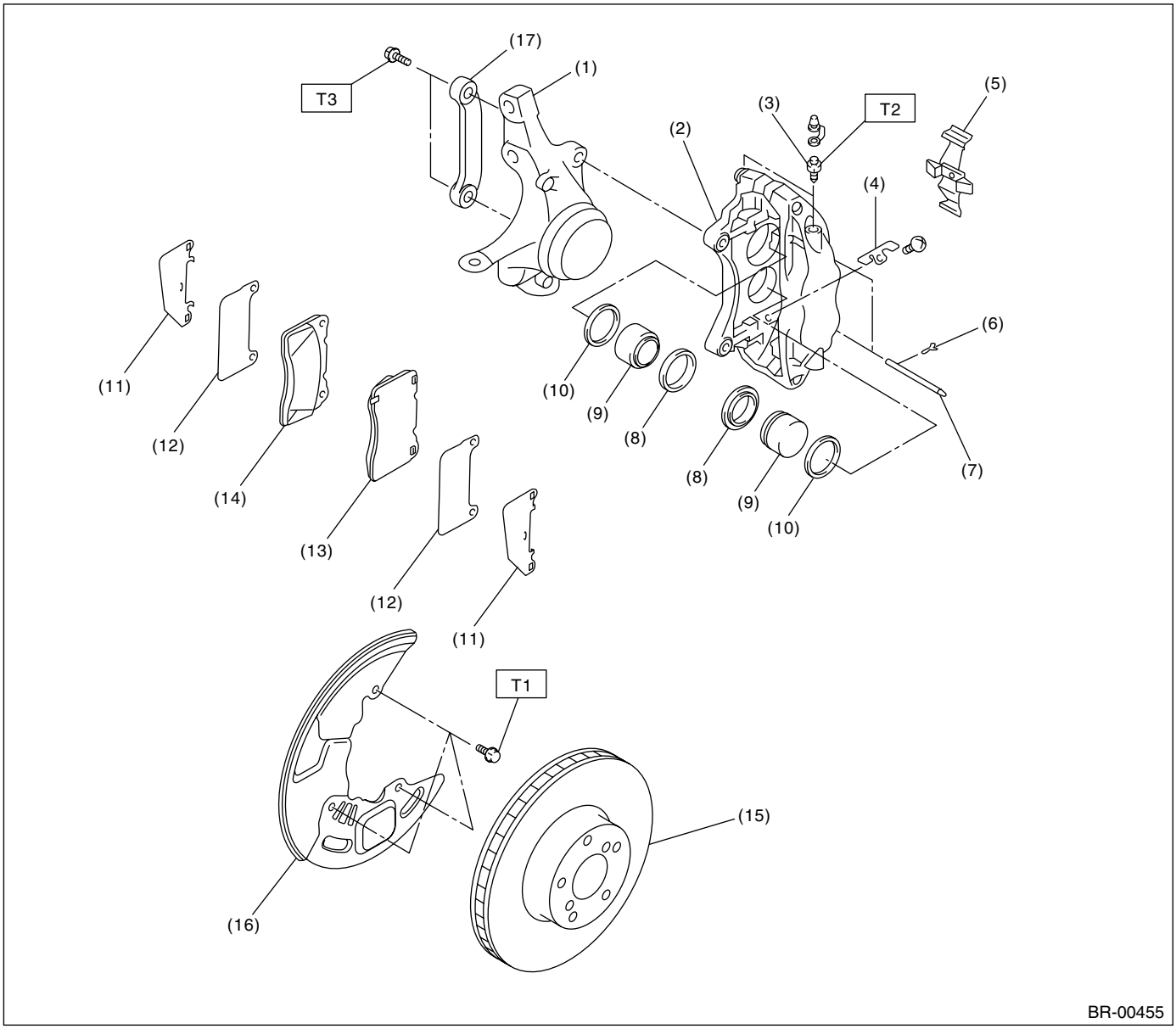
• 16 INCH TYPE



(1) Housing
(2) Air bleeder screw
(3) Caliper body
(4) M clip
(5) Cross spring
(6) Pad pin
(7) Piston seal
(8) Piston
(9) Piston boot
(10) Boot ring
(11) Outer shim
(12) Inner shim
(13) Pad (Outside)
(14) Pad (Inside)
(15) Disc rotor
(16) Disc cover
(17) Spacer

Tightening torque: N·m (kgf-m, ft-lb)
T1: 8 (0.8, 5.8)
T2: 18 (1.8, 13.3)
T3: 80 (8.2, 59)

• 17 INCH TYPE

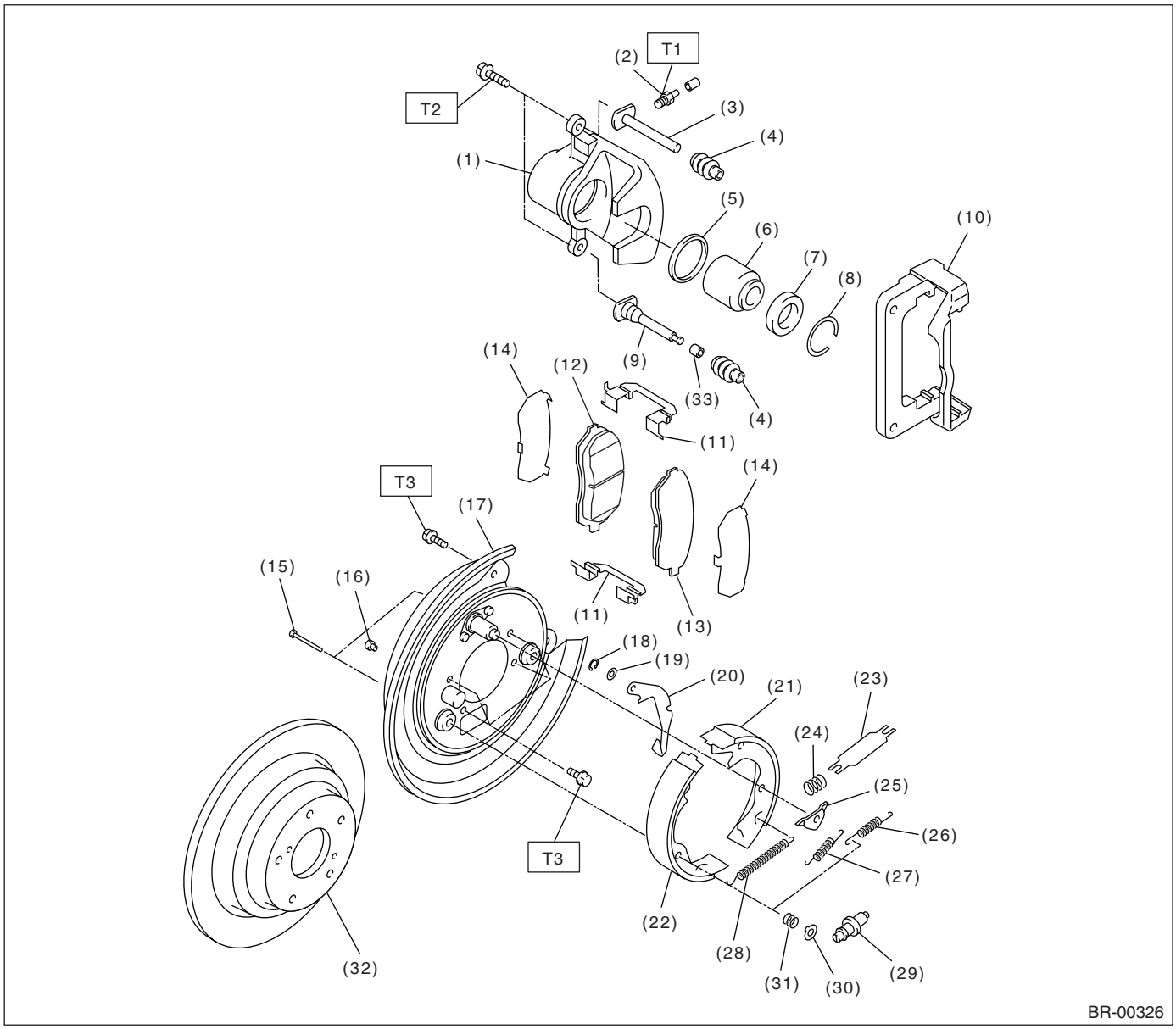


(1) Housing
(2) Caliper body
(3) Air bleeder screw
(4) Guide plate
(5) Cross spring
(6) Clip
(7) Pad pin
(8) Piston boot
(9) Piston
(10) Piston seal
(11) Outer shim
(12) Inner shim
(13) Pad (Outside)
(14) Pad (Inside)
(15) Disc rotor
(16) Disc cover
(17) Tie bar

Tightening torque: N·m (kgf-m, ft-lb)
T1: 18 (1.8, 13.3)
T2: 20 (2.0, 14.5)
T3: 155 (15.8, 114.3)

2. REAR DISC BRAKE

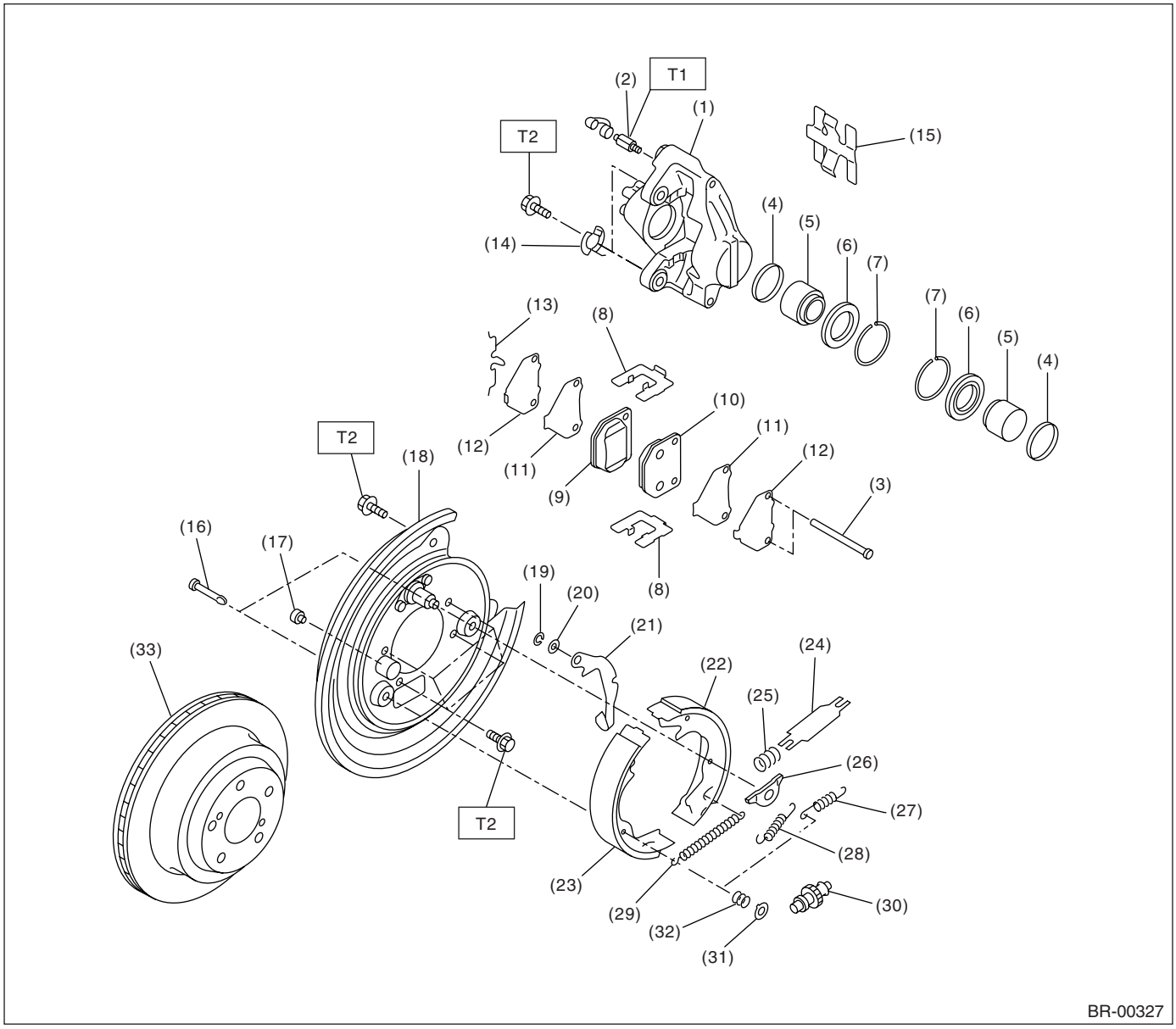
• 14 INCH TYPE



(1) Caliper body
(2) Air bleeder screw
(3) Guide pin (Green)
(4) Pin boot
(5) Piston seal
(6) Piston
(7) Piston boot
(8) Boot ring
(9) Lock pin (Yellow)
(10) Support
(11) Pad clip
(12) Pad (Inside)
(13) Pad (Outside)
(14) Shim
(15) Shoe hold-down pin
(16) Cover
(17) Back plate
(18) Retainer
(19) Spring washer
(20) Parking brake lever
(21) Parking brake shoe (Secondary)
(22) Parking brake shoe (Primary)
(23) Strut
(24) Strut shoe spring
(25) Shoe guide plate
(26) Secondary shoe return spring
(27) Primary shoe return spring
(28) Adjusting spring
(29) Adjuster
(30) Shoe hold-down cup
(31) Shoe hold-down spring
(32) Disc rotor
(33) Bushing

Tightening torque: N·m (kgf-m, ft-lb)
T1: 8 (0.8, 5.8)
T2: 37 (3.8, 27.5)
T3: 53 (5.4, 39.1)

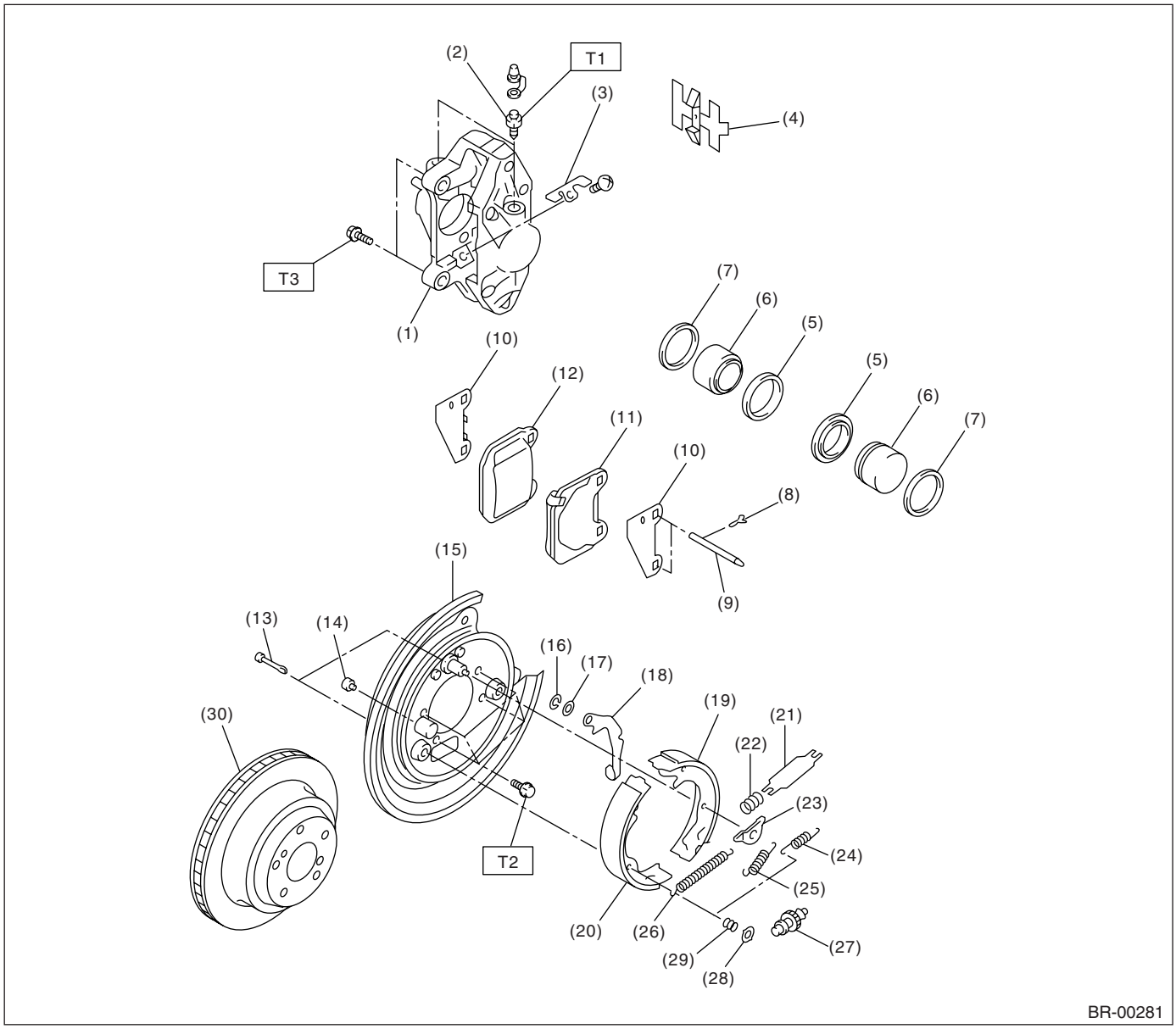
• 15 INCH TYPE



(1) Caliper body
(2) Air bleeder screw
(3) Pad pin
(4) Piston seal
(5) Piston
(6) Piston boot
(7) Boot ring
(8) Pad clip
(9) Pad (Inside)
(10) Pad (Outside)
(11) Inner shim
(12) Outer shim
(13) M clip
(14) Washer
(15) Cross spring
(16) Shoe hold-down pin
(17) Cover
(18) Back plate
(19) Retainer
(20) Spring washer
(21) Parking brake lever
(22) Parking brake shoe (Secondary)
(23) Parking brake shoe (Primary)
(24) Strut
(25) Strut shoe spring
(26) Shoe guide plate
(27) Secondary shoe return spring
(28) Primary shoe return spring
(29) Adjusting spring
(30) Adjuster
(31) Shoe hold-down cup
(32) Shoe hold-down spring
(33) Disc rotor

Tightening torque: N·m (kgf-m, ft-lb)
T1: 8 (0.8, 5.8)
T2: 53 (5.4, 39.1)

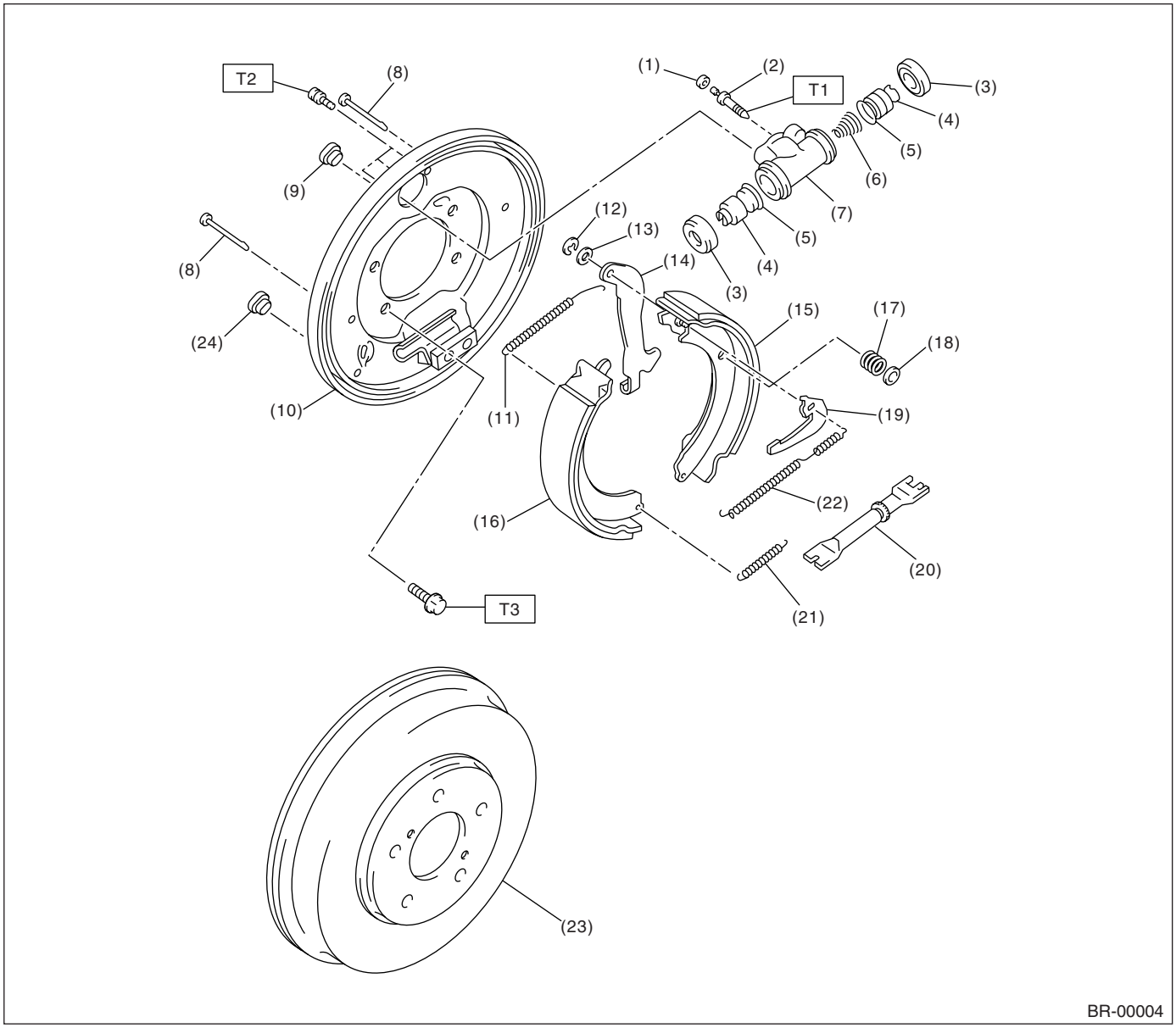
• 17 INCH TYPE



(1) Caliper body
(2) Air bleeder screw
(3) Guide plate
(4) Cross spring
(5) Piston boot
(6) Piston
(7) Piston seal
(8) Clip
(9) Pad pin
(10) Pad shim
(11) Pad (Outside)
(12) Pad (Inside)
(13) Shoe hold-down pin
(14) Cover
(15) Back plate
(16) Retainer
(17) Spring washer
(18) Parking brake lever
(19) Parking brake shoe (Secondary)
(20) Parking brake shoe (Primary)
(21) Strut
(22) Strut shoe spring
(23) Shoe guide plate
(24) Secondary shoe return spring
(25) Primary shoe return spring
(26) Adjusting spring
(27) Adjuster
(28) Shoe hold-down cup
(29) Shoe hold-down spring
(30) Disc rotor

Tightening torque: N·m (kgf-m, ft-lb)
T1: 20 (2.0, 14.5)
T2: 53 (5.4, 39.1)
T3: 65 (6.6, 47.9)

3. REAR DRUM BRAKE

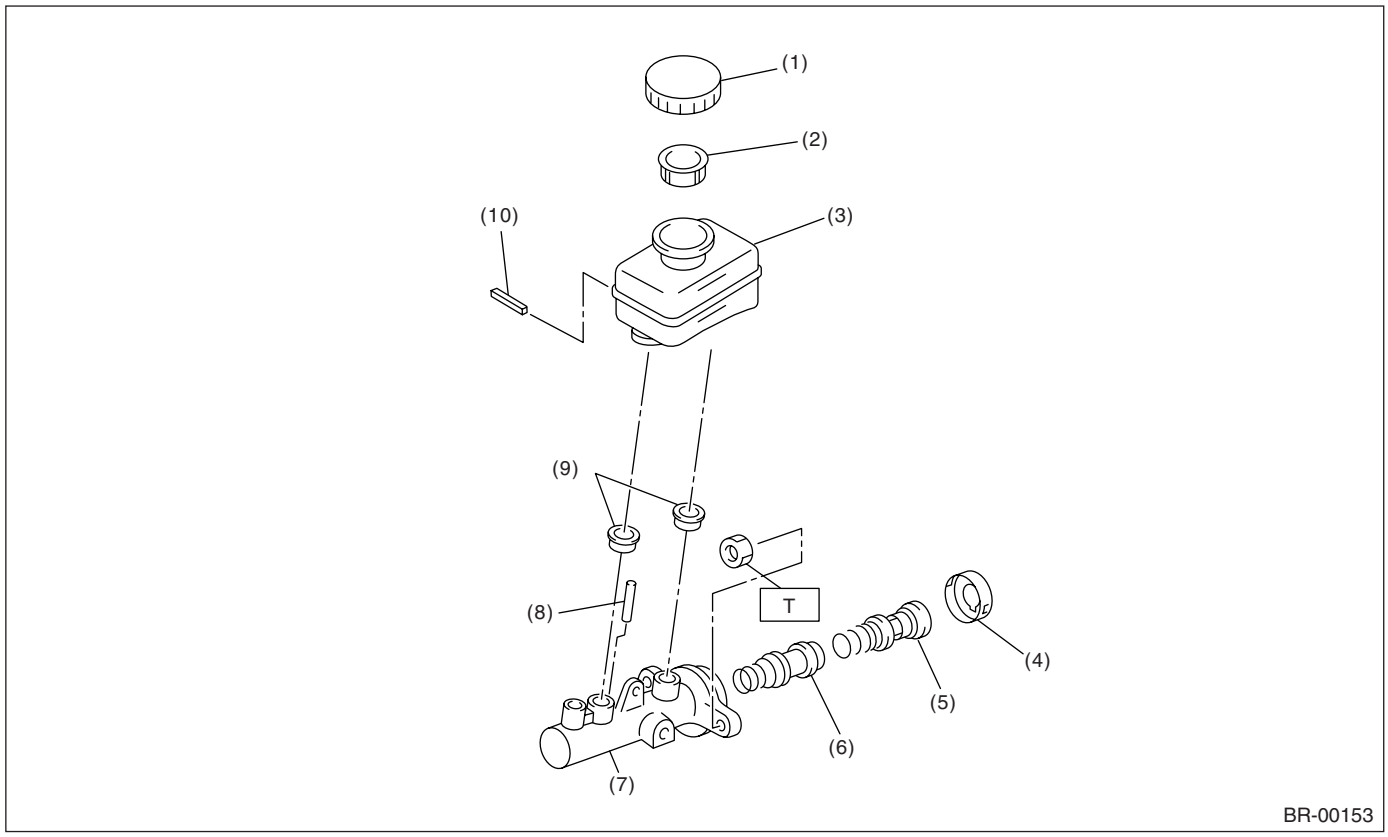


(1) Air bleeder cap
(2) Air bleeder screw
(3) Boot
(4) Piston
(5) Cup
(6) Spring
(7) Wheel cylinder body
(8) Pin
(9) Plug
(10) Back plate
(11) Upper shoe return spring
(12) Retainer
(13) Washer
(14) Parking brake lever
(15) Brake shoe (Trailing)
(16) Brake shoe (Leading)
(17) Shoe hold-down spring
(18) Cup
(19) Adjusting lever
(20) Adjuster
(21) Lower shoe return spring
(22) Adjusting spring
(23) Drum
(24) Plug

Tightening torque: N·m (kgf-m, ft-lb)
T1: 8 (0.8, 5.8)
T2: 10 (1.0, 7.2)
T3: 53 (5.4, 39.1)

4. MASTER CYLINDER

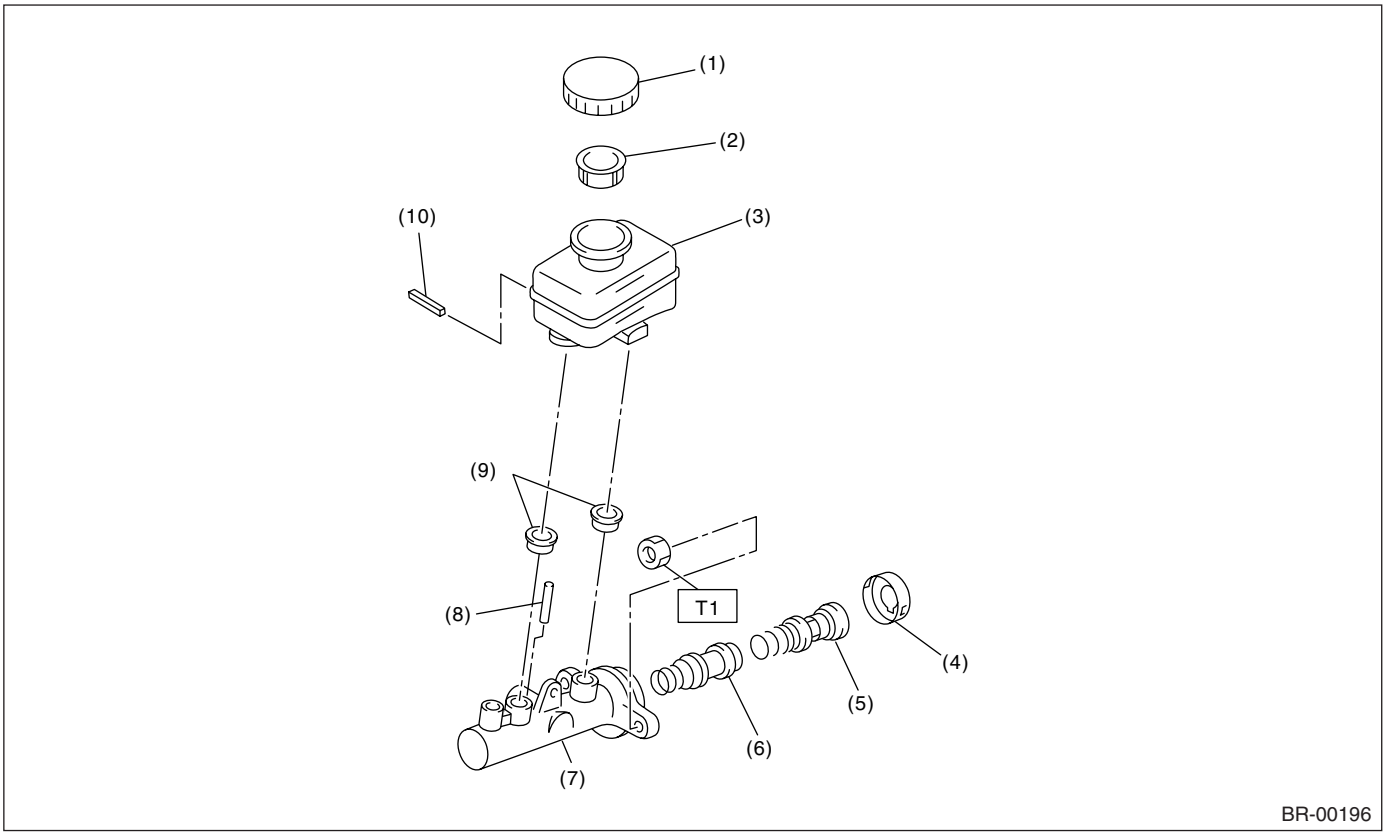
• LHD MODEL



(1) Cap
(2) Filter
(3) Reservoir tank
(4) Piston retainer
(5) Primary piston
(6) Secondary piston
(7) Cylinder body
(8) Cylinder pin (With ABS)
(9) Seal
(10) Pin

Tightening torque: N·m (kgf-m, ft-lb)
T1: 14 (1.4, 10.3)

• RHD MODEL

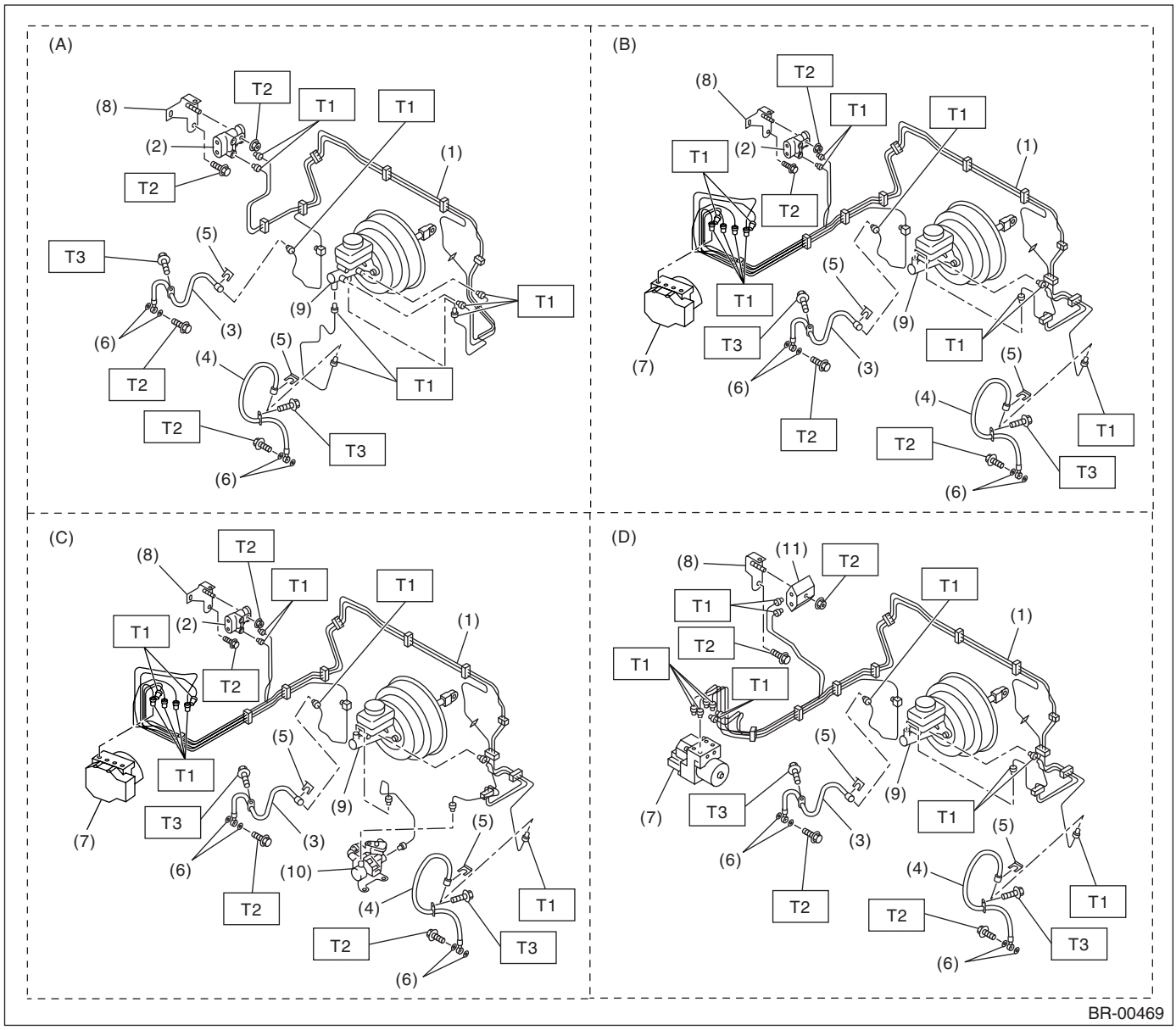


(1) Cap
(2) Filter
(3) Reservoir tank
(4) Piston retainer
(5) Primary piston
(6) Secondary piston
(7) Cylinder body
(8) Cylinder pin (With ABS)
(9) Seal
(10) Pin

Tightening torque: N·m (kgf-m, ft-lb)
T1: 14 (1.4, 10.3)

5. FRONT BRAKE PIPES AND HOSE

• LHD MODEL

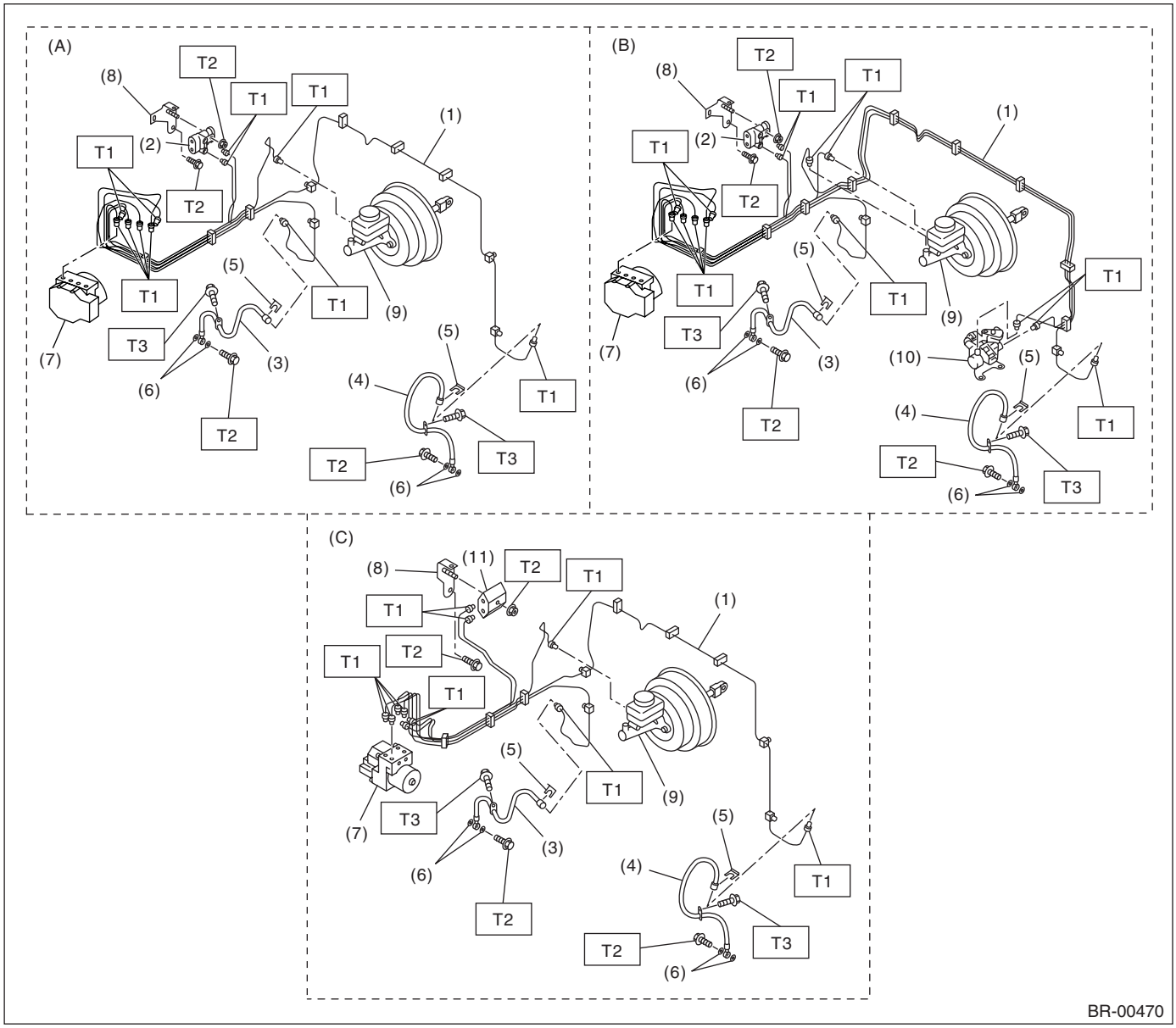


(A) Model without ABS
(B) Model with ABS
(C) Model with ABS (with hill holder)
(D) STi model without driver's control center differential auto

(1) Front brake pipe assembly
(2) Proportioning valve (Without ABS) Proportioning valve type connector (With ABS)
(3) Front brake hose RH
(4) Front brake hose LH
(5) Clamp
(6) Gasket
(7) ABS control module and hydraulic control unit (ABSCM&H/U)
(8) Bracket
(9) Master cylinder
(10) Hill holder
(11) Two-way connector

Tightening torque: N·m (kgf-m, ft-lb)
T1: 15 (1.5, 11.1)
T2: 18 (1.8, 13.3)
T3: 32 (3.3, 23.6)

• RHD MODEL

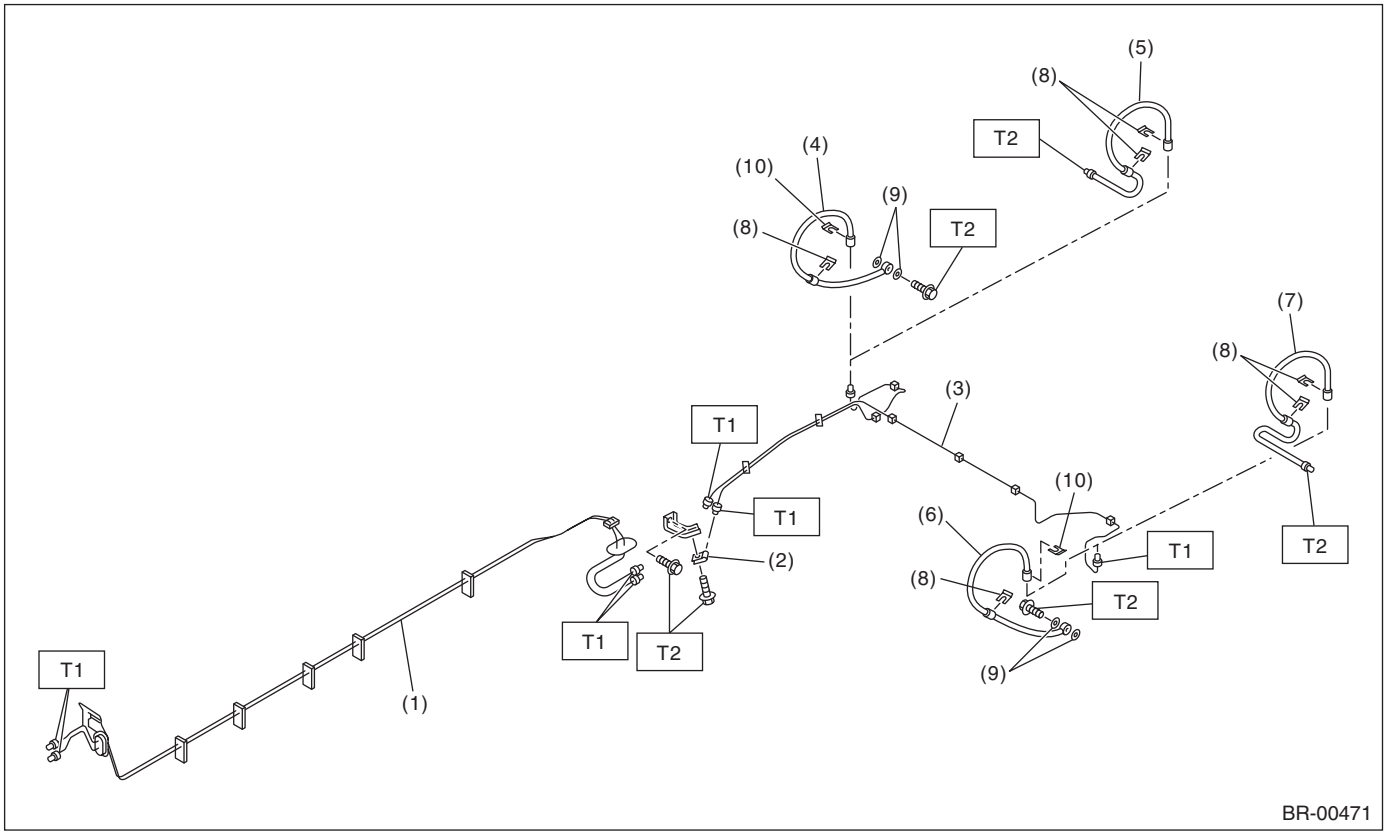


(A) Model without hill holder
(B) Model with hill holder
(C) STi model without driver's control center differential auto

(1) Front brake pipe assembly
(2) Proportioning type connector
(3) Front brake hose RH
(4) Front brake hose LH
(5) Clamp
(6) Gasket
(7) ABS control module and hydraulic control unit (ABSCM&H/U)
(8) Bracket
(9) Master cylinder
(10) Hill holder
(11) Two-way connector

Tightening torque: N·m (kgf-m, ft-lb)
T1: 15 (1.5, 11.1)
T2: 18 (1.8, 13.3)
T3: 32 (3.3, 23.6)

6. CENTER AND REAR BRAKE PIPES AND HOSES

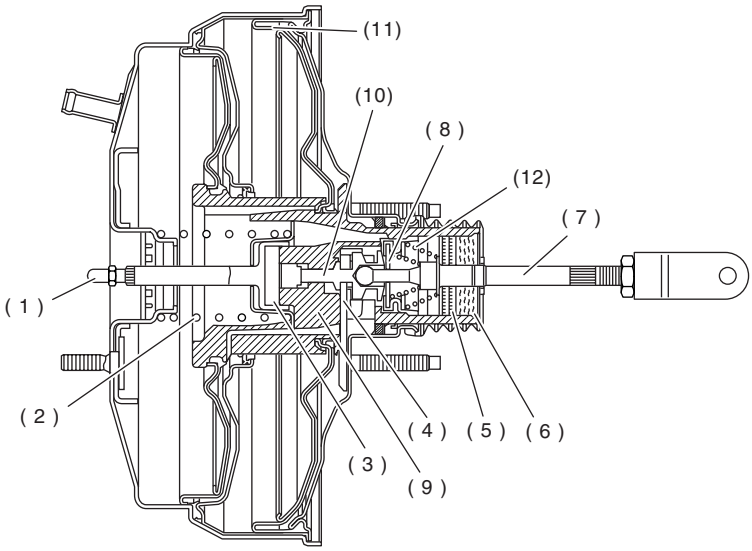


(1) Center brake pipe assembly
(2) Two-way connector
(3) Rear brake pipe assembly
(4) Rear brake hose RH (Disc brake model)
(5) Rear brake hose RH (Drum brake model)
(6) Rear brake hose LH (Disc brake model)
(7) Rear brake hose LH (Drum brake model)
(8) Clamp
(9) Gasket
(10) Clamp

Tightening torque: N·m (kgf-m, ft-lb)
T1: 15 (1.5, 11.1)
T2: 18 (1.8, 13.3)

7. BRAKE BOOSTER

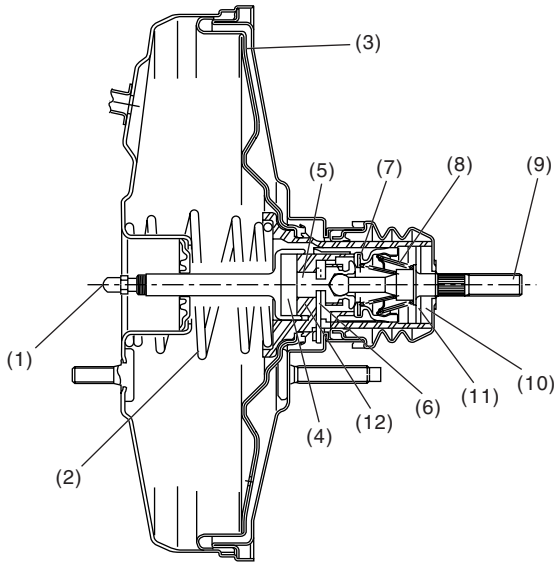
• MODEL With ABS



BR-00008

(1) Push rod
(2) Return spring
(3) Reaction disc
(4) Key
(5) Filter
(6) Silencer
(7) Operating rod
(8) Poppet valve
(9) Valve body
(10) Plunger valve
(11) Diaphragm plate
(12) Valve return spring

• MODEL Without ABS

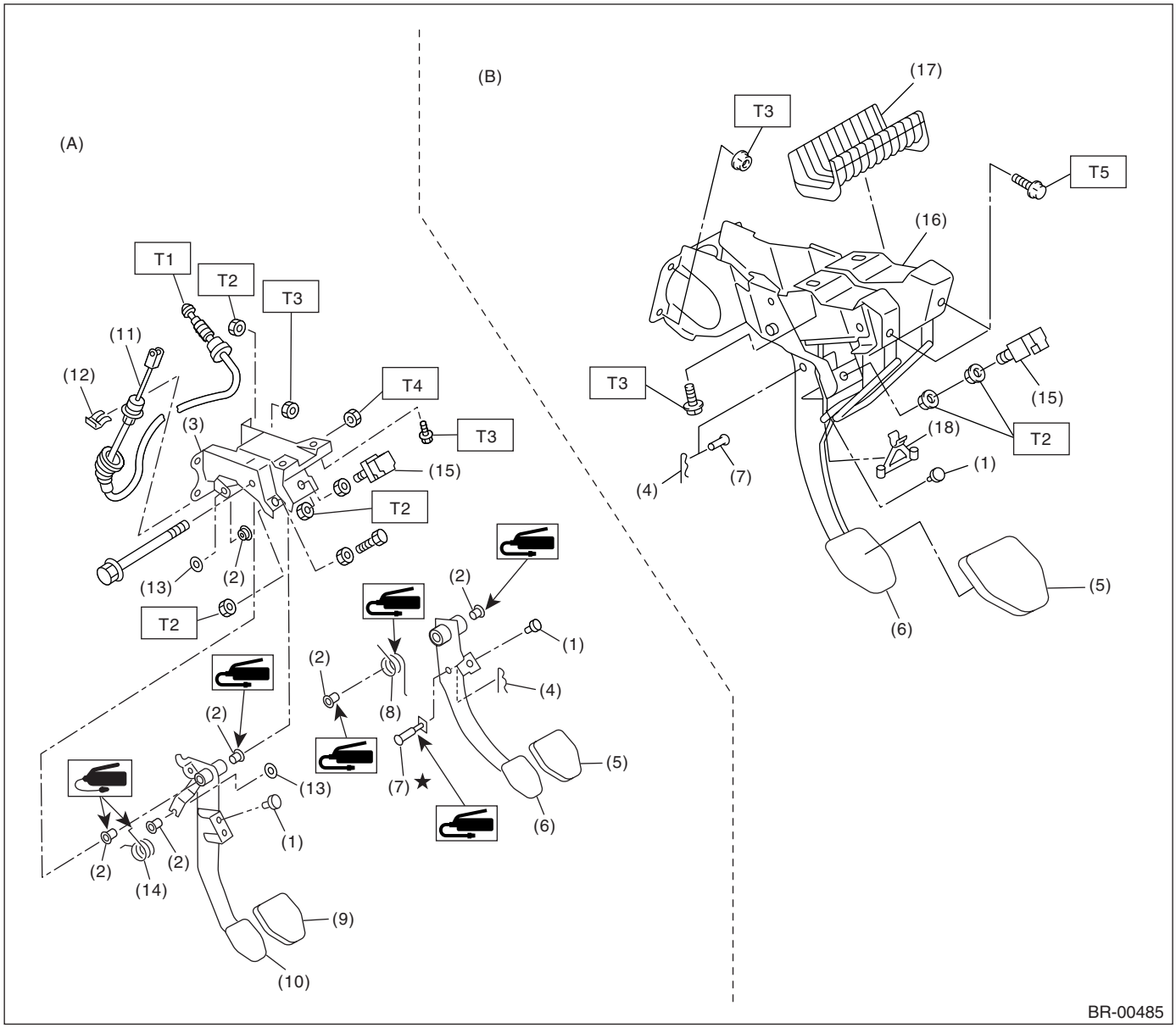


BR-00285

(1) Push rod
(2) Return spring
(3) Diaphragm plate
(4) Reaction disc
(5) Plunger valve
(6) Key
(7) Poppet valve
(8) Valve return spring
(9) Operating rod
(10) Silencer
(11) Filter
(12) Valve body

8. BRAKE PEDAL

• 1.6 L MT MODEL



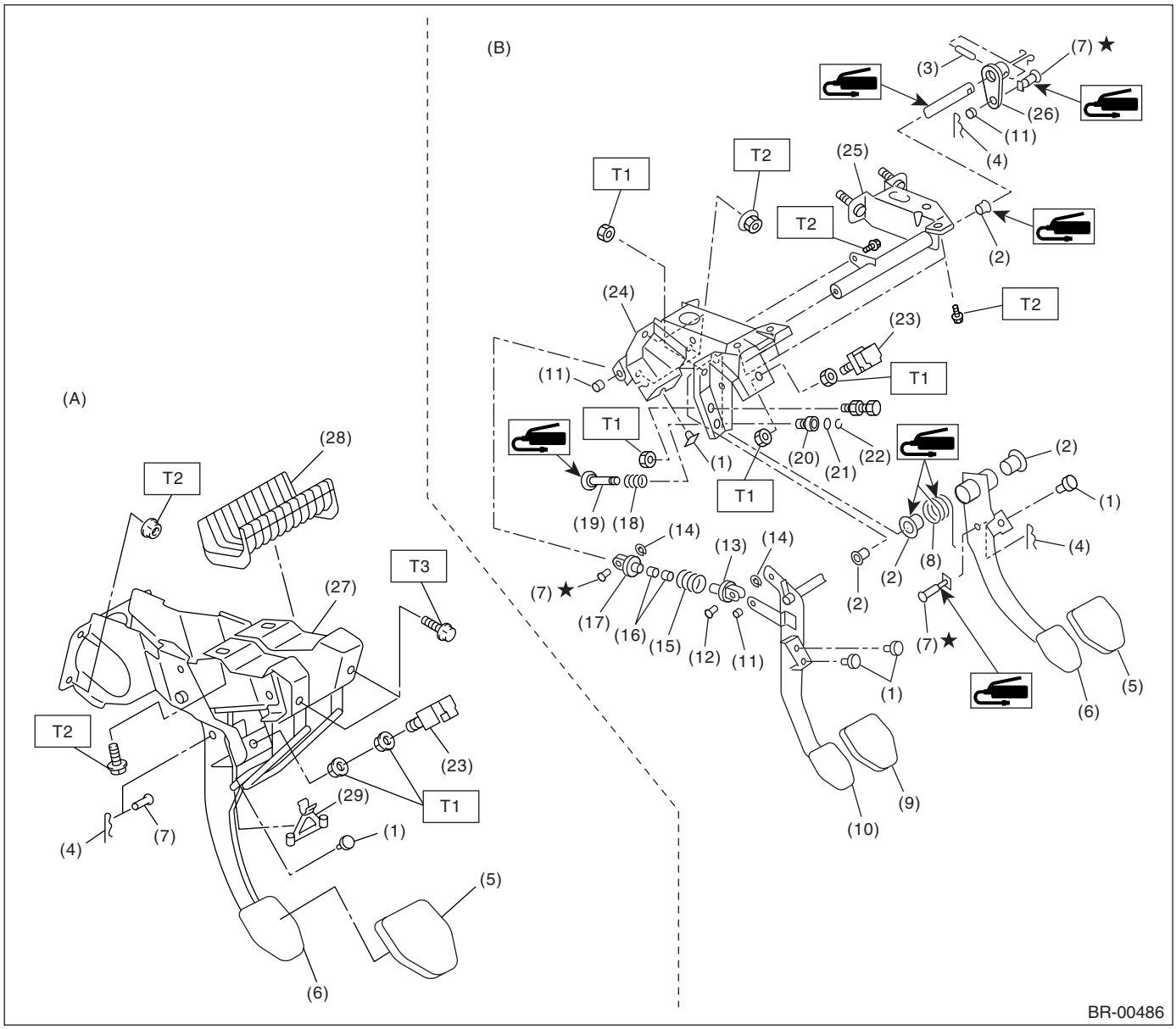
(A) LHD

(B) RHD

(1)	Stopper	(10)	Clutch pedal
(2)	Bushing	(11)	Clutch cable
(3)	Pedal bracket	(12)	Clutch cable clamp
(4)	Snap pin	(13)	Clip
(5)	Brake pedal pad	(14)	Assist spring
(6)	Brake pedal	(15)	Stop light switch
(7)	Clevis pin	(16)	Brake pedal bracket ASSY
(8)	Spring	(17)	Cover
(9)	Clutch pedal pad	(18)	Protector

Tightening torque: N·m (kgf-m, ft-lb)	
T1:	*6 (0.6, 4.5)*
T2:	*8 (0.8, 5.8)*
T3:	*18 (1.8, 13.3)*
T4:	*30 (3.1, 22.4)*
T5:	*33 (3.3, 24.3)*

• 2.0 L AND 2.5 L MT MODEL

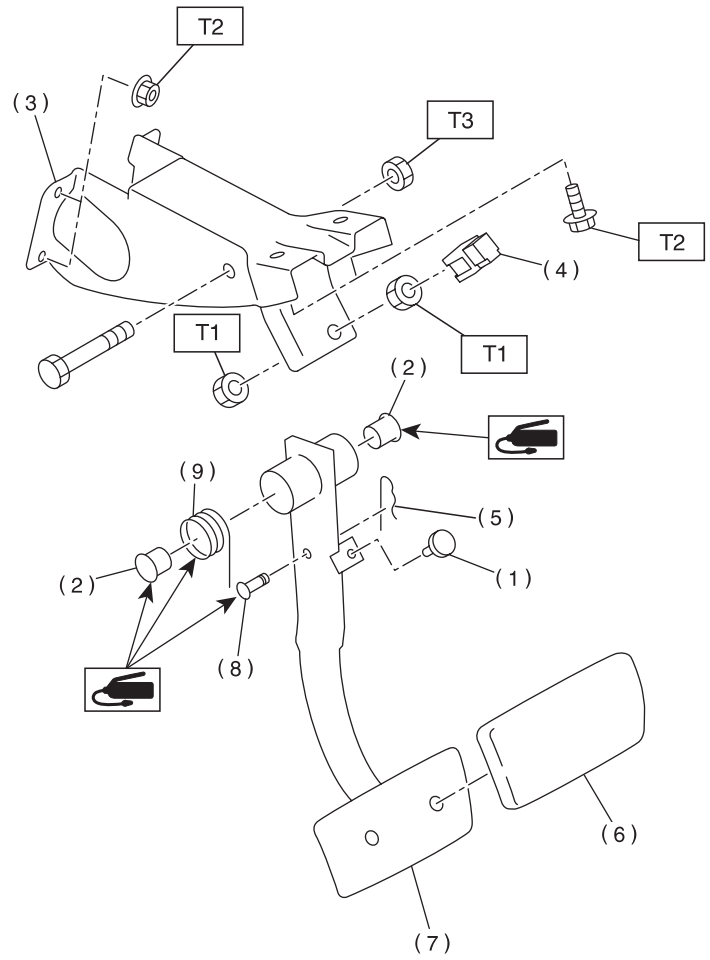


(A) RHD
(B) LHD

(1) Stopper
(2) Bushing
(3) Spring pin
(4) Snap pin
(5) Brake pedal pad
(6) Brake pedal
(7) Clevis pin
(8) Brake pedal spring
(9) Clutch pedal pad
(10) Clutch pedal
(11) Bushing C
(12) Clutch clevis pin
(13) Assist rod A
(14) Clip
(15) Assist spring
(16) Assist bushing
(17) Assist rod B
(18) Spring S
(19) Rod S
(20) Bushing S
(21) O-ring
(22) Clip
(23) Stop light switch
(24) Pedal bracket
(25) Clutch master cylinder bracket
(26) Lever
(27) Brake pedal bracket ASSY
(28) Cover
(29) Protector

Tightening torque: N·m (kgf-m, ft-lb)
T1: 8 (0.8, 5.8)
T2: 18 (1.8, 13.3)
T3: 33 (3.3, 24.3)

• LHD AT MODEL

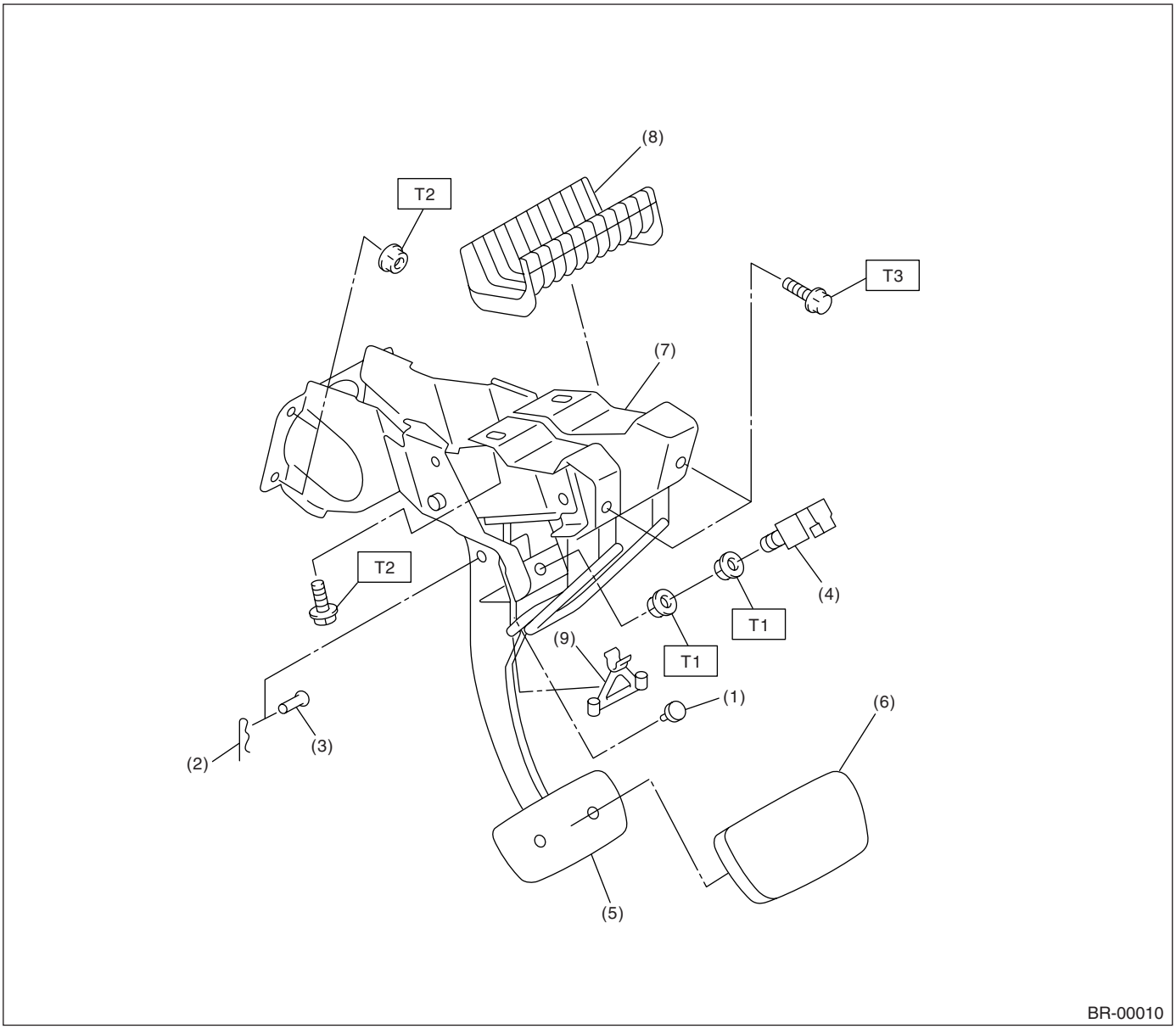


BR-00139

(1) Stopper
(2) Bushing
(3) Pedal bracket
(4) Stop light switch
(5) Snap pin
(6) Brake pedal pad
(7) Brake pedal
(8) Clevis pin
(9) Brake pedal spring

Tightening torque: N·m (kgf-m, ft-lb)
T1: 8 (0.8, 5.8)
T2: 18 (1.8, 13.3)
T3: 30 (3.1, 22.4)

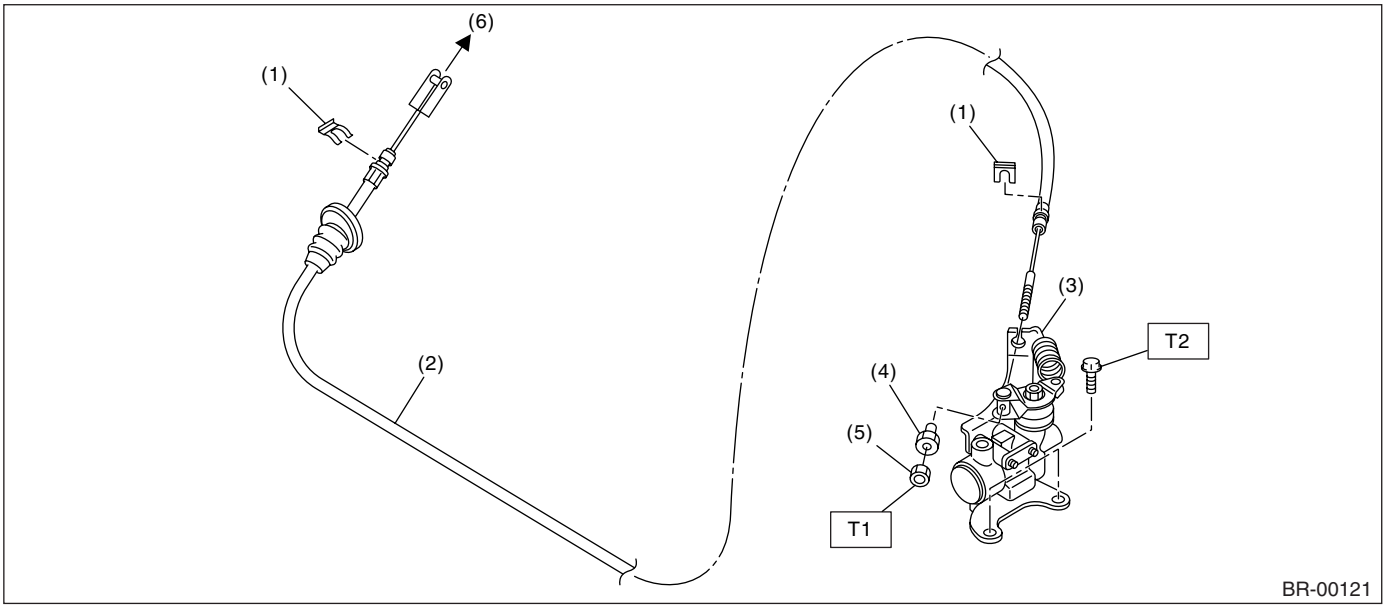
• RHD AT MODEL



(1) Stopper
(2) Snap pin
(3) Clevis pin
(4) Stop light switch
(5) Brake pedal
(6) Brake pedal pad
(7) Brake pedal bracket ASSY
(8) Cover
(9) Protector

Tightening torque: N·m (kgf-m, ft-lb)
T1: 8 (0.8, 5.8)
T2: 18 (1.8, 13.3)
T3: 33 (3.3, 24.3)

9. HILL HOLDER



(1)	Clamp	(4)	Adjusting nut
(2)	PHV cable	(5)	Lock nut
(3)	PHV (Pressure hold valve)	(6)	To clutch pedal

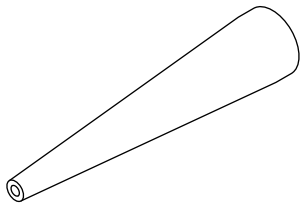
Tightening torque: N·m (kgf-m, ft-lb)
T1: 3.5 (0.35, 2.5)
T2: 18 (1.8, 13.3)

C: CAUTION

- Wear working clothing, including a cap, protective goggles, and protective shoes during operation.
- Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly, and replacement.
- Use SUBARU genuine grease etc. or the equivalent. Do not mix grease etc. with that of another grade or from other manufacturers.
- Be sure to tighten fasteners including bolts and nuts to the specified torque.
- Place shop jacks or rigid racks at the specified points.
- Before securing a part on a vise, place cushioning material such as wood blocks, aluminum plate, or shop cloth between the part and the vise.
- Do not allow brake fluid to come in contact with vehicle body; wash away with water and wipe off completely if spilled.

D: PREPARATION TOOL

1. SPECIAL TOOLS

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-925460000	925460000	WHEEL CYLINDER 11/16″ ADAPTER	Used for installing cup onto wheel cylinder piston (Size 11/16″).

2. GENERAL PURPOSE TOOLS

TOOL NAME	REMARKS
SNAP RING PLIERS	Used for removing and installing snap ring.

2. Front Brake Pad

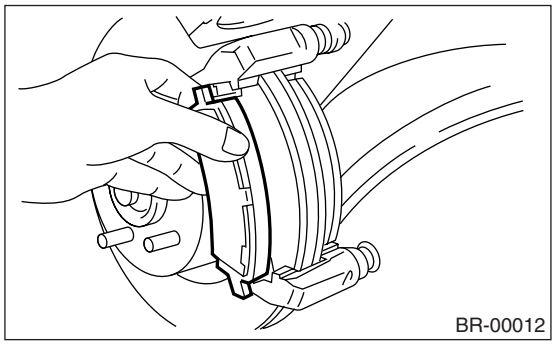
A: REMOVAL

1. 14 INCH AND 15 INCH TYPE

1) Set the vehicle on a lift.
2) Loosen the wheel nuts.
3) Lift-up the vehicle, and then remove the front wheel.
4) Remove the lower caliper bolt.
5) Raise the caliper body upward and support it.

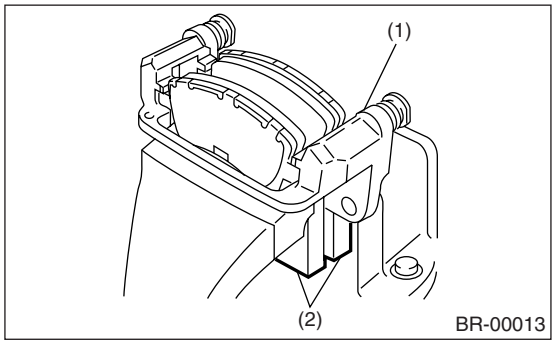
NOTE:
Do not disconnect the brake hose from caliper body.

6) Remove the pad.


BR-00012

NOTE:
If the brake pad is difficult to remove, proceed as follows:

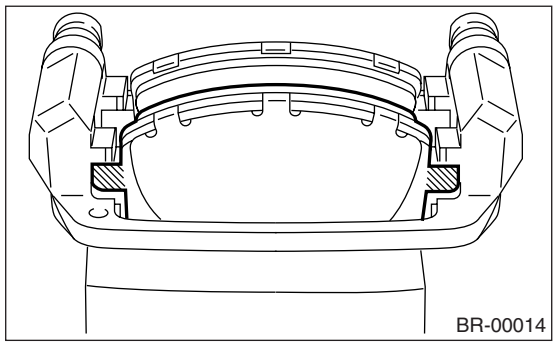
(1) Remove the caliper body from support.
(2) Remove the support.
(3) Place a support in a vise between wooden blocks.



BR-00013

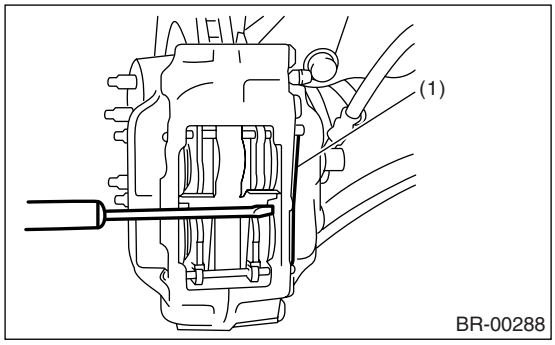
(1) Support
(2) Wooden blocks

(4) Use a rod of less than 12 mm (0.47 in) dia. to the shaded area of brake pad, and strike the rod with a hammer to drive brake pad out of place.


BR-00014

2. 16 INCH TYPE

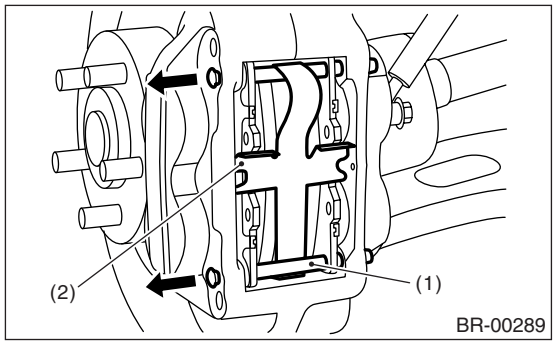
1) Set the vehicle on a lift.
2) Loosen the wheel nuts.
3) Lift-up the vehicle, and then remove the front wheel.
4) Remove the M clip.



BR-00288

(1) M clip

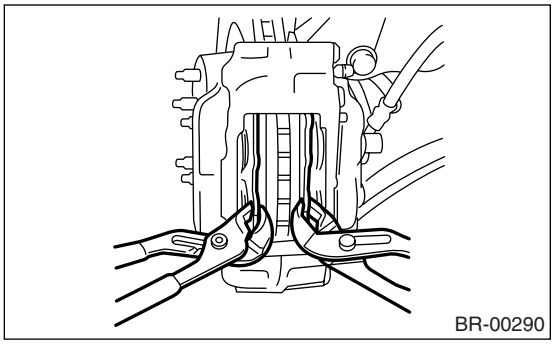
5) Remove the pad pins, then remove the cross spring.



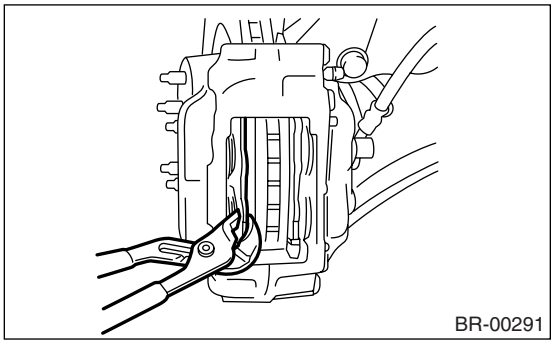
BR-00289

(1) Pad pin
(2) Cross spring

6) Use a wrench to expand the pads, and then push the piston back.

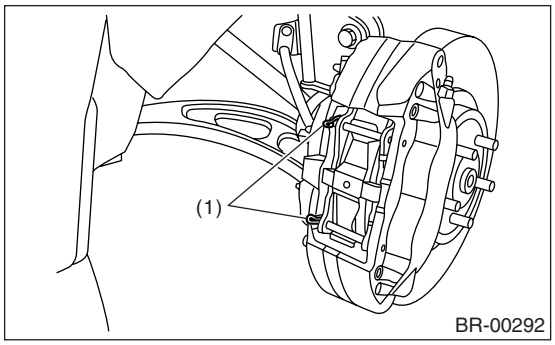


7) Remove the pad.



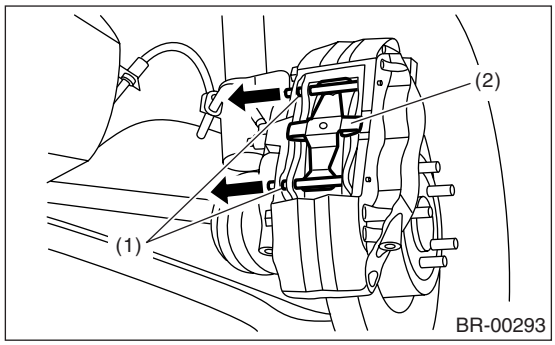
3. 17 INCH TYPE

1) Set the vehicle on a lift.
2) Loosen the wheel nuts.
3) Lift-up the vehicle, and then remove the front wheel.
4) Remove the clip.



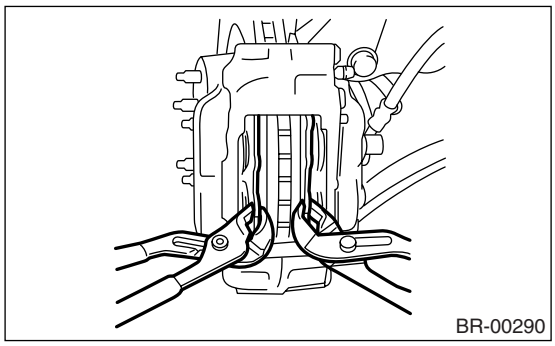
(1) Clip

5) Remove the pad pins and cross spring.

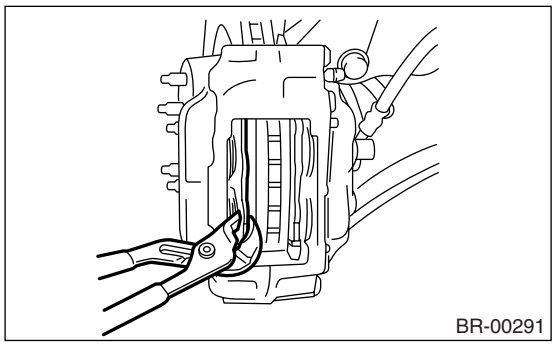


(1) Pad pin
(2) Cross spring

6) Use a wrench to expand the pads, and then push the piston back.



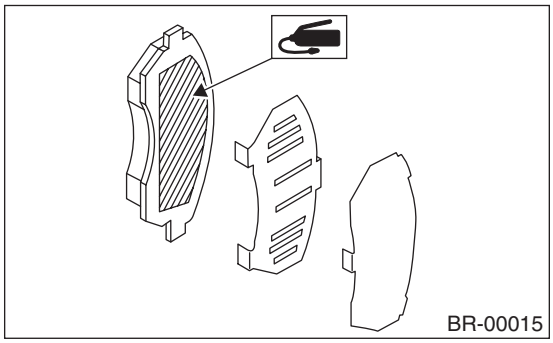
7) Remove the pad.



B: INSTALLATION

1. 14 INCH AND 15 INCH TYPE

1) Apply thin coat of Molykote AS880N (Part No. K0777YA010) to the frictional portion between pad and pad clip.
2) Apply thin coat of Molykote AS880N (Part No. K0777YA010) to the frictional portion between pad and pad inner shim.



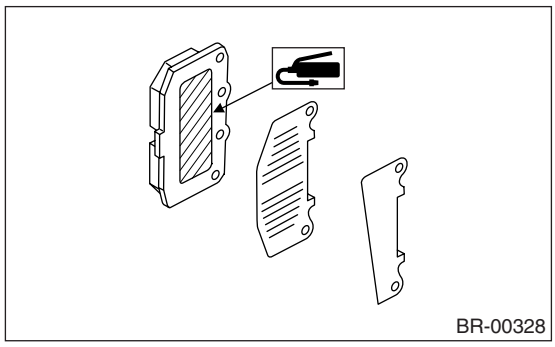
3) Install the pads on support.
4) Install the caliper body on support.

Tightening torque:
14 INCH TYPE
37 N·m (3.8 kgf-m, 27.5 ft-lb)
15 INCH TYPE
26.5 N·m (2.7 kgf-m, 19.6 ft-lb)

NOTE:
If it is difficult to push the piston during pad replacement, loosen the air bleeder to facilitate work.

2. 16 INCH TYPE

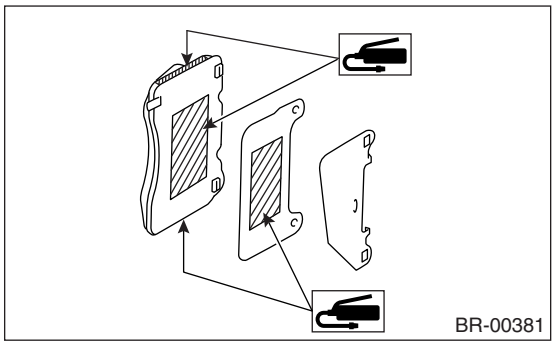
1) Apply thin coat of Molykote AS880N (Part No. K0777YA010) to the frictional portion between pad and pad inner shim.



2) Install the pads on caliper body.
3) Install the pad pins on caliper body.
4) Install the M clip.
5) Install the cross spring.

3. 17 INCH TYPE

1) Apply thin coat of Molykote AS880N (Part No. K0777YA010) to the frictional portion between pad and pad shim.

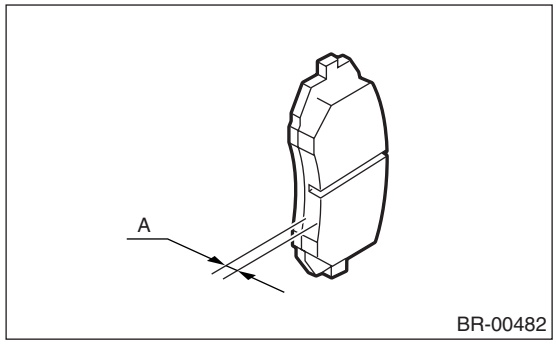


2) Install the pads on caliper body.
3) Install the cross spring.
4) Install the pad pins.
5) Install the clip.

C: INSPECTION

1. 14 INCH AND 15 INCH TYPE

Check the pad thickness A.

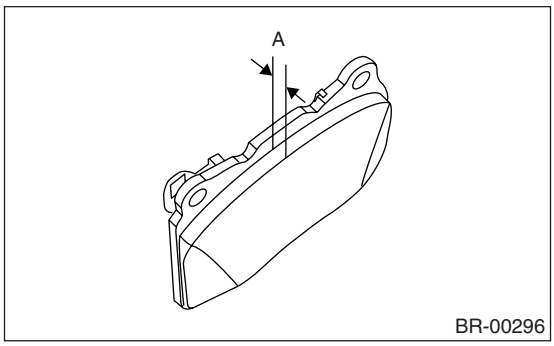


Pad thickness	Standard value	11 mm (0.43 in)
	Wear limit	1.5 mm (0.059 in)

NOTE:
• Always replace the pads for both right and left wheels at the same time.
• Also replace the pad clips if they are twisted or worn.
• A wear indicator is provided on the inner disc brake pad. If the pad wears down to such an extent that the end of wear indicator contacts disc rotor, a squeaking sound is produced as the wheel rotates. If this sound is heard, replace the pad.
• Replace the pad if there is oil or grease on it.

2. 16 INCH TYPE

Check the pad thickness A.

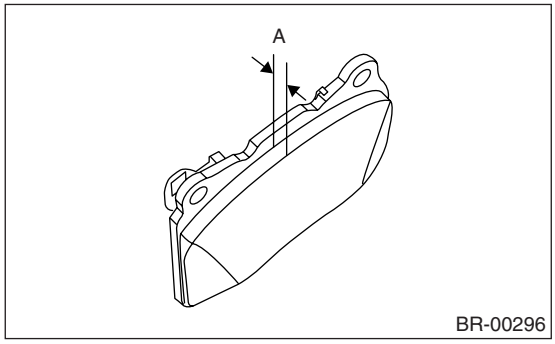


Pad thickness	Standard value	10 mm (0.393 in)
	Wear limit	1.5 mm (0.59 in)

NOTE:
• Always replace the pads for both right and left wheels at the same time.
• Also replace the pad clips if they are twisted or worn.
• A wear indicator is provided on the inner disc brake pad. If the pad wears down to such an extent that the end of wear indicator contacts disc rotor, a squeaking sound is produced as the wheel rotates. If this sound is heard, replace the pad.
• Replace the pad if there is oil or grease on it.

3. 17 INCH TYPE

Check the pad thickness A.



Pad thickness	Standard value	9.2 mm (0.362 in)
	Wear limit	1.2 mm (0.047 in)

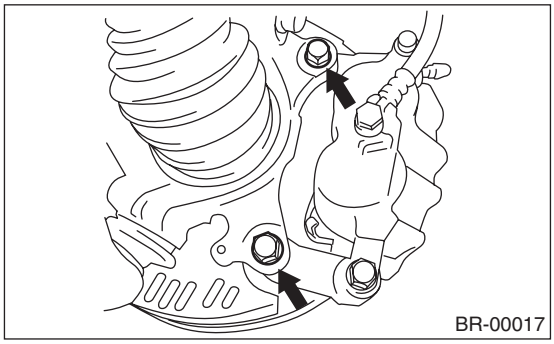
NOTE:
• Always replace the pads for both right and left wheels at the same time.
• Also replace the pad clips if they are twisted or worn.
• A wear indicator is provided on the inner disc brake pad. If the pad wears down to such an extent that the end of wear indicator contacts disc rotor, a squeaking sound is produced as the wheel rotates. If this sound is heard, replace the pad.
• Replace the pad if there is oil or grease on it.

3. Front Disc Rotor

A: REMOVAL

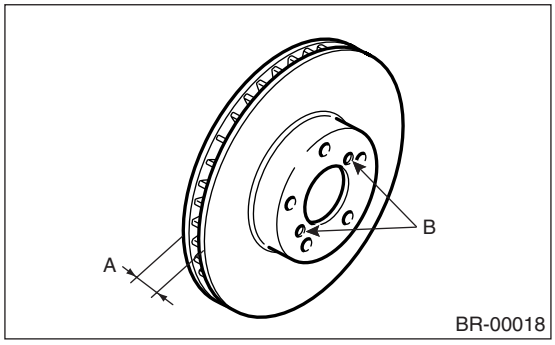
1. 14 INCH AND 15 INCH TYPE

1) Set the vehicle on a lift.
2) Loosen the wheel nuts.
3) Lift-up the vehicle, and then remove the front wheel.
4) Remove the caliper body and support from housing, and suspend it from strut using a wire.



5) Remove the disc rotor.

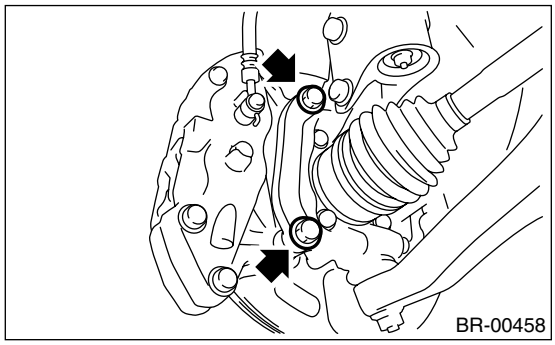
NOTE:
If the disc rotor seizes up within the hub, drive the disc rotor out by installing an 8-mm bolt in holes (B) on rotor.



6) Clean mud and foreign particles from the caliper body assembly and support.

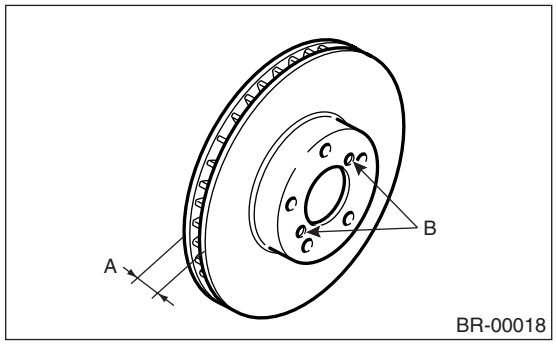
2. 16 INCH AND 17 INCH TYPE

1) Set the vehicle on a lift.
2) Loosen the wheel nut.
3) Lift-up the vehicle, and then remove the front wheel.
4) Remove the caliper body assy and tie bar (17 inch type) from housing and suspend from strut using a wire.



5) Remove the disc rotor from hub.

NOTE:
If the disc rotor seizes up within the hub, drive the disc rotor out by installing an 8-mm bolt in holes B on rotor.



6) Clean mud and foreign particles from the caliper body assembly and support.

B: INSTALLATION

1) Install the disc rotor.
2) Install the caliper body assy and tie bar (17 inch type) to housing.

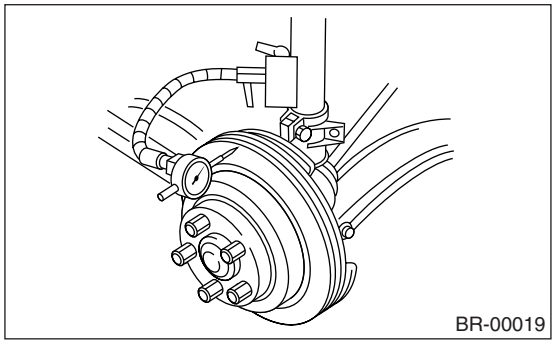
CAUTION:
• When installing the caliper body and tie bar, temporarily tighten two bolts until the bolts cannot be tighten by hand, and then tighten them to specified torque with tool.
• Keep away oil such as grease or etc, from bolt.

Tightening torque:
Except 17 inch type:
80 N·m (8.2 kgf-m, 59 ft-lb)
17 inch type:
155 N·m (15.8 kgf-m, 114.3 ft-lb)

3) Install the wheel.

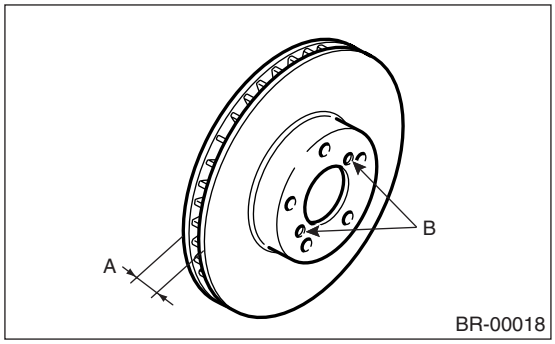
C: INSPECTION

1) Check bearing axial end play and hub runout before disc rotor runout limit inspection. <Ref. to DS-25, INSPECTION, Front Axle.>
2) Secure the disc rotor by tightening five wheel nuts.
3) Set a dial gauge 10 mm (0.39 in) inward of rotor outer perimeter. Turn the disc rotor to check runout. If the disc rotor runout is above specified value, replace the disc rotor.


BR-00019

Disc rotor runout limit:
0.075 mm (0.0030 in)

4) Set a micrometer 10 mm (0.39 in) inward of the rotor outer perimeter, and then measure the disc rotor thickness. If the thickness of disc rotor is outside the service limit, replace the disc rotor.



BR-00018

		Standard value	Service limit	Disc outer dia.
Disc rotor thickness A	14″	24 mm (0.94 in)	22 mm (0.87 in)	260 mm (10.24 in)
	15″	24 mm (0.94 in)	22 mm (0.87 in)	277 mm (10.91 in)
	16″	24 mm (0.94 in)	22 mm (0.87 in)	294 mm (11.57 in)
	17″	30 mm (1.18 in)	28 mm (1.10 in)	326 mm (12.83 in)

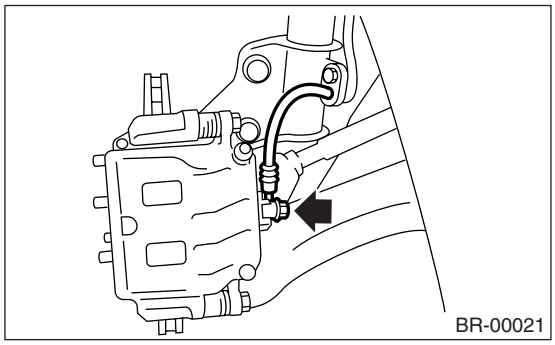
4. Front Disc Brake Assembly

A: REMOVAL

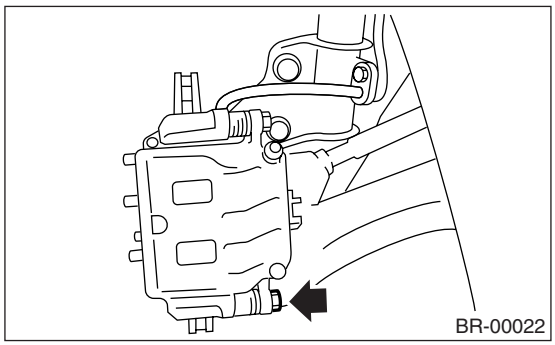
1. 14 INCH AND 15 INCH TYPE

CAUTION:
Do not allow brake fluid to come in contact with vehicle body; wash away with water and wipe off completely if spilled.

1) Set the vehicle on a lift.
2) Loosen the wheel nuts.
3) Lift-up the vehicle, and then remove the front wheel.
4) Remove the union bolt, and then disconnect the brake hose from caliper body assembly.

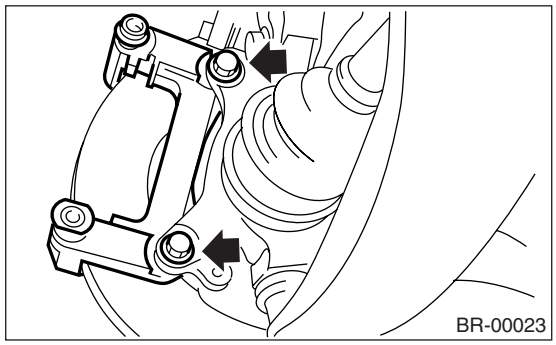


5) Remove the bolt securing lock pin to caliper body.



6) Raise the caliper body, and then move it toward vehicle center to separate it from support.
7) Remove the support from housing.

NOTE:
Remove the support only when replacing it or the rotor. It need not be removed when servicing the caliper body assembly.

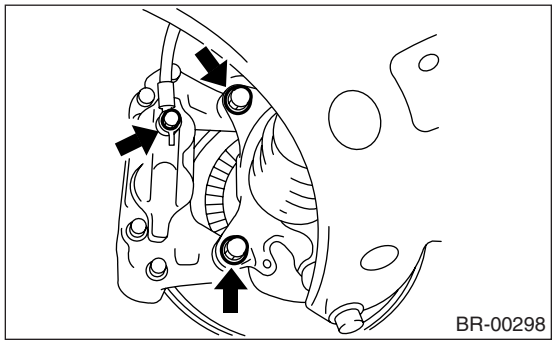


8) Clean mud and foreign particles from the caliper body assembly and support.

2. 16 INCH TYPE

CAUTION:
Do not allow brake fluid to come in contact with vehicle body; wash away with water and wipe off completely if spilled.

1) Set the vehicle on a lift.
2) Loosen the wheel nuts.
3) Lift-up the vehicle, and then remove the front wheel.
4) Remove the union bolt, and then disconnect the brake hose from caliper body assembly.
5) Remove the caliper body from housing.



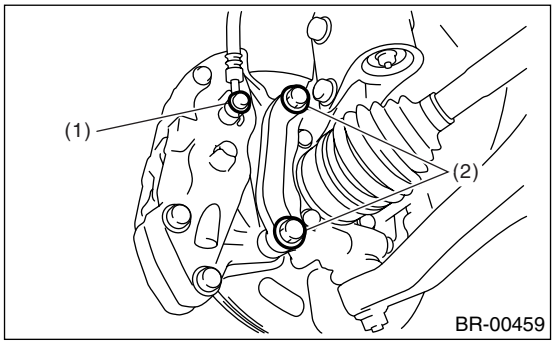
6) Clean mud and foreign particles from the caliper body assembly and support.

3. 17 INCH TYPE

CAUTION:
Do not allow brake fluid to come in contact with vehicle body; wash away with water and wipe off completely if spilled.

1) Set the vehicle on a lift.
2) Loosen the wheel nuts.
3) Lift-up the vehicle, and then remove the front wheel.

4) Remove the brake pads from caliper body. <Ref. to BR-26, 17 INCH TYPE, REMOVAL, Front Brake Pad.>.
5) Remove the union bolt (1) and brake hose from caliper body assembly.
6) Remove bolt (2) and tie bar from housing.



(1) Union bolt
(2) Installation bolt

7) Clean mud and foreign particles from the caliper body assembly.

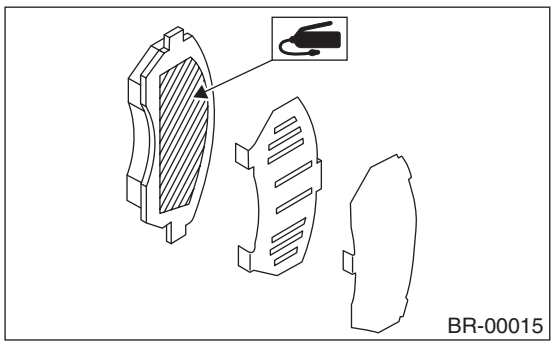
B: INSTALLATION

1. 14 INCH AND 15 INCH TYPE

1) Install the support on housing.

Tightening torque:
80 N·m (8.2 kgf-m, 59 ft-lb)

2) Apply thin coat of Molykote AS880N (Part No. K0777YA010) to the frictional portion between pad and pad clip.
3) Apply thin coat of Molykote AS880N (Part No. K0777YA010) to the frictional portion between pad and inner shim.



4) Install the pads on support.
5) Install the caliper body on support.

Tightening torque:
14 INCH TYPE
37 N·m (3.8 kgf-m, 27.5 ft-lb)
15 INCH TYPE
26.5 N·m (2.7 kgf-m, 1.96 ft-lb)

6) Replace the brake hose gaskets with new ones, and then connect the brake hose.

Tightening torque:
18 N·m (1.8 kgf-m, 13.3 ft-lb)

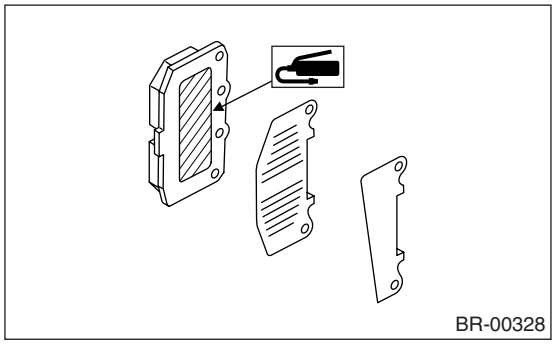
7) Bleed air from the brake system. <Ref. to BR-63, Air Bleeding.>

2. 16 INCH TYPE

1) Install the caliper body on housing.

Tightening torque:
80 N·m (8.2 kgf-m, 59 ft-lb)

2) Apply thin coat of Molykote AS880N (Part No. K0777YA010) to the frictional portion between pad and pad inner shim.



3) Install the pads on caliper body.
4) Install the pad pins and cross spring on caliper body.
5) Install the M clip.
6) Replace the brake hose gaskets with new ones, and then connect the brake hose.

Tightening torque:
18 N·m (1.8 kgf-m, 13.3 ft-lb)

7) Bleed air from the brake system. <Ref. to BR-63, Air Bleeding.>

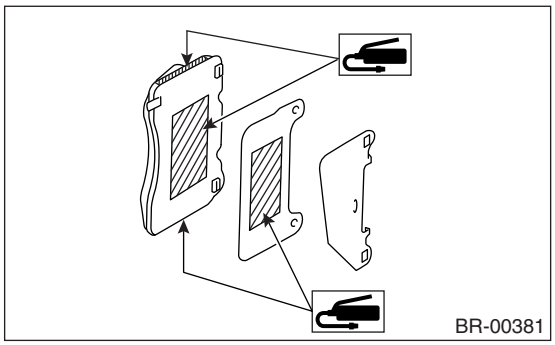
3. 17 INCH TYPE

1) Install the caliper body assembly and tie bar on housing.

CAUTION:
• When installing the caliper body and tie bar, temporarily tighten two bolts until the bolts cannot be tighten by hand, and then tighten them to specified torque with tool.
• Keep away oil such as grease or etc, from bolt.

Tightening torque:
155 N·m (15.8 kgf-m, 114.3 ft-lb)

2) Apply thin coat of Molykote AS880N (Part No. K0777YA010) to the frictional portion between pad and pad shim.



3) Install the pads on caliper body.
4) Install the cross spring.
5) Install the pad pins.
6) Install the clip.
7) Replace the brake hose gaskets with new ones, and then connect the brake hose.

Tightening torque:
18 N·m (1.8 kgf-m, 13.3 ft-lb)

8) Bleed air from the brake system. <Ref. to BR-63, Air Bleeding.>

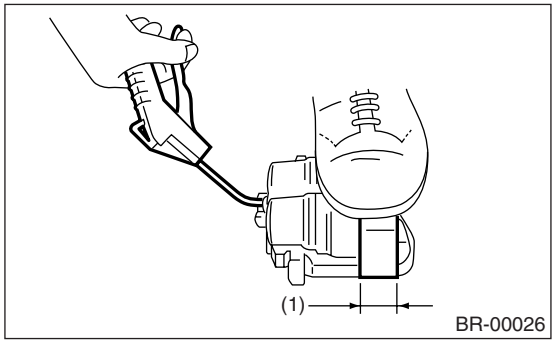
C: DISASSEMBLY

1. 14 INCH AND 15 INCH TYPE

1) Clean mud and foreign particles from the caliper body assembly and support.

CAUTION:
Be careful not to allow foreign particles to enter the brake hose connector.

2) Place a wooden block in caliper body as shown in the figure to prevent the piston from jumping out and avoid being damaged.
3) Gradually supply compressed air via the installation hole of brake hose to force the piston out.

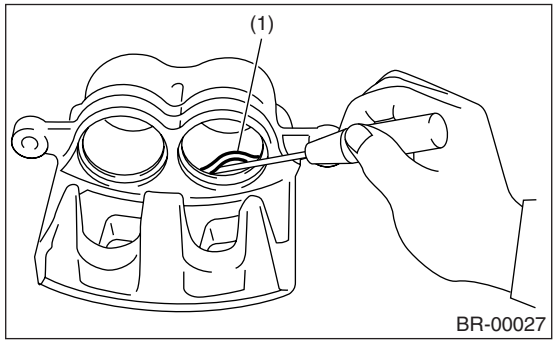


(1) Place a 30 mm (1.18 in) wide wooden block here.

4) Remove the piston boot.

5) Remove the piston seal from caliper body cylinder.

CAUTION:
Do not damage the cylinder and piston seal groove.



(1) Piston seal

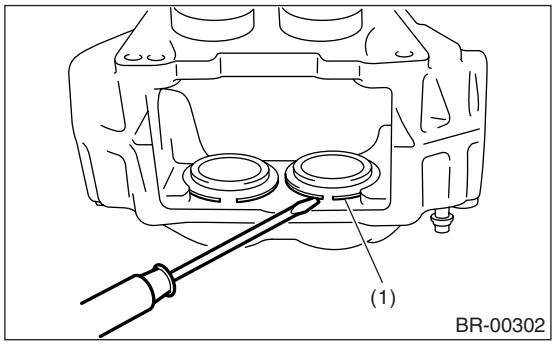
6) Remove the guide pin and boot from caliper body.

2. 16 INCH TYPE

1) Clean mud and foreign particles from the caliper body assembly.

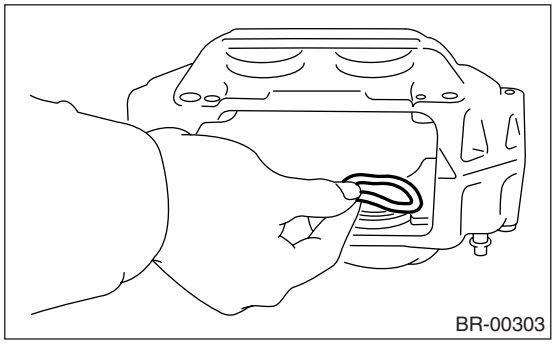
CAUTION:
Be careful not to allow foreign particles to enter the brake hose connector.

2) Using a standard screwdriver, remove the boot ring from piston.

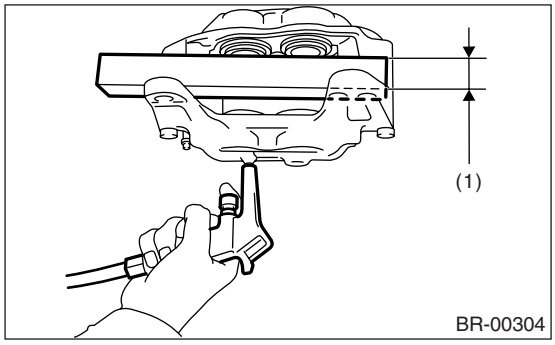


(1) Boot ring

3) Remove the boot from piston end.



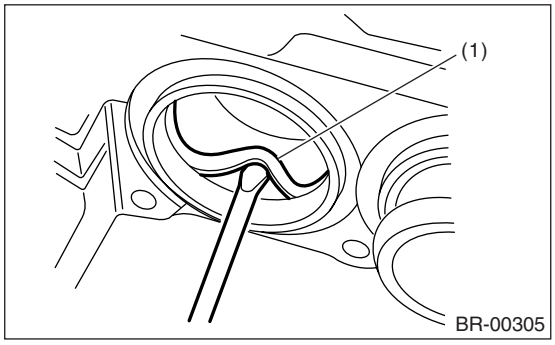
4) Place a wooden block in caliper body as shown in the figure to prevent the piston from jumping out and avoid being damaged.
5) Gradually supply compressed air via the installation hole of brake hose to force the piston out.



(1) Place a 30 mm (1.18 in) wide wooden block here.

6) Remove the piston seal from caliper body cylinder.

CAUTION:
Do not damage the cylinder and piston seal groove.



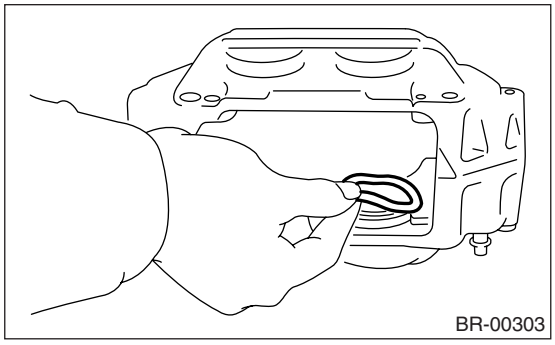
(1) Piston seal

3. 17 INCH TYPE

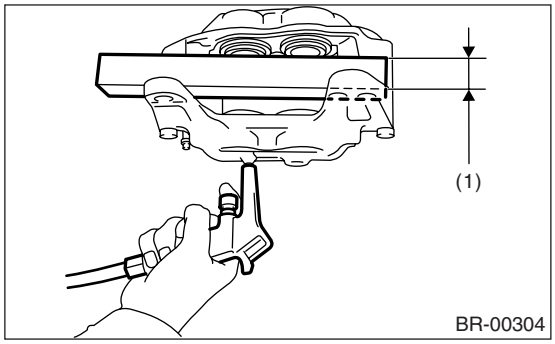
1) Clean mud and foreign particles from the caliper body assembly.

CAUTION:
Be careful not to allow foreign particles to enter the brake hose connector.

2) Remove the piston boots from each piston end.



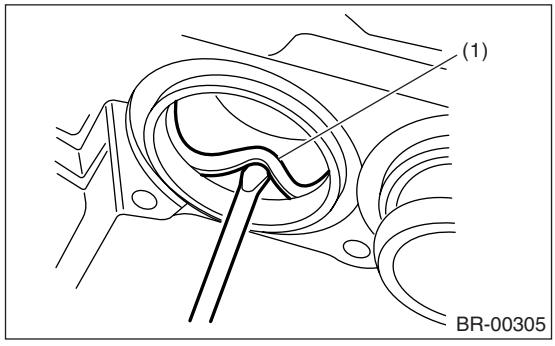
3) Place a wooden block in caliper body as shown in the figure to prevent the piston from jumping out and avoid being damaged.
4) Gradually supply compressed air via the installation hole of brake hose to force the piston out.



(1) Place a 30 mm (1.18 in) wide wooden block here.

5) Remove the piston seal from caliper body cylinder.

CAUTION:
Do not damage the cylinder and piston seal groove.



(1) Piston seal

D: ASSEMBLY

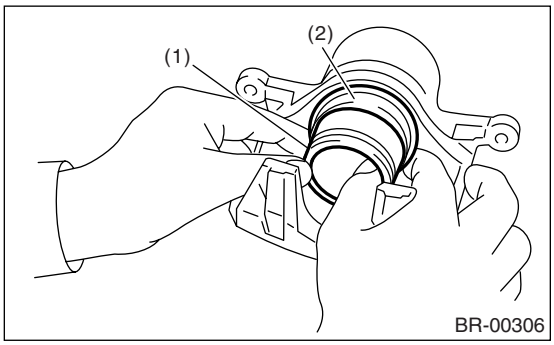
1. 14 INCH AND 15 INCH TYPE

1) Clean the caliper body interior using brake fluid.
2) Apply a coat of brake fluid to the piston seal and fit piston seal in groove on caliper body.
3) Apply a coat of brake fluid to the entire inner surface of cylinder and outer surface of piston.
4) Apply a coat of specified grease to the boot and install the piston boot to the groove on ends of cylinder.

Grease:
NIGLUBE RX-2 (Part No. K0779GA102)

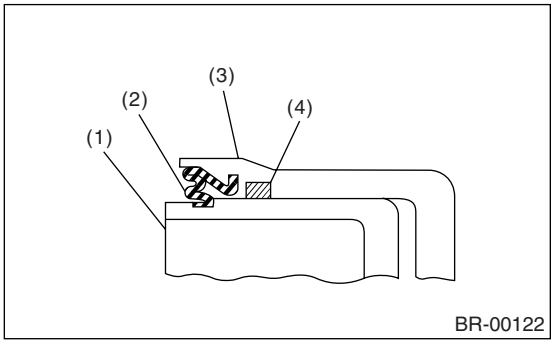
5) Insert the piston into cylinder.

CAUTION:
Do not force the piston into cylinder.



(1) Piston
(2) Piston boot

6) Position the boot in grooves on cylinder and piston.

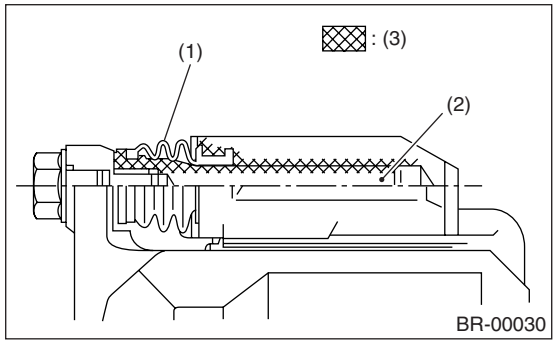


(1) Piston
(2) Piston boot
(3) Caliper body
(4) Piston seal

7) Apply a coat of specified grease to the lock pin and guide pin outer surface, cylinder inner surface, and boot grooves.

Grease:
NIGLUBE RX-2 (Part No. K0779GA102)

8) Install the lock and guide pin boot on support.



(1) Pin boot
(2) Lock pin or guide pin
(3) Apply grease.

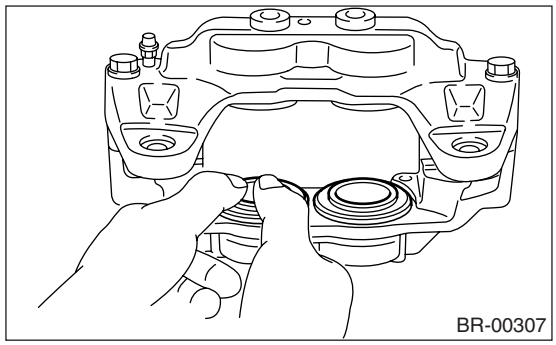
2. 16 INCH TYPE

1) Clean the caliper body interior using brake fluid.
2) Apply a coat of brake fluid to the piston seal and fit piston seal in groove on caliper body.
3) Apply a coat of brake fluid to the entire inner surface of cylinder and outer surface of piston.
4) Apply a coat of specified grease to the boot and fit in groove on ends of cylinder and piston.

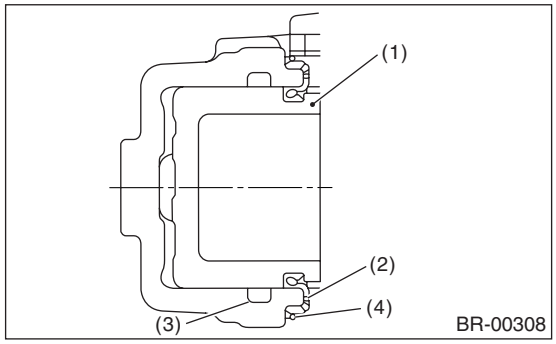
Grease:
NIGLUBE RX-2 (Part No. K0779GA102)

5) Insert the piston into cylinder.

CAUTION:
Do not force the piston into cylinder.



6) Position the boot in grooves on cylinder and piston.



(1) Piston
(2) Piston boot
(3) Piston seal
(4) Boot ring

7) Install the boot ring. Be careful not scratch the boot.

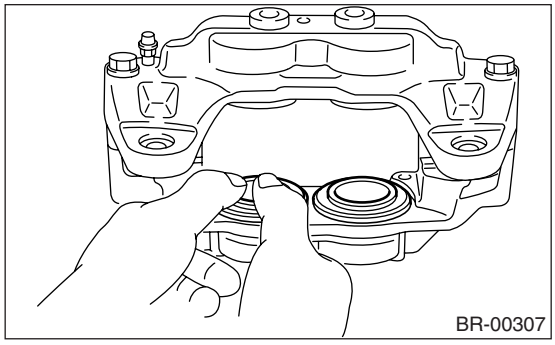
3. 17 INCH TYPE

1) Clean the caliper body interior using brake fluid.
2) Apply a coat of brake fluid to the piston seal, and then install the piston seal in groove on caliper body.
3) Apply a coat of brake fluid to the entire inner surface of cylinder and outer surface of piston.
4) Apply a coat of specified grease to the boot and install it in the groove on piston.

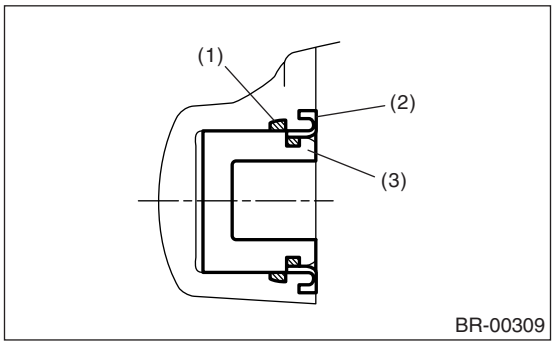
Grease:
NIGLUBE RX-2 (Part No. K0779GA102)

5) Insert the piston into cylinder.

CAUTION:
Do not force the piston into cylinder.



6) Position the boot in grooves on cylinder and piston.



(1) Piston seal
(2) Piston boot
(3) Piston

E: INSPECTION

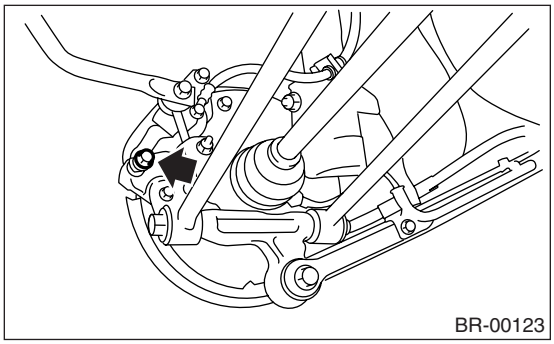
1) Repair or replace the faulty parts.
2) Check the caliper body and piston for uneven wear, damage or rust.
3) Check the rubber parts for damage or deterioration.

5. Rear Brake Pad

A: REMOVAL

1. 14 INCH TYPE

1) Set the vehicle on a lift.
2) Loosen the wheel nuts.
3) Lift-up the vehicle, and then remove the rear wheel.
4) Remove the lower caliper bolt.

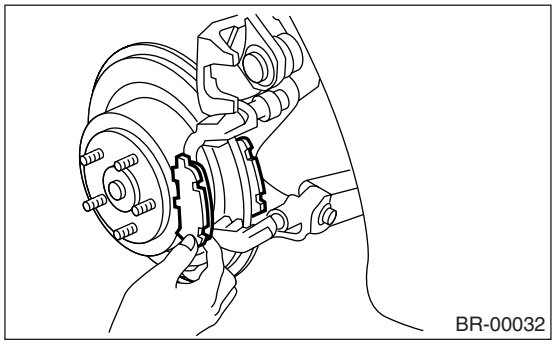


5) Raise the caliper body upward and support it.

NOTE:
Do not disconnect the brake hose from caliper body.

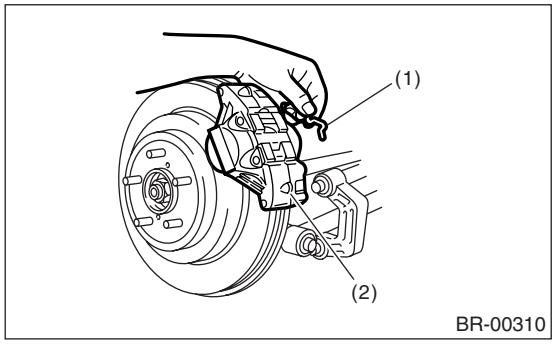
6) Remove the pad.

NOTE:
If the brake pad is difficult to remove, use the same procedure as for front disc brake pad.
<Ref. to BR-25, REMOVAL, Front Brake Pad.>



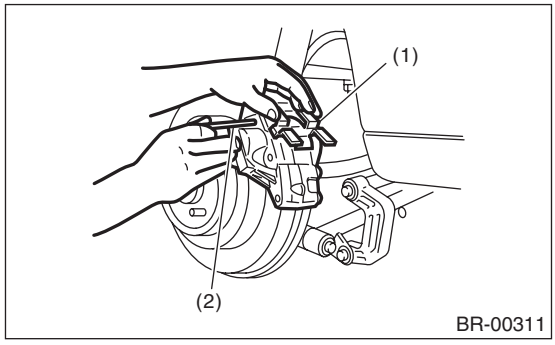
2. 15 INCH TYPE

1) Set the vehicle on a lift.
2) Loosen the wheel nuts.
3) Lift-up the vehicle, and then remove the rear wheel.
4) Remove the M clip.



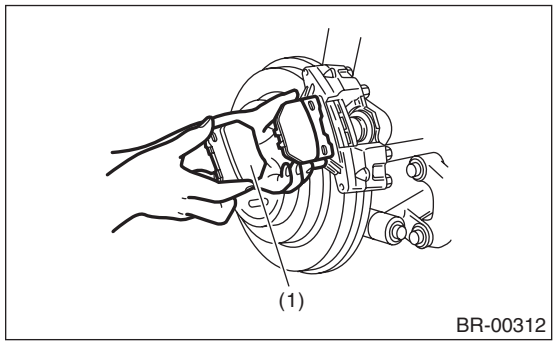
(1) M clip
(2) Caliper

5) Remove the two pad pins.
6) Remove the cross spring.



(1) Cross spring
(2) Pad pin

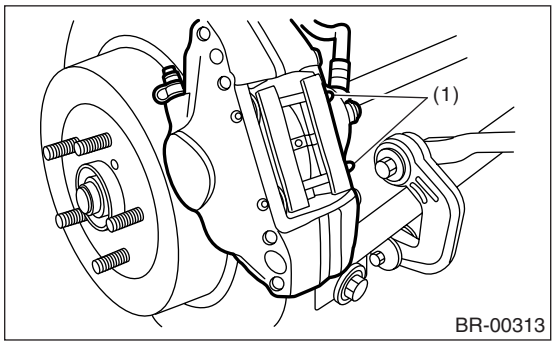
7) Expand the pads and push piston back.
8) Remove the pad and shim.



(1) Brake pad

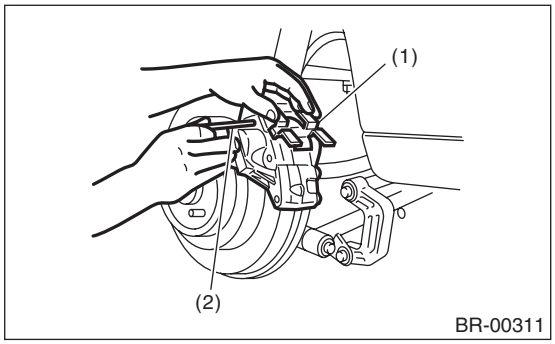
3. 17 INCH TYPE

1) Set the vehicle on a lift.
2) Loosen the wheel nuts.
3) Lift-up the vehicle, and then remove the rear wheel.
4) Remove the clip.



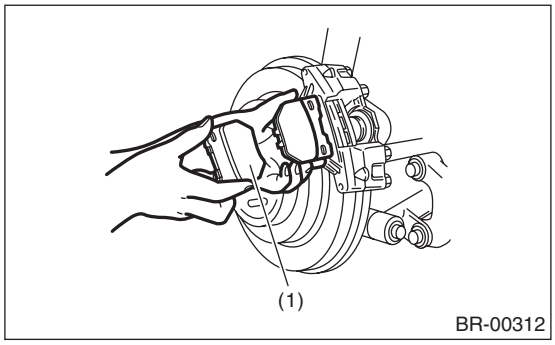
(1) Clip

5) Remove the pad pins and cross spring.



(1) Cross spring
(2) Pad pin

6) Expand the pads and push piston back.
7) Remove the pad.



(1) Rear brake pad

B: INSTALLATION

1. 14 INCH TYPE

1) Apply a thin coat of Molykote AS880N (Part No. K0777YA010) to the frictional portion between pad and pad clip.
2) Install the pad on support.
3) Install the caliper body on support.

Tightening torque:
37 N·m (3.8 kgf-m, 27.5 ft-lb)

NOTE:
If it is difficult to push the piston during pad replacement, loosen air bleeder to facilitate work.

2. 15 INCH TYPE

1) Apply a thin coat of Molykote AS880N (Part No. K0777YA010) to frictional portion between pad and pad inner shim.
2) Install the pads on caliper body.
3) Install the cross spring.
4) Install the pad pins on caliper body.
5) Install the M clip.

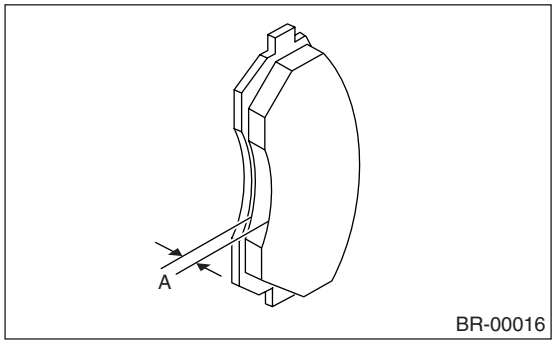
3. 17 INCH TYPE

1) Apply a thin coat of Molykote AS880N (Part No. K0777YA010) to frictional portion between pad and pad inner shim.
2) Install the pads on caliper body.
3) Install the cross spring and pad pins.
4) Install the Clip.

C: INSPECTION

1. 14 INCH TYPE

Check pad thickness A.



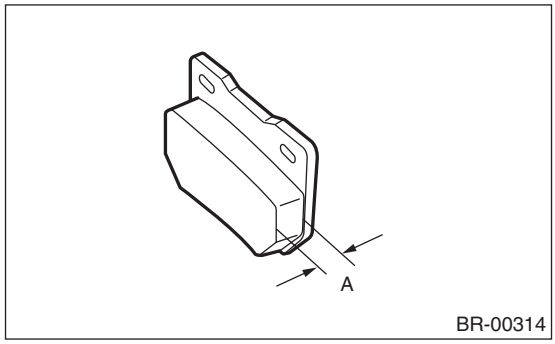
Pad thickness	Standard value	9.0 mm (0.354 in)
	Wear limit	1.5 mm (0.059 in)

NOTE:
• Always replace the pads for both right and left wheels at the same time.
• Also replace the pad clips if they are twisted or worn.

• A wear indicator is provided on the inner disc brake pad. If the pad wears down to such an extent that the end of wear indicator contacts disc rotor, a squeaking sound is produced as the wheel rotates. If this sound is heard, replace the pad.
• Replace the pad if there is oil or grease on it.

2. 15 INCH TYPE

Check the pad thickness A.

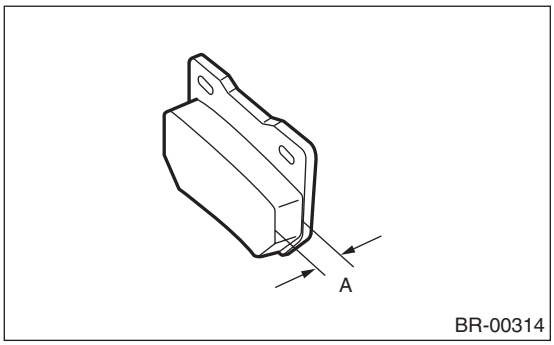


Pad thickness	Standard value	11.5 mm (0.452 in)
	Wear limit	1.5 mm (0.059 in)

NOTE:
• Always replace the pads for both right and left wheels at the same time.
• Also replace the pad clips if they are twisted or worn.
• A wear indicator is provided on the inner disc brake pad. If the pad wears down to such an extent that the end of wear indicator contacts disc rotor, a squeaking sound is produced as the wheel rotates. If this sound is heard, replace the pad.
• Replace the pad if there is oil or grease on it.

3. 17 INCH TYPE

Check the pad thickness A.



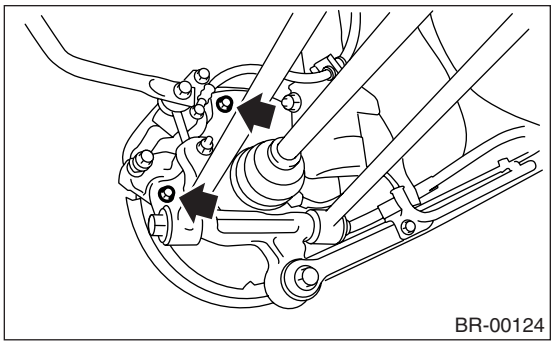
Pad thickness	Standard value	9.0 mm (0.354 in)
	Wear limit	1.2 mm (0.047 in)

NOTE:
• Always replace the pads for both right and left wheels at the same time.
• Also replace the pad clips if they are twisted or worn.
• A wear indicator is provided on the inner disc brake pad. If the pad wears down to such an extent that the end of wear indicator contacts disc rotor, a squeaking sound is produced as the wheel rotates. If this sound is heard, replace the pad.
• Replace the pad if there is oil or grease on it.

6. Rear Disc Rotor

A: REMOVAL

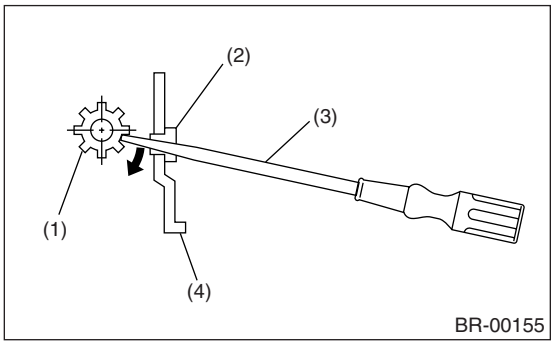
1) Set the vehicle on a lift.
2) Loosen the wheel nuts.
3) Lift-up the vehicle, and then remove the wheels.
4) Pull down and release the parking brake.
5) Remove the two mounting bolts, and then remove the disc brake assembly.


BR-00124

6) Suspend the disc brake assembly so that hose is not stretched.
7) Remove the disc rotor.

NOTE:
If the disc rotor is difficult to remove try following two methods in order.

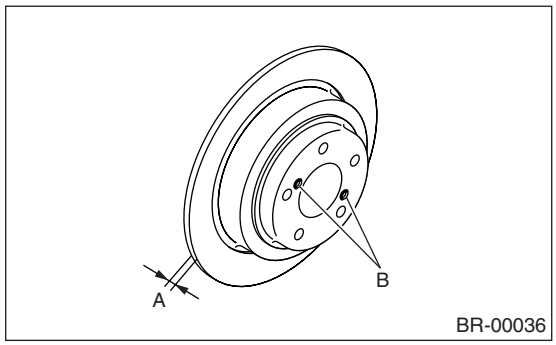
(1) Turn the adjusting screw using a flat tip screwdriver until brake shoe gets away enough from the disc rotor.



BR-00155

(1) Adjusting screw
(2) Cover
(3) Flat tip screwdriver
(4) Back plate

(2) If the disc rotor seizes up within hub, drive the disc rotor out by installing an 8-mm bolt in holes B on rotor.



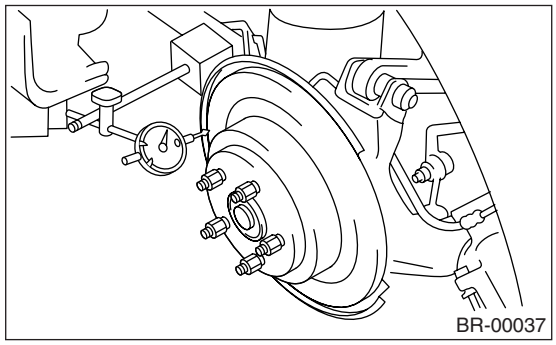
BR-00036

B: INSTALLATION

1) Install in the reverse order of removal.
2) Adjust the parking brake. <Ref. to PB-11, ADJUSTMENT, Parking Brake Assembly (Rear Disc Brake).>

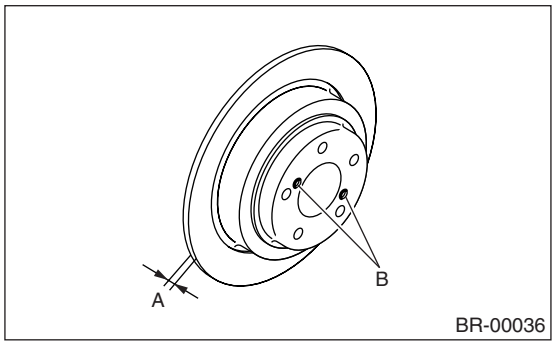
C: INSPECTION

1) Check bearing axial end play and hub runout before disc rotor runout limit inspection. <Ref. to DS-36, INSPECTION, Rear Axle [AWD Model].> <Ref. to DS-38, INSPECTION, Rear Axle [FWD Model].>
2) Secure the disc rotor by tightening five wheel nuts.
3) Set a dial gauge 10 mm (0.39 in) inward of rotor outer perimeter. Turn the disc rotor to check runout. If the disc rotor runout is above specified value, replace the disc rotor.


BR-00037

Disc rotor runout limit:
0.070 mm (0.0027 in)

4) Set a micrometer 10 mm (0.39 in) inward of the rotor outer perimeter, and then measure the disc rotor thickness. If the thickness of disc rotor is outside the service limit, replace the disc rotor.



		Standard value	Service limit	Disc outer dia.
Disc rotor thickness A	14″	10 mm (0.39 in)	8.5 mm (0.335 in)	266 mm (10.47 in)
	15″	18 mm (0.71 in)	16 mm (0.63 in)	290 mm (11.42 in)
	17″	20 mm (0.79 in)	18 mm (0.71 in)	316 mm (12.44 in)

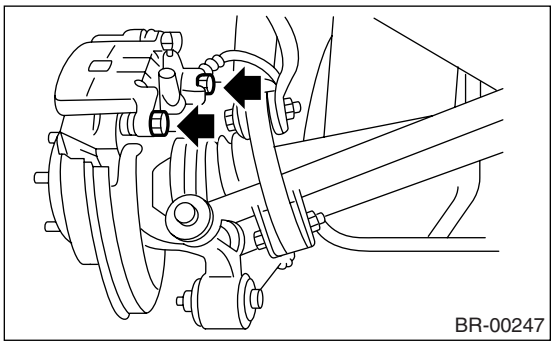
7. Rear Disc Brake Assembly

A: REMOVAL

1. 14 INCH TYPE

CAUTION:
Do not allow brake fluid to come in contact with vehicle body; wash away with water and wipe off completely if spilled.

1) Set the vehicle on a lift.
2) Loosen the wheel nuts.
3) Lift-up the vehicle, and then remove the wheels.
4) Disconnect the brake hose from caliper body assembly.
5) Remove the bolt securing lock pin to caliper body.


BR-00247

6) Raise the caliper body and move it toward vehicle center to separate it from support.
7) Remove the support from housing.

NOTE:
Remove the support only when replacing it or the rotor. It need not be removed when servicing the caliper body assembly.

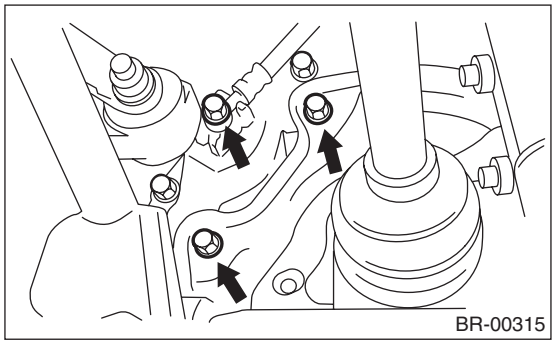
8) Clean mud and foreign particles from the caliper body assembly and support.

CAUTION:
Be careful not to allow foreign particles to enter brake hose connector.

2. 15 INCH TYPE

CAUTION:
Do not allow brake fluid to come in contact with vehicle body; wash away with water and wipe off completely if spilled.

1) Set the vehicle on a lift.
2) Loosen the wheel nuts.
3) Lift-up the vehicle, and then remove the wheels.
4) Remove the pads from caliper body. <Ref. to BR-37, REMOVAL, Rear Brake Pad.>
5) Disconnect the brake hose from caliper body assembly.
6) Remove the caliper body from housing.


BR-00315

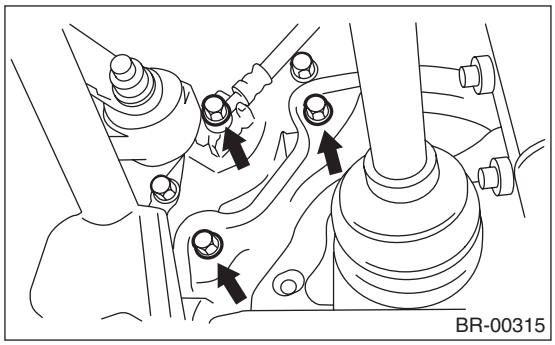
7) Clean mud and foreign particles from the caliper body assembly.

CAUTION:
Be careful not to allow foreign particles to enter brake hose connector.

3. 17 INCH TYPE

CAUTION:
Do not allow brake fluid to come in contact with vehicle body; wash away with water and wipe off completely if spilled.

1) Set the vehicle on a lift.
2) Loosen the wheel nuts.
3) Lift-up the vehicle, and then remove the wheels.
4) Remove the brake pads from caliper body. <Ref. to BR-38, 17 INCH TYPE, REMOVAL, Rear Brake Pad.>
5) Disconnect the brake hose from caliper body.
6) Remove the caliper body from housing.


BR-00315

7) Clean mud and foreign particles from the caliper body.

CAUTION:
Be careful not to allow foreign particles to enter brake hose connector.

B: INSTALLATION

1. 14 INCH TYPE

1) Install the support on housing.

Tightening torque:
53 N·m (5.4 kgf-m, 39.1 ft-lb)

2) Apply thin coat of Molykote AS880N (Part No. K0777YA010) to the frictional portion between pad and pad clip.
3) Install the pads on support.
4) Install the caliper body on support.

Tightening torque:
37 N·m (3.8 kgf-m, 27.5 ft-lb)

5) Replace the brake hose gaskets with new ones, and then connect the brake hose.

Tightening torque:
18 N·m (1.8 kgf-m, 13.3 ft-lb)

6) Bleed air from the brake system. <Ref. to BR-63, Air Bleeding.>

2. 15 INCH TYPE

1) Install the caliper body on housing.

Tightening torque:
53 N·m (5.4 kgf-m, 39.1 ft-lb)

2) Apply thin coat of Molykote AS880N (Part No. K0777YA010) to the frictional portion between pad and pad clip.
3) Install the pads on caliper body.
4) Replace the brake hose gaskets with new ones, and then connect the brake hose.

Tightening torque:
18 N·m (1.8 kgf-m, 13.3 ft-lb)

5) Bleed air from the brake system. <Ref. to BR-63, Air Bleeding.>

3. 17 INCH TYPE

1) Install the caliper body on housing.

Tightening torque:
65 N·m (6.6 kgf-m, 47.9 ft-lb)

2) Install the pads on caliper body.
3) Replace the brake hose gaskets with new ones, and then connect the brake hose.

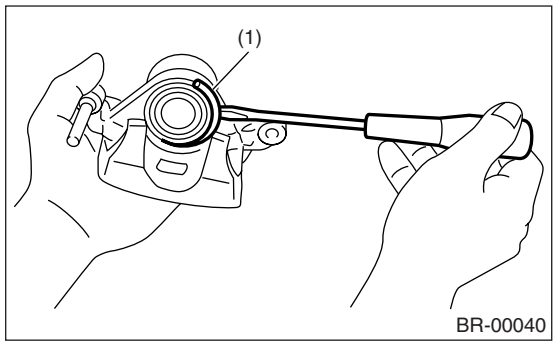
Tightening torque:
18 N·m (1.8 kgf-m, 13.3 ft-lb)

4) Bleed air from the brake system. <Ref. to BR-63, Air Bleeding.>

C: DISASSEMBLY

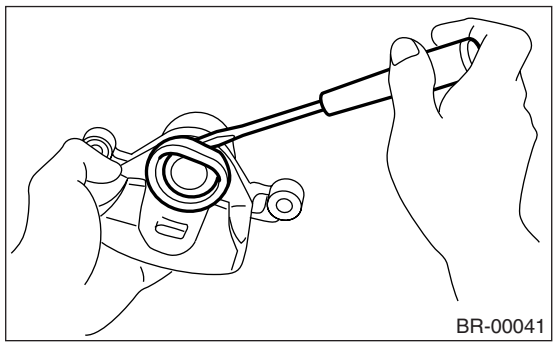
1. 14 INCH TYPE

1) Remove the boot ring.

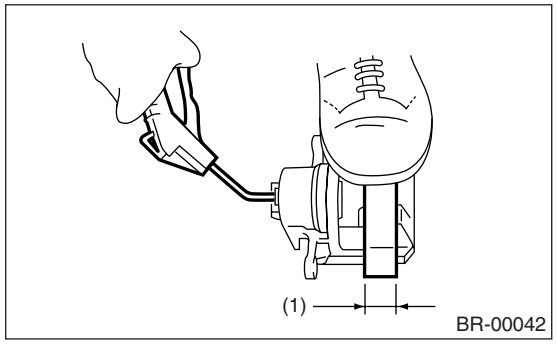


(1) Boot ring

2) Remove the piston boot.



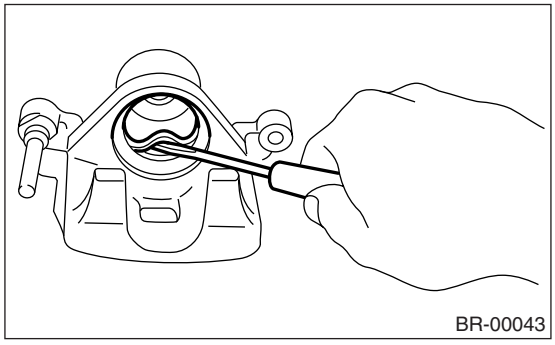
3) Place a wooden block in caliper body as shown in the figure to prevent the piston from jumping out and avoid being damaged.
4) Gradually supply compressed air via the installation hole of brake hose to force the piston out.



(1) Place a 30 mm (1.18 in) wide wooden block here.

5) Remove the piston seal from caliper body cylinder.

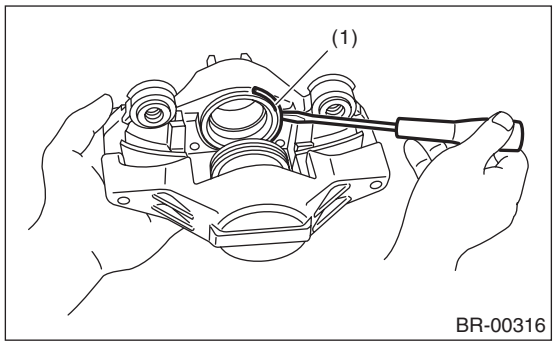
CAUTION:
Do not damage the cylinder and piston seal groove.



6) Remove the lock pin sleeve and boot from caliper body.

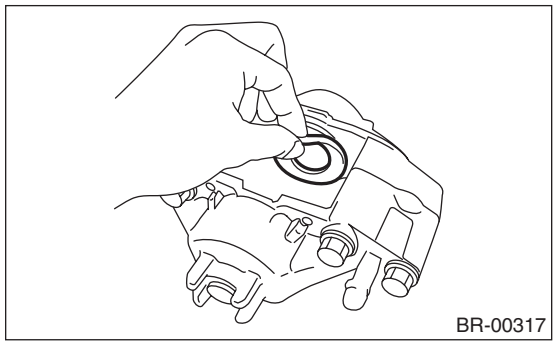
2. 15 INCH TYPE

1) Remove the boot ring.



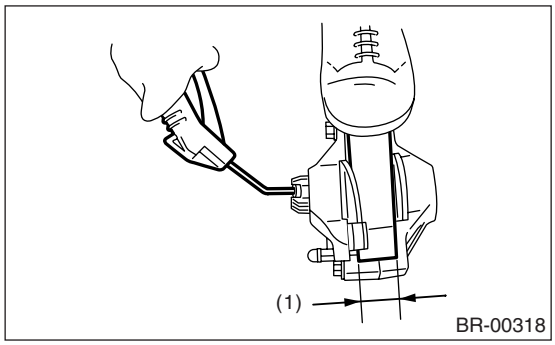
(1) Boot ring

2) Remove the piston boot.



3) Place a wooden block in caliper body as shown in the figure to prevent the piston from jumping out and avoid being damaged.

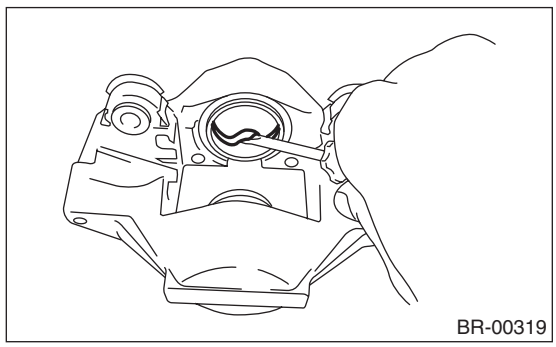
4) Gradually supply compressed air via the installation hole of brake hose to force the piston out.



(1) Place a 30 mm (1.18 in) wide wooden block here.

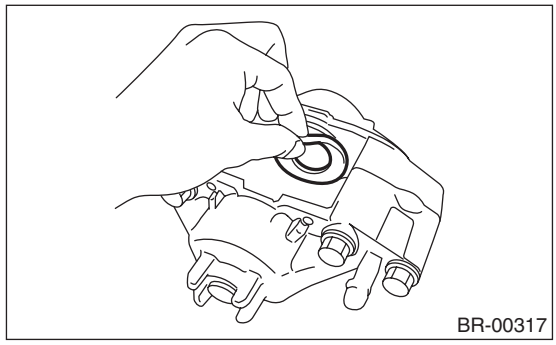
5) Remove the piston seal from caliper body cylinder.

CAUTION:
Do not damage the cylinder and piston seal groove.



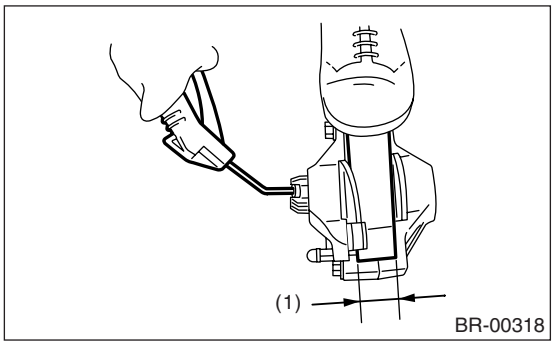
3. 17 INCH TYPE

1) Remove the piston boot from piston end.



2) Place a wooden block in caliper body as shown in the figure to prevent the piston from jumping out and avoid being damaged.

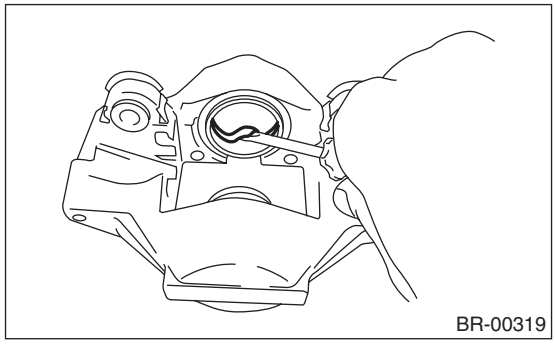
3) Gradually supply compressed air via the installation hole of brake hose to force the piston out.



(1) Place a 20 mm (0.79 in) wide wooden block here.

4) Remove the piston seal from caliper body cylinder.

CAUTION:
Do not damage the cylinder and piston seal groove.



D: ASSEMBLY

1. 14 INCH TYPE

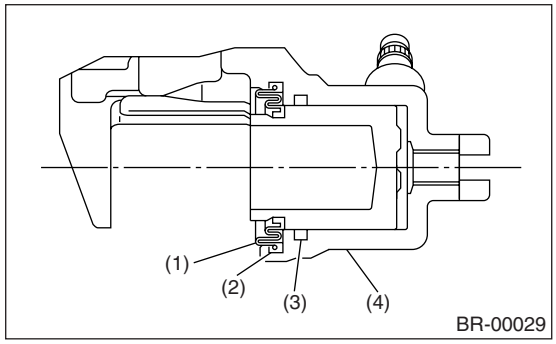
1) Clean the caliper body interior using brake fluid.
2) Apply a coat of brake fluid to the piston seal and fit piston seal in groove on caliper body.
3) Apply a coat of brake fluid to the entire inner surface of cylinder and outer surface of piston.
4) Insert the piston into cylinder.

CAUTION:
Do not force piston into cylinder.

5) Apply a coat of specified grease to the boot and fit in groove on ends of cylinder and piston.

Grease:
NIGLUBE RX-2 (Part No. K0779GA102)

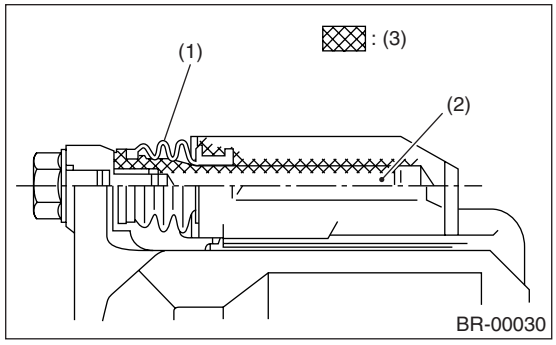
6) Install the piston boot to caliper body, and then attach boot ring.



(1) Piston boot
(2) Boot ring
(3) Piston seal
(4) Caliper body

7) Apply a coat of specified grease to the guide pin, outer surface, sleeve outer surface, cylinder inner surface, and boot grooves.

Grease:
NIGLUBE RX-2 (Part No. K0779GA102)



(1) Pin boot
(2) Lock pin or guide pin
(3) Apply grease.

8) Install the guide pin boot on support.
9) Install the lock pin boot on support, and then insert the lock pin sleeve into place.

2. 15 INCH TYPE

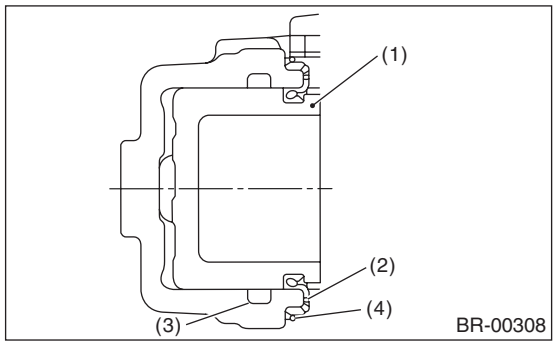
1) Clean the caliper body interior using brake fluid.
2) Apply a coat of brake fluid to the piston seal and fit piston seal in groove on caliper body.
3) Apply a coat of brake fluid to the entire inner surface of cylinder and outer surface of piston.
4) Apply a coat of specified grease to the boot and install it in the groove on piston.

Grease:
NIGLUBE RX-2 (Part No. K0779GA102)

5) Insert the piston into cylinder.

CAUTION:
Do not force piston into cylinder.

6) Install the piston boot to the caliper body, and then attach boot ring.



(1) Piston
(2) Piston boot
(3) Piston seal
(4) Boot ring

3. 17 INCH TYPE

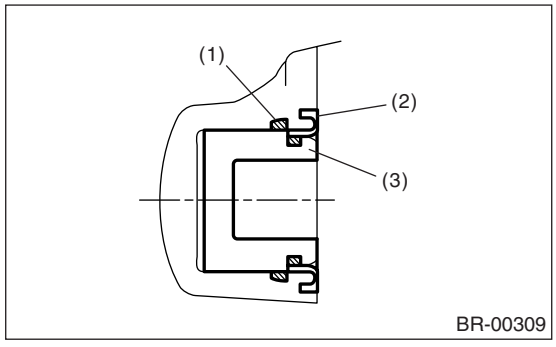
1) Clean the caliper body interior using brake fluid.
2) Apply a coat of brake fluid to the piston seal and install the piston seal in groove on caliper body.
3) Apply a coat of brake fluid to the entire inner surface of cylinder and outer surface of piston.
4) Apply a coat of specified grease to the boot and install it in the groove on piston.

Grease:
NIGLUBE RX-2 (Part No. K0779GA102)

5) Insert the piston into cylinder.

CAUTION:
Do not force the piston into cylinder.

6) Position the boot in grooves on cylinder and piston.



(1) Piston seal
(2) Piston boot
(3) Piston

E: INSPECTION

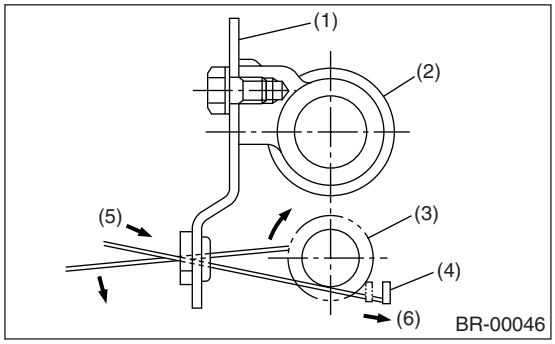
1) Repair or replace the faulty parts.
2) Check the caliper body and piston for uneven wear, damage or rust.
3) Check the rubber parts for damage or deterioration.

8. Rear Drum Brake Shoe

A: REMOVAL

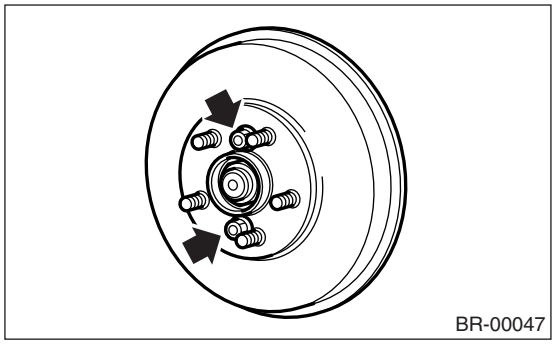
1) Set the vehicle on a lift.
2) Loosen the wheel nuts.
3) Lift-up the vehicle, and then remove the wheels.
4) Release the parking brake.
5) Remove the brake drum from brake assembly.

NOTE:
• If it is difficult to remove the brake drum, remove the adjusting hole cover from back plate, and then turn adjuster assembly pawls using a flat tip screwdriver until brake shoe separates from the drum.

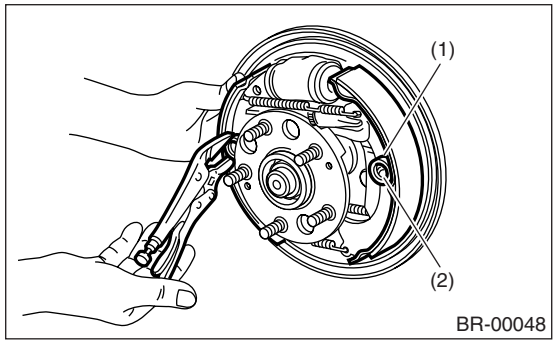


(1) Back plate
(2) Wheel cylinder
(3) Adjuster ASSY pawls
(4) Adjusting lever
(5) Tightening direction
(6) Push.

• If the brake drum is difficult to remove, drive it out by installing an 8-mm bolt into bolt hole in brake drum.

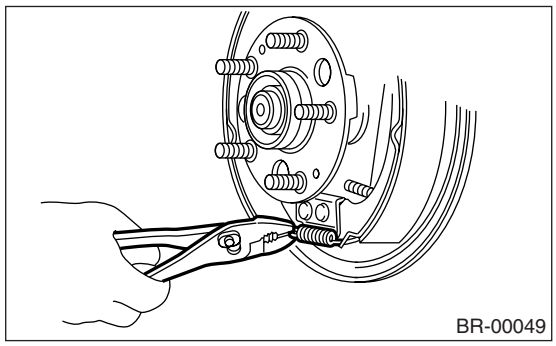


6) Hold the hold-down pin by securing rear of back plate with your hand.



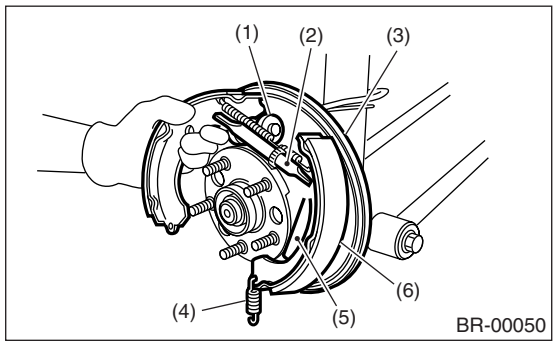
(1) Hold-down cup
(2) Hold-down pin

7) Disconnect the hold-down cup from hold-down pin by rotating hold-down cup.
8) Disconnect the lower shoe return spring from shoes.



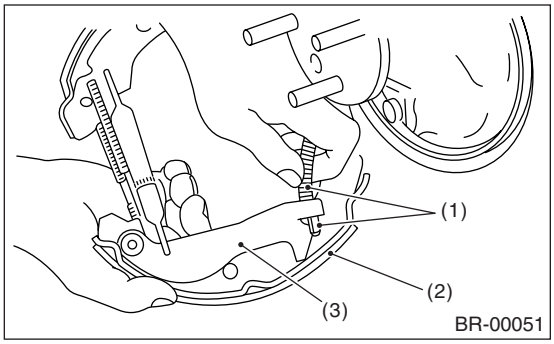
9) Remove the shoes one by one from back plate with adjuster.

CAUTION:
Be careful not to bend the parking brake cable excessively when removing brake shoes.



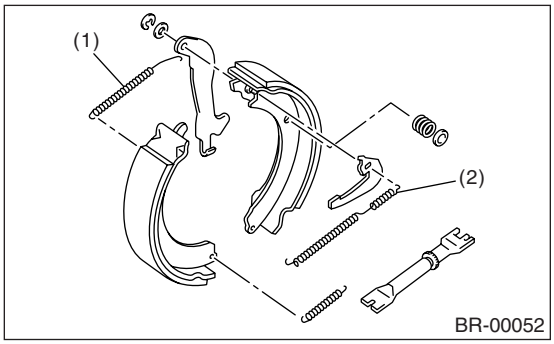
(1) Wheel cylinder
(2) Adjuster
(3) Back plate
(4) Lower shoe return spring
(5) Parking lever
(6) Trailing shoe

10) Disconnect the parking brake cable from parking lever.



(1) Parking brake cable
(2) Trailing shoe
(3) Parking brake lever

11) Remove the upper shoe return spring and adjusting spring from brake shoe.

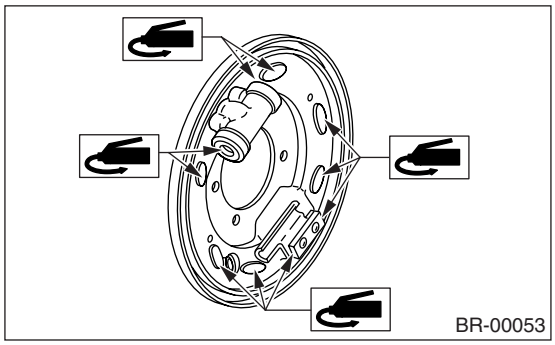


(1) Upper shoe return spring
(2) Adjusting spring

B: INSTALLATION

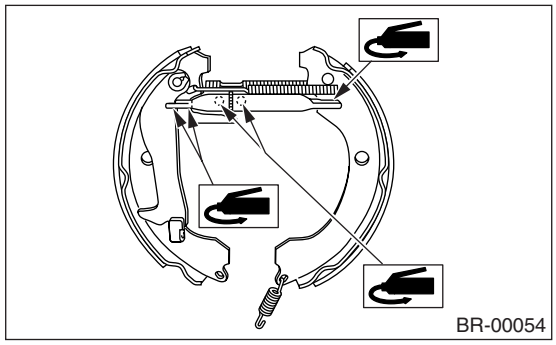
1) Clean the back plate and wheel cylinder.
2) Apply grease to portions indicated by arrows in the figure.

Brake grease:
Dow Corning Molykote No. 7439 (Part No. 003602001)

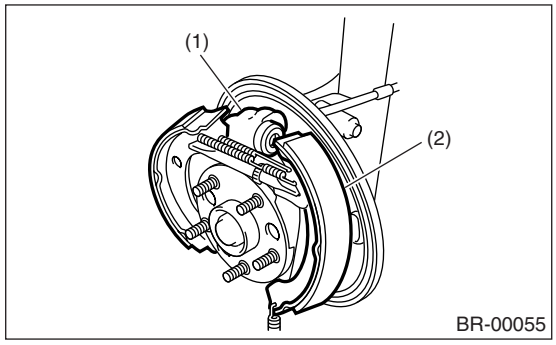


3) Apply grease to the adjusting screw and both ends of adjuster.

Brake grease:
Dow Corning Molykote No. 7439 (Part No. 003602001)



4) Connect the upper shoe return spring to shoes.
5) Connect the parking brake cable to parking lever.
6) While positioning the shoes (one at a time) in groove on wheel cylinder, secure the shoes.



(1) Wheel cylinder
(2) Shoe (Trailing)

7) Fix the shoes by connecting hold-down cup to hold-down pin.
8) Connect the lower shoe return spring.
9) Set the outside diameter of brake shoes less than 0.5 to 0.8 mm (0.020 to 0.031 in) in comparison with inside diameter of brake drum.

C: INSPECTION

1) Measure the lining thickness. If the thickness of lining is outside the service limit, replace the shoes.

Lining thickness:
Standard 4.1 mm (0.161 in)
Service limit 1.5 mm (0.059 in)

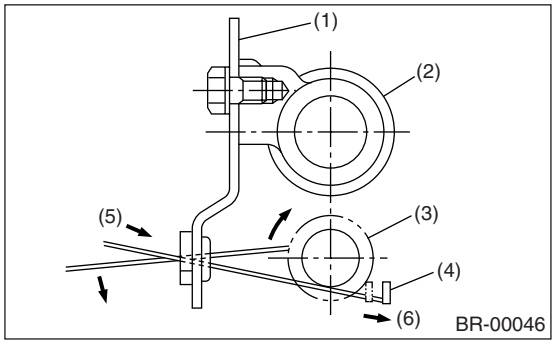
2) If the deformation or wear of back plate, shoe, etc. are notable, replace them.
3) When the shoe return spring tension is excessively weakened, replace it, taking care to identify the upper and lower springs.

9. Rear Drum Brake Drum

A: REMOVAL

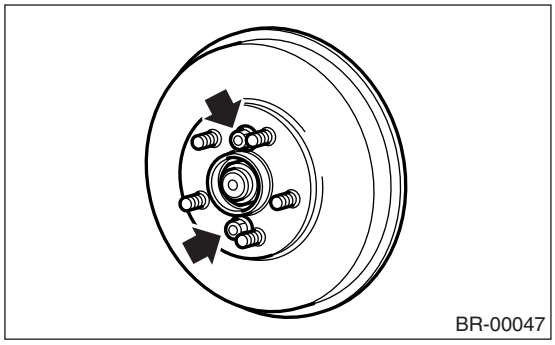
1) Set the vehicle on a lift.
2) Loosen the wheel nuts.
3) Lift-up the vehicle, and then remove the wheels.
4) Release the parking brake.
5) Remove the brake drum from brake assembly.

NOTE:
• If it is difficult to remove the brake drum, remove the adjusting hole cover from back plate, and then turn the adjuster assembly pawls using a flat tip screwdriver until brake shoe separates from drum.



(1) Back plate
(2) Wheel cylinder
(3) Adjuster ASSY pawls
(4) Adjusting lever
(5) Tightening direction
(6) Push.

• If the brake drum is difficult to remove, drive it out by installing an 8-mm bolt into bolt hole in the brake drum.



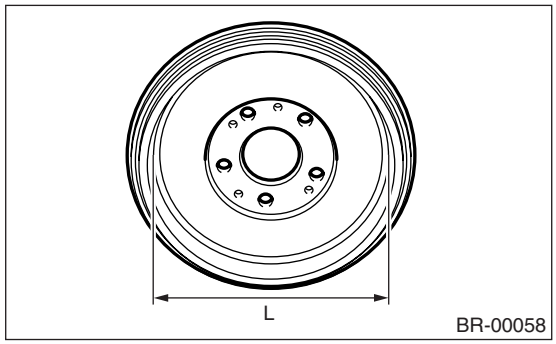
B: INSTALLATION

Set the outside diameter of brake shoes less than 0.5 to 0.8 mm (0.020 to 0.031 in) in comparison with inside diameter of brake drum.

C: INSPECTION

1) If the inside surface of brake drum is streaked, correct the surface. And, if it is unevenly worn, taperingly streaked, or the outside surface of brake drum is damaged, correct or replace it.
2) Measure the drum inner diameter. If the inner diameter of drum is outside the service limit, replace the drum.

Drum inner diameter L:
Standard 228.6 mm (9 in)
Service limit 230.6 mm (9.08 in)

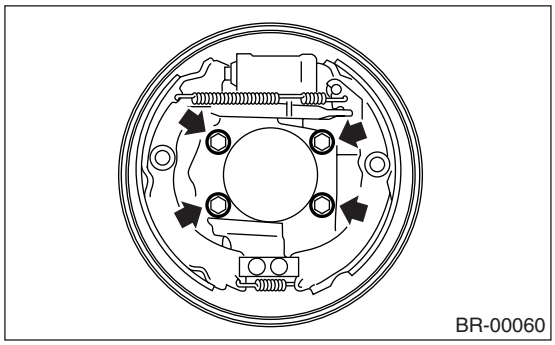


10.Rear Drum Brake Assembly

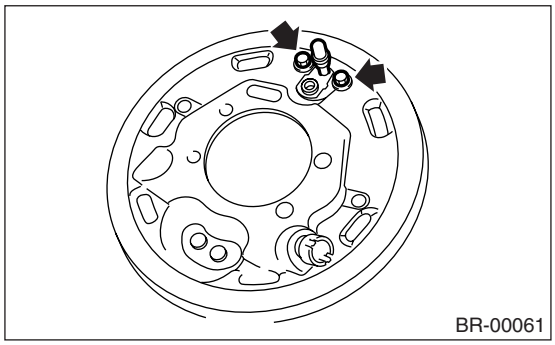
A: REMOVAL

CAUTION:
Do not allow brake fluid to come in contact with vehicle body; wash away with water and wipe off completely if spilled.

1) Set the vehicle on a lift.
2) Loosen the wheel nuts.
3) Lift-up the vehicle, and then remove the wheels.
4) Release the parking brake.
5) Remove the brake drum from brake assembly. <Ref. to BR-49, REMOVAL, Rear Drum Brake Drum.>
6) Remove the brake shoe. <Ref. to BR-47, REMOVAL, Rear Drum Brake Shoe.>
7) Disconnect the brake hose. <Ref. to BR-65, REAR BRAKE HOSE (DRUM BRAKE), REMOVAL, Brake Hose.>
8) Remove the hub. <Ref. to DS-28, REMOVAL, Rear Axle [AWD Model].> <Ref. to DS-37, REMOVAL, Rear Axle [FWD Model].>
9) Disconnect the ABS wheel speed sensor from back plate.
10) Remove the brake assembly.


BR-00060

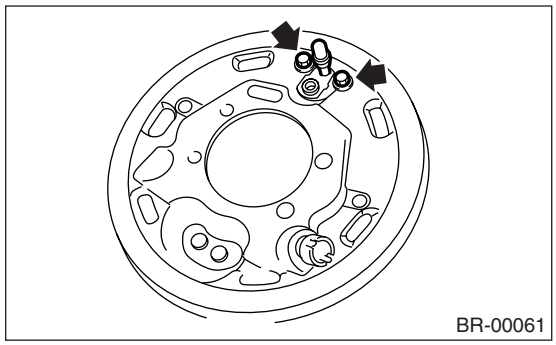
11) Remove the bolts installing wheel cylinder on back plate, and remove it.


BR-00061

B: INSTALLATION

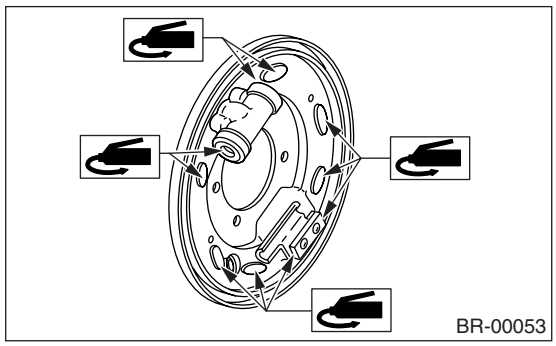
1) Clean the back plate and wheel cylinder.
2) Install the wheel cylinder on back plate, and tighten bolts.

Tightening torque:
10 N·m (1.0 kgf-m, 7.2 ft-lb)


BR-00061

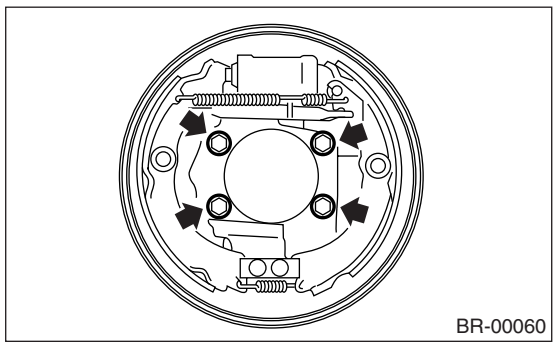
3) Apply grease to the portions indicated by arrows in the figure.

Brake grease:
Dow Corning Molykote No. 7439 (Part No. 003602001)


BR-00053

4) Install the brake assembly on housing, and tighten the bolts to install back plate.

Tightening torque:
53 N·m (5.4 kgf-m, 39.1 ft-lb)


BR-00060

5) Install the hub. <Ref. to DS-31, INSTALLATION, Rear Axle [AWD Model].> <Ref. to DS-37, INSTALLATION, Rear Axle [FWD Model].>

6) Connect the brake hose, and tighten the brake hose flange nut.

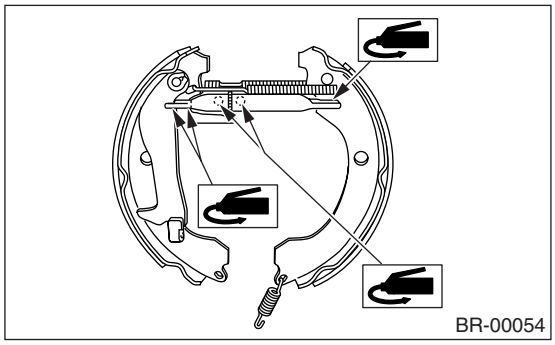
Tightening torque:
18 N·m (1.8 kgf-m, 13.3 ft-lb)

7) Connect the ABS wheel speed sensor to back plate.

Tightening torque:
32 N·m (3.3 kgf-m, 23.6 ft-lb)

8) Apply grease to the adjusting screw and both ends of adjuster.

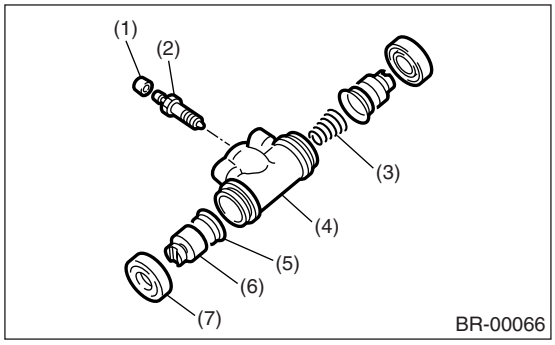
Brake grease:
Dow Corning Molykote No. 7439 (Part No. 003602001)



9) Install the brake shoe. <Ref. to BR-48, INSTALLATION, Rear Drum Brake Shoe.>
10) Install the brake drum. <Ref. to BR-49, INSTALLATION, Rear Drum Brake Drum.>
11) After installing the brake assembly, bleed air from the brake line. <Ref. to BR-63, Air Bleeding.>

C: DISASSEMBLY

1) Remove the right and left dust boots from wheel cylinder.



(1) Bleeder cap
(2) Bleeder screw
(3) Spring
(4) Cylinder
(5) Cup
(6) Piston
(7) Boot

2) Remove the piston, cup, spring and air bleeder screw and cap.

D: ASSEMBLY

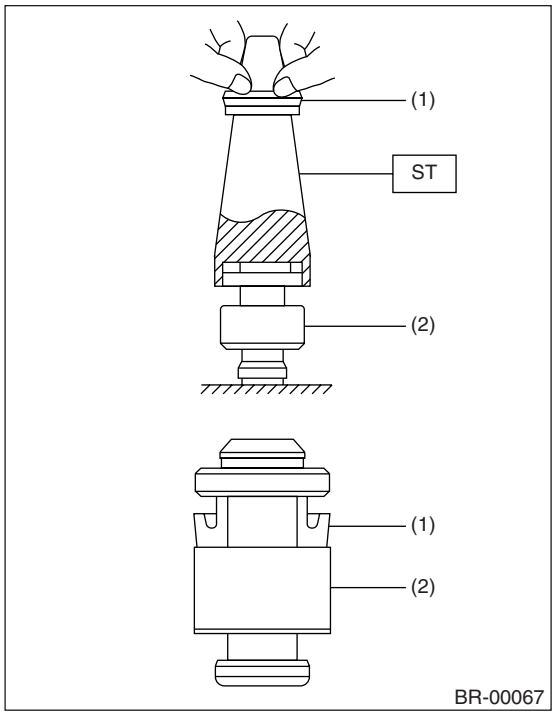
1) Clean all parts in brake fluid. Check and replace the faulty parts.
- Cup and boot for damage or fatigue
- Cylinder, piston and spring or damage or rust formation

2) Assemble in the reverse order of disassembly.
(1) When installing the cup, use ST, apply brake fluid to the frictional surface for smooth installation and pay attention to cup direction.
(2) STs are available in different sizes.

CAUTION:
When replacing the repair kit, make sure that the sizes of cylinder and cup are same as those which were replaced.

ST: ADAPTER	
Applicable size	Part No.
11/16″	925460000

CAUTION:
While assembling, be careful to prevent any metal chip, dust or dirt from entering the wheel cylinder.

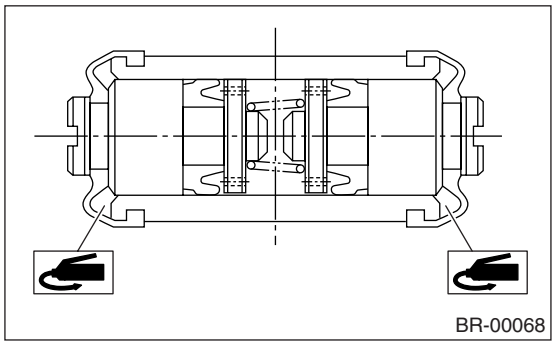


(1) Cup
(2) Piston

3) Apply rubber grease to the boot inside as shown in the figure.

CAUTION:
Never use brake grease.

Grease:
NIGLUBE RX-2 (Part No. K0779GA102)



E: INSPECTION

If the deformation or wear of back plate, shoe, etc. are notable, replace them.

11.Master Cylinder

A: REMOVAL

CAUTION:
Do not allow brake fluid to come in contact with vehicle body; wash away with water and wipe off completely if spilled.

1) Thoroughly drain brake fluid from reservoir tank.
2) Disconnect the fluid level indicator harness connector.
3) Remove the brake pipes from master cylinder.
4) Remove the master cylinder mounting nuts, and take out master cylinder from brake booster.

B: INSTALLATION

1) To install the master cylinder to body, reverse the sequence of removal procedure.

Tightening torque:
Master cylinder mounting nut
14 N·m (1.4 kgf-m, 10.3 ft-lb)
Piping flare nut
15 N·m (1.5 kgf-m, 11.1 ft-lb)

CAUTION:
Be sure to use recommended brake fluid.

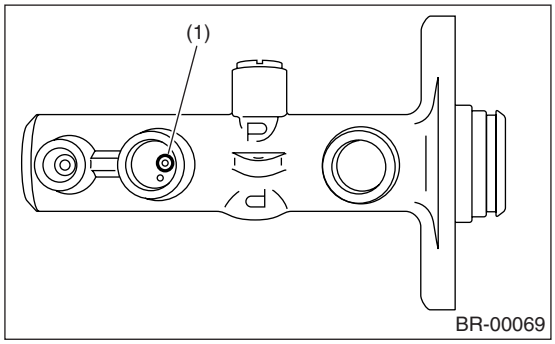
2) Bleed air from the brake system. <Ref. to BR-63, PROCEDURE, Air Bleeding.>

C: DISASSEMBLY

1) Remove mud and dirt from the surface of brake master cylinder.
2) Secure the master cylinder on a vise.

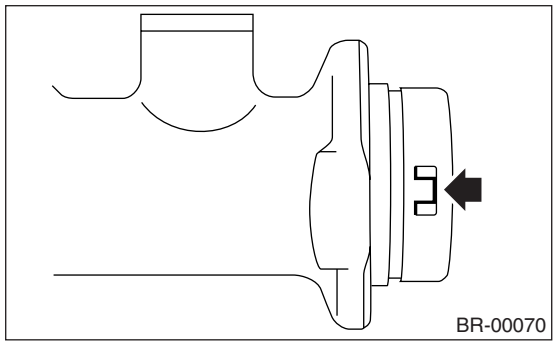
NOTE:
To avoid damaging master cylinder use aluminum plate while holding with vise.

3) Remove the pin which secures reservoir tank to master cylinder, and then remove the reservoir tank and seal.
4) Remove the cylinder pin with magnetic pick-up tool while pushing in primary piston by screwdriver which wrapped with tape. (Model with ABS)



(1) Cylinder pin (straight pin)

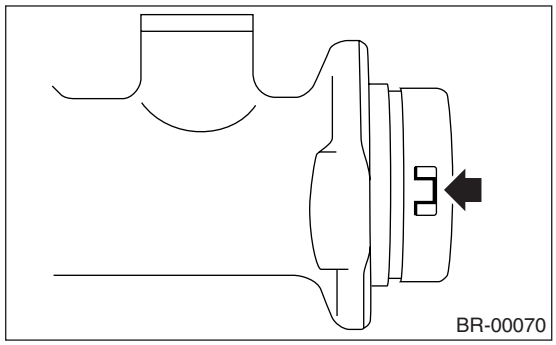
5) Pry up the pawl, and then remove the piston retainer. Hold piston retainer tight, because the piston may jump out from master cylinder.



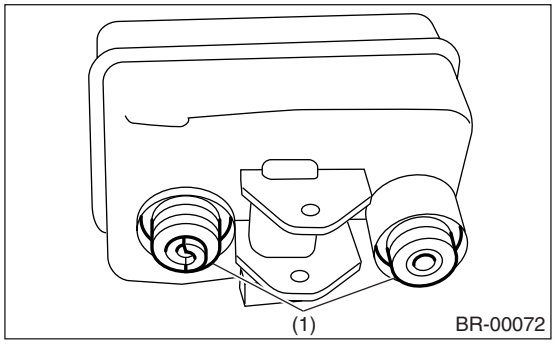
6) Extract the primary piston assembly and secondary piston assembly straight out, while taking care not to scratch the inner surface of cylinder.
7) Clean the inside of master cylinder with brake fluid. Check the inside of cylinder for damage, deform and wear. Replace the master cylinder as assembly if faulty.

D: ASSEMBLY

1) Apply recommended brake fluid to the inside wall of cylinder, and to outer surface of the piston assembly.
2) Ensure that the inside wall of cylinder, and piston assembly are free from dirt when assembling. Install the primary piston assembly and secondary piston assembly, while taking care not to damage, scratch, or dent the cylinder inside wall, and piston assembly.
3) Install the cylinder pin while pushing in primary piston by screwdriver which wrapped with tape. (Model with ABS)
4) Install the piston retainer, and then secure it by pressing the pawl.



5) Install the seal to reservoir tank.



(1) Seal

6) Install the reservoir tank to master cylinder and secure with pin.

E: INSPECTION

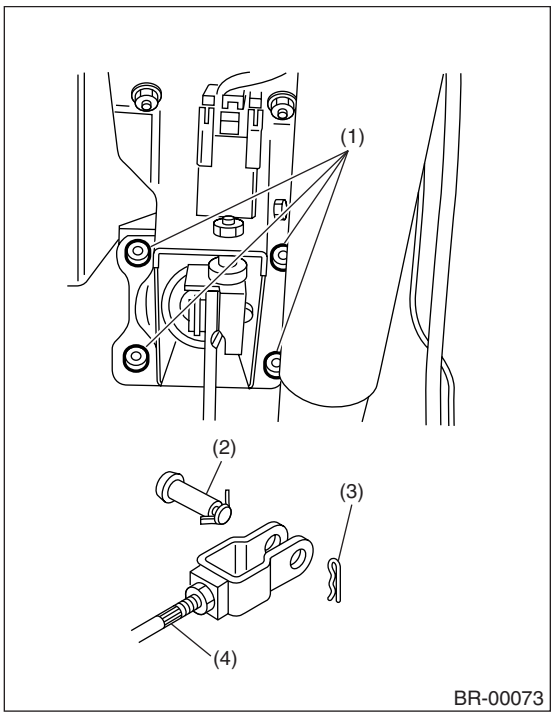
Inspect for oil leakage from the master cylinder.

NOTE:
After replacing piston kit; when the oil leakage is found without damaging or scratching the inside of cylinder wear of master cylinder inner wall may be the cause. In this case, replace the master cylinder as assembly.

12.Brake Booster

A: REMOVAL

1) Remove or disconnect the following parts at engine compartment.
   (1) Disconnect the connector for brake fluid level indicator.
   (2) Remove the brake pipes from master cylinder.
   (3) Remove the master cylinder installing nuts.
   (4) Disconnect the vacuum hose from brake booster.
2) Remove the following parts from pedal bracket.
   (1) Snap pin and clevis pin
   (2) Four brake booster installing nuts



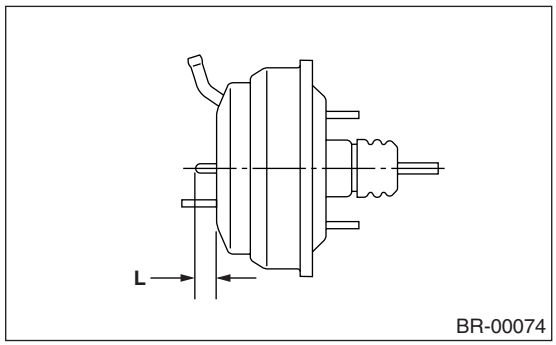
(1) Nuts
(2) Clevis pin
(3) Snap pin
(4) Operating rod

CAUTION:
The clevis pin must be replaced with a new one whenever it is removed.

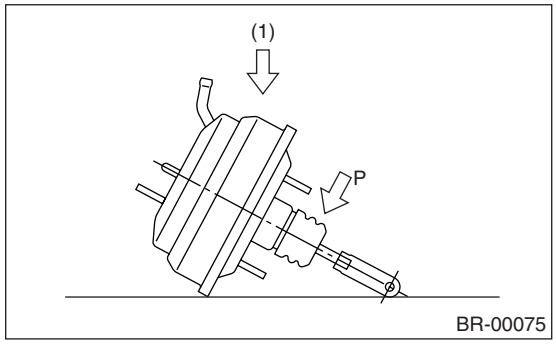
3) Remove the brake booster while shunning brake pipes.

NOTE:
• Be careful not to drop the brake booster. The brake booster should be discarded if it has been dropped.
• Use special care when handling the operating rod.
If excessive force is applied to the operating rod, sufficient to cause a change in the angle in excess of ±3°, it may result in damage to the power piston cylinder.
• Use care when placing the brake booster on floor.
• Do not change the push rod length. If it has been changed, reset the projected length “L” to standard length.

Standard L:
Europe model BASE and TS model:
10.4 mm (0.409 in)
Except Europe model BASE and TS model:
10.05 mm (0.396 in)



CAUTION:
If external force is applied from above when the brake booster is placed in this position, the resin portion as indicated by “P”, may be damaged.



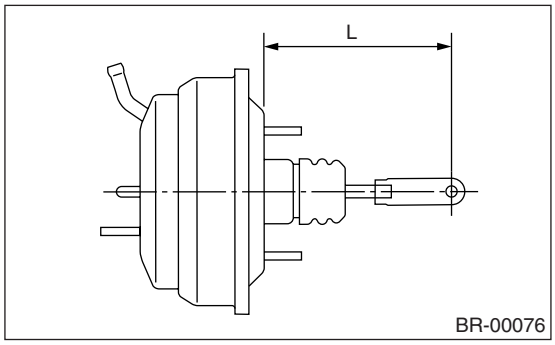
(1) Force

B: INSTALLATION

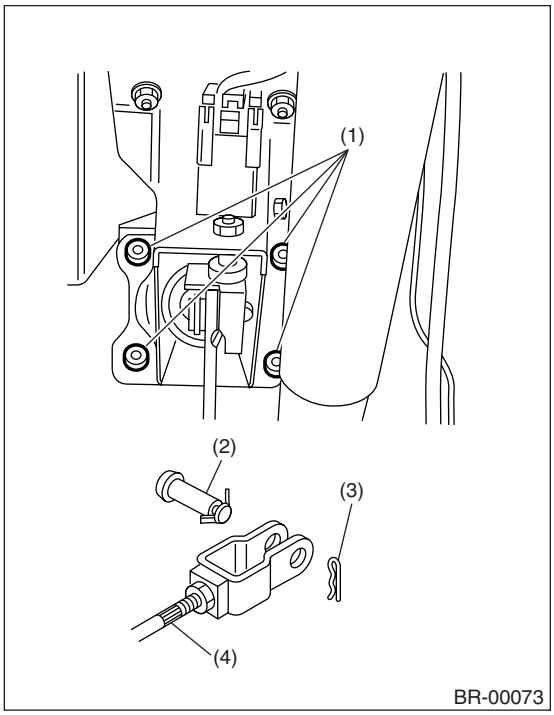
1) Adjust the operating rod of brake booster.

Standard L:
LHD model: 144.6 mm (5.69 in)
RHD model: 173.2 mm (6.82 in)

If it is not within specified value, adjust it by adjusting the brake booster operating rod.

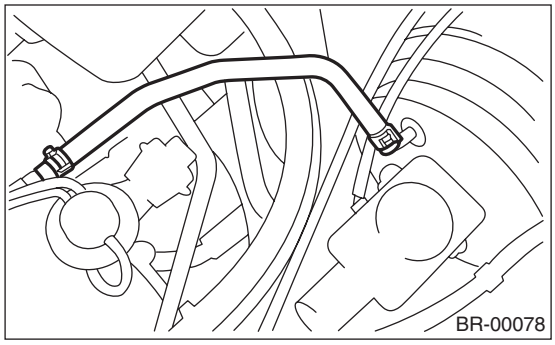


2) Mount the brake booster in position.
3) Connect the operating rod to brake pedal with new clevis pin and snap pin.



(1) Nuts
(2) Clevis pin
(3) Snap pin
(4) Operating rod

4) Connect the vacuum hose to brake booster.



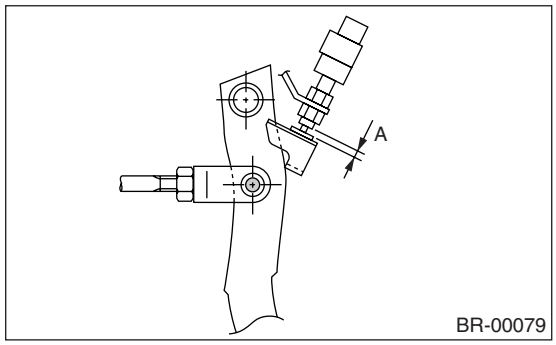
5) Mount the master cylinder onto brake booster.
6) Connect the brake pipes to master cylinder.

Tightening torque:
15 N·m (1.5 kgf-m, 11.1 ft-lb)

7) Connect the electric connector for brake fluid level indicator.
8) Measure the clearance between threaded end of stop light switch and stopper. If it is not within specified value, adjust it by adjusting the position of stop light switch. <Ref. to BR-74, ADJUSTMENT, Stop Light Switch.>
If it is not within specified value, adjust it by adjusting the position of stop light switch.

CAUTION:
Be careful not to rotate the stop light switch.

Stop light switch clearance A:
0.3 mm (0.012 in)



9) Apply grease to operating rod connecting pin to prevent it from wearing.
10) Bleed air from the brake system.

Tightening torque (Air bleeder screw):
Except 17 inch type:
8 N·m (0.8 kgf-m, 5.8 ft-lb)
17 inch type:
20 N·m (2.0 kgf-m, 14.5 ft-lb)

11) Conduct road tests to ensure brakes do not drag.

C: INSPECTION

1. OPERATION CHECK (WITHOUT GAUGES)

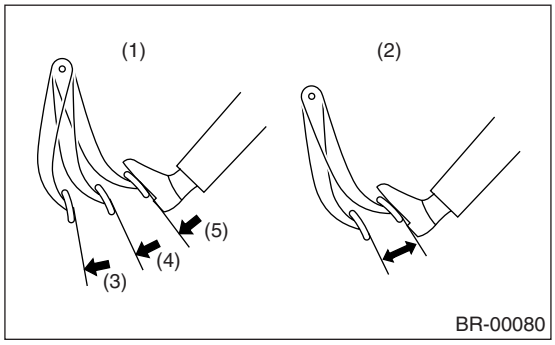
CAUTION:
When checking operation, be sure to securely apply the parking brake.

• Checking without gauges

This method cannot determine the exact portion which has failed, but it can provide a rough understanding of the nature of failure if checking is conducted in accordance with the following procedures.

• Air tightness check

Start the engine, and run it for 1 to 2 minutes, then turn it off. Depress the brake pedal several times applying same pedal force as that used in ordinary braking operations. The pedal stroke should be greatest on 1st depression, and it should become smaller with each successive depression. If no change occurs in the pedal height while in a depressed state, the brake booster is faulty.

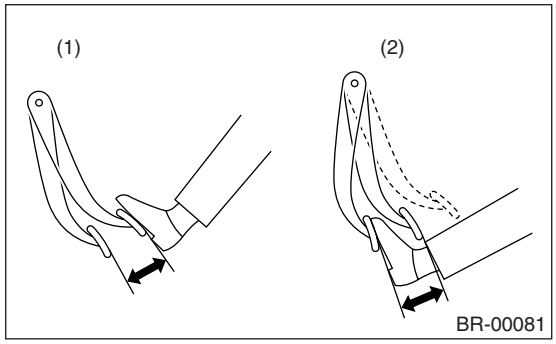


(1) OK
(2) NOT OK
(3) 1st
(4) 2nd
(5) 3rd

NOTE:
• In the event of defective operation, inspect the condition of check valve and vacuum hose.
• Replace them if faulty and conduct the test again.
• If no improvement is observed, check precisely with gauges.

• Operation check

1) With the engine off, depress the brake pedal several times applying same pedal force and make sure that pedal height does not vary with each depression of pedal.



(1) When engine is stopped
(2) When engine is started

2) With the brake pedal depressed, start the engine.
3) As the engine starts, the brake pedal should move slightly toward the floor. If no change occurs in the pedal height, the brake booster is faulty.

NOTE:
If faulty, check precisely with gauges.

• Loaded air tightness check

Depress the brake pedal while engine is running, and turn off the engine while pedal is still depressed. Keep the pedal depressed for 30 seconds; if no change occurs in the pedal height, the brake booster is functioning normally; if the pedal height increases, it is faulty.

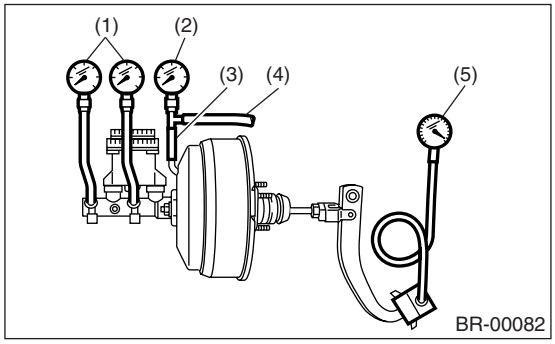
NOTE:
If faulty, check precisely with gauges.

2. OPERATION CHECK (WITH GAUGES)

CAUTION:
When checking operation, be sure to securely apply the parking brake.

• Checking with gauges

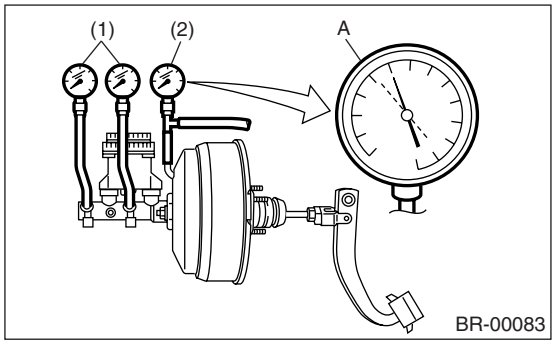
Connect gauges as shown in the figure. After bleeding air from pressure gauges, proceed to each check.



(1) Pressure gauge
(2) Vacuum gauge
(3) Adapter hose
(4) Vacuum hose
(5) Pedal force gauge

• Air tightness check

1) Start the engine and keep it running until a vacuum of 66.7 kPa (500 mmHg, 19.69 inHg) = point A is indicated on vacuum gauge. Do not depress the brake pedal.



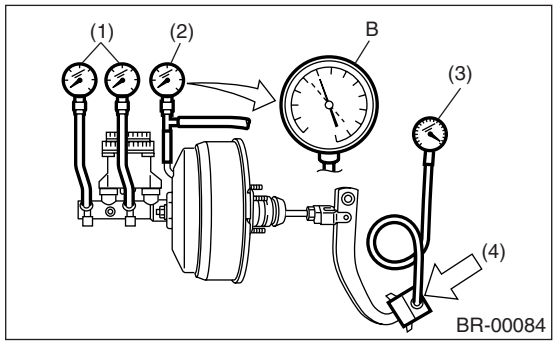
(1) Pressure gauge
(2) Vacuum gauge

2) Stop the engine and watch the gauge. If the vacuum drop range is less than 3.3 kPa (25 mmHg, 0.98 inHg) within 15 seconds after stopping engine, the brake booster is functioning properly.
If defective, the cause may be one of those listed below.

- Check valve malfunction
- Leak from vacuum hose
- Leak from the shell jointed portion or stud bolt welded portion
- Damaged diaphragm
- Leak from valve body seal and bearing portion
- Leak from plate and seal assembly portion
- Leak from poppet valve assembly portion

• Loaded air tightness check

1) Start the engine and depress brake pedal with pedal force of 196 N (20 kgf, 44 lbf). Keep the engine running until a vacuum of 66.7 kPa (500 mmHg, 19.69 inHg) = point B is indicated on vacuum gauge while the pedal is still depressed.



(1) Pressure gauge
(2) Vacuum gauge
(3) Pedal force gauge
(4) Depress

2) Stop the engine and watch vacuum gauge.
If the vacuum drop range is less than 3.3 kPa (25 mmHg, 0.98 inHg) within 15 seconds after stopping engine, the brake booster is functioning properly.
If defective, refer to “AIR TIGHTNESS CHECK”.
<Ref. to BR-57, INSPECTION, Brake Booster.>
3) If any fault is found on brake booster, replace the brake booster with a new one.

• Lack of boosting action check

Turn off the engine, and set the vacuum gauge reading at “0”. Then, check the fluid pressure when brake pedal is depressed. The pressure must be greater than the standard value listed.

Brake pedal force		147 N (15 kgf, 33 lbf)	294 N (30 kgf, 66 lbf)
Fluid pressure	14″	686 kPa (7 kgf/cm^2, 100 psi) [588 kPa (6 kgf/cm^2, 85 psi)]	1,961 kPa (20 kgf/cm^2, 284 psi) [1,667 kPa (17 kgf/cm^2, 242 psi)]
	15″	588 kPa (6 kgf/cm^2, 85 psi)	1,471 kPa (15 kgf/cm^2, 213 psi)
	16″		
	17″		

[ ] : Model with ABS

• Boosting action check

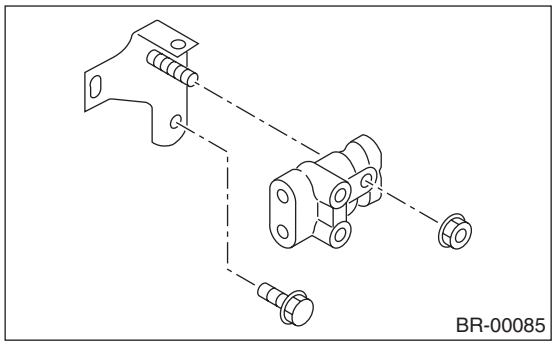
Set the vacuum gauge reading at 66.7 kPa (500 mmHg, 19.69 inHg) by running engine. Then, check the fluid pressure when brake pedal is depressed. The pressure must be greater than the standard value listed.

Brake pedal force		147 N (15 kgf, 33 lbf)	294 N (30 kgf, 66 lbf)
Fluid pressure	14″	5,786 kPa (59 kgf/cm^2, 839 psi)	7,649 kPa (78 kgf/cm^2, 1,109 psi) [8,434 kPa (86 kgf/cm^2, 1,223 psi)]
	15″	5,296 kPa (54 kgf/cm^2, 768 psi)	9,120 kPa (93 kgf/cm^2, 1,323 psi)
	16″	4,707 kPa (48 kgf/cm^2, 683 psi)	
	17″	4,021 kPa (41 kgf/cm^2, 583 psi)	8,336 kPa (85 kgf/cm^2, 1,209 psi)

[ ] : Model with ABS

13.Proportioning Valve

A: REMOVAL



1) Remove the brake pipe from proportioning valve at four places.
2) Remove the proportioning valve from its bracket.

NOTE:
Do not disassemble or adjust the proportioning valve. (The proportioning valve must be replaced as an assembly.)

B: INSTALLATION

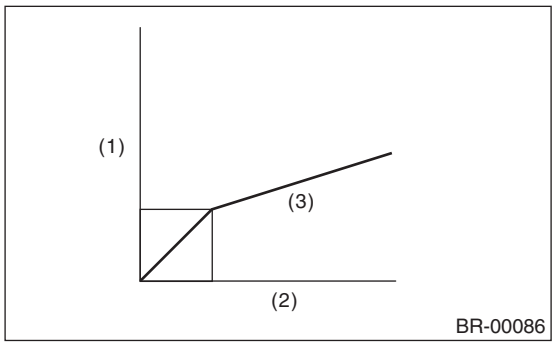
1) Install the proportioning valve to bracket.
2) Connect the brake pipes correctly to proportioning valve.

Tightening torque:
Proportioning valve to brake pipe flare nut:
15 N·m (1.5 kgf-m, 11.1 ft-lb)
Proportioning valve to bracket
18 N·m (1.8 kgf-m, 13.3 ft-lb)

3) Bleed air, and then check each joint of the brake pipe for oil leaks. <Ref. to BR-63, Air Bleeding.>

C: INSPECTION

1) Install the oil pressure gauges to measure the master cylinder fluid pressure (front wheel brake fluid pressure) and rear wheel cylinder fluid pressure.
2) Bleed air from the oil pressure gauges.
3) Check the master cylinder fluid pressure and rear wheel cylinder fluid pressure.
The standard values are shown in the figure.



(1) Rear wheel cylinder fluid pressure: P_3
(2) Master cylinder fluid pressure: P_2
(3) When both circuits are normal

4) For the oil pressure in case of split point, refer to “SPECIFICATIONS”.
<Ref. to BR-2, SPECIFICATION, General Description.>

14.Brake Fluid

A: INSPECTION

1) Check that the brake fluid level remains between “MIN” and “MAX”. If out of the specified range, refill or drain fluid. If the fluid level becomes close to “MIN”, refill the fluid.
2) Check the fluid for discoloration. If the fluid color has excessively changed, drain the fluid and refill with new fluid.

B: REPLACEMENT

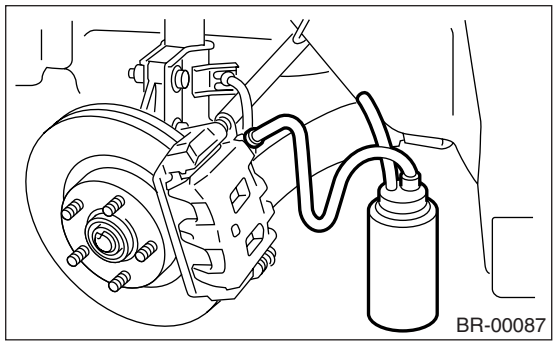
CAUTION:
• To always maintain the brake fluid characteristics, replace the brake fluid according to maintenance schedule or earlier than that when used in severe condition.
• The FMVSS No. 116, fresh DOT3 brake fluid must be used.
• Cover the bleeder with waste cloth, when loosening it, to prevent brake fluid from being splashed over surrounding parts.
• Do not allow brake fluid to come in contact with vehicle body; wash away with water and wipe off completely if spilled.
• Avoid mixing different brands of brake fluid to prevent degrading the quality of fluid.
• Be careful not to allow dirt or dust to get into the reservoir tank.
• When bleeding air of 16 and 17 inch model, flush with brake cleaner or water after air bleeding as soon as possible because brake fluid leaks through the threads of air bleeder screw, and then painted area of caliper body may be washed away. Also wipe out brake fluid in air bleeder screw with cloth.

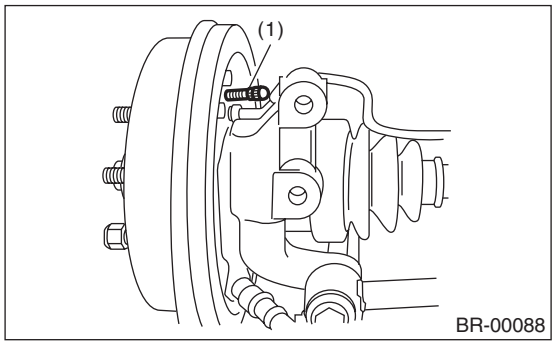
NOTE:
• During bleeding operation, keep the brake reservoir tank filled with brake fluid to eliminate entry of air.
• The brake pedal operating must be very slow.
• For convenience and safety, two people should do the work.
• The amount of brake fluid required is approx. 500 m ℓ (16.9 US fl oz, 17.6 Imp fl oz) for total brake system.

1) Either lift-up the vehicle and place a rigid rack under it, or lift-up vehicle.
2) Remove both front and rear wheels.
3) Draw out the brake fluid from master cylinder with syringe.
4) Refill the reservoir tank with recommended brake fluid.

Recommended brake fluid:
FMVSS No. 116, fresh DOT3 brake fluid

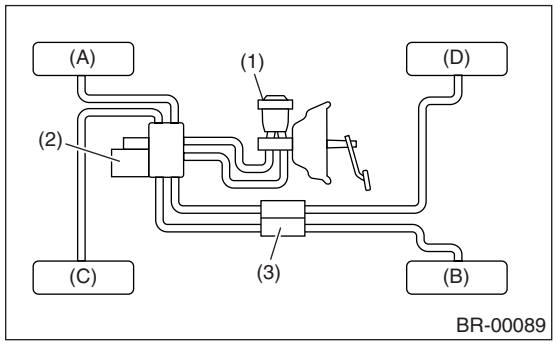
5) Install one end of a vinyl tube onto the air bleeder and insert the other end of the tube into a container to collect the brake fluid.





(1) Air bleeder screw

NOTE:
Brake fluid replacement sequence; (A) Front right → (B) Rear left → (C) Front left → (D) Rear right

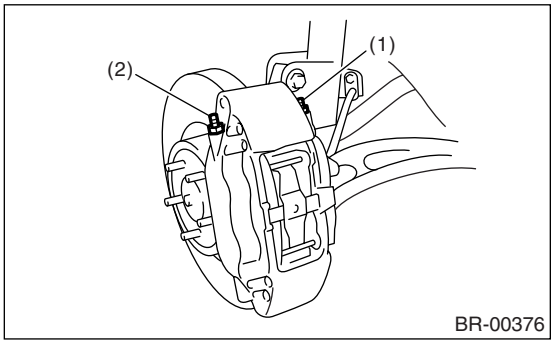


(1) Master cylinder
(2) Hydraulic unit
(3) Proportioning valve

6) Instruct your co-worker to depress the brake pedal slowly two or three times and then hold it depressed.
7) Loosen the bleeder screw approx. 1/4 turn until a small amount of brake fluid drains into container, and then quickly tighten the screw.

8) Release the brake pedal slowly. Repeat steps 6) through 8) until there are no air bubbles in the drained brake fluid and new fluid flows through vinyl tube.

NOTE:
• Add brake fluid as necessary while performing air bleed operation, in order to prevent the tank from running short of brake fluid.
• If caliper has two air bleeder screws, bleed air from inner first, then outer.



(1) Inner air bleeder screw
(2) Outer air bleeder screw

9) After completing the bleeding operation, hold brake pedal depressed and tighten screw and install bleeder cap.

Tightening torque (Bleeder screw):
Except 17 inch type:
8 N·m (0.8 kgf-m, 5.8 ft-lb)
17 inch type:
20 N·m (2.0 kgf-m, 14.5 ft-lb)

10) Bleed air from each wheel cylinder using the same procedures as described in steps 6) through 8) above.
11) Depress the brake pedal with a force of approx. 294 N (30 kgf, 66 lbf) and hold it there for approx. 20 seconds. At this time check for mix in air and pedal height change. Visually inspect the bleeder screws and brake pipe joints to make sure that there is no fluid leakage.
12) Install the wheels, and drive the vehicle for a short distance between 2 to 3 km (1 to 2 miles) to make sure that brakes are operating properly.

15.Air Bleeding

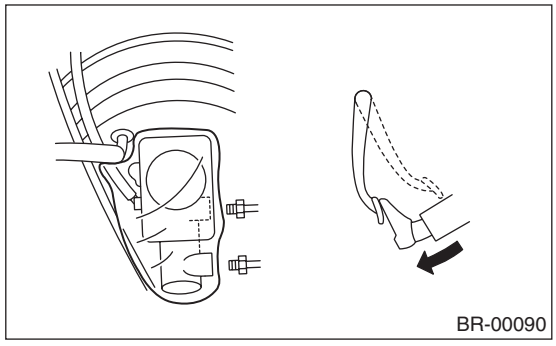
A: PROCEDURE

CAUTION:
• The FMVSS No. 116, fresh DOT3 brake fluid must be used.
• Cover the bleeder with waste cloth when loosening it to prevent brake fluid from being splashed over surrounding parts.
• Do not allow brake fluid to come in contact with vehicle body; wash away with water and wipe off completely if spilled.
• Avoid mixing different brands of brake fluid to prevent degrading the quality of the fluid.
• Be careful not to allow dirt or dust to get into the reservoir tank.
• When bleeding air of 16 and 17 inch model, flush with brake cleaner or water after air bleeding as soon as possible because brake fluid leaks through the threads of air bleeder screw, and then painted area of caliper body may be washed away. Also wipe out brake fluid in air bleeder screw with cloth.

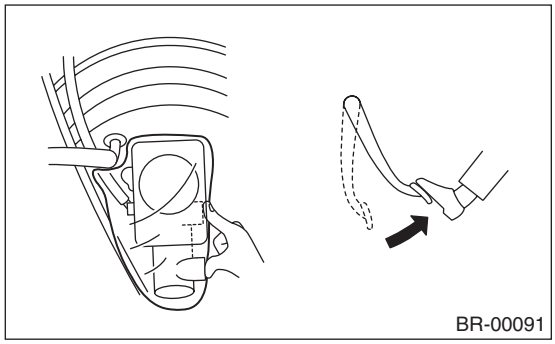
1. MASTER CYLINDER

NOTE:
• If the master cylinder is disassembled or reservoir tank is empty, bleed the master cylinder.
• During the bleeding operation, keep the brake reservoir tank filled with brake fluid to eliminate entry of air.
• The brake pedal operating must be very slow.
• For convenience and safety, two people should do the work.

1) Loosen the wheel nuts, jack-up the vehicle, support it with rigid racks, and remove the wheel.
2) Disconnect the brake line at primary and secondary sides.
3) Put a plastic bag cover on master cylinder.
4) Carefully depress and hold the brake pedal.


BR-00090

5) Close the outlet plug with your finger, and then release the brake pedal.


BR-00091

6) Repeat step4) and 5) until the brake fluid is completely bled from outlet plug.
7) Remove the plastic bag.
8) Install the brake pipes to master cylinder.

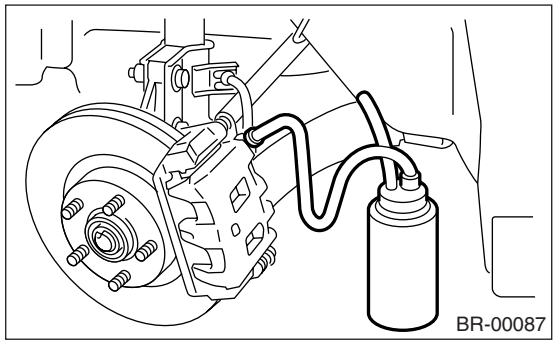
Tightening torque:
15 N·m (1.5 kgf-m, 11.1 ft-lb)

9) Bleed air from the brake line. <Ref. to BR-63, BRAKE LINE, PROCEDURE, Air Bleeding.>

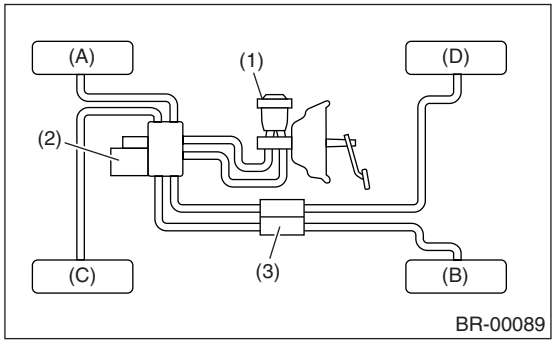
2. BRAKE LINE

NOTE:
• During the bleeding operation, keep the brake reservoir tank filled with brake fluid to eliminate entry of air.
• The brake pedal operating must be very slow.
• For convenience and safety, two people should do the work.

1) Make sure that there is no leak from the joints and connections of brake system.
2) Fit one end of vinyl tube into the air bleeder and put the other end into a brake fluid container.


BR-00087

NOTE:
Brake fluid replacement sequence; (A) Front right → (B) Rear left → (C) Front left → (D) Rear right

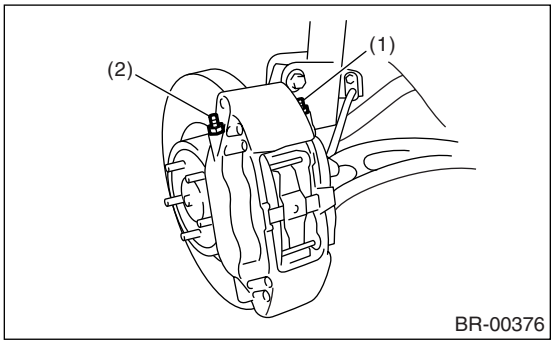


(1) Master cylinder
(2) Hydraulic unit
(3) Proportioning valve

3) Slowly depress the brake pedal and keep it depressed. Then, open the air bleeder to discharge air together with the fluid.
Release the air bleeder for 1 to 2 seconds.
Next, with the bleeder closed, slowly release the brake pedal.
Repeat these steps until there are no more air bubbles in the vinyl tube.
Allow 3 to 4 seconds between two brake pedal operations.

CAUTION:
Cover the bleeder with waste cloth, when loosening it, to prevent brake fluid from being splashed over surrounding parts.

NOTE:
If caliper has two air bleeder screws, bleed air from inner first, then outer.

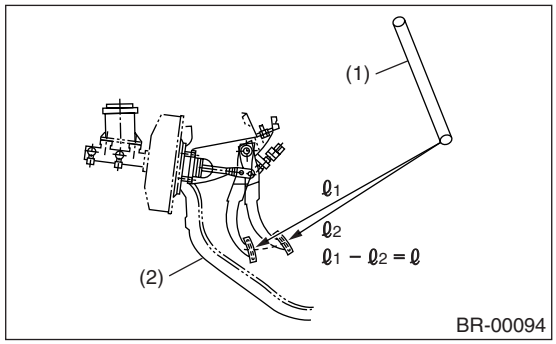


(1) Inner air bleeder screw
(2) Outer air bleeder screw

4) Tighten the air bleeder securely when no air bubbles are visible.

Air bleeder tightening torque:
Except 17 inch type:
8 N·m (0.8 kgf-m, 5.8 ft-lb)
17 inch type:
20 N·m (2.0 kgf-m, 14.5 ft-lb)

5) Fully depress the brake pedal and keep it in that position for approx. 20 seconds to make sure that there is no leak evident in the entire system.
6) Check the pedal stroke.
While the engine is idling, depress the brake pedal with a 490 N (50 kgf, 110 lbf) load and measure the distance between brake pedal and steering wheel. With the brake pedal released, measure the distance between pedal and steering wheel again. The difference between the two measurements must not be more than specified.



(1) Steering wheel
(2) Toe board

Specified pedal stroke
90 mm (3.54 in)
When depressing brake pedal with a 490 N (50 kgf, 110 lbf) load.

7) If the distance is more than the specifications, there is a possibility that air is in the brake line. Bleed the brake line until pedal stroke meets the specification.
8) Operate the hydraulic control unit in the sequence control mode. <Ref. to ABS-14, ABS Sequence Control.>
9) Recheck the pedal stroke.
10) If the distance is more than specifications, there is a possibility air is in the inside of hydraulic unit. Repeat above steps 2) to 9) above until pedal stroke meets the specification.
11) Add brake fluid to the required level (MAX. level) of reservoir tank.
12) As a final step, test run the vehicle at low speed and apply brakes relatively hard 2 to 3 times to ensure that brakes provide normal braking action on all four wheels without dragging and uneven braking.

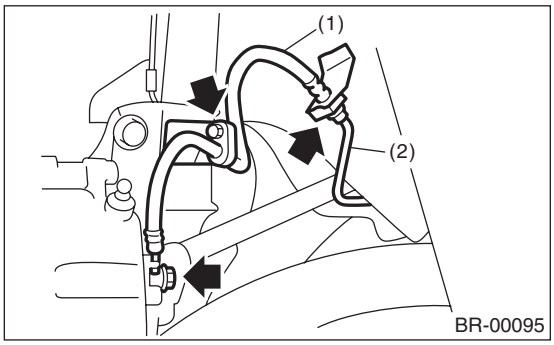
16.Brake Hose

A: REMOVAL

1. FRONT BRAKE HOSE

CAUTION:
Do not allow brake fluid to come in contact with vehicle body; wash away with water and wipe off completely if spilled.

1) Separate the brake pipe from brake hose.
(Always use the flare nut wrench and be careful not to deform the flare nut.)
2) Pull out the clamp to remove brake hose.
3) Remove the bolt at strut and union bolt.



(1) Brake hose
(2) Brake pipe

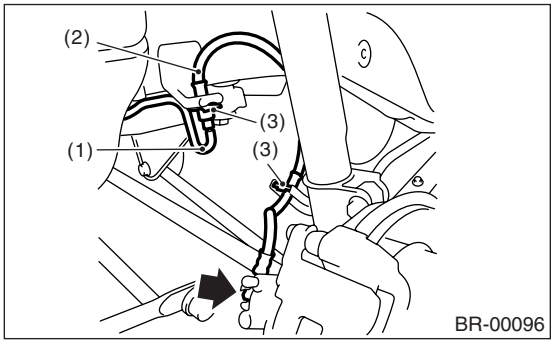
2. REAR BRAKE HOSE (DISC BRAKE)

CAUTION:
Do not allow brake fluid to come in contact with vehicle body; wash away with water and wipe off completely if spilled.

1) Separate the brake pipe from brake hose.

NOTE:
Always use the flare nut wrench and be careful not to deform the flare nut.

2) Remove the clamp and union bolt.

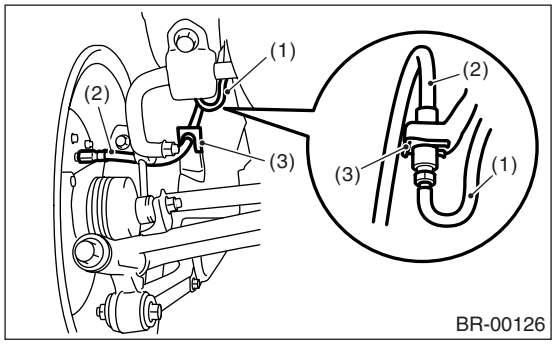


(1) Brake pipe
(2) Brake hose
(3) Brake hose clamp

3. REAR BRAKE HOSE (DRUM BRAKE)

CAUTION:
Do not allow brake fluid to come in contact with vehicle body; wash away with water and wipe off completely if spilled.

1) Separate the brake pipe from brake hose using a flare nut wrench.
2) Remove two clamps.
3) Separate the brake hose from wheel cylinder.



(1) Brake pipe
(2) Brake hose
(3) Brake hose clamp

B: INSTALLATION

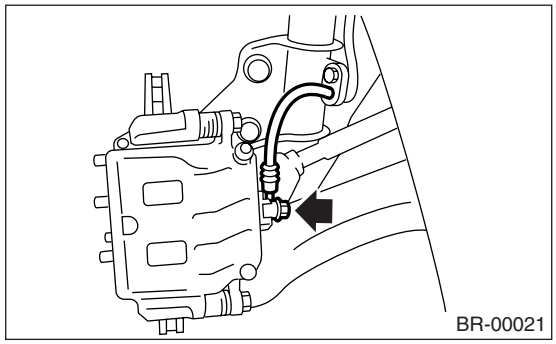
1. FRONT BRAKE HOSE

1) Secure the brake hose to strut.

Tightening torque:
32 N·m (3.3 kgf-m, 23.6 ft-lb)

2) Install the brake hose to caliper using a new gasket.

Tightening torque (Union bolt):
18 N·m (1.8 kgf-m, 13.3 ft-lb)



3) Position the disc in straight-forward direction and route brake hose through hole in bracket on wheel apron side.

CAUTION:
Be sure brake hose is not twisted.

4) Temporarily tighten the flare nut to connect brake pipe and hose.

5) Fix the brake hose with clamp at wheel apron bracket.
6) While holding the hexagonal part of brake hose fitting with a wrench, tighten the flare nut to the specified torque.

Tightening torque (Brake pipe flare nut):
15 N·m (1.5 kgf-m, 11.1 ft-lb)

7) Bleed air from the brake system. <Ref. to BR-63, Air Bleeding.>

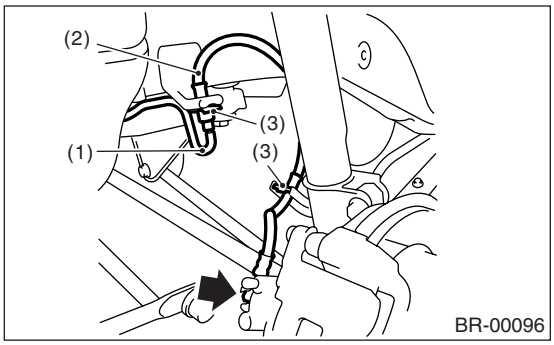
2. REAR BRAKE HOSE (DISC BRAKE)

1) Pass the brake hose through hole of bracket, and then lightly tighten the flare nut to connect brake pipe.
2) Insert the clamp upward to fix brake hose.
3) Install the brake hose to caliper using a new gasket.

Tightening torque (Union bolt):
18 N·m (1.8 kgf-m, 13.3 ft-lb)

4) While holding the hexagonal part of brake hose fitting with a wrench, tighten the flare nut to the specified torque.

Tightening torque (Brake pipe flare nut):
15 N·m (1.5 kgf-m, 11.1 ft-lb)



(1) Brake pipe
(2) Brake hose
(3) Brake hose clamp

5) Bleed air from the brake system. <Ref. to BR-63, Air Bleeding.>

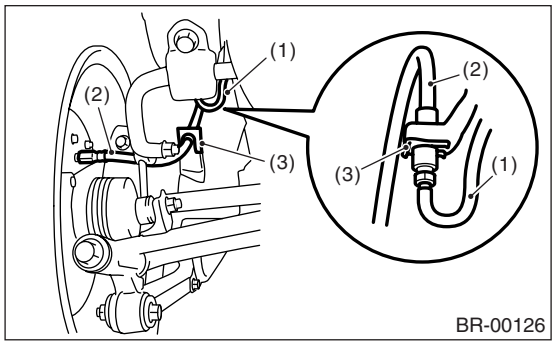
3. REAR BRAKE HOSE (DRUM BRAKE)

1) Install the brake hose to wheel cylinder.

Tightening torque:
15 N·m (1.5 kgf-m, 11.1 ft-lb)

2) Secure the brake hose to bracket on strut using a clamp.
3) Connect the brake hose through hole in bracket on body.

Tightening torque:
15 N·m (1.5 kgf-m, 11.1 ft-lb)



(1) Brake pipe
(2) Brake hose
(3) Brake hose clamp

4) Bleed air from the brake system. <Ref. to BR-63, Air Bleeding.>

C: INSPECTION

Ensure there are no cracks, breakage, or damage on the hoses. Check the joints for fluid leakage. If any cracks, breakage, damage or leakage is found, repair or replace the hose.

17.Brake Pipe

A: REMOVAL

NOTE:
Airbag system wiring harness is routed near the center brake pipe.

CAUTION:
• All airbag system wiring harness and connectors are colored yellow. Do not use electrical test equipment on these circuits.
• Be careful not to damage the airbag system wiring harness when servicing the center brake pipe.
• When removing the brake pipe, make sure that it is not bent.

B: INSTALLATION

NOTE:
Airbag system wiring harness is routed near the center brake pipe.

CAUTION:
• All airbag system wiring harness and connectors are colored yellow. Do not use electrical test equipment on these circuits.
• Be careful not to damage the airbag system wiring harness when servicing the center brake pipe.
• When installing the brake pipe, make sure that it is not bent.
• After installing the brake pipe and hose, bleed the air.
• After installing the brake hose, make sure that it does not touch the tire or suspension assembly, etc.

Brake pipe tightening torque:
15 N·m (1.5 kgf-m, 11.1 ft-lb)

C: INSPECTION

Ensure there are no cracks, breakage, or damage on pipes. Check the joints for fluid leakage. If any cracks, breakage, damage or leakage is found, repair or replace the pipe.

NOTE:
Use a mirror when inspecting low-visible part or back side.

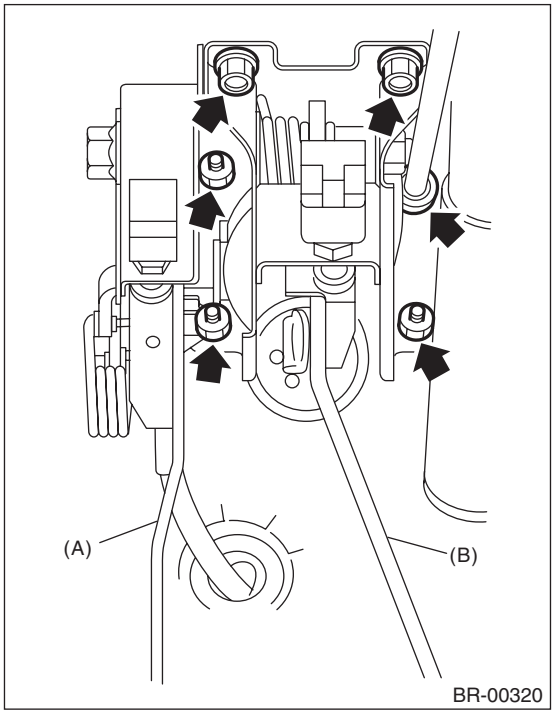
18.Brake Pedal

A: REMOVAL

1. LHD 1.6 L MT MODEL

1) Disconnect the ground cable from battery.
2) Disconnect the clutch cable from release lever.
3) Remove the instrument panel lower cover from instrument panel.
4) Disconnect the connectors (for stop light switch, etc.) from pedal bracket.
5) Remove the clevis pin which secures the pedal to push rod.
6) Remove the bolts and nuts which secure the brake and clutch pedals, and then remove the pedal bracket and clutch cable as a unit.

CAUTION:
Before removing the clutch cable from toe board, remove the grommet. Slowly remove the clutch cable, being careful not to scratch it.

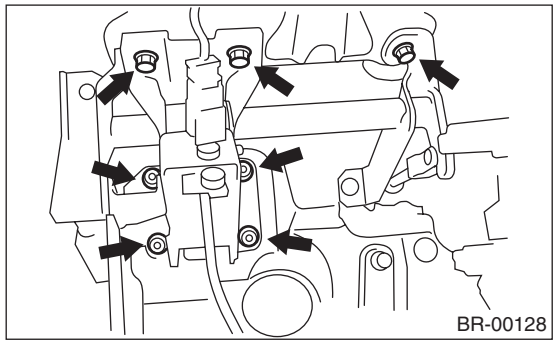


(A) Clutch pedal
(B) Brake pedal

7) Depress the clutch pedal, and then disconnect the clutch cable from clutch pedal.

2. LHD 2.0 L MT MODEL

1) Remove the steering shaft.
2) Disconnect the connectors (for stop light switch, etc.) from pedal bracket.
3) Remove the clevis pin which secures the lever to push rod.
4) Remove the nut which secures the clutch master cylinder.
5) Remove the accelerator pedal.
6) Remove the bolts and nuts which the secure pedal bracket.



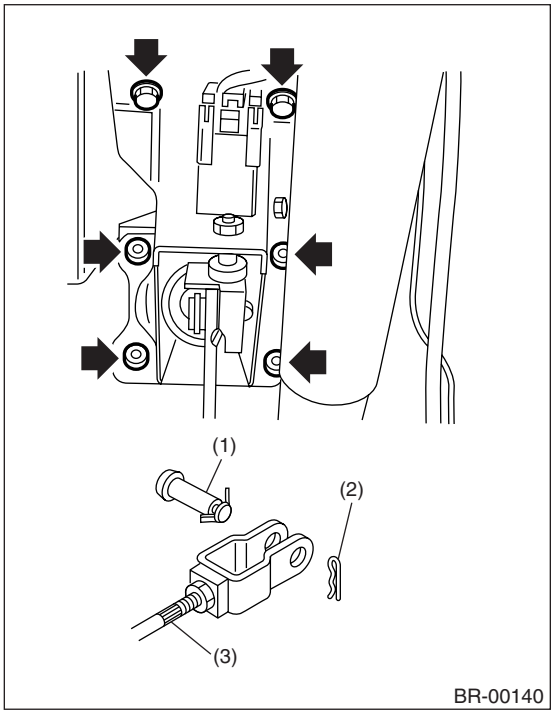
3. LHD 2.5 L MT MODEL

Refer to LHD 2.0 L MT MODEL for removal. <Ref. to BR-68, LHD 2.0 L MT MODEL, REMOVAL, Brake Pedal.>

4. LHD AT MODEL

1) Disconnect the ground cable from battery.
2) Remove the instrument panel lower cover from instrument panel.
3) Remove the clevis pin which secures the brake pedal to brake booster operating rod. Also disconnect the stop light switch connector.

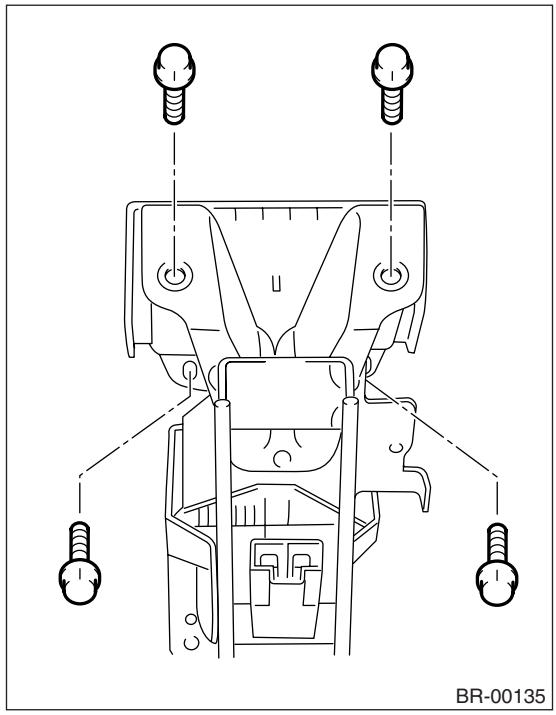
4) Remove the four bolts and four nuts which secure the brake pedal to pedal.



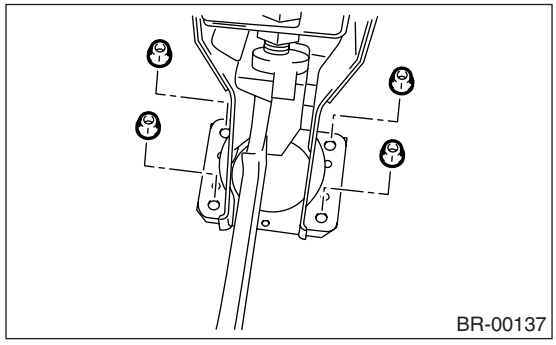
(1) Clevis pin
(2) Snap pin
(3) Operating rod

5. RHD AT MODEL

1) Disconnect the ground cable from battery.
2) Remove the instrument panel lower cover from instrument panel.
3) Disconnect the connectors (for stop light switch, etc.) from pedal bracket.
4) Remove the snap pin and clevis pin.
5) Remove the four bolts which secure the brake pedal bracket (rear side).



6) Remove the nuts which secure the brake pedal bracket (front side).



7) Remove the brake pedal without prying the bracket.

6. RHD MT MODEL

Refer to RHD AT MODEL. <Ref. to BR-69, RHD AT MODEL, REMOVAL, Brake Pedal.>

B: INSTALLATION

1) Install in the reverse order of removal.

CAUTION:
• If the cable clamp is damaged, replace it with a new one.
• Never fail to cover the outer cable end with boot.
• Be careful not to kink the accelerator cable.
• Always use new clevis pins.

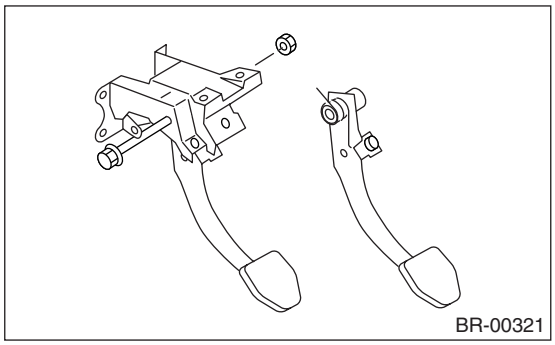
2) Adjust the clutch pedal. <Ref. to CL-44, ADJUSTMENT, Clutch Pedal.>

3) Inspect the brake pedal after installation <Ref. to BR-71, INSPECTION, Brake Pedal.>

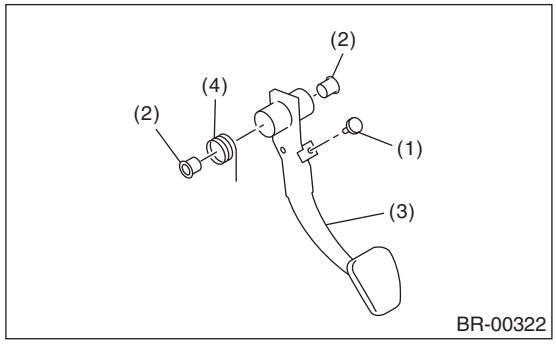
C: DISASSEMBLY

1. LHD 1.6 L MT MODEL

1) Remove the stop light switch.
<Ref. to BR-73, REMOVAL, Stop Light Switch.>
2) Remove the nut and pull out the bolt until brake pedal is able to remove, then remove brake pedal.


BR-00321

3) Remove the bushing, spring and stopper.



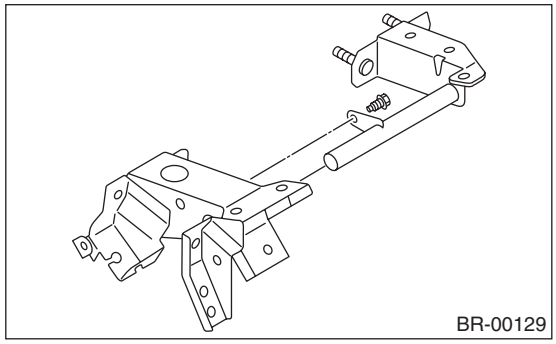
BR-00322

(1) Stopper
(2) Bushing
(3) Brake pedal
(4) Brake pedal spring

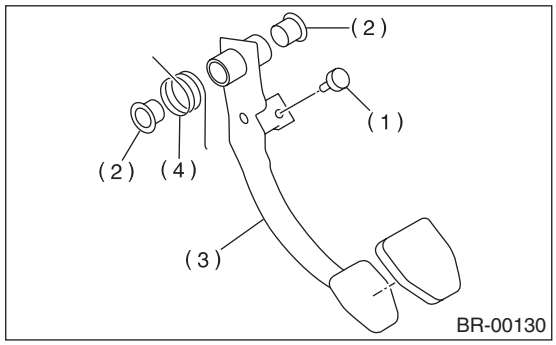
4) Remove the brake pad.

2. LHD 2.0 L MT MODEL

1) Remove the brake switch.
<Ref. to BR-73, REMOVAL, Stop Light Switch.>
2) Remove the clutch pedal. <Ref. to CL-41, DISASSEMBLY, Clutch Pedal.>
3) Remove the clutch master cylinder bracket.


BR-00129

4) Remove the bushing, spring and stopper.



BR-00130

(1) Stopper
(2) Bushing
(3) Brake pedal
(4) Brake pedal spring

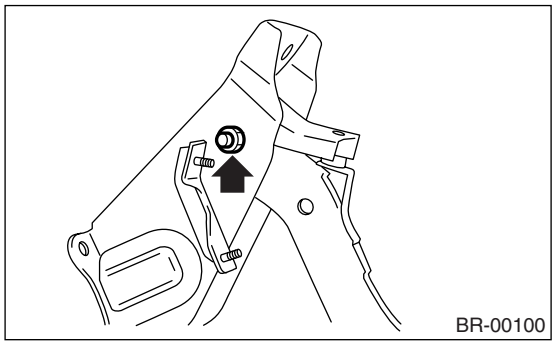
5) Remove the brake pedal pad.

3. LHD 2.5 L MT MODEL

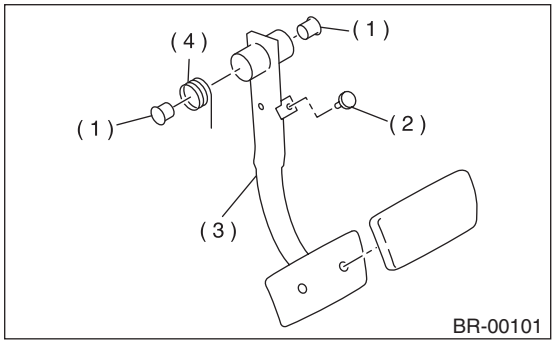
Refer to LHD 2.0 L MT MODEL for disassembly.
<Ref. to BR-70, LHD 2.0 L MT MODEL, DISASSEMBLY, Brake Pedal.>

4. LHD AT MODEL

1) Remove the brake switch.
2) Unbolt, and then remove the brake pedal.


BR-00100

3) Remove the bushing, spacer and spring.



(1) Plug
(2) Stopper
(3) Brake pedal
(4) Brake pedal spring

4) Remove the brake pedal pad.

5. RHD AT MODEL

Do not disassemble the brake pedal because it has non-disassemble structure.

6. RHD MT MODEL

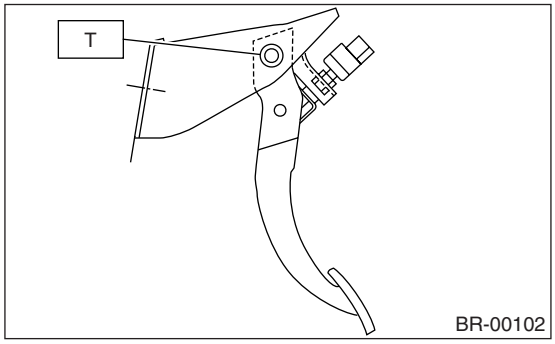
Do not disassemble the brake pedal because it has non-disassemble structure.

D: ASSEMBLY

1) Attach the stop light switch, etc. to pedal bracket temporarily.
2) Clean the inside of bores of clutch pedal and brake pedal, apply grease, and set the bushings into bores.
3) Align bores of the pedal bracket, clutch pedal and brake pedal, attach the brake pedal return spring and clutch pedal effort reducing spring (model with hill holder), and then install the pedal bolt.

NOTE:
Clean up the inside of bushings and apply grease before installing spacer.

Tightening torque:
T: 30 N·m (3.1 kgf-m, 22.4 ft-lb)



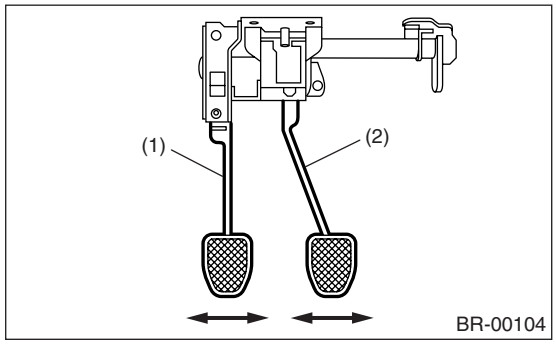
4) Adjust the stop light switch position after installing the brake pedal to vehicle.

E: INSPECTION

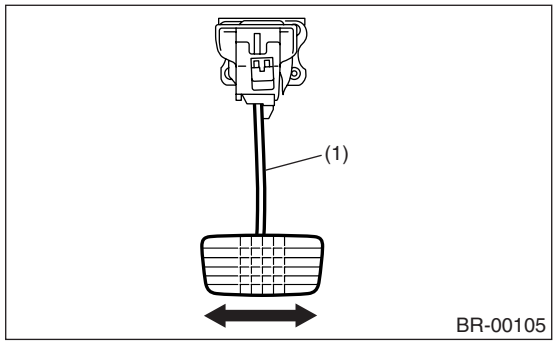
1) Move the brake and clutch pedal pads in the lateral direction with a force of approx. 10 N (1 kgf, 2 lbf) to ensure pedal deflection is in specified range.

CAUTION:
If excessive deflection is noted, replace the bushings with new ones.

Deflection of brake and clutch pedal:
Service limit
5.0 mm (0.197 in) or less



(1) Clutch pedal
(2) Brake pedal

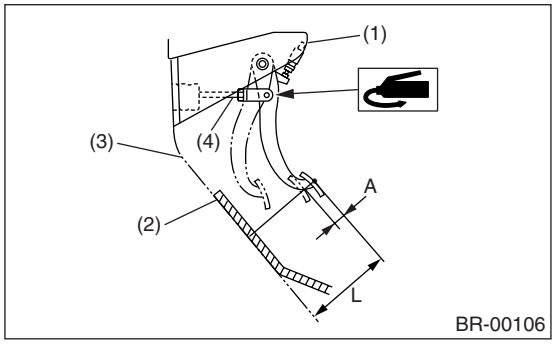


(1) Brake pedal

2) Check the position of pedal pad.

Pedal height L:
148 mm (5.83 in)

Brake pedal free play A:
1 — 3 mm (0.04 — 0.12 in) [Depress brake pedal pad with a force of less than 10 N (1 kgf, 2 lbf).]



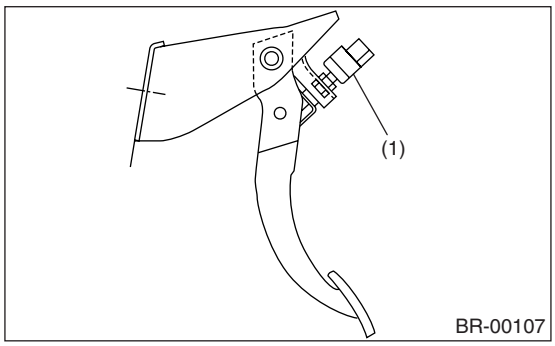
(1) Stop light switch
(2) Mat
(3) Toe board
(4) Brake booster operating rod

3) If it is not within specified value, adjust it by adjusting the brake booster operating rod length.

19.Stop Light Switch

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Disconnect the stop light switch connector.
3) Loosen nuts, and unscrew stop light switch to remove.

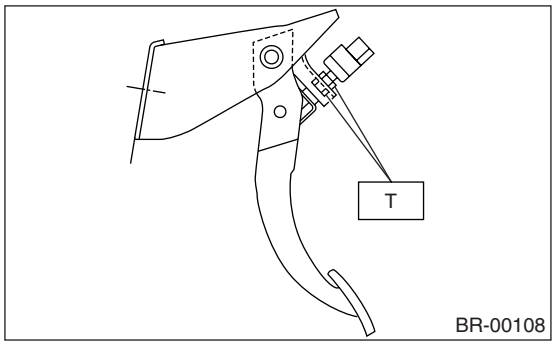


(1) Stop light switch

B: INSTALLATION

1) Screw the stop light switch onto a bracket and secure it temporarily with a nut.
2) Adjust the stop light switch position, and then tighten the nut.
<Ref. to BR-74, ADJUSTMENT, Stop Light Switch.>

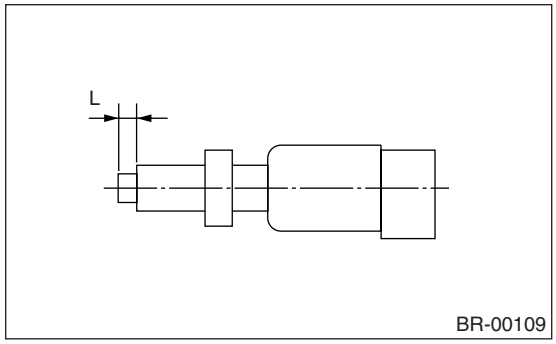
Tightening torque:
T: 8 N·m (0.8 kgf-m, 5.8 ft-lb)



C: INSPECTION

1) If the stop light switch does not operate properly (or if it does not stop at the specified position), replace with a new one.

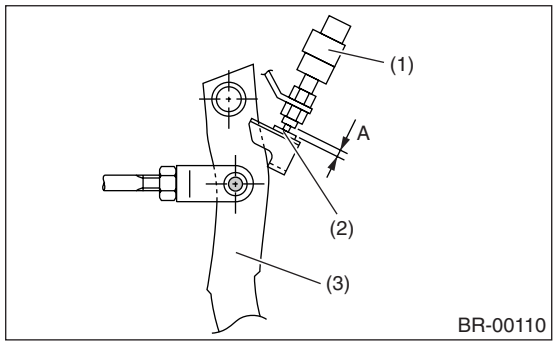
Specified position L:
2 mm (0.079 in)



2) Measure the clearance between threaded end of stop light switch and stopper.

CAUTION:
Be careful not to rotate stop light switch.

Stop light switch clearance A:
0.3 mm (0.012 in)



(1) Stop light switch
(2) Stopper
(3) Brake pedal

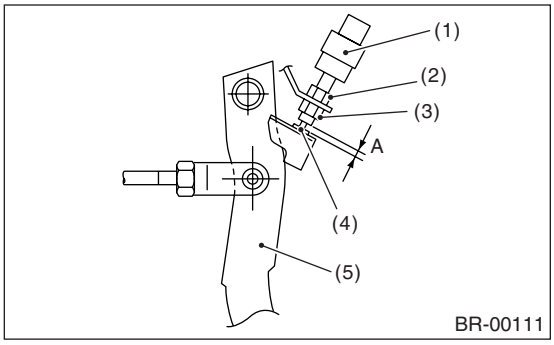
3) If it is not within specified value, adjust it by adjusting position of stop light switch.

CAUTION:
Be careful not to rotate the stop light switch.

D: ADJUSTMENT

Loosen the lock nut, and adjust the stop light switch position until the clearance between threaded end of stop light switch and stopper (A) becomes 0.3 mm (0.012 in). Then, tighten the lock nut.

Tightening torque:
8 N·m (0.8 kgf-m, 5.8 ft-lb)



(1) Stop light switch
(2) Lock nut A
(3) Lock nut B
(4) Stopper
(5) Brake pedal

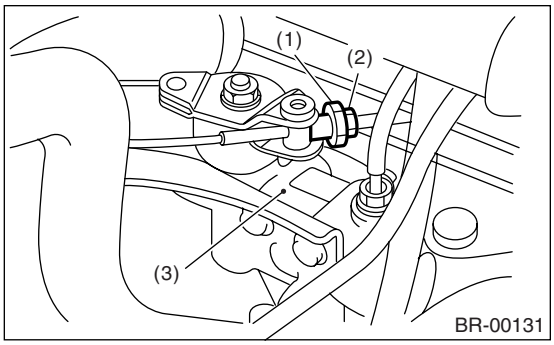
NOTE:
Tighten the lock nut B until the clearance between threaded end of stop light switch and stopper becomes 0 mm (0 in). Hold the stop light switch to prevent turning, and then loosen the lock nut B approx. 60°. The clearance (A) will become 0.3 mm (0.012 in).

20.Hill Holder

A: REMOVAL

1. PHV (PRESSURE HOLD VALVE)

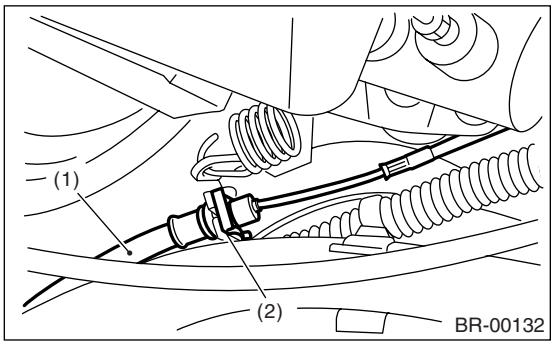
1) Drain the brake fluid from reservoir of master cylinder.
2) Remove the adjusting nut and lock nut.



(1) Adjusting nut
(2) Lock nut
(3) PHV

3) Remove the cable clamp, and disconnect the PHV cable from PHV.

CAUTION:
Carefully protect the boots and inner cable from damage when disconnecting PHV cable.



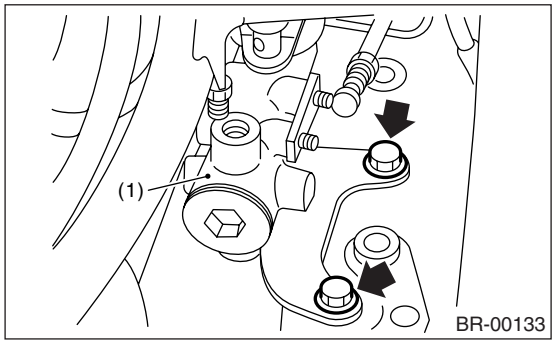
(1) PHV cable
(2) Clamp

4) Disconnect the brake pipes from PHV.

CAUTION:
• Pay attention not to drop the brake fluid onto body painting since it may dissolve paint.
• Pay attention not to damage hexagonal head of the flare nut by using pipe wrench without fail.

5) Detach the PHV along with support from side frame.

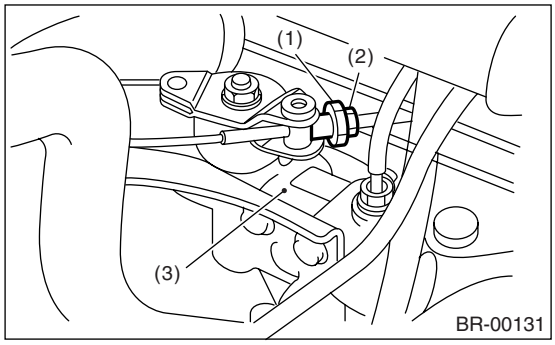
CAUTION:
Exercise utmost care to prevent foreign matter from entering into the PHV when removing it.



(1) PHV

2. PHV CABLE

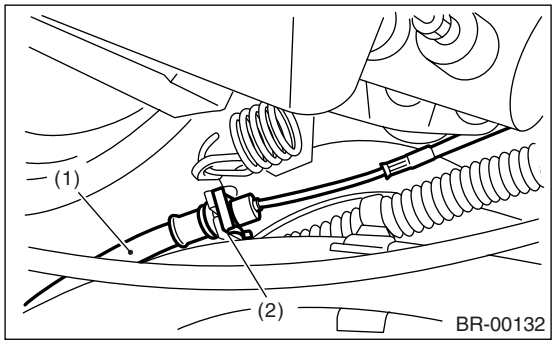
1) Remove the adjusting nut and lock nut.



(1) Adjusting nut
(2) Lock nut
(3) PHV

2) Remove the cable clamp, and disconnect PHV cable from PHV.

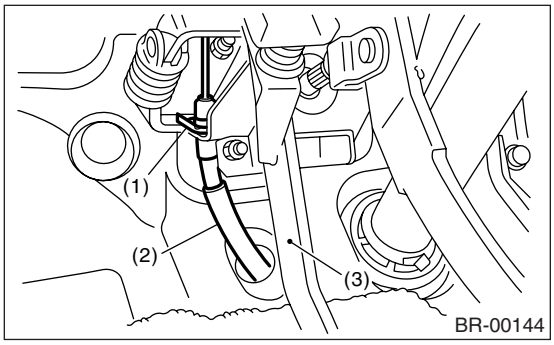
CAUTION:
Carefully protect the boot and inner cable from damage when disconnecting PHV cable.



(1) PHV cable
(2) Clamp

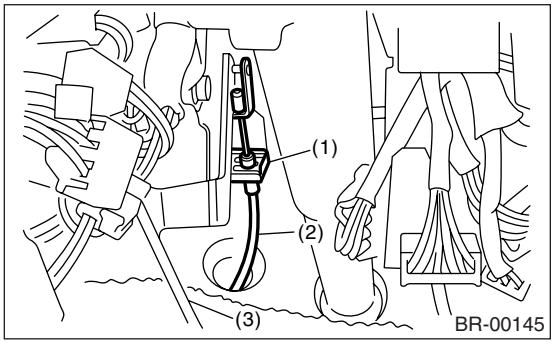
3) Remove the cable clamp from clutch pedal bracket.

- LHD MODEL



(1) Clamp
(2) PHV cable
(3) Clutch pedal

- RHD MODEL



(1) Clamp
(2) PHV cable
(3) Clutch pedal

4) Remove the PHV cable.

B: INSPECTION

Check up removed parts as follows, and replace defective ones.
1) Check if the boots of PHV cable are damaged or degraded, the inner cable is damaged or corroded.
2) Check if the return spring is worn out, damaged or corroded.
3) Confirm that rolling sound of the ball is heard with PHV inclined and lever rotates smoothly.

CAUTION:
Never disassemble the PHV. Replace entire PHV assembly if necessary.

C: INSTALLATION

1. PHV (PRESSURE HOLD VALVE)

1) Install the PHV onto side frame.

Tightening torque:
18 N·m (1.8 kgf-m, 13.3 ft-lb)

2) Connect the brake pipes to PHV.

Tightening torque:
15 N·m (1.5 kgf-m, 11.1 ft-lb)

CAUTION:
Confirm that the brake pipes are not deformed and/or damaged. Replace them with new ones if necessary.

3) Install the PHV cable to PHV.

CAUTION:
• If the cable clamp and clips are damaged, replace it with a new one.
• Avoid sharp bending of PHV cable as it may cause breakage.

4) Connect the PHV cable with clips.
5) Apply grease to the following points.
- Hook portion of return spring
- Cable end portion of lever

Grease:
SUNLIGHT 2 (Part No. 003602010)

6) Be sure to bleed air from the brake system. <Ref. to BR-63, Air Bleeding.>
7) Adjust the PHV cable. <Ref. to BR-77, ADJUSTMENT, Hill Holder.>

CAUTION:
After replacing with new one, operate the clutch pedal about 30 times as a running-in operation prior to adjustment.

2. PHV CABLE

1) Install in the reverse order of removal.

CAUTION:
• If the cable clamp is damaged, replace it with a new one.
• Avoid sharp bending of PHV cable as it may cause breakage.

2) Apply grease to the following points.
- Hook portion of return spring
- Cable end portion of lever

Grease:
SUNLIGHT 2 (Part No. 003602010)

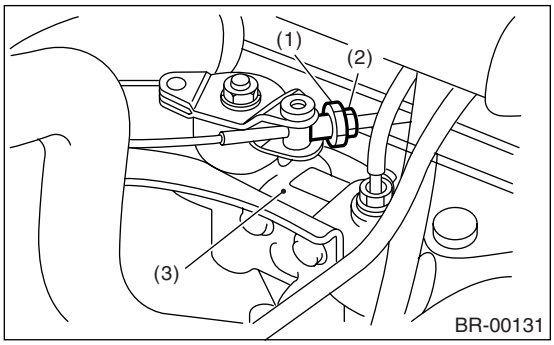
3) Adjust the PHV cable. <Ref. to BR-77, ADJUSTMENT, Hill Holder.>

CAUTION:
After replacing with new one, operate the clutch pedal about 30 times as a running-in operation prior to adjustment.

D: ADJUSTMENT

Confirm stopping and starting performances by activating the hill holder on an uphill road of 3° or higher inclination.
1) If the vehicle does not stop;
Tighten the adjusting nut of PHV cable.
2) If the vehicle does not start properly;
• Case A — When the hill holder is released later than engagement of clutch pedal (Engine tends to stall.):
Loosen adjusting nut gradually until smooth starting is enabled.
• Case B — When the hill holder is released earlier than engagement of clutch pedal (Vehicle slips down slightly.):
Tighten the adjusting nut so that hill holder is released later than engagement of clutch pedal (status in Case A). Then make adjustment the same as in Case A.

CAUTION:
Whenever turning the adjusting nut, prevent the PHV cable from revolving.



(1) Adjusting nut
(2) Lock nut
(3) PHV

3) Tighten the lock nut.

Tightening torque:
3.5 N·m (0.35 kgf-m, 2.5 ft-lb)

21.General Diagnostic Table

A: INSPECTION

	Trouble and possible cause	Corrective action
1. Insufficient braking	(1) Fluid leakage from the hydraulic mechanism	Repair or replace (cup, piston seal, piston boot, master cylinder piston kit, pipe or hose).
	(2) Entry of air into the hydraulic mechanism	Bleed the air.
	(3) Excessively wide shoe clearance	Adjust the clearance.
	(4) Wear, deteriorated surface material, adhering water or fluid on the lining	Replace, grind or clean.
	(5) Improper operation of master cylinder, disc caliper, brake booster or check valve	Correct or replace.
2. Unstable or uneven braking	(1) Fluid on the lining, drum or rotor	Eliminate cause of fluid leakage, clean, or replace.
	(2) Drum or rotor eccentricity	Correct or replace the drum or rotor.
	(3) Worn brake drum, or damage to the drum caused by sand	Correct by grinding, or replace.
	(4) Improper lining contact, deteriorated surface material, improper inferior material, or wear	Correct by grinding, or replace.
	(5) Deformed back plate	Correct or replace.
	(6) Improper tire inflation	Inflate to correct pressure.
	(7) Disordered wheel alignment	Adjust alignment.
	(8) Loosened back plate or the support installing bolts	Retighten.
	(9) Loosened wheel bearing	Retighten to normal tightening torque or replace.
	(10) Trouble in the hydraulic system	Replace the cylinder, brake pipe or hose.
	(11) Uneven effect of the parking brake	Check, adjust, or replace the rear brake and cable system.
3. Excessive pedal stroke	(1) Entry of air into the hydraulic mechanism	Bleed the air.
	(2) Excessive play in the master cylinder push rod	Adjust.
	(3) Fluid leakage from the hydraulic mechanism	Repair or replace (cup, piston seal, piston boot, master cylinder piston kit, pipe or hose).
	(4) Improperly adjusted shoe clearance	Adjust.
	(5) Improper lining contact or worn lining	Correct or replace.
4. Brake dragging or improper brake return	(1) Insufficient pedal play	Adjust play.
	(2) Improper master cylinder return	Clean or replace the cylinder.
	(3) Clogged hydraulic system	Replace.
	(4) Improper return or adjustment of parking brake	Correct or adjust.
	(5) Weakened spring tension or breakage of shoe return spring	Replace the spring.
	(6) Excessively narrow shoe clearance	Adjust the clearance.
	(7) Improper disc caliper operation	Correct or replace.
	(8) Wheel bearing faulty	Replace the wheel bearing.
5. Brake noise (1) (creak sound)	(1) Hardened or deteriorated lining	Replace the shoe assembly or pad.
	(2) Worn lining	Replace the shoe assembly or pad.
	(3) Loosened back plate or the support installing bolts	Retighten.
	(4) Loose wheel bearing	Retighten to normal tightening torque.
	(5) Dirty drum or rotor	Clean the drum or rotor, or clean and replace the brake assembly.
6. Brake noise (2) (hissing sound)	(1) Worn lining	Replace the shoe assembly or pad.
	(2) Improper installed shoe or pad	Correct or replace the shoe assembly or pad.
	(3) Loose or bent drum or rotor	Retighten or replace.

	Trouble and possible cause	Corrective action
7. Brake noise (3) (click sound)	In the case of the disc brake:	
	(1) Excessively worn pad or the support	Replace the pad or the support.
	In the case of the drum brake:	
	(1) Excessively worn shoe ridge	Replace the back plate.
	(2) Lack of oil on the shoe ridge surface and anchor	Add more grease.

PARKING BRAKE

PB

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2. Parking Brake Lever....5
3. Parking Brake Cable 7
4. Parking Brake Assembly (Rear Disc Brake) 9
5. General Diagnostic Table....12

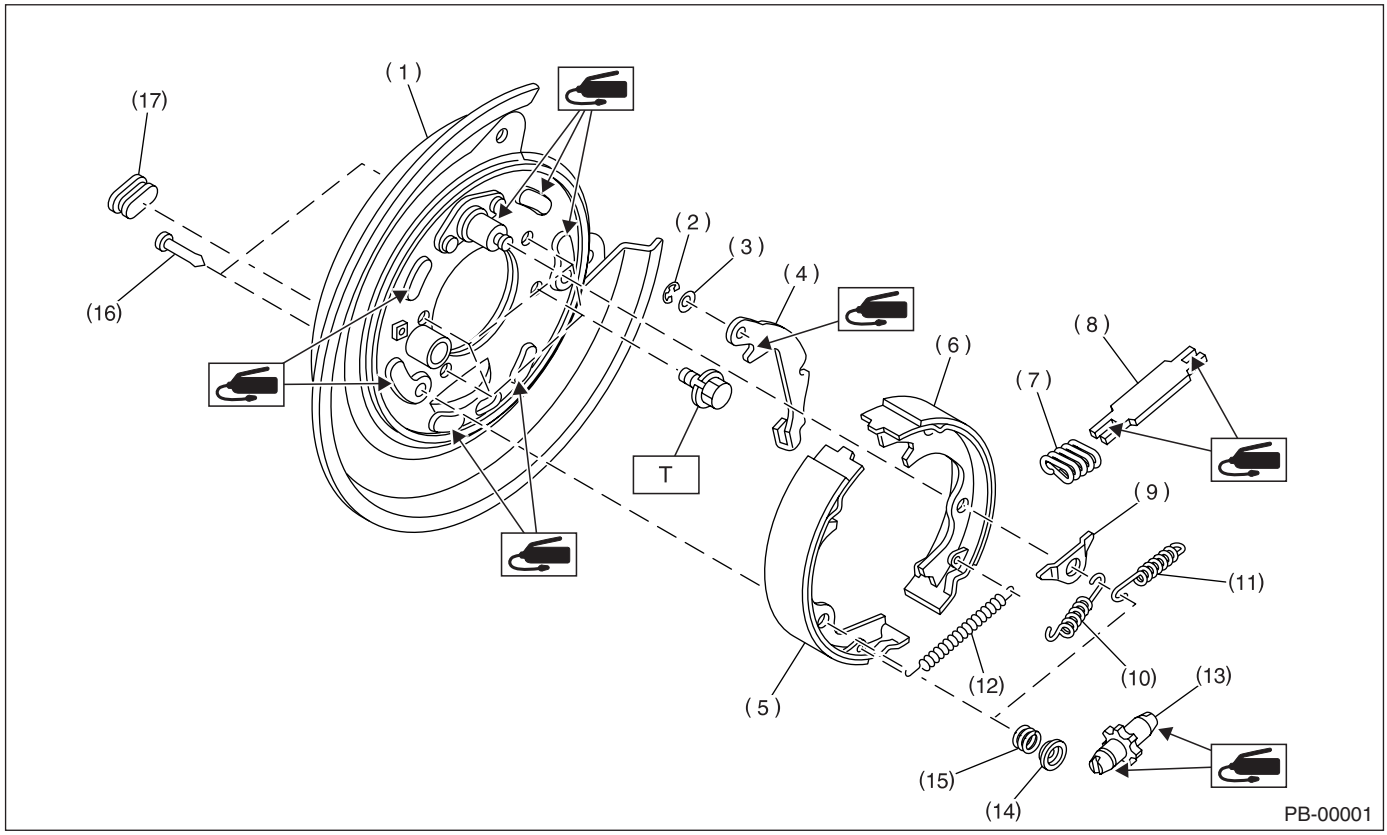
1. General Description

A: SPECIFICATION

Model		Rear drum brake	Rear disc brake	Rear disc brake (STi model)
Type		Mechanical on rear brakes	Mechanical on rear brakes, drum in disc	
Effective drum diameter	mm (in)	228.6 (9)	170 (6.69)	190 (7.48)
Lining dimensions (length × width × thickness)	mm (in)	218.8 × 35.0 × 4.1 (8.61 × 1.378 × 0.161)	162.6 × 30.0 × 3.2 (6.40 × 1.181 × 0.126)	182.3 × 30.0 × 3.2 (7.18 × 1.181 × 0.126)
Clearance adjustment		Automatic adjustment	Manual adjustment	
Lever stroke	notches/N (kgf, lbf)	7 to 8/196 (20, 44)		

B: COMPONENT

1. PARKING BRAKE (REAR DISC BRAKE)

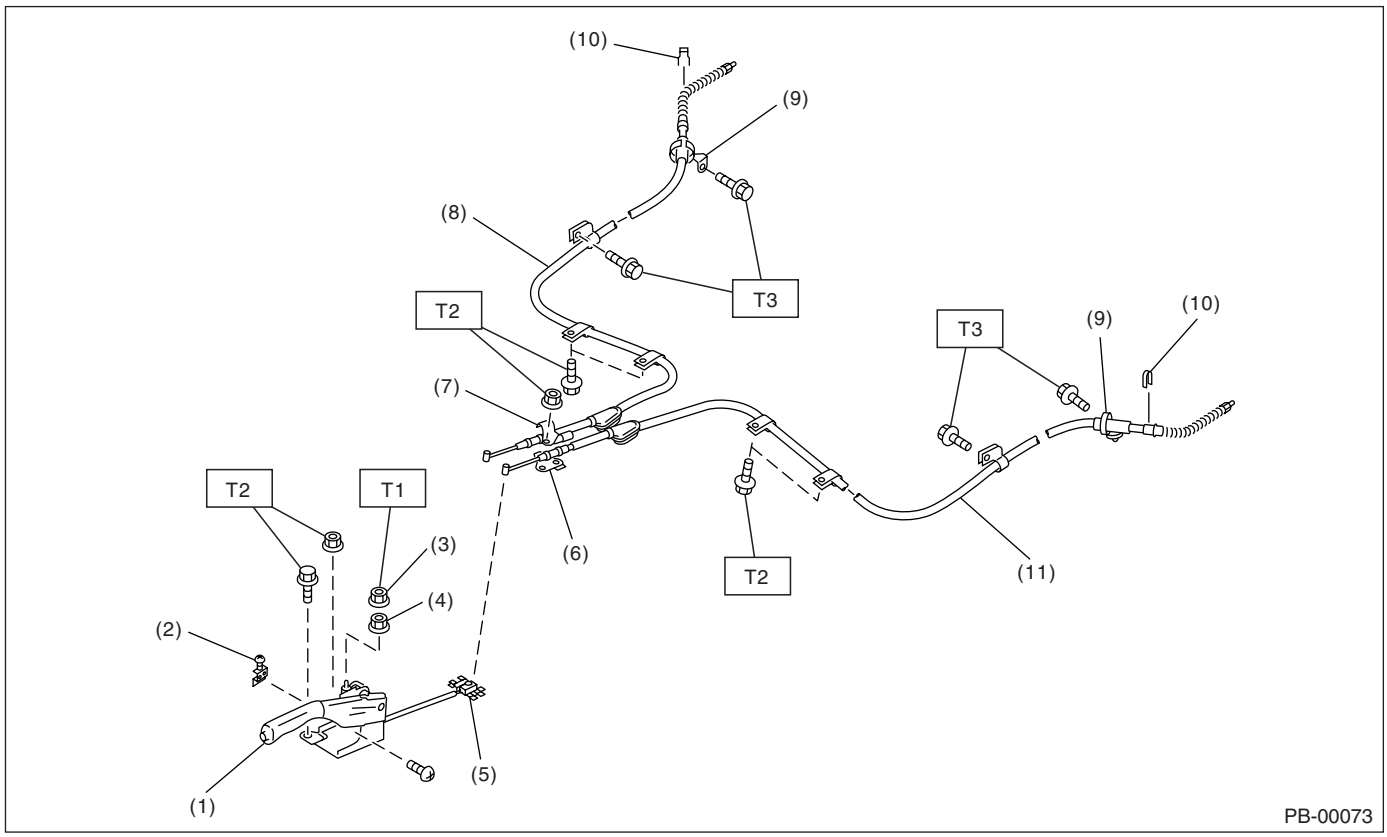


(1) Back plate
(2) Retainer
(3) Spring washer
(4) Lever
(5) Parking brake shoe (Primary)
(6) Parking brake shoe (Secondary)
(7) Strut spring
(8) Strut
(9) Shoe guide plate
(10) Primary return spring
(11) Secondary return spring
(12) Adjusting spring
(13) Adjuster
(14) Shoe hold-down cup
(15) Shoe hold-down spring
(16) Shoe hold-down pin
(17) Adjusting hole cover

Tightening torque: N·m (kgf-m, ft-lb)
T: 53 (5.4, 39.1)

2. PARKING BRAKE CABLE

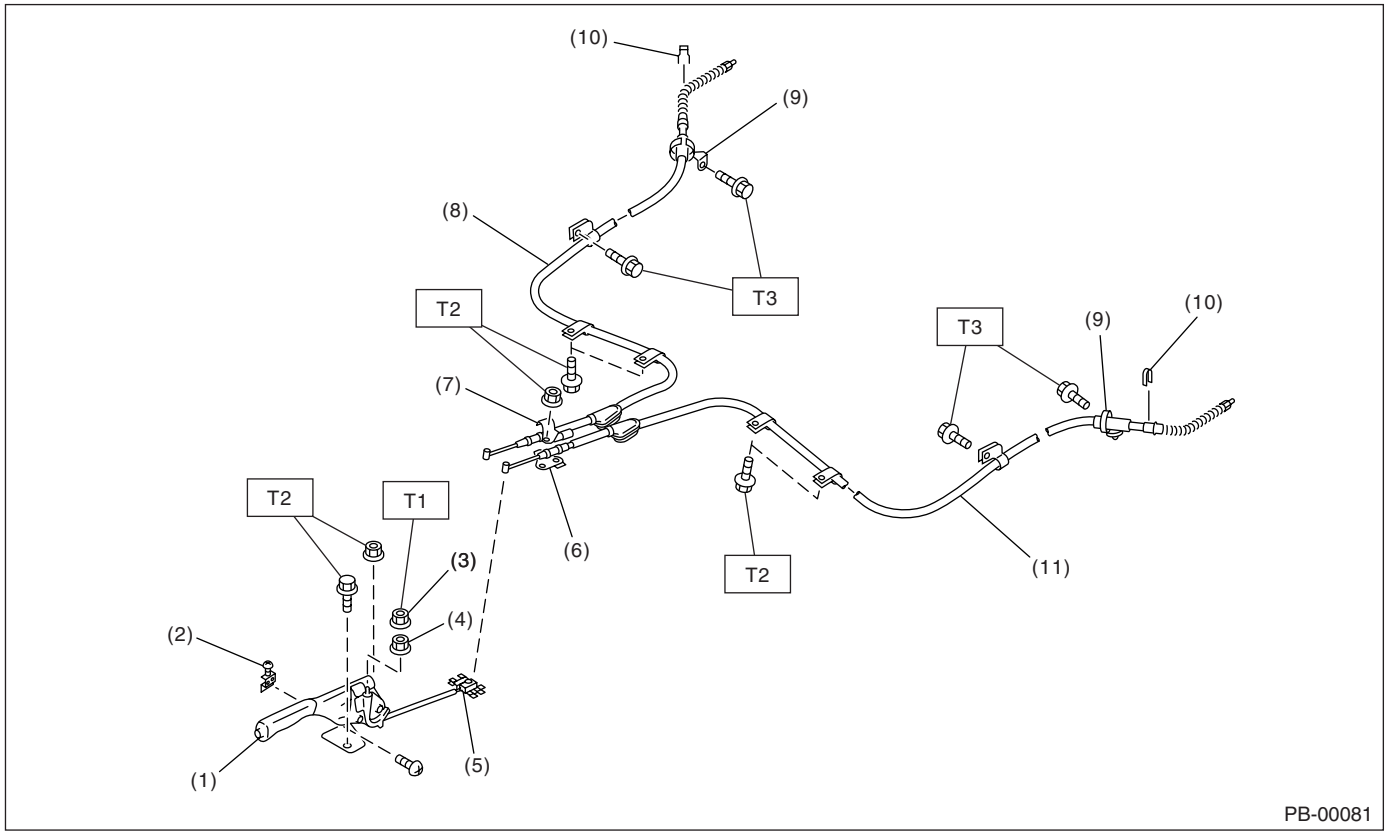
- LHD MODEL



(1) Parking brake lever
(2) Parking brake switch
(3) Lock nut
(4) Adjusting nut
(5) Equalizer
(6) Bracket
(7) Clamp
(8) Parking brake cable RH
(9) Cable guide
(10) Clamp (Rear disc brake model)
(11) Parking brake cable LH

Tightening torque: N·m (kgf-m, ft-lb)
T1: 6 (0.6, 4.4)
T2: 18 (1.8, 13.0)
T3: 32 (3.3, 23.6)

• RHD MODEL



(1) Parking brake lever
(2) Parking brake switch
(3) Lock nut
(4) Adjusting nut
(5) Equalizer
(6) Bracket
(7) Clamp
(8) Parking brake cable RH
(9) Cable guide
(10) Clamp (Rear disc brake model)
(11) Parking brake cable LH

Tightening torque: N·m (kgf-m, ft-lb)
T1: 6 (0.6, 4.4)
T2: 18 (1.8, 13.0)
T3: 32 (3.3, 23.6)

C: CAUTION

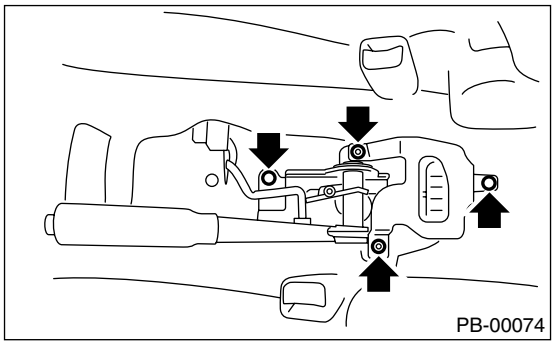
• Wear working clothing, including a cap, protective goggles and protective shoes during operation.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly, and replacement.
• Be careful not to burn, because each part on the vehicle is hot after running.
• Use SUBARU genuine grease etc. or the equivalent. Do not mix grease etc. with that of another grade or from other manufacturers.
• Be sure to tighten fasteners including bolts and nuts to the specified torque.
• Place shop jacks or rigid racks at the specified points.
• Before securing a part on a vise, place cushioning material such as wood blocks, aluminum plate, or shop cloth between the part and the vise.
• Keep grease etc. away from parking brake shoes.

2. Parking Brake Lever

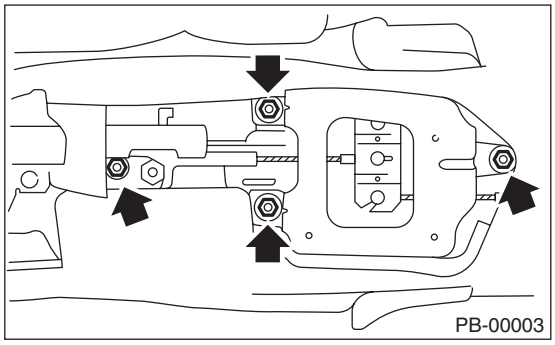
A: REMOVAL

1) Set the wheel stoppers to tires.
2) Remove the console box.
3) Loosen the parking cable adjusting nut and console bracket.
4) Disconnect the connector of parking brake switch.
5) Remove the parking brake lever.

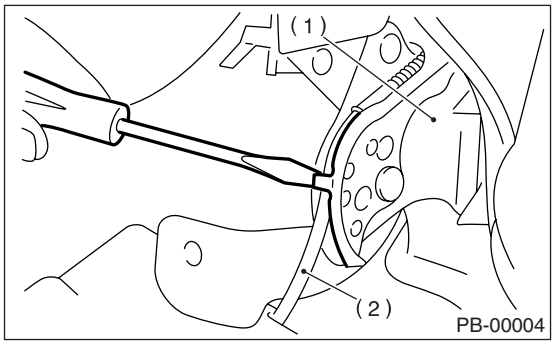
- LHD MODEL



- RHD MODEL



6) Unbend the parking brake lever pawls and remove cable.



(1) Parking brake lever
(2) Cable

B: INSTALLATION

1) Install in the reverse order of removal.

Tightening torque:
Parking brake lever;
18 N·m (1.8 kgf-m, 13.0 ft-lb)
Adjusting nut;
6 N·m (0.6 kgf-m, 4.4 ft-lb)

2) Be sure to adjust the lever stroke. <Ref. to PB-5, ADJUSTMENT, Parking Brake Lever.>

C: INSPECTION

While pulling the parking brake lever upward, count the notches.

Lever stroke:
7 to 8 notches when pulled with a force of 196 N (20 kgf, 44 lbf)

If not as specified, adjust the parking brake. <Ref. to PB-11, ADJUSTMENT, Parking Brake Assembly (Rear Disc Brake).>

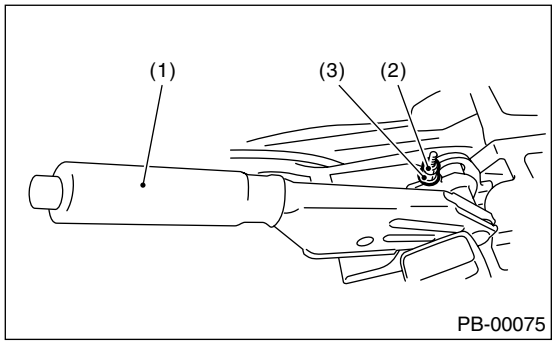
D: ADJUSTMENT

1) Remove the console cover.
2) Forcibly pull the parking brake lever 3 to 5 times.
3) Adjust the parking brake lever by turning adjuster until parking brake lever stroke is set at 7 to 8 notches with operating force of 196 N (20 kgf, 44 lbf).
4) Tighten the lock nut.

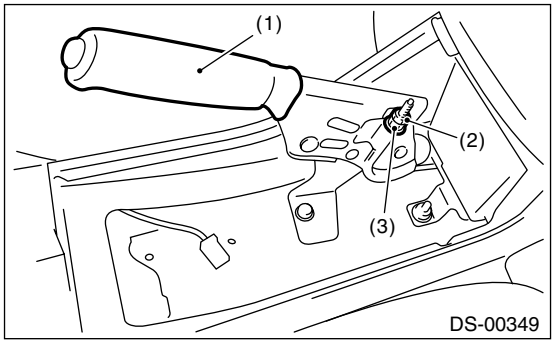
Lever stroke:
7 to 8 notches when pulled with a force of 196 N (20 kgf, 44 lbf)

Tightening torque (Lock nut):
6 N·m (0.6 kgf-m, 4.4 ft-lb)

- LHD MODEL



- RHD MODEL



(1) Parking brake lever
(2) Lock nut
(3) Adjusting nut

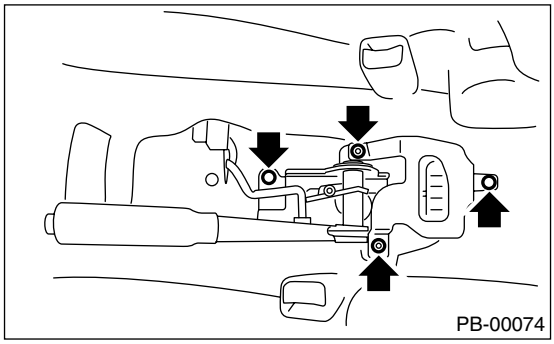
5) Install the console cover.

3. Parking Brake Cable

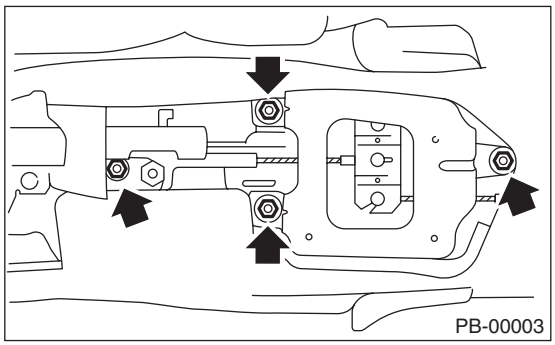
A: REMOVAL

1) Lift up the vehicle.
2) Remove the rear wheels.
3) Remove the rear seat cushion.
4) Remove the console box.
5) Loosen the parking cable adjusting nut and console bracket.
6) Remove the parking brake lever.

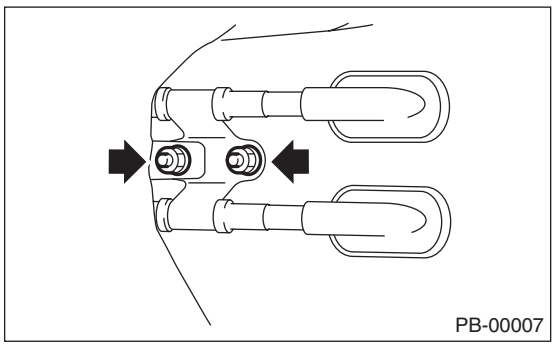
- LHD MODEL



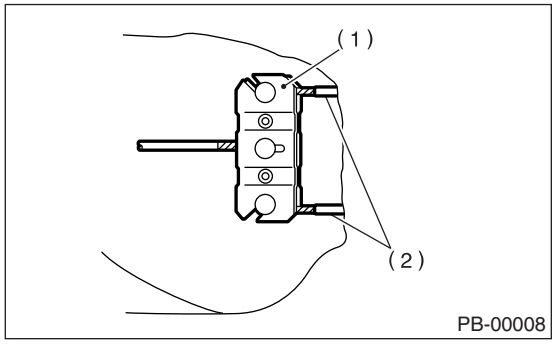
- RHD MODEL



7) Roll up the floor mat and remove clamps.

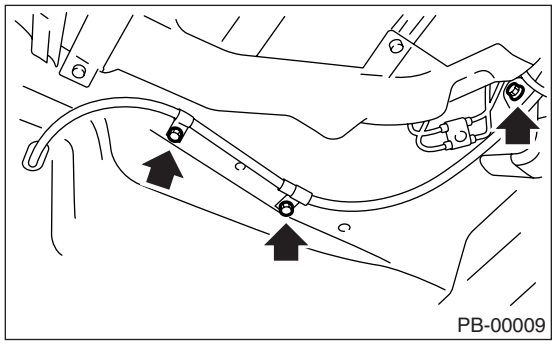


8) Remove the equalizer cover.
9) Remove the inner cable end from equalizer.



(1) Equalizer
(2) Inner cable end

10) Remove the parking brake cable from rear brake.
Disc brake
<Ref. to PB-9, REMOVAL, Parking Brake Assembly (Rear Disc Brake).>
Drum brake
<Ref. to BR-50, REMOVAL, Rear Drum Brake Assembly.>
11) Remove the clamp from rear brake.
12) Remove the bolt and bracket from trailing link bracket.
13) Remove the bolt and clamp from rear floor.



14) Detach the grommet from rear floor.
15) Remove the cable assembly from cabin by forcibly pulling it backward.
16) Detach the parking brake cable from cable guide at rear trailing link.

B: INSTALLATION

1) Install the (new) parking brake assembly in the reverse order of removal.

NOTE:
Be sure to pass the cable through cable guide inside the tunnel.

2) Be sure to adjust the lever stroke. <Ref. to PB-5, ADJUSTMENT, Parking Brake Lever.>

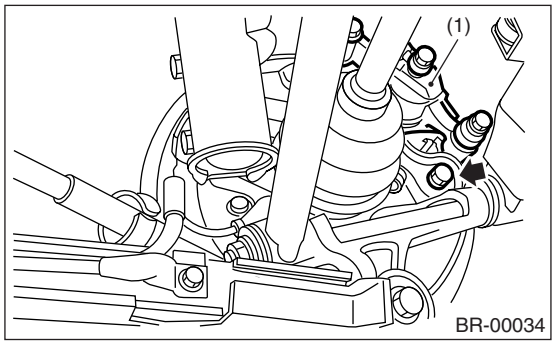
C: INSPECTION

Check the removed cable and replace it if damaged, rusty or malfunctioning.
1) Check for smooth operation of the cable.
2) Check the inner cable for damage and rust.
3) Check the outer cable for damage, bends and cracks.
4) Check the boot for damage, cracks and deterioration.

4. Parking Brake Assembly (Rear Disc Brake)

A: REMOVAL

1) Lift up the vehicle.
2) Remove the rear wheels.
3) Pull down and release the parking brake.
4) Remove the two mounting bolts and remove the brake caliper assembly.

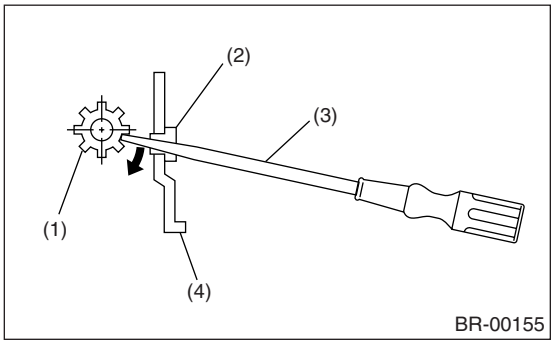


(1) Brake caliper assembly

5) Suspend the brake caliper assembly so that the hose is not stretched.
6) Remove the disc rotor.

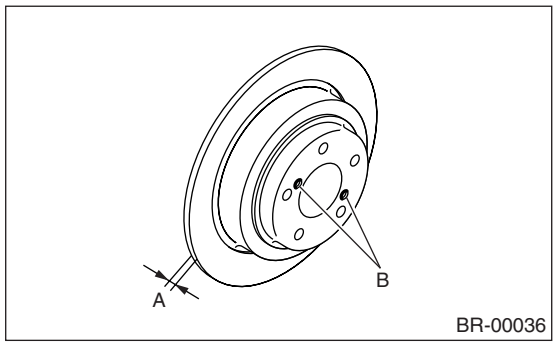
NOTE:
If the disc rotor is difficult to remove, try the two following methods in order.

(1) Turn the adjusting screw using a flat tip screwdriver until brake shoe gets away enough from the disc rotor.

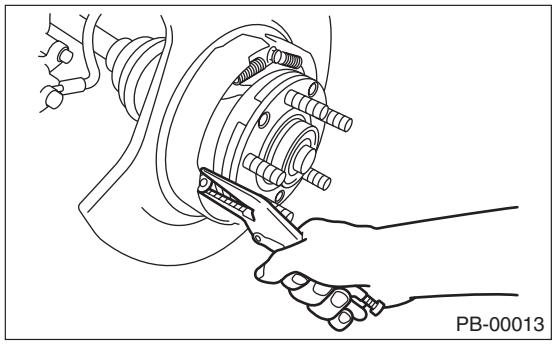


(1) Adjusting screw
(2) Adjusting hole cover (rubber)
(3) Flat tip screwdriver
(4) Back plate

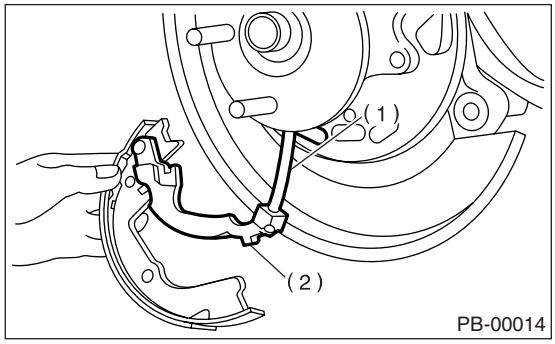
(2) If the disc rotor seizes up within hub, drive the disc rotor out by installing two 8-mm bolts in holes B on rotor.



7) Remove the shoe return spring from parking brake assembly.
8) Remove the front shoe hold-down spring and pin with pliers.



9) Remove the strut and strut spring.
10) Remove the adjuster assembly from parking brake assembly.
11) Remove the brake shoe.
12) Remove the rear shoe hold-down spring and pin with pliers.
13) Remove the parking brake cable from parking brake lever.



(1) Parking brake cable
(2) Parking brake lever

14) Using a standard screwdriver, raise the retainer. Remove the parking brake lever and washer from brake shoe.

B: INSTALLATION

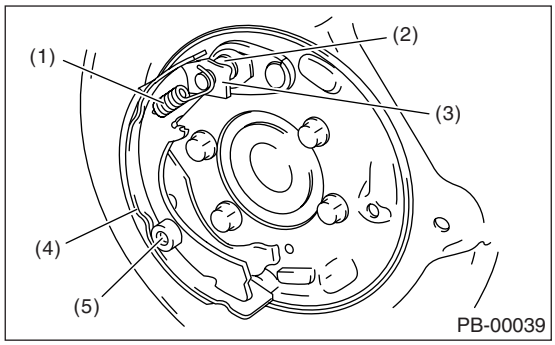
CAUTION:
Be sure the lining surface is free from oil and grease contamination.

1) Apply brake grease to the following places.

Brake grease:
Brake Grease (Part No. 003602002)

- Six contact surfaces of shoe rim and back plate packing
- Contact surface of shoe wave and anchor pin
- Contact surface of lever and strut
- Contact surface of shoe wave and adjuster assembly
- Contact surface of shoe wave and strut
- Contact surface of lever and shoe wave

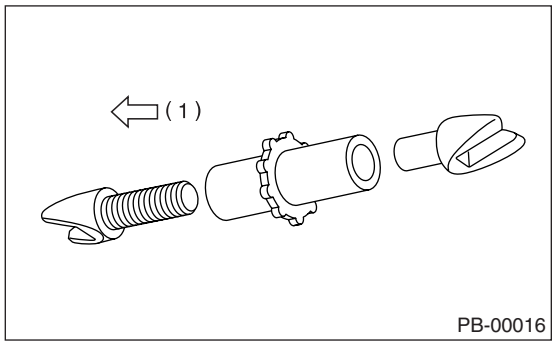
2) Insert the primary side brake shoe into anchor pin groove.
3) Secure the brake shoe with shoe hold-down pin and cup.
4) Install the plate to anchor pin, and then assemble the primary return spring to anchor pin.



(1) Primary return spring
(2) Anchor pin
(3) Plate
(4) Primary shoe
(5) Shoe hold-down pin & cup

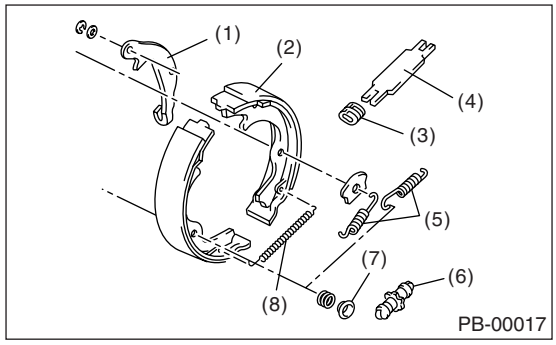
5) Install the parking brake cable to parking brake lever.
6) Assemble the strut and adjuster, and then secure the secondary side brake shoe with shoe hold-down pin & cup.

NOTE:
- Install the strut spring of both right and left wheels facing vehicle front.
- Install the adjuster assembly with screw on left side.



(1) Left

7) Install the secondary return spring and adjusting spring.



(1) Lever
(2) Secondary brake shoe
(3) Strut spring
(4) Strut
(5) Return spring
(6) Adjuster
(7) Shoe hold-down cup
(8) Adjusting spring

8) Adjust the parking brakes. <Ref. to PB-11, ADJUSTMENT, Parking Brake Assembly (Rear Disc Brake).>
9) Drive the vehicle for parking brake lining “break-in”.
(1) Drive the vehicle at about 35 km/h (22 MPH).
(2) With the parking brake release button pushed in, pull the parking brake lever gently.
(3) Drive the vehicle for about 200 meter (0.12 mile) in this condition.
(4) Wait 5 to 10 minutes for the parking brake to cool down. Repeat this procedure once more.
(5) After breaking-in, re-adjust the parking brakes.

C: INSPECTION

1) Measure the brake disc rotor inside diameter. If the disc is scored or worn, replace the brake disc rotor.

Disc rotor inside diameter:

Standard
Except STi model 170 mm (6.69 in)
STi model 190 mm (7.48 in)

Service limit
Except STi model 171 mm (6.73 in)
STi model 191 mm (7.52 in)

2) Measure the lining thickness. If it exceeds the limit, replace the shoe assembly.

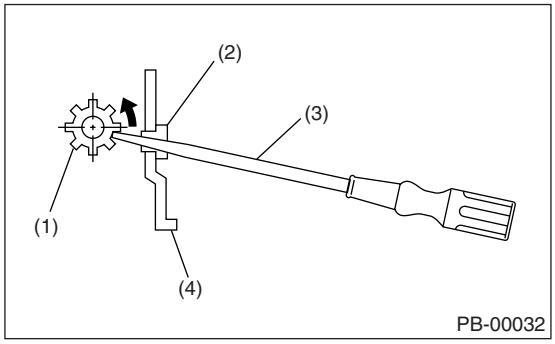
Lining thickness:
Standard
3.2 mm (0.126 in)
Service limit
1.5 mm (0.059 in)

NOTE:
Replace the right and left brake shoes at the same time.

D: ADJUSTMENT

1. SHOE CLEARANCE

1) Return the parking brake lever completely.
2) Remove the adjusting hole cover from back plate.
3) Turn the adjusting screw using a flat tip screwdriver until brake shoe is in close contact with disc rotor.



(1) Adjusting screw
(2) Adjusting hole cover (rubber)
(3) Flat tip screwdriver
(4) Back plate

4) Turn back (downward) the adjusting screw 3 or 4 notches.

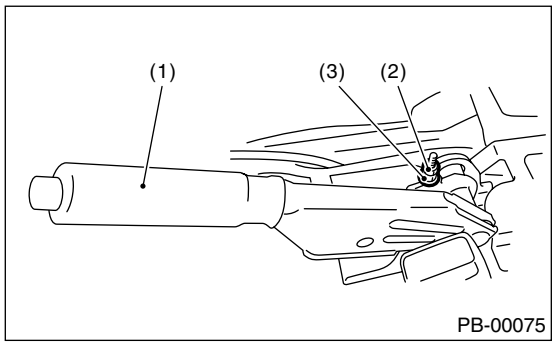
CAUTION:
Be sure that the brake is not dragging.

5) Install the adjusting hole cover to back plate.
6) Adjust the parking brake lever stroke. <Ref. to PB-11, LEVER STROKE, ADJUSTMENT, Parking Brake Assembly (Rear Disc Brake).>

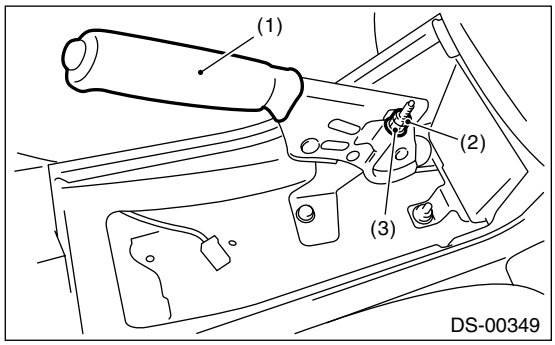
2. LEVER STROKE

1) Before adjusting the lever stroke, adjust the shoe clearance. <Ref. to PB-11, SHOE CLEARANCE, ADJUSTMENT, Parking Brake Assembly (Rear Disc Brake).>
2) Remove the console box lid.
3) Forcibly pulling the parking brake lever 3 to 5 times.
4) Adjust the parking brake lever stroke by turning adjusting nut to set the lever stroke to 7 to 8 notches when pulled the lever with a force of 196 N (20 kgf, 44 lbf).

- LHD MODEL



- RHD MODEL



(1) Parking brake lever
(2) Lock nut
(3) Adjusting nut

5) Tighten the lock nut.
6) Install the console box lid.

Lever stroke:
7 to 8 notches when pulled with a force of 196 N (20 kgf, 44 lbf)

Tightening torque (Lock nut):
6 N·m (0.6 kgf-m, 4.4 ft-lb)

5. General Diagnostic Table

A: INSPECTION

Symptom	Possible cause	Remedy
Brake drag	Parking brake lever is maladjusted.	Adjustment.
	Parking brake cable does not move.	Repair or replace.
	Parking brake shoe clearance is maladjusted.	Adjustment.
	Return spring is faulty.	Replace.
Noise from brake	Return spring is faulty.	Replace.
	Shoe hold-down spring is faulty.	Replace.

POWER ASSISTED SYSTEM (POWER STEERING)

PS

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1. General Description

A: SPECIFICATION

Model			1.6 L	2.0 L	OUTBACK	2.5 L	TURBO	STi
Whole system	Minimum turning radius m (ft)		5.2 (17.1)		5.5 (18.0)			5.7 (18.7)
	Steering angle (Inside-Outside)		37.3° — 32.4°		34.5° — 30.3°			32.9° — 28.5°
	Steering wheel diameter mm (in)		375 (14.76)					
	Overall gear ratio (Turns, lock to lock Gear box)		3.22		3.02	2.69		2.66
Gearbox	Type		Rack abd pinion, Integral					
	Backlash		0 (Automatically adjustable)					
	Valve (Power steering system)		Rotary valve					
Pump (Power steering system)	Type		Vane pump					
	Oil tank		Installed on body					
	Output cm^3 (cu in)/rev.		7.2 (0.439)	7.8 (0.476)			7.2 (0.439)	
	Relief pressure kPa (kgf/cm^2, psi)		6,174 — 6,860 (63 — 70, 896 — 994)	6,767 — 7,453 (69 — 76, 981 — 1,081)			7,350 — 8,036 (75 — 82, 1,067 — 1,165)	
	Hydraulic fluid control		Dropping in response to increased engine revolutions					
	Hydraulic fluid ℓ (US qt, Imp qt)/min		1,000 rpm: 6.7 (7.1, 5.9) 3,000 rpm: 6.2 (6.6, 5.4)	1,000 rpm: 7 (7.4, 6.2) 3,000 rpm: 5 (5.3, 4.4)			7.5 (7.9, 6.6)*1 7 (7.4, 6.2)*2	
	Range of revolution rpm		700 — 9,000					
	Revolving direction		Clockwise					
Working fluid (Power steering system)	Name		ATF DEXRON III or equivalent					
	Capacity ℓ (US qt, Imp qt)	Oil tank	0.3 (0.3, 0.3)					
		Total	0.7 (0.7, 0.6)					

*1: With maximum load.
*2: With no load.

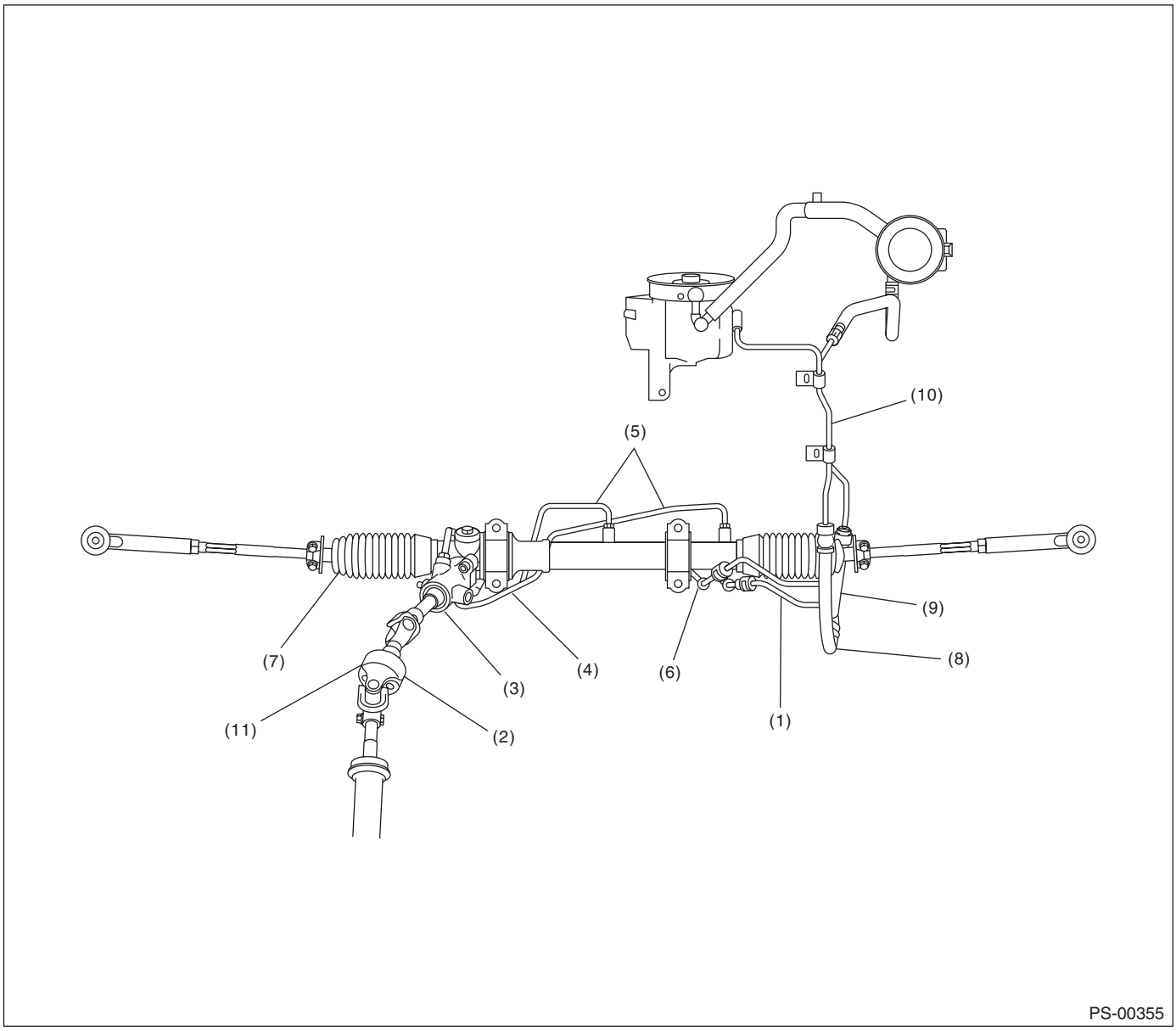
Model				LHD	RHD
Steering wheel	Free play		mm (in)	17 (0.67)	
Turning angle	Inner tire & wheel	TURBO, OUTBACK, RS		34.5°±1.5°	
		STi		32.9°±1.5°	
		Except TURBO, OUTBACK, RS, STi		37.3°±1.5°	
	Outer tire & wheel	TURBO, OUTBACK, RS		30.3°±1.5°	
		STi		28.5°±1.5°	
		Except TURBO, OUTBACK, RS, STi		32.4°±1.5°	
Steering shaft	Clearance between steering wheel and column cover		mm (in)	4.0 (0.16)	
Steering gear-box (Power steering system)	Sliding resistance		N (kgf, lbf)	400 (41, 90) or less	
	Rack shaft play in radial direction	Right-turn steering	mm (in)	0.19 (0.0075) or less	Horizontal movement: 0.19 (0.0075) or less Vertical movement: 0.3 (0.012) or less
		Left-turn steering	mm (in)	Horizontal movement: 0.15 (0.0059) or less Vertical movement: 0.3 (0.012) or less	0.19 (0.0075) or less
	Input shaft play	In radial direction	mm (in)	0.18 (0.0071) or less	
		In axial direction	mm (in)	0.5 (0.020) or less	
	Turning resistance		N (kgf, lbf)	Maximum allowable value: Less than 10.5 N (1.1 kgf, 2.4 lbf) Difference between right and left sliding resistance: Less than 20%	
Oil pump (Power steering system)	Pulley shaft	Radial play	mm (in)	0.4 (0.016) or less	
		Axial play	mm (in)	0.9 (0.035) or less	
	Pulley	Ditch deflection	mm (in)	1.0 (0.039) or less	
		Resistance to rotation	N (kgf, lbf)	9.22 (0.94, 2.07) or less	
	Regular pressure (Unloaded)		kPa (kgf/cm^2, psi)	981 (10, 142) or less	
Steering wheel effort (Power steering system)	At standstill with engine idling on a concrete road		N (kgf, lbf)	31.4 (3.2, 7.1) or less	
	At standstill with engine stalled on a concrete road		N (kgf, lbf)	294.2 (30, 66.2) or less	

Recommended power steering fluid	Manufacturer
ATF DEXRON III or equivalent	B.P.
	CALTEX
	CASTROL
	MOBIL
	SHELL
	TEXACO

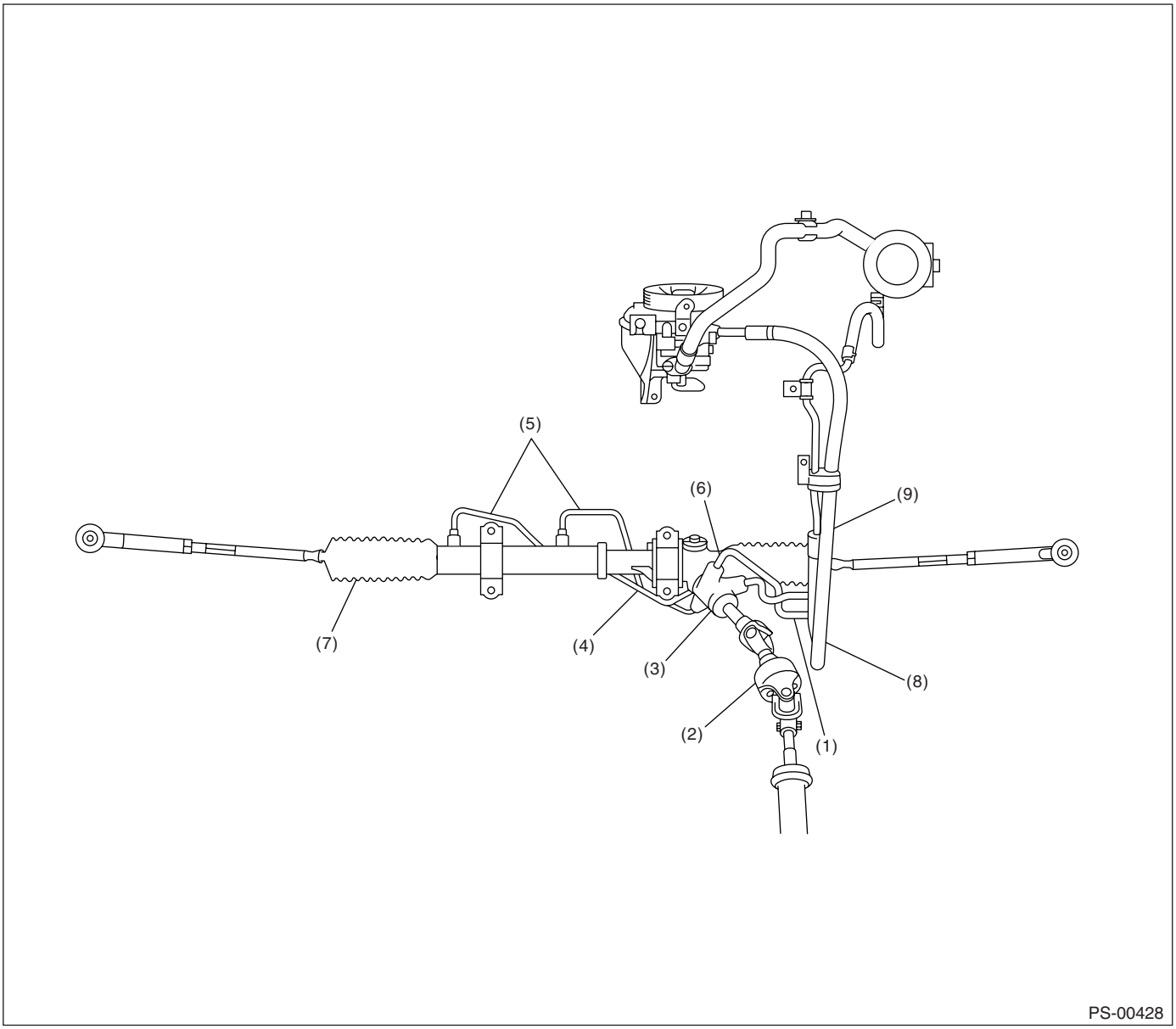
CAUTION:
This table lists various clearances that must be correctly adjusted to ensure the normal vehicle driving without interfering noise, or any other faults.

Location	Minimum allowance
(1) Crossmember — Pipe	5 mm (0.20 in)
(2) DOJ — Shaft or joint	14 mm (0.55 in)
(3) DOJ — Valve housing	11 mm (0.43 in)
(4) Pipe — Pipe	2 mm (0.08 in)
(5) Stabilizer — Pipe	5 mm (0.20 in)
(6) Exhaust pipe — Pipe	11 mm (0.43 in)
(7) Exhaust pipe — Gearbox bolt	15 mm (0.59 in)
(8) Side frame — Hose A and B	10 mm (0.39 in)
(9) Cruise control pump — Hose A and B	15 mm (0.59 in)
(10) Pipe portion of hose A — Pipe portion of hose B	1.5 mm (0.059 in)
(11) AT cooling hose — Joint (LHD model)	20 mm (0.79 in)

- LHD MODEL

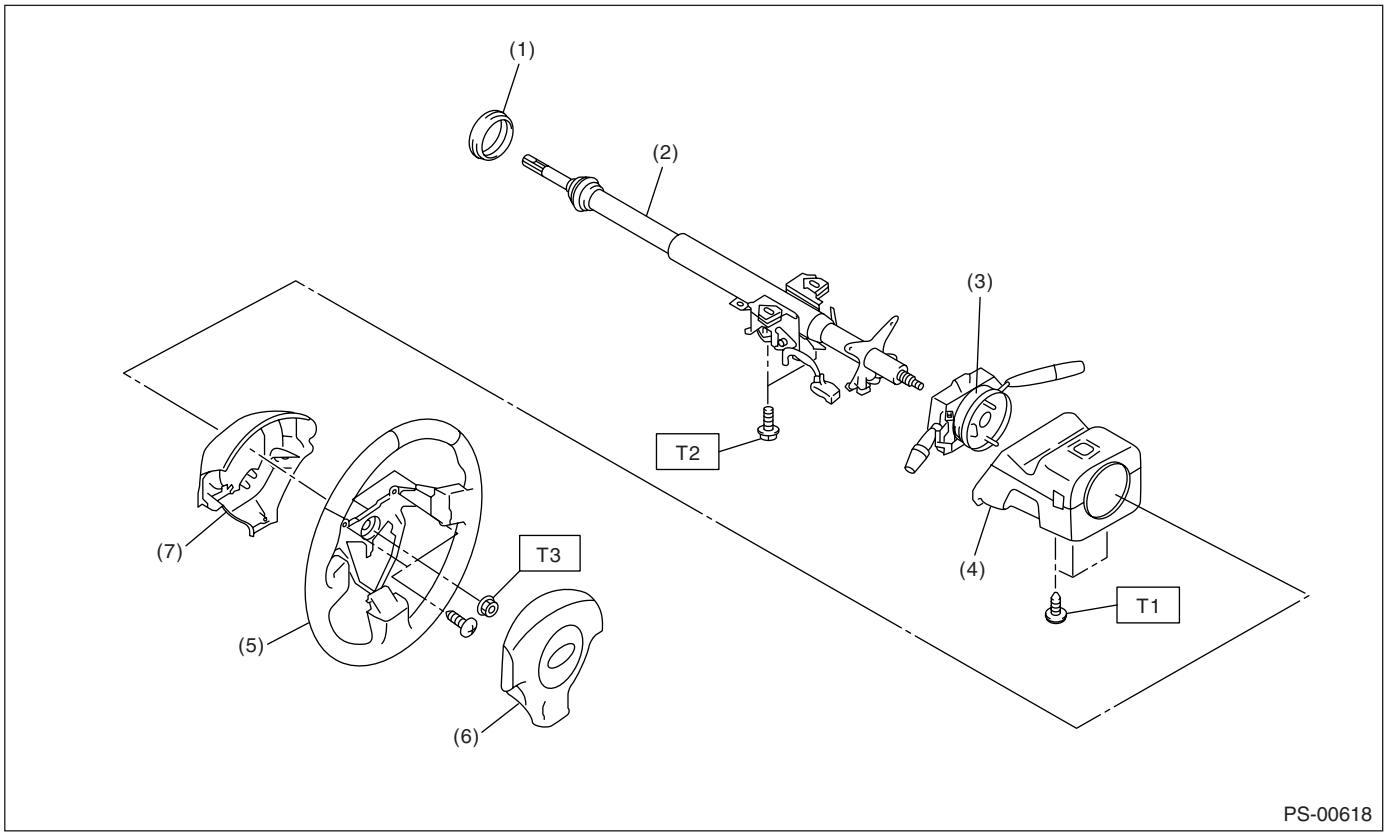


- RHD MODEL



B: COMPONENT

1. STEERING WHEEL AND COLUMN

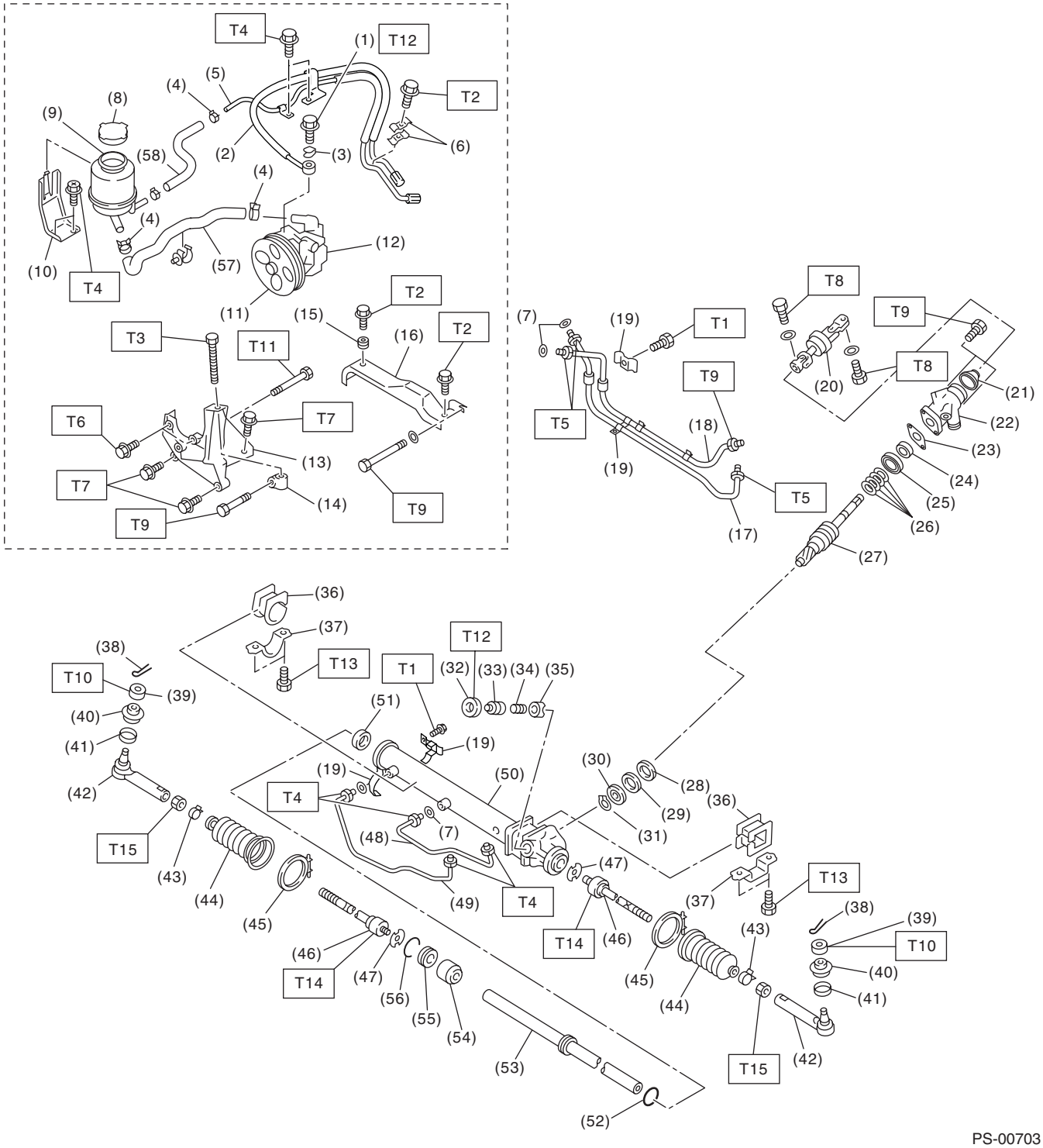


(1)	Bushing	(5)	Steering wheel
(2)	Steering shaft	(6)	Airbag module
(3)	Steering roll connector	(7)	Steering wheel lower cover
(4)	Column cover		

Tightening torque: N·m (kgf-m, ft-lb)
T1: 1.2 (0.12, 0.9)
T2: 25 (2.5, 18.1)
T3: 45 (4.6, 33.2)

2. POWER ASSISTED SYSTEM

• LHD NON-TURBO MODEL



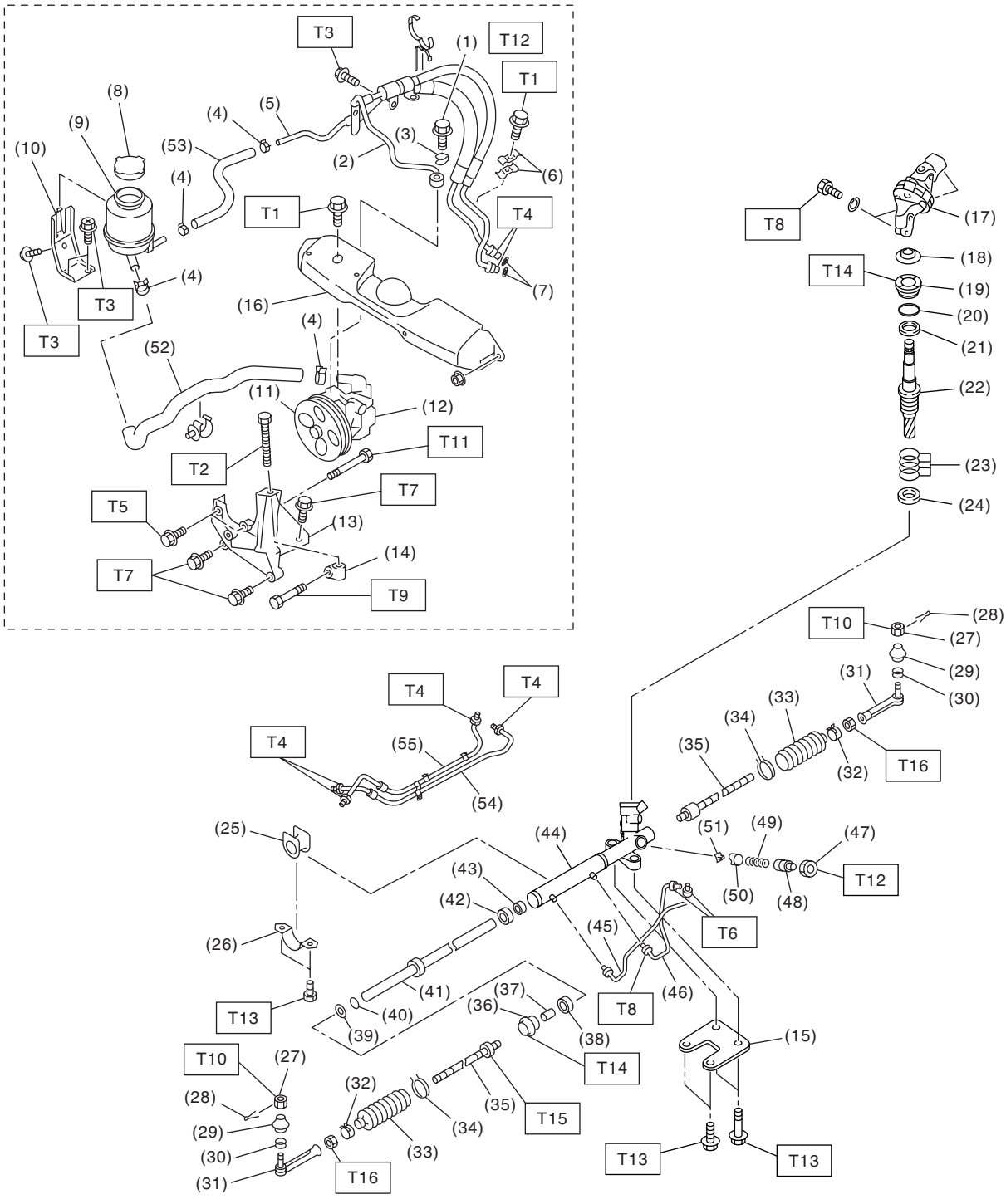
PS-00703

(1) Eye bolt
(2) Pipe C
(3) Gasket
(4) Clip
(5) Pipe D
(6) Clamp E
(7) O-ring
(8) Cap
(9) Reservoir tank
(10) Reservoir tank bracket
(11) Pulley
(12) Oil pump
(13) Bracket
(14) Belt tension nut
(15) Bush
(16) Belt cover
(17) Pipe E
(18) Pipe F
(19) Clamp plate
(20) Universal joint
(21) Dust seal
(22) Valve housing
(23) Gasket
(24) Oil seal
(25) Ball bearing
(26) Seal ring
(27) Pinion and valve ASSY
(28) Oil seal
(29) Back-up washer
(30) Ball bearing
(31) Snap ring
(32) Lock nut
(33) Adjusting screw
(34) Spring
(35) Sleeve
(36) Adapter
(37) Clamp
(38) Cotter pin
(39) Castle nut
(40) Dust cover
(41) Clip
(42) Tie-rod end
(43) Clip
(44) Boot
(45) Band
(46) Tie-rod
(47) Lock washer
(48) Pipe B
(49) Pipe A
(50) Steering body
(51) Oil seal
(52) Piston ring
(53) Rack
(54) Rack bushing
(55) Rack stopper
(56) Snap ring
(57) Suction hose
(58) Hose

Tightening torque: N·m (kgf-m, ft-lb)

T1:	***6 (0.6, 4.3)***
T2:	***7.4 (0.75, 5.4)***
T3:	***8 (0.8, 5.8)***
T4:	***13 (1.3, 9.4)***
T5:	***15 (1.5, 10.8)***
T6:	***15.7 (1.6, 11.6)***
T7:	***22 (2.2, 15.9)***
T8:	***24 (2.4, 17.4)***
T9:	***25 (2.5, 18.1)***
T10:	***27 (2.75, 19.9)***
T11:	***37.3 (3.8, 27.5)***
T12:	***39 (4.0, 28.9)***
T13:	***59 (6.0, 43.4)***
T14:	***78 (8.0, 57.9)***
T15:	***83 (8.5, 61.5)***

• LHD TURBO MODEL AND STi MODEL

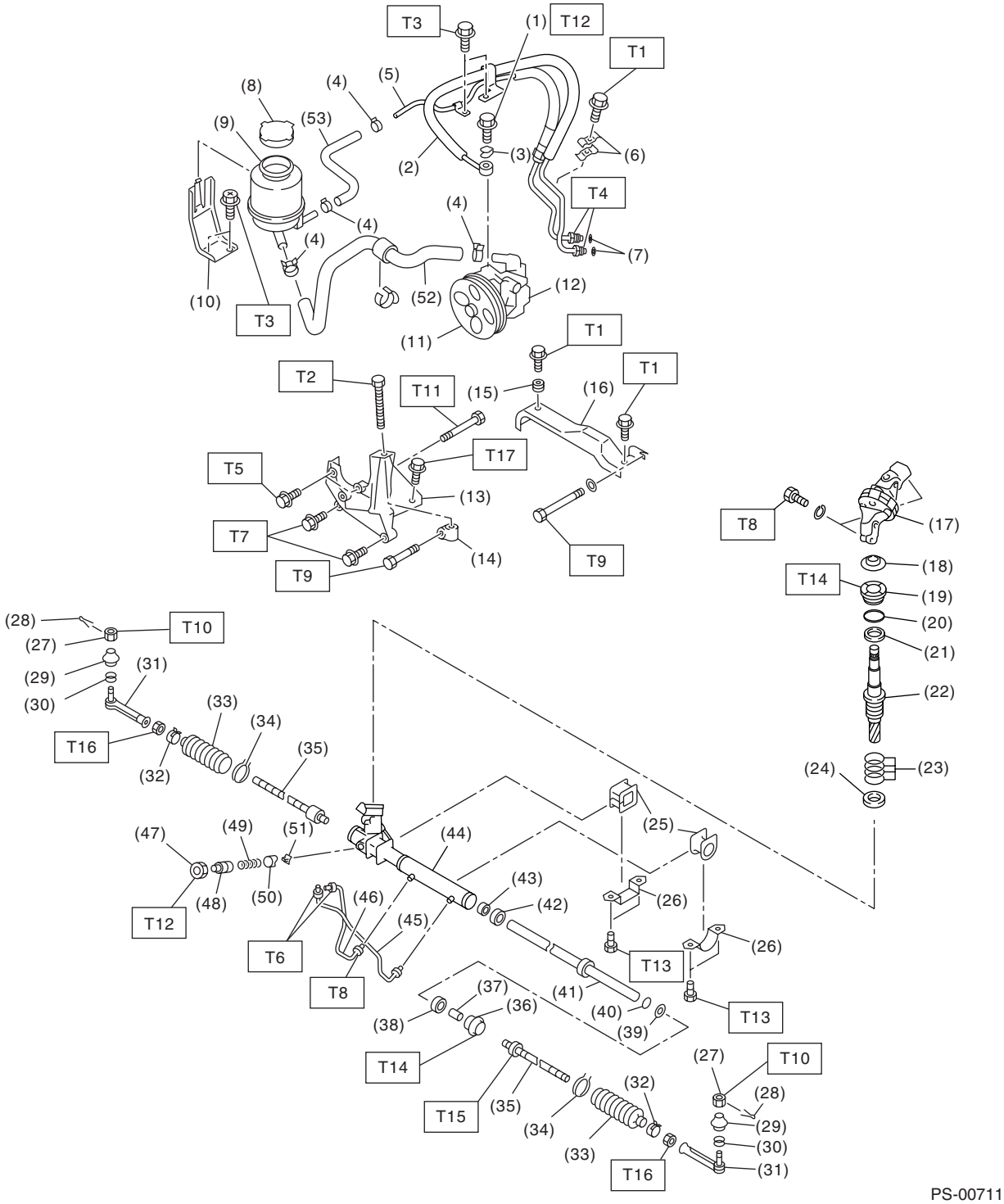


PS-00704

(1) Eye bolt
(2) Pipe C
(3) Gasket
(4) Clip
(5) Pipe D
(6) Clamp E
(7) O-ring
(8) Cap
(9) Reservoir tank
(10) Reservoir tank bracket
(11) Pulley
(12) Oil pump
(13) Bracket
(14) Belt tension nut
(15) Stiffener
(16) Belt cover
(17) Universal joint
(18) Dust cover
(19) Plug
(20) O-ring
(21) Oil seal
(22) Pinion
(23) Seal ring
(24) Oil seal
(25) Adapter
(26) Clamp
(27) Castle nut
(28) Cotter pin
(29) Dust seal
(30) Clip
(31) Tie-rod end
(32) Clip
(33) Boot
(34) Wire
(35) Tie-rod
(36) Holder
(37) Bushing
(38) Oil seal
(39) Oil seal
(40) O-ring
(41) Rack
(42) Oil seal
(43) Back-up washer
(44) Steering body
(45) Pipe A
(46) Pipe B
(47) Lock nut
(48) Adjusting screw
(49) Spring
(50) Sleeve
(51) Seat pad
(52) Suction hose
(53) Return hose
(54) Pipe G
(55) Pipe H

Tightening torque: N·m (kgf-m, ft-lb)	
T1:	***7.4 (0.75, 5.4)***
T2:	***8 (0.8, 5.8)***
T3:	***13 (1.3, 9.4)***
T4:	***15 (1.5, 10.8)***
T5:	***15.7 (1.6, 11.6)***
T6:	***20 (2.0, 14.5)***
T7:	***22 (2.2, 15.9)***
T8:	***24 (2.4, 17.4)***
T9:	***25 (2.5, 18.1)***
T10:	***27 (2.75, 19.9)***
T11:	***37.3 (3.8, 27.5)***
T12:	***39 (4.0, 28.9)***
T13:	***60 (6.1, 44.1)***
T14:	***64 (6.5, 47.0)***
T15:	***90 (9.0, 65.1)***
T16:	***85 (8.7, 62.7)***

• RHD NON-TURBO MODEL

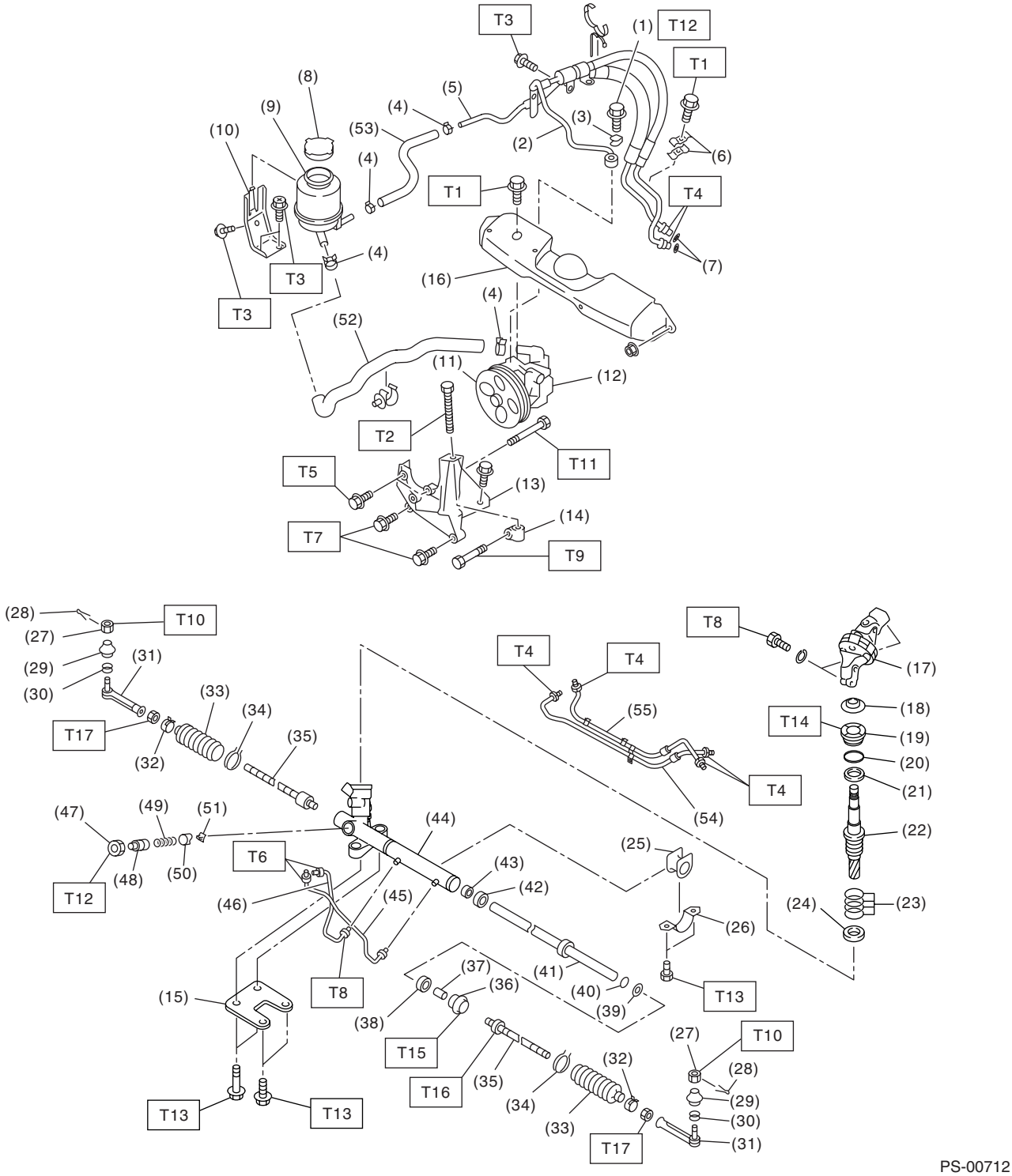


PS-00711

(1) Eye bolt
(2) Pipe C
(3) Gasket
(4) Clip
(5) Pipe D
(6) Clamp E
(7) O-ring
(8) Cap
(9) Reservoir tank
(10) Reservoir tank bracket
(11) Pulley
(12) Oil pump
(13) Bracket
(14) Belt tension nut
(15) Bush
(16) Belt cover
(17) Universal joint
(18) Dust cover
(19) Plug
(20) O-ring
(21) Oil seal
(22) Pinion
(23) Seal ring
(24) Oil seal
(25) Adapter
(26) Clamp
(27) Castle nut
(28) Cotter pin
(29) Dust seal
(30) Clip
(31) Tie-rod end
(32) Clip
(33) Boot
(34) Wire
(35) Tie-rod
(36) Holder
(37) Bush
(38) Oil seal
(39) Oil seal
(40) O-ring
(41) Rack
(42) Oil seal
(43) Back-up washer
(44) Steering body
(45) Pipe A
(46) Pipe B
(47) Lock nut
(48) Adjusting screw
(49) Spring
(50) Sleeve
(51) Seat pad
(52) Suction hose
(53) Return hose

Tightening torque: N·m (kgf-m, ft-lb)	
T1:	***7.4 (0.75, 5.4)***
T2:	***8 (0.8, 5.8)***
T3:	***13 (1.3, 9.4)***
T4:	***15 (1.5, 10.8)***
T5:	***15.7 (1.6, 11.6)***
T6:	***20 (2.0, 14.5)***
T7:	***22 (2.2, 15.9)***
T8:	***24 (2.4, 17.4)***
T9:	***25 (2.5, 18.1)***
T10:	***27 (2.75, 19.9)***
T11:	***37.3 (3.8, 27.5)***
T12:	***39 (4.0, 28.9)***
T13:	***60 (6.1, 44.1)***
T14:	***64 (6.5, 47.0)***
T15:	***90 (9.0, 65.1)***
T16:	***85 (8.7, 62.7)***

• RHD TURBO MODEL



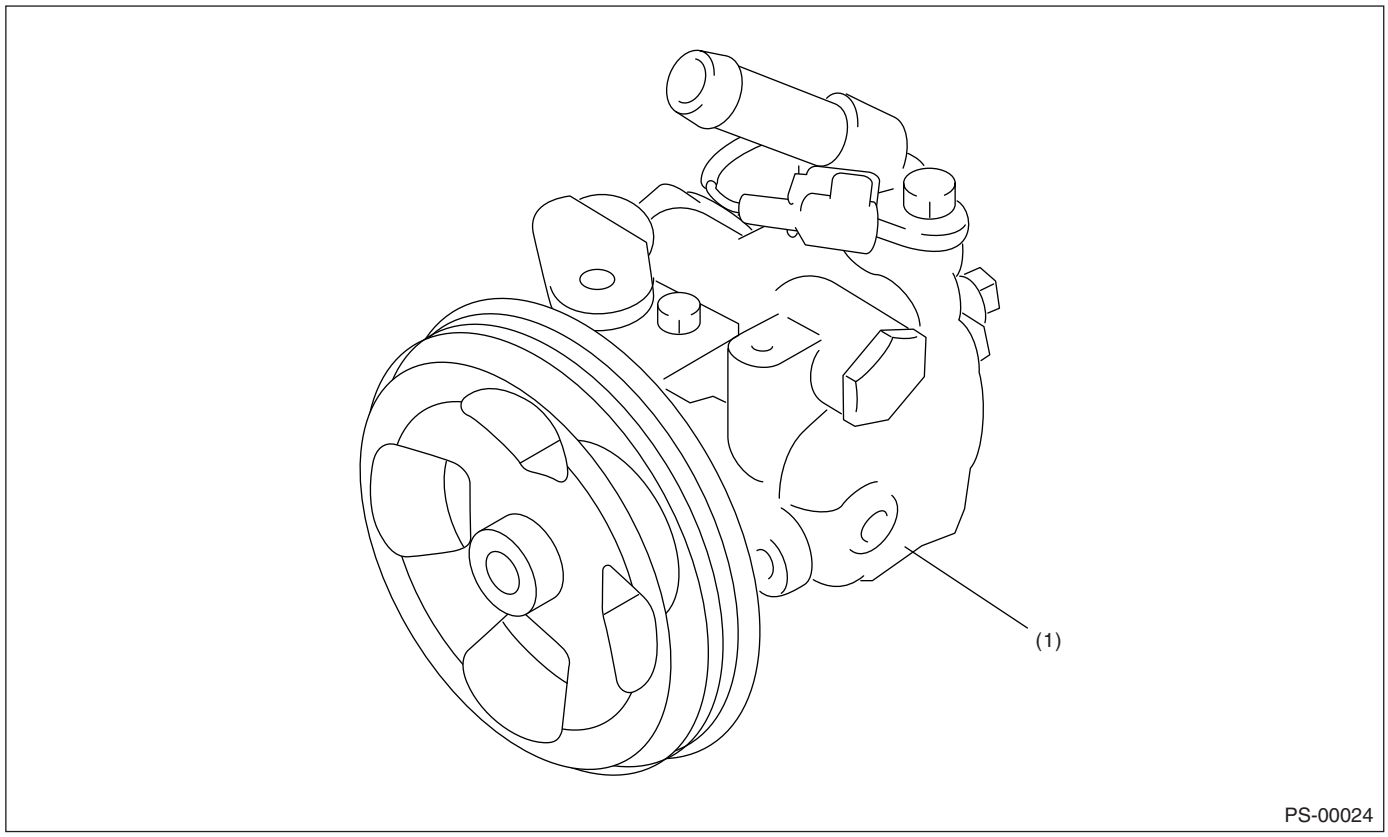
PS-00712

(1) Eye bolt
(2) Pipe C
(3) Gasket
(4) Clip
(5) Pipe D
(6) Clamp E
(7) O-ring
(8) Cap
(9) Reservoir tank
(10) Reservoir tank bracket
(11) Pulley
(12) Oil pump
(13) Bracket
(14) Belt tension nut
(15) Stiffener
(16) Belt cover
(17) Universal joint
(18) Dust cover
(19) Plug
(20) O-ring
(21) Oil seal
(22) Pinion
(23) Seal ring
(24) Oil seal
(25) Adapter
(26) Clamp
(27) Castle nut
(28) Cotter pin
(29) Dust seal
(30) Clip
(31) Tie-rod end
(32) Clip
(33) Boot
(34) Wire
(35) Tie-rod
(36) Holder
(37) Bush
(38) Oil seal
(39) Oil seal
(40) O-ring
(41) Rack
(42) Oil seal
(43) Back-up washer
(44) Steering body
(45) Pipe A
(46) Pipe B
(47) Lock nut
(48) Adjusting screw
(49) Spring
(50) Sleeve
(51) Seat pad
(52) Suction hose
(53) Return hose
(54) Pipe G
(55) Pipe H

Tightening torque: N·m (kgf-m, ft-lb)	
T1:	***7.4 (0.75, 5.4)***
T2:	***8 (0.8, 5.8)***
T3:	***13 (1.3, 9.4)***
T4:	***15 (1.5, 10.8)***
T5:	***15.7 (1.6, 11.6)***
T6:	***20 (2.0, 14.5)***
T7:	***22 (2.2, 15.9)***
T8:	***24 (2.4, 17.4)***
T9:	***25 (2.5, 18.1)***
T10:	***27 (2.75, 19.9)***
T11:	***37.3 (3.8, 27.5)***
T12:	***39 (4.0, 28.9)***
T13:	***60 (6.1, 44.1)***
T14:	***64 (6.5, 47.0)***
T15:	***75 (7.6, 58.7)***
T16:	***90 (9.0, 65.1)***
T17:	***85 (8.7, 62.7)***

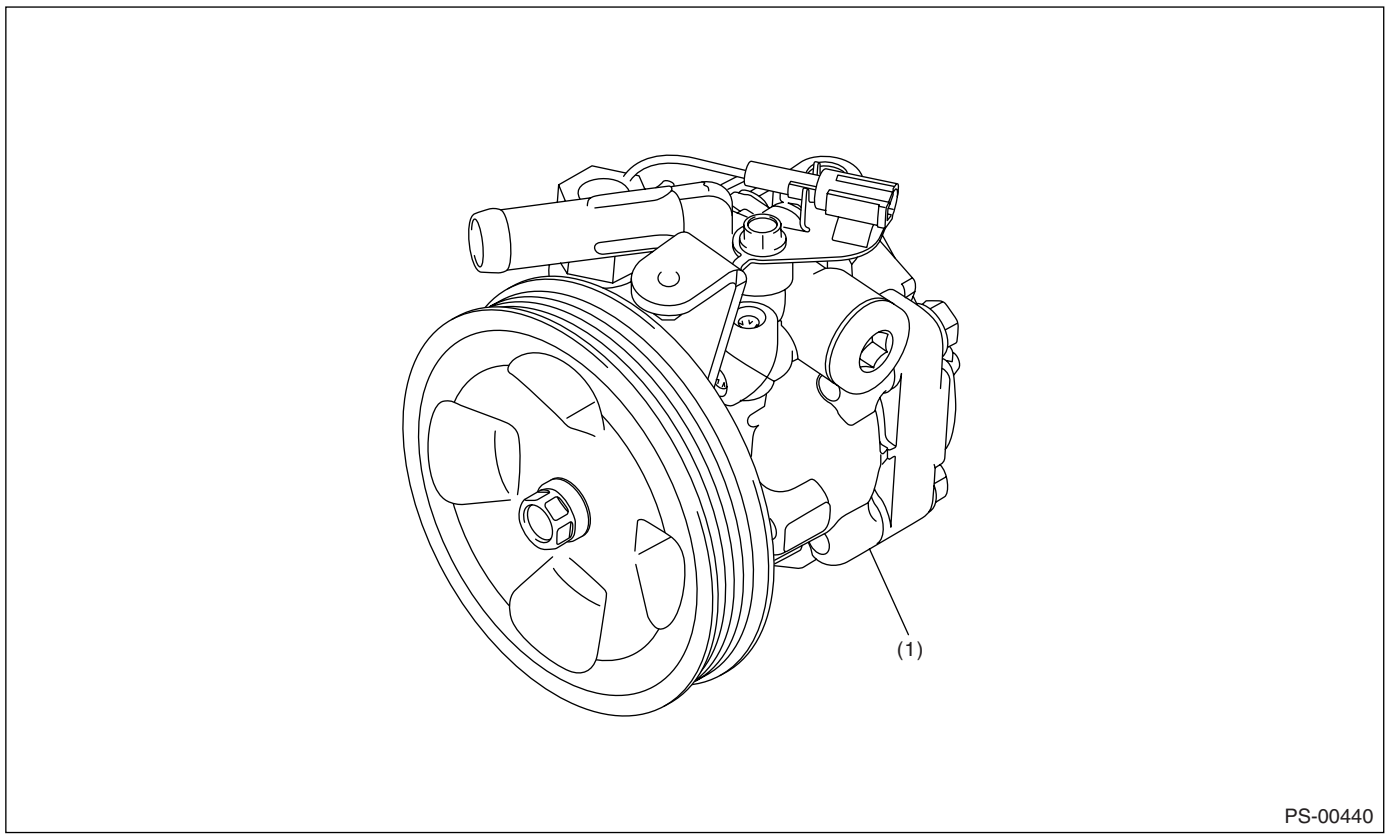
3. OIL PUMP

• NON-TURBO MODEL



(1) Power steering oil pump ASSY

• TURBO MODEL



(1) Power steering oil pump ASSY

C: CAUTION

• Wear working clothing, including a cap, protective goggles, and protective shoes during operation.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
• Be careful not to burn, because each part on the vehicle is hot after running.
• Use SUBARU genuine power steering fluid, grease etc. or the equivalent. Do not mix steering fluid, grease etc. with that of another grade or from other manufacturers.
• Be sure to tighten fasteners including bolts and nuts to the specified torque.
• Place shop jacks or rigid racks at the specified points.
• Before securing a part on a vise, place cushioning material such as wood blocks, aluminum plate, or shop cloth between the part and the vise.

D: PREPARATION TOOL

1. SPECIAL TOOLS

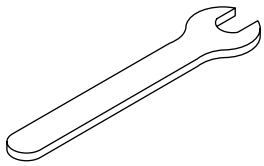
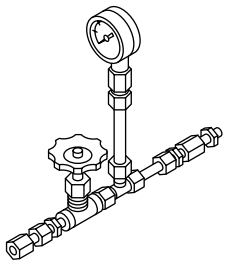
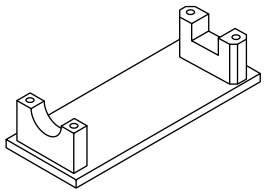
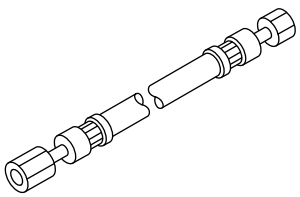
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-925700000	925700000	WRENCH	• Used for removing and installing tie-rod. • Apply this tool to rack.
 ST-925711000	925711000	PRESSURE GAUGE	Used for measuring oil pump pressure.
 ST-926200000	926200000	STAND	Used when inspecting characteristic of gearbox assembly and disassembling it.
 ST34099AC010	34099AC010	ADAPTER HOSE A	Used with PRESSURE GAUGE (925711000).

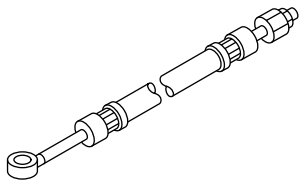
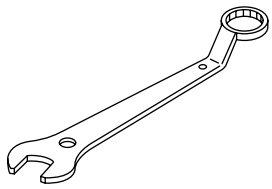
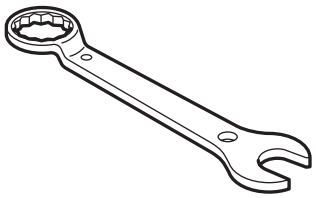
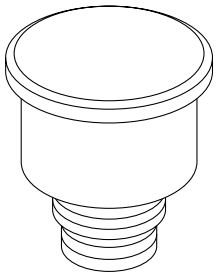
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST34099AC020	34099AC020	ADAPTER HOSE B	Used with PRESSURE GAUGE (925711000).
 ST-926230000	926230000	SPANNER	For the lock nut when adjusting backlash of gear-box.
 ST34099PA100	34099PA100	SPANNER	Used for measuring the rotating resistance of gear-box assembly.
 ST34199AE040	34199AE040	OIL CHARGE GUIDE	Used for charging power steering fluid.

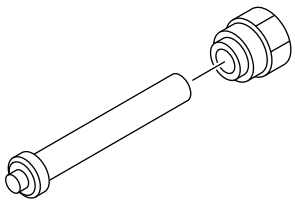
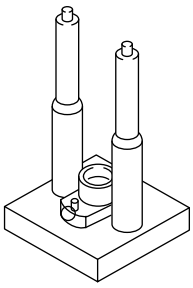
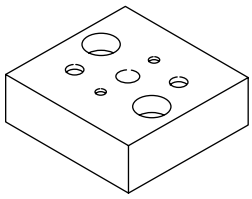
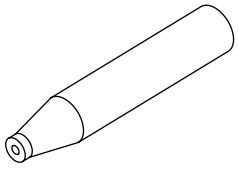
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-926420000	926420000	PLUG	When oil leaks from pinion side of gearbox assembly, remove pipe B from valve housing, attach this tool and check oil leaking points.
 ST-926370000	926370000	INSTALLER A	• Used for installing valve assembly into valve housing assembly. • Used with STAND BASE (34099FA100). • For LHD Non-turbo model.
 ST34099FA100	34099FA100	STAND BASE	• Used for assembling power steering gearbox. • For LHD Non-turbo model.
 ST-926390001	926390001	COVER & REMOVER ASSY	• Used for assembling rack assembly. • For LHD Non-turbo model.

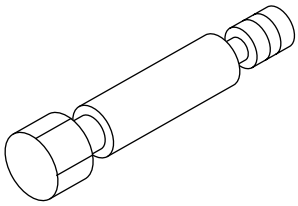
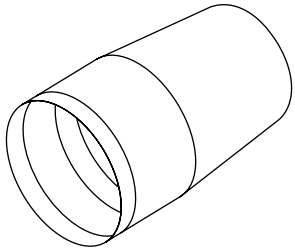
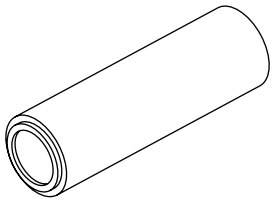
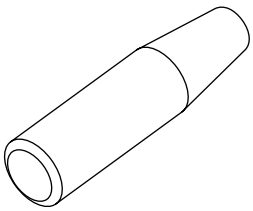
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-926400000	926400000	GUIDE	• Right side of rack when installing rack bush. • Used with GUIDE (927660000). • For LHD Non-turbo model.
 ST-927660000	927660000	GUIDE	• Right side of rack when installing rack bush. • Used with GUIDE (926400000). • For LHD Non-turbo model.
 ST-927620000	927620000	INSTALLER B	• Used for installing oil seal of valve housing. • Used with INSTALLER A (926360000). • For LHD Non-turbo model.
 ST-926360000	926360000	INSTALLER A	• Used as a guide to install oil seal. • Used with INSTALLER B (927620000). • For LHD Non-turbo model.

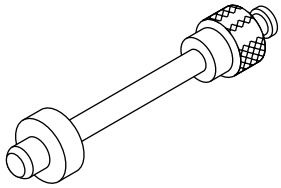
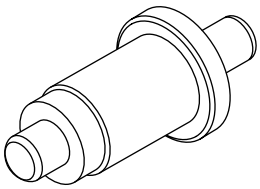
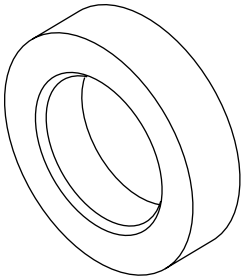
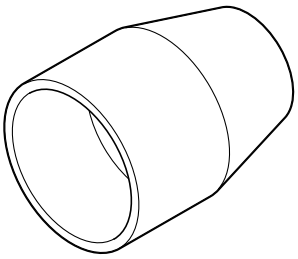
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST34099FA110	34099FA110	INSTALLER	Used for installing oil seal. • For LHD Non-turbo model.
 ST34099FA120	34099FA120	INSTALLER AND REMOVER SEAL	• Used for installing valve housing oil seal. • Used with INSTALLER SEAL. (34099FA130) • Used for installing valve housing ball bearing. • Used for removing oil seal and ball bearing from valve housing. • For LHD Non-turbo model.
 ST34099FA130	34099FA130	INSTALLER SEAL	• Used for installing valve housing oil seal. • Used with INSTALLER AND REMOVER SEAL (34099FA120). • For LHD Non-turbo model.
 ST-926250000	926250000	GUIDE	• Used for installing holder ASSY into rack housing. • For RHD Non-turbo model.

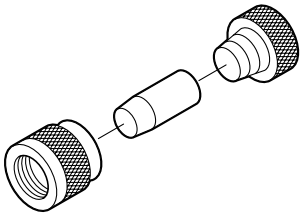
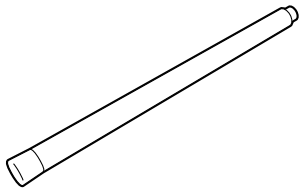
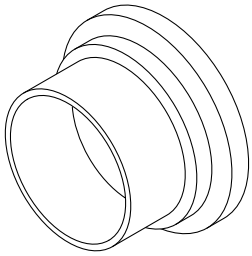
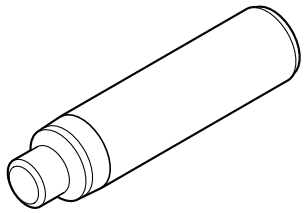
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-927490000	927490000	INSTALLER A, B, C	• Used for installing oil seal into rack assembly. • For RHD Non-turbo model.
 ST-927580000	927580000	REMOVER	• Used for removing back-up ring and oil seal. • For RHD Non-turbo model.
 ST34199AE000	34199AE000	GUIDE	• Used for installing rack and seal into housing assembly. • For RHD Non-turbo model.
 ST34099FA030	34099FA030	INSTALLER & REMOVER	• Used for removing and installing rack oil seal (outer & inner). • For RHD Non-turbo model.

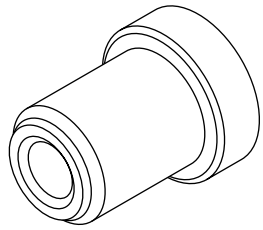
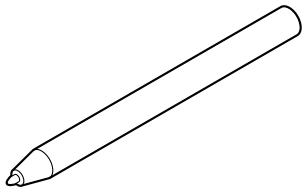
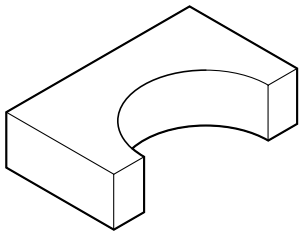
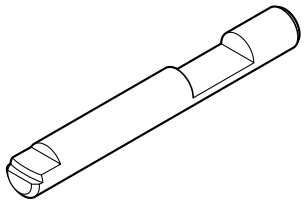
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST34199AE010	34199AE010	INSTALLER	• Used for installing rack oil seal (outer). • For RHD Non-turbo model.
 ST34099FA060	34099FA060	PUNCH HOLDER	• Used for caulking. • For RHD Non-turbo and Turbo model • For LHD Turbo model
 ST34099FA070	34099FA070	BASE	• Used for supporting housing assembly. • For RHD Non-turbo model.
 ST34099FA080	34099FA080	PUNCH	• Used for removing caulking. • For RHD Non-turbo and Turbo model • For LHD Turbo model

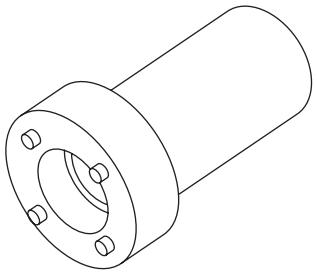
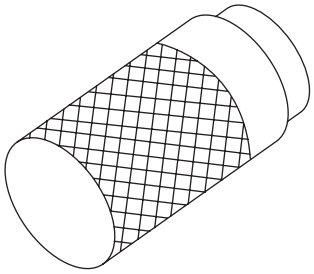
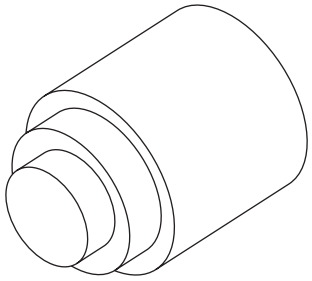
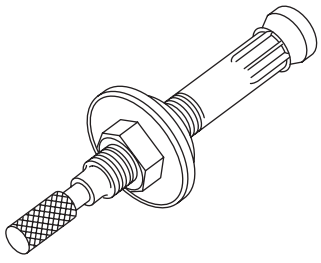
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST34199AE090	34199AE090	PLUG WRENCH	• Used for removing plug. • For RHD Non-turbo and Turbo model • For LHD Turbo model
 ST34199AE100	34199AE100	PLUG OIL SEAL REMOVER	• Used for removing plug oil seal. • For RHD Non-turbo and Turbo model • For LHD Turbo model
 ST34199AE110	34199AE110	PLUG OIL SEAL INSTALLER	• Used for installing plug oil seal. • For RHD Non-turbo and Turbo model • For LHD Turbo model
 ST34199AE120	34199AE120	GEARBOX OIL SEAL REMOVER	• Used for removing gearbox oil seal. • For RHD Non-turbo and Turbo model • For LHD Turbo model

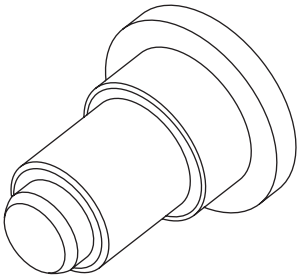
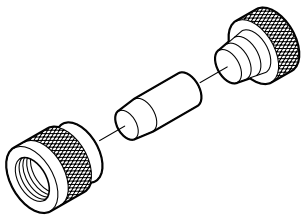
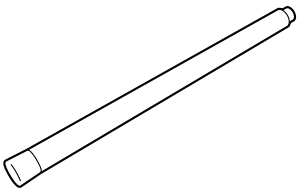
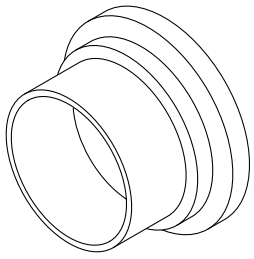
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST34199AE130	34199AE130	GEARBOX OIL SEAL INSTALLER	• Used for installing gearbox oil seal. • For RHD Non-turbo and Turbo model • For LHD Turbo model
 ST34199FE040	34199FE040	INSTALLER A, B, C	• Used for installing oil seal into rack assembly. • For RHD Turbo model. • For LHD Turbo model.
 ST34199FE010	34199FE010	REMOVER	• Used for removing back-up ring and oil seal. • For RHD Turbo model. • For LHD Turbo model.
 ST34199FE050	34199FE050	GUIDE	• Used for installing rack and seal into housing assembly. • For RHD Turbo model. • For LHD Turbo model.

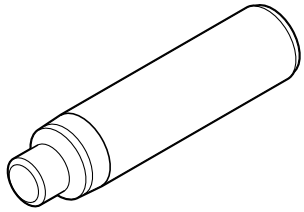
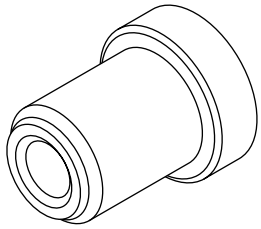
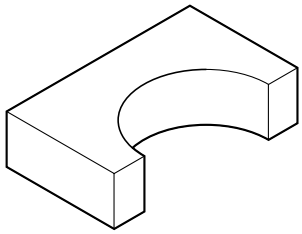
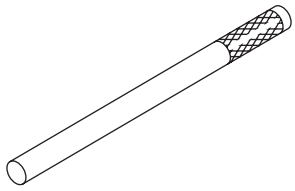
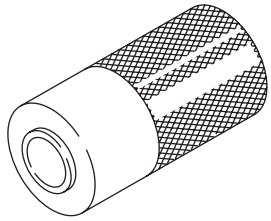
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST34199FE000	34199FE000	INSTALLER & REMOVER	• Used for removing and installing rack oil seal (outer & inner). • For RHD Turbo model. • For LHD Turbo model.
 ST34199FE060	34199FE060	INSTALLER	• Used for installing rack oil seal (outer). • For RHD Turbo model. • For LHD Turbo model.
 ST34199FE020	34199FE020	BASE	• Used for supporting housing assembly. • For RHD Turbo model. • For LHD Turbo model.
 ST34199AE050	34199AE050	OIL SEAL REMOVER	• Used for removing oil seal. • For LHD Non-turbo model.

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-927640000	927640000	INSTALLER B	• Used for ball bearing into housing. • For LHD Non-turbo model.

2. GENERAL TOOL

TOOL NAME	REMARKS
Spring scale	Used for measuring tightening torque.
Snap ring pliers	Used for removing and installing snap ring.
Dial gauge	Used for measuring steering gearbox.

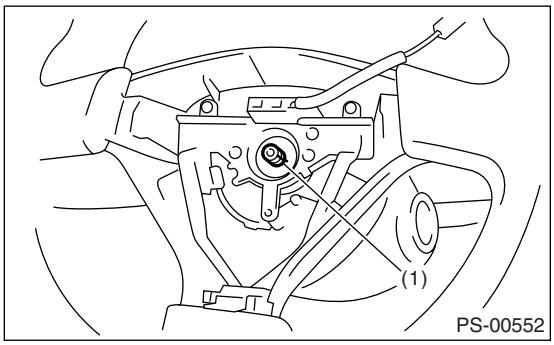
2. Steering Wheel

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Set the tires to straight-ahead position.
3) Remove the airbag module. <Ref. to AB-12, REMOVAL, Driver's Airbag Module.>

WARNING:
Always refer to "Airbag System" before performing airbag module service. <Ref. to AB-3, CAUTION, General Description.>

4) Make matching marks on the steering wheel and steering shaft.



(1) Matching mark

5) Remove the steering wheel nut, and then draw out the steering wheel from shaft using steering puller.

B: INSTALLATION

WARNING:
Always refer to "Airbag System" before performing airbag module service. <Ref. to AB-3, CAUTION, General Description.>

1) Align the center of roll connector. <Ref. to AB-18, ADJUSTMENT, Roll Connector.>
2) Install in the reverse order of removal.

NOTE:
Align matching marks on the steering wheel and steering shaft.

Tightening torque:
45 N·m (4.6 kgf-m, 33.2 ft-lb)

Column cover-to-steering wheel clearance:
2 — 4 mm (0.08 — 0.16 in)

CAUTION:
Insert the roll connector guide pin into guide hole on lower end of surface of steering wheel to prevent damage.

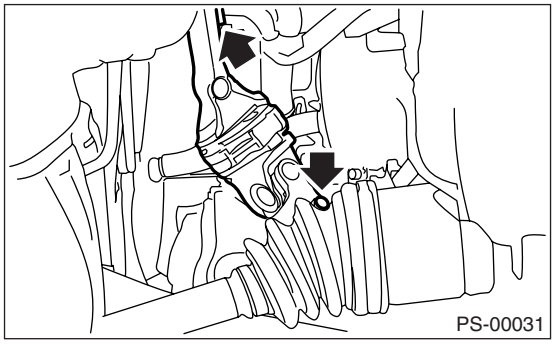
C: INSPECTION

1) Check the steering wheel for deformation. If the deformation is excessive, replace steering wheel.
2) Check the splines on steering wheel for damage. If the damage is excessive, replace steering wheel.

3. Universal Joint

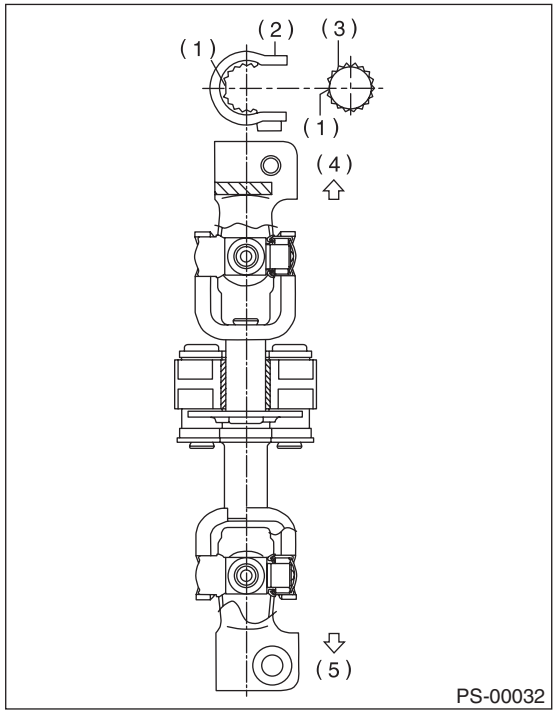
A: REMOVAL

1) Remove the steering wheel. <Ref. to PS-28, REMOVAL, Steering Wheel.>
2) Make matching mark on the universal joint.
3) Remove the universal joint bolts, and then remove the universal joint.



B: INSTALLATION

1) Align the cutout at serrated section of the column shaft and yoke, and then insert the universal joint into column shaft.



(1) Cutout
(2) Yoke
(3) Column shaft
(4) Column shaft side
(5) Gearbox side

2) Align the matching marks, and then insert the universal joint to serrated section of gear box assembly.
3) Tighten the bolt.

Tightening torque:
24 N·m (2.4 kgf-m, 17.4 ft-lb)

CAUTION:
Excessively large tightening torque of the universal joint bolts may lead to heavy steering wheel operation.

Standard clearance between gearbox to DOJ:
Over 14 mm (0.55 in)

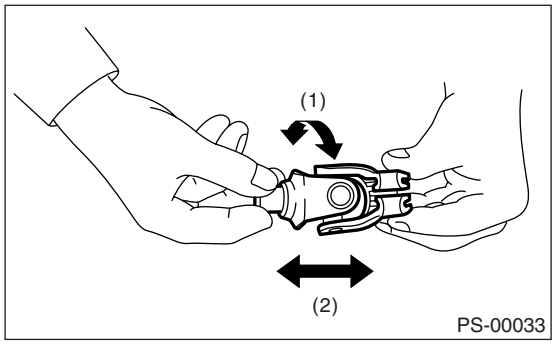
4) Align the center of roll connector. <Ref. to AB-18, ADJUSTMENT, Roll Connector.>
5) Install the steering wheel and airbag module. <Ref. to PS-28, INSTALLATION, Steering Wheel.>

WARNING:
Always refer to "Airbag System" before performing airbag module service. <Ref. to AB-3, CAUTION, General Description.>

C: INSPECTION

Check for wear, damage, or any other faults. If necessary, replace.

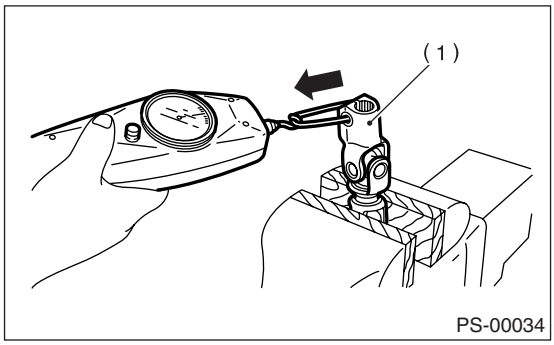
Service limit:
Universal joint play; 0 mm (0 in)
Maximum swing torque; 0.3 N (0.03 kgf, 0.07 lbf)



(1) Swing torque
(2) Play

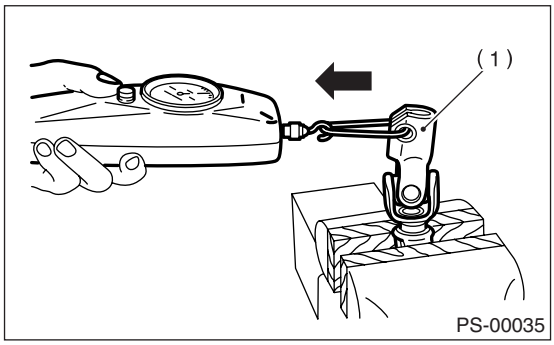
Measurement of swing torque of universal joint is as shown in the figures.

Service limit:
Maximum load; 3.8 N (0.39 kgf, 0.86 lbf) or less



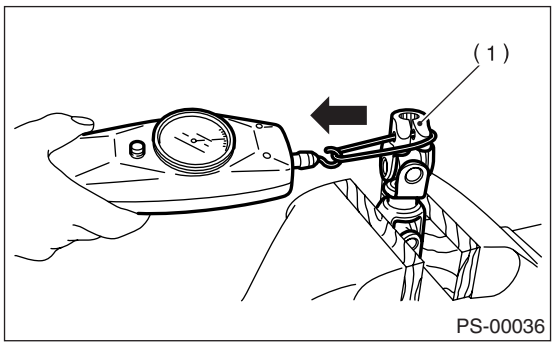
(1) Yoke (gearbox side)

Service limit:
Maximum load; 3.8 N (0.39 kgf, 0.86 lbf) or less



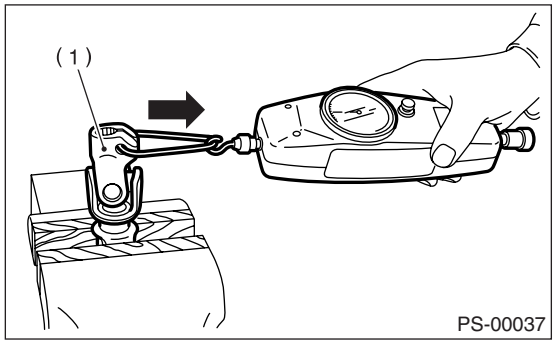
(1) Yoke (gearbox side)

Service limit:
Maximum load; 7.3 N (0.74 kgf, 1.64 lbf) or less



(1) Yoke (Steering column side)

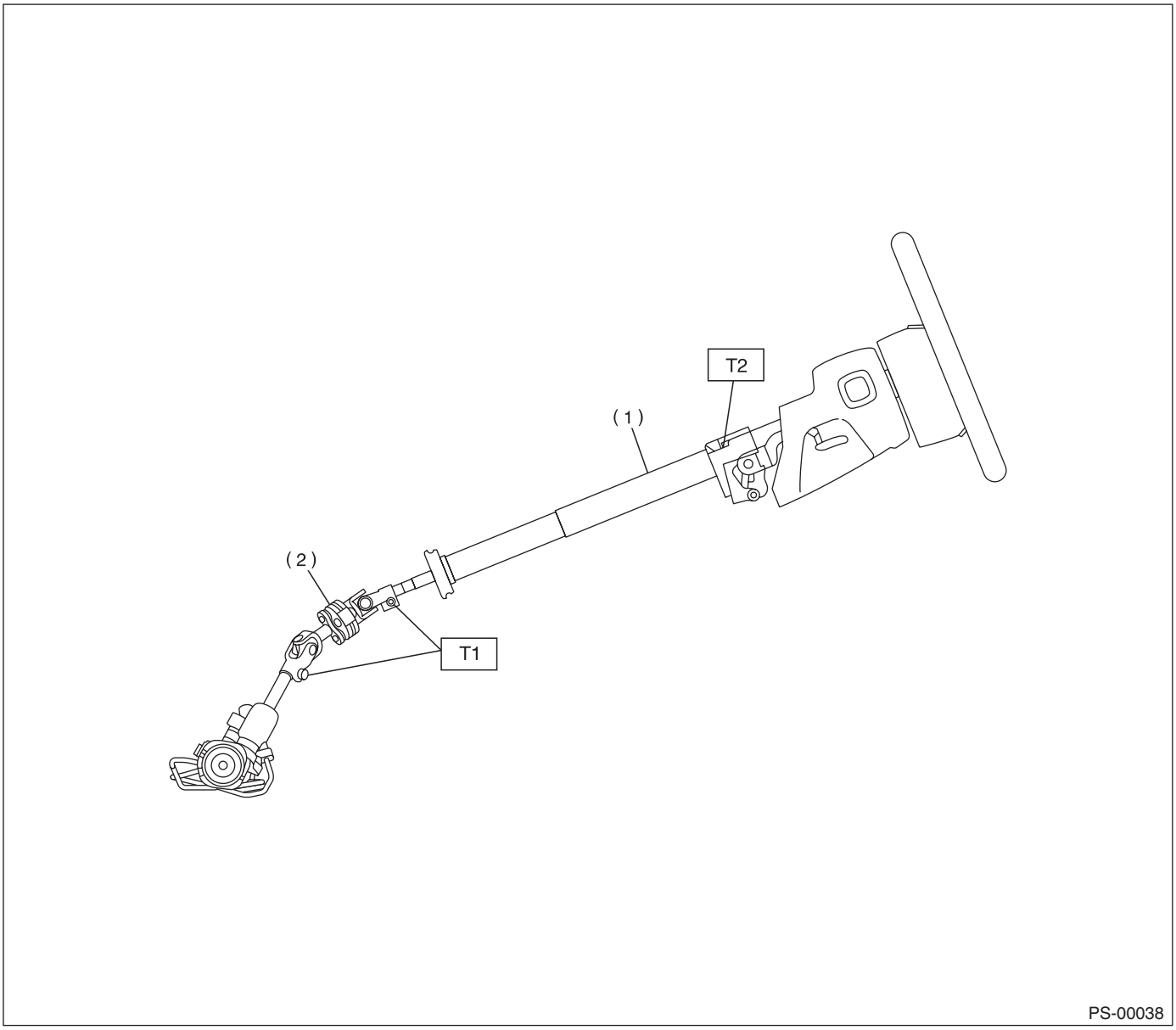
Service limit:
Maximum load; 7.3 N (0.74 kgf, 1.64 lbf) or less



(1) Yoke (Steering column side)

4. Tilt Steering Column

A: REMOVAL



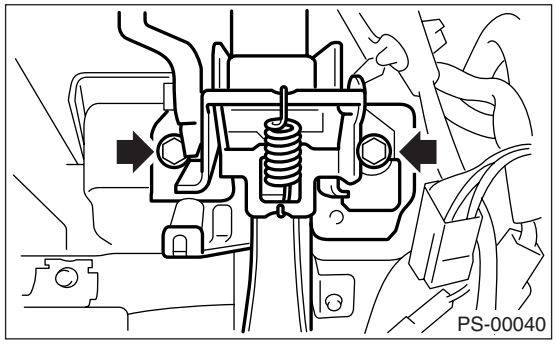
(1) Tilt steering column
(2) Universal joint

Tightening torque: N·m (kgf-m, ft-lb)
T1: 24 (2.4, 17.4)
T2: 25 (2.5, 18.1)

1) Set the vehicle on a lift.
2) Disconnect the ground cable from battery.
3) Remove the airbag module. <Ref. to AB-12, REMOVAL, Driver's Airbag Module.>

WARNING:
Always refer to "Airbag System" before performing airbag module service. <Ref. to AB-3, CAUTION, General Description.>

4) Remove the steering wheel. <Ref. to PS-28, REMOVAL, Steering Wheel.>
5) Remove the universal joint. <Ref. to PS-29, REMOVAL, Universal Joint.>
6) Remove the trim panel under instrument panel.
7) Remove the steering column lower cover.
8) Remove all connectors from steering column.
9) Remove the two bolts under instrument panel securing steering column.

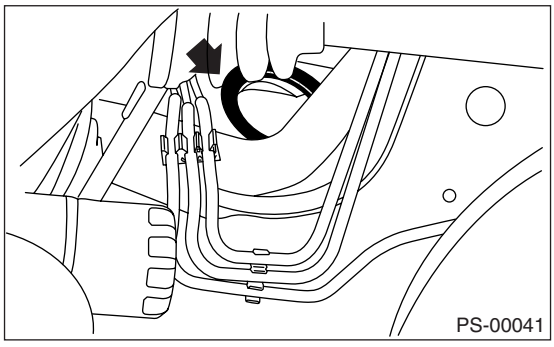

PS-00040

10) Pull out the steering shaft assembly from hole on toe board.

CAUTION:
• Be sure to remove the universal joint before removing the steering shaft assembly installing bolts when removing the steering shaft assembly or when lowering it for servicing of other parts.
• Do not loosen the tilt lever when the steering column is not secured to the vehicle.

B: INSTALLATION

1) Set the grommet to toe board.


PS-00041

2) Insert the end of steering shaft into toe board grommet.
3) With the tilt lever secured, tighten the steering shaft mounting bolts under instrument panel.

Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)

4) Connect all connectors under instrument panel.
5) Connect the airbag system connector at harness spool.

NOTE:
Make sure to apply double lock.

6) Install the lower column cover with tilt lever held in the lowered position.
7) Install the universal joint. <Ref. to PS-29, INSTALLATION, Universal Joint.>
8) Align center of roll connector. <Ref. to AB-18, ADJUSTMENT, Roll Connector.>
9) Install the steering wheel. <Ref. to PS-28, INSTALLATION, Steering Wheel.>

CAUTION:
Insert the roll connector guide pin into guide hole on lower end of surface of steering wheel to prevent damage.

10) Install the airbag module to steering wheel.

WARNING:
Always refer to "Airbag System" before performing the service operation. <Ref. to AB-3, CAUTION, General Description.>

C: DISASSEMBLY

Remove the two screws securing upper steering column covers, and two screws securing combination switch, and then remove the related parts.

D: ASSEMBLY

Insert the combination switch to upper column shaft, and then install the upper column cover. Then route the ignition key harness and combination switch harness between column cover mounting bosses.

Tightening torque:
Column cover
1.2 N·m (0.12 kgf-m, 0.9 ft-lb)

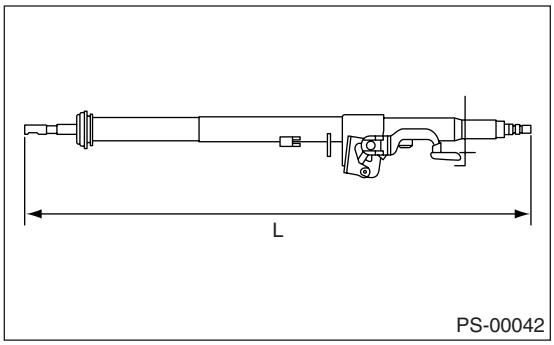
CAUTION:
Do not overtorque the screw.

E: INSPECTION

1. BASIC INSPECTION

Measure overall length of the steering column. If not as specified, replace.

Standard value:
Overall length L
818.7±1.5 mm (32.23±0.059 in)



2. AIRBAG MODEL INSPECTION

WARNING:
For airbag inspection procedures, refer to "Airbag System". <Ref. to AB-3, CAUTION, General Description.>

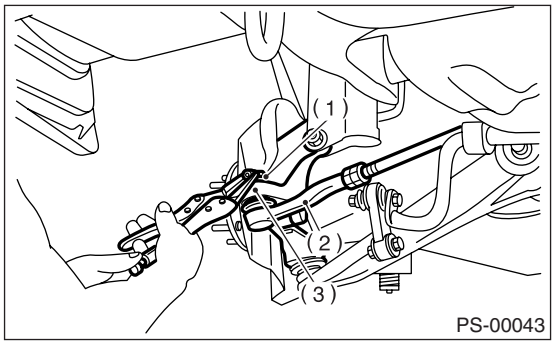
5. Steering Gearbox [LHD Model]

A: REMOVAL

1) Set the vehicle on a lift.
2) Disconnect the ground cable from battery.
3) Loosen the front wheel nut.
4) Lift-up the vehicle, and then remove the front wheels.
5) Remove the under cover.
6) Remove the sub frame. <Ref. to FS-25, REMOVAL, Sub Frame.>
7) Remove the front exhaust pipe assembly. (Non-turbo model)
<Ref. to EX(H4SO)-6, REMOVAL, Front Exhaust Pipe.>

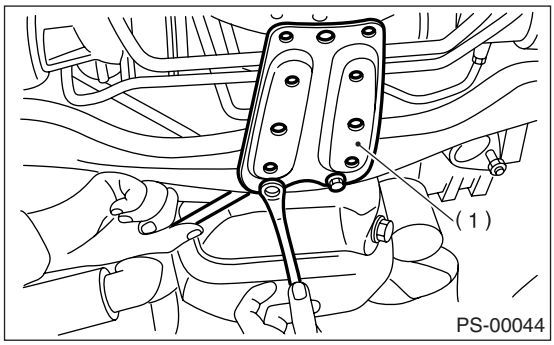
WARNING:
Be careful, the exhaust pipe is hot.

8) Using a puller, remove the tie-rod end from knuckle arm after pulling off cotter pin and removing castle nut.



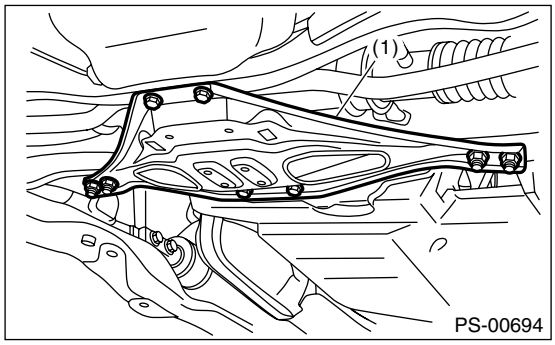
(1) Castle nut
(2) Tie-rod end
(3) Knuckle arm

9) Remove the jack-up plate and front stabilizer.
- NON-TURBO MODEL



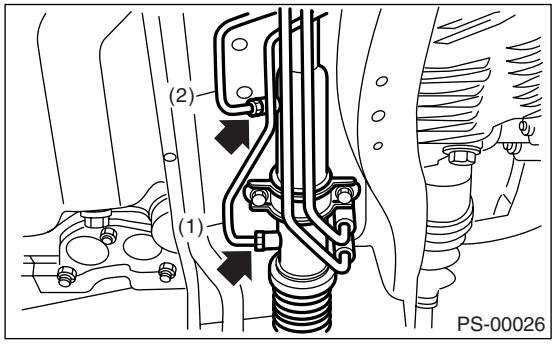
(1) Jack-up plate

- TURBO MODEL



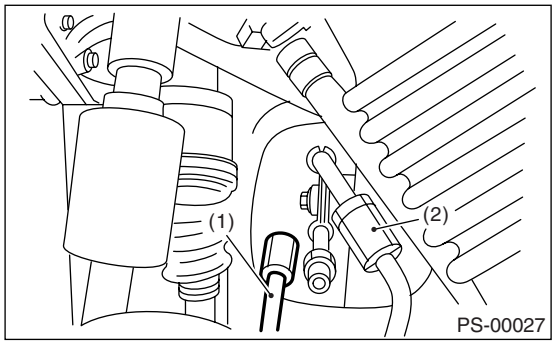
(1) Jack-up plate

10) Remove the one pipe joint at center of gearbox, and connect vinyl hose to pipe and joint. Discharge fluid by turning the steering wheel fully clockwise and counterclockwise. Discharge fluid similarly from the other pipe.



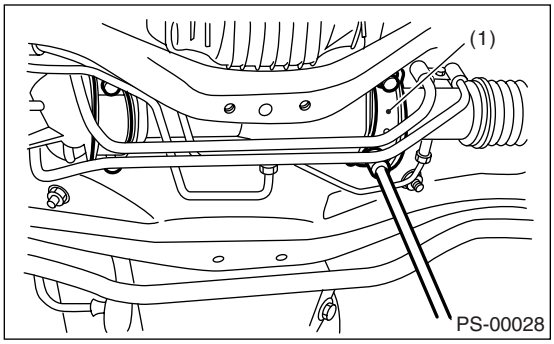
(1) Pipe A
(2) Pipe B

11) Remove the universal joint. <Ref. to PS-29, REMOVAL, Universal Joint.>
12) Disconnect the lower pipe C from gear box first, and upper pipe D second.



(1) Pipe C
(2) Pipe D

13) Remove the clamp bolts securing the gearbox to crossmember, and then remove the gearbox.

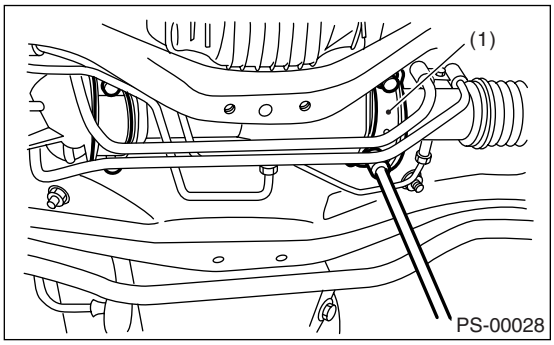


(1) Clamp

B: INSTALLATION

1) Insert the gearbox into crossmember, being careful not to damage the gearbox boot.
2) Tighten the gearbox to crossmember bracket via clamp with bolts to specified torque.

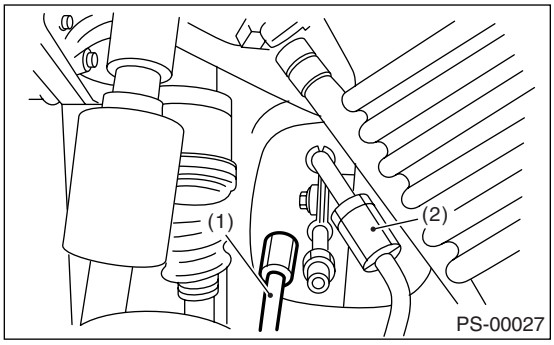
Tightening torque:
59 N·m (6.0 kgf-m, 43.4 ft-lb)



(1) Clamp

3) Connect the pipe D first to gear box, and pipe C second.

Tightening torque:
15 N·m (1.5 kgf-m, 10.8 ft-lb)



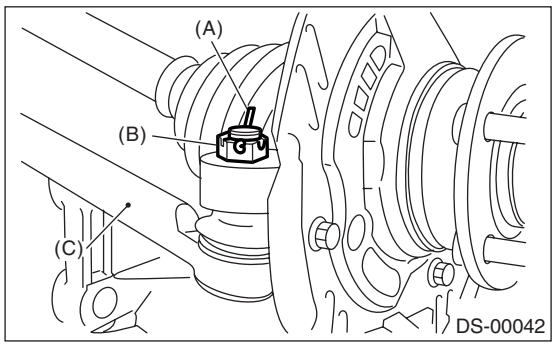
(1) Pipe C
(2) Pipe D

4) Install the universal joint. <Ref. to PS-29, INSTALLATION, Universal Joint.>
5) Connect the tie-rod end and knuckle arm, and tighten with castle nut.

Castle nut tightening torque:
27 N·m (2.75 kgf-m, 19.9 ft-lb)

CAUTION:
When connecting, do not hit the cap at bottom of tie-rod end with hammer.

6) After tightening the castle nut to specified torque, tighten it further within 60° until cotter pin hole is aligned with the slot in nut, and then bend the cotter pin to lock.



(A) Cotter pin
(B) Castle nut
(C) Tie-rod end

7) Install the front stabilizer to vehicle. <Ref. to FS-23, INSTALLATION, Front Stabilizer.>
8) Install the front exhaust pipe assembly.
9) Install the sub frame. <Ref. to FS-25, INSTALLATION, Sub Frame.>
10) Align the center of roll connector. <Ref. to AB-18, ADJUSTMENT, Roll Connector.>
11) Install the steering wheel. <Ref. to PS-28, INSTALLATION, Steering Wheel.>
12) Install the front wheels.
13) Tighten the wheel nuts to specified torque.

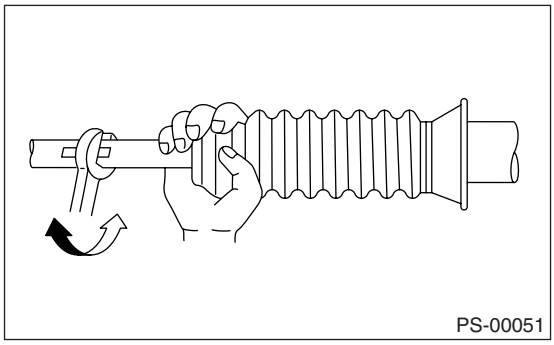
Tightening torque:
90 N·m (9.2 kgf-m, 66.4 ft-lb)

14) Connect the battery ground cable to battery.
15) Pour fluid into the oil tank, and bleed air.
<Ref. to PS-100, Power Steering Fluid.>
16) Check for fluid leaks.
17) Install the jack-up plate.
18) Install the under cover. <Ref. to EI-22, INSTALLATION, Front Under Cover.>
19) Lower the vehicle.
20) Check the fluid level in oil tank.

21) After adjusting the toe-in and steering angle, tighten the lock nut on tie-rod end.

Tightening torque:
83 N·m (8.5 kgf-m, 61.5 ft-lb)

NOTE:
When adjusting the toe-in, hold boot as shown to prevent it from being rotated or twisted. If twisted, straighten it.


PS-00051

C: DISASSEMBLY

1. NON-TURBO MODEL

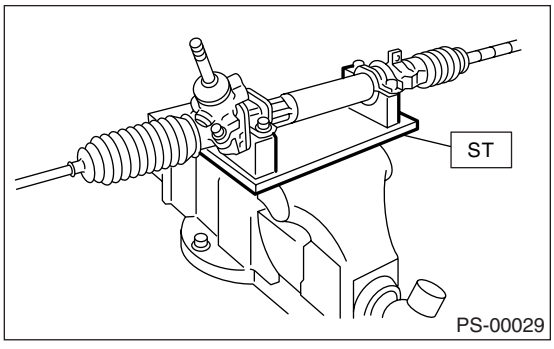
• RACK HOUSING ASSEMBLY

1) Disconnect the four pipes from gearbox.

NOTE:
Remove the pipes E and F as a single unit being fixed at clamp plate.

2) Secure the gearbox removed from vehicle in vice using ST.
ST 926200000 STAND

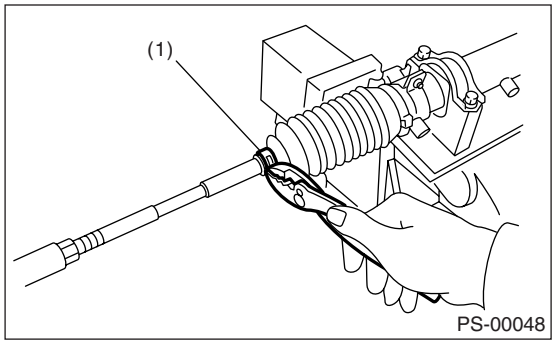
CAUTION:
Secure the gearbox in a vise using ST as shown. Do not attempt to secure it without this ST.



PS-00029

3) Remove the tie-rod end and lock nut from gearbox.

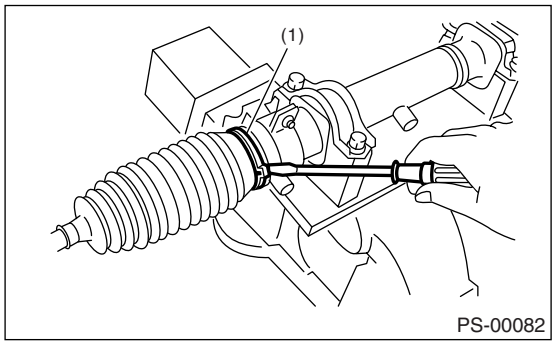
4) Remove the small clip from boot using pliers, and then move the boot to tie-rod end side.



PS-00048

(1) Clip

5) Using a flat tip screwdriver, remove the band from boot.

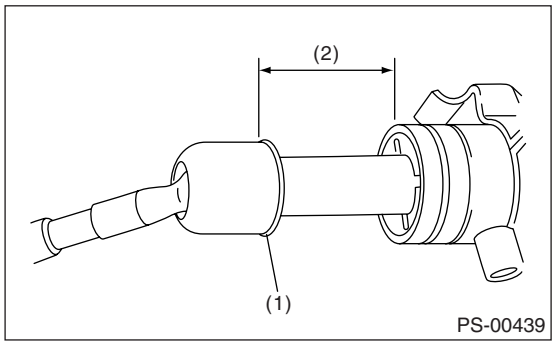


PS-00082

(1) Band

6) Extend the rack approx. 40 mm (1.57 in) out. Unlock the lock washer on both side of tie-rod end using a flat tip screwdriver.

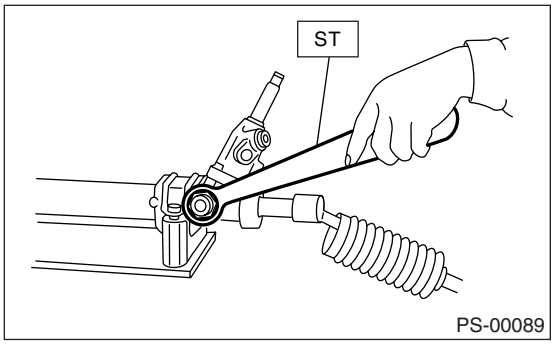
CAUTION:
Be careful not to scratch the rack surface as oil leaks may result.



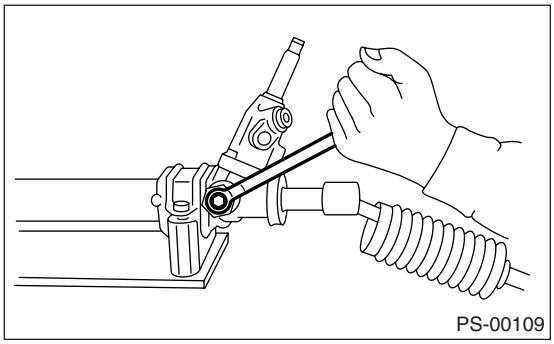
PS-00439

(1) Lock washer
(2) Approx. 40 mm (1.57 in)

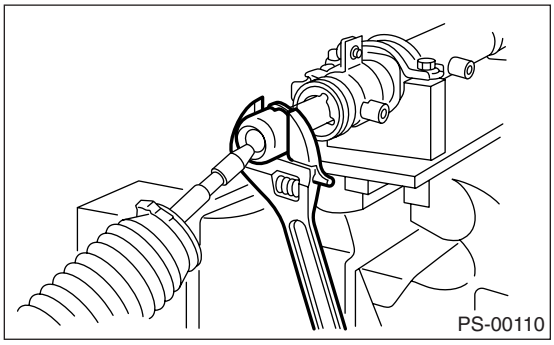
7) Using the ST, loosen the lock nut.
ST 926230000 SPANNER



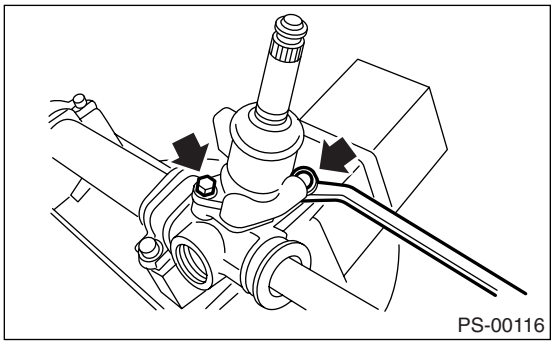
8) Tighten the adjusting screw until it no longer tightens.



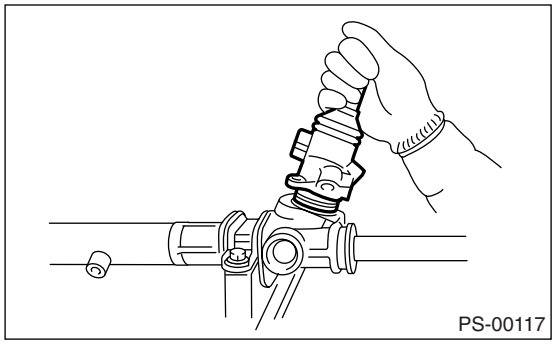
9) Using a wrench [32 mm (1.26 in) width across flats] or adjustable wrench, remove the tie-rod.



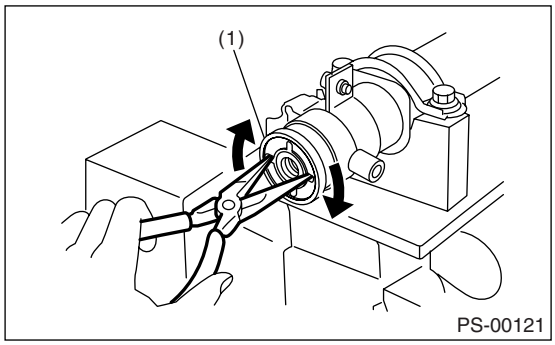
10) Loosen the adjusting screw, and then remove the spring and sleeve.
11) Remove the two bolts securing valve assembly.



12) Carefully draw out the input shaft, and then remove the valve assembly.



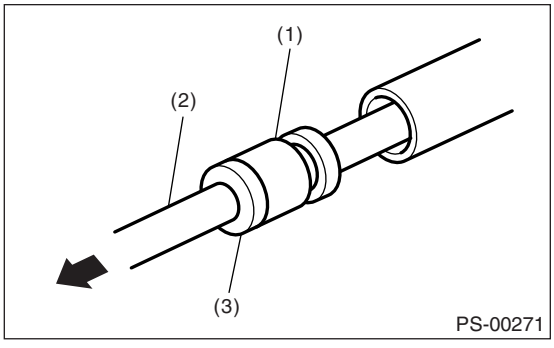
13) Using a sharp pointed pliers, rotate the rack stopper in direction of the arrow until end of the circlip comes out of stopper. Rotate the circlip in opposite direction and pull it out.



(1) Rack stopper

14) Pull the rack assembly from cylinder side, and draw out the rack bushing and rack stopper together with the rack assembly.

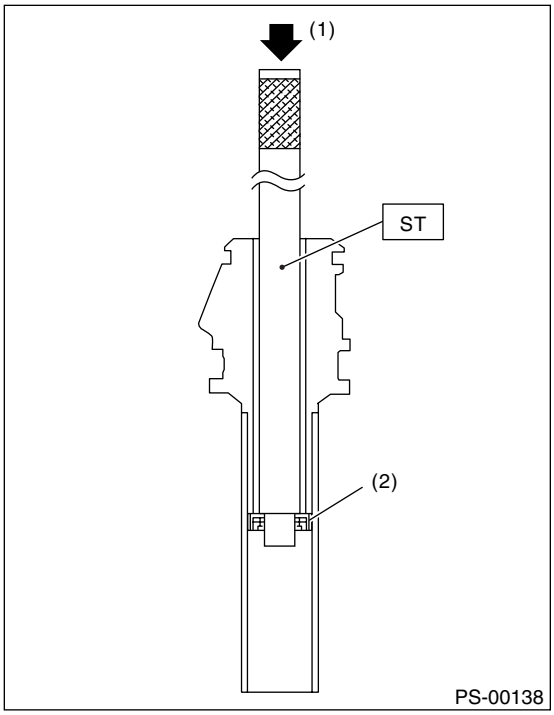
CAUTION:
Be careful not to contact the rack to inner wall of cylinder when drawing out. Any scratch on the cylinder inner wall will cause oil leakage.



(1) Rack bushing
(2) Rack assembly
(3) Rack stopper

15) Remove the rack bushing and rack stopper from rack assembly.
16) Remove the oil seal from rack.

17) Insert the ST from pinion housing side, and then remove the oil seal using a press.
ST 34199AE050 REMOVER



(1) Press
(2) Oil seal

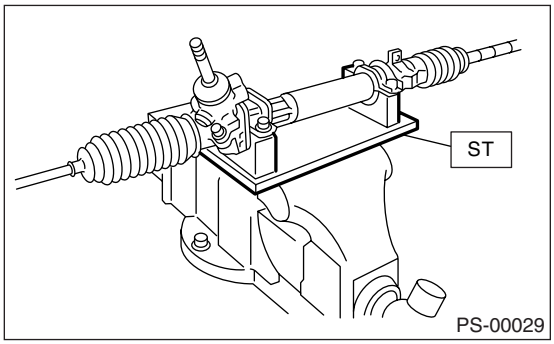
• CONTROL VALVE ASSEMBLY

1) Disconnect the four pipes from gearbox.

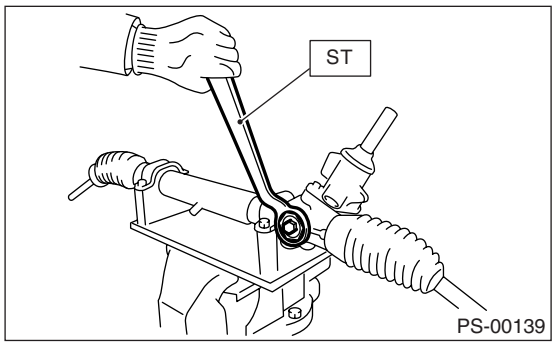
NOTE:
Remove the pipes E and F as a single unit being fixed at clamp plate.

2) Secure the gearbox removed from the vehicle in vise using ST.
ST 926200000 STAND

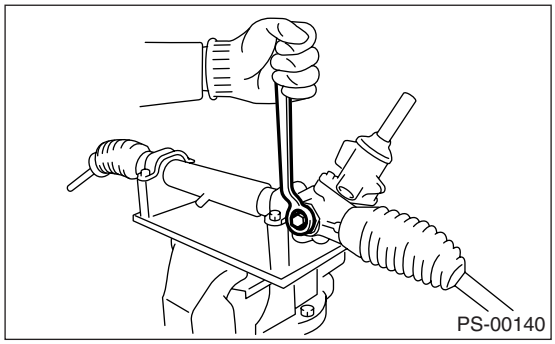
CAUTION:
Secure the gearbox in a vise using ST as shown. Do not attempt to secure it without this ST.



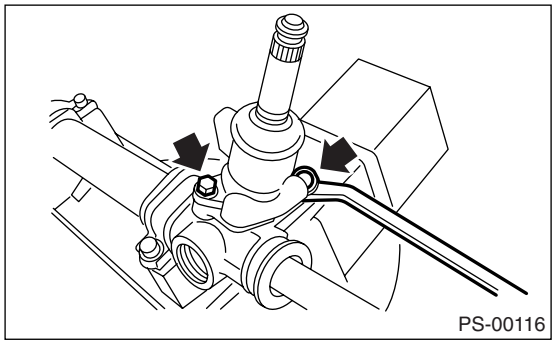
3) Using the ST, loosen the lock nut.
ST 926230000 SPANNER



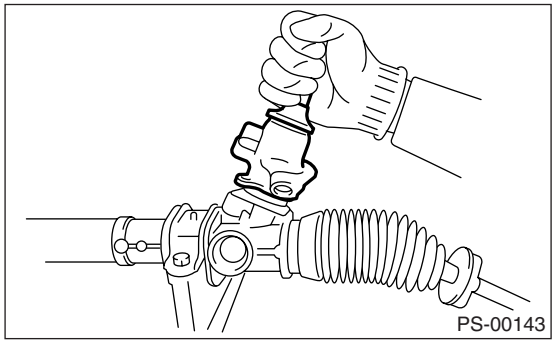
4) Loosen the adjusting screw, and then remove the spring and sleeve.



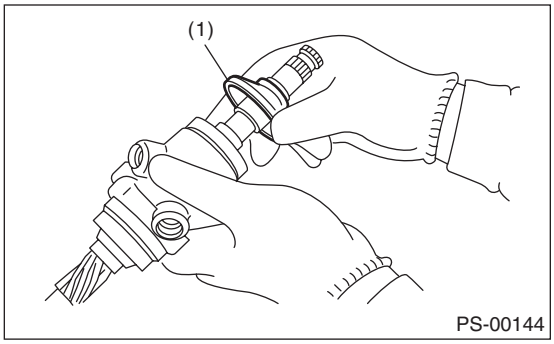
5) Remove the two bolts securing valve assembly.



6) Carefully draw out the input shaft, and then remove the valve assembly.

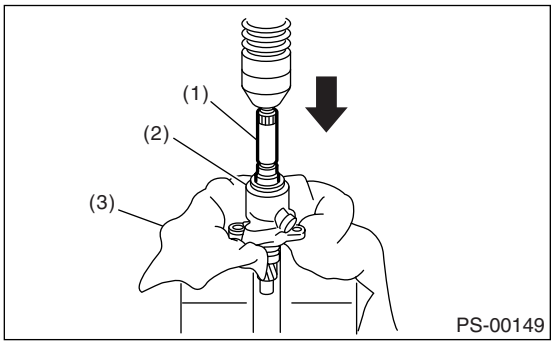


7) Slide the dust cover out.



(1) Dust cover

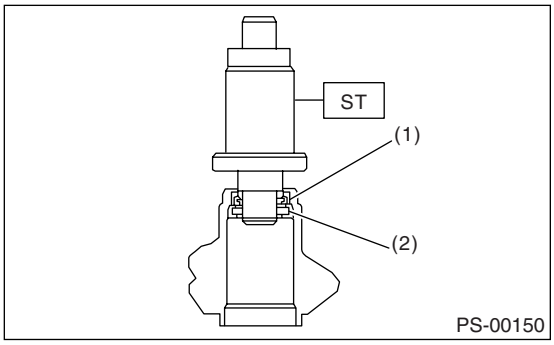
8) Using a press remove the pinion and valve assembly from valve housing.



(1) Valve assembly
(2) Valve housing
(3) Cloth

9) Using the ST and press, remove the dust seal, oil seal and special bearing from valve housing.
ST 34099FA120 INSTALLER & REMOVER SEAL

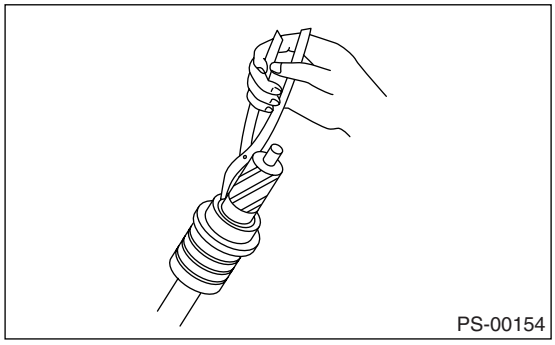
CAUTION:
• Do not apply force to the end surface of valve housing.
• Do not reuse the oil seal after removal.



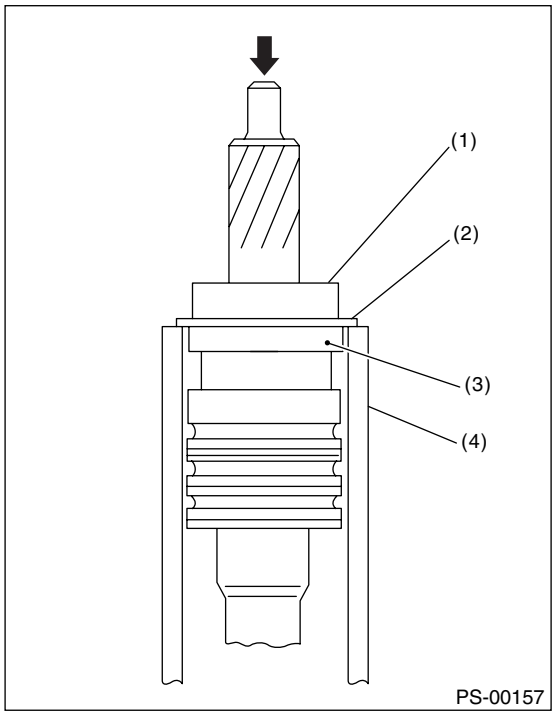
(1) Oil seal
(2) Special bearing

10) Remove the snap ring using snap ring pliers.

CAUTION:
Be careful not to scratch the pinion and valve assembly.



11) Press out the bearing together with the back up washer using pipe of I.D. 38.5 to 39.5 mm (1.516 to 1.555 in) and press.



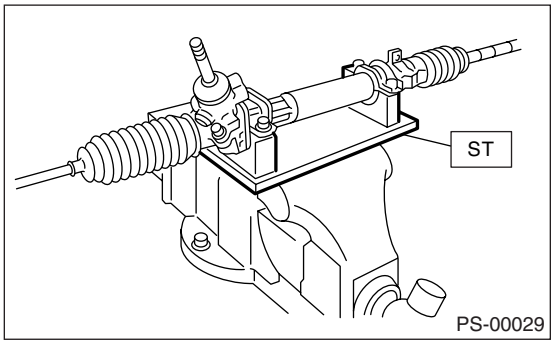
(1) Bearing
(2) Back-up washer
(3) Oil seal
(4) Pipe

12) Remove the oil seal.

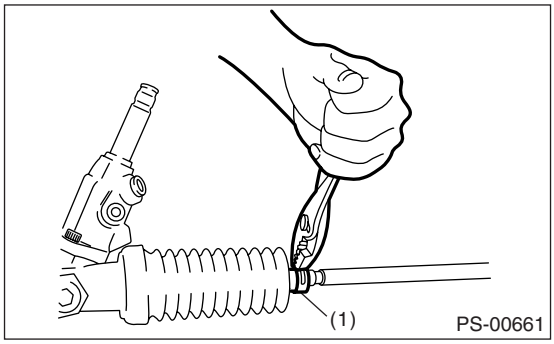
2. TURBO MODEL

1) Secure the gearbox removed from vehicle in vise using the ST.
ST 926200000 STAND

CAUTION:
Secure the gearbox assembly in a vise using the ST as shown. Do not attempt to secure it without this ST.



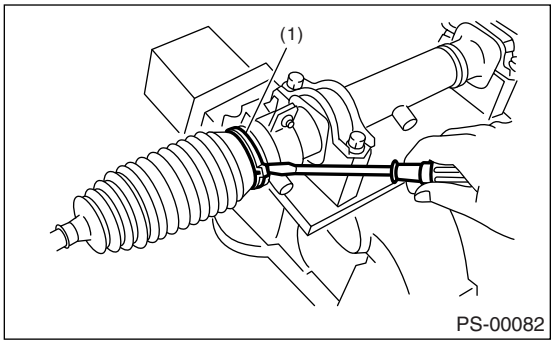
2) Remove the tie-rod end and lock nut from gearbox.
3) Remove the clip on outside of boot using pliers, and then slide the boot to tie-rod end side.



(1) Clip

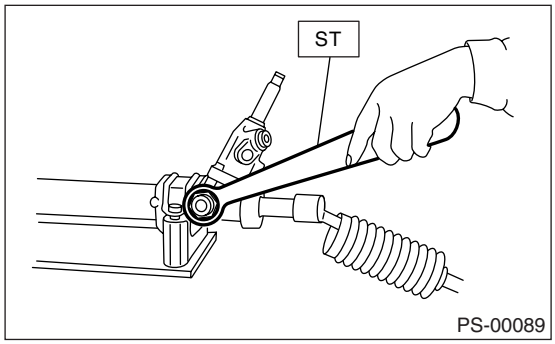
4) Using flat tip screwdriver, remove the band from boot.

NOTE:
Check the boot for crack, damage or deterioration. Replace the boot with a new one if necessary.



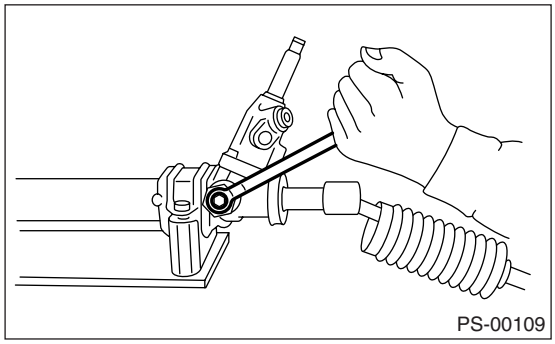
(1) Band

5) Using the ST, loosen lock nut.
ST 926230000 SPANNER

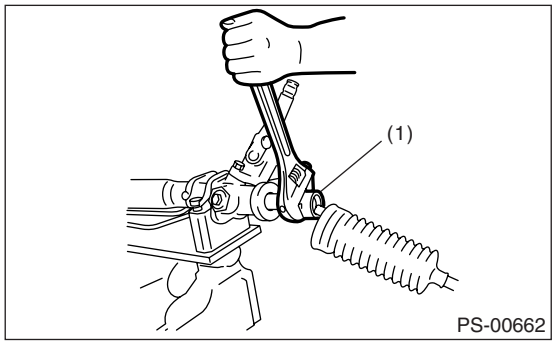


(1) Lock nut

6) Tighten the adjusting screw until it no longer tightens.



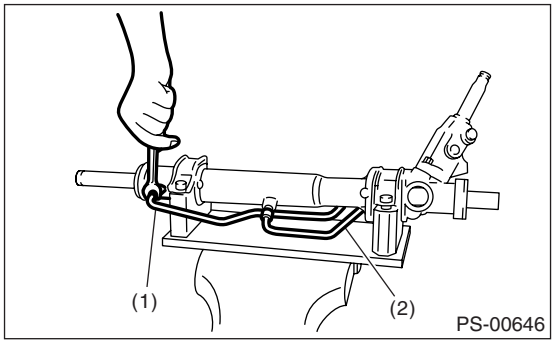
7) Using a wrench (32 mm (1.26 in) width across flats) or adjustable wrench with cinching boot, remove the tie-rod.



(1) Tie-rod

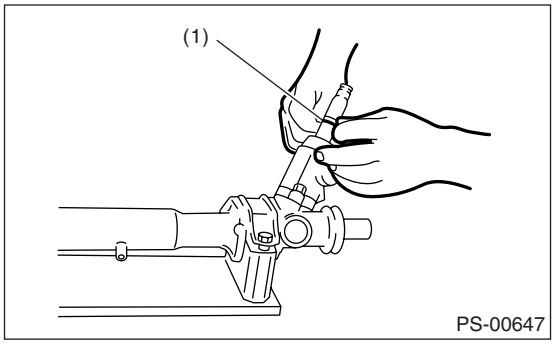
8) Loosen the adjusting screw, and then remove the spring and sleeve.

9) Disconnect the pipes A and B from steering body and control valve housing.



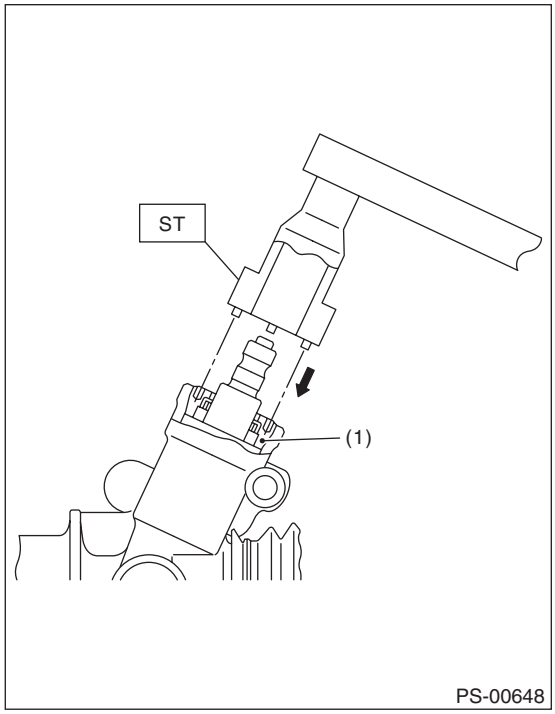
(1) Pipe A
(2) Pipe B

10) Clean the dirt of input shaft. Remove the dust cover taking care not to scratch the housing or input shaft and allow foreign matter to enter gear box interior.



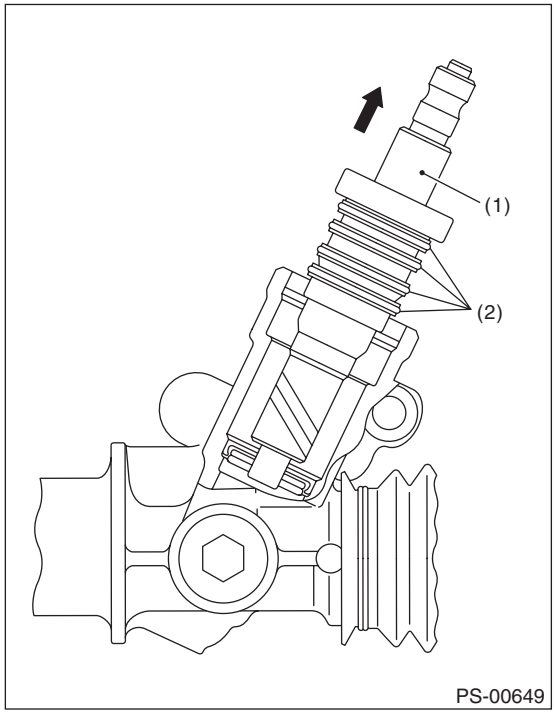
(1) Dust cover

11) Align the ST pin to plug hole to install. Rotate the ST counterclockwise to remove plug.
ST 34199AE090 PLUG WRENCH



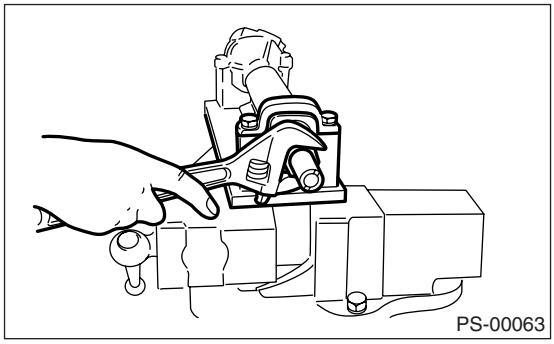
(1) Plug

12) Remove the valve assembly taking care not to scratch seal ring and valve housing inner surface.



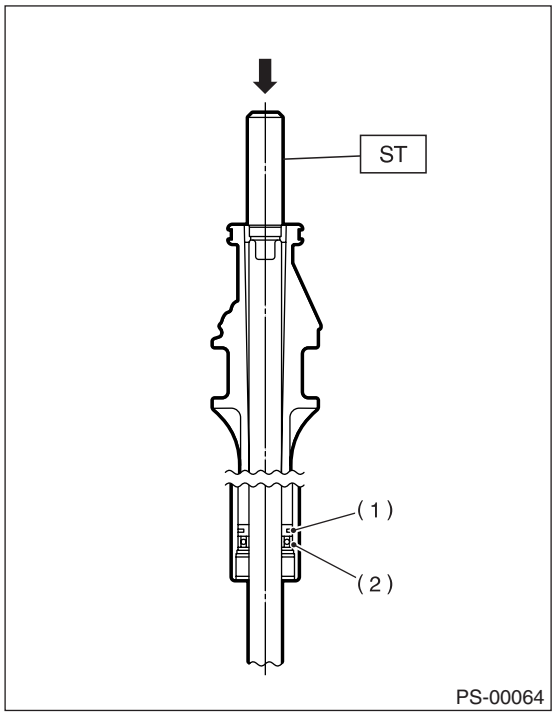
(1) Valve ASSY
(2) Seal ring

13) Remove the holder using a wrench (36 mm (1.42 in) width across flats) or adjustable wrench.



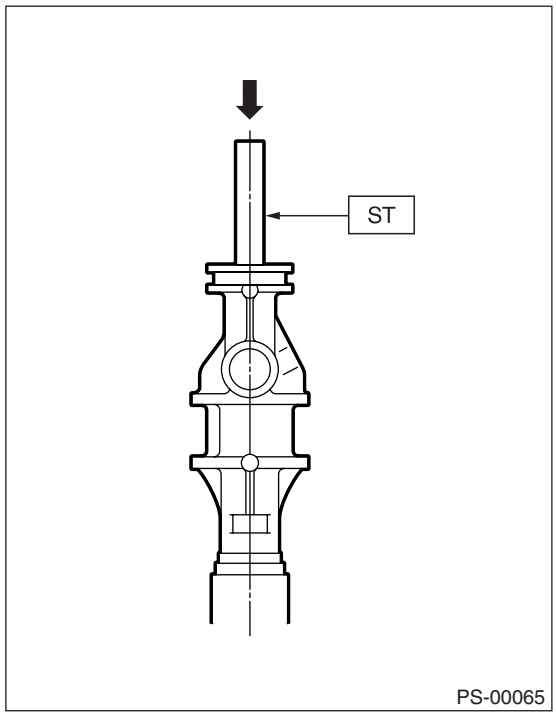
14) Install the ST on valve side of rack and press outer side oil seal out taking care not to contact rack with steering body inner surface.
ST 34199FE000 INSTALLER & REMOVER

NOTE:
Block the pipe connection of steering body to prevent fluid from flowing out.

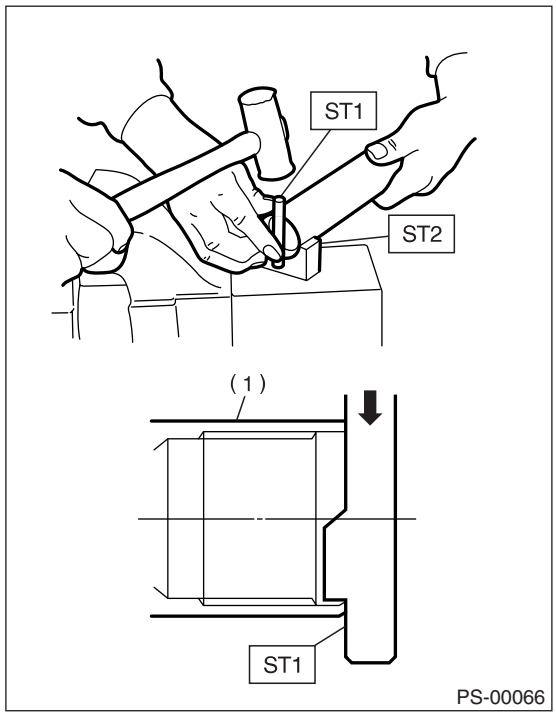


(1) Rack piston
(2) Outer side oil seal

15) Insert the ST from valve side and press back-up ring and oil seal out.
ST 34199FE010 REMOVER

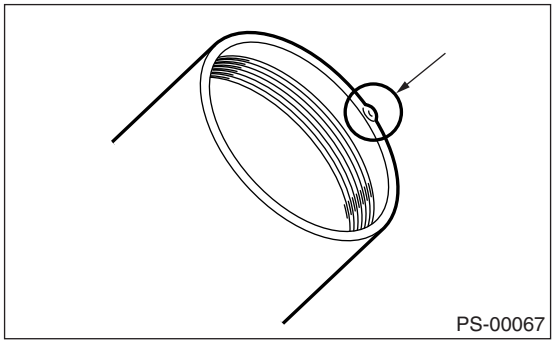


16) Using the ST1 and ST2, repair the cylinder's clinched sections.
ST1 34099FA080 PUNCH
ST2 34199FE020 BASE



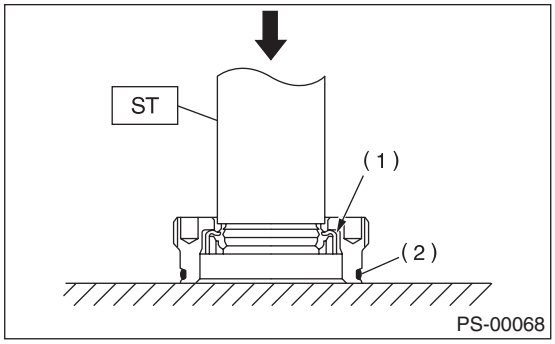
(1) Cylinder

17) If the cylinder edge is deformed in a convex shape, repair using an oil stone.



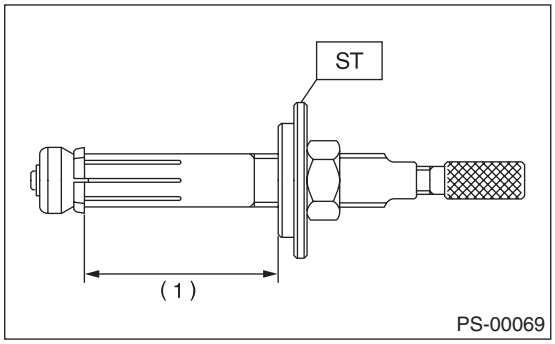
18) Remove the oil seal using ST and press from plug.
ST 34199AE100 PLUG OIL SEAL REMOVER

NOTE:
Do not apply force on the plug edge surface.



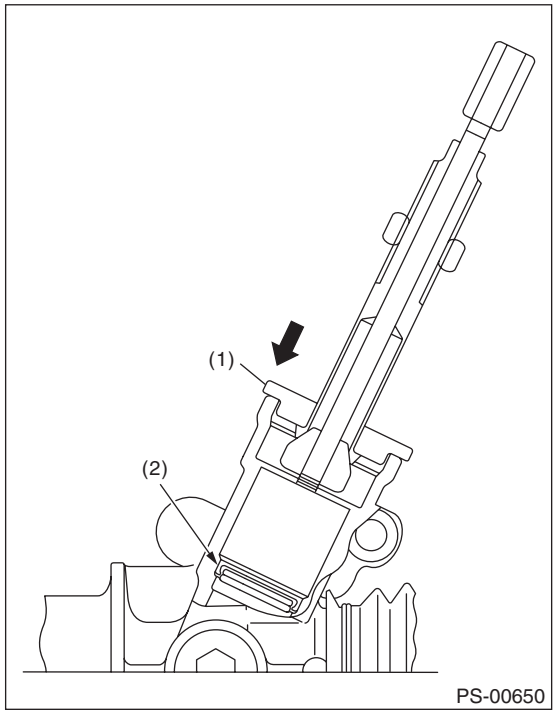
(1) Oil seal
(2) O-ring

19) Set the ST on drawing dimension.
ST 34199AE120 GEARBOX OIL SEAL REMOVER



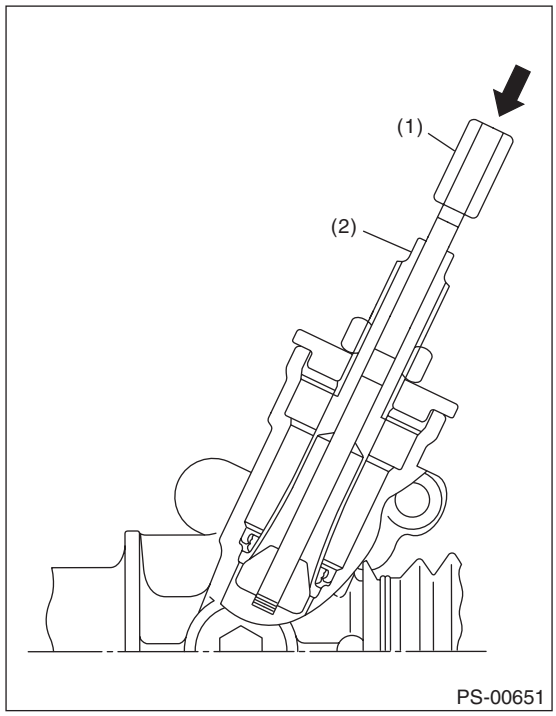
(1) 70 mm (2.76 in)

20) Set the stopper to gear box, and then insert the tip of ST to gear box.



(1) Stopper
(2) Oil seal

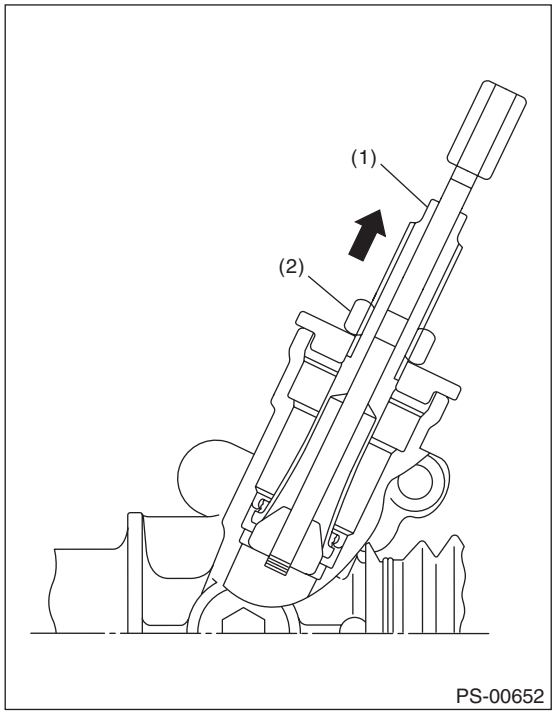
21) By fixing the 2-surface width, press in by rotating the rod and attach to oil seal.



(1) Rod
(2) 2-surface width

22) While fixing the 2-surface width, pull out the oil seal by rotating nut.

CAUTION:
Take care not to scratch the gear box inner surface.



(1) 2-surface width
(2) Nut

D: ASSEMBLY

1. NON-TURBO MODEL

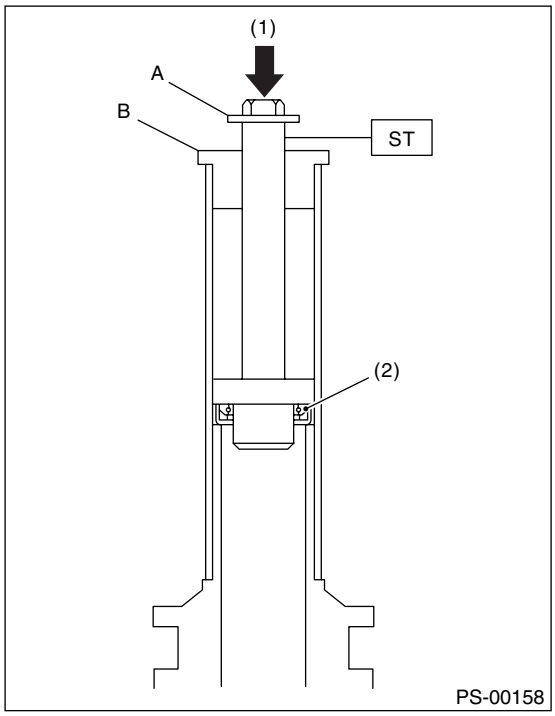
• RACK HOUSING ASSEMBLY

CAUTION:
Use only SUBARU genuine grease for the gearbox.

Specified grease for gearbox:
VALIANT GREASE M2 (Part No. 003608001)

1) Apply power steering fluid to a new oil seal.
2) Install the oil seal in correct position as shown in the figure. Push the oil seal using a press until portion A of ST contacts face of B.
ST 34099FA110 INSTALLER

CAUTION:
Be careful not to damage or scratch the cylinder inner wall.

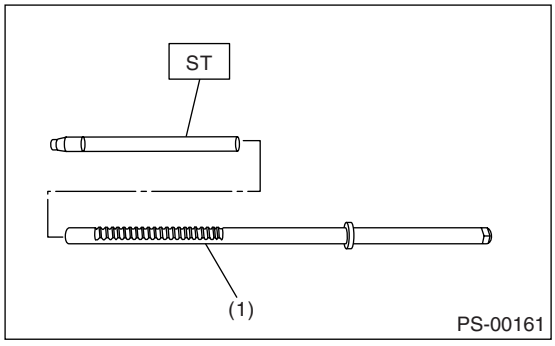


(1) Press
(2) Oil seal

3) Fix the rack housing in vise using ST.
ST 926200000 STAND

NOTE:
• When fixing the rack housing in vise, be sure to use this special tool. Do not fix rack housing in vise using pad such as aluminum plates, etc.
• When using the old rack housing, be sure to clean and remove rust before assembling. Check pinion housing bushing carefully.

4) Fit the ST over toothed portion of rack assembly, and check for binding or unsmooth insertion. If any deformation is noted on flats at the end of rack, shape by using file, and wash with cleaning fluid.
ST 926390001 COVER & REMOVER



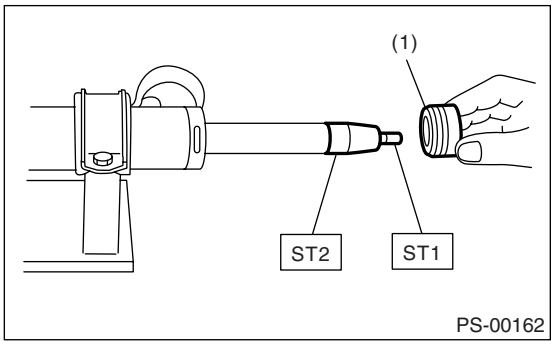
(1) Rack assembly

5) Apply genuine grease to the teeth of thoroughly washed rack assembly, and then fit the ST over the toothed portion.

CAUTION:
• Be careful not to block the air passage with grease. Remove excessive grease.
• After fitting cover, check the air passage hole for clogging. If clogged, open by removing grease from the hole.

6) Before inserting the rack assembly, apply a coat of specified power steering fluid to the surfaces of ST and rack piston.
7) Insert the rack assembly into rack housing from cylinder side, and then remove the ST after it has passed completely through oil seal.
8) Fit the ST1 and ST2 over the end of rack, and then install a new rack bushing.
ST1 926400000 GUIDE
ST2 927660000 GUIDE

CAUTION:
• If burrs or nicks are found on this guide and rack shaft portion, remove by filing.
• Dip the rack bushing in specified power steering fluid before installing, and pay attention not to damage O-ring and oil seal.

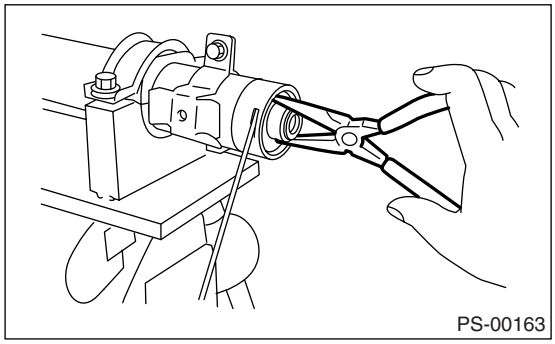


(1) Rack bushing assembly

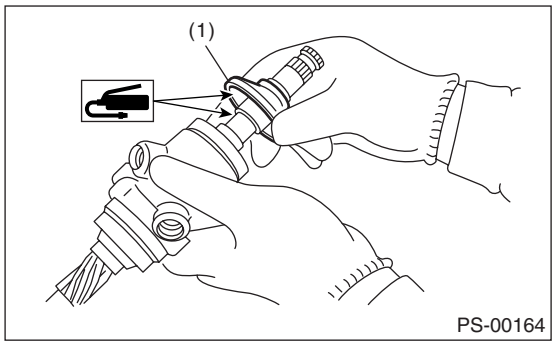
9) Insert the rack stopper into the cylinder tube until internal groove (on cylinder side) is aligned with external groove (on rack stopper). Turn the rack stopper with ST so that the rack stopper hole is seen through cylinder slits.
10) Insert the rack stopper into the rack housing, and then wrap a new circlip using a sharp pointed pliers to secure the rack stopper in position.

CAUTION:
Be careful not to scratch the rack while winding circlip.

NOTE:
Rotate the wrench another 90 to 180° after end of circlip has been wrapped in.

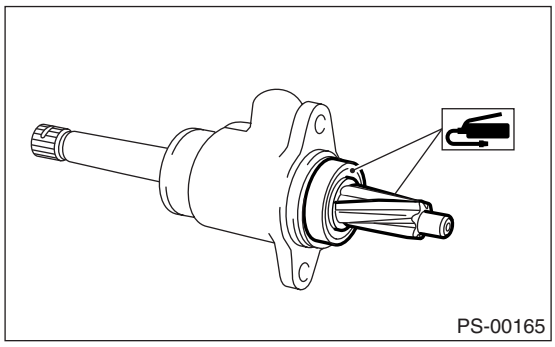


11) Apply genuine grease to dust cover, and then install the dust cover to valve assembly.

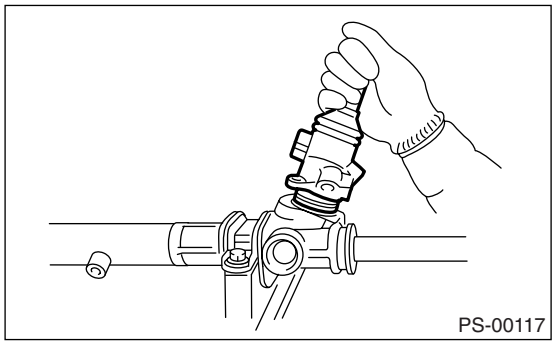


(1) Dust cover

12) Apply genuine grease to the pinion gear and bearing of valve assembly.



13) Install a new gasket on valve assembly. Insert the valve assembly into place while facing rack teeth toward pinion.



14) Tighten the bolts alternately to secure valve assembly.

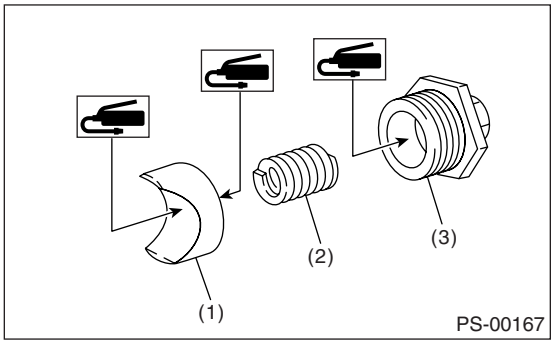
Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)

CAUTION:
Be sure to alternately tighten the bolts.

15) Temporarily install the rack, and then operate it from lock to lock two or three times to make it fit in. Remove the grease blocking air vent hole.

CAUTION:
If operating the rack from lock to lock without installing tie-rod, it may damage the oil seal. Always install the tie-rods LH and RH.

16) Apply a coat of grease to the sliding surface of sleeve and seating surface of spring, and then insert sleeve into steering body.
Charge the adjusting screw with grease, and then insert the spring into adjusting screw and install on steering body.



(1) Sleeve
(2) Spring
(3) Adjusting screw

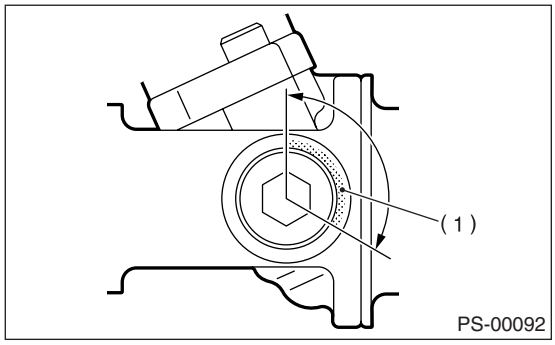
17) Tighten the adjusting screw to specified torque.

Tightening torque:
7.4 N·m (0.75 kgf-m, 5.4 ft-lb)

18) After tightening to the specified tightening torque, loosen it by 25°.
19) Remove the tie-rod.
20) Verify that play is within specified value. <Ref. to PS-58, SERVICE LIMIT, INSPECTION, Steering Gearbox [LHD Model].>

21) Loosen the adjusting screw, and then apply liquid gasket to at least 1/3 of the entire perimeter of adjusting screw thread.

Liquid gasket:
THREE BOND 1141 (Part No. 004403006)



(1) Apply liquid gasket to at least 1/3 of entire perimeter.

22) Tighten the adjusting screw to specified torque.

Tightening torque:
7.4 N·m (0.75 kgf-m, 5.4 ft-lb)

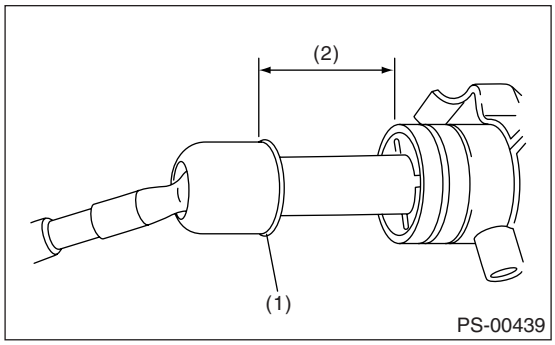
23) After tightening to the specified tightening torque, loosen it by 25°.
24) Install the lock nut. While holding the adjusting screw with a wrench, tighten lock nut using ST.
ST 926230000 SPANNER

Tightening torque (Lock nut):
39 N·m (4.0 kgf-m, 28.9 ft-lb)

NOTE:
Hold the adjusting screw with a wrench to prevent it from turning while tightening lock nut.

25) Extend the rack approx. 40 mm (1.57 in) beyond side of steering body.
26) Install the tie-rod and a new lock washer into rack.

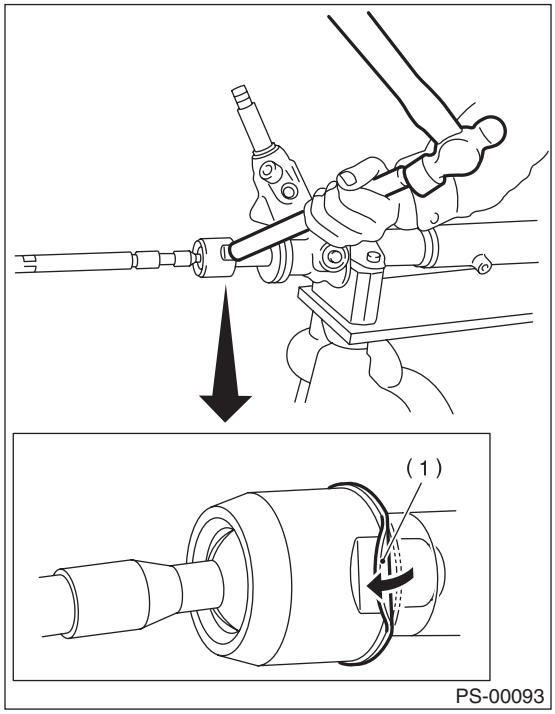
Tightening torque:
78 N·m (8.0 kgf-m, 57.9 ft-lb)



(1) Lock washer
(2) Approx. 40 mm (1.57 in)

27) Bend the lock washer.

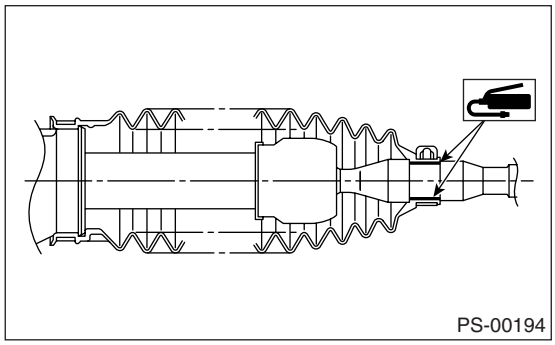
CAUTION:
Be careful not to scratch the rack when bending lock washer.



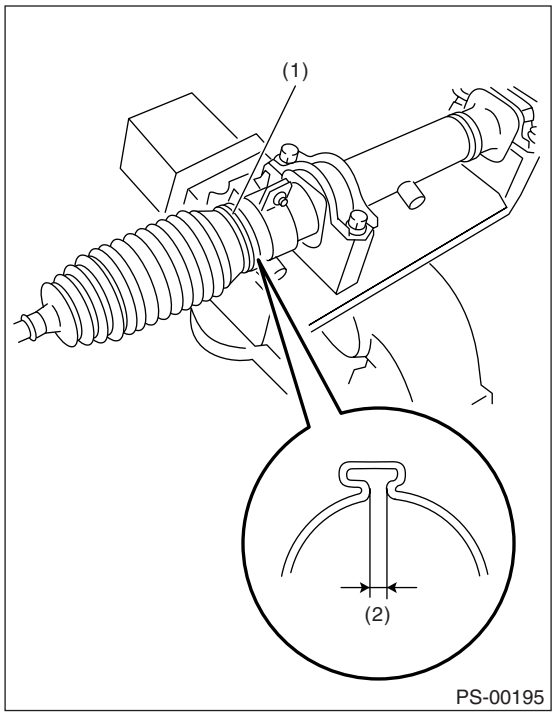
(1) Lock washer

28) Apply a coat of grease to the tie-rod groove, and then install the boot to housing.

NOTE:
Make sure that the boot is installed without unusual inflation or deflation.

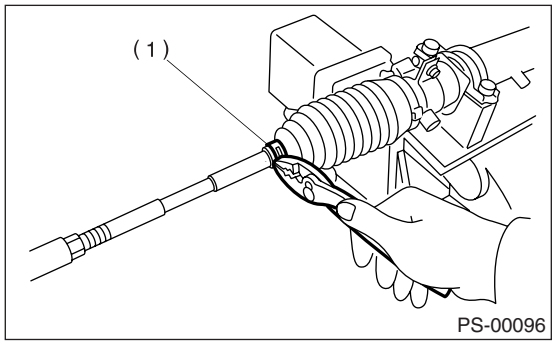


29) Install a new boot band. Using band clamp pliers, caulk the boot band until caulking part clearance is 2 mm (0.079 in) or less.



(1) Boot band
(2) 2 mm (0.079 in) or less

30) Fix the boot end with clip (small).

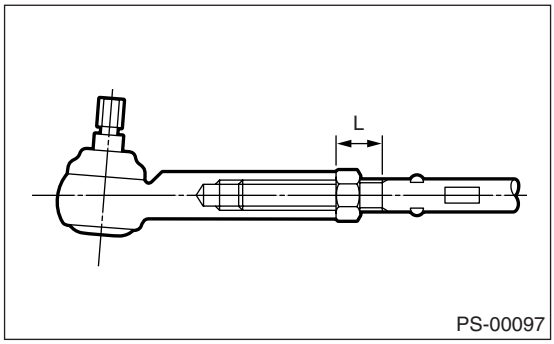


(1) Clip

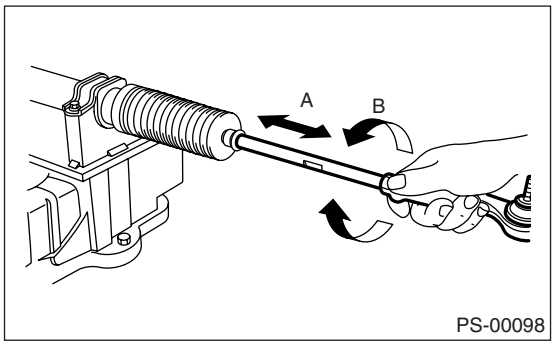
31) After installing, check the boot end is positioned into groove on tie-rod.

32) If the tie-rod end was removed, screw in the lock nut and tie-rod end to screwed portion of tie-rod, and then tighten the lock nut temporarily in a position as shown in the figure.

Installed tie-rod length L:
Sedan:
25 mm (0.98 in)
Wagon:
15 mm (0.59 in)



33) Inspect the gearbox as follows:
"A" Holding the tie-rod end, repeat lock to lock two or three times as quickly as possible.
"B" Holding the tie-rod end, turn it slowly at a radius one or two times as large as possible.
After all, make sure that the boot is installed in specified position without deflation.



34) Remove the gearbox from ST.
ST 926200000 STAND
35) Install the four pipes on gearbox.
(1) Connect the pipe A and B to four pipe joints of gearbox.

Tightening torque:
13 N·m (1.3 kgf-m, 9.4 ft-lb)

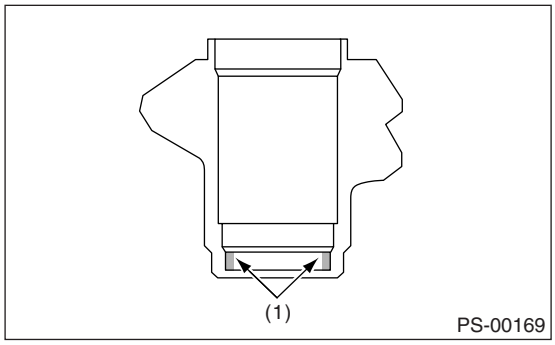
(2) Connect the pipe E and F to gearbox.

Tightening torque:
Pipe E: 15 N·m (1.5 kgf-m, 10.8 ft-lb)
Pipe F: 25 N·m (2.5 kgf-m, 18.1 ft-lb)

• CONTROL VALVE ASSEMBLY

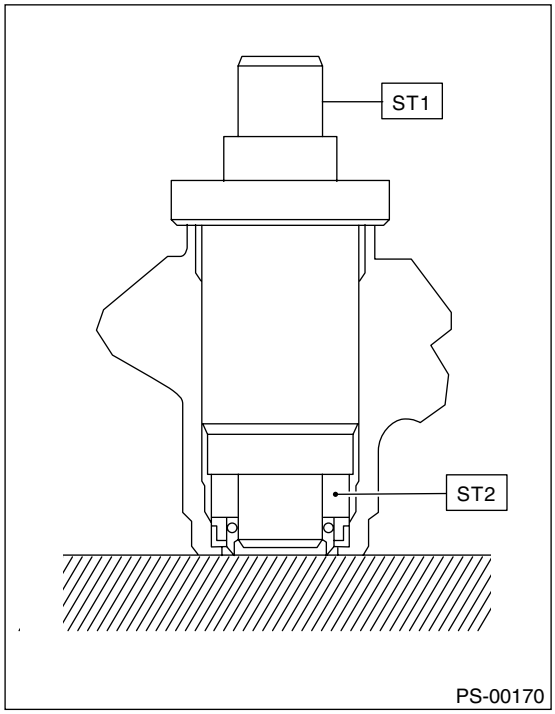
Specified steering grease:
VALIANT GREASE M2 (Part No. 003608001)

1) Clean all parts and tools before reassembling.
2) Apply a coat of specified power steering fluid to the inner wall of valve housing.



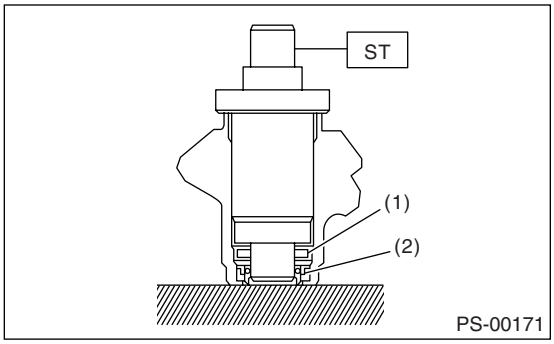
(1) Apply fluid.

3) Attach the ST2 to ST1.
ST1 34099FA120 INSTALLER & REMOVER SEAL
ST2 34099FA130 INSTALLER SEAL
4) To avoid scratching the oil seal, apply a coat of grease to the contact surface of installer and oil seal.
5) Verify the oil seal direction.
Attach the oil seal to installer and position in valve housing before pressing into place.
6) Press the oil seal into place using a press.



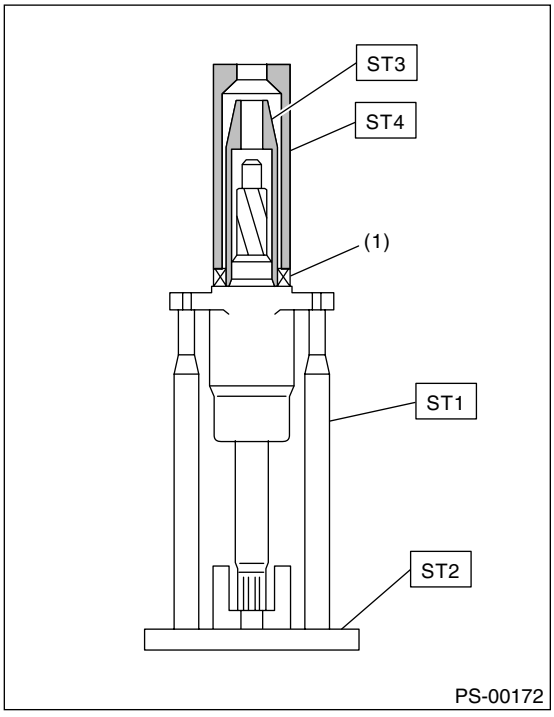
7) Attach the bearing to ST, and then position in value housing. Using the ST and press, install the special bearing in valve housing.

ST 34099FA120 INSTALLER & REMOVER SEAL



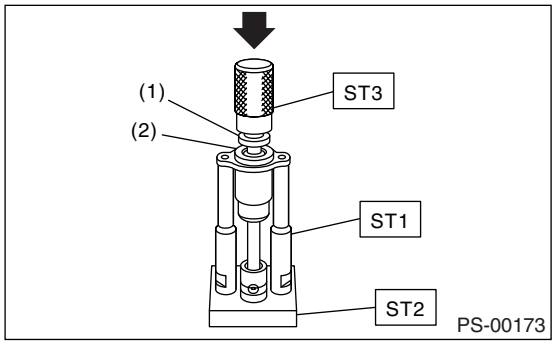
(1) Special bearing
(2) Oil seal

8) Put vinyl tape around the pinion shaft splines to protect oil seal from damage.
9) Fit the pinion and valve assembly into valve housing.
10) Secure the valve assembly to ST1 and ST2.
ST1 926370000 INSTALLER A
ST2 34099FA100 STAND BASE
11) Apply specified power steering fluid to oil seal and ST3.
12) Install the ST3 to pinion, and then insert the oil seal. Press the oil seal using a press until ST4 contacts face end of valve housing.
ST3 926360000 INSTALLER A
ST4 927620000 INSTALLER B



(1) Oil seal

13) Remove the ST used install oil seal, and then fit the back-up washer.
14) Force-fit the ball bearing using ST3.
ST1 926370000 INSTALLER A
ST2 34099FA100 STAND BASE
ST3 927640000 INSTALLER B



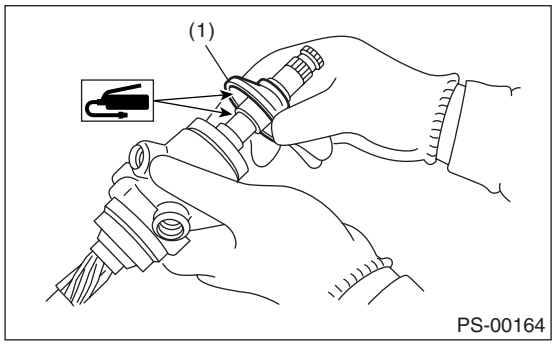
(1) Ball bearing
(2) Back-up washer

NOTE:
Be careful not to tilt the ball bearing during installation.

15) Install the snap ring using snap ring pliers.

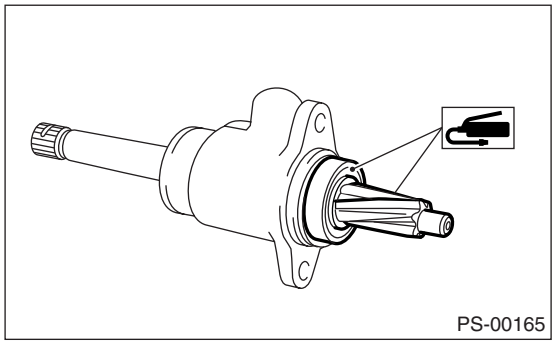
NOTE:
Rotate the snap ring to check for proper installation.

16) Apply the specified grease to dust cover.
17) Install the dust cover on valve assembly.

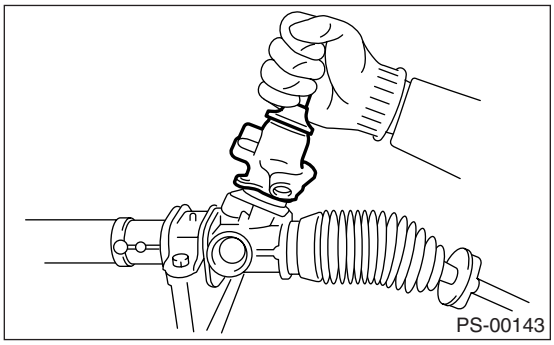


(1) Dust cover

18) Apply genuine grease to the pinion gear and bearing of valve assembly.



19) Install a new gasket on valve assembly. Insert the valve assembly into place while facing rack teeth toward pinion.

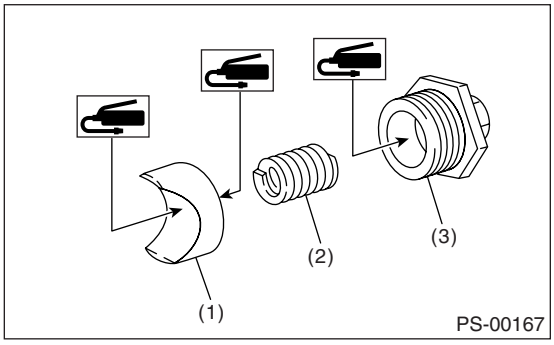


20) Tighten the bolts alternately to secure valve assembly.

Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)

CAUTION:
Be sure to alternately tighten the bolts.

21) Apply a coat of grease to the sliding surface of sleeve and seating surface of spring, and then insert sleeve into steering body.
Charge the adjusting screw with grease, and then insert the spring into adjusting screw and install on steering body.



(1) Sleeve
(2) Spring
(3) Adjusting screw

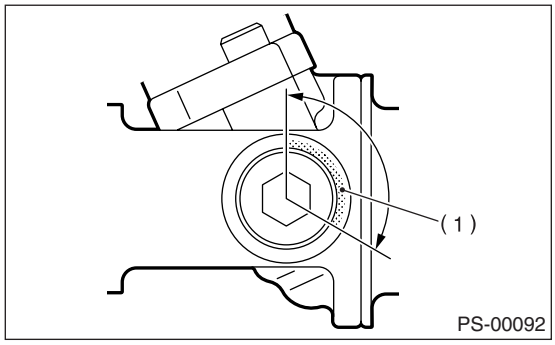
22) Tighten the adjusting screw to specified torque.

Tightening torque:
7.4 N·m (0.75 kgf-m, 5.4 ft-lb)

23) After tightening to the specified tightening torque, loosen it by 25°.
24) Verify that play is within specified value. <Ref. to PS-58, SERVICE LIMIT, INSPECTION, Steering Gearbox [LHD Model].>

25) Loosen the adjusting screw, and then apply liquid gasket to at least 1/3 of the entire perimeter of adjusting screw thread.

Liquid gasket:
THREE BOND 1141 (Part No. 004403006)



(1) Apply liquid gasket to at least 1/3 of entire perimeter.

26) Tighten the adjusting screw to specified torque.

Tightening torque:
7.4 N·m (0.75 kgf-m, 5.4 ft-lb)

27) After tightening to the specified tightening torque, loosen it by 25°.
28) Install the lock nut. While holding the adjusting screw with a wrench, tighten lock nut using ST.
ST 926230000 SPANNER

Tightening torque (Lock nut):
39 N·m (4.0 kgf-m, 28.9 ft-lb)

NOTE:
Hold the adjusting screw with a wrench to prevent it from turning while tightening lock nut.

29) Remove the gearbox from ST.
30) Install the four pipes on gearbox.
(1) Connect the pipe A and B to the gearbox.

Tightening torque:
13 N·m (1.3 kgf-m, 9.4 ft-lb)

(2) Connect the pipe E and F to gearbox.

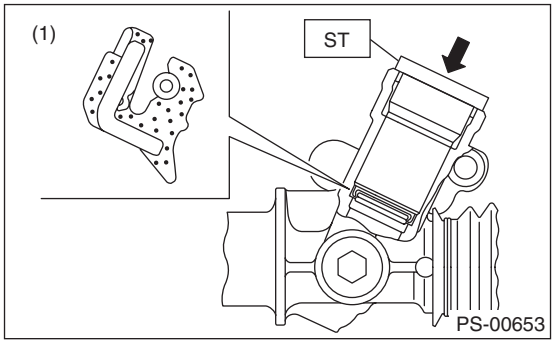
Tightening torque:
Pipe E: 15 N·m (1.5 kgf-m, 10.8 ft-lb)
Pipe F: 25 N·m (2.5 kgf-m, 18.1 ft-lb)

2. TURBO MODEL

1) Apply a coat of grease to inside and outside of new oil seal.

Specified steering grease:
VALIANT GREASE M2 (Part No. 003608001)

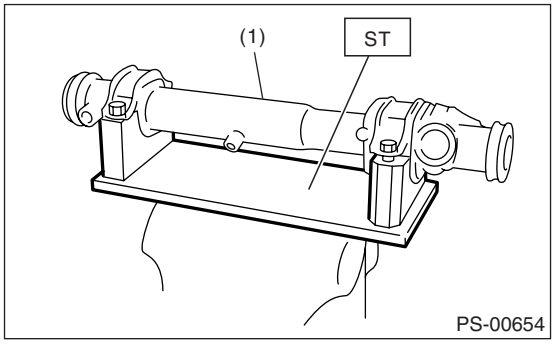
2) Verify the oil seal direction and installation position. Using the ST and press, press fit the oil seal to gear box.
ST 34199AE130 GEARBOX OIL SEAL INSTALLER



(1) Oil seal

3) Attach the steering body to ST as shown in the figure. Apply a coat of grease to needle bearing.
ST 926200000 STAND

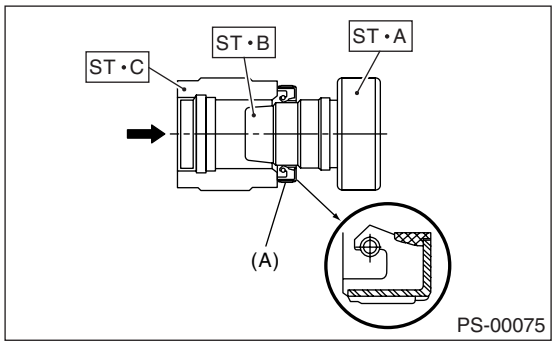
CAUTION:
Ensure the needle bearing is free from defects. If it is faulty, replace the steering body with a new one.



(1) Steering body

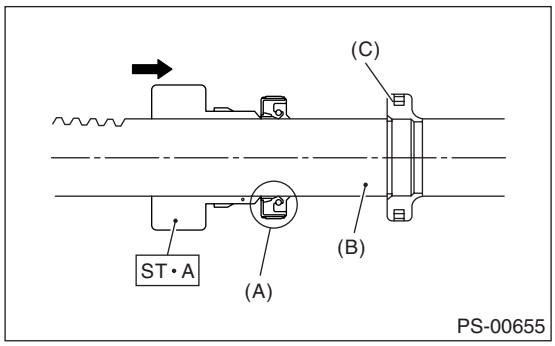
4) Using the ST·B and ST·C, attach the oil seal to ST·A.
ST 34199FE040 INSTALLER A, B, C

NOTE:
Face the oil seal in direction shown in the figure.



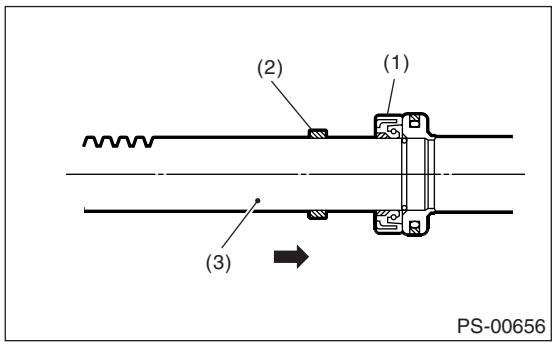
(A) Oil seal

5) Insert the ST·A with oil seal assembled, through gear side of rack. Remove the oil seal from ST·A near piston, and then remove the ST·A from rack.



(A) Oil seal
(B) Rack
(C) Piston

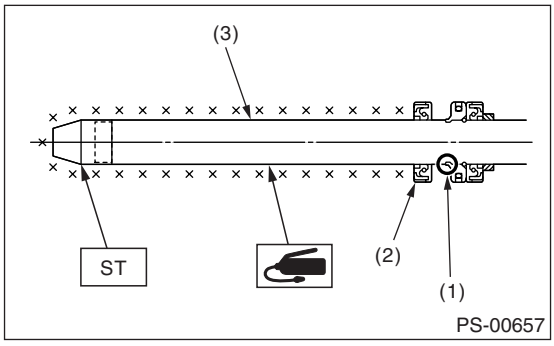
6) Install the back-up washer from gear side of rack.



(1) Oil seal
(2) Back-up washer
(3) Rack

7) Equally apply a thin coat of grease to the rack, then install the oil seal.

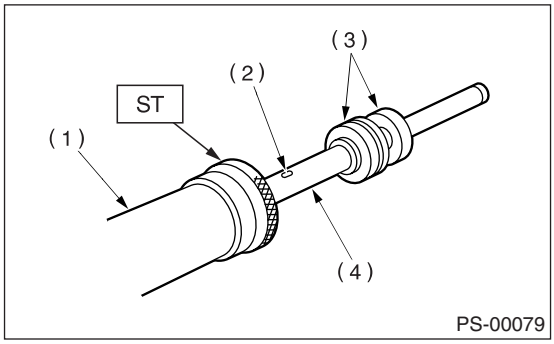
CAUTION:
Be careful not to scratch the oil seal lips with piston's inner ring section.



(1) Rack piston inner ring
(2) Outer side oil seal
(3) Rack

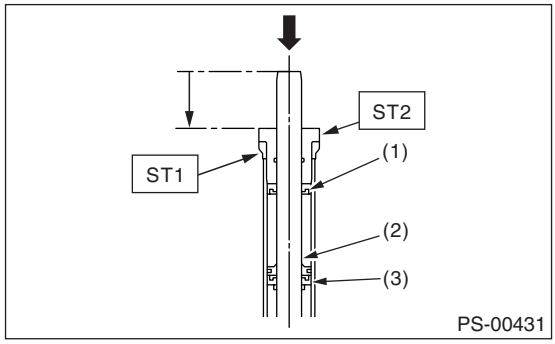
8) Apply a coat of grease to the grooves in rack, sliding surface of sleeve and sealing surface of piston. Install the ST on end of steering body cylinder. Then insert the rack into steering body from cylinder side.
ST 34199FE050 GUIDE

CAUTION:
Do not allow grease to block the air vent hole on rack.



(1) Cylinder side of steering body
(2) Air vent hole
(3) Oil seal
(4) Rack

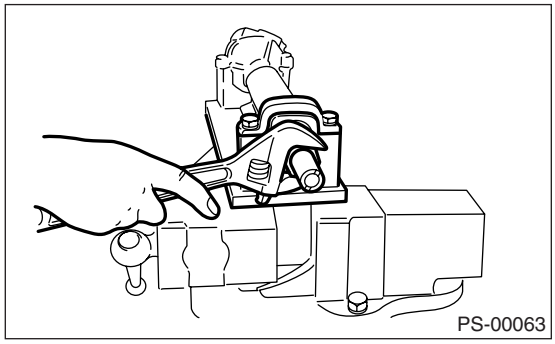
9) Make the ST2 pass through rack, and then push in the rack and ST2 using a press until ST1 comes in contact with ST2 and the end of rack is aligned with end of ST2.
ST1 34199FE050 GUIDE
ST2 34199FE060 INSTALLER



(1) Outer side oil seal
(2) Rack piston
(3) Inner side oil seal

10) Install a new holder to cylinder side of steering body.

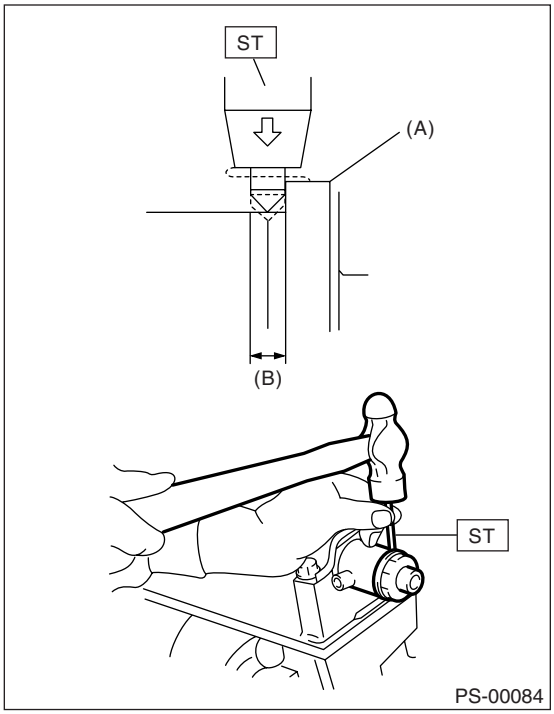
Tightening torque:
90 N·m (9.18 kgf-m, 66.4 ft-lb)



11) Using the ST, clinch steering body cylinder at a point less than 3 mm (0.12 in) from holder.

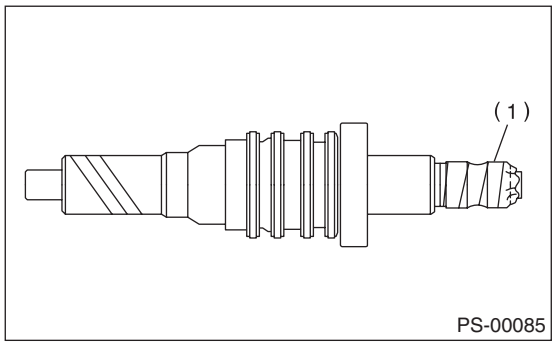
CAUTION:
Be careful not to deform the holder.

ST 34099FA060 PUNCH HOLDER



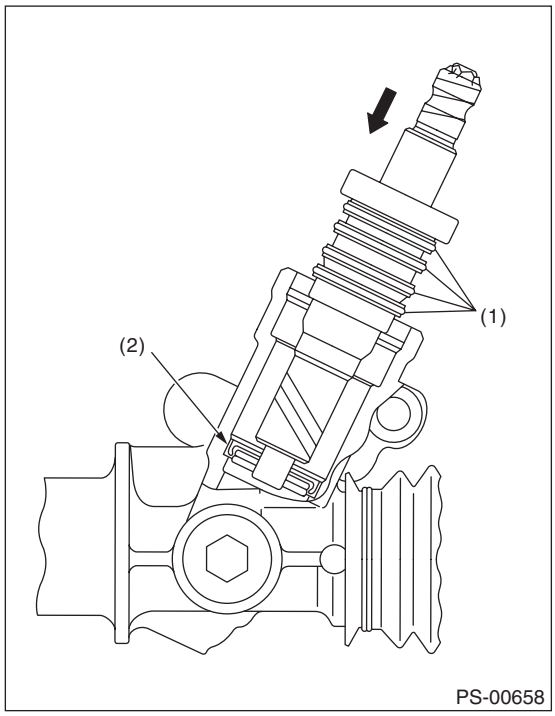
(A) Holder
(B) 3 mm (0.12 in)

12) Roll the vinyl tape on serration part of valve assembly, and then apply grease on the tape surface.



(1) Vinyl tape

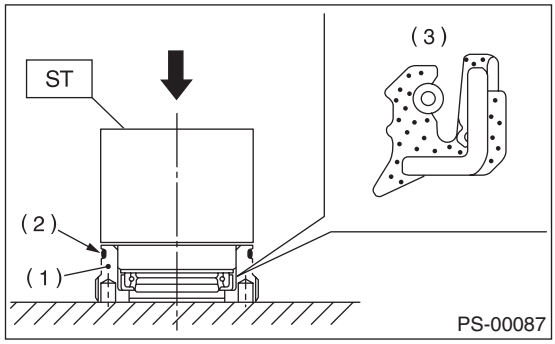
13) Apply a coat of grease on the gear teeth of valve assembly, and then attach the valve assembly taking care not to scratch oil seal and seal ring.



(1) Seal ring
(2) Oil seal

14) Apply grease on the oil seal circumference, and then press into the plug using ST and a press. Replace the plug circumference O-rings with new ones.
ST 34199AE110 PLUG OIL SEAL INSTALLER

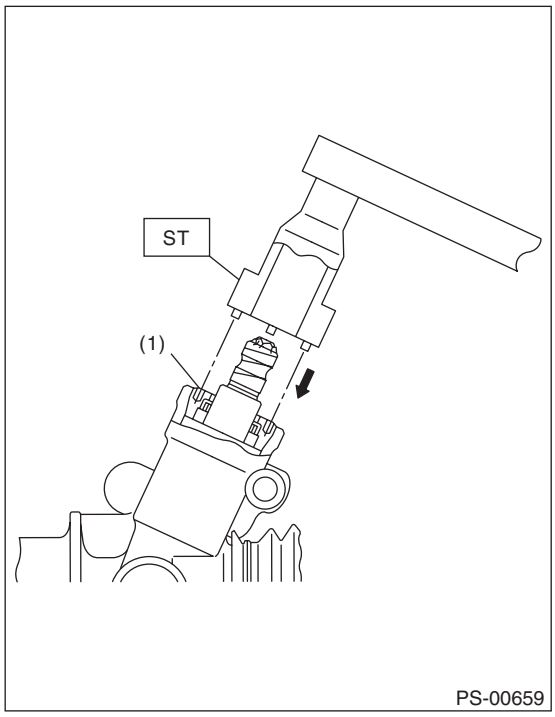
CAUTION:
Pay attention to the oil seal direction, and attaching position.



(1) Plug
(2) O-ring
(3) Oil seal

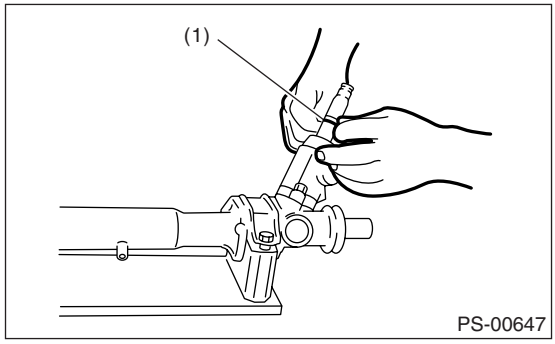
15) Using the ST, install the plug.
ST 34199AE090 PLUG WRENCH

Tightening torque:
64 N·m (6.5 kgf-m, 47.0 ft-lb)



(1) Plug

16) Install the dust cover. Remove the vinyl tape.

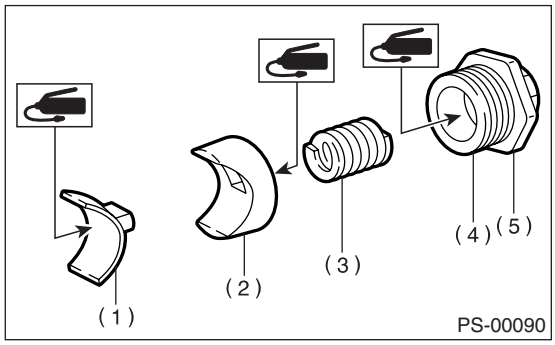


(1) Dust cover

17) Temporarily install the rack, and then operate it from lock to lock two or three times to make it fit in. Remove the grease blocking air vent hole.

CAUTION:
If operating the rack from lock to lock without installing tie-rod, it may damage the oil seal. Always install the tie-rods LH and RH.

18) Apply a coat of grease to the sliding surface of seat pad, sleeve and seating surface of spring, and then insert sleeve into steering body.
Charge the adjusting screw with grease, and then insert the spring into adjusting screw and install on steering body.



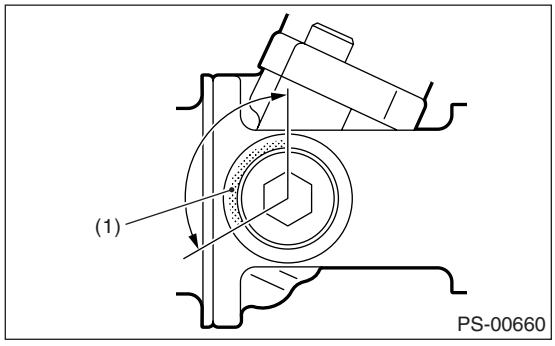
(1) Seat pad
(2) Sleeve
(3) Spring
(4) Adjusting screw
(5) Lock nut

19) Tighten the adjusting screw to specified torque.

Tightening torque:
7.4 N·m (0.75 kgf-m, 5.4 ft-lb)

20) After tightening to the specified tightening torque, loosen it by 37°.
21) Remove the tie-rod.
22) Verify that play is within specified value. <Ref. to PS-58, SERVICE LIMIT, INSPECTION, Steering Gearbox [LHD Model].>
23) Loosen the adjusting screw, and then apply liquid gasket to at least 1/3 of the entire perimeter of adjusting screw thread.

Liquid gasket:
THREE BOND 1141 (Part No. 004403006)



(1) Apply liquid gasket to at least 1/3 of entire perimeter.

24) Tighten the adjusting screw.

Tightening torque:
9.8 N·m (1.0 kgf-m, 7.2 ft-lb)

25) After tightening to the specified tightening torque, loosen it.

26) Tighten the adjusting screw.

Tightening torque:
4.8 N·m (0.49 kgf-m, 3.5 ft-lb)

27) After tightening to the specified tightening torque, loosen it.

28) Tighten the adjusting screw.

Tightening torque:
4.8 N·m (0.49 kgf-m, 3.5 ft-lb)

29) After tightening to the specified tightening torque, loosen it by 37°.

30) Install the lock nut. While holding the adjusting screw with a wrench, tighten lock nut using ST.
ST 926230000 SPANNER

Tightening torque (Lock nut):
39 N·m (4.0 kgf-m, 28.9 ft-lb)

NOTE:
Hold the adjusting screw with a wrench to prevent it from turning while tightening lock nut.

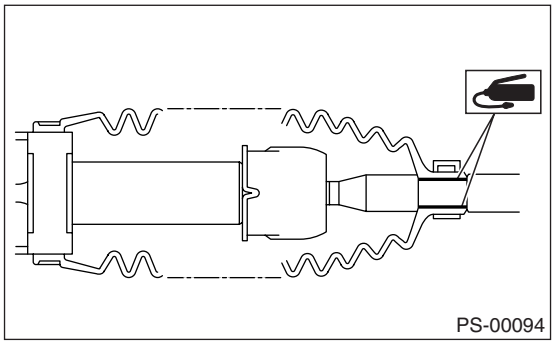
31) Install the tie-rod into rack.

Tightening torque:
90 N·m (9.0 kgf-m, 65.1 ft-lb)

NOTE:
Check the mating face of rack and tie-rod for foreign material, dirt, dust and etc.
If required, clean the mating face.

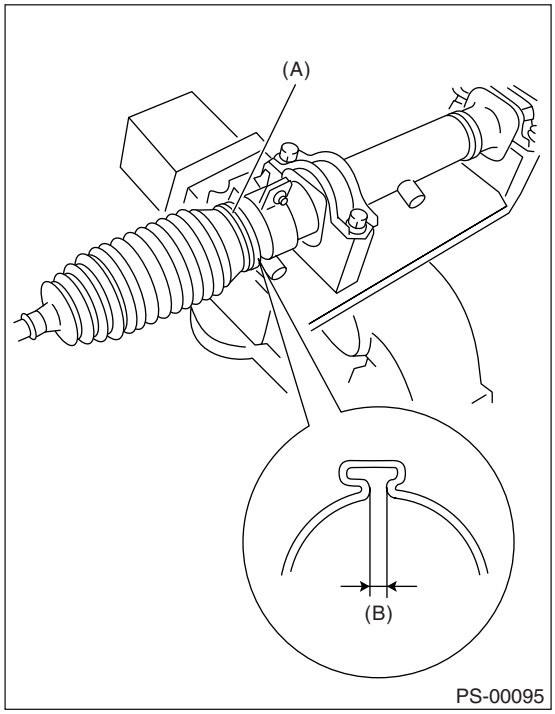
32) Apply a coat of grease to the tie-rod groove, and then install the boot to housing.

NOTE:
Make sure that the boot is installed without unusual inflation or deflation.


PS-00094

33) Caulk the boot so the space inside boot band caulking portion becomes 2 mm (0.08 in) or less.

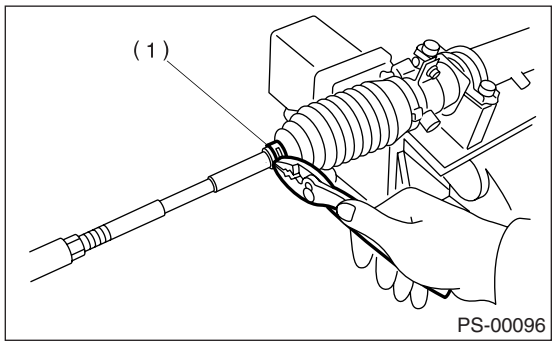
NOTE:
Use a new boot band.



PS-00095

(A) Boot band
(B) Less than 2mm (0.08 in)

34) Fix the boot end with clip (small).



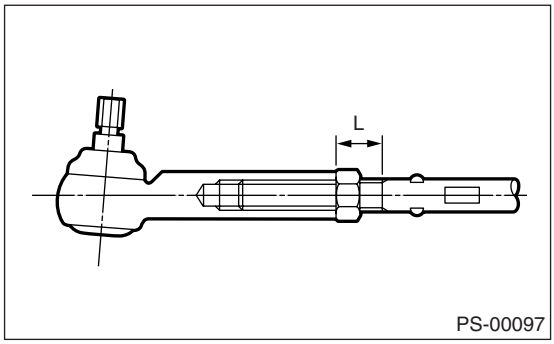
PS-00096

(1) Clip

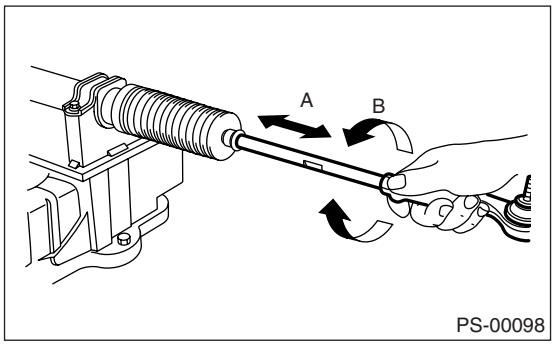
35) After installing, check the boot end is positioned into groove on tie-rod.

36) If the tie-rod end was removed, screw in the lock nut and tie-rod end to screwed portion of tie-rod, and then tighten the lock nut temporarily in a position as shown in the figure.

Installed tie-rod length L:
Sedan:
25 mm (0.98 in)
Wagon:
15 mm (0.59 in)



37) Inspect the gearbox as follows:
"A" Holding the tie-rod end, repeat lock to lock two or three times as quickly as possible.
"B" Holding the tie-rod end, turn it slowly at a radius one or two times as large as possible.
After all, make sure that the boot is installed in specified position without deflation.



38) Remove the gearbox from ST.
ST 926200000 STAND
39) Install the four pipes on gearbox.
(1) Connect the pipe A and B to gearbox.

Tightening torque:
Housing side
20 N·m (2.0 kgf-m, 14.5 ft-lb)
Cylinder side
24 N·m (2.4 kgf-m, 17.4 ft-lb)

(2) Connect the pipe G and H to gearbox.

Tightening torque:
15 N·m (1.5 kgf-m, 10.8 ft-lb)

E: INSPECTION

1. BASIC INSPECTION

1) Clean all disassembled parts, and check for wear, damage, or any other faults, then repair or replace as necessary.
2) When disassembling, check the inside of gearbox for water. If any water is found, carefully check the boot for damage, input shaft dust seal, adjusting screw and boot clips for poor sealing. If faulty, replace with new parts.

No.	Parts	Inspection	Corrective action
1	Input shaft	(1) Bend of input shaft (2) Damage on serration	If the bend or damage is excessive, replace the entire gearbox assembly.
2	Dust seal	(1) Crack or damage (2) Wear	If the outer wall slips, the lip is worn out or damage is found, replace it with a new one.
3	Rack and pinion	Poor mating of rack with pinion	(1) Adjust the backlash properly. By measuring the turning torque of gearbox and sliding resistance of rack, check if rack and pinion engage uniformly and smoothly with each other. (Refer to “Service limit”.) (2) Keeping the rack pulled out all the way so that all teeth emerge, check teeth for damage. Even if abnormality is found in either (1) or (2), replace the entire gearbox assembly.
4	Gearbox unit	(1) Bend of rack shaft (2) Bend of cylinder portion (3) Crack or damage on cast iron portion	Replace the gearbox assembly with a new one.
		(4) Wear or damage on rack bush	If the free play of rack shaft in radial direction is out of the specified range, replace the gearbox assembly with a new one. (Refer to “Service limit”.)
		(5) Wear on input shaft bearing	If the free plays of input shaft in radial and axial directions are out of the specified ranges, replace the gearbox assembly with a new one. (Refer to “Service limit”.)
5	Boot	Crack, damage or deterioration	Replace.
6	Tie-rod	(1) Looseness of ball joint (2) Bend of tie-rod	Replace.
7	Tie-rod end	Damage or deterioration on dust seal	Replace.
8	Adjusting screw spring	Deterioration	Replace.
9	Boot clip	Deterioration	Replace.
10	Sleeve	Damage	Replace.
11	Pipes	(1) Damage to flared surface (2) Damage to flare nut (3) Damage to pipe	Replace.

2. SERVICE LIMIT

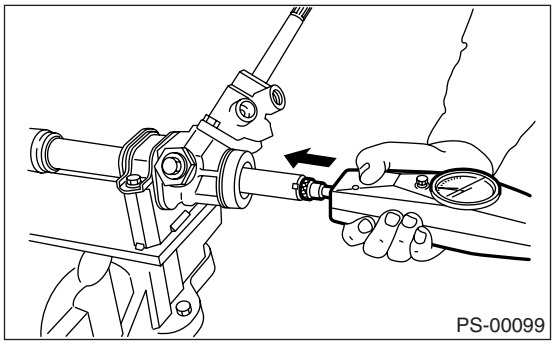
Make a measurement as follows. If it exceeds the specified service limit, adjust or replace.

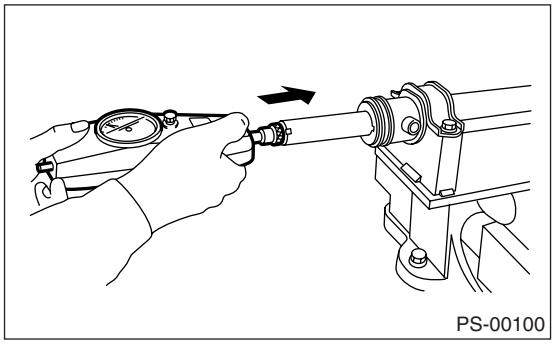
NOTE:
When making a measurement, vise the gearbox by using ST. Never vise the gearbox by inserting aluminum plates, etc. between vise and gearbox.

ST 926200000 STAND

Sliding resistance of rack shaft:

Service limit
400 N (41 kgf, 90 lbf) or less


PS-00099

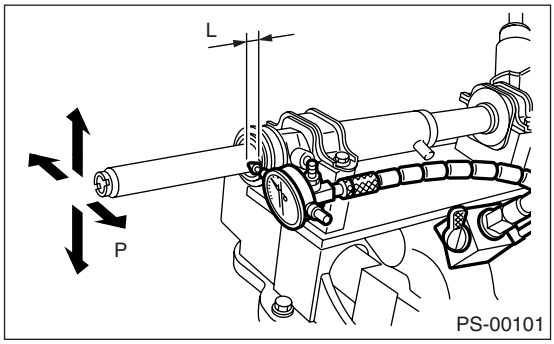

PS-00100

3. RACK SHAFT PLAY IN RADIAL DIRECTION

Right-turn steering:

Service limit
0.19 mm (0.0075 in) or less

On condition
L: 5 mm (0.20 in)
P: 122.6 N (12.5 kgf, 27.6 lbf)

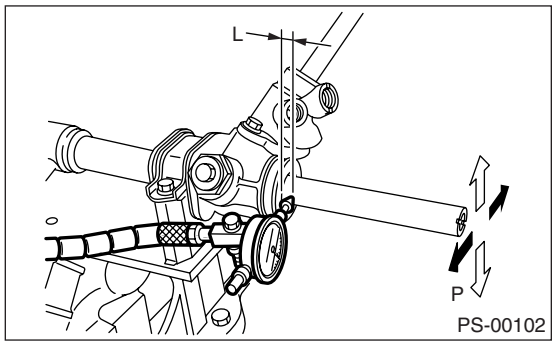


PS-00101

Left-turn steering:

Service limit
Direction ⇦⇨
0.3 mm (0.012 in) or less
Direction ⬅➡
0.15 mm (0.0059 in) or less

On condition
L: 5 mm (0.20 in)
P: 98 N (10 kgf, 22 lbf)



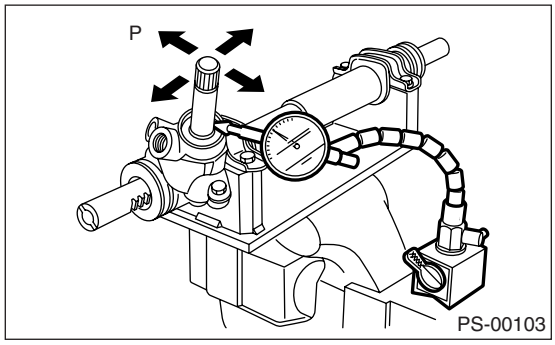
PS-00102

4. INPUT SHAFT PLAY

In radial direction:

Service limit
0.18 mm (0.0071 in) or less

On condition
P: 98 N (10 kgf, 22 lbf)



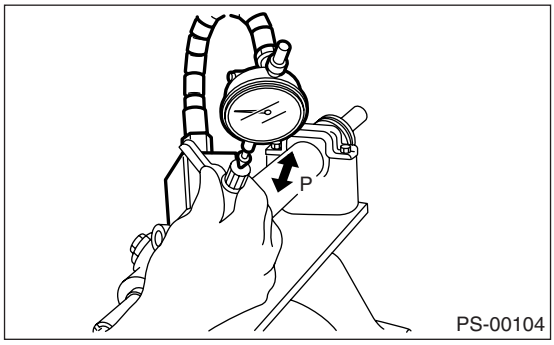
PS-00103

In axial direction:

Service limit
0.5 mm (0.020 in) or less

On condition

P: 20 — 49 N (2 — 5 kgf, 4 — 11 lbf)



5. TURNING RESISTANCE OF GEARBOX

Using the ST, measure the gearbox turning resistance.

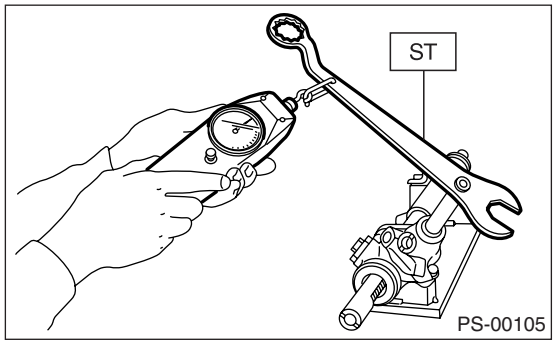
ST 34099PA100 SPANNER

Service limit

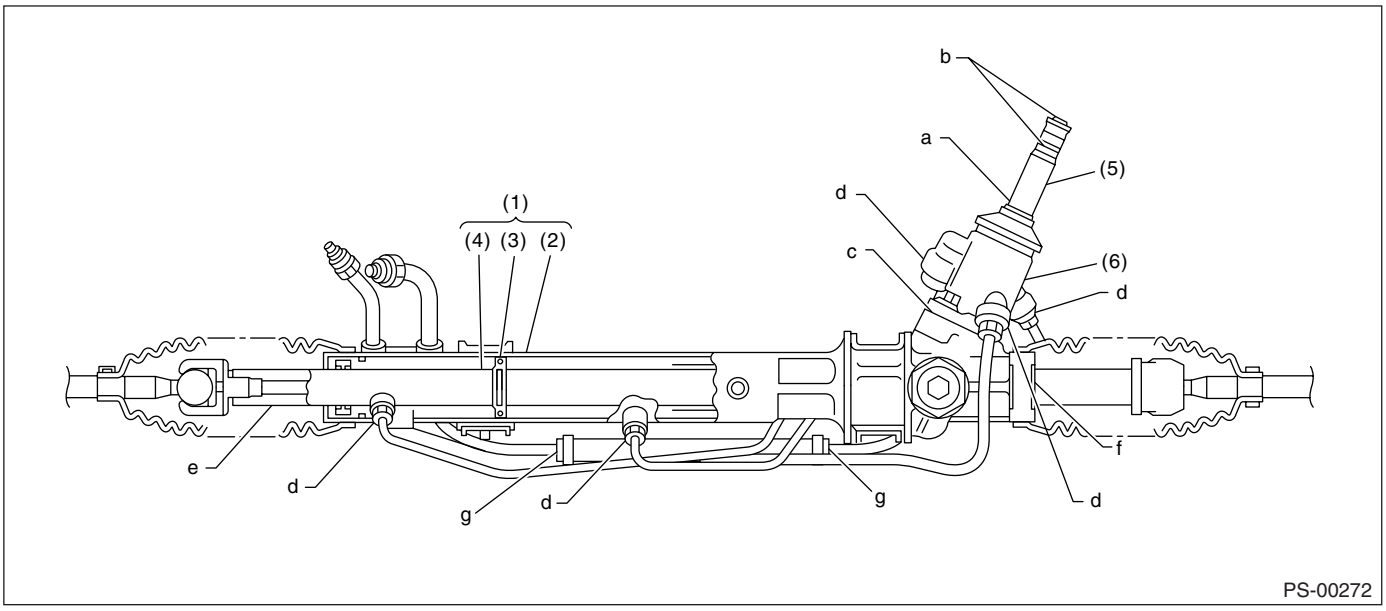
Maximum allowable resistance

10.5 N (1.1 kgf, 2.4 lbf) or less

Difference between right and left turning resistance: Less than 20%



6. OIL LEAKING



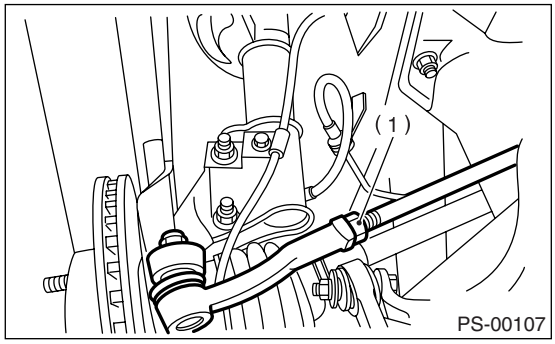
(1) Power cylinder
(2) Cylinder
(3) Rack piston
(4) Rack
(5) Input shaft
(6) Valve housing

1) Lift up the vehicle.
2) Even if the location of the leak can be easily found by observing the leaking condition, it is necessary to thoroughly remove the fluid from the suspected portion and turn the steering wheel from lock to lock about thirty to forty times with engine running, then make comparison of the suspected portion between immediately after and several hours after this operation.
3) Inspect leakage from “a”.
The oil seal is damaged. Replace the valve assembly with a new one.
4) Inspect leakage from “b”.
The torsion bar O-ring is damaged. Replace the valve assembly with a new one.
5) Inspect leakage from “c”.
The oil seal is damaged. Replace the valve assembly or oil seal with a new one.
6) Inspect leakage from “d”.
The pipe is damaged. Replace the faulty pipe or O-ring.
7) Inspect leakage from “g”.
The hose is damaged. Replace the hose with a new one.
8) If leak is other than a, b, c, d, or g, and if oil is leaking from the gearbox, move the right and left boots toward tie-rod end side, respectively, with the gearbox mounted to the vehicle, and remove fluid from the surrounding portions. Then, turn the steering wheel from lock to lock thirty to forty times with the engine running, then make comparison of the leaked portion immediately after and several hours after this operation.
(1) Leakage from “e”
The cylinder seal is damaged. Replace the rack bush with a new one.
(2) Leakage from “f”
There are two possible causes. Take the following step first. Remove the pipe assembly B from the valve housing, and close the circuit with ST.
ST 926420000 PLUG
Turn the steering wheel from lock to lock thirty to forty times with the engine running, then make comparison of the leaked portion between immediately after and several hours after this operation.
• If leakage from “f” is noted again:
The oil seal of pinion and valve assembly is damaged. Replace the pinion and valve assembly with a new one. Or replace the oil seal and parts that are damaged during disassembly with new ones.
• If oil stops leaking from “f”:
The oil seal of rack housing is damaged. Replace the oil seal and the parts that are damaged during disassembly with new ones.

F: ADJUSTMENT

1) Adjust the front toe. <Ref. to FS-11, FRONT WHEEL TOE-IN, INSPECTION, Wheel Alignment.>

Standard of front toe:
IN 3 — OUT 3 mm (IN 0.12 — OUT 0.12 in)



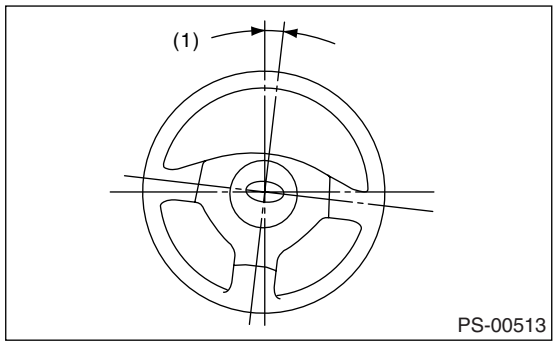
(1) Lock nut

2) Adjust the steering angle of wheels.

Standard of steering angle:

Model	TURBO, 2.5 L and OUTBACK	1.6 L and 2.0 L	STi
Inner wheel	34.5°±1.5°	37.3°±1.5°	32.9°±1.5°
Outer wheel	30.3°±1.5°	32.4°±1.5°	28.5°±1.5°

3) If the steering wheel spokes are not horizontal when wheels are set in the straight ahead position, and error is more than 5° on the periphery of steering wheel, correctly re-install the steering wheel.



(1) Within 5°

4) If the steering wheel spokes are not horizontal with vehicle set in the straight ahead position after this adjustment, correct it by turning the right and left tie-rods in opposite direction by same angle.

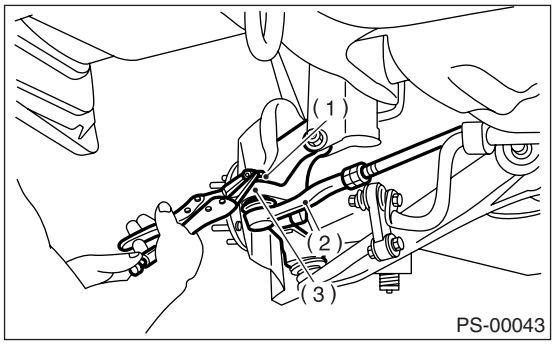
6. Steering Gearbox [RHD Model]

A: REMOVAL

1) Set the vehicle on a lift.
2) Disconnect the ground cable from battery.
3) Loosen the front wheel nut.
4) Lift-up the vehicle, and then remove the front wheels.
5) Remove the under cover.
6) Remove the sub frame. <Ref. to FS-25, REMOVAL, Sub Frame.>
7) Remove the front exhaust pipe assembly. (Non-turbo model)
<Ref. to EX(H4SO)-6, REMOVAL, Front Exhaust Pipe.>

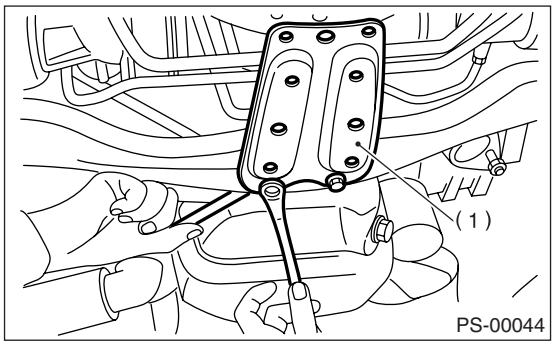
WARNING:
Be careful, the exhaust pipe is hot.

8) Using a puller, remove the tie-rod end from knuckle arm after pulling off cotter pin and removing castle nut.



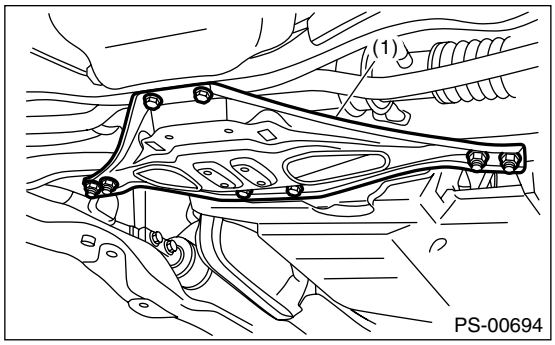
(1) Castle nut
(2) Tie-rod end
(3) Knuckle arm

9) Remove the jack-up plate and front stabilizer.
- NON-TURBO MODEL



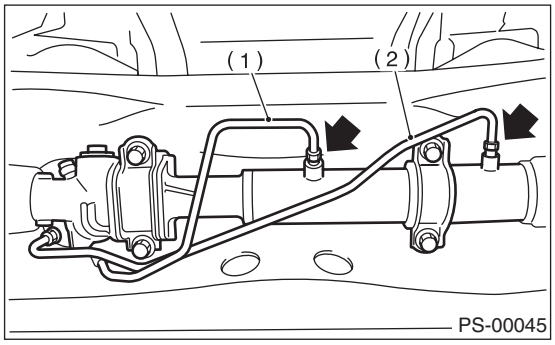
(1) Jack-up plate

- TURBO MODEL



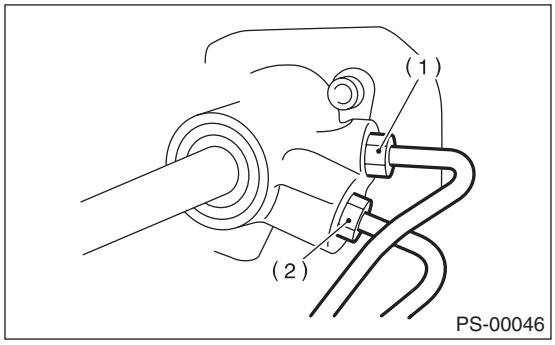
(1) Jack-up plate

10) Remove the one pipe joint at center of gearbox, and connect vinyl hose to pipe and joint. Discharge fluid by turning the steering wheel fully clockwise and counterclockwise. Discharge fluid similarly from the other pipe.



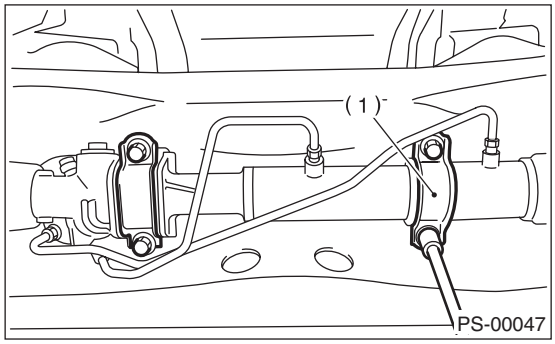
(1) Pipe A
(2) Pipe B

11) Remove the universal joint. <Ref. to PS-29, REMOVAL, Universal Joint.>
12) Disconnect the lower pipe C from gear box first, and upper pipe D second.



(1) Pipe C
(2) Pipe D

13) Remove the clamp bolts securing the gearbox to crossmember, and then remove the gearbox.

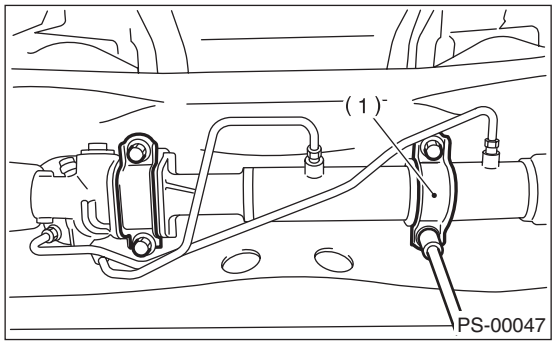


(1) Clamp

B: INSTALLATION

1) Insert the gearbox into crossmember, being careful not to damage the gearbox boot.
2) Tighten the gearbox to crossmember bracket via clamp with bolts to specified torque.

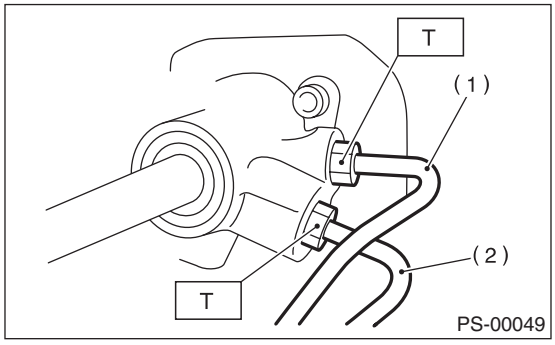
Tightening torque:
60 N·m (6.1 kgf-m, 44.1 ft-lb)



(1) Clamp

3) Connect the pipe D first to gear box, and pipe C second.

Tightening torque:
T: 15 N·m (1.5 kgf-m, 10.8 ft-lb)



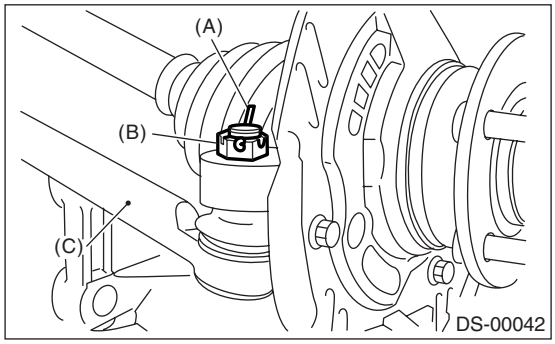
(1) Pipe C
(2) Pipe D

4) Install the universal joint. <Ref. to PS-29, INSTALLATION, Universal Joint.>
5) Connect the tie-rod end and knuckle arm, and tighten with castle nut.

Castle nut tightening torque:
27 N·m (2.75 kgf-m, 19.9 ft-lb)

CAUTION:
When connecting, do not hit the cap at bottom of tie-rod end with hammer.

6) After tightening the castle nut to the specified tightening torque, tighten it further within 60° until cotter pin hole is aligned with slot in the nut. Fit the cotter pin into nut, and then bend the pin to lock.



(A) Cotter pin
(B) Castle nut
(C) Tie-rod

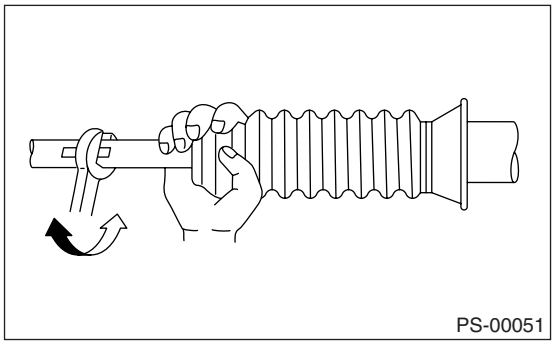
7) Install the front stabilizer to vehicle.
8) Install the front exhaust pipe assembly.
9) Install the sub frame.
10) Align the center of roll connector. <Ref. to AB-18, ADJUSTMENT, Roll Connector.>
11) Install the steering wheel. <Ref. to PS-28, INSTALLATION, Steering Wheel.>
12) Install the front wheels.
13) Tighten the wheel nuts to specified torque.

Tightening torque:
90 N·m (9.2 kgf-m, 66.4 ft-lb)

14) Connect the battery ground cable to battery.
15) Pour fluid into the oil tank, and bleed air.
<Ref. to PS-100, Power Steering Fluid.>
16) Check for fluid leaks.
17) Install the jack-up plate.
18) Install the under cover.
19) Lower the vehicle.
20) Check the fluid level in oil tank.
21) After adjusting the toe-in and steering angle, tighten the lock nut on tie-rod end.

Tightening torque:
85 N·m (8.7 kgf-m, 62.7 ft-lb)

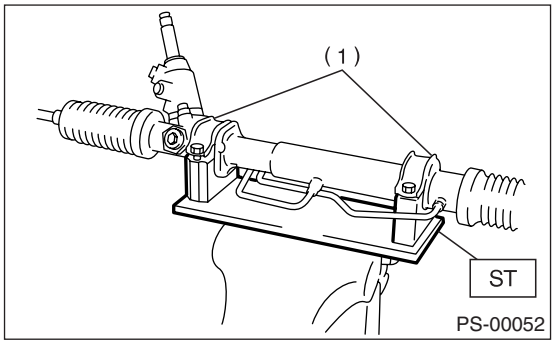
NOTE:
When adjusting the toe-in, hold boot as shown to prevent it from being rotated or twisted. If twisted, straighten it.



C: DISASSEMBLY

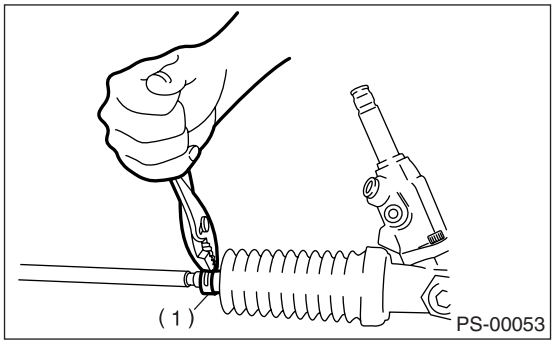
1) Secure the gearbox removed from vehicle in vise using the ST.
ST 926200000 STAND

CAUTION:
Secure the gearbox assembly in a vise using the ST as shown. Do not attempt to secure it without this ST.



(1) Clamp

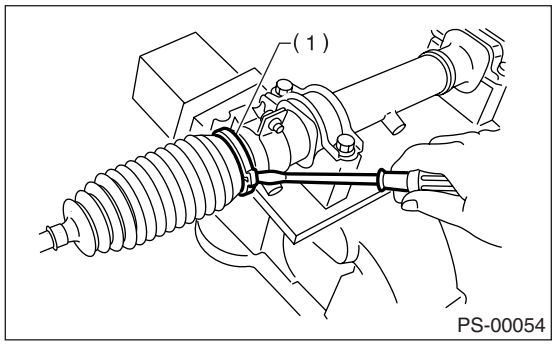
2) Remove the tie-rod end and lock nut from gearbox.
3) Remove the clip on outside of boot using pliers, and then slide the boot to tie-rod end side.



(1) Clip

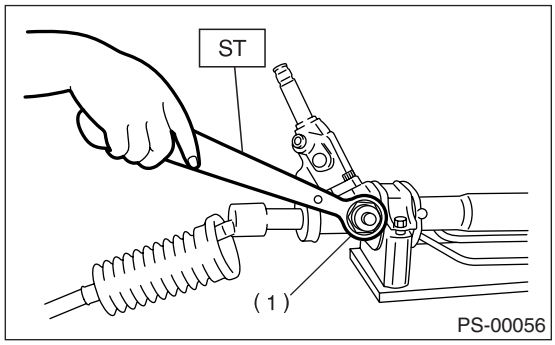
4) Using flat tip screwdriver, remove the band from boot.

NOTE:
Check the boot for crack, damage or deterioration. Replace the boot with a new one if necessary.



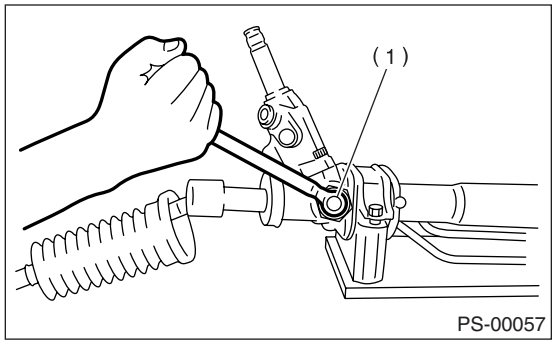
(1) Band

5) Using the ST, loosen lock nut.
ST 926230000 SPANNER



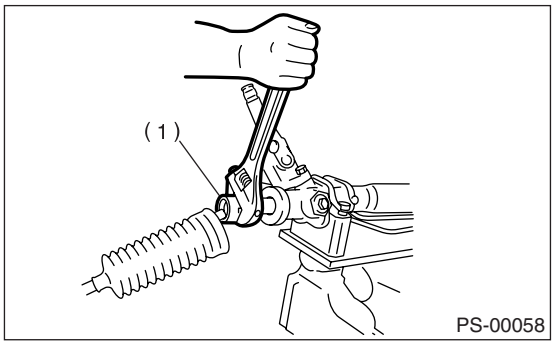
(1) Lock nut

6) Tighten the adjusting screw until it no longer tightens.



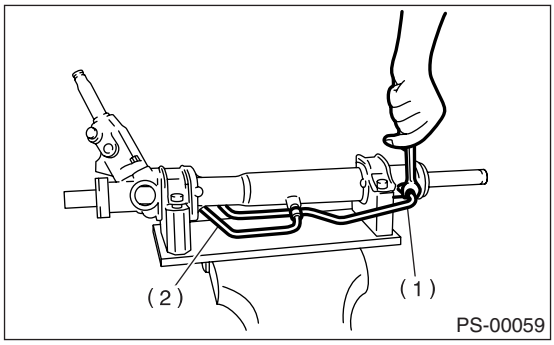
(1) Adjusting screw

7) Using a wrench (32 mm (1.26 in) width across flats) or adjustable wrench with cinching boot, remove the tie-rod.



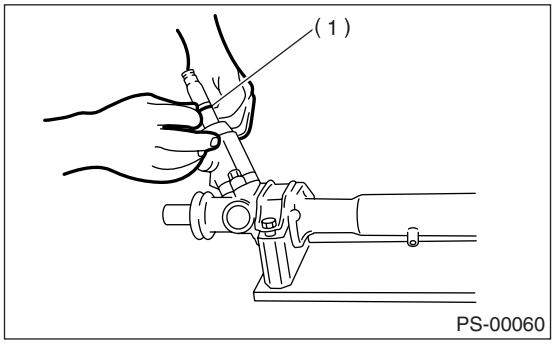
(1) Tie-rod

8) Loosen the adjusting screw, and then remove the spring and sleeve.
9) Disconnect the pipes A and B from steering body and control valve housing.



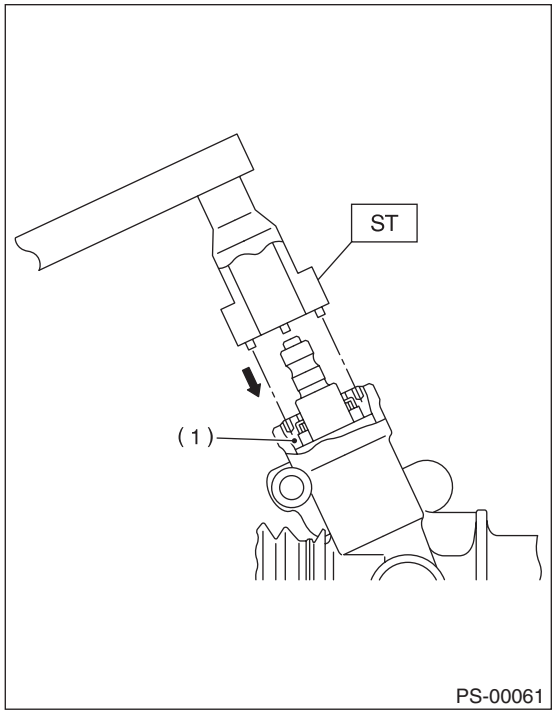
(1) Pipe A
(2) Pipe B

10) Clean the dirt of input shaft. Remove the dust cover taking care not to scratch the housing or input shaft and allow foreign matter to enter gear box interior.



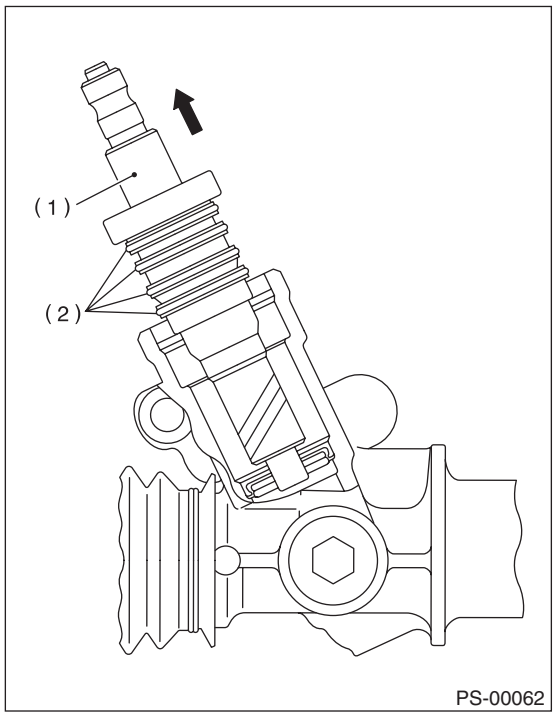
(1) Dust cover

11) Align the ST pin to plug hole to install. Rotate the ST counterclockwise to remove plug.
ST 34199AE090 PLUG WRENCH



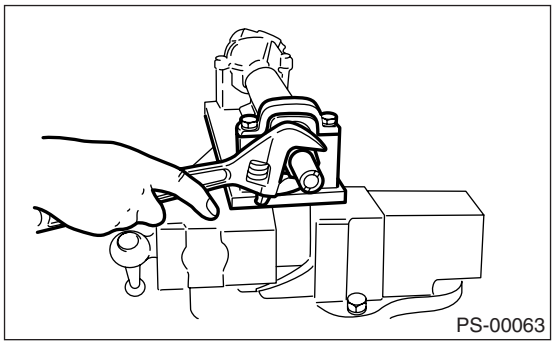
(1) Plug

12) Remove the valve assembly taking care not to scratch seal ring and valve housing inner surface.



(1) Valve ASSY
(2) Seal ring

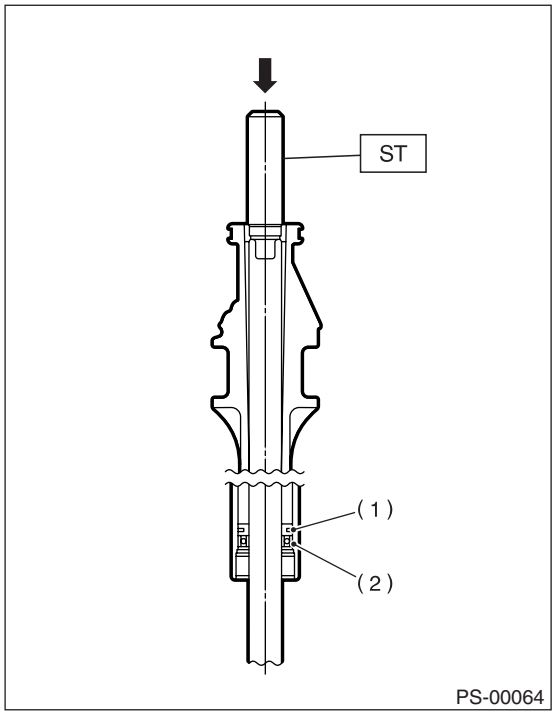
13) Remove the holder using a wrench (32 mm (1.26 in) width across flats for non-turbo model, 36 mm (1.42 in) width across flats for turbo model) or adjustable wrench.



14) Install the ST on valve side of rack and press outer side oil seal out taking care not to contact rack with steering body inner surface.

ST 34099FA030 INSTALLER & REMOVER (Non-turbo model)
ST 34199FE000 INSTALLER & REMOVER (Turbo model)

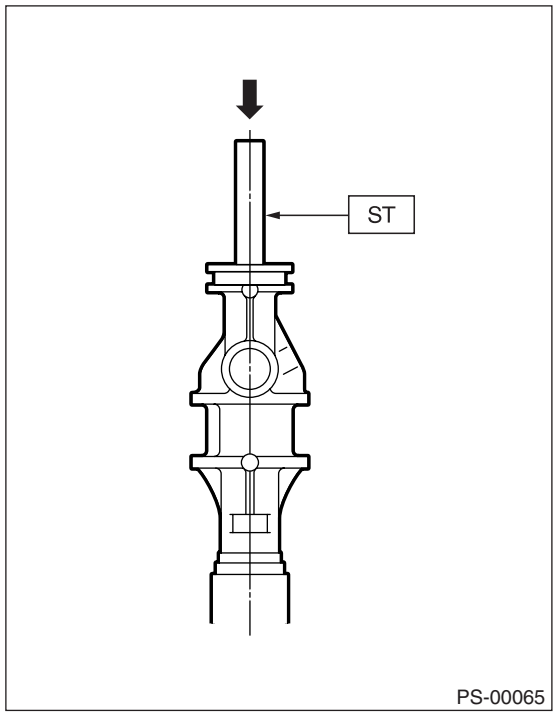
NOTE:
Block the pipe connection of steering body to prevent fluid from flowing out.



(1) Rack piston
(2) Outer side oil seal

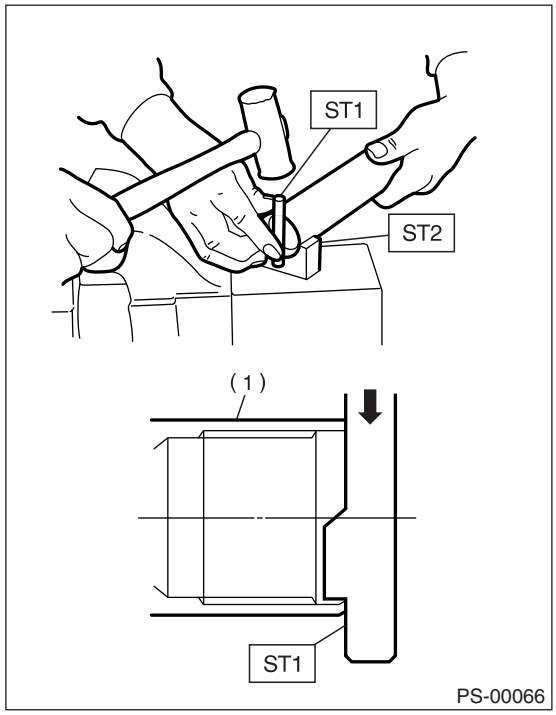
15) Insert the ST from valve side and press back-up ring and oil seal out.

ST 927580000 REMOVER (Non-turbo model)
ST 34199FE010 REMOVER (Turbo model)



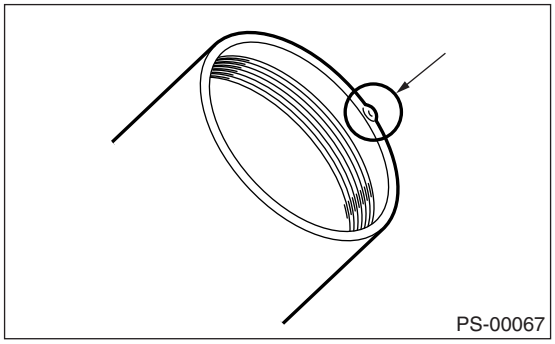
16) Using the ST1 and ST2, repair the cylinder's clinched sections.

ST1 34099FA080 PUNCH
ST2 34099FA070 BASE (Non-turbo model)
ST2 34199FE020 BASE (Turbo model)



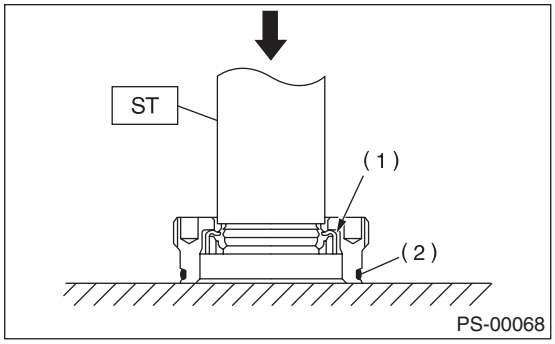
(1) Cylinder

17) If the cylinder edge is deformed in a convex shape, repair using an oil stone.



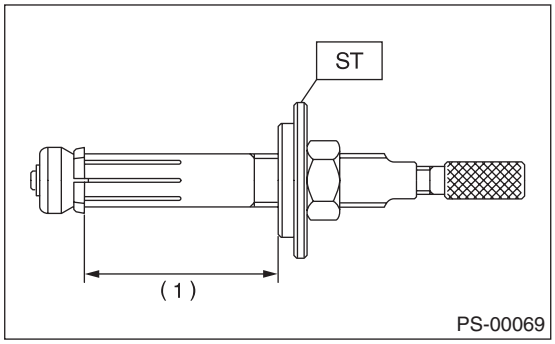
18) Remove the oil seal using ST and press from plug.
ST 34199AE100 PLUG OIL SEAL REMOVER

NOTE:
Do not apply force on the plug edge surface.



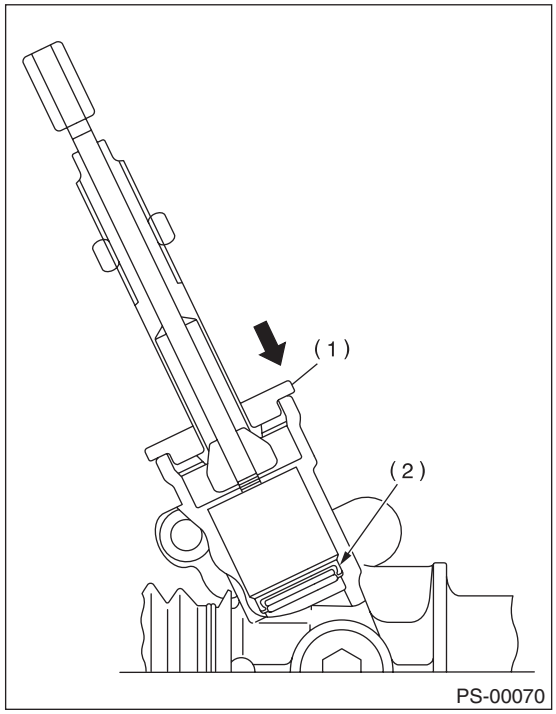
(1) Oil seal
(2) O-ring

19) Set the ST on drawing dimension.
ST 34199AE120 GEARBOX OIL SEAL REMOVER



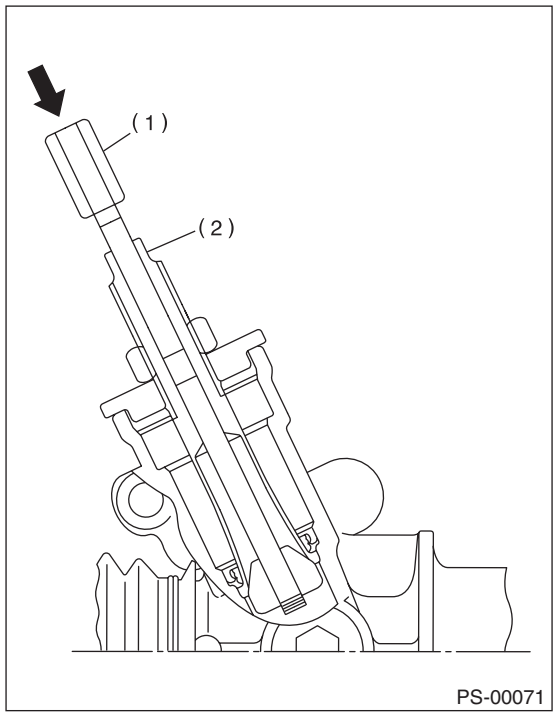
(1) 70 mm (2.76 in)

20) Set the stopper to gear box, and then insert the tip of ST to gear box.



(1) Stopper
(2) Oil seal

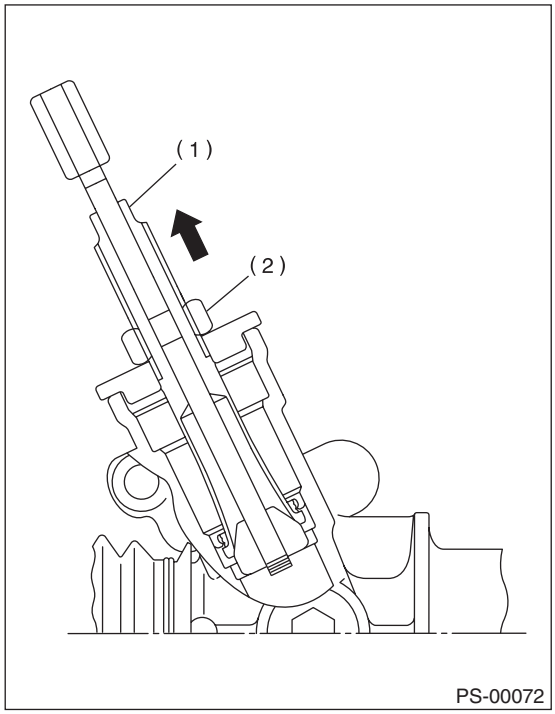
21) By fixing the 2-surface width, press in by rotating the rod and attach to oil seal.



(1) Rod
(2) 2-surface width

22) While fixing the 2-surface width, pull out the oil seal by rotating nut.

CAUTION:
Take care not to scratch the gear box inner surface.



(1) 2-surface width
(2) Nut

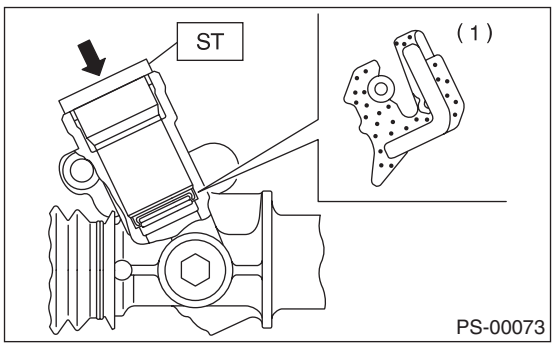
D: ASSEMBLY

1) Apply a coat of grease to inside and outside of new oil seal.

Specified steering grease:
VALIANT GREASE M2 (Part No. 003608001)

2) Verify the oil seal direction and installation position. Using the ST and press, press fit the oil seal to gear box.

ST 34199AE130 GEARBOX OIL SEAL INSTALLER

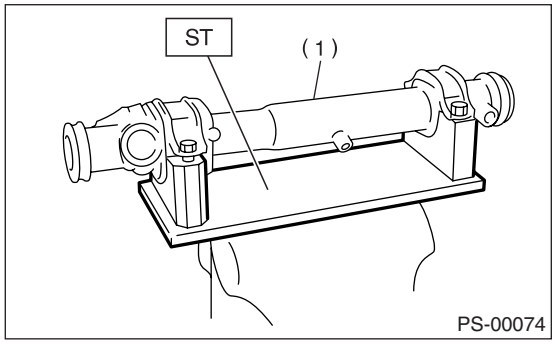


(1) Oil seal

3) Attach the steering body to ST as shown in the figure. Apply a coat of grease to needle bearing.

ST 926200000 STAND

CAUTION:
Ensure the needle bearing is free from defects. If it is faulty, replace the steering body with a new one.

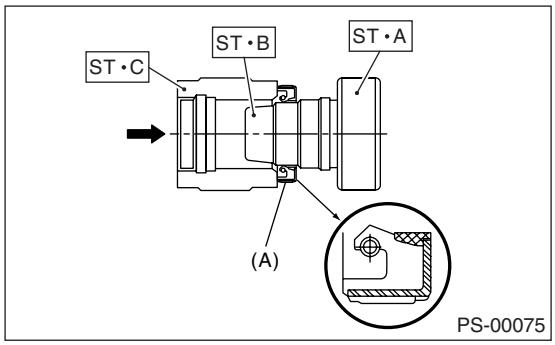


(1) Steering body

4) Using the ST·B and ST·C, attach the oil seal to ST·A.

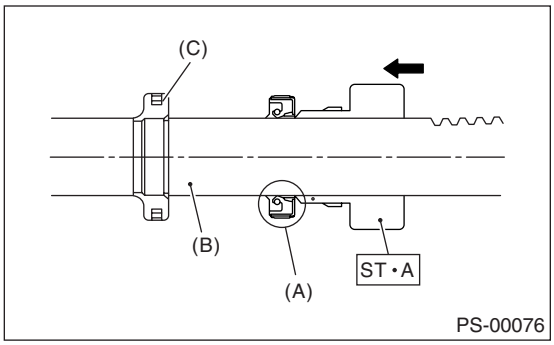
ST 927490000 INSTALLER A, B, C (Non-turbo model)
ST 34199FE040 INSTALLER A, B, C (Turbo model)

NOTE:
Face the oil seal in direction shown in the figure.



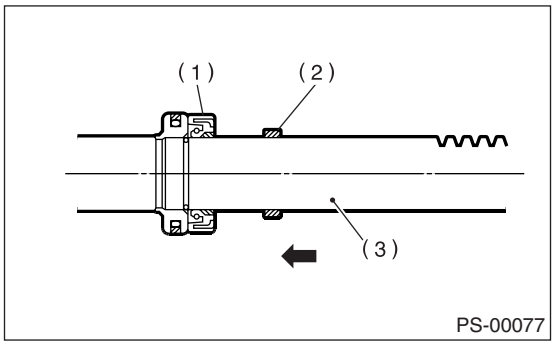
(A) Oil seal

5) Insert the ST·A with oil seal assembled, through gear side of rack. Remove the oil seal from ST·A near piston, and then remove the ST·A from rack.



(A) Oil seal
(B) Rack
(C) Piston

6) Install the back-up washer from gear side of rack.

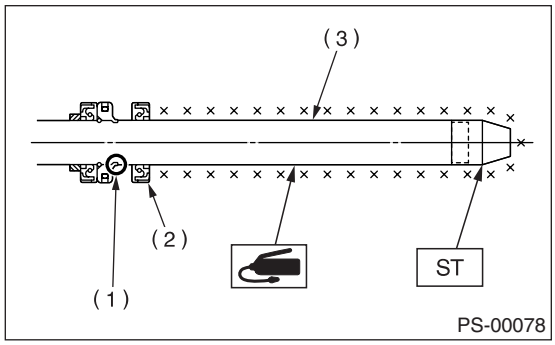


(1) Oil seal
(2) Back-up washer
(3) Rack

7) Install the ST on rack and equally apply a thin coat of grease to the rack and ST, then install the oil seal.
ST 926250000 GUIDE

CAUTION:
Be careful not to scratch the oil seal lips with piston's inner ring section.

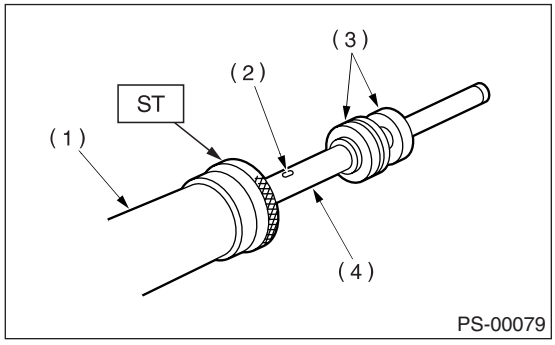
NOTE:
For turbo model, do not use this ST.



(1) Rack piston inner ring
(2) Outer side oil seal
(3) Rack

8) Apply a coat of grease to the grooves in rack, sliding surface of sleeve and sealing surface of piston. Install the ST on end of steering body cylinder. Then insert the rack into steering body from cylinder side.
ST 34199AE000 GUIDE (Oil seal) (Non-turbo model)
ST 34199FE050 GUIDE (Oil seal) (Turbo model)

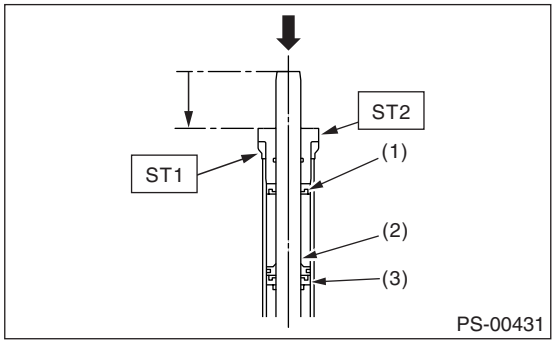
CAUTION:
Do not allow grease to block the air vent hole on rack.



(1) Cylinder side of steering body
(2) Air vent hole
(3) Oil seal
(4) Rack

9) Make the ST2 pass through rack, and then push in the rack and ST2 using a press until ST1 comes in contact with ST2 and the end of rack is aligned with end of ST2.
ST1 34199AE000 GUIDE (Oil seal) (Non-turbo model)
ST1 34199FE050 GUIDE (Oil seal) (Turbo model)
ST2 34199AE010 INSTALLER (Oil seal) (Non-turbo model)

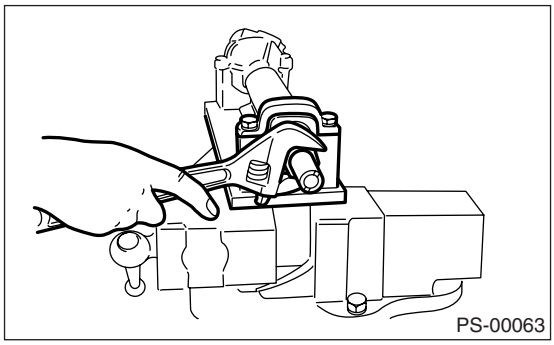
ST2 34199FE060 INSTALLER (Oil seal) (Turbo model)



(1) Outer side oil seal
(2) Rack piston
(3) Inner side oil seal

10) Install a new holder to cylinder side of steering body.

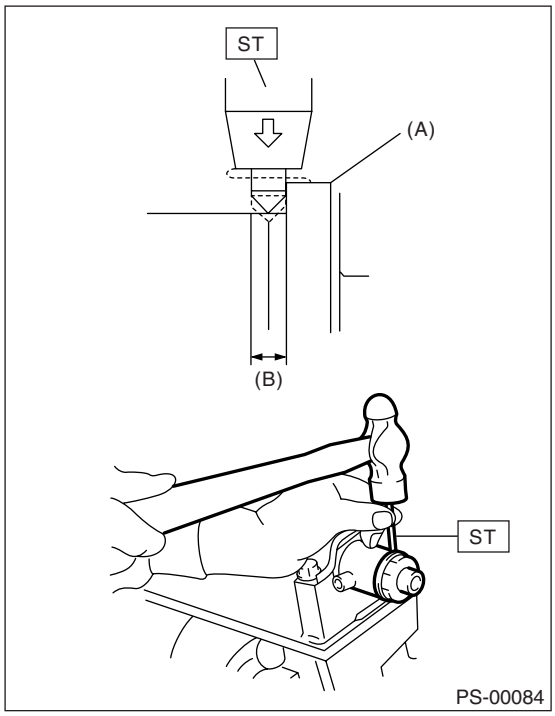
Tightening torque:
Non-turbo model:
64 N·m (6.5 kgf-m, 47.0 ft-lb)
Turbo model:
75 N·m (7.6 kgf-m, 58.7 ft-lb)



11) Using the ST, clinch steering body cylinder at a point less than 3 mm (0.12 in) from holder.

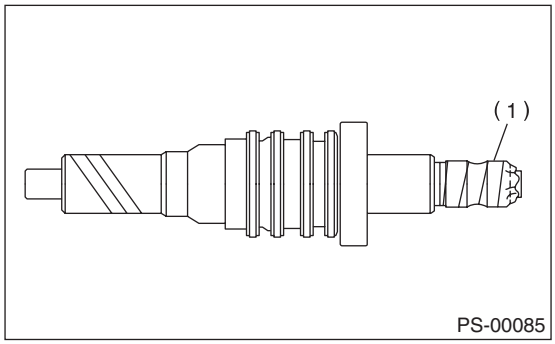
CAUTION:
Be careful not to deform the holder.

ST 34099FA060 PUNCH HOLDER



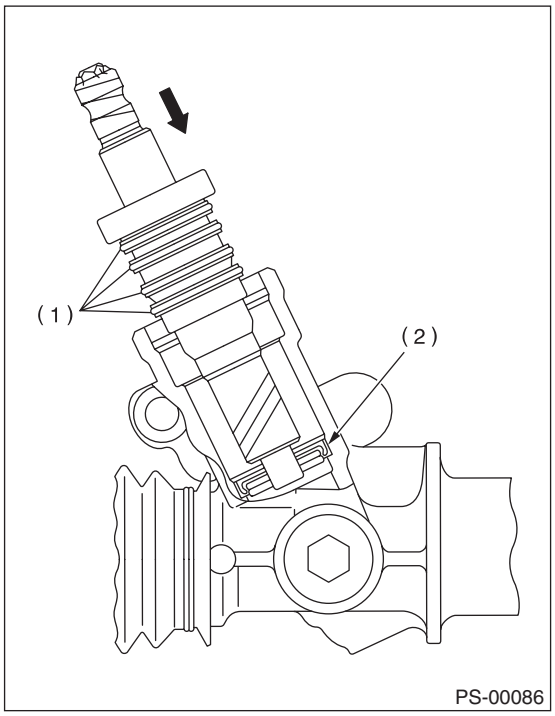
(A) Holder
(B) 3 mm (0.12 in)

12) Roll the vinyl tape on serration part of valve assembly, and then apply grease on the tape surface.



(1) Vinyl tape

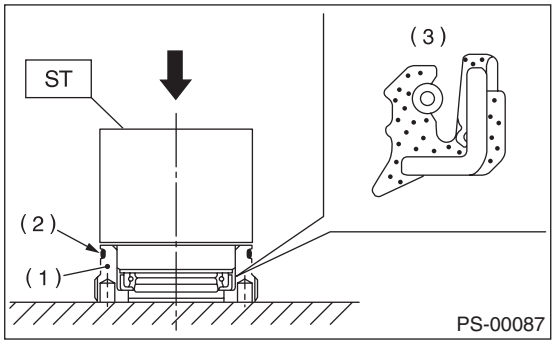
13) Apply a coat of grease on the gear teeth of valve assembly, and then attach the valve assembly taking care not to scratch oil seal and seal ring.



(1) Seal ring
(2) Oil seal

14) Apply grease on the oil seal circumference, and then press into the plug using ST and a press. Replace the plug circumference O-rings with new ones.
ST 34199AE110 PLUG OIL SEAL INSTALLER

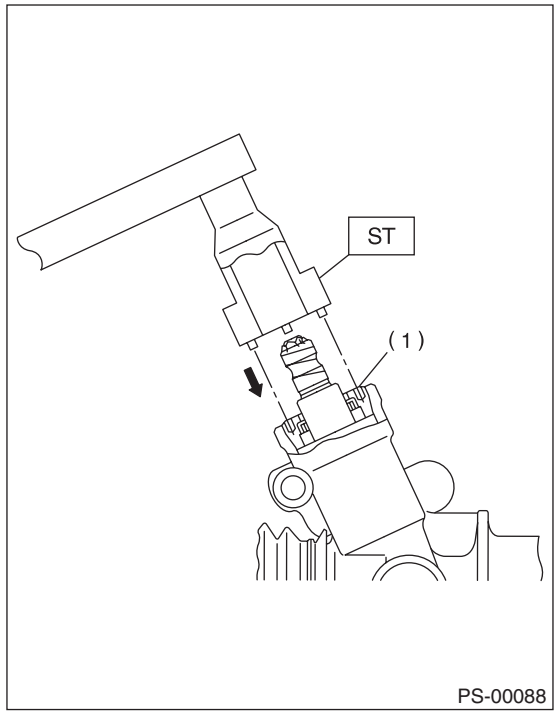
CAUTION:
Pay attention to the oil seal direction, and attaching position.



(1) Plug
(2) O-ring
(3) Oil seal

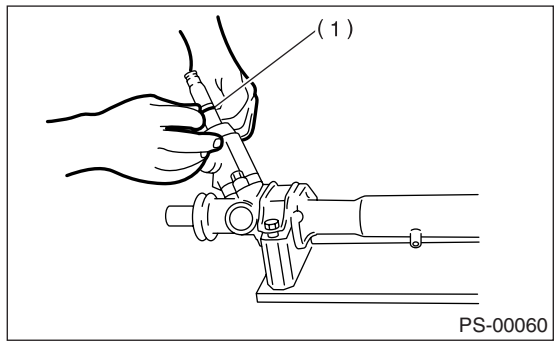
15) Using the ST, install plug.
ST 34199AE090 PLUG WRENCH

Tightening torque:
64 N·m (6.5 kgf-m, 47.0 ft-lb)



(1) Plug

16) Install the dust cover. Remove the vinyl tape.

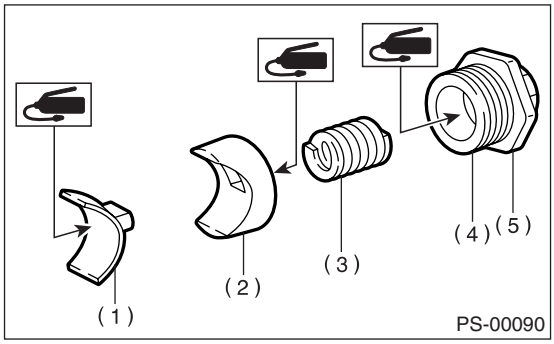


(1) Dust cover

17) Temporarily install the rack, and then operate it from lock to lock two or three times to make it fit in. Remove the grease blocking air vent hole.

CAUTION:
If operating the rack from lock to lock without installing tie-rod, it may damage the oil seal. Always install the tie-rods LH and RH.

18) Apply a coat of grease to the sliding surface of seat pad, sleeve and seating surface of spring, and then insert sleeve into steering body.
Charge the adjusting screw with grease, and then insert the spring into adjusting screw and install on steering body.



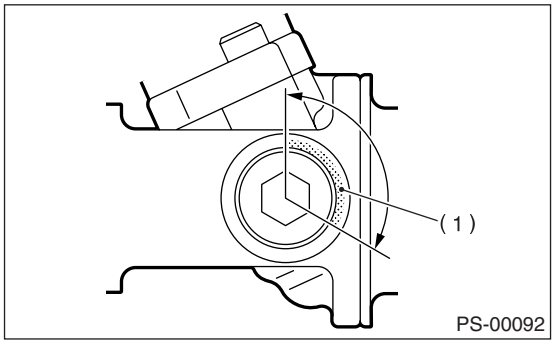
(1) Seat pad
(2) Sleeve
(3) Spring
(4) Adjusting screw
(5) Lock nut

19) Tighten the adjusting screw to specified torque.

Tightening torque:
7.4 N·m (0.75 kgf-m, 5.4 ft-lb)

20) After tightening to the specified tightening torque, loosen it by 25°. (Non-turbo model)
21) After tightening to the specified tightening torque, loosen it by 37°. (Turbo model)
22) Remove the tie-rod.
23) Verify that play is within specified value. <Ref. to PS-74, SERVICE LIMIT, INSPECTION, Steering Gearbox [RHD Model].>
24) Loosen the adjusting screw, and then apply liquid gasket to at least 1/3 of the entire perimeter of adjusting screw thread.

Liquid gasket:
THREE BOND 1141 (Part No. 004403006)



(1) Apply liquid gasket to at least 1/3 of entire perimeter.

25) Tighten the adjusting screw.

Tightening torque:
9.8 N·m (10.0 kgf-m, 7.2 ft-lb)

26) After tightening to the specified tightening torque, loosen it.
27) Tighten the adjusting screw.

Tightening torque:
4.8 N·m (0.49 kgf-m, 3.5 ft-lb)

28) After tightening to the specified tightening torque, loosen it.
29) Tighten the adjusting screw.

Tightening torque:
4.8 N·m (0.49 kgf-m, 3.5 ft-lb)

30) After tightening to the specified tightening torque, loosen it by 25°. (Non-turbo model)
31) After tightening to the specified tightening torque, loosen it by 37°. (Turbo model)
32) Install the lock nut. While holding the adjusting screw with a wrench, tighten lock nut using ST.
ST 926230000 SPANNER

Tightening torque (Lock nut):
39 N·m (4.0 kgf-m, 28.9 ft-lb)

NOTE:
Hold the adjusting screw with a wrench to prevent it from turning while tightening lock nut.

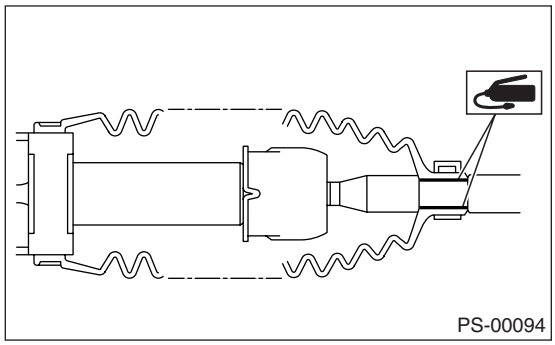
33) Install the tie-rod into rack.

Tightening torque:
90 N·m (9.0 kgf-m, 65.1 ft-lb)

NOTE:
Check the mating face of rack and tie-rod for foreign material, dirt, dust and etc.
If required, clean the mating face.

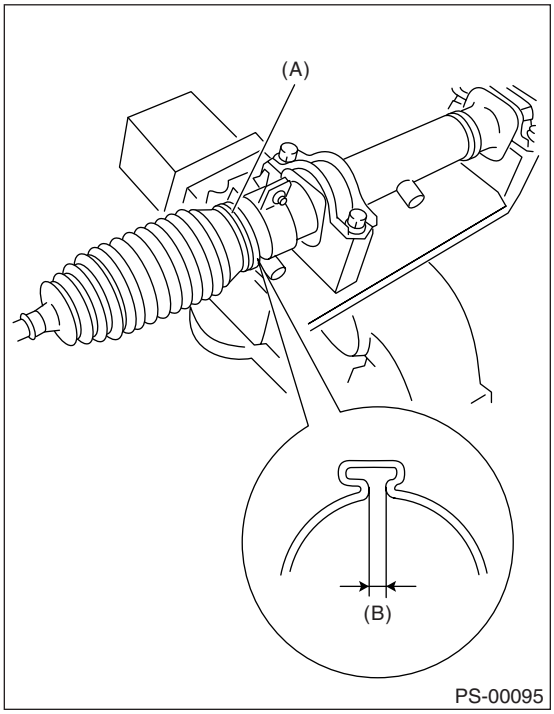
34) Apply a coat of grease to the tie-rod groove, and then install the boot to housing.

NOTE:
Make sure that the boot is installed without unusual inflation or deflation.



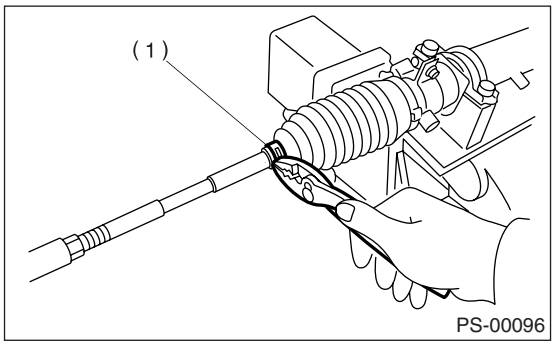
35) Caulk the boot so the space inside boot band caulking portion becomes 2 mm (0.08 in) or less.

NOTE:
Use a new boot band.



(A) Boot band
(B) Less than 2mm (0.08 in)

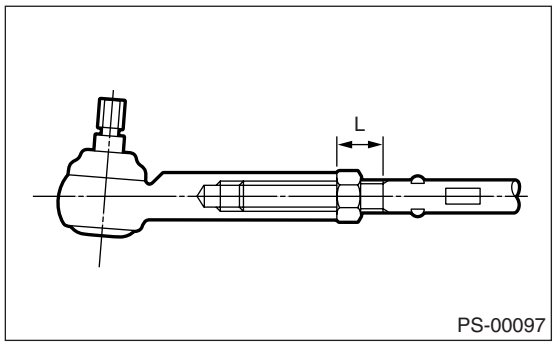
36) Fix the boot end with clip (small).



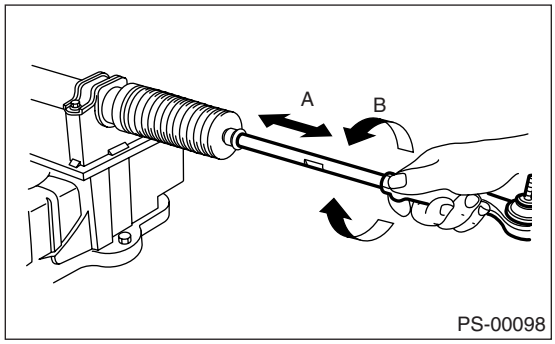
(1) Clip

37) After installing, check the boot end is positioned into groove on tie-rod.
38) If the tie-rod end was removed, screw in the lock nut and tie-rod end to screwed portion of tie-rod, and then tighten the lock nut temporarily in a position as shown in the figure.

Installed tie-rod length L:
Sedan:
25 mm (0.98 in)
Wagon:
15 mm (0.59 in)



39) Inspect the gearbox as follows:
"A" Holding the tie-rod end, repeat lock to lock two or three times as quickly as possible.
"B" Holding the tie-rod end, turn it slowly at a radius one or two times as large as possible.
After all, make sure that the boot is installed in specified position without deflation.



40) Remove the gearbox from ST.
ST 926200000 STAND

E: INSPECTION

1. BASIC INSPECTION

1) Clean all disassembled parts, and check for wear, damage, or any other faults, then repair or replace as necessary.
2) When disassembling, check the inside of gearbox for water. If any water is found, carefully check the boot for damage, input shaft dust seal, adjusting screw and boot clips for poor sealing. If faulty, replace with new parts.

No.	Parts	Inspection	Corrective action
1	Input shaft	(1) Bend of input shaft (2) Damage on serration	If the bend or damage is excessive, replace the entire gearbox assembly.
2	Dust seal	(1) Crack or damage (2) Wear	If the outer wall slips, lip is worn out or damage is found, replace it with a new one.
3	Rack and pinion	Poor mating of rack with pinion	(1) Adjust the backlash properly. By measuring the turning torque of gearbox and sliding resistance of rack, check if rack and pinion engage uniformly and smoothly with each other. (Refer to “Service limit”.) (2) Keeping the rack pulled out all the way so that all teeth emerge, check teeth for damage. Even if abnormality is found in either (1) or (2), replace the entire gearbox assembly.
4	Gearbox unit	(1) Bend of rack shaft (2) Bend of cylinder portion (3) Crack or damage on cast iron portion	Replace the gearbox assembly with a new one.
		(4) Wear or damage on rack bush	If the free play of rack shaft in radial direction is out of the specified range, replace the gearbox assembly with a new one. (Refer to “Service limit”.)
		(5) Wear on input shaft bearing	If the free plays of input shaft in radial and axial directions are out of the specified ranges, replace the gearbox assembly with a new one. (Refer to “Service limit”.)
5	Boot	Crack, damage or deterioration	Replace with a new one.
6	Tie-rod	(1) Looseness of ball joint (2) Bend of tie-rod	Replace with a new one.
7	Tie-rod end	Damage or deterioration on dust seal	Replace with a new one.
8	Adjusting screw spring	Deterioration	Replace with a new one.
9	Boot clip	Deterioration	Replace with a new one.
10	Sleeve	Damage	Replace with a new one.
11	Pipes	(1) Damage to flared surface (2) Damage to flare nut (3) Damage to pipe	Replace with a new one.

2. SERVICE LIMIT

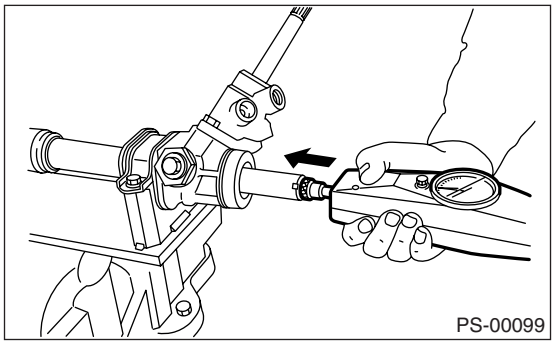
Make a measurement as follows. If it exceeds the specified service limit, adjust or replace.

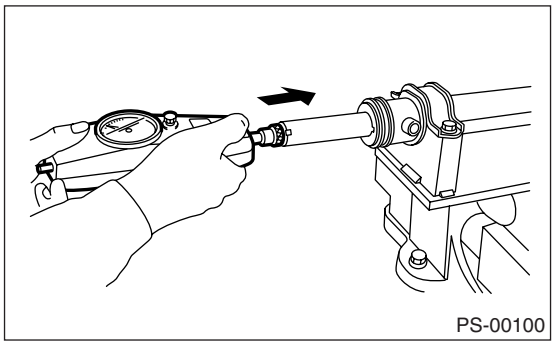
NOTE:
When making a measurement, vise gearbox by using ST. Never vise the gearbox by inserting aluminum plates, etc. between vise and gearbox.

ST 926200000 STAND

Sliding resistance of rack shaft:

Service limit
400 N (41 kgf, 90 lbf) or less



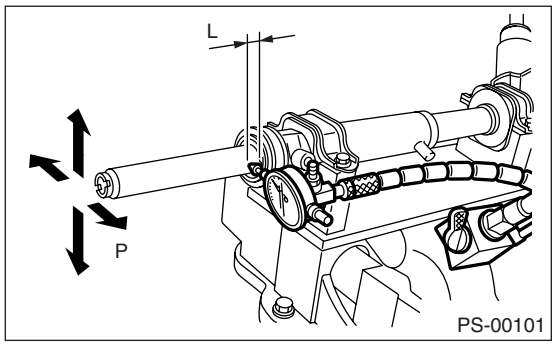


3. RACK SHAFT PLAY IN RADIAL DIRECTION

Left-turn steering:

Service limit
0.19 mm (0.0075 in) or less

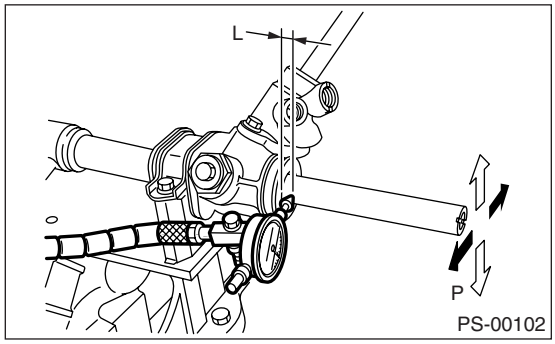
On condition
L: 5 mm (0.20 in)
P: 98 N (10 kgf, 22 lbf)



Right-turn steering:

Service limit
Direction ⇦ ⇨
0.3 mm (0.012 in) or less
Direction ⬅ ➡
0.19 mm (0.0075 in) or less

On condition
L: 5 mm (0.20 in)
P: 98 N (10 kgf, 22 lbf)

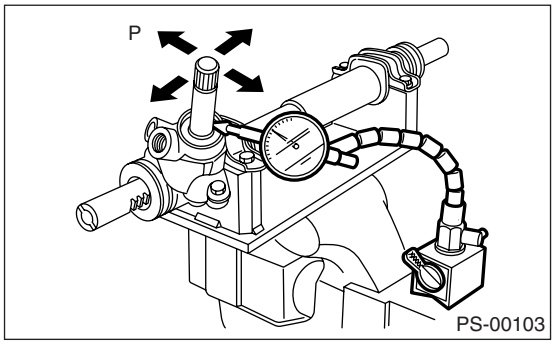


4. INPUT SHAFT PLAY

In radial direction:

Service limit
0.18 mm (0.0071 in) or less

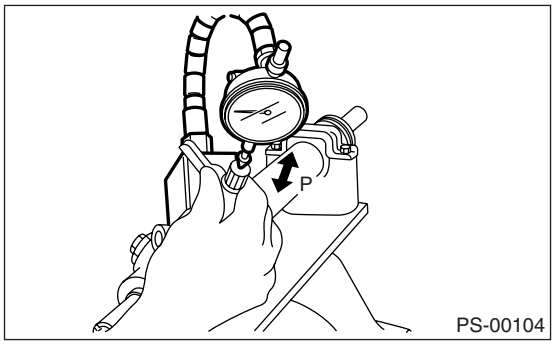
On condition
P: 98 N (10 kgf, 22 lbf)



In axial direction:

Service limit
0.5 mm (0.020 in) or less

On condition
P: 20 — 49 N (2 — 5 kgf, 4 — 11 lbf)

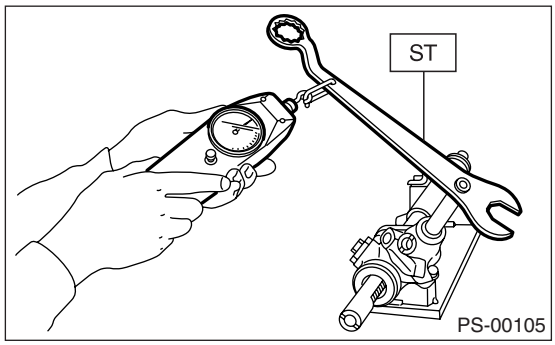


5. TURNING RESISTANCE OF GEARBOX

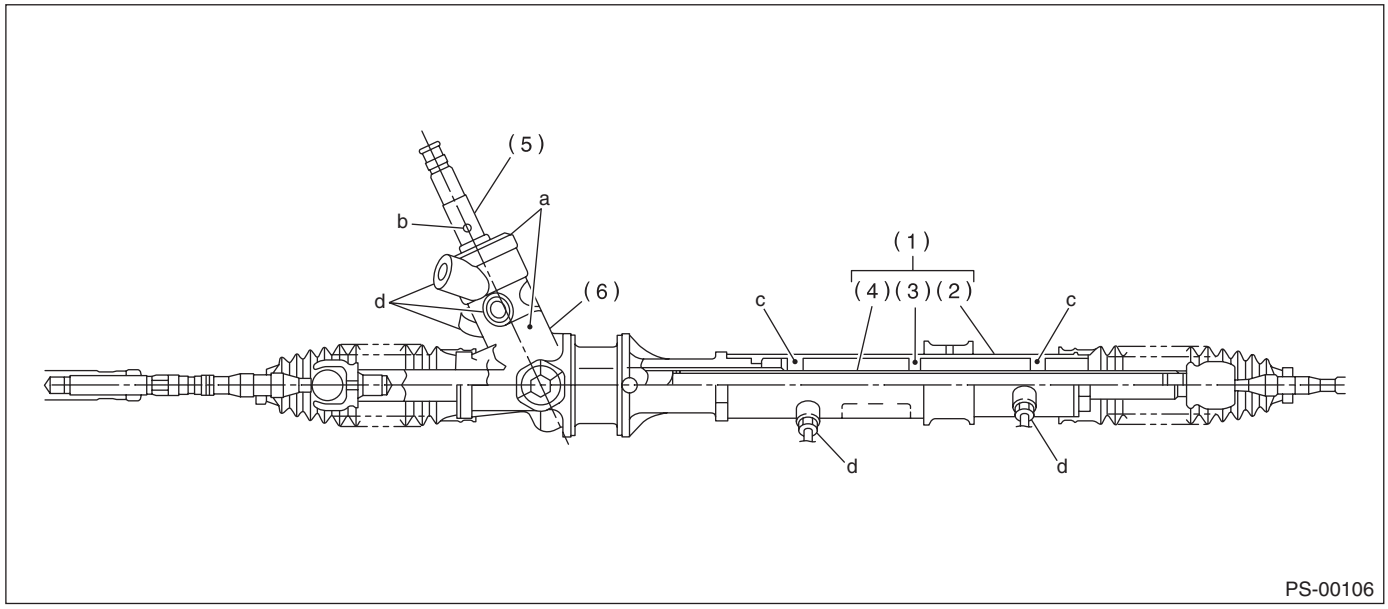
Using the ST, measure gearbox turning resistance.
ST 34099PA100 SPANNER

Service limit
Maximum allowable resistance
10.5 N (1.1 kgf, 2.4 lbf) or less

Difference between right and left turning resistance:
Less than 20%



6. OIL LEAKING



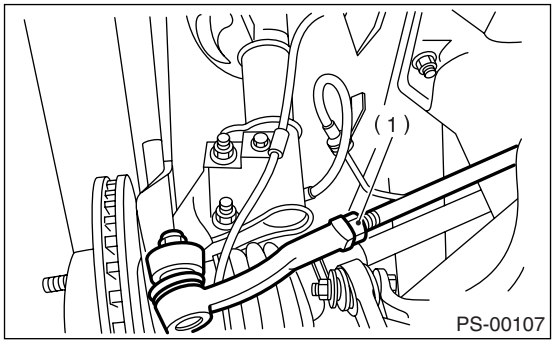
(1) Power cylinder
(2) Cylinder
(3) Rack piston
(4) Rack
(5) Input shaft
(6) Valve housing

1) Lift up the vehicle.
2) Even if the location of leak can be easily found by observing leaking condition, it is necessary to thoroughly remove the oil from suspected portion and turn steering wheel from lock to lock about thirty to forty times with engine running, then reinspect the suspected portion between immediately after and several hours after this operation.
3) Inspect leakage from “a”.
The oil seal is damaged. Replace the valve assembly with a new one.
4) Inspect leakage from “b”.
The torsion bar O-ring is damaged. Replace the valve assembly with a new one.
5) Inspect leakage from “c”.
The oil seal is damaged. Replace the oil seal with a new one.
6) Inspect leakage from “d”.
The pipe is damaged. Replace the faulty pipe or O-ring with a new one.

F: ADJUSTMENT

1) Adjust the front toe. <Ref. to FS-11, FRONT WHEEL TOE-IN, INSPECTION, Wheel Alignment.>

Standard of front toe:
IN 3 — OUT 3 mm (IN 0.12 — OUT 0.12 in)



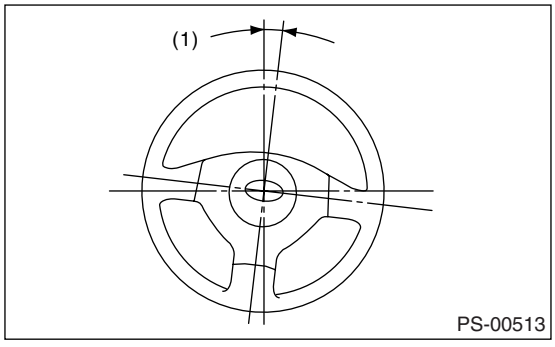
(1) Lock nut

2) Adjust the steering angle of wheels. <Ref. to FS-10, STEERING ANGLE, INSPECTION, Wheel Alignment.>

Standard of steering angle:

Model	TURBO, 2.5 L and OUTBACK	1.6 L and 2.0 L	STi
Inner wheel	34.5°±1.5°	37.3°±1.5°	32.9°±1.5°
Outer wheel	30.3°±1.5°	32.4°±1.5°	28.5°±1.5°

3) If the steering wheel spokes are not horizontal when wheels are set in the straight ahead position, and error is more than 5° on the periphery of steering wheel, correctly re-install the steering wheel.



(1) Within 5°

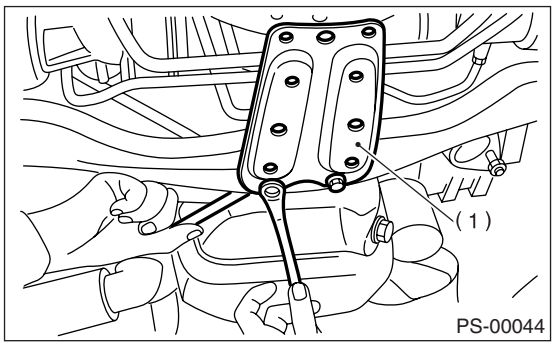
4) If the steering wheel spokes are not horizontal with vehicle set in the straight ahead position after this adjustment, correct it by turning the right and left tie-rods in the opposite direction each other by the same angle.

7. Pipe Assembly [LHD Model]

A: REMOVAL

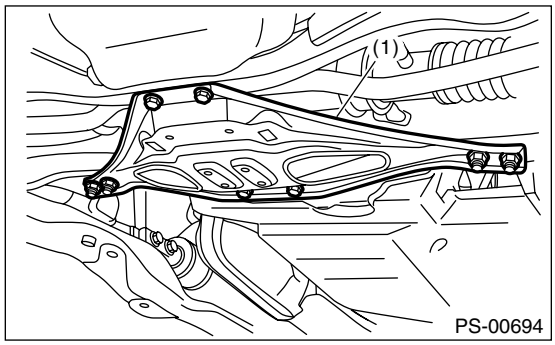
1) Disconnect the ground cable from battery.
2) Lift-up the vehicle, and then remove the jack-up plate.

• NON-TURBO MODEL



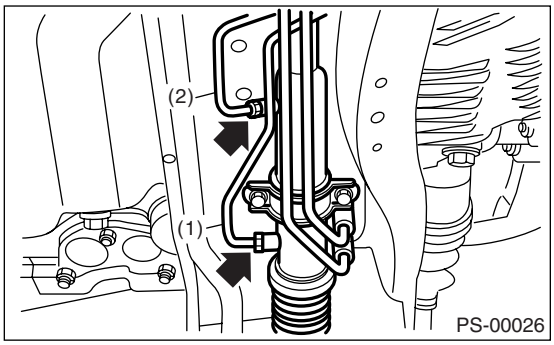
(1) Jack-up plate

• TURBO MODEL



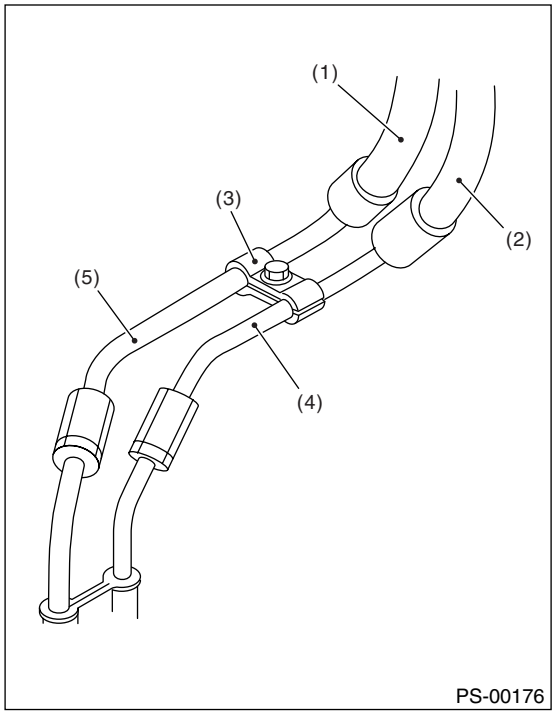
(1) Jack-up plate

3) Remove the one pipe joint at the center of gear-box, and then connect the vinyl hose to pipe and joint. Discharge fluid by turning steering wheel fully clockwise and counterclockwise. Discharge fluid similarly from the other pipe.



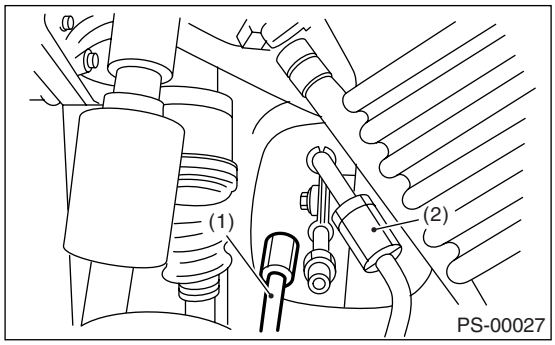
(1) Pipe A
(2) Pipe B

4) Remove the clamp E from pipes C and D.



(1) Return hose
(2) Pressure hose
(3) Clamp E
(4) Pipe C
(5) Pipe D

5) Disconnect the pipe C and D from gear box.

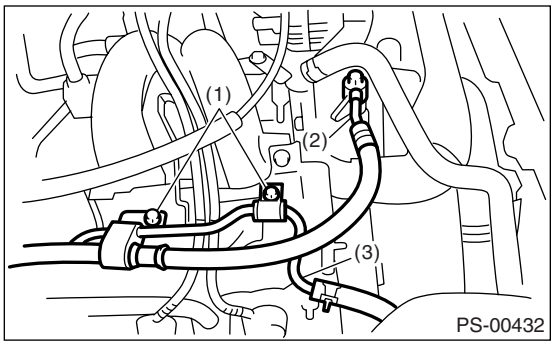


(1) Pipe C
(2) Pipe D

6) NON-TURBO MODEL
(1) Remove the air intake duct. <Ref. to IN(H4SO)-6, REMOVAL, Air Intake Duct.>
(2) Remove the bolt A.
(3) Disconnect the pipe C from oil pump. Disconnect the pipe D from return hose.

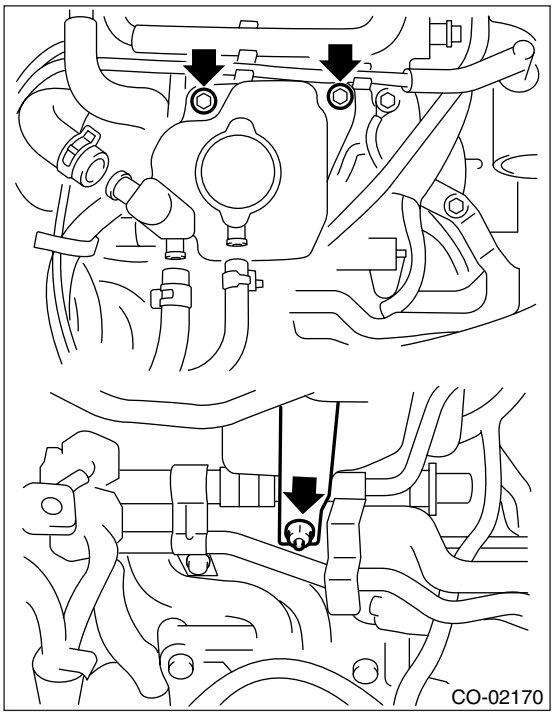
CAUTION:
• Do not allow fluid from the hose end to come into contact with pulley belt.

• To prevent foreign matter from entering the hose and pipe, cover the open ends of them with a clean cloth.



(1) Bolt A
(2) Pipe C
(3) Pipe D

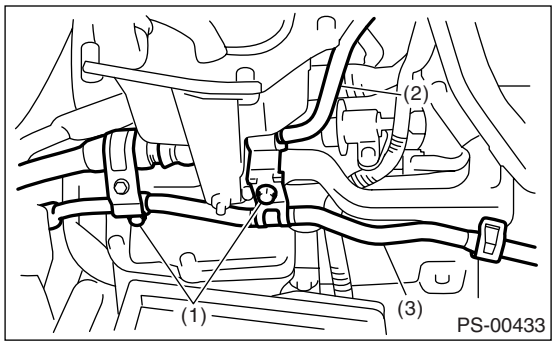
7) TURBO MODEL
(1) Remove the air cleaner case.
<Ref. to IN(H4DOTC)-9, REMOVAL, Air Cleaner Case.>
(2) Remove the coolant filler tank.



(3) Remove the two bolts fixing pipe C and D.
(4) Disconnect the pipe C from oil pump. Disconnect the pipe D from return hose.

CAUTION:
• Do not allow fluid from the hose end to come into contact with pulley belt.

• To prevent foreign matter from entering the hose and pipe, cover the open ends of them with a clean cloth.



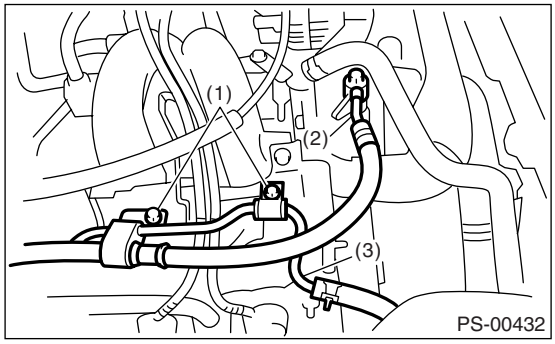
(1) Bolt
(2) Pipe C
(3) Pipe D

B: INSTALLATION

1) Temporarily tighten the two bolts fixing pipe C and D. (bolt A)

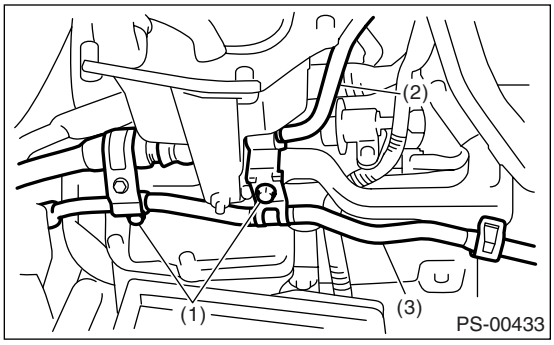
NOTE:
Visually check that the hose between tank and pipe D is free from bending or twisting.

• NON-TURBO MODEL



(1) Bolt A
(2) Pipe C
(3) Pipe D

• TURBO MODEL



(1) Bolt
(2) Pipe C
(3) Pipe D

(1) Connect the pipe D to oil tank.
(2) Using a new gasket, connect the pipe C to oil pump.

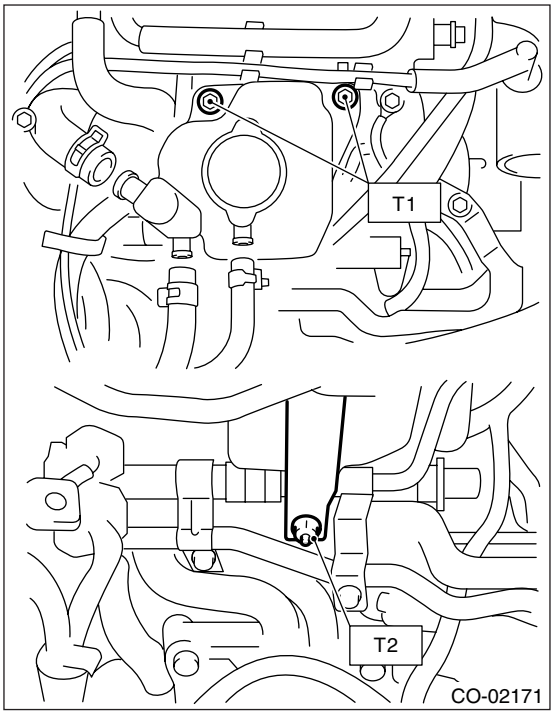
Tightening torque:
39 N·m (4.0 kgf-m, 28.9 ft-lb)

(3) Tighten the two bolts fixing pipe C and D. (bolt A)

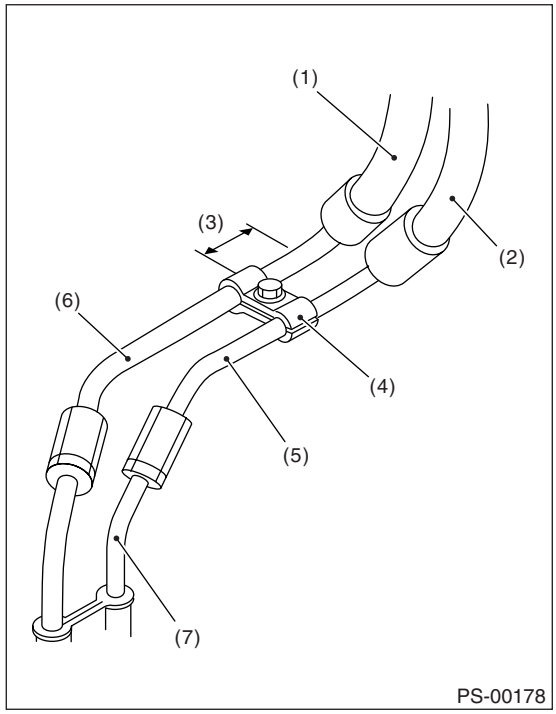
Tightening torque:
13 N·m (1.3 kgf-m, 9.4 ft-lb)

2) Install the coolant filler tank. (Turbo model)

Tightening torque:
T1: 16 N·m (1.6 kgf-m, 11.8 ft-lb)
T2: 13 N·m (1.3 kgf-m, 9.6 ft-lb)



3) Temporarily connect the pipe C and D to gear box.

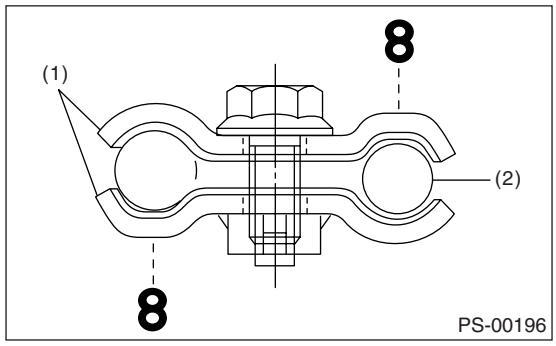


(1) Return hose
(2) Pressure hose
(3) Approx. 30 mm (1.18 in)
(4) Clamp E
(5) Pipe C
(6) Pipe D
(7) Pipe (Gear box side)

4) Temporarily install the clamp E on pipes C and D.

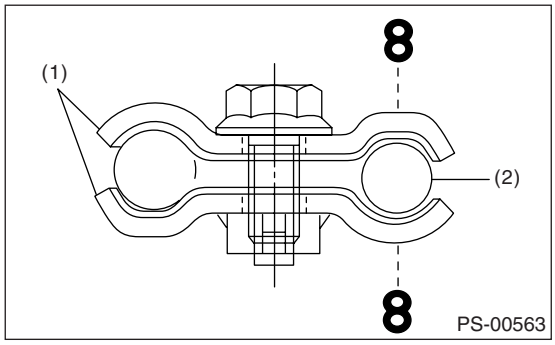
NOTE:
Ensure the letter “8” on each clamp are diagonally opposite each other as shown in the figure.

• NON-TURBO MODEL



(1) Clamp E
(2) Pipe C

- TURBO MODEL



(1) Clamp E
(2) Pipe C

5) Tighten the clamp E firmly.

Tightening torque:
7.4 N·m (0.75 kgf-m, 5.4 ft-lb)

6) Tighten the joint nut.

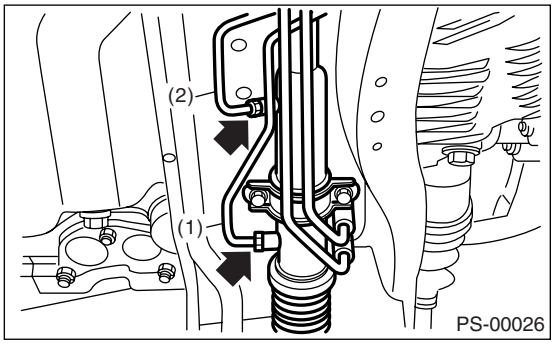
Tightening torque:
15 N·m (1.5 kgf-m, 10.8 ft-lb)

7) Connect the pipes A and B to four pipe joints of gearbox. Connect the upper pipe B first, and lower pipe A second.

Tightening torque:

Non-turbo model
13 N·m (1.3 kgf-m, 9.4 ft-lb)

Turbo model
Housing side
20 N·m (2.0 kgf-m, 14.5 ft-lb)
Cylinder side
24 N·m (2.4 kgf-m, 17.4 ft-lb)

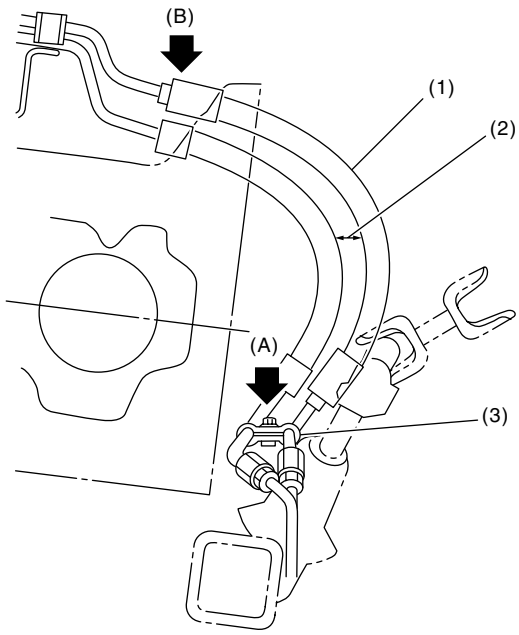


(1) Pipe A
(2) Pipe B

8) Install the jack-up plate.
9) Install the air intake duct. <Ref. to IN(H4SO)-6, INSTALLATION, Air Intake Duct.>
10) Install the air intake duct, air cleaner upper cover and air intake boot.
<Ref. to IN(H4DOTC)-9, INSTALLATION, Air Cleaner Case.> and <Ref. to IN(H4SO)-6, INSTALLATION, Air Intake Duct.>
11) Connect the battery ground cable to battery.
12) Feed the specified fluid.

CAUTION:
Never start the engine before feeding the fluid; otherwise vane pump might be seized up.

13) Finally check clearance between pipes and/or hoses, as shown above.
If cruise control actuator-to-power steering hose clearance is less than 10 mm (0.39 in), move the portion (A) secured by clamp to other portion, or bend portion (B) to adjust.



PS-00179

(1) High pressure hose
(2) No interference is allowed between hoses.
(3) Clearance between crossmember and pipe: 3 — 8 mm (0.12 — 0.31 in)

C: INSPECTION

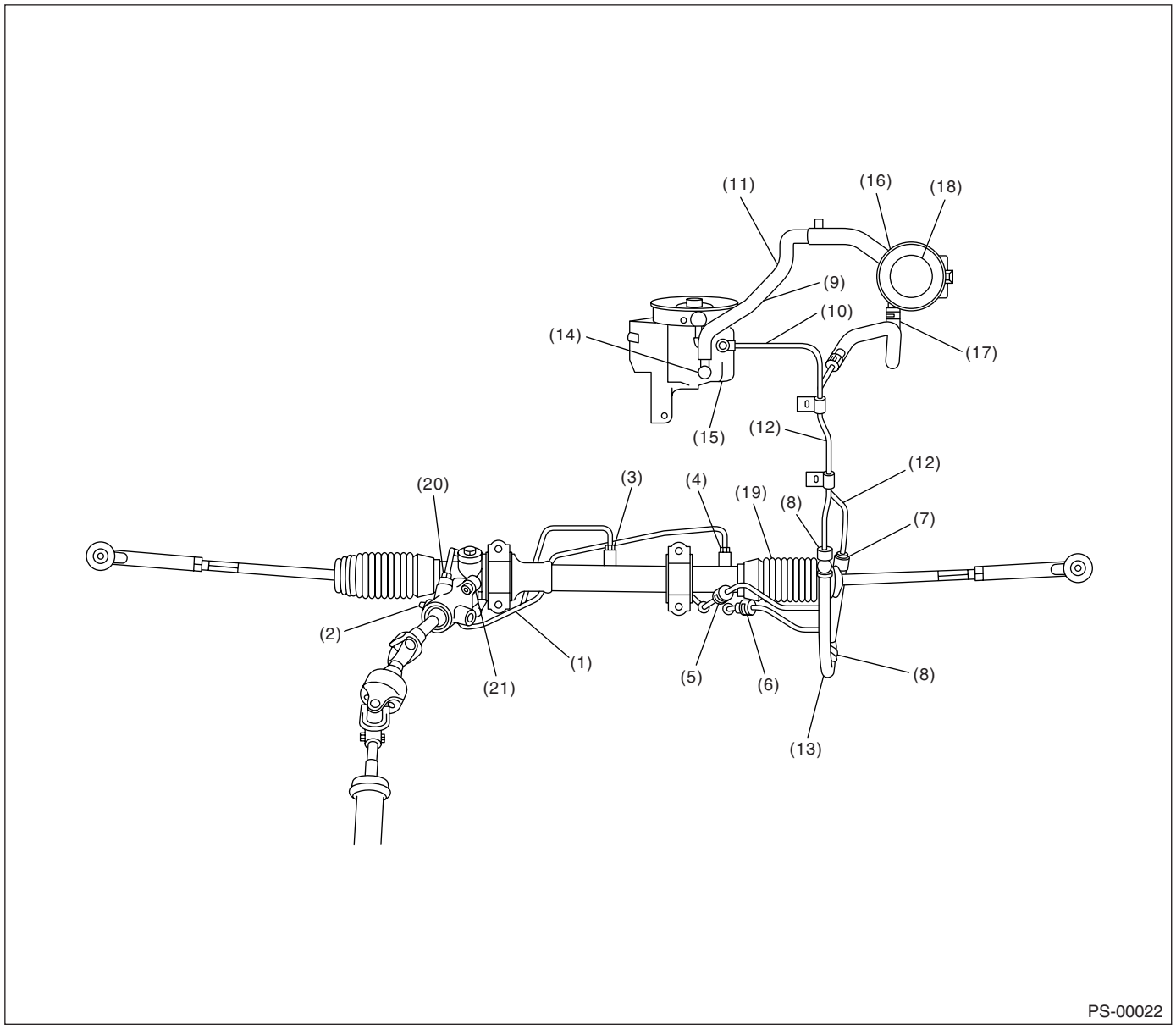
Check all disassembled parts for wear, damage or other abnormalities. Repair or replace faulty parts as required.

Part name	Inspection	Remedy
Pipe	• O-ring fitting surface for damage • Nut for damage • Pipe for damage	Replace with a new one.
Clamp	• Clamps for weak clamping force	Replace with a new one.
Hose	• Flared surface for damage • Flare nut for damage • Outer surface for cracks • Outer surface for wear • Clip for damage • End coupling or adapter for degradation	Replace with a new one.

CAUTION:
Although the surface layer materials of rubber hoses have excellent weathering resistance, heat resistance and resistance for low temperature brittleness, they are likely to be damaged chemically by brake fluid, battery electrolyte, engine oil and automatic transmission fluid and their service lives are to be very shortened. It is very important to keep the hoses free from before mentioned fluids and to wipe out immediately when the hoses are adhered with the fluids.
Since the resistances for heat or low temperature brittleness are gradually declining according to time accumulation of hot or cold conditions for the hoses and their service lives are shortening accordingly, it is necessary to perform the careful inspection frequently when the vehicle is used in hot weather areas, cold weather area and a driving condition in which many steering operations are required in short time.
Particularly, continuous work of relief valve over 5 seconds causes to reduce service lives of the hoses, the oil pump, the fluid, etc. due to over heat.

Trouble	Possible cause	Corrective action
Pressure hose burst	Excessive holding time of relief status	Instruct the customers.
	Malfunction of relief valve	Replace the oil pump.
	Poor cold characteristic of fluid	Replace the fluid.
Forced out return hose	Poor connection	Correct.
	Poor holding of clip	Retighten.
	Poor cold characteristic of fluid	Replace the fluid.
Fluid bleeding out of hose slightly	Wrong layout, tensioned	Replace the hose.
	Excessive play of engine due to deterioration of engine mounting rubber	Replace the defective parts.
	Improper stop position of pitching stopper	Replace the defective parts.
Crack on hose	Excessive holding time of relief status	Replace. Instruct customer.
	Excessive tightening torque for return hose clip	Replace.
	Power steering fluid, brake fluid, engine oil, electrolyte adhere on the hose surface	Replace. Pay attention on service work.
	Too many times use in extremely cold weather	Replace. Instruct the customers.

NOTE:
It is likely that although one judges fluid leakage, there is actually no leakage. This is because the fluid spilt during the last maintenance was not completely wiped off. Be sure to wipe off spilt fluid thoroughly after maintenance.



Fluid leaking area	Possible cause	Corrective action
Leakage from connecting portions of pipes and hoses, numbered with (1) through (10) in figure	Insufficient tightening of flare nut, catching dirt or the like, damage to flare or flare nut or eye bolt	Loosen and retighten, if ineffective, replace.
	Poor insertion of hose, poor clamping	Retighten or replace the clamp.
	Damaged O-ring or gasket	Replace the O-ring or gasket pipe or hose with new one, if ineffective, replace gearbox also.
Leakage from hose (11), (12) and (13) in figure	Crack or damage in hose	Replace with a new one.
	Crack or damage in hose hardware	Replace with a new one.
Leakage from surrounding of cast iron portion of oil pump (14) and (15) in figure	Damaged O-ring	Replace the oil pump.
	Damaged gasket	Replace the oil pump.

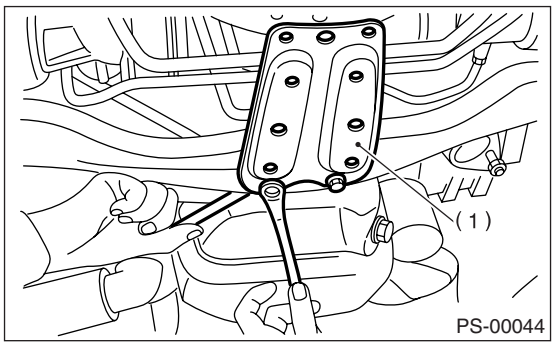
Fluid leaking area	Possible cause	Corrective action
Leakage from oil tank (16) and (17) in figure	Crack in oil tank	Replace the oil tank.
Leakage from filler neck (18)	Damaged cap packing	Replace the cap.
	Crack in root of filler neck	Replace the oil tank.
	High fluid level	Adjust the fluid level.
Leakage from surrounding of power cylinder of gearbox (19) in figure	Damaged oil seal	Replace the oil seal.
Leakage from control valve of gear-box (20) and (21) in figure	Damaged packing or oil seal	Replace the problem parts.
	Damage in control valve	Replace the control valve.

8. Pipe Assembly [RHD Model]

A: REMOVAL

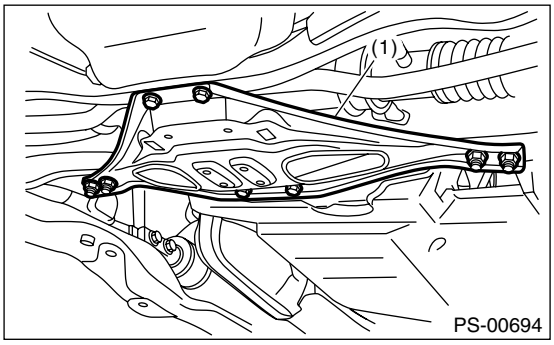
1) Disconnect the ground cable from battery.
2) Lift-up the vehicle, and then remove the jack-up plate.

- NON-TURBO MODEL



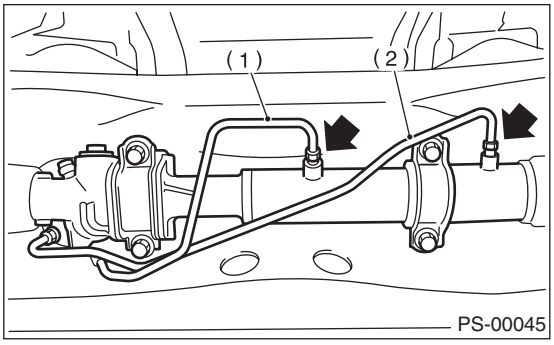
(1) Jack-up plate

- TURBO MODEL



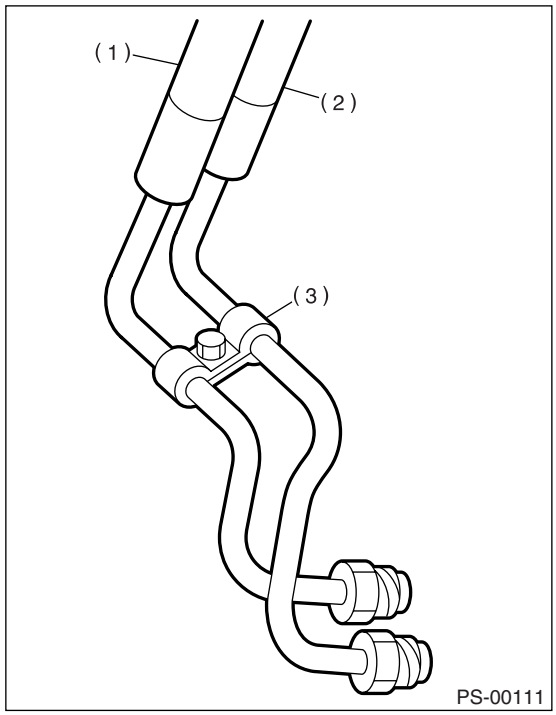
(1) Jack-up plate

3) Remove the one pipe joint at the center of gear-box, and then connect the vinyl hose to pipe and joint. Discharge fluid by turning steering wheel fully clockwise and counterclockwise. Discharge fluid similarly from the other pipe.



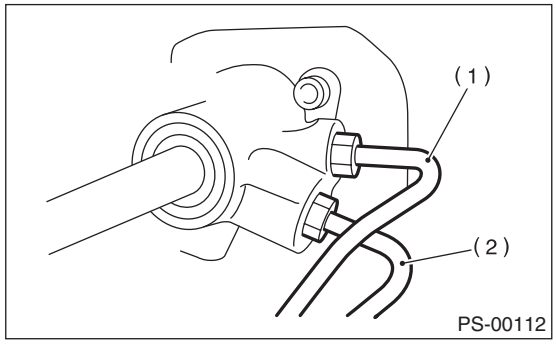
(1) Pipe A
(2) Pipe B

4) Remove the clamp E from pipes C and D.



(1) Return hose
(2) Pressure hose
(3) Clamp E

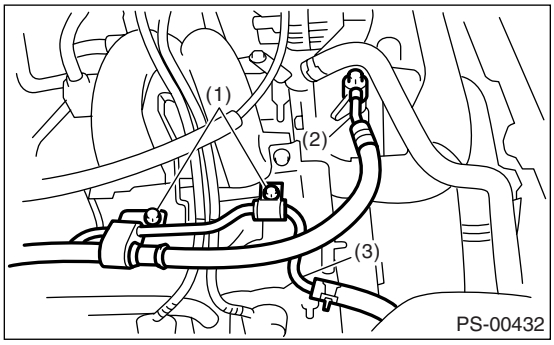
5) Disconnect the pipe C and D from gear box.



(1) Pipe C
(2) Pipe D

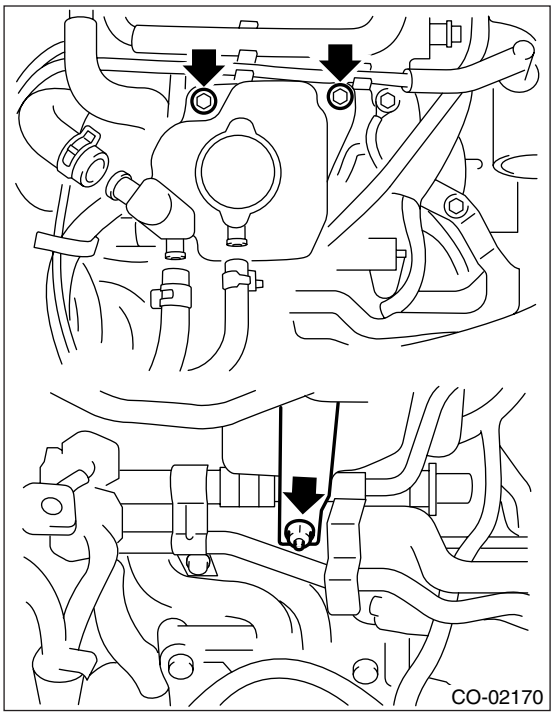
6) Non-turbo model
(1) Remove the air cleaner case. <Ref. to IN(H4SO)-5, REMOVAL, Air Cleaner Case.>
(2) Remove the bolt A.
(3) Disconnect the pipe C from oil pump. Disconnect the pipe D from return hose.

CAUTION:
• Do not allow fluid from the hose end to come into contact with pulley belt.
• To prevent foreign matter from entering the hose and pipe, cover the open ends of them with a clean cloth.



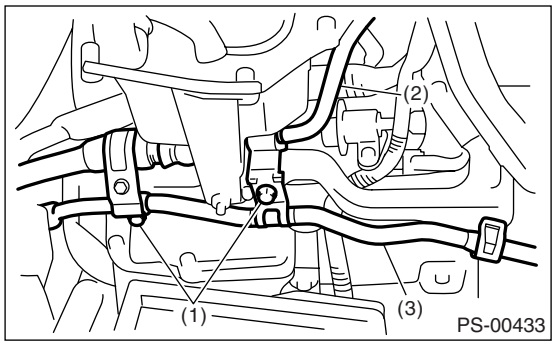
(1) Bolt A
(2) Pipe C
(3) Pipe D

7) Turbo model
(1) Remove the air cleaner case.
<Ref. to IN(H4DOTC)-9, REMOVAL, Air Cleaner Case.>
(2) Remove the coolant filler tank.



(3) Remove the two bolts fixing pipe C and D.
(4) Disconnect the pipe C from oil pump. Disconnect pipe D from return hose.

CAUTION:
• Do not allow fluid from the hose end to come into contact with pulley belt.
• To prevent foreign matter from entering the hose and pipe, cover the open ends of them with a clean cloth.



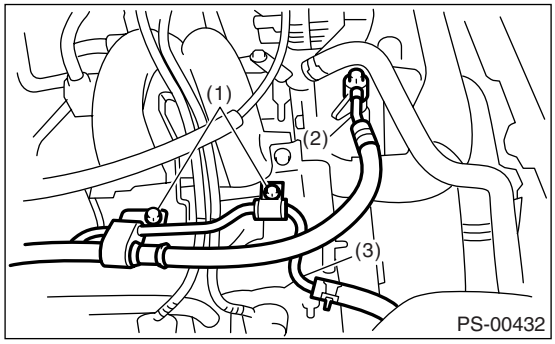
(1) Bolt
(2) Pipe C
(3) Pipe D

B: INSTALLATION

1) Temporarily tighten the two bolts fixing pipe C and D. (bolt A for Non-turbo model.)

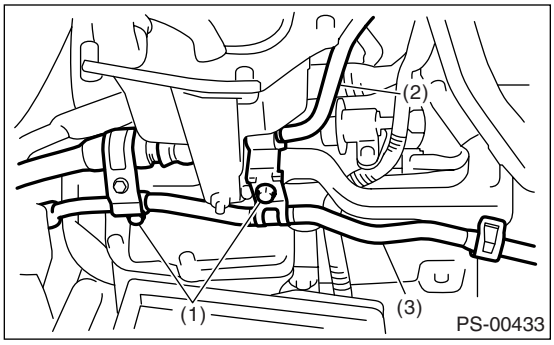
NOTE:
Visually check that the hose between tank and pipe D is free from bending or twisting.

• NON-TURBO MODEL



(1) Bolt A
(2) Pipe C
(3) Pipe D

• TURBO MODEL



(1) Bolt
(2) Pipe C
(3) Pipe D

(1) Connect the pipe D to oil tank.
(2) Using a new gasket, connect the pipe C to oil pump.

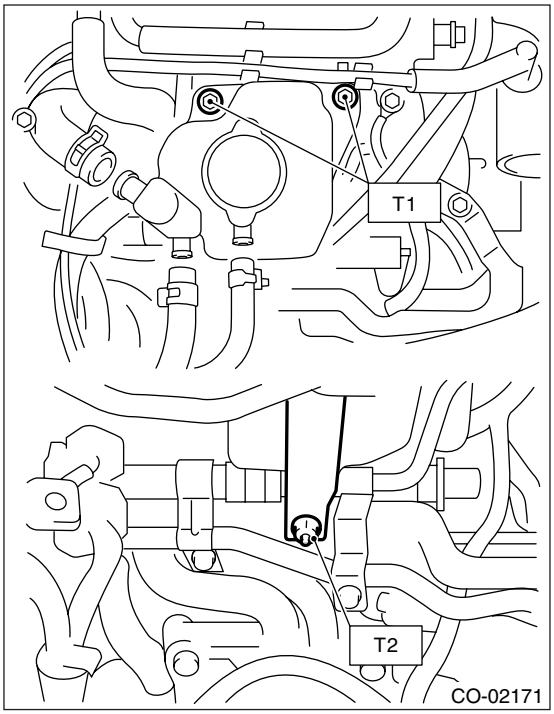
Tightening torque:
39 N·m (4.0 kgf-m, 28.9 ft-lb)

(3) Tighten the two bolts fixing pipe C and D. (bolt A for Non-turbo model.)

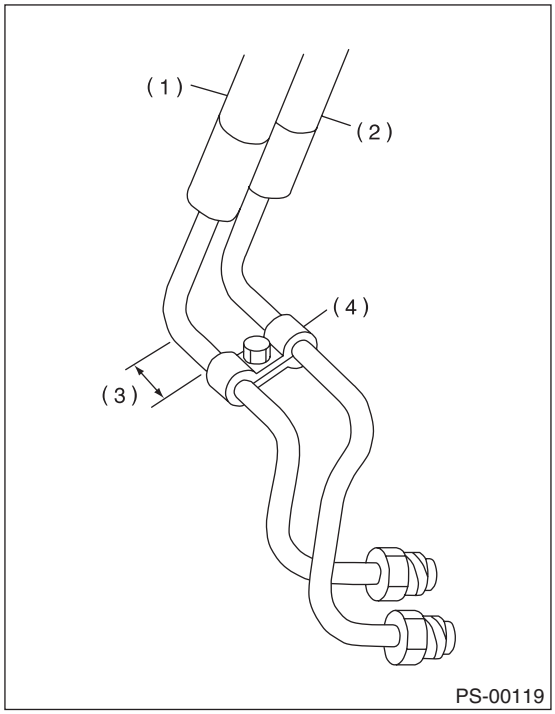
Tightening torque:
13 N·m (1.3 kgf-m, 9.4 ft-lb)

2) Install the coolant filler tank. (Turbo model)

Tightening torque:
T1: 16 N·m (1.6 kgf-m, 11.8 ft-lb)
T2: 13 N·m (1.3 kgf-m, 9.6 ft-lb)



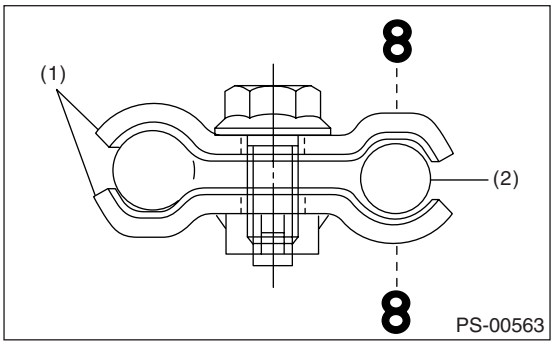
3) Temporarily connect the pipe C and D to gear box.



(1) Return hose
(2) Pressure hose
(3) Approx. 30 mm (1.18 in)
(4) Clamp E

4) Temporarily install the clamp E on pipes C and D.

NOTE:
Ensure the letter “8” on each clamp are opposite each other as shown in the figure.



(1) Clamp E
(2) Pipe C

5) Tighten the clamp E firmly.

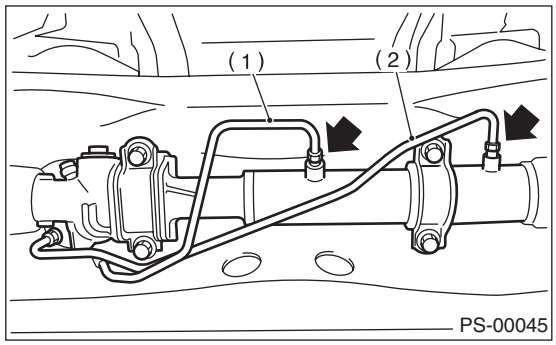
Tightening torque:
7.4 N·m (0.75 kgf-m, 5.4 ft-lb)

6) Tighten the joint nut.

Tightening torque:
15 N·m (1.5 kgf-m, 10.8 ft-lb)

7) Connect the pipes A and B to four pipe joints of gearbox. Connect the upper pipe B first, and lower pipe A second.

Tightening torque:
Housing side
20 N·m (2.0 kgf-m, 14.5 ft-lb)
Cylinder side
24 N·m (2.4 kgf-m, 17.4 ft-lb)

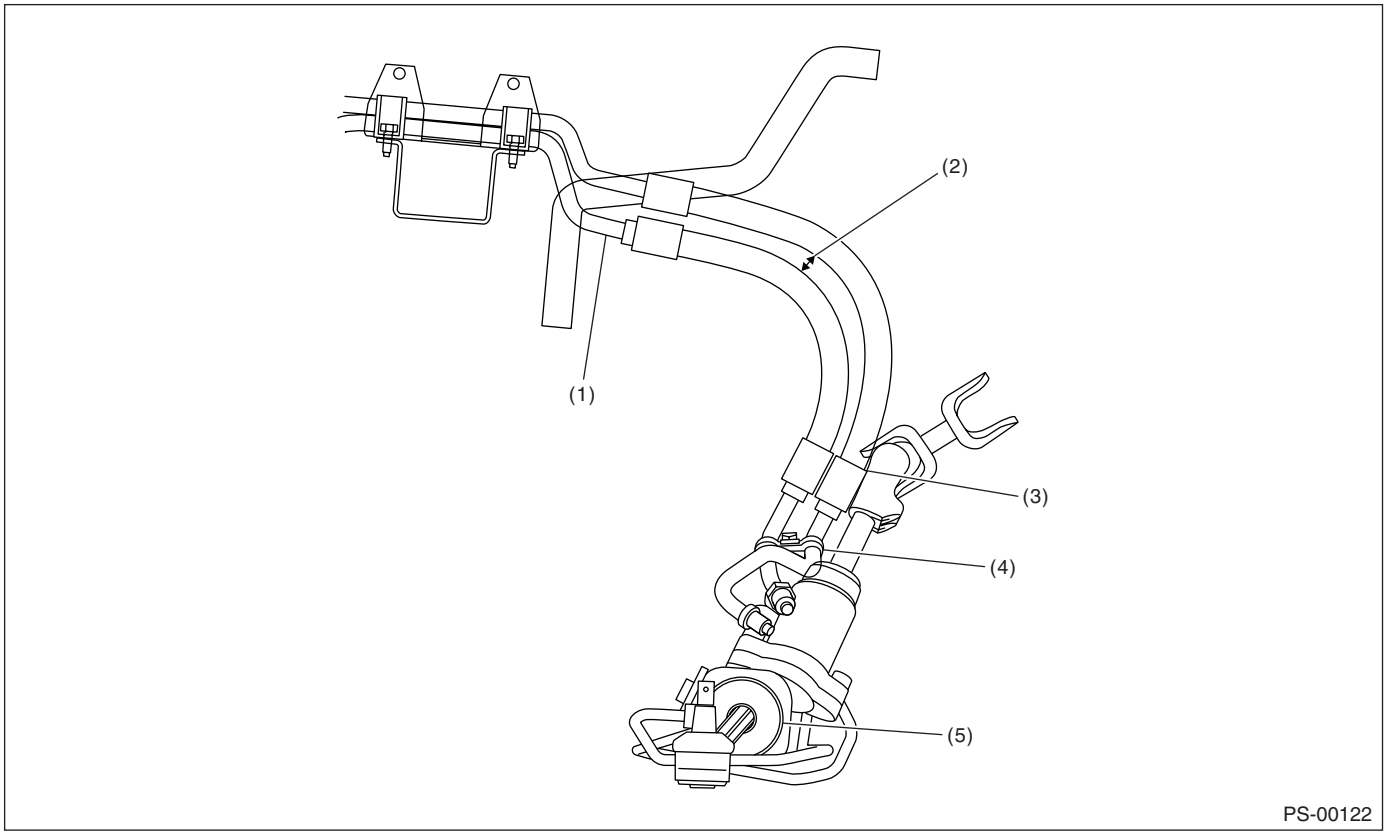


(1) Pipe A
(2) Pipe B

8) Install the jack-up plate.
9) Install the air intake duct, air cleaner upper cover and air intake boot.
<Ref. to IN(H4DOTC)-9, INSTALLATION, Air Cleaner Case.> and <Ref. to IN(H4SO)-6, REMOVAL, Air Intake Duct.>
10) Connect the battery ground cable to battery.
11) Feed the specified fluid.

CAUTION:
Never start the engine before feeding the fluid; otherwise vane pump might be seized up.

12) Finally check clearance between pipes and/or hoses, as shown in the figure.



(1) Clearance between blow-by hose and pipe: 3 — 5 mm (0.12 — 0.20 in)
(2) No interference is allowed between hoses.
(3) Clearance between side frame and hose: 15 mm (0.59 in) or more
(4) Clearance between crossmember and pipe: 5 — 13 mm (0.20 — 0.51 in)
(5) Steering gearbox

C: INSPECTION

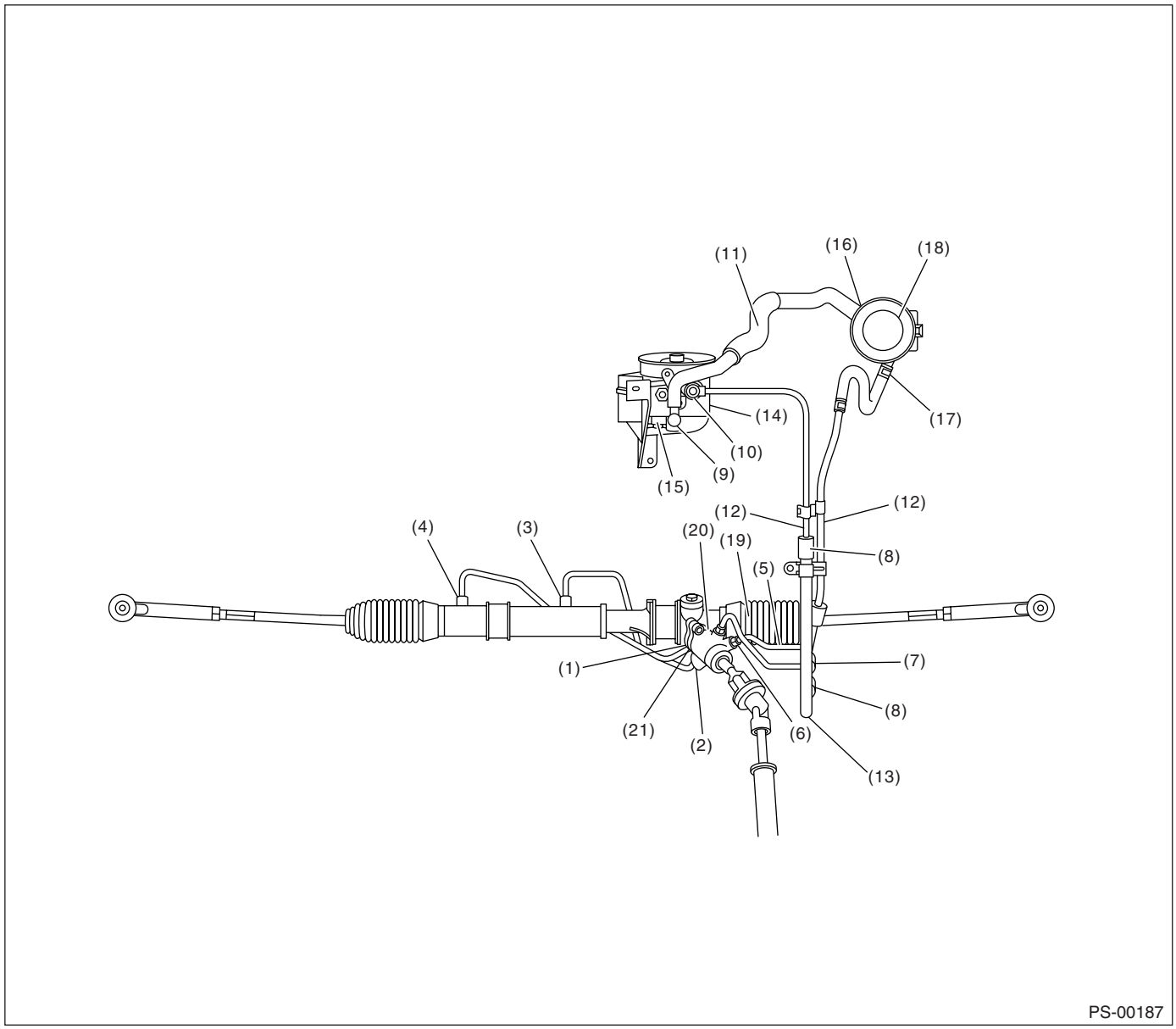
Check all disassembled parts for wear, damage or other abnormalities. Repair or replace faulty parts as required.

Part name	Inspection	Remedy
Pipe	• O-ring fitting surface for damage • Nut for damage • Pipe for damage	Replace with a new one.
Clamp	• Clamps for weak clamping force	Replace with a new one.
Hose	• Flared surface for damage • Flare nut for damage • Outer surface for cracks • Outer surface for wear • Clip for damage • End coupling or adapter for degradation	Replace with a new one.

CAUTION:
Although the surface layer materials of rubber hoses have excellent weathering resistance, heat resistance and resistance for low temperature brittleness, they are likely to be damaged chemically by brake fluid, battery electrolyte, engine oil and automatic transmission fluid and their service lives are to be very shortened. It is very important to keep the hoses free from before mentioned fluids and to wipe out immediately when the hoses are adhered with the fluids.
Since the resistances for heat or low temperature brittleness are gradually declining according to time accumulation of hot or cold conditions for the hoses and their service lives are shortening accordingly, it is necessary to perform the careful inspection frequently when the vehicle is used in hot weather areas, cold weather area and a driving condition in which many steering operations are required in short time.
Particularly, continuous work of relief valve over 5 seconds causes to reduce service lives of the hoses, the oil pump, the fluid, etc. due to over heat.

Trouble	Possible cause	Corrective action
Pressure hose burst	Excessive holding time of relief status	Instruct the customers.
	Malfunction of relief valve	Replace the oil pump.
	Poor cold characteristic of fluid	Replace the fluid.
Forced out return hose	Poor connection	Correct.
	Poor holding of clip	Retighten.
	Poor cold characteristic of fluid	Replace the fluid.
Fluid bleeding out of hose slightly	Wrong layout, tensioned	Replace the hose.
	Excessive play of engine due to deterioration of engine mounting rubber	Replace the defective parts.
	Improper stop position of pitching stopper	Replace the defective parts.
Crack on hose	Excessive holding time of relief status	Replace. Instruct customer.
	Excessive tightening torque for return hose clip	Replace.
	Power steering fluid, brake fluid, engine oil, electrolyte adhere on the hose surface	Replace. Pay attention on service work.
	Too many times use in extremely cold weather	Replace. Instruct the customers.

NOTE:
It is likely that although one judges fluid leakage, there is actually no leakage. This is because the fluid spilt during the last maintenance was not completely wiped off. Be sure to wipe off spilt fluid thoroughly after maintenance.



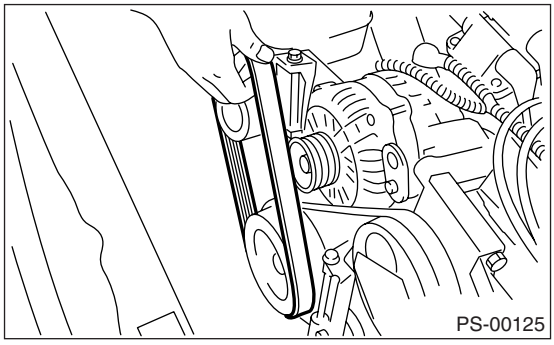
Fluid leaking area	Possible cause	Corrective action
Leakage from connecting portions of pipes and hoses, numbered with (1) through (10) in figure	Insufficient tightening of flare nut, catching dirt or the like, damage to flare or flare nut or eye bolt	Loosen and retighten, if ineffective, replace.
	Poor insertion of hose, poor clamping	Retighten or replace the clamp.
	Damaged O-ring or gasket	Replace the O-ring or gasket pipe or hose with new one, if ineffective, replace gearbox also.
Leakage from hose (11), (12) and (13) and oil cooler (22) in figure	Crack or damage in hose	Replace with a new one.
	Crack or damage in hose hardware	Replace with a new one.
Leakage from surrounding of cast iron portion of oil pump (14) and (15) in figure	Damaged O-ring	Replace the oil pump.
	Damaged gasket	Replace the oil pump.

Fluid leaking area	Possible cause	Corrective action
Leakage from oil tank (16) and (17) in figure	Crack in oil tank	Replace the oil tank.
Leakage from filler neck (18)	Damaged cap packing	Replace the cap.
	Crack in root of filler neck	Replace the oil tank.
	High fluid level	Adjust the fluid level.
Leakage from surrounding of power cylinder of gearbox (19) in figure	Damaged oil seal	Replace the oil seal.
Leakage from control valve of gear-box (20) and (21) in figure	Damaged packing or oil seal	Replace the problem parts.
	Damage in control valve	Replace the control valve.

9. Oil Pump

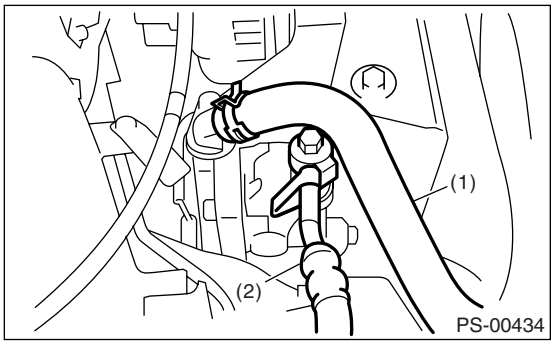
A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the pulley belt cover.
3) Loosen the belt tension adjusting bolt and generator securing bolt, and then remove the power steering pump V-belt.



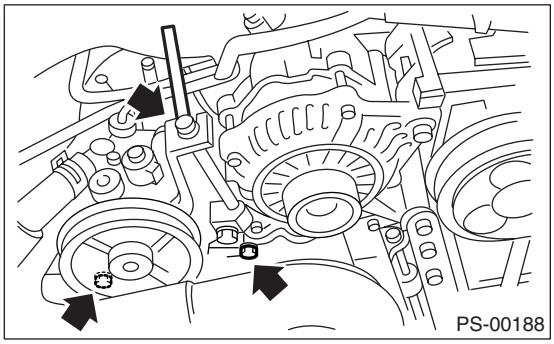
4) Disconnect the connector from power steering pump switch.
5) Disconnect the pipe C and suction hose from oil pump.

CAUTION:
• Do not allow fluid from the hose end to come into contact with pulley belt.
• To prevent foreign matter from entering the hose, cover the open ends of them with a clean cloth.



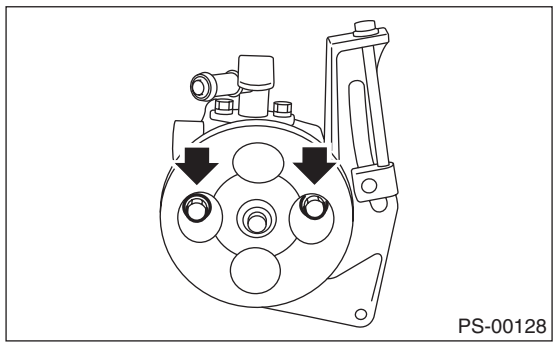
(1) Suction hose
(2) Pipe C

6) Remove the bolts which install the power steering pump bracket.

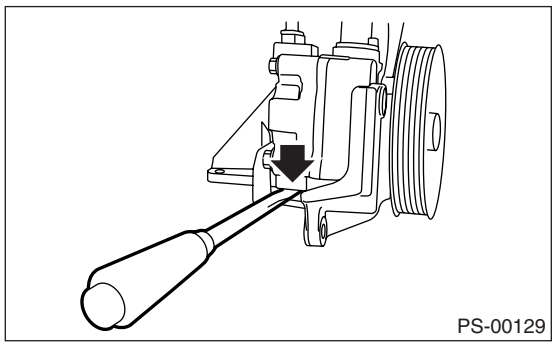


7) Place the oil pump bracket in a vise, remove the two bolts from front side of oil pump.

CAUTION:
Do not place the oil pump bracket directly in the vise; use soft pads and hold oil pump lightly to protect the pump.



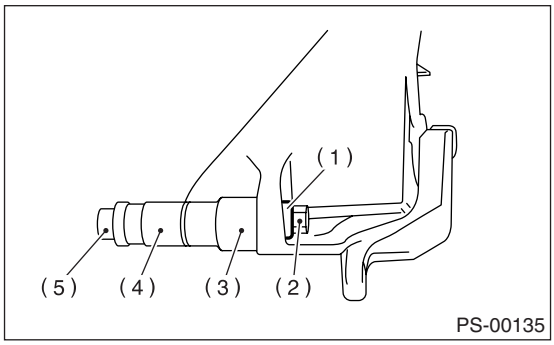
8) Remove the bolt from the rear side of oil pump.
9) Disassemble the oil pump and bracket by inserting a flat tip screwdriver as shown in the figure.



B: INSTALLATION

1) Install the oil pump to bracket.
(1) Place the oil pump bracket in a vise. Tighten the bushing using a 12.7 mm (1/2″) type 14 mm and 21 mm box wrench until it is in contact with the oil pump mounting surface.

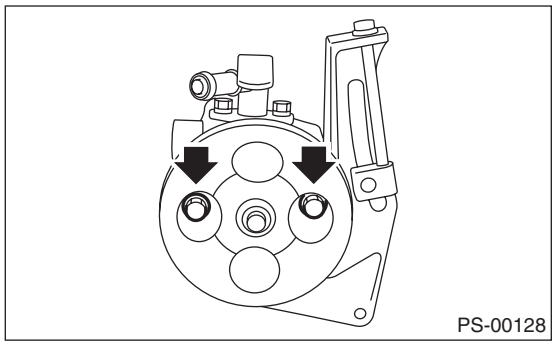
CAUTION:
Do not place the oil pump bracket directly in the vise; use soft pads and hold oil pump lightly to protect the pump.



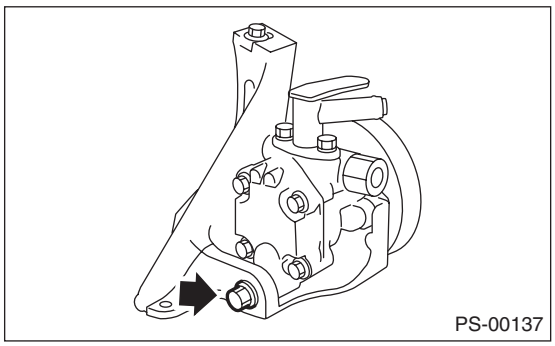
(1) Bush
(2) Nut
(3) 21 mm
(4) 14 mm
(5) Bolt

(2) Tighten the bolts which install the oil pump to bracket.

Tightening torque:
15.7 N·m (1.6 kgf-m, 11.6 ft-lb)

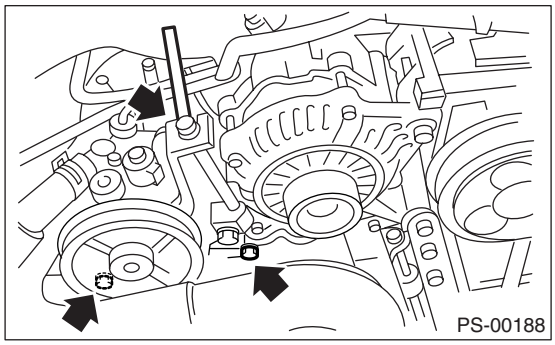


Tightening torque:
37.3 N·m (3.8 kgf-m, 27.5 ft-lb)



2) Tighten the bolts which install the power steering pump bracket.

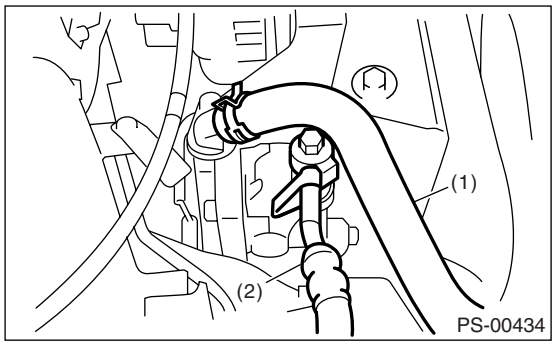
Tightening torque:
22 N·m (2.2 kgf-m, 15.9 ft-lb)



3) Interconnect the pipe C and suction hose.

Tightening torque:
Eye bolt
39 N·m (4.0 kgf-m, 28.9 ft-lb)

CAUTION:
If a hose is twisted at this step, the hose may come into contact with some other parts.



(1) Suction hose
(2) Pipe C

4) Connect the connector to power steering pump switch.
5) Install the pulley belt to oil pump.
6) Check the pulley belt tension.
<Ref. to ME(H4SO)-42, INSPECTION, V-belt.>
7) Tighten the lock bolt of belt tension nut.

Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)

8) Tighten the tension bolt.

Tightening torque:
8 N·m (0.8 kgf-m, 5.8 ft-lb)

9) Install the pulley belt cover.
10) Connect the battery ground cable to battery.
11) Feed the specified power steering fluid. <Ref. to PS-100, Power Steering Fluid.>

CAUTION:
Never start the engine before feeding the fluid; otherwise vane pump might be seized up.

C: INSPECTION

1. BASIC INSPECTION

Perform the following inspection procedures and repair or replace defective parts.

No.	Parts	Inspection	Corrective action
1	Oil pump (Exterior)	(1) Crack, damage or oil leakage	Replace the oil pump with a new one.
		(2) Play of pulley shaft	Measure the radial play and axial play. If any of these exceeds the service limit, replace the oil pump with a new one.
2	Pulley	(1) Damage	Replace it with a new one.
		(2) Bend	Measure the V ditch deflection. If it exceeds the service limit, replace the pulley with a new one.
3	Oil pump (Interior)	(1) Defect or burning of vane pump	Check the resistance to rotation of pulley. If it is past the service limit, replace the oil pump with a new one.
		(2) Bend in the shaft or damage to bearing	Oil pump emits a noise that is markedly different in tone and loudness from a sound of a new oil pump when turning with a string put around its pulley, replace the oil pump with a new one.
4	O-ring	Crack or deterioration	Replace it with a new one.
5	Bracket	Crack	Replace it with a new one.

2. SERVICE LIMIT

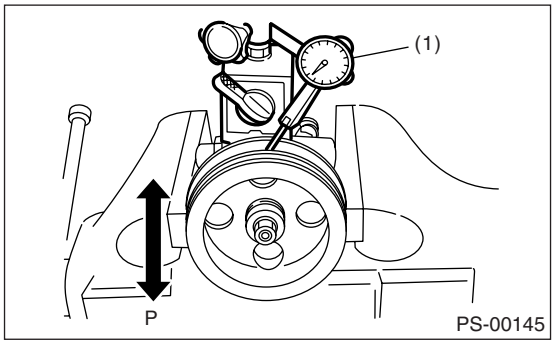
Make a measurement as follows. If it exceeds the specified service limit, replace the parts with new ones.

CAUTION:
• Fix the oil pump on a vise to make a measurement. At this time, hold the oil pump with least possible force between two wood blocks.
• Do not set outside of flow control valve or pulley on a vise; otherwise outside or pulley might be deformed. Select properly sized wood blocks.

1) Play of the pulley shaft

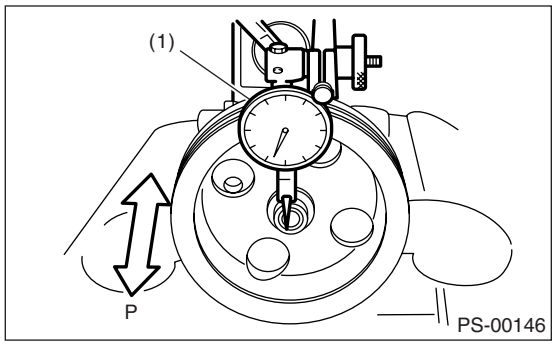
Condition:
P: When applying the force of 9.8 N (1.0 kgf, 2.2 lbf)

Service limit:
Radial play (Direction ⇦ ⇨)
0.4 mm (0.016 in) or less



(1) Dial indicator

Axial play (Direction ⇦ ⇨)
0.9 mm (0.035 in) or less

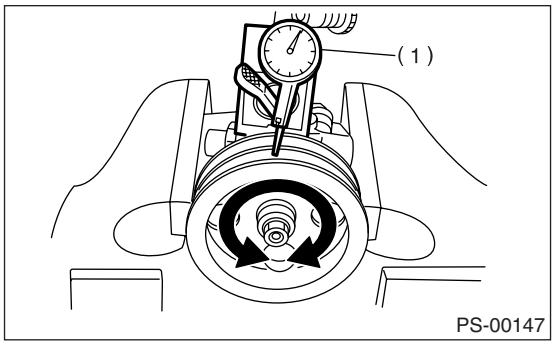


(1) Dial indicator

2) Ditch deflection of pulley

Service limit:
1.0 mm (0.039 in) or less

NOTE:
Read the value for one surface of V ditch, and then the value for another off the dial.

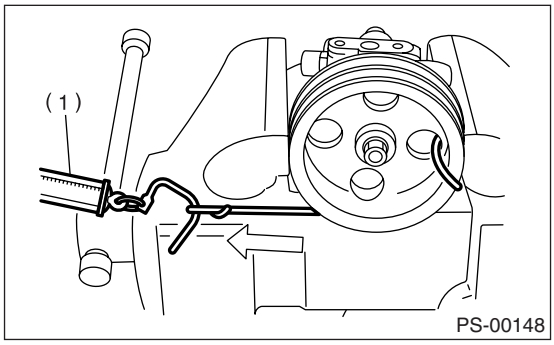


(1) Dial indicator

3) Resistance to rotation of pulley

Service limit:
Maximum load; 9.22 N (0.94 kgf, 2.07 lbf) or less

NOTE:
• A rather higher value may be indicated when pulley starts turning.
• Measure the load during rotation and make a judgment.



(1) Spring balance

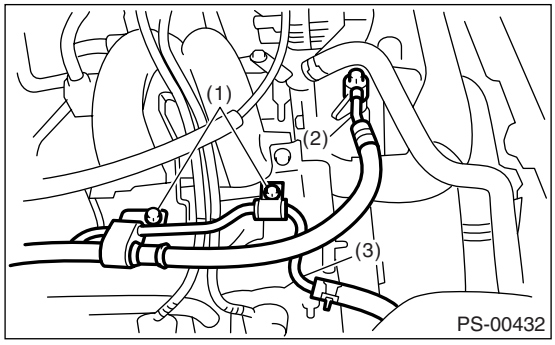
3. HYDRAULIC PRESSURE

NOTE:
• Be sure to complete all items aforementioned in "INSPECTION", prior to measuring hydraulic pressure. Otherwise, pressure can not be measured correctly. <Ref. to PS-101, INSPECTION, General Diagnostic Table.>
• Do not leave the valve of pressure gauge closed or hold the steering wheel at stop end for 5 seconds or more in any case, as the oil pump may be damaged due to long keep of these conditions.
• Put a cotton cloth waste at a place where fluid drops before the pressure gauge is installed. Wipe off split fluid thoroughly after the measurement.

1) REGULAR PRESSURE MEASUREMENT
(1) Connect the ST1, ST2 and ST3.

ST1 92511000 PRESSURE GAUGE
ST2 34099AC020 ADAPTER HOSE B
ST3 34099AC010 ADAPTER HOSE A

(2) Remove the air intake duct.
(3) Disconnect the pipe C from the pump.
(4) Using the gasket (Part No. 34621AC021) and bolt (Part No. 34620AC010), install the ST2 to the pump instead of pipe C.

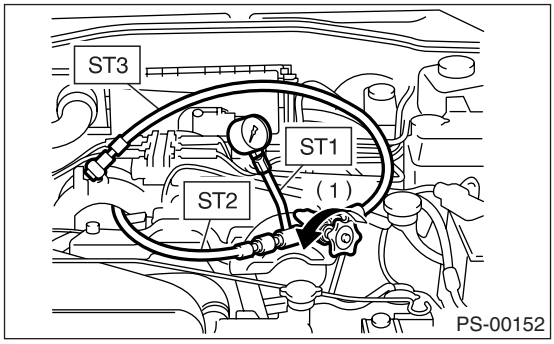


(1) Bolt A
(2) Pipe C
(3) Pipe D

(5) Install the ST3 to end of pipe C removed from pump.
(6) Replenish power steering fluid up to the specified level.
(7) Open the valve, and start the engine.
(8) Measure the regular pressure.

ST1 925711000 PRESSURE GAUGE
ST2 34099AC020 ADAPTER HOSE B

ST3 34099AC010 ADAPTER HOSE A



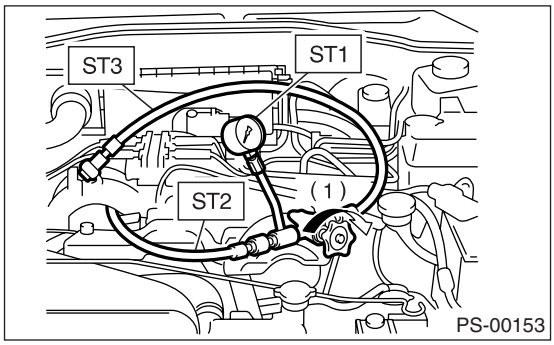
(1) Open the valve

Service limit:
981 kPa (10 kgf/cm^2, 142 psi) or less

(9) If it is not within the specified value, replace the troubled part caused by the following symptoms; pipe or hose clogged, leaks from fluid line, and mix of foreign objects in fluid line.

2) Measure the relief pressure.
(1) Using the STs, measure the relief pressure.
(2) Close the valve.
(3) Measure the relief pressure.

ST1 925711000 PRESSURE GAUGE
ST2 34099AC020 ADAPTER HOSE B
ST3 34099AC010 ADAPTER HOSE A



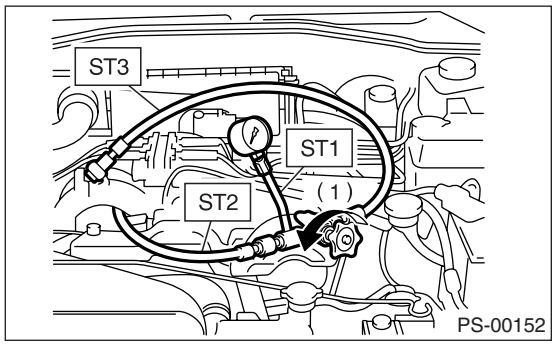
(1) Close the valve

Service limit:
1.6 L model:
6,174 — 6,860 kPa (63 — 70 kgf/cm^2, 896 — 994 psi)
2.0 L Non-turbo model, 2.5 L model:
6,767 — 7,453 kPa (69 — 76 kgf/cm^2, 981 — 1,081 psi)
2.0 L Turbo model (WRX model):
7,350 — 8,036 kPa (75 — 82 kgf/cm^2, 1,067 — 1,165 psi)
2.0 L Turbo model (STi model):
8,100 — 8,800 kPa (82.6 — 89.8 kgf/cm^2, 1,176 — 1,277 psi)

(4) If it is not within the specified value, replace the oil pump.

3) Measure the working pressure.
(1) Using the STs, measure the working pressure.
(2) Open the valve.
(3) Measure the working pressure of control valve by turning wheel from stop to stop.

ST1 925711000 PRESSURE GAUGE
ST2 34099AC020 ADAPTER HOSE B
ST3 34099AC010 ADAPTER HOSE A



(1) Open the valve

Service limit:
1.6 L model:
6,174 — 6,860 kPa (63 — 70 kgf/cm^2, 896 — 994 psi)
2.0 L Non-turbo model, 2.5 L model:
6,767 — 7,453 kPa (69 — 76 kgf/cm^2, 981 — 1,081 psi)
2.0 L Turbo model:
7,350 — 8,036 kPa (75 — 82 kgf/cm^2, 1,067 — 1,165 psi)

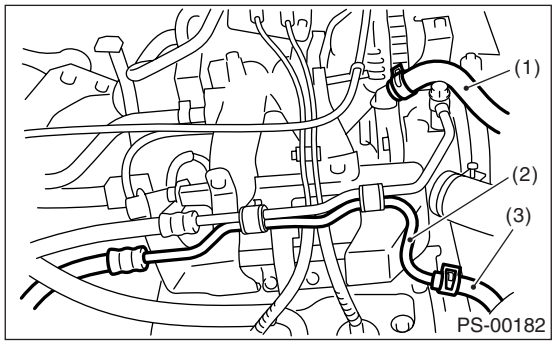
(4) If it is within the specified value, measure the steering effort. <Ref. to PS-103, MEASUREMENT OF STEERING EFFORT, INSPECTION, General Diagnostic Table.> If it is not within specified value, replace the control valve itself or control valve and pinion as a single unit with new ones.

10.Reservoir Tank

A: REMOVAL

1) Remove the air intake duct. <Ref. to IN(H4SO)-6, REMOVAL, Air Intake Duct.>
2) Drain fluid from the reservoir tank.
3) Disconnect the pipe D from return hose and suction hose from oil pump.

CAUTION:
• Do not allow fluid from the hose end to come into contact with pulley belt.
• To prevent foreign matter from entering the hose and pipe, cover the open ends of them with a clean cloth.

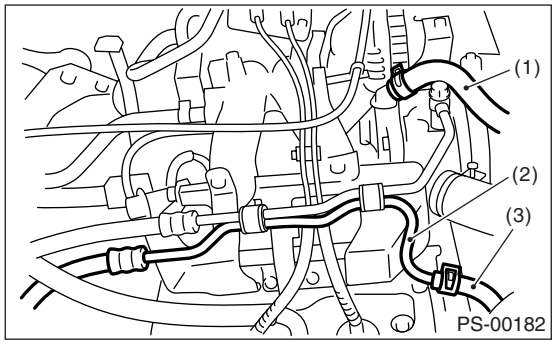


(1) Suction hose
(2) Pipe D
(3) Return hose

4) Remove the reservoir tank from bracket by pulling it upwards.

B: INSTALLATION

1) Install the reservoir tank to bracket.
2) Connect the pipes D to return hose and suction hose to oil pump.



(1) Suction hose
(2) Pipe D
(3) Return hose

3) Feed the power steering fluid to the specified level. <Ref. to PS-100, Power Steering Fluid.>

C: INSPECTION

Check the reservoir tank for cracks, breakage, or damage. If any cracks, breakage, or damage is found, replace the reservoir tank.

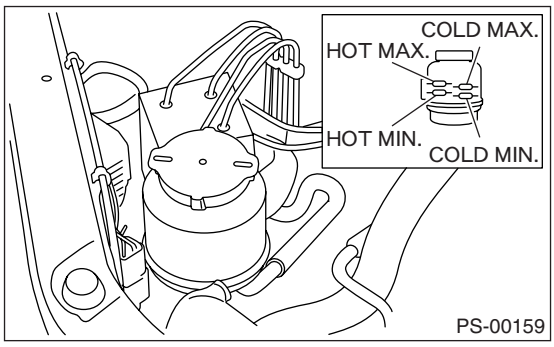
11.Power Steering Fluid

A: SPECIFICATION

Recommended power steering fluid	Manufacturer
DEXRON III or equivalent	B.P.
	CALTEX
	CASTROL
	MOBIL
	SHELL
	TEXACO

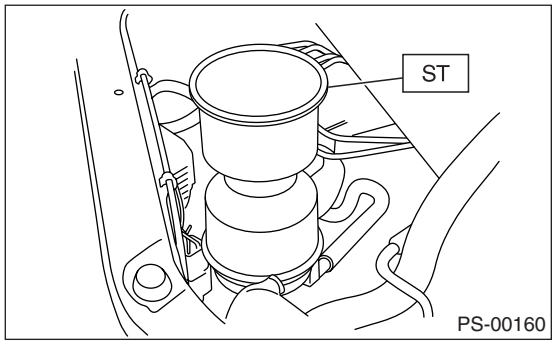
B: INSPECTION

1) Check the power steering fluid for deterioration or contamination. If the fluid is highly deteriorated or contaminated, drain it and refill with new fluid.
2) Check the joints and units for oil leakage. If any oil leaks are found, repair or replace the applicable part.
3) Inspect the fluid level on flat and level surface with engine "OFF" by indicator of reservoir tank.
If the level is at MIN. point or below, add fluid to keep the level in the specified range of the indicator. If at MAX. point or above, drain fluid by using a syringe or the like.
(1) Check at power steering fluid temperature 20°C (68°F); read the fluid level on the "COLD" side.
(2) Check at power steering fluid temperature 80°C (176°F); read the fluid level on the "HOT" side.



C: REPLACEMENT

1) Lift up the vehicle.
2) Remove the jack up plate.
3) Remove the pipe joint in center of gear box, and then install the vinyl hose to pipe and joint. Drain the fluid while turning steering wheel.
4) Set the ST on top of reservoir tank and fill it about half way with the specified fluid.
ST 34199AE040 OIL CHARGE GUIDE



5) Continue to turn the steering wheel slowly from lock to lock until bubbles stop appearing on oil surface while keeping the fluid at that level.
6) If turning the steering wheel in low fluid level condition, air will be sucked in pipe. In this case, leave it about half an hour and then do the step 5) again.
7) Lift up the vehicle, start the engine and let it idle.
8) Continue to turn the steering wheel slowly from lock to lock again until bubbles stop appearing on oil surface while keeping the fluid at that level.
It is normal that bubbles stop appearing after three times turning of steering wheel from lock to lock.
9) In case the bubbles do not stop appearing in the tank, leave it about half an hour and then do the step 4) all over again.
10) Lower the vehicle, and then idle the engine.
11) Continue to turn the steering wheel from lock to lock until bubbles stop appearing and change of the fluid level is within 3 mm (0.12 in).
12) In case the following happens, leave it about half an hour and then do step 8) to 11) again.
(1) The fluid level changes over 3 mm (0.12 in).
(2) Bubbles remain on the upper surface of the fluid.
(3) Grinding noise is generated from oil pump.
13) Check the fluid leakage after turning steering wheel from lock to lock with engine running.

12.General Diagnostic Table

A: INSPECTION

Trouble	Possible cause	Corrective action
• Heavy steering effort in all ranges • Heavy steering effort at stand still • Steering wheel surges when turning.	1. Pulley belt • Unequal length of pulley belts • Adhesion of oil and grease • Loose or damage of pulley belt • Poor uniformity of pulley belt cross section • Pulley belt touches to pulley bottom • Poor revolution of pulleys (except oil pump pulley) • Poor revolution of oil pump pulley	Adjust or replace.
	2. Tire and wheel • Improper tires out of specification • Improper wheels out of specification • Tires not properly inflated *1	Replace or reinflate.
	3. Fluid • Low fluid level • Aeration • Dust mix • Deterioration of fluid • Poor warming-up of fluid *2	Refill, bleed air, replace or instruct the customer.
	4. Idle speed • Lower idle speed • Excessive drop of idle speed at start or at turning steering wheel *3	Adjust or instruct the customer.
	5. Measure hydraulic pressure. <Ref. to PS-96, INSPECTION, Oil Pump.>	Replace the problem parts.
	6. Measure steering effort. <Ref. to PS-101, INSPECTION, General Diagnostic Table.>	Adjust or replace.
• Vehicle leads to one side or the other. • Poor return of steering wheel to center • Steering wheel surges when turning.	1. Fluid line • Folded hose • Flattened pipe	Reform or replace.
	2. Tire and wheel • Flat tire • Mix use of different tires • Mix use of different wheels • Abnormal wear of tire • Unbalance of remained grooves • Unbalance of tire pressure	Adjust, fix or replace.
	3. Front alignment • Improper or unbalance caster • Improper or unbalance toe-in • Loose connection of suspension	Adjust or retighten.
	4. Others • Damaged joint assembly • Unbalanced height • One-sided weight	Replace, adjust or instruct the customer.
	5. Measure steering effort. <Ref. to PS-101, INSPECTION, General Diagnostic Table.>	Adjust or replace.

*1 If tires and/or wheels are wider, the load to power steering system is the more. Accordingly, in a condition, for example before fluid warms-up, relief valve may work before maximum turning angle. In this case, steering effort may be heavy. When measured hydraulic pressure is normal, there is no abnormal thing.
*2 In cold weather, steering effort may be heavy due to increased flow resistance of cold fluid. After warming-up engine, turn steering wheel from stop to stop several times to warm-up fluid. Then if steering effort reduces normally, there is no abnormal thing.
*3 In cold weather or with insufficient warm-up of engine, steering effort may be heavy due to excessive drop of idling when turning steering wheel. In this case, it is recommended to start the vehicle with increasing engine speed than usual. Then if steering effort reduces normally, there is no abnormal thing.

1. NOISE AND VIBRATION

CAUTION:
Don't keep the relief valve operated over 5 seconds at any time or inner parts of the oil pump may be damaged due to rapid increase of fluid temperature.

NOTE:
• Grinding noise may be heard immediately after the engine start in extremely cold condition. In this case, if the noise goes off during warm-up there is no abnormal function in the system. This is due to the fluid characteristic in extremely cold condition.
• Oil pump makes whine or growl noise slightly due to its mechanism. Even if the noise can be heard when steering wheel is turned at stand still there is no abnormal function in the system provided that the noise eliminates when the vehicle is running.
• When turning the steering wheel with service brake and/or parking brake applied, the noise is generated by creaking between disk and pads. However this does not indicate abnormal function in system.
• There may be a little vibration around the steering devices when turning steering wheel at standstill, even though the component parts have no defects.
Hydraulic systems are likely to generate this kind of vibration as well as working noise and fluid noise because of combined conditions, i.e., road surface and tire surface, engine speed and turning speed of steering wheel, fluid temperature and braking condition.
This phenomena does not indicate there is some abnormal function in the system.
The vibration can be known when steering wheel is turned repeatedly at various speeds from slow to rapid step by step with parking brake applied on concrete road and in "D" range for automatic transmission vehicle.

Trouble	Possible cause	Corrective action
Hiss noise (continuous) While engine is running.	Relief valve emits operating sound when steering wheel is completely turned in either direction. (Don't keep this condition over 5 seconds.)	Normal
	Relief valve emits operating sound when steering wheel is not turned. This means that the relief valve is faulty.	Defective Replace the oil pump.
Rattling noise (intermittent) While engine is running.	Interference with adjacent parts	Check the clearance. Correct if necessary. <Ref. to PS-83, INSPECTION, Pipe Assembly [LHD Model].>
	Loosened installation of oil pump, oil tank, pump bracket, gearbox or crossmember	Retighten.
	Loosened installation of oil pump pulley or other pulley(s)	Retighten.
	Loosened linkage or play of steering or suspension Loosened tightening of joint or steering column	Retighten or replace.
	Sound generates from the inside of gearbox or oil pump.	Replace the faulty parts of gearbox or oil pump.
Knocking When turning steering wheel in both direction with small angle repeatedly at engine ON or OFF.	Excessive backlash Loosened lock nut for adjusting backlash	Adjust and retighten.
	Loosened tightening or play of tie-rod, or tie-rod end	Retighten or replace.
Grinding noise (continuous) While engine is running.	Vane pump aeration	Inspect and retighten the fluid line connection. Refill fluid and vent air.
	Vane pump seizing	Replace the oil pump.
	Pulley bearing seizing of oil pump	Replace the oil pump.
	Folded hose, flat pipe	Replace.
Squeal, squeak (intermittent or continuous) While engine is running.	Maladjustment of pulley belt Damaged or charged pulley belt Unequal length of pulley belts	Adjust or replace. (Replace two belts as a set.)
	Run out or soilage of V-groove surface of oil pump pulley	Clean or replace.

Trouble	Possible cause	Corrective action
Sizzling noise (continuous) While engine is running.	Fluid aeration	Fix the wrong part causing aeration. Replace the fluid and vent air.
	Damaged pipe of gearbox	Replace the pipe.
	Abnormal inside of hose or pipe Flat hose or pipe	Rectify or replace.
	Abnormal inside of oil tank	Replace.
	Removed oil tank cap	Install the cap.
Whistle (continuous) While engine is running.	Abnormal pipe of gearbox or abnormal inside of hose	Replace the faulty parts of gearbox or hose.
Whine or growl (continuous or intermittent) While engine is running with/ without steering turned.	Loosened installation of oil pump, oil pump bracket	Retighten.
	Abnormal inside of oil pump, hose	Replace the oil pump, hose, if the noise can be heard when running as well as stand still.
	Torque converter growl, air conditioner compression growl	Remove the power steering pulley belt and confirm.
Creaking noise (intermittent) While engine is running with steering turned.	Abnormal inside of gearbox	Replace the faulty parts of gearbox.
	Abnormal bearing for steering shaft	Apply grease or replace.
	Generates when turning steering wheel with brake (service or parking) applied.	If the noise goes off when brake is released, it is normal.
Vibration While engine is running with/ without steering turned.	Too low engine speed	Adjust and instruct customers.
	Vane pump aeration	Fix the wrong part. Vent air.
	Damaged valve in oil pump, gearbox	Replace the oil pump, faulty parts of gearbox.
	Looseness of play of steering, suspension parts	Retighten.

2. MEASUREMENT OF STEERING EFFORT

	Step	Check	Yes	No
1	**CHECK STEERING EFFORT.** 1) Stop the vehicle on a concrete road. 2) Start the engine. 3) Idle the engine. 4) Install the spring scale on the steering wheel. 5) Pull the spring scale at an right angle to steering wheel, and measure both right and left steering wheel effort. NOTE: When turning the steering more quickly than necessary from a direction to the other direction at an engine speed over 2,000 rpm, steering effort may be heavy. This is caused by flow characteristic of oil pump and is not a problem.	Is the steering effort less than 29.4 N (3.0 kgf, 6.6 lbf)?	Go to step **2.**	Adjust the backlash.
2	**CHECK STEERING EFFORT.** 1) Stop the engine. 2) Pull the spring scale at an right angle to the steering wheel, and measure both right and left steering wheel effort.	Is the steering effort less than 400 N (41 kgf, 90 lbf)?	Go to step **3.**	Perform adjustment.
3	**CHECK STEERING WHEEL EFFORT.** 1) Remove the universal joint. 2) Measure the steering wheel effort.	Is the maximum steering effort less than 2.26 N (0.23 kgf, 0.51 lbf)?	Go to step **4.**	Check, adjust and replace if necessary.

	Step	Check	Yes	No
4	**CHECK STEERING WHEEL EFFORT.** Measure the steering wheel effort.	Is the difference of steering effort between clockwise and counterclockwise less than 20%?	Go to step **5.**	Check, adjust and replace if necessary.
5	**CHECK UNIVERSAL JOINT.** Measure the swing torque of the joint (yoke of steering column side). <Ref. to PS-29, INSPECTION, Universal Joint.>	Is the swing torque less than 7.3 N (0.74 kgf, 1.64 lbf)?	Go to step **6.**	Replace with new one.
6	**CHECK UNIVERSAL JOINT.** Measure the swing torque of the joint (yoke of gearbox side). <Ref. to PS-29, INSPECTION, Universal Joint.>	Is the swing torque less than 3.8 N (0.39 kgf, 0.86 lbf)?	Go to step **7.**	Replace with new one.
7	**CHECK FRONT WHEEL.** Check the front wheel.	Are the front wheels for unsteady revolution or rattling and brake for dragging?	Inspect, readjust and replace if necessary.	Go to step **8.**
8	**CHECK TIE-ROD ENDS.** Remove the tie-rod ends.	Are the tie-rod ends of suspension for unsteady revolution or rattling?	Inspect and replace if necessary.	Go to step **9.**
9	**CHECK BALL JOINT.** Remove the ball joint.	Are the ball joints of suspension for unsteady revolution or rattling?	Inspect and replace if necessary.	Go to step **10.**
10	**CHECK GEARBOX.** Measure the rotating of gearbox. <Ref. to PS-59, TURNING RESISTANCE OF GEARBOX, INSPECTION, Steering Gearbox [LHD Model].> or <Ref. to PS-75, TURNING RESISTANCE OF GEARBOX, INSPECTION, Steering Gearbox [RHD Model].>	Is the rotating resistance of gear box less than 10.5 N (1.1 kgf, 2.4 lbf)? Is the difference between clockwise and counterclockwise 20%?	Go to step **11.**	Readjust the backlash, and if ineffective, replace the faulty parts.
11	**CHECK GEARBOX.** Measure the sliding of gearbox. <Ref. to PS-58, SERVICE LIMIT, INSPECTION, Steering Gearbox [LHD Model].> or <Ref. to PS-74, SERVICE LIMIT, INSPECTION, Steering Gearbox [RHD Model].>	Is the sliding resistance of gear box less than 400 N (41 kgf, 90 lbf)? Is the difference between right and left 20%?	Steering effort is normal.	Readjust the backlash, and if ineffective, replace the faulty parts.

BODY SECTION

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

HVAC SYSTEM (HEATER, VENTILATOR AND A/C)	AC
HVAC SYSTEM (AUTO A/C) (DIAGNOSTICS)	AC(diag)
AIRBAG SYSTEM	AB
AIRBAG SYSTEM (DIAGNOSTICS)	AB(diag)
SEAT BELT SYSTEM	SB
LIGHTING SYSTEM	LI
WIPER AND WASHER SYSTEMS	WW
ENTERTAINMENT	ET
COMMUNICATION SYSTEM	COM
GLASS/WINDOWS/MIRRORS	GW
BODY STRUCTURE	BS
INSTRUMENTATION/DRIVER INFO	IDI
SEATS	SE
SECURITY AND LOCKS	SL
SUNROOF/T-TOP/CONVERTIBLE TOP (SUNROOF)	SR
EXTERIOR/INTERIOR TRIM	EI
EXTERIOR BODY PANELS	EB

FUJI HEAVY INDUSTRIES LTD.

G1880GE6

BODY SECTION

CRUISE CONTROL SYSTEM	CC
CRUISE CONTROL SYSTEM (DIAGNOSTICS)	CC(diag)
IMMOBILIZER (DIAGNOSTICS)	IM(diag)

HVAC SYSTEM (HEATER, VENTILATOR AND A/C)

AC

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1. General Description

A: SPECIFICATION

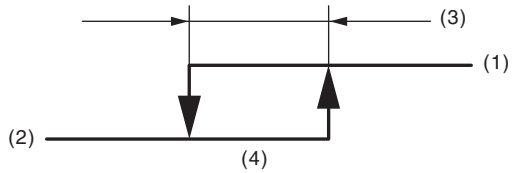
1. HEATER SYSTEM

Item		Specifications	Condition
Heating capacity		5.0 kW (4,300 kcal/h, 17,062 BTU/h) or more	• Mode selector switch: HEAT • Temperature control switch: FULL HOT • Temperature difference between hot water and inlet air: 65°C (149°F) • Hot water flow rate: 360 ℓ (95.1 US gal, 79.2 Imp gal)/h
Air flow rate		280 m^3 (9,888 cu ft)/h	Heat mode (FRESH), FULL HOT at 12.5 V
Max air flow rate		450 m^3 (15,892 cu ft)/h	• Temperature control switch: FULL COLD • Blower fan speed: 4th position • Mode selector lever: RECIRC
Heater core size (height × length × width)		163.9 × 200 × 25.0 mm (6.45 × 7.87 × 0.984 in)	—
Blower motor	Type	Magnet motor 200 W or less	at 12 V
	Fan type and size (diameter × width)	Sirocco fan type 150 × 75 mm (5.91 × 2.95 in)	—

2. A/C SYSTEM

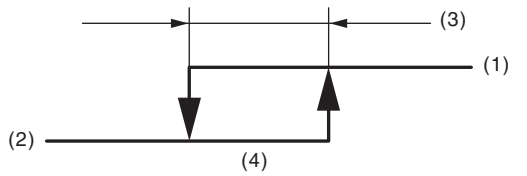
• AUTO A/C MODEL

Item		Specifications
Type of air conditioner		Reheat air-mix type
Cooling capacity		5.1 kW (4,385 kcal/h, 17,402 BTU/h)
Refrigerant		HFC-134a (CH_2FCF_3) [0.5±0.05 kg (0.99±0.11 lb)]
Compressor	Type	Vane rotary, fix volume (CR-14)
	Discharge	144 cm^3 (8.79 cu in)/rev
	Max. permissible speed	7,000 rpm
Magnet clutch	Type	Dry, single-disc type
	Power consumption	47 W
	Type of belt	V-Ribbed 4 PK
	Pulley dia. (effective dia.)	125 mm (4.92 in)
	Pulley ratio	1.064
Condenser	Type	Corrugated fin (Sub cool type)
	Core face area	0.21 m^2 (2.26 sq ft)
	Core thickness	16 mm (0.63 in)
	Radiation area	5.34 m^2 (57.48 sq ft)
Receiver drier	Effective inner capacity	250 cm^3 (15.26 cu in)
Expansion valve	Type	Internal equalizing
Evaporator	Type	Single tank
	Dimensions (W × H × T)	255 × 200 × 48 mm (10 × 7.87 × 1.89 in)
Blower fan	Fan type	Sirocco fan
	Outer diameter × width	150 × 75 mm (5.91 × 2.95 in)
	Power consumption	200 W

Item			Specifications
Condenser fan (Sub fan)		Motor type	Magnet
		Power consumption	120 W (Turbo model), 70 W (Non-turbo model)
		Fan outer diameter	320 mm (12.6 in)
Radiator fan (Main fan)		Motor type	Magnet
		Power consumption	120 W (Turbo model), 70 W (Non-turbo model)
		Fan outer diameter	320 mm (12.6 in)
Idling speed (A/C ON)		MPFI model	850±100 rpm
Dual switch (Pressure switch)	Low-pressure switch operating pressure	ON → OFF	278±29 kPa (2.83±0.3 kgf/cm^2, 40.3±4.2 psi)
		OFF → ON	$287^{+39}/_{-25}$ kPa ($2.9^{+0.4}/_{-0.25}$ kgf/cm^2, $42^{+5.7}/_{-3.6}$ psi)
	High-pressure switch operating pressure	ON → OFF	2,800±100 kPa (29±1 kgf/cm^2, 406±15 psi)
		DIFF	600±200 kPa (6.12±2 kgf/cm^2, 87±29 psi)
Thermo control amplifier working temperature (Evaporator outlet air)			 AC-00601 (1) ON (2) OFF (3) 2.5±0.5°C (36.5±0.9°F) (4) 1.5±0.5°C (35±0.9°F)

• MANUAL A/C MODEL

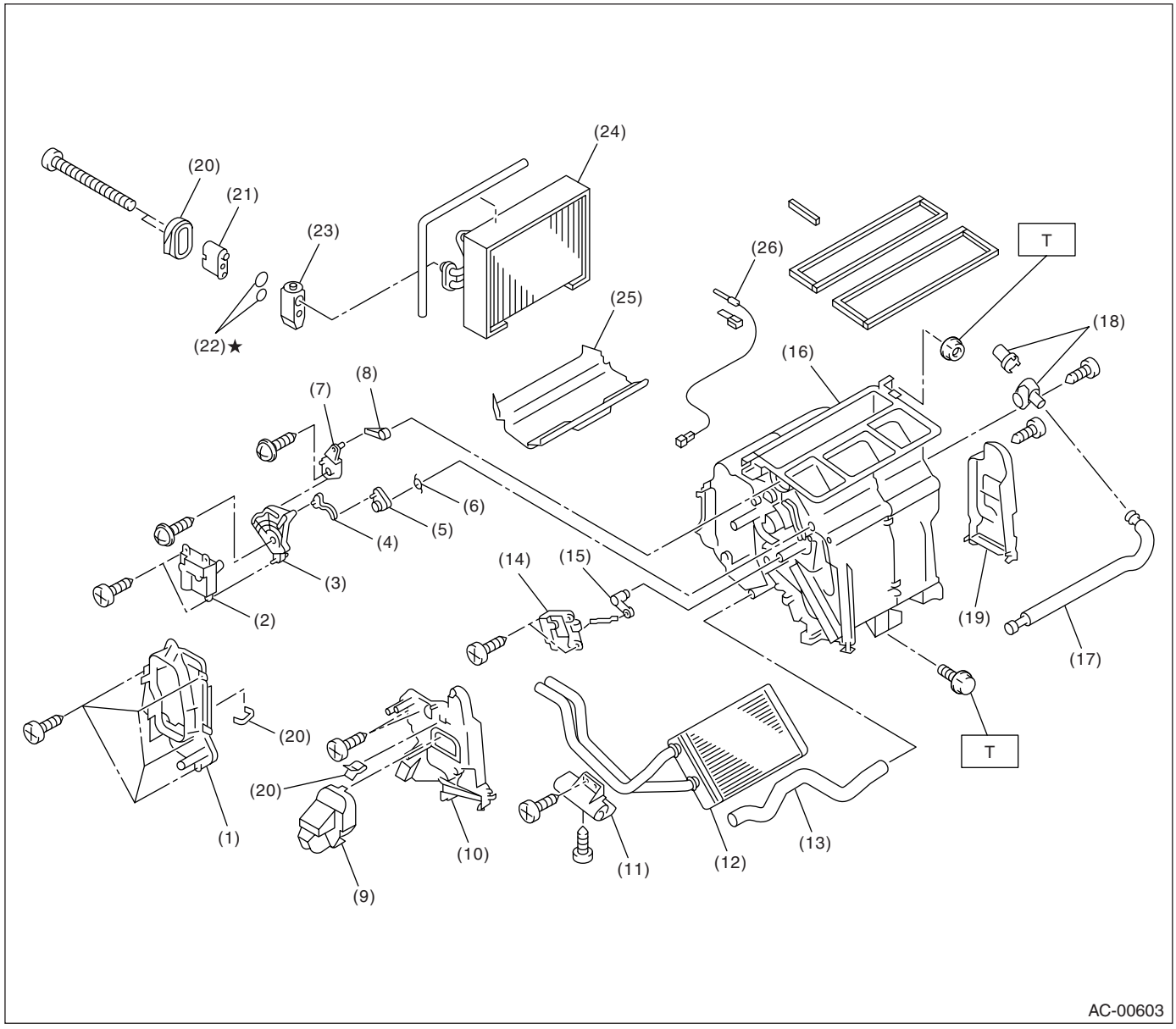
Item		Specifications
Type of air conditioner		Reheat air-mix type
Cooling capacity		5.1 kW (4,385 kcal/h, 17,402 BTU/h)
Refrigerant		HFC-134a (CH_2FCF_3) [0.5±0.05 kg (1.10±0.11 lb)]
Compressor	Type	Vane rotary, fix volume (CR-14)
	Discharge	144 cm^3 (8.79 cu in)/rev
	Max. permissible speed	7,000 rpm
Magnet clutch	Type	Dry, single-disc type
	Power consumption	47 W
	Type of belt	V-Ribbed 4 PK
	Pulley dia. (effective dia.)	125 mm (4.92 in)
	Pulley ratio	1.064
Condenser	Type	Corrugated fin (Sub cool type)
	Core face area	0.21 m^2 (2.26 sq ft)
	Core thickness	16 mm (0.63 in)
	Radiation area	5.34 m^2 (57.48 sq ft)
Receiver drier	Effective inner capacity	250 cm^3 (15.26 cu in)
Expansion valve	Type	Externally equalizing

Item			Specifications
Evaporator		Type	Single tank
		Dimensions (W × H × T)	255 × 200 × 48 mm (10 × 7.87 × 1.89 in)
Blower fan		Fan type	Sirocco fan
		Outer diameter × width	150 × 75 mm (5.91 × 2.95 in)
		Power consumption	200 W
Condenser fan (Sub fan)		Motor type	Magnet
		Power consumption	120 W (Turbo model), 70 W (Non-turbo model)
		Fan outer diameter	320 mm (12.6 in)
Radiator fan (Main fan)		Motor type	Magnet
		Power consumption	120 W (Turbo model), 70 W (Non-turbo model)
		Fan outer diameter	320 mm (12.6 in)
Idling speed (A/C ON)		MPFI model	850±100 rpm
Dual switch (Pressure switch)	Low-pressure switch operating pressure	ON → OFF	278±29 kPa (2.83±0.3 kgf/cm^2, 40.3±4.2 psi)
		OFF → ON	$287^{+39}/_{-25}$ kPa ($2.9^{+0.4}/_{-0.25}$ kgf/cm^2, $42^{+5.7}/_{-3.6}$ psi)
	High-pressure switch operating pressure	ON → OFF	2,800±100 kPa (29±1 kgf/cm^2, 406±15 psi)
		DIFF	600±200 kPa (6.12±2 kgf/cm^2, 87±29 psi)
Thermo control amplifier working temperature (Evaporator outlet air)			 AC-00601 (1) ON (2) OFF (3) 1.5±0.5°C (35±0.9°F) (4) 3.0±0.5°C (37±0.9°F)

B: COMPONENT

1. HEATER COOLING UNIT

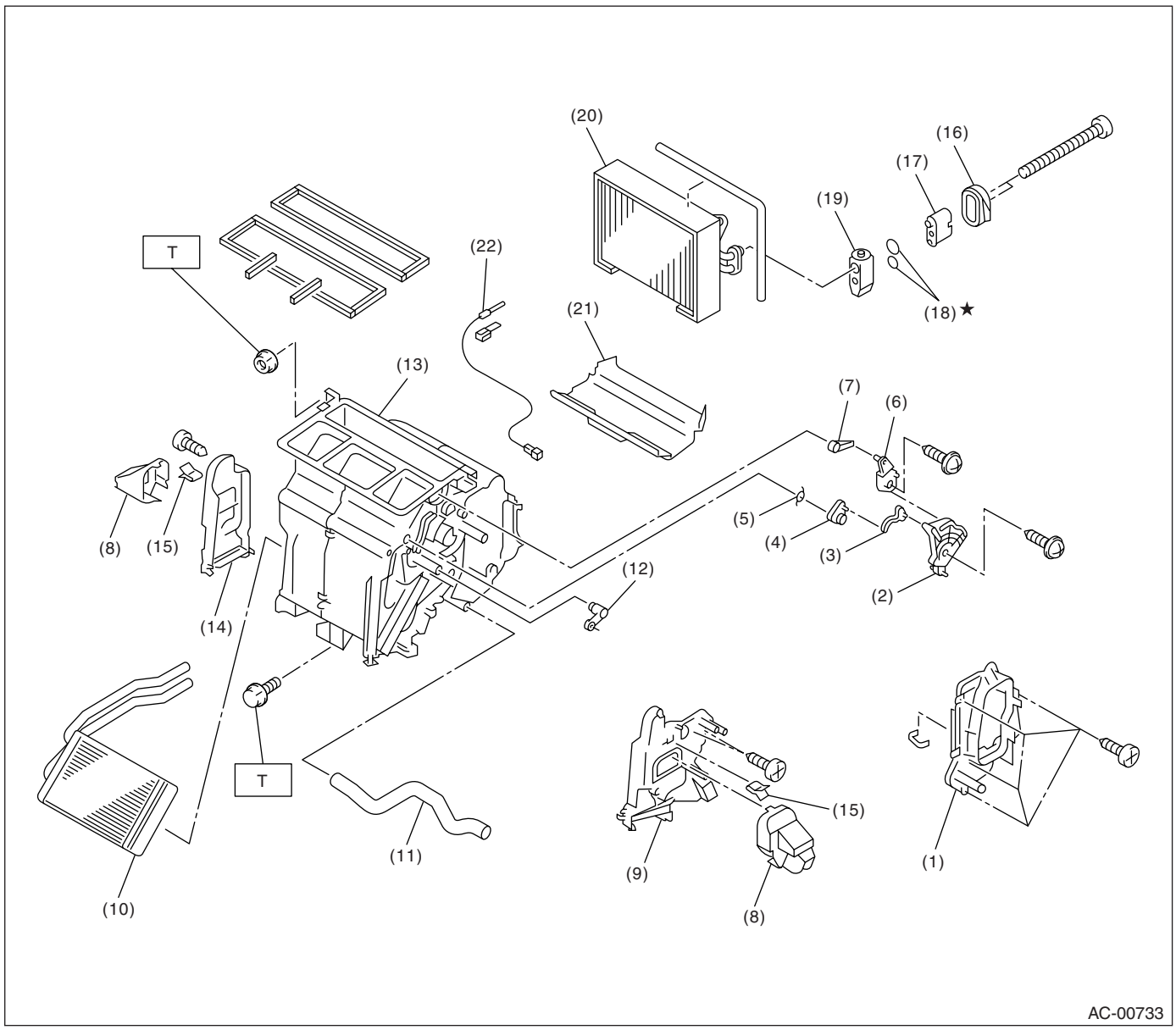
• AUTO A/C MODEL



(1) Unit cover
(2) Mode actuator
(3) Side link
(4) Mode actuator lever
(5) Foot lever
(6) Spring
(7) Mode actuator link
(8) Defroster lever
(9) Foot nozzle
(10) Unit duct cover
(11) Heater core clamp
(12) Heater core
(13) Drain hose
(14) Mix actuator
(15) Mix actuator lever
(16) Unit assembly
(17) Aspirator hose
(18) Aspirator
(19) Foot duct
(20) Packing
(21) Cooling unit block
(22) O-ring
(23) Expansion valve
(24) Evaporator
(25) Evaporator cover
(26) Thermistor

Tightening torque: N·m (kgf-m, ft-lb)
T: 7.4 (0.75, 5.4)

• MANUAL A/C MODEL

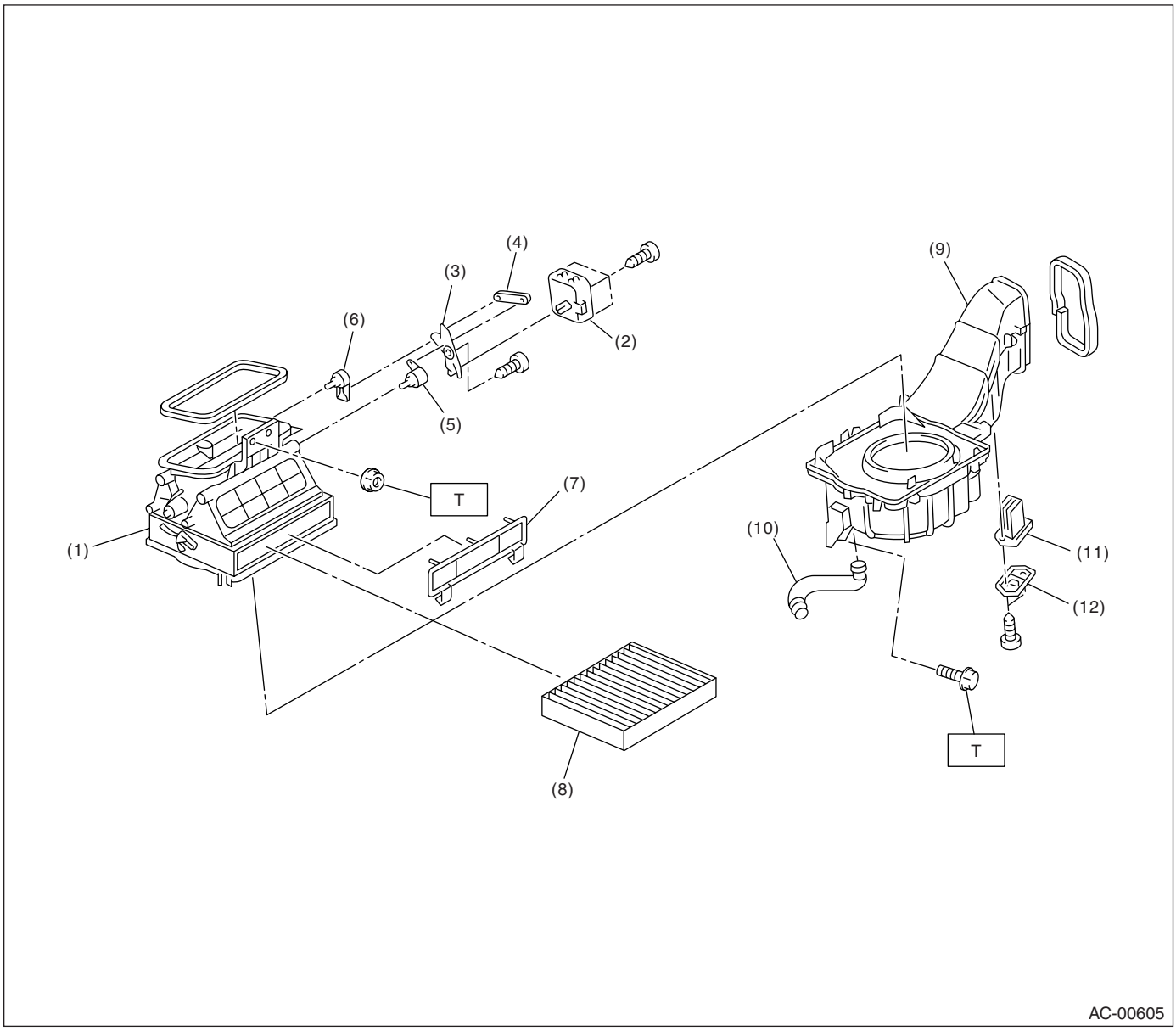


(1) Unit cover
(2) Side link
(3) Mode lever
(4) Foot lever
(5) Spring
(6) Mode link
(7) Defroster lever
(8) Foot nozzle
(9) Unit duct cover
(10) Heater core
(11) Drain hose
(12) Mix lever
(13) Unit assembly
(14) Foot duct
(15) Clip
(16) Packing
(17) Cooling unit block
(18) O-ring
(19) Expansion valve
(20) Evaporator
(21) Evaporator cover
(22) Thermistor

Tightening torque: N·m (kgf-m, ft-lb)
T: 7.4 (0.75, 5.4)

2. BLOWER MOTOR UNIT

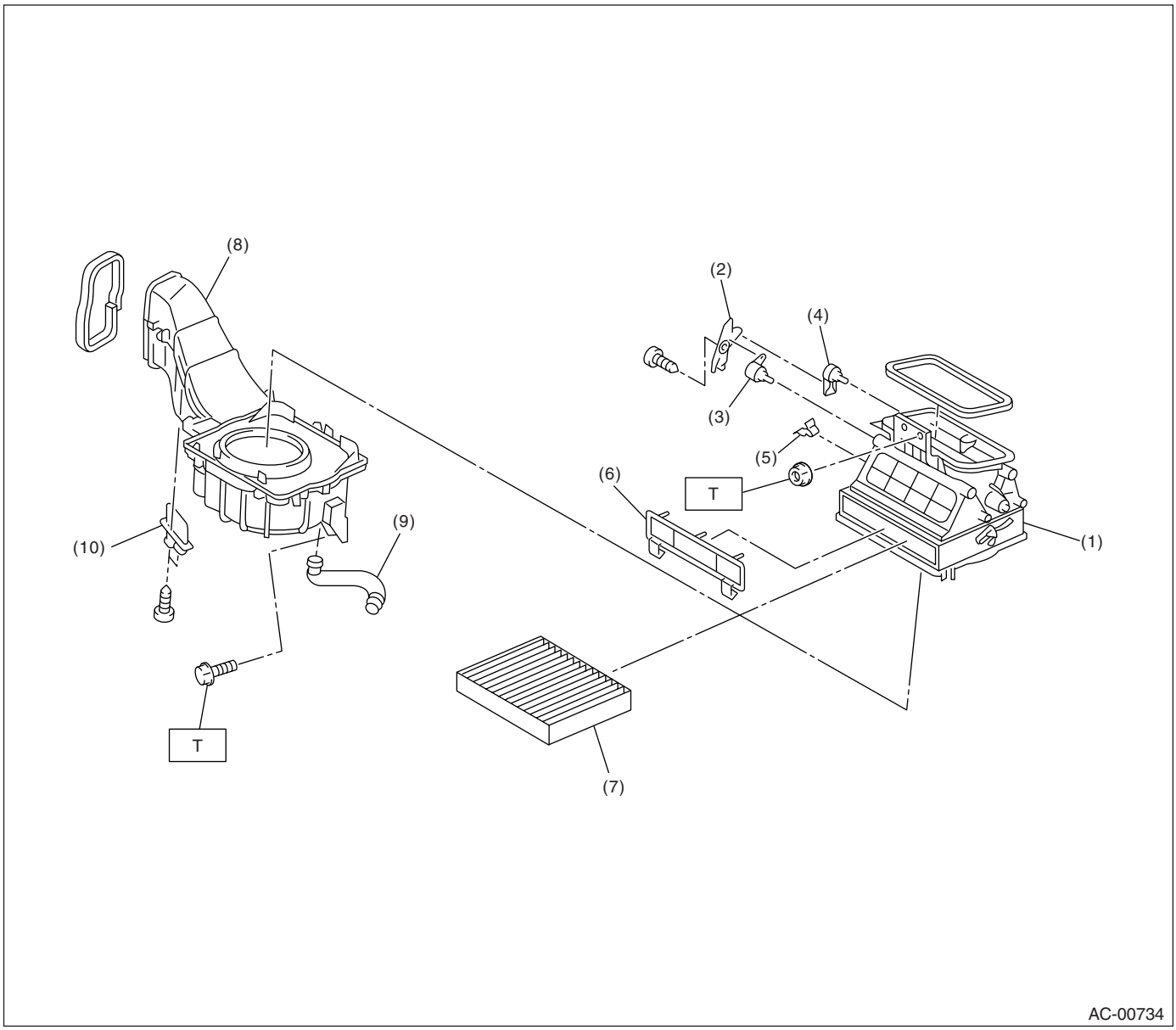
• AUTO A/C MODEL



(1) Upper case
(2) Servo motor
(3) Blower link
(4) Blower link lever A
(5) Blower link lever B
(6) Blower link lever C
(7) Filter cover
(8) Filter
(9) Blower motor assembly
(10) Hose
(11) Power transistor
(12) Power transistor cover

Tightening torque: N·m (kgf-m, ft-lb)
T: 7.4 (0.75, 5.4)

• WITHOUT A/C MODEL AND MANUAL A/C MODEL

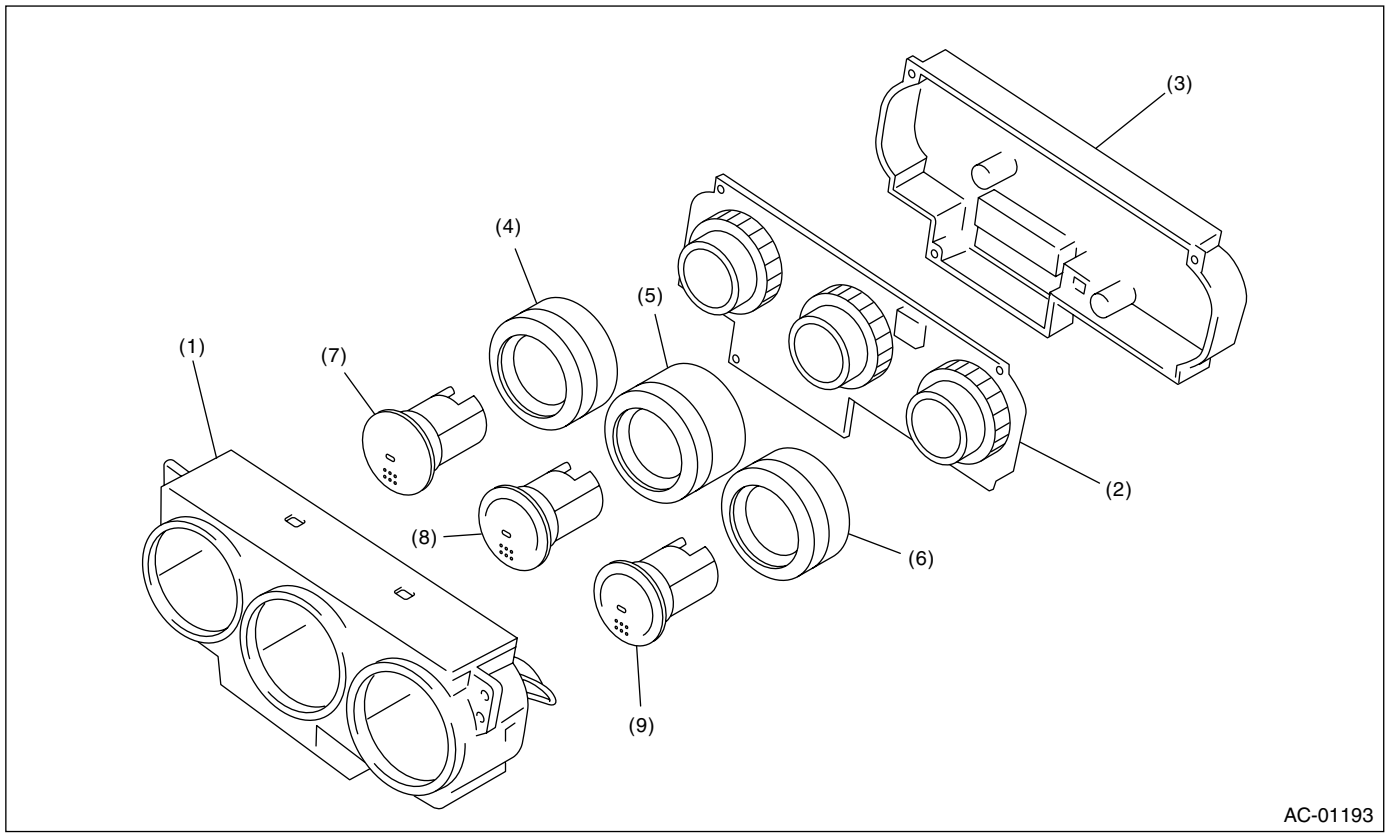


(1) Upper case
(2) Blower link
(3) Blower link lever A
(4) Blower link lever B
(5) Clip
(6) Filter cover
(7) Filter
(8) Blower motor assembly
(9) Hose
(10) Blower resistor

Tightening torque: N·m (kgf-m, ft-lb)
T: 7.4 (0.75, 5.4)

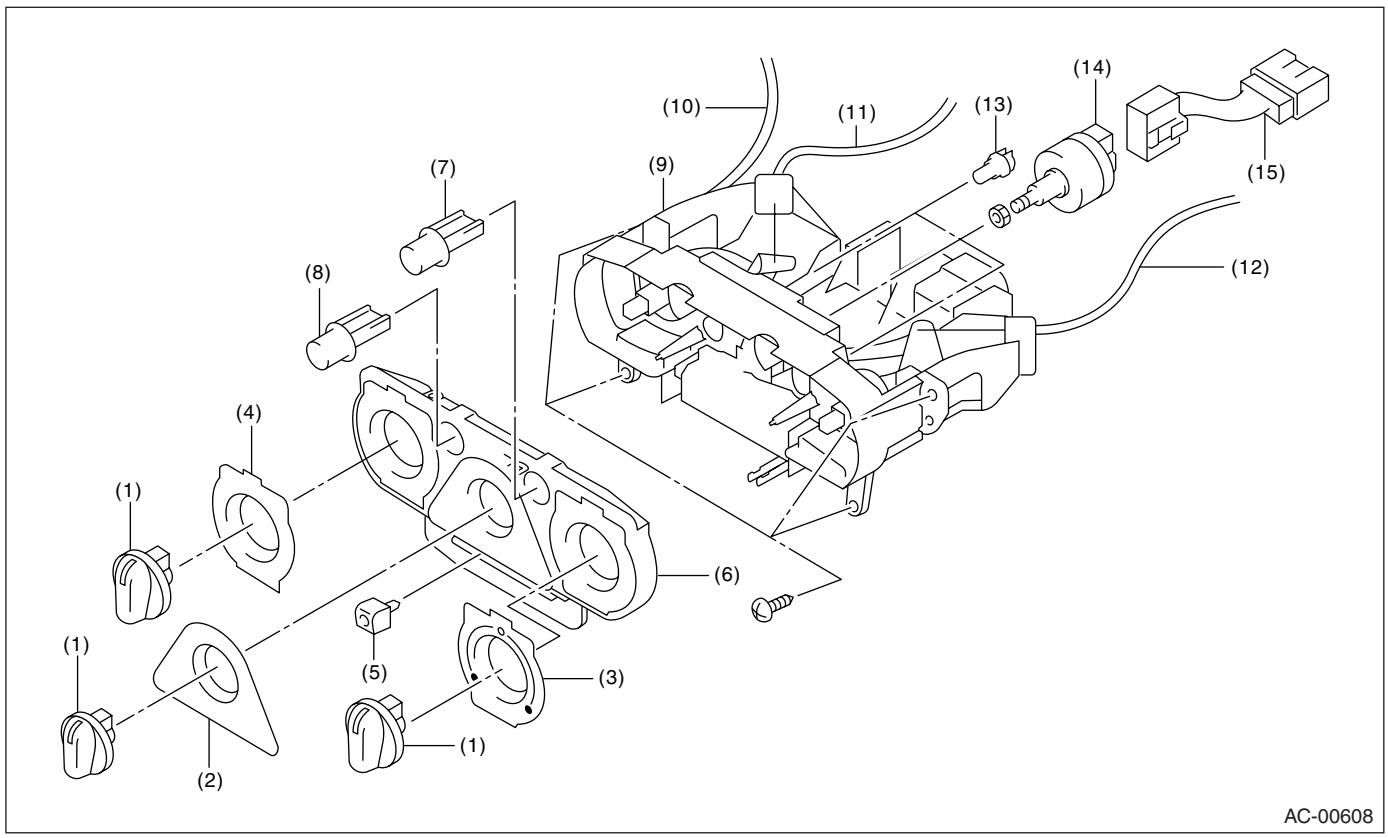
3. CONTROL UNIT

• AUTO A/C MODEL



(1)	Panel	(4)	Mode control dial	(7)	Rear window deffogger switch
(2)	Switch base	(5)	Fan speed control dial	(8)	FRESH/RECIRC switch
(3)	Control case	(6)	Temperature control dial	(9)	A/C switch

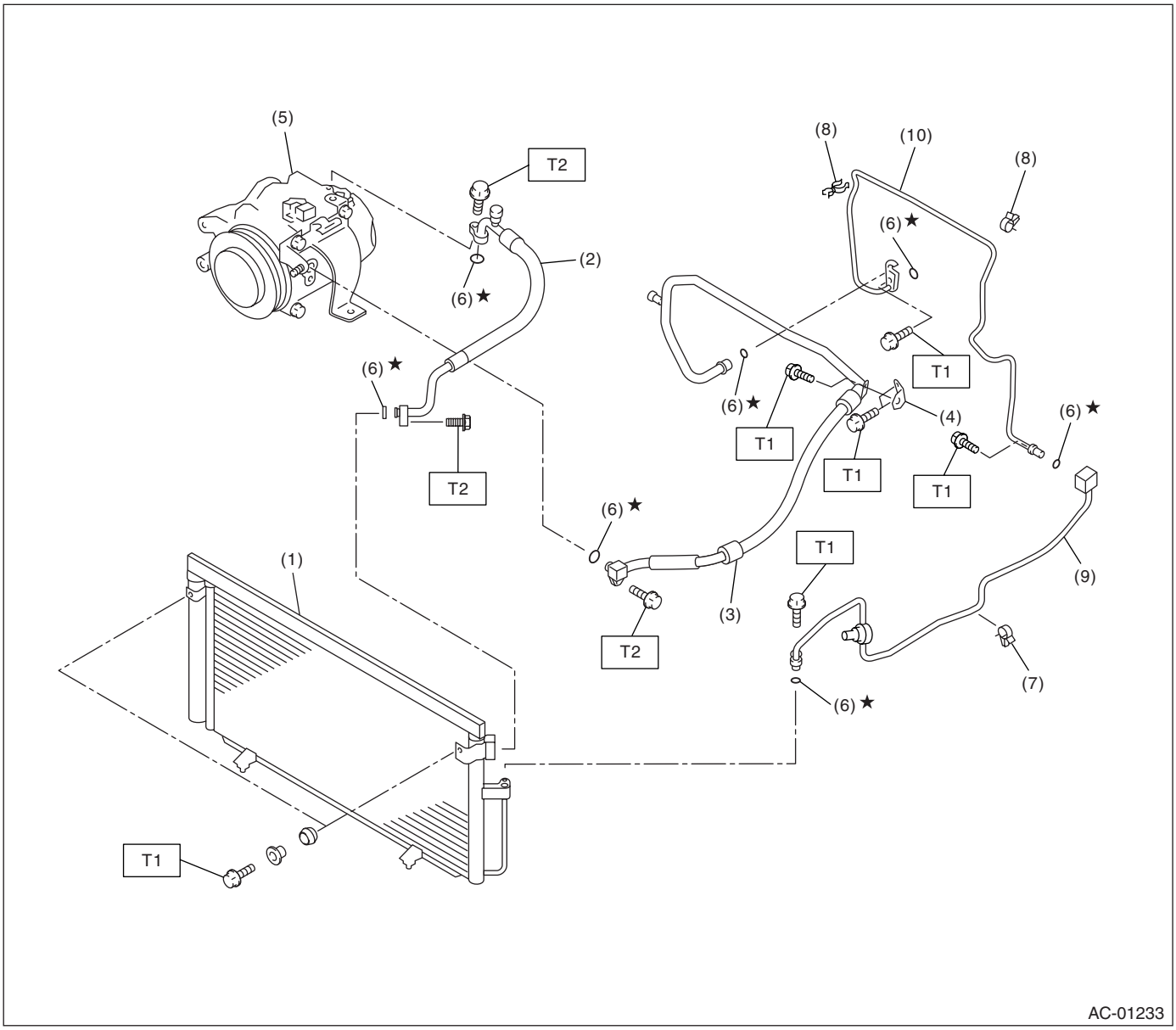
• WITHOUT A/C MODEL AND MANUAL A/C MODEL



(1)	Dial	(6)	Heater control panel	(11)	Mode cable
(2)	Fan control plate	(7)	A/C switch (with A/C model)	(12)	Temperature cable
(3)	Temperature control plate	(8)	Rear window defogger switch	(13)	Bulb
(4)	Mode control plate	(9)	Heater control base	(14)	Fan switch ASSY
(5)	FRESH/RECIRC switching knob	(10)	Intake cable	(15)	Harness

4. AIR CONDITIONING UNIT

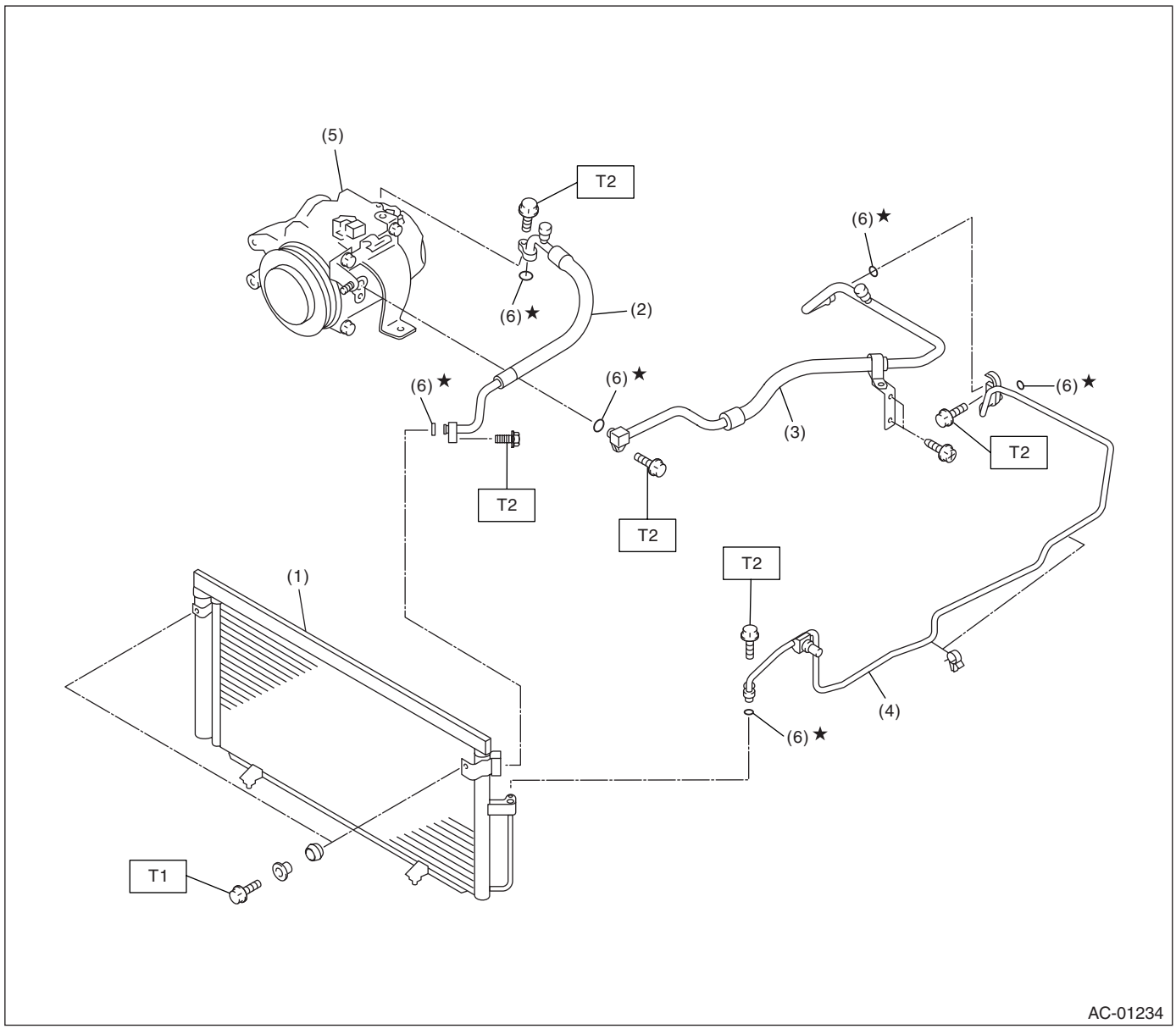
• LHD MODEL



(1)	Condenser	(6)	O-ring
(2)	Hose (High-pressure)	(7)	Clamp A
(3)	Hose (Low-pressure)	(8)	Clamp B
(4)	Bracket	(9)	Tube (To condenser)
(5)	Compressor	(10)	Tube (To evaporator)

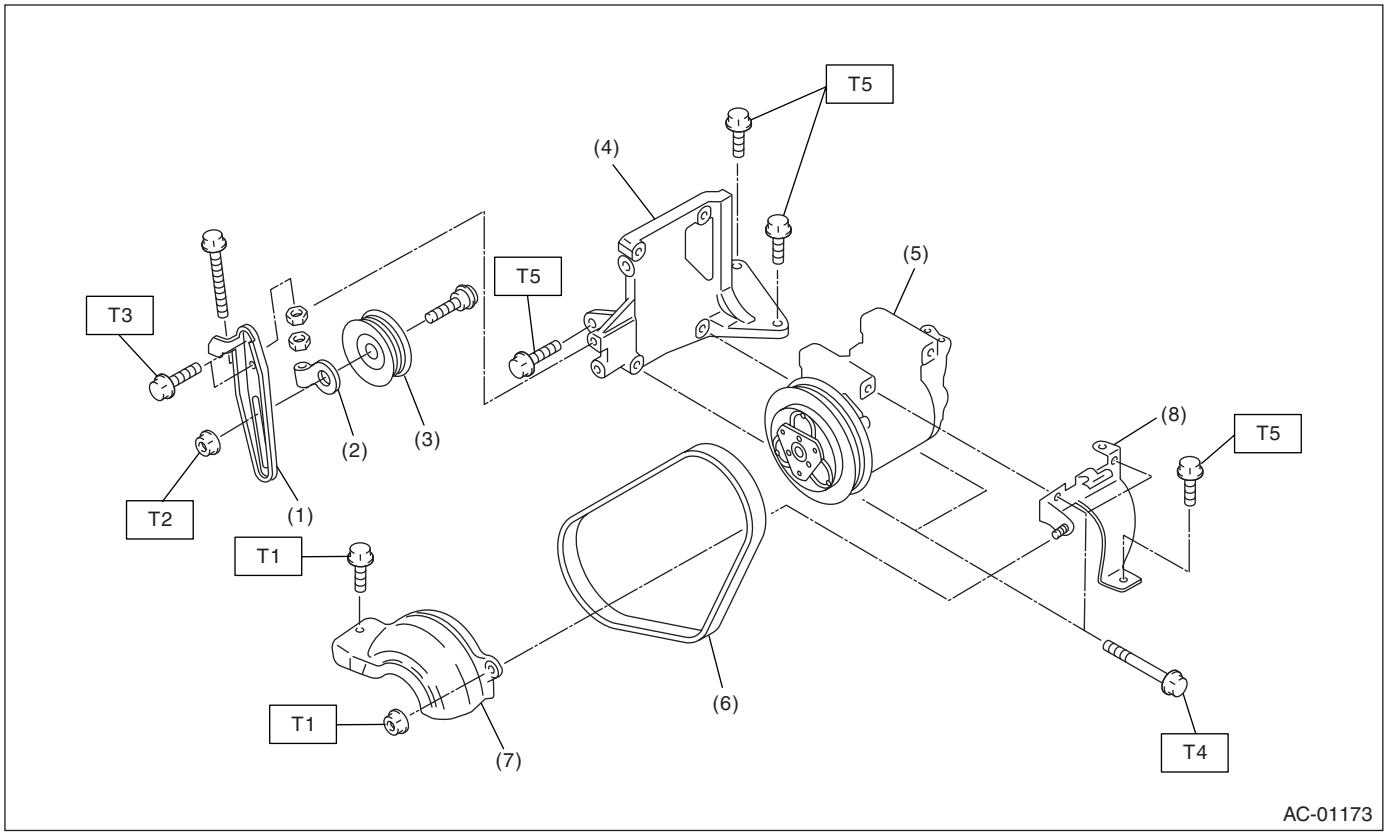
Tightening torque: N·m (kgf-m, ft-lb)
T1: 7.4 (0.75, 5.4)
T2: 15 (1.5, 10.8)

• RHD MODEL



(1)	Condenser	(4)	Tube	***Tightening torque: N·m (kgf-m, ft-lb)***
(2)	Hose (High-pressure)	(5)	Compressor	***T1: 7.4 (0.75, 5.4)***
(3)	Hose (Low-pressure)	(6)	O-ring	***T2: 15 (1.5, 10.8)***

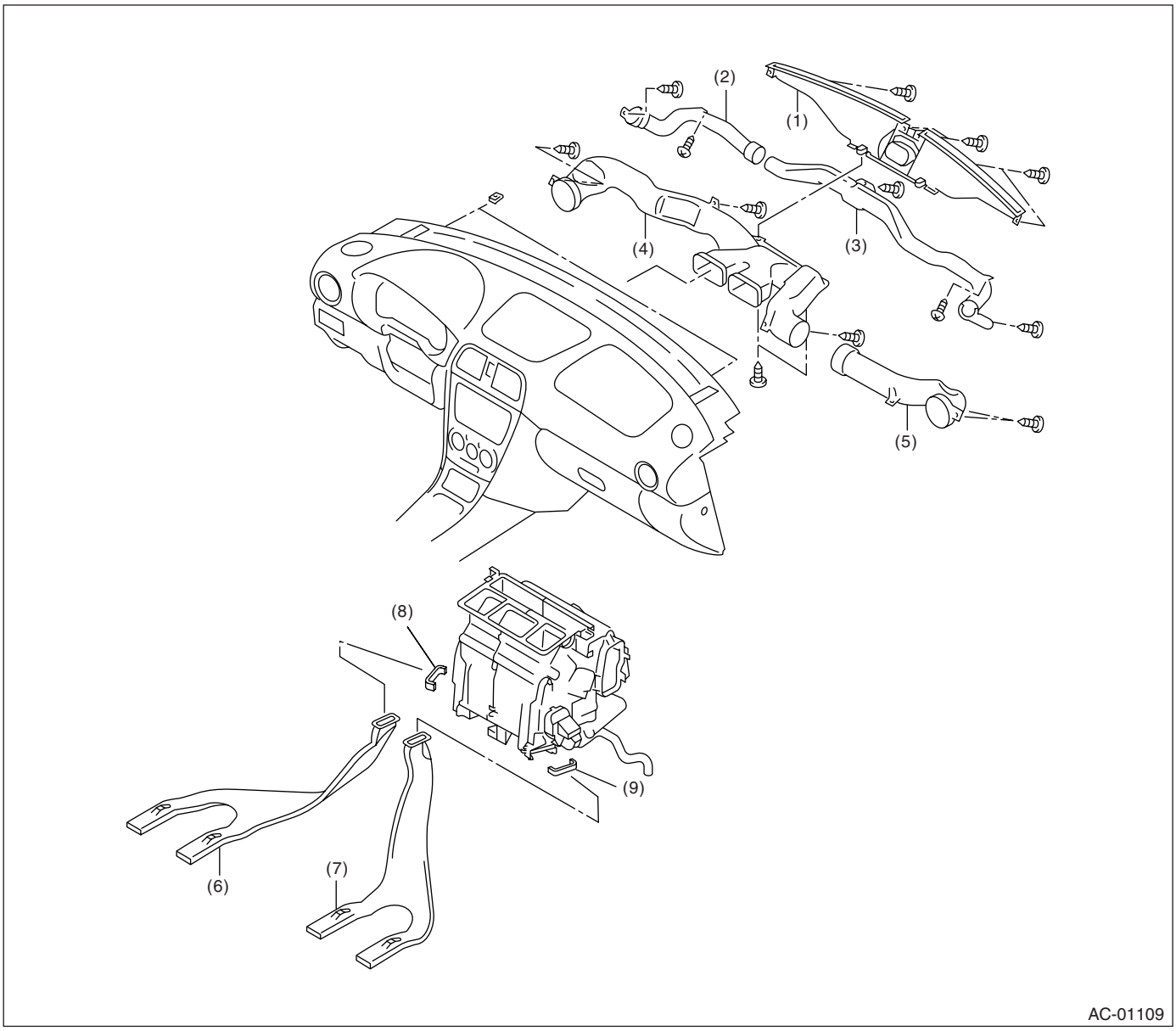
5. COMPRESSOR



(1) Idler pulley bracket
(2) Idler pulley adjuster
(3) Idler pulley
(4) Compressor upper bracket
(5) Compressor
(6) V-belt
(7) Compressor belt cover
(8) Compressor bracket

Tightening torque: N·m (kgf-m, ft-lb)
T1: 7.4 (0.75, 5.4)
T2: 22.6 (2.3, 16.6)
T3: 23.0 (2.35, 17.0)
T4: 28.9 (2.95, 21.3)
T5: 35 (3.6, 26)

6. HEATER DUCT

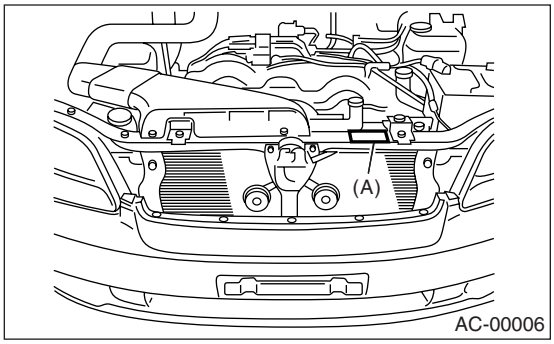


(1) Front defroster nozzle
(2) Side defroster duct (LH)
(3) Side defroster duct (RH)
(4) Side ventilation duct (LH)
(5) Side ventilation duct (RH)
(6) Rear heater duct (LH)
(7) Rear heater duct (RH)
(8) Rear heater duct cover (LH)
(9) Rear heater duct cover (RH)

C: CAUTION

1. HFC-134a A/C SYSTEM

• Unlike the old conventional CFC-12 system components, the cooling system components for the HFC-134a system such as the refrigerant and compressor oil are incompatible.
• Vehicles with the HFC-134a system can be identified by the label (A) attached to the vehicle.
Before maintenance, check which A/C system is installed in the vehicle.



2. COMPRESSOR OIL

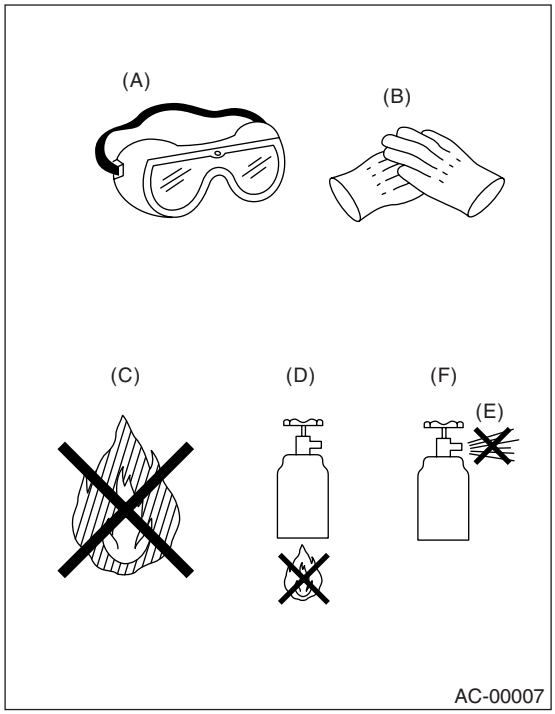
• HFC-134a compressor oil has no compatibility with that for CFC-12 system.
• Use only the manufacturer-authorized compressor oil for the HFC-134a system; only use DH-PR.
• Do not mix multiple compressor oils.
If CFC-12 compressor oil is used in a HFC-134a A/C system, the compressor may become stuck due to poor lubrication, or the refrigerant may leak due to swelling of rubber parts.
On the other hand, if HFC-134a compressor oil is used in a CFC-12 A/C system, the durability of the A/C system will be lowered.
• HFC-134a compressor oil is very hygroscopic. When replacing or installing/removing A/C parts, immediately isolate the oil from the atmosphere using a plug or tape. In order to avoid moisture, store the oil in a container with its cap tightly closed.

3. REFRIGERANT

• The CFC-12 refrigerant cannot be used in the HFC-134a A/C system. The HFC-134a refrigerant, also, cannot be used in the CFC-12 A/C system.
• If an incorrect or no refrigerant is used, poor lubrication will result and the compressor itself may be damaged.

4. HANDLING OF REFRIGERANT

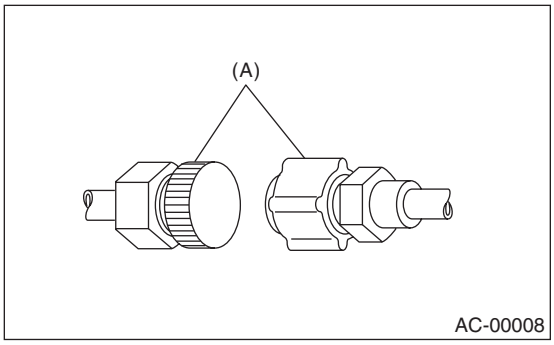
• The refrigerant boils at approx. −30°C (−22°F). When handling it, be sure to wear safety goggles and protective gloves. Direct contact of the refrigerant with skin may cause frostbite.
If the refrigerant gets into your eye, avoid rubbing your eyes with your hands. Wash your eye with plenty of water, and receive medical treatment from an eye doctor.
• Do not heat a service can. If a service can is directly heated, or put into boiling water, the inside pressure will become extremely high. This may cause the can to explode. If a service can must be warmed up, use hot water in 40°C (104°F) max.
• Do not drop or impact a service can. (Observe the precautions and operation procedure described on the refrigerant can.)
• When the engine is running, do not open the high-pressure valve of the manifold gauge. The high-pressure gas will back-flow resulting in an explosion of the can.
• Provide good ventilation and do not work in a closed area.
• In order to prevent global warning, avoid releasing HFC-134a into the atmosphere. Using a refrigerant recovery system, discharge and reuse it.



(A) Goggles
(B) Gloves
(C) Avoid open flame
(D) No direct heat on container
(E) Do not discharge
(F) Loosen

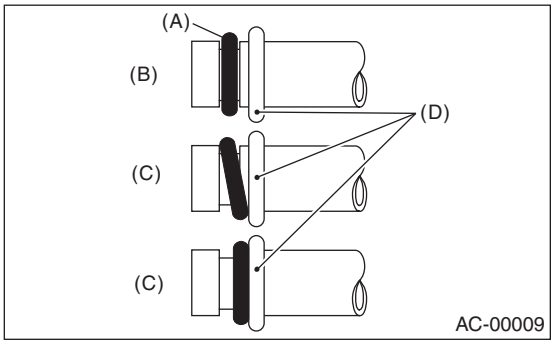
5. O-RING CONNECTIONS

- Use new O-rings.
- In order to keep the O-rings free of lint which will cause a refrigerant gas leak, perform operations without gloves and shop cloths.
- Apply the compressor oil to the O-rings to avoid sticking, then install them.
- Use a torque wrench to tighten the O-ring fittings: Over-tightening will damage the O-ring and tube end distortion.
- If the operation is interrupted before completing a pipe connection, recap the tubes, components, and fittings with a plug or tape to prevent contamination from entering.



(A) Seal

- Visually check the surfaces and mating surfaces of O-rings, threads, and connecting points. If a failure is found, replace the applicable parts.
- Install the O-rings at right angle to the tube beards.

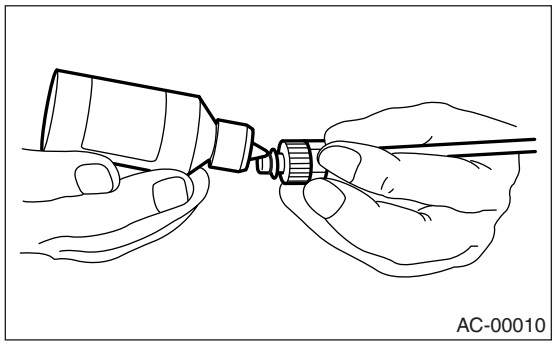


(A) O-ring
(B) OK
(C) NG
(D) Bead

- Use the oil specified in the service manual to lubricate the O-rings.

Apply the oil to the top and sides of the O-rings before installation.

Apply the oil to the area including the O-rings and tube beads.

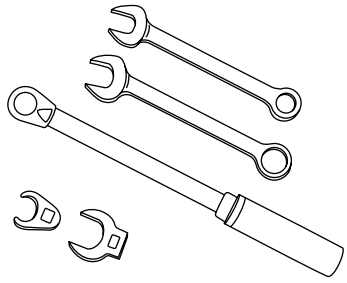
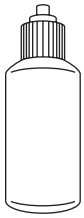
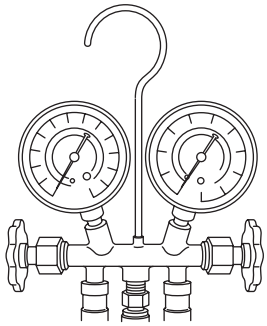
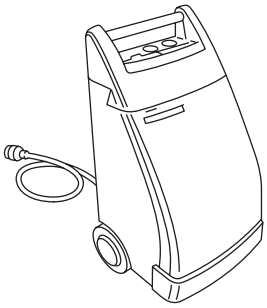


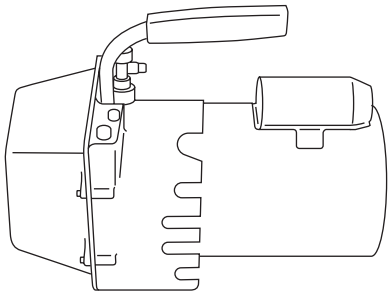
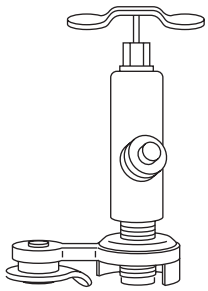
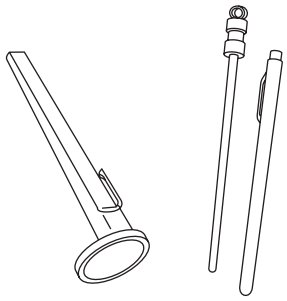
- After tightening, use a clean shop cloth to remove excess oil from the connections and any oil which may have run on the vehicle body or other parts.
- If any leakage is suspected after tightening, do not retighten the connections, Disconnect the connections, remove the O-rings, and check the O-rings, threads, and connections.

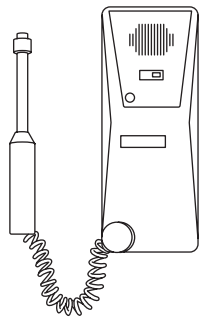
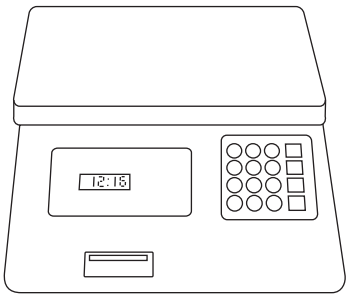
D: PREPARATION TOOL

CAUTION:
When working on vehicles with the HFC-134a system, only use HFC-134a specified tools and parts. Do not mix with CFC-12 tools and parts. If HFC-134a and CFC-12 refrigerant or compressor oil is mixed, poor lubrication will result and the compressor itself may be destroyed.
In order to help prevent mixing HFC-134a and CFC-12 parts and liquid, the tool and screw type and the type of service valves used are different. The gas leak detectors for the HFC-134a and CFC-12 systems must also not be interchanged.

	HFC-134a	CFC-12
Tool & screw type	Millimeter size	Inch size
Valve type	Quick joint type	Screw-in type

Description	Tools and Equipment
 AC-00213	Wrench Various **WRENCHES** will be required to service any A/C system. A 7 to 40 N·m (0.7 to 4.1 kgf-m, 5 to 30 ft-lb) torque wrench with various crow-foot wrenches will be needed. Open end or flare nut wrenches will be needed for back-up on the tube and hose fittings.
 AC-00012	Applicator bottle A small **APPLICATOR BOTTLE** is recommended to apply refrigerant oil to the various parts. They can be obtained at a hardware or drug store.
 AC-00013	Manifold gauge set A **MANIFOLD GAUGE SET** (with hoses) can be obtained from either a commercial refrigeration supply house or from an auto shop equipment supplier.
 AC-00014	Refrigerant recovery system A **REFRIGERANT RECOVERY SYSTEM** is used for the recovery and reuse of A/C system refrigerant after contaminants and moisture have been removed from the refrigerant.

Description	Tools and Equipment
AC-00015	Syringe A graduated plastic **SYRINGE** will be needed to add oil back into the system. The syringe can be found at a pharmacy or drug store.
 AC-00016	Vacuum pump A **VACUUM PUMP** (in good working condition) is necessary, and may be obtained from either a commercial refrigeration supply house or an automotive equipment supplier.
 AC-00017	Can tap A **CAN TAP** for the 397 g (14 oz) can is available from an auto supply store.
 AC-00018	Thermometer Pocket **THERMOMETERS** are available from either industrial hardware store or commercial refrigeration supply houses.

Description	Tools and Equipment
 AC-00019	Electronic leak detector An **ELECTRONIC LEAK DETECTOR** can be obtained from either a specialty tool supply or an A/C equipment supplier.
 AC-00020	Weight scale A **WEIGHT SCALE** such as an electronic charging scale or a bathroom scale with digital display will be needed if a 13.6 kg (30 lb) refrigerant container is used.

2. Refrigerant Pressure with Manifold Gauge Set

A: PROCEDURE

1) Place the vehicle in the shade and windless condition.
2) Connect the manifold gauge set.
3) Open the front windows and close all doors.
4) Open the front hood.
5) Increase the engine to 1,500 rpm.
6) Turn ON the A/C switch.
7) Turn the temperature control switch to MAX COOL.
8) Put in RECIRC position.
9) Turn the blower control switch to HI.
10) Read the gauge.

Standard:
Low pressure: 127 — 196 kPa (1.3 — 2.0 kgf/cm^2, 18 — 28 psi)
High pressure: 1,471 — 1,667 kPa (15 — 17 kgf/cm^2, 213 — 242 psi)
Ambient temperature: 30 — 35°C (86 — 95°F)

B: INSPECTION

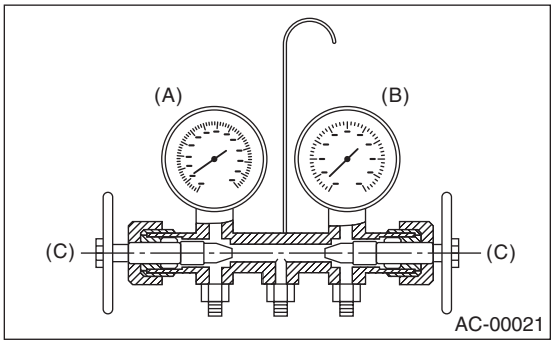
Symptom	Probable cause	Repair order
High-pressure side is unusually high.	• Defective condenser fan motor • Clogged condenser fin • Too much refrigerant • Air inside the system • Defective receiver dryer	• Replace the fan motor. • Clean the condenser fin. • Discharge refrigerant. • Replace the receiver dryer. • After revacuating the receiver dryer, charge appropriate amount of refrigerant.
High-pressure side is unusually low.	• Defective compressor • Not enough refrigerant • Clogged expansion valve • Expansion valve frozen temporarily by moisture	• Replace the compressor. • Check for leaks. • Replace the expansion valve. • Fully evacuate the expansion valve.
Low-pressure side is unusually high.	• Defective compressor • Defective expansion valve • Too much refrigerant	• Replace the compressor. • Replace the expansion valve. • Discharge refrigerant.
Low-pressure side is unusually low.	• Not enough refrigerant • Clogged expansion valve • Expansion valve frozen temporarily by moisture • Saturated receiver dryer	• Check for leaks. • Replace the expansion valve. • Replace the receiver dryer.

3. Refrigerant Recovery Procedure

A: PROCEDURE

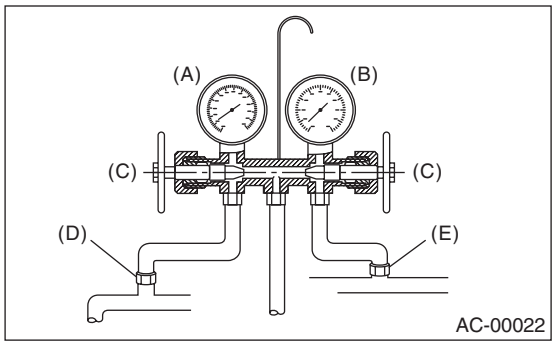
CAUTION:
• During operation, be sure to wear safety goggles and protective gloves.
• Connect the refrigerant recovery system with the manifold gauge set to discharge the refrigerant from the A/C system and reuse it.
• When reusing the discharged refrigerant, keep service cans on hand. Because the discharge rate with the recovery system is approx. 90%, service cans are necessary to charge the refrigerant.
• Follow the detailed operation procedure described in the operation manual attached to the refrigerant recovery system.

1) Perform the compressor oil return operation. <Ref. to AC-26, PROCEDURE, Compressor Oil.>
2) Stop the engine.
3) Make sure the valves on low-/high-pressure sides of manifold gauge set are fully closed.



(A) Low-pressure gauge (Compound pressure gauge)
(B) High-pressure gauge
(C) Close

4) Install the low-/high-pressure hoses to the service ports on the low-/high-pressure sides of the vehicle respectively.



(A) Low-pressure gauge (Compound pressure gauge)
(B) High-pressure gauge
(C) Close
(D) Low-pressure side service port
(E) High-pressure side service port

5) Connect the center hose to the refrigerant recovery system.
6) Follow the operation manual to activate the refrigerant recovery system.

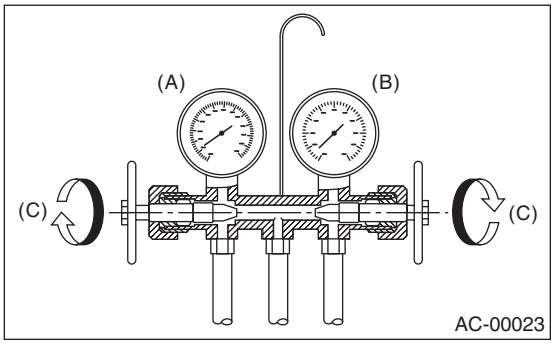
4. Refrigerant Charging Procedure

A: PROCEDURE

CAUTION:
• During operation, be sure to wear safety goggles and protective gloves.
• Before charging the refrigerant, evacuate the system to remove small amounts of moisture remaining in the system.
The moisture in the system can be completely evacuated only under the minimum vacuum level. The minimum vacuum level affects the temperature in the system.
• The list below shows the vacuum values necessary to boil water in various temperature. In addition, the vacuum levels indicated on the gauge are approx. 3.3 kPa (25 mmHg, 0.98 inHg) lower than those measured at 304.8 m (1,000 ft) above sea level.

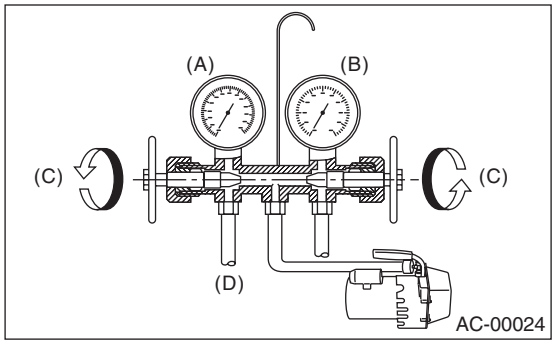
Vacuum level required to boil water (at sea level)	
Temperature	Vacuum
1.7°C (35°F)	100.9 kPa (757 mmHg, 29.8 inHg)
7.2°C (45°F)	100.5 kPa (754 mmHg, 29.7 inHg)
12.8°C (55°F)	99.8 kPa (749 mmHg, 29.5 inHg)
18.3°C (65°F)	99.2 kPa (744 mmHg, 29.3 inHg)
23.9°C (75°F)	98.5 kPa (739 mmHg, 29.1 inHg)
29.4°C (85°F)	97.2 kPa (729 mmHg, 28.7 inHg)
35°C (95°F)	95.8 kPa (719 mmHg, 28.3 inHg)

1) Close the valves on low-/high-pressure sides of the manifold gauge.



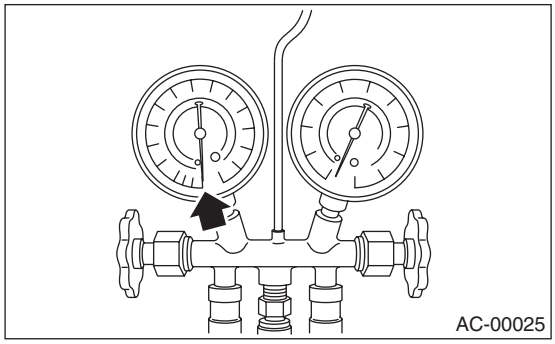
(A) Low-pressure gauge (Compound pressure gauge)
(B) High-pressure gauge
(C) Close

2) Install the low-/high-pressure hoses to the corresponding service ports on the vehicle respectively.
3) Connect the center hose of the manifold gauge set with the vacuum pump.
4) Carefully open the valves on the low-/high-pressure sides to activate the vacuum pump.

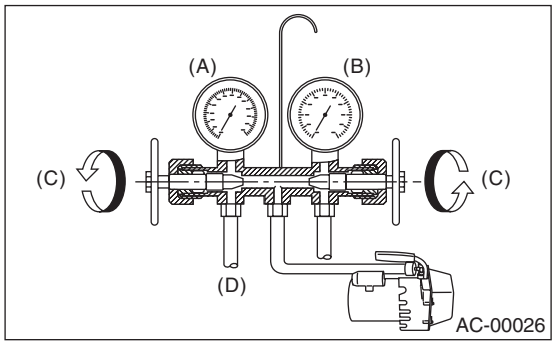


(A) Low-pressure gauge (Compound pressure gauge)
(B) High-pressure gauge
(C) Slowly open
(D) Vacuum pump turn on

5) After the low-pressure gauge reaches 100.0 kPa (750 mmHg, 29.5 inHg) or higher, evacuate the system for approx. 15 minutes (Continue evacuation).

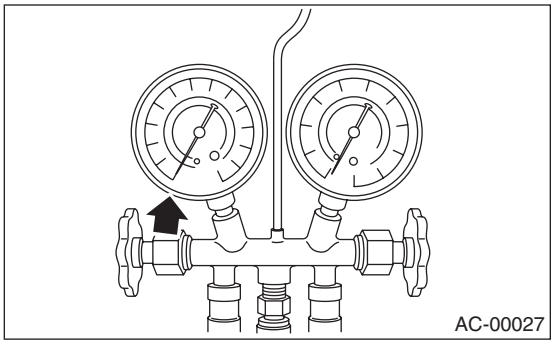


6) After 15 minutes of evacuation, if the reading shows 100.0 kPa (750 mmHg, 29.5 inHg) or higher, close the valves on the both sides to stop the vacuum pump.

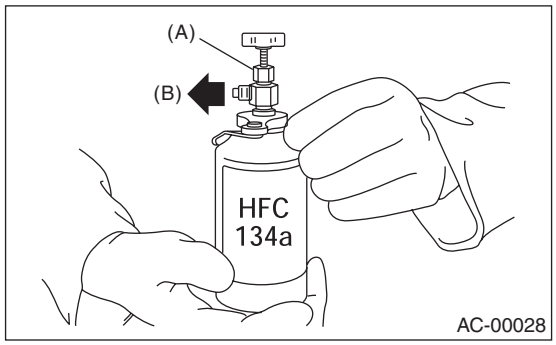


(A) Low-pressure gauge (Compound pressure gauge)
(B) High-pressure gauge
(C) Close
(D) Vacuum pump turn off

7) Note the low-pressure gauge reading.

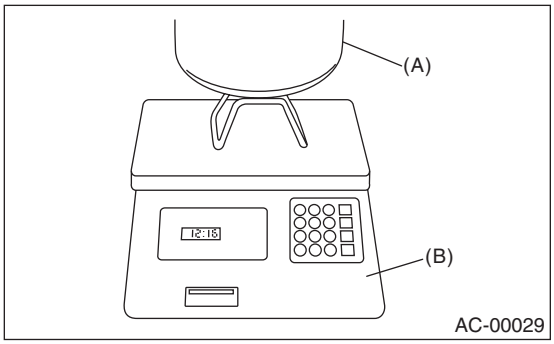


8) Leave it at least 5 minutes, and then check the low-pressure gauge reading for any changes.
When a gauge indicator shows near to zero point, this is a sign of leakage. Check pipe connector points, repair them, make sure there is no leakage by air bleeding.
9) Following the can tap operation manual instructions, install it to the refrigerant can.



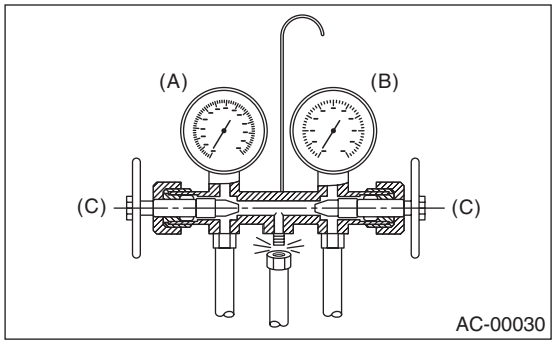
(A) Tap valve
(B) Center manifold hose

10) Disconnect the center manifold hose from the vacuum pump, and connect the hose to the tap valve.
11) When a 13.6 kg (30 lb) refrigerant container is used, measure the refrigerant amount in use using a weighting scale.



(A) Refrigerant container (HFC-134a)
(B) Weight scale

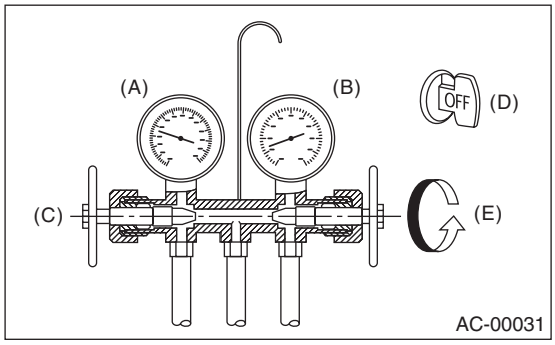
12) Confirm that all the 3 hoses are tightly connected to the manifold gauge set.



(A) Low-pressure gauge (Compound pressure gauge)
(B) High-pressure gauge
(C) Close

13) Open the valve on the HFC-134a source.
14) Loosen the center hose connection on the manifold gauge set (if applicable, press a purge valve on the manifold gauge set) only for a couple of seconds to allow the air in the center hose to escape by the refrigerant.
15) Carefully open the high-pressure valve with the engine stopping.

CAUTION:
Do not open the low-pressure valve.



(A) Low-pressure gauge (Compound pressure gauge)
(B) High-pressure gauge
(C) Close
(D) Ignition switch OFF
(E) Slowly open

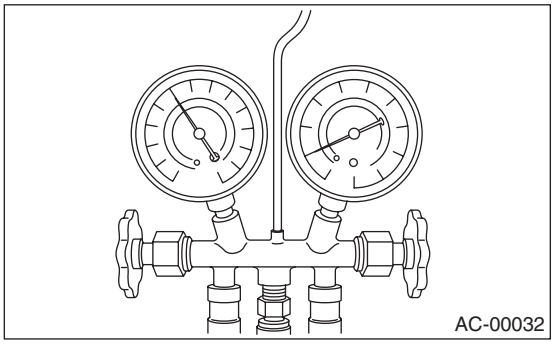
CAUTION:
Never run the engine during charging from the high-pressure side.

16) Close the high-pressure valve when the low-pressure gauge reaches 98 kPa (1 kgf/cm^2, 14 psi).
Using a leak tester, check the system for leaks.
If any leakage is found after the refrigerant recovery is completed, repair the applicable area.

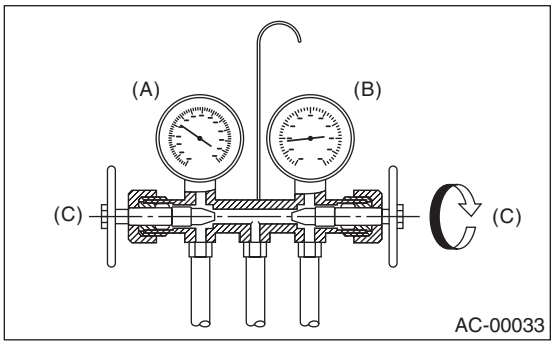
17) After confirming that there are no leaks with the leak test, charge the required amount of refrigerant.

CAUTION:
Never run the engine during charging from the high-pressure side.

18) Close the high-pressure valve when;
• the readings of low-/high-pressure gauges become almost equal, after the charging speed is reduced.
• the HFC-134a source becomes empty, or the system is filled with the gas.



19) If the HFC-134a source is empty, close the high-pressure valve, close the valve on the can tap, and replace the HFC-134a source with a new one to restart the operation.

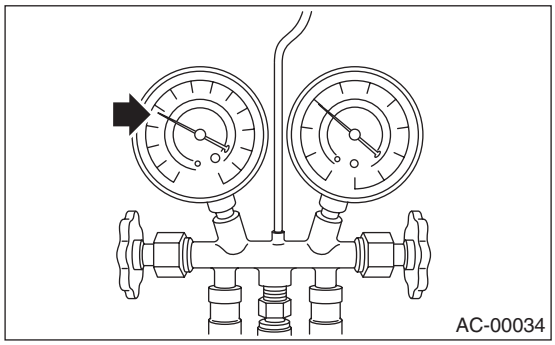


(A) Low-pressure gauge (Compound pressure gauge)
(B) High-pressure gauge
(C) Close

20) Confirm that both the low-/high-pressure valves can be closed. Start the engine with the A/C switch OFF.
21) Quickly repeat ON-OFF cycles a few times to prevent initial compressor damage.
22) Set up the vehicle to the following status:
• A/C switch ON
• Engine running at 1,500 rpm
• Blower speed setting to “HI”
• Temperature setting to “MAX COOL”
• Air inlet setting to “RECIRC”
• Windows open

23) While reading the low-pressure gauge, carefully open the low-pressure valve with the refrigerant source connected and the service hose purged.

CAUTION:
Never open the high-pressure valve with the engine running. Doing so may result in a reflow of high-pressure gas and refrigerant can’s explosion.



24) Adjust the refrigerant flow to maintain the pressure on the low-pressure side at 276 kPa (2.81 kgf/cm^2, 40 psi) max.
25) After the system is fully charged, close the low-pressure valve.
26) Close the valve on the refrigerant source.

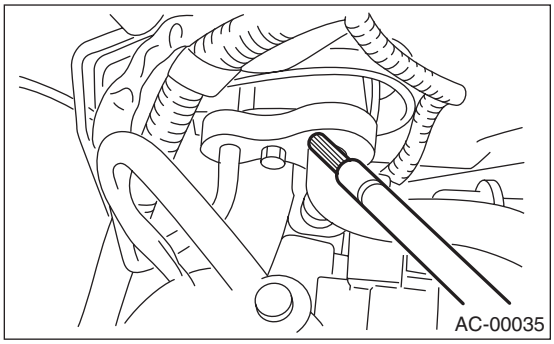
Refrigerant amount		
Refrigerant	Minimum	Maximum
HFC-134a	450 g (0.99 lb)	550 g (1.21 lb)

27) Disconnect the hose from the service port, and install the service port cap.

5. Refrigerant Leak Check

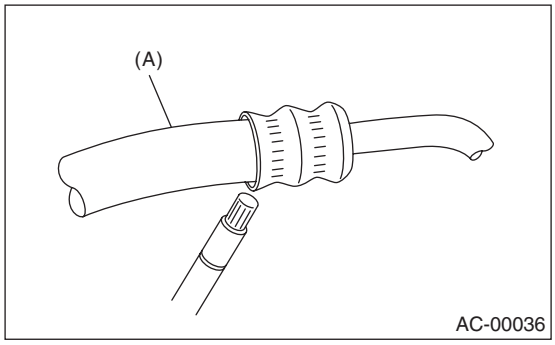
A: INSPECTION

1) Operate the A/C system for approx. 10 minutes, and confirm that the high-pressure side shows at least 690 kPa (7.03 kgf/cm^2, 100 psi). Then stop the engine to start the leak test.
2) Starting from the connection between the high-pressure pipe and evaporator, check the system for leaks along the high-pressure side through the compressor. The following items must be checked thoroughly.
3) Check the joint and seam between the pressure switch (dual pressure switch) and high-pressure pipe.
4) Check the connections between the condenser and pipes, and welded joints on the condenser.
The leak tester may detect the oil on the condenser fins as a leak.
5) Check the joint between the compressor and hoses.
6) Check the machined area of compressor and other joints on the compressor.
7) Check the compressor shaft seal at the area near the center of compressor clutch pulley.
Some shaft seals show a slight amount of leakage about 3 g (0.1 oz) per year. This is not a problem.
8) Starting from the connection between the low-pressure pipe and evaporator, check the system for leakage along the low-pressure side through the compressor. The following items must be checked thoroughly.
- Connection between two parts
- Connection between the pipe and plate


AC-00035

9) Visually check the rubber area of the flexible hose for cracks.
Check the entire length of the flexible hose, especially the connection with the metal hose end.

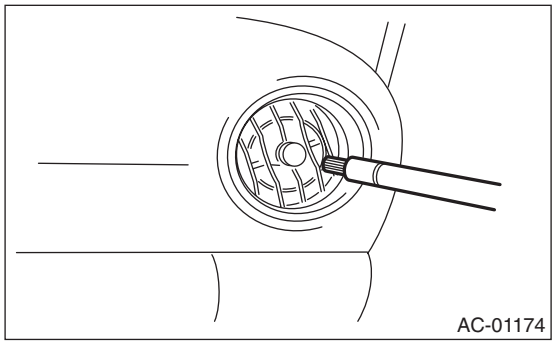
CAUTION:
Carefully check the external surface of hoses and tubes at approx. 25 mm (0.98 in) per second.



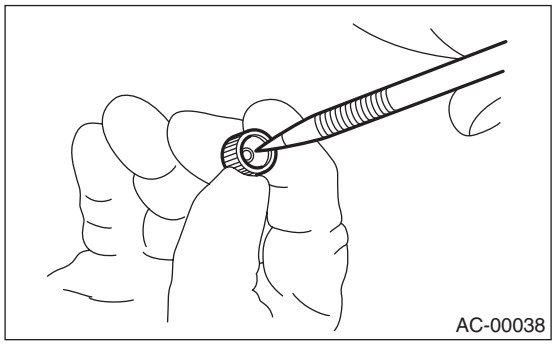
AC-00036

(A) Flexible hose

10) Disconnect the drain hose from the heater case, and check the hose end for at least 10 seconds.
After the test is finished, reconnect the drain hose.
11) Turn the ignition key to ON position, and run the blower at high speed for 1 minute. Stop the blower to check the ventilation grille on the instrument panel. While moving the tester closer to the grille, run the blower for 1 or 2 seconds, then stop it. Check the grille at that point for at least 10 seconds.


AC-01174

12) Check the valve in the service port.
13) Visually check the rubber seal in service port cap.


AC-00038

6. Compressor Oil

A: PROCEDURE

NOTE:
Before making repairs, conduct the oil return operation to return the compressor oil in circulation with the refrigerant to compressor.

1) Increase the engine speed to 1,500 rpm.
2) Turn ON the A/C switch.
3) Turn the temperature control switch to MAX COOL.
4) Put in RECIRC position.
5) Turn the blower control switch to HI.
6) Leave in this condition for 10 minutes.

B: REPLACEMENT

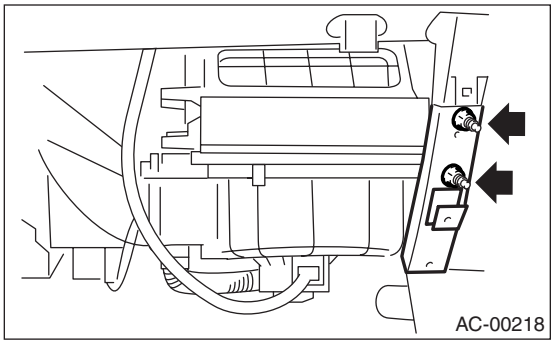
NOTE:
• If a component is replaced, add an appropriate amount of compressor oil.
• When replacing the compressor, the new compressor will already have the specified amount of oil in it. Install the new compressor after removing the same amount of oil that is remaining in the compressor removed.

Replacement parts	Amount of oil replenishment
Evaporator	114 m ℓ (3.9 US fl oz, 4.0 Imp fl oz)
Condenser	7 m ℓ (0.24 US fl oz, 0.25 Imp fl oz)
Hose	1 m ℓ (0.03 US fl oz, 0.04 Imp fl oz)

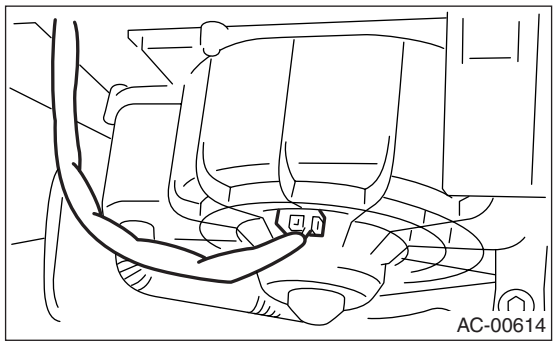
7. Blower Motor Unit Assembly

A: REMOVAL

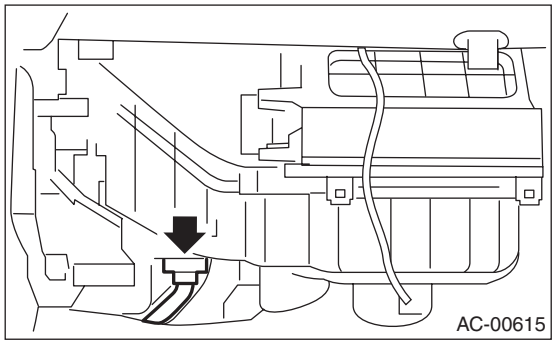
1) Disconnect the ground cable from battery.
2) Remove the glove box. <Ref. to EI-42, REMOVAL, Glove Box.>
3) Loosen the nut to remove the support beam stay.


AC-00218

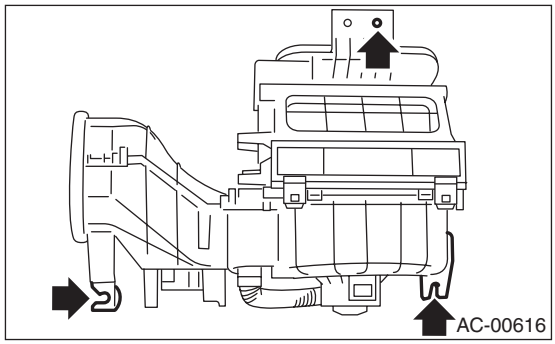
4) Disconnect the blower motor connector.


AC-00614

5) Disconnect the power transistor or blower resistor connector.


AC-00615

6) Loosen the bolt and nut to remove the blower motor unit assembly.


AC-00616

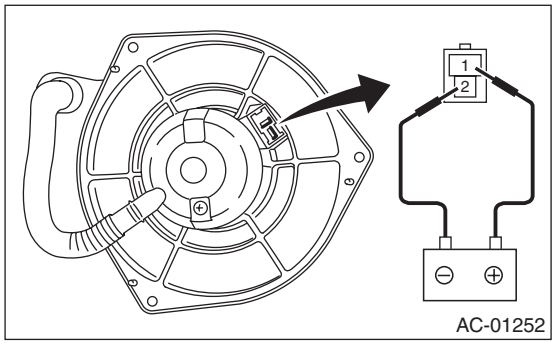
B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
Refer to COMPONENT in General Description. <Ref. to AC-5, HEATER COOLING UNIT, COMPONENT, General Description.> and <Ref. to AC-7, BLOWER MOTOR UNIT, COMPONENT, General Description.>

C: INSPECTION

Connect the motor connector terminal 1 from the battery to the positive (+) lead and terminal 2 to the negative (–) lead. Make sure the motor runs smoothly.

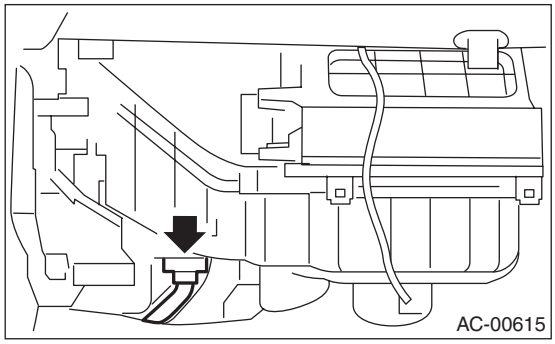


AC-01252

8. Power Transistor (Auto A/C Model)

A: REMOVAL

1) Remove the glove box. <Ref. to EI-42, REMOVAL, Glove Box.>
2) Disconnect the power transistor connector.
3) Loosen the two screws to remove the power transistor.



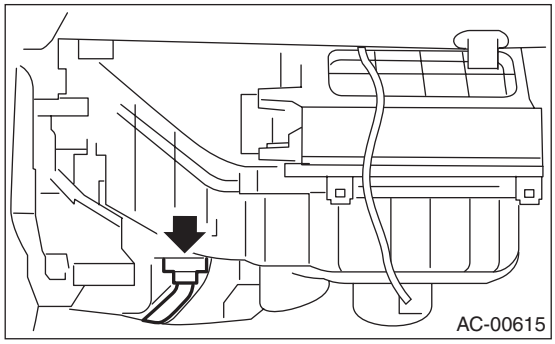
B: INSTALLATION

Install in the reverse order of removal.

9. Blower Resistor (Without A/C Model and Manual A/C Model)

A: REMOVAL

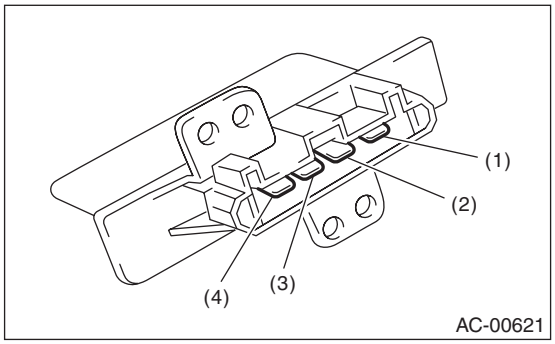
1) Remove the glove box. <Ref. to EI-42, REMOVAL, Glove Box.>
2) Disconnect the blower resistor connector.
3) Loosen the two screws to remove the blower resistor.



B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION



Measure the blower resistor resistance.

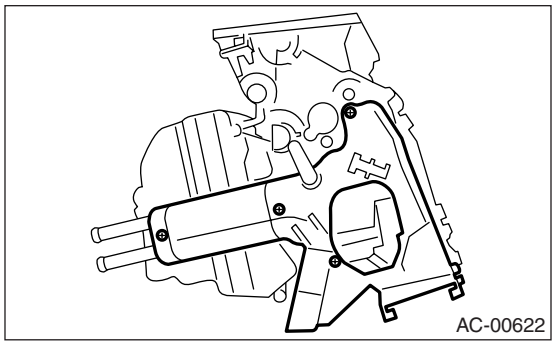
Terminal No.	Standard
3 and 1	Approx. 0.51 Ω
3 and 2	Approx. 2.70 Ω
3 and 4	Approx. 1.43 Ω

If NG, replace the blower resistor.

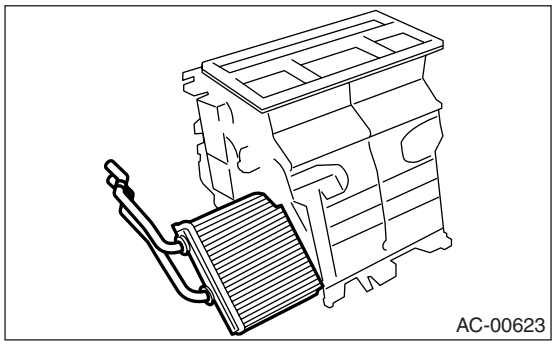
10.Heater Core

A: REMOVAL

1) Remove the heater and cooling unit. <Ref. to AC-36, REMOVAL, Heater and Cooling Unit.>
2) Loosen the screws to remove the heater core cover.



3) Remove the heater core.



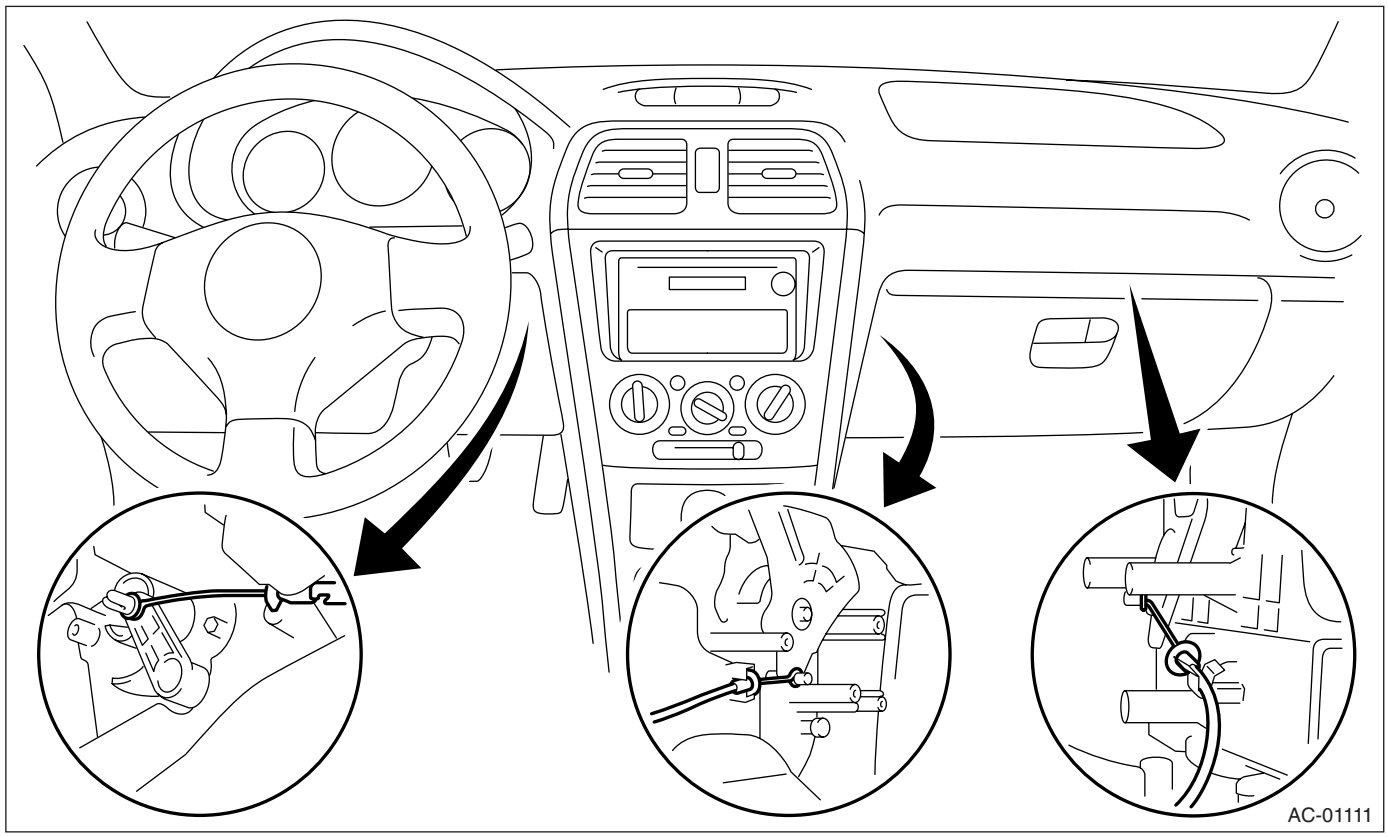
B: INSTALLATION

Install in the reverse order of removal.

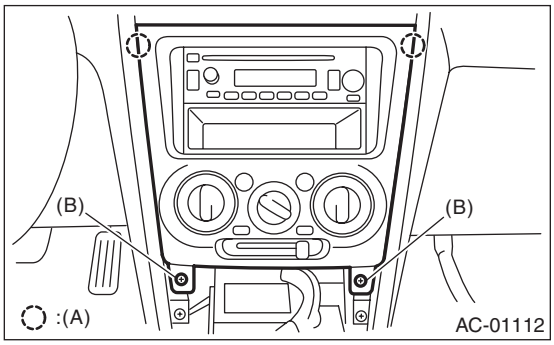
11.Control Unit (Manual A/C Model)

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the glove box. <Ref. to EI-42, REMOVAL, Glove Box.>
3) Remove the lower panel. <Ref. to EI-46, Instrument Panel Assembly.>
4) Remove the control wires.

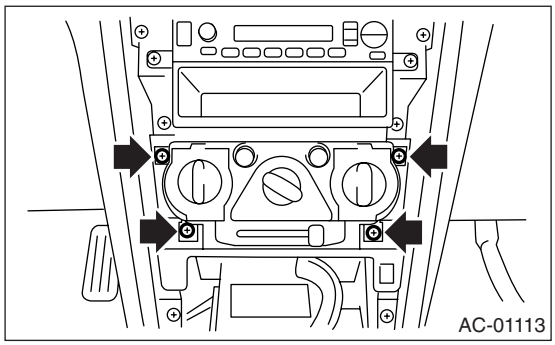


5) Remove the console front panel.
6) Remove the center console panel.



(A) Clip
(B) Screw

7) Remove four screws.



8) Pull out the control unit and disconnect connectors.

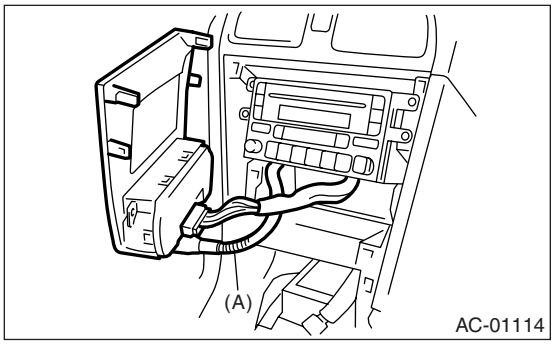
B: INSTALLATION

Install in the reverse order of removal.

12.Control Unit (Auto A/C Model)

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the console front panel.
3) Remove the center console panel.
4) Disconnect the connector and aspirator hose (A).



B: INSTALLATION

Install in the reverse order of removal.

13.Compressor

A: INSPECTION

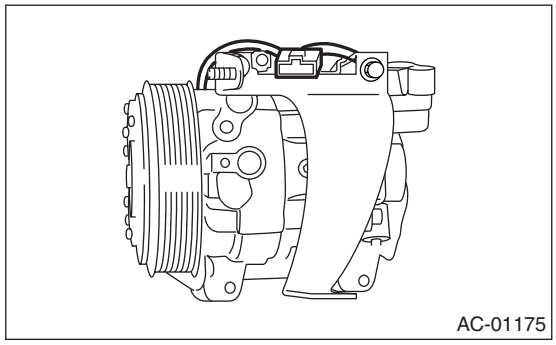
1. MAGNETIC CLUTCH CLEARANCE

Check the clearance of the entire circumference around the drive plate and pulley.

Standard:
0.45±0.15 mm (0.0177±0.0059 in)

2. MAGNETIC CLUTCH OPERATION

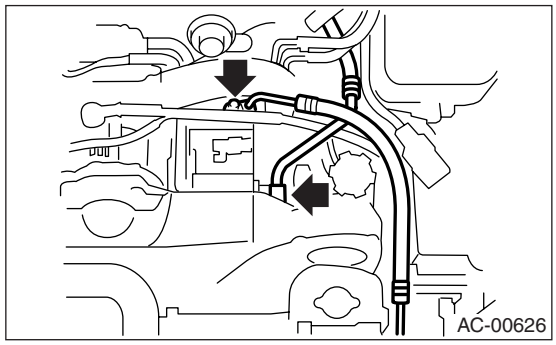
1) Disconnect the compressor connector.
2) Connect the battery positive (+) terminal to the terminal of compressor connector.


AC-01175

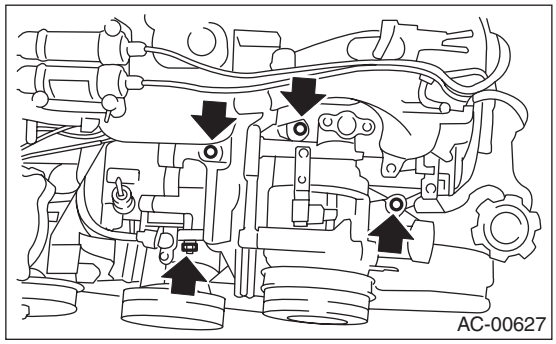
3) Make sure the magnet clutch engages.
If NG, replace the compressor.

B: REMOVAL

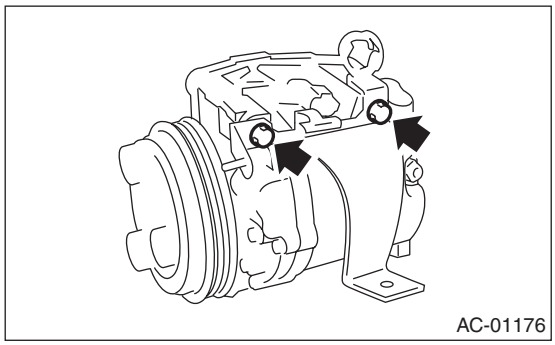
1) Perform the compressor oil return operation. <Ref. to AC-26, PROCEDURE, Compressor Oil.>
2) Turn the A/C switch OFF and stop the engine.
3) Using the refrigerant recovery system, discharge refrigerant. <Ref. to AC-21, PROCEDURE, Refrigerant Recovery Procedure.>
4) Disconnect the ground cable from battery.
5) Remove the V-belt. <Ref. to ME(H4SO)-41, REMOVAL, V-belt.> or <Ref. to ME(H4DOTC)-53, REMOVAL, V-belt.>
6) Remove the generator. <Ref. to SC(H4SO)-14, REMOVAL, Generator.>
7) Remove the low-pressure hose and high-pressure hose.


AC-00626

8) Disconnect the compressor harness from body harness.
9) Loosen the bolts to remove the compressor bracket.


AC-00627

10) Remove the bolts, and then separate the compressor and bracket.


AC-01176

C: INSTALLATION

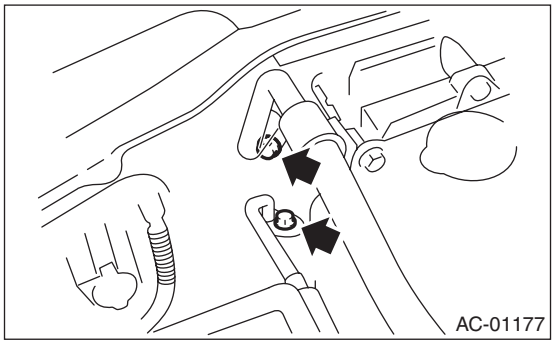
1) Install in the reverse order of removal.
2) Replace the O-rings on low-/high-pressure hoses with new ones, then apply compressor oil.
3) When replacing compressor, adjust amount of compressor oil. <Ref. to AC-26, PROCEDURE, Compressor Oil.>
4) Charge refrigerant. <Ref. to AC-22, PROCEDURE, Refrigerant Charging Procedure.>

Tightening torque:
Refer to COMPONENT in General Description. <Ref. to AC-11, AIR CONDITIONING UNIT, COMPONENT, General Description.> and <Ref. to AC-13, COMPRESSOR, COMPONENT, General Description.>

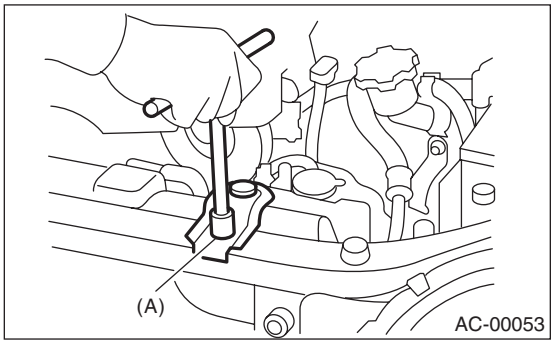
14.Condenser

A: REMOVAL

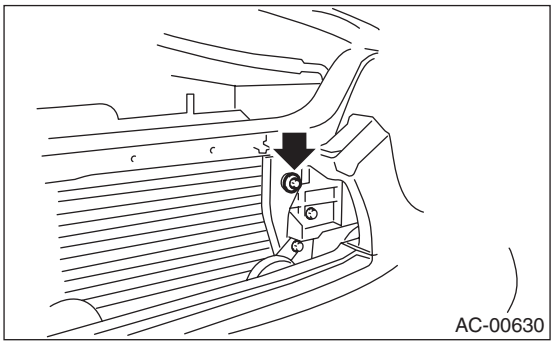
1) Using the refrigerant recovery system, discharge refrigerant. <Ref. to AC-21, PROCEDURE, Refrigerant Recovery Procedure.>
2) Disconnect the ground cable from battery.
3) Disconnect the pressure hose and pipe from condenser.



4) Remove the radiator bracket (A).



5) Remove the two bolts. While lifting the condenser, pull it out through the space between radiator and radiator panel.

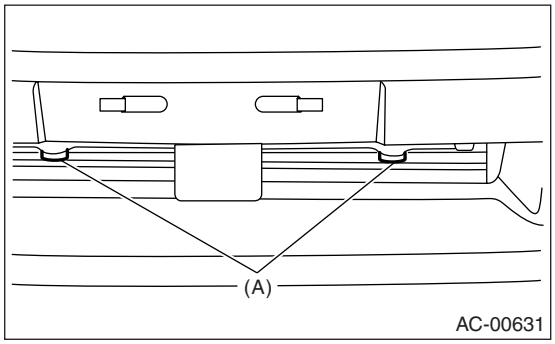


CAUTION:
• Be careful not to damage the condenser fins. If a damaged fin is found, repair it using a thin screwdriver.
• If the condenser is replaced, add appropriate amount of compressor oil to the compressor. <Ref. to AC-26, REPLACEMENT, Compressor Oil.>

B: INSTALLATION

1) Install in the reverse order of removal.

CAUTION:
Replace the O-rings on hoses or pipes with new ones, and then apply compressor oil. Confirm that lower guide of condenser (A) has been fitted into holes on radiator panel.



2) Charge refrigerant. <Ref. to AC-22, PROCEDURE, Refrigerant Charging Procedure.>

Tightening torque:
Refer to COMPONENT in General Description. <Ref. to AC-11, AIR CONDITIONING UNIT, COMPONENT, General Description.> and <Ref. to CO(H4SO)-6, RADIATOR AND RADIATOR FAN, COMPONENT, General Description.>

C: INSPECTION

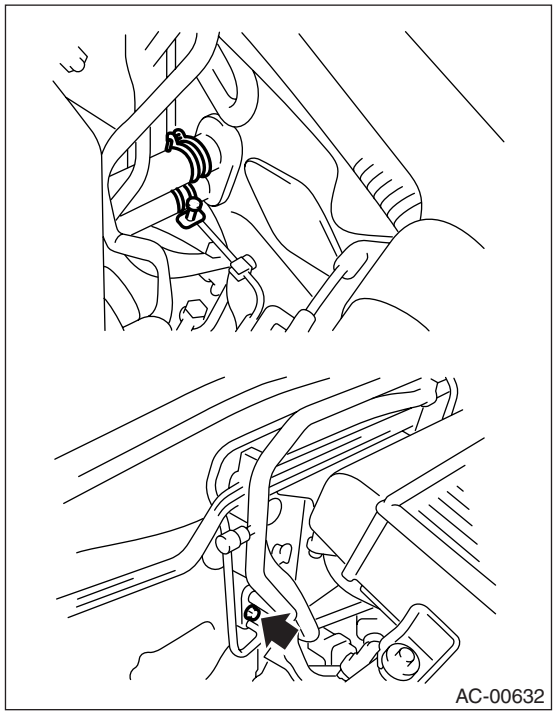
1) Confirm that no dust or insects are found on the condenser fins. Air-blow or flush fins with water as needed.
2) Confirm that no oil leaks from condenser. If a failure is found, replace the condenser with a new one.

15.Heater and Cooling Unit

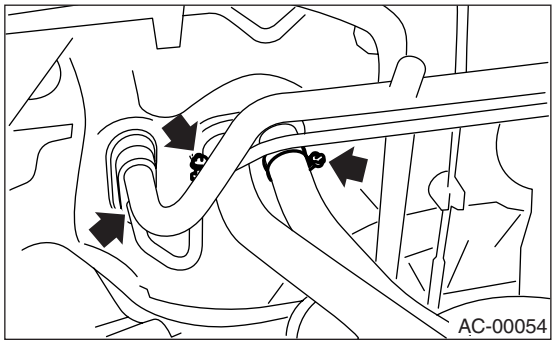
A: REMOVAL

1) Disconnect the ground cable from battery.
2) Using the refrigerant recovery system, discharge refrigerant. <Ref. to AC-21, PROCEDURE, Refrigerant Recovery Procedure.>
3) Drain engine coolant from the radiator.
4) Remove the bolt securing expansion valve and pipe in engine compartment. Release the heater hose clamps in engine compartment to remove the hoses.

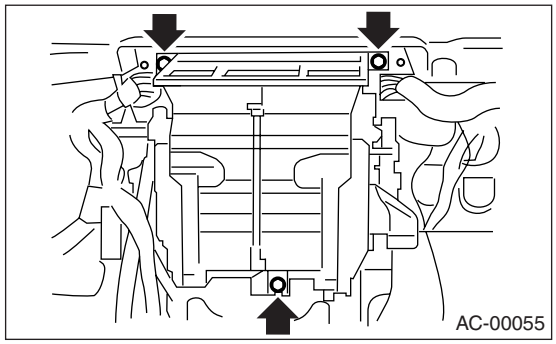
- LHD MODEL



- RHD MODEL



5) Remove the instrument panel. <Ref. to EI-46, REMOVAL, Instrument Panel Assembly.>
6) Remove the support beam.
7) Remove the blower motor unit assembly. <Ref. to AC-27, REMOVAL, Blower Motor Unit Assembly.>
8) Disconnect the servo motor connectors.
9) Loosen the bolt and nuts to remove the heater and cooling unit.



B: INSTALLATION

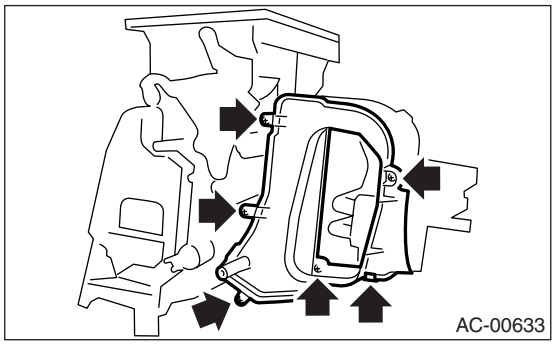
1) Install in the reverse order of removal.
2) Charge refrigerant. <Ref. to AC-22, PROCEDURE, Refrigerant Charging Procedure.>

Tightening torque:
Refer to COMPONENT in General Description. <Ref. to AC-5, HEATER COOLING UNIT, COMPONENT, General Description.>

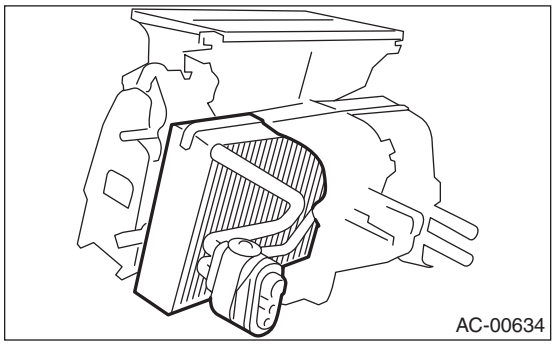
16.Evaporator

A: REMOVAL

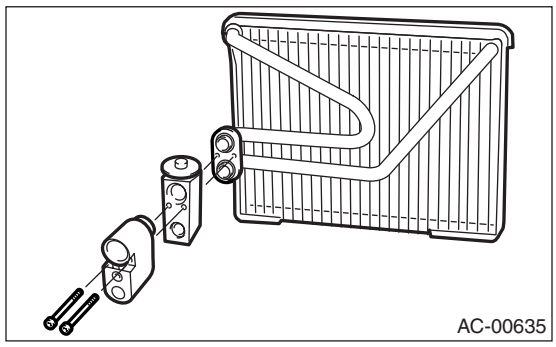
1) Remove the heater and cooling unit. <Ref. to AC-36, REMOVAL, Heater and Cooling Unit.>
2) Loosen the screws and clip to remove the evaporator cover.



3) Remove the evaporator.



4) Loosen the two bolts to remove the expansion valve.



CAUTION:
If the evaporator is replaced, add appropriate amount of compressor oil to evaporator. <Ref. to AC-26, REPLACEMENT, Compressor Oil.>

B: INSTALLATION

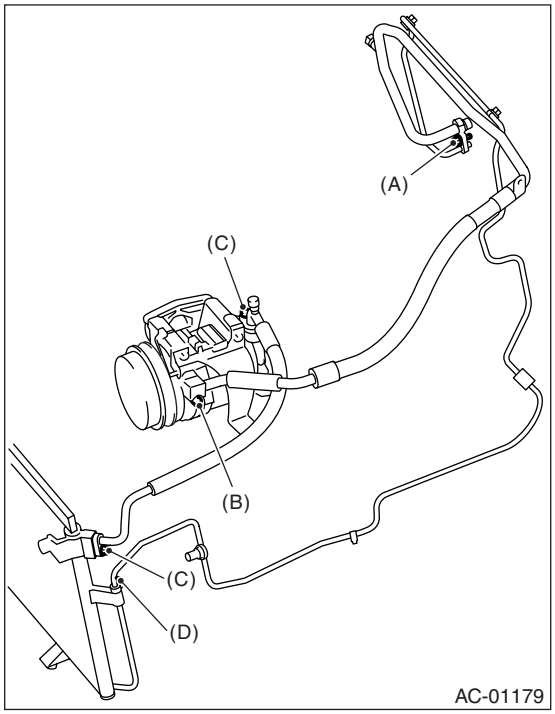
Install in the reverse order of removal.

17.Hose and Tube

A: REMOVAL

CAUTION:
• When disconnecting/connecting hoses, do not apply excessive force to them. Confirm that no torsion and excessive tension exists after installing.
• Seal the disconnected hose with a plug or vinyl tape to prevent contamination from entering.

1) Disconnect the ground cable from battery.
2) Using the refrigerant recovery system, discharge refrigerant. <Ref. to AC-21, PROCEDURE, Refrigerant Recovery Procedure.>
3) Remove the evaporator unit mounting bolt (A).
4) Remove the low-pressure hose attaching bolts (B).
5) Disconnect the low-pressure hose from evaporator unit.
6) Disconnect the low-pressure hose from compressor.
7) Remove the low-pressure hose from vehicle.
8) Remove the high-pressure hose attaching bolts (C).
9) Disconnect the high-pressure hose from compressor.
10) Disconnect the high-pressure hose from condenser.
11) Remove the high-pressure hose from vehicle.
12) Remove the high-pressure tube attaching bolt (D).
13) Remove the high-pressure tube from vehicle.



B: INSTALLATION

CAUTION:
• When disconnecting/connecting hoses, do not apply an excessive force to them. Confirm that no torsion and excessive tension exists after installing.
• Seal the disconnected hose with a plug or vinyl tape to prevent contamination from entering.

1) Install in the reverse order of removal.
2) Charge refrigerant. <Ref. to AC-22, PROCEDURE, Refrigerant Charging Procedure.>

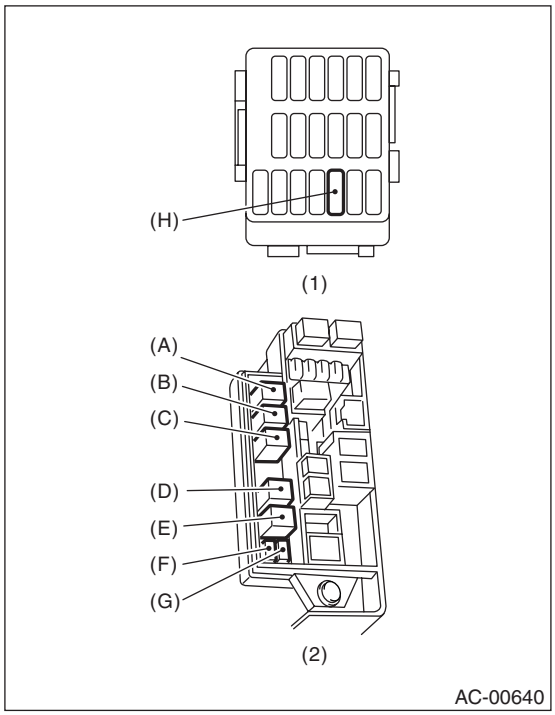
Tightening torque:
Refer to COMPONENT in General Description. <Ref. to AC-11, AIR CONDITIONING UNIT, COMPONENT, General Description.>

C: INSPECTION

NOTE:
If cracking, damage, or swelling is found on a hose, replace it with a new one.

18.Relay and Fuse

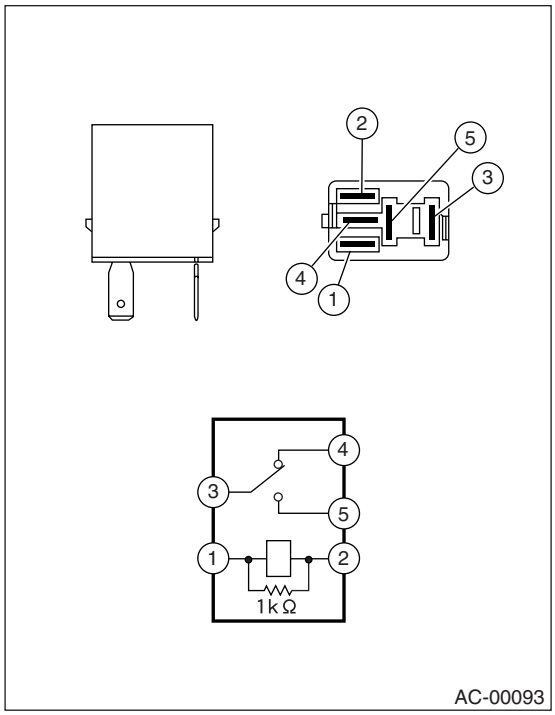
A: LOCATION



(1) Joint box
(2) Main fuse box

Main Fan Relay 1	A
Main Fan Relay 2	B
Sub Fan Relay 1	C
Sub Fan Relay 2	E
A/C Relay	D
Main Fan Fuse	F
Sub Fan Fuse	G
A/C Fuse	H

B: INSPECTION



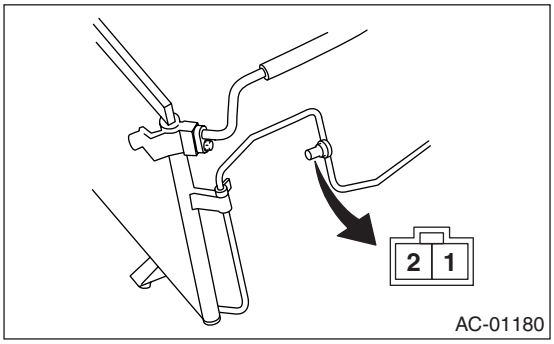
(1) — (2): Continuity exists.
(3) — (4): Continuity exists.
(3) — (5): No continuity

While applying battery voltage to the terminal between (1) and (2), check continuity between (3) and (5).
If no continuity exists, replace the relay with a new one.

19.Pressure Switch (Dual Switch)

A: INSPECTION

1) Connect the manifold gauge to the service valve on high-pressure side.
2) Remove the pressure switch harness connector. Using a circuit tester, inspect the ON-OFF operation of pressure switch.

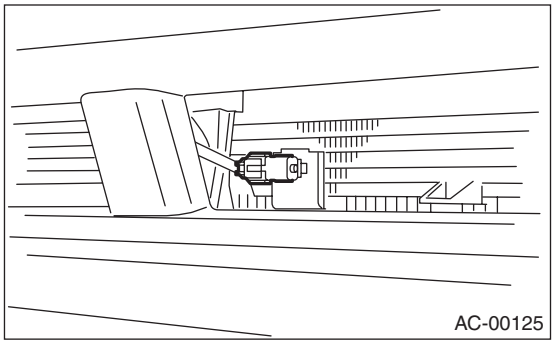


	Terminal No.	Operation	Standard kPa (kgf/cm^2, psi)
High and low pressure switch	1 and 2	Turns OFF.	Increasing to 2,800±100 (29±1, 406±15)
			Decreasing to 278±29 (2.83±0.3, 40.3±4.2)
		Turns ON.	Increasing to $287^{+39}/_{-25}$ ($2.9^{+0.4}/_{-0.25}$, $42^{+57}/_{-3.6}$)
			Decreasing to 2,200±200 (22.4±2, 319±29)

20. Ambient Sensor (Auto A/C Model)

A: REMOVAL

1) Open the front hood.
2) Disconnect the ground cable from battery.
3) Disconnect the ambient sensor connector.
4) Remove the ambient sensor from radiator lower panel.



B: INSTALLATION

Install in the reverse order of removal.

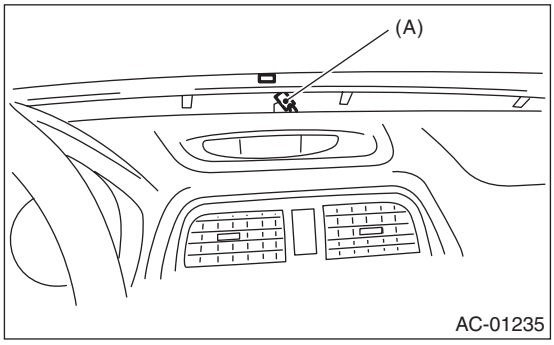
C: INSPECTION

<Ref. to AC(diag)-29, AMBIENT SENSOR, Diagnostic Procedure for Sensors.>

21.Sunload Sensor (Auto A/C Model)

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the front defroster grille.
3) Disconnect the sunload sensor connector (A).



CAUTION:
Be careful not to damage the sensors and interior trims when removing them.

B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

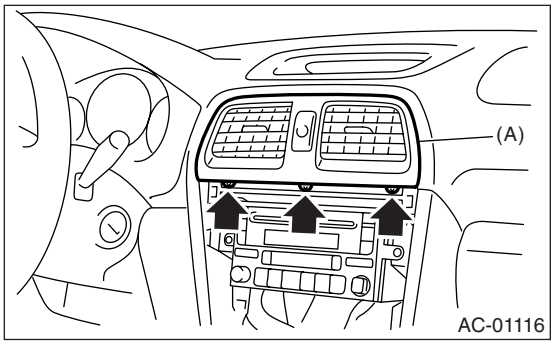
<Ref. to AC(diag)-33, SUNLOAD SENSOR, Diagnostic Procedure for Sensors.>

22.Air Vent Grille

A: REMOVAL

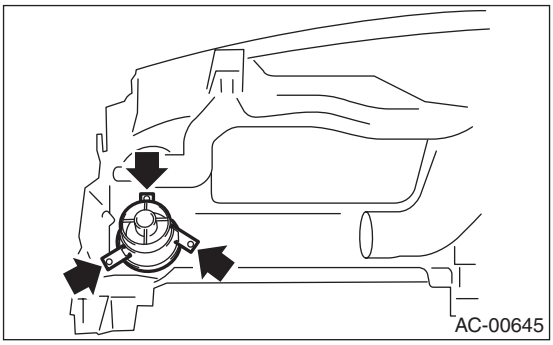
1. CENTER GRILLE

1) Disconnect the ground cable from battery.
2) Remove the console front panel.
3) Remove the center console panel.
4) Loosen the three screws to remove the center air vent grille (A).



2. SIDE GRILLE

1) Disconnect the ground cable from battery.
2) Remove the heater vent duct. <Ref. to AC-45, REMOVAL, Heater Vent Duct.>
3) Loosen the screws to remove the side air vent grille.



B: INSTALLATION

Install in the reverse order of removal.

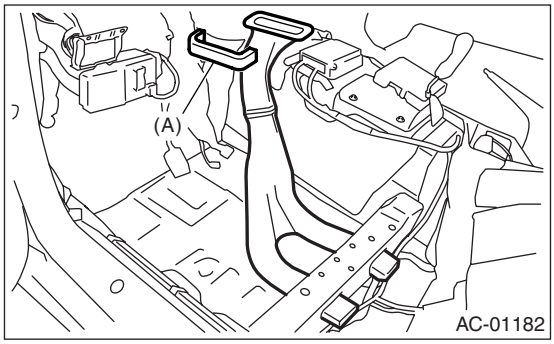
C: INSPECTION

The direction and amount of air should be adjusted smoothly.
The adjustment should be kept in each position.

23.Heater Duct

A: REMOVAL

1) Remove the front seats. <Ref. to SE-6, REMOVAL, Front Seat.>
2) Remove the console box. <Ref. to EI-45, Console Box.>
3) Remove the side sill front cover, side sill rear cover and center pillar lower trim. <Ref. to EI-50, REMOVAL, Lower Inner Trim.>
4) Remove the foot rest.
5) Remove the clips from floor mat.
6) Remove the mat hook.
7) Remove the mat from toe board area.
8) Remove the rear heater duct cover (A). Draw out the rear heater duct from the unit assembly and slide it forward to remove.



B: INSTALLATION

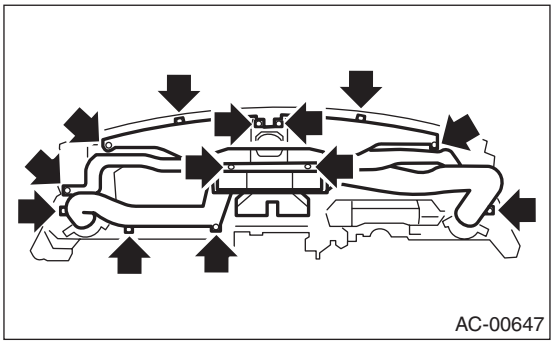
Install in the reverse order of removal.

NOTE:
- Secure the mat firmly with hook and Velcro tape.
- Insert the mat edge firmly into the groove of side sill cover.

24.Heater Vent Duct

A: REMOVAL

1) Remove the instrument panel. <Ref. to EI-46, REMOVAL, Instrument Panel Assembly.>
2) Remove the screws.
3) Remove the heater vent duct.



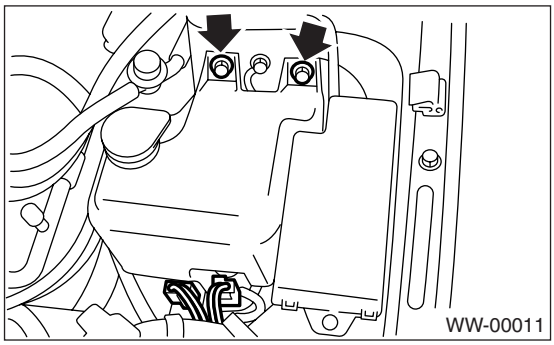
B: INSTALLATION

Install in the reverse order of removal.

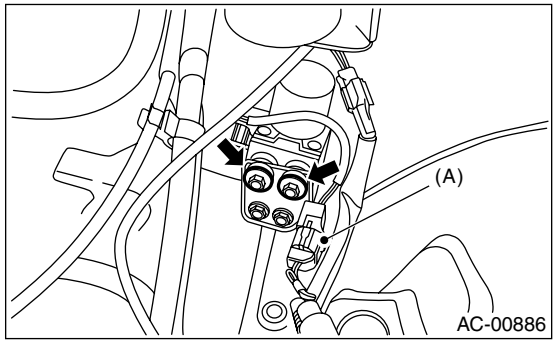
25.Heater Cock Solenoid Valve

A: REMOVAL

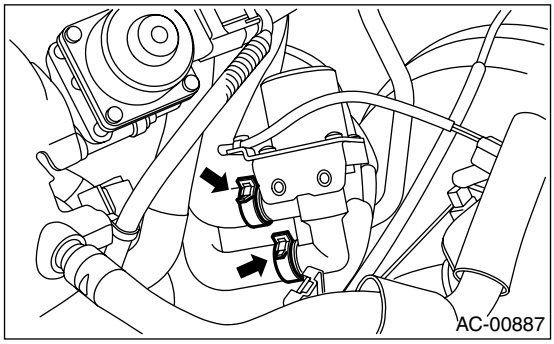
1) Drain the engine coolant.
<Ref. to CO(H4SO)-15, DRAINING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>
2) Remove the battery.
3) Remove the two bolts and disconnect harness connector, and move the washer tank forward.



4) Disconnect the harness connector (A) of the heater cock solenoid valve.
5) Remove the two bolts to remove the heater cock solenoid from the bracket.



6) Pull out the heater cock solenoid. Loosen the hose clamp and disconnect the two heater hoses.

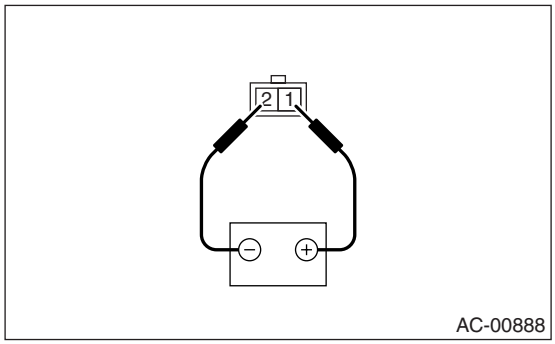


B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

1) Remove the heater cock solenoid valve. <Ref. to AC-46, REMOVAL, Heater Cock Solenoid Valve.>
2) Connect the positive terminal of battery to No. 1 terminal of heater cock solenoid valve, and the ground terminal to No. 2 terminal. Check that the heater cock solenoid valve opens and closes normally.



If any failure is found, replace the heater cock solenoid valve.

26.General Diagnostic Table

A: INSPECTION

Symptom		Repair order
Blower motor	Doesn't move.	Fuse
		Blower motor relay
		Blower motor
		Blower motor resistor
		Blower switch
		Wire harness
	Strange noise.	Blower motor
Compressor	Doesn't move.	Refrigerant
		Fuse
		Air conditioning relay
		Magnet clutch
		Compressor
		Pressure switch
		A/C switch
		Blower switch
		Wire harness
	Noise	V-Belt
		Magnet clutch
		Compressor
Cold air not emitted.		Refrigerant
		V-Belt
		Magnet clutch
		Compressor
		Pressure switch
		A/C switch
		Blower switch
		Wire harness
		Heater duct
		Heater vent duct
Warm air not emitted.		Engine coolant
		Blower switch
		Heater core
Temperature of air from vents does not change.		Engine coolant
		Air mix actuator (Auto A/C)
		Wire harness (Auto A/C)
		Temperature control cable (Manual A/C)
Unable to switch blow vents.		Mode actuator (Auto A/C)
		Air flow switch (Auto A/C)
		Wire harness (Auto A/C)
		Mode cable (Manual A/C)
Unable to switch suction vents.		Air inlet select switch (Auto A/C)
		FRESH/RECIRC actuator (Auto A/C)
		Wire harness (Auto A/C)
		Intake cable (Manual A/C)

HVAC SYSTEM (AUTO A/C) (DIAGNOSTICS)

AC(diag)

Page

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2. General Description 3
3. Electrical Component Location 5
4. Auto A/C Control Module I/O Signal....7
5. Diagnostic Chart for Self-Diagnosis 9
6. Diagnostics for A/C System Malfunction 12
7. Diagnostic Procedure for Actuators 23
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9. Diagnostics with Phenomenon....35

1. Basic Diagnostic Procedure

A: PROCEDURE

	Step	Check	Yes	No
1	**START INSPECTIONS.** 1) Perform the pre-inspection. <Ref. to AC(diag)-3, INSPECTION, General Description.> 2) Perform the self-diagnosis. <Ref. to AC(diag)-9, OPERATION, Diagnostic Chart for Self-Diagnosis.>	Does the self-diagnosis operate?	Go to step **2.**	<Ref. to AC(diag)-12, A/C OR SELF-DIAGNOSIS SYSTEMS DO NOT OPERATE, Diagnostics for A/C System Malfunction.>
2	**CONFIRM MALFUNCTION PART.** Confirm the malfunction part with self-diagnosis.	Can the malfunction part be confirmed?	Repair the malfunction part according to each diagnostics chart.	Go to step **3.**
3	**CHECK COMPARTMENT TEMPERATURE.** 1) Turn the A/C switch ON. 2) Set the temperature at maximum cold position. 3) Check the compartment temperature changes.	Is the compartment temperature changed?	Go to step **4.**	<Ref. to AC(diag)-16, COMPARTMENT TEMPERATURE DOES NOT CHANGE, OR A/C SYSTEM DOES NOT RESPOND PROMPTLY., Diagnostics for A/C System Malfunction.>
4	**CHECK A/C SYSTEM RESPONSE.** Change the temperature setting, and check the response of A/C system.	Does the A/C system respond quickly?	A/C system is OK.	<Ref. to AC(diag)-16, COMPARTMENT TEMPERATURE DOES NOT CHANGE, OR A/C SYSTEM DOES NOT RESPOND PROMPTLY., Diagnostics for A/C System Malfunction.>

2. General Description

A: CAUTION

1) Never connect the battery in reverse polarity.
• The Auto A/C control module will be destroyed instantly.
2) Do not disconnect the battery cables while the engine is running.
• A large counter electromotive force will be generated in the alternator, and this voltage may damage electronic parts such as A/C control module.
3) Before disconnecting the connectors of each sensor and the A/C control module, be sure to turn off the ignition switch.
• Otherwise, the Auto A/C control module may be damaged.
4) Every Auto A/C-related part is a precision part. Do not drop them.
5) Airbag system wiring harness is routed near the A/C control panel (A/C control module) and junction box.

CAUTION:
• All airbag system wiring harness and connectors are colored yellow. Do not use electrical test equipment on these circuits.
• Be careful not to damage the airbag system wiring harness when servicing the A/C control panel (A/C control module) and junction box.

B: INSPECTION

Before performing diagnosis, check the following items which might affect A/C system problems.

1. BATTERY

1) Measure the battery voltage and specific gravity of electrolyte.

Standard voltage: 12 V

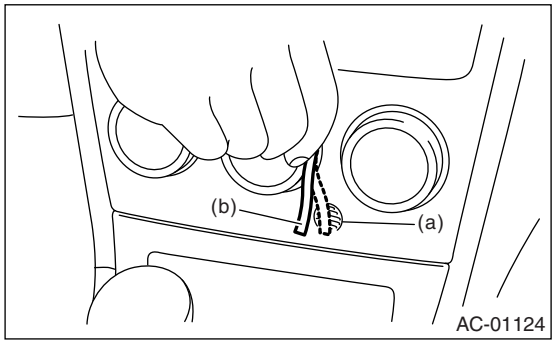
Specific gravity: Above 1.260

2) Check the condition of the fuses for A/C system power supply and other fuses.
3) Check the condition of the harnesses and harness connectors connection.

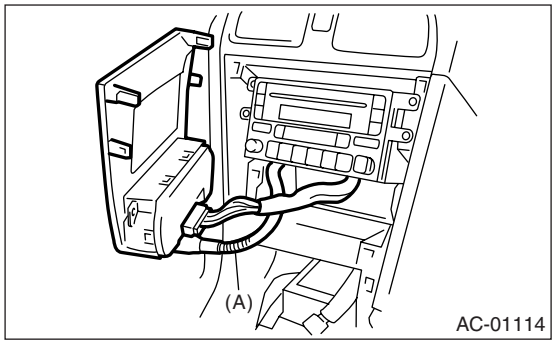
2. ASPIRATOR HOSE

1) Turn the ignition switch to ON and push the A/C switch.
2) Turn the temperature control dial to maximum hot position.
3) Turn the air flow control dial to “DEF” position.
4) Turn the fan speed control dial to 4th position.
5) Firmly hold a thin paper (b) in front of the in-vehicle sensor suction port (a) for the auto A/C control module and check that the paper moves towards the port indicating that air is being sucked into the port.

NOTE:
Ensure the paper does not get sucked into the port.

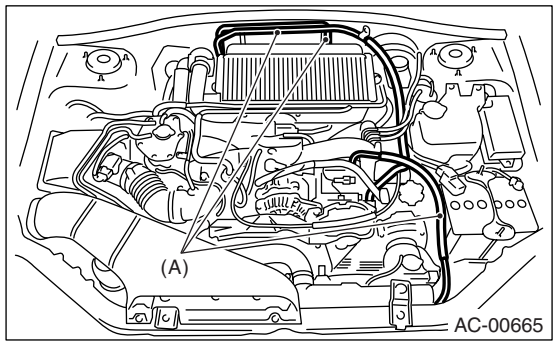


6) If the paper does not move at all, remove the auto A/C control module <Ref. to AC-32, REMOVAL, Control Unit (Auto A/C Model).> and check for improper connection of the aspirator hose (A), auto A/C control unit and heater unit, and secure as necessary.



3. REFRIGERANT LINE

Check the connection for refrigerant line (A) and high-pressure pipe.



4. CONTROL LINKAGE

1) Check the state of mode door linkage.
2) Check the state of air mix door linkage.
3) Check the state of intake door linkage.

5. CONTROL SWITCHES

Start and warm up the engine completely.
1) Inspection using switches.

No.	Item to be checked	Switch position	Judgment standard
1	Air flow control dial	Turn the dial to the right.	Outlet opening (mode) switches AUTO → VENT → BILEVEL → HEAT → DEF/HEAT → DEF each time turning the dial.
2	Fan speed control dial	Turn the dial to the right	Fan speed switches OFF → AUTO → 1st — 25th each time turning the dial.
3	FRESH/RECIRC switch	Press the FRESH/RECIRC switch.	Inlet opening switches RECIRC → FRESH each time pressing the switch.
		Press the FRESH/RECIRC switch more than 1 seconds.	LED blinks twice, and switches to AUTO.
4	A/C switch	Turn the A/C switch to ON with the fan speed control dial position other than OFF.	LED comes on, and the compressor will be operated.
		Press the A/C switch longer more than 1 seconds.	LED blinks twice, and switches to AUTO.
5	Auto function Operate from 1) in order.	1) Set the following dials and switches to AUTO. • Air flow control dial • Fan speed control dial • FRESH/RECIRC switch • A/C switch 2) Turn the temperature control dial to the left fully, to set to the maximum cool position.	• Outlet air temperature: COOL • Fan speed: MAX • Outlet opening: VENT • Inlet opening: Internal air • Compressor: AUTO
		3)Turn the temperature control dial to the right slowly, to change the setting gradually to the maximum hot position.	• Outlet air temperature: COOL → HOT • Fan speed: AUTO • Outlet opening: AUTO • Inlet opening: AUTO • Compressor: AUTO
		4) Turn the temperature control dial to the right fully, to set to the maximum hot position.	• Outlet air temperature: HOT • Fan speed: MAX • Outlet opening: HEAT • Inlet opening: External air • Compressor: AUTO
6	Defroster interlock	Turn the air flow control dial to DEF or DEF/HEAT position.	• Outlet air temperature: AUTO • Fan speed: AUTO • Outlet opening: DEF or DEF/HEAT • Inlet opening: External air • Compressor: ON
7	Rear window defogger switch	Press the rear window defogger switch.	LED comes on.

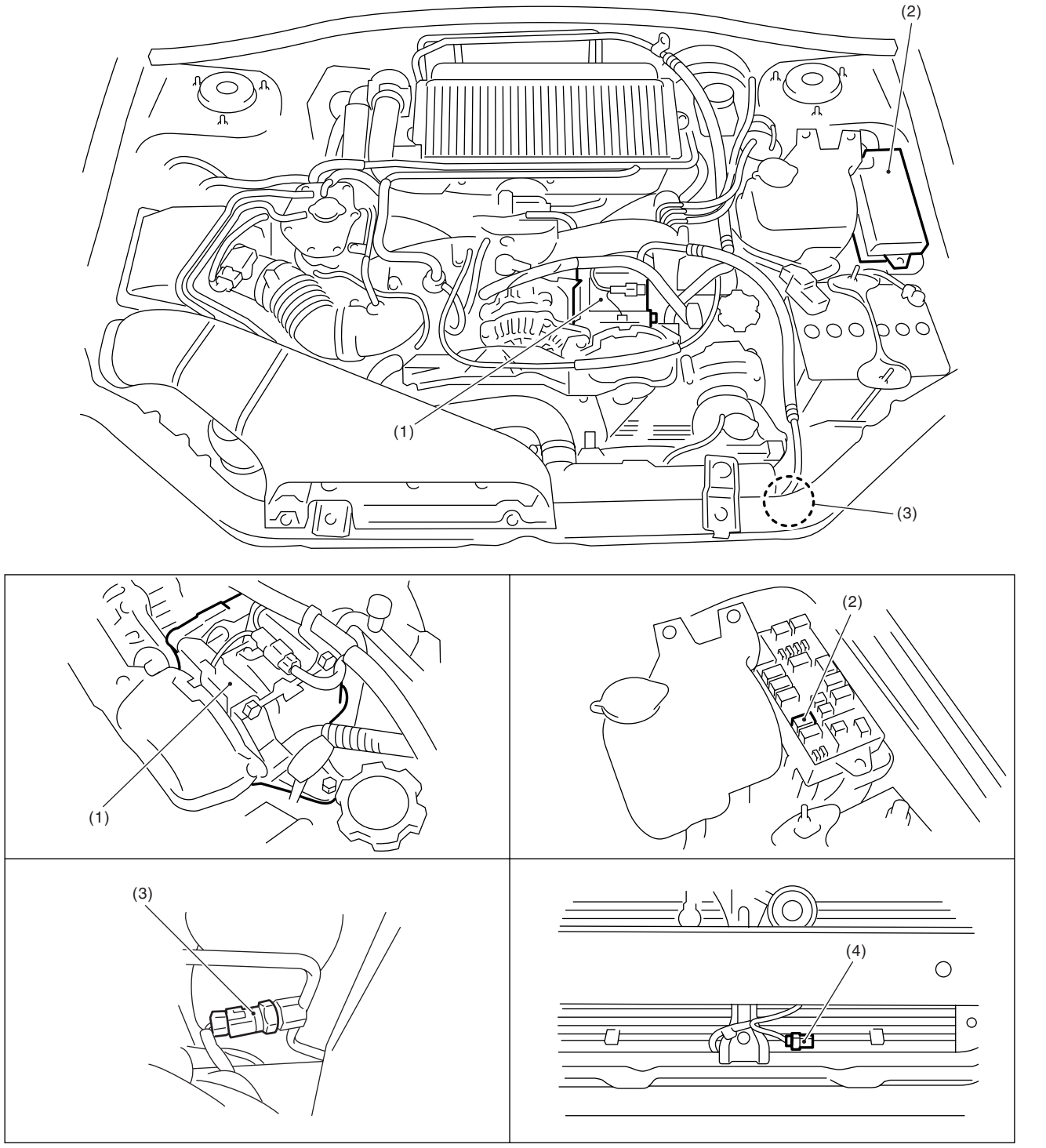
2) Inspection of illumination control.

No.	Item to be checked	Switch operation	Judgment standard
1	Illumination	Turn the lighting switch to ON.	Illumination comes on. LED goes dim if it has been illuminated.

3. Electrical Component Location

A: LOCATION

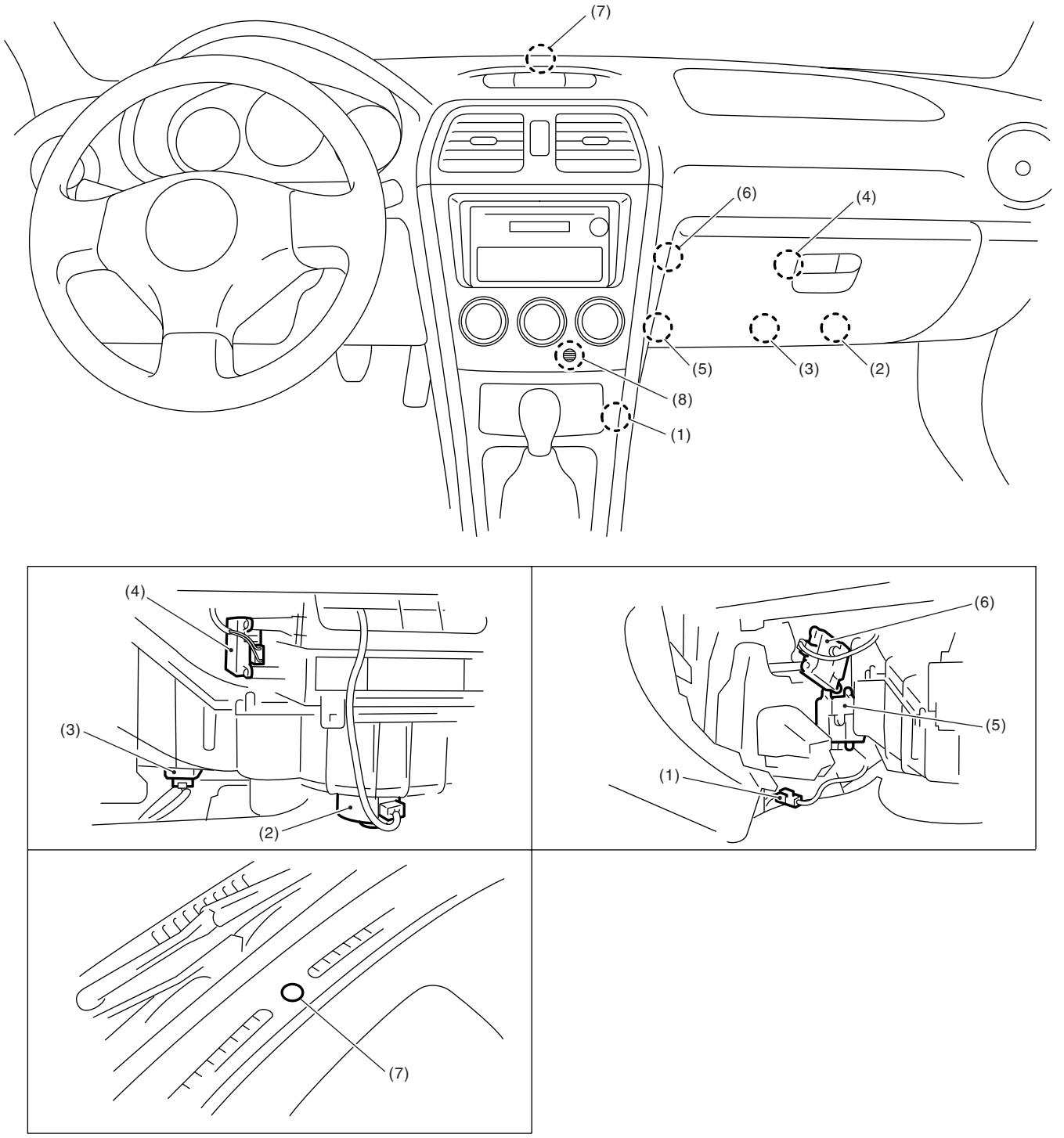
1. ENGINE COMPARTMENT



AC-01194

(1) A/C compressor
(2) A/C relay
(3) Pressure switch
(4) Ambient sensor

2. PASSENGER COMPARTMENT

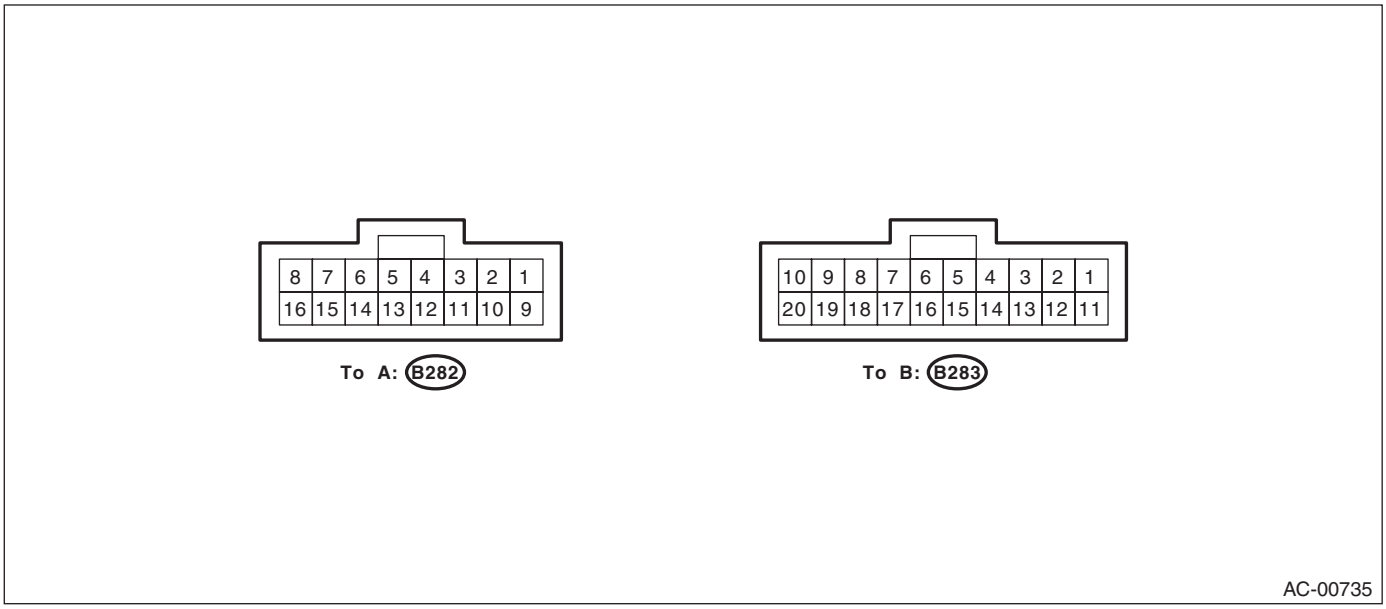


AC-01127

(1) Evaporator sensor
(2) Blower motor
(3) Blower motor resistor
(4) Intake door actuator
(5) Air mix door actuator
(6) Mode door actuator
(7) Sunload sensor
(8) In-vehicle sensor (built-in with Auto A/C control module)

4. Auto A/C Control Module I/O Signal

A: ELECTRICAL SPECIFICATION



Content	Connector & Terminal No.	Signal (V)
Battery power supply (Memory back-up)	B1 — B12	Battery voltage, 13 — 14 (engine running)
IGN power supply	A8 — B12	Battery voltage (ignition switch ON), 13 — 14 (engine running)
ACC power supply	B2 — B12	Battery voltage, 0 (engine cranking), Battery voltage (engine running)
A/C control module ground circuit	B12 — chassis ground	0 (ignition switch ON) — circuit constantly grounded to chassis
Sensor ground circuit	B17 — chassis ground	0 (ignition switch ON) — circuit constantly grounded to chassis
Ambient sensor	B9 — B17	Approx. 5 (disconnect connector, and ignition switch ON)
Evaporator sensor	B7 — B17	
Engine coolant temperature sensor	B15 — B12	
Sunload sensor	B16 — B17	Approx. 5 (disconnect connector, and ignition switch ON)
Air mix door actuator	B5 — B1	Battery voltage (ignition switch ON)
Air mix door actuator P.B.R.	A4 — B17	LAN connection
Mode door actuator	B6 — B17	Battery voltage (ignition switch ON)
Mode door actuator P.B.R.	A12 — B17	LAN connection
Intake door FRS voltage	A15 — A7	Battery voltage (FRESH/RECIRC switch OFF)
Intake door CIRC voltage	A7 — A15	Battery voltage (FRESH/RECIRC switch ON)
Blower fan relay	B14 — body	Battery voltage (ignition switch ON)
A/C relay	B3 — B12	0 (ignition and A/C switches ON) Battery voltage (A/C switch OFF)
Illumination control signal	B10 — B20	Battery voltage (ignition and lighting switches ON)
Rear window defogger	A13 — B12	0 (ignition switch ON, rear window defogger switch ON)

B: WIRING DIAGRAM

1. AIR CONDITIONER AUTO A/C LHD MODEL

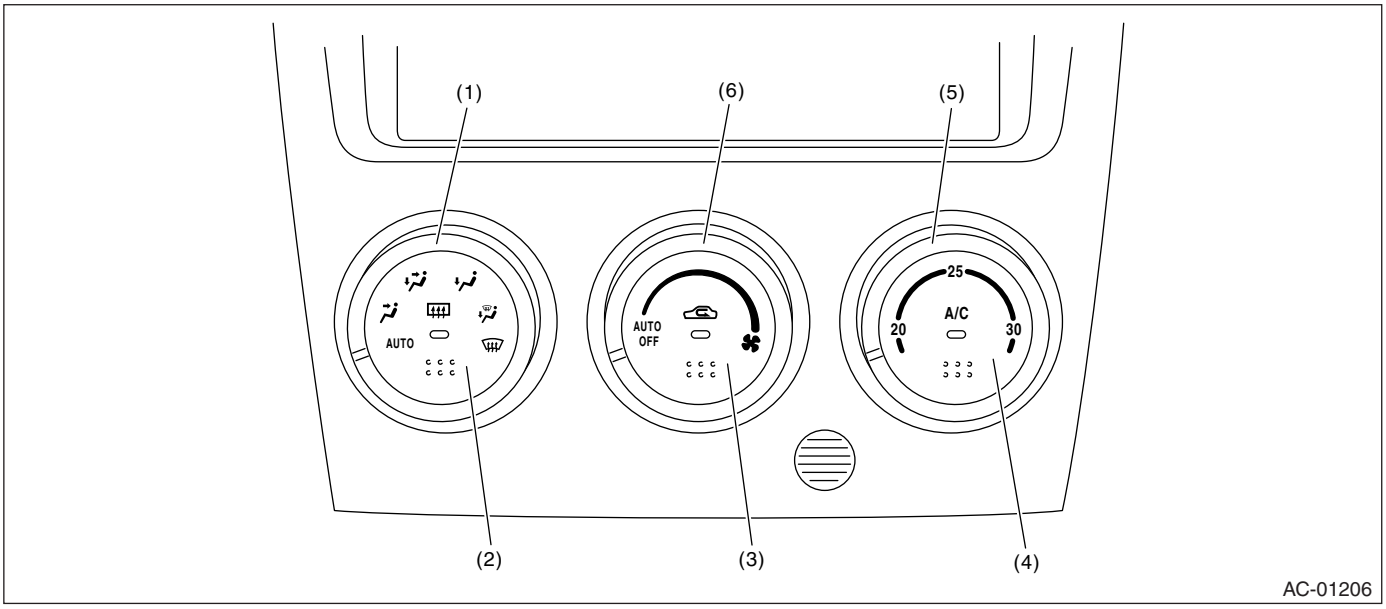
<Ref. to WI-153, MANUAL A/C LHD MODEL, WIRING DIAGRAM, Air Conditioning System.>

2. AIR CONDITIONER AUTO A/C RHD MODEL

<Ref. to WI-159, MANUAL A/C RHD MODEL, WIRING DIAGRAM, Air Conditioning System.>

5. Diagnostic Chart for Self-Diagnosis

A: OPERATION



(1) Air flow control dial
(2) Rear window defogger switch
(3) FRESH/RECIRC switch
(4) A/C switch
(5) Temperature control dial
(6) Fan speed control dial

	Step	Check	Yes	No
1	**SELECT CONTROL PANEL TO SELF-DIAGNOSIS MODE.** 1) Turn the fan speed control dial to OFF position. 2) Start the engine and press the A/C switch for at least 5 seconds. The A/C switch must be pressed within 10 seconds after starting engine.	Does the self-diagnosis mode operate?	Go to step **2.**	<Ref. to AC(diag)-12, A/C OR SELF-DIAGNOSIS SYSTEMS DO NOT OPERATE, Diagnostics for A/C System Malfunction.>
2	**CHECK LED ILLUMINATION.** Make sure that all switch LED illuminate on control panel.	Do all LED illuminate?	Go to step **3.**	Check the switch LED.
3	**CHECK SENSORS MALFUNCTION.** 1) Turn the fan speed control dial to AUTO position. 2) If the system has trouble for each sensor, rear window defogger switch LED is turned off. 3) If the system has no trouble, rear window defogger switch LED is illuminated.	Does the rear window defogger switch LED illuminate?	Go to step **5.**	Go to step **4.**
4	**CONFIRM MALFUNCTIONING SENSOR.** 1) Turn the fan speed control dial to 1 — 6th position. 2) Turn the air flow control dial to each mode position, check each switch LED illumination according to sensor check table. <Ref. to AC(diag)-11, SENSOR CHECK TABLE, OPERATION, Diagnostic Chart for Self-Diagnosis.>	Do FRESH/RECIRC and A/C switch LED illuminate when turning the dial to each mode position?	Go to step **5.**	Repair the malfunctioning sensor. <Ref. to AC(diag)-29, Diagnostic Procedure for Sensors.>

	Step	Check	Yes	No
5	**CHECK MODE DOOR POSITION SIGNAL.** 1) Turn the fan speed control dial to 7 — 12th position. 2) If the system has trouble for mode door position signal, rear window defogger switch LED is turned off. 3) If the system has no trouble, rear window defogger switch LED is illuminated.	Does the rear window defogger switch LED illuminate?	Go to step **6.**	Check the mode door actuator circuit. <Ref. to AC(diag)-25, MODE DOOR ACTUATOR, Diagnostic Procedure for Actuators.>
6	**CHECK BLOWER FAN OPERATION.** 1) Turn the fan speed control dial to 13 — 18th position. 2) Turn the temperature control dial, check that blower fan speed changes depending on set temperature.	Does the blower fan speed change?	Go to step **7.**	Check the blower motor circuit. <Ref. to AC(diag)-14, BLOWER FAN DOES NOT ROTATE., Diagnostics for A/C System Malfunction.>
7	**CHECK OPERATION OF EACH ACTUATOR, BLOWER FAN AND COMPRESSOR CLUTCH.** 1) Turn the fan speed control dial to 19 — 25th position. 2) Select the operating mode by turning air flow control dial. 3) Check the operation of each mode according to operating mode table. <Ref. to AC(diag)-11, OPERATING MODE TABLE, OPERATION, Diagnostic Chart for Self-Diagnosis.> • Air inlet: • Air outlet: • Air mix door: • Blower fan: • A/C compressor:	Does the operation of each mode match to operating mode table?	Push the A/C switch or turn the ignition switch to OFF, and finish the self-diagnosis.	Repair the malfunction part according to each diagnostics chart.

1. SENSOR CHECK TABLE

NOTE:
When the sunload sensor is checked indoors or in the shade, open circuit might be indicated so that always check the sunload sensor at a place where sun shines directly on it.

Air flow control dial position	Checked sensor	No trouble	Short circuit	Open circuit
VENT	Ambient sensor	A/C switch LED and FRESH/RECIRC switch LED illuminate	A/C switch LED illuminate	FRESH/RECIRC switch LED illuminate
BI-LEVEL	In-vehicle sensor	A/C switch LED and FRESH/RECIRC switch LED illuminate	A/C switch LED illuminate	FRESH/RECIRC switch LED illuminate
HEAT	Evaporator sensor	A/C switch LED and FRESH/RECIRC switch LED illuminate	A/C switch LED illuminate	FRESH/RECIRC switch LED illuminate
DEF/HEAT	Sunload sensor	A/C switch LED and FRESH/RECIRC switch LED illuminate	A/C switch LED illuminate	FRESH/RECIRC switch LED illuminate
DEF	Air mix door motor (Potentio balance resistor)	A/C switch LED and FRESH/RECIRC switch LED illuminate	A/C switch LED illuminate	

2. OPERATING MODE TABLE

Operation	Air flow control dial position				
	VENT	BI-LEVEL	HEAT	DEF/HEAT	DEF
Air outlet	VENT	BI-LEVEL	HEAT	DEF/HEAT	DEF
Air inlet	RECIRC	RECIRC	RECIRC	FRESH	FRESH
Air mix door	FULL COOL	FULL COOL	FULL HOT	FULL HOT	FULL COOL
Blower fan	5V	5V	8V	10V	Power supply voltage
A/C compressor	ON	OFF	OFF	ON	ON

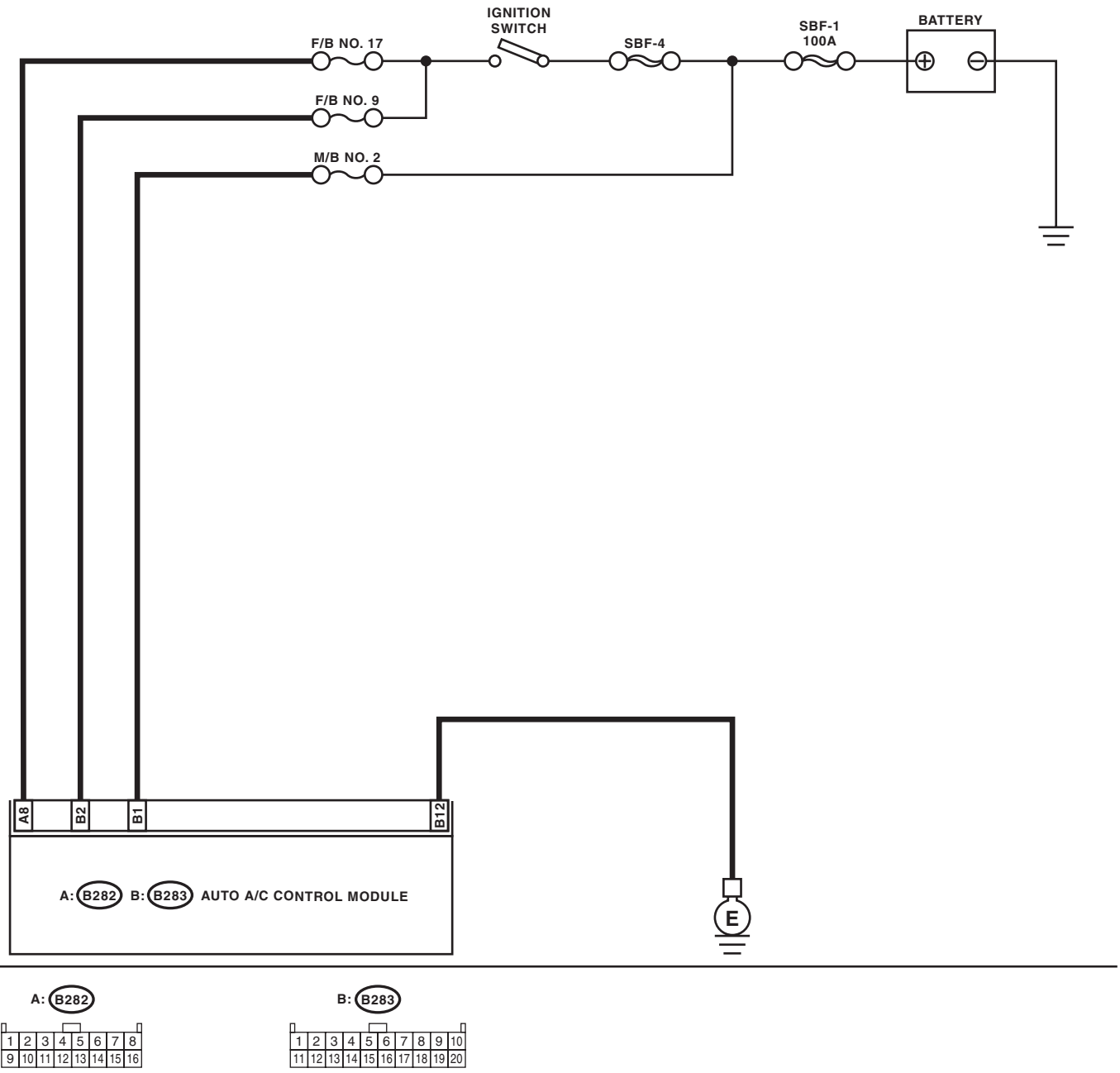
6. Diagnostics for A/C System Malfunction

A: A/C OR SELF-DIAGNOSIS SYSTEMS DO NOT OPERATE

TROUBLE SYMPTOM:

- “Set” temperature is not indicated on the display, switch LEDs are faulty and switches do not operate.
- Self-diagnosis system does not operate.

WIRING DIAGRAM:



AC-01236

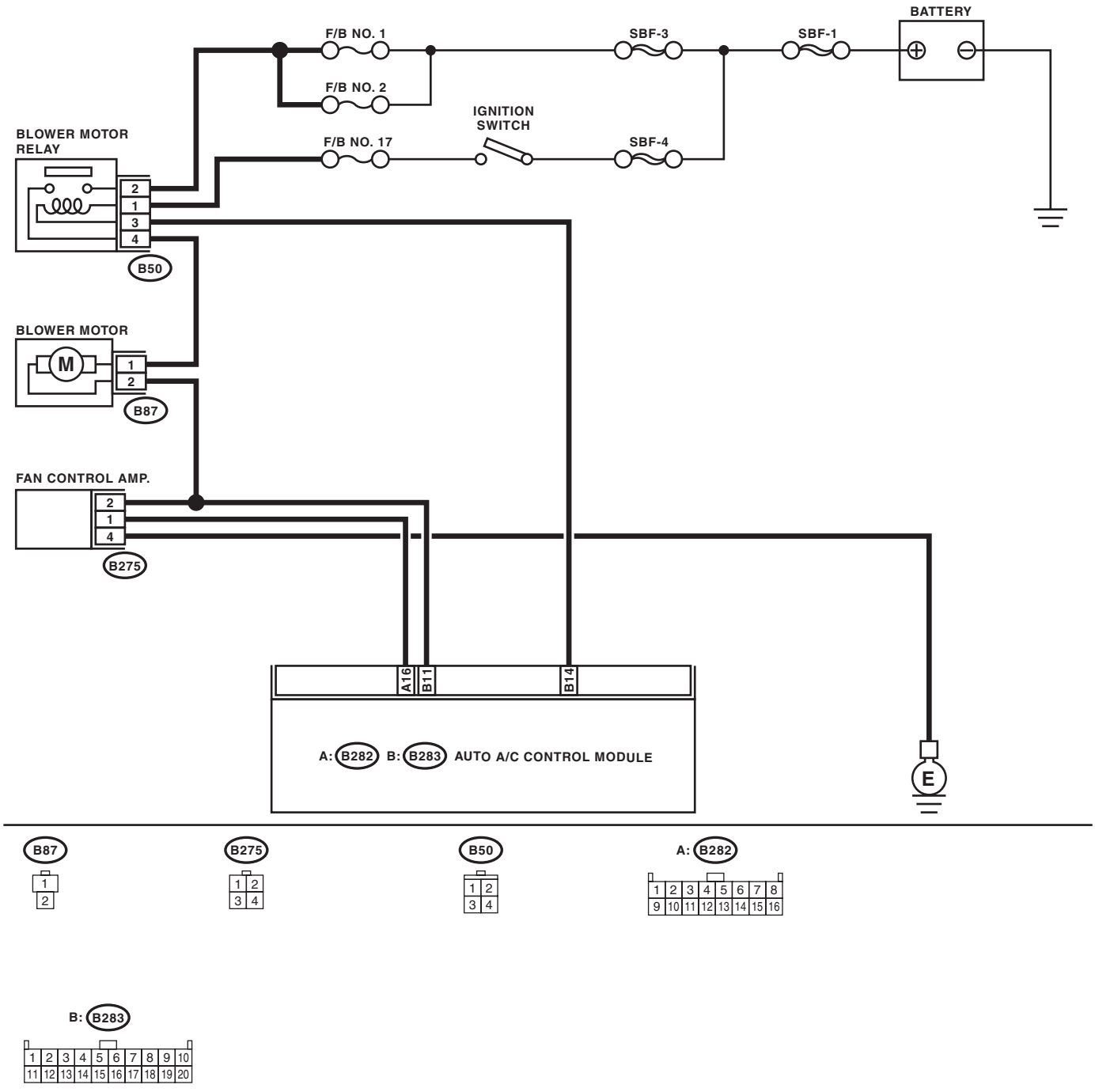
	Step	Check	Yes	No
1	**CHECK FUSE.** 1) Turn the ignition switch to OFF. 2) Remove the fuse No. 2 from main fuse box. 3) Check the condition of fuse.	Is the fuse blown-out?	Replace the fuse.	Go to step **2.**
2	**CHECK FUSE.** 1) Turn the ignition switch to OFF. 2) Remove the fuses No. 9 and No. 17 from fuse & relay box. 3) Check the condition of fuse.	Is the fuse blown-out?	Replace the fuse.	Go to step **3.**
3	**CHECK A/C CONTROL MODULE POWER CIRCUIT.** 1) Pull out the A/C control module connector. 2) Measure the voltage between A/C control module connector terminal and chassis ground when turning ignition switch to OFF. ***Connector & terminal*** ***(B283) No. 1 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **4.**	Repair the open circuit in harness for power supply line.
4	**CHECK A/C CONTROL MODULE POWER CIRCUIT.** Measure the voltage between A/C control module connector terminal and chassis ground when turning the ignition switch to ACC. ***Connector & terminal*** ***(B283) No. 2 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **5.**	Repair the open circuit in harness for power supply line.
5	**CHECK A/C CONTROL MODULE POWER CIRCUIT.** Measure the voltage between A/C control module connector terminal and chassis ground when turning the ignition switch to ON. ***Connector & terminal*** ***(B282) No. 8 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **6.**	Repair the open circuit in harness for power supply line.
6	**CHECK A/C CONTROL MODULE GROUND CIRCUIT.** Measure the resistance of harness between A/C control module and chassis ground. ***Connector & terminal*** ***(B283) No. 12 — Chassis ground:***	Is the resistance less than 5 Ω?	Go to step **7.**	Repair the open circuit in harness for ground line.
7	**CHECK POOR CONTACT.** Check poor contact in A/C control module connector.	Is there poor contact in connector?	Repair the connector.	Replace the A/C control module.

B: BLOWER FAN DOES NOT ROTATE.

TROUBLE SYMPTOM:

- Blower motor is not rotated.
- Blower motor is not rotated in “HI”.

WIRING DIAGRAM:



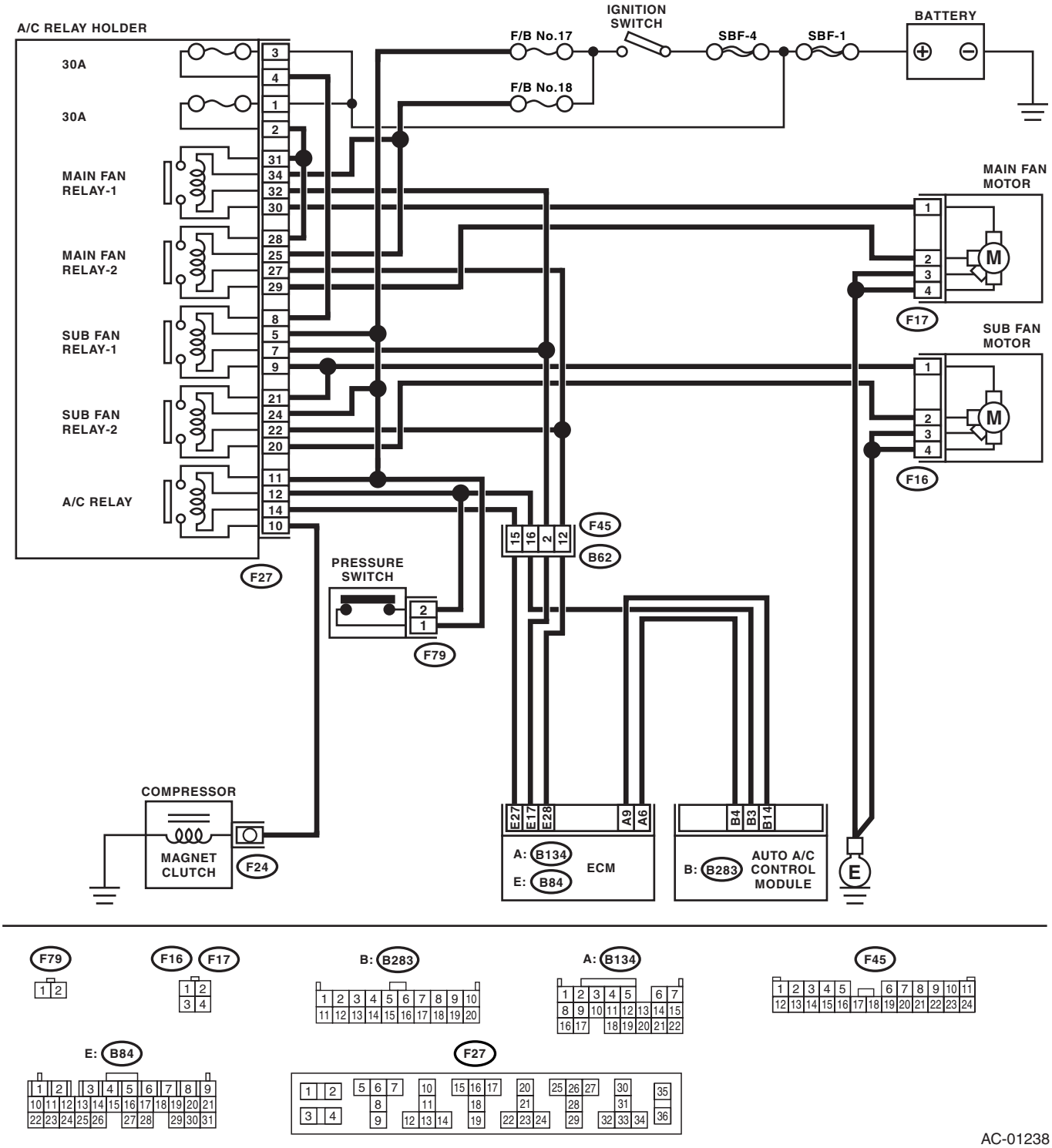
AC-01237

	Step	Check	Yes	No
1	**CHECK FUSE.** 1) Remove the No.1, No. 2 and No. 17 fuses in fuse & relay box. 2) Check the condition of fuses.	Are any of the fuses blown-out?	Replace the fuse.	Go to step **2.**
2	**CHECK POWER SUPPLY TO BLOWER FAN MOTOR.** 1) Turn the ignition switch to ON. 2) Turn the blower switch to ON. 3) Measure the voltage between blower fan motor and chassis ground. ***Connector & terminal*** ***(B87) No. 1 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **3.**	Repair the open circuit in harness for blower fan motor power supply line.
3	**CHECK BLOWER FAN MOTOR RELAY.** 1) Turn the ignition switch to OFF. 2) Remove the blower fan motor relay. 3) Connect the battery positive (+) terminal to No. 1 terminal and negative (–) terminal to No. 3 terminal of blower fan motor relay connector. 4) Measure the resistance between No. 2 and No. 4 terminals. ***Terminals*** ***No. 2 — No. 4:***	Is the resistance less than 1 Ω?	Go to step **4.**	Replace the blower fan motor relay.
4	**CHECK BLOWER FAN MOTOR.** 1) Disconnect the connector from blower fan motor. 2) Connect the battery positive (+) terminal to No.1 terminal and negative (–) terminal to No.2 terminal of blower fan motor connector. 3) Check the blower fan motor is operated.	Does the blower fan motor operate?	Go to step **5.**	Replace the blower fan motor.
5	**CHECK POOR CONTACT.** Check poor contact in A/C control module connector.	Is there poor contact in connector?	Repair the connector.	Replace the A/C control module.

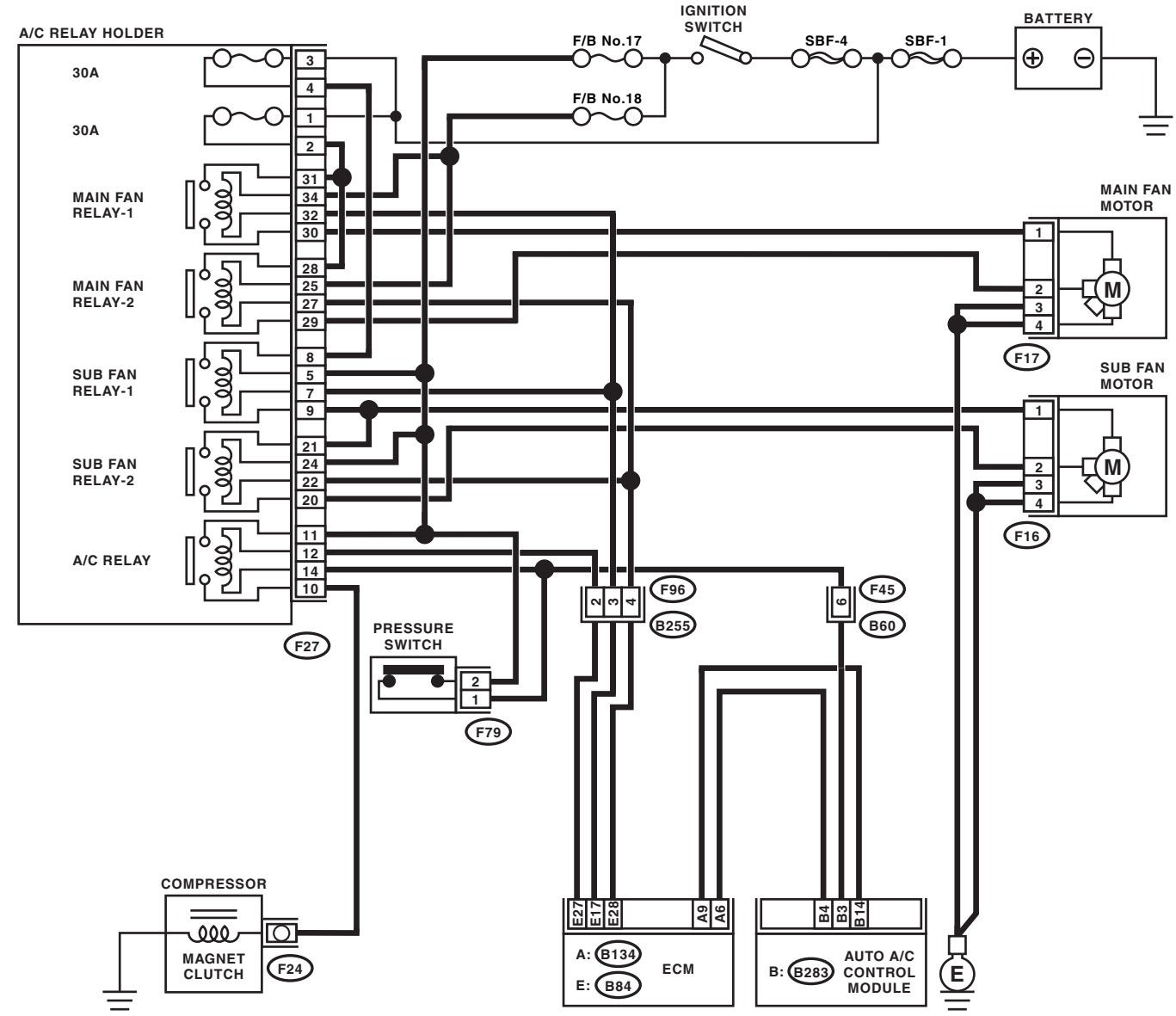
C: COMPARTMENT TEMPERATURE DOES NOT CHANGE, OR A/C SYSTEM DOES NOT RESPOND PROMPTLY.

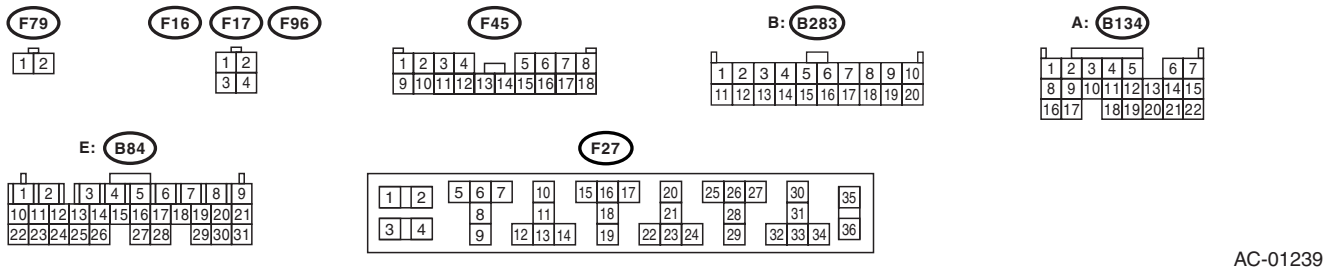
WIRING DIAGRAM:

- LHD TURBO MODEL



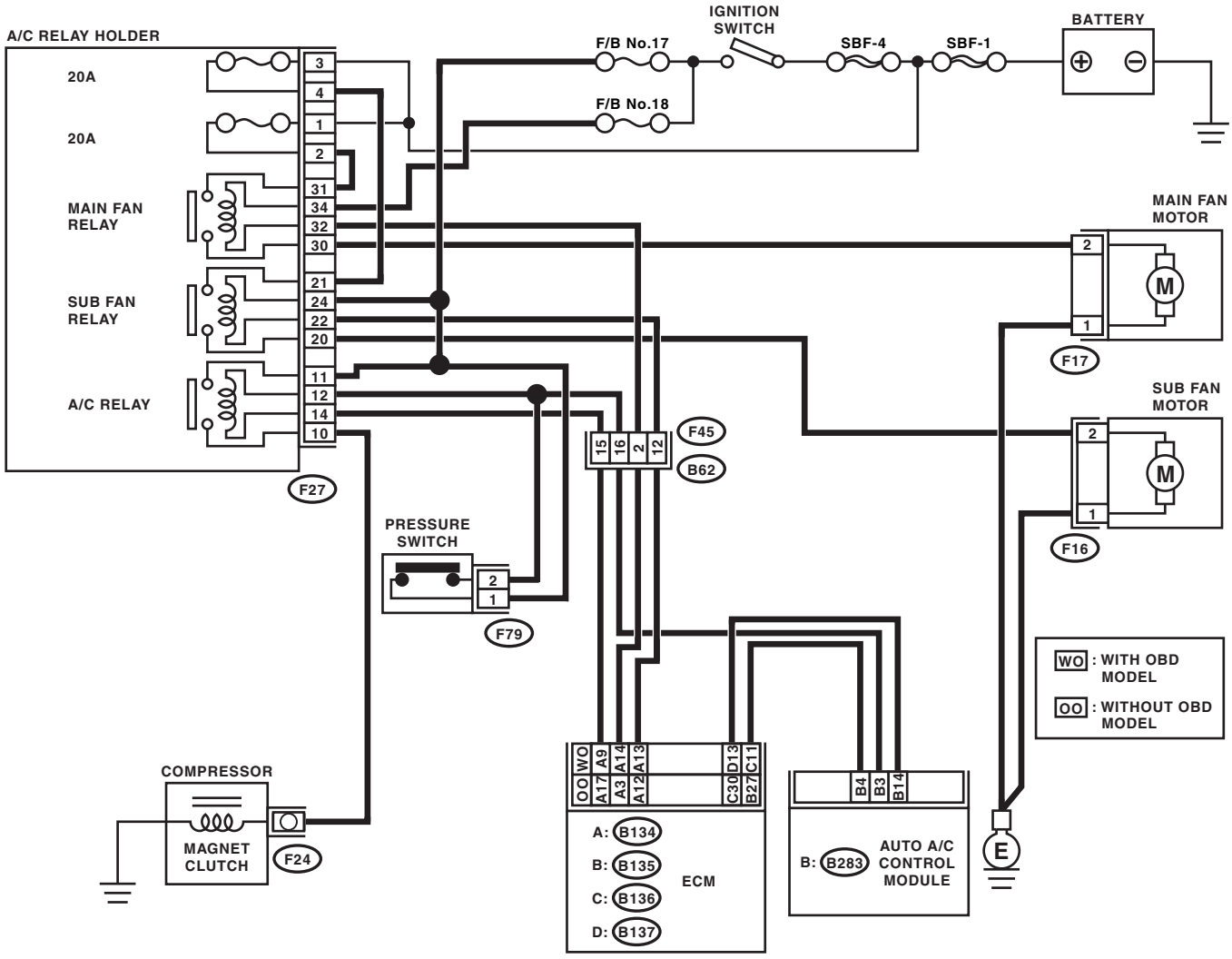
- RHD TURBO MODEL

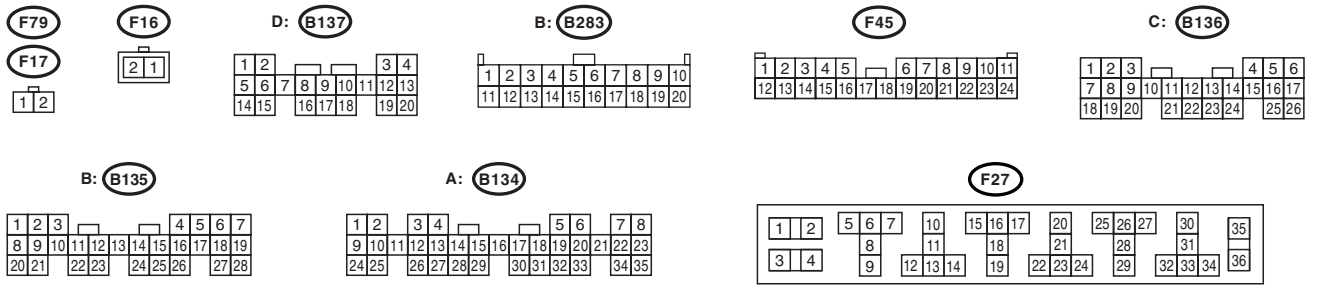




AC-01239

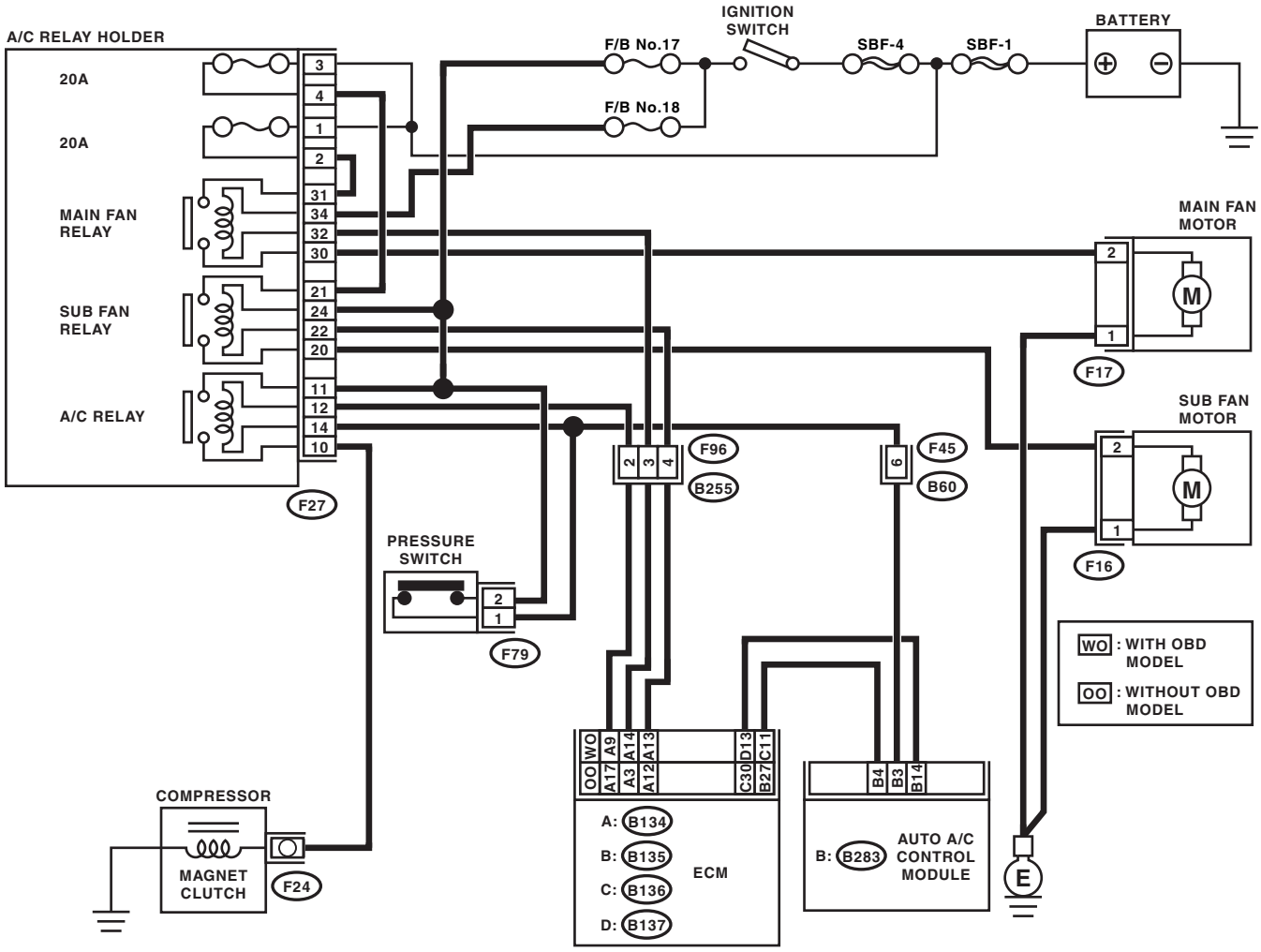
- LHD NON-TURBO MODEL

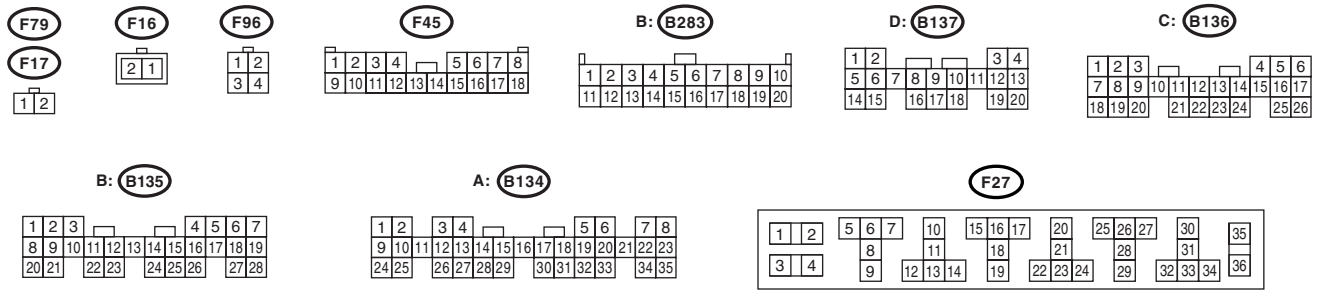




AC-01240

- RHD NON-TURBO MODEL





AC-01241

	Step	Check	Yes	No
1	**CHECK FUSE.** 1) Turn the ignition switch to OFF. 2) Remove the No. 2 fuse in main fuse box. 3) Check the condition of fuse.	Is the fuse blown-out?	Replace the fuse.	Go to step **2.**
2	**CHECK POWER SUPPLY TO MAGNET CLUTCH OF A/C COMPRESSOR.** 1) Start the engine, and turn A/C switch to ON. 2) Set the temperature control dial to maximum cold position. 3) Measure the voltage between magnet clutch connector and chassis ground. ***Connector & terminal*** ***(F24) No. 1 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **3.**	Repair the open circuit in harness for power supply line of the A/C compressor.
3	**CHECK SIGNAL VOLTAGE TO A/C RELAY.** 1) Stop the engine, and turn the ignition switch to ON. 2) Measure the signal voltage between A/C relay and chassis ground. ***Connector & terminal*** ***(F27) No. 12 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **4.**	Repair the open circuit in harness for A/C relay signal circuit.
4	**CHECK A/C RELAY.** 1) Remove the A/C relay in main fuse box. 2) Check the A/C relay. <Ref. to AC-39, INSPECTION, Relay and Fuse.>	Is the operation of the relay OK?	Go to step **5.**	Replace the A/C relay.
5	**CHECK OPERATION OF MAIN FAN MOTOR.** 1) Start the engine. 2) Turn the A/C switch to ON. 3) Check the operation of main fan motor.	Does the radiator main fan operate?	Go to step **10.**	Go to step **6.**
6	**CHECK POWER SUPPLY TO MAIN FAN MOTOR.** **CAUTION:** **Be careful not to overheat the engine during repair.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from main fan motor. 3) Start the engine, and warm it up until engine coolant temperature increases over 95°C (203°F). 4) Stop the engine and turn ignition switch to ON. 5) Measure the voltage between main fan motor connector and chassis ground. ***Connector & terminal*** ***Turbo model:*** ***(F17) No. 1, 2 (+) — Chassis ground (–):*** ***Non-turbo model:*** ***(F17) No. 2 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **7.**	Repair the open circuit in harness for power supply circuit.
7	**CHECK GROUND CIRCUIT OF MAIN FAN MOTOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between main fan motor connector and chassis ground. ***Connector & terminal*** ***Turbo model:*** ***(F17) No. 3, 4 — Chassis ground:*** ***Non-turbo model:*** ***(F17) No. 1 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **8.**	Repair the open circuit in harness between main fan motor connector and chassis ground.

	Step	Check	Yes	No
8	**CHECK POOR CONTACT.** Check poor contact in main fan motor connector.	Is there poor contact in main fan motor connector?	Repair the poor contact in main fan motor connector.	Go to step **9.**
9	**CHECK MAIN FAN MOTOR.** Connect the battery to main fan motor, and check rotate the main fan motor. ***Battery positive (+) terminal:*** ***No. 1, No. 2 (Turbo model)*** ***No. 2 (Non-turbo model)*** ***Battery negative (−) terminal:*** ***No. 3, No. 4 (Turbo model)*** ***No. 1 (Non-turbo model)***	Does the main fan rotate?	Repair the poor contact in main fan motor connector.	Replace the main fan motor with a new one.
10	**CHECK OPERATION OF SUB FAN MOTOR.** Check the operation of sub fan motor.	Does the radiator sub fan operate?	Go to step **15.**	Go to step **11.**
11	**CHECK POWER SUPPLY TO SUB FAN MOTOR.** **CAUTION:** **Be careful not to overheat the engine during repair.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from sub fan motor. 3) Start the engine, and warm it up until engine coolant temperature increases over 100°C (212°F). 4) Stop the engine and turn the ignition switch to ON. 5) Measure the voltage between sub fan motor connector and chassis ground. ***Connector & terminal*** ***Turbo model:*** ***(F16) No. 1, 2 (+) — Chassis ground (−):*** ***Non-turbo model:*** ***(F16) No. 2 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **12.**	Repair the open circuit in harness for power supply circuit.
12	**CHECK GROUND CIRCUIT OF SUB FAN MOTOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between sub fan motor connector and chassis ground. ***Connector & terminal*** ***Turbo model:*** ***(F16) No. 3, 4 — Chassis ground:*** ***Non-turbo model:*** ***(F16) No. 1 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **13.**	Repair the open circuit in harness between sub fan motor connector and chassis ground.
13	**CHECK POOR CONTACT.** Check poor contact in sub fan motor connector.	Is there poor contact in sub fan motor connector?	Repair the poor contact in sub fan motor connector.	Go to step **14.**
14	**CHECK SUB FAN MOTOR.** Connect the battery to sub fan motor, and check rotate the sub fun moter. ***Battery positive (+) terminal:*** ***No. 1, No. 2 (Turbo model)*** ***No. 2 (Non-turbo model)*** ***Battery negative (−) terminal:*** ***No. 3, No. 4 (Turbo model)*** ***No. 1 (Non-turbo model)***	Does the sub fan rotate?	Repair the poor contact in sub fan motor connector.	Replace the sub fan motor with a new one.

	Step	Check	Yes	No
15	**CHECK EACH SENSOR AND POTENTIOMETER.** Check the sensors and potentiometer for proper operation using the self-diagnostic function. <Ref. to AC(diag)-9, Diagnostic Chart for Self-Diagnosis.>	Is the operation of each sensor and potentiometer normal?	Go to step **16.**	Check the sensor and circuit. <Ref. to AC(diag)-29, Diagnostic Procedure for Sensors.>
16	**CHECK CONNECTION OF ASPIRATOR HOSE.** Check the connection of aspirator hose.	Is the connection of aspirator hose correct?	Go to step **17.**	Connect the aspirator hose correctly.
17	**CHECK EACH ACTUATOR.** Check the actuators for proper operation using the self-diagnostic function. <Ref. to AC(diag)-9, Diagnostic Chart for Self-Diagnosis.>	Is the operation of each actuator normal?	Go to step **18.**	Check the actuator and circuit. <Ref. to AC(diag)-23, Diagnostic Procedure for Actuators.>
18	**CHECK POOR CONTACT.** Check poor contact in A/C control module connector.	Is there poor contact in connector?	Repair the connector.	Replace the A/C control module.

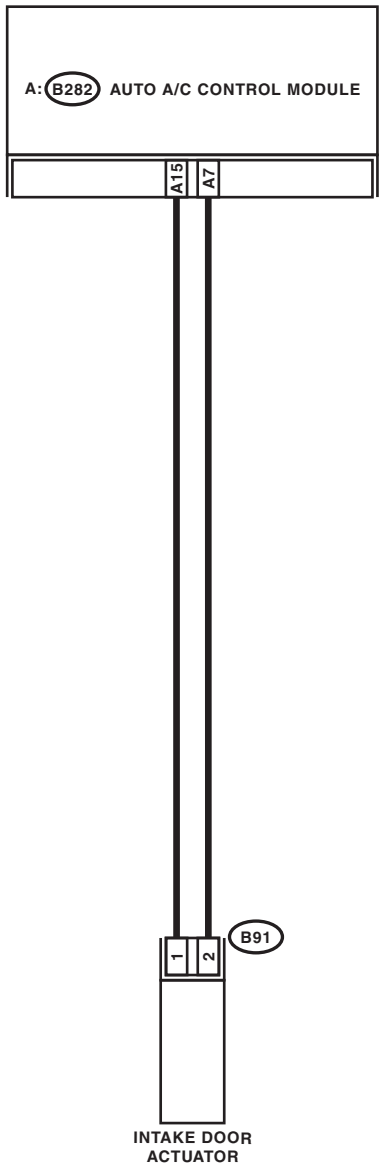
7. Diagnostic Procedure for Actuators

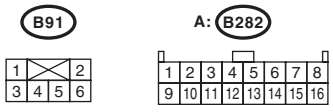
A: INTAKE DOOR ACTUATOR

TROUBLE SYMPTOM:

FRESH/RECIRC mode is not changed.

WIRING DIAGRAM:





AC-01242

Diagnostic Procedure for Actuators

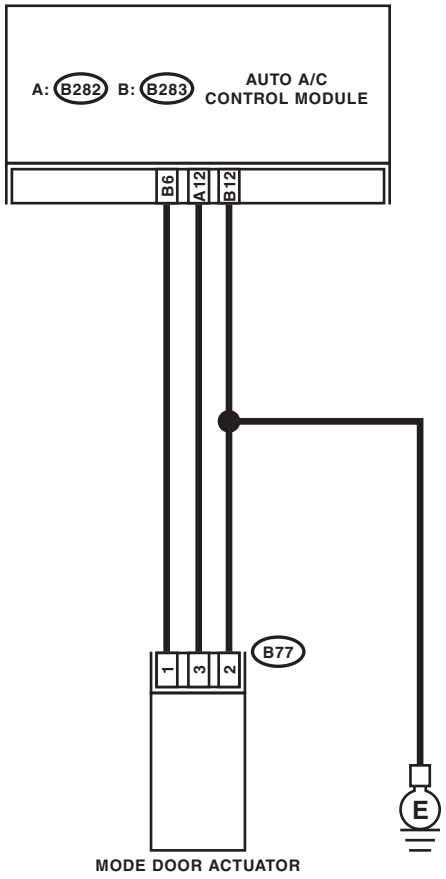
	Step	Check	Yes	No
1	**CHECK FUSE.** 1) Remove the No. 17 fuse in fuse & relay box. 2) Check the condition of fuse.	Is the fuse blown-out?	Replace the fuse.	Go to step **2.**
2	**CHECK SIGNAL VOLTAGE.** 1) Change the air intake to RECIRC by pushing FRESH/RECIRC switch. 2) Measure the voltage between A/C control module and chassis ground . ***Connector & terminal*** ***(B282) No. 15 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Go to step **3.**	Repair the open circuit in harness for power supply line.
3	**CHECK SIGNAL VOLTAGE.** 1) Change the air intake to FRESH with pushing FRESH/RECIRC switch. 2) Measure the voltage between A/C control module and chassis ground. ***Connector & terminal*** ***(B282) No. 7 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Go to step **4.**	Repair the open circuit in harness for power supply line.
4	**CHECK HARNESS CONNECTOR BETWEEN A/C CONTROL MODULE AND FRESH/RECIRC ACTUATOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from A/C control module and intake door actuator. 3) Measure the resistance of harness between A/C control module and intake door actuator. ***Connector & terminal*** ***(B282) No. 15 — (B91) No. 1:***	Is the resistance less than 1 Ω?	Go to step **5.**	Repair the open circuit in harness between A/C control module and intake door actuator.
5	**CHECK HARNESS CONNECTOR BETWEEN A/C CONTROL MODULE AND FRESH/RECIRC ACTUATOR.** Measure the resistance of harness between A/C control module and intake door actuator. ***Connector & terminal*** ***(B282) No. 7 — (B91) No. 2:***	Is the resistance less than 1 Ω?	Go to step **6.**	Repair the open circuit in harness between A/C control module and intake door actuator.
6	**CHECK POOR CONTACT.** Check poor contact in A/C control module connector.	Is there poor contact in connector?	Repair the connector.	Replace the A/C control module.

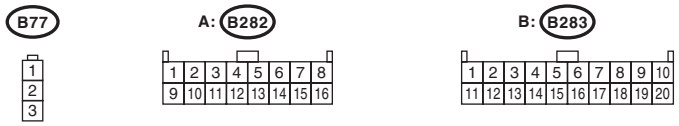
B: MODE DOOR ACTUATOR

TROUBLE SYMPTOM:

Air flow outlet is not changed.

WIRING DIAGRAM:





AC-01243

Diagnostic Procedure for Actuators

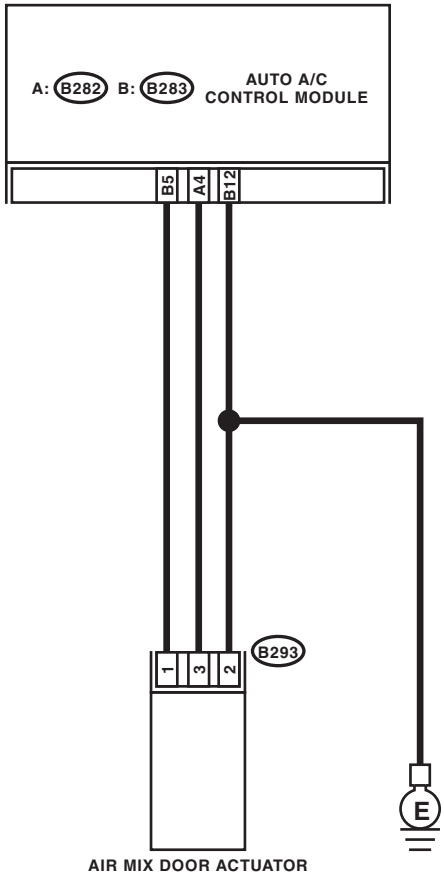
	Step	Check	Yes	No
1	**CHECK POWER SUPPLY FOR AUTO A/C CONTROL MODULE SIDE.** 1) Turn the ignition switch to ON. 2) Turn the A/C switch to ON. 3) Measure the voltage between auto A/C control module harness connector terminal and chassis ground. ***Connector & terminal*** ***(B283) No. 6 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **2.**	Replace the auto A/C control module.
2	**CHECK POWER SUPPLY FOR ACTUATOR SIDE.** Measure the voltage between mode door actuator harness connector terminal and chassis ground. ***Connector & terminal*** ***(B77) No. 1 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **3.**	Repair the open circuit in harness between auto A/C control module and mode door actuator.
3	**CHECK SIGNAL FOR AUTO A/C CONTROL MODULE SIDE.** Measure the voltage between auto A/C control module harness connector terminal and chassis ground with oscilloscope. ***Connector & terminal*** ***(B282) No. 12 (+) — Chassis ground (–):***	Is the voltage approx. 5.5 V?	Go to step **4.**	Replace the auto A/C control module.
4	**CHECK SIGNAL FOR ACTUATOR SIDE.** Measure the voltage between mode door actuator harness connector terminal and chassis ground. ***Connector & terminal*** ***(B77) No. 3 (+) — Chassis ground (–):***	Is the voltage approx. 5.5 V?	Go to step **5.**	Repair the open circuit in harness between auto A/C control module and mode door actuator.
5	**CHECK GROUND CIRCUIT OF ACTUATOR.** 1) Turn the ignition switch and A/C switch to OFF. 2) Measure the resistance between mode door actuator harness connector terminal and chassis ground. ***Connector & terminal*** ***(B77) No. 2 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **6.**	Repair the open circuit in harness between mode door actuator and chassis ground.
6	**CHECK POOR CONTACT.** Check poor contact in auto A/C control module connector.	Is there poor contact in connector?	Repair the connector.	Replace the A/C control module.

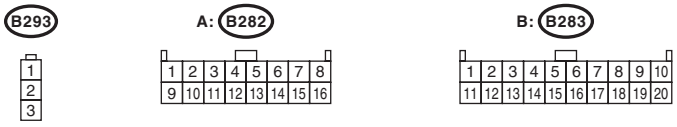
C: AIR MIX DOOR ACTUATOR

TROUBLE SYMPTOM:

Outlet air temperature is not changed.

WIRING DIAGRAM:





AC-01244

Diagnostic Procedure for Actuators

	Step	Check	Yes	No
1	**CHECK POWER SUPPLY FOR AUTO A/C CONTROL MODULE SIDE.** 1) Turn the ignition switch to ON. 2) Turn the A/C switch to ON. 3) Measure the voltage between auto A/C control module harness connector terminal and chassis ground. ***Connector & terminal*** ***(B283) No. 5 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **2.**	Replace the auto A/C control module.
2	**CHECK POWER SUPPLY FOR ACTUATOR SIDE.** Measure the voltage between air mix door actuator harness connector terminal and chassis ground. ***Connector & terminal*** ***(B293) No. 1 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **3.**	Repair the open circuit in harness between auto A/C control module and air mix door actuator.
3	**CHECK SIGNAL FOR AUTO A/C CONTROL MODULE SIDE.** Measure the voltage between auto A/C control module harness connector terminal and chassis ground with oscilloscope. ***Connector & terminal*** ***(B282) No. 4 (+) — Chassis ground (−):***	Is the voltage approx. 5.5 V?	Go to step **4.**	Replace the auto A/C control module.
4	**CHECK SIGNAL FOR ACTUATOR SIDE.** Measure the voltage between air mix door actuator harness connector terminal and chassis ground with oscilloscope. ***Connector & terminal*** ***(B293) No. 3 (+) — Chassis ground (−):***	Is the voltage approx. 5.5 V?	Go to step **5.**	Repair the open circuit in harness between auto A/C control module and air mix door actuator.
5	**CHECK GROUND CIRCUIT OF ACTUATOR.** 1) Turn the ignition switch and A/C switch to OFF. 2) Measure the resistance between air mix door actuator harness connector terminal and chassis ground. ***Connector & terminal*** ***(B293) No. 2 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **6.**	Repair the open circuit in harness between air mix door actuator and chassis ground.
6	**CHECK POOR CONTACT.** Check poor contact in auto A/C control module connector.	Is there poor contact in connector?	Repair the connector.	Replace the A/C control module.

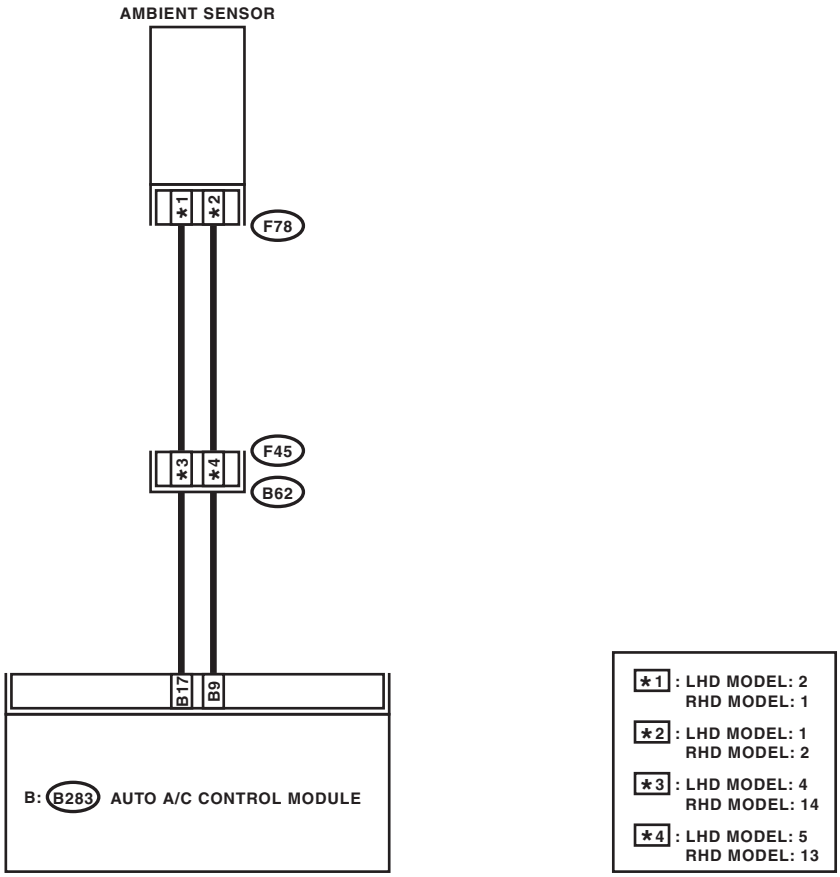
8. Diagnostic Procedure for Sensors

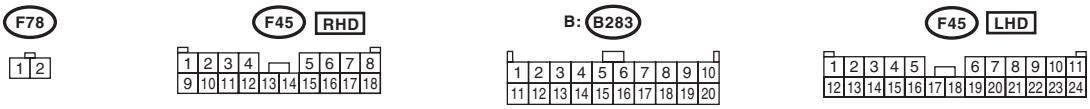
A: AMBIENT SENSOR

TROUBLE SYMPTOM:

Fan speed is not switched when the fan speed control dial is in AUTO position.

WIRING DIAGRAM:





AC-01245

Diagnostic Procedure for Sensors

	Step	Check	Yes	No
1	**CHECK AMBIENT SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ambient sensor. 3) Measure the resistance between connector terminals of ambient sensor. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance approx. 2.2 kΩ at 25°C (77°F)?	Go to step **2.**	Replace the ambient sensor.
2	**CHECK INPUT SIGNALS FOR AMBIENT SENSOR.** 1) Turn the ignition ON. 2) Measure the voltage between (F78) connector terminals. ***Connector & terminal*** ***LHD model:*** ***(F78) No. 1 (+) — No. 2 (–):*** ***RHD model:*** ***(F78) No. 2 (+) — No. 1 (–):***	Is the voltage approx. 5 V?	Go to step **6.**	Go to step **3.**
3	**CHECK OUTPUT SIGNALS FROM A/C CONTROL MODULE.** 1) Turn the ignition switch to OFF. 2) Pull out the A/C control unit. 3) Disconnect the connector from ambient sensor. 4) Turn the ignition switch to ON. 5) Measure the voltage between connector terminals of A/C control module. ***Connector & terminal*** ***(B283) No. 9 (+) — No. 17 (–):***	Is the voltage approx. 5 V?	Go to step **4.**	Go to step **6.**
4	**CHECK HARNESS CONNECTOR BETWEEN A/C CONTROL MODULE AND AMBIENT SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from A/C control module. 3) Measure the resistance of harness between A/C control module and ambient sensor. ***Connector & terminal*** ***LHD model:*** ***(F78) No. 1 — (B283) No. 9:*** ***RHD model:*** ***(F78) No. 2 — (B283) No. 9:***	Is the resistance less than 1 Ω?	Go to step **5.**	Repair the open circuit in harness between A/C control module and ambient sensor.
5	**CHECK HARNESS CONNECTOR BETWEEN A/C CONTROL MODULE AND AMBIENT SENSOR.** Measure the resistance of harness between A/C control module and ambient sensor. ***Connector & terminal*** ***LHD model:*** ***(F78) No. 2 — (B283) No. 17:*** ***RHD model:*** ***(F78) No. 1 — (B283) No. 17:***	Is the resistance less than 1 Ω?	Go to step **6.**	Repair the open circuit in harness between A/C control module and ambient sensor.
6	**CHECK POOR CONTACT.** Check poor contact in A/C control module connector.	Is there poor contact in connector?	Repair the connector.	Replace the A/C control module.

B: IN-VEHICLE SENSOR

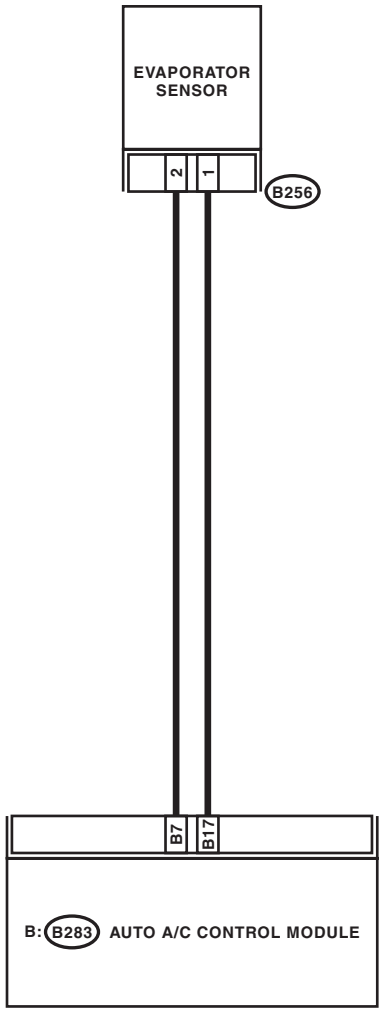
TROUBLE SYMPTOM:

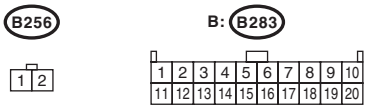
• When turning the AUTO switch to ON, blower fan speed, air flow outlet and FRESH/RECIRC is not changed.

• If the switch LED indicates that the sensor is malfunctioning, replace the A/C control module. The in-vehicle sensor is built into the A/C control module and cannot be replaced as a single unit.

C: EVAPORATOR SENSOR

WIRING DIAGRAM:





AC-01246

Diagnostic Procedure for Sensors

	Step	Check	Yes	No
1	**CHECK EVAPORATOR SENSOR.** 1) Turn the ignition switch to OFF. 2) Remove the glove box. 3) Disconnect the connector from evaporator sensor. 4) Measure the resistance between connector terminals of evaporator sensor. ***Terminals*** ***No. 1 — No. 2***	Is the resistance approx. 3.3 kΩ at 20°C (68°F)?	Go to step **2.**	Replace the evaporator sensor.
2	**CHECK INPUT SIGNALS FOR EVAPORATOR SENSOR.** 1) Turn the ignition switch to ON. 2) Measure the voltage between connector terminal and chassis ground. ***Connector & terminal*** ***(B256) No. 2 (+) — Chassis ground (−):***	Is the voltage approx. 5 V?	Go to step **6.**	Go to step **3.**
3	**CHECK OUTPUT SIGNALS FROM A/C CONTROL MODULE.** 1) Turn the ignition switch to OFF. 2) Pull out the A/C control module. 3) Turn the ignition switch to ON. 4) Measure the voltage between A/C control module connector terminals. ***Connector & terminal*** ***(B283) No. 7 (+) — No. 17 (−):***	Is the voltage approx. 5 V?	Go to step **4.**	Go to step **6.**
4	**CHECK HARNESS CONNECTOR BETWEEN A/C CONTROL MODULE AND EVAPORATOR SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from A/C control module. 3) Measure the resistance of harness between A/C control module and evaporator sensor. ***Connector & terminal*** ***(B256) No. 2 — (B283) No. 7:***	Is the resistance less than 1 Ω?	Go to step **5.**	Repair the open circuit in harness between A/C control module and evaporator sensor.
5	**CHECK HARNESS CONNECTOR BETWEEN A/C CONTROL MODULE AND EVAPORATOR SENSOR.** Measure the resistance of harness between A/C control module and evaporator sensor. ***Connector & terminal*** ***(B256) No. 1 — (B283) No. 17:***	Is the resistance less than 1 Ω?	Go to step **6.**	Repair the open circuit in harness between A/C control module and evaporator sensor.
6	**CHECK POOR CONTACT.** Check poor contact in A/C control module connector.	Is there poor contact in connector?	Repair the connector.	Replace the A/C control module.

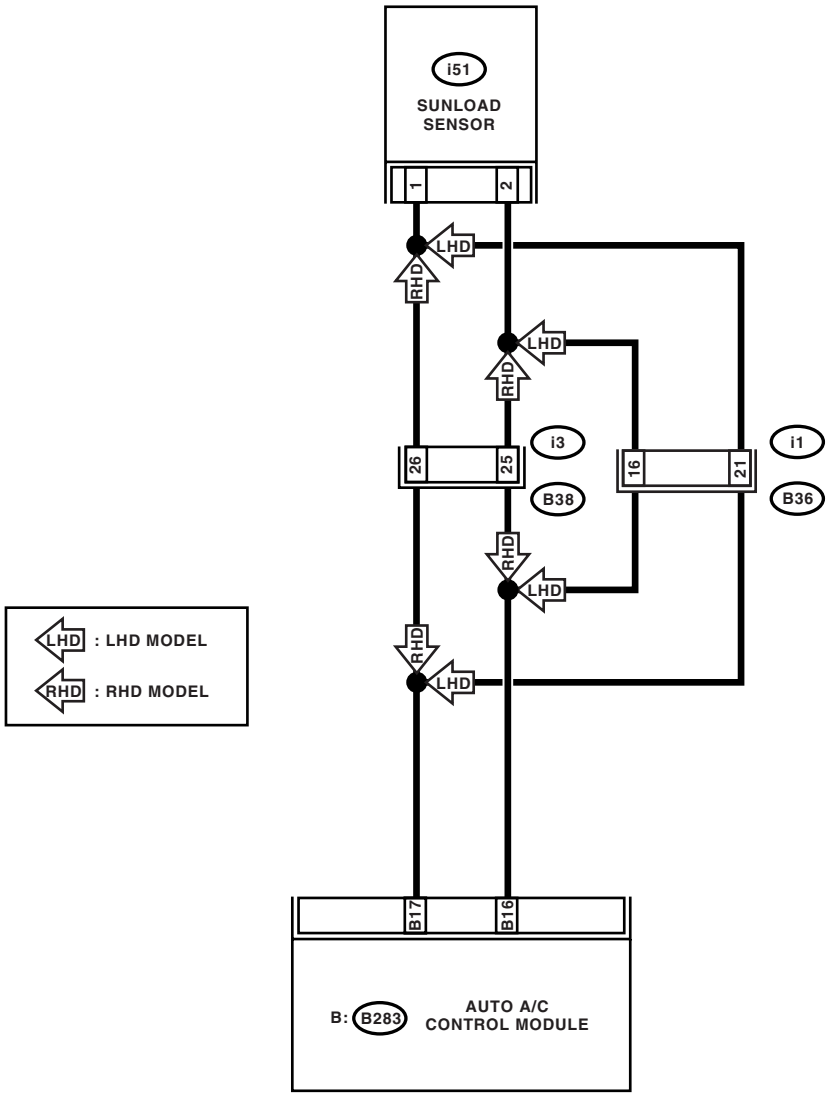
D: SUNLOAD SENSOR

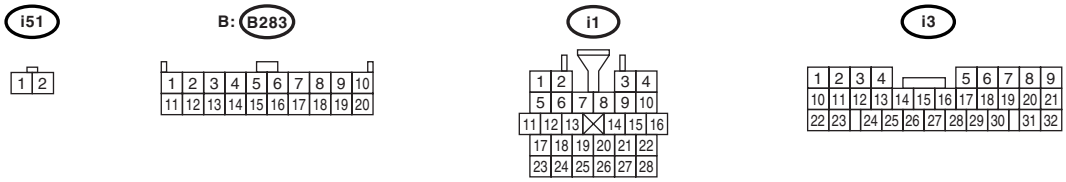
TROUBLE SYMPTOM:

- Sensor identified that sunlight is at maximum. Then, A/C system is controlled to COOL side.
- Sensor identified that sunlight is at minimum. Then, A/C system is controlled to HOT side.

NOTE:
When the sunload sensor is checked indoors or in the shade, open circuit might be indicated. Always check the sunload sensor at a place where sun shines directly on it.

WIRING DIAGRAM:





AC-01247

Diagnostic Procedure for Sensors

	Step	Check	Yes	No
1	**CHECK INPUT VOLTAGE TO SUNLOAD SENSOR.** 1) Turn the ignition switch to ON. 2) Measure the input voltage to sunload sensor. ***Connector & terminal*** ***(i51) No. 2 (+) — Chassis ground (–):***	Is the voltage approx. 5 V?	Go to step **3.**	Go to step **2.**
2	**CHECK HARNESS CONNECTOR BETWEEN A/C CONTROL MODULE AND SUNLOAD SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from A/C control module. 3) Measure the resistance of harness between A/C control module and sunload sensor. ***Connector & terminal*** ***(i51) No. 2 — (B283) No. 16:***	Is the resistance less than 1 Ω?	Go to step **3.**	Repair the open circuit in harness between A/C control module and sunload sensor.
3	**CHECK HARNESS CONNECTOR BETWEEN A/C CONTROL MODULE AND SUNLOAD SENSOR.** Measure the resistance of harness between A/C control module and sunload sensor. ***Connector & terminal*** ***(i51) No. 1 — (B283) No. 17:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the open circuit in harness between A/C control module and sunload sensor.
4	**CHECK THE INPUT VOLTAGE TO A/C CONTROL MODULE.** 1) Connect the A/C control module connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between A/C control module connector terminals. ***Connector & terminal*** ***(B283) No. 16 (+) — (B283) No. 17 (–):***	Is the voltage approx. 2.5 V?	Go to step **5.**	Replace the sunload sensor.
5	**CHECK POOR CONTACT.** Check poor contact in A/C control module connector.	Is there poor contact in connector?	Repair the connector.	Replace the A/C control module.

9. Diagnostics with Phenomenon

A: INSPECTION

Symptom	Problem parts
A/C system fails to operate.	• Fuse (M/B No. 2, F/B No. 9, 17) • Connector (Poor contact) • Ground • Auto A/C control module • Blower fan motor • Blower fan relay • A/C Relay • Compressor (Magnet clutch) • Evaporator sensor
Fuse is blown out.	• Fuse (M/B No. 2, F/B No. 9, 17) • Connector (Poor contact)
Blower fan does not rotate or fan speed cannot be controlled.	• Fuse (F/B No. 1, 2, 17) • Connector (Poor contact) • Ground • Auto A/C control module • Blower fan motor • Blower fan relay
Unable to switch suction vents.	• Connector (Poor contact) • Auto A/C control module • Intake door actuator
Unable to switch blow vents.	• Connector (Poor contact) • Auto A/C control module • Mode door actuator
Compartment temperature does not increase. (No hot air is discharged.)	• Connector (Poor contact) • Auto A/C control module • Air mix door actuator • In-vehicle sensor, ambient sensor, evaporator sensor and sunload sensor • In-vehicle sensor aspirator hose
Compartment temperature does not decrease. (No cool air is discharged.)	• Connector (Poor contact) • Auto A/C control module • Air mix door actuator • A/C Relay • Compressor (Magnet clutch) • Radiator fan motor • Radiator fan relay • In-vehicle sensor, ambient sensor, evaporator sensor and sunload sensor • In-vehicle sensor aspirator hose
Compartment temperature is higher or lower than setting temperature.	• Auto A/C control module • Air mix door actuator • In-vehicle sensor, ambient sensor, evaporator sensor and sunload sensor • In-vehicle sensor aspirator hose
Compartment temperature does not quickly respond to setting temperature.	• Air mix door actuator • In-vehicle sensor, ambient sensor, evaporator sensor and sunload sensor • In-vehicle sensor aspirator hose
Radiator fan does not rotate during A/C operation.	• Radiator fan motor • Radiator fan relay

AIRBAG SYSTEM

AB

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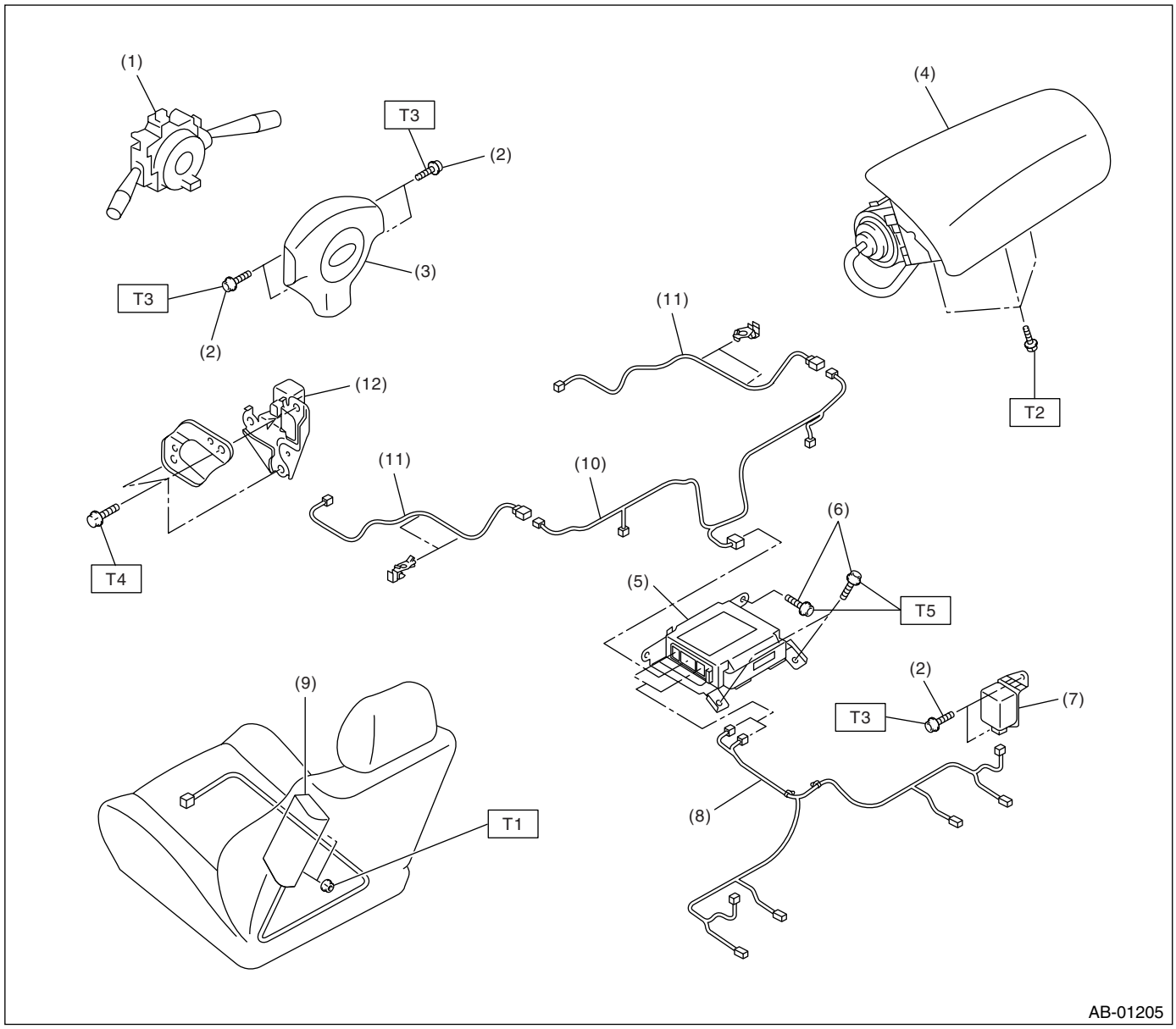
1. General Description

A: COMPONENT

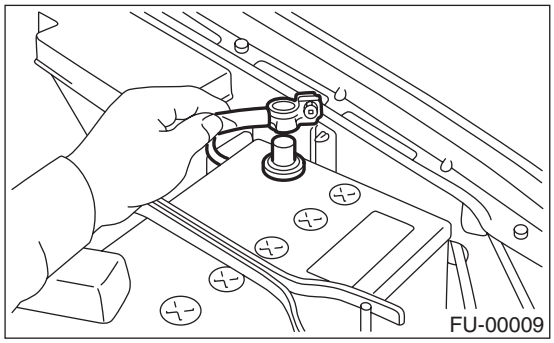
1. SRS AIRBAG



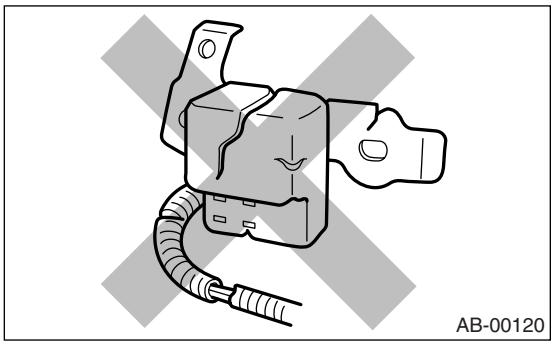
(1)	Combination switch ASSY with roll connector	(6)	Hexagon head bolt (exclusive use)	***Tightening torque: N·m (kgf-m, ft-lb)***
(2)	TORX® bolt T30	(7)	Side airbag sensor	***T1: 6 (0.61, 4.4)***
(3)	Airbag module ASSY (Driver's side)	(8)	Side airbag harness	***T2: 7.5 (0.76, 5.5)***
(4)	Airbag module ASSY (Passenger's side)	(9)	Side airbag module	***T3: 10 (1.0, 7.2)***
(5)	Airbag control module	(10)	Airbag main harness	***T4: 20 (2.0, 14.5)***
		(11)	Front sub sensor harness	***T5: 25 (2.5, 18.1)***
		(12)	Front sub sensor	

B: CAUTION

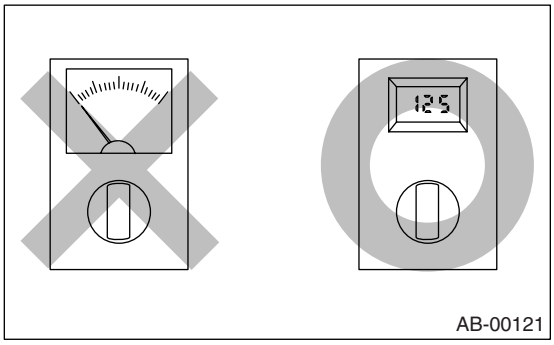
• When servicing a vehicle, be sure to turn the ignition switch to OFF, disconnect the ground cable from battery, and wait for more than 20 seconds before starting work.
• The airbag system is fitted with a backup power source. If the airbag system is serviced within 20 seconds after the ground cable is disconnected, it may inflate.



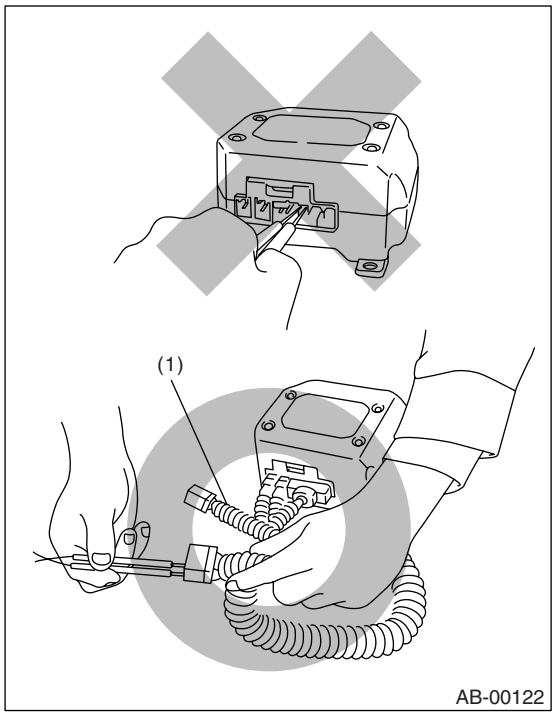
• If the airbag warning light illuminates, repair the vehicle immediately. Airbag or pretensioner may inflate incorrectly, or not inflate in collision.
• If sensors, airbag module, airbag control module, pretensioner, and harness are deformed or damaged, replace them with new genuine parts.



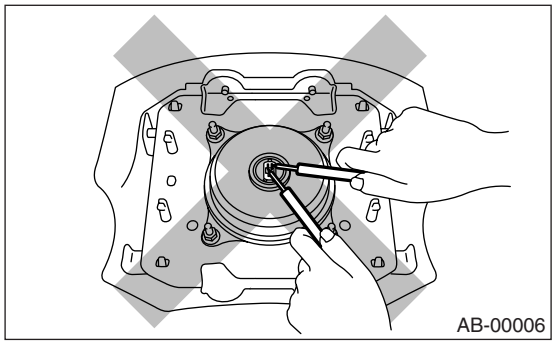
• When checking the airbag system, be sure to use a digital circuit tester.
Infinitesimal electric current in an analog circuit tester may cause the airbag to activate erroneously.



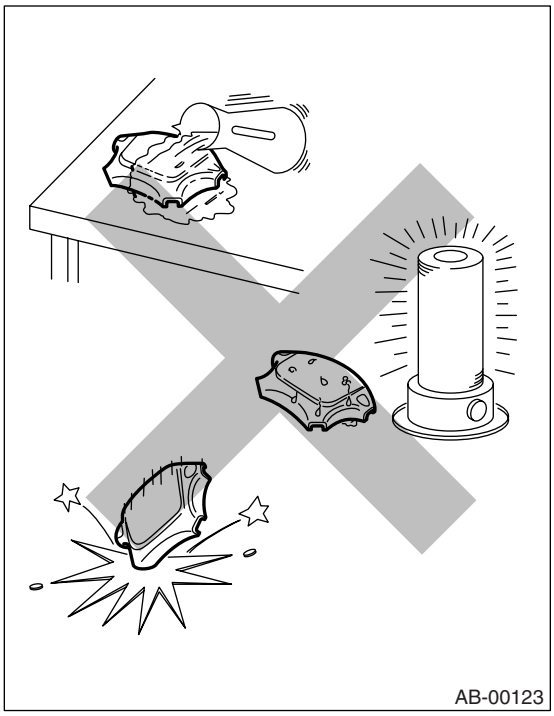
• When checking, use a test harness (1). Do not directly apply the tester probe to any connector terminal of the airbag. Damage to the connector terminal may cause the airbag to activate erroneously.



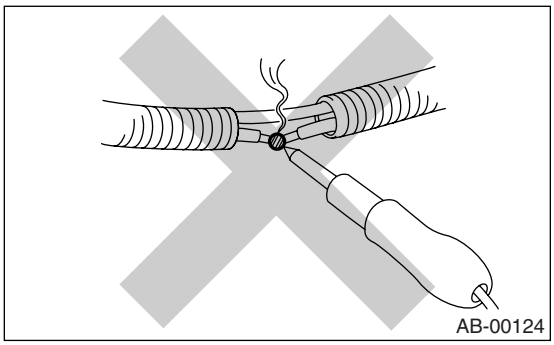
• Do not check continuity of either of the airbag modules for driver, passenger or side, or pretensioner.



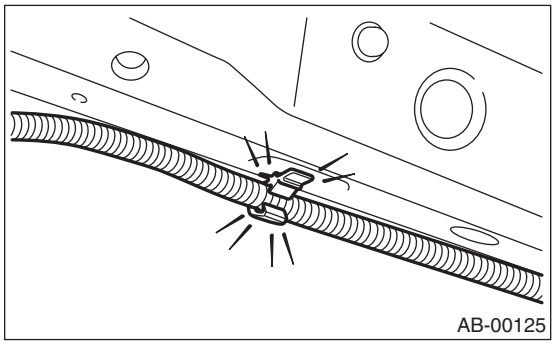
• Do not drop the airbag modulator parts, subject them to high temperature over 93°C (199°F), or let water, oil, or grease get on them; otherwise, the internal parts may be damaged and reliability greatly lowered.


AB-00123

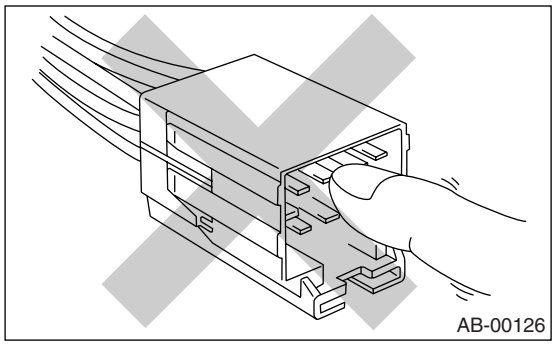
• If any damage, opening, or rust is found on the airbag system wire harness, do not attempt to repair using soldering equipment. Be sure to replace the faulty harness with a new genuine part.


AB-00124

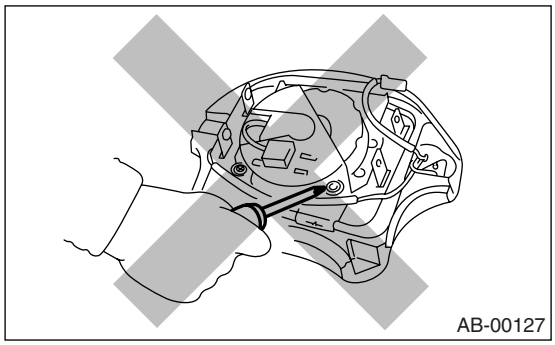
• Install the wire harness securely with the specified clips to avoid interference or tangled up with other parts.


AB-00125

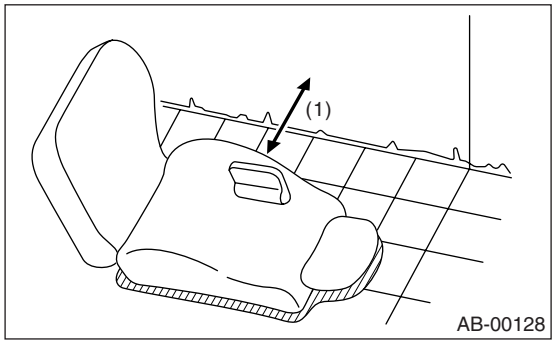
• Do not allow water or oil to come in contact with the connector terminals. Do not touch the connector terminals.


AB-00126

• Either of the airbag modules for driver, passenger or side, or pretensioner must not be disassembled.


AB-00127

• The removed front seat with the airbag module must be kept at least 200 mm (8 in) away from walls and other objects.

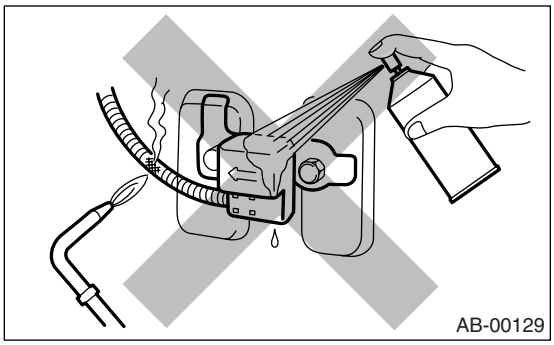


AB-00128

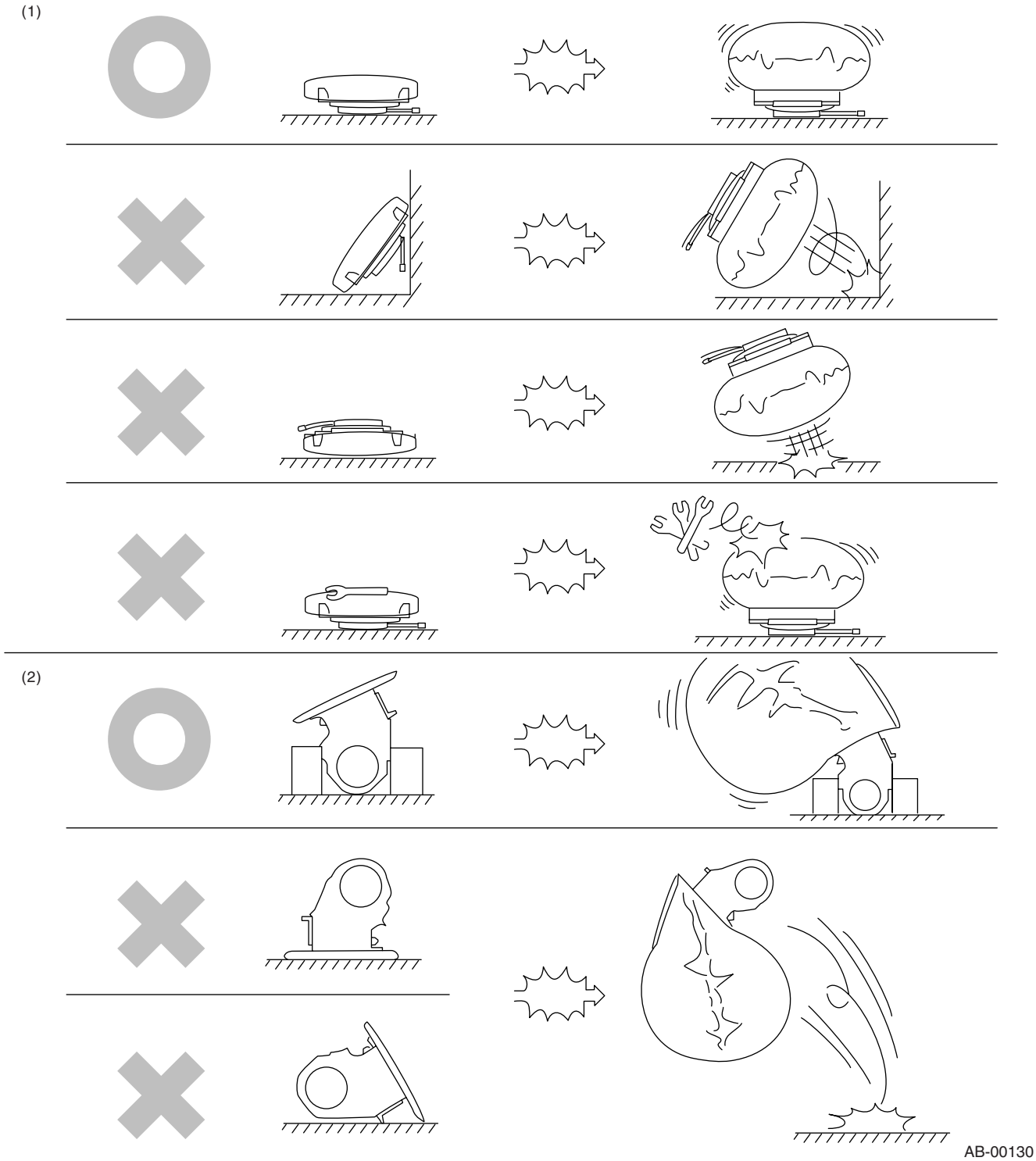
(1) More than 200 mm (8 in)

• Do not use the airbag or pretensioner parts from other vehicles. Always replace defective parts with new parts.
• Never reuse a deployed airbag or pretensioner.
• When painting or performing sheet metal work on the front part of the vehicle, including the front wheel apron, front fender, and front side frame, remove the front sub sensors and wire harness of the airbag system.

• When painting or performing sheet metal work on the side of the vehicle, including the side sill, center pillar, and front and rear doors, remove the side airbag sensors and wire harness of the airbag system.



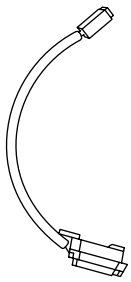
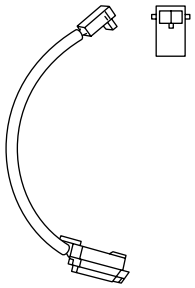
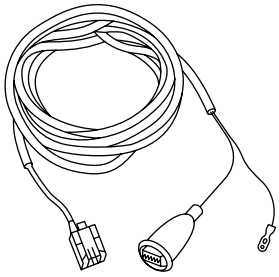
• When storing a removed airbag module, do not place any objects on it or pile airbag modules on top of each other. If the airbag inflates for some reason when it is placed with its pad side facing downward or under any object, a serious accident may result.



(1) Driver's airbag module (2) Passenger's airbag module

C: PREPARATION TOOL

1. SPECIAL TOOLS

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST98299FC030	98299FC030	DEPLOYMENT ADAPTER A	• Used for deploying the driver's airbag module. • Used for deploying the passenger's airbag module. • Used for deploying the side airbag module. • Used with DEPLOYMENT TOOL (98299PA030).
 ST98299SA010	98299SA010	DEPLOYMENT ADAPTER D	• Used for deploying the driver's airbag module. • Used with DEPLOYMENT TOOL (98299PA030). • Can not reuse.
 ST98299PA030	98299PA030	DEPLOYMENT TOOL	• Used for deploying the airbag module. • Used with each DEPLOYMENT ADAPTER.

2. GENERAL TOOL

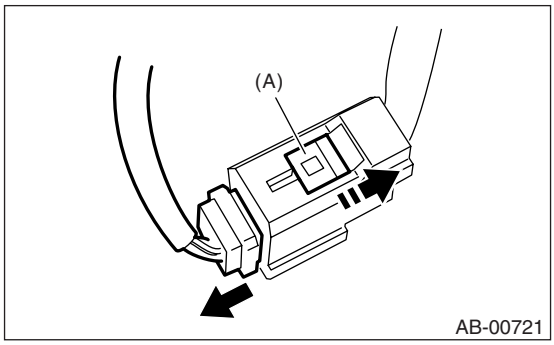
TOOL NAME	REMARKS
TORX® T30	Used for removal/installation of driver's airbag module.

2. Airbag Connector

A: PROCEDURE

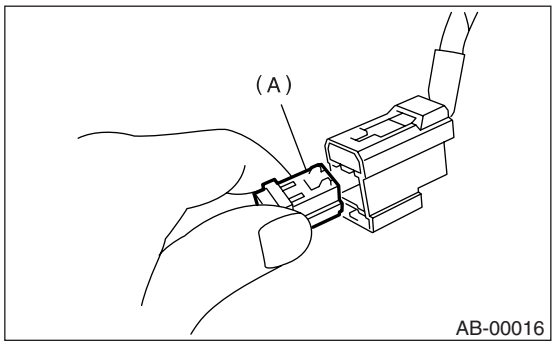
1. POWER SUPPLY

1) How to disconnect:
(1) Move the slide lock (A) in the direction of the arrow.
(2) Disconnect the connector with slide lock (A) moved.



CAUTION:
When pulling the slide lock or disconnecting the connector, be sure to hold onto the connector and not the wire.

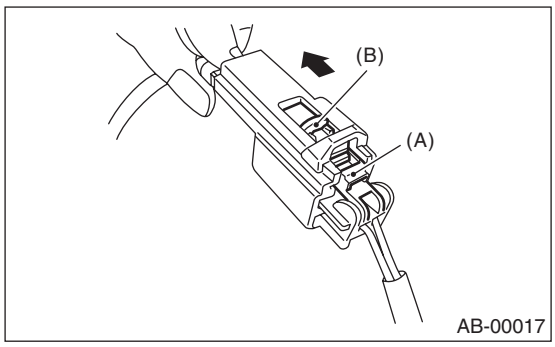
2) How to connect:
Holding the connector (A), and push it in carefully until a connecting sound is heard.



CAUTION:
Be sure to insert the connector in until it locks. Then pull on it gently to make sure that it is locked.

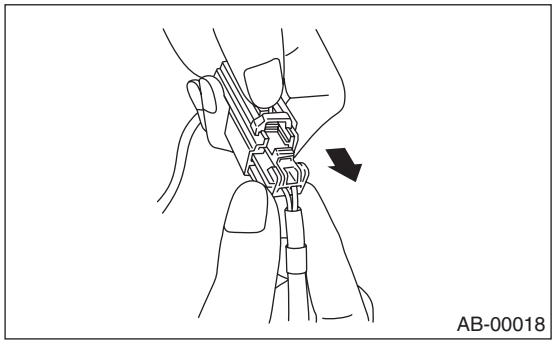
2. DRIVER'S AIRBAG (BETWEEN AIRBAG HARNESS AND ROLL CONNECTOR), PASSENGER'S AIRBAG AND SIDE AIRBAG

1) How to disconnect:
(1) Push the lock arm (A).
(2) With the lock arm (A) pushed in, move the slide lock (B) in the direction of the arrow.



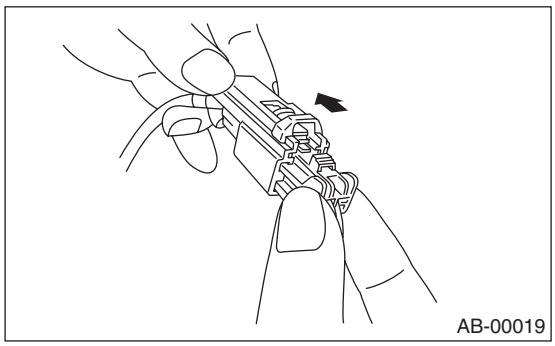
(3) With the slide lock (B) pulled, release the lock arm (A) to its original position, and then disconnect the connector.

CAUTION:
When pulling the slide lock or disconnecting the connector, be sure to hold onto the connector and not the wire.



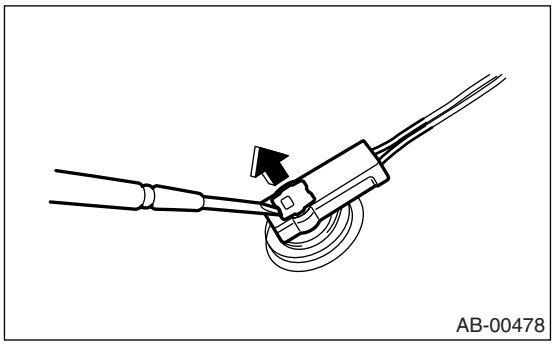
2) How to connect:
Holding the connector, and push it in carefully until a connecting sound is heard.

CAUTION:
Be sure to insert the connector in until it locks. Then pull on it gently to make sure that it is locked.

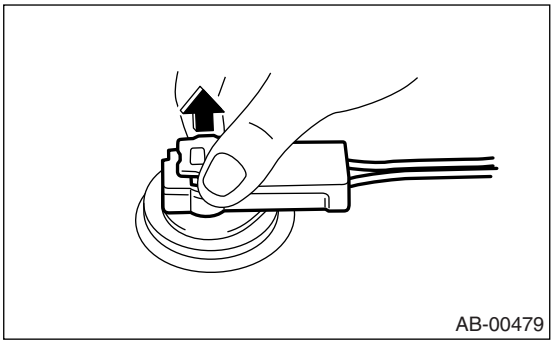


3. DRIVER'S AIRBAG MODULE AND PRE-TENSIONER

1) How to disconnect:
(1) Using a flat tip screwdriver, pry the push lock upward to unlock.

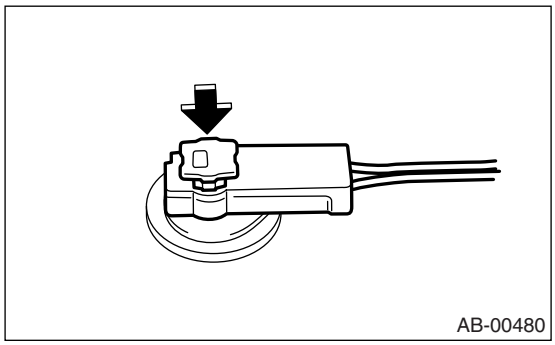


(2) Pull the connector to disconnect from driver's side airbag module assembly.



2) How to connect:
Connect the connector in reverse order of disconnecting. At this time, be sure to insert the connector in until connecting sound is heard.

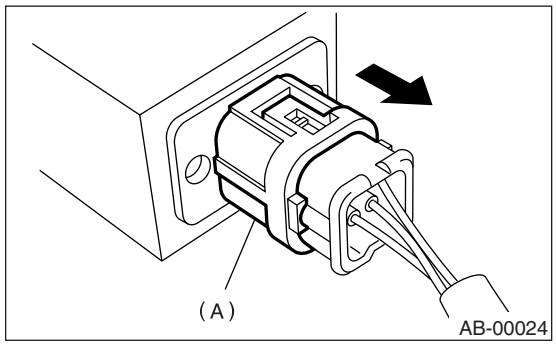
CAUTION:
• Be sure to insert the connector in until it locks. Then pull on it gently to make sure that it is locked.
• At this time, be sure to insert the push lock in.



4. FRONT SUB-SENSOR AND SIDE AIRBAG SENSOR

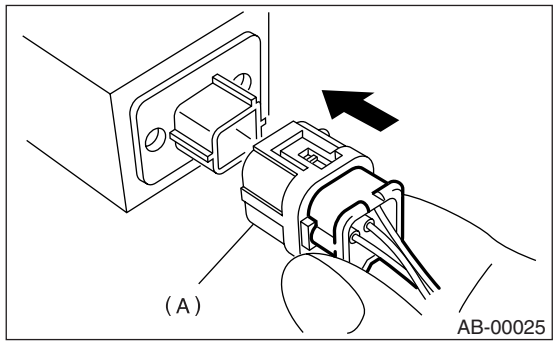
1) How to disconnect:
Holding outer part (A), pull it in the direction of the arrow.

CAUTION:
When pulling the slide lock or disconnecting the connector, be sure to hold onto the connector and not the wire.



2) How to connect:
Holding the connector, and push it in carefully until a connecting sound is heard.

CAUTION:
• Outer (A) moves back, and so do not put your hand on the outer part.
• Be sure to insert the connector in until it locks. Then pull on it gently to make sure that it is locked.



3. Inspection Locations After a Collision

A: REPLACEMENT

When airbag system is deployed, replace the following parts.

1. FRONT COLLISION

1) Driver's airbag module
2) Passenger's airbag module
3) Driver's seat belt (pretensioner)
4) Passenger's seat belt (pretensioner)
5) Airbag control module
6) Front sub-sensor
7) Roll connector

2. SIDE COLLISION

1) Airbag control module
2) Side airbag module (operating side)
3) Side airbag module (operating side)

3. INSPECTION OF OTHER PARTS

Check for the following parts, replace the damaged parts with new ones.
1) Steering wheel and steering shaft
Check the steering wheel and steering shaft for mounting condition and deflection of axial and radical, upward and downward direction. Check the steering shaft for deflection of axial and radical direction with tilt lever released. (After a collision, absorbing part of steering shaft may inflate.)
2) Check the direct type connector of driver's airbag module, pretensioner, etc. for damage, and also check each harness for pinch and connector damage. If damage is found, replace the harness as a unit.

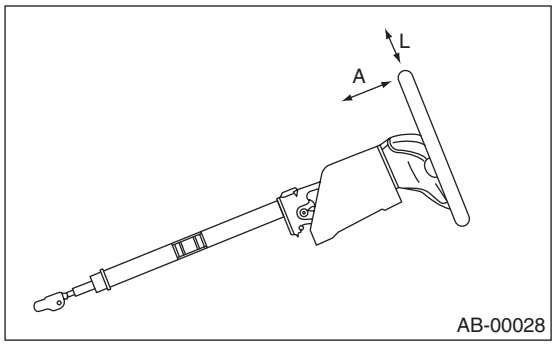
B: INSPECTION

If the vehicle is involved in a collision on any side, even if it is a slight collision, be sure to check the following system parts.

1. DRIVER'S AIRBAG MODULE

1) Check for the following, and replace damaged parts with new parts.
• Airbag module is cracked or deformed.
• Harness and/or connector is cracked, deformed or open. Lead wire is exposed.
• The module surface is fouled with grease, oil, water or cleaning solvent.
2) When installing a new driver's airbag module, check the following and replace the damaged parts with new ones.
• The steering wheel is in the way, making it difficult to install the airbag module.
• The clearance between the driver's airbag module and steering wheel is not constant.
• The steering wheel deformation in axial and radial directions exceed limits.

Specifications:
Height deflection A
Less than 6 mm (0.24 in)
O.D. deflection L
Less than 17 mm (0.67 in)



2. PASSENGER'S AIRBAG MODULE

Check for the following, and replace damaged parts with new parts.
• Airbag module is cracked or deformed.
• Harness and/or connector is cracked, deformed or open. Lead wire is exposed.
• Mounting bracket is cracked or deformed.

3. SIDE AIRBAG MODULE

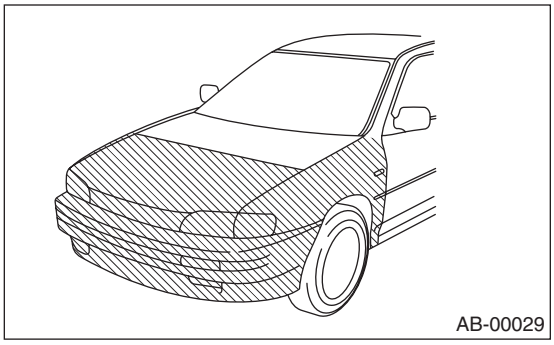
Check for the following, and replace damaged parts with new parts.
• Front seat, airbag module and mounting bracket are damaged or deformed.
• Harness and/or connector is cracked, deformed or open.
• Lead wire is exposed.

4. AIRBAG CONTROL MODULE

Check for the following, and replace damaged parts with new parts.
• Control module is cracked or deformed.
• Mounting bracket is cracked or deformed.
• Connector is scratched, cracked or deformed.
• Airbag is deployed.
• Side airbag is deployed.

5. FRONT SUB SENSOR

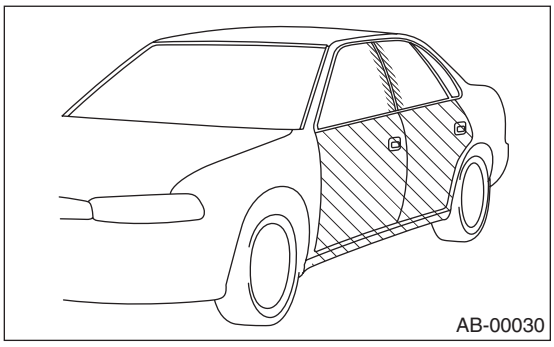
If the section of vehicle as shown in the figure is damaged, check for the following items, and replace the damaged parts with new parts.



- Front sub sensor is cracked or deformed.
- Mounting bracket is cracked or deformed.
- Connector is scratched, cracked or deformed.
- Airbag is deployed.

6. SIDE AIRBAG SENSOR

If the section of vehicle as shown in the figure is damaged, check for the following items, and replace the damaged parts with new parts.



- Side airbag sensor is cracked or deformed.
- Mounting bracket is cracked or deformed.
- Connector is scratched, cracked or deformed.
- Side airbag is deployed. (operating side)

7. ROLL CONNECTOR

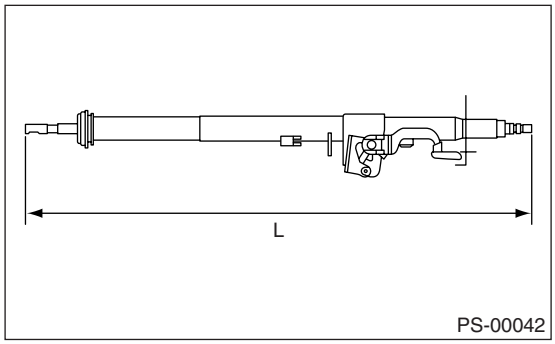
Check for the following, and replace damaged parts with new parts.

- Combination switch or steering roll connector is cracked or deformed.

8. STEERING SHAFT

Check for the following, and replace damaged parts with new parts.
Overall length of steering column should be within specifications.

Specifications:
Overall length L
818.7±1.5 mm (32.23±0.06 in)



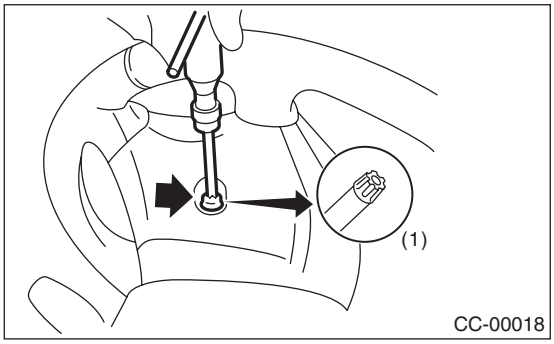
If necessary, replace it with a new part.

4. Driver's Airbag Module

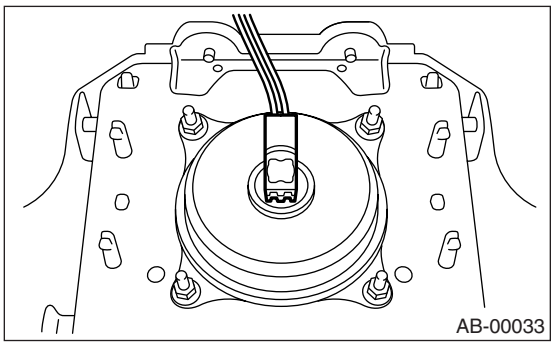
A: REMOVAL

CAUTION:
Refer to "CAUTION" in General Description before handing the airbag module. <Ref. to AB-3, CAUTION, General Description.>

1) Position the front wheels straight ahead. (After moving the vehicle more than 5 m (16 ft) with front wheels positioned straight ahead, make sure that the vehicle moves straight ahead).
2) Turn the ignition switch to OFF.
3) Disconnect the ground cable from battery, and wait for at least 20 seconds before starting work.
4) Using the TORX® BIT T30 (1), remove the two TORX® bolts on side of steering wheel.



5) Disconnect the horn harness.
6) Disconnect the airbag connector on the back of airbag module, and then remove the airbag module. <Ref. to AB-8, PROCEDURE, Airbag Connector.>



7) Refer to "CAUTION" for handling of a removed airbag module. <Ref. to AB-3, CAUTION, General Description.>

B: INSTALLATION

Install in the reverse order of removal.

CAUTION:
Do not allow harness and connectors to interfere or get tangled up with other parts.

Tightening torque:
Refer to "COMPONENT" in "General Description" <Ref. to AB-2, SRS AIRBAG, COMPONENT, General Description.>

C: INSPECTION

CAUTION:
Refer to "CAUTION" in General Description before handing the airbag module. <Ref. to AB-3, CAUTION, General Description.>

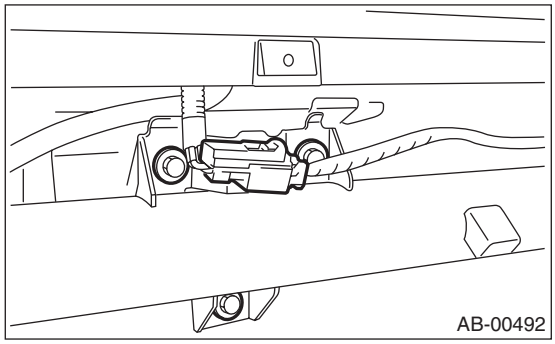
Check for the following, and replace damaged parts with new parts.
• Airbag module, harness, connector, and mounting bracket are damaged.

5. Passenger's Airbag Module

A: REMOVAL

CAUTION:
Refer to "CAUTION" in General Description before handing the airbag module. <Ref. to AB-3, CAUTION, General Description.>

1) Turn the ignition switch to OFF.
2) Disconnect the ground cable from battery, and wait for at least 20 seconds before starting work.
3) Remove the glove box. <Ref. to EI-42, REMOVAL, Glove Box.>
4) Detach the airbag connector from support beam bracket, and then disconnect the airbag connector.



5) Remove the three bolts, and then carefully remove the airbag module.
6) Refer to "CAUTION" for handling of a removed airbag module. <Ref. to AB-3, CAUTION, General Description.>

B: INSTALLATION

Install in the reverse order of removal.

CAUTION:
Do not allow harness and connectors to interfere or get tangled up with other parts.

Tightening torque:
Refer to "COMPONENT" in "General Description" <Ref. to AB-2, SRS AIRBAG, COMPONENT, General Description.>

C: INSPECTION

CAUTION:
Refer to "CAUTION" in General Description before handing the airbag module. <Ref. to AB-3, CAUTION, General Description.>

Check for the following, and replace damaged parts with new parts.
• Airbag module, harness, connector, and mounting bracket are damaged.

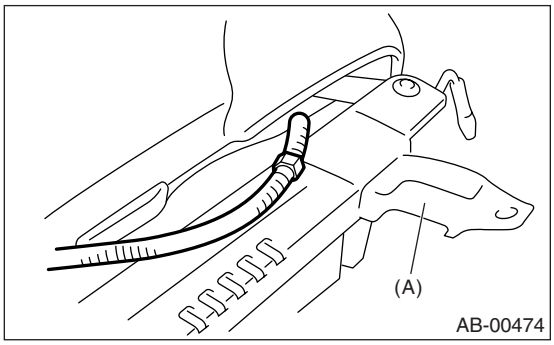
6. Side Airbag Module

A: REMOVAL

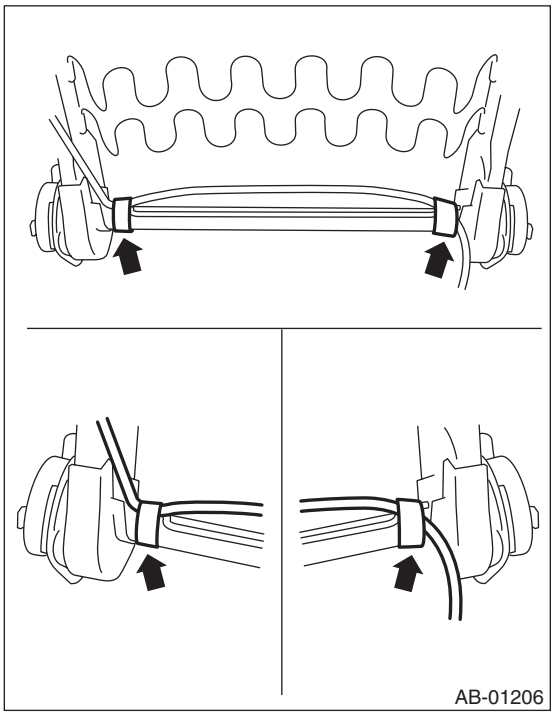
CAUTION:
Before working on the airbag module, refer to the "CAUTION" in General Description. <Ref. to AB-3, CAUTION, General Description.>

NOTE:
Remove the passenger's side by referring to driver's side.

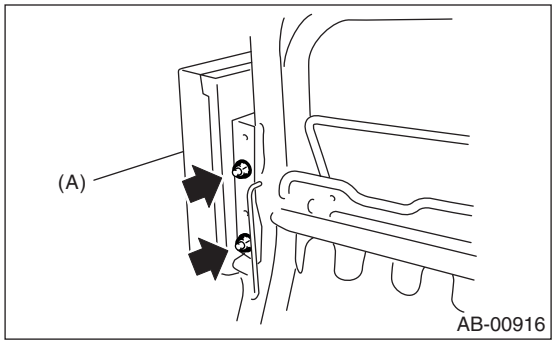
1) Turn the ignition switch to OFF.
2) Disconnect the ground cable from battery, and wait for at least 20 seconds before starting work.
3) Remove the front seat from the vehicle. <Ref. to SE-6, REMOVAL, Front Seat.>
4) Remove the clip, and then remove the side airbag harness from slide rail IN (A) and reverse side of seat cushion assembly.



5) Remove the backrest cover. <Ref. to SE-6, DISASSEMBLY, Front Seat.>
6) Remove the side airbag harness from backrest frame assembly.



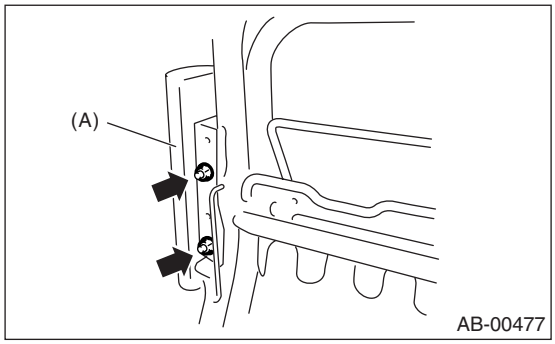
7) Remove the side airbag module (A) from backrest frame assembly.



B: INSTALLATION

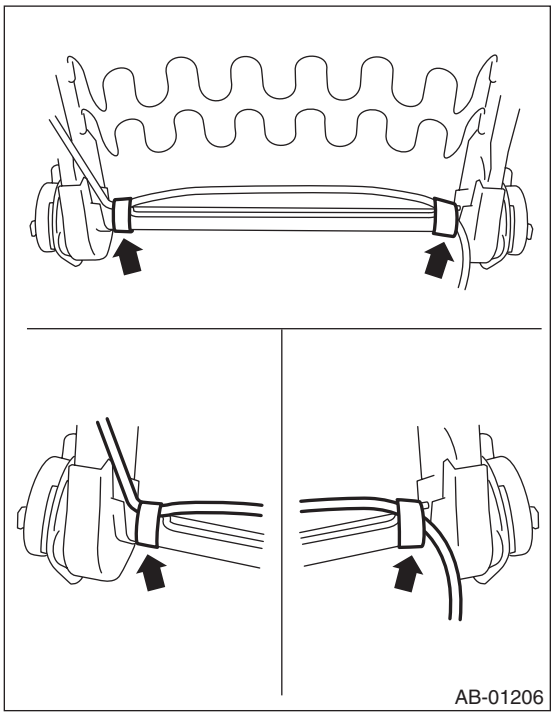
1) Ensure there are no foreign particles on side airbag module.
2) Install the side airbag module (A) to backrest frame assembly.

Tightening torque:
6 N·m (0.61 kgf-m, 4.4 ft-lb)

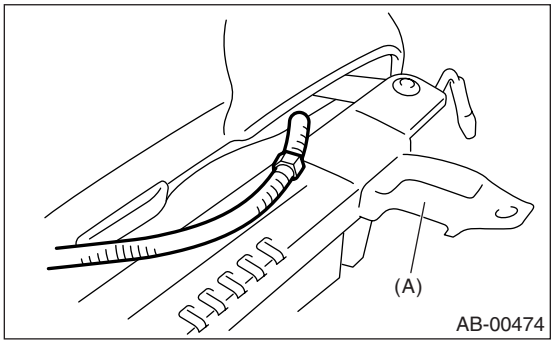


3) Install the side airbag harness to backrest frame assembly.

NOTE:
Secure the harness to its original position of seat.



4) Install the backrest cover. <Ref. to SE-11, ASSEMBLY, Front Seat.>
5) Install the side airbag harness to slide rail IN (A).



6) Recline the seat or slide it backward and forward. Check there is no contact between seat backrest assembly, cushion cover assembly and side airbag harness.

C: INSPECTION

CAUTION:
Before working on the airbag module, refer to the "CAUTION" in General Description. <Ref. to AB-3, CAUTION, General Description.>

Perform the inspection of following items, and replace the damaged parts with new ones. <Ref. to AB-10, SIDE AIRBAG MODULE, INSPECTION, Inspection Locations After a Collision.>
1) With side clash (when side airbag is deployed)
<Replacement parts>
- Side airbag module assembly
- Backrest pad assembly
- Backrest frame assembly
- Backrest cover assembly

<Other replacement parts, which found to be damaged by visual check>
- Headrest assembly
- Bush
- Slide rail OUT
- Slide rail IN
- Seat hinge cover
- Seat lifter dial
- Reclining lever
- Side airbag harness and connector (body side)

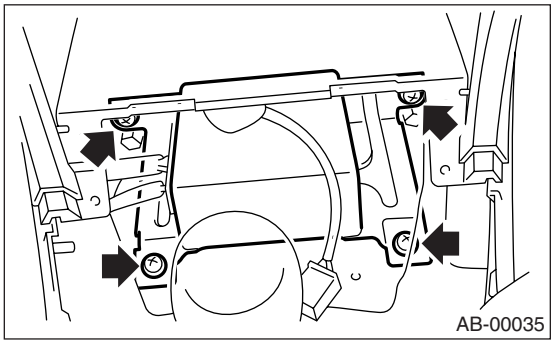
2) With side clash (when side airbag is not deployed)
Check the seat and airbag module visually, and then replace them with new ones if damaged or cracked.
Specially inspect the damage of airbag module body, installing bracket, harness connector.
3) Without side clash (dirt and damage of cover)
Replace the corresponding part with a new one.

7. Airbag Control Module

A: REMOVAL

CAUTION:
• Do not disassemble the airbag control module.
• If the airbag control module is deformed or if water damage is suspected, replace the airbag control module with a new genuine part.
• Do not drop the airbag control module.
• After removal, keep the airbag control module on a dry, clean surface away from moisture, heat, and dust.

1) Turn the ignition switch to OFF.
2) Disconnect the ground cable from battery, and wait for at least 20 seconds before starting work.
3) Remove the console cover. <Ref. to EI-45, REMOVAL, Console Box.>
4) Remove the center console panel. <Ref. to EI-46, REMOVAL, Instrument Panel Assembly.>
5) Disconnect the connector from airbag control module.
6) Remove the four bolts to remove airbag control module.



B: INSTALLATION

CAUTION:
Use new hexagon head bolts (exclusive part) during installation.

Install in the reverse order of removal.

Tightening torque:
Refer to "COMPONENT" in "General Description" <Ref. to AB-2, SRS AIRBAG, COMPONENT, General Description.>

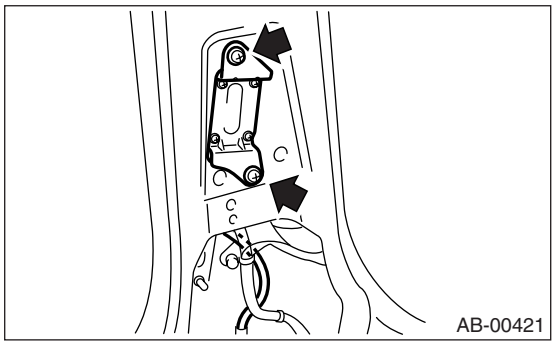
C: INSPECTION

Check for the following, and replace damaged parts with new parts.
• Control module, connector, and mounting bracket are damaged.
• Airbag is deployed.
• Side airbag is deployed.

8. Side Airbag Sensor

A: REMOVAL

1) Turn the ignition switch to OFF.
2) Disconnect the ground cable from battery, and wait for at least 20 seconds before starting work.
3) Remove the outer seat belt (FRONT). <Ref. to SB-12, INNER SEAT BELT ASSEMBLY, REMOVAL, Front Seat Belt.>
4) Detach the side airbag sensor, and then disconnect the airbag connector.



B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
Refer to "COMPONENT" in "General Description" <Ref. to AB-2, SRS AIRBAG, COMPONENT, General Description.>

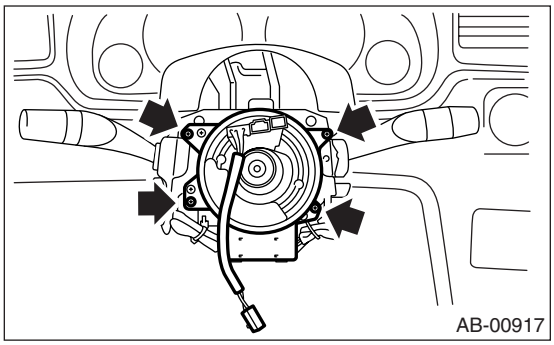
C: INSPECTION

Check for the following, and replace damaged parts with new parts.
• Bracket or connector for side airbag sensor is damaged.
• Side airbag is deployed.

9. Roll Connector

A: REMOVAL

1) Turn the ignition switch to OFF.
2) Disconnect the ground cable from battery, and wait for at least 20 seconds before starting work.
3) Remove the driver's airbag module. <Ref. to AB-12, Driver's Airbag Module.>
4) Remove the steering wheel. <Ref. to PS-28, REMOVAL, Steering Wheel.>
5) Remove the steering column cover.
6) Remove the screws, and then remove the roll connector.



B: INSTALLATION

1) Install in the reverse order of removal.
2) Before installing the steering wheel, be sure the direction of roll connector is adjusted with steering. <Ref. to AB-18, ADJUSTMENT, Roll Connector.>

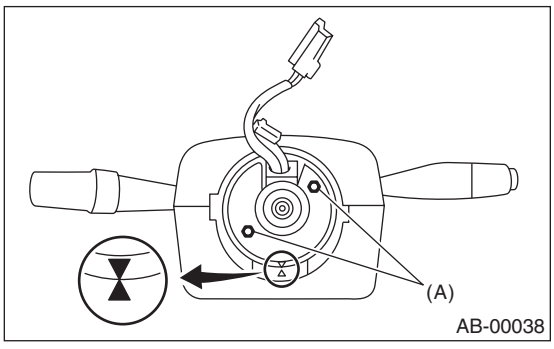
C: INSPECTION

Check for the following, and replace damaged parts with new parts.

- Combination switch and roll connector is cracked or deformed.

D: ADJUSTMENT

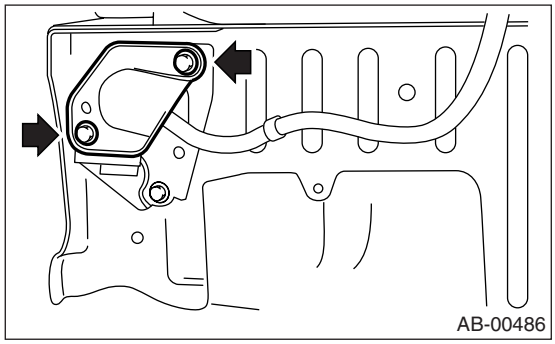
1) Check that the front wheels are positioned in straight ahead direction.
2) Turn the roll connector pin (A) clockwise until it stops.
3) Turn the roll connector pin (A) counterclockwise approx. 3.25 turns until "▲" marks are aligned.



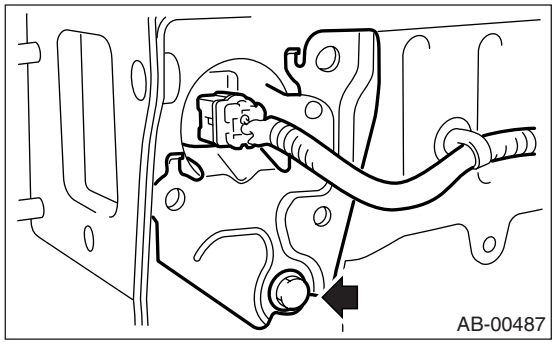
10.Front Sub Sensor

A: REMOVAL

1) Turn the ignition switch to OFF.
2) Disconnect the ground cable from battery, and wait for at least 20 seconds before starting work.
3) Remove the front bumper. <Ref. to EI-23, REMOVAL, Front Bumper.>
4) Loosen the two bolts to remove the sensor cover.



5) Remove the bolt, and then detach the front sub sensor.



6) Disconnect the connector from front sub sensor.

B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
Refer to "COMPONENT" in "General Description" <Ref. to AB-2, SRS AIRBAG, COMPONENT, General Description.>

C: INSPECTION

Check for the following, and replace damaged parts with new parts.
• Front sub sensor, mounting bracket, and connector are damaged.
• Airbag is deployed.

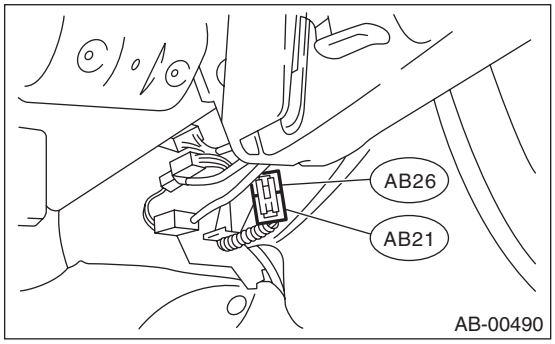
11. Airbag Module Disposal (Deployment Processing On Vehicle)

A: PROCEDURE

CAUTION:
• Do not discard an undeployed airbag module because it may cause serious personal injury when accidentally deployed.
• As a rule, the airbag module should be deployed while still installed in the vehicle. Do not remove it unless necessary.
• Deployment of the airbag module should be done on a flat place free from any possible danger. Avoid deploying outdoors during rainy or windy weather.
• Deploying the airbag module causes a high explosive noise, be sure to warn people in the area, and do not allow anyone within a 5 m (16 ft) radius of the disposal site.
• Some smoke will be emitted from deployment of the airbag module. Therefore, it must be deployed in a well-ventilated place with no fire alarms nearby.
• Wear gloves, goggles, and earplugs during this operation. Wash your hands afterwards.
• After deployment, the airbag module will be especially hot. Leave it unattended for 40 minutes, and then discard it.
• Do not let water get on the deployed airbag module.
• Wrap the deployed airbag module in an airtight vinyl bag, and discard it.
• If circumstances do not permit airbag module deployment, contact a SUBARU dealer.

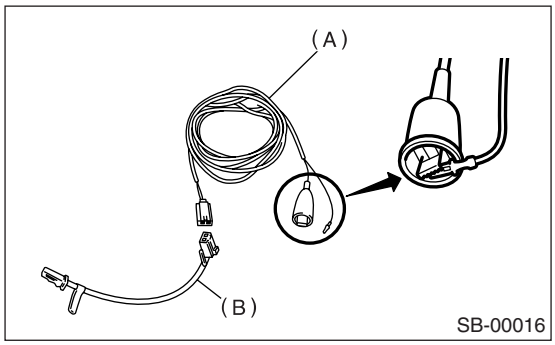
1. DRIVER'S AIRBAG MODULE

1) Turn the ignition switch to OFF.
2) Disconnect the ground cable from battery, and wait for at least 20 seconds before starting work.
3) Remove the instrument panel lower cover.
4) Disconnect the airbag connector (AB26) and (AB21) below steering column.



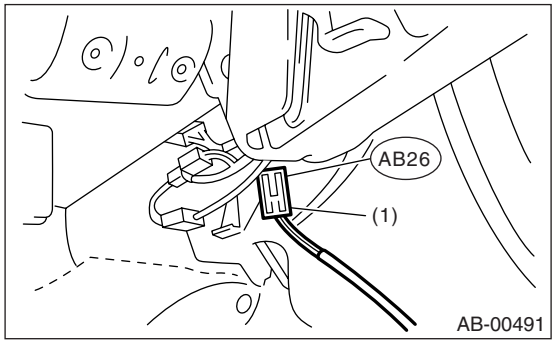
5) Short the terminal to alligator clip furnished as deployment tool (A).
6) Connect the deployment tool (A) and deployment adapter A (B).

CAUTION:
The deployment tool should be kept shorted terminals until just before deployment of the airbag module.



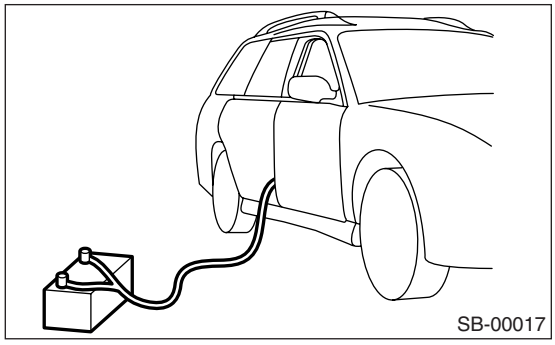
(A) Deployment tool: (Tool No. 98299PA030)
(B) Deployment adapter A: (Tool No. 98299FC030)

7) Connect the deployment adapter A to airbag connector (AB26).



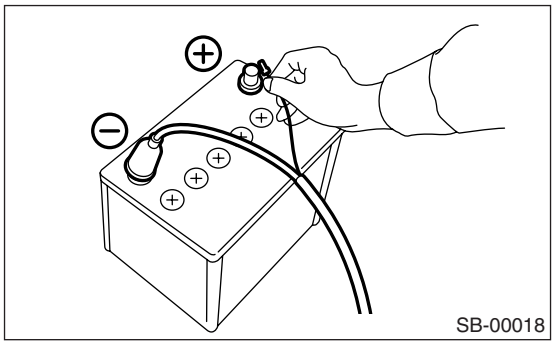
(1) Deployment adapter A: (Tool No. 98299FC030)

8) Extend the deployment tool to the limit, and make sure that the vehicle is empty. Close all windows, sunroof, and rear gate completely.



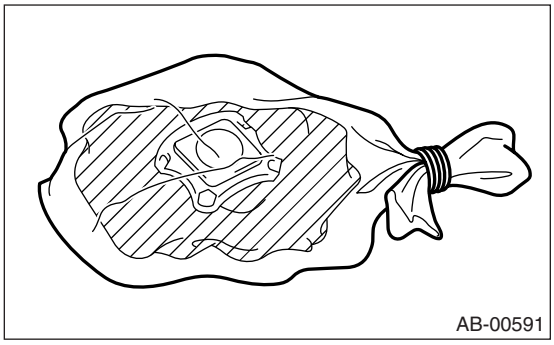
9) Move the battery at least 5 m (16 ft) from vehicle, and secure the nearby area. Connect the deployment tool alligator clip to the battery negative (–) terminal.

10) Connect the other cable of the deployment tool to the battery positive (+) terminal and deploy the airbag module.



CAUTION:
• After deployment, the airbag module will be especially hot. Leave it unattended for 40 minutes, and then discard it.
• Do not let water get on the deployed airbag module.

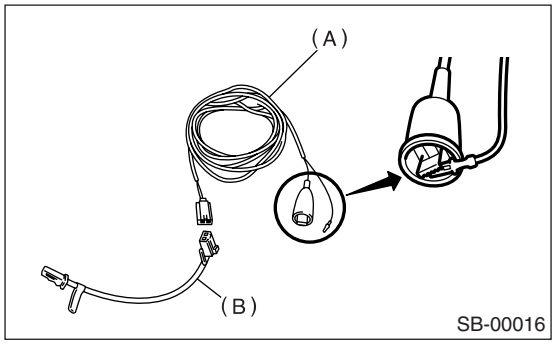
11) Remove the airbag module. <Ref. to AB-12, Driver's Airbag Module.>
12) Wrap the deployed airbag module in an airtight vinyl bag, and discard it.



2. PASSENGER'S AIRBAG MODULE

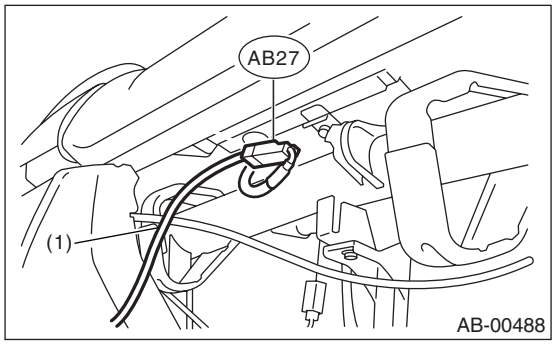
1) Turn the ignition switch to OFF.
2) Disconnect the ground cable from battery, and wait for at least 20 seconds before starting work.
3) Remove the glove box.
4) Disconnect the airbag connectors (AB27).
5) Short the terminal to alligator clip furnished as deployment tool (A).
6) Connect the deployment tool (A) and deployment adapter A (B).

CAUTION:
The deployment tool should be kept shorted terminals until just before deployment of the airbag module.



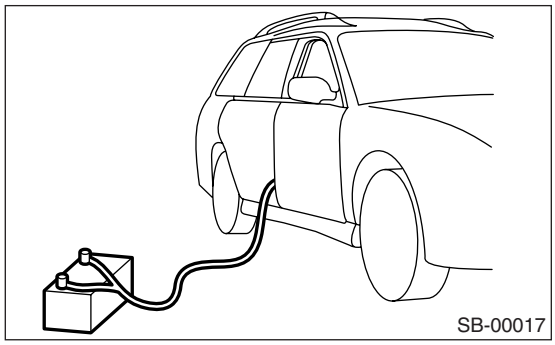
(A) Deployment tool: (Tool No. 98299PA030)
(B) Deployment adapter A: (Tool No. 98299FC030)

7) Connect the deployment adapter A to airbag connector (AB27).



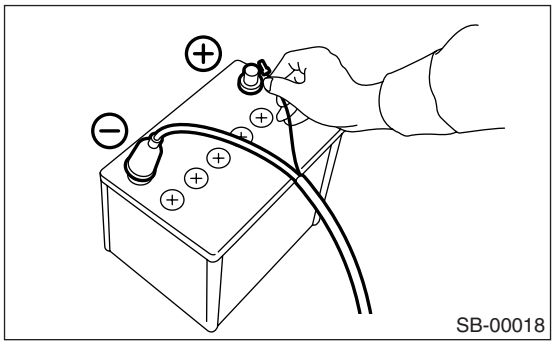
(1) Deployment adapter A: (Tool No. 98299FC030)

8) Extend the deployment tool to the limit, and make sure that the vehicle is empty. Close all windows, sunroof, and rear gate completely.



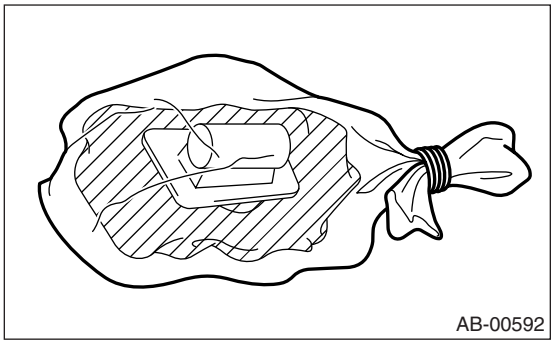
9) Move the battery at least 5 m (16 ft) from vehicle, and secure the nearby area. Connect the deployment tool alligator clip to the battery negative (–) terminal.

10) Connect the other cable of the deployment tool to the battery positive (+) terminal and deploy the airbag module.



CAUTION:
• After deployment, the airbag module will be especially hot. Leave it unattended for 40 minutes, and then discard it.
• Do not let water get on the deployed airbag module.

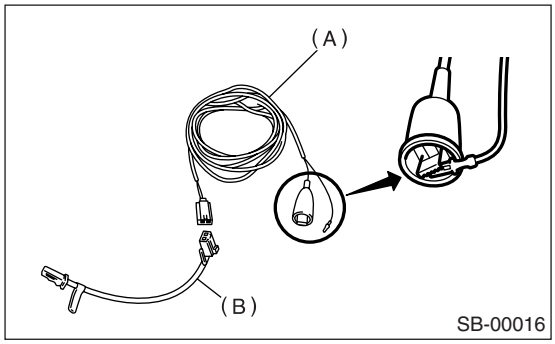
11) Remove the airbag module. <Ref. to AB-13, Passenger's Airbag Module.>
12) Wrap the deployed airbag module in an airtight vinyl bag, and discard it.



3. SIDE AIRBAG MODULE

1) Turn the ignition switch to OFF.
2) Disconnect the ground cable from battery, and wait for at least 20 seconds before starting work.
3) Disconnect the side airbag module connector (yellow) under the front seat cushion.
4) Adjust both the front seat and front seat backrest to center positions.
5) Short the terminal to alligator clip furnished as deployment tool (A).
6) Connect the deployment tool (A) and deployment adapter A (B).

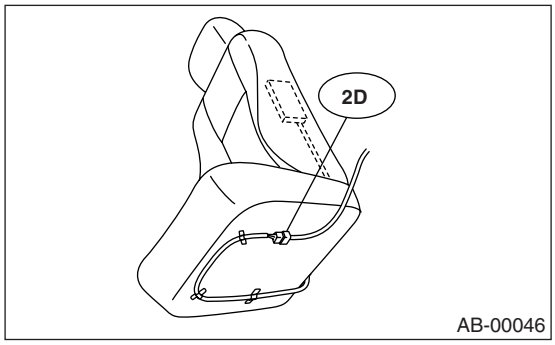
CAUTION:
The deployment tool should be kept shorted terminals until just before deployment of the airbag module.



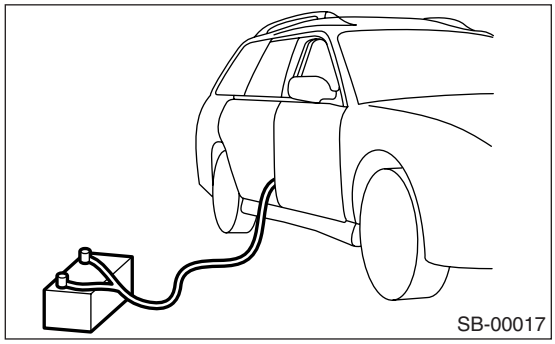
(A) Deployment tool: (Tool No. 98299PA030)
(B) Deployment adapter A: (Tool No. 98299FC030)

7) Connect the deployment adapter A connector (2D) to side airbag module connector (yellow).

CAUTION:
Do not put any objects on the front seat.

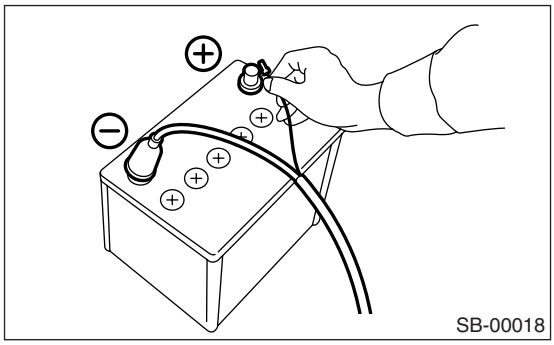


8) Extend the deployment tool to the limit, and make sure that the vehicle is empty. Close all windows, sunroof, and rear gate completely.



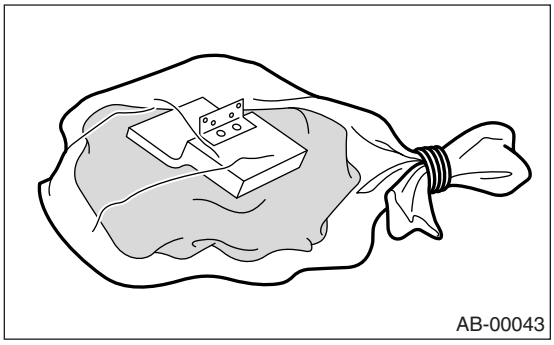
9) Move the battery at least 5 m (16 ft) from vehicle, and secure the nearby area. Connect the deployment tool alligator clip to the battery negative (–) terminal.

10) Connect the other cable of the deployment tool to the battery positive (+) terminal and deploy the airbag module.



CAUTION:
• After deployment, the airbag module will be especially hot. Leave it unattended for 40 minutes, and then discard it.
• Do not let water get on the deployed airbag module.

11) Remove the side airbag module. <Ref. to AB-14, REMOVAL, Side Airbag Module.>
12) Wrap the deployed airbag module in an airtight vinyl bag, and discard it.



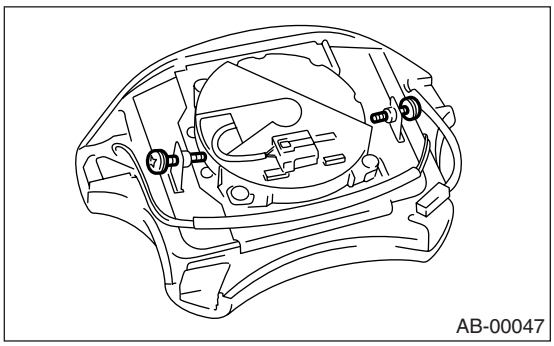
12. Airbag Module Disposal (Deployment Processing After Removal from Vehicle)

A: PROCEDURE

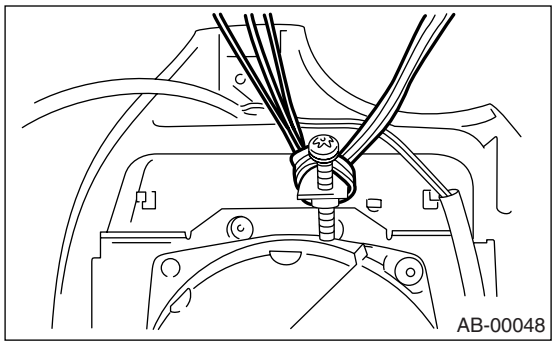
CAUTION:
• Do not discard an undeployed airbag module because it may cause serious personal injury when accidentally deployed.
• As a rule, the airbag module should be deployed while still installed in the vehicle. Do not remove it unless necessary.
• Deployment of the airbag module should be done on a flat place free from any possible danger. Avoid deploying outdoors during rainy or windy weather.
• Do not damage the airbag module or drop it.
• Deploying the airbag module causes a high explosive noise, be sure to warn people in the area, and do not allow anyone within a 5 m (16 ft) radius of the disposal site.
• Some smoke will be emitted from deployment of the airbag module. Therefore, it must be deployed in a well-ventilated place with no fire alarms nearby.
• Wear gloves, goggles, and earplugs during this operation. Wash your hands afterwards.
• After deployment, the airbag module will be especially hot. Leave it unattended for 40 minutes, and then discard it.
• Do not let water get on the deployed airbag module.
• Wrap the deployed airbag module in an airtight vinyl bag, and discard it.
• If circumstances do not permit airbag module deployment, contact a SUBARU dealer.

1. DRIVER'S AIRBAG MODULE

1) Turn the ignition switch to OFF.
2) Disconnect the ground cable from battery, and wait for at least 20 seconds before starting work.
3) Remove the airbag module. <Ref. to AB-12, Driver's Airbag Module.>
4) Install the removed bolts to airbag module.

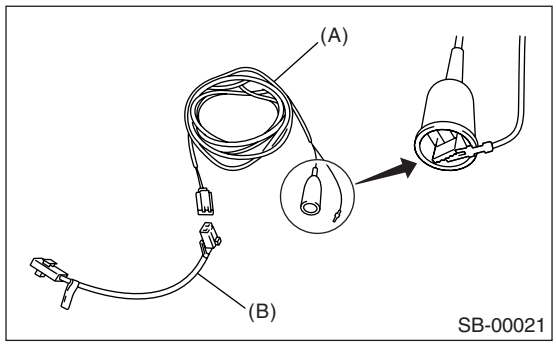

AB-00047

5) Bundle three wire automotive harnesses [each with a sectional area of 1.25 mm^2 (0.00194 sq in) or more], and bind them twofold around the airbag module stay.


AB-00048

6) Short the terminal to alligator clip furnished as deployment tool (A).
7) Connect the deployment tool (A) and deployment adapter D.

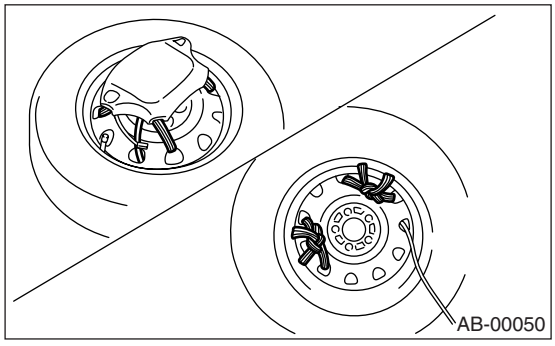
CAUTION:
The deployment tool should be kept shorted terminals until just before deployment of the airbag module.



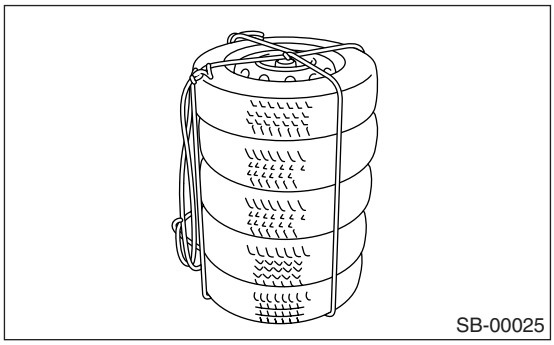
SB-00021

(A) Deployment tool: (Tool No. 98299PA030)
(B) Deployment adapter D: (Tool No. 98299SA010)

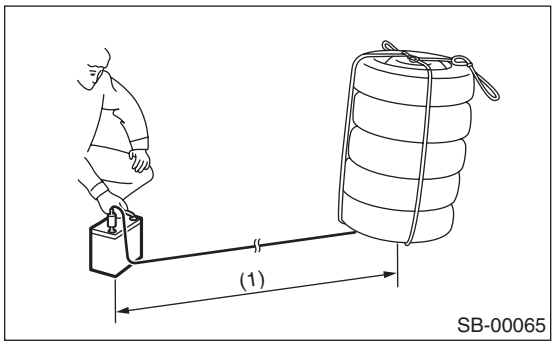
8) Connect the deployment adapter D connector (2D) to airbag module.
9) Install the airbag module with pad side facing upward on a wheel with tire.


AB-00050

10) Put three tires without a wheel on the tire installed with the airbag module. Put on an additional tire with a wheel, and then fasten them tight with a rope.


SB-00025

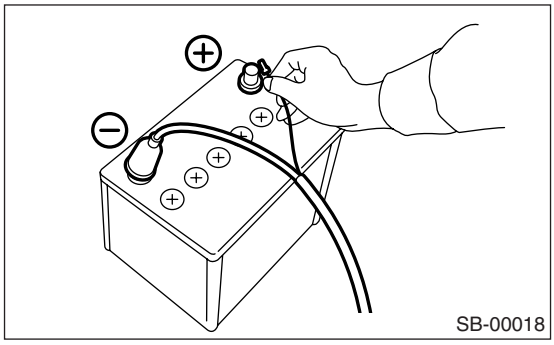
11) Move the battery at least 5 m (16 ft) from tires, and secure the nearby area. Connect the deployment tool alligator clip to the battery negative (–) terminal.



SB-00065

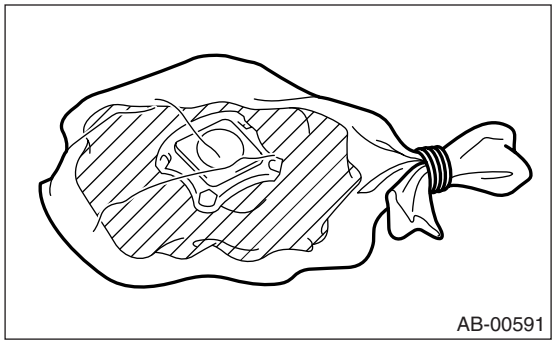
(1) More than 5 m (16 ft)

12) Connect the other cable of the deployment tool to the battery positive (+) terminal and deploy the airbag module.


SB-00018

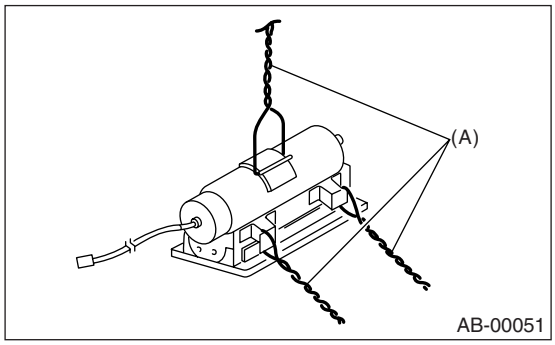
CAUTION:
• After deployment, the airbag module will be especially hot. Leave it unattended for 40 minutes, and then discard it.
• Do not let water get on the deployed airbag module.

13) Wrap the deployed airbag module in an airtight vinyl bag, and discard it.


AB-00591

2. PASSENGER'S AIRBAG MODULE

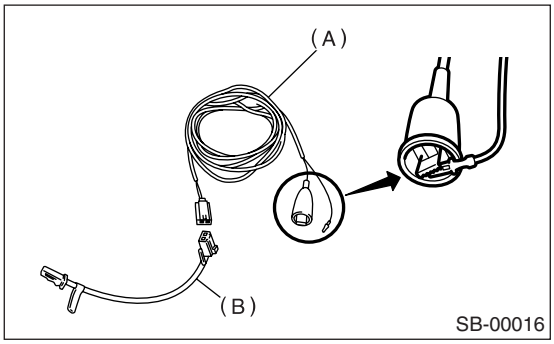
1) Turn the ignition switch to OFF.
2) Disconnect the ground cable from battery, and wait for at least 20 seconds before starting work.
3) Remove the airbag module. <Ref. to AB-13, Passenger's Airbag Module.>
4) Bundle three wire automotive harnesses [each with a sectional area of 1.25 mm^2 (0.00194 sq in) or more], and route them through the airbag module bracket. Then, twist them for added strength (A).



AB-00051

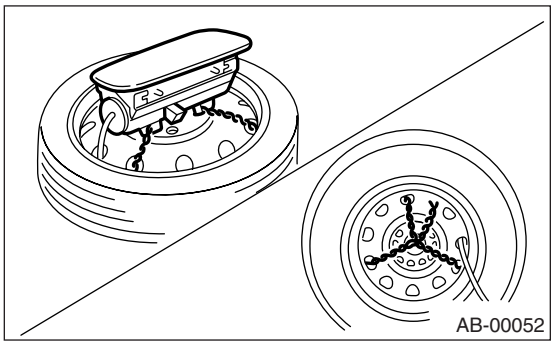
5) Short the terminal to alligator clip furnished as deployment tool (A).
6) Connect the deployment tool (A) and deployment adapter A (B).

CAUTION:
The deployment tool should be kept shorted terminals until just before deployment of the airbag module.

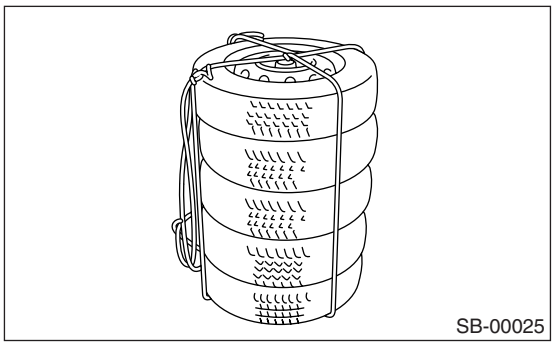


(A) Deployment tool: (Tool No. 98299PA030)
(B) Deployment adapter A: (Tool No. 98299FC030)

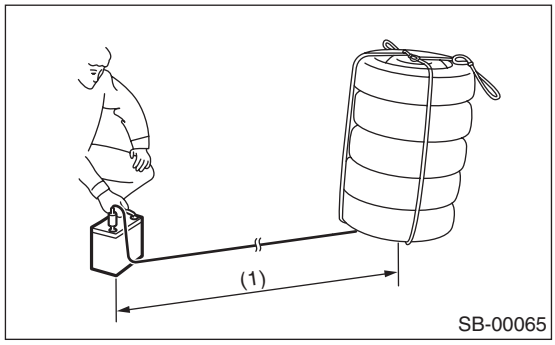
7) Connect the adapter A connector to airbag module.
8) Install the airbag module with pad side facing upward on 14 inch or greater size wheel with tire.



9) Put three tires without a wheel on the tire installed with the airbag module. Put on an additional tire with a wheel on top, and then fasten them tight with a rope.

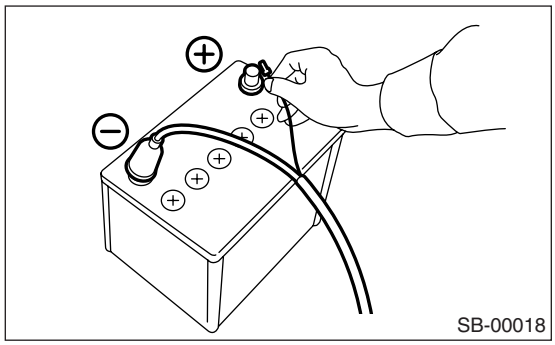


10) Move the battery at least 5 m (16 ft) from tires, and secure the nearby area. Connect the deployment tool alligator clip to the battery negative (–) terminal.



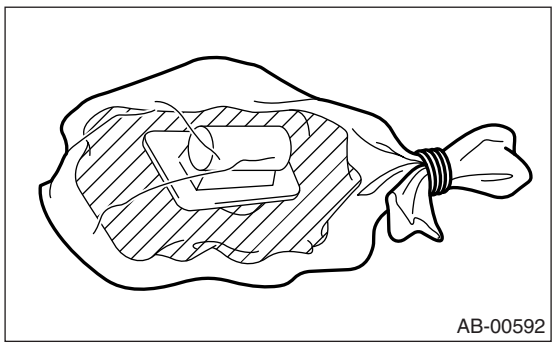
(1) More than 5 m (16 ft)

11) Connect the other cable of the deployment tool to the battery positive (+) terminal and deploy the airbag module.



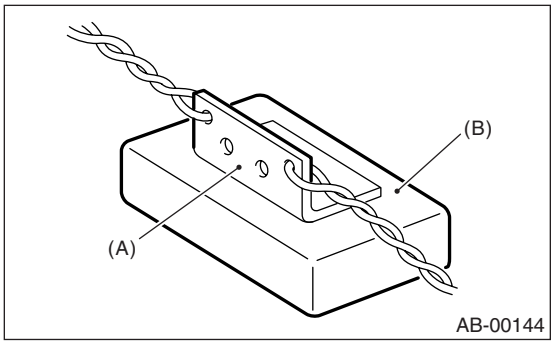
CAUTION:
• After deployment, the airbag module will be especially hot. Leave it unattended for 40 minutes, and then discard it.
• Do not let water get on the deployed airbag module.

12) Wrap the deployed airbag module in an airtight vinyl bag, and discard it.



3. SIDE AIRBAG MODULE

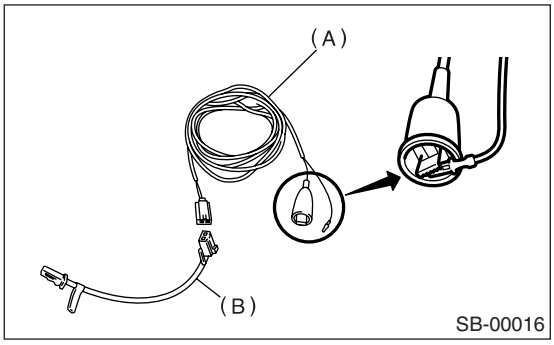
1) Turn the ignition switch to OFF.
2) Disconnect the ground cable from battery, and wait for at least 20 seconds before starting work.
3) Remove the front seat. <Ref. to SE-6, REMOVAL, Front Seat.>
4) Remove the side airbag module. <Ref. to AB-14, REMOVAL, Side Airbag Module.>
5) Bundle three wire automotive harnesses [each with a sectional area of 1.25 mm^2 (0.00194 sq in) or more], and then bind them through the holes in airbag module bracket.



(A) Airbag module bracket
(B) Side airbag module

6) Short the terminal to alligator clip furnished as deployment tool (A).
7) Connect the deployment tool (A) and deployment adapter A (B).

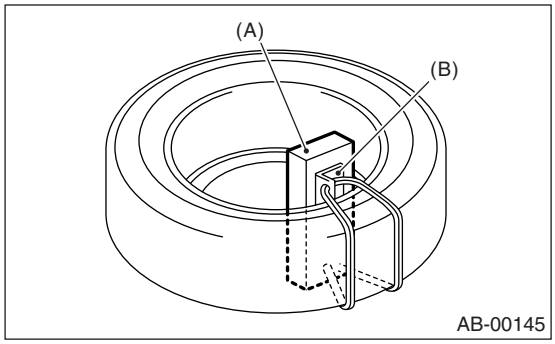
CAUTION:
The deployment tool should be kept shorted terminals until just before deployment of the airbag module.



(A) Deployment tool: (Tool No. 98299PA030)
(B) Deployment adapter A: (Tool No. 98299FC030)

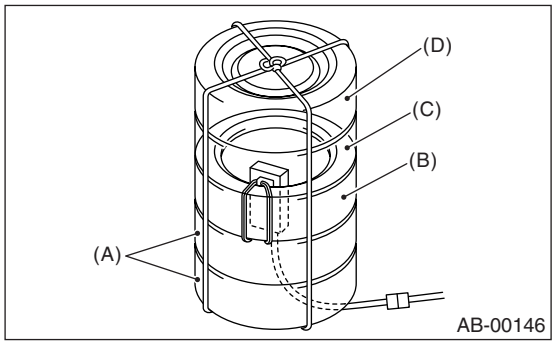
8) Connect the deployment adapter A connector to airbag module.

9) Install the side airbag module on 14 inch or greater size tire without disk wheel.

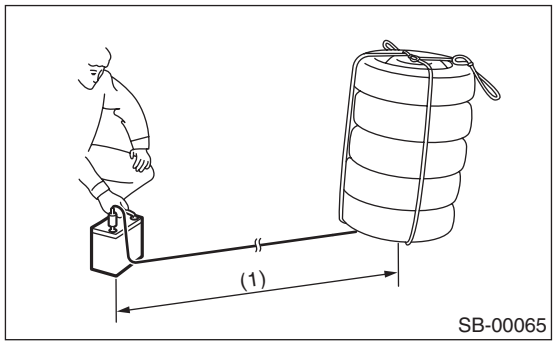


(A) Pad
(B) Airbag module bracket

10) Put two tires without a wheel (A) under the tire (B) installed with the side airbag module. Put on an additional tire without disk wheel (C), and then put a tire with a wheel (D) on top. Fasten them tight with a rope.

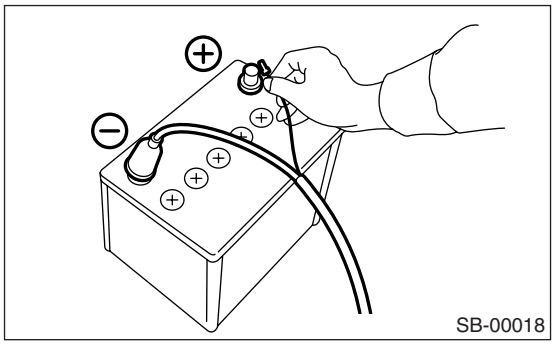


11) Move the battery at least 5 m (16 ft) from the tires, and secure the nearby area. Connect the deployment tool alligator clip to the battery negative (–) terminal.



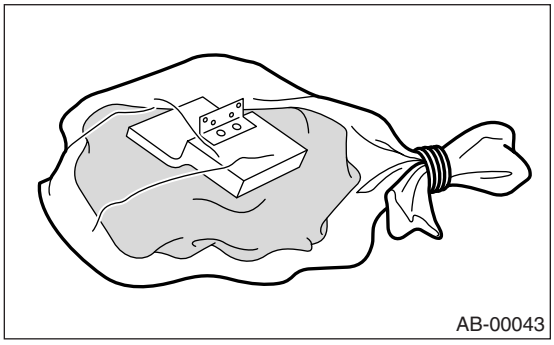
(1) More than 5 m (16 ft)

12) Connect the other cable of the deployment tool to the battery positive (+) terminal and deploy the airbag module.



CAUTION:
• After deployment, the airbag module will be especially hot. Leave it unattended for 40 minutes, and then discard it.
• Do not let water get on the deployed airbag module.

13) Wrap the deployed airbag module in an airtight vinyl bag, and discard it.



AIRBAG SYSTEM (DIAGNOSTICS)

AB(diag)

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13.	Diagnostic Chart with Trouble Code	35

1. Basic Diagnostic Procedure

A: PROCEDURE

Step		Check	Yes	No
1	**READ DTC.** <Ref. to AB(diag)-22, Read Diagnostic Trouble Code (DTC).>	Is the normal code being detected?	Finish the diagnosis.	Go to step **2.**
2	**READ DTC.** <Ref. to AB(diag)-22, Read Diagnostic Trouble Code (DTC).>	Is the DTC being detected?	Go to step **3.**	Go to “Airbag Warning Light Failure”. <Ref. to AB(diag)-25, Airbag Warning Light Failure.>
3	**PERFORM THE DIAGNOSIS.** 1) Judge the possible cause from “List of Diagnostic Trouble Code (DTC)”. <Ref. to AB(diag)-32, List of Diagnostic Trouble Code (DTC).> 2) Inspect using “Diagnostic Chart with Diagnostic Trouble Code (DTC)”. 3) Repair the cause of the trouble. 4) Perform the clear memory mode. <Ref. to AB(diag)-24, Clear Memory Mode.> 5) Perform the inspection mode. <Ref. to AB(diag)-23, Inspection Mode.> 6) Read any DTC again.	Is the DTC being detected?	Perform the procedure 1) to 5) in step 3.	Finish the diagnosis.

2. Check List for Interview

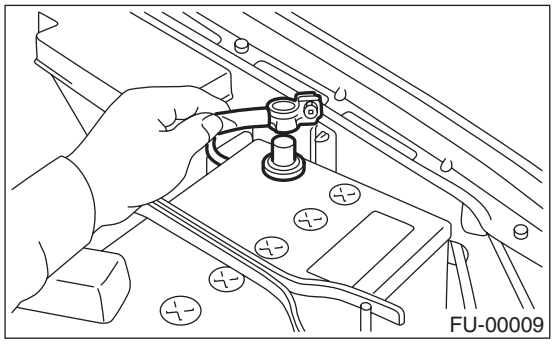
A: CHECK

Customer's Name		Inspector's Name	
Date Vehicle Brought In	/ /	Registration No.	
Odometer Reading	km Miles	VIN	
Date Problem Occurred	/ /	Registration Year	/ /
Weather	❑ Fine ❑ Cloudy ❑ Rainy ❑ Snowy ❑ Other:		
Temperature	°C (°F)		
Road Condition	❑ Level road ❑ Uphill ❑ Downhill ❑ Rough road ❑ Others:		
Vehicle Operation	❑ Starting ❑ Idling ❑ Driving (❑ Constant Speed ❑ Acceleration ❑ Deceleration ❑ Steering wheel turn ❑ Other:)		
Details of Problem			
Check Airbag Warning Light	❑ Normal (Illuminates 6 seconds after ignition switch turned to ON, and then goes off) ❑ Remains ON ❑ Remains OFF		
Check DTC	❑ Normal Code ❑ DTC: (Code:)		

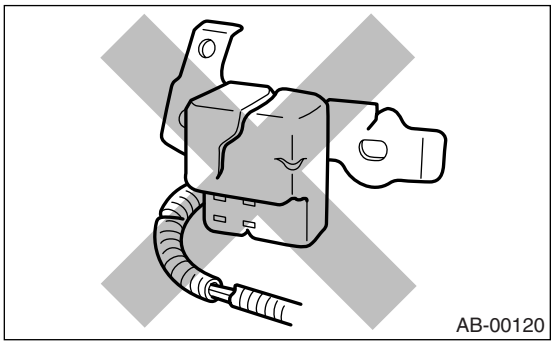
3. General Description

A: CAUTION

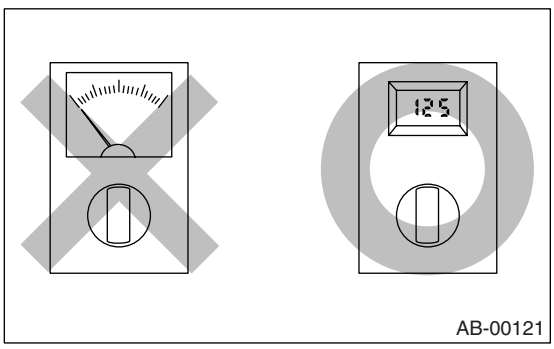
• When servicing a vehicle, be sure to turn the ignition switch to OFF, disconnect the ground cable from battery, and wait for more than 20 seconds before starting work.
• The airbag system is fitted with a backup power source. If the airbag system is serviced within 20 seconds after the ground cable is disconnected, it may inflate.



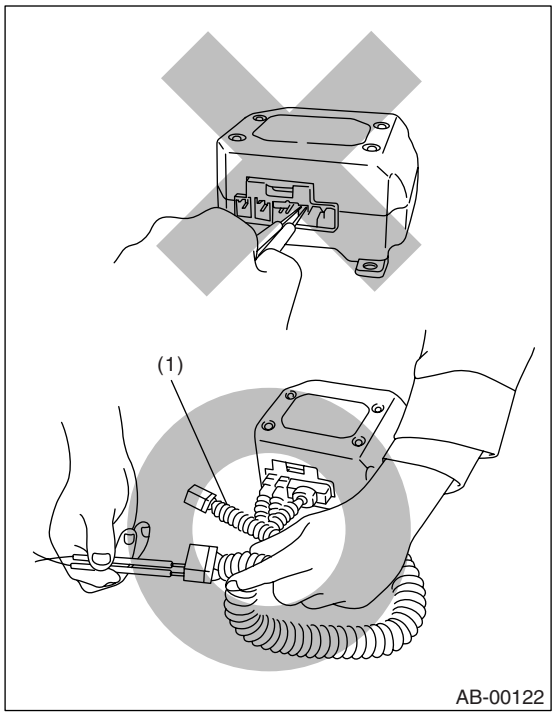
• If sensors, airbag module, airbag control module, pretensioner, and harness are deformed or damaged, replace them with new genuine parts.



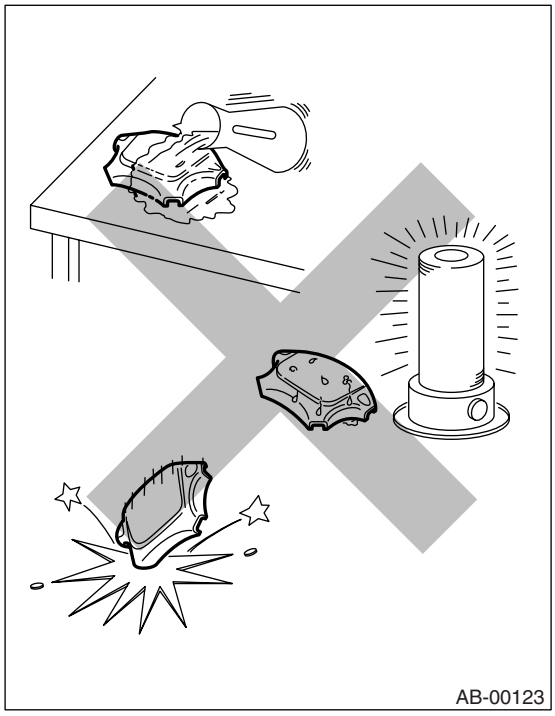
• Do not use the airbag system and pretensioners on other vehicles. When replacing parts, be sure to replace them with new parts.
• When checking the airbag system, be sure to use a digital circuit tester. Infinitesimal electric current in an analog circuit tester may cause the airbag to activate erroneously.



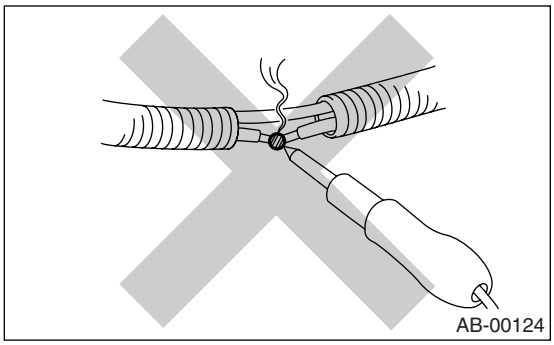
• When checking, use a test harness (1). To avoid damaging connector terminal, do not directly apply the tester probe to any connector terminal of the airbag. Damage to the connector terminal may cause the airbag to activate erroneously.



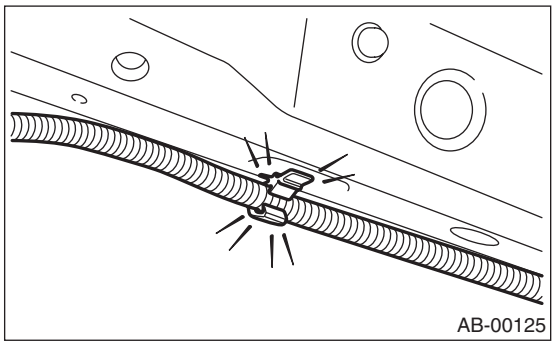
• Do not drop the airbag modulator parts, subject them to high temperature over 93°C (199°F), or let water, oil, or grease get on them; otherwise, the internal parts may be damaged and may be reliability greatly lowered.



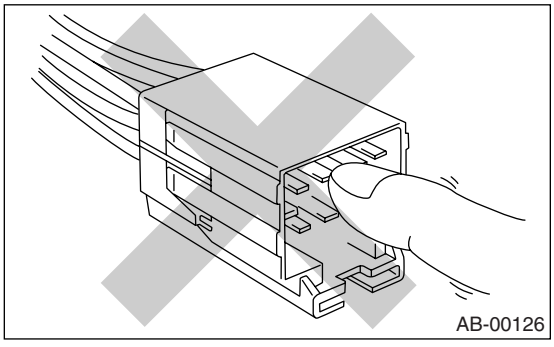
• If any damage, opening, or rust is found on the airbag system wire harness, do not attempt to repair using soldering equipment. Be sure to replace the faulty harness with a new genuine part.



• Install the wire harness securely with the specified clips to avoid interference or tangled up with other parts.

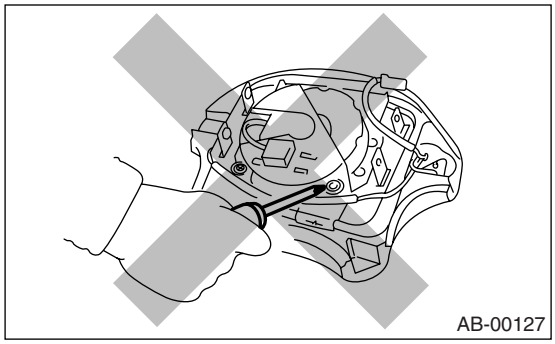


• Do not allow water or oil to come in contact with the connector terminals. Do not touch the connector terminals.

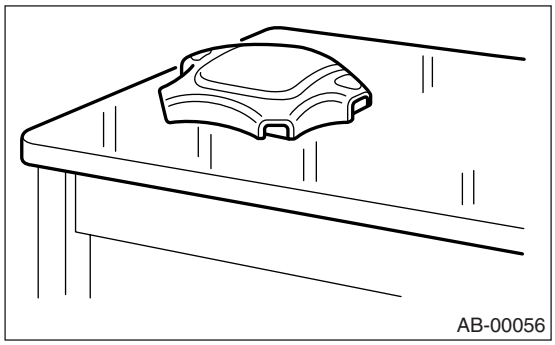


• Either of the airbag modules for driver, passenger or side, or pretensioner must not be disassembled.

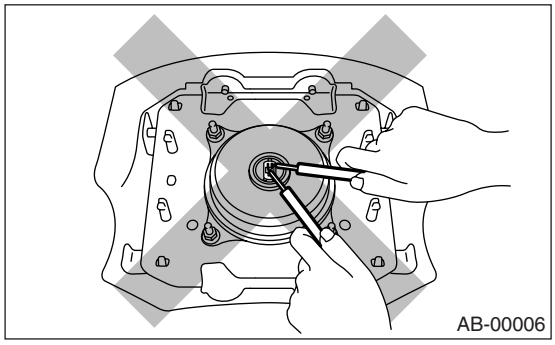
• The airbag module cannot be used again if once inflated.



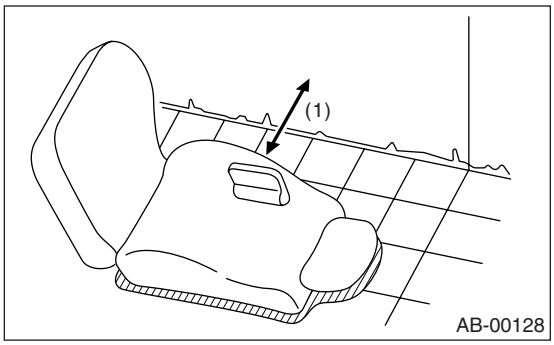
• After removal, keep the airbag module with the pad facing upward on a dry, clean, and flat surface away from heat and light sources, and moisture and dust.



• Do not check continuity of either of the airbag modules for driver, passenger or side, or pretensioner.

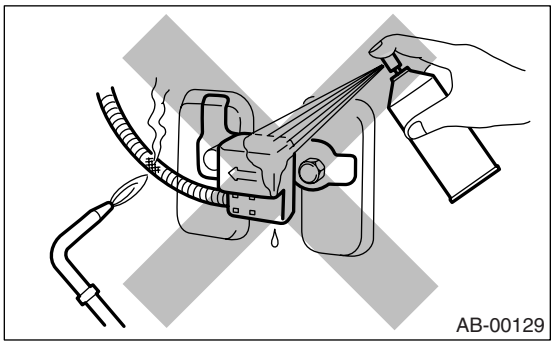


• The removed front seat with the airbag module must be kept at least 200 mm (8 in) away from walls and other objects.



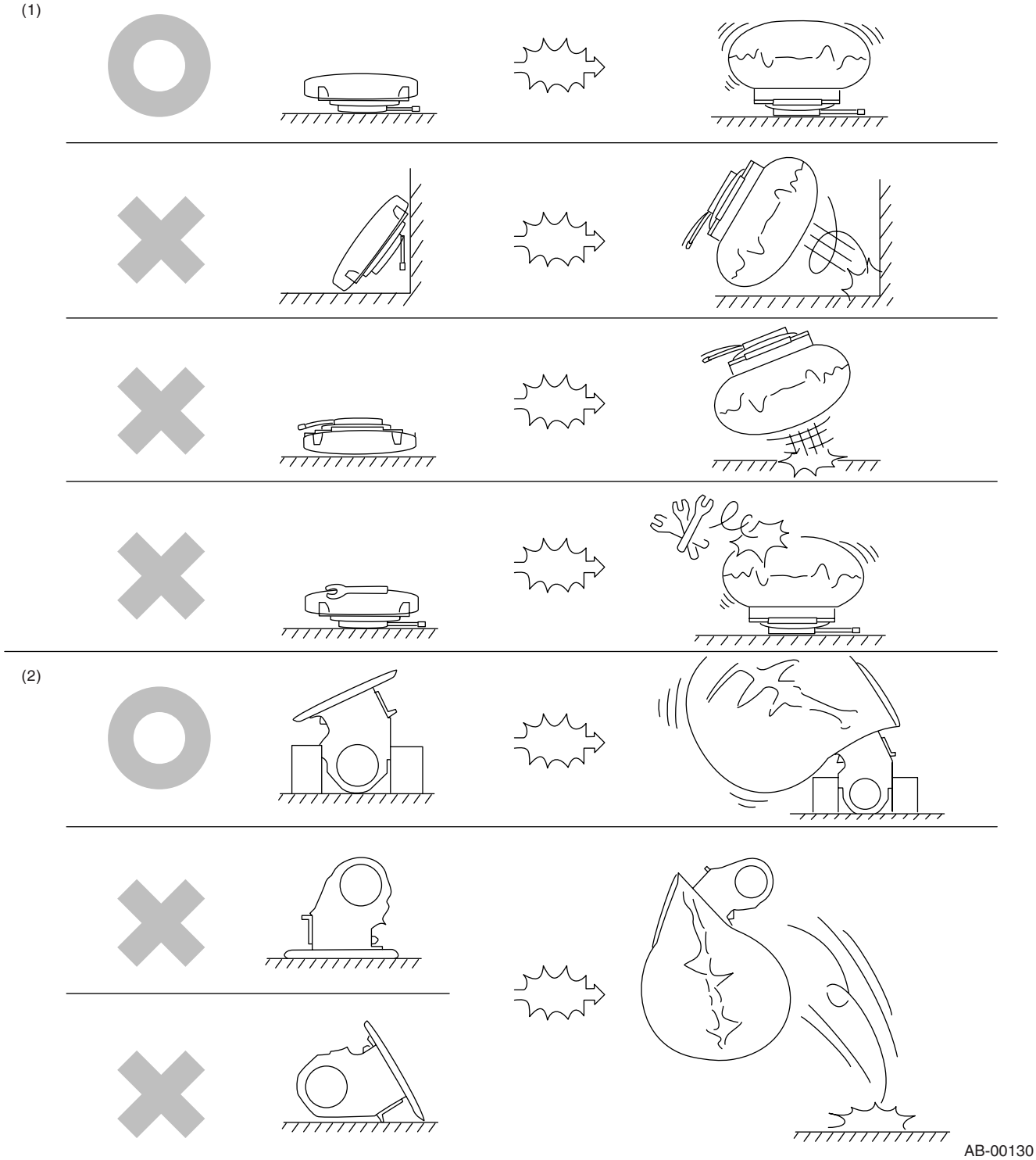
(1) More than 200 mm (8 in)

• When painting or performing sheet metal work on the front part of the vehicle, including the front wheel apron, front fender, and front side frame, remove the front sub sensors and wire harness of the airbag system.
• When painting or performing sheet metal work on the side of the vehicle, including the side sill, center pillar, and front and rear doors, remove the side airbag sensors and wire harness of the airbag system.



• Do not discard undeployed airbag modules. They could easily cause a serious accident if accidentally deployed.

• When storing a removed airbag module, do not place any objects on it or pile airbag modules on top of each other. If the airbag inflates for some reason when it is placed with its pad side facing downward or under any object, a serious accident may result.



(1) Driver side airbag module (2) Passenger side airbag module

B: INSPECTION

Before diagnosing, check the following items that might be related to the engine problem:

1. BATTERY

Measure the battery voltage and specific gravity of electrolyte.

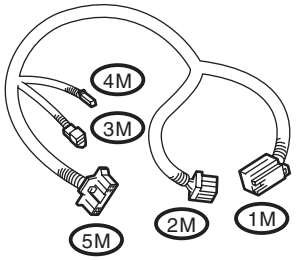
Standard voltage: 12 V

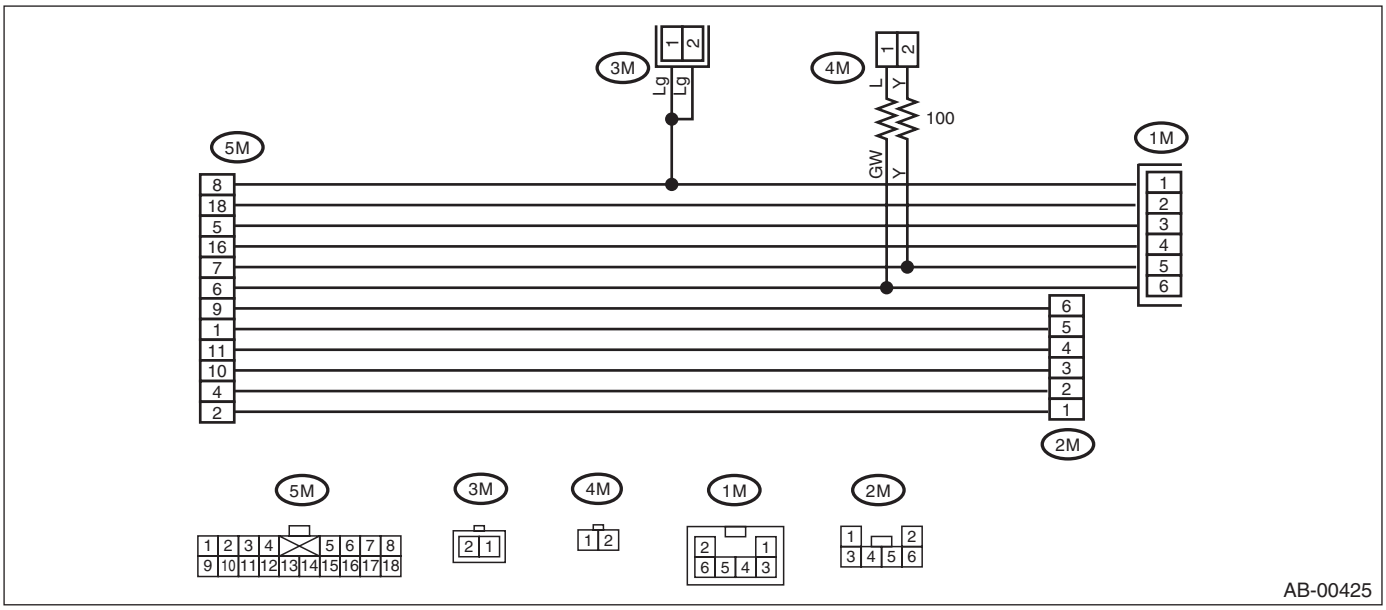
Specific gravity: Above 1.260

C: PREPARATION TOOL

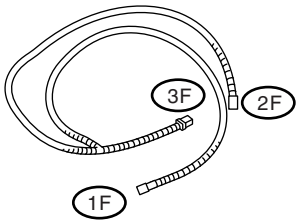
1. SPECIAL TOOL

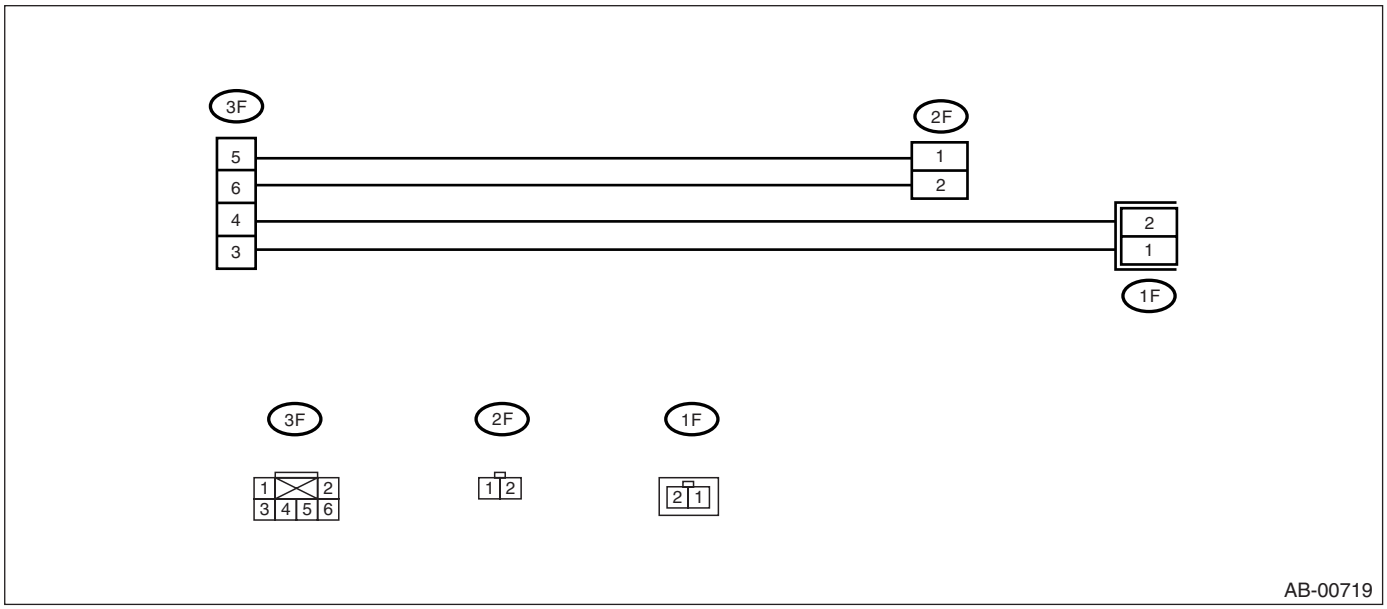
• TEST HARNESS M

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST98299FE020	98299FE020	TEST HARNESS M	• Used when measuring voltage, resistance of airbag system. • Used with test harness T (98299SA060).

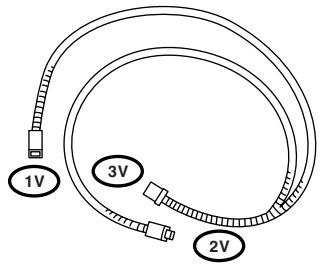


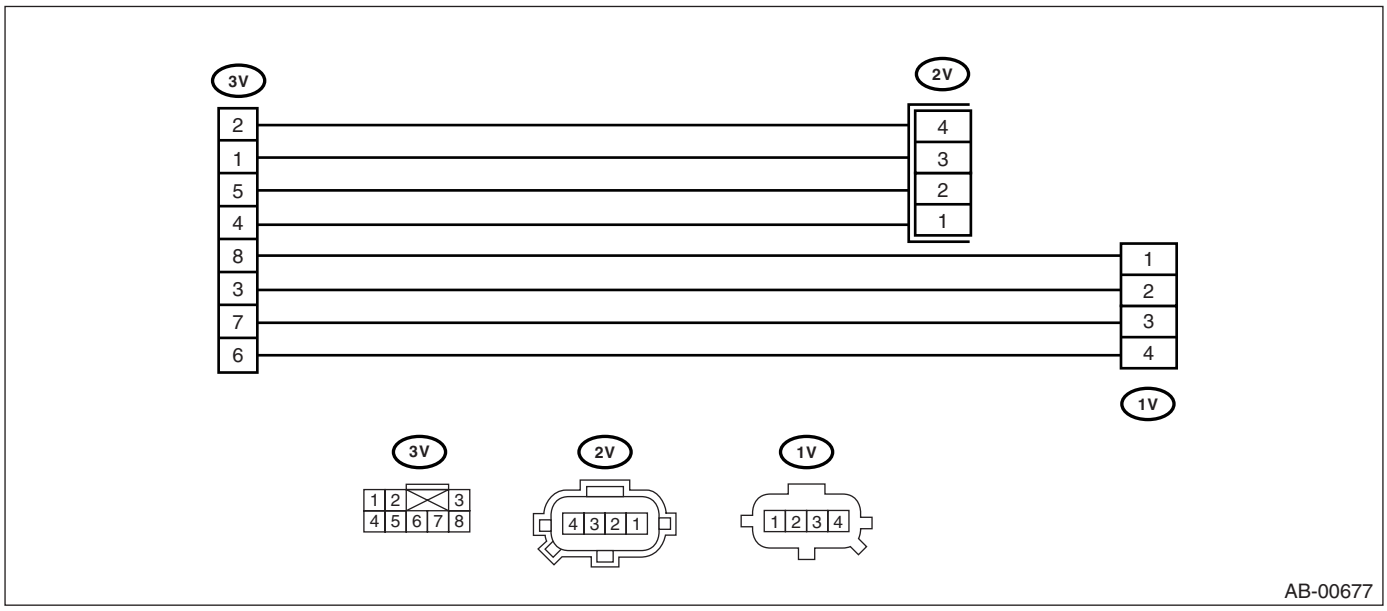
• TEST HARNESS F

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST98299FC010	98299FC010	TEST HARNESS F	Used when measuring voltage, resistance of air-bag module harness.

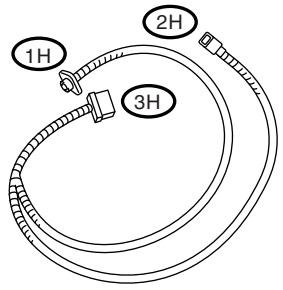


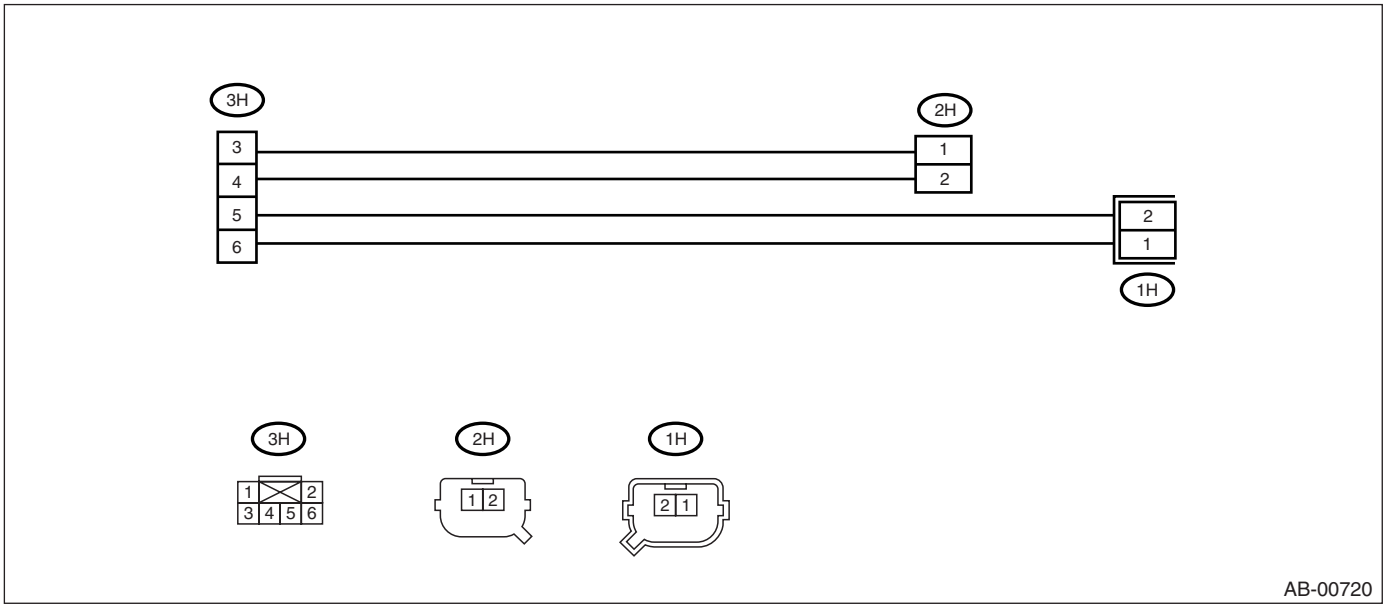
• TEST HARNESS V

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST98299AG010	98299AG010	TEST HARNESS V	Used when measuring voltage and resistance of side airbag sensor.

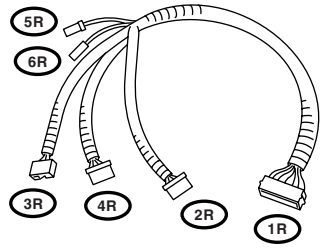


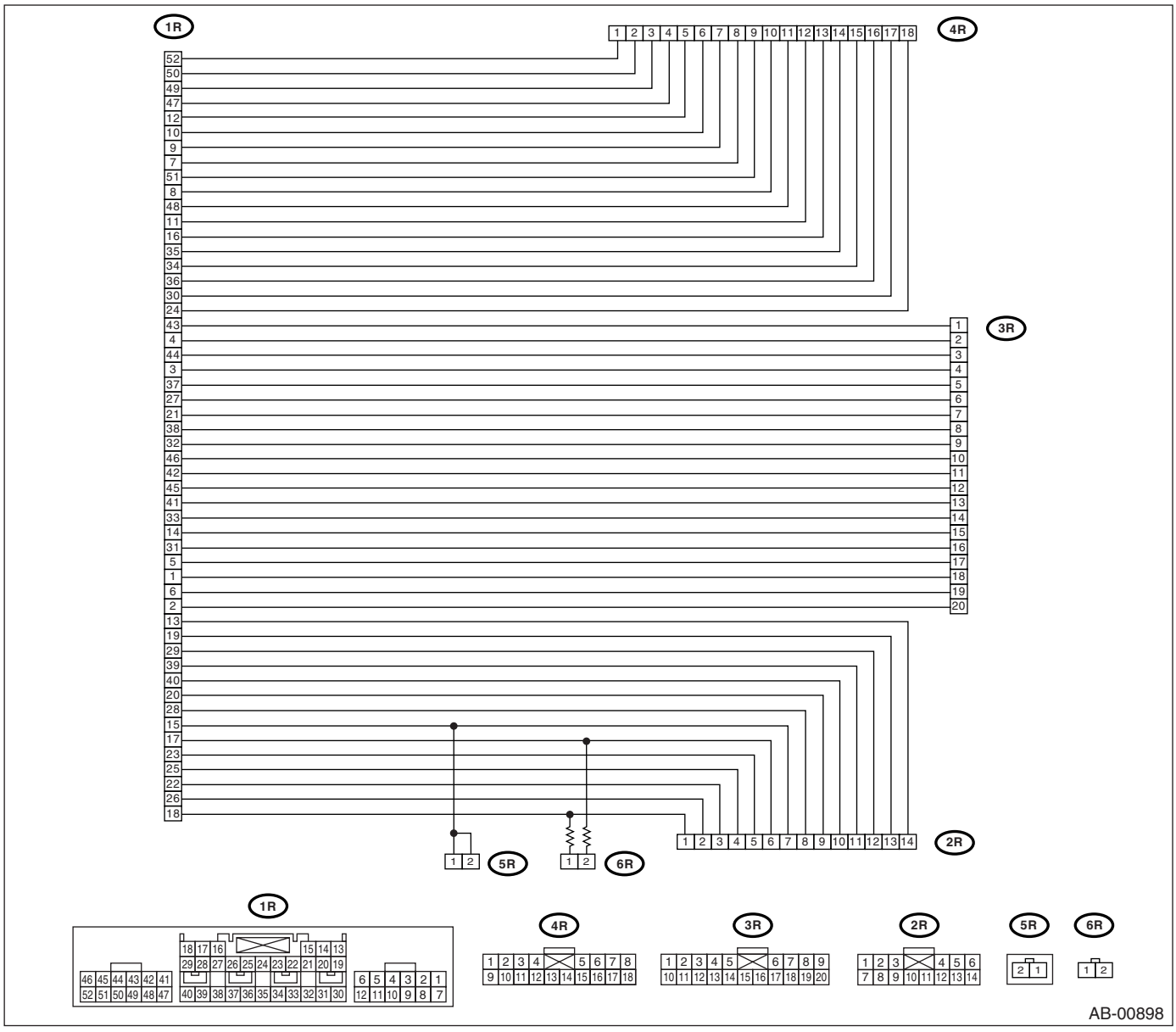
• TEST HARNESS H

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST98299FA030	98299FA030	TEST HARNESS H	Used when measuring voltage, resistance of front sub-sensor.

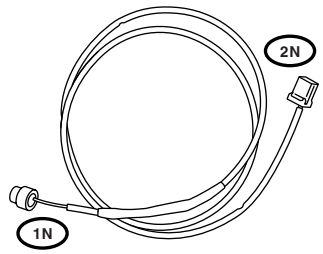


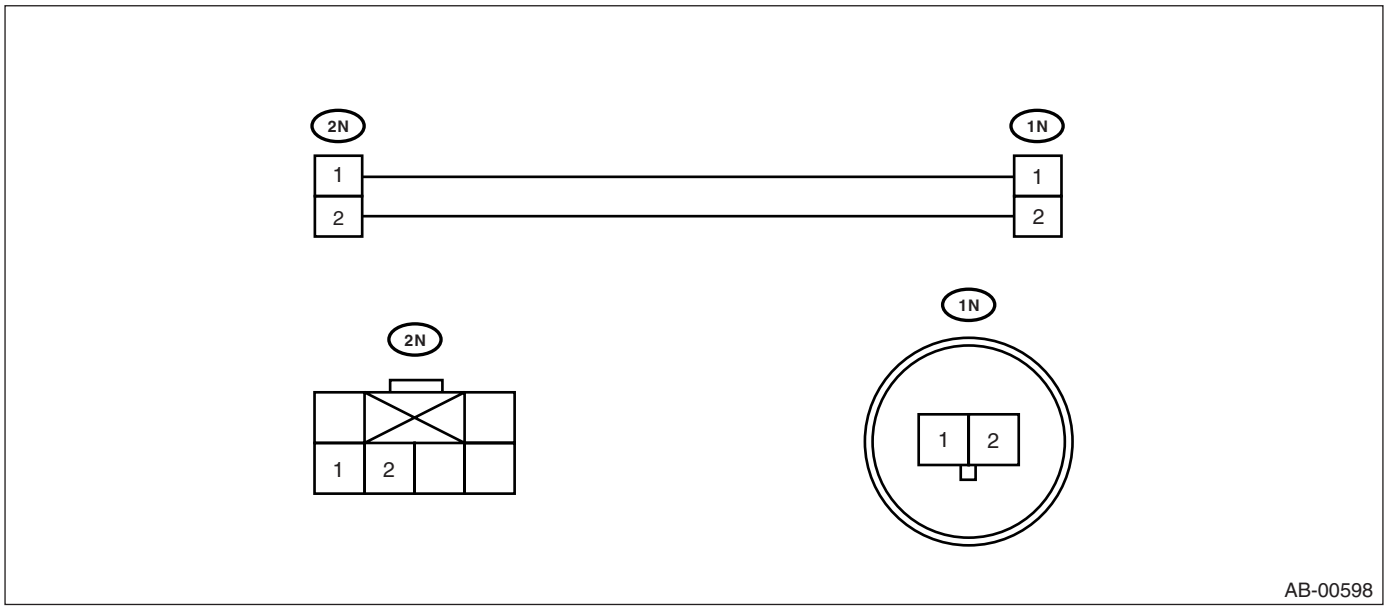
• TEST HARNESS R

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST98299FE030	98299FE030	TEST HARNESS R	Used when measuring voltage, resistance of air-bag control module.



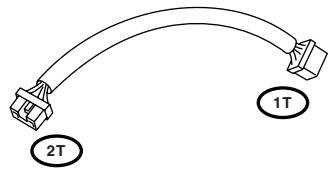
• TEST HARNESS N

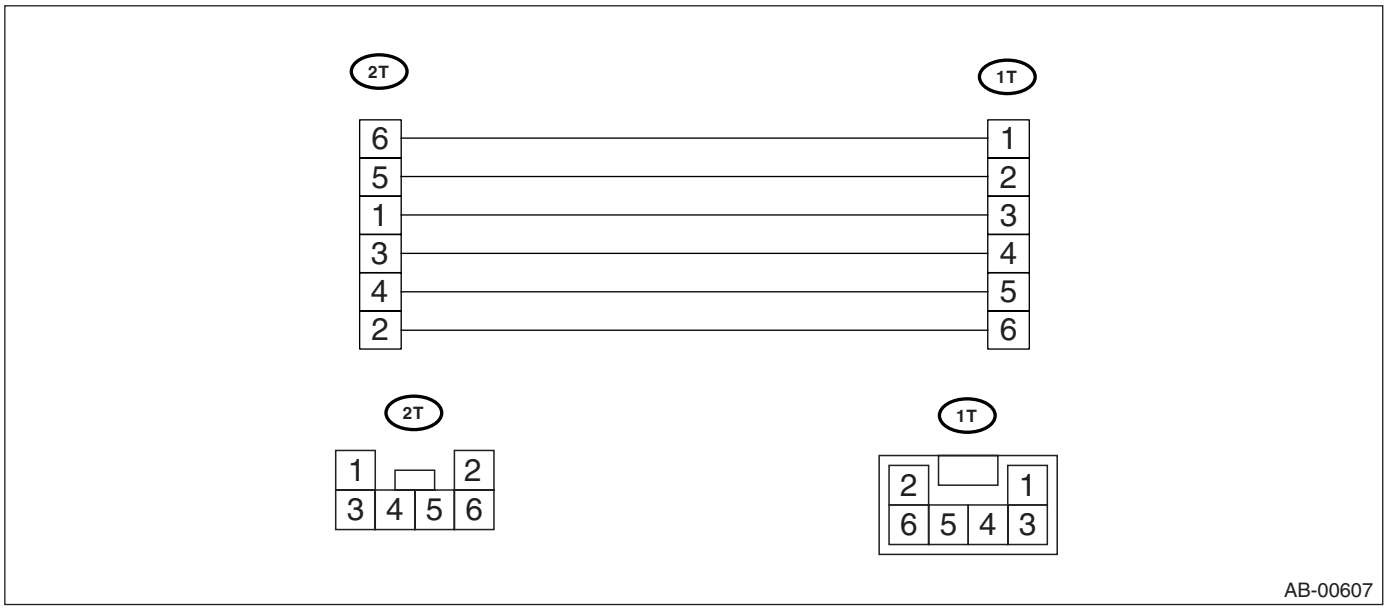
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST98299SA000	98299SA000	TEST HARNESS N	Used when measuring voltage, resistance of driver's airbag module and seat belt pretensioner.



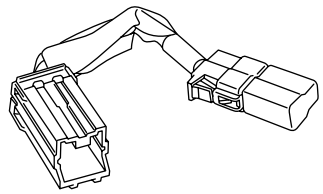
AB-00598

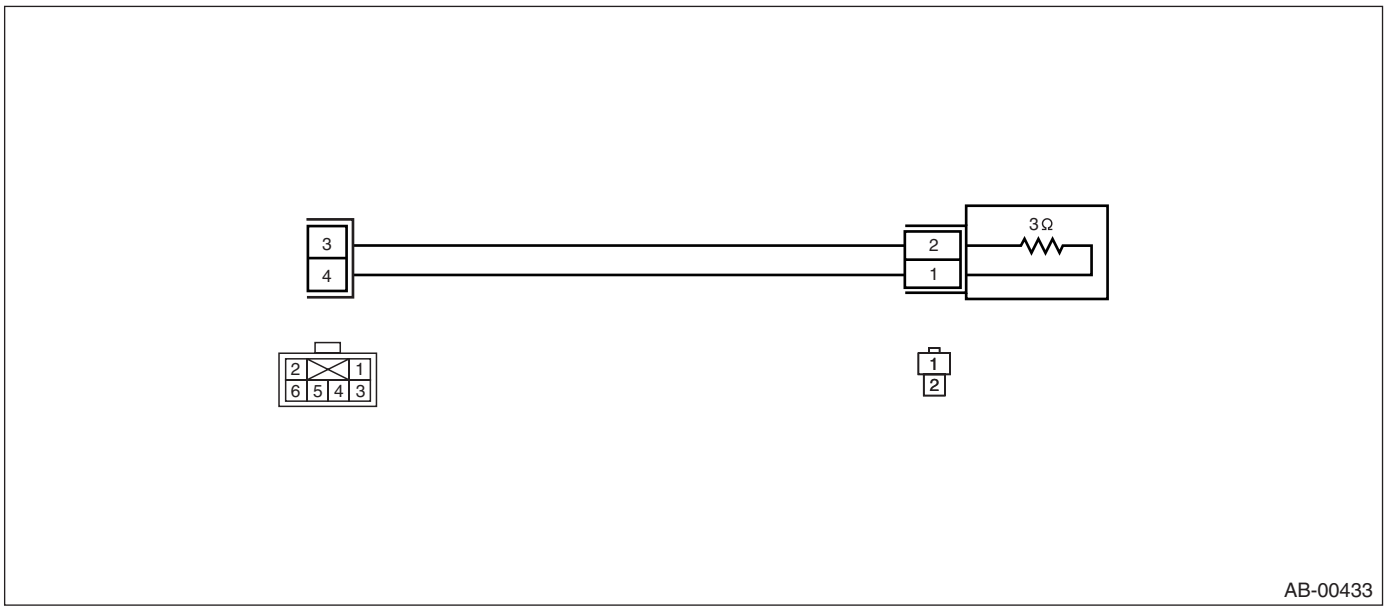
• TEST HARNESS T

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST98299SA060	98299SA060	TEST HARNESS T	• Used when measuring voltage, resistance of airbag system. • Used with test harness M (98299FE020). • Only LHD



• AIRBAG RESISTOR

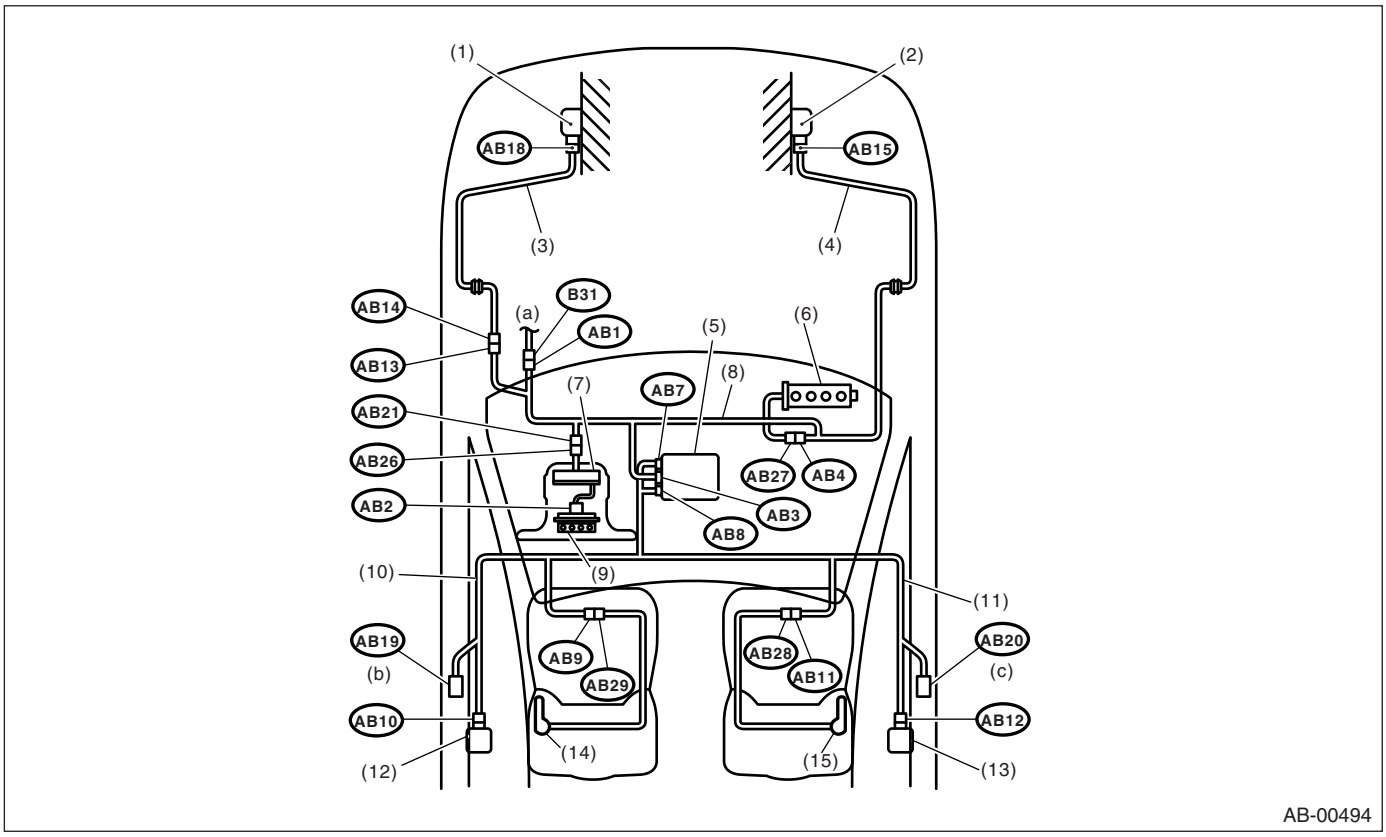
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST98299PA040	98299PA040	AIRBAG RESISTOR	Used in replacement of airbag module which resistance value is same as airbag module.



4. Electrical Component Location

A: LOCATION

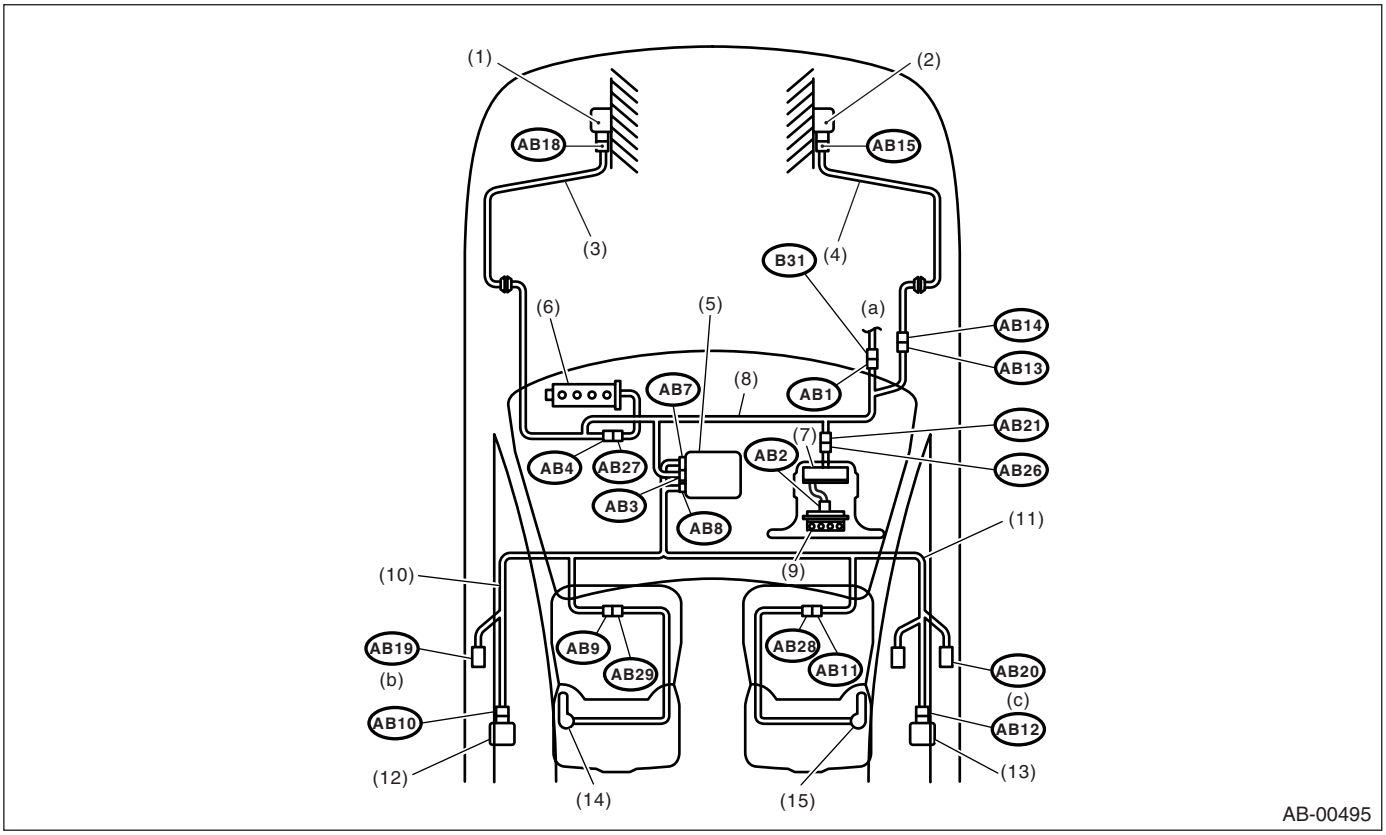
1. LHD MODEL



(1) Front sub sensor (LH)
(2) Front sub sensor (RH)
(3) Front sub sensor harness (LH)
(4) Front sub sensor harness (RH)
(5) Airbag control module with built-in safety and electric sensor
(6) Passenger's airbag module
(7) Roll connector
(8) Airbag main harness
(9) Driver's airbag module
(10) Side airbag harness (LH)
(11) Side airbag harness (RH)
(12) Side airbag sensor (LH)
(13) Side airbag sensor (RH)
(14) Side airbag module (LH)
(15) Side airbag module (RH)
(a) To body harness
(b) To seat belt pretensioner (LH)
(c) To seat belt pretensioner (RH)

Connector No.	(AB1)	(AB2)	(AB3)	(AB4)	(AB7)	(AB8)	(AB9)	(AB10)	(AB11)	(AB12)	(AB13)	(AB14)
Pole	6	2	28	2	12	12	2	4	2	4	2	2
Connector color	Yellow	Black	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
Male/Female	Male	Female	Female	Female	Female	Female	Female	Female	Female	Female	Female	Male
Connector No.	(AB15)	(AB18)	(AB19)	(AB20)	(AB21)	(AB26)	(AB27)	(AB28)	(AB29)			
Pole	2	2	2	2	2	2	2	2	2			
Connector color	Yellow	Yellow	Black	Black	Yellow	Yellow	Yellow	Yellow	Yellow			
Male/Female	Female	Female	Female	Female	Female	Male	Male	Male	Male			

2. RHD MODEL



(1) Front sub sensor (LH)
(2) Front sub sensor (RH)
(3) Front sub sensor harness (LH)
(4) Front sub sensor harness (RH)
(5) Airbag control module with built-in safety and electric sensor
(6) Passenger's airbag module
(7) Roll connector
(8) Airbag main harness
(9) Driver's airbag module
(10) Side airbag harness (LH)
(11) Side airbag harness (RH)
(12) Side airbag sensor (LH)
(13) Side airbag sensor (RH)
(14) Side airbag module (LH)
(15) Side airbag module (RH)
(a) To body harness
(b) To seat belt pretensioner (LH)
(c) To seat belt pretensioner (RH)

Connector No.	(AB1)	(AB2)	(AB3)	(AB4)	(AB7)	(AB8)	(AB9)	(AB10)	(AB11)	(AB12)	(AB13)	(AB14)
Pole	6	2	28	2	12	12	2	4	2	4	2	2
Connector color	Yellow	Black	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
Male/Female	Male	Female	Female	Female	Female	Female	Female	Female	Female	Female	Female	Male
Connector No.	(AB15)	(AB18)	(AB19)	(AB20)	(AB21)	(AB26)	(AB27)	(AB28)	(AB29)			
Pole	2	2	2	2	2	2	2	2	2			
Connector color	Yellow	Yellow	Black	Black	Black	Yellow	Yellow	Yellow	Yellow			
Male/Female	Female	Female	Female	Female	Female	Female	Male	Male	Male			

5. Airbag Control Module I/O Signal

A: WIRING DIAGRAM

1. AIRBAG LHD MODEL

<Ref. to WI-165, LHD MODEL, WIRING DIAGRAM, Airbag System.>

2. AIRBAG RHD MODEL

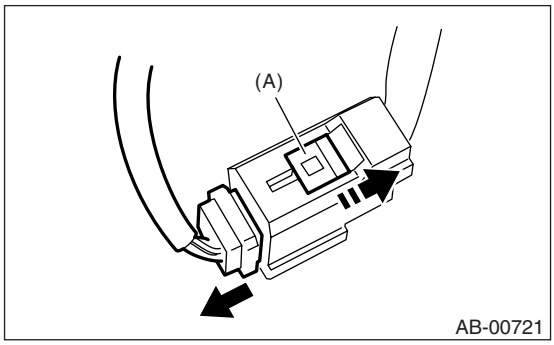
<Ref. to WI-168, RHD MODEL, WIRING DIAGRAM, Airbag System.>

6. Airbag Connector

A: PROCEDURE

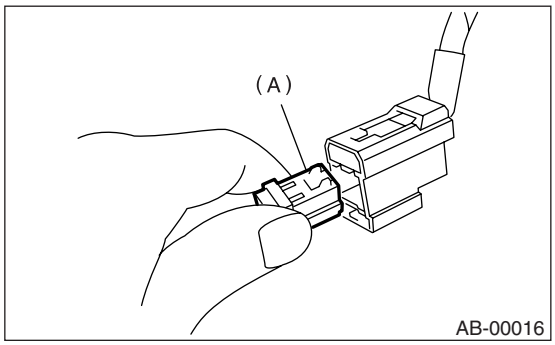
1. POWER SUPPLY

1) How to disconnect:
(1) Move the slide lock (A) in the direction of the arrow.
(2) Disconnect the connector with slide lock (A) moved.



CAUTION:
When pulling the slide lock or disconnecting the connector, be sure to hold onto the connector and not the wire.

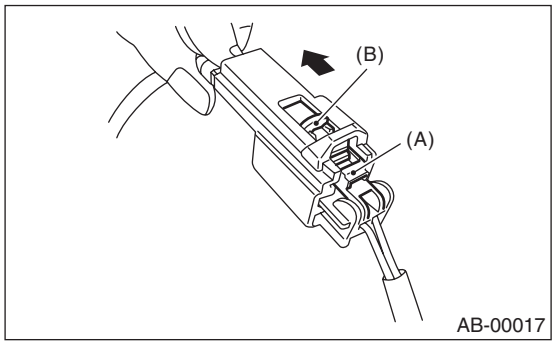
2) How to connect:
Holding the connector (A), and push it in carefully until a connecting sound is heard.



CAUTION:
Be sure to insert the connector in until it locks. Then pull on it gently to make sure that it is locked.

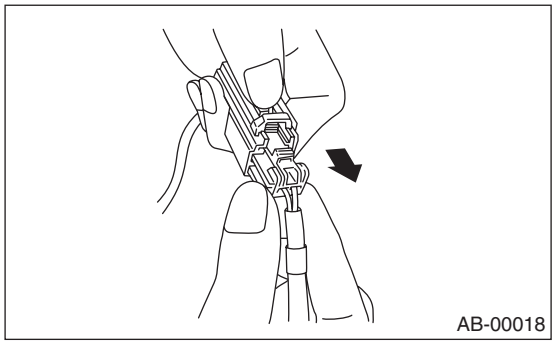
2. DRIVER'S AIRBAG (BETWEEN AIRBAG MAIN HARNESS AND ROLL CONNECTOR), PASSENGER'S AIRBAG AND SIDE AIRBAG

1) How to disconnect:
(1) Push the lock arm (A).
(2) With the lock arm (A) pushed in, move the slide lock (B) in the direction of the arrow.



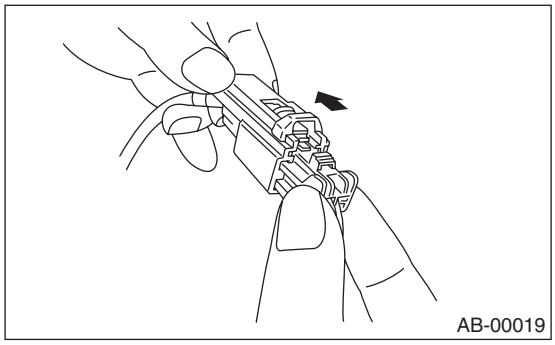
(3) With the slide lock (B) pulled, remove the lock arm (A) to its original position, and then pull in the direction of the arrow and separate the connector.

CAUTION:
When pulling the slide lock or disconnecting the connector, be sure to hold onto the connector and not the wire.



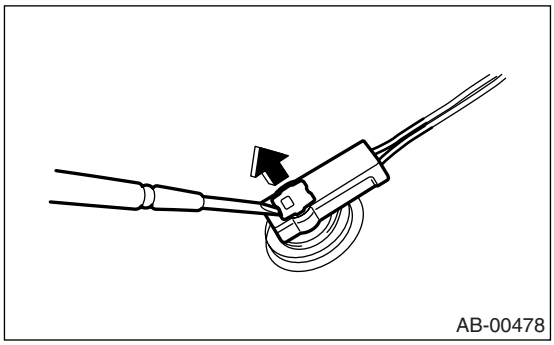
2) How to connect:
Holding the connector, and push it in carefully until a connecting sound is heard.

CAUTION:
Be sure to insert the connector in until it locks. Then pull on it gently to make sure that it is locked.

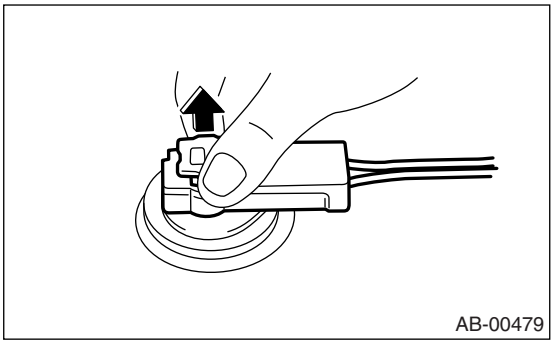


3. DRIVER'S AIRBAG MODULE AND PRETENSIONER

1) How to disconnect:
(1) Using a flat tip screwdriver, pry the push lock upward to unlock.

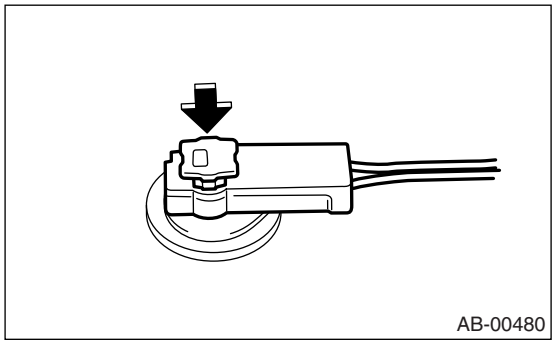


(2) Pull the connector to disconnect from driver's side airbag module assembly or retractor assembly.



2) How to connect:
Connect the connector in reverse order of disconnecting. At this time, be sure to push the push lock until connecting sound is heard.

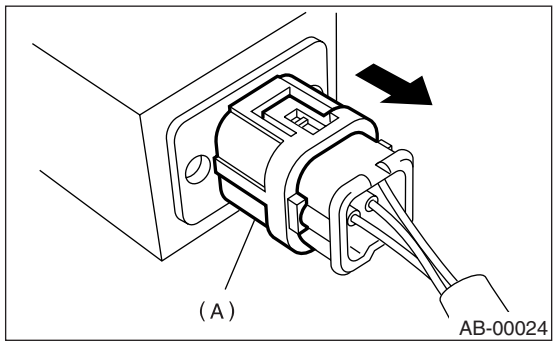
CAUTION:
• Be sure to insert the connector in until it locks. Then pull on it gently to make sure that it is locked.
• Be sure to push the push lock in securely.



4. FRONT SUB-SENSOR AND SIDE AIRBAG SENSOR

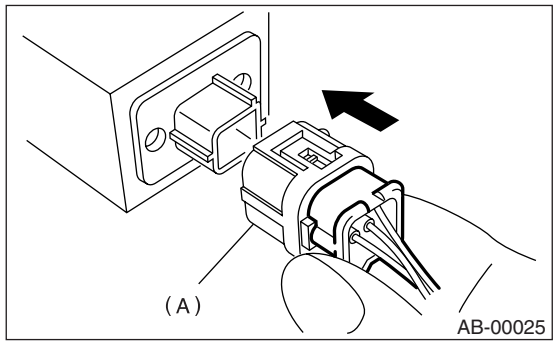
1) How to disconnect:
Holding outer part (A), pull it in the direction of the arrow.

CAUTION:
When pulling the slide lock or disconnecting the connector, be sure to hold onto the connector and not the wire.



2) How to connect:
Holding the connector, and push it in carefully until a connecting sound is heard.

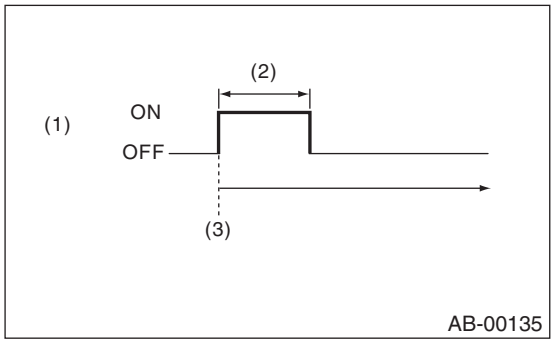
CAUTION:
• Outer (A) moves back, and so do not put your hand on the outer part.
• Be sure to insert the connector in until it locks. Then pull on it gently to make sure that it is locked.



7. Airbag Warning Light Illumination Pattern

A: INSPECTION

Keep the ignition switch to ON, and confirm that the airbag warning light remains off after being turned on for approx. 6 seconds.



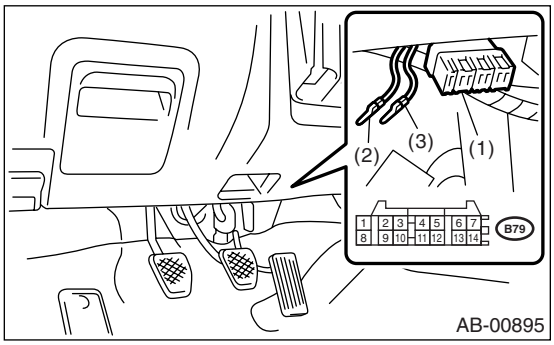
(1) Airbag warning light
(2) Approx. 6 seconds
(3) Ignition switch ON

8. Read Diagnostic Trouble Code (DTC)

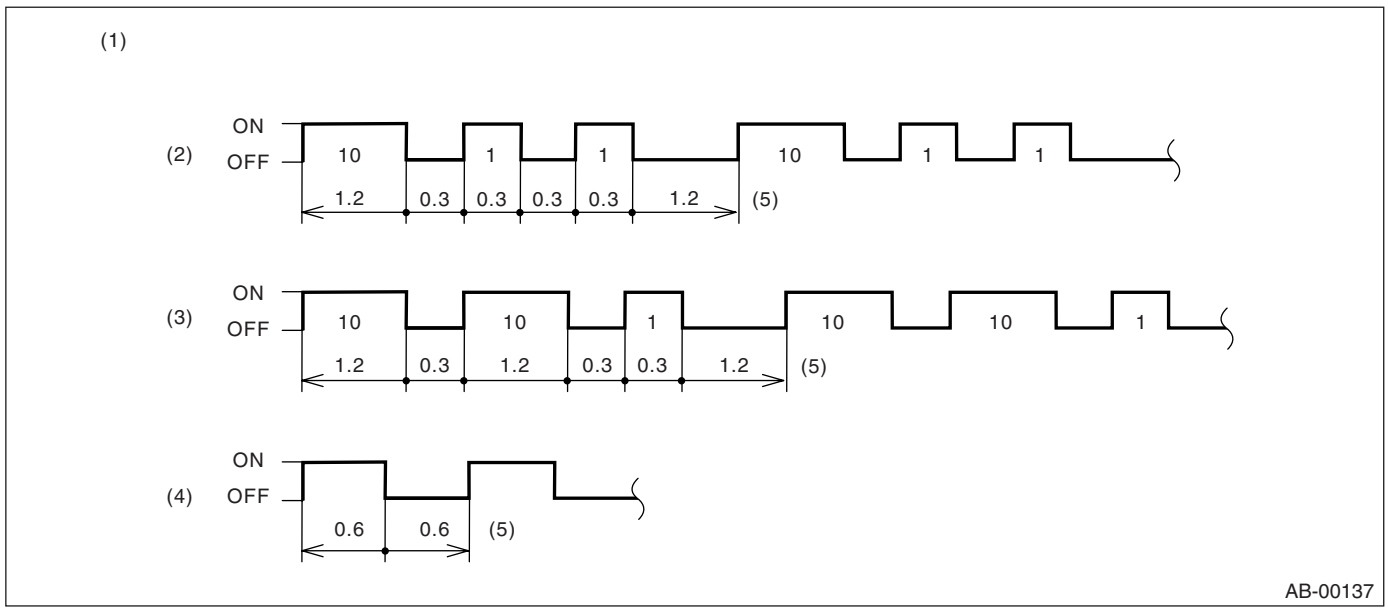
A: OPERATION

1) Turn the ignition switch to ON.
2) Connect the ground terminal to check connector terminal No. 2 in the instrument panel lower cover area.

NOTE:
The harness of ground terminal is wrapped by tapes with the harness of check connector.



(1) Check connector
(2) Ground terminal
(3) Ground terminal



(1) Example
(2) Flashing code 12:
(3) Flashing code 21:
(4) Flashing normal code:
(5) Sec.

4) Turn the ignition switch to OFF, and disconnect the ground terminal from the check connector terminal No. 2.
5) Wind tape around the ground terminal and return it to its original position.

3) Read the DTC by identifying the way airbag warning light flashes.
The airbag warning light flashes a code corresponding to the faulty parts.
The long segment (1.2 sec on) indicates a “ten”, and the short segment (0.3 sec on) indicates a “one”.

NOTE:
• “List of Diagnostic Trouble Code (DTC)”<Ref. to AB(diag)-32, List of Diagnostic Trouble Code (DTC).>
• “Airbag Warning Light Failure” <Ref. to AB(diag)-25, Airbag Warning Light Failure.>

9. Inspection Mode

A: PROCEDURE

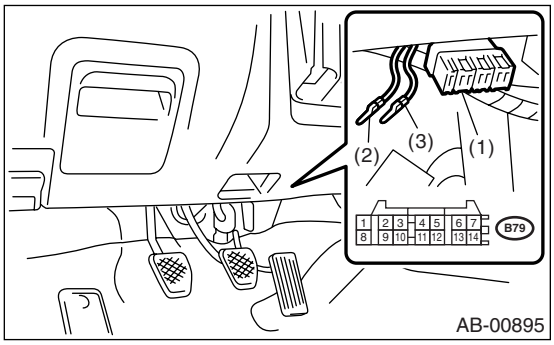
Recreate the circumstance by referring to the conditions described in the checklist.

10.Clear Memory Mode

A: OPERATION

1) Turn the ignition switch to ON.
2) Connect the ground terminal (ground terminal “A”) to check connector terminal No. 2 in the instrument panel lower cover area.

NOTE:
The harness of ground terminal is wrapped by tapes with the harness of check connector.



(1) Check connector
(2) Ground terminal “B”
(3) Ground terminal “A”

3) While the warning light flashes, connect another diagnosis terminal (ground terminal “B”) to the check connector terminal No. 3.
4) Once the memory is erased, the warning light returns to the normal flash rate (0.6 sec on). The failure to recover the normal flash rate indicates that trouble parts still remain. Having repaired such parts, erase the memory again and confirm that the normal flash rate has returned.
5) When the memory has been cleared, disconnect the ground terminal from check connector.
6) Wind tape around the ground terminal and return it to its original position.

11.Airbag Warning Light Failure

A: AIRBAG WARNING LIGHT REMAINS ON

DIAGNOSIS:

- Airbag warning light unit is faulty.
- Airbag control module to airbag warning light circuit is shorted or open.
- Grounding circuit is faulty.
- Airbag control module is faulty.
- (AB1) and (B31) are not connected properly.
- (AB3) is not connected properly to the airbag control module.

CAUTION:

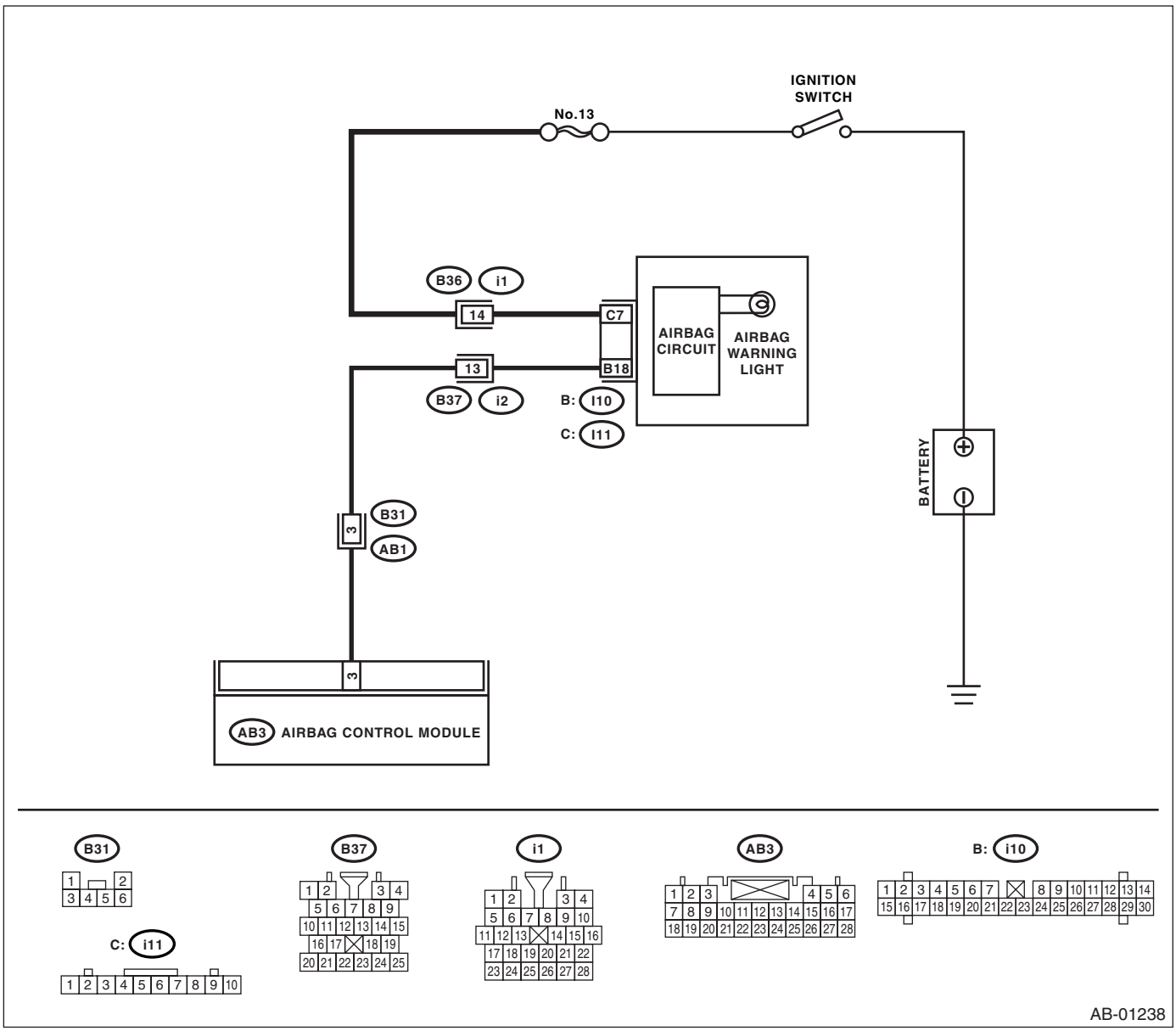
• Before diagnosing the airbag system, be sure to turn the ignition switch to OFF, disconnect the ground cable from battery, and wait more than 20 seconds before starting to work.

• Before replacing the airbag module, seat belt pretensioner roll connector, control module, and sensor, reconnect each part and confirm that the warning light operates properly.

• When inspecting the airbag main harness, disconnect the airbag module connector of the driver and passenger seats for safety reasons.

1. LHD MODEL

WIRING DIAGRAM:

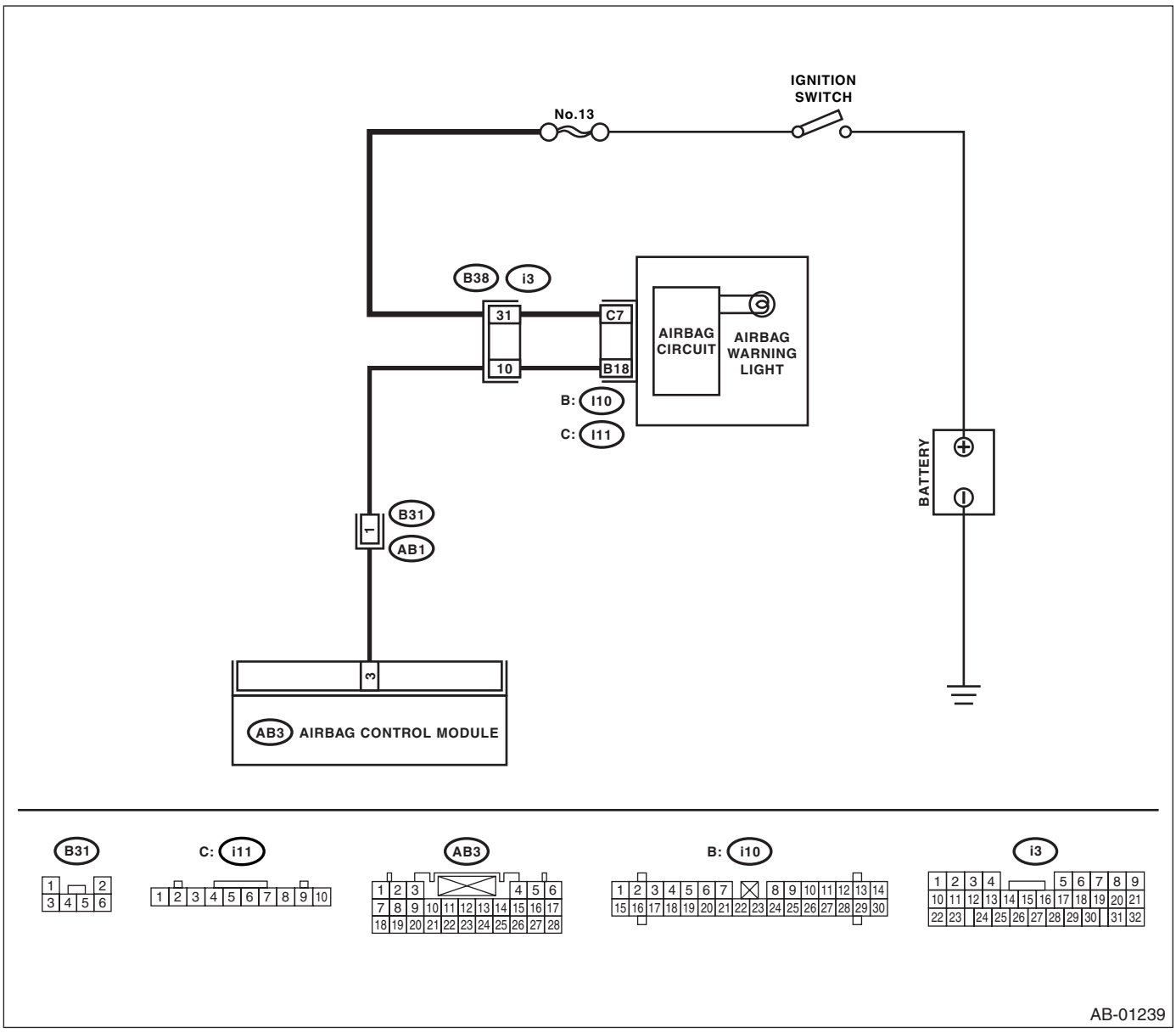


Step		Check	Yes	No
1	**CHECK POOR CONTACT IN CONNECTORS (AB1) AND (B31).** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Remove the side sill cover. (Driver's side) 3) Confirm that firm contact is secured between connectors (AB1) and (B31).	Is the poor contact in connectors (AB1) and (B31)?	Repair the body harness or replace the airbag main harness with body harness.	Go to step **2.**

	Step	Check	Yes	No
2	**CHECK AIRBAG WARNING LIGHT.** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Connect the connector (1T) in test harness T to the body harness connector (B31). 3) Connect the connector (1M) in test harness M to the connector (2T) in test harness T. 4) Connect the battery ground cable and turn the ignition switch to ON. 5) Connect two connectors, (3M) and (4M) in test harness M.	Is the airbag warning light turned off?	Go to step **4.**	Go to step **3.**
3	**CHECK BODY HARNESS.** Check the body harness. NOTE: After problem has been eliminated, disconnect the connectors (3M) and (4M).	Is the anything unusual to body harness?	Repair the body harness.	Replace the combination meter printed circuit. <Ref. to IDI-12, Combination Meter.>
4	**CHECK POOR CONTACT.** Confirm that firm contact is secured between the airbag control module and the connector (AB3). <Ref. to AB-16, Airbag Control Module.>	Is the poor contact in connector (AB3)?	Replace the airbag main harness with body harness or replace the airbag control module. <Ref. to AB-16, Airbag Control Module.>	Go to step **5.**
5	**CHECK AIRBAG MAIN HARNESS.** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Connect the connector (AB1) to (B31). 3) Disconnect the connectors (AB26) and (AB21). 4) Remove the glove box and disconnect the connectors (AB27) and (AB4). 5) Disconnect the connector (AB3) from the airbag control module, and connect the connector (1R) in test harness R. <Ref. to AB-16, Airbag Control Module.> 6) Connect the battery ground cable and turn the ignition switch to ON. 7) Connect the connectors (5R) and (6R) in test harness R. NOTE: After problem has been eliminated, disconnect the connectors (5R) and (6R).	Is the airbag warning light turned off?	Go to step **6.**	Replace the airbag main harness with body harness.
6	**CHECK GROUN DING CIRCUIT.** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Disconnect the connector (AB3) from the airbag control module. 3) Connect the connector (1R) in test harness R to body harness connector (AB3). 4) Measure the resistance between connector (2R) in test harness R and the chassis ground. ***Connector & terminal*** ***(2R) No. 10 — Chassis ground:*** ***(2R) No. 11 — Chassis ground:***	Is the resistance less than 10 Ω?	Replace the airbag control module. <Ref. to AB-16, Airbag Control Module.>	Repair the body-grounding circuit.

2. RHD MODEL

WIRING DIAGRAM:



Step		Check	Yes	No
1	**CHECK POOR CONTACT IN CONNECTORS (AB1) AND (B31).** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Remove the side sill cover. (Driver's side) 3) Confirm that firm contact is secured between connectors (AB1) and (B31).	Is the poor contact in connectors (AB1) and (B31)?	Repair the body harness or replace the airbag main harness with body harness.	Go to step **2.**

	Step	Check	Yes	No
2	**CHECK AIRBAG WARNING LIGHT.** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Connect the connector (1M) in test harness M to the body harness connector (B31). 3) Connect the battery ground cable and turn the ignition switch to ON. 4) Connect two connectors, (3M) and (4M) in test harness M.	Is the airbag warning light turned off?	Go to step **4.**	Go to step **3.**
3	**CHECK BODY HARNESS.** Check the body harness. NOTE: After problem has been eliminated, disconnect the connectors (3M) and (4M).	Is the anything unusual to body harness?	Repair the body harness.	Replace the combination meter printed circuit. <Ref. to IDI-12, Combination Meter.>
4	**CHECK POOR CONTACT.** Confirm that firm contact is secured between the airbag control module and the connector (AB3). <Ref. to AB-16, Airbag Control Module.>	Is the poor contact in connector (AB3)?	Replace the airbag main harness with body harness or replace the airbag control module. <Ref. to AB-16, Airbag Control Module.>	Go to step **5.**
5	**CHECK AIRBAG MAIN HARNESS.** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Connect the connector (AB1) to (B31). 3) Disconnect the connectors (AB26) and (AB21). 4) Remove the glove box and disconnect the connectors (AB27) and (AB4). 5) Disconnect the connector (AB3) from the airbag control module, and connect the connector (1R) in test harness R. <Ref. to AB-16, Airbag Control Module.> 6) Connect the battery ground cable and turn the ignition switch to ON. 7) Connect the connectors (5R) and (6R) in test harness R. NOTE: After problem has been eliminated, disconnect the connectors (5R) and (6R).	Is the airbag warning light turned off?	Go to step **6.**	Replace the airbag main harness with body harness.
6	**CHECK GROUN DING CIRCUIT.** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Disconnect the connector (AB3) from the airbag control module. 3) Connect the connector (1R) in test harness R to body harness connector (AB3). 4) Measure the resistance between connector (2R) in test harness R and the chassis ground. ***Connector & terminal*** ***(2R) No. 10 — Chassis ground:*** ***(2R) No. 11 — Chassis ground:***	Is the resistance less than 10 Ω?	Replace the airbag control module. <Ref. to AB-16, Airbag Control Module.>	Repair the body-grounding circuit.

B: AIRBAG WARNING LIGHT REMAINS OFF

DIAGNOSIS:

- Fuse No. 13 (in fuse box) is blown.
- Body harness circuit is open.
- Airbag warning light is faulty.
- Airbag main harness is faulty.
- Airbag control module is faulty.

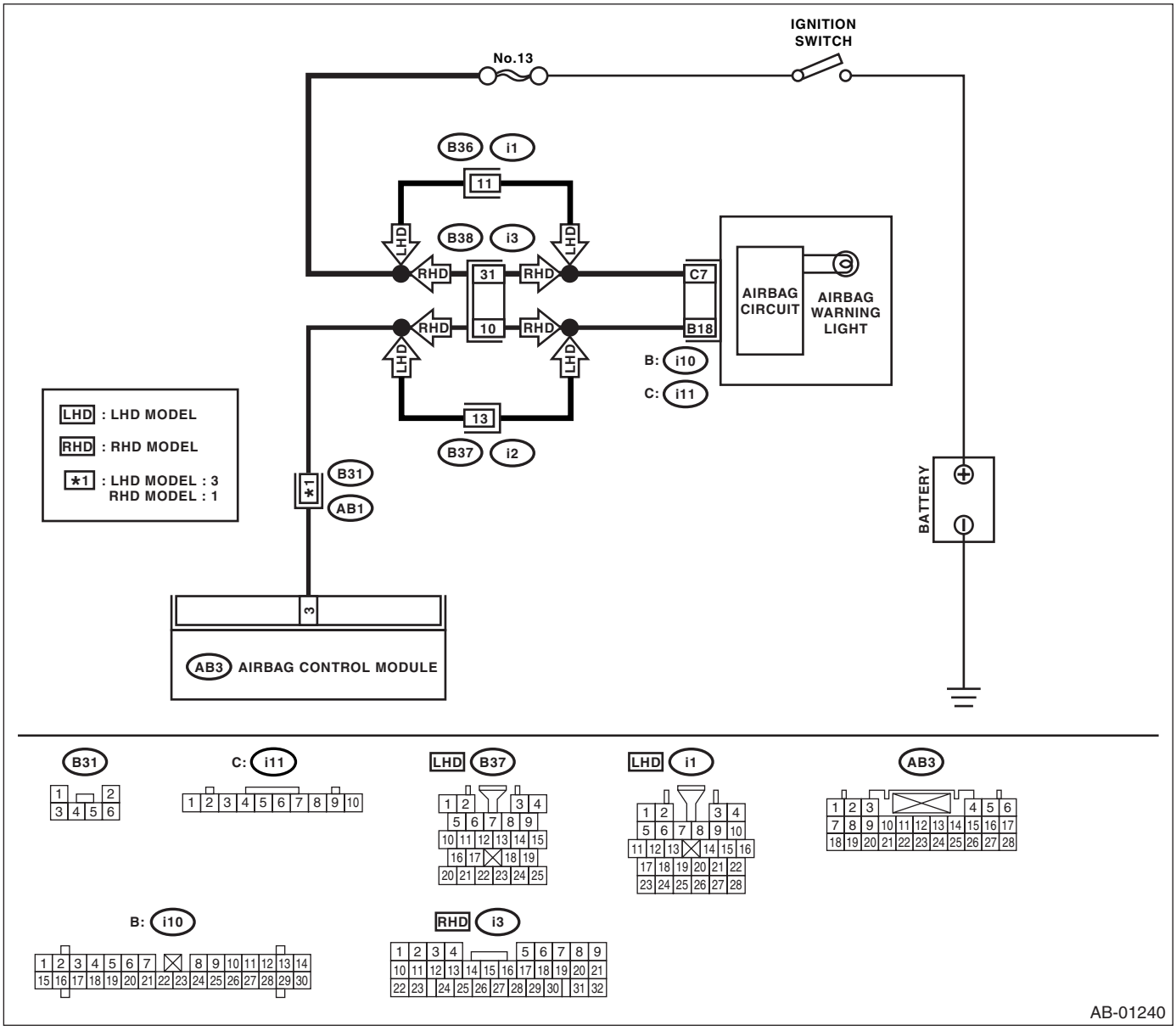
CAUTION:

• Before diagnosing the airbag system, be sure to turn the ignition switch to OFF, disconnect the ground cable from battery, and wait more than 20 seconds before starting to work.

• Before replacing the airbag module, seat belt pretensioner roll connector, control module, and sensor, reconnect each part and confirm that the warning light operates properly.

• When inspecting the airbag main harness, disconnect the airbag module connector of the driver and passenger seats for safety reasons.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK COMBINATION METER.** Turn the ignition switch to ON, and confirm that warning lights equipped in the combination meter are turned on.	Do the warning lights not for airbag turn on?	Go to step **2.**	Repair the combination meter power supply. <Ref. to IDI-3, Combination Meter System.>
2	**CHECK FUSE No. 13 (IN MAIN FUSE BOX).** Remove the fuse No. 13 and perform visual inspection.	Is the fuse No. 13 (in main fuse box) blown out?	Replace the fuse No. 13. If fuse No. 13 is blown out again, go to step 3.	Go to step **3.**
3	**CHECK AIRBAG WARNING LIGHT CIRCUIT (IN COMBINATION METER).** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Disconnect the connector (AB1) from (B31). 3) Connect the battery ground cable and turn the ignition switch to ON.	Is the airbag warning light turned on?	Go to step **4.**	Replace the airbag warning light bulb or combination meter printed circuit. <Ref. to IDI-12, Combination Meter.>
4	**CHECK AIRBAG MAIN HARNESS.** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Connect the connector (AB1) to (B31). 3) Disconnect the connector (AB3) from the airbag control module. <Ref. to AB-16, Airbag Control Module.> 4) Connect the battery ground cable and turn the ignition switch to ON.	Is the airbag warning light turned on?	Replace the airbag control module. <Ref. to AB-16, Airbag Control Module.>	Replace the airbag main harness with body harness.

12.List of Diagnostic Trouble Code (DTC)

A: LIST

DTC	Memory function	Contents of diagnosis	Index No.
11	Provided.	• Airbag main harness circuit is open, shorted or shorted to ground. • Airbag module harness (driver) circuit is open, shorted or shorted to ground. • Roll connector circuit is open, shorted or shorted to ground. • Airbag control module is faulty. • Driver's airbag module is faulty.	<Ref. to AB(diag)-35, DTC 11, Diagnostic Chart with Trouble Code.>
12	Provided.	• Airbag main harness circuit is open, shorted or shorted to ground. • Airbag module harness (passenger) circuit is open, shorted or shorted to ground. • Airbag control module is faulty. • Passenger's airbag module is faulty.	<Ref. to AB(diag)-37, DTC 12, Diagnostic Chart with Trouble Code.>
15	Provided.	• Airbag main harness circuit (driver) is shorted to power supply. • Airbag module harness (driver) is shorted to power supply. • Roll connector is shorted to power supply. • Airbag control module is faulty. • Driver's airbag module is faulty.	<Ref. to AB(diag)-39, DTC 15, Diagnostic Chart with Trouble Code.>
16	Provided.	• Airbag main harness circuit (passenger) is shorted to power supply. • Airbag module harness (passenger) is shorted to power supply. • Airbag control module is faulty. • Passenger's airbag module is faulty.	<Ref. to AB(diag)-41, DTC 16, Diagnostic Chart with Trouble Code.>
21	Provided.	Airbag control module is faulty.	<Ref. to AB(diag)-42, DTC 21, Diagnostic Chart with Trouble Code.>
22	Provided.	Front airbag module and seat belt pretensioner (LH/RH) are inflated.	<Ref. to AB(diag)-43, DTC 22, Diagnostic Chart with Trouble Code.>
23	Not provided.	(AB3), (AB7) and (AB8) are not connected properly to airbag control module.	<Ref. to AB(diag)-44, DTC 23, Diagnostic Chart with Trouble Code.>
24	Not provided.	• Airbag control module is faulty. • Airbag main harness circuit is open. • Fuse No. 11 (in joint box) is blown. • Body harness circuit is open.	<Ref. to AB(diag)-45, DTC 24, Diagnostic Chart with Trouble Code.>
25	Provided.	• Airbag control module is faulty. • Airbag main harness circuit is open. • Fuse No. 6 (in joint box) is blown. • Body harness circuit is open.	<Ref. to AB(diag)-47, DTC 25, Diagnostic Chart with Trouble Code.>
31	Provided.	• Front sub-sensor harness (RH) circuit is shorted. • Front sub-sensor harness (RH) circuit is open. • Front sub-sensor (RH) is faulty. • Airbag control module is faulty.	<Ref. to AB(diag)-49, DTC 31, Diagnostic Chart with Trouble Code.>

DTC	Memory function	Contents of diagnosis	Index No.
32	Provided.	• Front sub-sensor harness (LH) circuit is shorted. • Front sub-sensor harness (LH) circuit is open. • Front sub-sensor (LH) is faulty. • Airbag control module is faulty.	<Ref. to AB(diag)-52, DTC 32, Diagnostic Chart with Trouble Code.>
41	Provided.	• Side airbag harness (RH) is faulty. • Side airbag module (RH) is faulty. • Airbag control module is faulty.	<Ref. to AB(diag)-55, DTC 41, Diagnostic Chart with Trouble Code.>
42	Provided.	• Side airbag harness (LH) is faulty. • Side airbag module (LH) is faulty. • Airbag control module is faulty.	<Ref. to AB(diag)-57, DTC 42, Diagnostic Chart with Trouble Code.>
45	Provided.	• Side airbag harness (RH) is shorted to power supply. • Airbag control module is faulty.	<Ref. to AB(diag)-59, DTC 45, Diagnostic Chart with Trouble Code.>
46	Provided.	• Side airbag harness (LH) is shorted to power supply. • Airbag control module is faulty.	<Ref. to AB(diag)-61, DTC 46, Diagnostic Chart with Trouble Code.>
51	Provided.	• Side airbag sensor (RH) is faulty. • Side airbag harness (RH) is faulty. • Airbag control module is faulty.	<Ref. to AB(diag)-63, DTC 51, Diagnostic Chart with Trouble Code.>
52	Provided.	• Side airbag sensor (LH) is faulty. • Side airbag harness (LH) is faulty. • Airbag control module is faulty.	<Ref. to AB(diag)-65, DTC 52, Diagnostic Chart with Trouble Code.>
53	Provided.	Side airbag sensor (RH) is faulty.	<Ref. to AB(diag)-67, DTC 53, Diagnostic Chart with Trouble Code.>
54	Provided.	Side airbag sensor (LH) is faulty.	<Ref. to AB(diag)-67, DTC 54, Diagnostic Chart with Trouble Code.>
55	Provided.	Side airbag module is inflated.	<Ref. to AB(diag)-67, DTC 55, Diagnostic Chart with Trouble Code.>
61	Provided.	• Seat belt pretensioner (RH) circuit is open, shorted or shorted to ground. • Airbag control module is faulty. • Pretensioner is faulty. • Pretensioner harness is faulty.	<Ref. to AB(diag)-68, DTC 61, Diagnostic Chart with Trouble Code.>
62	Provided.	• Seat belt pretensioner (LH) circuit is open, shorted or shorted to ground. • Airbag control module is faulty. • Pretensioner is faulty. • Pretensioner harness is faulty.	<Ref. to AB(diag)-70, DTC 62, Diagnostic Chart with Trouble Code.>
65	Provided.	• Seat belt pretensioner (RH) circuit is shorted to power supply. • Pretensioner is faulty. • Pretensioner harness is faulty. • Airbag control module is faulty.	<Ref. to AB(diag)-72, DTC 65, Diagnostic Chart with Trouble Code.>

DTC	Memory function	Contents of diagnosis	Index No.
66	Provided.	Seat belt pretensioner (LH) circuit is shorted to power supply. • Pretensioner is faulty. • Pretensioner harness is faulty. • Airbag control module is faulty.	<Ref. to AB(diag)-74, DTC 66, Diagnostic Chart with Trouble Code.>

13.Diagnostic Chart with Trouble Code

A: DTC 11

DIAGNOSIS:

- Airbag main harness circuit is open, shorted or shorted to ground.
- Airbag module harness (Driver) circuit is open, shorted or shorted to ground.
- Roll connector circuit is open, shorted or shorted to ground.
- Driver's airbag module is faulty.
- Airbag control module is faulty.

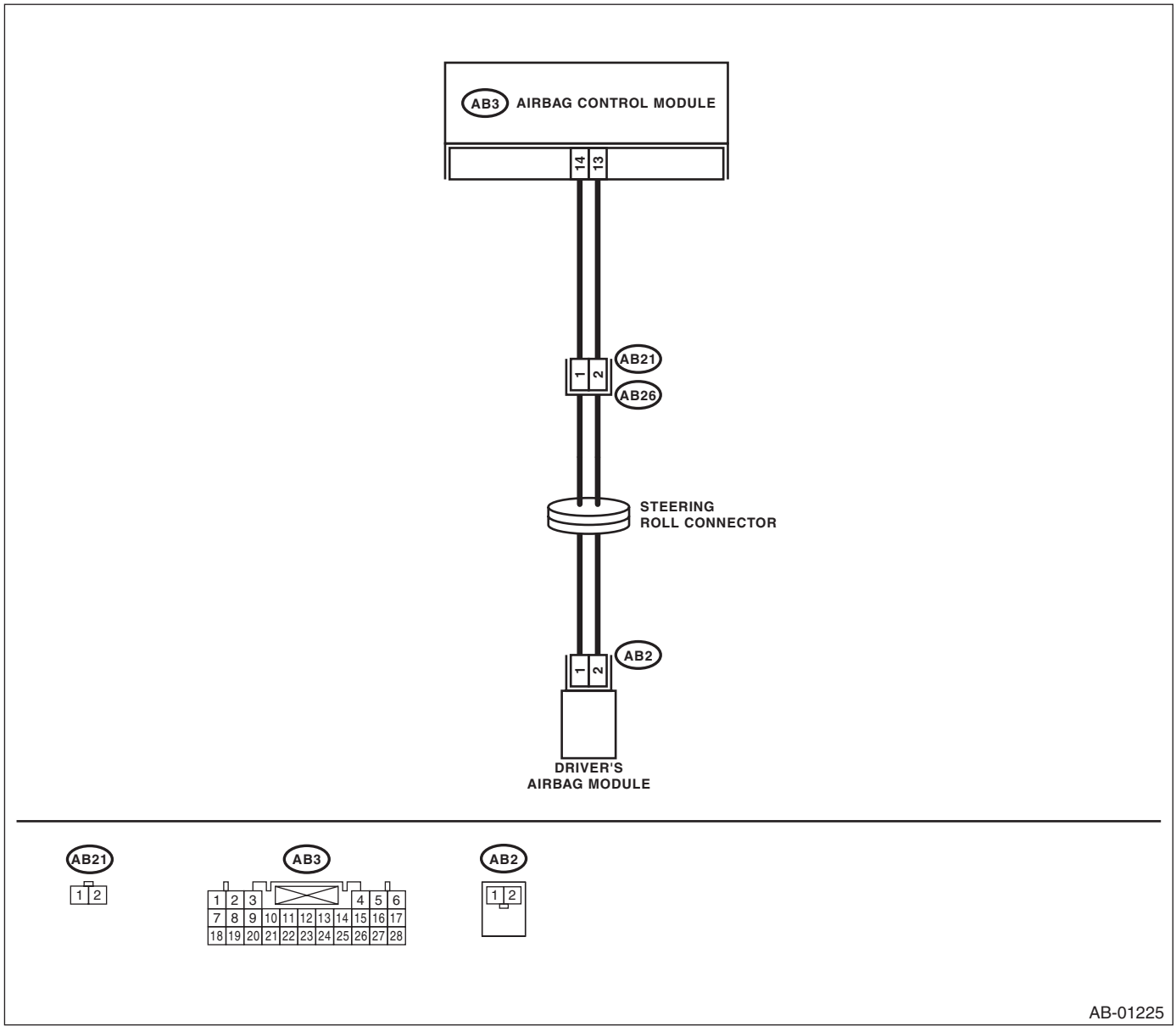
CAUTION:

• Before diagnosing the airbag system, be sure to turn the ignition switch to OFF, disconnect the ground cable from battery, and wait more than 20 seconds before starting to work.

• Before replacing the airbag module, seat belt pretensioner roll connector, control module, and sensor, reconnect each part and confirm that the warning light operates properly.

• When inspecting the airbag main harness, disconnect the driver's airbag module and passenger's airbag module connectors for safety reasons.

WIRING DIAGRAM:



Diagnostic Chart with Trouble Code

	Step	Check	Yes	No
1	**CHECK DRIVER'S AIRBAG MODULE.** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Remove the driver's airbag module. <Ref. to AB-12, Driver's Airbag Module.> 3) Connect the connector (1N) in test harness N to connector (AB2). 4) Connect the airbag resistor to connector (2N) in test harness N. 5) Connect the battery ground cable and turn the ignition switch to ON.	Does the airbag warning light operate properly?	Replace the driver's airbag module. <Ref. to AB-12, Driver's Airbag Module.>	Go to step **2.**
2	**CHECK ROLL CONNECTOR.** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 second. 2) Disconnect the test harness N from the connector (AB2). 3) Remove the instrument panel lower cover, disconnect the connector (AB26) from (AB21) and connect the connector (1F) in test harness F to connector (AB21). 4) Connect the airbag resistor to connector (3F) in test harness F. 5) Connect the battery ground cable and turn the ignition switch to ON.	Does the airbag warning light operate properly?	Replace the roll connector. <Ref. to AB-18, Roll Connector.>	Go to step **3.**
3	**CHECK AIRBAG MAIN HARNESS.** 1) Turn the ignition switch to OFF, disconnect the ground cable, and wait more than 20 seconds. 2) Disconnect the airbag resistor from the connector (3F) in test harness F. 3) Remove the glove box, <Ref. to AB-13, Passenger's Airbag Module.> and disconnect connectors (AB27) and (AB4). 4) Disconnect the connector (AB3) from the airbag control module, and connect the connector (1R) in test harness R. <Ref. to AB-16, Airbag Control Module.> 5) Measure the resistance between connector (2R) in test harness R and the connector (3F) in test harness F. ***Connector & terminal*** ***(2R) No. 2 — (3F) No. 4:*** ***(2R) No. 4 — (3F) No. 3:***	Is the resistance less than 10 Ω?	Go to step **4.**	Replace the airbag main harness with body harness.
4	**CHECK AIRBAG MAIN HARNESS.** Measure the resistance of the connector (2R) in test harness R. ***Connector & terminal*** ***(2R) No. 2 — (2R) No. 4:*** ***(2R) No. 4 — Chassis ground:*** ***(2R) No. 2 — Chassis ground:***	Is the resistance more than 1 MΩ?	Replace the airbag control module. <Ref. to AB-16, Airbag Control Module.>	Replace the airbag main harness with body harness.

B: DTC 12

DIAGNOSIS:

- Airbag main harness circuit is open, shorted or shorted to ground.
- Airbag module harness (Passenger) circuit is open, shorted or shorted to ground.
- Passenger's airbag module is faulty.
- Airbag control module is faulty.

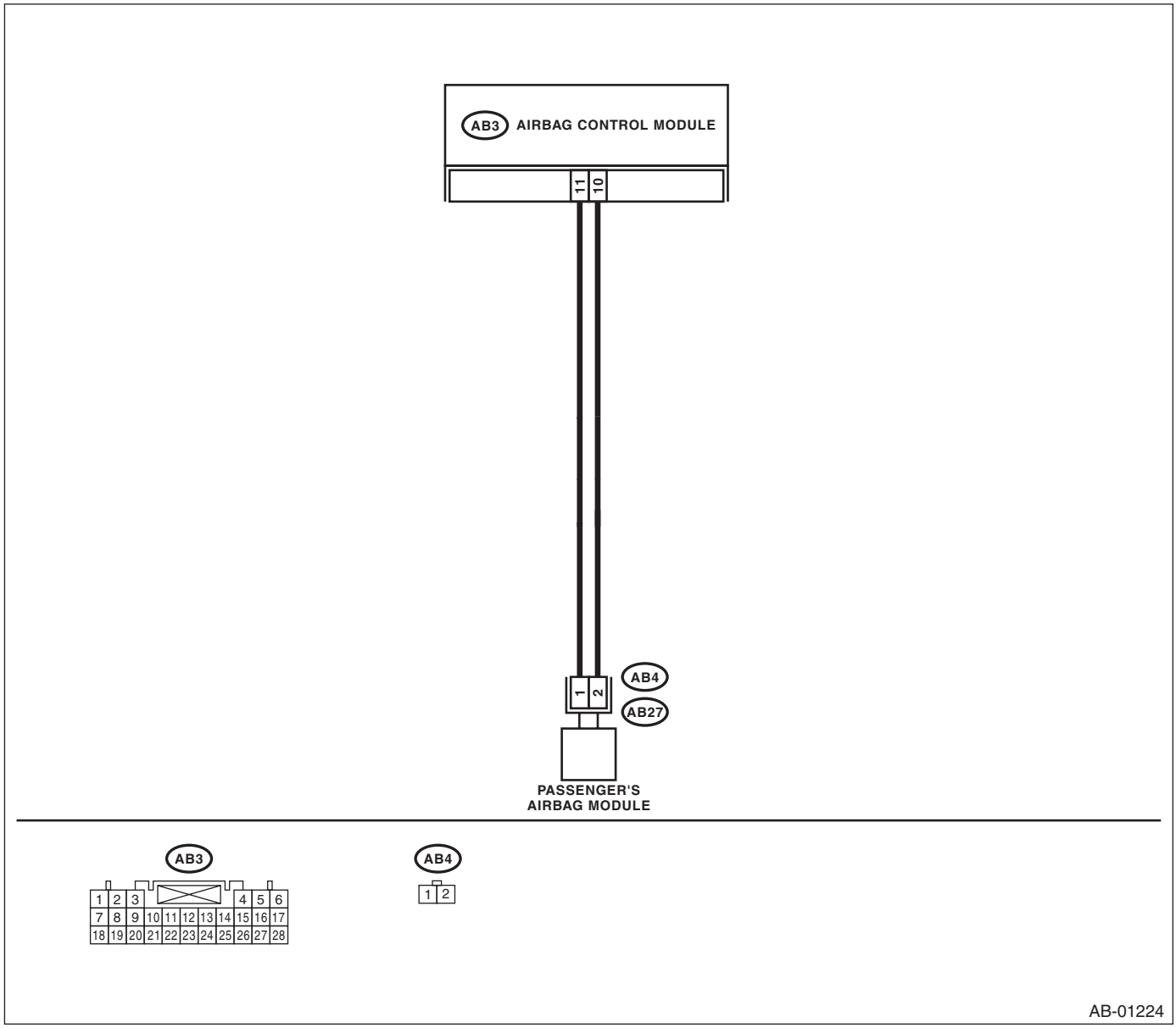
CAUTION:

• Before diagnosing the airbag system, be sure to turn the ignition switch to OFF, disconnect the ground cable from battery, and wait more than 20 seconds before starting to work.

• Before replacing the airbag module, seat belt pretensioner roll connector, control module, and sensor, reconnect each part and confirm that the warning light operates properly.

• When inspecting the airbag main harness, disconnect the airbag module connector of the driver and passenger seats for safety reasons.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK PASSENGER'S AIRBAG MODULE.** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Remove the glove box. 3) Disconnect the connector (AB27) from (AB4). 4) Connect the connector (1F) in test harness F to connector (AB4). 5) Connect the airbag resistor to connector (3F) in test harness F. 6) Connect the battery ground cable and turn the ignition switch to ON.	Does the airbag warning light operate properly?	Replace the passenger airbag module. <Ref. to AB-13, Passenger's Airbag Module.>	Go to step **2.**
2	**CHECK AIRBAG MAIN HARNESS.** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Disconnect the airbag resistor from the connector (3F) in test harness F. 3) Remove the instrument panel lower cover and disconnect the connector (AB26) from (AB21). 4) Disconnect the connector (AB3) from the airbag control module, and connect the connector (1R) in test harness R. <Ref. to AB-16, Airbag Control Module.> 5) Measure the resistance between connector (2R) in test harness R and the connector (3F) in test harness F. ***Connector & terminal*** ***(2R) No. 3 — (3F) No. 3:*** ***(2R) No. 5 — (3F) No. 4:***	Is the resistance less than 10 Ω?	Go to step **3.**	Replace the airbag main harness with body harness.
3	**CHECK AIRBAG MAIN HARNESS.** Measure the resistance of the connector (2R) in test harness R. ***Connector & terminal*** ***(2R) No. 3 — (2R) No. 5:*** ***(2R) No. 3 — Chassis ground:*** ***(2R) No. 5 — Chassis ground:***	Is the resistance more than 1 MΩ?	Replace the airbag control module. <Ref. to AB-16, Airbag Control Module.>	Replace the airbag main harness with body harness.

C: DTC 15

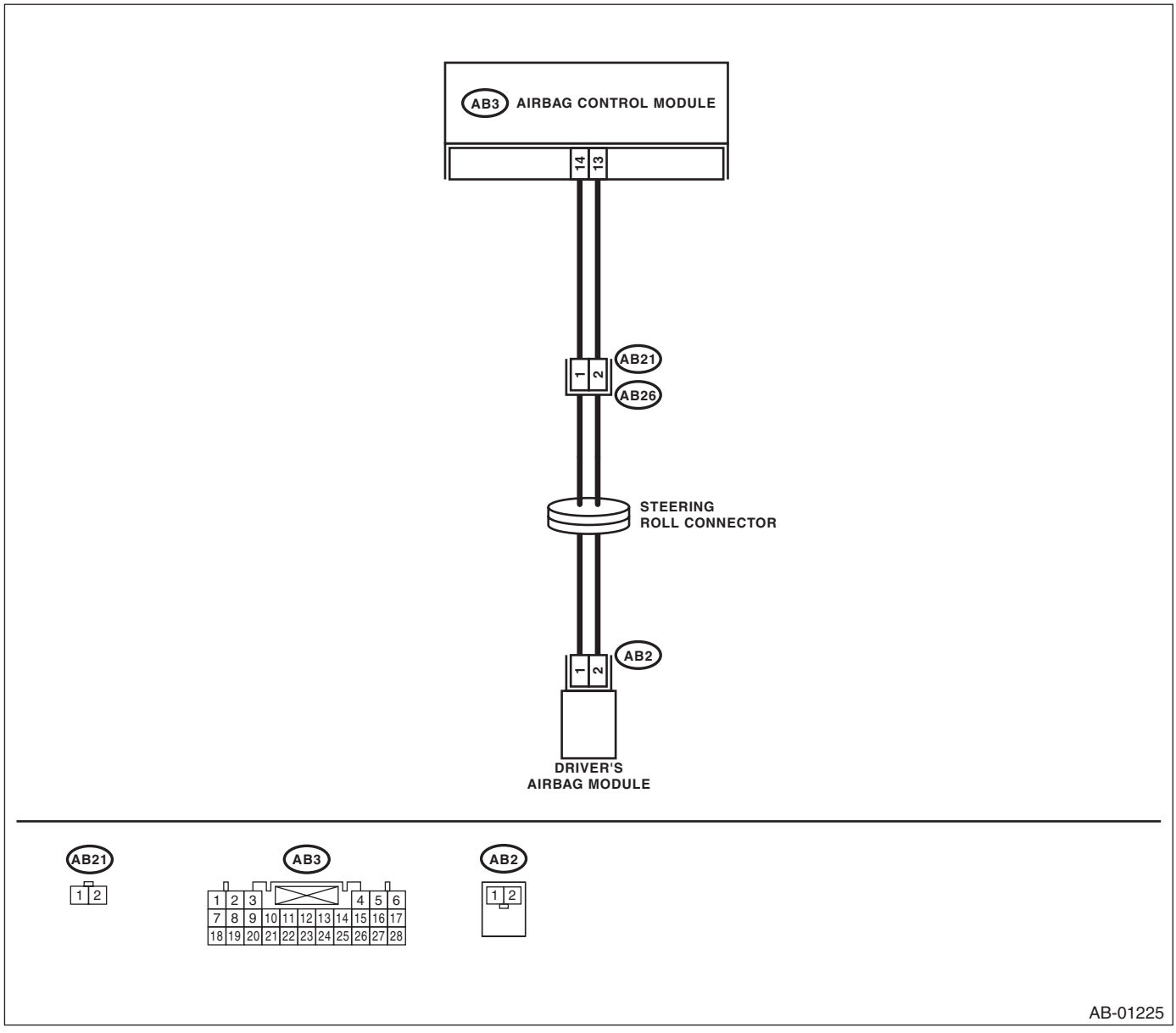
DIAGNOSIS:

- Airbag main harness circuit (Driver) is shorted to the power supply.
- Airbag module harness (Driver) is shorted to the power supply.
- Roll connector is shorted to the power supply.
- Driver's airbag module is faulty.
- Airbag control module is faulty.

CAUTION:

• Before diagnosing the airbag system, be sure to turn the ignition switch to OFF, disconnect the ground cable from battery, and wait more than 20 seconds before starting to work.
• Before replacing the airbag module, seat belt pretensioner roll connector, control module, and sensor, reconnect each part and confirm that the warning light operates properly.
• When inspecting the airbag main harness, disconnect the driver's airbag module and passenger's airbag module connectors for safety reasons.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK DRIVER'S AIRBAG MODULE.** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Remove the driver's airbag module. <Ref. to AB-12, Driver's Airbag Module.> 3) Connect the connector (AB2) to connector (1N) in test harness N. 4) Connect the airbag resistor to connector (2N) in test harness N. 5) Connect the battery ground cable and turn the ignition switch to ON.	Does the airbag warning light operate properly?	Replace the driver's airbag module. <Ref. to AB-12, Driver's Airbag Module.>	Go to step **2.**
2	**CHECK ROLL CONNECTOR.** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Disconnect the test harness N from the connector (AB2). 3) Remove the instrument panel lower cover panel and disconnect the connector (AB26) from (AB21). 4) Connect the connector (1F) in test harness F to connector (AB21). 5) Connect the airbag resistor to connector (3F) in test harness F. 6) Connect the battery ground cable and turn the ignition switch to ON.	Does the airbag warning light operate properly?	Replace the roll connector. <Ref. to AB-18, Roll Connector.>	Go to step **3.**
3	**CHECK AIRBAG MAIN HARNESS.** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Disconnect the airbag resistor from the connector (3F) in test harness F. 3) Remove the glove box, and disconnect the connectors (AB27) and (AB4). 4) Disconnect the connector (AB3) from the airbag control module, and connect the connector (1R) in test harness R. <Ref. to AB-16, Airbag Control Module.> 5) Connect the battery ground cable and turn the ignition switch to ON. (engine OFF) 6) Measure the voltage between connector (2R) in test harness R and the chassis ground. ***Connector & terminal*** ***(2R) No. 4 (+) — Chassis ground (−):*** ***(2R) No. 2 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Replace the airbag control module. <Ref. to AB-16, Airbag Control Module.>	Replace the airbag main harness with body harness.

D: DTC 16

DIAGNOSIS:

- Airbag main harness circuit (Passenger) is shorted to the power supply.
- Airbag module harness (Passenger) is shorted to the power supply.
- Passenger's airbag module is faulty.
- Airbag control module is faulty.

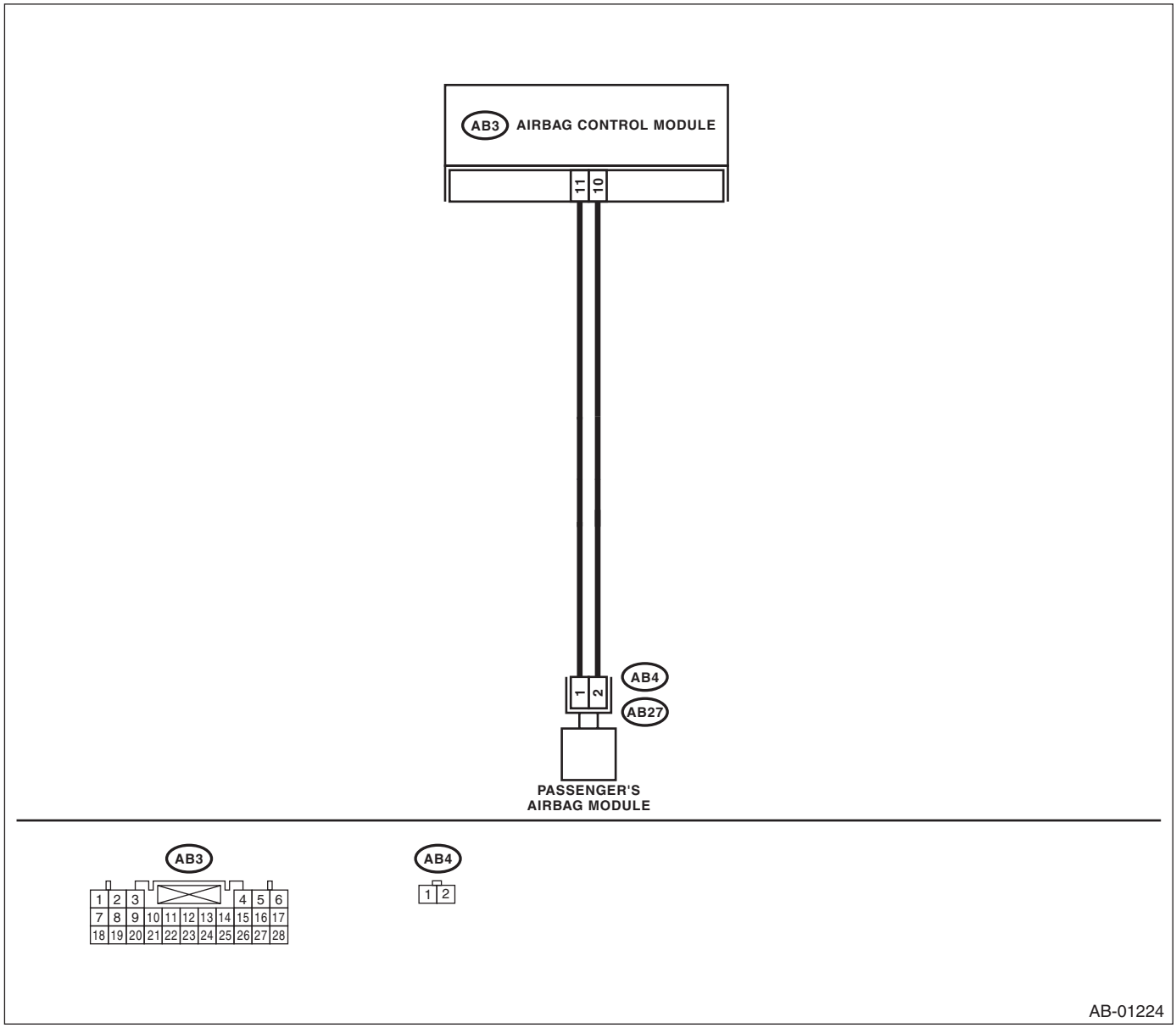
CAUTION:

• Before diagnosing the airbag system, be sure to turn the ignition switch to OFF, disconnect the ground cable from battery, and wait more than 20 seconds before starting to work.

• Before replacing the airbag module, seat belt pretensioner roll connector, control module, and sensor, reconnect each part and confirm that the warning light operates properly.

• When inspecting the airbag main harness, disconnect the airbag module connector of the driver and passenger seats for safety reasons.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK PASSENGER'S AIRBAG MODULE.** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Remove the glove box. 3) Disconnect the connector (AB27) from (AB4) 4) Connect the connector (1F) in test harness F to connector (AB4). 5) Connect the airbag resistor to connector (3F) in test harness F. 6) Connect the battery ground cable and turn the ignition switch to ON.	Does the airbag warning light operate properly?	Replace the passenger airbag module. <Ref. to AB-13, Passenger's Airbag Module.>	Go to step **2.**
2	**CHECK AIRBAG MAIN HARNESS.** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Disconnect the airbag resistor from the connector (3F) in test harness F. 3) Remove the instrument panel lower cover and disconnect the connector (AB26) from (AB21). 4) Disconnect the connector (AB3) from the airbag control module, and connect the connector (1R) in test harness R. <Ref. to AB-16, Airbag Control Module.> 5) Measure the voltage between connector (2R) in test harness R and the chassis ground. ***Connector & terminal*** ***(2R) No. 3 (+) — Chassis ground (−):*** ***(2R) No. 5 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Replace the airbag control module. <Ref. to AB-16, Airbag Control Module.>	Replace the airbag main harness with body harness.

E: DTC 21

DIAGNOSIS:

Airbag control module is faulty.

CAUTION:

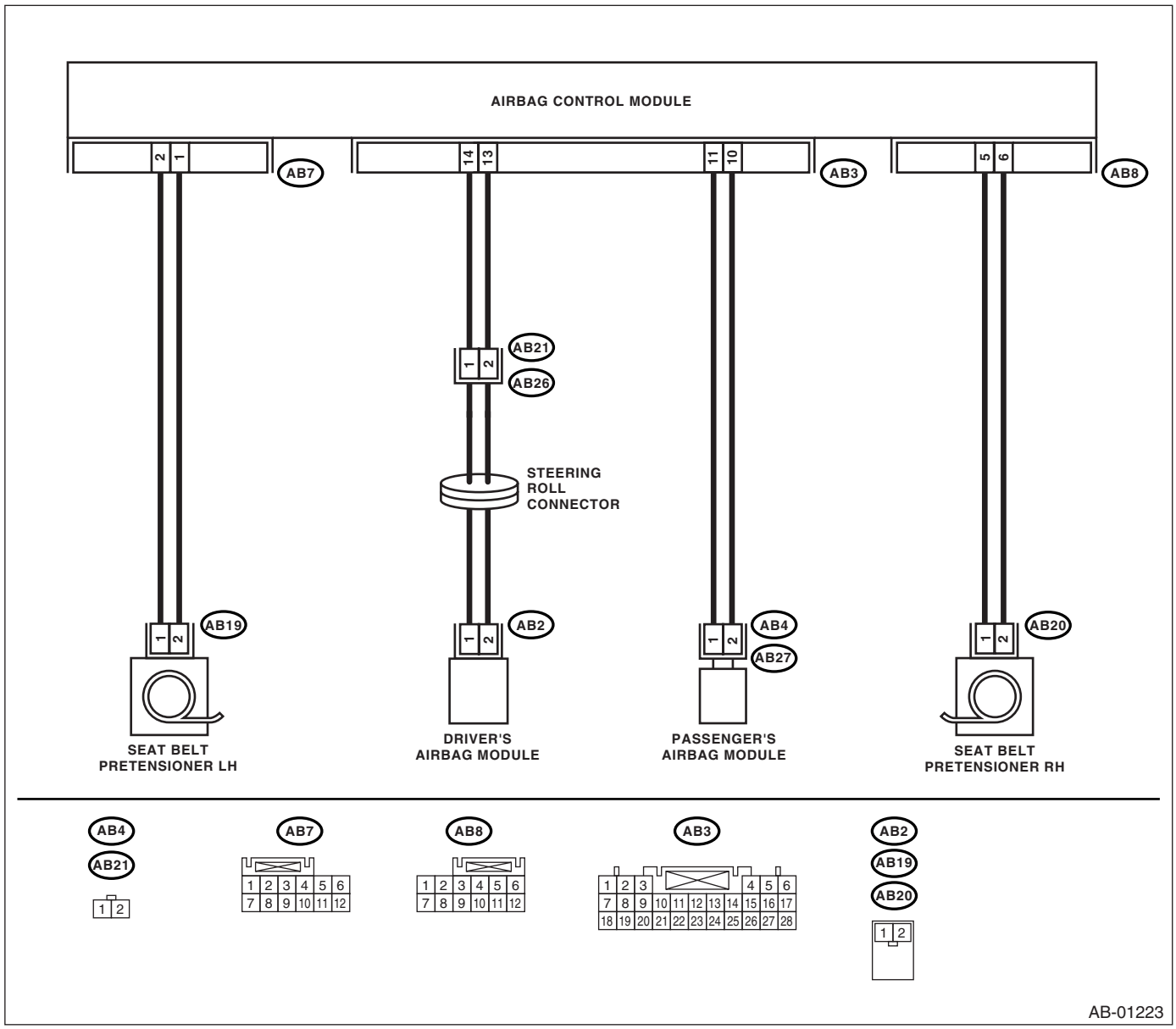
• Before diagnosing the airbag system, be sure to turn the ignition switch to OFF, disconnect the ground cable from battery, and wait more than 20 seconds before starting to work.

• Before replacing the airbag module, seat belt pretensioner roll connector, control module, and sensor, reconnect each part and confirm that the warning light operates properly.

	Step	Check	Yes	No
1	**CHECK IF DTC 21 IS INDICATED.** Read the DTC. <Ref. to AB(diag)-22, Read Diagnostic Trouble Code (DTC).>	Is the airbag warning light DTC 21 indicated?	Replace the airbag control module. <Ref. to AB-16, Airbag Control Module.>	Perform clear memory. <Ref. to AB(diag)-24, Clear Memory Mode.>

F: DTC 22

WIRING DIAGRAM:



This code is indicated when the front airbag and the pretensioner are in operation.
Once this code is indicated, memory is not erasable; therefore replace the following parts.

- Airbag control module. <Ref. to AB-16, Airbag Control Module.>
- Driver's airbag module. <Ref. to AB-12, Driver's Airbag Module.>
- Passenger's airbag module. <Ref. to AB-13, Passenger's Airbag Module.>
- Front sub-sensor of both sides. <Ref. to AB-19, Front Sub Sensor.>
- Front seat belt outer with pretensioner of both sides. <Ref. to SB-12, Front Seat Belt.>

G: DTC 23

DIAGNOSIS:

(AB3), (AB7) and (AB8) are not connected properly to airbag control module.

CAUTION:

Before diagnosing the airbag system, be sure to turn the ignition switch to OFF, disconnect the ground cable from battery, and wait more than 20 seconds before starting to work.

	Step	Check	Yes	No
1	**CHECK POOR CONTACT IN CONNECTORS (AB3), (AB7) AND (AB8).** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Disconnect the connectors (AB3), (AB7) and (AB8) from the airbag control module. <Ref. to AB-16, Airbag Control Module.>	Is there rust or damage on the harness connector and the control module connector?	Replace the airbag control module. <Ref. to AB-16, Airbag Control Module.> Replace the airbag main harness with body harness. Replace the body harness with side airbag harness.	Go to step **2.**
2	**CHECK POOR CONTACT IN CONNECTORS (AB3), (AB7) AND (AB8).** 1) Ensure that connectors are firmly reconnected. 2) Connect the battery ground cable and turn the ignition switch to ON.	Does the airbag warning light operate properly?	Finish the diagnosis.	Replace the airbag control module. <Ref. to AB-16, Airbag Control Module.>

H: DTC 24

DIAGNOSIS:

- Airbag control module is faulty.
- Airbag main harness circuit is open.
- Fuse No. 11 (in joint box) is blown.
- Body harness circuit is open.

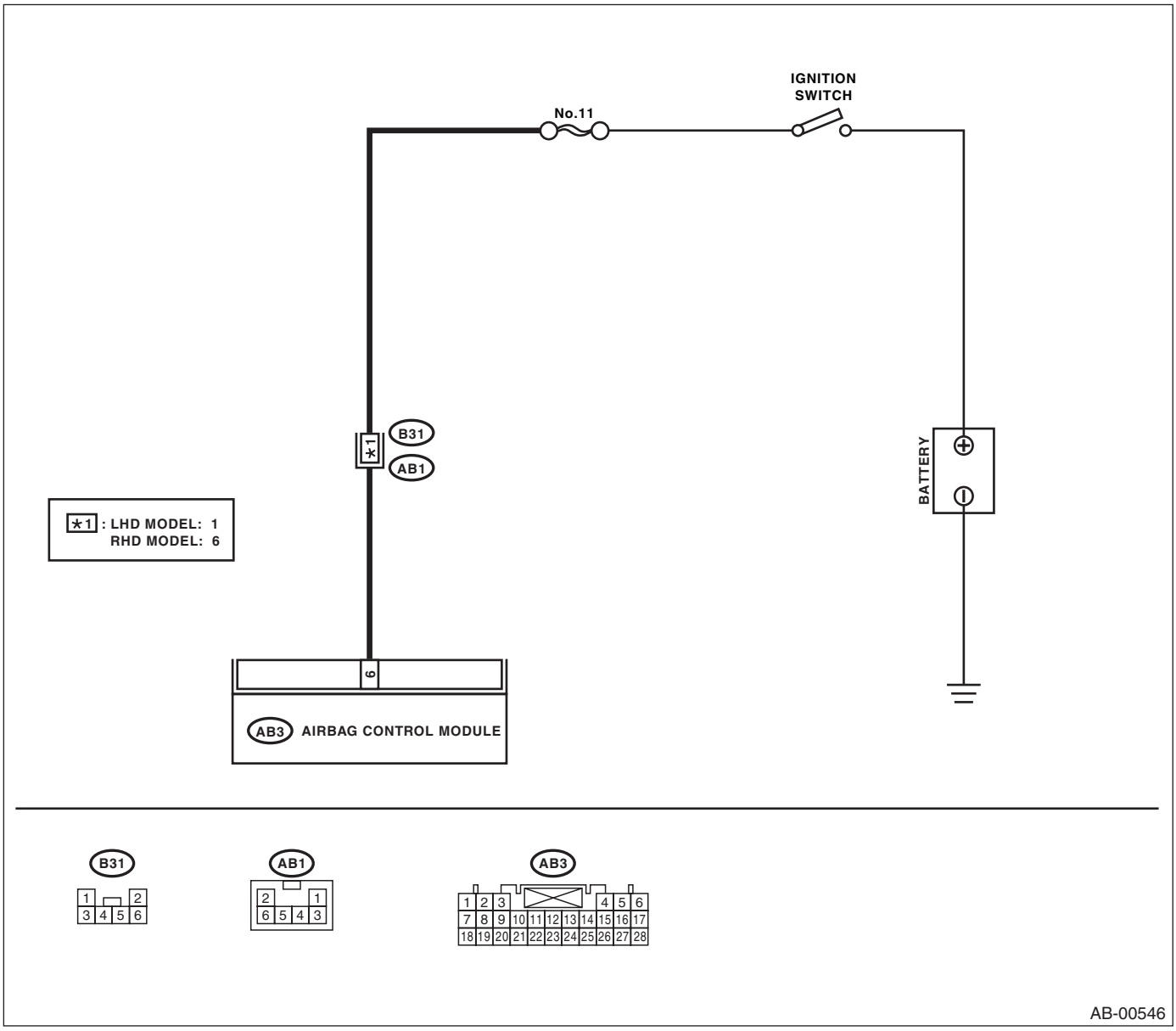
CAUTION:

• Before diagnosing the airbag system, be sure to turn the ignition switch to OFF, disconnect the ground cable from battery, and wait more than 20 seconds before starting to work.

• Before replacing the airbag module, seat belt pretensioner roll connector, control module, and sensor, reconnect each part and confirm that the warning light operates properly.

• When inspecting the airbag main harness, disconnect the driver's airbag module and passenger's airbag module connectors for safety reasons.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK AIRBAG CONTROL MODULE.** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Disconnect the connector (AB3) from the airbag control module. <Ref. to AB-16, Airbag Control Module.> 3) Connect the connector (1R) in test harness R to connector (AB3). 4) Connect the battery ground cable and turn the ignition switch to ON. 5) Measure the voltage between connector (2R) in test harness R and chassis ground. ***Connector & terminal*** ***(2R) No. 1 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Replace the airbag control module. <Ref. to AB-16, Airbag Control Module.>	Go to step **2.**
2	**CHECK AIRBAG MAIN HARNESS.** 1) While checking control module, turn the ignition switch to OFF and disconnect the battery ground cable. Wait more than 20 seconds before operation. 2) Disconnect the airbag connector (AB1) from the body harness (B31). 3) Connect the connector (2M) in test harness M to connector (AB1). 4) Measure the resistance between connector (5M) in test harness M and the connector (2R) in test harness R. ***Connector & terminal*** ***LHD MODEL:*** ***(5M) No. 2 — (2R) No. 1:*** ***RHD MODEL:*** ***(5M) No. 9 — (2R) No. 1:***	Is the resistance less than 10 Ω?	Go to step **3.**	Replace the airbag main harness with body harness.
3	**CHECK AIRBAG MAIN HARNESS.** Measure the following resistance with the above-mentioned condition maintained. ***Connector & terminal*** ***LHD MODEL:*** ***(5M) No. 2 — Chassis ground:*** ***(2R) No. 1 — Chassis ground:*** ***RHD MODEL:*** ***(5M) No. 9 — Chassis ground:*** ***(2R) No. 1 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **4.**	Replace the airbag main harness with body harness.
4	**CHECK FUSE No. 11 (IN JOINT BOX).** 1) Confirm that the ignition switch is turned OFF. 2) Remove the fuse No. 11 (in joint box) and perform visual inspection.	Is the fuse No. 11 blown out?	Replace the fuse No. 11. If fuse No. 11 is blown out again, repair the body harness.	Repair the body harness.

I: DTC 25

DIAGNOSIS:

- Airbag control module is faulty.
- Airbag main harness circuit is open.
- Fuse No. 6 (in joint box) is blown.
- Body harness circuit is open.

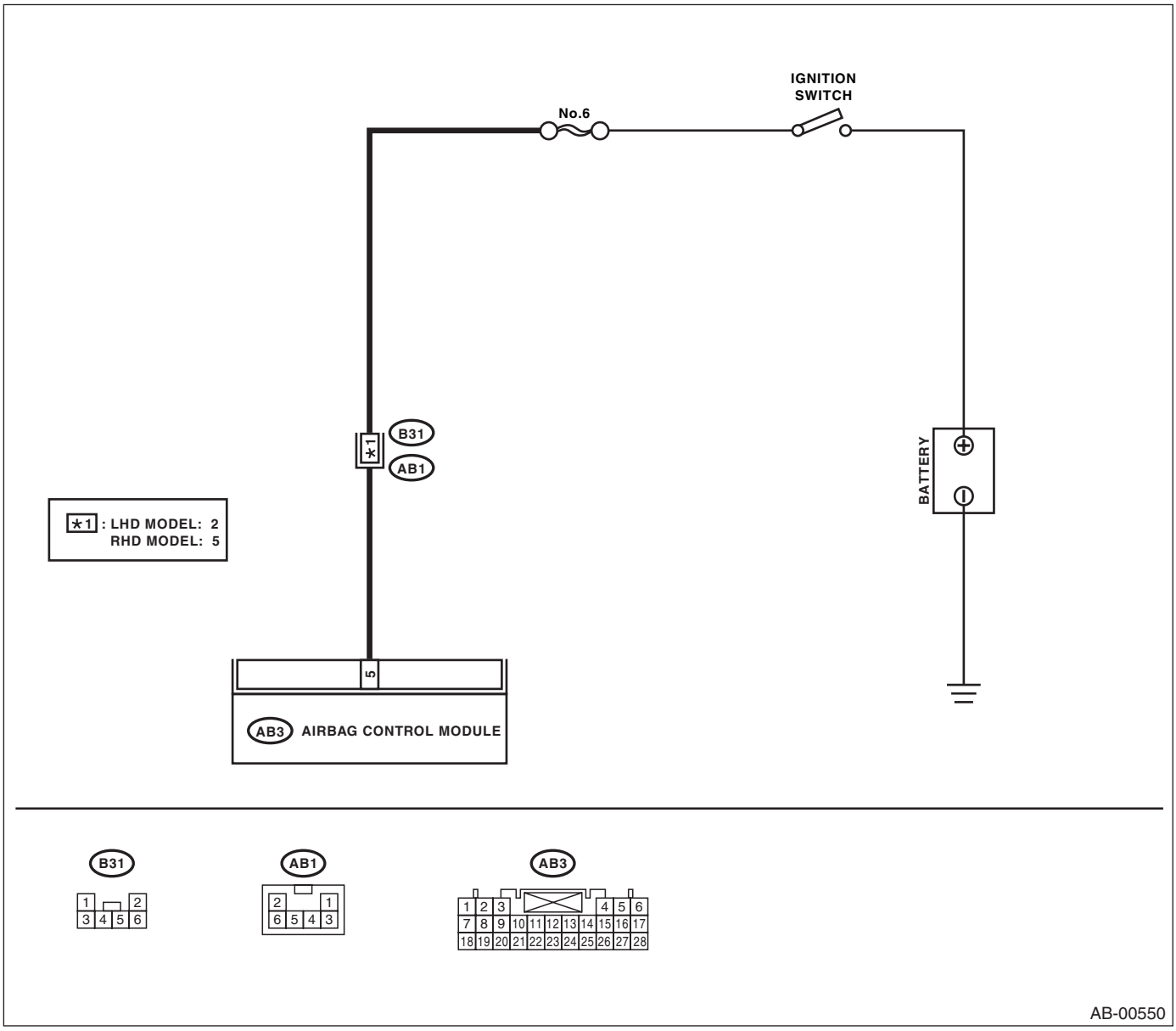
CAUTION:

• Before diagnosing the airbag system, be sure to turn the ignition switch to OFF, disconnect the ground cable from battery, and wait more than 20 seconds before starting to work.

• Before replacing the airbag module, seat belt pretensioner roll connector, control module, and sensor, reconnect each part and confirm that the warning light operates properly.

• When inspecting the airbag main harness, disconnect the driver's airbag module and passenger's airbag module connectors for safety reasons.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK AIRBAG CONTROL MODULE.** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Disconnect the connector (AB3) from airbag control module. <Ref. to AB-16, Airbag Control Module.> 3) Connect the connector (1R) in test harness R to connector (AB3). 4) Connect the battery ground cable, and turn the ignition switch to ON. 5) Measure the voltage between the connector (2R) in test harness R and the chassis ground. ***Connector & terminal*** ***(2R) No. 6 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Replace the airbag control module. <Ref. to AB-16, Airbag Control Module.>	Go to step **2.**
2	**CHECK AIRBAG MAIN HARNESS.** 1) While checking control module, turn the ignition switch to OFF and disconnect the battery ground cable. Wait more than 20 seconds before operation. 2) Disconnect the airbag connector (AB1) from the body harness (B31). 3) Connect the connector (2M) in test harness M to the airbag connector (AB1). 4) Measure the resistance between the connector (5M) in test harness M and the connector (2R) in test harness R. ***Connector & terminal*** ***LHD MODEL:*** ***(5M) No. 4 — (2R) No. 6:*** ***RHD MODEL:*** ***(5M) No. 1 — (2R) No. 6:***	Is the resistance less than 10 Ω?	Go to step **3.**	Replace the airbag main harness with body harness.
3	**CHECK AIRBAG MAIN HARNESS.** Measure the following resistance with the above-mentioned condition maintained. ***Connector & terminal*** ***LHD MODEL:*** ***(5M) No. 4 — Chassis ground:*** ***(2R) No. 6 — Chassis ground:*** ***RHD MODEL:*** ***(5M) No. 1 — Chassis ground:*** ***(2R) No. 6 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **4.**	Replace the airbag main harness with body harness.
4	**CHECK FUSE No. 6 (IN JOINT BOX).** 1) Confirm that the ignition switch is turned OFF. 2) Remove the fuse No. 6 (in joint box) and perform visual inspection.	Is the fuse No. 6 blown out?	Replace the fuse No. 6. If fuse No. 6 is blown out again, repair the body harness.	Repair the body harness.

J: DTC 31

DIAGNOSIS:

- Front sub-sensor harness (RH) circuit is shorted.
- Front sub-sensor harness (RH) circuit is open.
- Front sub-sensor (RH) is faulty.
- Airbag control module is faulty.

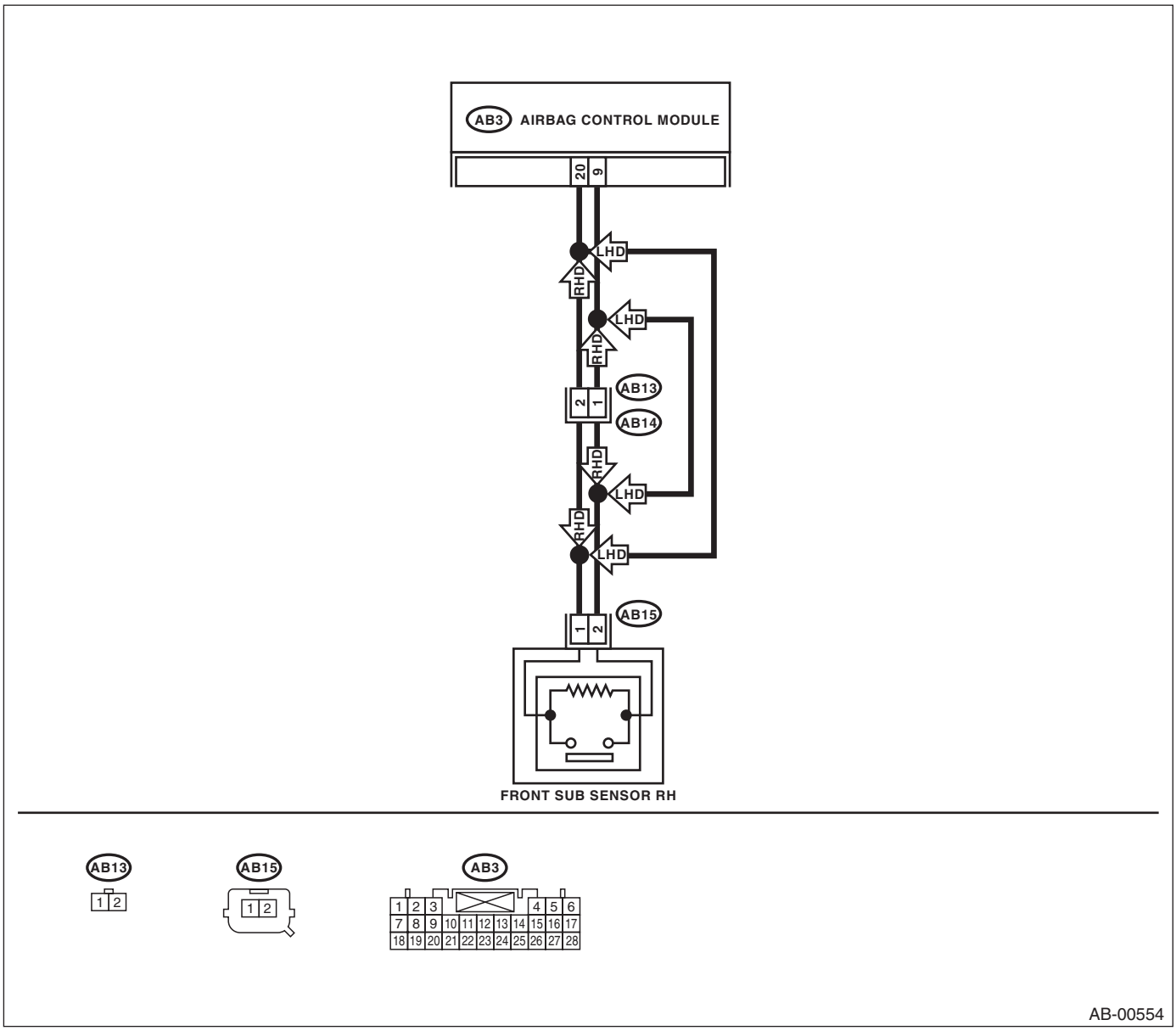
CAUTION:

• Before diagnosing the airbag system, be sure to turn the ignition switch to OFF, disconnect the ground cable from battery, and wait more than 20 seconds before starting to work.

• Before replacing the airbag module, seat belt pretensioner roll connector, control module, and sensor, reconnect each part and confirm that the warning light operates properly.

• When inspecting the airbag main harness, disconnect the driver's airbag module and passenger's airbag module connectors for safety reasons.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK FRONT SUB-SENSOR (RH) AND FRONT SUB-SENSOR HARNESS (RH).** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Disconnect the connector (AB3) from the airbag control module, and connect the connector (1R) in test harness R. <Ref. to AB-16, Airbag Control Module.> 3) Measure the resistance of the connector (3R) in test harness R. ***Connector & terminal*** ***(3R) No. 7 — (3R) No. 9:***	Is the resistance 750 Ω — 1 kΩ?	Replace the airbag control module. <Ref. to AB-16, Airbag Control Module.>	Go to step **2.**
2	**CHECK FRONT SUB-SENSOR (RH) AND FRONT SUB-SENSOR HARNESS (RH).** Measure the resistance between connector (3R) in test harness R and the chassis ground. ***Connector & terminal*** ***(3R) No. 7 — Chassis ground:*** ***(3R) No. 9 — Chassis ground:***	Is the resistance more than 1 MΩ?	Replace the airbag control module. <Ref. to AB-16, Airbag Control Module.>	Go to step **3.**
3	**CHECK AIRBAG MAIN HARNESS AND FRONT SUB-SENSOR HARNESS (RH).** 1) Disconnect the connector (AB15) from the front sub-sensor. <Ref. to AB-19, Front Sub Sensor.> 2) Connect the connector (1H) in test harness H to connector (AB15). 3) Measure the resistance between connector (3R) in test harness R and connector (3H) in test harness H. ***Connector & terminal*** ***(3R) No. 7 — (3H) No. 5:*** ***(3R) No. 9 — (3H) No. 6:***	Is the resistance less than 10 Ω?	Go to step **4.**	Go to step **5.**
4	**CHECK AIRBAG MAIN HARNESS AND FRONT SUB-SENSOR HARNESS (RH).** Measure the resistance between connector (3R) in test harness R and the chassis ground. ***Connector & terminal*** ***(3R) No. 7 — Chassis ground:*** ***(3R) No. 9 — Chassis ground:***	Is the resistance more than 1 MΩ?	LHD model: Finish the diagnosis. RHD model:Go to step **9.**	LHD model: Replace the front sub-sensor (RH). <Ref. to AB-19, Front Sub Sensor.> RHD model: Go to step **5.**
5	**CHECK AIRBAG MAIN HARNESS** 1) Disconnect the connector (AB14) from (AB13), and connect the connector (1F) in test harness F to connector (AB13). 2) Measure the resistance between connector (3R) in test harness R and connector (3F) in test harness F. ***Connector & terminal*** ***(3R) No. 7 — (3F) No. 4:*** ***(3R) No. 9 — (3F) No. 3:***	Is the resistance less than 10 Ω?	Go to step **6.**	Replace the airbag main harness with body harness.
6	**CHECK AIRBAG MAIN HARNESS** Measure the resistance between connector (3R) in test harness R and the chassis ground. ***Connector & terminal*** ***(3R) No. 7 — Chassis ground:*** ***(3R) No. 9 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **7.**	Replace the airbag main harness with body harness.

	Step	Check	Yes	No
7	**CHECK FRONT SUB-SENSOR HARNESS (RH).** 1) Connect the connector (2F) in test harness F to the connector (AB14). 2) Measure the resistance between connector (3H) in test harness H and connector (3F) in the test harness F. ***Connector & terminal*** ***(3F) No. 5 — (3H) No. 5:*** ***(3F) No. 6 — (3H) No. 6:***	Is the resistance less than 10 Ω?	Go to step **8.**	Replace the front sub-sensor harness (RH) with body harness.
8	**CHECK FRONT SUB-SENSOR HARNESS (RH).** Measure the resistance between connector (3F) in test harness F and the chassis ground. ***Connector & terminal*** ***(3F) No. 5 — Chassis ground:*** ***(3F) No. 6 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **9.**	Replace the front sub-sensor harness (RH) with body harness.
9	**CHECK FRONT SUB-SENSOR (RH).** 1) Connect the connector (2H) in test harness H to front sub-sensor (RH). 2) Measure the resistance of the connector (3H) in test harness H. ***Connector & terminal*** ***(3H) No. 3 — (3H) No. 4:***	Is the resistance 750 Ω — 1 kΩ?	Go to step **10.**	Replace the front sub-sensor (RH). <Ref. to AB-19, Front Sub Sensor.>
10	**CHECK FRONT SUB-SENSOR (RH).** Measure the resistance between connector (3H) in test harness H and the chassis ground. ***Connector & terminal*** ***(3H) No. 3 — Chassis ground:*** ***(3H) No. 4 — Chassis ground:***	Is the resistance more than 1 MΩ?	Finish the diagnosis.	Replace the front sub-sensor (RH). <Ref. to AB-19, Front Sub Sensor.>

K: DTC 32

DIAGNOSIS:

- Front sub-sensor harness (LH) circuit is shorted.
- Front sub-sensor harness (LH) circuit is open.
- Front sub-sensor (LH) is faulty.
- Airbag control module is faulty.

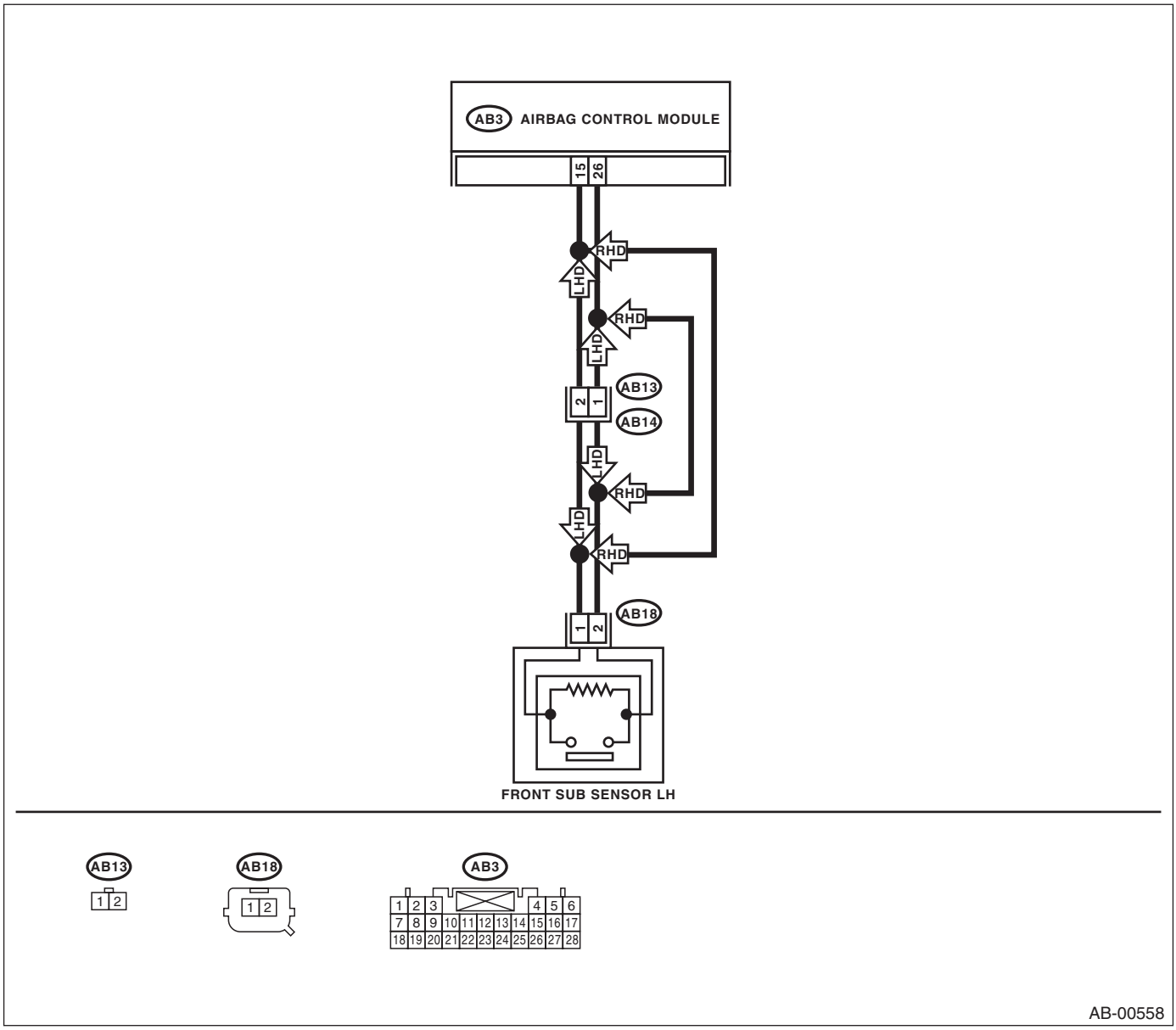
CAUTION:

• Before diagnosing the airbag system, be sure to turn the ignition switch to OFF, disconnect the ground cable from battery, and wait more than 20 seconds before starting to work.

• Before replacing the airbag module, seat belt pretensioner roll connector, control module, and sensor, reconnect each part and confirm that the warning light operates properly.

• When inspecting the airbag main harness, disconnect the driver's airbag module and passenger's airbag module connectors for safety reasons.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK FRONT SUB-SENSOR (LH) AND FRONT SUB-SENSOR HARNESS (LH).** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Disconnect the connector (AB3) from the airbag control module, and connect connector (1R) in the test harness R to connector (AB3). <Ref. to AB-16, Airbag Control Module.> 3) Measure the resistance of the connector (3R) in the test harness R. ***Connector & terminal*** ***(3R) No. 8 — (3R) No. 6:***	Is the resistance 750 Ω — 1 kΩ?	Replace the airbag control module. <Ref. to AB-16, Airbag Control Module.>	Go to step **2.**
2	**CHECK FRONT SUB-SENSOR (LH) AND FRONT SUB-SENSOR HARNESS (LH).** Measure the resistance between connector (3R) in test harness R and the chassis ground. ***Connector & terminal*** ***(3R) No. 8 — Chassis ground:*** ***(3R) No. 6 — Chassis ground:***	Is the resistance more than 1 MΩ?	Replace the airbag control module. <Ref. to AB-16, Airbag Control Module.>	Go to step **3.**
3	**CHECK AIRBAG MAIN HARNESS AND FRONT SUB-SENSOR HARNESS (LH).** 1) Disconnect the connector (AB18) from the front sub-sensor. <Ref. to AB-19, Front Sub Sensor.> 2) Connect the connector (1H) in test harness H to connector (AB18). 3) Measure the resistance between connector (3R) in test harness R and connector (3H) in test harness H. ***Connector & terminal*** ***(3R) No. 6 — (3H) No. 6:*** ***(3R) No. 8 — (3H) No. 5:***	Is the resistance less than 10 Ω?	Go to step **4.**	Go to step **5.**
4	**CHECK AIRBAG MAIN HARNESS AND FRONT SUB-SENSOR HARNESS (LH).** Measure the resistance between connector (3R) in test harness R and the chassis ground. ***Connector & terminal*** ***(3R) No. 6 — Chassis ground:*** ***(3R) No. 8 — Chassis ground:***	Is the resistance more than 1 MΩ?	LHD MODEL: Go to step **9.** RHD MODEL: Finish the diagnosis.	LHD MODEL: Go to step **5.** RHD MODEL: Replace the front sub-sensor (LH). <Ref. to AB-19, Front Sub Sensor.>
5	**CHECK AIRBAG MAIN HARNESS.** 1) Disconnect the connector (AB13) from (AB14), and connect the connector (1F) in test harness F to (AB13). 2) Measure the resistance between connector (3R) in test harness R and connector (3F) in test harness F. ***Connector & terminal*** ***(3R) No. 6 — (3F) No. 3:*** ***(3R) No. 8 — (3F) No. 4:***	Is the resistance less than 10 Ω?	Go to step **6.**	Replace the airbag main harness with body harness.
6	**CHECK AIRBAG MAIN HARNESS.** Measure the resistance between connector (3R) in the test harness R and the chassis ground. ***Connector & terminal*** ***(3R) No. 6 — Chassis ground:*** ***(3R) No. 8 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **7.**	Replace the airbag main harness with body harness.

	Step	Check	Yes	No
7	**CHECK FRONT SUB-SENSOR HARNESS (LH).** 1) Connect the connector (2F) in test harness F to connector (AB14). 2) Measure the resistance between connector (3H) in test harness H and connector (3F) in test harness F. ***Connector & terminal*** ***(3F) No. 5 — (3H) No. 5:*** ***(3F) No. 6 — (3H) No. 6:***	Is the resistance less than 10 Ω?	Go to step **8.**	Replace the front sub-sensor harness (LH) with body harness.
8	**CHECK FRONT SUB-SENSOR HARNESS (LH).** Measure the resistance between connector (3F) in test harness F and the chassis ground. ***Connector & terminal*** ***(3F) No. 5 — Chassis ground:*** ***(3F) No. 6 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **9.**	Replace the front sub-sensor harness (LH) with body harness.
9	**CHECK FRONT SUB-SENSOR (LH).** 1) Connect the connector (2H) in test harness H to front sub-sensor (LH). 2) Measure the resistance of the connector (3H) in test harness H. ***Connector & terminal*** ***(3H) No. 3 — (3H) No. 4:***	Is the resistance 750 Ω — 1 kΩ?	Go to step **10.**	Replace the front sub-sensor (LH). <Ref. to AB-19, Front Sub Sensor.>
10	**CHECK FRONT SUB-SENSOR (LH).** Measure the resistance between connector (3H) in test harness H and the chassis ground. ***Connector & terminal*** ***(3H) No. 3 — Chassis ground:*** ***(3H) No. 4 — Chassis ground:***	Is the resistance more than 1 MΩ?	Finish the diagnosis.	Replace the front sub-sensor (LH). <Ref. to AB-19, Front Sub Sensor.>

L: DTC 41

DIAGNOSIS:

- Side airbag harness (RH) is faulty.
- Side airbag module (RH) is faulty.
- Airbag control module is faulty.

CAUTION:

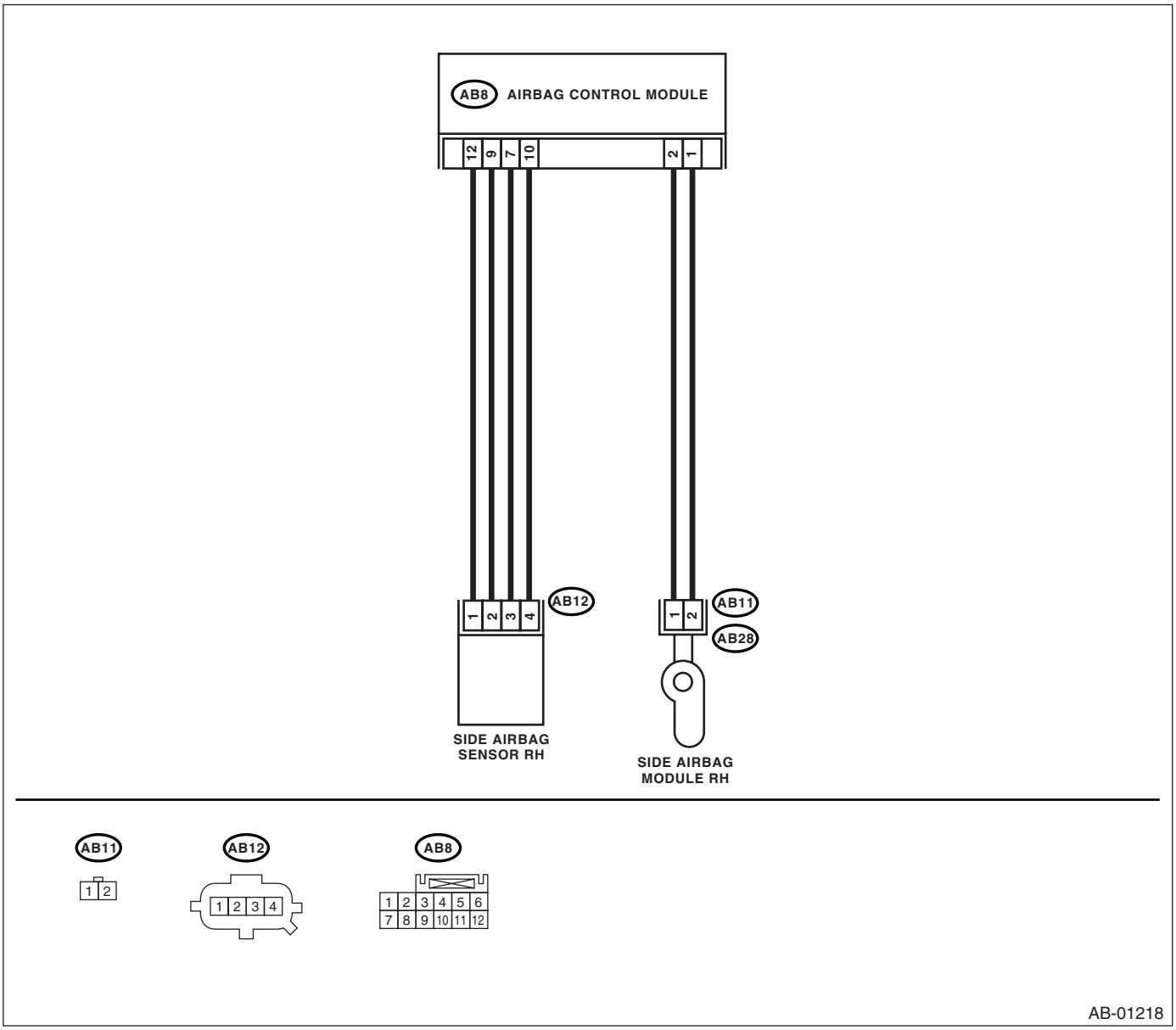
• Before diagnosing the airbag system, be sure to turn the ignition switch to OFF, disconnect the ground cable from battery, and wait more than 20 seconds before starting to work.

• Before replacing the airbag module, seat belt pretensioner roll connector, control module, and sensor, reconnect each part and confirm that the warning light operates properly.

• When inspecting the airbag main harness, disconnect the driver's airbag module and passenger's airbag module connectors for safety reasons.

• When inspecting the side airbag harness, disconnect the side airbag module connector and seat belt pretensioner connector for the safety reasons.

WIRING DIAGRAM:



Diagnostic Chart with Trouble Code

	Step	Check	Yes	No
1	**CHECK SIDE AIRBAG MODULE.** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Disconnect the connector (AB20) from the seat belt pretensioner (RH). <Ref. to SB-12, Front Seat Belt.> 3) Disconnect the connector (AB28) from (AB11), and connect the connector (1F) in test harness F to (AB11). 4) Connect the airbag resistor to connector (3F) in test harness F. 5) Connect the battery ground cable, and turn the ignition switch to ON.	Does the airbag warning light operate properly?	Replace the front seat with side airbag module (RH). <Ref. to SE-6, Front Seat.>	Go to step **2.**
2	**CHECK SIDE AIRBAG HARNESS (RH).** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Disconnect the airbag resistor from test harness F. 3) Disconnect the connector (AB8) from air bag control module. <Ref. to AB-16, Airbag Control Module.> 4) Connect the connector (1R) in test harness R to connector (AB8). 5) Measure the resistance between connector (3R) in test harness R and connector (3F) in test harness F. ***Connector & terminal*** ***(3R) No. 20 — (3F) No. 4:*** ***(3R) No. 18 — (3F) No. 3:***	Is the resistance less than 10 Ω?	Go to step **3.**	Replace the side airbag harness with body harness.
3	**CHECK SIDE AIRBAG HARNESS (RH).** Measure the resistance of the connector (3R) in test harness R. ***Connector & terminal*** ***(3R) No. 20 — (3R) No. 18:***	Is the resistance more than 1 MΩ?	Go to step **4.**	Replace the side airbag harness with body harness.
4	**CHECK SIDE AIRBAG HARNESS (RH).** Measure the resistance of the connector (3F) in test harness F. ***Connector & terminal*** ***(3F) No. 3 — (3F) No. 4:***	Is the resistance more than 1 MΩ?	Go to step **5.**	Replace the side airbag harness with body harness.
5	**CHECK SIDE AIRBAG HARNESS (RH).** Measure the resistance between connector (3F) in test harness F and the chassis ground. ***Connector & terminal*** ***(3F) No. 3 — Chassis ground:*** ***(3F) No. 4 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **6.**	Replace the side airbag harness with body harness.
6	**CHECK SIDE AIRBAG HARNESS (RH).** Measure the resistance between connector (3R) in test harness R and the chassis ground. ***Connector & terminal*** ***(3R) No. 20 — Chassis ground:*** ***(3R) No. 18 — Chassis ground:***	Is the resistance more than 1 MΩ?	Replace the airbag control module. <Ref. to AB-16, Airbag Control Module.>	Replace the side airbag harness with body harness.

M: DTC 42

DIAGNOSIS:

- Side airbag harness (LH) is faulty.
- Side airbag module (LH) is faulty.
- Airbag control module is faulty.

CAUTION:

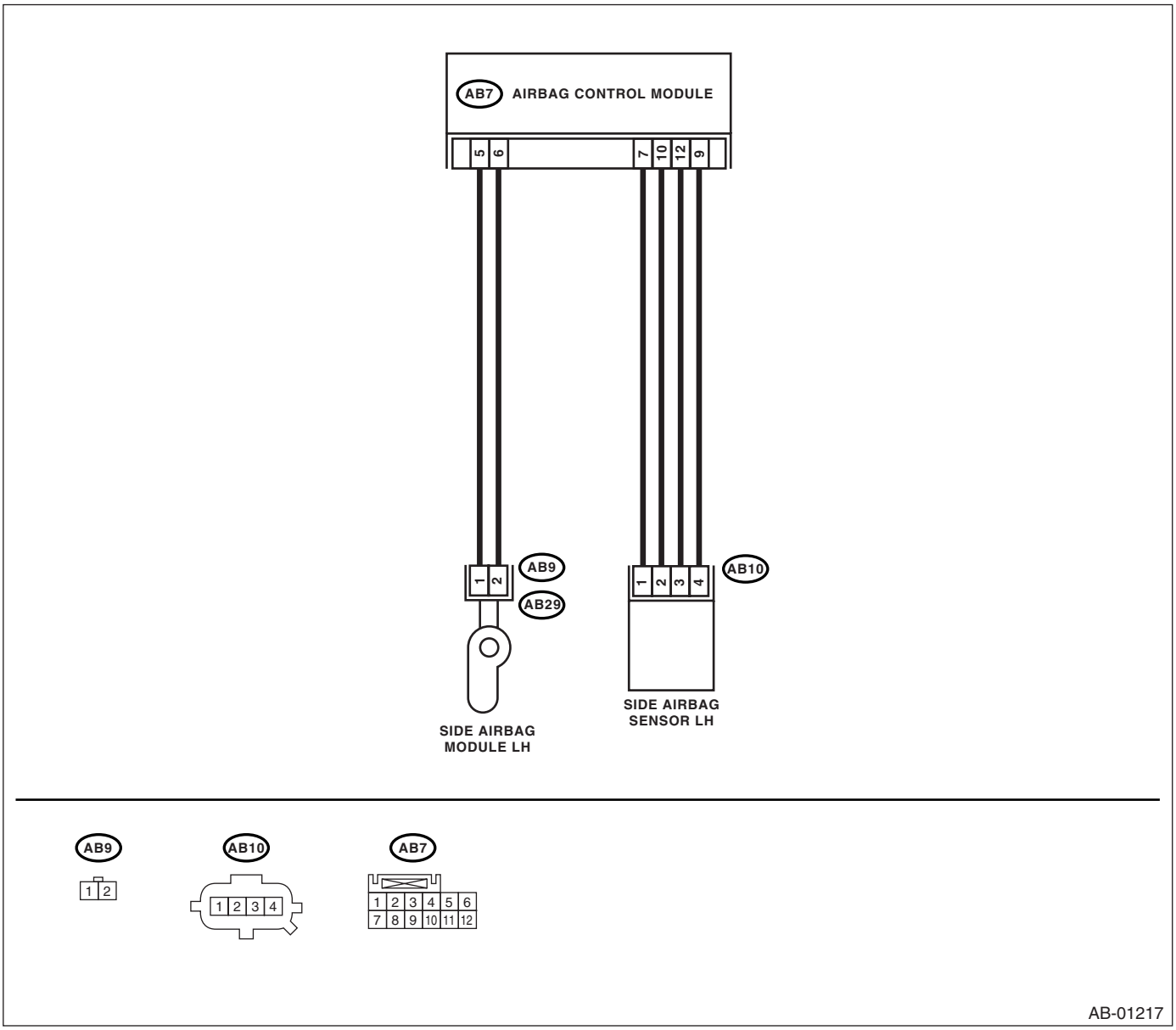
• Before diagnosing the airbag system, be sure to turn the ignition switch to OFF, disconnect the ground cable from battery, and wait more than 20 seconds before starting to work.

• Before replacing the airbag module, seat belt pretensioner roll connector, control module, and sensor, reconnect each part and confirm that the warning light operates properly.

• When inspecting the airbag main harness, disconnect the driver's airbag module and passenger's airbag module connectors for safety reasons.

• When inspecting the side airbag harness, disconnect the side airbag module connector and seat belt pretensioner connector for the safety reasons.

WIRING DIAGRAM:



Diagnostic Chart with Trouble Code

	Step	Check	Yes	No
1	**CHECK SIDE AIRBAG MODULE.** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Disconnect the connector (AB19) from the seat belt pretensioner (LH). <Ref. to SB-12, Front Seat Belt.> 3) Disconnect the connector (AB29) from (AB9), and connect the connector (1F) in test harness F to (AB9). 4) Connect the airbag resistor to connector (3F) in test harness F. 5) Connect the battery ground cable, and turn the ignition switch to ON.	Does the airbag warning light operate properly?	Replace the front seat with side airbag module (LH). <Ref. to SE-6, Front Seat.>	Go to step **2.**
2	**CHECK SIDE AIRBAG HARNESS (LH).** 1) Turn ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Disconnect the airbag resistor from the test harness. 3) Disconnect the connector (AB7) from the airbag control module. <Ref. to AB-16, Airbag Control Module.> 4) Connect the connector (1R) in test harness R to connector (AB7). 5) Measure the resistance between connector (3R) in test harness R and connector (3F) in test harness F. ***Connector & terminal*** ***(3R) No. 12 — (3F) No. 4:*** ***(3R) No. 10 — (3F) No. 3:***	Is the resistance less than 10 Ω?	Go to step **3.**	Replace the side airbag harness with body harness.
3	**CHECK SIDE AIRBAG HARNESS (LH).** Measure the resistance of the connector (3R) in test harness R. ***Connector & terminal*** ***(3R) No. 12 — (3R) No. 10:***	Is the resistance more than 1 MΩ?	Go to step **4.**	Replace the side airbag harness with body harness.
4	**CHECK SIDE AIRBAG HARNESS (LH).** Measure the resistance of the connector (3F) in test harness F. ***Connector & terminal*** ***(3F) No. 3 — (3F) No. 4:***	Is the resistance more than 1 MΩ?	Go to step **5.**	Replace the side airbag harness with body harness.
5	**CHECK SIDE AIRBAG HARNESS (LH).** Measure the resistance between connector (3F) in test harness F and the chassis ground. ***Connector & terminal*** ***(3F) No. 3 — Chassis ground:*** ***(3F) No. 4 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **6.**	Replace the side airbag harness with body harness.
6	**CHECK SIDE AIRBAG HARNESS (LH).** Measure the resistance between connector (3R) in test harness R and the chassis ground. ***Connector & terminal*** ***(3R) No. 12 — Chassis ground:*** ***(3R) No. 10 — Chassis ground:***	Is the resistance more than 1 MΩ?	Replace the airbag control module. <Ref. to AB-16, Airbag Control Module.>	Replace the side airbag harness with body harness.

N: DTC 45

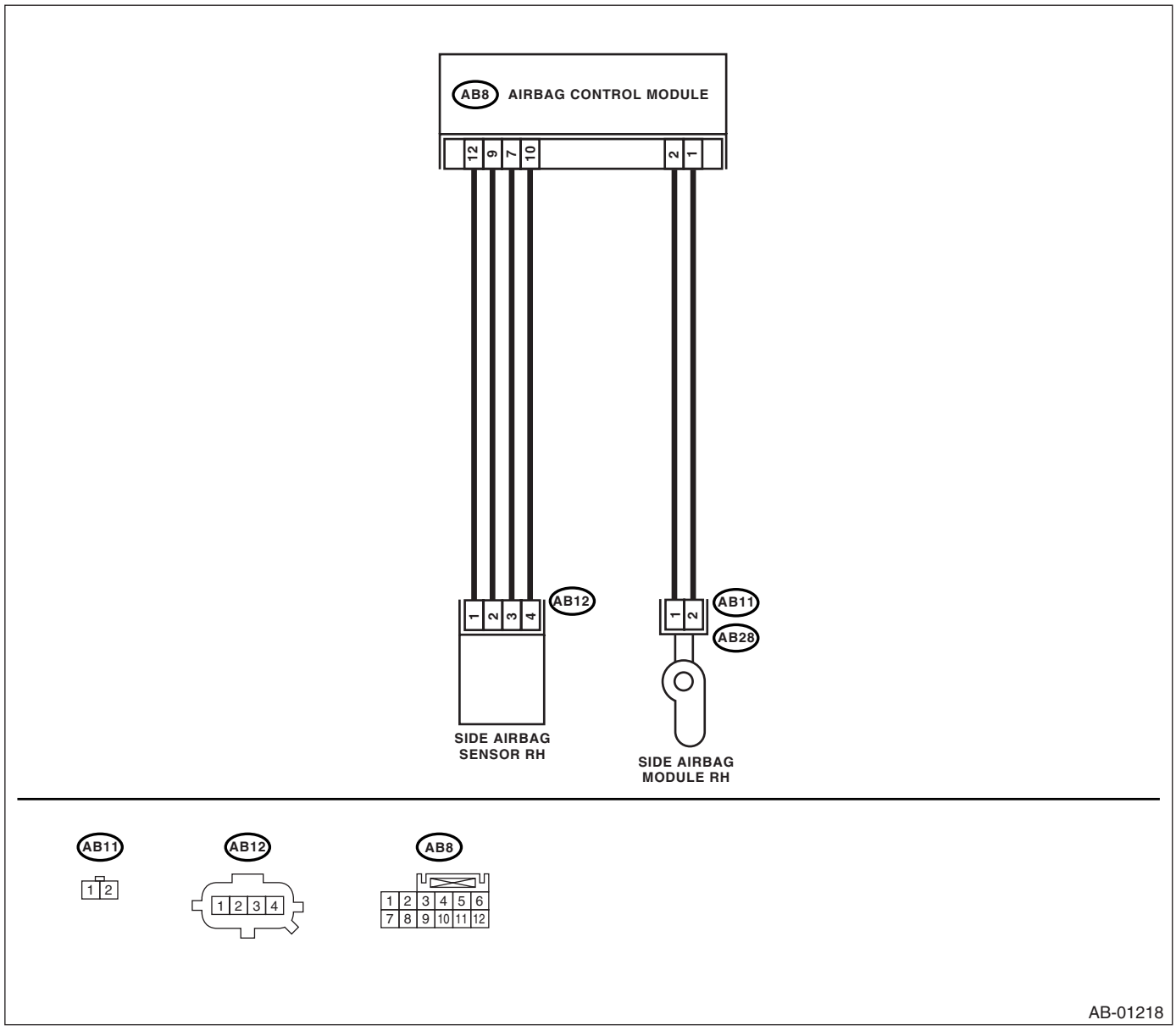
DIAGNOSIS:

- Side airbag harness (RH) is shorted to power supply.
- Airbag control module is faulty.

CAUTION:

• Before diagnosing the airbag system, be sure to turn the ignition switch to OFF, disconnect the ground cable from battery, and wait more than 20 seconds before starting to work.
• Before replacing the airbag module, seat belt pretensioner roll connector, control module, and sensor, reconnect each part and confirm that the warning light operates properly.
• When inspecting the airbag main harness, disconnect the driver's airbag module and passenger's airbag module connectors for safety reasons.
• When inspecting the side airbag harness, disconnect the side airbag module connector and seat belt pretensioner connector for the safety reasons.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK SIDE AIRBAG MODULE.** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Disconnect the connector (AB20) from the seat belt pretensioner (RH). <Ref. to SB-12, Front Seat Belt.> 3) Disconnect the connector (AB28) from (AB11), and connect the connector (1F) in test harness F to (AB11). 4) Connect the airbag resistor to connector (3F) in test harness F. 5) Connect the battery ground cable, and turn the ignition switch to ON.	Does the airbag warning light operate properly?	Replace the front seat with side airbag module (RH). <Ref. to SE-6, Front Seat.>	Go to step **2.**
2	**CHECK SIDE AIRBAG HARNESS (RH).** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Disconnect the airbag resistor from the test harness. 3) Disconnect the connector (AB8) from the airbag control module. <Ref. to AB-16, Airbag Control Module.> 4) Connect the connector (1R) in test harness R to connector (AB8). 5) Connect the battery ground cable, and turn the ignition switch to ON. 6) Measure the voltage between connector (3R) in test harness R and the chassis ground. ***Connector & terminal*** ***(3R) No. 20 (+) — Chassis ground (−):*** ***(3R) No. 18 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Replace the airbag control module. <Ref. to AB-16, Airbag Control Module.>	Replace the side airbag harness with body harness.

O: DTC 46

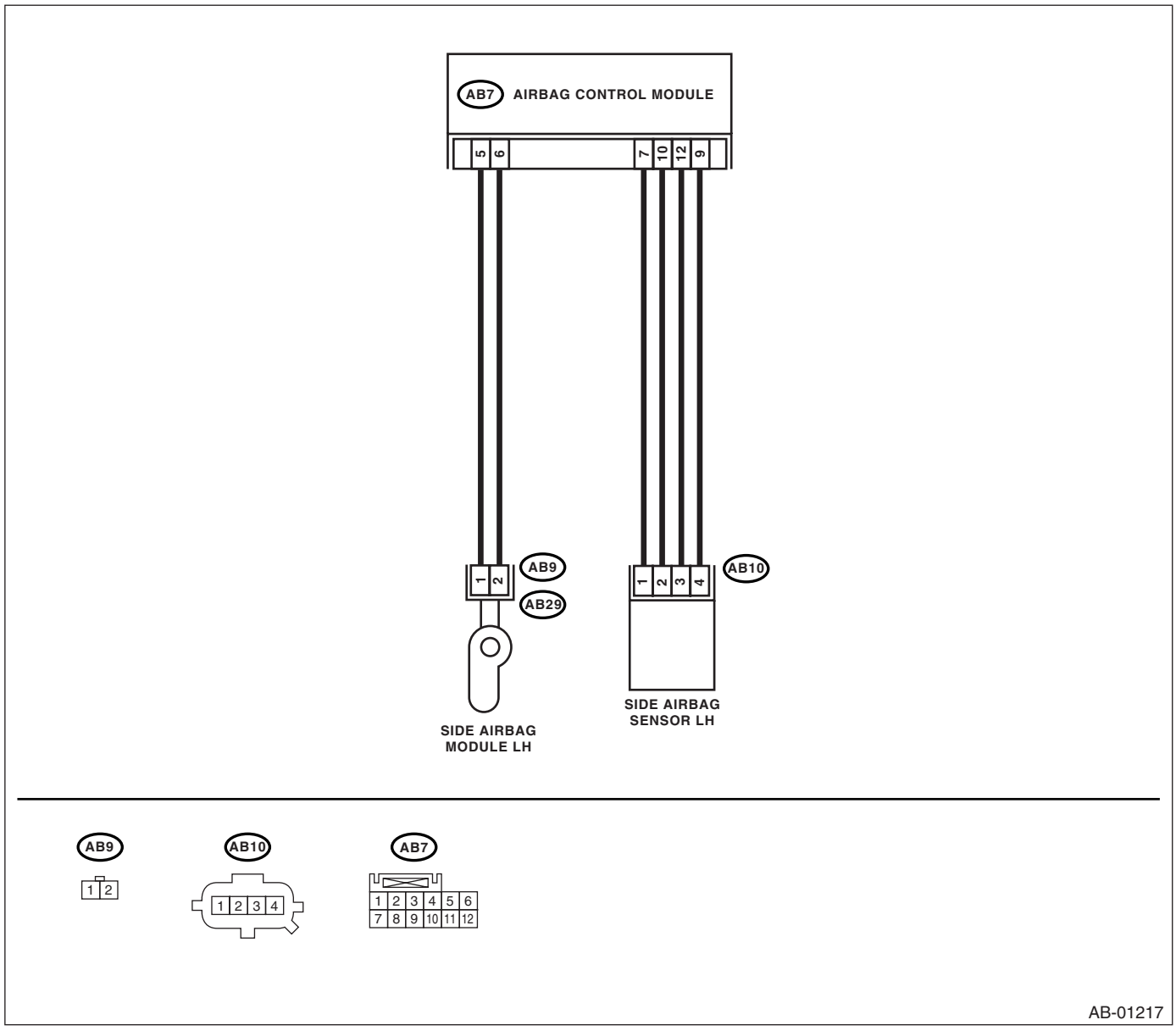
DIAGNOSIS:

- Side airbag harness (LH) is shorted to power supply.
- Airbag control module is faulty.

CAUTION:

• Before diagnosing the airbag system, be sure to turn the ignition switch to OFF, disconnect the ground cable from battery, and wait more than 20 seconds before starting to work.
• Before replacing the airbag module, seat belt pretensioner roll connector, control module, and sensor, reconnect each part and confirm that the warning light operates properly.
• When inspecting the airbag main harness, disconnect the driver's airbag module and passenger's airbag module connectors for safety reasons.
• When inspecting the side airbag harness, disconnect the side airbag module connector and seat belt pretensioner connector for the safety reasons.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK SIDE AIRBAG MODULE.** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Disconnect the connector (AB19) from the seat belt pretensioner (LH). <Ref. to SB-12, Front Seat Belt.> 3) Disconnect the connector (AB29) from (AB9), and connect the connector (1F) in test harness F to (AB9). 4) Connect the airbag resistor to connector (3F) in test harness F. 5) Connect the battery ground cable and turn the ignition switch to ON.	Does the airbag warning light operate properly?	Replace the front seat with side airbag module (LH). <Ref. to SE-6, Front Seat.>	Go to step **2.**
2	**CHECK SIDE AIRBAG HARNESS (LH).** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Disconnect the airbag resistor from the test harness. 3) Disconnect the connector (AB7) from the airbag control module. <Ref. to AB-16, Airbag Control Module.> 4) Connect the connector (1R) in test harness R to connector (AB7). 5) Connect the battery ground cable, and turn the ignition switch to ON. 6) Measure the voltage between connector (3R) in test harness R and the chassis ground. ***Connector & terminal*** ***(3R) No. 12 (+) — Chassis ground (−):*** ***(3R) No. 10 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Replace the airbag control module. <Ref. to AB-16, Airbag Control Module.>	Replace the side airbag harness with body harness.

P: DTC 51

DIAGNOSIS:

- Side airbag sensor (RH) is faulty.
- Side airbag harness (RH) is faulty.
- Airbag control module is faulty.

CAUTION:

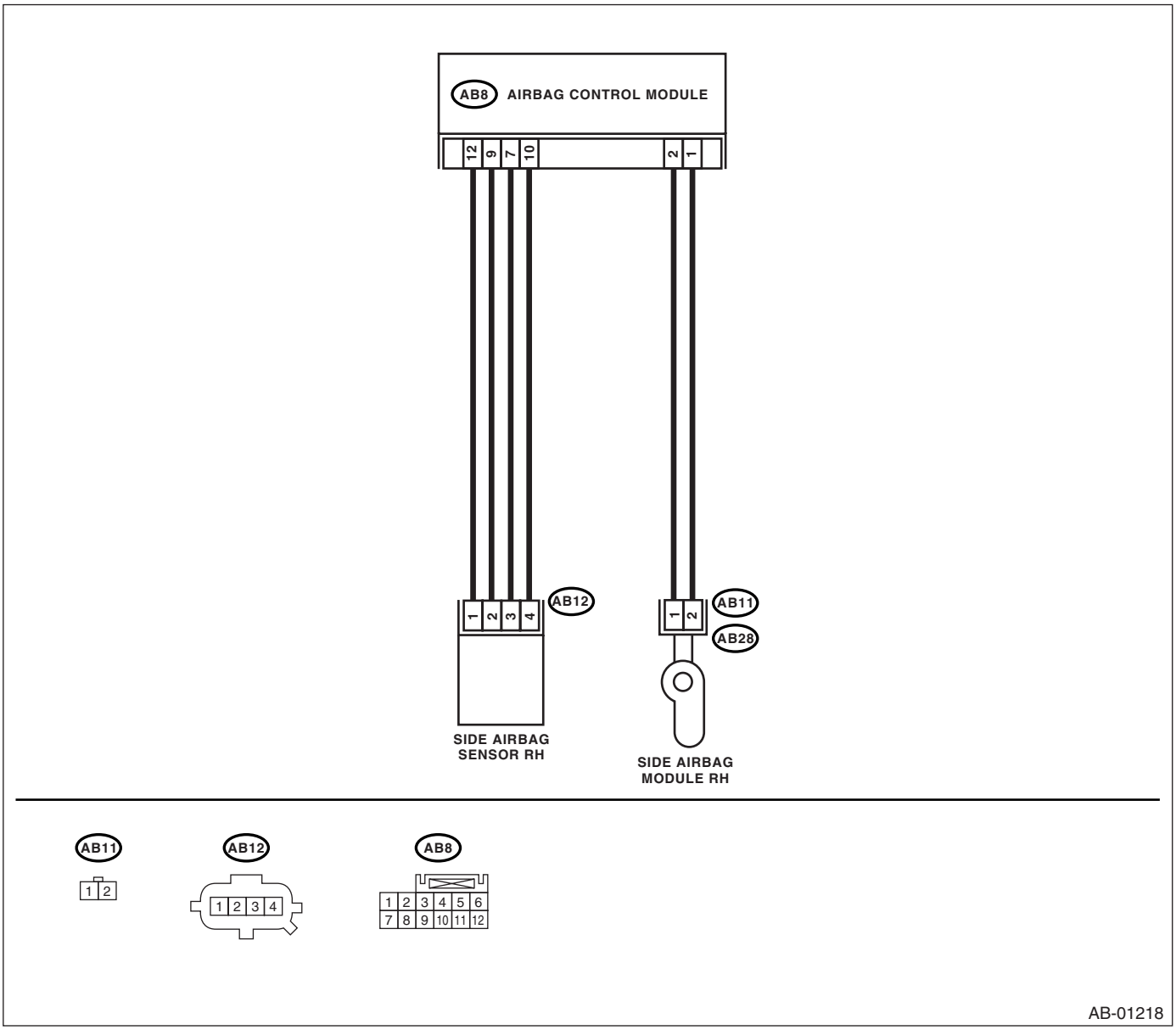
• Before diagnosing the airbag system, be sure to turn the ignition switch to OFF, disconnect the ground cable from battery, and wait more than 20 seconds before starting to work.

• Before replacing the airbag module, seat belt pretensioner roll connector, control module, and sensor, reconnect each part and confirm that the warning light operates properly.

• When inspecting the airbag main harness, disconnect the driver's airbag module and passenger's airbag module connectors for safety reasons.

• When inspecting the side airbag harness, disconnect the side airbag module connector and seat belt pretensioner connector for the safety reasons.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK SIDE AIRBAG HARNESS (RH).** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Disconnect the connector (AB20) from the seat belt pretensioner (RH). <Ref. to SB-12, Front Seat Belt.> 3) Disconnect the connector (AB28) from (AB11). 4) Disconnect the connector (AB8) from the airbag control module. <Ref. to AB-16, Airbag Control Module.> 5) Connect the connector (1R) in test harness R to the connector (AB8). 6) Disconnect the connector (AB12) from the side airbag sensor (RH), and connect the connector (2V) in test harness V to connector (AB12). 7) Measure the resistance between connector (4R) in test harness R and connector (3V) in test harness V. ***Connector & terminal*** ***(4R) No. 5 — (3V) No. 2:*** ***(4R) No. 7 — (3V) No. 1:*** ***(4R) No. 8 — (3V) No. 5:*** ***(4R) No. 6 — (3V) No. 4:***	Is the resistance less than 10 Ω?	Go to step **2.**	Replace the side airbag harness with body harness.
2	**CHECK SIDE AIRBAG HARNESS (RH).** Measure the resistance between connector (4R) in test harness R and the chassis ground. ***Connector & terminal*** ***(4R) No. 5 — Chassis ground:*** ***(4R) No. 7 — Chassis ground:*** ***(4R) No. 8 — Chassis ground:*** ***(4R) No. 6 — Chassis ground:***	Is the resistance more than 1 MΩ?	Replace the side airbag sensor (RH). <Ref. to AB-17, Side Airbag Sensor.> When sensor replacement is not OK, replace the airbag control module. <Ref. to AB-16, Airbag Control Module.>	Replace the side airbag harness with body harness.

Q: DTC 52

DIAGNOSIS:

- Side airbag sensor (LH) is faulty.
- Side airbag harness (LH) is faulty.
- Airbag control module is faulty.

CAUTION:

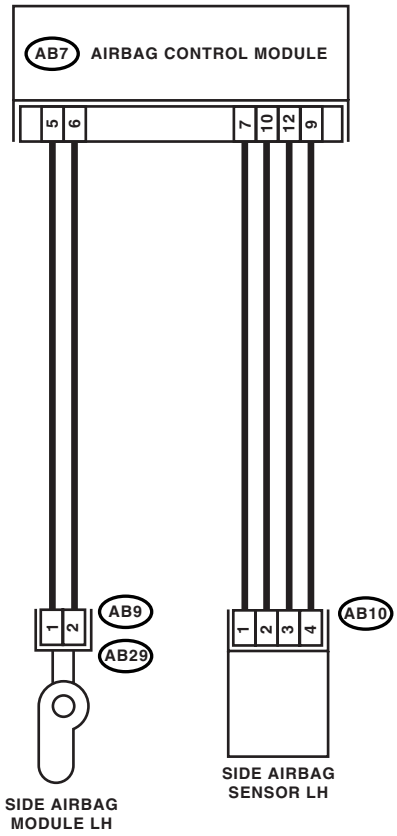
• Before diagnosing the airbag system, be sure to turn the ignition switch to OFF, disconnect the ground cable from battery, and wait more than 20 seconds before starting to work.

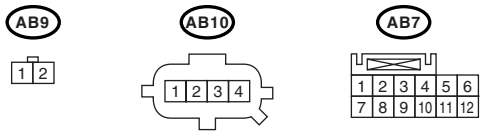
• Before replacing the airbag module, seat belt pretensioner roll connector, control module, and sensor, reconnect each part and confirm that the warning light operates properly.

• When inspecting the airbag main harness, disconnect the driver's airbag module and passenger's airbag module connectors for safety reasons.

• When inspecting the side airbag harness, disconnect the side airbag module connector and seat belt pretensioner connector for the safety reasons.

WIRING DIAGRAM:





AB-01217

	Step	Check	Yes	No
1	**CHECK SIDE AIRBAG HARNESS (LH).** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Disconnect the connector (AB19) from the seat belt pretensioner (LH). <Ref. to SB-12, Front Seat Belt.> 3) Disconnect the connector (AB29) from (AB9). 4) Disconnect the connector (AB7) from the airbag control module. <Ref. to AB-16, Airbag Control Module.> 5) Connect the connector (1R) in test harness R to connector (AB7). 6) Disconnect the connector (AB10) from the side airbag sensor (LH), and connect the connector (2V) in test harness V to connector (AB10). 7) Measure the resistance between connector (4R) in test harness R and connector (3V) in test harness V. ***Connector & terminal*** ***(4R) No. 3 — (3V) No. 4:*** ***(4R) No. 1 — (3V) No. 5:*** ***(4R) No. 2 — (3V) No. 1:*** ***(4R) No. 4 — (3V) No. 2:***	Is the resistance less than 10 Ω?	Go to step **2.**	Replace the side airbag harness with body harness.
2	**CHECK SIDE AIRBAG HARNESS (RH).** Measure the resistance between connector (4R) in test harness R and the chassis ground. ***Connector & terminal*** ***(4R) No. 3 — Chassis ground:*** ***(4R) No. 1 — Chassis ground:*** ***(4R) No. 2 — Chassis ground:*** ***(4R) No. 4 — Chassis ground:***	Is the resistance more than 1 MΩ?	Replace the side airbag sensor (LH). <Ref. to AB-17, Side Airbag Sensor.> When sensor replacement is not OK, replace the airbag control module. <Ref. to AB-16, Airbag Control Module.>	Replace the side airbag harness with body harness.

R: DTC 53

DIAGNOSIS:

Side airbag sensor (RH) is faulty.

When Code 53 is displayed, the circuit within the side airbag sensor (RH) is faulty. Replace the side airbag sensor (RH). <Ref. to AB-17, Side Airbag Sensor.>

S: DTC 54

DIAGNOSIS:

Side airbag sensor (LH) is faulty.

When Code 53 is displayed, the circuit within the side airbag sensor (LH) is faulty. Replace the side airbag sensor (LH). <Ref. to AB-17, Side Airbag Sensor.>

T: DTC 55

This code is displayed when the side airbag is deployed .

When this code is displayed, the memory cannot be erased. Replace the following parts.

- Airbag control module. <Ref. to AB-16, Airbag Control Module.>
- Front seat with side airbag module. (Operating side) <Ref. to SE-6, Front Seat.>
- Side airbag sensor. (Operating side) <Ref. to AB-17, Side Airbag Sensor.>

U: DTC 61

DIAGNOSIS:

- Seat belt pretensioner (RH) circuit is open, shorted or shorted to ground.
- Airbag control module is faulty.
- Pretensioner is faulty.
- Pretensioner harness is faulty.

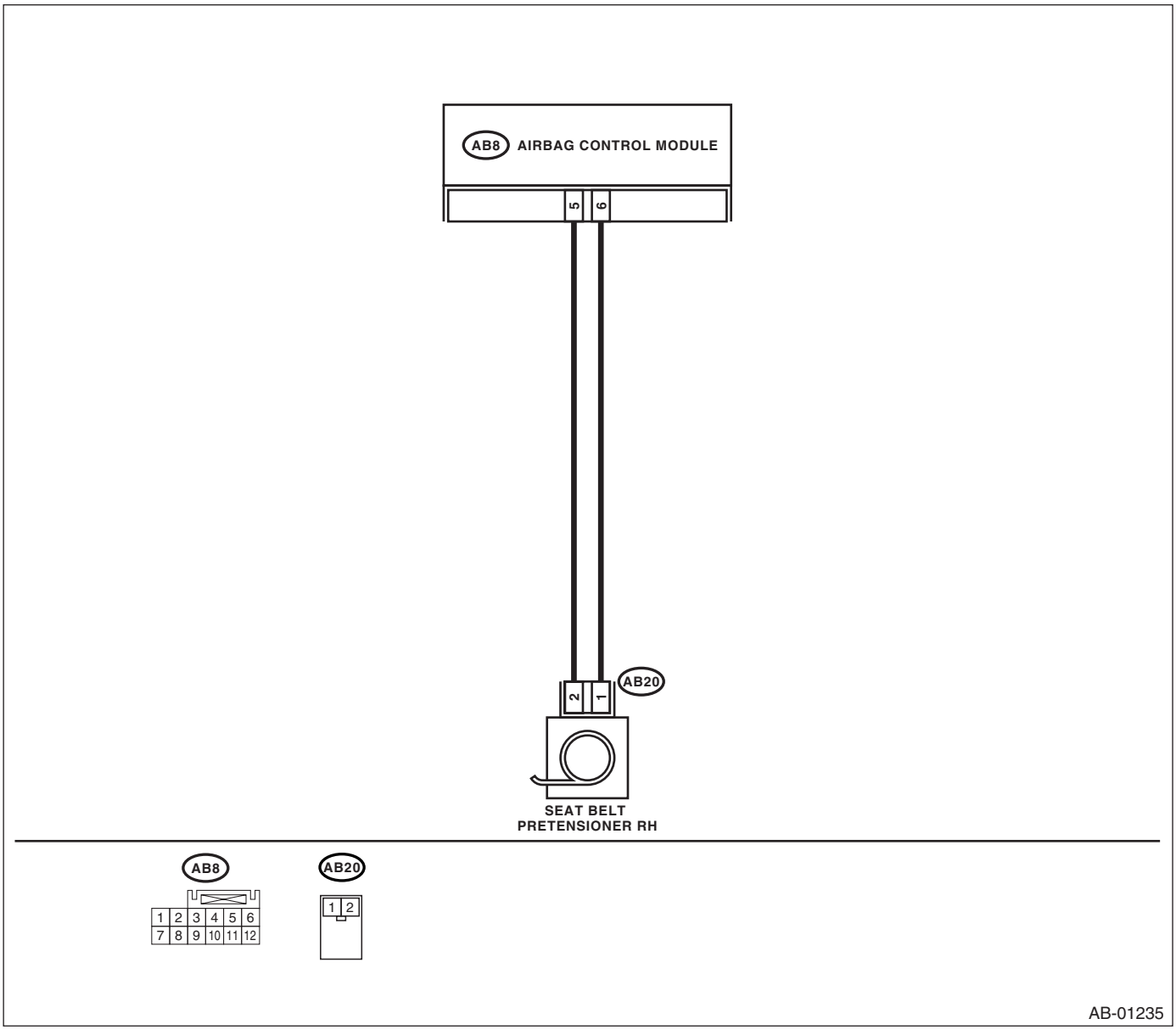
CAUTION:

• Before diagnosing the airbag system, be sure to turn the ignition switch to OFF, disconnect the ground cable from battery, and wait more than 20 seconds before starting to work.

• Before replacing the airbag module, seat belt pretensioner roll connector, control module, and sensor, reconnect each part and confirm that the warning light operates properly.

• When inspecting the side airbag harness, disconnect the side airbag module connector and seat belt pretensioner connector for the safety reasons.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK SEAT BELT PRETENSIONER.** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Disconnect the connector (AB20) from the seat belt pretensioner (RH). <Ref. to SB-12, Front Seat Belt.> 3) Connect the connector (1N) in test harness N to (AB20). 4) Connect the airbag resistor to connector (2N) in test harness N. 5) Connect the battery ground cable and turn the ignition switch to ON.	Does the airbag warning light operate properly?	Replace the seat belt pretensioner (RH). <Ref. to SB-12, Front Seat Belt.>	Go to step **2.**
2	**CHECK SIDE AIRBAG HARNESS (RH).** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Disconnect the airbag resistor from the test harness. 3) Disconnect the connector (AB28) from (AB11). 4) Disconnect the connectors (AB7) and (AB8) from the airbag control module. <Ref. to AB-16, Airbag Control Module.> 5) Connect the connector (1R) in test harness R to connector (AB8). 6) Measure the resistance between connector (3R) in test harness R and connector (2N) in test harness N. ***Connector & terminal*** ***(3R) No. 19 — (2N) No. 2:*** ***(3R) No. 17 — (2N) No. 1:***	Is the resistance less than 10 Ω?	Go to step **3.**	Replace the side airbag harness with body harness.
3	**CHECK SIDE AIRBAG HARNESS (RH).** Measure the resistance of the connector (3R) in test harness R. ***Connector & terminal*** ***(3R) No. 17 — (3R) No. 19:***	Is the resistance more than 1 MΩ?	Go to step **4.**	Replace the side airbag harness with body harness.
4	**CHECK SIDE AIRBAG HARNESS (RH).** Measure the resistance between connector (3R) in test harness R and the chassis ground. ***Connector & terminal*** ***(3R) No. 17 — Chassis ground:*** ***(3R) No. 19 — Chassis ground:***	Is the resistance more than 1 MΩ?	Replace the airbag control module. <Ref. to AB-16, Airbag Control Module.>	Replace the side airbag harness with body harness.

V: DTC 62

DIAGNOSIS:

- Seat belt pretensioner (LH) circuit is open, shorted or shorted to ground.
- Airbag control module is faulty.
- Pretensioner is faulty.
- Pretensioner harness is faulty.

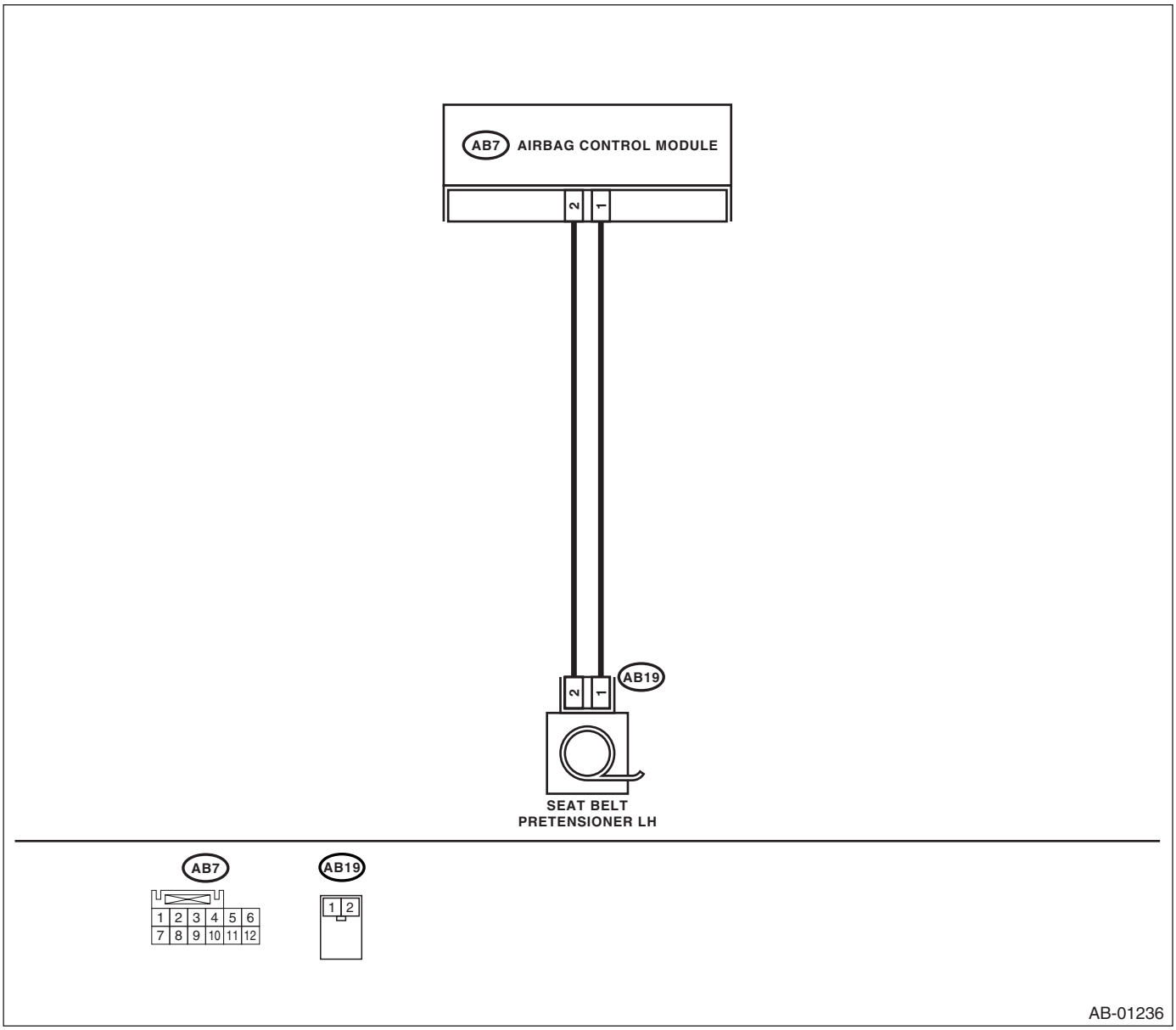
CAUTION:

• Before diagnosing the airbag system, be sure to turn the ignition switch to OFF, disconnect the ground cable from battery, and wait more than 20 seconds before starting to work.

• Before replacing the airbag module, seat belt pretensioner roll connector, control module, and sensor, reconnect each part and confirm that the warning light operates properly.

• When inspecting the side airbag harness, disconnect the side airbag module connector and seat belt pretensioner connector for the safety reasons.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK SEAT BELT PRETENSIONER.** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Disconnect the connector (AB19) from the seat belt pretensioner (LH). <Ref. to SB-12, Front Seat Belt.> 3) Connect the connector (1N) in test harness N to (AB19). 4) Connect the airbag resistor to the connector (2N) in test harness N. 5) Connect the battery ground cable and turn the ignition switch to ON.	Does the airbag warning light operate properly?	Replace the seat belt pretensioner (LH). <Ref. to SB-12, Front Seat Belt.>	Go to step **2.**
2	**CHECK SIDE AIRBAG HARNESS (LH).** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Disconnect the airbag resistor from the test harness. 3) Disconnect the connector (AB29) from (AB9). 4) Disconnect the connectors (AB7) and (AB8) from the airbag control module. <Ref. to AB-16, Airbag Control Module.> 5) Connect the connector (1R) in test harness R to the connector (AB7). 6) Measure the resistance between connector (3R) in test harness R and the connector (2N) in test harness N. ***Connector & terminal*** ***(3R) No. 11 — (2N) No. 1:*** ***(3R) No. 13 — (2N) No. 2:***	Is the resistance less than 10 Ω?	Go to step **3.**	Replace the side airbag harness with body harness.
3	**CHECK SIDE AIRBAG HARNESS (LH).** Measure the resistance of the connector (3R) in test harness R. ***Connector & terminal*** ***(3R) No. 11 — (3R) No. 13:***	Is the resistance more than 1 MΩ?	Go to step **4.**	Replace the side airbag harness with body harness.
4	**CHECK SIDE AIRBAG HARNESS (LH).** Measure the resistance between the connector (3R) in test harness R and the chassis ground. ***Connector & terminal*** ***(3R) No. 11 — Chassis ground:*** ***(3R) No. 13 — Chassis ground:***	Is the resistance more than 1 MΩ?	Replace the airbag control module. <Ref. to AB-16, Airbag Control Module.>	Replace the side airbag harness with body harness.

W: DTC 65

DIAGNOSIS:

- Seat belt pretensioner (RH) circuit is shorted to the power supply.
- Pretensioner is faulty.
- Pretensioner harness is faulty.
- Airbag control module is faulty.

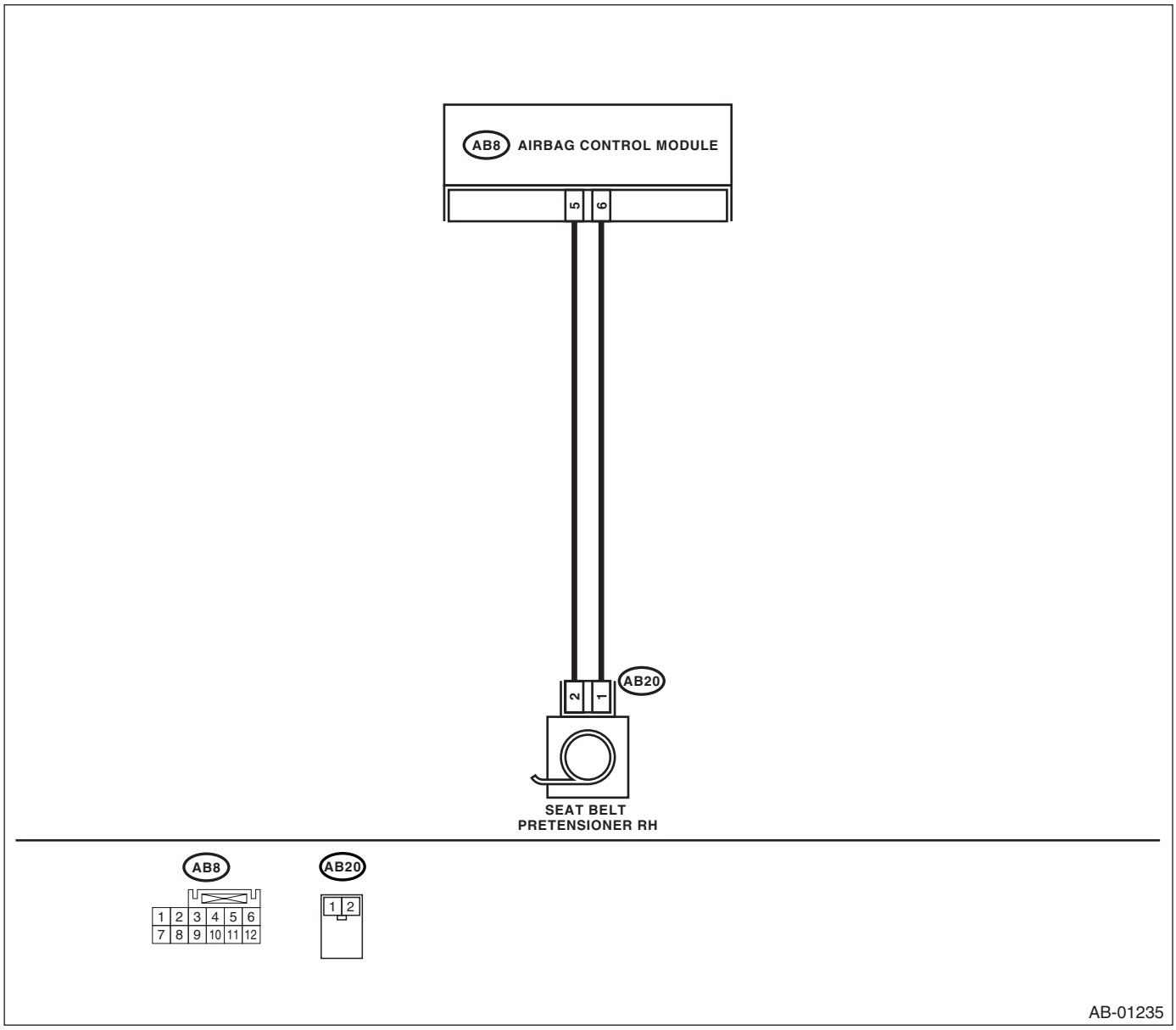
CAUTION:

• Before diagnosing the airbag system, be sure to turn the ignition switch to OFF, disconnect the ground cable from battery, and wait more than 20 seconds before starting to work.

• Before replacing the airbag module, seat belt pretensioner roll connector, control module, and sensor, reconnect each part and confirm that the warning light operates properly.

• When inspecting the side airbag harness, disconnect the side airbag module connector and seat belt pretensioner connector for the safety reasons.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK SEAT BELT PRETENSIONER.** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Disconnect the connector (AB20) from the seat belt pretensioner (RH). <Ref. to SB-12, Front Seat Belt.> 3) Connect the connector (1N) in test harness N to (AB20). 4) Connect the airbag resistor to connector (2N) in test harness N. 5) Connect the battery ground cable, and turn the ignition switch to ON.	Does the airbag warning light operate properly?	Replace the seat belt pretensioner (RH). <Ref. to SB-12, Front Seat Belt.>	Go to step **2.**
2	**CHECK SIDE AIRBAG HARNESS (RH).** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Disconnect the airbag resistor from the test harness. 3) Disconnect the connector (AB28) from (AB11). 4) Disconnect the connectors (AB7) and (AB8) from the airbag control module. <Ref. to AB-16, Airbag Control Module.> 5) Connect the connector (1R) in test harness R to the connector (AB8). 6) Connect the battery ground cable and turn the ignition switch to ON. 7) Measure the voltage between connector (3R) in test harness R and the chassis ground. ***Connector & terminal*** ***(3R) No. 17 (+) — Chassis ground (−):*** ***(3R) No. 19 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Replace the airbag control module. <Ref. to AB-16, Airbag Control Module.>	Replace the side airbag harness with body harness.

X: DTC 66

DIAGNOSIS:

- Seat belt pretensioner (LH) circuit is shorted to the power supply.
- Pretensioner is faulty.
- Pretensioner harness is faulty.
- Airbag control module is faulty.

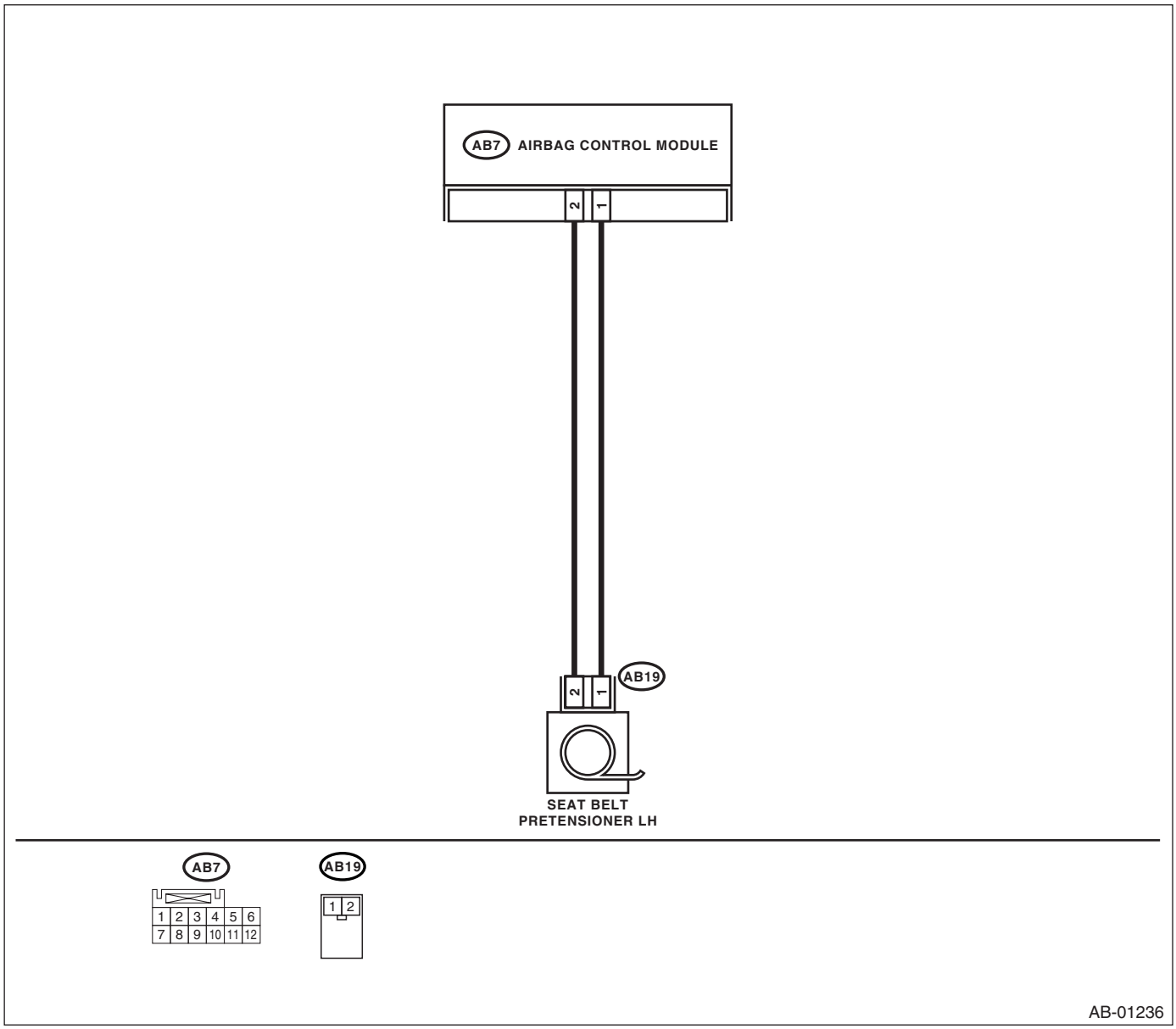
CAUTION:

• Before diagnosing the airbag system, be sure to turn the ignition switch to OFF, disconnect the ground cable from battery, and wait more than 20 seconds before starting to work.

• Before replacing the airbag module, seat belt pretensioner roll connector, control module and the sensor, reconnect each part and confirm that the warning light operates properly.

• When inspecting the side airbag harness, disconnect the side airbag module connector and seat belt pretensioner connector for the safety reasons.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK SEAT BELT PRETENSIONER.** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Disconnect the connector (AB19) from the seat belt pretensioner (LH). <Ref. to SB-12, Front Seat Belt.> 3) Connect the connector (1N) in test harness N to (AB19). 4) Connect the airbag resistor to the connector (2N) in test harness N. 5) Connect the battery ground cable and turn the ignition switch to ON.	Does the airbag warning light operate properly?	Replace the seat belt pretensioner (LH). <Ref. to SB-12, Front Seat Belt.>	Go to step **2.**
2	**CHECK SIDE AIRBAG HARNESS (LH).** 1) Turn the ignition switch to OFF, disconnect the battery ground cable, and wait more than 20 seconds. 2) Disconnect the airbag resistor from the test harness. 3) Disconnect the connector (AB29) from (AB9). 4) Disconnect the connectors (AB7) and (AB8) from the airbag control module. <Ref. to AB-16, Airbag Control Module.> 5) Connect the connector (1R) in test harness R to the connector (AB7). 6) Connect the battery ground cable and turn the ignition switch to ON. 7) Measure the voltage between connector (3R) in test harness R and the chassis ground. ***Connector & terminal*** ***(3R) No. 11 (+) — Chassis ground (−):*** ***(3R) No. 13 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Replace the airbag control module. <Ref. to AB-16, Airbag Control Module.>	Replace the side airbag harness with body harness.

SEAT BELT SYSTEM

SB

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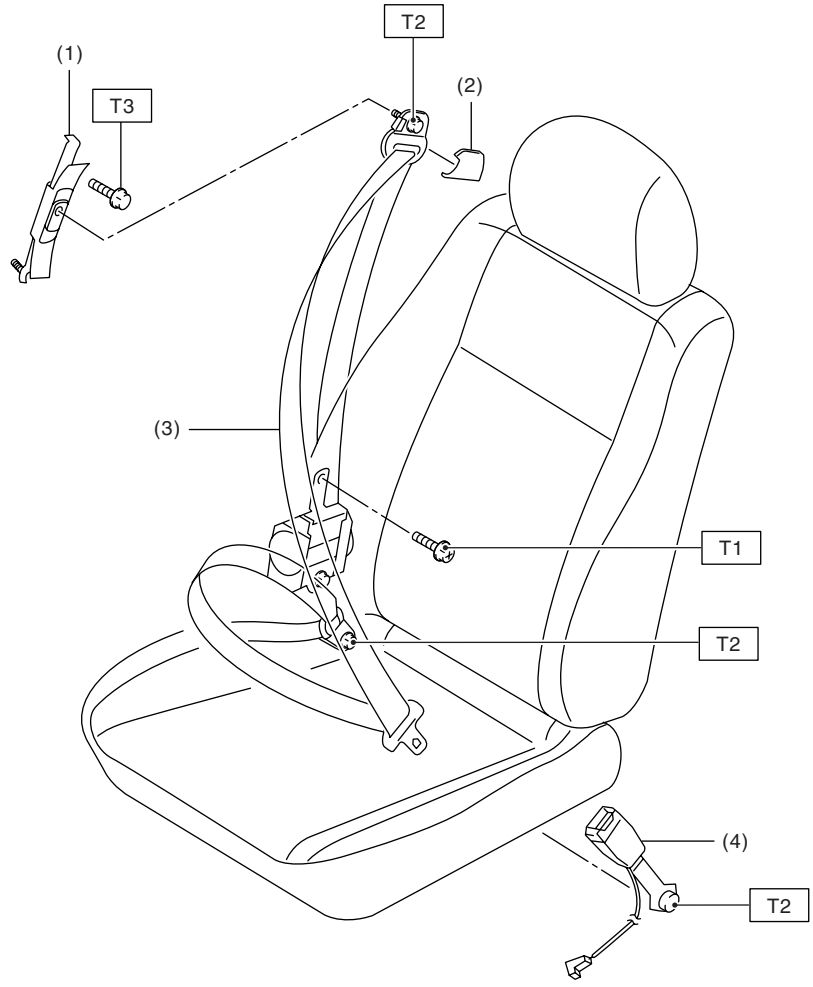
2. Pretensioner Connector 6
3. Seat Belt Warning System 7
4. Inspection Locations After a Collision 11
5. Front Seat Belt 12
6. Rear Seat Belt 14
7. Disposal of Pretensioner 17

1. General Description

A: COMPONENT

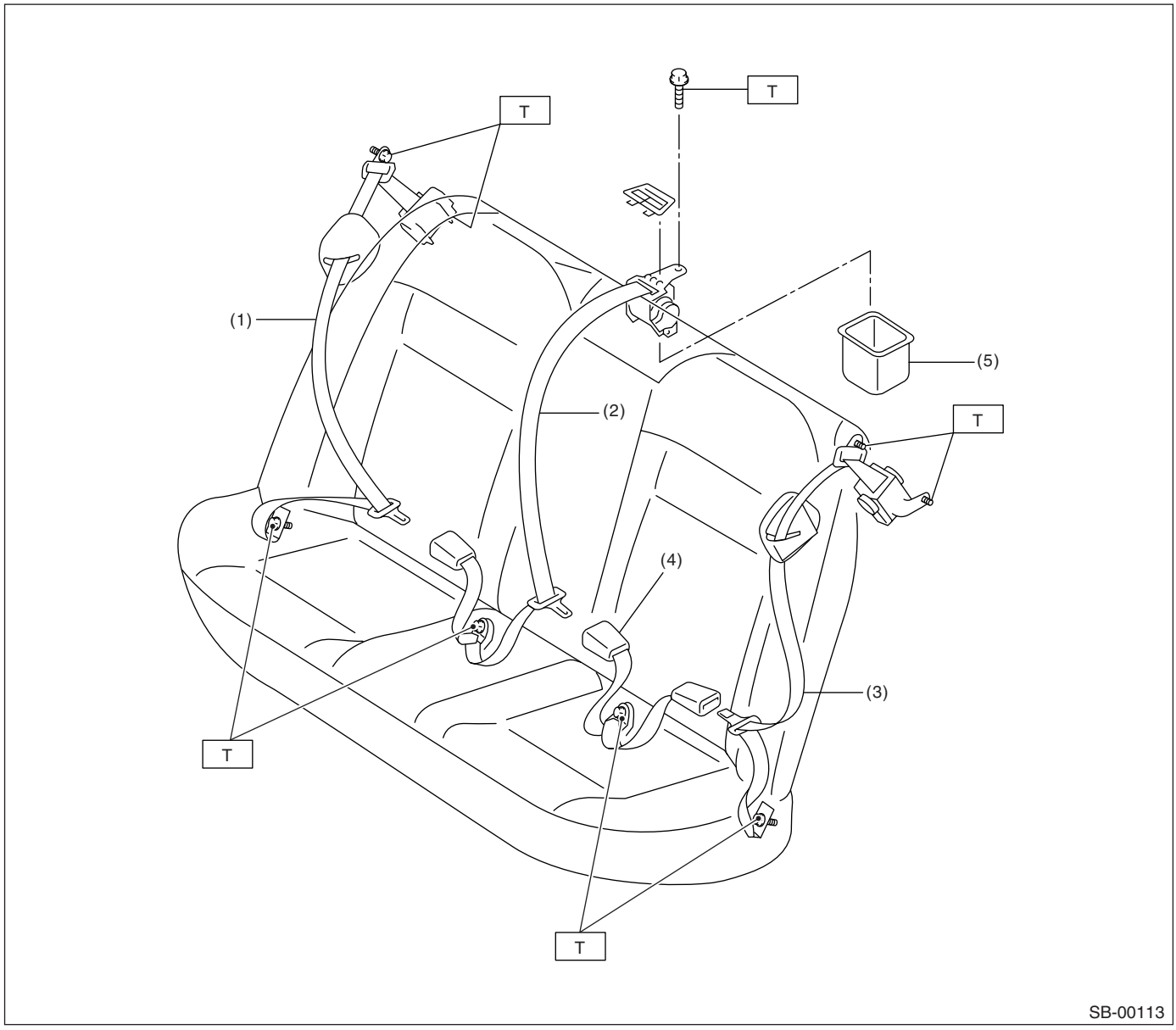
1. FRONT SEAT BELT



(1) Adjuster anchor ASSY
(2) Anchor cover
(3) Outer seat belt ASSY
(4) Inner seat belt ASSY

Tightening torque: N·m (kgf-m, ft-lb)
T1: 7.5 (0.76, 5.5)
T2: 30 (3.1, 22)
T3: 53 (5.4, 39)

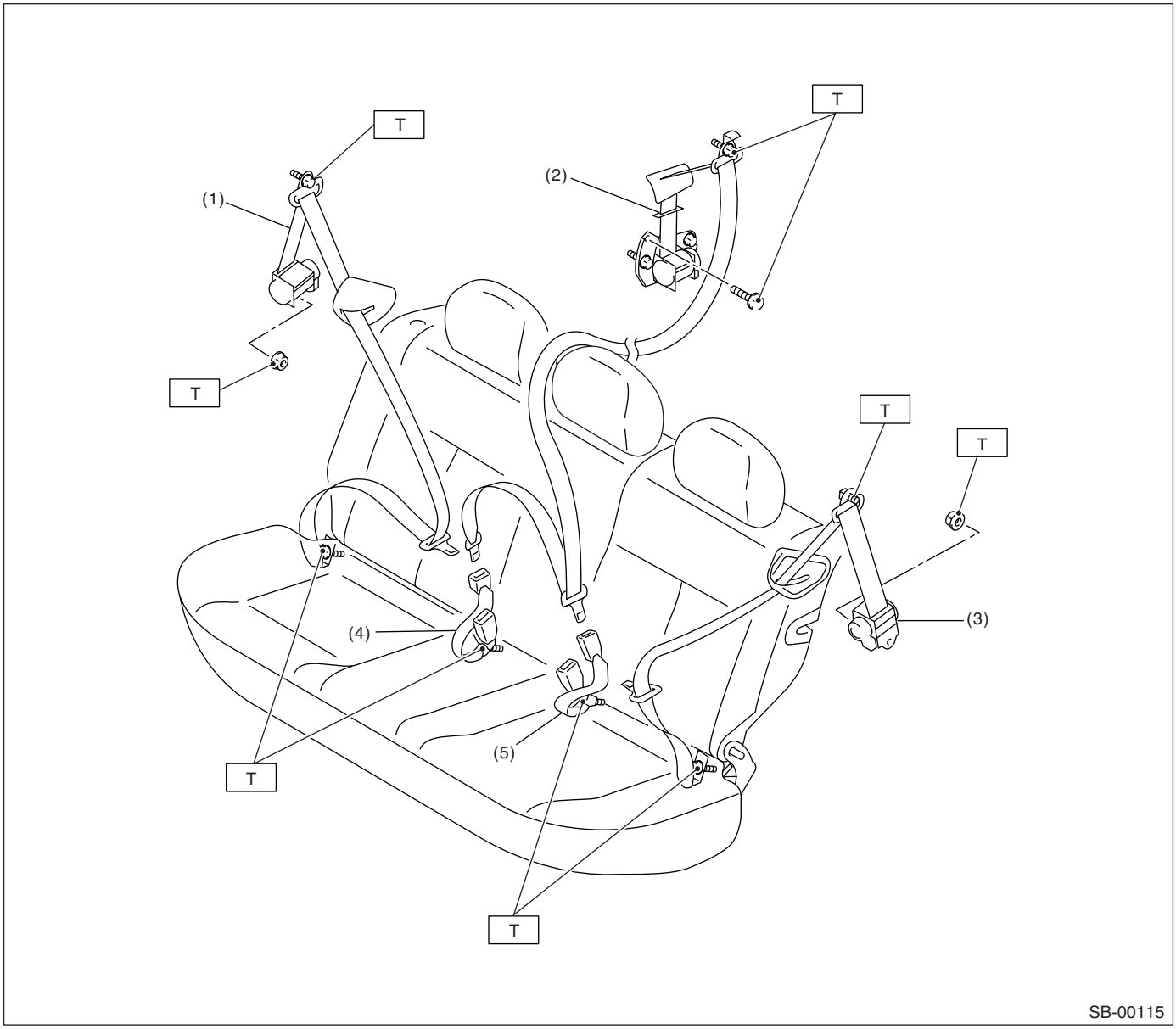
2. REAR SEAT BELT (SEDAN MODEL)



(1) Outer seat belt RH ASSY
(2) Shoulder seat belt CTR ASSY
(3) Outer seat belt LH ASSY
(4) Center seat belt LH ASSY
(5) Case center ELR

Tightening torque: N·m (kgf-m, ft-lb)
T: 30 (3.1, 22)

3. REAR SEAT BELT (WAGON MODEL)



(1) Outer seat belt RH ASSY
(2) Shoulder seat belt CTR ASSY
(3) Outer seat belt LH ASSY
(4) Center seat belt RH ASSY
(5) Center seat belt LH ASSY

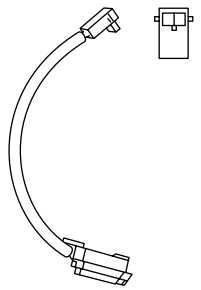
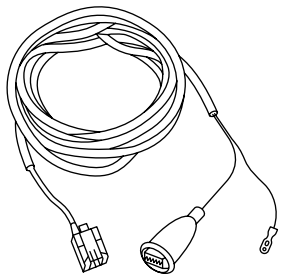
Tightening torque: N·m (kgf-m, ft-lb)
T: 30 (3.1, 22)

B: CAUTION

• Before starting, turn the ignition switch to OFF, disconnect the battery ground cable and wait for 20 seconds or more.
• The pretensioner system has a backup power source. The pretensioner might deploy if you do not wait for 20 seconds or more before starting work.
• Do not drop or apply any impact to the pretensioner.
• If oil, grease, or water gets on the pretensioner, wipe it off immediately with a dry cloth.
• Do not expose the pretensioner to high temperature or flame.
• Do not allow current to flow through or voltage to reach the pretensioner. Do not use a circuit tester to check resistance of the pretensioner.
• Do not disassemble or attempt to repair the pretensioner. If it is dented, cracked, or deformed, replace it with a new one.
• Do not use the airbag or pretensioner parts from other vehicles. Always replace parts with new parts.
• When handling a seat belt with a deployed pretensioner, wear gloves and goggles. Wash your hands afterwards.
• Do not re-use a seat belt with a deployed pretensioner again.
• Be sure to deploy pretensioner before disposal. <Ref. to SB-17, PROCEDURE, Disposal of Pretensioner.>
• If the material gets in your eyes or on your skin during deployment, wash it away with clean water, and then consult a doctor.

C: PREPARATION TOOL

1. SPECIAL TOOLS

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST98299SA010	98299SA010	ADAPTER D (DEPLOYMENT)	• Used for deploying the pretensioner. • Used with DEPLOYMENT TOOL (98299PA030).
 ST98299PA030	98299PA030	DEPLOYMENT TOOL	• Used for deploying the pretensioner. • Used with ADAPTER D (DEPLOYMENT) (98299SA010).

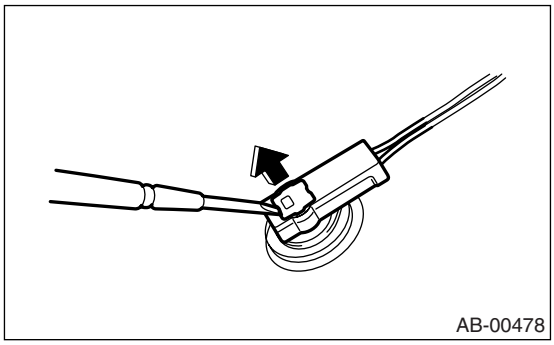
2. GENERAL PURPOSE TOOLS

TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance and voltage.

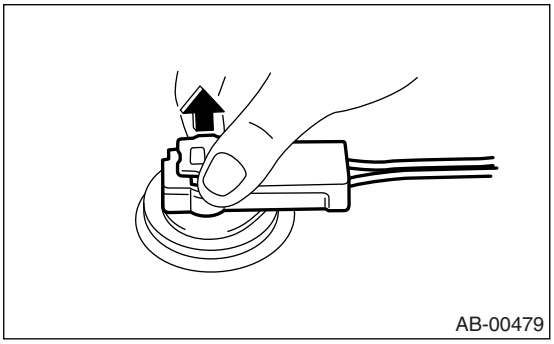
2. Pretensioner Connector

A: OPERATION

1) How to disconnect:
(1) Using a flat tip screwdriver, pull the push lock upward to unlock.

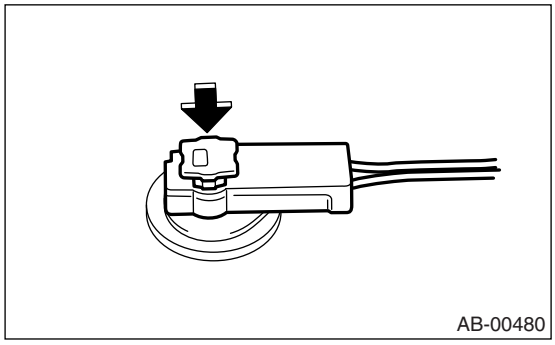

AB-00478

(2) Pull the connector to disconnect from retractor assembly.


AB-00479

2) How to connect:
Connect the connector in reverse order of disconnecting. At this time, be sure to insert the push lock in until connecting sound is heard.

CAUTION:
• Be sure to insert the connector in until it locks. Then pull on it gently to make sure that it is locked.
• At this time, be sure to insert the push lock in.


AB-00480

3. Seat Belt Warning System

A: WIRING DIAGRAM

1. LHD MODEL
<Ref. to WI-186, LHD FOR EUROPE MODEL, WIRING DIAGRAM, Seat Belt Warning System.>
2. RHD MODEL
<Ref. to WI-187, RHD FOR EUROPE MODEL, WIRING DIAGRAM, Seat Belt Warning System.>

B: INSPECTION

TROUBLE SYMPTOM:

- Seat belt warning light does not come on or go off.
- Buzzer does not beep.

	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN SEAT BELT TIMER MODULE AND CHASSIS GROUND.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from seat belt timer module. 3) Measure the resistance between seat belt timer module harness connector and chassis ground. ***Connector & terminal*** ***(B44) No. 3 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the open circuit of harness between seat belt timer module and chassis ground.
2	**CHECK POWER SUPPLY OF SEAT BELT TIMER MODULE.** 1) Turn the ignition switch to ON. 2) Measure the voltage between seat belt timer module connector and chassis ground. ***Connector & terminal*** ***(B44) No. 9 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **3.**	Repair the open harness, short circuit and poor contact of connector between seat belt timer module and battery.
3	**CHECK HARNESS AND SEAT BELT SWITCH.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from seat belt timer module. 3) Hold the tang plate disconnected from seat belt buckle. 4) Measure the resistance between seat belt timer module harness connector and chassis ground. ***Connector & terminal*** ***(B44) No. 6 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **4.**	Go to step **5.**
4	**CHECK SEAT BELT SWITCH AND HARNESS.** 1) Turn the ignition switch to OFF. 2) Insert the tang plate into seat belt buckle. 3) Measure the resistance between seat belt timer module connector and chassis ground. ***Connector & terminal*** ***(B44) No. 6 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **9.**	Go to step **5.**

	Step	Check	Yes	No
5	**CHECK HARNESS BETWEEN SEAT BELT TIMER MODULE AND SEAT BELT SWITCH.** Measure the resistance of harness between seat belt timer module connector and seat belt switch. ***Connector & terminal*** ***LHD model:*** ***(B44) No. 6 — (R8) No. 2:*** ***RHD model:*** ***(B44) No. 6 — (R8) No. 1:***	Is the resistance less than 1 Ω?	Go to step **6.**	Repair the open circuit of harness and poor contact of connector between seat belt timer module connector and seat belt switch.
6	**CHECK HARNESS BETWEEN SEAT BELT SWITCH AND CHASSIS GROUND.** Measure the resistance of harness between seat belt switch and chassis ground. ***Connector & terminal*** ***LHD model:*** ***(R8) No. 1 — Chassis ground:*** ***RHD model:*** ***(R8) No. 2 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **7.**	Repair the open circuit of harness between seat belt switch and chassis ground.
7	**CHECK SEAT BELT SWITCH.** 1) Hold the tang plate disconnected from seat belt buckle. 2) Measure the resistance between seat belt switch terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance less than 1 Ω?	Go to step **8.**	Replace the inner seat belt assembly.
8	**CHECK SEAT BELT SWITCH.** 1) Insert the tang plate into seat belt buckle. 2) Measure the resistance between seat belt switch terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance more than 1 MΩ?	Go to step **9.**	Replace the inner seat belt assembly.
9	**CHECK OPERATION OF SPEEDOMETER IN COMBINATION METER.** Check the speedometer indicates vehicle speed correctly.	Does the speedometer operate correctly?	Go to step **10.**	Check the speedometer circuit.
10	**CHECK VEHICLE MODEL.** Check the model of vehicle.	Is the vehicle MT model?	Go to step **11.**	Go to step **13.**
11	**CHECK HARNESS BETWEEN VEHICLE SPEED SENSOR AND SEAT BELT TIMER MODULE.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector of vehicle speed sensor. 3) Measure the resistance between vehicle speed sensor harness connector and seat belt timer module connector. ***Connector & terminal*** ***(B17) No. 1 — (B44) No. 7:***	Is the resistance less than 10 Ω?	Go to step **12.**	Repair the open harness between vehicle speed sensor and seat belt timer module.
12	**CHECK HARNESS BETWEEN VEHICLE SPEED SENSOR AND SEAT BELT TIMER MODULE.** Measure the resistance between seat belt timer module harness connector and chassis ground. ***Connector & terminal*** ***(B44) No. 7 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **15.**	Repair the short of harness.

	Step	Check	Yes	No
13	**CHECK HARNESS BETWEEN TCU AND SEAT BELT TIMER MODULE.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector of TCU. 3) Measure the resistance of harness between TCU harness connector and seat belt timer module harness connector ***Connector & terminal*** ***(B56) No. 17 — (B44) No. 7:***	Is the resistance less than 10 Ω?	Go to step **14.**	Repair the open harness between TCU and seat belt timer module.
14	**CHECK HARNESS BETWEEN TCU AND SEAT BELT TIMER MODULE.** Measure the resistance between seat belt timer module harness connector and chassis ground. ***Connector & terminal*** ***(B44) No. 7 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **15.**	Repair the short of harness.
15	**CHECK SEAT BELT TIMER MODULE OUTPUT SIGNAL.** 1) Turn the ignition switch to ON. 2) Measure the voltage between seat belt timer module harness connector and chassis ground. ***Connector & terminal*** ***(B44) No. 2 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **16.**	Check the wiring harness and combination meter, and then repair or replace them.
16	**CHECK POOR CONTACT.** Check the poor contact of seat belt warning light circuit.	Is there any poor contact occurs?	Repair the poor contact.	Go to step **17.**
17	**CHECK SEAT BELT TIMER MODULE.** 1) Connect all connectors. 2) Lift-up the vehicle and place rigid racks. NOTE: Raise all wheels off floor. 3) Hold the tang plate disconnected from seat belt buckle. 4) Start the engine, and set the vehicle speed less than 19 km/h (12 MPH). NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. After diagnosis is finished, perform the clear memory mode of ABS system. <Ref. to ABS(diag)-27, Clear Memory Mode.> Check seat belt warning light comes on.	Does the seat belt warning light come on?	Go to step **18.**	Replace the seat belt timer module.

	Step	Check	Yes	No
18	**CHECK SEAT BELT TIMER MODULE.** 1) Connect all connectors. 2) Lift-up the vehicle and place rigid racks. NOTE: Raise all wheels off floor. 3) Hold the tang plate disconnected from seat belt buckle. 4) Start the engine, and set the vehicle speed more than 25 km/h (16 MPH). NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. After diagnosis is finished, perform the clear memory mode of ABS system. <Ref. to ABS(diag)-27, Clear Memory Mode.> Check seat belt warning light comes on and buzzer beeps.	Does the seat belt warning light come on and buzzer beep?	Temporary poor contact of connector or harness may be the cause. Check the poor contact.	Replace the seat belt timer module.

4. Inspection Locations After a Collision

A: INSPECTION

Check for the following, and then replace with new parts if necessary.

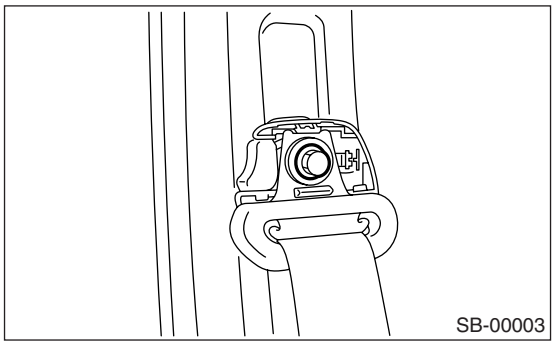
- Center pillar lower garnish is discolored or cracked.
- Wire harness and/or connector is damaged.

5. Front Seat Belt

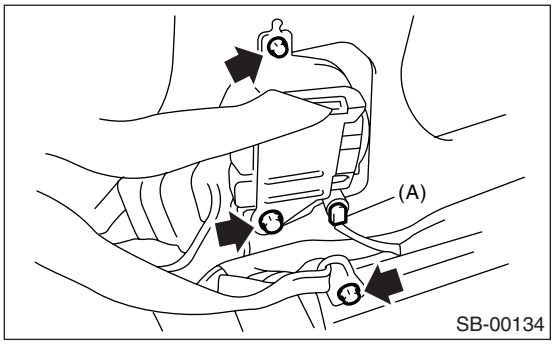
A: REMOVAL

1. OUTER SEAT BELT ASSEMBLY

1) Turn the ignition switch to OFF, disconnect the ground cable from battery, and wait for more than 20 seconds before starting work.
2) Fold backrest all the way forward, and then move front seat all the way forward.
3) Remove the center pillar lower trim. <Ref. to EI-50, REMOVAL, Lower Inner Trim.>
4) Remove the anchor cover. Loosen the shoulder anchor bolt, and then detach the shoulder anchor from center pillar.

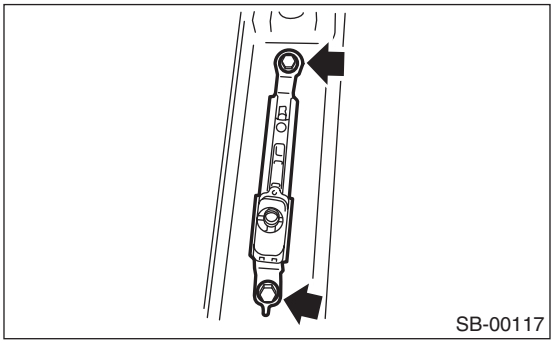

SB-00003

5) Turn over the floor mat to disconnect the connector (A) of pretensioner, and then loosen the three bolts to remove the outer seat belt assembly.



SB-00134

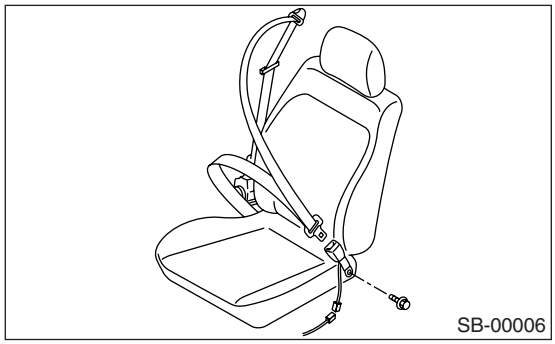
6) Remove the center pillar upper trim. <Ref. to EI-49, REMOVAL, Upper Inner Trim.>
7) Remove the two bolts and adjustable anchor assembly.


SB-00117

CAUTION:
• Do not drop or apply any impact to the pretensioner.
• Pretensioner and bracket should be treated as an assembly. Do not attempt to disassemble it.

2. INNER SEAT BELT ASSEMBLY

1) Turn the ignition switch to OFF, disconnect the ground cable from battery, and wait for more than 20 seconds before starting work.
2) Remove the console box. <Ref. to EI-45, REMOVAL, Console Box.>
3) Disconnect the seat belt warning light connector under the seat.
4) Remove the clip of harness from seat rail.
5) Remove the anchor bolt, and then remove the inner seat belt assembly.


SB-00006

B: INSTALLATION

1. OUTER SEAT BELT ASSEMBLY

Install in the reverse order of removal.

CAUTION:
• Parts on right and left are not identical. Before installation, make sure the correct part is used.
• Be careful not to twist the seat belts during installation.

Tightening torque:
<Ref. to SB-2, FRONT SEAT BELT, COMPONENT, General Description.>

2. INNER SEAT BELT ASSEMBLY

Install in the reverse order of removal.

Tightening torque:
<Ref. to SB-2, FRONT SEAT BELT, COMPONENT, General Description.>

C: INSPECTION

1. OUTER SEAT BELT ASSEMBLY

Check for the following, and replace with new parts if necessary.
- Pretensioner is cracked or deformed.
- Seat belt is slackened, bent, or frayed. Seat belt is abnormally wound or extended.

2. INNER SEAT BELT ASSEMBLY

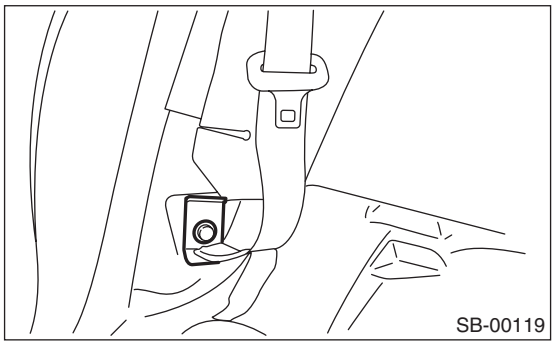
Check for the following, and replace with new parts if necessary.
- Inner belt is deformed or damaged.
- Seat belt buckle is engaged improperly.

6. Rear Seat Belt

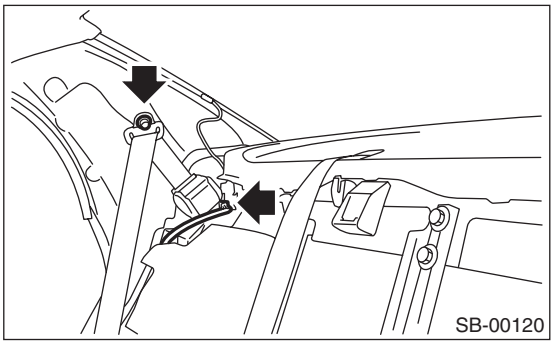
A: REMOVAL

1. OUTER SEAT BELT RH ASSEMBLY AND LH ASSEMBLY (SEDAN MODEL)

1) Remove the rear seat cushion. <Ref. to SE-12, REMOVAL, Rear Seat.>
2) Remove the side sill rear lower cover. <Ref. to EI-50, REMOVAL, Lower Inner Trim.>
3) Remove the seat belt lower anchor bolt.

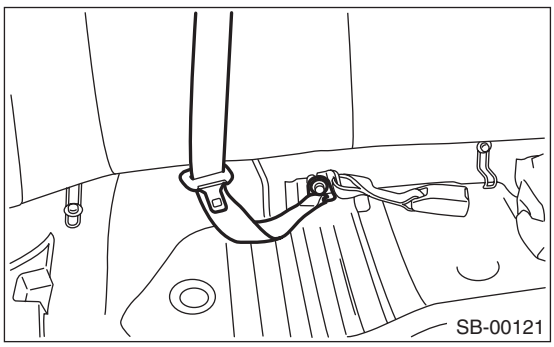

SB-00119

4) Remove the quarter pillar trim. <Ref. to EI-51, REMOVAL, Rear Quarter Trim.>
5) Remove the bolts, and then detach the outer seat belt assembly.

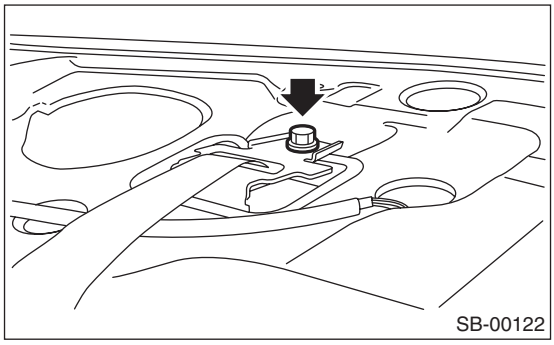

SB-00120

2. SHOULDER SEAT BELT CTR ASSEMBLY (SEDAN MODEL)

1) Remove the rear seat cushion. <Ref. to SE-12, REMOVAL, Rear Seat.>
2) Remove the seat belt lower anchor bolt.

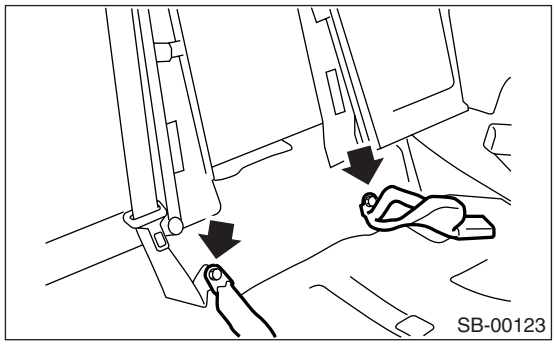

SB-00121

3) Remove the quarter pillar trim. <Ref. to EI-51, REMOVAL, Rear Quarter Trim.>
4) Remove the rear shelf trim. <Ref. to EI-56, REMOVAL, Rear Shelf Trim.>
5) Remove the bolts, and then detach the shoulder seat belt assembly.


SB-00122

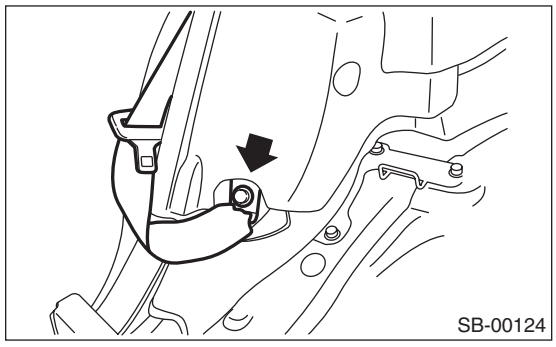
3. CENTER SEAT BELT ASSEMBLY (SEDAN MODEL)

1) Remove the rear seat cushion. <Ref. to SE-12, REMOVAL, Rear Seat.>
2) Remove the bolts, and then detach the center seat belt assembly.


SB-00123

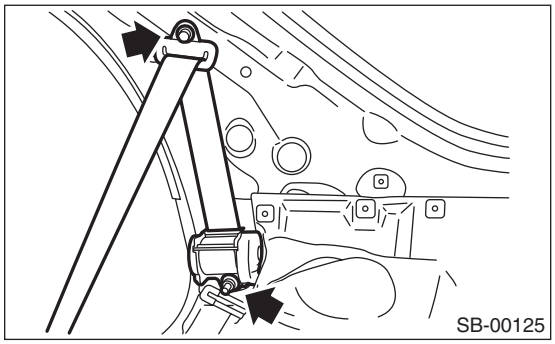
4. OUTER SEAT BELT RH ASSEMBLY AND LH ASSEMBLY (WAGON MODEL)

1) Remove the luggage floor mat. <Ref. to EI-59, REMOVAL, Luggage Floor Mat.>
2) Remove the rear seat. <Ref. to SE-12, REMOVAL, Rear Seat.>
3) Remove the side sill rear lower cover. <Ref. to EI-50, REMOVAL, Lower Inner Trim.>
4) Remove the seat belt lower anchor bolt.


SB-00124

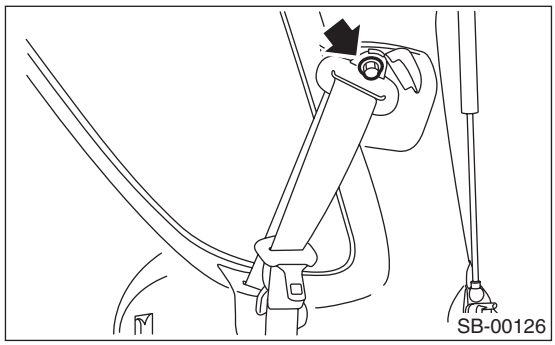
5) Remove the rear quarter trim. <Ref. to EI-51, REMOVAL, Rear Quarter Trim.>

6) Remove the bolts, and then detach the outer seat belt assembly.

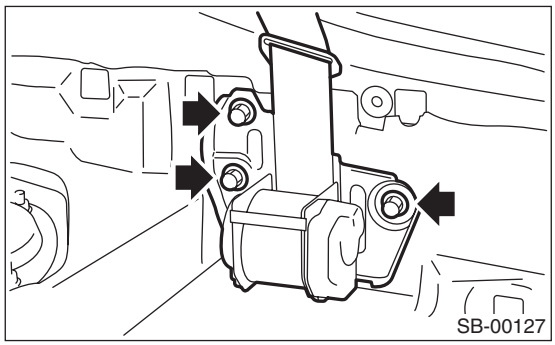


5. SHOULDER SEAT BELT CTR ASSEMBLY (WAGON MODEL)

1) Remove the shoulder anchor bolt, and then detach the shoulder anchor from quarter pillar.

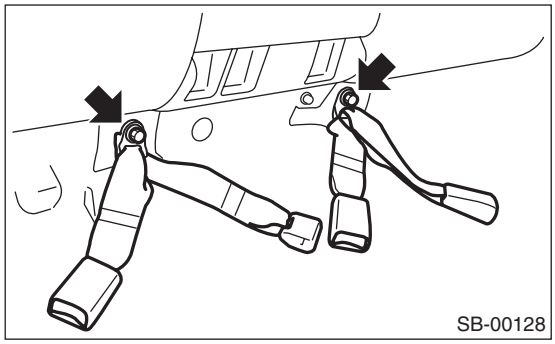


2) Remove the quarter trim. <Ref. to EI-51, REMOVAL, Rear Quarter Trim.>
3) Remove the three bolts, and then detach the shoulder seat belt CTR assembly.



6. CENTER SEAT BELT ASSEMBLY (WAGON MODEL)

1) Remove the rear seat cushion.
2) Remove the bolt, and then detach the center seat belt assembly.



B: INSTALLATION

1. OUTER SEAT BELT RH ASSEMBLY AND LH ASSEMBLY (SEDAN MODEL)

Install in the reverse order of removal.

CAUTION:
• During installation, make sure that the seat belts are not twisted.
• After installation, make sure that the seat belts can be smoothly extended and wound.

2. SHOULDER SEAT BELT CTR ASSEMBLY (SEDAN MODEL)

Install in the reverse order of removal.

CAUTION:
• During installation, make sure that the seat belts are not twisted.
• After installation, make sure that the seat belts can be smoothly extended and wound.

3. CENTER SEAT BELT ASSEMBLY (SEDAN MODEL)

Install in the reverse order of removal.

CAUTION:
During installation, make sure that the seat belts are not twisted.

4. OUTER SEAT BELT RH ASSEMBLY AND LH ASSEMBLY (WAGON MODEL)

Install in the reverse order of removal.

CAUTION:
• During installation, make sure that the seat belts are not twisted.
• After installation, make sure that the seat belts can be smoothly extended and wound.

5. SHOULDER SEAT BELT CTR ASSEMBLY (WAGON MODEL)

Install in the reverse order of removal.

CAUTION:
• During installation, make sure that the seat belts are not twisted.
• After installation, make sure that the seat belts are smoothly extended and wound.

6. CENTER SEAT BELT ASSEMBLY (WAGON MODEL)

Install in the reverse order of removal.

CAUTION:
During installation, make sure that the seat belts are not twisted.

C: INSPECTION

1. OUTER SEAT BELT RH ASSEMBLY AND LH ASSEMBLY (SEDAN MODEL)

Check for the following, and replace with new parts if necessary.
• Seat belt is slackened, bent, or frayed. Seat belt is abnormally wound or extended.

2. SHOULDER SEAT BELT CTR ASSEMBLY (SEDAN MODEL)

Check for the following, and replace with new parts if necessary.
• Seat belt is slackened, bent, or frayed. Seat belt is abnormally wound or extended.

3. CENTER SEAT BELT ASSEMBLY (SEDAN MODEL)

Check for the following, and replace with new parts if necessary.
• Inner seat belt is deformed or damaged.
• Seat belt buckle is engaged improperly.

4. OUTER SEAT BELT RH ASSEMBLY AND LH ASSEMBLY (WAGON MODEL)

Check for the following, and replace with new parts if necessary.
• Seat belt is slackened, bent, or frayed. Seat belt is abnormally wound or extended.

5. SHOULDER SEAT BELT CTR ASSEMBLY (WAGON MODEL)

Check for the following, and replace with new parts if necessary.
• Seat belt is slackened, bent, or frayed. Seat belt is abnormally wound or extended.

6. CENTER SEAT BELT ASSEMBLY (WAGON MODEL)

Check for the following, and replace with new parts if necessary.
• Inner seat belt is deformed or damaged.
• Seat belt buckle is engaged improperly.

7. Disposal of Pretensioner

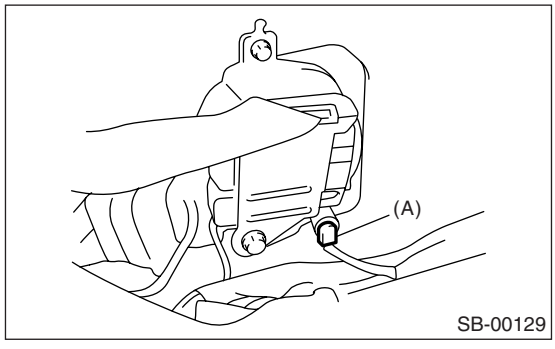
A: CAUTION

• Do not discard undeployed pretensioners, because they may cause serious personal injury when accidentally deployed.
• Deployment of the pretensioners should be done on a flat place free from any possible danger. Avoid deploying outdoors during heavy rainy or strong windy weather.
• Do not drop or damage the pretensioner.
• Because deploying the pretensioners causes a high-explosive noise, be sure to warn people in the area, and do not allow anyone within a 5 m (16 ft) radius of the disposal site.
• Some smoke will be emitted after deployment of the pretensioners. Therefore, it must be deployed in a well-ventilated area with no smoke alarms nearby.
• Wear gloves, goggles, and earplugs during this operation. Wash your hands afterwards.
• After deployment, the pretensioner is especially hot. Leave it unattended for 40 minutes or longer, and then discard it.
• Do not let water get on the deployed pretensioner.
• Wrap the deployed pretensioner in an airtight vinyl bag, and then discard it.
• If circumstances do not permit pretensioner deployment, contact a SUBARU dealer.

B: PROCEDURE

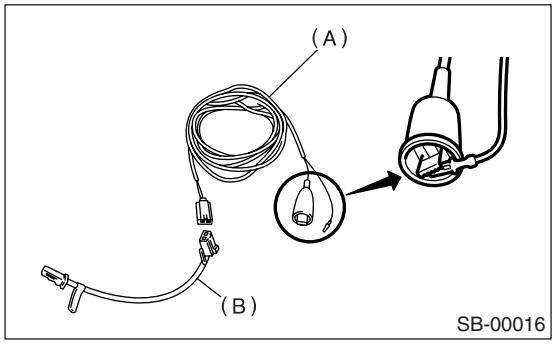
1. DEPLOYING OF PRETENSIONER WHILE INSTALLED IN VEHICLE

1) Fold backrest all the way forward, and then move front seat all the way forward.
2) Turn the ignition switch to OFF, disconnect the ground cable from battery, and wait for more than 20 seconds before starting work.
3) Remove the center pillar lower trim. <Ref. to EI-50, REMOVAL, Lower Inner Trim.>
4) Disconnect the connector (A) of pretensioner.



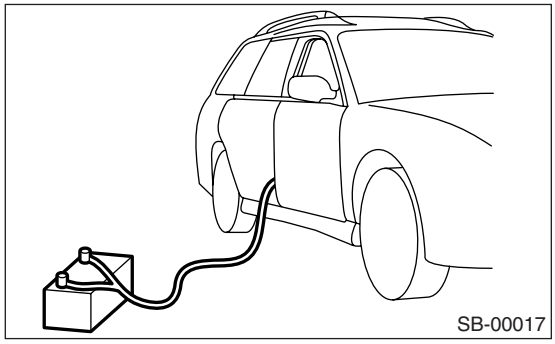
5) Short the terminal to alligator clip furnished as deployment tool (A).
6) Connect the deployment tool and adapter D (deployment) (B).

CAUTION:
Deployment tool terminals should be kept shorted until just before deployment of the pretensioner.



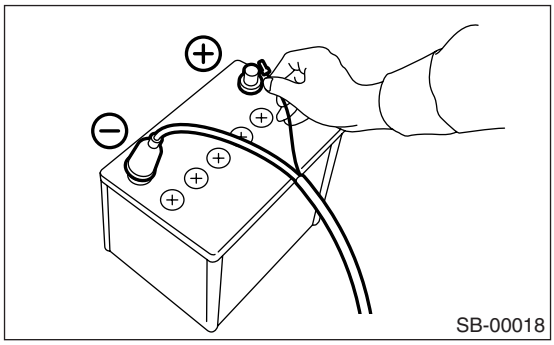
(A) Deployment tool: (Tool No. 98299PA030)
(B) Adapter D (deployment): (Tool No. 98299SA010)

7) Connect the adapter D (deployment) connector and pretensioner connector.
8) Extend the deployment tool to the limit, and make sure the vehicle is empty. Close all windows, sunroof, and rear gate completely.



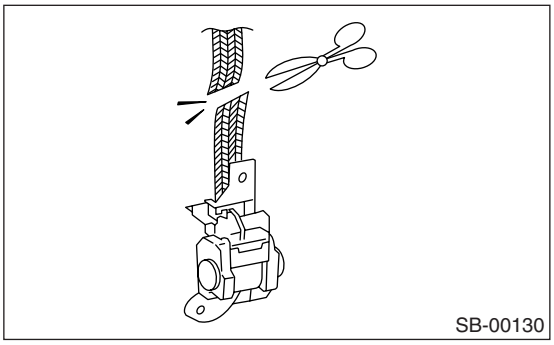
9) Move the battery at least 5 m (16 ft) from the vehicle, and secure the nearby area. Connect the deployment tool alligator clip to the battery negative (−) terminal.

10) Connect the other cable of deployment tool to the battery positive (+) terminal. Then deploy the pretensioner.

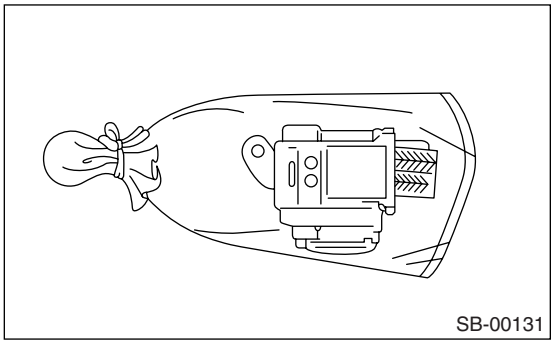

SB-00018

CAUTION:
• After deployment, pretensioner is especially hot. Leave it unattended for 40 minutes or longer.
• Do not let water get on the deployed pretensioner.

11) Remove the front outer seat belt assembly. <Ref. to SB-12, REMOVAL, Front Seat Belt.>
12) Cut off the seat belt as close to retractor as possible.

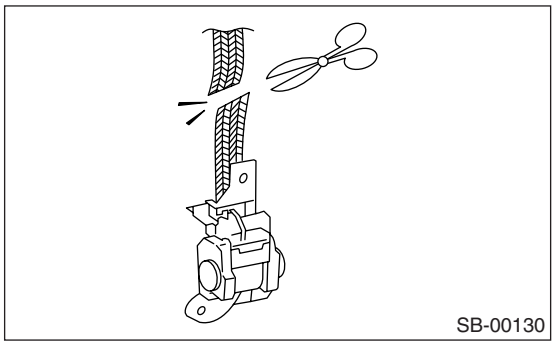

SB-00130

13) Wrap the deployed pretensioner in an airtight vinyl bag, and discard it.


SB-00131

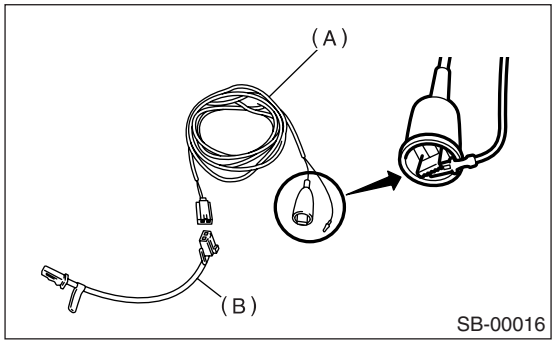
2. DEPLOYING OF PRETENSIONER AFTER REMOVAL FROM VEHICLE

1) Fold the backrest all the way forward, and then move the front seat all the way forward.
2) Turn the ignition switch to OFF, disconnect the ground cable from battery, and wait for more than 20 seconds before starting work.
3) Remove the front outer seat belt assembly. <Ref. to SB-12, REMOVAL, Front Seat Belt.>
4) Cut off the seat belt as close to retractor as possible.


SB-00130

5) Short the terminal to alligator clip furnished as a deployment tool.
6) Connect the deployment tool (A) and adapter D (deployment) (B).

CAUTION:
Deployment tool terminals should be kept shorted until just before deployment of the pretensioner.

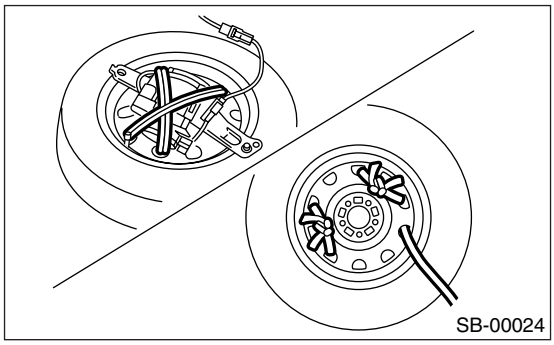


SB-00016

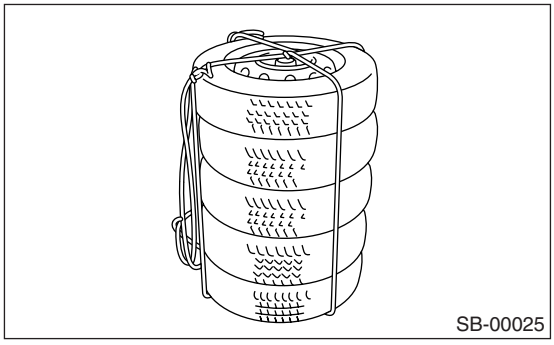
(A) Deployment tool: (Tool No. 98299PA030)
(B) Adapter D (deployment): (Tool No. 98299SA010)

7) Connect the adapter D (deployment) connector and pretensioner connector.

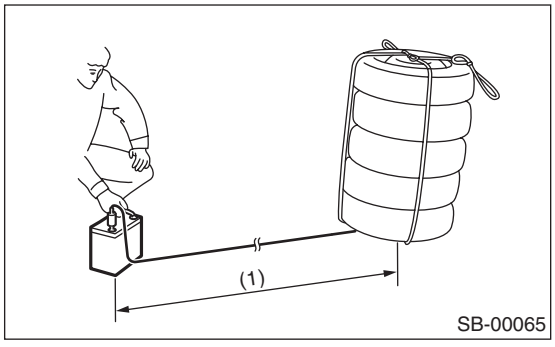
8) Install the pretensioner on a wheel with tire. Then, bundle three wire automotive harness [each with a sectional area of 1.25 mm^2 (0.00194 sq in) or more], and bind them twofold around the pretensioner bracket and wheel.


SB-00024

9) Put three tires without a wheel on the tire installed with pretensioner. Put on an additional tire with a wheel on top, and then fasten them tight with a rope.


SB-00025

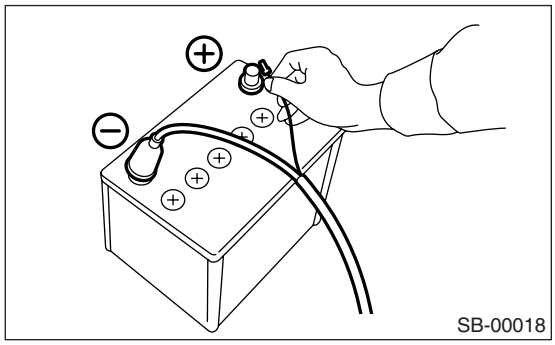
10) Move the battery at least 5 m (16 ft) from the tires, and secure the nearby area. Connect the deployment tool alligator clip to the battery negative (−) terminal.



SB-00065

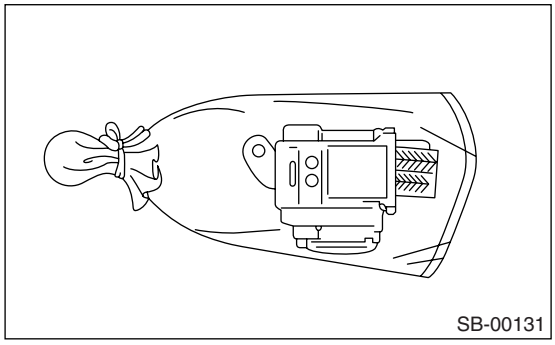
(1) 5 m (16 ft) or more

11) Connect the other cable of deployment tool to the battery positive (+) terminal. Then deploy the pretensioner.


SB-00018

CAUTION:
• After deployment, pretensioner is especially hot. Leave it unattended for 40 minutes or longer.
• Do not let water get on the deployed pretensioner.

12) Wrap the deployed pretensioner in an airtight vinyl bag, and discard it.


SB-00131

Disposal of Pretensioner

LIGHTING SYSTEM

LI

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1. General Description

A: SPECIFICATION

Headlight		Low beam	12 V — 55 W (Halogen)
		High beam	12 V — 60 W (Halogen)
Front turn signal light			12 V — 21 W
Side turn signal light			12 V — 5 W
Clearance/Parking light			12 V — 5 W
Front fog light			12 V — 55 W
Rear fog light			12 V — 21 W
Rear combination light	Sedan	Tail light	12 V — 5/21 W
		Stop light	12 V — 21 W
	Wagon	Tail/Stop light	12 V — 5/21 W
	Turn signal light		12 V — 21 W
	Back-up light		12 V — 21 W
License plate light			12 V — 5 W
High-mounted stop light	Sedan	Standard type	12 V — 21 W
		Rear spoiler built-in type	12 V — 1.2 W (LED)
	Wagon		12 V — 10 W
Room light			12 V — 8 W
Spot light			12 V — 8 W
Luggage room light			12 V — 13 W
Trunk room light			12 V — 5 W
Glove box light			12 V — 1.4 W

B: CAUTION

- Before disassembling or reassembling parts, always disconnect the battery ground cable. When replacing radio, control module, and other parts provided with memory functions, record memory contents before disconnecting the battery ground cable. Otherwise, the memory will be erased.
- Reassemble in reverse order of disassembly, unless otherwise indicated.
- Adjust parts to the given specifications.
- Connect the connectors securely during reassembly.
- After reassembly, make sure functional parts operate smoothly.

WARNING:

• Airbag system wiring harness is routed near electrical parts and switches. All airbag system wiring harnesses and connectors are yellow. Do not use electric test equipment on these circuits.

• Be careful not to damage the airbag system wiring harness when servicing electrical parts and switches.

C: PREPARATION TOOL

1. GENERAL TOOLS

TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance and voltage.

2. Headlight and Tail Light System

A: WIRING DIAGRAM

1. HEADLIGHT LHD MODEL

<Ref. to WI-189, LHD MODEL, WIRING DIAGRAM, Headlight System.>

2. HEADLIGHT RHD MODEL

<Ref. to WI-190, RHD MODEL, WIRING DIAGRAM, Headlight System.>

3. CLEARANCE LIGHT AND ILLUMINATION LIGHT LHD MODEL

<Ref. to WI-199, LHD MODEL, WIRING DIAGRAM, Clearance Light and Illumination Light System.>

4. CLEARANCE LIGHT AND ILLUMINATION LIGHT RHD WITHOUT ILLUMINATION CONTROL MODEL

<Ref. to WI-202, RHD WITHOUT ILLUMINATION CONTROL MODEL, WIRING DIAGRAM, Clearance Light and Illumination Light System.>

5. CLEARANCE LIGHT AND ILLUMINATION LIGHT RHD WITH ILLUMINATION CONTROL MODEL

<Ref. to WI-205, RHD WITH ILLUMINATION CONTROL EXCEPT FOR AUSTRALIA STi MODEL, WIRING DIAGRAM, Clearance Light and Illumination Light System.>

6. CLEARANCE LIGHT AND ILLUMINATION LIGHT STi MODEL FOR AUSTRALIA

<Ref. to WI-208, RHD FOR AUSTRALIA STi MODEL, WIRING DIAGRAM, Clearance Light and Illumination Light System.>

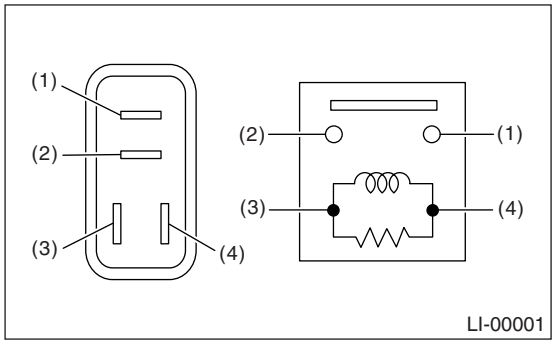
B: INSPECTION

1. HEADLIGHT SWITCH

<Ref. to LI-11, INSPECTION, Combination Switch (Light).>

2. HEADLIGHT RELAY

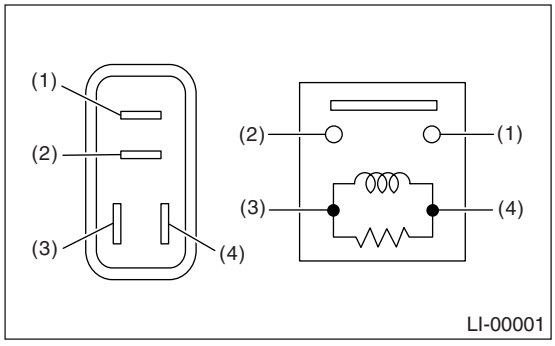
Measure the headlight relay resistance between terminals when connecting terminal No. 4 to battery positive terminal and terminal No. 3 to battery ground terminal.



Current	Terminal No.	Standard
Flow	1 and 2	Less than 1 Ω
No flow		More than 1 MΩ

3. TAIL AND ILLUMINATION RELAY

Measure the tail and illumination relay resistance between terminals when connecting terminal No. 4 to battery positive terminal and terminal No. 3 to battery ground terminal.



Current	Terminal No.	Standard
Flow	1 and 2	Less than 1 Ω
No flow		More than 1 MΩ

3. Front Fog Light System

A: WIRING DIAGRAM

1. FRONT FOG LIGHT LHD MODEL

<Ref. to WI-192, LHD MODEL, WIRING DIAGRAM, Front Fog Light System.>

2. FRONT FOG LIGHT RHD FOR EUROPE MODEL

<Ref. to WI-193, RHD FOR EUROPE MODEL, WIRING DIAGRAM, Front Fog Light System.>

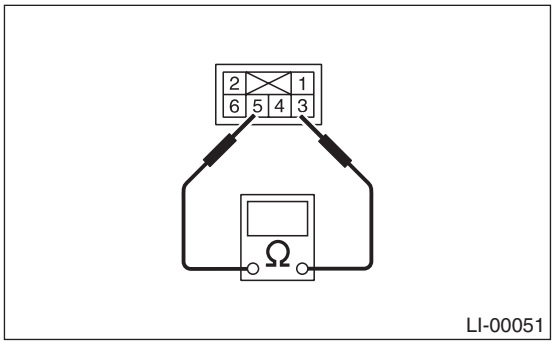
3. FRONT FOG LIGHT RHD EXCEPT FOR EUROPE MODEL

<Ref. to WI-194, RHD EXCEPT FOR EUROPE MODEL, WIRING DIAGRAM, Front Fog Light System.>

B: INSPECTION

1. FRONT FOG LIGHT SWITCH

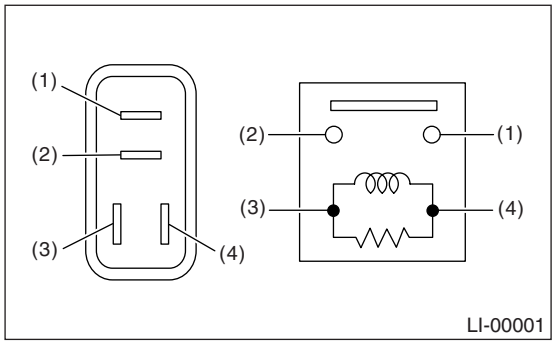
Measure the front fog light switch resistance.



Switch position	Terminal No.	Standard
OFF	3 and 5	More than 1 MΩ
ON		Less than 1 Ω

2. FRONT FOG LIGHT RELAY

Measure the front fog light relay resistance between terminals when connecting terminal No. 4 to battery positive terminal and terminal No. 3 to battery ground terminal.



Current	Terminal No.	Standard
Flow	1 and 2	Less than 1 Ω
No flow		More than 1 MΩ

4. Rear Fog Light System

A: WIRING DIAGRAM

1. REAR FOG LIGHT LHD MODEL

<Ref. to WI-195, LHD MODEL, WIRING DIAGRAM, Rear Fog Light System.>

2. REAR FOG LIGHT RHD MODEL

<Ref. to WI-196, RHD MODEL, WIRING DIAGRAM, Rear Fog Light System.>

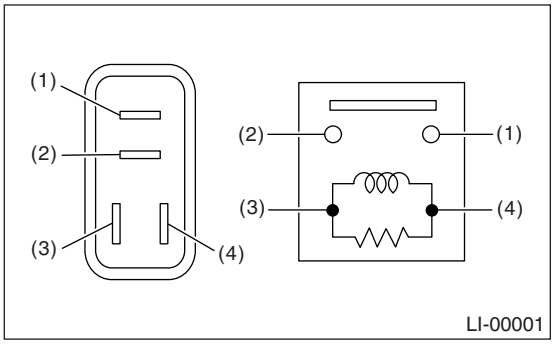
B: INSPECTION

1. REAR FOG LIGHT SWITCH

1) Turn the ignition switch to ON.
2) Turn on the headlight or front fog light.
3) Push the rear fog light switch and check if the rear fog light turns on.

2. REAR FOG LIGHT RELAY

Measure the rear fog light relay resistance between terminals when connecting terminal No. 4 to battery positive terminal and terminal No. 3 to battery ground terminal.



Current	Terminal No.	Standard
Flow	1 and 2	Less than 1 Ω
No flow		More than 1 MΩ

5. Turn Signal Light and Hazard Light System

A: WIRING DIAGRAM

1. TURN SIGNAL LIGHT AND HAZARD LIGHT LHD MODEL

<Ref. to WI-211, LHD MODEL, WIRING DIAGRAM, Turn Signal Light and Hazard Light System.>

2. TURN SIGNAL LIGHT AND HAZARD LIGHT RHD MODEL

<Ref. to WI-213, RHD MODEL, WIRING DIAGRAM, Turn Signal Light and Hazard Light System.>

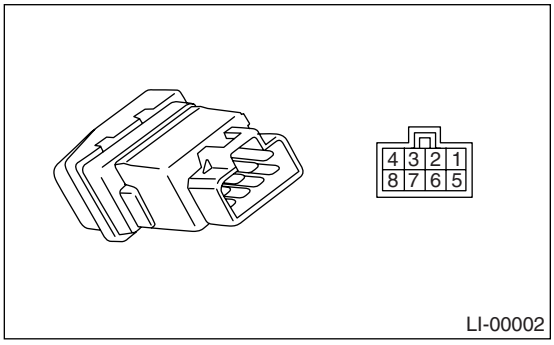
B: INSPECTION

1. TURN SIGNAL SWITCH

<Ref. to LI-11, INSPECTION, Combination Switch (Light).>

2. HAZARD SWITCH

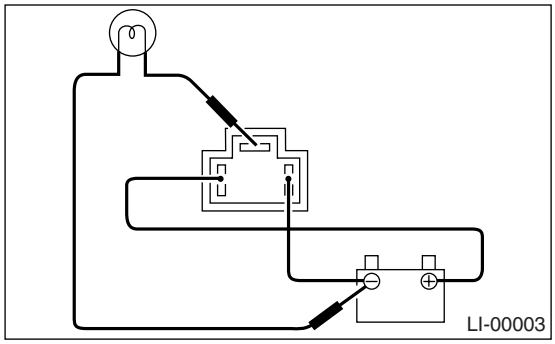
Measure the hazard switch resistance.



Switch position	Terminal No.	Standard
OFF	6 and 7	Less than 1 Ω
ON	1, 3 and 4	Less than 1 Ω
	7 and 8	Less than 1 Ω

3. TURN SIGNAL AND HAZARD MODULE

Connect the battery and turn signal light bulb to the module, as shown in the figure. The module is properly functioning if it blinks when power is supplied to the circuit.



6. Back-up Light System

A: WIRING DIAGRAM

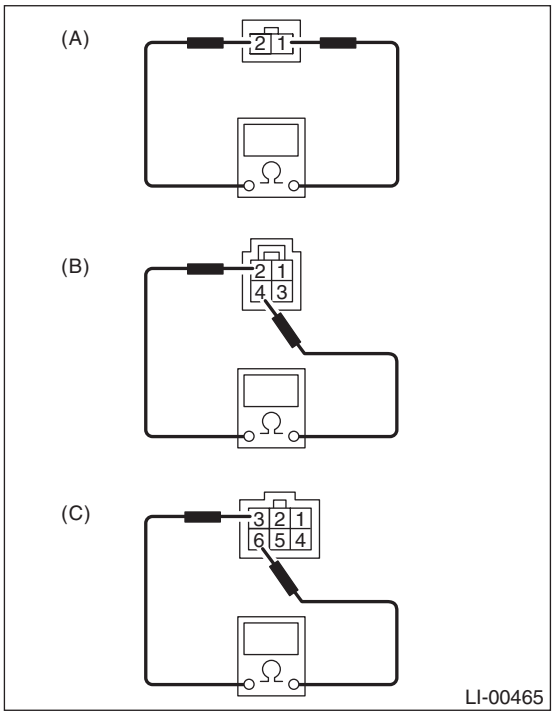
1. BACK-UP LIGHT

<Ref. to WI-197, WIRING DIAGRAM, Back-up Light System.>

B: INSPECTION

1. BACK-UP LIGHT SWITCH (M/T)

Measure the back-up light switch resistance.

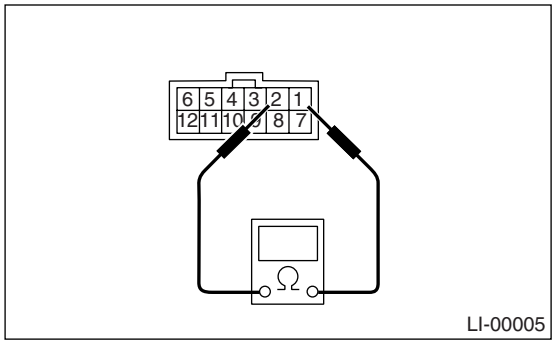


(A) Non-turbo model
(B) Turbo model (Without driver's control center differential)
(C) Turbo model (With driver's control center differential)

Switch position	Terminal No.	Standard
When shift lever is set in reverse position	Turbo model (Without driver's control center differential): 2 and 4 Turbo model (With driver's control center differential): 3 and 6 Non-turbo model: 1 and 2	Less than 1 Ω
Other positions		More than 1 MΩ

2. INHIBITOR SWITCH (A/T)

Measure the inhibitor switch resistance.



Switch position	Terminal No.	Standard
When select lever is set in "R" range	1 and 2	Less than 1 Ω
Other positions		More than 1 MΩ

7. Stop Light System

A: WIRING DIAGRAM

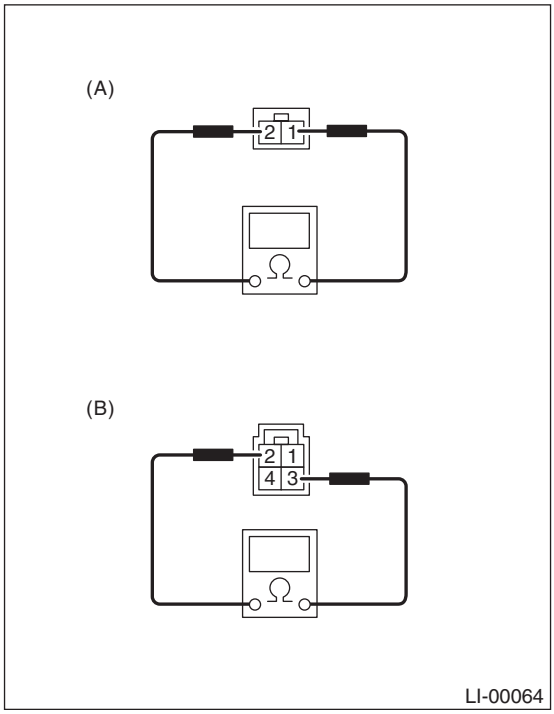
1. STOP LIGHT

<Ref. to WI-198, WIRING DIAGRAM, Stop Light System.>

B: INSPECTION

1. STOP LIGHT SWITCH

Measure the stop light switch resistance.



(A) Without cruise control
(B) With cruise control

Switch position	Terminal No.	Standard
When brake pedal is depressed	1 and 2: Without cruise control 2 and 3: With cruise control	Less than 1 Ω
When brake pedal is released		More than 1 MΩ

8. Room Light System

A: WIRING DIAGRAM

1. INTERIOR LIGHT LHD MODEL

<Ref. to WI-215, LHD MODEL, WIRING DIAGRAM, Interior Light System.>

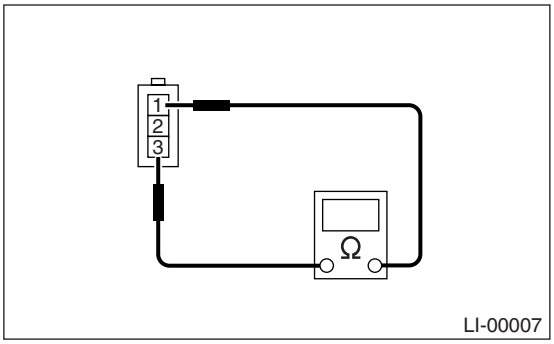
2. INTERIOR LIGHT RHD MODEL

<Ref. to WI-217, RHD MODEL, WIRING DIAGRAM, Interior Light System.>

B: INSPECTION

1. DOOR SWITCH

Measure the door switch resistance.



Switch position	Terminal No.	Standard
When door is opened	1 and 3	Less than 1 Ω
When door is closed		More than 1 MΩ

2. REAR GATE LATCH SWITCH

Measure the rear gate latch switch resistance.

Switch position	Terminal No.	Standard
When rear gate is opened	1 and 2	Less than 1 Ω
When rear gate is closed		More than 1 MΩ

3. TRUNK ROOM LIGHT SWITCH

Measure the trunk room light switch resistance.

Switch position	Terminal No.	Standard
When trunk lid is opened	1 and 2	Less than 1 Ω
When trunk lid is closed		More than 1 MΩ

9. Headlight Beam Leveler System

A: WIRING DIAGRAM

1. HEADLIGHT BEAM LEVELER

<Ref. to WI-191, WIRING DIAGRAM, Headlight Beam Leveler System.>

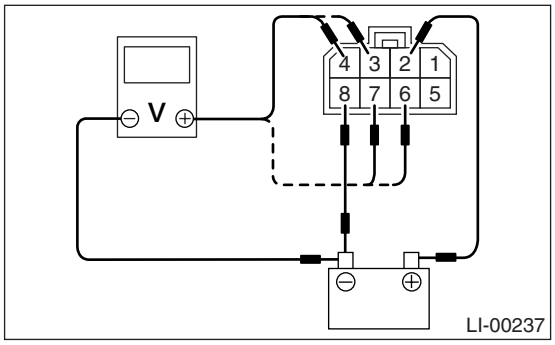
B: INSPECTION

1. HEADLIGHT BEAM LEVELER ACTUATOR

1) Turn on the headlights.
2) Confirm the headlight beam level is lowered by changing the switch position to 0 - 1 - 2 - 3.

2. HEADLIGHT BEAM LEVELER SWITCH

Connect the battery, headlight beam leveler switch connector and circuit tester as shown in the figure. Measure the voltage at each switch position.

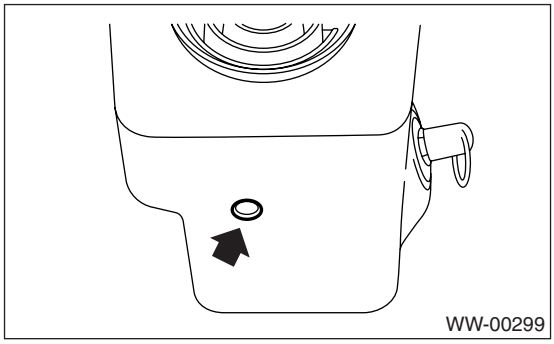


Switch position	Terminal No.	Standard
0	7 (+) and battery (–)	Battery voltage
1	6 (+) and battery (–)	Battery voltage
2	3 (+) and battery (–)	Battery voltage
3	4 (+) and battery (–)	Battery voltage

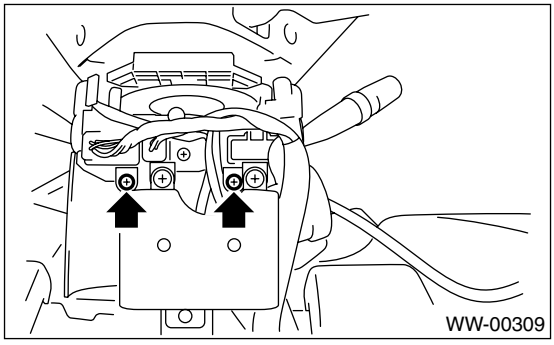
10.Combination Switch (Light)

A: REMOVAL

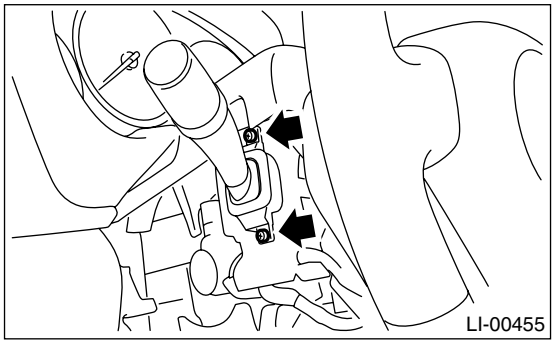
1) Disconnect the ground cable from battery.
2) Remove the instrument panel lower cover. <Ref. to EI-46, REMOVAL, Instrument Panel Assembly.>
3) Remove the screws which secure the upper column cover to lower column cover.



4) Remove the screws which secure the upper column cover.



5) Disconnect the connector from combination switch.
6) Remove the screws which secure the switch, and then remove the switch.

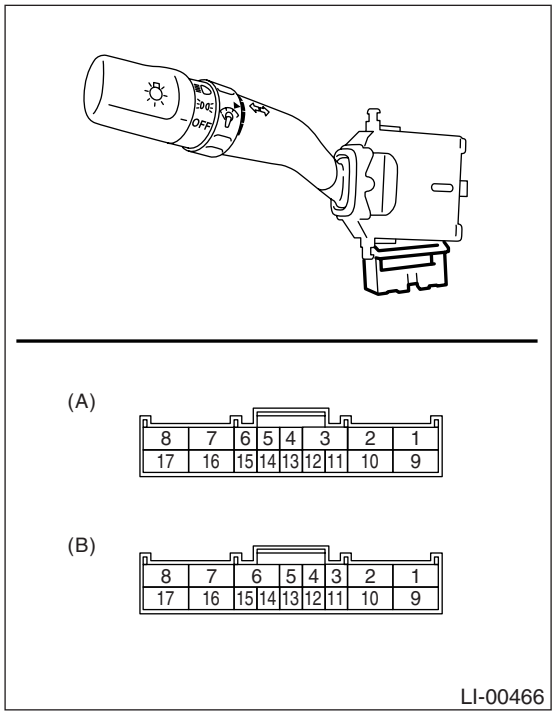


B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

Measure the combination switch resistance.



(A) LHD model/RHD model (for Europe)
(B) RHD model (Except for Europe)

1. LIGHTING SWITCH

LHD model and RHD for Europe model:

Switch position	Terminal No.	Standard
OFF	—	More than 1 MΩ
Tail	14 and 16	Less than 1 Ω
Head	13, 14 and 16	Less than 1 Ω

RHD except for Europe model:

Switch position	Terminal No.	Standard
OFF	—	More than 1 MΩ
Tail	9 and 15	Less than 1 Ω
Head	9, 14 and 15	Less than 1 Ω

2. DIMMER AND PASSING SWITCH

LHD model and RHD for Europe model:

Switch position	Terminal No.	Standard
Passing	7, 8 and 16	Less than 1 Ω
Low beam	16 and 17	Less than 1 Ω
High beam	7 and 16	Less than 1 Ω

RHD except for Europe model:

Switch position	Terminal No.	Standard
Passing	1, 2 and 9	Less than 1 Ω
Low beam	9 and 10	Less than 1 Ω
High beam	2 and 9	Less than 1 Ω

3. TURN SIGNAL SWITCH

LHD model and RHD for Europe model:

Switch position	Terminal No.	Standard
Left	1 and 2	Less than 1 Ω
Neutral	—	More than 1 MΩ
Right	2 and 3	Less than 1 Ω

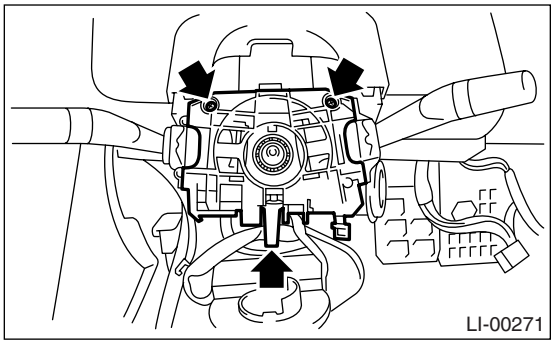
RHD except for Europe model:

Switch position	Terminal No.	Standard
Left	6 and 7	Less than 1 Ω
Neutral	—	More than 1 MΩ
Right	7 and 8	Less than 1 Ω

11.Combination Switch Base

A: REMOVAL

1) Remove the driver's airbag module. <Ref. to AB-12, REMOVAL, Driver's Airbag Module.>
2) Remove the steering wheel. <Ref. to PS-28, REMOVAL, Steering Wheel.>
3) Remove the steering column cover.
4) Remove the combination switch. <Ref. to LI-11, REMOVAL, Combination Switch (Light).> <Ref. to WW-6, REMOVAL, Combination Switch (Wiper).>
5) Loosen the four screws and remove the roll connector.
6) Loosen the three screws.



7) Disconnect the connector and remove the combination switch base.

B: INSTALLATION

1) Install in the reverse order of removal.
2) Align the attaching direction of roll connector with the steering wheel, before installation of steering wheel. <Ref. to AB-18, ADJUSTMENT, Roll Connector.>

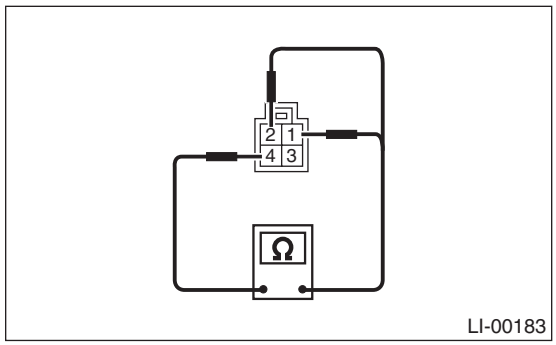
C: INSPECTION

1. COMBINATION SWITCH BASE

Perform the inspection for the following items and replace with a new one, if any damage is found.
• Crack or deformation of combination switch base or roll connector

2. PARKING SWITCH

Measure the parking switch resistance.

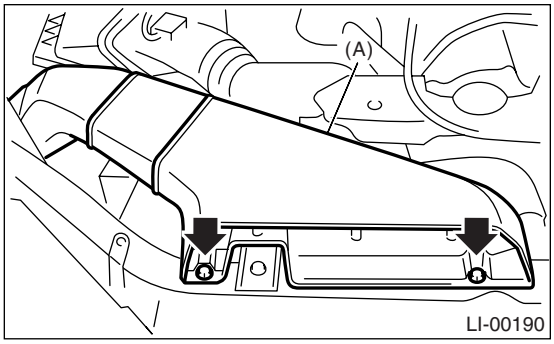


Switch position	Terminal No.	Standard
OFF	2 and 4	Less than 1 Ω
ON	1 and 4	Less than 1 Ω

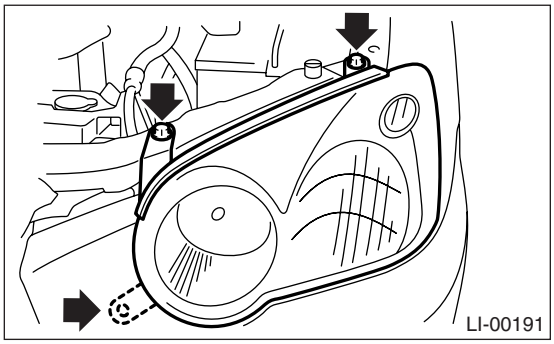
12.Headlight Assembly

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the duct (A) (when right side headlight is removed).



3) Remove the front grille and bumper upper clips. <Ref. to EI-19, REMOVAL, Front Grille.>
4) Disconnect each harness connector.
5) Remove the three bolts and disengage the clips, and then detach the headlight assembly.



B: INSTALLATION

Install in the reverse order of removal.

C: ADJUSTMENT

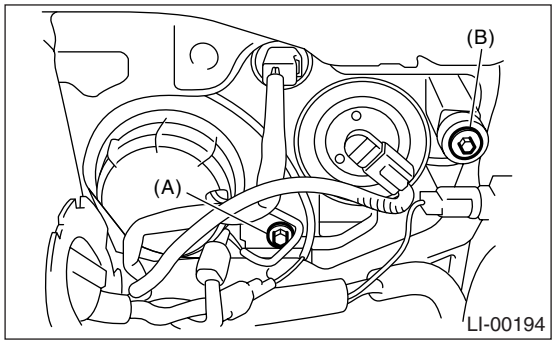
1. HEADLIGHT AIMING

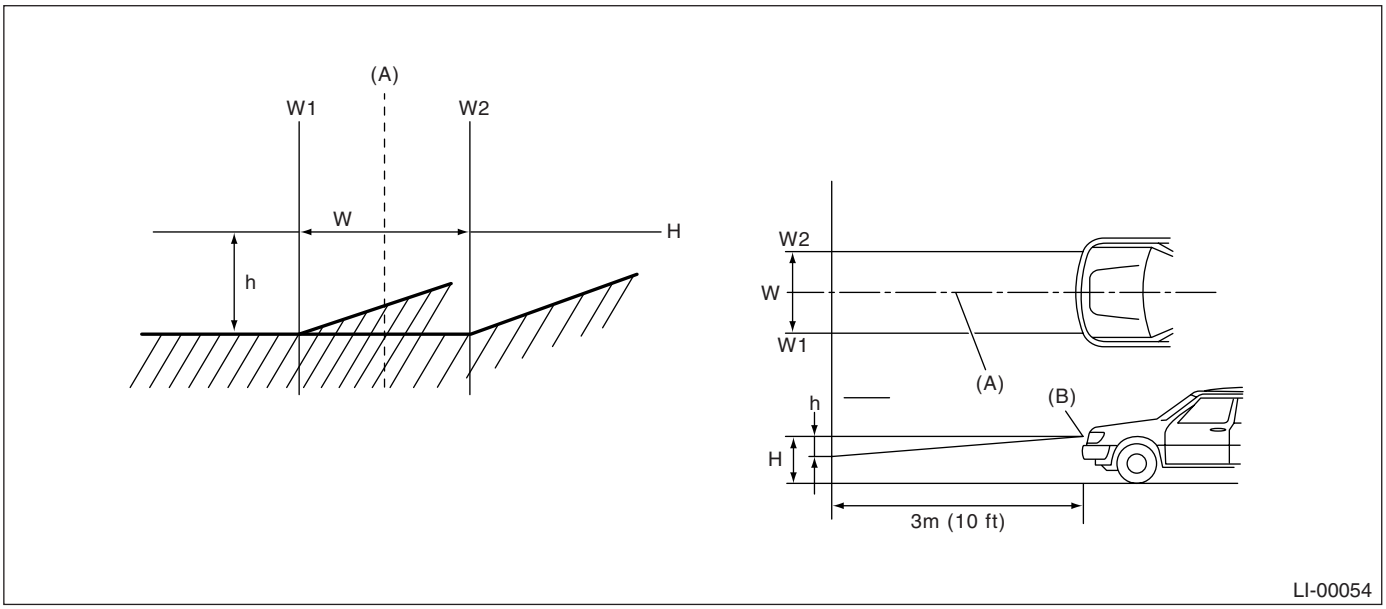
CAUTION:
Turn off the light before adjusting headlight aiming. If the light is necessary to check aiming, do not turn on for more than 2 minutes.

1) Before checking the headlight aiming, be sure of the following:
- The area around the headlight has not sustained any accident, damage or other type of deformation.
- Vehicle is parked on level ground.
- The inflation pressure of tires is correct.
- Vehicle's gas tank is fully charged.
- Bounce the vehicle several times to normalize the suspension.
- Make certain that someone is seated in the driver's seat.

2) Turn the headlights on and then adjust the low beam pattern to the following positions on the screen.

NOTE:
- Set the headlight leveler switch to "0" position.
- Adjust the vertical aim (A) first, then horizontal aim (B).





(A) Vehicle center (B) Bulb center making

This illustration is for LHD model.
The pattern for RHD model is symmetrically opposite.

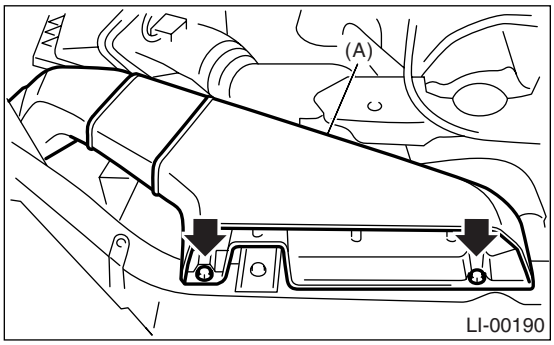
W mm (in)	H mm (in)					h mm (in) at 3 m (10 ft)
	Sedan		Wagon			
	TS	GX, RS, WRX STi	TS	GX, WRX	OUTBACK	
1,279 (50.35)	644 (25.35)	639 (25.16)	644 (25.35)	639 (25.16)	649 (25.55)	30 (1.18)

13.Headlight Bulb

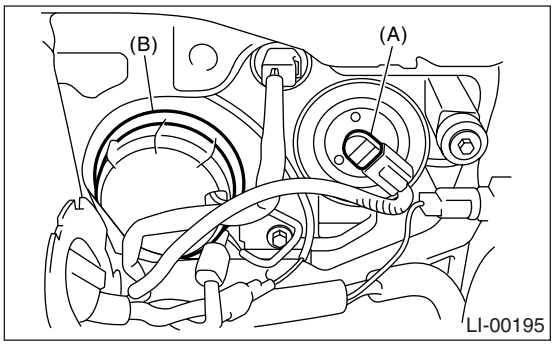
A: REMOVAL

CAUTION:
• Because the halogen bulb operates at a high temperature, dirt and oil on the bulb surface reduces the bulb's service life. Hold the flange portion when replacing the bulb. Never touch the glass portion.
• Do not leave the headlight without a bulb for a long time. Dust, moisture, etc. entering the headlight may affect its performance.

1) Disconnect the ground cable from battery.
2) Remove the air intake duct (A) (when right side headlight bulb is removed).

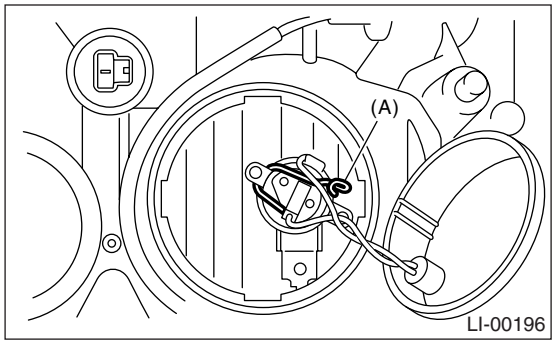


3) Disconnect the harness connector.
4) Remove the bulb ASSY (A). To remove the low beam, remove the back cover, and then go to Step 5.



(A) High beam
(B) Low beam

5) Remove the light bulb retaining spring (A) to remove the bulb.



B: INSTALLATION

Install in the reverse order of removal.

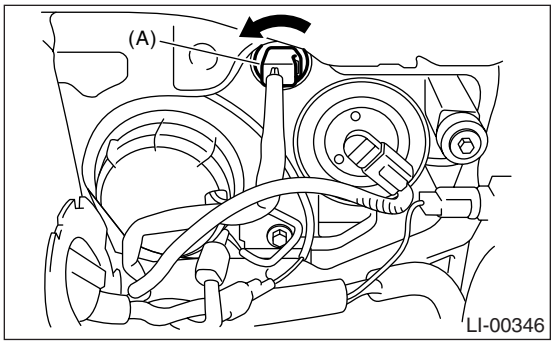
C: INSPECTION

1) Visually check the bulb for blow out.
2) Check the bulb specification. <Ref. to LI-2, SPECIFICATION, General Description.>
3) If NG, replace the bulb with a new one.

14.Front Turn Signal Light Bulb

A: REMOVAL

Turn the socket (A) and remove the bulb.



B: INSTALLATION

Install in the reverse order of removal.

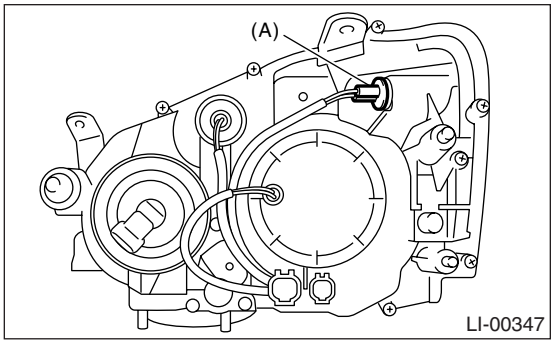
C: INSPECTION

1) Visually check the bulb for blow out.
2) Check the bulb specification. <Ref. to LI-2, SPECIFICATION, General Description.>
3) If NG, replace the bulb with a new one.

15.Clearance/Parking Light Bulb

A: REMOVAL

1) Remove the headlight assembly. <Ref. to LI-14, REMOVAL, Headlight Assembly.>
2) Turn the socket (A) and remove the bulb.



B: INSTALLATION

Install in the reverse order of removal.

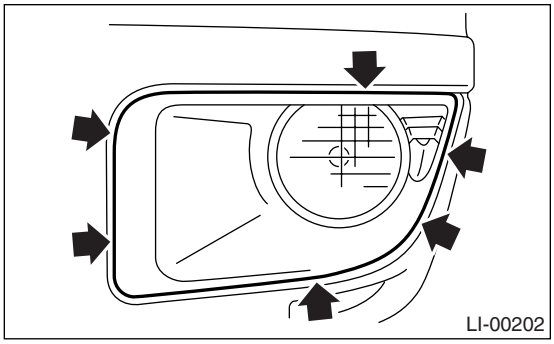
C: INSPECTION

1) Visually check the bulb for blow out.
2) Check the bulb specification. <Ref. to LI-2, SPECIFICATION, General Description.>
3) If NG, replace the bulb with a new one.

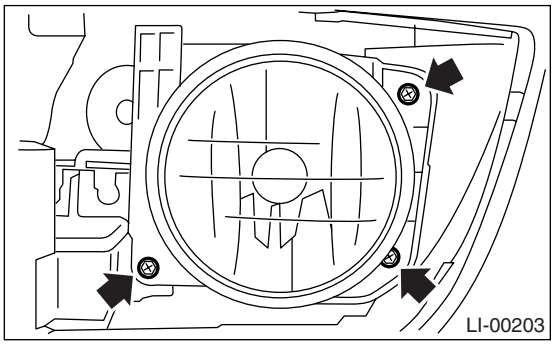
16.Front Fog Light Assembly

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Disengage the hooks (six places), and then remove the fog light cover.



3) Remove the mounting bolts, and then detach the fog light assembly by disconnecting the harness connector.



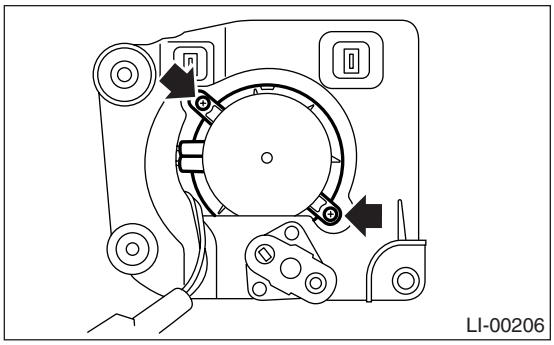
B: INSTALLATION

Install in the reverse order of removal.

17.Front Fog Light Bulb

A: REMOVAL

1) Remove the front fog light assembly. <Ref. to LI-19, REMOVAL, Front Fog Light Assembly.>
2) Remove the two screws, and then remove the back cover.



3) Remove the spring retainer, and then detach the fog light bulb.

B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

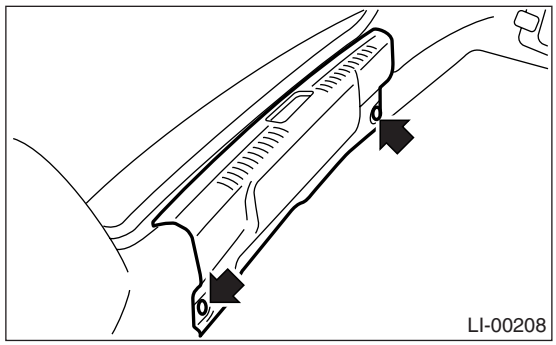
1) Visually check the bulb for blow out.
2) Check the bulb specification. <Ref. to LI-2, SPECIFICATION, General Description.>
3) If NG, replace the bulb with a new one.

18. Rear Combination Light Assembly

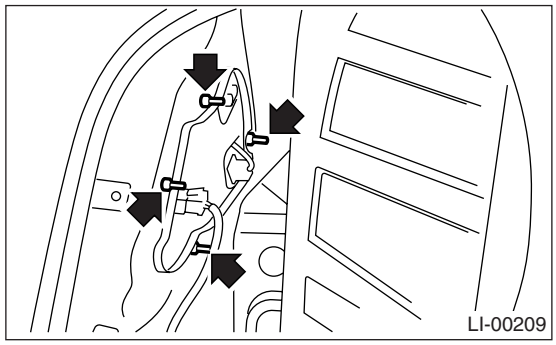
A: REMOVAL

1. SEDAN MODEL

1) Disconnect the ground cable from battery.
2) Remove the clips, and then detach the trunk rear trim.

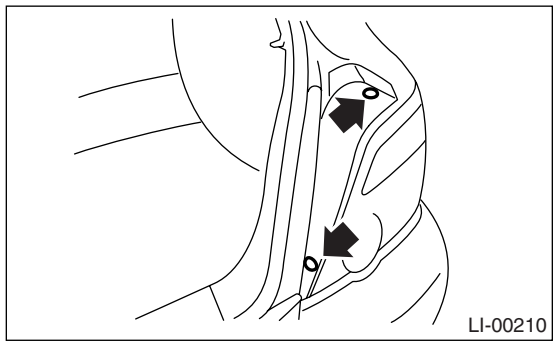


3) Remove the trunk side trim of rear portion.
4) Remove the four nuts, and then detach the rear combination light while disconnecting connector.

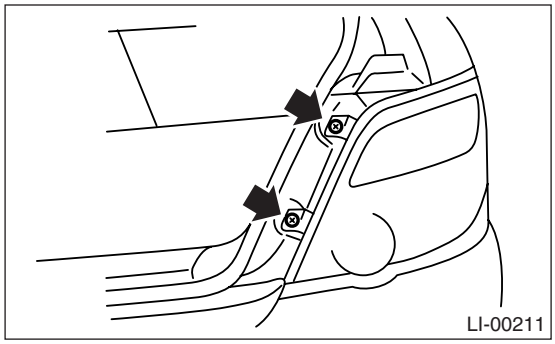


2. WAGON MODEL

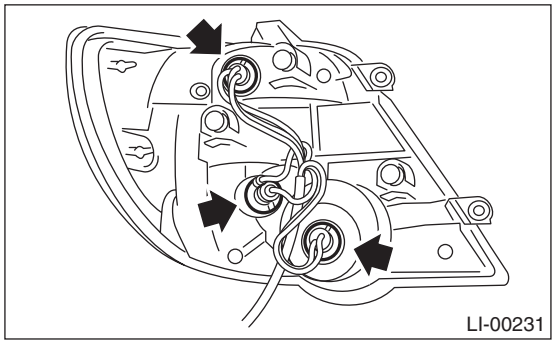
1) Disconnect the ground cable from battery.
2) Remove the clips, and then detach the rear combination light covers.



3) Remove two bolts, and then remove the rear combination light by pulling it backward.



4) Turn the sockets to remove each bulb.



B: INSTALLATION

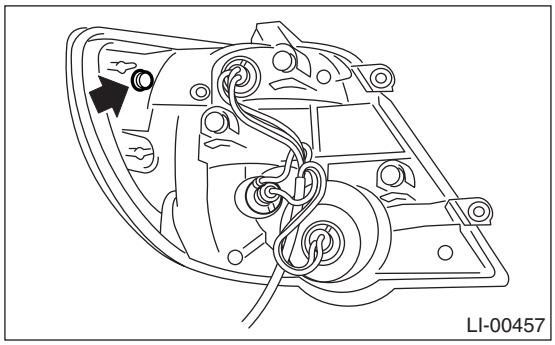
1. SEDAN MODEL

Install in the reverse order of removal.

2. WAGON MODEL

Install in the reverse order of removal.

NOTE:
Install the rear combination light by aligning the clip with body side.

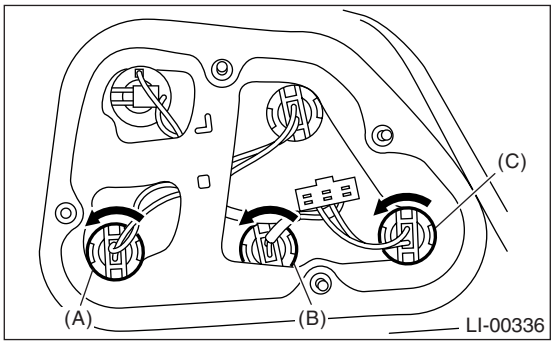


19.Tail/Stop Light Bulb

A: REMOVAL

1. SEDAN MODEL

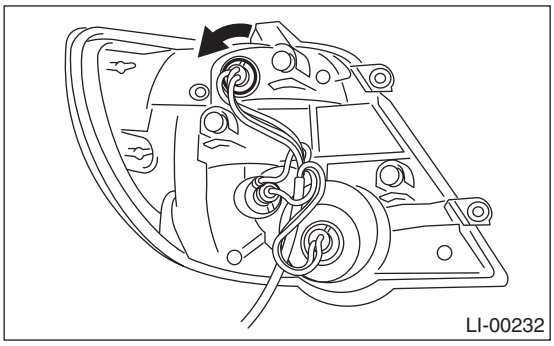
1) Remove the trunk side trim of rear portion.
2) Turn the socket and remove the bulb.



(A) Model without rear fog light: Stop light
(B) Model with rear fog light: Tail light
(C) Model with rear fog light: Stop light
Model without rear fog light: Tail light

2. WAGON MODEL

1) Remove the rear combination light assembly. <Ref. to LI-21, WAGON MODEL, REMOVAL, Rear Combination Light Assembly.>
2) Turn the socket and remove the bulb.



B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

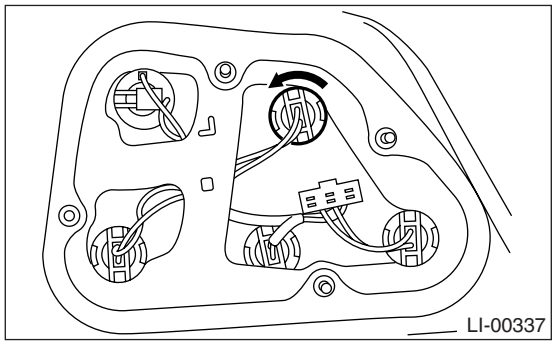
1) Visually check the bulb for blow out.
2) Check the bulb specification. <Ref. to LI-2, SPECIFICATION, General Description.>
3) If NG, replace the bulb with a new one.

20.Back-up Light Bulb

A: REMOVAL

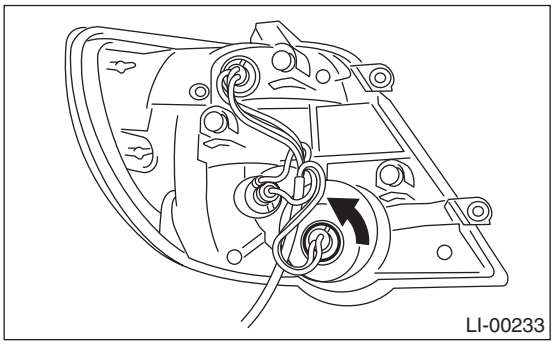
1. SEDAN MODEL

1) Remove the trunk side trim of rear portion.
2) Turn the socket and remove the bulb.



2. WAGON MODEL

1) Remove the rear combination light assembly. <Ref. to LI-21, WAGON MODEL, REMOVAL, Rear Combination Light Assembly.>
2) Turn the socket and remove the bulb.



B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

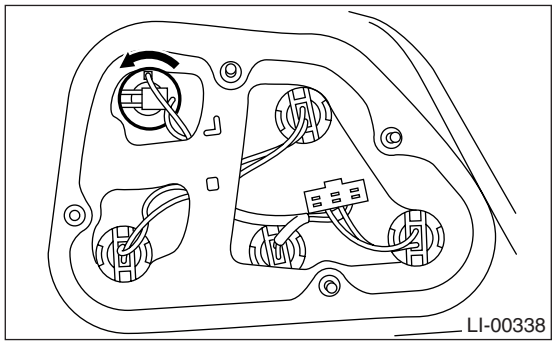
1) Visually check the bulb for blow out.
2) Check the bulb specification. <Ref. to LI-2, SPECIFICATION, General Description.>
3) If NG, replace the bulb with a new one.

21.Rear Turn Signal Light Bulb

A: REMOVAL

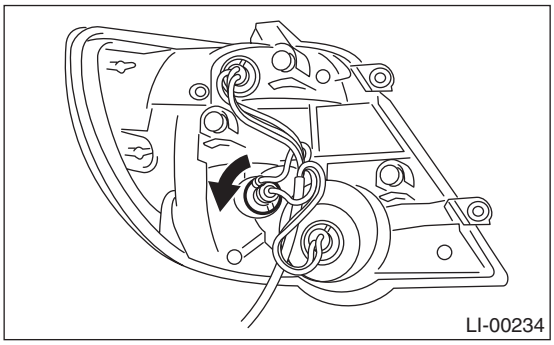
1. SEDAN MODEL

1) Remove the trunk side trim of rear portion.
2) Turn the socket and remove the bulb.



2. WAGON MODEL

1) Remove the rear combination light assembly. <Ref. to LI-21, WAGON MODEL, REMOVAL, Rear Combination Light Assembly.>
2) Turn the socket and remove the bulb.



B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

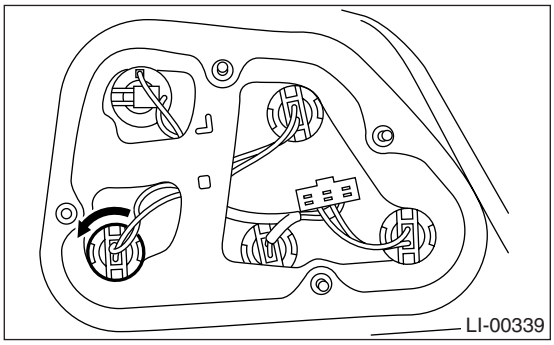
1) Visually check the bulb for blow out.
2) Check the bulb specification. <Ref. to LI-2, SPECIFICATION, General Description.>
3) If NG, replace the bulb with a new one.

22.Rear Fog Light Bulb

A: REMOVAL

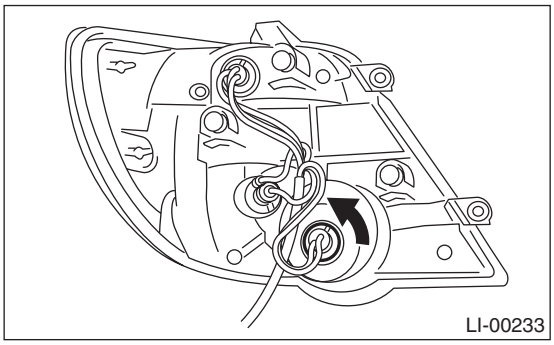
1. SEDAN MODEL

1) Remove the trunk side trim of rear portion.
2) Turn the socket and remove the bulb.



2. WAGON MODEL

1) Remove the rear combination light assembly. <Ref. to LI-21, WAGON MODEL, REMOVAL, Rear Combination Light Assembly.>
2) Turn the socket and remove the bulb.



B: INSTALLATION

Install in the reverse order of removal.

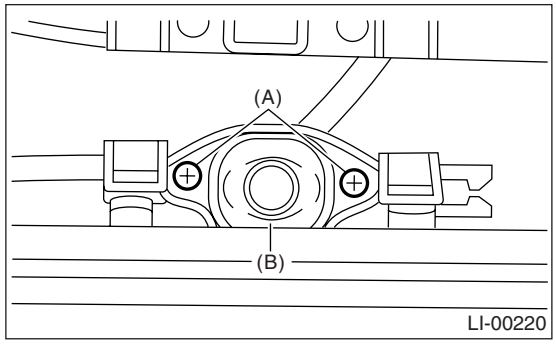
C: INSPECTION

1) Visually check the bulb for blow out.
2) Check the bulb specification. <Ref. to LI-2, SPECIFICATION, General Description.>
3) If NG, replace the bulb with a new one.

23.License Plate Light

A: REMOVAL

1) Remove the license plate light mounting screw (A), and then remove the lens (B).



2) Remove the bulb.

B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

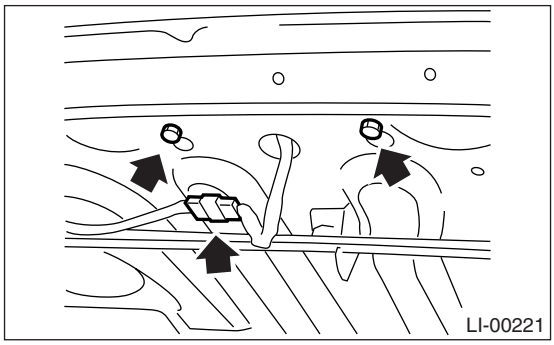
1) Visually check the bulb for blow out.
2) Check the bulb specification. <Ref. to LI-2, SPECIFICATION, General Description.>
3) If NG, replace the bulb with a new one.

24.High-mounted Stop Light

A: REMOVAL

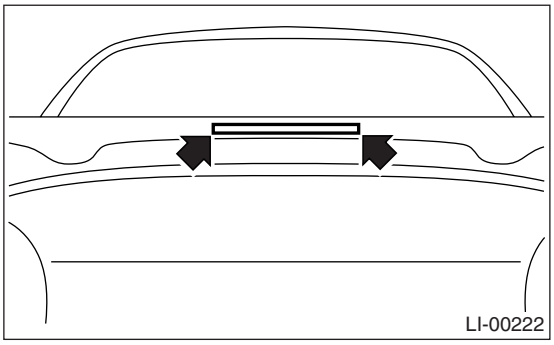
1. SEDAN MODEL (STANDARD TYPE)

1) Disconnect the ground cable from battery.
2) Disconnect the connector of high-mounted stop light from body harness.
3) Remove the bolts, then detach the high-mounted stop light assembly.



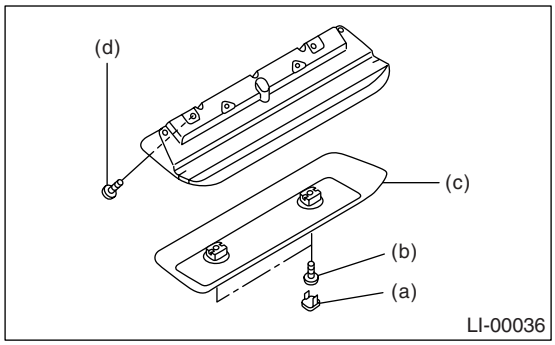
2. SEDAN MODEL (REAR SPOILER BUILT-IN TYPE)

1) Disconnect the ground cable from battery.
2) Remove the bolts, then detach the high-mounted stop light assembly.
3) Disconnect the connector of high-mounted stop light from body harness.



3. WAGON MODEL

1) Disconnect the ground cable from battery.
2) Remove the cap (a) by prying on the edge with screwdriver.
3) Remove the screws (b), and then the detach cover (c).
4) Remove screws (d), and then detach the high-mounted stop light while disconnecting connector.



B: INSTALLATION

Install in the reverse order of removal.

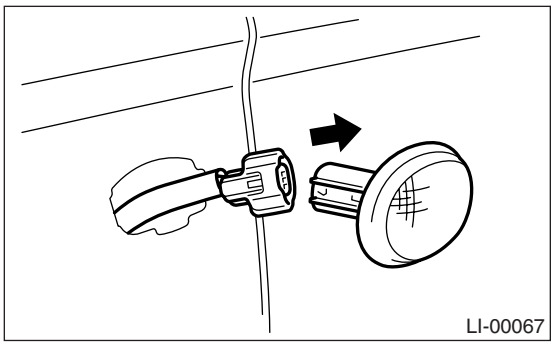
C: INSPECTION

1) Visually check the bulb for blow out.
2) Check the bulb specification. <Ref. to LI-2, SPECIFICATION, General Description.>
3) If NG, replace the bulb with a new one.

25.Side Turn Signal Light Assembly

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Pull out the light from body while pushing it in direction of vehicle front.
3) Disconnect the harness connector and remove the light.



B: INSTALLATION

Install in the reverse order of removal.

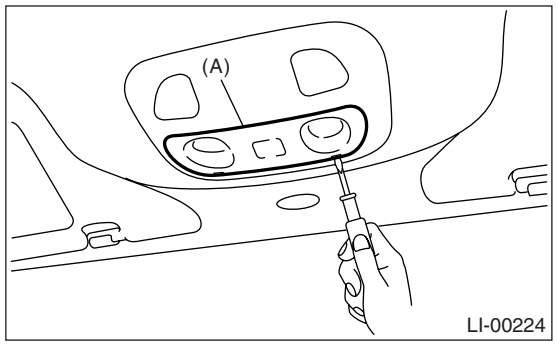
C: INSPECTION

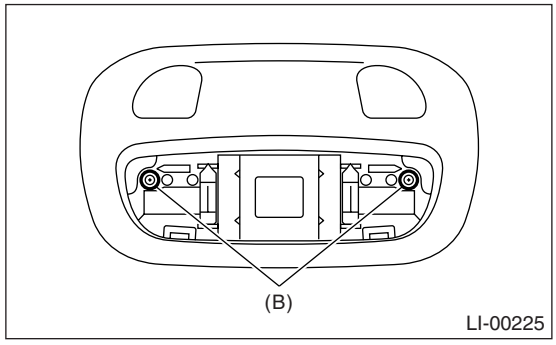
1) Check the bulb for blow out using a tester.
2) If NG, replace the side turn signal light assembly with a new one.

26.Spot Map Light

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the lens (A) and spot map light mounting screw (B) .





3) Disconnect the harness connectors and remove the spot map light.

B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

1. SPOT MAP LIGHT BULB

1) Visually check the bulb for blow out.
2) Check the bulb specification. <Ref. to LI-2, SPECIFICATION, General Description.>
3) If NG, replace the bulb with a new one.

2. SPOT MAP LIGHT SWITCH

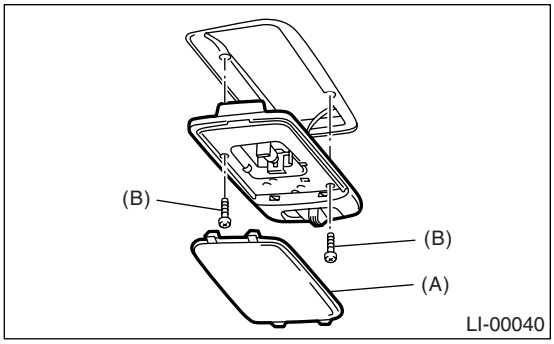
Measure the spot map light resistance.

Switch position	Terminal No.	Standard
OFF	—	More than 1 MΩ
ON	1 and 2	18±5.4 Ω

27.Room Light

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the lens (A) and room light mounting screws (B).



3) Disconnect the harness connectors and remove the light.

B: INSTALLATION

Install in the reverse order of removal.

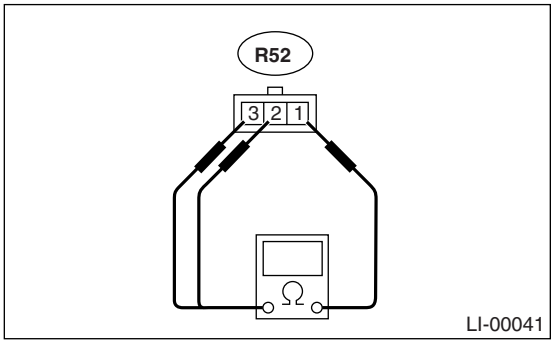
C: INSPECTION

1. ROOM LIGHT BULB

1) Visually check the bulb for blow out.
2) Check the bulb specification. <Ref. to LI-2, SPECIFICATION, General Description.>
3) If NG, replace the bulb with a new one.

2. ROOM LIGHT SWITCH

Measure the room light resistance.

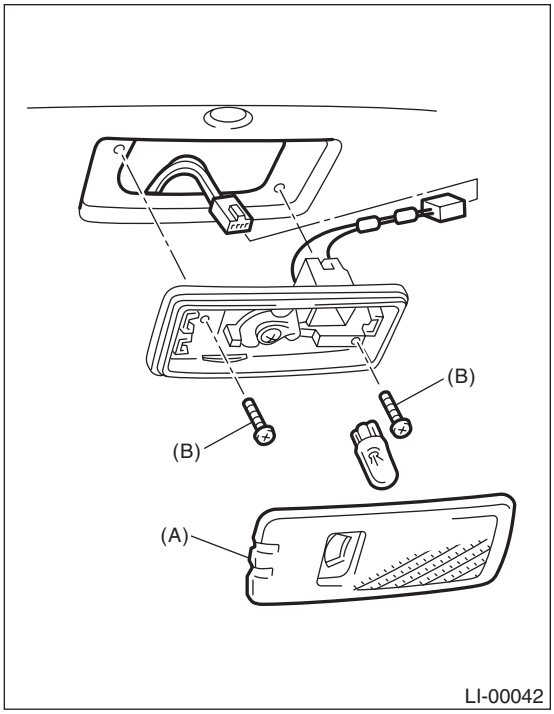


Switch position	Terminal No.	Standard
OFF	—	More than 1 MΩ
ON	1 and 3	1.5±0.5 Ω
DOOR	1 and 2	1.5±0.5 Ω

28.Luggage Room Light

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the lens (A) and luggage room light mounting screws (B).



3) Disconnect the harness connectors and remove the luggage room light.

B: INSTALLATION

Install in the reverse order of removal.

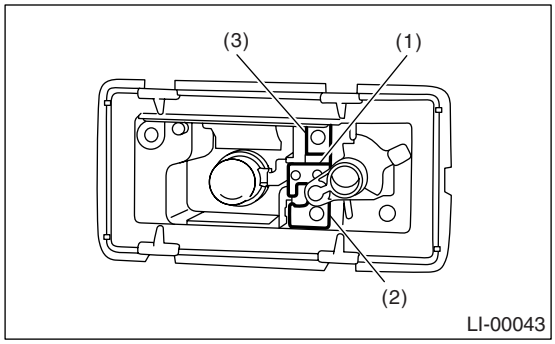
C: INSPECTION

1. LUGGAGE ROOM LIGHT BULB

1) Visually check the bulb for blow out.
2) Check the bulb specification. <Ref. to LI-2, SPECIFICATION, General Description.>
3) If NG, replace the bulb with a new one.

2. LUGGAGE ROOM LIGHT SWITCH

Measure the luggage room light resistance.

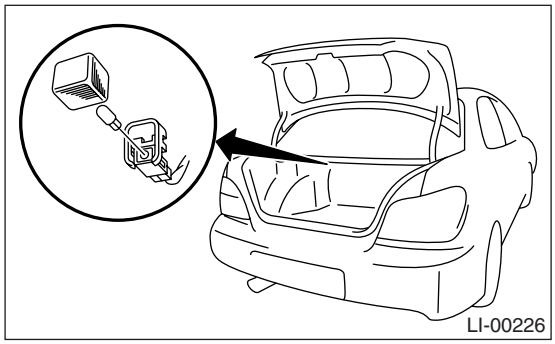


Switch position	Terminal No.	Standard
OFF	—	More than 1 MΩ
ON	1 and 3	1.5±0.5 Ω
DOOR	1 and 2	1.5±0.5 Ω

29.Trunk Room Light

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Disconnect the harness connectors and remove the trunk room light.



B: INSTALLATION

Install in the reverse order of removal.

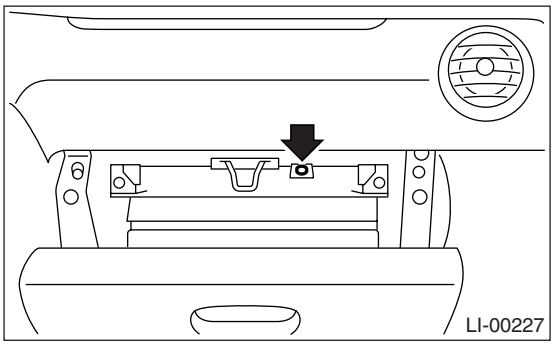
C: INSPECTION

1) Visually check the bulb for blow out.
2) Check the bulb specification. <Ref. to LI-2, SPECIFICATION, General Description.>
3) If NG, replace the bulb with a new one.

30.Glove Box Light

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the glove box. <Ref. to EI-42, REMOVAL, Glove Box.>
3) Disconnect the harness connector.
4) Remove the glove box light.



B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

1) Visually check the bulb for blow out.
2) Check the bulb specification. <Ref. to LI-2, SPECIFICATION, General Description.>
3) If NG, replace the bulb with a new one.

Glove Box Light

WIPER AND WASHER SYSTEMS

WW

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5.	Washer Tank and Motor	10
6.	Front Wiper Arm	11
7.	Front Wiper Motor and Link	12
8.	Front Washer Nozzle	14
9.	Rear Wiper Arm	15
10.	Rear Wiper Motor	16
11.	Rear Washer	17
12.	Wiper Control Relay (Wagon Model)	18

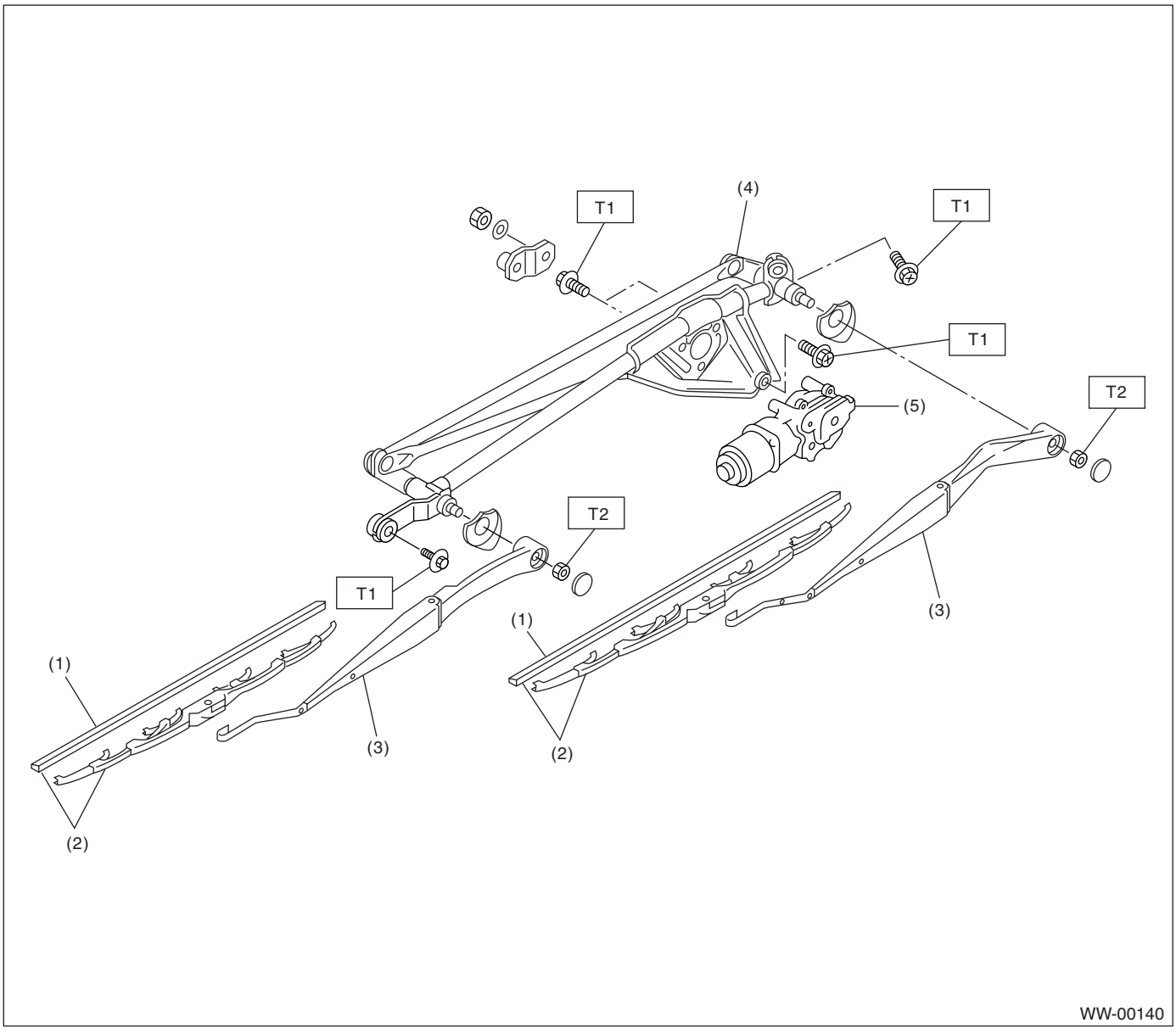
1. General Description

A: SPECIFICATION

Front wiper motor	Input	12 V — 72 W or less
Rear wiper motor	Input	12 V — 42 W or less
Front washer motor	Pump type	Centrifugal
	Input	12 V — 36 W or less
Rear washer motor	Pump type	Centrifugal
	Input	12 V — 36 W or less

B: COMPONENT

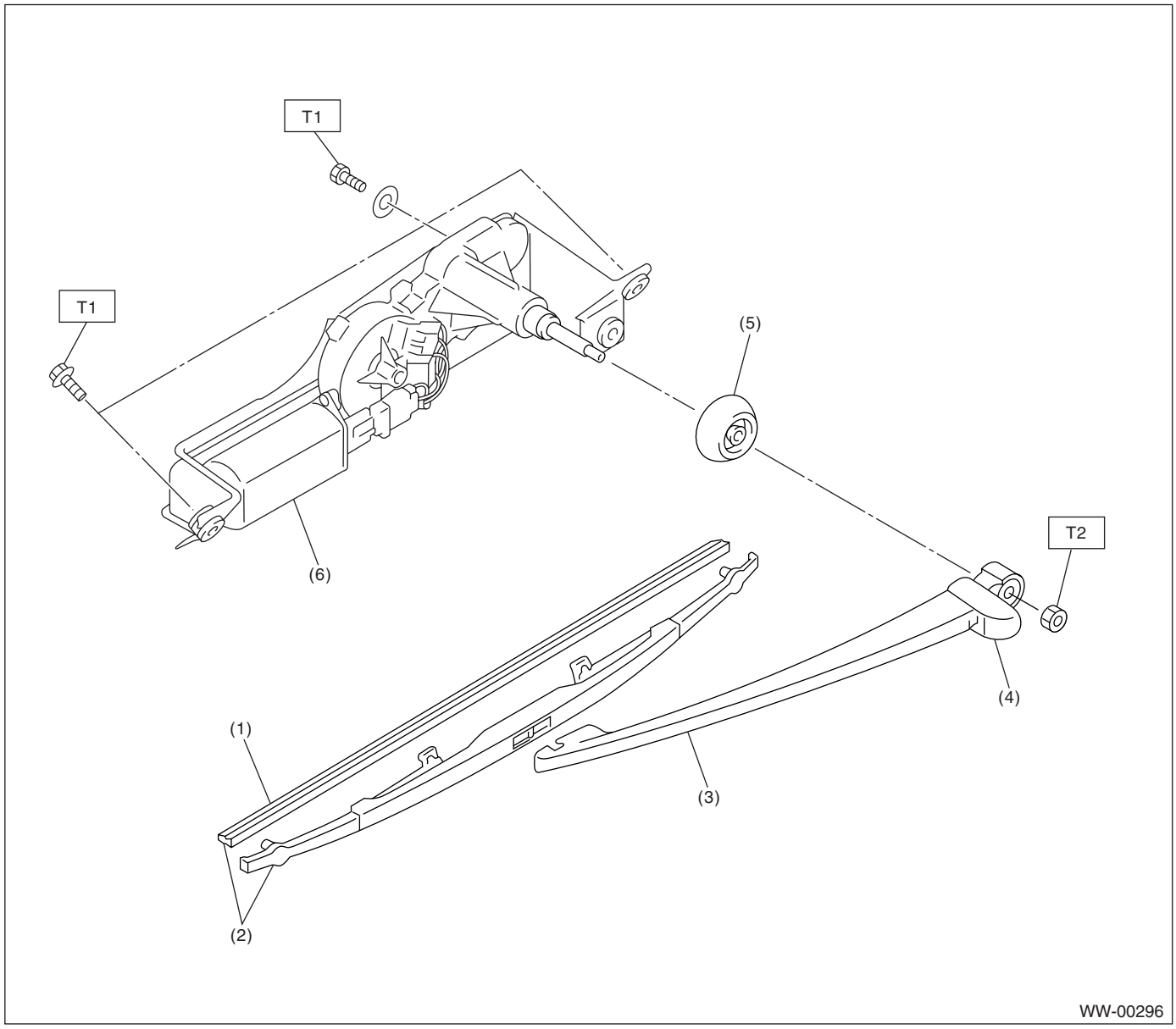
1. FRONT WIPER



(1) Wiper rubber
(2) Wiper blade ASSY
(3) Wiper arm
(4) Wiper link
(5) Wiper motor

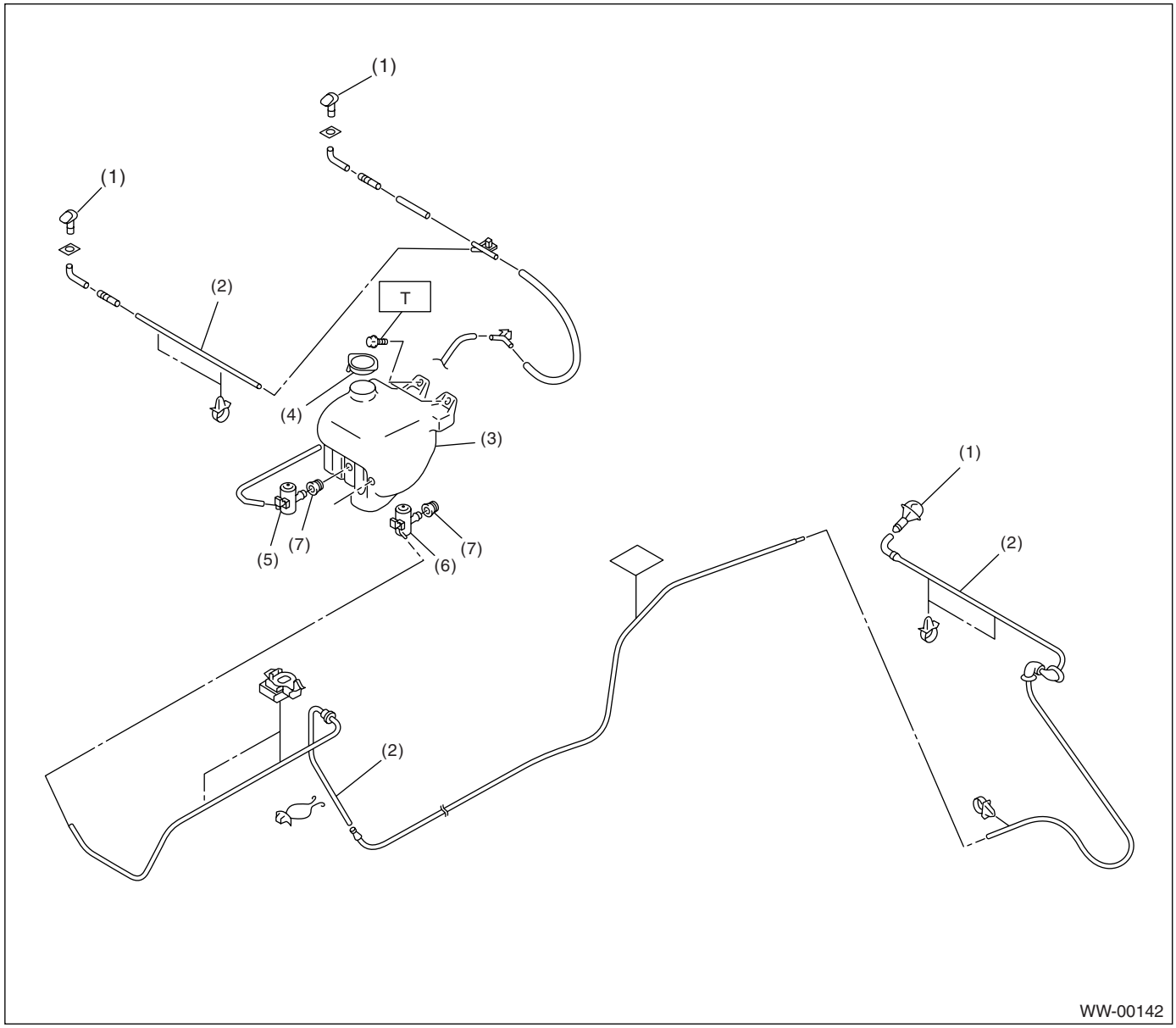
Tightening torque: N·m (kgf-m, ft-lb)
T1: 6.0 (0.61, 4.4)
T2: 20 (2.0, 14.5)

2. REAR WIPER



(1)	Wiper rubber	(4)	Wiper arm cover	***Tightening torque: N·m (kgf-m, ft-lb)***
(2)	Wiper blade ASSY	(5)	Pivot cap	***T1: 6.0 (0.61, 4.4)***
(3)	Wiper arm	(6)	Wiper moter	***T2: 8.0 (0.82, 5.9)***

3. WASHER TANK



(1) Washer nozzle
(2) Washer hose
(3) Washer tank
(4) Washer tank cap
(5) Front washer motor
(6) Rear washer motor
(7) Grommet

Tightening torque: N·m (kgf-m, ft-lb)
T: 6.0 (0.61, 4.4)

C: CAUTION

- Reconnect the connectors and hoses securely.

After reconnecting, confirm that each function operates normally.

- Be careful that wiring harnesses of airbag system pass near electrical parts and switches.
- Wiring harnesses and connectors of all airbag system are yellow color. Do not use a tester on these circuits.
- Care must be taken when installing the piping hose so that no bending, jamming, etc. are caused.
- If even a little oil or grease such as silicon oil gets in the tank and washer passages, an oil film easily forms on the glass, causing the wiper to chatter and judder. Therefore, be careful not to let this happen.

2. Wiper and Washer System

A: WIRING DIAGRAM

1. WIPER AND WASHER (FRONT) LHD MODEL

<Ref. to WI-219, LHD MODEL, WIRING DIAGRAM, Front Wiper and Washer System.>

2. WIPER AND WASHER (FRONT) RHD MODEL

<Ref. to WI-220, RHD MODEL, WIRING DIAGRAM, Front Wiper and Washer System.>

3. WIPER AND WASHER (REAR) LHD MODEL

<Ref. to WI-221, LHD MODEL, WIRING DIAGRAM, Rear Wiper and Washer System.>

4. WIPER AND WASHER (REAR) R HD MODEL

<Ref. to WI-222, RHD MODEL, WIRING DIAGRAM, Rear Wiper and Washer System.>

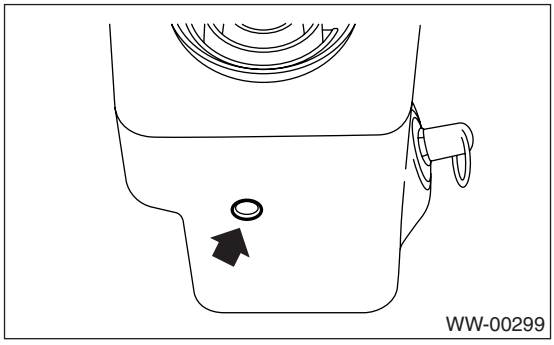
B: INSPECTION

Symptom	Repair order
Wiper and washers do not operate.	(1) Wiper fuse (F/B No. 14, 15) (2) Combination switch (3) Wiper motor (4) Wiring harness
Wipers do not operate in LO or HI.	(1) Combination switch (2) Wiper motor (3) Wiring harness
Wipers do not operate in INT.	(1) Combination switch (2) Wiper motor (3) Wiring harness
Washer motor does not operate.	(1) Washer switch (2) Washer motor (3) Wiring harness
Wipers do not operate when washer switch is ON.	(1) Washer motor (2) Wiring harness
Washer fluid spray does not operate.	(1) Washer motor (2) Washer hose and nozzle

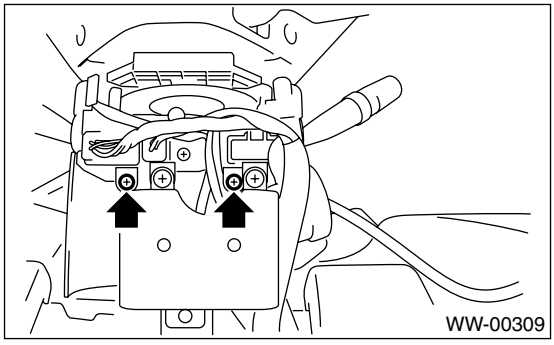
3. Combination Switch (Wiper)

A: REMOVAL

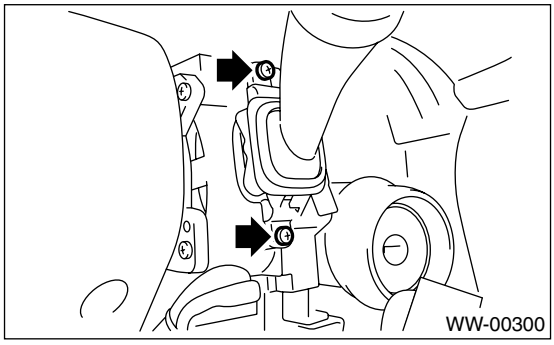
1) Disconnect the ground cable from battery.
2) Remove the instrument panel lower cover. <Ref. to EI-46, REMOVAL, Instrument Panel Assembly.>
3) Loosen the screw to remove steering column cover lower.



4) Remove the screw to steering column cover upper.



5) Disconnect the connectors from combination switches.
6) Loosen the screw to remove combination switch.

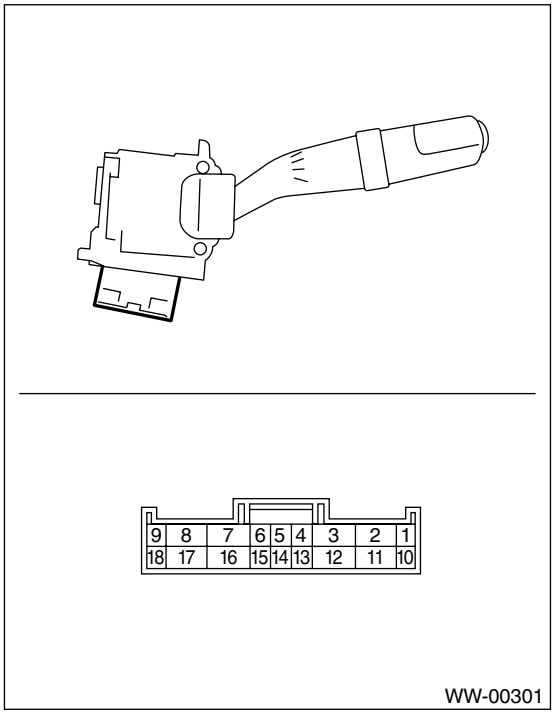


B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

• Inspect the continuity between each connector terminal.



LHD model and RHD model (Europe model):

	Switch position	Terminal No.	Standard
FRONT	OFF	7 and 16	Less than 1 Ω
	INT	7 and 16	Less than 1 Ω
	LO	7 and 17	Less than 1 Ω
	HI	8 and 17	Less than 1 Ω
	Washer ON	2 and 11	Less than 1 Ω
REAR	Washer ON	2 and 10 10 and 12 2 and 12	Less than 1 Ω
	OFF	—	More than 1 MΩ
	ON	2 and 10	Less than 1 Ω
	Washer ON	2 and 10 10 and 12 2 and 12	Less than 1 Ω

If continuity is not as specified, replace the switch.

RHD model (Except Europe model):

	Switch position	Terminal No.	Standard
FRONT	OFF	3 and 12	Less than 1 Ω
	INT	3 and 12	Less than 1 Ω
	LO	3 and 11	Less than 1 Ω
	HI	2 and 11	Less than 1 Ω
	Washer ON	8 and 17	Less than 1 Ω
REAR	Washer ON	8 and 16 16 and 18 8 and 18	Less than 1 Ω
	OFF	—	More than 1MΩ
	ON	8 and 18	Less than 1 Ω
	Washer ON	8 and 16 16 and 18 8 and 18	Less than 1 Ω

If continuity is not as specified, replace the switch.

- Intermittent operation inspection

1) Turn the wiper switch to INT.
2) Adjust the intermittent control switch to MAX.
3) Apply battery voltage to switch terminals 16 and 2.
4) Inspect the voltage of combination switch terminals.

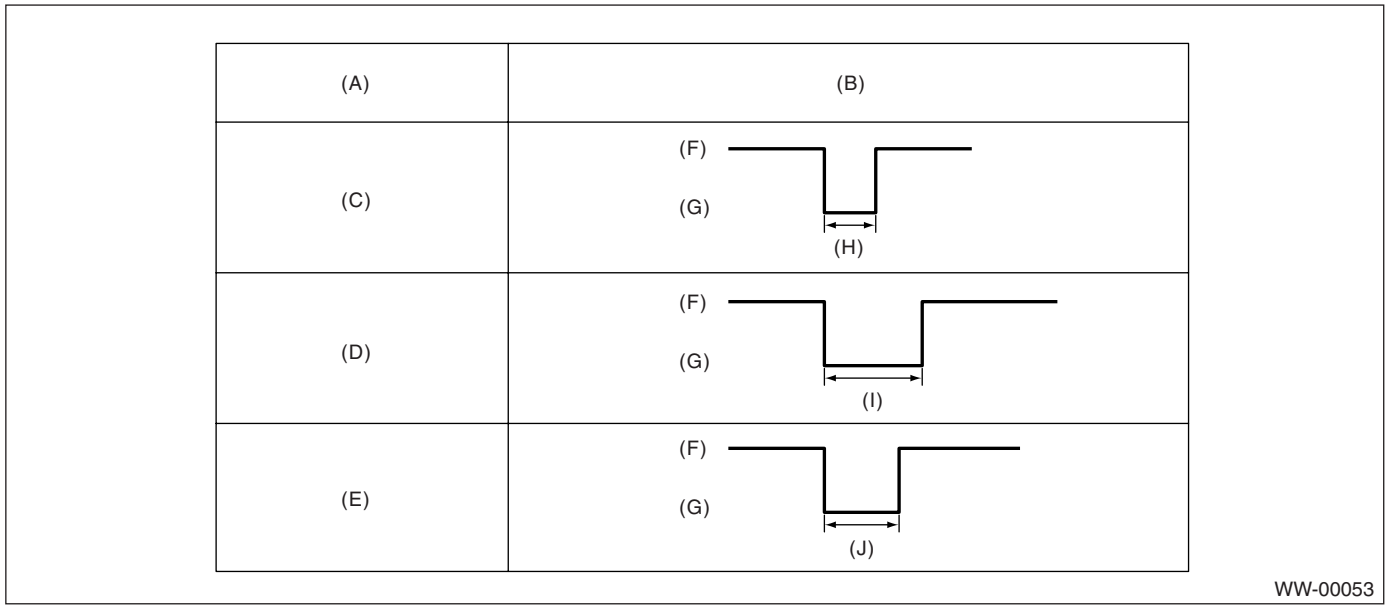
Terminals

LHD model and RHD model (Europe model)

No. 7 — No. 2:

RHD model (Except for Europe model)

No. 3 — No. 8:



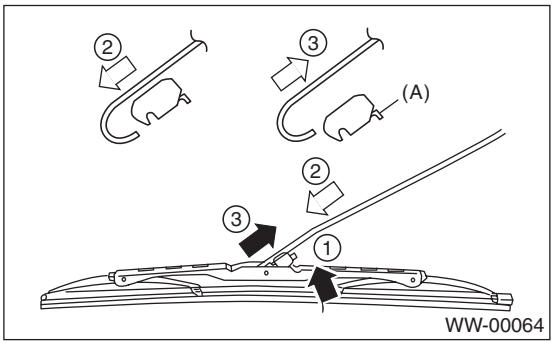
(A) Switch position
(B) Voltage
(C) MIN.
(D) MAX.
(E) Non variable type
(F) 12 V
(G) 0 V
(H) Approx. 2 sec.
(I) 16±6 sec.
(J) 3±1 sec.

If operation is not as specified, replace the switch.

4. Wiper Blade

A: REMOVAL

While pushing the locking clip (A) up, pull out the blade from arm to arrow direction.



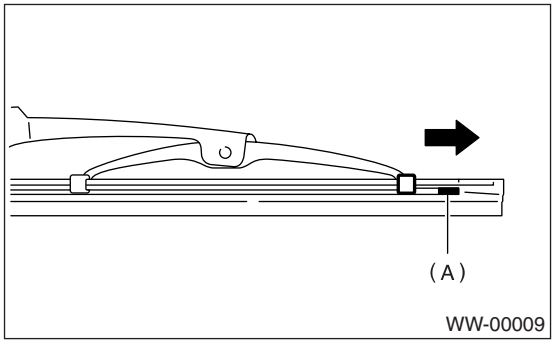
B: INSTALLATION

1) Install in the reverse order of removal.
2) Confirm that the clip is locked securely.

C: DISASSEMBLY

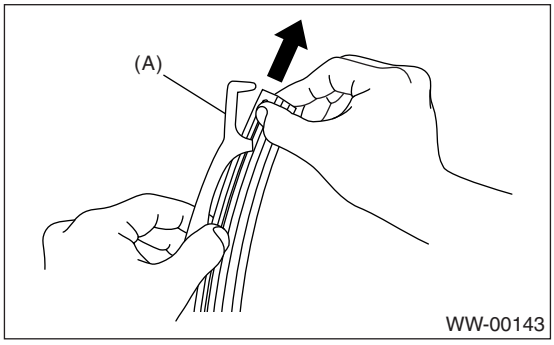
1. METAL TYPE

Pull on the side (A) of wiper rubber stopper, and then remove the rubber from blade assembly.



2. RESIN TYPE

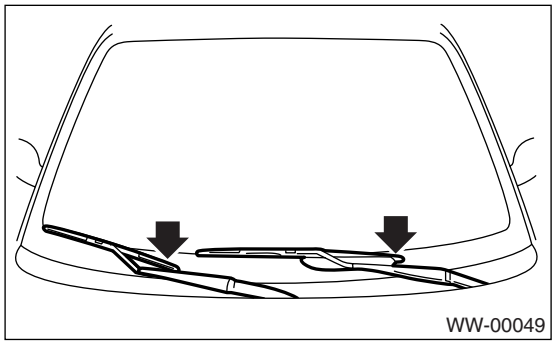
Pull the wiper rubber top slightly from the stopper (A) and pull it out fully.



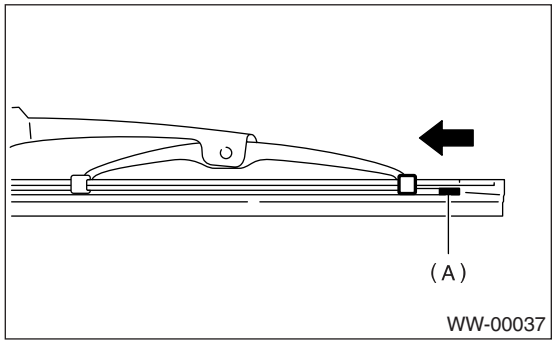
D: ASSEMBLY

1. METAL TYPE

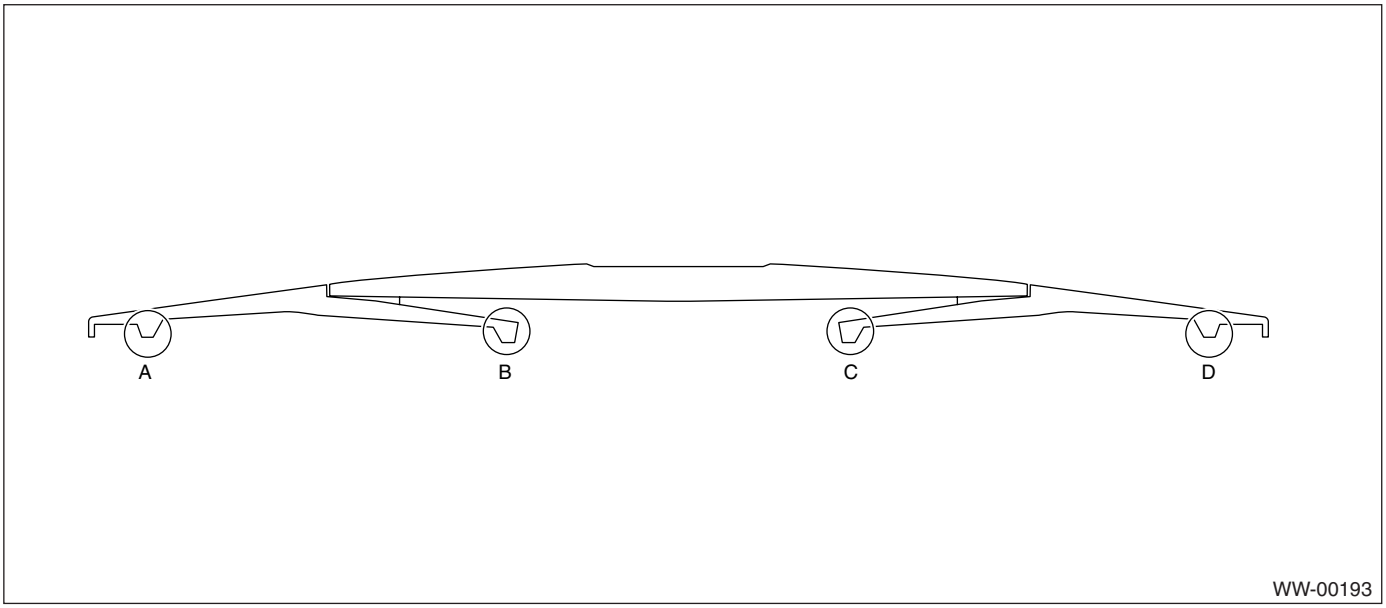
1) Insert the wiper rubber onto blade so that the stopper is in the position shown.



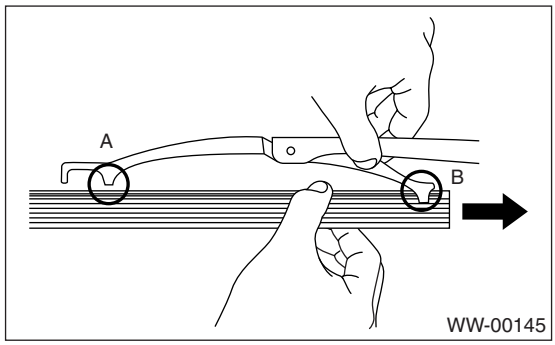
2) Make sure the wiper rubber is securely fastened to the pull stopper (A).



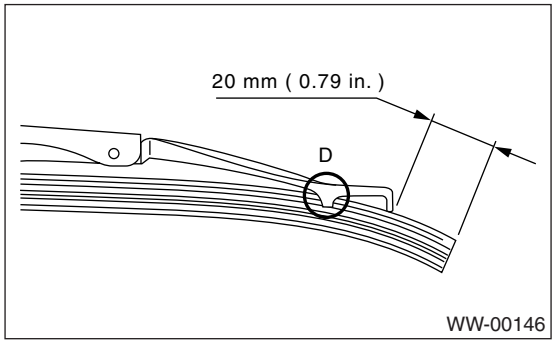
2. RESIN TYPE



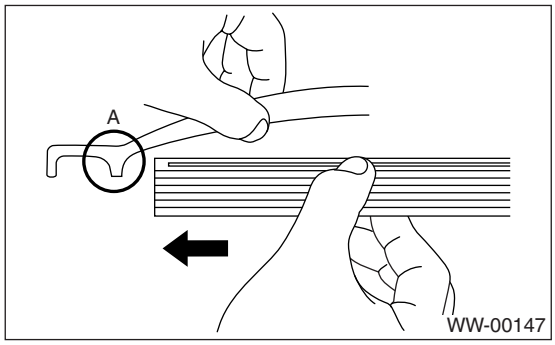
1) Insert the wiper rubber through the claw (B).



2) Insert the wiper rubber top until it protrudes about 20 mm (0.79 in) from the stopper (D).



3) Insert the wiper rubber into the claw (A).



E: INSPECTION

1) When the wiper does not perform well, inspect the following:

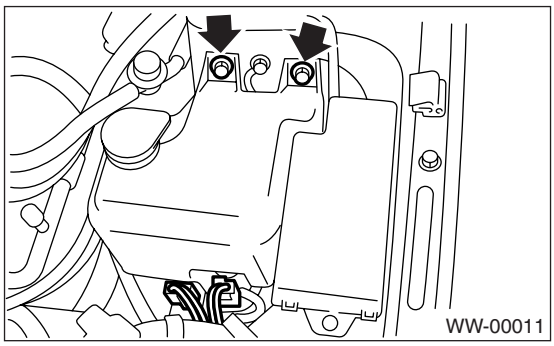
- Make sure the movable part of the blade assembly moves smoothly.
- Make sure the wiper rubber is not deformed or damaged.

2) Replace them with new parts if damaged.

5. Washer Tank and Motor

A: REMOVAL

1) Open the hood.
2) Disconnect the ground cable from battery.
3) Remove the two bolts, hose and connector, and then remove the tank.



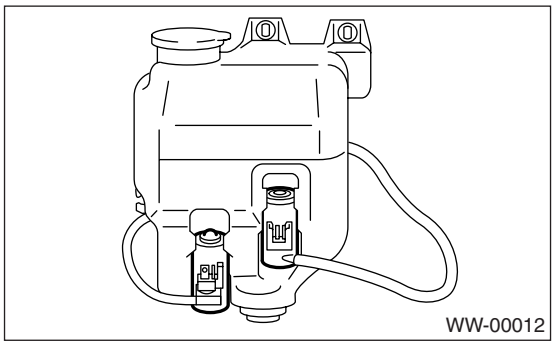
B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
6.0 N·m (0.61 kgf-m, 4.4 ft-lb)

C: DISASSEMBLY

Pull out the washer motor from tank.

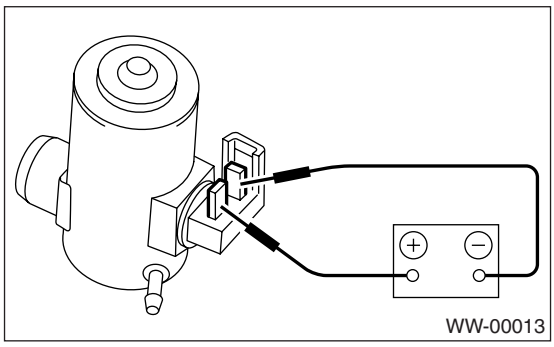


D: ASSEMBLY

1) Assemble in the reverse order of disassembly.
2) Confirm that water does not leak from installation area of motor.

E: INSPECTION

Apply battery voltage to the connector terminal of the washer motor and make sure the motor operates.



6. Front Wiper Arm

A: REMOVAL

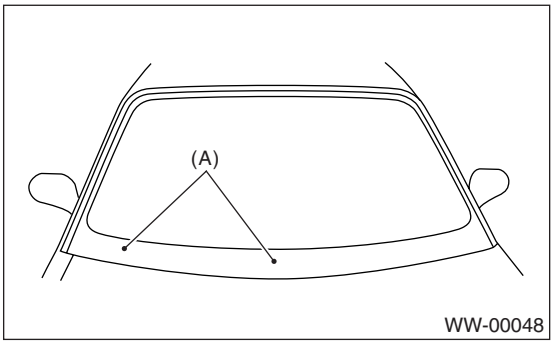
NOTE:
The positions for RHD model are symmetrically opposite.

1) Open the hood.
2) Remove the cap.
3) Loosen the nut to remove arm.

B: INSTALLATION

NOTE:
The positions for RHD model are symmetrically opposite.

1) Install in the reverse order of removal.
2) Operate the wiper once.
3) Align the wiper blade to the ceramic print point mark (A) of front window pane.

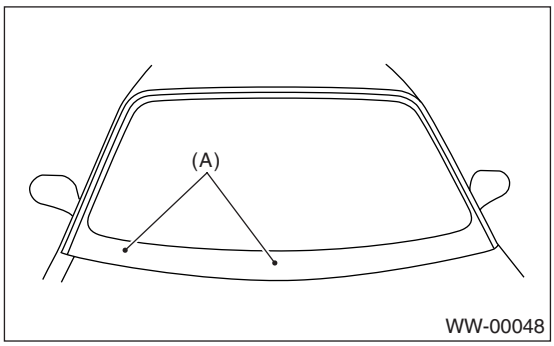


Tightening torque:
Refer to COMPONENT in General Description.
<Ref. to WW-2, FRONT WIPER, COMPONENT, General Description.>

C: ADJUSTMENT

NOTE:
The positions for RHD model are symmetrically opposite.

Operate the wiper once. Align the wiper blade to the ceramic print point mark (A) of front window pane.

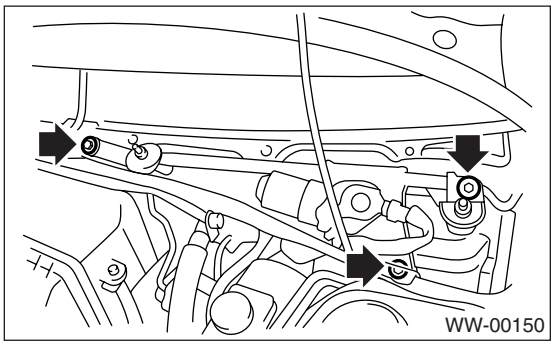


7. Front Wiper Motor and Link

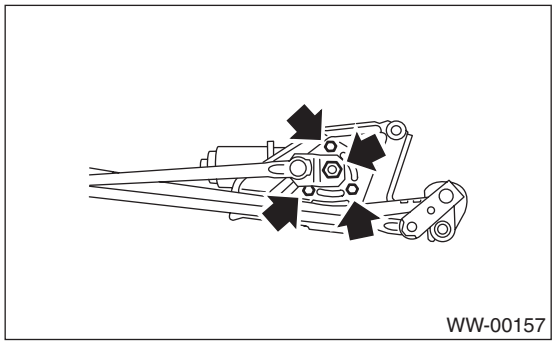
A: REMOVAL

NOTE:
The positions for RHD model are symmetrically opposite.

1) Disconnect the ground cable from battery.
2) Remove the cowl panel. <Ref. to EI-34, REMOVAL, Cowl Panel.>
3) Disconnect the connector of motor.
4) Loosen the bolts to remove wiper link.

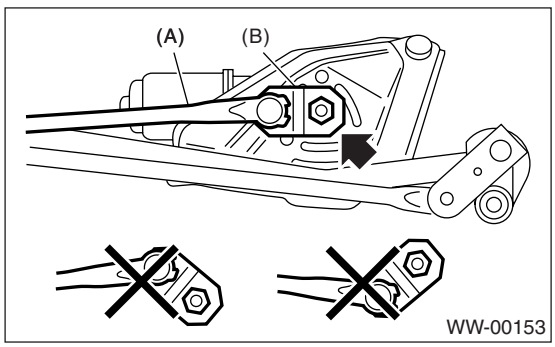


5) Loosen the bolts and nuts to remove motor.



B: INSTALLATION

1) Connect the battery ground cable to battery.
2) To confirm that the motor is at auto stop position, connect the harness to motor and turn the wiper switch ON/OFF once.
3) Disconnect the ground cable from battery.
4) Tighten the nut where rod (A) and link plate (B) is aligned in a straight line.



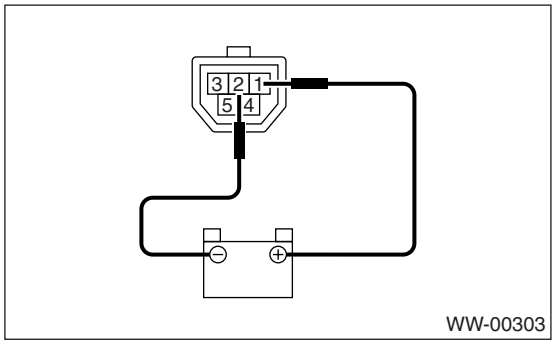
5) Install in the reverse order of removal.

Tightening torque:
Refer to COMPONENT in General Description.
<Ref. to WW-2, FRONT WIPER, COMPONENT, General Description.>

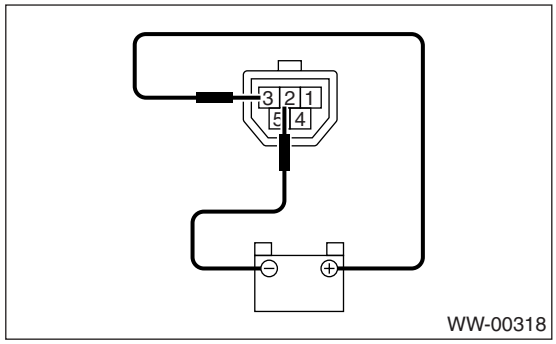
C: INSPECTION

1) When the battery is connected to the terminal of connectors, confirm that the motor operates at low speed.

LHD model:

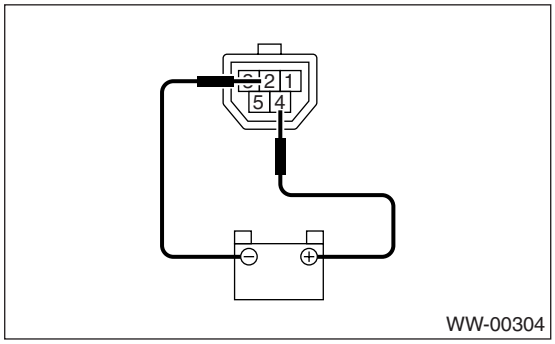


RHD model:

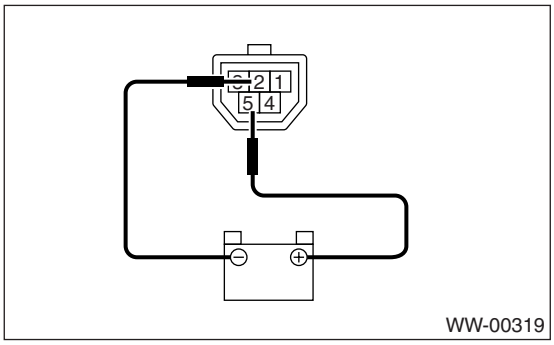


2) When the battery is connected to the terminal of connectors, confirm that the motor operates at high speed.

LHD model:

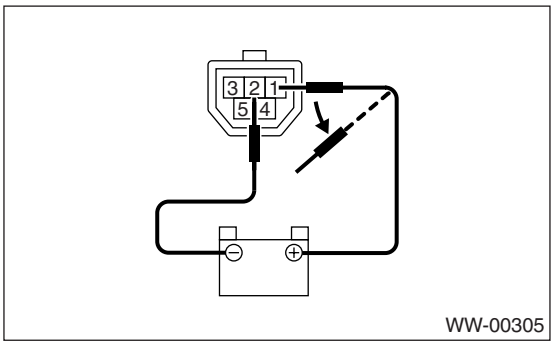


RHD model:

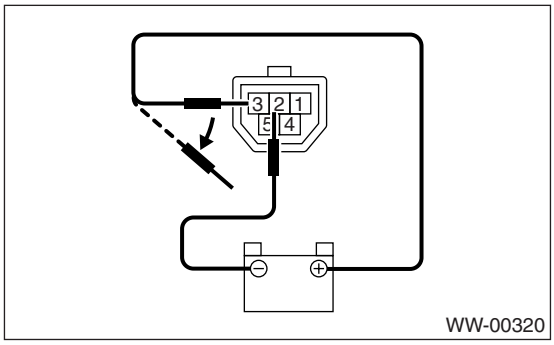


3) Connect the battery to terminals of connector, and then remove the terminal connection with motor rotated at low speed, and stop the wiper motor through operation.

LHD model:

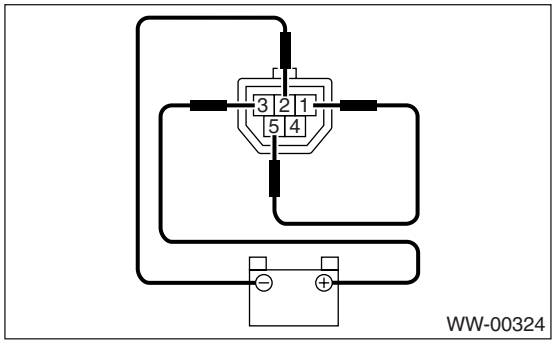


RHD model:

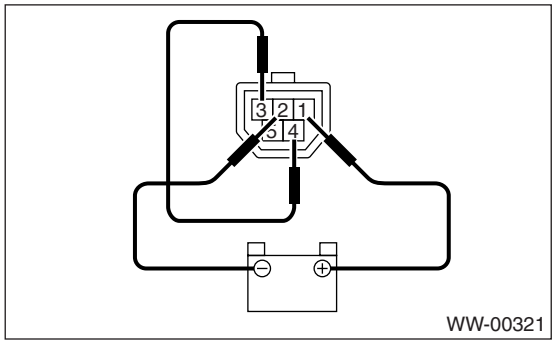


4) Connect the battery and confirm that the motor stops at automatic stop position after the motor operates at low speed again.

LHD model:



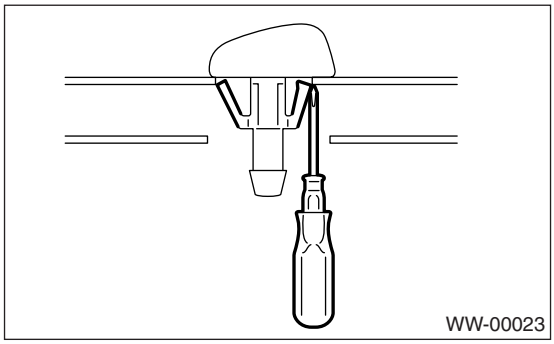
RHD model:



8. Front Washer Nozzle

A: REMOVAL

1) Remove the washer hose from washer nozzle.
2) Open the clips on the underside of hood with a thin screwdriver or other tool, and then remove the washer nozzle.



B: INSTALLATION

1) Install in the reverse order of removal.
2) Adjust the position of the washer liquid sprayer. <Ref. to WW-14, ADJUSTMENT, Front Washer Nozzle.>

C: INSPECTION

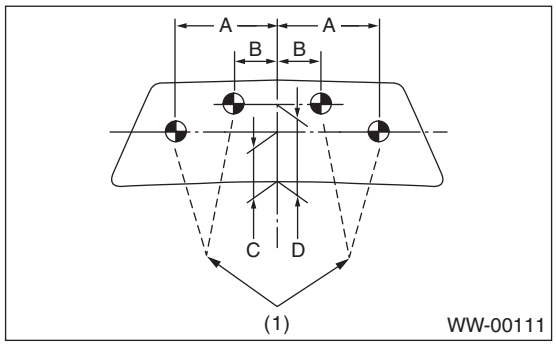
- Make sure the nozzle and hose are not clogged.
- Make sure the hose is not bent.

D: ADJUSTMENT

NOTE:
This adjustment position is for left-handed vehicle. Carry out left-right symmetry for adjustment positions for right-handed vehicle.

1) Turn the wiper switch to OFF position.
2) When the vehicle stops, adjust the washer injection position as shown in the figure.

Injection position:
A: 350 mm (13.78 in)
B: 162 mm (6.38 in)
C: 300 mm (11.81 in)
D: 500 mm (19.69 in)

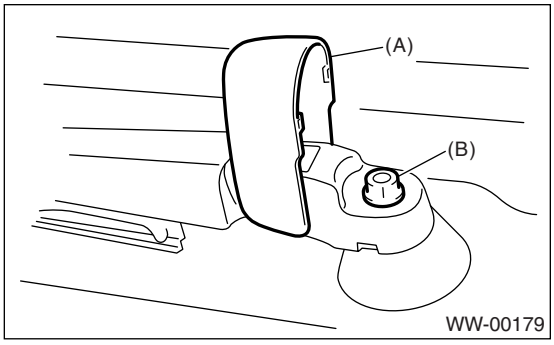


(1) Nozzle

9. Rear Wiper Arm

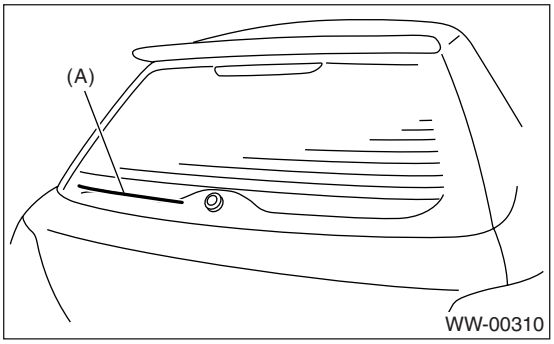
A: REMOVAL

1) Raise the wiper arm cover (A).
2) Remove the nut (B) to remove wiper arm.



B: INSTALLATION

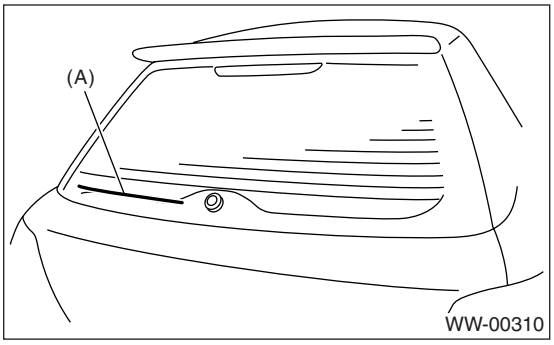
1) Install in the reverse order of removal.
2) Operate the rear wiper once.
3) Align the blade to rear defogger heat wire (A).



Tightening torque:
Refer to COMPONENT in General Description.
<Ref. to WW-3, REAR WIPER, COMPONENT, General Description.>

C: ADJUSTMENT

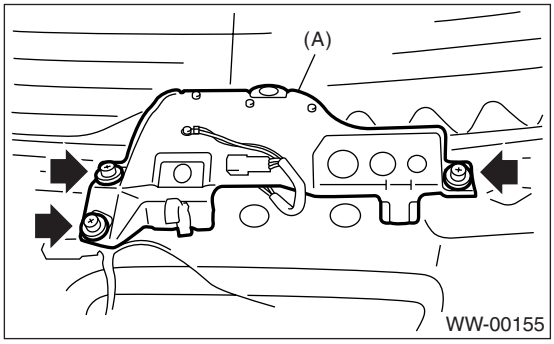
1) Operate the rear wiper once.
2) Align the blade to rear defogger heat wire (A).



10.Rear Wiper Motor

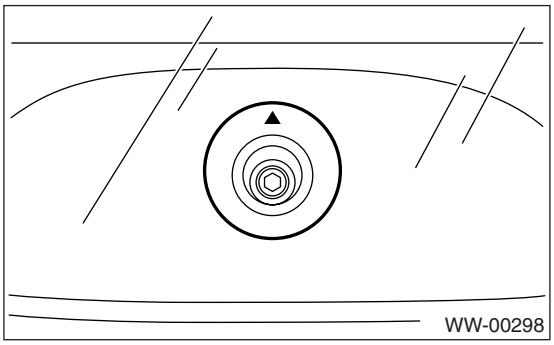
A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the rear wiper arm. <Ref. to WW-15, REMOVAL, Rear Wiper Arm.>
3) Remove the rear gate lower trim. <Ref. to EI-55, REMOVAL, Rear Gate Trim.>
4) Unclip the clip of harness, and then disconnect the connector of wiper motor.
5) Loosen the bolts to remove the wiper motor assembly (A).



B: INSTALLATION

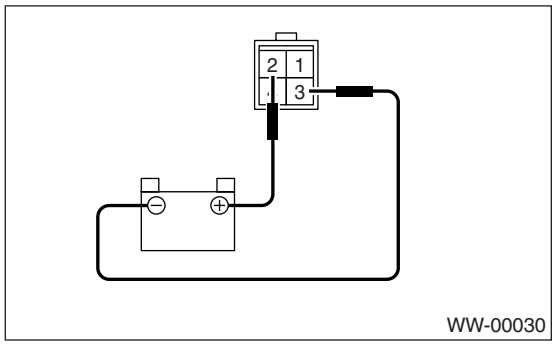
1) Install in the reverse order of removal.
2) Install the pivot cap with the arrow mark facing up, as shown in the figure.



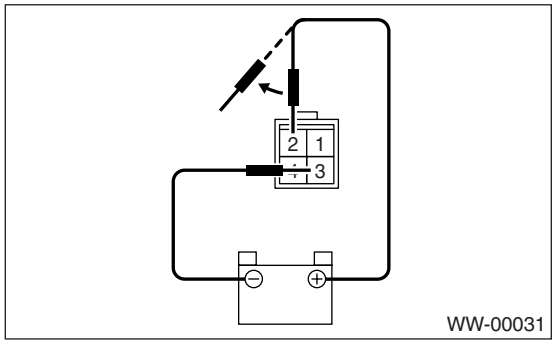
Tightening torque:
Refer to COMPONENT in General Description.
<Ref. to WW-3, REAR WIPER, COMPONENT, General Description.>

C: INSPECTION

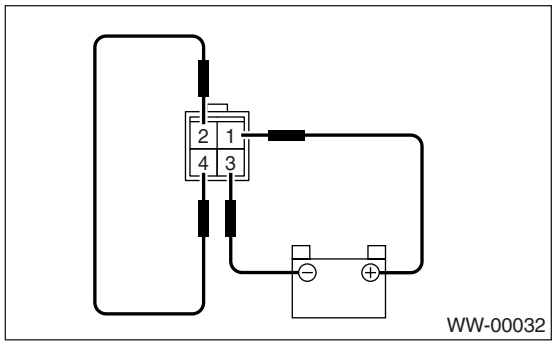
1) Connect the battery to wiper motor connector and confirm that the wiper motor operates.



2) Connect the battery to terminal of connector, and then remove the terminal connections with motor rotated, and stop the wiper motor through operation.



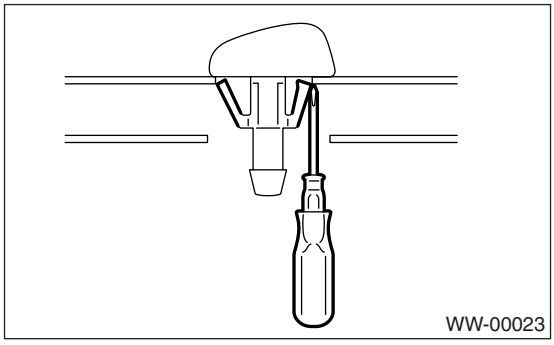
3) Connect the battery and confirm that the motor stops at automatic stop position after the motor operates at low speed again.



11.Rear Washer

A: REMOVAL

1) Remove the high-mount stop light. <Ref. to LI-27, REMOVAL, High-mounted Stop Light.>
2) Remove the washer hose from washer nozzle.
3) Open the clips on the underside of hood with a thin screwdriver or other tool, and then remove the washer nozzle.



B: INSTALLATION

1) Install in the reverse order of removal.
2) Adjust the position of the washer liquid sprayer. <Ref. to WW-17, ADJUSTMENT, Rear Washer.>

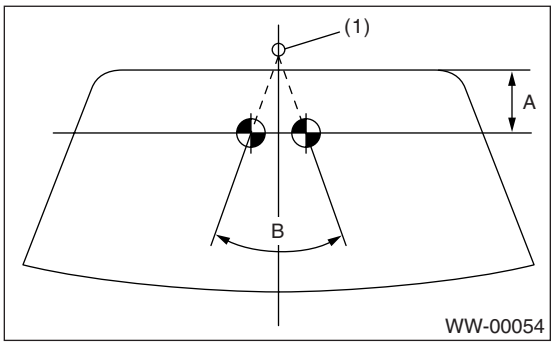
C: INSPECTION

- Make sure the nozzle and hose are not clogged.
- Make sure the hose is not bent.

D: ADJUSTMENT

1) Turn the wiper switch to OFF position.
2) When the vehicle stops, adjust the washer injection position as shown in the figure.

Injection position:
A: 39 mm (1.54 in)
B: 72°

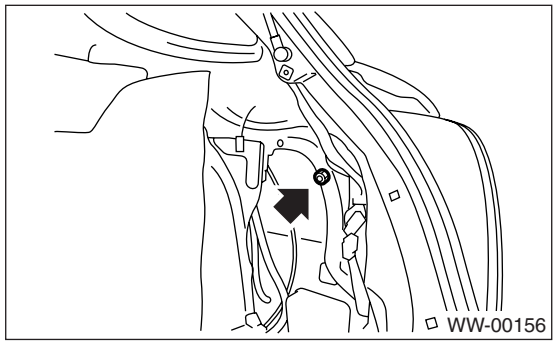


(1) Nozzle

12. Wiper Control Relay (Wagon Model)

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the right quarter lower trim. <Ref. to EI-51, REMOVAL, Rear Quarter Trim.>
3) Loosen the nut to remove control unit.

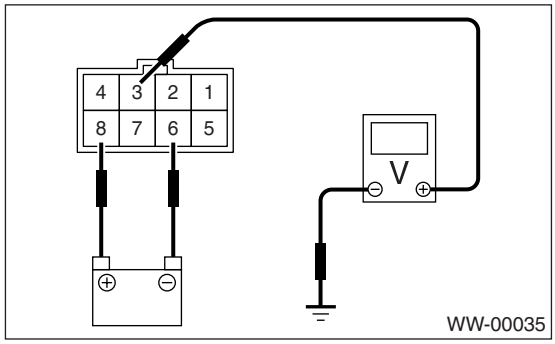


B: INSTALLATION

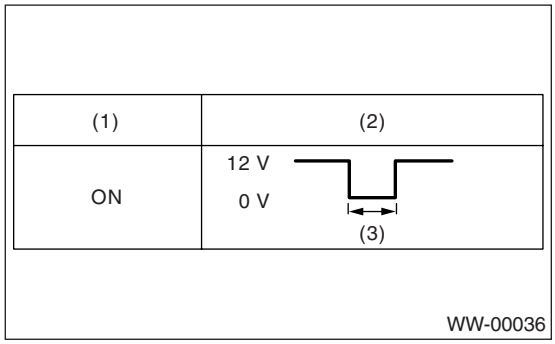
Install in the reverse order of removal.

C: INSPECTION

1) Disconnect the connector from wiper control relay.
2) Connect the positive (+) lead from the battery to terminal 8 and the negative (−) lead to terminal 6. Connect the positive (+) lead from the voltmeter to terminal 3 and the negative (−) lead to ground.



3) Measure the voltage when the wiper relay is operated.



(1) Switch position
(2) Voltage
(3) 9±2 sec.

If operation is not as specified, replace the switch.

ENTERTAINMENT

ET

		Page
1.	General Description	2
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3.	Front Accessory Power Supply Socket System	4
4.	Audio	5
5.	Front Speaker	6
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11.	Front Accessory Power Supply Socket	12

1. General Description

A: CAUTION

• Before disassembling or reassembling parts, always disconnect the battery ground cable. When replacing radio, control module, and other parts provided with memory functions, record memory contents before disconnecting the battery ground cable. Otherwise, the memory will be erased.
• Reassemble in reverse order of disassembly, unless otherwise indicated.
• Adjust parts to the given specifications.
• Connect the connectors and hoses securely during reassembly.
• After reassembly, make sure functional parts operate smoothly.

B: PREPARATION TOOL

1. GENERAL TOOLS

TOOL NAME	REMARKS
Circuit Tester	Used for measuring resistance and voltage.
Conductive Silver Composition (DUPONT No. 4817 or equivalent)	Used for repairing antenna wire.

2. Audio System

A: WIRING DIAGRAM

1. AUDIO LHD MODEL

<Ref. to WI-223, LHD MODEL, WIRING DIAGRAM, Audio System.>

2. AUDIO RHD MODEL

<Ref. to WI-225, RHD MODEL, WIRING DIAGRAM, Audio System.>

B: INSPECTION

Symptom	Repair order
No power coming in. (No display and no sound from speakers)	(1) Check the fuse and power supply for audio. (2) Check the audio ground. (3) Remove the audio, and repair it.
A specific speaker does not operate.	(1) Check the speaker. (2) Check the output circuit between audio and speaker.
Audio generates noise with engine running.	(1) Check the audio ground. (2) Check the generator. (3) Check the ignition coil. (4) Remove the audio, and repair it.
AM and FM modes are weak or noisy.	(1) Check the antenna. (2) Check the antenna amplifier. (3) Check the noise suppressor. (4) Check the audio ground. (5) Remove the audio, and repair it.

3. Front Accessory Power Supply Socket System

A: WIRING DIAGRAM

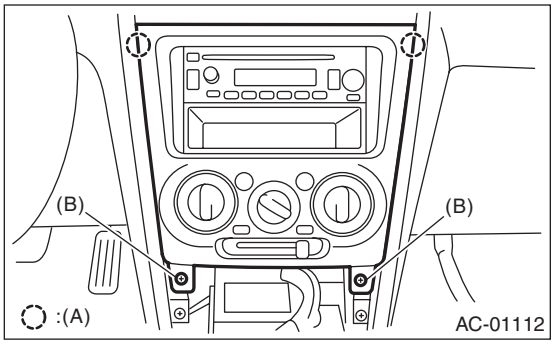
1. FRONT ACCESSORY POWER SUPPLY SOCKET

<Ref. to WI-227, WIRING DIAGRAM, Front Accessory Power Supply Socket System.>

4. Audio

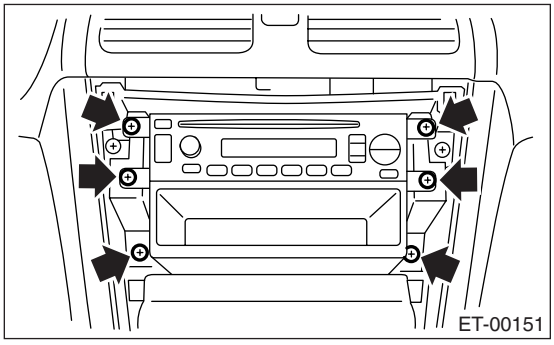
A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the console front panel. <Ref. to EI-45, REMOVAL, Console Box.>
3) Remove the fitting screws and hook pawls, and remove the center panel while disconnecting connector.



(A) Hook pawl
(B) Screw

4) Remove the fitting screws, and slightly pull out the audio from center console.



5) Disconnect the harness connectors and antenna feeder cord.

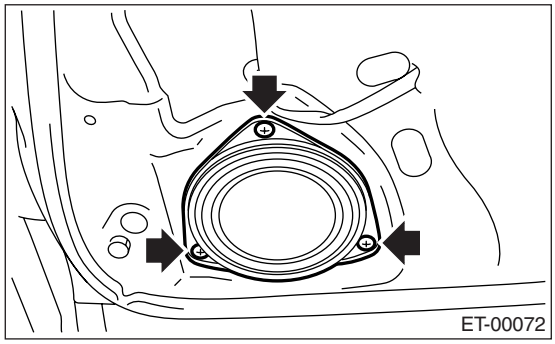
B: INSTALLATION

Install in the reverse order of removal.

5. Front Speaker

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the front door trim. <Ref. to EI-40, REMOVAL, Front Door Trim.>
3) Remove the front speaker mounting screws.



4) Disconnect the harness connector and remove front speaker.

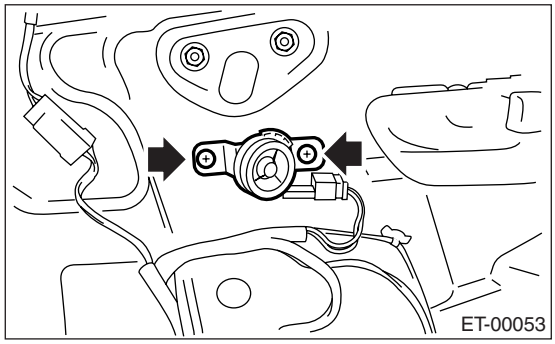
B: INSTALLATION

Install in the reverse order of removal.

6. Tweeter

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the front door trim. <Ref. to EI-40, REMOVAL, Front Door Trim.>
3) Remove the tweeter mounting screws.



4) Disconnect the harness connector and remove tweeter.

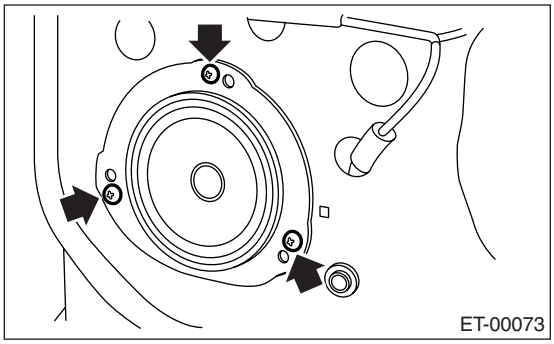
B: INSTALLATION

Install in the reverse order of removal.

7. Rear Speaker

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the rear door trim. <Ref. to EI-41, REMOVAL, Rear Door Trim.>
3) Remove the rear speaker mounting screws.



4) Disconnect the harness connector and remove rear speaker.

B: INSTALLATION

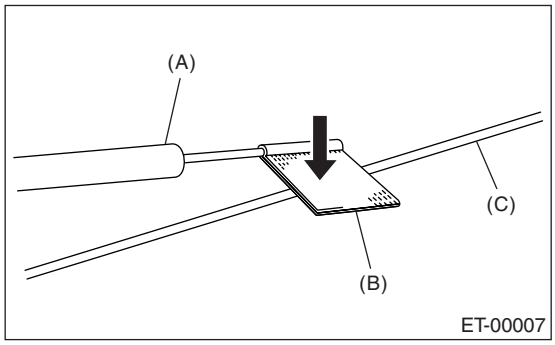
I nstall in the reverse order of removal.

8. Antenna

A: INSPECTION

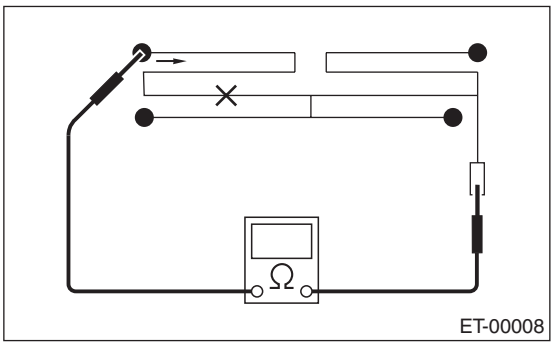
Measure the resistance between antenna terminal and each antenna wire.
If an antenna wire is OK, resistance will be less than 1 Ω. If an antenna wire is broken, the resistance will be more than 1 MΩ .

NOTE:
When checking the continuity, wind a piece of aluminum foil around the tip of tester probe, and then press the aluminum foil against wire with your finger.



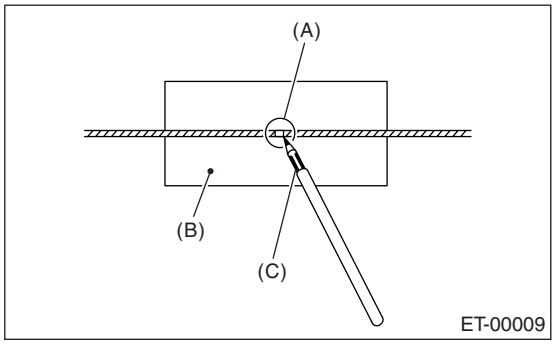
(A) Tester probe
(B) Aluminum foil
(C) Antenna wire

To locate the broken point, move the probe along antenna wire.



B: REPAIR

1) Clean the antenna wire and surrounding area with a cloth dampened by alcohol.
2) Paste a thin masking film on the glass along broken wire.
3) Deposit conductive silver composition (DUPONT No. 4817) on the broken portion with a drawing pen.



(A) Broken portion
(B) Masking film
(C) Conductive silver composition

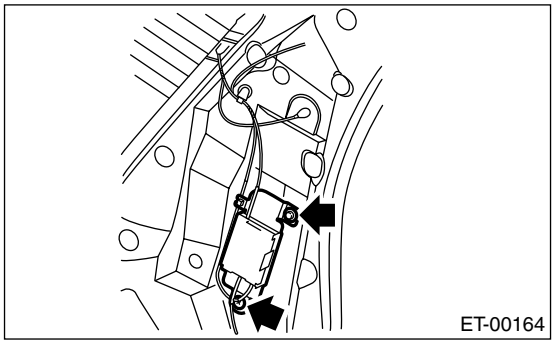
4) Dry out the deposited portion.
5) After repair has been completed, measure the resistance in repaired wire.

9. Antenna Amplifier

A: REMOVAL

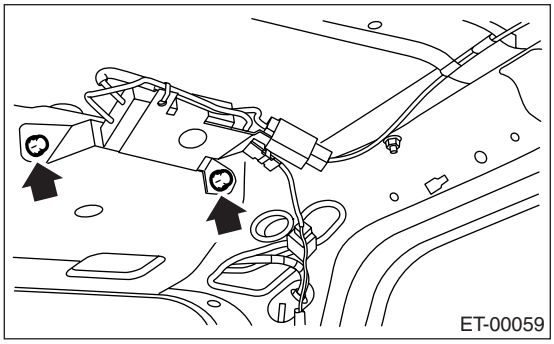
1. SEDAN MODEL

1) Disconnect the ground cable from battery.
2) Remove the rear pillar upper trim. <Ref. to EI-51, SEDAN MODEL, REMOVAL, Rear Quarter Trim.>
3) Disconnect the harness connector and terminal.
4) Remove the mounting screws and detach antenna amplifier.



2. WAGON MODEL

1) Disconnect the ground cable from battery.
2) Remove the rear quarter upper trim and roof trim. <Ref. to EI-53, WAGON MODEL, REMOVAL, Roof Trim.>
3) Disconnect the harness connector and terminal.
4) Remove the mounting screws and detach the antenna amplifier.



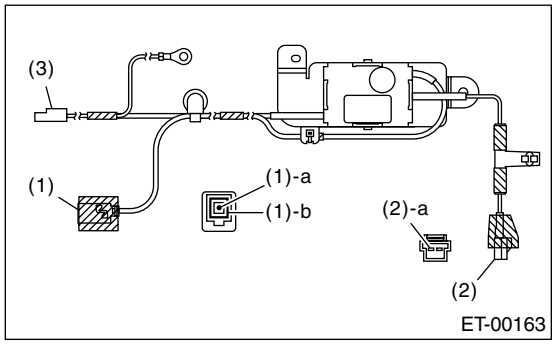
B: INSTALLATION

Install in the reverse order of removal.

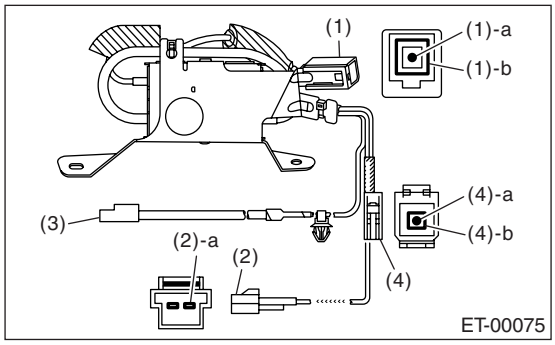
C: INSPECTION

Measure the antenna amplifier resistance.

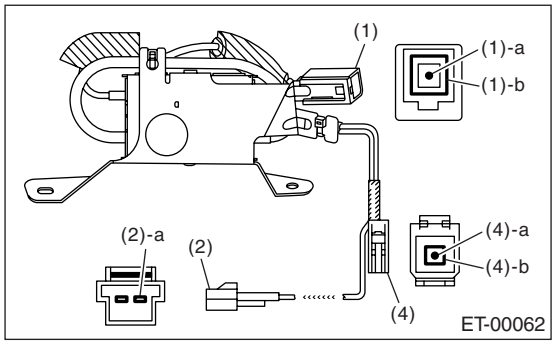
- SEDAN MODEL



- WAGON MODEL (Europe model)



- WAGON MODEL (Except Europe model)



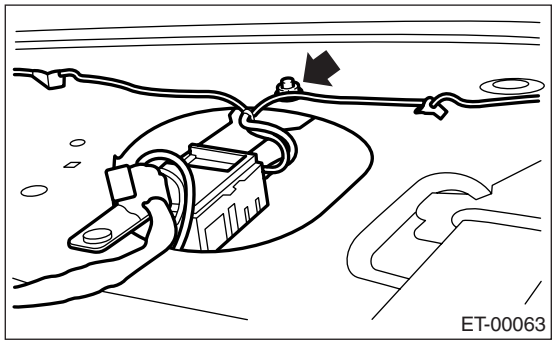
Terminal No.	Standard
1-a and Amplifier body	More than 100 kΩ
1-b and Amplifier body	Less than 1 Ω
2-a and Amplifier body	More than 100 Ω
3 and Amplifier body	More than 100 kΩ
4-a and Amplifier body	More than 100 kΩ
4-b and Amplifier body	Less than 1 Ω

10.Noise Suppressor

A: REMOVAL

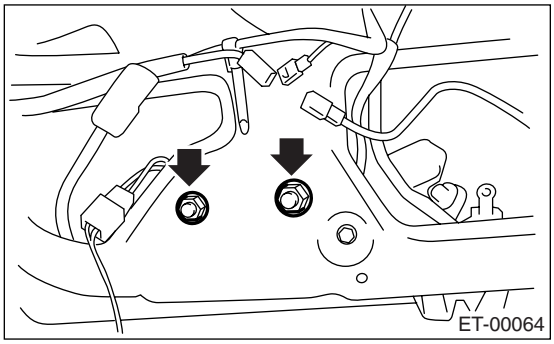
1. SEDAN MODEL

1) Disconnect the ground cable from battery.
2) Remove the rear pillar upper trim. <Ref. to EI-51, SEDAN MODEL, REMOVAL, Rear Quarter Trim.>
3) Remove the rear shelf trim. <Ref. to EI-56, REMOVAL, Rear Shelf Trim.>
4) Disconnect the feeder cord connector from antenna amplifier.
5) Disconnect the harness connector of noise suppressor from terminal on glass antenna.
6) Remove the harness clip.
7) Remove the mounting nut and detach the noise suppressor.



2. WAGON MODEL

1) Disconnect the ground cable from battery.
2) Remove the rear gate trim. <Ref. to EI-55, REMOVAL, Rear Gate Trim.>
3) Disconnect the connector from noise suppressor.
4) Remove the mounting nut and detach the noise suppressor.



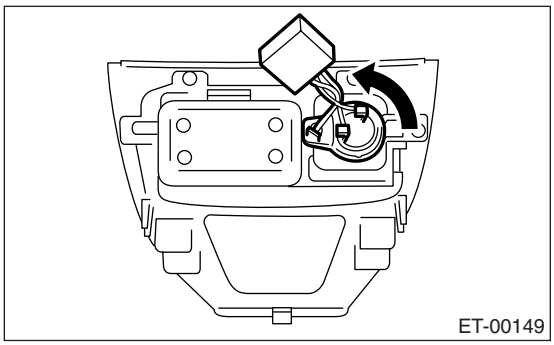
B: INSTALLATION

Install in the reverse order of removal.

11.Front Accessory Power Supply Socket

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the console front panel. <Ref. to EI-45, REMOVAL, Console Box.>
3) Disconnect the harness connectors and remove front accessory power supply socket.



B: INSTALLATION

Install in the reverse order of removal.

COMMUNICATION SYSTEM

COM

Page

1. General Description 2
2. Horn System 3
3. Horn 4
4. Horn Switch 5

1. General Description

A: CAUTION

• Before disassembling or reassembling parts, always disconnect the battery ground cable. When replacing radio, control module, and other parts provided with memory functions, record memory contents before disconnecting the battery ground cable. Otherwise, the memory will be erased.
• Reassemble in reverse order of disassembly, unless otherwise indicated.
• Adjust parts to the given specifications.
• Connect the connectors and hoses securely during reassembly.
• After reassembly, make sure functional parts operate smoothly.

B: PREPARATION TOOL

1. GENERAL TOOLS

TOOL NAME	REMARKS
Circuit Tester	Used for measuring resistance and voltage.

2. Horn System

A: WIRING DIAGRAM

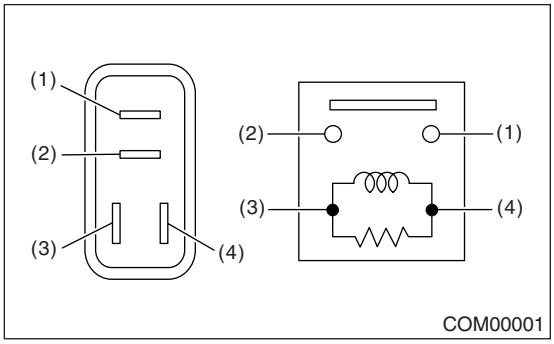
1. HORN

<Ref. to WI-228, WIRING DIAGRAM, Horn System.>

B: INSPECTION

1. HORN RELAY

Measure the horn relay resistance between terminals (indicated in table below) when connecting the terminal No. 4 to battery positive terminal and terminal No. 3 to battery ground cable.

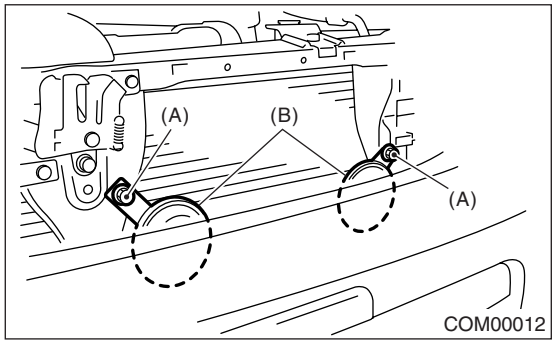


Current	Terminal No.	Standard
Flow	1 and 2	Less than 1 Ω
No Flow		More than 1 MΩ

3. Horn

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the horn bracket mounting bolt (A).
3) Disconnect the harness connector and remove the horn assembly (B).

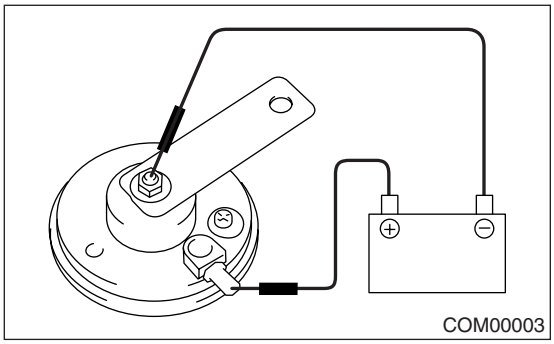


B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

With 12 V direct current supplied between horn terminal and case ground, check that the horn sounds properly.



4. Horn Switch

A: REMOVAL

WARNING:
Before servicing, be sure to read the notes in AB section for proper handling of driver's airbag module. <Ref. to AB-3, CAUTION, General Description.>

NOTE:
Horn switch forms a unit with the driver's airbag module.

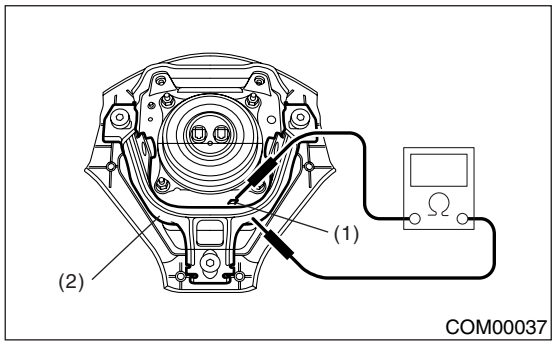
1) Disconnect the ground cable from battery.
2) Remove the driver's airbag module. <Ref. to AB-12, REMOVAL, Driver's Airbag Module.>

B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

Measure the resistance between horn switch terminal and airbag module bracket.



(1) Horn switch terminal
(2) Airbag module bracket

Switch position	Terminal No.	Resistance
When airbag module bracket is pushed.	Horn switch terminal and Airbag module bracket	Less than 1 Ω
When airbag module bracket is not pushed.		More than 1 MΩ

GLASS/WINDOWS/MIRRORS

GW

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4.	Front Door Glass	13
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6.	Remote Control Mirror System	19
7.	Scalp Cap	20
8.	Outer Mirror Assembly	21
9.	Outer Mirror	23
10.	Remote Control Mirror Switch	24
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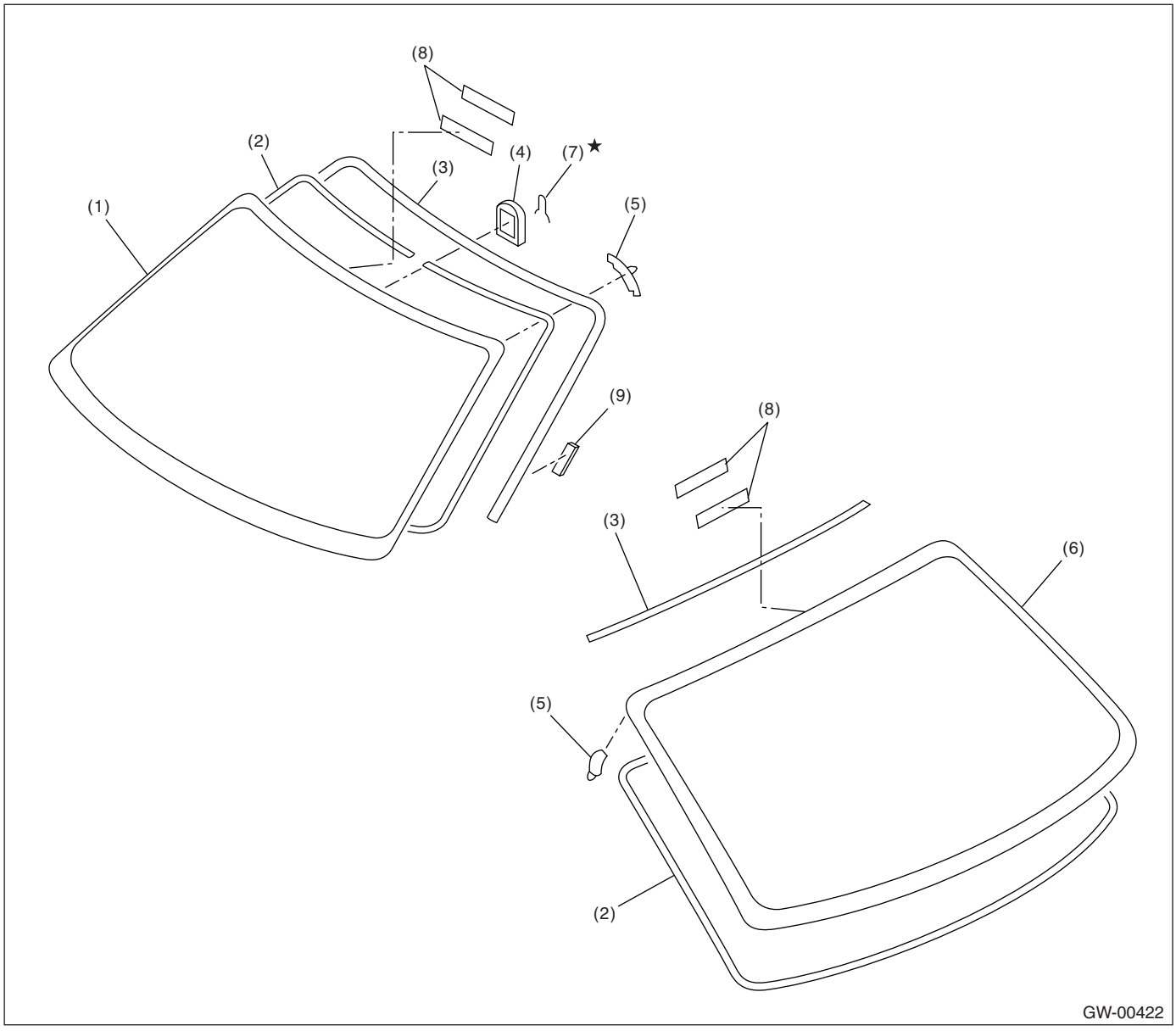
18.	Rear Quarter Glass	35
19.	Sunroof Glass	37
20.	Rearview Mirror	38

1. General Description

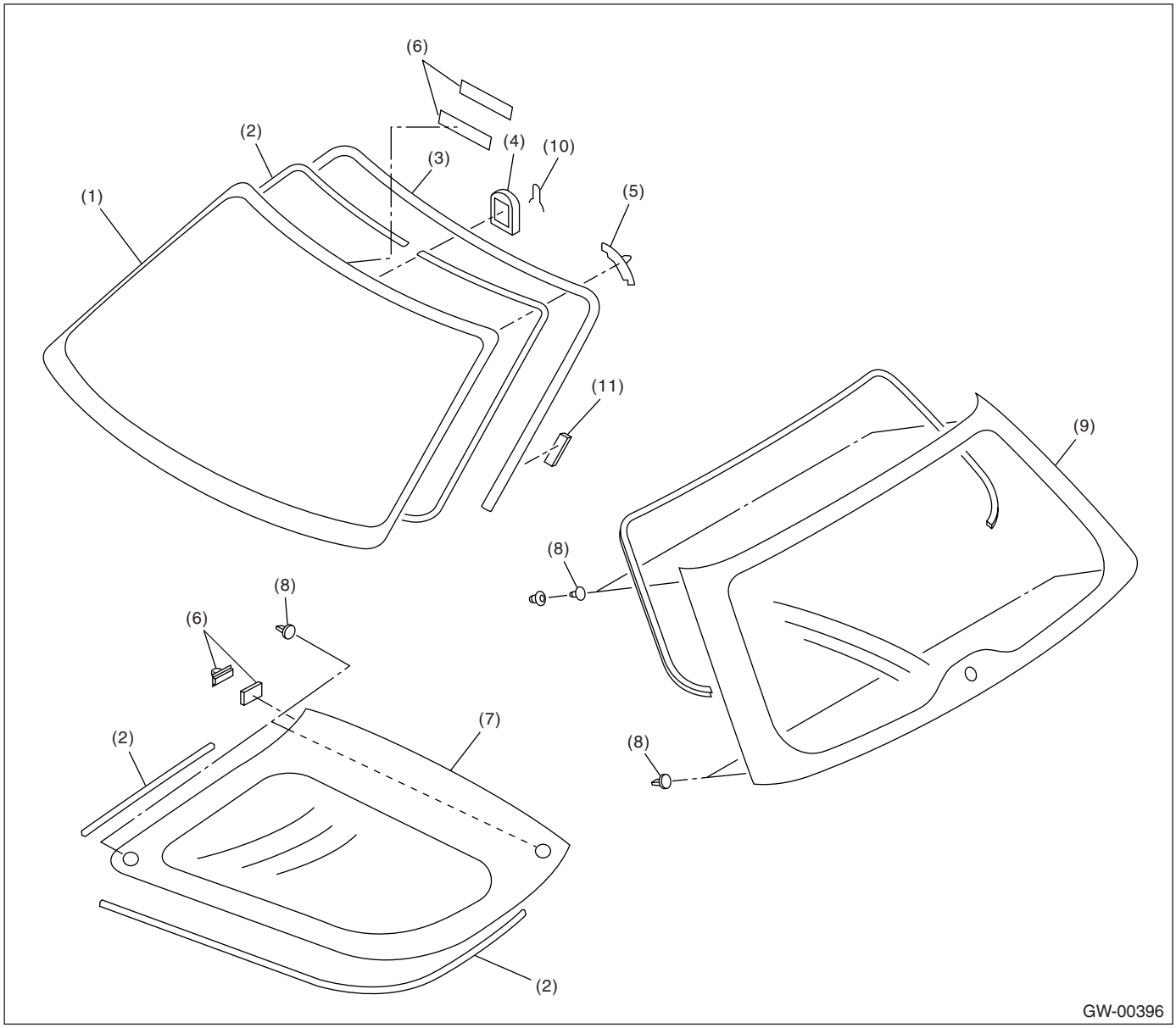
A: COMPONENT

1. FIXED GLASS (SEDAN MODEL)



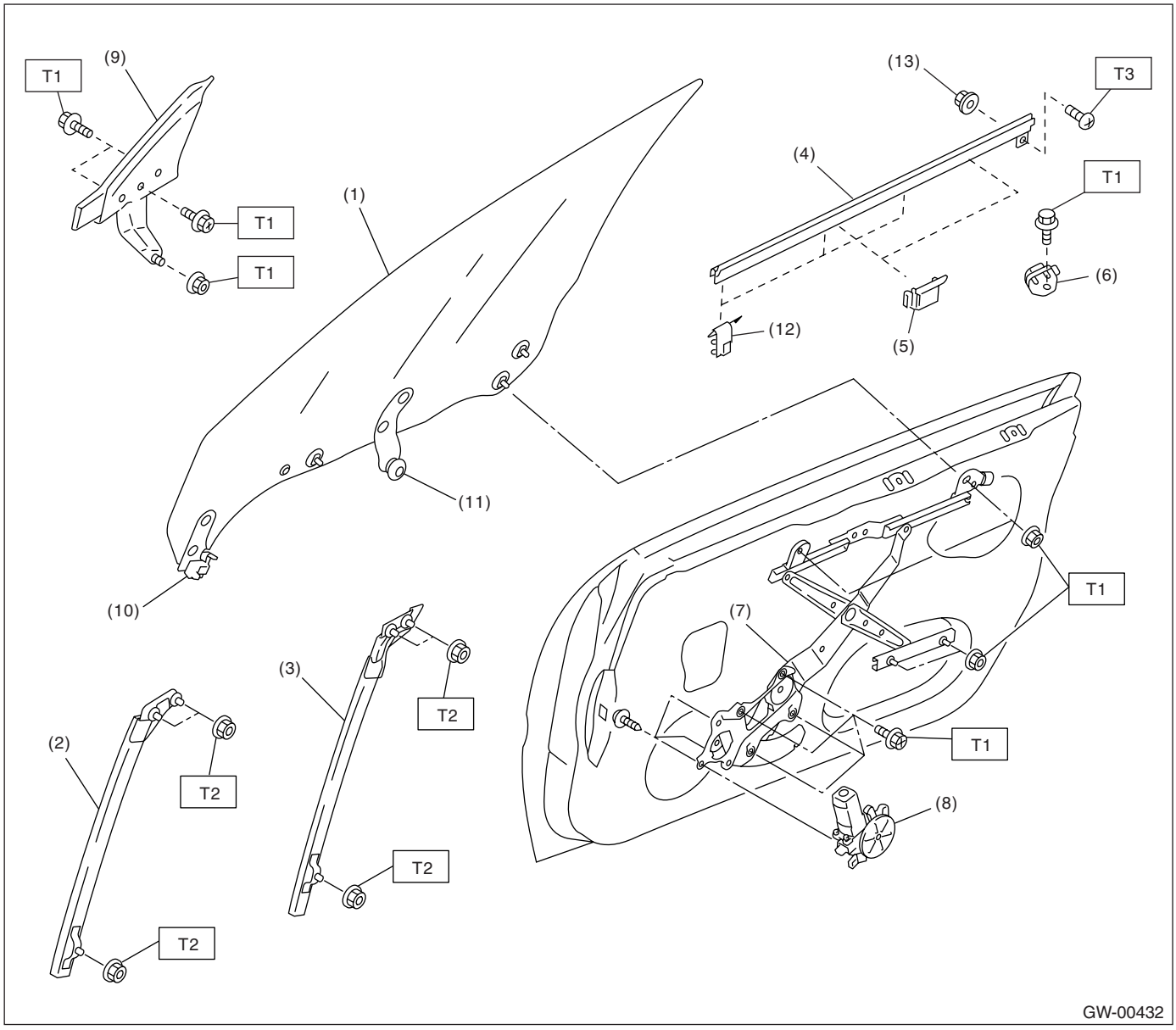
(1) Windshield glass
(2) Dam rubber
(3) Molding
(4) Rearview mirror mount
(5) Locating pin
(6) Rear window glass
(7) Spring
(8) Fastener
(9) Seal

2. FIXED GLASS (WAGON MODEL)



(1)	Windshield glass	(5)	Locating pin	(9)	Glass
(2)	Dam rubber	(6)	Fastener	(10)	Spring
(3)	Molding	(7)	Rear quarter glass	(11)	Seal
(4)	Rearview mirror mount	(8)	Locating pin		

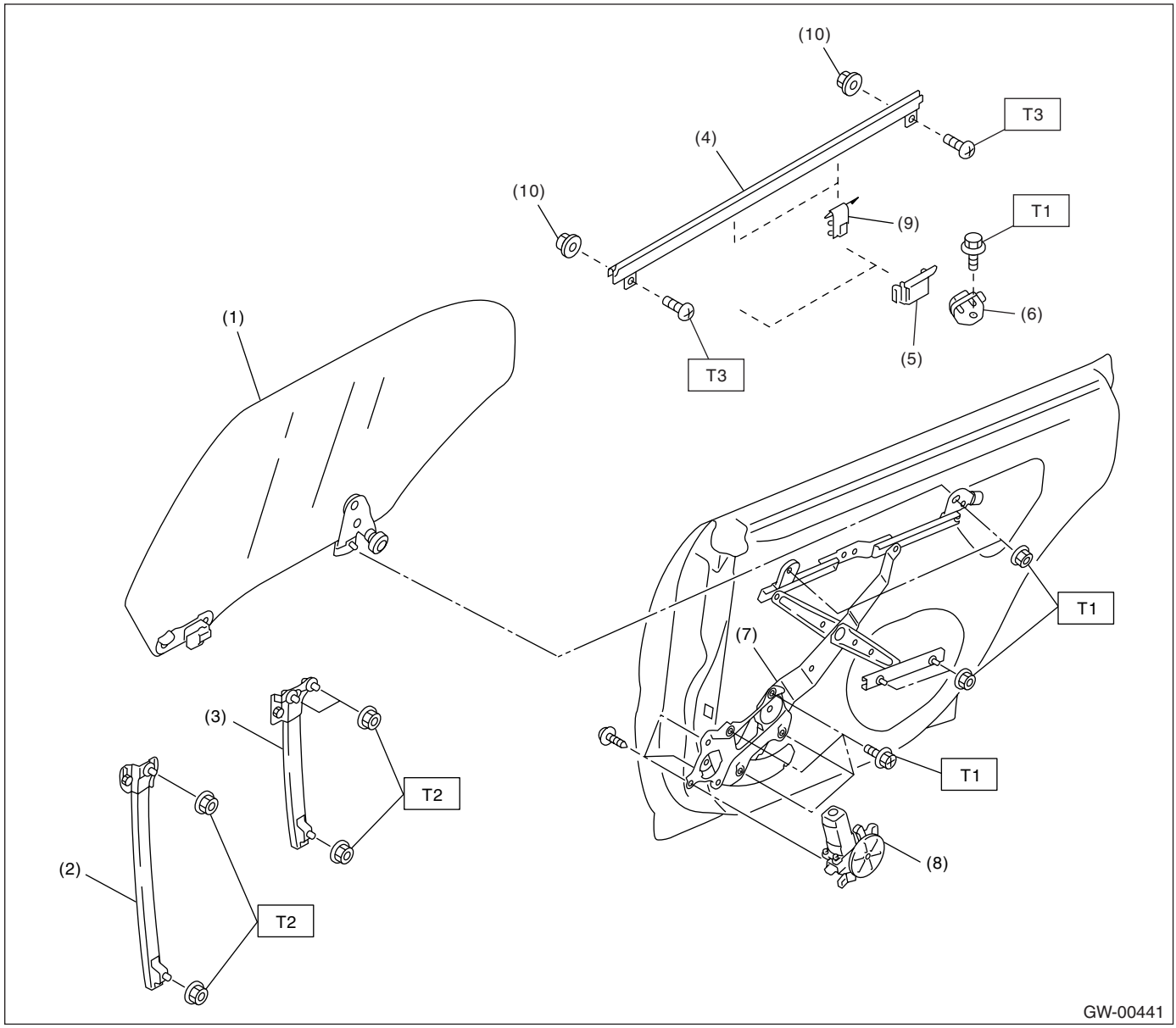
3. FRONT DOOR GLASS



(1) Glass
(2) Door sash (Front)
(3) Door sash (Rear)
(4) Weather strip
(5) Stabilizer (Outer)
(6) Stabilizer (Inner)
(7) Regulator ASSY
(8) Motor ASSY
(9) Mirror gusset
(10) Slider
(11) Roller
(12) Clip (Weather strip)
(13) Screw gromet

Tightening torque: N·m (kgf-m, ft-lb)
T1: 7.4 (0.75, 5.5)
T2: 13.7 (1.4, 10.1)
T3: 1.5 (0.15, 1.1)

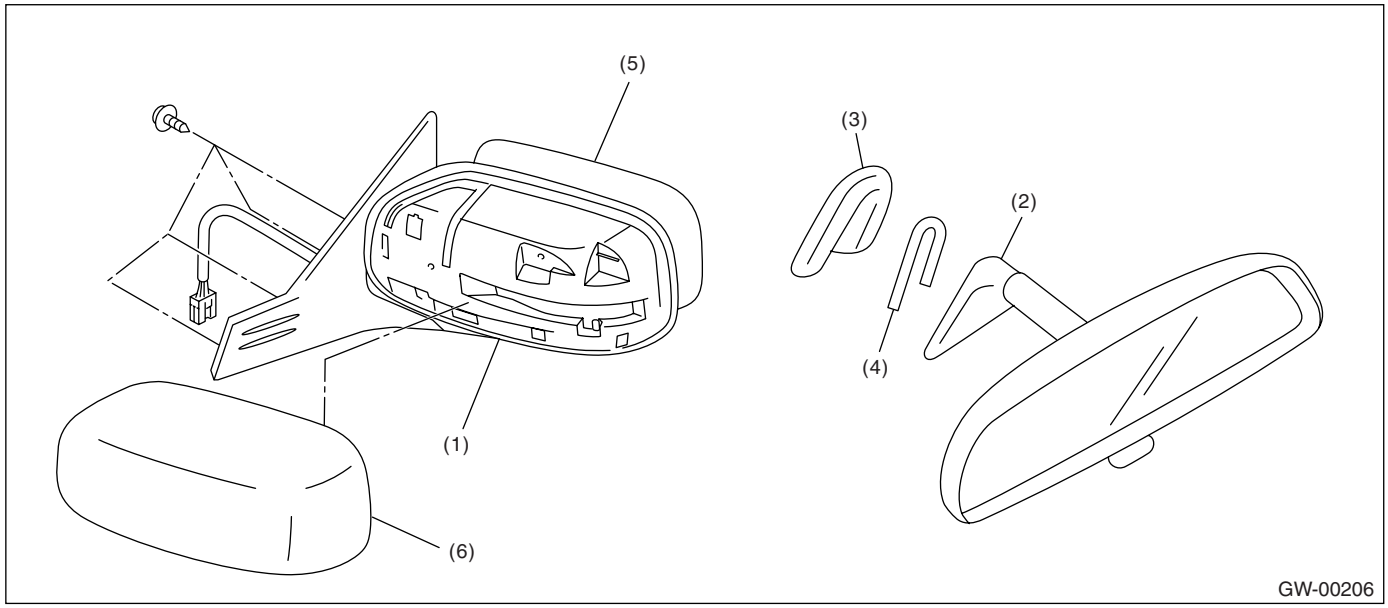
4. REAR DOOR GLASS



(1)	Glass	(6)	Stabilizer (Inner)
(2)	Door sash (Front)	(7)	Regulator ASSY
(3)	Door sash (Rear)	(8)	Motor ASSY
(4)	Weather strip	(9)	Clip (Weather strip)
(5)	Stabilizer (Outer)	(10)	Screw gromet

Tightening torque: N·m (kgf-m, ft-lb)
T1: 7.4 (0.75, 5.5)
T2: 13.7 (1.4, 10.1)
T3: 1.5 (0.15, 1.1)

5. MIRROR



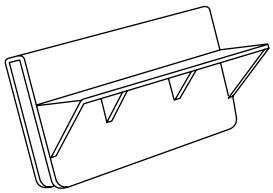
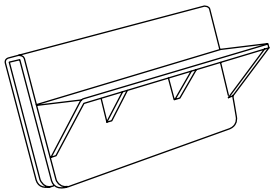
(1) Outer mirror
(2) Inner rearview mirror
(3) Mount
(4) Spring
(5) Mirror
(6) Scalp cap

B: CAUTION

- When the electrical connectors are disconnected, always conduct an operational check after connecting them again.
- Avoid impact and damage to glass.

C: PREPARATION TOOL

1. SPECIAL TOOL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST61299AE000	61299AE000	SPACER	Used for adjusting the upper end position of front door glass. (Glass thickness: 5 mm (0.197 in))
 ST61299AE010	61299AE010	SPACER	Used for adjusting the upper end position of rear door glass. (Glass thickness: 4 mm (0.157 in))

2. GENERAL TOOL

TOOL NAME	REMARKS
Circuit tester	Used for checking voltage and continuity.
Piano wire	Used for removing the window glass.
Windshield glass knife	Used for removing the window glass.

2. Power Window System

A: WIRING DIAGRAM

1. POWER WINDOW LHD MODEL

<Ref. to WI-229, LHD MODEL, WIRING DIAGRAM, Power Window System.>

2. POWER WINDOW RHD MODEL

<Ref. to WI-233, RHD MODEL, WIRING DIAGRAM, Power Window System.>

B: INSPECTION

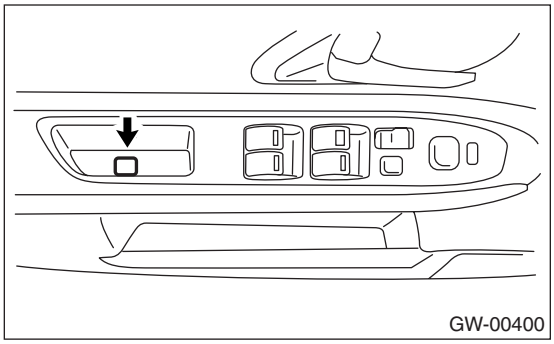
Symptom	Repair order
All power windows do not operate.	(1) Fuse (SBF-6) (F/B No. 18: RHD model) (2) Power window circuit breaker (3) Power window relay (4) Wiring harness
One window does not operate.	(1) Power window main switch (2) Power window sub switch (3) Power window motor (4) Wiring harness
“Window Lock” does not operate.	(1) Power window main switch

3. Power Window Control Switch

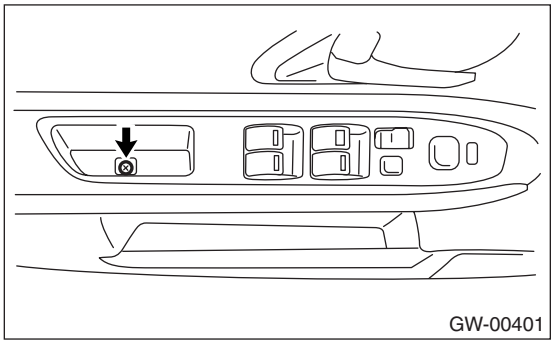
A: REMOVAL

1. MAIN SWITCH

1) Disconnect the ground cable from battery.
2) Using a flat tip screwdriver, remove the screw cover.



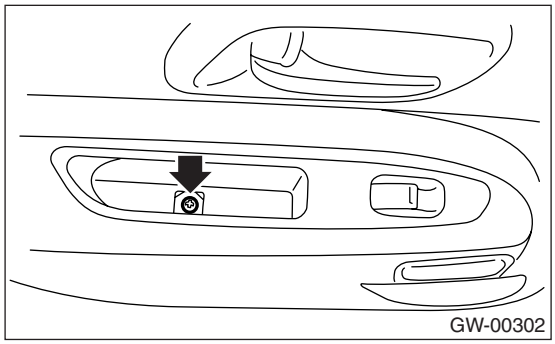
3) Loosen the screw to remove the power window main switch.



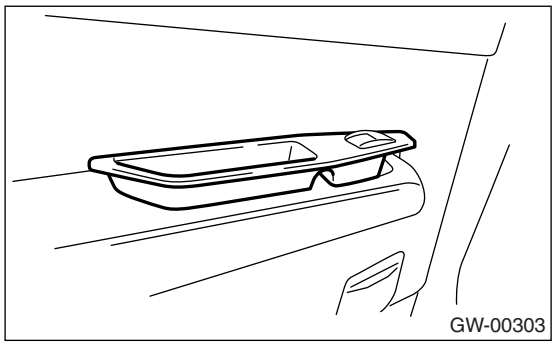
4) Disconnect the connector.

2. SUB SWITCH

1) Disconnect the ground cable from battery.
2) Remove the screw which secures switch panel.



3) Remove the switch panel.



4) Disconnect the connector.

B: INSTALLATION

1. MAIN SWITCH

Install in the reverse order of removal.

2. SUB SWITCH

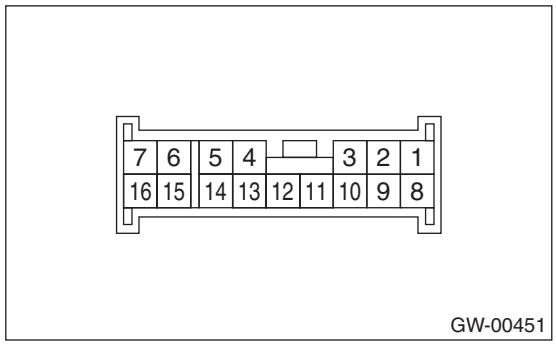
Install in the reverse order of removal.

C: INSPECTION

1. MAIN SWITCH

• LHD MODEL

Measure the switch resistance.

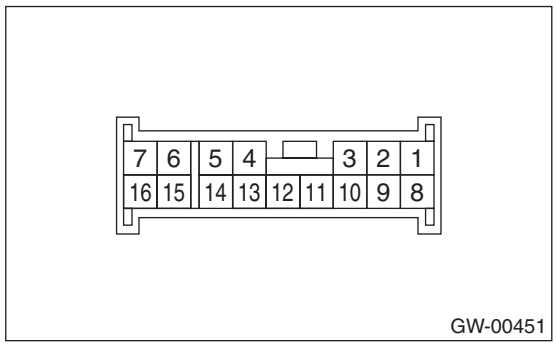


	Switch position	Terminal No.	Standard
Driver's side	AUTO UP	13 and 2, 1 and 5	Less than 1 Ω
	UP	13 and 2, 1 and 5	Less than 1 Ω
	OFF	1 and 2 1 and 5 2 and 5	Less than 1 Ω
	DOWN	13 and 1, 2 and 5	Less than 1 Ω
	AUTO DOWN	13 and 1, 2 and 5	Less than 1 Ω
Front passenger's side	UP	13 and 7, 6 and 5	Less than 1 Ω
	OFF	5 and 6 5 and 7 6 and 7	Less than 1 Ω
	DOWN	13 and 6, 7 and 5	Less than 1 Ω
Rear LH	UP	10 and 13, 11 and 5	Less than 1 Ω
	OFF	5 and 11 5 and 10 11 and 10	Less than 1 Ω
	DOWN	13 and 11, 10 and 5	Less than 1 Ω
Rear RH	UP	13 and 15, 16 and 5	Less than 1 Ω
	OFF	5 and 15 5 and 16 15 and 16	Less than 1 Ω
	DOWN	13 and 16, 15 and 5	Less than 1 Ω

If NG, replace the main switch.

• RHD MODEL

Measure the switch resistance.

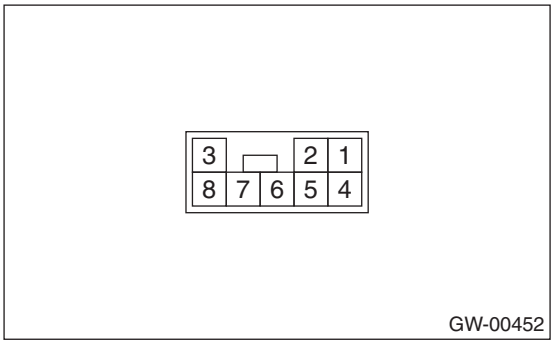


	Switch position	Terminal No.	Standard
Driver's side	AUTO UP	12 and 6, 7 and 1	Less than 1 Ω
	UP	12 and 6, 7 and 1	Less than 1 Ω
	OFF	1 and 6 1 and 7 6 and 7	Less than 1 Ω
	DOWN	12 and 7, 6 and 1	Less than 1 Ω
	AUTO DOWN	12 and 7, 6 and 1	Less than 1 Ω
Front passenger's side	UP	12 and 2, 3 and 1	Less than 1 Ω
	OFF	1 and 2 1 and 3 2 and 3	Less than 1 Ω
	DOWN	12 and 3, 2 and 1	Less than 1 Ω
Rear LH	UP	12 and 9, 10 and 1	Less than 1 Ω
	OFF	1 and 9 1 and 10 9 and 10	Less than 1 Ω
	DOWN	12 and 10, 9 and 1	Less than 1 Ω
Rear RH	UP	12 and 13, 1 and 14	Less than 1 Ω
	OFF	1 and 13 1 and 14 13 and 14	Less than 1 Ω
	DOWN	12 and 14, 13 and 1	Less than 1 Ω

If NG, replace the main switch.

2. SUB-SWITCH

Measure the switch resistance.



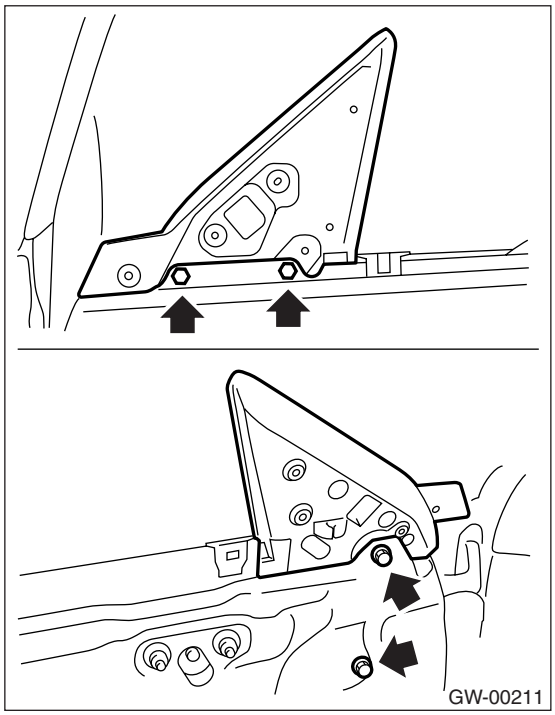
	Switch position	Terminal No.	Standard
Front passenger's side & rear	UP	3 or 8 and 5, 6 and 7	Less than 1 Ω
	OFF	4 and 5, 6 and 7	Less than 1 Ω
	DOWN	3 or 8 and 7, 4 and 5	Less than 1 Ω

If NG, replace the sub-switch.

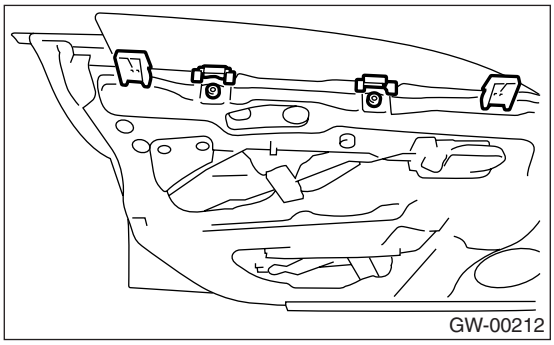
4. Front Door Glass

A: REMOVAL

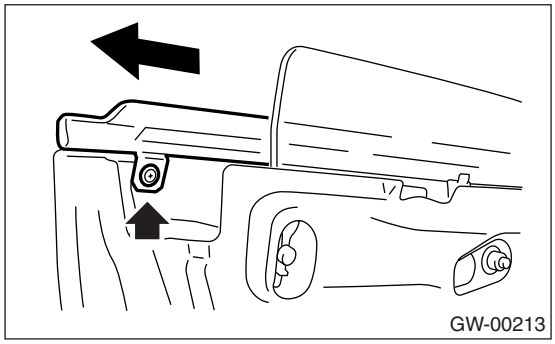
1) Remove the front door trim. <Ref. to EI-40, REMOVAL, Front Door Trim.>
2) Remove the sealing cover. <Ref. to EB-17, REMOVAL, Front Sealing Cover.>
3) Remove the outer mirror assembly. <Ref. to GW-21, REMOVAL, Outer Mirror Assembly.>
4) Remove the gusset.



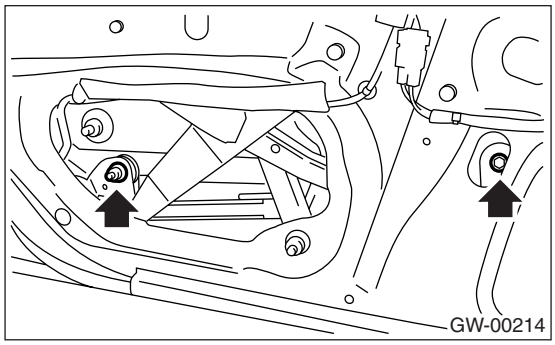
5) Remove the stabilizers and trim hooks.



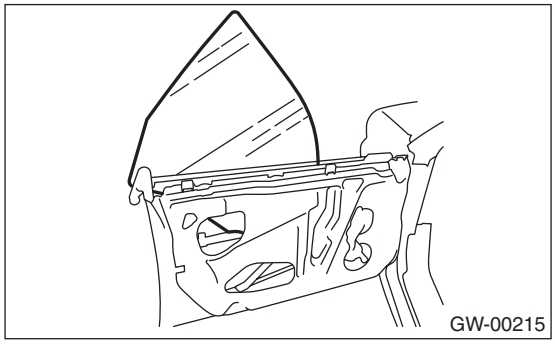
6) Remove the rear end of door weather strip and weather strip outer.



7) Operate the power window switch to move the glass to position shown in the figure, and then remove the two nuts from service holes.



8) Take out the door glass.



CAUTION:
• Do not turn the regulator in closing direction after removal of the glass. Otherwise gear may be disengaged.
• Avoid impact and damage to the glass.

B: INSTALLATION

1) Install in the reverse order of removal.

CAUTION:
Make sure the slider (front) and roller (rear) of glass is placed securely in sash.

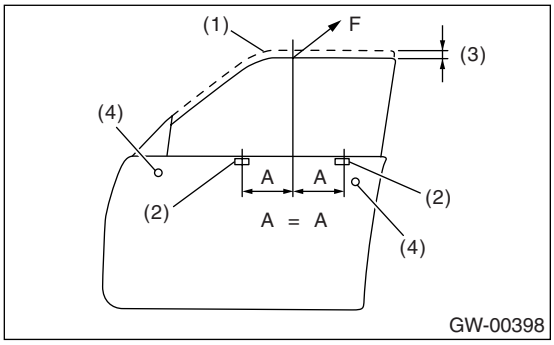
2) Adjust the front door glass. <Ref. to GW-14, ADJUSTMENT, Front Door Glass.>

Tightening torque:
Refer to COMPONENT in General Description. <Ref. to GW-4, FRONT DOOR GLASS, COMPONENT, General Description.>

C: ADJUSTMENT

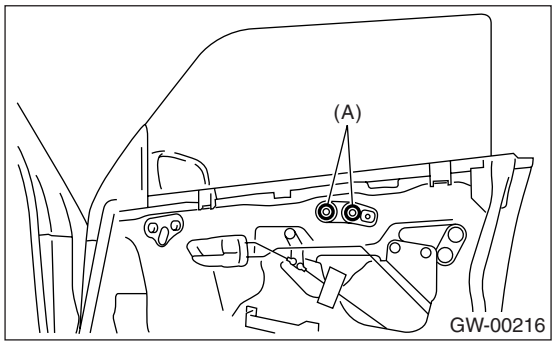
NOTE:
Before adjustment, ensure that all adjusting bolts of stabilizer (innner), upper stopper, and sash are loosened and door glass is raised so that it is in contact with weather strip.

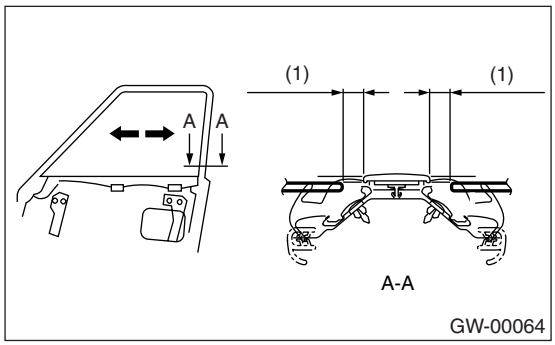
1) Temporarily tighten one adjusting bolt on one side of rear sash at the midpoint of slotted hole in the inner panel.
2) Temporarily tighten the regulator B-channel in a position at the top of slotted hole.
3) Lower the door glass 10 to 15 mm (0.39 to 0.59 in) from fully closed position. While applying outward pressure of 45.0±5.0 N (4.5±0.5 kgf, 9.9±1.1 lbf) (F) to upper edge of glass above midpoint of two stabilizers (outer), press the stabilizer (inner) at pressure of 30±5 N (3.0±0.5 kgf, 6.6±1.1 lbf) to the glass, then secure it.



(1) Full close position
(2) Stabilizer (outer)
(3) 10 — 15 mm (0.39 — 0.59 in)
(4) Upper stopper

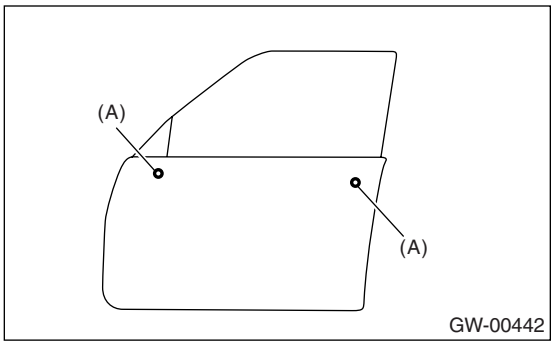
4) For adjustment of clearance between front glass and center pillar cover, loosen the nuts (A), and move the glass sash back and forward until clearance becomes the value shown.

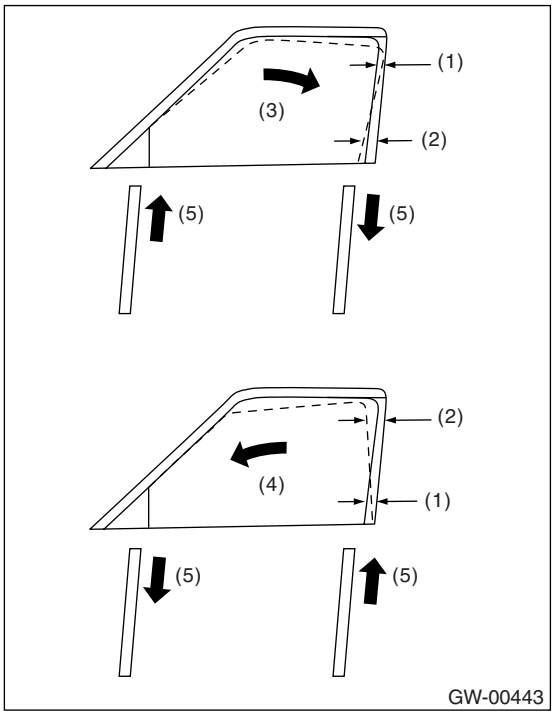




(1) 12 mm (0.472 in)

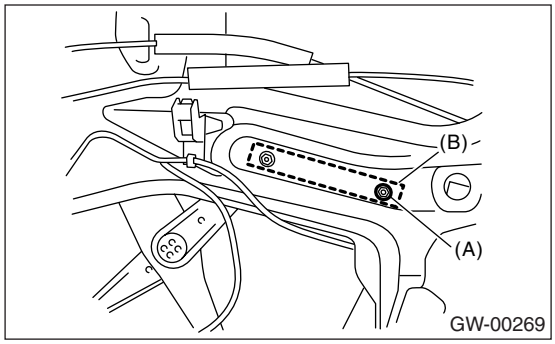
5) Adjust so that the upper and lower ends of center pillar are the same size by moving the position of upper stopper (A).

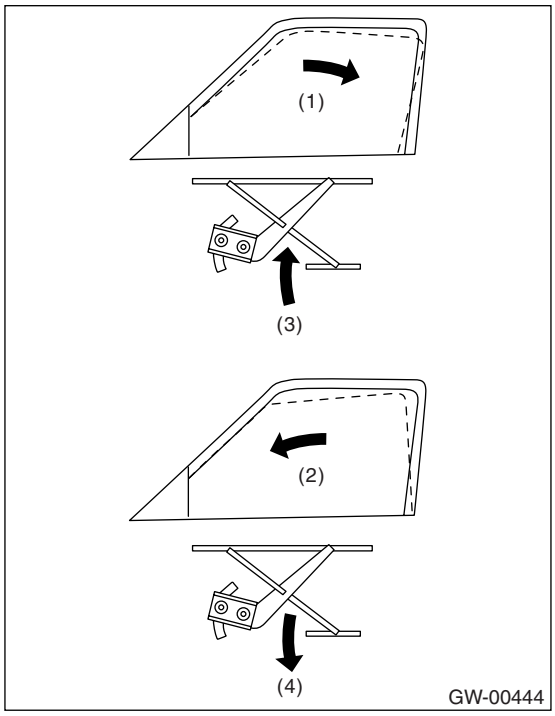




(1) Narrow
(2) Wide
(3) To tilt glass rearward
(4) To tilt glass forward
(5) Stopper adjusting direction

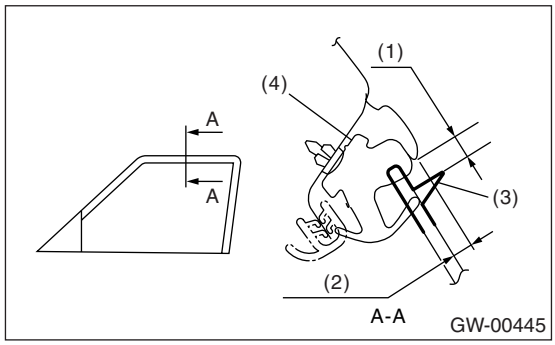
6) After adjusting the clearance between center pillar, up and down the glass several times to check glass contact to stopper when glass is fully closed. Adjust it so that the front and rear stoppers contact simultaneously by loosening the adjusting nut (A) of B channel (B).





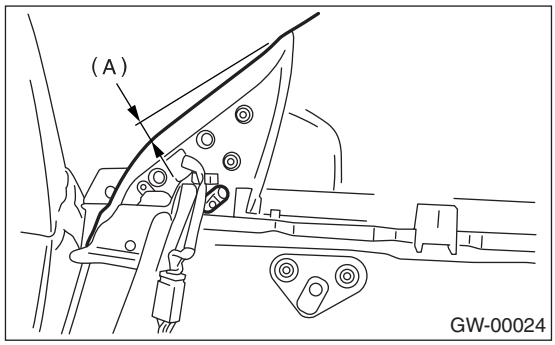
(1) When the stopper of door sash (rear) contacts first
(2) When the stopper of door sash (front) contacts first
(3) Raise B channel
(4) Lower B channel

7) For glass stroke adjustment, set the ST on glass and close the door, raise glass until positional relationship between glass and weather strip becomes as shown. And secure the glass so that the upper stopper lightly touches the glass holder.
ST 61299AE000 SPACER (For front door glass of thickness 5 mm (0.197 in))



(1) 2.7 — 4.3 mm (0.106 — 0.169 in)
(2) 4 — 6 mm (0.157 — 0.236 in) : when re-using weather strip
3 — 5 mm (0.118 — 0.197 in) : when replacing weather strip
(3) ST
(4) Weather strip

For preventing wind noise, adjust the glass at the position where tip of gusset is raised up a little.

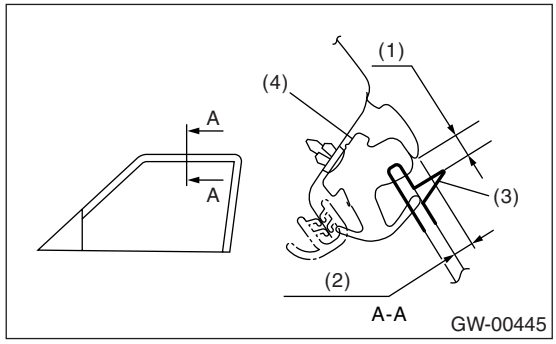


(A) 0 — 1.5 mm (0 — 0.059 in)

8) After stabilizer adjustment, carry out the glass crimp adjustment. First, visually ensure positional relationship between retainer & molding and glass of the roof side, and then begin with rear sash adjustment. Set the ST on glass, and then adjust two adjusting bolts alternately step by step to obtain dimensions shown below (cross-section A).
ST 61299AE000 SPACER (For front door glass of thickness 5 mm (0.197 in))

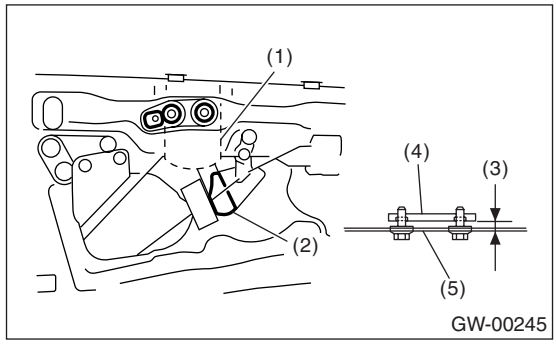
NOTE:
If two nuts are loosened at the same time, sash moves back and forth. Therefore, when one nut is adjusted, leave the other secured.

9) Make the same adjustment of two adjusting bolts of rear sash.



(1) 2.7 — 4.3 mm (0.106 — 0.169 in)
(2) 4 — 6 mm (0.157 — 0.236 in) : when re-using weather strip
3 — 5 mm (0.118 — 0.197 in) : when replacing weather strip
(3) ST
(4) Weather strip

NOTE:
Do not tilt the sash bracket to inner panel during adjustment. Otherwise smooth regulator operation cannot be achieved.



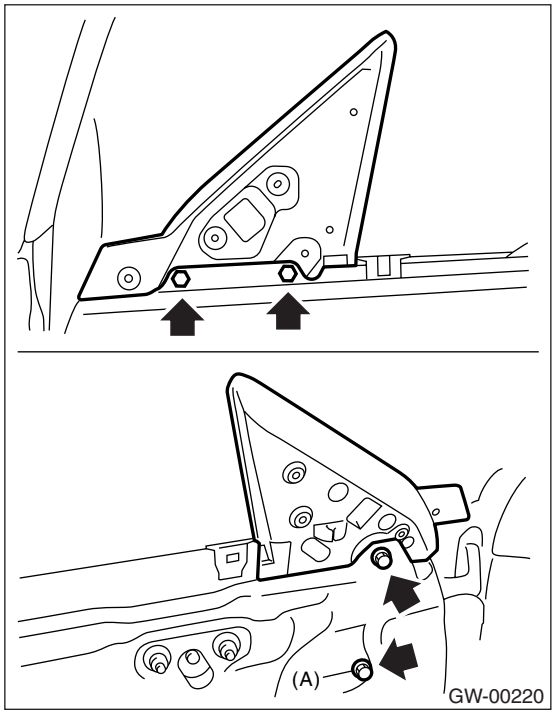
(1) Sash bracket
(2) Rear sash
(3) Adjust a line parallel
(4) Sash
(5) Inner panel

10) Make adjustment of front sash in the same manner as that of rear sash.

NOTE:
Although front and rear sashes must, as a rule, be adjusted in the same manner, in some door installation, the adjustment in a different manner may be required. However, adjustment of one sash to the maximum amount and the other to the minimum amount is not permitted. Such adjustment may result in application of excessive load to regulator.

11) After adjustments, tighten the nuts.

12) After adjustment to glass, close the door. If there is a gap between outer lip of gusset and glass surface, adjust the gap with adjusting bolt (A) in lower fitting part of the gusset to prevent generation of wind noise.
13) During adjustments, loosen the other three clamping bolts.

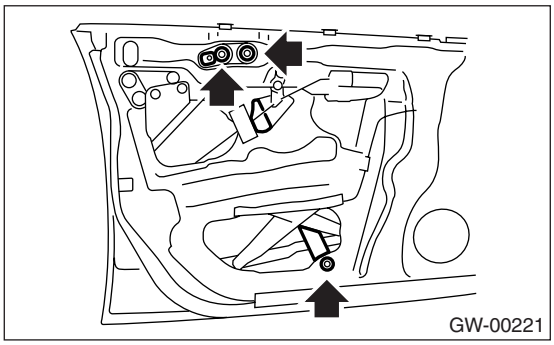


14) After adjustment, tighten the bolts and nuts.

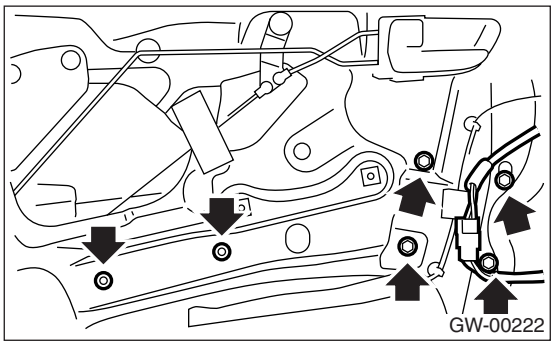
5. Front Regulator and Motor Assembly

A: REMOVAL

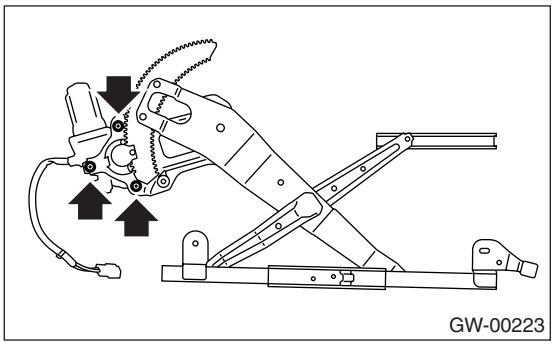
1) Remove the door glass. <Ref. to GW-13, REMOVAL, Front Door Glass.>
2) Remove the nuts to remove the rear sash.



3) Disconnect the motor connector.
4) Remove the four bolts and two nuts to remove the regulator assembly.



5) Remove the screw to remove motor assembly.



B: INSTALLATION

1) Install in the reverse order of removal.
2) Adjust the front door glass. <Ref. to GW-14, ADJUSTMENT, Front Door Glass.>

Tightening torque:
Refer to COMPONENT in General Description. <Ref. to GW-4, FRONT DOOR GLASS, COMPONENT, General Description.>

C: INSPECTION

1) Make sure the power window motor rotates properly when battery voltage is applied to the terminals of motor connector.
2) Change polarity of battery connections to terminals to ensure the motor rotates in reverse direction.

6. Remote Control Mirror System

A: WIRING DIAGRAM

1. REMOTE CONTROL MIRROR LHD MODEL

<Ref. to WI-239, LHD MODEL, WIRING DIAGRAM, Remote Control Mirror System.>

2. REMOTE CONTROL MIRROR RHD MODEL

<Ref. to WI-240, RHD MODEL, WIRING DIAGRAM, Remote Control Mirror System.>

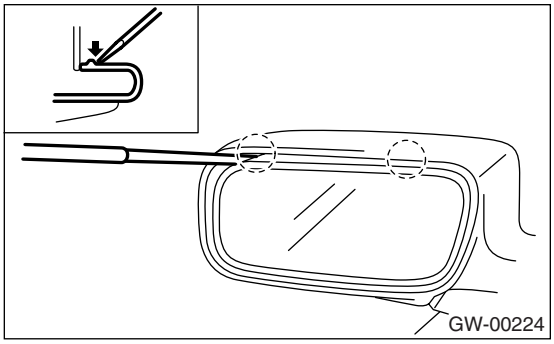
B: INSPECTION

Symptom	Repair order
All functions do not operate.	(1) Fuse (F/B No. 4) (F/B No. 19) (2) Mirror switch (3) Wiring harness
One side of the mirror motor does not operate.	(1) Mirror switch (2) Mirror motor (3) Wiring harness
Mirror heater does not operate.	(1) Mirror switch (2) Mirror heater (3) Wiring harness

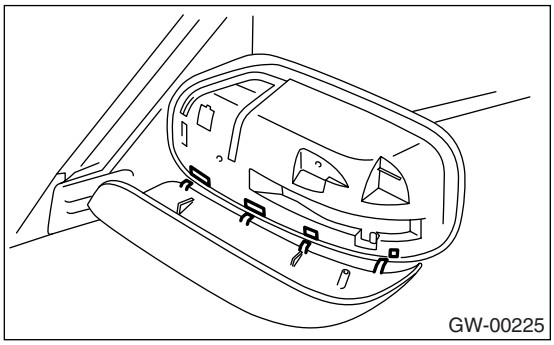
7. Scalp Cap

A: REPLACEMENT

1) Turn the mirror downward.
2) Insert a thin screw driver, push the clip part of scalp cap, and remove the scalp cap.



3) Insert the claw at the bottom of scalp cap into outer mirror.

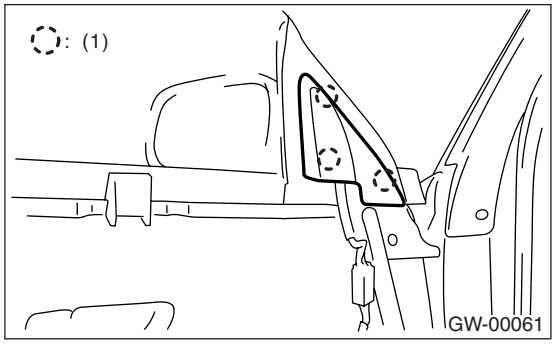


4) Install the scalp cap securely.

8. Outer Mirror Assembly

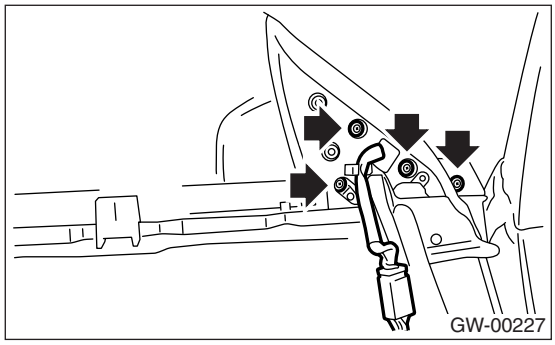
A: REMOVAL

1) Remove the door trim. <Ref. to EI-40, REMOVAL, Front Door Trim.>
2) Remove the mirror gusset cover.



(1) Hook

3) Disconnect the mirror connector.
4) Remove the screws to remove the mirror assembly.



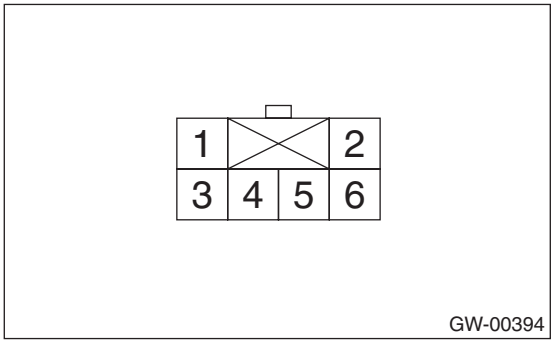
B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

Check to ensure that the rearview mirror moves properly when battery voltage is applied to terminals.

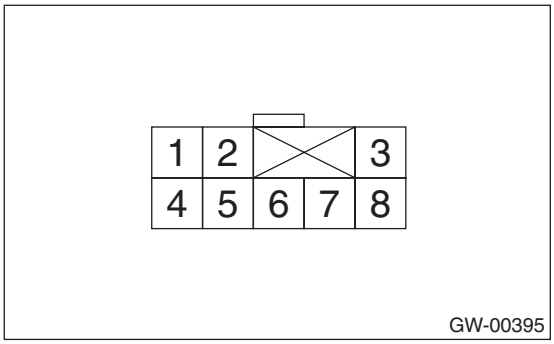
- Mirror heater not-equipped model:



Switch position	Terminal No.
OFF	—
UP	4 (+) and 6 (–)
DOWN	6 (+) and 4 (–)
LEFT	5 (+) and 6 (–)
RIGHT	6 (+) and 5 (–)

If NG, replace the mirror.

- Mirror heater equipped model:



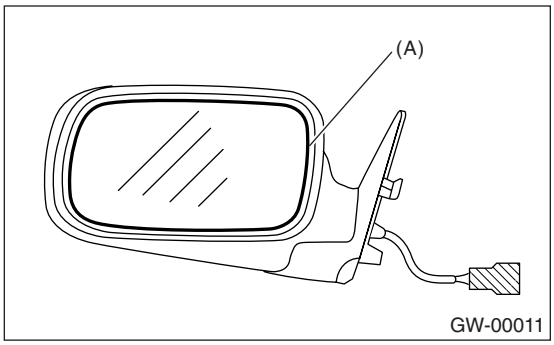
Switch position	Terminal No.
OFF	—
UP	6 (+) and 8 (–)
DOWN	8 (+) and 6 (–)
LEFT	7 (+) and 8 (–)
RIGHT	8 (+) and 7 (–)

If NG, replace the mirror.

9. Outer Mirror

A: REPLACEMENT

1) Remove the outer mirror assembly. <Ref. to GW-21, REMOVAL, Outer Mirror Assembly.>
2) Warm the area around the mirror holder (A) with a hair drier until the edges of the mirror holder become soft (about 2 or 3 minutes with a 1,000 W drier.)
3) Use a flat tip screwdriver without sharp edges to lift the mirror out of the mirror holder (A).



4) Disconnect the mirror heater connector from back of mirror. (Model with mirror heater)
5) Warm the area around the mirror holder with a hair drier until the edges of the mirror holder become soft (about 2 or 3 minutes with a 1,000 W drier.)
6) Connect the mirror heater connector. (Model with mirror heater)
7) Remove the backing of the new double-stick tape, and push the mirror in to install it.

NOTE:
Unless the mirror holder is warmed sufficiently, the mirror holder edges may be damaged or the mirror cracked.

10.Remote Control Mirror Switch

A: REMOVAL

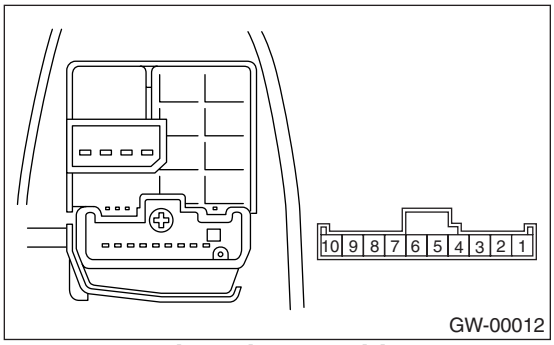
Refer to Power Window Control Switch for removal procedure, because the remote control mirror switch is installed in power window control switch panel. <Ref. to GW-9, REMOVAL, Power Window Control Switch.>

B: INSTALLATION

Refer to Power Window Control Switch for installation procedure, because the remote control mirror switch is installed in power window control switch panel. <Ref. to GW-9, INSTALLATION, Power Window Control Switch.>

C: INSPECTION

Move the rearview mirror switch to each position and check continuity between terminals.



Change over switch right position:

Switch position	Terminal No.	Standard
OFF	—	More than 1 MΩ
UP	8 and 3, 6 and 7	Less than 1 Ω
DOWN	8 and 6, 3 and 7	Less than 1 Ω
LEFT	8 and 2, 6 and 7	Less than 1 Ω
RIGHT	8 and 6, 2 and 7	Less than 1 Ω

Change over switch left position:

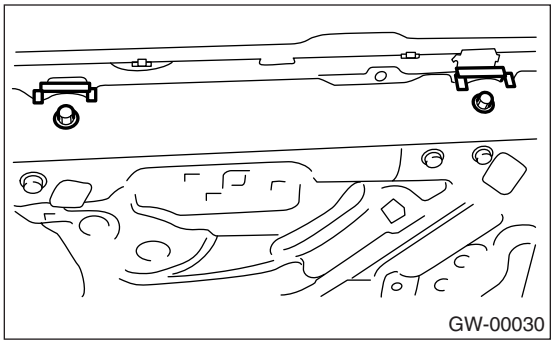
Switch position	Terminal No.	Standard
OFF	—	More than 1 MΩ
UP	8 and 4, 6 and 7	Less than 1 Ω
DOWN	8 and 6, 4 and 7	Less than 1 Ω
LEFT	8 and 5, 6 and 7	Less than 1 Ω
RIGHT	8 and 6, 5 and 7	Less than 1 Ω

If NG, replace the switch.

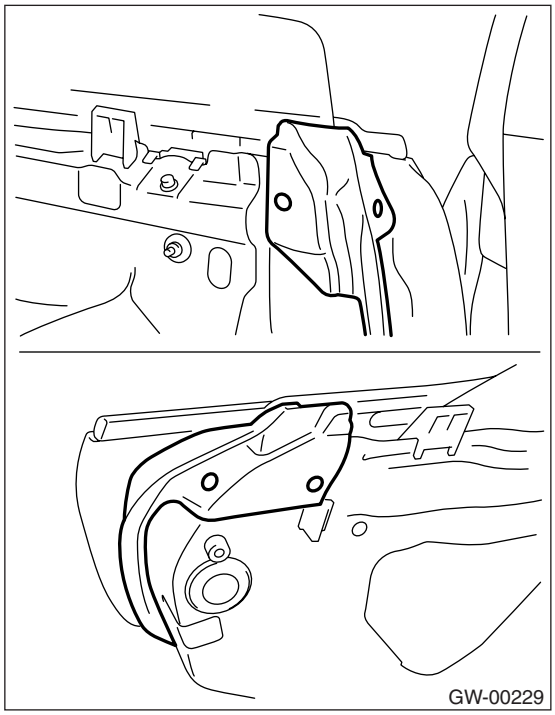
11.Rear Door Glass

A: REMOVAL

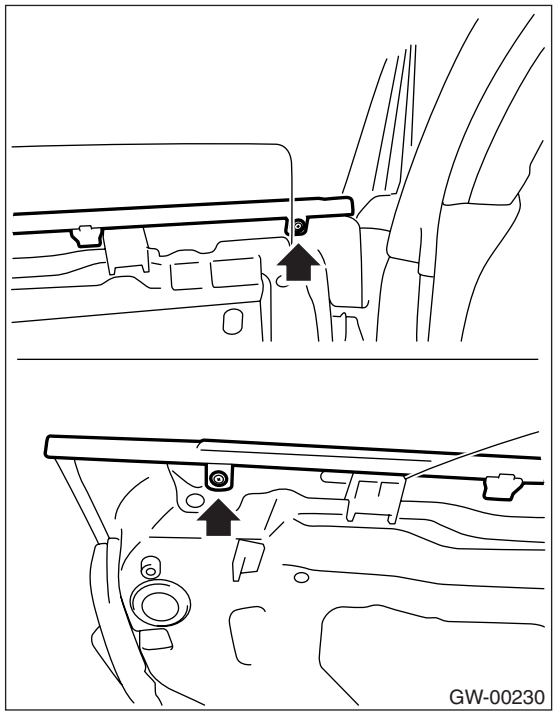
1) Remove the rear door trim. <Ref. to EI-41, REMOVAL, Rear Door Trim.>
2) Remove the sealing cover. <Ref. to EB-20, REMOVAL, Rear Sealing Cover.>
3) Remove the stabilizer and trim hook.


GW-00030

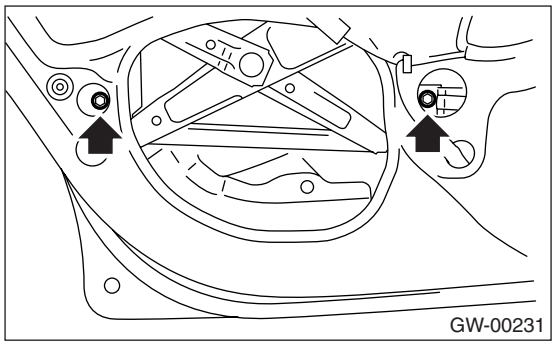
4) Remove the front end and rear end of door weather strip.


GW-00229

5) Loosen the two screws to remove the weather strip outer.


GW-00230

6) Operate the power window switch to move the glass to position shown in the figure, and then remove two nuts from service holes.


GW-00231

7) Remove the two rear sash installation nuts, and then move the rear sash backward.
8) Remove the glass.

CAUTION:
Avoid impact and damage to the glass.

B: INSTALLATION

1) Install in the reverse order of removal.

NOTE:
Make sure the glass stay is placed securely in sash.

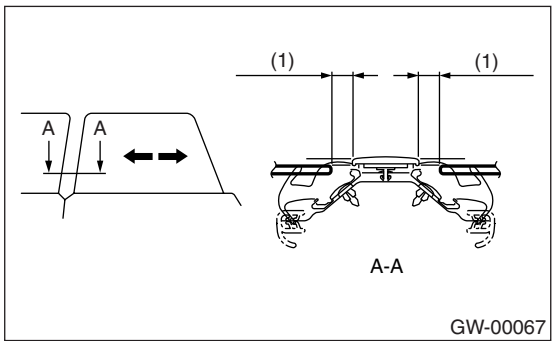
2) Adjust the rear door glass. <Ref. to GW-26, ADJUSTMENT, Rear Door Glass.>

Tightening torque:
Refer to COMPONENT in General Description. <Ref. to GW-5, REAR DOOR GLASS, COMPONENT, General Description.>

C: ADJUSTMENT

NOTE:
The rear door glass, as a rule, should be adjusted in the same manner as front glass, although they are different in dimension. Special notes for the rear glass are given below.

1) Adjust the glass position using the following dimensions as a guide line.

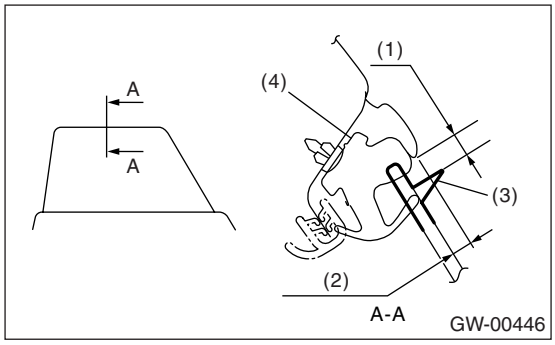


(1) 12 mm (0.472 in)

NOTE:
• If the dimensions are smaller than the given dimensions, glass may get caught in weather strip during lifting/lowering operation. In the worst case, it may cause the glass not to be opened fully.
• After adjustment, move the glass up and down to check whether it is caught.

2) Set the ST on glass, and then adjust the contact degree of glass using the following dimensions as a guide line.

ST 61299AE010 SPACER (For rear door glass of thickness 4 mm (0.157 in))



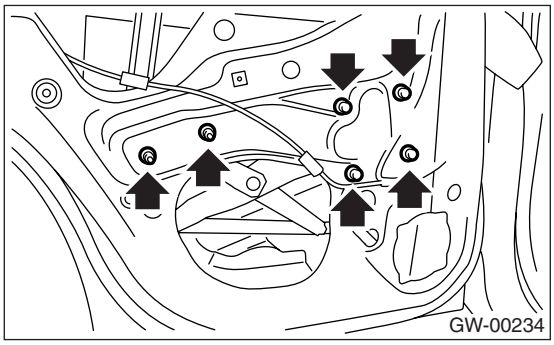
(1) 3.7 — 5.3 mm (0.146 — 0.209 in)
(2) 4 — 6 mm (0.157 — 0.236 in) : when re-using weather strip
3 — 5 mm (0.118 — 0.197 in) : when replacing weather strip
(3) ST
(4) Weather strip

NOTE:
• If the contact degree of rear glass is higher than necessary, glass may get caught in weather strip of center pillar corner, resulting in early wear of weather strip. Be careful when adjusting.
• After adjustment, move the glass up and down to check whether it is caught.

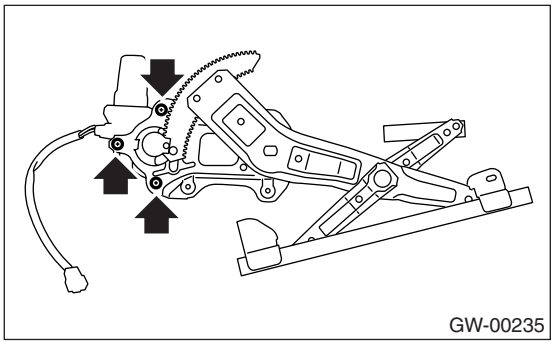
12. Rear Regulator and Motor Assembly

A: REMOVAL

1) Remove the rear door glass. <Ref. to GW-25, REMOVAL, Rear Door Glass.>
2) Remove the front sash.
3) Disconnect the motor connector.
4) Remove the four bolts and two nuts to remove regulator assembly.



5) Remove the screws to remove motor assembly.



B: INSTALLATION

1) Install in the reverse order of removal.
2) Adjust the rear door glass. <Ref. to GW-26, ADJUSTMENT, Rear Door Glass.>

Tightening torque:
Refer to COMPONENT in General Description. <Ref. to GW-5, REAR DOOR GLASS, COMPONENT, General Description.>

C: INSPECTION

1) Make sure that the power window motor rotates properly when battery voltage is applied to terminals of motor connector.
2) Change polarity of battery connections to terminals to ensure that the motor rotates in reverse direction.

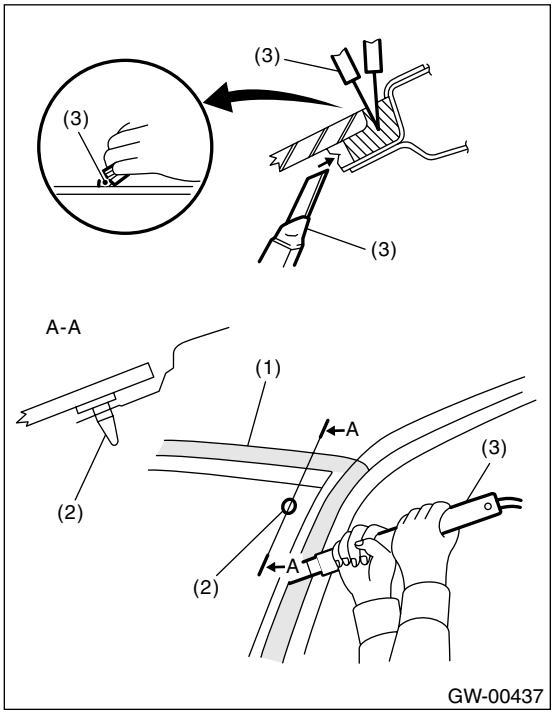
13.Windshield Glass

A: REMOVAL

1. USING WINDSHIELD KNIFE

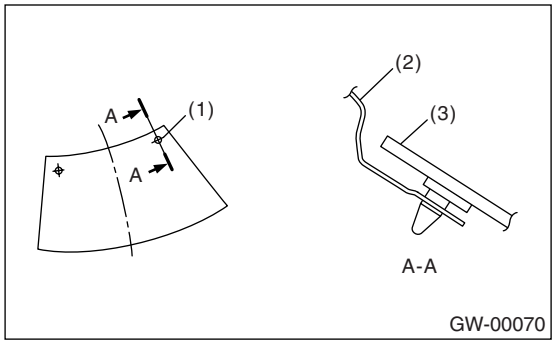
1) Remove the cowl panel. <Ref. to EI-34, REMOVAL, Cowl Panel.>
2) Remove the glass molding.
3) Tape the body side of the circumference of windshield glass for protection.
4) Apply sufficient amount of soapy water to the adhesive layer.
5) Insert the windshield knife into the adhesive layer.
6) While holding the knife edge and windshield glass edge at a right angle, move the windshield knife in parallel to the windshield glass edge along face and edge of windshield glass to cut the adhesive layer.

NOTE:
• Do not twist the windshield knife.
• Cutting of adhesive layer shall be started with wider gap between windshield glass and body.



(1) Protective tape
(2) Locating pin
(3) Windshield knife

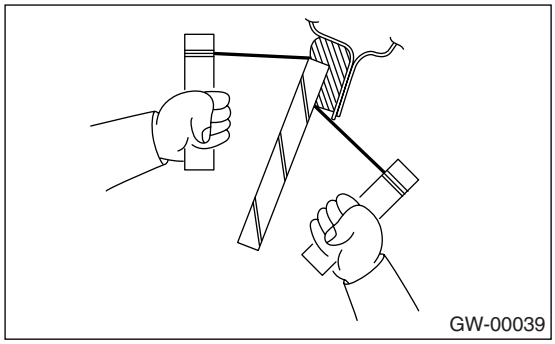
• Because the locating pins are bonded to corners of glass, use piano wire to cut the pin.



(1) Locating pin
(2) Body panel
(3) Front glass

2. USING PIANO WIRE

1) Remove the cowl panel. <Ref. to EI-34, REMOVAL, Cowl Panel.>
2) Remove the glass molding.
3) Tape the body side of circumference of windshield glass for protection.
4) Make a hole in adhesive layer using a drill or knife.
5) Pass the piano wire through hole, and attach securely both the piano wire ends to pieces of wood.



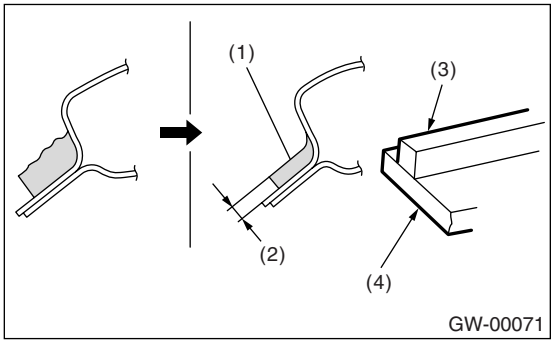
6) Pull the wire ends alternately to cut off the adhesive layer.

CAUTION:
• Do not tightly pull the piano wire against the windshield glass edge.
• Be careful not to damage the interior and exterior parts.
• When removal is made with area close to instrument panel, place a protection plate over it. Pay particular attention to the removal.
• Do not cross piano wires. Otherwise they may be cut.

B: INSTALLATION

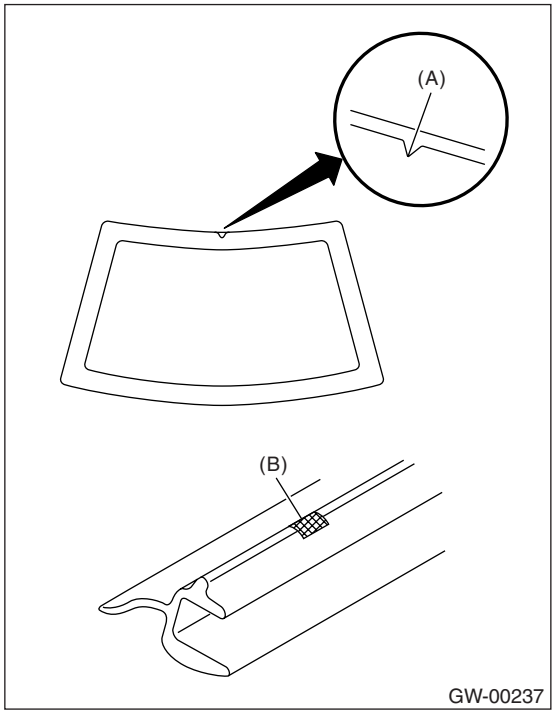
1) Clean the external circumference of windshield glass with alcohol or white gasoline.
2) Remove the adhesive layer on the body using cutter knife to obtain smooth face 2 mm (0.08 in) thick.

CAUTION:
Be careful not to damage the body and paint surface.



(1) Adhesive
(2) 2 mm (0.08 in)
(3) Dam rubber
(4) Glass

3) Clean the body with alcohol or white gasoline to remove thoroughly chips, dusts, and dirt from body face.
4) Fit the molding mark (B) to notch (A) and install it.



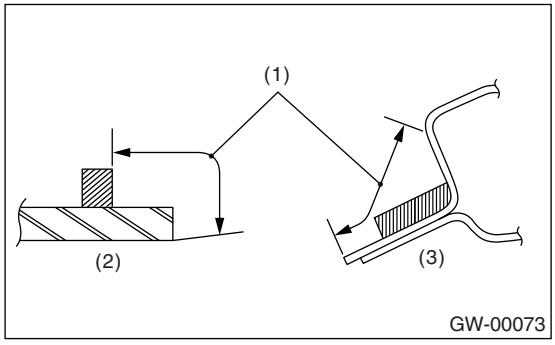
5) Apply primer to the adhesive layer of glass using sponge.

Glass primer:
Betawipe VP 04604 or Betaprime 5001 or equivalent

6) Apply primer to adhesive layer of body.

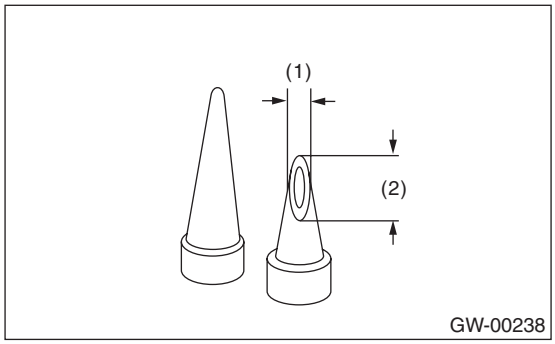
Painted surface primer:
Betaprime 5402 or equivalent

NOTE:
• Primer once attached to painted surface of the body and internal trim is hard to wipe off. Mask the circumference of such areas.
• Let the primer dry for about ten minutes before installing the glass.
• Do not touch the surface coated with primer.



(1) Application of primer
(2) Glass side
(3) Body side

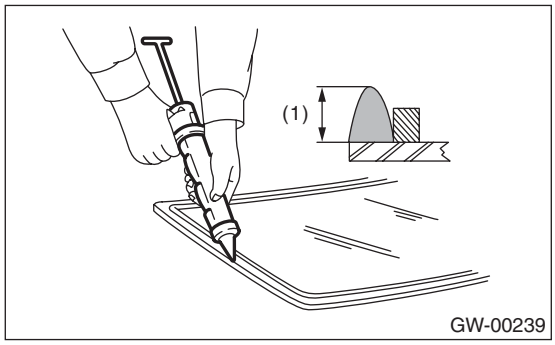
7) Cut off the cartridge nozzle tip as shown and set it in sealant gun.



(1) 10 mm (0.39 in)
(2) 15 mm (0.59 in)

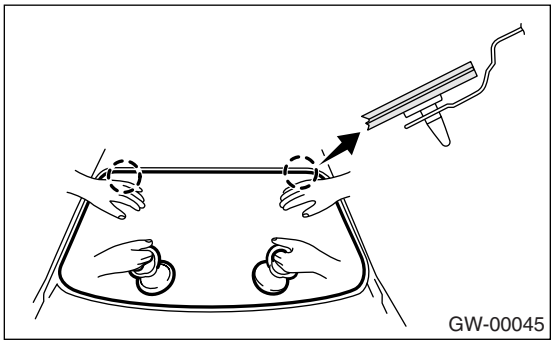
8) Apply adhesive to the glass end surface as shown.

Adhesive:
Gurit-ESSEX Betaseal 1502 or equivalent



(1) 12 — 15 mm (0.47 — 0.59 in)

9) Fit the locating pins to vehicle body using suction rubber cup to install the windshield glass.



10) Lightly press the windshield glass for tight fit.
11) Make flush the adhesive surface jutted out using spatula.
12) After completion of all work, allow the vehicle to stand for about 24 hours.

NOTE:
• When the door is opened/closed after glass is bonded, always lower the door glass and then open/close it carefully.
• Move the vehicle slowly.
• For minimum drying time and time the vehicle must be left standing before driving after bonding, follow the instructions or instruction manual from adhesive manufacturer.

13) After curing of adhesive, pour water on external surface of vehicle to check that there are no water leaks.

NOTE:
When a vehicle is returned to the user, tell him or her that the vehicle should not be subjected to heavy impact for at least three days.

14) Install the cowl panel. <Ref. to EI-34, INSTALLATION, Cowl Panel.>

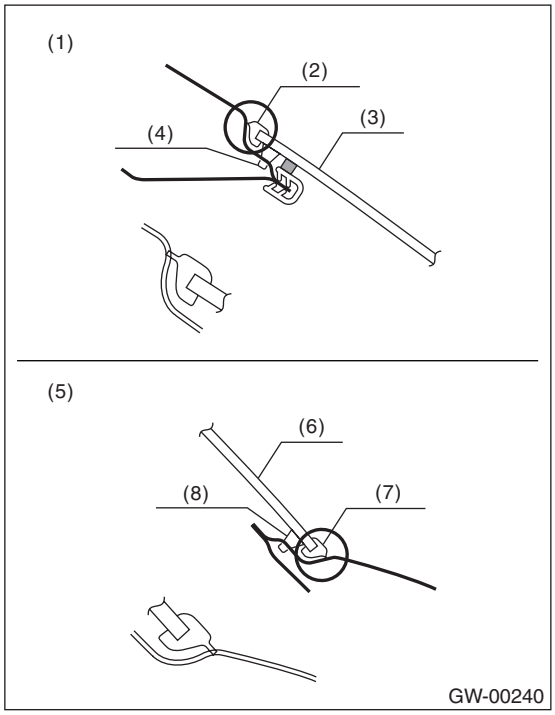
14.Rear Gate Glass

A: REMOVAL

1) Remove the rear wiper motor. <Ref. to WW-16, REMOVAL, Rear Wiper Motor.>
2) Disconnect the electrical connector from rear defogger terminal.
3) Remove the glass in the same procedure as for windshield glass. <Ref. to GW-28, REMOVAL, Windshield Glass.>

B: INSTALLATION

1) Apply adhesive in the same procedure as for windshield glass. <Ref. to GW-29, INSTALLATION, Windshield Glass.>
2) Insert the glass locating pin into the rear gate hole, and after pushing on the area around the locating pin to secure it, push lightly all around the area to seal it.
3) About one hour after installation, conduct a water leak test.



(1) Upper side
(2) Molding
(3) Glass
(4) Adhesive
(5) Lower side
(6) Glass
(7) Molding
(8) Adhesive

4) After completion of all work, allow the vehicle to stand for about 24 hours.

NOTE:
• When the door is opened/closed after glass is bonded, always lower the door glass and then open/close it carefully.
• Move the vehicle slowly.
• For minimum drying time and time the vehicle must be left standing before driving after bonding, follow the instructions or instruction manual from adhesive manufacturer.
• When a vehicle is returned to the user, tell him or her that the vehicle should not be subjected to heavy impact for at least three days.

5) Connect the rear defogger terminals.
6) Install the rear wiper. <Ref. to WW-16, INSTALLATION, Rear Wiper Motor.>

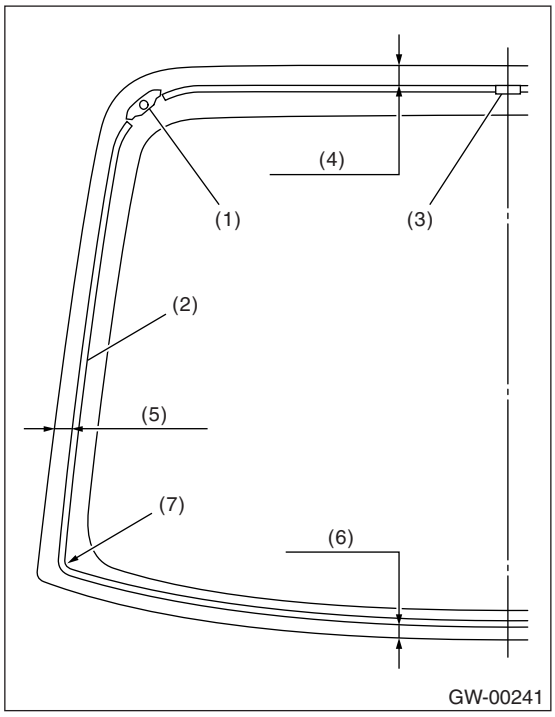
15.Rear Window Glass

A: REMOVAL

1) Disconnect the electrical connectors from rear defogger terminals and antenna terminals.
2) Remove the glass in the same procedure as for windshield glass. <Ref. to GW-28, REMOVAL, Windshield Glass.>

B: INSTALLATION

1) Bond the dam rubber.



(1) Locating pin
(2) Dam rubber
(3) Fastener
(4) 14.5 mm (0.571 in)
(5) 8 mm (0.315 in)
(6) 22 mm (0.866 in)
(7) R20

2) Install the glass in the same procedure as for windshield glass. <Ref. to GW-29, INSTALLATION, Windshield Glass.>
3) Connect the rear defogger terminals and antenna terminals.
4) After completion of all work, allow the vehicle to stand for about 24 hours.

NOTE:
• When the door is opened/closed after glass is bonded, always lower the door glass and then open/close door carefully.
• Move the vehicle slowly.
• For minimum drying time and time the vehicle must be left standing before driving after bonding, follow the instructions or instruction manual from adhesive manufacturer.

5) After curing of adhesive, pour water on external surface of vehicle to check that there are no water leaks.

NOTE:
When a vehicle is returned to user, tell him or her that the vehicle should not be subjected to heavy impact for at least three days.

16.Rear Window Defogger System

A: WIRING DIAGRAM

1. REAR WINDOW DEFOGGER LHD MODEL

<Ref. to WI-237, LHD MODEL, WIRING DIAGRAM, Rear Defogger System.>

2. REAR WINDOW DEFOGGER RHD MODEL

<Ref. to WI-238, RHD MODEL, WIRING DIAGRAM, Rear Defogger System.>

B: INSPECTION

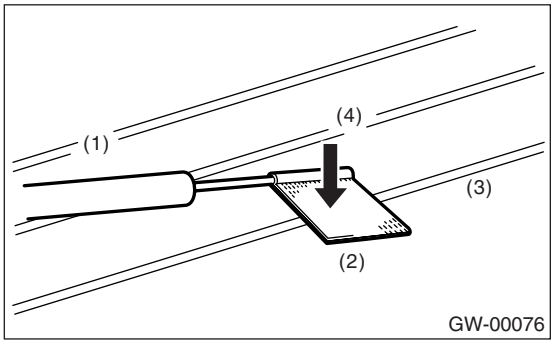
Symptom	Repair order
Rear window defogger does not operate.	(1) Fuse (M/B No. 1) (F/B No. 17: LHD model) (F/B No. 18: RHD model) (2) Rear defogger relay (3) Rear defogger timer (4) Defogger switch (5) Rear defogger condenser (6) Defogger wire (7) Wiring harness

17.Rear Window Defogger

A: INSPECTION

CAUTION:
When wiping stain on glass off with cloth, use a dry and soft cloth and move it in the direction of heat wire extension to avoid damage to heat wire.

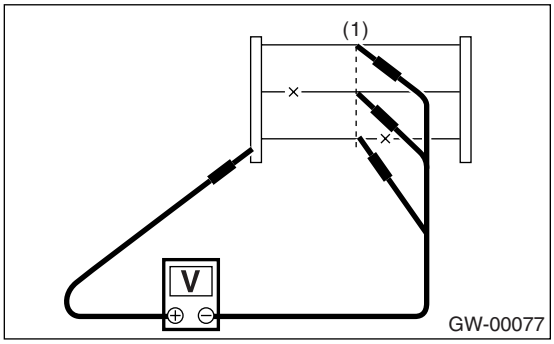
1) Turn the ignition switch to ON.
2) Turn the defogger switch to ON.
3) Wrap the tips of tester pins with aluminum foil to avoid damage to heat wire.



(1) Tester probe
(2) Aluminum foil
(3) Heat wire
(4) Press

4) Measure the voltage at wire center (1) with DC voltmeter.

Standard voltage:
Approx. 6 V



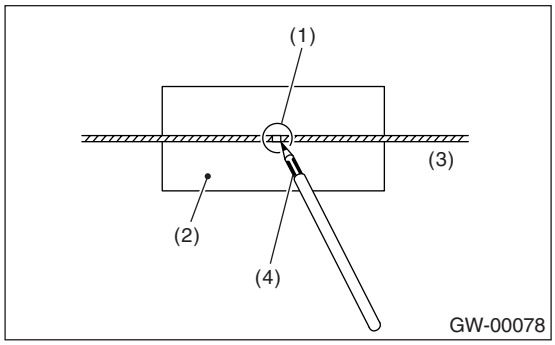
Voltage	Criteria
Approx. 6 V	OK
Approx. 12 V or 0 V	Broken

NOTE:
• If the measured value is 12 volts, heat wire is open between wire center and positive (+) end.
• If zero volt, heat wire is open between wire center and ground.

5) Apply positive lead of voltmeter to positive terminal of voltmeter, and then move the negative lead along the wire up to negative terminal end. If voltage changes from zero to several volts during movement of lead, heat wire is open at the voltage change point.

B: REPAIR

1) Clean the broken portion with alcohol or white gasoline.
2) Mask both side of wire with thin film.
3) Apply conductive silver composition (DUPONT No. 4817) to broken portion.



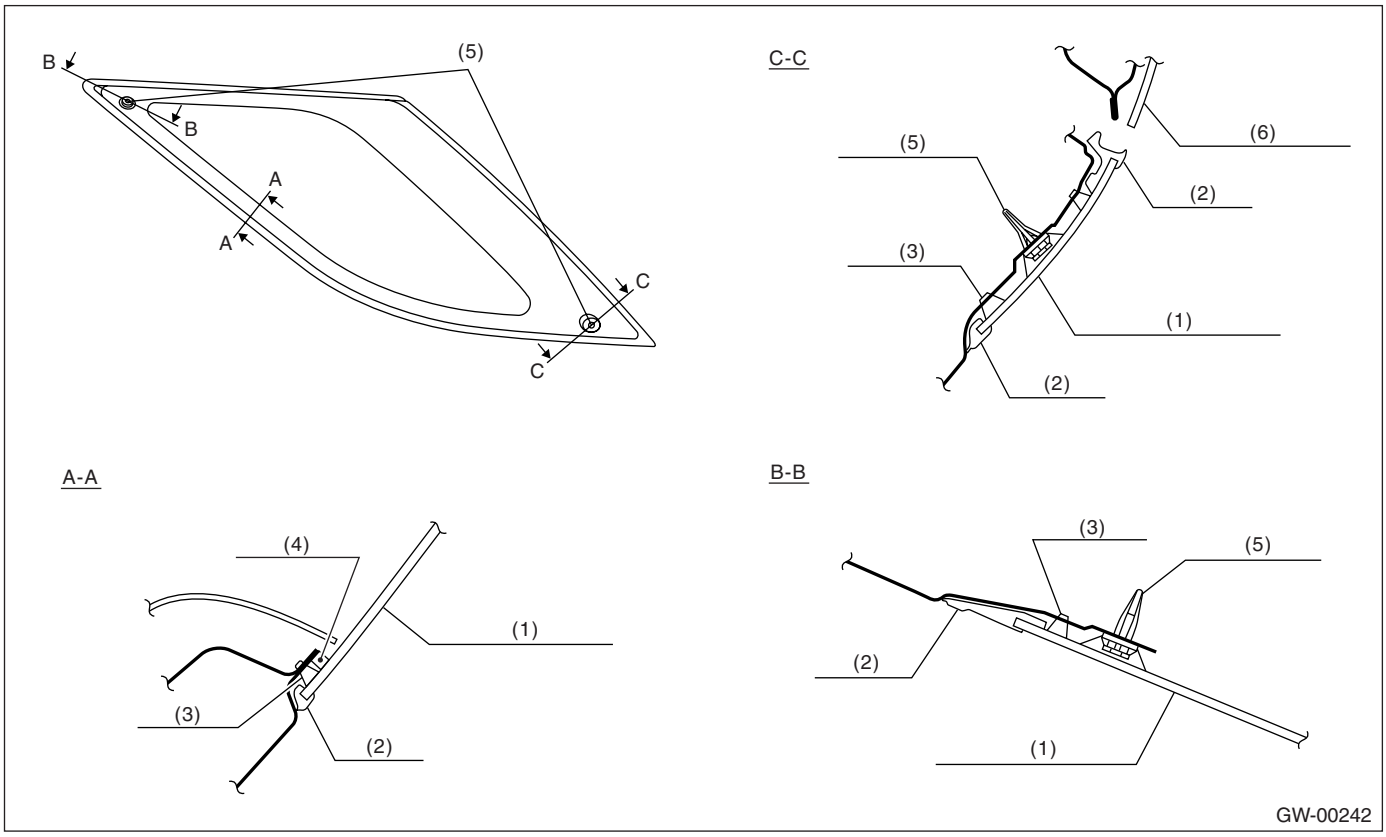
(1) Broken portion
(2) Masking thin film
(3) Broken wire
(4) Conductive silver composition (DUPONT No. 4817)

4) After repair, check the wire.

18.Rear Quarter Glass

A: REMOVAL

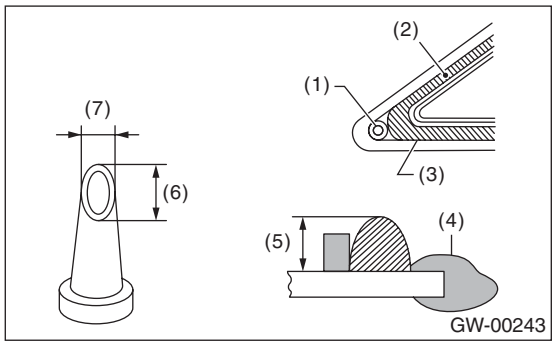
Remove the glass in the same procedure as for windshield glass. <Ref. to GW-28, REMOVAL, Windshield Glass.>



(1) Rear quarter glass
(2) Molding
(3) Adhesive
(4) Dam rubber
(5) Locating pin
(6) Rear gate glass

B: INSTALLATION

1) Cut off the nozzle tip as shown in the figure.



(1) Locating pin
(2) Dam rubber
(3) Adhesive
(4) Molding
(5) 12 — 15 mm (0.47 — 0.59 in)
(6) 15 mm (0.59 in)
(7) 10 mm (0.39 in)

2) Install the glass in the same procedure as for windshield glass. <Ref. to GW-29, INSTALLATION, Windshield Glass.>

3) After completion of all work, allow the vehicle to stand for about 24 hours.

NOTE:
• When the door is opened/closed after glass is bonded, always lower the door glass and then open/close it carefully.
• Move the vehicle slowly.
• For minimum drying time and time the vehicle must be left standing before driving after bonding, follow the instructions or instruction manual from adhesive manufacturer.

4) After curing of adhesive, pour water on external surface of vehicle to check that there are no water leaks.

NOTE:
When a vehicle is returned to user, tell him or her that the vehicle should not be subjected to heavy impact for at least three days.

19.Sunroof Glass

A: REMOVAL

<Ref. to SR-5, REMOVAL, Glass Lid.>

B: INSTALLATION

<Ref. to SR-5, INSTALLATION, Glass Lid.>

C: ADJUSTMENT

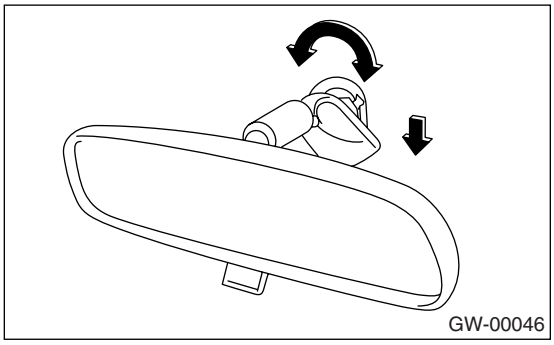
<Ref. to SR-5, ADJUSTMENT, Glass Lid.>

20.Rearview Mirror

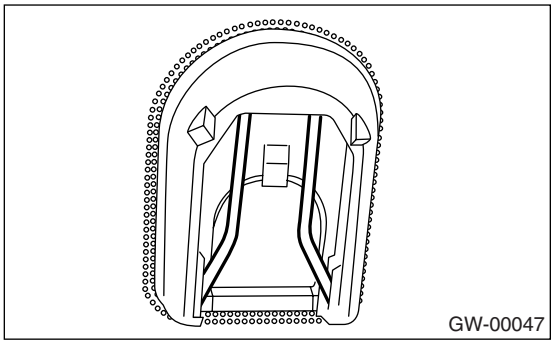
A: REMOVAL

NOTE:
The spring cannot be reused. Prepare a new spring before removal.

1) Turn the mirror base 90° clockwise or counter-clockwise to remove it.



2) Remove the spring from mirror base.



CAUTION:
Be careful not to damage the mirror surface.

3) If the mirror base is damaged, remove the mirror base using piano wire or spatula, etc.

CAUTION:
Be careful not to damage the windshield glass.

B: INSTALLATION

1) If removing the mirror base, remove the remaining adhesive thoroughly, and then fit the mirror base to mark on windshield glass to install.

Adhesive:
REPAIR KIT IN MR (Part No. 65029FC000) or equivalent

2) Verify that the mirror base is adhered securely, and then install the spring.
3) Install in the reverse order of removal.

C: INSPECTION

Make sure the mirror is not damaged.
Make sure the spring is not deteriorated.

BODY STRUCTURE

BS

Page

1. General Description 2
2. Datum Points 3
3. Datum Dimensions 11

1. General Description

A: PREPARATION TOOL

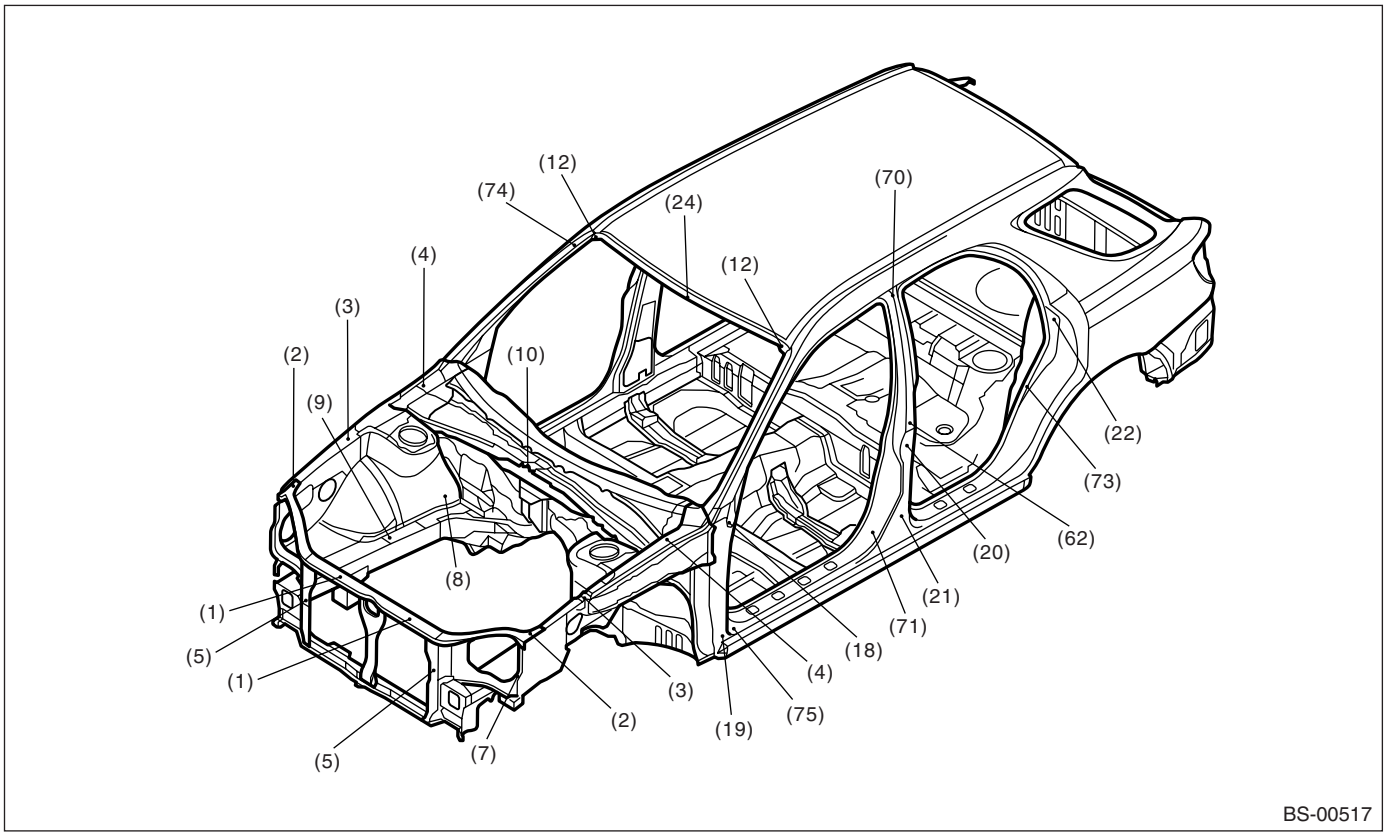
TOOL NAME	REMARKS
Tram tracking gauge	Used for measuring dimension.
Tape measure	Used for measuring dimension.

2. Datum Points

A: LOCATION

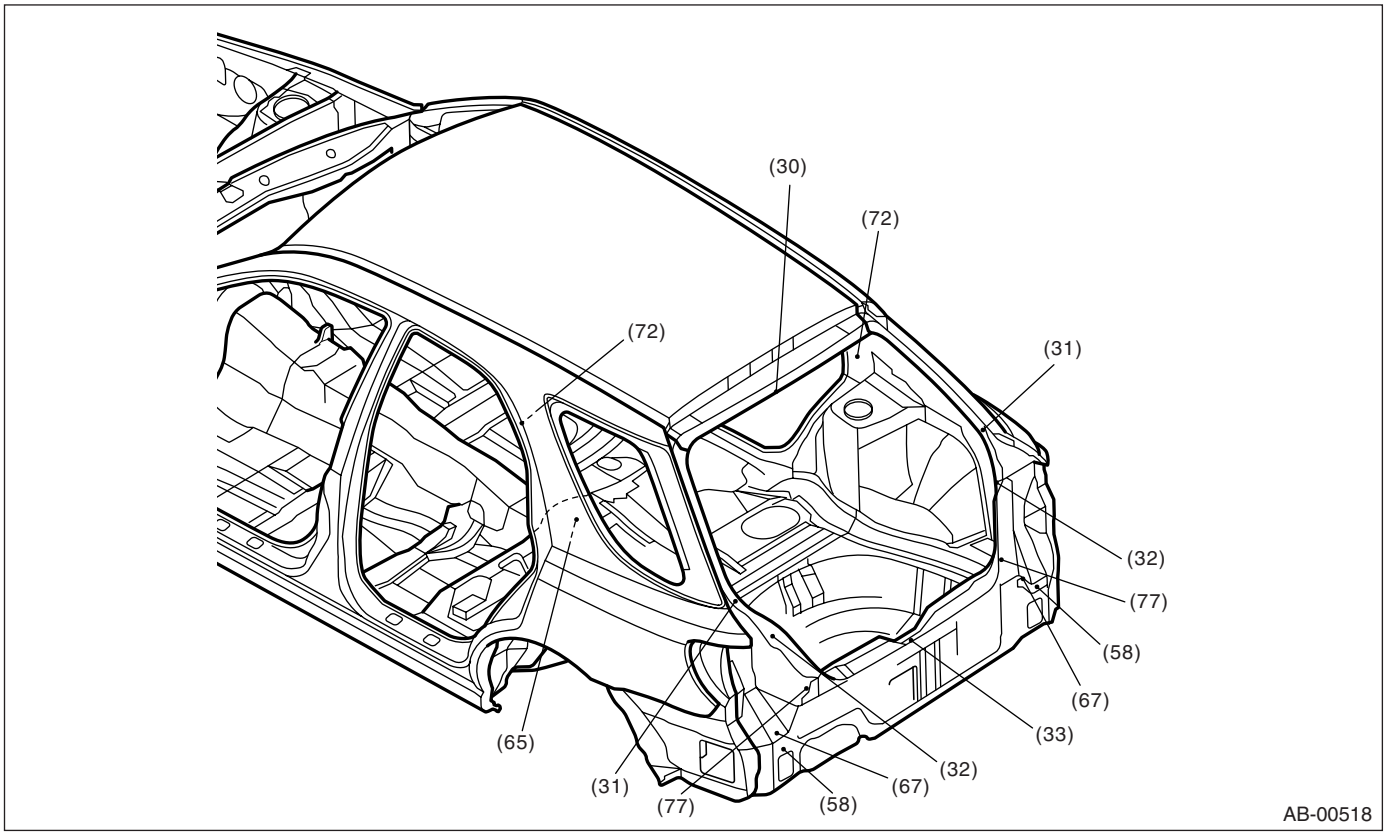
NOTE:
- Datum points are specified for body repair.
- Guide holes, locators, and indents are provided to facilitate panel replacement and to increase alignment accuracy.
- Both right and left reference points are symmetrical.

1. WAGON MODEL/SEDAN MODEL



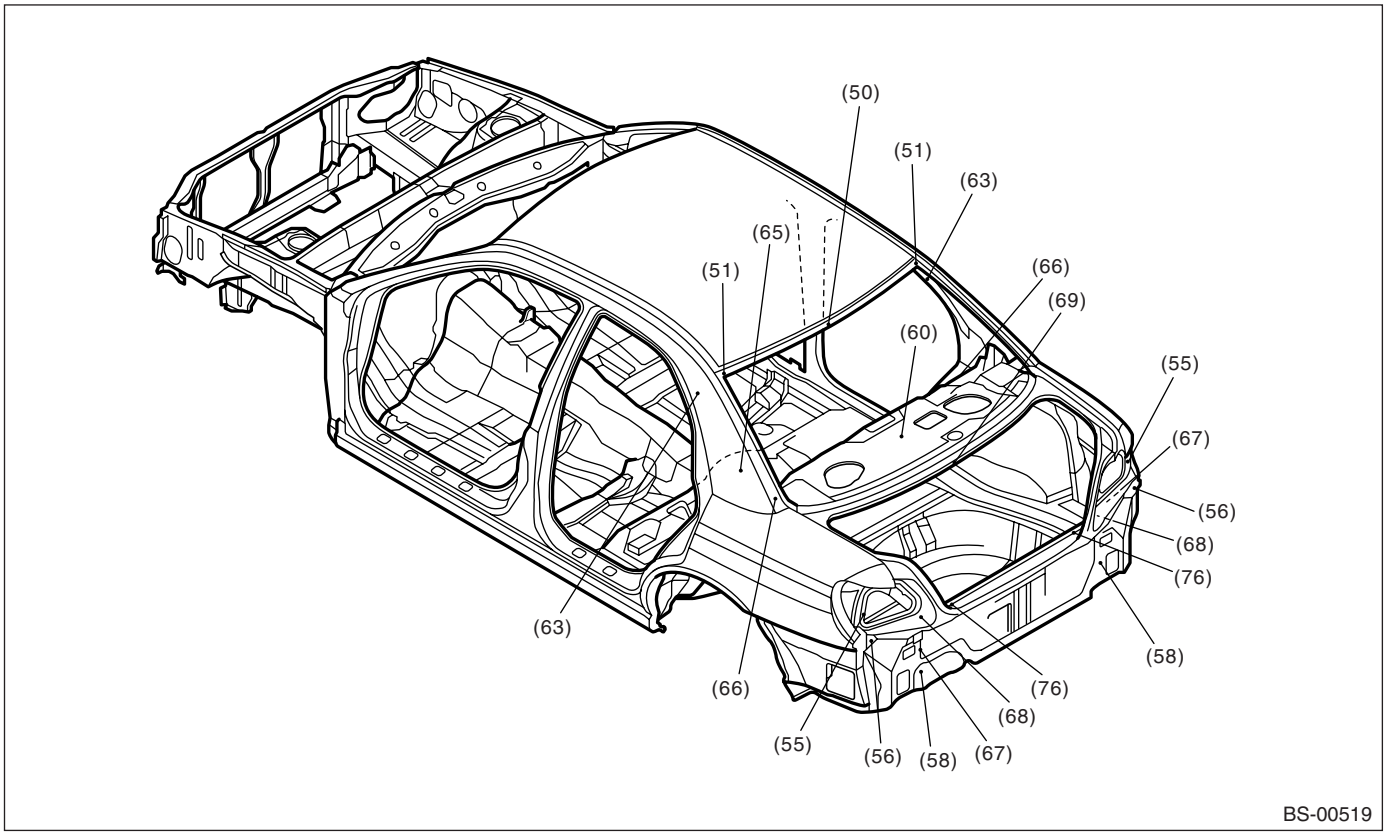
(1) Radiator attaching hole 12 mm (0.47 in) dia. (Symmetrical)
(2) Fender attaching hole 7 mm (0.28 in) dia. (Symmetrical)
(3) Fender attaching hole 10 mm (0.39 in) dia. (Symmetrical)
(4) Hood hinge attaching hole 12 mm (0.47 in) dia. (Symmetrical)
(5) Radiator panel side gauge hole 20 mm (0.79 in) dia. (Symmetrical)
(7) Fender attaching hole 9 mm (0.35 in) dia. (Symmetrical)
(8) Gauge hole 12 mm (0.47 in) dia. (Symmetrical)
(9) Front suspension crossmember attaching hole 12.4 mm (0.488 in) dia. (Symmetrical)
(10) Bracket module center gauge hole 6 mm (0.24 in) dia. (Vehicle center)
(12) Front glass attaching hole RH 6.5 mm (0.256 in) dia. LH 6.5 × 10 mm (0.256 × 0.39 in) dia.
(18) Fender attaching hole 12 mm (0.47 in) dia. (Symmetrical)
(19) Fender attaching hole 12 mm (0.47 in) dia. (Symmetrical)
(20) Outer panel center pillar gauge hole 12 mm (0.47 in) dia. (Symmetrical)
(21) Outer panel center pillar gauge hole 12 mm (0.47 in) dia. (Symmetrical)
(22) Weather strip patch attaching hole 5.2 mm (0.205 in) dia. (Symmetrical)
(24) Roof panel repair locator hollow
(62) Belt anchor attaching hole 11 mm (0.43 in) dia. (Symmetrical)
(70) Trim clip attaching hole 8.5 mm (0.335 in) dia. (Symmetrical)
(71) Harness clip attaching hole 7 mm (0.28 in) dia. (Symmetrical)
(73) Harness clip attaching hole 7 mm (0.28 in) dia. (Symmetrical)
(74) Trim clip attaching hole 10 mm (0.39 in) dia. (Symmetrical)
(75) Insulator attaching hole 8 mm (0.31 in) dia. (Symmetrical)

2. WAGON MODEL (REAR)



(30) Child anchor attaching hole 11 mm (0.43 in) dia.
(31) Washer hose attaching hole LH 7 mm (0.28 in) dia.
(32) Rear combination light mounting hole 7 mm (0.28 in) dia. (Symmetrical)
(33) Two striker attaching hole 15 mm (0.59 in) dia.
(58) Rear bumper plate nut attaching hole 13 mm (0.51 in) dia. (Symmetrical)
(65) Floor mat clip attaching hole 8 mm (0.31 in) dia.
(67) Gusset floor rear side gauge hole 11.5 mm (0.453 in) dia. (Symmetrical)
(72) Trim upper clip attaching hole 8.5 mm (0.335 in) dia. (Symmetrical)
(77) Harness clip attaching hole 7 mm (0.28 in) dia. (Symmetrical)

3. SEDAN MODEL (REAR)



(50) Repair locator hollow (Vehicle center)

(51) Glass attaching hole RH 6.5 mm (0.256 in) dia. LH 6.5 × 10 mm (0.256 × 0.39 in) dia.

(55) Rear combination light mounting hole 8 mm (0.31 in) dia. (Symmetrical)

(56) Bumper attaching hole 7 mm (0.28 in) dia. (Symmetrical)

(58) Rear bumper attaching hole 11 mm (0.43 in) dia. (Symmetrical)

(60) Choke coil harness attaching hole 5.4 mm (0.213 in) dia.

(63) Feeder line fixing hole 7 mm (0.28 in) dia. (Symmetrical)

(65) Floor mat clip attaching hole 8 mm (0.31 in) dia.

(66) Bulkhead rear gauge hole 10 mm (0.39 in) dia. (Symmetrical)

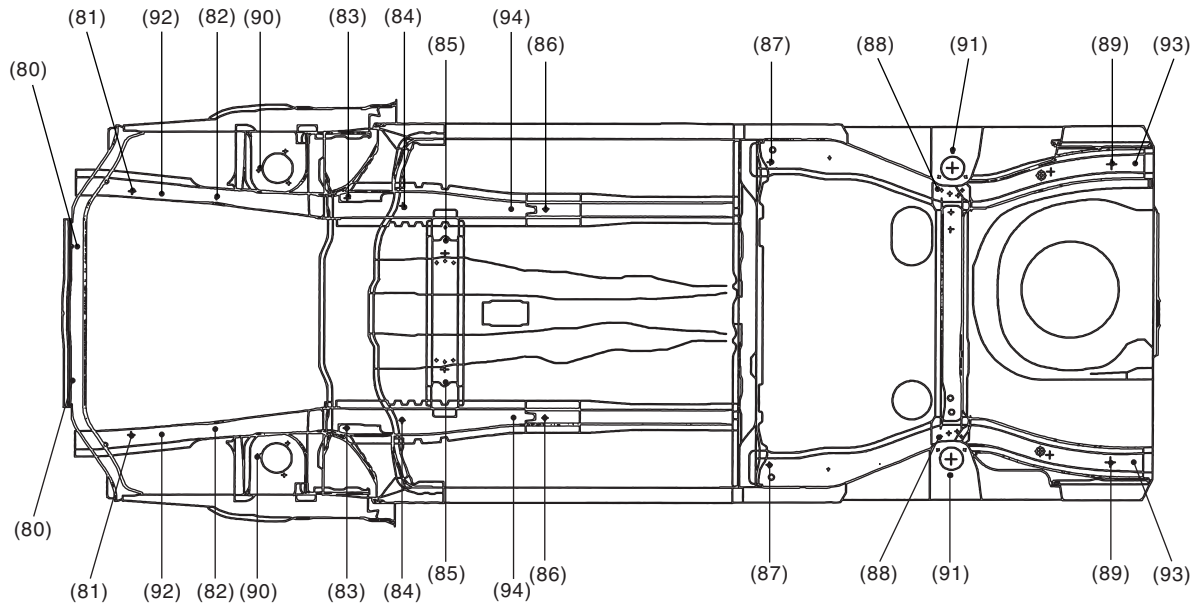
(67) Gusset floor rear side gauge hole 11.5 mm (0.453 in) dia. (Symmetrical)

(68) Rear skirt inner side gauge hole 10 mm (0.39 in) dia. (Symmetrical)

(69) Rear panel (reinforcement) repair locator hollow (Vehicle center)

(76) Press location hole 15 mm (0.59 in) dia. (Symmetrical)

4. UNDERBODY



(80) Radiator lower frame gauge hole 12 mm (0.47 in) dia. (Symmetrical)

(81) Side frame gauge hole 20 mm (0.79 in) dia. (Symmetrical)

(82) Front crossmember attaching hole 12.4 mm (0.488 in) dia. (Symmetrical)

(83) Suspension attaching hole 17 mm (0.67 in) dia. (Symmetrical)

(84) Side frame gauge hole 20 mm (0.79 in) dia. (Symmetrical)

(85) Transmission mount attaching hole 14 mm (0.55 in) dia.

(86) Side frame gauge hole 18 mm (0.71 in) dia. (Symmetrical)

(87) Rear differential attaching hole 16 mm (0.63 in) dia. (Symmetrical)

(88) Rear suspension attaching hole 16 mm (0.63 in) dia. (Symmetrical)

(89) Rear side frame gauge hole 15 mm (0.59 in) dia. (Symmetrical)

(90) Strut mount attaching hole 9.5 mm (0.374 in) dia. (Symmetrical)

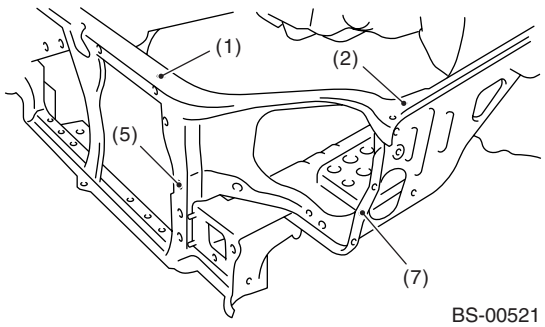
(91) Strut mount attaching hole 10 mm (0.39 in) dia. (Symmetrical)

(92) Sub frame attaching hole 16 mm (0.63 in) dia. (Symmetrical)

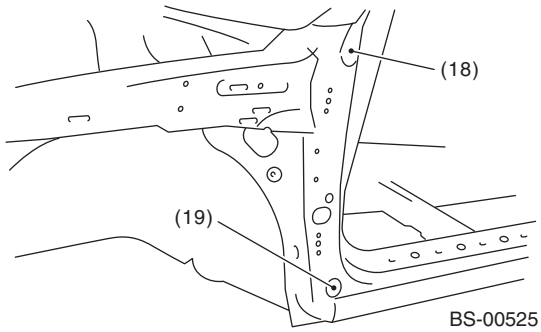
(93) Bumper beam attaching hole RH 15 mm (0.59 in) dia. LH 19 × 15 mm (0.75 × 0.59 in) dia.

(94) Side frame gauge hole 15 mm (0.59 in) dia. (Symmetrical)

Datum Points



BS-00521



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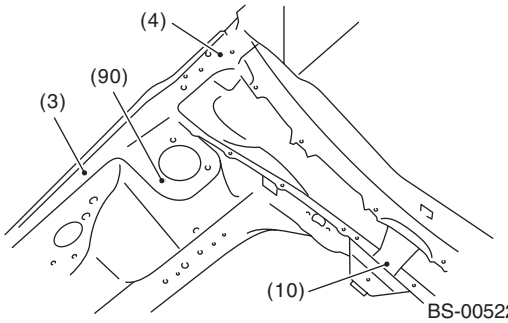

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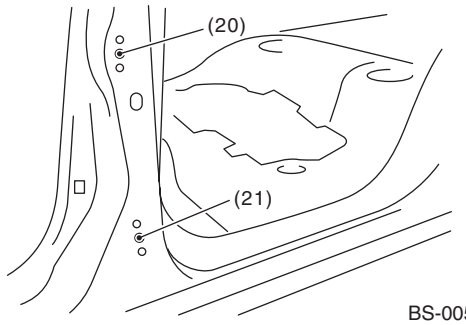

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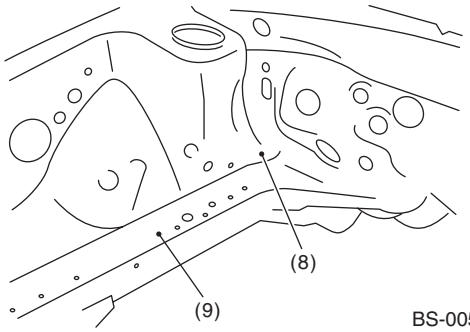

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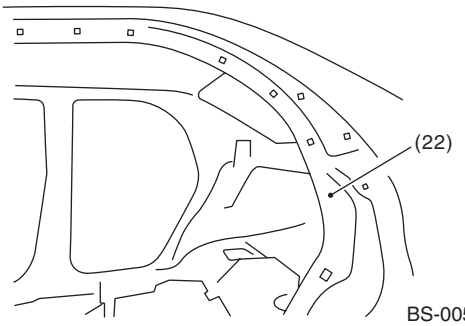

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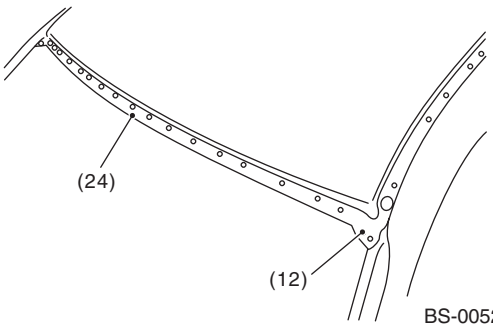
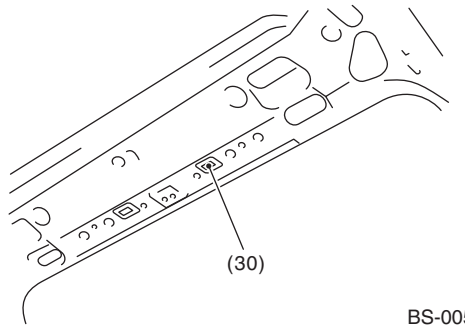


BS-00524

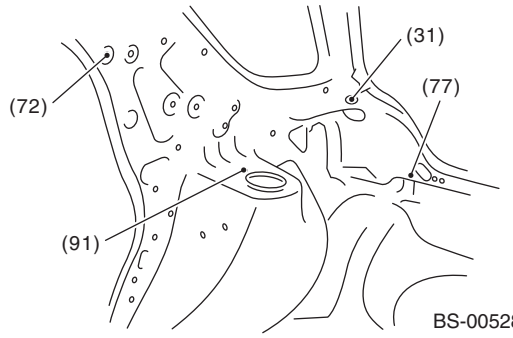
Wagon model



BS-00527

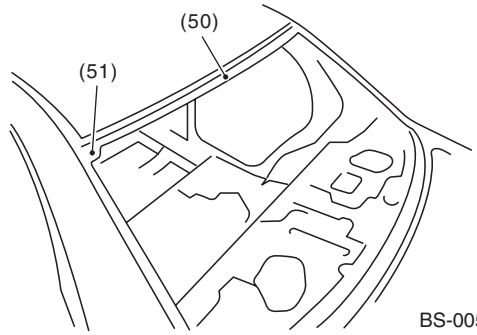
Datum Points

Wagon model



BS-00528

Sedan model



BS-00532

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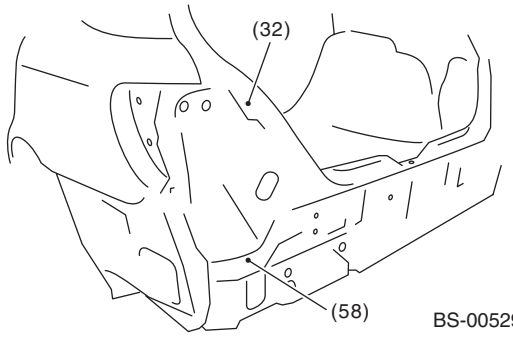
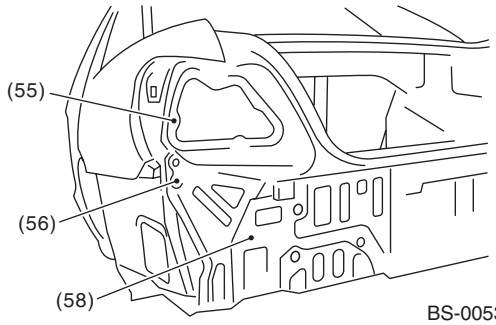


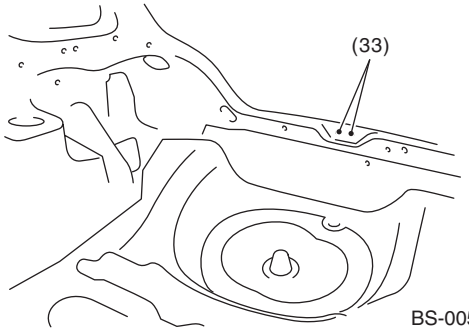
BS-00529

Sedan model



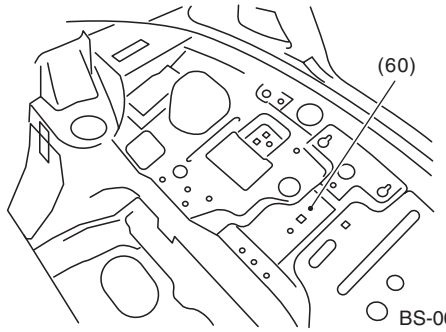
BS-00533

Wagon model



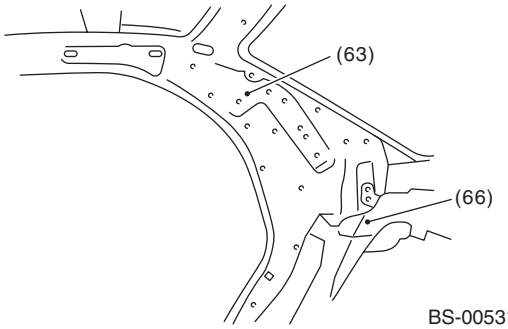
BS-00530

Sedan model

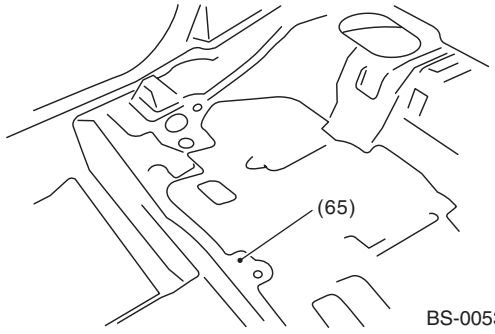


BS-00534

Sedan model

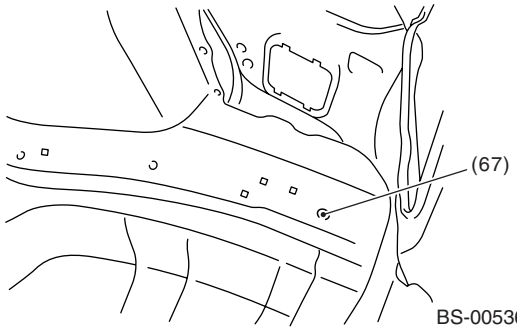


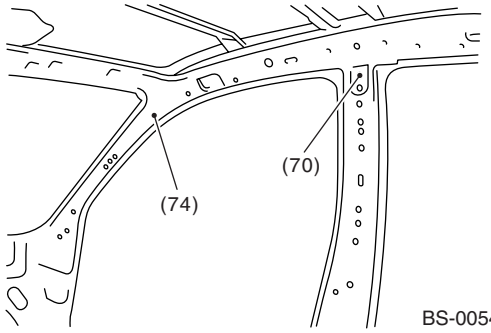
BS-00531



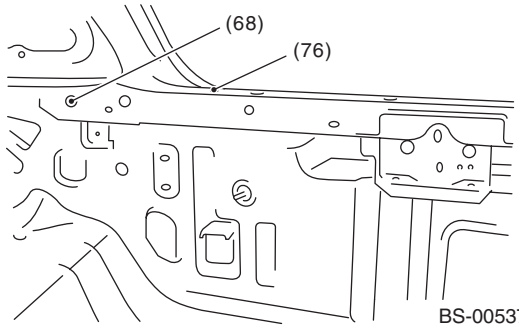
BS-00535

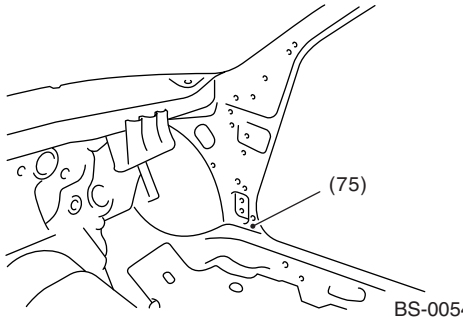
Datum Points



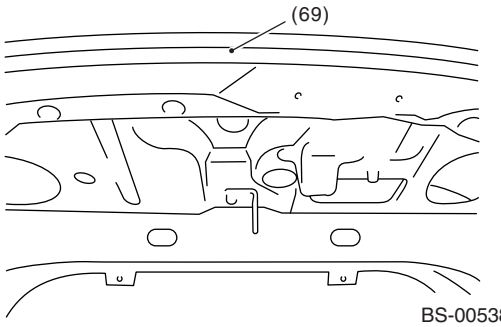


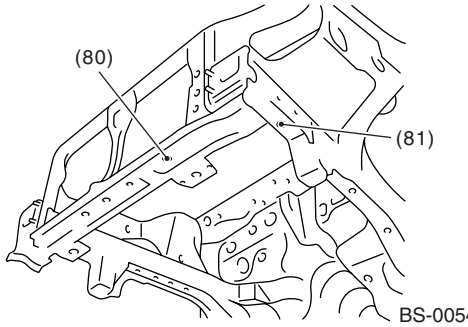
Sedan model

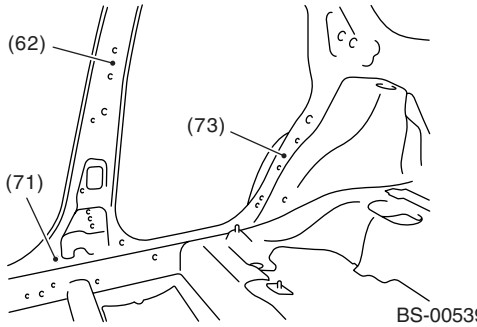


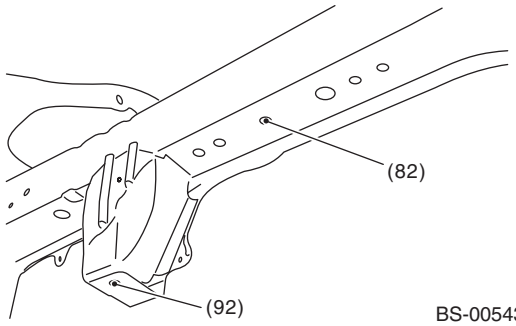


Sedan model

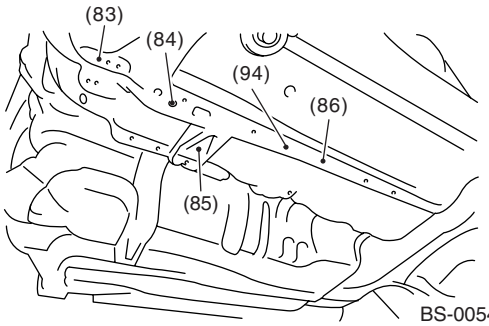




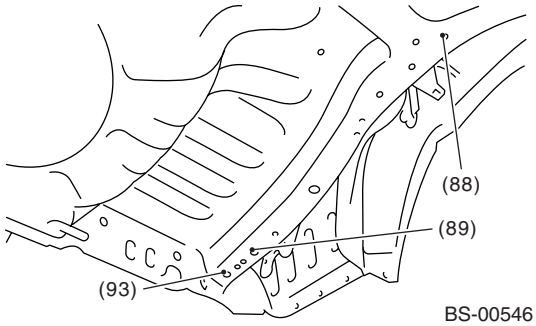




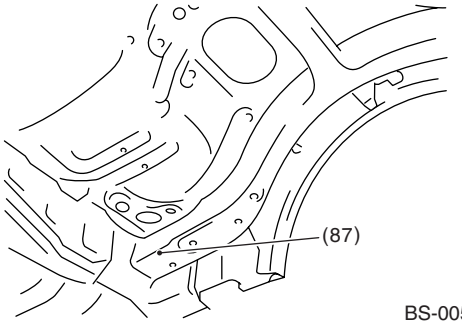
Datum Points



BS-00544



BS-00546



BS-00545

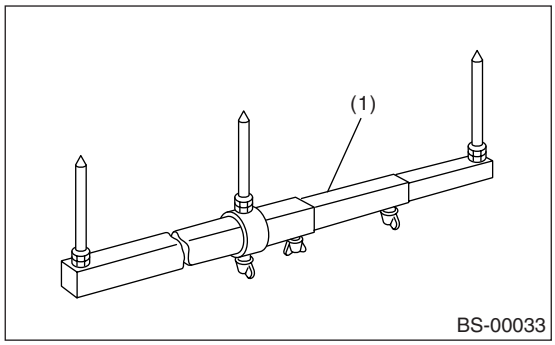
3. Datum Dimensions

A: MEASUREMENT

Refer to LOCATION for details on measurement points. <Ref. to BS-3, LOCATION, Datum Points.>

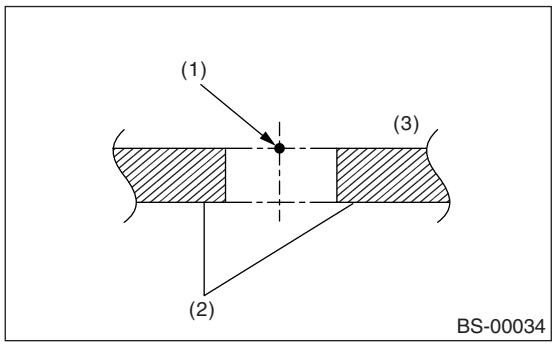
NOTE:

- Using a tram tracking gauge, measure all the dimensions.
- When using a tape measure, carefully measure dimensions without letting the tape measure sag or twist.
- Measure the linear dimensions between cores of holes.
- Suffixes “RH” and “LH” indicate right-hand and left-hand.



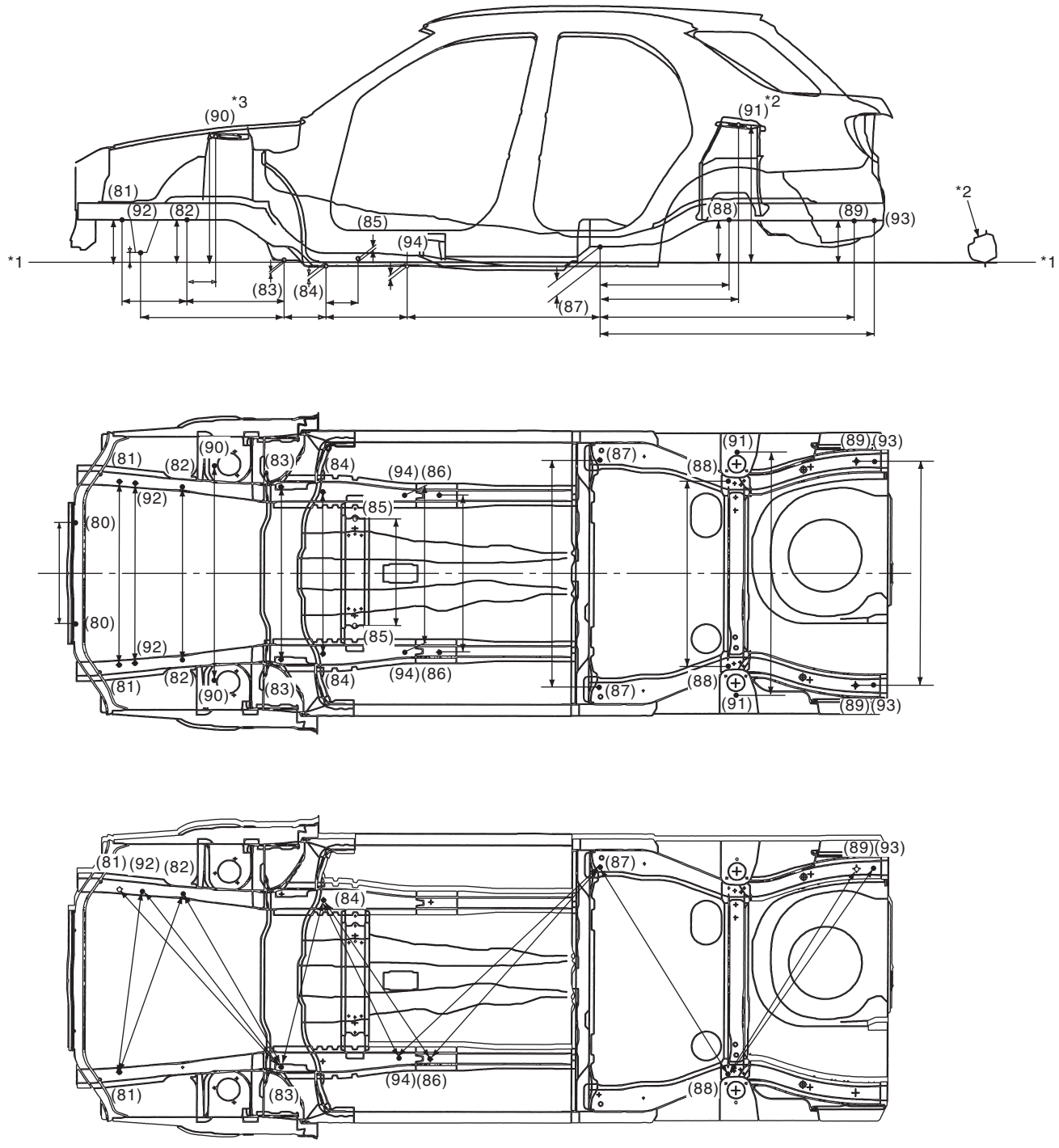
(1) Tram tracking gauge

- Measure at the center of the circle around the outside of the body panel.



(1) Datum point
(2) Body panel
(3) Outside

1. CENTER STRUCTURE



BS-00633

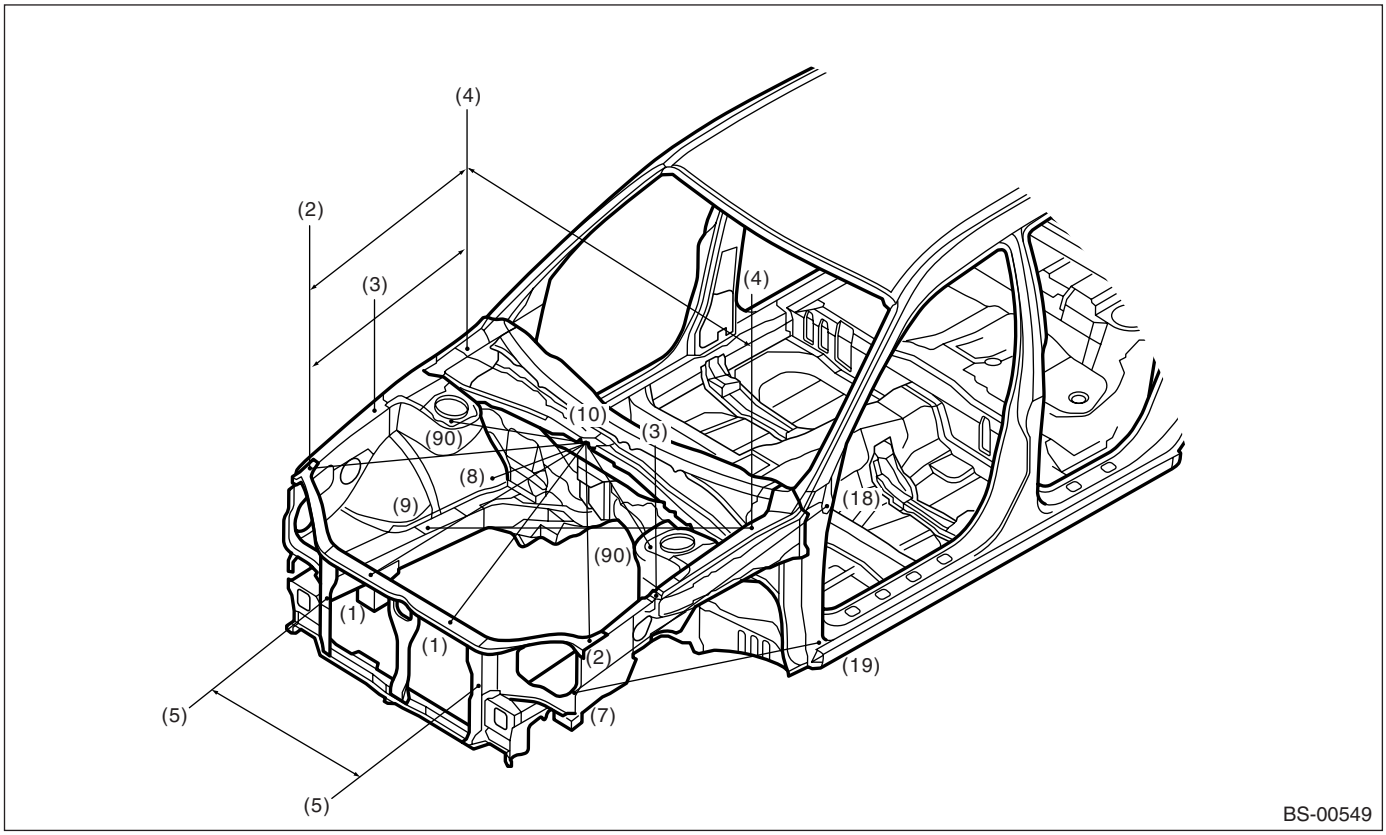
*1: Standard line
*2: Side sill
*3: Upper surface

Datum Dimensions

Point to point	Dimension mm (in)
(81) from standard line	206 (8.11)
(92) from standard line	77 (3.03)
(82) from standard line	206 (8.11)
(90) from standard line	620 (24.41)
(83) from standard line	8 (0.31)
(84) from standard line	20 (0.79)
(85) from standard line	13 (0.51)
(94) from standard line	12 (0.47)
(87) from standard line	76 (2.99)
(88) from standard line	206 (8.11)
(91) from standard line	674 (26.54)
(89) from standard line	205 (8.07)
(81) to (82)	317 (12.48)
(82) to (90)	157 (6.18)
(82) to (83)	485 (19.09)
(92) to (83)	694 (27.32)
(83) to (84)	206 (8.11)
(84) to (85)	159 (6.26)
(84) to (94)	380 (14.96)
(94) to (87)	982 (38.66)
(87) to (88)	633 (24.92)
(87) to (91)	673 (26.50)
(87) to (89)	1,258 (49.53)
(87) to (93)	1,358 (53.46)
(80) RH to (80) LH	500 (19.69)
(81) RH to (81) LH	910 (35.83)
(92) RH to (92) LH	906 (35.67)
(82) RH to (82) LH	860 (33.86)
(90) RH to (90) LH	1,065 (41.93)
(83) RH to (83) LH	856 (33.70)
(84) RH to (84) LH	800 (31.50)
(85) RH to (85) LH	529 (20.83)
(94) RH to (94) LH	776 (30.55)
(86) RH to (86) LH	780 (30.71)
(87) RH to (87) LH	1,128 (44.41)
(88) RH to (88) LH	920 (36.22)
(91) RH to (91) LH	1,205 (47.44)
(89) RH to (89) LH	1,110 (43.70)
(93) RH to (93) LH	1,110 (43.70)
(81) LH to (92) RH	924 (36.38)
(81) LH to (82) RH	940 (37.01)
(81) RH to (83) LH	1,209 (47.60)
(92) RH to (83) LH	1,124 (44.25)
(82) RH to (83) LH	1,005 (39.57)
(83) LH to (84) RH	854 (33.62)
(84) RH to (94) LH	875 (34.45)
(84) RH to (86) LH	951 (37.44)
(94) LH to (87) RH	1,371 (53.98)
(86) LH to (87) RH	1,269 (49.96)
(87) RH to (88) LH	1,211 (47.68)
(88) LH to (89) RH	1,192 (46.93)

Point to point	Dimension mm (in)
(88) LH to (93) RH	1,247 (49.09)

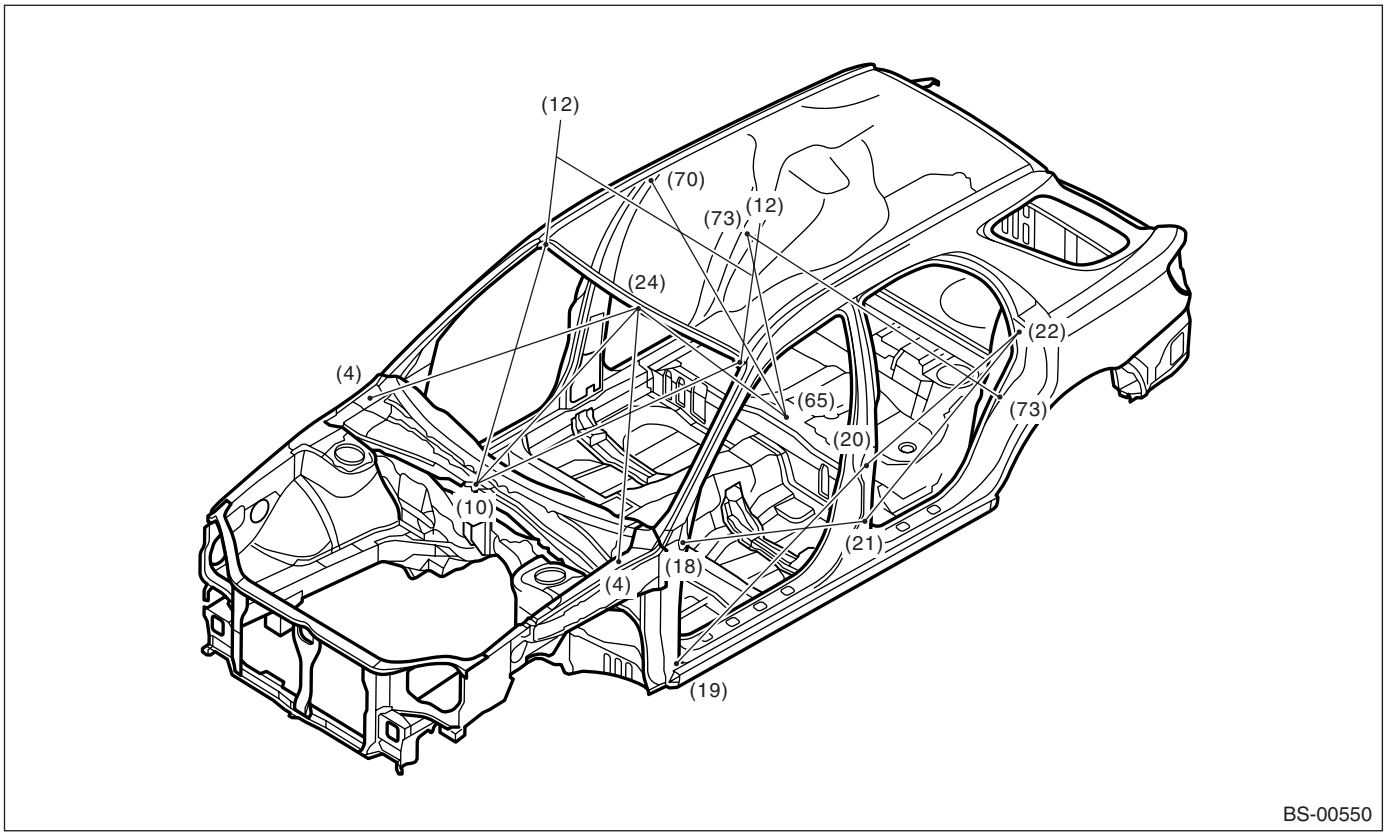
2. WAGON MODEL/SEDAN MODEL (FRONT STRUCTURE)



Point to point	Dimension mm (in)
(10) to (1) RH	912 (35.91)
(10) to (1) LH	912 (35.91)
(10) to (90) RH	566 (22.28)
(10) to (90) LH	566 (22.28)
(10) to (8) RH	581 (22.87)
(10) to (8) LH	581 (22.87)
(10) to (2) RH	948 (37.32)
(10) to (2) LH	948 (37.32)
(4) RH to (2) RH	779 (30.67)
(4) LH to (2) LH	779 (30.67)
(4) RH to (3) RH	430 (16.93)
(4) LH to (3) LH	430 (16.93)
(90) RH to (90) LH	1,065 (41.93)
(8) RH to (8) LH	894 (35.20)
(8) RH to (4) LH	1,210 (47.64)
(8) LH to (4) RH	1,210 (47.64)
(3) RH to (2) RH	350 (13.78)
(3) LH to (2) LH	350 (13.78)
(4) RH to (4) LH	1,417 (55.79)
(2) RH to (2) LH	1,341 (52.80)
(5) RH to (5) LH	720 (28.35)
(7) RH to (18) RH	1,107 (43.58)
(7) LH to (18) LH	1,107 (43.58)
(7) RH to (19) RH	1,105 (43.50)
(7) LH to (19) LH	1,105 (43.50)

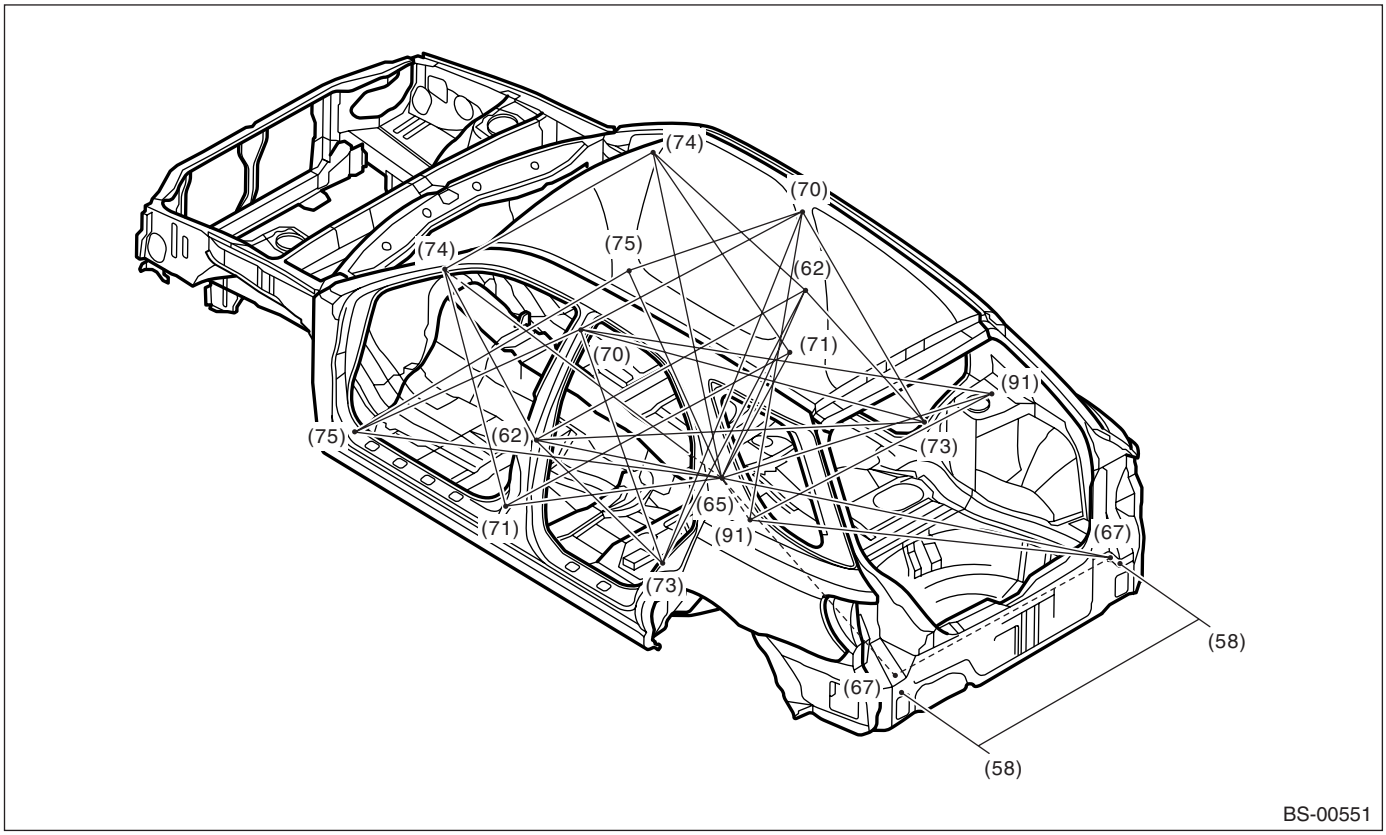
Point to point	Dimension mm (in)
(4) RH to (2) LH	1,583 (62.32)
(4) LH to (2) RH	1,583 (62.32)
(3) RH to (3) LH	1,396 (54.96)
(3) RH to (4) LH	1,470 (57.87)
(3) LH to (4) RH	1,470 (57.87)
(2) RH to (3) LH	1,412 (55.59)
(2) LH to (3) RH	1,412 (55.59)
(9) RH to (9) LH	860 (33.86)
(9) RH to (8) LH	931 (36.65)
(9) LH to (8) RH	931 (36.65)
(9) RH to (4) LH	1,278 (50.31)
(9) LH to (4) RH	1,278 (50.31)

Datum Dimensions



Point to point	Dimension mm (in)
(4) RH to (24)	1,127 (44.37) Wagon model
(4) LH to (24)	1,110 (43.70) Sedan model
(10) to (24)	958 (37.72) Wagon model
(10) to (24)	935 (36.81) Sedan model
(10) to (12) RH	1,122 (44.17) Wagon model
(10) to (12) RH	1,106 (43.54) Sedan model
(10) to (12) LH	1,122 (44.17) Wagon model
(10) to (12) LH	1,106 (43.54) Sedan model
(12) RH to (12) LH	1,029 (40.51) Wagon model
(12) RH to (12) LH	1,042 (41.02) Sedan model
(18) RH to (21) RH	1,049 (41.30)
(18) LH to (21) LH	1,049 (41.30)
(19) RH to (20) RH	1,089 (42.87)
(19) LH to (20) LH	1,089 (42.87)
(20) RH to (22) RH	869 (34.21)
(20) LH to (22) LH	869 (34.21)
(21) RH to (22) RH	985 (38.78)
(21) LH to (22) LH	985 (38.78)
(24) to (65)	1,232 (48.50) Wagon model
(24) to (65)	1,237 (48.70) Sedan model
(65) to (70) RH	1,067 (42.01)
(65) to (70) LH	1,067 (42.01)
(65) to (73) RH	830 (32.68)
(65) to (73) LH	830 (32.68)
(73) RH to (73) LH	1,394 (54.88)

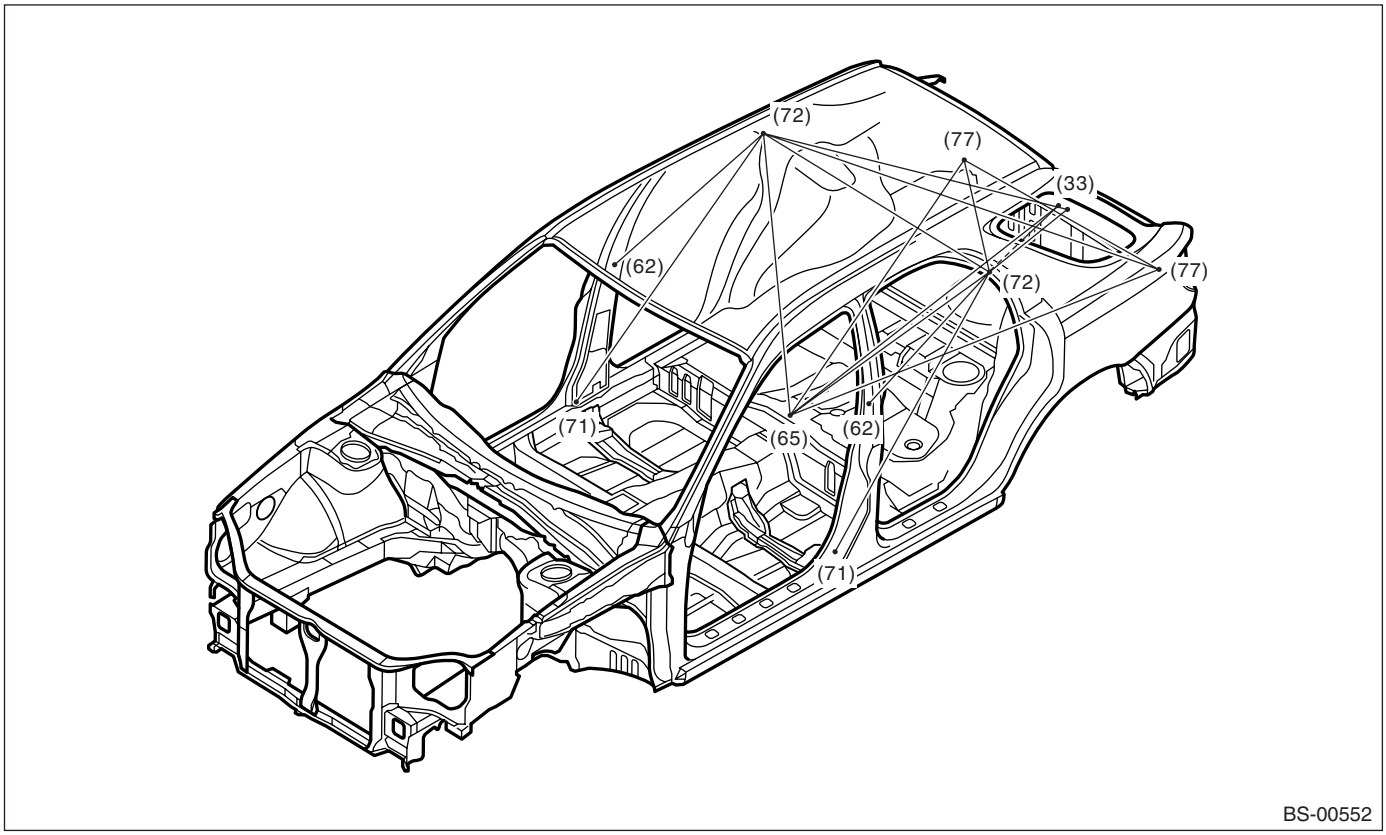
3. WAGON MODEL/SEDAN MODEL (REAR STRUCTURE)



Point to point	Dimension mm (in)
(58) RH to (58) LH	1,128 (44.41)
(62) RH to (62) LH	1,332 (52.44)
(62) RH to (65)	915 (36.02)
(62) LH to (65)	915 (36.02)
(62) RH to (73) RH	762 (30.00)
(62) LH to (73) LH	762 (30.00)
(62) RH to (73) LH	1,561 (61.46)
(62) LH to (73) RH	1,561 (61.46)
(62) RH to (74) RH	592 (23.31) Wagon model
(62) LH to (74) LH	603 (23.74) Sedan model
(65) to (67) RH	1,501 (59.09)
(65) to (67) LH	1,501 (59.09)
(65) to (71) RH	823 (32.40)
(65) to (71) LH	823 (32.40)
(65) to (74) RH	1,275 (50.20) Wagon model
(65) to (74) LH	1,282 (50.47) Sedan model
(65) to (75) RH	1,450 (57.09)
(65) to (75) LH	1,450 (57.09)
(65) to (91) RH	1,064 (41.89)
(65) to (91) LH	1,064 (41.89)
(67) RH to (67) LH	1,110 (43.70)
(67) RH to (91) LH	1,381 (54.37)
(67) LH to (91) RH	1,381 (54.37)
(70) RH to (70) LH	1,060 (41.73)
(70) RH to (73) RH	948 (37.32)

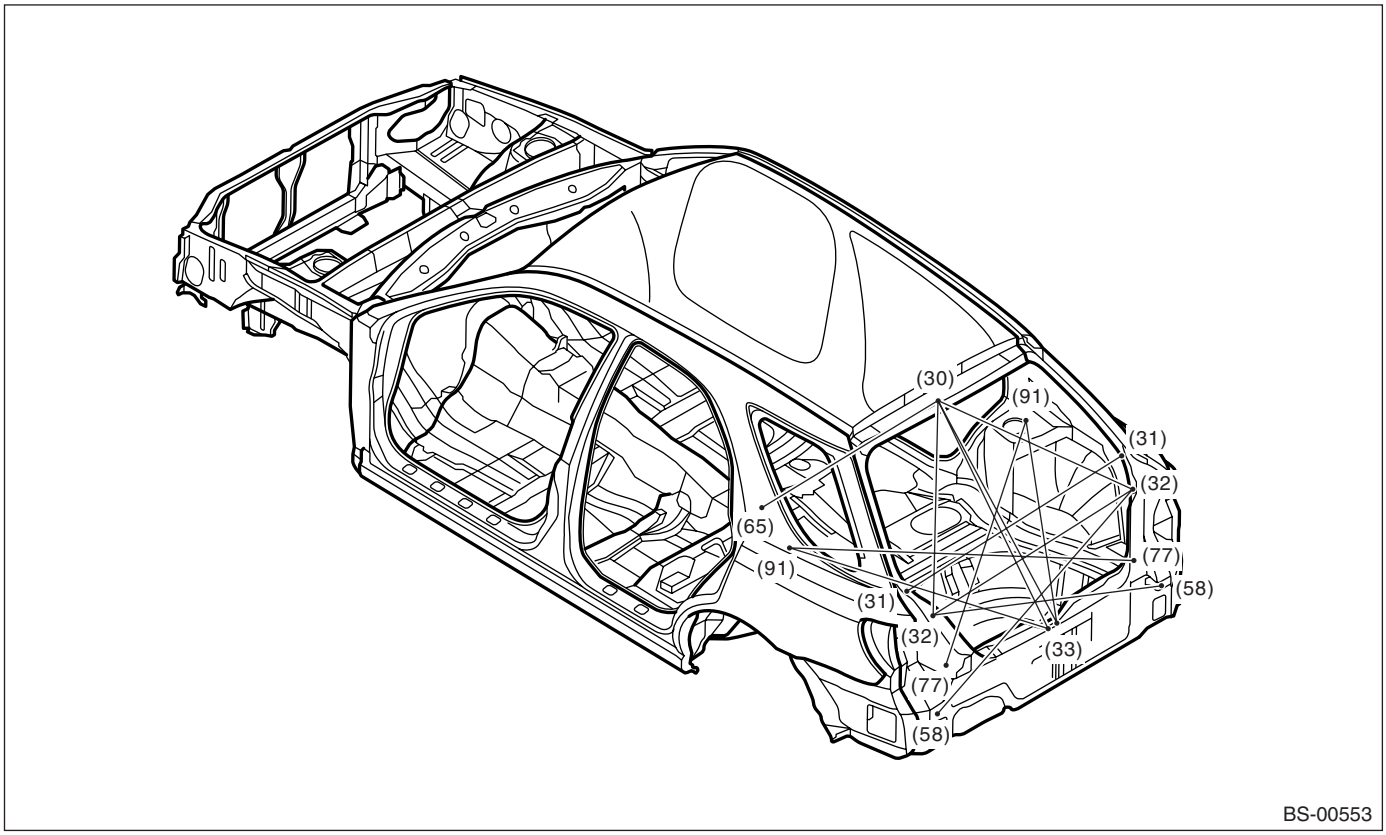
Point to point	Dimension mm (in)
(70) LH to (73) LH	948 (37.32)
(70) RH to (73) LH	1,542 (60.71)
(70) LH to (73) RH	1,542 (60.71)
(70) RH to (75) RH	1,443 (56.81)
(70) LH to (75) LH	1,443 (56.81)
(70) RH to (91) LH	1,532 (60.32)
(70) LH to (91) RH	1,532 (60.32)
(71) RH to (71) LH	1,361 (53.58)
(71) RH to (74) RH	954 (37.56) Wagon model
(71) LH to (74) LH	949 (37.36) Sedan model
(74) RH to (74) LH	1,135 (44.69) Wagon model
(74) RH to (74) LH	1,147 (45.16) Sedan model
(75) RH to (75) LH	1,399 (55.08)
(91) RH to (91) LH	1,205 (47.44)

4. WAGON MODEL (FRONT STRUCTURE)



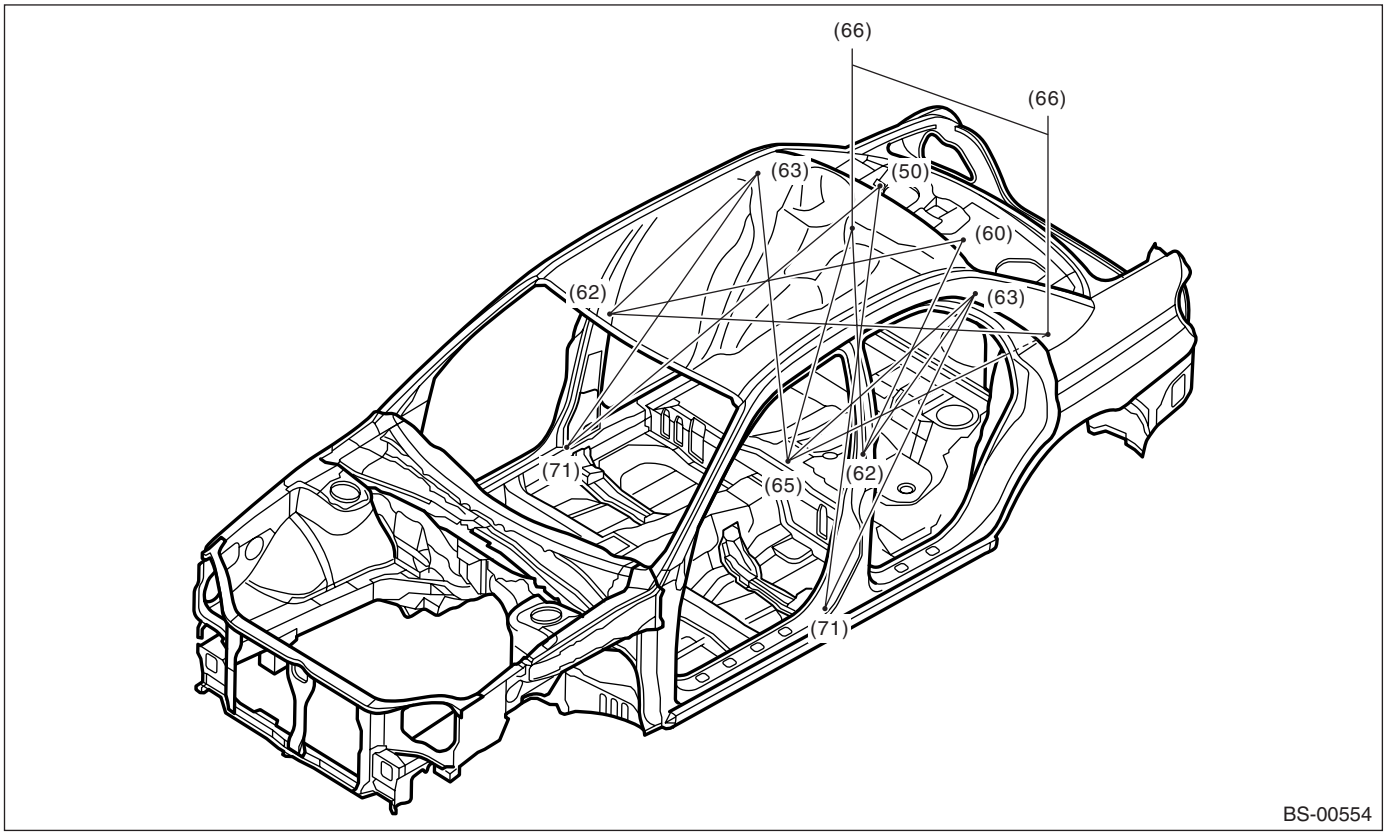
Point to point	Dimension mm (in)
(33) RH to (65)	1,534 (60.39)
(33) LH to (65)	1,534 (60.39)
(33) RH to (72) LH	1,334 (52.52)
(33) LH to (72) RH	1,334 (52.52)
(62) RH to (72) RH	732 (28.82)
(62) LH to (72) LH	732 (28.82)
(65) to (72) RH	1,076 (42.36)
(65) to (72) LH	1,076 (42.36)
(65) to (77) RH	1,538 (60.55)
(65) to (77) LH	1,538 (60.55)
(71) RH to (72) RH	1,223 (48.15)
(71) LH to (72) LH	1,223 (48.15)
(72) RH to (72) LH	1,226 (48.27)
(72) RH to (77) LH	1,544 (60.79)
(72) LH to (77) RH	1,544 (60.79)
(77) RH to (77) LH	898 (35.35)

5. WAGON MODEL (REAR STRUCTURE)



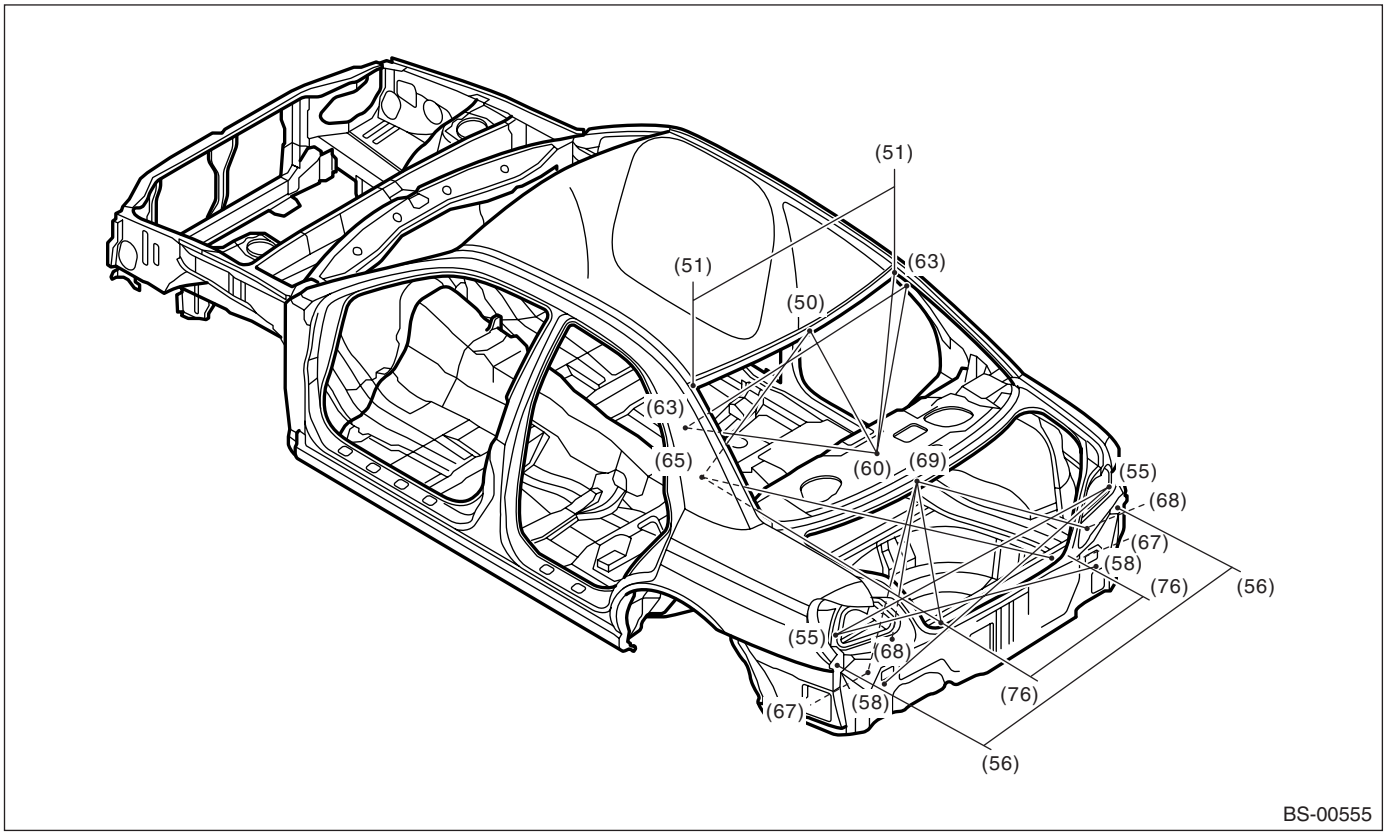
Point to point	Dimension mm (in)
(30) to (32) RH	850 (33.46)
(30) to (32) LH	850 (33.46)
(30) to (33) RH	904 (35.59)
(30) to (33) LH	904 (35.59)
(30) to (65)	1,293 (50.91)
(31) RH to (31) LH	1,212 (47.72)
(32) RH to (32) LH	1,038 (40.87)
(32) RH to (58) LH	1,139 (44.84)
(32) LH to (58) RH	1,139 (44.84)
(33) RH to (91) RH	993 (39.09)
(33) LH to (91) LH	993 (39.09)
(77) RH to (91) LH	1,289 (50.75)
(77) LH to (91) RH	1,289 (50.75)

6. SEDAN MODEL (FRONT STRUCTURE)



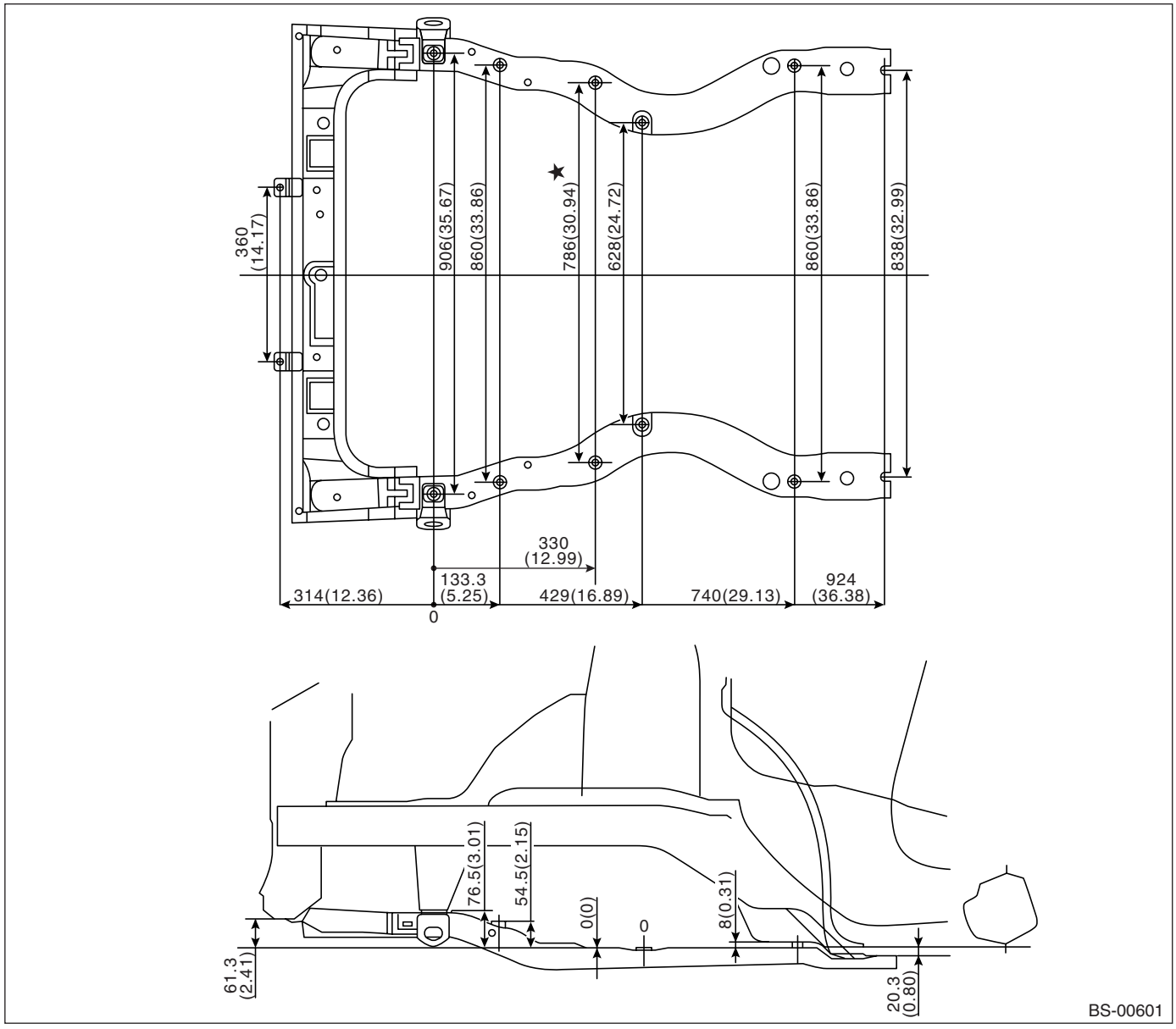
Point to point	Dimension mm (in)
(50) to (71) RH	1,562 (61.50)
(50) to (71) LH	1,562 (61.50)
(60) to (62) RH	1,338 (52.68)
(60) to (62) LH	1,338 (52.68)
(62) RH to (63) RH	773 (30.43)
(62) LH to (63) LH	773 (30.43)
(62) RH to (66) LH	1,449 (57.05)
(62) LH to (66) RH	1,449 (57.05)
(63) RH to (65)	1,118 (44.02)
(63) LH to (65)	1,118 (44.02)
(63) RH to (71) RH	1,283 (50.51)
(63) LH to (71) LH	1,283 (50.51)
(65) to (66) RH	956 (37.64)
(65) to (66) LH	956 (37.64)
(66) RH to (66) LH	840 (33.07)

7. SEDAN MODEL (REAR STRUCTURE)



Point to point	Dimension mm (in)
(50) to (60)	501 (19.72)
(50) to (65)	1,082 (42.60)
(51) RH to (51) LH	1,025 (40.35)
(51) RH to (60)	734 (28.90)
(55) RH to (55) LH	1,406 (55.35)
(55) RH to (58) LH	1,297 (51.06)
(55) LH to (58) RH	1,297 (51.06)
(56) RH to (56) LH	1,426 (56.14)
(60) to (63) RH	764 (30.08)
(60) to (63) LH	764 (30.08)
(63) RH to (63) LH	1,183 (46.57)
(65) to (76) RH	1,544 (60.79)
(65) to (76) LH	1,544 (60.79)
(65) to (68) RH	1,581 (62.24)
(65) to (68) LH	1,581 (62.24)
(67) RH to (69)	784 (30.87)
(67) LH to (69)	784 (30.87)
(68) RH to (68) LH	1,020 (40.16)
(68) RH to (69)	681 (26.81)
(68) LH to (69)	681 (26.81)
(69) to (76) RH	537 (21.14)
(69) to (76) LH	537 (21.14)
(76) RH to (76) LH	600 (23.62)

8. SUB FRAME ALIGNMENT



Unit: mm (in)

★ : Only for STi model

Horizontal and vertical dimensions are values measured from datum points (0).

INSTRUMENTATION/DRIVER INFO

IDI

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4.	Speedometer	16
5.	Tachometer	17
6.	Fuel Gauge	18
7.	Engine Coolant Temperature Gauge	19
8.	Ambient Sensor	20

1. General Description

A: SPECIFICATION

Combination meter	Type	Normal meter	Red luminescent meter
	Speedometer	Electric pulse type	Stepping motor type
	Engine coolant temperature gauge	Cross coil type	Stepping motor type
	Fuel gauge	Cross coil type	Stepping motor type
	Tachometer	Electric pulse type	Stepping motor type
	Turn signal indicator light	14 V — 1.4 W	LED
	Charge indicator light	14 V — 1.4 W	LED
	Oil pressure indicator light	LED	
	ABS warning light	LED	
	Malfunction indicator light	LED	
	HI-beam indicator light	14 V — 1.4 W	LED
	Rear fog light indicator light	LED	—
	Door open warning light	LED	
	Seat belt warning light	LED	
	Brake fluid and parking brake warning light	14 V — 1.4 W	LED
	AWD indicator light	LED	—
	AIRBAG warning light	LED	
	Meter illumination light	14 V — 3 W, 14 V — 2 W	LED
	AT OIL TEMP. warning light	LED	—
	LO indicator light	LED	—
	HOLD indicator light	LED	—
	Immobilizer indicator light	LED	
	POWER indicator light	14 V — 2 W	—
	Low fuel warning light	LED	
	AT select lever position indicator light	14 V — 100 mA	—
	Intercooler water spray warning light	LED	
	REV indicator light	LED	
	Rear differential oil temperature warning light	LED	
	Driver's control center differential indicator light	14 V — 100 mA	LED
	Headlight indicator light	—	LED
	LCD back light	14 V — 1.4 W	LED

B: CAUTION

- Be careful not to damage the meters and instrument panel.
- Be careful not to damage the meter glasses.
- Make sure that electrical connector is connected securely.
- After installation, make sure that each meter operates normally.
- Use gloves to avoid damage and getting fingerprints on the glass surface and meter surfaces.
- Do not apply excessive force to the printed circuit.
- Do not drop or otherwise apply impact.

C: PREPARATION TOOL

1. GENERAL TOOLS

TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance and voltage.

2. Combination Meter System

A: WIRING DIAGRAM

1. COMBINATION METER

<Ref. to WI-241, WIRING DIAGRAM, Combination Meter System.>

2. OUTSIDE TEMPERATURE INDICATOR

<Ref. to WI-255, WIRING DIAGRAM, Outside Temperature Display System.>

B: INSPECTION

CAUTION:
When measuring voltage and resistance of the ECM, TCM, or each sensor, use a tapered pin with a diameter of less than 0.64 mm (0.025 in) in order to avoid poor contact. Do not insert the pin more than 2 mm (0.08 in).

1. SYMPTOM CHART

Symptom	Repair order	Reference
Combination meter assembly does not operate.	(1) Power supply (2) Ground circuit	<Ref. to IDI-4, CHECK POWER SUPPLY AND GROUND CIRCUIT, INSPECTION, Combination Meter System.>
Speedometer does not operate.	(1) Vehicle speed sensor (MT model) TCM (AT model) (2) Harness (3) Speedometer	MT model: <Ref. to IDI-5, CHECK VEHICLE SPEED SENSOR, INSPECTION, Combination Meter System.>
		AT model: <Ref. to IDI-6, CHECK TRANSMISSION CONTROL MODULE (TCM), INSPECTION, Combination Meter System.>
Tachometer does not operate.	(1) ECM (2) Harness (3) Tachometer	<Ref. to IDI-6, CHECK ENGINE CONTROL MODULE (ECM), INSPECTION, Combination Meter System.>
Fuel gauge does not operate.	(1) Fuel level sensor (2) Harness (3) Fuel gauge	<Ref. to IDI-7, CHECK FUEL LEVEL SENSOR, INSPECTION, Combination Meter System.>
Engine coolant temperature gauge does not operate.	(1) Engine coolant temperature sensor (2) Harness (3) Engine coolant temperature gauge	<Ref. to IDI-9, CHECK ENGINE COOLANT TEMPERATURE SENSOR, INSPECTION, Combination Meter System.>
Outside temperature indicator does not operate.	(1) Ambient sensor (2) Harness (3) Combination meter (4) Auto A/C control module	<Ref. to IDI-9, CHECK OUTSIDE TEMPERATURE INDICATOR, INSPECTION, Combination Meter System.>

2. CHECK POWER SUPPLY AND GROUND CIRCUIT

	Step	Check	Yes	No
1	**CHECK POWER SUPPLY FOR COMBINATION METER.** 1) Remove the combination meter. <Ref. to IDI-12, REMOVAL, Combination Meter.> 2) Disconnect the combination meter harness connector. 3) Turn the ignition switch to ON. 4) Measure the voltage between combination meter connector and chassis ground. ***Connector & terminal*** ***(i11) No. 7 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **2.**	Check the harness for open or short between ignition switch and combination meter.
2	**CHECK POWER SUPPLY FOR COMBINATION METER.** Measure the voltage between combination meter connector and chassis ground. ***Connector & terminal*** ***(i11) No. 10 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **3.**	Check the harness for open or short between fuse and combination meter.
3	**CHECK GROUND CIRCUIT OF COMBINATION METER.** 1) Turn the ignition switch to OFF. 2) Measure the resistance of harness between combination meter connector and chassis ground. ***Connector & terminal*** ***(i11) No. 6 — Chassis ground:***	Is the resistance less than 10 Ω?	Normal meter: Replace the combination meter printed circuit. Red luminescent meter: Replace the meter main assembly.	Repair the wiring harness.

3. CHECK VEHICLE SPEED SENSOR

	Step	Check	Yes	No
1	**CHECK VEHICLE SPEED SENSOR.** 1) Lift-up the vehicle and support it with rigid racks. 2) Remove the combination meter with harness connector. 3) Drive the vehicle at a speed greater than 20 km/h (12 MPH). **Warning:** **Be careful not to get caught in the running wheels.** 4) Measure the voltage between combination meter connector and chassis ground. ***Connector & terminal*** ***(i11) No. 2 (+) — Chassis ground (–):***	Is the voltage less than 1 V ←→ more than 5 V?	Normal meter: Check the speedometer. <Ref. to IDI-16, REMOVAL, Speedometer.> Red luminescent meter: Replace the meter main assembly.	Go to step **2.**
2	**CHECK VEHICLE SPEED SENSOR POWER SUPPLY.** 1) Turn the ignition switch to OFF. 2) Disconnect the vehicle speed sensor harness connector. 3) Turn the ignition switch to ON. 4) Measure the voltage between vehicle speed sensor connector and engine ground. ***Connector & terminal*** ***(B17) No. 3 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **3.**	Check the harness for open or short between ignition switch and vehicle speed sensor.
3	**CHECK HARNESS BETWEEN VEHICLE SPEED SENSOR AND ENGINE GROUND.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between vehicle speed sensor connector and engine ground. ***Connector & terminal*** ***(B17) No. 2 — Chassis ground:***	Is the resistance less than 10 Ω?	Go to step **4.**	Repair the wiring harness.
4	**CHECK HARNESS BETWEEN VEHICLE SPEED SENSOR AND COMBINATION METER.** 1) Disconnect the connector from combination meter. 2) Measure the resistance between vehicle speed sensor harness connector and combination meter harness connector. ***Connector & terminal*** ***(B17) No. 1 — (i11) No. 2:***	Is the resistance less than 10 Ω?	Replace the vehicle speed sensor.	Repair the wiring harness.

4. CHECK TRANSMISSION CONTROL MODULE (TCM)

	Step	Check	Yes	No
1	**CHECK TCM SIGNAL.** 1) Lift-up the vehicle and support it with rigid racks. 2) Drive the vehicle faster than 10 km/h (6 MPH). **Warning:** **Be careful not to get caught in the running wheels.** 3) Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B56) No. 17 (+) — Chassis ground (−):***	Is the voltage less than 1 V ←→ more than 5 V?	Go to step **2.**	Check the TCM. <Ref. to 4AT(diag)-2, Basic Diagnostic Procedure.>
2	**CHECK HARNESS BETWEEN TCM AND COMBINATION METER.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM and combination meter. 3) Measure the resistance between TCM harness connector and combination meter harness connector. ***Connector & terminal*** ***(B56) No. 17 — (i11) No. 2:***	Is the resistance less than 10 Ω?	Check the speed meter. <Ref. to IDI-16, REMOVAL, Speedometer.>	Repair the wiring harness.

5. CHECK ENGINE CONTROL MODULE (ECM)

	Step	Check	Yes	No
1	**CHECK ECM SIGNAL.** 1) Start the engine. 2) Measure the voltage between ECM connector and engine ground. ***Connector & terminal*** ***Turbo model:*** ***(B137) No. 9 (+) — Chassis ground (−):*** ***Non-turbo model without OBD:*** ***(B134) No. 30 (+) — Chassis ground (−):*** ***Non-turbo model with OBD:*** ***(B134) No. 10 (+) — Chassis ground (−):***	Is the voltage 0 ←→ 14 V or more?	Go to step **2.**	Check the ECM. <Ref. to EN(H4SO)(diag)-2, Basic Diagnostic Procedure.> or <Ref. to EN(H4SOw/oOBD)(diag)-2, Basic Diagnostic Procedure.> or <Ref. to EN(H4DOTC)(diag)-2, Basic Diagnostic Procedure.>
2	**CHECK HARNESS BETWEEN COMBINATION METER AND ECM.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM and combination meter. 3) Measure the resistance between ECM harness connector and combination meter harness connector. ***Connector & terminal*** ***Turbo model:*** ***(B137) No. 9 — (i11) No. 5:*** ***Non-turbo model without OBD:*** ***(B134) No. 30 — (i11) No. 5:*** ***Non-turbo model with OBD:*** ***(B134) No. 10 — (i11) No. 5:***	Is the resistance less than 10 Ω?	Normal meter: Check the tachometer. <Ref. to IDI-17, REMOVAL, Tachometer.> Red luminescent meter: Replace the meter main assembly.	Repair the wiring harness.

6. CHECK FUEL LEVEL SENSOR

	Step	Check	Yes	No
1	**CHECK ENGINE TYPE.**	Is the displacement 2.5 L or is the engine equipped with turbocharger?	Go to step **2.**	Go to step **7.**
2	**CHECK FUEL LEVEL SENSOR.** 1) Remove the fuel level sensor. <Ref. to FU(H4DOTC)-63, REMOVAL, Fuel Level Sensor.> 2) Measure the resistance between fuel level sensor terminals when setting the float to FULL and EMPTY position. ***Terminals*** ***No. 3 — No. 5:***	Is the resistance 0.5 — 2.5 Ω (FULL) and 50 — 52 Ω (EMPTY)?	Go to step **3.**	Replace the fuel level sensor.
3	**CHECK FUEL SUB LEVEL SENSOR.** 1) Remove the fuel sub level sensor. <Ref. to FU(H4DOTC)-64, REMOVAL, Fuel Sub Level Sensor.> 2) Measure the resistance between fuel sub level sensor terminals when setting the float to FULL and EMPTY position. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 0.5 — 2.5 Ω (FULL) and 42 — 44 Ω (EMPTY)?	Go to step **4.**	Replace the fuel sub level sensor.
4	**CHECK HARNESS BETWEEN FUEL SUB LEVEL SENSOR AND COMBINATION METER.** 1) Disconnect the connector from combination meter. 2) Measure the resistance between fuel sub level sensor harness connector terminal and combination meter harness connector terminal. ***Connector & terminal*** ***Red luminescent meter*** ***(R59) No. 1 — (i12) No. 3:*** ***Normal meter*** ***(R59) No. 1 — (i12) No. 2:***	Is the resistance less than 10 Ω?	Go to step **5.**	Repair the wiring harness.
5	**CHECK HARNESS BETWEEN FUEL LEVEL SENSOR AND FUEL SUB LEVEL SENSOR.** Measure the resistance between fuel level sensor harness connector terminal and fuel sub level sensor harness connector terminal. ***Connector & terminal*** ***(R58) No. 3 — (R59) No.2:***	Is the resistance less than 10 Ω?	Go to step **6.**	Repair the wiring harness.
6	**CHECK FUEL LEVEL SENSOR GROUND CIRCUIT.** Measure the resistance between fuel level sensor harness connector terminal and chassis ground. ***Connector & terminal*** ***(R58) No. 5 — Chassis ground:***	Is the resistance less than 10 Ω?	Normal meter: Check the fuel gauge. <Ref. to IDI-18, REMOVAL, Fuel Gauge.> Red luminescent meter: Replace the meter main assembly.	Repair the wiring harness.

	Step	Check	Yes	No
7	**CHECK FUEL LEVEL SENSOR.** 1) Remove the fuel level sensor. <Ref. to FU(H4SO)-59, REMOVAL, Fuel Level Sensor.> or <Ref. to FU(H4SOw/oOBD)-56, REMOVAL, Fuel Level Sensor.> 2) Measure the resistance between fuel level sensor terminals when setting the float to FULL and EMPTY position. ***Terminals*** ***No. 3 — No. 5:***	Is the resistance 2 — 5 Ω (FULL) and 92 — 95 Ω (EMPTY)?	Go to step **8.**	Replace the fuel level sensor.
8	**CHECK HARNESS BETWEEN FUEL LEVEL SENSOR AND COMBINATION METER.** 1) Disconnect the connector from combination meter. 2) Measure the resistance between fuel level sensor harness connector terminal and combination meter harness connector terminal. ***Connector & terminal*** ***(R58) No. 3 — (i12) No. 2:***	Is the resistance less than 10 Ω?	Go to step **9.**	Repair the wiring harness.
9	**CHECK FUEL LEVEL SENSOR GROUND CIRCUIT.** Measure the resistance between fuel level sensor harness connector terminal and chassis ground. ***Connector & terminal*** ***(R58) No. 5 — Chassis ground:***	Is the resistance less than 10 Ω?	Check the fuel gauge. <Ref. to IDI-18, REMOVAL, Fuel Gauge.>	Repair the wiring harness.

7. CHECK ENGINE COOLANT TEMPERATURE SENSOR

	Step	Check	Yes	No
1	**CHECK ENGINE COOLANT TEMPERATURE SENSOR.** Check the engine coolant temperature sensor. <Ref. to EN(H4SO)(diag)-2, Basic Diagnostic Procedure.> or <Ref. to EN(H4SOw/oOBD)(diag)-2, Basic Diagnostic Procedure.> or <Ref. to EN(H4DOTC)(diag)-2, Basic Diagnostic Procedure.>	Is the engine coolant temperature sensor OK?	Go to step **2.**	Replace the engine coolant temperature sensor.
2	**CHECK HARNESS BETWEEN ENGINE COOLANT TEMPERATURE SENSOR AND COMBINATION METER.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from engine coolant temperature sensor and combination meter. 3) Measure the resistance between engine coolant temperature sensor harness connector and combination meter harness connector. ***Connector & terminal*** ***Red luminescent meter*** ***(E8) No. 3 — (i12) No. 11:*** ***Normal meter*** ***(E8) No. 3 — (i12) No. 9:***	Is the resistance less than 10 Ω?	Normal meter: Check the engine coolant temperature gauge. <Ref. to IDI-19, REMOVAL, Engine Coolant Temperature Gauge.> Red luminescent meter: Replace the meter main assembly.	Repair the wiring harness.

8. CHECK OUTSIDE TEMPERATURE INDICATOR

	Step	Check	Yes	No
1	**CHECK AIR CONDITIONER TYPE.**	Is the vehicle equipped with auto A/C?	Go to step **6.**	Go to step **2.**
2	**CHECK POWER SUPPLY FOR AMBIENT SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from combination meter. 3) Turn the ignition switch to ON. 4) Measure the voltage between combination meter terminal and chassis ground. ***Connector & terminal*** ***(i10) No. 11 (+) — Chassis ground (−):***	Is the voltage more than 4 V?	Go to step **3.**	Replace the combination meter printed circuit.
3	**CHECK HARNESS BETWEEN AMBIENT SENSOR AND COMBINATION METER.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ambient sensor. 3) Measure the resistance between ambient sensor harness connector terminal and combination meter harness connector terminal. ***Connector & terminal*** ***LHD model:*** ***(F78) No. 1 — (i10) No. 11:*** ***(F78) No. 2 — (i10) No. 8:*** ***RHD model:*** ***(F78) No. 2 — (i10) No. 11:*** ***(F78) No. 1 — (i10) No. 8:***	Is the resistance less than 10 Ω?	Go to step **4.**	Repair the wiring harness.

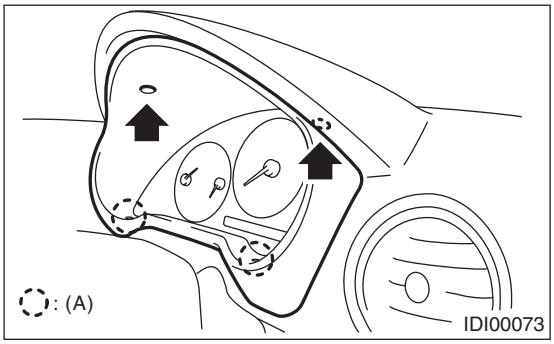
	Step	Check	Yes	No
4	**CHECK AMBIENT SENSOR.** 1) Remove the ambient sensor. 2) Check the ambient sensor. <Ref. to IDI-20, INSPECTION, Ambient Sensor.>	Is the ambient sensor OK?	Go to step **5.**	Replace the ambient sensor.
5	**CHECK OUTSIDE TEMPERATURE INDICATOR.** 1) Connect the combination meter harness connector. 2) Connect a resistor (2.2 kΩ) between terminals of ambient sensor harness connector. 3) Turn the ignition switch to ON and check the outside temperature indicator display.	Is the outside temperature indicator indicating 25°C (77°F)?	Repair the poor contact of ambient sensor harness connector.	Replace the combination meter printed circuit.
6	**CHECK POWER SUPPLY FOR COMBINATION METER.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from auto A/C control module. 3) Turn the ignition switch to ON. 4) Measure the voltage between auto A/C control module terminal and chassis ground. ***Connector & terminal*** ***(B282) No. 11 (+) — chassis ground (–):***	Is the voltage more than 4 V?	Go to step **7.**	Replace the auto A/C control module.
7	**CHECK HARNESS BETWEEN AUTO A/C CONTROL MODULE AND COMBINATION METER.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from combination meter. 3) Measure the resistance between auto A/C control module harness connector terminal and combination meter harness connector terminal. ***Connector & terminal*** ***(B282) No. 11 — (i10) No. 12:***	Is the resistance less than 10 Ω?	Go to step **8.**	Repair the wiring harness.
8	**CHECK POWER SUPPLY FOR AMBIENT SENSOR.** 1) Turn the ignition switch to ON. 2) Measure the voltage between auto A/C control module terminal and chassis ground. ***Connector & terminal*** ***(B283) No. 9 (+) — chassis ground (–):***	Is the voltage more than 4 V?	Go to step **9.**	Replace the auto A/C control module.
9	**CHECK HARNESS BETWEEN AMBIENT SENSOR AND COMBINATION METER.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ambient sensor. 3) Measure the resistance between ambient sensor harness connector terminal, combination meter harness connector terminal and auto A/C control module harness connector terminal. ***Connector & terminal*** ***LHD model:*** ***(F78) No. 1 — (i10) No. 11:*** ***(F78) No. 1 — (B283) No. 9:*** ***(F78) No. 2 — (i10) No. 8:*** ***RHD model:*** ***(F78) No. 2 — (i10) No. 11:*** ***(F78) No. 2 — (B283) No. 9:*** ***(F78) No. 1 — (i10) No. 8:***	Is the resistance less than 10 Ω?	Go to step **10.**	Repair the wiring harness.

	Step	Check	Yes	No
10	**CHECK AMBIENT SENSOR.** 1) Remove the ambient sensor. 2) Check the ambient sensor. <Ref. to IDI-20, INSPECTION, Ambient Sensor.>	Is the ambient sensor OK?	Go to step **11.**	Replace the ambient sensor.
11	**CHECK OUTSIDE TEMPERATURE INDICATOR.** 1) Connect the combination meter and auto A/C control module harness connector. 2) Connect a resistor (2.2 kΩ) between terminals of ambient sensor harness connector. 3) Turn the ignition switch to ON and check the outside temperature indicator display.	Is the outside temperature indicator indicating 25°C (77°F)?	Repair the poor contact of ambient sensor harness connector.	Normal meter: Replace the combination meter printed circuit. Red luminescent meter: Replace the meter main assembly.

3. Combination Meter

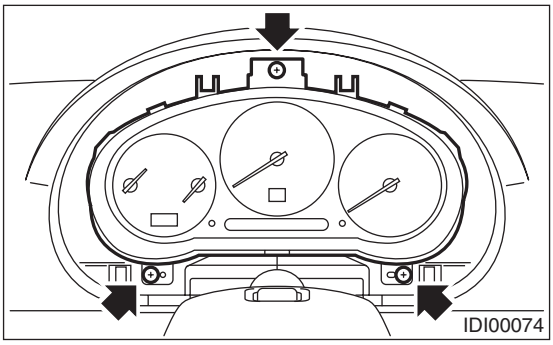
A: REMOVAL

1) Disconnect the ground cable from battery.
2) Set the tilt steering at lowest position.
3) Remove the screws and detach the meter visor.



(A) Hook

4) Remove the screws of combination meter and pull out the meter toward you.



5) Disconnect the connector in the upper area of combination meter to remove the meter.

CAUTION:
• Be careful not to damage the meter or instrument panel.
• Pay particular attention to avoid damaging the meter glass.

B: INSTALLATION

Install in the reverse order of removal.

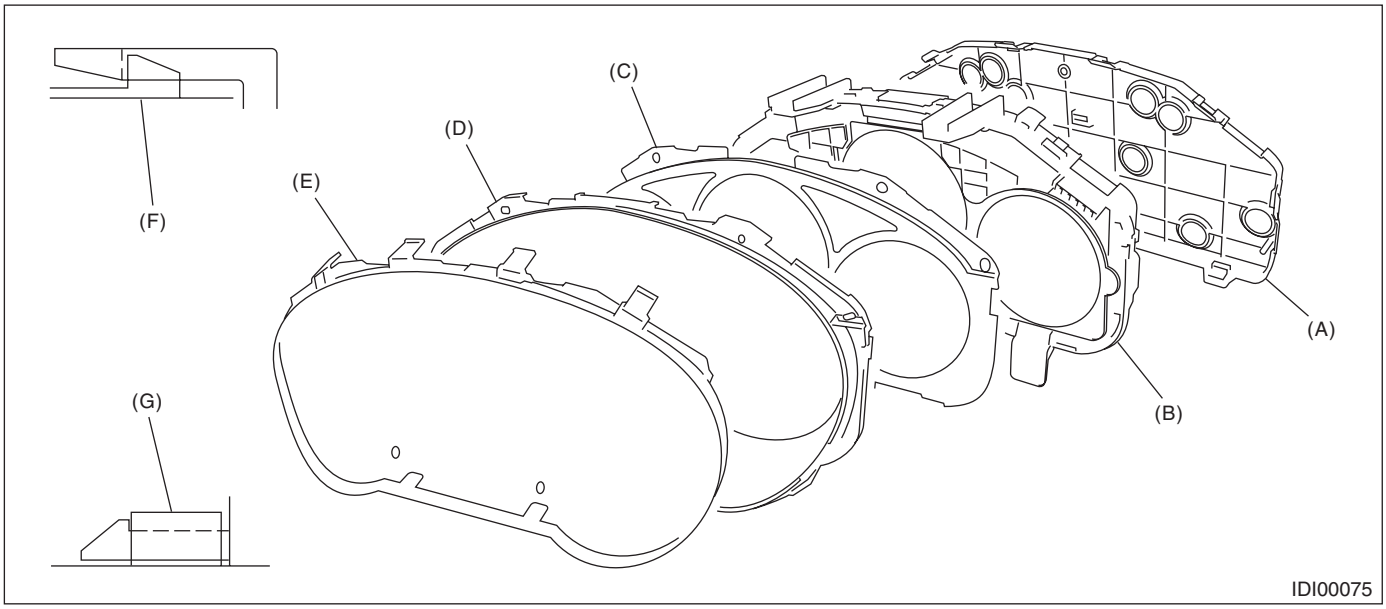
CAUTION:
• Make sure that electrical connector is connected securely.
• Make sure that each meter operates normally.

C: DISASSEMBLY

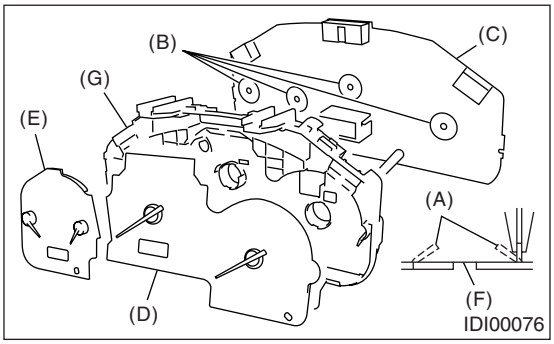
1. NORMAL METER

CAUTION:
Use gloves to avoid damage and getting fingerprints on the glass surface and meter surfaces.

1) Disengage the claw (F) to remove the inner case (B) from back cover (A).
2) Disengage the claw (G) to remove the meter glass (E), reflector (D), and window plate (C) from inner case (B).



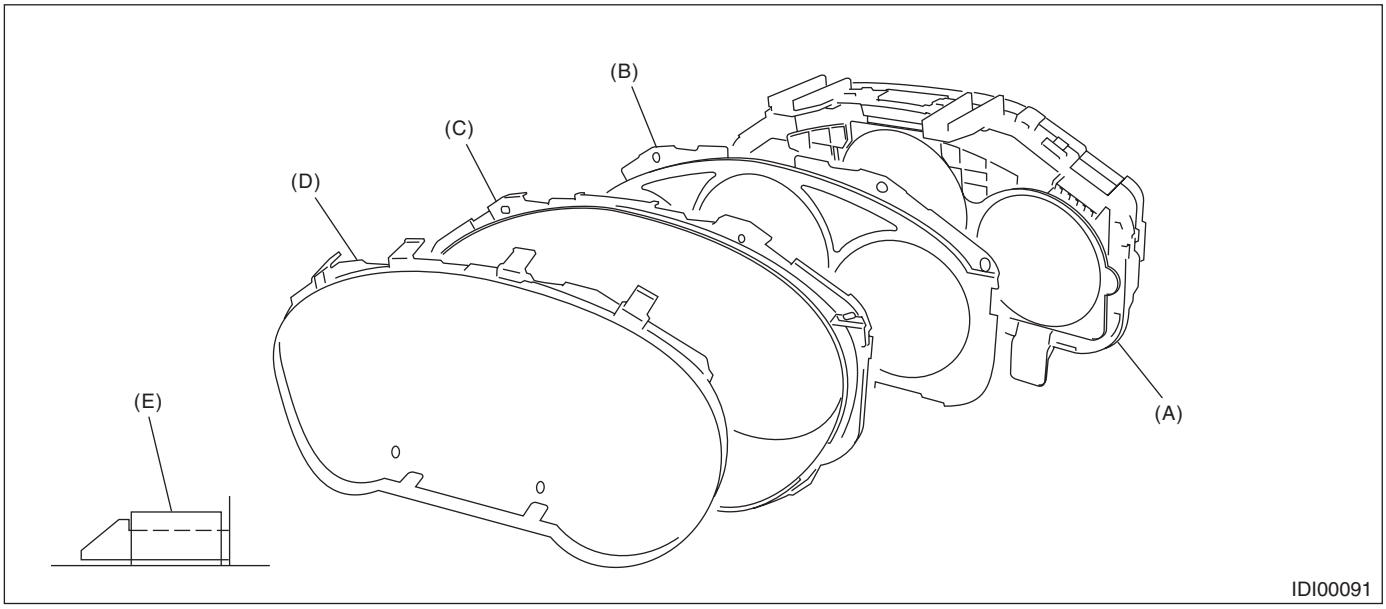
3) Pull up the claw (A) in portion (B) of combination meter printed circuit (C) with combination pliers. Push out the speedometer and tachometer assembly (D) and fuel gauge and engine coolant temperature gauge assembly (E) using hole (F).
4) Pull up the claw in center of combination meter printed circuit (C), and remove the printed circuit from case (G).



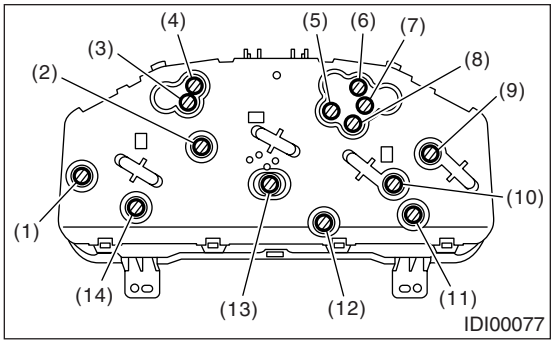
2. RED LUMINESCENT METER

CAUTION:
- **Use gloves to avoid damage and getting fingerprints on the glass surface and meter surfaces.**
- **Do not disassemble the meter main assembly of red luminescent meter.**

Disengage the claw (E) to remove the meter glass (D), reflector (C), and window plate (B) from meter main assembly (A).



3. BULB REPLACEMENT



(1) Tachometer (Non-turbo model) or speedometer (Turbo model)
(2) Speedometer and tachometer
(3) Turn signal indicator light (RH)
(4) HI-beam indicator light
(5) Speedometer (Non-turbo model) or tachometer (Turbo model)
(6) POWER indicator light
(7) Turn signal indicator light (LH)
(8) Brake fluid and parking brake warning light
(9) Fuel gauge
(10) Engine coolant temperature gauge
(11) LCD (Outside temperature indicator)
(12) Charge warning light
(13) LCD (Odometer and tripmeter: non-turbo model)
(14) LCD (Odometer and tripmeter: turbo model)

NOTE:
Replace the meter main assembly of red luminescent meter if it does not function properly, because the warning light and indicator light are made from LED.

D: ASSEMBLY

Assemble in the reverse order of disassembly.

4. Speedometer

A: REMOVAL

NOTE:
Since the meter main assembly of red luminescent meter cannot be disassembled, do not remove or inspect the speedometer alone.

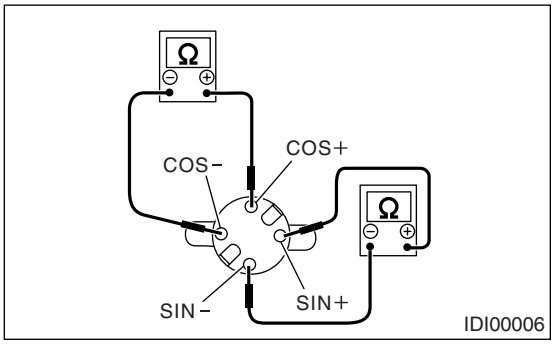
Disassemble the combination meter, and then remove the speedometer and tachometer assembly. <Ref. to IDI-13, DISASSEMBLY, Combination Meter.>

B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

Measure the speedometer resistance.



Terminal	Resistance
Terminals SIN+ and SIN−	200±8 Ω
Terminals COS+ and COS−	200±8 Ω

If NG, replace the speedometer and tachometer assembly.
If OK, replace the combination meter printed circuit.

5. Tachometer

A: REMOVAL

NOTE:
Since the meter main assembly of red luminescent meter cannot be disassembled, do not remove or inspect the tachometer alone.

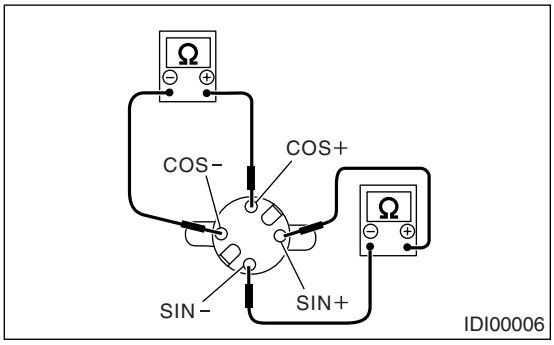
Disassemble the combination meter, and then remove the speedometer and tachometer assembly. <Ref. to IDI-13, DISASSEMBLY, Combination Meter.>

B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

Measure the tachometer resistance.



Terminal	Resistance
Terminals SIN+ and SIN−	200±8 Ω
Terminals COS+ and COS−	200±8 Ω

If NG, replace the speedometer and tachometer assembly.
If OK, replace the combination meter printed circuit.

6. Fuel Gauge

A: REMOVAL

NOTE:
Since the meter main assembly of red luminescent meter cannot be disassembled, do not remove or inspect the fuel gauge alone.

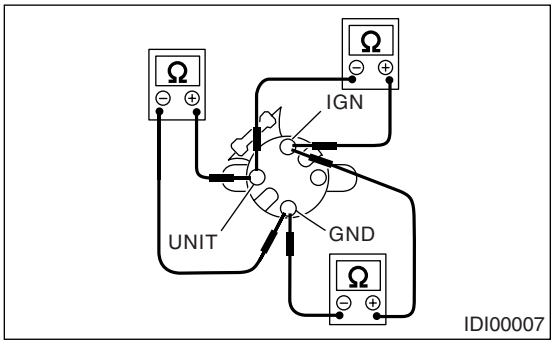
Disassemble the combination meter, and then remove the water temperature gauge and fuel gauge assembly. <Ref. to IDI-13, DISASSEMBLY, Combination Meter.>

B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

Measure the fuel gauge resistance.



Terminal	Resistance
Terminals IGN and GND	170±10 Ω
Terminals IGN and UNIT	35±10 Ω
Terminals UNIT and GND	136±10 Ω

If NG, replace the engine coolant temperature gauge and fuel gauge assembly.
If OK, replace the combination meter printed circuit.

7. Engine Coolant Temperature Gauge

A: REMOVAL

NOTE:
Since the meter main assembly of red luminescent meter cannot be disassembled, do not remove or inspect the engine coolant temperature gauge alone.

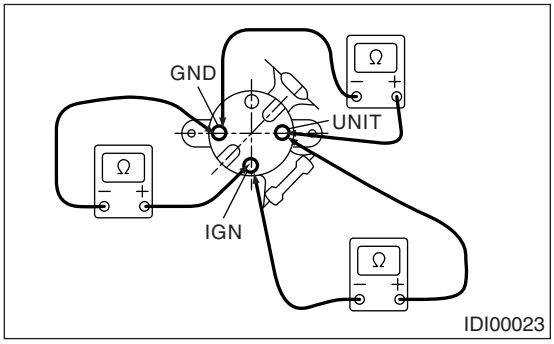
Disassemble the combination meter, and then remove the tachometer and engine coolant temperature gauge and fuel gauge assembly. <Ref. to IDI-13, DISASSEMBLY, Combination Meter.>

B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

Measure the engine coolant temperature gauge resistance.



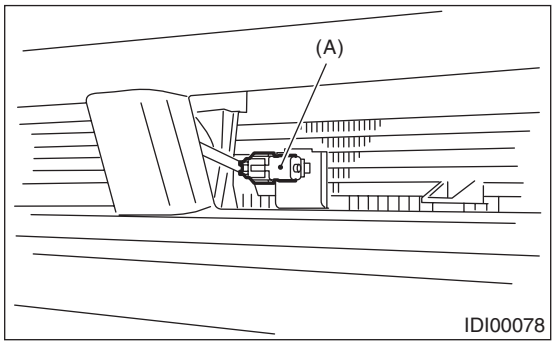
Terminal	Resistance
Terminals IGN and GND	208±10 Ω
Terminals IGN and UNIT	56±10 Ω
Terminals UNIT and GND	264±10 Ω

If NG, replace the engine coolant temperature gauge and fuel gauge assembly.
If OK, replace the combination meter printed circuit.

8. Ambient Sensor

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Disconnect the ambient sensor connector.
3) Remove the ambient sensor (A) from radiator lower panel.

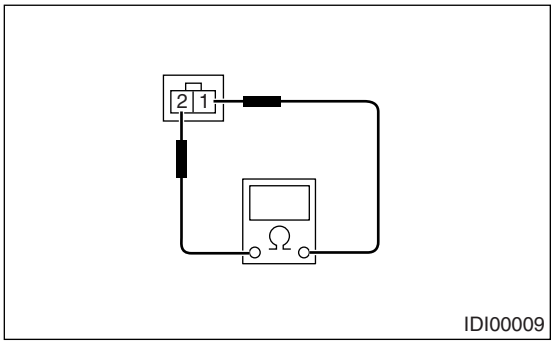


B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

Measure the ambient sensor resistance.



Terminal	Resistance
1 and 2	2.2 kΩ/25°C (77°F)

If NG, replace the ambient sensor.

SEATS

SE

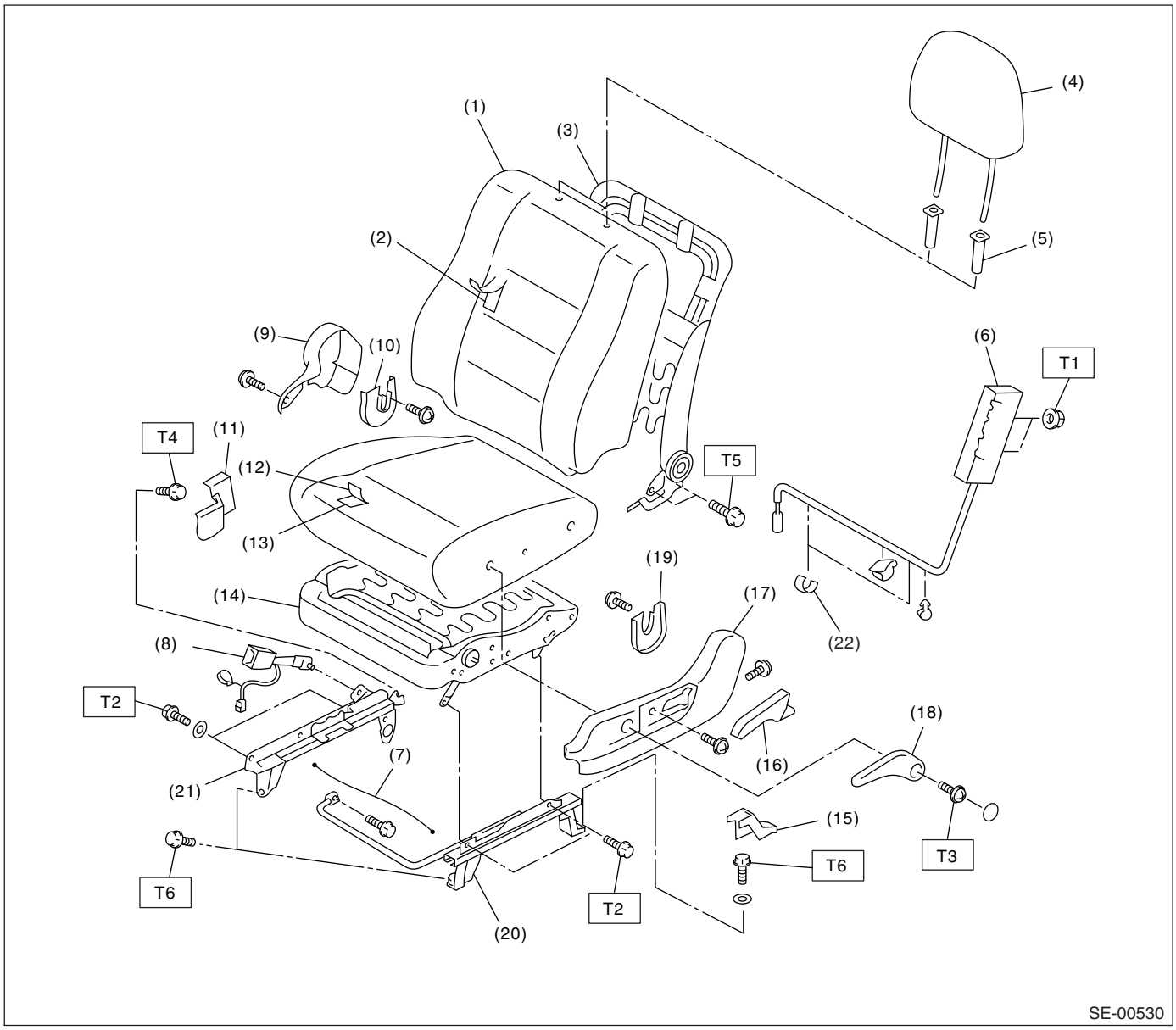
Page

1. General Description 2
2. Front Seat 6
3. Rear Seat 12

1. General Description

A: COMPONENT

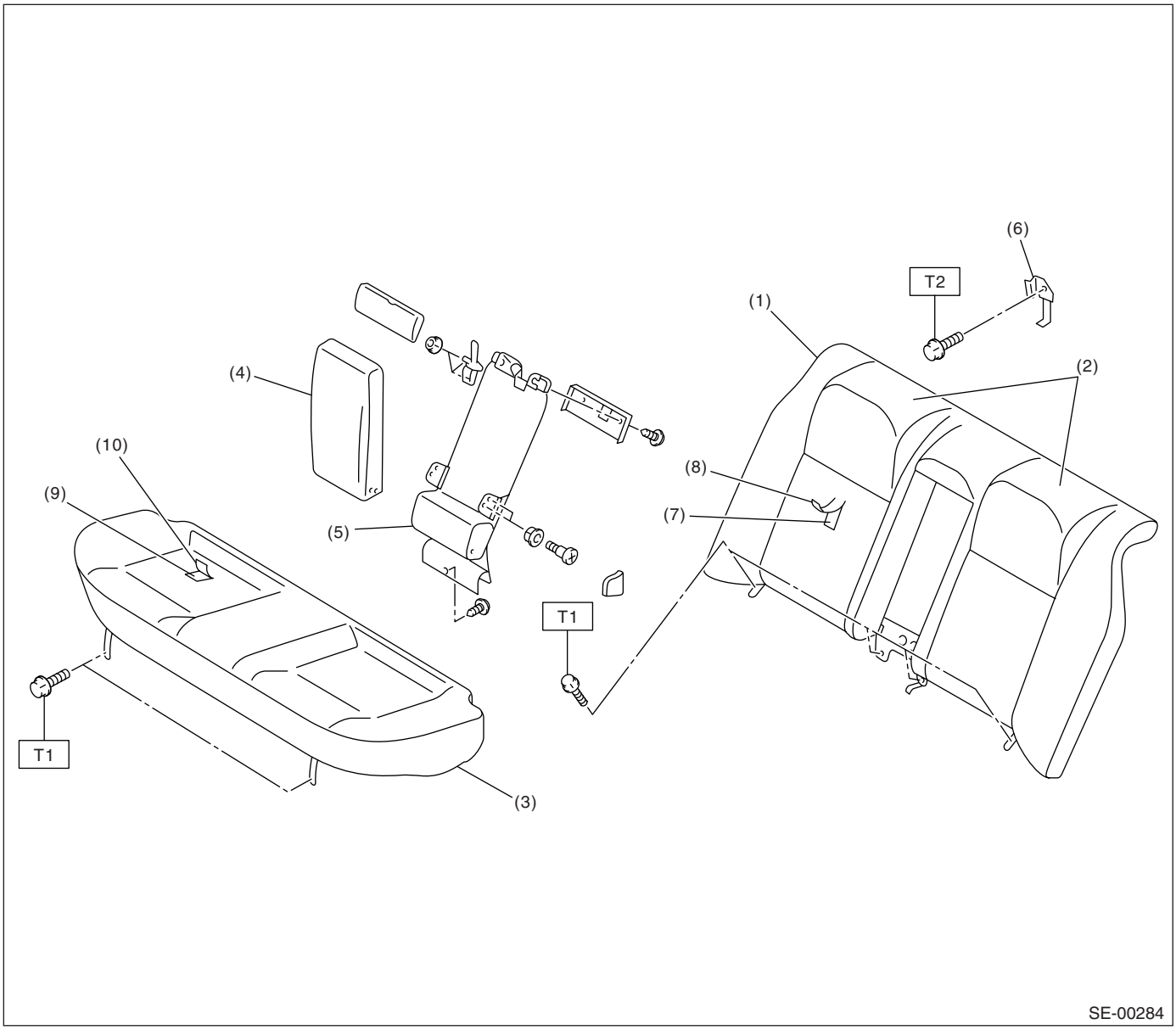
1. FRONT SEAT



(1)	Backrest cover	(11)	Bolt cover inner	(21)	Inner slide rail
(2)	Backrest pad	(12)	Seat cushion cover	(22)	Tape
(3)	Backrest frame ASSY	(13)	Seat cushion pad		
(4)	Headrest ASSY	(14)	Seat cushion frame ASSY		
(5)	Headrest lock bush	(15)	Bolt cover outer		
(6)	Side airbag module	(16)	Reclining lever		
(7)	Connecting cable	(17)	Seat hinge outer cover		
(8)	Inner belt	(18)	Lifter lever		
(9)	Seat hinge inner cover	(19)	Seat hinge inner cover RH		
(10)	Seat hinge inner cover LH	(20)	Outer slide rail		

Tightening torque: N·m (kgf-m, ft-lb)
T1: 6 (0.61, 4.43)
T2: 10 (1.02, 7.38)
T3: 22 (2.24, 16.2)
T4: 30 (3.06, 22.1)
T5: 52 (5.30, 38.4)
T6: 53 (5.40, 39.1)

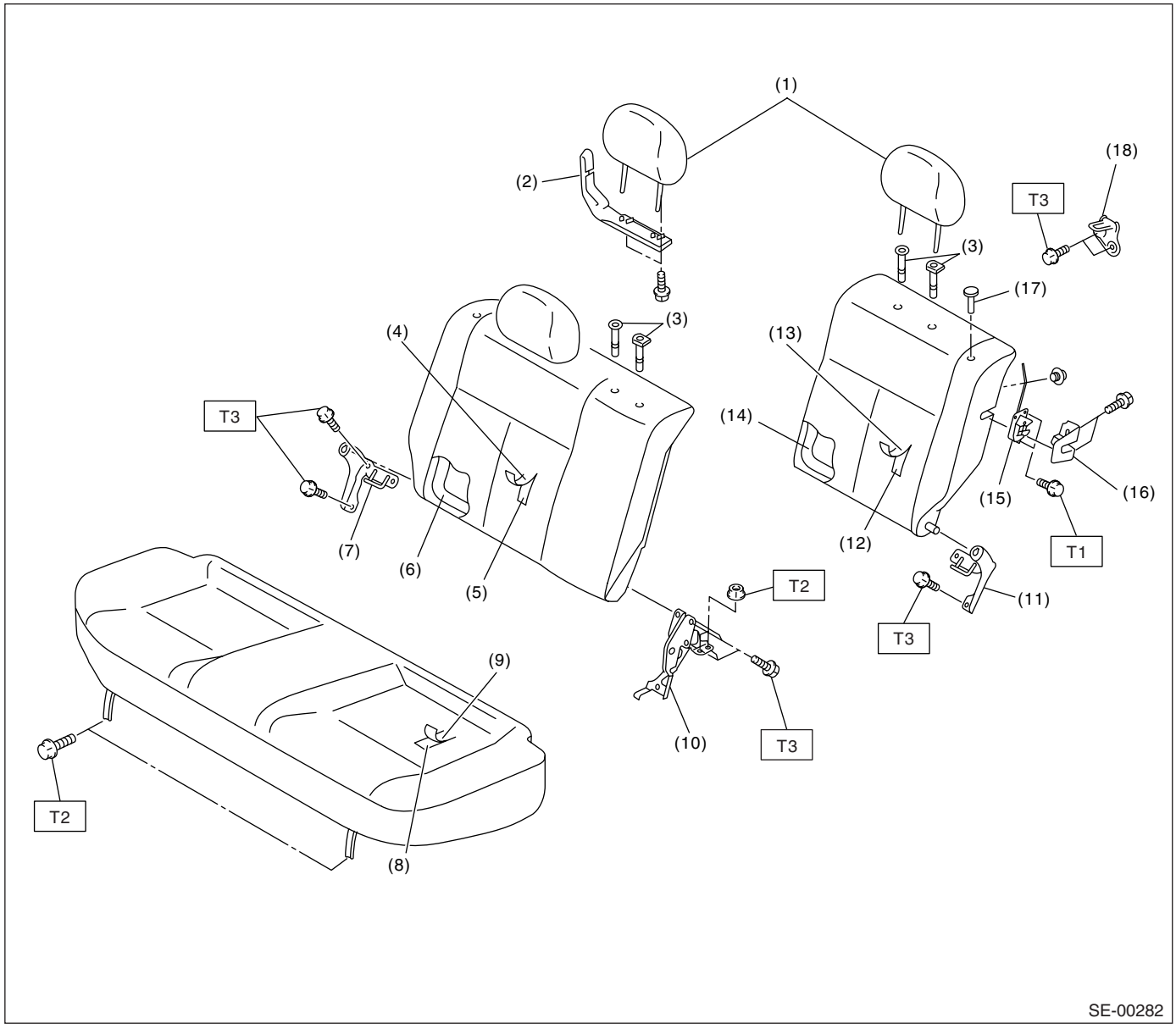
2. REAR SEAT (SEDAN MODEL)



(1)	Backrest	(6)	Hook
(2)	Headrest	(7)	Backrest pad ASSY
(3)	Cushion	(8)	Backrest cover ASSY
(4)	Arm rest	(9)	Rear pad & cushion frame ASSY
(5)	Center through frame	(10)	Rear cushion cover

Tightening torque: N·m (kgf-m, ft-lb)
T1: 10 (1.02, 7.38)
T2: 24.5 (2.5, 18.1)

3. REAR SEAT (WAGON MODEL)



(1) Headrest
(2) Seat belt guide
(3) Headrest bush
(4) Backrest cover RH
(5) Backrest pad RH
(6) Backrest frame RH
(7) Hinge ASSY RH
(8) Seat cushion cover
(9) Seat cushion pad
(10) Hinge ASSY CTR
(11) Hinge ASSY LH
(12) Backrest pad LH
(13) Backrest cover LH
(14) Backrest frame LH
(15) Seat back latch
(16) Seat back latch cover
(17) Backrest knob
(18) Striker

Tightening torque: N·m (kgf-m, ft-lb)
T1: 17.3 (1.76, 12.8)
T2: 24.5 (2.5, 18.1)
T3: 33 (3.3, 24.6)

B: CAUTION

When removing the front seat from a side airbag loaded vehicle, follow cautions given in the airbag section.

C: PREPARATION TOOL

1. GENERAL TOOL

TOOL NAME	REMARKS
Long Nose Pliers	Used for removing hog ring.
Hog Ring Pliers	Used for installing hog ring.

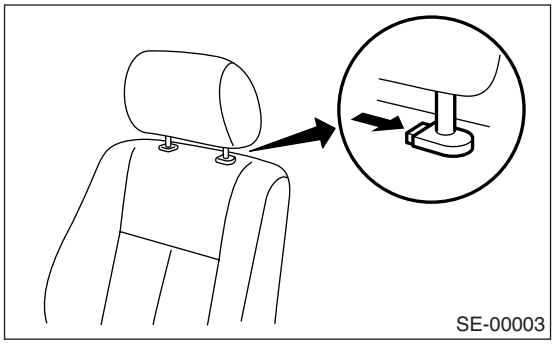
2. Front Seat

A: REMOVAL

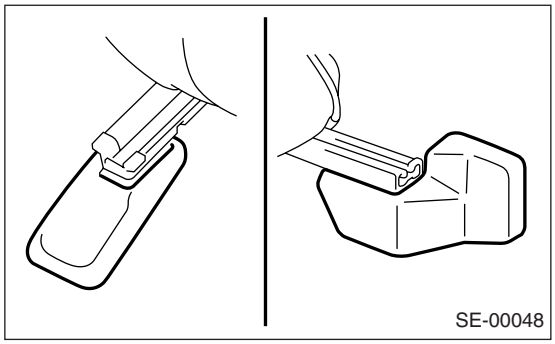
1) Disconnect the ground cable from battery.

CAUTION:
The airbag system is fitted with a backup power source. If the airbag system is serviced within 20 seconds after the ground cable is disconnected, it may inflate.

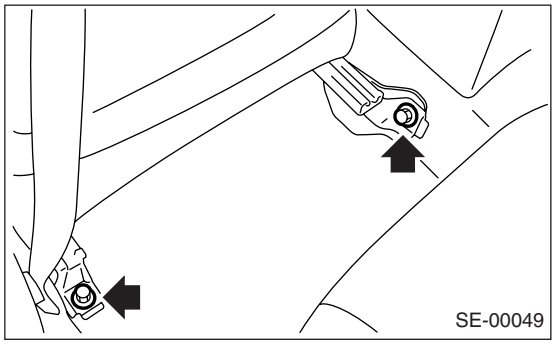
2) While pressing the headrest lock button, remove the headrest.


SE-00003

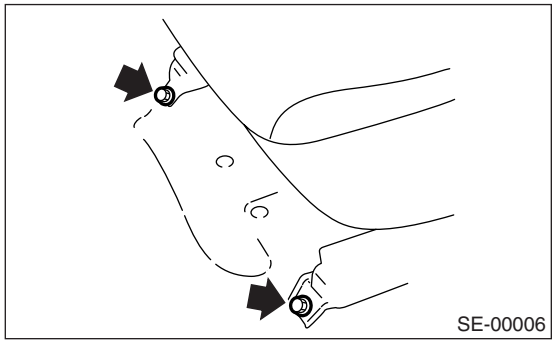
3) Tilt forward the backrest.
4) Move the seat to full front end.
5) Remove the bolt cover at rear end of slide rail.


SE-00048

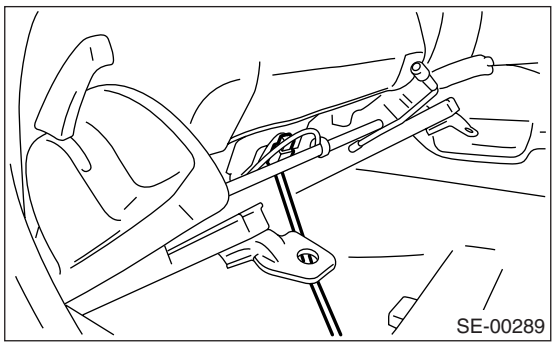
6) Remove the two bolts at rear side of seat rail.


SE-00049

7) Move the seat to full rear end.
8) Remove the two bolts at front side of seat rail.


SE-00006

9) Disconnect the connector under seat.
- Seat belt warning light connector (Driver's seat)
- Side airbag connector (with side airbag)


SE-00289

10) Remove the front seat from vehicle.

B: INSTALLATION

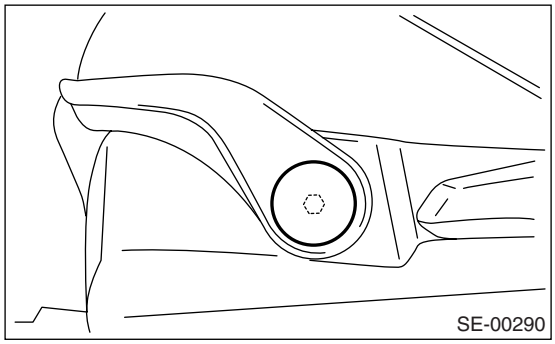
Install in the reverse order of removal.

Tightening torque:
Refer to COMPONENT in General Description. <Ref. to SE-2, FRONT SEAT, COMPONENT, General Description.>

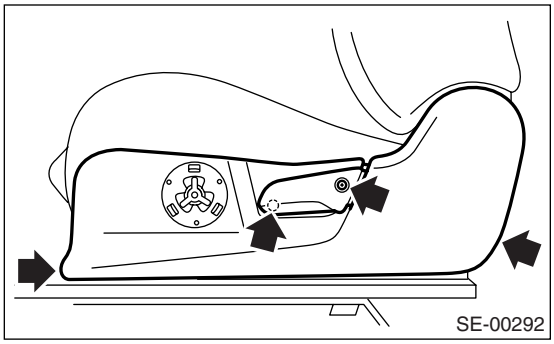
C: DISASSEMBLY

1. STANDARD SEAT

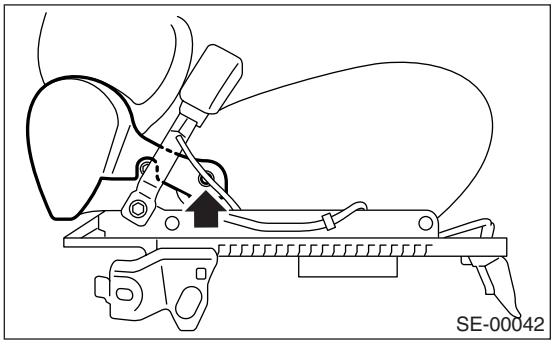
1) Remove the seat from vehicle. <Ref. to SE-6, REMOVAL, Front Seat.>
2) Remove the seat lifter cover using a flat tip screwdriver or equivalent, and then loosen the inside bolt to remove seat lifter lever.


SE-00290

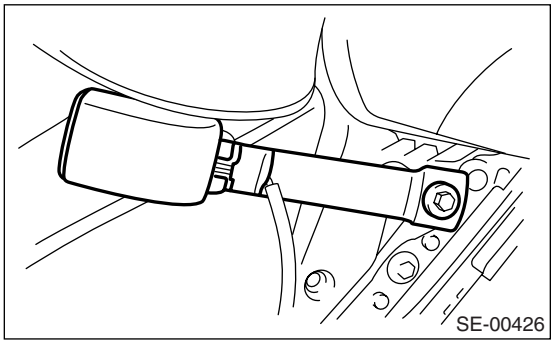
3) Remove the reclining lever and seat hinge outer cover.



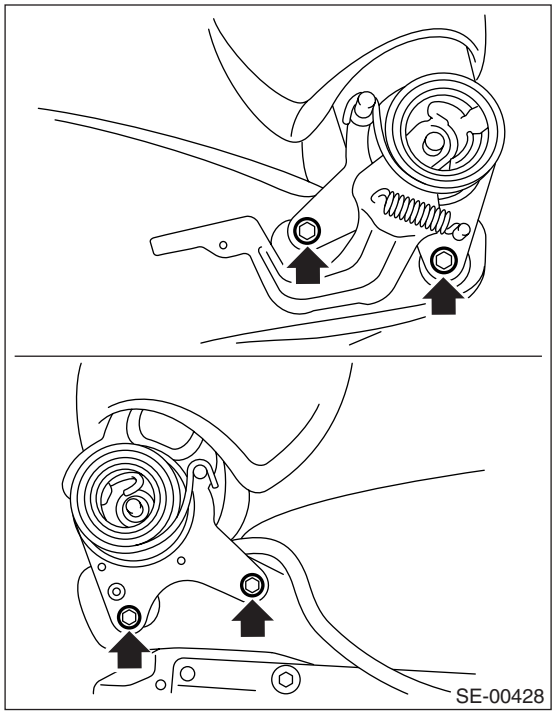
4) Remove the seat hinge inner cover.



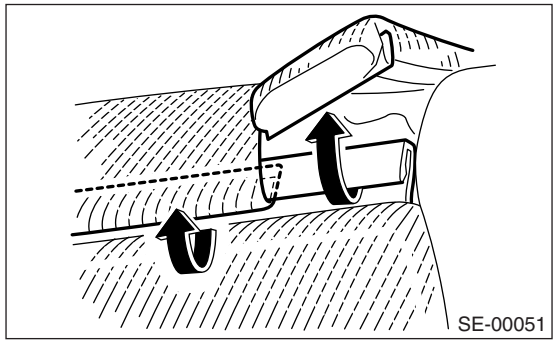
5) Remove the inner belt.



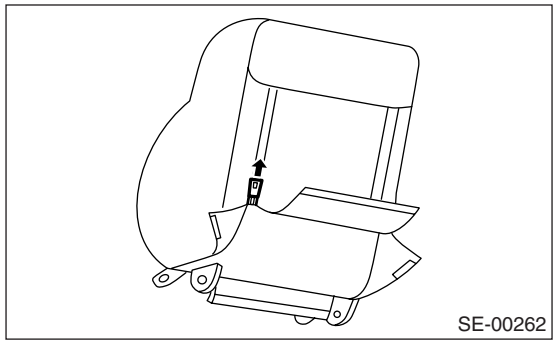
6) Remove two bolts from reclining hinge on each side.



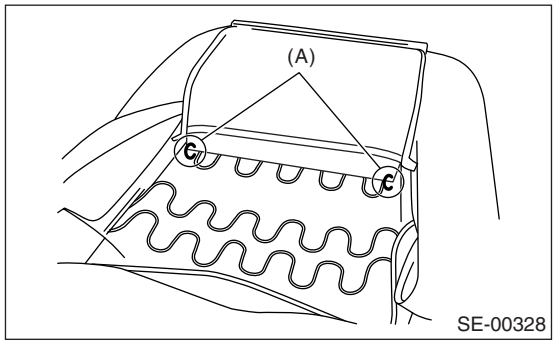
7) Remove the hook at the bottom-back side of backrest.



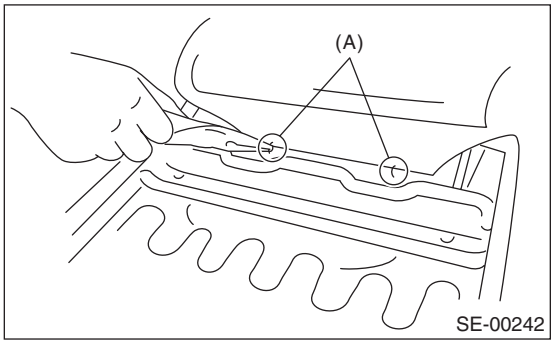
8) Open the zipper behind of backrest.



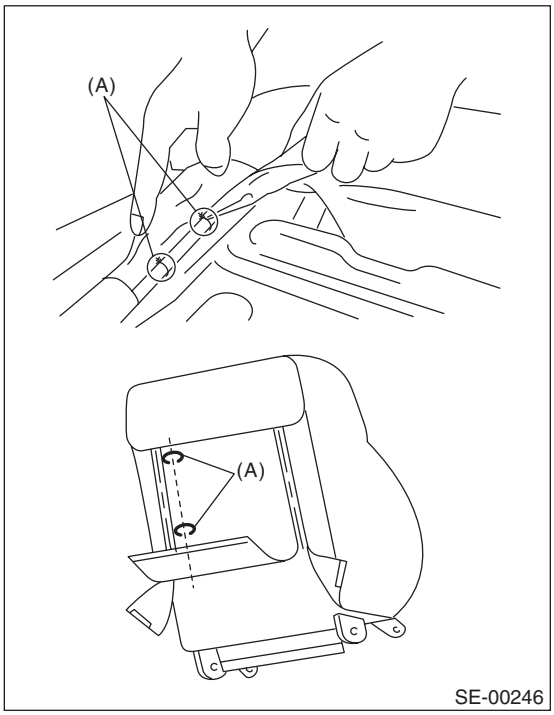
9) Remove the hog rings (A) of backrest cover.



10) Remove the hog rings (A) which secure the backrest cover and backrest pad.

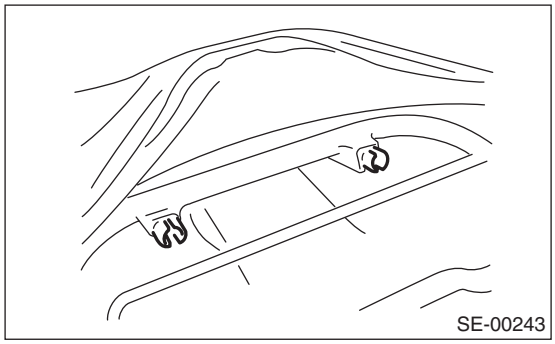


11) Open the zipper behind of backrest cover, and then remove the hog rings (A) at the side-inner part of backrest from backrest frame. (Side airbag equipped seat)

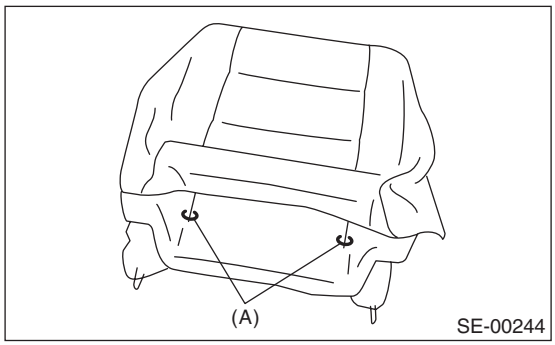


12) Remove the headrest bushes.

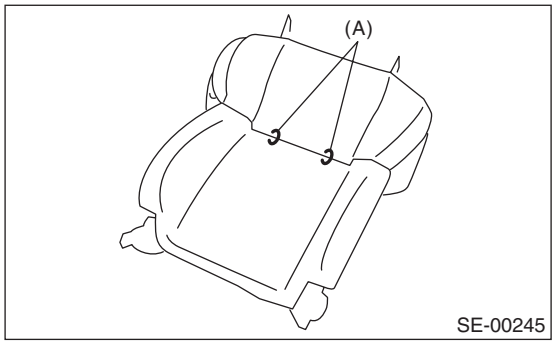
NOTE:
Push the headrest bushes to outside of seat from inside, and then remove them.



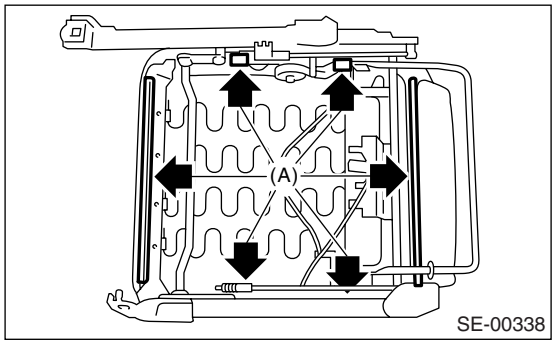
13) Pull out the backrest frame.
14) Remove the hog rings (A) at bottom of seat back. (Side airbag equipped seat)



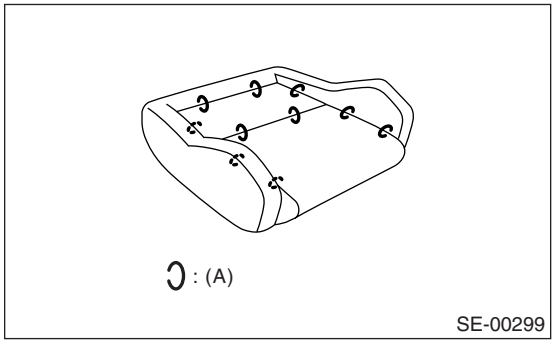
15) Remove the hog rings (A) at front of seat back, and then remove the seat back cover from seat back.



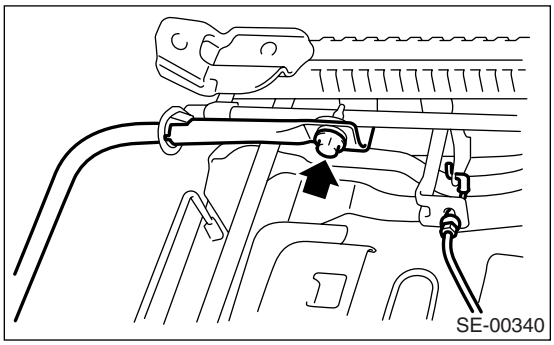
16) Remove the hooks (A), and then remove the seat cushion frame assembly.



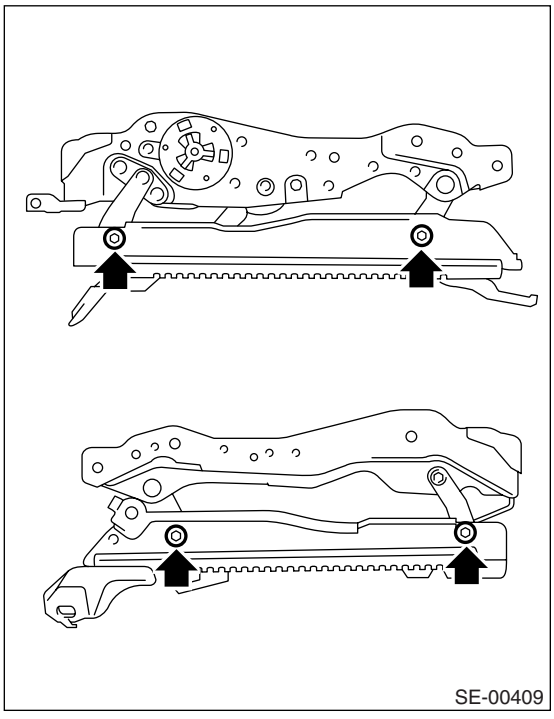
17) Remove the hog rings (A), and then remove the seat cushion cover from seat cushion pad.



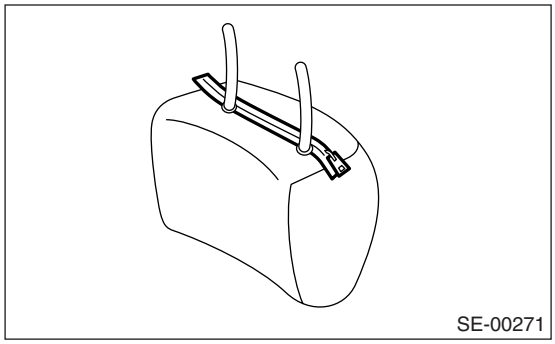
18) Remove the bolt of sliding adjustment bar and connecting cable.



19) Remove the bolts, and then remove the slide rail.

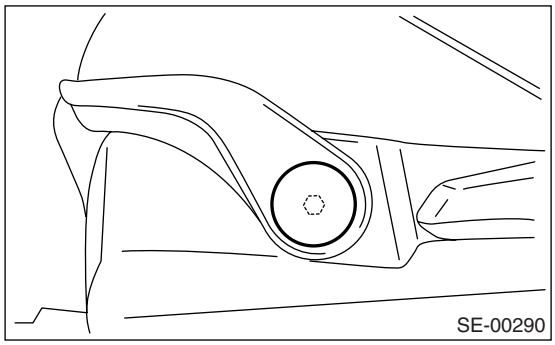


20) Open the zipper at bottom of headrest, and then remove the headrest cover from headrest.

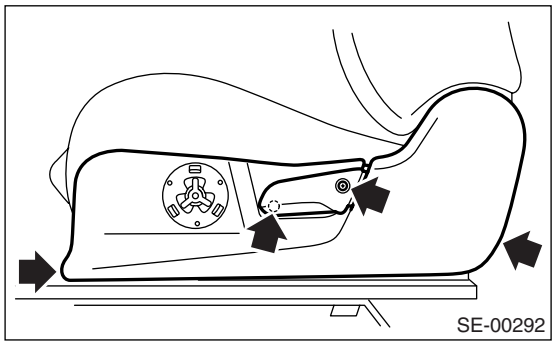


2. BUCKET TYPE SEAT

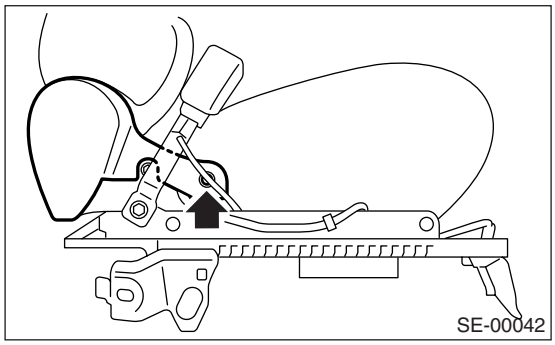
1) Remove the seat from vehicle. <Ref. to SE-6, REMOVAL, Front Seat.>
2) Remove the seat lifter cover using a flat tip screwdriver or equivalent, and then loosen inside bolt to remove seat lifter lever.



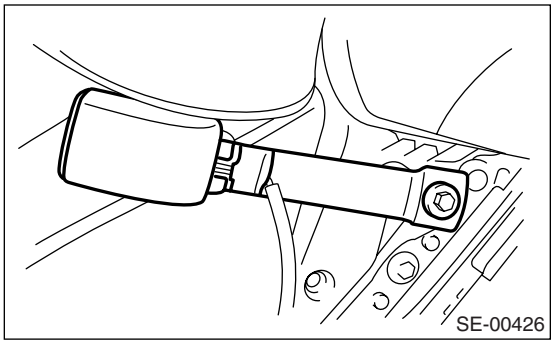
3) Remove the reclining lever and seat hinge outer cover.



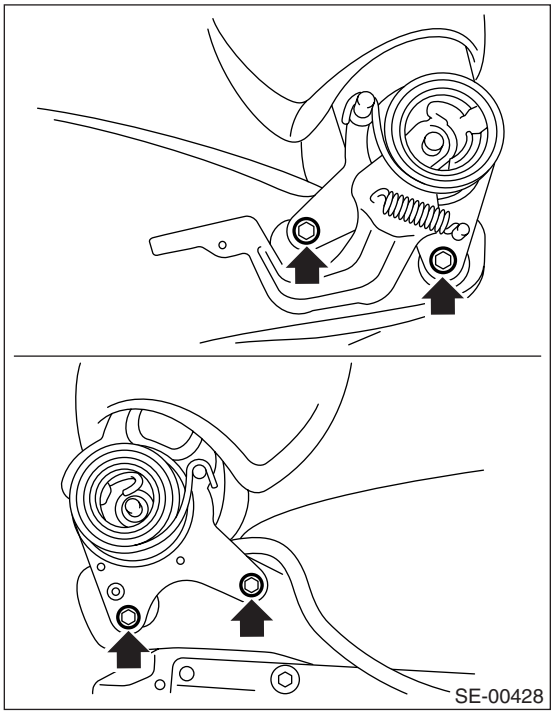
4) Remove the seat hinge inner cover.



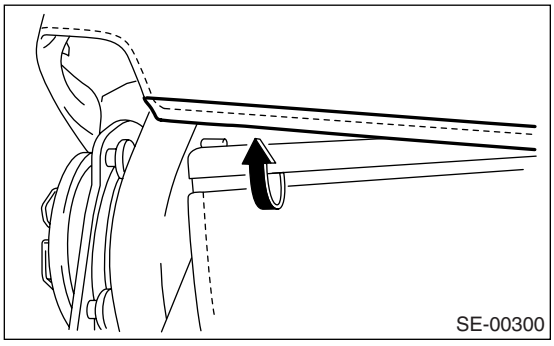
5) Remove the inner belt.



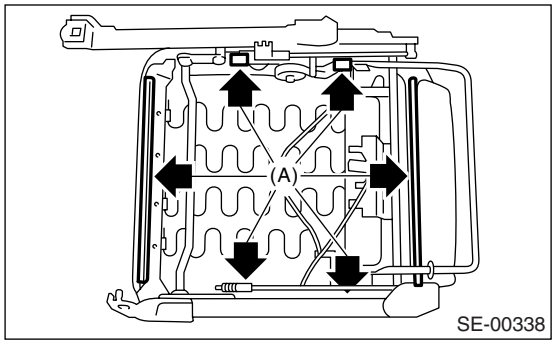
6) Remove two bolts from reclining hinge on each side.



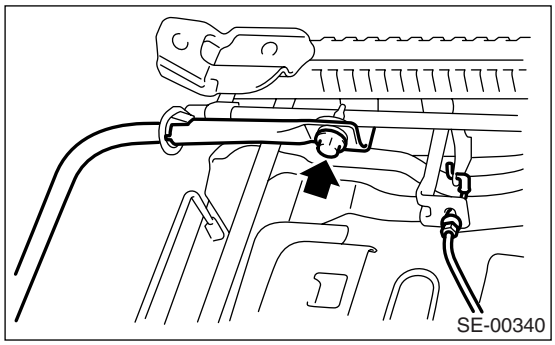
7) Remove the hook at bottom of backrest.



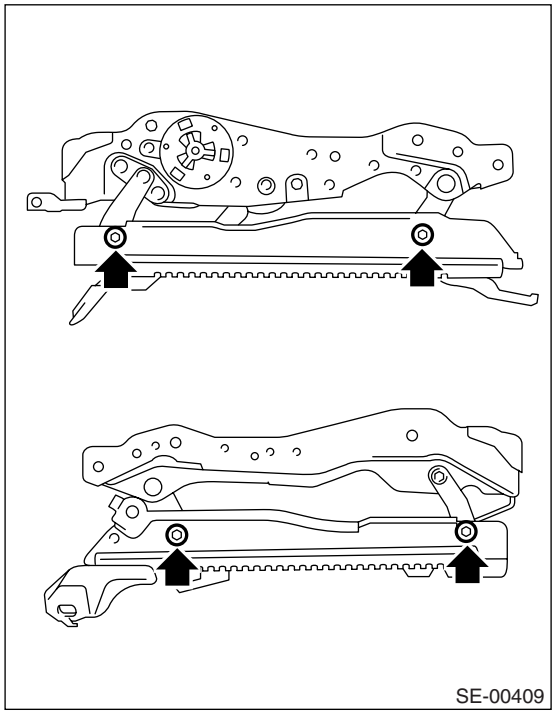
8) Remove the hooks (A), and then remove the seat cushion frame assembly.



9) Remove the bolt of sliding adjustment bar and connecting cable.



10) Remove the bolts, and then remove the slide rail.



D: ASSEMBLY

1. STANDARD SEAT

Assemble in the reverse order of disassembly.

CAUTION:
Because it may cause the side airbag to activate incorrectly, observe the following steps to install the side airbag correctly.
- **Be careful not to dirty or damage the backrest cover.**
- **Always use new hog rings.**
- **Secure the hog ring using hog ring pliers.**
- **Install the hog ring to its original position, and not to twist or wrinkle the backrest cover.**

Tightening torque:
Refer to "COMPONENT" of "General Description". <Ref. to SE-2, FRONT SEAT, COMPONENT, General Description.>

2. BUCKET TYPE SEAT

Assemble in the reverse order of disassembly.

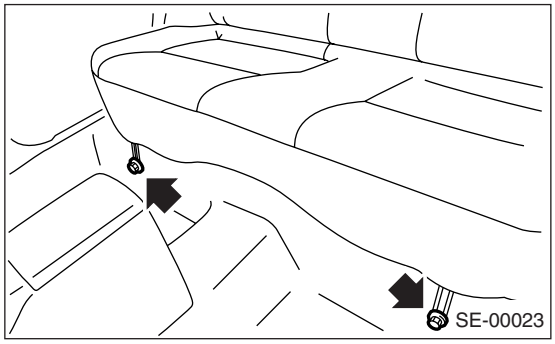
Tightening torque:
Refer to "COMPONENT" of "General Description". <Ref. to SE-2, FRONT SEAT, COMPONENT, General Description.>

3. Rear Seat

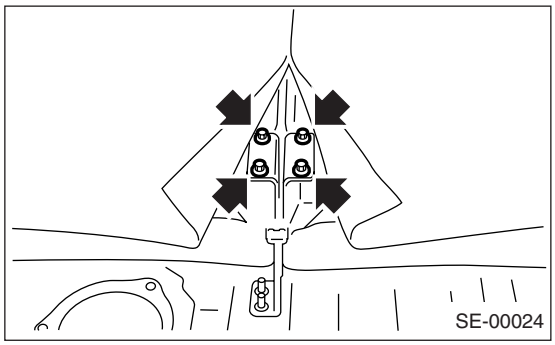
A: REMOVAL

1. WAGON MODEL

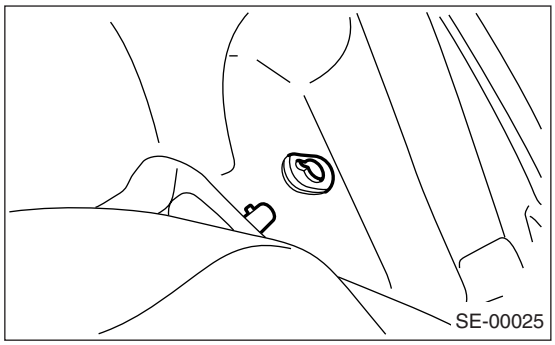
1) Remove the bolts, and then detach the rear seat cushion.



2) Remove the headrest.
3) Remove the luggage floor mat. <Ref. to EI-59, REMOVAL, Luggage Floor Mat.>
4) Turn over the mat to remove the bolts.

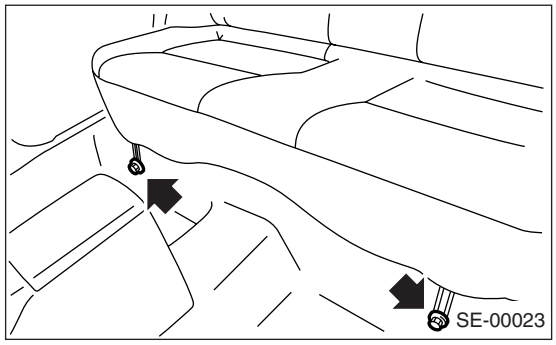


5) Remove the rear seat backrest.

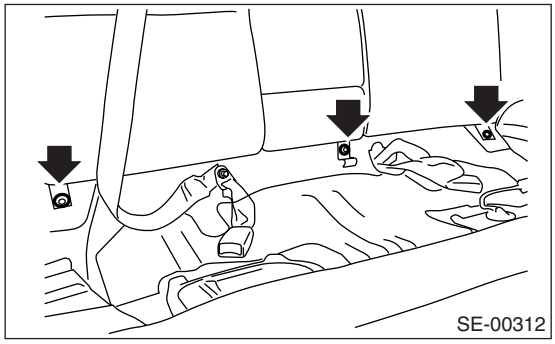


2. SEDAN MODEL

1) Remove the bolts, and then detach the rear seat cushion.



2) Remove the bolts securing lower portion of backrest and then open the center trunk through lid.



3) Lift the rear seat backrest and then remove it.

B: INSTALLATION

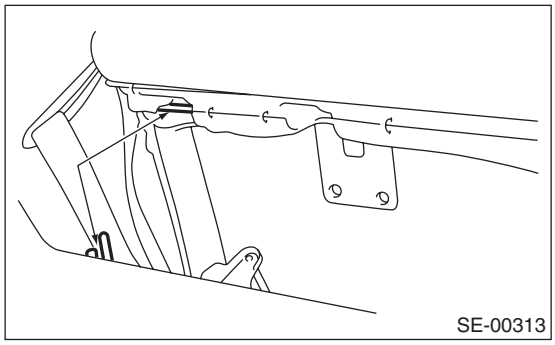
1. WAGON MODEL

Install in the reverse order of removal.

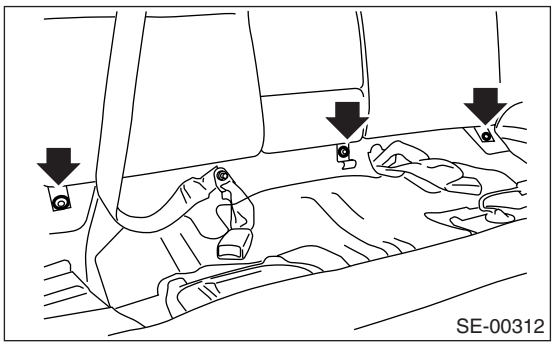
Tightening torque:
Refer to COMPONENT in General Description. <Ref. to SE-4, REAR SEAT (WAGON MODEL), COMPONENT, General Description.>

2. SEDAN MODEL

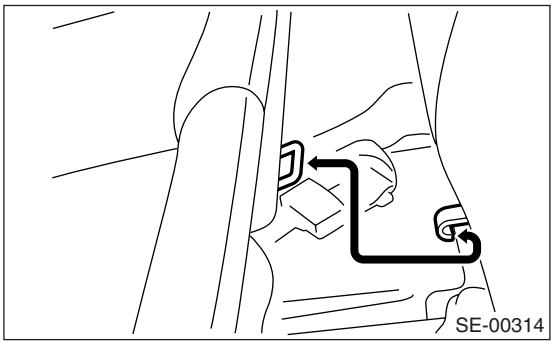
1) Hook and fasten the upper-back side of the rear seat backrest to the body hook.



2) Tighten the bolts.



3) Hook and fasten the seat cushion to the hook on the lower part of the rear seat backrest.

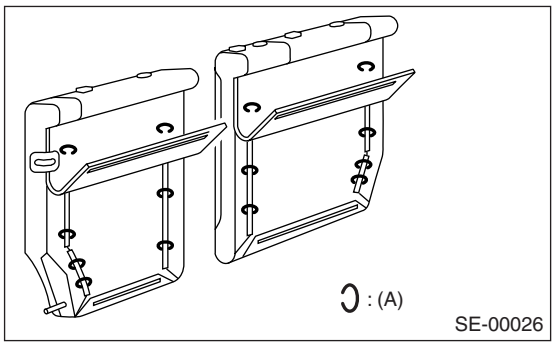


Tightening torque:
Refer to COMPONENT in General Description. <Ref. to SE-4, REAR SEAT (WAGON MODEL), COMPONENT, General Description.>

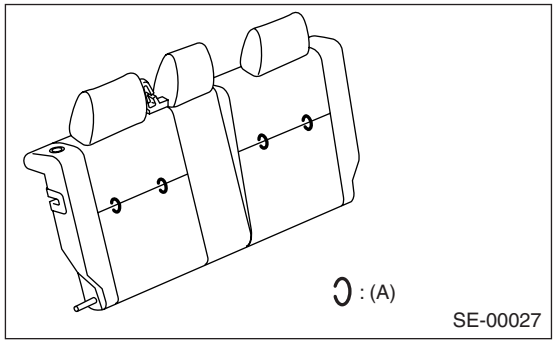
C: DISASSEMBLY

1. WAGON MODEL

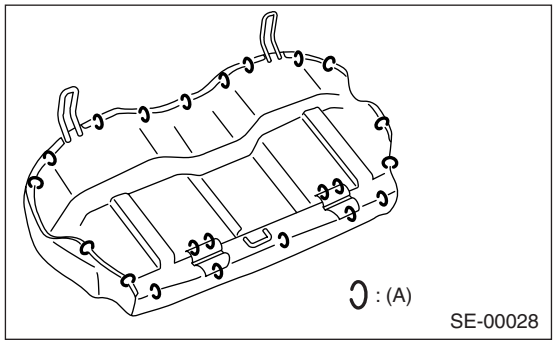
1) Remove the rear seat. <Ref. to SE-12, WAGON MODEL, REMOVAL, Rear Seat.>
2) Remove the hog rings (A) behind of seat backrest.



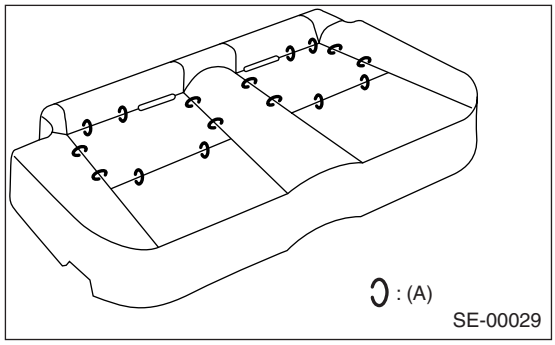
3) Remove the hog rings (A) on front side of cushion pad, and remove the cover.



4) Remove the hog rings (A) behind of seat cushion.

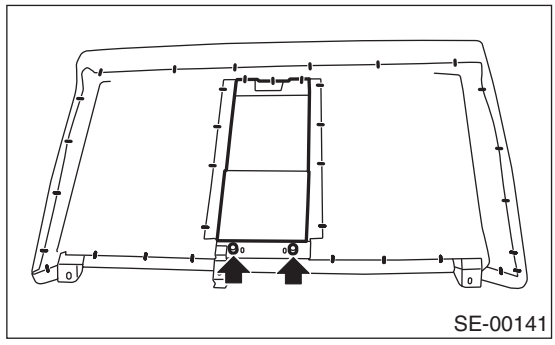


5) Remove the hog rings (A), and then remove the cover.

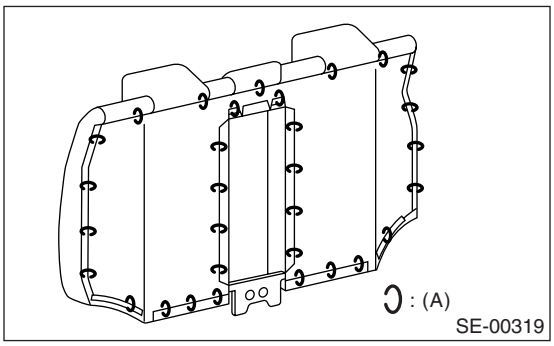


2. SEDAN MODEL

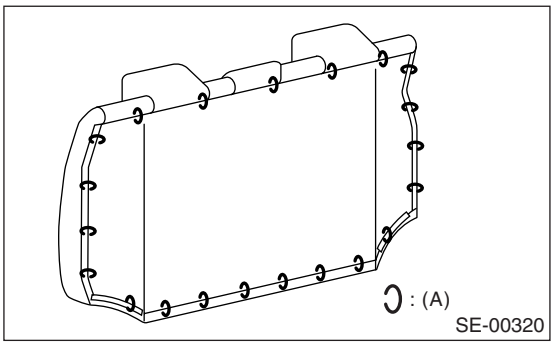
1) Remove the rear seat. <Ref. to SE-12, SEDAN MODEL, REMOVAL, Rear Seat.>
2) Remove two nuts, and then remove the armrest assembly.



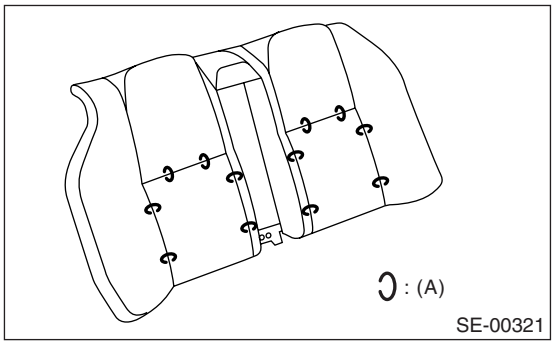
3) Remove the hog rings (A) behind of seat backrest.
• Armrest through type model



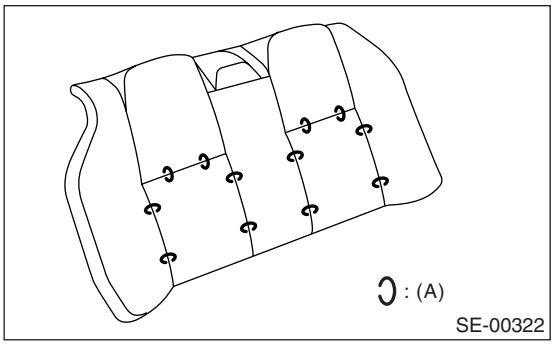
• Unified type model



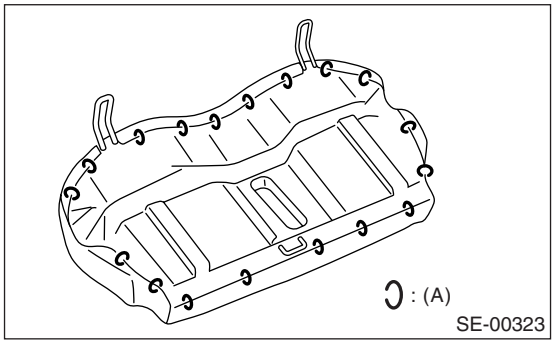
4) Remove the hog rings (A), and then remove the seat cover.
• Armrest through type model



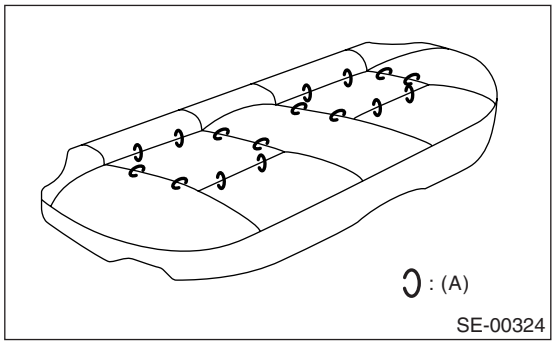
• Unified type model



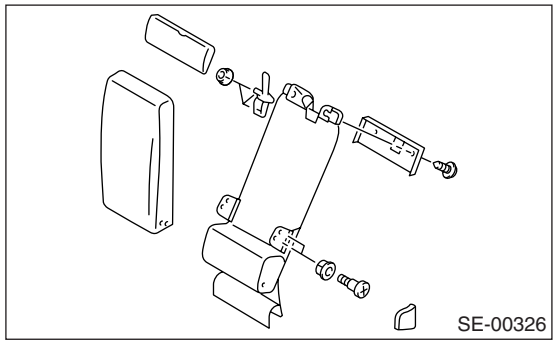
5) Remove the hog rings (A) behind of seat cushion.



6) Remove the hog rings (A), and then remove the seat cover.



7) Remove the nuts and screws, and then disassemble the armrest assembly.



D: ASSEMBLY

1. WAGON MODEL

Assemble in the reverse order of disassembly.

NOTE:
• Do not contaminate or damage the cover.
• While installing the hog rings, prevent the seat from getting wrinkled.

2. SEDAN MODEL

Assemble in the reverse order of disassembly.

NOTE:
• Do not contaminate or damage the cover.
• While installing the hog rings, prevent the seat from getting wrinkled.

SECURITY AND LOCKS

SL

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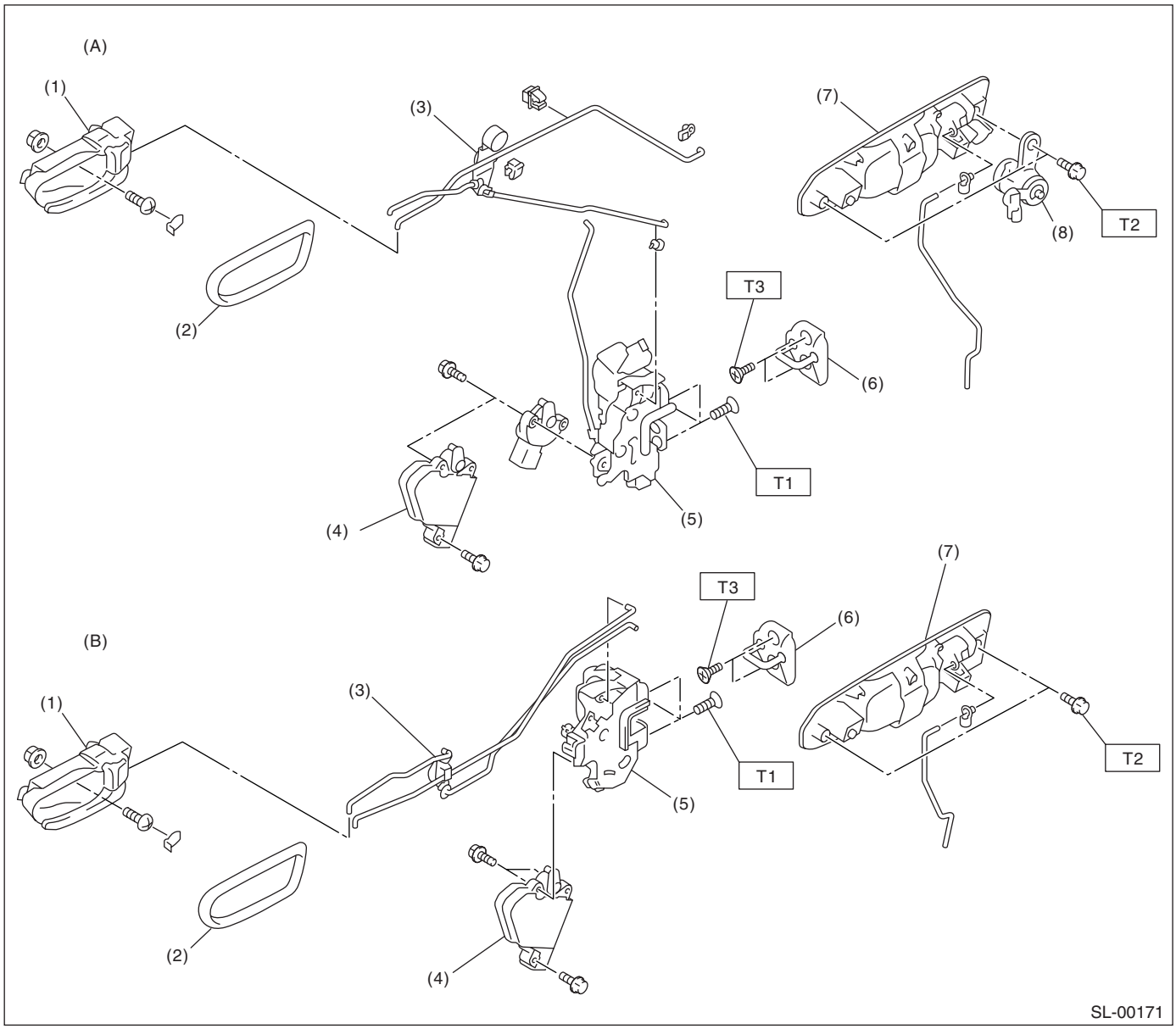
1. General Description

A: COMPONENT

1. DOOR LOCK ASSEMBLY

• Without double lock

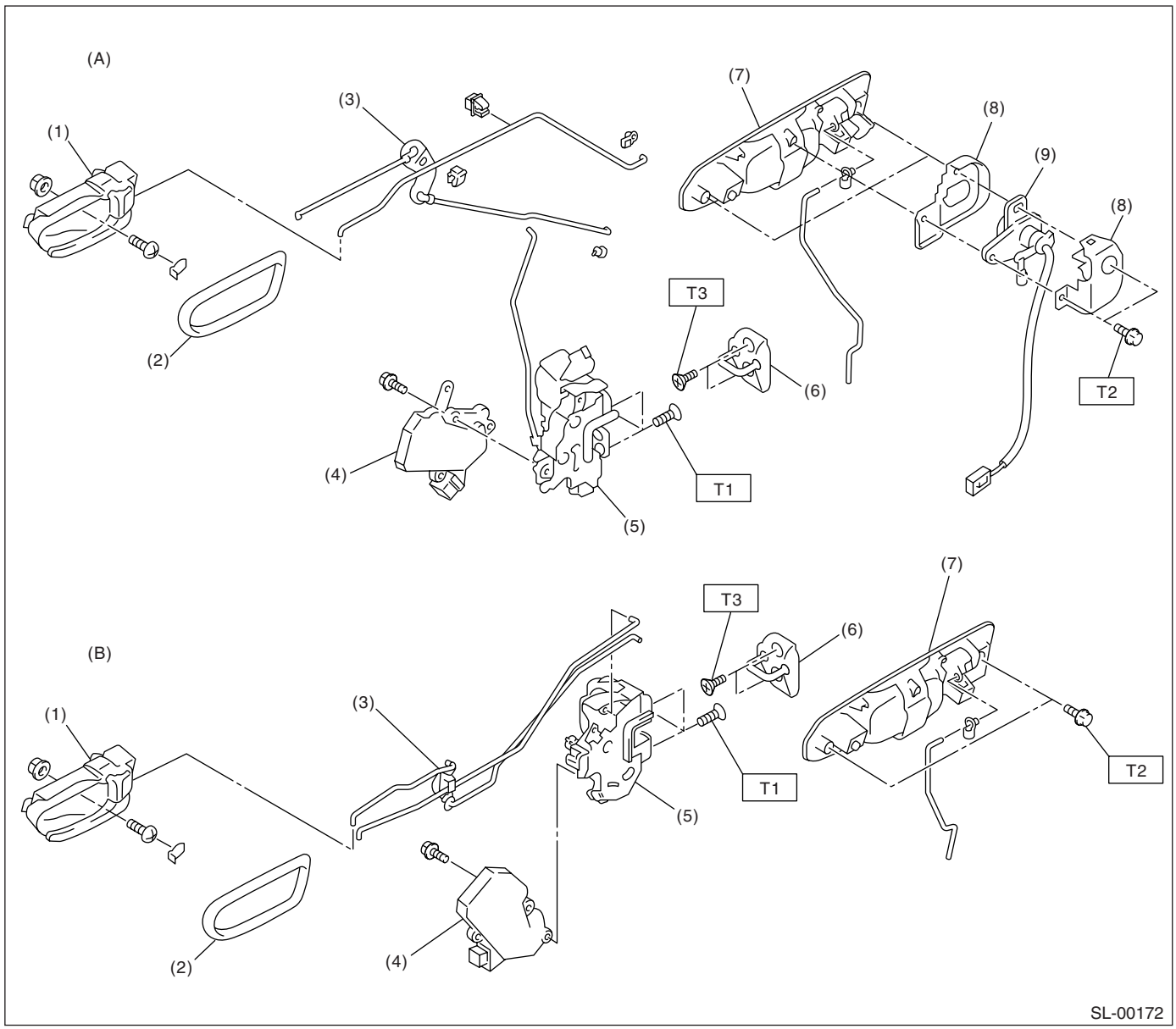


(A) Front
(B) Rear

(1) Inner remote ASSY
(2) Inner remote cover
(3) Bell crank
(4) Auto-door lock actuator
(5) Door latch
(6) Striker
(7) Door outer handle
(8) Key cylinder

Tightening torque: N·m (kgf-m, ft-lb)
T1: 6.4 (0.65, 4.7)
T2: 7.4 (0.75, 5.5)
T3: 17.6 (1.8, 13.0)

• With double lock

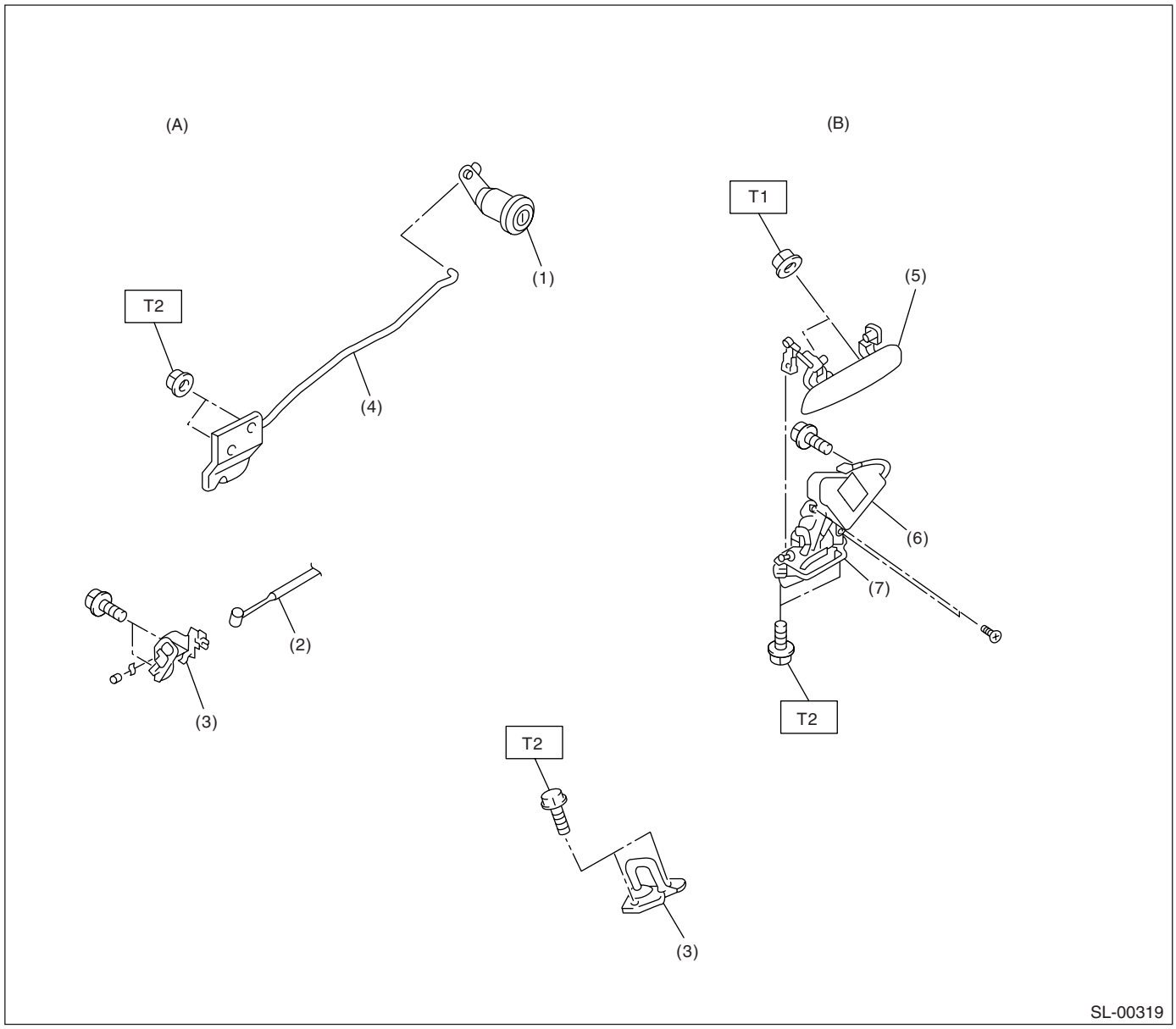


(A)	Front	(B)	Rear
(1)	Inner remote ASSY	(6)	Striker
(2)	Inner remote cover	(7)	Door outer handle
(3)	Bell crank	(8)	Outer handle cover
(4)	Auto-door lock actuator	(9)	Key cylinder (switch)
(5)	Door latch		

Tightening torque: N·m (kgf-m, ft-lb)
T1: 6.4 (0.65, 4.7)
T2: 7.4 (0.75, 5.5)
T3: 17.6 (1.8, 13.0)

2. TRUNK LID AND REAR GATE LOCK

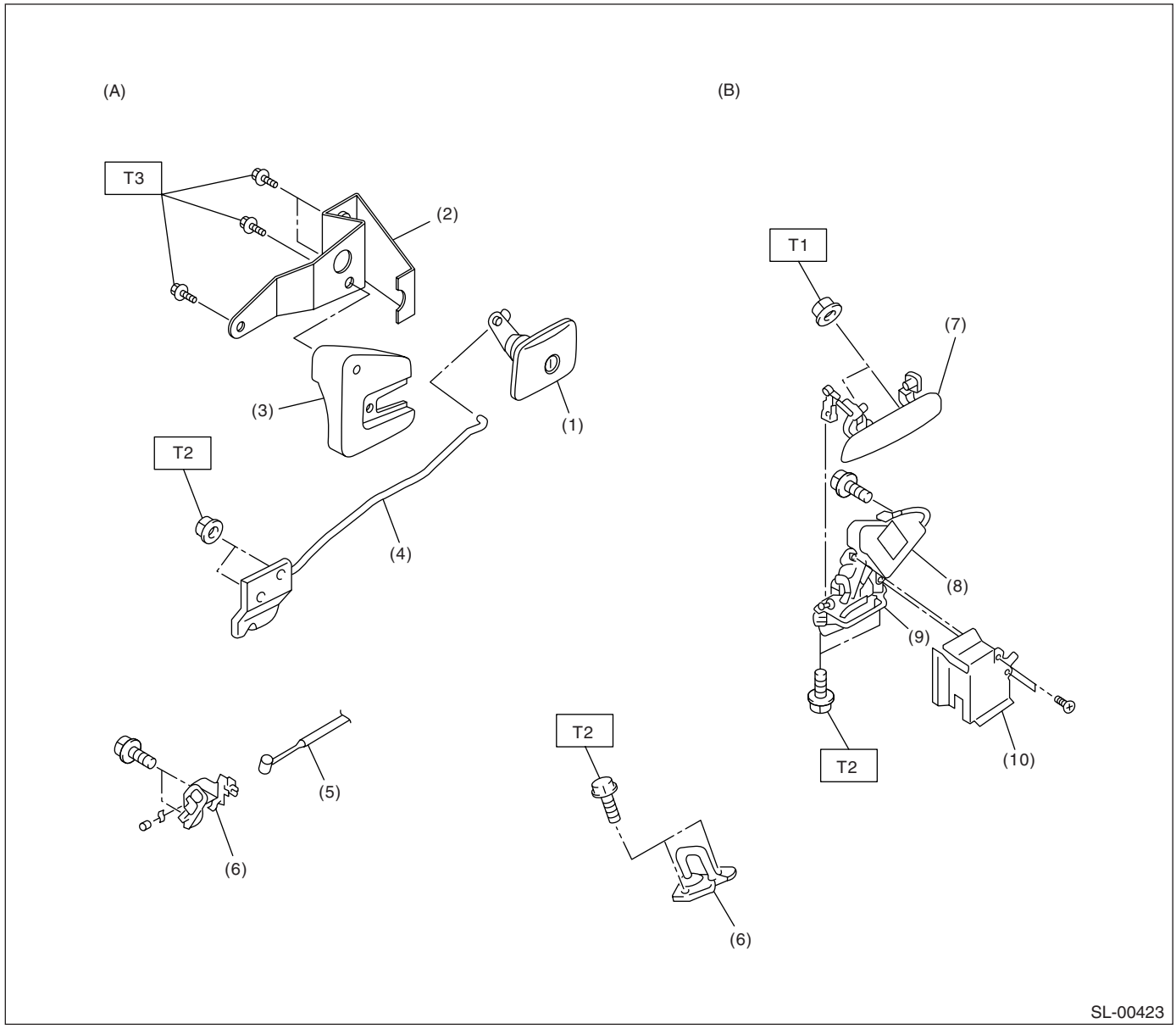
• Without double lock



(A)	Trunk	(B)	Rear gate
(1)	Key cylinder	(5)	Rear gate outer handle
(2)	Cable	(6)	Rear gate actuator
(3)	Striker	(7)	Rear gate latch
(4)	Trunk lid lock ASSY		

Tightening torque: N·m (kgf-m, ft-lb)
T1: 4.5 (0.45, 3.3)
T2: 25 (2.5, 18.4)

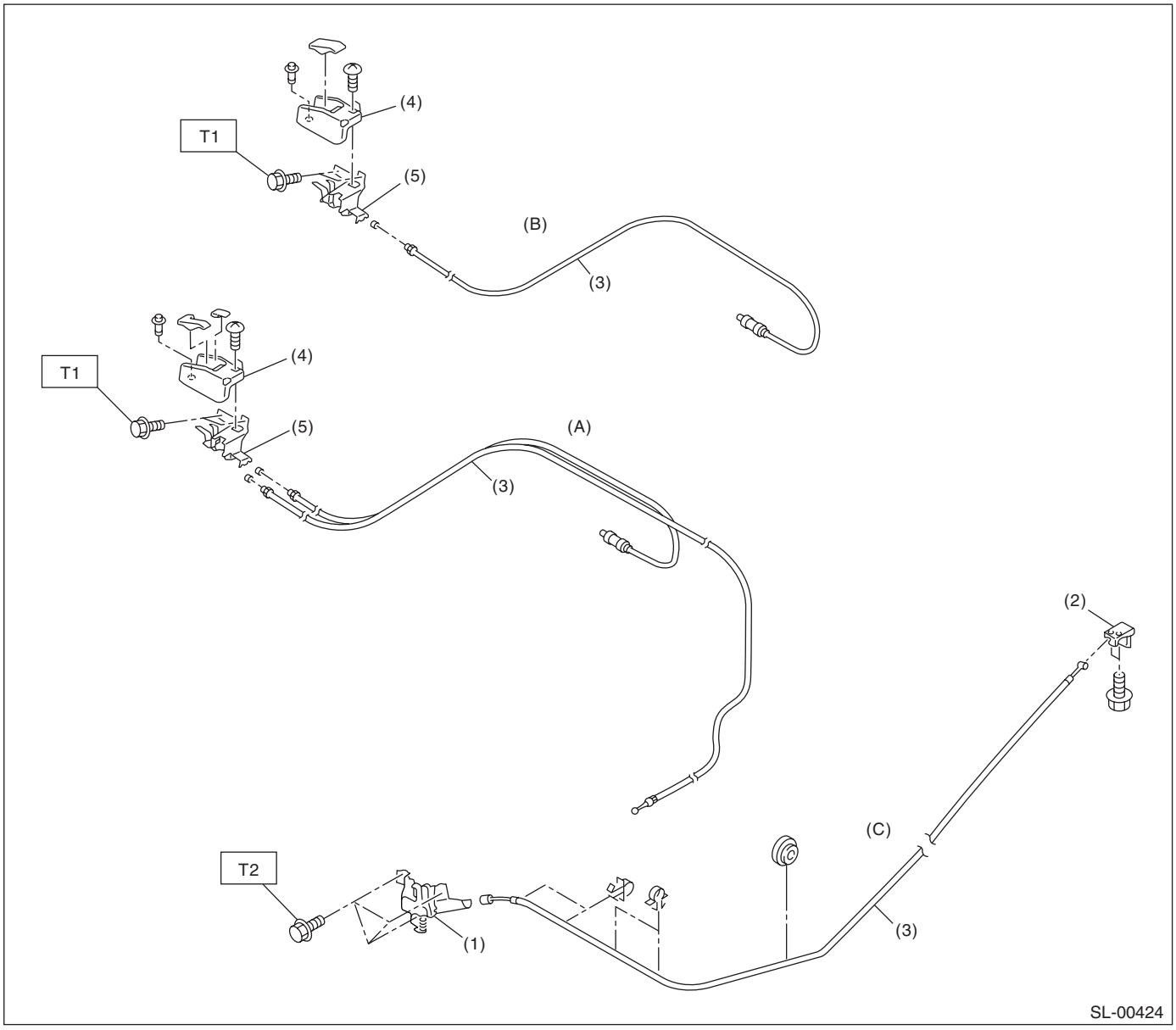
• With double lock



(A)	Trunk	(B)	Rear gate
(1)	Key cylinder	(6)	Striker
(2)	Bracket	(7)	Rear gate outer handle
(3)	Key cylinder stopper	(8)	Rear gate actuator
(4)	Trunk lid lock ASSY	(9)	Rear gate latch
(5)	Cable	(10)	Rear gate latch cover

Tightening torque: N·m (kgf-m, ft-lb)	
T1:	*4.5 (0.45, 3.3)*
T2:	*25 (2.5, 18.4)*
T3:	*7.5 (0.76, 5.5)*

3. HOOD LOCK AND REMOTE OPENERS

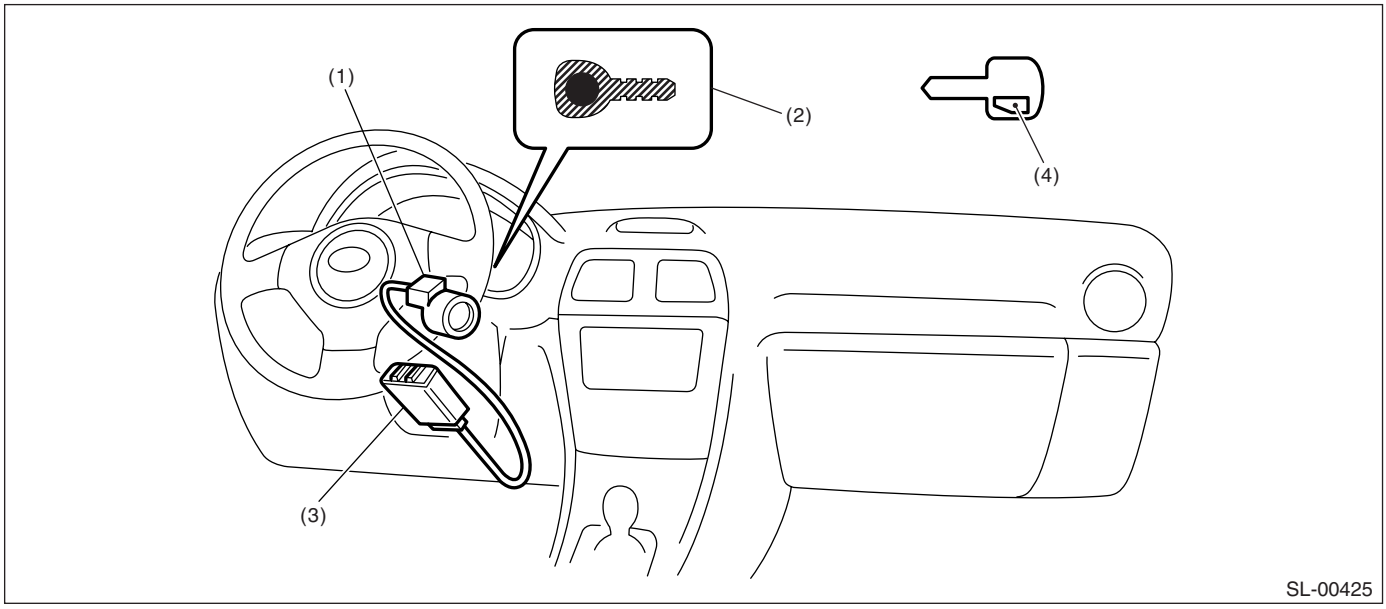


(A) Sedan
(B) Wagon
(C) Hood

(1) Hood lock ASSY
(2) Lever ASSY
(3) Cable
(4) Cover
(5) Pull handle ASSY

Tightening torque: N·m (kgf-m, ft-lb)
T1: 6.5 (0.66, 4.8)
T2: 32 (3.3, 23.9)

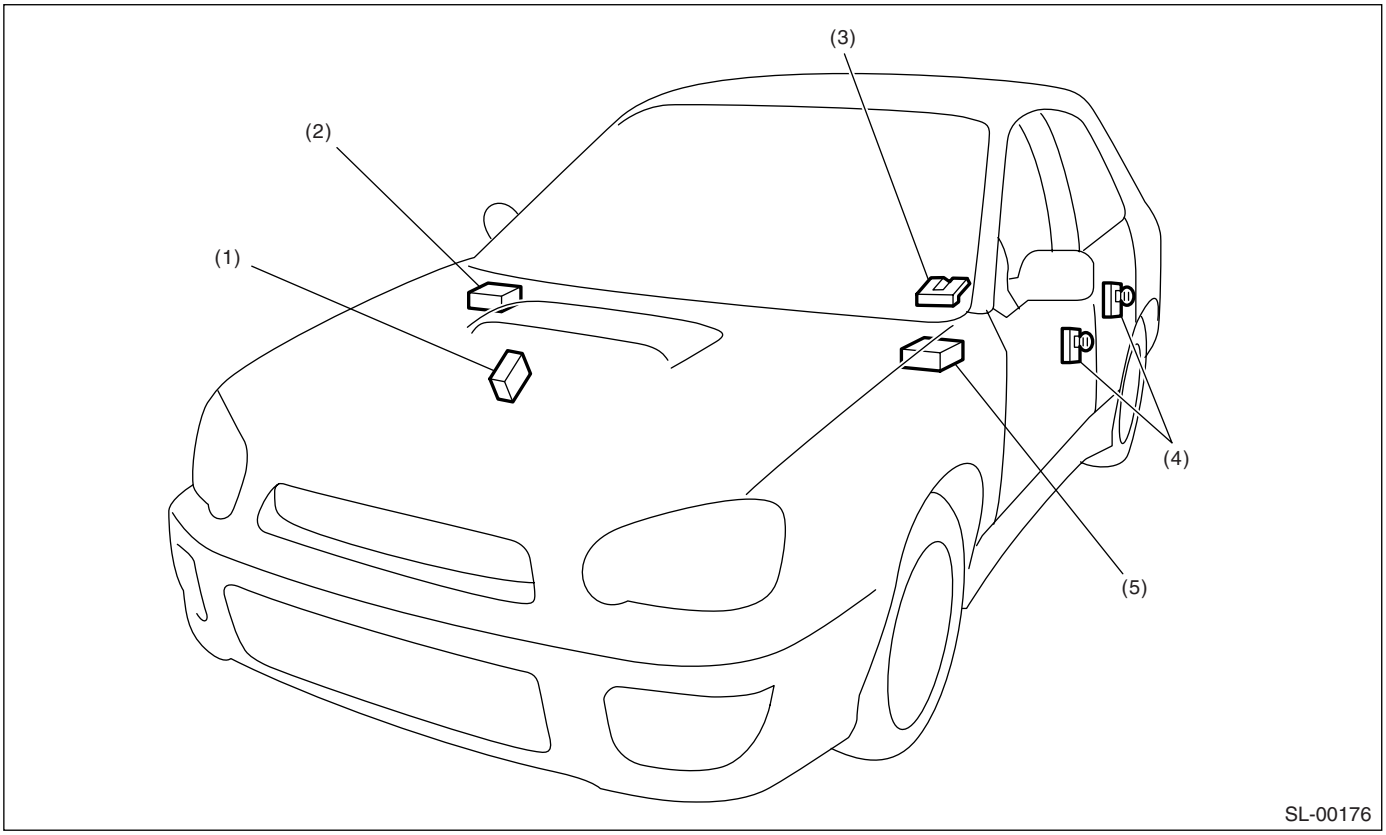
4. IMMOBILIZER SYSTEM



(1) Antenna
(2) Immobilizer indicator light (LED bulb)
(3) Immobilizer control module (IMM ECM)
(4) Transponder

NOTE:
IMM ECM location for RHD model is symmetrically opposite.

5. KEYLESS ENTRY SYSTEM



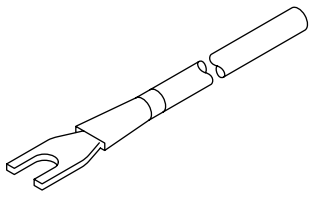
(1) Double lock module (with double lock)
(2) Keyless entry control module (RHD model)
(3) Rear gate latch
(4) Door switch
(5) Keyless entry control module (LHD model)

B: CAUTION

• Before disassembling or reassembling parts, always disconnect the ground cable from battery. When repairing radio, control module, etc. which are provided with memory functions, record the memory contents before disconnecting the ground cable from battery. Otherwise, these contents are cancelled upon disconnection.
• Reassemble parts in the reverse order of disassembly procedure unless otherwise indicated.
• Adjust parts to specifications contained in this manual if so designated.
• Connect the connectors securely during reassembly.
• After reassembly, ensure all functional parts operate smoothly.
• Airbag system wiring harness is routed near the electrical parts and switch.
• All airbag system wiring harness and connectors are colored yellow. Do not use electrical test equipment on these circuits.
• Be careful not to damage the airbag system wiring harness when servicing the ignition key cylinder.

C: PREPARATION TOOL

1. SPECIAL TOOLS

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-925580000	925580000	PULLER	Used for removing trim clip

2. GENERAL TOOLS

TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance and voltage.
Drill	Used for replacing ignition key lock.

2. Door Lock Control System

A: WIRING DIAGRAM

1. DOOR LOCK CONTROL

<Ref. to WI-260, WIRING DIAGRAM, Keyless Entry System.>

B: INSPECTION

1. SYMPTOM CHART

Symptom	Repair order	Reference
The door lock control system does not operate.	1. Check the fuse.	<Ref. to SL-11, CHECK FUSE, INSPECTION, Door Lock Control System.>
	2. Check the power supply and ground circuit for keyless entry control module (without double lock) or double lock module (with double lock).	<Ref. to SL-11, CHECK POWER SUPPLY AND GROUND CIRCUIT, INSPECTION, Door Lock Control System.>
	3. Check the door lock switch and the circuit.	<Ref. to SL-12, CHECK DOOR LOCK SWITCH AND CIRCUIT, INSPECTION, Door Lock Control System.>
	4. Check the door lock actuator and the circuit.	<Ref. to SL-13, CHECK DOOR LOCK ACTUATOR AND CIRCUIT, INSPECTION, Door Lock Control System.>
The door lock switch does not operate.	Check the door lock switch and the circuit.	<Ref. to SL-12, CHECK DOOR LOCK SWITCH AND CIRCUIT, INSPECTION, Door Lock Control System.>
A specific door lock actuator does not operate.	Check the door lock actuator and the circuit.	<Ref. to SL-13, CHECK DOOR LOCK ACTUATOR AND CIRCUIT, INSPECTION, Door Lock Control System.>
The key cylinder lock switch does not operate. (with double lock)	Check the key cylinder lock switch and circuit.	<Ref. to SL-14, CHECK KEY CYLINDER LOCK SWITCH AND CIRCUIT, INSPECTION, Door Lock Control System.>
The double lock does not operate. (with double lock)	Check the door lock actuator (double lock) and circuit.	<Ref. to SL-14, CHECK DOOR LOCK ACTUATOR (DOUBLE LOCK) AND CIRCUIT, INSPECTION, Door Lock Control System.>

2. CHECK FUSE

	Step	Check	Yes	No
1	**CHECK FUSE.** Remove and visually check the fuse No. 2 (in the main fuse box) and No. 3 (in the fuse and relay box).	Is the fuse blown out?	Replace the fuse with a new one.	Check the power supply and ground circuit. <Ref. to SL-11, CHECK POWER SUPPLY AND GROUND CIRCUIT, INSPECTION, Door Lock Control System.>

3. CHECK POWER SUPPLY AND GROUND CIRCUIT

	Step	Check	Yes	No
1	**CHECK POWER SUPPLY.** 1) Disconnect the keyless entry control module or double lock module harness connector. 2) Measure the voltage between the harness connector terminal and chassis ground. ***Connector & terminal*** ***Without double lock:*** ***(B176) No. 5, 16 (+) — Chassis ground (−):*** ***With double lock:*** ***(B324) No. 7, 8 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **2.**	Check the harness for open circuits or shorts between the keyless entry control module or double lock module and the fuse.
2	**CHECK GROUND CIRCUIT.** Measure the resistance between the harness connector terminal and chassis ground. ***Connector & terminal*** ***Without double lock:*** ***(B176) No. 6, 14 — Chassis ground:*** ***With double lock:*** ***(B324) No. 9 — Chassis ground:***	Is the resistance less than 10 Ω?	The power supply and ground circuit is OK.	Repair the harness.

4. CHECK DOOR LOCK SWITCH AND CIRCUIT

	Step	Check	Yes	No
1	**CHECK DOOR LOCK SWITCH CIRCUIT.** 1) Disconnect the keyless entry control module or double lock module harness connector. 2) Measure the resistance between the harness connector terminal and chassis ground when moving the door lock switch to LOCK. ***Connector & terminal*** ***Without double lock:*** ***(B176) No. 10 — Chassis ground:*** ***With double lock:*** ***(B325) No. 7 — Chassis ground:***	Is the resistance less than 10 Ω?	Go to step **2.**	Go to step **3.**
2	**CHECK DOOR LOCK SWITCH CIRCUIT.** Measure the resistance between the harness connector terminal and chassis ground when the door lock switch is moved to UNLOCK. ***Connector & terminal*** ***Without double lock:*** ***(B176) No. 8 — Chassis ground:*** ***With double lock:*** ***(B325) No. 4 — Chassis ground:***	Is the resistance less than 10 Ω?	The door lock switch is OK.	Go to step **3.**
3	**CHECK DOOR LOCK SWITCH.** 1) Disconnect the door lock switch harness connector. 2) Measure the resistance between the door lock switch terminals when moving the door lock switch to LOCK. ***Connector & terminal*** ***LHD model:*** ***(D7) No. 5 — No. 9:*** ***RHD model:*** ***(D7) No. 1 — No. 15:***	Is the resistance less than 1 Ω?	Go to step **4.**	Replace the door lock switch.
4	**CHECK DOOR LOCK SWITCH.** Measure the resistance between the door lock switch terminals when moving the door lock switch to UNLOCK. ***Connector & terminal*** ***LHD model:*** ***(D7) No. 5 — No. 8:*** ***RHD model:*** ***(D7) No. 1 — No. 16:***	Is the resistance less than 1 Ω?	Check the harness for open circuits or shorts between the keyless entry control module or double lock module and the door lock switch.	Replace the door lock switch.

5. CHECK DOOR LOCK ACTUATOR AND CIRCUIT

	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL.** Measure the voltage between the harness connector terminal of keyless entry control module or double lock module and chassis ground when moving the door lock switch to LOCK. ***Connector & terminal*** ***Without double lock:*** ***(B176) No. 18 (+) — Chassis ground (–):*** ***With double lock:*** ***(B324) No. 3 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **2.**	Replace the keyless entry control module or double lock module.
2	**CHECK OUTPUT SIGNAL.** Measure the voltage between the harness connector terminal of keyless entry control module or double lock module and chassis ground when moving the door lock switch to UNLOCK. ***Connector & terminal*** ***Without double lock:*** ***(B176) No. 17 (+) — Chassis ground (–):*** ***With double lock:*** ***(B324) No. 5 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **3.**	Replace the keyless entry control module or double lock module.
3	**CHECK DOOR LOCK ACTUATOR.** Check the door lock actuator. Front door lock actuator: <Ref. to SL-26, Front Door Lock Actuator.> Rear door lock actuator: <Ref. to SL-30, Rear Door Lock Actuator.> Rear gate latch lock actuator: <Ref. to SL-33, Rear Gate Latch Lock Actuator.>	Is the door lock actuator OK?	Check the harness for open circuits or shorts between the keyless entry control module or double lock module and the door lock actuator.	Replace the door lock actuator.

6. CHECK KEY CYLINDER LOCK SWITCH AND CIRCUIT

	Step	Check	Yes	No
1	**CHECK KEY CYLINDER LOCK SWITCH CIRCUIT.** 1) Disconnect the double lock module harness connector. 2) Measure the resistance between harness connector terminal and chassis ground when turning the key cylinder lock switch to lock position. ***Connector & terminal*** ***(B325) No. 3 — Chassis ground:***	Is the resistance less than 10 Ω?	Go to step **2.**	Go to step **3.**
2	**CHECK KEY CYLINDER LOCK SWITCH CIRCUIT.** Measure the resistance between harness connector terminal and chassis ground when turning the key cylinder lock switch to unlock position. ***Connector & terminal*** ***(B325) No. 2 — Chassis ground:***	Is the resistance less than 10 Ω?	Key cylinder lock switch is OK.	Go to step **3.**
3	**CHECK KEY CYLINDER LOCK SWITCH.** 1) Disconnect the key cylinder lock switch connector. 2) Measure the resistance between key cylinder lock switch terminals when turning the key cylinder lock switch to lock position. ***Terminals*** ***No. 3 — No. 2***	Is the resistance less than 1 Ω?	Go to step **4.**	Replace the key cylinder lock switch.
4	**CHECK KEY CYLINDER LOCK SWITCH.** Measure the resistance between key cylinder lock switch terminals when turning the key cylinder lock switch to unlock position. ***Terminals*** ***No. 2 — No. 1***	Is the resistance less than 1 Ω?	Check the harness for open or short circuits between double lock module and key cylinder lock switch.	Replace the key cylinder lock switch.

7. CHECK DOOR LOCK ACTUATOR (DOUBLE LOCK) AND CIRCUIT

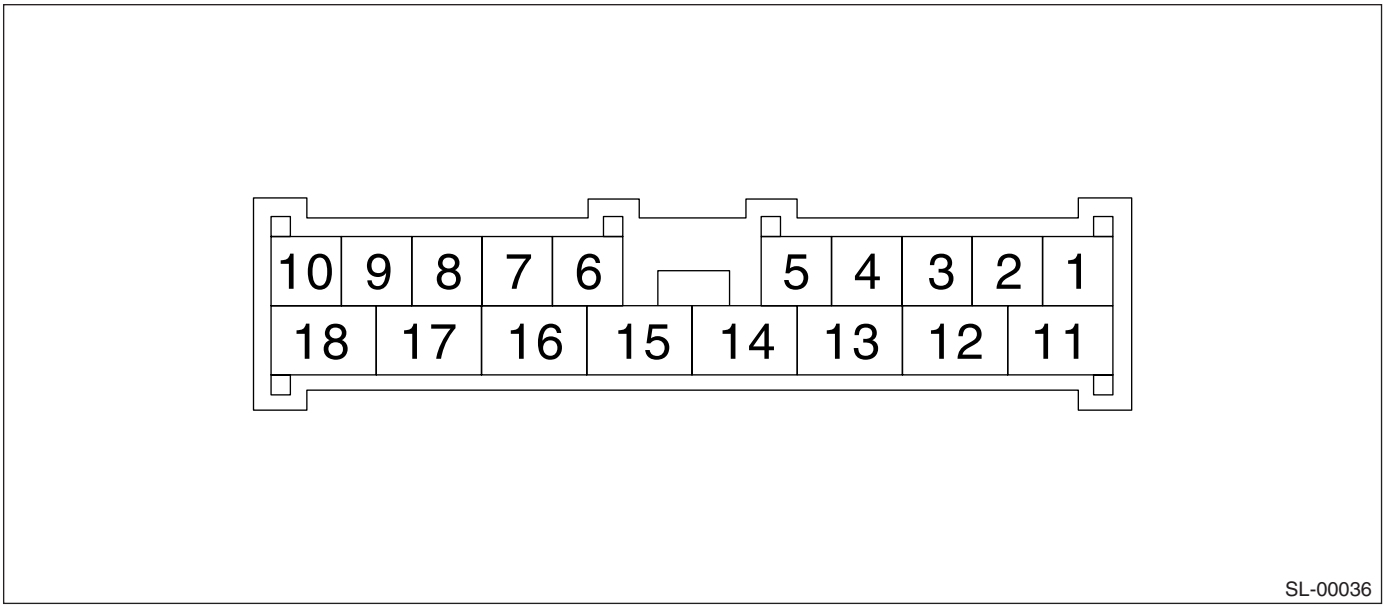
	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL.** Measure the resistance between double lock module harness connector terminal and chassis ground when turning the key cylinder lock switch to lock position. ***Connector & terminal*** ***(B324) No. 3 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **2.**	Replace the double lock module.
2	**CHECK OUTPUT SIGNAL.** Measure the resistance between double lock module harness connector terminal and chassis ground when turning the key cylinder lock switch to unlock position. ***Connector & terminal*** ***(B324) No. 6 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **3.**	Replace the double lock module.
3	**CHECK DOOR LOCK ACTUATOR.** Check door lock actuator. Front door lock actuator: <Ref. to SL-26, Front Door Lock Actuator.> Rear door lock actuator: <Ref. to SL-30, Rear Door Lock Actuator.>	Is the door lock actuator normal?	Check the harness for open or short circuits between double lock module and door lock actuator.	Replace the door lock actuator.

3. Keyless Entry System

A: WIRING DIAGRAM

<Ref. to WI-260, WIRING DIAGRAM, Keyless Entry System.>

B: ELECTRICAL SPECIFICATION



Content	Terminal No.	Measuring condition
Key warning switch	1 (INPUT)	Battery voltage is present when inserting the key into ignition switch.
Registration connector	2 (INPUT)	0 V is present when connecting the registration connector.
Door switch	3 (INPUT)	0 V is present when any door is open.
Power supply	5	Battery voltage is constantly present.
Ground	6	0 V is constantly present.
Empty	7	—
Door lock switch (Unlock)	8 (INPUT)	0 V is present when the door lock switch is turned to unlock position.
Empty	9	—
Door lock switch (Lock)	10 (INPUT)	0 V is present when the door lock switch is turned to lock position.
Room light/Ignition switch illumination	11 (OUTPUT)	• 0 V is present when pressing the transmitter OPEN button. • 0 V is present when any door is open.
Turn signal light (Left)	12 (OUTPUT)	Battery voltage is present when pressing the transmitter OPEN or LOCK button.
Turn signal light (Right)	13 (OUTPUT)	Battery voltage is present when pressing the transmitter OPEN or LOCK button.
Ground	14	0 V is constantly present.
Power supply (Hazard light)	15	Battery voltage is constantly present.
Power supply	16	Battery voltage is constantly present.
Door, rear gate lock actuator (without double lock) or double lock module (with double lock)(unlock)	17 (OUTPUT)	Battery voltage is present when pressing the transmitter OPEN button.
Door, rear gate lock actuator (without double lock) or double lock module (with double lock)(lock)	18 (OUTPUT)	Battery voltage is present when pressing the transmitter LOCK button.

C: INSPECTION

1. SYMPTOM CHART

Symptom	Repair order	Reference
None of the functions of keyless entry system operate.	1. Check the transmitter battery.	<Ref. to SL-17, CHECK TRANSMITTER BATTERY, INSPECTION, Keyless Entry System.>
	2. Check the fuse.	<Ref. to SL-17, CHECK FUSE, INSPECTION, Keyless Entry System.>
	3. Check the keyless entry control module power supply and ground circuit.	<Ref. to SL-18, CHECK POWER SUPPLY AND GROUND CIRCUIT, INSPECTION, Keyless Entry System.>
	4. Check the registration connector circuit.	<Ref. to SL-18, CHECK REGISTRATION CONNECTOR CIRCUIT, INSPECTION, Keyless Entry System.>
	5. Check the key warning switch.	<Ref. to SL-20, CHECK KEY WARNING SWITCH, INSPECTION, Keyless Entry System.>
	6. Check the door switch.	<Ref. to SL-19, CHECK DOOR SWITCH, INSPECTION, Keyless Entry System.>
	7. Replace the keyless entry control module.	<Ref. to SL-42, Keyless Entry Control Module.>
The transmitter cannot be registered.	1. Check the transmitter battery.	<Ref. to SL-17, CHECK TRANSMITTER BATTERY, INSPECTION, Keyless Entry System.>
	2. Check the registration connector circuit.	<Ref. to SL-18, CHECK REGISTRATION CONNECTOR CIRCUIT, INSPECTION, Keyless Entry System.>
	3. Replace the keyless entry control module.	<Ref. to SL-42, Keyless Entry Control Module.>
The door lock or unlock does not operate. NOTE: If the door lock control system does not operate when using the door lock switch, check the door lock control system. <Ref. to SL-10, INSPECTION, Door Lock Control System.>	1. Check the transmitter battery.	<Ref. to SL-17, CHECK TRANSMITTER BATTERY, INSPECTION, Keyless Entry System.>
	2. Check the key warning switch.	<Ref. to SL-20, CHECK KEY WARNING SWITCH, INSPECTION, Keyless Entry System.>
	3. Check the door switch.	<Ref. to SL-19, CHECK DOOR SWITCH, INSPECTION, Keyless Entry System.>
	4. Check output signal to double lock module. (with double lock)	<Ref. to SL-22, CHECK OUTPUT SIGNAL TO DOUBLE LOCK MODULE, INSPECTION, Keyless Entry System.>
	5. Replace the keyless entry control module.	<Ref. to SL-42, Keyless Entry Control Module.>
The hazard light does not operate.	1. Check the hazard light operation.	<Ref. to SL-21, CHECK HAZARD LIGHT OPERATION, INSPECTION, Keyless Entry System.>
	2. Replace the keyless entry control module.	<Ref. to SL-42, Keyless Entry Control Module.>

Symptom	Repair order	Reference
The room light and ignition switch illumination operation does not activate.	1. Check the room light operation.	<Ref. to SL-21, CHECK ROOM LIGHT OPERATION, INSPECTION, Keyless Entry System.>
	2. Check the ignition switch illumination circuit.	<Ref. to SL-22, CHECK IGNITION SWITCH ILLUMINATION CIRCUIT, INSPECTION, Keyless Entry System.>
	3. Replace the keyless entry control module. (without double lock)	<Ref. to SL-42, Keyless Entry Control Module.>
	4. Replace the double lock module. (with double lock)	<Ref. to SL-43, Double Lock Module.>

2. CHECK TRANSMITTER BATTERY

	Step	Check	Yes	No
1	**CHECK TRANSMITTER BATTERY.** 1) Remove the battery from transmitter. <Ref. to SL-44, REMOVAL, Keyless Transmitter.> 2) Check the battery voltage. <Ref. to SL-44, INSPECTION, Keyless Transmitter.>	Is the voltage more than 2.5 V?	Further inspection is necessary, refer to “SYMPTOM CHART”. <Ref. to SL-16, SYMPTOM CHART, INSPECTION, Keyless Entry System.>	Replace the transmitter battery.

3. CHECK FUSE

	Step	Check	Yes	No
1	**CHECK FUSE.** Remove and visually check the fuse No. 2 (in the main fuse box), No. 3 (in the fuse and relay box) and SBF-6 (in the main fuse box).	Is the fuse blown out?	Replace the fuse with a new one.	Check the power supply and ground circuit. <Ref. to SL-18, CHECK POWER SUPPLY AND GROUND CIRCUIT, INSPECTION, Keyless Entry System.>

4. CHECK POWER SUPPLY AND GROUND CIRCUIT

	Step	Check	Yes	No
1	**CHECK POWER SUPPLY.** 1) Disconnect the keyless entry control module harness connector. 2) Measure the voltage between harness connector terminal and chassis ground. ***Connector & terminal*** ***(B176) No. 5, No. 16 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **2.**	Check the harness for open circuits or shorts between keyless entry control module and fuse.
2	**CHECK GROUND CIRCUIT.** Measure the resistance between harness connector terminal and chassis ground. ***Connector & terminal*** ***(B176) No. 6, No. 14 — Chassis ground:***	Is the resistance less than 10 Ω?	The power supply and ground circuit are OK.	Repair the harness.

5. CHECK REGISTRATION CONNECTOR CIRCUIT

	Step	Check	Yes	No
1	**REGISTRATION CONNECTOR INPUT VOLTAGE INSPECTION** 1) Disconnect the registration connector. 2) Measure the voltage between keyless entry control module harness connector and chassis ground. ***Connector & terminal*** ***(B176) No. 2 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **2.**	Repair the harness, and/or connector.
2	**REGISTRATION CONNECTOR INPUT VOLTAGE INSPECTION** 1) Connect the registration connector. 2) Measure the voltage between keyless entry control module harness connector and chassis ground. ***Connector & terminal*** ***(B176) No. 2 (+) — Chassis ground (–):***	Is the voltage 0 V?	Registration connector circuit is OK.	Repair the harness, and/or connector.

6. CHECK DOOR SWITCH

	Step	Check	Yes	No
1	**CHECK DOOR SWITCH CIRCUIT.** Measure the voltage between keyless entry control module harness connector terminal and chassis ground. ***Connector & terminal*** ***Without double lock:*** ***(B176) No. 3 (+) — Chassis ground (–):*** ***With double lock:*** ***(B176) No. 3 (+) — Chassis ground (–):*** ***(B325) No. 17 (+) — Chassis ground (–):***	Is the voltage 0 V when any one of doors or rear gate is opened?	Go to step **2.**	Go to step **3.**
2	**CHECK DOOR SWITCH CIRCUIT.** Measure the voltage between keyless entry control module harness connector terminal and chassis ground. ***Connector & terminal*** ***Without double lock:*** ***(B176) No. 3 (+) — Chassis ground (–):*** ***With double lock*** ***(B176) No. 3 (+) — Chassis ground (–):*** ***(B325) No. 17 (+) — Chassis ground (–):***	Is the voltage more than 10 V when all doors and rear gate are closed?	The door switch is OK.	Go to step **3.**
3	**CHECK DOOR SWITCH.** 1) Disconnect the door switch harness connector. 2) Measure the resistance between door switch terminals. ***Terminal*** ***Door switch No. 1 — No. 3:*** ***Rear gate latch switch No. 1 — No. 2:***	Is the resistance more than 1 MΩ when door switch is pushed?	Go to step **4.**	Replace the door switch.
4	**CHECK DOOR SWITCH.** Measure the resistance between door switch terminals. ***Terminal*** ***Door switch No. 1 — No. 3:*** ***Rear gate latch switch No. 1 — No. 2:***	Is the resistance less than 1 Ω when door switch is released?	Check the following: • Without double lock: Check the harness for open circuits or shorts between keyless entry control module and door switch. • With double lock: Check the harness for open circuits or short between keyless entry control module and door switch, between double lock module and door switch, and between check connector and door switch.	Replace the door switch.

7. CHECK KEY WARNING SWITCH

	Step	Check	Yes	No
1	**CHECK FUSE.** Remove and visually check the fuse No. 6 (in the main fuse box).	Is the fuse blown out?	Replace the fuse with a new one.	Go to step **2.**
2	**CHECK KEY WARNING SWITCH CIRCUIT.** 1) Disconnect the keyless entry control module harness connector. 2) Insert the key into ignition switch. (LOCK position) 3) Measure the voltage between harness connector terminal and chassis ground. ***Connector & terminal*** ***(B176) No. 1 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **3.**	Go to step **4.**
3	**CHECK KEY WARNING SWITCH CIRCUIT.** 1) Remove the key from ignition switch. 2) Measure the voltage between harness connector terminal and chassis ground. ***Connector & terminal*** ***(B176) No. 1 (+) — Chassis ground (–):***	Is the voltage 0 V?	The key warning switch is OK.	Go to step **4.**
4	**CHECK KEY WARNING SWITCH.** 1) Disconnect the key warning switch harness connector. 2) Insert the key into ignition switch. (LOCK position) 3) Measure the resistance between key warning switch terminals. ***Terminal*** ***No. 1 — No. 2:***	Is the resistance less than 1 Ω?	Go to step **5.**	Replace the key warning switch.
5	**CHECK KEY WARNING SWITCH.** 1) Remove the key from ignition switch. 2) Measure the resistance between key warning switch terminals. ***Terminal*** ***No. 1 — No. 2:***	Is the resistance more than 1 MΩ?	Check the followng: • Harness for open circuits or shorts between the key warning switch and fuse • Harness for open circuits and shorts between the keyless entry control module and key warning switch	Replace the key warning switch.

8. CHECK HAZARD LIGHT OPERATION

	Step	Check	Yes	No
1	**CHECK HAZARD LIGHT OPERATION.** Make sure the hazard light blinks when hazard switch is turned to ON.	Does the hazard light blink?	Go to step **2.**	Check the hazard light circuit.
2	**CHECK OUTPUT SIGNAL.** 1) Remove the key from ignition switch. 2) Close all doors and rear gate. 3) Measure the voltage between keyless entry control module harness connector terminal and chassis ground when LOCK or OPEN button of transmitter is pressed. ***Connector & terminal*** ***(B176) No. 12, No. 13 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Check the harness for open or short between keyless entry control module and turn signal lights.	Replace the keyless entry control module.

9. CHECK ROOM LIGHT OPERATION

	Step	Check	Yes	No
1	**CHECK ROOM LIGHT OPERATION.** Make sure the room light illuminates when the room light switch is turned to ON.	Does the room light illuminate?	Go to step **2.**	Check the room light circuit.
2	**CHECK HARNESS BETWEEN ROOM LIGHT AND KEYLESS ENTRY CONTROL MODULE (WITHOUT DOUBLE LOCK) OR DOUBLE LOCK MODULE (WITH DOUBLE LOCK).** 1) Disconnect the keyless entry control module or double lock module harness connector and room light harness connector. 2) Measure the resistance between keyless entry control module or double lock module harness connector terminal and room light harness connector terminal. ***Connector & terminal*** ***Without double lock:*** ***(B176) No. 11 — (R52) No. 2:*** ***With double lock:*** ***(B325) No. 1 — (R52) No. 2:*** ***(B79) No. 13 — (R52) No. 2:***	Is the resistance less than 10 Ω?	The room light operation circuit is OK.	Check the follownng: • Without double lock: Check the harness for open circuit or short between keyless entry control module and room light. • With double lock: Check the harness for open circuit or short between double lock module and room light, and between check connector and room light.

10.CHECK IGNITION SWITCH ILLUMINATION CIRCUIT

	Step	Check	Yes	No
1	**CHECK IGNITION SWITCH ILLUMINATION POWER SUPPLY.** 1) Disconnect the ignition switch illumination harness connector. 2) Measure the voltage between ignition switch illumination harness connector terminal and chassis ground. ***Connector & terminal*** ***(B370) No. 3 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **2.**	Check the harness for open circuit or shorts between ignition switch illumination and fuse.
2	**CHECK HARNESS BETWEEN IGNITION SWITCH ILLUMINATION AND KEYLESS ENTRY CONTROL MODULE (WITHOUT DOUBLE LOCK) OR DOUBLE LOCK MODULE (WITH DOUBLE LOCK).** 1) Disconnect the keyless entry control module or double lock module harness connector. 2) Measure the resistance between keyless entry or double lock module harness connector terminal and ignition switch illumination harness connector. ***Connector & terminal*** ***Without double lock:*** ***(B176) No. 11 — (B370) No. 4:*** ***With double lock:*** ***(B325) No. 1 — (B370) No. 4:*** ***(B79) No. 13 — (B370) No. 4:***	Is the resistance less than 10 Ω?	Check the ignition switch illumination. If NG, replace the ignition switch illumination.	Check the followng: • Without double lock: Check the harness for open circuit or short between keyless entry control module and ignition switch illumination. • With double lock: Check the harness for open circuit or short between double lock module and ignition switch illumination, and between check connector and ignition switch illumination.

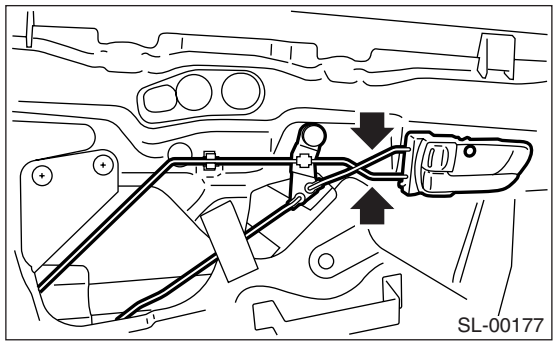
11.CHECK OUTPUT SIGNAL TO DOUBLE LOCK MODULE

	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL.** Measure the voltage between the keyless entry control module harness connector terminal and chassis ground when OPEN button of transmitter is pressed. ***Connector & terminal*** ***(B176) No. 17 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **2.**	Replace the keyless entry control module.
2	**CHECK OUTPUT SIGNAL.** Measure the voltage between the keyless entry control module harness connector terminal and chassis ground when LOCK button of transmitter is pressed. ***Connector & terminal*** ***(B176) No. 18 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Replace the double lock module.	Check the harness for open circuit or shorts between the keyless entry control module and double lock module.

4. Front Inner Remote

A: REMOVAL

1) Remove the door trim. <Ref. to EI-40, REMOVAL, Front Door Trim.>
2) Remove the sealing cover. <Ref. to EB-17, REMOVAL, Front Sealing Cover.>
3) Remove a screw and two rod joints.
4) Remove the front inner remote.



B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Make sure the inner remote works properly after installation.

C: INSPECTION

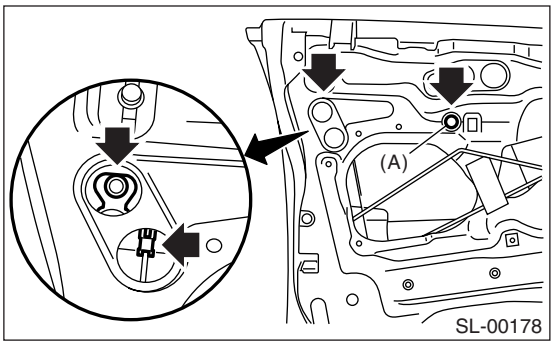
1) Make sure the rod is not deformed.
2) Make sure the lever and rod work smoothly.

5. Front Outer Handle

A: REMOVAL

1. MODEL WITHOUT DOUBLE LOCK

1) Remove the door trim. <Ref. to EI-40, REMOVAL, Front Door Trim.>
2) Remove the sealing cover. <Ref. to EB-17, REMOVAL, Front Sealing Cover.>
3) Remove the bolt (A).
4) Move the front door glass downward. Remove the bolt and rod clamp.
5) Remove the front outer handle.



2. MODEL WITH DOUBLE LOCK

1) Remove the door trim. <Ref. to EI-40, REMOVAL, Front Door Trim.>
2) Remove the sealing cover. <Ref. to EB-17, REMOVAL, Front Sealing Cover.>
3) Remove the front door glass. <Ref. to GW-13, REMOVAL, Front Door Glass.>
4) Remove the key cylinder. <Ref. to SL-39, FRONT DOOR, REPLACEMENT, Key Lock Cylinders.>
5) Remove the front side bolt, and then remove the front outer handle.

CAUTION:
Do not use excessive force to remove the handle from door panel. This will deform it.

B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Make sure the outer handle works properly after installation.

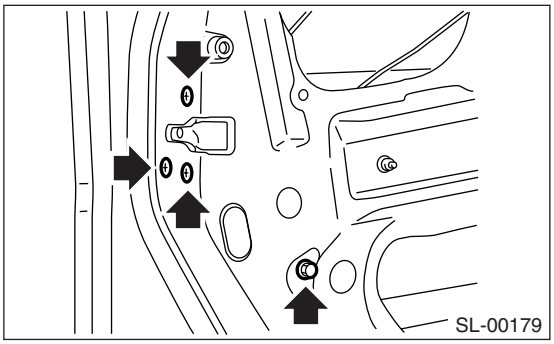
C: INSPECTION

1) Make sure the rod is not deformed.
2) Make sure the lever and rod work smoothly.

6. Front Door Latch and Door Lock Actuator Assembly

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the front door trim. <Ref. to EI-40, REMOVAL, Front Door Trim.>
3) Remove the sealing cover. <Ref. to EB-17, REMOVAL, Front Sealing Cover.>
4) Remove the front inner remote. <Ref. to SL-23, REMOVAL, Front Inner Remote.>
5) Remove three screws and a bolt.



6) Remove the front door latch and door lock actuator assembly, and then disconnect the connector.

B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Make sure the lock works properly after installation.

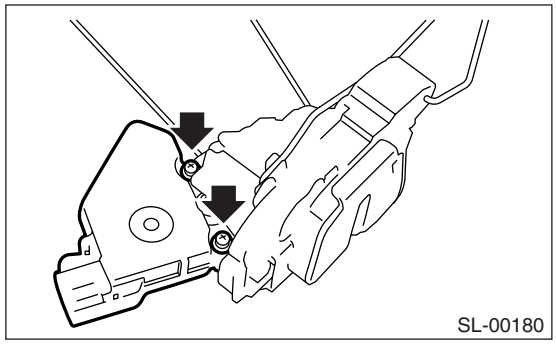
C: INSPECTION

1) Make sure the rod is not deformed.
2) Make sure the lever and rod work smoothly.

7. Front Door Lock Actuator

A: REMOVAL

1) Remove the front door latch and door lock actuator assembly. <Ref. to SL-25, REMOVAL, Front Door Latch and Door Lock Actuator Assembly.>
2) Remove two screws to remove the front door lock actuator.


SL-00180

B: INSTALLATION

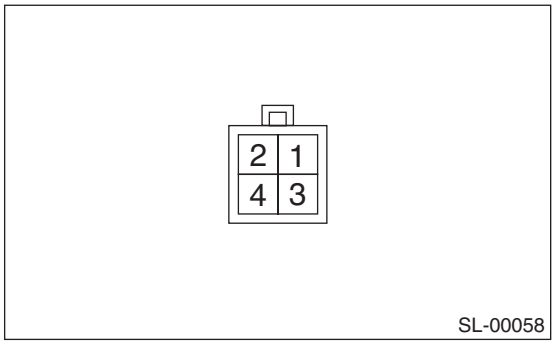
Install in the reverse order of removal.

NOTE:
Make sure the lock works properly after installation.

C: INSPECTION

1) Disconnect the door lock actuator harness connector.
2) Connect the battery to door lock actuator terminals.
If NG, replace the door lock actuator.

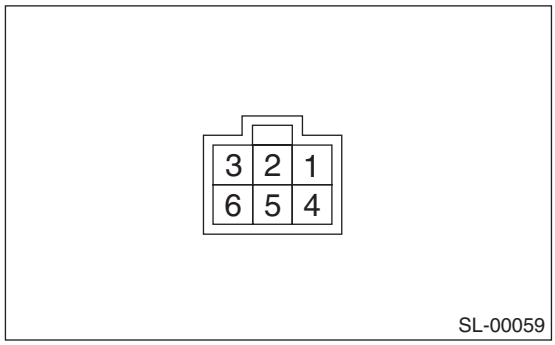
1. WITHOUT DOUBLE LOCK



SL-00058

Terminal No.	Actuator operation
No. 3 (+) and No. 1 (–)	Unlocked → Locked
No. 1 (+) and No. 3 (–)	Locked → Unlocked

2. WITH DOUBLE LOCK



SL-00059

• DOOR ACTUATOR RH

Terminal No.	Actuator operation
No. 1 (+) and No. 4 (–)	Unlocked → Locked
No. 4 (+) and No. 1 (–)	Locked → Unlocked
No. 6 (+) and No. 3 (–)	Double lock released → Double lock set
No. 3 (+) and No. 6 (–)	Double lock set → Double lock released

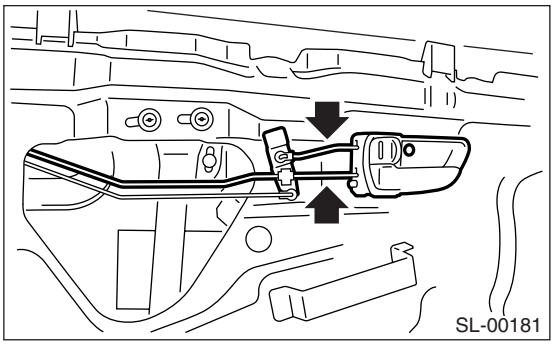
• DOOR ACTUATOR LH

Terminal No.	Actuator operation
No. 6 (+) and No. 3 (–)	Unlocked → Locked
No. 3 (+) and No. 6 (–)	Locked → Unlocked
No. 1 (+) and No. 4 (–)	Double lock released → Double lock set
No. 4 (+) and No. 1 (–)	Double lock set → Double lock released

8. Rear Inner Remote

A: REMOVAL

1) Remove the rear door trim. <Ref. to EI-41, REMOVAL, Rear Door Trim.>
2) Remove the sealing cover. <Ref. to EB-20, REMOVAL, Rear Sealing Cover.>
3) Remove a screw and two rod joints.
4) Remove the inner remote.



B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Make sure the inner remote works properly after installation.

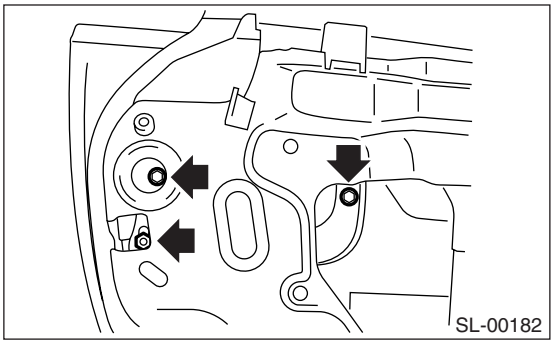
C: INSPECTION

1) Make sure the rod is not deformed.
2) Make sure the lever and rod work smoothly.
3) Make sure the child safety lock work properly.

9. Rear Outer Handle

A: REMOVAL

1) Remove the rear door trim. <Ref. to EI-41, REMOVAL, Rear Door Trim.>
2) Remove the sealing cover. <Ref. to EB-20, REMOVAL, Rear Sealing Cover.>
3) Remove the rear inner remote. <Ref. to SL-27, REMOVAL, Rear Inner Remote.>
4) Remove the rear door latch assembly. <Ref. to SL-29, REMOVAL, Rear Door Latch and Door Lock Actuator Assembly.>
5) Remove two bolts and a nut to remove the rear outer handle.



CAUTION:
Do not use excessive force to remove the handle from door panel. This will deform it.

B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Make sure the outer handle works properly after installation.

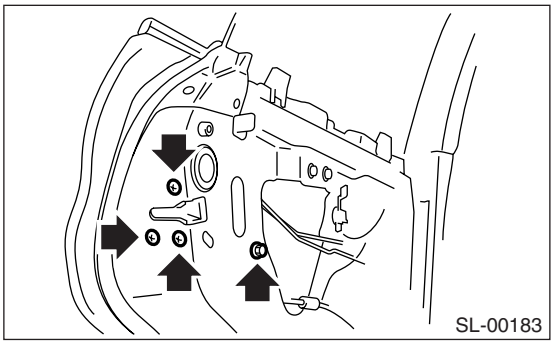
C: INSPECTION

1) Make sure the rod is not deformed.
2) Make sure the lever and rod work smoothly.

10.Rear Door Latch and Door Lock Actuator Assembly

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the rear door trim. <Ref. to EI-41, REMOVAL, Rear Door Trim.>
3) Remove the sealing cover. <Ref. to EB-20, REMOVAL, Rear Sealing Cover.>
4) Remove the rear inner remote. <Ref. to SL-27, REMOVAL, Rear Inner Remote.>
5) Remove three screws and a bolt.



6) Disconnect the connector, and then remove the rear door latch and door lock actuator assembly.

B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Make sure the lock works properly after installation.

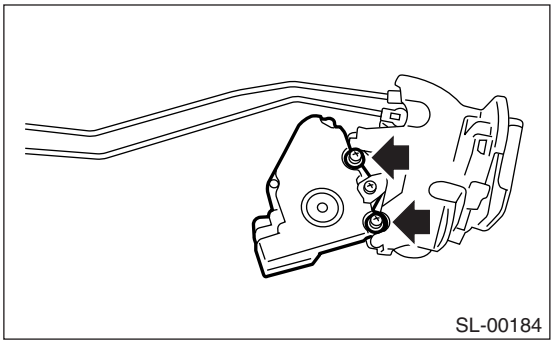
C: INSPECTION

1) Make sure the rod is not deformed.
2) Make sure the lever and rod work smoothly.

11.Rear Door Lock Actuator

A: REMOVAL

1) Remove the rear door latch and door lock actuator assembly. <Ref. to SL-29, REMOVAL, Rear Door Latch and Door Lock Actuator Assembly.>
2) Remove two screws to remove rear door lock actuator.


SL-00184

B: INSTALLATION

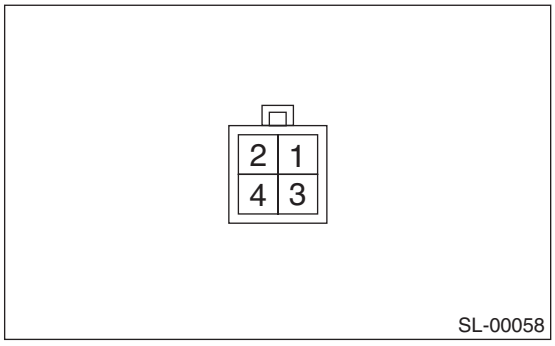
Install in the reverse order of removal.

NOTE:
Make sure the lock works properly after installation.

C: INSPECTION

1) Disconnect the door lock actuator harness connector.
2) Connect the battery to door lock actuator terminals.
If NG, replace the door lock actuator.

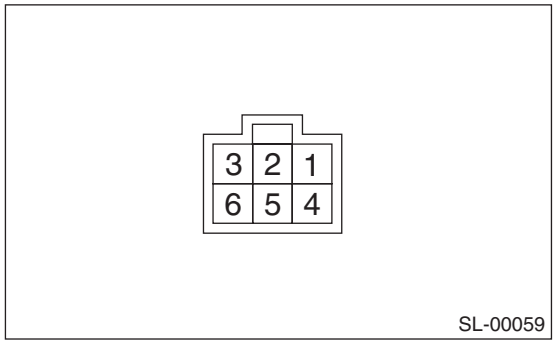
1. WITHOUT DOUBLE LOCK



SL-00058

Terminal No.	Actuator operation
No. 3 (+) and No. 1 (–)	Unlocked → Locked
No. 1 (+) and No. 3 (–)	Locked → Unlocked

2. WITH DOUBLE LOCK



SL-00059

• DOOR ACTUATOR RH

Terminal No.	Actuator operation
No. 1 (+) and No. 4 (–)	Unlocked → Locked
No. 4 (+) and No. 1 (–)	Locked → Unlocked
No. 6 (+) and No. 3 (–)	Double lock released → Double lock set
No. 3 (+) and No. 6 (–)	Double lock set → Double lock released

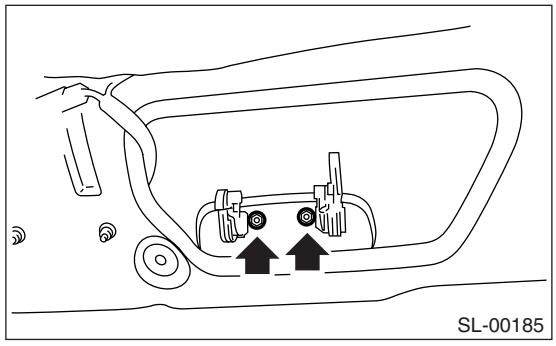
• DOOR ACTUATOR LH

Terminal No.	Actuator operation
No. 6 (+) and No. 3 (–)	Unlocked → Locked
No. 3 (+) and No. 6 (–)	Locked → Unlocked
No. 1 (+) and No. 4 (–)	Double lock released → Double lock set
No. 4 (+) and No. 1 (–)	Double lock set → Double lock released

12.Rear Gate Outer Handle

A: REMOVAL

1) Remove the rear gate trim. <Ref. to EI-55, REMOVAL, Rear Gate Trim.>
2) Remove the rear gate latch assembly. <Ref. to SL-32, REMOVAL, Rear Gate Latch Assembly.>
3) Remove two nuts to remove the rear gate outer handle.



B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Make sure the outer handle works properly after installation.

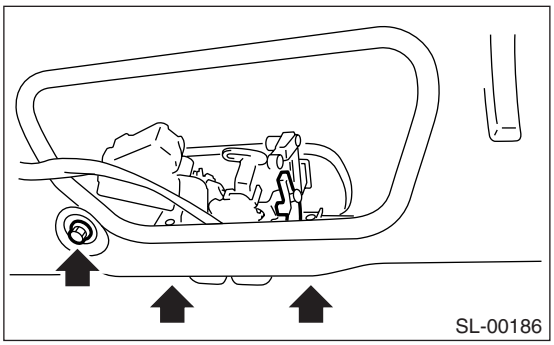
C: INSPECTION

1) Inspect the rod for deformation.
2) Make sure the lever and rod move smoothly.

13.Rear Gate Latch Assembly

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the rear gate trim. <Ref. to EI-55, REMOVAL, Rear Gate Trim.>
3) Remove three bolts.



4) Disconnect the connectors, and then remove the rear gate latch assembly.

B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Make sure the lock works properly after installation.

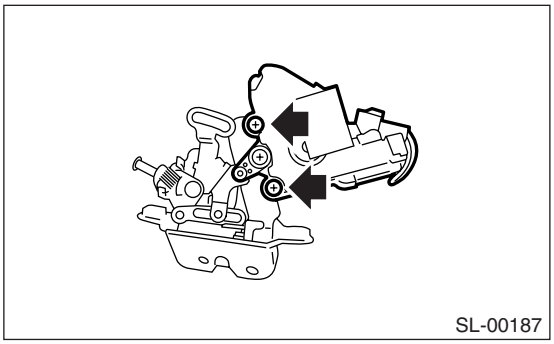
C: INSPECTION

1) Make sure the rod is not deformed.
2) Make sure the lever and rod work smoothly.

14.Rear Gate Latch Lock Actuator

A: REMOVAL

1) Remove the rear gate latch assembly. <Ref. to SL-32, REMOVAL, Rear Gate Latch Assembly.>
2) Remove two screws to remove the rear gate lock actuator.


SL-00187

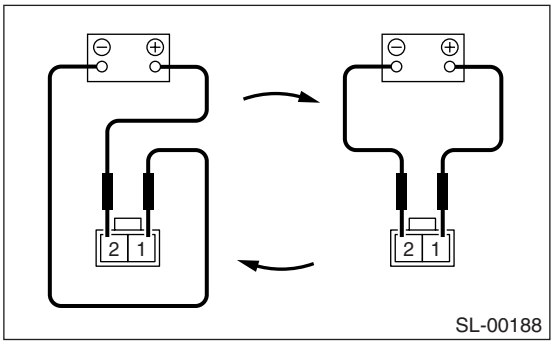
B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Make sure the lock works properly after installation.

C: INSPECTION

1) Disconnect the door lock actuator harness connector.
2) Connect the battery to door lock actuator terminals.



SL-00188

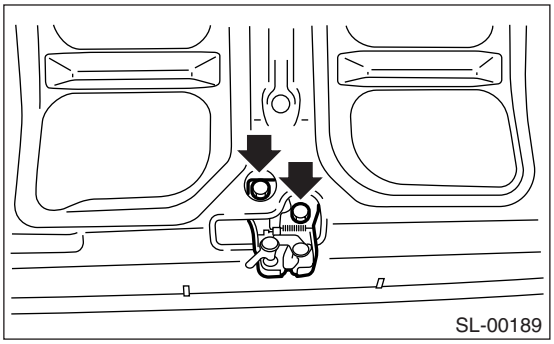
Terminal No.	Actuator operation
No. 1 (+) and No. 2 (–)	Unlocked → Locked
No. 2 (+) and No. 1 (–)	Locked → Unlocked

If NG, replace the rear gate latch lock actuator.

15.Trunk Lid Lock Assembly

A: REMOVAL

1) Remove the trunk lid key cylinder rod clamp.
2) Remove two bolts to remove the trunk lid lock assembly.



B: INSTALLATION

Install in the reverse order of removal.

NOTE:
- Apply grease to the movable parts.
- Make sure the lock works properly after installation.

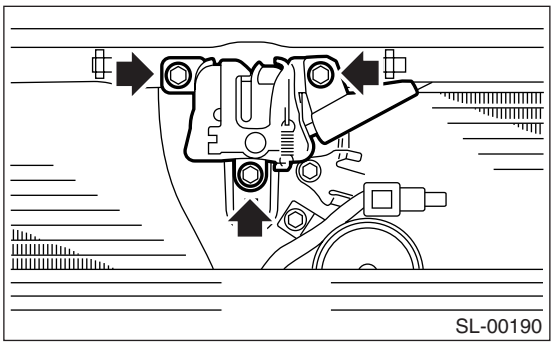
C: INSPECTION

1) Check the striker for bending or abnormal wear.
2) Check the safety lever for improper movement.
3) Check other levers and the spring for rust formation and unsmooth movement.

16.Front Hood Lock Assembly

A: REMOVAL

1) Open the hood.
2) Remove the bolts. Remove the hood lock assembly.
3) Remove the release cable from lock assembly.



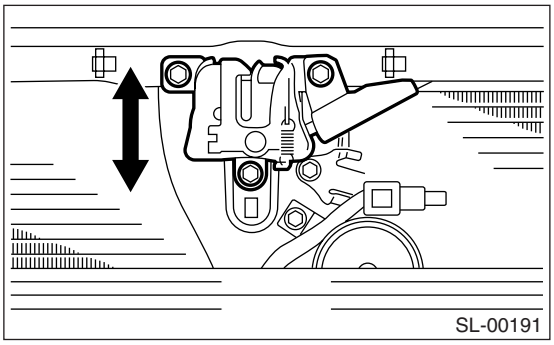
B: INSTALLATION

Install in the reverse order of removal.

NOTE:
- Apply grease to parts that rub.
- Make sure the release cable works properly after installation.

C: ADJUSTMENT

Loosen the bolt. Adjust the lock assembly while moving it up and down.



D: INSPECTION

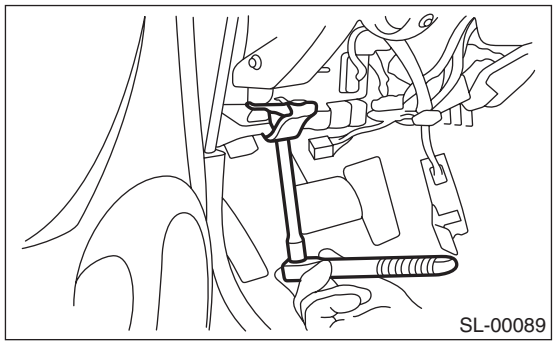
1) Check the striker for bending or abnormal wear.
2) Check the safety lever for improper movement.
3) Check other levers and the spring for rust formation and unsmooth movement.

17.Remote Openers

A: REMOVAL

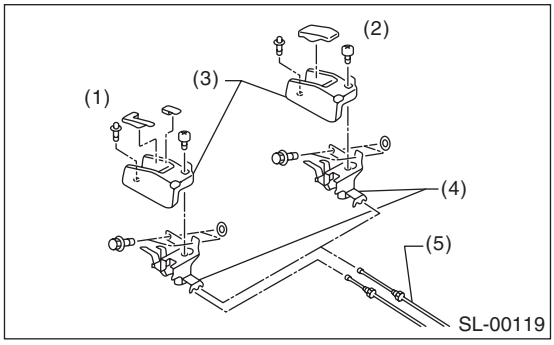
1. HOOD OPENER

1) Remove the release cable from hood lock.
2) Remove the bolt. Remove the opener lever.



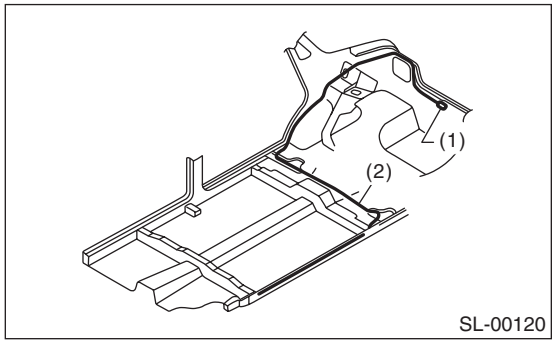
2. TRUNK LID OPENER

1) Remove the rear seat. <Ref. to SE-12, REMOVAL, Rear Seat.>
2) Remove the center pillar lower trim, and for LHD model, remove the side sill cover on passenger side. Remove the rear pillar lower trim. Pull back the floor mat. Remove the clip holding the cable.
3) Remove the bolt. Remove the opener pull handle.



(1) Sedan
(2) Wagon
(3) Cover
(4) Pull handle ASSY
(5) Cable

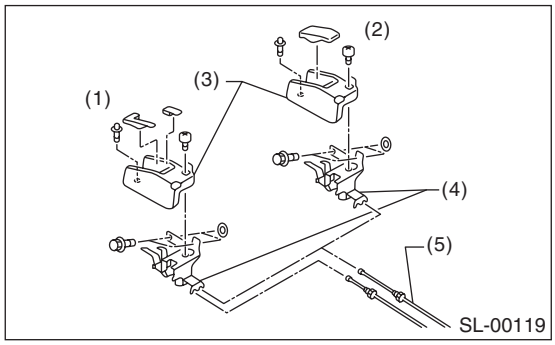
4) Remove the cable from opener pull handle.
5) Remove the striker from trunk lid.
6) Remove the cable from striker.



(1) Striker
(2) Cable

3. FUEL FLAP OPENER

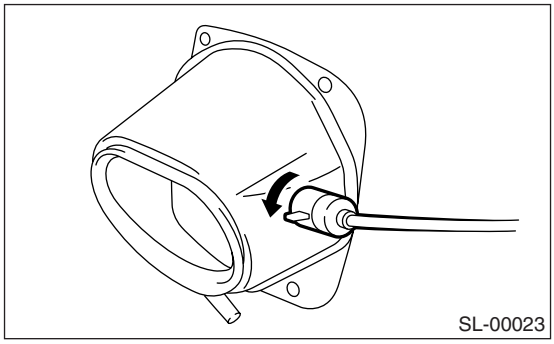
1) Remove the rear seat. <Ref. to SE-12, REMOVAL, Rear Seat.>
2) Remove the center pillar lower trim, and for LHD model, remove the side sill cover on passenger side. Remove the rear pillar lower trim. Pull back the floor mat. Remove the clip holding the cable.
3) Remove the bolt. Remove the opener pull handle.



(1) Sedan
(2) Wagon
(3) Cover
(4) Pull handle ASSY
(5) Cable

4) Remove the cable from opener pull handle.
5) Remove the right rear quarter trim. <Ref. to EI-51, REMOVAL, Rear Quarter Trim.>

6) Rotate the fuel lock inside the quarter panel to left and remove.



B: INSTALLATION

1. HOOD OPENER

Install in the reverse order of removal.

2. TRUNK LID OPENER

Install in the reverse order of removal.

3. FUEL FLAP OPENER

Install in the reverse order of removal.

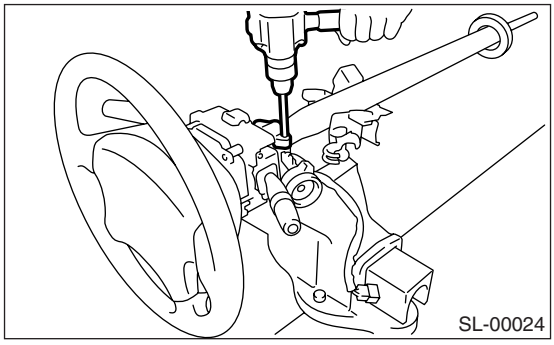
C: INSPECTION

Make sure the front hood, trunk lid and fuel flap open and close smoothly.

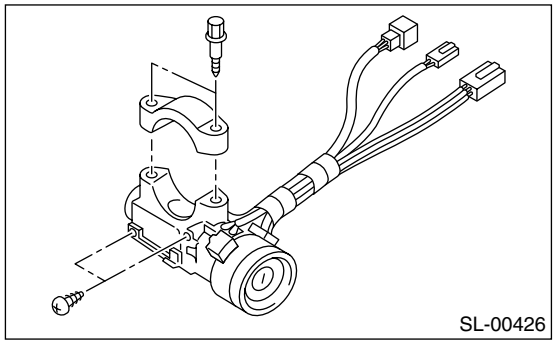
18.Ignition Key Lock

A: REPLACEMENT

1) Remove the ground cable from battery.
2) Remove the steering column. <Ref. to PS-31, REMOVAL, Tilt Steering Column.>
3) Secure the steering column in a vise. Remove the bolt with a drill.



4) Remove the ignition key lock.
5) Use a new torn bolt. Tighten the torn bolt to end of thread.



B: INSPECTION

1) Remove the instrument panel lower cover.
2) Remove the lower column cover.
3) Unfasten the hold-down clip which secures harness and disconnect the connector of ignition switch from body harness.
4) Turn the ignition key plate to each position and check the continuity between terminals of ignition connector.

Switch position	Terminal No.	Standard
LOCK	—	—
ACC	No. 1 and No. 2	Less than 1 Ω
ON	No. 1 and No. 2 No. 1 and No. 4 No. 2 and No. 4	Less than 1 Ω
ST	No. 1 and No. 3 No. 1 and No. 4 No. 3 and No. 4	Less than 1 Ω

If NG, replace the ignition switch.

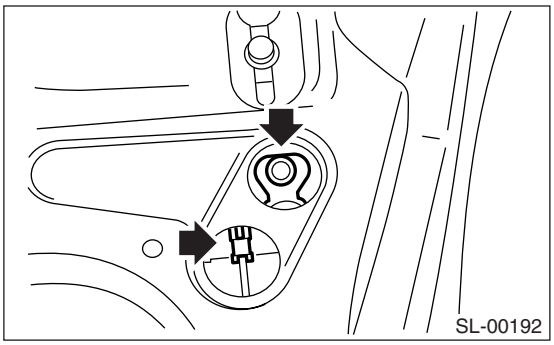
19.Key Lock Cylinders

A: REPLACEMENT

1. FRONT DOOR

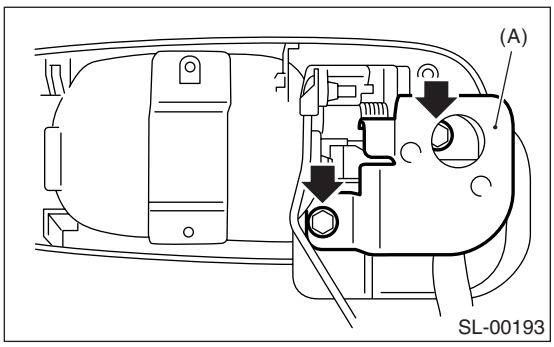
• Without double lock

1) Remove the door trim. <Ref. to EI-40, REMOVAL, Front Door Trim.>
2) Pull back the sealing cover. <Ref. to EB-17, REMOVAL, Front Sealing Cover.>
3) Move the front door glass downward.
4) Remove the rod clamp. Remove the bolt. Replace the key cylinder.


SL-00192

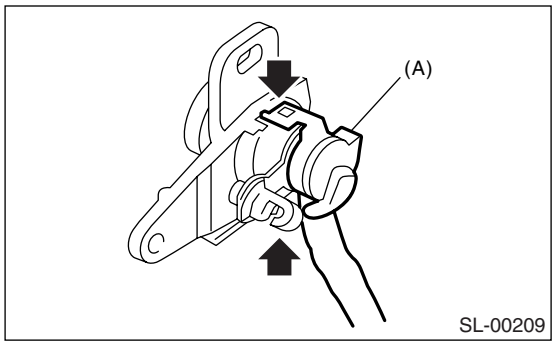
• With double lock

1) Remove the door trim. <Ref. to EI-40, REMOVAL, Front Door Trim.>
2) Remove the sealing cover. <Ref. to EB-17, REMOVAL, Front Sealing Cover.>
3) Remove the front door glass. <Ref. to GW-13, REMOVAL, Front Door Glass.>
4) Remove the rod clamp.
5) Remove two bolts, and then remove the key cylinder and outer handle cover (A).



SL-00193

6) Remove the hooks (two), and then remove the key cylinder lock switch (A) to replace the key cylinder.

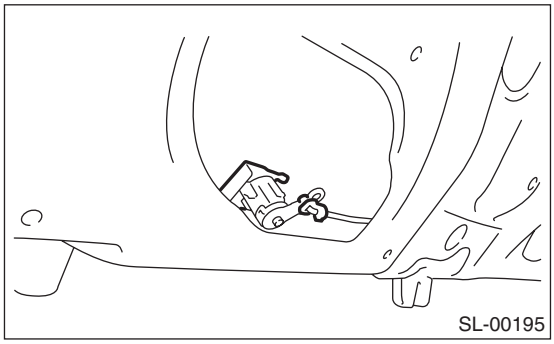


SL-00209

2. TRUNK LID

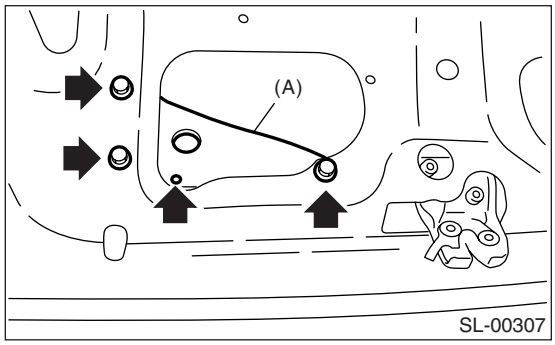
• Without double lock

Remove the rod clamp. Remove the lock plate. Replace the key cylinder.


SL-00195

• With double lock

1) Remove the four bolts, and remove the bracket (A).



SL-00307

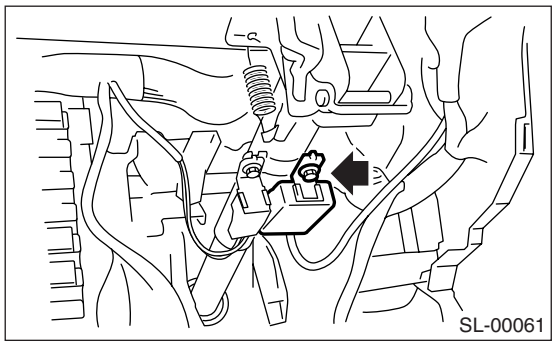
2) Remove the rod clump on key cylinder side.
3) Remove the stopper of key cylinder, and then replace the key cylinder.

20.Immobilizer Control Module

A: REMOVAL

NOTE:
• The following positions for removal and installation are for LHD models. The positions for RHD models are symmetrically opposite.

1) Disconnect the ground cable from battery.
2) Remove the instrument panel lower cover. <Ref. to EI-46, REMOVAL, Instrument Panel Assembly.>
3) Disconnect the connector from immobilizer control module.
4) Remove the immobilizer control module.



B: INSTALLATION

Install in the reverse order of removal.

C: REPLACEMENT

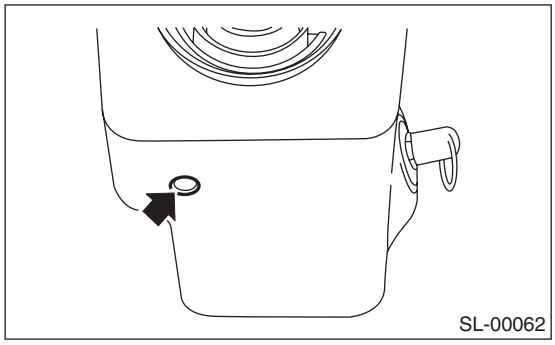
NOTE:
Prepare all the registered immobilizer key.

1) Prepare new immobilizer key, and make a registration of immobilizer. For detailed operation procedure, refer to “Immobilizer teaching operation manual”.
2) Discard the immobilizer control module and immobilizer key which are originally installed to the vehicle.

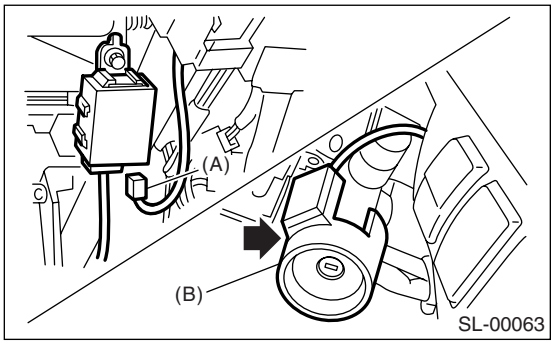
21.Immobilizer Antenna

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the instrument panel lower cover. <Ref. to EI-46, REMOVAL, Instrument Panel Assembly.>
3) Remove the screws, separate upper column cover and lower column cover.



4) Disconnect the immobilizer antenna connector (A) from immobilizer control module.
5) Remove the screw, and detach the immobilizer antenna (B).



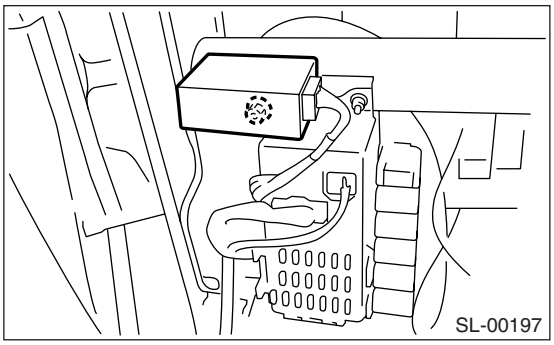
B: INSTALLATION

Install in the reverse order of removal.

22.Keyless Entry Control Module

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the instrument panel lower cover. <Ref. to EI-46, REMOVAL, Instrument Panel Assembly.>
3) Remove the nut, and then remove the keyless entry control module while disconnecting connector.



4) Disconnect the keyless entry control module and other electrical control module.

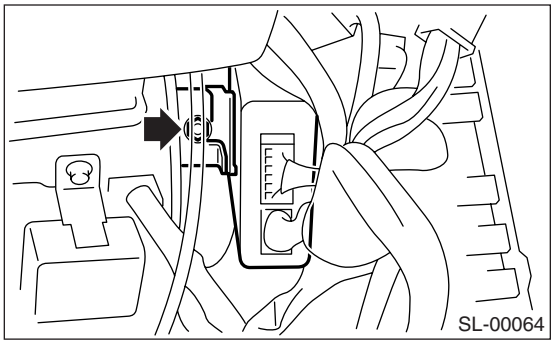
B: INSTALLATION

Install in the reverse order of removal.

23.Double Lock Module

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the instrument panel lower cover. <Ref. to EI-46, REMOVAL, Instrument Panel Assembly.>
3) Remove the nut, then remove the double lock module while disconnecting the connector.



B: INSTALLATION

Install in the reverse order of removal.

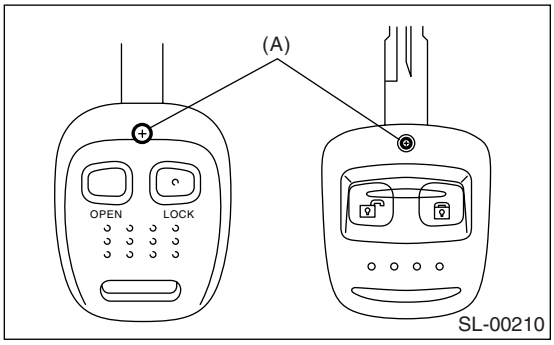
24.Keyless Transmitter

A: REMOVAL

1. TRANSMITTER BATTERY

Remove the screw (A) from transmitter, and then remove the battery.

NOTE:
To prevent static electricity damage to transmitter printed circuit board, touch the steel area of building with hand to discharge the static electricity carried on body or clothes before disassembling transmitter.



(A) Screw

B: INSTALLATION

1. TRANSMITTER BATTERY

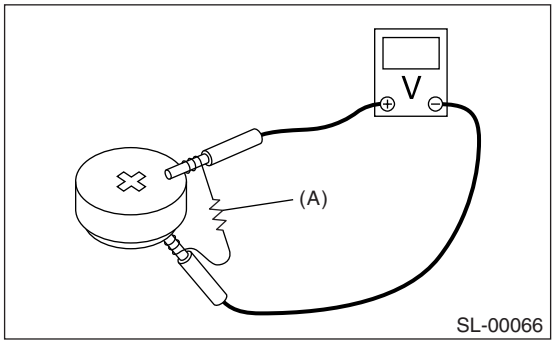
Install in the reverse order of removal.

C: INSPECTION

1. TRANSMITTER BATTERY

Measure the voltage between battery (+) terminal and (−) terminal.

NOTE:
Battery discharge occurs during measurement. Complete the measurement within 5 seconds.



(A) Resistance 270 — 300 Ω

Tester connection		Standard
(+)	(−)	
Battery (+) terminal	Battery (−) terminal	2.5 — 3.0 V

If NG, replace the battery. (Use CR1620 or equivalent.)

D: REPLACEMENT

1. TRANSMITTER REGISTRATION

NOTE:
• A maximum of three transmitters can be registered for each individual vehicle.
• When replacing and adding the transmitter, registration to immobilizer system is also necessary.

1) Remove the side sill cover at driver's side, then connect the registration connectors at front pillar lower section.
2) Push the door lock switch at driver's side to UNLOCK, and then unlock the door lock.
3) Press any button of the transmitter twice to be registered, while pushing the door lock switch to UNLOCK. To make a registration of additional 2nd and 3rd keyless transmitters, press the button of each keyless transmitter twice with door lock switch pressed to unlock side.
4) The door lock will automatically lock and unlock in sequence. This indicates the completion of transmitter registration.
5) Disconnect the registration connectors after the completion of all registration operations. After confirming the operation of door lock using newly registered transmitter(s), reinstall the side sill cover at driver's side.

SUNROOF/T-TOP/CONVERTIBLE TOP (SUNROOF)

SR

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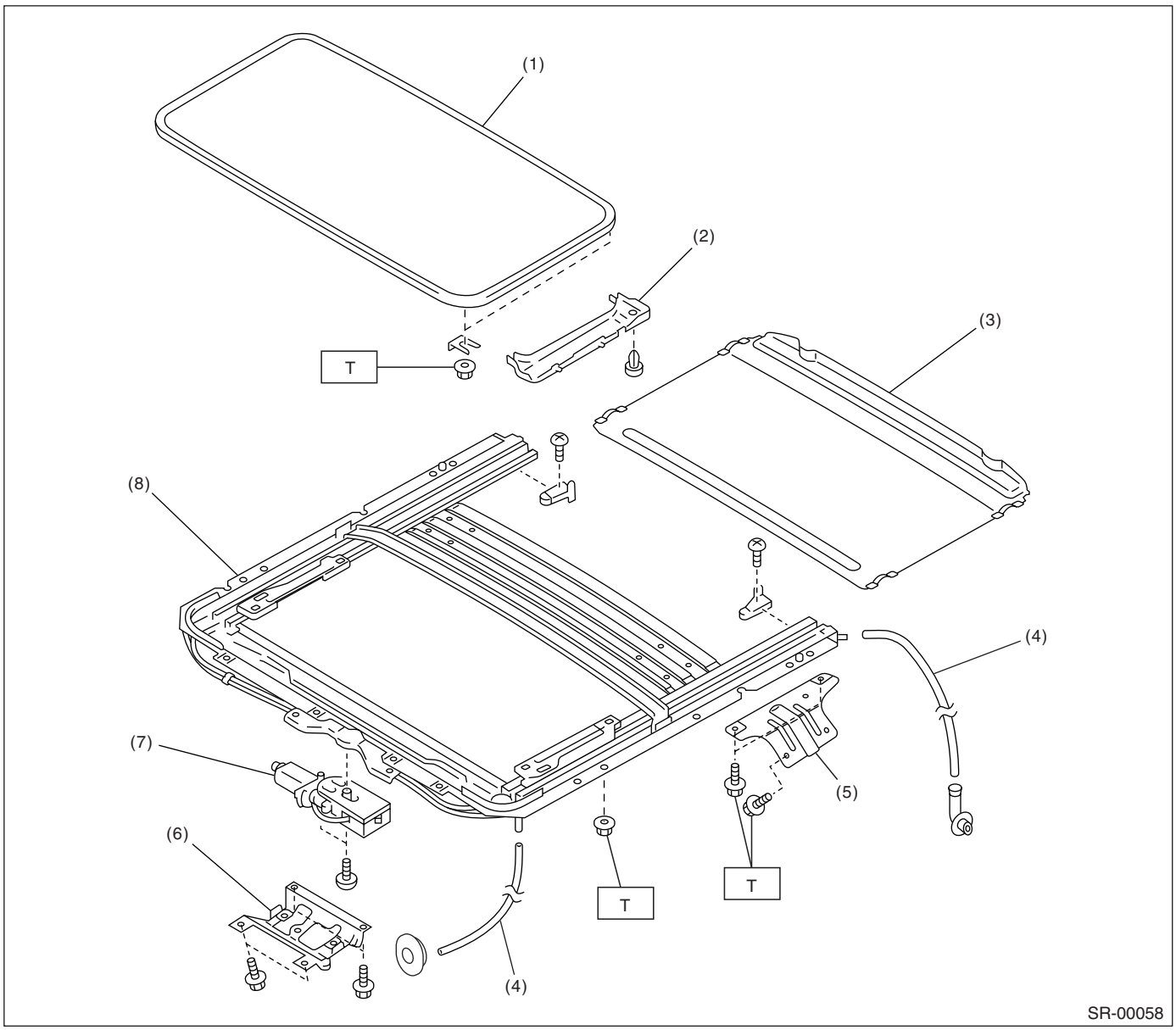
3.	Glass Lid	5
4.	Sunroof Assembly	6
5.	Sunroof Motor	8
6.	Sunroof Switch	9

1. General Description

A: COMPONENT



(1) Glass lid
(2) Guide rail cover
(3) Sunshade
(4) Drain tube
(5) Sunroof bracket
(6) Motor cover
(7) Sunroof motor
(8) Frame ASSY

Tightening torque: N·m (kgf-m, ft-lb)
T: 7.4 (0.75, 5.4)

B: CAUTION

• Before disassembling or reassembling parts, always disconnect battery ground cable. When replacing radio, control module, and other parts provided with memory functions, record memory contents before disconnecting the battery ground cable. Otherwise, the memory will be erased.
• Reassemble in reverse order of disassembly, unless otherwise indicated.
• Adjust parts to the given specifications.
• Connect the connectors and hoses securely during reassembly.
• After reassembly, make sure functional parts operate smoothly.

C: PREPARATION TOOL

1. GENERAL TOOLS

TOOL NAME	REMARKS
Circuit Tester	Used for measuring resistance and voltage.

2. Sunroof Control System

A: WIRING DIAGRAM

1. SUNROOF

<Ref. to WI-259, WIRING DIAGRAM, Sunroof Control System.>

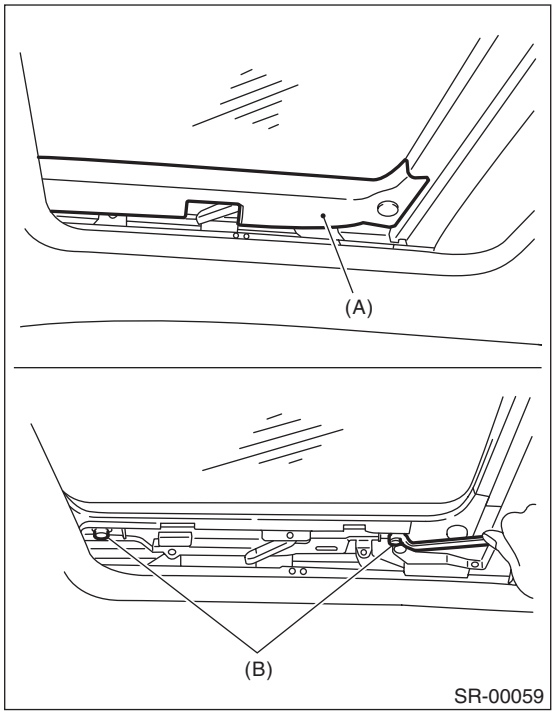
B: INSPECTION

Symptom	Checking order
Water leaks.	(1) Check roof panel and glass lid for improper or poor sealing. (2) Check drain tube for clogging. (3) Check frame assembly seal and body for improper fit.
Booming noise, wind noise and other noise	(1) Check glass lid and roof panel for improper clearance. (2) Check sunshade and roof trim for improper clearance.
Abnormal motor noise	(1) Check motor for looseness. (2) Check gears and bearings for wear. (3) Check cables for wear. (4) Check cable pipe for deformities.
Failure of sunroof (Motor operates properly.)	(1) Check guide rail for foreign particles. (2) Check guide rail for improper installation. (3) Check parts for mutual interference. (4) Check cable slider for improper clinching. (5) Check cable for improper installation. (6) Check clutch adjustment nut for improper tightness.
Motor does not rotate or rotates improperly.	(1) Check fuse for blow-out. (2) Check switch for improper function. (3) Check motor for incorrect terminal voltage. (4) Check relay for improper operation. (5) Check poor grounding system. (6) Check harness for open or short and terminals for poor connections. (7) Check limit switch for improper operation.

3. Glass Lid

A: REMOVAL

1) Completely close the glass lid and open the sunshade.
2) Remove the cover (A) then remove the nuts (B).



3) Remove the glass lid carefully.

B: INSTALLATION

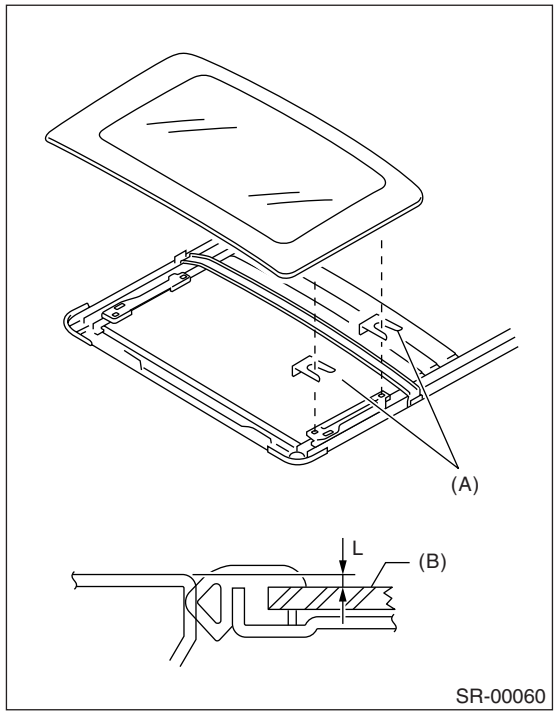
Install in the reverse order of removal.

C: ADJUSTMENT

1. ALIGNMENT OF HEIGHT BETWEEN GLASS LID AND ROOF PANEL

Loosen the glass lid installation nuts and then adjust the height by adding (max: three pieces) or extracting (min: zero pieces) shims (standard: one piece).

Difference in height between glass lid and roof panel L:
2.0±0.5 mm (0.079±0.020 in)

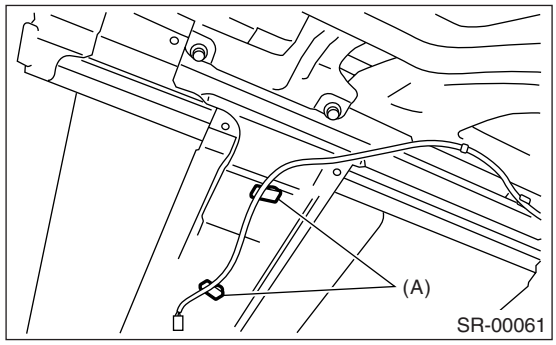


(A) Shim
(B) Glass lid

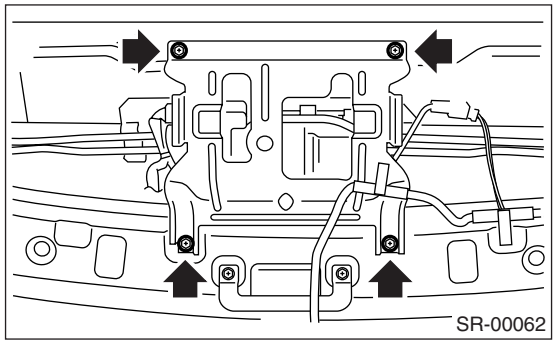
4. Sunroof Assembly

A: REMOVAL

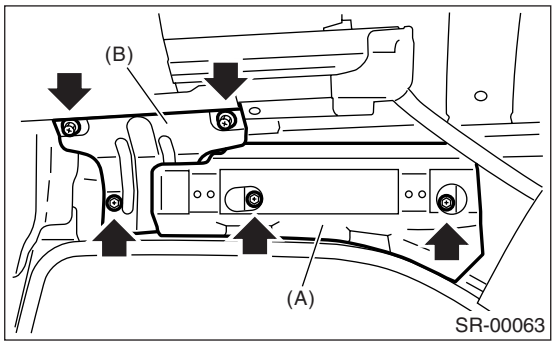
1) Disconnect the ground cable from battery.
2) Remove the roof trim. <Ref. to EI-53, REMOVAL, Roof Trim.>
3) Remove the glass lid. <Ref. to SR-5, REMOVAL, Glass Lid.>
4) Disconnect the drain tubes from frame assembly.
5) Remove the room lamp harness clip (A).



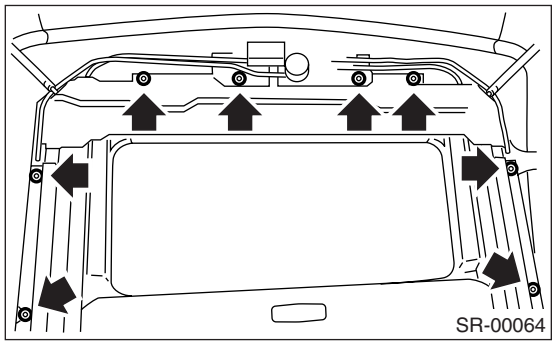
6) Disconnect the sunroof harness connector.
7) Remove the motor cover.



8) Remove the assist grip bracket (A) and sunroof bracket (B).



9) Remove the nuts then detach the frame assembly.



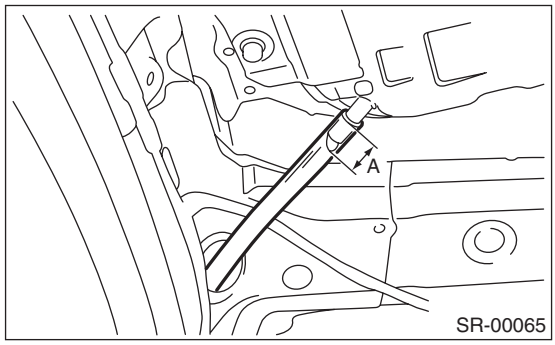
B: INSTALLATION

Install in the reverse order of removal.

CAUTION:
Be careful not to snag the harness.

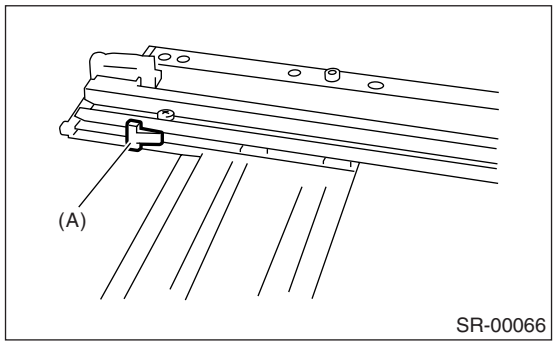
NOTE:
- Make sure to connect the harness connector.
- When installing the drain tube, insert it securely onto drain pipe.

Length A:
15 mm (0.59 in) or more

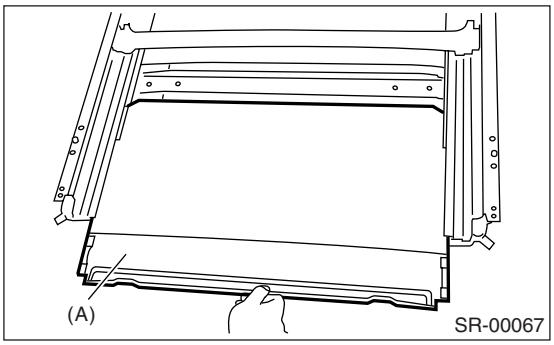


C: DISASSEMBLY

1) Remove the frame assembly.
2) Remove the rail stoppers (A).



3) Pull out the sunshade (A) from frame assembly.



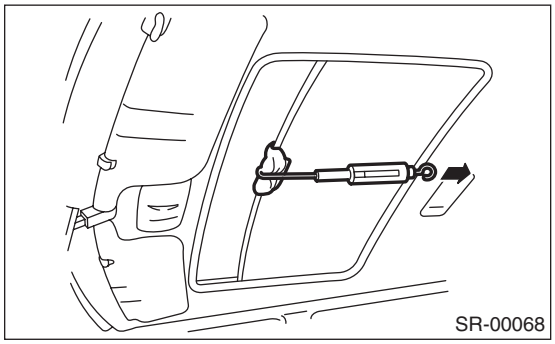
D: ASSEMBLY

Assemble in the reverse order of disassembly.

E: INSPECTION

1. CHECK FOR MOVING LOAD OF SUNSHADE

1) Attach a spring scale to sunshade edge using a cloth.



2) Pull the spring scale back to measure moving load of the sunshade.

Moving load of rear sunshade:
Less than 24.5±4.9 N (2.5±0.5 kgf, 55±1.1 lbf)

NOTE:
Moving load is larger at the beginning of pulling a spring scale, so take a scale reading while sunshade sliding smoothly.

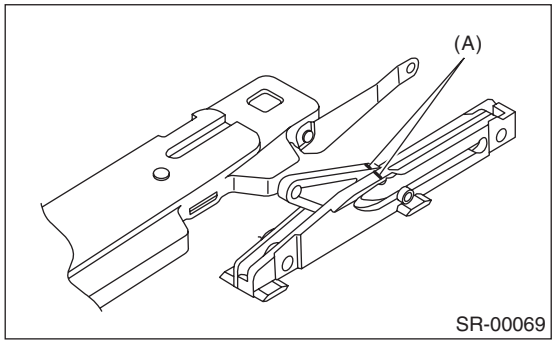
3) If moving load exceeds specifications, check the glass lid, sunshade and frame assembly for improper installation.

5. Sunroof Motor

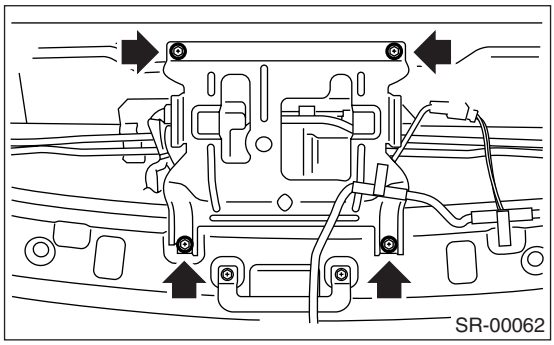
A: REMOVAL

CAUTION:
• When removing the clip, use great care to not damage the roof trim.
• Never rotate the sunroof motor after removing it.

1) Completely close the sunroof.
2) Disconnect the ground cable from battery.
3) Remove the glass lid. <Ref. to SR-5, REMOVAL, Glass Lid.>
4) Confirm the alignment mark (A) of sunroof bracket link and the guide from sunroof opening. (If the mark does not align, adjust to align the mark.)



5) Remove the roof trim. <Ref. to EI-53, REMOVAL, Roof Trim.>
6) Remove the motor cover.

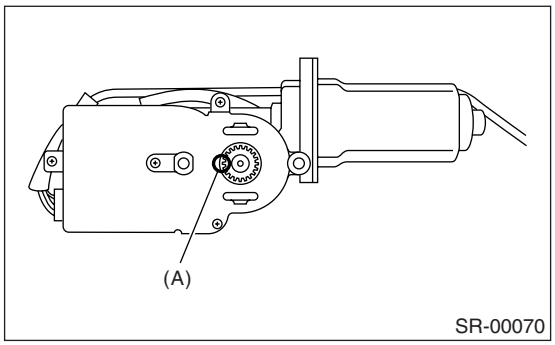


7) Disconnect the harness connector and remove the sunroof motor mounting screw.

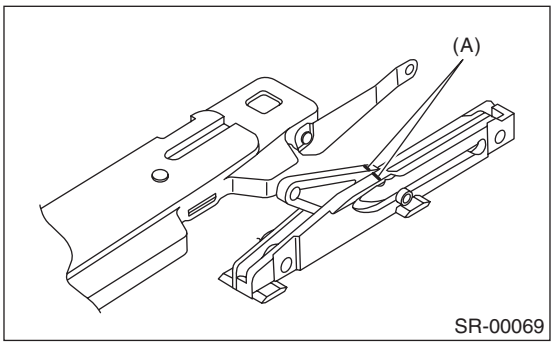
B: INSTALLATION

CAUTION:
Be careful not to move the sunroof cable when installing sunroof motor.

1) Check the alignment mark (A) of sunroof motor.



2) Confirm the alignment mark (A) of sunroof bracket link.



3) Install the sunroof motor.
4) After installing the motor, reconfirm the alignment marks of motor side and sunroof bracket link side.
5) Install the glass lid in the reverse order of removal.
6) Connect the sunroof motor harness connector and then connect the battery ground cable.
7) Check the sunroof operation with the procedure as shown in the table.

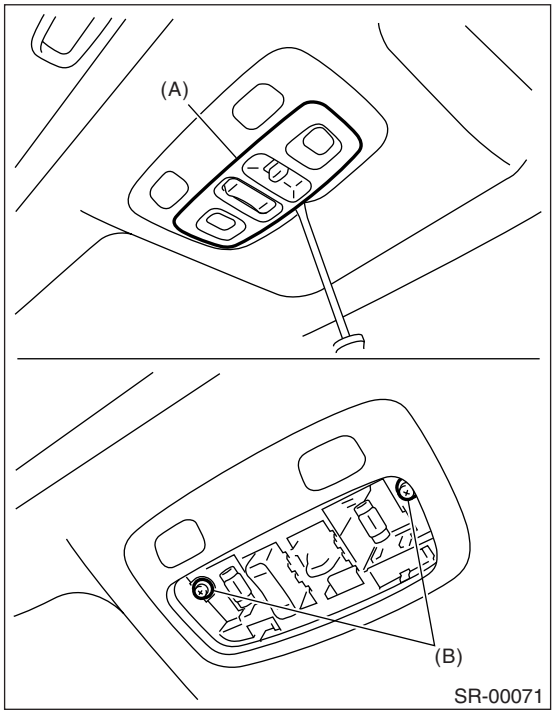
Checking order	Switch position
(1) Completely close sunroof.	Closed
(2) Tilt-up sunroof to most upper position.	Tilt-up
(3) Lower sunroof completely.	Tilt-down
(4) Open sunroof to near the completely open position.	Open
(5) Completely open sunroof.	Open
(6) Close sunroof 150 mm (5.91 in) away from completely closed position.	Closed
(7) Completely close sunroof.	Closed

8) If there is no problem in the operation of the sunroof,install the motor cover and the roof trim.

6. Sunroof Switch

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the spot light lens (A) and sunroof switch mounting screw (B).



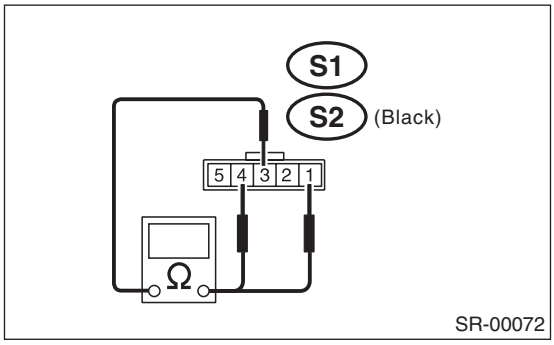
3) Disconnect the harness connectors and remove the sunroof switch.

B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

Measure the sunroof switch resistance.



Switch	Terminal No.	Standard value
Open	S1: 3 and 4	Less than 1 Ω
Close	S1: 1 and 3	Less than 1 Ω
Tilt-up	S2: 3 and 4	Less than 1 Ω
Tilt-down	S2: 1 and 3	Less than 1 Ω

EXTERIOR/INTERIOR TRIM

EI

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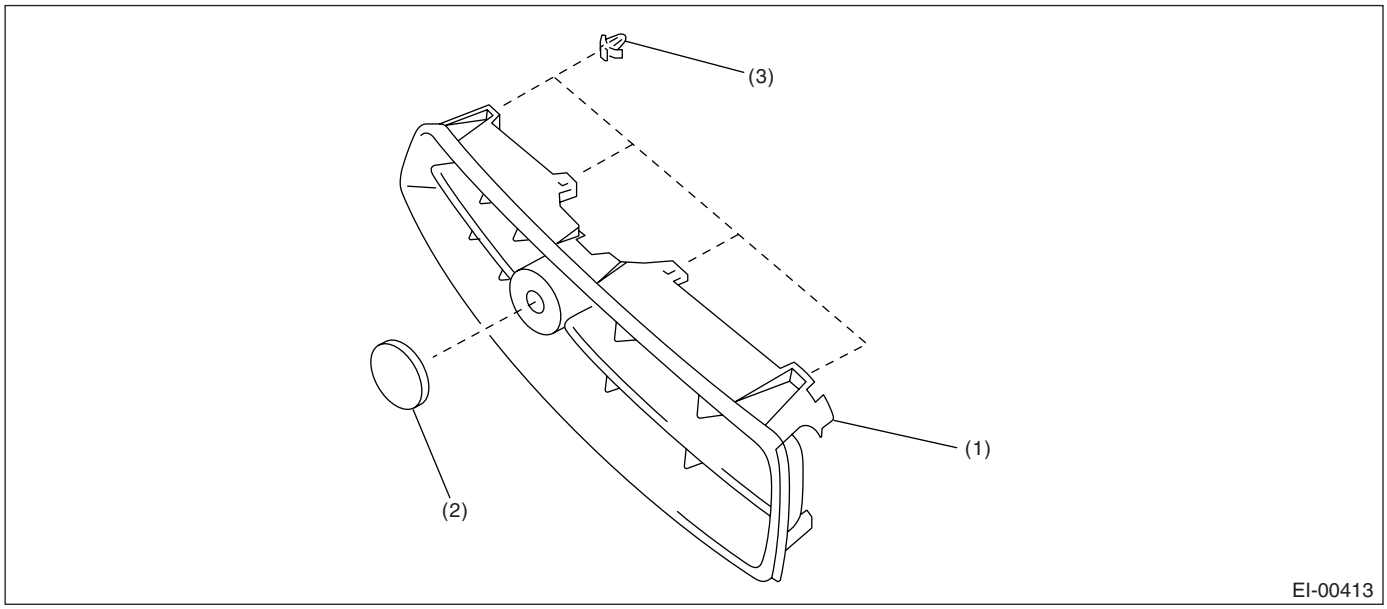
1. General Description

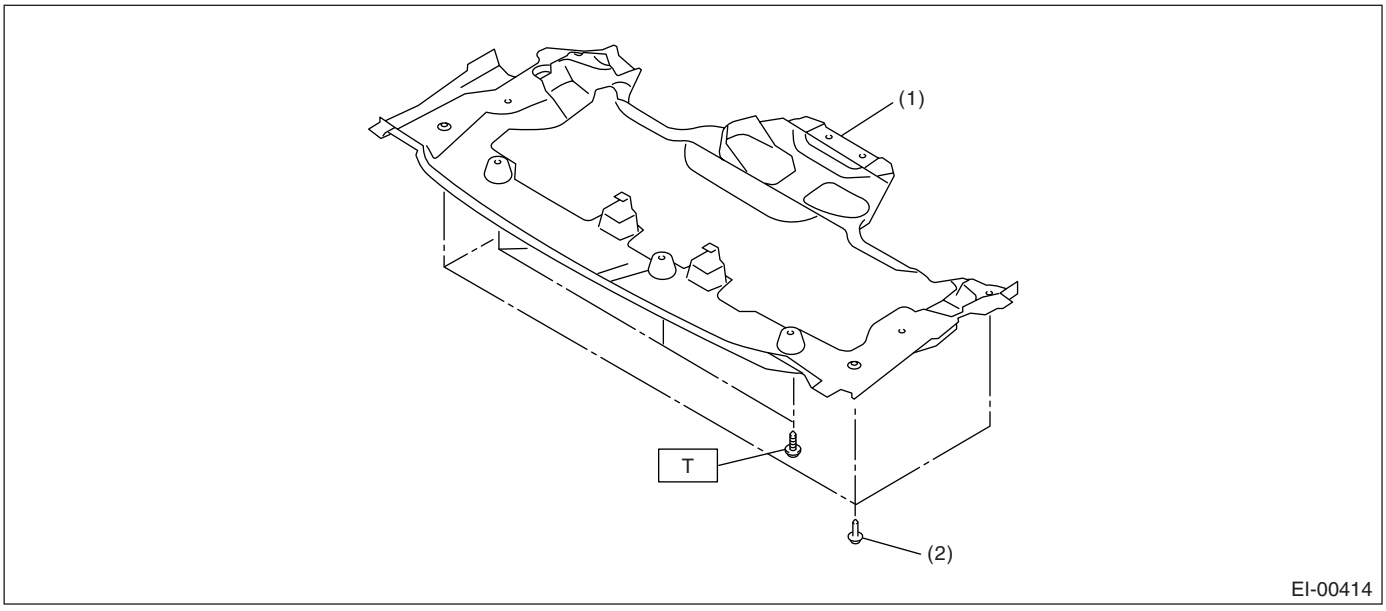
A: COMPONENT

1. FRONT GRILLE



(1) Front grille
(2) Front grille emblem
(3) Clip

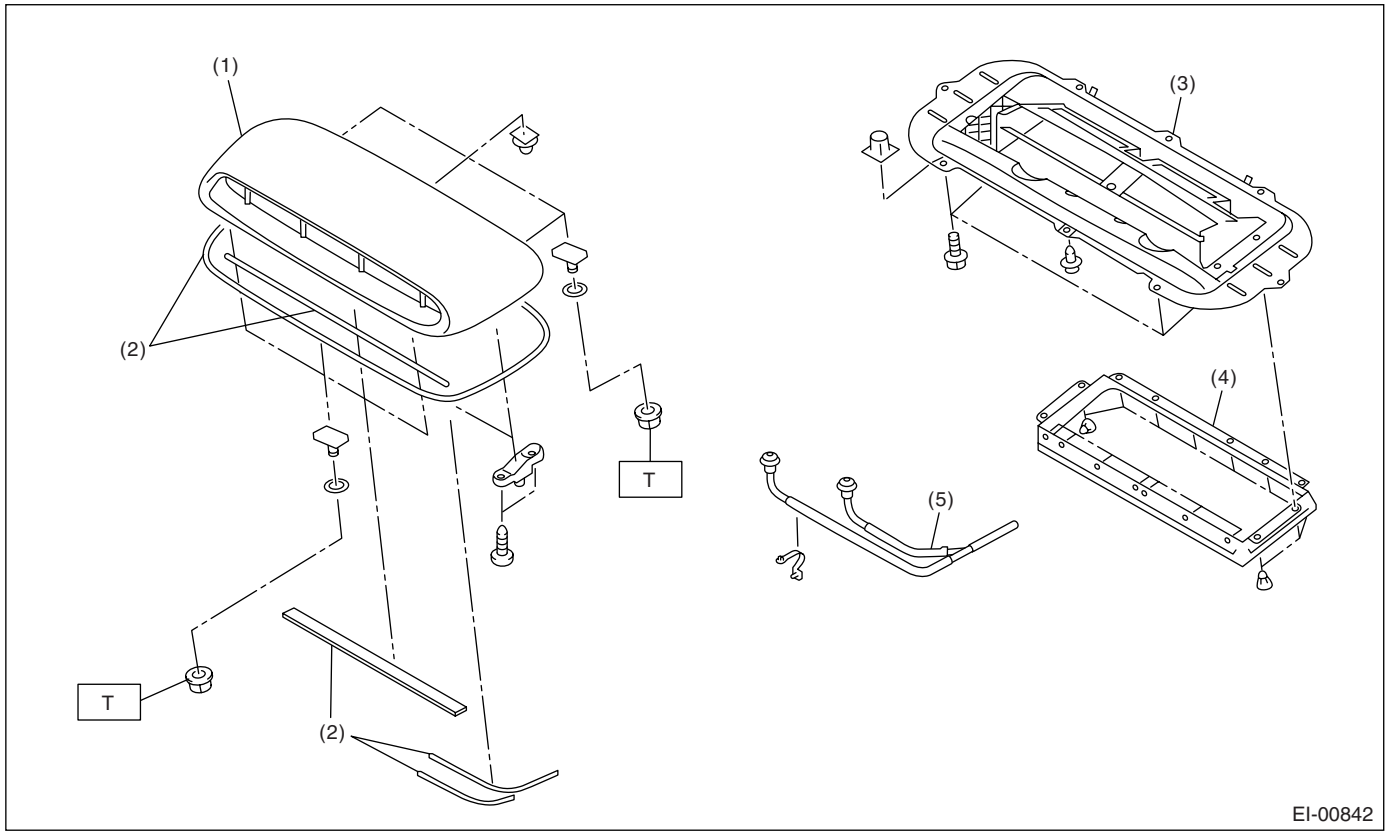
2. UNDER COVER



(1) Under cover
(2) Clip (side)

Tightening torque: N·m (kgf-m, ft-lb)
T: 14 (1.42, 10.3)

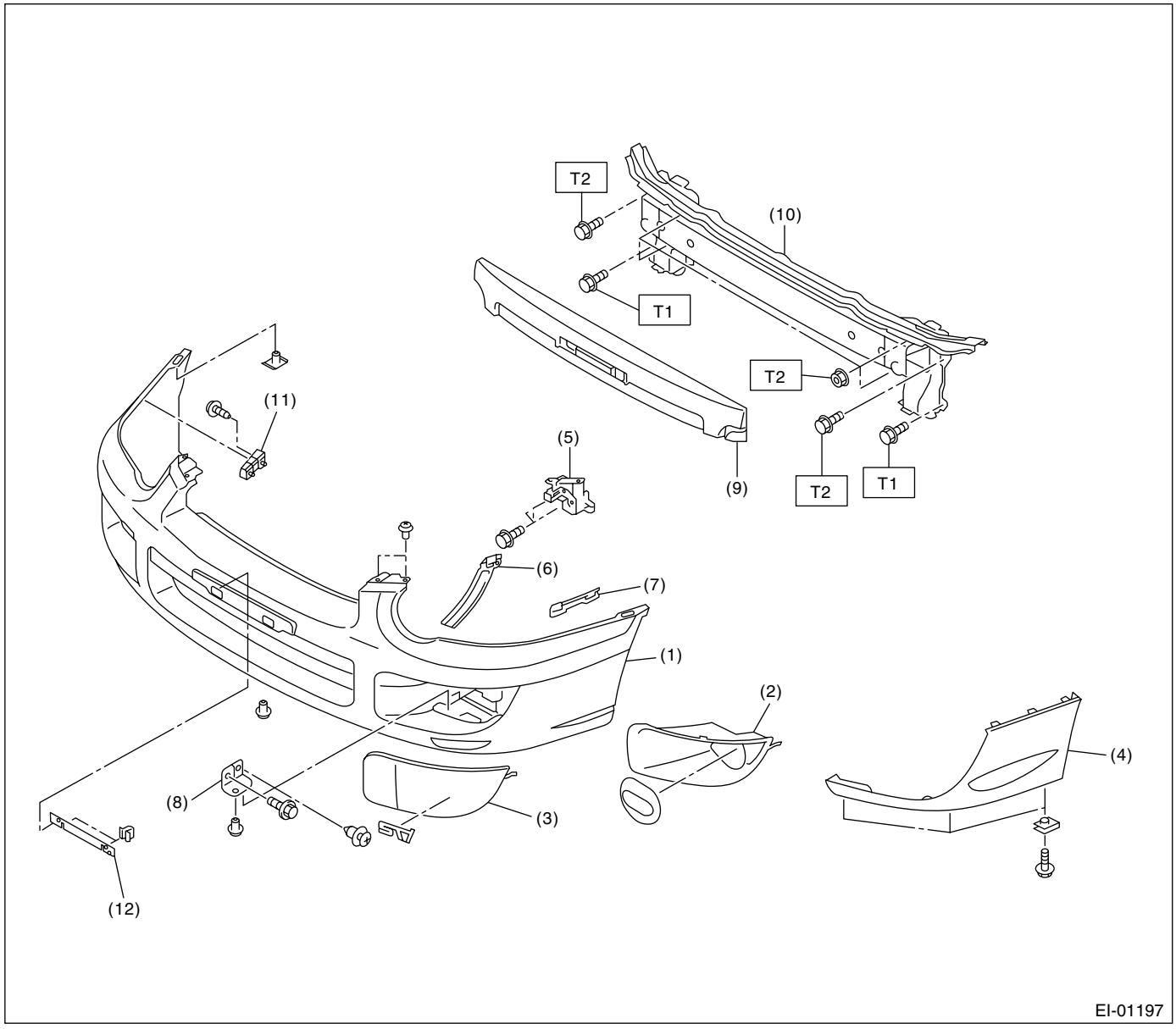
3. HOOD GRILLE



(1) Front hood grille
(2) Packing
(3) Grille duct upper
(4) Grille duct lower
(5) Intercooler water spray (STi model)

Tightening torque: N·m (kgf-m, ft-lb)
T: 4.5 (0.46, 3.32)

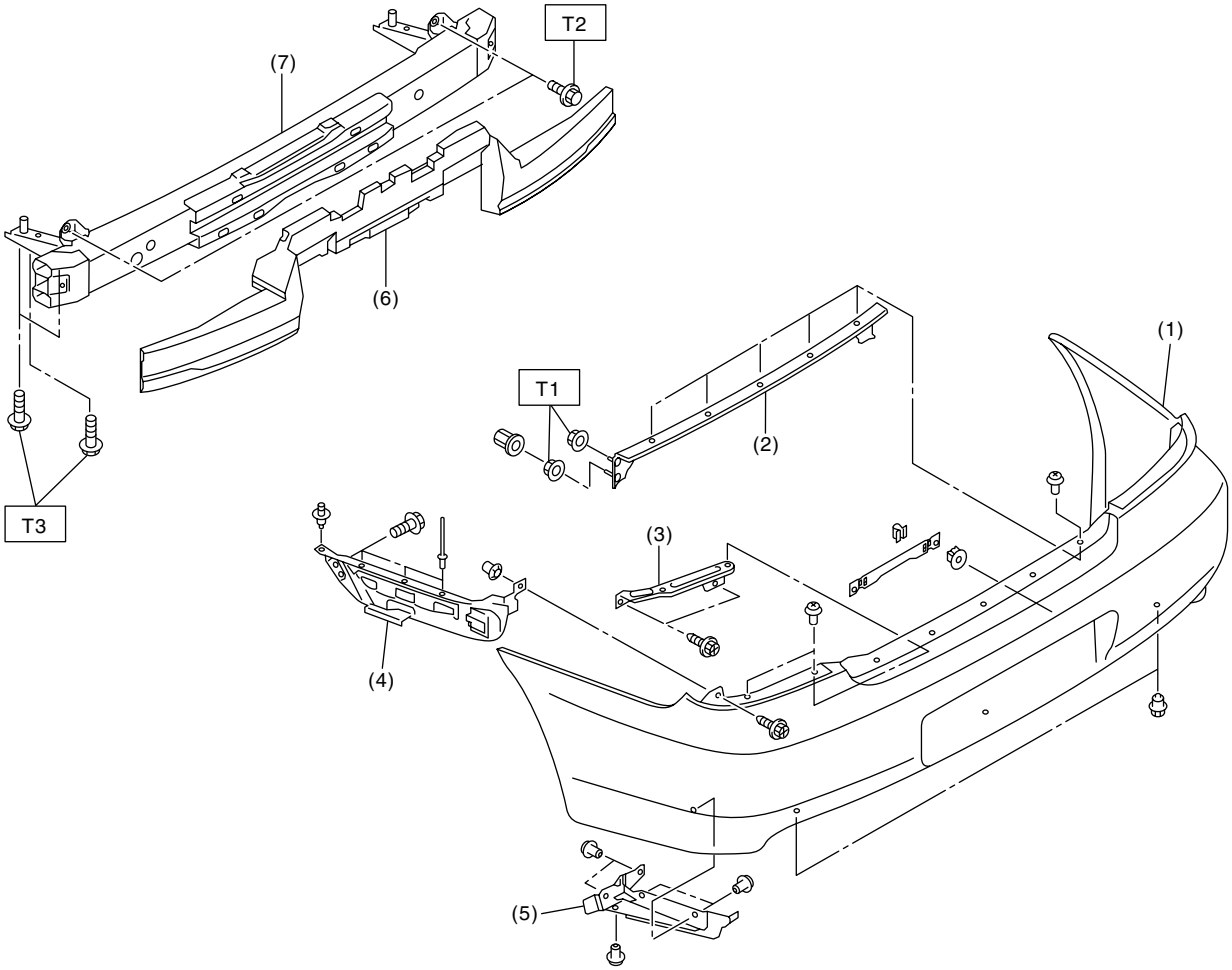
4. FRONT BUMPER



(1) Bumper face
(2) Fog light cover
(3) Fog light cover (STi model)
(4) Air dam skirt ASSY (STi model)
(5) Bumper bracket side upper
(6) Air dam skirt side bracket (STi model)
(7) Air dam skirt upper bracket (STi model)
(8) Bumper bracket side lower
(9) Energy absorber form
(10) Bumper beam ASSY
(11) Slider
(12) License plate bracket

Tightening torque: N·m (kgf-m, ft-lb)
T1: 32 (3.3, 24)
T2: 69 (7.0, 51)

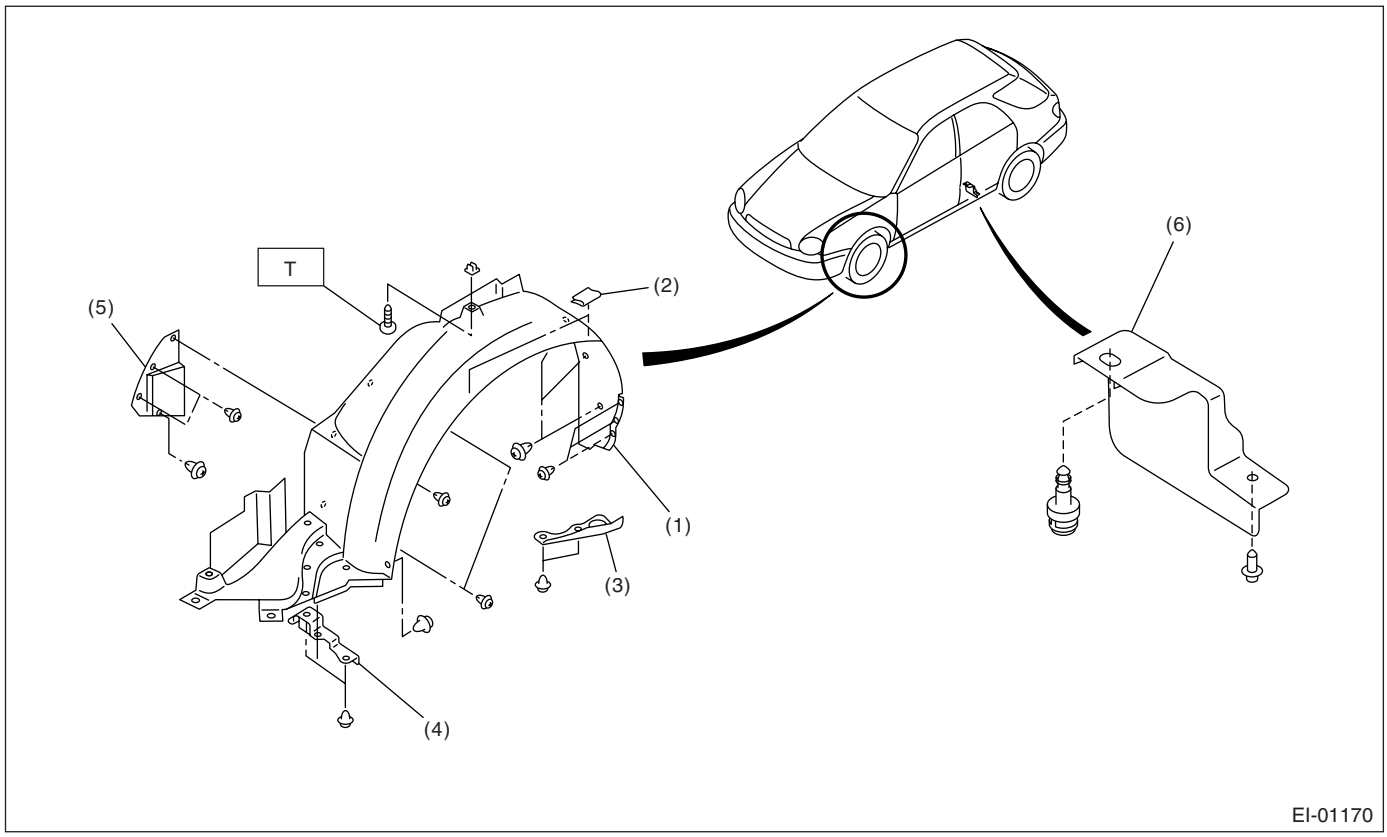
5. REAR BUMPER



(1) Bumper face
(2) Bumper upper beam
(3) Bumper corner bracket
(4) Bumper side bracket
(5) Bumper side cover
(6) Energy absorber form (model with bumper beam)
(7) Back beam ASSY (model with bumper beam)

Tightening torque: N·m (kgf-m, ft-lb)
T1: 33 (3.4, 24)
T2: 34 (3.5, 25)
T3: 95 (9.7, 70)

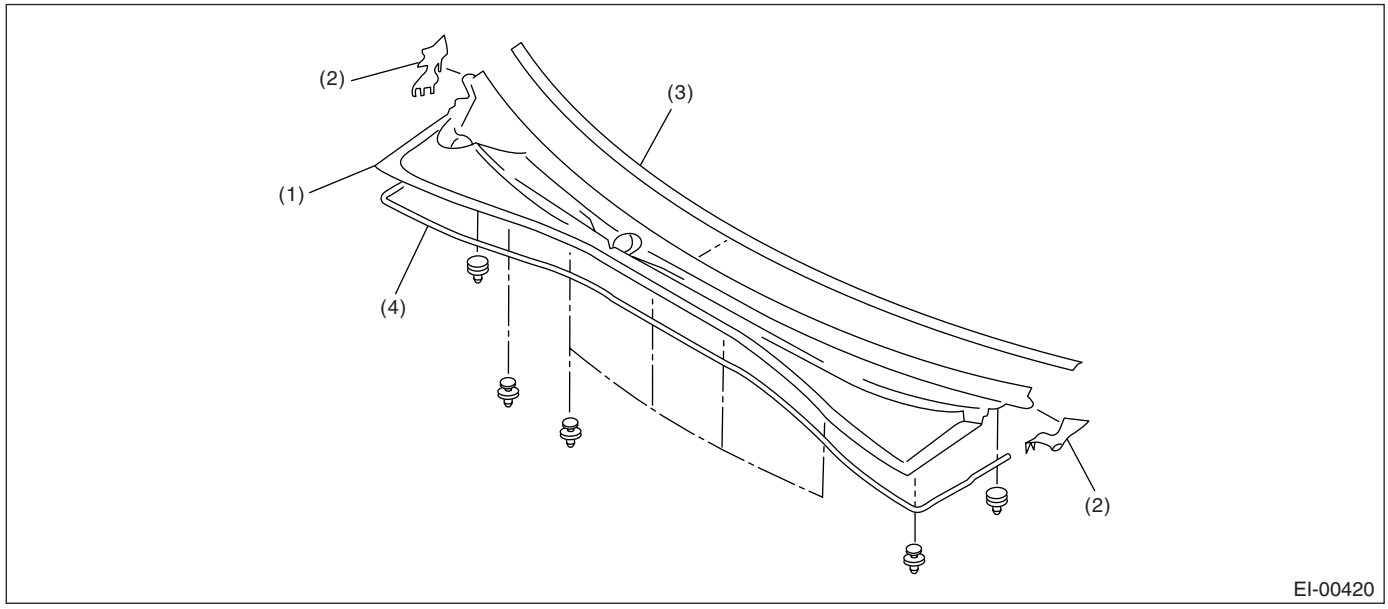
6. MUD GUARD



(1) Mud guard
(2) Clip
(3) Sub frame cover
(4) Front air flap plate
(5) Mud guard plate
(6) Rear air flap plate

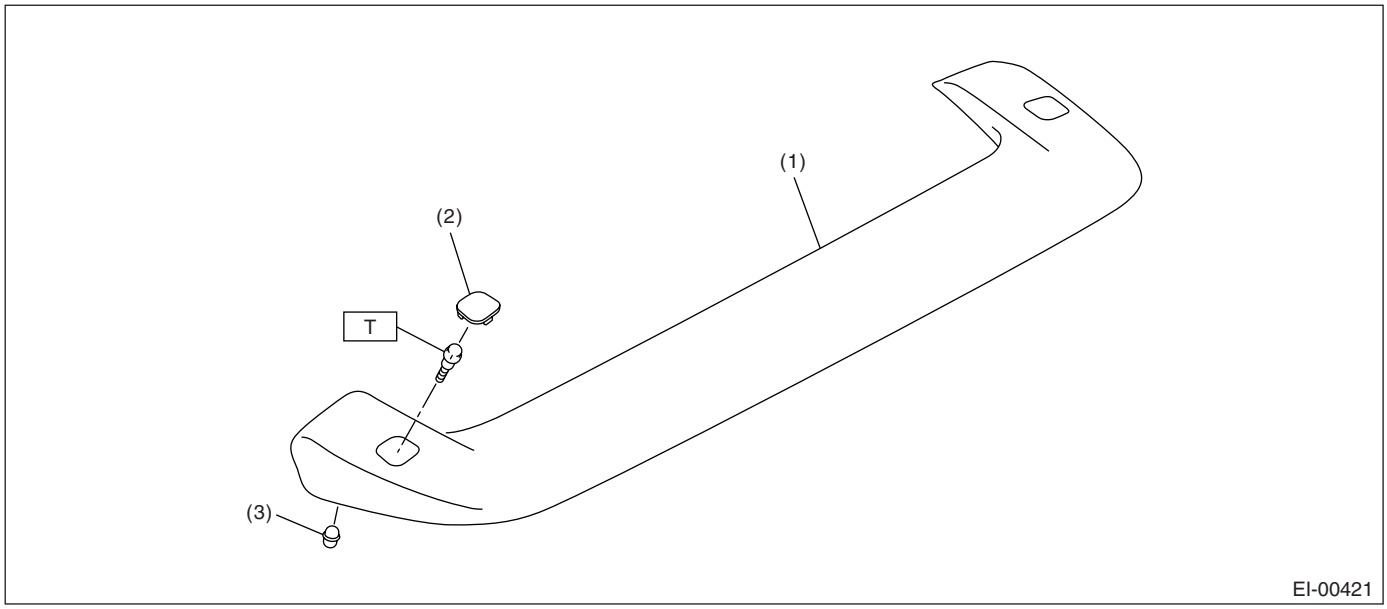
Tightening torque: N·m (kgf-m, ft-lb)
T: 4.5 (0.46, 3.32)

7. COWL PANEL



(1) Cowl panel
(2) Cowl side panel
(3) Protector
(4) Seal

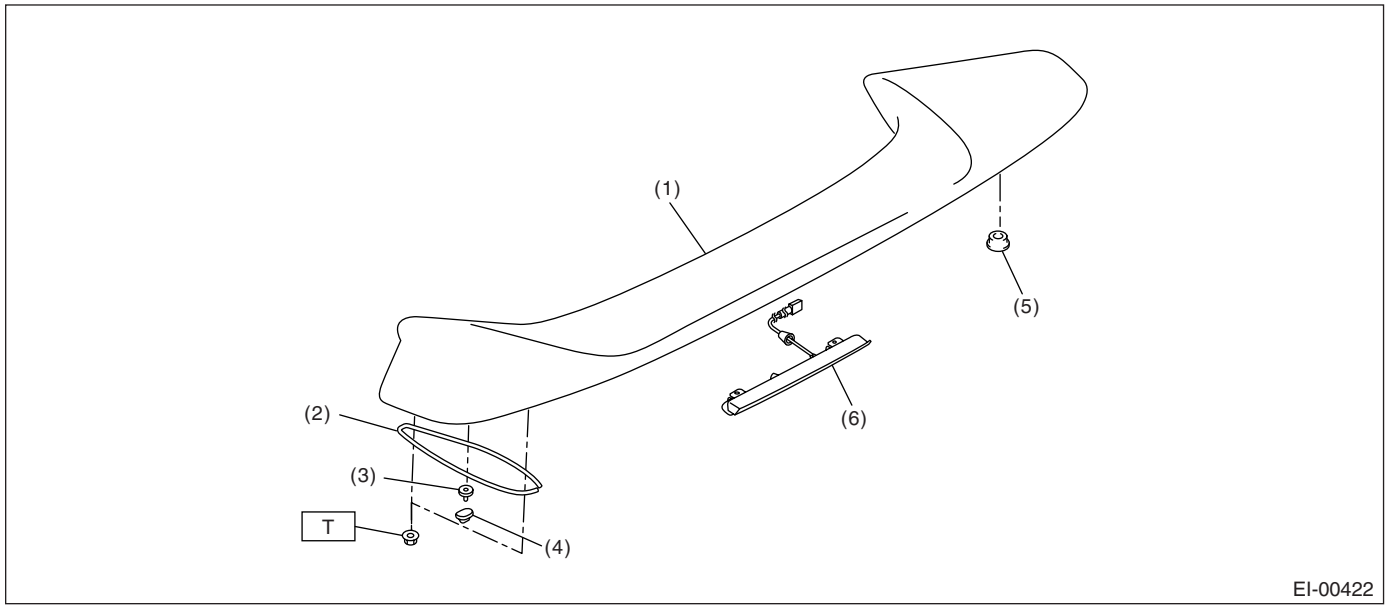
8. ROOF SPOILER



(1) Roof spoiler
(2) Cap
(3) Clip

Tightening torque: N·m (kgf-m, ft-lb)
T: 7.4 (0.75, 5.46)

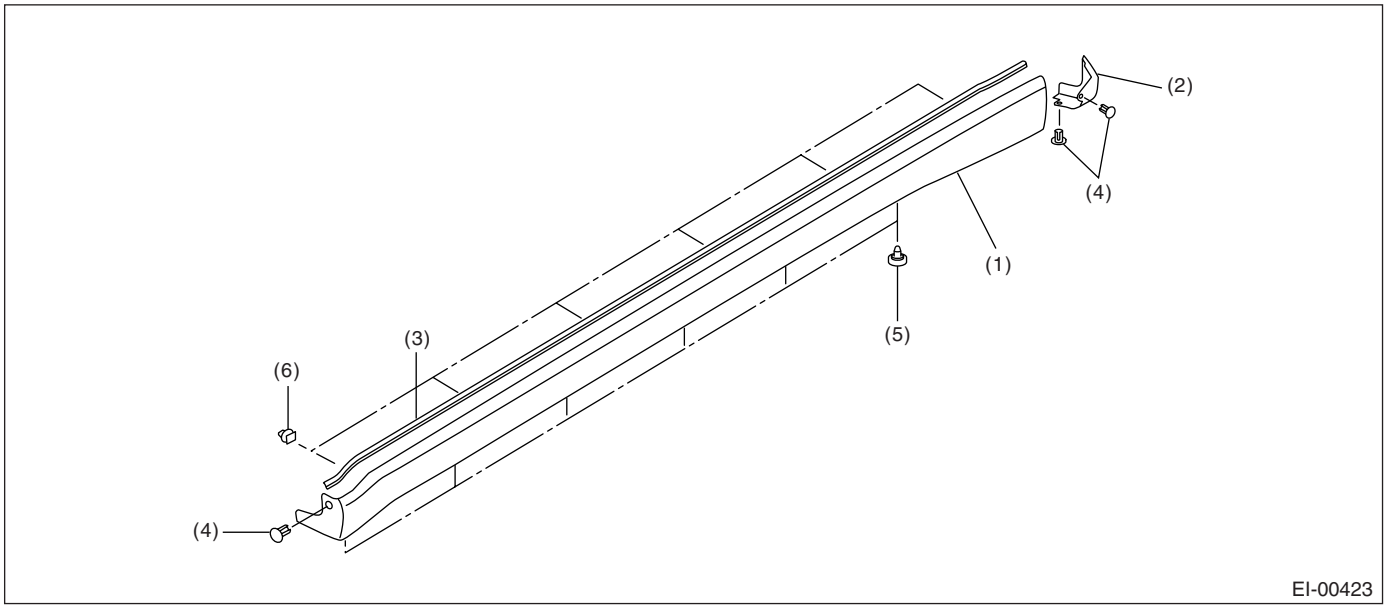
9. REAR SPOILER



(1) Rear spoiler
(2) Protector
(3) Clip
(4) Grommet
(5) Seal (RH)
(6) High mount stop light

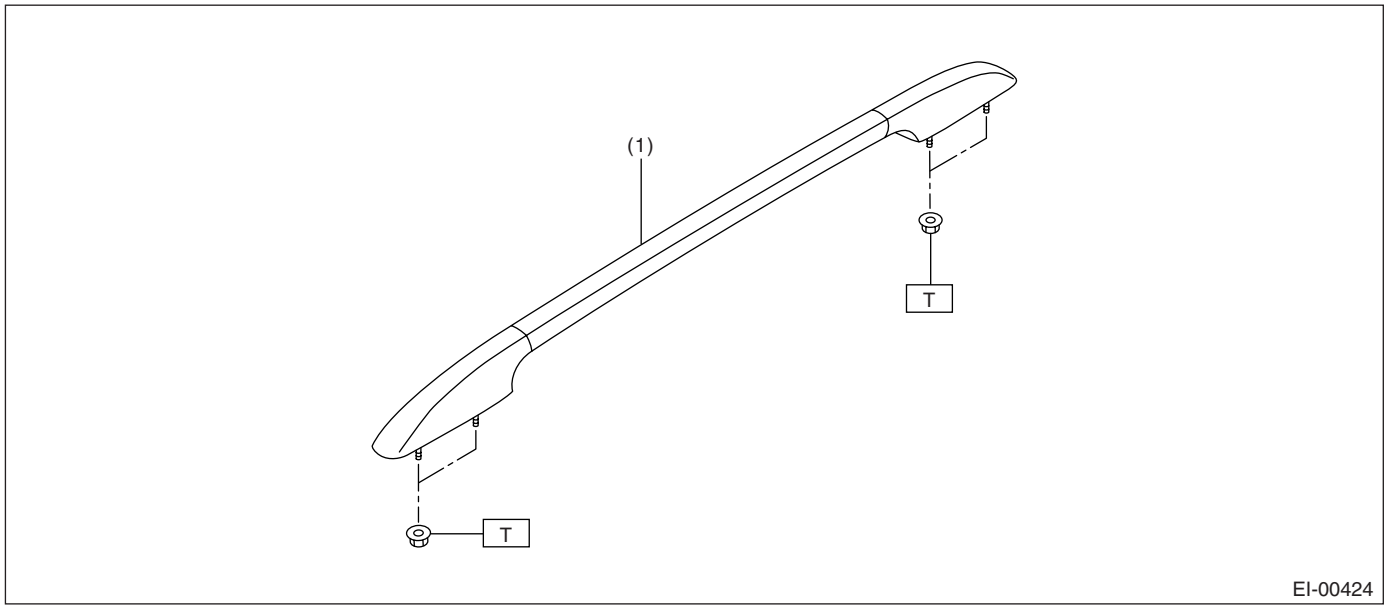
Tightening torque: N·m (kgf-m, ft-lb)
T: 7.5 (0.76, 5.53)

10.SIDE SILL SPOILER



(1) Side sill spoiler
(2) End cover
(3) Protector
(4) Rivet clip
(5) Clip (Side sill spoiler)
(6) Clip

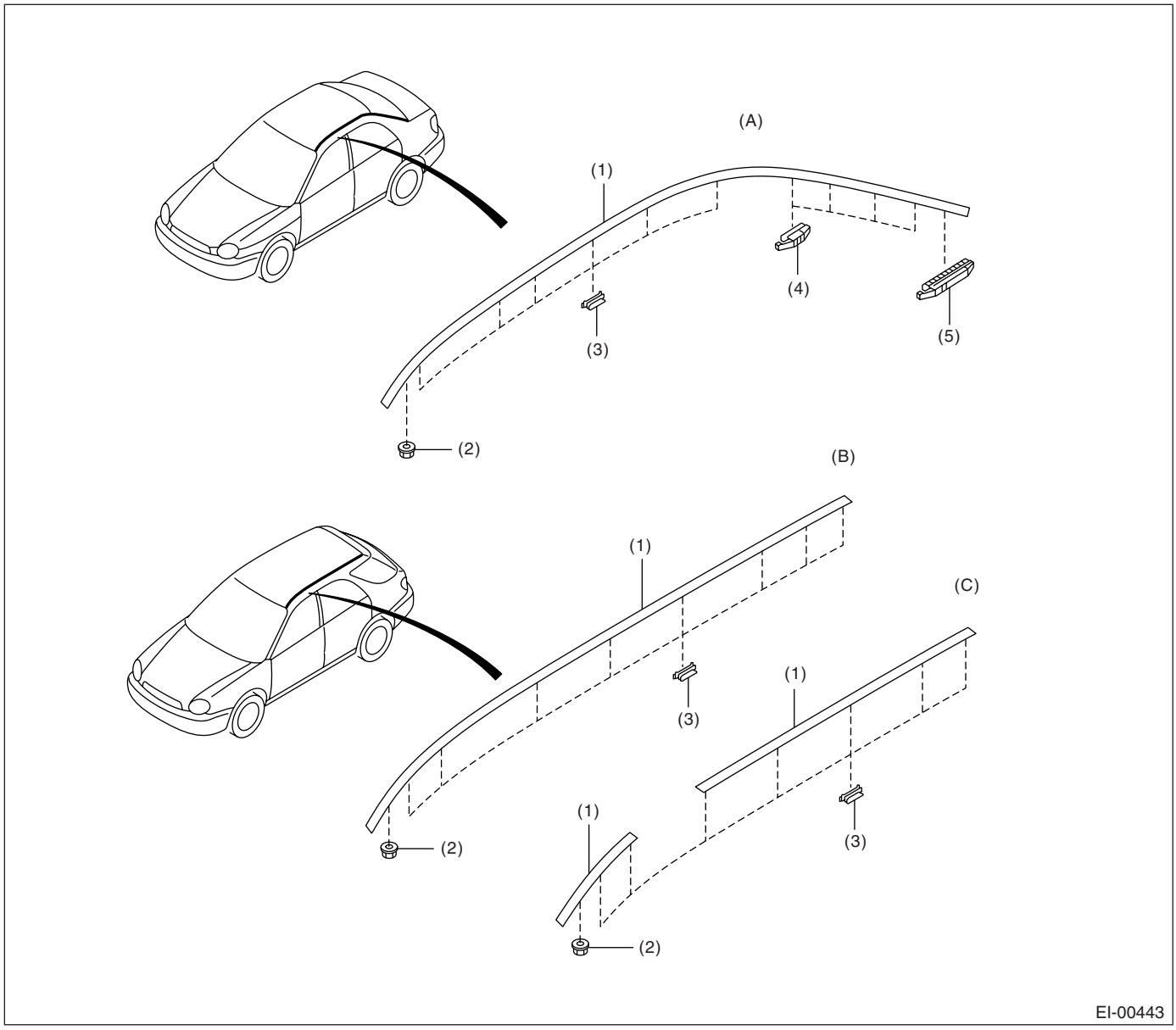
11.ROOF RAIL



(1) Roof rail

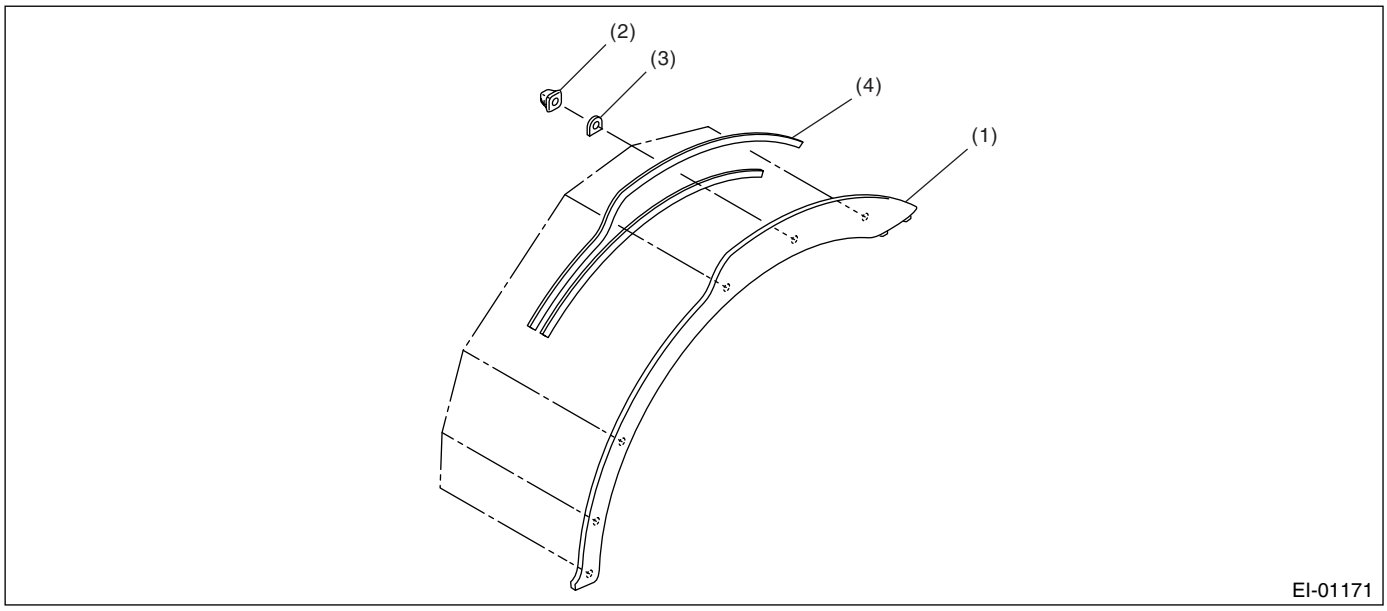
Tightening torque: N·m (kgf-m, ft-lb)
T: 7.4 (0.75, 5.46)

12.ROOF MOLDING



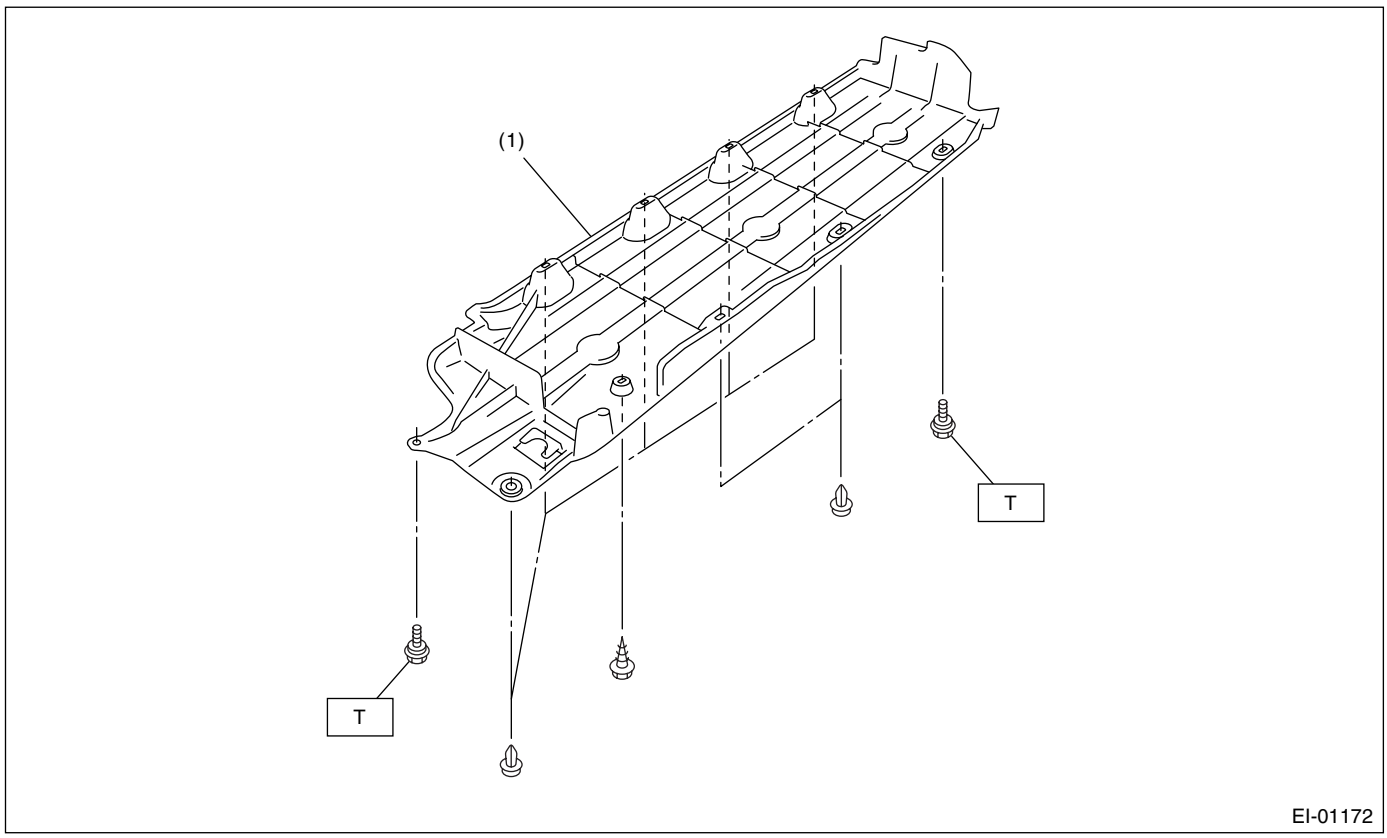
(A)	For sedan model	(B)	For wagon model	(C)	For wagon model (with roof rail)
(1)	Roof molding	(3)	Clip B	(5)	Clip D
(2)	Clip A	(4)	Clip C		

13.ARCH COVER



(1) Arch cover
(2) Clip
(3) Cushion
(4) Double side tape

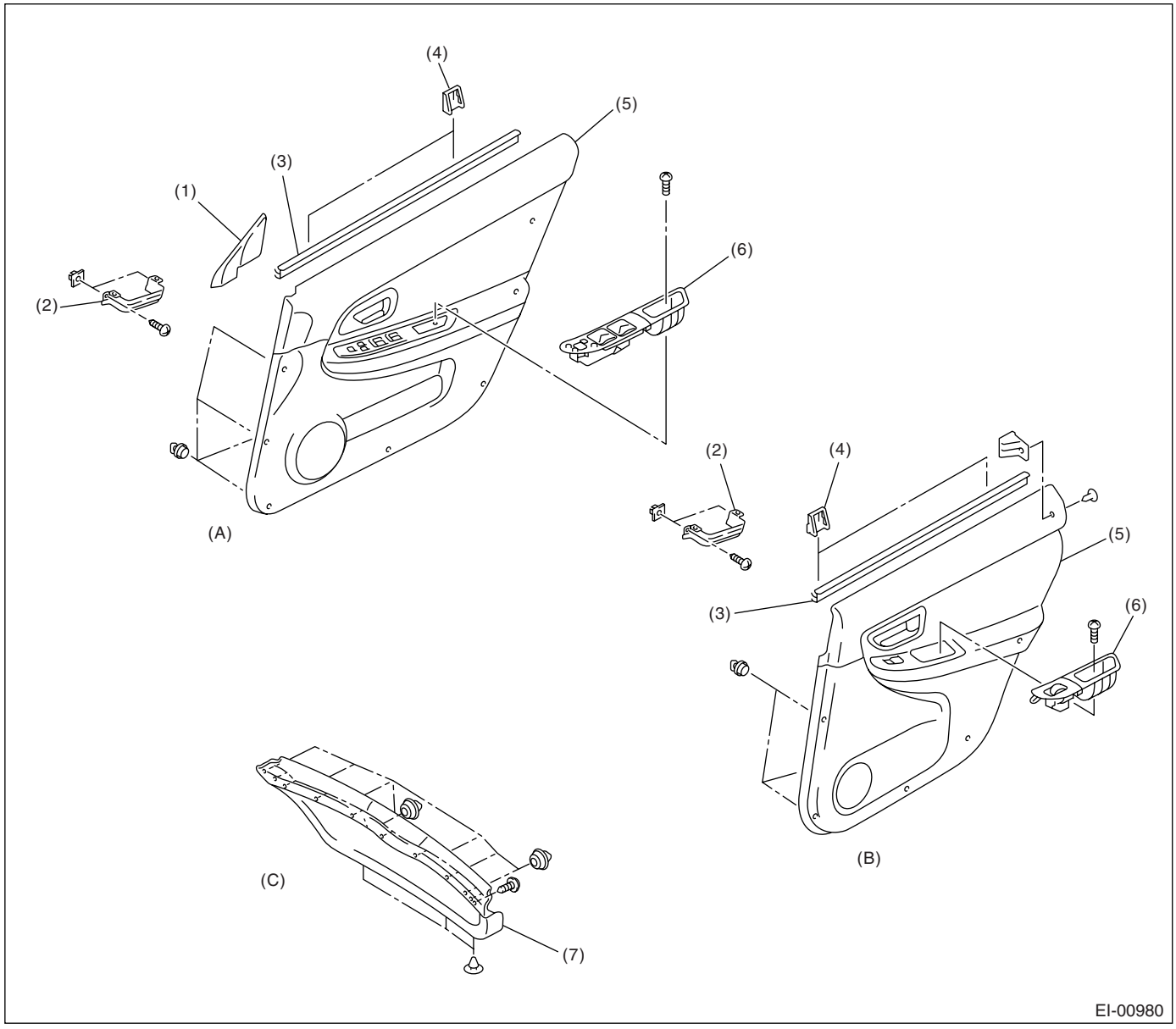
14.FLOOR UNDER PROTECTOR



(1) Floor under protector

Tightening torque: N·m (kgf-m, ft-lb)
T: 7.5 (0.76, 5.53)

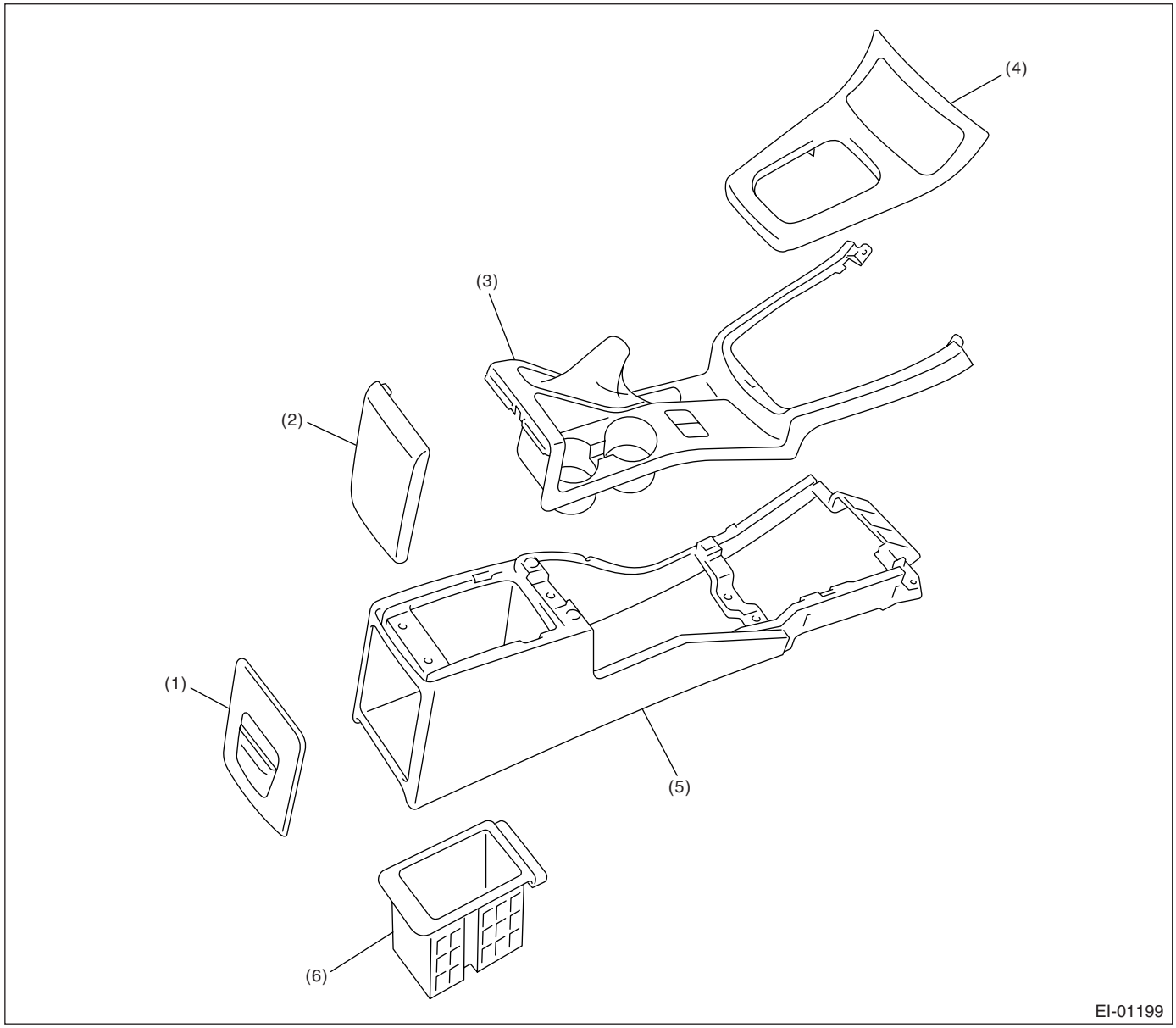
15.DOOR TRIM



(A) Front door trim
(B) Rear door trim
(C) Rear gate trim

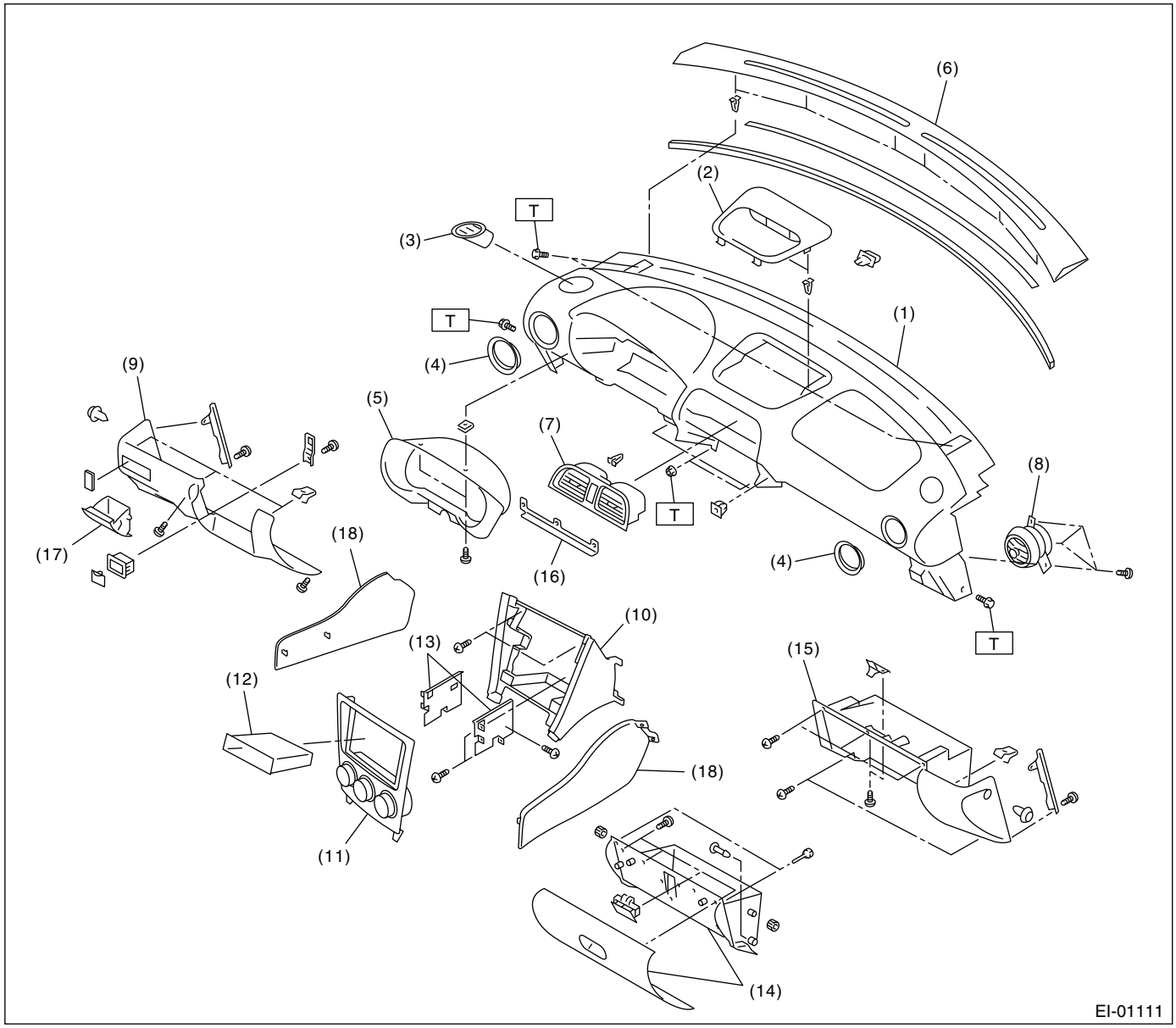
(1) Gusset cover
(2) Bracket
(3) Upper weather strip
(4) Clip
(5) Trim panel
(6) Power window switch cover
(7) Lower trim

16.CONSOLE BOX



(1) Rear ash tray
(2) Console lid
(3) Console cover
(4) Console front panel
(5) Console box
(6) Console pocket

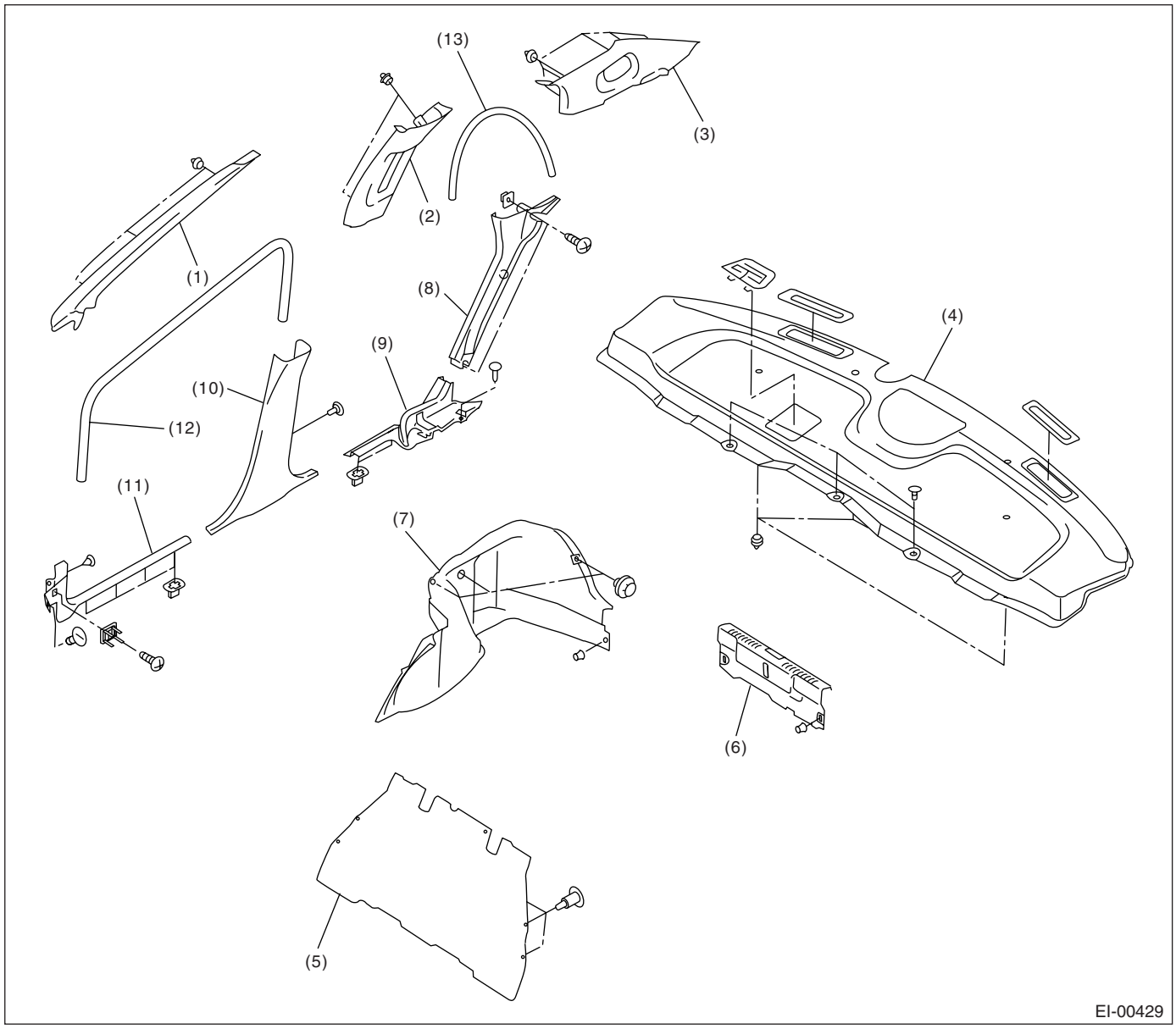
17.INSTRUMENT PANEL



(1) Pad & frame
(2) Center upper panel
(3) Air vent grille (defroster)
(4) Grille cover
(5) Meter visor
(6) Defroster grille
(7) Air vent grille (center)
(8) Air vent grille (side)
(9) Instrument panel lower cover
(10) Console cover
(11) Center panel
(12) Center pocket
(13) Audio bracket
(14) Glove box lid
(15) Glove box panel
(16) Bracket
(17) Coin box
(18) Console side panel

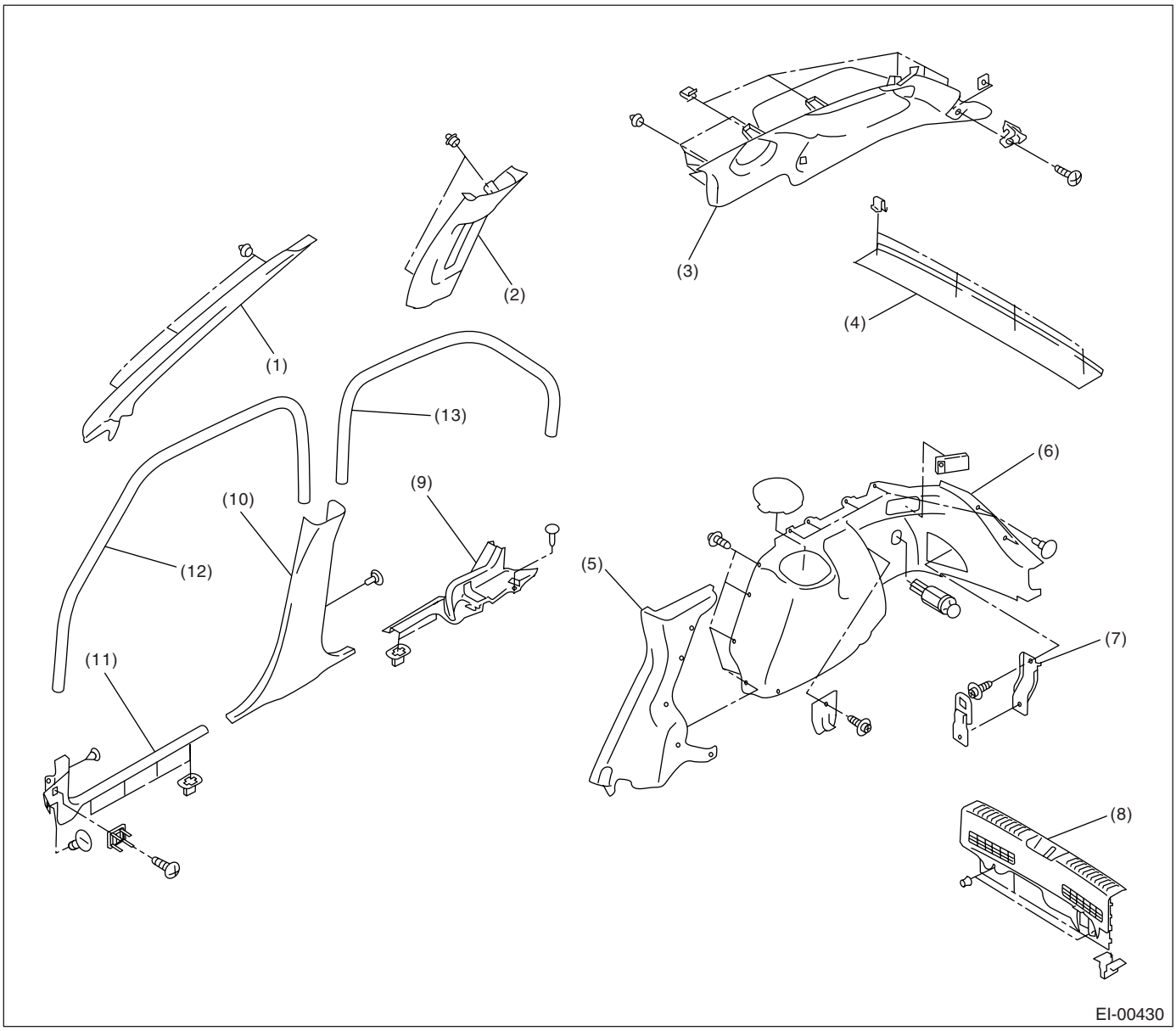
Tightening torque: N·m (kgf-m, ft-lb)
T: 7 (0.71, 5.2)

18.INNER TRIM (SEDAN MODEL)



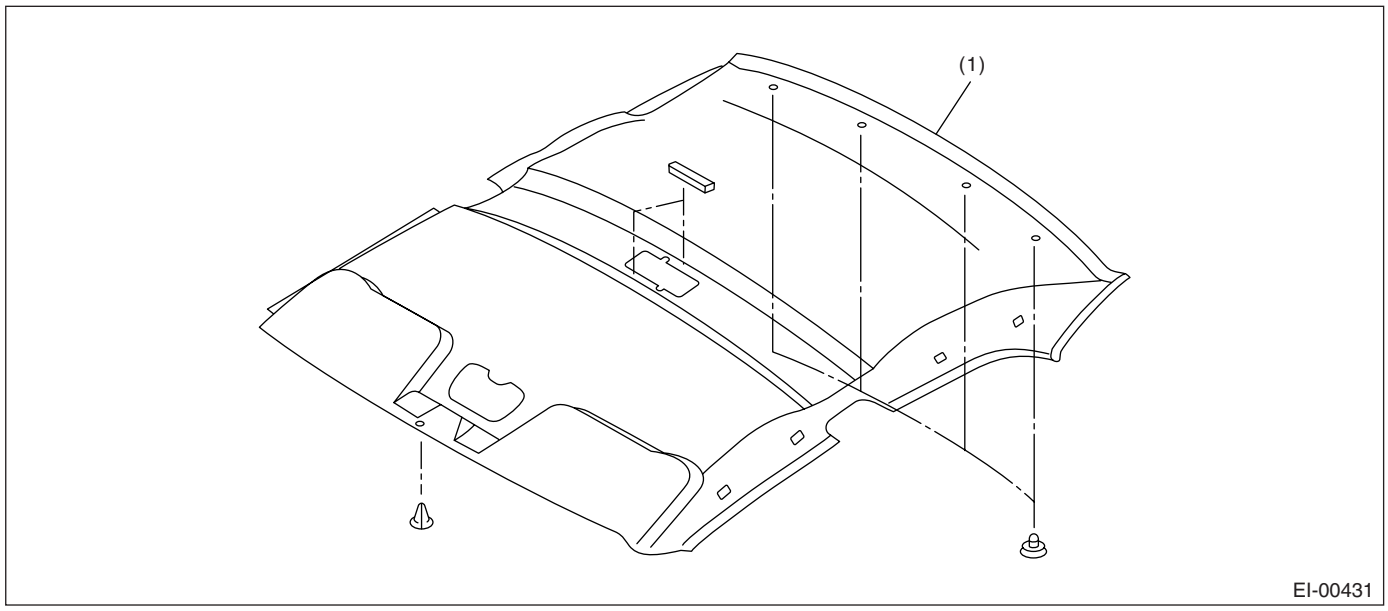
(1) Front pillar upper trim
(2) Center pillar upper trim
(3) Rear pillar upper trim
(4) Rear shelf trim
(5) Rear bulk trim
(6) Trunk rear trim
(7) Trunk side trim
(8) Rear pillar lower trim
(9) Side sill rear cover
(10) Center pillar lower trim
(11) Side sill front cover
(12) Front garnish
(13) Rear garnish

19.INNER TRIM (WAGON MODEL)



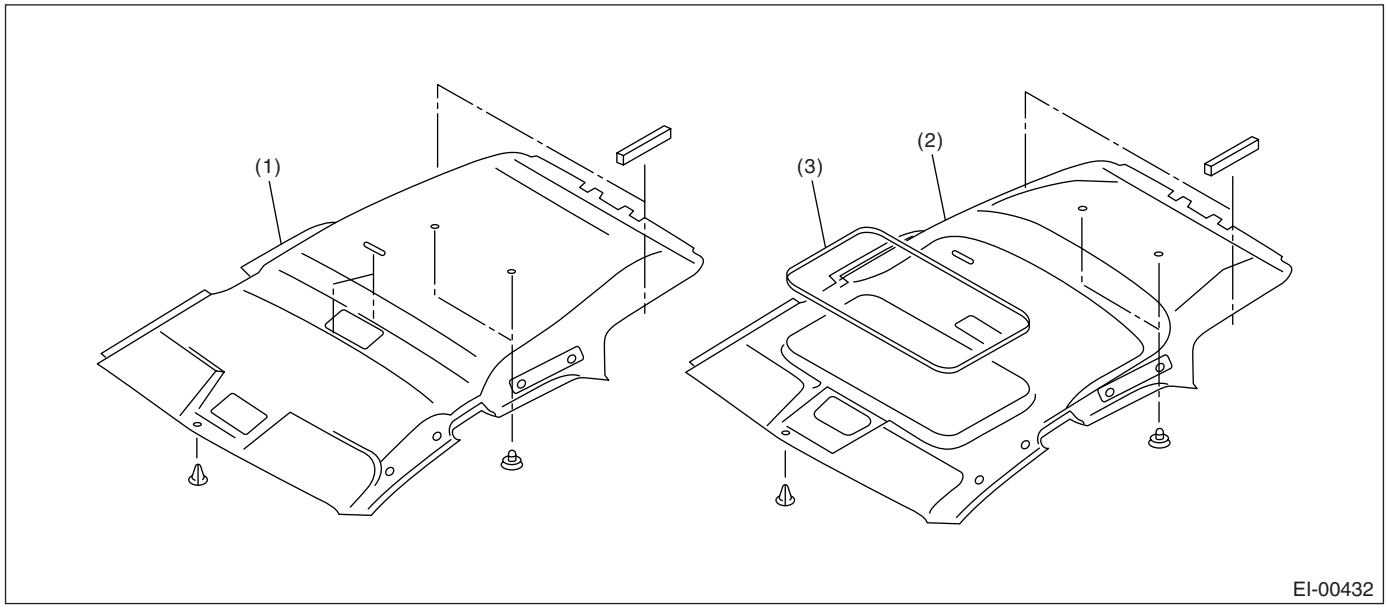
(1) Front pillar upper trim
(2) Center pillar upper trim
(3) Rear pillar upper trim
(4) Rear rail trim
(5) Rear pillar lower trim
(6) Rear quarter lower trim
(7) Hook
(8) Rear skirt trim
(9) Side sill rear cover
(10) Center pillar lower trim
(11) Side sill front cover
(12) Front garnish
(13) Rear garnish

20.ROOF TRIM (SEDAN MODEL)



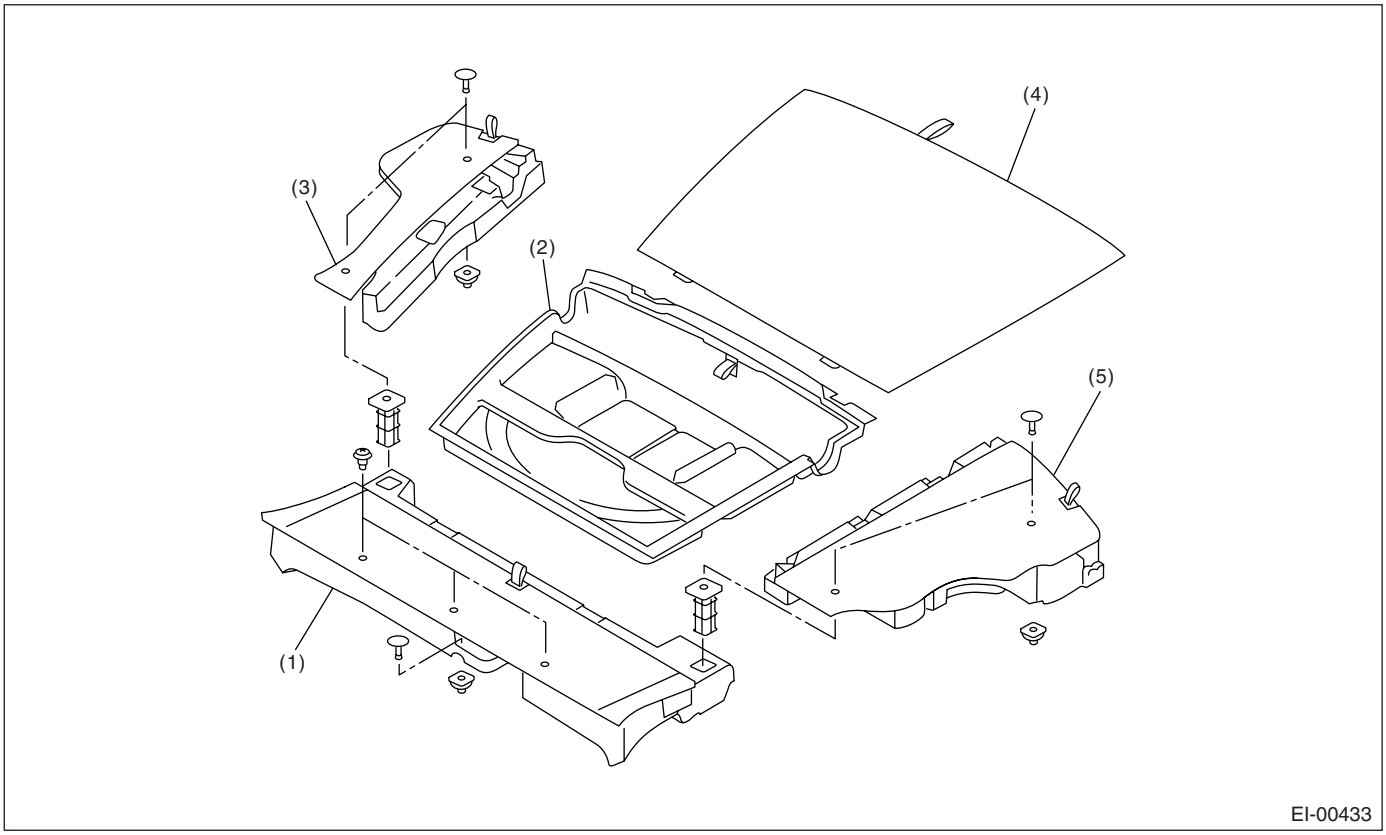
(1) Roof trim

21.ROOF TRIM (WAGON MODEL)



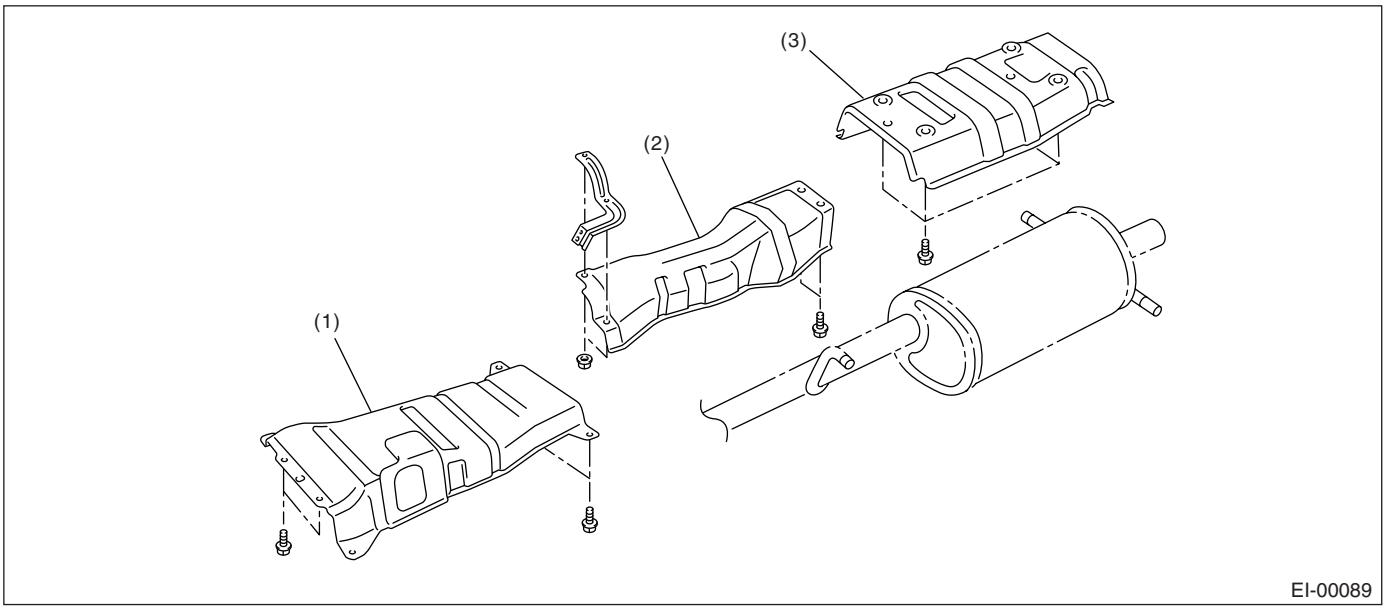
(1) Roof trim (2) Roof trim (Model with sun roof) (3) Sun roof garnish

22.LUGGAGE FLOOR MAT



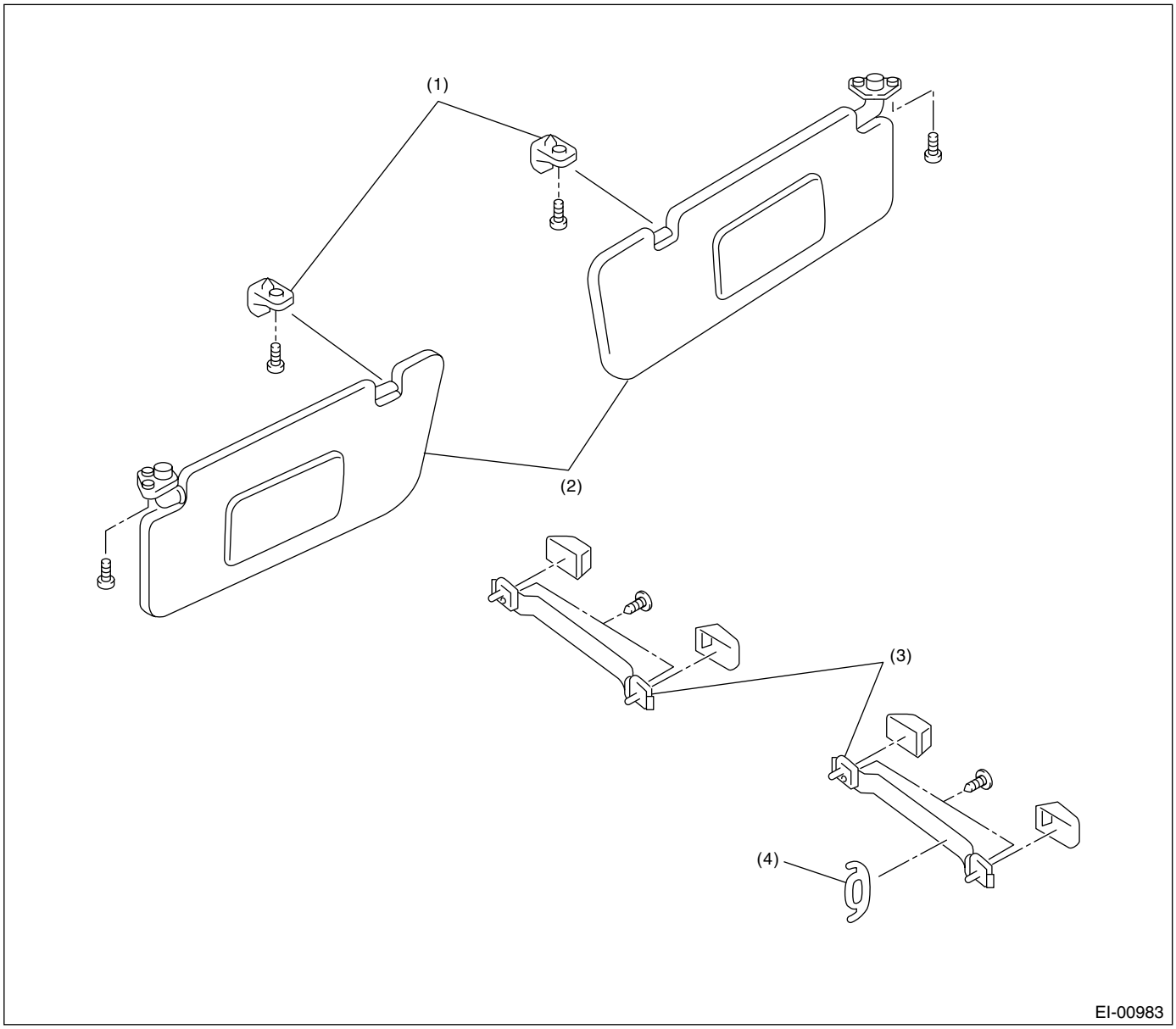
(1) Front floor mat
(2) Floor box
(3) Side floor mat (RH)
(4) Center floor mat
(5) Side floor mat (LH)

23.HEAT SHIELD COVER



(1) Front heat shield cover
(2) Center heat shield cover
(3) Rear heat shield cover

24.INNER ACCESSORIES



(1) Hook
(2) Sun visor
(3) Assist grip
(4) Coat hook

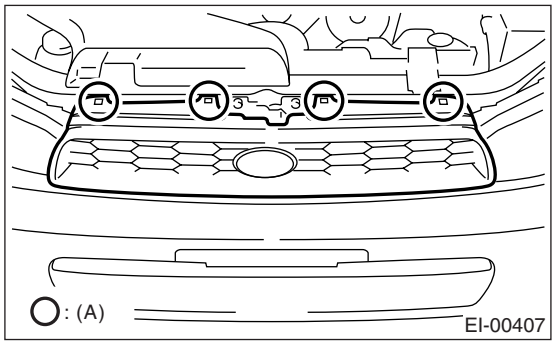
B: PREPARATION TOOL

TOOL NAME	REMARKS
Clip remover	Used for removal of trim.
Clip clamp pliers	Used for removal of various clips and clamps.

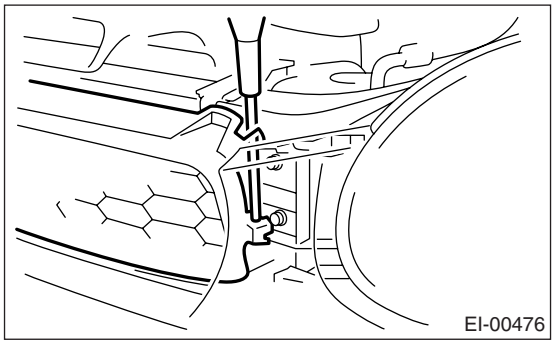
2. Front Grille

A: REMOVAL

1) Open the front hood.
2) Remove the four clips (A).



3) Remove the right and left hooks on the lower side.



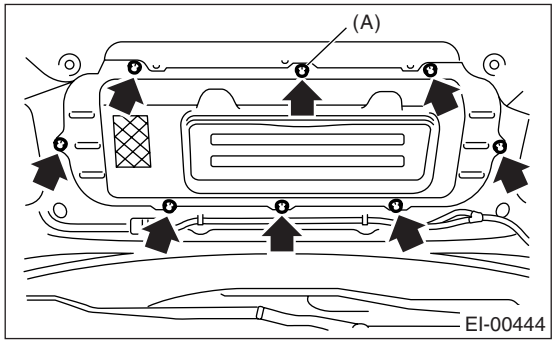
B: INSTALLATION

Install in the reverse order of removal.

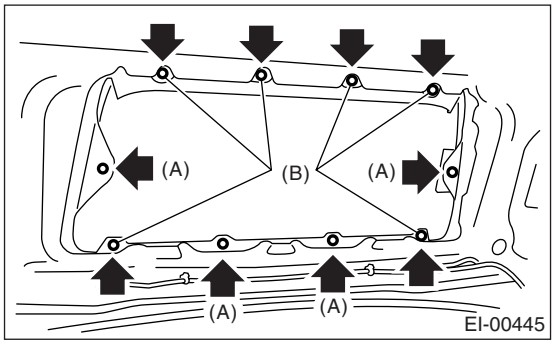
3. Front Hood Grille

A: REMOVAL

1) Remove the hood insulator.
2) Remove the seven tapping screws and clip (A) to remove the hood duct.

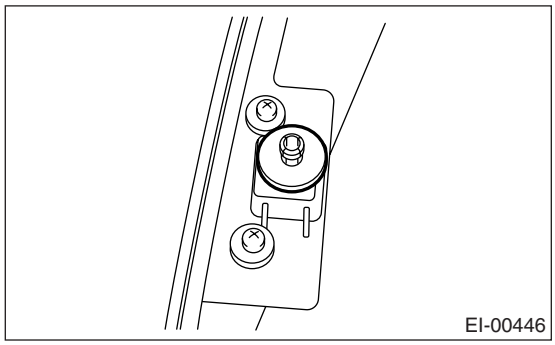


3) Loosen the six nuts (B), remove the four clips (A), and then remove the hood grille.



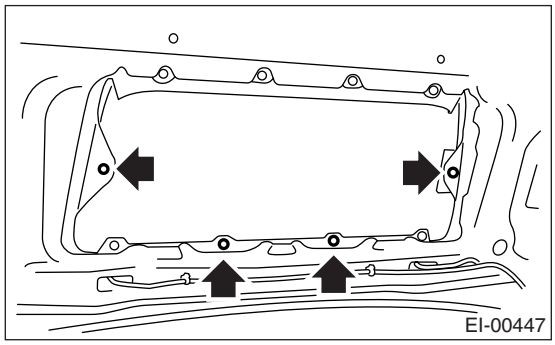
B: INSTALLATION

1) Replace the four clips with new ones.



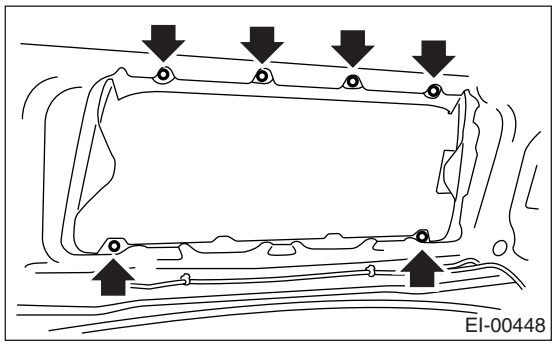
2) Engage the four clips of hood grille to front hood panel.

CAUTION:
Make sure that the anchor portion of each clip is firmly engaged.

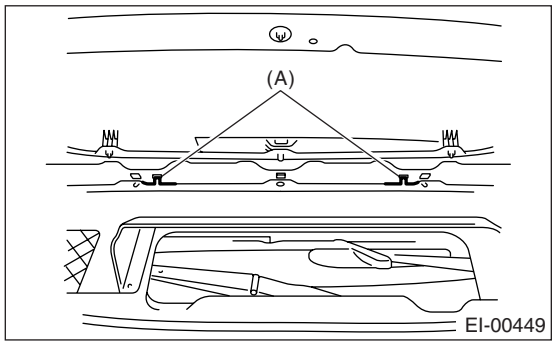


3) Install the six nuts.

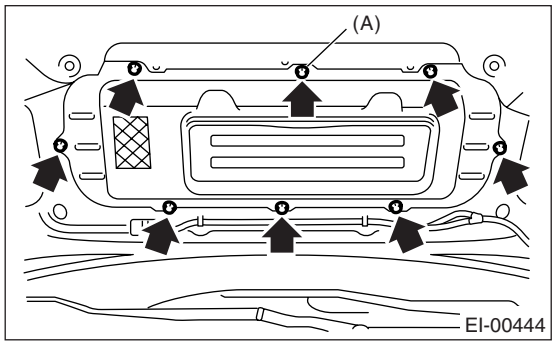
Tightening torque:
4.5 N·m (0.46 kgf-m, 3.32 ft-lb)



4) Catch the two hooks (A) of hood duct to hood holes.



5) Install the hood duct with clip (A) and seven tapping screws.



6) Install the hood insulator with new clips.

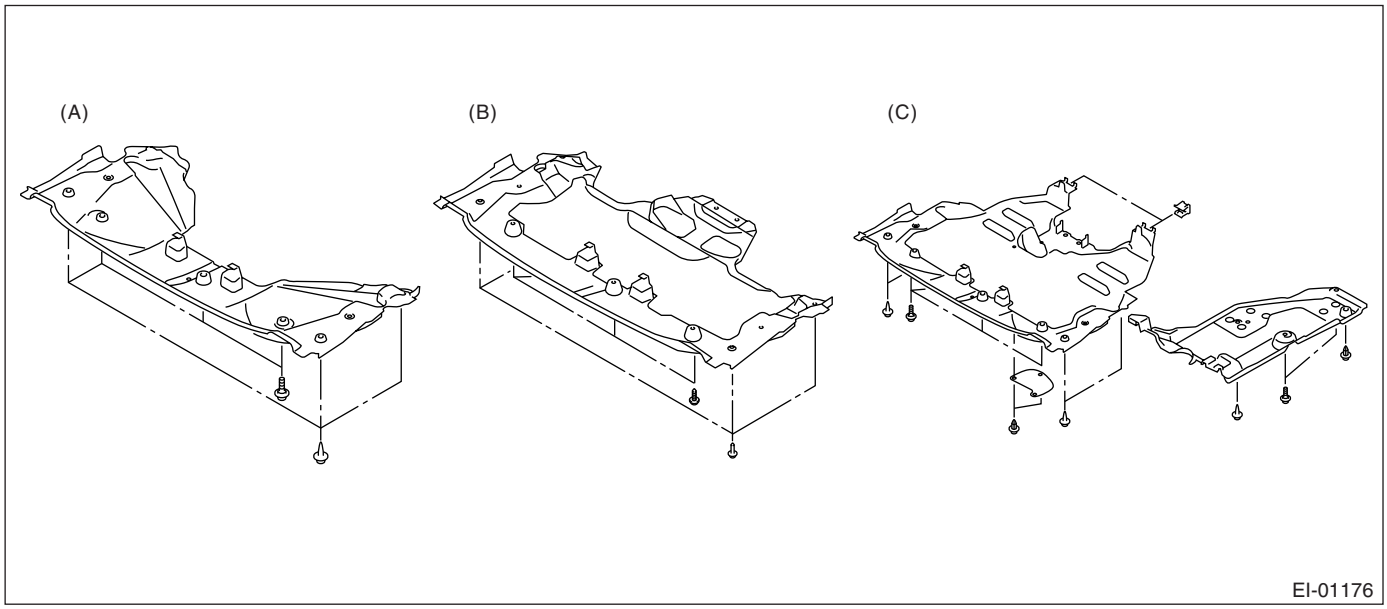
C: INSPECTION

Make sure that the clip is firmly engaged.
Make sure that there is no abnormal gap at whole periphery of hood grille.
Make sure that there is no damage on hood grille.

4. Front Under Cover

A: REMOVAL

1) Lift-up the vehicle.
2) Loosen the bolts and clips to remove the under cover.



(A) Small type (B) Large type (C) Extra large type

B: INSTALLATION

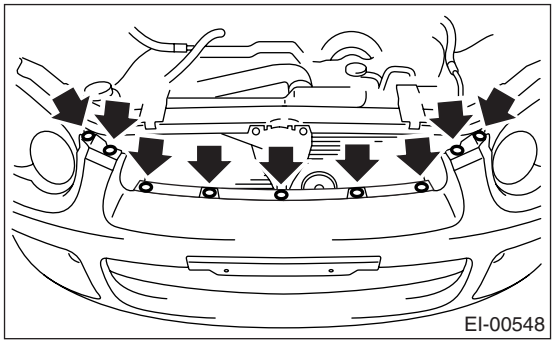
Install in the reverse order of removal.

Tightening torque:
14 N·m (1.42 kgf-m, 10.3 ft-lb)

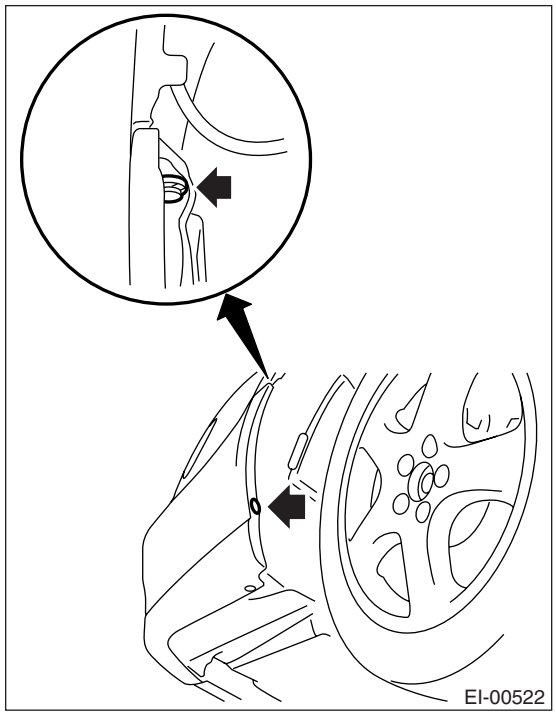
5. Front Bumper

A: REMOVAL

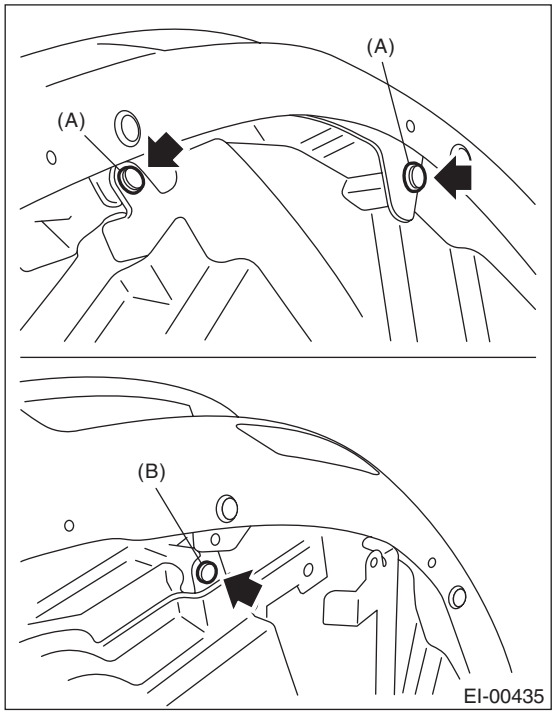
1) Disconnect the ground cable from battery.
2) Remove the front grille. <Ref. to EI-19, REMOVAL, Front Grille.>
3) Remove the nine clips on the upper part of bumper.



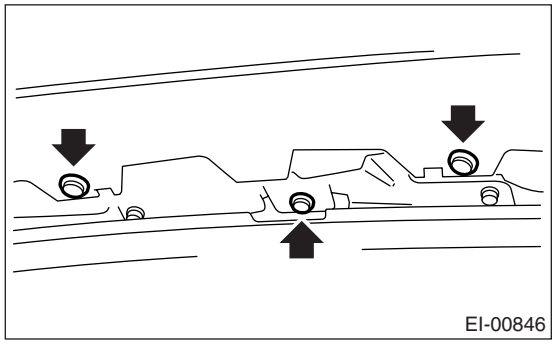
4) Turn over the mud guard, and then remove the clips, which secure the front bumper to fender.



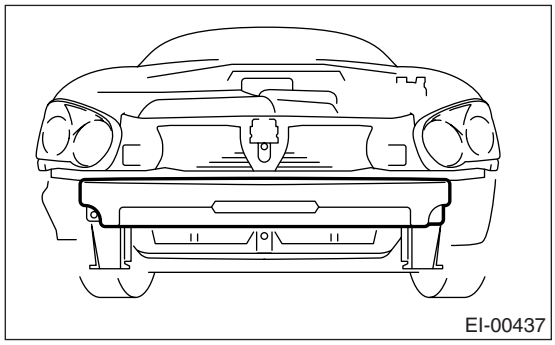
5) Remove the two clips (A), turn over the mud guard, and then remove the clip (B). (Same procedure on the right side.)



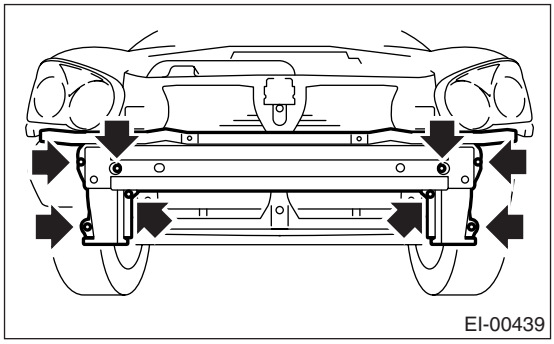
6) Remove the three clips in the center part of bumper.



7) Remove the fog light. <Ref. to LI-19, REMOVAL, Front Fog Light Assembly.>
8) Remove the bumper from body.
9) Remove the energy absorber foam.



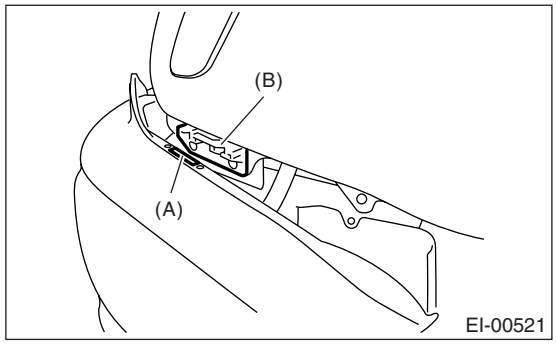
10) Loosen the bolt and nut, and then remove the bumper beam from body.


EI-00439

B: INSTALLATION

1) Install in the reverse order of removal.

2) Secure the bumper (A) to slider (B).

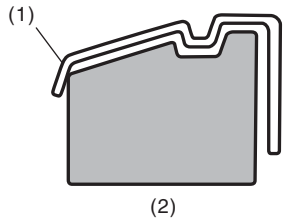


EI-00521

Tightening torque:
Refer to COMPONENT in General Description.
<Ref. to EI-4, FRONT BUMPER, COMPONENT, General Description.>

C: REPAIR

1. COATING METHOD FOR PP BUMPER

Process No.	Process name	Job contents	
1	Bumper mounting	Set the bumper on paint worktable if required. Use paint worktable conforming to inner shape of bumper when possible.	 EI-00234 (1) Bumper (2) Set bumper section
2	Masking	Mask specified part (black base) with masking tape. Use masking tape for PP (example, Nichiban No. 533, etc.).	
3	Degreasing, cleaning	Clean all parts to be painted with white gasoline, normal alcohol, etc. to remove dirt, oil, fat, etc.	
4	Primer paint	Apply primer one to all parts to be painted, using compressed air. Use primer (clear).	
5	Drying	Dry at normal temperature [10 to 15 min. at 20°C (68°F)]. In half-dried condition, PP primer paint is dissolved by solvent, e.g. thinner, etc. Therefore, if dust or dirt must be removed, use ordinary alcohol, etc.	
6	Top coat paint (I)	Solid color	Metallic color
		Use section (block) paint for top coat. • Paint in use (for each color): Solid paint Hardener PB Thinner T-301 • Mixing ratio: Main agent vs. hardener = 4:1 • Viscosity: 10 — 13 sec/20°C (68°F) • Film thickness: 35 — 45 μ • Spraying pressure: 245 — 343 kPa (2.5 — 3.5 kgf/cm^2, 36 — 50 psi)	Use section (block) paint for top coat. • Paint in use (for each color): Metallic paint Hardener PB Thinner T-306 • Mixing ratio: Main agent vs. hardener = 10:1 • Viscosity: 10 — 13 sec/20°C (68°F) • Film thickness: 15 — 20 μ • Spraying pressure: 245 — 343 kPa (2.5 — 3.5 kgf/cm^2, 36 — 50 psi)

Process No.	Process name	Job contents	
7	Drying	Not required.	Dry at normal temperature [10 min. or more at 20°C (68°F)]. In half-dried condition, avoid dust, dirt.
8	Top coat paint (II)	Not required.	Apply a clear coat to parts with top coat paint (I), three times, at 5 — 7 minutes intervals. • Paint in use: Metallic paint Hardener PB Thinner T-301 • Mixing ratio: Clear vs. hardener = 6:1 • Viscosity: 14 — 16 sec/20°C (68°F) • Film thickness: 25 — 30 μ • Spraying pressure: 245 — 343 kPa (2.5 — 3.5 kgf/cm^2, 36 — 50 psi)
9	Drying	60°C (140°F), 60 min. or 80°C (176°F), 30 min. If higher than 80°C (176°F), PP may be deformed. Keep maximum temperature of 80°C (176°F).	
10	Inspection	Paint check.	
11	Masking removal	Remove the masking in process No. 2.	

2. REPAIR INSTRUCTIONS FOR COLORED PP BUMPER

NOTE:
All PP bumpers are provided with a grained surface, and if the surface is damaged, it cannot normally be restored to its former condition. Damage limited to shallow scratches that cause only a change in the lustre of the base material or coating, can be almost fully restored. Before repairing a damaged area, explain this point to the customer and get an understanding about the matter. Repair methods are outlined below, based on a classification of the extent of damage.

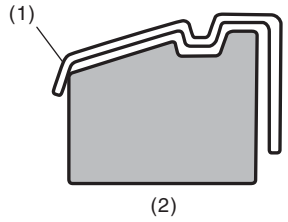
1) Minor damage causing only a change in the lustre of the bumper due to a light touch
Almost restorable.

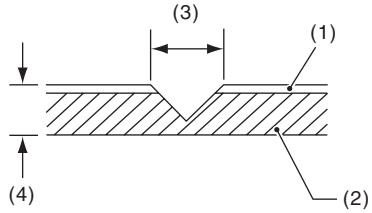
Process No.	Process name	Job contents	
1	Cleaning	Clean the area to be repaired using water.	
2	Sanding	Grind the repairing area with #500 sand paper in a “feathering” motion.	
3	Finish	Resin section	Coated section
		Repeatedly apply wax to the affected area using a soft cloth (such as flannel). Recommended wax: NITTO KASEI Soft 99 TIRE WAX BLACK, or equivalent.	Perform either the same operation as for the resin section or process No. 18 and subsequent operations in the “3)” section, depending on the degree and nature of damage.
		Polish the waxed area with a clean cloth after 5 to 10 minutes.	

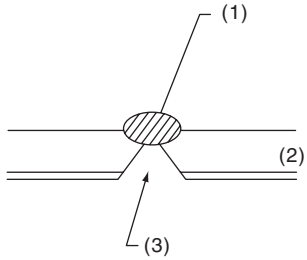
2) Deep damage caused by scratching fences, etc.
A dent cannot be repaired but a whitened or swelled part can be removed.

Process No.	Process name	Job contents	
1	Cleaning	Clean the damaged area with water.	
2	Removal of damaged area	Cut off protruding area, if any, due to collision, using a putty knife.	
3	Sanding	Grind the affected area with #100 to #500 sand paper.	
4	Finish	Resin section	Coated section
		Same as Process No. 3 in the “1)” section.	Perform Process No. 12 and subsequent operations in the “3)” section.

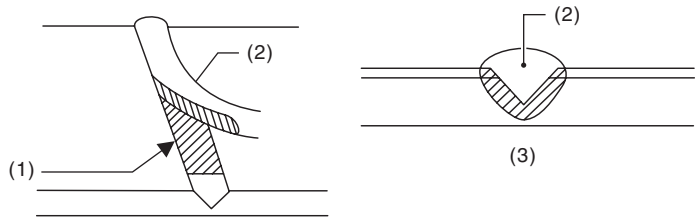
3) Deep damage such as a break or hole that requires filling
Much of the peripheral grained surface must be sacrificed for repair, and the degree of restoration is not really worth the expense. (The surface, however, will become almost flush with adjacent areas.)
Recommended repair kit: PP Part Repair Kit (NRM)

<table>
<tr><th>Process No.</th><th>Process name</th><th colspan="2">Job contents</th></tr>
<tr><td>1</td><td>Bumper removal</td><td colspan="2">Remove the bumper as required.</td></tr>
<tr><td>2</td><td>Part removal</td><td colspan="2">Remove the parts built into bumper as required.</td></tr>
<tr><td>3</td><td>Bumper placement</td><td>Place the bumper on a paint worktable as required.
It is recommended that contour of worktable accommodate internal shape of bumper.</td><td> 

EI-00234
(1) Bumper
(2) Set bumper section</td></tr>
<tr><td>4</td><td>Surface preparation</td><td colspan="2">Remove dust, oil, etc. from areas to be repaired and surrounding areas, using a suitable solvent (NRM No. 900 Precleno, white gasoline, or alcohol).</td></tr>
<tr><td>5</td><td>Cutting</td><td>If nature of damage are cracks or holes, cut a guide slit of 20 to 30 mm (0.79 to 1.18 in) in length along the crack or hole up to the bumper's base surface. Then, bevel or "vee-out" the affected area using a knife or grinder.</td><td> 

EI-00235
(1) Paint surface
(2) PP base surface
(3) 20 — 30 mm (0.79 — 1.18 in)
(4) 3 mm (0.12 in)</td></tr>
<tr><td>6</td><td>Sanding (I)</td><td colspan="2">Grind beveled surface with sand paper (#40 to #60) to smooth finish.</td></tr>
<tr><td>7</td><td>Cleaning</td><td colspan="2">Clean the sanded surface with the same solvent as used in Process No. 4.</td></tr>
<tr><td rowspan="2">8</td><td rowspan="2">Temporary welding</td><td colspan="2">Grind the side just opposite the beveled area with sand paper (#40 to #60) and clean using a solvent.
Temporarily spot-weld the side, using a PP welding rod and heater gun.</td></tr>
<tr><td colspan="2"> 

EI-00236
(1) Welded spot (Use heater gun and PP welding rod)
(2) PP base surface
(3) Beveled section
NOTE:
• Do not melt the welding rod until it flows out. This results in reduced strength.
• Leave the welded spot unattended until it cools completely.</td></tr>
</table>

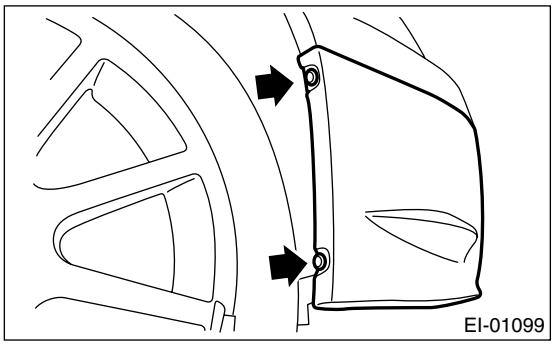
Process No.	Process name	Job contents
9	Welding	Using a heater gun and PP welding rod, weld the beveled spot while melting the rod and damaged area.
		 EI-00237 (1) Melt hatched area (2) Welding rod (3) Section NOTE: • Melt the sections indicated by hatched area. • Do not melt the welding rod until it flows out, in order to provide strength. • Always keep the heater gun 1 to 2 cm (0.4 to 0.8 in) away from the welding spot. • Leave the welded spot unattended until it cools completely.
10	Sanding (II)	Remove excess part of weld with a putty knife. If a drill or disc wheel is used instead of the knife, operate it at a rate lower than 1,500 rpm and grind the excess part little by little. A higher rpm will cause the PP substrate to melt from the heat.
		 EI-00042
		Sand the welded spot smooth with #240 sand paper.
11	Masking	Mask the black substrate section using masking tape. Recommended masking tape: Nichiban No. 533 or equivalent
12	Cleaning/ degreasing	Completely clean the entire coated area, using solvent similar to that used in Process No. 4.
13	Primer coating	Apply a coat of primer to the repaired surface and its surrounding areas. Mask these areas, if necessary. Recommended primer: Mp/ 364 PP Primer NOTE: Be sure to apply one coat of primer at a spraying pressure of 245 to 343 kPa (2.5 to 3.5 kgf/cm^2, 36 to 50 psi) with a spray gun.
14	Leave unattended.	Leave the repaired area unattended at 20°C (68°F) for 10 to 15 minutes until primer is half-dry. NOTE: If dirt or dust comes in contact with the coated area, wipe it off with a cloth impregnated with alcohol. (Do not use thinner since the coated area tends to melt.)
15	Primer surfacer coating	Apply a coat of primer surfacer to the repaired area two or three times at an interval of 3 to 5 minutes. Recommended surfacer: • UPS 300 Flex Primer • No. 303 UPS 300 Exclusive hardener • NPS 725 Exclusive Reducer (thinner) • Mixing ratio: 2 : 1 (UPS 300: No. 303) • Viscosity: 12 — 14 sec/20°C (68°F) • Coated film thickness: 40 — 50 μ

Process No.	Process name	Job contents	
16	Drying	Allow the coated surface to dry for 60 minutes at 20°C (68°F) [or 30 minutes at 60°C (140°F)].	
17	Sanding (III)	Sand the coated surface and its surrounding areas using #400 sand paper and water.	
18	Cleaning/ degreasing	Same as Process No. 12.	
19	Top coat (I)	Solid color	Metallic color
		Use a “block” coating method. • Recommended paint: Suncryl (SC) No. 307 Flex Hardener SC Reducer (thinner) • Mixing ratio: 3 : 1 Suncryl (SC) vs. No. 307 Flex Hardener • Viscosity: 11 — 13 sec/20°C (68°F) • Coated film thickness: 40 — 50 μ • Spraying thickness: 245 — 343 kPa (2.5 — 3.5 kgf/cm^2, 36 — 50 psi)	Use a “block” coating method. • Recommended paint: Suncryl (SC) No. 307 Flex Hardener SC Reducer (thinner) • Mixing ratio: 3 : 1 Suncryl (SC) vs. No. 307 Flex Hardener • Viscosity: 11 — 13 sec/20°C (68°F) • Coated film thickness: 20 — 30 μ • Spraying thickness: 245 — 343 kPa (2.5 — 3.5 kgf/cm^2, 36 — 50 psi)
20	Leave unattended.	Not required.	Leave unattended at 20°C (68°F) for at least 10 minutes until the topcoated area is half-dry. NOTE: Be careful to keep dust or dirt from coming in contact with the affected area.
21	Top coat (II)	Not required.	Apply a clear coat three times at an interval of 3 to 5 minutes. • Recommended paint: SC710 Overlay Clear No. 307 Flex Hardener SC Reducer (thinner) • Mixing ratio: 3 : 1 Suncryl (SC) vs. No. 307 Flex Hardener • Viscosity: 10 — 13 sec/20°C (68°F) • Coated film thickness: 20 — 30 μ • Spraying pressure: 245 — 343 kPa (2.5 — 3.5 kgf/cm^2, 36 — 50 psi)
22	Drying	Allow the coated surface to dry at 20°C (68°F) for two hours or 60°C (140°F) for 30 minutes. NOTE: Do not allow the temperature to exceed 80°C (176°F) since this will deform the PP substrate.	
23	Inspection	Carefully check the condition of the repaired area.	
24	Masking removal	Remove the masking tape applied in Process No. 11 and 13.	
25	Parts installation	Install the parts on bumper in reverse order of removal.	
26	Bumper installation	Install the bumper.	

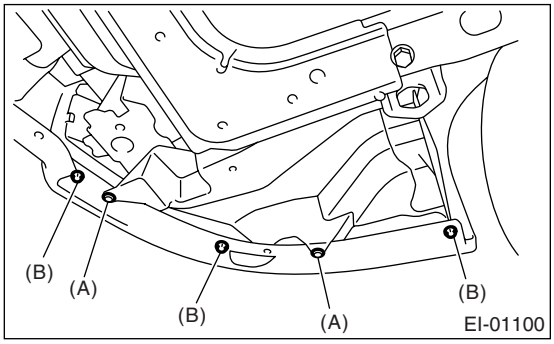
6. Air Dam Skirt

A: REMOVAL

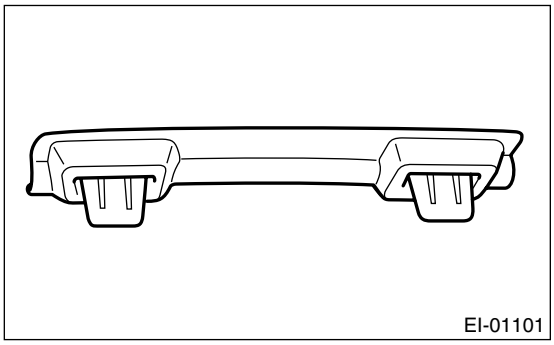
1) Lift-up the vehicle.
2) Remove the clip in the backside of air dam skirt.



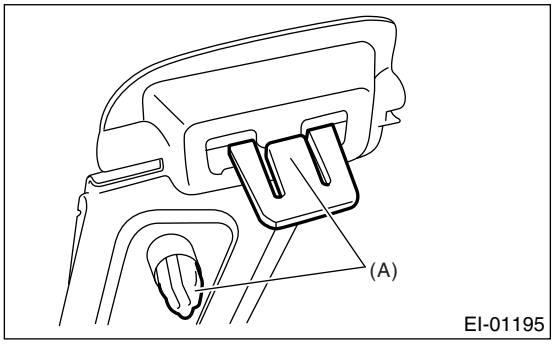
3) Remove the clips (A) and bolt (B) under the bumper.



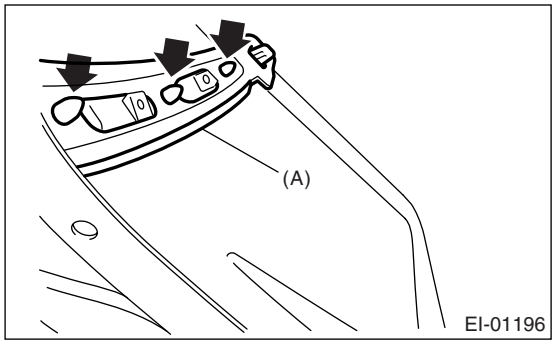
4) Turn over the mud guard, and remove the air dam skirt upper bracket from the inside of bumper.



NOTE:
Push the part A to remove the side and upper bracket.



5) Push the clip to remove the air dam skirt side bracket (A).



6) Remove the air dam skirt assembly.

B: INSTALLATION

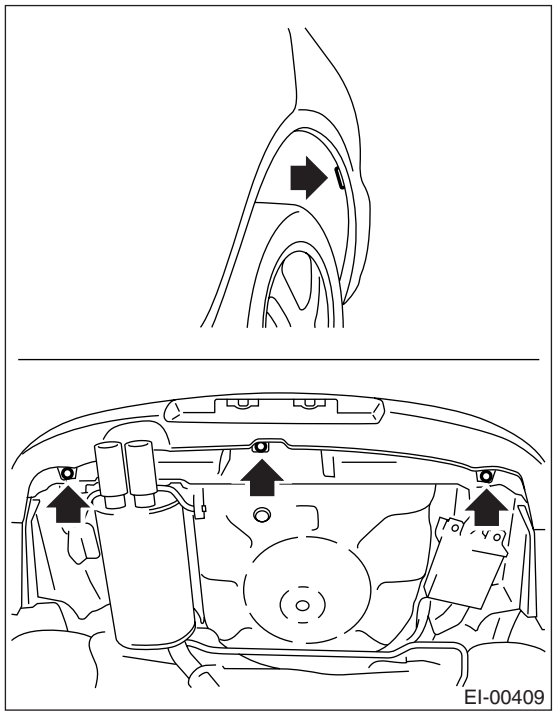
Install in the reverse order of removal.

7. Rear Bumper

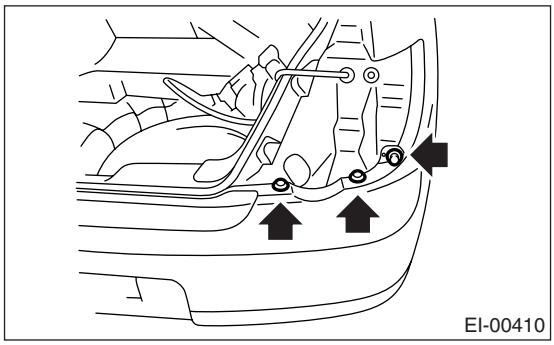
A: REMOVAL

1. WAGON MODEL

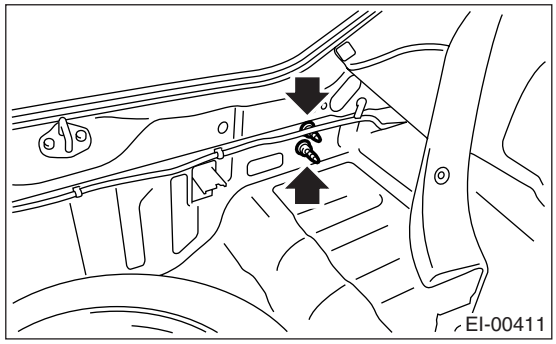
1) Disconnect the ground cable from battery.
2) Remove the bolts inside wheel house (both sides), and the clips on lower side of bumper.



3) Remove the rear combination light assembly. <Ref. to LI-21, REMOVAL, Rear Combination Light Assembly.>
4) Remove the screw and two clips (both sides).

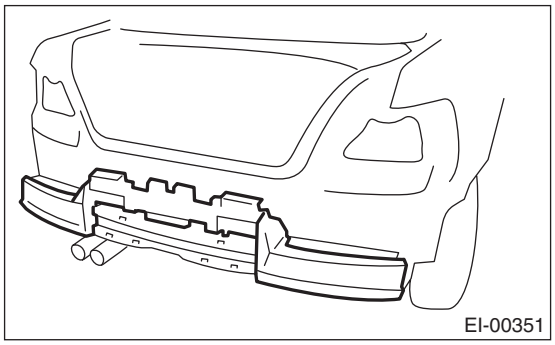


5) Remove the floor box.
6) Remove the rear skirt trim.
7) Turn over the rear quarter lower trims on both sides, and then loosen the four nuts.

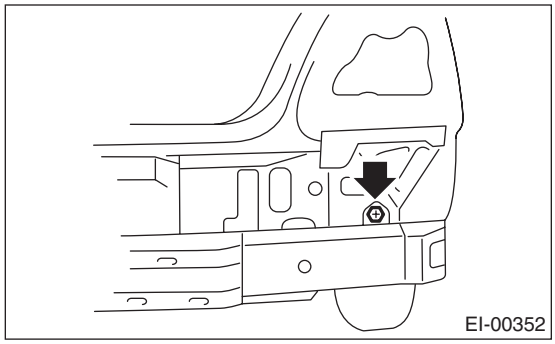


8) Disconnect the license plate light connector, and then remove the rear bumper.
9) Remove the energy absorber form from bumper beam. (model with bumper beam)

CAUTION:
Energy absorber form may easily break. Do not apply excessive force to it during removal.

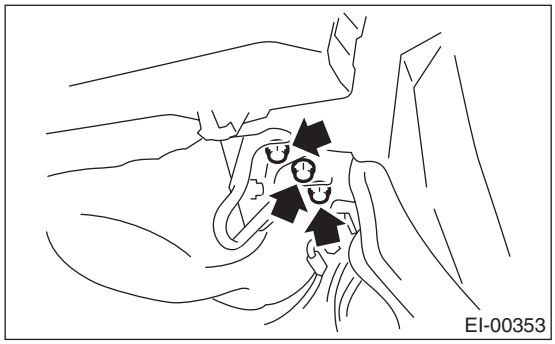


10) Remove the bolt. (model with bumper beam)

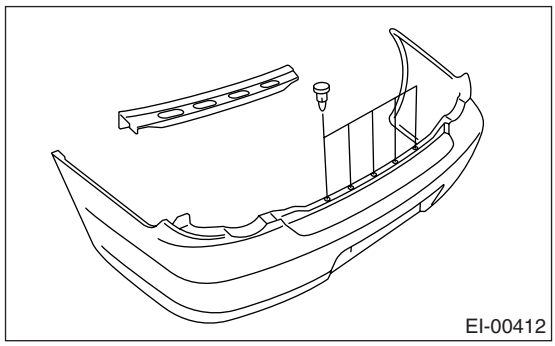


11) Remove the six bolts, then remove the bumper beam. (model with bumper beam)

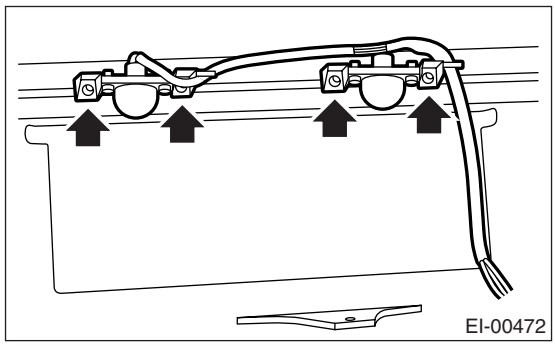
NOTE:
In the case of right side, remove the canister first. Loosen the bolt, and then remove the bumper beam.


EI-00353

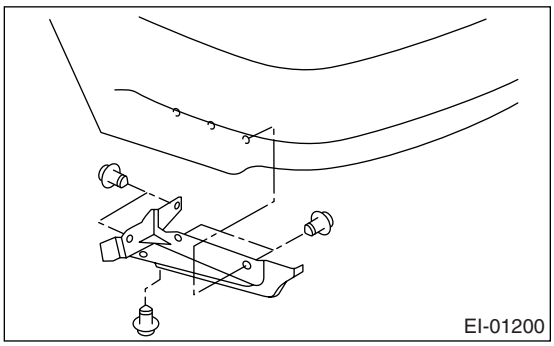
12) Remove the five clips, and then remove the bumper upper beam.


EI-00412

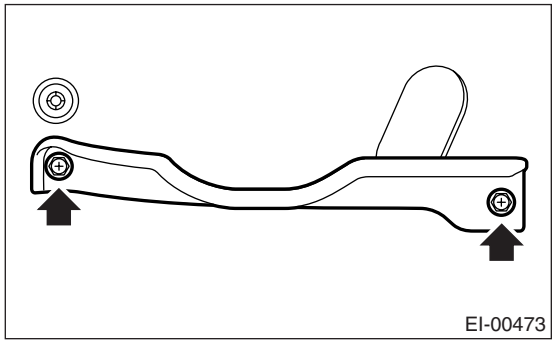
13) Remove the license plate light.


EI-00472

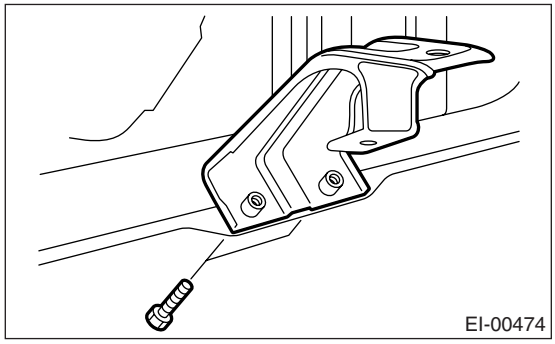
14) Remove the six clips, and then remove the bumper side cover.


EI-01200

15) Remove the corner bracket from body.

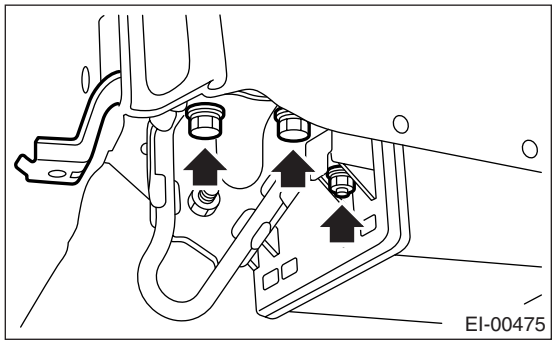

EI-00473

16) Remove the lower bracket (center) from body. (model without bumper beam)


EI-00474

17) Loosen the three bolts, and then remove the lower bracket (side). (model without bumper beam)

NOTE:
On the right side, after removing the canister, loosen the bolts and remove the lower bracket.


EI-00475

2. SEDAN MODEL

Refer to description about removal of rear bumper of wagon model. <Ref. to EI-30, WAGON MODEL, REMOVAL, Rear Bumper.>

B: INSTALLATION

1. WAGON MODEL

Install in the reverse order of removal.

Tightening torque:
Refer to COMPONENT in General Description.
<Ref. to EI-5, REAR BUMPER, COMPONENT, General Description.>

2. SEDAN MODEL

Install in the reverse order of removal.

Tightening torque:
Refer to COMPONENT in General Description.
<Ref. to EI-5, REAR BUMPER, COMPONENT, General Description.>

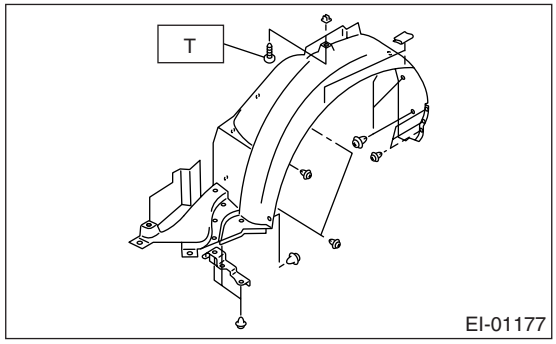
C: REPAIR

Refer to description about repair of front bumper.
<Ref. to EI-23, REMOVAL, Front Bumper.>

8. Mud Guard

A: REMOVAL

1) Jack-up the vehicle.
2) Remove the screws and clips to remove mud guard.



B: INSTALLATION

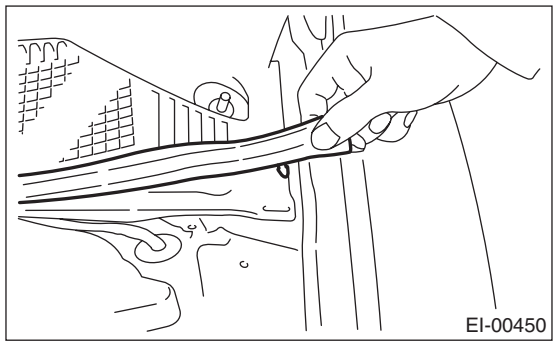
Insert the hook into body, and tighten it with screw and clip.

Tightening torque:
T: 4.5 N·m (0.46 kgf-m, 3.32 ft-lb)

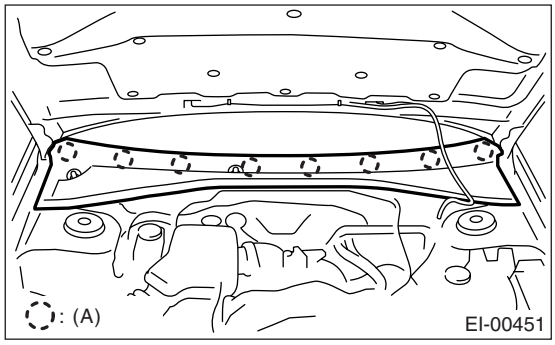
9. Cowl Panel

A: REMOVAL

1) Open the front hood.
2) Remove the wiper arm. <Ref. to WW-11, REMOVAL, Front Wiper Arm.>
3) Remove the front panel seal.



4) Disengage the clips (A) to remove the cowl panel.



B: INSTALLATION

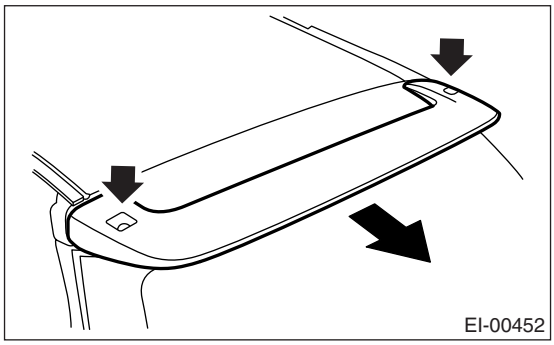
Install in the reverse order of removal.

10.Roof Spoiler

A: REMOVAL

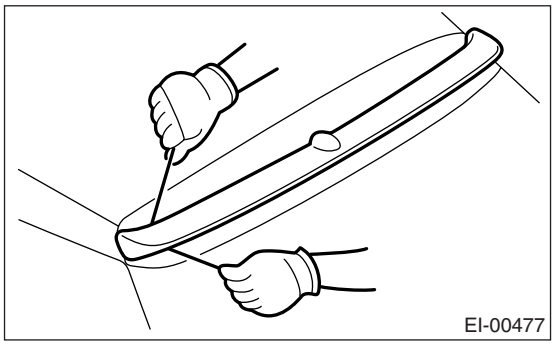
1. LARGE-SIZED ROOF SPOILER

1) Remove the bolt cap, and then remove the two bolts.
2) Remove the roof spoiler.

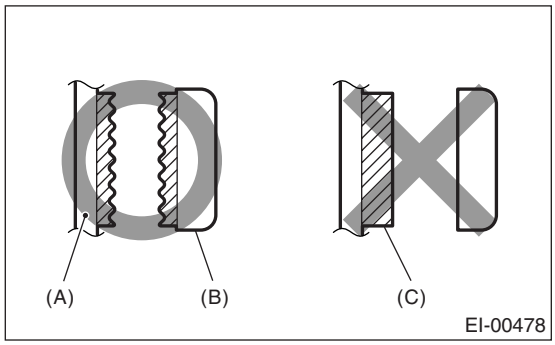


2. SMALL-SIZED ROOF SPOILER

1) Slide in a thin thread of 0.8 mm (0.031 in) diameter or less (fishing line etc.) between body and spoiler, and then remove the spoiler detaching double-sided tape.



NOTE:
• To optimize the effect of solvent, slide the thread along the body without removing the double-sided tape on surface of body and spoiler.
• If it is difficult to detach the double-sided tape, warm up to approx. 40°C (104°F).
• If the double-sided tape remains thick on surface due to interfacial peeling, apply the solvent after slicing off the double-sided tape using a cutter.



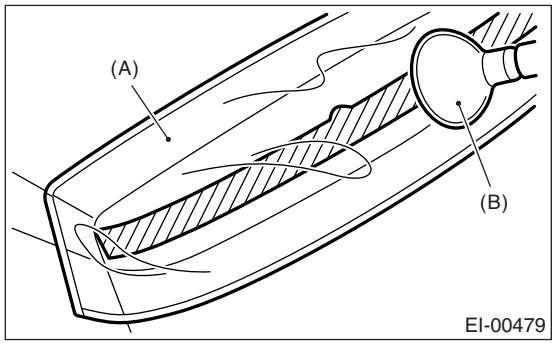
(A) Panel
(B) Spoiler
(C) Double-sided tape

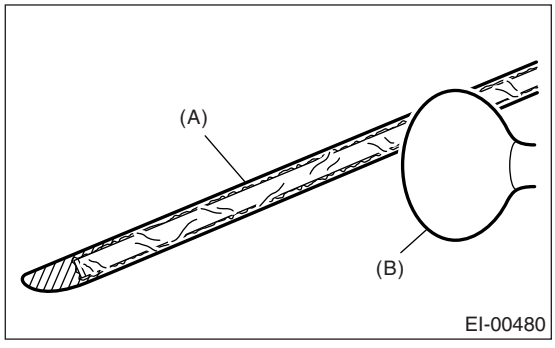
2) Adhere the masking tape around the double-sided tape remaining on surface of body and spoiler.
3) Apply the solvent uniformly on double-sided tape using a brush.

CAUTION:
• Do not use the solvent to body which is repaired with lacquer paint.
• Wipe off immediately when the solvent is touched on surface of body and spoiler.

Solvent:
3M 8907 or equivalent

4) Cover the area where solvent is applied using plastic wrap (A), and then heat the double-sided tape for 5 to 10 minutes in 40 to 60°C (104 to 140°F) using a heat lamp (B).





CAUTION:
Do not heat the double-sided tape until the surface becomes white and excessively dried.

5) Remove the double-sided tape using a plastic spatula.
6) After completely removing the double-sided tape, detach the masking tape and clean the surface using a cotton cloth waste damped with white gasoline.

B: INSTALLATION

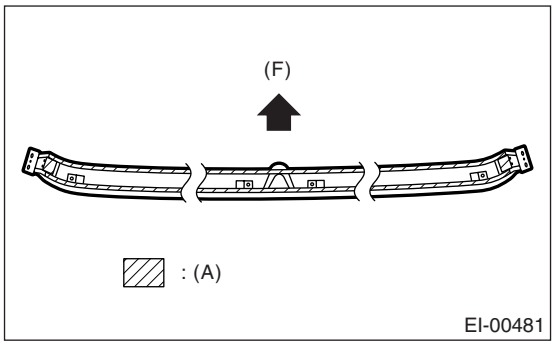
1. LARGE-SIZED ROOF SPOILER

Install in the reverse order of removal.

Tightening torque:
7.4 N·m (0.75 kgf-m, 5.46 ft-lb)

2. SMALL-SIZED ROOF SPOILER

1) Apply the primer to spoiler surface where the double-sided tape is adhered, and then adhere the double-sided tape as shown in the figure.



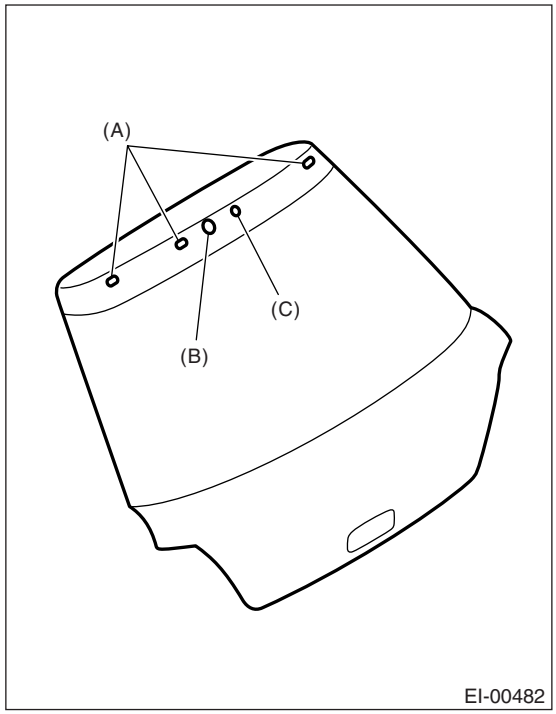
(F) Front side
(A) Double-sided tape; thickness: 0.8 mm (0.031 in), width: 5 mm (0.197 in)

Primer:
3M K-500 or equivalent

Double-sided tape:
3M 5531-5 or equivalent

2) Heat the adhering part using a heat lamp.
Body side: 40 — 60°C (104 — 140°F)
Spoiler side: 20 — 30°C (68 — 86°F)
3) Detach the double-sided tape backing sheet, align to clip position, and then adhere to body using care to avoid air entering.

CAUTION:
To keep the adhesion, do not wash the vehicle within 24 hours.



(A) Cap oblong hole
(B) Washer nozzle
(C) Cap round hole

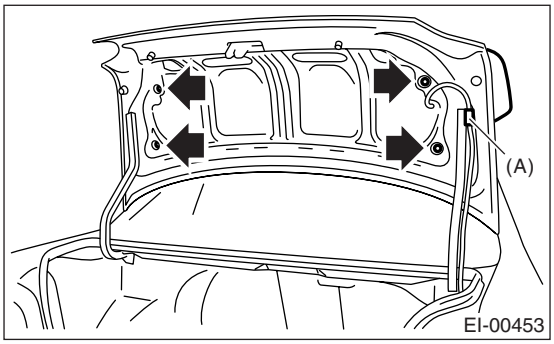
11.Rear Spoiler

A: REMOVAL

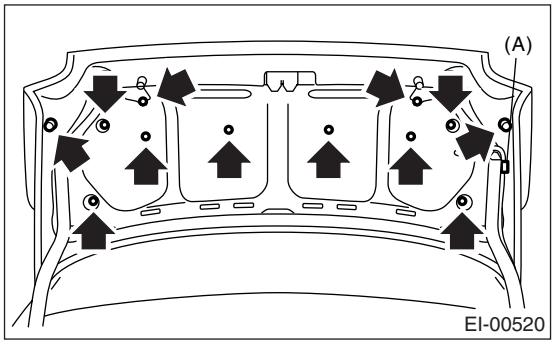
1) Disconnect the ground cable from battery.
2) Open the trunk lid.
3) Remove the electrical connector (A) of high mount stop light.
4) Loosen the mounting nut of rear spoiler to remove rear spoiler.

CAUTION:
• When removing the nut, do not drop it into trunk lid.
• Pay attention to avoid damage during removal or installation.

Small-sized rear spoiler:
Four tightening positions



Large-sized rear spoiler:
Twelve tightening positions



B: INSTALLATION

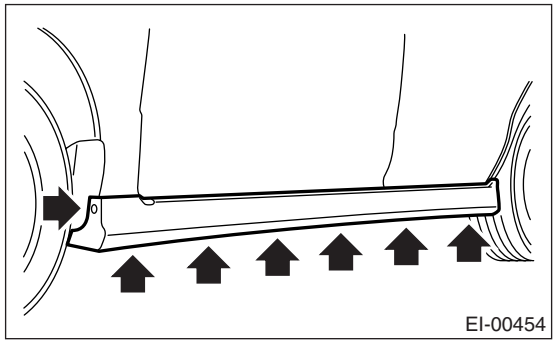
1) Install in the reverse order of removal.
2) Clean the mounting surfaces of trunk lid and spoiler before installation.

Tightening torque:
7.5 N·m (0.76 kgf-m, 5.53 ft-lb)

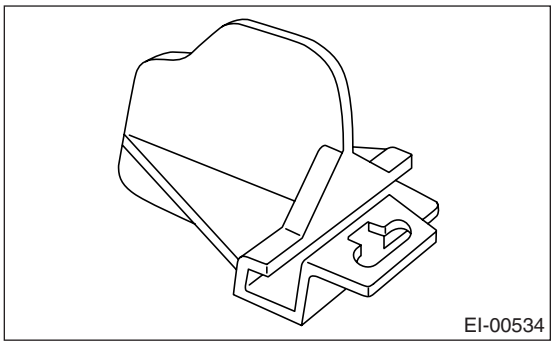
12.Side Sill Spoiler

A: REMOVAL

Remove the clips (one on front fender arch, six on bottom of side sill spoiler), then remove the side spoiler.



NOTE:
Some vehicle have a clip to retain the splash board together with side sill spoiler (forward of rear tire) at rearmost end.



B: INSTALLATION

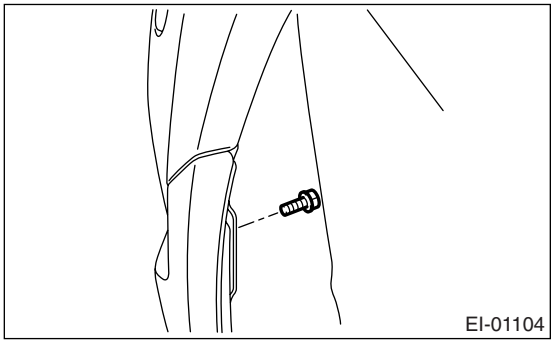
Install in the reverse order of removal.

13.Arch Cover

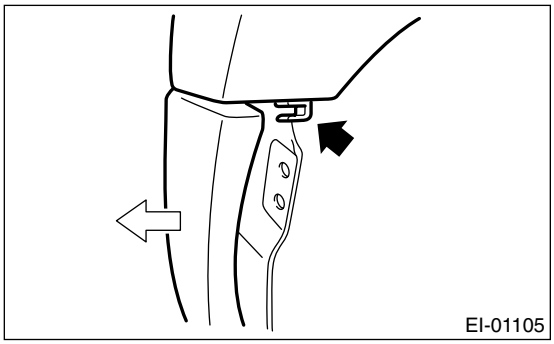
A: REMOVAL

CAUTION:
Never remove the arch cover unless necessary.
Otherwise the arch cover may be damaged.

1) Lift-up the vehicle.
2) Remove the bolt inside the wheel house.



3) Remove the two hook of arch cover by pulling the rear bumper outward.



4) Remove the arch cover using clip remover.

B: INSTALLATION

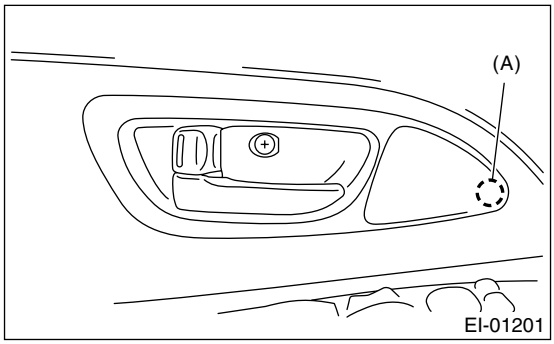
Install in the reverse order of removal.

14.Front Door Trim

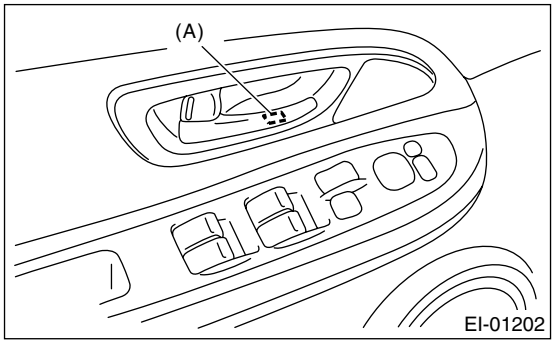
A: REMOVAL

CAUTION:
Do not apply excessive force to the clip. Otherwise the clip may be broken.

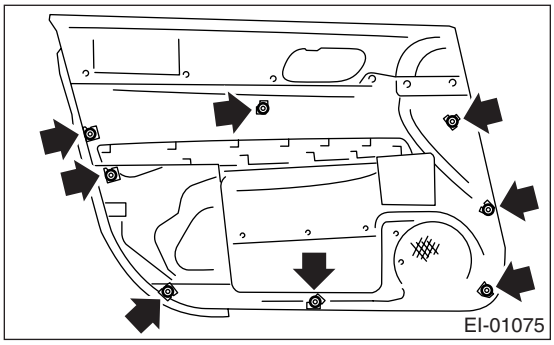
1) Disconnect the ground cable from battery.
2) Remove the gusset cover.
3) Remove a clip (A) of inner remote cover.



4) Insert the flat tip screw driver into (A) part of inner remote cover, and then remove the lower hook with turning screw driver.
Remove the upper hook with pulling inner remote cover, and then remove the inner remote cover.



5) Remove the power window control switch. <Ref. to GW-9, REMOVAL, Power Window Control Switch.>
6) Remove the clips of trim panel using clip remover to remove trim panel.



B: INSTALLATION

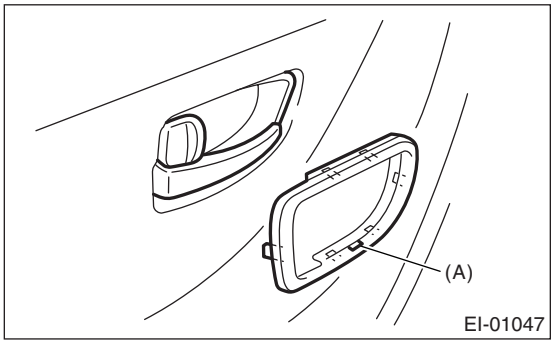
Install in the reverse order of removal.

15.Rear Door Trim

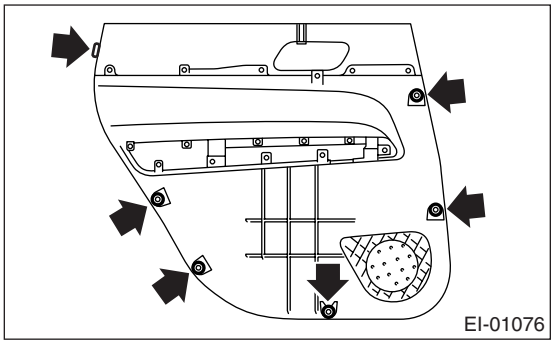
A: REMOVAL

CAUTION:
Do not apply excessive force to the clip. Otherwise the clip may be broken.

1) Disconnect the ground cable from battery.
2) Insert the flat tip screw driver into (A) part of inner remote cover, and then remove the lower hook with turning screw driver.
Remove the upper hook with pulling inner remote cover, and then remove the inner remote cover.



3) Remove the power window control switch. <Ref. to GW-9, REMOVAL, Power Window Control Switch.>
4) Remove the clips of trim panel using clip remover to remove trim panel.



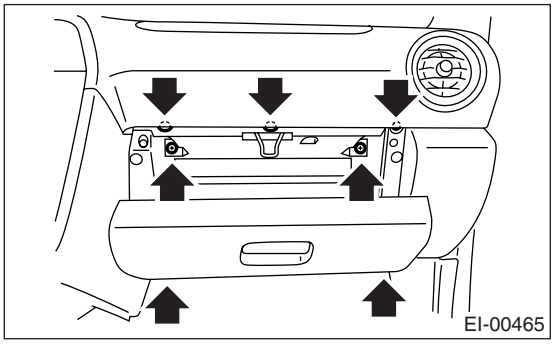
B: INSTALLATION

Install in the reverse order of removal.

16.Glove Box

A: REMOVAL

1) Open the glove box.
2) Loosen the screws to remove the glove box.



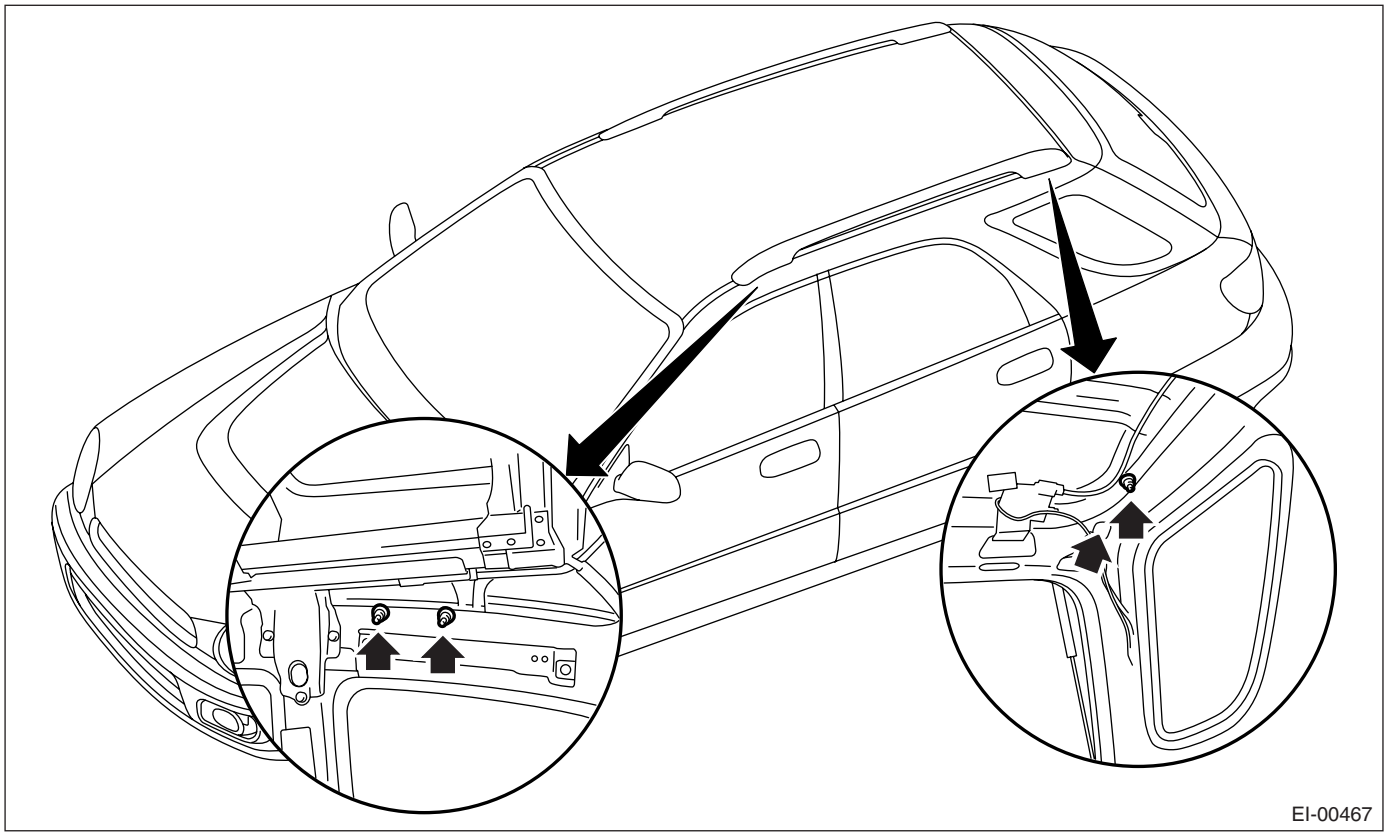
B: INSTALLATION

Install in the reverse order of removal.

17.Roof Rail

A: REMOVAL

1) Remove the roof trim. <Ref. to EI-53, REMOVAL, Roof Trim.>
2) Remove the four mounting nuts, and then detach the roof rail carefully.



B: INSTALLATION

Install in the reverse order of removal.

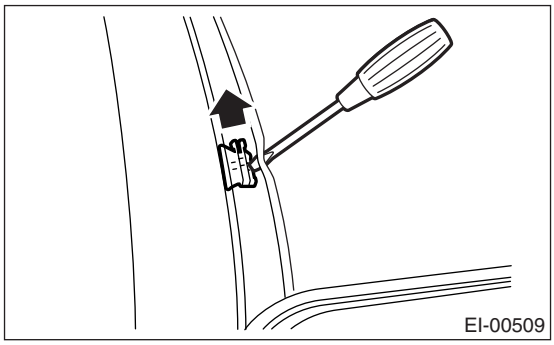
CAUTION:
Be careful not to scratch the body panels with roof rail stud bolts when removing and installing them.

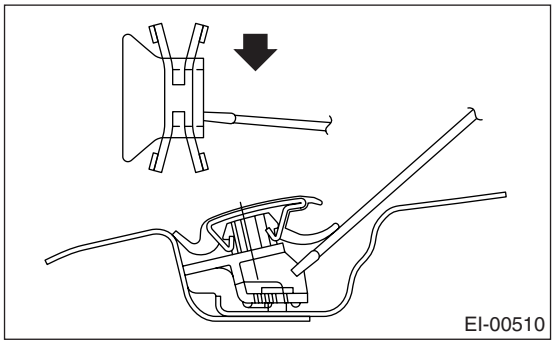
Tightening torque:
7.4 N·m (0.75 kgf-m, 5.46 ft-lb)

18.Roof Molding

A: REMOVAL

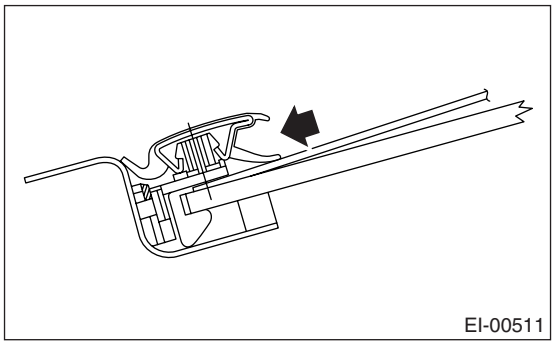
1) Turn over the edge of roof molding, and then remove it by sliding the internal clip using a flat tip screwdriver.
RH: Slide the molding toward the rear side of vehicle.
LH: Slide the molding toward the front side of vehicle.





Sedan model: six clips
Wagon model: eight clips

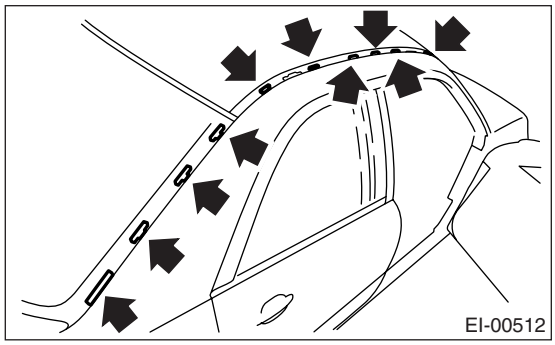
2) For sedan model, remove four clips of rear pillar. Turn over the roof molding on rear glass side, insert a board of about 0.5 mm (0.020 in) thickness into clearance between roof molding and glass, and then remove the claw of internal clip.



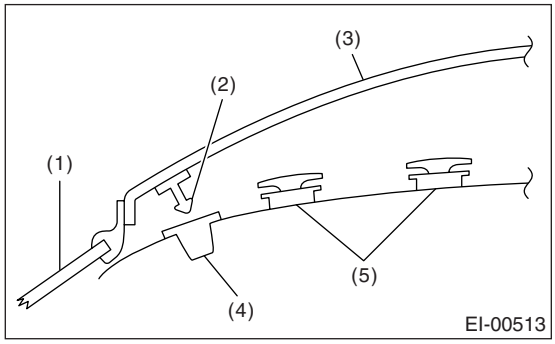
B: INSTALLATION

1) Remove the clip of roof and rear pillar (sedan model) from roof molding, and then install it to body side.

CAUTION:
Make sure to replace the clips broken when removing the roof molding with new ones.



2) Put the front edge of roof molding onto front window molding, and insert the front locating pin into body side cap.



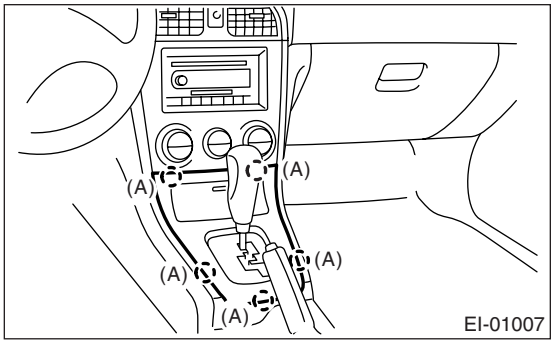
(1) Front window
(2) Locating pin
(3) Roof molding
(4) Cap
(5) Clip (roof)

3) Install the roof molding to body, by pushing the roof molding from above being careful not to deform it.

19.Console Box

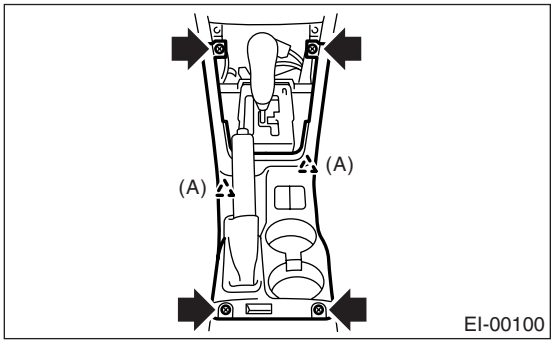
A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the console front panel.



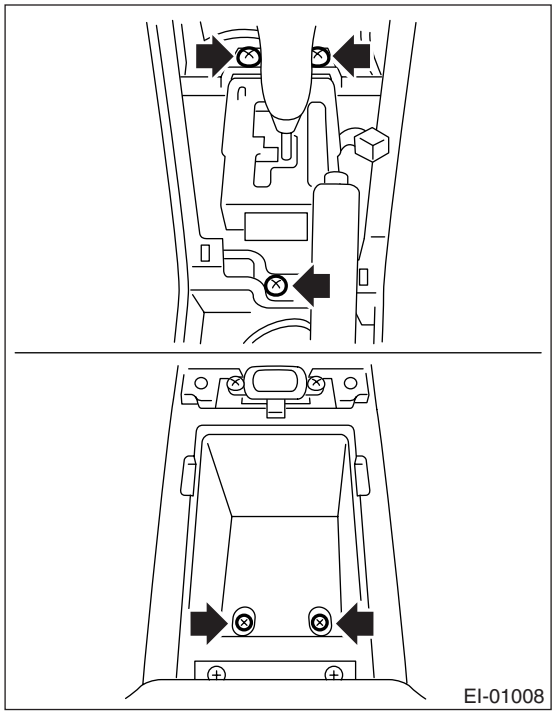
(A) Hook pawl

3) Remove the shift knob (MT model).
4) Remove the screws to remove console cover.

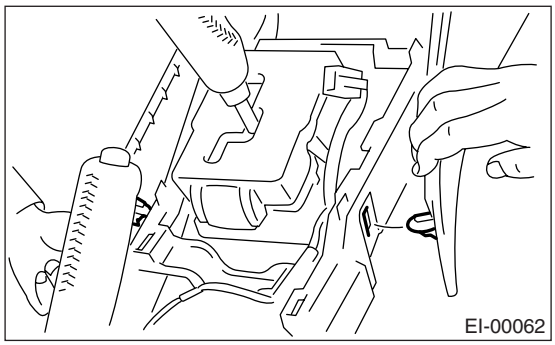


(A) Clip

5) Remove the screws.



6) Remove the hook pawl of console side panel to remove console box.



B: INSTALLATION

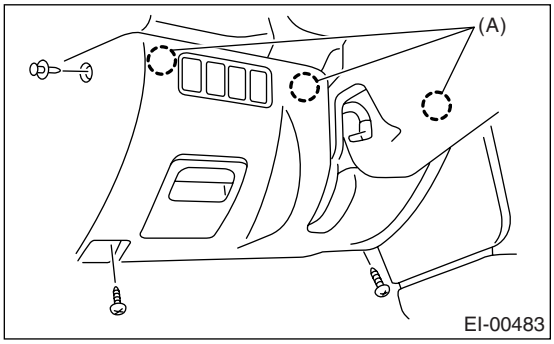
Install in the reverse order of removal.

20.Instrument Panel Assembly

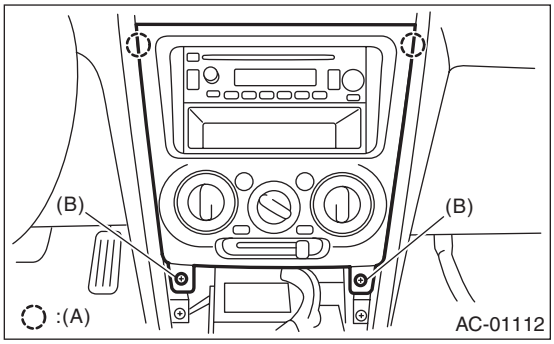
A: REMOVAL

CAUTION:
• All airbag system wiring harness and connectors are colored yellow. Do not use electrical equipment on these circuits.
• Be careful not to damage the airbag system harness when servicing the instrument panel.

1) Disconnect the ground cable from battery.
2) Loosen the screws, remove the clip (A), disconnect the connectors, and then remove the instrument panel lower cover.

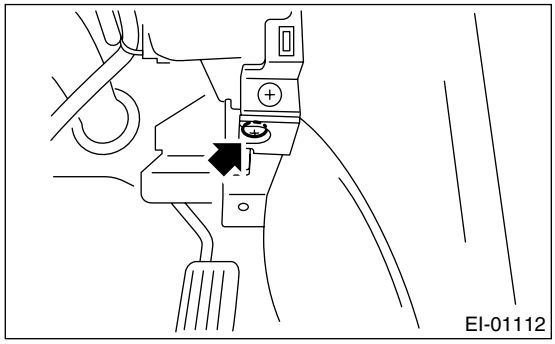


3) Remove the console front panel and console cover. <Ref. to EI-45, REMOVAL, Console Box.>
4) Remove the clip (A) and screw (B), and then remove the center console panel.

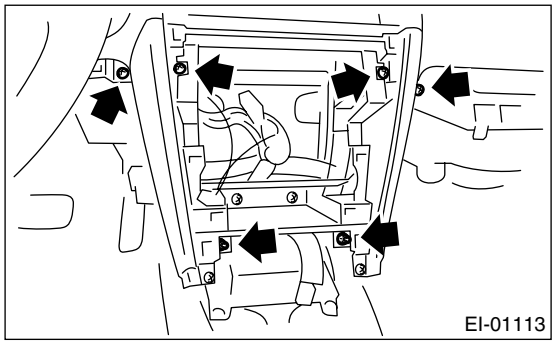


(A) Clip
(B) Screw

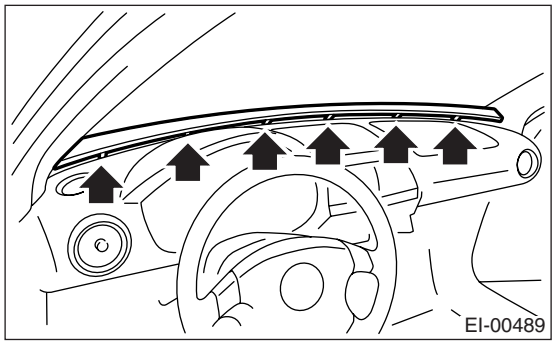
5) Remove the glove box. <Ref. to EI-42, REMOVAL, Glove Box.>
6) Loosen the screws, and then remove the console side panel.



7) Remove the passenger's airbag module. <Ref. to AB-13, Passenger's Airbag Module.>
8) Loosen the four screws and two nuts, and then remove the lower console panel.

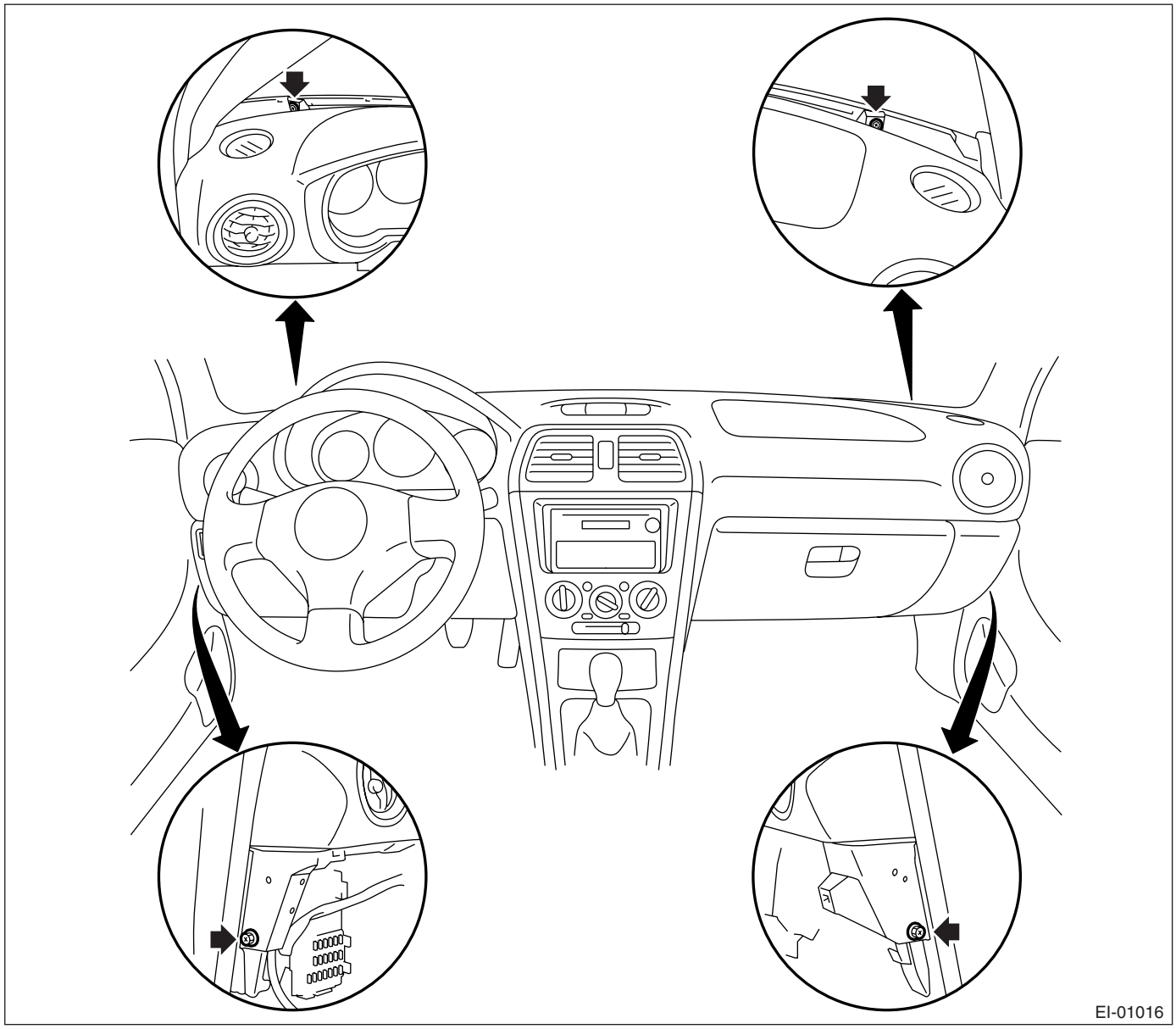


9) Remove the hook, and then remove the defroster panel.



10) Remove the front pillar upper trim. <Ref. to EI-49, REMOVAL, Upper Inner Trim.>
11) Disconnect the two connectors, and then loosen the nuts.

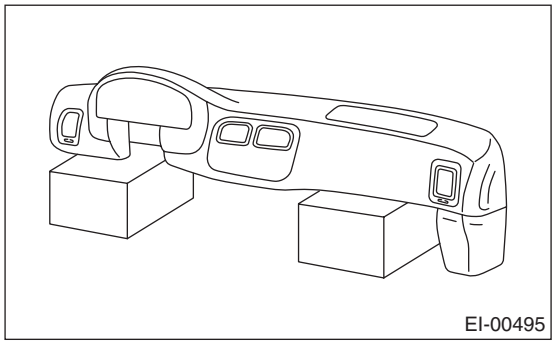
12) Remove the instrument panel installation bolts.



13) Check that all the harness is disconnected, and then remove the instrument panel from vehicle.

NOTE:
• Put alignment marks as necessary, in order to facilitate the reassembly.

• When storing the removed instrument panel, place it standing up on the floor.

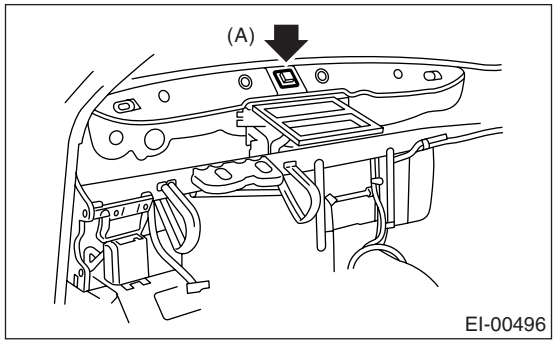


B: INSTALLATION

CAUTION:
- **Be careful not to snag the harness.**
- **Carry out installation checking that the harness is connected correctly.**
- **When setting the instrument panel into vehicle, do not damage trim panels.**

Install in the reverse order of removal.

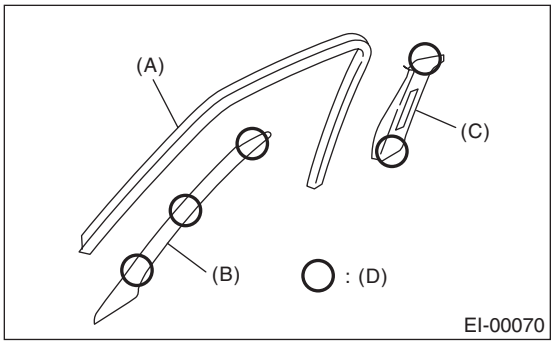
NOTE:
When installing the instrument panel into position, push the hook into grommet (A) on the body panel. After tightening the bolts, recheck the installation.



21.Upper Inner Trim

A: REMOVAL

1) Remove the lower inner trim. <Ref. to EI-50, REMOVAL, Lower Inner Trim.>
2) Remove the front molding (A).
3) Remove the front pillar upper trim (B).
4) Detach the front seat belt shoulder anchor, and then remove the center pillar upper trim (C).



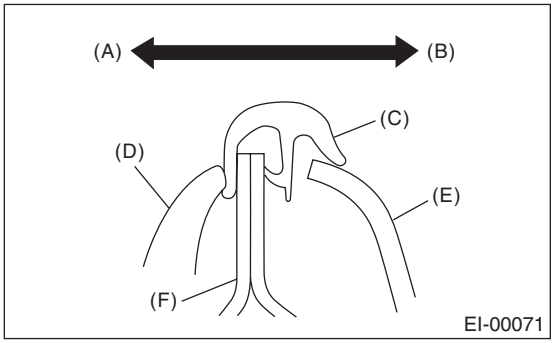
(D) Clip

B: INSTALLATION

Install in the reverse order of removal.

CAUTION:
Be sure to securely hook pawls of inner trim panel to body flange.

NOTE:
When installing the center pillar upper trim and front pillar upper trim, be sure to set the front molding as shown in the figure.

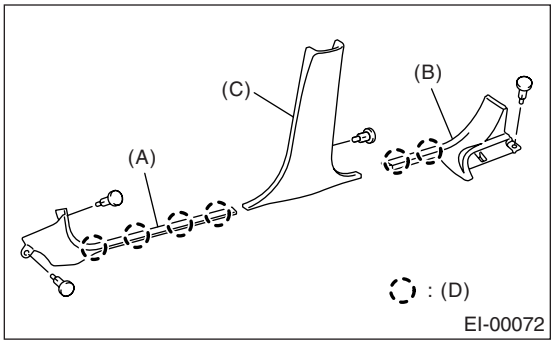


(A) Outside
(B) Inside
(C) Molding
(D) Weather strip
(E) Trim
(F) Body

22.Lower Inner Trim

A: REMOVAL

1) Remove the side sill front cover (A).
2) Remove the rear seat cushion <Ref. to SE-12, REMOVAL, Rear Seat.>, and then remove side sill rear cover (B).
3) Remove the center pillar lower trim (C).



(D) Clip

B: INSTALLATION

Install in the reverse order of removal.

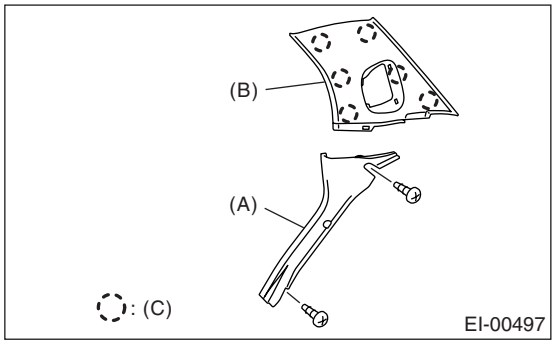
CAUTION:
Be sure to securely hook pawls of inner trim panel to body flange.

23.Rear Quarter Trim

A: REMOVAL

1. SEDAN MODEL

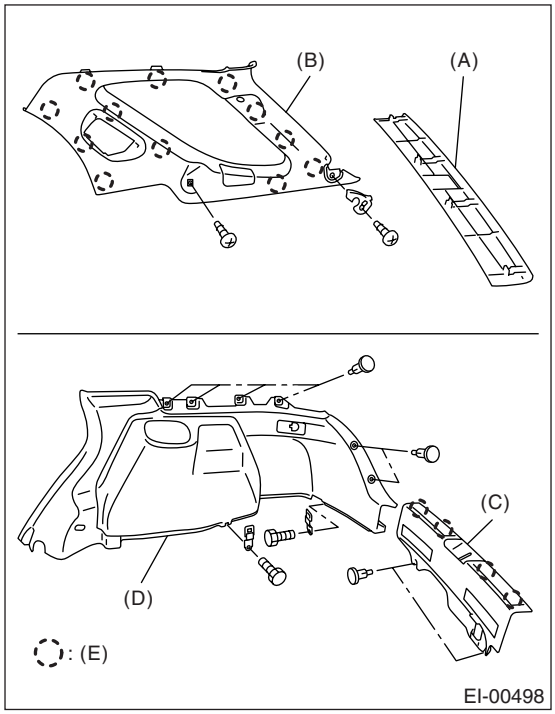
1) Remove the rear seat. <Ref. to SE-12, REMOVAL, Rear Seat.>
2) Remove the side sill rear cover. <Ref. to EI-50, REMOVAL, Lower Inner Trim.>
3) Remove the rear pillar lower cover (A).
4) Remove the seatbelt lower anchor bolt, and then remove the rear pillar upper trim (B).



(C) Clip

2. WAGON MODEL

1) Remove the rear seat. <Ref. to SE-12, REMOVAL, Rear Seat.>
2) Remove the side sill rear cover.
3) Remove the rear rail trim (A).
4) Loosen the screws and clips to remove the rear quarter upper trim (B).
5) Remove the rear skirt trim (C).
6) Loosen the bolts and clips to remove the rear quarter lower trim (D).



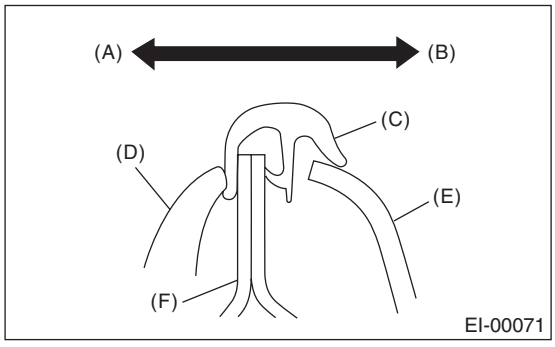
(E) Clip

B: INSTALLATION

Install in the reverse order of removal.

CAUTION:
Be sure to securely hook pawls of inner trim panel to body flange.

NOTE:
When installing the rear quarter upper trim, be sure to set the rear molding as shown in the figure.

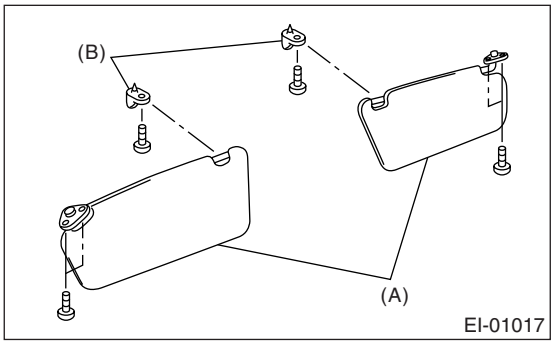


(A) Outside
(B) Inside
(C) Molding
(D) Weather strip
(E) Trim
(F) Body

24.Sun Visor

A: REMOVAL

Remove the mounting screws, and then detach the sun visor (A) and hook (B).



B: INSTALLATION

Install in the reverse order of removal.

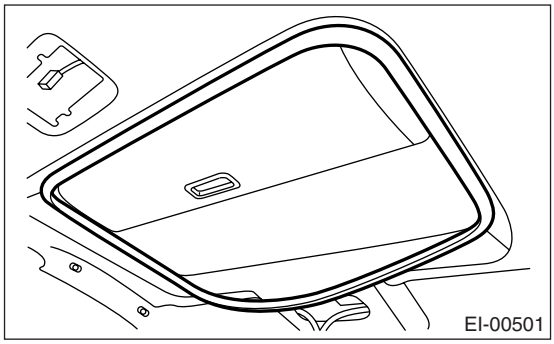
25.Roof Trim

A: REMOVAL

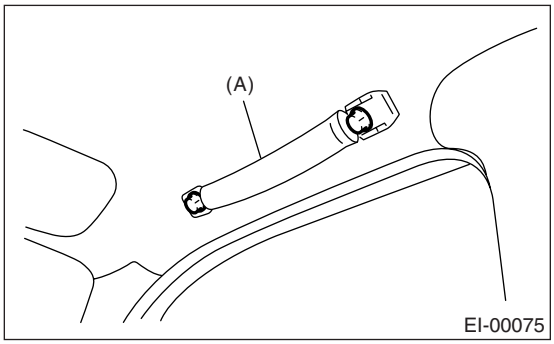
CAUTION:
When removing the clip, use great care not to damage the roof trim.

1. SEDAN MODEL

1) Disconnect the ground cable from battery.
2) Remove the sunroof switch. (Model with sunroof) <Ref. to SR-9, REMOVAL, Sunroof Switch.>
3) Remove the spot map light. <Ref. to LI-29, REMOVAL, Spot Map Light.>
4) Remove the room light. <Ref. to LI-30, REMOVAL, Room Light.>
5) Remove the sun visor and hook or both sides. <Ref. to EI-52, REMOVAL, Sun Visor.>
6) In case of models with sunroof, remove the sunroof weather strip.

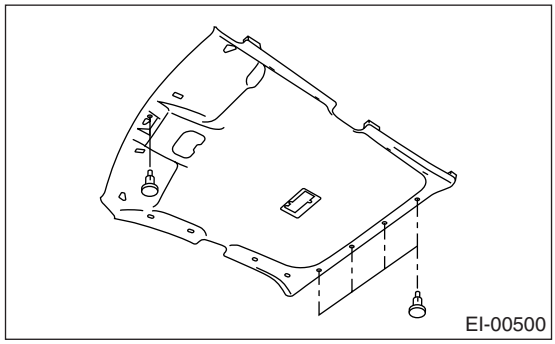

EI-00501

7) Remove the assist-grips (A).



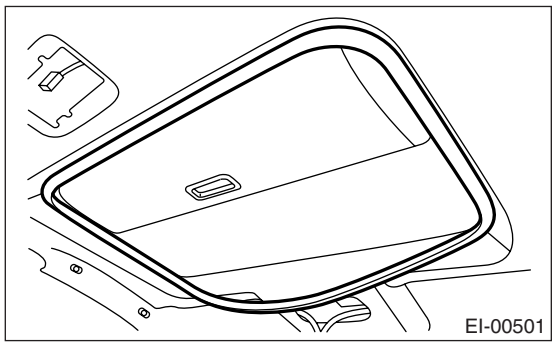
EI-00075

8) Remove the upper inner trim. <Ref. to EI-49, REMOVAL, Upper Inner Trim.>
9) Remove the quarter upper trim. <Ref. to EI-51, SEDAN MODEL, REMOVAL, Rear Quarter Trim.>
10) Remove the clips, and then remove the roof trim.

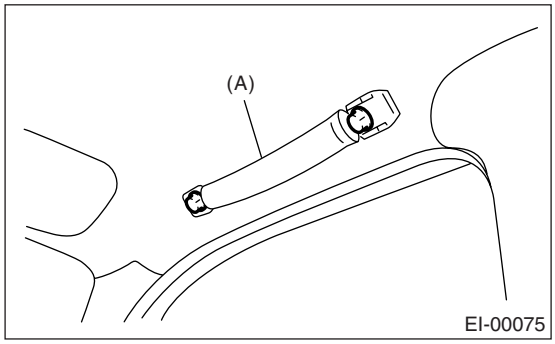

EI-00500

2. WAGON MODEL

1) Disconnect the ground cable from battery.
2) Remove the sunroof switch. (Model with sunroof) <Ref. to SR-9, REMOVAL, Sunroof Switch.>
3) Remove the room light. <Ref. to LI-30, REMOVAL, Room Light.>
4) Remove the sun visor and hook or both sides. <Ref. to EI-52, REMOVAL, Sun Visor.>
5) In case of models with sunroof, remove the sunroof weather strip.


EI-00501

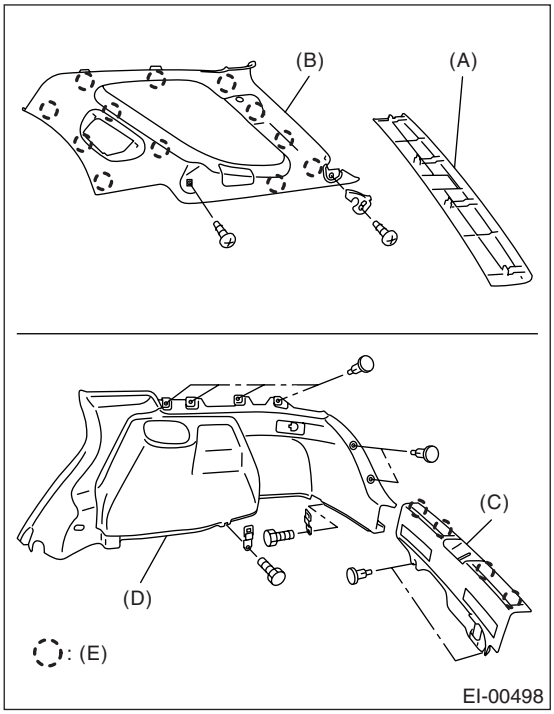
6) Remove the assist-grips (A).



EI-00075

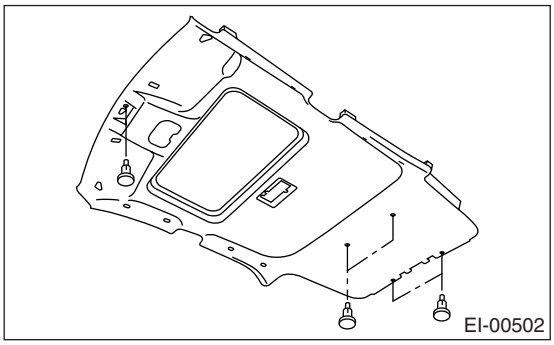
7) Remove the upper inner trim. <Ref. to EI-49, REMOVAL, Upper Inner Trim.>
8) Remove the rear quarter upper trim shown in the figure.
9) Remove the rear rail trim (A).

10) Remove the rear quarter upper trim (B) of both sides.



(E) Clip

11) Remove the clips, and then remove the roof trim.



B: INSTALLATION

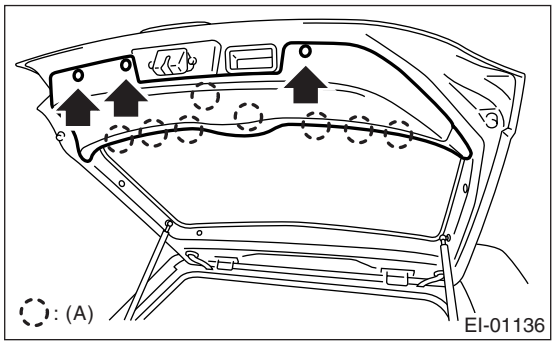
Install in the reverse order of removal.

26.Rear Gate Trim

A: REMOVAL

CAUTION:
Be careful not to damage the clips or their holes.

Remove the clips, and then detach the rear gate trim.



(A) Clip

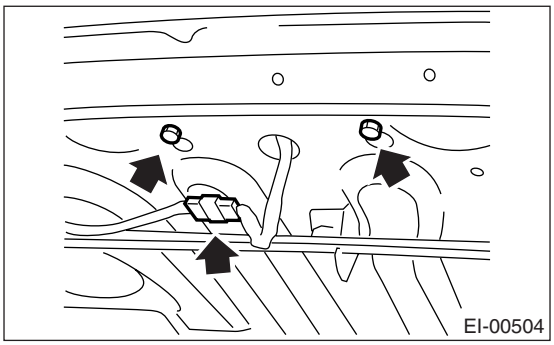
B: INSTALLATION

Install in the reverse order of removal.

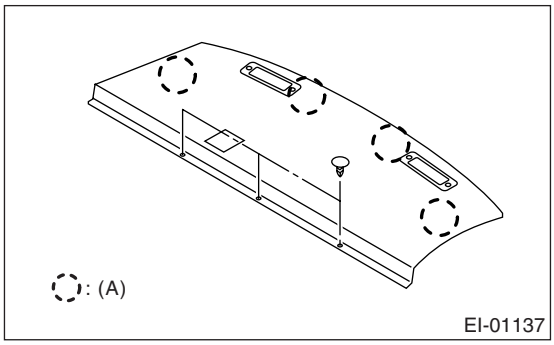
27.Rear Shelf Trim

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the high mount stop light.



3) Remove the rear quarter upper trim. <Ref. to EI-51, REMOVAL, Rear Quarter Trim.>
4) Remove the seat belt center anchor lower bolt.
5) Remove the clips, and then detach the roof trim.



(A) Clip

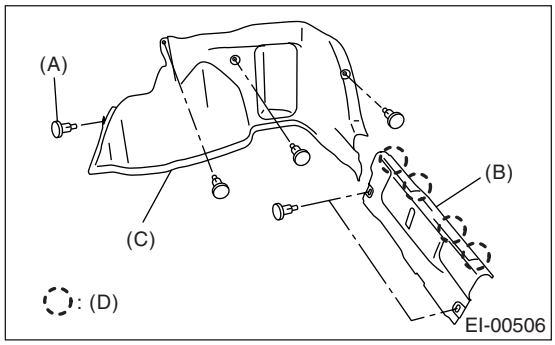
B: INSTALLATION

Install in the reverse order of removal.

28.Trunk Room Trim

A: REMOVAL

1) Remove the rear seat backrest. <Ref. to SE-12, SEDAN MODEL, REMOVAL, Rear Seat.>
2) Remove the trunk room mat.
3) Remove the clip (A).
4) Loosen the clips, and then detach the trunk rear trim (B).
5) Loosen the clips to remove the trunk side trim (C).



(D) Clip

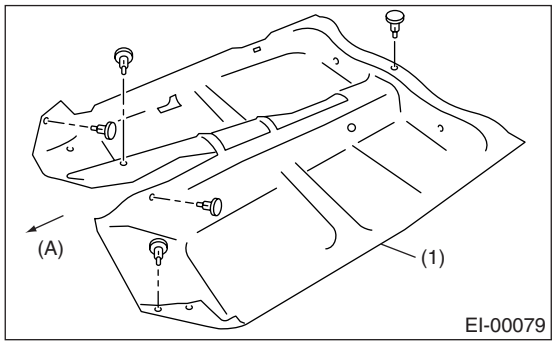
B: INSTALLATION

Install in the reverse order of removal.

29.Floor Mat

A: REMOVAL

1) Remove the front seats. <Ref. to SE-6, REMOVAL, Front Seat.>
2) Remove the rear seat cushion. <Ref. to SE-12, REMOVAL, Rear Seat.>
3) Remove the console box. <Ref. to EI-45, Console Box.>
4) Remove the side sill front cover, side sill rear cover and center pillar lower trim. <Ref. to EI-50, REMOVAL, Lower Inner Trim.>
5) Remove the foot rest.
6) Remove the clips from floor mat.
7) Remove the mat hook.
8) Remove the mat from toe board area.
9) Remove the mat from rear heater duct.
10) Roll the mat, and then take it out of opened rear door.



(A) Front
(1) Floor mat

B: INSTALLATION

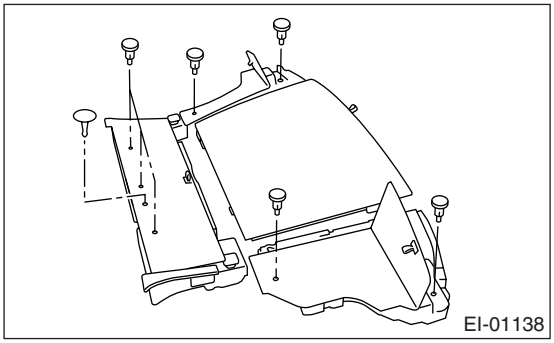
Install in the reverse order of removal.

NOTE:
- Secure the mat firmly with hook and Velcro tape.
- Insert the mat edge firmly into the groove of side sill cover.

30.Luggage Floor Mat

A: REMOVAL

Remove the clips, and then detach the rear floor mats and boxes.



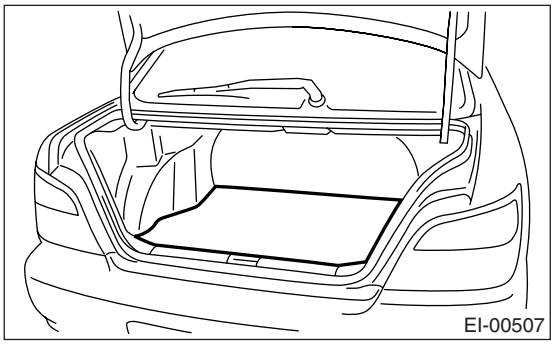
B: INSTALLATION

Install in the reverse order of removal.

31.Trunk Room Mat

A: REMOVAL

Draw out the trunk room mat.



B: INSTALLATION

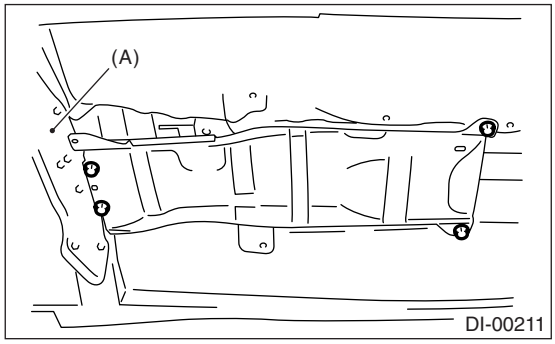
Install in the reverse order of removal.

32.Heat Shield Cover

A: REMOVAL

1. FRONT HEAT SHIELD COVER

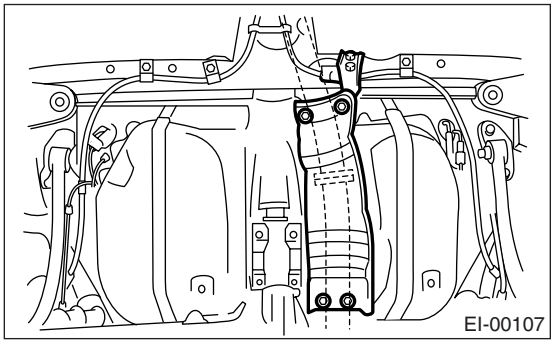
Loosen the four bolts to remove the front heat shield cover.



(A) Transmission mount

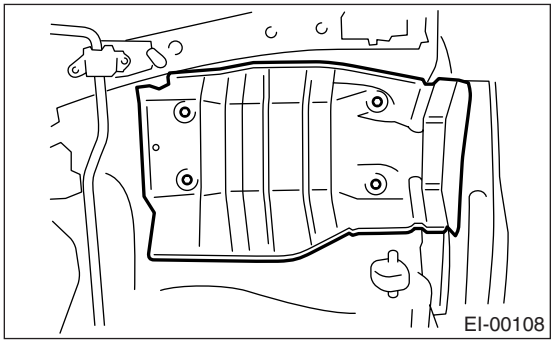
2. CENTER HEAT SHIELD COVER

Loosen the four bolts to remove the center heat shield cover.



3. REAR HEAT SHIELD COVER

1) Remove the muffler. <Ref. to EX(H4SO)-12, REMOVAL, Muffler.>, <Ref. to EX(H4SOw/oOBD)-11, REMOVAL, Muffler.>, <Ref. to EX(H4DOTC)-16, REMOVAL, Muffler.>
2) Loosen the four bolts to remove the rear heat shield cover.



B: INSTALLATION

Install in the reverse order of removal.

EXTERIOR BODY PANELS

EB

		Page
1.	General Description	2
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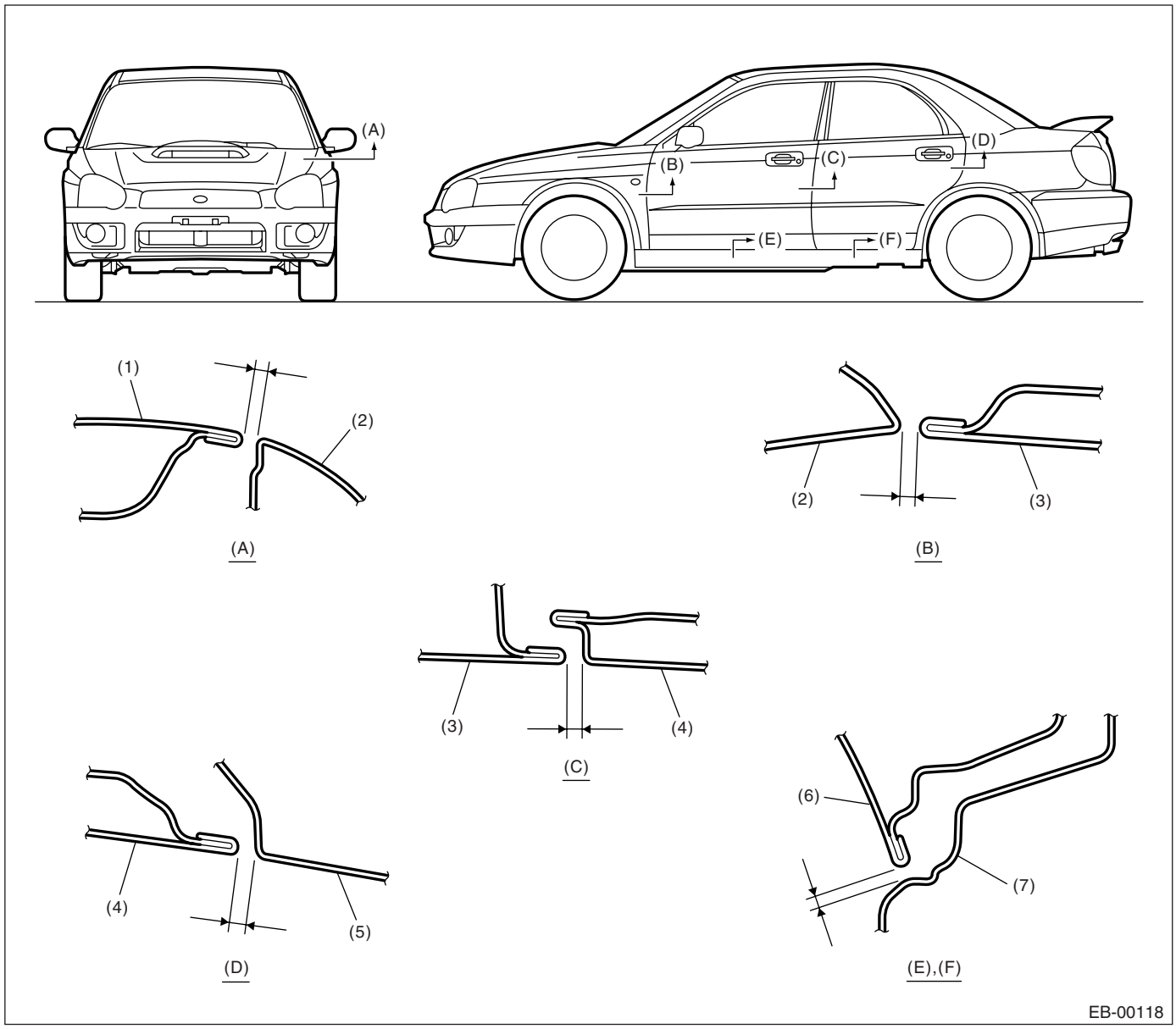
3.	Front Fender	14
4.	Front Door	15
5.	Front Sealing Cover	17
6.	Rear Door	18
7.	Rear Sealing Cover	20
8.	Trunk Lid	21
9.	Rear Gate	22

1. General Description

A: SPECIFICATION

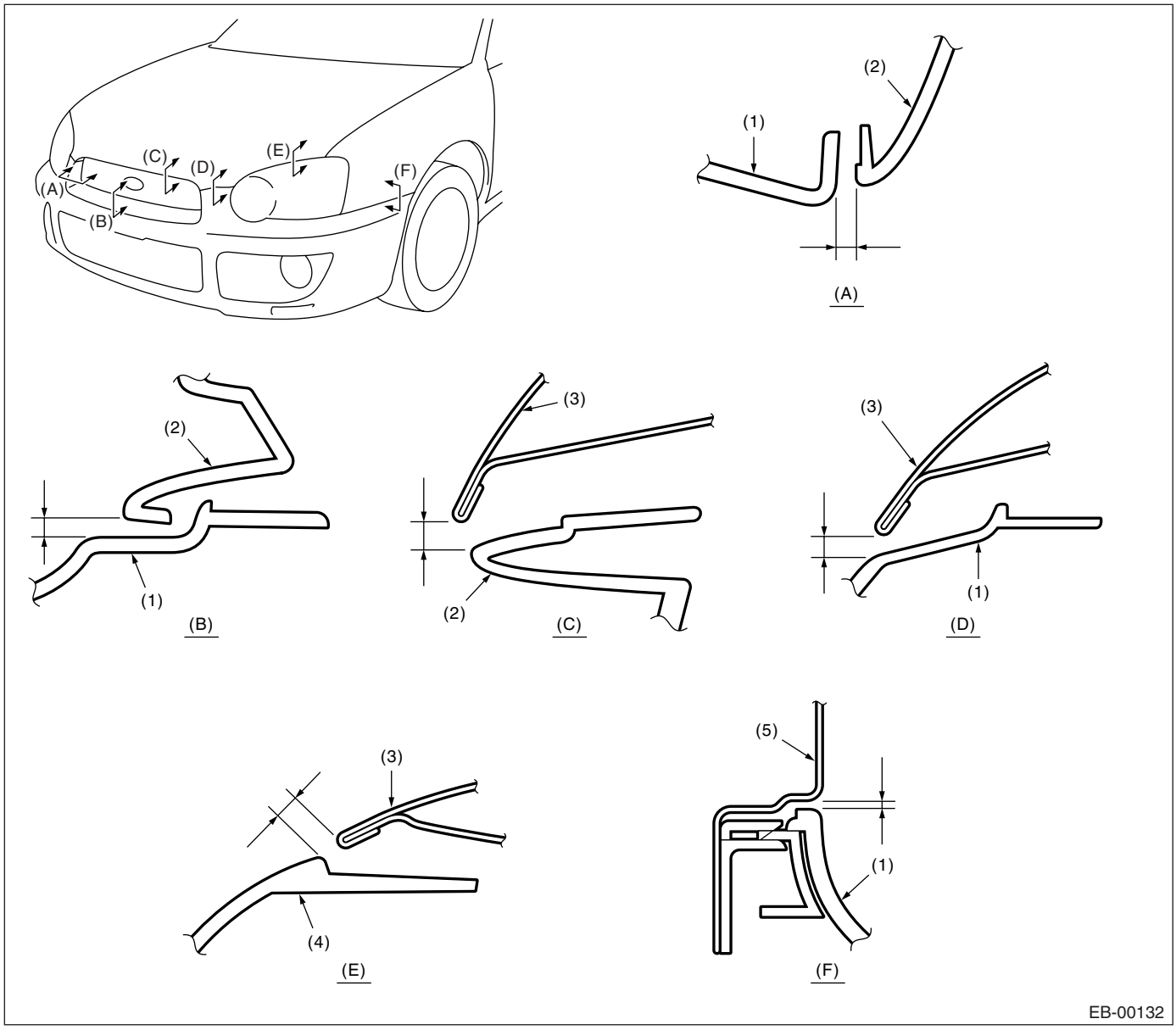
1. SIDE



(1) Front hood panel
(2) Front fender panel
(3) Front door panel
(4) Rear door panel
(5) Rear quarter panel
(6) Door panel
(7) Side sill

Section	Part	Standard
(A)	Front hood panel to Front fender panel	NON-TURBO: 4.0±1.0 mm (0.16±0.04 in) TURBO: 3.7±1.0 mm (0.15±0.04 in)
(B)	Front fender panel to Front door panel	4.7±1.0 mm (0.19±0.04 in)
(C)	Front door panel to Rear door panel	5.1±1.0 mm (0.20±0.04 in)
(D)	Rear door panel to Rear quarter panel	4.6±1.0 mm (0.18±0.04 in)
(E), (F)	Door panel to Side sill	5.9±1.0 mm (0.23±0.04 in)

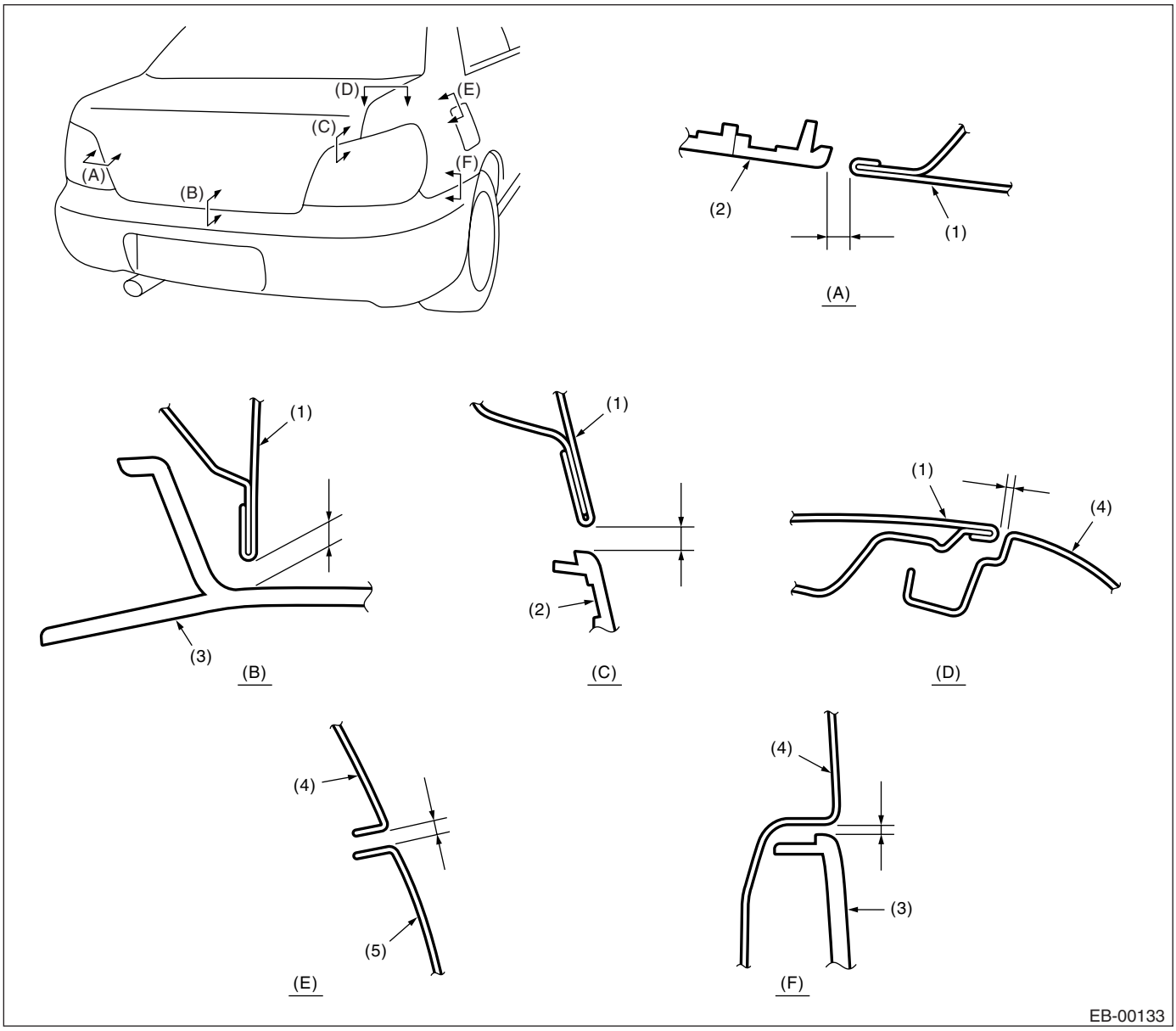
2. FRONT



(1) Front bumper
(2) Front grille
(3) Front hood panel
(4) Headlight
(5) Front fender panel

Section	Part	Standard
(A)	Front bumper to Front grille (Lateral direction)	1.0±0.5 mm (0.04±0.02 in)
(B)	Front bumper to Front grille (Longitudinal direction)	1.0±1.0 mm (0.04±0.04 in)
(C)	Front hood panel to Front grille	Steel: 6.8±1.0 mm (0.27±0.04 in) Aluminum: 6.5±1.0 mm (0.26±0.04 in)
(D)	Front hood panel to Front bumper	6.0±1.0 mm (0.24±0.04 in)
(E)	Front hood panel to Headlight	5.5±1.0 mm (0.22±0.04 in)
(F)	Front fender panel to Front bumper	1.5±0.7 mm (0.06±0.03 in)

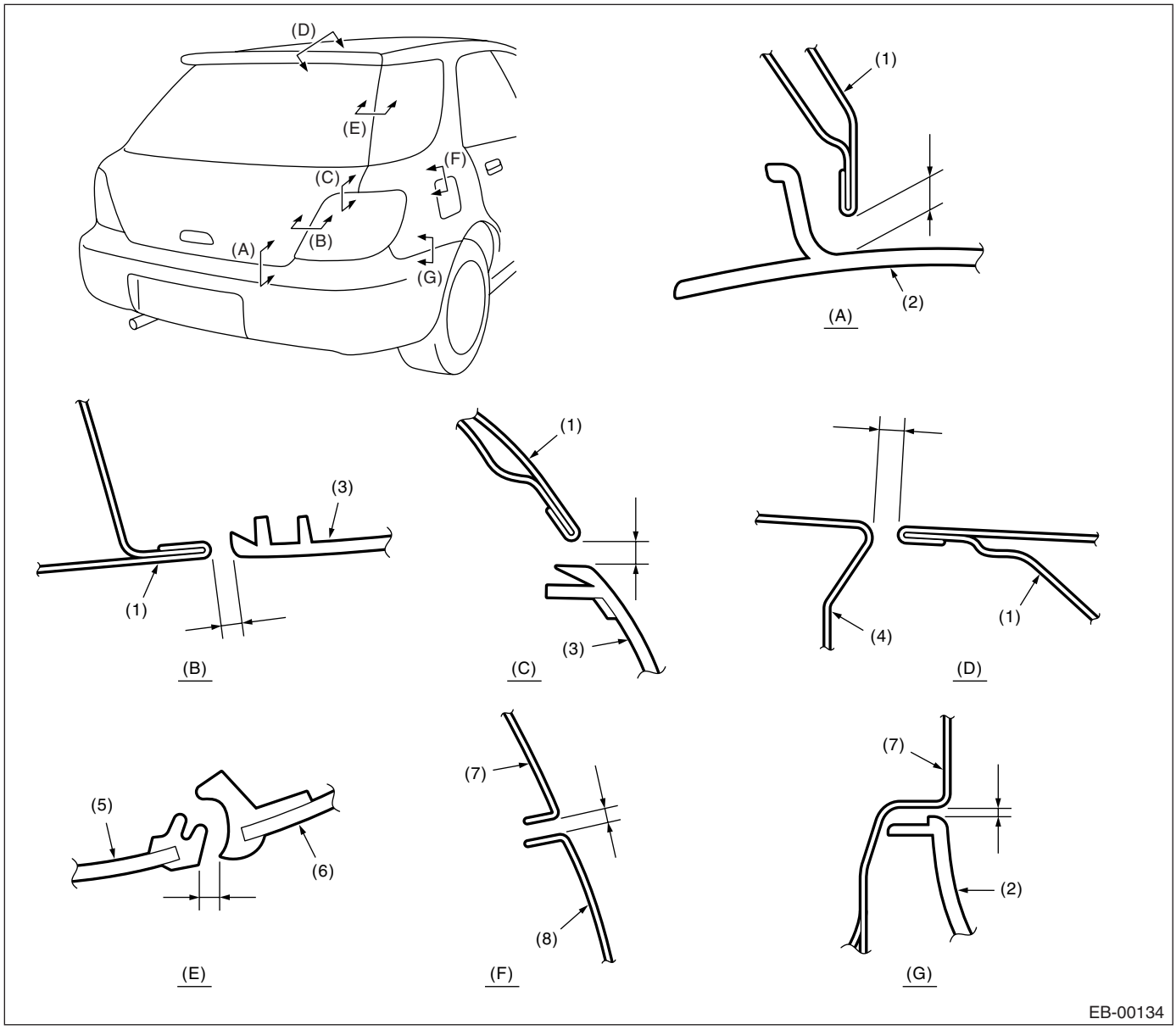
3. REAR (SEDAN MODEL)



(1) Trunk lid panel
(2) Rear combination light
(3) Rear bumper
(4) Rear fender panel
(5) Fuel filler flap lid

Section	Part	Standard
(A)	Trunk lid panel to Rear combination light (Lateral direction)	5.0±1.0 mm (0.20±0.04 in)
(B)	Trunk lid panel to Rear bumper	7.0±1.5 mm (0.28±0.06 in)
(C)	Trunk lid panel to Rear combination light (Longitudinal direction)	7.0±1.0 mm (0.28±0.04 in)
(D)	Trunk lid panel to Rear fender panel	4.0±1.0 mm (0.16±0.04 in)
(E)	Rear fender panel to Fuel filler flap lid	3.5±0.5 mm (0.14±0.02 in)
(F)	Rear fender panel to Rear bumper	0.3 — 2.2 mm (0.01 — 0.09 in)

4. REAR (WAGON MODEL)

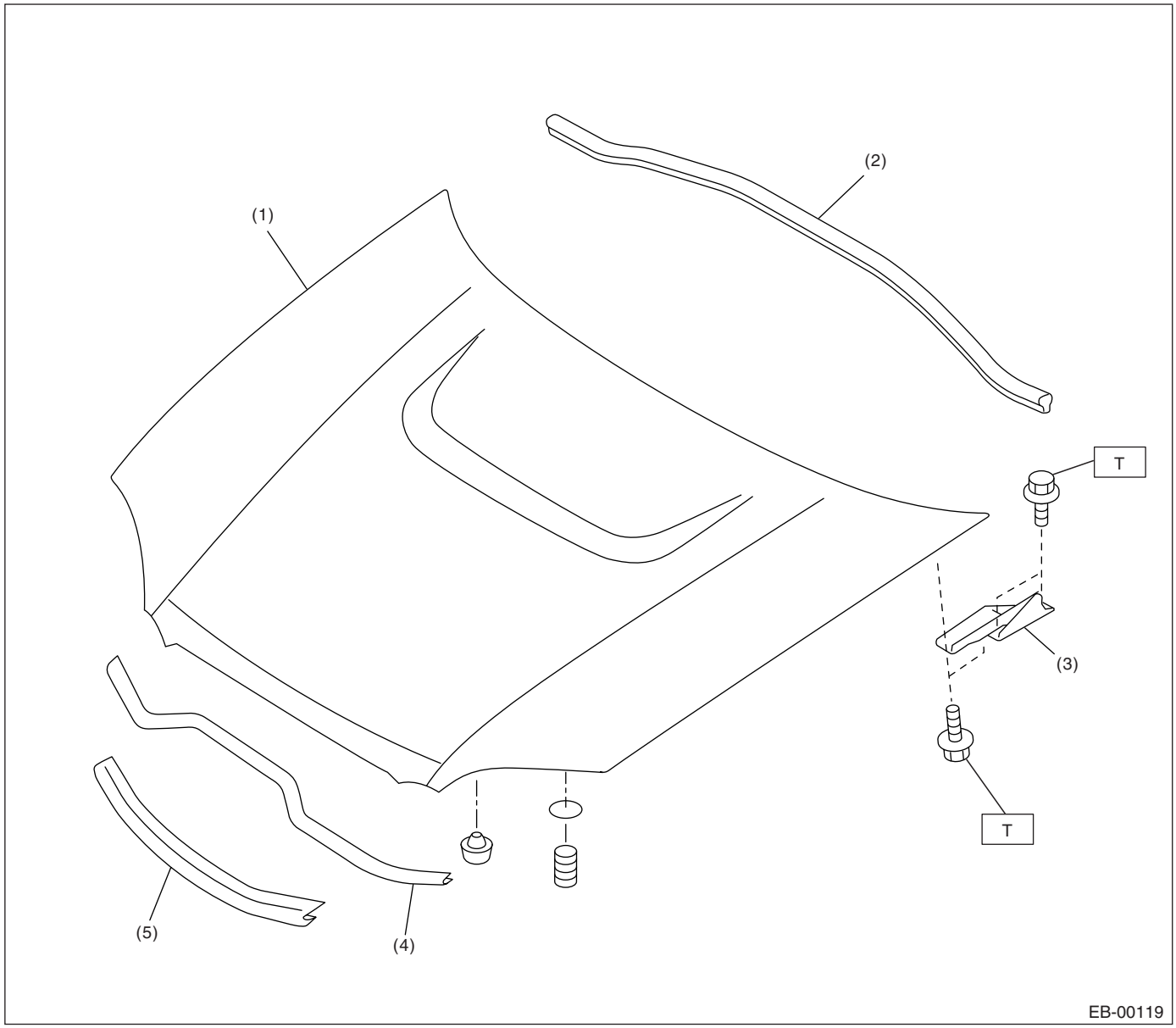


(1) Rear gate panel
(2) Rear bumper
(3) Rear combination light
(4) Roof panel
(5) Rear gate glass
(6) Rear quarter glass
(7) Rear fender panel
(8) Fuel filler flap lid

Section	Part	Standard
(A)	Rear gate panel to Rear bumper	8.3±1.5 mm (0.33±0.06 in)
(B)	Rear gate panel to Rear combination light (Lateral direction)	5.0±1.0 mm (0.20±0.04 in)
(C)	Rear gate panel to Rear combination light (Longitudinal direction)	6.0±1.0 mm (0.24±0.04 in)
(D)	Roof panel to Rear gate panel	6.1 — 7.6 mm (0.24 — 0.30 in)
(E)	Rear gate glass to Rear quarter glass	6.0±1.5 mm (0.24±0.06 in)
(F)	Rear fender panel to Fuel filler flap lid	3.5±0.5 mm (0.14±0.02 in)
(G)	Rear fender panel to Rear bumper	0.3 — 2.2 mm (0.01 — 0.09 in)

B: COMPONENT

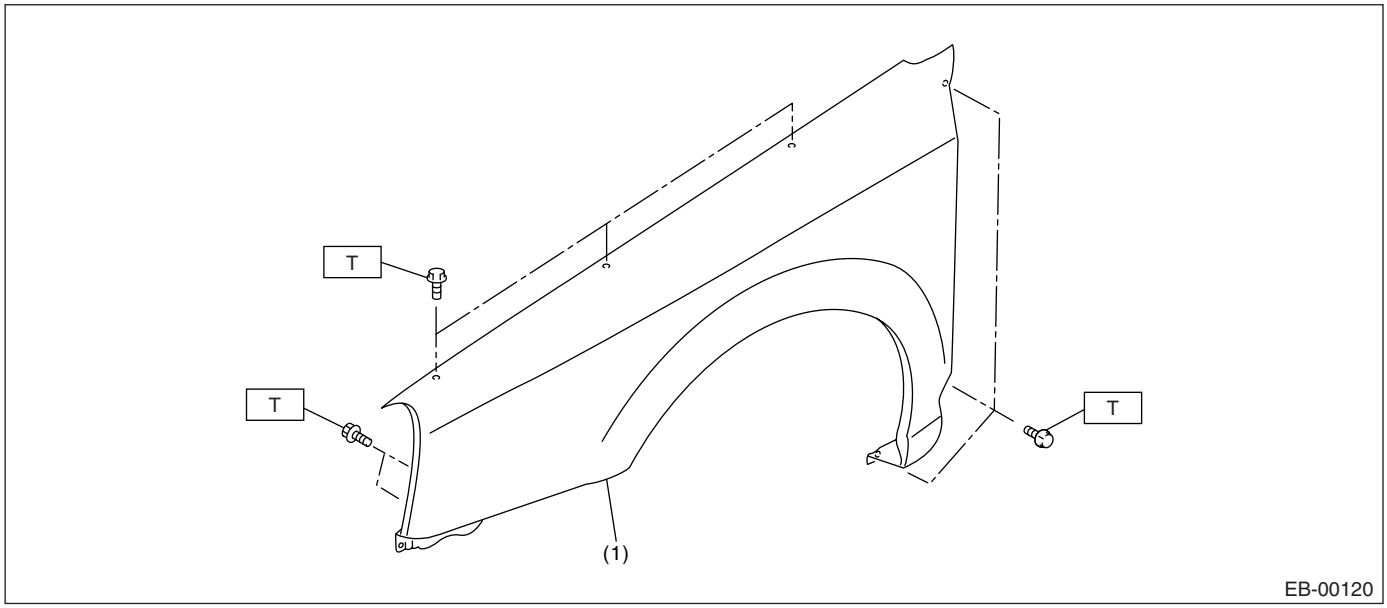
1. FRONT HOOD



(1) Front hood
(2) Seal (Front panel)
(3) Hinge
(4) Seal (Intake duct) (Turbo model)
(5) Seal (Hood)

Tightening torque: N·m (kgf-m, ft-lb)
T: 24.5 (2.5, 18.1)

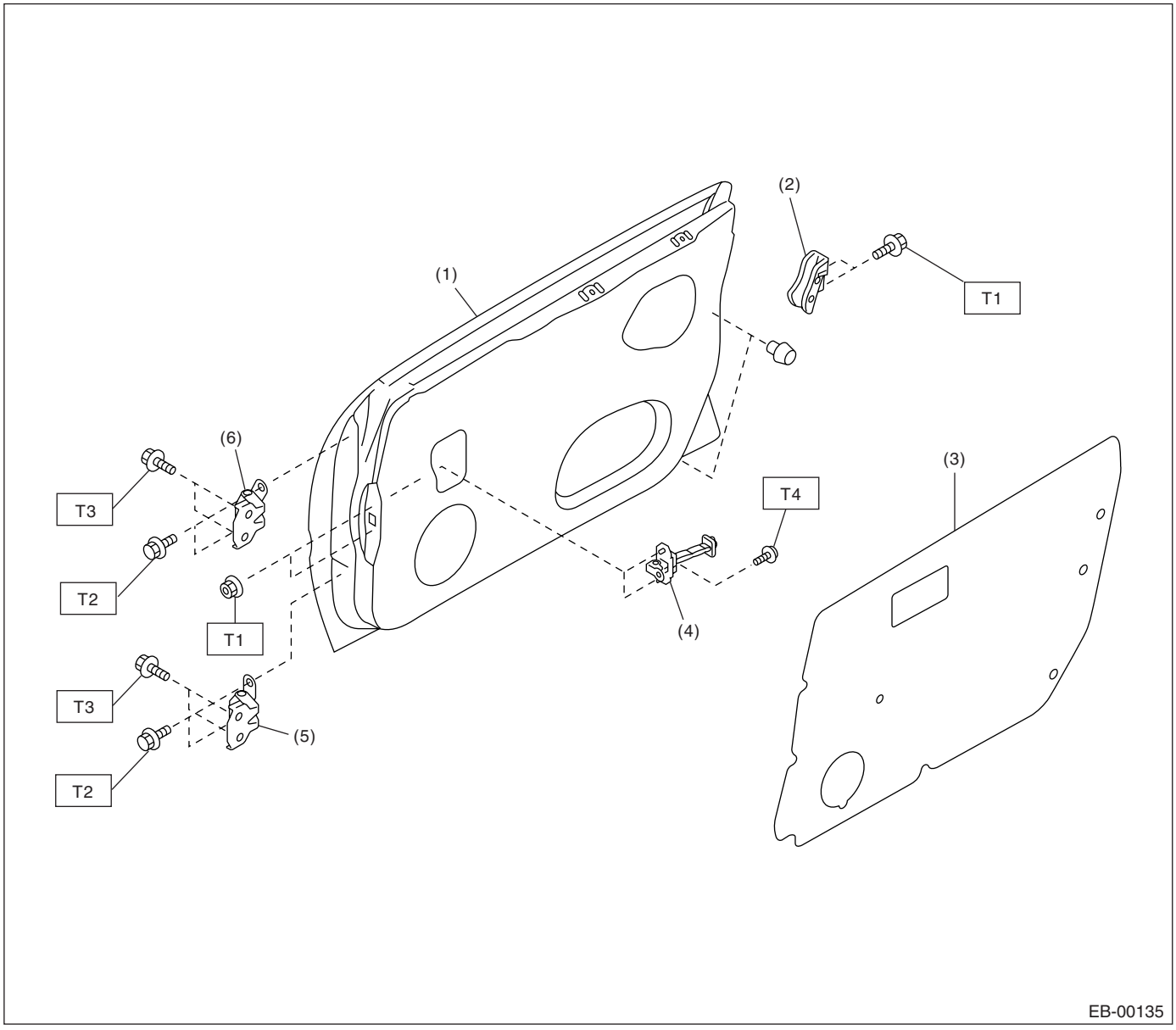
2. FRONT FENDER



(1) Front fender panel

Tightening torque: N·m (kgf-m, ft-lb)
T: 7.5 (0.76, 5.5)

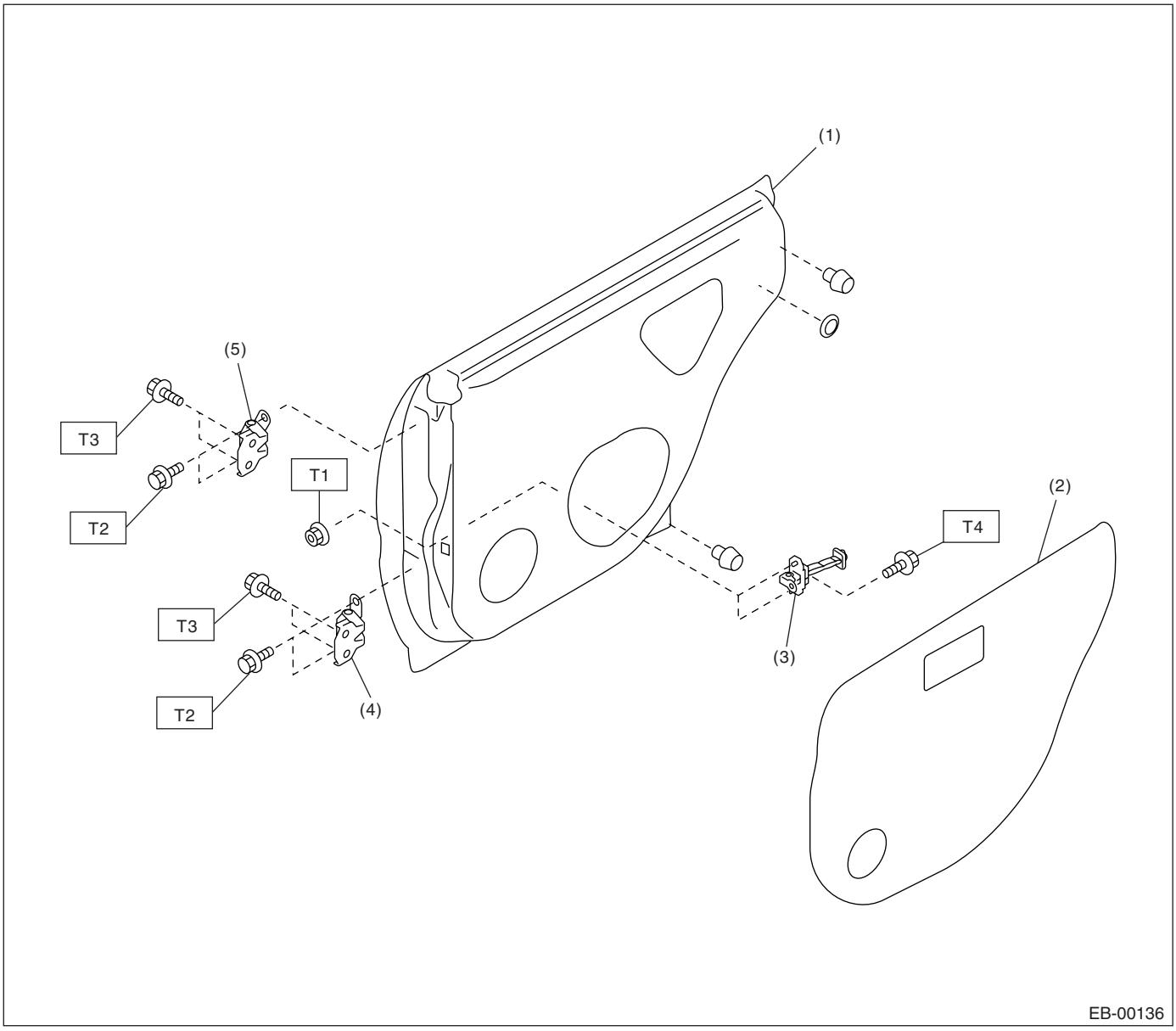
3. FRONT DOOR



(1) Front door panel
(2) Guide
(3) Sealing cover
(4) Checker
(5) Lower hinge
(6) Upper hinge

Tightening torque: N·m (kgf-m, ft-lb)
T1: 7.4 (0.75, 5.5)
T2: 24.5 (2.5, 18.1)
T3: 29.4 (3.0, 21.7)
T4: 32.3 (3.3, 23.8)

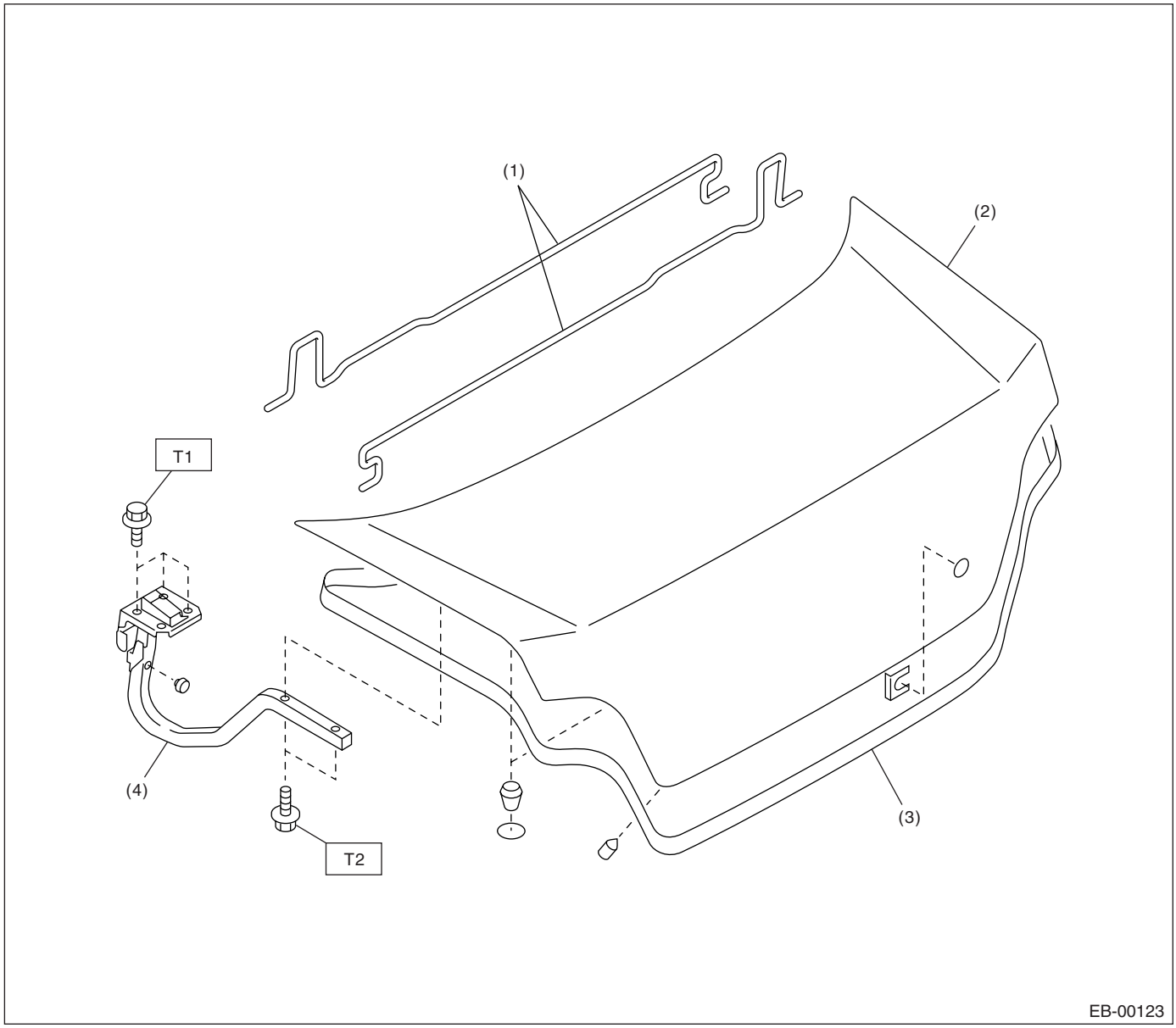
4. REAR DOOR



(1) Rear door panel
(2) Sealing cover
(3) Checker
(4) Lower hinge
(5) Upper hinge

Tightening torque: N·m (kgf-m, ft-lb)
T1: 7.4 (0.75, 5.5)
T2: 24.5 (2.5, 18.1)
T3: 29.4 (3.0, 21.7)
T4: 32.3 (3.3, 23.8)

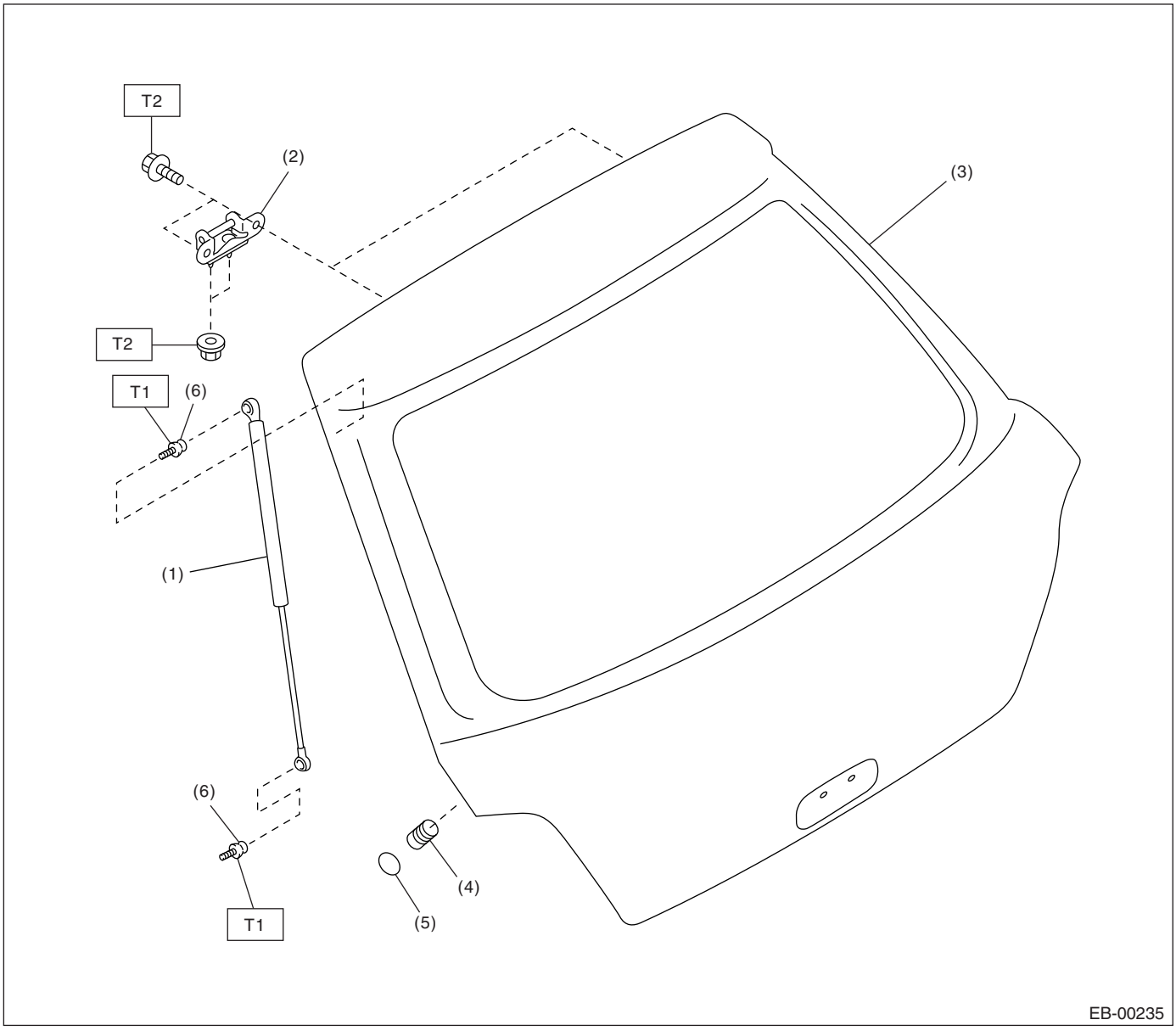
5. TRUNK LID



(1) Torsion bar
(2) Trunk lid panel
(3) Weather strip
(4) Hinge ASSY

Tightening torque: N·m (kgf-m, ft-lb)
T1: 7.5 (0.76, 5.5)
T2: 14 (1.43, 10.3)

6. REAR GATE



(1) Rear gate damper stay
(2) Hinge
(3) Rear gate panel
(4) Stopper rubber
(5) Protector seat
(6) Stud bolt

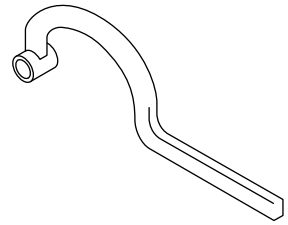
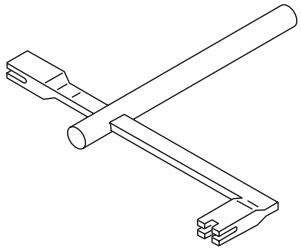
Tightening torque: N·m (kgf-m, ft-lb)
T1: 19.6 (2.0, 14.5)
T2: 24.5 (2.5, 18.1)

C: CAUTION

- Exterior body panels are heavy. Do not drop and damage the panels. During removal and installation, do not damage the panel painting surface.
- While removing the mounting bolts, using assistance devices such as a support jack will help support the panel.
- Be careful not to lose small parts.

D: PREPARATION TOOL

1. SPECIAL TOOLS

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-925610000	925610000	WRENCH	Used for removing and installing door hinge.
 ST-927780000	927780000	REMOVER	Used for removing and installing trunk torsion bar.

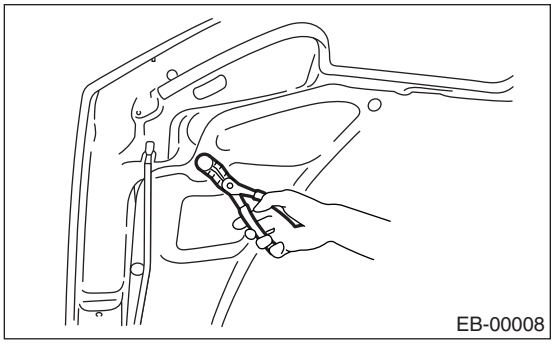
2. GENERAL TOOL

TOOL NAME	REMARKS
Support Jack	Used for supporting door panel.

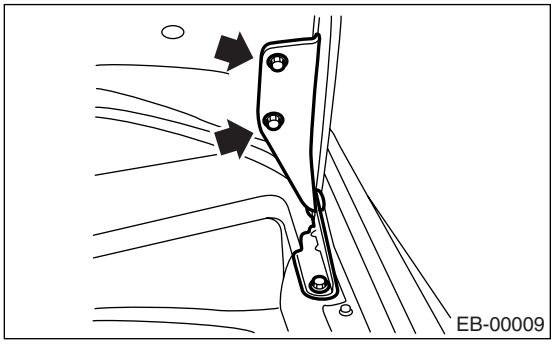
2. Front Hood

A: REMOVAL

1) Open the front hood to remove washer nozzles.
2) Release the clips to remove hood insulator.



3) Remove the bolts to remove the front hood from hinges.



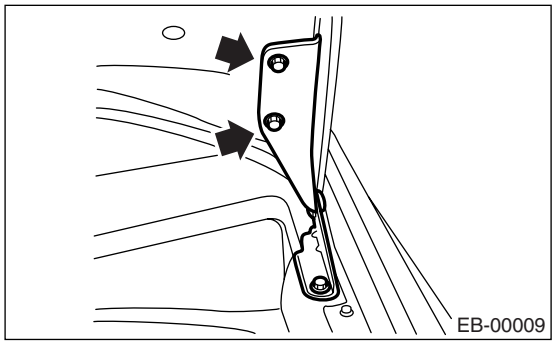
B: INSTALLATION

1) Install in the reverse order of removal.
2) Adjust the clearance between front hood panel and front fender panel. Clearance must be equal at both sides.

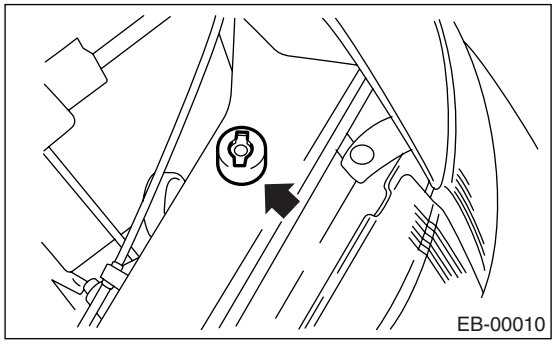
Tightening torque:
24.5 N·m (2.5 kgf-m, 18.1 ft-lb)

C: ADJUSTMENT

1) Use the hinge mounting holes to align the front hood longitudinally and laterally.



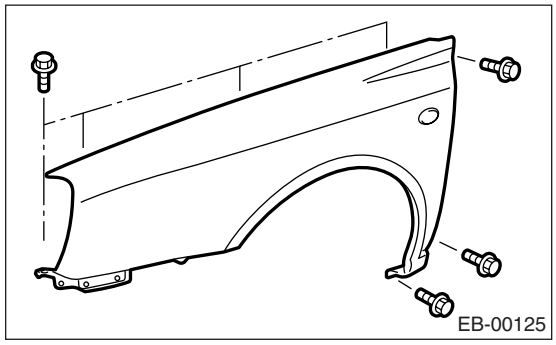
2) Adjust the height at front end of hood. <Ref. to SL-35, ADJUSTMENT, Front Hood Lock Assembly.>
3) Rotate the hood buffer to adjust lateral height.



3. Front Fender

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the front bumper face. <Ref. to EI-23, REMOVAL, Front Bumper.>
3) Remove the headlight. <Ref. to LI-14, REMOVAL, Headlight Assembly.>
4) Remove the side sill spoilers. <Ref. to EI-38, Side Sill Spoiler.> (Model with side sill spoiler)
5) Remove the mud guard. <Ref. to EI-33, REMOVAL, Mud Guard.>
6) Loosen the bolts to remove front fender panel.



B: INSTALLATION

1) Install in the reverse order of removal.
2) When the front fender panel is installed, clearance between front fender panel and front hood panel must be equal.

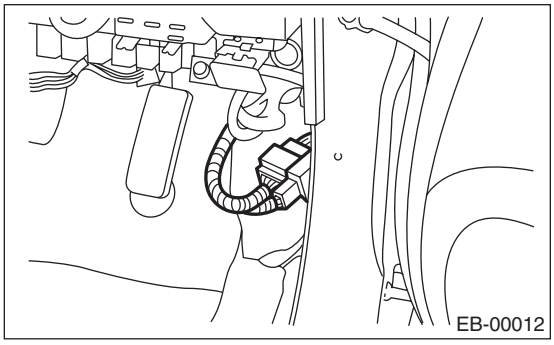
CAUTION:
After the installation of front fender panel, be sure to perform headlight aiming adjustment.

Tightening torque:
7.5 N·m (0.76 kgf-m, 5.5 ft-lb)

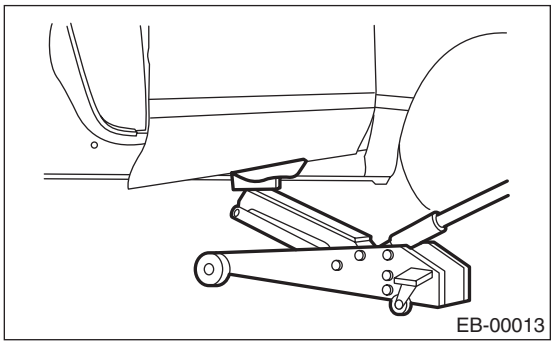
4. Front Door

A: REMOVAL

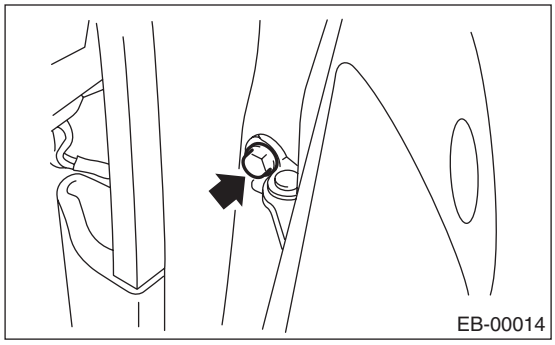
1) Disconnect the ground cable from battery.
2) Remove the front door trim. <Ref. to EI-40, REMOVAL, Front Door Trim.>
3) Remove the outer mirror assembly. <Ref. to GW-21, REMOVAL, Outer Mirror Assembly.>
4) Remove the front door glass. <Ref. to GW-13, REMOVAL, Front Door Glass.>
5) Remove the front door regulator and motor. <Ref. to GW-18, REMOVAL, Front Regulator and Motor Assembly.>
6) Remove the front door latch assembly. <Ref. to SL-25, REMOVAL, Front Door Latch and Door Lock Actuator Assembly.>
7) Remove the front outer handle. <Ref. to SL-24, REMOVAL, Front Outer Handle.>
8) Remove the front pillar lower trim to disconnect the connector from body harness.


EB-00012

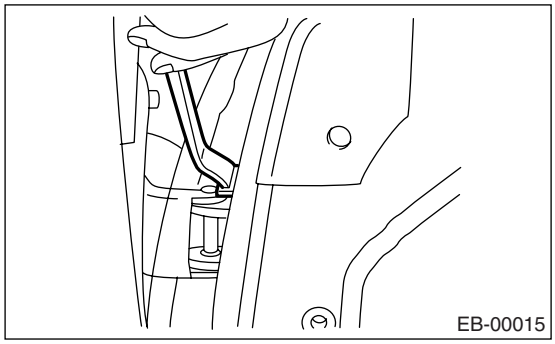
9) Put a wooden block on jack and place the jack under front door panel. Support the front door with the jack to protect it from damage.


EB-00013

10) Remove the checker bolts.


EB-00014

11) Remove the door-side bolts for upper and lower hinges to remove the front door panel.


EB-00015

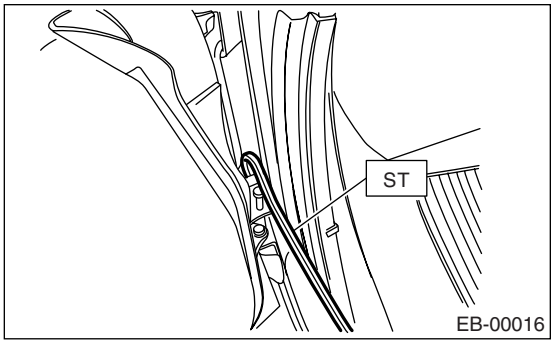
B: INSTALLATION

1) Install in the reverse order of removal.
2) Apply grease to the sliding area of door hinges.

Tightening torque:
Refer to COMPONENT in General Description.
<Ref. to EB-8, FRONT DOOR, COMPONENT, General Description.>

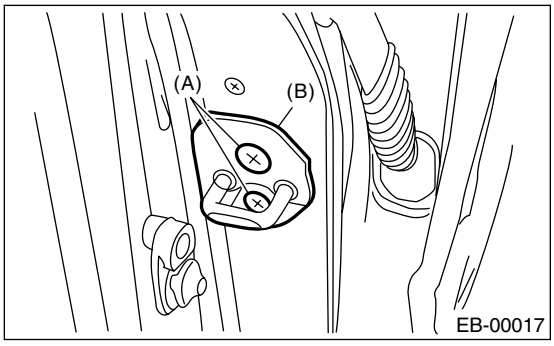
C: ADJUSTMENT

1) Using the ST, loosen the body-side bolts of upper and lower hinges to align the position for vertical and horizontal direction of front door panel.
ST 925610000 DOOR HINGE WRENCH



2) Loosen the screw (A) and tap striker (B) using a plastic hammer to adjust striker to align the position of front door panel laterally at the rear end.

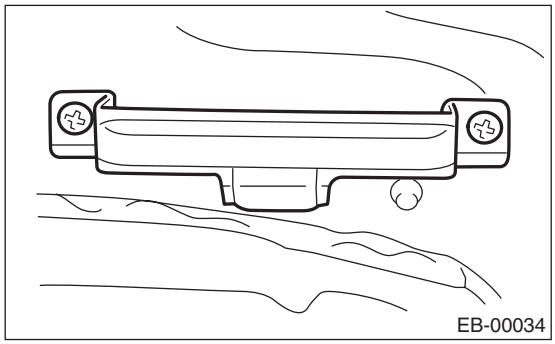
CAUTION:
Do not use an impact wrench. Welding area on the striker nut plate is easily broken.



5. Front Sealing Cover

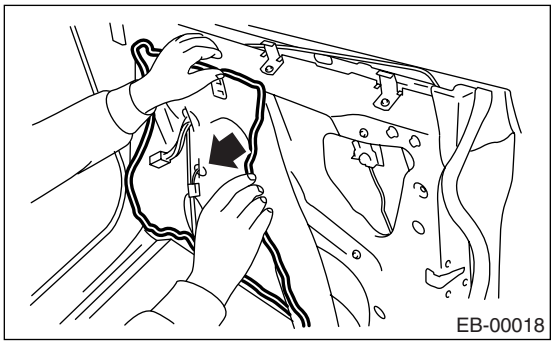
A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the front door trim. <Ref. to EI-40, REMOVAL, Front Door Trim.>
3) Remove the front speaker. <Ref. to ET-6, REMOVAL, Front Speaker.>
4) Remove the door trim bracket.


EB-00034

5) Remove the sealing cover.

NOTE:
• Carefully remove the butyl tape. Excessive force will easily break the cover.
• If the cover gets broken, replace it with a new one.


EB-00018

B: INSTALLATION

1) Install in the reverse order of removal.
2) When replacing the sealing cover, use the butyl tape.
3) Press the butyl tape-applied area firmly to prevent any floating on surface.

Butyl tape:
3M 8626 or equivalent

NOTE:
• Apply a uniform bead of butyl tape.
• Attach the sealing cover, keeping it from becoming wrinkled.
• Breaks in the bead will allow water leakage and contamination.

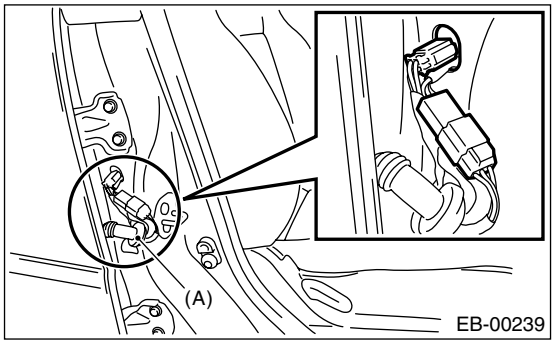
C: INSPECTION

If the sealing cover is damaged, replace it with a new one.

6. Rear Door

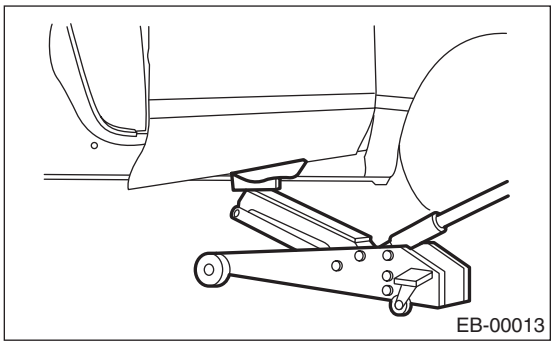
A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the rear door trim. <Ref. to EI-41, REMOVAL, Rear Door Trim.>
3) Remove the rear door glass. <Ref. to GW-25, REMOVAL, Rear Door Glass.>
4) Remove the rear door regulator and motor assembly. <Ref. to GW-27, REMOVAL, Rear Regulator and Motor Assembly.>
5) Remove the rear door latch. <Ref. to SL-29, REMOVAL, Rear Door Latch and Door Lock Actuator Assembly.>
6) Remove the rear outer handle. <Ref. to SL-28, REMOVAL, Rear Outer Handle.>
7) Remove the connection of rubber dust (A) from center pillar, pull out the connection of door harness to separate.

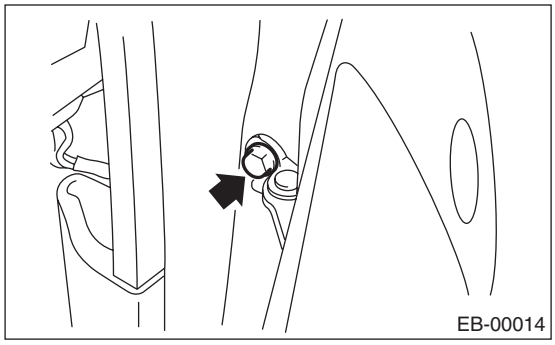


8) Put a wooden block on the jack and place the jack under the rear door. Support the rear door with jack to protect it.

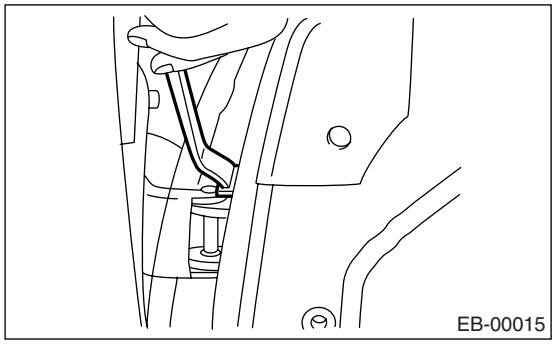
NOTE:
When supporting the door with jack, do not deform the hinge portion of door during work.



9) Remove the checker bolts.



10) Remove the door-side bolts for upper and lower hinges to remove the rear door panel.



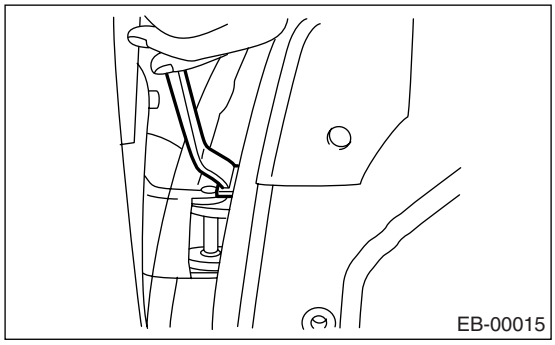
B: INSTALLATION

1) Install in the reverse order of removal.
2) Apply grease to the sliding area of door hinges.

Tightening torque:
Refer to COMPONENT in General Description.
<Ref. to EB-9, REAR DOOR, COMPONENT, General Description.>

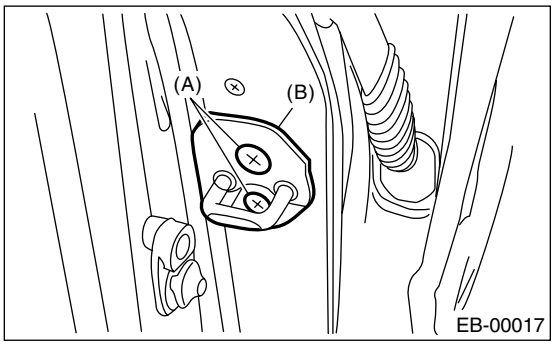
C: ADJUSTMENT

1) Open the rear door, loosen the door-side bolts of upper and lower hinges to aligh the position for vertical and horizontal direction of rear door panel.



2) Loosen the screw (A), and then tap striker (B) using plastic hammer to adjust striker to align the position of rear door panel laterally at the rear end.

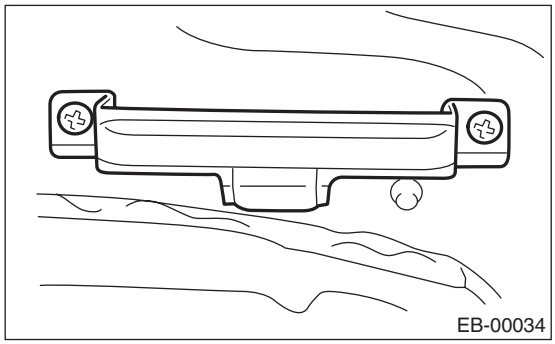
CAUTION:
Do not use an impact wrench. The welding area on the striker nut plate is easily broken.



7. Rear Sealing Cover

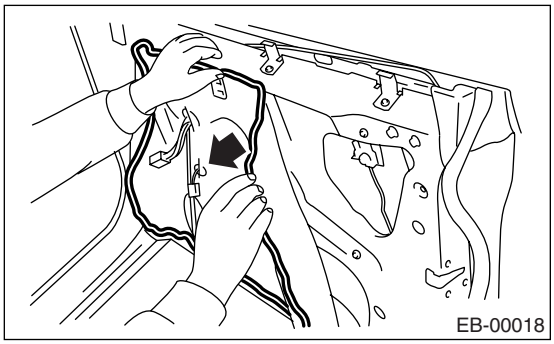
A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the rear door trim. <Ref. to EI-41, REMOVAL, Rear Door Trim.>
3) Remove the rear speaker. <Ref. to ET-8, REMOVAL, Rear Speaker.>
4) Remove the door trim bracket.


EB-00034

5) Remove the sealing cover.

NOTE:
• Carefully remove the butyl tape. Excessive force will easily break the cover.
• If the cover gets broken, replace it with a new one.


EB-00018

B: INSTALLATION

1) Install in the reverse order of removal.
2) When replacing the sealing cover, use butyl tape.
3) Press the butyl tape-applied area firmly to prevent any floating on surface.

Butyl tape:
3M 8626 or equivalent

NOTE:
• Apply an uniform bead of butyl tape.
• Attach the sealing cover, keeping it from becoming wrinkled.
• Breaks in the bead will allow water leakage and contamination.

C: INSPECTION

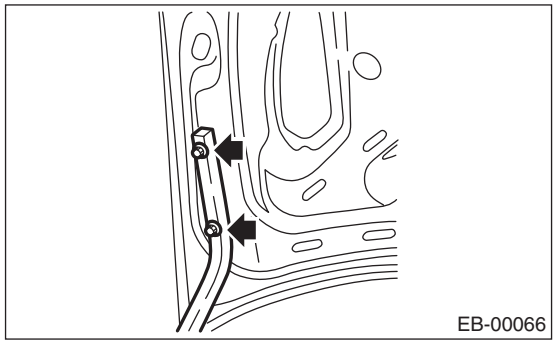
If the sealing cover is damaged, replace it with a new one.

8. Trunk Lid

A: REMOVAL

1. TRUNK LID

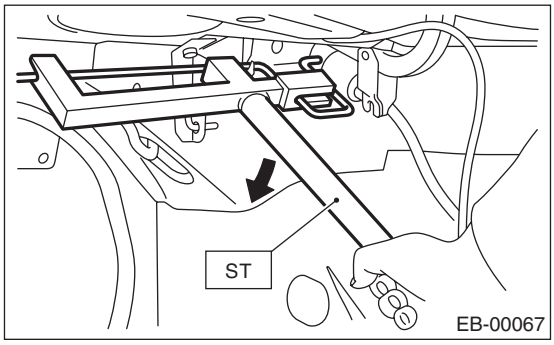
1) Open the trunk lid.
2) Disconnect the trunk lid connector.
3) Loosen the trunk lid mounting bolts to remove the trunk lid from hinges.



2. TORSION BAR

1) Open the trunk lid.
2) Using the ST, remove the torsion bar from hinge link.
ST 927780000 REMOVER

CAUTION:
During removal and installation, carefully handle the torsion bar, because it will generate reactive force.



3) Remove the right/left torsion bars.

CAUTION:
Be careful not to get hit by the trunk lid, because the trunk lid will slam shut after the torsion bar is removed.

B: INSTALLATION

1. TRUNK LID

1) Install in the reverse order of removal.
2) Install the trunk lid with uniform clearance.

Tightening torque:
14 N·m (1.43 kgf-m, 10.3 ft-lb)

2. TORSION BAR

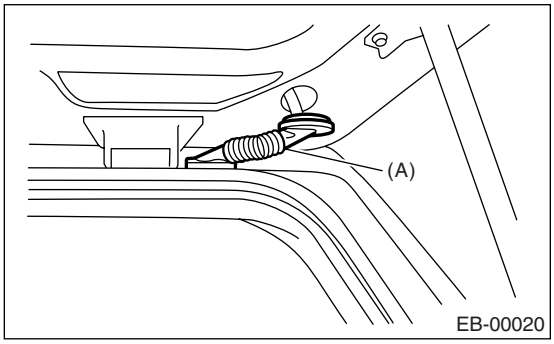
1) Install in the reverse order of removal.
2) Apply grease to the rotating area of hinges and mating surface of torsion bar.

9. Rear Gate

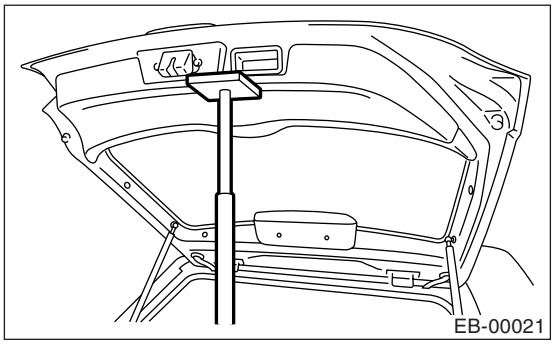
A: REMOVAL

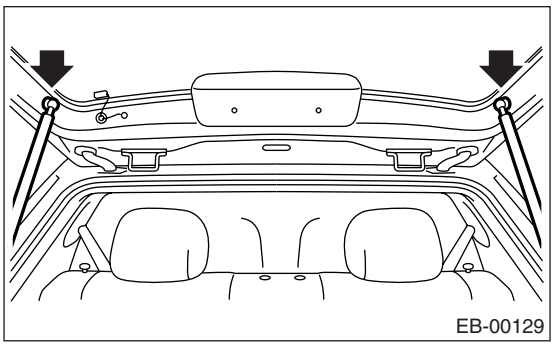
1. REAR GATE PANEL

1) Disconnect the ground cable from battery.
2) Open the rear gate.
3) Remove the rear gate outer handle. <Ref. to SL-31, REMOVAL, Rear Gate Outer Handle.>
4) Remove the rear gate latch assembly. <Ref. to SL-32, REMOVAL, Rear Gate Latch Assembly.>
5) Remove the rear wiper. <Ref. to WW-16, REMOVAL, Rear Wiper Motor.>
6) Disconnect the connectors of rear wiper, rear defogger and other lighting devices.
7) Disconnect the washer hose.
8) Remove the rubber duct (A) connection, and then pull out the harness and washer hose from rear gate.



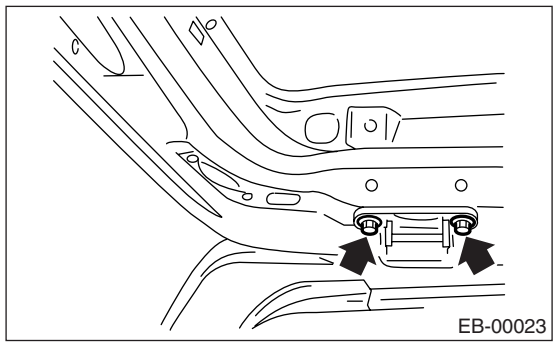
9) Using a support jack, support the rear gate while removing the rear gate damper stay stud bolts.





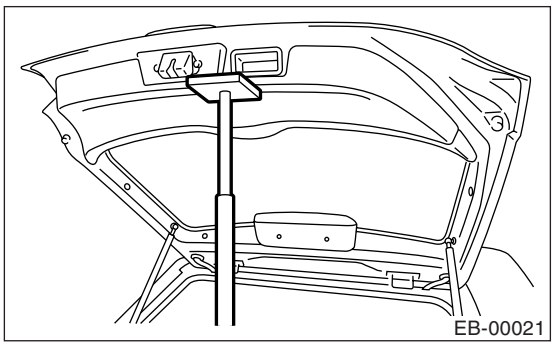
CAUTION:
When the support jack to support the rear gate is released, it may hit and damage the body. To prevent this, place a shop cloth between the body and gate.

10) Loosen the rear gate bolts to remove rear gate.



2. REAR GATE DAMPER STAY

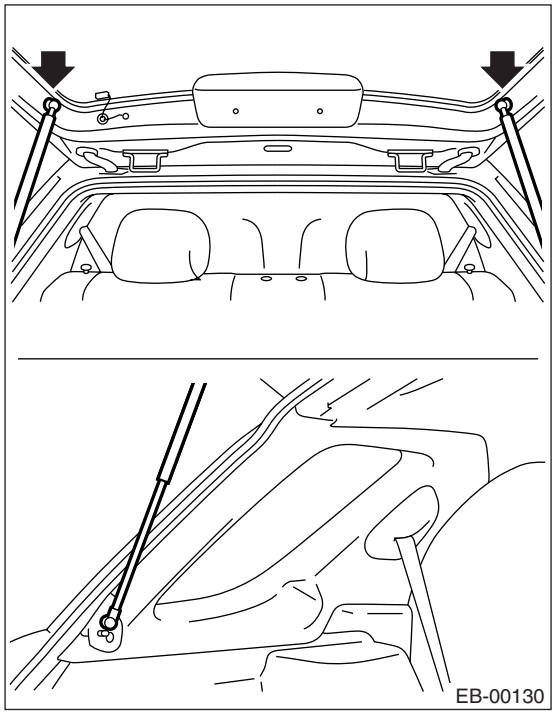
1) Open the rear gate. Use a support jack to support the rear gate.


EB-00021

NOTE:
After the rear gate damper stay is removed, the rear gate cannot stay open. Supporting the rear gate with a support jack, remove the bolts.

CAUTION:
- **Do not damage the piston rods and oil seals.**
- **Never disassemble the cylinders: They contain gas.**

2) Loosen the bolts to remove the rear gate damper stay from rear gate.


EB-00130

B: INSTALLATION

1. REAR GATE PANEL

1) Install in the reverse order of removal.
2) Install the rear gate panel with uniform clearance to the body.
Refer to COMPONENT of General Description for tightening torque. <Ref. to EB-11, REAR GATE, COMPONENT, General Description.>

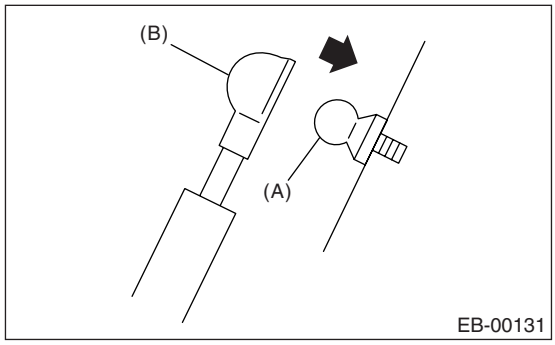
CAUTION:
Do not damage the painted surfaces of body and rear gate panel.

2. REAR GATE DAMPER STAY

1) Install the stud bolt (A) to the rear gate and body.

Tightening torque:
19.6 N·m (2.0 kgf-m, 14.5 ft-lb)

2) Firmly install the rear gate damper stay (B) to stud bolt (A).



EB-00131

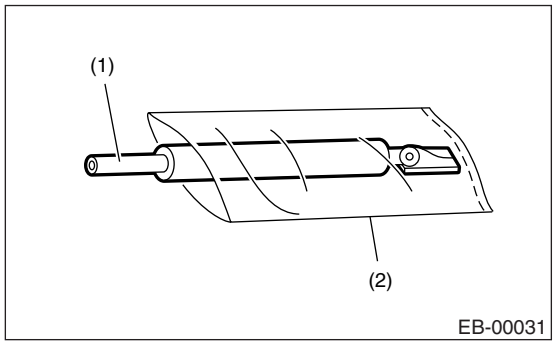
NOTE:
After supporting the rear gate with a support jack, start operation.

C: DISPOSAL

1. REAR GATE DAMPER STAY

CAUTION:
Gas is colorless, odorless, and harmless. However, gas pressure may spray the cutting powder or oil. Be sure to wear dust-resistant goggles.

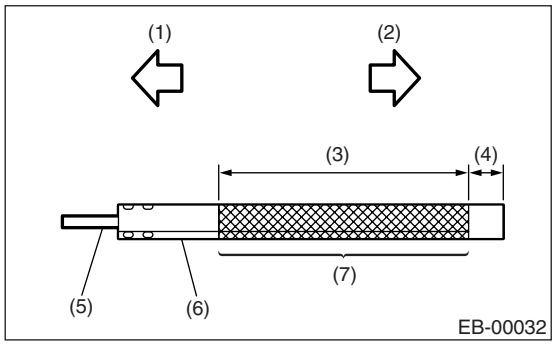
1) Cover with a vinyl case as shown in the figure.



(1) Rear gate damper stay
(2) Vinyl sack

NOTE:
Prevent the vinyl case from being caught by drill cutting edge.

2) Lift the body side slightly with piston rods fully extended, and secure the body side on vise stand. Drill a hole in 2 to 3 mm (0.08 to 0.12 in) diameter at a point 10 to 200 mm (0.39 to 7.87 in) from door side, and bleed the rear gate damper stay completely.



(1) Body side
(2) Door side
(3) 190 mm (7.48 in)
(4) 10 mm (0.39 in)
(5) Piston rod
(6) Cylinder
(7) Portion to be drilled

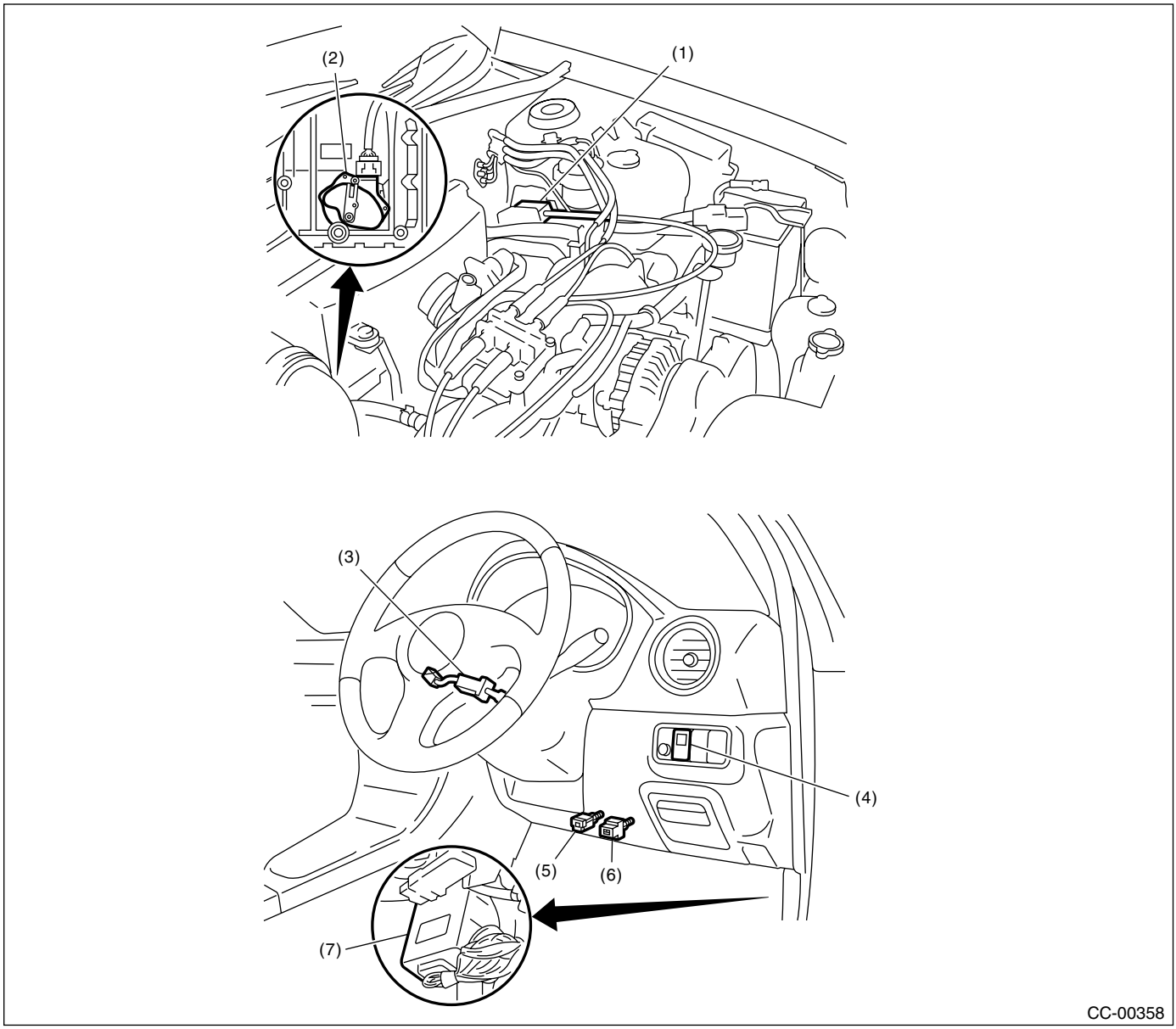
CRUISE CONTROL SYSTEM

CC

		Page
1.	General Description	2
2.	Actuator	4
3.	Cruise Control Unit	5
4.	Cruise Control Main Switch	6
5.	Cruise Control Command Switch	7
6.	Stop Light & Brake Switch	8
7.	Clutch Switch	9
8.	Inhibitor Switch	10

1. General Description

A: COMPONENT



(1) Actuator
(2) Inhibitor switch (AT model)
(3) Cruise control command switch
(4) Cruise control main switch
(5) Clutch switch (MT model)
(6) Stop light and brake switch
(7) Cruise control module

B: CAUTION

• Before disassembling or reassembling parts, always disconnect the battery ground cable. When repairing the radio, control module and other parts with memory functions, make note of the memory before disconnecting the battery ground cable. All memory will be erased.
• Reassemble parts in the reverse order of disassembly unless otherwise indicated.
• Adjust parts to specifications specified in this manual.
• Connect the connectors and hoses securely during reassembly.
• After reassembly, ensure functional parts operate properly.

C: PREPARATION TOOL

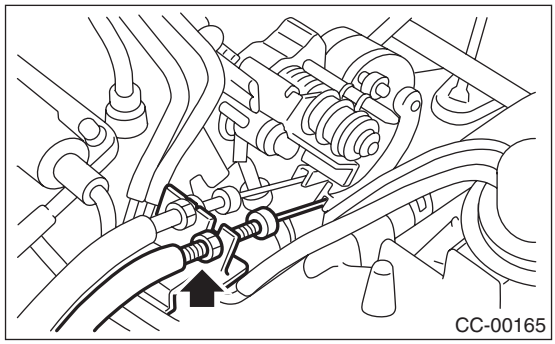
TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance and voltage.
TORX® BIT T30	Used for removing and installing driver's airbag module.

2. Actuator

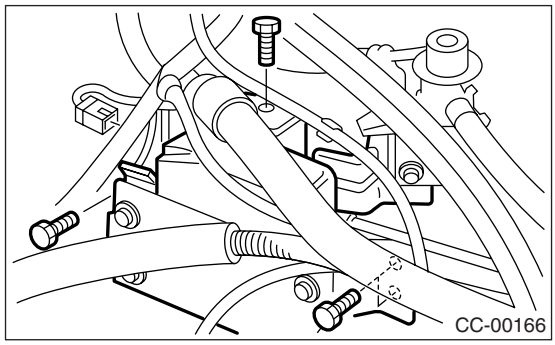
A: REMOVAL

CAUTION:
• Be careful not to apply excessive load to the wire cable when adjusting and/or installing; otherwise, the actuator may be deformed or damaged.
• Do not bend the cable sharply with a radius less than 100 mm (3.94 in); otherwise, cable may bend permanently, resulting in poor performance.
• When installing the cable, be careful not to sharply bend or pinch the inner cable; otherwise, the cable may break.

1) Disconnect the ground cable from battery.
2) Remove the clip bands from cruise control cable.
3) Loosen the nut which secures cruise control cable end to throttle cam, and then remove the cable from throttle cam.



4) Remove the actuator attaching bolts.
5) Remove the actuator while disconnecting the connector.

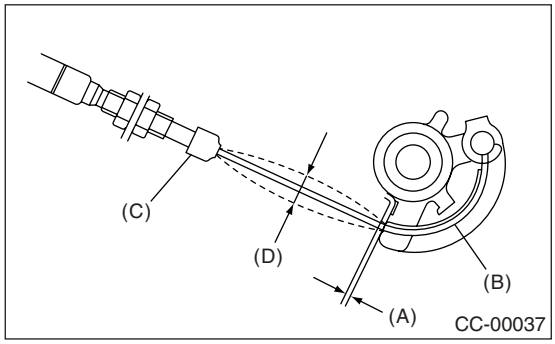


B: INSTALLATION

Install in the reverse order of removal.

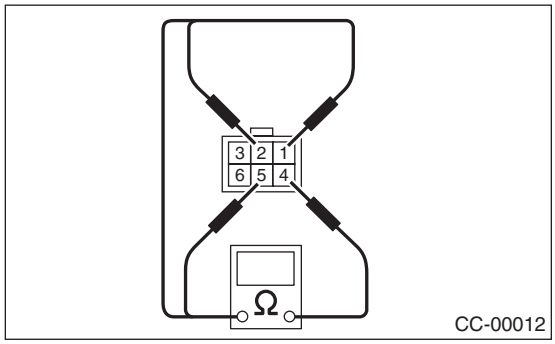
Tightening torque:
7.4 N·m (0.75 kgf-m, 5.4 ft-lb)
Cable end nut:
12 N·m (1.2 kgf-m, 8.7 ft-lb)

NOTE:
(A): Must be adjusted when the cable end outer is fixed in place, so that gap between throttle cam and lever is 0 — 1 mm (0 — 0.04 in), and, inner cable deflection (D) is 1 — 8 mm (0.04 — 0.31 in) when the throttle cable is installed.
(Must be attached while the throttle cam is being pulled by wire cable.)
(B): Must be coated evenly on the cam end inner connection.
(C): Cover must be inserted securely, until tip of cable touches cover stopper.



C: INSPECTION

Measure the cruise control actuator resistance.



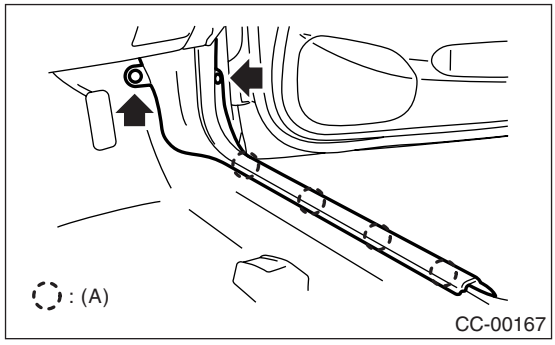
Terminal No.	Standard value
4 and 1	Approx. 5 Ω
4 and 2	Approx. 5 Ω
4 and 5	Approx. 5 Ω
3 and 6	Approx. 39 Ω

If NG, replace the cruise control actuator.

3. Cruise Control Unit

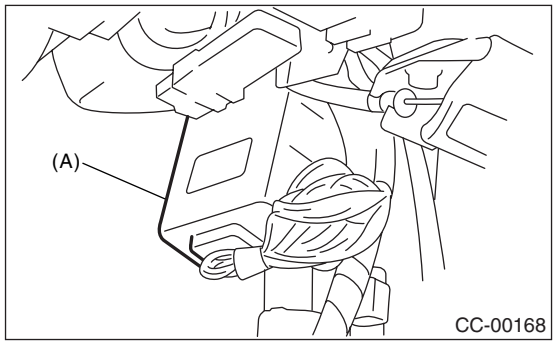
A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the side sill front cover.



(A) Hook

3) Disconnect the connector from cruise control module.
4) Remove the bolt, then detach the cruise control module (A).



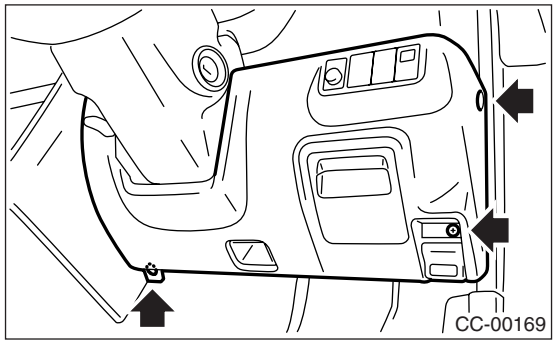
B: INSTALLATION

Install in the reverse order of removal.

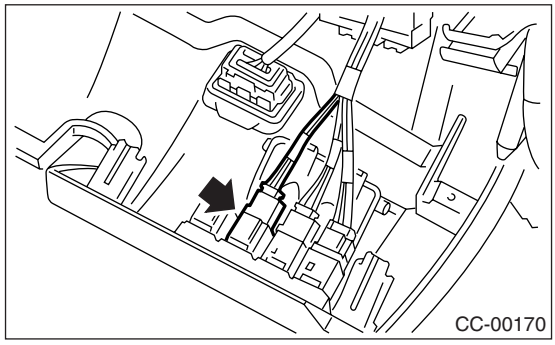
4. Cruise Control Main Switch

A: REMOVAL

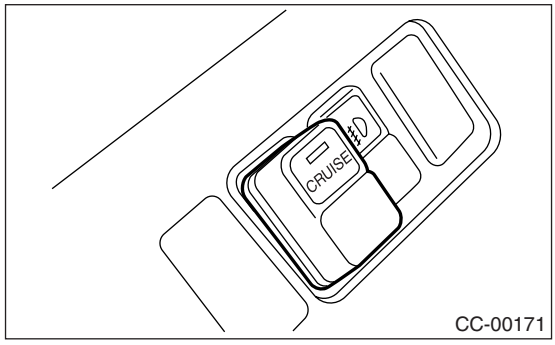
1) Disconnect the ground cable from battery.
2) Remove the screws and clip from instrument panel lower cover.
3) Remove the instrument panel lower cover.



4) Disconnect the connector from cruise control main switch.



5) Remove the main switch by pushing it outward.

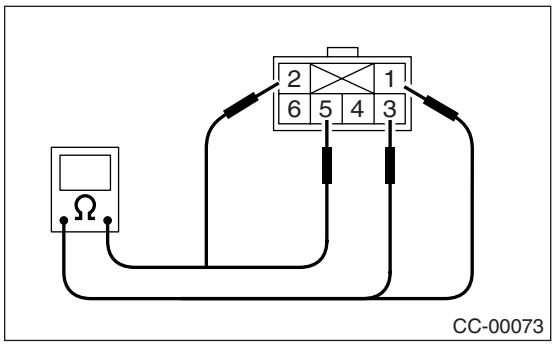


B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

Measure the cruise control main switch resistance.



Switch position	Terminal No.	Standard value
OFF	3 and 5	More than 1 MΩ
ON	3 and 5	Less than 1 Ω

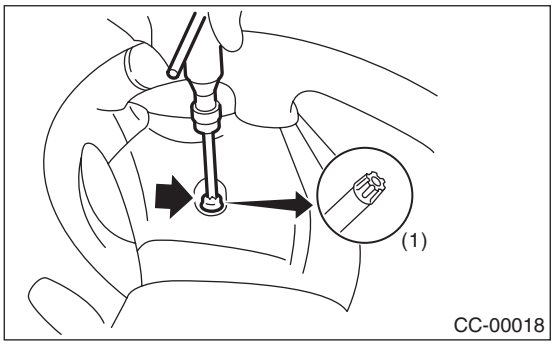
If NG, replace the cruise control main switch.

5. Cruise Control Command Switch

A: REMOVAL

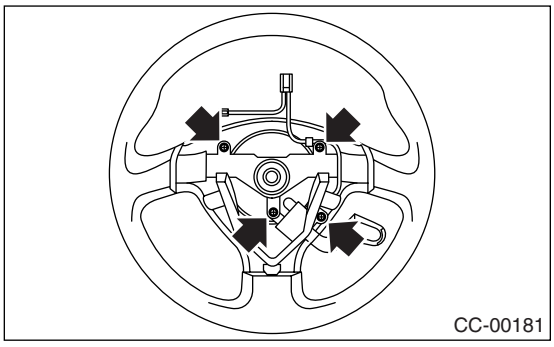
WARNING:
Before servicing, be sure to read the notes in the AB section for proper handling of the driver's airbag module. <Ref. to AB-3, CAUTION, General Description.>

1) Set the front wheels in straight ahead position.
2) Turn the ignition switch to OFF.
3) Disconnect the ground cable from battery and wait for at least 20 seconds before starting work.
4) Using the TORX® BIT T30 (Tamper resistant type), loosen the two TORX® bolts which secure driver's airbag module.

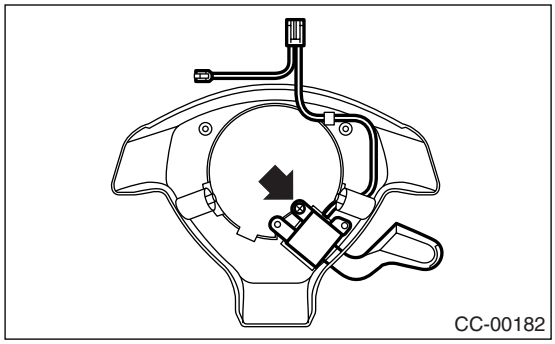


(1) TORX® BIT T30

5) Disconnect the airbag module connector on back of airbag module.
6) Remove the horn switch from steering wheel.
7) Remove the steering wheel. <Ref. to PS-28, REMOVAL, Steering Wheel.>
8) Remove four screws, and then remove the lower cover from steering wheel.



9) Remove the screw, and then remove the cruise control command switch from lower cover.

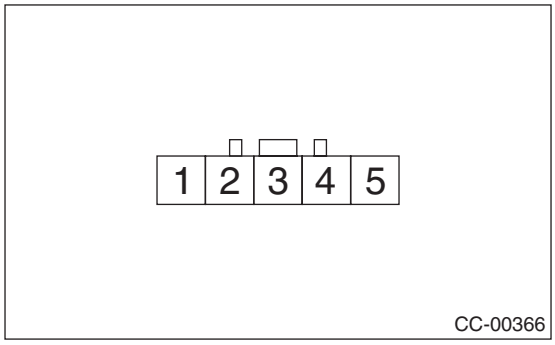


B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

Measure the cruise control command switch resistance.



Switch	Position	Terminal No.	Standard value
CANCEL	ON	5 (+) and 4 (–)	Less than 1 Ω
	ON	5 (+) and 3 (–)	Less than 1 Ω
SET/COAST	OFF	5 and 3	More than 1 MΩ
	ON	5 and 3	Less than 1 Ω
RESUME/ ACCEL	OFF	5 and 4	More than 1 MΩ
	ON	5 and 4	Less than 1 Ω

If NG, replace the cruise control command switch.

6. Stop Light & Brake Switch

A: REMOVAL

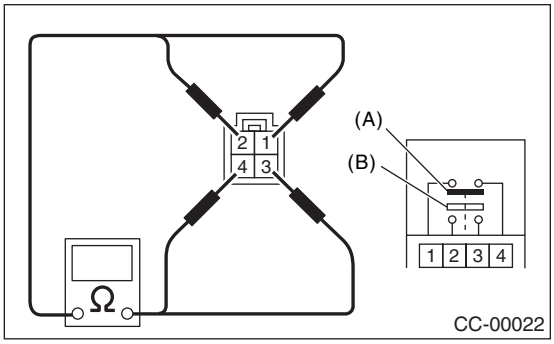
1) Disconnect the ground cable from battery.
2) Disconnect the connector from stop light and brake switch, and then remove the switch. <Ref. to BR-73, REMOVAL, Stop Light Switch.>

B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

Measure the brake switch (A) and stop light switch (B) resistance.



Switch	Pedal	Terminal No.	Standard value
Brake	Released	1 and 4	Less than 1 Ω
	Depressed	1 and 4	More than 1 MΩ
Stop light	Released	2 and 3	More than 1 MΩ
	Depressed	2 and 3	Less than 1 Ω

If NG, replace the stop light and brake switch.

7. Clutch Switch

A: REMOVAL

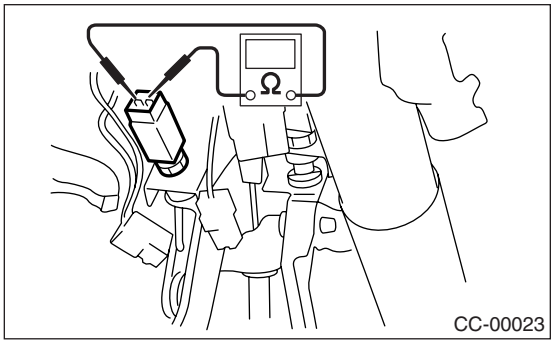
1) Disconnect the ground cable from battery.
2) Disconnect the connector from clutch switch, and then remove the switch. <Ref. to CL-41, DISASSEMBLY, Clutch Pedal.>

B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

Measure the clutch switch resistance.



Switch	Pedal	Terminal No.	Standard value
Clutch	Released	1 and 2	Less than 1 Ω
	Depressed	1 and 2	More than 1 MΩ

If NG, replace the clutch switch.

8. Inhibitor Switch

A: REMOVAL

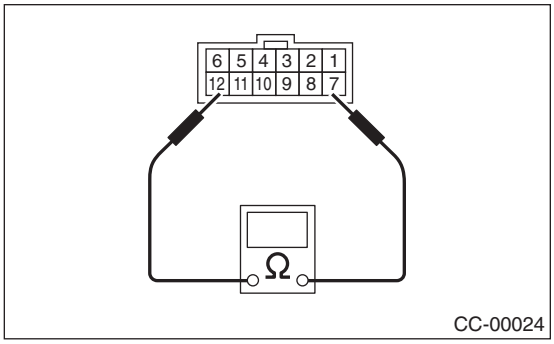
1) Disconnect the ground cable from battery.
2) Disconnect the connector from inhibitor switch, and then remove the switch. <Ref. to 4AT-54, REMOVAL, Inhibitor Switch.>

B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

Measure the inhibitor switch resistance.



Selector lever position	Terminal No.	Standard value
P	7 and 12	Less than 1 Ω
N		Less than 1 Ω
Except P and N		More than 1 MΩ

If NG, replace the inhibitor switch.

CRUISE CONTROL SYSTEM (DIAGNOSTICS)

CC(diag)

Page

1. Basic Diagnostic Procedure 2
2. General Description 4
3. Electrical Component Location 6
4. Cruise Control Module I/O Signal....7
5. Subaru Select Monitor....9
6. Diagnostics with Phenomenon....11
7. List of Diagnostic Trouble Code (DTC) 25
8. Diagnostic Procedure with Diagnostic Trouble Code (DTC) 27

1. Basic Diagnostic Procedure

A: PROCEDURE

	Step	Check	Yes	No
1	**START DIAGNOSIS.** 1) Perform the pre-inspection. <Ref. to CC(diag)-5, INSPECTION, General Description.> 2) Check the cruise control main switch operation.	Is the cruise control main switch turned ON?	Go to step **2.**	Go to phenomenon 1. <Ref. to CC(diag)-11, DIAGNOSTIC PROCEDURE WITH PHENOMENON, Diagnostics with Phenomenon.>
2	**PREPARE SUBARU SELECT MONITOR.**	Is the select monitor available?	Go to step **3.**	Go to step **4.**
3	**PERFORM CRUISE CANCEL CONDITIONS DIAGNOSIS.** Perform the cruise cancel conditions diagnosis. <Ref. to CC(diag)-9, Subaru Select Monitor.>	Are any DTC indicated?	Go to "List of DTC". <Ref. to CC(diag)-25, List of Diagnostic Trouble Code (DTC).>	Go to step **4.**
4	**CHECK CRUISE CONTROL SET OPERATION.** Check the cruise control set operation.	Can the cruise control be set while driving at 40 km/h (25 MPH)?	Go to step **5.**	Go to phenomenon 2. <Ref. to CC(diag)-11, DIAGNOSTIC PROCEDURE WITH PHENOMENON, Diagnostics with Phenomenon.>
5	**CHECK VEHICLE SPEED IS HELD WITHIN SET SPEED.** Make sure the vehicle speed is held within set speed.	Is the vehicle speed held within set speed ±3 km/h (±2 MPH)?	Go to step **6.**	Go to phenomenon 3. <Ref. to CC(diag)-11, DIAGNOSTIC PROCEDURE WITH PHENOMENON, Diagnostics with Phenomenon.>
6	**CHECK RESUME/ACCEL OPERATION.** Check the RESUME/ACCEL operation.	Does the vehicle speed increase or return to set speed after RESUME/ACCEL switch has been pressed?	Go to step **7.**	Go to phenomenon 4. <Ref. to CC(diag)-11, DIAGNOSTIC PROCEDURE WITH PHENOMENON, Diagnostics with Phenomenon.>
7	**CHECK SET/COAST OPERATION.** Check the SET/COAST operation.	Does the vehicle speed decrease after SET/COAST switch has been pressed?	Go to step **8.**	Go to phenomenon 5. <Ref. to CC(diag)-11, DIAGNOSTIC PROCEDURE WITH PHENOMENON, Diagnostics with Phenomenon.>

	Step	Check	Yes	No
8	**CHECK CANCEL OPERATION.** Check the CANCEL operation.	Is the cruise control released after CANCEL switch has been pressed?	Go to step **9.**	Go to phenomenon 6. <Ref. to CC(diag)-11, DIAGNOSTIC PROCEDURE WITH PHENOMENON, Diagnostics with Phenomenon.>
9	**CHECK CRUISE CONTROL RELEASE OPERATION.** Check the cruise control release operation.	Is the cruise control released after brake pedal has been depressed?	Go to step **10.**	Go to phenomenon 7. <Ref. to CC(diag)-11, DIAGNOSTIC PROCEDURE WITH PHENOMENON, Diagnostics with Phenomenon.>
10	**CHECK CRUISE CONTROL RELEASE OPERATION.** Check the cruise control release operation.	Is the cruise control released after clutch pedal has been depressed? (MT model)	Finish the diagnostics.	Go to phenomenon 8. <Ref. to CC(diag)-11, DIAGNOSTIC PROCEDURE WITH PHENOMENON, Diagnostics with Phenomenon.>

2. General Description

A: CAUTION

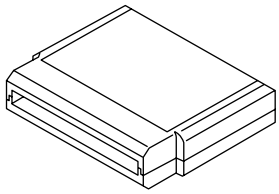
1. SUPPLEMENTAL RESTRAINT SYSTEM "AIRBAG"

Airbag system wiring harness is routed near the cruise control module and cruise control command switch.

CAUTION:
• All airbag system wiring harness and connectors are colored yellow. Do not use electrical test equipment on these circuits.
• Be careful not to damage the airbag system wiring harness when servicing the cruise control module and cruise control command switch.

B: PREPARATION TOOL

1. SPECIAL TOOLS

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18482AA000	18482AA000	CARTRIDGE	Used for troubleshooting for electrical systems.
ST22771AA030	22771AA030	SUBARU SELECT MONITOR KIT	Used for troubleshooting for electrical systems. • English: 22771AA030 (Without printer) • German: 22771AA070 (Without printer) • French: 22771AA080 (Without printer) • Spanish: 22771AA090 (Without printer)

2. GENERAL TOOLS

TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance, voltage and ampere.

C: INSPECTION

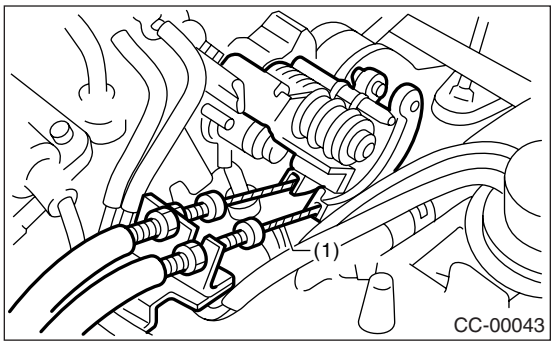
1. BATTERY

Measure the battery voltage and specific gravity of electrolyte.

Standard voltage:
12 V, or more

Specific gravity:
Above 1.260

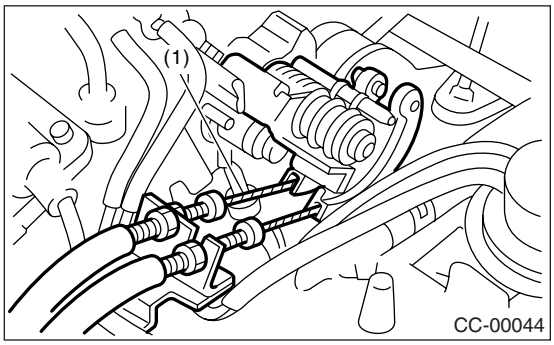
2. CRUISE CONTROL CABLE



(1) Cruise control cable

Check the cruise control cable installation.
If NG, install the cable securely.

3. ACCELERATOR CABLE



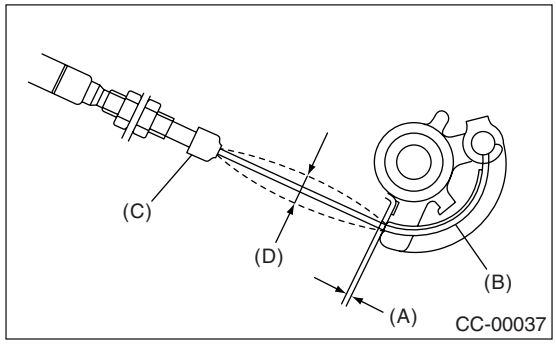
(1) Accelerator cable

Check the movement of accelerator cable when the cruise control throttle is moved by hand.
If NG, check the throttle cam.

4. THROTTLE CAM

Check that the throttle cam moves smoothly.
If NG, repair the throttle cam.

5. CABLE FREE PLAY



Check that the throttle cam-to-lever clearance (A) and cable (B) deflection amount (D) is within specifications.

Throttle cam-to-lever clearance:
0 — 1 mm (0 — 0.04 in)

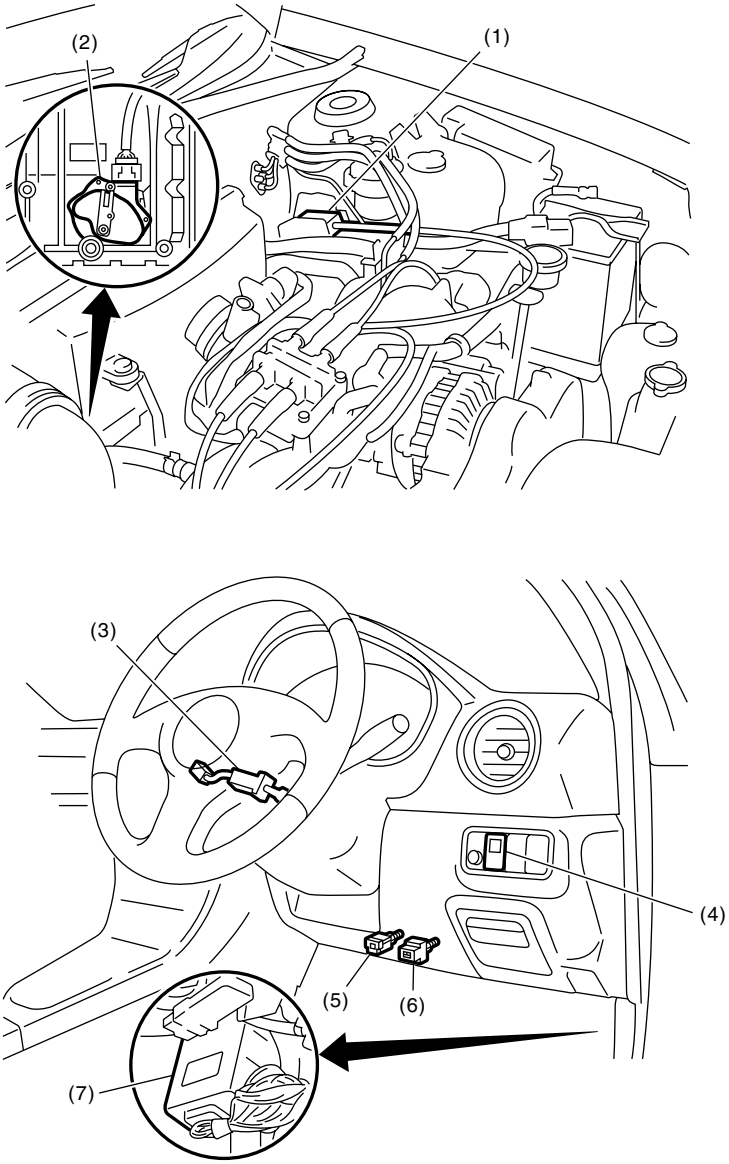
Inner cable deflection:
1 — 8 mm (0.04 — 0.31 in)

If NG, adjust the clearance with the adjust nut.

NOTE:
Check that the cap (C) is positioned in the groove.

3. Electrical Component Location

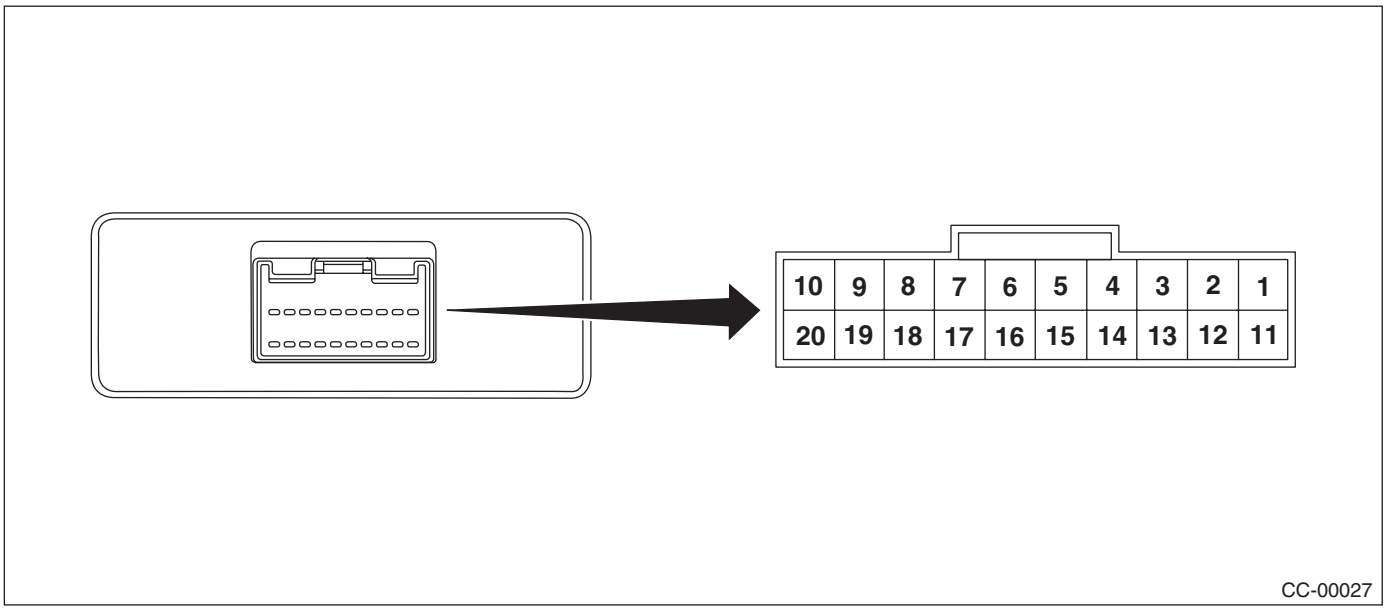
A: LOCATION



(1) Actuator
(2) Inhibitor switch (AT model)
(3) Cruise control command switch
(4) Cruise control main switch
(5) Clutch switch (MT model)
(6) Stop light and brake switch
(7) Cruise control module

4. Cruise Control Module I/O Signal

A: ELECTRICAL SPECIFICATION



Content	Terminal No.	Measuring conditions and I/O signals (ignition switch ON and engine idling)
Cruise indicator light	1	• Battery voltage is present when main switch is turned OFF. • “0 V” voltage is present when main switch is turned ON.
Inhibitor switch (AT model)	4	• Battery voltage is present when selector lever is other than “P” or “N” position. • “0 V” voltage is present when selector lever is set to “P” or “N” position.
Motor B	5	• ON-and-OFF (“0 V”-and-battery voltage) operation is alternately repeated while cruise control is operating. • “0 V” voltage is present when main switch is turned OFF.
Ground	6	—
Motor A	7	• ON-and-OFF (“0 V”-and-battery voltage) operation is alternately repeated while cruise control is operating. • “0 V” voltage is present when main switch is turned OFF.
RESUME/ACCEL switch	9	• Battery voltage is present when command switch is turned to RESUME/ACCEL position. • “0 V” voltage is present when command switch is released.
SET/COAST switch	10	• Battery voltage is present when command switch is turned to SET/COAST position. • “0 V” voltage is present when command switch is released.
Main power supply	11	• Battery voltage is present when ignition switch is turned ON. • “0 V” voltage is present when ignition switch is turned OFF.
Ignition switch	12	• Battery voltage is present when ignition switch is turned ON. • “0 V” voltage is present when ignition switch is turned OFF.
Motor C	13	• ON-and-OFF (“0 V”-and-battery voltage) operation is alternately repeated while cruise control is operating. • “0 V” voltage is present when main switch is turned OFF.
Motor clutch	14	• ON-and-OFF (“0 V”-and-battery voltage) operation is alternately repeated while cruise control is operating. • “0 V” voltage is present when vehicle is stopped.
Cruise control main switch	15	• Battery voltage is present during pressing the cruise control main switch. • “0 V” voltage is present when main switch is turned OFF.

Content	Terminal No.	Measuring conditions and I/O signals (ignition switch ON and engine idling)
Brake switch	16	Leave clutch pedal released (MT model), while cruise control main switch is turned ON. Then check that; • Battery voltage is present when brake pedal is released. • "0 V" voltage is present when brake pedal is depressed. Additionally only in MT model, keep the cruise control main switch to ON and leave brake pedal released. Then check that; • Battery voltage is present when clutch pedal is released. • "0 V" voltage is present when clutch pedal is depressed.
Data link connector	17	—
Data link connector	18	—
Vehicle speed sensor (MT model) TCM (AT model)	19	Lift-up the vehicle until all four wheels are raised off ground, and then rotate any wheel manually. Approx. "5 V" and "0 V" voltage pulse signals are alternately input to cruise control module.
Stop light switch	20	Turn ignition switch to OFF. Then check that; • Battery voltage is present when brake pedal is depressed. • "0 V" voltage is present when brake pedal is released.
NOTE: Voltage at terminals 5, 7, 13 and 14 cannot be checked unless vehicle is driving by cruise control operation.		

B: WIRING DIAGRAM

<Ref. to WI-175, WIRING DIAGRAM, Cruise Control System.>

5. Subaru Select Monitor

A: OPERATION

1. GENERAL

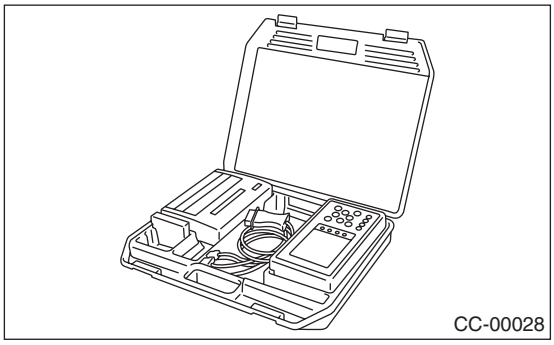
The on-board diagnosis function of the cruise control system uses the Subaru Select Monitor.
The on-board diagnosis function operates in two categories, which are used depending on the type of problems;
1) Cruise cancel conditions diagnosis:
(1) This category of diagnosis requires actual vehicle driving in order to determine the cause, (as when cruise speed is cancelled during driving although cruise cancel condition is not entered).
(2) Cruise control module memory stores the cancel condition (Code No.) which occurred during driving. When there are plural cancel conditions (Code No.), they are shown on the Subaru Select Monitor.

CAUTION:
• The cruise control memory stores not only the cruise "cancel" which occurred (although "cancel" operation is not entered by the driver), but also the "cancel" condition input by the driver.
• The content of memory is cleared when ignition switch or cruise main switch is turned OFF.

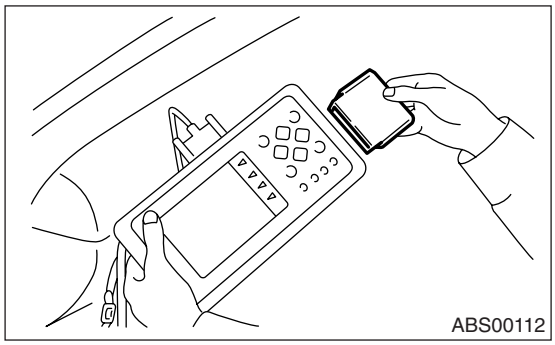
2) Real-time diagnosis:
The real-time diagnosis function is used to determine whether or not the input signal system is in good order, according to signal emitted from switches, sensors, etc.
(1) Vehicle cannot be driven at cruise speed because problem occurs in the cruise control system or its associated circuits.
(2) Monitor the signal conditions from switches and sensors.

2. CRUISE CANCEL CONDITIONS DIAGNOSIS

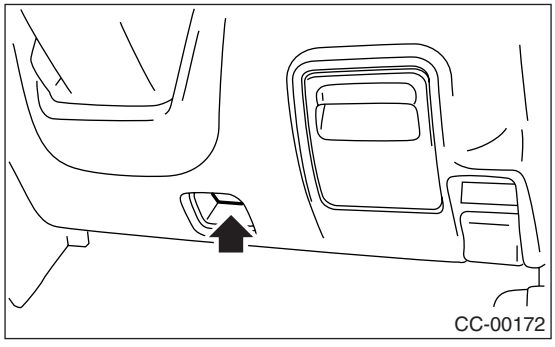
1) Prepare the Subaru Select Monitor kit.


CC-00028

2) Connect the diagnosis cable to Subaru Select Monitor.
3) Insert the cartridge into Subaru Select Monitor. <Ref. to CC(diag)-4, SPECIAL TOOLS, PREPARATION TOOL, General Description.>

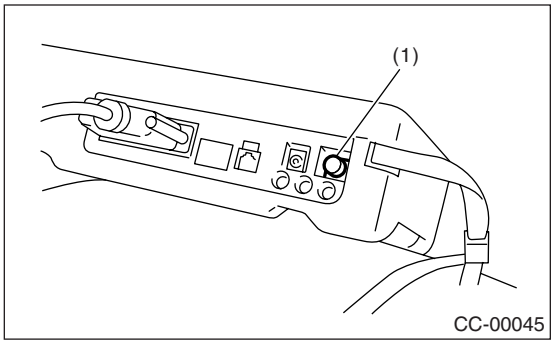

ABS00112

4) Connect the Subaru Select Monitor to data link connector.
(1) Data link connector is located in the lower portion of the instrument panel (on the driver's side).


CC-00172

(2) Connect the diagnosis cable to data link connector.
5) Start the engine and turn the cruise control main switch to ON.

6) Turn the Subaru Select Monitor power switch to ON.



(1) Power switch

7) On the Main Menu display screen, select the {All System Diagnosis} and press [YES] key.

NOTE:
The DTC is also shown in the {Each System Check} mode. This mode is called up on the Cruise Control Diagnosis screen by selecting the item {Cancel Code(s) Display}.

8) Drive the vehicle at least 40 km/h (25 MPH) with cruise speed set.
9) If the cruise speed is canceled itself (without doing any cancel operations), a DTC will appear on select monitor display.

CAUTION:
• A DTC will also appear when cruise cancel is effected by driver. Do not confuse.
• Have a co-worker ride in the vehicle to assist in diagnosis during driving.

NOTE:
DTC will be cleared by turning the ignition switch or cruise control main switch to OFF.

3. REAL-TIME DIAGNOSIS

1) Connect the select monitor.
2) Turn the ignition switch and cruise control main switch to ON.
3) Turn the Subaru Select Monitor switch to ON.
4) On the Main Menu display screen, select the {Each System Check} and press [YES] key.
5) On the System Selection Menu display screen, select the {Cruise Control} and press [YES] key.
6) Press the [YES] key after displayed the information of engine type.
7) On the Cruise Control Diagnosis display screen, select the {Current Data Display & Save} and press [YES] key.
8) Make sure that normal indication is displayed when controls are operated as indicated below:
• Depress/release the brake pedal. (Stop light switch and brake switch turn ON.)
• Turn ON the “SET/COAST” switch.
• Turn ON the “RESUME/ACCEL” switch.
• Depress/release the clutch pedal. (MT model)
• Set the selector lever to P or N. (AT model)

NOTE:
• For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.
• For details concerning DTCs, refer to the List of DTC. <Ref. to CC(diag)-25, List of Diagnostic Trouble Code (DTC).>

6. Diagnostics with Phenomenon

A: DIAGNOSTIC PROCEDURE WITH PHENOMENON

Phenomenon		Checking item	Reference
1	Cruise control main switch is not turned ON.	(1) Check the power supply.	<Ref. to CC(diag)-13, CHECK POWER SUPPLY AND GROUND LINE, Diagnostics with Phenomenon.>
		(2) Check the cruise control main switch.	<Ref. to CC(diag)-15, CHECK CRUISE CONTROL MAIN SWITCH, Diagnostics with Phenomenon.>
2	Cruise control cannot be set.	(1) Check the SET/COAST switch.	<Ref. to CC(diag)-17, CHECK CRUISE CONTROL COMMAND SWITCH, Diagnostics with Phenomenon.>
		(2) Check the stop light switch and brake switch.	<Ref. to CC(diag)-19, CHECK STOP LIGHT SWITCH AND BRAKE SWITCH, Diagnostics with Phenomenon.>
		(3) Check the clutch switch (MT model).	<Ref. to CC(diag)-21, CHECK CLUTCH SWITCH (MT MODEL), Diagnostics with Phenomenon.>
		(4) Check the inhibitor switch (AT model).	<Ref. to CC(diag)-23, CHECK INHIBITOR SWITCH, Diagnostics with Phenomenon.>
		(5) Check the vehicle speed sensor.	<Ref. to CC(diag)-28, DTC 22 VEHICLE SPEED SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
		(6) Check the motor drive system.	<Ref. to CC(diag)-31, DTC 35 AND 36 ACTUATOR MOTOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
		(7) Check the motor clutch drive system.	<Ref. to CC(diag)-33, DTC 37 ACTUATOR MOTOR CLUTCH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
3	Vehicle speed is not held within set speed ±3 km/h (±2 MPH).	(1) Check the vehicle speed sensor.	<Ref. to CC(diag)-28, DTC 22 VEHICLE SPEED SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
		(2) Check the motor drive system.	<Ref. to CC(diag)-31, DTC 35 AND 36 ACTUATOR MOTOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
		(3) Check the motor clutch drive system.	<Ref. to CC(diag)-33, DTC 37 ACTUATOR MOTOR CLUTCH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
4	Vehicle speed does not increase or does not return to set speed after RESUME/ ACCEL switch has been pressed.	(1) Check the RESUME/ ACCEL switch.	<Ref. to CC(diag)-17, CHECK CRUISE CONTROL COMMAND SWITCH, Diagnostics with Phenomenon.>
		(2) Check the motor drive system.	<Ref. to CC(diag)-31, DTC 35 AND 36 ACTUATOR MOTOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
		(3) Check the motor clutch drive system.	<Ref. to CC(diag)-33, DTC 37 ACTUATOR MOTOR CLUTCH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
5	Vehicle speed does not decrease after SET/COAST switch has been pressed.	(1) Check the SET/COAST switch.	<Ref. to CC(diag)-17, CHECK CRUISE CONTROL COMMAND SWITCH, Diagnostics with Phenomenon.>
		(2) Check the motor drive system.	<Ref. to CC(diag)-31, DTC 35 AND 36 ACTUATOR MOTOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
		(3) Check the motor clutch drive system.	<Ref. to CC(diag)-33, DTC 37 ACTUATOR MOTOR CLUTCH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

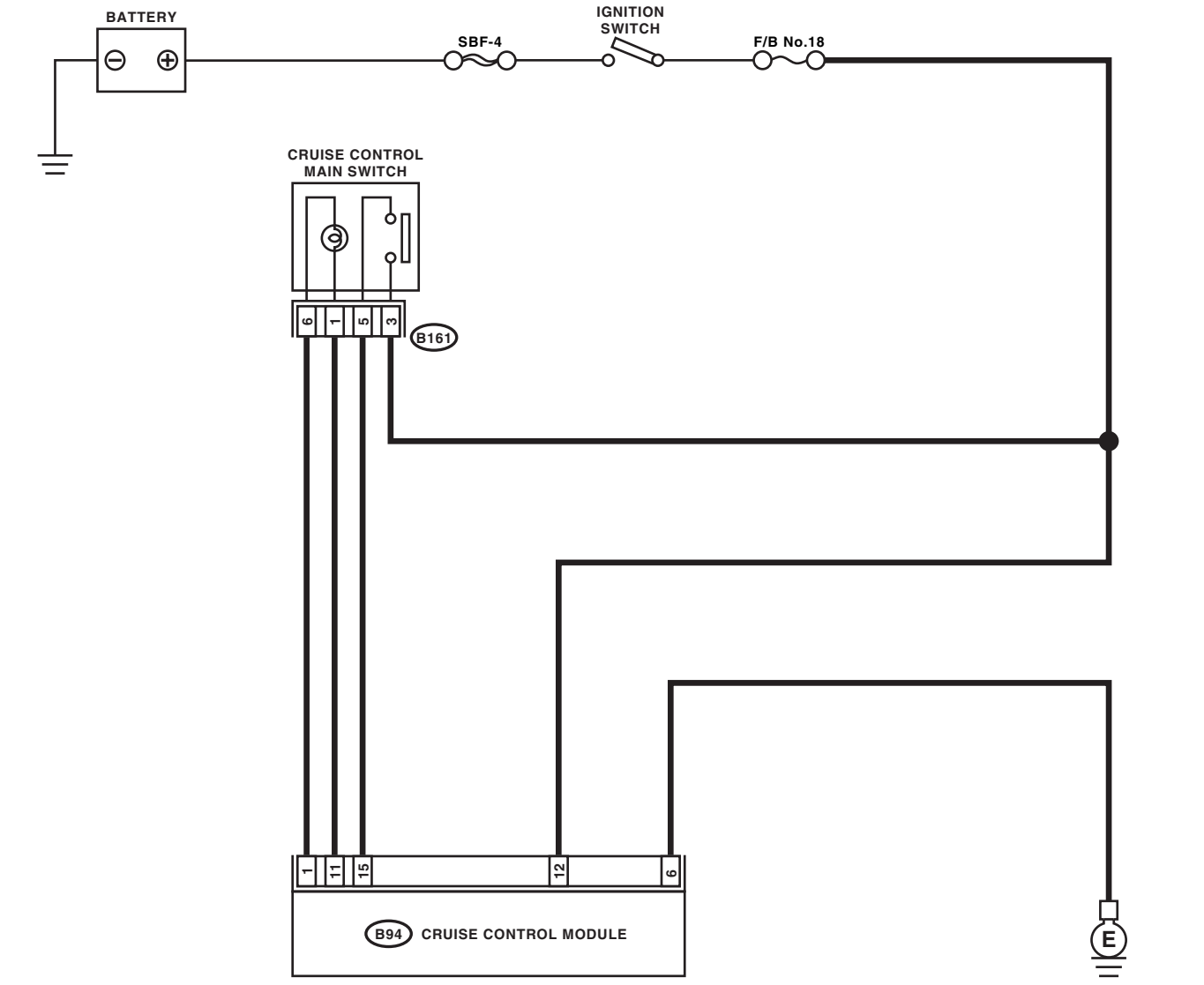
Phenomenon		Checking item	Reference
6	Cruise control is not released after CANCEL switch has been pressed.	(1) Check the CANCEL switch.	<Ref. to CC(diag)-17, CHECK CRUISE CONTROL COMMAND SWITCH, Diagnostics with Phenomenon.>
		(2) Check the motor drive system.	<Ref. to CC(diag)-31, DTC 35 AND 36 ACTUATOR MOTOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
		(3) Check the motor clutch drive system.	<Ref. to CC(diag)-33, DTC 37 ACTUATOR MOTOR CLUTCH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
7	Cruise control is not released after brake pedal has been depressed.	(1) Check the stop light switch and brake switch.	<Ref. to CC(diag)-19, CHECK STOP LIGHT SWITCH AND BRAKE SWITCH, Diagnostics with Phenomenon.>
		(2) Check the motor drive system.	<Ref. to CC(diag)-31, DTC 35 AND 36 ACTUATOR MOTOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
		(3) Check the motor clutch drive system.	<Ref. to CC(diag)-33, DTC 37 ACTUATOR MOTOR CLUTCH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
8	Cruise control is not released after clutch pedal has been depressed (MT model).	(1) Check the clutch switch.	<Ref. to CC(diag)-21, CHECK CLUTCH SWITCH (MT MODEL), Diagnostics with Phenomenon.>
		(2) Check the motor drive system.	<Ref. to CC(diag)-31, DTC 35 AND 36 ACTUATOR MOTOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
		(3) Check the motor clutch drive system.	<Ref. to CC(diag)-33, DTC 37 ACTUATOR MOTOR CLUTCH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

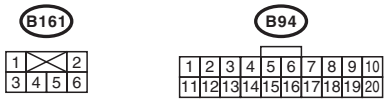
B: CHECK POWER SUPPLY AND GROUND LINE

TROUBLE SYMPTOM:

Cruise control can be set, but indicator does not come on. (When main switch is pressed.)

WIRING DIAGRAM:





CC-00173

	Step	Check	Yes	No
1	**CHECK POWER SUPPLY.** 1) Turn the ignition switch to OFF. 2) Disconnect the cruise control module harness connector. 3) Turn the ignition switch to ON. 4) Measure the voltage between harness connector terminal and chassis ground. ***Connector & terminal*** ***(B94) No. 12 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **2.**	• Check the fuse No. 18 (in fuse & relay box). • Check the harness for open or short between cruise control module and fuse & relay box.
2	**CHECK GROUND CIRCUIT.** 1) Turn the ignition switch OFF. 2) Measure the resistance between harness connector terminal and chassis ground. ***Connector & terminal*** ***(B94) No. 6 — Chassis ground:***	Is the resistance less than 10 Ω?	Power supply and ground circuit are OK.	Repair the harness.

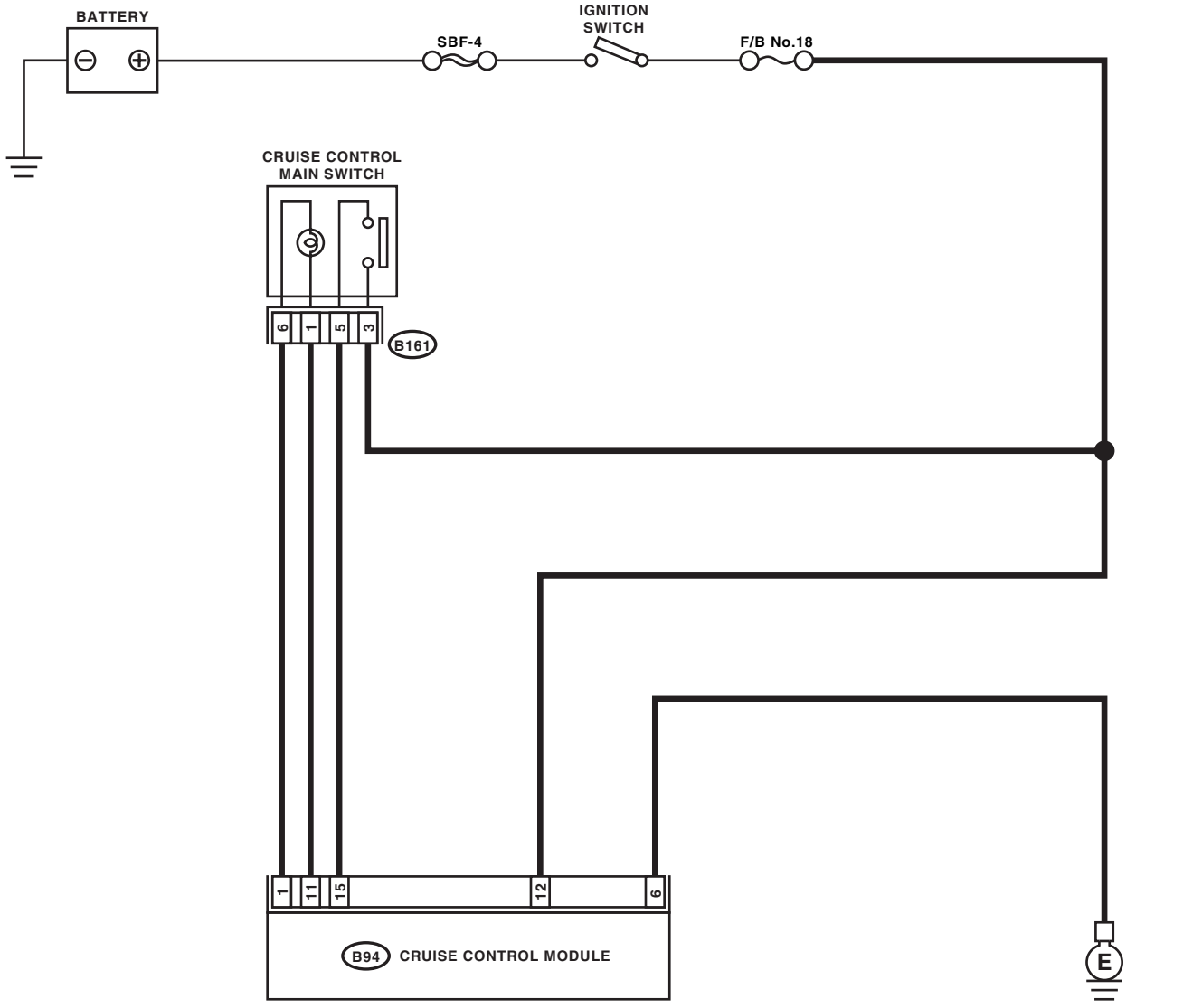
C: CHECK CRUISE CONTROL MAIN SWITCH

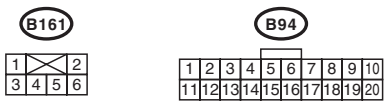
TROUBLE SYMPTOM:

Cruise control main switch is not turned ON and cruise control cannot be set.

NOTE:
When the main relay (built-in cruise control module) operates, the main switch circuit is in normal condition.
The main relay operation can be checked by hearing the operation sound.
This operation sound will be heard when the ignition switch and cruise control main switch is turned to ON.

WIRING DIAGRAM:





CC-00173

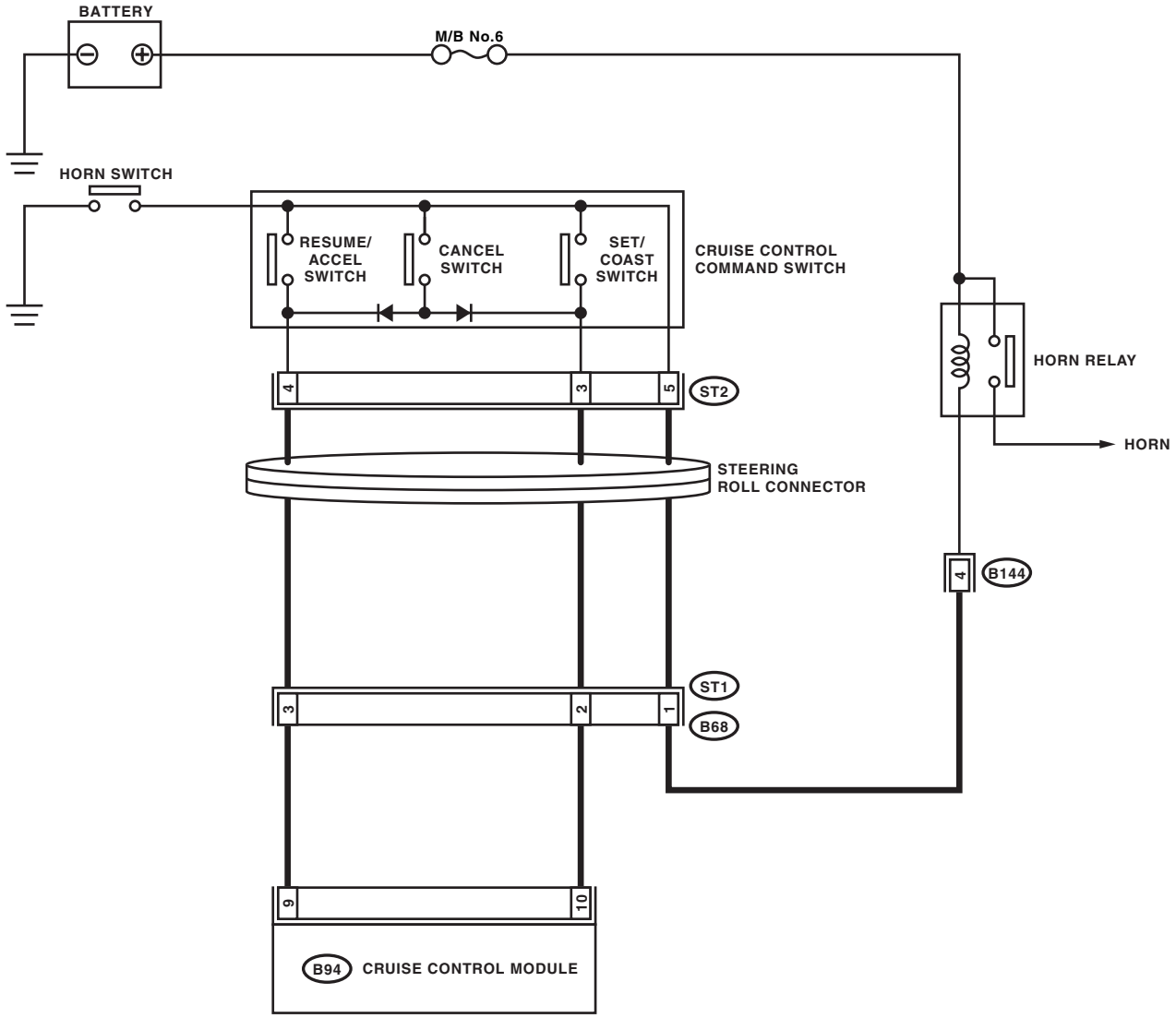
	Step	Check	Yes	No
1	**CHECK CRUISE CONTROL MAIN SWITCH CIRCUIT.** 1) Turn the ignition switch to OFF. 2) Disconnect the cruise control main switch harness connector. 3) Turn the ignition switch to ON. 4) Measure the voltage between harness connector terminal and chassis ground. ***Connector & terminal*** ***(B161) No. 3 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **2.**	• Check the fuse No. 18 (in fuse & relay box). • Check the harness for open or short between cruise control main switch and fuse & relay box.
2	**CHECK CRUISE CONTROL MAIN SWITCH CIRCUIT.** 1) Turn the ignition switch OFF. 2) Disconnect the cruise control module harness connector. 3) Measure the resistance between cruise control module harness connector terminal and cruise control main switch harness connector terminal. ***Connector & terminal*** ***(B94) No. 15 — (B161) No. 5:*** ***(B94) No. 1 — (B161) No. 6:*** ***(B94) No. 11 — (B161) No. 1:***	Is the resistance less than 10 Ω?	Go to step **3.**	Repair the harness.
3	**CHECK CRUISE CONTROL MAIN SWITCH.** Remove and check the cruise control main switch. <Ref. to CC-6, Cruise Control Main Switch.>	Is the cruise control main switch OK?	Replace the cruise control module.	Replace the cruise control main switch.

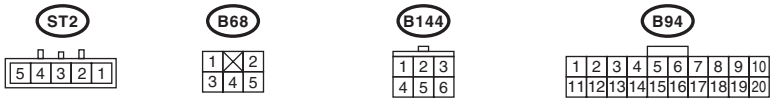
D: CHECK CRUISE CONTROL COMMAND SWITCH

TROUBLE SYMPTOM:

Cruise control cannot be set. (Cancelled immediately.)

WIRING DIAGRAM:





CC-00359

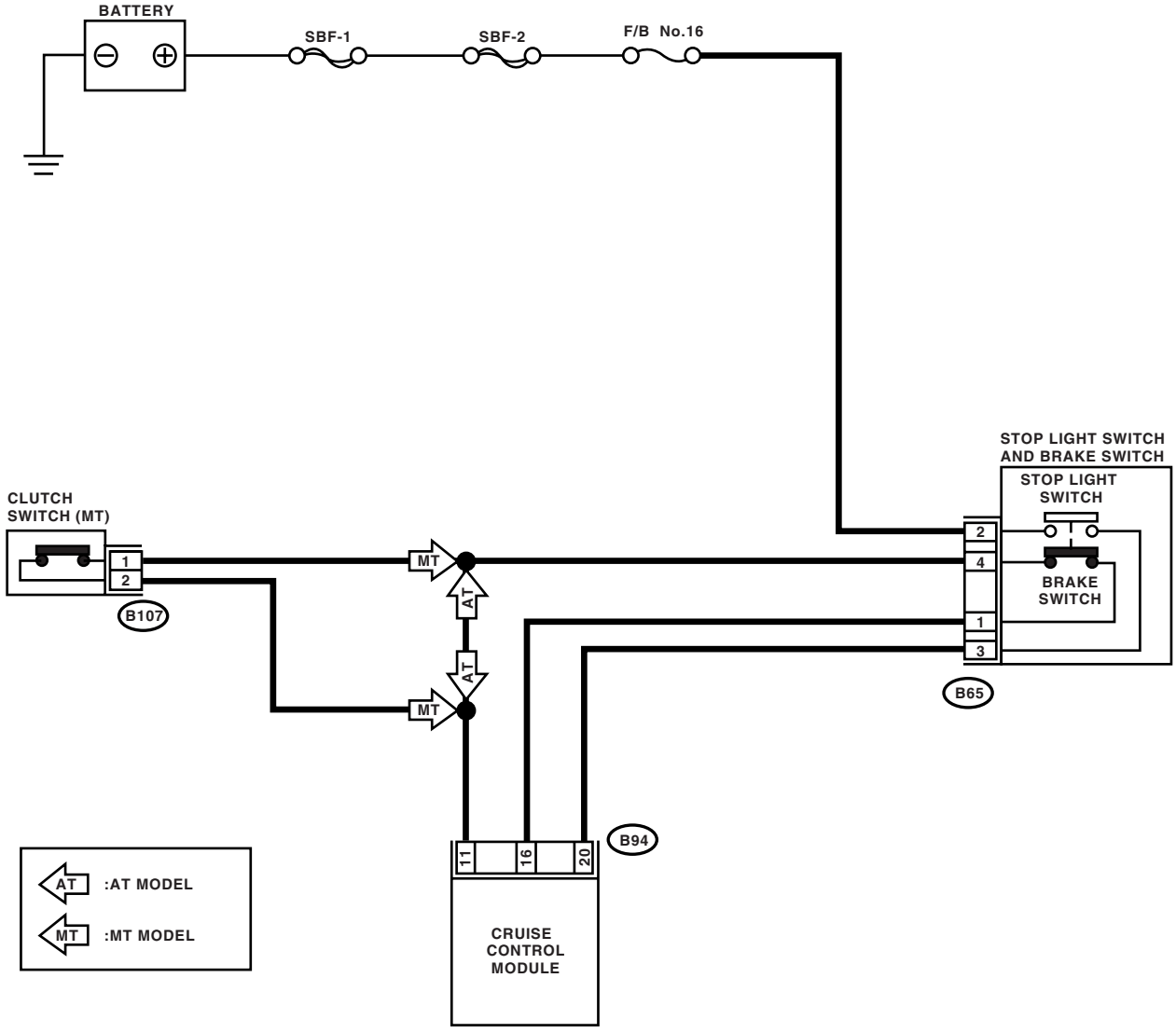
	Step	Check	Yes	No
1	**CHECK SET/COAST SWITCH CIRCUIT.** 1) Turn the ignition switch to OFF. 2) Disconnect the cruise control module harness connector. 3) Measure the voltage between harness connector terminal and chassis ground when SET/COAST switch is pressed and not pressed. ***Connector & terminal*** ***(B94) No. 10 (+) — Chassis ground (−):***	Is the voltage 0 V when SET/COAST switch is not pressed? Is the voltage more than 10 V when SET/COAST switch is pressed?	Go to step **2.**	Go to step **4.**
2	**CHECK RESUME/ACCEL SWITCH CIRCUIT.** Measure the voltage between harness connector terminal and chassis ground when RESUME/ACCEL switch is pressed and not pressed. ***Connector & terminal*** ***(B94) No. 9 (+) — Chassis ground (−):***	Is the voltage 0 V when RESUME/ACCEL switch is not pressed? Is the voltage more than 10 V when RESUME/ACCEL switch is pressed?	Go to step **3.**	Go to step **4.**
3	**CHECK CANCEL SWITCH CIRCUIT.** Measure the voltage between harness connector terminal and chassis ground when CANCEL switch is pressed and not pressed. ***Connector & terminal*** ***(B94) No. 9 (+) — Chassis ground (−):*** ***(B94) No. 10 (+) — Chassis ground (−):***	Is the voltage 0 V when CANCEL switch is not pressed? Is the voltage more than 10 V when CANCEL switch is pressed?	Cruise control command switch circuit is OK.	Go to step **4.**
4	**CHECK POWER SUPPLY FOR COMMAND SWITCH.** Check the horn operation.	Does the horn sound?	Go to step **5.**	• Check the fuse No. 6 (in main fuse box). • Check the horn relay. <Ref. to COM-3, HORN RELAY, INSPECTION, Horn System.> • Check the harness for open or short between cruise control command switch and fuse & relay box.
5	**CHECK CRUISE CONTROL COMMAND SWITCH.** Remove and check the cruise control command switch. <Ref. to CC-7, Cruise Control Command Switch.>	Is the cruise control command switch OK?	Check the harness between cruise control command switch and cruise control module.	Replace the cruise control command switch.

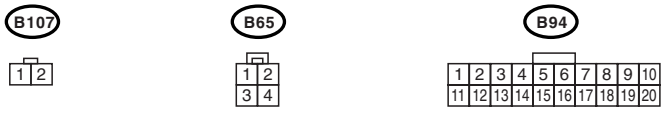
E: CHECK STOP LIGHT SWITCH AND BRAKE SWITCH

TROUBLE SYMPTOM:

Cruise control cannot be set.

WIRING DIAGRAM:





CC-00033

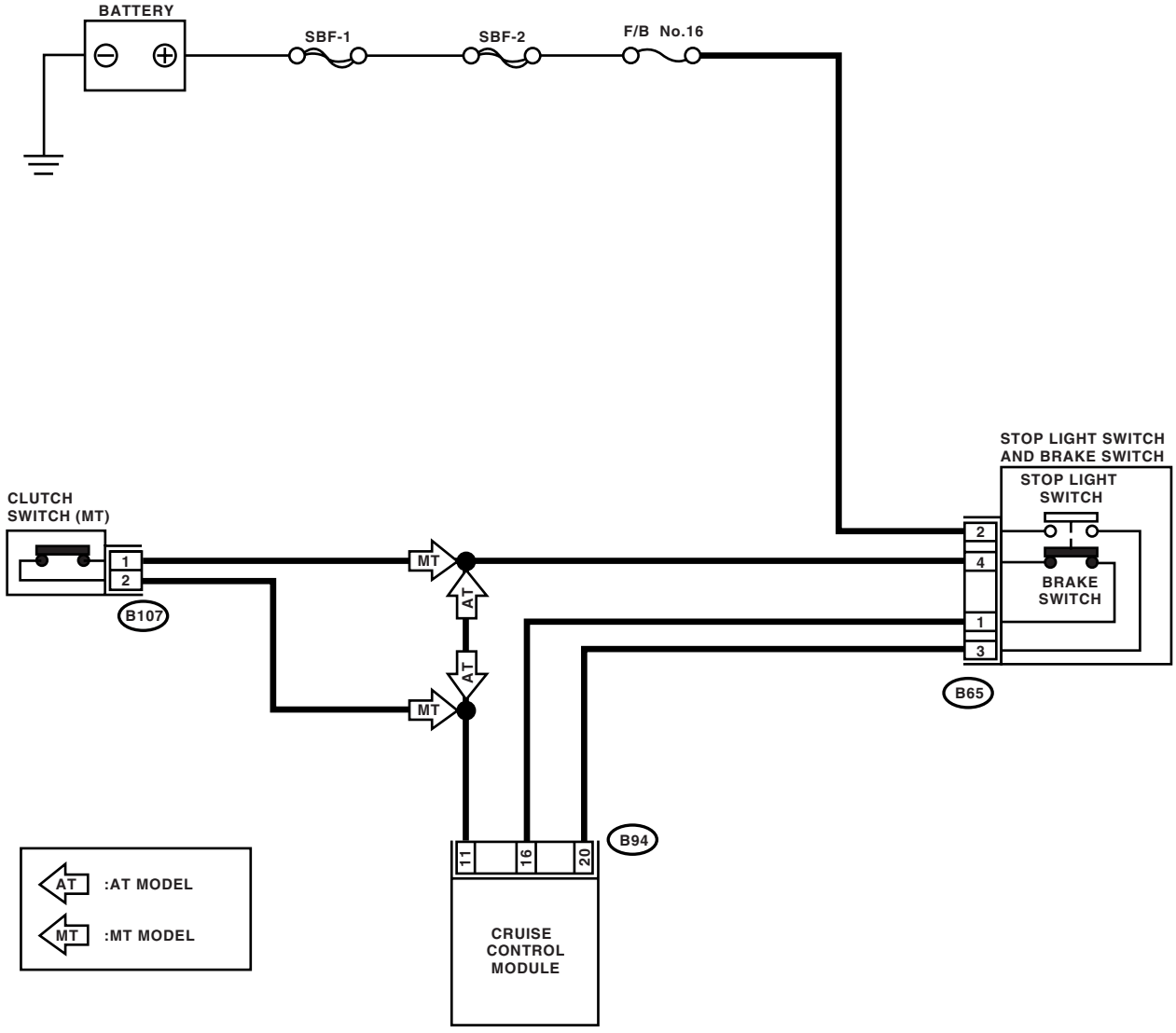
	Step	Check	Yes	No
1	**CHECK STOP LIGHT SWITCH AND BRAKE SWITCH CIRCUIT.** 1) Turn the ignition switch to OFF. 2) Disconnect the stop light switch and brake switch harness connector. 3) Turn the ignition switch to ON. 4) Turn the cruise control main switch to ON. 5) Measure the voltage between harness connector terminal and chassis ground. ***Connector & terminal*** ***(B65) No. 2 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **2.**	• Check the fuse No. 16 (in fuse & relay box). • Check the harness for open or short between stop light/brake switch and fuse & relay box.
2	**CHECK STOP LIGHT SWITCH AND BRAKE SWITCH CIRCUIT.** Measure the voltage between harness connector terminal and chassis ground. ***Connector & terminal*** ***(B65) No. 4 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **3.**	• Check the harness for open or short between stop light/brake switch and cruise control module (AT model). • Check the clutch switch and circuit (MT model).
3	**CHECK STOP LIGHT SWITCH AND BRAKE SWITCH CIRCUIT.** 1) Turn the cruise control main switch and ignition switch to OFF. 2) Disconnect the cruise control module harness connector. 3) Measure the resistance between cruise control module harness connector terminal and stop light switch and brake switch harness connector terminal. ***Connector & terminal*** ***(B94) No. 20 — (B65) No. 3:*** ***(B94) No. 16 — (B65) No. 1:***	Is the resistance less than 10 Ω?	Go to step **4.**	Repair the harness.
4	**CHECK STOP LIGHT SWITCH AND BRAKE SWITCH.** Remove and check the stop light switch and brake switch. <Ref. to CC-8, Stop Light & Brake Switch.>	Are the stop light switch and brake switch OK?	Stop light switch and brake switch circuit are OK.	Replace the stop light switch and brake switch.

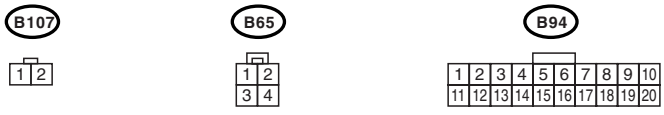
F: CHECK CLUTCH SWITCH (MT MODEL)

TROUBLE SYMPTOM:

Cruise control cannot be set.

WIRING DIAGRAM:





CC-00033

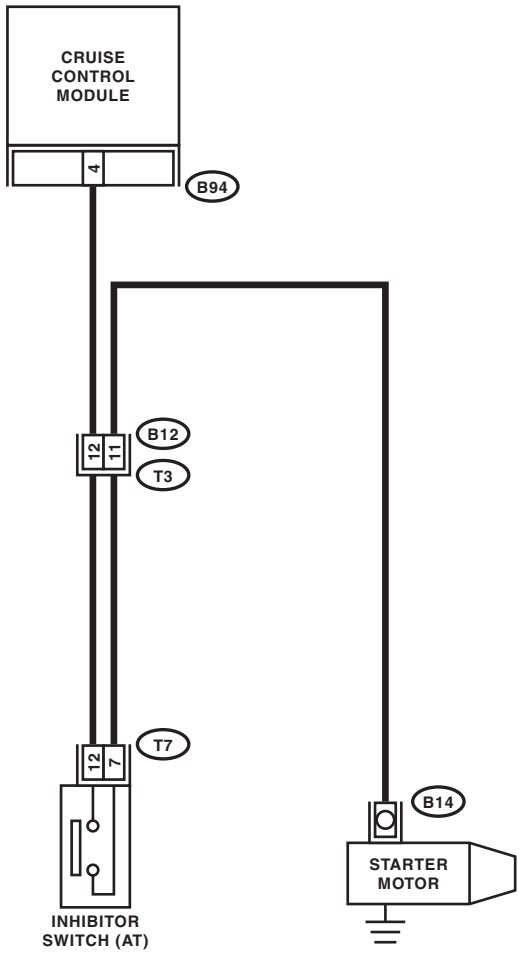
	Step	Check	Yes	No
1	**CHECK CLUTCH SWITCH CIRCUIT.** 1) Turn the ignition switch to OFF. 2) Disconnect the clutch switch harness connector. 3) Turn the ignition switch to ON. 4) Turn the cruise control main switch to ON. 5) Measure the voltage between harness connector terminal and chassis ground. ***Connector & terminal*** ***(B107) No. 2 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **2.**	Check the harness for open or short between clutch switch and cruise control module.
2	**CHECK CLUTCH SWITCH CIRCUIT.** 1) Turn the cruise control main switch and ignition switch OFF. 2) Disconnect the stop light switch and brake switch harness connector. 3) Measure the resistance between clutch switch harness connector terminal and stop light switch and brake switch harness connector terminal. ***Connector & terminal*** ***(B107) No. 1 — (B65) No. 4:***	Is the resistance less than 10 Ω?	Go to step **3.**	Repair the harness.
3	**CHECK CLUTCH SWITCH.** Remove and check the clutch switch. <Ref. to CC-9, Clutch Switch.>	Is the clutch switch OK?	Clutch switch circuit is OK.	Replace the clutch switch.

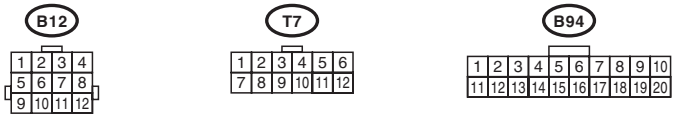
G: CHECK INHIBITOR SWITCH

TROUBLE SYMPTOM:

Cruise control cannot be set.

WIRING DIAGRAM:





CC-00360

	Step	Check	Yes	No
1	**CHECK INHIBITOR SWITCH CIRCUIT.** 1) Turn the ignition switch to OFF. 2) Disconnect the inhibitor switch harness connector. 3) Turn the ignition switch to ON. 4) Turn the cruise control main switch to ON. 5) Measure the voltage between harness connector terminal and chassis ground. ***Connector & terminal*** ***(T7) No. 12 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **2.**	Check the harness for open or short between inhibitor switch and cruise control module.
2	**CHECK INHIBITOR SWITCH CIRCUIT.** 1) Turn the cruise control main switch and ignition switch to OFF. 2) Disconnect the starter motor harness connector. 3) Measure the resistance between inhibitor switch harness connector terminal and chassis ground. ***Connector & terminal*** ***(T7) No. 7 — (B14) No. 1:***	Is the resistance less than 10 Ω?	Go to step **3.**	Repair the harness.
3	**CHECK INHIBITOR SWITCH.** Remove and check the inhibitor switch. <Ref. to CC-10, Inhibitor Switch.>	Is the inhibitor switch OK?	Inhibitor switch circuit is OK.	Replace the inhibitor switch.

7. List of Diagnostic Trouble Code (DTC)

A: LIST

DTC	Item	Contents of diagnosis	Reference
21	Inner relay is seized.	Cruise control module inner relay is seized when main switch is OFF.	<Ref. to CC(diag)-27, DTC 21, 24, 25 AND 2A CRUISE CONTROL MODULE BUILT-IN RELAY, CPU RAM, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
22	Vehicle speed sensor	Vehicle speed signal changes more than 10 km/h (6 MPH) within 350 ms.	<Ref. to CC(diag)-28, DTC 22 VEHICLE SPEED SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
24	Cruise control module is abnormal.	Two vehicle speed values stored in cruise control module memory are not the same.	<Ref. to CC(diag)-27, DTC 21, 24, 25 AND 2A CRUISE CONTROL MODULE BUILT-IN RELAY, CPU RAM, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
25	Cruise control module is abnormal.	Two output values stored in cruise control module memory are not the same.	<Ref. to CC(diag)-27, DTC 21, 24, 25 AND 2A CRUISE CONTROL MODULE BUILT-IN RELAY, CPU RAM, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
28	Wiring harness opened.	Open wiring harness circuit is detected via control module relay when main switch is ON.	<Ref. to CC(diag)-30, DTC 28 WIRING HARNESS OPENED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
35	Motor drive system is abnormal.	• Motor output circuit is open or shorted. • Motor drive circuit is open or shorted.	<Ref. to CC(diag)-31, DTC 35 AND 36 ACTUATOR MOTOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
36	Trouble of motor turning speed	Motor turning speed is low.	<Ref. to CC(diag)-31, DTC 35 AND 36 ACTUATOR MOTOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
37	Motor clutch drive system is abnormal.	• Motor clutch output circuit is open or shorted. • Motor clutch drive circuit is open or shorted.	<Ref. to CC(diag)-33, DTC 37 ACTUATOR MOTOR CLUTCH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC	Item	Contents of diagnosis	Reference
38	Motor drive shaft does not engage properly.	Motor drive gear engagement is not properly adjusted.	<Ref. to CC(diag)-35, DTC 38 MOTOR DRIVE SHAFT DOES NOT ENGAGE PROPERLY, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
39	Motor is overloaded.	Current flows through motor more frequently than under normal conditions.	<Ref. to CC(diag)-35, DTC 39 MOTOR IS OVERLOADED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
2A	Cruise control module is abnormal.	Cruise control module self-diagnosis function senses abnormality.	<Ref. to CC(diag)-27, DTC 21, 24, 25 AND 2A CRUISE CONTROL MODULE BUILT-IN RELAY, CPU RAM, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

8. Diagnostic Procedure with Diagnostic Trouble Code (DTC)

A: DTC 21, 24, 25 AND 2A CRUISE CONTROL MODULE BUILT-IN RELAY, CPU RAM

DIAGNOSIS:

- Poor welding of built-in relay of cruise control module.
- Failure of built-in CPU RAM of cruise control module.

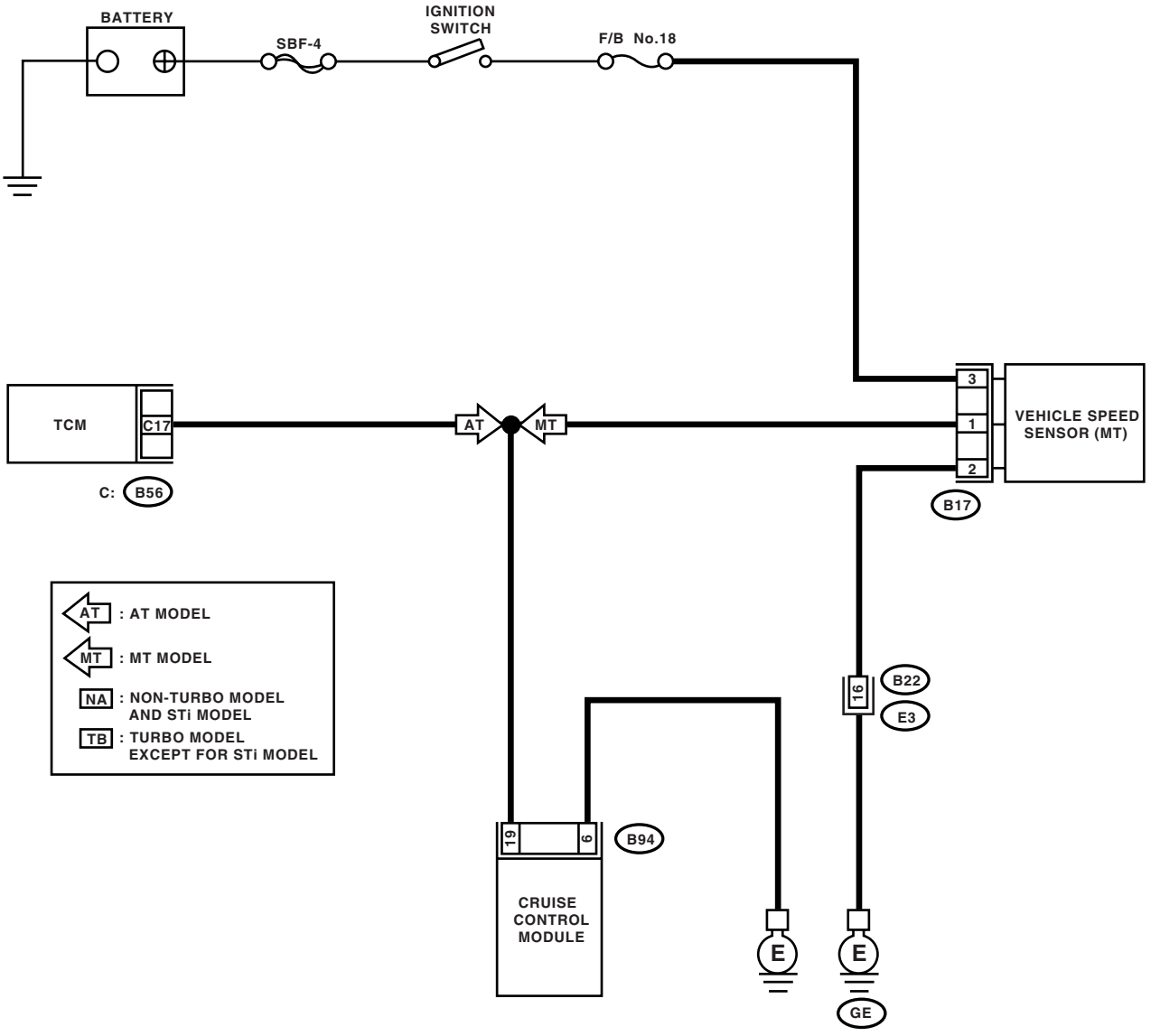
TROUBLE SYMPTOM:

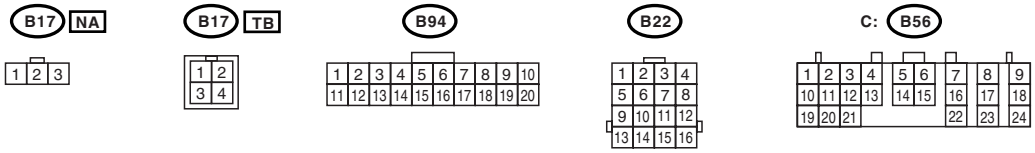
- Cruise control is canceled and memorized cruise speed is also canceled.
- Once cruise control is canceled, cruise control cannot be set until the ignition switch and cruise control main switch turns OFF, and then turns ON again.

NOTE:
Check input/output signal and vehicle speed signal with select monitor. When signals are in good condition, failure is in cruise control module. (Check the power supply and ground conditions of cruise control module.)

B: DTC 22 VEHICLE SPEED SENSOR

DIAGNOSIS:
Disconnection or short circuit of vehicle speed sensor system.
TROUBLE SYMPTOM:
Cruise control cannot be set. (Cancelled immediately.)
WIRING DIAGRAM:





CC-00361

	Step	Check	Yes	No
1	**CHECK TRANSMISSION TYPE.**	Is the transmission type MT?	Go to step **2.**	Go to step **6.**
2	**CHECK HARNESS BETWEEN BATTERY AND VEHICLE SPEED SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the harness connector from vehicle speed sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between vehicle speed sensor harness connector terminal and chassis ground. ***Connector & terminal*** ***(B17) No. 3 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **3.**	Check the harness for open or short between fuse and vehicle speed sensor.
3	**CHECK HARNESS BETWEEN CRUISE CONTROL MODULE AND VEHICLE SPEED SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the harness connector from cruise control module. 3) Measure the resistance between vehicle speed sensor harness connector terminal and cruise control module harness connector terminal. ***Connector & terminal*** ***(B17) No. 1 — (B94) No. 19:***	Is the resistance less than 10 Ω?	Go to step **4.**	Repair the harness.
4	**CHECK HARNESS BETWEEN VEHICLE SPEED SENSOR AND ENGINE GROUND.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between vehicle speed sensor harness connector terminal and engine ground. ***Connector & terminal*** ***(B17) No. 2 — Engine ground:***	Is the resistance less than 10 Ω?	Go to step **5.**	Repair the harness.
5	**CHECK VEHICLE SPEED SENSOR.** 1) Connect the harness connector to vehicle speed sensor. 2) Lift-up the vehicle and support with rigid racks. 3) Drive the vehicle at speed greater than 20 km/h (12 MPH). **Warning:** **Be careful not to be caught up by the running wheels.** 4) Measure the voltage between cruise control module harness connector terminal and chassis ground. ***Connector & terminal*** ***(B94) No. 19 (+) — Chassis ground (−):***	Is the voltage less than 1 V ←→ more than 5 V?	Replace the cruise control module. <Ref. to CC-5, Cruise Control Unit.>	Replace the vehicle speed sensor.
6	**CHECK HARNESS BETWEEN CRUISE CONTROL MODULE AND TRANSMISSION CONTROL MODULE.** 1) Turn the ignition switch to OFF. 2) Disconnect the harness connector from transmission control module and cruise control module. 3) Measure the resistance between cruise control module harness connector terminal and transmission control module harness connector terminal. ***Connector & terminal*** ***(B94) No. 19 — (B56) No. 17:***	Is the resistance less than 10 Ω?	Go to step **7.**	Repair the harness.

	Step	Check	Yes	No
7	**CHECK TRANSMISSION CONTROL MODULE.** 1) Connect the harness connector to transmission control module. 2) Lift-up the vehicle and support with rigid racks. 3) Drive the vehicle faster than 10 km/h (6 MPH). **Warning:** **Be careful not to be caught by the running wheels.** 4) Measure the voltage between transmission control module harness connector terminal and chassis ground. ***Connector & terminal*** ***(B56) No. 17 (+) — Chassis ground (–):***	Is the voltage less than 1 V ←→ more than 5 V?	Replace the cruise control module. <Ref. to CC-5, Cruise Control Unit.>	Replace the transmission control module. <Ref. to 4AT-75, Transmission Control Module (TCM).>

C: DTC 28 WIRING HARNESS OPENED

	Step	Check	Yes	No
1	**CHECK BATTERY.** Measure the battery specific gravity of electrolyte.	Is the battery specific gravity more than 1.260?	Go to step **2.**	Charge or replace the battery. Go to step **2.**
2	**CHECK FUSES, CONNECTORS AND HARNESSES.** Check the condition of the main and other fuses, and harnesses and connectors. Also check for proper grounding.	Is there anything unusual about the appearance of main fuse, fuse, harness, connector and grounding?	Repair or replace the faulty parts.	End of inspection.

D: DTC 35 AND 36 ACTUATOR MOTOR

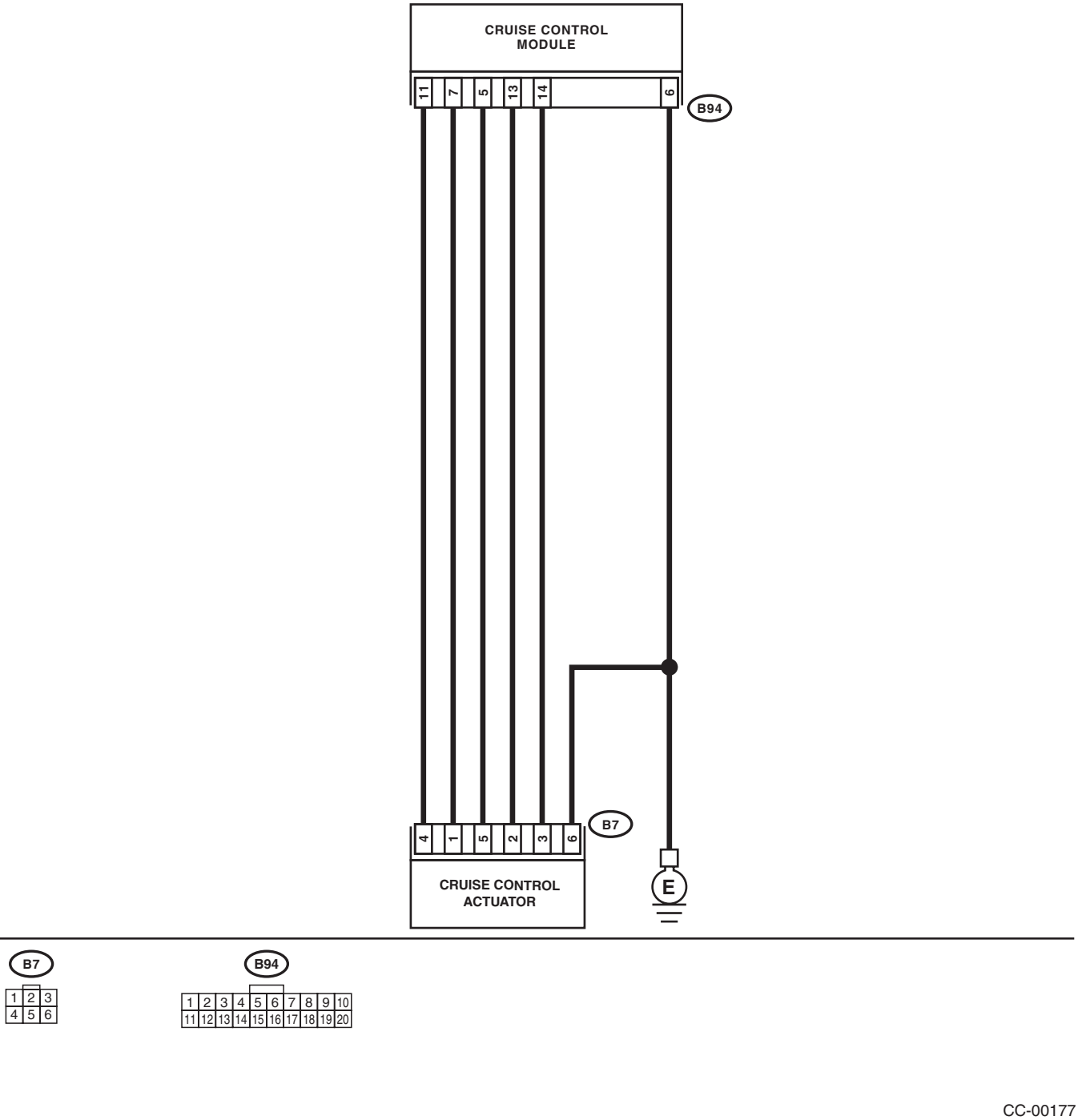
DIAGNOSIS:

Open or poor contact of cruise control actuator motor.

TROUBLE SYMPTOM:

Cruise control cannot be set. (Cancelled immediately.)

WIRING DIAGRAM:



CC-00177

	Step	Check	Yes	No
1	**CHECK POWER SUPPLY.** 1) Turn the ignition switch to OFF. 2) Disconnect the harness connector from cruise control actuator. 3) Turn the ignition switch to ON. 4) Turn the cruise control main switch to ON. 5) Measure the voltage between cruise control actuator harness connector terminal and chassis ground. ***Terminals*** ***(B7) No. 4 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **2.**	Check the harness for open or short between cruise control module and cruise control actuator.
2	**CHECK GROUND CIRCUIT OF ACTUATOR.** 1) Turn the ignition switch and cruise control main switch to OFF. 2) Measure the resistance between cruise control actuator harness connector terminal and chassis ground. ***Terminals*** ***(B7) No. 6 — Chassis ground:***	Is the resistance less than 10 Ω?	Go to step **3.**	Repair the harness.
3	**MEASURE RESISTANCE OF ACTUATOR.** Measure the resistance of cruise control actuator motor. ***Terminals*** ***No. 4 — No. 1:*** ***No. 4 — No. 2:*** ***No. 4 — No. 5:***	Is the resistance approx. 5 Ω?	Go to step **4.**	Replace the cruise control actuator. <Ref. to CC-4, Actuator.>
4	**CHECK HARNESS BETWEEN ACTUATOR AND CRUISE CONTROL MODULE.** 1) Disconnect the harness connector from cruise control module. 2) Measure the resistance between cruise control module harness connector terminal and cruise control actuator harness connector terminal. ***Connector & terminal*** ***(B7) No. 1 — (B94) No. 7:***	Is the resistance less than 10 Ω?	Go to step **5.**	Repair the harness.
5	**CHECK HARNESS BETWEEN ACTUATOR AND CRUISE CONTROL MODULE.** Measure the resistance between cruise control module harness connector terminal and cruise control actuator harness connector terminal. ***Connector & terminal*** ***(B7) No. 5 — (B94) No. 5:***	Is the resistance less than 10 Ω?	Replace the cruise control module. <Ref. to CC-5, Cruise Control Unit.>	Repair the harness.

E: DTC 37 ACTUATOR MOTOR CLUTCH

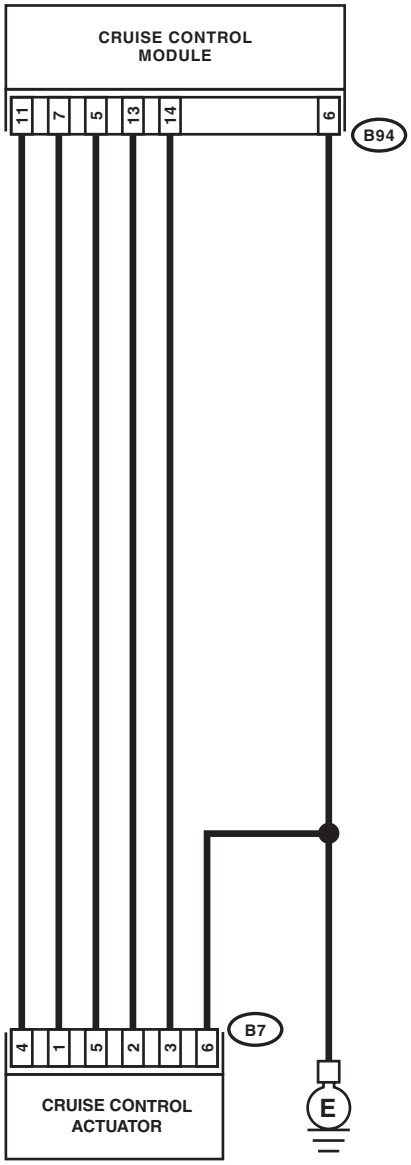
DIAGNOSIS:

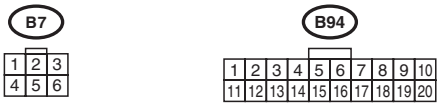
Open or poor contact of cruise control actuator motor clutch.

TROUBLE SYMPTOM:

Cruise control cannot be set. (Cancelled immediately.)

WIRING DIAGRAM:





CC-00177

	Step	Check	Yes	No
1	**CHECK POWER SUPPLY.** 1) Turn the ignition switch to OFF. 2) Disconnect the harness connector from cruise control actuator. 3) Turn the ignition switch to ON. 4) Turn the cruise control main switch to ON. 5) Measure the voltage between cruise control actuator harness connector terminal and chassis ground. ***Terminals*** ***(B7) No. 4 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **2.**	Check the harness for open or short between cruise control module and cruise control actuator.
2	**CHECK GROUND CIRCUIT OF ACTUATOR.** 1) Turn the ignition switch and cruise control main switch to OFF. 2) Measure the resistance between cruise control actuator harness connector terminal and chassis ground. ***Terminals*** ***(B7) No. 6 — Chassis ground:***	Is the resistance less than 10 Ω?	Go to step **3.**	Repair the harness.
3	**MEASURE RESISTANCE OF ACTUATOR CLUTCH.** Measure the resistance of cruise control actuator clutch. ***Terminals*** ***No. 3 — No. 6:***	Is the resistance approx. 39 Ω?	Go to step **4.**	Replace the cruise control actuator. <Ref. to CC-4, Actuator.>
4	**CHECK HARNESS BETWEEN ACTUATOR AND CRUISE CONTROL MODULE.** 1) Disconnect the harness connector from cruise control module. 2) Measure the resistance between cruise control module harness connector terminal and cruise control actuator harness connector terminal. ***Connector & terminal*** ***(B7) No. 2 — (B94) No. 13:***	Is the resistance less than 10 Ω?	Go to step **5.**	Repair the harness.
5	**CHECK HARNESS BETWEEN ACTUATOR AND CRUISE CONTROL MODULE.** Measure the resistance between cruise control module harness connector terminal and cruise control actuator harness connector terminal. ***Connector & terminal*** ***(B7) No. 3 — (B94) No. 14:***	Is the resistance less than 10 Ω?	Replace the cruise control module. <Ref. to CC-5, Cruise Control Unit.>	Repair the harness.

F: DTC 38 MOTOR DRIVE SHAFT DOES NOT ENGAGE PROPERLY

	Step	Check	Yes	No
1	**CHECK ACTUATOR MOTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the harness connector from cruise control actuator. 3) Remove the cruise control actuator from mounting bracket. 4) Pull the cable by hand to check for looseness or status of inner gear engagement.	Are foreign particles caught in the inner gear or does inner gear engage and disengage improperly?	Replace the cruise control actuator. <Ref. to CC-4, Actuator.>	Check the cruise control cable adjustment. <Ref. to CC(diag)-5, CABLE FREE PLAY, INSPECTION, General Description.>

G: DTC 39 MOTOR IS OVERLOADED

	Step	Check	Yes	No
1	**CHECK THE OPERATING CURRENT TO ACTUATOR MOTOR.** 1) Connect the Subaru Select Monitor to data link connector. 2) Try to drive the vehicle while operating the cruise control system. 3) Measure the operation current to the cruise control actuator motor. ***Connector & terminal*** ***(B7) No. 4 (+) — Chassis ground (−):***	Is the current more than 10 A ?	Replace the cruise control module. <Ref. to CC-5, Cruise Control Unit.>	Check the power supply circuit. <Ref. to CC(diag)-13, CHECK POWER SUPPLY AND GROUND LINE, Diagnostics with Phenomenon.>

IMMOBILIZER (DIAGNOSTICS)

IM(diag)

Page

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1. Basic Diagnostic Procedure

A: PROCEDURE

	Step	Check	Yes	No
1	**CHECK IMMOBILIZER INDICATOR LIGHT.** 1) Turn the ignition switch to “OFF” or “ACC”. 2) Wait for more than 60 seconds.	Does the immobilizer indicator light blink?	Go to step **2.**	Check the immobilizer indicator light circuit. <Ref. to IM(diag)-11, CHECK IMMOBILIZER INDICATOR CIRCUIT, INSPECTION, Diagnostics Chart for Immobilizer Indicator Light.>
2	**CHECK KEY SWITCH.** Remove the key from ignition switch.	Does the immobilizer indicator light blink within 1 second after removing ignition key?	Go to step **3.**	Check the key switch circuit. <Ref. to IM(diag)-13, CHECK KEY SWITCH CIRCUIT, INSPECTION, Diagnostics Chart for Immobilizer Indicator Light.>
3	**CHECK IMMOBILIZER INDICATOR LIGHT.** Turn the ignition switch to ON.	Does the immobilizer indicator light go off?	Go to step **4.**	Perform teaching operation on all keys of the vehicle. Go to step **4.**
4	**CHECK ENGINE START.** Turn the ignition switch to START.	Does the starter operate?	Go to step **5.**	Check the starter motor circuit.
5	**CHECK ENGINE START.** Turn the ignition switch to START.	Does the engine start?	Immobilizer system is OK.	Go to step **6.**
6	**CHECK ANY OTHER DTC ON DISPLAY.** 1) Turn the ignition switch to OFF. 2) Connect the Subaru Select Monitor to data link connector. <Ref. to IM(diag)-8, OPERATION.> 3) Turn the ignition switch and Subaru Select Monitor switch to ON. 4) Read DTC on display. <Ref. to IM(diag)-9, Read Diagnostic Trouble Code (DTC).>	Is the DTC displayed on screen?	Go to step **7.**	Inspection using “Engine Starting Failure”. <Ref. to EN(H4DOTC)(diag)-58, Diagnostics for Engine Starting Failure.> <Ref. to EN(H4SO)(diag)-56, Diagnostics for Engine Starting Failure.> <Ref. to EN(H4SOw/oOBD)(diag)-37, Diagnostics for Engine Starting Failure.>

	Step	Check	Yes	No
7	**PERFORM THE DIAGNOSIS.** 1) Inspect using the “Diagnostic Procedure with Diagnostic Trouble Code (DTC)”. <Ref. to IM(diag)-16, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> 2) Repair the trouble cause. 3) Perform clear memory mode. 4) Read DTC again.	Is the DTC displayed on screen?	Inspect using the “Diagnostic Procedure with Diagnostic Trouble Code (DTC)”. <Ref. to IM(diag)-16, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Finish the diagnosis.

2. General Description

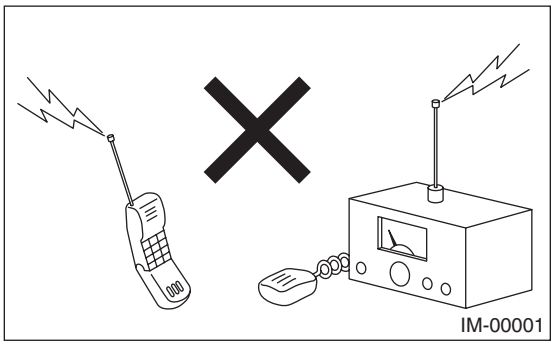
A: CAUTION

CAUTION:

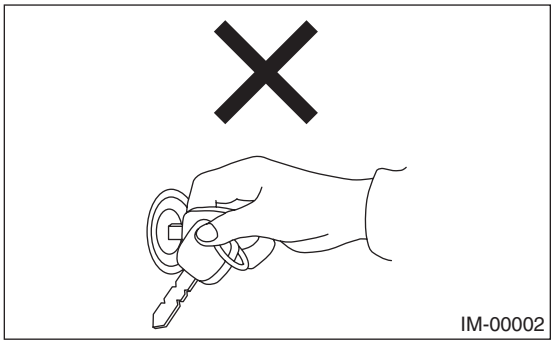
• The airbag system wiring harness is routed near the immobilizer control module. All airbag system wiring harness and connectors are colored yellow. Do not use electrical test equipment on these circuits.

• Be careful not to damage the airbag system wiring harness when servicing the immobilizer control module.

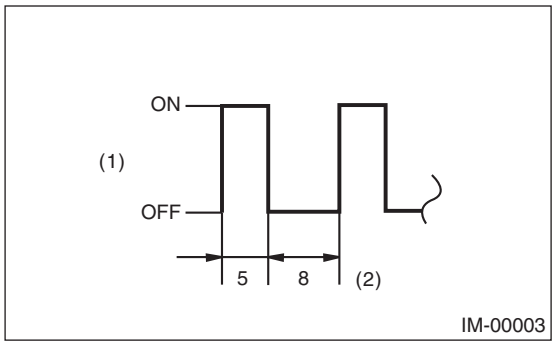
• While diagnostic items are being checked, do not operate radios, portable telephones, etc. which emit electromagnetic waves near or inside the vehicle.



• When the ignition switch is being turned ON or OFF while diagnostic items are being checked, do not allow keys with different ID codes close to the ignition switch. If the ignition key is in a key holder, remove it from the holder before carrying out diagnoses.



• When repeatedly turning the ignition ON or OFF while diagnostic items are being checked, it should be switched in cycles of "ON" for at least 5 seconds → "OFF" for at least 8 seconds.



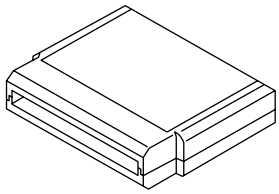
(1) Ignition switch position
(2) Sec.

• If the engine fails to start with a registered ignition key, detach the ignition key from ignition switch and wait for approx. 1 second until immobilizer indicator light begins to flash. Start the engine again.

• Before checking the diagnostic items, obtain all keys for the vehicle to be checked possessed by owner.

B: PREPARATION TOOL

1. SPECIAL TOOLS

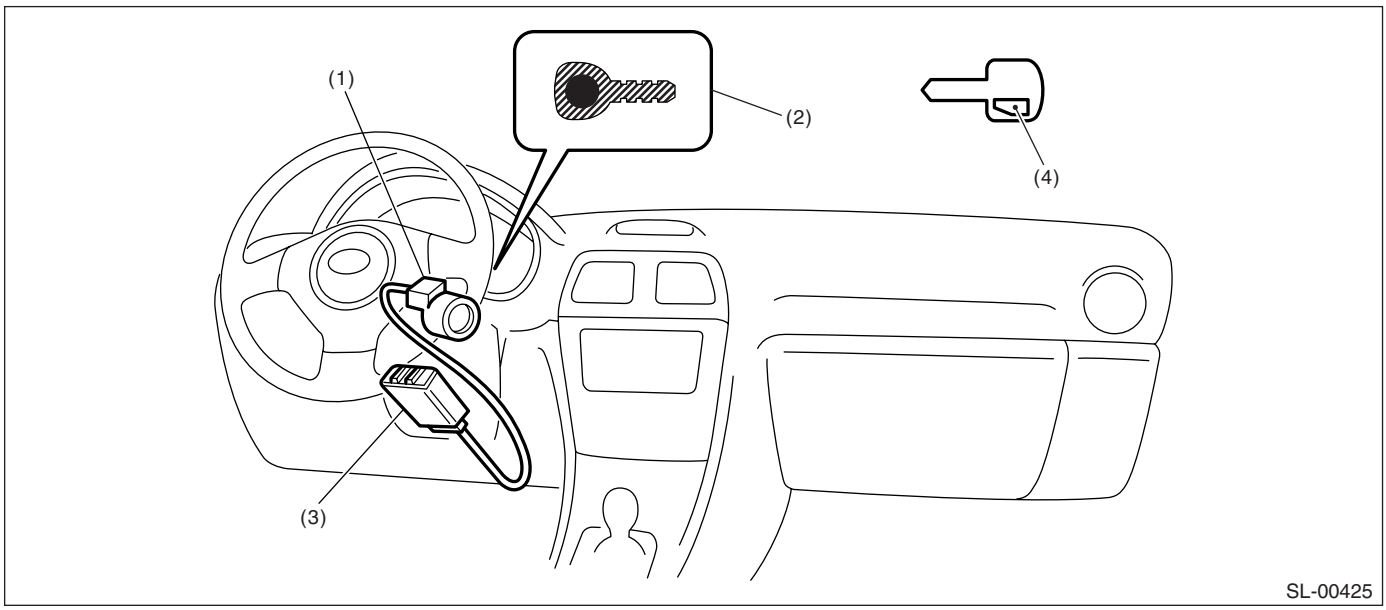
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18482AA000	18482AA000	CARTRIDGE	Troubleshooting for electrical systems.
ST22771AA030	22771AA030	SUBARU SELECT MONITOR KIT	Troubleshooting for electrical systems. • English: 22771AA030 (Without printer) • German: 22771AA070 (Without printer) • French: 22771AA080 (Without printer) • Spanish: 22771AA090 (Without printer)

2. GENERAL TOOLS

TOOL NAME	REMARKS
Circuit Tester	Used for measuring resistance, voltage and current.

3. Electrical Component Location

A: LOCATION



(1) Antenna
(2) Immobilizer indicator light (LED bulb)
(3) Immobilizer control module (IMM ECM)
(4) Transponder

NOTE:
IMM ECM location for RHD model is symmetrically opposite.

4. Immobilizer Control Module I/O Signal

A: WIRING DIAGRAM

1. IMMOBILIZER

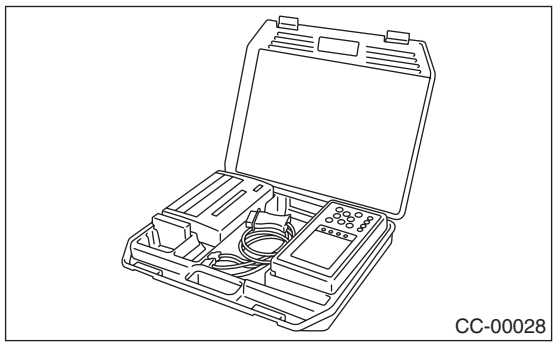
<Ref. to WI-171, WIRING DIAGRAM, Immobilizer System.>

5. Subaru Select Monitor

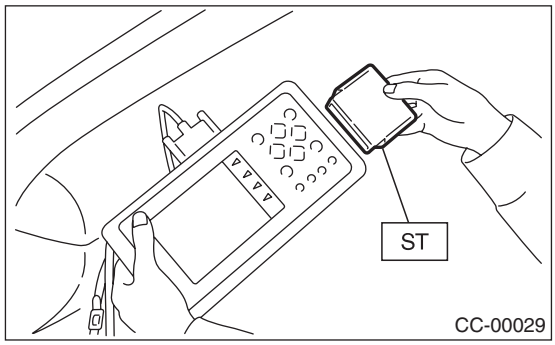
A: OPERATION

1. HOW TO USE SUBARU SELECT MONITOR

1) Prepare the Subaru Select Monitor kit.

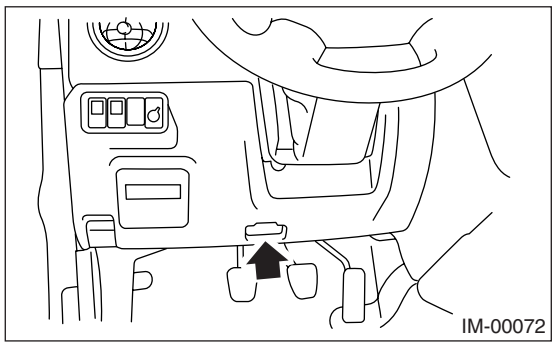


2) Connect the diagnosis cable to Subaru Select Monitor.
3) Insert the cartridge into Subaru Select Monitor.



4) Connect the Subaru Select Monitor to data link connector.

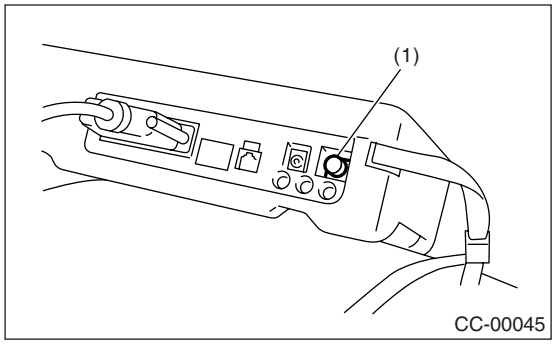
(1) Data link connector is located in the lower portion of the instrument panel (on driver's side).



(2) Connect the diagnosis cable to data link connector.

CAUTION:
Do not connect the scan tools except for Subaru Select Monitor.

5) Turn the ignition switch to ON (engine OFF), and then Subaru Select Monitor power switch to ON.



(1) Power switch

6) Using the Subaru Select Monitor, call up any DTCs and various data, and then record them.

2. READ DIAGNOSTIC TROUBLE CODE (DTC) FOR ENGINE.

Refer to Read DTC for information about how to indicate DTC. <Ref. to IM(diag)-9, Read Diagnostic Trouble Code (DTC).>

3. COMMUNICATION LINE CHECK

NOTE:
The communication line between ECM and body integrated module can be checked in "System Operation Check Mode". This is referred to as "Communication line check".

1) Connect the Subaru Select Monitor.
2) On the «Each system check» display, select the {Engine}.
3) Start the communication line check.
4) Is «Communication Line not Shorted» displayed on screen?
If displayed, go to step 5).
If "NO", go to step 6).
5) After diagnostic results, it is determined that the circuit is not shorted. Finish the communication line check.
6) If a problem is detected, repair the trouble cause. <Ref. to IM(diag)-20, DTC P1572 IMM CIRCUIT FAILURE (EXCEPT ANTENNA CIRCUIT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

6. Read Diagnostic Trouble Code (DTC)

A: OPERATION

1) On the «Main Menu» display screen, select the {Each System Check}, and then press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Engine Control System}, and then press the [YES] key.
3) Press the [YES] key after the information of engine type is displayed.
4) On the «Engine Diagnosis» display screen, select the {DTC Display}, and then press the [YES] key.
5) On the «DTC Display» display screen, select the {Current DTC} or {History DTC}, and then press the [YES] key.

NOTE:
• For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.
• For detailed concerning DTC, refer to the List of DTC. <Ref. to IM(diag)-15, LIST, List of Diagnostic Trouble Code (DTC).>

7. Clear Memory Mode

A: OPERATION

1) On the «Main Menu» display screen, select the {Each System Check}, and then press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Engine Control System}, and then press the [YES] key.
3) Press the [YES] key after the information of engine type is displayed.
4) On the «Engine Diagnosis» display screen, select the {Clear Memory}, and then press the [YES] key.
5) When the 'Done' are shown on the display screen, turn the Subaru Select Monitor and ignition switch to OFF.

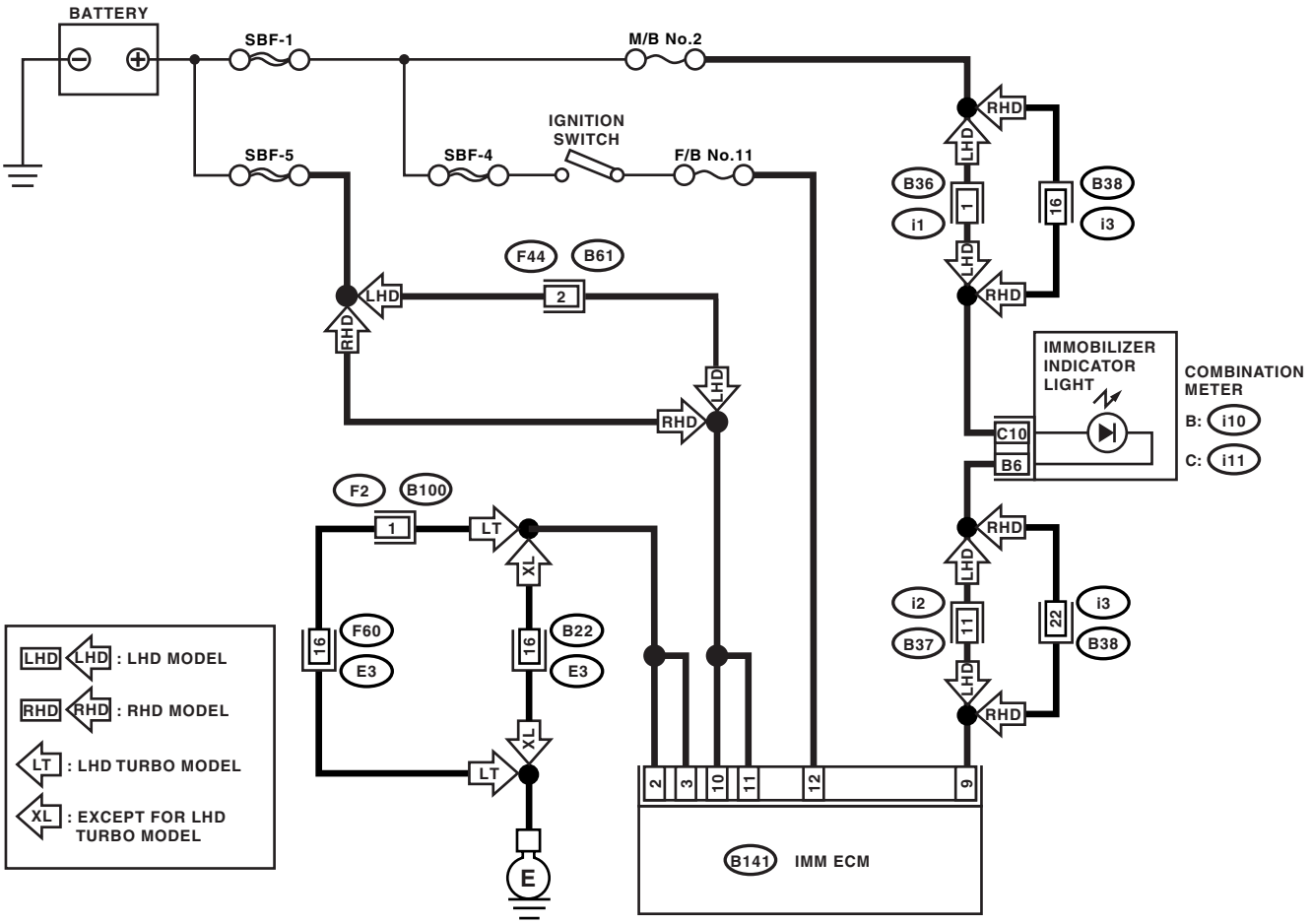
NOTE:
• After the memory has been cleared, the idle air control solenoid valve must be initialized. To do this, turn the ignition switch to ON position. Wait 3 seconds before starting the engine.
• For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

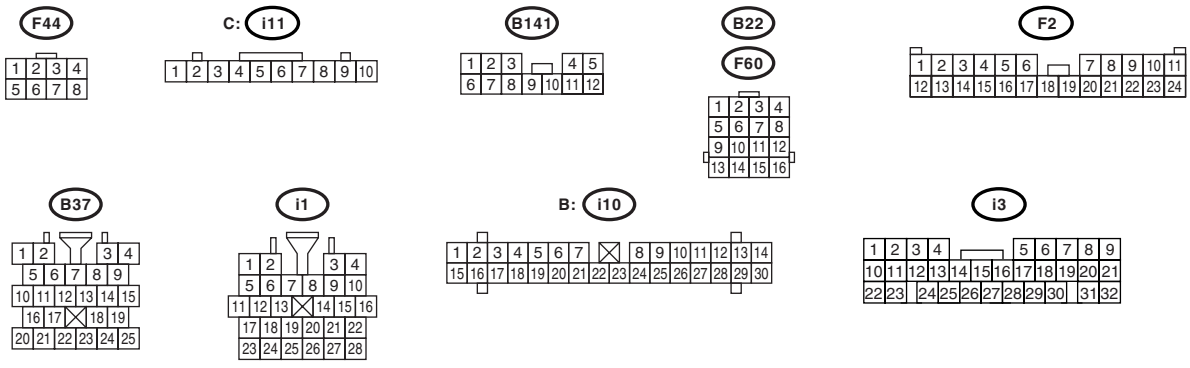
8. Diagnostics Chart for Immobilizer Indicator Light

A: INSPECTION

1. CHECK IMMOBILIZER INDICATOR CIRCUIT

WIRING DIAGRAM:





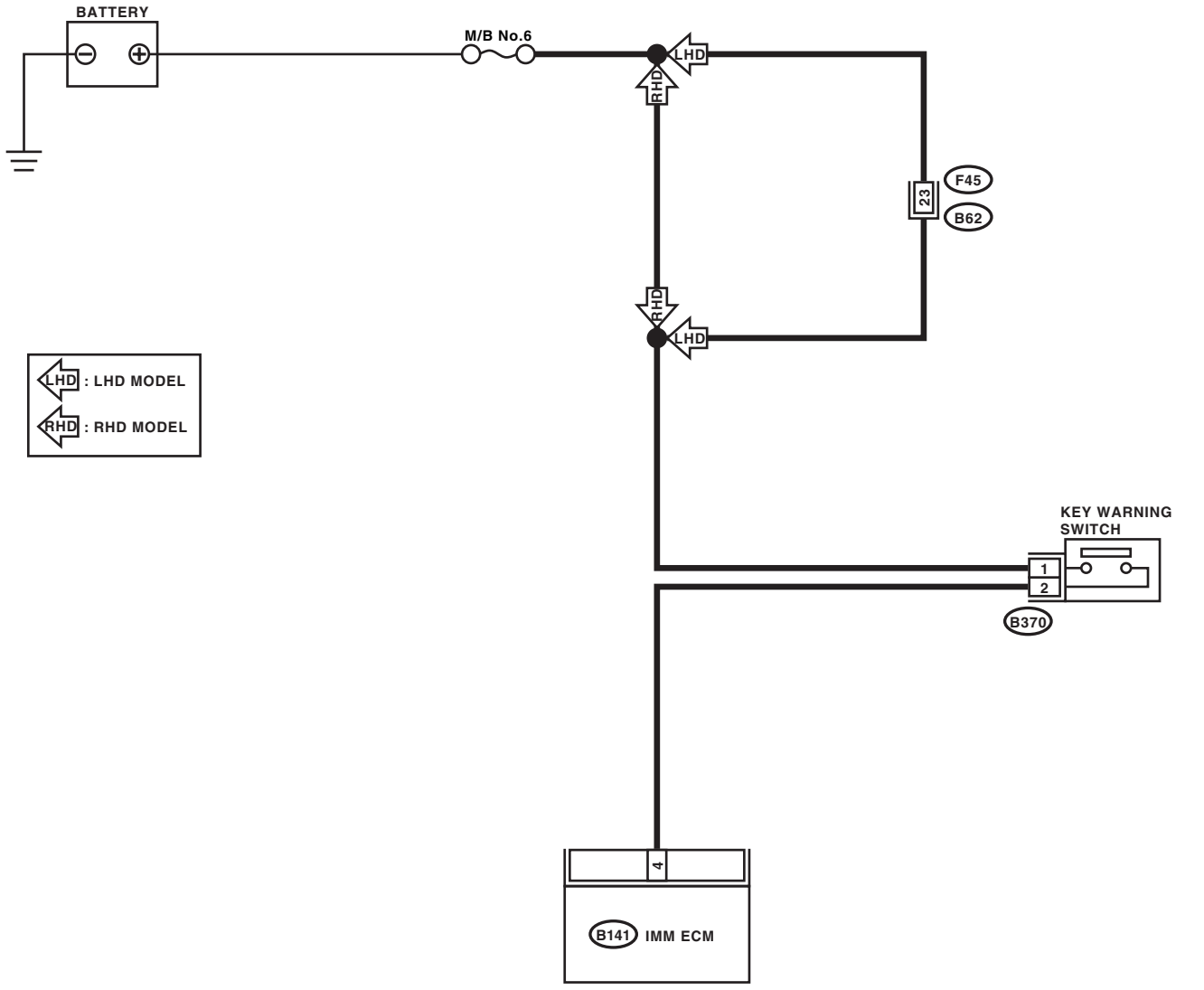
IM-00135

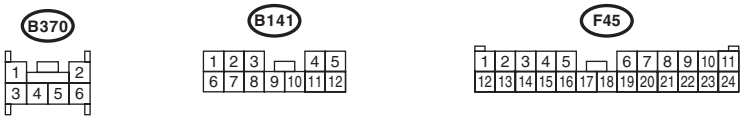
Diagnostics Chart for Immobilizer Indicator Light

	Step	Check	Yes	No
1	**CHECK IMMOBILIZER INDICATOR LIGHT COMES ON.** 1) Turn the ignition switch to OFF. 2) Disconnect the harness connector from IMM ECM. 3) Connect a resistor (750 Ω) between IMM ECM harness connector terminal No. 9 and chassis ground.	Does the indicator light come on?	Go to step **2.**	Go to step **5.**
2	**CHECK IMM ECM GROUND CIRCUIT.** Measure the resistance between IMM ECM harness connector terminal and chassis ground. ***Connector & terminal*** ***(B141) No. 2, No. 3 — Chassis ground:***	Is the resistance less than 10 Ω?	Go to step **3.**	Repair the open circuit of IMM ECM ground circuit.
3	**CHECK IMM ECM IGNITION CIRCUIT.** 1) Turn the ignition switch to ON. (Engine OFF.) 2) Measure the voltage between IMM ECM harness connector terminal and chassis ground. ***Connector & terminal*** ***(B141) No. 12 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **4.**	Check the harness for open or short between IMM ECM and ignition switch.
4	**CHECK IMM ECM POWER SUPPLY CIRCUIT.** 1) Turn the ignition switch to OFF. 2) Measure the voltage between IMM ECM harness connector terminal and chassis ground. ***Connector & terminal*** ***(B141) No. 10, No. 11 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Replace the IMM ECM <Ref. to SL-40, Immobilizer Control Module.> and then replace all ignition keys (including the transponder). Then perform teaching operation. Refer to teaching operation manual.	Check the harness for open or short between IMM ECM and fuse.
5	**CHECK COMBINATION METER CIRCUIT.** 1) Remove the combination meter. <Ref. to IDI-12, Combination Meter.> 2) Measure the voltage between combination meter harness connector terminal and chassis ground. ***Connector & terminal*** ***(i11) No. 10 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **6.**	Check the harness for open or short between combination meter and fuse.
6	**CHECK COMBINATION METER CIRCUIT.** Measure the resistance between IMM ECM harness connector terminal and combination meter harness connector terminal. ***Connector & terminal*** ***(B141) No. 9 — (i10) No. 6:***	Is the resistance less than 10 Ω?	Faulty LED bulb. Replace the combination meter printed circuit or meter main assembly. <Ref. to IDI-13, DISASSEMBLY, Combination Meter.>	Repair the harness or connector.

2. CHECK KEY SWITCH CIRCUIT

WIRING DIAGRAM:





IM-00136

Diagnostics Chart for Immobilizer Indicator Light

	Step	Check	Yes	No
1	**CHECK POWER SUPPLY CIRCUIT.** 1) Disconnect the harness connector from key warning switch. 2) Turn the ignition switch to ACC or LOCK position (The key inserted). 3) Measure the voltage between key warning switch harness connector terminal and chassis ground. ***Connector & terminal*** ***(B370) No. 1 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **2.**	Check the harness for open or short between key warning switch and fuse.
2	**CHECK KEY SWITCH.** 1) Insert the ignition key to the ignition switch. (OFF or ACC position) 2) Measure the resistance between key warning switch connector terminals. ***Connector & terminal*** ***No. 1 — No. 2:***	Is the resistance less than 1 Ω?	Go to step **3.**	Replace the key warning switch.
3	**CHECK KEY SWITCH.** 1) Remove the ignition key from the ignition switch. 2) Measure the resistance between key warning switch connector terminals. ***Connector & terminal*** ***No. 1 — No. 2:***	Is the resistance more than 1 MΩ?	Go to step **4.**	Replace the key warning switch.
4	**CHECK HARNESS BETWEEN KEY SWITCH AND IMM ECM.** 1) Disconnect the harness connector from key warning switch. 2) Disconnect the harness connector from IMM ECM. 3) Measure the resistance between key warning switch harness connector terminal and IMM ECM harness connector terminal. ***Connector & terminal*** ***(B370) No. 2 — (B141) No. 4:***	Is the resistance less than 10 Ω?	Replace the IMM ECM <Ref. to SL-40, Immobilizer Control Module.> and then replace all ignition keys (including the transponder). Then perform teaching operation. Refer to teaching operation manual.	Repair the harness between key warning switch and IMM ECM.

9. List of Diagnostic Trouble Code (DTC)

A: LIST

DTC		Item	Contents of diagnosis	Index No.
Without OBD	With OBD			
53	P0513	Incorrect Immobilizer Key	Incorrect immobilizer key (Use of unregistered key in IMM ECM)	<Ref. to IM(diag)-16, DTC P0513 INCORRECT IMMOBILIZER KEY, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	P1570	ANTENNA	Faulty antenna	<Ref. to IM(diag)-17, DTC P1570 ANTENNA, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	P1571	Reference Code Incompatibility	Reference code incompatibility between IMM ECM and ECM	<Ref. to IM(diag)-19, DTC P1571 REFERENCE CODE INCOMPATIBILITY, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	P1572	IMM Circuit Failure (Except Antenna Circuit)	Communication failure between IMM ECM and ECM	<Ref. to IM(diag)-20, DTC P1572 IMM CIRCUIT FAILURE (EXCEPT ANTENNA CIRCUIT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	P1574	Key Communication Failure	Failure of IMM ECM to verify key (transponder) ID code	<Ref. to IM(diag)-23, DTC P1574 KEY COMMUNICATION FAILURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	P1576	EGI Control Module EEPROM	ECM malfunctioning	<Ref. to IM(diag)-23, DTC P1576 EGI CONTROL MODULE EEPROM, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	P1577	IMM Control Module EEPROM	IMM ECM malfunctioning	<Ref. to IM(diag)-23, DTC P1577 IMM CONTROL MODULE EEPROM, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

NOTE:
If any DTC except for the above immobilizer DTC has been output, carry out diagnosis for the engine DTC. <Ref. to EN(H4SO)(diag)-70, List of Diagnostic Trouble Code (DTC).> or <Ref. to EN(H4SOw/oOBD)(diag)-54, List of Diagnostic Trouble Code (DTC).> or <Ref. to EN(H4DOTC)(diag)-72, List of Diagnostic Trouble Code (DTC).>

10.Diagnostic Procedure with Diagnostic Trouble Code (DTC)

A: DTC P0513 INCORRECT IMMOBILIZER KEY

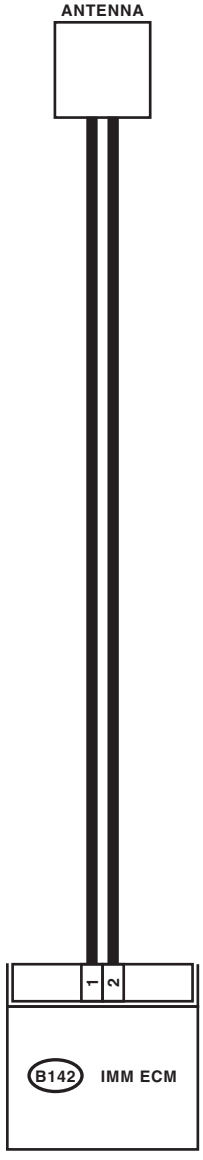
DIAGNOSIS:

Use of unregistered key in IMM ECM

Step		Check	Yes	No
1	**PERFORM TEACHING OPERATION ON IGNITION KEY.** Perform teaching operation on all keys of the vehicle. Refer to the teaching operation manual.	Is teaching operation for all keys completed?	END	Replace all ignition keys (including the transponder). Go to step **2.**
2	**PERFORM TEACHING OPERATION ON IGNITION KEY.** Perform teaching operation on all keys with vehicle. Refer to the teaching operation manual.	Is teaching operation for all keys completed?	END	Replace the IMM ECM <Ref. to SL-40, Immobilizer Control Module.> and then replace all ignition keys (including the transponder). Then perform teaching operation. Refer to the teaching operation manual.

B: DTC P1570 ANTENNA

DIAGNOSIS:
Faulty antenna
WIRING DIAGRAM:



IM-00008

	Step	Check	Yes	No
1	**CHECK ANTENNA CIRCUIT.** 1) Turn the ignition switch to OFF. 2) Disconnect the harness antenna connector from IMM ECM. <Ref. to SL-41, Immobilizer Antenna.> 3) Measure the resistance of antenna circuit. ***Connector & terminal*** ***(B142) No. 1 — No. 2:***	Is the resistance less than 10 Ω?	Go to step **2.**	Replace the antenna. <Ref. to SL-41, Immobilizer Antenna.>
2	**CHECK ANTENNA CIRCUIT.** Measure the resistance between antenna harness connector and chassis ground. ***Connector & terminal*** ***(B142) No. 1 — Chassis ground:***	Is the resistance less than 10 Ω?	Replace the antenna. <Ref. to SL-41, Immobilizer Antenna.>	Go to step **3.**
3	**CHECK ANTENNA CIRCUIT.** Measure the resistance between antenna harness connector and chassis ground. ***Connector & terminal*** ***(B142) No. 2 — Chassis ground:***	Is the resistance less than 10 Ω?	Replace the antenna. <Ref. to SL-41, Immobilizer Antenna.>	Go to step **4.**
4	**CHECK ANTENNA CIRCUIT.** 1) Turn the ignition switch to ON. (Engine OFF.) 2) Measure the voltage between antenna harness connector and chassis ground. ***Connector & terminal*** ***(B142) No. 1 (+) — Chassis ground (−):***	Is the voltage 0 V?	Go to step **5.**	Replace the antenna. <Ref. to SL-41, Immobilizer Antenna.>
5	**CHECK ANTENNA CIRCUIT.** Measure the voltage between antenna harness connector and chassis ground. ***Connector & terminal*** ***(B142) No. 2 (+) — Chassis ground (−):***	Is the voltage 0 V?	Go to step **6.**	Repair the harness between IMM ECM and antenna, because there is short circuit with battery voltage circuit or ignition switch “ON” circuit.
6	**CHECK IMM ECM FUNCTION.** 1) Turn the ignition switch to OFF. 2) Connect the antenna harness connector to IMM ECM. 3) Insert the key to ignition switch, measure changes in voltage between antenna harness connector. ***Connector & terminal*** ***(B142) No. 1 (+) — No. 2 (−):***	Is the voltage −30 — 30 V? (Approx. 0.1 second after inserting the key) Is the voltage 0 V? (Approx. 1 second after inserting the key)	Go to step **7.**	Replace the IMM ECM <Ref. to SL-40, Immobilizer Control Module.> and then replace all ignition keys (including the transponder). Then perform teaching operation. Refer to the teaching operation manual.
7	**CHECK IGNITION KEY (TRANSPONDER).** 1) Remove the key from ignition switch. 2) Start the engine using other keys that have undergone the teaching operation, furnished with vehicle.	Does the engine start?	Replace the ignition key (including the transponder). Then perform teaching operation. Refer to the teaching operation manual.	Replace the IMM ECM <Ref. to SL-40, Immobilizer Control Module.> and then replace all ignition keys (including the transponder). Then perform teaching operation. Refer to the teaching operation manual.

C: DTC P1571 REFERENCE CODE INCOMPATIBILITY

DIAGNOSIS:

Reference code incompatibility between IMM ECM and ECM

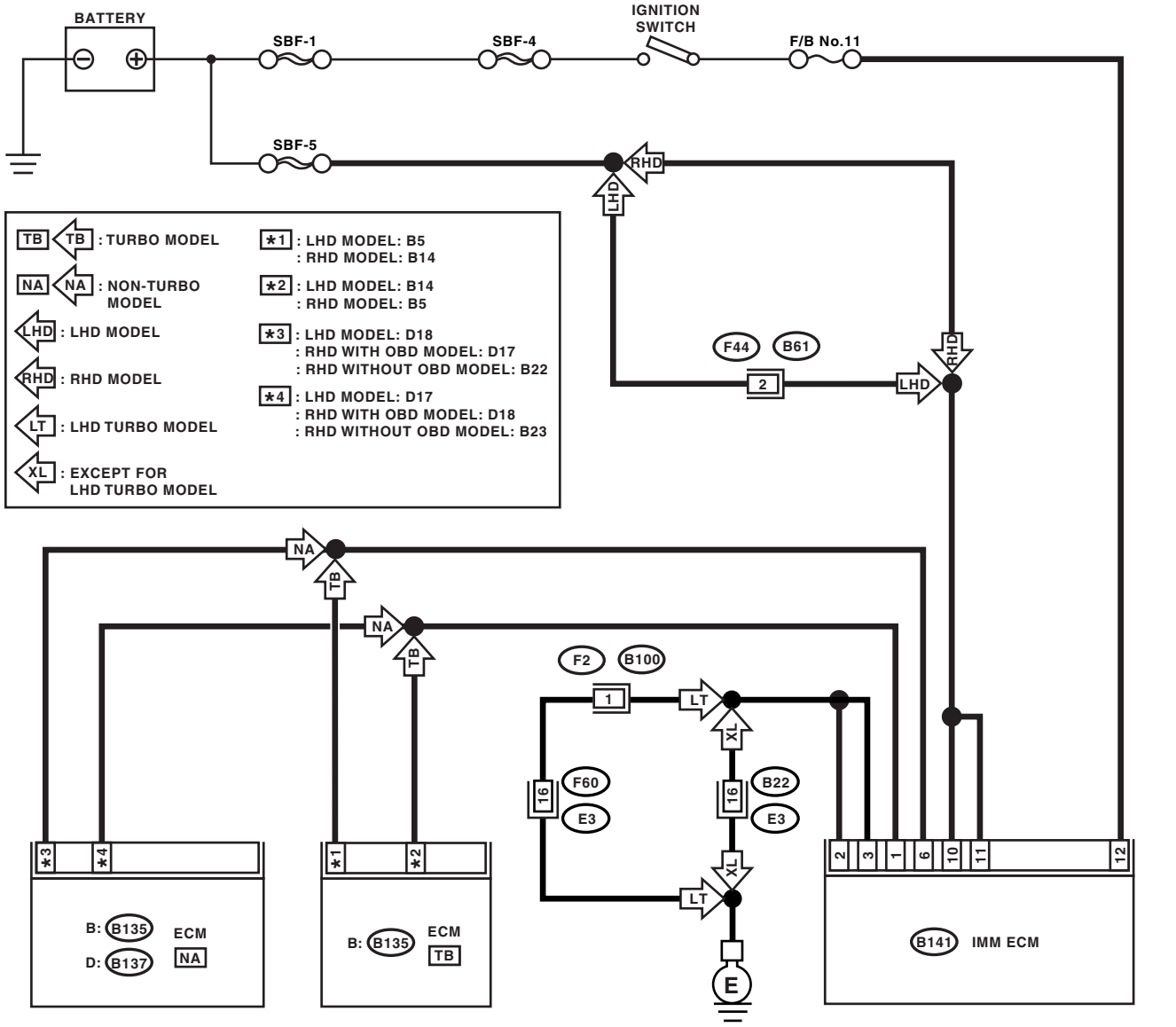
	Step	Check	Yes	No
1	**PERFORM TEACHING OPERATION ON IGNITION KEY.** Perform teaching operation on all keys of the vehicle. Refer to the teaching operation manual.	Is teaching operation for all keys completed?	END	Replace the ECM <Ref. to FU(H4SO)-47, Engine Control Module (ECM).>, <Ref. to FU(H4SOw/ oOBD)-42, Engine Control Module (ECM).> or <Ref. to FU(H4DOTC)-50, Engine Control Module (ECM).>, IMM ECM <Ref. to SL-40, Immobilizer Control Module.> and then replace all ignition keys (including the transponder). Then perform teaching operation. Refer to the teaching operation manual.

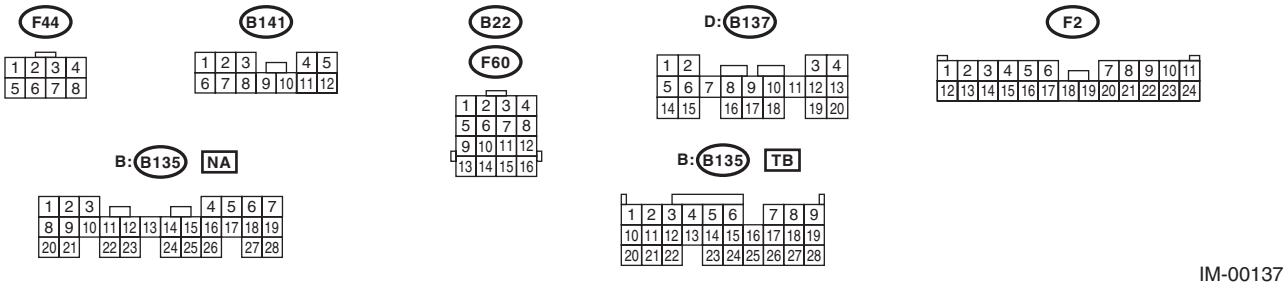
D: DTC P1572 IMM CIRCUIT FAILURE (EXCEPT ANTENNA CIRCUIT)

DIAGNOSIS:

Communication failure between IMM ECM and ECM

WIRING DIAGRAM:





IM-00137

	Step	Check	Yes	No
1	**CHECK POWER SUPPLY CIRCUIT OF IMM ECM.** 1) Turn the ignition switch to OFF. 2) Disconnect the harness connector from IMM ECM. 3) Measure the voltage between IMM ECM harness connector terminal and chassis ground. ***Connector & terminal*** ***(B141) No. 10, No.11 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **2.**	Check the harness for open or short between IMM ECM and fuse.
2	**CHECK POWER SUPPLY CIRCUIT OF IMM ECM.** 1) Turn the ignition switch to ON. (Engine OFF.) 2) Measure the voltage between IMM ECM harness connector terminal and chassis ground. ***Connector & terminal*** ***(B141) No. 12 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **3.**	Check the harness for open or short between IMM ECM and ignition switch.
3	**CHECK GROUND CIRCUIT OF IMM ECM.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between IMM ECM harness connector terminal and chassis ground. ***Connector & terminal*** ***(B141) No. 2, No.3 — Chassis ground:***	Is the resistance less than 10 Ω?	Go to step **4.**	Repair the open circuit of IMM ECM ground circuit.
4	**CHECK HARNESS BETWEEN IMM ECM AND ECM.** 1) Disconnect the harness connector from ECM and IMM ECM. 2) Measure the resistance between IMM ECM harness connector terminal and ECM harness connector terminal. ***Connector & terminal*** ***LHD non-turbo model*** ***(B141) No. 1 — (B137) No. 17:*** ***RHD non-turbo model with OBD*** ***(B141) No. 1 — (B137) No. 18:*** ***RHD non-turbo model without OBD*** ***(B141) No. 1 — (B135) No. 23:*** ***LHD turbo model*** ***(B141) No. 1 — (B135) No. 14:*** ***RHD turbo model*** ***(B141) No. 1 — (B135) No. 5:***	Is the resistance less than 10 Ω?	Go to step **5.**	Repair the open circuit of harness between IMM ECM and ECM.

	Step	Check	Yes	No
5	**CHECK HARNESS BETWEEN IMM ECM AND ECM.** Measure the resistance between IMM ECM harness connector terminal and ECM harness connector terminal. ***Connector & terminal*** ***LHD non-turbo model*** ***(B141) No. 6 — (B137) No. 18:*** ***RHD non-turbo model with OBD*** ***(B141) No. 6 — (B137) No. 17:*** ***RHD non-turbo model without OBD*** ***(B141) No. 6 — (B135) No. 22:*** ***LHD turbo model*** ***(B141) No. 6 — (B135) No. 5:*** ***RHD turbo model*** ***(B141) No. 6 — (B135) No. 14:***	Is the resistance less than 10 Ω?	Go to step **6.**	Repair the open circuit of harness between IMM ECM and ECM.
6	**CHECK HARNESS OF COMMUNICATION LINE.** 1) Turn the ignition switch to ON. (Engine OFF.) 2) Measure the voltage between IMM ECM harness connector terminal and chassis ground. ***Connector & terminal*** ***(B141) No. 1, No.6 (+) — Chassis ground (−):***	Is the voltage 0 V?	Go to step **7.**	Repair the harness between IMM ECM and ECM, because there is short circuit with battery voltage circuit or ignition switch “ON” circuit.
7	**CHECK HARNESS OF COMMUNICATION LINE.** Measure the voltage between ECM harness connector terminal and engine ground. ***Connector & terminal*** ***LHD non-turbo and RHD non-turbo model with OBD*** ***(B137) No. 17, No. 18 (+) — Engine ground (−):*** ***RHD non-turbo model without OBD*** ***(B135) No. 22, No.23 (+) — Engine ground (−):*** ***Turbo model*** ***(B135) No. 5, No.14 (+) — Engine ground (−):***	Is the voltage 0 V?	Go to step **8.**	Repair the harness between IMM ECM and ECM, because there is short circuit with battery voltage circuit or ignition switch “ON” circuit.
8	**CHECK ECM BY COMMUNICATION LINE CHECK.** 1) Connect the harness connector to ECM. 2) Disconnect the harness connector from IMM ECM. 3) Perform communication line check. <Ref. to IM(diag)-8, COMMUNICATION LINE CHECK, OPERATION, Subaru Select Monitor.>	Does “Communication Line not Shorted” appear on the screen?	Replace the IMM ECM <Ref. to SL-40, Immobilizer Control Module.> and then replace all ignition keys (including the transponder). Then perform teaching operation. Refer to the teaching operation manual.	Replace the ECM. <Ref. to FU(H4DOTC)-50, Engine Control Module (ECM).> Then perform teaching operation. Refer to the teaching operation manual.

E: DTC P1574 KEY COMMUNICATION FAILURE

DIAGNOSIS:
Failure of IMM ECM to verify key (transponder) ID code

	Step	Check	Yes	No
1	**CHECK IMM ECM FUNCTION.** Insert the key to ignition switch (LOCK position), measure changes in voltage between Antenna connector. ***Connector & terminal (B142) No. 1 — No. 2:***	Is the voltage −30 — 30 V? (Approx. 0.1 second after inserting the key) Is the voltage 0 V? (Approx. 1 second after inserting the key)	Go to step **2.**	Replace the IMM ECM <Ref. to SL-40, Immobilizer Control Module.> and then replace all ignition keys (including the transponder). Then perform teaching operation. Refer to the teaching operation manual.
2	**CHECK IGNITION KEY (TRANSPONDER).** 1) Remove the key from ignition switch. 2) Start the engine using other keys that have undergone the teaching operation, furnished with vehicle.	Does the engine start?	Replace the ignition key (including the transponder). Then perform teaching operation. Refer to the teaching operation manual.	Replace the IMM ECM <Ref. to SL-40, Immobilizer Control Module.> and then replace all ignition keys (including the transponder). Then perform teaching operation. Refer to the teaching operation manual.

F: DTC P1576 EGI CONTROL MODULE EEPROM

DIAGNOSIS:
ECM malfunctioning

1. REPLACE ECM.

Replace the ECM.
<Ref. to FU(H4SO)-47, Engine Control Module (ECM).>, <Ref. to FU(H4SOw/oOBD)-42, Engine Control Module (ECM).> or <Ref. to FU(H4DOTC)-50, Engine Control Module (ECM).>
Then perform teaching operation. Refer to the teaching operation manual.

G: DTC P1577 IMM CONTROL MODULE EEPROM

DIAGNOSIS:
IMM ECM malfunctioning

1. REPLACE IMM ECM.

Replace the IMM ECM <Ref. to SL-40, Immobilizer Control Module.>, and then replace all ignition keys (including the transponder). Then perform teaching operation. Refer to the teaching operation manual.

WIRING SYSTEM SECTION

WIRING SYSTEM WI

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

FUJI HEAVY INDUSTRIES LTD. G1880GE7

WIRING SYSTEM

WI

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1. Basic Diagnostic Procedure

A: BASIC PROCEDURES

1. GENERAL

The most important purpose of diagnostics is to determine which part is malfunctioning quickly, to save time and labor.

2. IDENTIFICATION OF TROUBLE SYMPTOM

Determine what the problem is based on symptom.

3. PROBABLE CAUSE OF TROUBLE

Look at the wiring diagram and check system's circuit. Then check the switch, relay, fuse, ground, etc.

4. LOCATION AND REPAIR OF TROUBLE

1) Using the diagnostics narrow down the causes.
2) If necessary, use a voltmeter, ohmmeter, etc.
3) Before replacing certain component parts (switch, relay, etc.), check the power supply, ground, for open wiring harness, poor connectors, etc. If no problems are encountered, check the component parts.

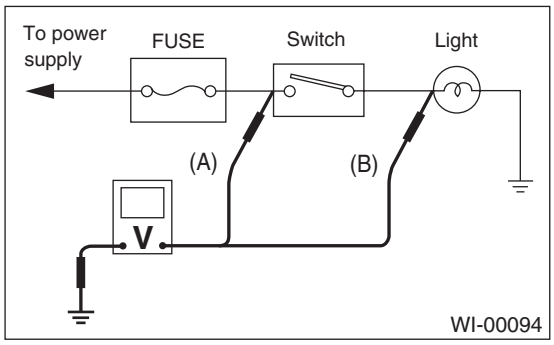
5. CONFIRMATION OF SYSTEM OPERATION

After repairing, ensure that the system operates properly.

B: BASIC INSPECTION

1. VOLTAGE MEASUREMENT

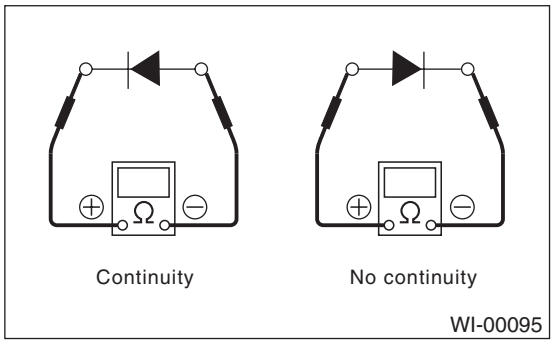
1) Using a voltmeter, connect the negative lead to a good ground point or negative battery terminal and the positive lead to the connector or component terminal.
2) Contact the positive probe of the voltmeter on connector (A).
The voltmeter will indicate a voltage.
3) Shift the positive probe to connector (B). The voltmeter will indicate no voltage.



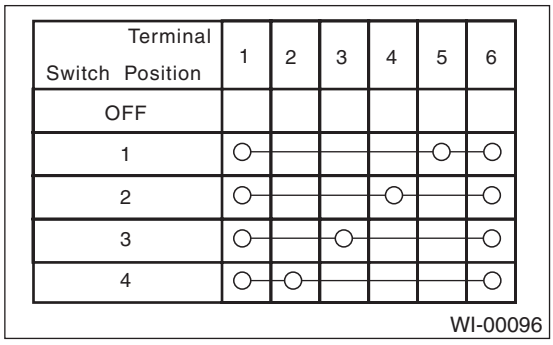
4) With test set-up held as it is, turn the switch ON. The voltmeter will indicate a voltage and, at the same time, the light will come on.
5) The circuit is in good order. If a problem such as a lamp failing to light occurs, use the procedures outlined above to track down malfunction.

2. CIRCUIT CONTINUITY CHECKS

1) Disconnect the battery cable or connector so there is no voltage between check points.
Contact the two leads of an ohmmeter to each of the check points.
If the circuit has diodes, reverse the two leads and check again.
2) Use an ohmmeter to check for the diode continuity. When contacting the negative lead to diode positive side and positive lead to negative side, there should be continuity.
When contacting the two leads in reverse, there should be no continuity.

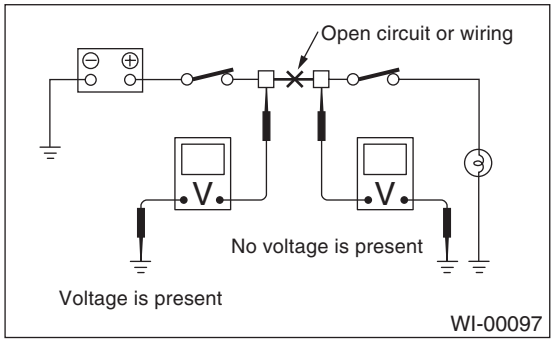


3) Symbol "❍—❍" indicates that continuity exists between two points or terminals. For example, when a switch position is "3", continuity exists among terminals 1, 3 and 6, as shown in table below.

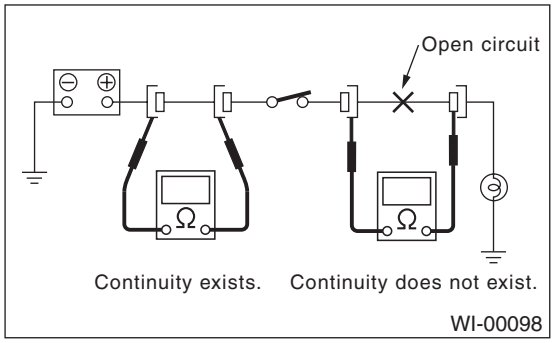


3. HOW TO DETERMINE AN OPEN CIRCUIT

1) Voltmeter Method:
An open circuit is determined by measuring the voltage between respective connectors and ground using a voltmeter, starting with the connector closest to power supply. The power supply must be turned ON so that current flows in the circuit. If voltage is not present between a particular connector and ground, the circuit between that connector and previous connector is open.

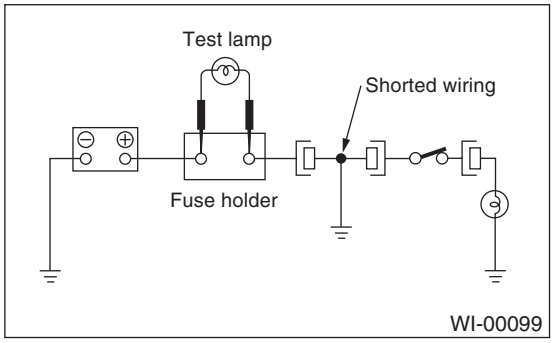


2) Ohmmeter method:
Disconnect all connectors affected, and check the continuity in wiring between adjacent connectors. When the ohmmeter indicates “infinite”, the wiring is open.

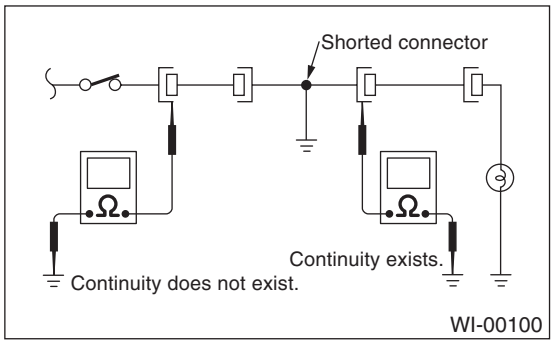


4. HOW TO DETERMINE A SHORT CIRCUIT

1) Test lamp method:
Connect a test lamp (rated at approx. 3 watts) in place of the blown fuse and allow current to flow through the circuit. Disconnect one connector at a time from the circuit, starting with the one located farthest from power supply. If the test lamp goes out when a connector is disconnected, the wiring between that connection and next connector (farther from the power supply) is shorted.



2) Ohmmeter method:
Disconnect all affected connectors, and check the continuity between each connector and ground. When the ohmmeter indicates continuity between a particular connector and ground, that the connector is shorted.

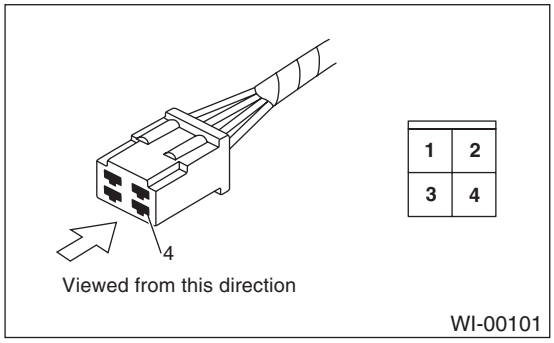


C: HOW TO READ WIRING DIAGRAMS

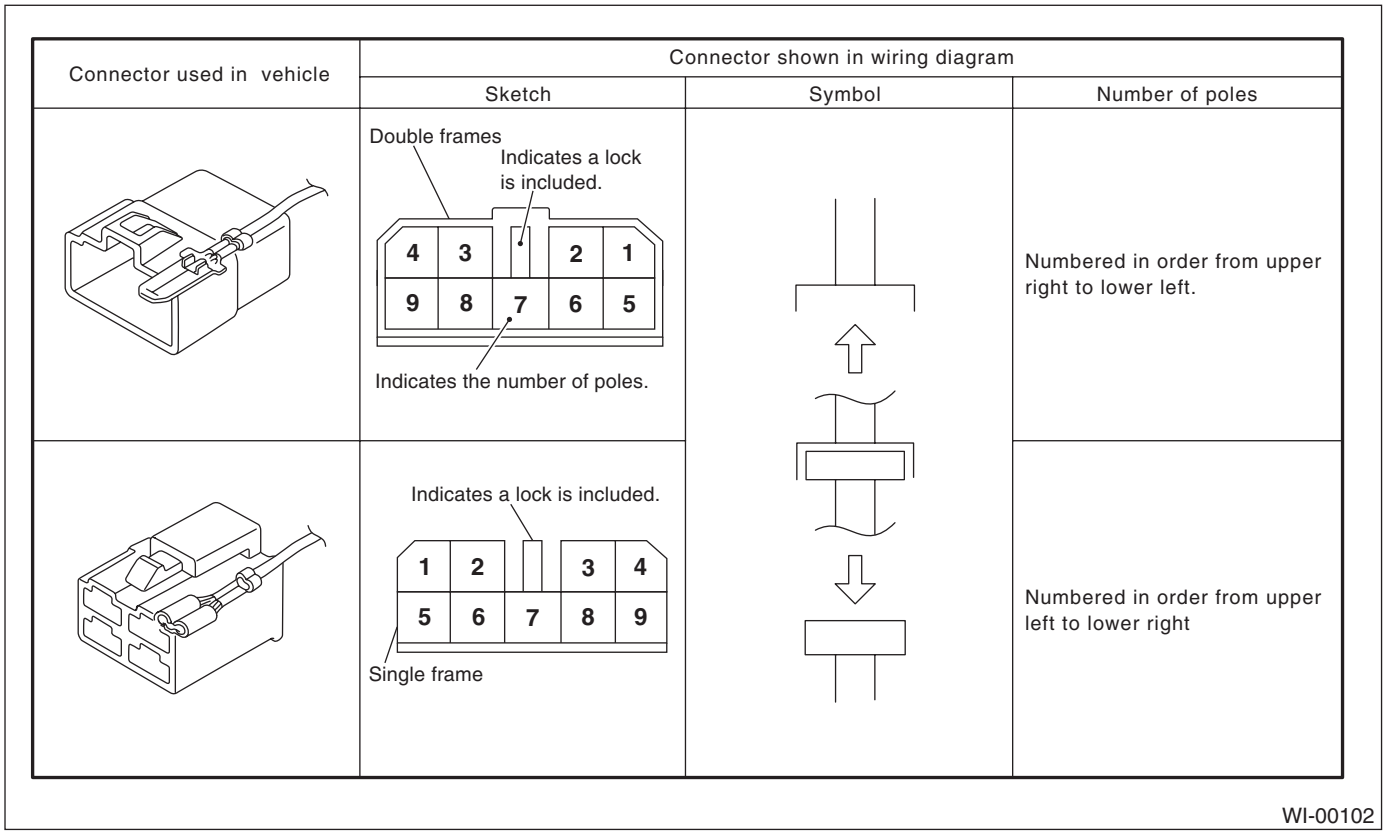
1. WIRING DIAGRAM

The wiring diagram of each system is illustrated so that you can understand the path through which electric current flows from battery.
Sketches and codes are used in the diagrams. They should read as follows:

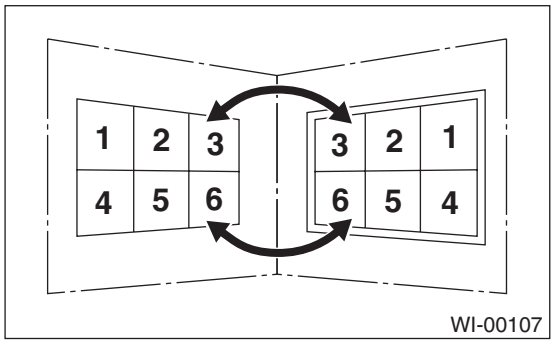
- Each connector and its terminal position are indicated by a sketch of the connector in a disconnected state which is viewed from front.



- The number of poles or pins, presence of a lock, and pin number of each terminal are indicated in the sketch of each connector. In the sketch, the highest pole number refers to the number of poles which connector has. For example, the sketch of connector shown in the figure indicates the connector has 9 poles.



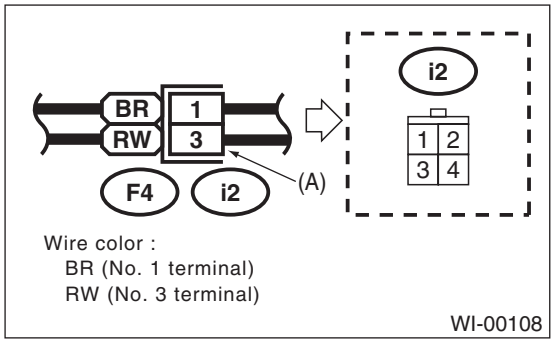
• When one set of connectors is viewed from the front side, the pole numbers of one connector are symmetrical to those of other. When these two connectors are connected as a unit, the poles which have the same number are joined.



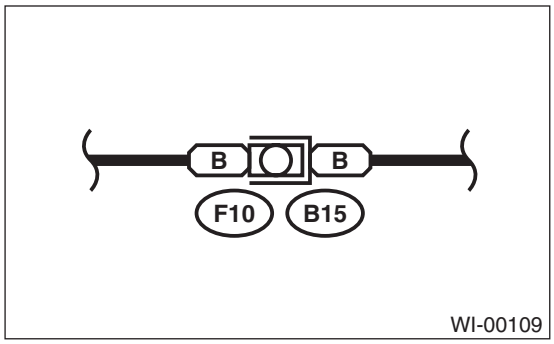
• Electrical wiring harness:
The connectors are numbered along with the number of poles, external colors, and mating connections in accompanying list.

• The sketch of each connector in the wiring diagram usually shows (A) side of the connector. The relationship between wire color, terminal number and connector is described in figure.

NOTE:
A wire which runs in one direction from a connector terminal sometimes may have a different color from that which runs in the other direction from that terminal.

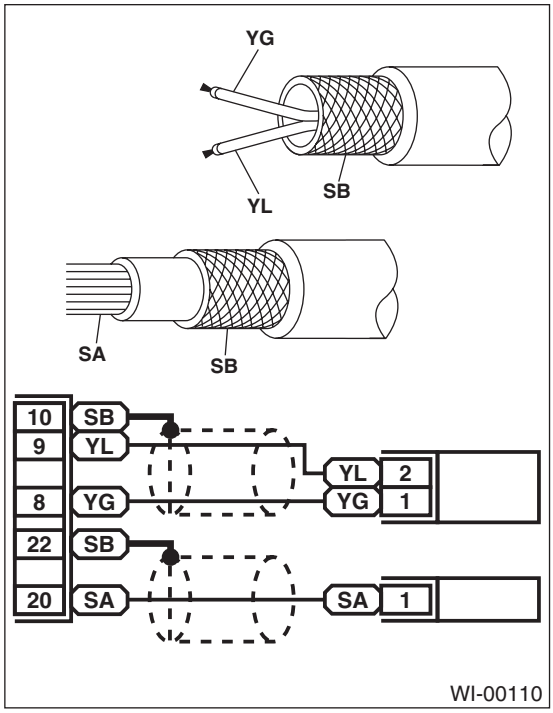


• In wiring diagram, connectors which have no terminal number refer to one-pole types. Sketches of these connectors are omitted intentionally.

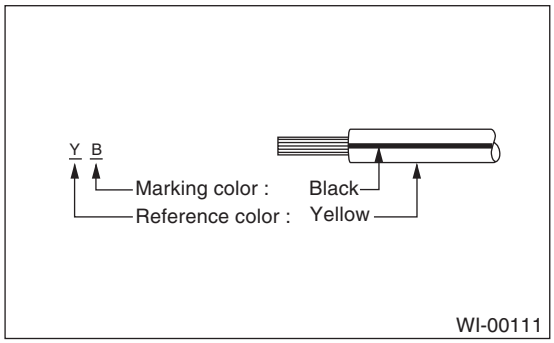


• The following color codes are used to indicate the colors of the wires used.

Color code	Color
L	Blue
B	Black
Y	Yellow
G	Green
R	Red
W	White
Br	Brown
Lg	Light green
Gr	Gray
P	Pink
Or	Orange
Lb	Light Blue
V	Violet
SA	Sealed (Inner)
SB	Sealed (Outer)



• The wire color code, which consists of two letters (or three letters including Br or Lg), indicates the standard color (base color of the wire covering) by its first letter and stripe marking by its second letter.



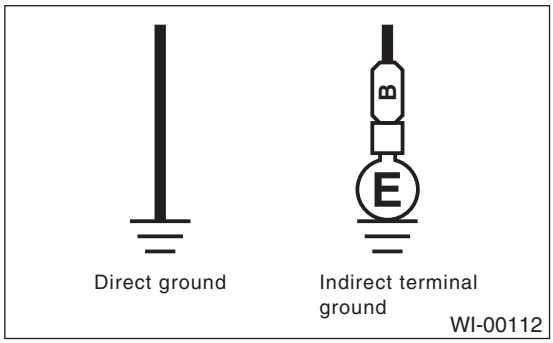
• The table lists the nominal sectional areas and allowable currents of wires.

CAUTION:
When replacing or repairing a wire, be sure to use the same size and type of wire which was originally used.

NOTE:
• The allowable current in the table indicates tolerable amperage of each wire at an ambient temperature of 40°C (104°F).
• The allowable current changes with ambient temperature. Also, it changes if a bundle of more than two wires is used.

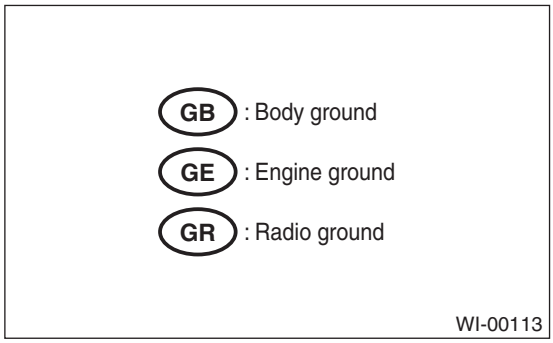
Nominal sectional area mm^2	No. of strands/ strand diameter	Outside diameter of finished wiring mm	Allowable current Amps/ 40°C (104°F)
0.3	7/0.26	1.8	7
0.5	7/0.32	2.2 (or 2.0)	12
0.75	30/0.18	2.6 (or 2.4)	16
0.85	11/0.32	2.4 (or 2.2)	16
1.25	16/0.32	2.7 (or 2.5)	21
2	26/0.32	3.1 (or 2.9)	28
3	41/0.32	3.8 (or 3.6)	38
5	65/0.32	4.6 (or 4.4)	51
8	50/0.45	5.5	67

• Each unit is directly grounded to the body or indirectly grounds through a harness ground terminal. Different symbols are used in the wiring diagram to identify the two grounding systems.



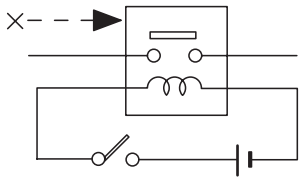
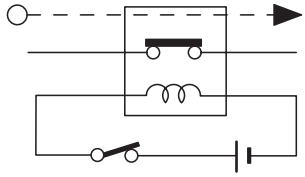
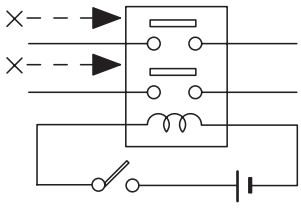
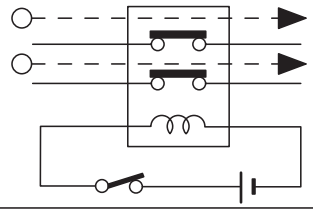
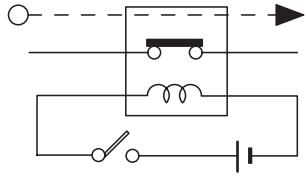
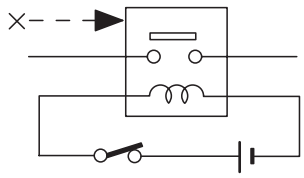
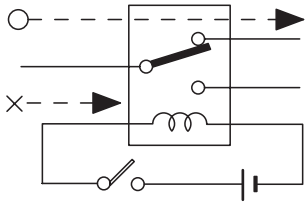
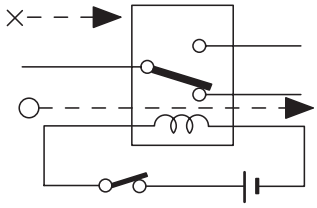
• The ground points shown in the wiring diagram refer to the following:

NOTE:
All wiring harnesses are provided with a ground point which should be securely connected.



• Relays are classified as normally-open or normally-closed. The normally-closed relay has one or more contacts.

The wiring diagram shows the relay mode when energizing circuit is OFF.

Relay type		Energizing circuit OFF	Energizing circuit ON
Normally-open type	4-pole		
	6-pole		
Normally-closed type	4-pole		
Mixed type	6-pole		

Key to symbols:

○ ⟶ : Current flows.

× ⟶ : Current does not flow.

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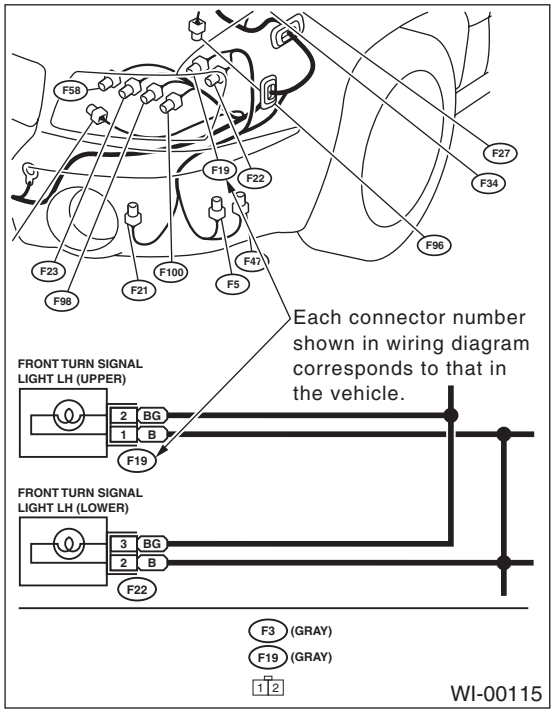
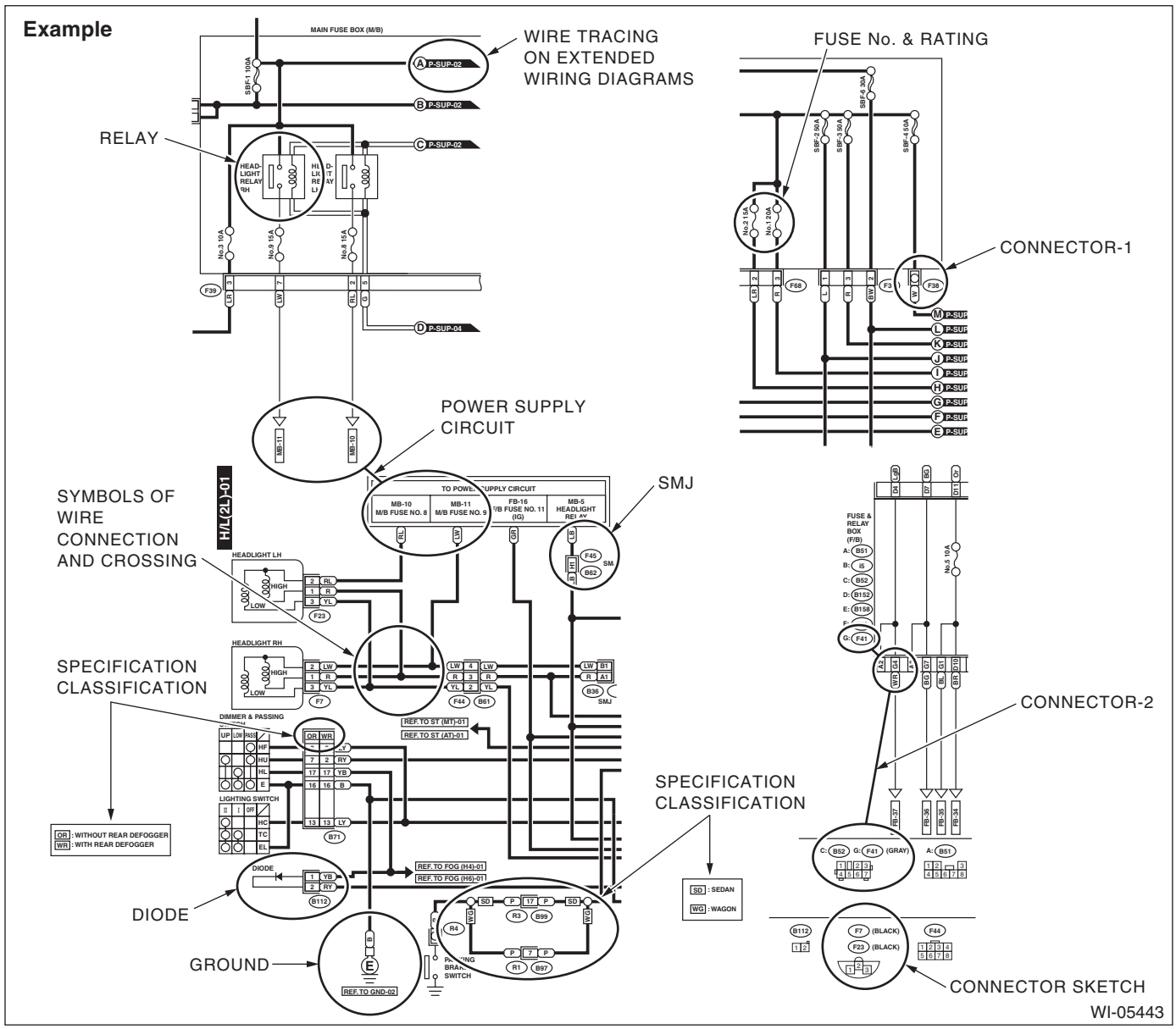
• Each connector number shown in the wiring diagram corresponds to that in wiring harness. The location of each connector in actual vehicle is determined by reading the first character of the connector (for example, a “F” for F8, “i” for i16, etc.) and type of wiring harness.
The first character of each connector number refers to the area or system of the vehicle.

Symbol	Wiring harness and cord
F	Front wiring harness
B	Bulkhead wiring harness
E	Engine wiring harness
T	Transmission cord, Rear oxygen sensor cord
D	Door cord LH & RH, Rear door cord LH & RH, Rear gate cord
i	Instrument panel wiring harness
R	Rear wiring harness, Fuel tank cord, Roof cord, Trunk lid cord
AB	Airbag wiring harness



D: SYMBOLS IN WIRING DIAGRAMS

A number of symbols are used in each wiring diagram to easily identify parts or circuits.



1. RELAY

A symbol used to indicate a relay.

2. CONNECTOR-1

The sketch of the connector indicates one-pole types.

3. WIRING CONNECTION

Some wiring diagrams are indicated in foldouts for convenience. Wiring destinations are indicated where necessary by corresponding symbols (as when two pages are needed for clear indication).

4. FUSE No. & RATING

The “FUSE No. & RATING” corresponds with that used in fuse box (main fuse box, fuse and joint box).

5. CONNECTOR-2

- Each connector is indicated by a symbol.
- Each terminal number is indicated in the corresponding wiring diagram in an abbreviated form.
- For example, terminal number “G4” refers to No. 4 terminal of connector (G: F41) shown in the connector sketch.

6. CONNECTOR SKETCH

• Each connector sketch clearly identifies the shape and color of a connector as well as terminal locations. Non-colored connectors are indicated in natural color.
• When more than two types of connector number are indicated in a connector sketch, it means that the same type connectors are used.

7. GROUND

Each grounding point can be located easily by referring to the corresponding wiring harness.

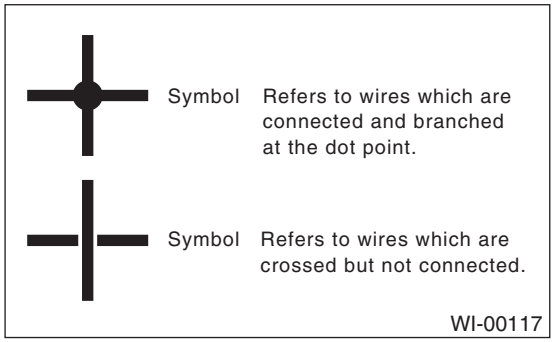
8. DIODE

A symbol is used to indicate a diode.

9. WIRE TRACING ON EXTENDED WIRING DIAGRAMS

For a wiring diagram extending over at least two pages, a symbol (consisting of the same characters with arrows), facilitates wire tracing from one page to the next.
A ←→ A, B ←→ B

10.SYMBOLS OF WIRE CONNECTION AND CROSSING



11.POWER SUPPLY CIRCUIT

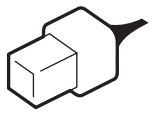
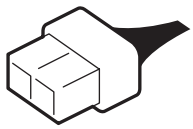
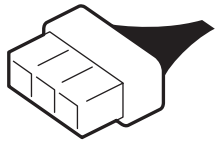
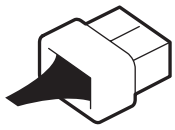
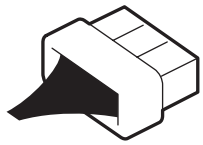
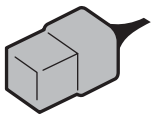
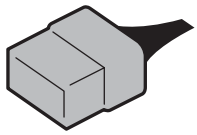
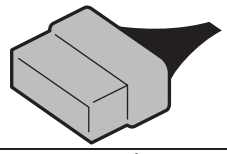
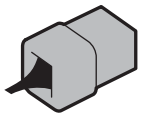
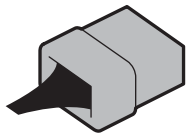
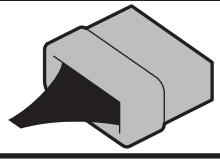
A symbol is used to indicate the power supply in each wiring diagram.
“MB-5”, “MB-6”, etc., which are used as power-supply symbols throughout the text, correspond with those shown in POWER SUPPLY CIRCUIT in the wiring diagram.
Accordingly, using the POWER SUPPLY CIRCUIT and wiring diagrams permits service personnel to understand the entire electrical arrangement of a system.

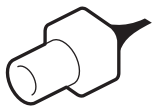
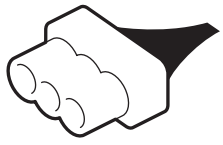
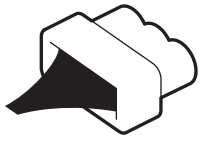
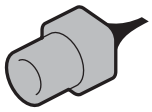
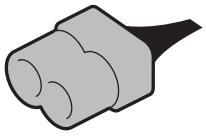
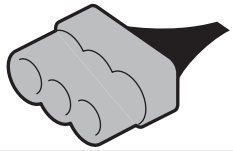
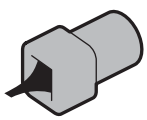
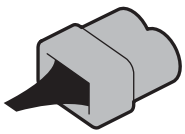
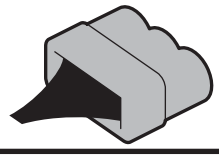
12.CLASSIFICATION BY SPECIFICATION

When the wiring diagrams differ according to vehicle specifications, the specification difference is described by using abbreviations.

E: CONNECTOR SYMBOL IN WIRING HARNESS

Main symbols of connector (in wiring harness) are indicated in below.

Standard type: Female		
Pole: From 1 to 8	Pole: From 9 to 20	Pole: More than 21
		
		
Standard type: Male		
		
		

Water proof type: Female		
Pole: From 1 to 8	Pole: From 9 to 20	Pole: More than 21
		
		
Water proof type: Male		
		
		

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F: ABBREVIATION IN WIRING DIAGRAMS

Abbreviation	Full name
ABS	Antilock Brake System
ACC	Accessory
A/C	Air Conditioning
AD	Auto Down
AT	Automatic Transmission
AU	Auto Up
+B	Battery
DCCD	Driver's Control Center Differential
DIFF	Differential
DN	Down
E	Ground
F/B	Fuse & Joint Box
FL1.5	Fusible link 1.5 mm^2
IG	Ignition
Illumi.	Illumination
LH	Left Hand
Lo	Low
M	Motor
M/B	Main Fuse Box
MG	Magnet
Mi	Middle
OP	Optional Parts
PASS	Passing
RH	Right Hand
SBF	Slow Blow Fuse
ST	Starter
SW	Switch
UP	Up
WASH	Washer

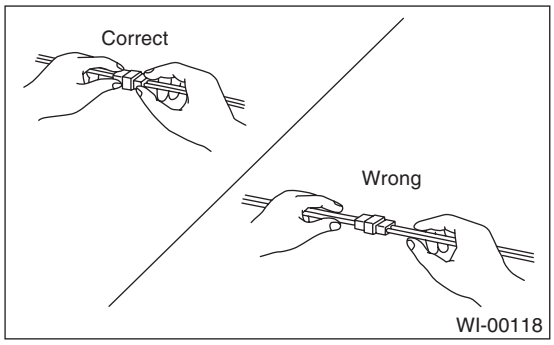
2. Working Precautions

A: PRECAUTIONS WHEN WORKING WITH THE PARTS MOUNTED ON THE VEHICLE

1) When working under a vehicle which is jacked-up, always be sure to use rigid racks.
2) The parking brake must always be applied during working. Also, in automatic transmission models, keep the select lever set to P (Parking) range.
3) Be sure the workshop is properly ventilated when running the engine. Further, be careful not to touch the belt or fan while the engine is operating.
4) Be careful not to touch hot metal parts, especially the radiator and exhaust system immediately after the engine has been shut off.

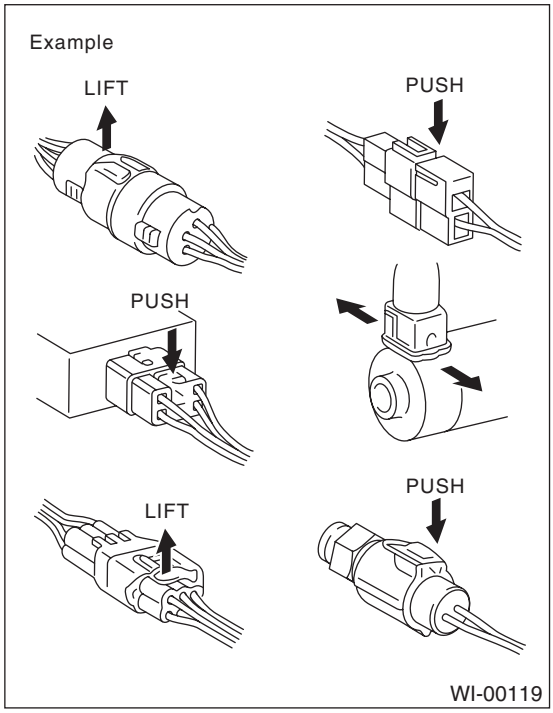
B: PRECAUTIONS IN TROUBLE DIAGNOSIS AND REPAIR OF ELECTRIC PARTS

1) The battery cable must be disconnected from battery's (–) terminal, and the ignition switch must be set to OFF position, unless otherwise required by the diagnostics.
2) Securely fasten the wiring harness with clamps and slips so that the harness does not interfere with body end parts or edges and bolts or screws.
3) When installing the parts, be careful not to catch them on the wiring harness.
4) When disconnecting a connector, do not pull the wires, but pull while holding the connector body.

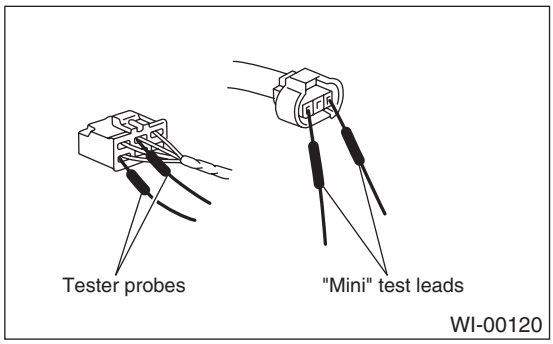


5) Some connectors are provided with a lock. One type of such a connector is disconnected by pushing the lock, and the other, by moving the lock up. In either type the lock shape must be identified before attempting to disconnect the connector.

To connect, insert the connector until it snaps and confirm that it is tightly connected.



6) When checking continuity between connector terminals, or measuring the voltage across the terminal and ground, always contact tester probe(s) on terminals from the wiring connection side. If the probe is too thick to gain access to the terminal, use "mini" test leads.
To check water-proof connectors (which are not accessible from the wiring side), contact test probes on the terminal side being careful not to bend or damage terminals.



7) Sensors, relays, electrical unit, etc., are sensitive to strong impacts.
Handle them with care so that they are not dropped or mishandled.

3. Power Supply Circuit

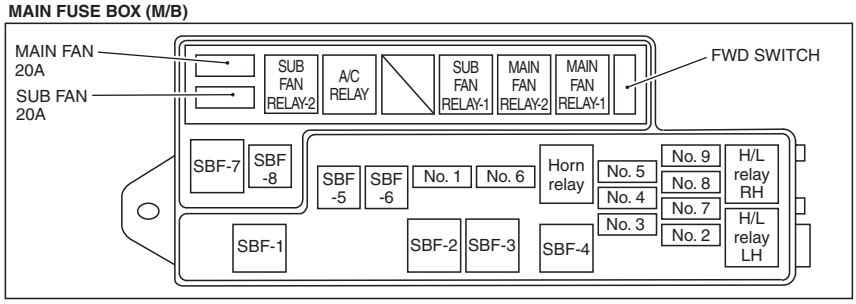
A: WIRING DIAGRAM

1. LHD MODEL

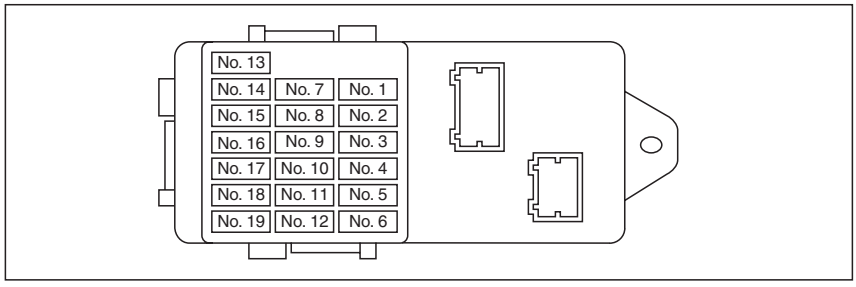
P-SUP(L)-01

P-SUP(L)-01

MAIN FUSE BOX (M/B)

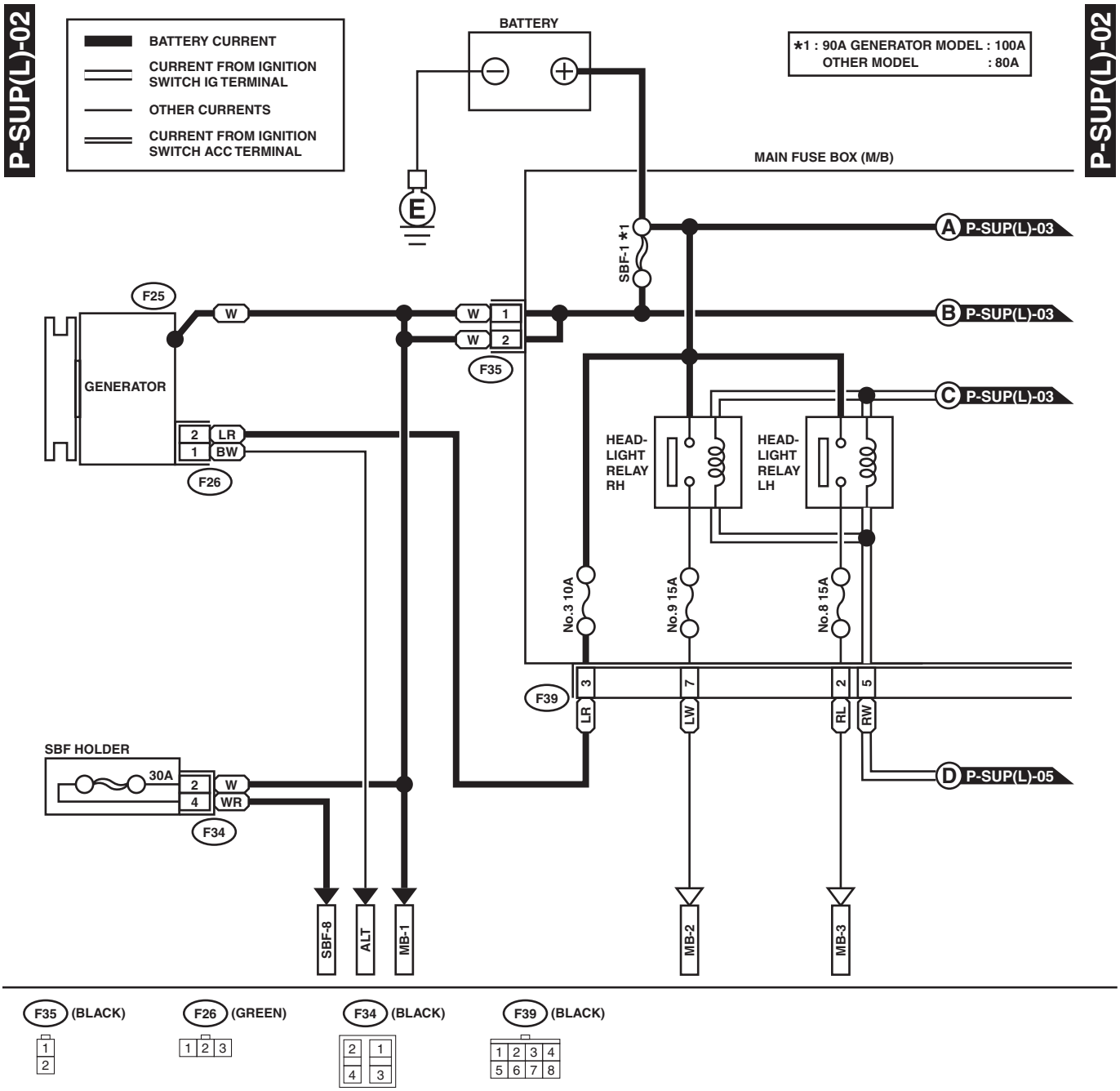


FUSE & RELAY BOX (F/B)

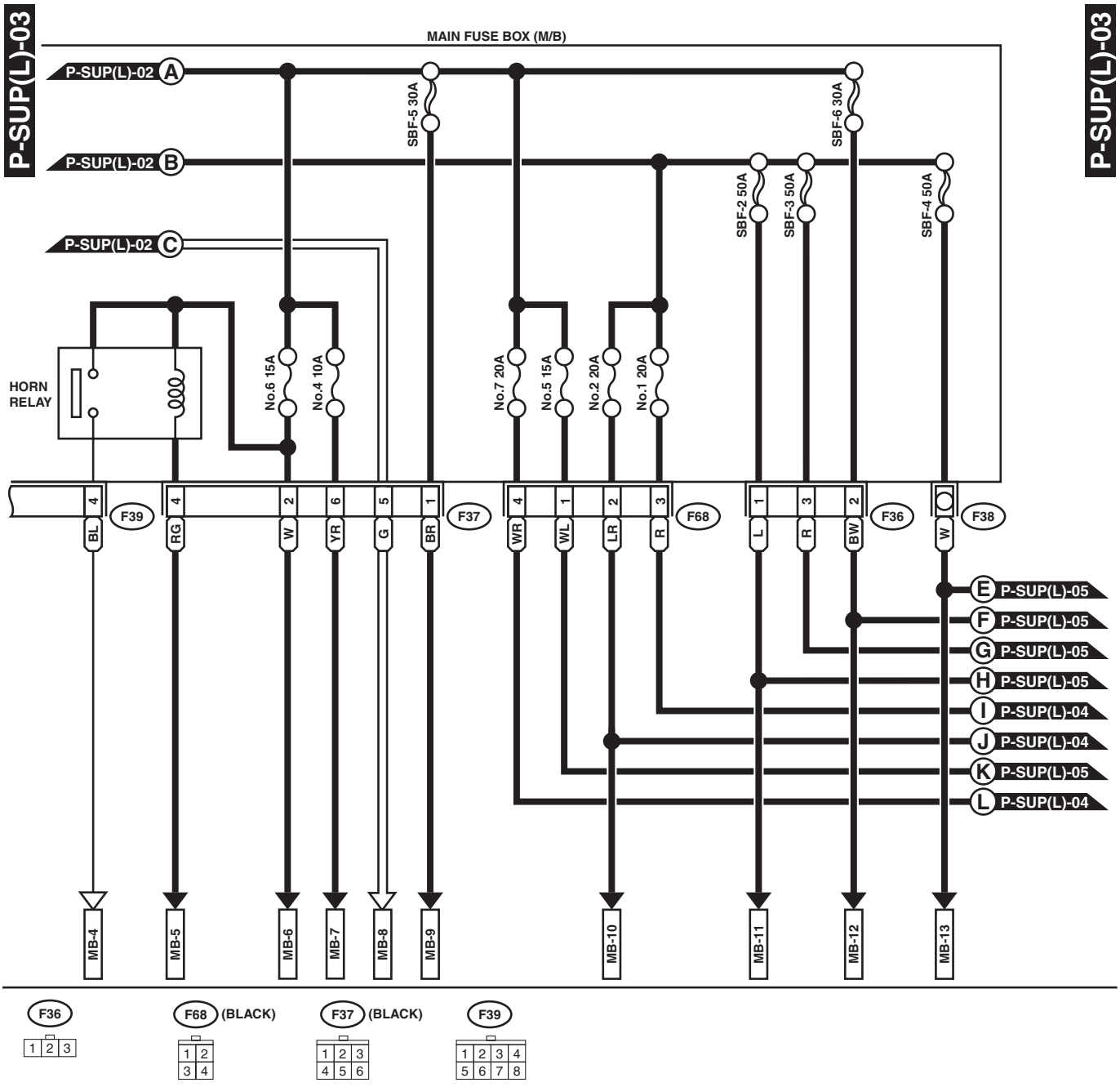


WI-02233

Power Supply Circuit

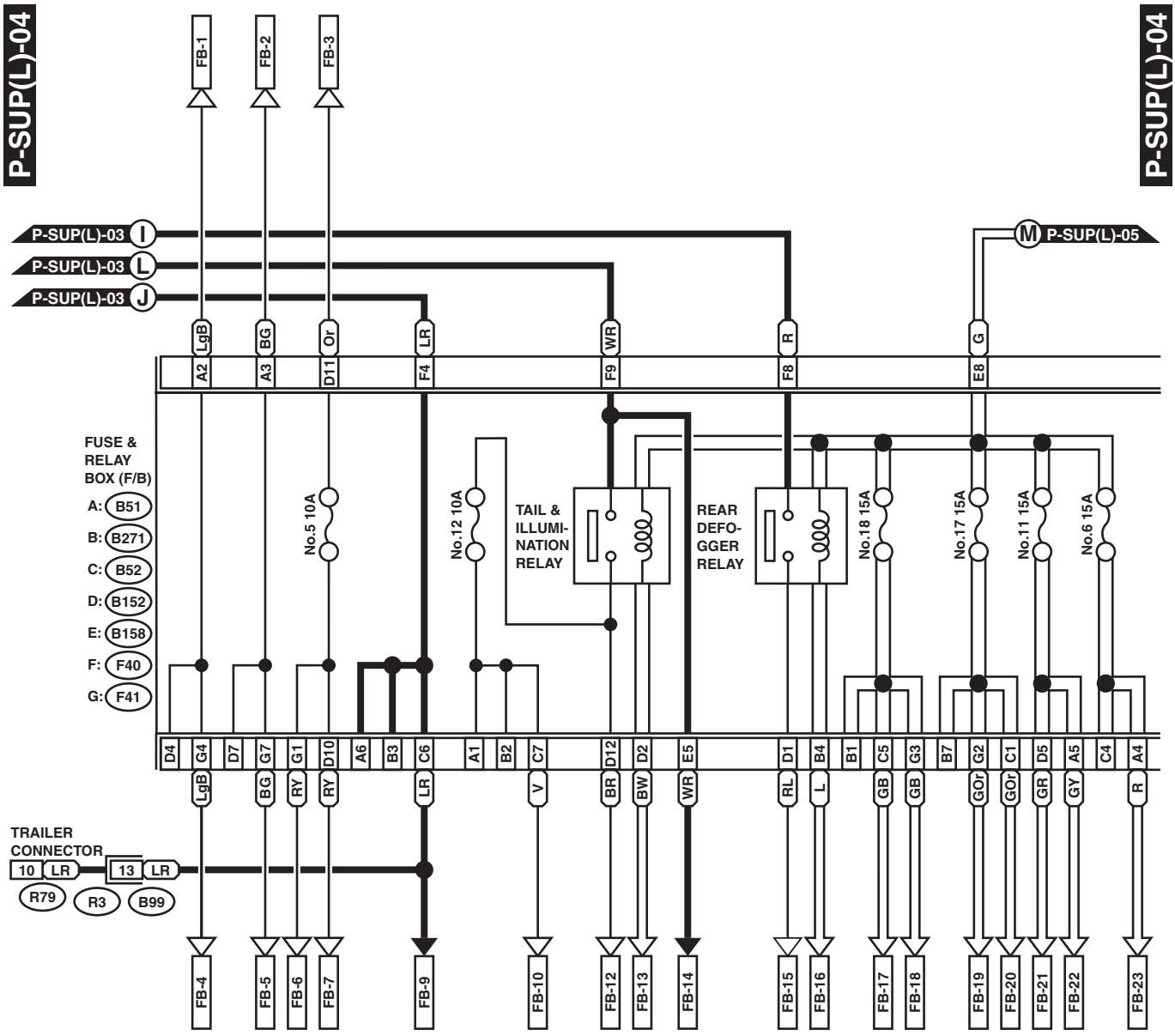


WI-07040

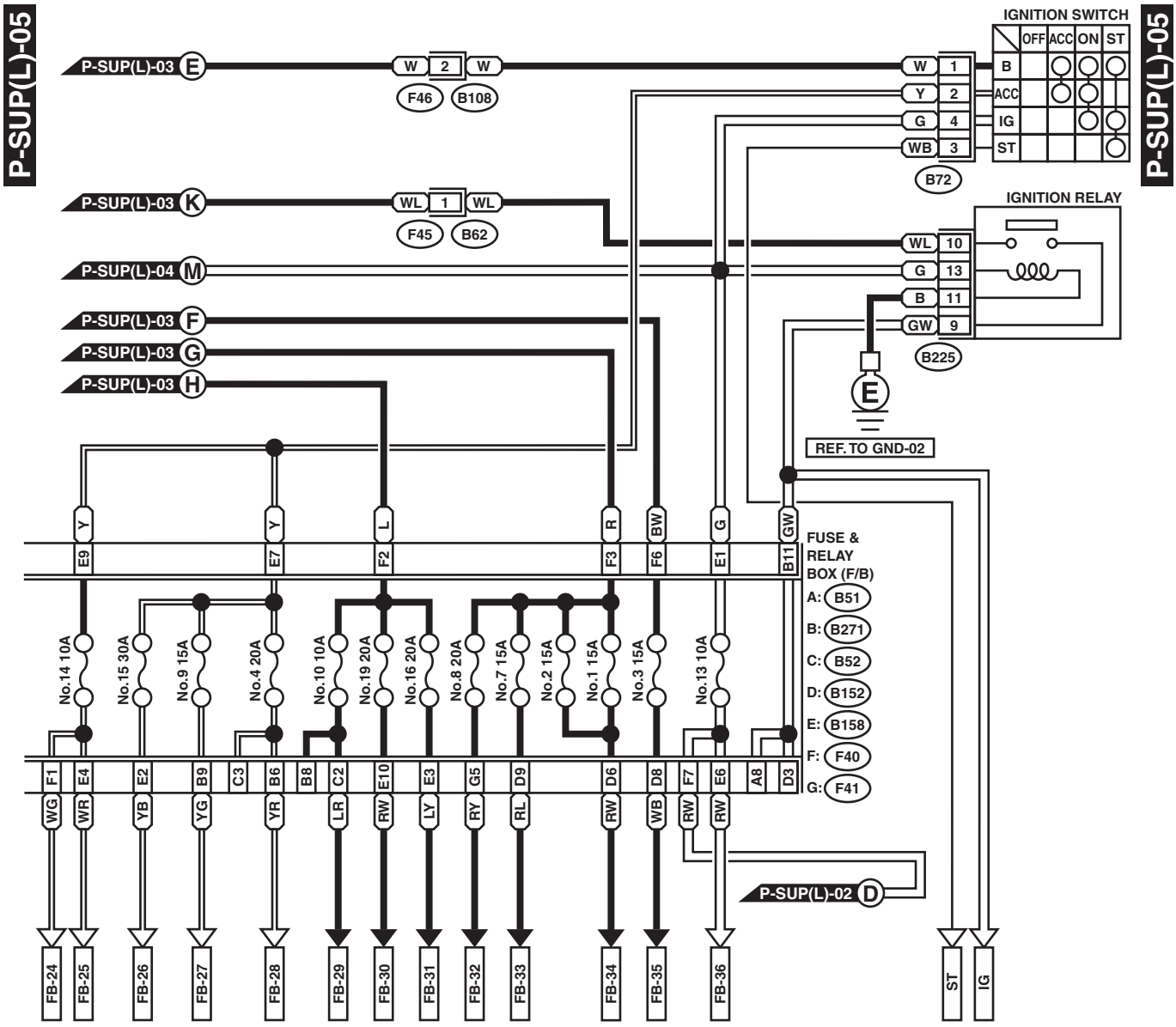

P-SUP(L)-03
P-SUP(L)-03
MAIN FUSE BOX (M/B)
P-SUP(L)-02 A
P-SUP(L)-02 B
P-SUP(L)-02 C
SBF-5 30A
SBF-6 30A
SBF-2 50A
SBF-3 50A
SBF-4 50A
HORN RELAY
No.6 15A
No.4 10A
No.7 20A
No.5 15A
No.2 20A
No.1 20A
F39
F37
F68
F36
F38
BL
RG
W
YR
G
BR
WR
WL
LR
R
L
R
BW
W
E P-SUP(L)-05
F P-SUP(L)-05
G P-SUP(L)-05
H P-SUP(L)-05
I P-SUP(L)-04
J P-SUP(L)-04
K P-SUP(L)-05
L P-SUP(L)-04
MB-4
MB-5
MB-6
MB-7
MB-8
MB-9
MB-10
MB-11
MB-12
MB-13
F36
F68 (BLACK)
F37 (BLACK)
F39

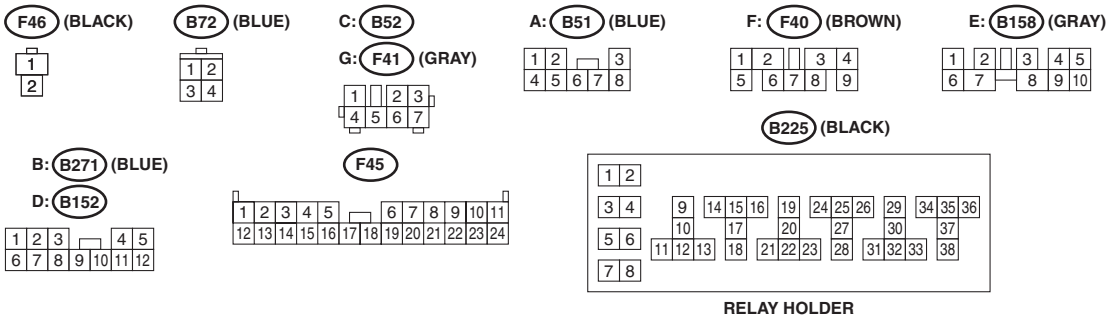
WI-07041

Power Supply Circuit



WI-02236


P-SUP(L)-05
P-SUP(L)-03 E
P-SUP(L)-03 K
P-SUP(L)-04 M
P-SUP(L)-03 F
P-SUP(L)-03 G
P-SUP(L)-03 H
W 2 W
F46 B108
WL 1 WL
F45 B62
IGNITION SWITCH
OFF ACC ON ST
B
ACC
IG
ST
W 1
Y 2
G 4
WB 3
B72
IGNITION RELAY
WL 10
G 13
B 11
GW 9
B225
E
REF. TO GND-02
Y E9
Y E7
L F2
R F3
BW F6
G E1
GW B11
FUSE & RELAY BOX (F/B)
A: B51
B: B271
C: B52
D: B152
E: B158
F: F40
G: F41
No.14 10A
No.15 30A
No.9 15A
No.4 20A
No.10 10A
No.19 20A
No.16 20A
No.8 20A
No.7 15A
No.2 15A
No.1 15A
No.3 15A
No.13 10A
F1 E4 E2 B9 C3 B6 B8 C2 E10 E3 G5 D9 D6 D8 F7 E6 A8 D3
WG WR YB YG YR LR RW LY RY RL RW WB RW RW
P-SUP(L)-02 D
FB-24 FB-25 FB-26 FB-27 FB-28 FB-29 FB-30 FB-31 FB-32 FB-33 FB-34 FB-35 FB-36
ST IG


F46 (BLACK)
B72 (BLUE)
C: B52
G: F41 (GRAY)
A: B51 (BLUE)
F: F40 (BROWN)
E: B158 (GRAY)
B: B271 (BLUE)
D: B152
F45
B225 (BLACK)
RELAY HOLDER

WI-04431

No.	Load
MB-1	A/C relay holder
MB-2	Combination meter Headlight RH
MB-3	Headlight LH
MB-4	Horn
MB-5	Horn switch
MB-6	Hazard switch Key warning switch Ignition starter and steering lock assembly AT shift lock module Keyless entry control module
MB-7	Driver's control center differential control module Driver's control center differential relay TCM
MB-8	Diode (With rear fog light model) Lighting switch
MB-9	Data link connector ECM Fuel pump relay IMM ECM Main relay
MB-11	Fuse (Seat heater)
MB-12	Power window circuit breaker
MB-13	Relay holder
SBF-8	ABS control module
IG	Hazard switch Power window relay
ST	ECM Inhibitor switch (AT) Starter motor (MT)
FB-1	Hazard switch Rear turn signal light RH Trailer connector Turn signal switch Side turn signal light RH Keyless entry control module
FB-2	Hazard switch Rear turn signal light LH Trailer connector Turn signal switch
FB-3	Parking switch
FB-4	Front turn signal light RH
FB-5	Front turn signal light LH Side turn signal light LH
FB-6	Front clearance light LH Front clearance light RH
FB-7	License plate light Tail light LH Tail light RH Trailer connector

No.	Load
FB-9	Auto A/C control module Combination meter Keyless entry control module Luggage room light (Wagon) Radio Room light Spot map light Trunk room light (Sedan) Ignition switch illumination light Clock Trailer connector
FB-10	Bright switch Combination meter Front fog light relay Front fog light switch Headlight leveler switch Illumination light Rear fog light relay Rear fog light switch Intercooler water spray switch
FB-12	Parking switch
FB-13	ECM Lighting switch
FB-14	Parking switch
FB-15	Mirror heater relay Rear defogger Rear defogger switch
FB-16	ECM Rear defogger timer
FB-17	ABS relay Back-up light switch (MT) Check connector Inhibitor switch (AT) AT shift lock module Seat belt timer module Vehicle speed sensor (MT)
FB-18	Headlight leveler LH Headlight leveler RH A/C main fan relay
FB-19	A/C sub fan relay Pressure switch (A/C)
FB-20	Auto A/C control module Blower motor relay Mode control panel Rear defogger timer
FB-21	Driver's control center differential control module Driver's control center differential relay ECM Fuel pump relay Ignition coil and ignitor IMM ECM TCM
FB-22	Airbag control module
FB-23	Airbag control module
FB-24	Rear washer motor
FB-25	Rear wiper intermittent module Rear wiper motor

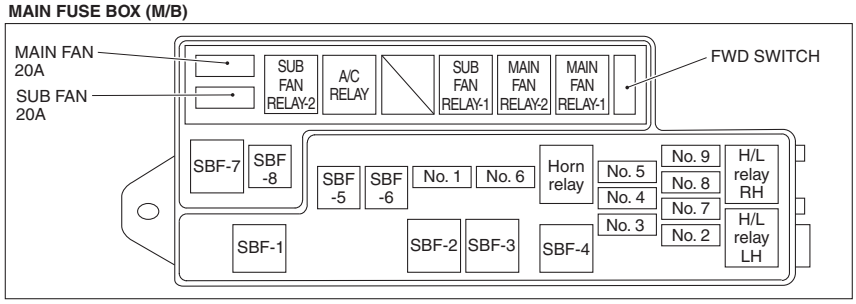
No.	Load
FB-26	Front washer motor Front wiper motor Front wiper switch
FB-27	Auto A/C control module Radio Clock
FB-28	Front accessory power supply socket Remote control mirror switch Intercooler water spray switch Intercooler water spray timer AT shift lock module Seat heater relay
FB-29	Rear fog light relay
FB-30	Mirror heater relay
FB-31	Stop light switch
FB-32	ABS control module
FB-33	Front fog light relay
FB-34	Blower motor relay
FB-35	Keyless entry control module
FB-36	Combination meter

2. RHD MODEL

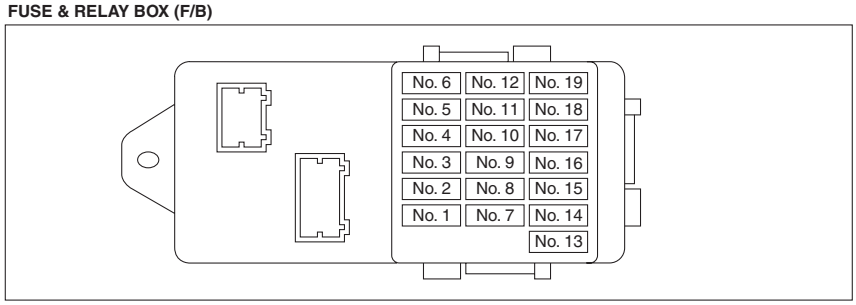
P-SUP(R)-01

P-SUP(R)-01

MAIN FUSE BOX (M/B)

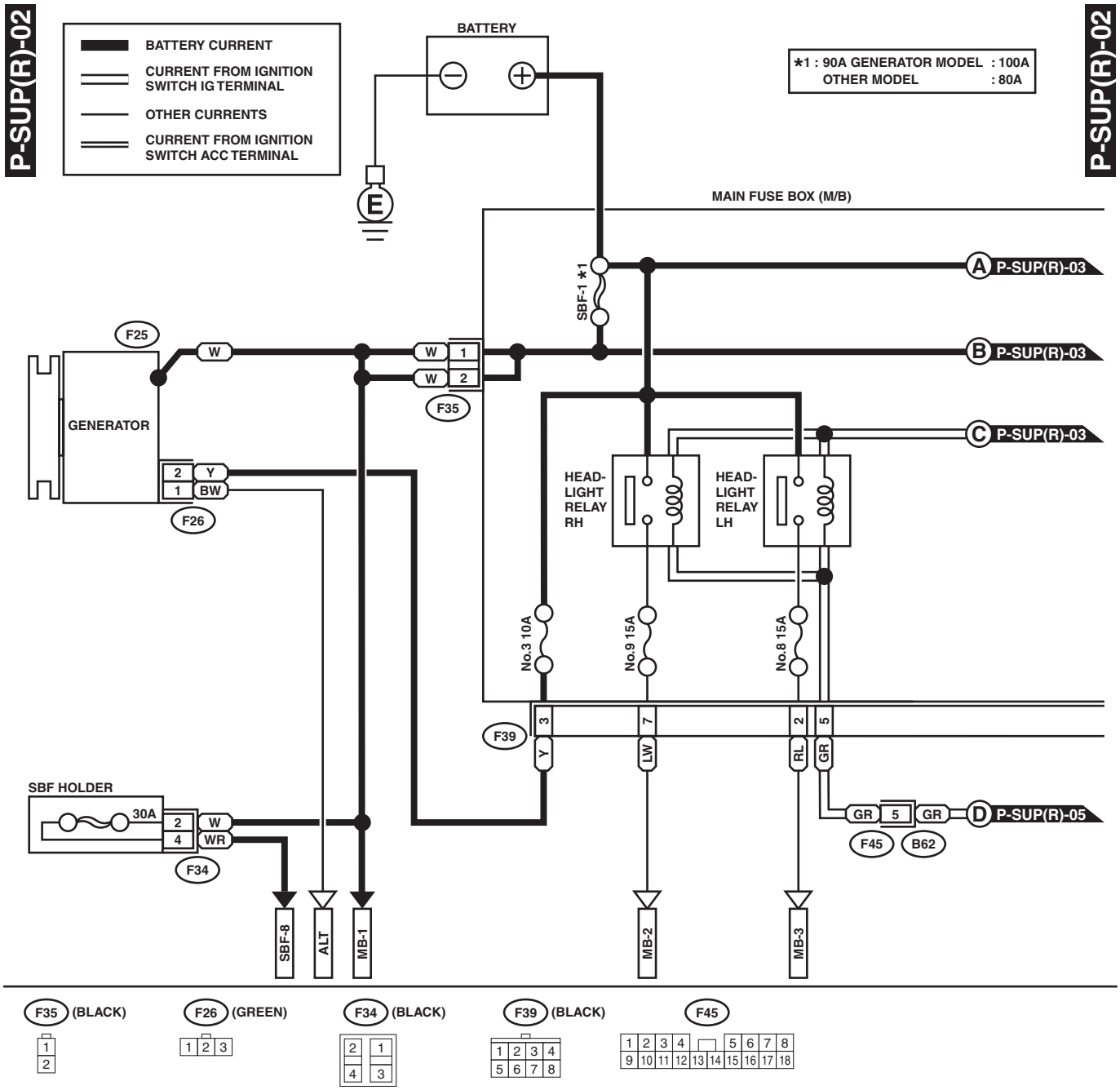


FUSE & RELAY BOX (F/B)



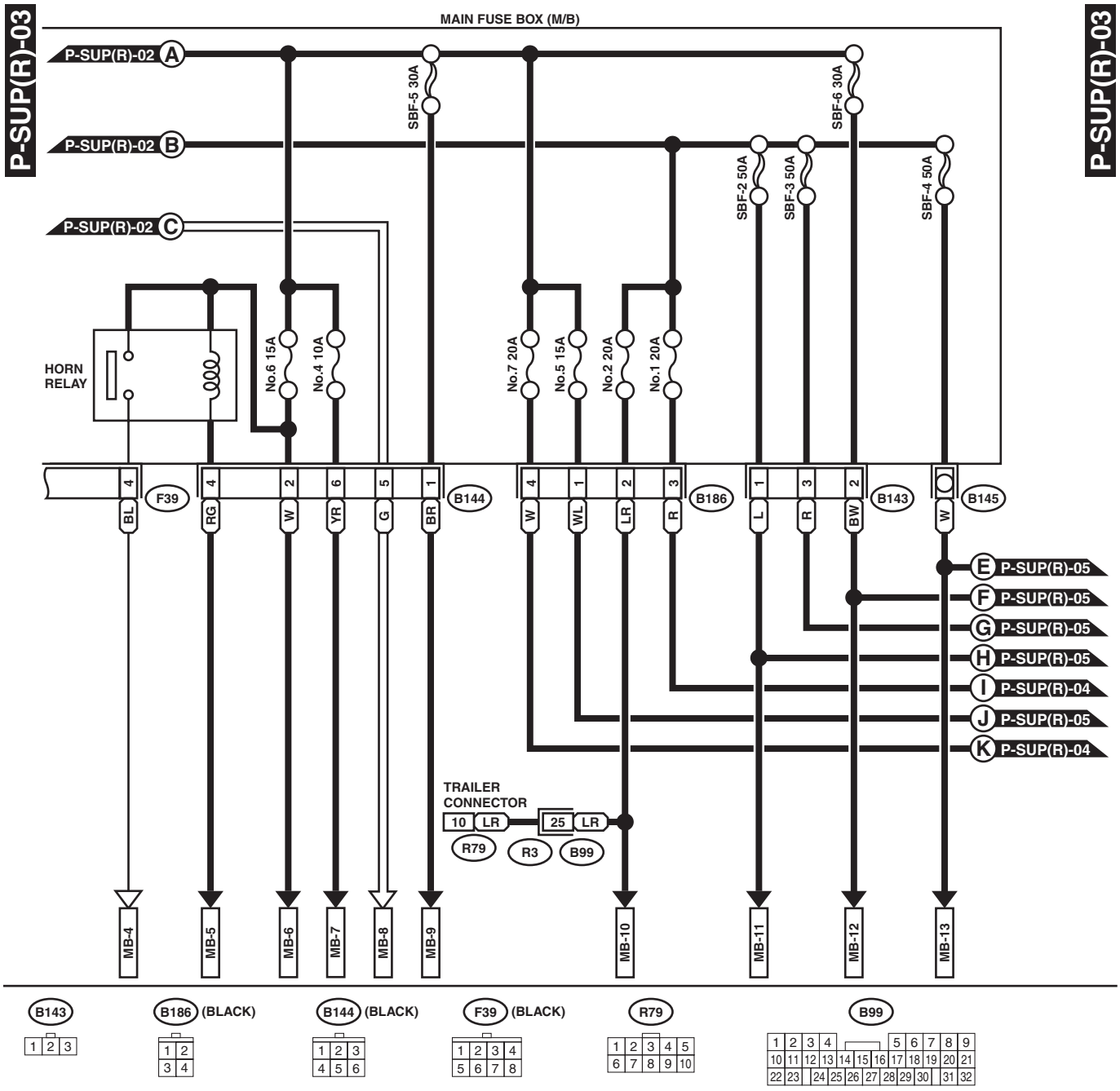
WI-02238

Power Supply Circuit

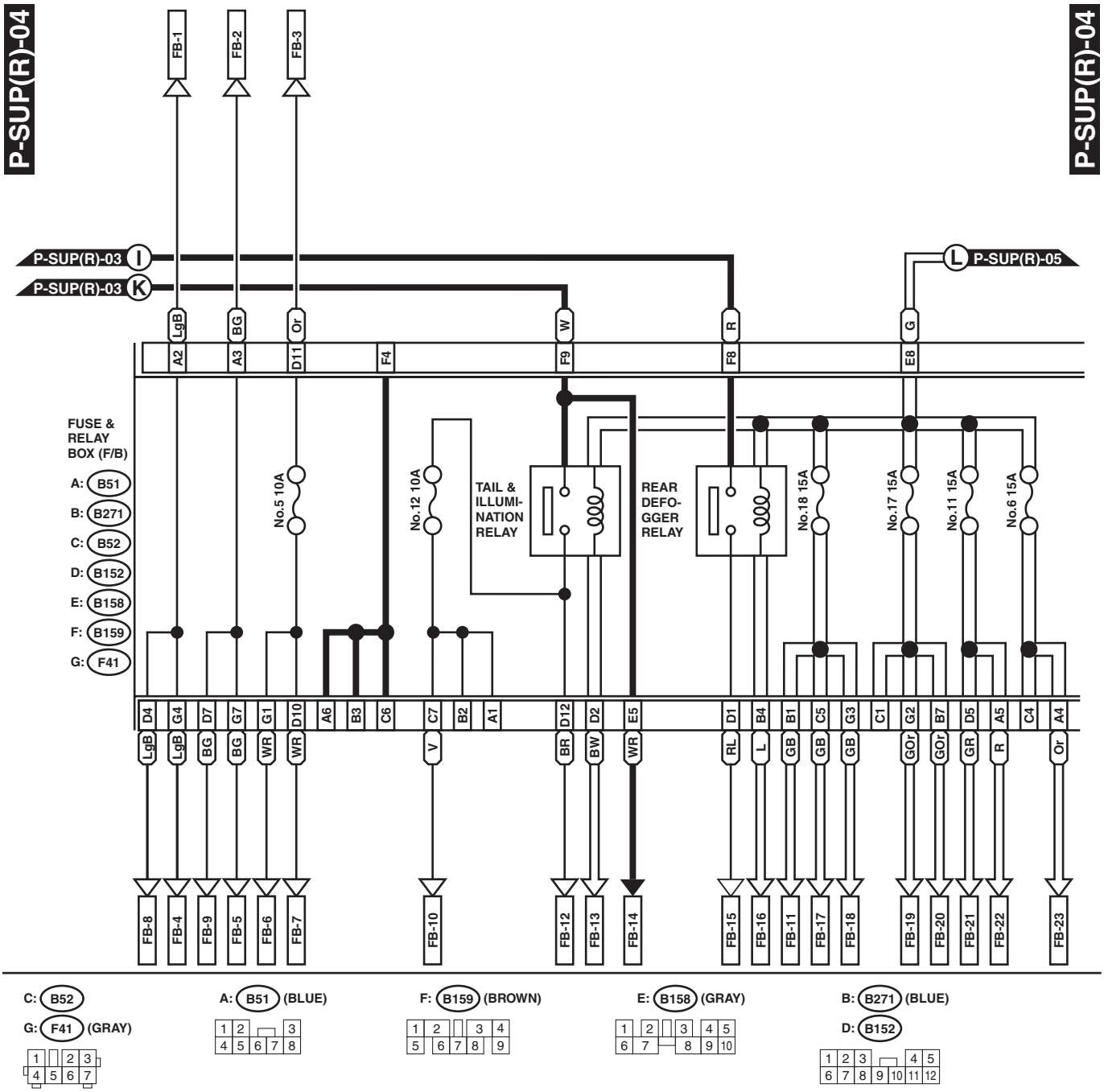


WI-07042

Power Supply Circuit

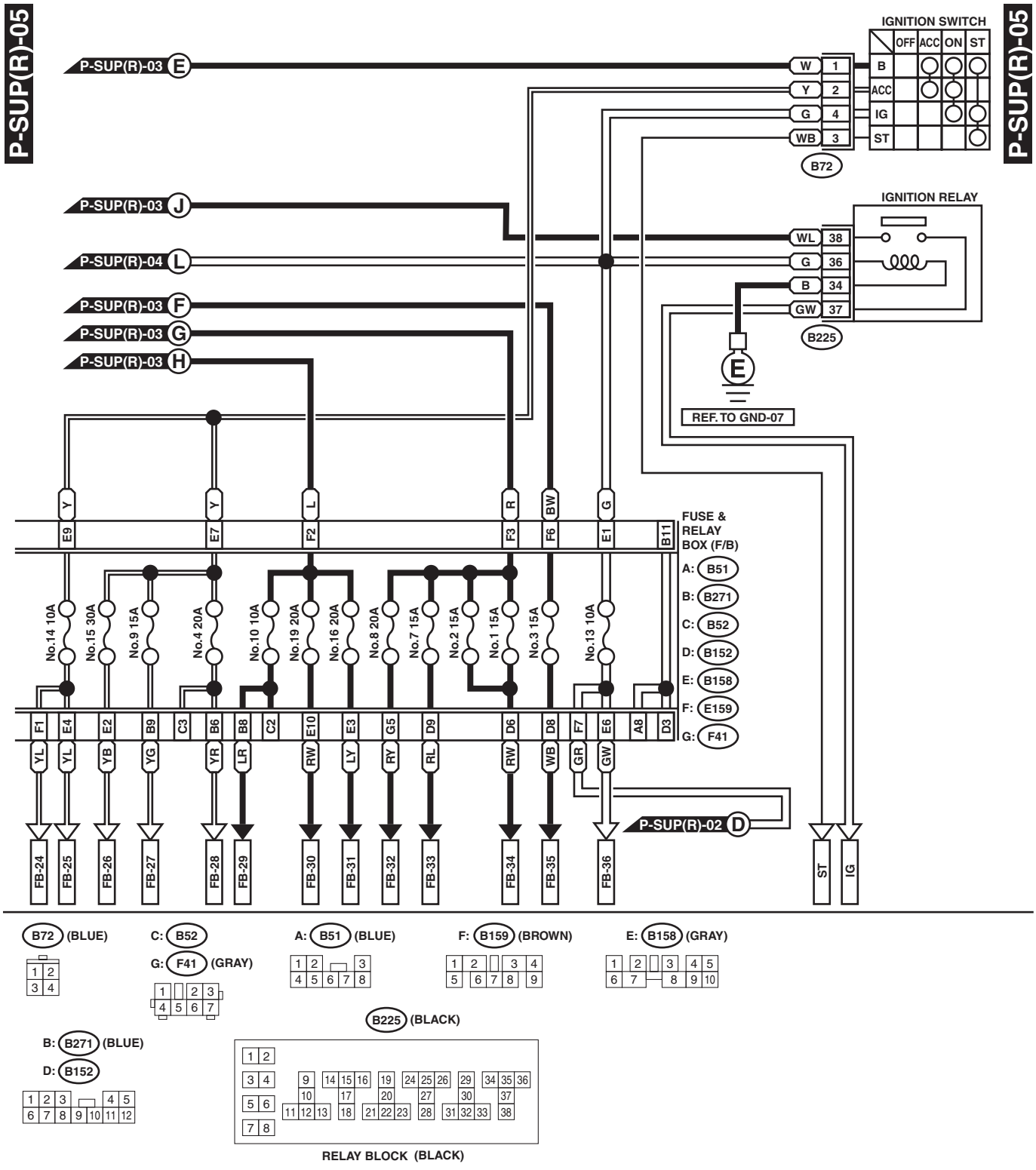


WI-07230


P-SUP(R)-04
P-SUP(R)-04
FB-1
FB-2
FB-3
P-SUP(R)-03 I
P-SUP(R)-03 K
L P-SUP(R)-05
LgB
BG
Or
W
R
G
A2
A3
D11
F4
F9
F8
E8
FUSE & RELAY BOX (F/B)
A: B51
B: B271
C: B52
D: B152
E: B158
F: B159
G: F41
No.5 10A
No.12 10A
TAIL & ILLUMI-NATION RELAY
REAR DEFO-GGER RELAY
No.18 15A
No.17 15A
No.11 15A
No.6 15A
D4 G4 D7 G7 G1 D10 A6 B3 C6 C7 B2 A1 D12 D2 E5 D1 B4 B1 C5 G3 C1 G2 B7 D5 A5 C4 A4
LgB LgB BG BG WR WR V BR BW WR RL L GB GB GB GOr GOr GR R Or
FB-8 FB-4 FB-9 FB-5 FB-6 FB-7 FB-10 FB-12 FB-13 FB-14 FB-15 FB-16 FB-11 FB-17 FB-18 FB-19 FB-20 FB-21 FB-22 FB-23

C: B52
G: F41 (GRAY)
A: B51 (BLUE)
F: B159 (BROWN)
E: B158 (GRAY)
B: B271 (BLUE)
D: B152

WI-07043


P-SUP(R)-05
P-SUP(R)-05
IGNITION SWITCH
OFF ACC ON ST
B
ACC
IG
ST
P-SUP(R)-03 E
W 1
Y 2
G 4
WB 3
B72
P-SUP(R)-03 J
P-SUP(R)-04 L
P-SUP(R)-03 F
P-SUP(R)-03 G
P-SUP(R)-03 H
IGNITION RELAY
WL 38
G 36
B 34
GW 37
B225
E
REF. TO GND-07
Y Y L R BW G
E9 E7 F2 F3 F6 E1 B11
FUSE & RELAY BOX (F/B)
A: B51
B: B271
C: B52
D: B152
E: B158
F: E159
G: F41
No.14 10A
No.15 30A
No.9 15A
No.4 20A
No.10 10A
No.19 20A
No.16 20A
No.8 20A
No.7 15A
No.2 15A
No.1 15A
No.3 15A
No.13 10A
F1 E4 E2 B9 C3 B6 B8 C2 E10 E3 G5 D9 D6 D8 F7 E6 A8 D3
YL YL YB YG YR LR RW LY RY RL RW WB GR GW
P-SUP(R)-02 D
FB-24 FB-25 FB-26 FB-27 FB-28 FB-29 FB-30 FB-31 FB-32 FB-33 FB-34 FB-35 FB-36 ST IG
B72 (BLUE)
C: B52
G: F41 (GRAY)
A: B51 (BLUE)
F: B159 (BROWN)
E: B158 (GRAY)
B225 (BLACK)
B: B271 (BLUE)
D: B152
RELAY BLOCK (BLACK)

WI-07044

No.	Load
MB-1	A/C relay holder
MB-2	Combination meter Headlight RH
MB-3	Headlight LH
MB-4	Horn
MB-5	Cruise control sub switch Horn switch
MB-6	Hazard switch Keyless entry control module Key warning switch Security control module Ignition starter and steering lock assembly AT shift lock module
MB-7	Driver's control center differential control module Driver's control center differential relay TCM
MB-8	Diode (With rear fog light model) Lighting switch
MB-9	Data link connector ECM Fuel pump relay IMM ECM Main relay
MB-10	Auto A/C control module Combination meter Ignition switch illumination light Keyless entry control module Luggage room light (Wagon) Radio Room light Security control module Security relay Spot map light Trunk room light (Sedan) Trailer connector Clock
MB-11	Fuse (Seat heater)
MB-12	Power window circuit breaker
MB-13	Relay holder
SBF-8	ABS control module
IG	Hazard switch
ST	ECM Inhibitor switch (AT) Security relay Starter motor (MT)
FB-1	Keyless entry control module Rear turn signal light RH Trailer connector
FB-2	Keyless entry control module Rear turn signal light LH Trailer connector
FB-3	Parking switch
FB-4	Front turn signal light RH Side turn signal light RH
FB-5	Front turn signal light LH

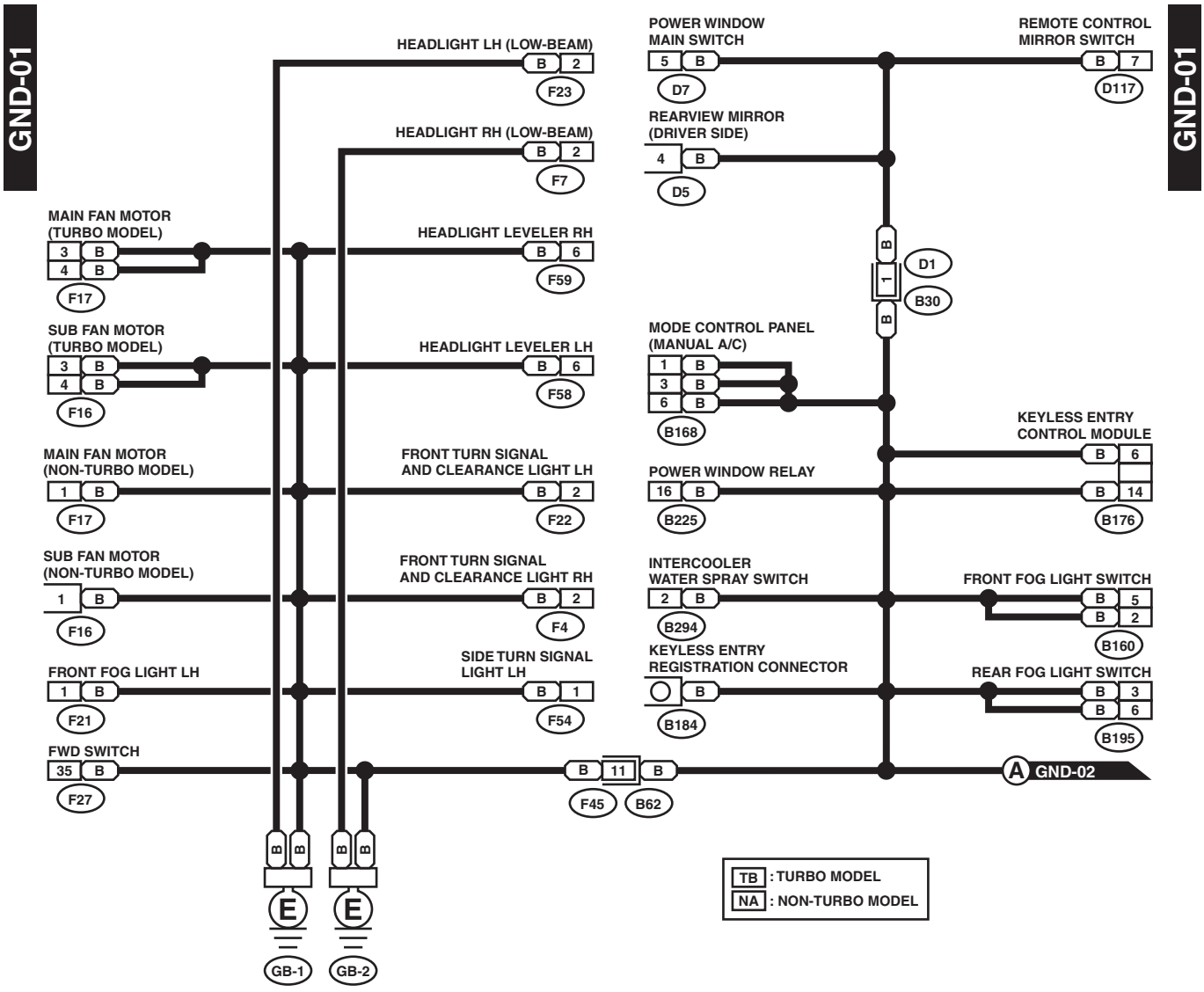
No.	Load
FB-6	Front clearance light LH Front clearance light RH
FB-7	License plate light Tail light LH Tail light RH Trailer connector
FB-8	Hazard switch Turn signal switch Security control module
FB-9	Hazard switch Side turn signal light LH Turn signal switch Security control module
FB-10	Bright switch Combination meter Front fog light relay Front fog light switch Headlight leveler switch Illumination control module Illumination light Rear fog light relay Rear fog light switch Intercooler water spray switch
FB-12	Parking switch
FB-13	ECM Lighting switch
FB-14	Parking switch
FB-15	Mirror heater relay Auto A/C control module Rear defogger Rear defogger switch
FB-16	ECM Rear defogger timer Double lock module
FB-17	ABS relay Back-up light switch (MT) Check connector Cruise control actuator Cruise control main switch Cruise control module Inhibitor switch (AT) AT shift lock module Power window relay Rear defogger timer Seat belt timer module Vehicle speed sensor (MT)
FB-18	Headlight leveler LH Headlight leveler RH A/C main fan relay
FB-19	A/C sub fan Pressure switch Sub fan relay
FB-20	Auto A/C control module Blower motor relay Mode control panel Double lock module

No.	Load
FB-21	Driver's control center differential control module Driver's control center differential relay ECM Fuel pump relay Ignition coil and ignitor IMM ECM Security control module TCM
FB-22	Airbag control module
FB-23	Airbag control module
FB-25	Rear washer motor Rear wiper intermittent module Rear wiper motor
FB-26	Front washer motor Front wiper motor Front wiper switch
FB-27	Auto A/C control module Radio Clock
FB-28	Front accessory power supply socket Remote control mirror switch Intercooler water spray switch Intercooler water spray timer Seat heater relay AT shift lock module
FB-29	Rear fog light relay
FB-30	Mirror heater relay
FB-31	Stop light switch
FB-32	ABS control module
FB-33	Front fog light relay
FB-34	Blower motor relay
FB-35	Double lock module Keyless entry control module
FB-36	Combination meter

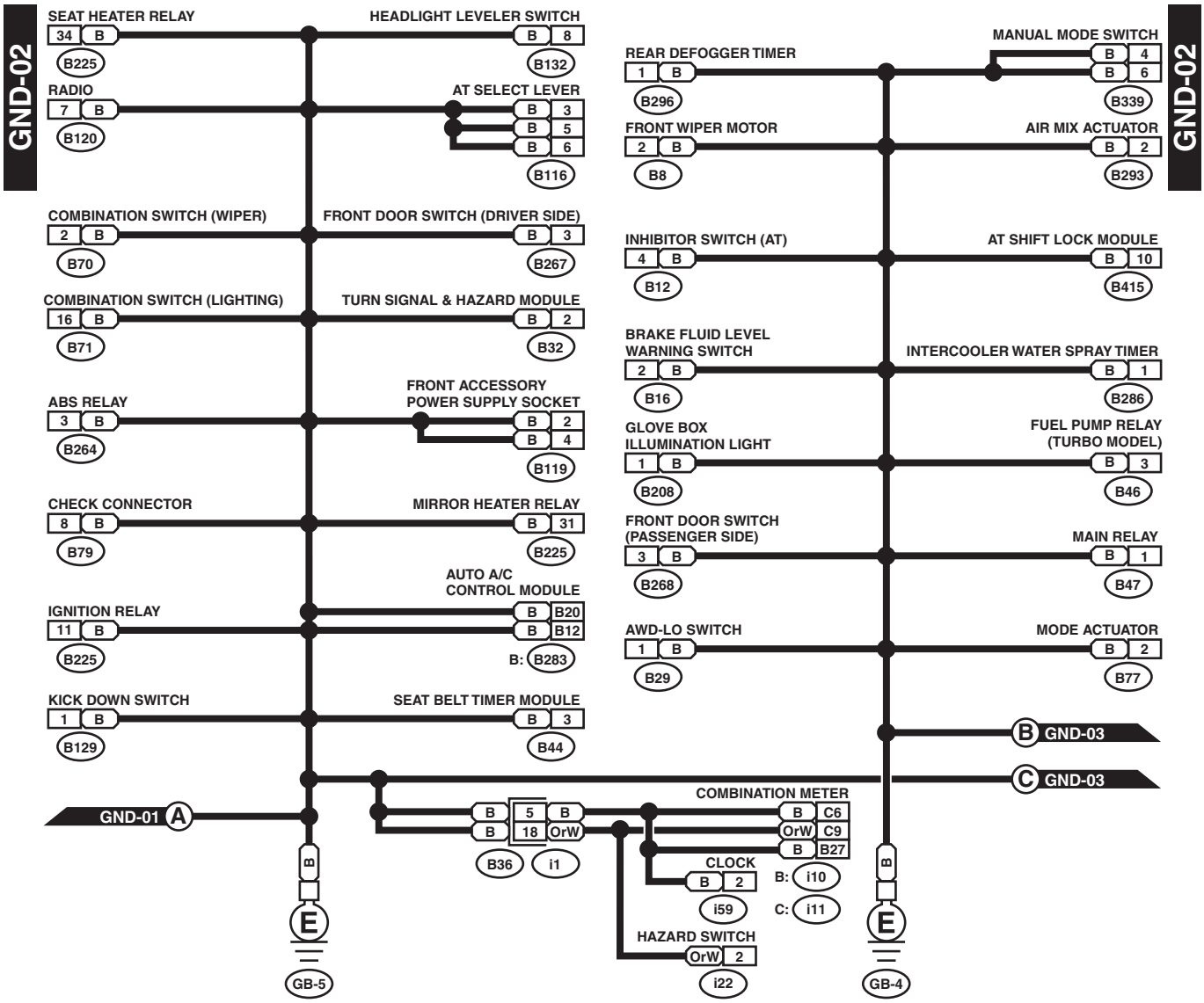
4. Ground Circuit

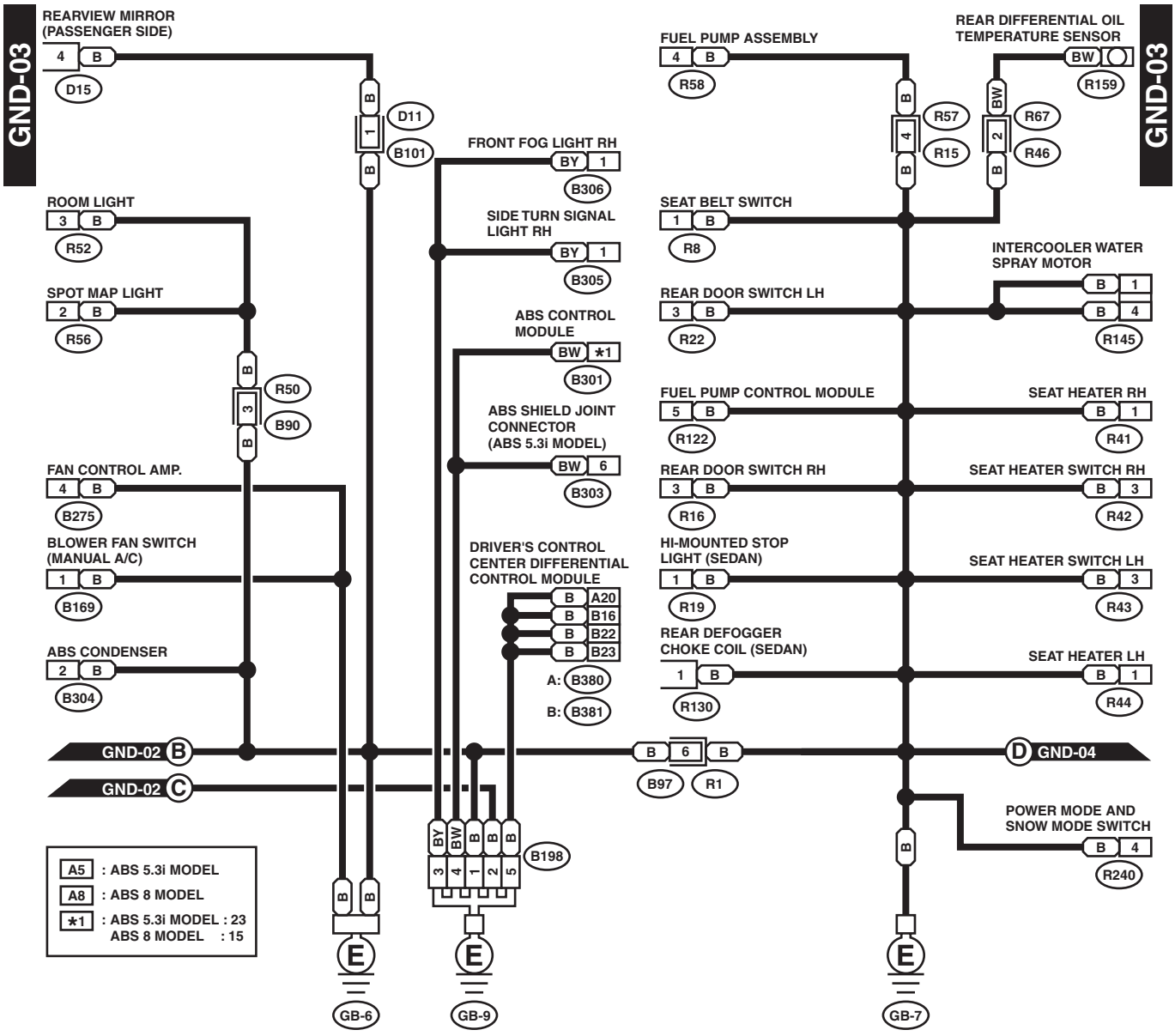
A: WIRING DIAGRAM

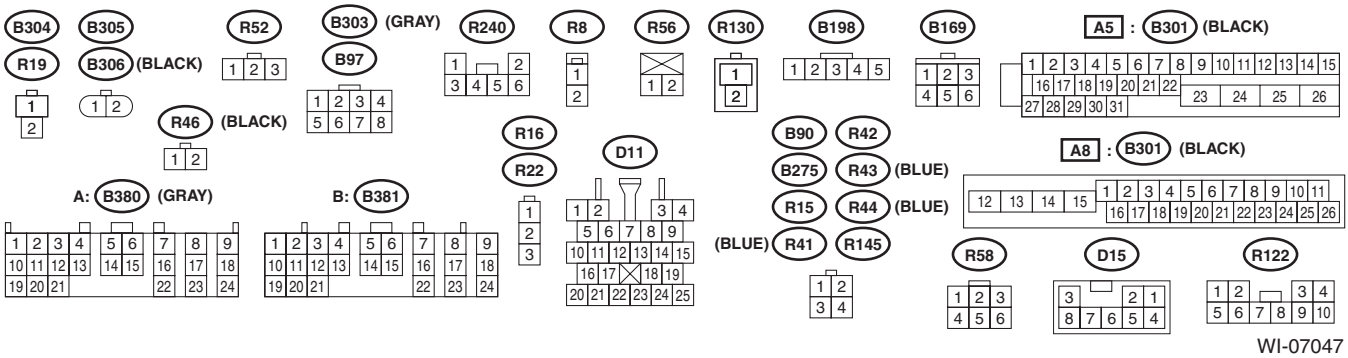
1. CHASSIS GROUND LHD MODEL



Ground Circuit

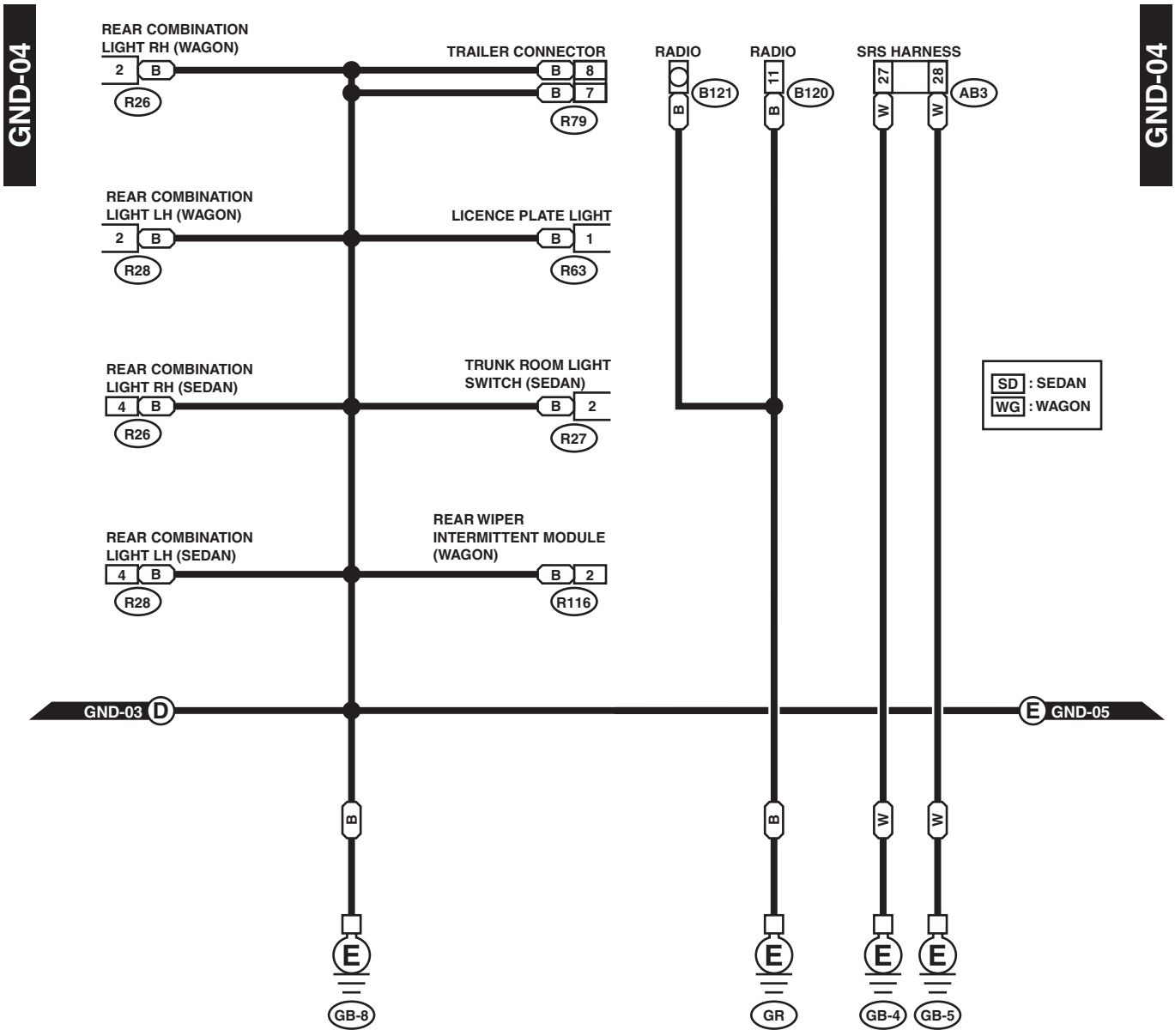


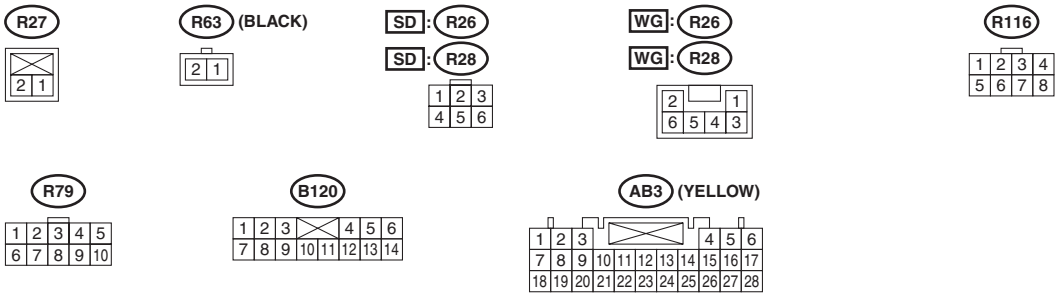

GND-03
REARVIEW MIRROR (PASSENGER SIDE)
4 B
D15
D11
B101
FRONT FOG LIGHT RH
BY 1
B306
ROOM LIGHT
3 B
R52
SIDE TURN SIGNAL LIGHT RH
BY 1
B305
SPOT MAP LIGHT
2 B
R56
ABS CONTROL MODULE
BW ★1
B301
R50
B90
ABS SHIELD JOINT CONNECTOR (ABS 5.3i MODEL)
BW 6
B303
FAN CONTROL AMP.
4 B
B275
BLOWER FAN SWITCH (MANUAL A/C)
1 B
B169
DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE
B A20
B B16
B B22
B B23
A: B380
B: B381
ABS CONDENSER
2 B
B304
GND-02 B
GND-02 C
B 6 B
B97
R1
B198
A5 : ABS 5.3i MODEL
A8 : ABS 8 MODEL
★1 : ABS 5.3i MODEL : 23
ABS 8 MODEL : 15
GB-6
GB-9
GB-7
FUEL PUMP ASSEMBLY
4 B
R58
R57
R15
REAR DIFFERENTIAL OIL TEMPERATURE SENSOR
BW
R159
R67
R46
SEAT BELT SWITCH
1 B
R8
INTERCOOLER WATER SPRAY MOTOR
B 1
B 4
R145
REAR DOOR SWITCH LH
3 B
R22
FUEL PUMP CONTROL MODULE
5 B
R122
SEAT HEATER RH
B 1
R41
REAR DOOR SWITCH RH
3 B
R16
SEAT HEATER SWITCH RH
B 3
R42
HI-MOUNTED STOP LIGHT (SEDAN)
1 B
R19
SEAT HEATER SWITCH LH
B 3
R43
REAR DEFOGGER CHOKE COIL (SEDAN)
1 B
R130
SEAT HEATER LH
B 1
R44
D GND-04
POWER MODE AND SNOW MODE SWITCH
B 4
R240
GND-03


B304
B305
R19
B306 (BLACK)
R52
B303 (GRAY)
B97
R46 (BLACK)
R240
R8
R56
R130
B198
B169
A5 : B301 (BLACK)
A: B380 (GRAY)
B: B381
R16
R22
D11
B90
R42
B275
R43 (BLUE)
R15
R44 (BLUE)
(BLUE) R41
R145
A8 : B301 (BLACK)
R58
D15
R122

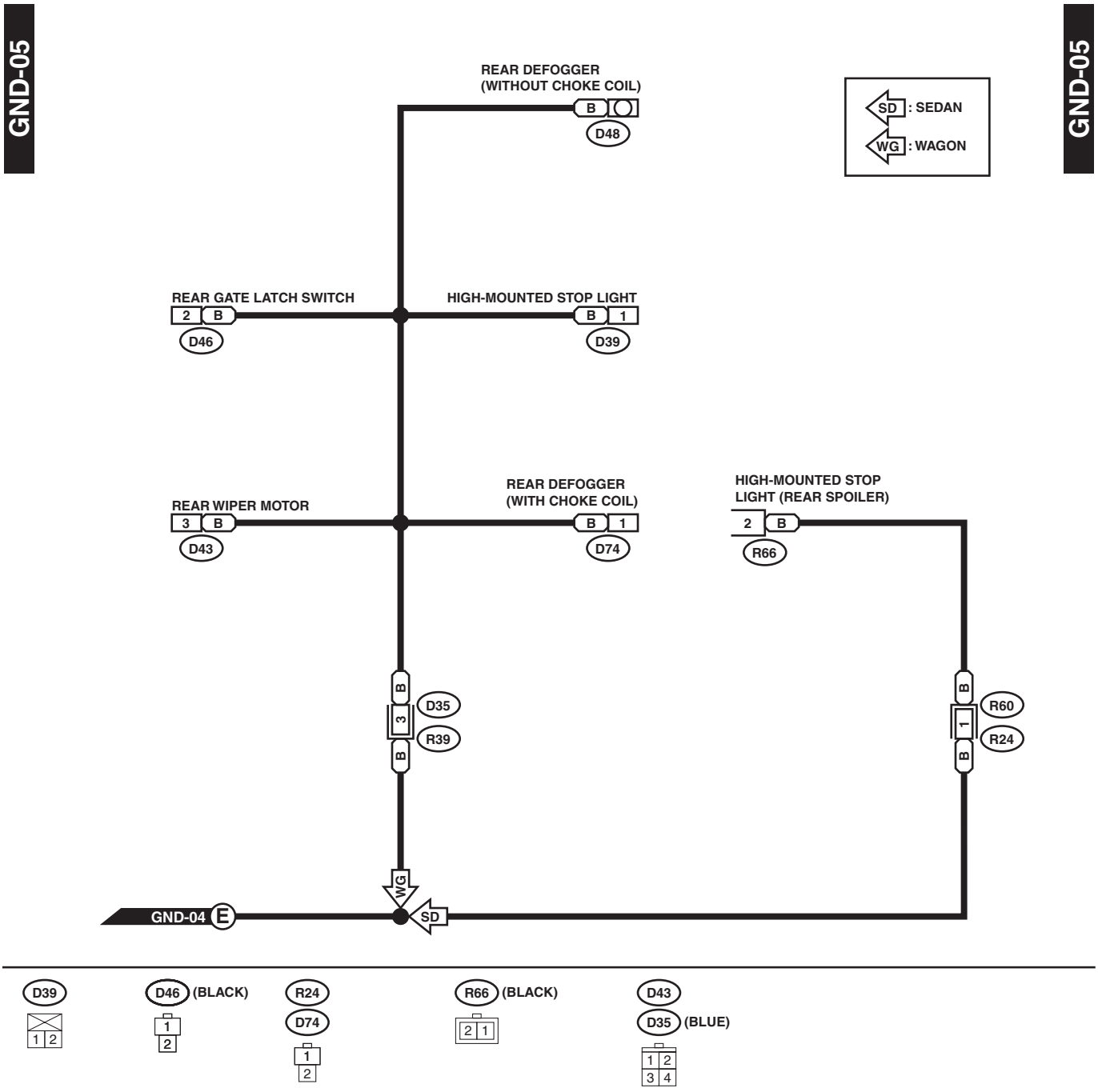
WI-07047

Ground Circuit



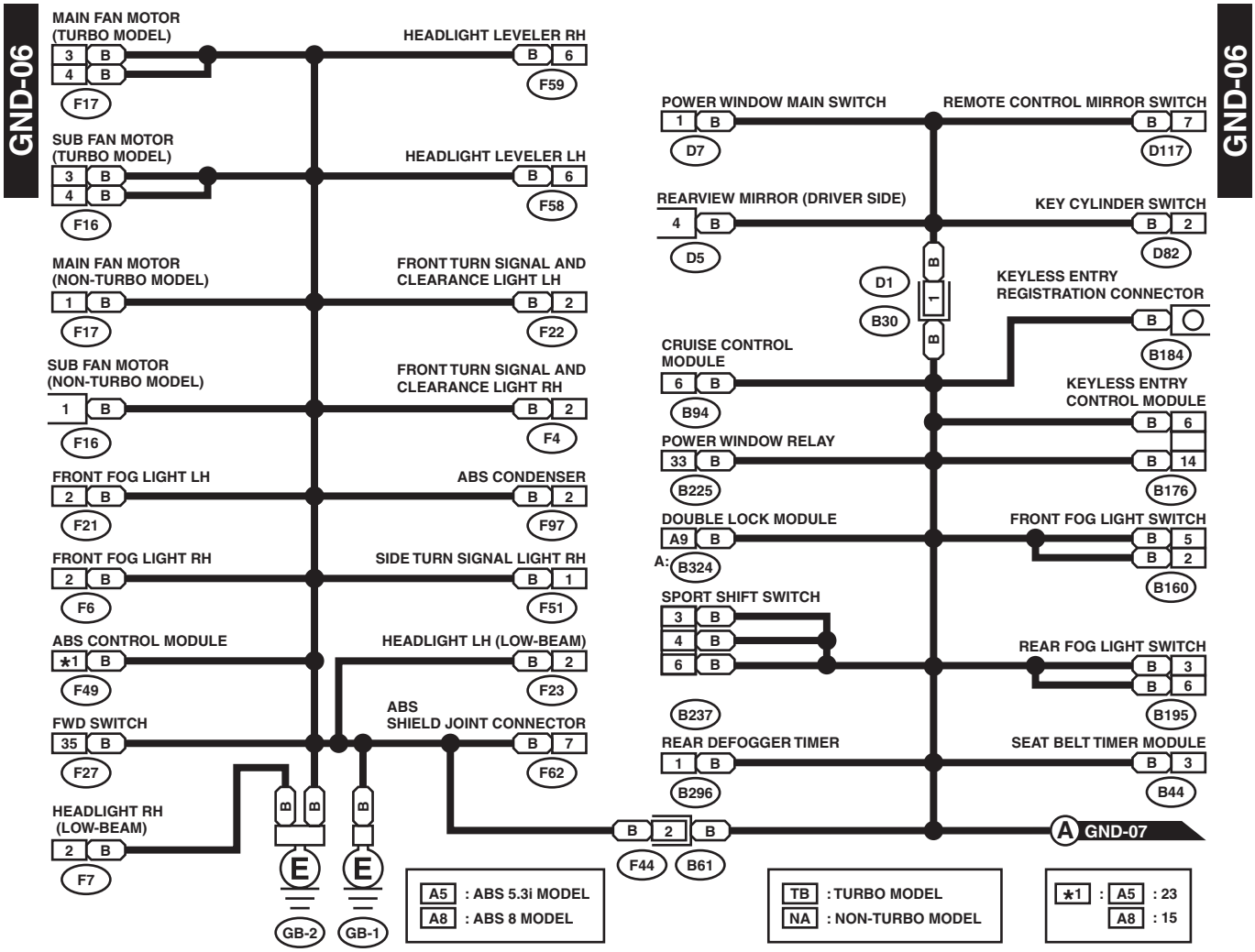


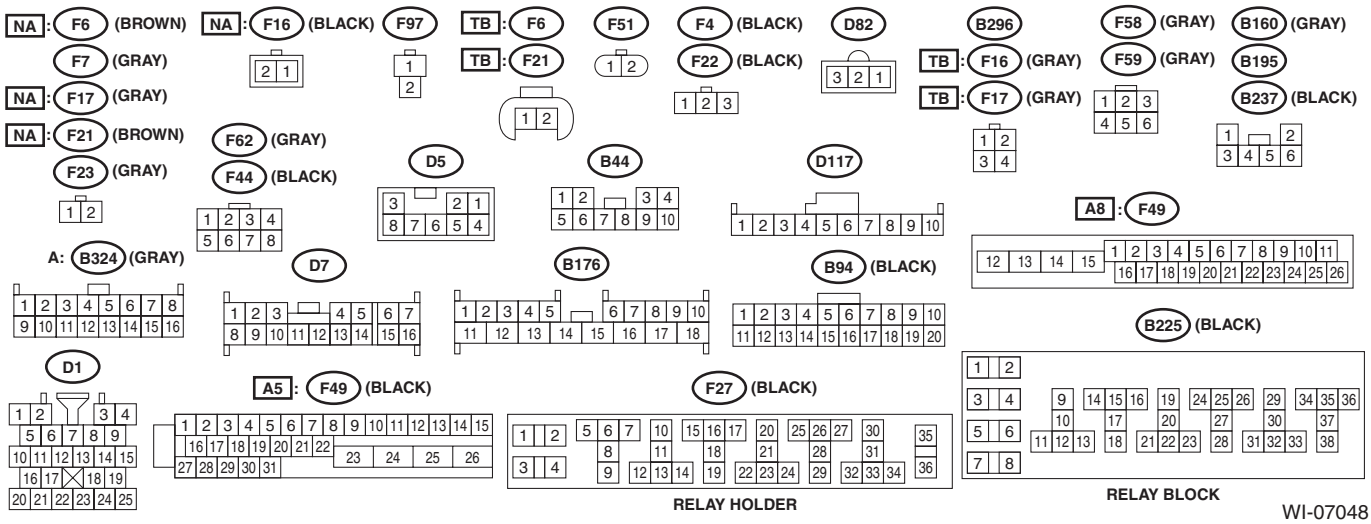
WI-04537


GND-05
GND-05
REAR DEFOGGER
(WITHOUT CHOKE COIL)
B
D48
SD : SEDAN
WG : WAGON
REAR GATE LATCH SWITCH
2
B
D46
HIGH-MOUNTED STOP LIGHT
B
1
D39
REAR WIPER MOTOR
3
B
D43
REAR DEFOGGER
(WITH CHOKE COIL)
B
1
D74
HIGH-MOUNTED STOP
LIGHT (REAR SPOILER)
2
B
R66
B
3
B
D35
R39
B
1
B
R60
R24
WG
SD
GND-04
E
D39
D46 (BLACK)
R24
D74
R66 (BLACK)
D43
D35 (BLUE)

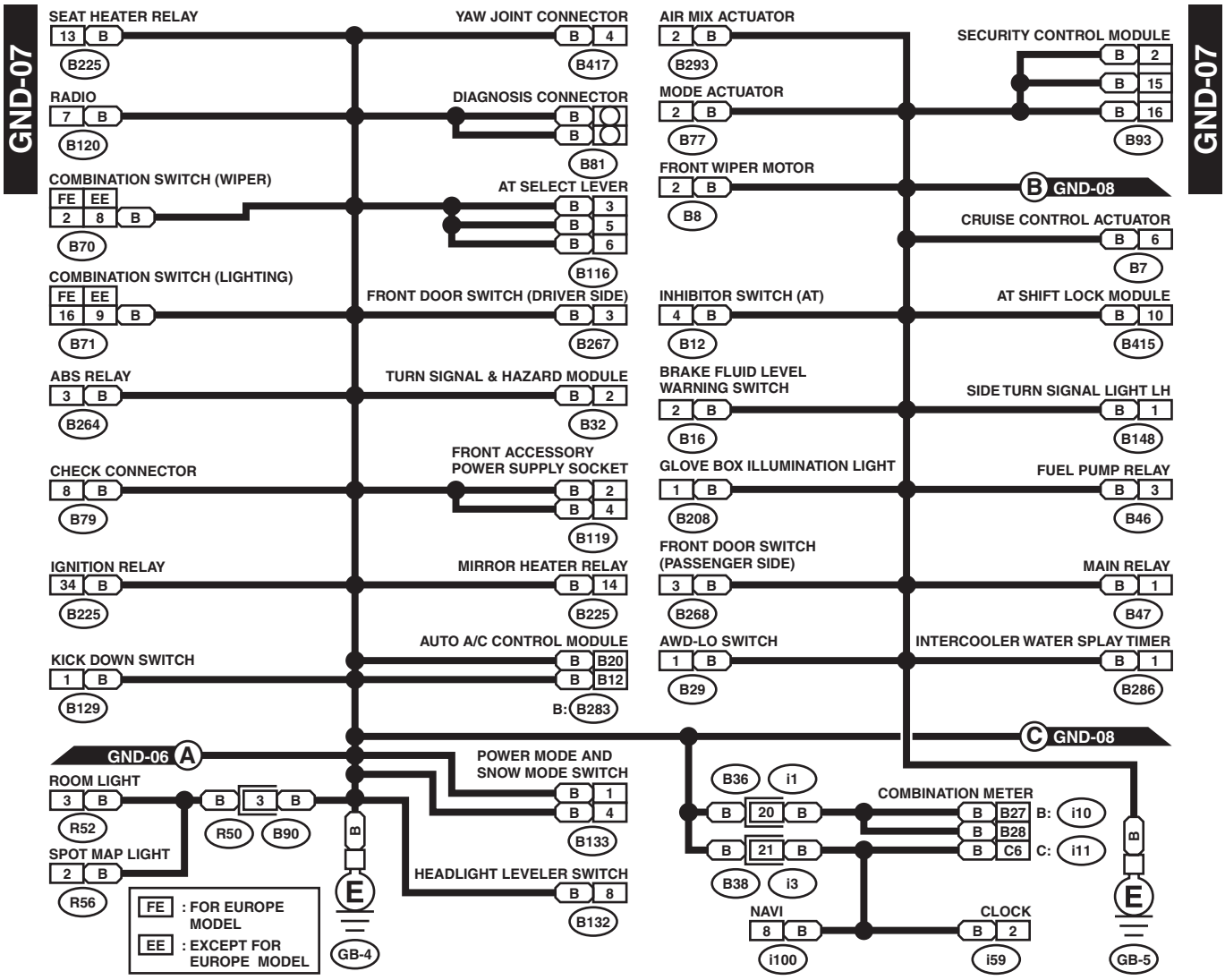
WI-04538

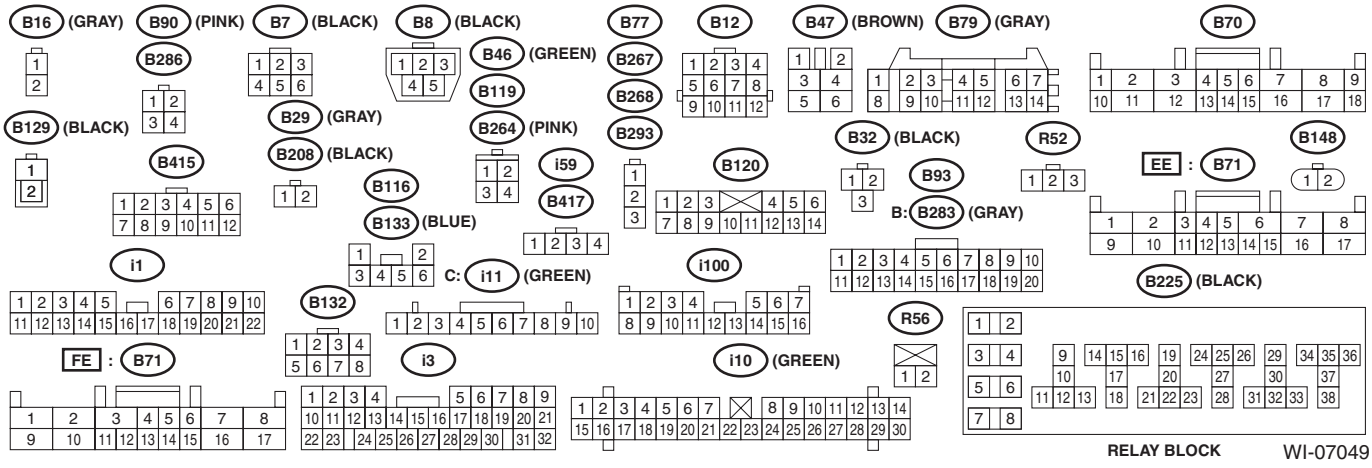
2. CHASSIS GROUND RHD MODEL



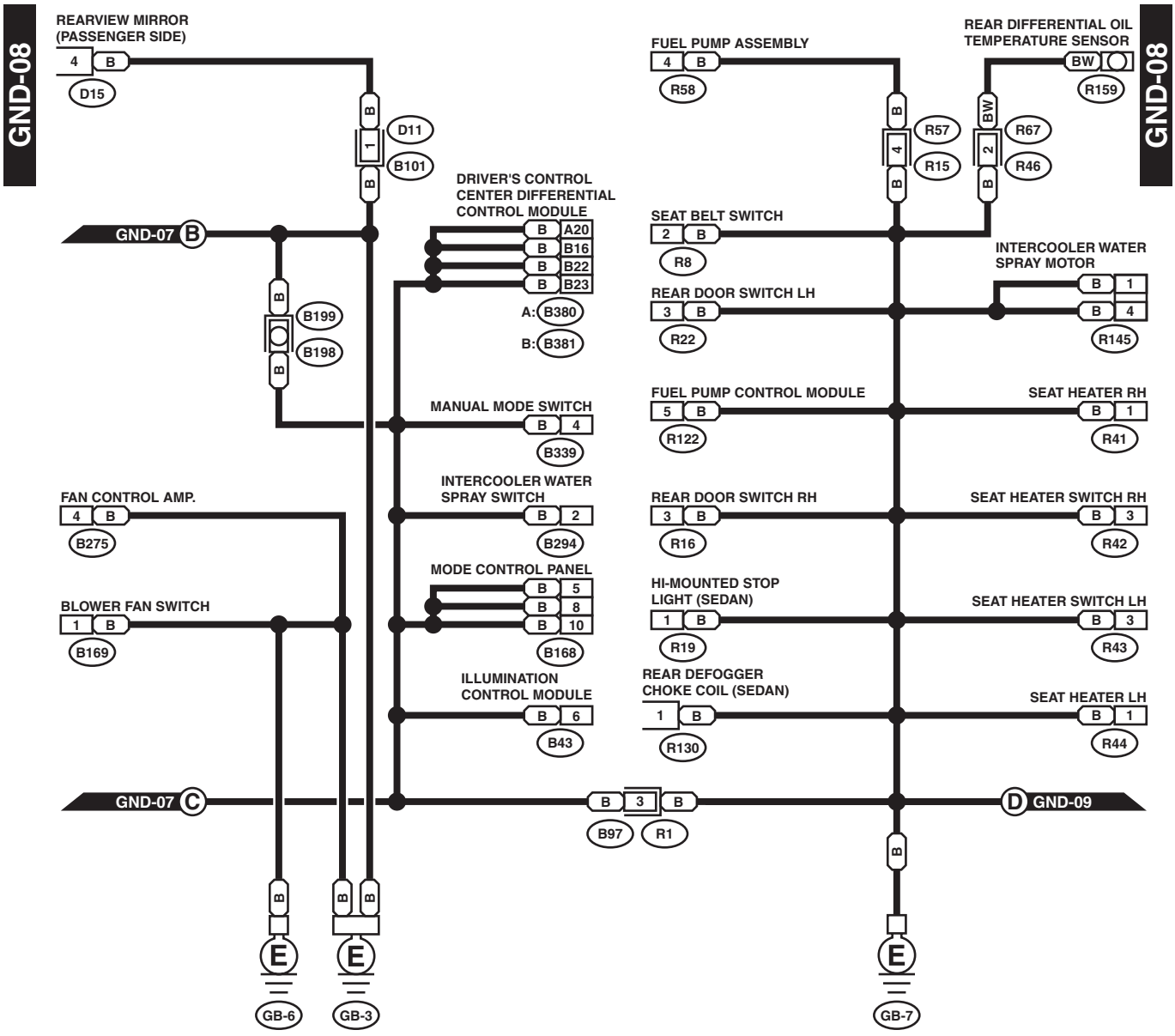


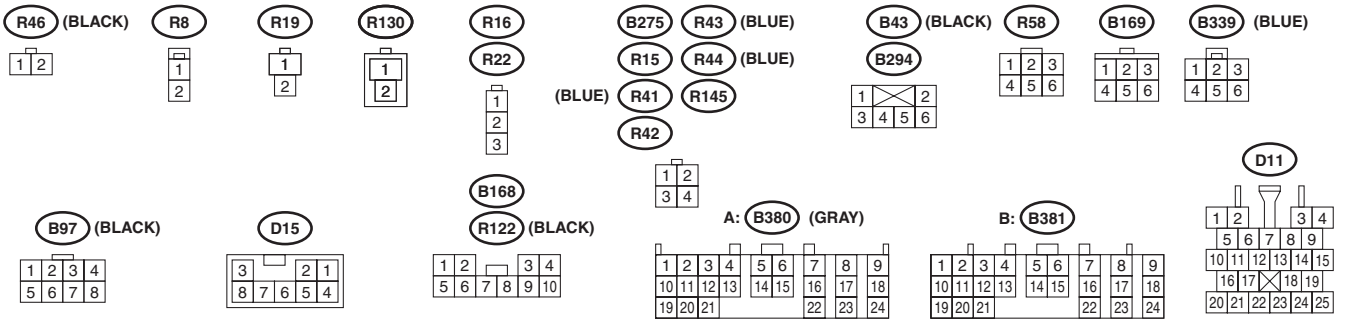
WI-07048


GND-07
SEAT HEATER RELAY
13 B
B225
RADIO
7 B
B120
COMBINATION SWITCH (WIPER)
FE EE
2 8 B
B70
COMBINATION SWITCH (LIGHTING)
FE EE
16 9 B
B71
ABS RELAY
3 B
B264
CHECK CONNECTOR
8 B
B79
IGNITION RELAY
34 B
B225
KICK DOWN SWITCH
1 B
B129
YAW JOINT CONNECTOR
B 4
B417
DIAGNOSIS CONNECTOR
B
B
B81
AT SELECT LEVER
B 3
B 5
B 6
B116
FRONT DOOR SWITCH (DRIVER SIDE)
B 3
B267
TURN SIGNAL & HAZARD MODULE
B 2
B32
FRONT ACCESSORY POWER SUPPLY SOCKET
B 2
B 4
B119
MIRROR HEATER RELAY
B 14
B225
AUTO A/C CONTROL MODULE
B 20
B 12
B: B283
AIR MIX ACTUATOR
2 B
B293
MODE ACTUATOR
2 B
B77
FRONT WIPER MOTOR
2 B
B8
INHIBITOR SWITCH (AT)
4 B
B12
BRAKE FLUID LEVEL WARNING SWITCH
2 B
B16
GLOVE BOX ILLUMINATION LIGHT
1 B
B208
FRONT DOOR SWITCH (PASSENGER SIDE)
3 B
B268
AWD-LO SWITCH
1 B
B29
SECURITY CONTROL MODULE
B 2
B 15
B 16
B93
B GND-08
CRUISE CONTROL ACTUATOR
B 6
B7
AT SHIFT LOCK MODULE
B 10
B415
SIDE TURN SIGNAL LIGHT LH
B 1
B148
FUEL PUMP RELAY
B 3
B46
MAIN RELAY
B 1
B47
INTERCOOLER WATER SPLAY TIMER
B 1
B286
C GND-08
GND-06 A
ROOM LIGHT
3 B
R52
B 3 B
R50 B90
SPOT MAP LIGHT
2 B
R56
POWER MODE AND SNOW MODE SWITCH
B 1
B 4
B133
HEADLIGHT LEVELER SWITCH
B 8
B132
B36 i1
B 20 B
B 21 B
B38 i3
COMBINATION METER
B B27
B B28
B C6
B: i10
C: i11
NAVI
8 B
i100
CLOCK
B 2
i59
FE : FOR EUROPE MODEL
EE : EXCEPT FOR EUROPE MODEL
GB-4
GB-5

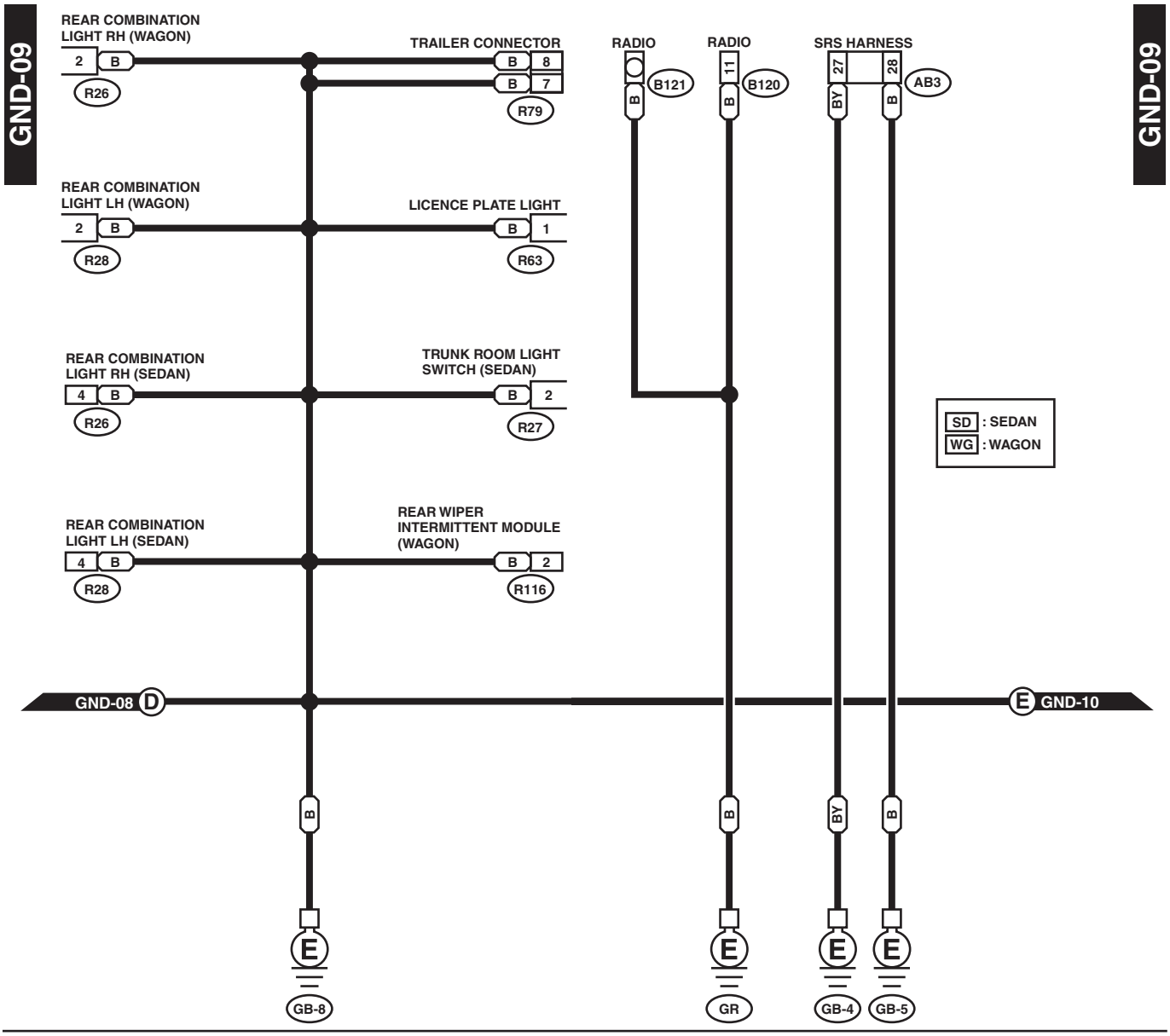

B16 (GRAY)
B129 (BLACK)
B90 (PINK)
B286
B415
B7 (BLACK)
B29 (GRAY)
B208 (BLACK)
B8 (BLACK)
B46 (GREEN)
B119
B264 (PINK)
B116
B133 (BLUE)
B417
i59
C: i11 (GREEN)
B132
i3
B77
B267
B268
B293
B12
B120
i100
B47 (BROWN)
B79 (GRAY)
B32 (BLACK)
B93
B: B283 (GRAY)
R52
R56
i10 (GREEN)
B70
B148
EE : B71
B225 (BLACK)
i1
FE : B71
RELAY BLOCK
WI-07049

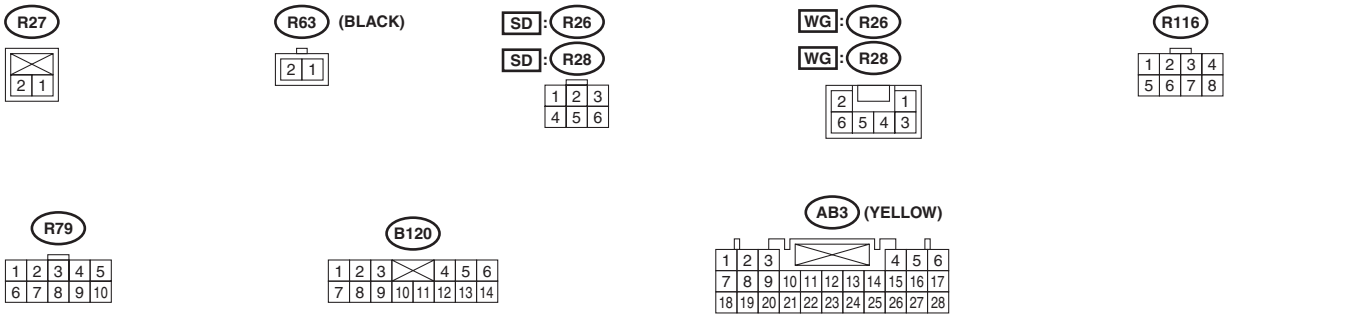
Ground Circuit





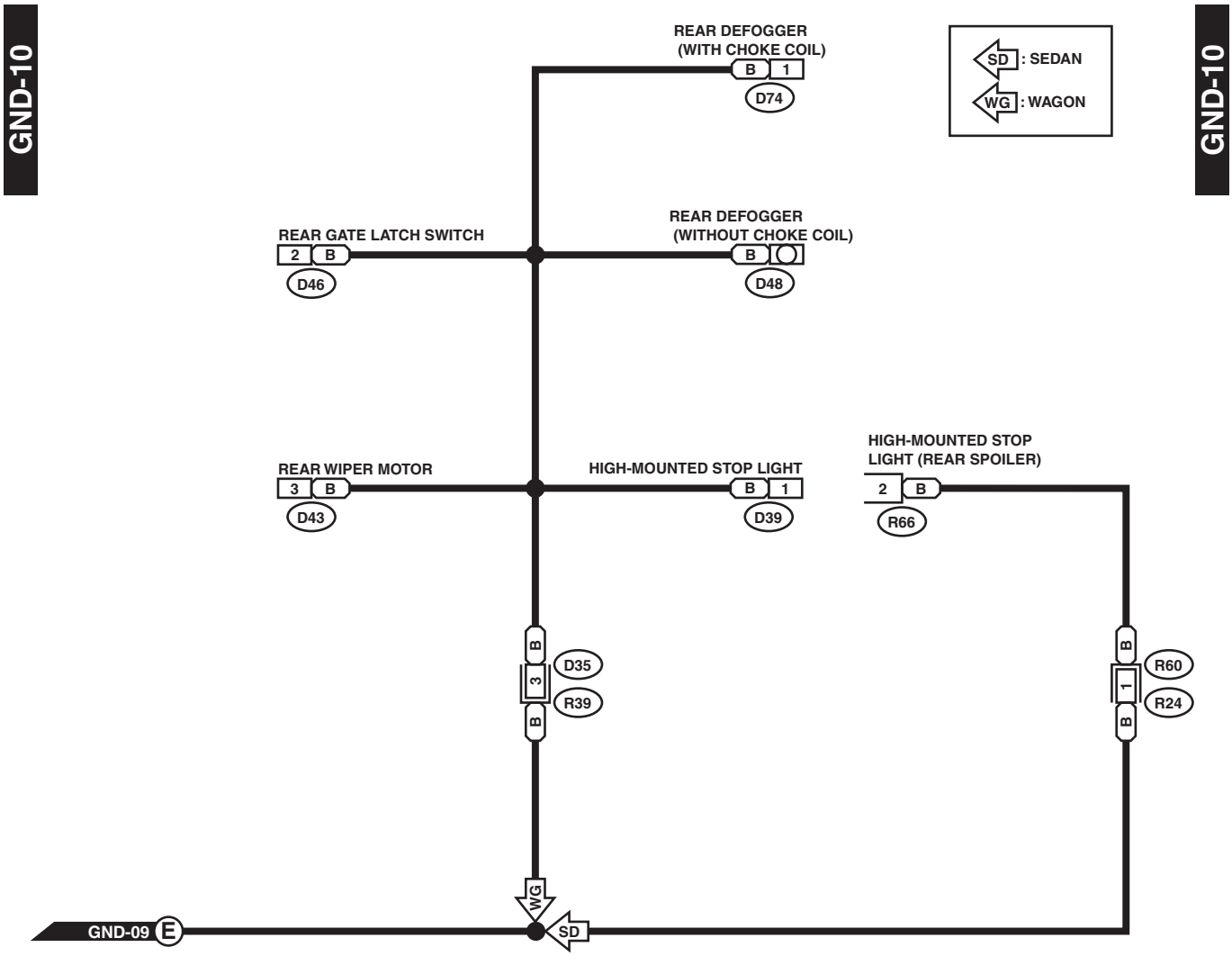
WI-07050

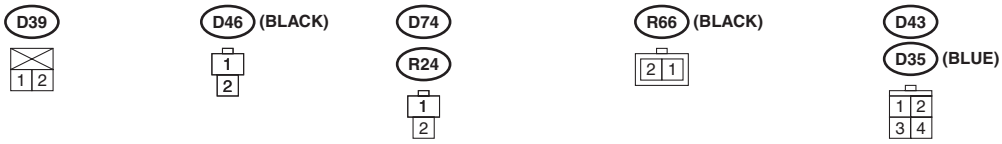

GND-09
GND-09
REAR COMBINATION LIGHT RH (WAGON)
2 B
R26
TRAILER CONNECTOR
B 8
B 7
R79
RADIO
B121
RADIO
11
B120
SRS HARNESS
27
28
AB3
BY
B
REAR COMBINATION LIGHT LH (WAGON)
2 B
R28
LICENCE PLATE LIGHT
B 1
R63
REAR COMBINATION LIGHT RH (SEDAN)
4 B
R26
TRUNK ROOM LIGHT SWITCH (SEDAN)
B 2
R27
SD : SEDAN
WG : WAGON
REAR COMBINATION LIGHT LH (SEDAN)
4 B
R28
REAR WIPER INTERMITTENT MODULE (WAGON)
B 2
R116
GND-08 D
E GND-10
B
B
BY
B
E
E
E
E
GB-8
GR
GB-4
GB-5


R27
2 1
R63 (BLACK)
2 1
SD : R26
SD : R28
1 2 3
4 5 6
WG : R26
WG : R28
2 1
6 5 4 3
R116
1 2 3 4
5 6 7 8
R79
1 2 3 4 5
6 7 8 9 10
B120
1 2 3 4 5 6
7 8 9 10 11 12 13 14
AB3 (YELLOW)
1 2 3 4 5 6
7 8 9 10 11 12 13 14 15 16 17
18 19 20 21 22 23 24 25 26 27 28

WI-02251

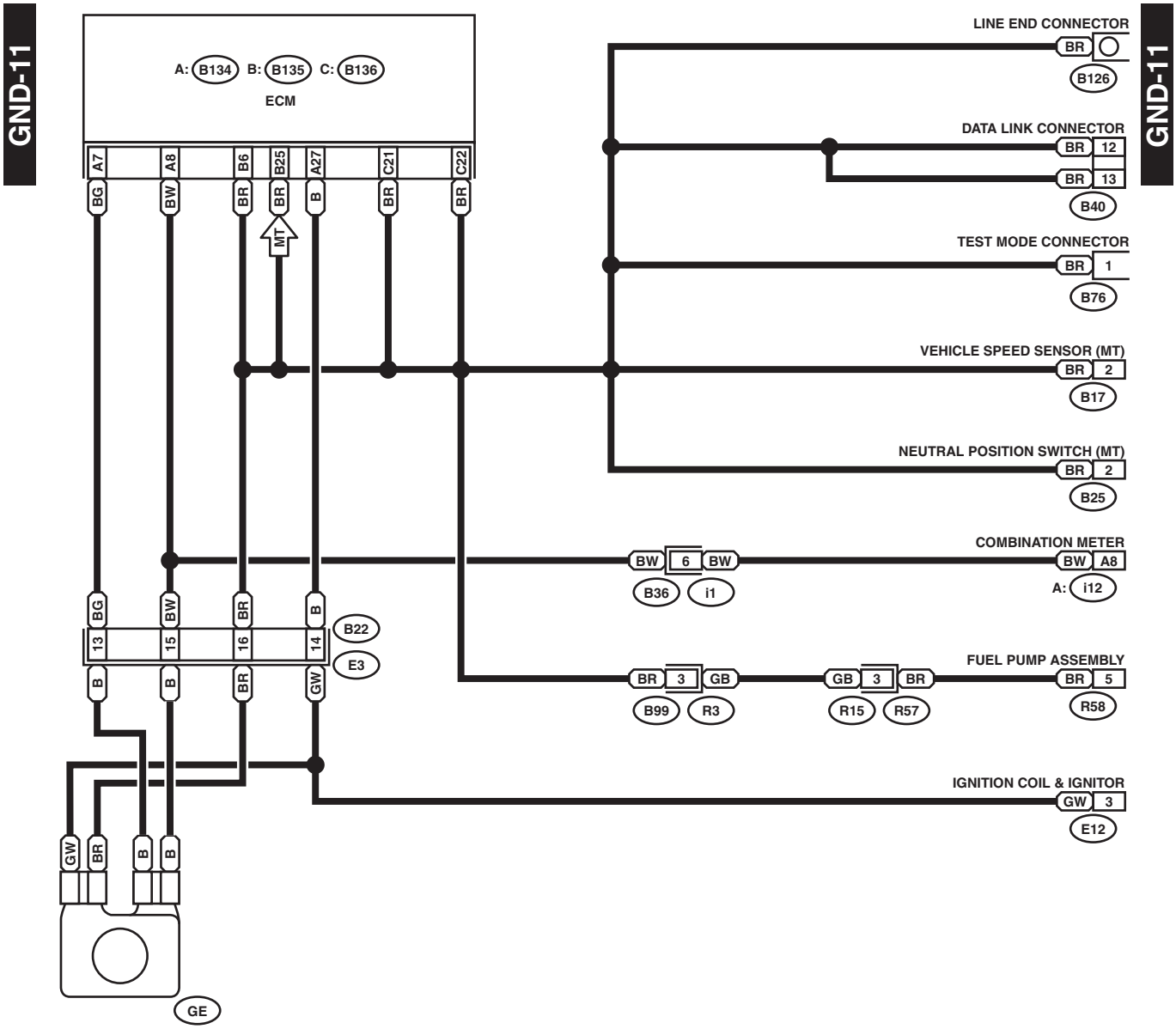
Ground Circuit

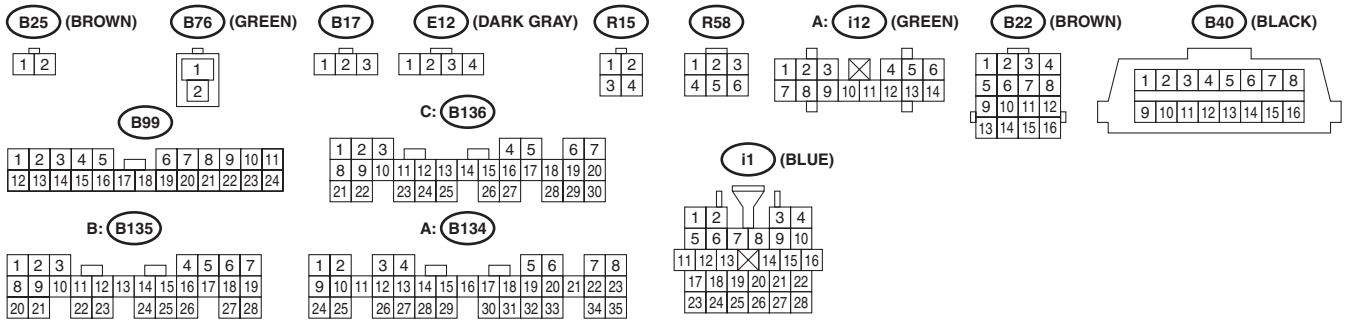




WI-04539

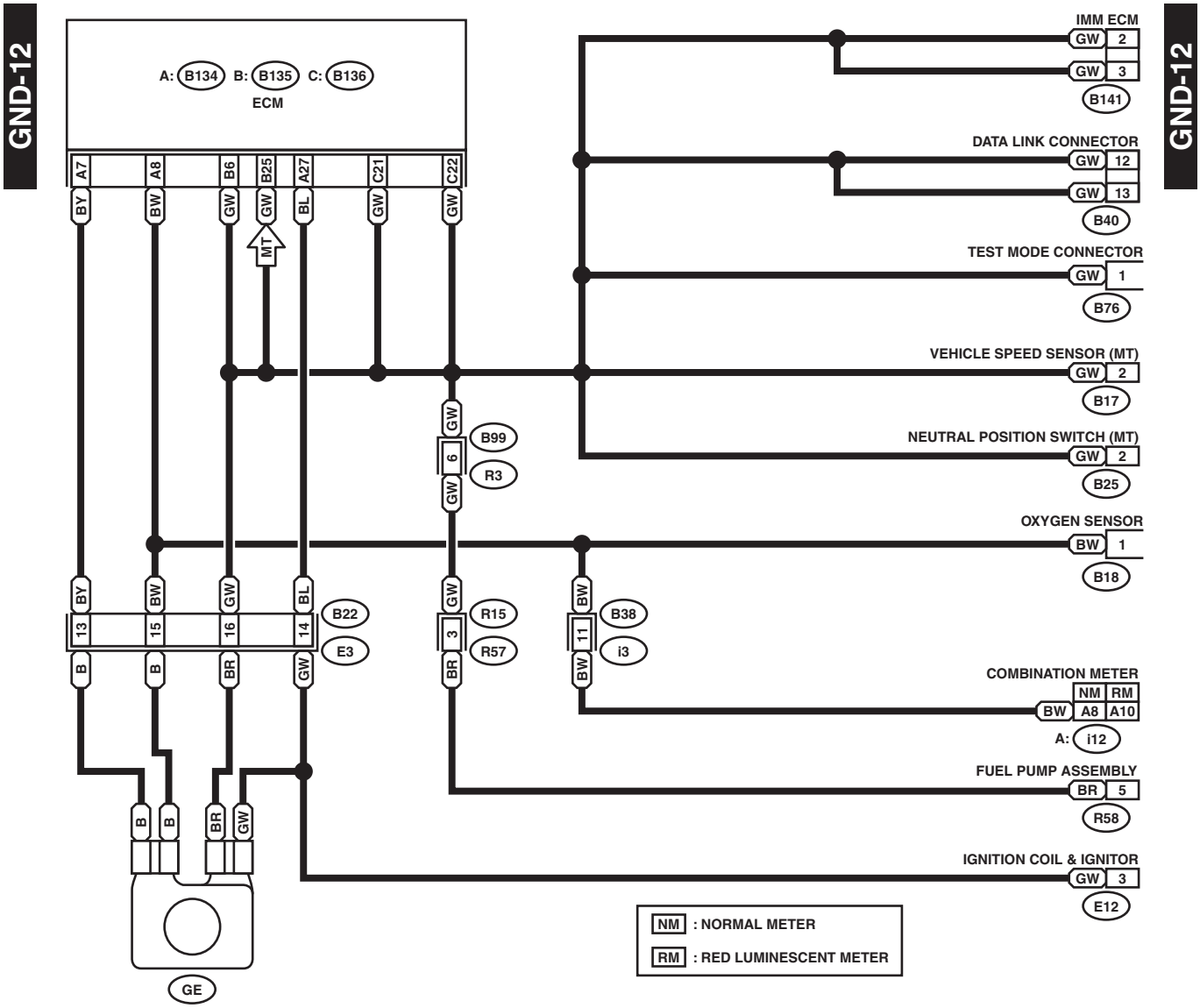
3. ENGINE GROUND LHD SOHC WITHOUT OBD MODEL

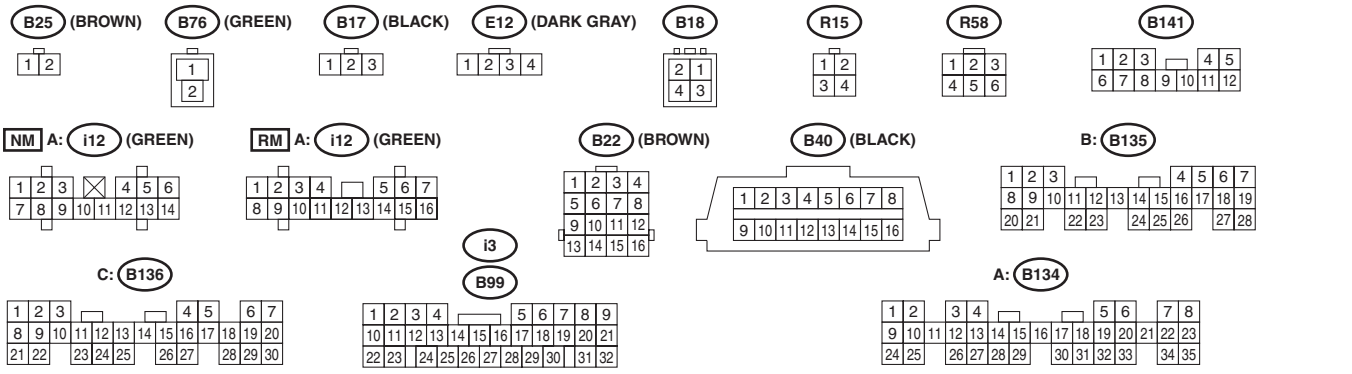




WI-07051

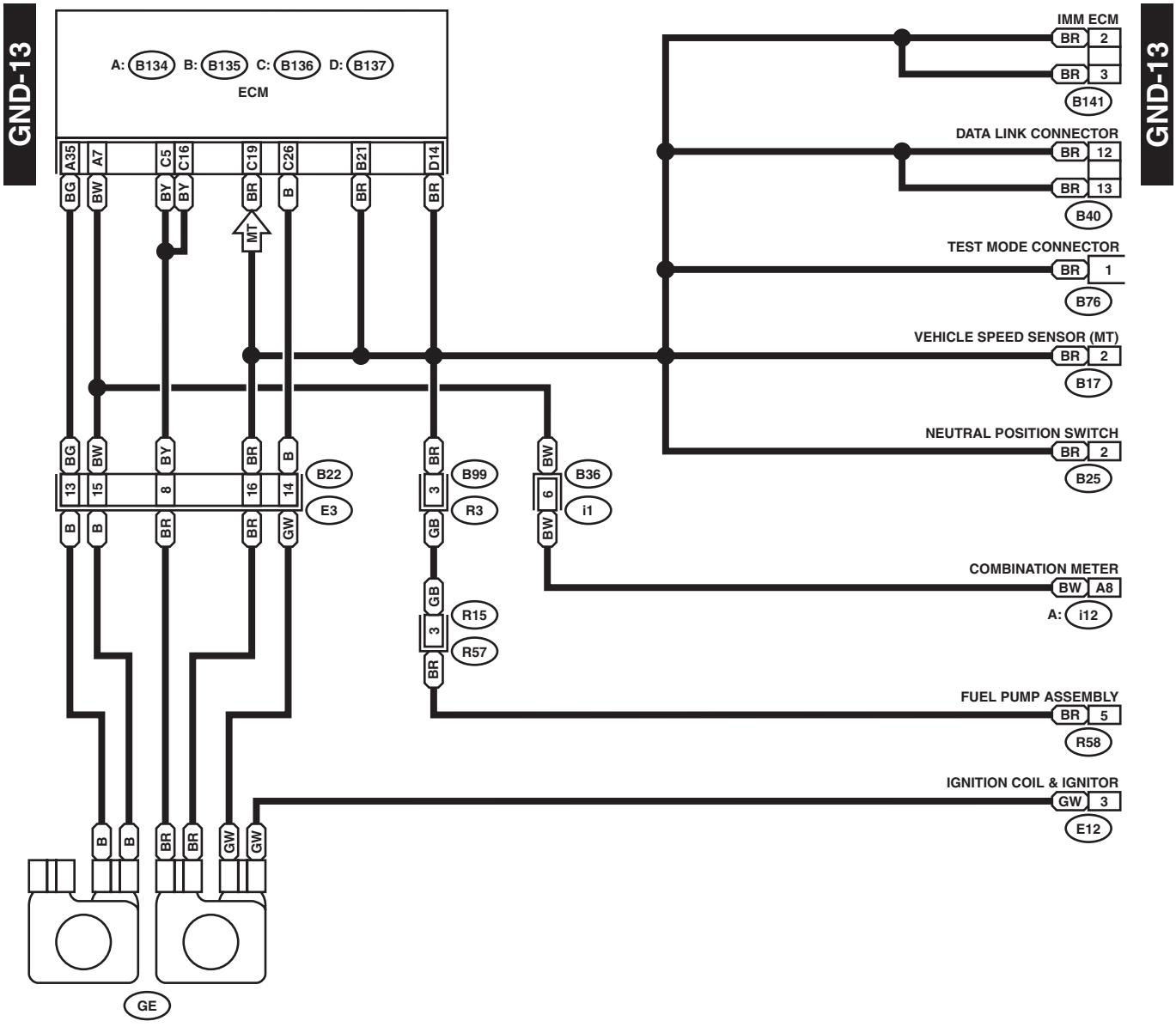
4. ENGINE GROUND RHD SOHC WITHOUT OBD MODEL

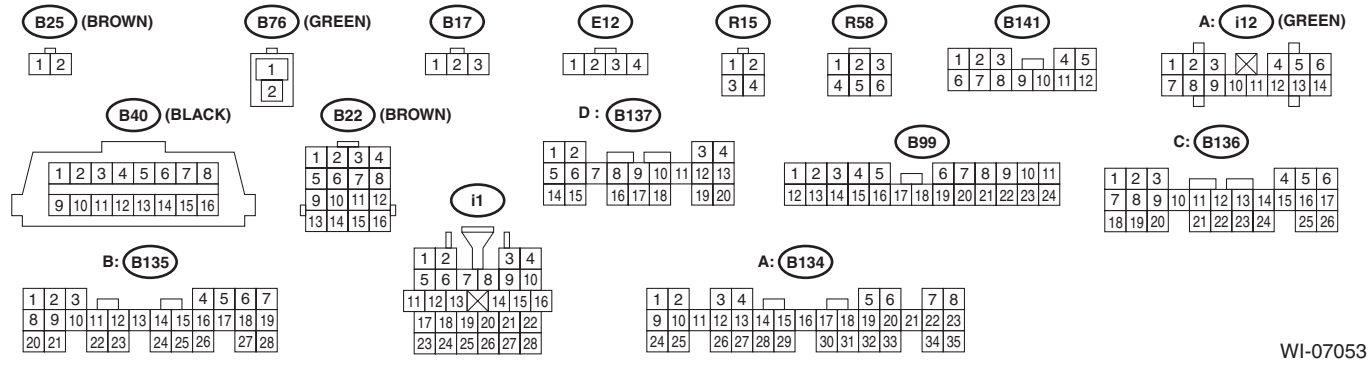




WI-07052

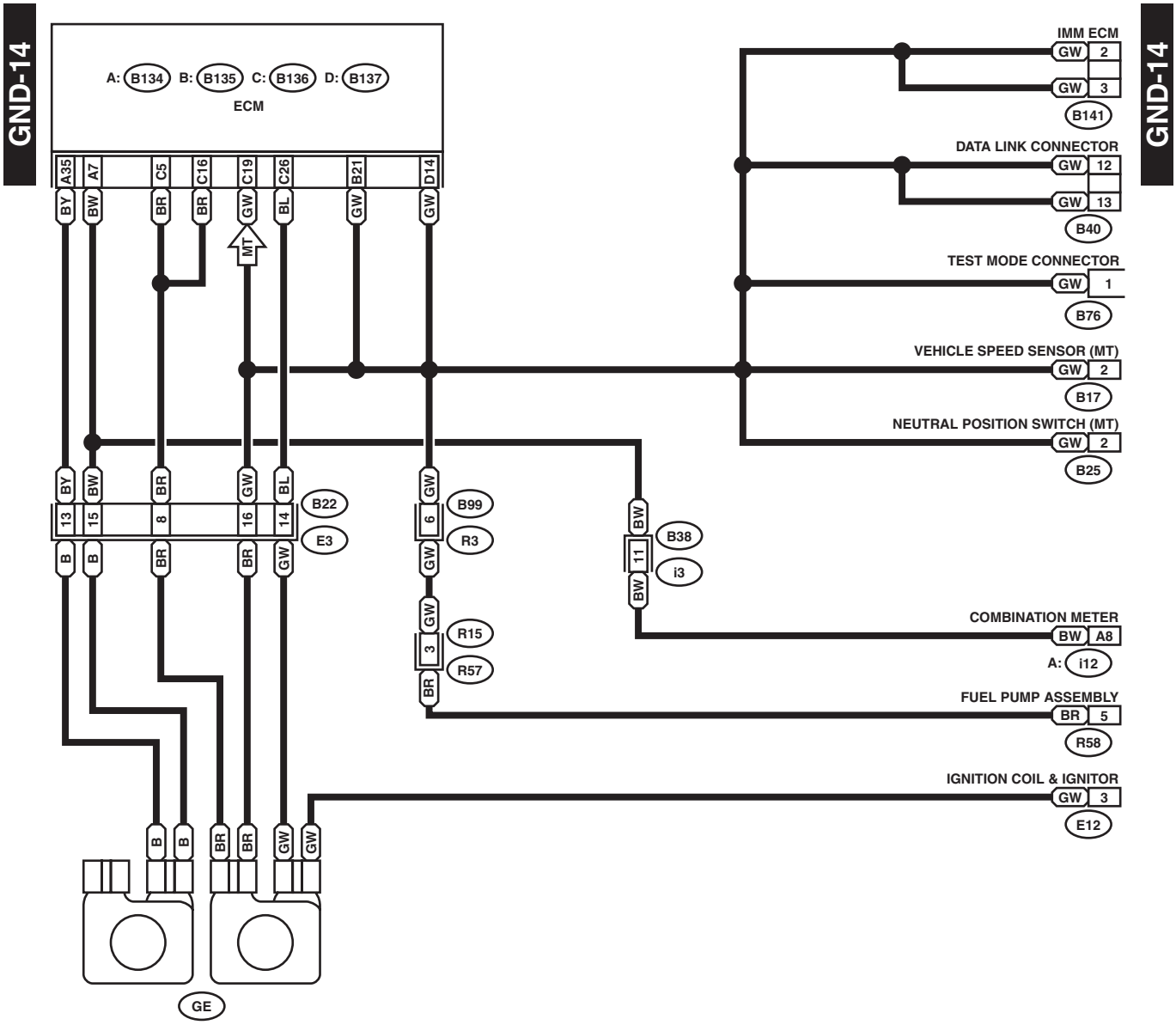
5. ENGINE GROUND LHD SOHC WITH OBD MODEL

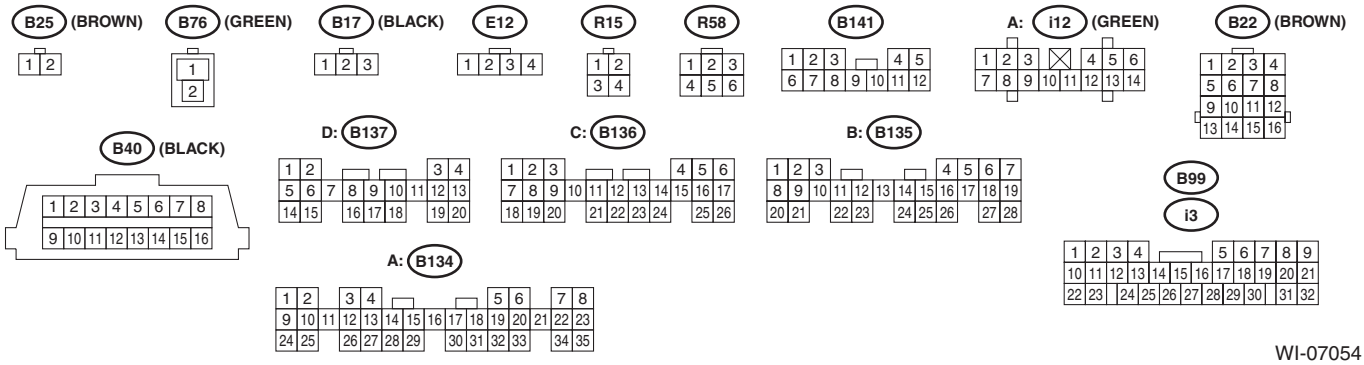




WI-07053

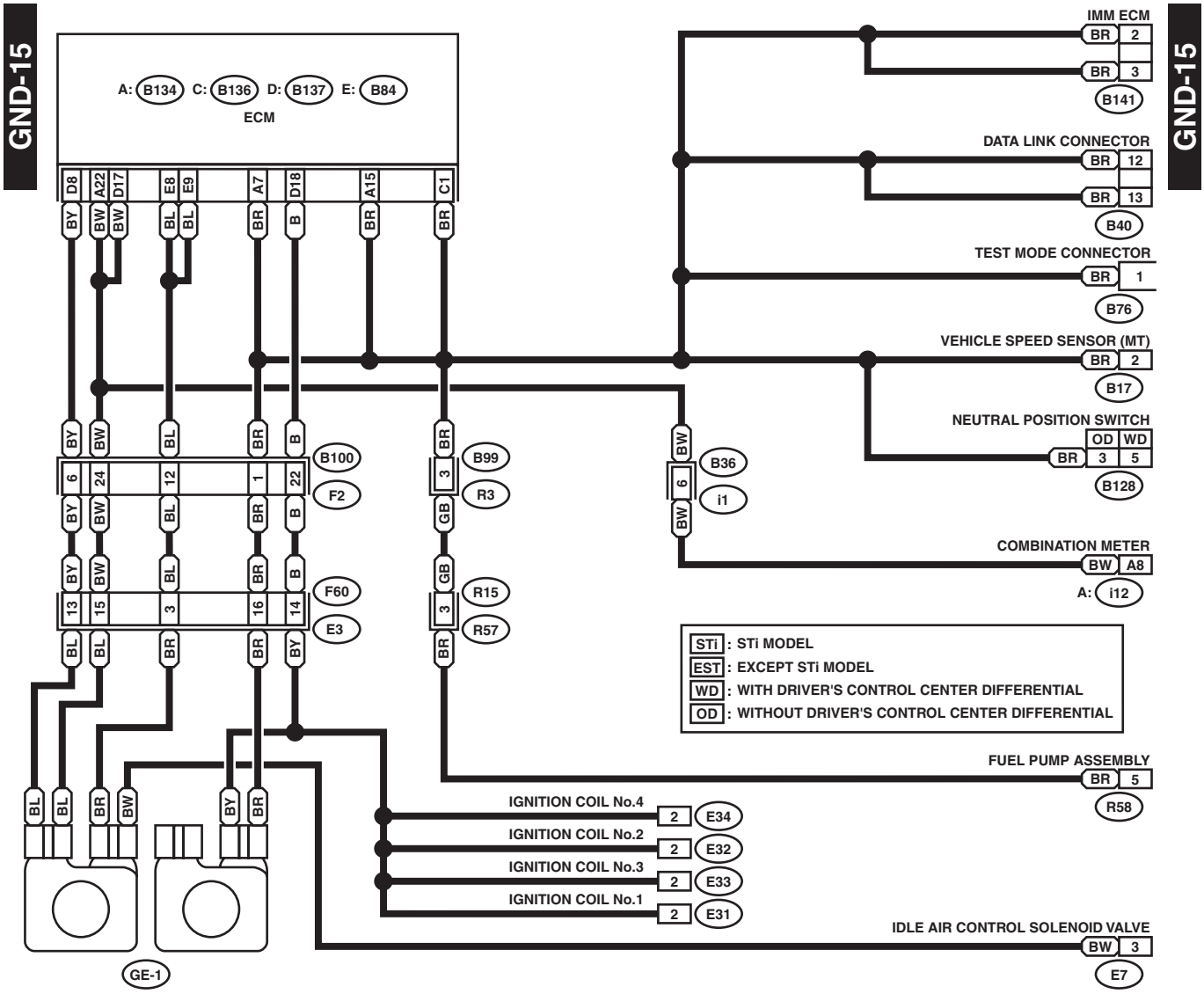
6. ENGINE GROUND RHD SOHC WITH OBD MODEL

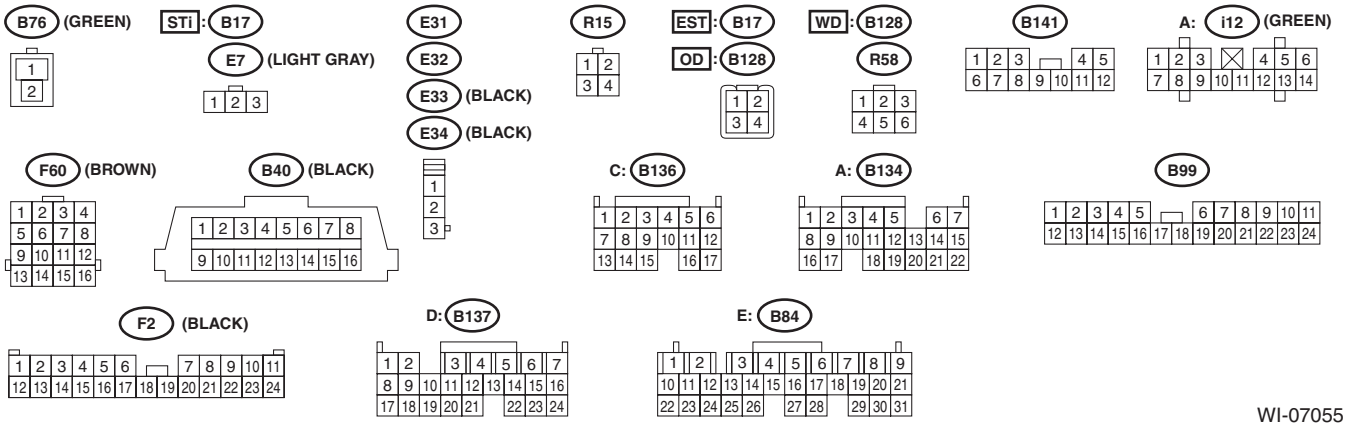




WI-07054

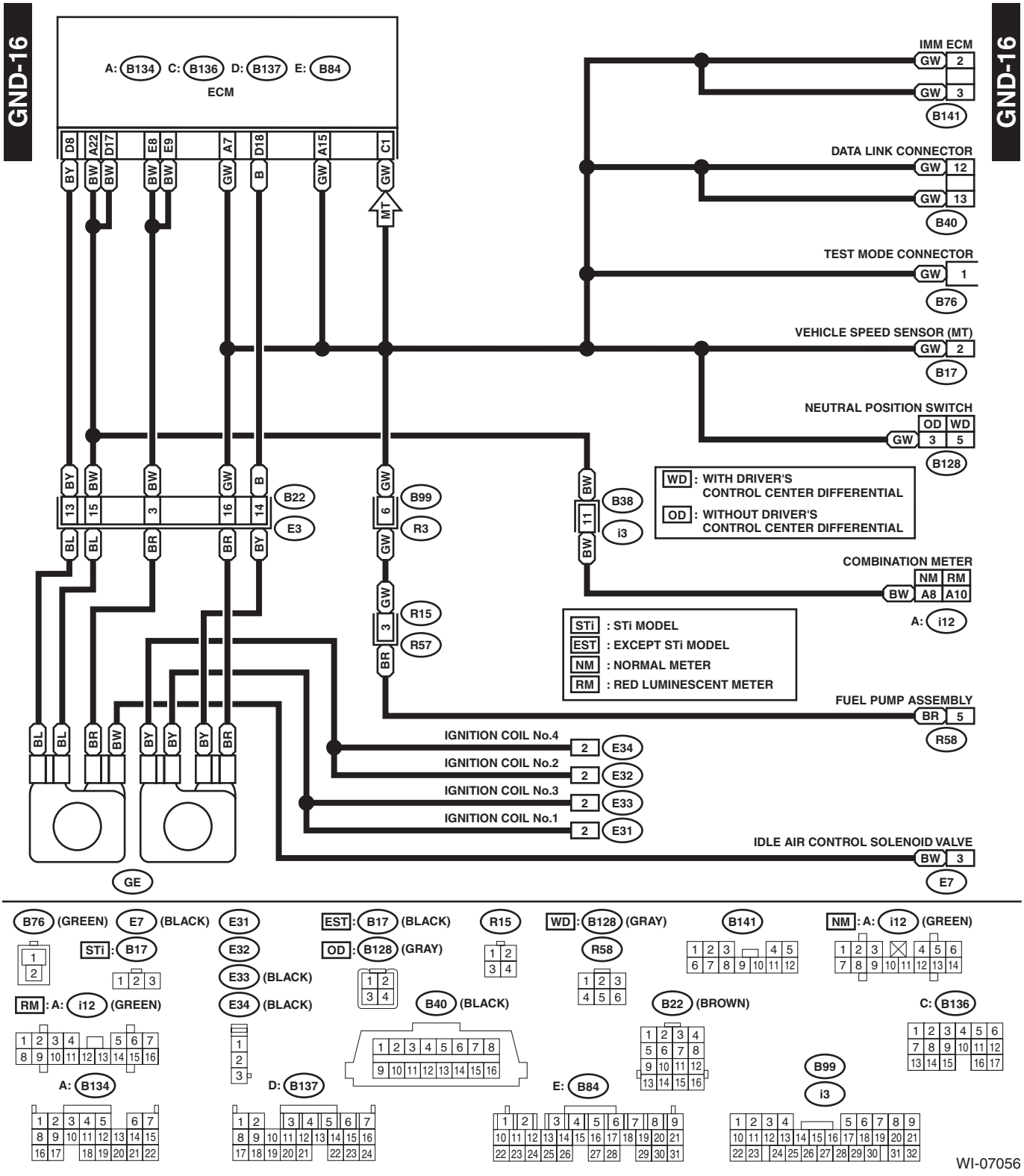
7. ENGINE GROUND LHD TURBO MODEL



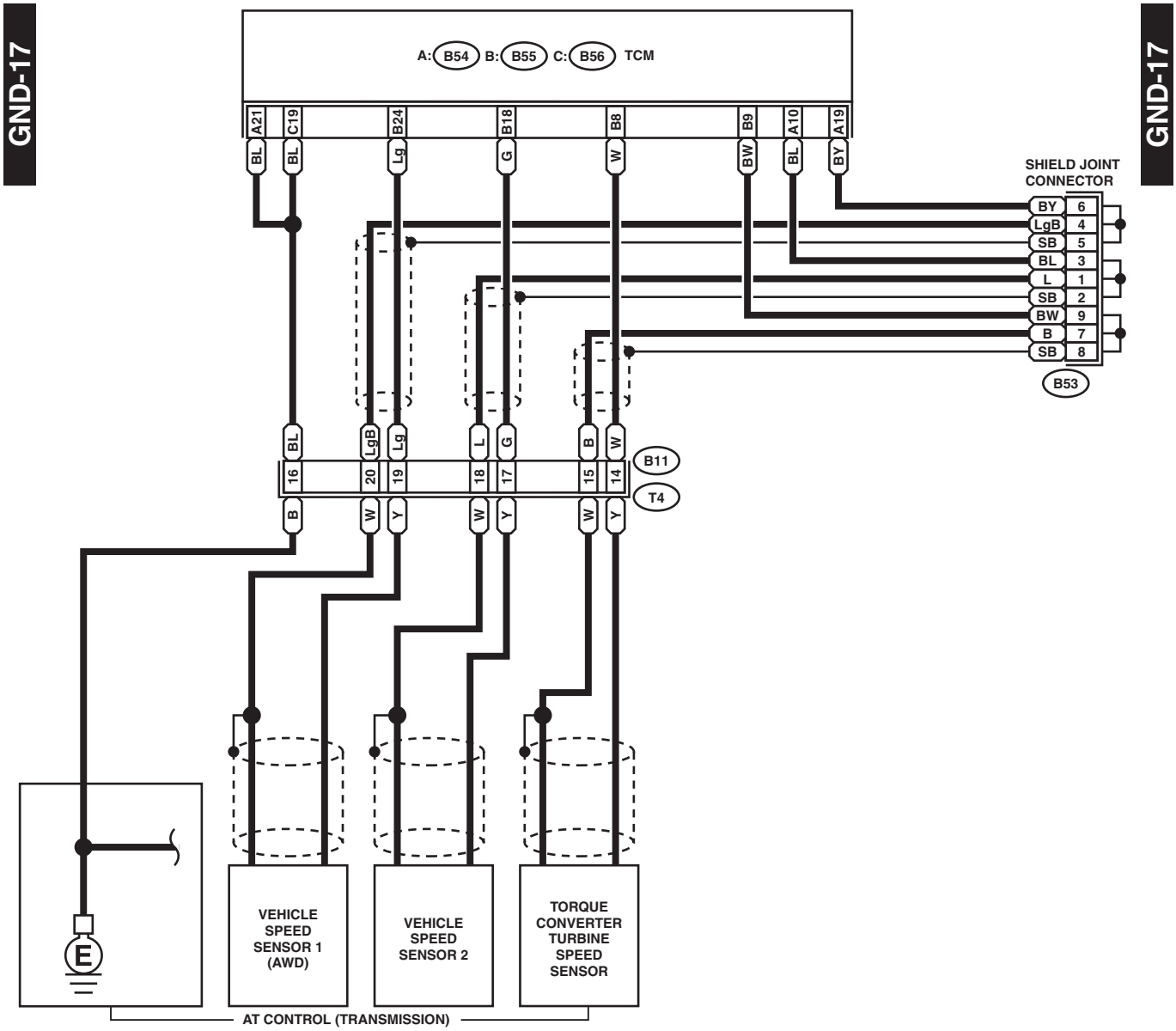


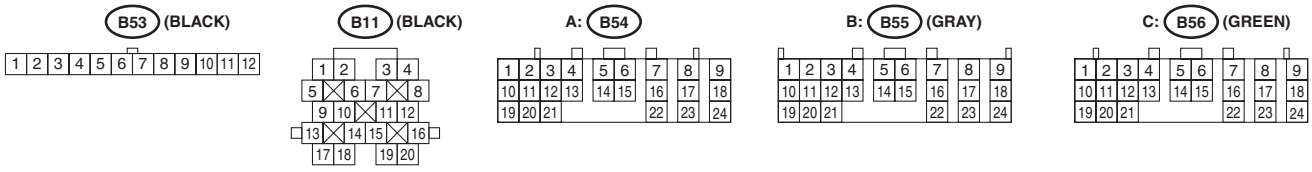
WI-07055

8. ENGINE GROUND RHD TURBO MODEL



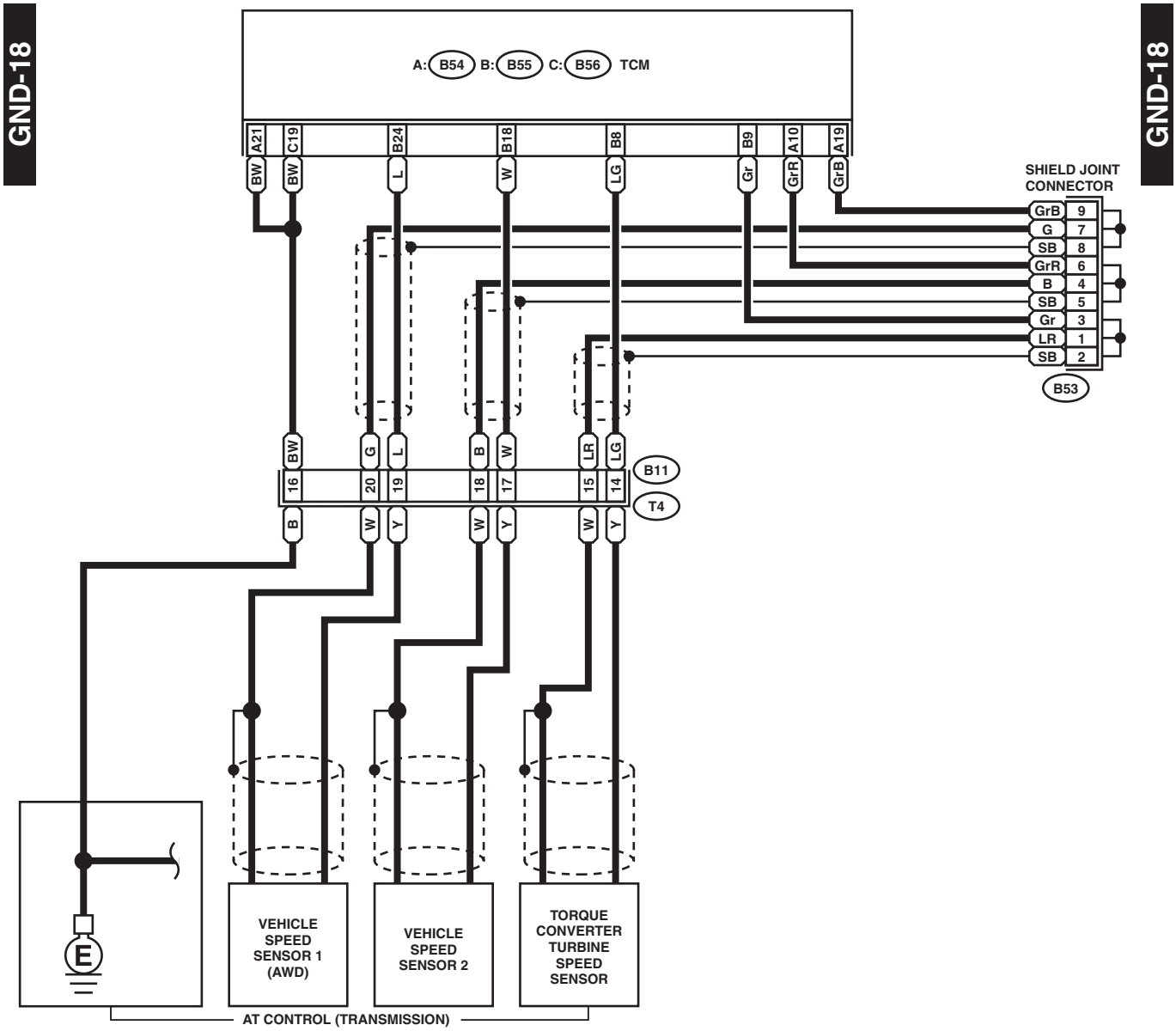
9. TRANSMISSION GROUND LHD MODEL

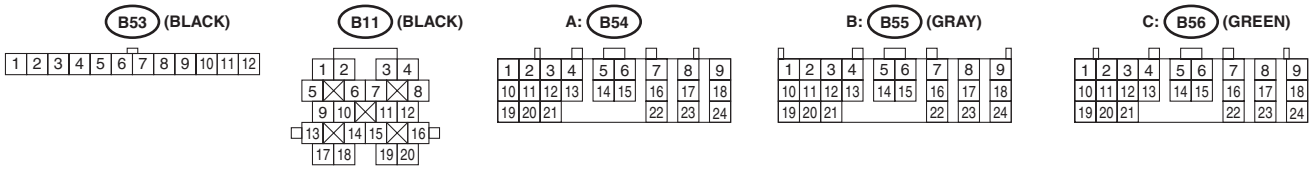




WI-02259

10.TRANSMISSION GROUND RHD MODEL



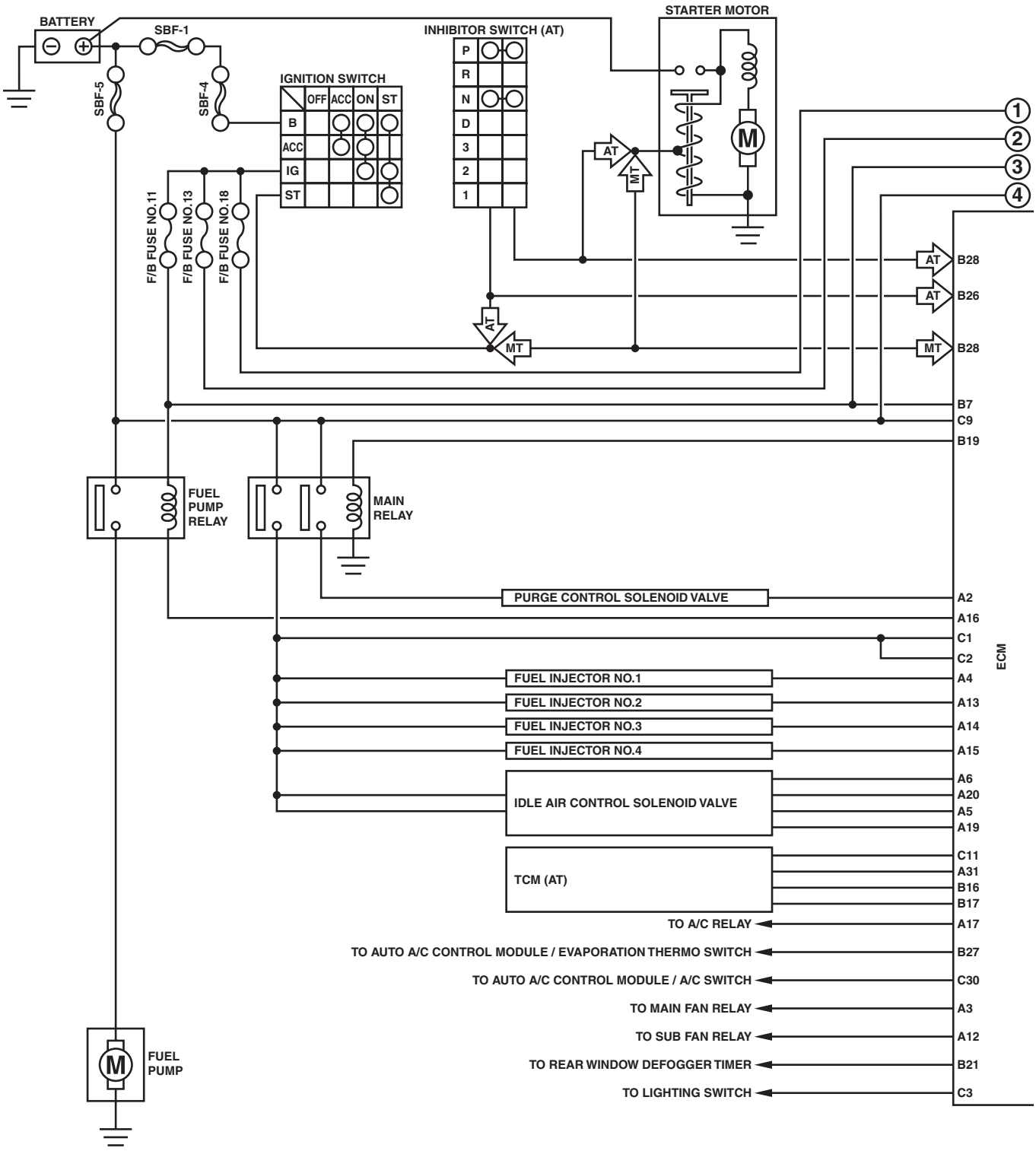


WI-04542

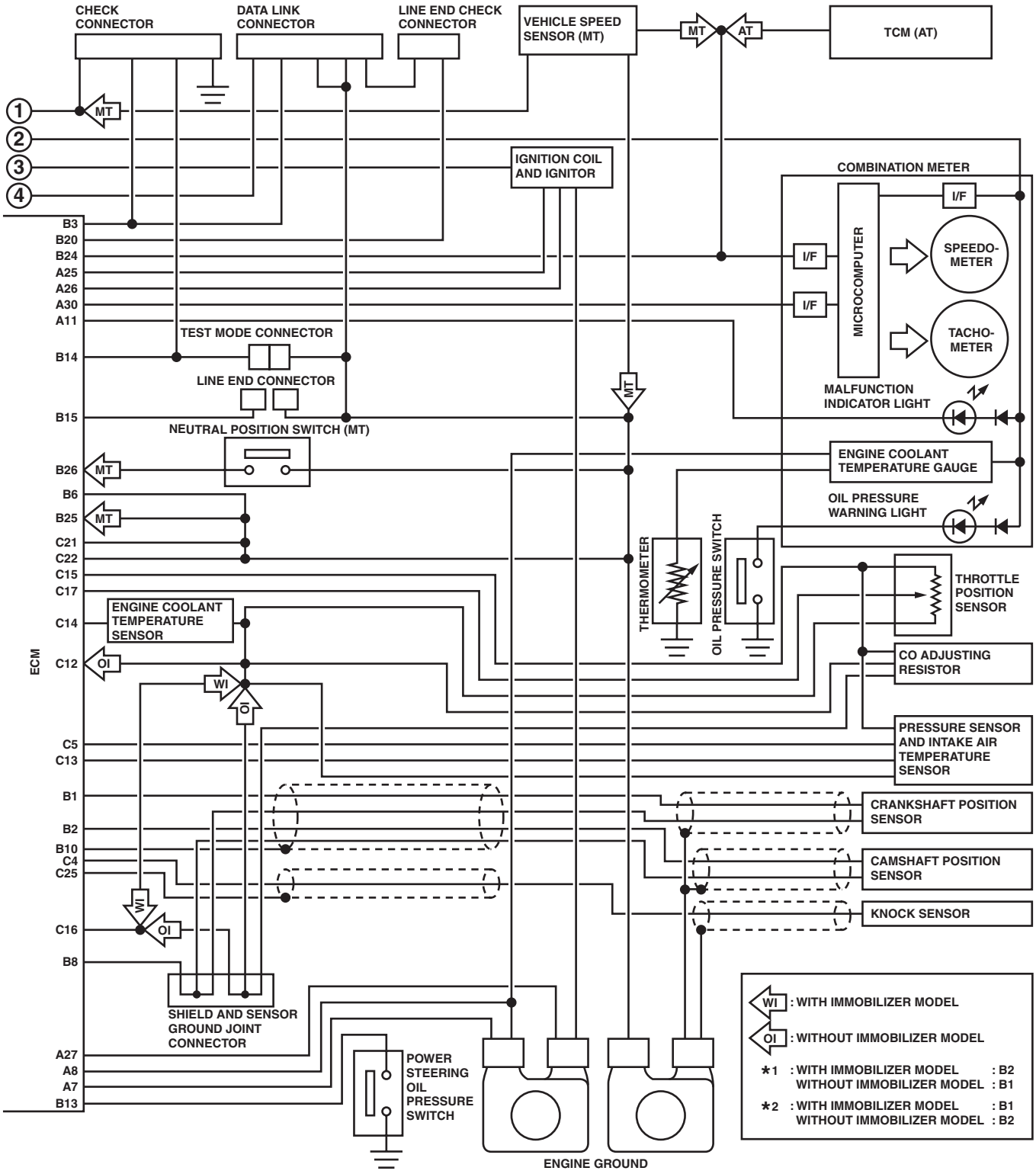
5. Engine Electrical System

A: WIRING DIAGRAM

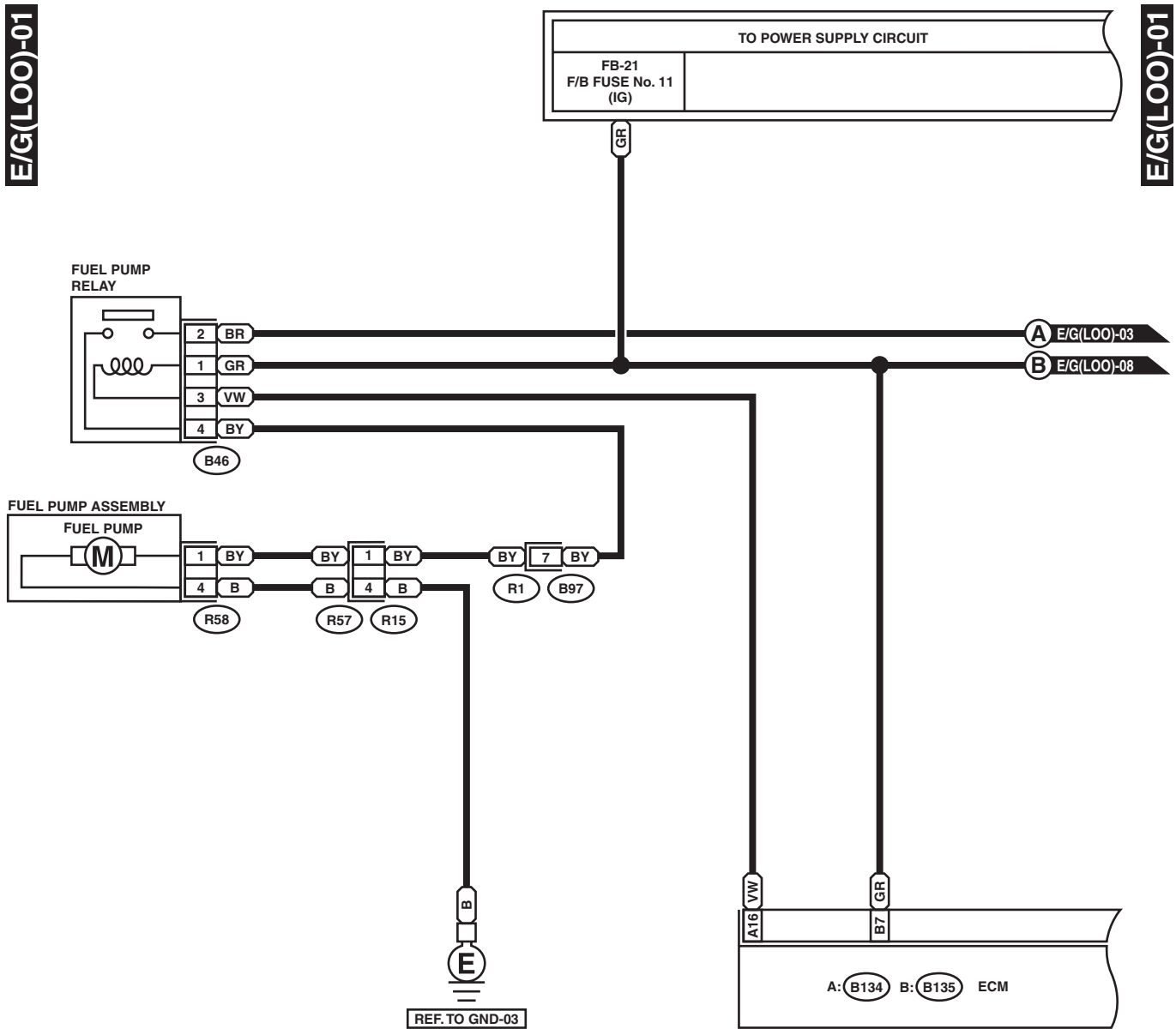
1. LHD SOHC WITHOUT OBD MODEL

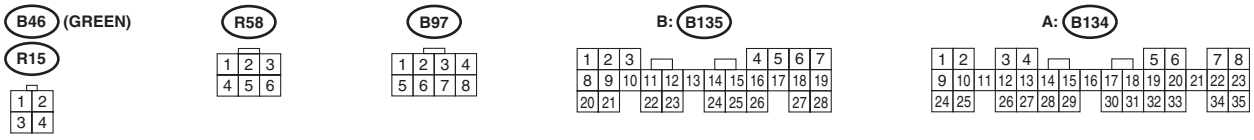


WI-04466

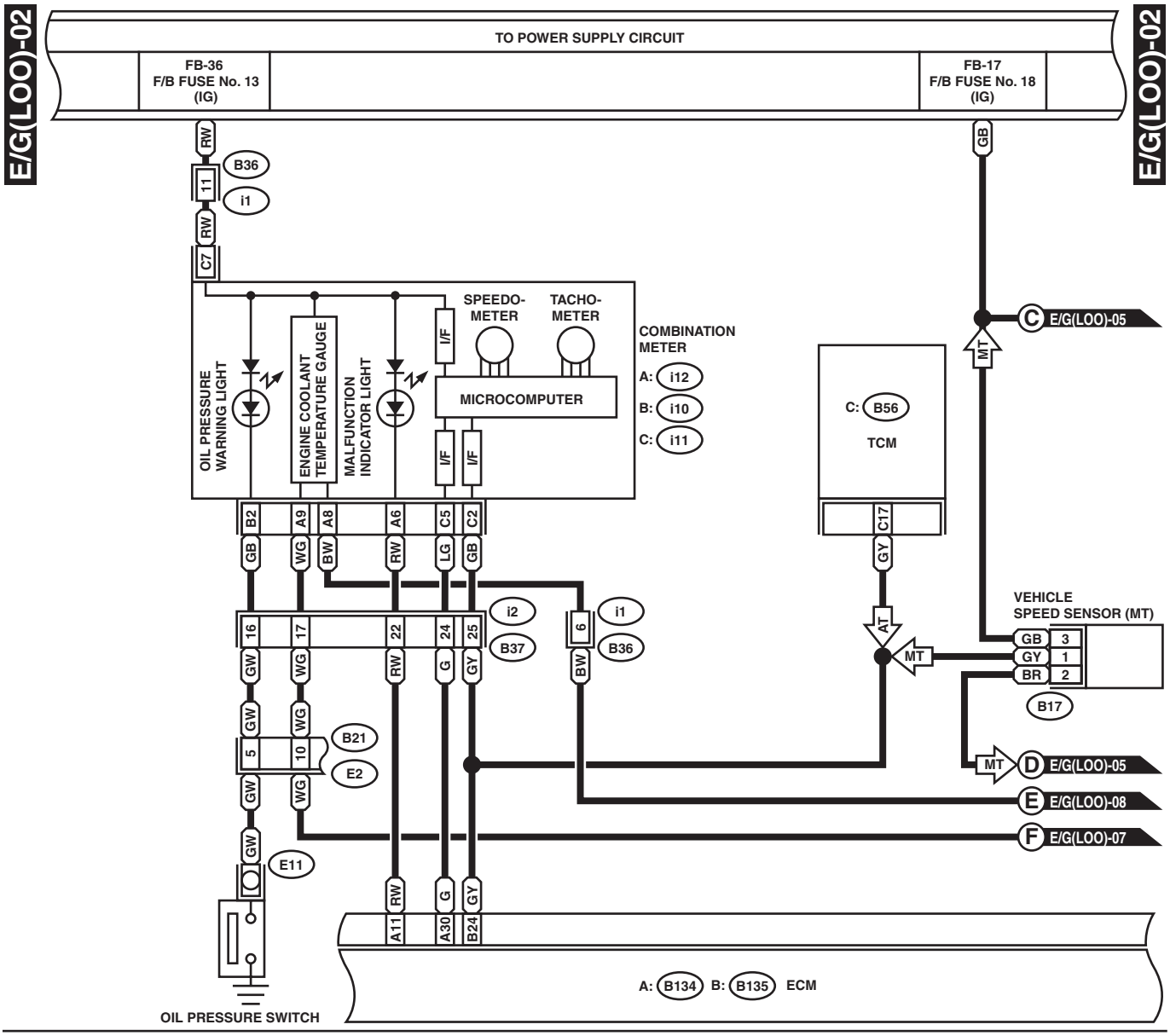

CHECK CONNECTOR
DATA LINK CONNECTOR
LINE END CHECK CONNECTOR
VEHICLE SPEED SENSOR (MT)
MT
AT
TCM (AT)
IGNITION COIL AND IGNITOR
COMBINATION METER
I/F
MICROCOMPUTER
SPEEDO-METER
TACHO-METER
MALFUNCTION INDICATOR LIGHT
ENGINE COOLANT TEMPERATURE GAUGE
OIL PRESSURE WARNING LIGHT
TEST MODE CONNECTOR
LINE END CONNECTOR
NEUTRAL POSITION SWITCH (MT)
THERMOMETER
OIL PRESSURE SWITCH
THROTTLE POSITION SENSOR
CO ADJUSTING RESISTOR
ENGINE COOLANT TEMPERATURE SENSOR
PRESSURE SENSOR AND INTAKE AIR TEMPERATURE SENSOR
CRANKSHAFT POSITION SENSOR
CAMSHAFT POSITION SENSOR
KNOCK SENSOR
ECM
SHIELD AND SENSOR GROUND JOINT CONNECTOR
POWER STEERING OIL PRESSURE SWITCH
ENGINE GROUND
WI : WITH IMMOBILIZER MODEL
OI : WITHOUT IMMOBILIZER MODEL
*1 : WITH IMMOBILIZER MODEL : B2
WITHOUT IMMOBILIZER MODEL : B1
*2 : WITH IMMOBILIZER MODEL : B1
WITHOUT IMMOBILIZER MODEL : B2

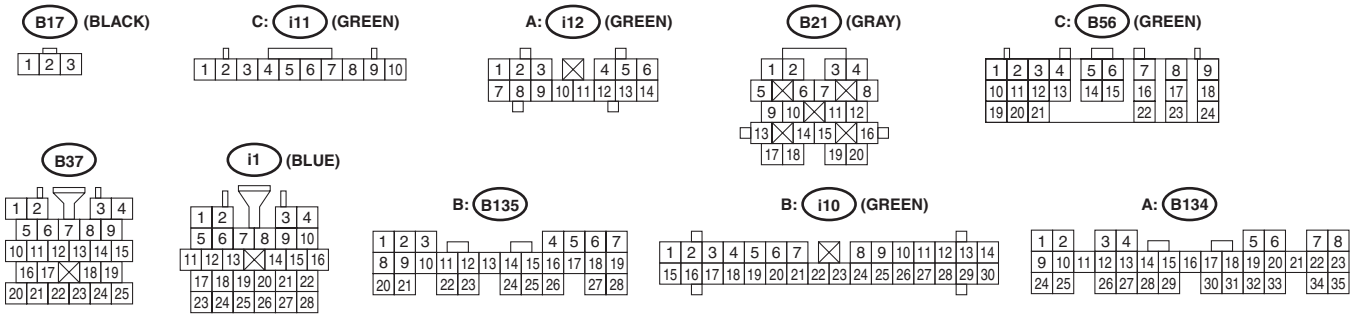
WI-07093


E/G(LOO)-01
E/G(LOO)-01
TO POWER SUPPLY CIRCUIT
FB-21
F/B FUSE No. 11
(IG)
GR
FUEL PUMP
RELAY
2 BR
1 GR
3 VW
4 BY
B46
A E/G(LOO)-03
B E/G(LOO)-08
FUEL PUMP ASSEMBLY
FUEL PUMP
M
1 BY
4 B
R58
BY
B
R57
1 BY
4 B
R15
BY 7 BY
R1
B97
B
E
REF. TO GND-03
VW
GR
A16
B7
A: B134 B: B135 ECM

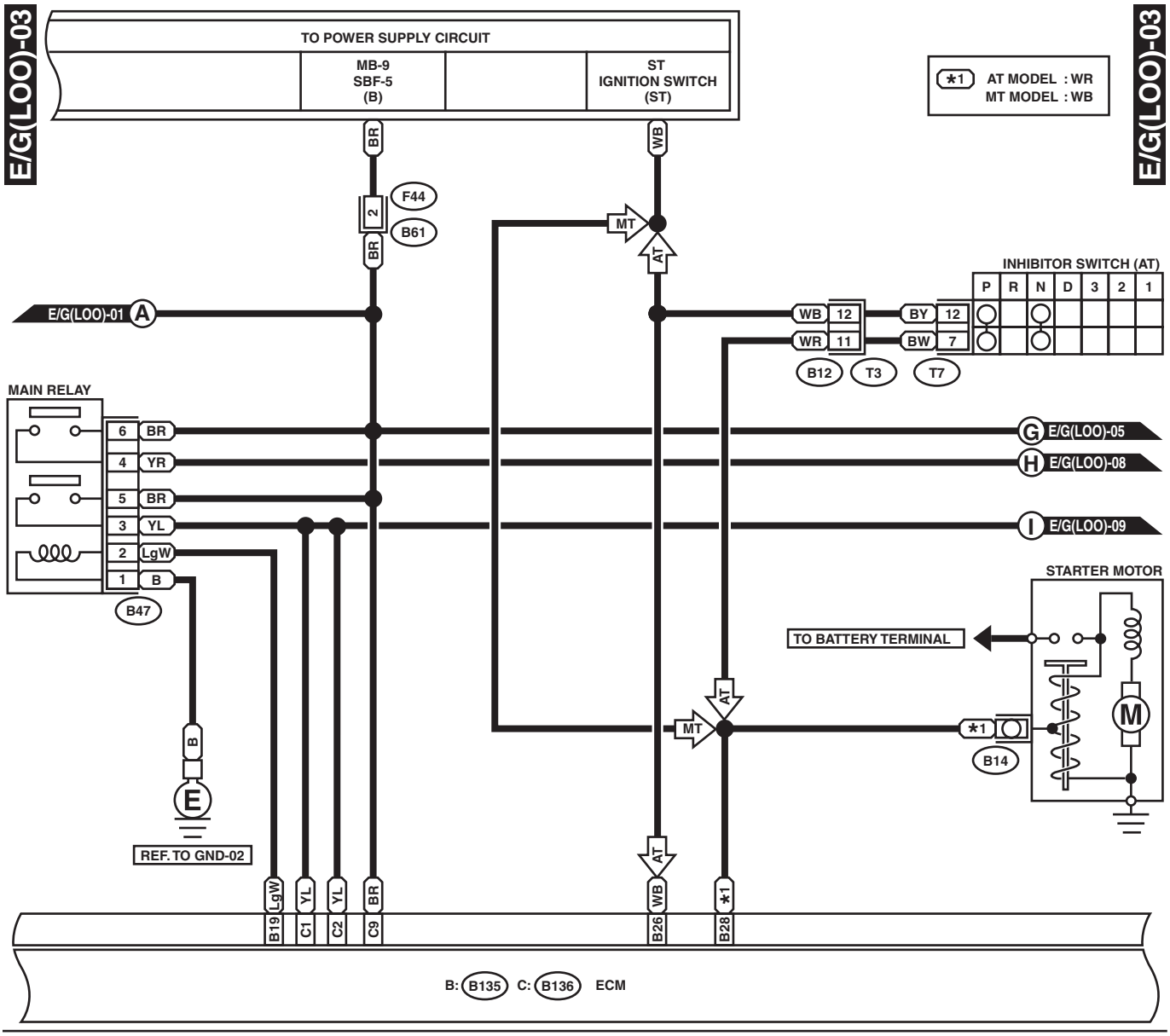

B46 (GREEN)
R15
R58
B97
B: B135
A: B134

WI-02307


E/G(LOO)-02
TO POWER SUPPLY CIRCUIT
FB-36
F/B FUSE No. 13
(IG)
FB-17
F/B FUSE No. 18
(IG)
E/G(LOO)-02
RW
B36
11
i1
RW
C7
SPEEDO-METER
TACHO-METER
I/F
COMBINATION METER
A: i12
B: i10
C: i11
OIL PRESSURE WARNING LIGHT
ENGINE COOLANT TEMPERATURE GAUGE
MALFUNCTION INDICATOR LIGHT
MICROCOMPUTER
I/F
I/F
B2
A9
A8
A6
C5
C2
GB
WG
BW
RW
LG
GB
C: B56
TCM
C17
GY
GB
C E/G(LOO)-05
MT
AT
MT
VEHICLE SPEED SENSOR (MT)
GB 3
GY 1
BR 2
B17
i2
B37
16
17
22
24
25
GW
WG
RW
G
GY
6
i1
B36
BW
MT
D E/G(LOO)-05
E E/G(LOO)-08
F E/G(LOO)-07
5
10
B21
E2
E11
RW
G
GY
A11
A30
B24
A: B134 B: B135 ECM
OIL PRESSURE SWITCH


B17 (BLACK)
C: i11 (GREEN)
A: i12 (GREEN)
B21 (GRAY)
C: B56 (GREEN)
B37
i1 (BLUE)
B: B135
B: i10 (GREEN)
A: B134

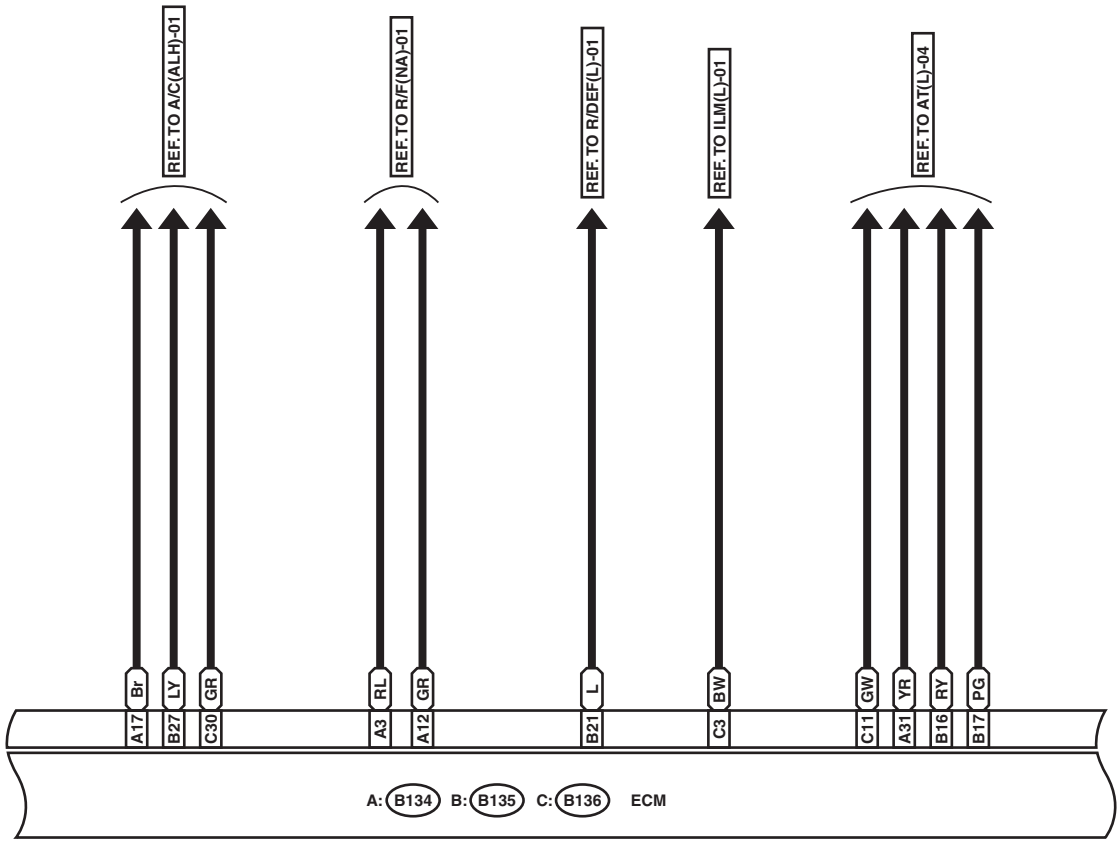
WI-07094

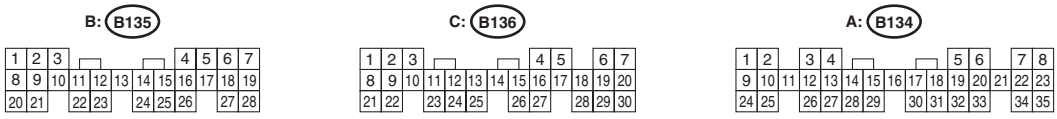

E/G(LOO)-03
TO POWER SUPPLY CIRCUIT
MB-9
SBF-5
(B)
ST
IGNITION SWITCH
(ST)
*1 AT MODEL : WR
MT MODEL : WB
BR
WB
F44
2
B61
MT
AT
INHIBITOR SWITCH (AT)
P R N D 3 2 1
E/G(LOO)-01 A
WB 12
WR 11
BY 12
BW 7
B12 T3 T7
MAIN RELAY
6 BR
4 YR
5 BR
3 YL
2 LgW
1 B
B47
G E/G(LOO)-05
H E/G(LOO)-08
I E/G(LOO)-09
STARTER MOTOR
TO BATTERY TERMINAL
M
*1
B14
B
E
REF. TO GND-02
B19 LgW
C1 YL
C2 YL
C9 BR
B26 WB
B28 *1
B: B135 C: B136 ECM
B47 (BROWN)
F44
B12 (GRAY)
T7
B: B135
C: B136

WI-07095

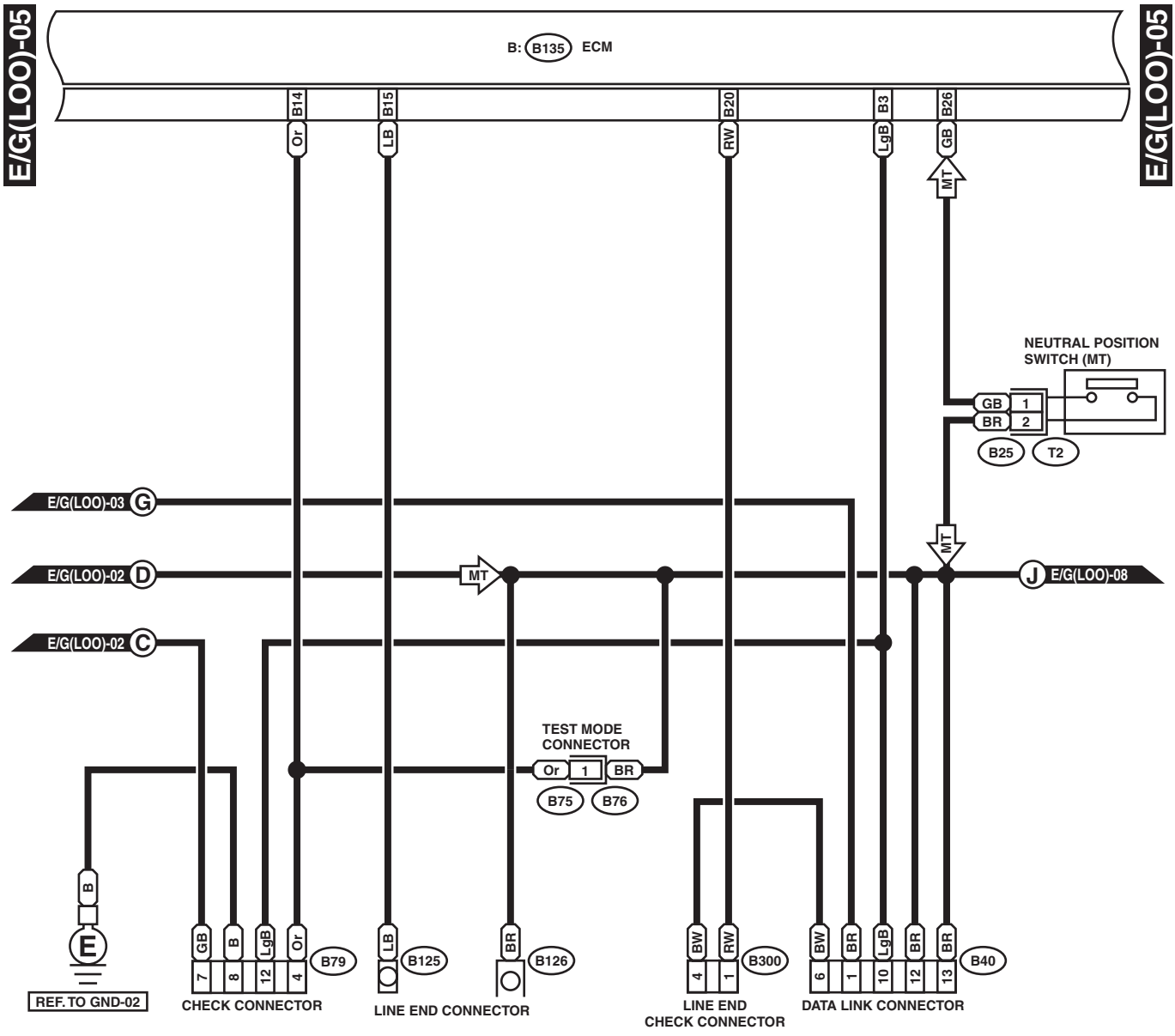
E/G(LOO)-04

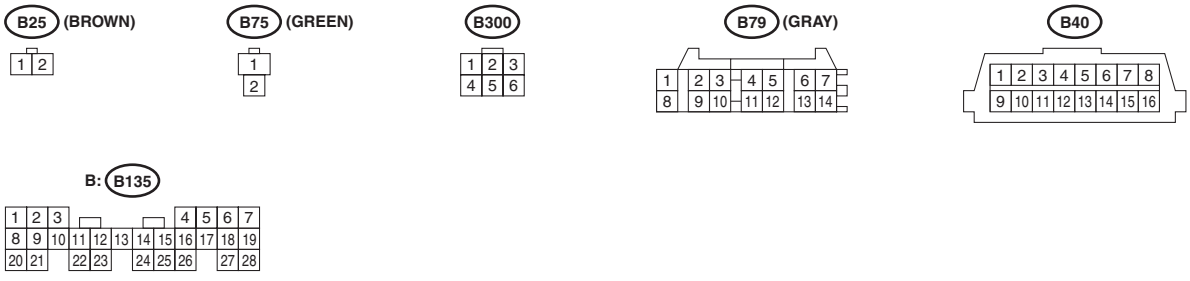
E/G(LOO)-04





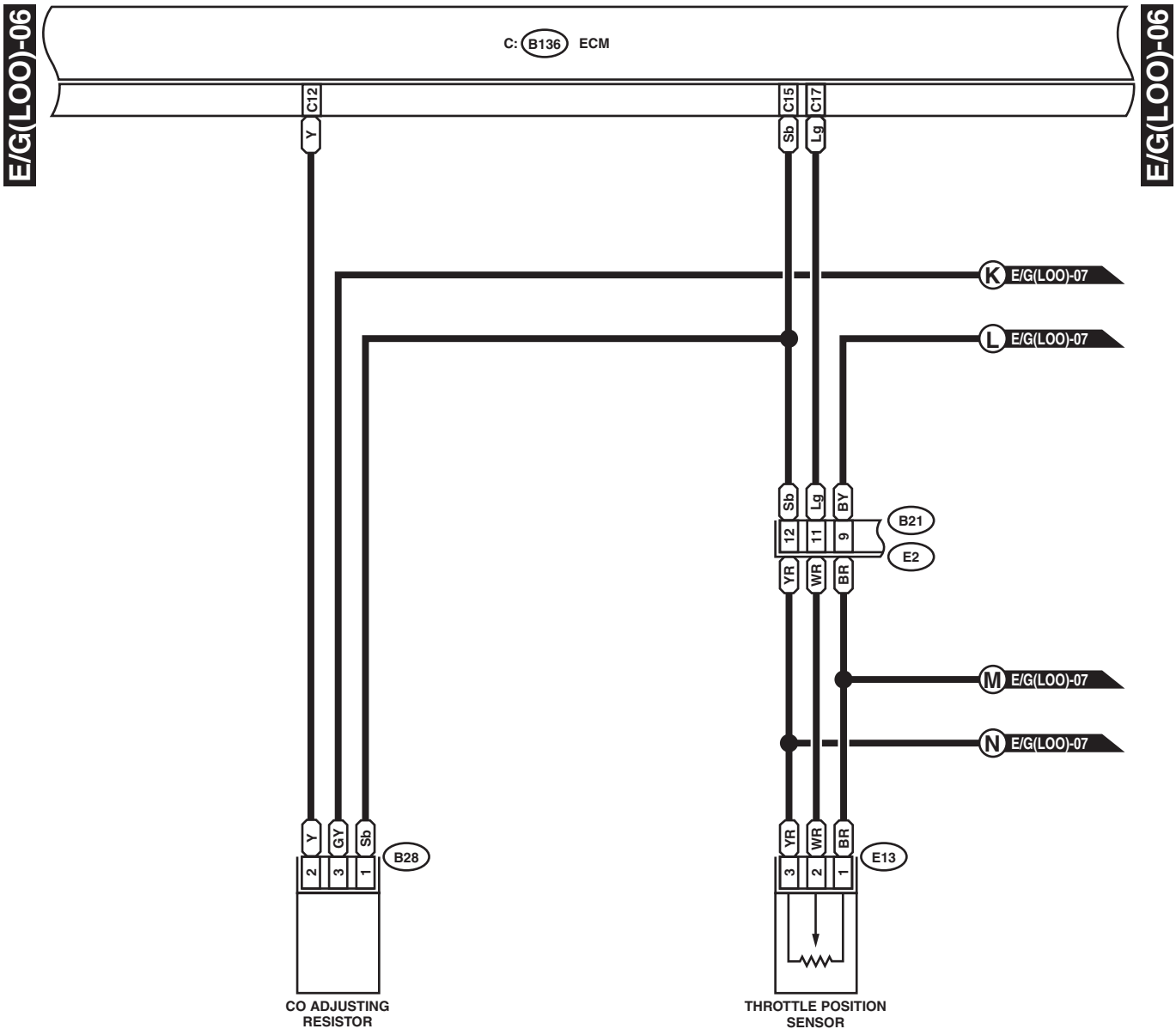
WI-02310


E/G(LOO)-05
E/G(LOO)-05
B: B135 ECM
B14
B15
B20
B3
B26
Or
LB
RW
LgB
GB
MT
NEUTRAL POSITION SWITCH (MT)
GB
BR
1
2
B25
T2
E/G(LOO)-03 G
E/G(LOO)-02 D
E/G(LOO)-02 C
MT
J E/G(LOO)-08
TEST MODE CONNECTOR
Or
1
BR
B75
B76
B
REF. TO GND-02
GB
B
LgB
Or
7
8
12
4
B79
CHECK CONNECTOR
LB
B125
LINE END CONNECTOR
BR
B126
BW
RW
4
1
B300
LINE END CHECK CONNECTOR
BW
BR
LgB
BR
BR
6
1
10
12
13
B40
DATA LINK CONNECTOR


B25 (BROWN)
1 2
B75 (GREEN)
1
2
B300
1 2 3
4 5 6
B79 (GRAY)
1 2 3 4 5 6 7
8 9 10 11 12 13 14
B40
1 2 3 4 5 6 7 8
9 10 11 12 13 14 15 16

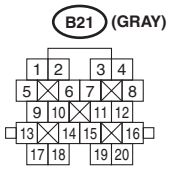
B: B135
1 2 3 4 5 6 7
8 9 10 11 12 13 14 15 16 17 18 19
20 21 22 23 24 25 26 27 28

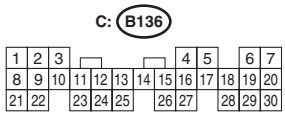
WI-07096


E/G(LOO)-06
E/G(LOO)-06
C: B136 ECM
C12
C15
C17
Y
Sb
Lg
K E/G(LOO)-07
L E/G(LOO)-07
Sb
Lg
BY
12
11
9
B21
E2
YR
WR
BR
M E/G(LOO)-07
N E/G(LOO)-07
Y
GY
Sb
2
3
1
B28
YR
WR
BR
3
2
1
E13
CO ADJUSTING RESISTOR
THROTTLE POSITION SENSOR

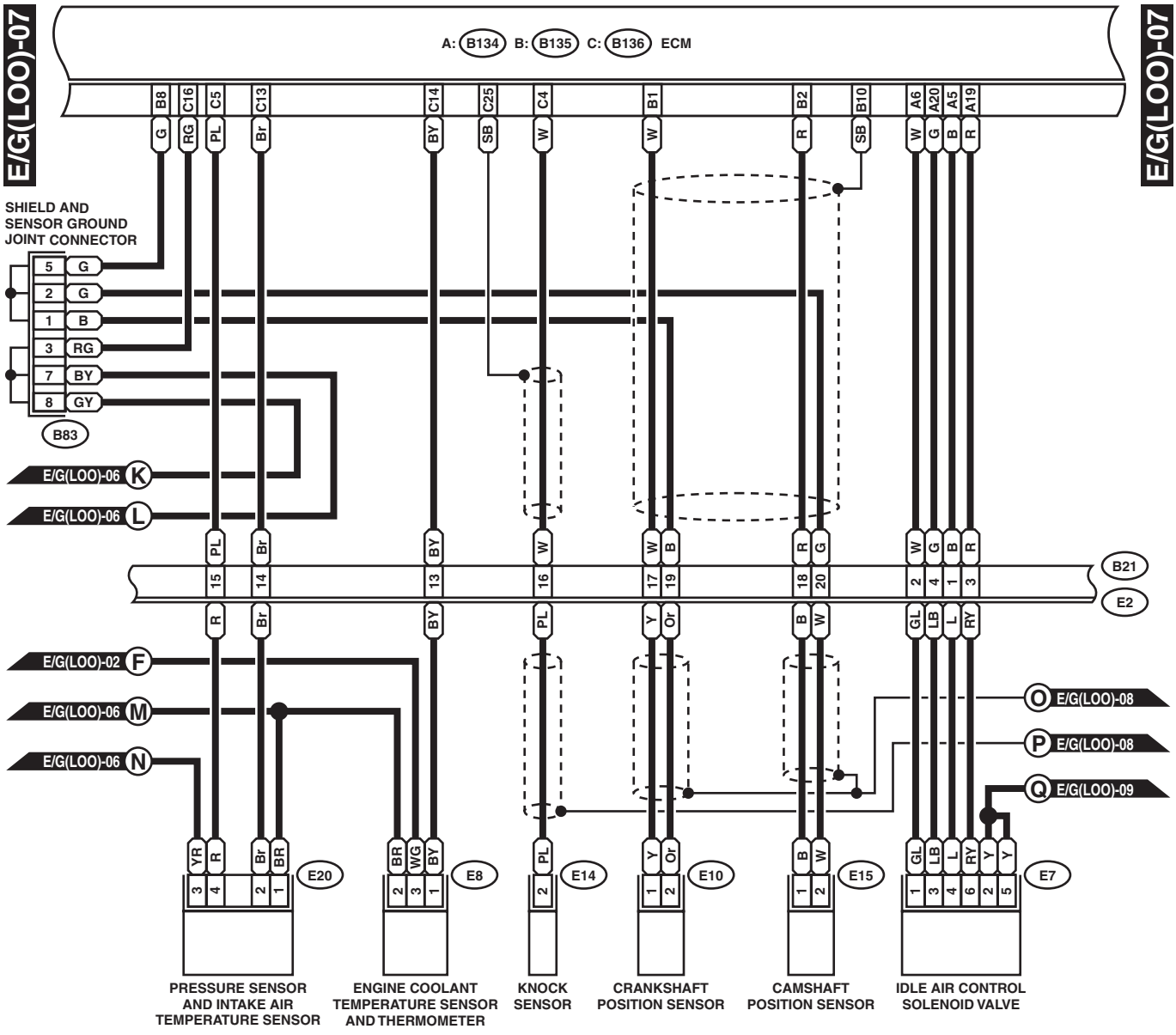
B28
1 2 3

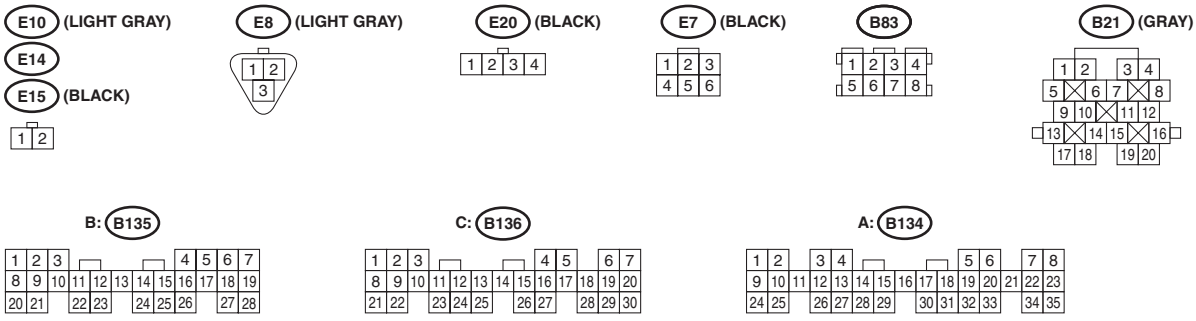
E13 (BROWN)
1 2 3


B21 (GRAY)
1 2 3 4
5 6 7 8
9 10 11 12
13 14 15 16
17 18 19 20

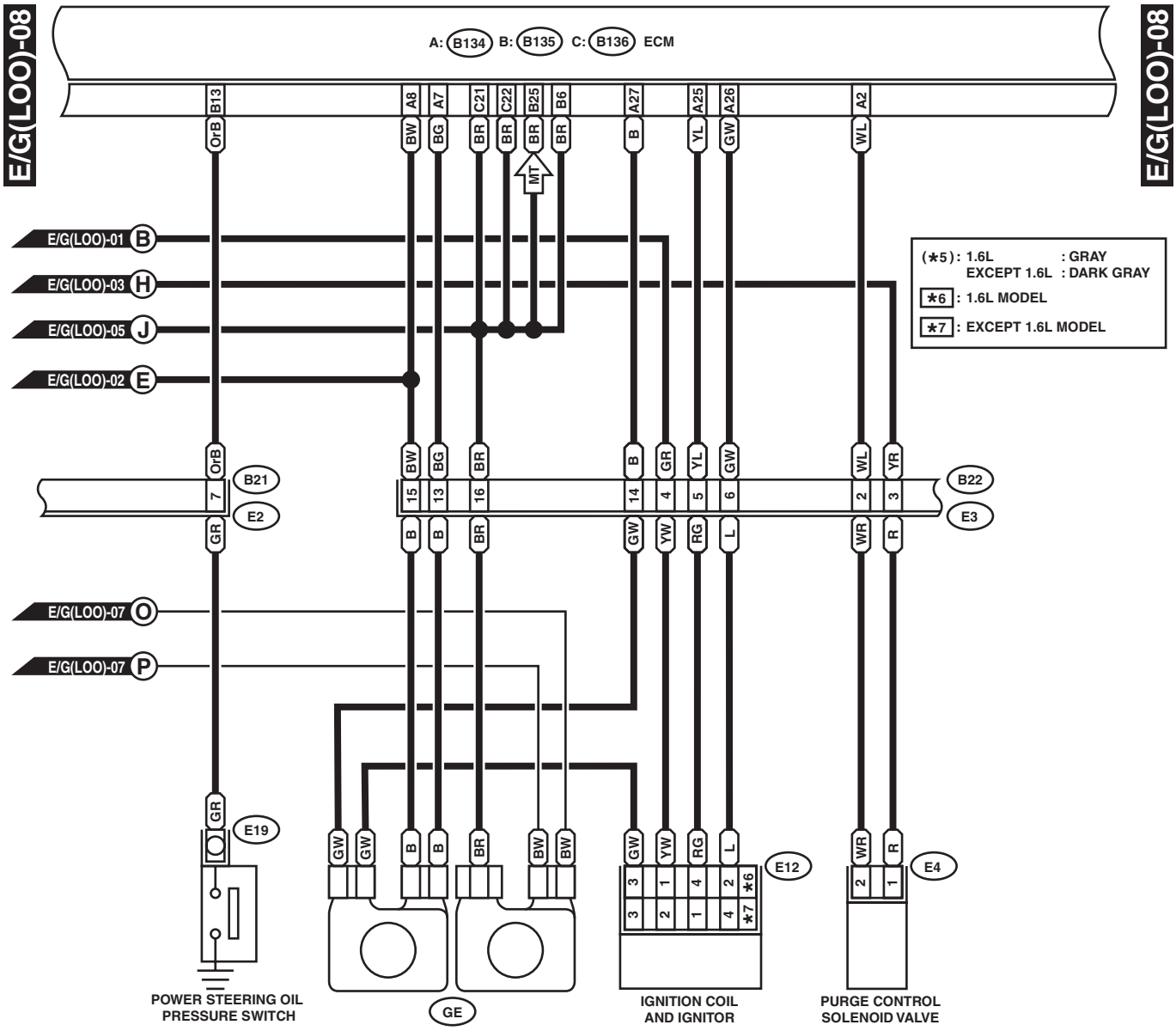

C: B136
1 2 3 4 5 6 7
8 9 10 11 12 13 14 15 16 17 18 19 20
21 22 23 24 25 26 27 28 29 30

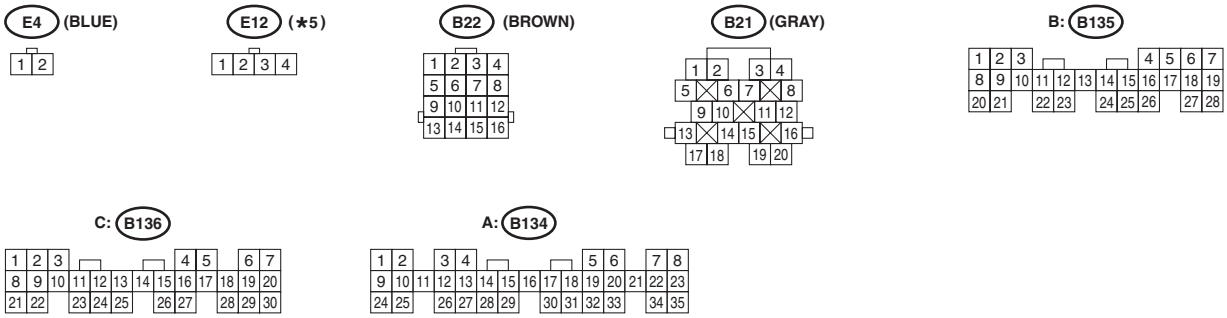
WI-07097


E/G(LOO)-07
E/G(LOO)-07
A: B134 B: B135 C: B136 ECM
B8 C16 C5 C13 C14 C25 C4 B1 B2 B10 A6 A20 A5 A19
G RG PL Br BY SB W W R SB W G B R
SHIELD AND SENSOR GROUND JOINT CONNECTOR
5 G
2 G
1 B
3 RG
7 BY
8 GY
B83
E/G(LOO)-06 K
E/G(LOO)-06 L
PL Br BY W W B R G W G B R
15 14 13 16 17 19 18 20 2 4 1 3
B21
E2
R Br BY PL Y Or B W GL LB L RY
E/G(LOO)-02 F
E/G(LOO)-06 M
E/G(LOO)-06 N
O E/G(LOO)-08
P E/G(LOO)-08
Q E/G(LOO)-09
YR R Br BR BR WG BY PL Y Or B W GL LB L RY Y Y
3 4 2 1 E20
2 3 1 E8
2 E14
1 2 E10
1 2 E15
1 3 4 6 2 5 E7
PRESSURE SENSOR AND INTAKE AIR TEMPERATURE SENSOR
ENGINE COOLANT TEMPERATURE SENSOR AND THERMOMETER
KNOCK SENSOR
CRANKSHAFT POSITION SENSOR
CAMSHAFT POSITION SENSOR
IDLE AIR CONTROL SOLENOID VALVE

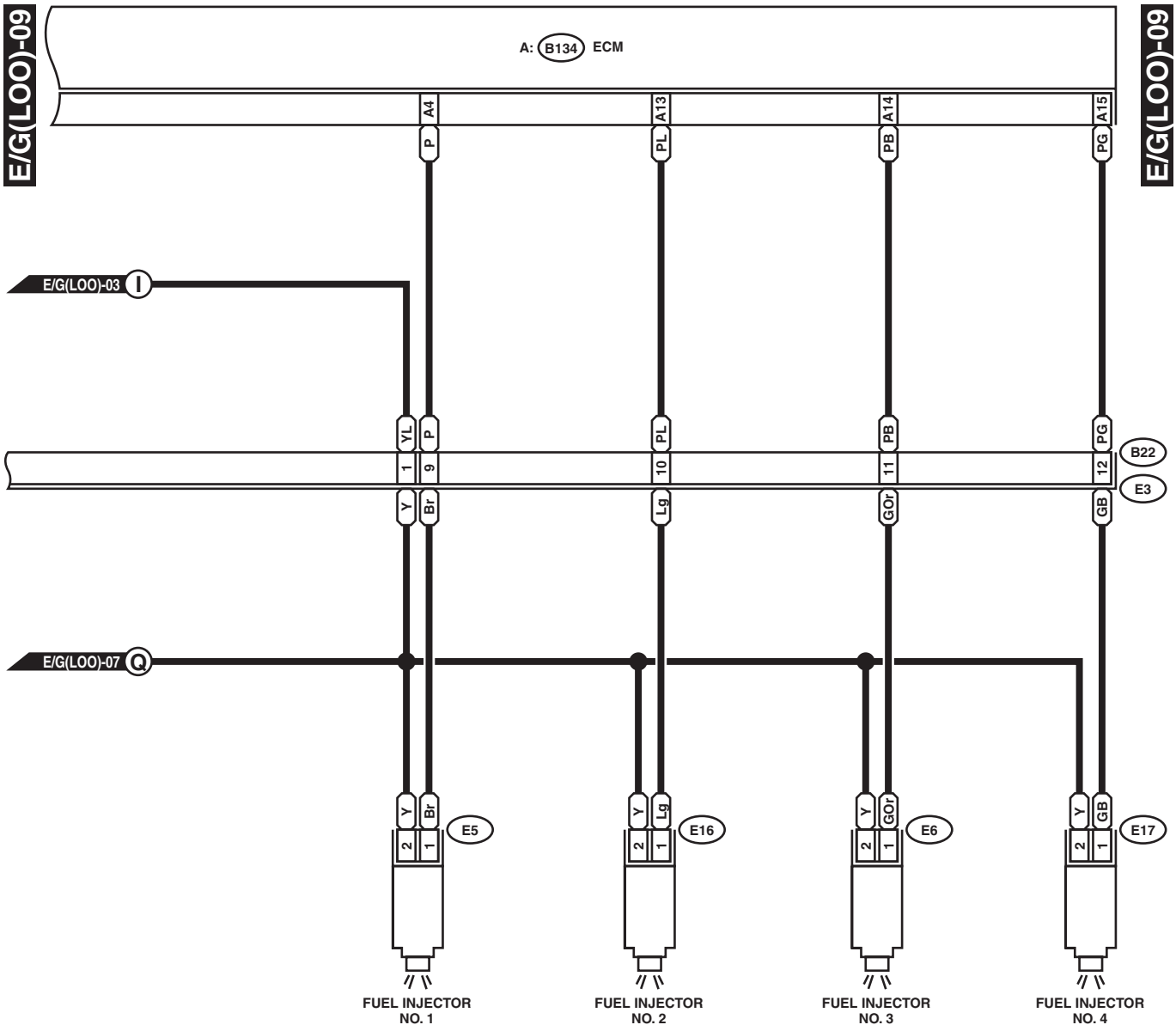

E10 (LIGHT GRAY)
E14
E15 (BLACK)
E8 (LIGHT GRAY)
E20 (BLACK)
E7 (BLACK)
B83
B21 (GRAY)
B: B135
C: B136
A: B134

WI-07098


E/G(LOO)-08
A: B134 B: B135 C: B136 ECM
E/G(LOO)-08
B13 A8 A7 C21 C22 B25 B6 A27 A25 A26 A2
OrB BW BG BR BR BR BR B YL GW WL
MT
E/G(LOO)-01 B
E/G(LOO)-03 H
E/G(LOO)-05 J
E/G(LOO)-02 E
(*5): 1.6L : GRAY
EXCEPT 1.6L : DARK GRAY
*6: 1.6L MODEL
*7: EXCEPT 1.6L MODEL
OrB BW BG BR B GR YL GW WL YR
B21 7 15 13 16 14 4 5 6 2 3 B22
E2 E3
GR B B BR GW YW RG L WR R
E/G(LOO)-07 O
E/G(LOO)-07 P
GR E19
GW GW B B BR BW BW GW YW RG L E12
3 1 4 2 *6
3 2 1 4 *7
WR R E4
2 1
POWER STEERING OIL PRESSURE SWITCH
GE
IGNITION COIL AND IGNITOR
PURGE CONTROL SOLENOID VALVE

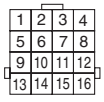

E4 (BLUE)
1 2
E12 (*5)
1 2 3 4
B22 (BROWN)
1 2 3 4
5 6 7 8
9 10 11 12
13 14 15 16
B21 (GRAY)
1 2 3 4
5 6 7 8
9 10 11 12
13 14 15 16
17 18 19 20
B: B135
1 2 3 4 5 6 7
8 9 10 11 12 13 14 15 16 17 18 19
20 21 22 23 24 25 26 27 28
C: B136
1 2 3 4 5 6 7
8 9 10 11 12 13 14 15 16 17 18 19 20
21 22 23 24 25 26 27 28 29 30
A: B134
1 2 3 4 5 6 7 8
9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
24 25 26 27 28 29 30 31 32 33 34 35

WI-07099

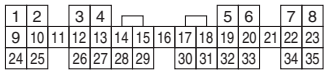


E5 (LIGHT GRAY)
E6 (LIGHT GRAY)
E16 (LIGHT GRAY)
E17 (LIGHT GRAY)

B22 (BROWN)

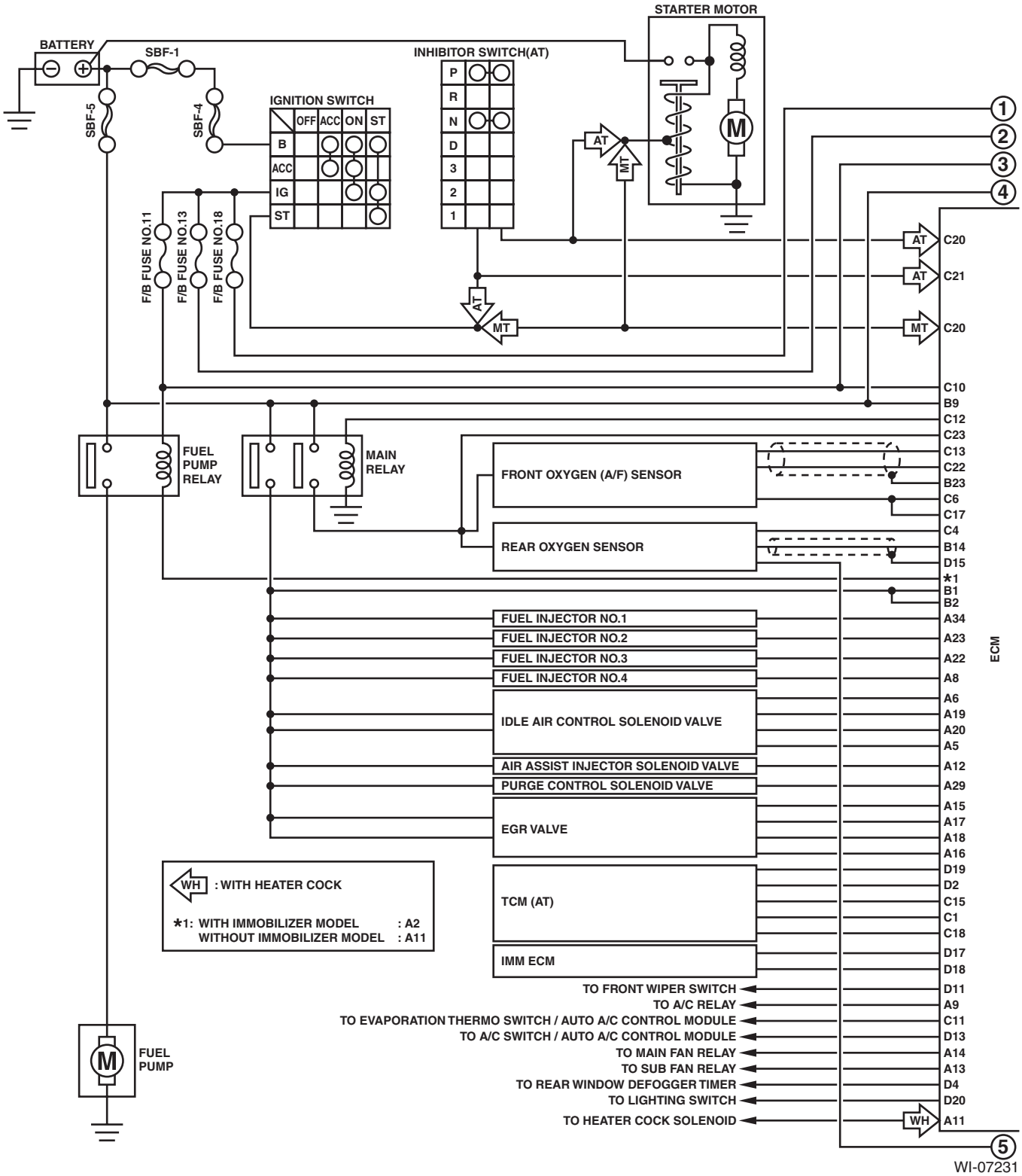


A: B134

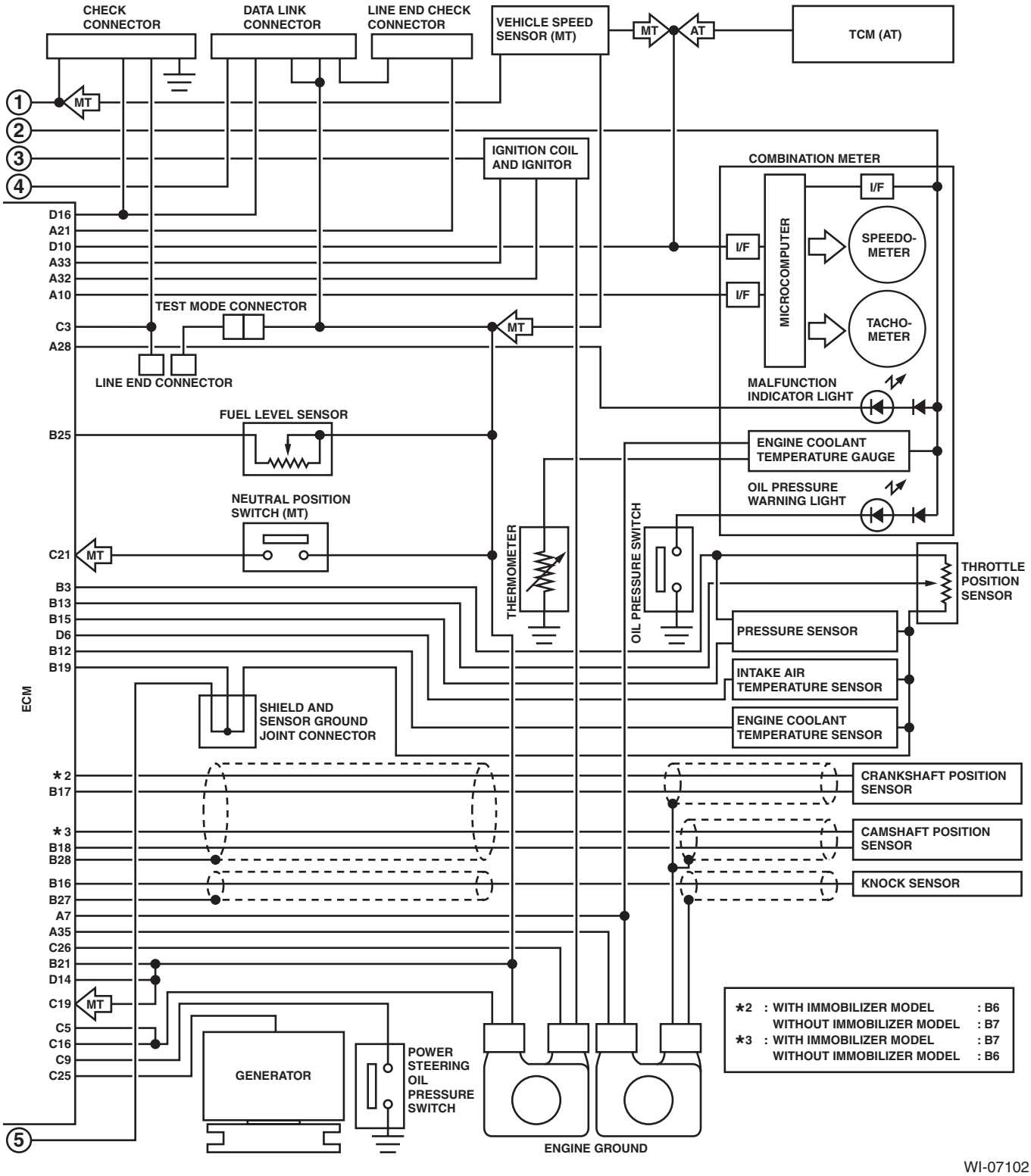


WI-07100

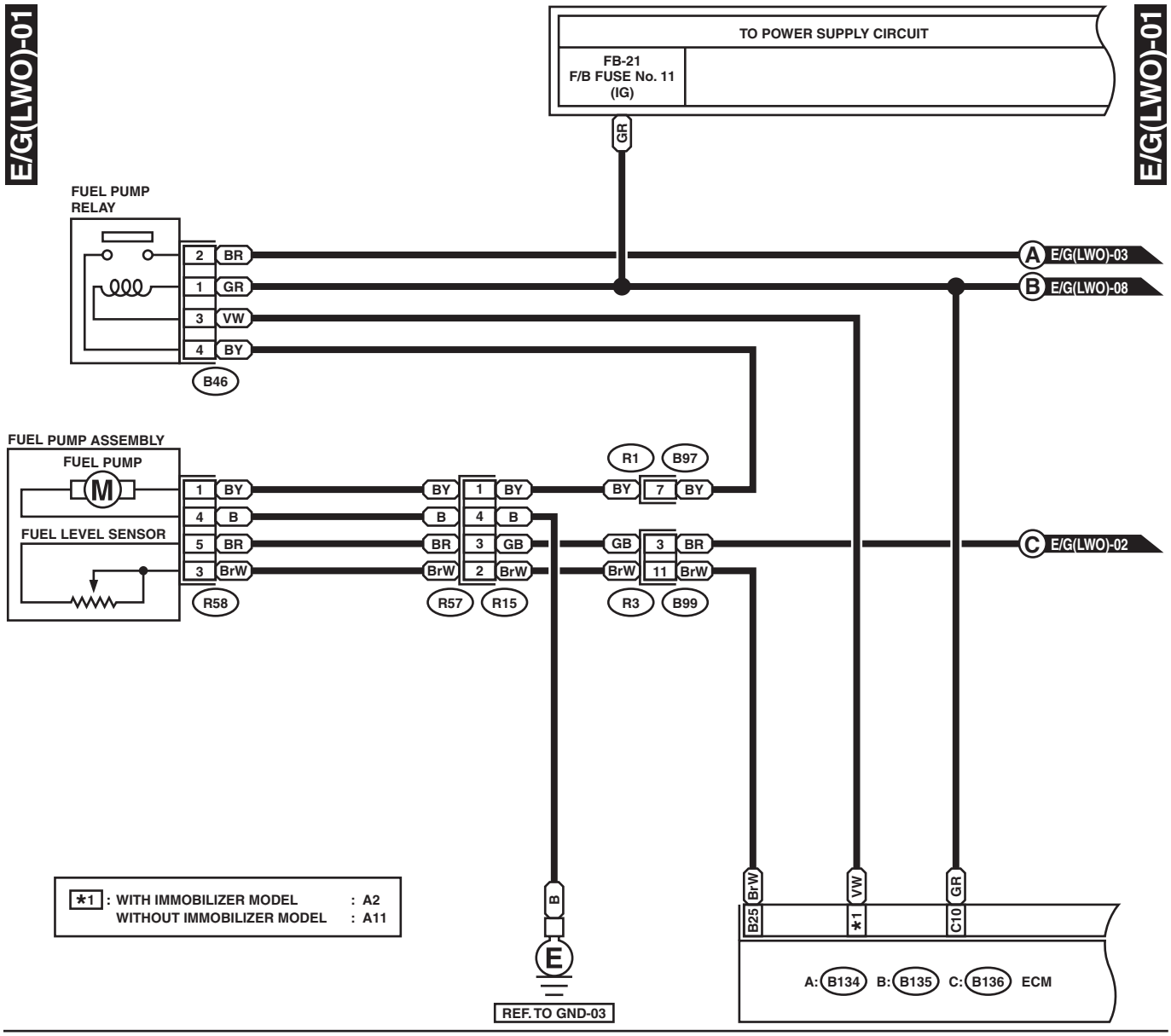
2. LHD SOHC WITH OBD MODEL

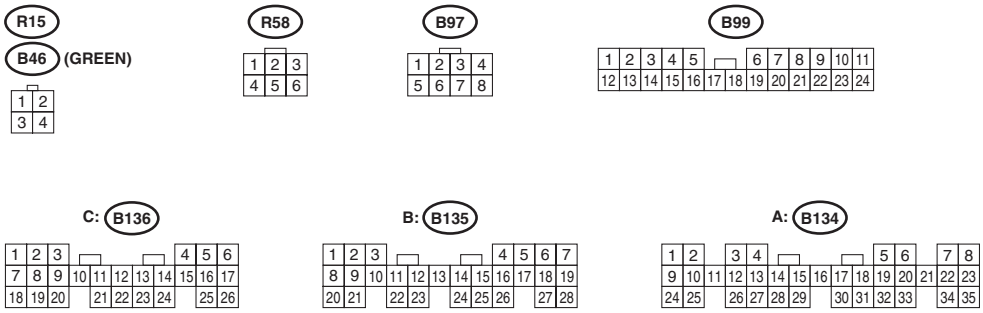


WI-07231

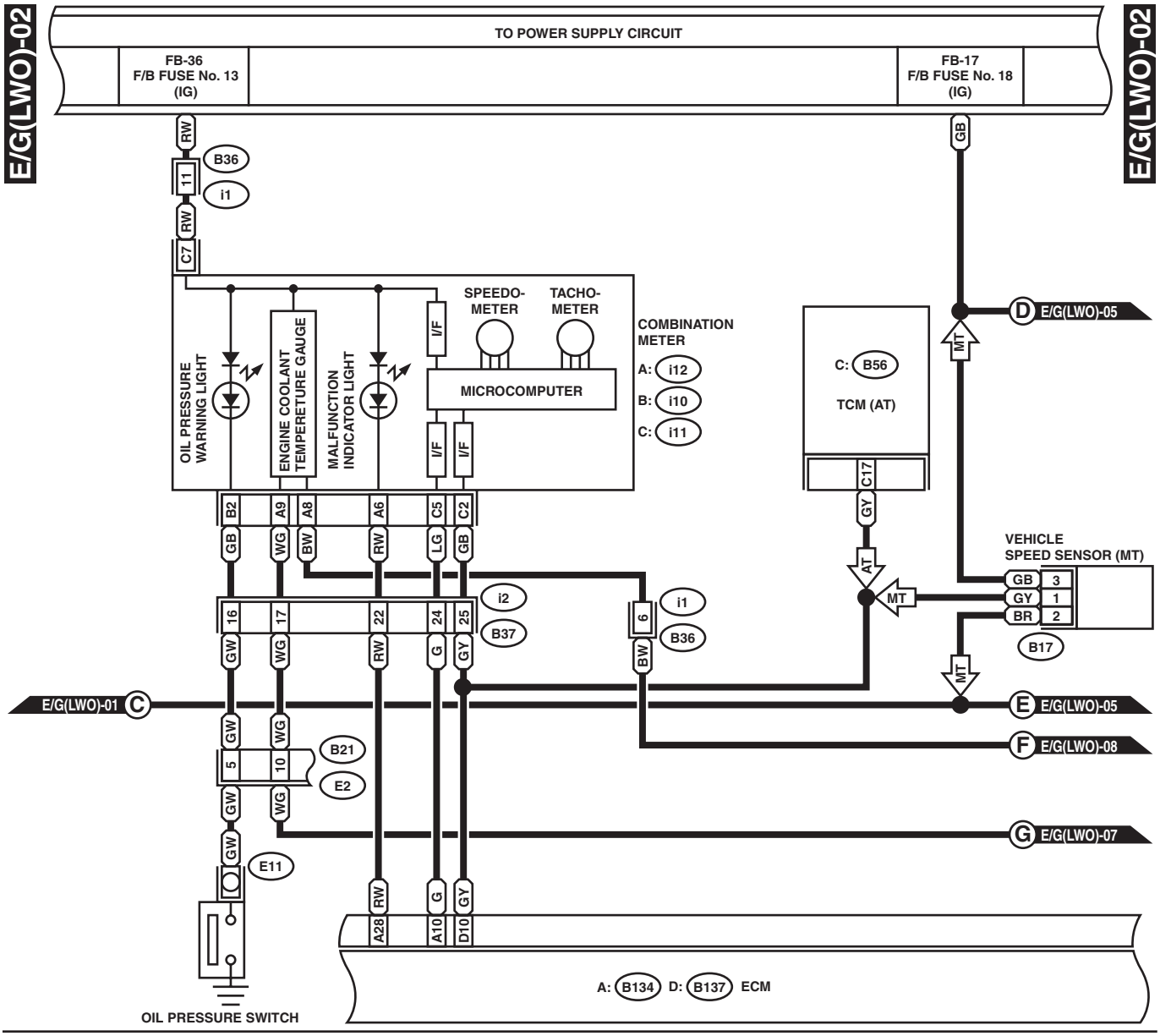

CHECK CONNECTOR
DATA LINK CONNECTOR
LINE END CHECK CONNECTOR
VEHICLE SPEED SENSOR (MT)
MT
AT
TCM (AT)
IGNITION COIL AND IGNITOR
COMBINATION METER
I/F
MICROCOMPUTER
SPEEDO-METER
TACHO-METER
MALFUNCTION INDICATOR LIGHT
ENGINE COOLANT TEMPERATURE GAUGE
OIL PRESSURE WARNING LIGHT
TEST MODE CONNECTOR
LINE END CONNECTOR
FUEL LEVEL SENSOR
NEUTRAL POSITION SWITCH (MT)
THERMOMETER
OIL PRESSURE SWITCH
THROTTLE POSITION SENSOR
PRESSURE SENSOR
INTAKE AIR TEMPERATURE SENSOR
ENGINE COOLANT TEMPERATURE SENSOR
SHIELD AND SENSOR GROUND JOINT CONNECTOR
CRANKSHAFT POSITION SENSOR
CAMSHAFT POSITION SENSOR
KNOCK SENSOR
GENERATOR
POWER STEERING OIL PRESSURE SWITCH
ENGINE GROUND
ECM
D16
A21
D10
A33
A32
A10
C3
A28
B25
C21
B3
B13
B15
D6
B12
B19
*2
B17
*3
B18
B28
B16
B27
A7
A35
C26
B21
D14
C19
C5
C16
C9
C25
1
2
3
4
5
*2 : WITH IMMOBILIZER MODEL : B6
WITHOUT IMMOBILIZER MODEL : B7
*3 : WITH IMMOBILIZER MODEL : B7
WITHOUT IMMOBILIZER MODEL : B6

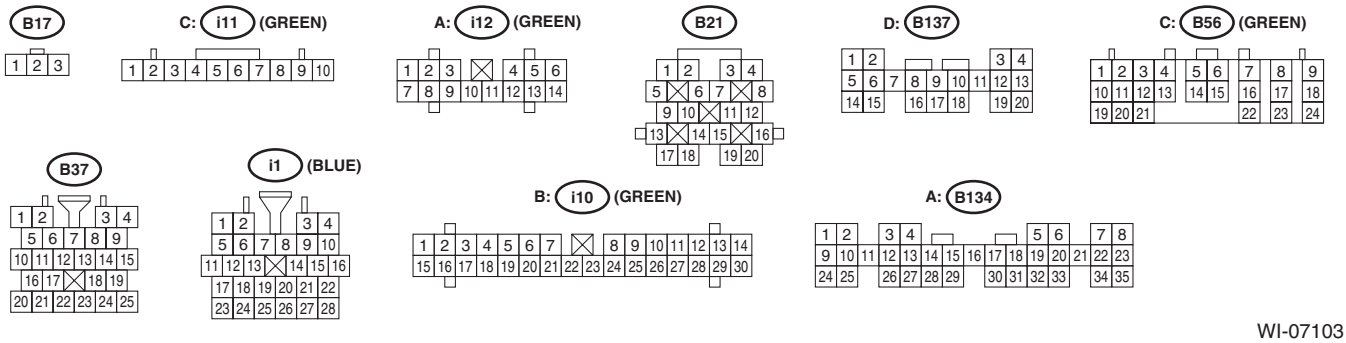
WI-07102


E/G(LWO)-01
E/G(LWO)-01
TO POWER SUPPLY CIRCUIT
FB-21
F/B FUSE No. 11
(IG)
GR
FUEL PUMP
RELAY
2 BR
1 GR
3 VW
4 BY
B46
A E/G(LWO)-03
B E/G(LWO)-08
FUEL PUMP ASSEMBLY
FUEL PUMP
M
FUEL LEVEL SENSOR
1 BY
4 B
5 BR
3 BrW
R58
BY 1 BY
B 4 B
BR 3 GB
BrW 2 BrW
R57
R15
R1
B97
BY 7 BY
GB 3 BR
BrW 11 BrW
R3
B99
C E/G(LWO)-02
*1 : WITH IMMOBILIZER MODEL : A2
WITHOUT IMMOBILIZER MODEL : A11
B
E
REF. TO GND-03
BrW
VW
GR
B25
*1
C10
A: B134 B: B135 C: B136 ECM

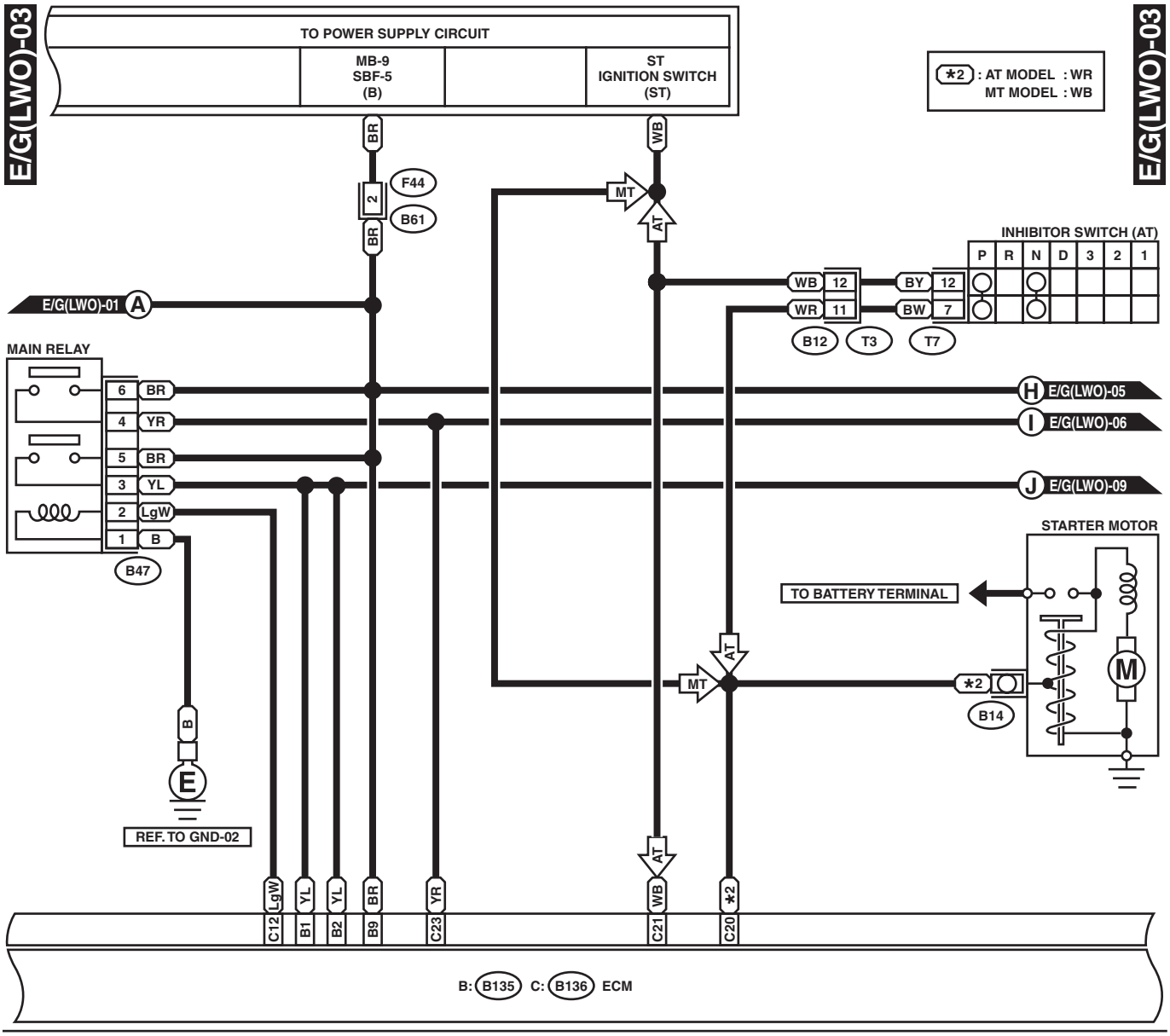

R15
B46 (GREEN)
1 2
3 4
R58
1 2 3
4 5 6
B97
1 2 3 4
5 6 7 8
B99
1 2 3 4 5 6 7 8 9 10 11
12 13 14 15 16 17 18 19 20 21 22 23 24
C: B136
1 2 3 4 5 6
7 8 9 10 11 12 13 14 15 16 17
18 19 20 21 22 23 24 25 26
B: B135
1 2 3 4 5 6 7
8 9 10 11 12 13 14 15 16 17 18 19
20 21 22 23 24 25 26 27 28
A: B134
1 2 3 4 5 6 7 8
9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
24 25 26 27 28 29 30 31 32 33 34 35

WI-02316


E/G(LWO)-02
TO POWER SUPPLY CIRCUIT
FB-36
F/B FUSE No. 13
(IG)
FB-17
F/B FUSE No. 18
(IG)
B36
i1
C7
SPEEDO-METER
TACHO-METER
COMBINATION METER
A: i12
B: i10
C: i11
OIL PRESSURE WARNING LIGHT
ENGINE COOLANT TEMPERETURE GAUGE
MALFUNCTION INDICATOR LIGHT
I/F
MICROCOMPUTER
C: B56
TCM (AT)
C17
D E/G(LWO)-05
MT
AT
VEHICLE SPEED SENSOR (MT)
GB 3
GY 1
BR 2
B17
i2
B37
i1
B36
E/G(LWO)-01 C
E E/G(LWO)-05
F E/G(LWO)-08
G E/G(LWO)-07
B21
E2
E11
OIL PRESSURE SWITCH
A: B134 D: B137 ECM


B17
C: i11 (GREEN)
A: i12 (GREEN)
B21
D: B137
C: B56 (GREEN)
B37
i1 (BLUE)
B: i10 (GREEN)
A: B134

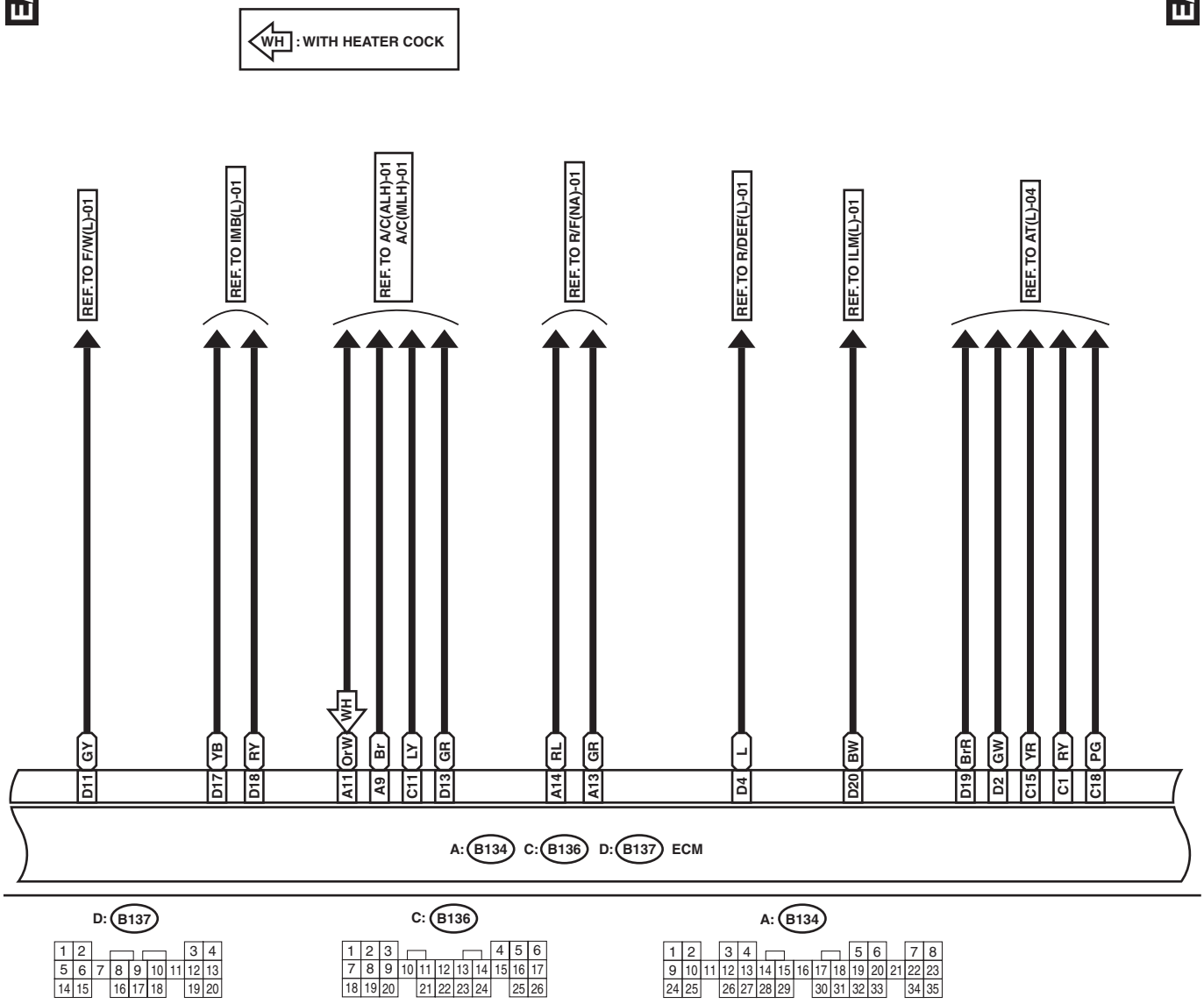
WI-07103


E/G(LWO)-03
TO POWER SUPPLY CIRCUIT
MB-9
SBF-5
(B)
ST
IGNITION SWITCH
(ST)
*2 : AT MODEL : WR
MT MODEL : WB
BR
WB
F44
2
B61
MT
AT
INHIBITOR SWITCH (AT)
P R N D 3 2 1
WB 12
WR 11
BY 12
BW 7
B12 T3 T7
E/G(LWO)-01 A
MAIN RELAY
6 BR
4 YR
5 BR
3 YL
2 LgW
1 B
B47
H E/G(LWO)-05
I E/G(LWO)-06
J E/G(LWO)-09
STARTER MOTOR
TO BATTERY TERMINAL
M
*2
B14
B
E
REF. TO GND-02
C12 LgW
B1 YL
B2 YL
B9 BR
C23 YR
C21 WB
C20 *2
B: B135 C: B136 ECM
B47 (BROWN)
F44
B12 (GRAY)
T7
C: B136
B: B135

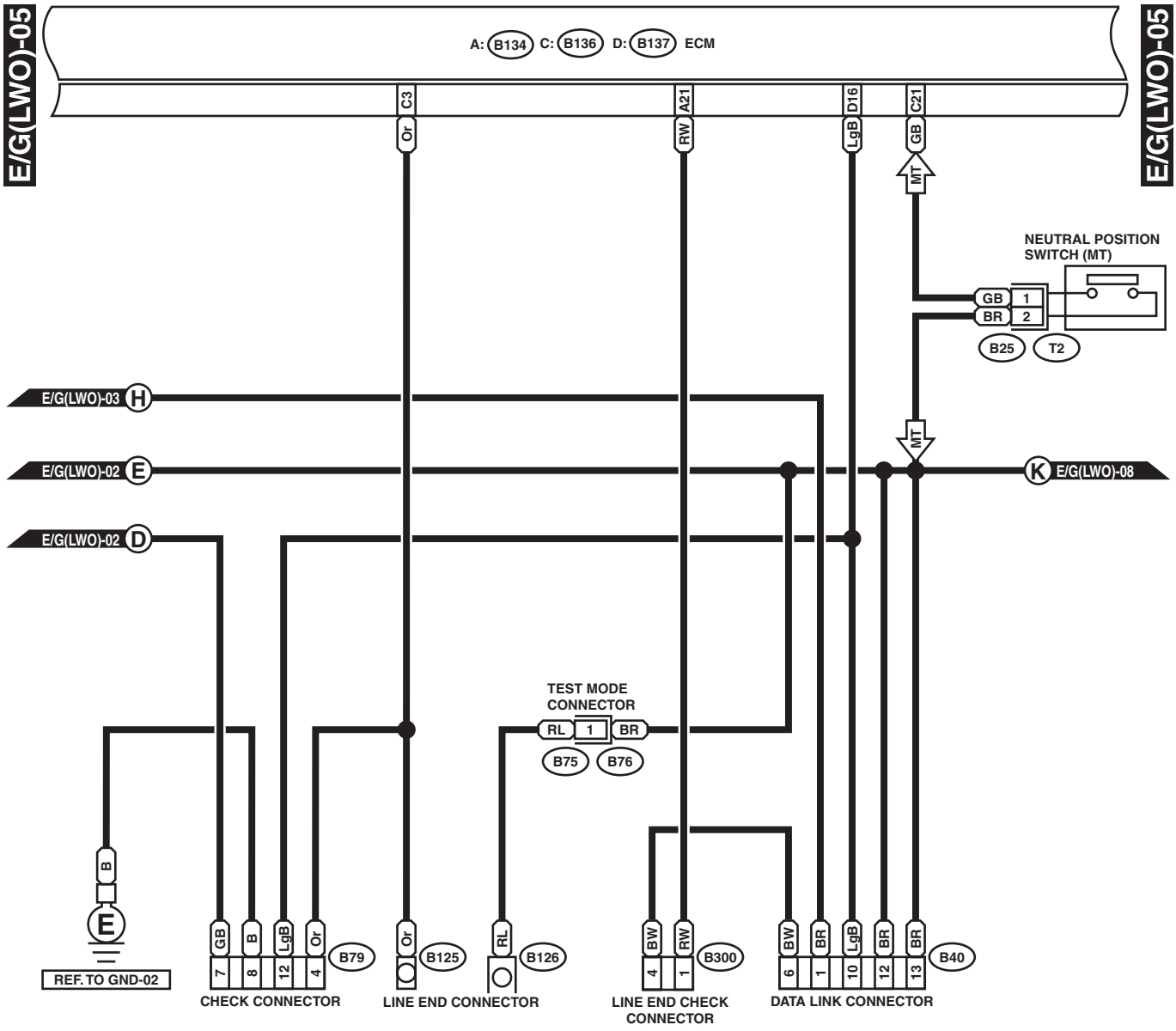
WI-07232

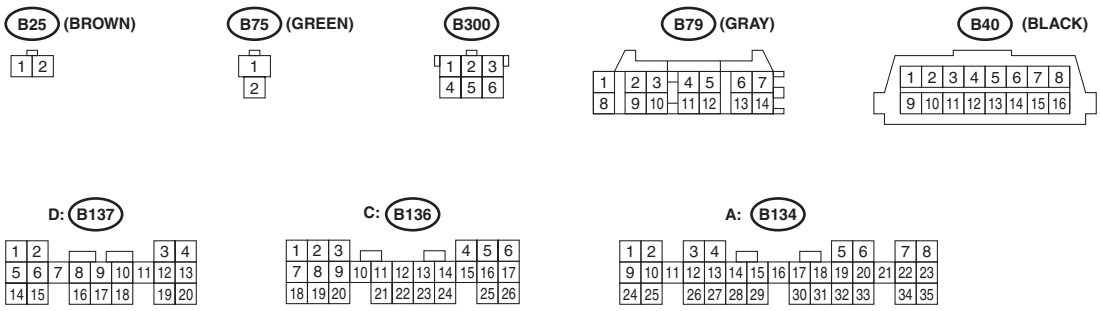
E/G(LWO)-04

E/G(LWO)-04

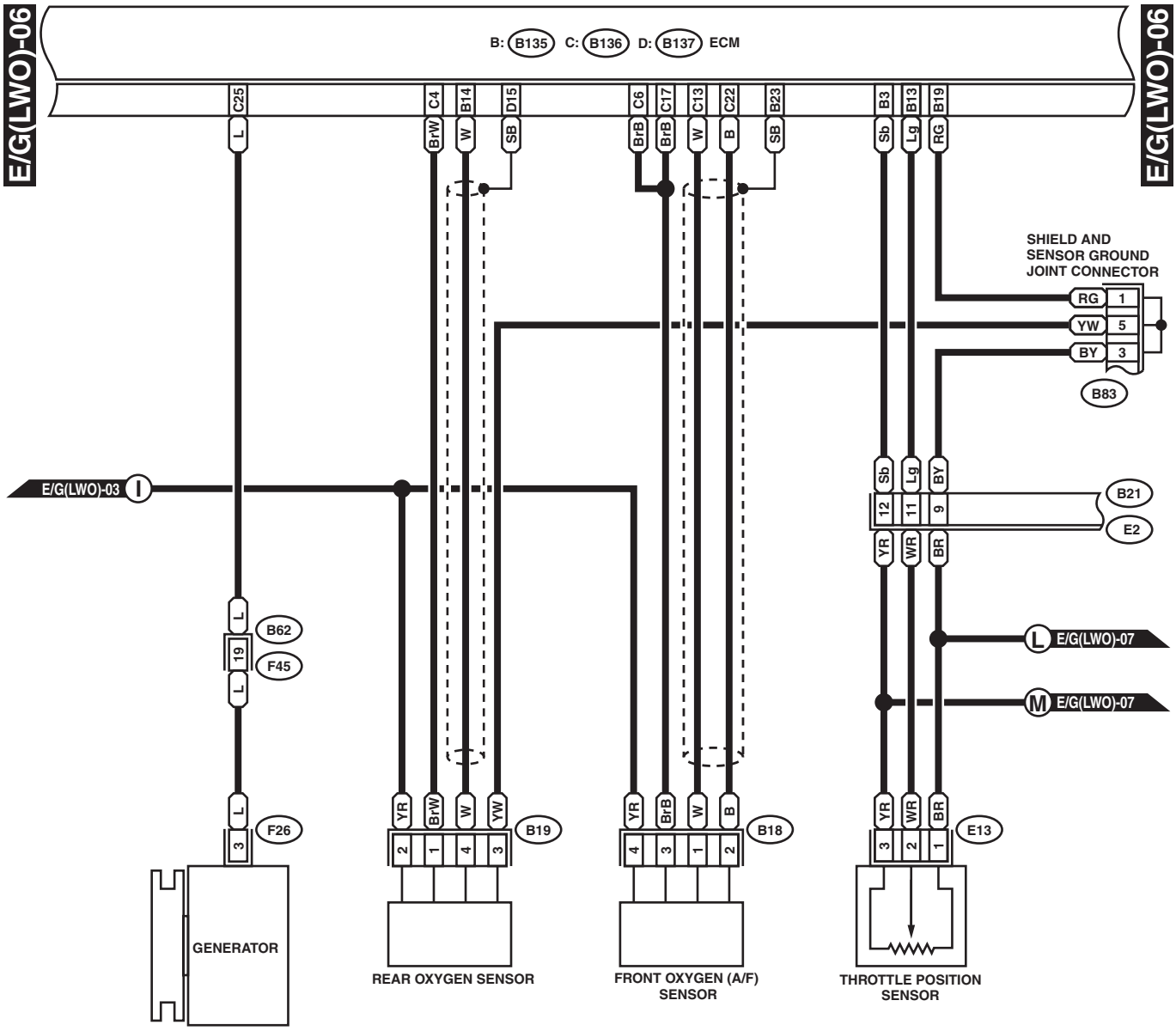


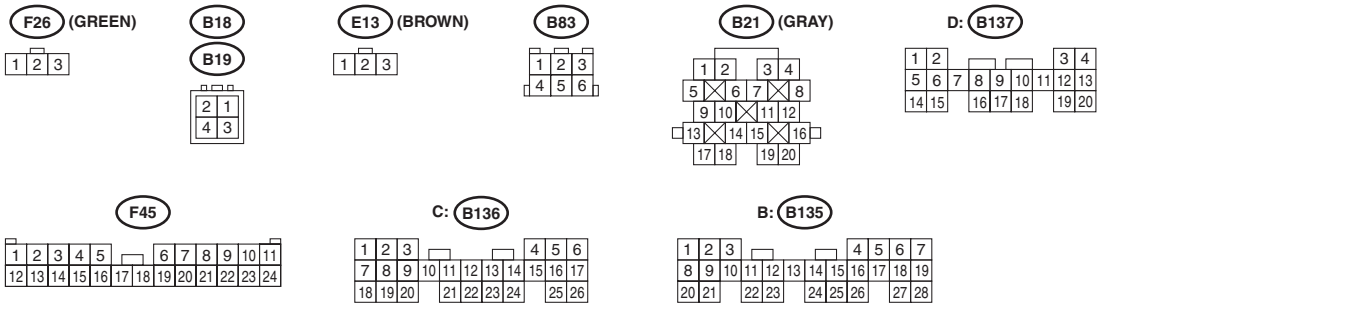
WI-07233


E/G(LWO)-05
A: B134 C: B136 D: B137 ECM
C3
A21
D16
C21
Or
RW
LgB
GB
MT
NEUTRAL POSITION SWITCH (MT)
GB 1
BR 2
B25
T2
E/G(LWO)-03 H
E/G(LWO)-02 E
E/G(LWO)-02 D
K E/G(LWO)-08
TEST MODE CONNECTOR
RL 1 BR
B75
B76
B
E
REF. TO GND-02
GB
B
LgB
Or
B79
Or
B125
RL
B126
BW
RW
B300
BW
BR
LgB
BR
BR
B40
CHECK CONNECTOR
LINE END CONNECTOR
LINE END CHECK CONNECTOR
DATA LINK CONNECTOR

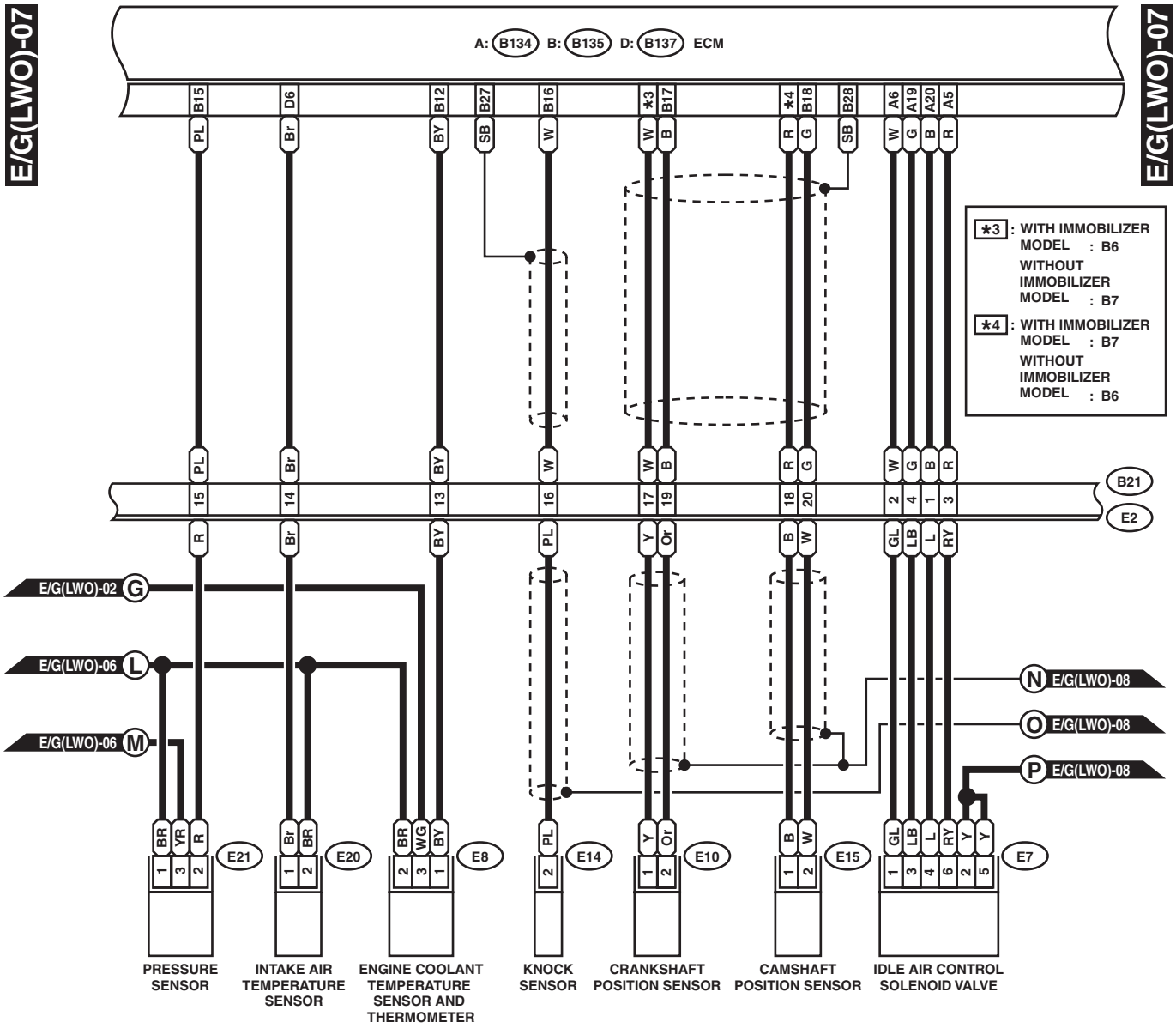

B25 (BROWN)
B75 (GREEN)
B300
B79 (GRAY)
B40 (BLACK)
D: B137
C: B136
A: B134

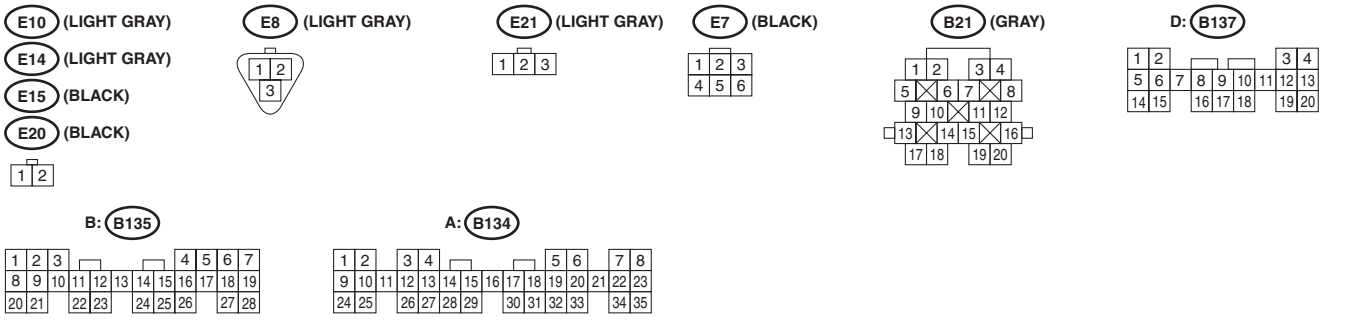
WI-07104


E/G(LWO)-06
E/G(LWO)-06
B: B135 C: B136 D: B137 ECM
C25 L
C4 BrW
B14 W
D15 SB
C6 BrB
C17 BrB
C13 W
C22 B
B23 SB
B3 Sb
B13 Lg
B19 RG
SHIELD AND SENSOR GROUND JOINT CONNECTOR
RG 1
YW 5
BY 3
B83
E/G(LWO)-03 I
Sb 12
Lg 11
BY 9
B21
E2
YR
WR
BR
L E/G(LWO)-07
M E/G(LWO)-07
L
B62
19
F45
L
L
F26
3
GENERATOR
YR
BrW
W
YW
2 1 4 3
B19
REAR OXYGEN SENSOR
YR
BrB
W
B
4 3 1 2
B18
FRONT OXYGEN (A/F) SENSOR
YR
WR
BR
3 2 1
E13
THROTTLE POSITION SENSOR

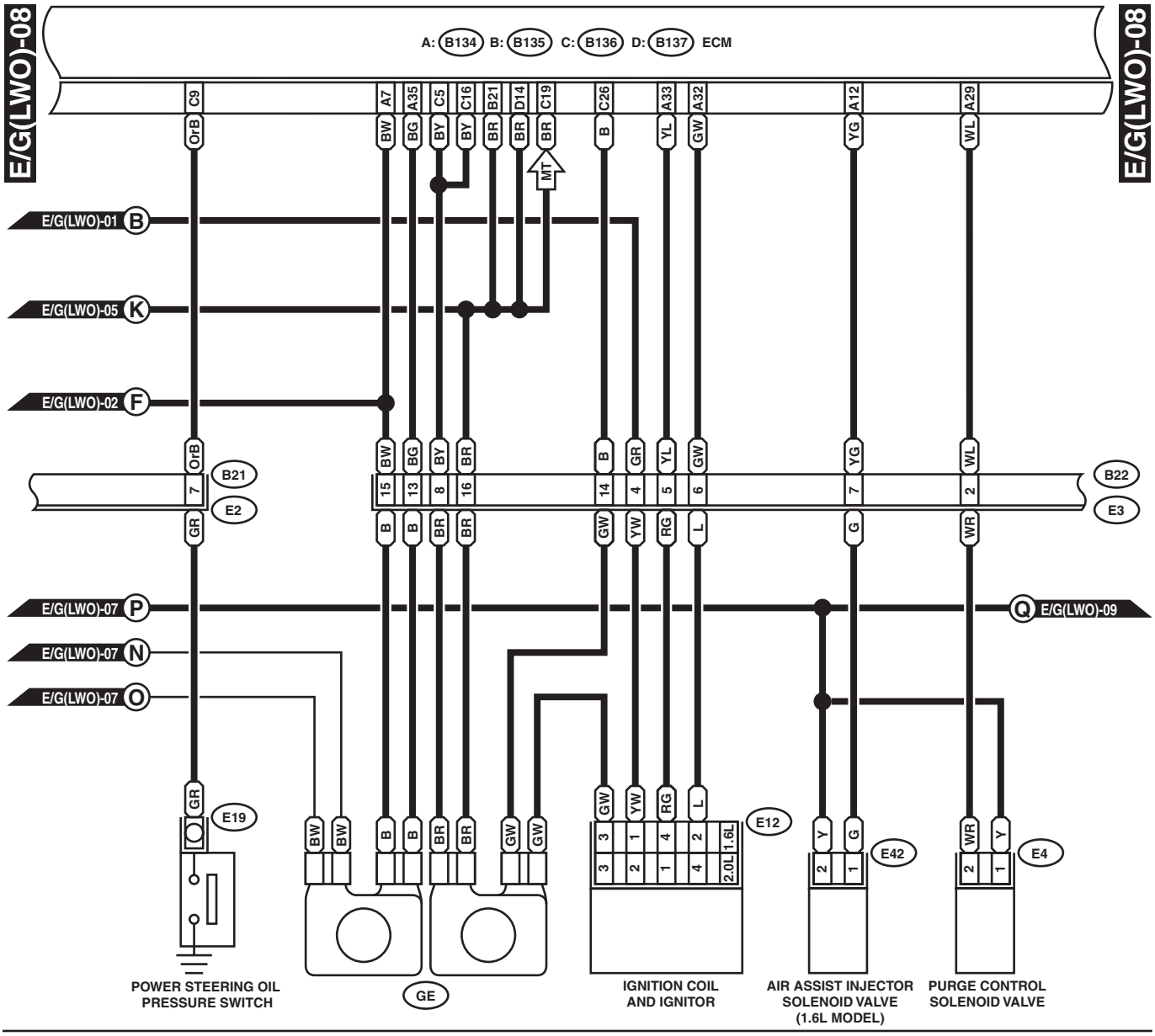

F26 (GREEN)
1 2 3
B18
B19
2 1
4 3
E13 (BROWN)
1 2 3
B83
1 2 3
4 5 6
B21 (GRAY)
1 2 3 4
5 6 7 8
9 10 11 12
13 14 15 16
17 18 19 20
D: B137
1 2 3 4
5 6 7 8 9 10 11 12 13
14 15 16 17 18 19 20
F45
1 2 3 4 5 6 7 8 9 10 11
12 13 14 15 16 17 18 19 20 21 22 23 24
C: B136
1 2 3 4 5 6
7 8 9 10 11 12 13 14 15 16 17
18 19 20 21 22 23 24 25 26
B: B135
1 2 3 4 5 6 7
8 9 10 11 12 13 14 15 16 17 18 19
20 21 22 23 24 25 26 27 28

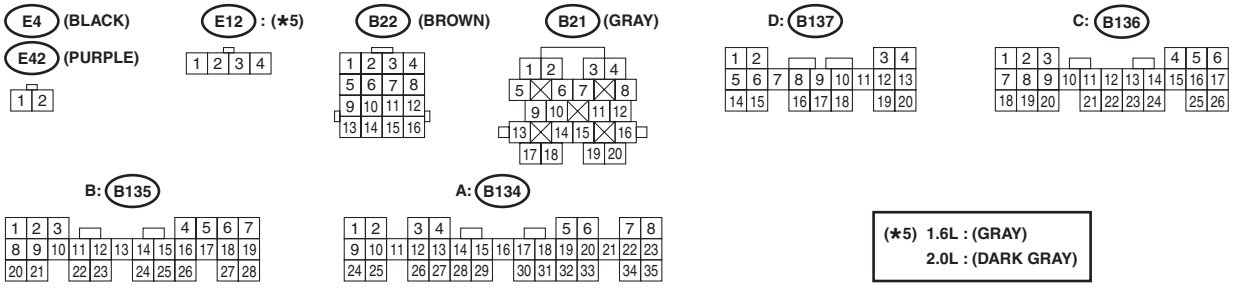
WI-07105


E/G(LWO)-07
E/G(LWO)-07
A: B134 B: B135 D: B137 ECM
B15 D6 B12 B27 B16 *3 B17 *4 B18 B28 A6 A19 A20 A5
PL Br BY SB W W B R G SB W G B R
*3 : WITH IMMOBILIZER MODEL : B6
WITHOUT IMMOBILIZER MODEL : B7
*4 : WITH IMMOBILIZER MODEL : B7
WITHOUT IMMOBILIZER MODEL : B6
B21
E2
15 14 13 16 17 19 18 20 2 4 1 3
R Br BY PL Y Or B W GL LB L RY
E/G(LWO)-02 G
E/G(LWO)-06 L
E/G(LWO)-06 M
N E/G(LWO)-08
O E/G(LWO)-08
P E/G(LWO)-08
BR YR R
E21
Br BR
E20
BR WG BY
E8
PL
E14
Y Or
E10
B W
E15
GL LB L RY Y Y
E7
PRESSURE SENSOR
INTAKE AIR TEMPERATURE SENSOR
ENGINE COOLANT TEMPERATURE SENSOR AND THERMOMETER
KNOCK SENSOR
CRANKSHAFT POSITION SENSOR
CAMSHAFT POSITION SENSOR
IDLE AIR CONTROL SOLENOID VALVE

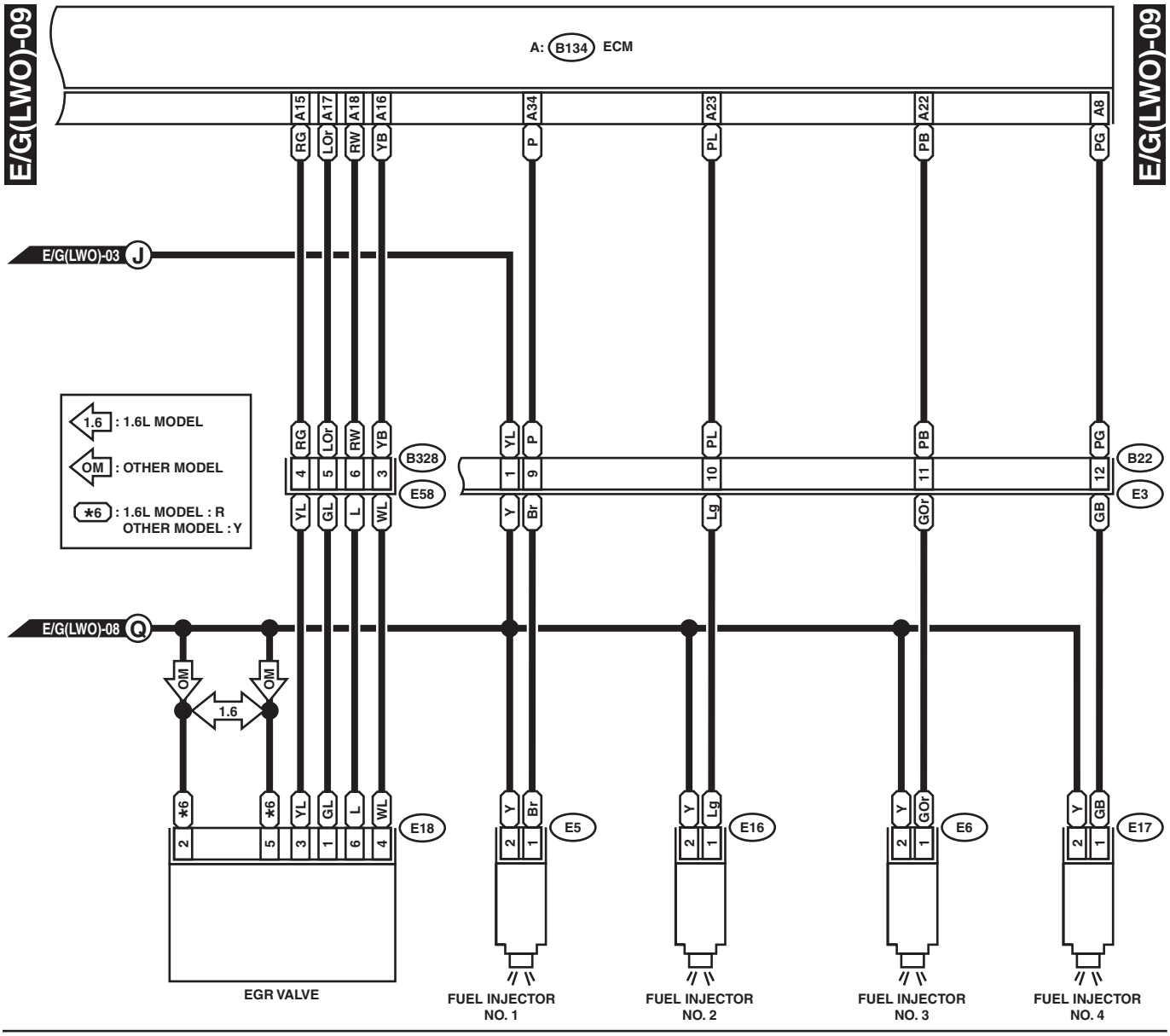

E10 (LIGHT GRAY)
E14 (LIGHT GRAY)
E15 (BLACK)
E20 (BLACK)
E8 (LIGHT GRAY)
E21 (LIGHT GRAY)
E7 (BLACK)
B21 (GRAY)
D: B137
B: B135
A: B134

WI-07106


E/G(LWO)-08
A: B134 B: B135 C: B136 D: B137 ECM
E/G(LWO)-01 B
E/G(LWO)-05 K
E/G(LWO)-02 F
E/G(LWO)-07 P
E/G(LWO)-07 N
E/G(LWO)-07 O
Q E/G(LWO)-09
B21
B22
E2
E3
E19
E12
E42
E4
MT
POWER STEERING OIL PRESSURE SWITCH
GE
IGNITION COIL AND IGNITOR
AIR ASSIST INJECTOR SOLENOID VALVE (1.6L MODEL)
PURGE CONTROL SOLENOID VALVE


E4 (BLACK)
E42 (PURPLE)
E12 : (*5)
B22 (BROWN)
B21 (GRAY)
D: B137
C: B136
B: B135
A: B134
(*5) 1.6L : (GRAY)
2.0L : (DARK GRAY)

WI-07107



E5 (LIGHT GRAY)
E6 (LIGHT GRAY)
E16 (LIGHT GRAY)
E17 (LIGHT GRAY)

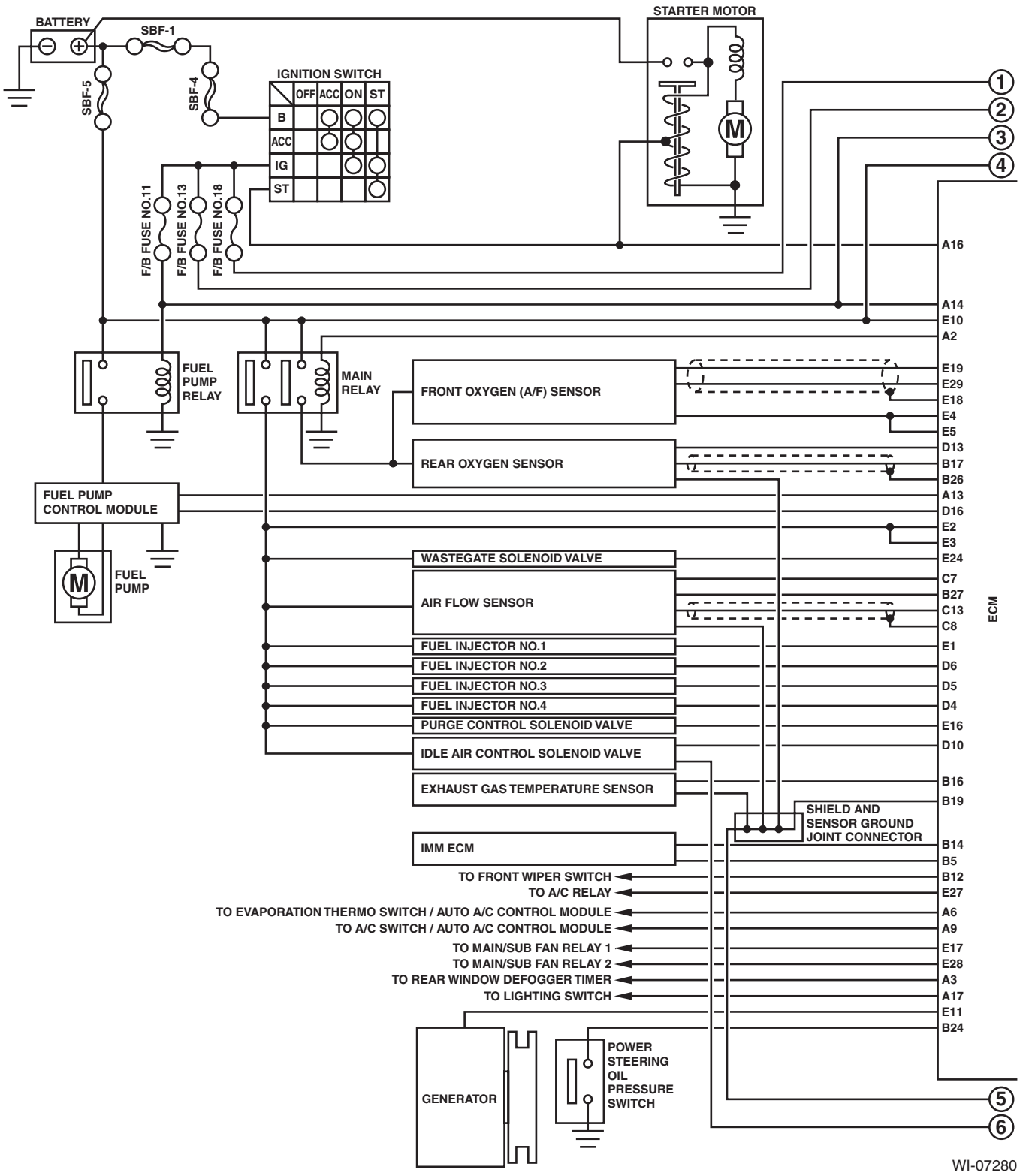
B328 (BLACK)
E18 (DARK GRAY)

B22 (BROWN)

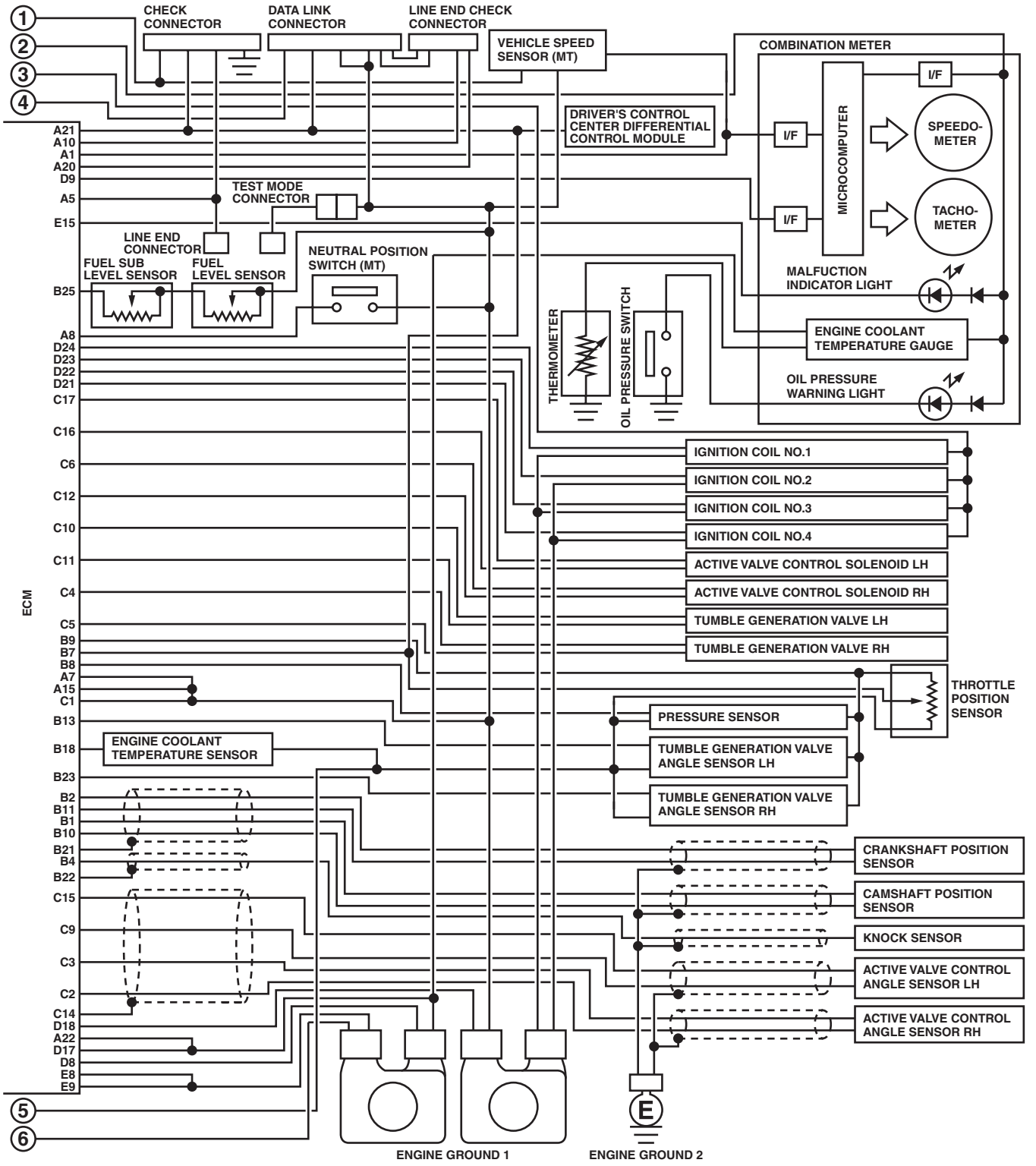
A: B134

WI-07108

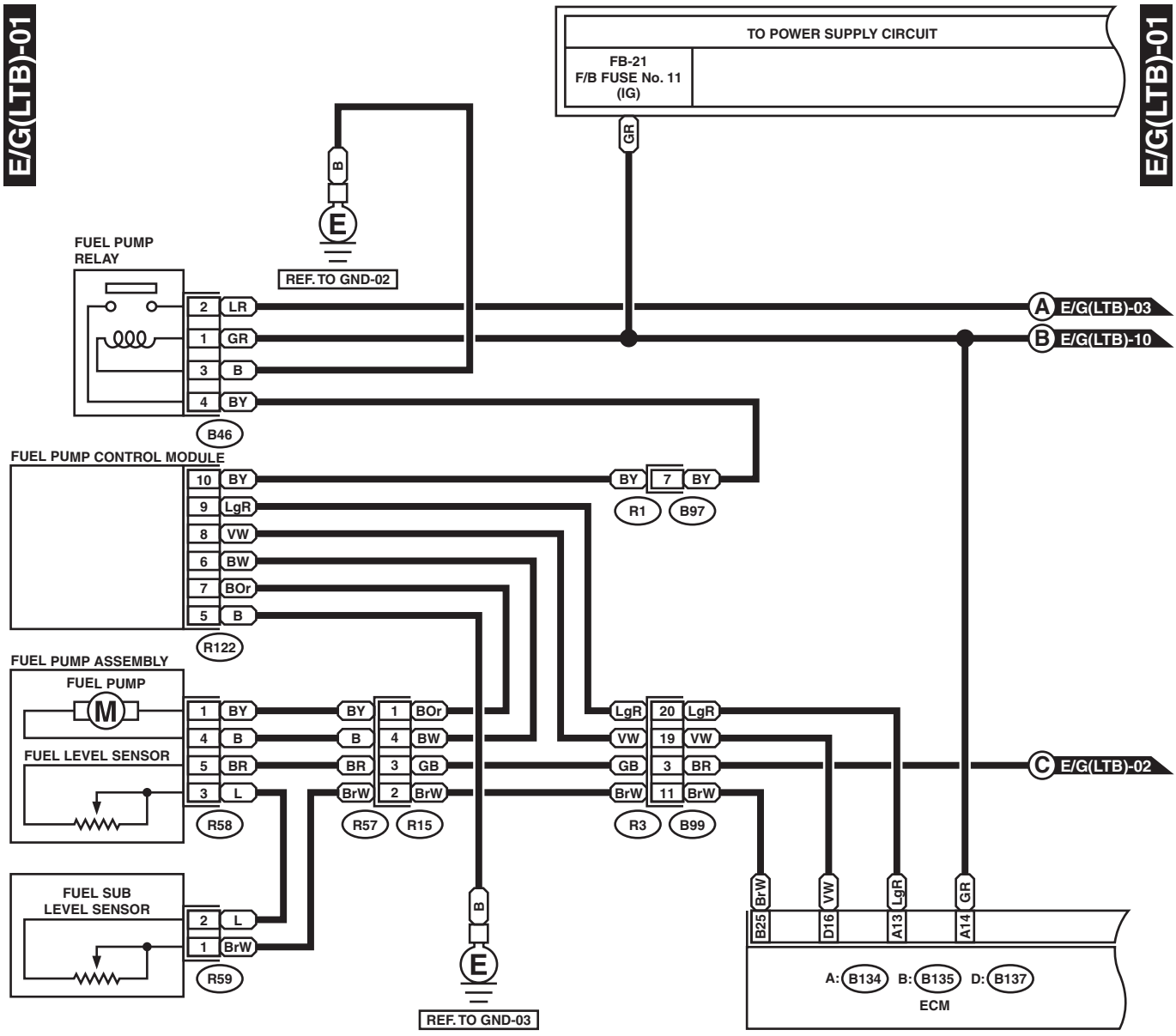
3. LHD TURBO MODEL

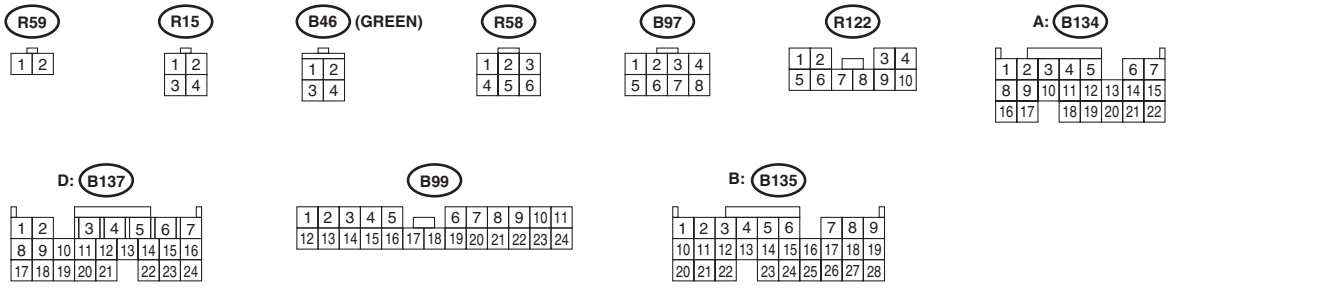


WI-07280

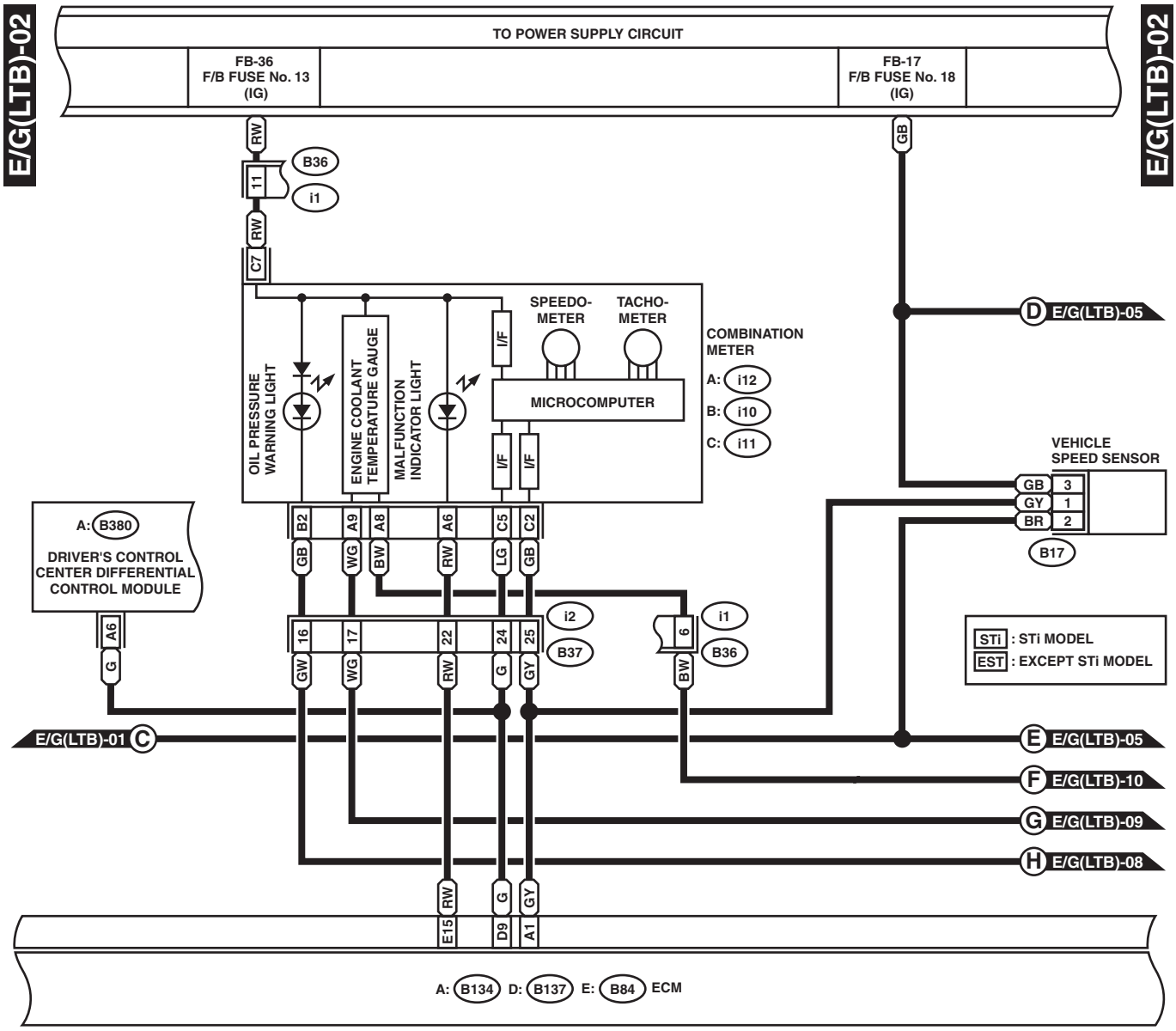

CHECK CONNECTOR
DATA LINK CONNECTOR
LINE END CHECK CONNECTOR
VEHICLE SPEED SENSOR (MT)
COMBINATION METER
DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE
I/F
MICROCOMPUTER
SPEEDO-METER
TACHO-METER
TEST MODE CONNECTOR
LINE END CONNECTOR
FUEL SUB LEVEL SENSOR
FUEL LEVEL SENSOR
NEUTRAL POSITION SWITCH (MT)
MALFUCTION INDICATOR LIGHT
THERMOMETER
OIL PRESSURE SWITCH
ENGINE COOLANT TEMPERATURE GAUGE
OIL PRESSURE WARNING LIGHT
ECM
IGNITION COIL NO.1
IGNITION COIL NO.2
IGNITION COIL NO.3
IGNITION COIL NO.4
ACTIVE VALVE CONTROL SOLENOID LH
ACTIVE VALVE CONTROL SOLENOID RH
TUMBLE GENERATION VALVE LH
TUMBLE GENERATION VALVE RH
THROTTLE POSITION SENSOR
PRESSURE SENSOR
TUMBLE GENERATION VALVE ANGLE SENSOR LH
TUMBLE GENERATION VALVE ANGLE SENSOR RH
ENGINE COOLANT TEMPERATURE SENSOR
CRANKSHAFT POSITION SENSOR
CAMSHAFT POSITION SENSOR
KNOCK SENSOR
ACTIVE VALVE CONTROL ANGLE SENSOR LH
ACTIVE VALVE CONTROL ANGLE SENSOR RH
ENGINE GROUND 1
ENGINE GROUND 2
E
1
2
3
4
5
6
A21
A10
A1
A20
D9
A5
E15
B25
A8
D24
D23
D22
D21
C17
C16
C6
C12
C10
C11
C4
C5
B9
B7
B8
A7
A15
C1
B13
B18
B23
B2
B11
B1
B10
B21
B4
B22
C15
C9
C3
C2
C14
D18
A22
D17
D8
E8
E9

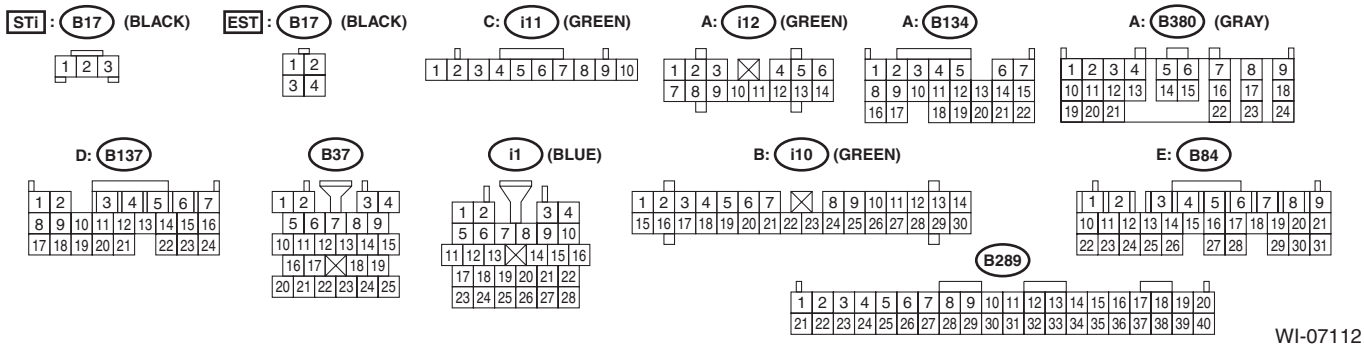
WI-07110


E/G(LTB)-01
E/G(LTB)-01
TO POWER SUPPLY CIRCUIT
FB-21
F/B FUSE No. 11
(IG)
GR
B
E
REF. TO GND-02
FUEL PUMP
RELAY
2 LR
1 GR
3 B
4 BY
B46
A E/G(LTB)-03
B E/G(LTB)-10
FUEL PUMP CONTROL MODULE
10 BY
9 LgR
8 VW
6 BW
7 BOr
5 B
R122
BY 7 BY
R1 B97
FUEL PUMP ASSEMBLY
FUEL PUMP
M
FUEL LEVEL SENSOR
1 BY
4 B
5 BR
3 L
R58
BY 1 BOr
B 4 BW
BR 3 GB
BrW 2 BrW
R57 R15
LgR 20 LgR
VW 19 VW
GB 3 BR
BrW 11 BrW
R3 B99
C E/G(LTB)-02
FUEL SUB
LEVEL SENSOR
2 L
1 BrW
R59
B
E
REF. TO GND-03
BrW VW LgR GR
B25 D16 A13 A14
A: B134 B: B135 D: B137
ECM

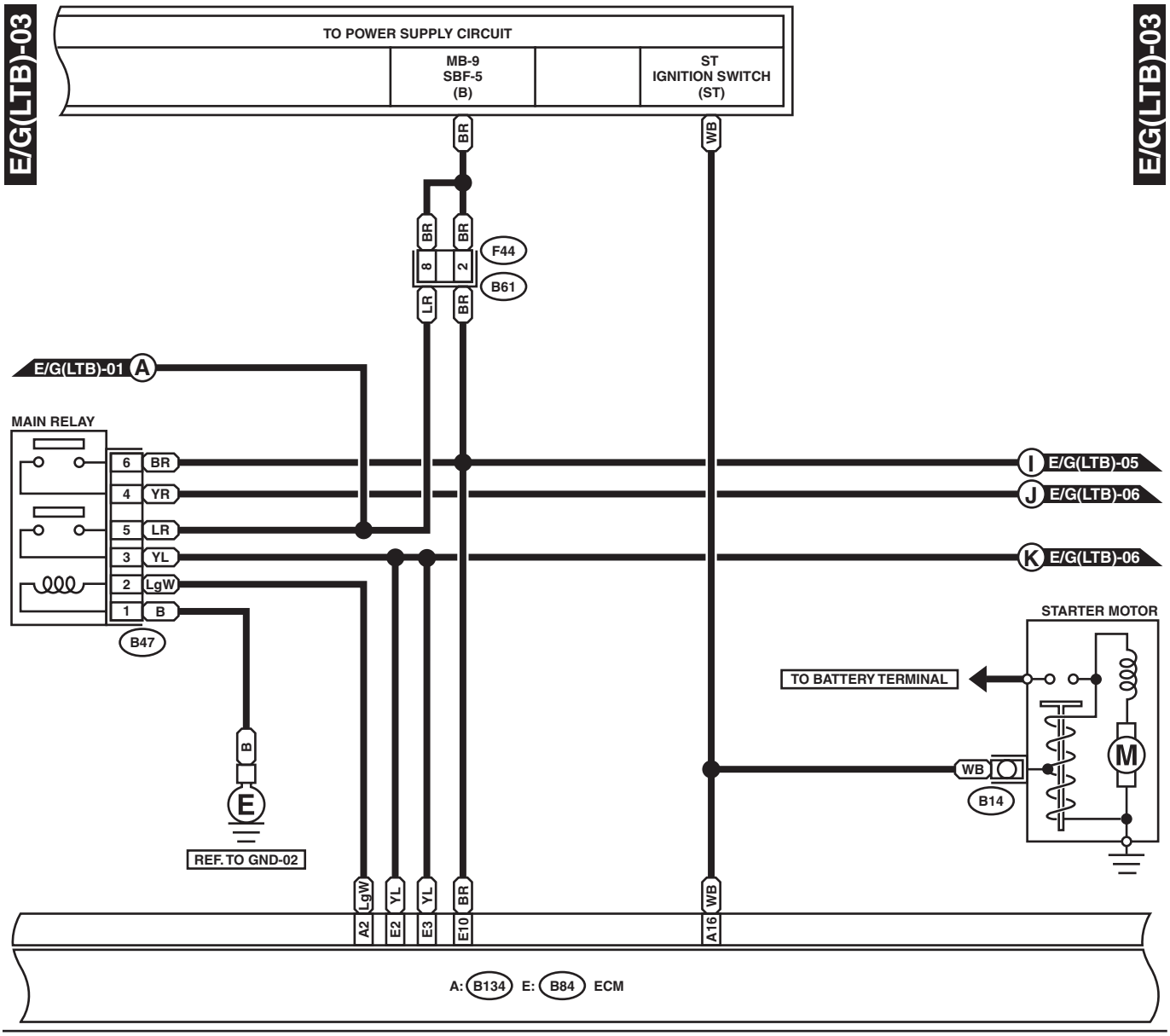

R59
R15
B46 (GREEN)
R58
B97
R122
A: B134
D: B137
B99
B: B135

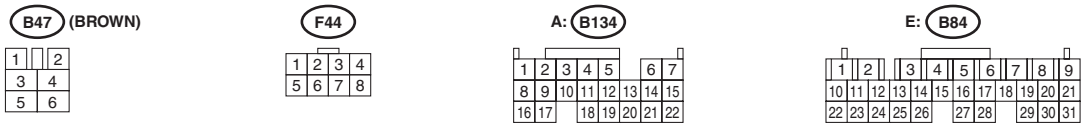
WI-07111


E/G(LTB)-02
TO POWER SUPPLY CIRCUIT
FB-36
F/B FUSE No. 13
(IG)
FB-17
F/B FUSE No. 18
(IG)
RW
B36
11
i1
C7
GB
SPEEDO-METER
TACHO-METER
COMBINATION METER
A: i12
B: i10
C: i11
I/F
MICROCOMPUTER
OIL PRESSURE WARNING LIGHT
ENGINE COOLANT TEMPERATURE GAUGE
MALFUNCTION INDICATOR LIGHT
D E/G(LTB)-05
VEHICLE SPEED SENSOR
GB 3
GY 1
BR 2
B17
A: B380
DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE
B2
A9
A8
A6
C5
C2
GB
WG
BW
RW
LG
GB
i2
B37
i1
B36
16
17
22
24
25
6
GW
WG
RW
G
GY
BW
A6
G
STi : STi MODEL
EST : EXCEPT STi MODEL
E/G(LTB)-01 C
E E/G(LTB)-05
F E/G(LTB)-10
G E/G(LTB)-09
H E/G(LTB)-08
RW
G
GY
E15
D9
A1
A: B134 D: B137 E: B84 ECM


STi : B17 (BLACK)
EST : B17 (BLACK)
C: i11 (GREEN)
A: i12 (GREEN)
A: B134
A: B380 (GRAY)
D: B137
B37
i1 (BLUE)
B: i10 (GREEN)
E: B84
B289

WI-07112

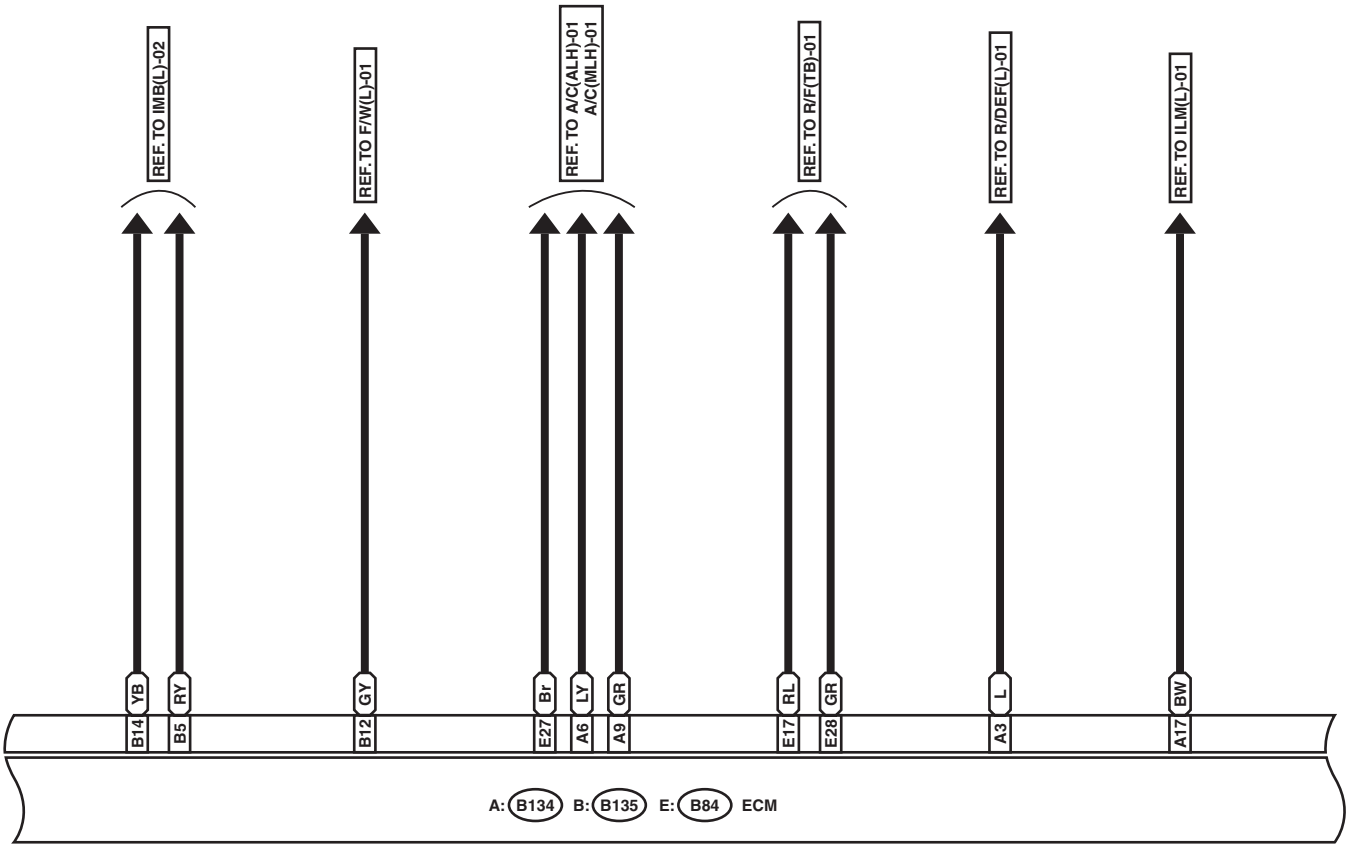

E/G(LTB)-03
E/G(LTB)-03
TO POWER SUPPLY CIRCUIT
MB-9
SBF-5
(B)
ST
IGNITION SWITCH
(ST)
BR
WB
BR
BR
F44
8
2
B61
LR
BR
E/G(LTB)-01 A
MAIN RELAY
6 BR
4 YR
5 LR
3 YL
2 LgW
1 B
B47
I E/G(LTB)-05
J E/G(LTB)-06
K E/G(LTB)-06
STARTER MOTOR
TO BATTERY TERMINAL
WB
B14
M
B
E
REF. TO GND-02
LgW
YL
YL
BR
WB
A2
E2
E3
E10
A16
A: B134 E: B84 ECM

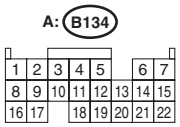

B47 (BROWN)
F44
A: B134
E: B84

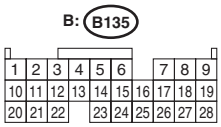
WI-02327

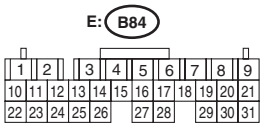
E/G(LTB)-04

E/G(LTB)-04

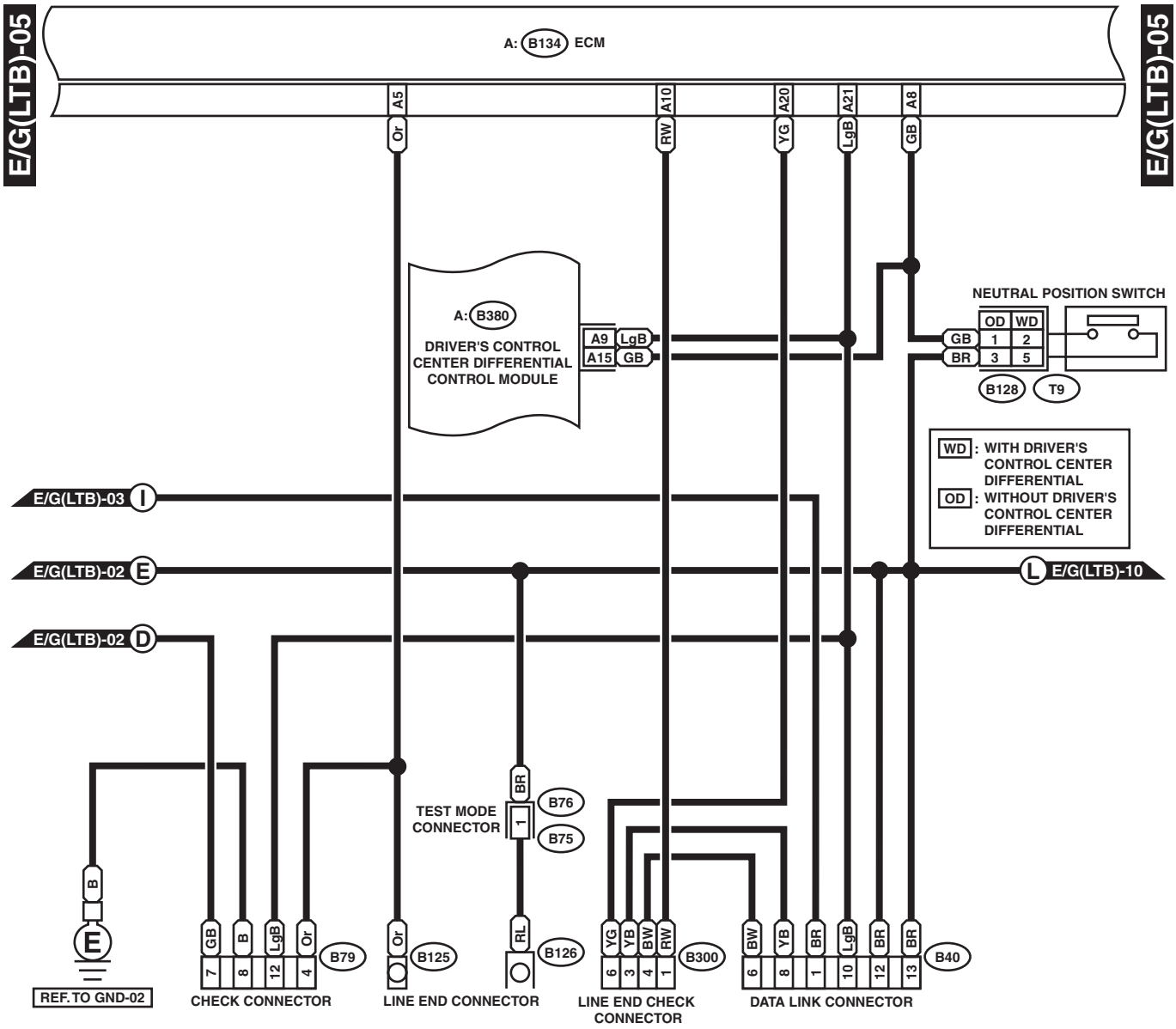


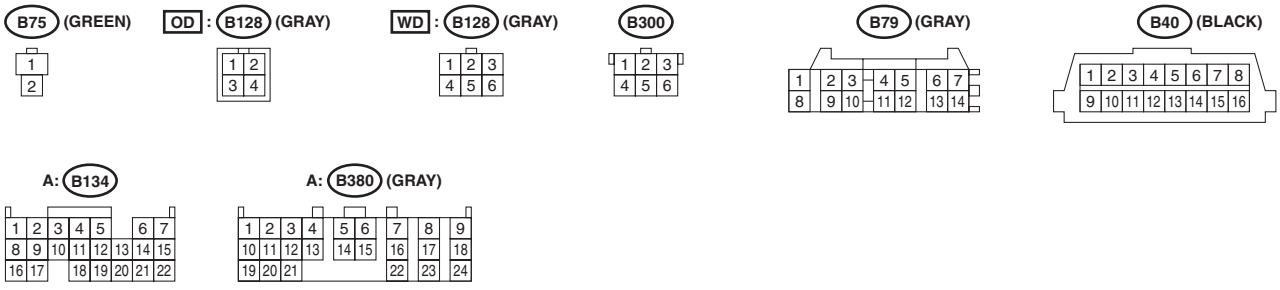




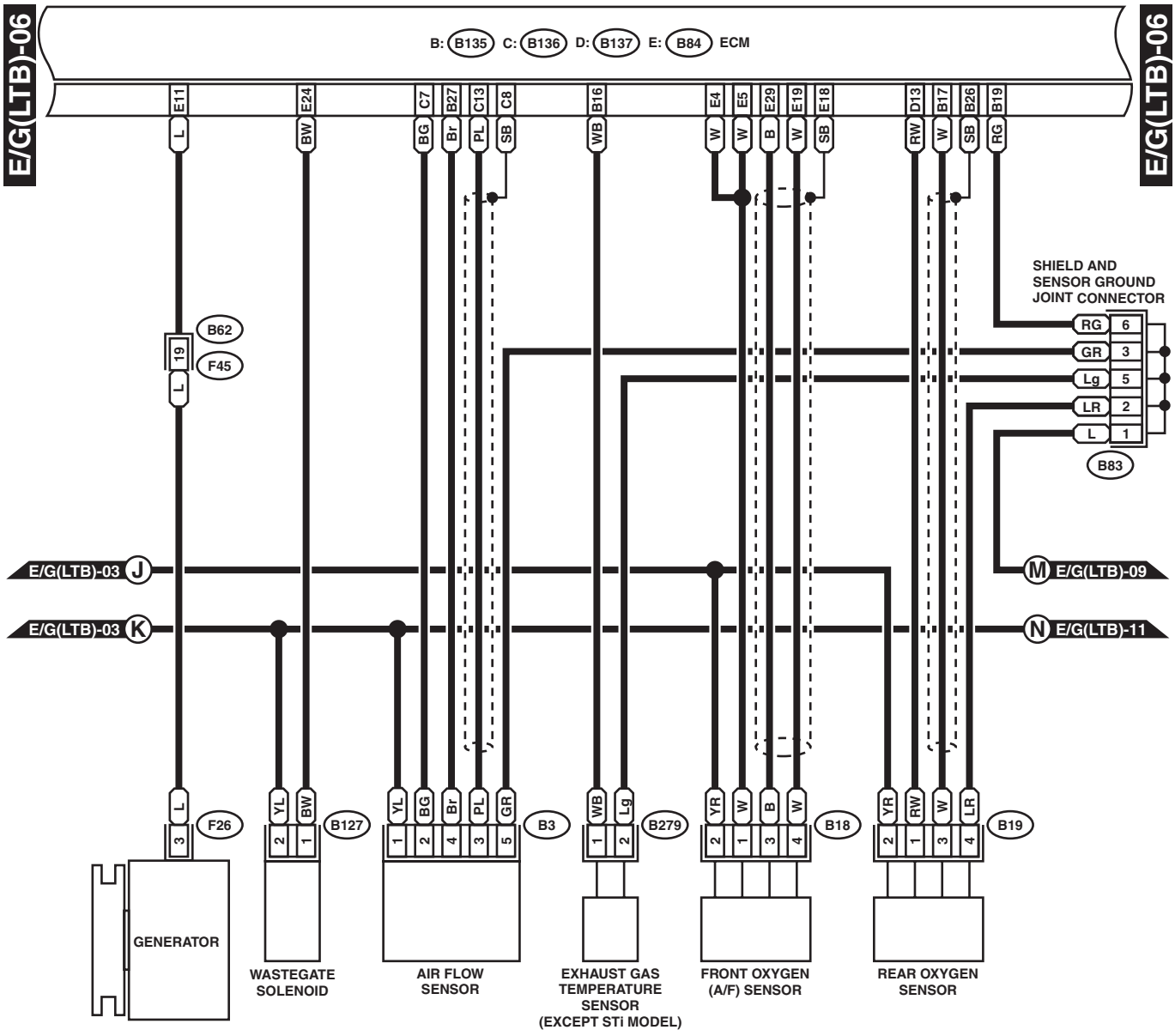


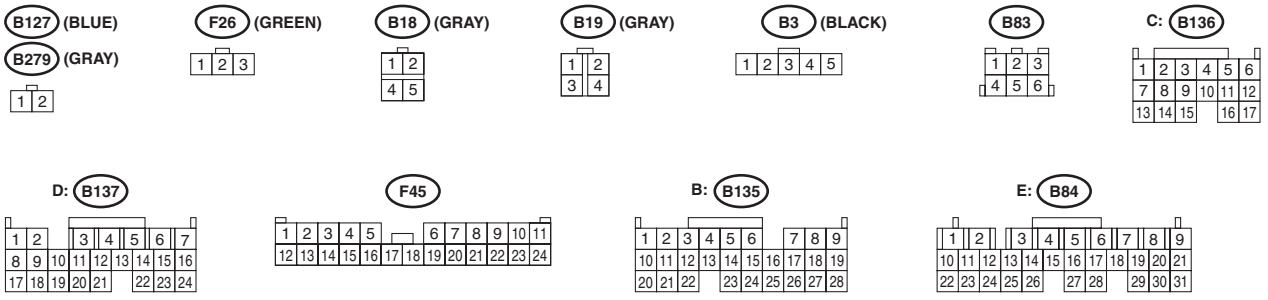
WI-04471


E/G(LTB)-05
E/G(LTB)-05
A: B134 ECM
A5 Or
A10 RW
A20 YG
A21 LgB
A8 GB
A: B380
DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE
A9 LgB
A15 GB
NEUTRAL POSITION SWITCH
OD WD
GB 1 2
BR 3 5
B128 T9
WD : WITH DRIVER'S CONTROL CENTER DIFFERENTIAL
OD : WITHOUT DRIVER'S CONTROL CENTER DIFFERENTIAL
E/G(LTB)-03 I
E/G(LTB)-02 E
E/G(LTB)-02 D
L E/G(LTB)-10
TEST MODE CONNECTOR
BR 1
B76
B75
B
E
REF. TO GND-02
GB B LgB Or
7 8 12 4
B79
CHECK CONNECTOR
Or
B125
LINE END CONNECTOR
RL
B126
YG YB BW RW
6 3 4 1
B300
LINE END CHECK CONNECTOR
BW YB BR LgB BR BR
6 8 1 10 12 13
B40
DATA LINK CONNECTOR

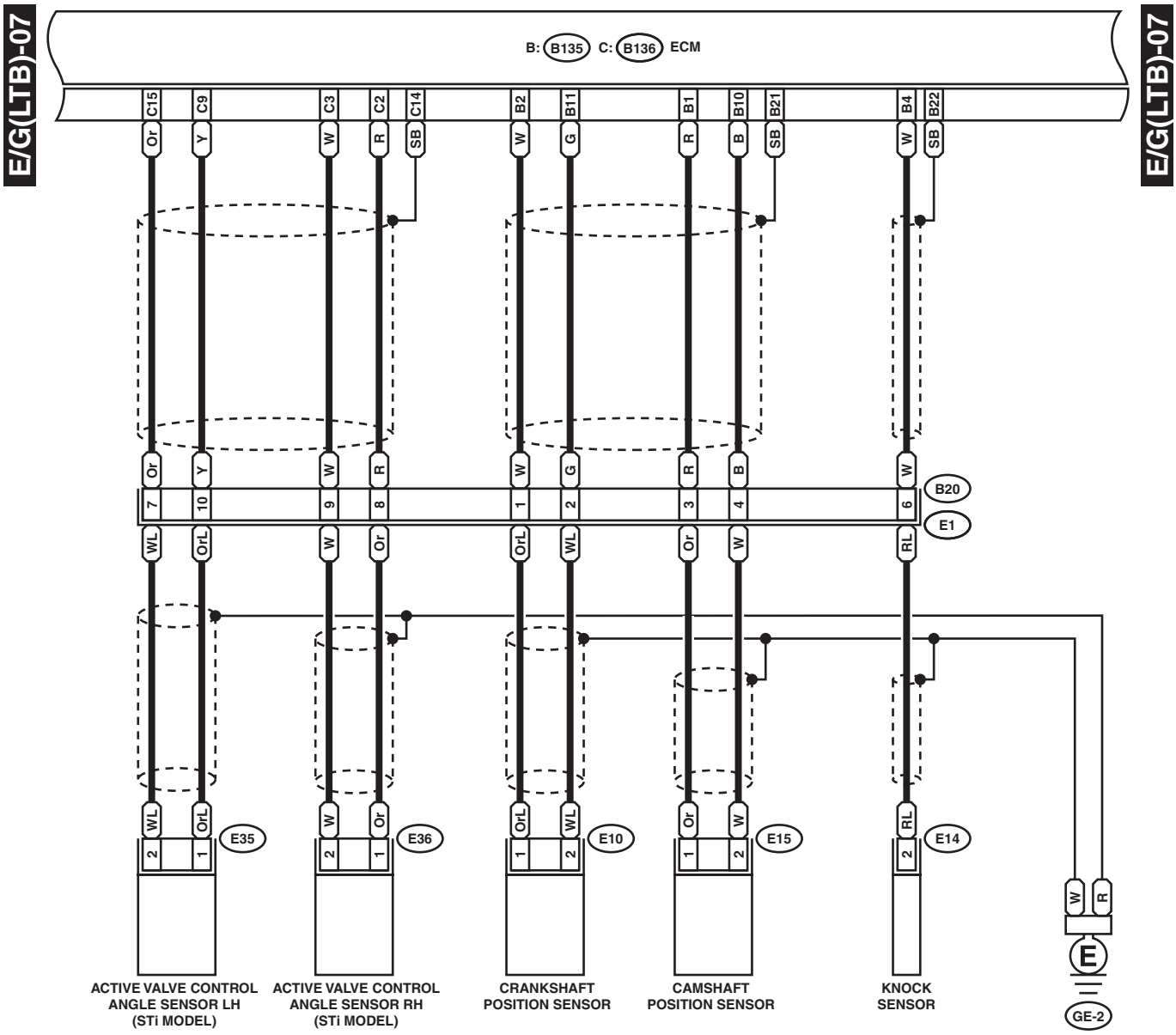

B75 (GREEN)
OD : B128 (GRAY)
WD : B128 (GRAY)
B300
B79 (GRAY)
B40 (BLACK)
A: B134
A: B380 (GRAY)

WI-07113


E/G(LTB)-06
E/G(LTB)-06
B: B135 C: B136 D: B137 E: B84 ECM
E11 L
E24 BW
C7 BG
B27 Br
C13 PL
C8 SB
B16 WB
E4 W
E5 W
E29 B
E19 W
E18 SB
D13 RW
B17 W
B26 SB
B19 RG
SHIELD AND SENSOR GROUND JOINT CONNECTOR
RG 6
GR 3
Lg 5
LR 2
L 1
B83
B62
19 L
F45
E/G(LTB)-03 J
E/G(LTB)-03 K
M E/G(LTB)-09
N E/G(LTB)-11
L F26 3
YL BW B127 2 1
YL BG Br PL GR B3 1 2 4 3 5
WB Lg B279 1 2
YR W B W B18 2 1 3 4
YR RW W LR B19 2 1 3 4
GENERATOR
WASTEGATE SOLENOID
AIR FLOW SENSOR
EXHAUST GAS TEMPERATURE SENSOR (EXCEPT STi MODEL)
FRONT OXYGEN (A/F) SENSOR
REAR OXYGEN SENSOR


B127 (BLUE)
B279 (GRAY)
F26 (GREEN)
B18 (GRAY)
B19 (GRAY)
B3 (BLACK)
B83
C: B136
D: B137
F45
B: B135
E: B84

WI-07114



E10 (LIGHT GRAY)
E14 (*1)
E15 (LIGHT GRAY)
E35
E36

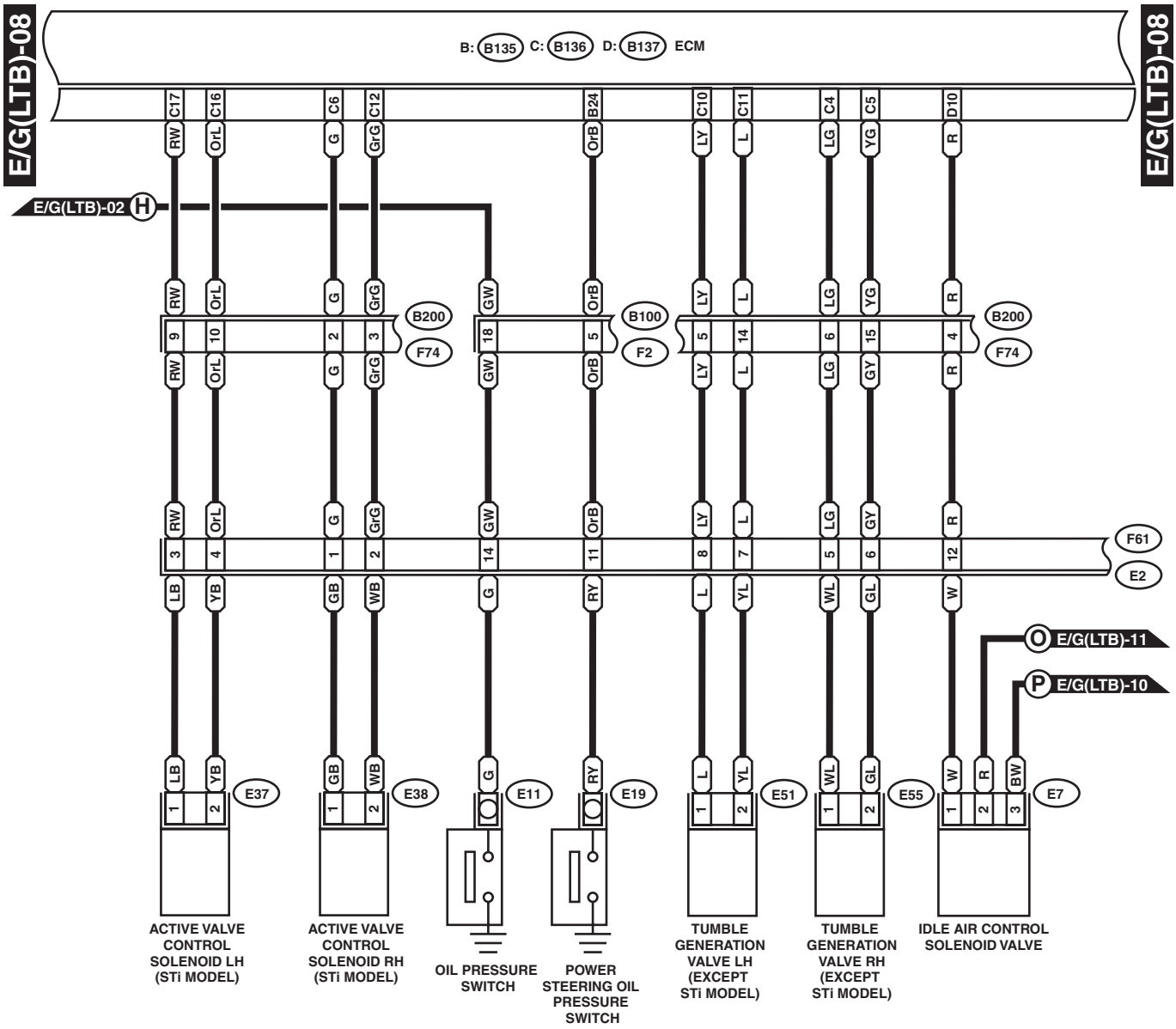
B20 (GRAY)

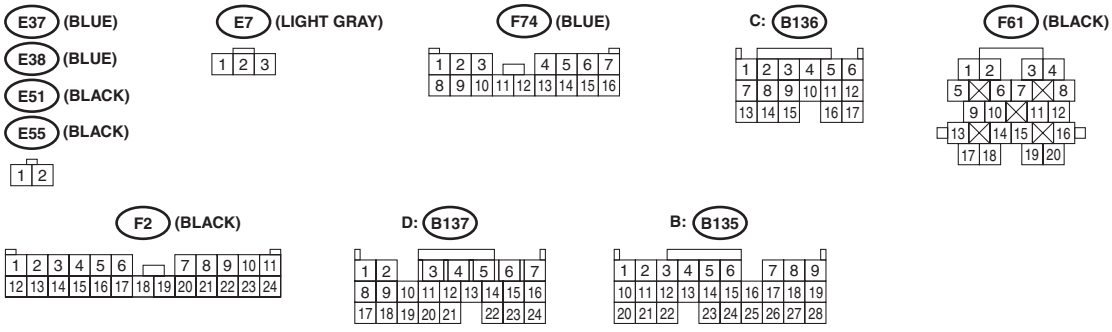
C: B136

B: B135

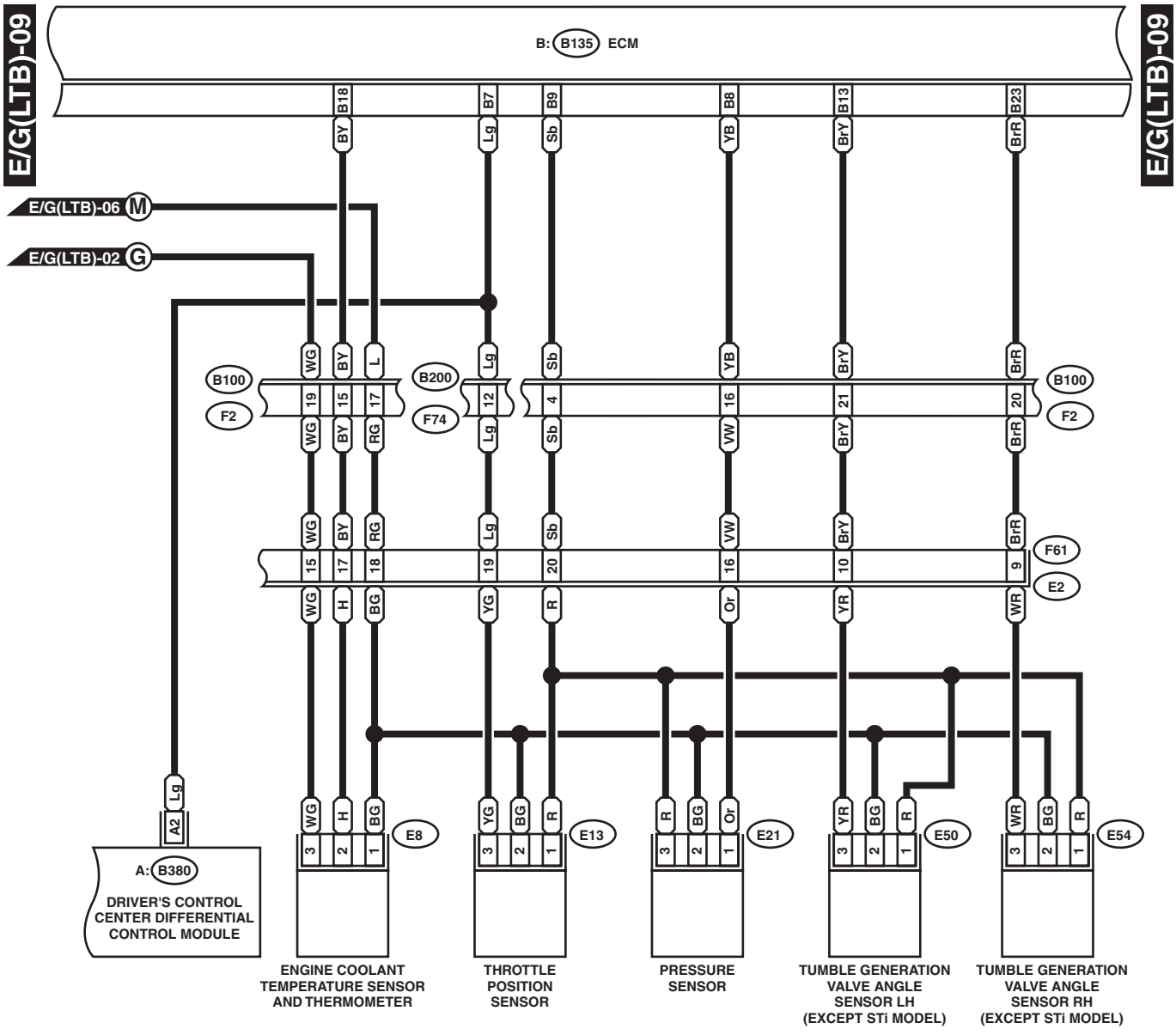
(*1): STi MODEL : BROWN
EXCEPT STi MODEL : LIGHT GRAY

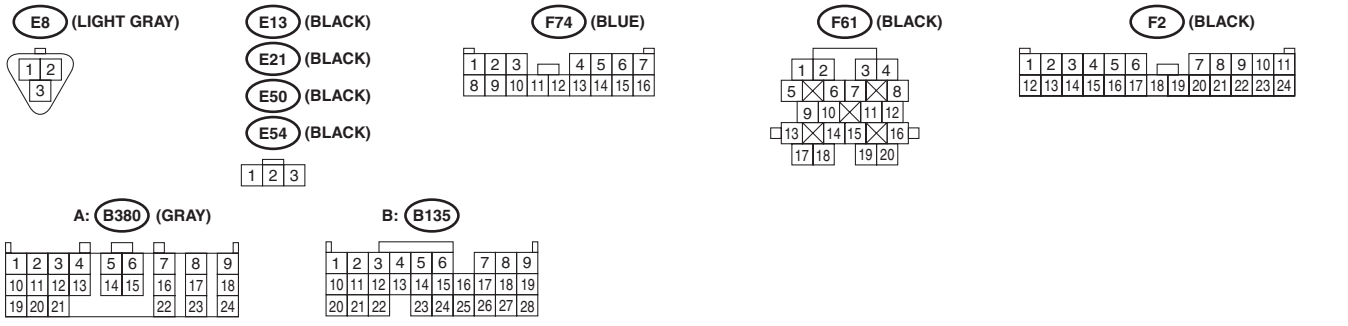
WI-07115


E/G(LTB)-08
E/G(LTB)-08
B: B135 C: B136 D: B137 ECM
C17 C16 C6 C12 B24 C10 C11 C4 C5 D10
RW OrL G GrG OrB LY L LG YG R
E/G(LTB)-02 H
B200 B100 B200
F74 F2 F74
GW
9 10 2 3 18 5 5 14 6 15 4
F61
E2
3 4 1 2 14 11 8 7 5 6 12
LB YB GB WB G RY L YL WL GL W R BW
E/G(LTB)-11 O
E/G(LTB)-10 P
E37 E38 E11 E19 E51 E55 E7
ACTIVE VALVE CONTROL SOLENOID LH (STi MODEL)
ACTIVE VALVE CONTROL SOLENOID RH (STi MODEL)
OIL PRESSURE SWITCH
POWER STEERING OIL PRESSURE SWITCH
TUMBLE GENERATION VALVE LH (EXCEPT STi MODEL)
TUMBLE GENERATION VALVE RH (EXCEPT STi MODEL)
IDLE AIR CONTROL SOLENOID VALVE

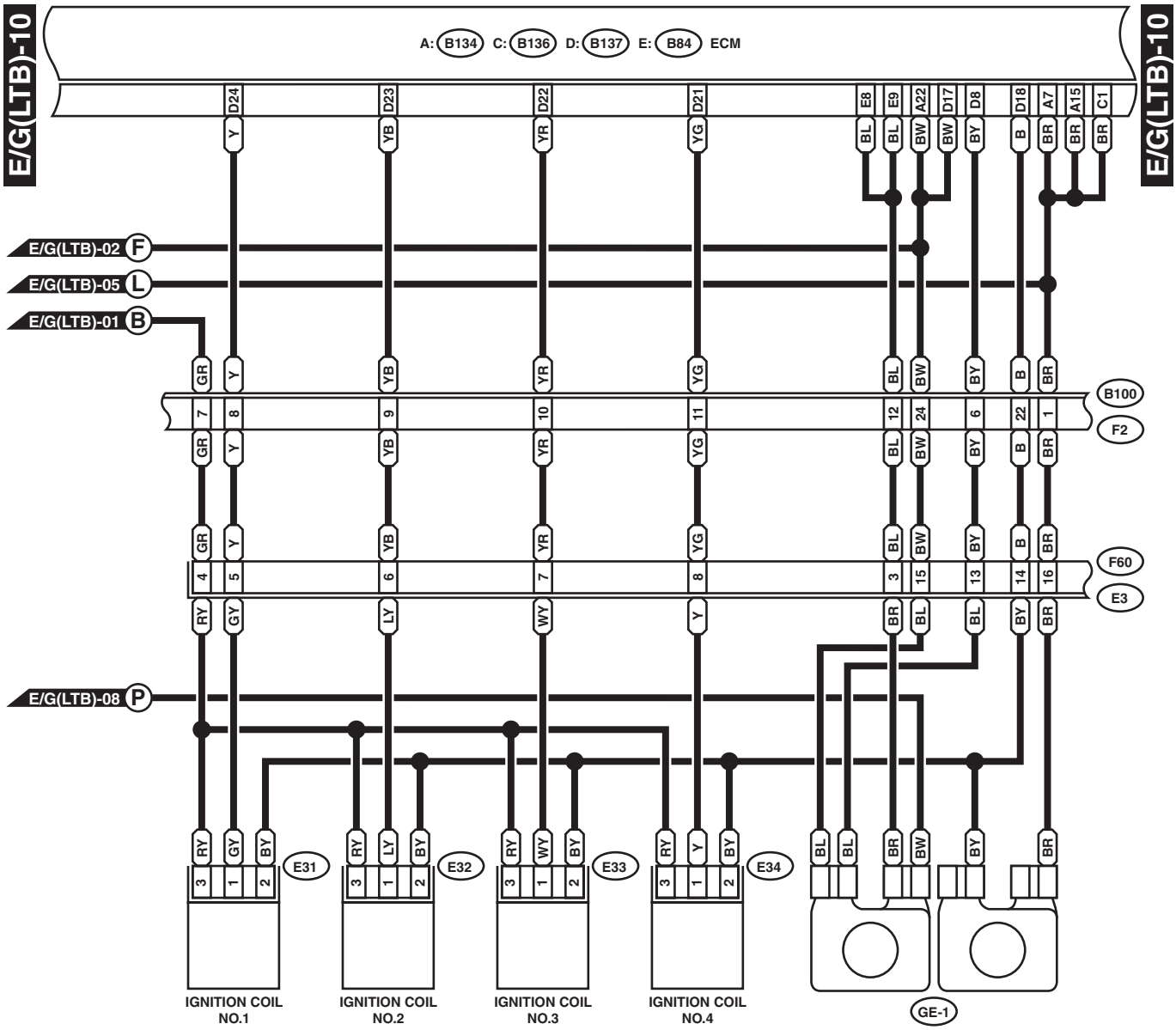

E37 (BLUE)
E38 (BLUE)
E51 (BLACK)
E55 (BLACK)
E7 (LIGHT GRAY)
F74 (BLUE)
C: B136
F61 (BLACK)
F2 (BLACK)
D: B137
B: B135

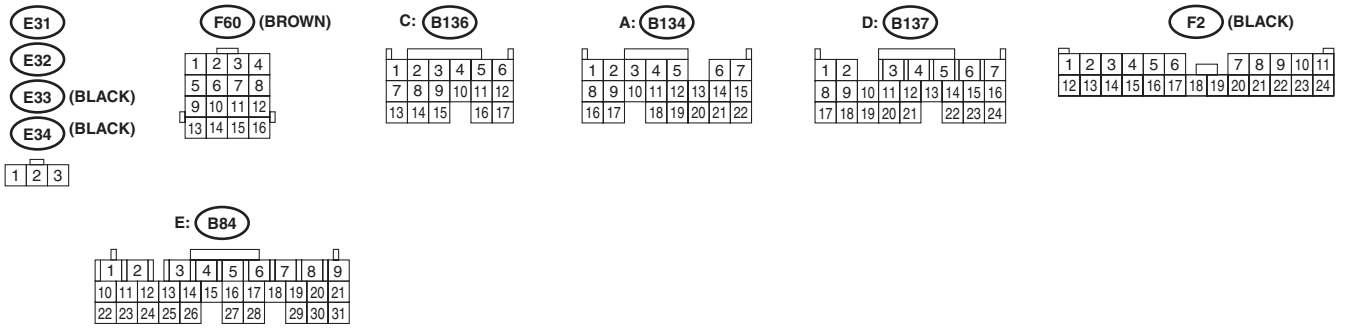
WI-07116


E/G(LTB)-09
E/G(LTB)-09
B: B135 ECM
B18
B7
B9
B8
B13
B23
BY
Lg
Sb
YB
BrY
BrR
E/G(LTB)-06 M
E/G(LTB)-02 G
B100
F2
B200
F74
B100
F2
WG
BY
L
Lg
Sb
YB
BrY
BrR
19
15
17
12
4
16
21
20
RG
VW
18
F61
E2
H
BG
YG
R
Or
YR
WR
9
10
A2
A: B380
DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE
E8
E13
E21
E50
E54
ENGINE COOLANT TEMPERATURE SENSOR AND THERMOMETER
THROTTLE POSITION SENSOR
PRESSURE SENSOR
TUMBLE GENERATION VALVE ANGLE SENSOR LH (EXCEPT STi MODEL)
TUMBLE GENERATION VALVE ANGLE SENSOR RH (EXCEPT STi MODEL)

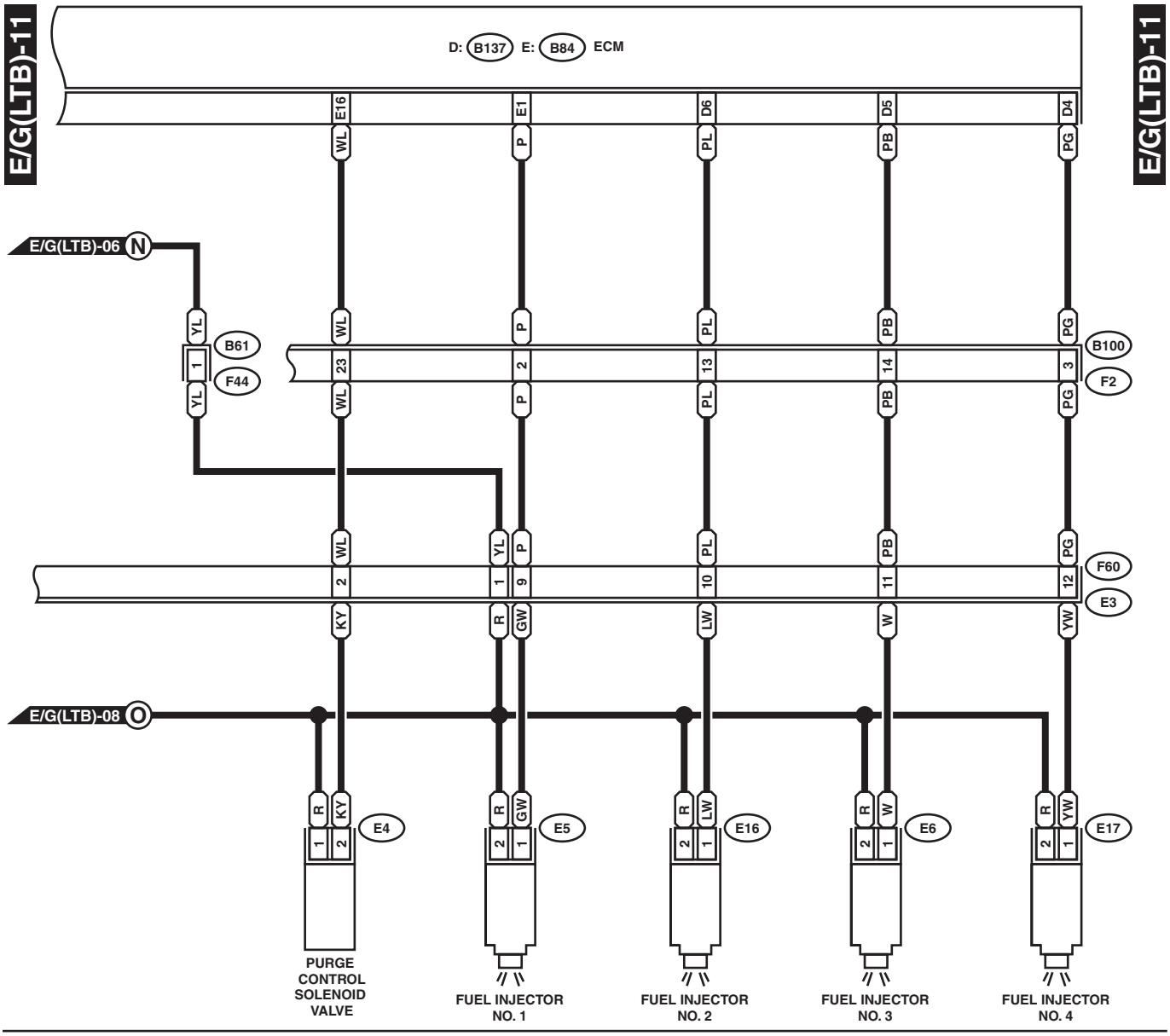

E8 (LIGHT GRAY)
E13 (BLACK)
E21 (BLACK)
E50 (BLACK)
E54 (BLACK)
F74 (BLUE)
F61 (BLACK)
F2 (BLACK)
A: B380 (GRAY)
B: B135

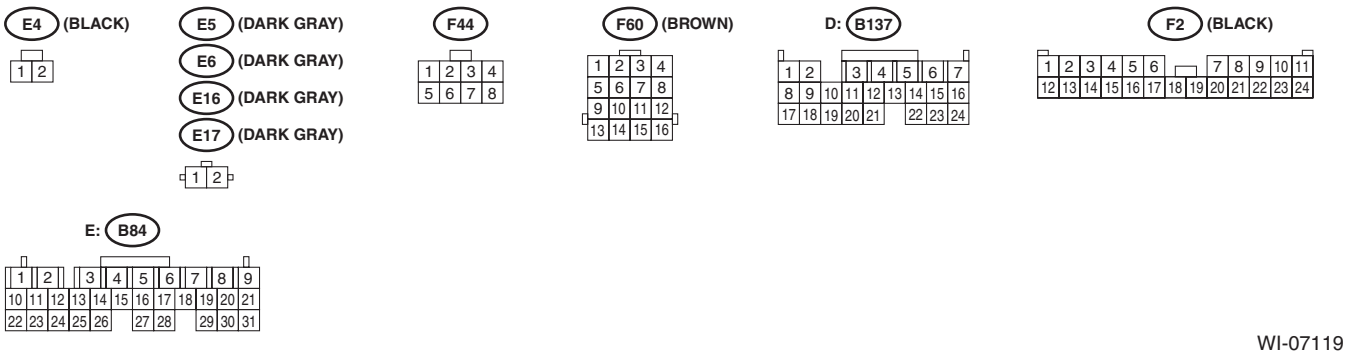
WI-07117


E/G(LTB)-10
A: B134 C: B136 D: B137 E: B84 ECM
E/G(LTB)-10
D24 D23 D22 D21 E8 E9 A22 D17 D8 D18 A7 A15 C1
Y YB YR YG BL BL BW BW BY B BR BR BR
E/G(LTB)-02 F
E/G(LTB)-05 L
E/G(LTB)-01 B
B100
F2
F60
E3
E/G(LTB)-08 P
RY GY LY WY Y BR BL BL BY BR
E31 E32 E33 E34
IGNITION COIL NO.1
IGNITION COIL NO.2
IGNITION COIL NO.3
IGNITION COIL NO.4
GE-1


E31
E32
E33 (BLACK)
E34 (BLACK)
F60 (BROWN)
C: B136
A: B134
D: B137
F2 (BLACK)
E: B84

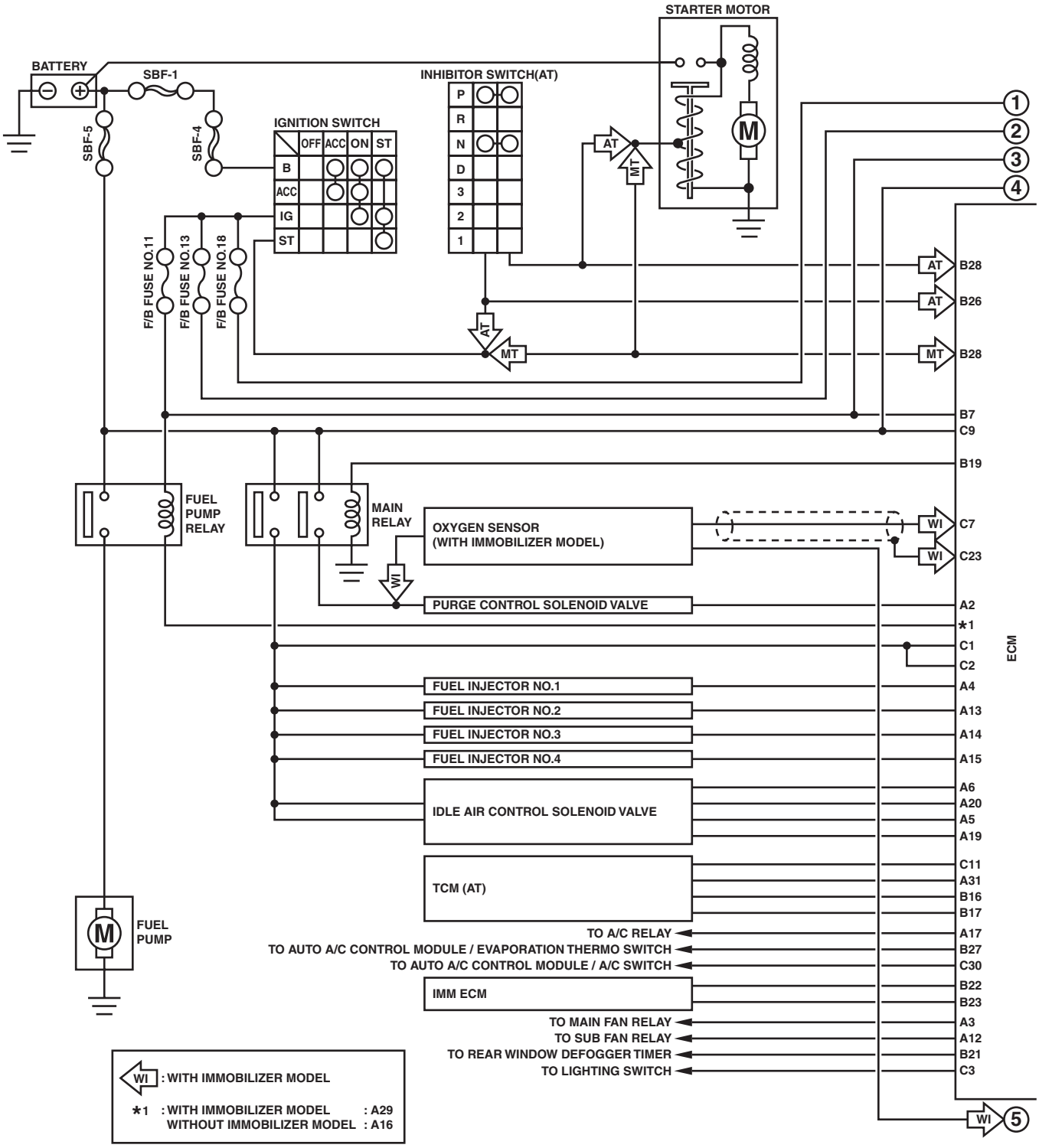
WI-07118


E/G(LTB)-11
E/G(LTB)-11
D: B137 E: B84 ECM
E16
E1
D6
D5
D4
WL
P
PL
PB
PG
E/G(LTB)-06 N
YL
B61
F44
B100
F2
F60
E3
E/G(LTB)-08 O
KY
R
GW
LW
W
YW
E4
E5
E16
E6
E17
PURGE CONTROL SOLENOID VALVE
FUEL INJECTOR NO. 1
FUEL INJECTOR NO. 2
FUEL INJECTOR NO. 3
FUEL INJECTOR NO. 4

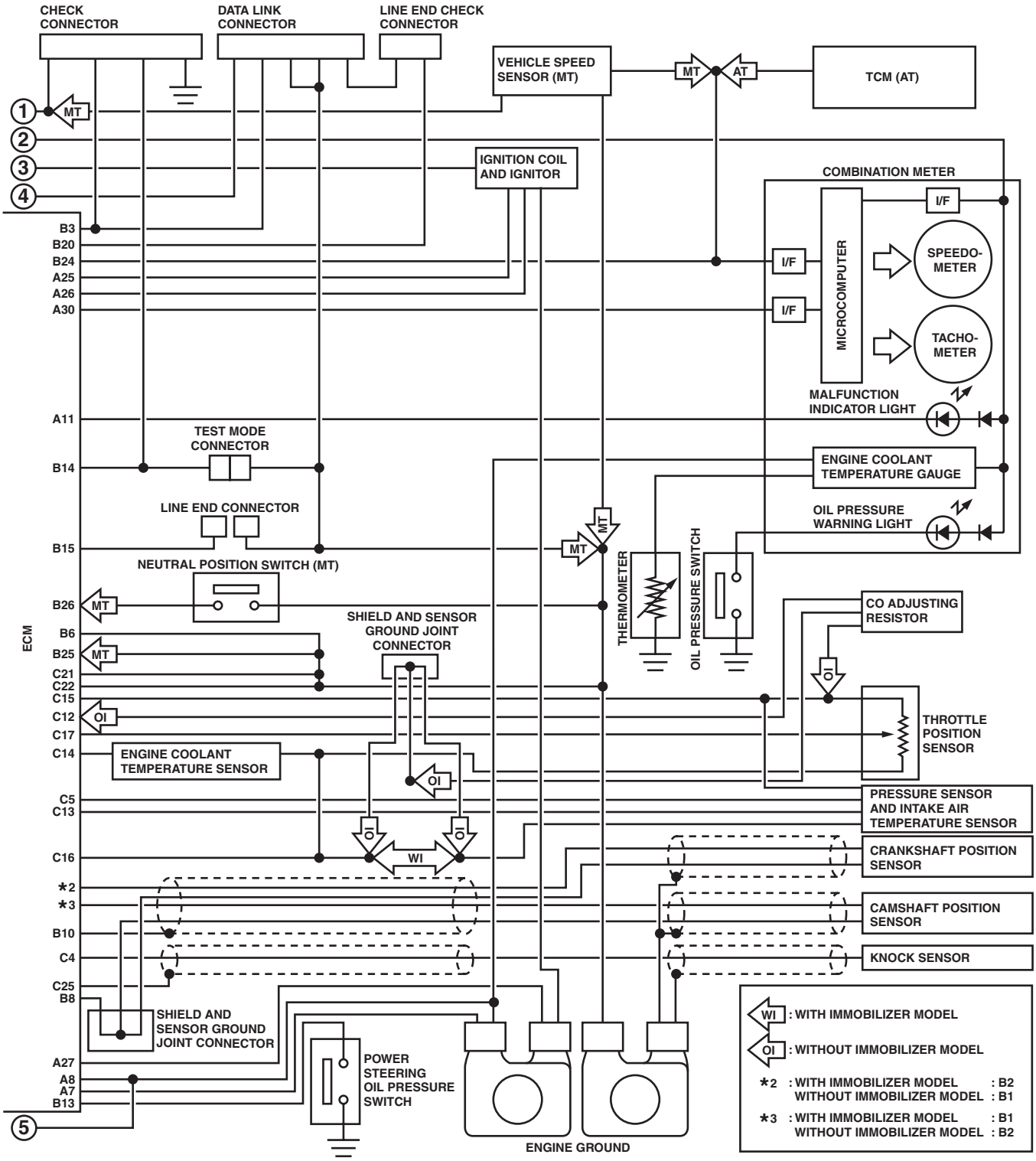

E4 (BLACK)
E5 (DARK GRAY)
E6 (DARK GRAY)
E16 (DARK GRAY)
E17 (DARK GRAY)
F44
F60 (BROWN)
D: B137
F2 (BLACK)
E: B84

WI-07119

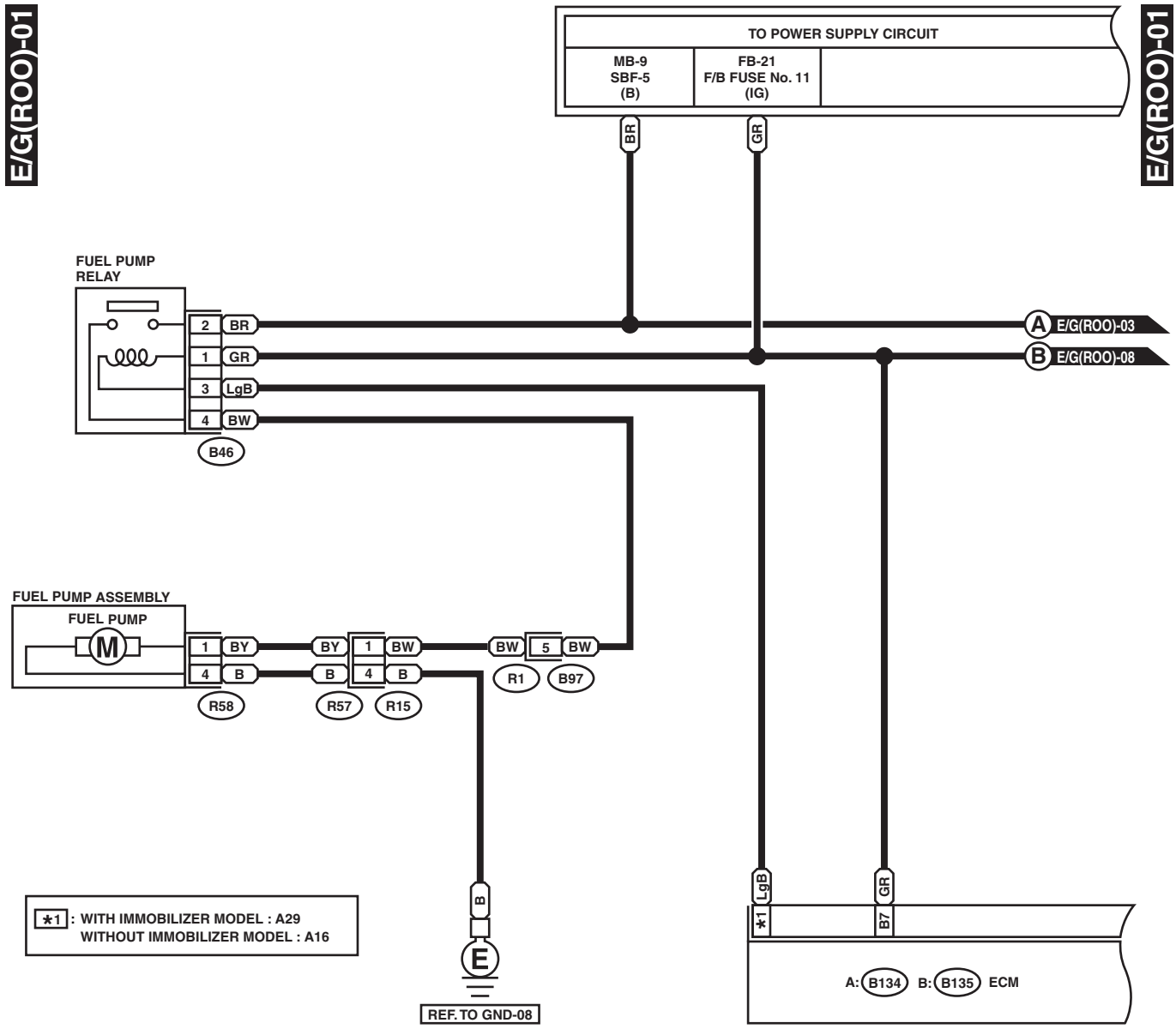
4. RHD SOHC WITHOUT OBD MODEL

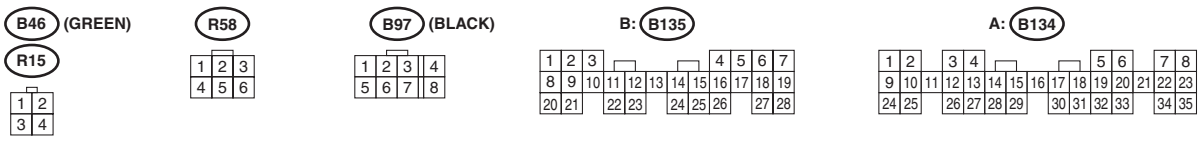


WI-07120

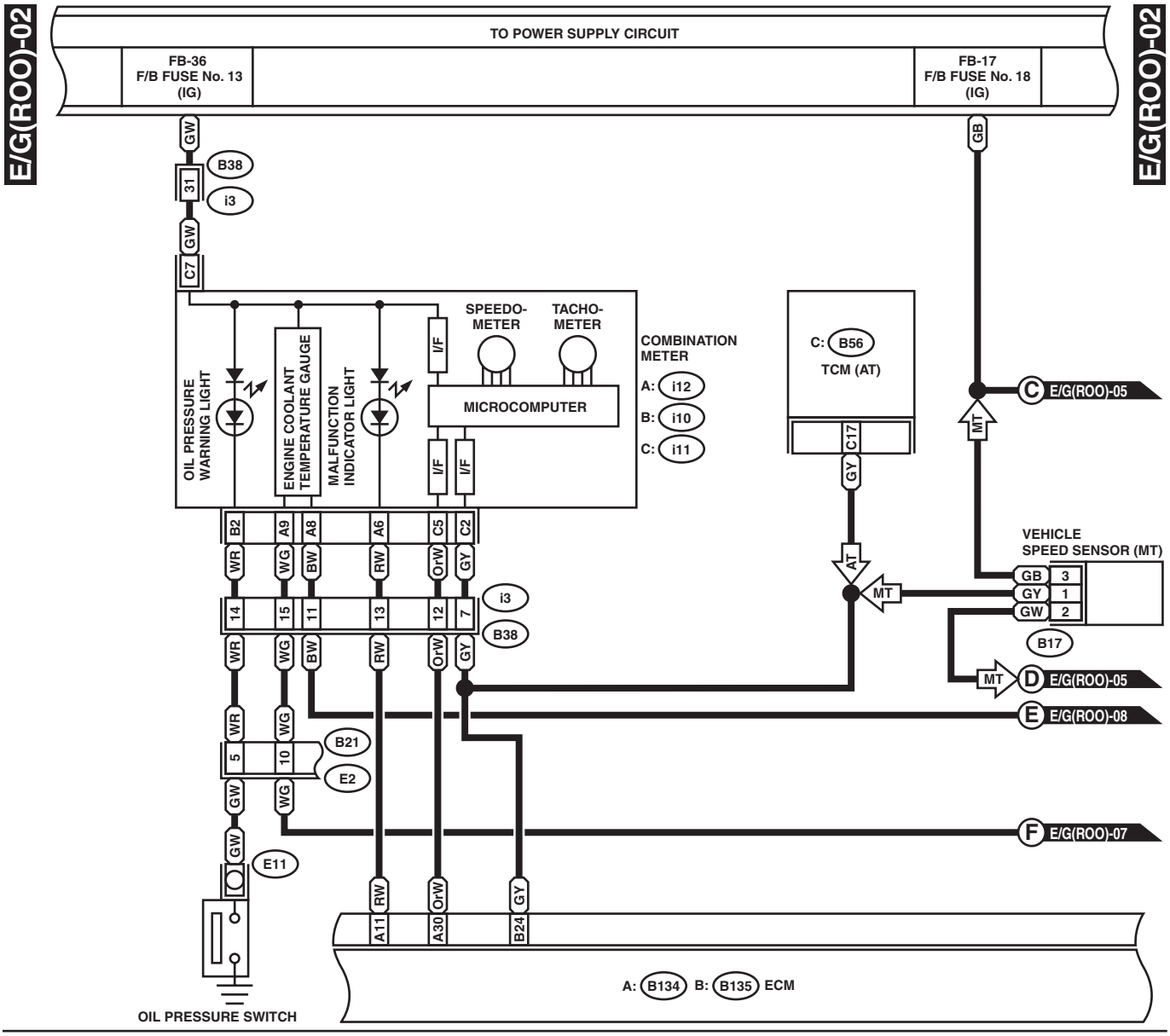

CHECK CONNECTOR
DATA LINK CONNECTOR
LINE END CHECK CONNECTOR
VEHICLE SPEED SENSOR (MT)
MT
AT
TCM (AT)
IGNITION COIL AND IGNITOR
COMBINATION METER
I/F
MICROCOMPUTER
SPEEDO-METER
TACHO-METER
MALFUNCTION INDICATOR LIGHT
ENGINE COOLANT TEMPERATURE GAUGE
OIL PRESSURE WARNING LIGHT
TEST MODE CONNECTOR
LINE END CONNECTOR
NEUTRAL POSITION SWITCH (MT)
THERMOMETER
OIL PRESSURE SWITCH
CO ADJUSTING RESISTOR
SHIELD AND SENSOR GROUND JOINT CONNECTOR
THROTTLE POSITION SENSOR
ENGINE COOLANT TEMPERATURE SENSOR
PRESSURE SENSOR AND INTAKE AIR TEMPERATURE SENSOR
CRANKSHAFT POSITION SENSOR
CAMSHAFT POSITION SENSOR
KNOCK SENSOR
SHIELD AND SENSOR GROUND JOINT CONNECTOR
POWER STEERING OIL PRESSURE SWITCH
ENGINE GROUND
ECM
WI : WITH IMMOBILIZER MODEL
OI : WITHOUT IMMOBILIZER MODEL
*2 : WITH IMMOBILIZER MODEL : B2
WITHOUT IMMOBILIZER MODEL : B1
*3 : WITH IMMOBILIZER MODEL : B1
WITHOUT IMMOBILIZER MODEL : B2

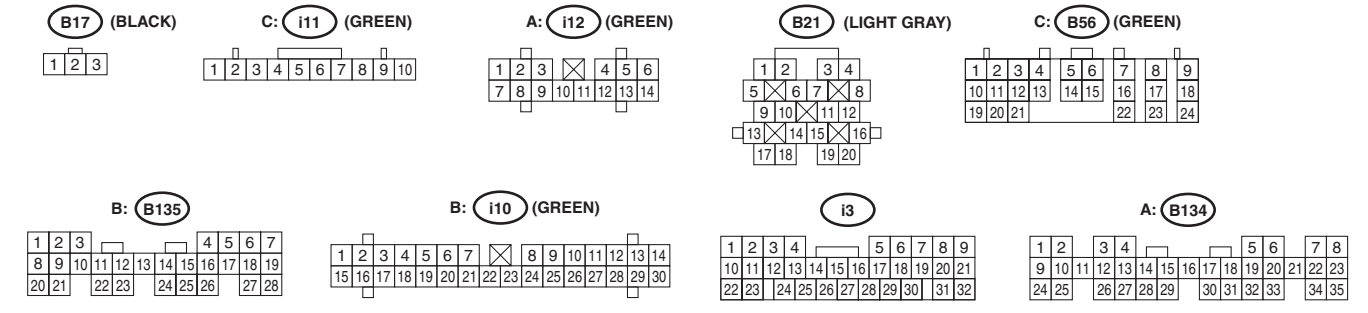
WI-07121


E/G(ROO)-01
E/G(ROO)-01
TO POWER SUPPLY CIRCUIT
MB-9
SBF-5
(B)
FB-21
F/B FUSE No. 11
(IG)
BR
GR
FUEL PUMP
RELAY
2 BR
1 GR
3 LgB
4 BW
B46
A E/G(ROO)-03
B E/G(ROO)-08
FUEL PUMP ASSEMBLY
FUEL PUMP
M
1 BY
4 B
BY
B
1 BW
4 B
BW
5 BW
R58
R57
R15
R1
B97
*1 : WITH IMMOBILIZER MODEL : A29
WITHOUT IMMOBILIZER MODEL : A16
B
E
REF. TO GND-08
LgB
GR
*1
B7
A: B134 B: B135 ECM

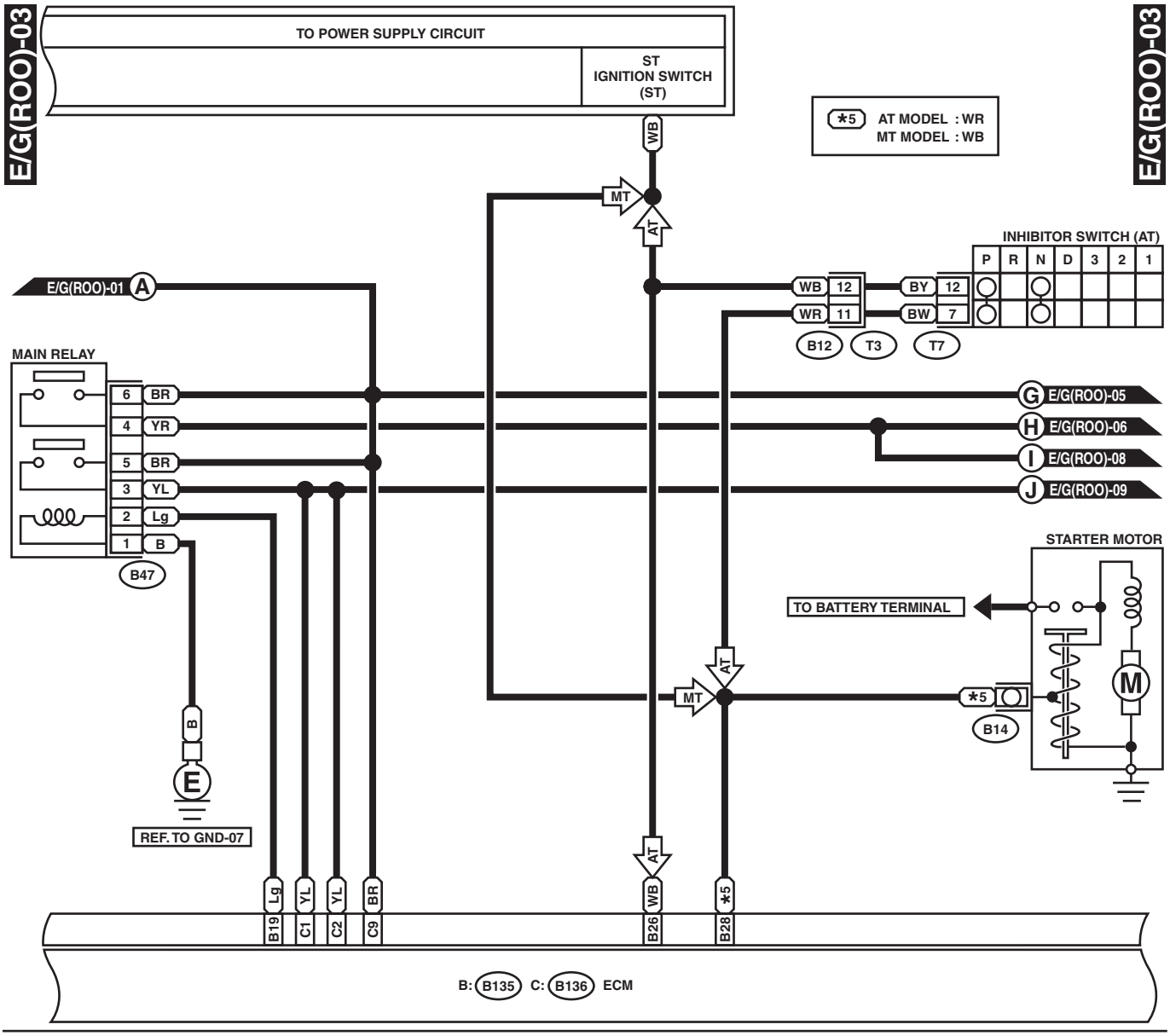

B46 (GREEN)
R15
R58
B97 (BLACK)
B: B135
A: B134

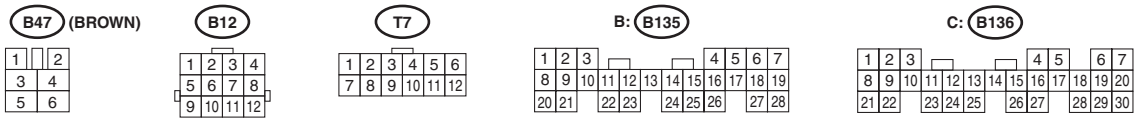
WI-07122


E/G(ROO)-02
TO POWER SUPPLY CIRCUIT
FB-36
F/B FUSE No. 13
(IG)
FB-17
F/B FUSE No. 18
(IG)
GW
B38
31
i3
C7
GB
SPEEDO-METER
TACHO-METER
COMBINATION METER
A: i12
B: i10
C: i11
I/F
MICROCOMPUTER
OIL PRESSURE WARNING LIGHT
ENGINE COOLANT TEMPERATURE GAUGE
MALFUNCTION INDICATOR LIGHT
C: B56
TCM (AT)
C17
GY
AT
MT
C E/G(ROO)-05
VEHICLE SPEED SENSOR (MT)
GB 3
GY 1
GW 2
B17
D E/G(ROO)-05
E E/G(ROO)-08
F E/G(ROO)-07
B2
A9
A8
A6
C5
C2
WR
WG
BW
RW
OrW
14
15
11
13
12
7
5
10
B21
E2
E11
A11
A30
B24
A: B134 B: B135 ECM
OIL PRESSURE SWITCH


B17 (BLACK)
C: i11 (GREEN)
A: i12 (GREEN)
B21 (LIGHT GRAY)
C: B56 (GREEN)
B: B135
B: i10 (GREEN)
i3
A: B134

WI-07123

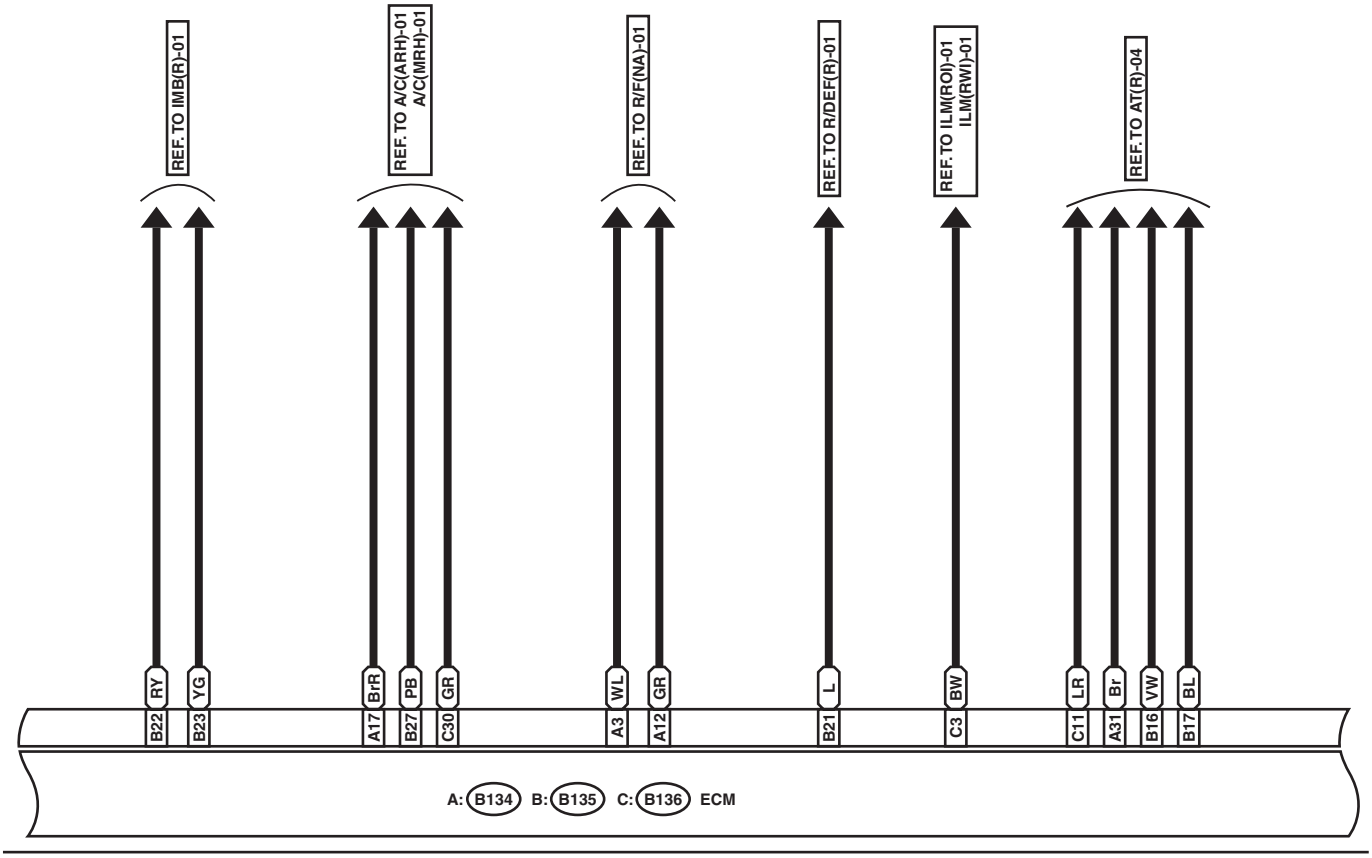

E/G(ROO)-03
TO POWER SUPPLY CIRCUIT
ST
IGNITION SWITCH
(ST)
E/G(ROO)-03
*5 AT MODEL : WR
MT MODEL : WB
WB
MT
AT
INHIBITOR SWITCH (AT)
P R N D 3 2 1
E/G(ROO)-01 A
WB 12
WR 11
BY 12
BW 7
B12 T3 T7
MAIN RELAY
6 BR
4 YR
5 BR
3 YL
2 Lg
1 B
B47
G E/G(ROO)-05
H E/G(ROO)-06
I E/G(ROO)-08
J E/G(ROO)-09
STARTER MOTOR
TO BATTERY TERMINAL
M
*5
B14
B
E
REF. TO GND-07
Lg YL YL BR
B19 C1 C2 C9
WB *5
B26 B28
B: B135 C: B136 ECM

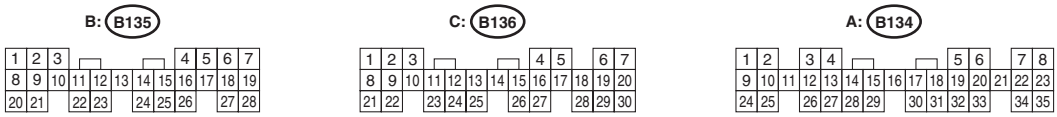

B47 (BROWN)
B12
T7
B: B135
C: B136

WI-07124

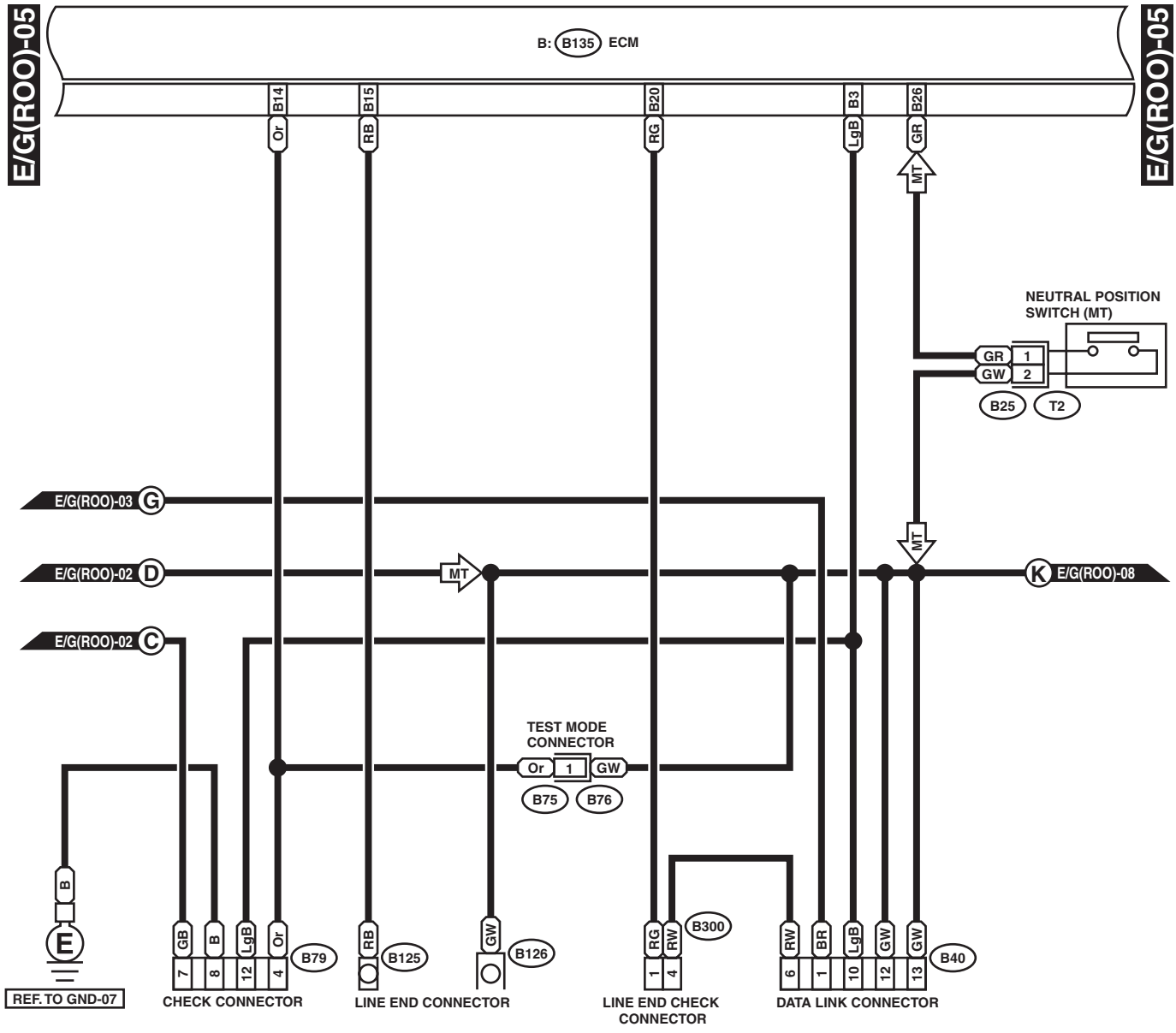
E/G(ROO)-04

E/G(ROO)-04

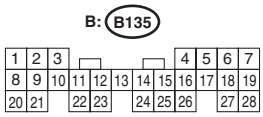




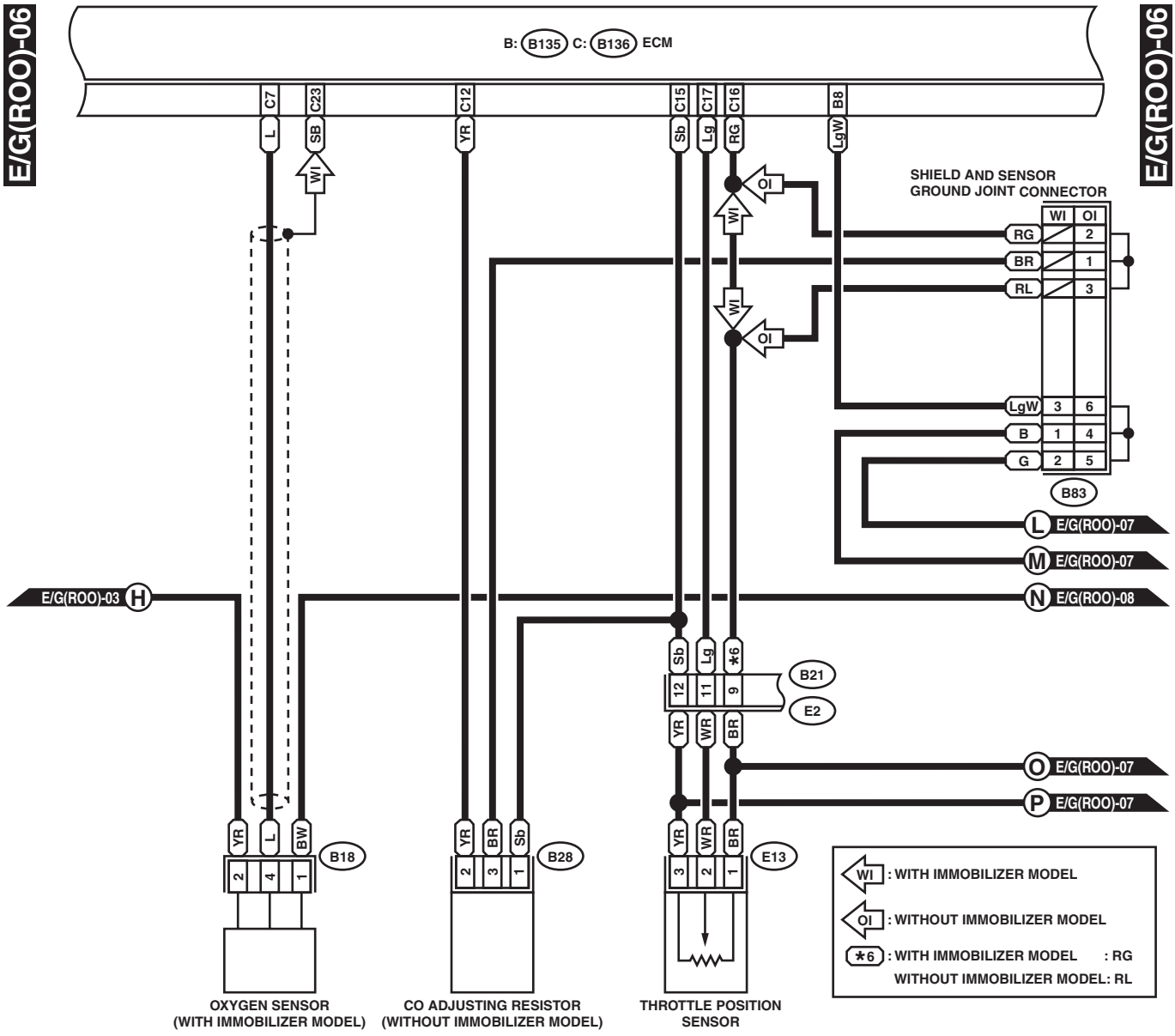
WI-07617

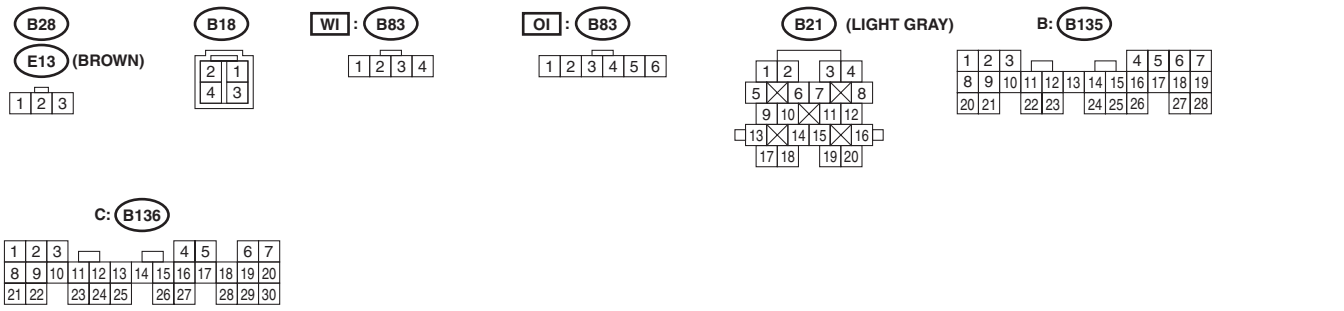

E/G(ROO)-05
E/G(ROO)-05
B: B135 ECM
B14
B15
B20
B3
B26
Or
RB
RG
LgB
GR
MT
NEUTRAL POSITION SWITCH (MT)
GR 1
GW 2
B25
T2
E/G(ROO)-03 G
E/G(ROO)-02 D
E/G(ROO)-02 C
MT
K E/G(ROO)-08
TEST MODE CONNECTOR
Or 1 GW
B75
B76
B
E
REF. TO GND-07
GB
B
LgB
Or
7
8
12
4
B79
CHECK CONNECTOR
RB
B125
LINE END CONNECTOR
GW
B126
RG
RW
B300
1
4
LINE END CHECK CONNECTOR
RW
BR
LgB
GW
GW
6
1
10
12
13
B40
DATA LINK CONNECTOR

B25 (BROWN)
1 2
B75 (GREEN)
1
2
B300
1 2 3
4 5 6
B79 (GRAY)
1 2 3 4 5 6 7
8 9 10 11 12 13 14
B40 (BLACK)
1 2 3 4 5 6 7 8
9 10 11 12 13 14 15 16

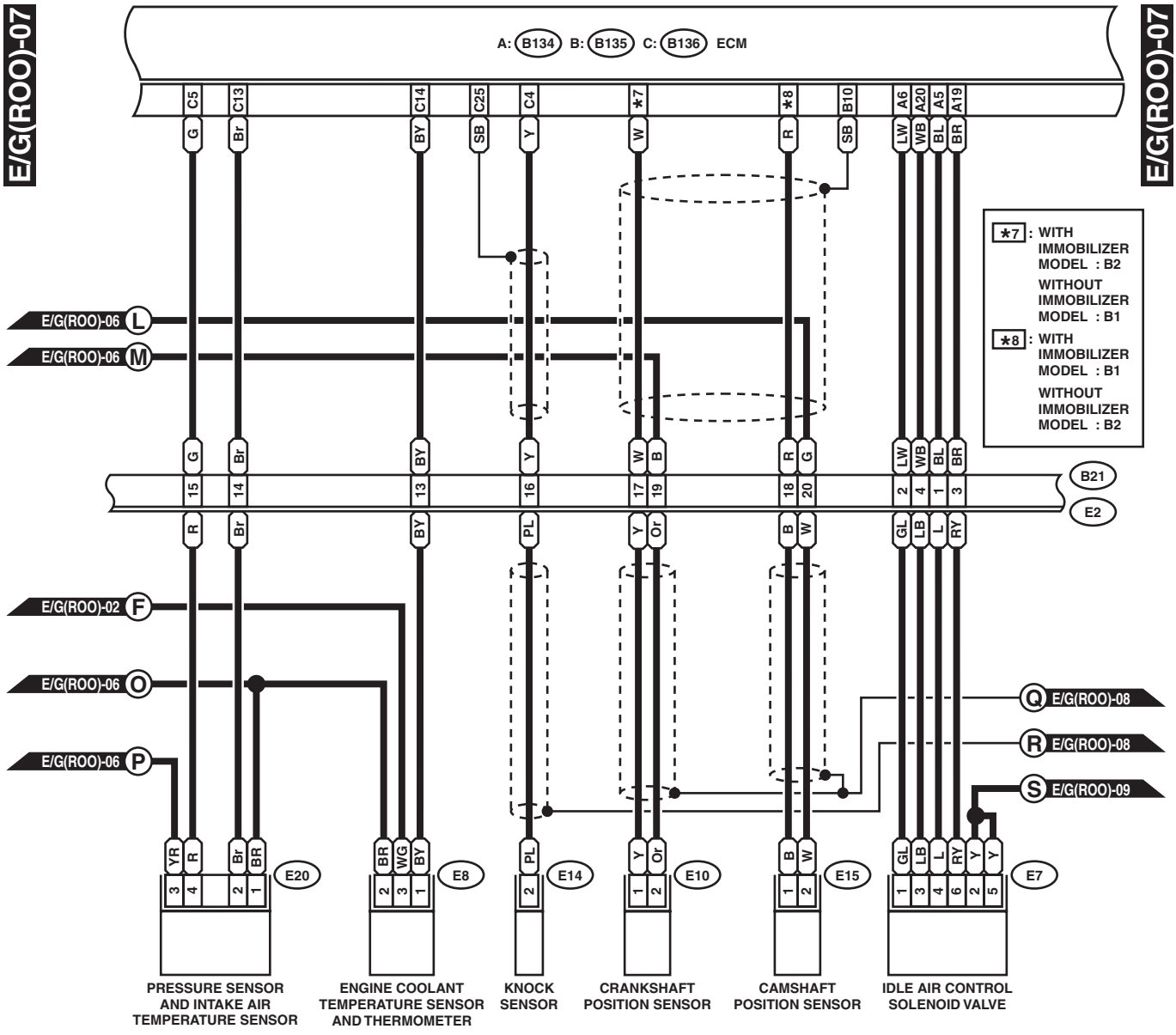

B: B135
1 2 3 4 5 6 7
8 9 10 11 12 13 14 15 16 17 18 19
20 21 22 23 24 25 26 27 28

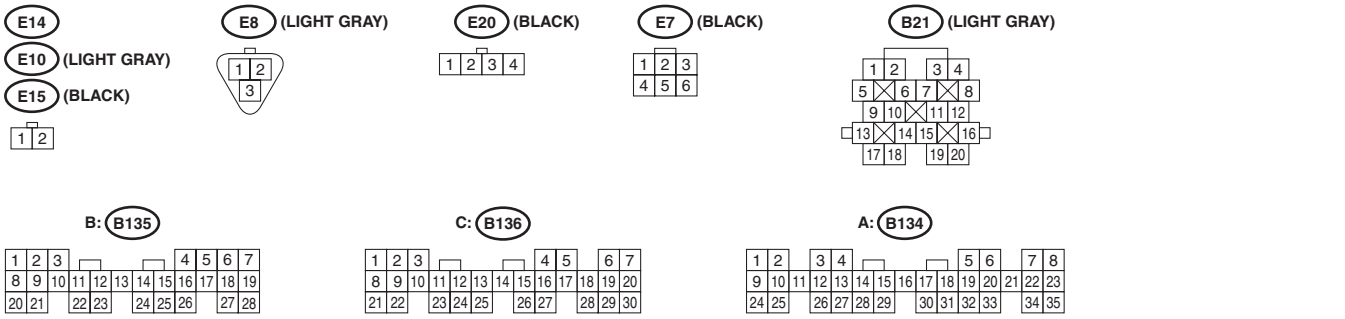
WI-07125


E/G(ROO)-06
E/G(ROO)-06
B: B135 C: B136 ECM
C7
C23
C12
C15
C17
C16
B8
L
SB
YR
Sb
Lg
RG
LgW
WI
OI
SHIELD AND SENSOR GROUND JOINT CONNECTOR
WI OI
RG 2
BR 1
RL 3
LgW 3 6
B 1 4
G 2 5
B83
L E/G(ROO)-07
M E/G(ROO)-07
N E/G(ROO)-08
E/G(ROO)-03 H
*6
B21
12 11 9
E2
YR WR BR
O E/G(ROO)-07
P E/G(ROO)-07
YR L BW
B18
2 4 1
YR BR Sb
B28
2 3 1
YR WR BR
E13
3 2 1
WI : WITH IMMOBILIZER MODEL
OI : WITHOUT IMMOBILIZER MODEL
*6 : WITH IMMOBILIZER MODEL : RG
WITHOUT IMMOBILIZER MODEL: RL
OXYGEN SENSOR (WITH IMMOBILIZER MODEL)
CO ADJUSTING RESISTOR (WITHOUT IMMOBILIZER MODEL)
THROTTLE POSITION SENSOR

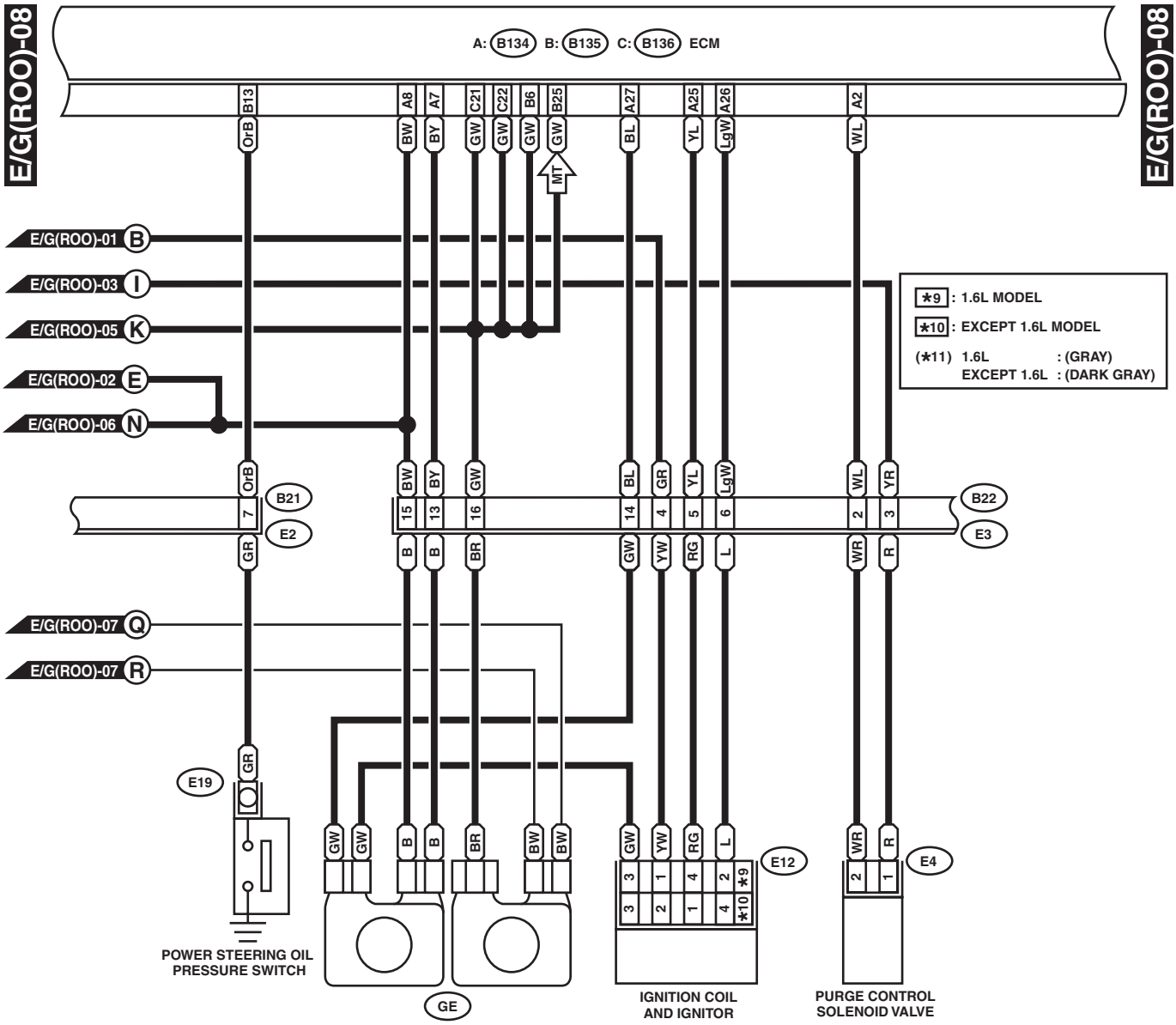

B28
E13 (BROWN)
1 2 3
B18
2 1
4 3
WI : B83
1 2 3 4
OI : B83
1 2 3 4 5 6
B21 (LIGHT GRAY)
1 2 3 4
5 6 7 8
9 10 11 12
13 14 15 16
17 18 19 20
B: B135
1 2 3 4 5 6 7
8 9 10 11 12 13 14 15 16 17 18 19
20 21 22 23 24 25 26 27 28
C: B136
1 2 3 4 5 6 7
8 9 10 11 12 13 14 15 16 17 18 19 20
21 22 23 24 25 26 27 28 29 30

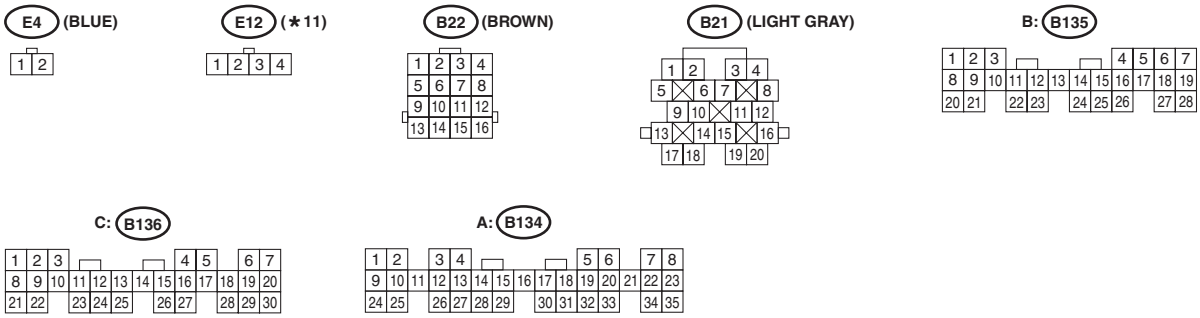
WI-07126


E/G(ROO)-07
E/G(ROO)-07
A: B134 B: B135 C: B136 ECM
C5 C13 C14 C25 C4 ✱7 ✱8 B10 A6 A20 A5 A19
G Br BY SB Y W R SB LW WB BL BR
✱7 : WITH IMMOBILIZER MODEL : B2
WITHOUT IMMOBILIZER MODEL : B1
✱8 : WITH IMMOBILIZER MODEL : B1
WITHOUT IMMOBILIZER MODEL : B2
E/G(ROO)-06 L
E/G(ROO)-06 M
G Br BY Y W B R G LW WB BL BR
15 14 13 16 17 19 18 20 2 4 1 3
B21
E2
R Br BY PL Y Or B W GL LB L RY
E/G(ROO)-02 F
E/G(ROO)-06 O
E/G(ROO)-06 P
Q E/G(ROO)-08
R E/G(ROO)-08
S E/G(ROO)-09
YR R Br BR BR WG BY PL Y Or B W GL LB L RY Y Y
3 4 2 1 2 3 1 2 1 2 1 2 1 3 4 6 2 5
E20 E8 E14 E10 E15 E7
PRESSURE SENSOR AND INTAKE AIR TEMPERATURE SENSOR
ENGINE COOLANT TEMPERATURE SENSOR AND THERMOMETER
KNOCK SENSOR
CRANKSHAFT POSITION SENSOR
CAMSHAFT POSITION SENSOR
IDLE AIR CONTROL SOLENOID VALVE

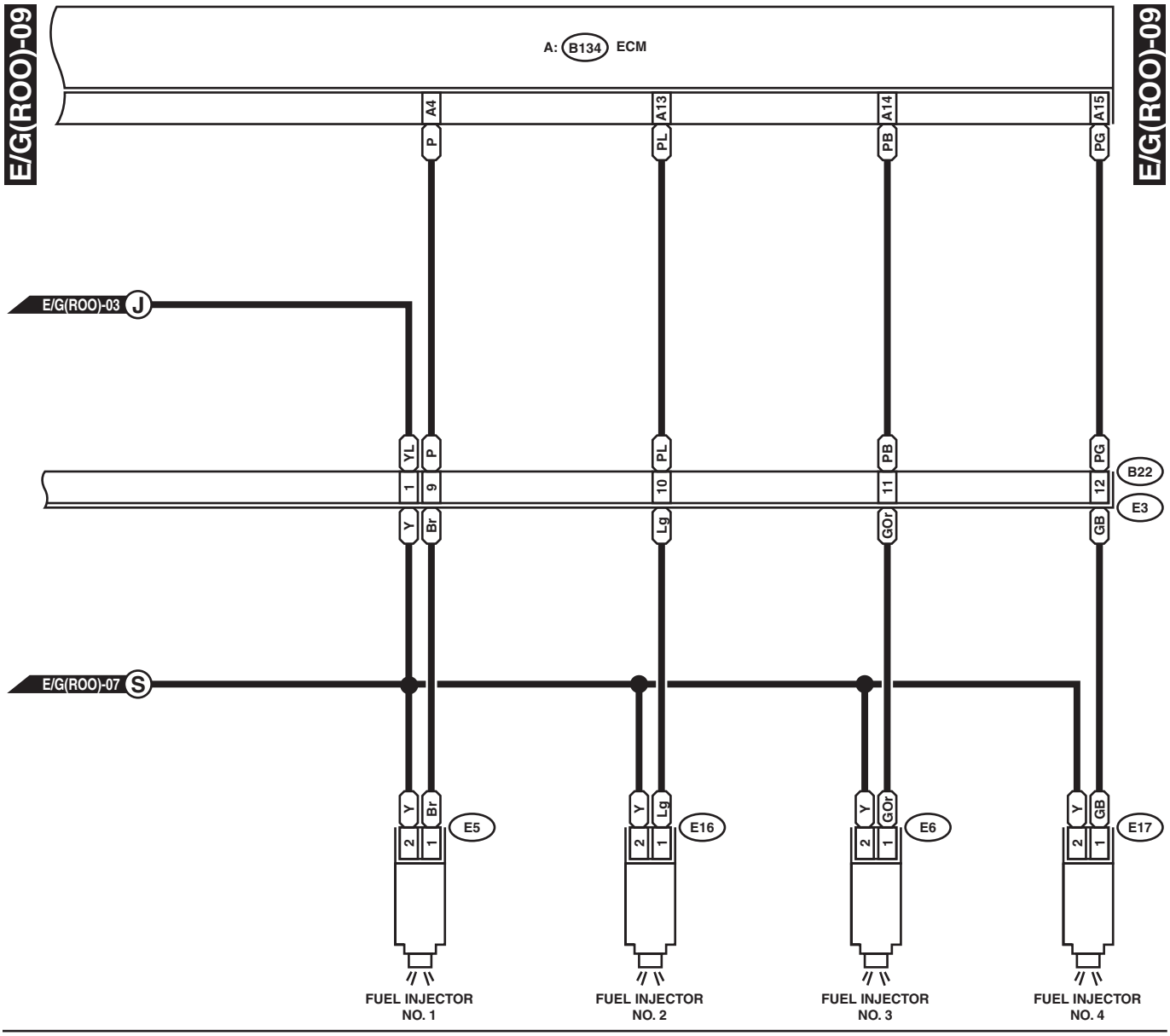

E14
E10 (LIGHT GRAY)
E15 (BLACK)
E8 (LIGHT GRAY)
E20 (BLACK)
E7 (BLACK)
B21 (LIGHT GRAY)
B: B135
C: B136
A: B134

WI-07127


E/G(ROO)-08
A: B134 B: B135 C: B136 ECM
E/G(ROO)-01 B
E/G(ROO)-03 I
E/G(ROO)-05 K
E/G(ROO)-02 E
E/G(ROO)-06 N
E/G(ROO)-07 Q
E/G(ROO)-07 R
*9 : 1.6L MODEL
*10 : EXCEPT 1.6L MODEL
(*11) 1.6L : (GRAY)
EXCEPT 1.6L : (DARK GRAY)
B21
E2
B22
E3
E19
E12
E4
GE
POWER STEERING OIL PRESSURE SWITCH
IGNITION COIL AND IGNITOR
PURGE CONTROL SOLENOID VALVE

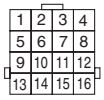

E4 (BLUE)
E12 (*11)
B22 (BROWN)
B21 (LIGHT GRAY)
B: B135
C: B136
A: B134

WI-07128

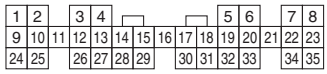


E5 (LIGHT GRAY)
E6 (LIGHT GRAY)
E16 (LIGHT GRAY)
E17 (LIGHT GRAY)

B22 (BROWN)

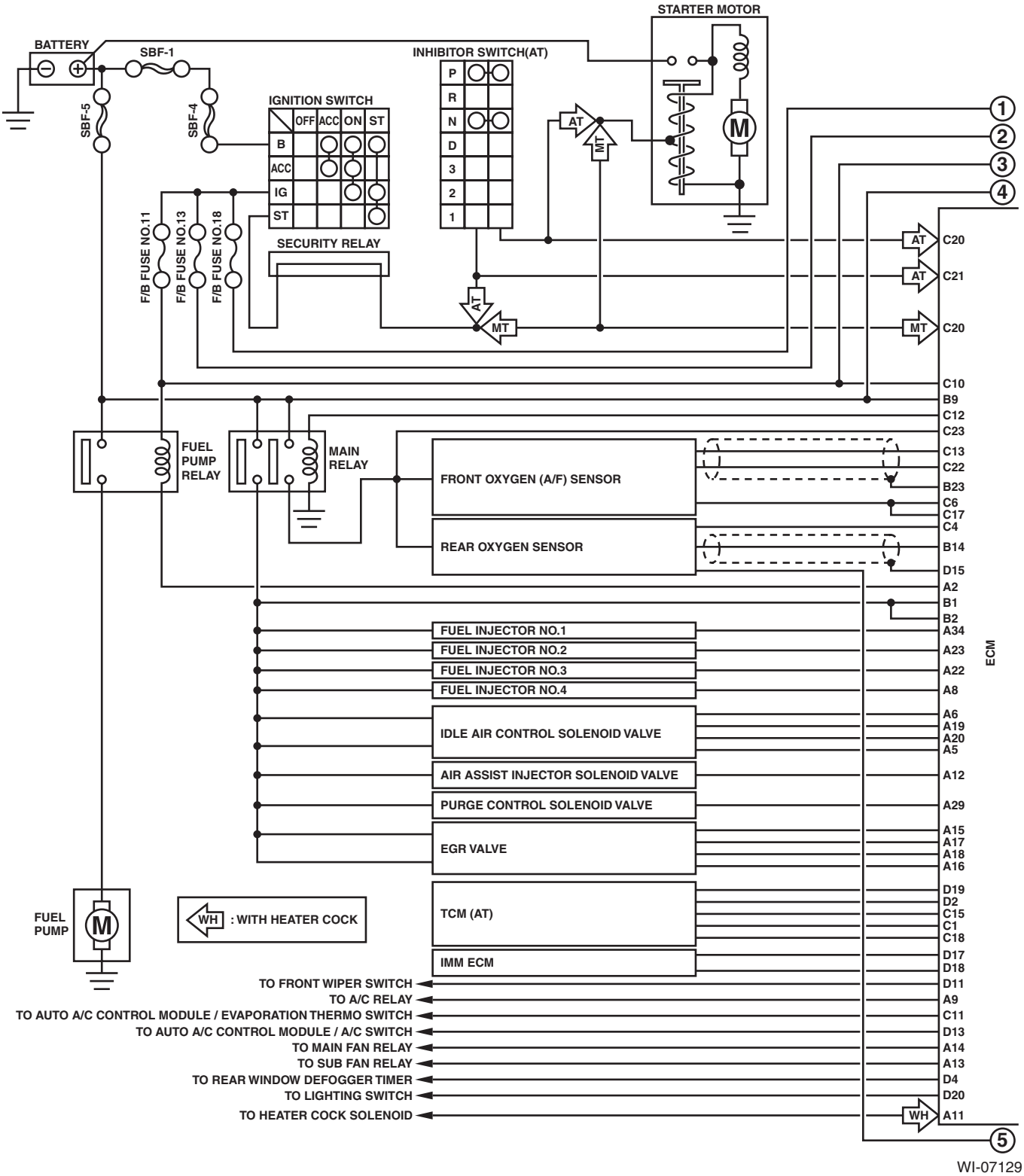


A: B134

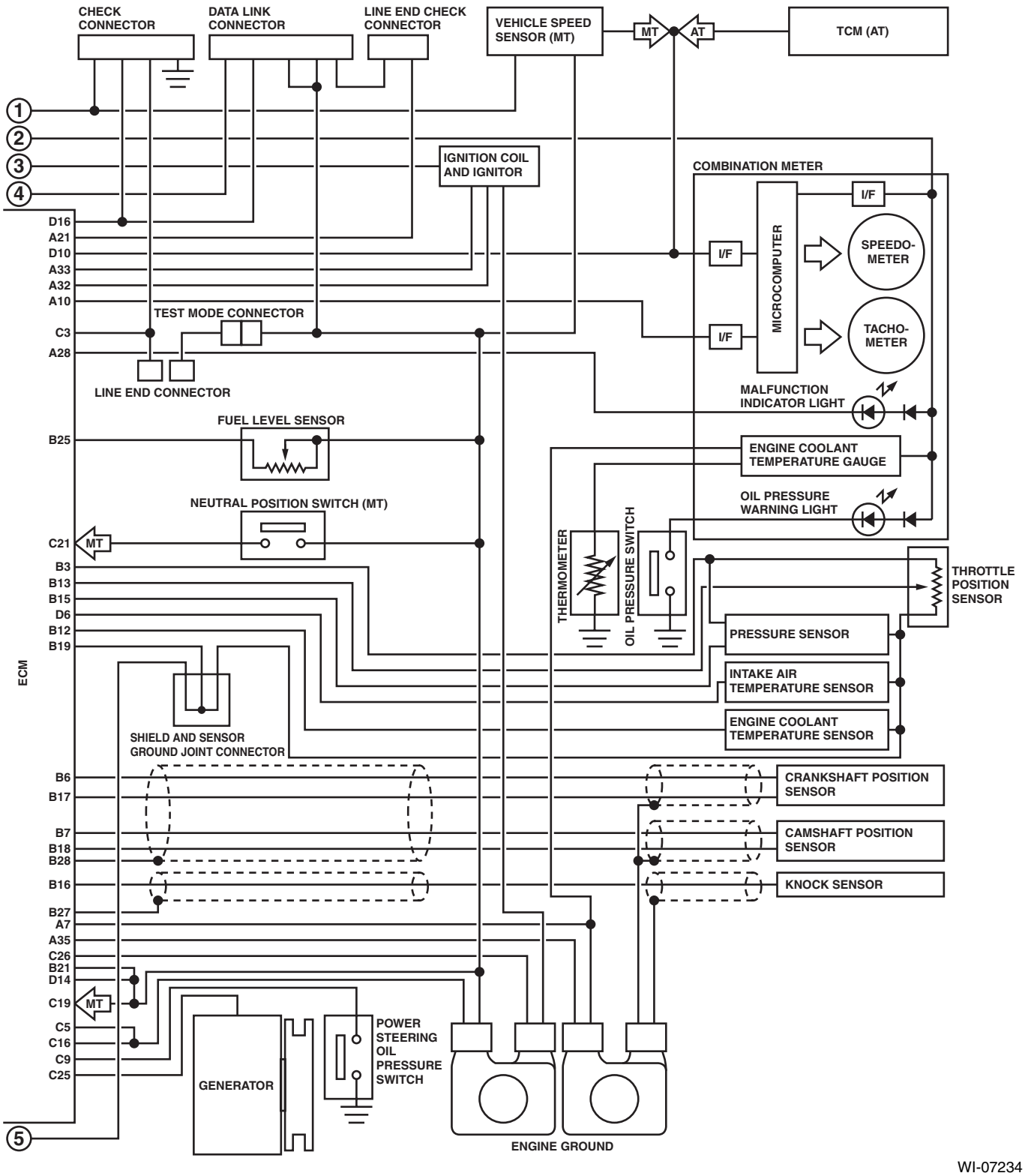


WI-02344

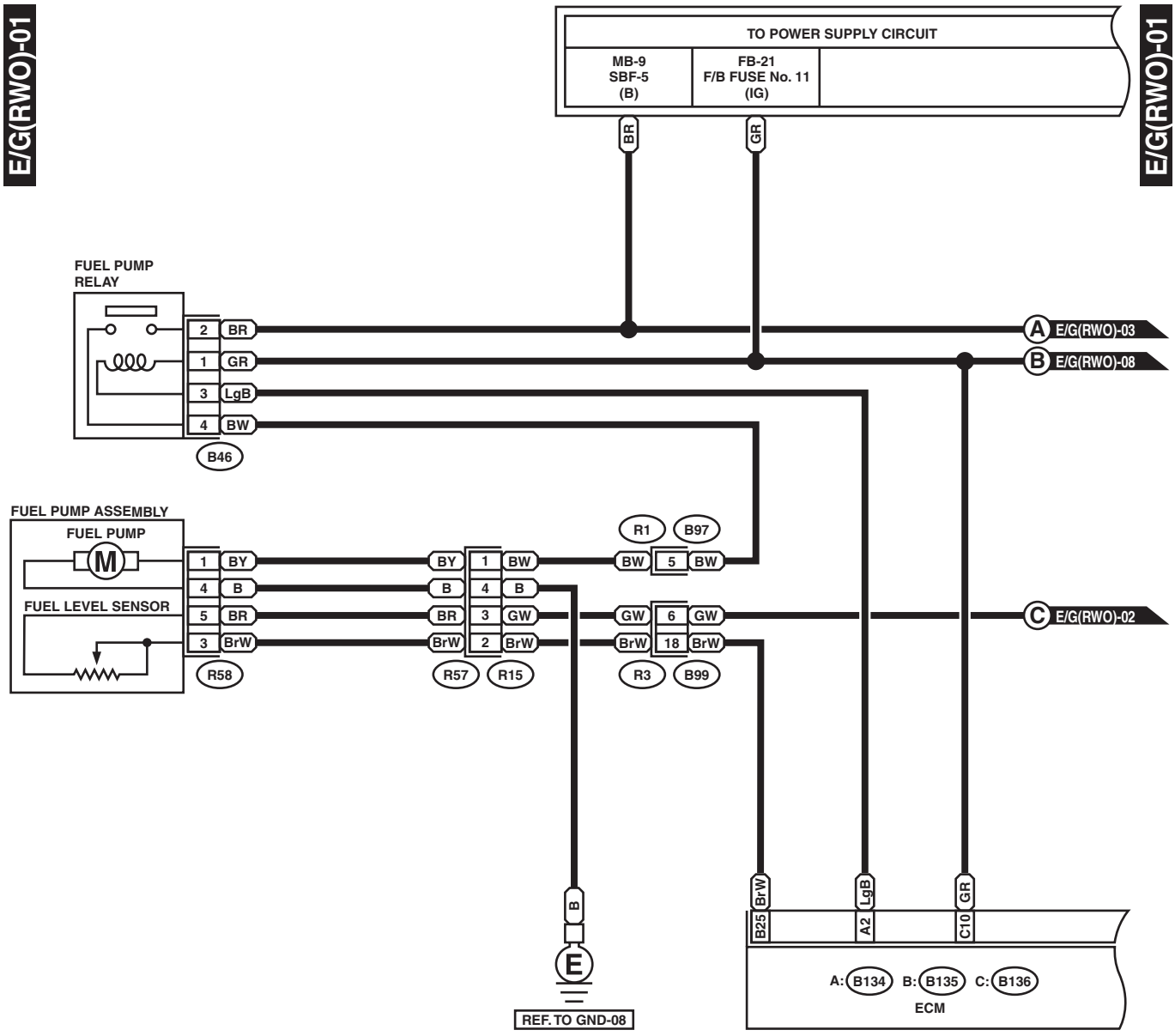
5. RHD SOHC WITH OBD MODEL

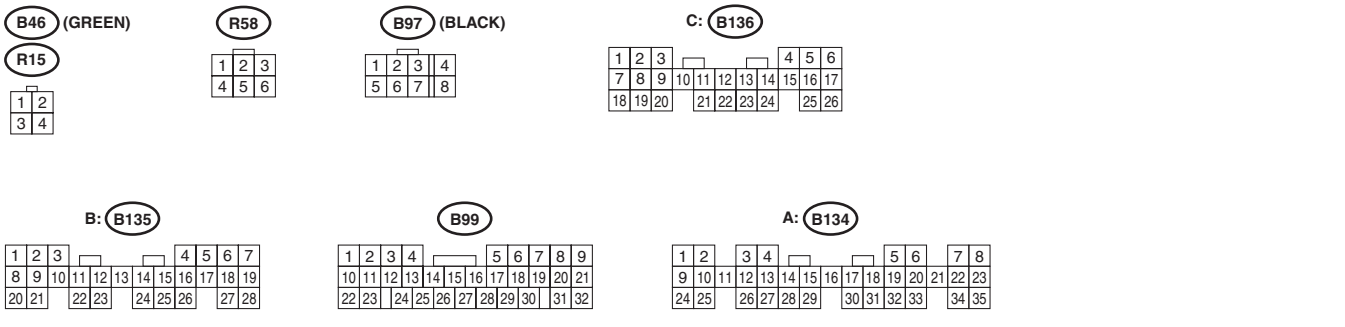


WI-07129

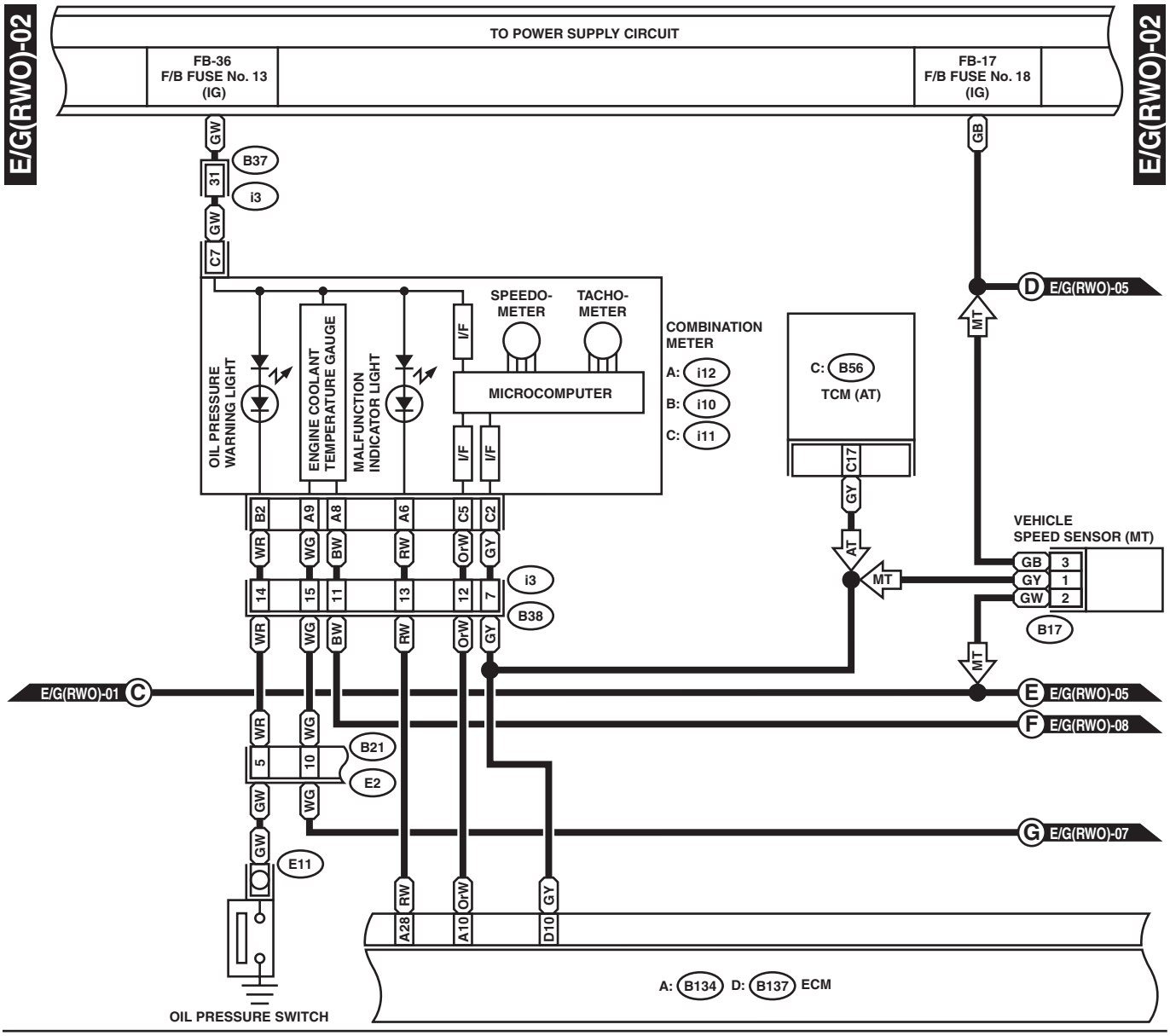

CHECK CONNECTOR
DATA LINK CONNECTOR
LINE END CHECK CONNECTOR
VEHICLE SPEED SENSOR (MT)
MT
AT
TCM (AT)
IGNITION COIL AND IGNITOR
COMBINATION METER
I/F
MICROCOMPUTER
SPEEDO-METER
TACHO-METER
MALFUNCTION INDICATOR LIGHT
ENGINE COOLANT TEMPERATURE GAUGE
OIL PRESSURE WARNING LIGHT
TEST MODE CONNECTOR
LINE END CONNECTOR
FUEL LEVEL SENSOR
NEUTRAL POSITION SWITCH (MT)
THERMOMETER
OIL PRESSURE SWITCH
THROTTLE POSITION SENSOR
PRESSURE SENSOR
INTAKE AIR TEMPERATURE SENSOR
ENGINE COOLANT TEMPERATURE SENSOR
SHIELD AND SENSOR GROUND JOINT CONNECTOR
CRANKSHAFT POSITION SENSOR
CAMSHAFT POSITION SENSOR
KNOCK SENSOR
ECM
GENERATOR
POWER STEERING OIL PRESSURE SWITCH
ENGINE GROUND
D16
A21
D10
A33
A32
A10
C3
A28
B25
C21
B3
B13
B15
D6
B12
B19
B6
B17
B7
B18
B28
B16
B27
A7
A35
C26
B21
D14
C19
C5
C16
C9
C25
1
2
3
4
5

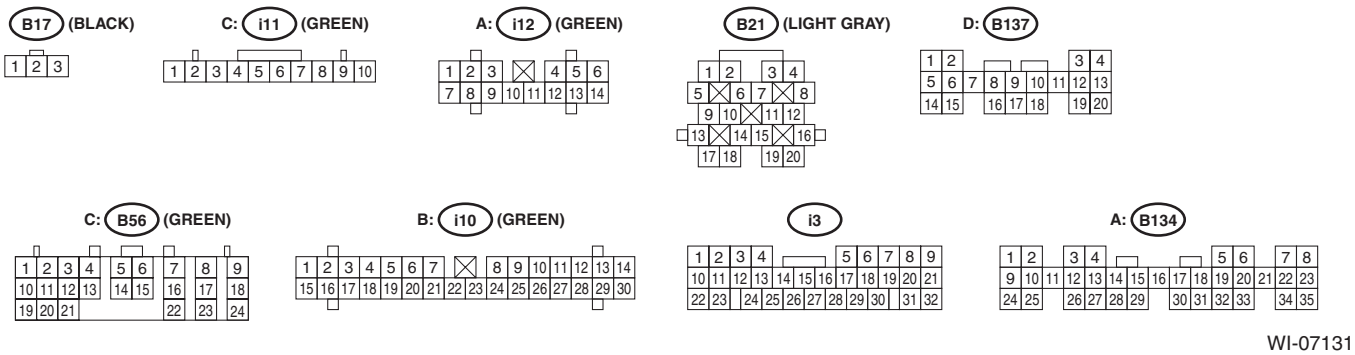
WI-07234


E/G(RWO)-01
E/G(RWO)-01
TO POWER SUPPLY CIRCUIT
MB-9
SBF-5
(B)
FB-21
F/B FUSE No. 11
(IG)
BR
GR
FUEL PUMP
RELAY
2 BR
1 GR
3 LgB
4 BW
B46
A E/G(RWO)-03
B E/G(RWO)-08
FUEL PUMP ASSEMBLY
FUEL PUMP
FUEL LEVEL SENSOR
1 BY
4 B
5 BR
3 BrW
R58
BY 1 BW
B 4 B
BR 3 GW
BrW 2 BrW
R57
R15
R1
B97
BW 5 BW
GW 6 GW
BrW 18 BrW
R3
B99
C E/G(RWO)-02
B
E
REF. TO GND-08
BrW
LgB
GR
B25
A2
C10
A: B134 B: B135 C: B136
ECM

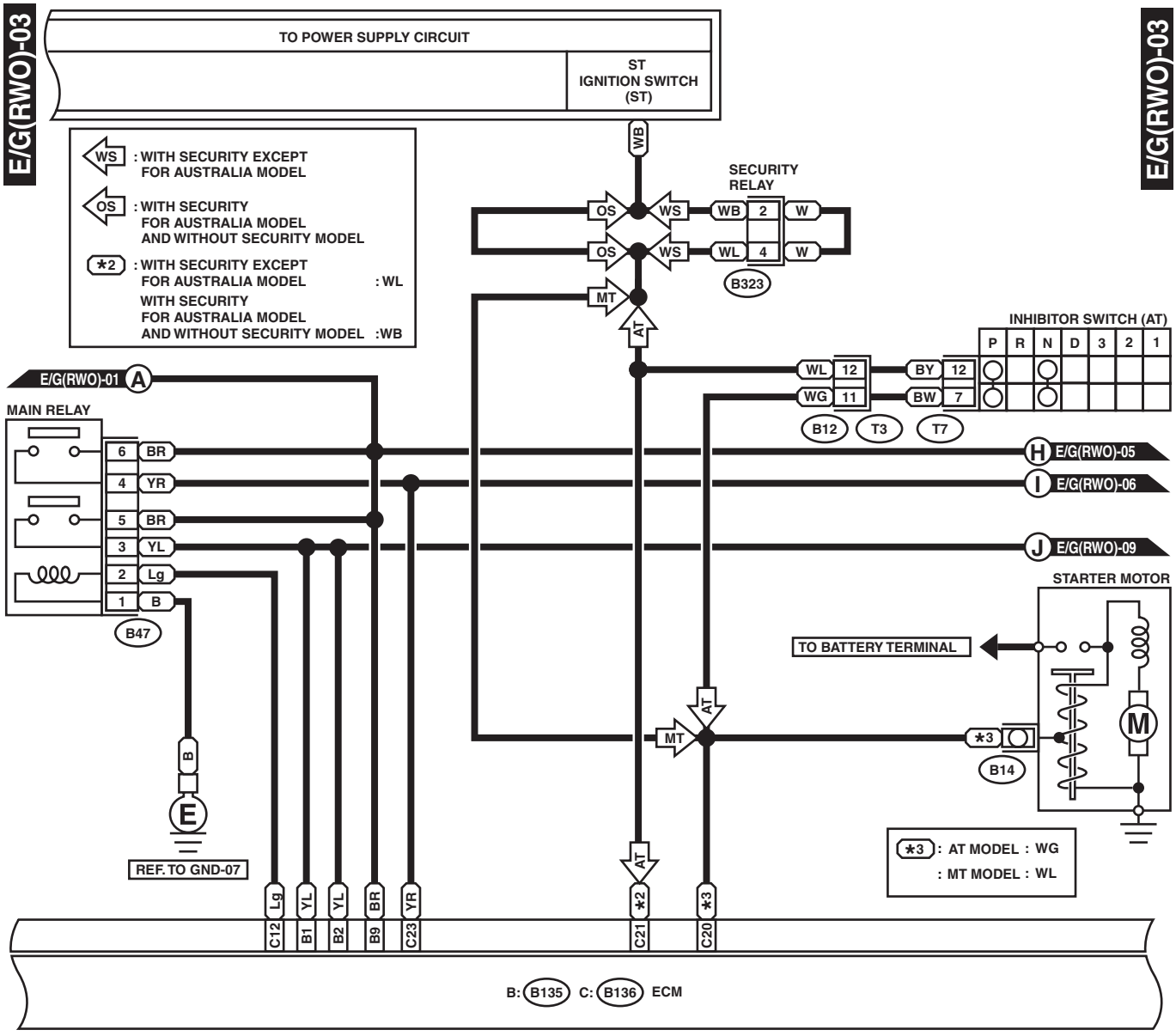

B46 (GREEN)
R15
R58
B97 (BLACK)
C: B136
B: B135
B99
A: B134

WI-07130


E/G(RWO)-02
E/G(RWO)-02
TO POWER SUPPLY CIRCUIT
FB-36
F/B FUSE No. 13
(IG)
FB-17
F/B FUSE No. 18
(IG)
GW
B37
31
i3
GW
C7
GB
D E/G(RWO)-05
MT
SPEEDO-METER
TACHO-METER
COMBINATION METER
A: i12
B: i10
C: i11
OIL PRESSURE WARNING LIGHT
ENGINE COOLANT TEMPERATURE GAUGE
MALFUNCTION INDICATOR LIGHT
I/F
MICROCOMPUTER
C: B56
TCM (AT)
C17
GY
AT
MT
VEHICLE SPEED SENSOR (MT)
GB 3
GY 1
GW 2
B17
B2
A9
A8
A6
C5
C2
WR
WG
BW
RW
OrW
GY
14
15
11
13
12
7
i3
B38
E/G(RWO)-01 C
E E/G(RWO)-05
F E/G(RWO)-08
5
10
B21
E2
G E/G(RWO)-07
E11
A28
A10
D10
A: B134 D: B137 ECM
OIL PRESSURE SWITCH


B17 (BLACK)
C: i11 (GREEN)
A: i12 (GREEN)
B21 (LIGHT GRAY)
D: B137
C: B56 (GREEN)
B: i10 (GREEN)
i3
A: B134

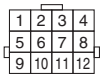
WI-07131



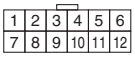
B323 (BLUE)

B47 (BROWN)

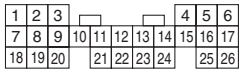
B12



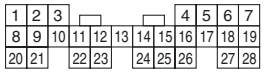
T7



C: B136



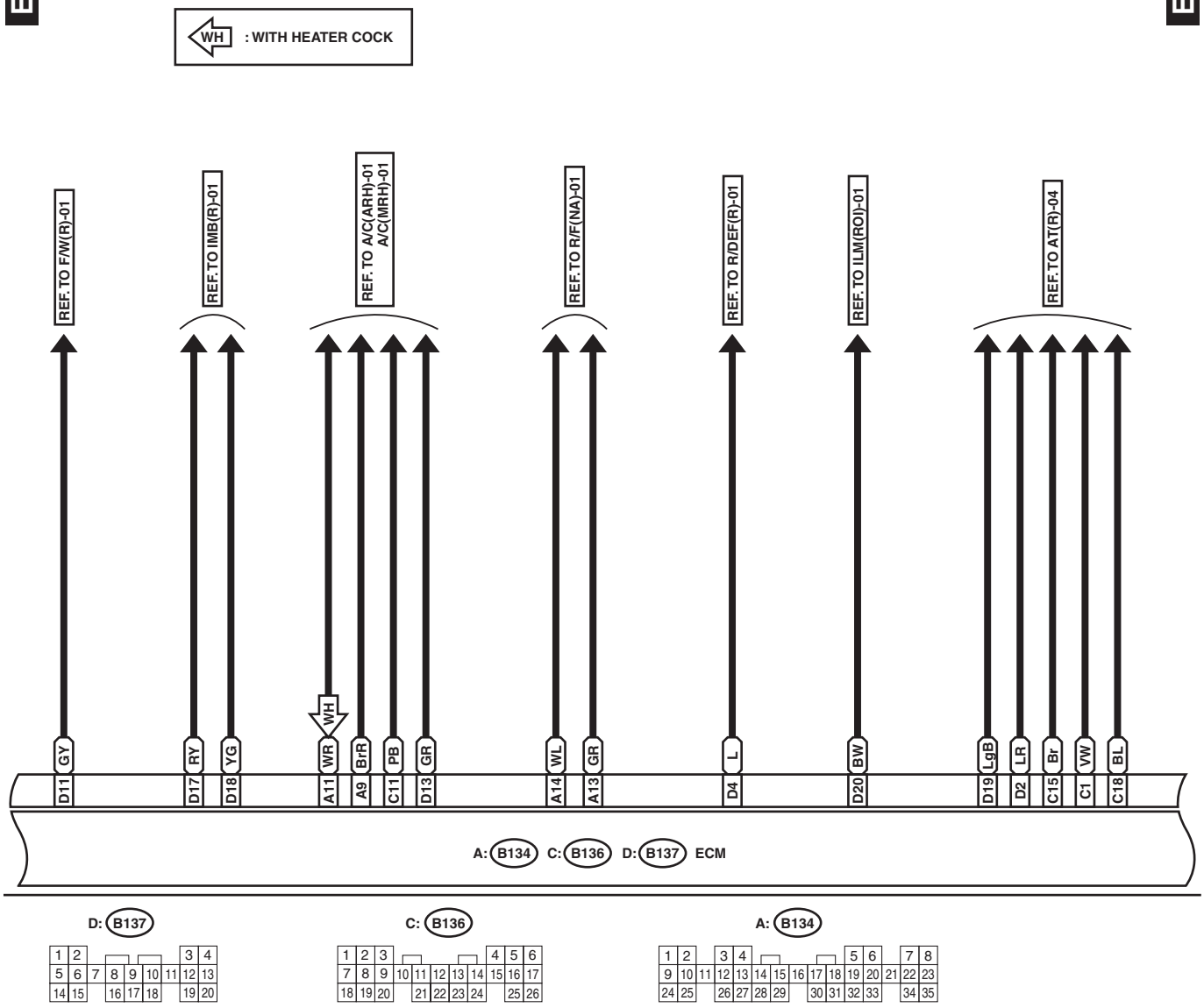
B: B135



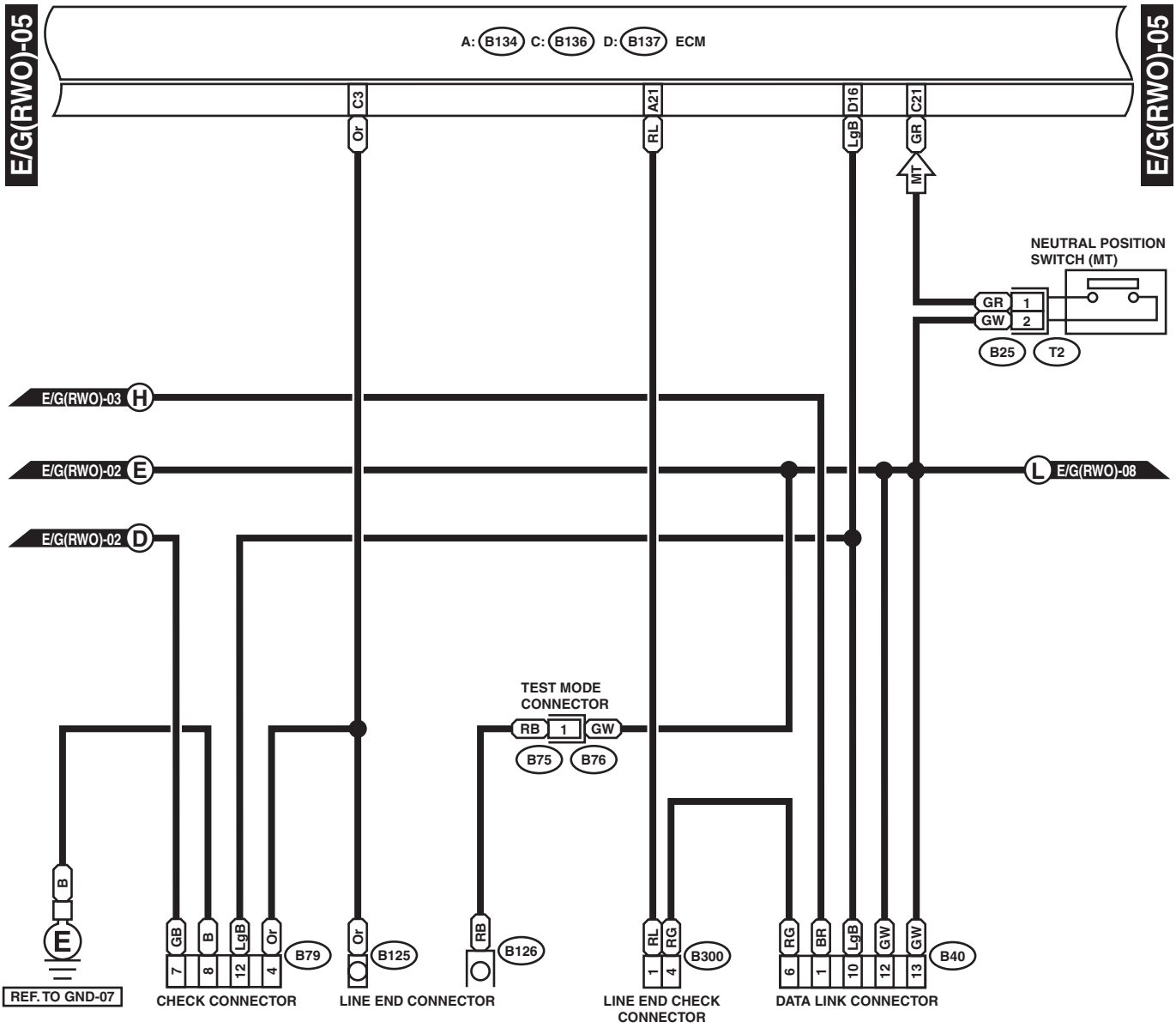
WI-07132

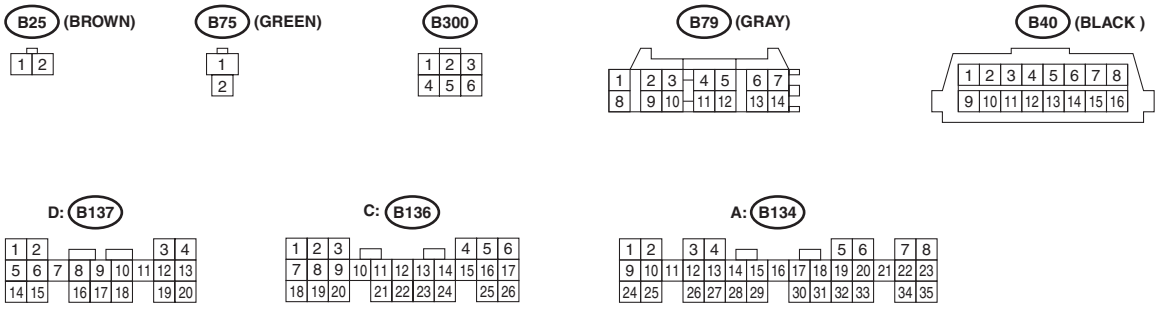
E/G(RWO)-04

E/G(RWO)-04

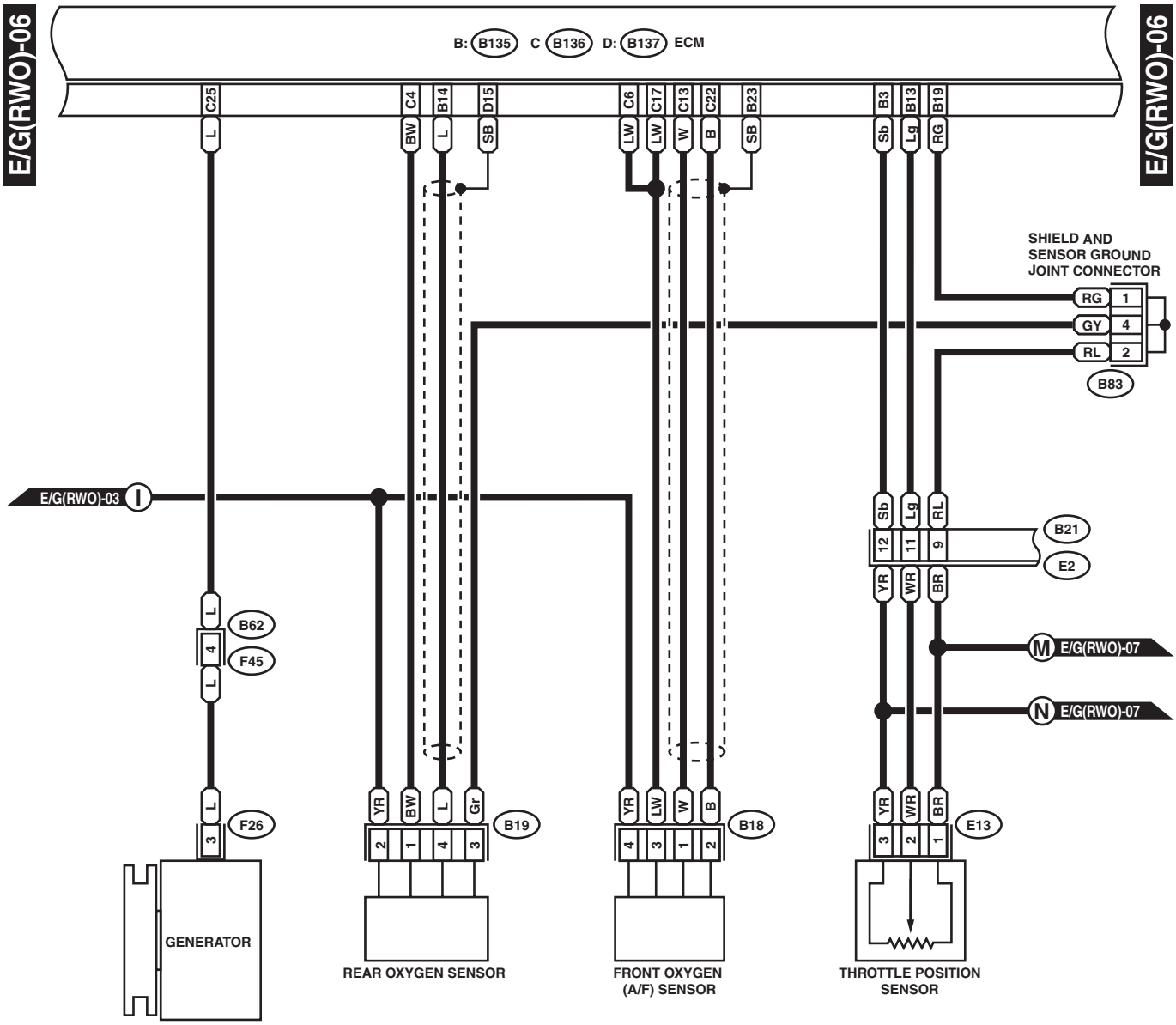


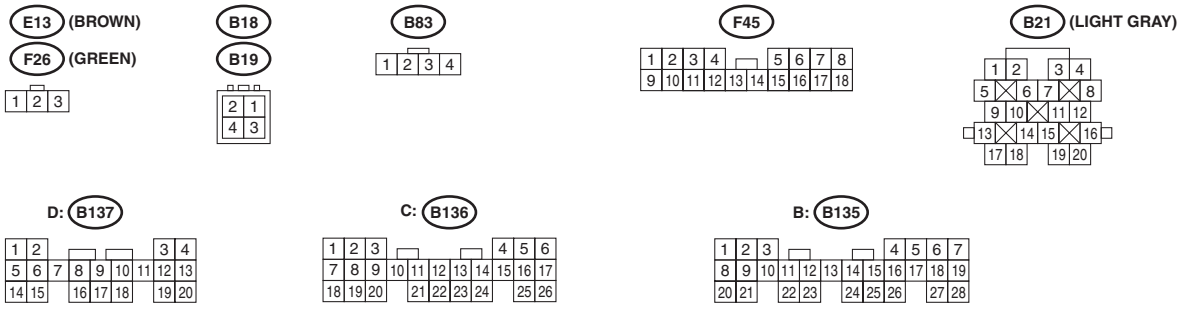
WI-07235


E/G(RWO)-05
A: B134 C: B136 D: B137 ECM
E/G(RWO)-05
C3
Or
A21
RL
D16
LgB
C21
GR
MT
NEUTRAL POSITION SWITCH (MT)
GR 1
GW 2
B25
T2
E/G(RWO)-03 H
E/G(RWO)-02 E
E/G(RWO)-02 D
L E/G(RWO)-08
TEST MODE CONNECTOR
RB 1 GW
B75
B76
B
E
REF. TO GND-07
GB
B
LgB
Or
7
8
12
4
B79
CHECK CONNECTOR
Or
B125
LINE END CONNECTOR
RB
B126
RL
RG
1
4
B300
LINE END CHECK CONNECTOR
RG
BR
LgB
GW
GW
6
1
10
12
13
B40
DATA LINK CONNECTOR

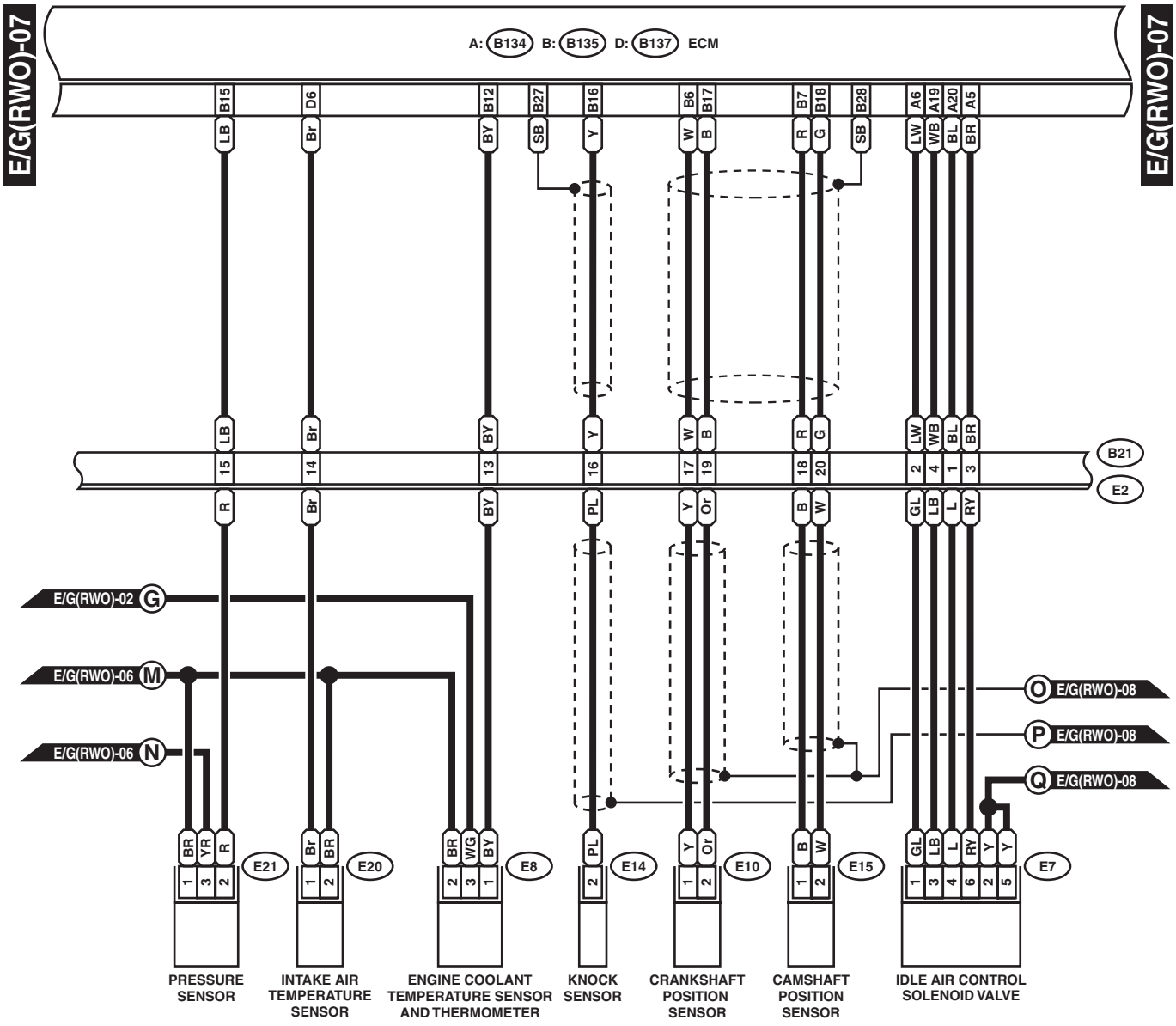

B25 (BROWN)
1 2
B75 (GREEN)
1
2
B300
1 2 3
4 5 6
B79 (GRAY)
1 2 3 4 5 6 7
8 9 10 11 12 13 14
B40 (BLACK)
1 2 3 4 5 6 7 8
9 10 11 12 13 14 15 16
D: B137
1 2 3 4
5 6 7 8 9 10 11 12 13
14 15 16 17 18 19 20
C: B136
1 2 3 4 5 6
7 8 9 10 11 12 13 14 15 16 17
18 19 20 21 22 23 24 25 26
A: B134
1 2 3 4 5 6 7 8
9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
24 25 26 27 28 29 30 31 32 33 34 35

WI-02349


E/G(RWO)-06
E/G(RWO)-06
B: B135 C B136 D: B137 ECM
C25
C4
B14
D15
C6
C17
C13
C22
B23
B3
B13
B19
L
BW
L
SB
LW
LW
W
B
SB
Sb
Lg
RG
SHIELD AND SENSOR GROUND JOINT CONNECTOR
RG 1
GY 4
RL 2
B83
E/G(RWO)-03 I
Sb
Lg
RL
12
11
9
B21
E2
YR
WR
BR
L
B62
4
F45
L
M E/G(RWO)-07
N E/G(RWO)-07
L
F26
3
YR
BW
L
Gr
B19
2
1
4
3
YR
LW
W
B
B18
4
3
1
2
YR
WR
BR
E13
3
2
1
GENERATOR
REAR OXYGEN SENSOR
FRONT OXYGEN (A/F) SENSOR
THROTTLE POSITION SENSOR


E13 (BROWN)
F26 (GREEN)
1 2 3
B18
B19
2 1
4 3
B83
1 2 3 4
F45
1 2 3 4 5 6 7 8
9 10 11 12 13 14 15 16 17 18
B21 (LIGHT GRAY)
1 2 3 4
5 6 7 8
9 10 11 12
13 14 15 16
17 18 19 20
D: B137
1 2 3 4
5 6 7 8 9 10 11 12 13
14 15 16 17 18 19 20
C: B136
1 2 3 4 5 6
7 8 9 10 11 12 13 14 15 16 17
18 19 20 21 22 23 24 25 26
B: B135
1 2 3 4 5 6 7
8 9 10 11 12 13 14 15 16 17 18 19
20 21 22 23 24 25 26 27 28

WI-07133



E10 (LIGHT GRAY)
E14 (LIGHT GRAY)
E15 (BLACK)
E20 (BLACK)

E8 (LIGHT GRAY)

E21 (LIGHT GRAY)

E7 (BLACK)

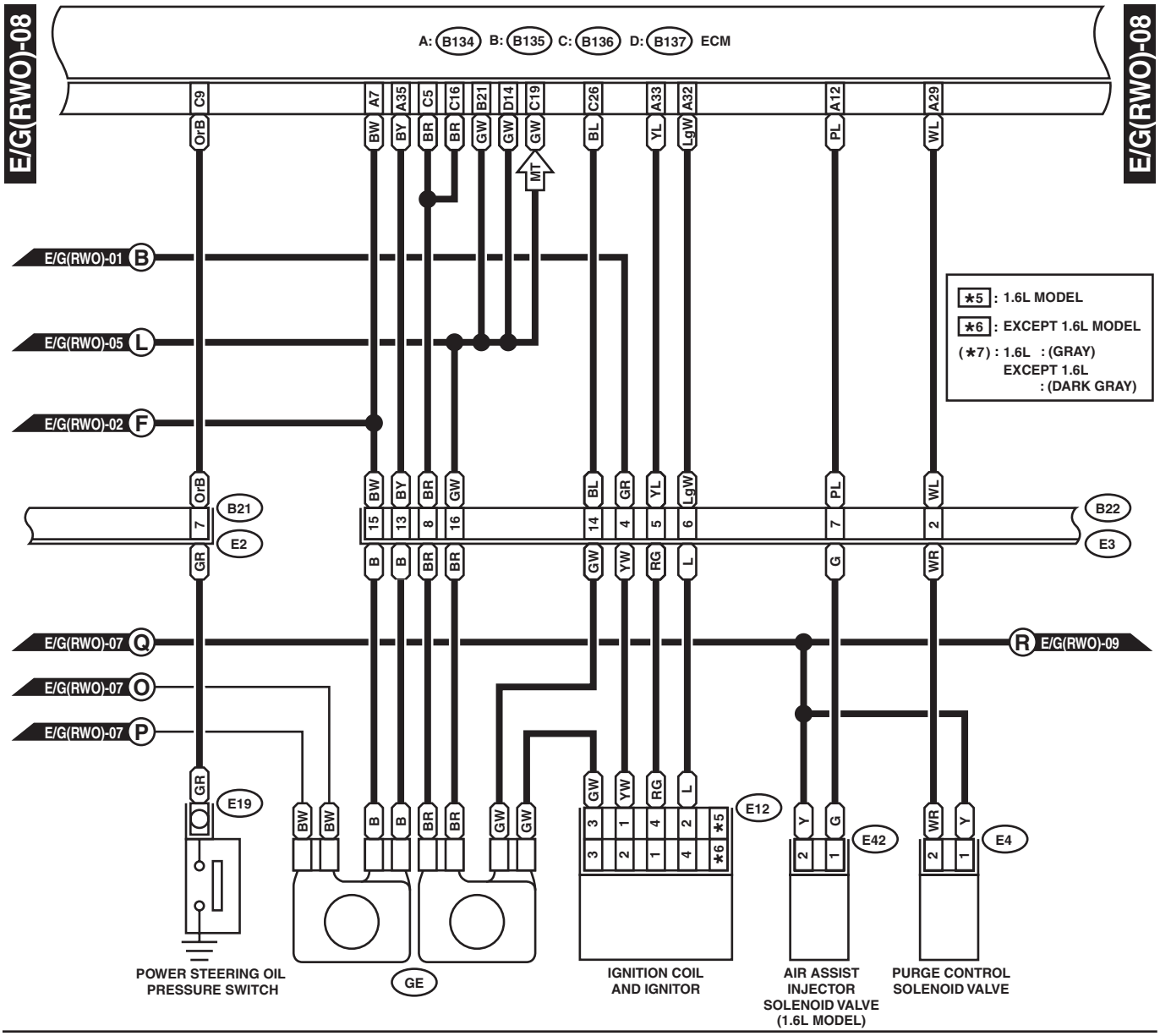
B21 (LIGHT GRAY)

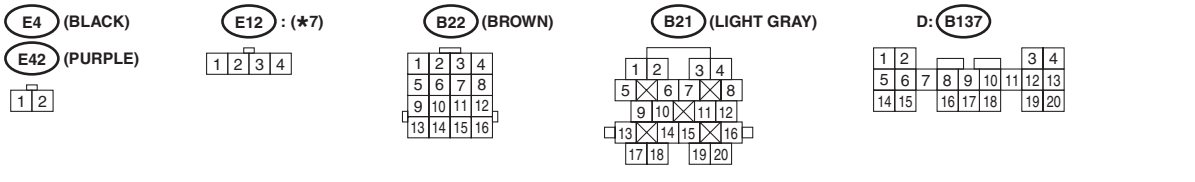
D: B137

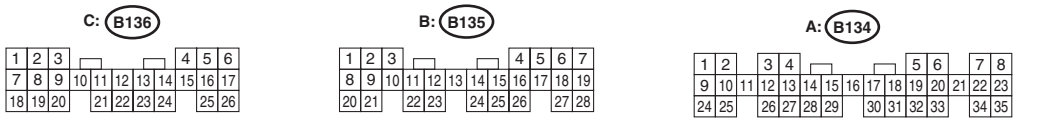
B: B135

A: B134

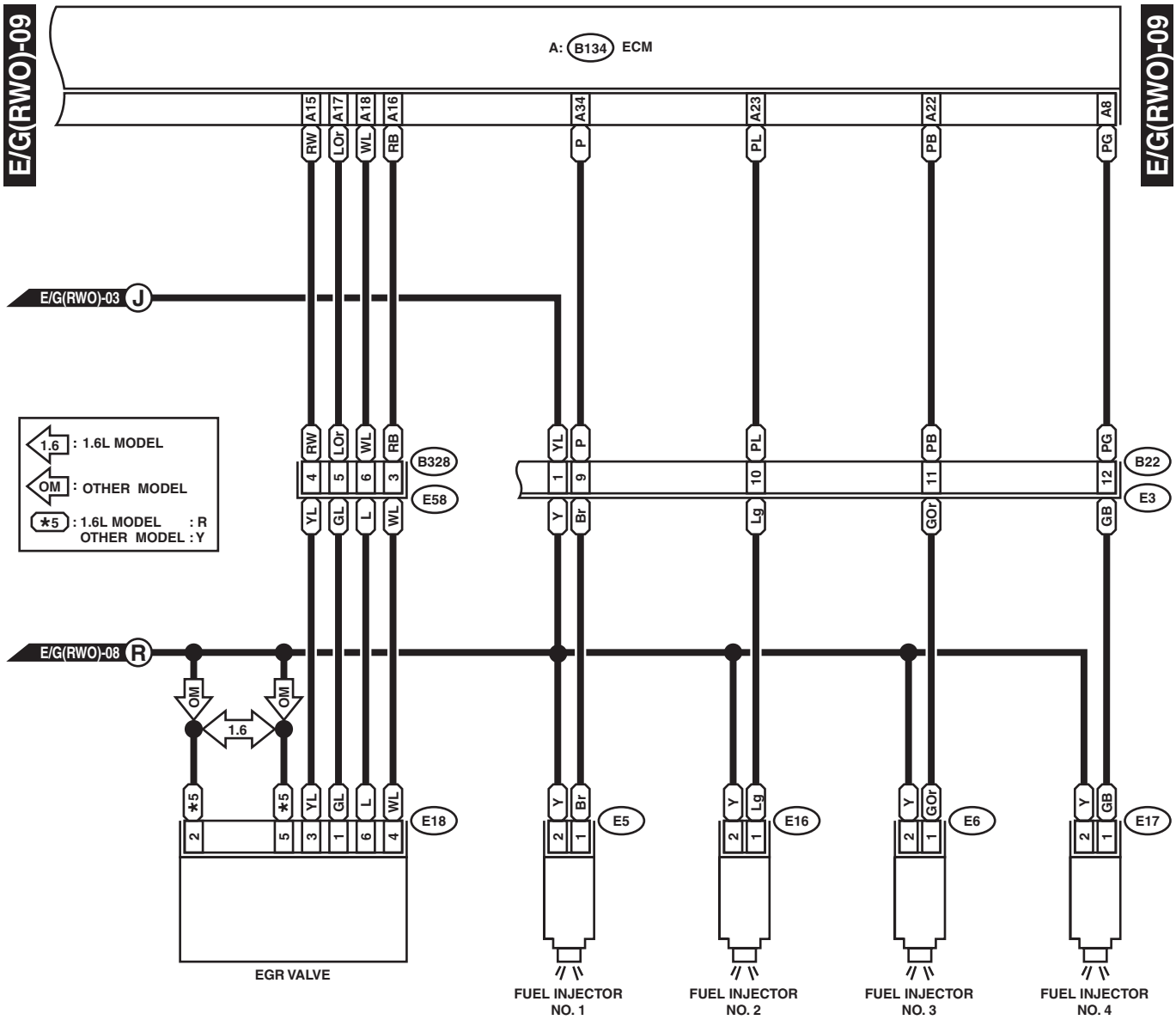
WI-07134


E/G(RWO)-08
A: B134 B: B135 C: B136 D: B137 ECM
C9 A7 A35 C5 C16 B21 D14 C19 C26 A33 A32 A12 A29
OrB BW BY BR BR GW GW GW BL YL LgW PL WL
MT
E/G(RWO)-01 B
E/G(RWO)-05 L
E/G(RWO)-02 F
★5 : 1.6L MODEL
★6 : EXCEPT 1.6L MODEL
(★7) : 1.6L : (GRAY)
EXCEPT 1.6L
: (DARK GRAY)
B21
E2
B22
E3
E/G(RWO)-07 Q
E/G(RWO)-09 R
E/G(RWO)-07 O
E/G(RWO)-07 P
E19
E12
E42
E4
POWER STEERING OIL PRESSURE SWITCH
GE
IGNITION COIL AND IGNITOR
AIR ASSIST INJECTOR SOLENOID VALVE (1.6L MODEL)
PURGE CONTROL SOLENOID VALVE


E4 (BLACK)
E42 (PURPLE)
E12 : (★7)
B22 (BROWN)
B21 (LIGHT GRAY)
D: B137


C: B136
B: B135
A: B134

WI-07135



E5 (LIGHT GRAY)
E6 (LIGHT GRAY)
E16 (LIGHT GRAY)
E17 (LIGHT GRAY)

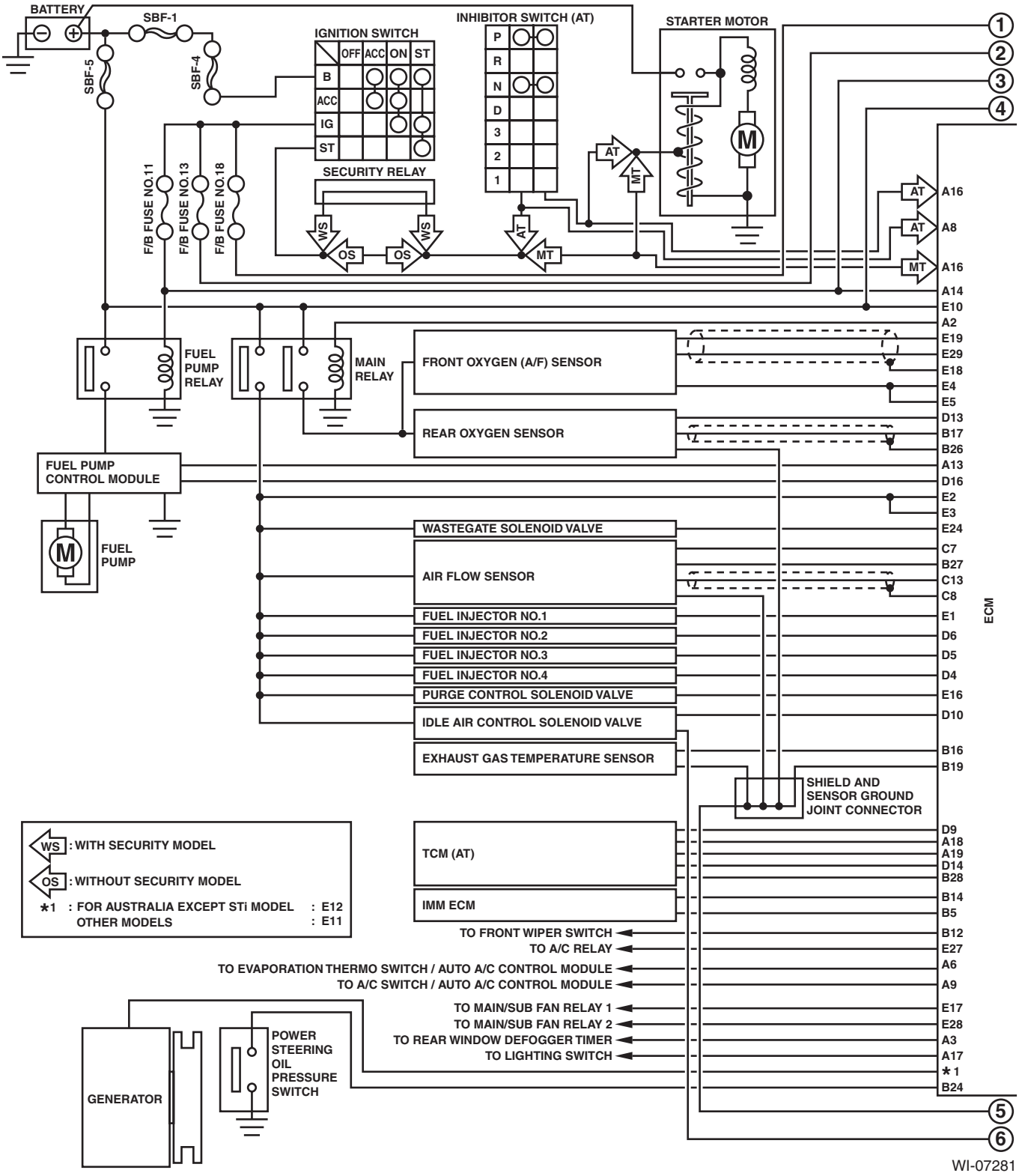
B328 (BLACK)
E18 (DARK GRAY)

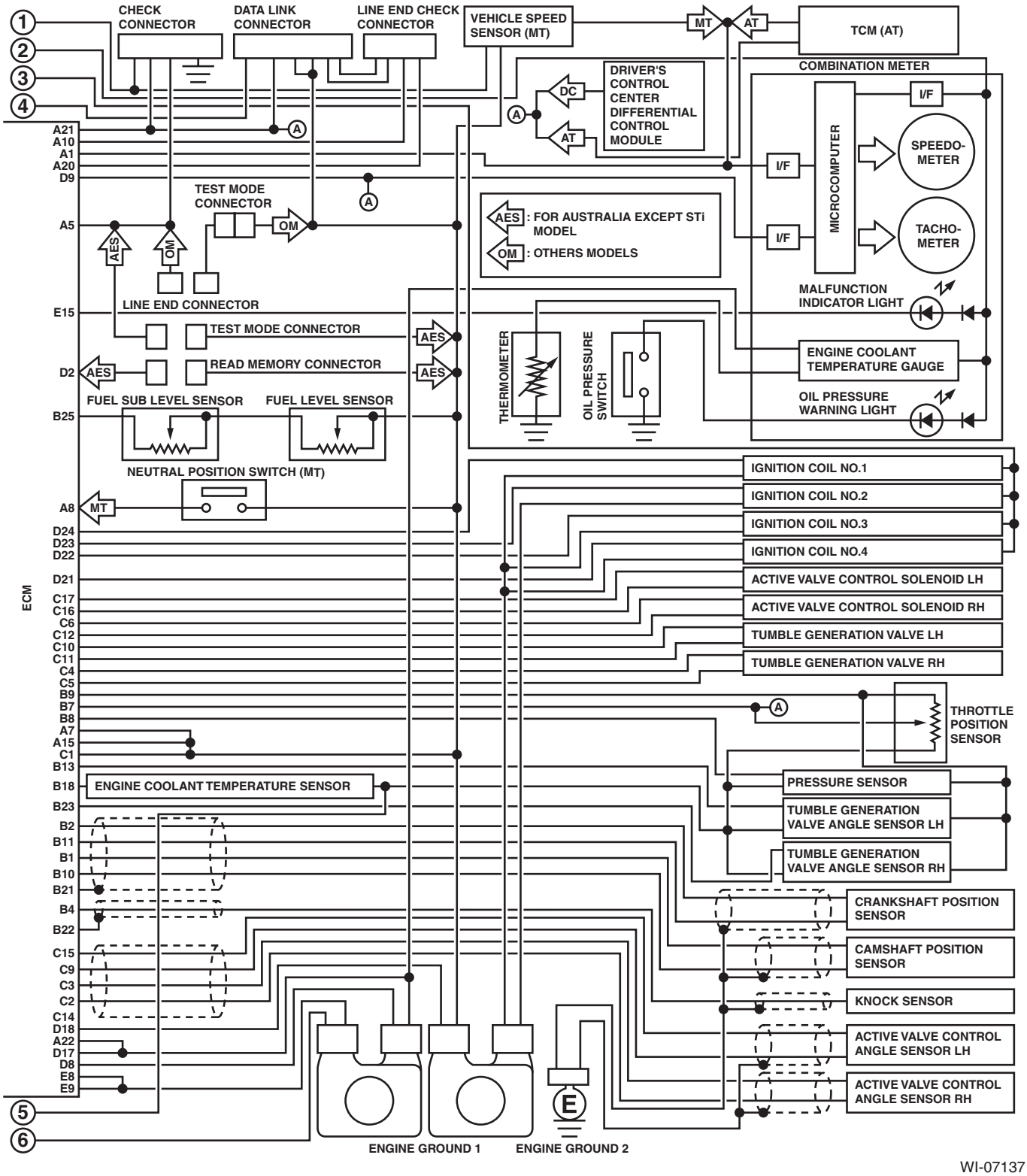
B22 (BROWN)

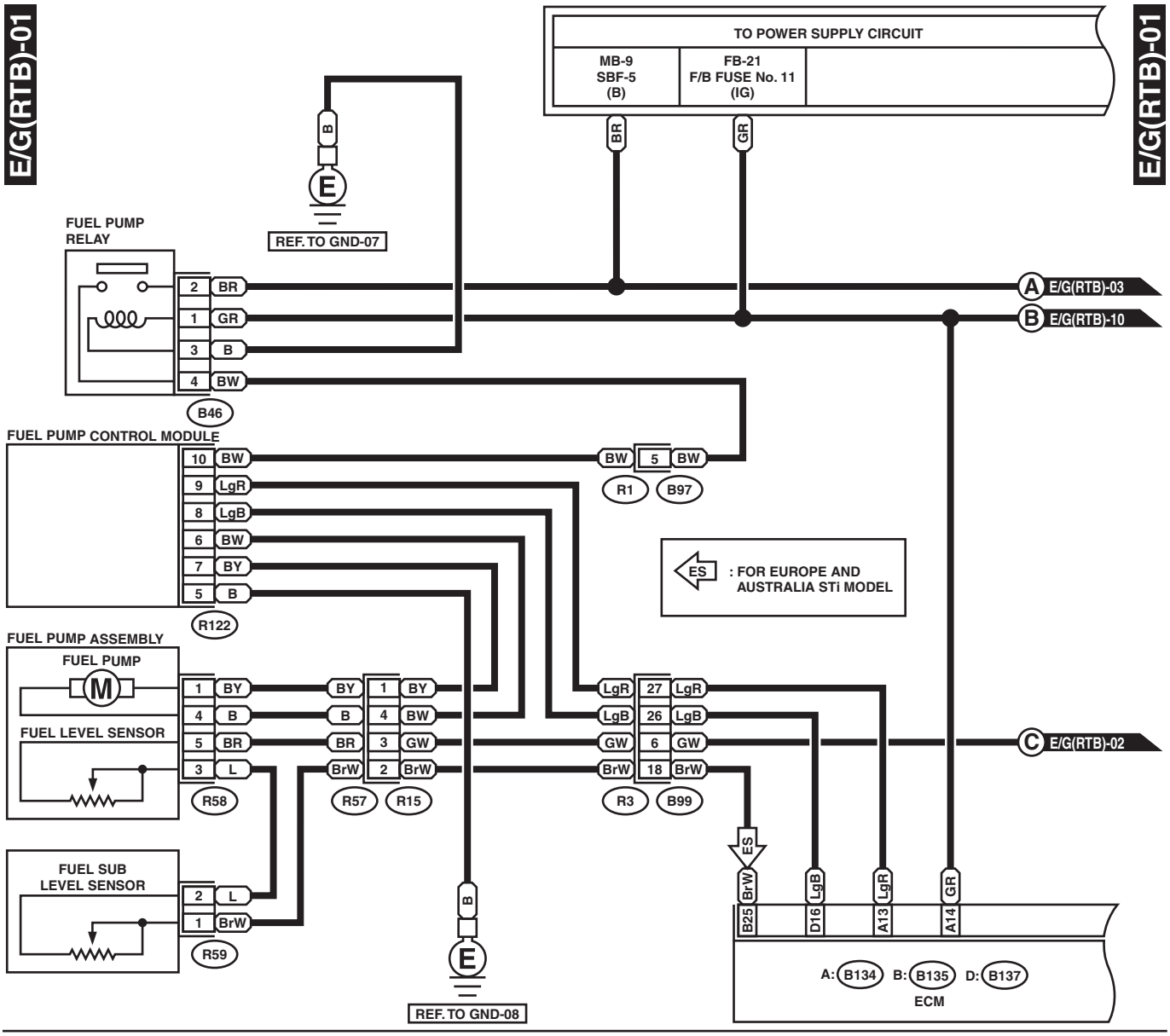
A: B134

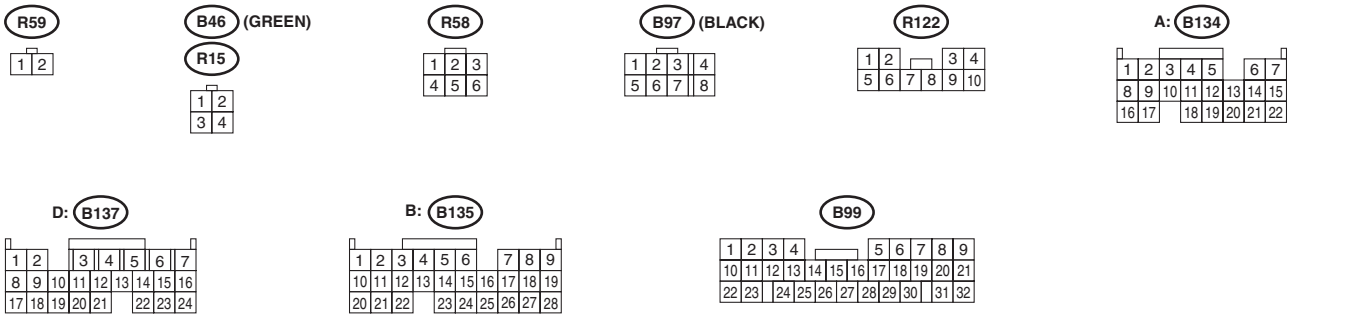
WI-07136

6. RHD DOHC TURBO MODEL

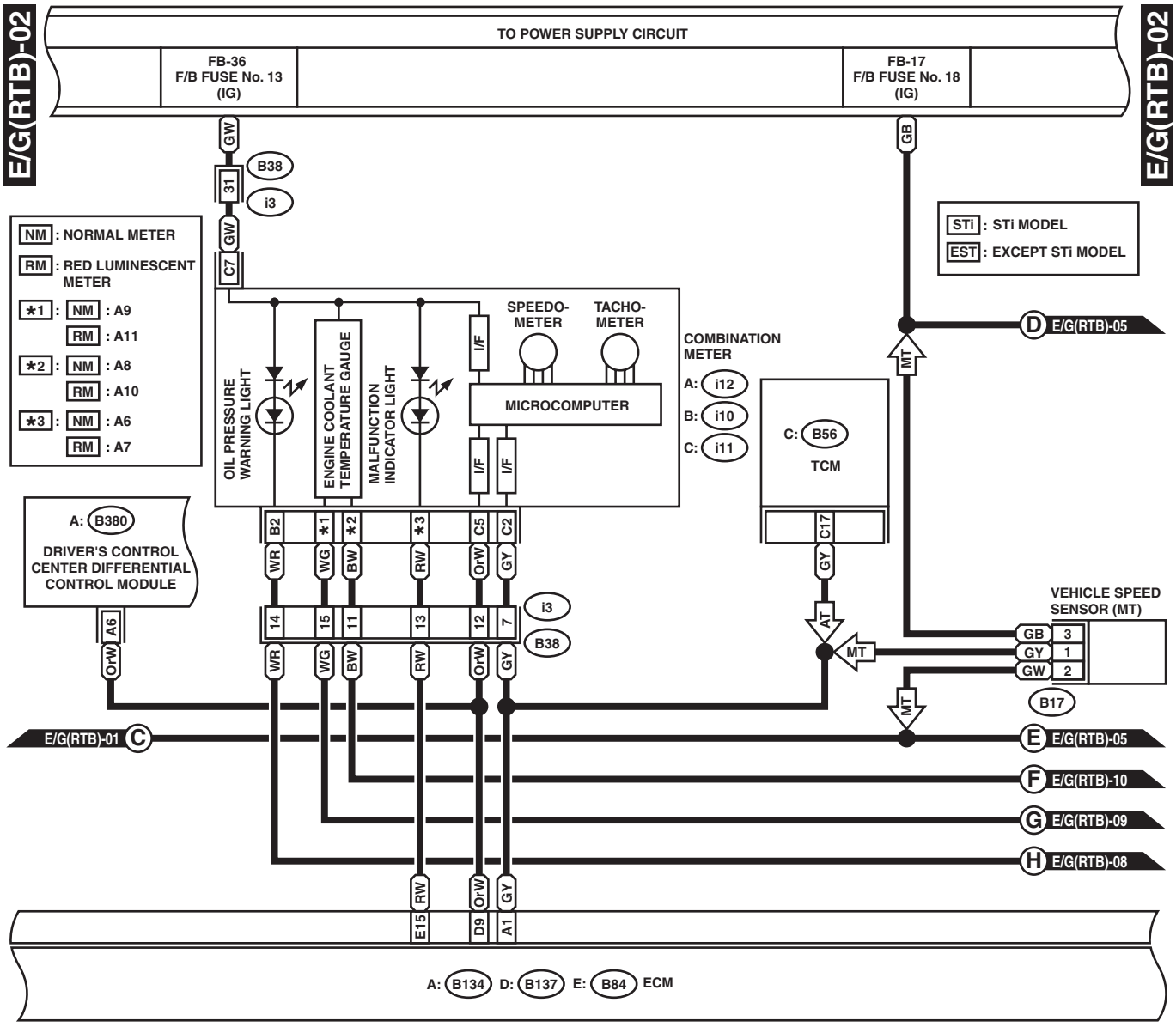


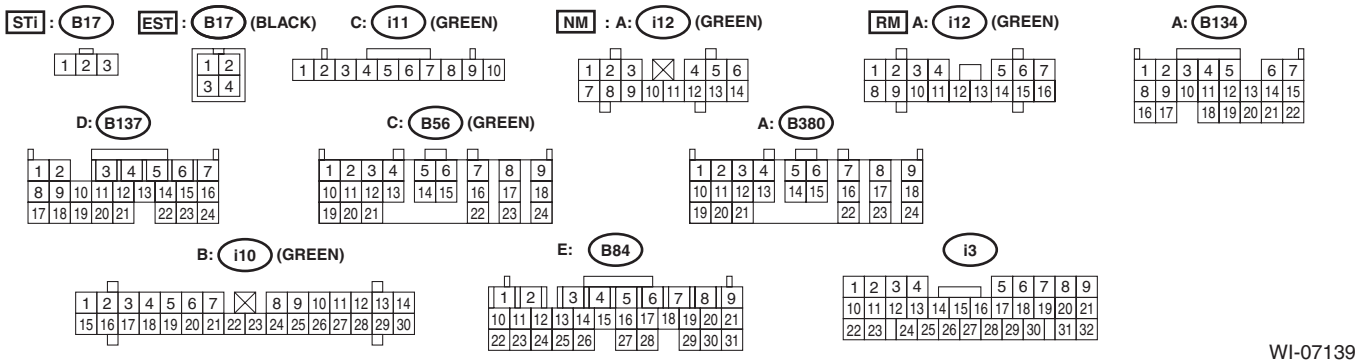

CHECK CONNECTOR
DATA LINK CONNECTOR
LINE END CHECK CONNECTOR
VEHICLE SPEED SENSOR (MT)
MT
AT
TCM (AT)
COMBINATION METER
DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE
DC
AT
I/F
MICROCOMPUTER
SPEEDO-METER
TACHO-METER
TEST MODE CONNECTOR
AES : FOR AUSTRALIA EXCEPT STi MODEL
OM : OTHERS MODELS
MALFUNCTION INDICATOR LIGHT
LINE END CONNECTOR
READ MEMORY CONNECTOR
THERMOMETER
OIL PRESSURE SWITCH
ENGINE COOLANT TEMPERATURE GAUGE
OIL PRESSURE WARNING LIGHT
FUEL SUB LEVEL SENSOR
FUEL LEVEL SENSOR
NEUTRAL POSITION SWITCH (MT)
ECM
IGNITION COIL NO.1
IGNITION COIL NO.2
IGNITION COIL NO.3
IGNITION COIL NO.4
ACTIVE VALVE CONTROL SOLENOID LH
ACTIVE VALVE CONTROL SOLENOID RH
TUMBLE GENERATION VALVE LH
TUMBLE GENERATION VALVE RH
THROTTLE POSITION SENSOR
ENGINE COOLANT TEMPERATURE SENSOR
PRESSURE SENSOR
TUMBLE GENERATION VALVE ANGLE SENSOR LH
TUMBLE GENERATION VALVE ANGLE SENSOR RH
CRANKSHAFT POSITION SENSOR
CAMSHAFT POSITION SENSOR
KNOCK SENSOR
ACTIVE VALVE CONTROL ANGLE SENSOR LH
ACTIVE VALVE CONTROL ANGLE SENSOR RH
ENGINE GROUND 1
ENGINE GROUND 2
WI-07137


E/G(RTB)-01
E/G(RTB)-01
TO POWER SUPPLY CIRCUIT
MB-9
SBF-5
(B)
FB-21
F/B FUSE No. 11
(IG)
BR
GR
B
E
REF. TO GND-07
FUEL PUMP
RELAY
2 BR
1 GR
3 B
4 BW
B46
A E/G(RTB)-03
B E/G(RTB)-10
FUEL PUMP CONTROL MODULE
10 BW
9 LgR
8 LgB
6 BW
7 BY
5 B
R122
BW 5 BW
R1 B97
ES : FOR EUROPE AND AUSTRALIA STi MODEL
FUEL PUMP ASSEMBLY
FUEL PUMP
FUEL LEVEL SENSOR
1 BY
4 B
5 BR
3 L
R58
BY 1 BY
B 4 BW
BR 3 GW
BrW 2 BrW
R57 R15
LgR 27 LgR
LgB 26 LgB
GW 6 GW
BrW 18 BrW
R3 B99
C E/G(RTB)-02
FUEL SUB
LEVEL SENSOR
2 L
1 BrW
R59
B
E
REF. TO GND-08
ES
B25 BrW
D16 LgB
A13 LgR
A14 GR
A: B134 B: B135 D: B137
ECM

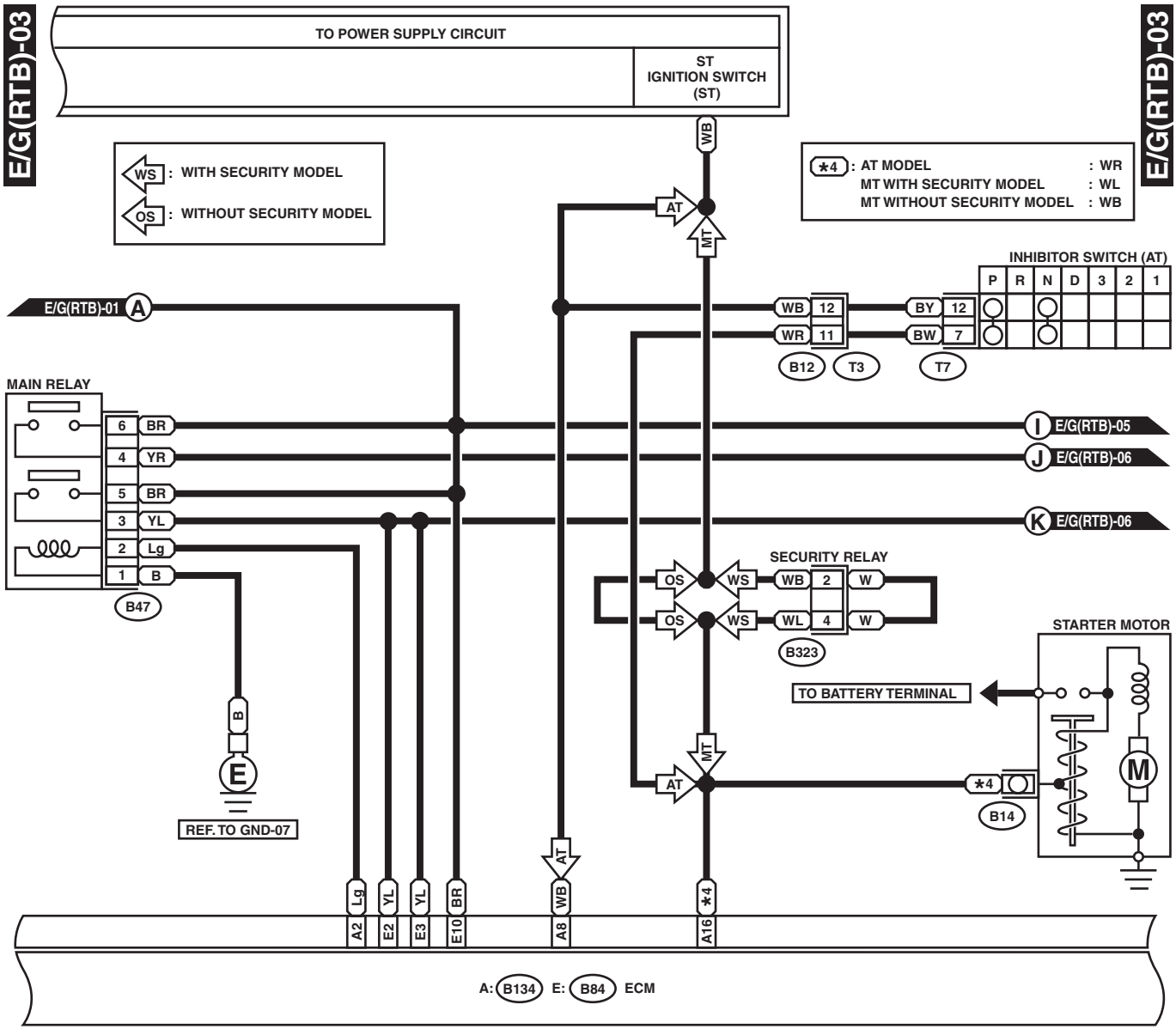

R59
B46 (GREEN)
R15
R58
B97 (BLACK)
R122
A: B134
D: B137
B: B135
B99

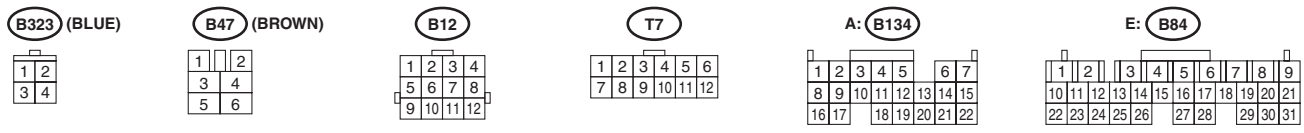
WI-07138


E/G(RTB)-02
TO POWER SUPPLY CIRCUIT
FB-36
F/B FUSE No. 13
(IG)
FB-17
F/B FUSE No. 18
(IG)
GW
B38
31
i3
GW
C7
GB
NM : NORMAL METER
RM : RED LUMINESCENT METER
*1 : NM : A9
RM : A11
*2 : NM : A8
RM : A10
*3 : NM : A6
RM : A7
STi : STi MODEL
EST : EXCEPT STi MODEL
SPEEDO-METER
TACHO-METER
COMBINATION METER
A: i12
B: i10
C: i11
I/F
MICROCOMPUTER
OIL PRESSURE WARNING LIGHT
ENGINE COOLANT TEMPERATURE GAUGE
MALFUNCTION INDICATOR LIGHT
D E/G(RTB)-05
MT
C: B56
TCM
C17
A: B380
DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE
B2
*1
*2
*3
C5
C2
WR
WG
BW
RW
OrW
GY
14
15
11
13
12
7
i3
B38
A6
AT
VEHICLE SPEED SENSOR (MT)
GB
GY
GW
3
1
2
B17
E/G(RTB)-01
C
E E/G(RTB)-05
F E/G(RTB)-10
G E/G(RTB)-09
H E/G(RTB)-08
E15
D9
A1
A: B134 D: B137 E: B84 ECM


STi : B17
EST : B17 (BLACK)
C: i11 (GREEN)
NM : A: i12 (GREEN)
RM A: i12 (GREEN)
A: B134
D: B137
C: B56 (GREEN)
A: B380
B: i10 (GREEN)
E: B84
i3

WI-07139

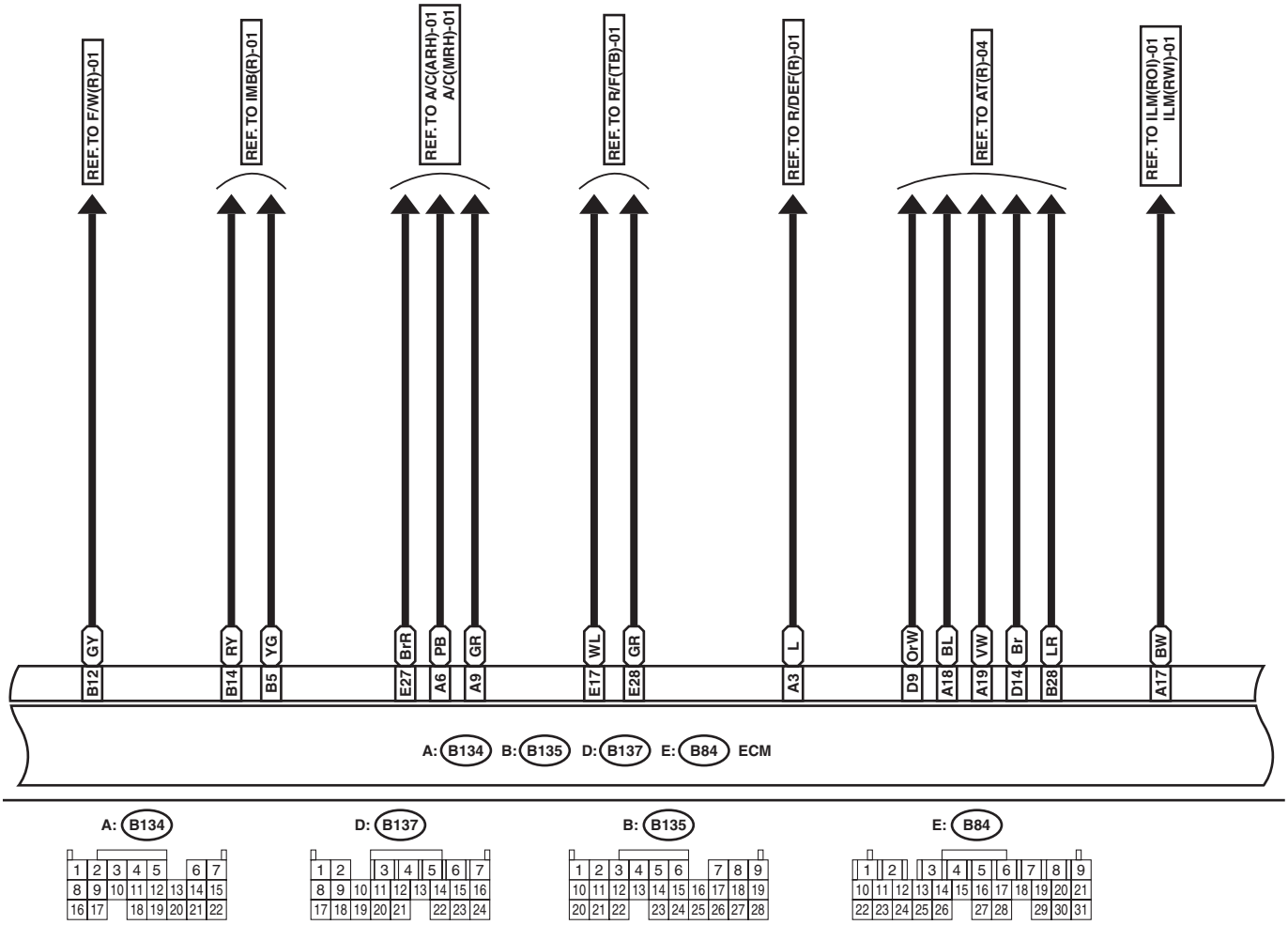

E/G(RTB)-03
TO POWER SUPPLY CIRCUIT
ST
IGNITION SWITCH
(ST)
WS : WITH SECURITY MODEL
OS : WITHOUT SECURITY MODEL
*4 : AT MODEL : WR
MT WITH SECURITY MODEL : WL
MT WITHOUT SECURITY MODEL : WB
INHIBITOR SWITCH (AT)
P R N D 3 2 1
E/G(RTB)-01 A
MAIN RELAY
6 BR
4 YR
5 BR
3 YL
2 Lg
1 B
B47
WB 12
WR 11
BY 12
BW 7
B12
T3
T7
E/G(RTB)-05
E/G(RTB)-06
E/G(RTB)-06
SECURITY RELAY
OS WS WB 2 W
OS WS WL 4 W
B323
STARTER MOTOR
TO BATTERY TERMINAL
B
E
REF. TO GND-07
AT
MT
*4
B14
Lg
YL
YL
BR
WB
*4
A2
E2
E3
E10
A8
A16
A: B134 E: B84 ECM


B323 (BLUE)
B47 (BROWN)
B12
T7
A: B134
E: B84

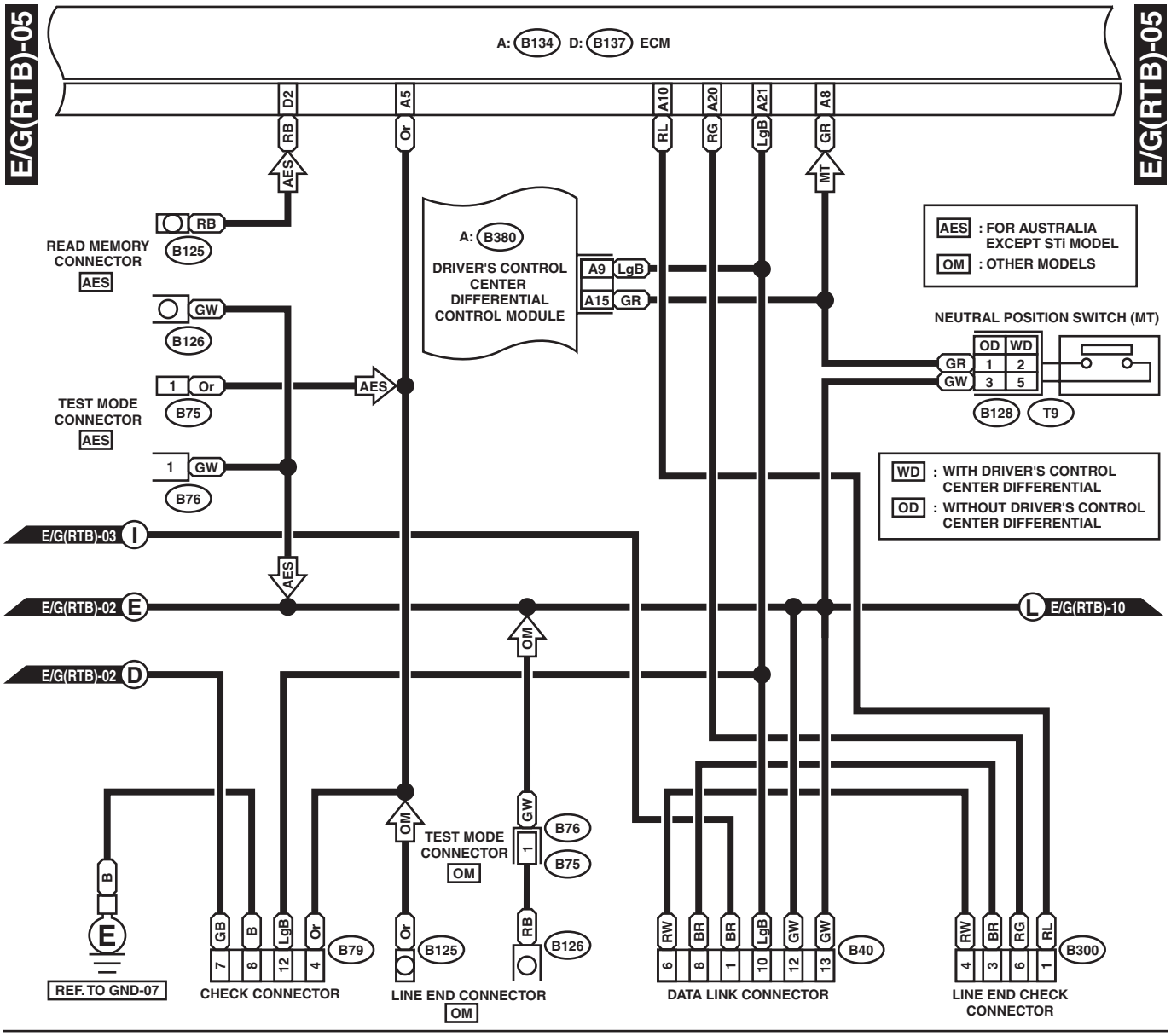
WI-07140

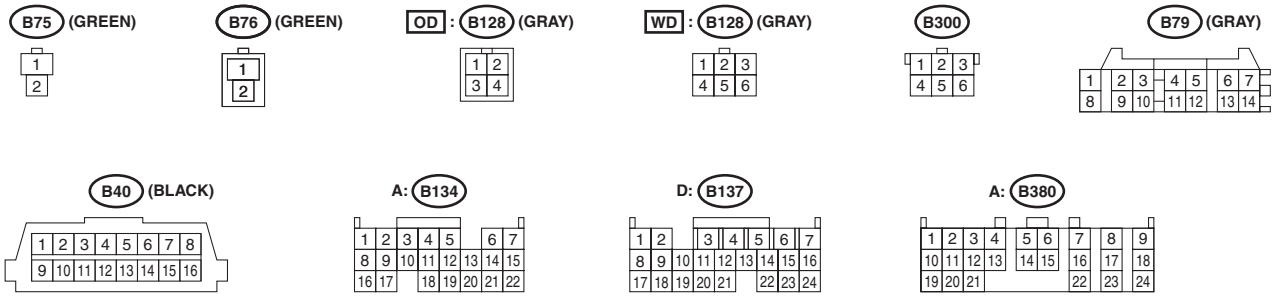
E/G(RTB)-04

E/G(RTB)-04

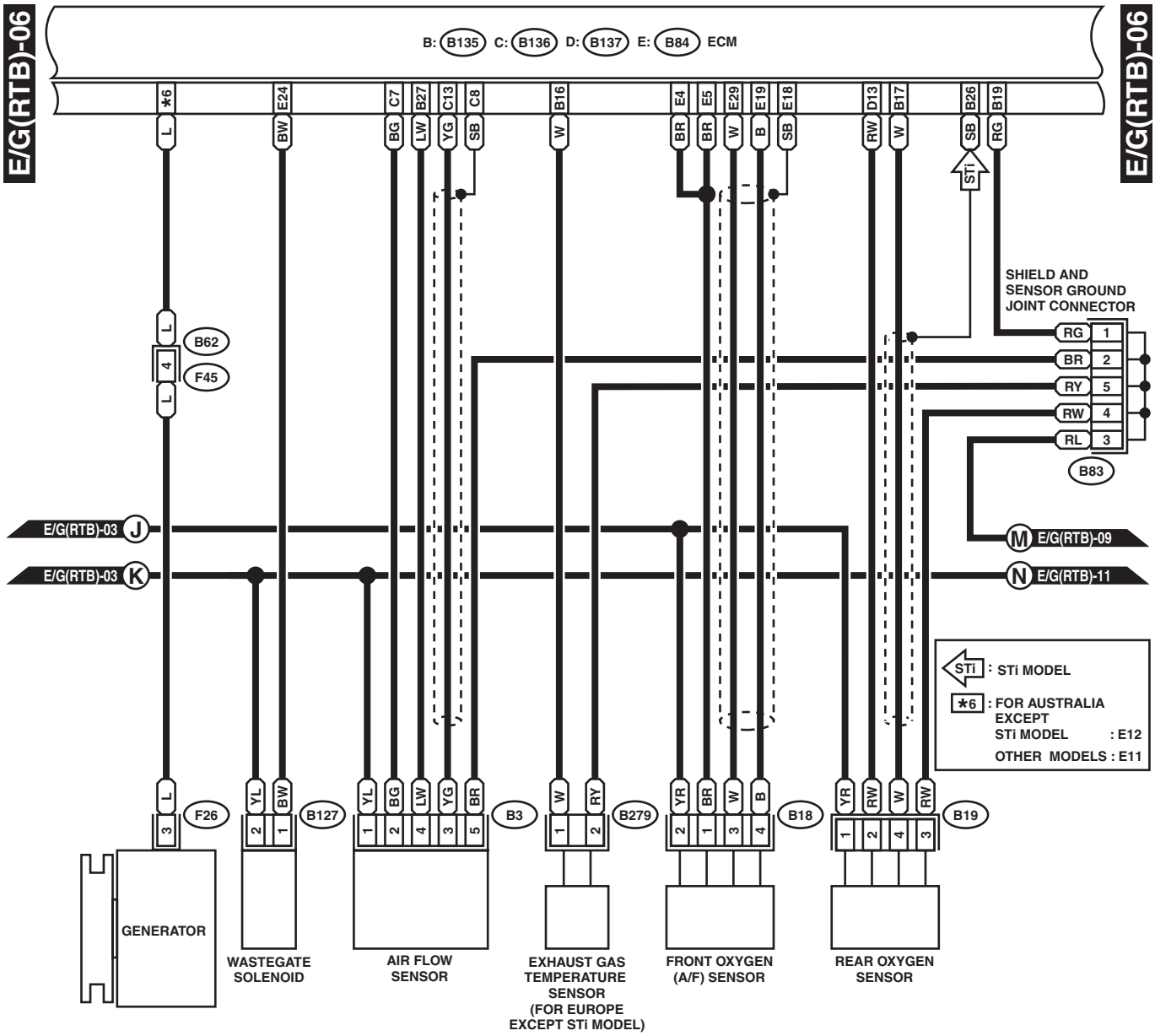


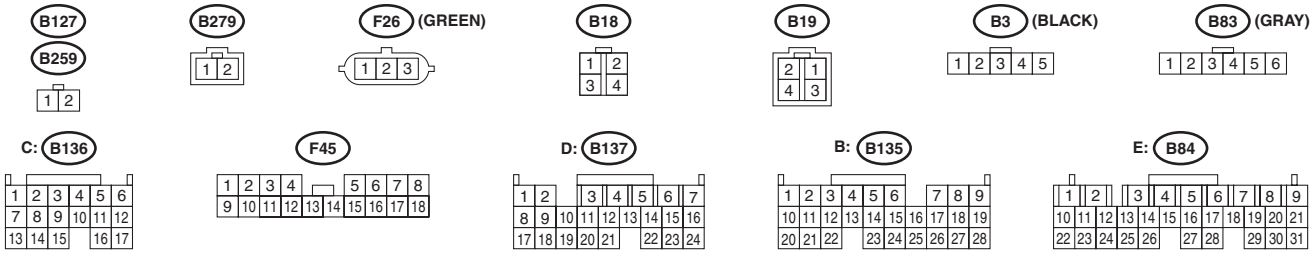
WI-07141


E/G(RTB)-05
A: B134 D: B137 ECM
D2
A5
A10
A20
A21
A8
RB
Or
RL
RG
LgB
GR
AES
MT
READ MEMORY CONNECTOR
AES
RB
B125
A: B380
DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE
A9 LgB
A15 GR
AES : FOR AUSTRALIA EXCEPT STi MODEL
OM : OTHER MODELS
NEUTRAL POSITION SWITCH (MT)
OD WD
GR 1 2
GW 3 5
B128 T9
GW
B126
TEST MODE CONNECTOR
AES
1 Or
B75
1 GW
B76
WD : WITH DRIVER'S CONTROL CENTER DIFFERENTIAL
OD : WITHOUT DRIVER'S CONTROL CENTER DIFFERENTIAL
E/G(RTB)-03 I
E/G(RTB)-02 E
E/G(RTB)-10 L
E/G(RTB)-02 D
OM
B
E
REF. TO GND-07
GB B LgB Or B79
7 8 12 4
CHECK CONNECTOR
Or B125
LINE END CONNECTOR
OM
TEST MODE CONNECTOR
OM
GW B76
1 B75
RB B126
RW BR BR LgB GW GW B40
6 8 1 10 12 13
DATA LINK CONNECTOR
RW BR RG RL B300
4 3 6 1
LINE END CHECK CONNECTOR

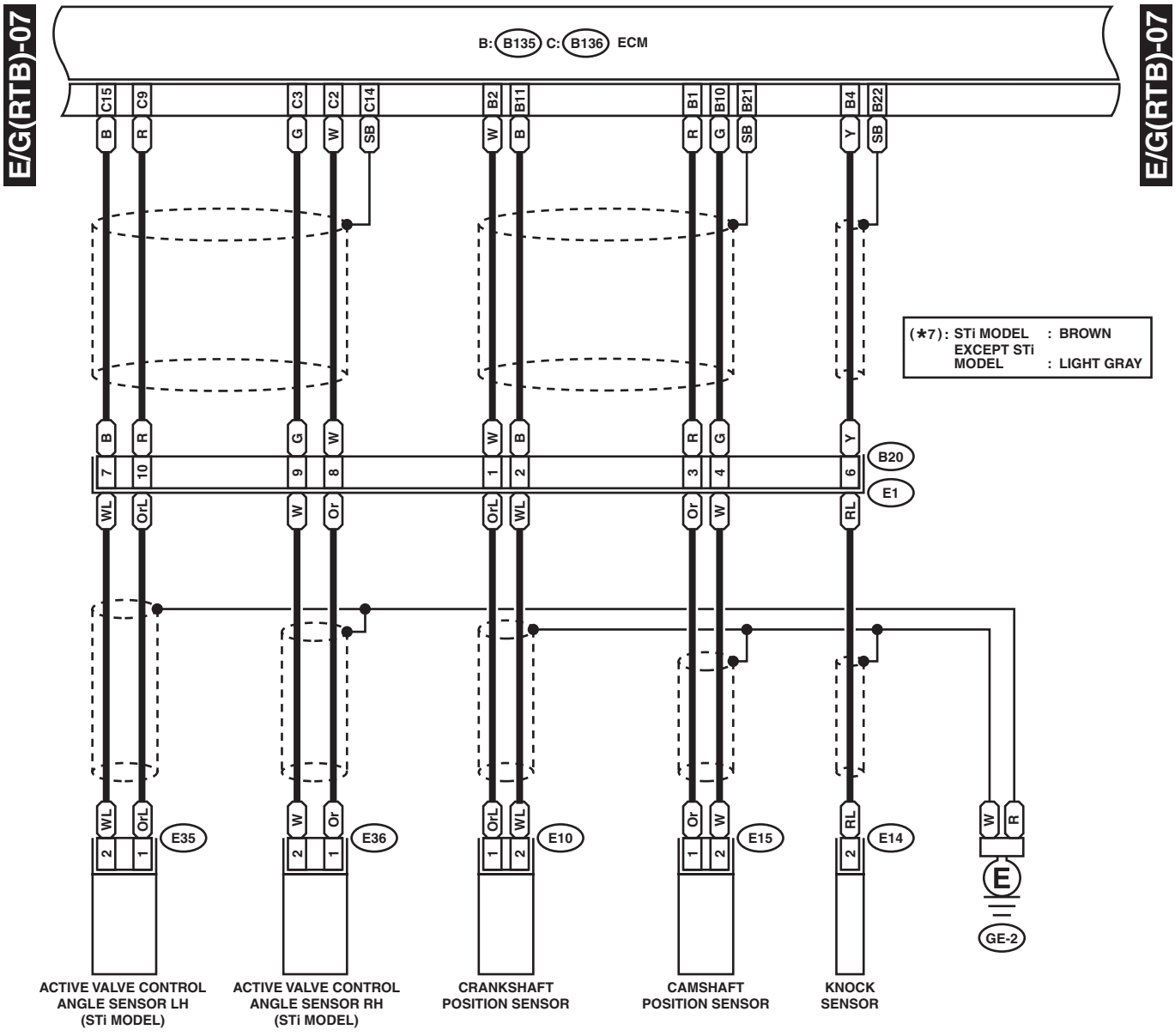

B75 (GREEN)
B76 (GREEN)
OD : B128 (GRAY)
WD : B128 (GRAY)
B300
B79 (GRAY)
B40 (BLACK)
A: B134
D: B137
A: B380

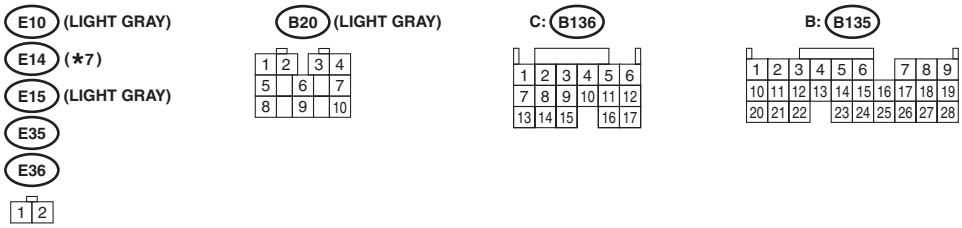
WI-07142


E/G(RTB)-06
E/G(RTB)-06
B: B135 C: B136 D: B137 E: B84 ECM
*6 L
E24 BW
C7 BG
B27 LW
C13 YG
C8 SB
B16 W
E4 BR
E5 BR
E29 W
E19 B
E18 SB
D13 RW
B17 W
B26 SB
B19 RG
STi
SHIELD AND SENSOR GROUND JOINT CONNECTOR
RG 1
BR 2
RY 5
RW 4
RL 3
B83
B62
F45
E/G(RTB)-03 J
E/G(RTB)-03 K
M E/G(RTB)-09
N E/G(RTB)-11
STi : STi MODEL
*6 : FOR AUSTRALIA EXCEPT STi MODEL : E12
OTHER MODELS : E11
F26 L 3
B127 YL BW 2 1
B3 YL BG LW YG BR 1 2 4 3 5
B279 W RY 1 2
B18 YR BR W B 2 1 3 4
B19 YR RW W RW 1 2 4 3
GENERATOR
WASTEGATE SOLENOID
AIR FLOW SENSOR
EXHAUST GAS TEMPERATURE SENSOR (FOR EUROPE EXCEPT STi MODEL)
FRONT OXYGEN (A/F) SENSOR
REAR OXYGEN SENSOR

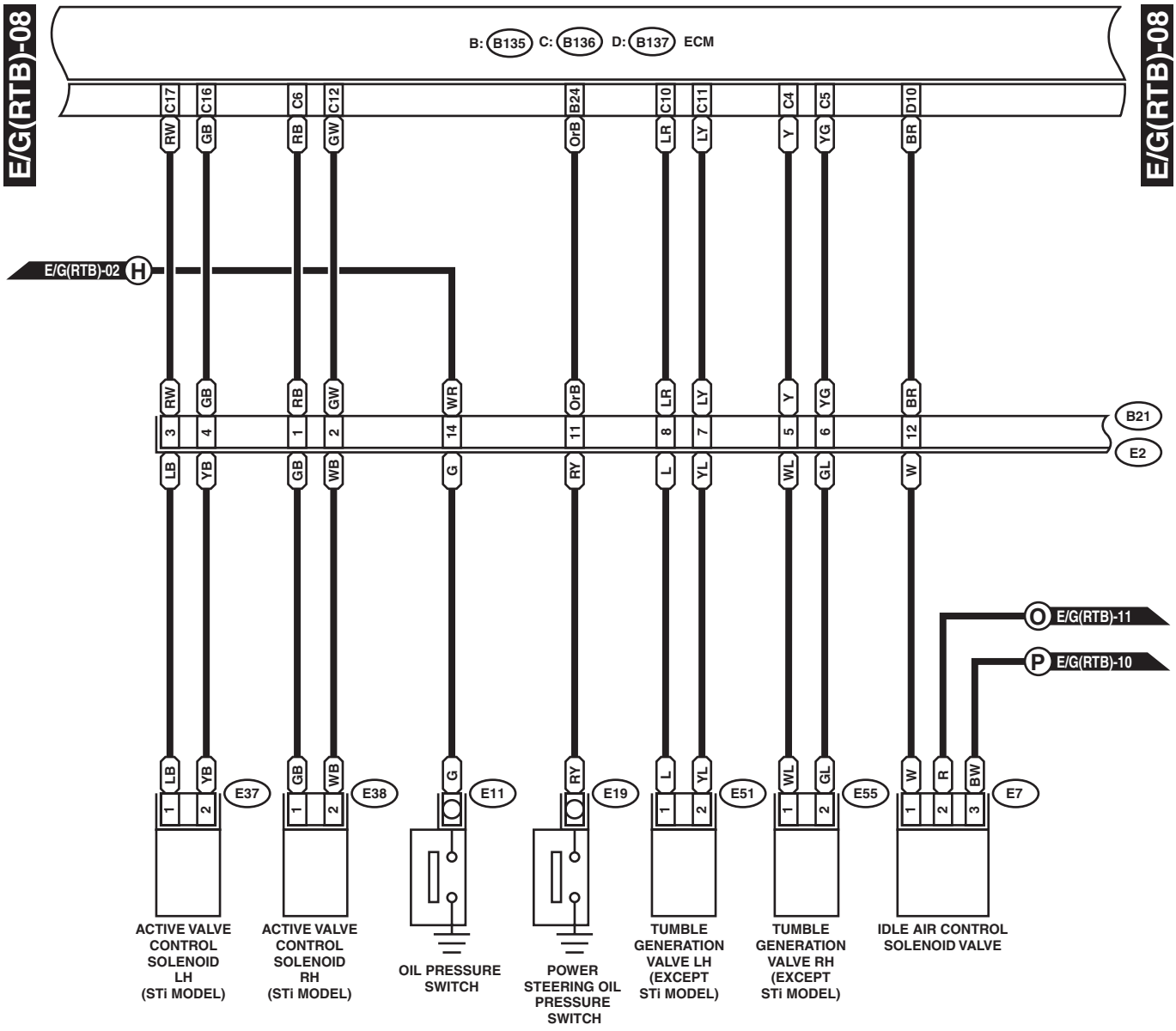

B127
B259
B279
F26 (GREEN)
B18
B19
B3 (BLACK)
B83 (GRAY)
C: B136
F45
D: B137
B: B135
E: B84

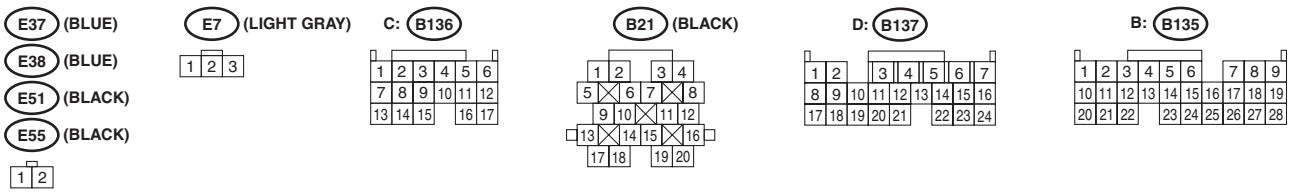
WI-07143


E/G(RTB)-07
E/G(RTB)-07
B: B135 C: B136 ECM
C15
C9
C3
C2
C14
B2
B11
B1
B10
B21
B4
B22
B
R
G
W
SB
W
B
R
G
SB
Y
SB
(*7): STi MODEL : BROWN
EXCEPT STi MODEL : LIGHT GRAY
7
10
9
8
1
2
3
4
6
B20
E1
WL
OrL
W
Or
OrL
WL
Or
W
RL
E35
E36
E10
E15
E14
W
R
E
GE-2
ACTIVE VALVE CONTROL ANGLE SENSOR LH (STi MODEL)
ACTIVE VALVE CONTROL ANGLE SENSOR RH (STi MODEL)
CRANKSHAFT POSITION SENSOR
CAMSHAFT POSITION SENSOR
KNOCK SENSOR

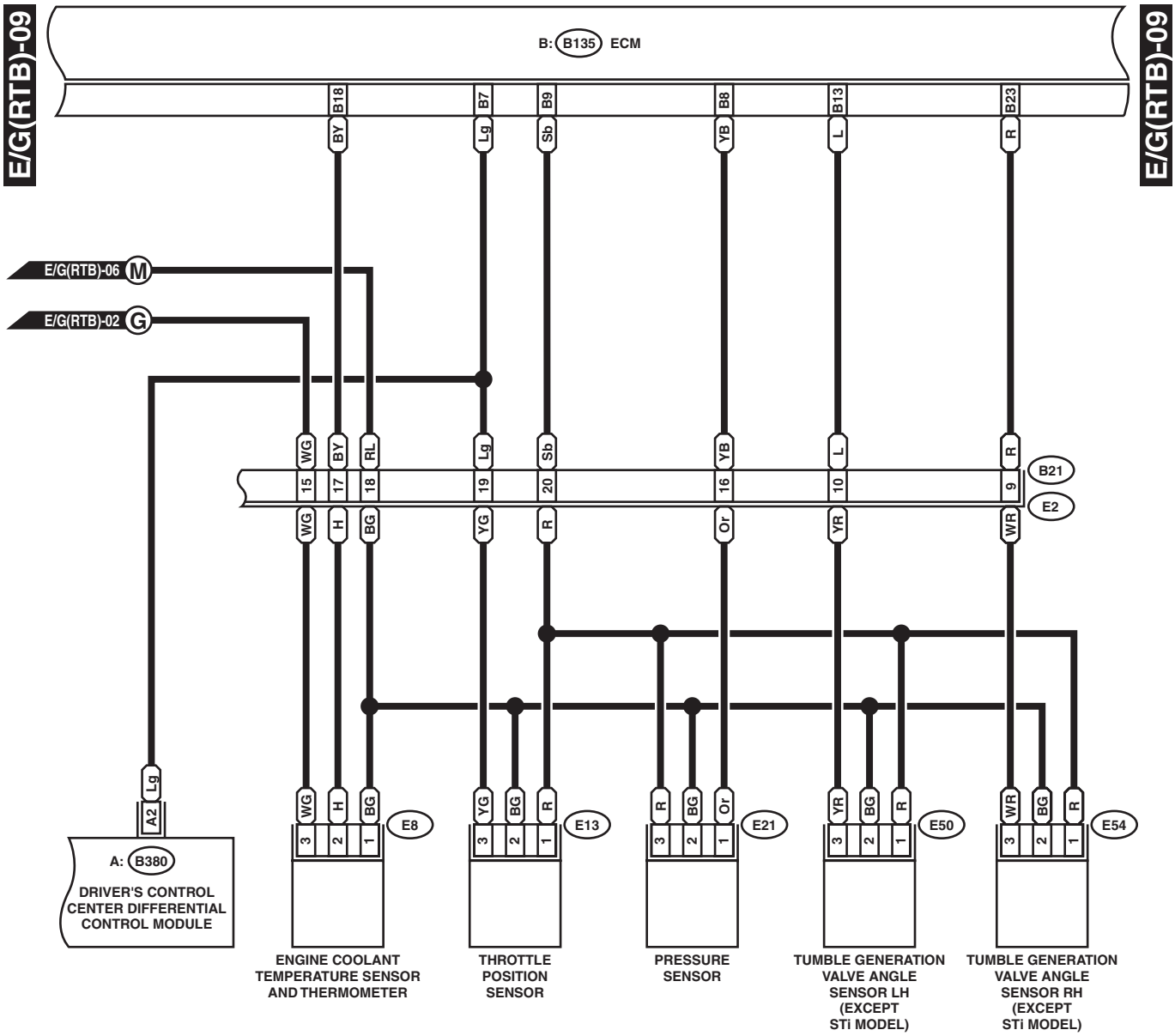

E10 (LIGHT GRAY)
E14 (*7)
E15 (LIGHT GRAY)
E35
E36
B20 (LIGHT GRAY)
C: B136
B: B135

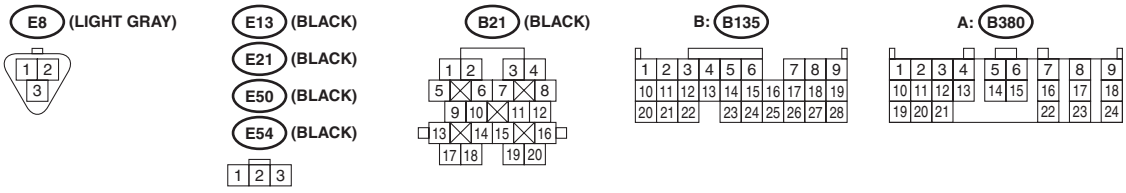
WI-07144


E/G(RTB)-08
E/G(RTB)-08
B: B135 C: B136 D: B137 ECM
C17 C16 C6 C12 B24 C10 C11 C4 C5 D10
RW GB RB GW OrB LR LY Y YG BR
E/G(RTB)-02 H
RW GB RB GW WR OrB LR LY Y YG BR
3 4 1 2 14 11 8 7 5 6 12
B21
E2
LB YB GB WB G RY L YL WL GL W
E/G(RTB)-11 O
E/G(RTB)-10 P
LB YB GB WB G RY L YL WL GL W R BW
E37 E38 E11 E19 E51 E55 E7
1 2 1 2 1 2 1 2 1 2 1 2 3
ACTIVE VALVE CONTROL SOLENOID LH (STi MODEL)
ACTIVE VALVE CONTROL SOLENOID RH (STi MODEL)
OIL PRESSURE SWITCH
POWER STEERING OIL PRESSURE SWITCH
TUMBLE GENERATION VALVE LH (EXCEPT STi MODEL)
TUMBLE GENERATION VALVE RH (EXCEPT STi MODEL)
IDLE AIR CONTROL SOLENOID VALVE

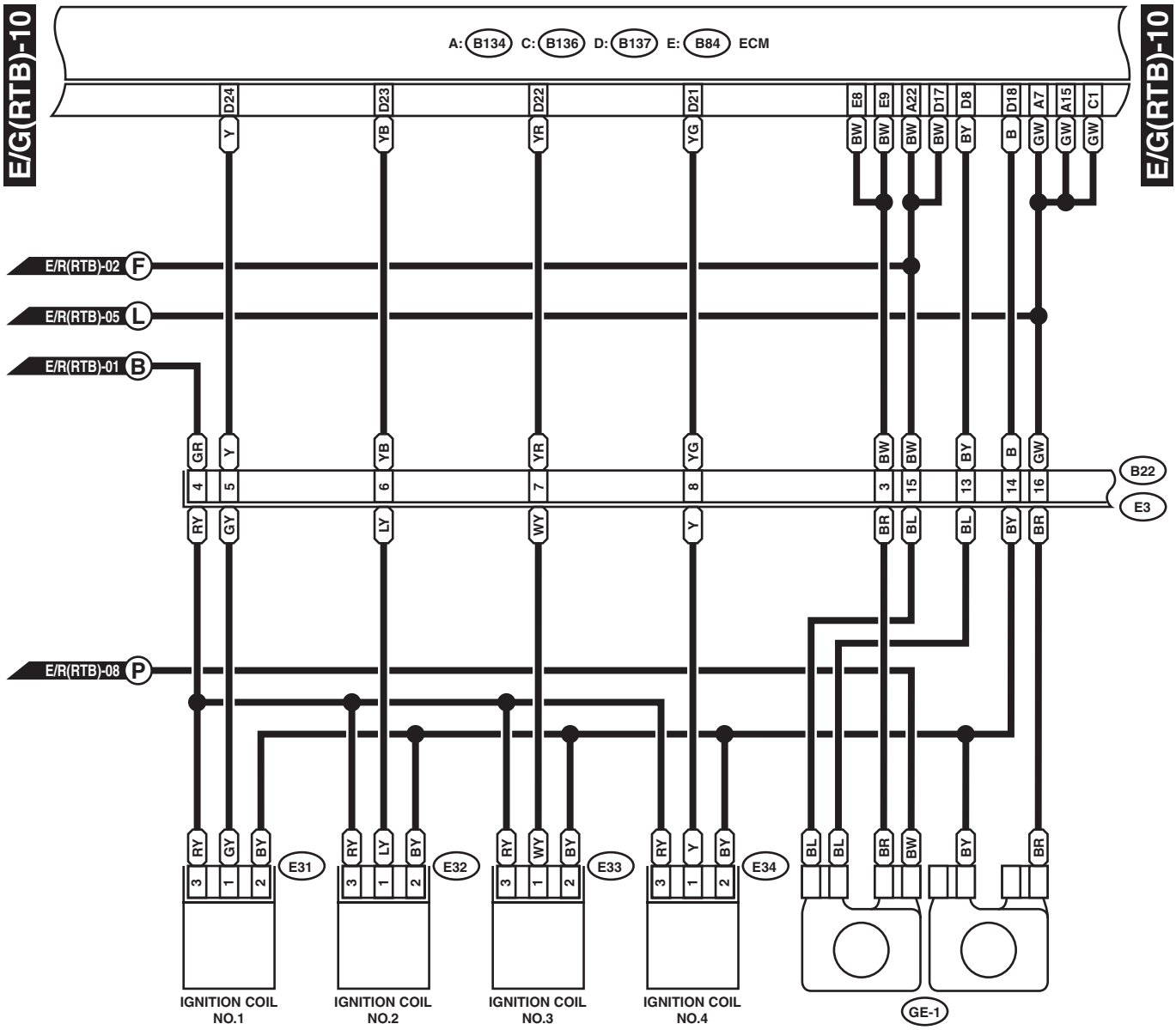

E37 (BLUE)
E38 (BLUE)
E51 (BLACK)
E55 (BLACK)
1 2
E7 (LIGHT GRAY)
1 2 3
C: B136
1 2 3 4 5 6
7 8 9 10 11 12
13 14 15 16 17
B21 (BLACK)
1 2 3 4
5 6 7 8
9 10 11 12
13 14 15 16
17 18 19 20
D: B137
1 2 3 4 5 6 7
8 9 10 11 12 13 14 15 16
17 18 19 20 21 22 23 24
B: B135
1 2 3 4 5 6 7 8 9
10 11 12 13 14 15 16 17 18 19
20 21 22 23 24 25 26 27 28

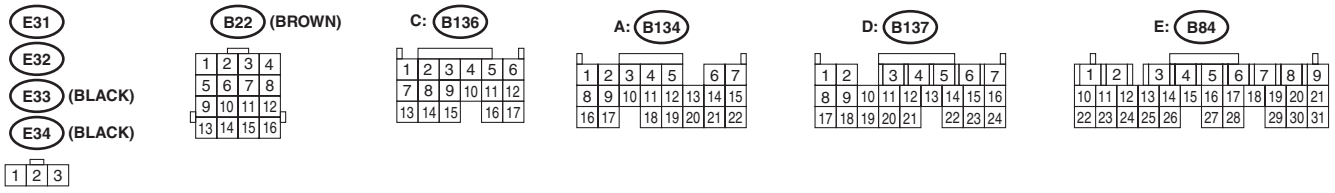
WI-07145


E/G(RTB)-09
E/G(RTB)-09
B: B135 ECM
B18
B7
B9
B8
B13
B23
BY
Lg
Sb
YB
L
R
E/G(RTB)-06 M
E/G(RTB)-02 G
WG
BY
RL
Lg
Sb
YB
L
R
15
17
18
19
20
16
10
9
B21
E2
WG
H
BG
YG
R
Or
YR
WR
Lg
A2
A: B380
DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE
E8
E13
E21
E50
E54
3
2
1
ENGINE COOLANT TEMPERATURE SENSOR AND THERMOMETER
THROTTLE POSITION SENSOR
PRESSURE SENSOR
TUMBLE GENERATION VALVE ANGLE SENSOR LH (EXCEPT STi MODEL)
TUMBLE GENERATION VALVE ANGLE SENSOR RH (EXCEPT STi MODEL)

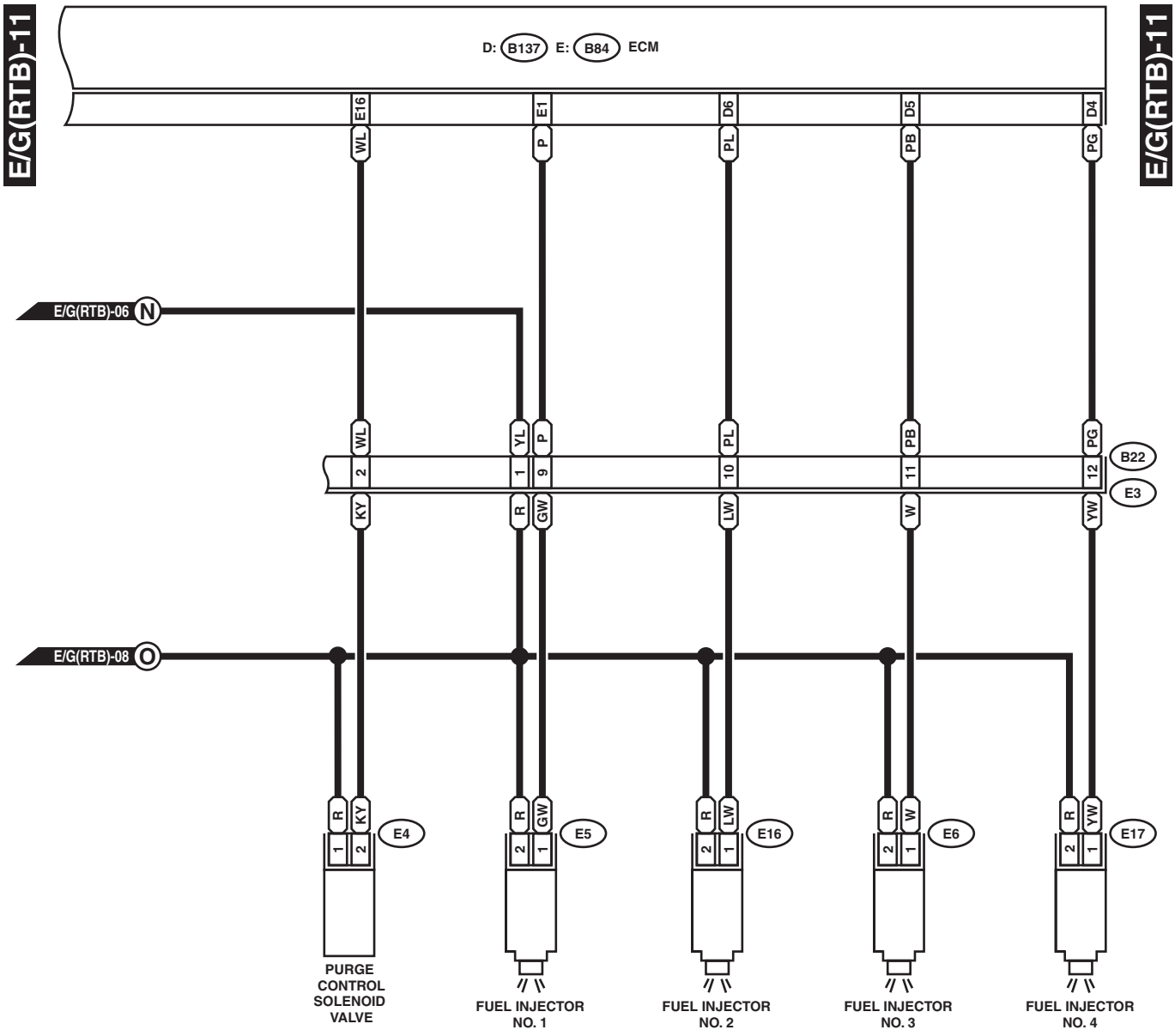

E8 (LIGHT GRAY)
E13 (BLACK)
E21 (BLACK)
E50 (BLACK)
E54 (BLACK)
B21 (BLACK)
B: B135
A: B380

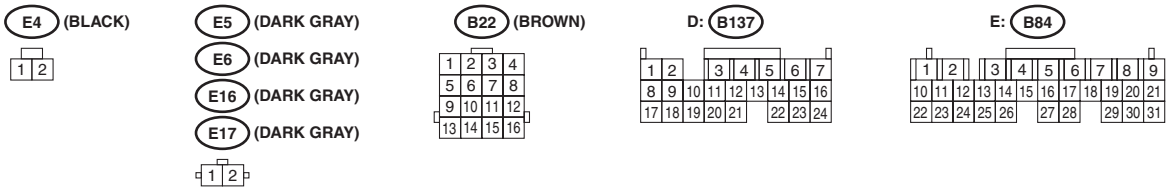
WI-07146


E/G(RTB)-10
A: B134 C: B136 D: B137 E: B84 ECM
E/G(RTB)-10
D24 D23 D22 D21 E8 E9 A22 D17 D8 D18 A7 A15 C1
Y YB YR YG BW BW BW BW BY B GW GW GW
E/R(RTB)-02 F
E/R(RTB)-05 L
E/R(RTB)-01 B
GR Y YB YR YG BW BW BY B GW
4 5 6 7 8 3 15 13 14 16
B22
E3
RY GY LY WY Y BR BL BL BY BR
E/R(RTB)-08 P
RY GY BY E31
RY LY BY E32
RY WY BY E33
RY Y BY E34
BL BL BR BW BY BR
3 1 2
IGNITION COIL NO.1
IGNITION COIL NO.2
IGNITION COIL NO.3
IGNITION COIL NO.4
GE-1


E31
E32
E33 (BLACK)
E34 (BLACK)
B22 (BROWN)
C: B136
A: B134
D: B137
E: B84

WI-07147


E/G(RTB)-11
E/G(RTB)-11
D: B137 E: B84 ECM
E16
E1
D6
D5
D4
WL
P
PL
PB
PG
E/G(RTB)-06 N
E/G(RTB)-08 O
2
1
9
10
11
12
B22
E3
KY
R
GW
LW
W
YW
E4
E5
E16
E6
E17
PURGE CONTROL SOLENOID VALVE
FUEL INJECTOR NO. 1
FUEL INJECTOR NO. 2
FUEL INJECTOR NO. 3
FUEL INJECTOR NO. 4

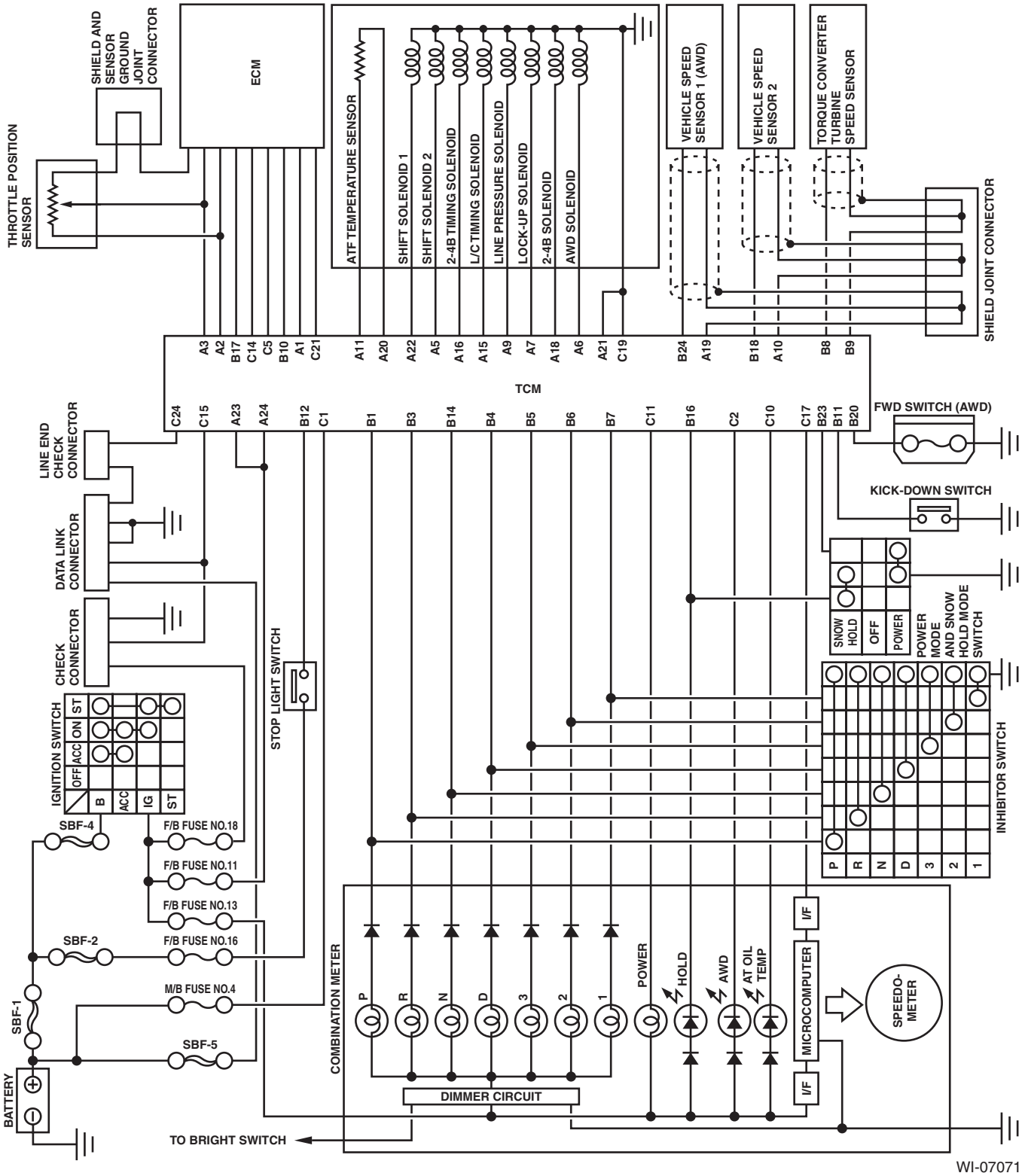

E4 (BLACK)
E5 (DARK GRAY)
E6 (DARK GRAY)
E16 (DARK GRAY)
E17 (DARK GRAY)
B22 (BROWN)
D: B137
E: B84

WI-07148

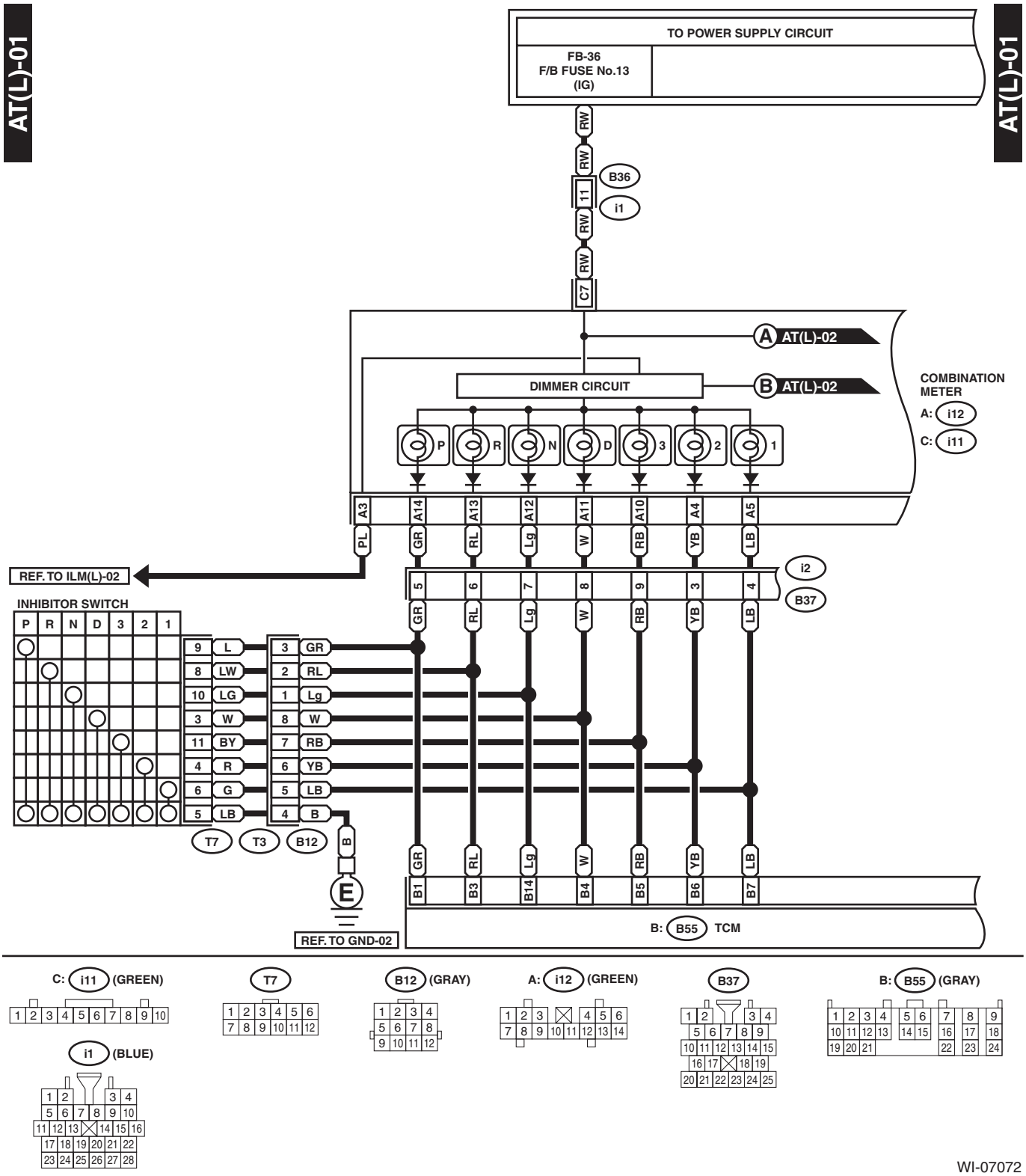
6. AT Control System

A: WIRING DIAGRAM

1. LHD MODEL

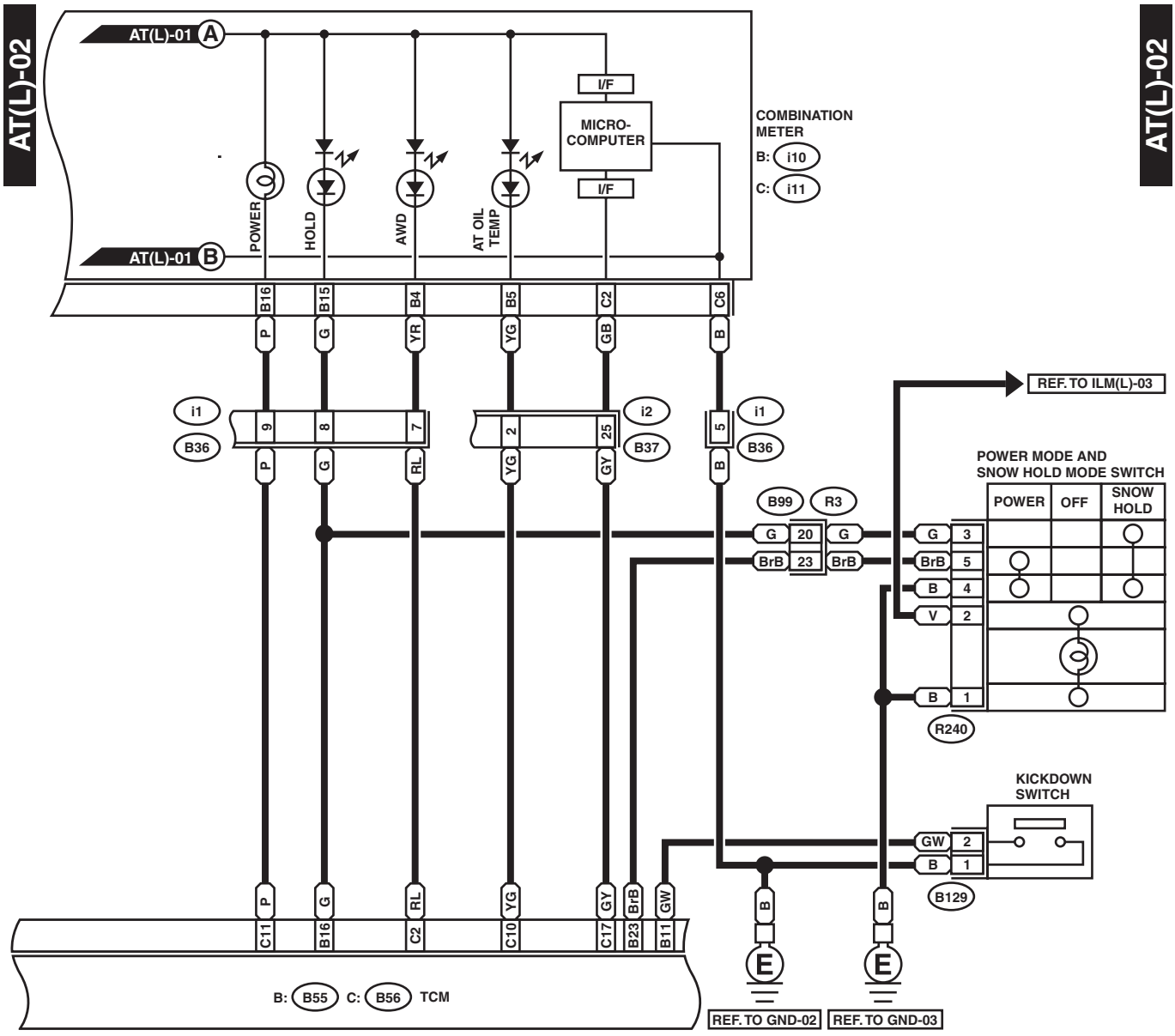


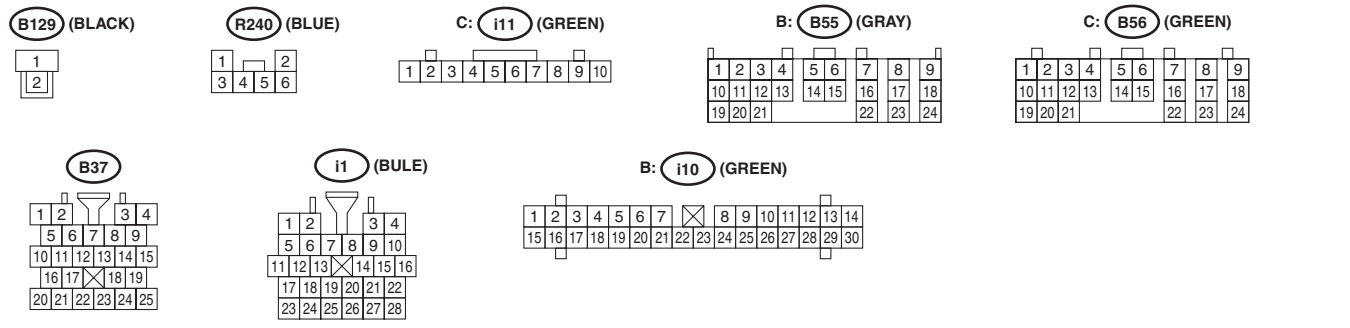
WI-07071


AT(L)-01
AT(L)-01
TO POWER SUPPLY CIRCUIT
FB-36
F/B FUSE No.13
(IG)
RW
B36
11
i1
C7
A AT(L)-02
DIMMER CIRCUIT
B AT(L)-02
COMBINATION METER
A: i12
C: i11
P
R
N
D
3
2
1
A3
A14
A13
A12
A11
A10
A4
A5
PL
GR
RL
Lg
W
RB
YB
LB
REF. TO ILM(L)-02
i2
B37
INHIBITOR SWITCH
P R N D 3 2 1
9 L
8 LW
10 LG
3 W
11 BY
4 R
6 G
5 LB
3 GR
2 RL
1 Lg
8 W
7 RB
6 YB
5 LB
4 B
T7
T3
B12
B
E
REF. TO GND-02
B1
B3
B14
B4
B5
B6
B7
B: B55 TCM

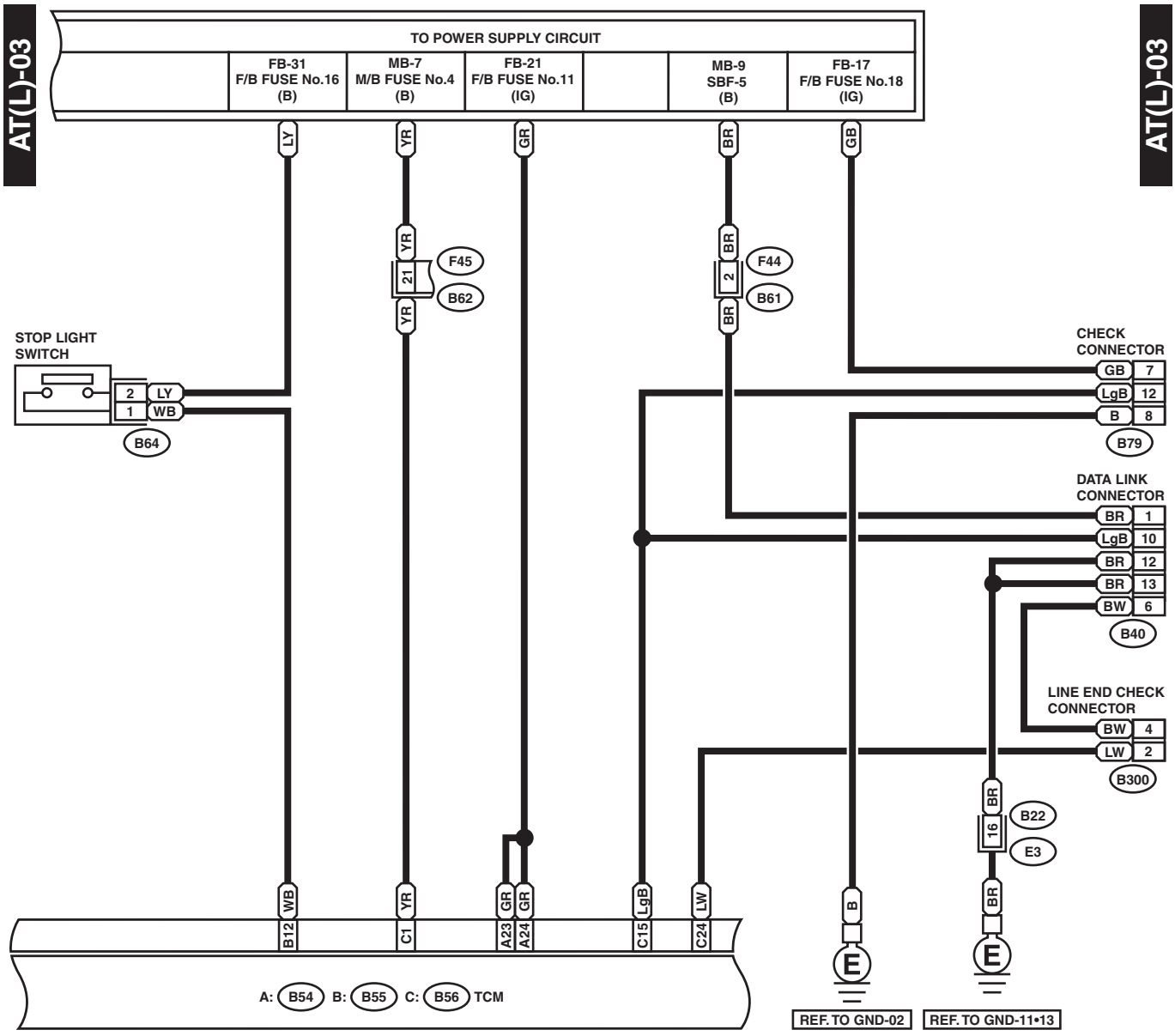
C: i11 (GREEN)
i1 (BLUE)
T7
B12 (GRAY)
A: i12 (GREEN)
B37
B: B55 (GRAY)

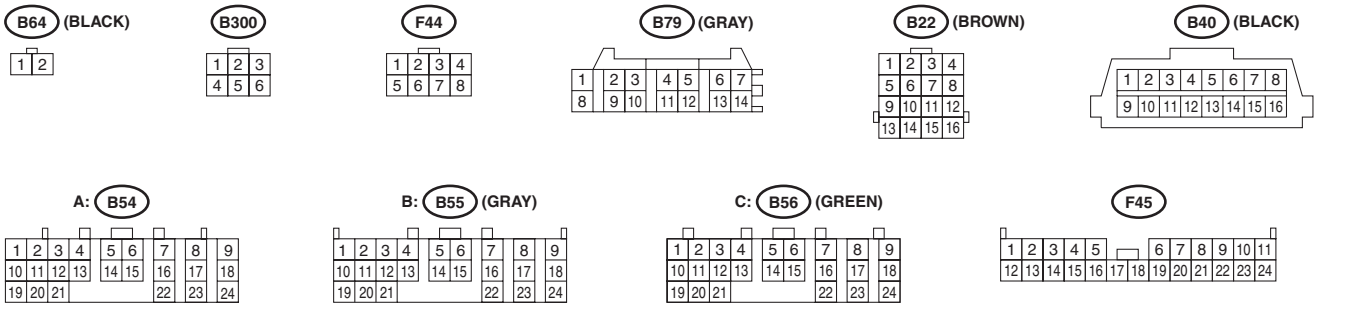
WI-07072


AT(L)-02
AT(L)-01 A
AT(L)-01 B
I/F
MICRO-COMPUTER
I/F
COMBINATION METER
B: i10
C: i11
POWER
HOLD
AWD
AT OIL TEMP
B16 B15 B4 B5 C2 C6
P G YR YG GB B
i1 B36
i2 B37
REF. TO ILM(L)-03
POWER MODE AND SNOW HOLD MODE SWITCH
POWER
OFF
SNOW HOLD
B99 R3
G 20 G
BrB 23 BrB
G 3
BrB 5
B 4
V 2
B 1
R240
KICKDOWN SWITCH
GW 2
B 1
B129
P G RL YG GY BrB GW
C11 B16 C2 C10 C17 B23 B11
B: B55 C: B56 TCM
REF. TO GND-02
REF. TO GND-03

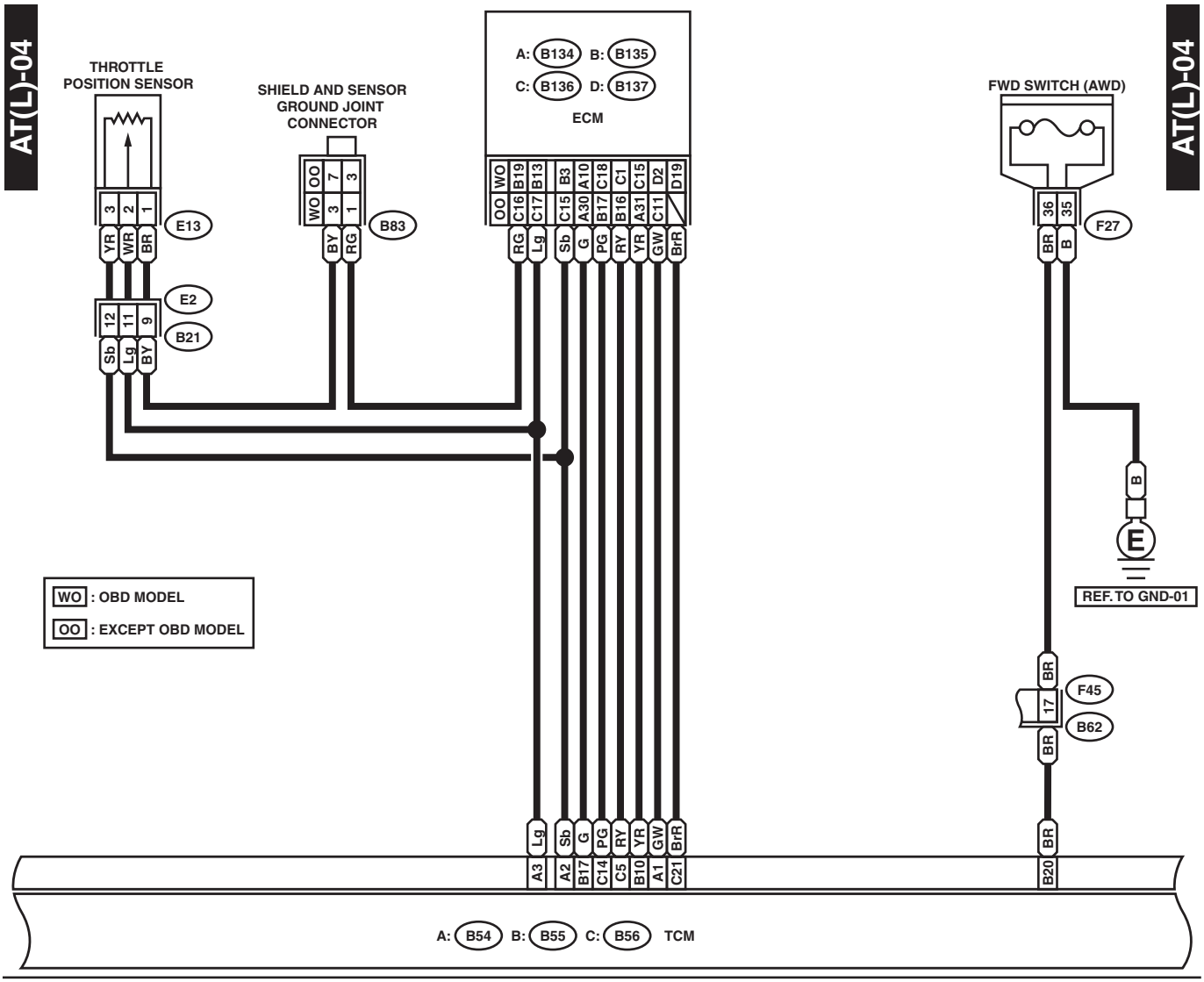

B129 (BLACK)
R240 (BLUE)
C: i11 (GREEN)
B: B55 (GRAY)
C: B56 (GREEN)
B37
i1 (BULE)
B: i10 (GREEN)

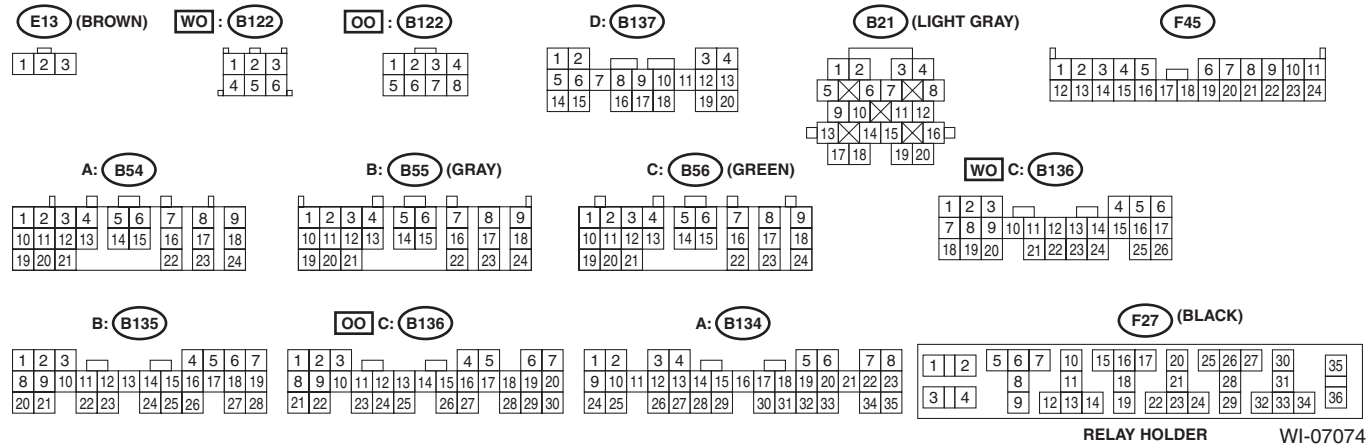
WI-07073

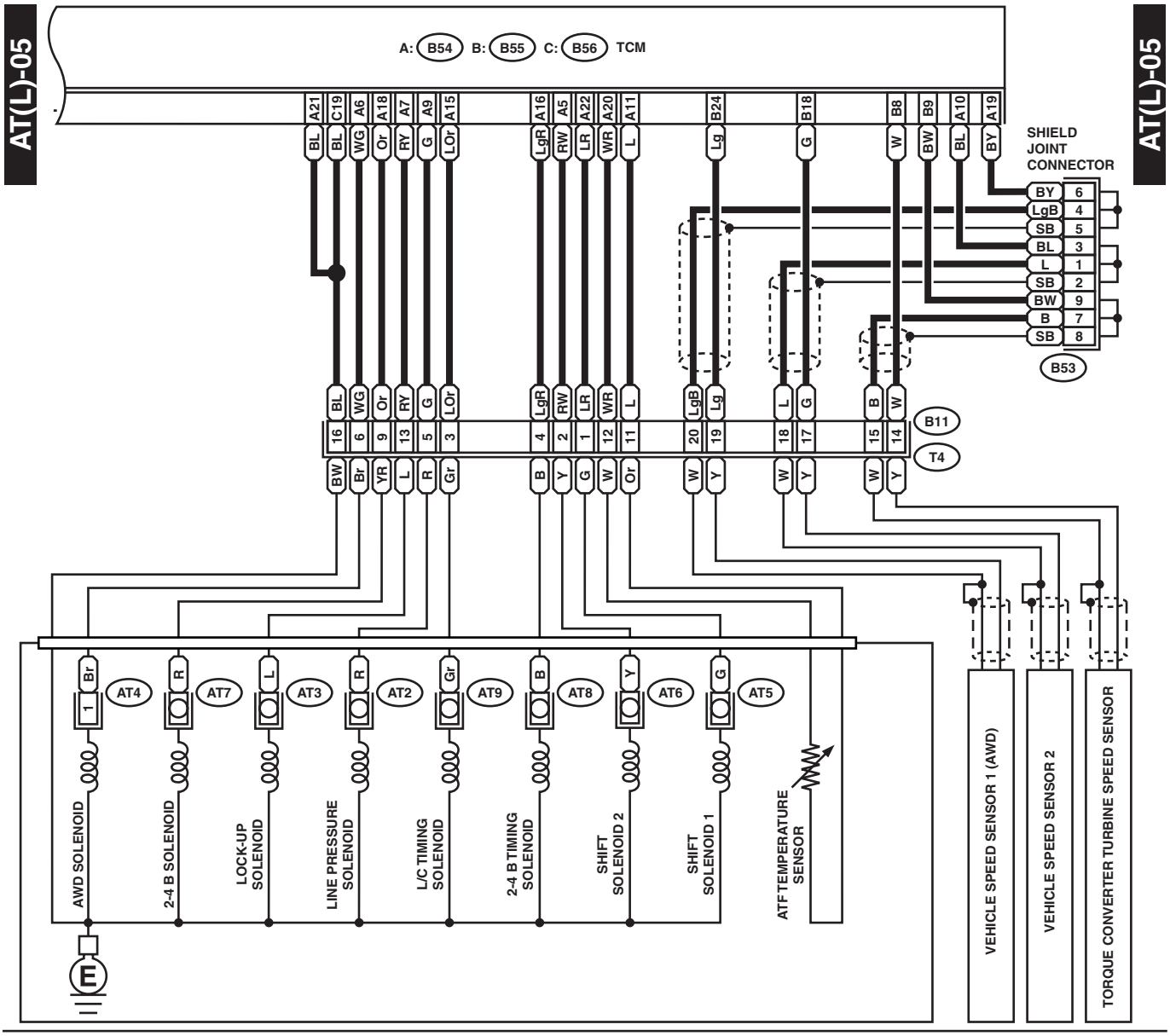

AT(L)-03
AT(L)-03
TO POWER SUPPLY CIRCUIT
FB-31 F/B FUSE No.16 (B)
MB-7 M/B FUSE No.4 (B)
FB-21 F/B FUSE No.11 (IG)
MB-9 SBF-5 (B)
FB-17 F/B FUSE No.18 (IG)
LY
YR
GR
BR
GB
F45
B62
F44
B61
STOP LIGHT SWITCH
B64
CHECK CONNECTOR
B79
DATA LINK CONNECTOR
B40
LINE END CHECK CONNECTOR
B300
B22
E3
WB
B12
C1
A23
A24
C15
C24
LgB
LW
A: B54 B: B55 C: B56 TCM
REF. TO GND-02
REF. TO GND-11•13

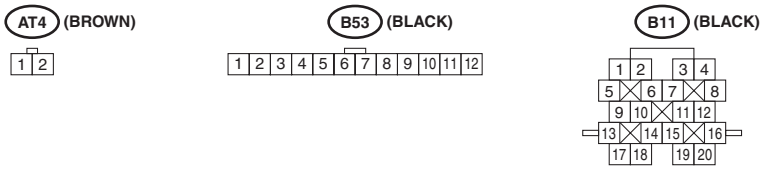

B64 (BLACK)
B300
F44
B79 (GRAY)
B22 (BROWN)
B40 (BLACK)
A: B54
B: B55 (GRAY)
C: B56 (GREEN)
F45

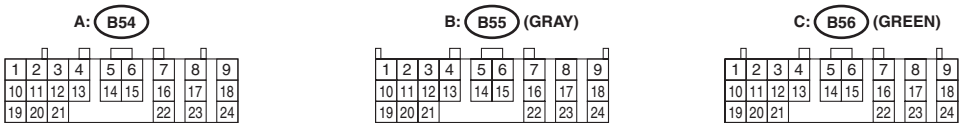
WI-02287


AT(L)-04
AT(L)-04
THROTTLE POSITION SENSOR
SHIELD AND SENSOR GROUND JOINT CONNECTOR
A: B134 B: B135
C: B136 D: B137
ECM
FWD SWITCH (AWD)
E13
B83
E2
B21
F27
WO : OBD MODEL
OO : EXCEPT OBD MODEL
REF. TO GND-01
F45
B62
A: B54 B: B55 C: B56 TCM


E13 (BROWN)
WO : B122
OO : B122
D: B137
B21 (LIGHT GRAY)
F45
A: B54
B: B55 (GRAY)
C: B56 (GREEN)
WO C: B136
B: B135
OO C: B136
A: B134
F27 (BLACK)
RELAY HOLDER
WI-07074

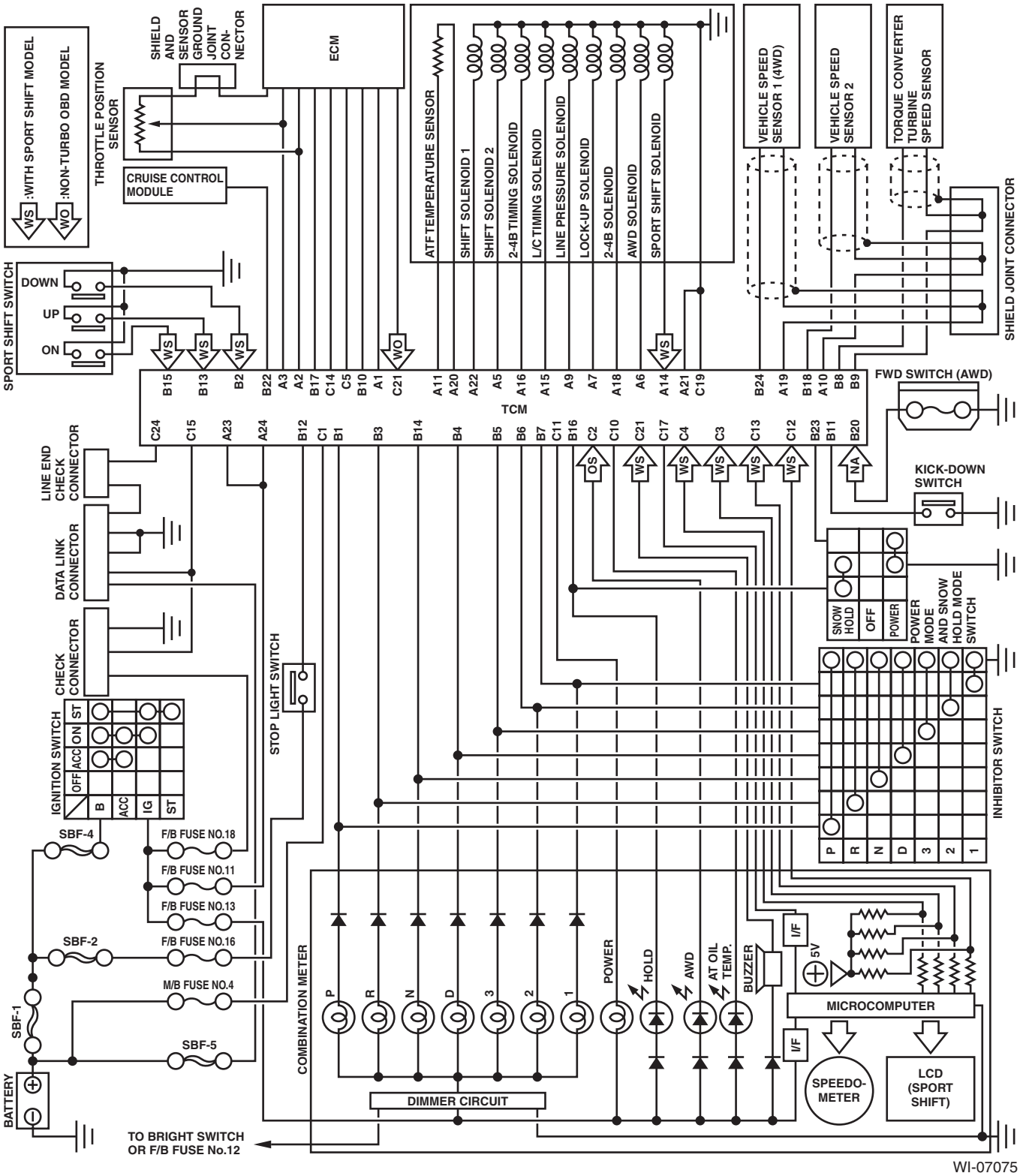

AT(L)-05
AT(L)-05
A: B54 B: B55 C: B56 TCM
A21 C19 A6 A18 A7 A9 A15 A16 A5 A22 A20 A11 B24 B18 B8 B9 A10 A19
BL BL WG Or RY G LOr LgR RW LR WR L Lg G W BW BL BY
SHIELD JOINT CONNECTOR
BY 6
LgB 4
SB 5
BL 3
L 1
SB 2
BW 9
B 7
SB 8
B53
BL WG Or RY G LOr LgR RW LR WR L LgB Lg L G B W
16 6 9 13 5 3 4 2 1 12 11 20 19 18 17 15 14
B11
T4
BW Br YR L R Gr B Y G W Or W Y W Y W Y
AT4 AT7 AT3 AT2 AT9 AT8 AT6 AT5
AWD SOLENOID
2-4 B SOLENOID
LOCK-UP SOLENOID
LINE PRESSURE SOLENOID
L/C TIMING SOLENOID
2-4 B TIMING SOLENOID
SHIFT SOLENOID 2
SHIFT SOLENOID 1
ATF TEMPERATURE SENSOR
VEHICLE SPEED SENSOR 1 (AWD)
VEHICLE SPEED SENSOR 2
TORQUE CONVERTER TURBINE SPEED SENSOR
E

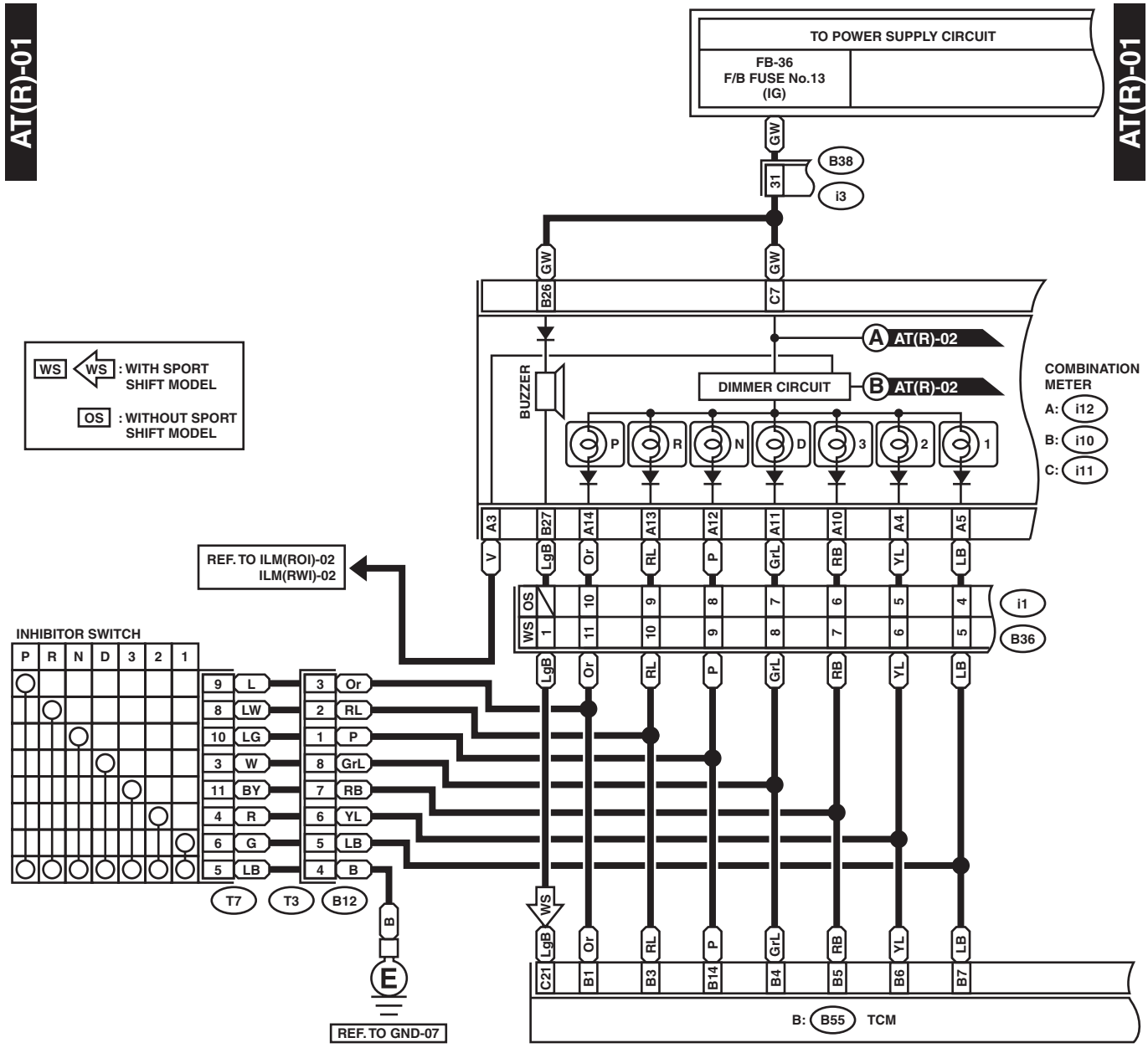

AT4 (BROWN)
1 2
B53 (BLACK)
1 2 3 4 5 6 7 8 9 10 11 12
B11 (BLACK)
1 2 3 4
5 6 7 8
9 10 11 12
13 14 15 16
17 18 19 20

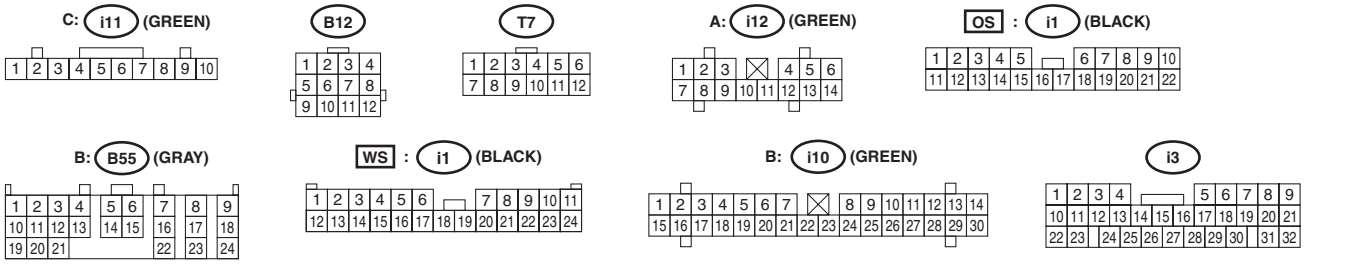

A: B54
1 2 3 4 5 6 7 8 9
10 11 12 13 14 15 16 17 18
19 20 21 22 23 24
B: B55 (GRAY)
1 2 3 4 5 6 7 8 9
10 11 12 13 14 15 16 17 18
19 20 21 22 23 24
C: B56 (GREEN)
1 2 3 4 5 6 7 8 9
10 11 12 13 14 15 16 17 18
19 20 21 22 23 24

WI-07224

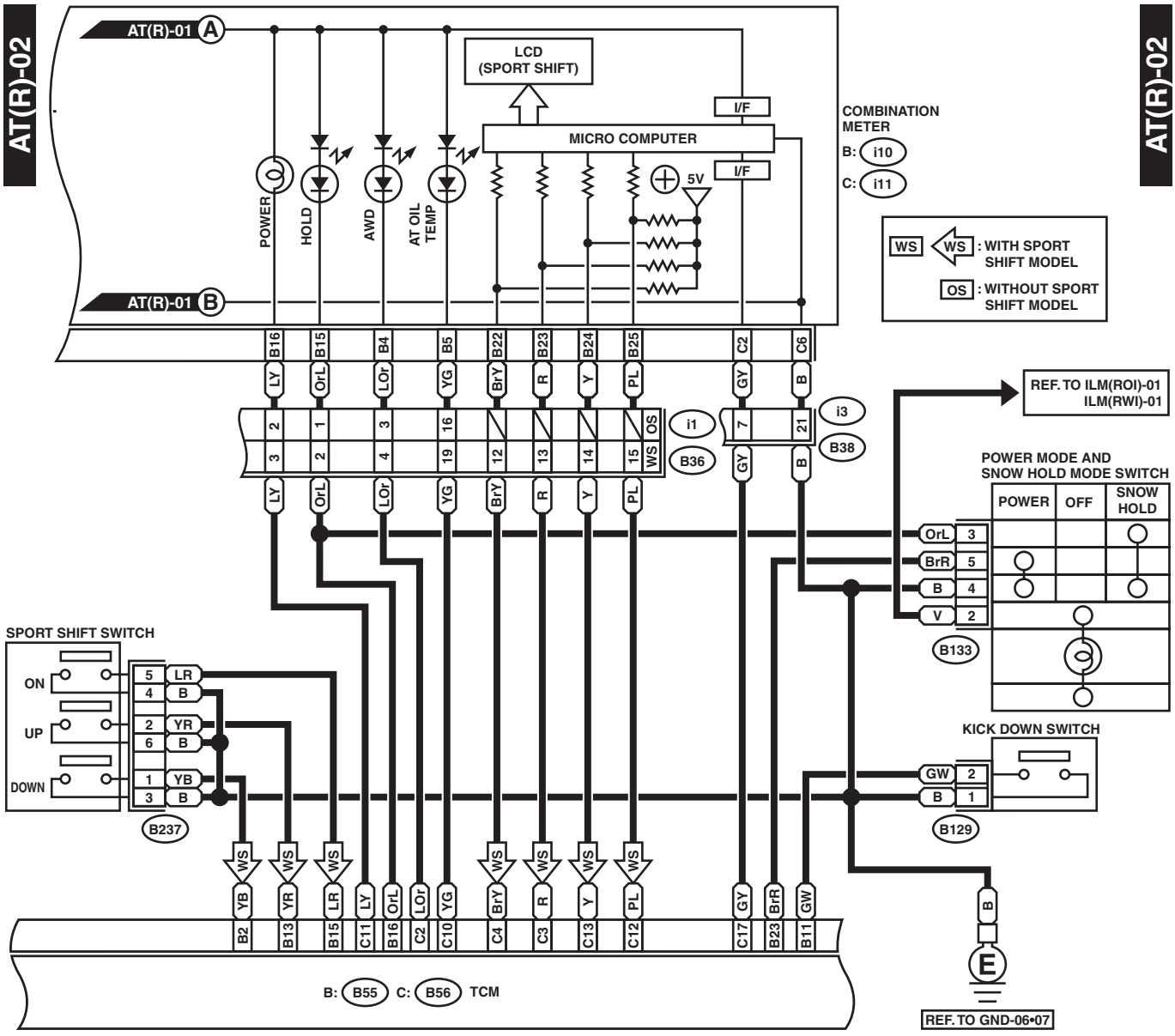
2. RHD MODEL

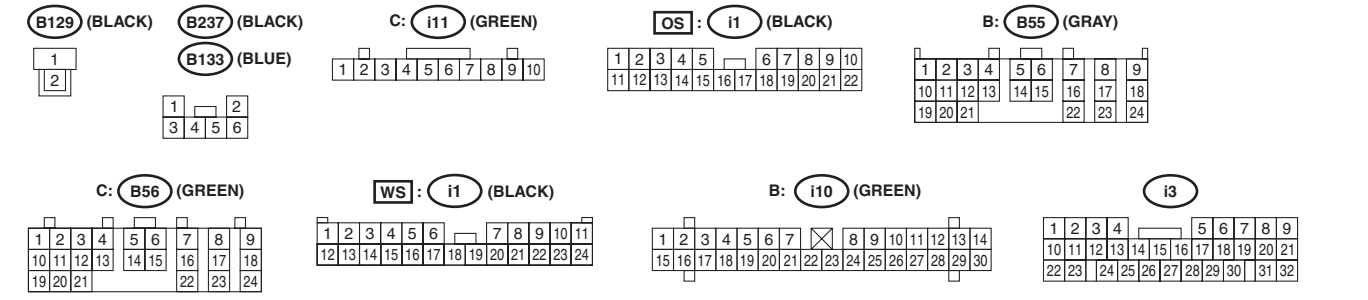

:WITH SPORT SHIFT MODEL
:NON-TURBO OBD MODEL
WS
WO
THROTTLE POSITION SENSOR
SHIELD AND SENSOR GROUND JOINT CONNECTOR
ECM
CRUISE CONTROL MODULE
ATF TEMPERATURE SENSOR
SHIFT SOLENOID 1
SHIFT SOLENOID 2
2-4B TIMING SOLENOID
L/C TIMING SOLENOID
LINE PRESSURE SOLENOID
LOCK-UP SOLENOID
2-4B SOLENOID
AWD SOLENOID
SPORT SHIFT SOLENOID
VEHICLE SPEED SENSOR 1 (4WD)
VEHICLE SPEED SENSOR 2
TORQUE CONVERTER TURBINE SPEED SENSOR
SHIELD JOINT CONNECTOR
SPORT SHIFT SWITCH
DOWN
UP
ON
TCM
FWD SWITCH (AWD)
KICK-DOWN SWITCH
LINE END CHECK CONNECTOR
DATA LINK CONNECTOR
CHECK CONNECTOR
IGNITION SWITCH
ST
ON
ACC
OFF
B
ACC
IG
ST
STOP LIGHT SWITCH
SNOW HOLD
OFF
POWER
POWER MODE AND SNOW HOLD MODE SWITCH
INHIBITOR SWITCH
P
R
N
D
3
2
1
SBF-4
SBF-2
SBF-1
SBF-5
F/B FUSE NO.18
F/B FUSE NO.11
F/B FUSE NO.13
F/B FUSE NO.16
M/B FUSE NO.4
BATTERY
COMBINATION METER
DIMMER CIRCUIT
POWER
HOLD
AWD
AT OIL TEMP.
BUZZER
I/F
5V
MICROCOMPUTER
SPEEDO-METER
LCD (SPORT SHIFT)
TO BRIGHT SWITCH OR F/B FUSE No.12
WI-07075


AT(R)-01
AT(R)-01
TO POWER SUPPLY CIRCUIT
FB-36
F/B FUSE No.13
(IG)
GW
B38
31
i3
GW
GW
B26
C7
A AT(R)-02
DIMMER CIRCUIT
B AT(R)-02
BUZZER
COMBINATION METER
A: i12
B: i10
C: i11
P
R
N
D
3
2
1
WS : WITH SPORT SHIFT MODEL
OS : WITHOUT SPORT SHIFT MODEL
REF. TO ILM(ROI)-02 ILM(RWI)-02
INHIBITOR SWITCH
P R N D 3 2 1
9 L
8 LW
10 LG
3 W
11 BY
4 R
6 G
5 LB
3 Or
2 RL
1 P
8 GrL
7 RB
6 YL
5 LB
4 B
T7
T3
B12
A3 B27 A14 A13 A12 A11 A10 A4 A5
V LgB Or RL P GrL RB YL LB
OS 10 9 8 7 6 5 4
WS 1 11 10 9 8 7 6 5
i1
B36
LgB Or RL P GrL RB YL LB
WS
B
E
REF. TO GND-07
C21 B1 B3 B14 B4 B5 B6 B7
B: B55 TCM

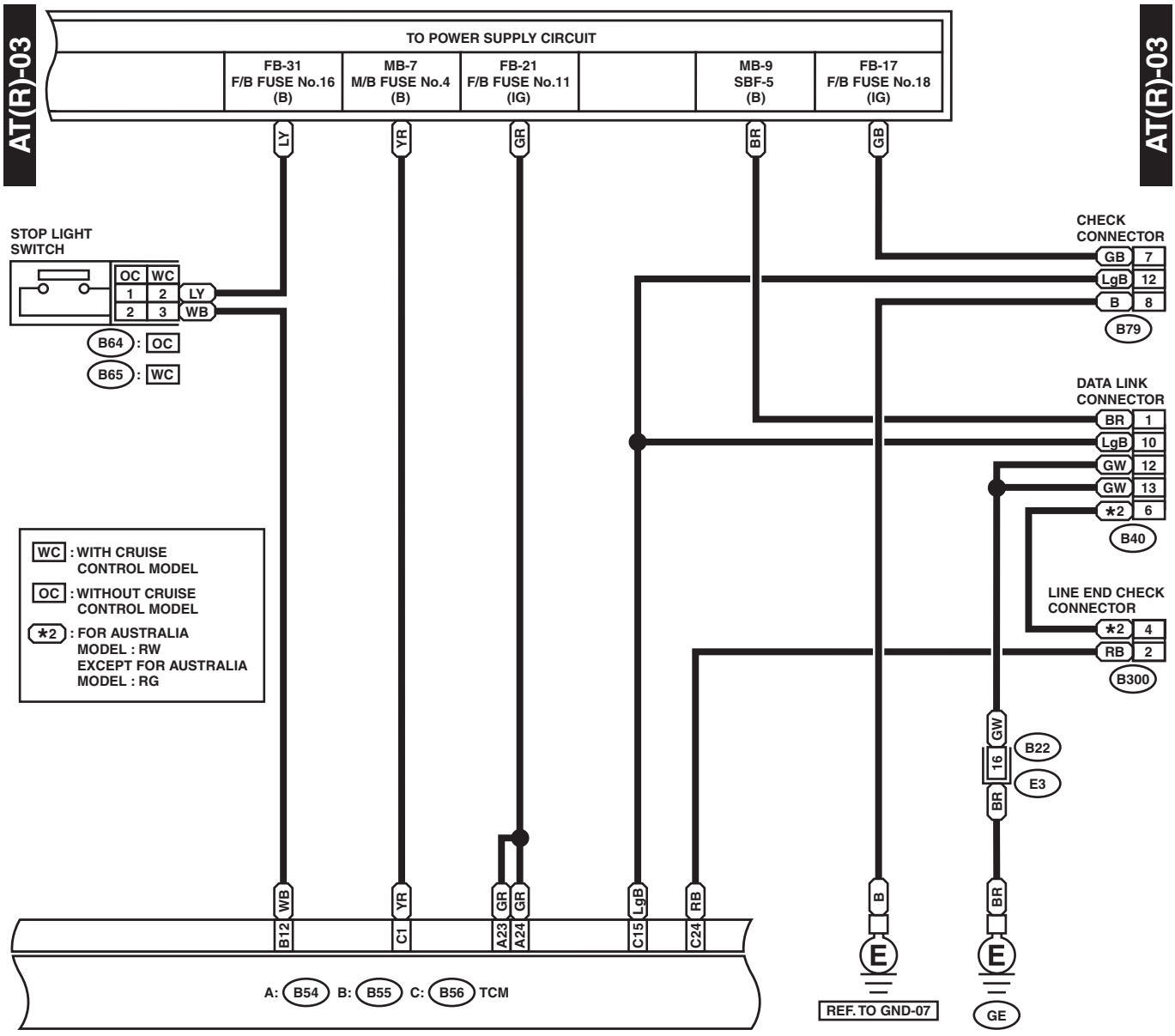

C: i11 (GREEN)
B12
T7
A: i12 (GREEN)
OS : i1 (BLACK)
B: B55 (GRAY)
WS : i1 (BLACK)
B: i10 (GREEN)
i3

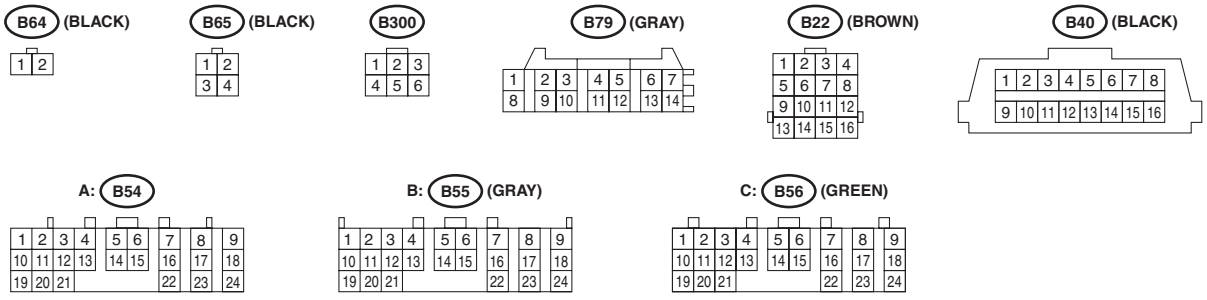
WI-07076


AT(R)-02
AT(R)-01 A
AT(R)-01 B
LCD (SPORT SHIFT)
I/F
MICRO COMPUTER
I/F
5V
POWER
HOLD
AWD
AT OIL TEMP
COMBINATION METER
B: i10
C: i11
WS : WITH SPORT SHIFT MODEL
OS : WITHOUT SPORT SHIFT MODEL
REF. TO ILM(ROI)-01 ILM(RWI)-01
POWER MODE AND SNOW HOLD MODE SWITCH
POWER
OFF
SNOW HOLD
SPORT SHIFT SWITCH
ON
UP
DOWN
KICK DOWN SWITCH
B133
B237
B129
B36
B38
i1
i3
B: B55 C: B56 TCM
REF. TO GND-06•07

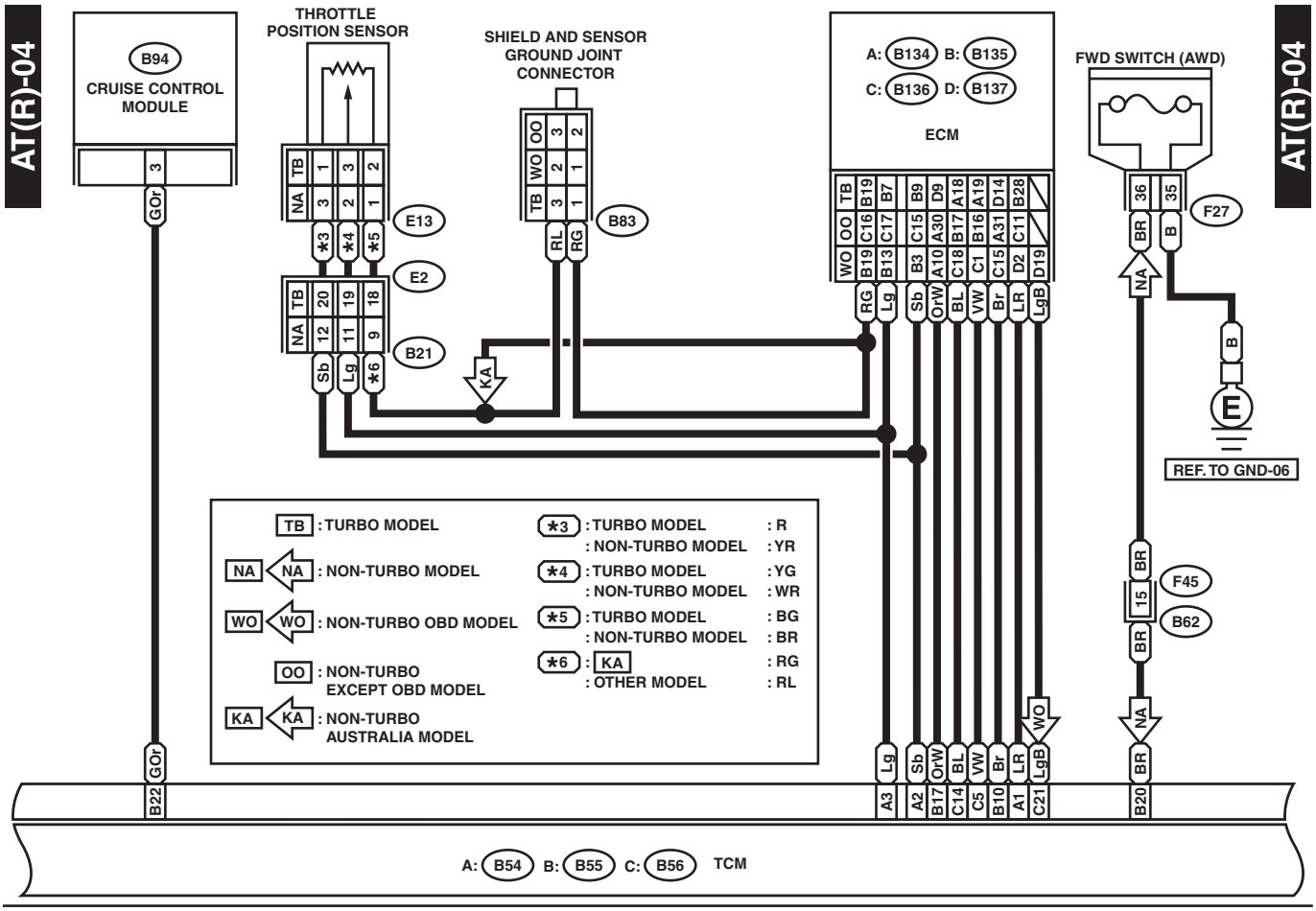

B129 (BLACK)
B237 (BLACK)
B133 (BLUE)
C: i11 (GREEN)
OS : i1 (BLACK)
B: B55 (GRAY)
C: B56 (GREEN)
WS : i1 (BLACK)
B: i10 (GREEN)
i3

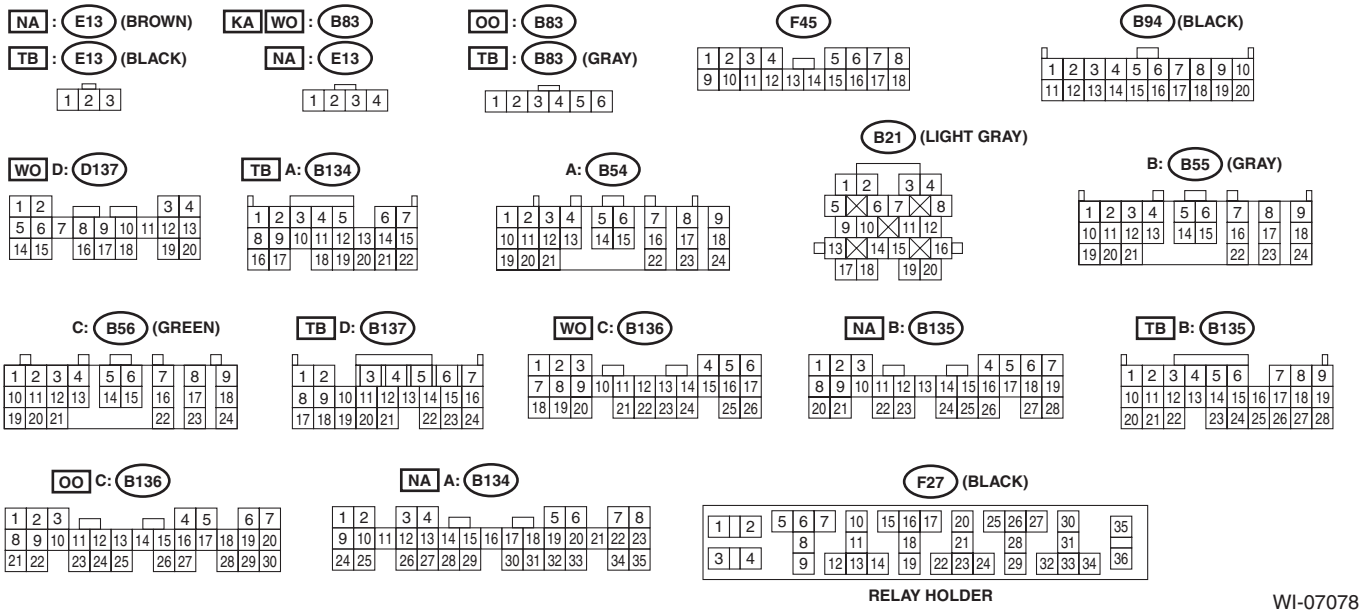
WI-07077


AT(R)-03
TO POWER SUPPLY CIRCUIT
FB-31 F/B FUSE No.16 (B)
MB-7 M/B FUSE No.4 (B)
FB-21 F/B FUSE No.11 (IG)
MB-9 SBF-5 (B)
FB-17 F/B FUSE No.18 (IG)
AT(R)-03
LY
YR
GR
BR
GB
STOP LIGHT SWITCH
OC WC
1 2 LY
2 3 WB
B64 : OC
B65 : WC
CHECK CONNECTOR
GB 7
LgB 12
B 8
B79
DATA LINK CONNECTOR
BR 1
LgB 10
GW 12
GW 13
*2 6
B40
LINE END CHECK CONNECTOR
*2 4
RB 2
B300
WC : WITH CRUISE CONTROL MODEL
OC : WITHOUT CRUISE CONTROL MODEL
*2 : FOR AUSTRALIA MODEL : RW
EXCEPT FOR AUSTRALIA MODEL : RG
GW
16
BR
B22
E3
WB
YR
GR
GR
LgB
RB
B
BR
B12
C1
A23
A24
C15
C24
E
E
A: B54 B: B55 C: B56 TCM
REF. TO GND-07
GE

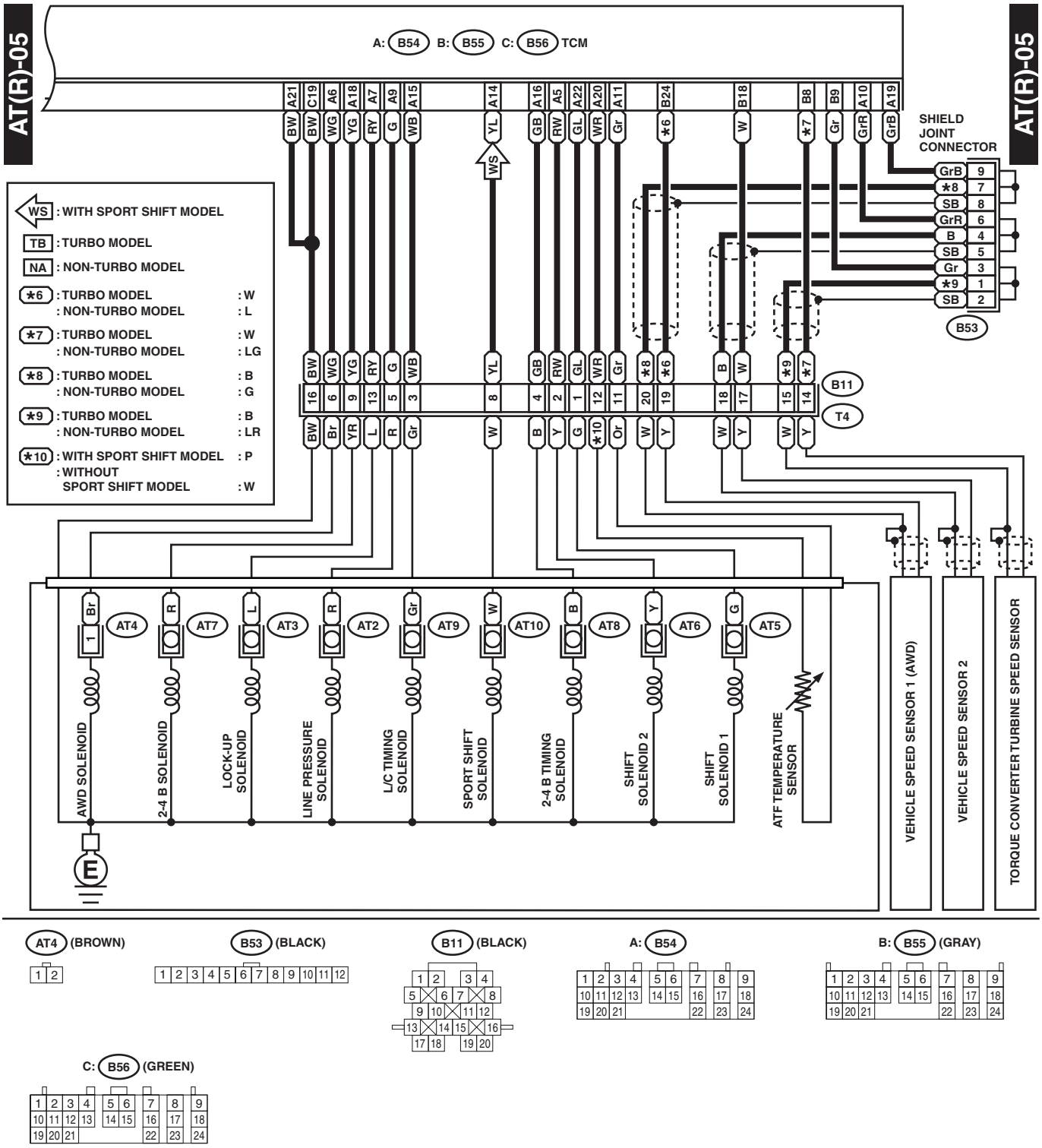

B64 (BLACK)
B65 (BLACK)
B300
B79 (GRAY)
B22 (BROWN)
B40 (BLACK)
A: B54
B: B55 (GRAY)
C: B56 (GREEN)

WI-02292


AT(R)-04
B94
CRUISE CONTROL MODULE
THROTTLE POSITION SENSOR
SHIELD AND SENSOR GROUND JOINT CONNECTOR
A: B134 B: B135
C: B136 D: B137
ECM
FWD SWITCH (AWD)
E13
E2
B21
B83
F27
REF. TO GND-06
F45
B62
B22
B20
A3
A2
B17
C14
C5
B10
A1
C21
TB : TURBO MODEL
NA : NON-TURBO MODEL
WO : NON-TURBO OBD MODEL
OO : NON-TURBO EXCEPT OBD MODEL
KA : NON-TURBO AUSTRALIA MODEL
*3 : TURBO MODEL : R
: NON-TURBO MODEL : YR
*4 : TURBO MODEL : YG
: NON-TURBO MODEL : WR
*5 : TURBO MODEL : BG
: NON-TURBO MODEL : BR
*6 : KA : RG
: OTHER MODEL : RL
A: B54 B: B55 C: B56 TCM


NA : E13 (BROWN)
TB : E13 (BLACK)
KA WO : B83
NA : E13
OO : B83
TB : B83 (GRAY)
F45
B94 (BLACK)
B21 (LIGHT GRAY)
WO D: D137
TB A: B134
A: B54
B: B55 (GRAY)
C: B56 (GREEN)
TB D: B137
WO C: B136
NA B: B135
TB B: B135
OO C: B136
NA A: B134
F27 (BLACK)
RELAY HOLDER

WI-07078


AT(R)-05
AT(R)-05
A: B54 B: B55 C: B56 TCM
A21 C19 A6 A18 A7 A9 A15 A14 A16 A5 A22 A20 A11 B24 B18 B8 B9 A10 A19
BW BW WG YG RY G WB YL GB RW GL WR Gr *6 W *7 Gr GrR GrB
WS
SHIELD JOINT CONNECTOR
GrB 9
*8 7
SB 8
GrR 6
B 4
SB 5
Gr 3
*9 1
SB 2
B53
WS : WITH SPORT SHIFT MODEL
TB : TURBO MODEL
NA : NON-TURBO MODEL
*6 : TURBO MODEL : W
: NON-TURBO MODEL : L
*7 : TURBO MODEL : W
: NON-TURBO MODEL : LG
*8 : TURBO MODEL : B
: NON-TURBO MODEL : G
*9 : TURBO MODEL : B
: NON-TURBO MODEL : LR
*10 : WITH SPORT SHIFT MODEL : P
: WITHOUT SPORT SHIFT MODEL : W
BW WG YG RY G WB YL GB RW GL WR Gr *8 *6 B W *9 *7
16 6 9 13 5 3 8 4 2 1 12 11 20 19 18 17 15 14
B11
T4
BW Br YR L R Gr W B Y G *10 Or W Y W Y W Y
Br R L R Gr W B Y G
AT4 AT7 AT3 AT2 AT9 AT10 AT8 AT6 AT5
AWD SOLENOID
2-4 B SOLENOID
LOCK-UP SOLENOID
LINE PRESSURE SOLENOID
L/C TIMING SOLENOID
SPORT SHIFT SOLENOID
2-4 B TIMING SOLENOID
SHIFT SOLENOID 2
SHIFT SOLENOID 1
ATF TEMPERATURE SENSOR
VEHICLE SPEED SENSOR 1 (AWD)
VEHICLE SPEED SENSOR 2
TORQUE CONVERTER TURBINE SPEED SENSOR
E

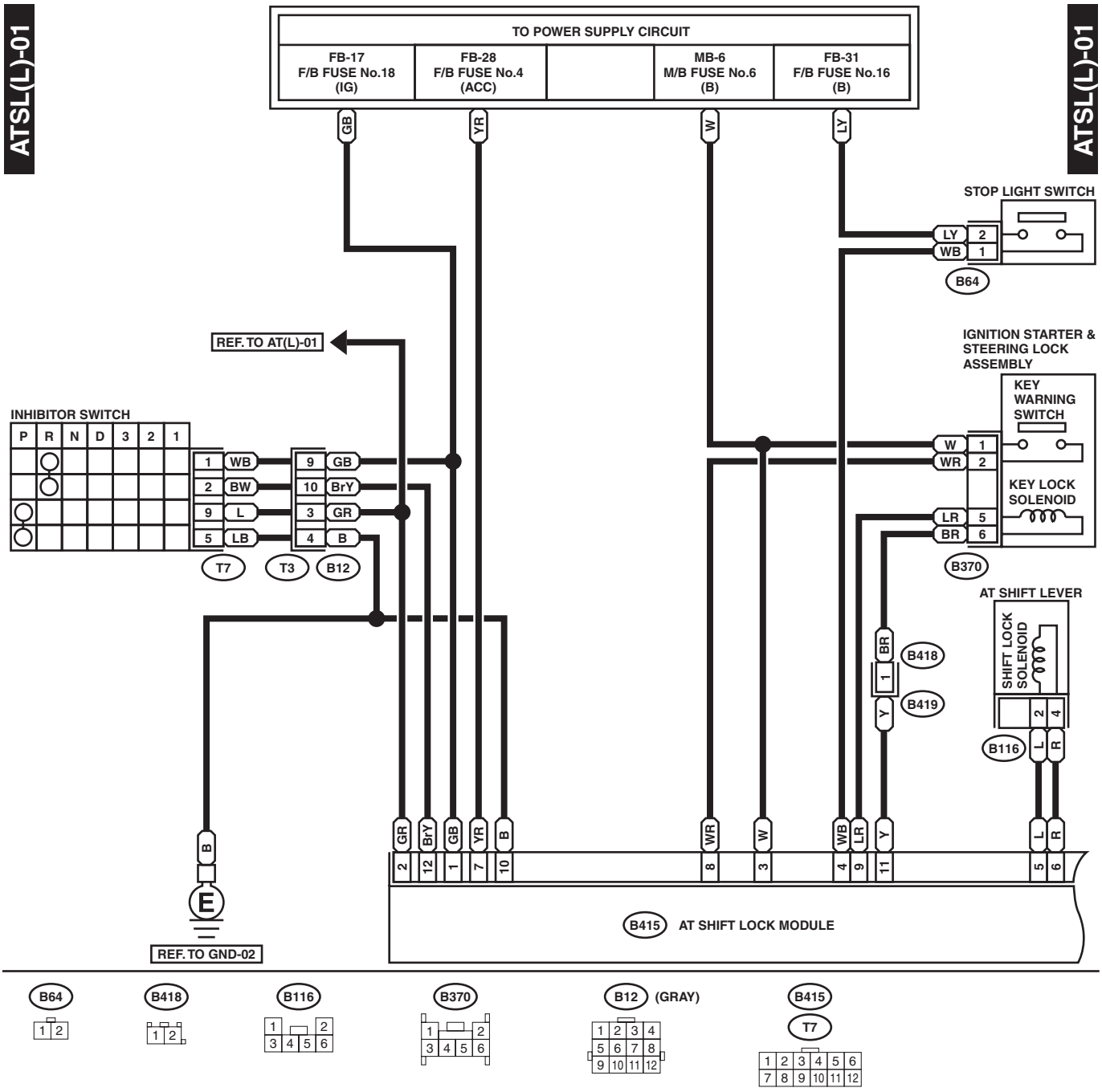
AT4 (BROWN)
B53 (BLACK)
B11 (BLACK)
A: B54
B: B55 (GRAY)
C: B56 (GREEN)

WI-07236

7. AT Shift Lock Control System

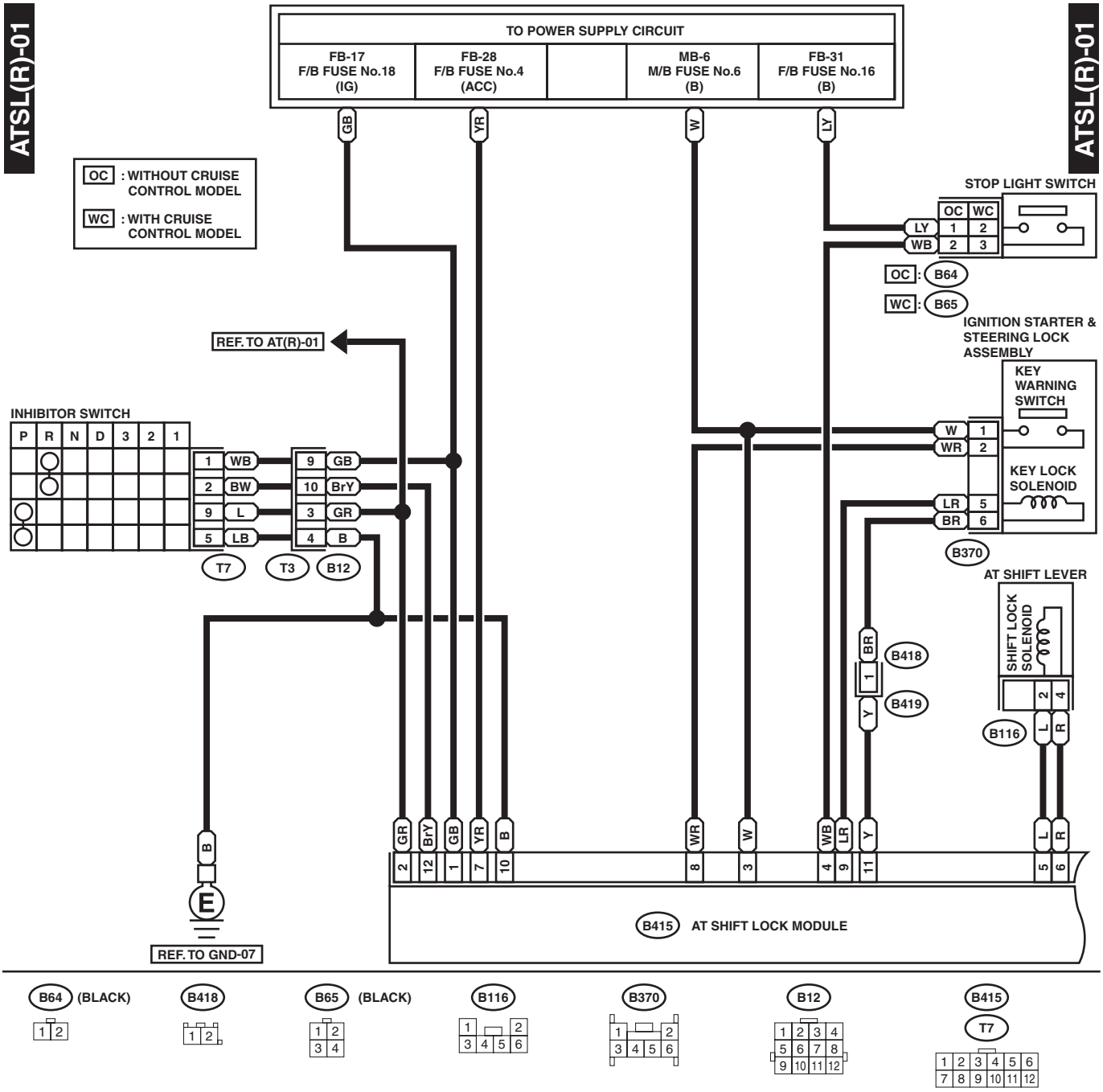
A: WIRING DIAGRAM

1. LHD MODEL



WI-07220

2. RHD MODEL

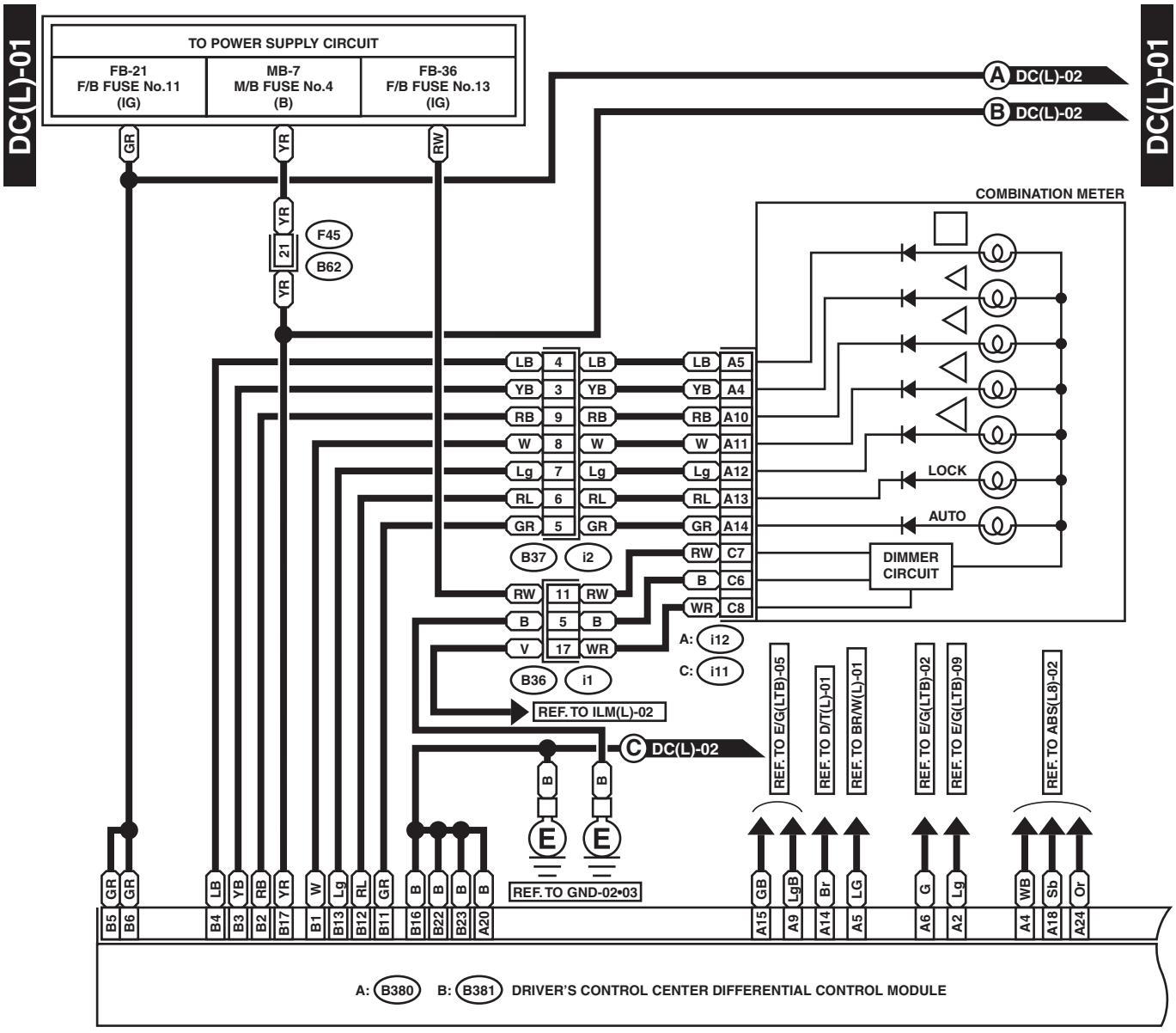


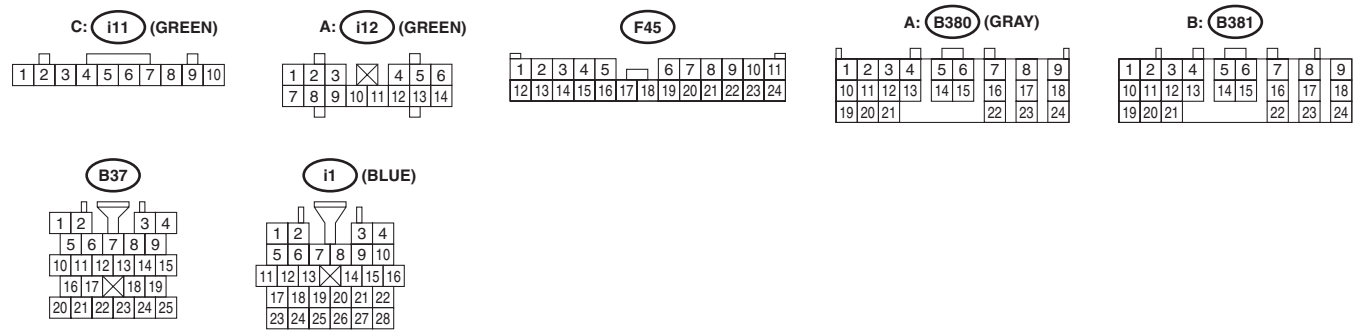
WI-07221

8. Driver's Control Center Differential Control System

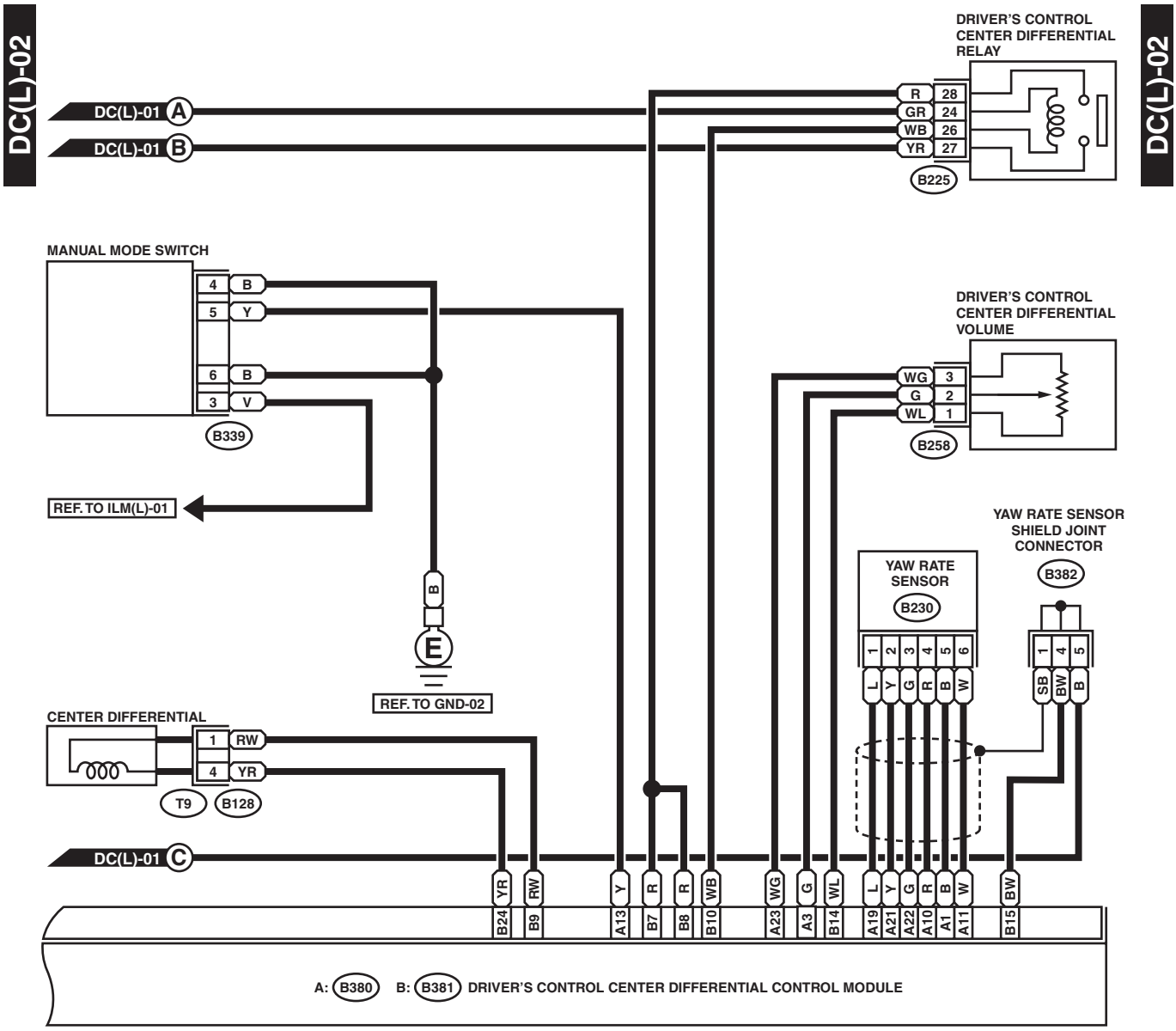
A: WIRING DIAGRAM

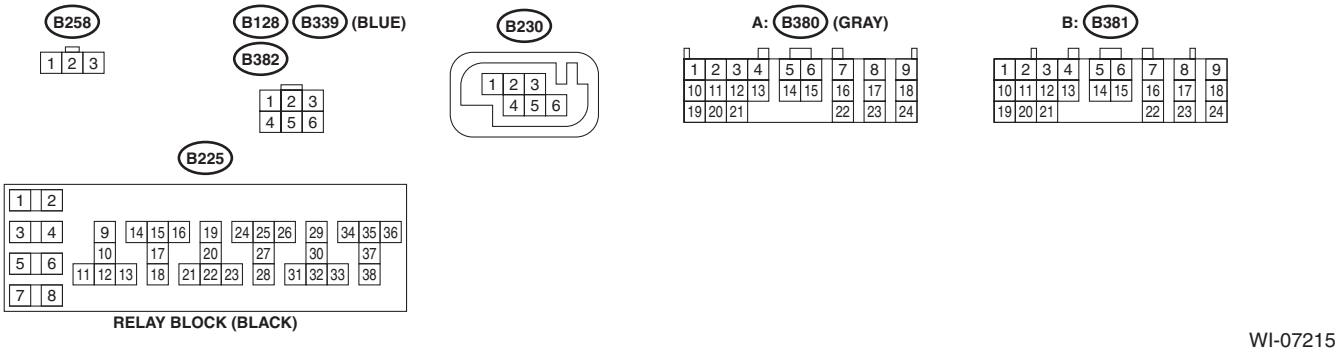
1. LHD MODEL





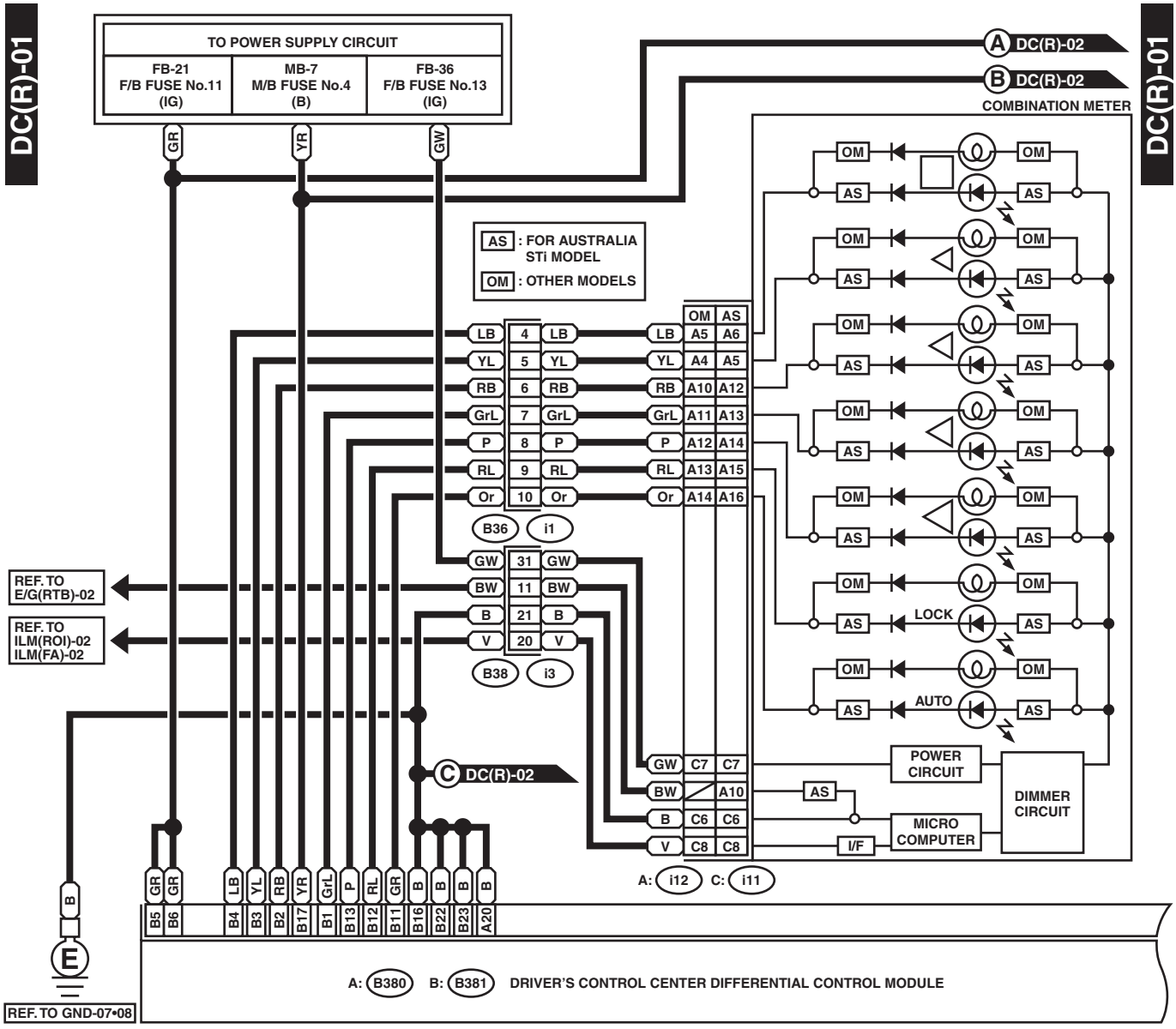
WI-07214

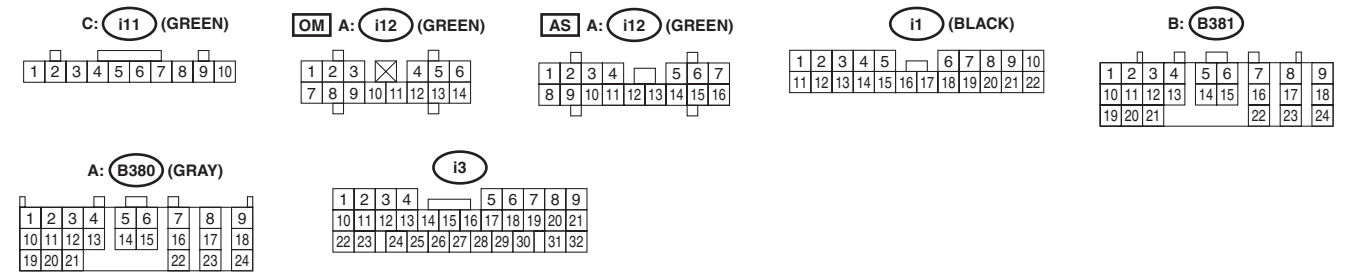

DC(L)-02
DC(L)-02
DRIVER'S CONTROL CENTER DIFFERENTIAL RELAY
DC(L)-01 A
DC(L)-01 B
R 28
GR 24
WB 26
YR 27
B225
MANUAL MODE SWITCH
4 B
5 Y
6 B
3 V
B339
REF. TO ILM(L)-01
DRIVER'S CONTROL CENTER DIFFERENTIAL VOLUME
WG 3
G 2
WL 1
B258
YAW RATE SENSOR SHIELD JOINT CONNECTOR
B382
YAW RATE SENSOR
B230
B
E
REF. TO GND-02
CENTER DIFFERENTIAL
1 RW
4 YR
T9
B128
DC(L)-01 C
YR RW Y R R WB WG G WL L Y G R B W BW
B24 B9 A13 B7 B8 B10 A23 A3 B14 A19 A21 A22 A10 A1 A11 B15
A: B380 B: B381 DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE


B258
B128 B339 (BLUE)
B382
B230
A: B380 (GRAY)
B: B381
B225
RELAY BLOCK (BLACK)

WI-07215

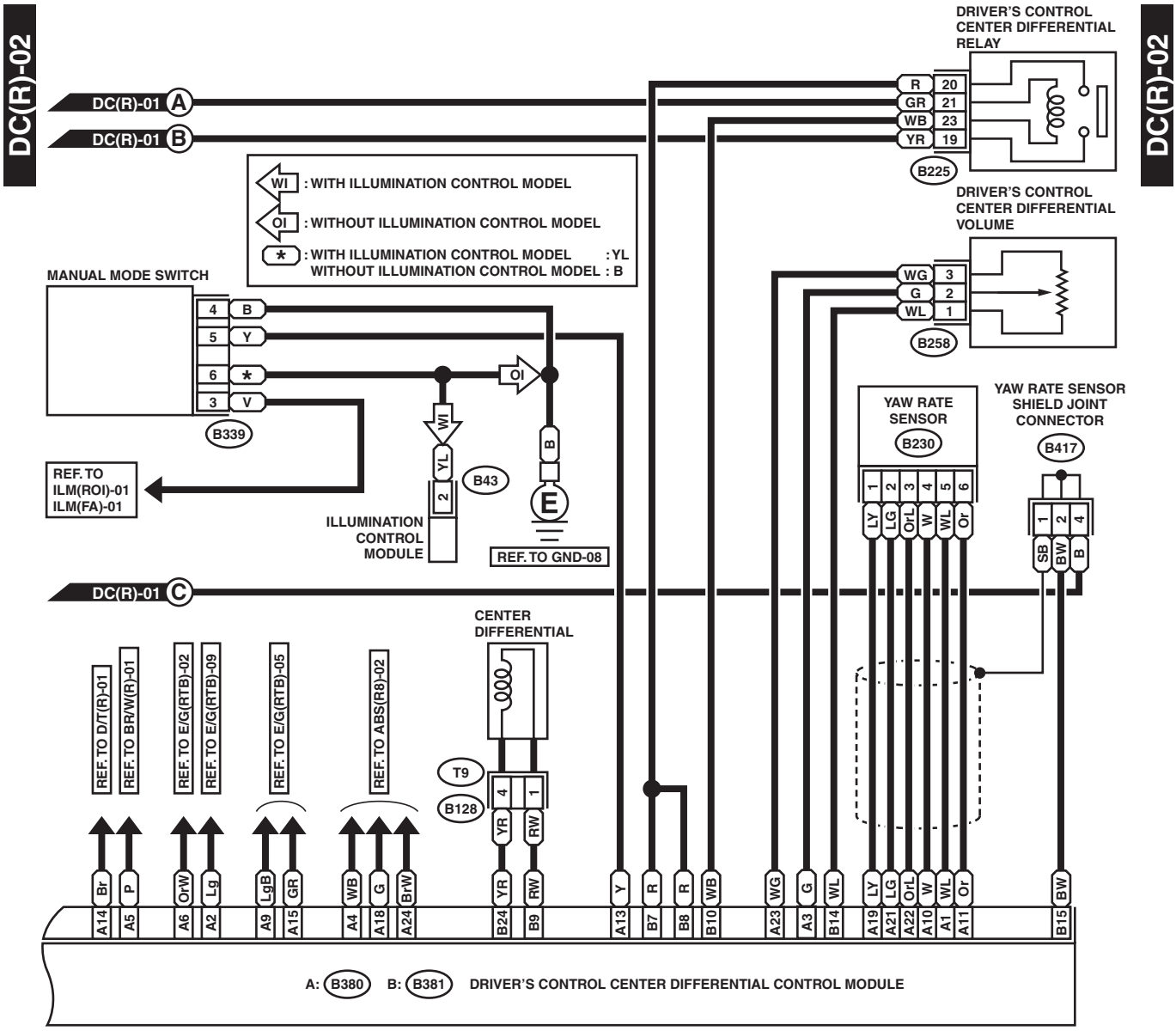
2. RHD MODEL

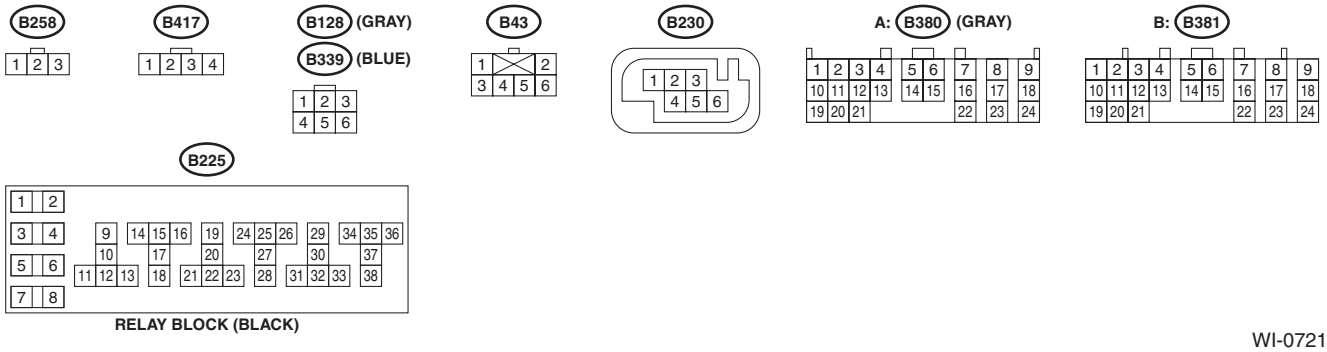




WI-07216

Driver's Control Center Differential Control System



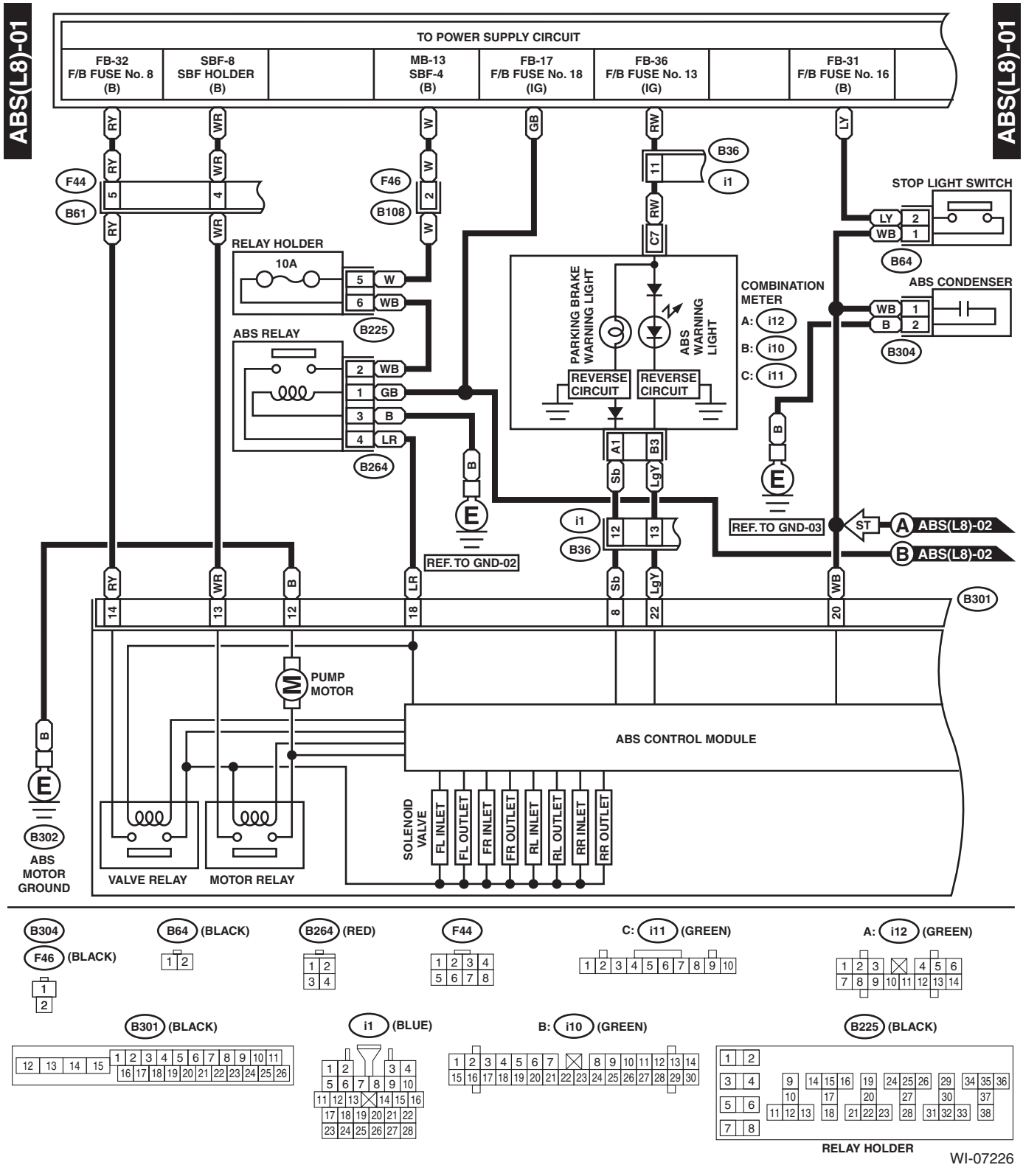


WI-07217

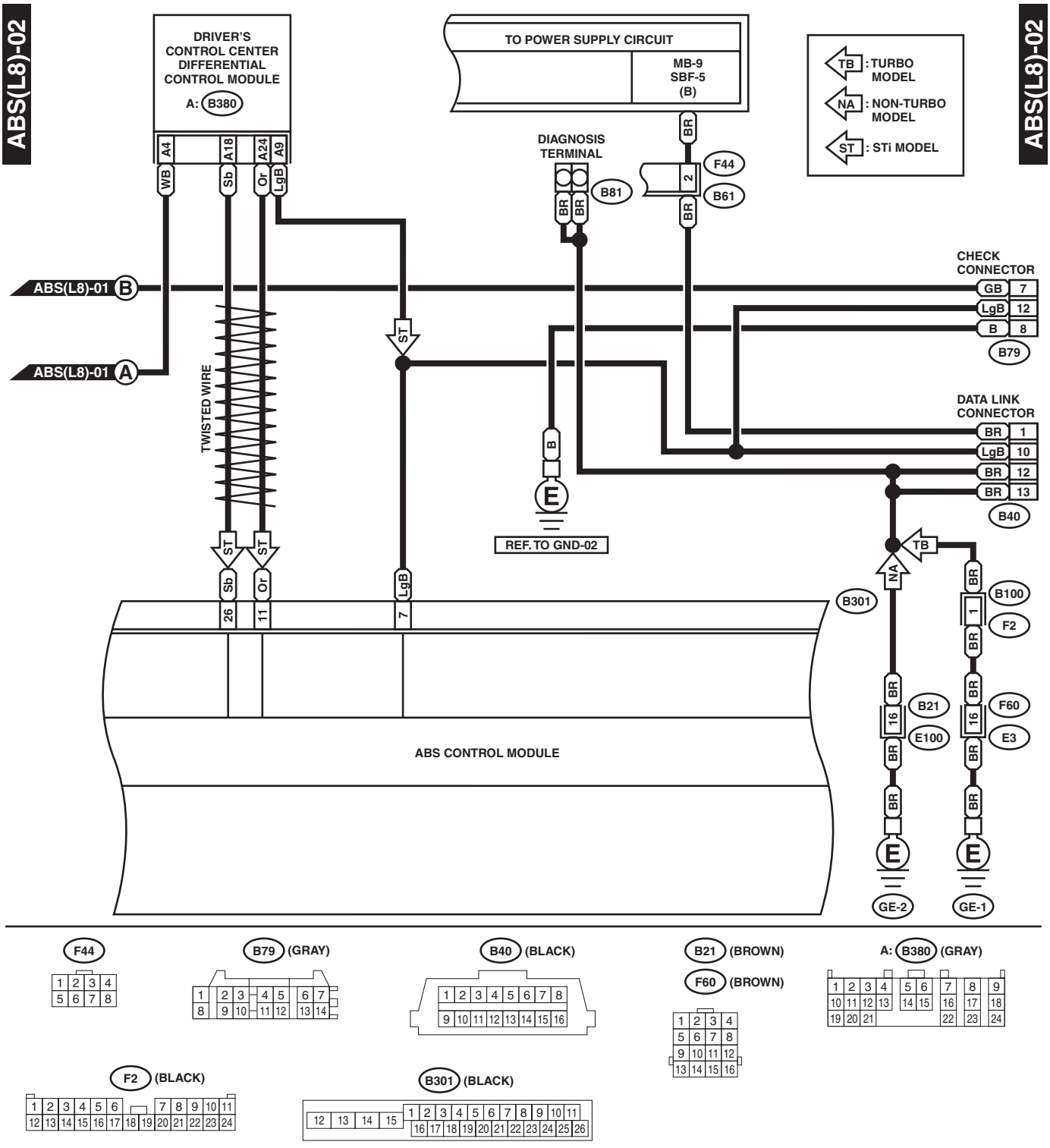
9. Anti-lock Brake System

A: WIRING DIAGRAM

1. LHD ABS 8.0 (EXCEPT FOR STi MODEL WITHOUT DRIVER'S CONTROL CENTER DIFFERENTIAL)



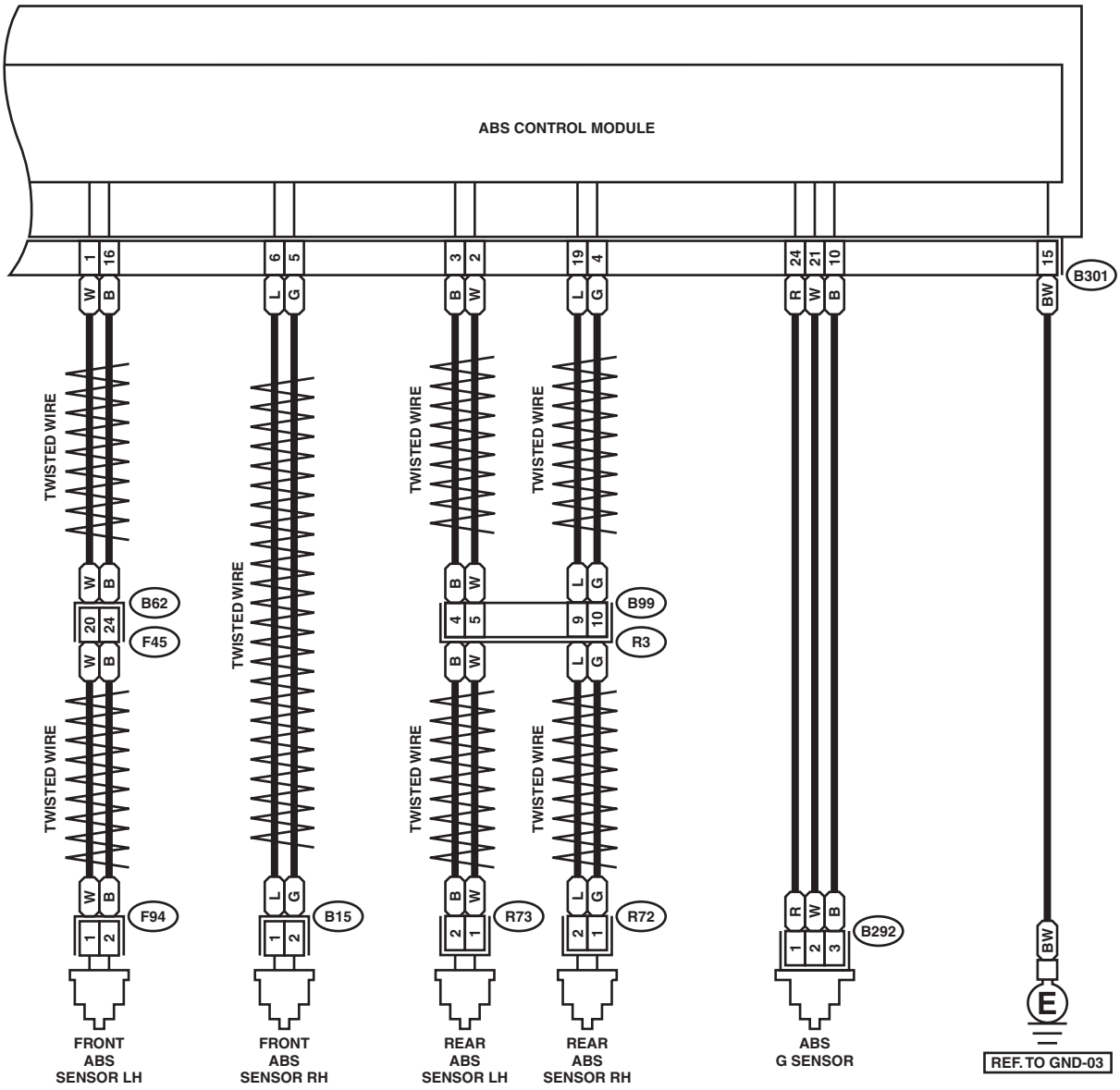
WI-07226

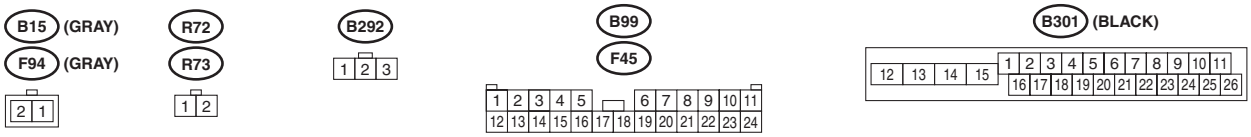

ABS(L8)-02
DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE
A: B380
A4
A18
A24
A9
WB
Sb
Or
LgB
TO POWER SUPPLY CIRCUIT
MB-9 SBF-5 (B)
BR
F44
2
B61
DIAGNOSIS TERMINAL
B81
BR
BR
TB : TURBO MODEL
NA : NON-TURBO MODEL
ST : STi MODEL
ABS(L8)-02
CHECK CONNECTOR
GB 7
LgB 12
B 8
B79
ABS(L8)-01 B
ABS(L8)-01 A
TWISTED WIRE
ST
DATA LINK CONNECTOR
BR 1
LgB 10
BR 12
BR 13
B40
B
E
REF. TO GND-02
TB
NA
B301
BR
B100
1
F2
BR
BR
16
B21
E100
BR
BR
16
F60
E3
BR
BR
BR
BR
E
E
GE-2
GE-1
ST
ST
Sb
Or
LgB
26
11
7
ABS CONTROL MODULE

F44
B79 (GRAY)
B40 (BLACK)
B21 (BROWN)
F60 (BROWN)
A: B380 (GRAY)
F2 (BLACK)
B301 (BLACK)

WI-07237

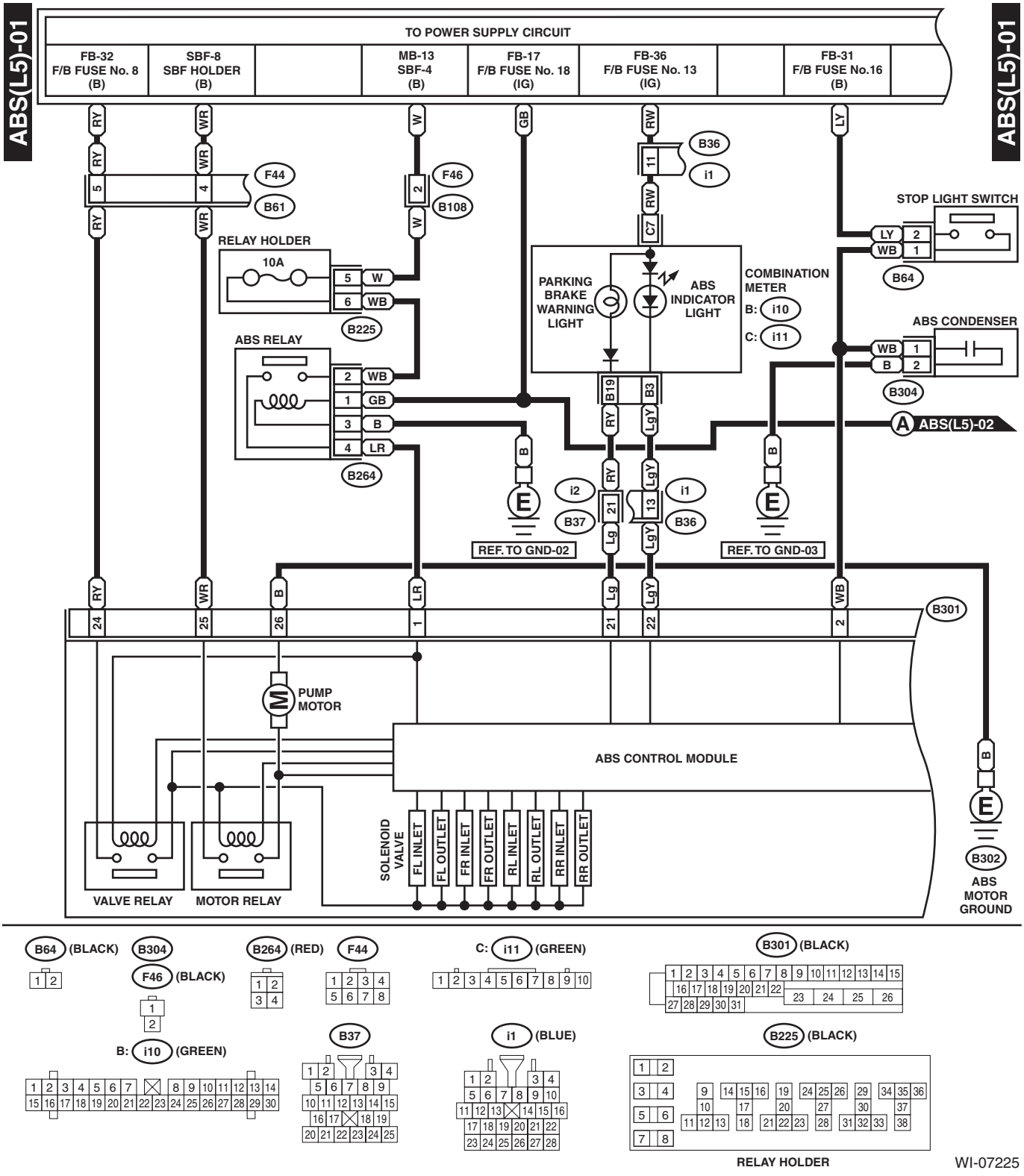
ABS(L8)-03



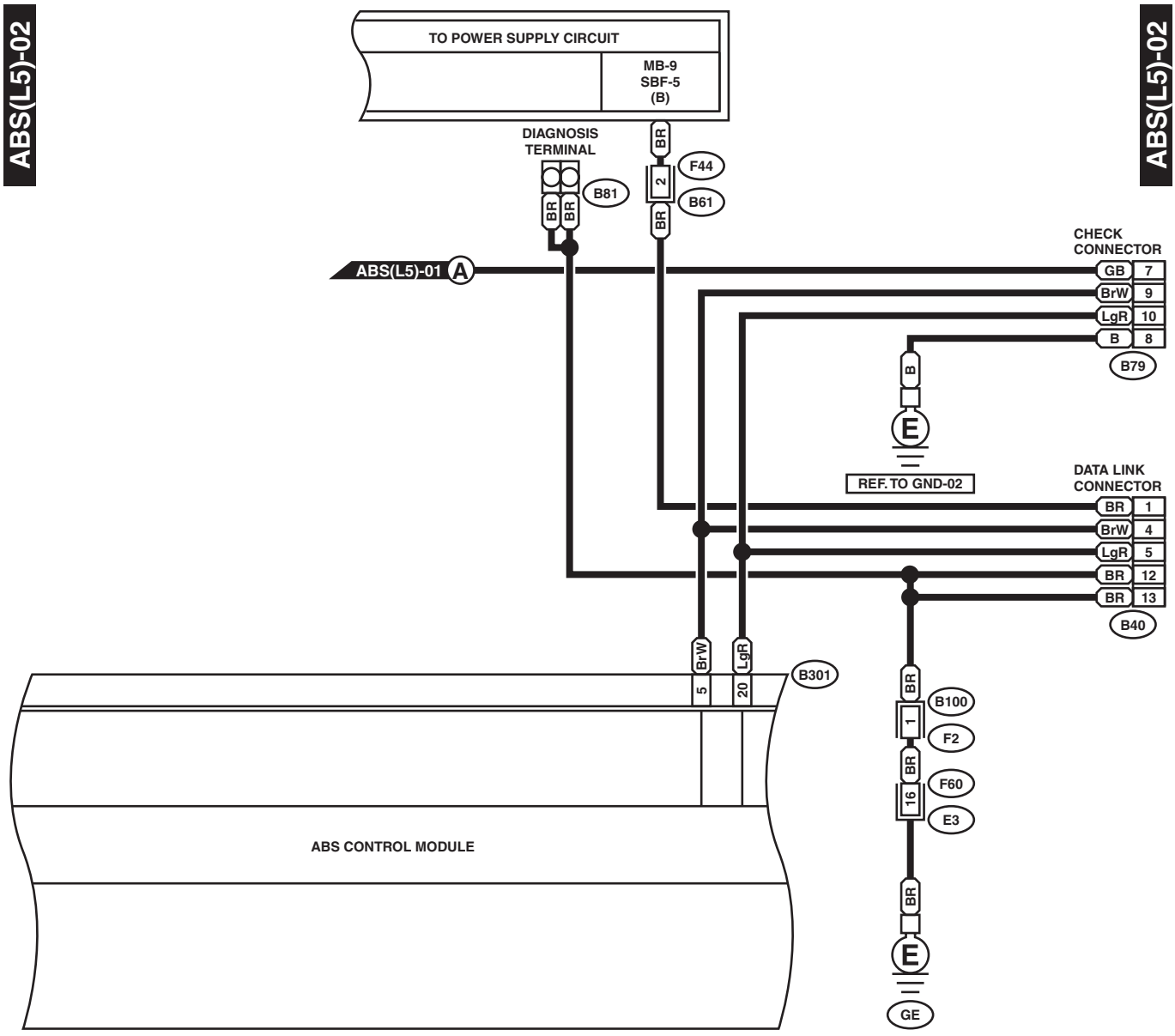


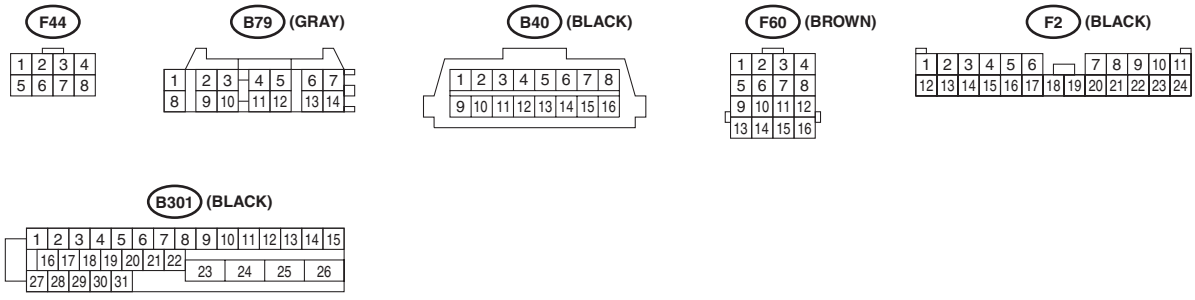
WI-07616

2. LHD ABS 5.3i (STi MODEL WITHOUT DRIVER'S CONTROL CENTER DIFFERENTIAL)



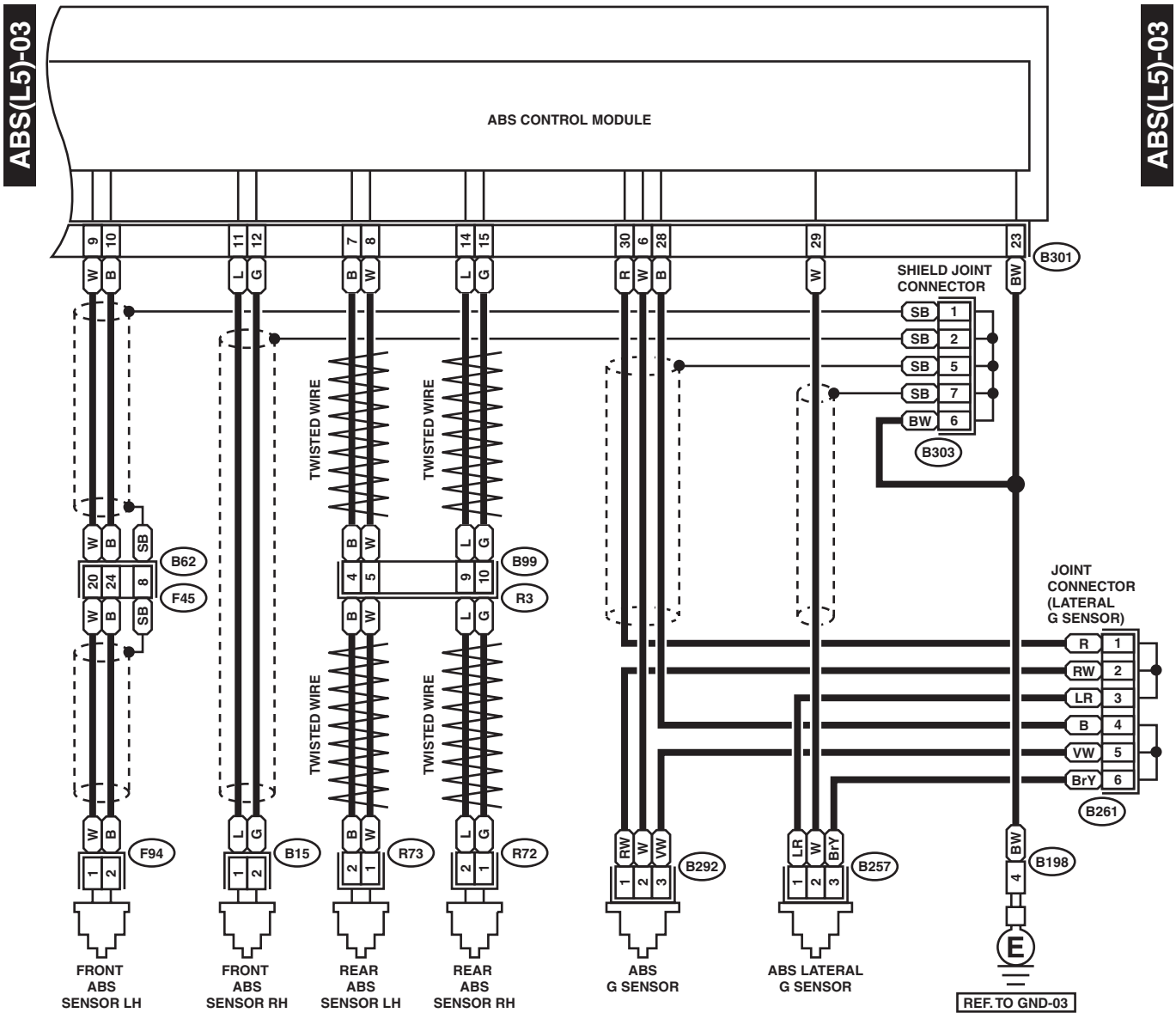
WI-07225

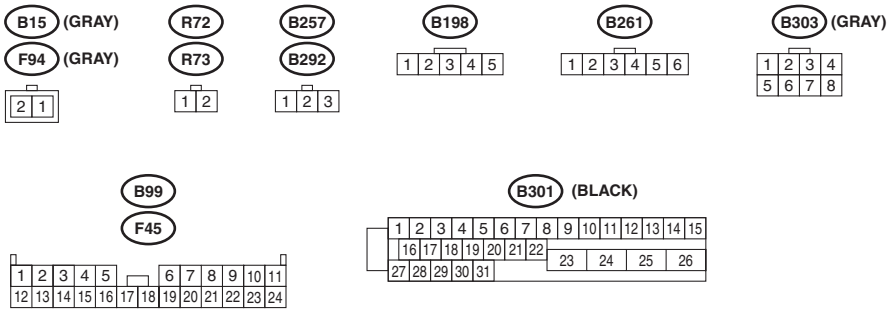

ABS(L5)-02
ABS(L5)-02
TO POWER SUPPLY CIRCUIT
MB-9
SBF-5
(B)
DIAGNOSIS
TERMINAL
B81
BR
BR
BR
2
F44
B61
BR
ABS(L5)-01 A
CHECK
CONNECTOR
GB 7
BrW 9
LgR 10
B 8
B79
B
E
REF. TO GND-02
DATA LINK
CONNECTOR
BR 1
BrW 4
LgR 5
BR 12
BR 13
B40
BrW
LgR
5
20
B301
ABS CONTROL MODULE
BR
1
B100
F2
BR
16
F60
E3
BR
E
GE


F44
B79 (GRAY)
B40 (BLACK)
F60 (BROWN)
F2 (BLACK)

B301 (BLACK)

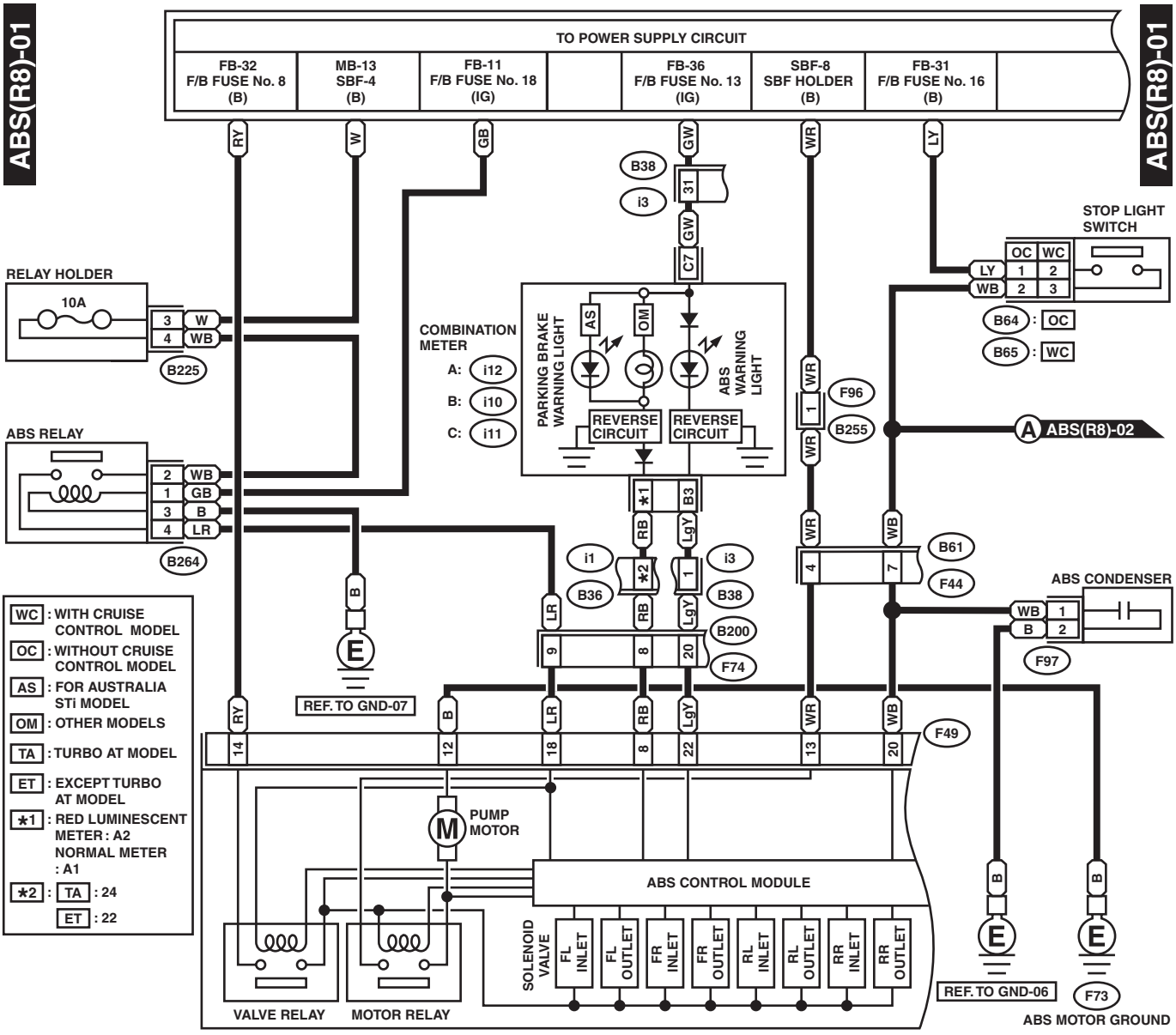
WI-07066

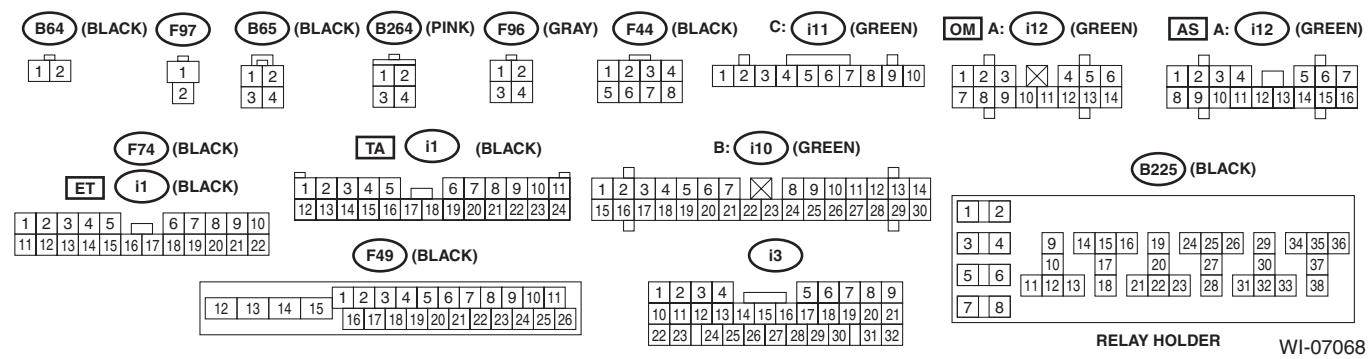

ABS(L5)-03
ABS(L5)-03
ABS CONTROL MODULE
SHIELD JOINT CONNECTOR
JOINT CONNECTOR (LATERAL G SENSOR)
TWISTED WIRE
TWISTED WIRE
TWISTED WIRE
TWISTED WIRE
B301
B303
B62
F45
B99
R3
F94
B15
R73
R72
B292
B257
B198
B261
FRONT ABS SENSOR LH
FRONT ABS SENSOR RH
REAR ABS SENSOR LH
REAR ABS SENSOR RH
ABS G SENSOR
ABS LATERAL G SENSOR
REF. TO GND-03


B15 (GRAY)
F94 (GRAY)
R72
R73
B257
B292
B198
B261
B303 (GRAY)
B99
F45
B301 (BLACK)

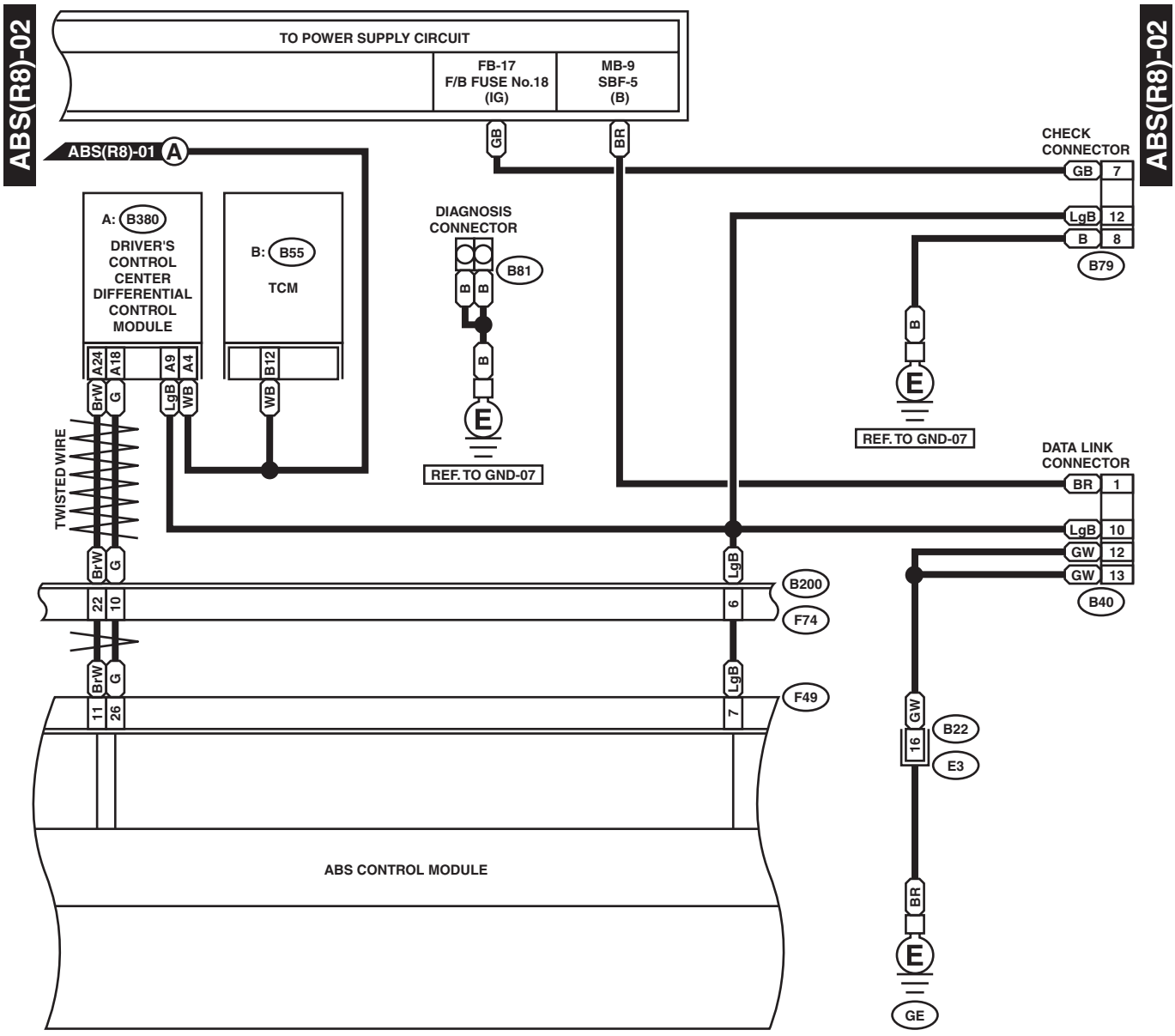
WI-07067

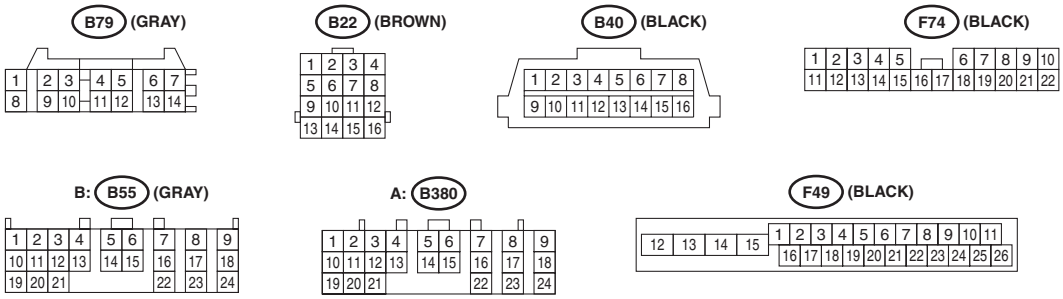
3. RHD ABS 8.0 (EXCEPT FOR STi MODEL WITHOUT DRIVER'S CONTROL CENTER DIFFERENTIAL)



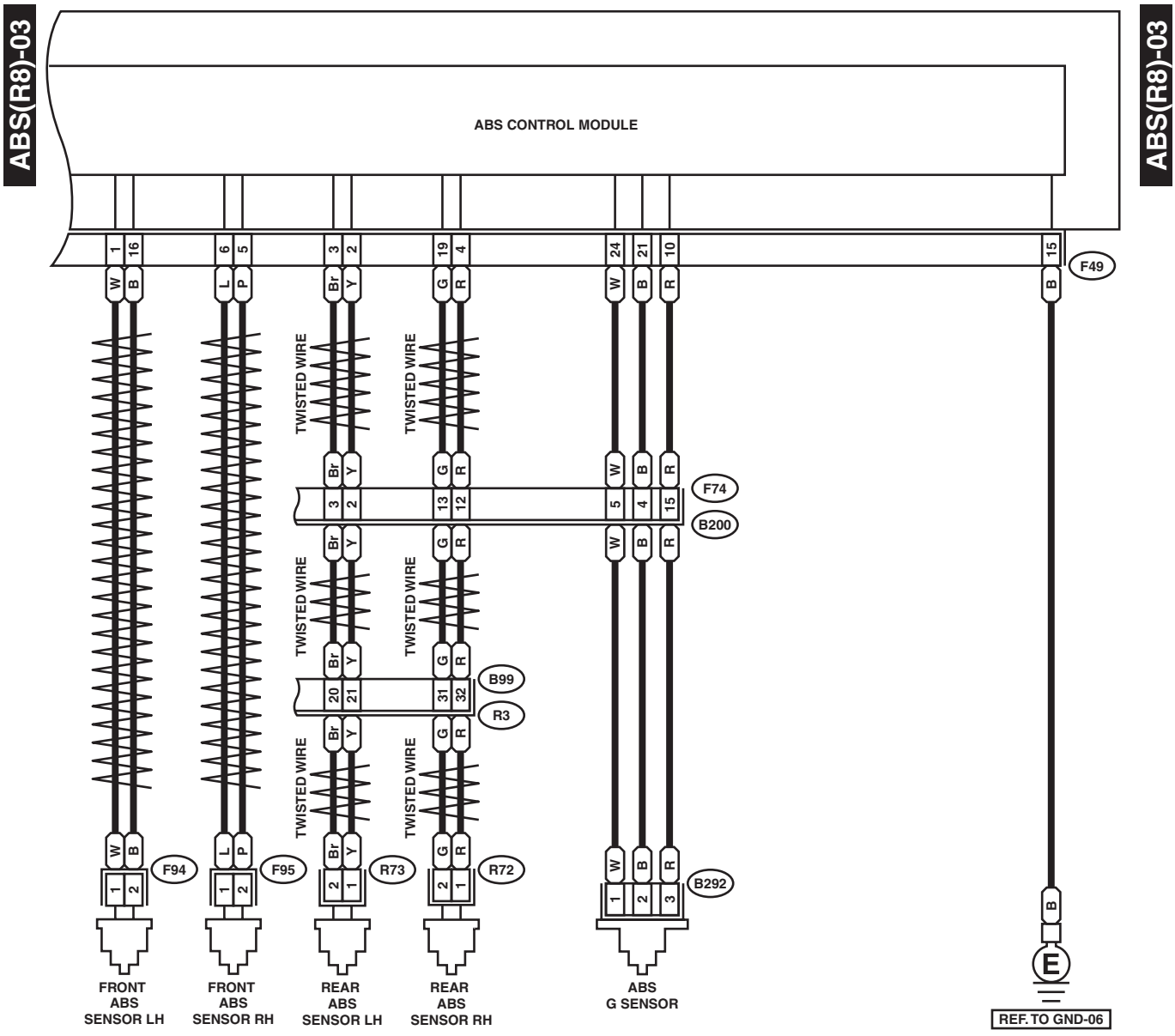


WI-07068


ABS(R8)-02
TO POWER SUPPLY CIRCUIT
FB-17
F/B FUSE No.18
(IG)
MB-9
SBF-5
(B)
GB
BR
ABS(R8)-01 A
CHECK CONNECTOR
GB 7
LgB 12
B 8
B79
A: B380
DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE
A24 A18 A9 A4
BrW G LgB WB
B: B55
TCM
B12
WB
DIAGNOSIS CONNECTOR
B81
B B
B
E
REF. TO GND-07
B
E
REF. TO GND-07
TWISTED WIRE
DATA LINK CONNECTOR
BR 1
LgB 10
GW 12
GW 13
B40
BrW G
LgB
B200
22 10
6
F74
BrW G
LgB
F49
11 26
7
GW
16
B22
E3
ABS CONTROL MODULE
BR
E
GE


B79 (GRAY)
B22 (BROWN)
B40 (BLACK)
F74 (BLACK)
B: B55 (GRAY)
A: B380
F49 (BLACK)

WI-07069

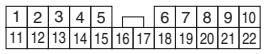


F94 (GRAY)
F95 (GRAY)

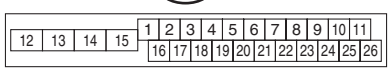
R72
R73

B292 (BLACK)

F74 (BLACK)



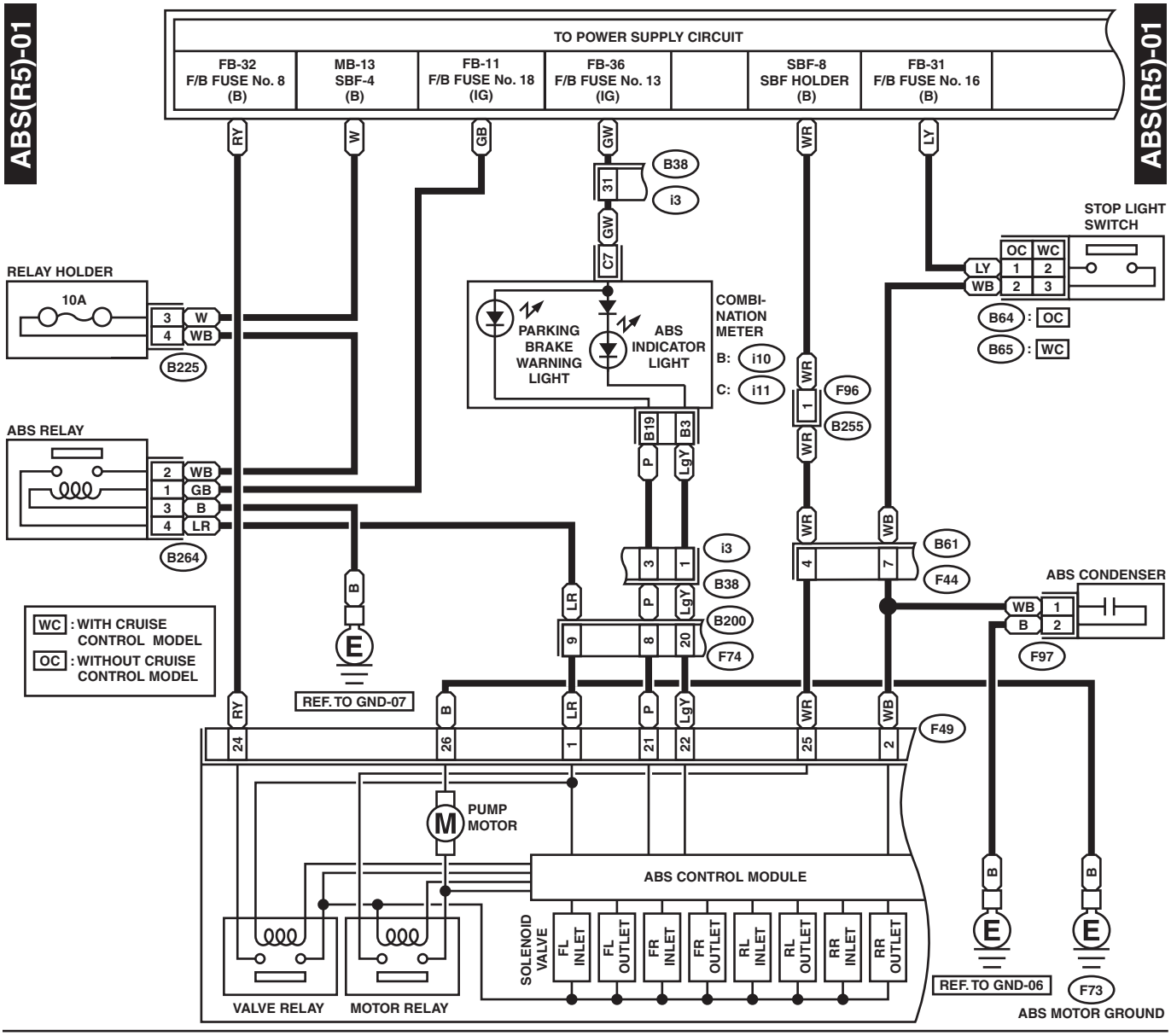
F49 (BLACK)

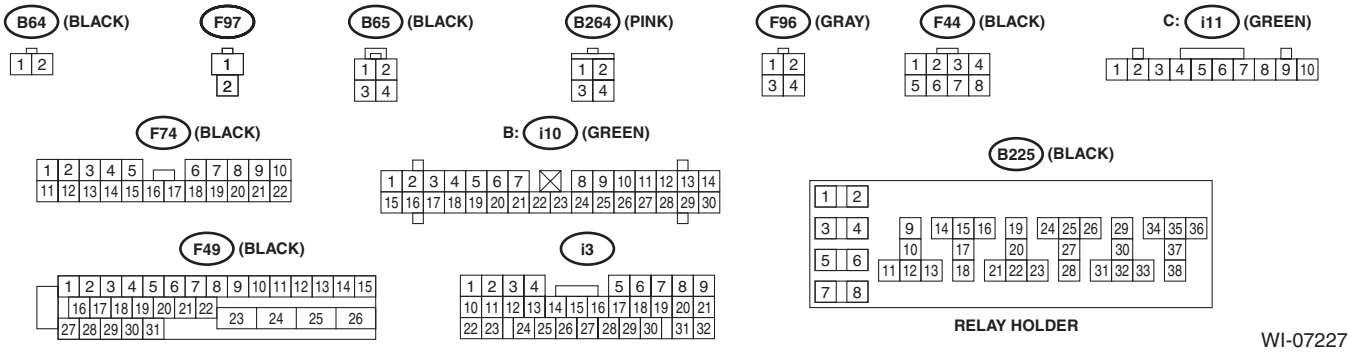


B99

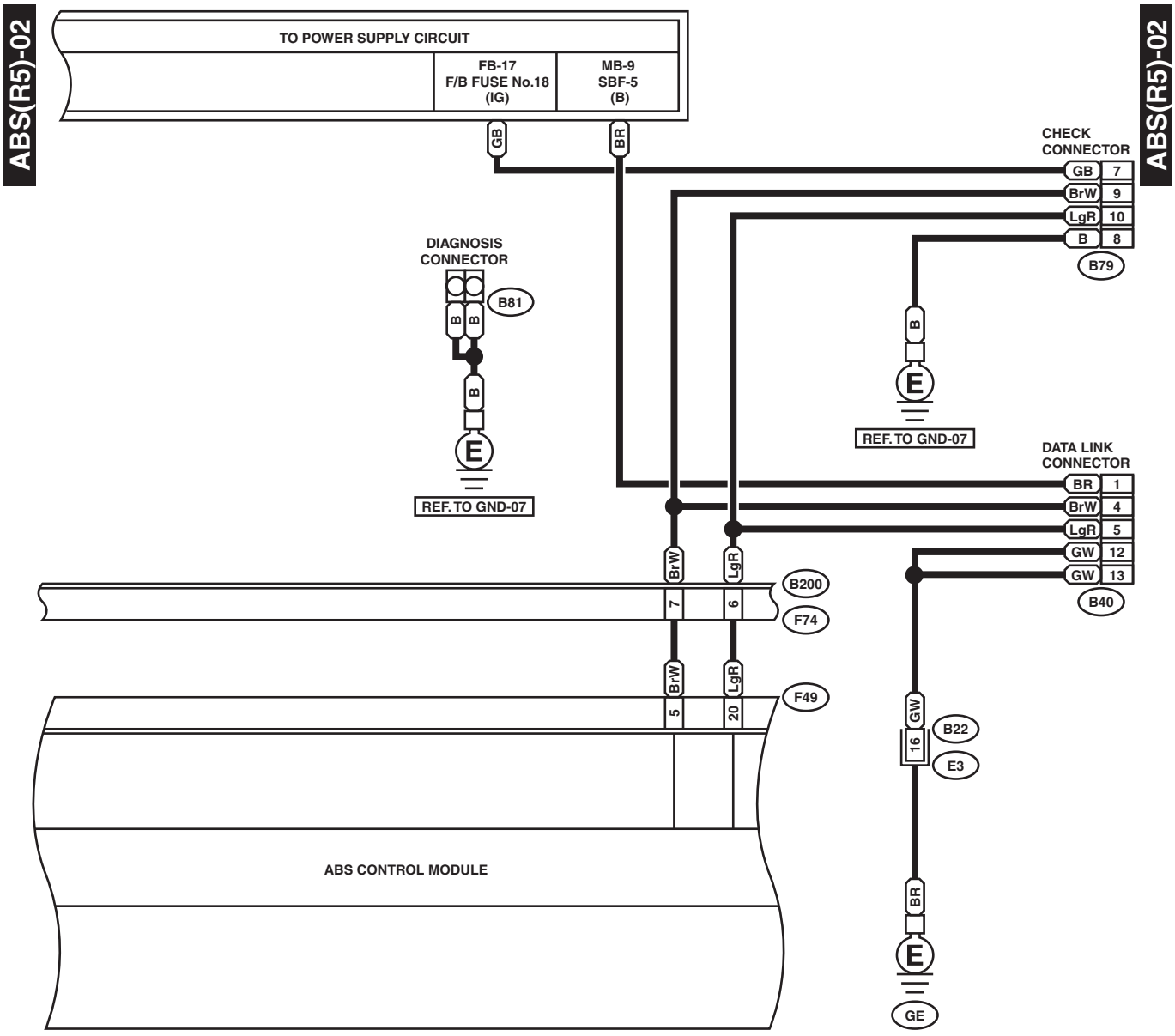
WI-07070

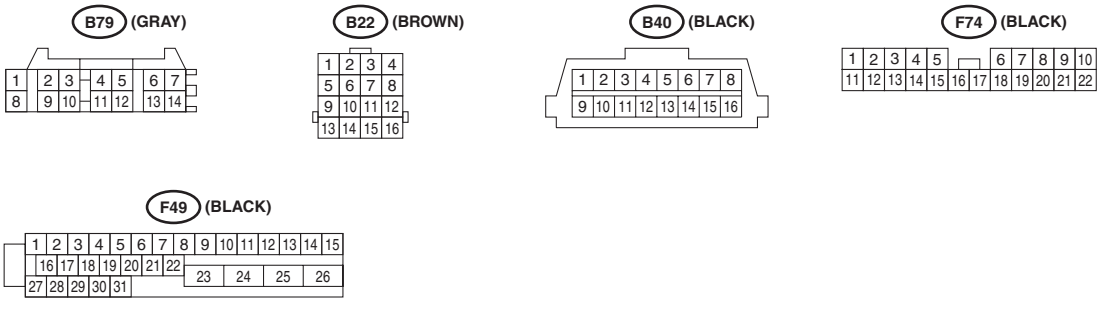
4. RHD ABS 5.3i (STi MODEL WITHOUT DRIVER'S CONTROL CENTER DIFFERENTIAL)



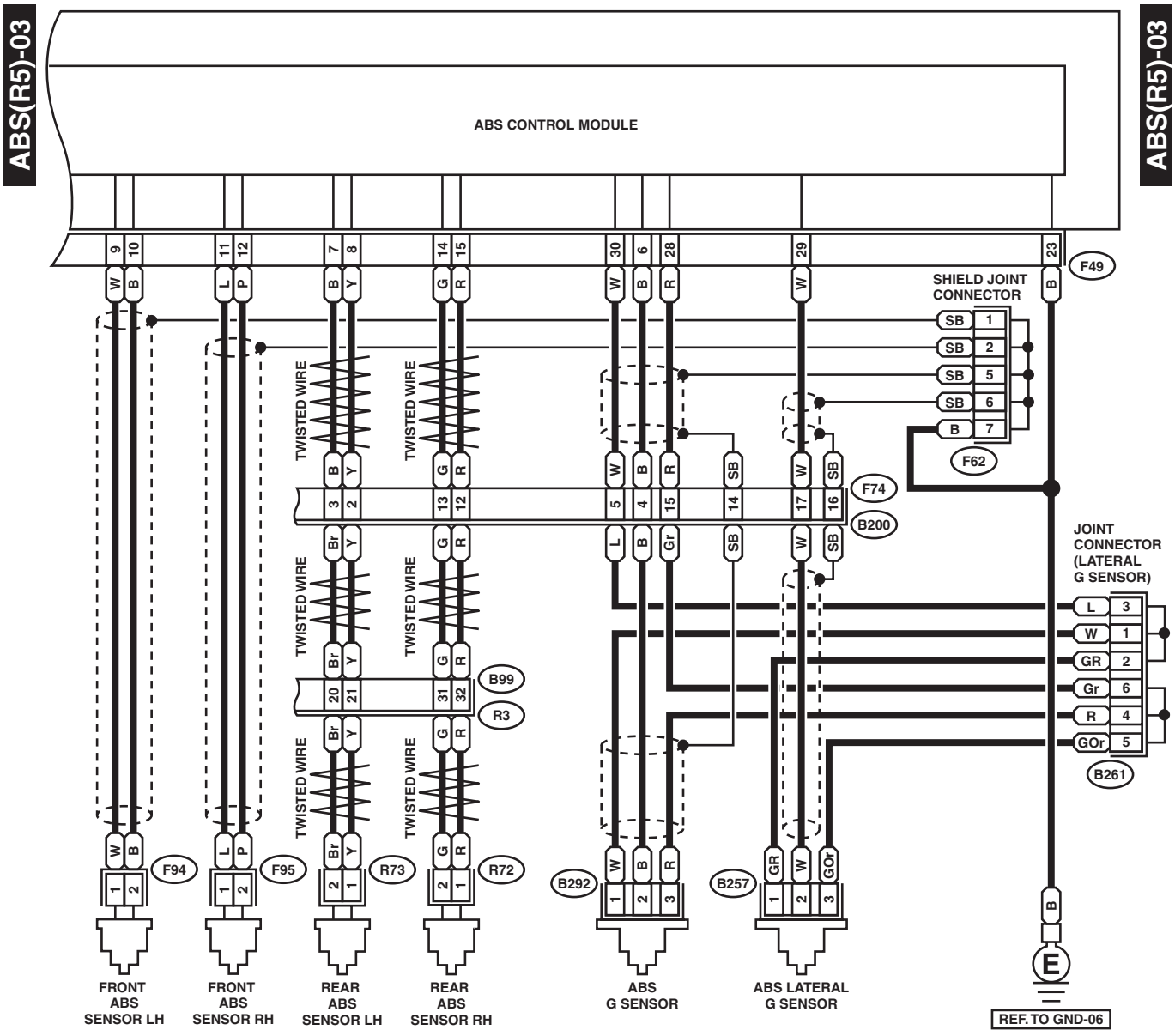


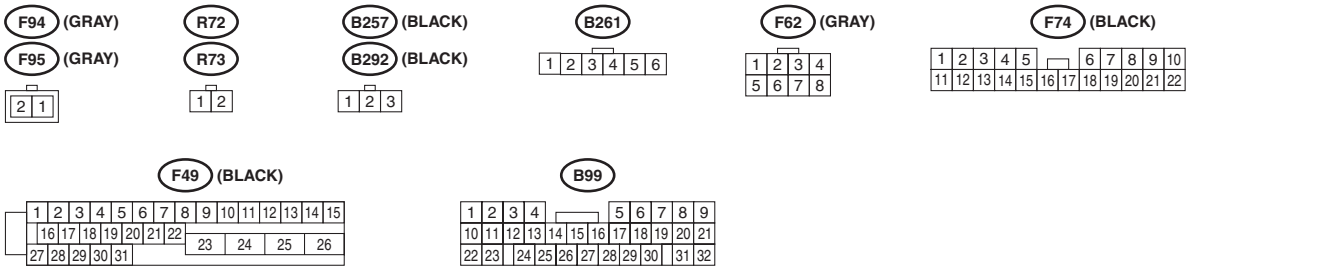
WI-07227


ABS(R5)-02
ABS(R5)-02
TO POWER SUPPLY CIRCUIT
FB-17
F/B FUSE No.18
(IG)
MB-9
SBF-5
(B)
GB
BR
CHECK
CONNECTOR
GB 7
BrW 9
LgR 10
B 8
B79
DIAGNOSIS
CONNECTOR
B81
B
B
B
E
REF. TO GND-07
B
E
REF. TO GND-07
DATA LINK
CONNECTOR
BR 1
BrW 4
LgR 5
GW 12
GW 13
B40
BrW
LgR
B200
7
6
F74
BrW
LgR
F49
5
20
GW
16
B22
E3
ABS CONTROL MODULE
BR
E
GE


B79 (GRAY)
B22 (BROWN)
B40 (BLACK)
F74 (BLACK)
F49 (BLACK)

WI-07228


ABS(R5)-03
ABS(R5)-03
ABS CONTROL MODULE
SHIELD JOINT CONNECTOR
JOINT CONNECTOR (LATERAL G SENSOR)
TWISTED WIRE
F49
F62
F74
B200
B99
R3
B261
F94
F95
R73
R72
B292
B257
FRONT ABS SENSOR LH
FRONT ABS SENSOR RH
REAR ABS SENSOR LH
REAR ABS SENSOR RH
ABS G SENSOR
ABS LATERAL G SENSOR
REF. TO GND-06

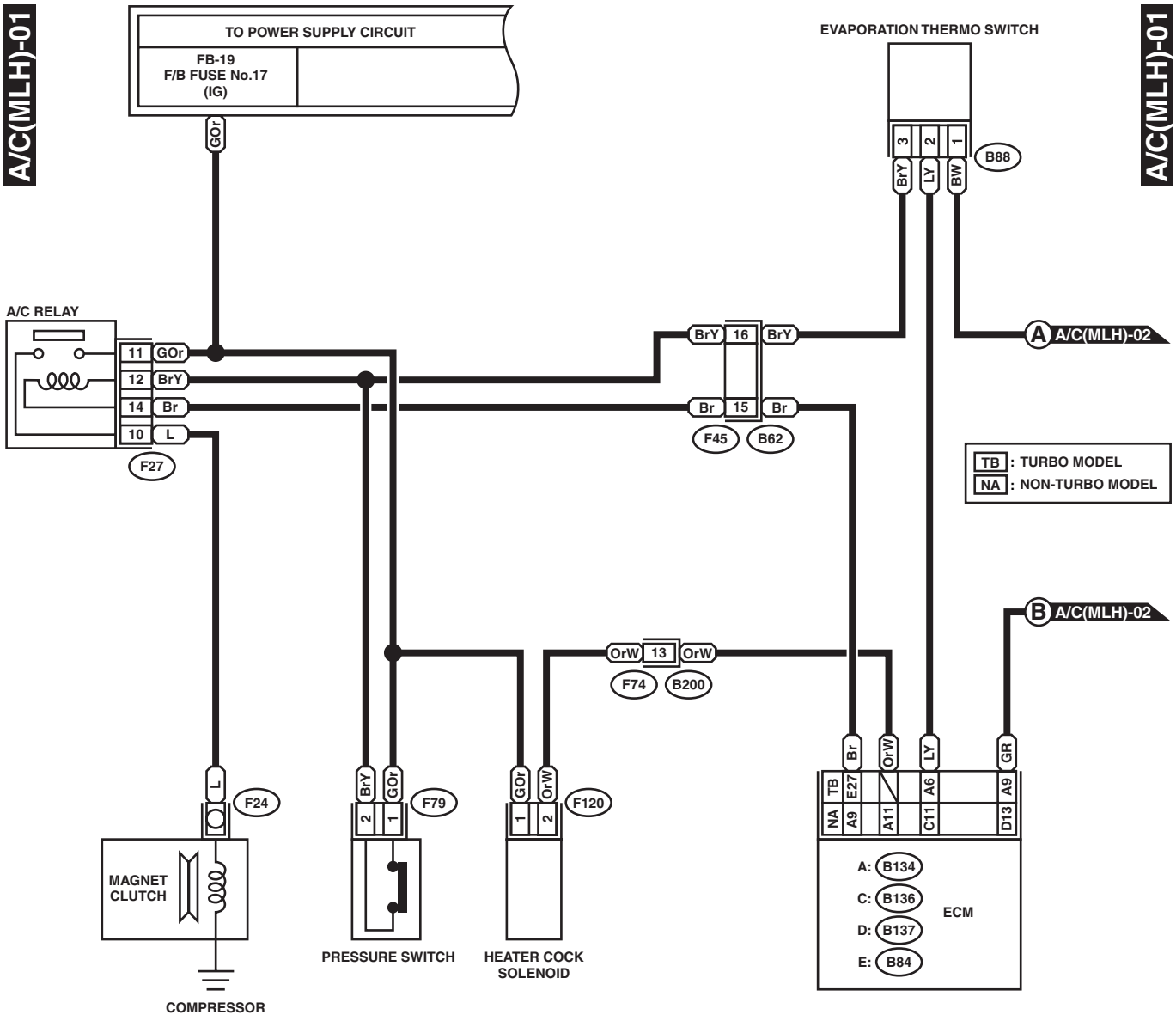

F94 (GRAY)
F95 (GRAY)
R72
R73
B257 (BLACK)
B292 (BLACK)
B261
F62 (GRAY)
F74 (BLACK)
F49 (BLACK)
B99

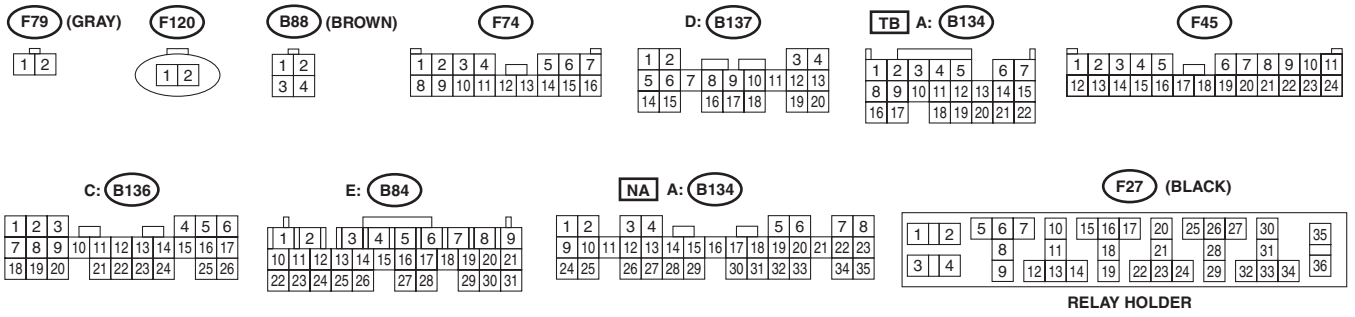
WI-07229

10.Air Conditioning System

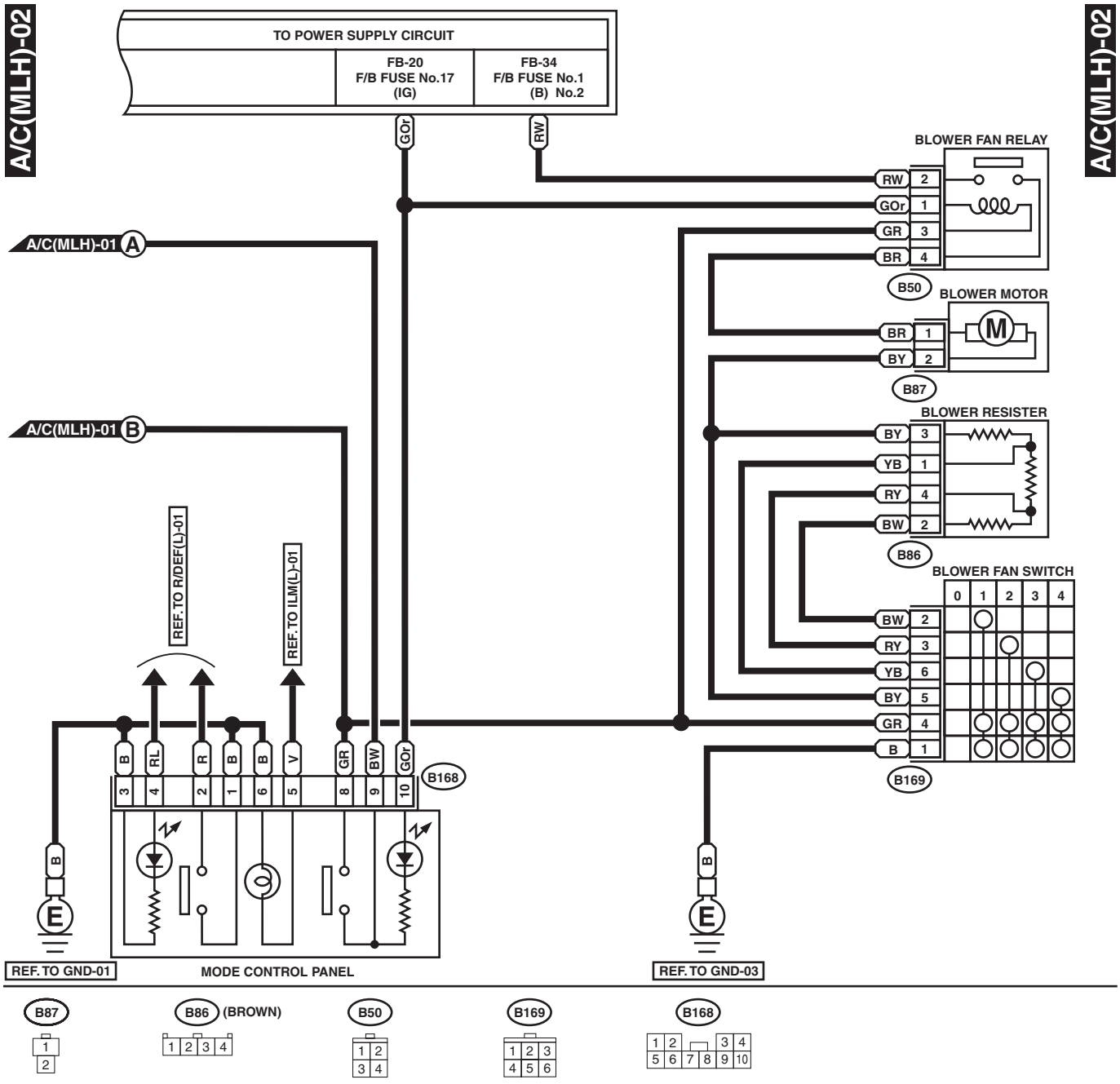
A: WIRING DIAGRAM

1. MANUAL A/C LHD MODEL



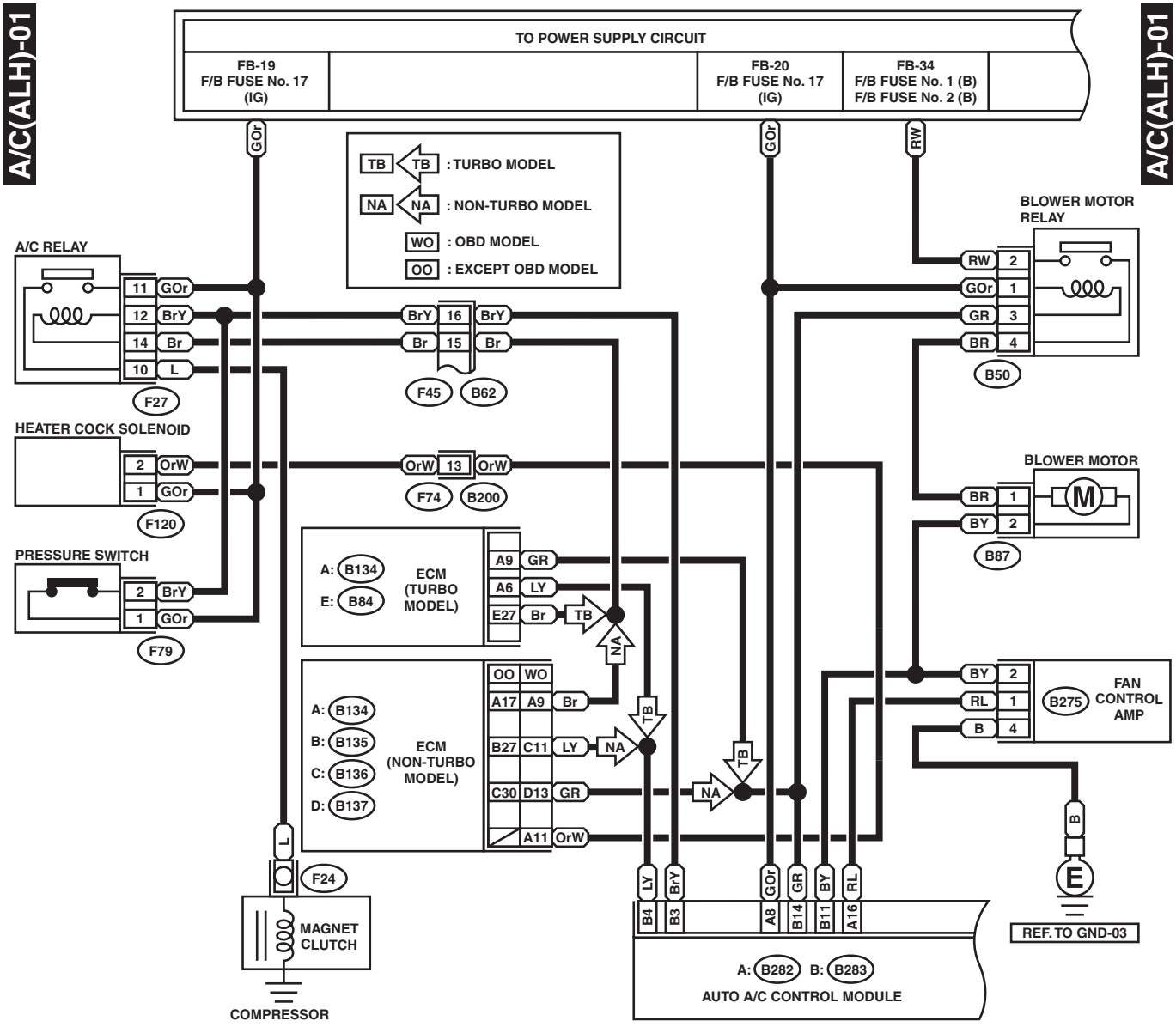


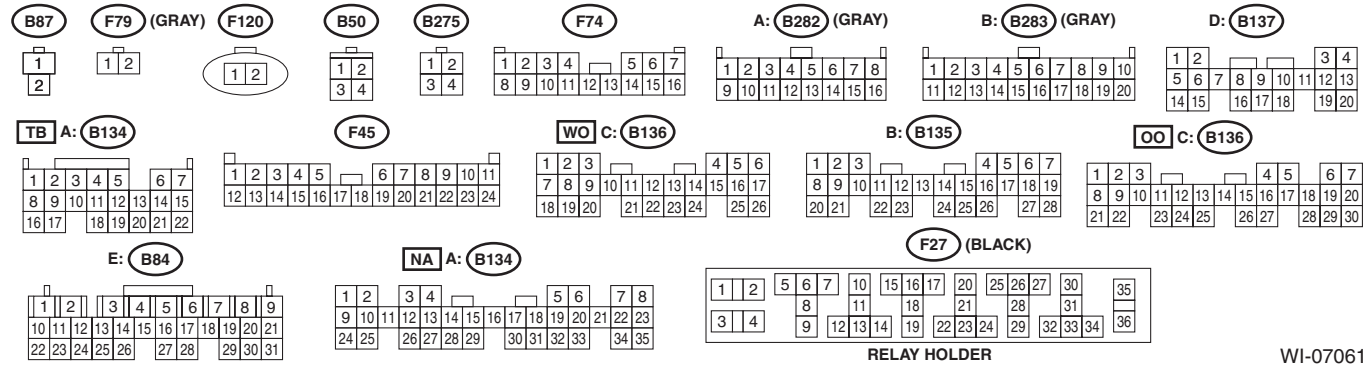
WI-07060

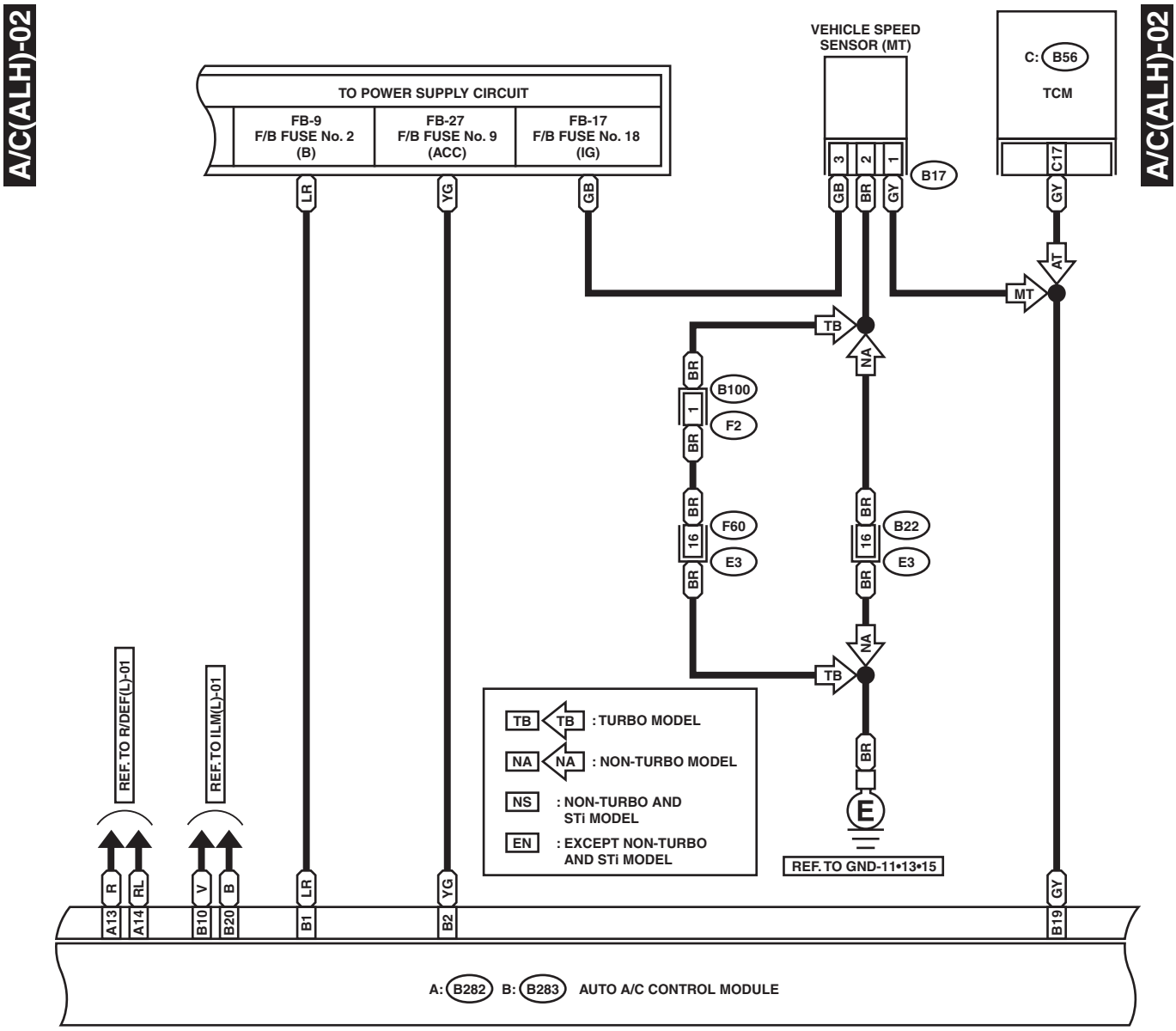

A/C(MLH)-02
TO POWER SUPPLY CIRCUIT
FB-20
F/B FUSE No.17
(IG)
FB-34
F/B FUSE No.1
(B) No.2
GOr
RW
BLOWER FAN RELAY
RW 2
GOr 1
GR 3
BR 4
B50
BLOWER MOTOR
BR 1
BY 2
B87
A/C(MLH)-01 A
A/C(MLH)-01 B
BLOWER RESISTER
BY 3
YB 1
RY 4
BW 2
B86
BLOWER FAN SWITCH
0 1 2 3 4
BW 2
RY 3
YB 6
BY 5
GR 4
B 1
B169
REF. TO R/DEF(L)-01
REF. TO ILM(L)-01
B RL R B B V GR BW GOr
3 4 2 1 6 5 8 9 10
B168
B
E
REF. TO GND-01
MODE CONTROL PANEL
REF. TO GND-03
B87
B86 (BROWN)
B50
B169
B168

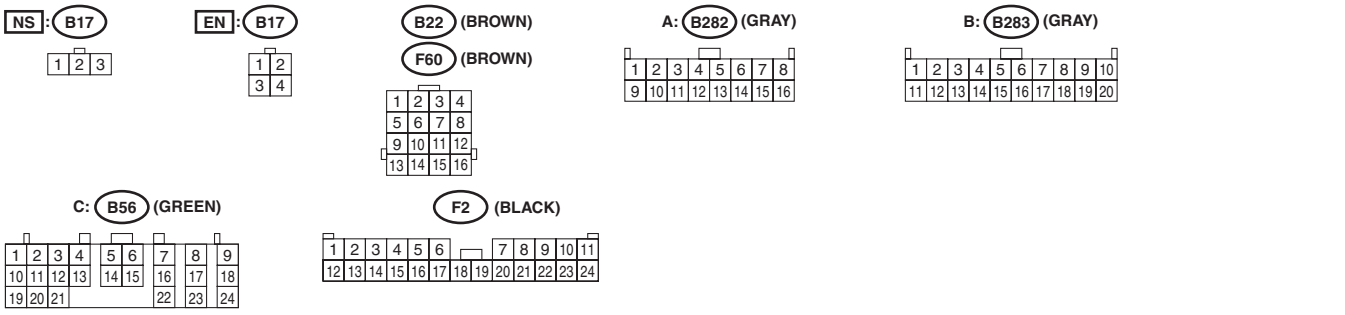
WI-04441

2. AUTO A/C LHD MODEL

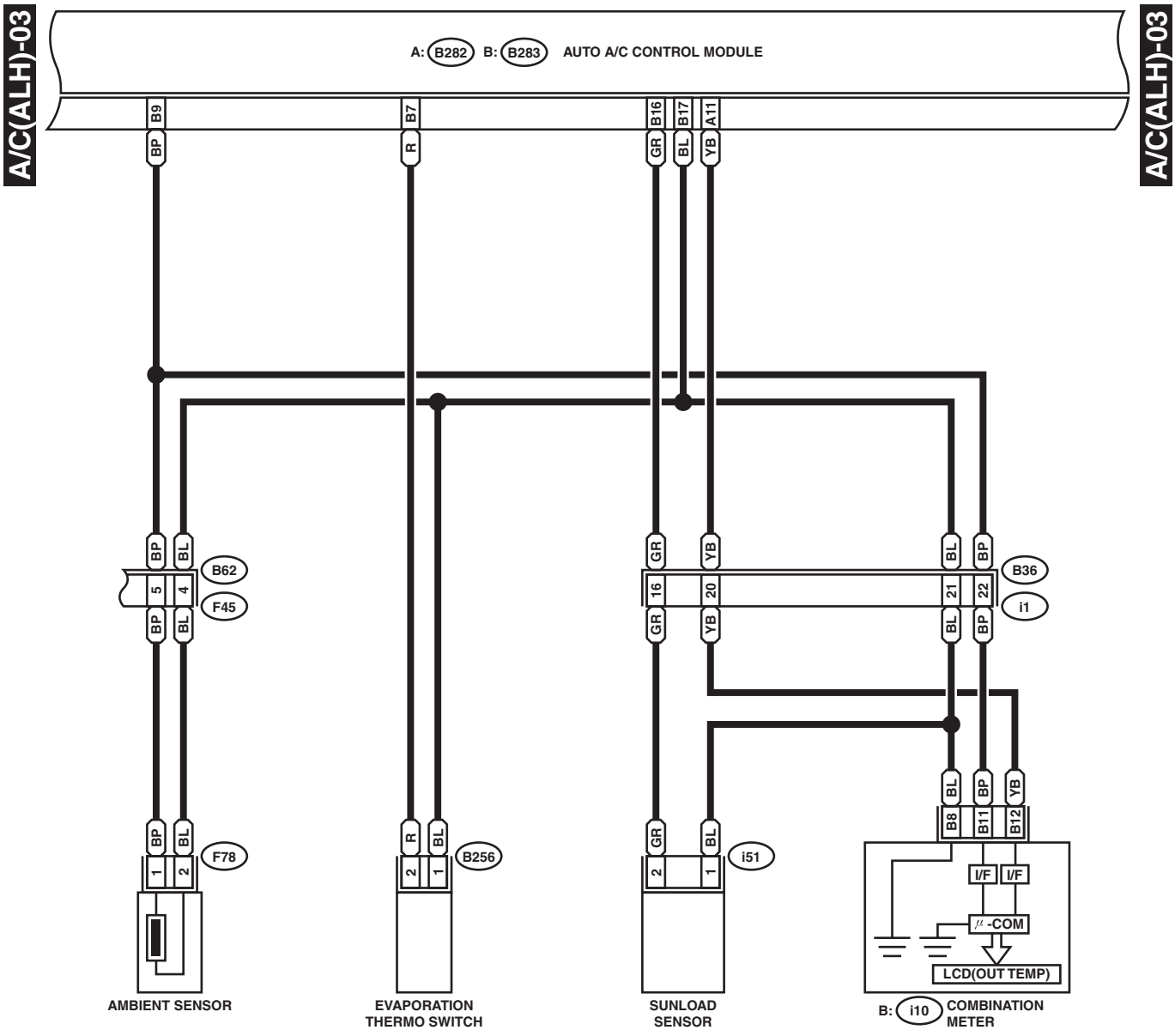


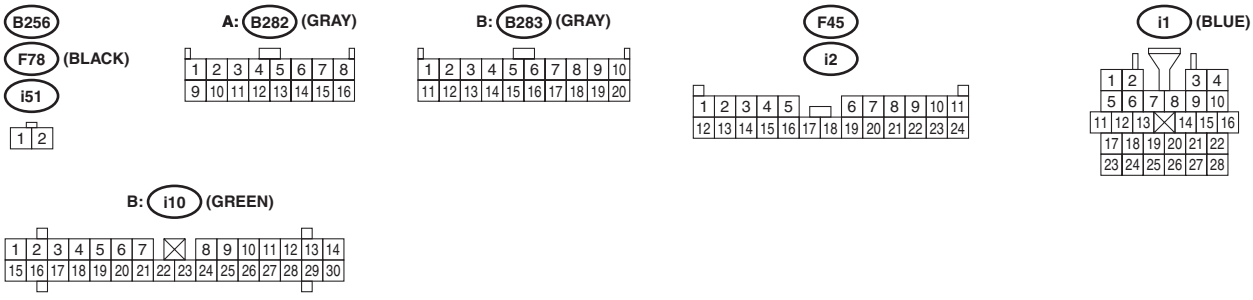



A/C(ALH)-02
A/C(ALH)-02
TO POWER SUPPLY CIRCUIT
FB-9
F/B FUSE No. 2
(B)
FB-27
F/B FUSE No. 9
(ACC)
FB-17
F/B FUSE No. 18
(IG)
VEHICLE SPEED
SENSOR (MT)
C: B56
TCM
B17
C17
LR
YG
GB
GB
BR
GY
GY
AT
MT
TB
NA
BR
B100
1
F2
BR
BR
16
F60
E3
BR
BR
16
B22
E3
BR
NA
TB
BR
E
REF. TO GND-11•13•15
REF. TO R/DEF(L)-01
REF. TO ILM(L)-01
TB : TURBO MODEL
NA : NON-TURBO MODEL
NS : NON-TURBO AND STi MODEL
EN : EXCEPT NON-TURBO AND STi MODEL
R
RL
V
B
LR
YG
GY
A13
A14
B10
B20
B1
B2
B19
A: B282 B: B283 AUTO A/C CONTROL MODULE

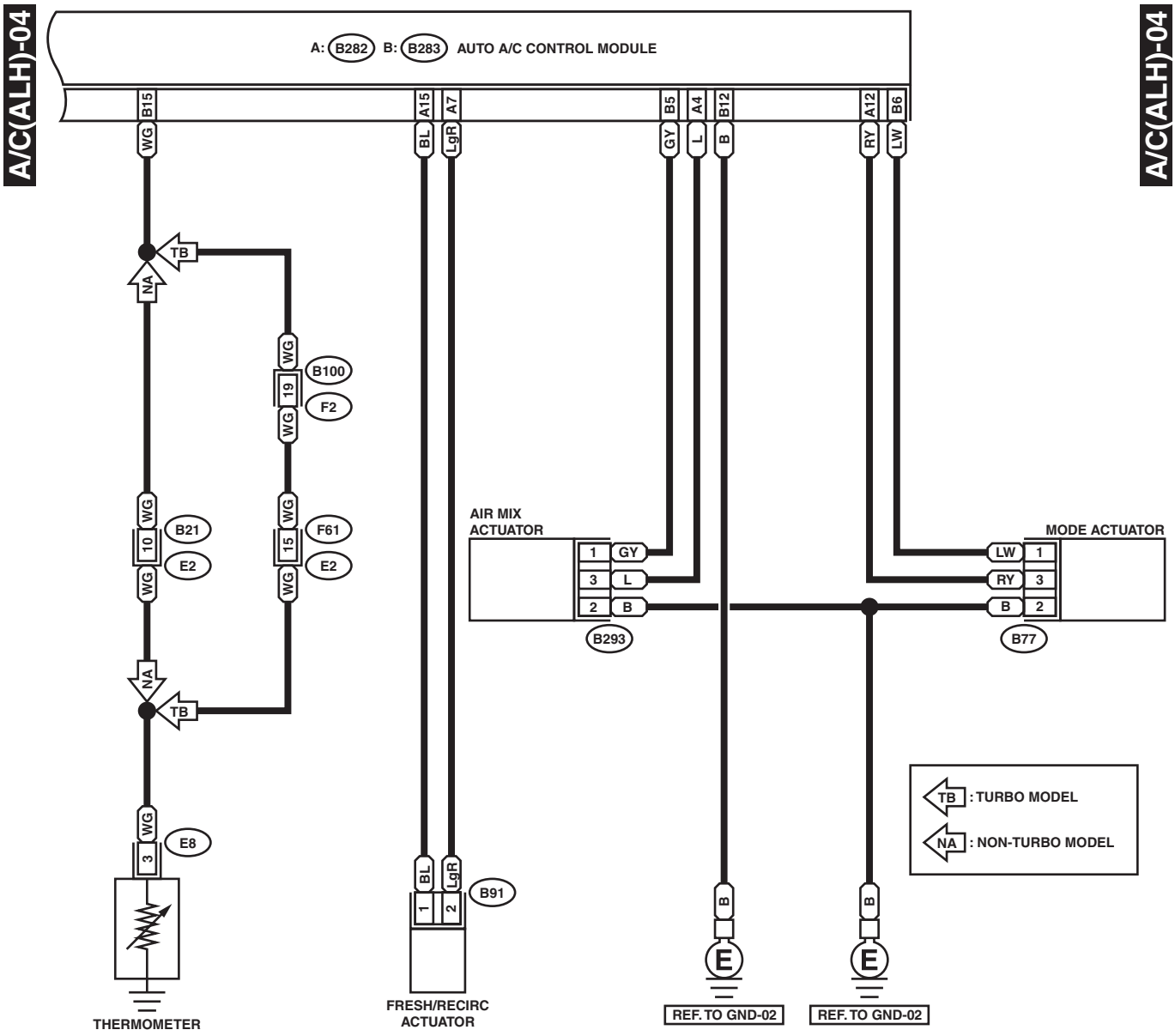

NS : B17
EN : B17
B22 (BROWN)
F60 (BROWN)
A: B282 (GRAY)
B: B283 (GRAY)
C: B56 (GREEN)
F2 (BLACK)

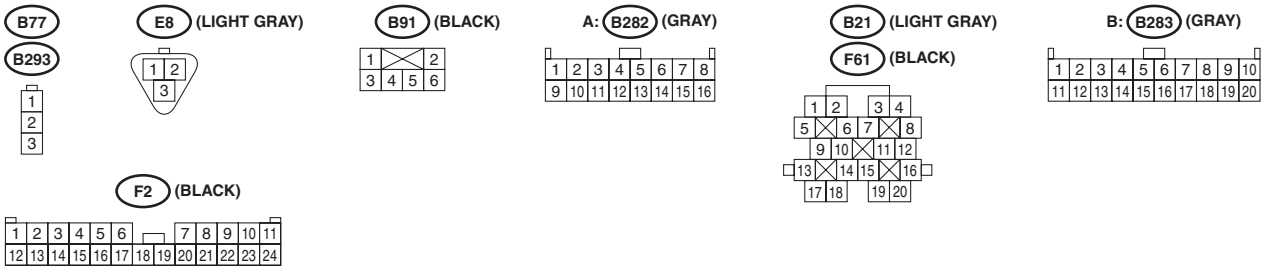
WI-07238


A/C(ALH)-03
A/C(ALH)-03
A: B282 B: B283 AUTO A/C CONTROL MODULE
B9
B7
B16
B17
A11
BP
R
GR
BL
YB
B62
F45
5
4
16
20
21
22
B36
i1
F78
B256
i51
B8
B11
B12
I/F
I/F
-COM
LCD(OUT TEMP)
AMBIENT SENSOR
EVAPORATION THERMO SWITCH
SUNLOAD SENSOR
B: i10 COMBINATION METER


B256
F78 (BLACK)
i51
A: B282 (GRAY)
B: B283 (GRAY)
F45
i2
i1 (BLUE)
B: i10 (GREEN)

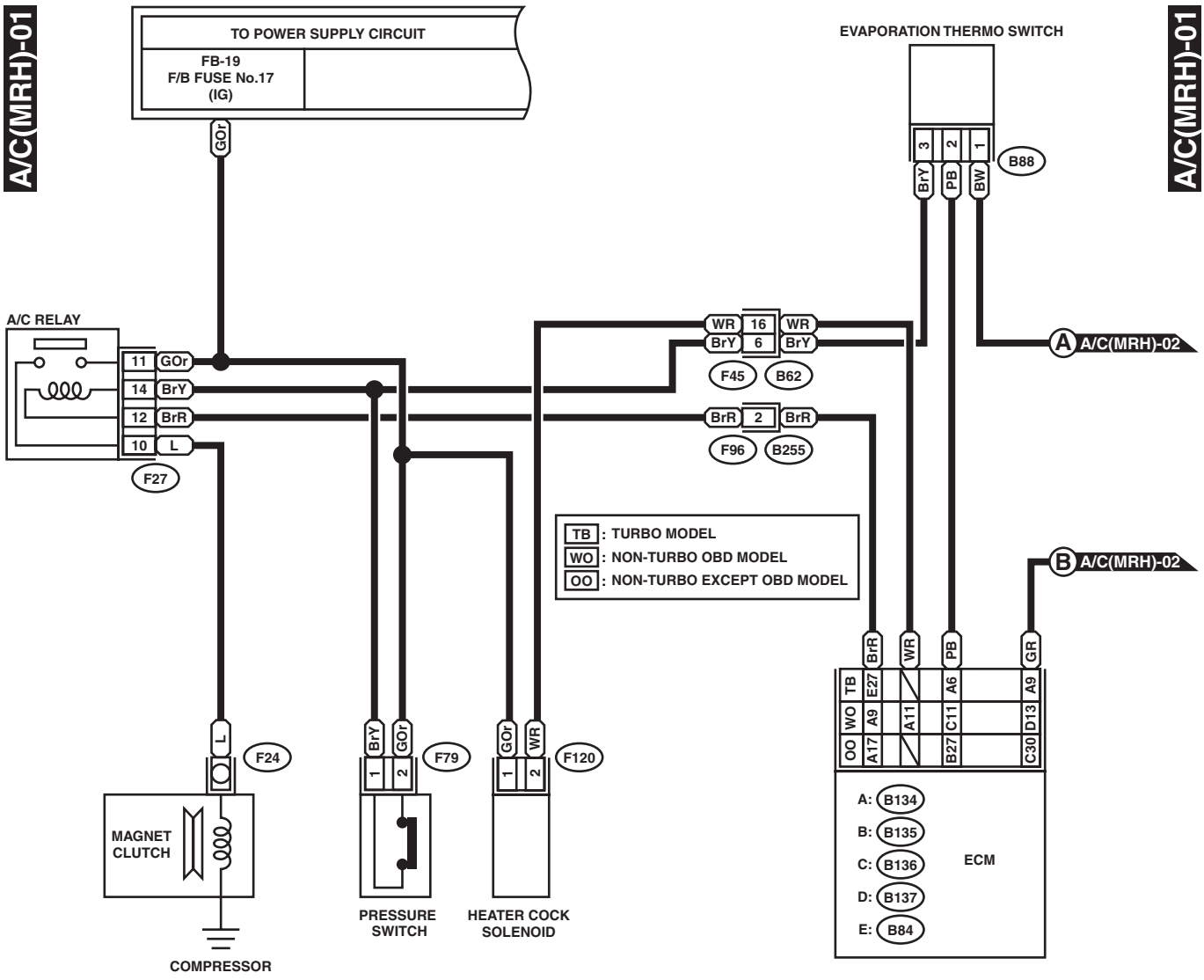
WI-07062

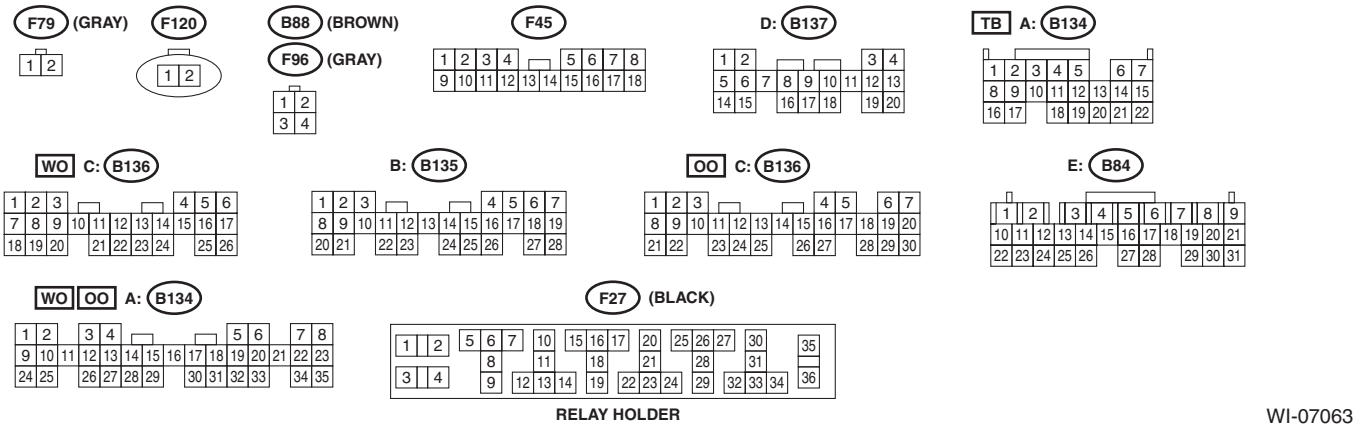

A/C(ALH)-04
A: B282 B: B283 AUTO A/C CONTROL MODULE
B15
A15
A7
B5
A4
B12
A12
B6
WG
BL
LgR
GY
L
B
RY
LW
TB
NA
B100
19
F2
B21
10
E2
F61
15
E2
E8
3
B91
1
2
AIR MIX ACTUATOR
MODE ACTUATOR
B293
B77
THERMOMETER
FRESH/RECIRC ACTUATOR
REF. TO GND-02
REF. TO GND-02
TB : TURBO MODEL
NA : NON-TURBO MODEL


B77
B293
E8 (LIGHT GRAY)
B91 (BLACK)
A: B282 (GRAY)
B21 (LIGHT GRAY)
F61 (BLACK)
B: B283 (GRAY)
F2 (BLACK)

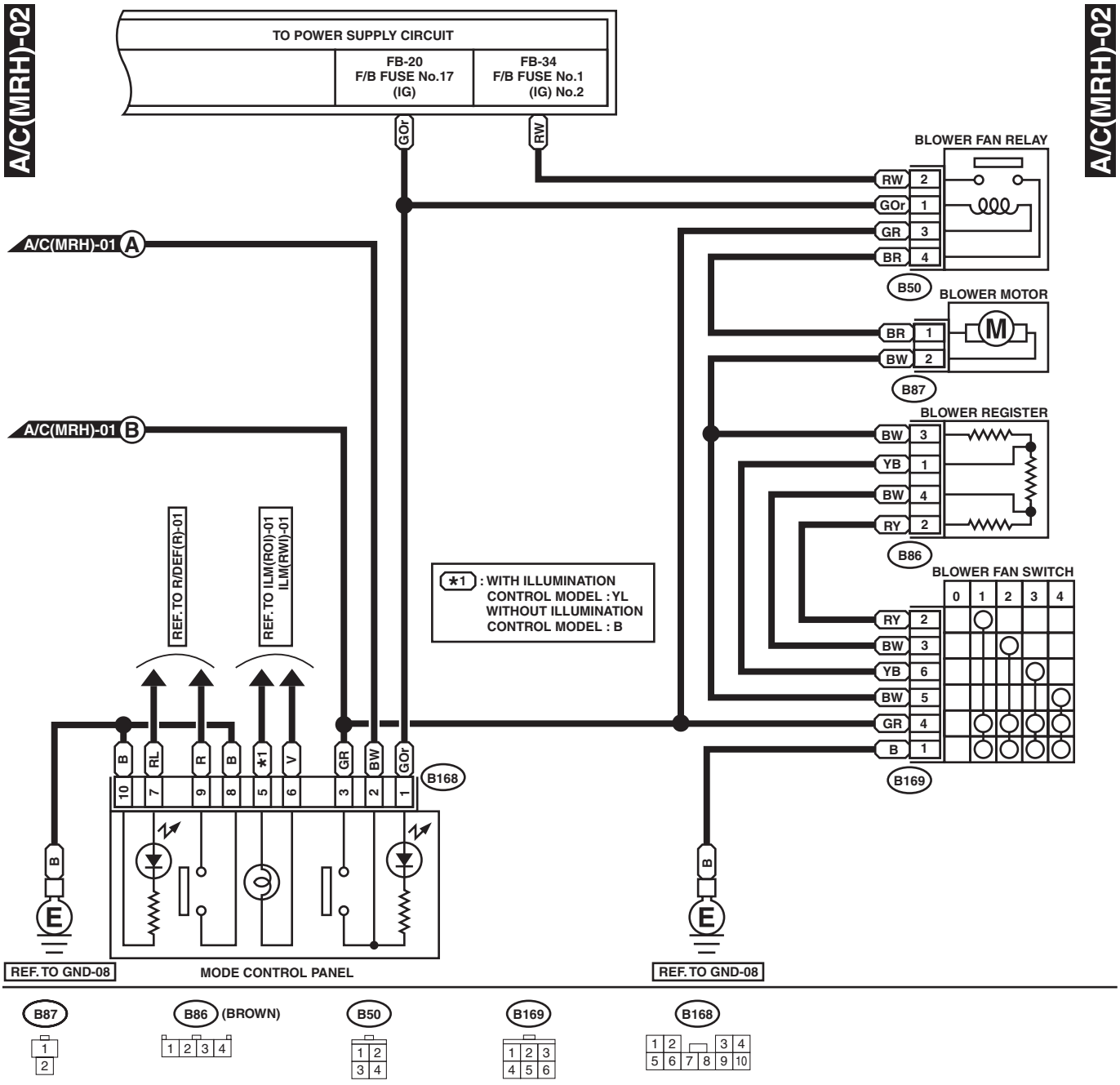
WI-02274

3. MANUAL A/C RHD MODEL



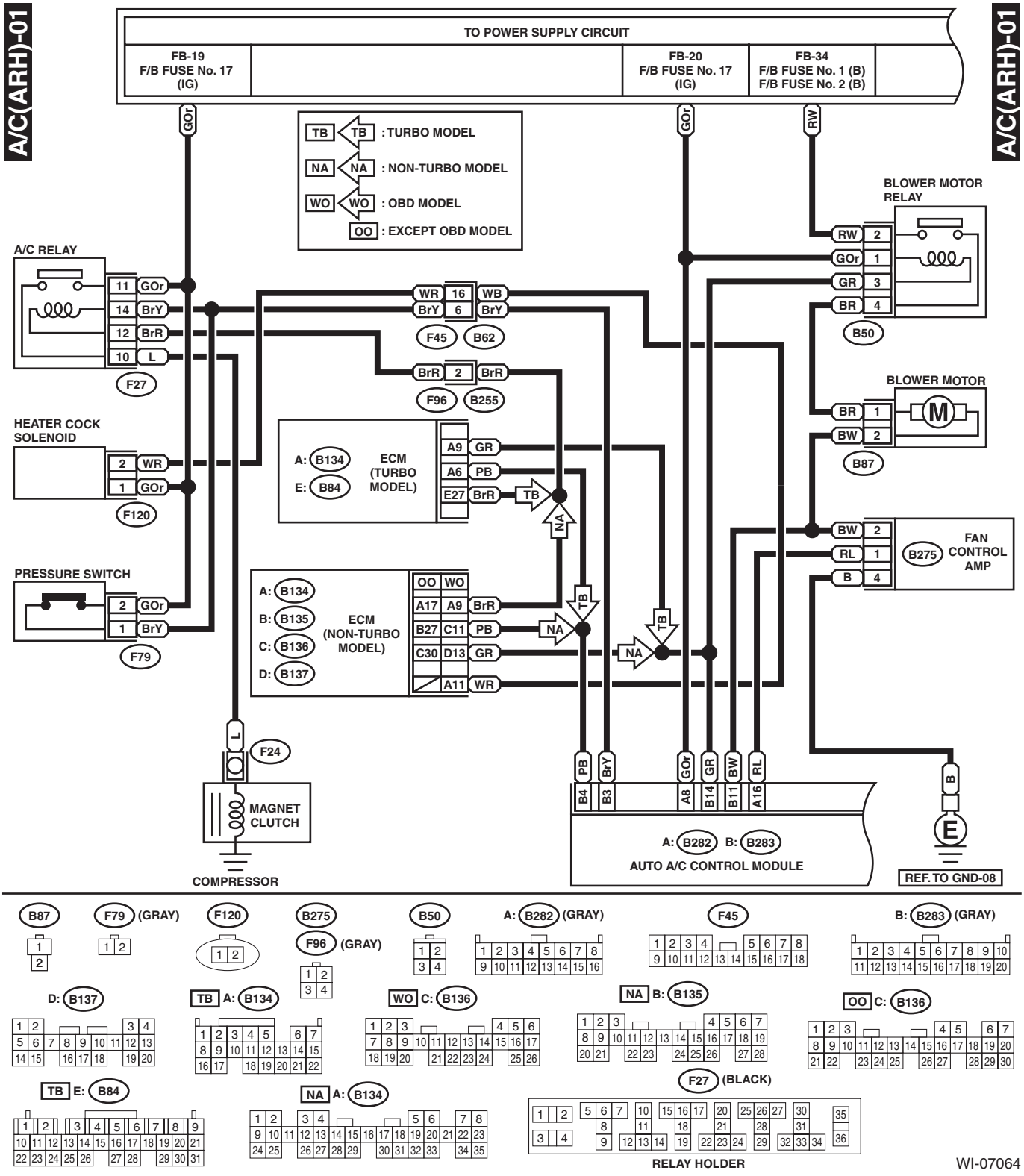


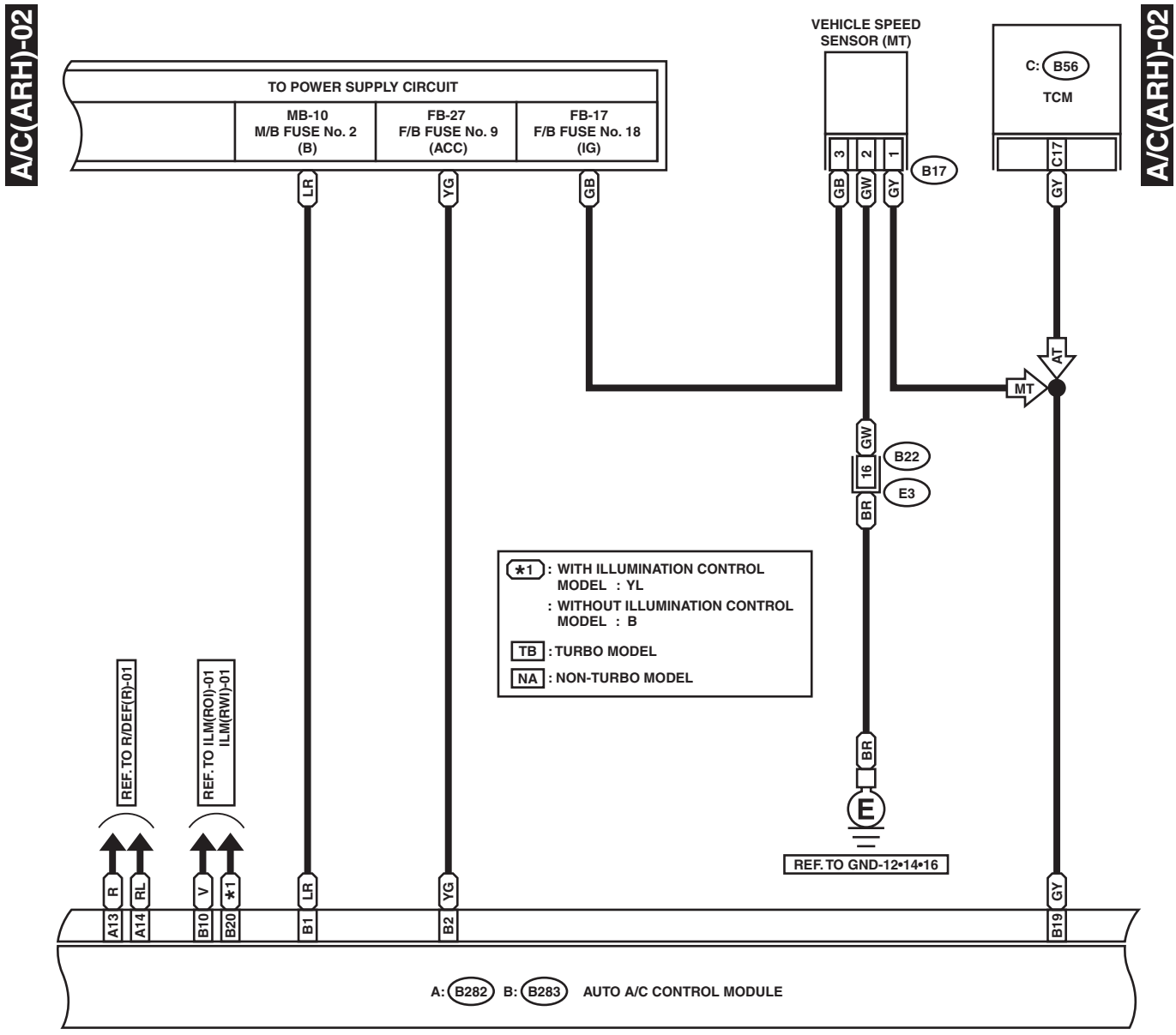
WI-07063

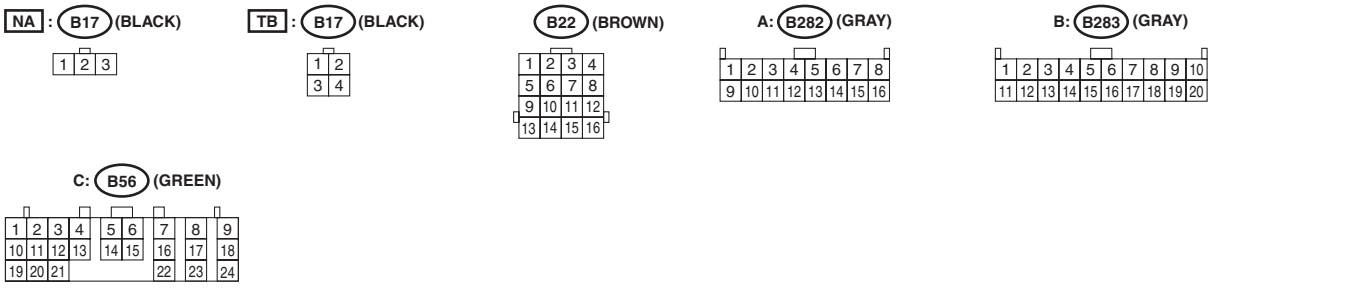

A/C(MRH)-02
A/C(MRH)-02
TO POWER SUPPLY CIRCUIT
FB-20
F/B FUSE No.17
(IG)
FB-34
F/B FUSE No.1
(IG) No.2
GOr
RW
BLOWER FAN RELAY
RW 2
GOr 1
GR 3
BR 4
B50
BLOWER MOTOR
BR 1
BW 2
B87
A/C(MRH)-01 A
A/C(MRH)-01 B
BLOWER REGISTER
BW 3
YB 1
BW 4
RY 2
B86
BLOWER FAN SWITCH
0 1 2 3 4
RY 2
BW 3
YB 6
BW 5
GR 4
B 1
B169
REF. TO R/DEF(R)-01
REF. TO ILM(RO)-01
ILM(RW)-01
*1 : WITH ILLUMINATION CONTROL MODEL : YL
WITHOUT ILLUMINATION CONTROL MODEL : B
B RL R B *1 V GR BW GOr
10 7 9 8 5 6 3 2 1
B168
REF. TO GND-08
MODE CONTROL PANEL
REF. TO GND-08
B87
1
2
B86 (BROWN)
1 2 3 4
B50
1 2
3 4
B169
1 2 3
4 5 6
B168
1 2 3 4
5 6 7 8 9 10

WI-04443

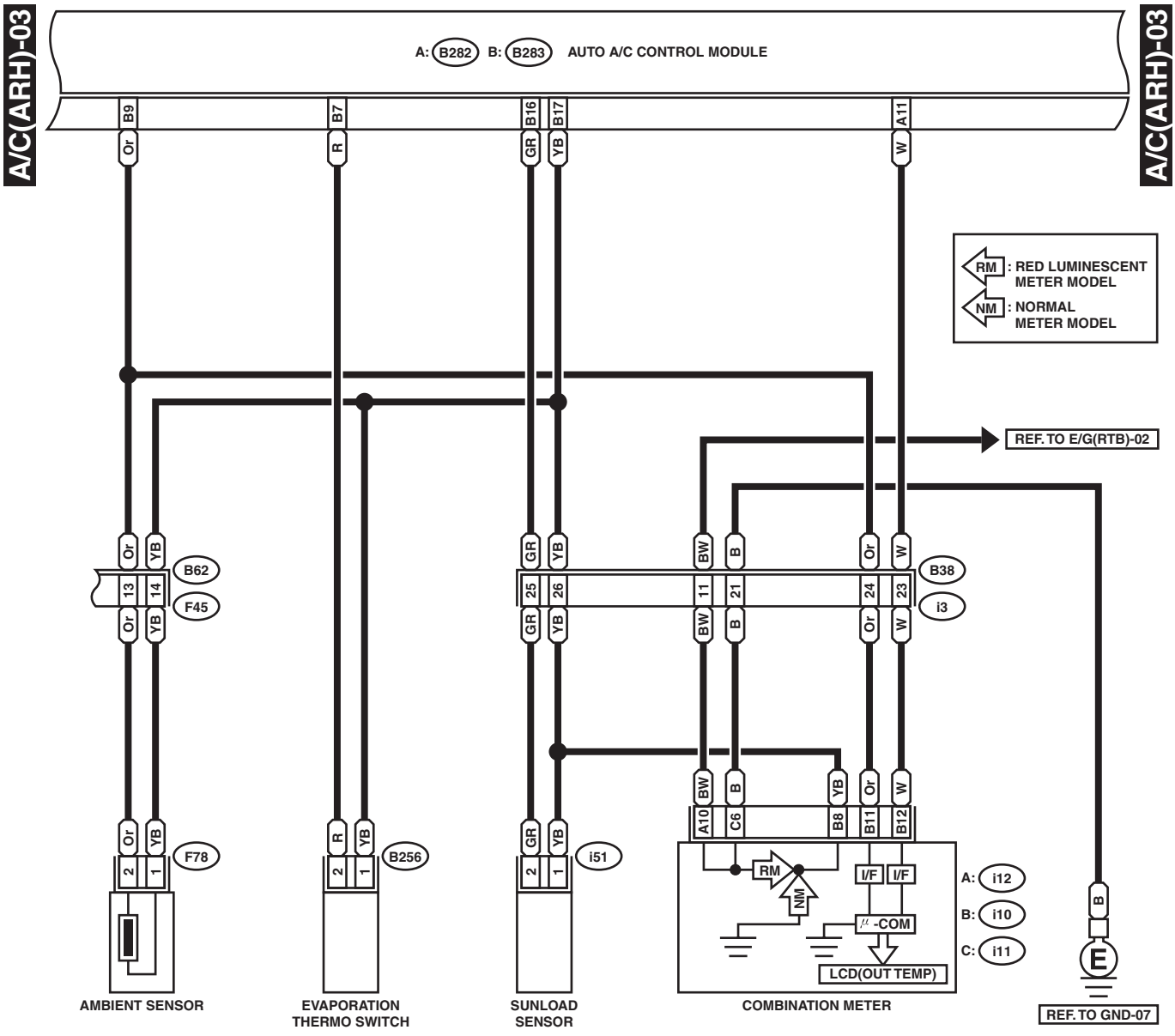
4. AUTO A/C RHD MODEL

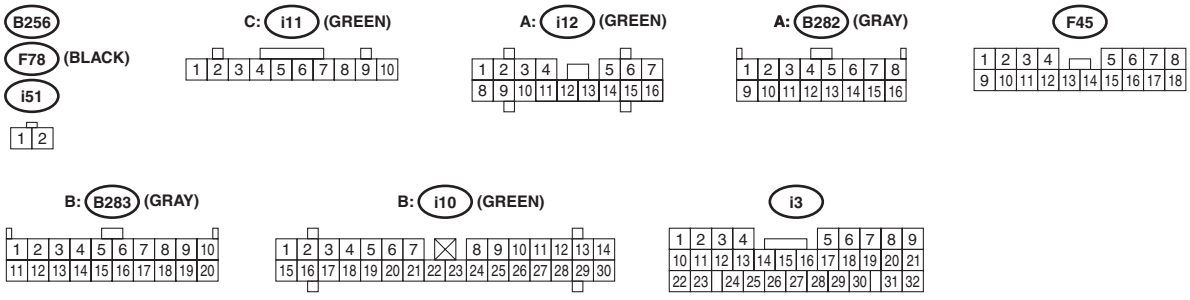



A/C(ARH)-02
A/C(ARH)-02
TO POWER SUPPLY CIRCUIT
MB-10
M/B FUSE No. 2
(B)
FB-27
F/B FUSE No. 9
(ACC)
FB-17
F/B FUSE No. 18
(IG)
VEHICLE SPEED
SENSOR (MT)
C: B56
TCM
B17
C17
LR
YG
GB
GW
GY
AT
MT
B22
E3
16
BR
*1 : WITH ILLUMINATION CONTROL
MODEL : YL
: WITHOUT ILLUMINATION CONTROL
MODEL : B
TB : TURBO MODEL
NA : NON-TURBO MODEL
REF. TO R/DEF(R)-01
REF. TO ILM(ROI)-01
ILM(RWI)-01
REF. TO GND-12•14•16
R
RL
V
*1
A13
A14
B10
B20
B1
B2
B19
A: B282 B: B283 AUTO A/C CONTROL MODULE

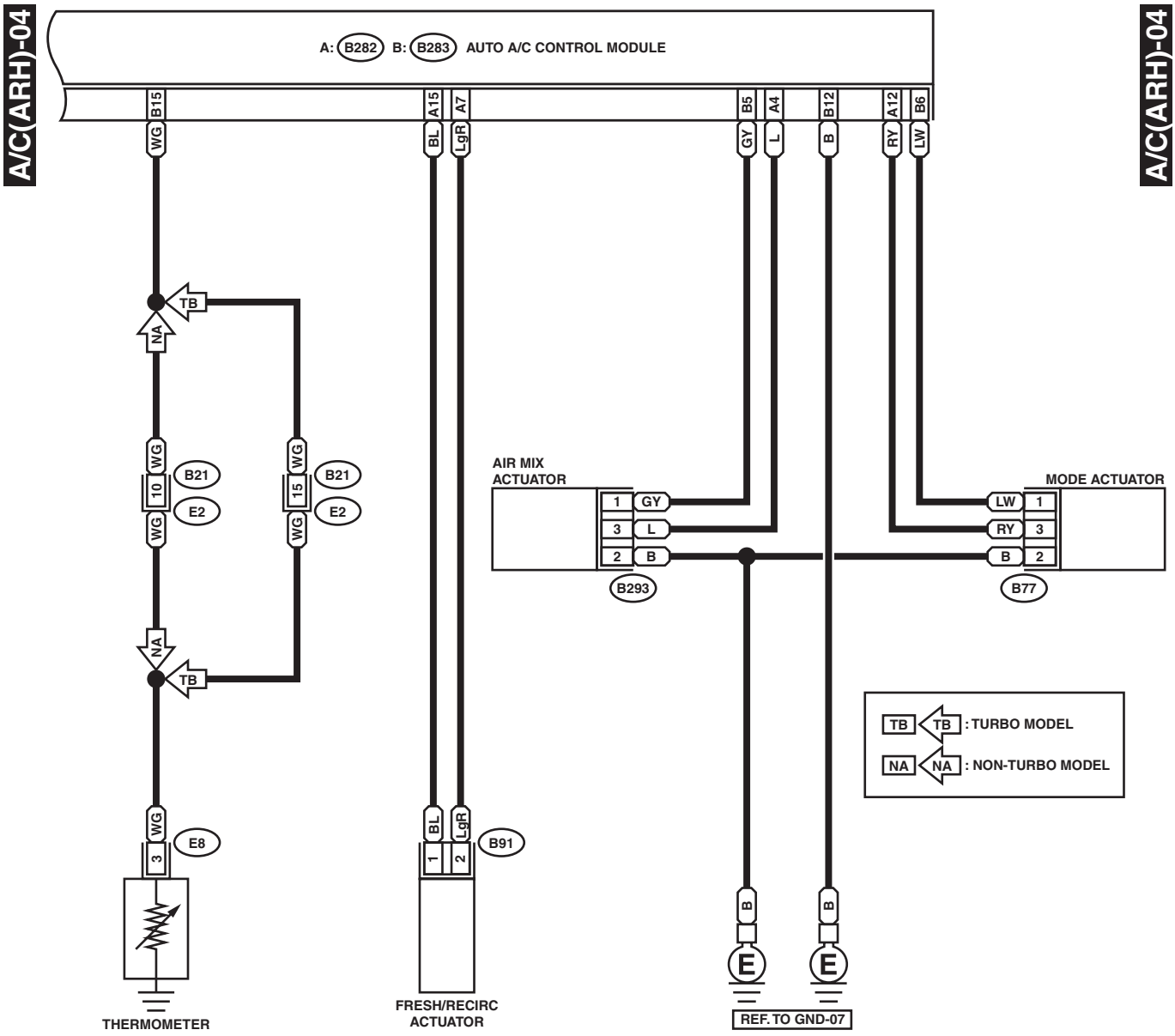

NA : B17 (BLACK)
TB : B17 (BLACK)
B22 (BROWN)
A: B282 (GRAY)
B: B283 (GRAY)
C: B56 (GREEN)

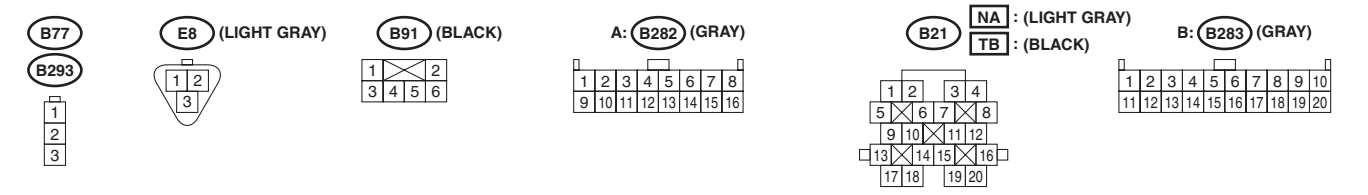
WI-02276


A/C(ARH)-03
A/C(ARH)-03
A: B282 B: B283 AUTO A/C CONTROL MODULE
B9
B7
B16
B17
A11
Or
R
GR
YB
W
RM : RED LUMINESCENT METER MODEL
NM : NORMAL METER MODEL
REF. TO E/G(RTB)-02
B62
F45
B38
i3
F78
B256
i51
BW
B
A10
C6
B8
B11
B12
RM
NM
I/F
I/F
-COM
LCD(OUT TEMP)
A: i12
B: i10
C: i11
REF. TO GND-07
AMBIENT SENSOR
EVAPORATION THERMO SWITCH
SUNLOAD SENSOR
COMBINATION METER


B256
F78 (BLACK)
i51
C: i11 (GREEN)
A: i12 (GREEN)
A: B282 (GRAY)
F45
B: B283 (GRAY)
B: i10 (GREEN)
i3

WI-07065


A/C(ARH)-04
A/C(ARH)-04
A: B282 B: B283 AUTO A/C CONTROL MODULE
B15
A15
A7
B5
A4
B12
A12
B6
WG
BL
LgR
GY
L
B
RY
LW
TB
NA
B21
E2
AIR MIX ACTUATOR
MODE ACTUATOR
B293
B77
TB : TURBO MODEL
NA : NON-TURBO MODEL
E8
B91
THERMOMETER
FRESH/RECIRC ACTUATOR
REF. TO GND-07

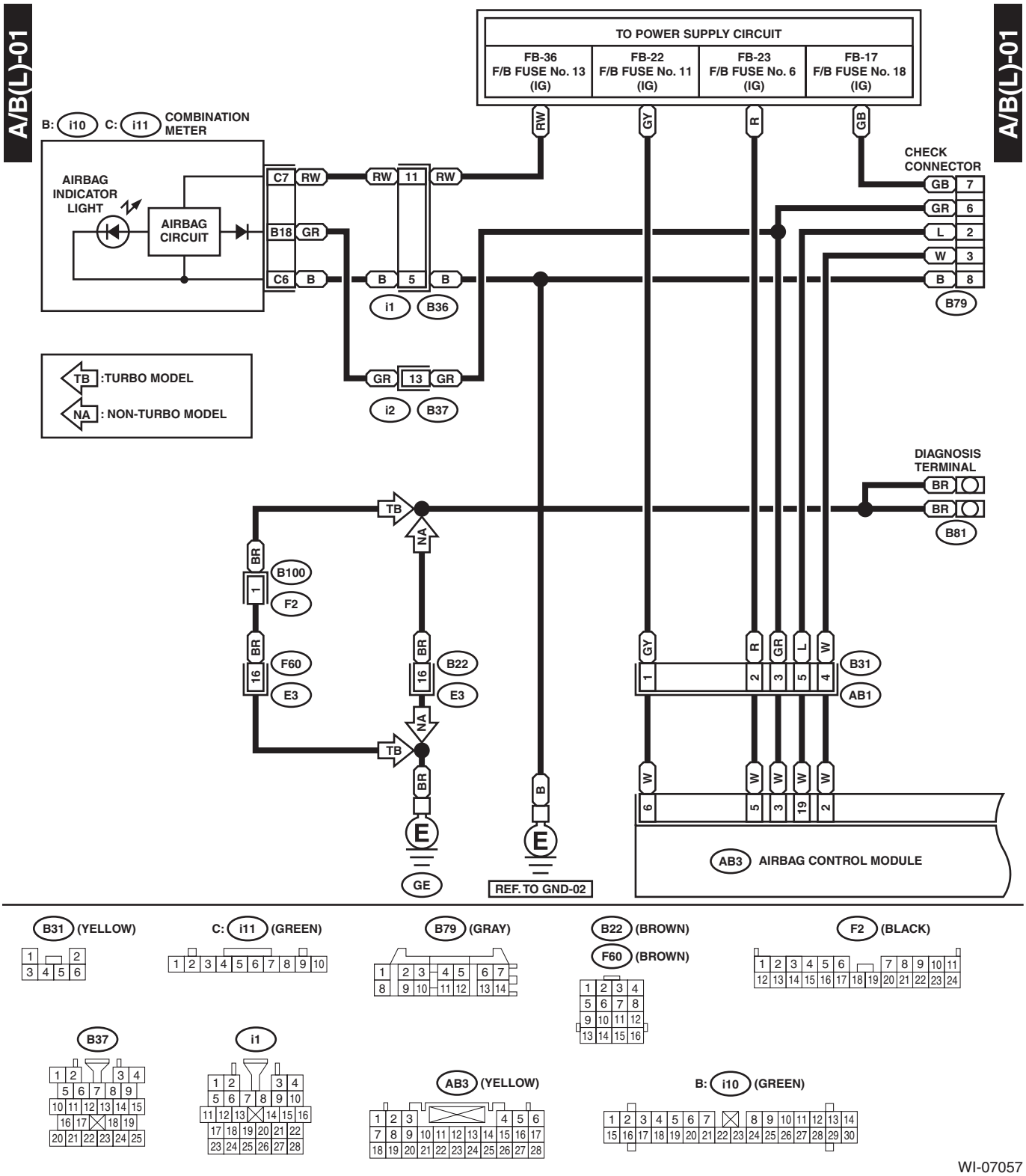

B77
B293
E8 (LIGHT GRAY)
B91 (BLACK)
A: B282 (GRAY)
B21
NA : (LIGHT GRAY)
TB : (BLACK)
B: B283 (GRAY)

WI-07239

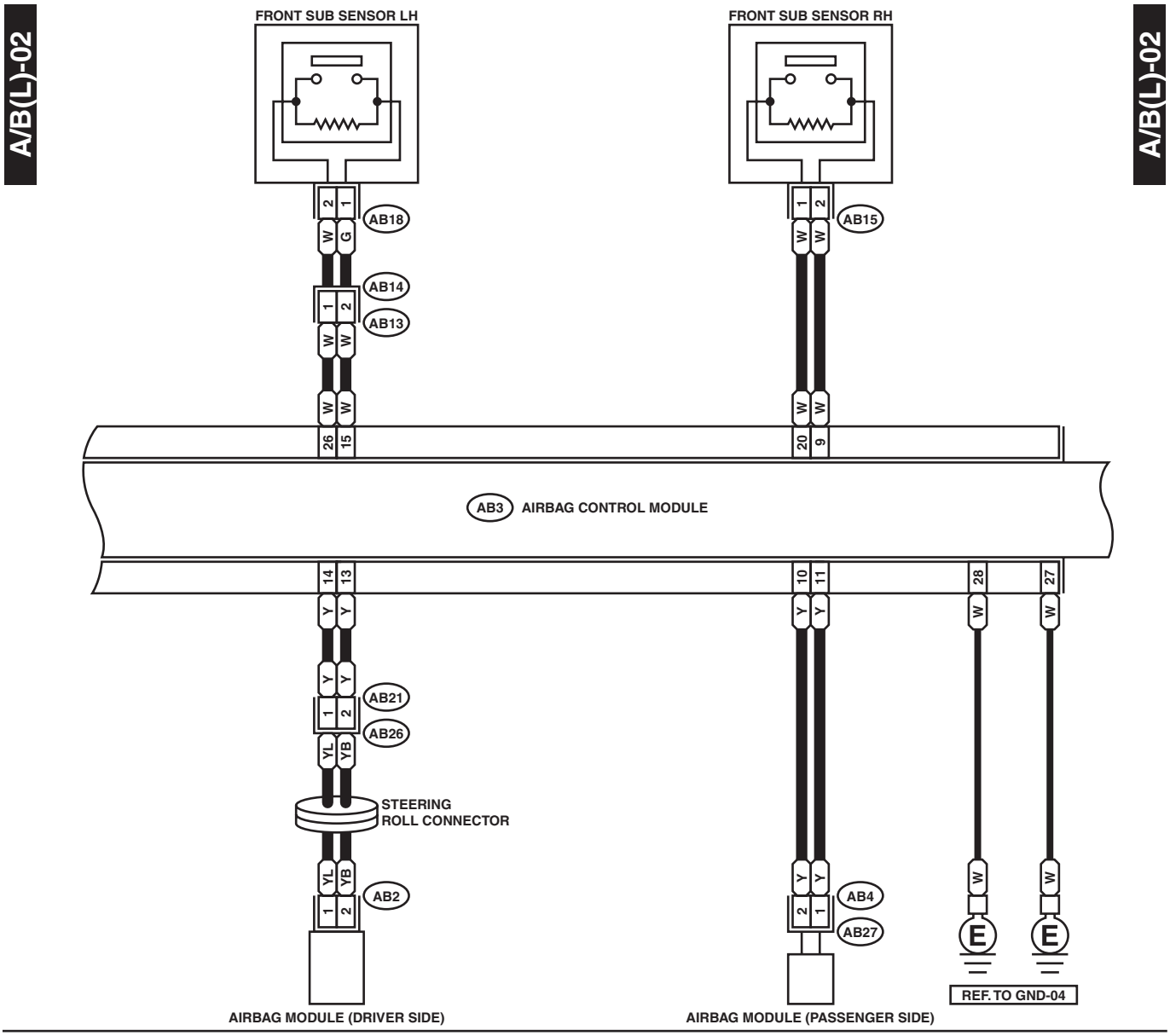
11.Airbag System

A: WIRING DIAGRAM

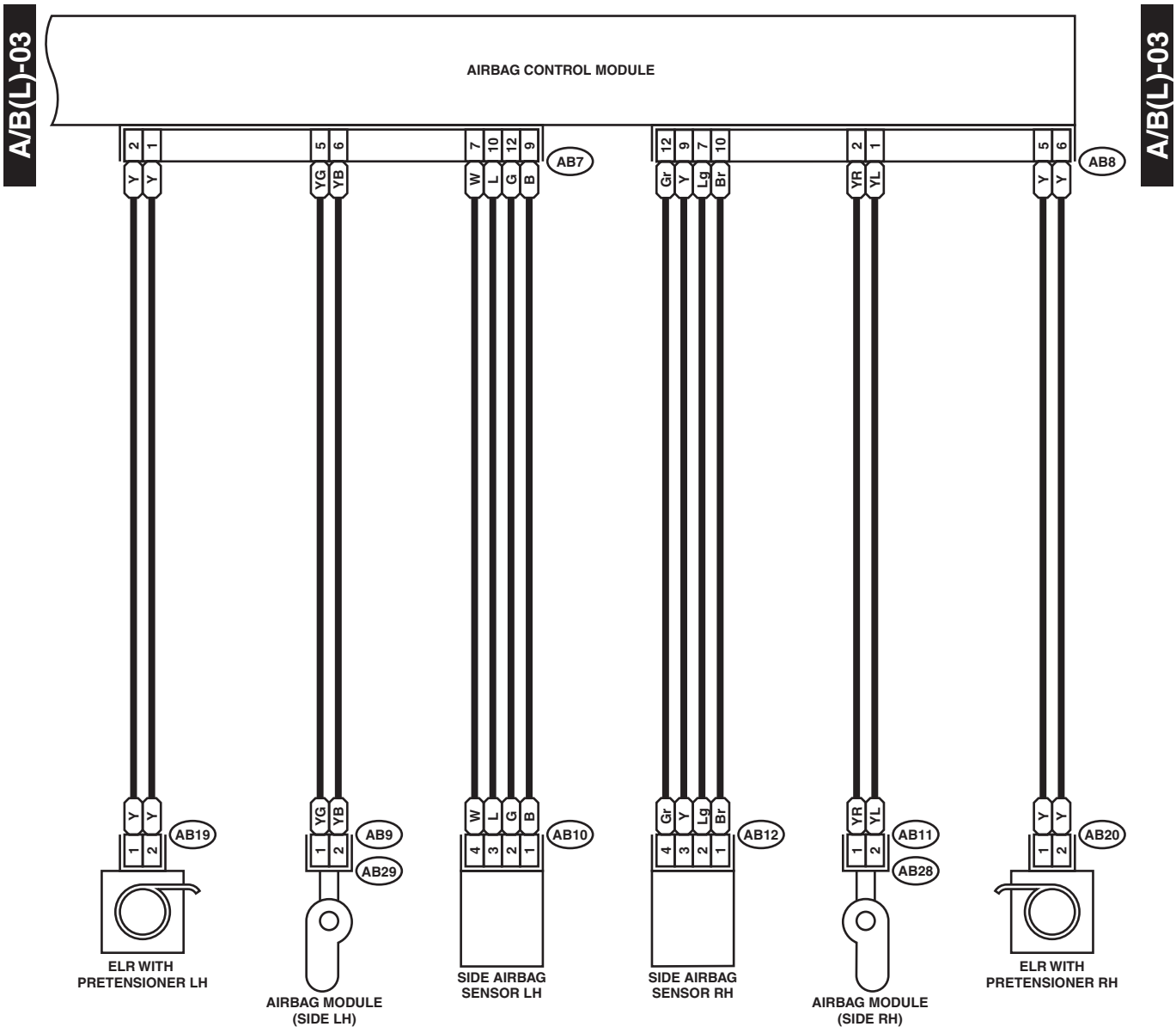
1. LHD MODEL



WI-07057


A/B(L)-02
A/B(L)-02
FRONT SUB SENSOR LH
FRONT SUB SENSOR RH
AB18
AB14
AB13
AB15
AB3 AIRBAG CONTROL MODULE
AB21
AB26
STEERING ROLL CONNECTOR
AB2
AB4
AB27
REF. TO GND-04
AIRBAG MODULE (DRIVER SIDE)
AIRBAG MODULE (PASSENGER SIDE)
AB4 (YELLOW)
AB13 (YELLOW)
AB21 (YELLOW)
AB2
AB15 (YELLOW)
AB18 (YELLOW)
AB3 (YELLOW)

WI-07282



AB9 (YELLOW)
AB11 (YELLOW)
AB19 (YELLOW)
AB20 (YELLOW)

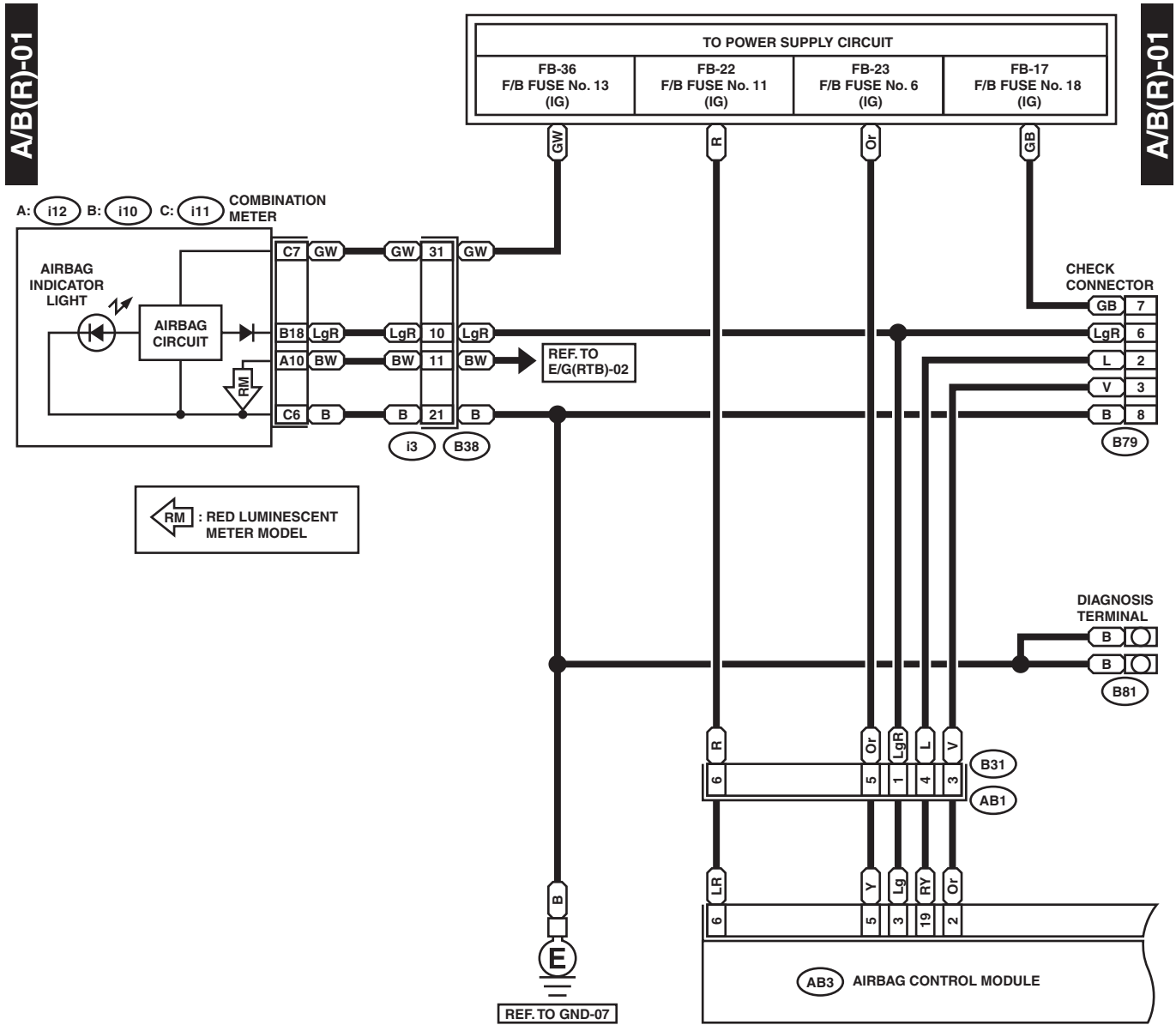
AB10 (YELLOW)
AB12 (YELLOW)

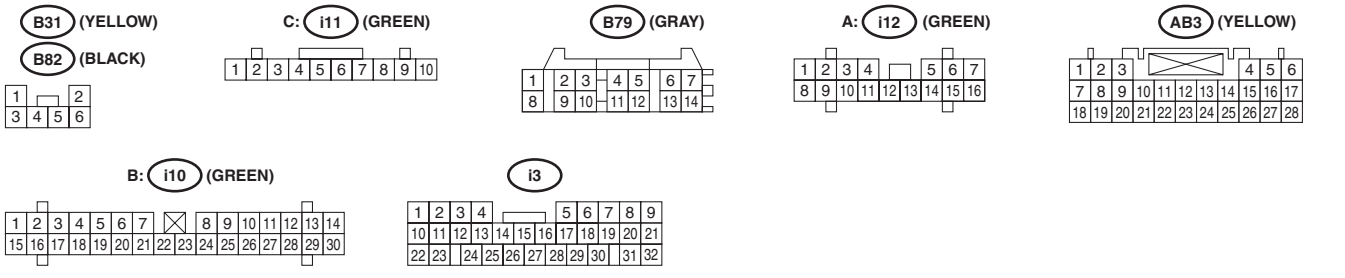
AB7 (YELLOW)

AB8 (YELLOW)

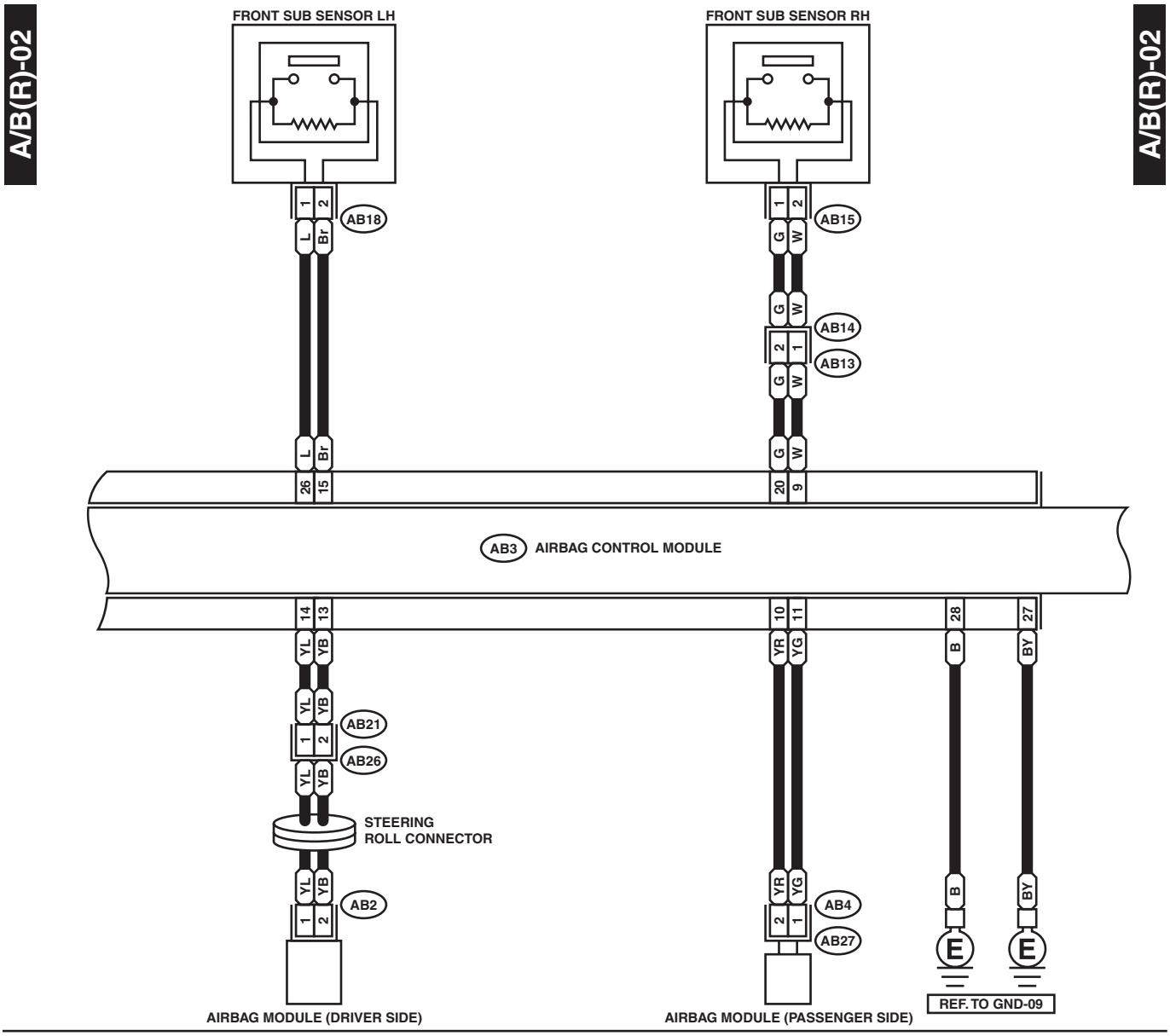
WI-07240

2. RHD MODEL

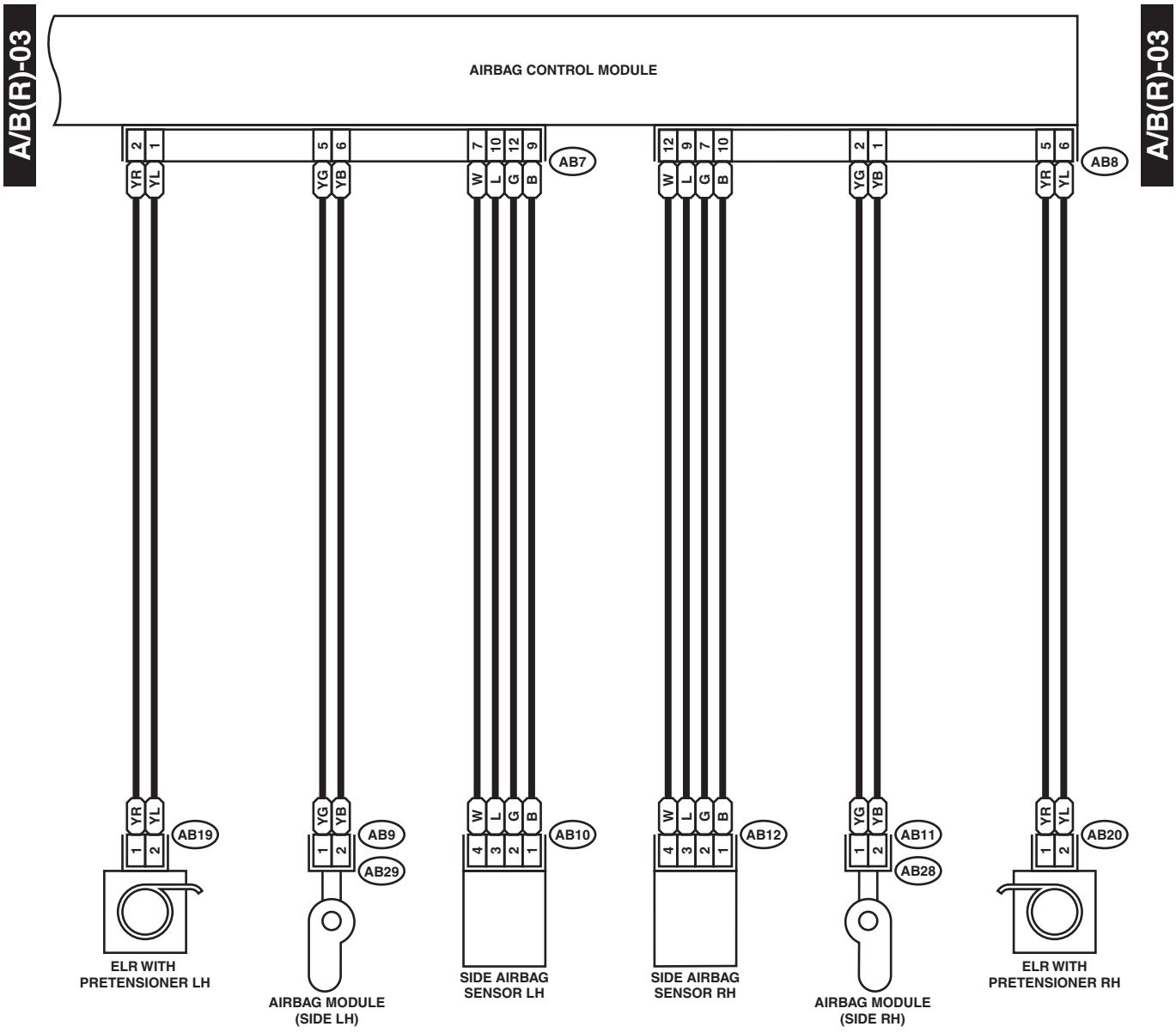


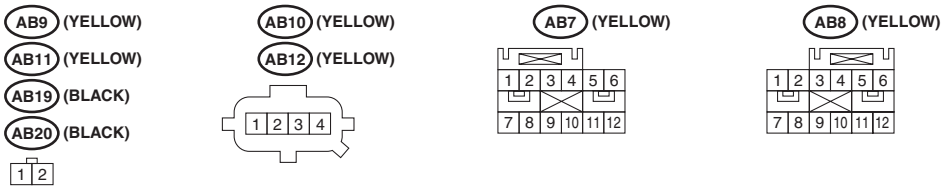


WI-07058


A/B(R)-02
A/B(R)-02
FRONT SUB SENSOR LH
FRONT SUB SENSOR RH
AB18
AB15
AB14
AB13
AB3 AIRBAG CONTROL MODULE
AB21
AB26
STEERING ROLL CONNECTOR
AB2
AB4
AB27
REF. TO GND-09
AIRBAG MODULE (DRIVER SIDE)
AIRBAG MODULE (PASSENGER SIDE)
AB4 (YELLOW)
AB13 (YELLOW)
AB21 (YELLOW)
AB2
AB15 (YELLOW)
AB18 (YELLOW)
AB3 (YELLOW)

WI-07283


A/B(R)-03
A/B(R)-03
AIRBAG CONTROL MODULE
AB7
AB8
AB19
AB9
AB29
AB10
AB12
AB11
AB28
AB20
ELR WITH PRETENSIONER LH
AIRBAG MODULE (SIDE LH)
SIDE AIRBAG SENSOR LH
SIDE AIRBAG SENSOR RH
AIRBAG MODULE (SIDE RH)
ELR WITH PRETENSIONER RH

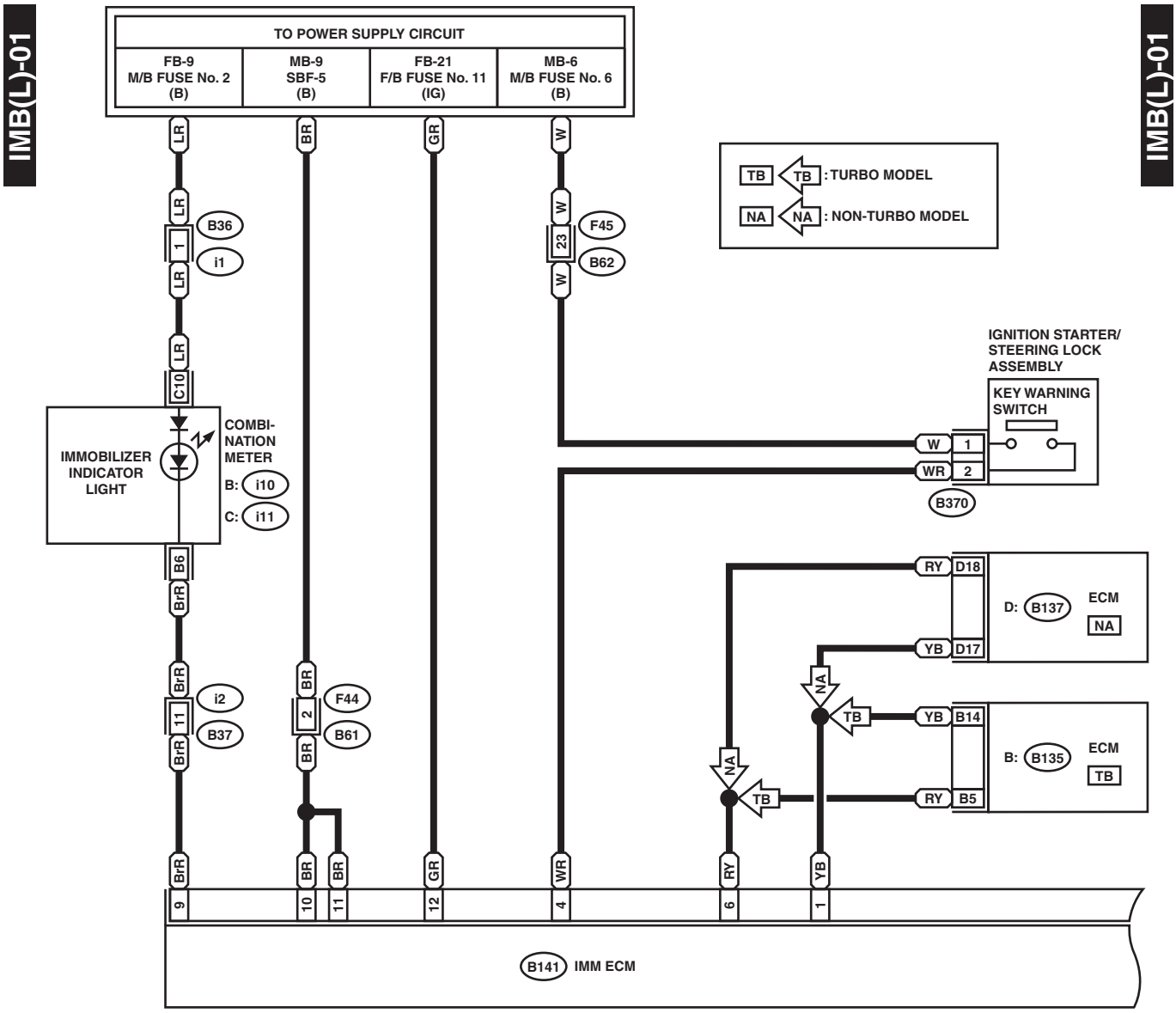

AB9 (YELLOW)
AB11 (YELLOW)
AB19 (BLACK)
AB20 (BLACK)
AB10 (YELLOW)
AB12 (YELLOW)
AB7 (YELLOW)
AB8 (YELLOW)

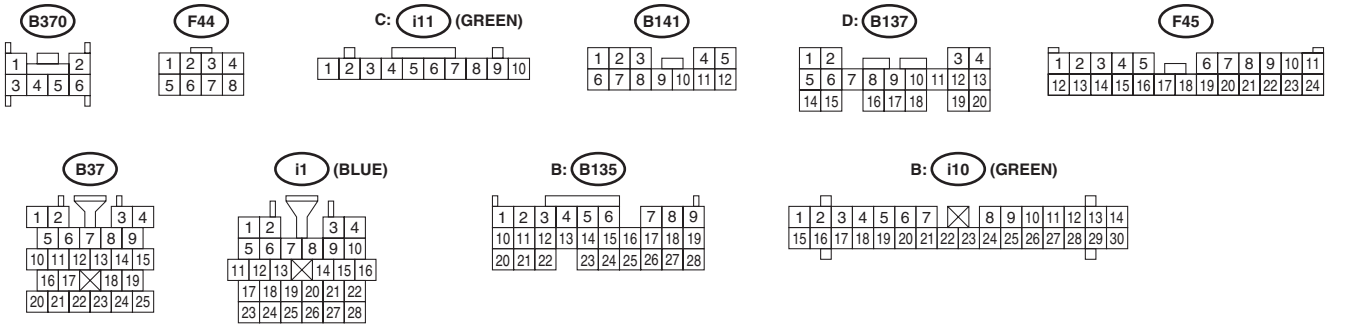
WI-07059

12.Immobilizer System

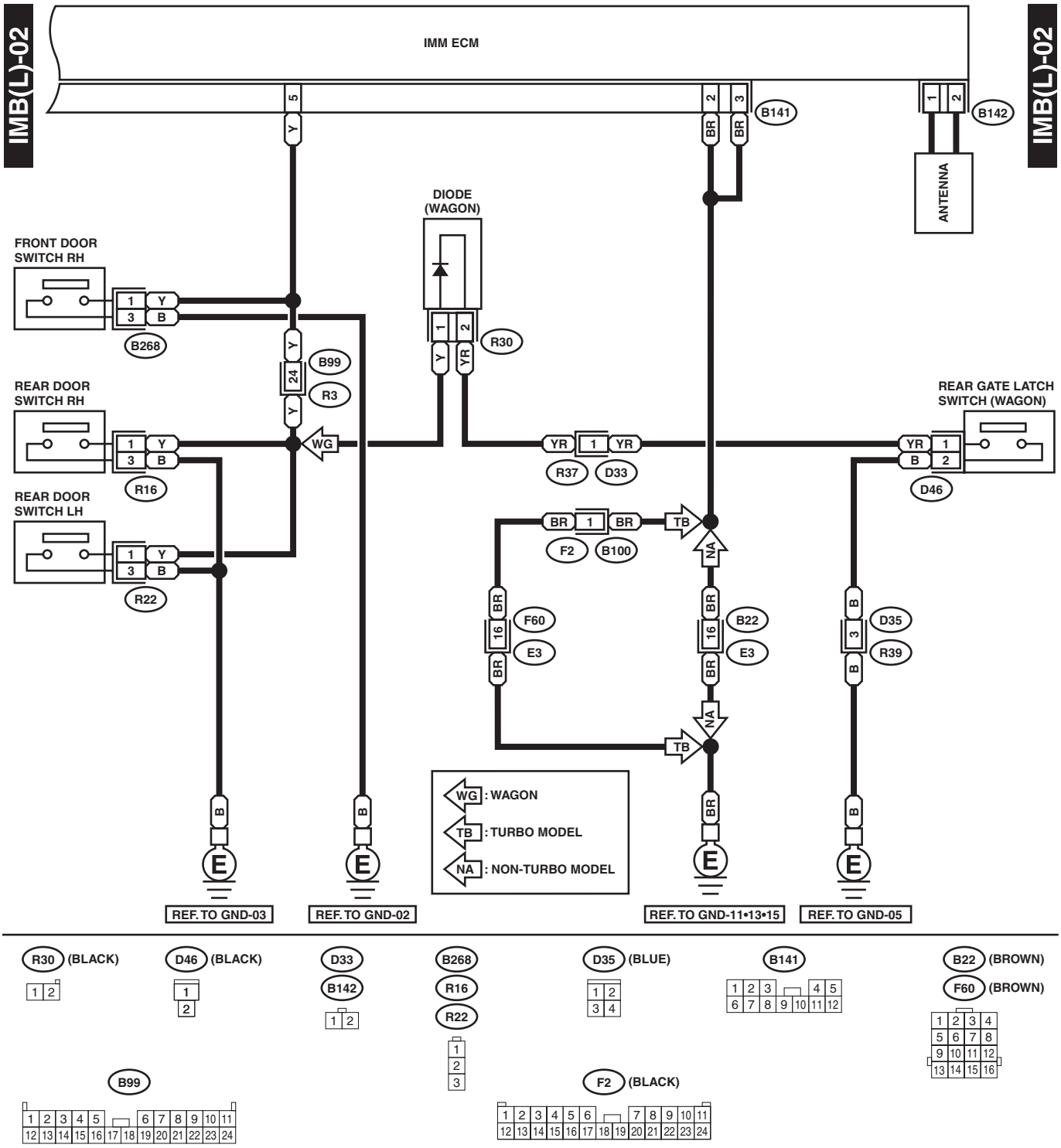
A: WIRING DIAGRAM

1. LHD MODEL





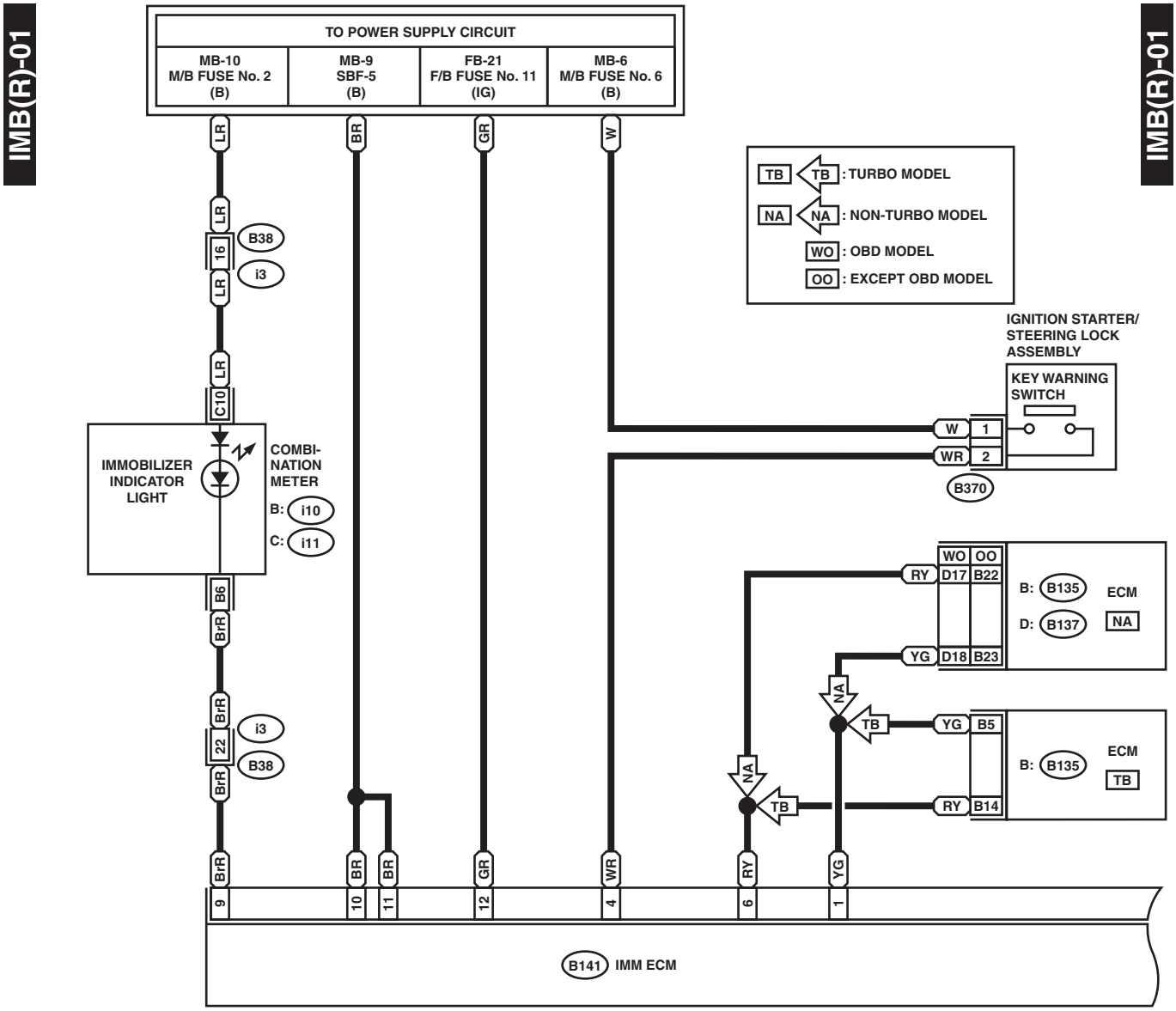
WI-07154

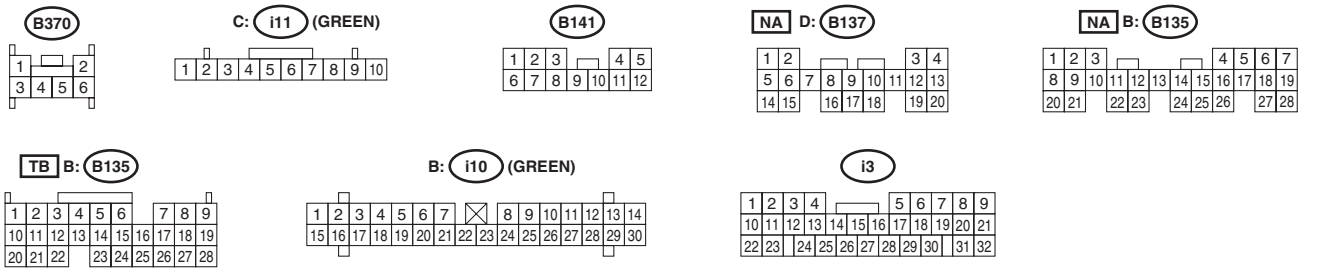

IMB(L)-02
IMM ECM
IMB(L)-02
B141
B142
ANTENNA
DIODE (WAGON)
FRONT DOOR SWITCH RH
B268
REAR DOOR SWITCH RH
R16
REAR DOOR SWITCH LH
R22
B99
R3
R30
WG
REAR GATE LATCH SWITCH (WAGON)
D46
R37
D33
F2
B100
TB
NA
F60
E3
B22
D35
R39
WG : WAGON
TB : TURBO MODEL
NA : NON-TURBO MODEL
REF. TO GND-03
REF. TO GND-02
REF. TO GND-11•13•15
REF. TO GND-05

R30 (BLACK)
D46 (BLACK)
D33
B142
B268
R16
R22
D35 (BLUE)
B141
B22 (BROWN)
F60 (BROWN)
B99
F2 (BLACK)

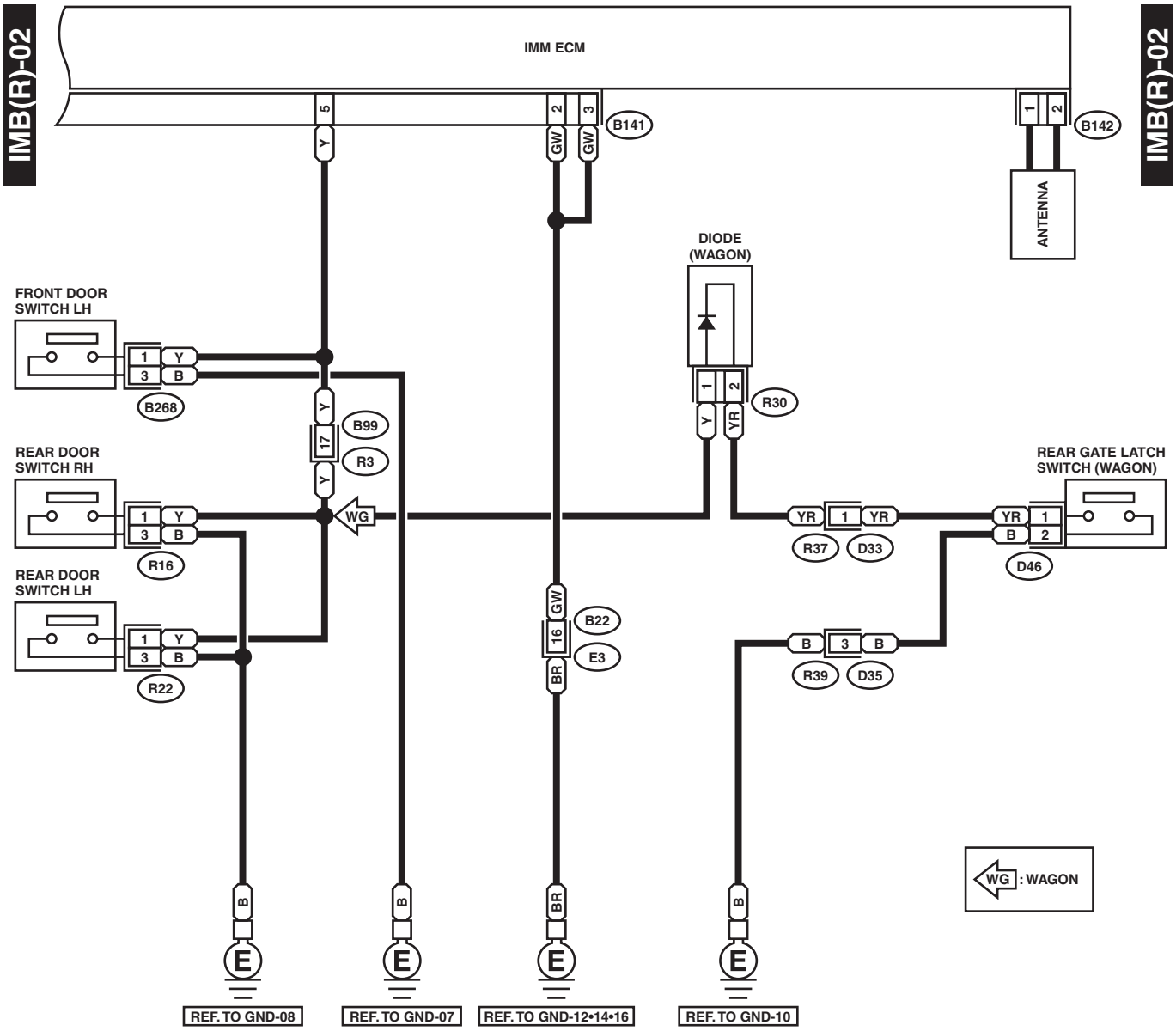
WI-07155

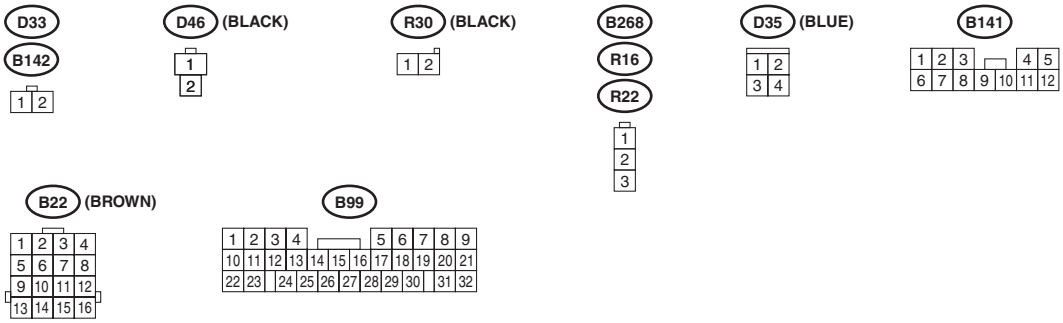
2. RHD MODEL





WI-07156

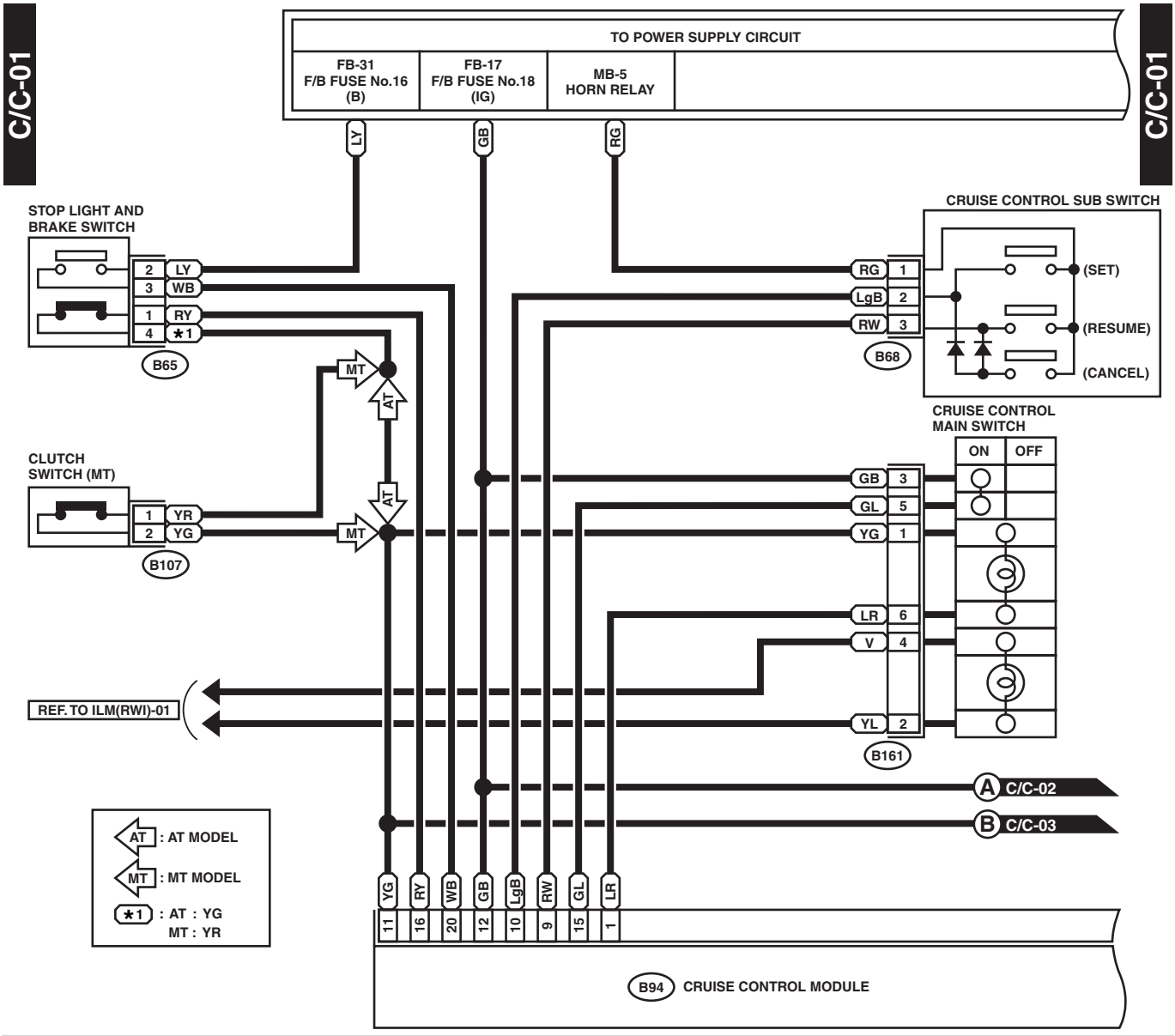

IMB(R)-02
IMM ECM
IMB(R)-02
B141
B142
ANTENNA
DIODE (WAGON)
R30
FRONT DOOR SWITCH LH
B268
REAR DOOR SWITCH RH
R16
REAR DOOR SWITCH LH
R22
B99
R3
WG
REAR GATE LATCH SWITCH (WAGON)
R37
D33
D46
B22
E3
R39
D35
WG : WAGON
REF. TO GND-08
REF. TO GND-07
REF. TO GND-12•14•16
REF. TO GND-10

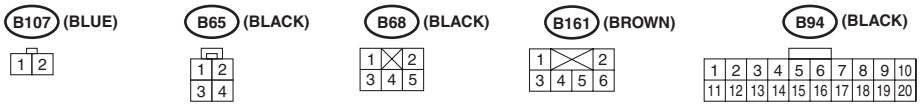

D33
B142
D46 (BLACK)
R30 (BLACK)
B268
R16
R22
D35 (BLUE)
B141
B22 (BROWN)
B99

WI-07157

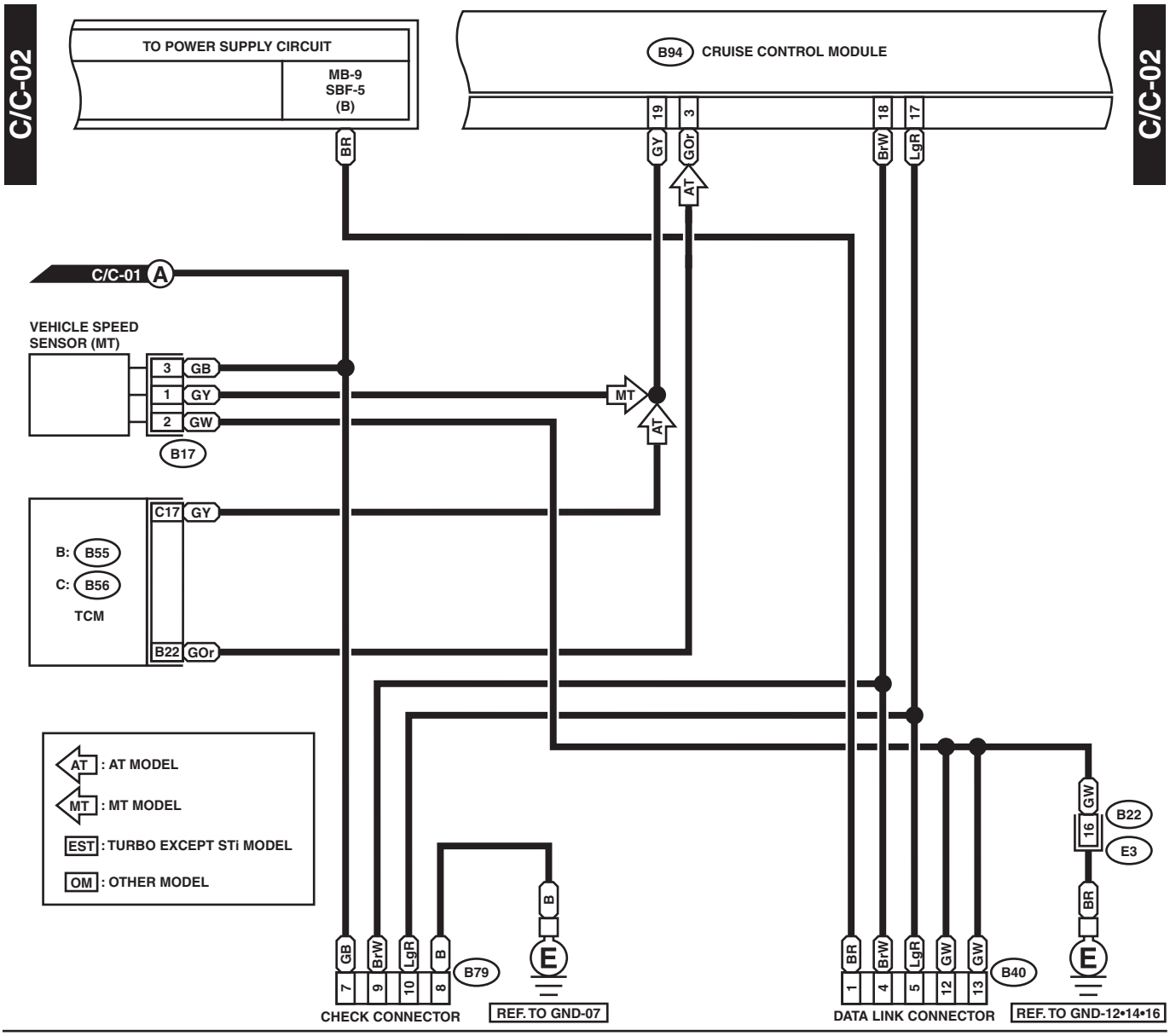
13.Cruise Control System

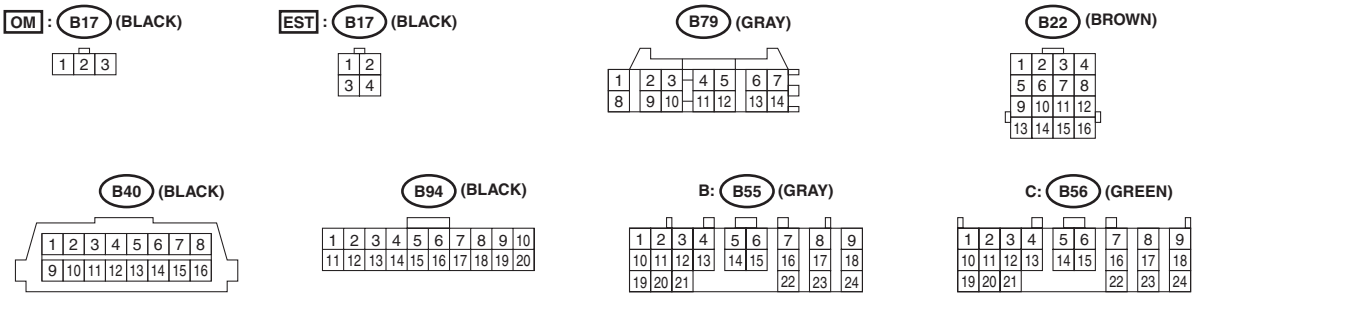
A: WIRING DIAGRAM



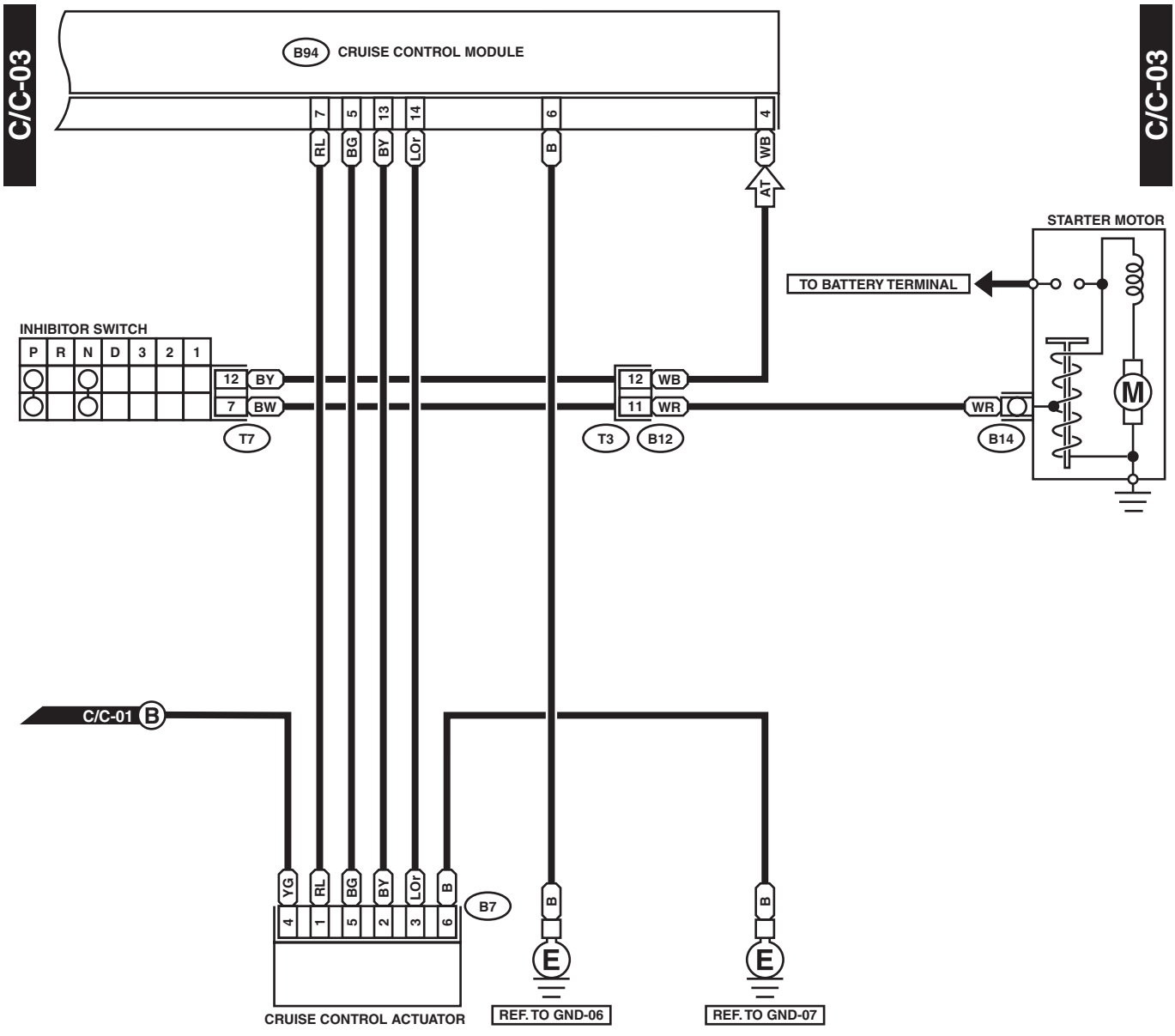


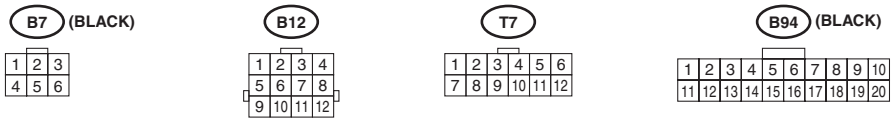
WI-07088


C/C-02
TO POWER SUPPLY CIRCUIT
MB-9
SBF-5
(B)
B94 CRUISE CONTROL MODULE
C/C-02
BR
GY
GOr
BrW
LgR
AT
C/C-01 A
VEHICLE SPEED SENSOR (MT)
3 GB
1 GY
2 GW
B17
MT
AT
C17 GY
B: B55
C: B56
TCM
B22 GOr
AT : AT MODEL
MT : MT MODEL
EST : TURBO EXCEPT STi MODEL
OM : OTHER MODEL
GB
BrW
LgR
B
7
9
10
8
B79
CHECK CONNECTOR
REF. TO GND-07
BR
BrW
LgR
GW
GW
1
4
5
12
13
B40
DATA LINK CONNECTOR
REF. TO GND-12•14•16
GW
16
B22
E3
BR


OM : B17 (BLACK)
EST : B17 (BLACK)
B79 (GRAY)
B22 (BROWN)
B40 (BLACK)
B94 (BLACK)
B: B55 (GRAY)
C: B56 (GREEN)

WI-07089


C/C-03
C/C-03
B94 CRUISE CONTROL MODULE
7
5
13
14
6
4
RL
BG
BY
LOr
B
WB
AT
STARTER MOTOR
TO BATTERY TERMINAL
INHIBITOR SWITCH
P R N D 3 2 1
12 BY
7 BW
T7
12 WB
11 WR
T3
B12
WR
B14
M
C/C-01 B
YG
RL
BG
BY
LOr
B
4 1 5 2 3 6
B7
CRUISE CONTROL ACTUATOR
B
E
REF. TO GND-06
B
E
REF. TO GND-07

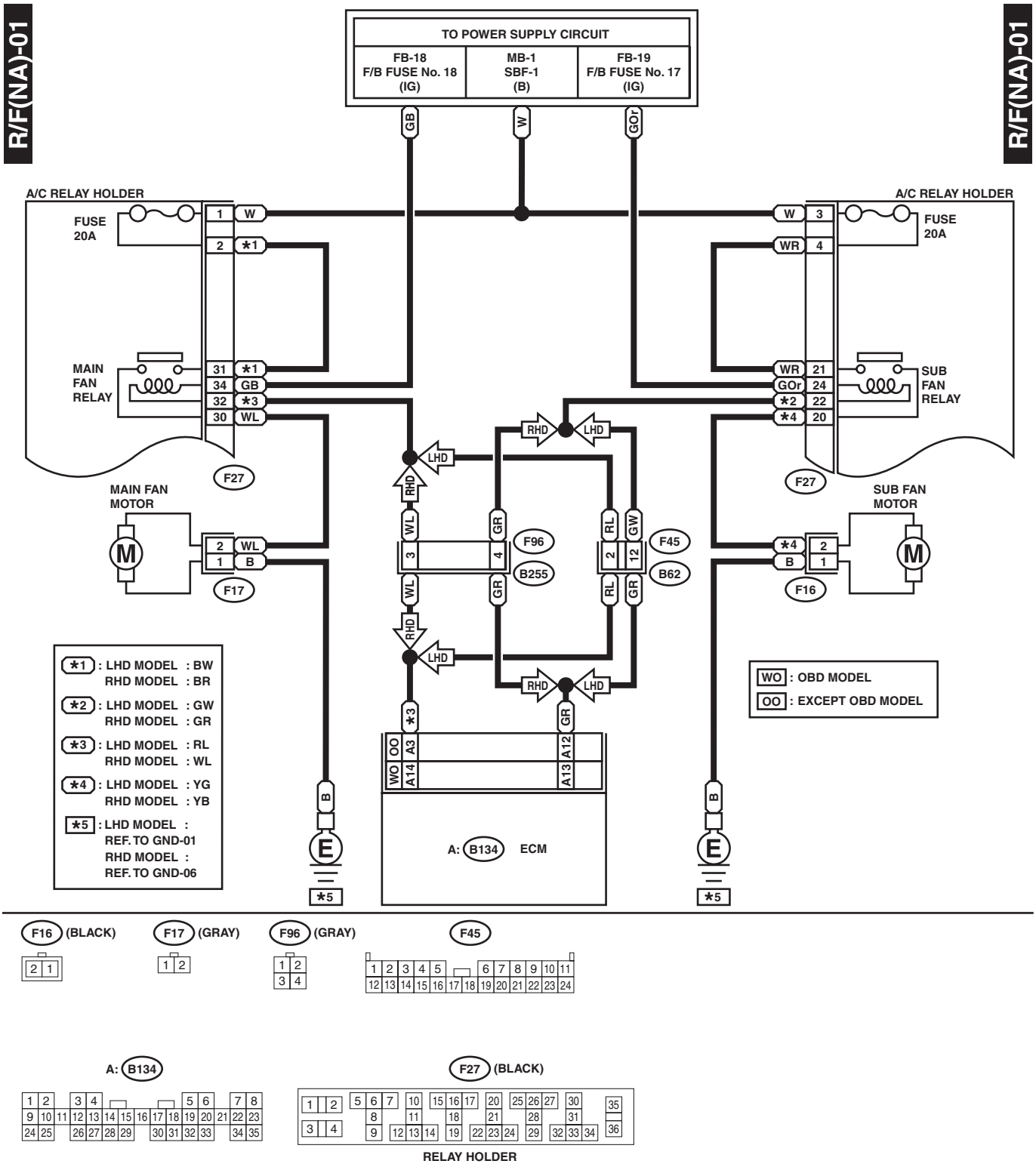

B7 (BLACK)
1 2 3
4 5 6
B12
1 2 3 4
5 6 7 8
9 10 11 12
T7
1 2 3 4 5 6
7 8 9 10 11 12
B94 (BLACK)
1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16 17 18 19 20

WI-07090

14.Radiator Fan System

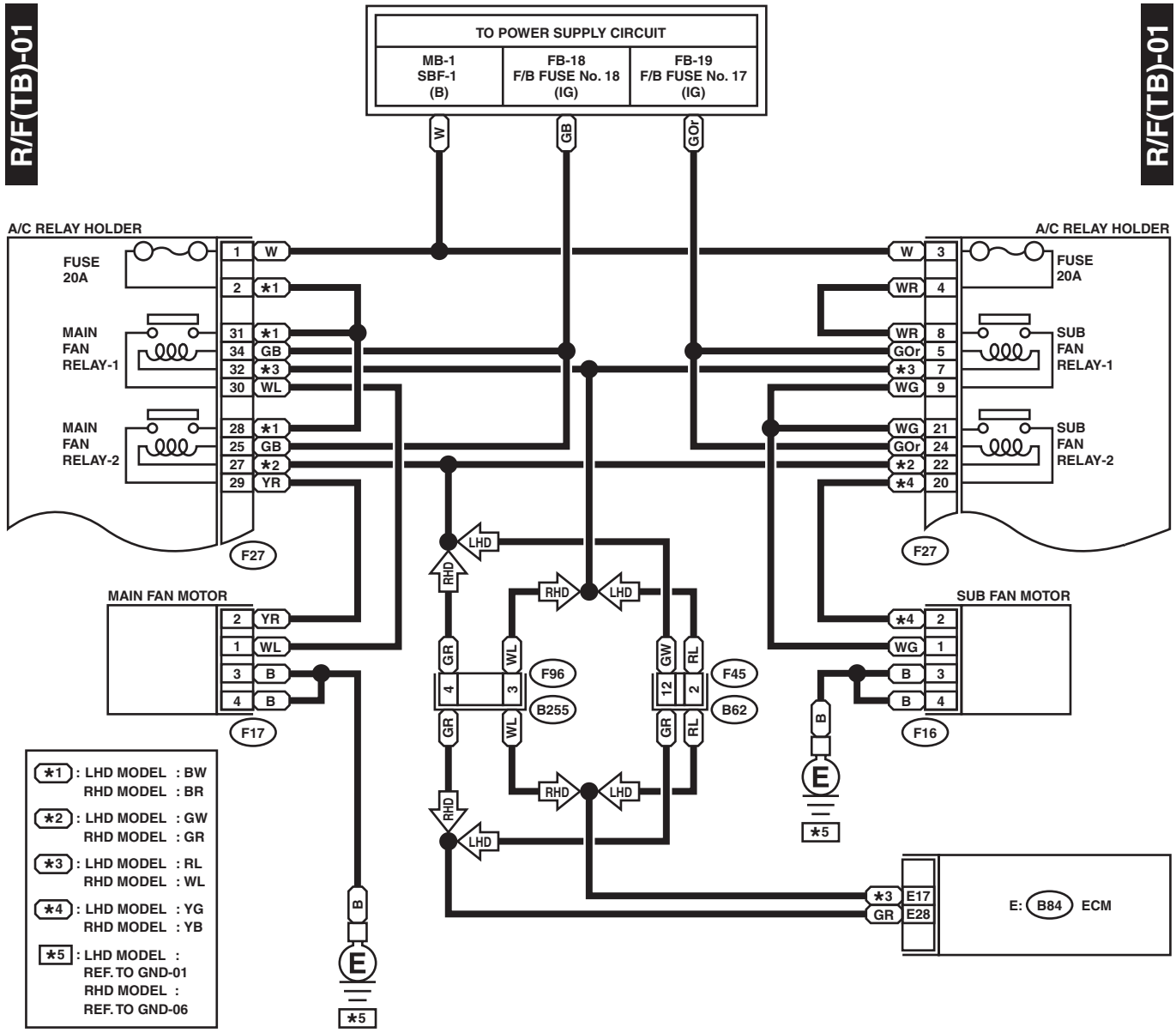
A: WIRING DIAGRAM

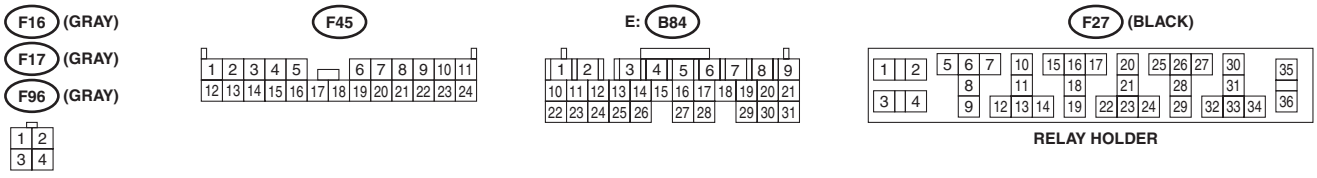
1. NON-TURBO MODEL



WI-07241

2. TURBO MODEL



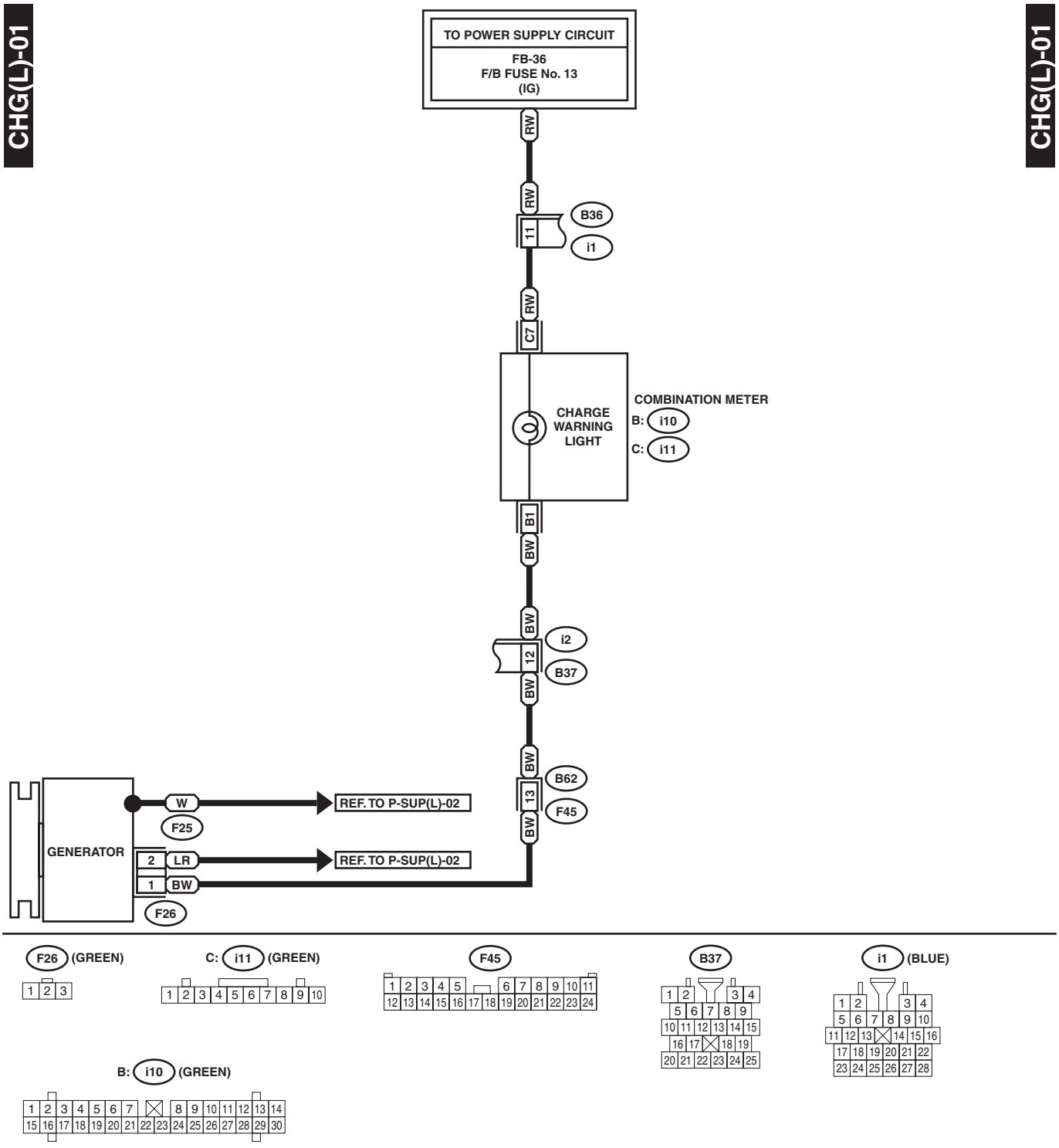


WI-07242

15.Charging System

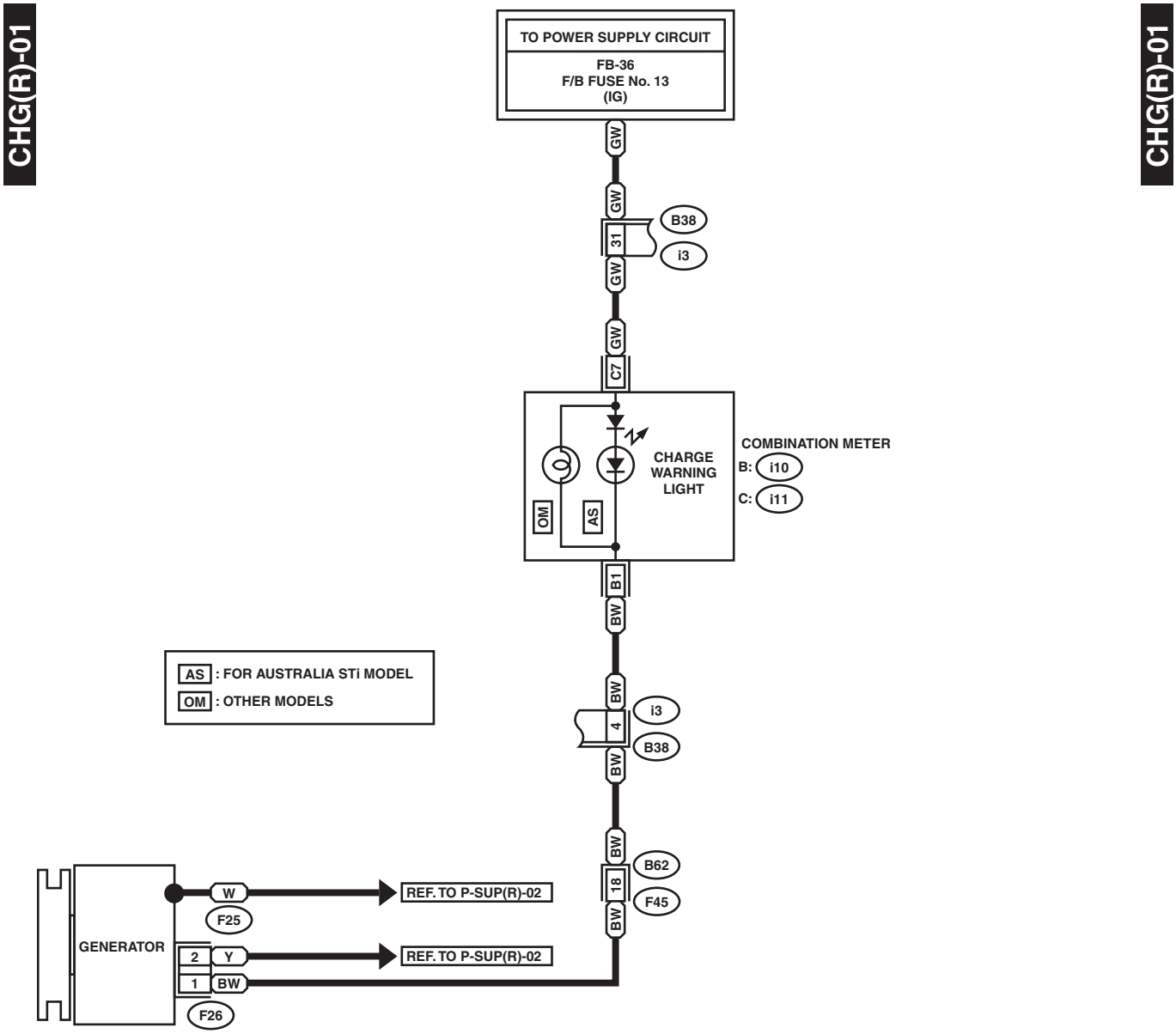
A: WIRING DIAGRAM

1. LHD MODEL



WI-07080

2. RHD MODEL

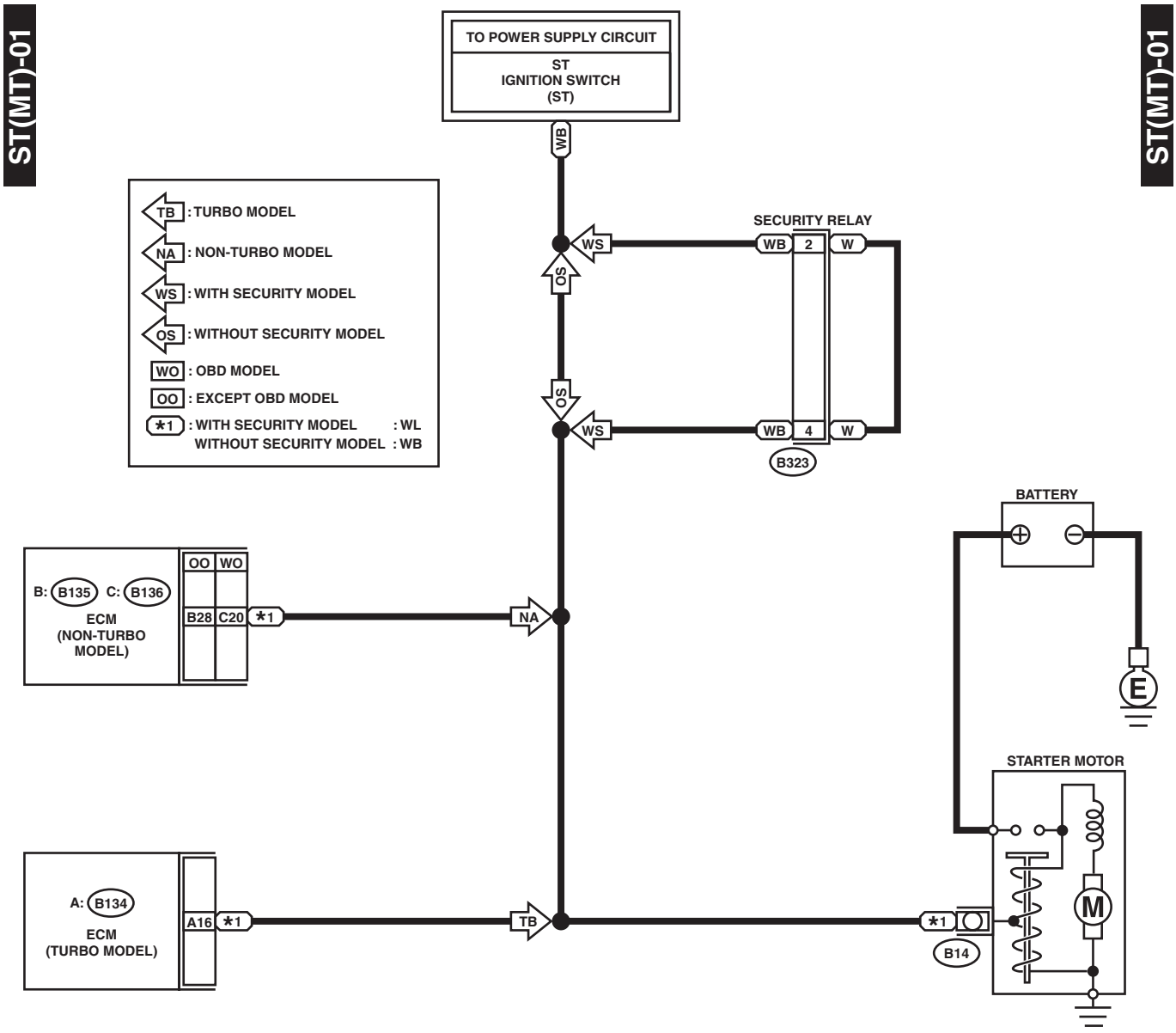


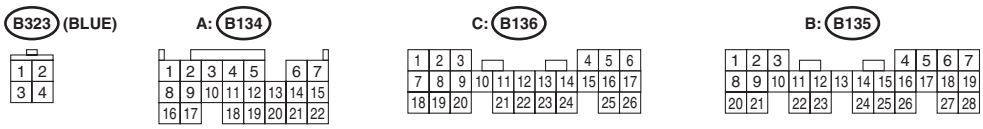
WI-07081

16.Starter System

A: WIRING DIAGRAM

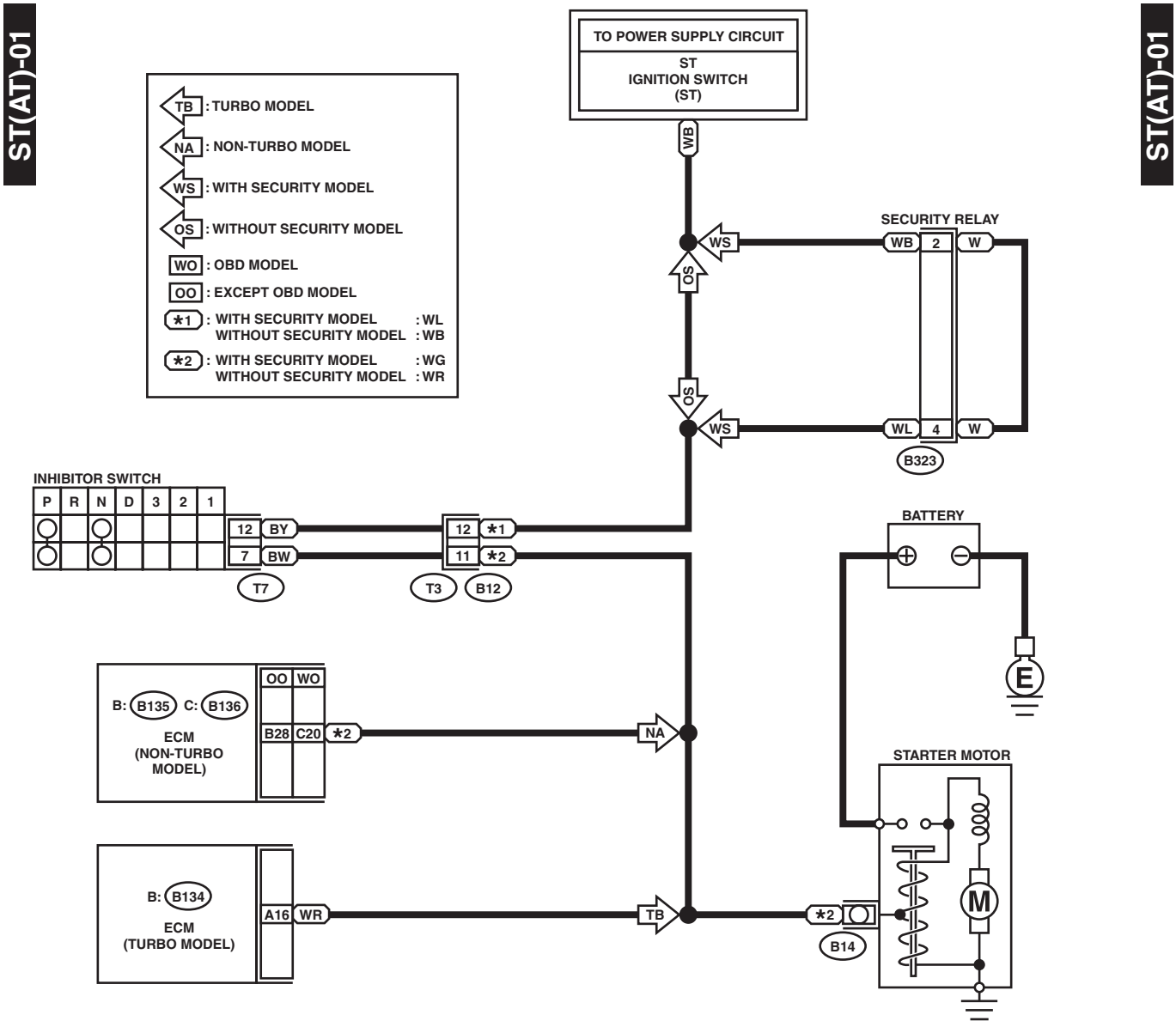
1. MT MODEL

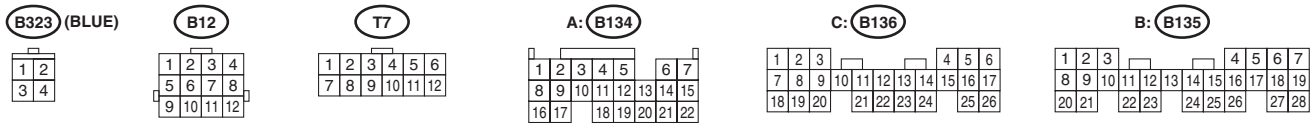




WI-07207

2. AT MODEL





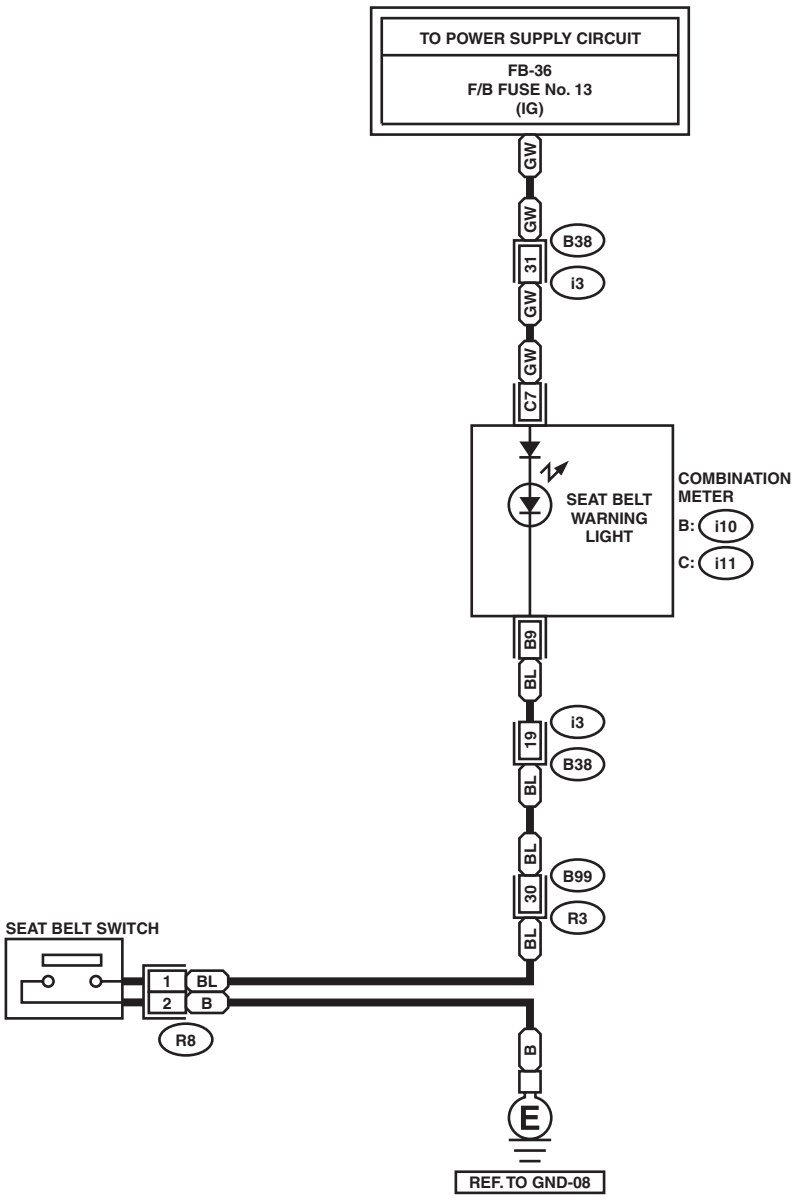
WI-07208

17.Seat Belt Warning System

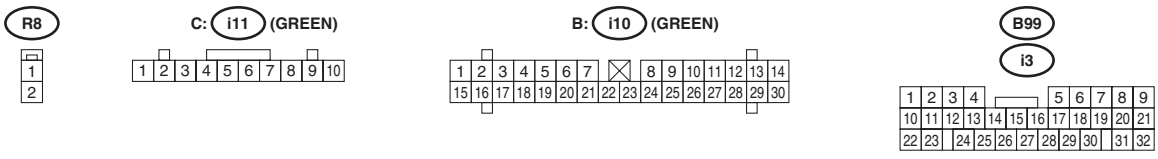
A: WIRING DIAGRAM

1. WITHOUT SEAT BELT TIMER MODEL

S/BELT-01

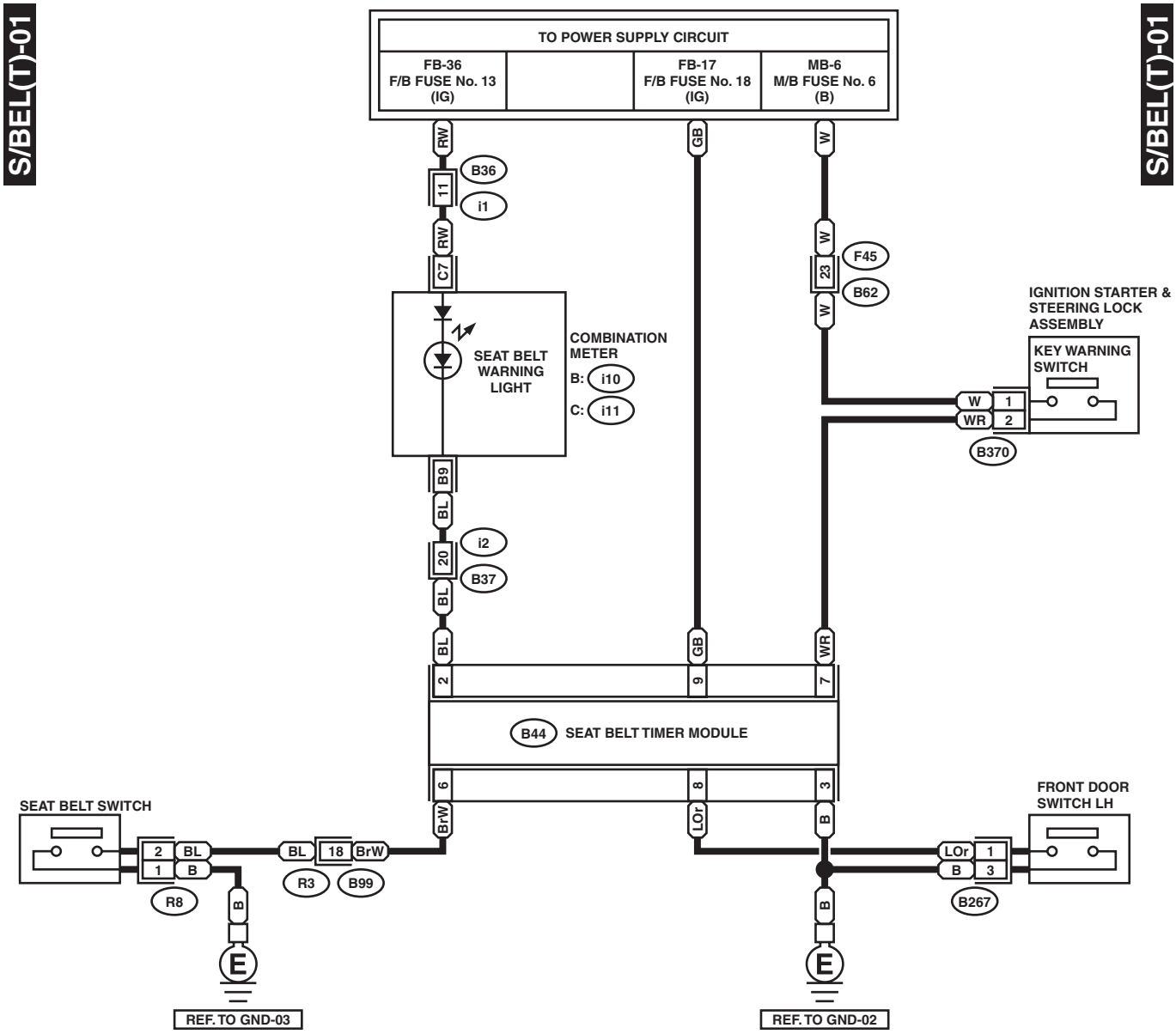


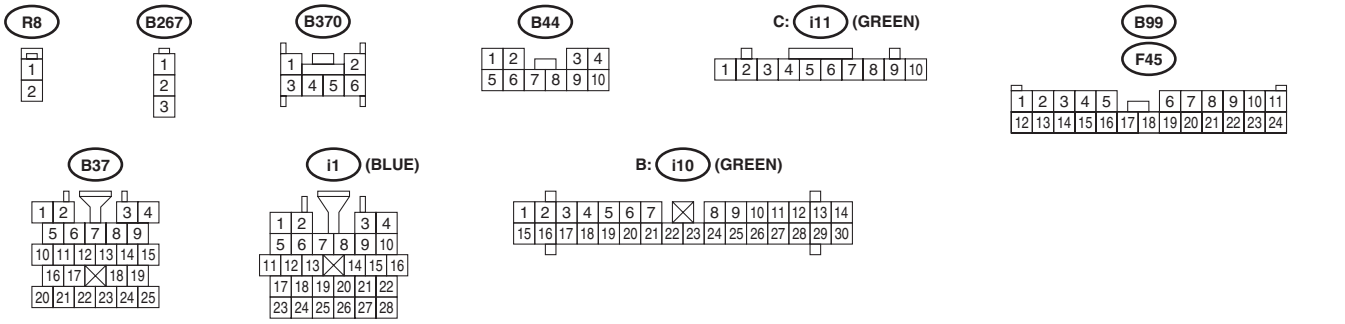
S/BELT-01



WI-07202

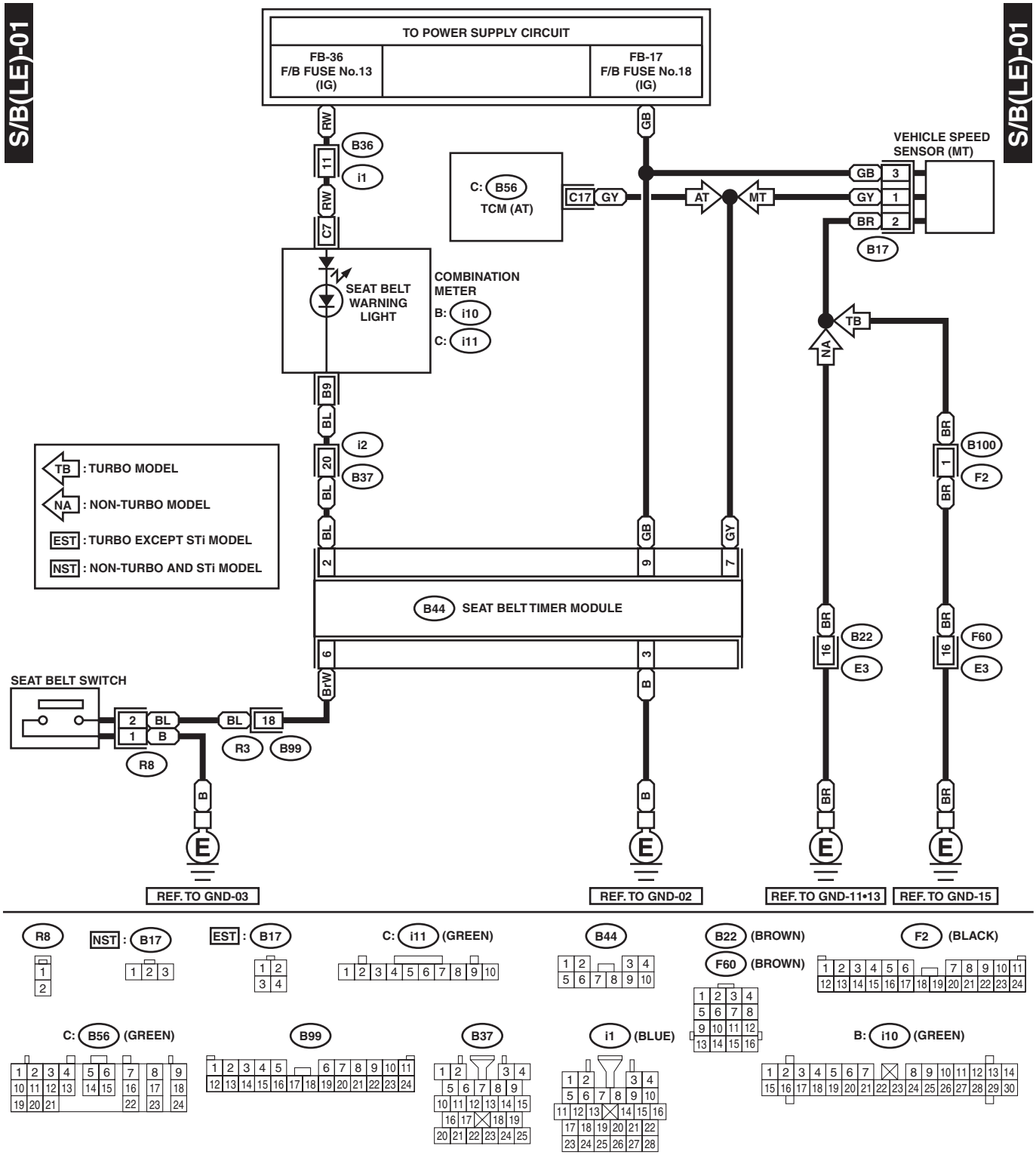
2. WITH SEAT BELT TIMER EXCEPT FOR EUROPE MODEL





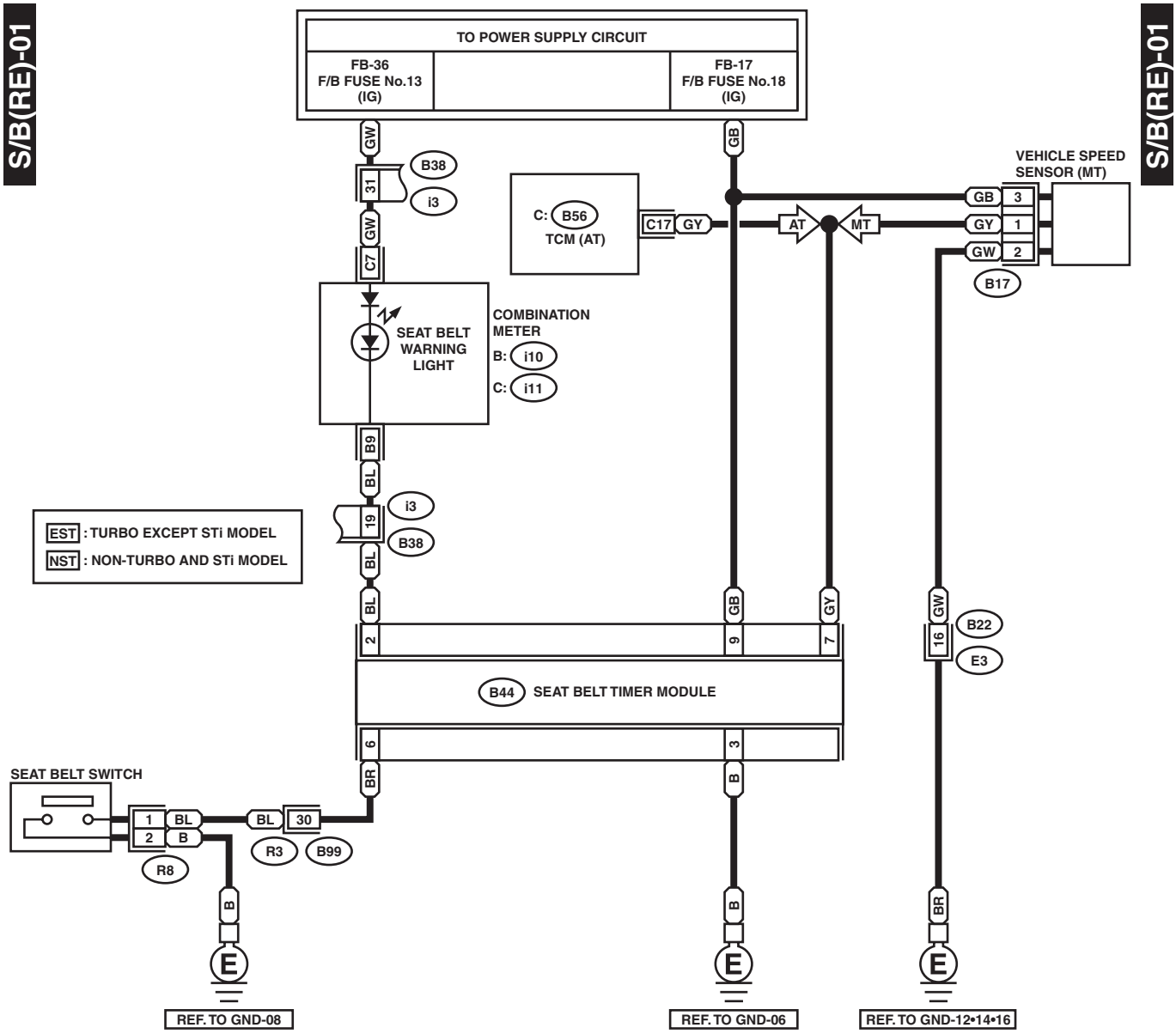
WI-07203

3. LHD FOR EUROPE MODEL



WI-07204

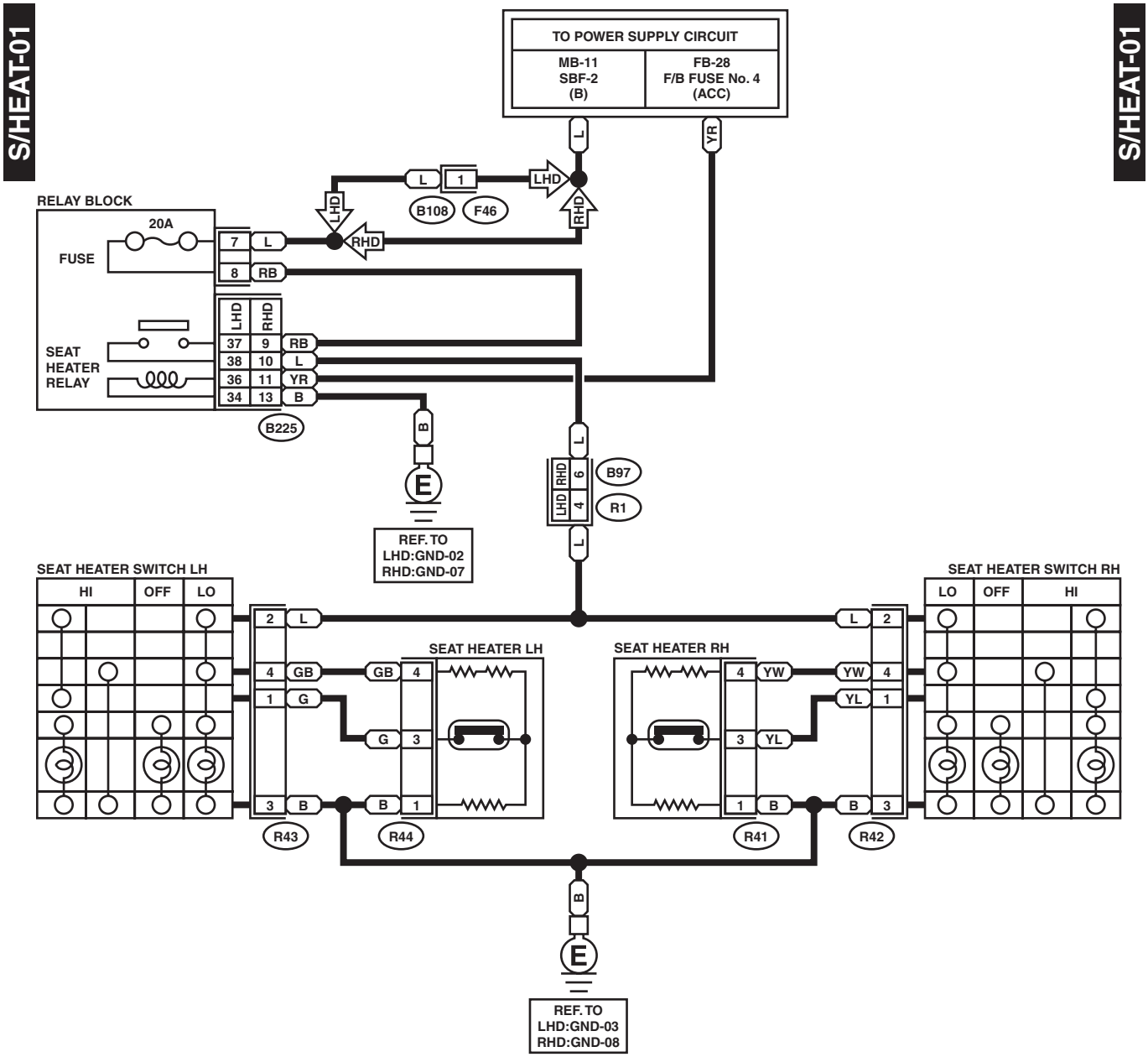
4. RHD FOR EUROPE MODEL

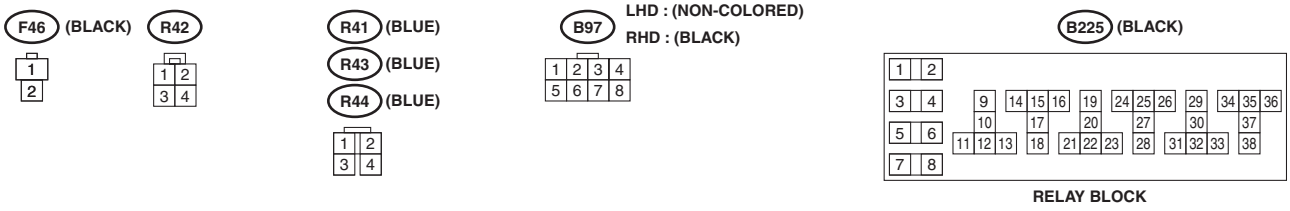


WI-07205

18.Seat Heater System

A: WIRING DIAGRAM



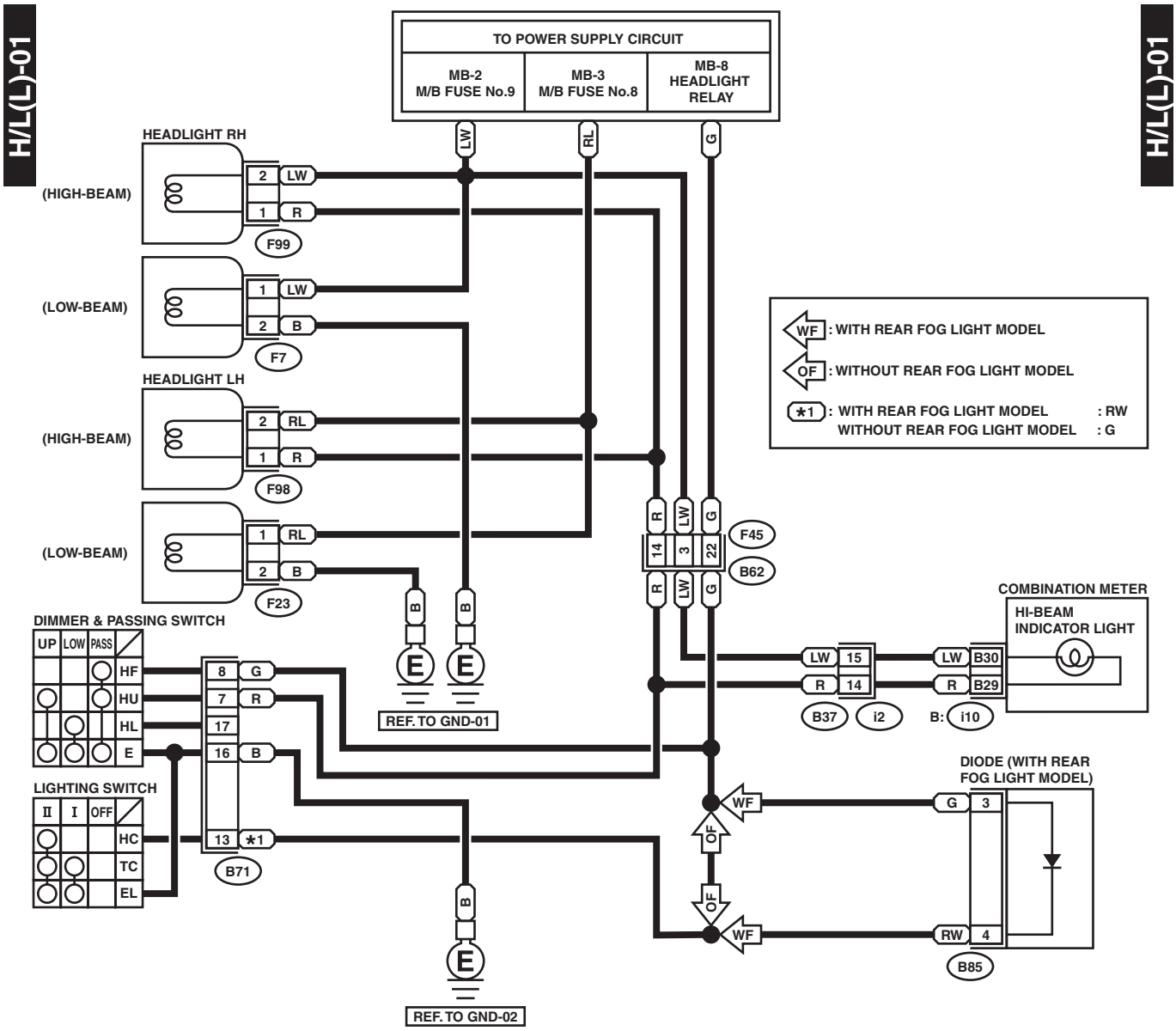


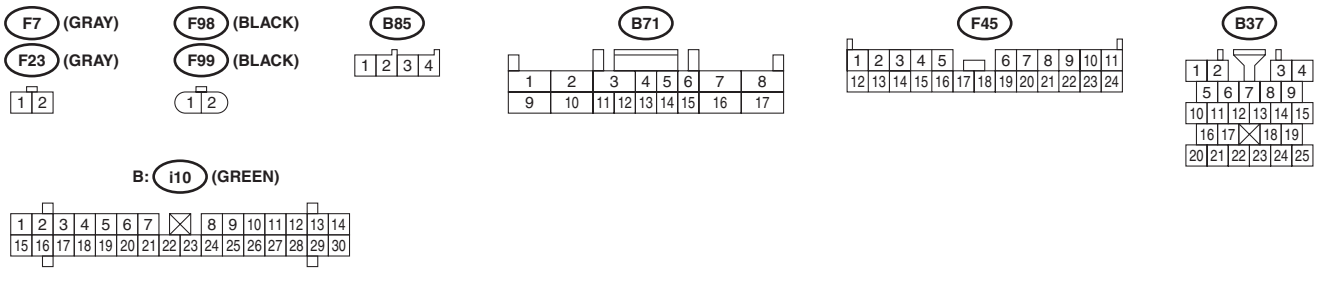
WI-02439

19.Headlight System

A: WIRING DIAGRAM

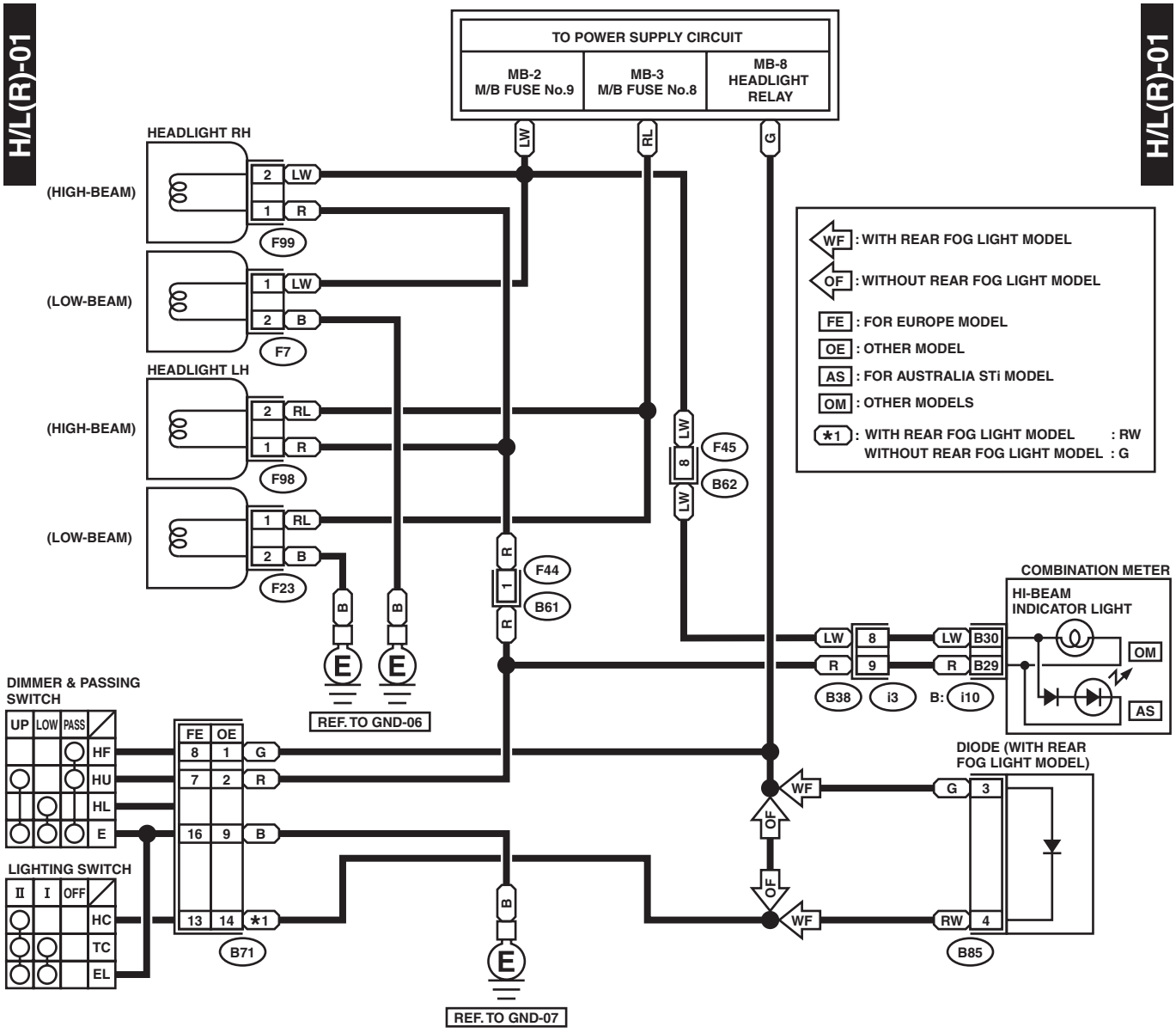
1. LHD MODEL

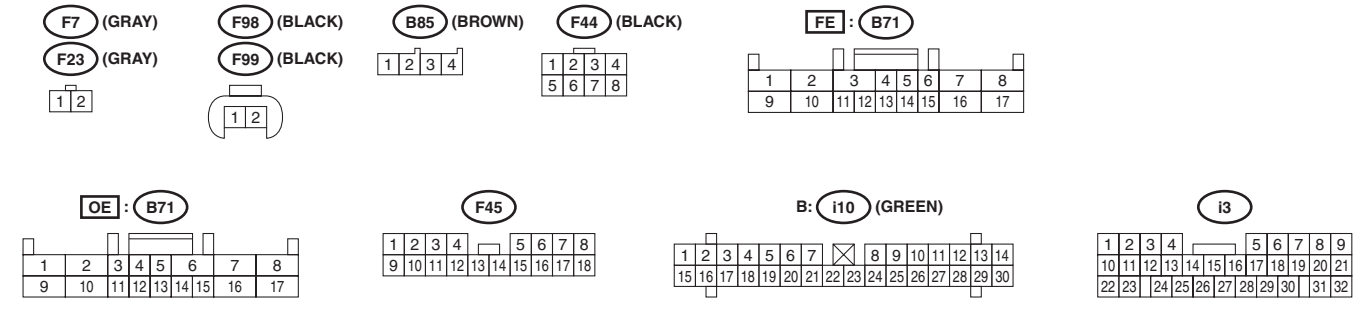




WI-07179

2. RHD MODEL

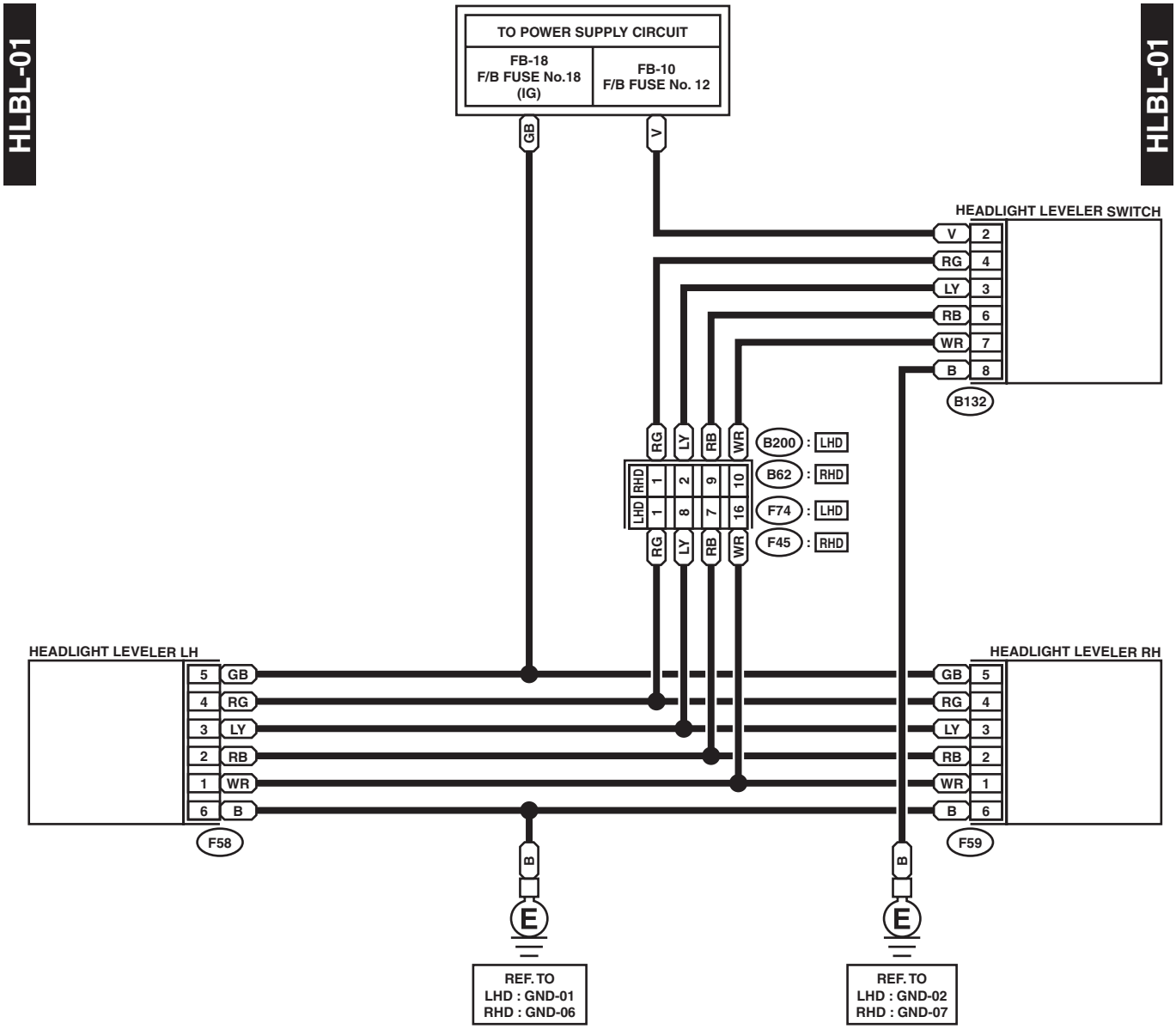


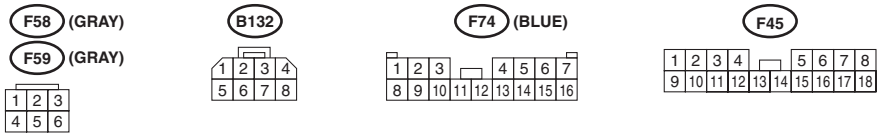


WI-07180

20.Headlight Beam Leveler System

A: WIRING DIAGRAM



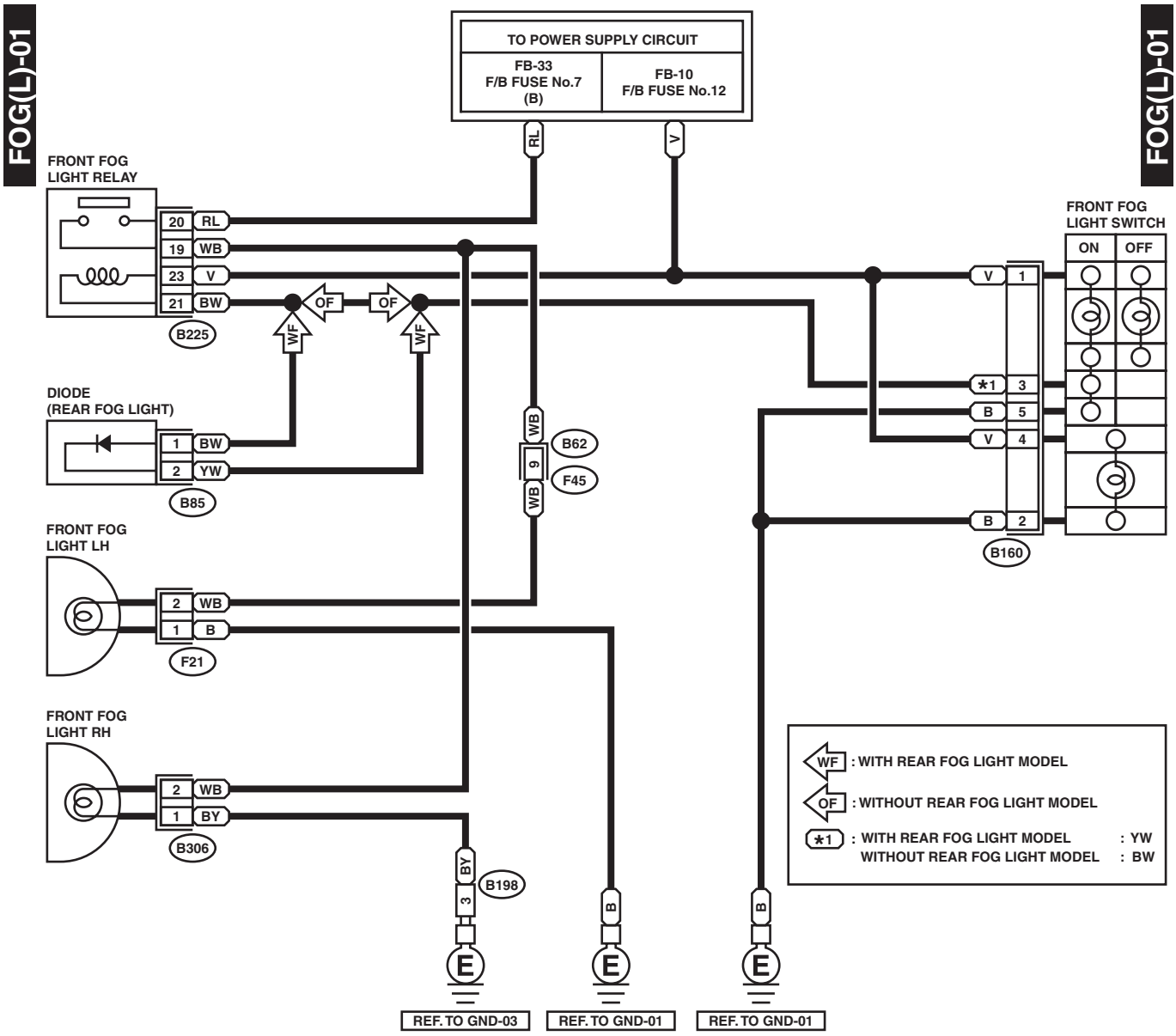


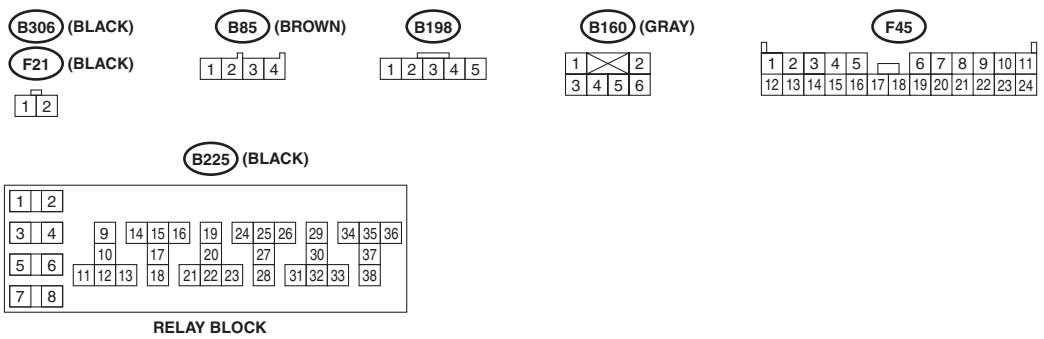
WI-02369

21.Front Fog Light System

A: WIRING DIAGRAM

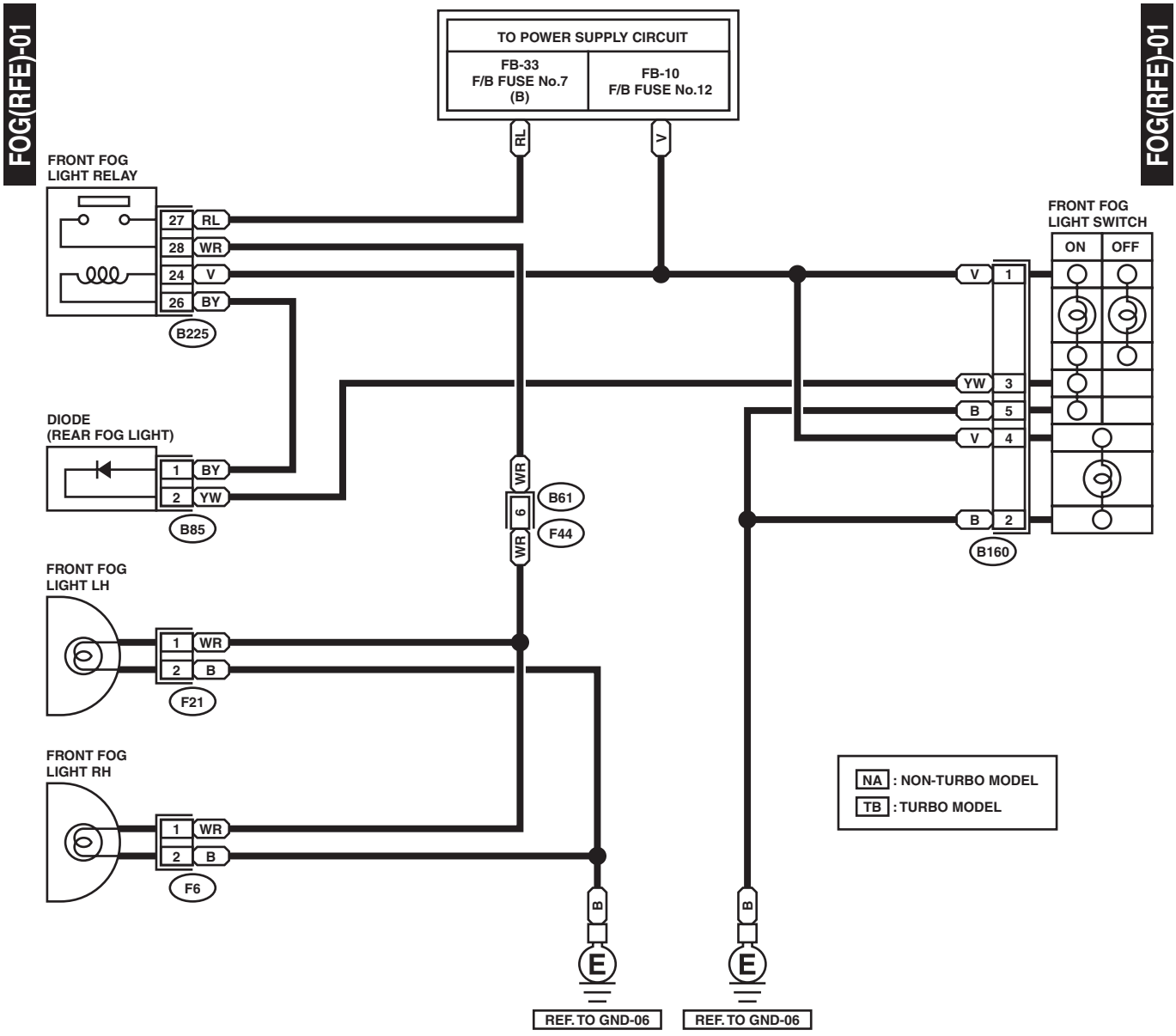
1. LHD MODEL





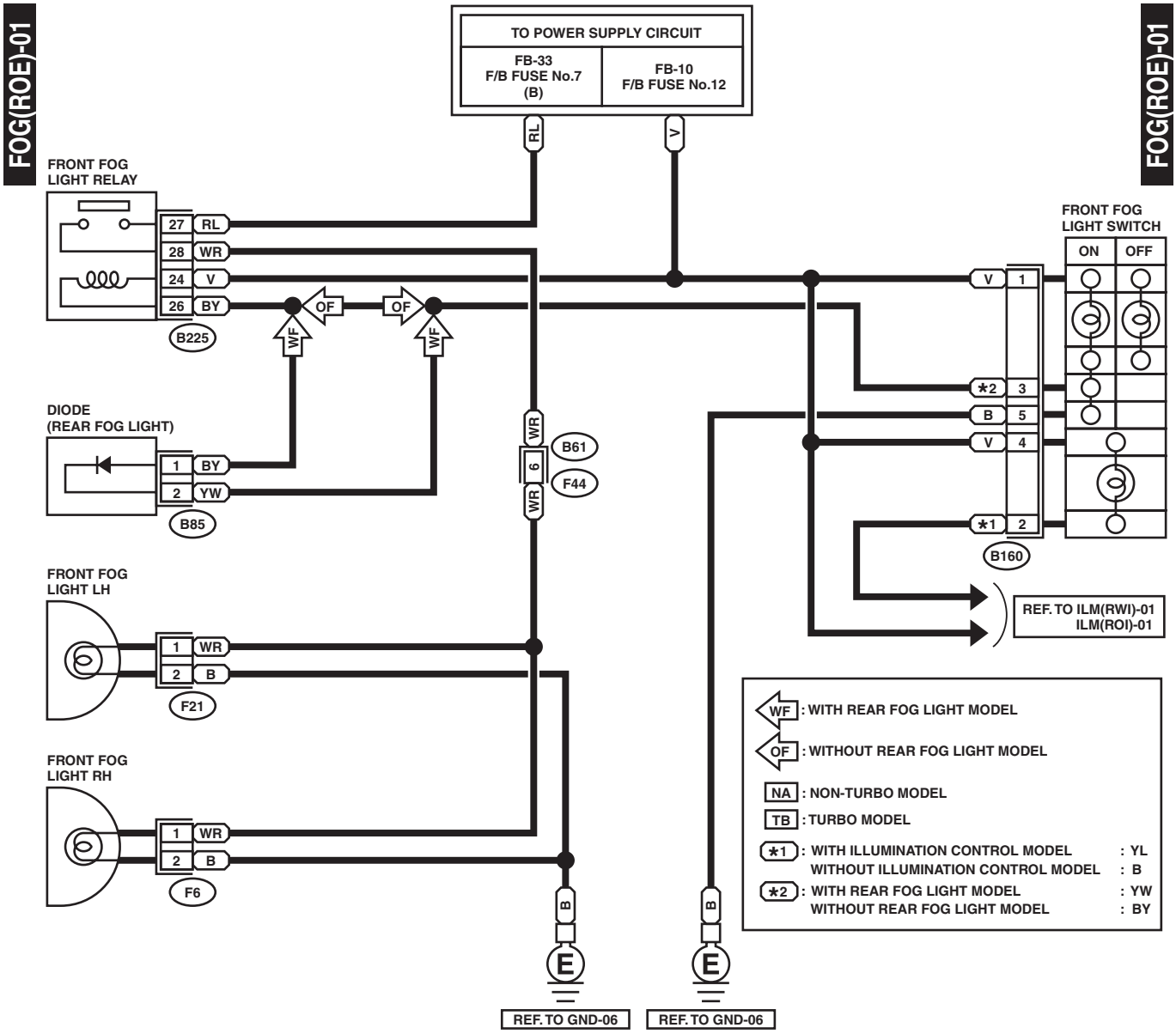
WI-07243

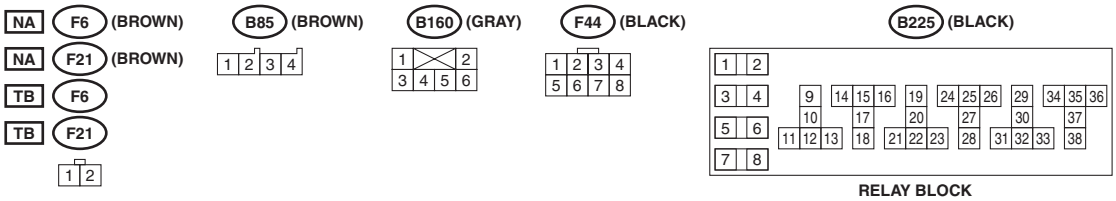
2. RHD FOR EUROPE MODEL



WI-07177

3. RHD EXCEPT FOR EUROPE MODEL



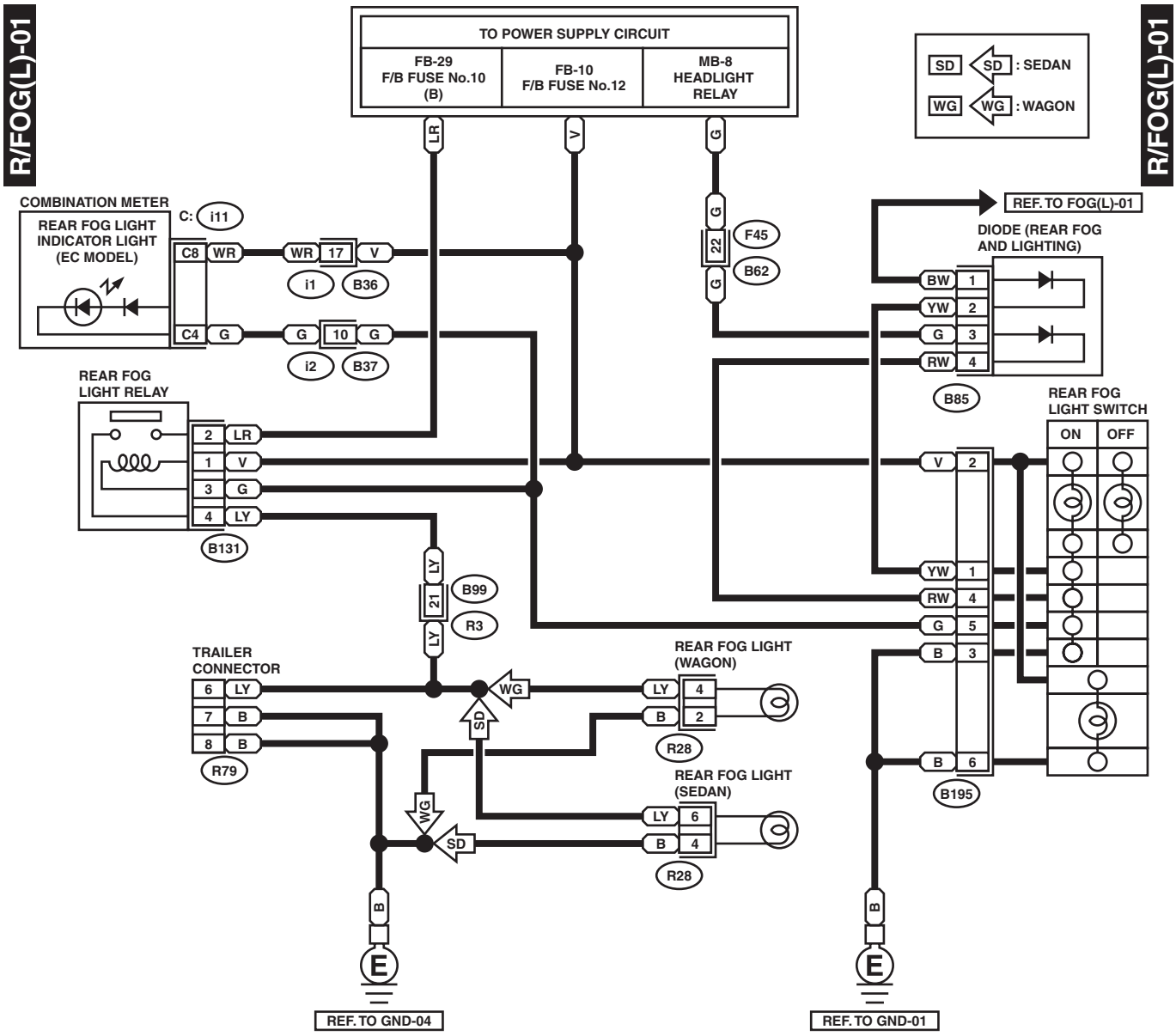


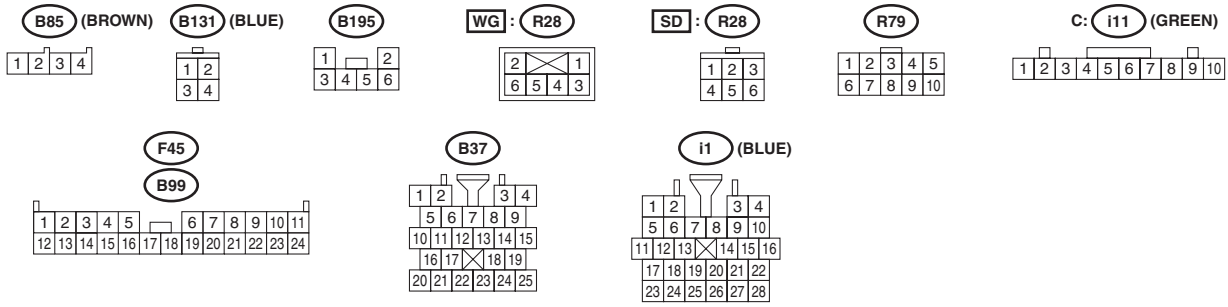
WI-07178

22.Rear Fog Light System

A: WIRING DIAGRAM

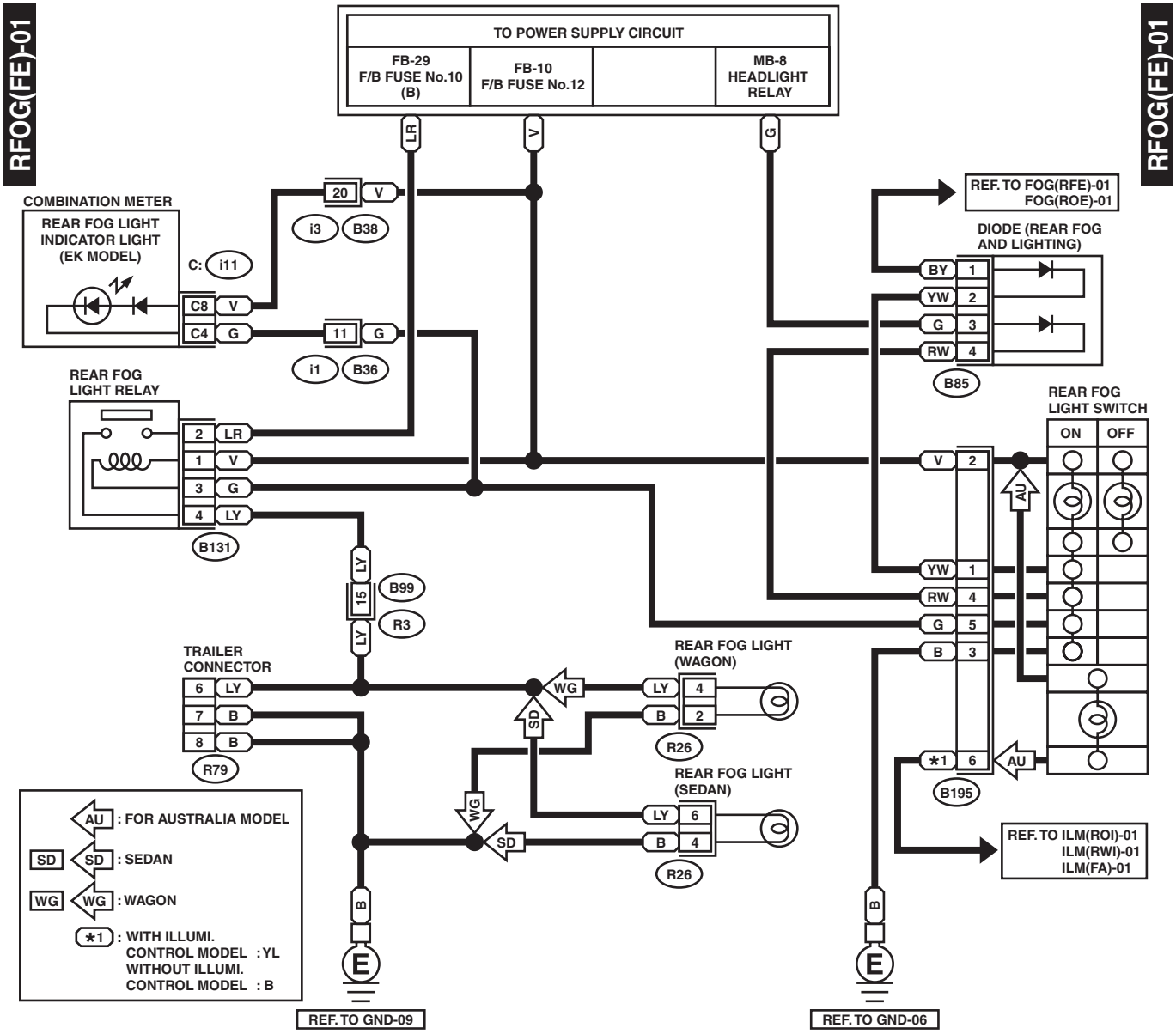
1. LHD MODEL

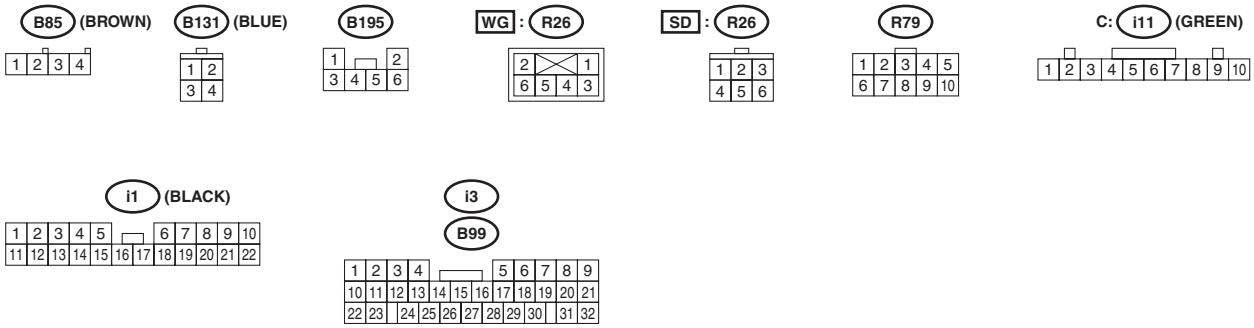




WI-07198

2. RHD MODEL

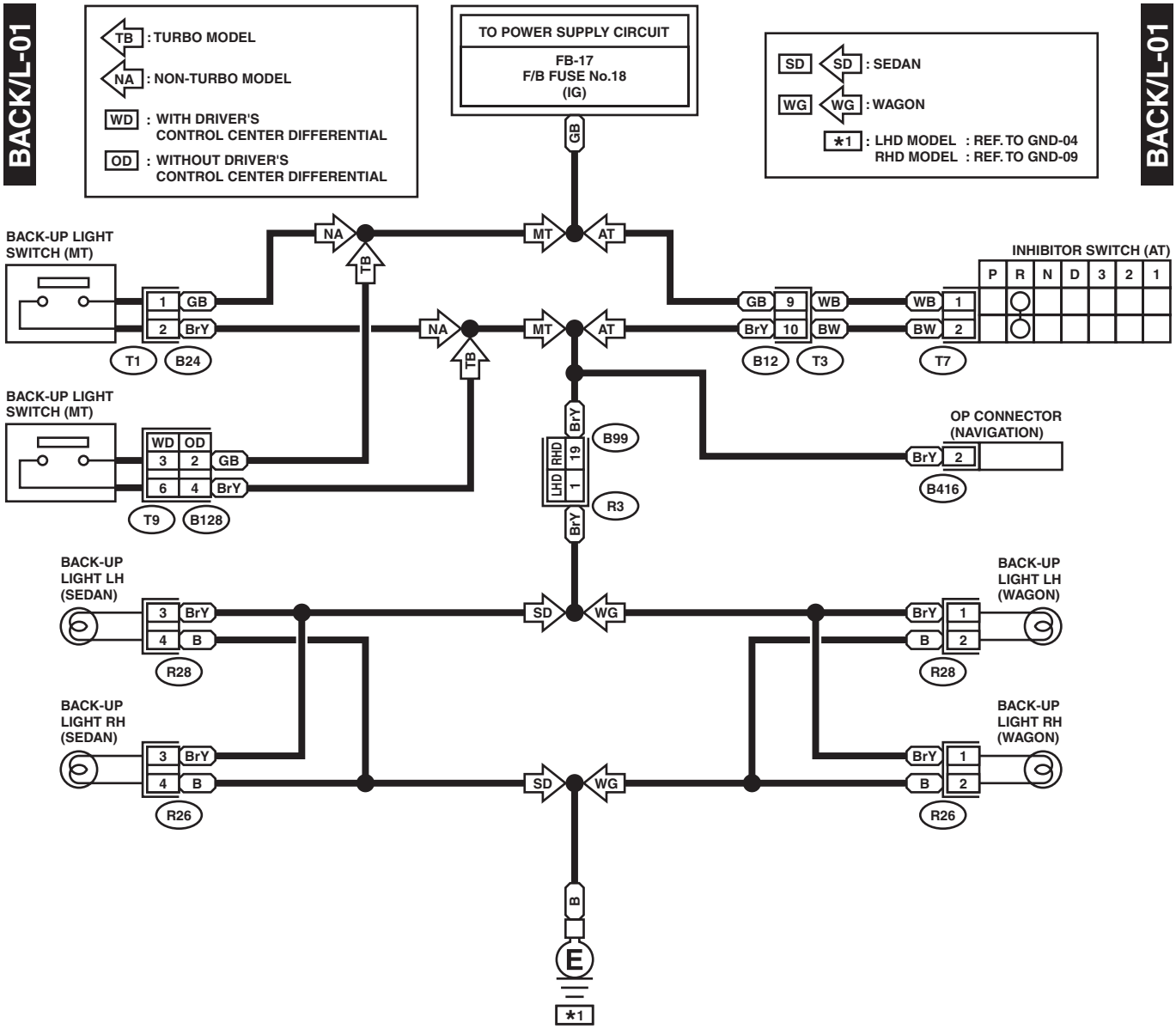


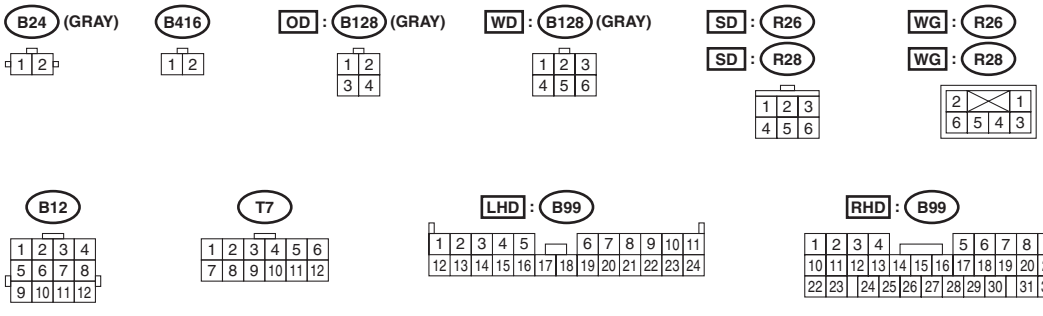


WI-07199

23.Back-up Light System

A: WIRING DIAGRAM

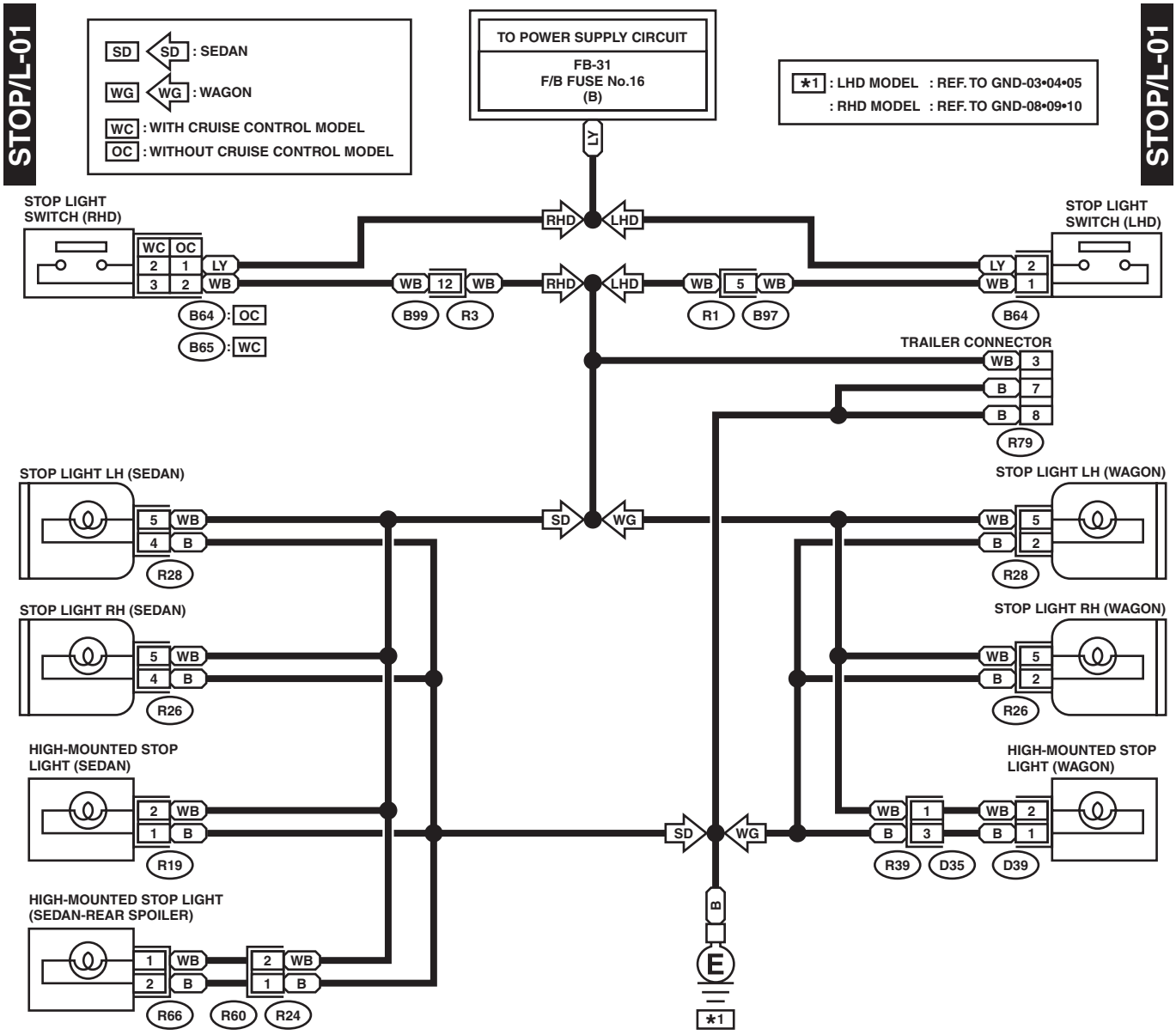




WI-07167

24.Stop Light System

A: WIRING DIAGRAM

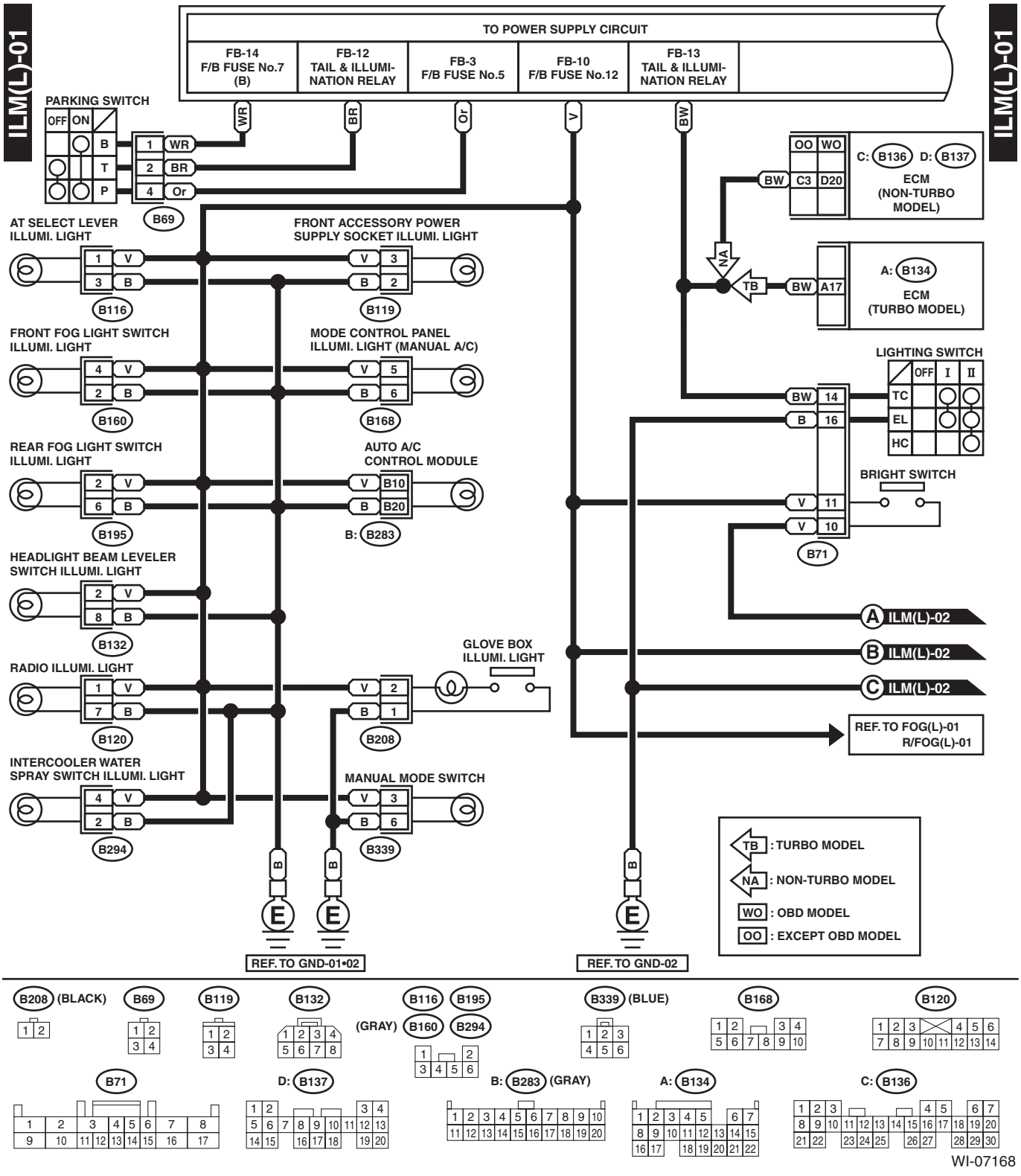


WI-04573

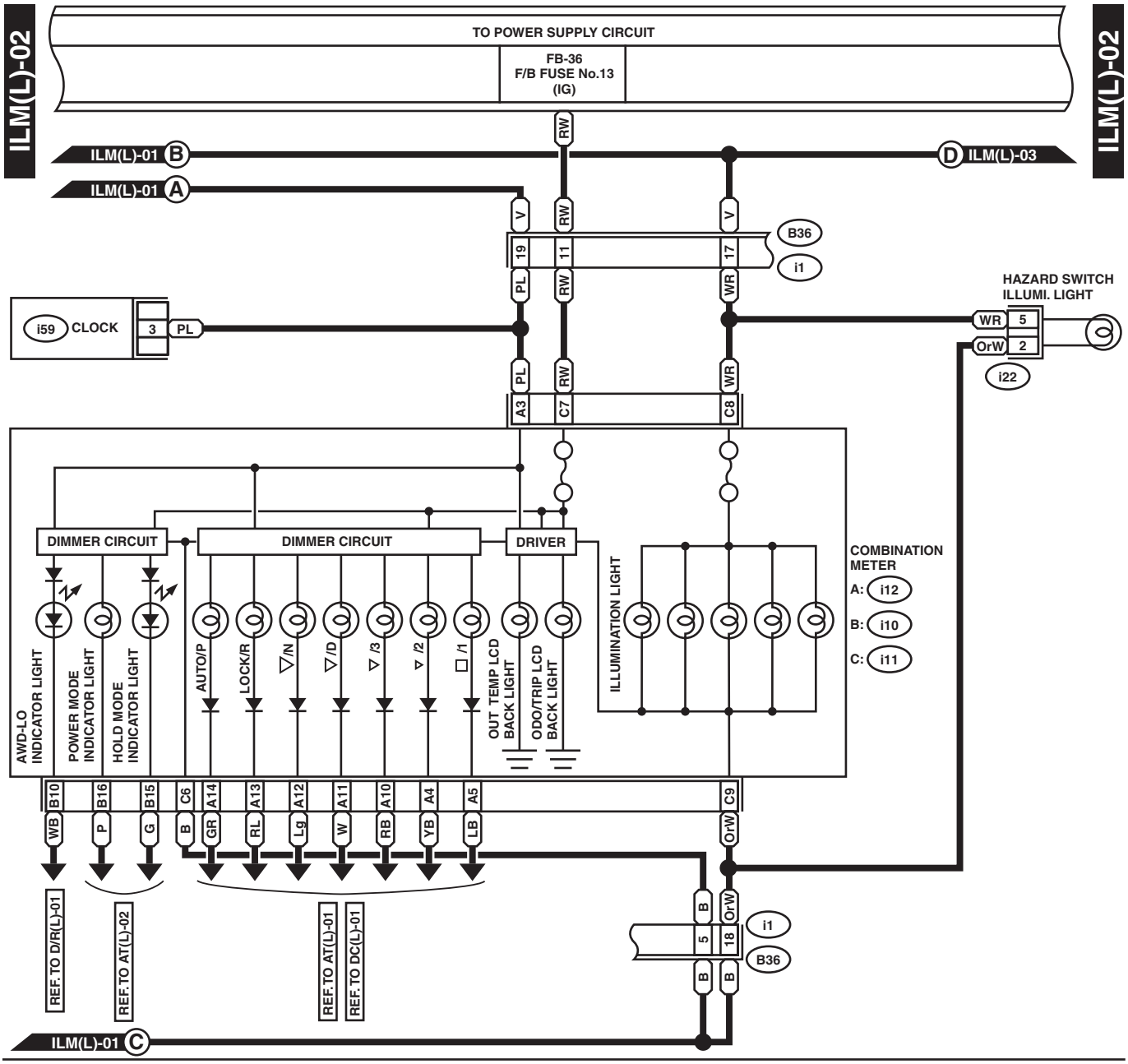
25.Clearance Light and Illumination Light System

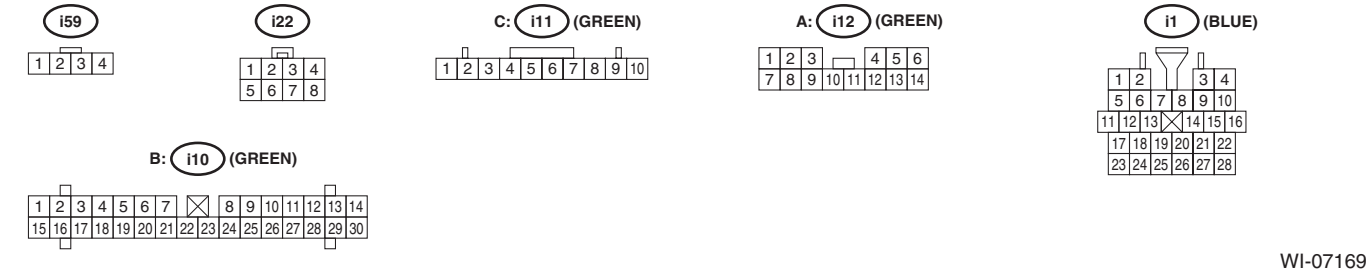
A: WIRING DIAGRAM

1. LHD MODEL

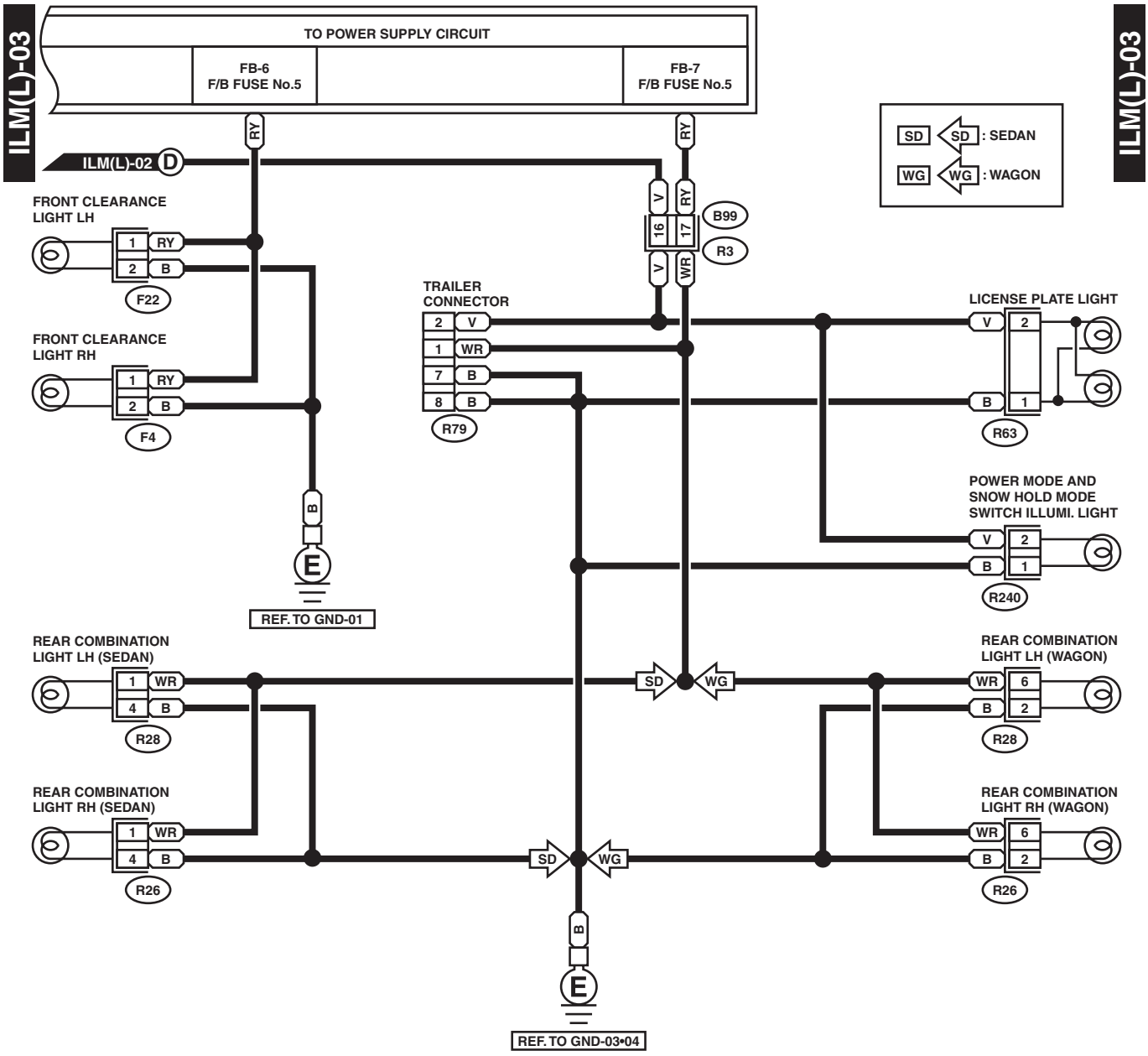


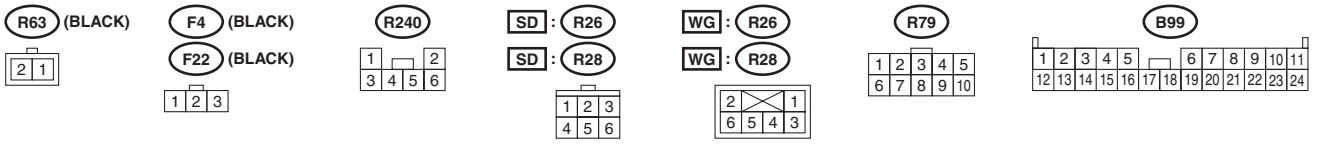
Clearance Light and Illumination Light System





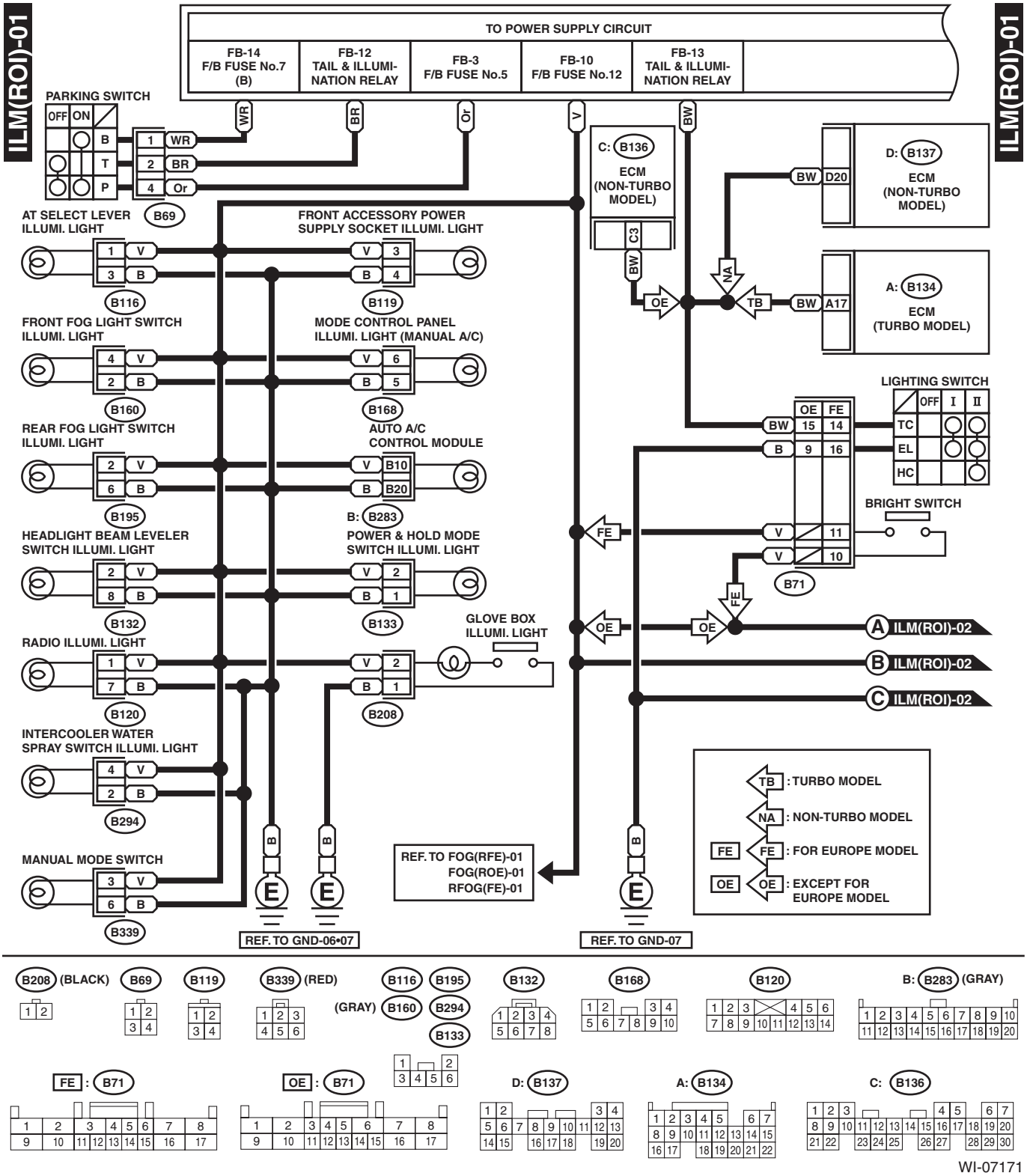
WI-07169


ILM(L)-03
TO POWER SUPPLY CIRCUIT
FB-6
F/B FUSE No.5
FB-7
F/B FUSE No.5
SD : SEDAN
WG : WAGON
ILM(L)-02
FRONT CLEARANCE LIGHT LH
FRONT CLEARANCE LIGHT RH
F22
F4
TRAILER CONNECTOR
R79
B99
R3
LICENSE PLATE LIGHT
R63
POWER MODE AND SNOW HOLD MODE SWITCH ILLUMI. LIGHT
R240
REF. TO GND-01
REAR COMBINATION LIGHT LH (SEDAN)
REAR COMBINATION LIGHT RH (SEDAN)
REAR COMBINATION LIGHT LH (WAGON)
REAR COMBINATION LIGHT RH (WAGON)
R28
R26
REF. TO GND-03•04

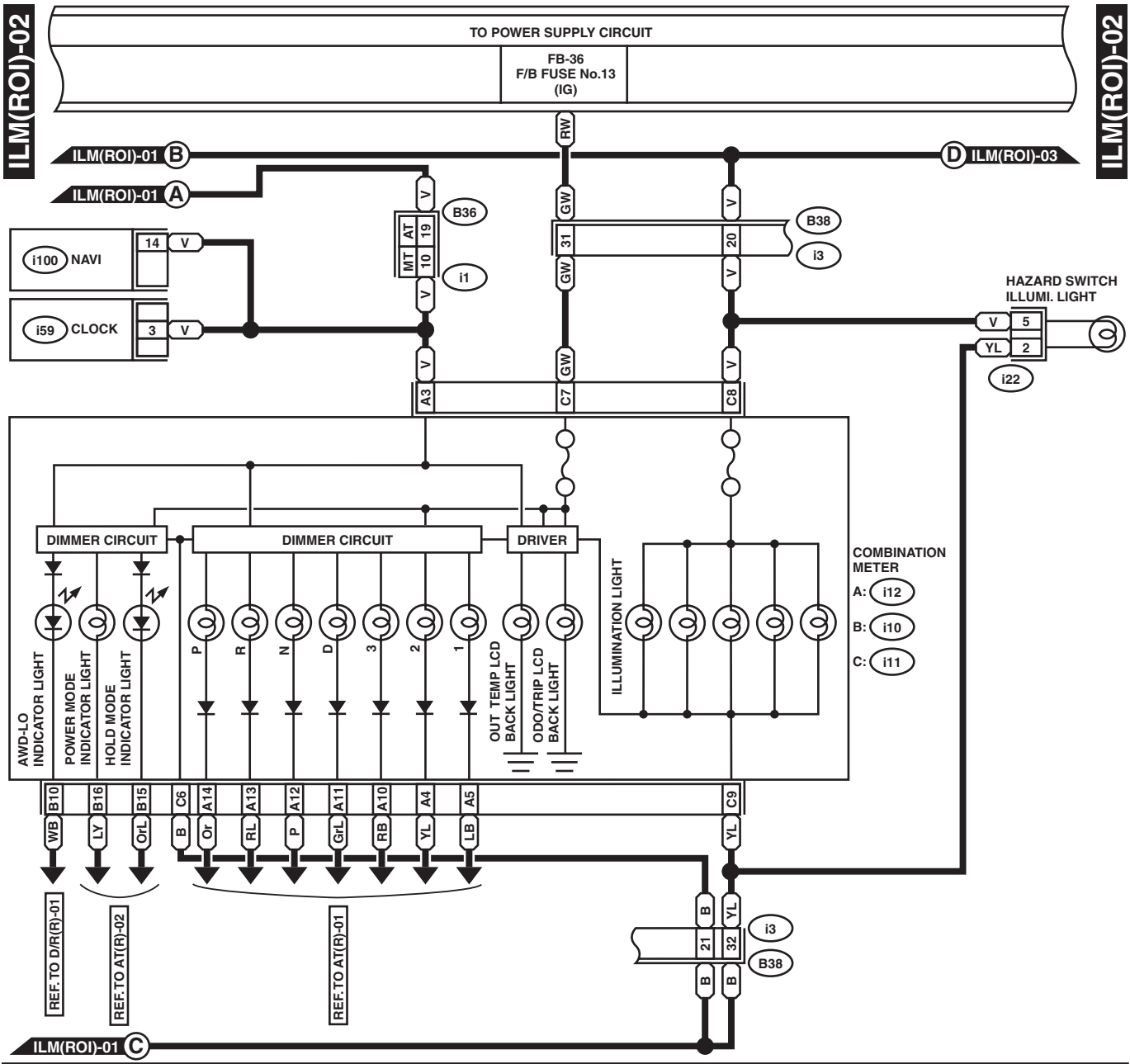

R63 (BLACK)
F4 (BLACK)
F22 (BLACK)
R240
SD : R26
SD : R28
WG : R26
WG : R28
R79
B99

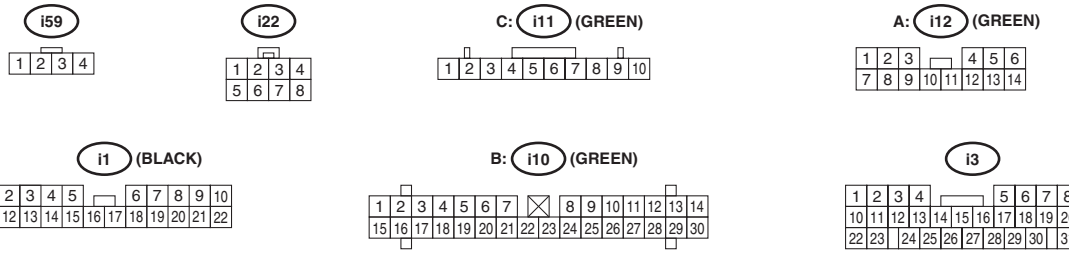
WI-07170

2. RHD WITHOUT ILLUMINATION CONTROL MODEL

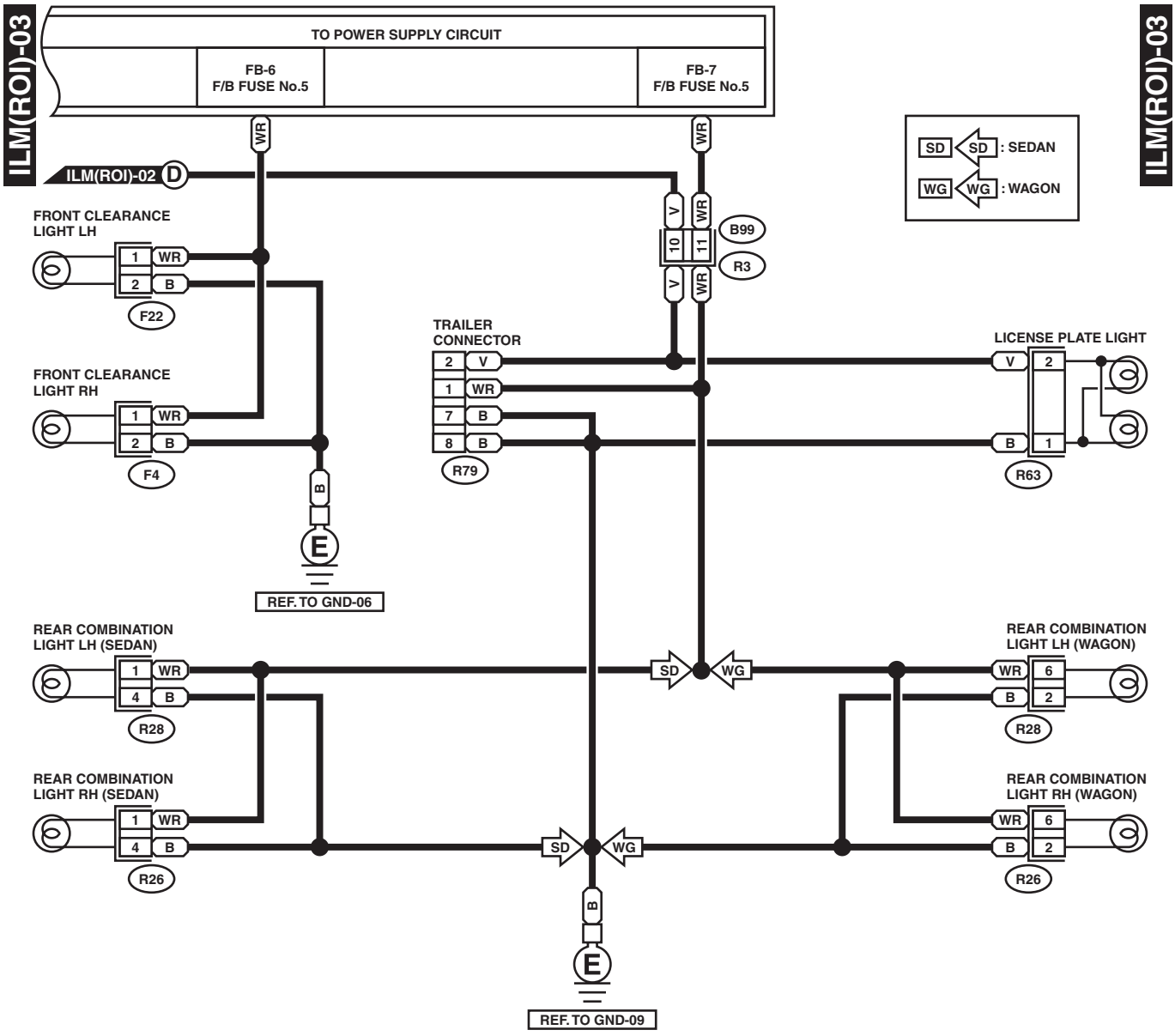


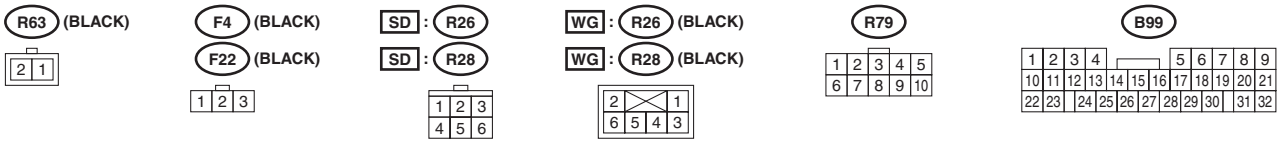
WI-07171


ILM(ROI)-02
TO POWER SUPPLY CIRCUIT
FB-36
F/B FUSE No.13
(IG)
ILM(ROI)-01 B
ILM(ROI)-01 A
ILM(ROI)-03 D
i100 NAVI
i59 CLOCK
B36
i1
B38
i3
HAZARD SWITCH
ILLUMI. LIGHT
i22
A3
C7
C8
DIMMER CIRCUIT
DIMMER CIRCUIT
DRIVER
AWD-LO INDICATOR LIGHT
POWER MODE INDICATOR LIGHT
HOLD MODE INDICATOR LIGHT
P
R
N
D
3
2
1
OUT TEMP LCD BACK LIGHT
ODO/TRIP LCD BACK LIGHT
ILLUMINATION LIGHT
COMBINATION METER
A: i12
B: i10
C: i11
B10
B16
B15
C6
A14
A13
A12
A11
A10
A4
A5
C9
WB
LY
OrL
B
Or
RL
P
GrL
RB
YL
LB
REF. TO D/R(R)-01
REF. TO AT(R)-02
REF. TO AT(R)-01
ILM(ROI)-01 C


i59
i22
C: i11 (GREEN)
A: i12 (GREEN)
i1 (BLACK)
B: i10 (GREEN)
i3

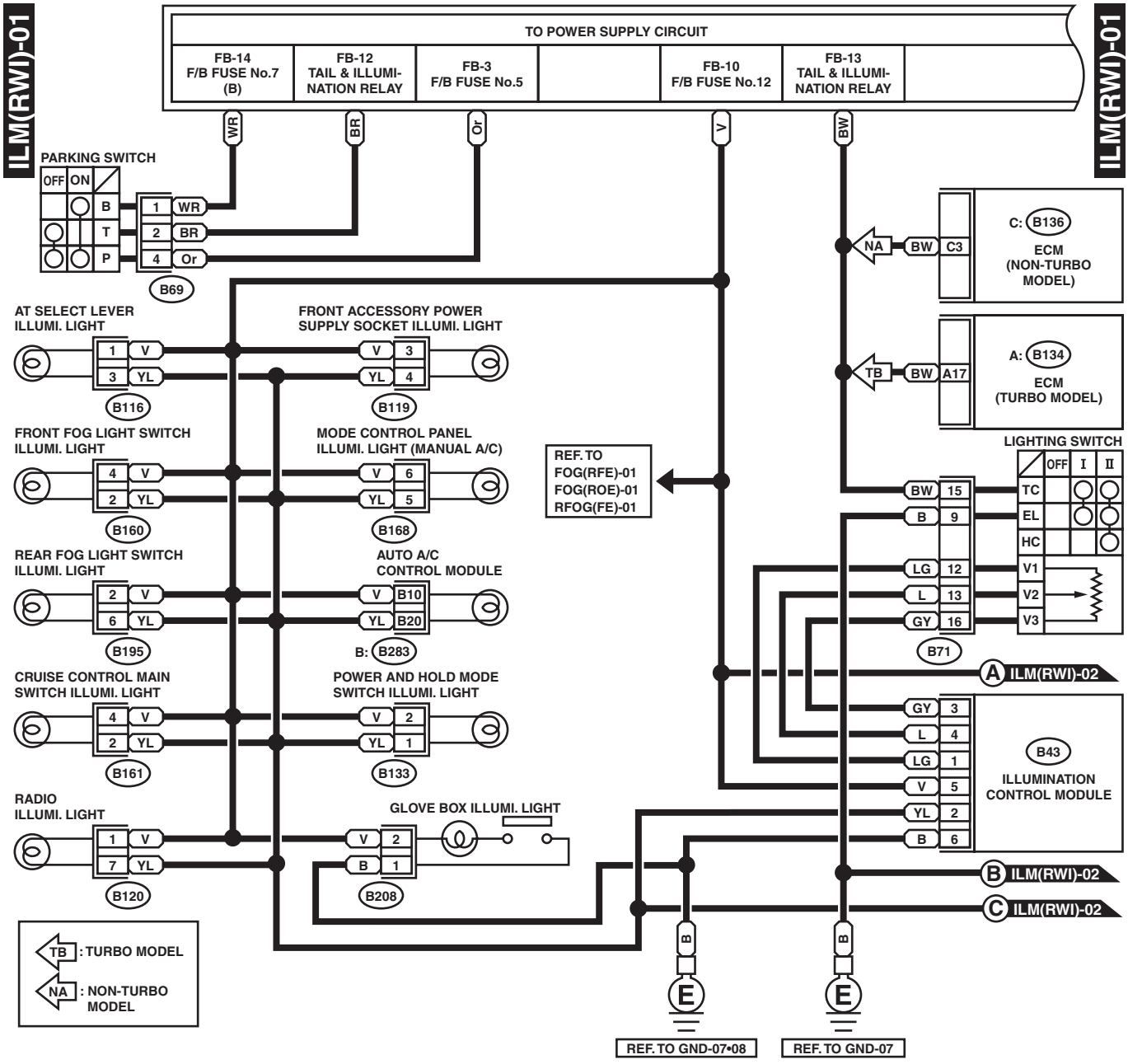
WI-07172

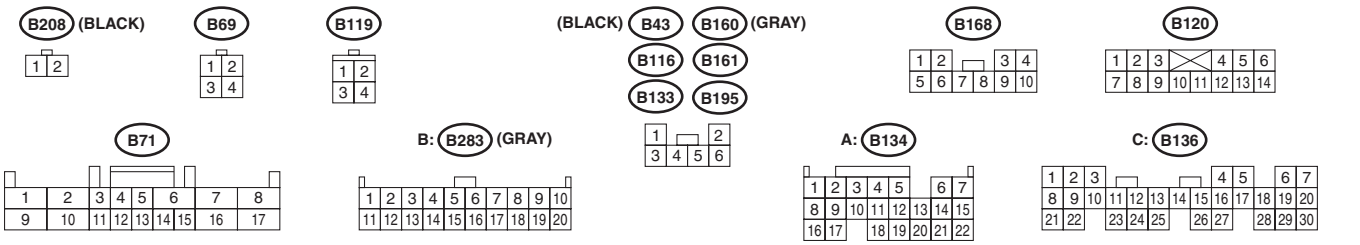

ILM(ROI)-03
TO POWER SUPPLY CIRCUIT
FB-6
F/B FUSE No.5
FB-7
F/B FUSE No.5
ILM(ROI)-02
SD : SEDAN
WG : WAGON
FRONT CLEARANCE LIGHT LH
FRONT CLEARANCE LIGHT RH
F22
F4
B99
R3
TRAILER CONNECTOR
R79
LICENSE PLATE LIGHT
R63
REF. TO GND-06
REF. TO GND-09
REAR COMBINATION LIGHT LH (SEDAN)
REAR COMBINATION LIGHT RH (SEDAN)
REAR COMBINATION LIGHT LH (WAGON)
REAR COMBINATION LIGHT RH (WAGON)
R28
R26
WR
V
B
SD
WG


R63 (BLACK)
F4 (BLACK)
F22 (BLACK)
SD : R26
SD : R28
WG : R26 (BLACK)
WG : R28 (BLACK)
R79
B99

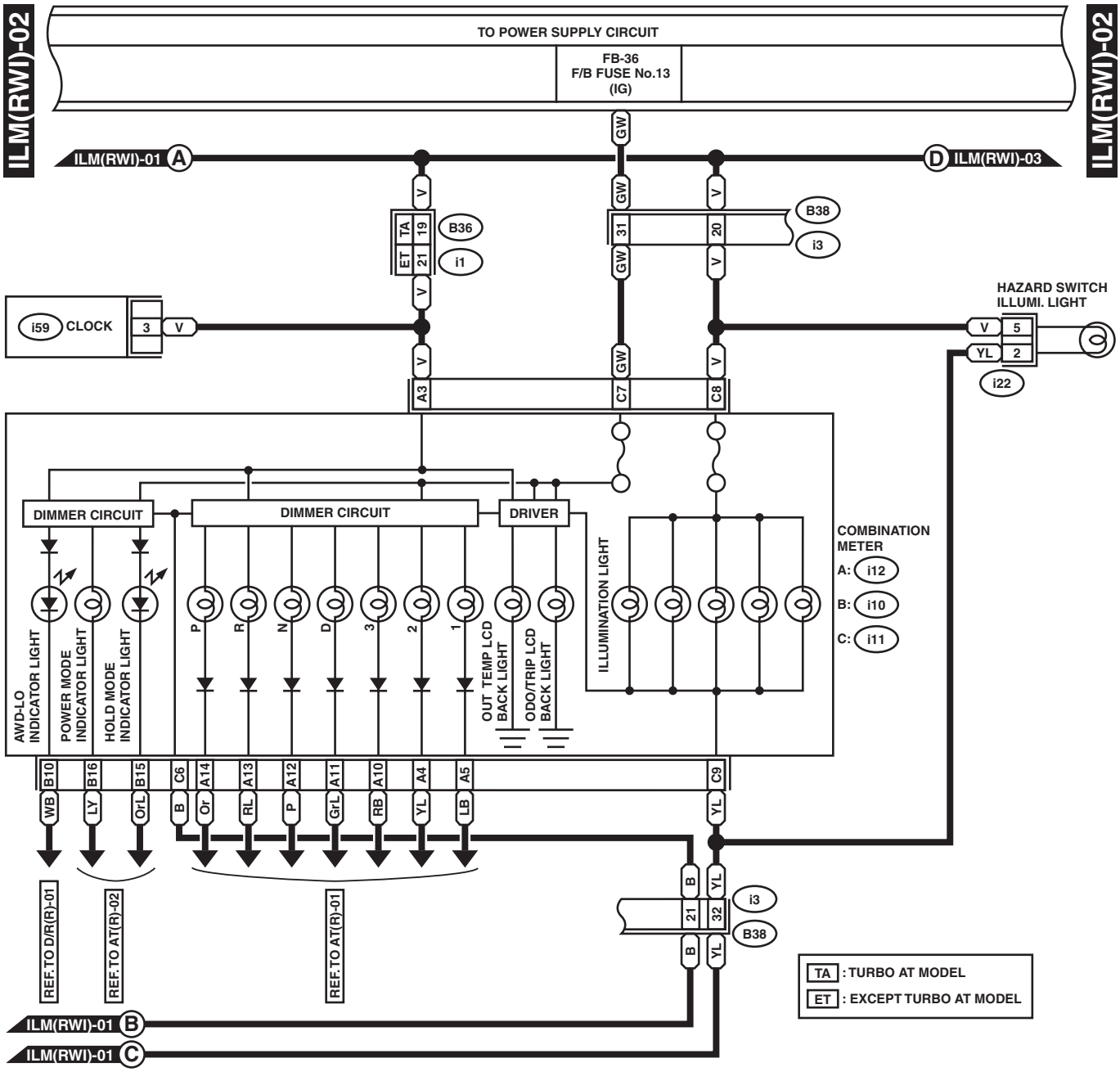
WI-04492

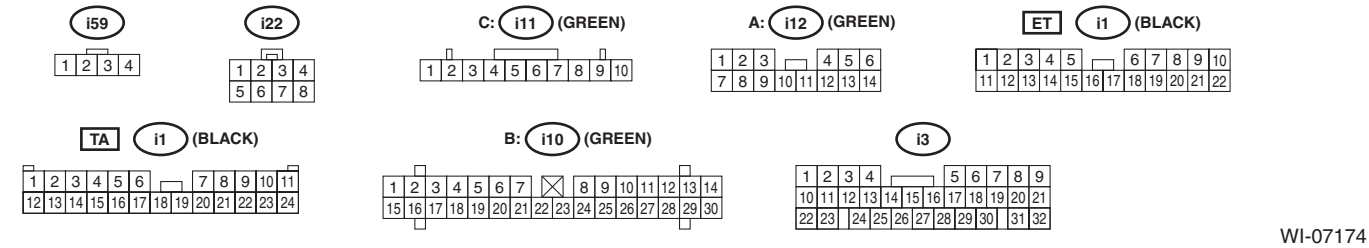
3. RHD WITH ILLUMINATION CONTROL EXCEPT FOR AUSTRALIA STi MODEL



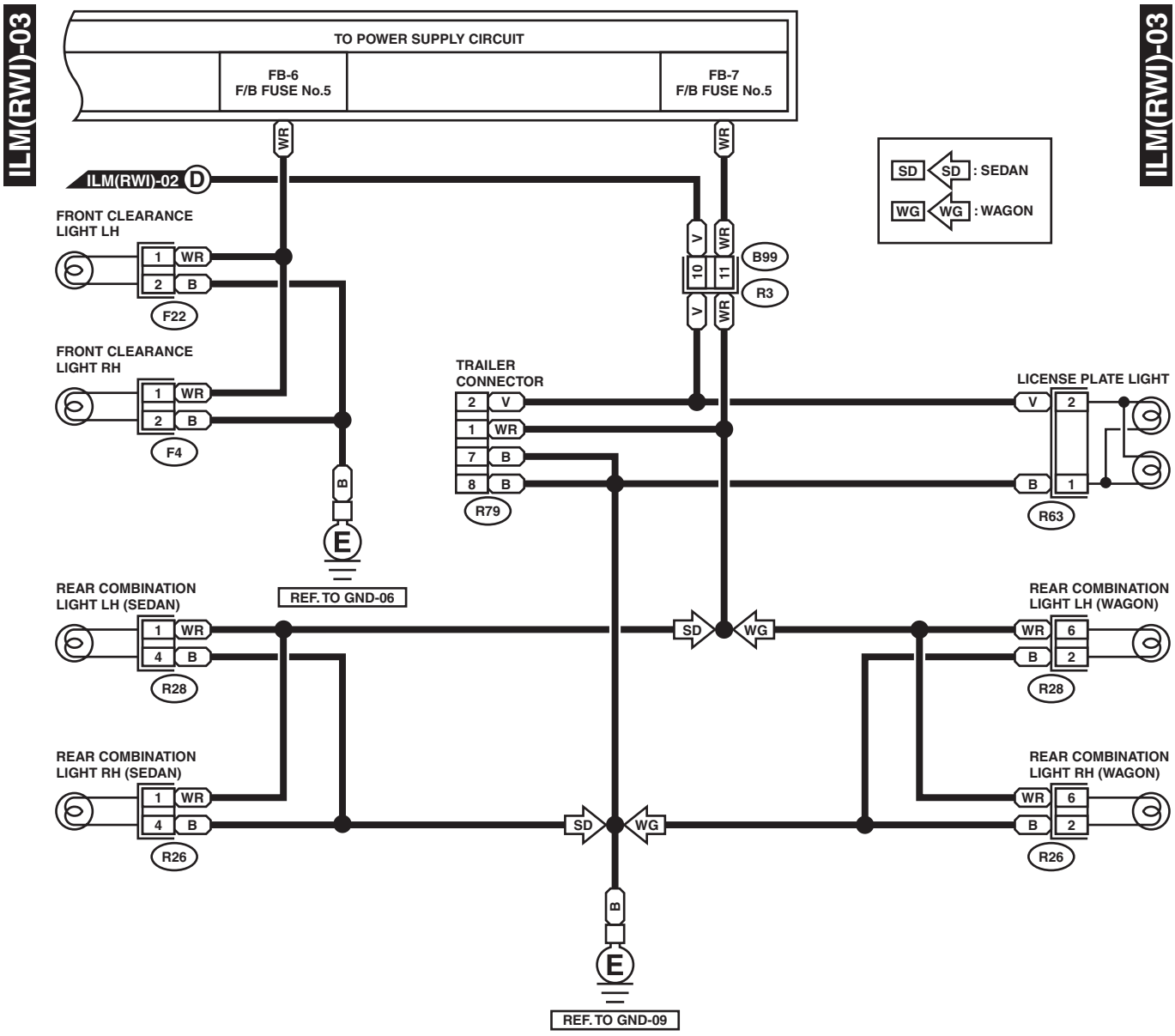


WI-07173


ILM(RWI)-02
TO POWER SUPPLY CIRCUIT
FB-36
F/B FUSE No.13
(IG)
ILM(RWI)-01 A
D ILM(RWI)-03
B36
i1
B38
i3
i59 CLOCK
HAZARD SWITCH
ILLUMI. LIGHT
i22
A3
C7
C8
DIMMER CIRCUIT
DIMMER CIRCUIT
DRIVER
ILLUMINATION LIGHT
COMBINATION
METER
A: i12
B: i10
C: i11
AWD-LO
INDICATOR LIGHT
POWER MODE
INDICATOR LIGHT
HOLD MODE
INDICATOR LIGHT
OUT TEMP LCD
BACK LIGHT
ODO/TRIP LCD
BACK LIGHT
B10
B16
B15
C6
A14
A13
A12
A11
A10
A4
A5
C9
REF:TO D/R(R)-01
REF:TO AT(R)-02
REF:TO AT(R)-01
ILM(RWI)-01 B
ILM(RWI)-01 C
TA : TURBO AT MODEL
ET : EXCEPT TURBO AT MODEL


i59
i22
C: i11 (GREEN)
A: i12 (GREEN)
ET i1 (BLACK)
TA i1 (BLACK)
B: i10 (GREEN)
i3

WI-07174

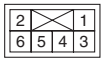


R63 (BLACK)

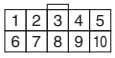
F4 (BLACK)
F22 (BLACK)

SD : R26
SD : R28

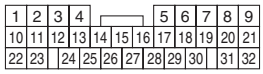
WG : R26
WG : R28



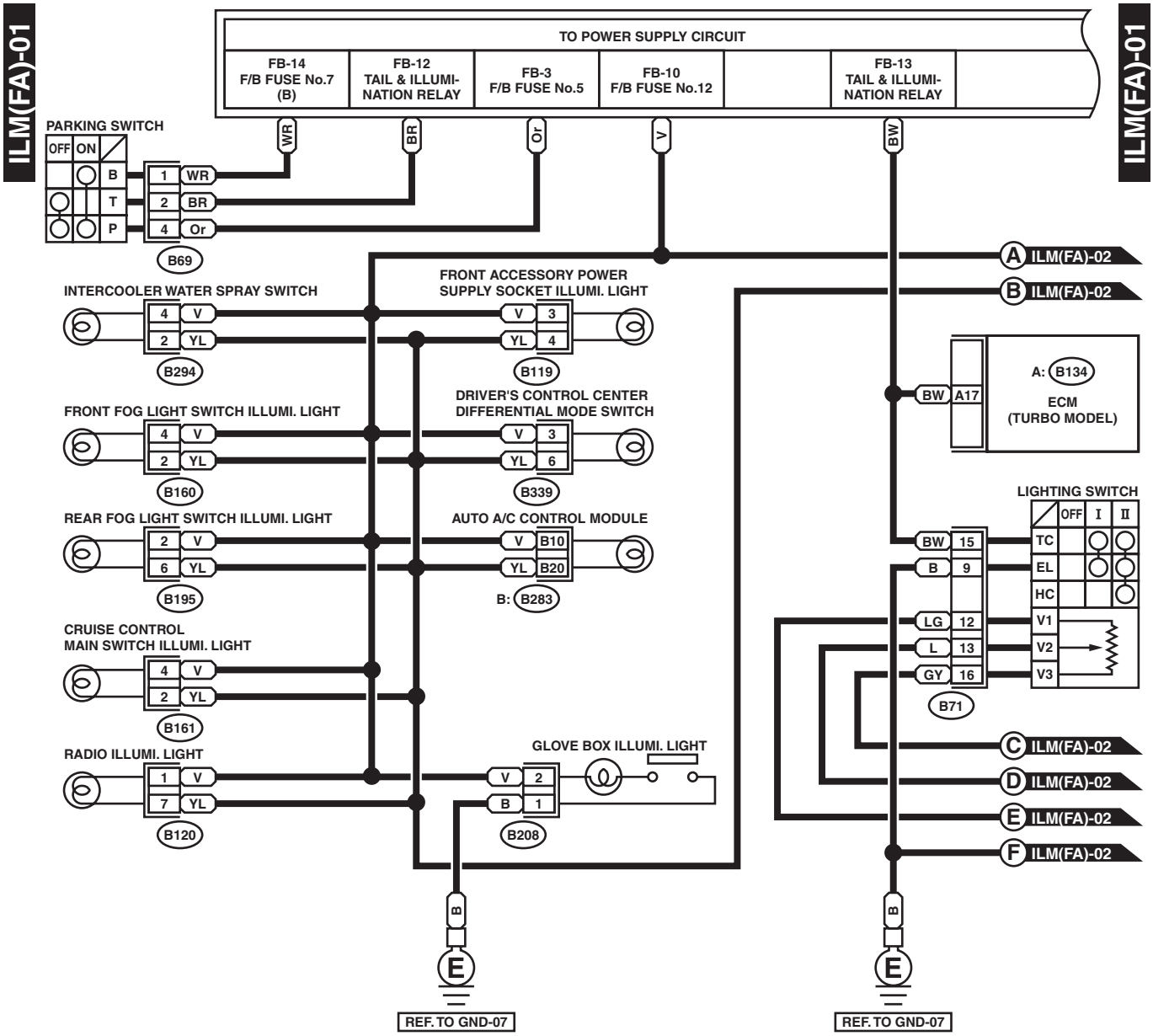
R79

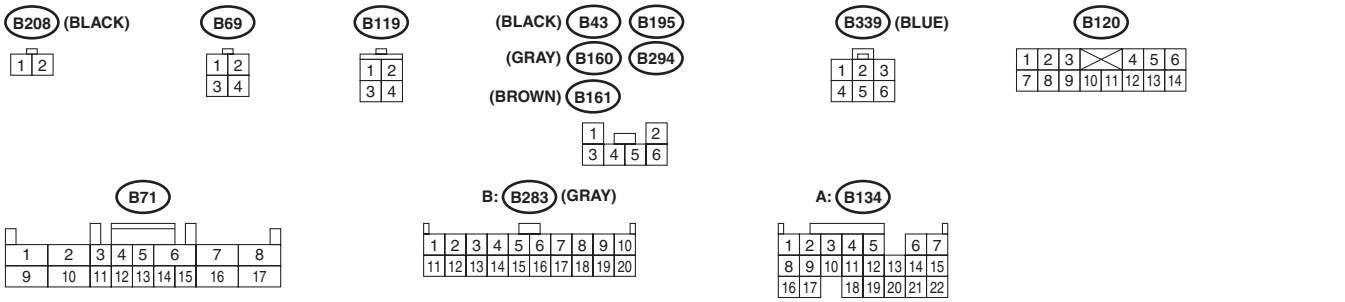


B99

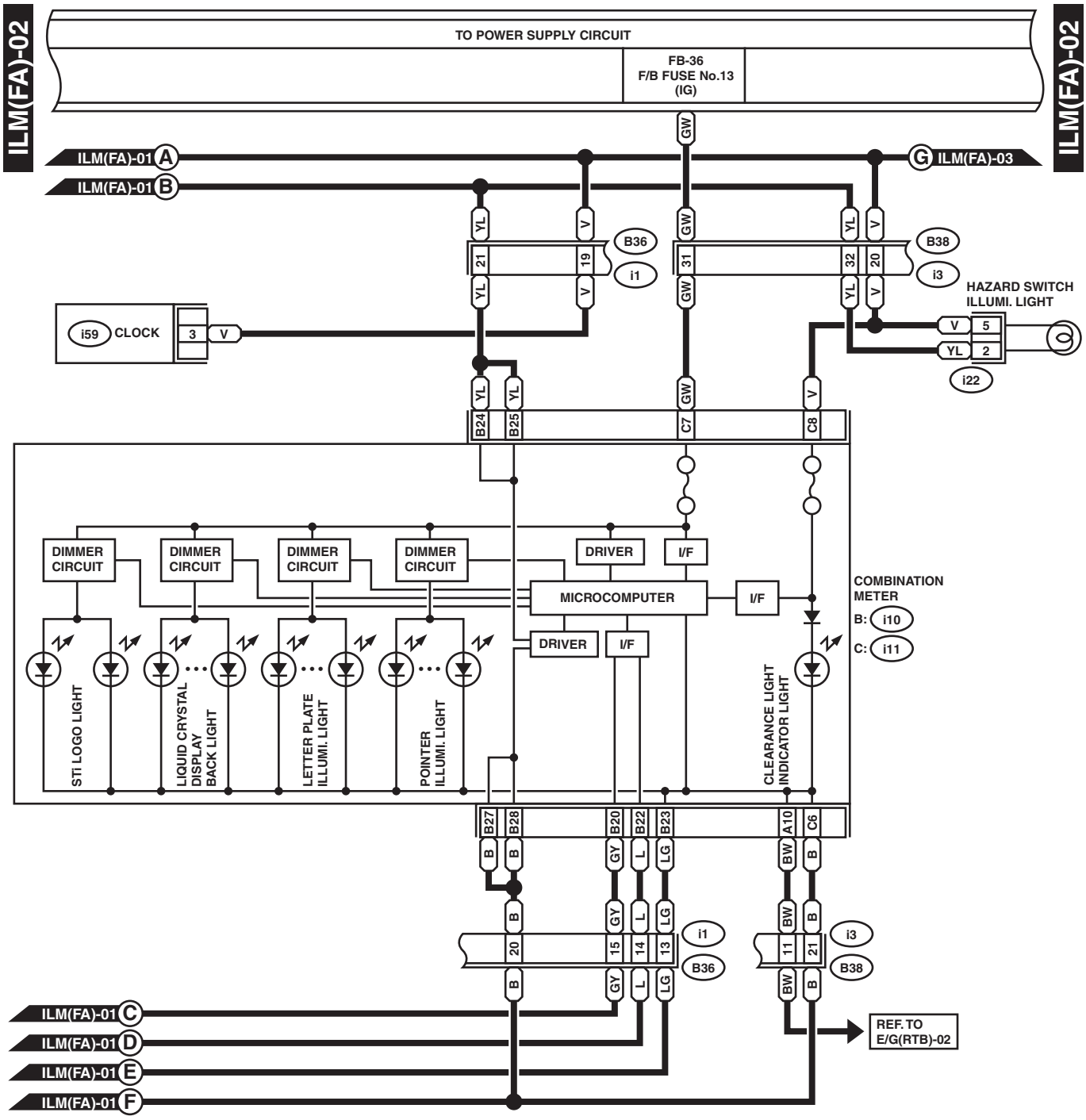


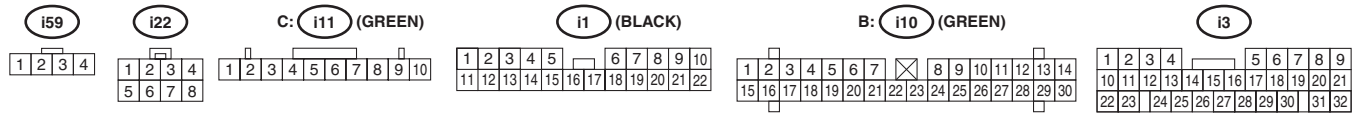
4. RHD FOR AUSTRALIA STi MODEL



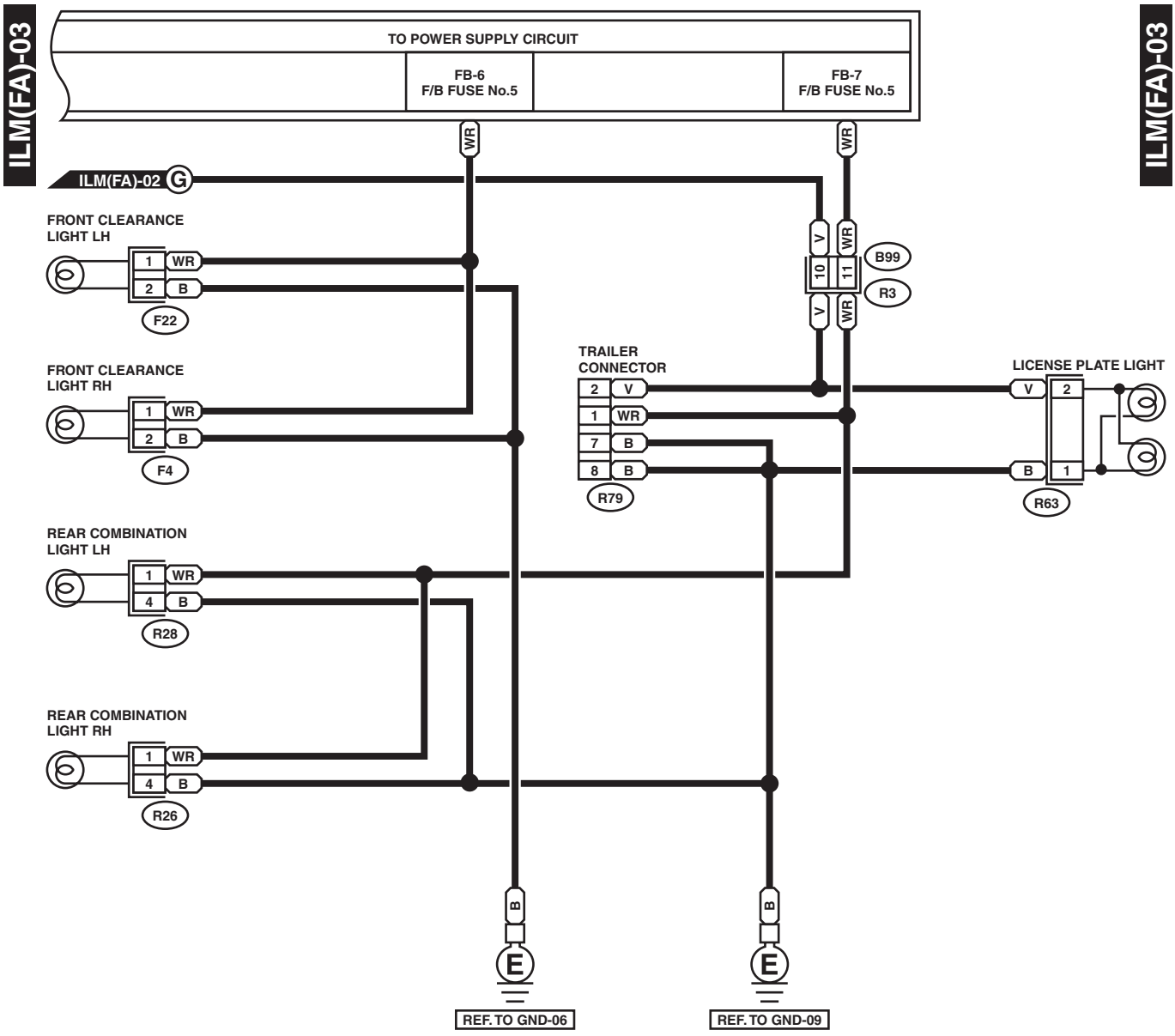


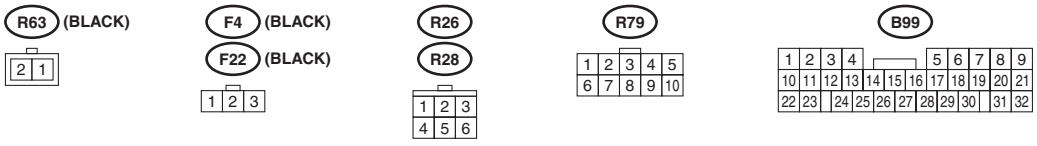
WI-07175


ILM(FA)-02
TO POWER SUPPLY CIRCUIT
FB-36
F/B FUSE No.13
(IG)
ILM(FA)-02
ILM(FA)-01 A
ILM(FA)-01 B
G ILM(FA)-03
GW
YL
V
B36
i1
B38
i3
HAZARD SWITCH
ILLUMI. LIGHT
i59 CLOCK
i22
B24
B25
C7
C8
DIMMER CIRCUIT
DRIVER
I/F
MICROCOMPUTER
COMBINATION METER
B: i10
C: i11
STI LOGO LIGHT
LIQUID CRYSTAL DISPLAY BACK LIGHT
LETTER PLATE ILLUMI. LIGHT
POINTER ILLUMI. LIGHT
CLEARANCE LIGHT INDICATOR LIGHT
B27
B28
B20
B22
B23
A10
C6
B
GY
L
LG
BW
ILM(FA)-01 C
ILM(FA)-01 D
ILM(FA)-01 E
ILM(FA)-01 F
REF. TO E/G(RTB)-02


i59
i22
C: i11 (GREEN)
i1 (BLACK)
B: i10 (GREEN)
i3

WI-07176


ILM(FA)-03
ILM(FA)-03
TO POWER SUPPLY CIRCUIT
FB-6
F/B FUSE No.5
FB-7
F/B FUSE No.5
WR
WR
ILM(FA)-02 G
FRONT CLEARANCE
LIGHT LH
1 WR
2 B
F22
FRONT CLEARANCE
LIGHT RH
1 WR
2 B
F4
REAR COMBINATION
LIGHT LH
1 WR
4 B
R28
REAR COMBINATION
LIGHT RH
1 WR
4 B
R26
V
WR
10
11
B99
R3
V
WR
TRAILER
CONNECTOR
2 V
1 WR
7 B
8 B
R79
LICENSE PLATE LIGHT
V 2
B 1
R63
B
B
E
E
REF. TO GND-06
REF. TO GND-09

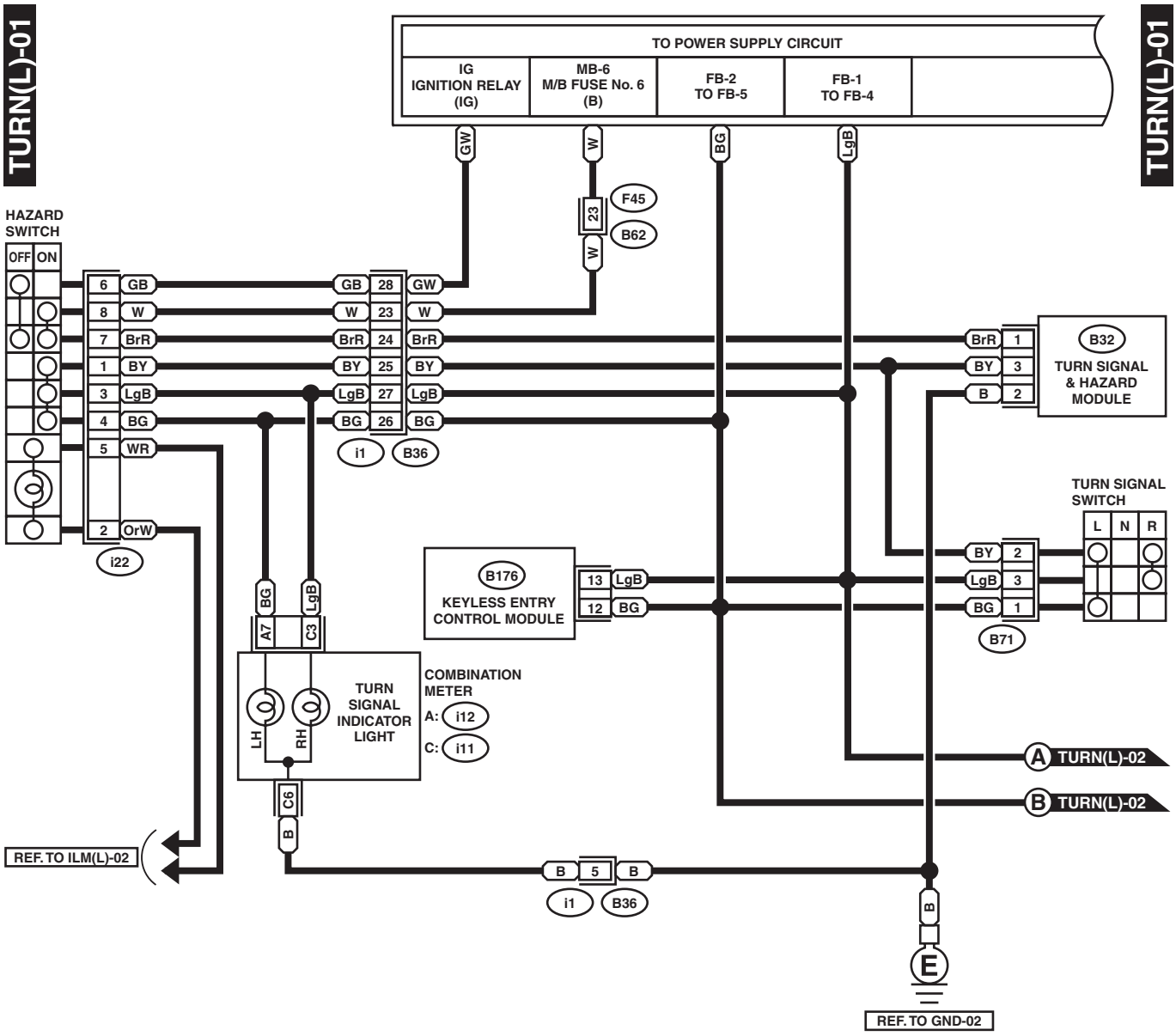

R63 (BLACK)
2 1
F4 (BLACK)
F22 (BLACK)
1 2 3
R26
R28
1 2 3
4 5 6
R79
1 2 3 4 5
6 7 8 9 10
B99
1 2 3 4 5 6 7 8 9
10 11 12 13 14 15 16 17 18 19 20 21
22 23 24 25 26 27 28 29 30 31 32

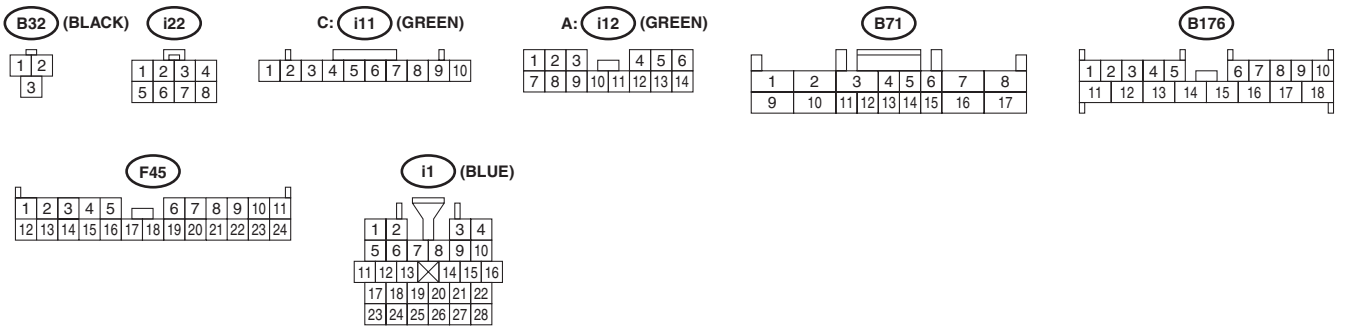
WI-04498

26.Turn Signal Light and Hazard Light System

A: WIRING DIAGRAM

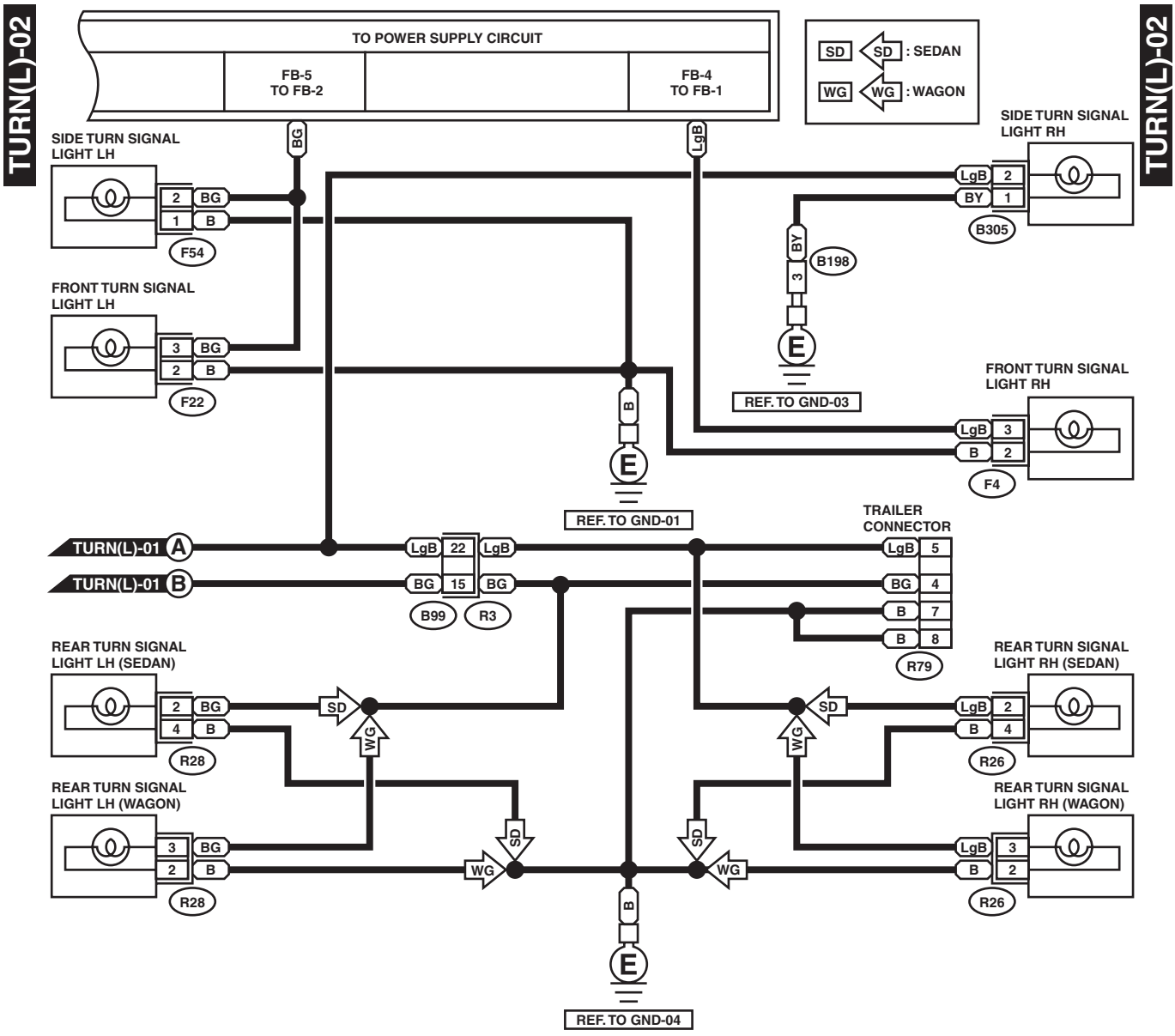
1. LHD MODEL





WI-07185

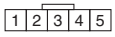
Turn Signal Light and Hazard Light System



B305 F54 (1 2)

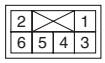
F4 (BLACK) F22 (BLACK)

B198

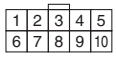


SD : R26
SD : R28

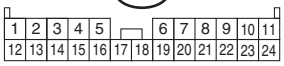
WG : R26
WG : R28



R79

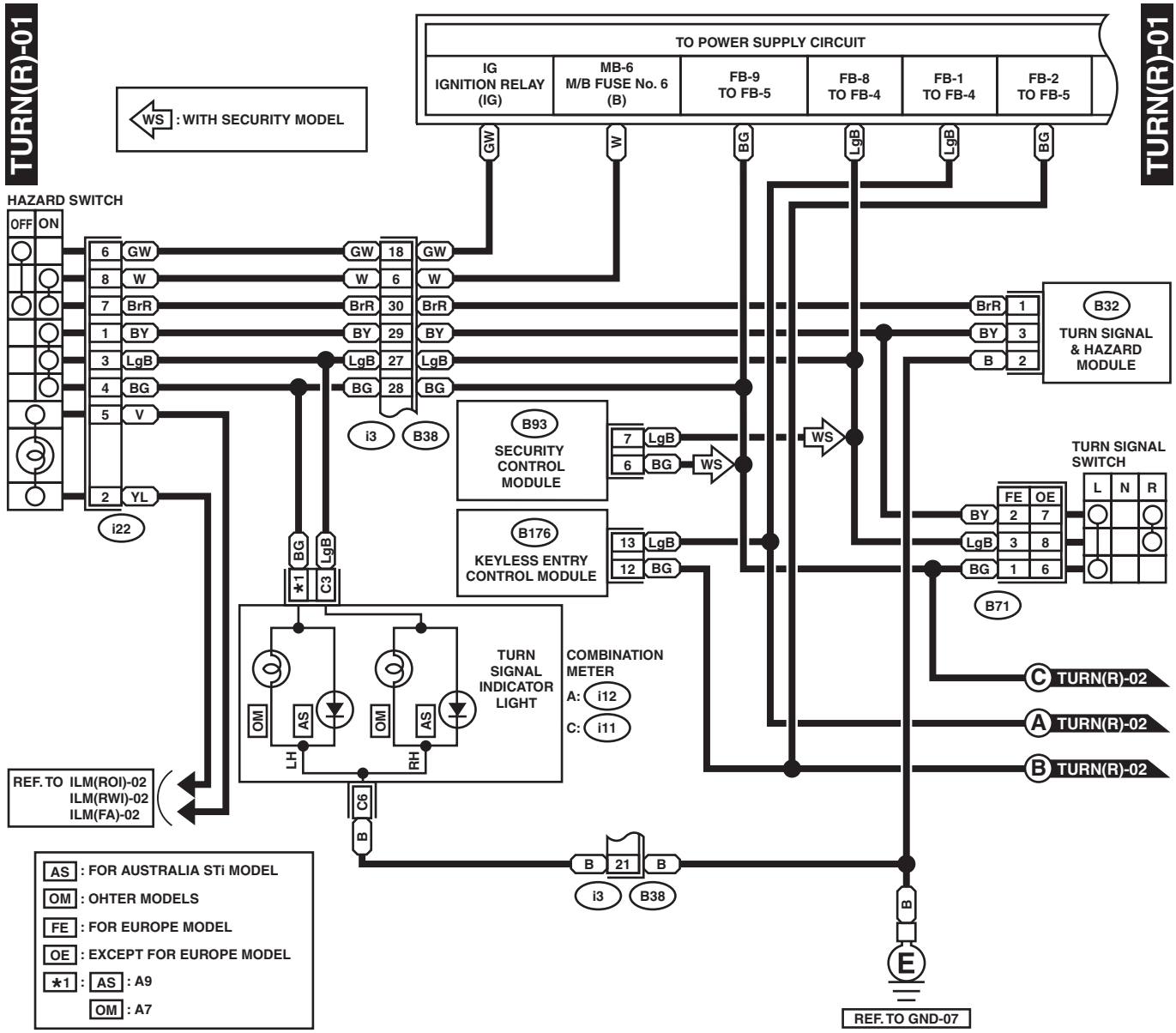


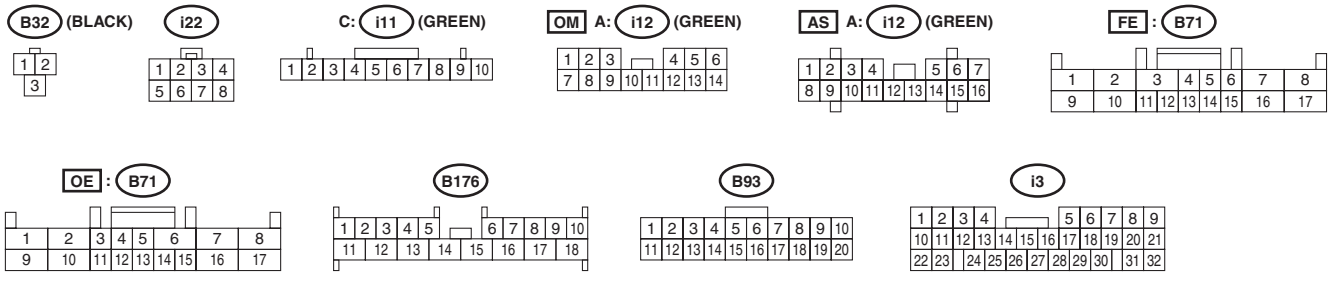
B99



WI-02402

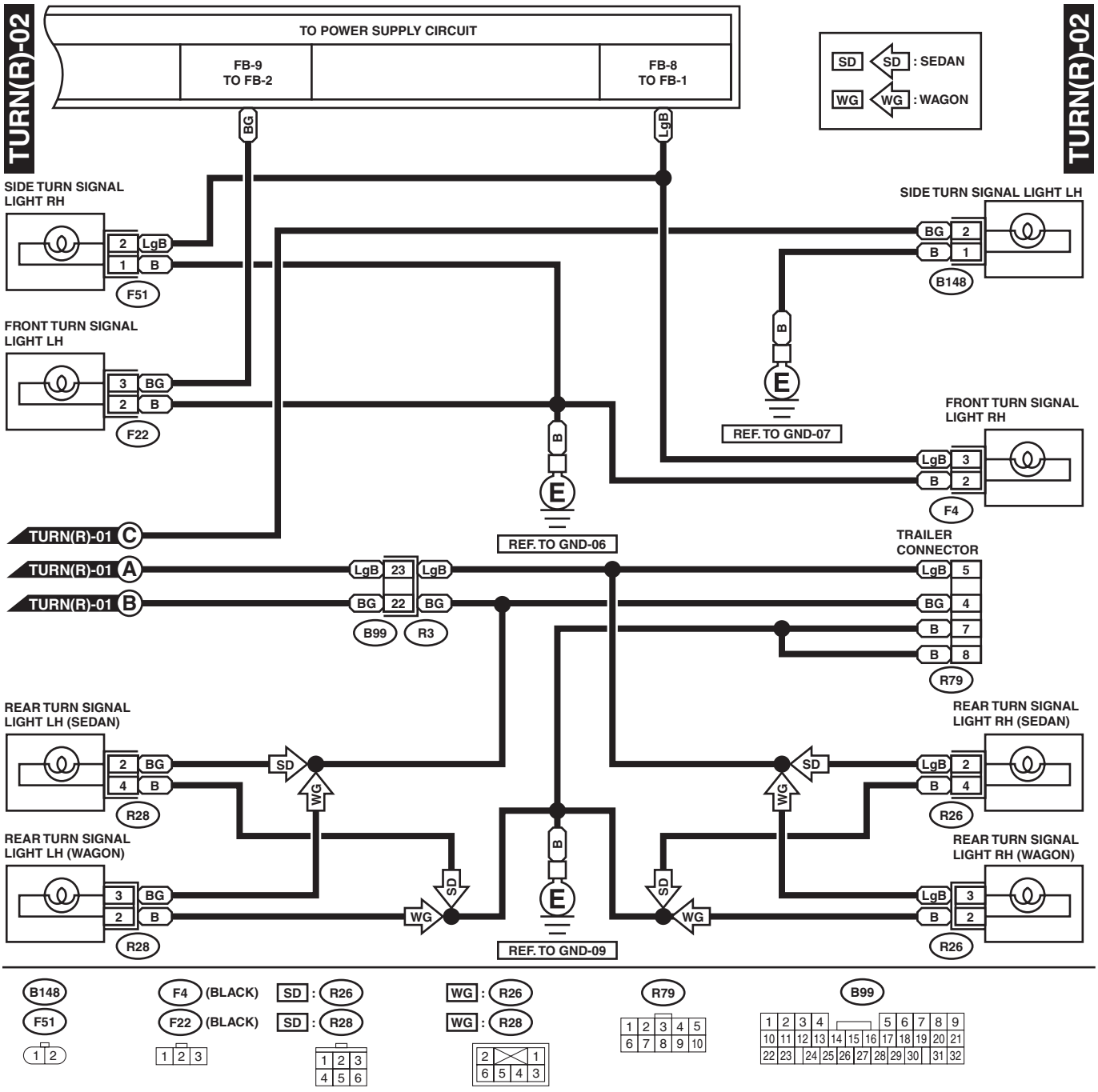
2. RHD MODEL





WI-07186

Turn Signal Light and Hazard Light System

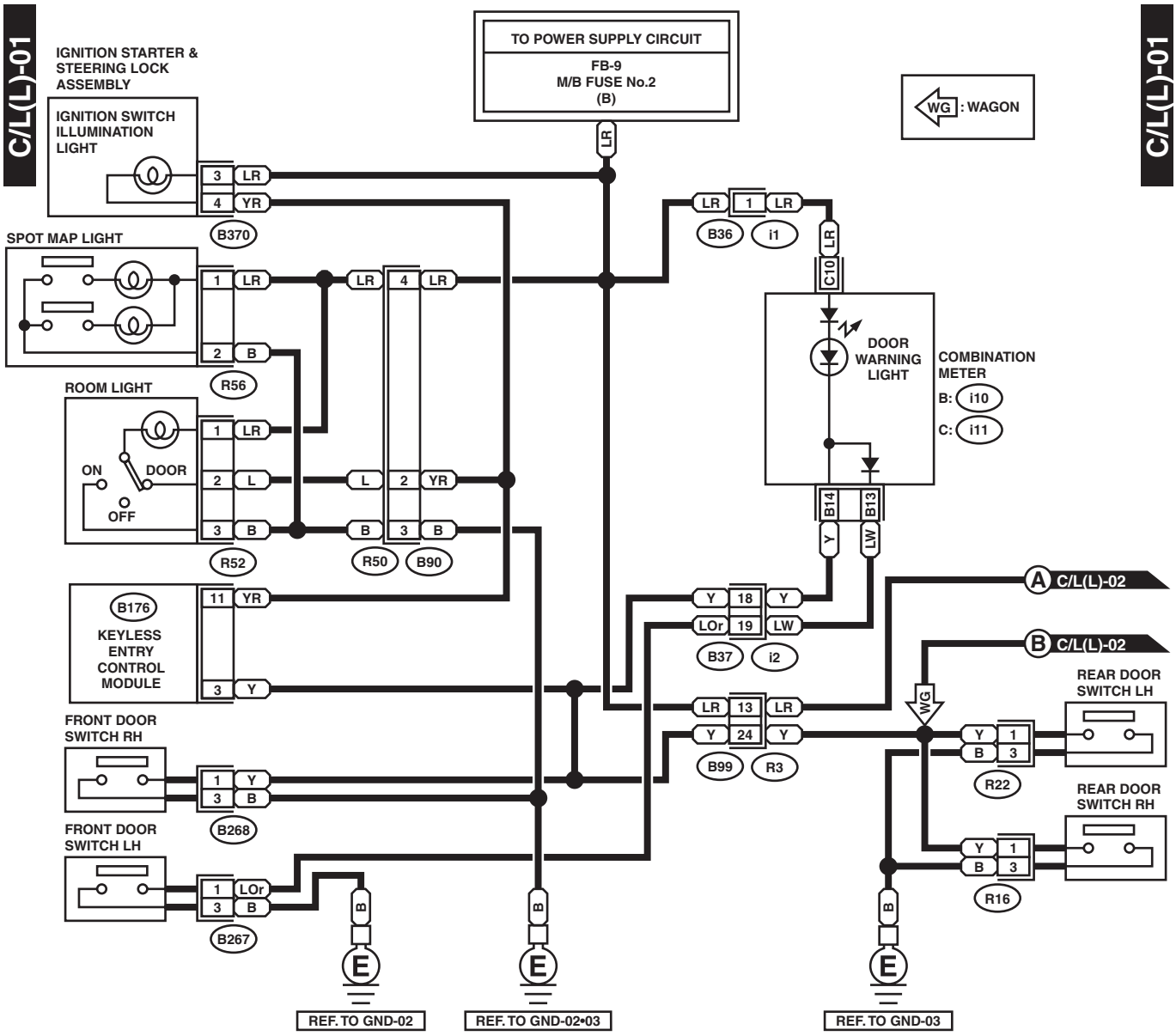


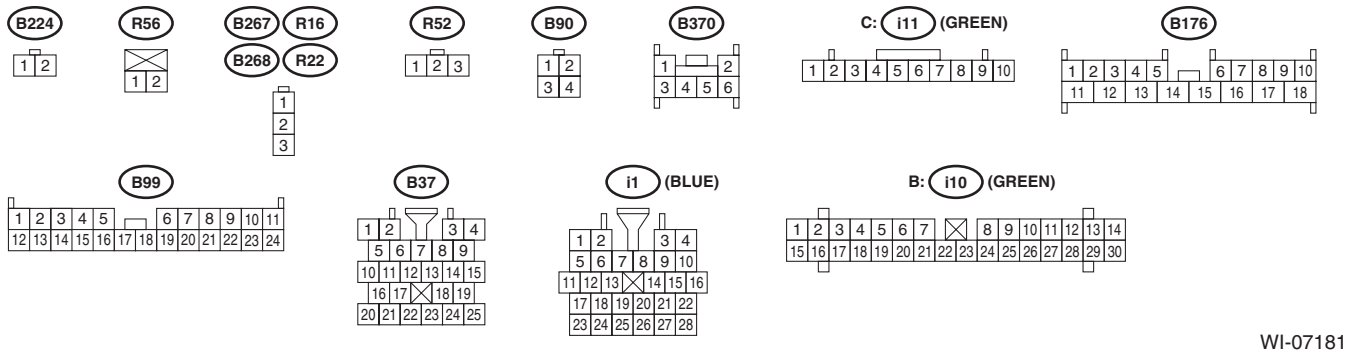
WI-07187

27.Interior Light System

A: WIRING DIAGRAM

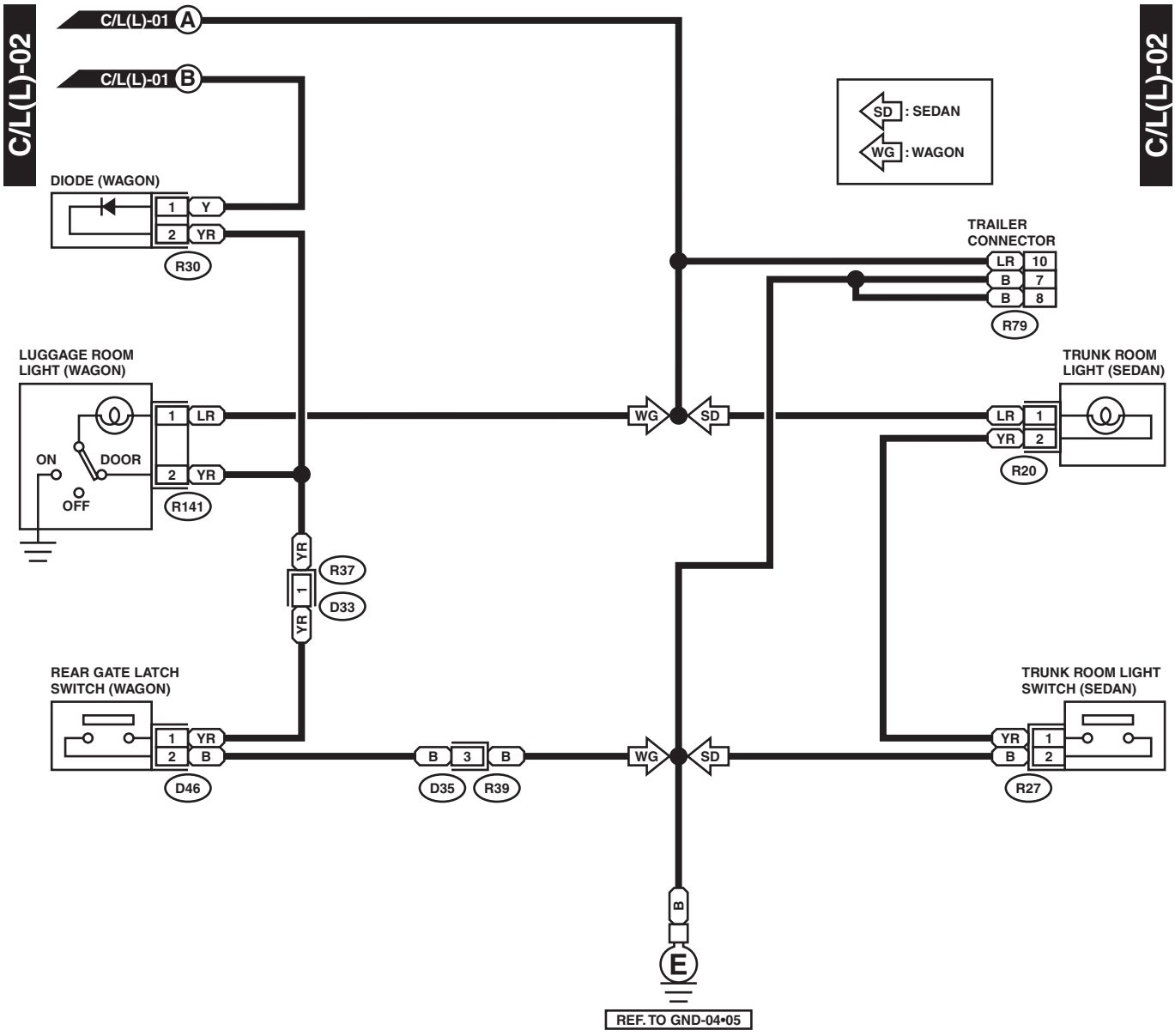
1. LHD MODEL





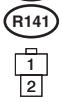
WI-07181

Interior Light System



D46 (BLACK)

R20 (BLACK) R141



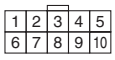
R27

R30 (BLACK)

D33

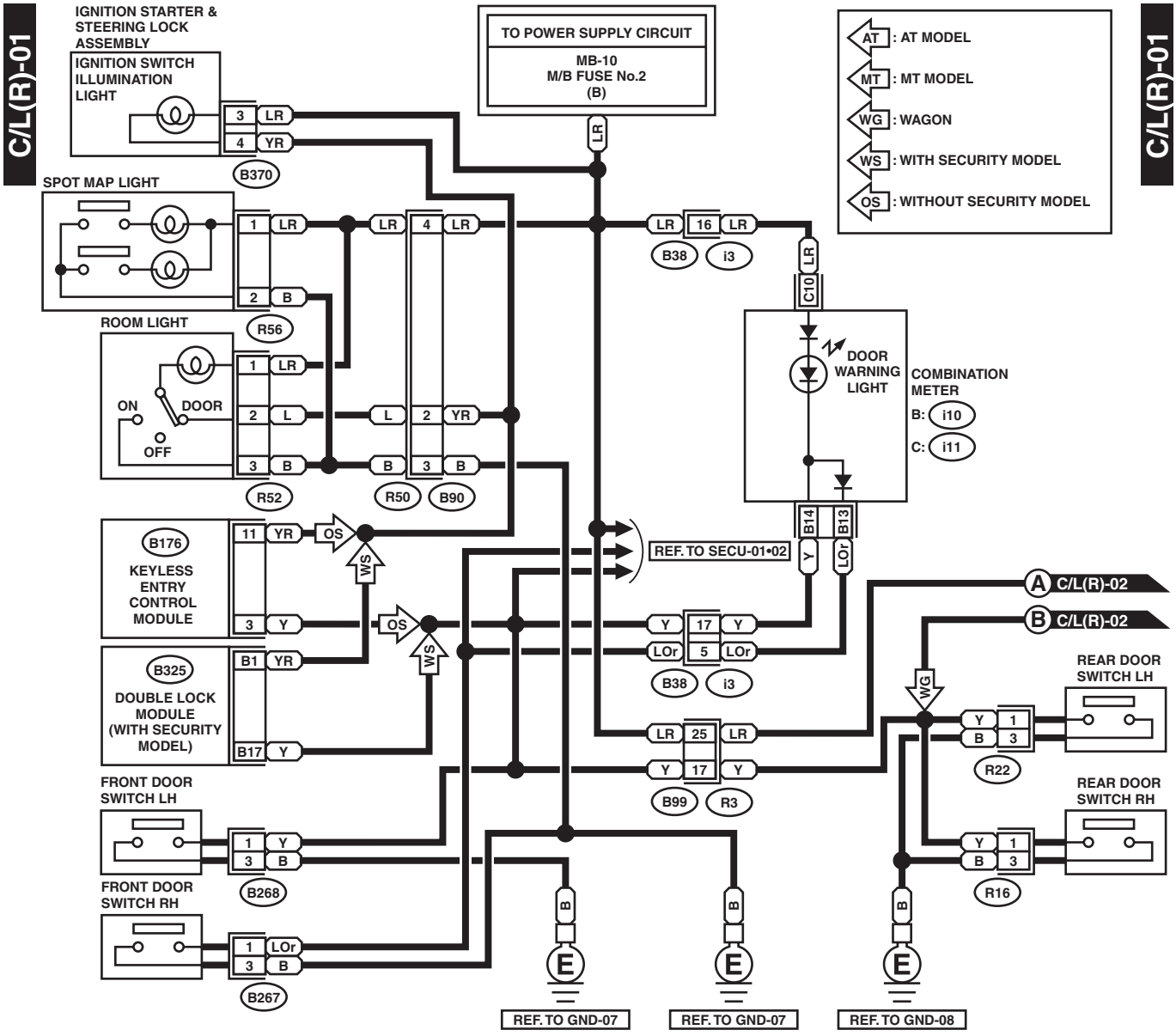
D35 (BLUE)

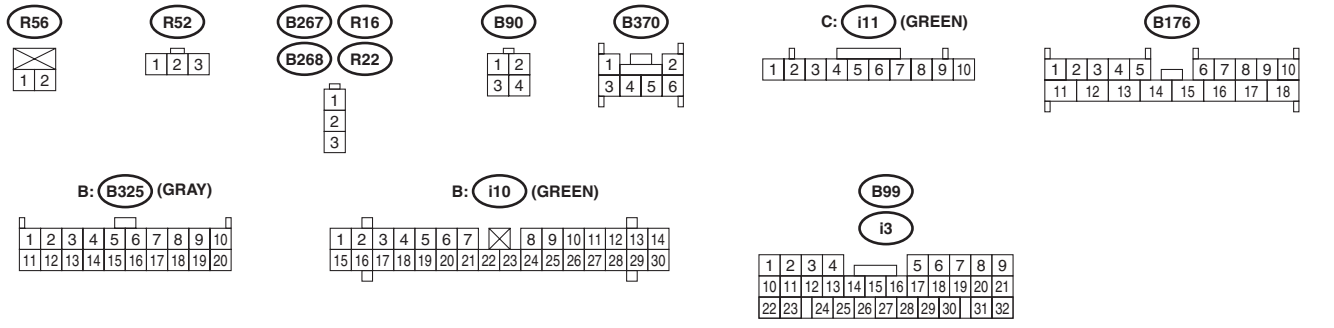
R79



WI-07182

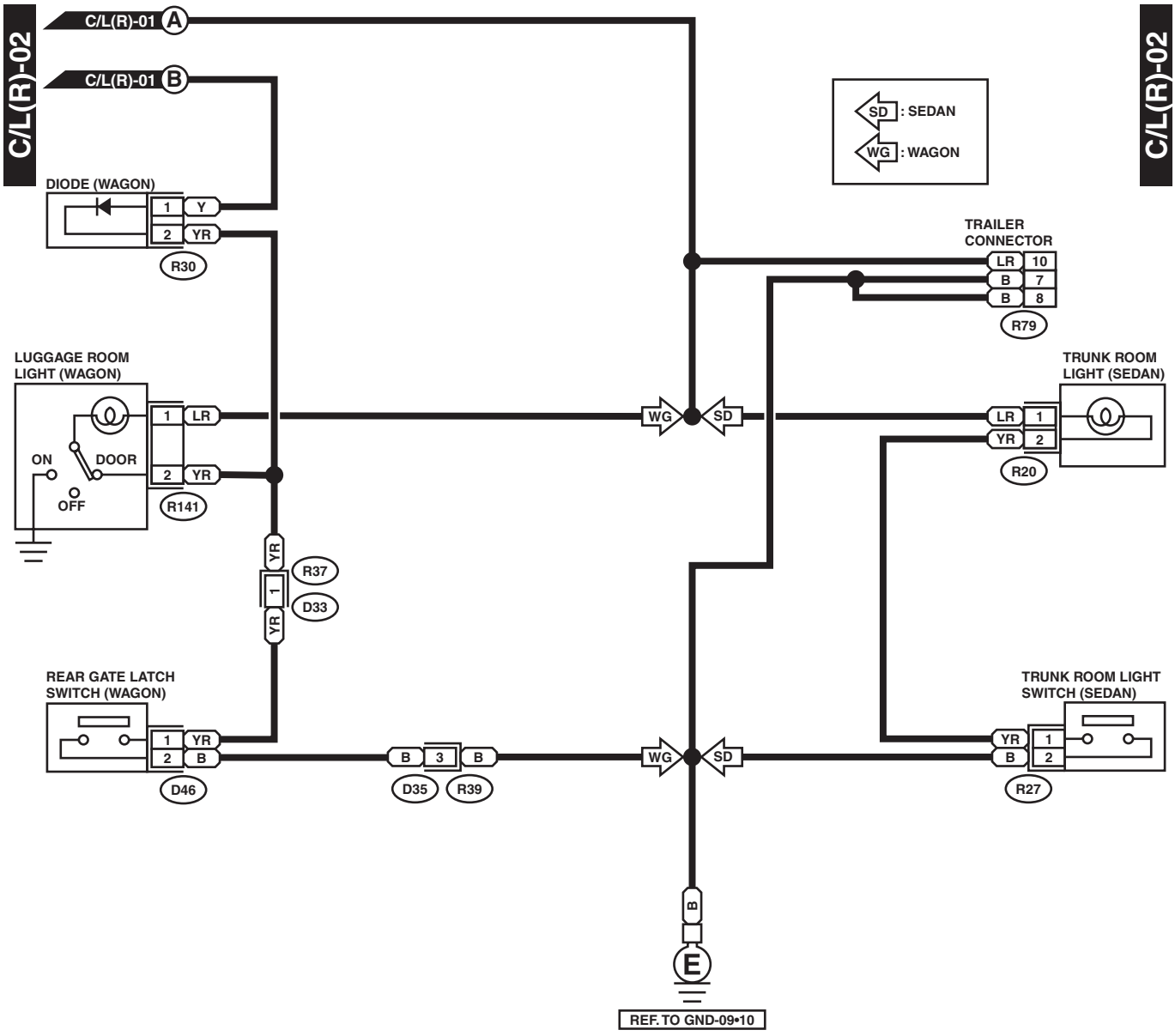
2. RHD MODEL





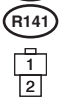
WI-07183

Interior Light System



D46 (BLACK)

R20 (BLACK) R141



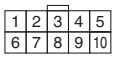
D33

R27

R30 (BLACK)

D35 (BLUE)

R79

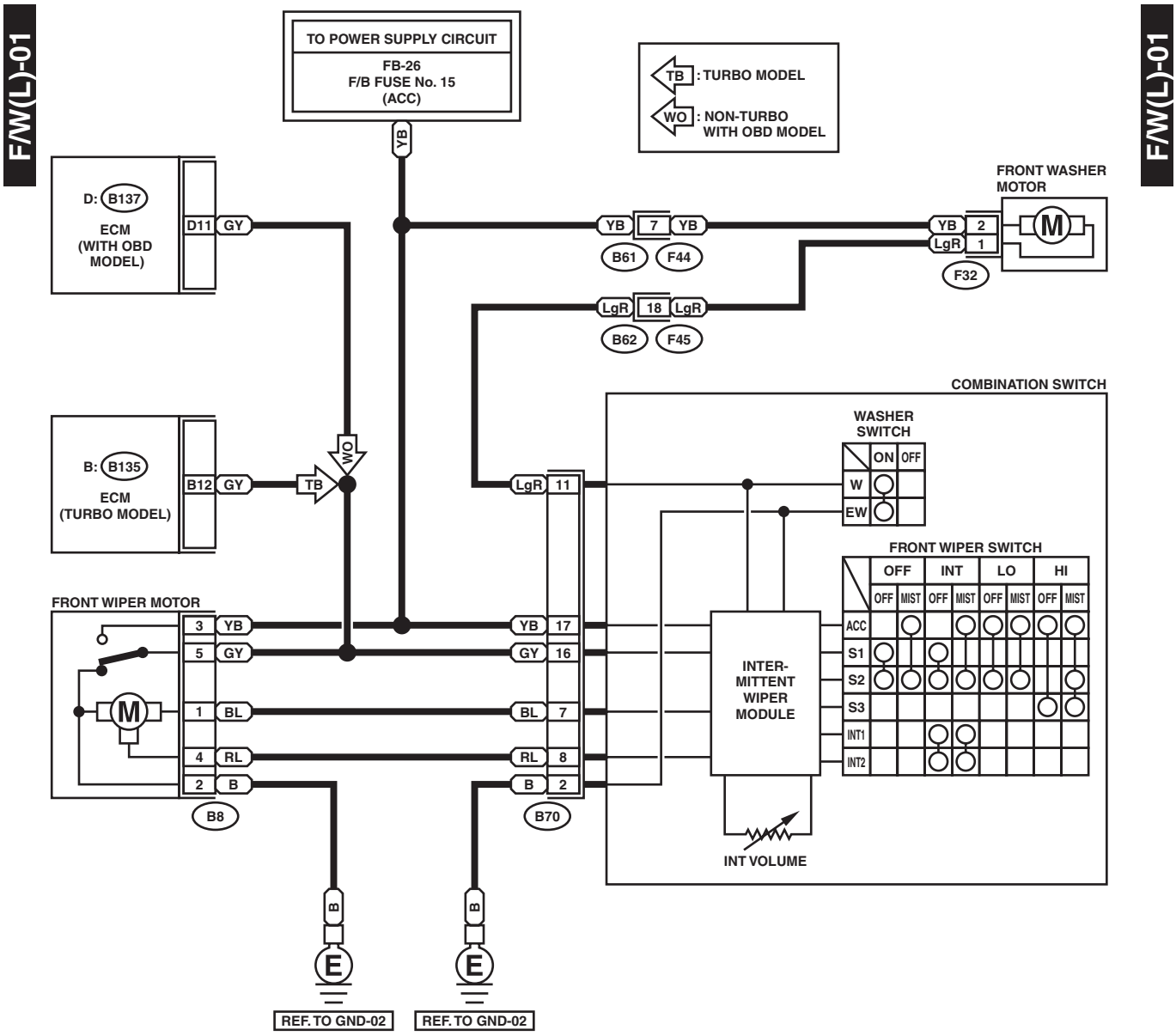


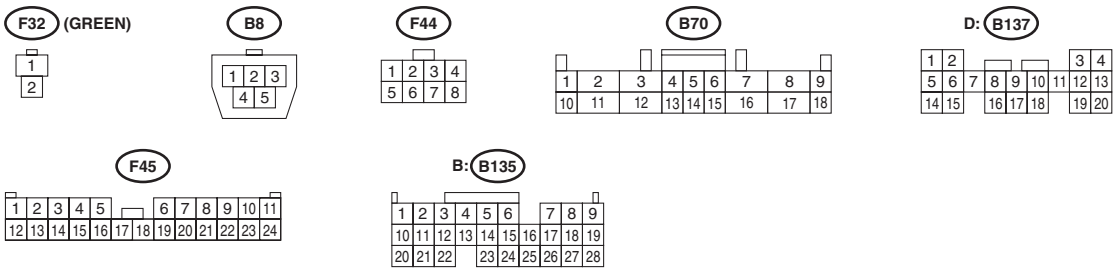
WI-07184

28.Front Wiper and Washer System

A: WIRING DIAGRAM

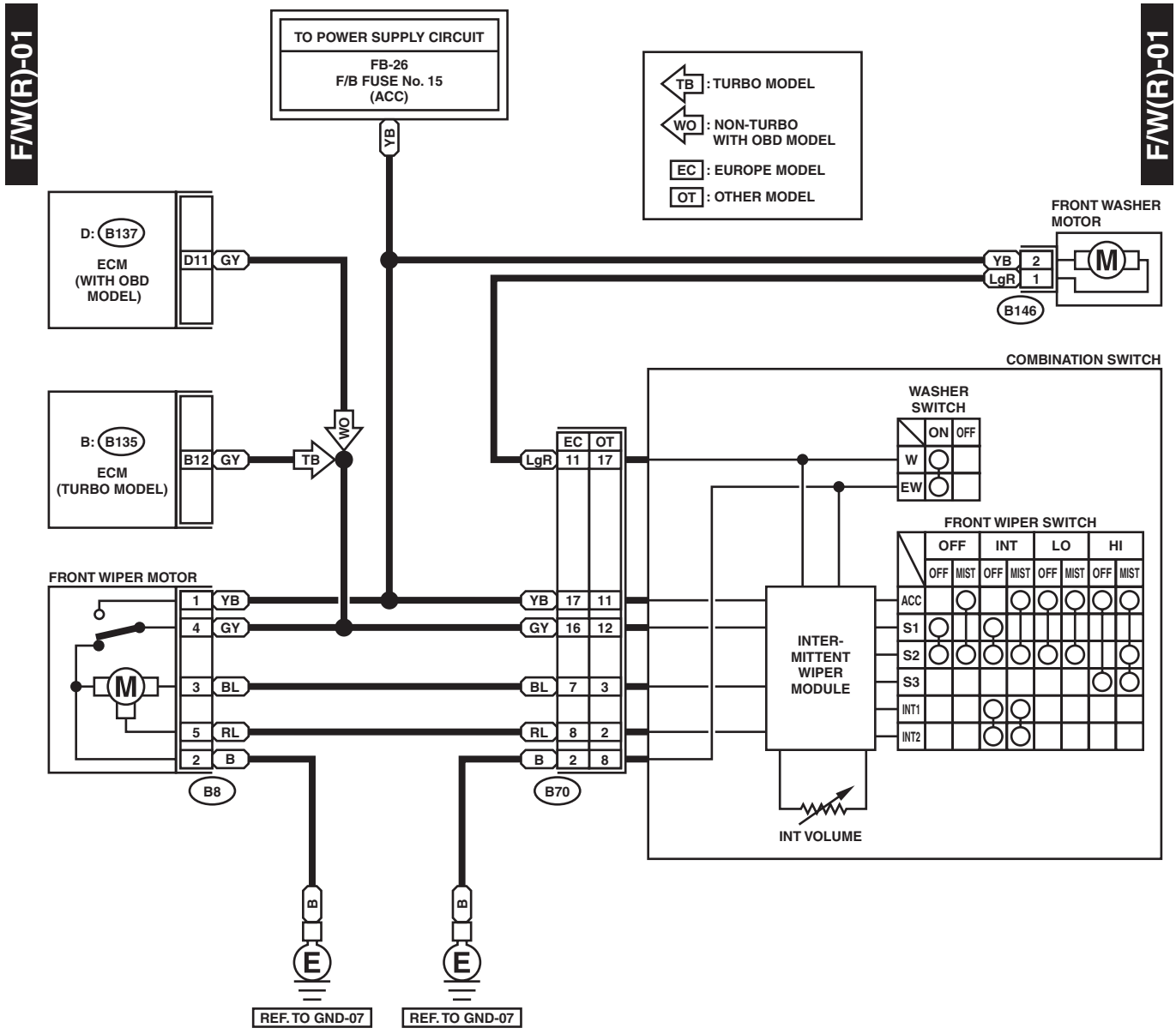
1. LHD MODEL

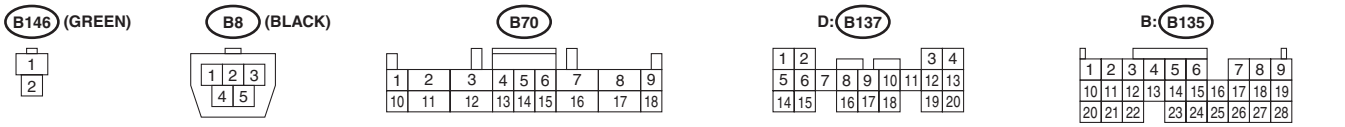




WI-07209

2. RHD MODEL



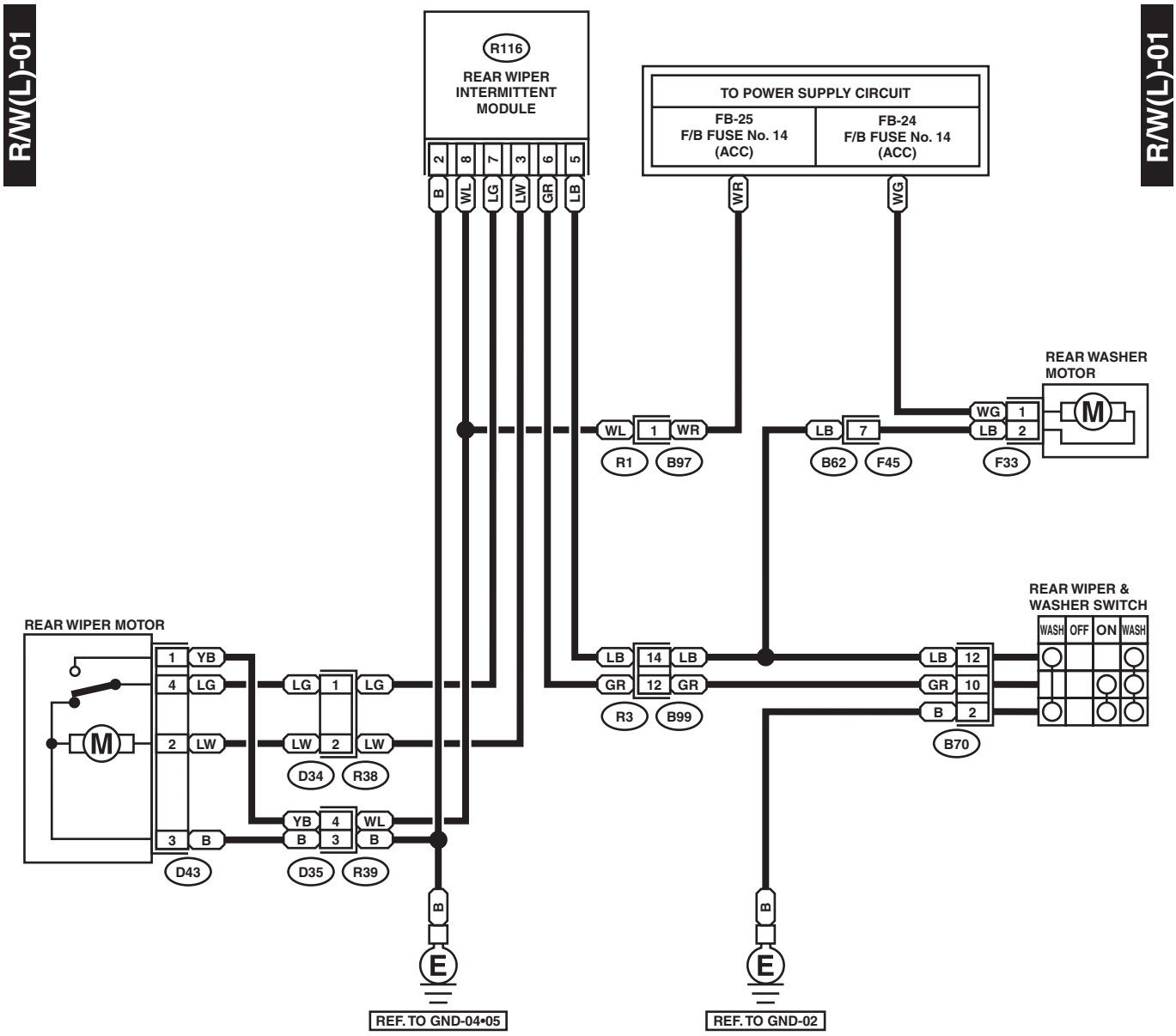


WI-07210

29.Rear Wiper and Washer System

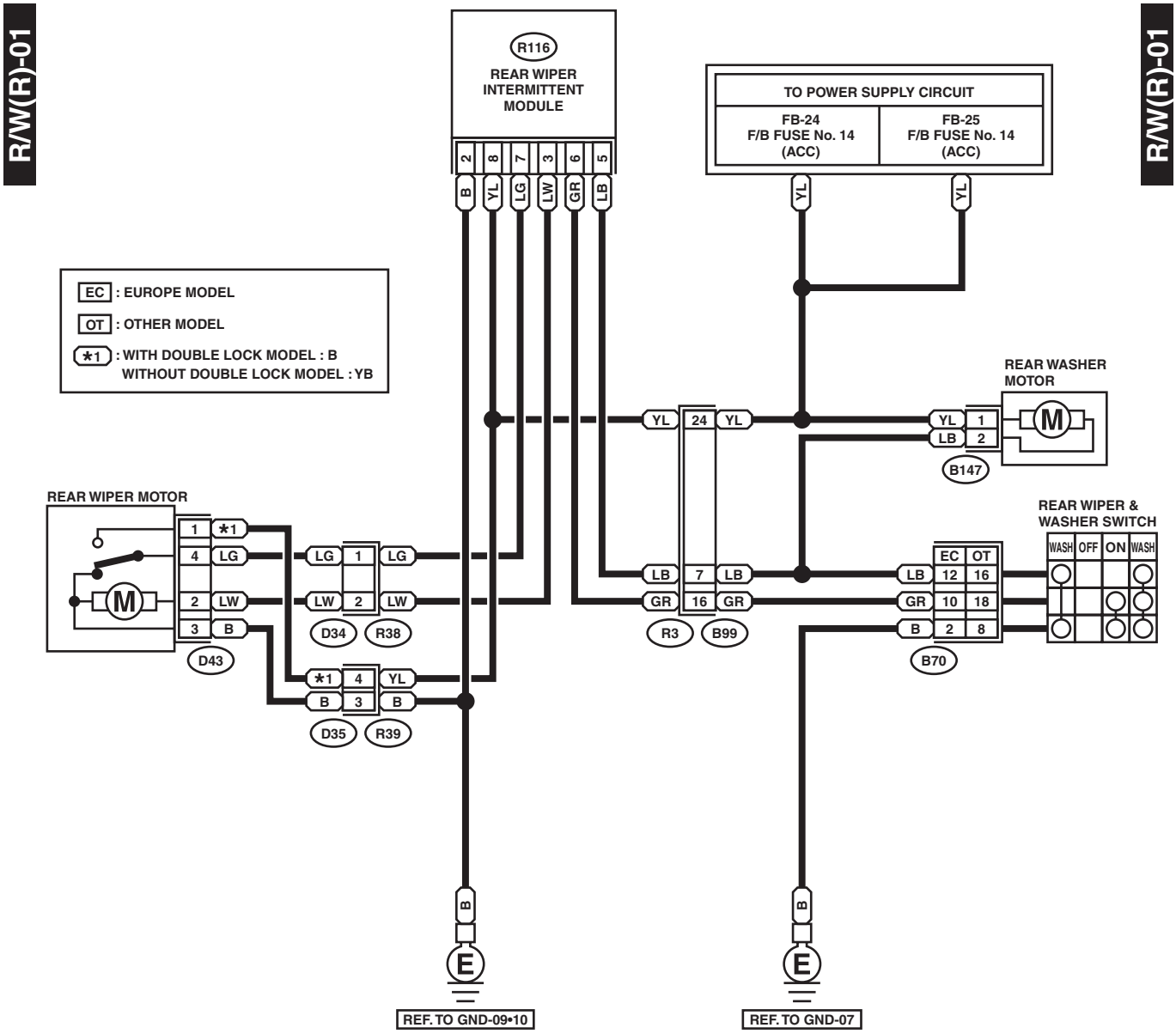
A: WIRING DIAGRAM

1. LHD MODEL



WI-07211

2. RHD MODEL

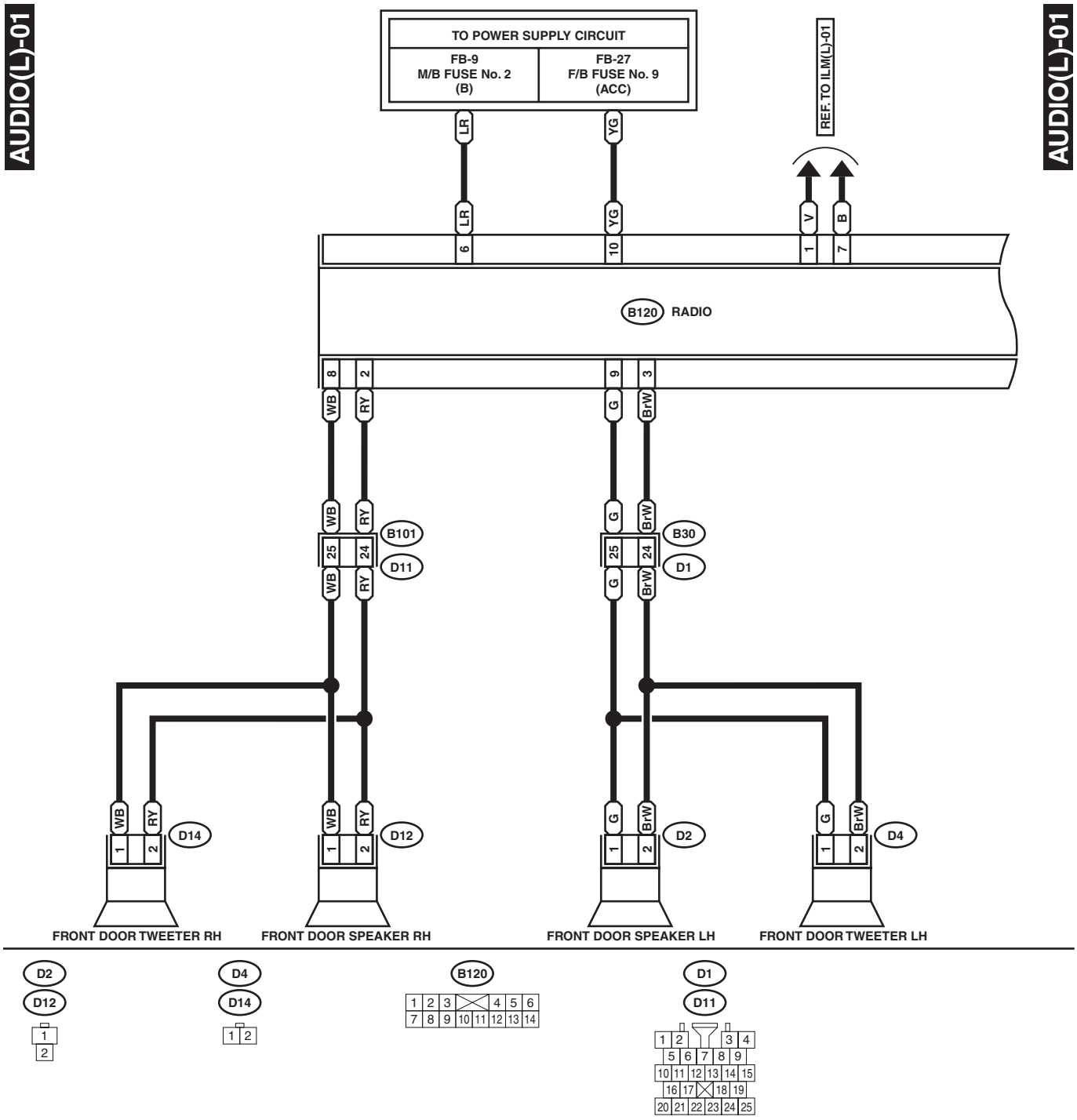


WI-07245

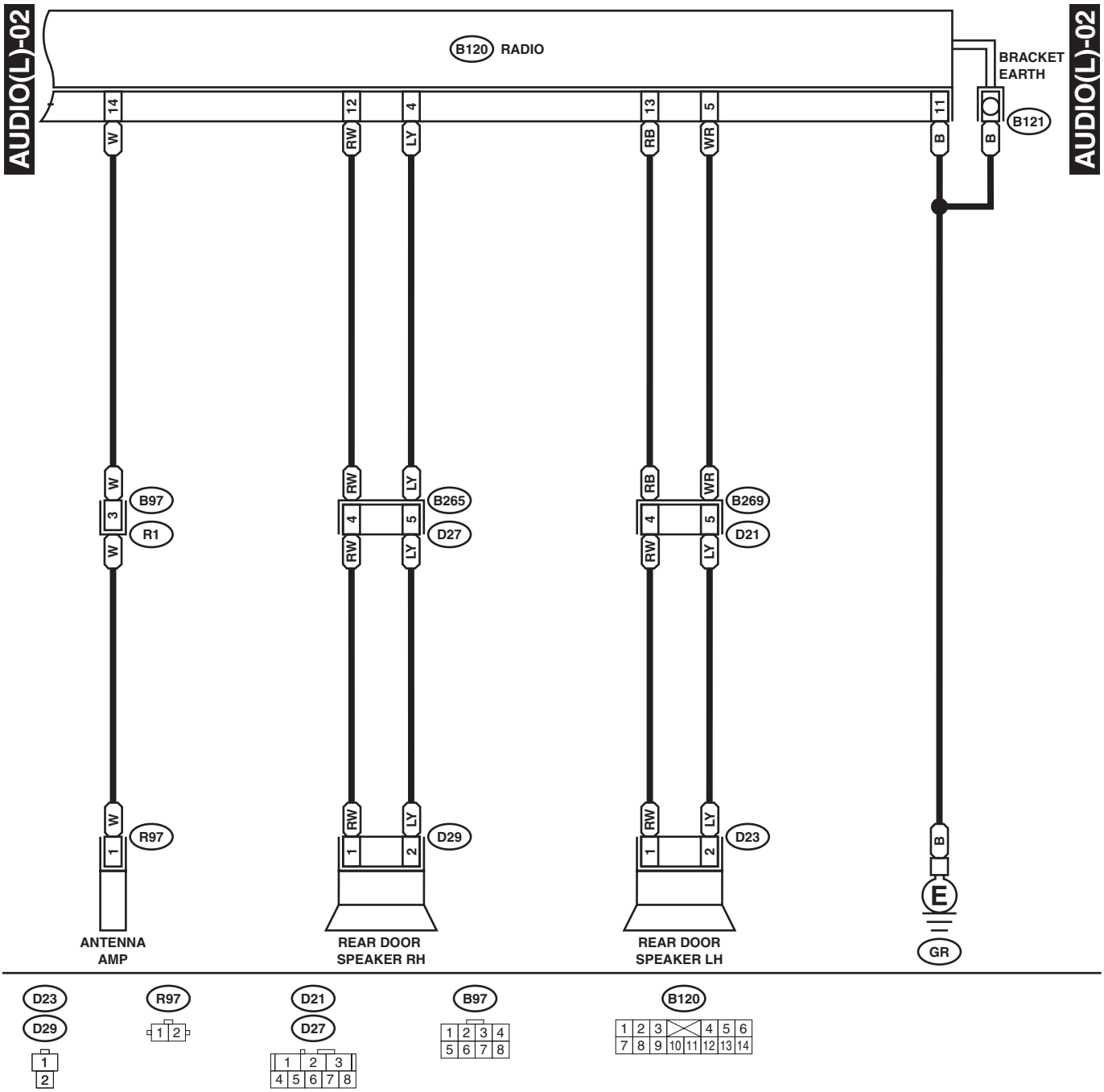
30.Audio System

A: WIRING DIAGRAM

1. LHD MODEL



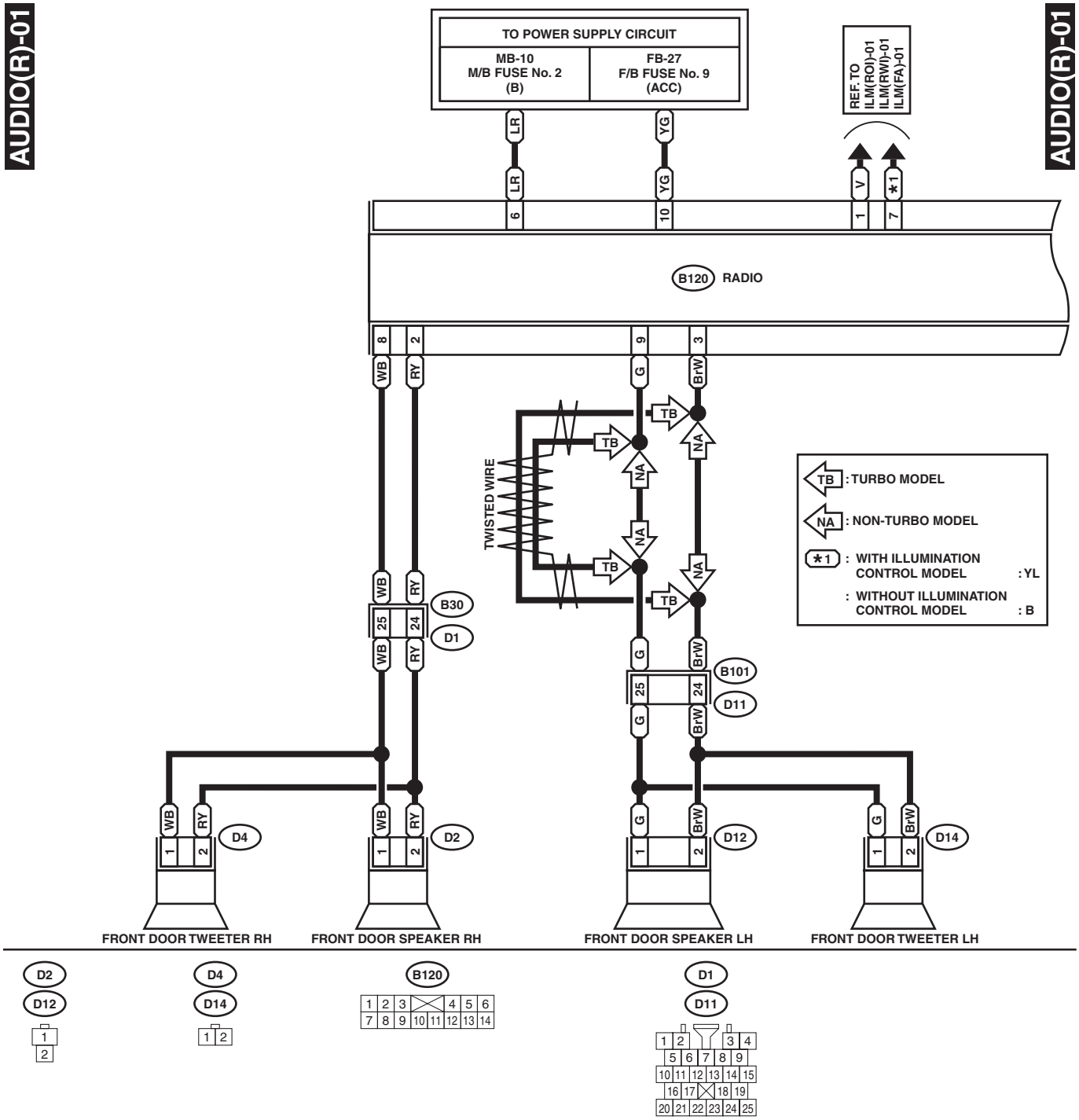
WI-07079


AUDIO(L)-02
AUDIO(L)-02
B120 RADIO
BRACKET EARTH
B121
14
12
4
13
5
11
W
RW
LY
RB
WR
B
B97
3
R1
R97
1
B265
4
5
D27
D29
2
B269
D21
D23
E
GR
ANTENNA AMP
REAR DOOR SPEAKER RH
REAR DOOR SPEAKER LH

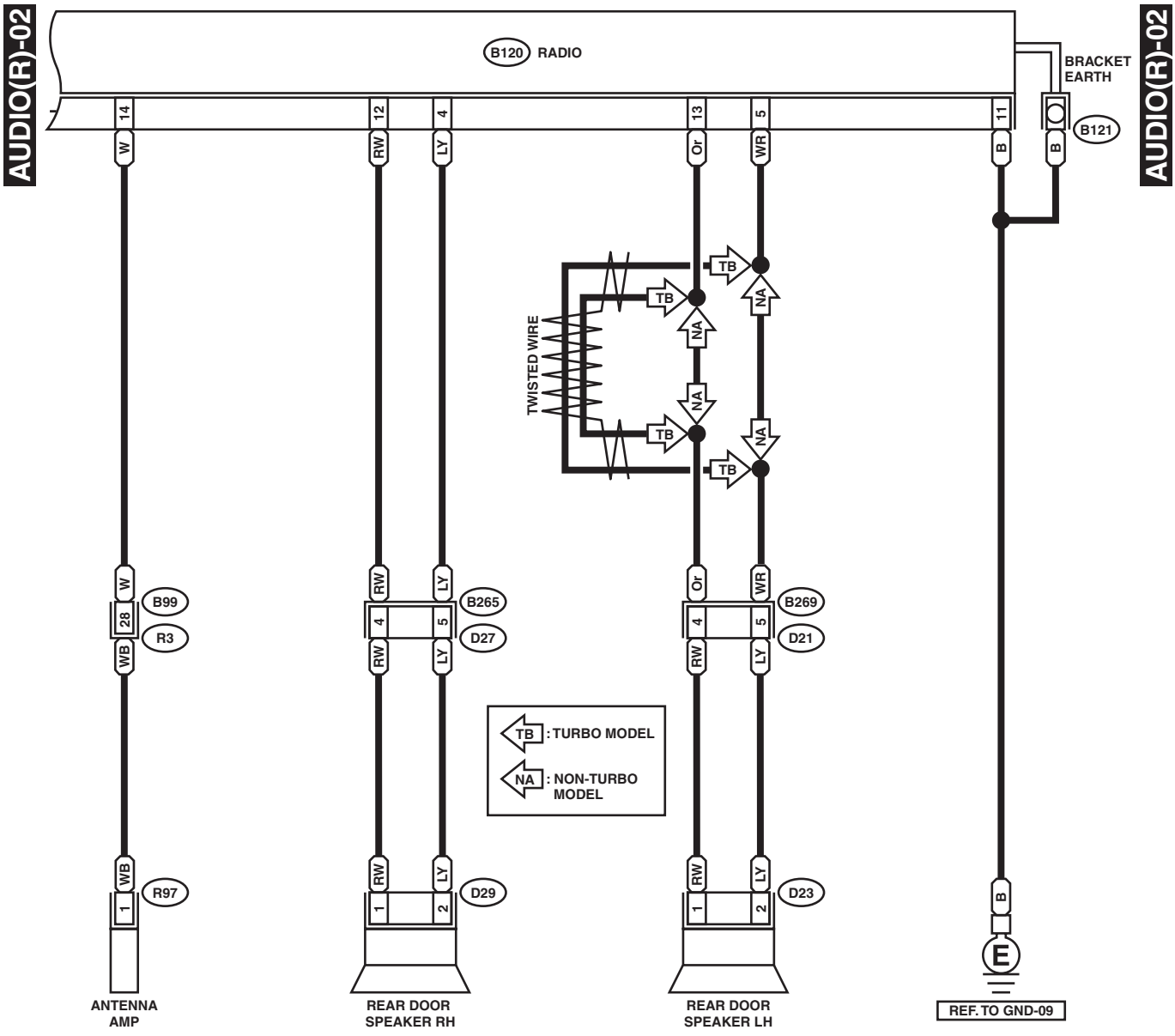
D23
D29
R97
D21
D27
B97
B120

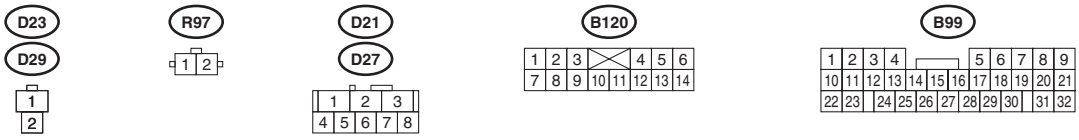
WI-04456

2. RHD MODEL



WI-02297


AUDIO(R)-02
AUDIO(R)-02
B120 RADIO
BRACKET EARTH
B121
14
12
4
13
5
11
W
RW
LY
Or
WR
B
B
TWISTED WIRE
TB
NA
B99
28
R3
WB
B265
D27
B269
D21
R97
D29
D23
B
E
ANTENNA AMP
REAR DOOR SPEAKER RH
REAR DOOR SPEAKER LH
REF. TO GND-09
TB : TURBO MODEL
NA : NON-TURBO MODEL

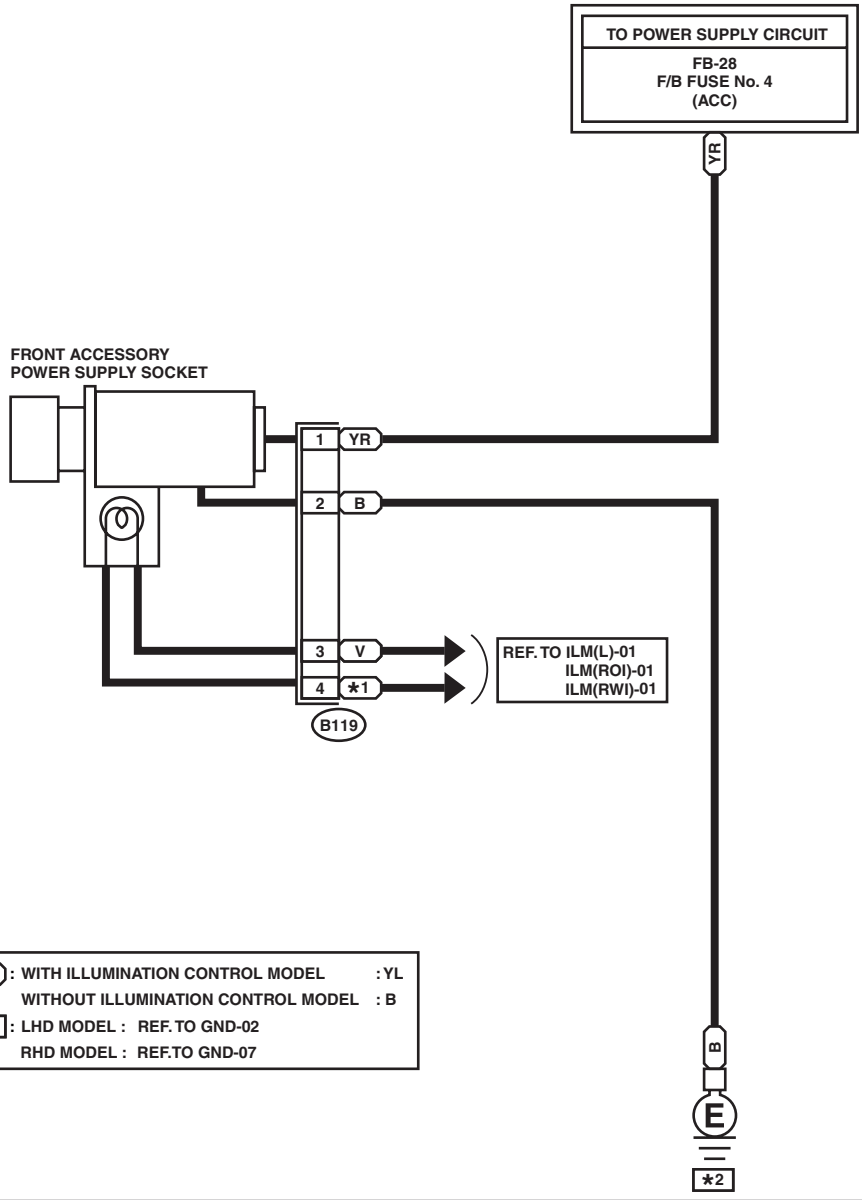

D23
D29
R97
D21
D27
B120
B99

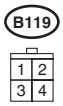
WI-04457

31.Front Accessory Power Supply Socket System

A: WIRING DIAGRAM

FAPS-01



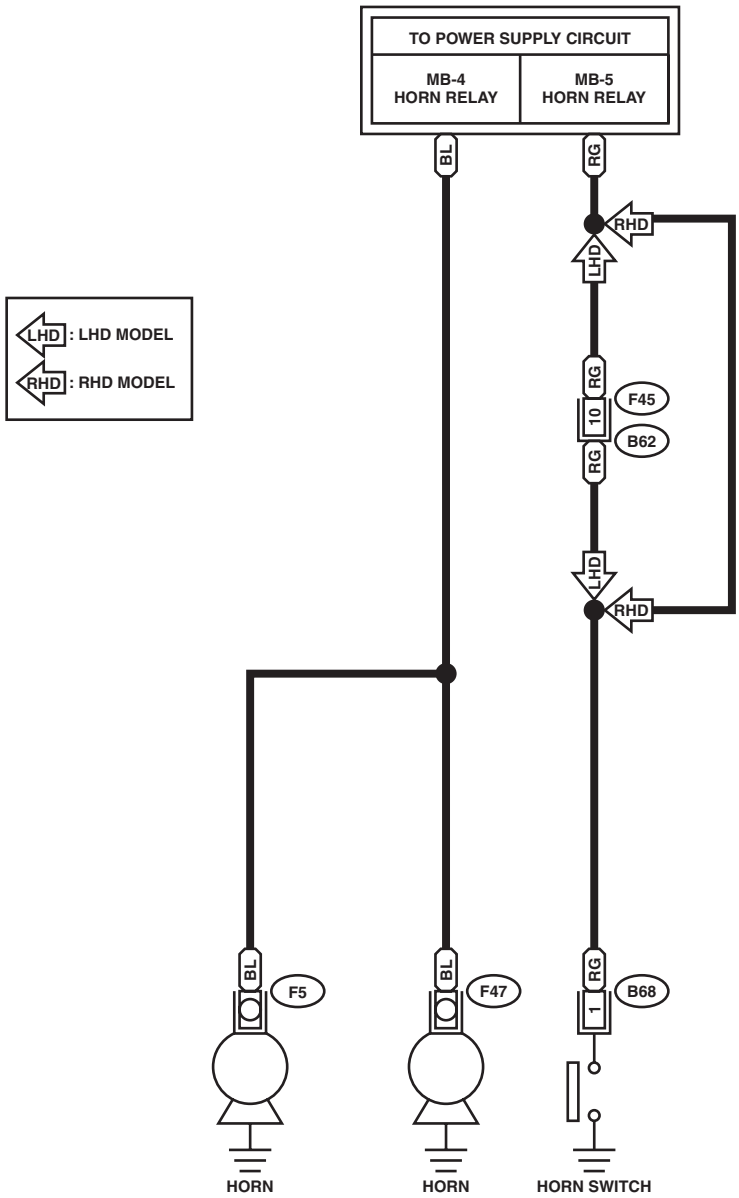


WI-07153

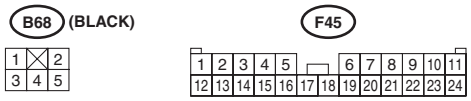
32.Horn System

A: WIRING DIAGRAM

HORN-01



HORN-01

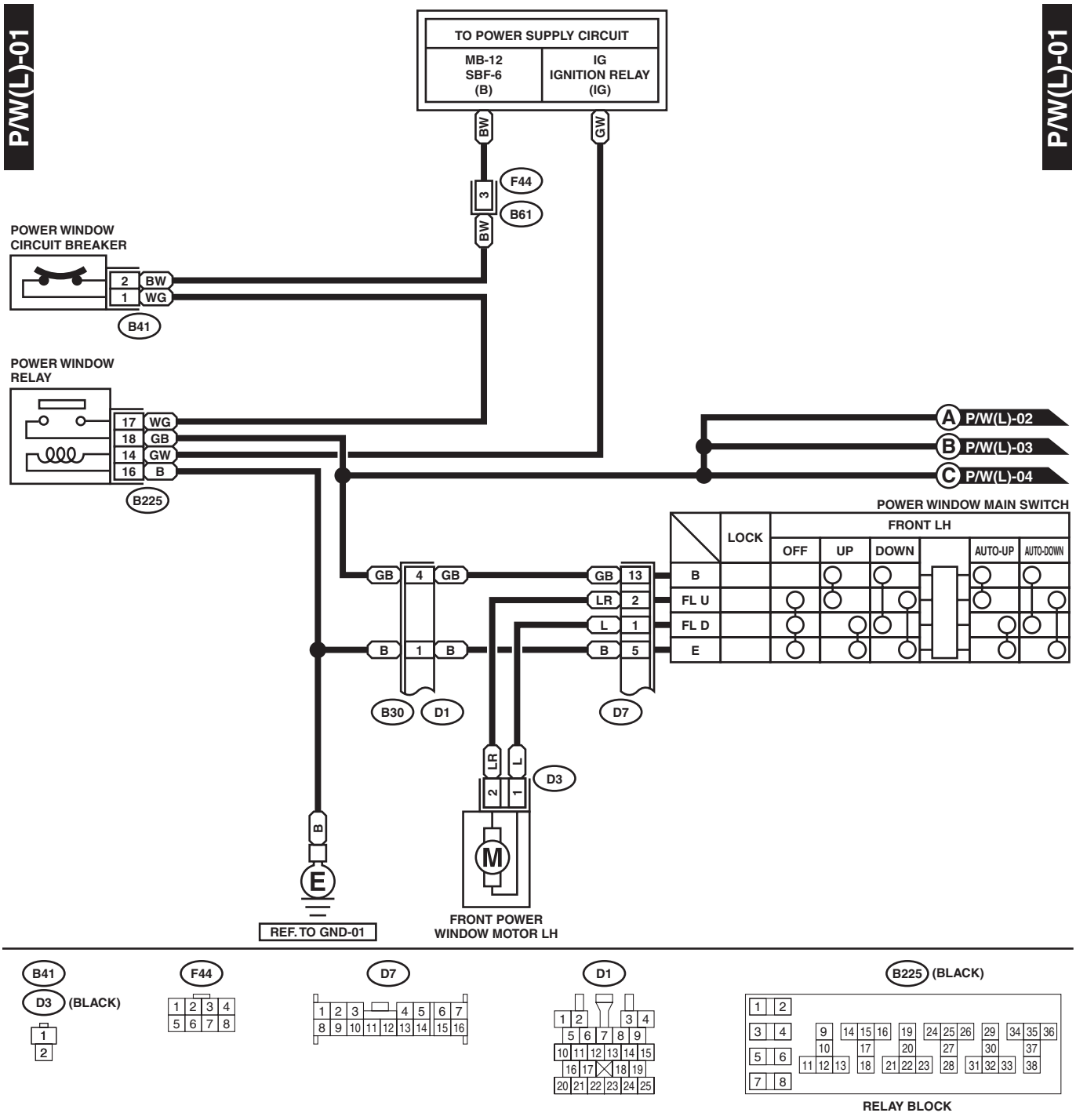


WI-07246

33.Power Window System

A: WIRING DIAGRAM

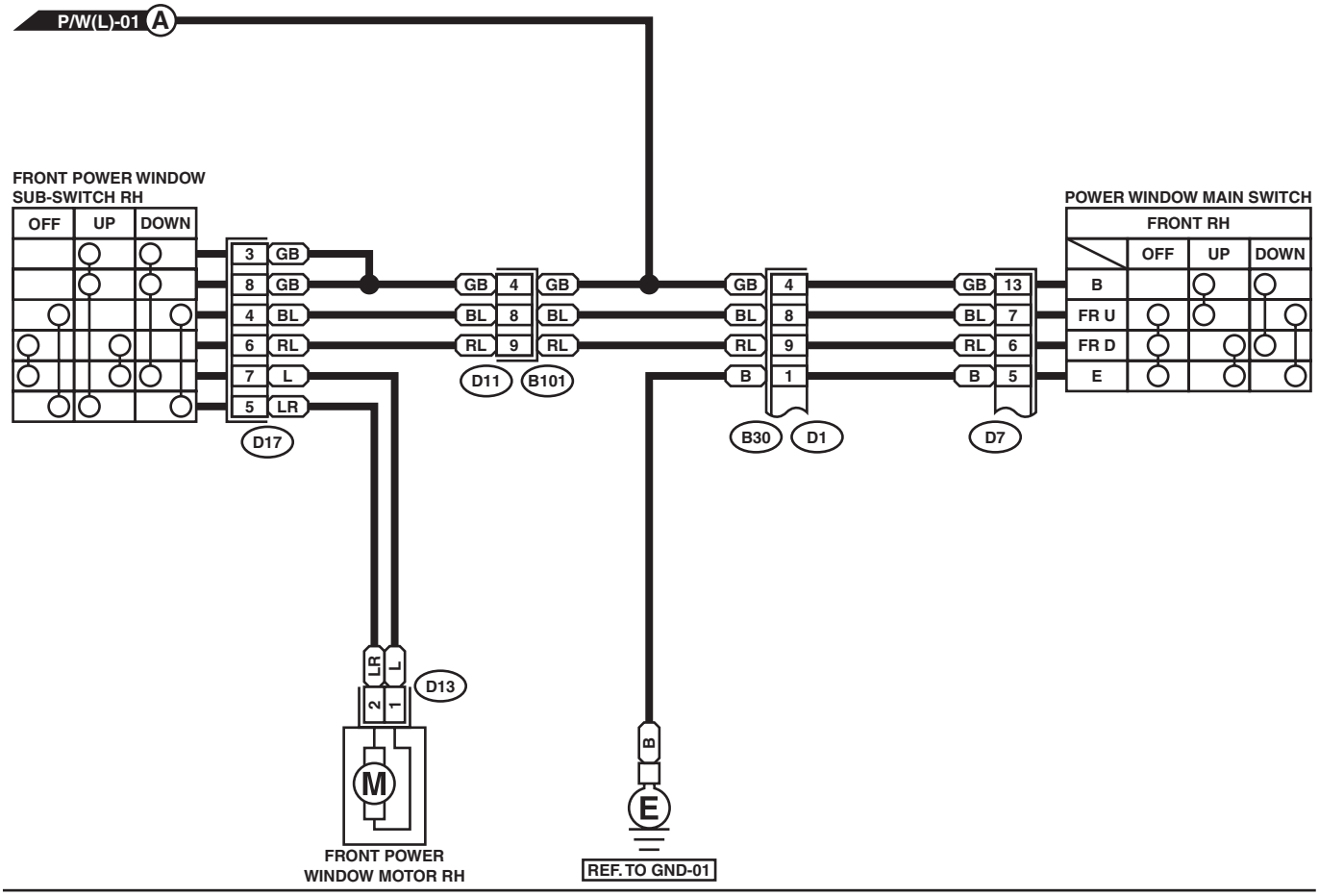
1. LHD MODEL

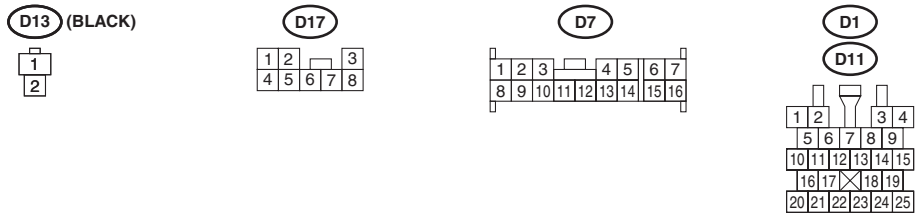


WI-04502

P/W(L)-02

P/W(L)-02

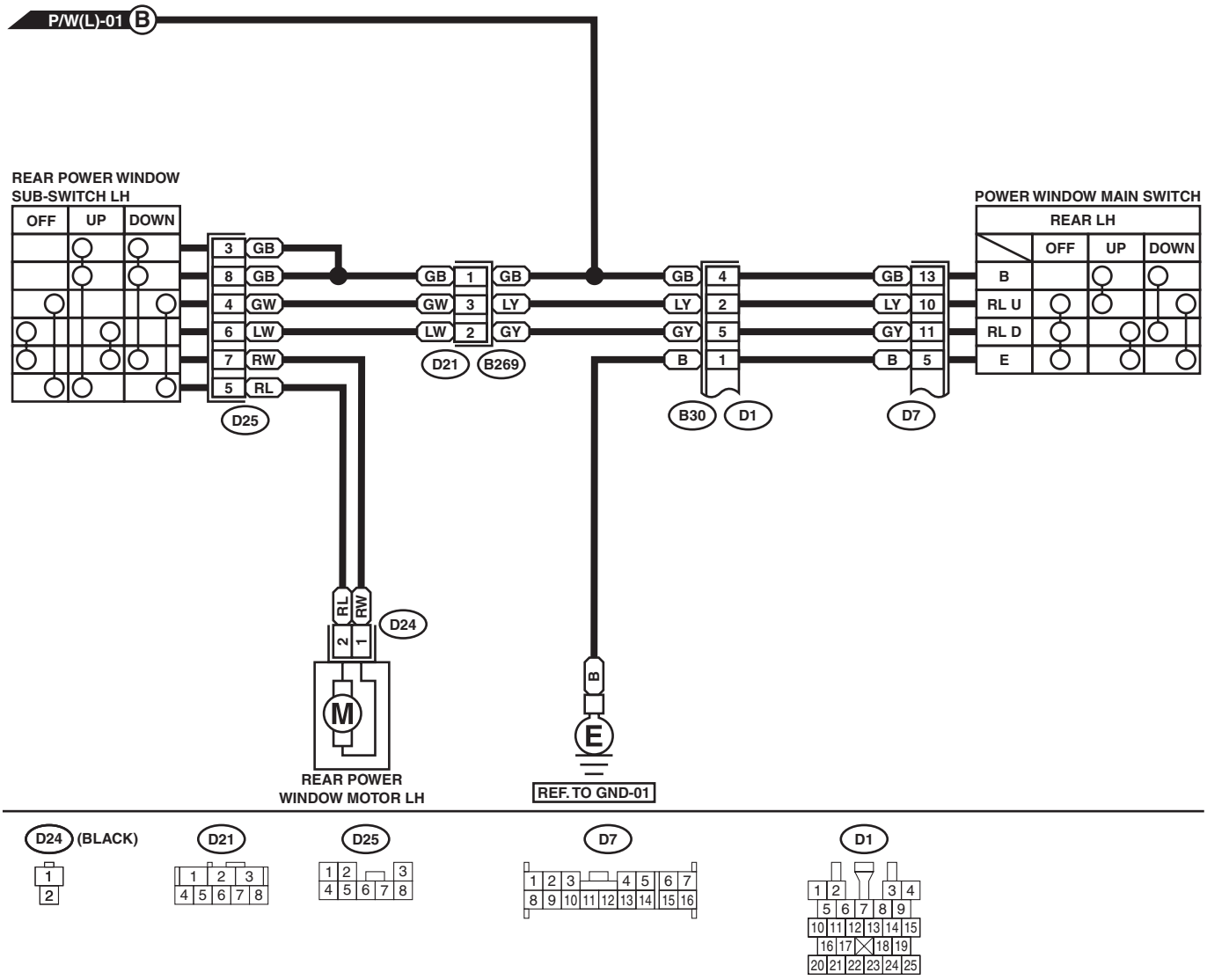




WI-04503

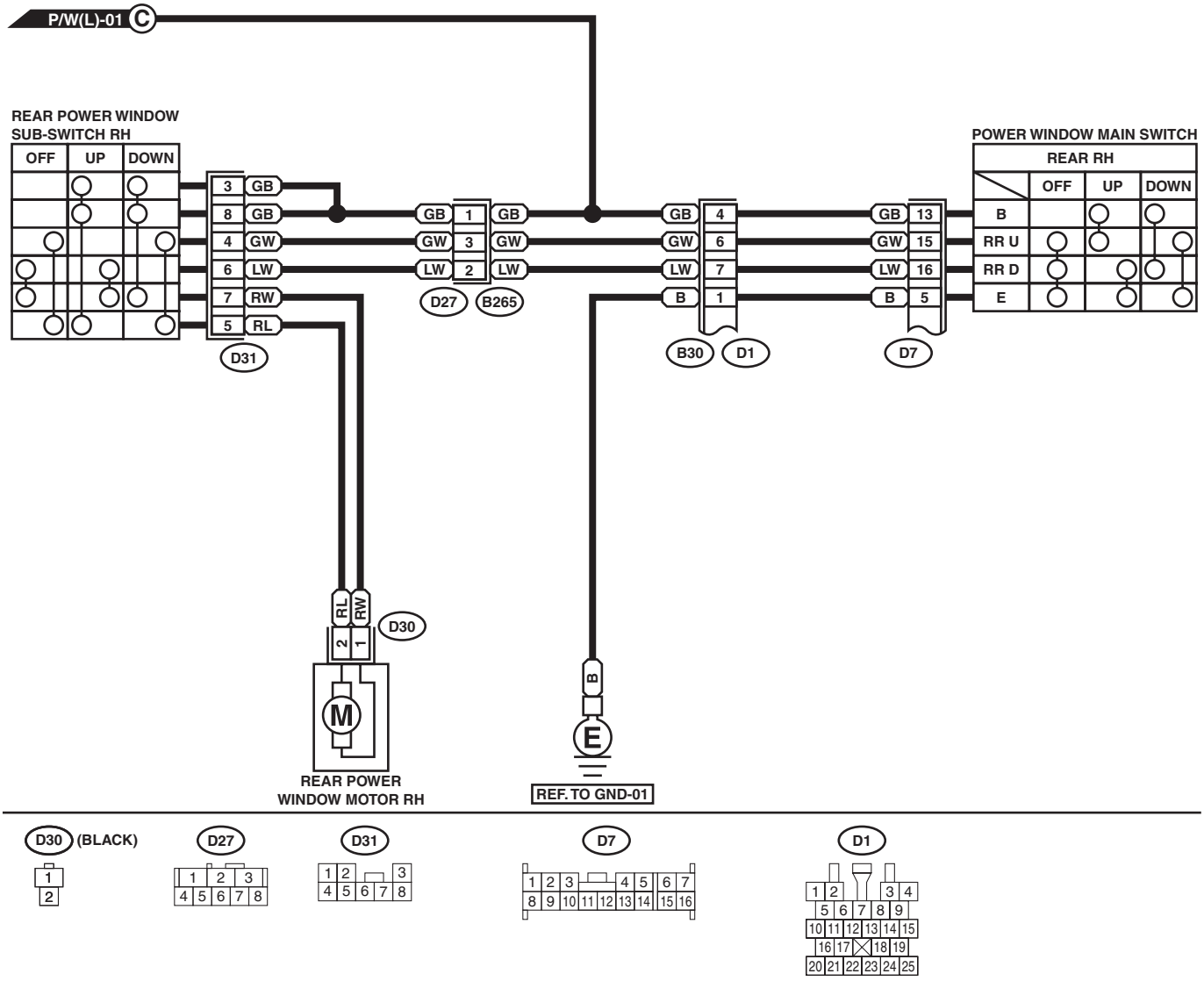
P/W(L)-03

P/W(L)-03



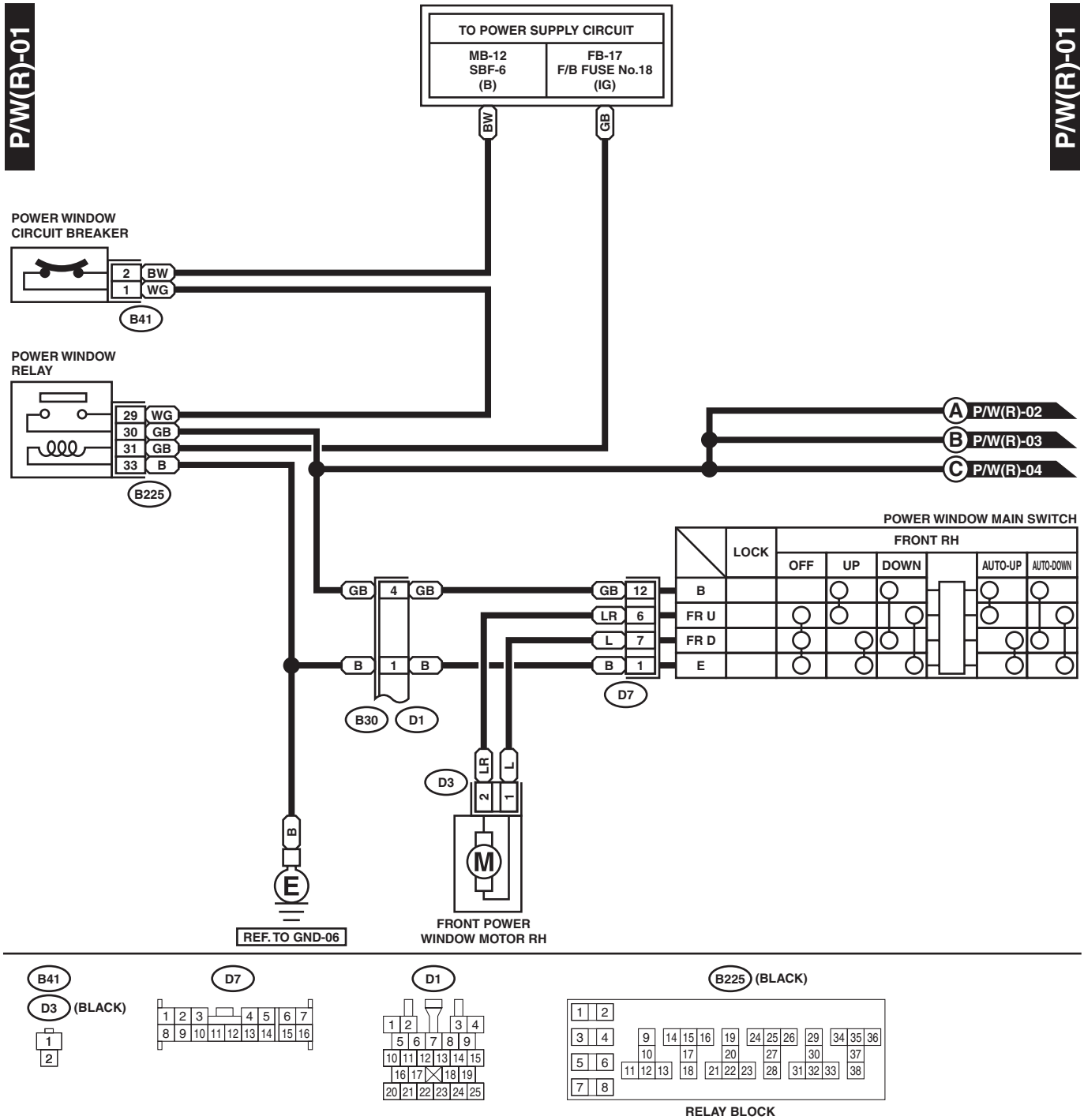
WI-04504

P/W(L)-04



WI-04505

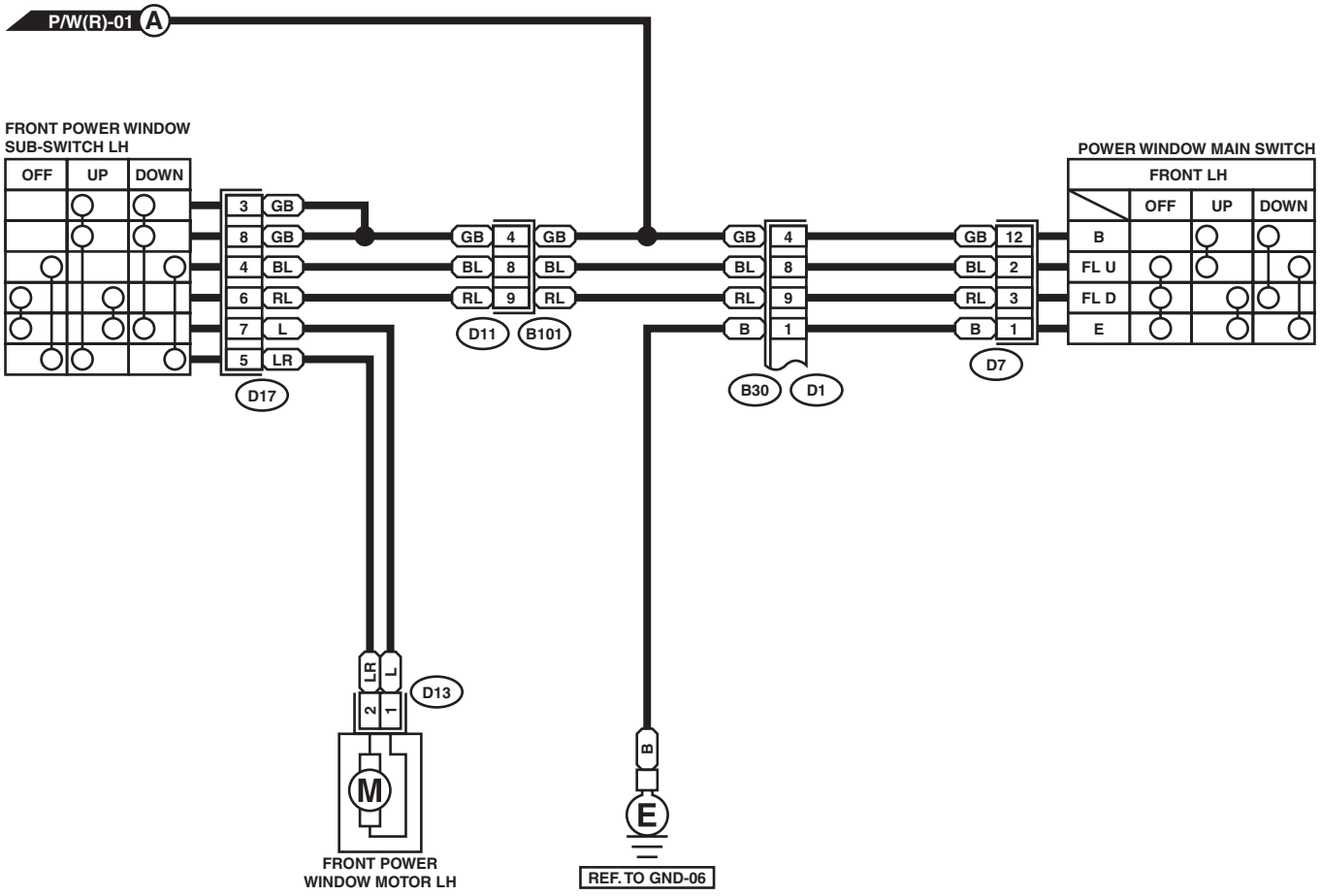
2. RHD MODEL

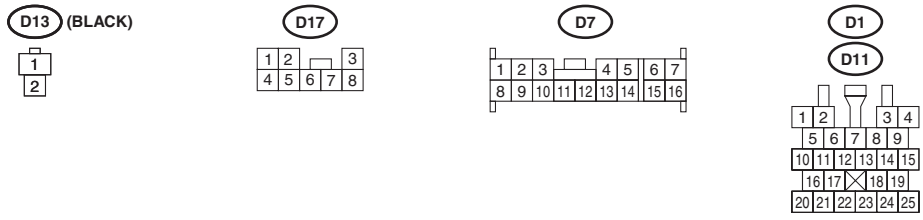


WI-07194

P/W(R)-02

P/W(R)-02

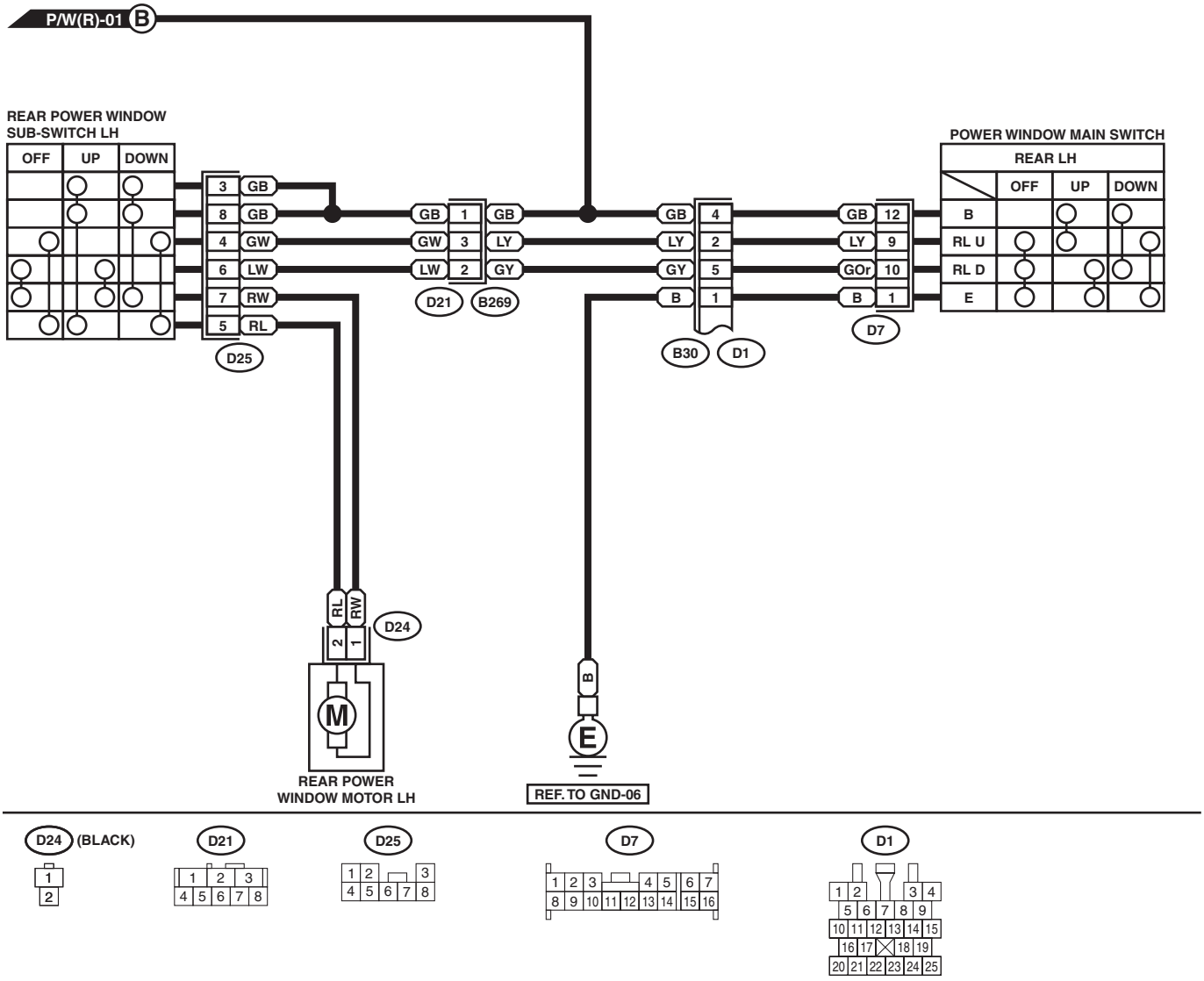




WI-07195

P/W(R)-03

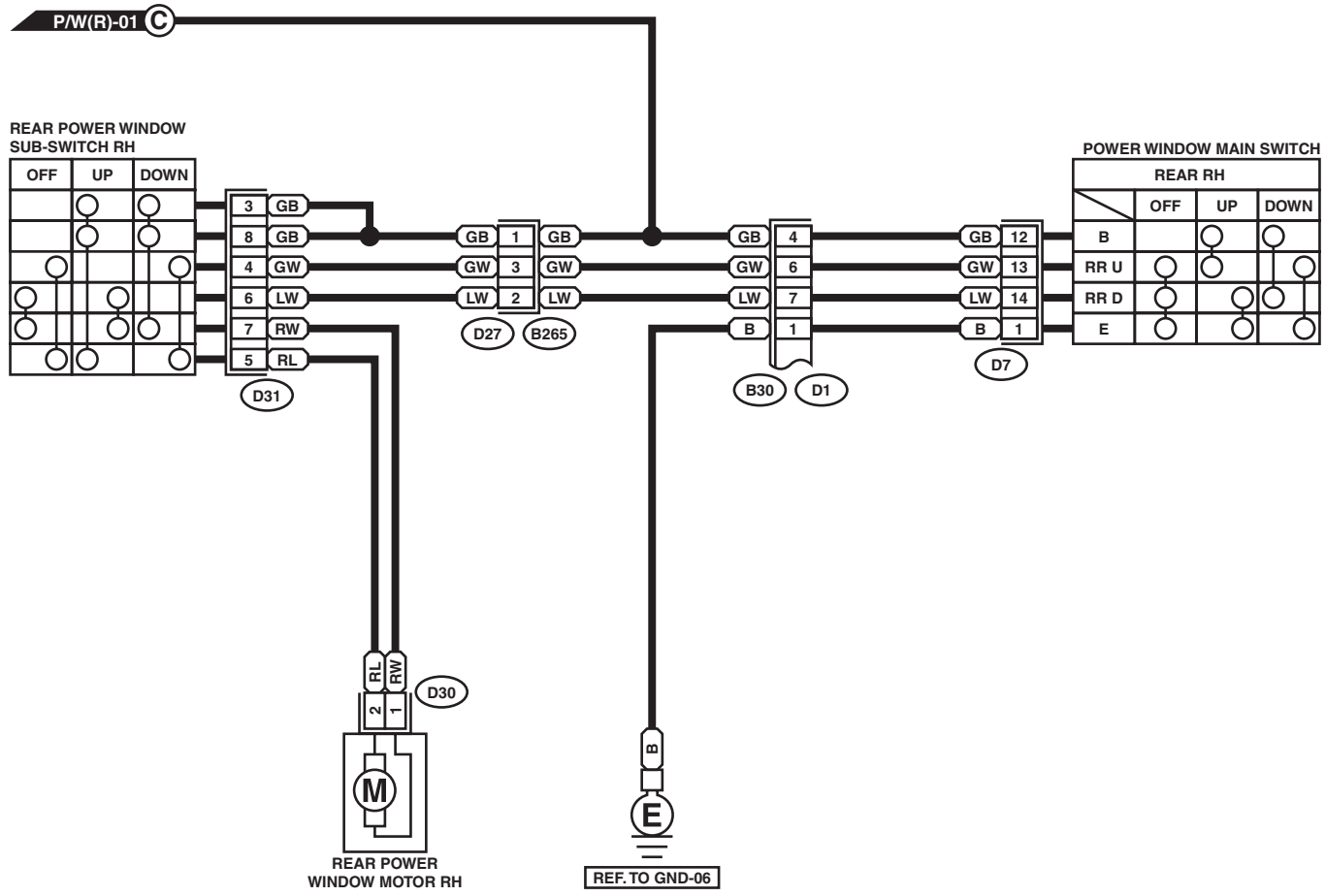
P/W(R)-03

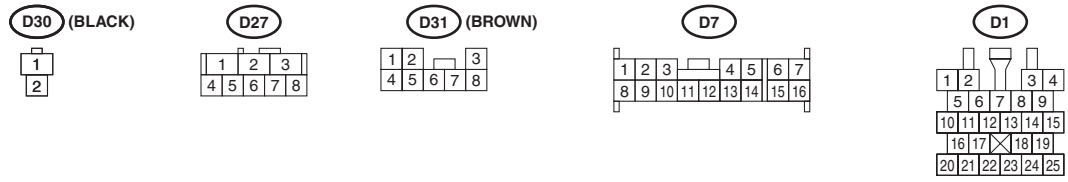


WI-07196

P/W(R)-04

P/W(R)-04



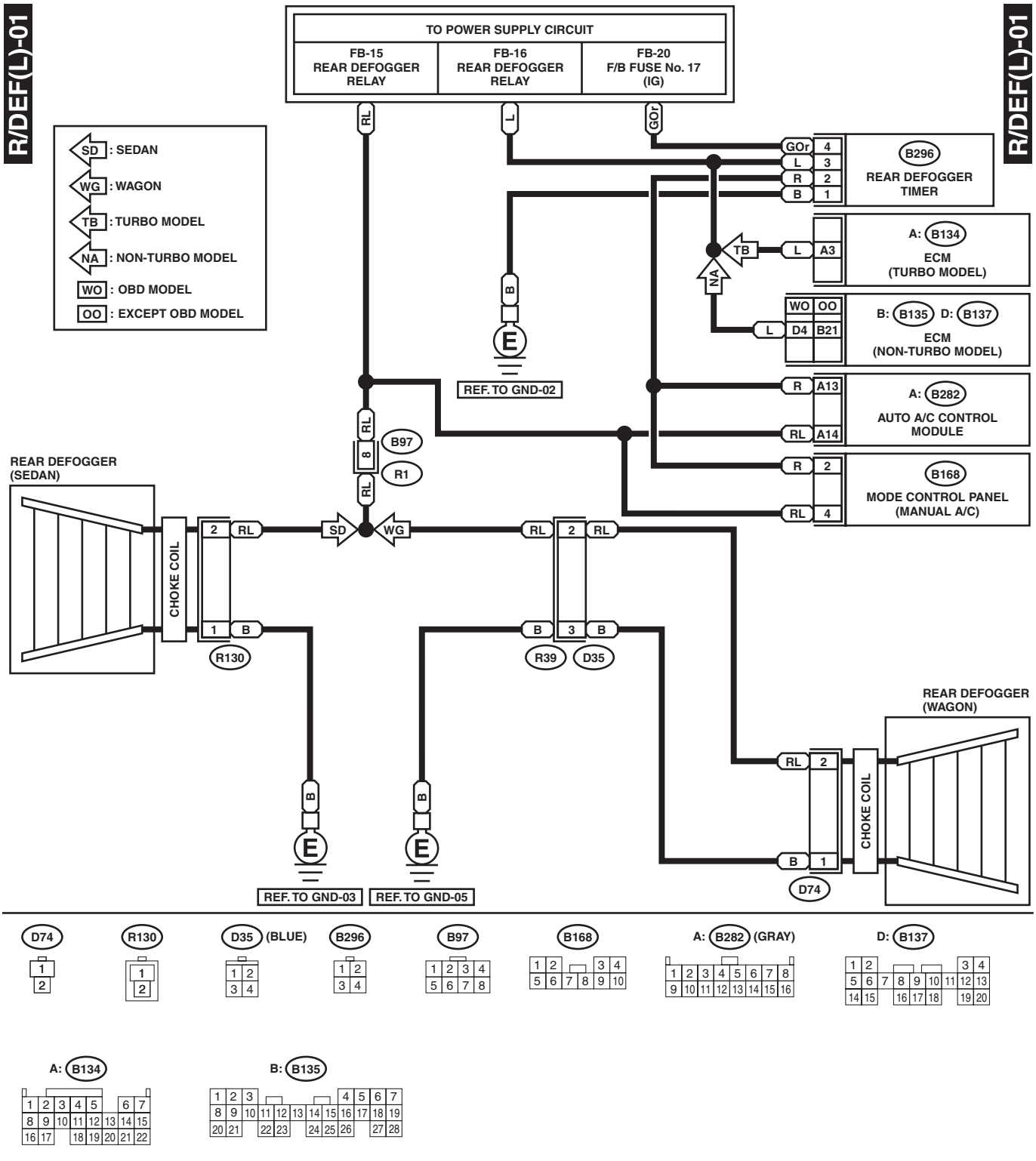


WI-07197

34.Rear Defogger System

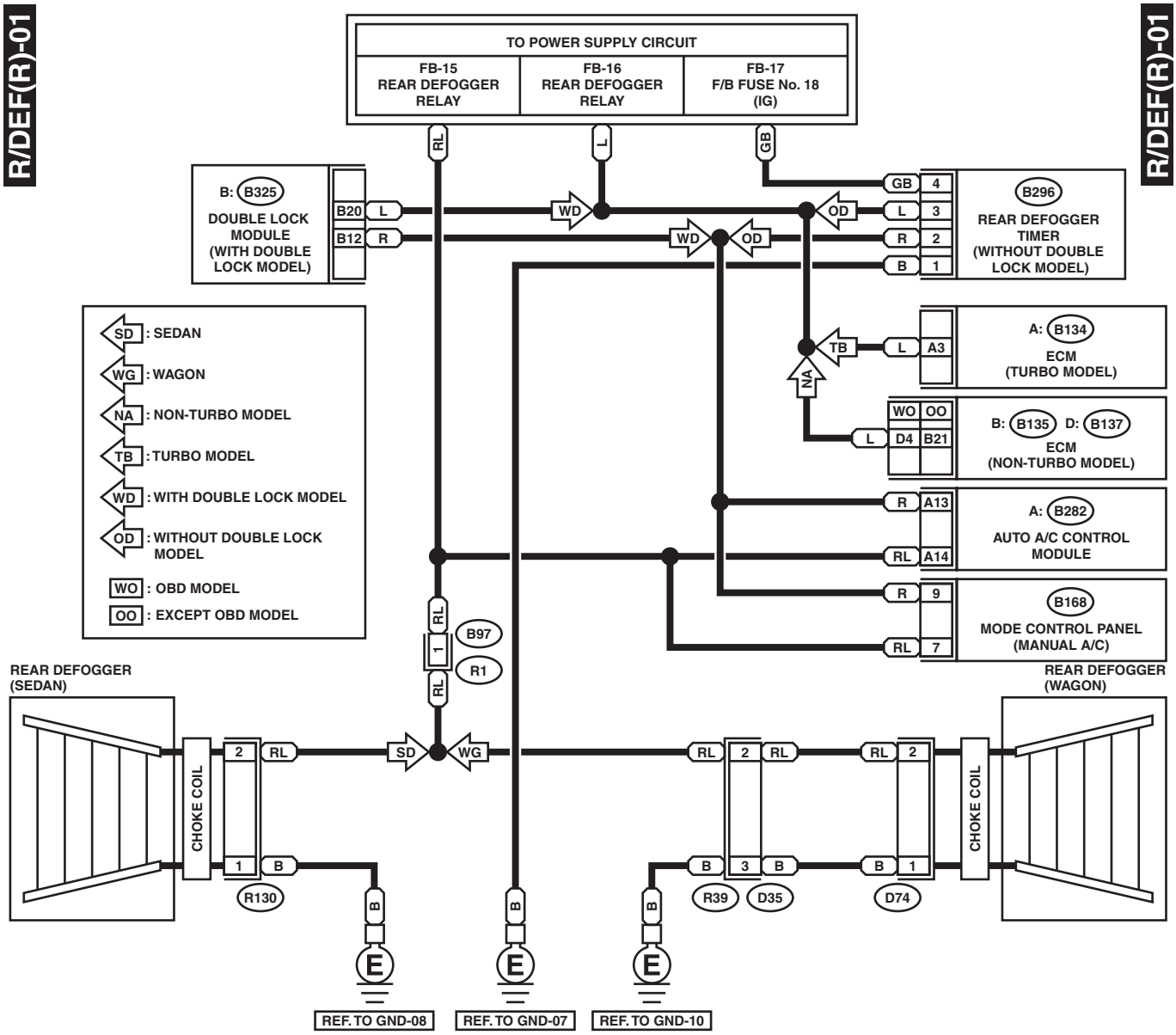
A: WIRING DIAGRAM

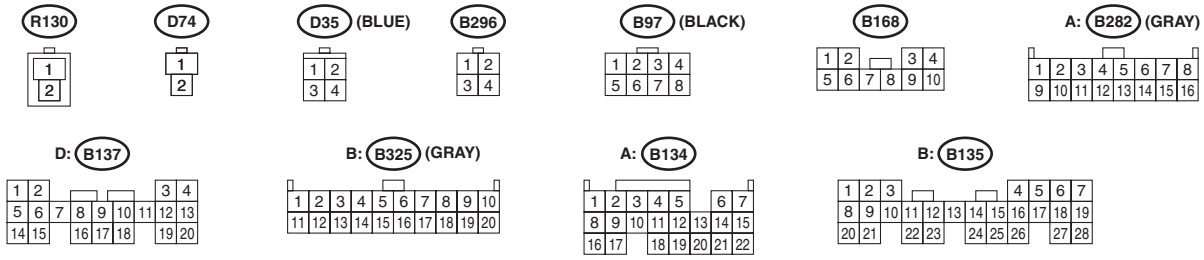
1. LHD MODEL



WI-04578

2. RHD MODEL



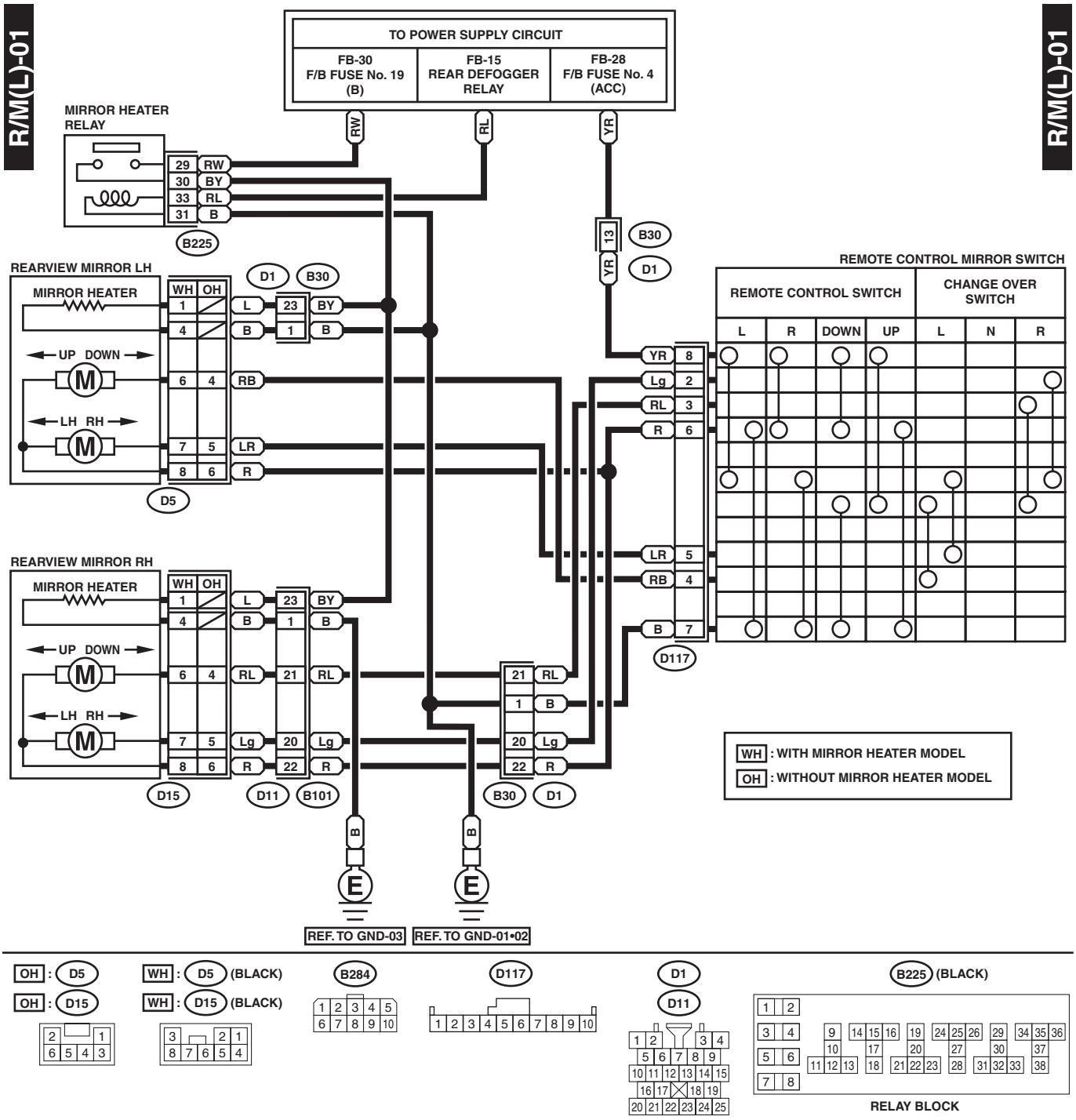


WI-07247

35.Remote Control Mirror System

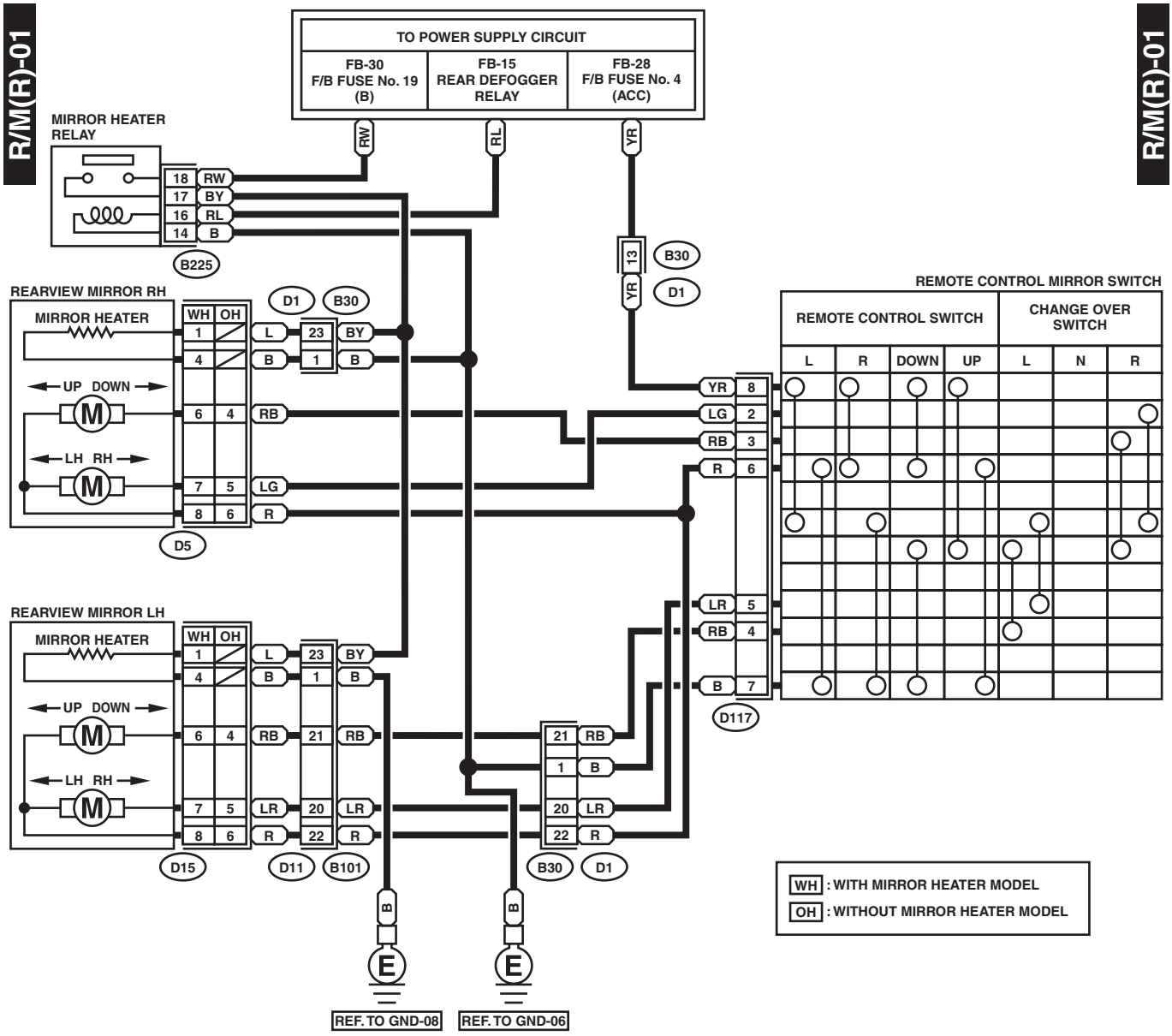
A: WIRING DIAGRAM

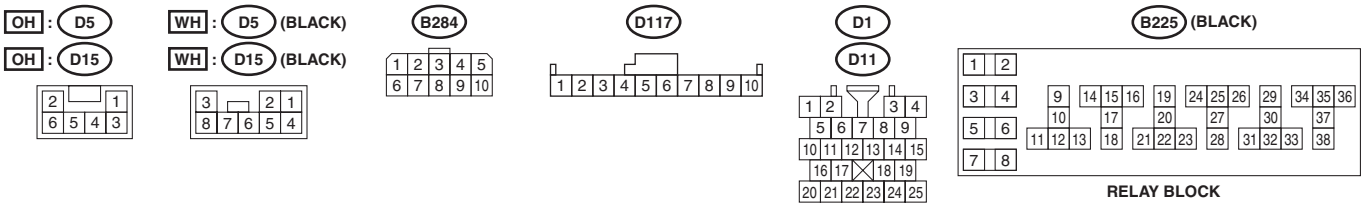
1. LHD MODEL



WI-07200

2. RHD MODEL





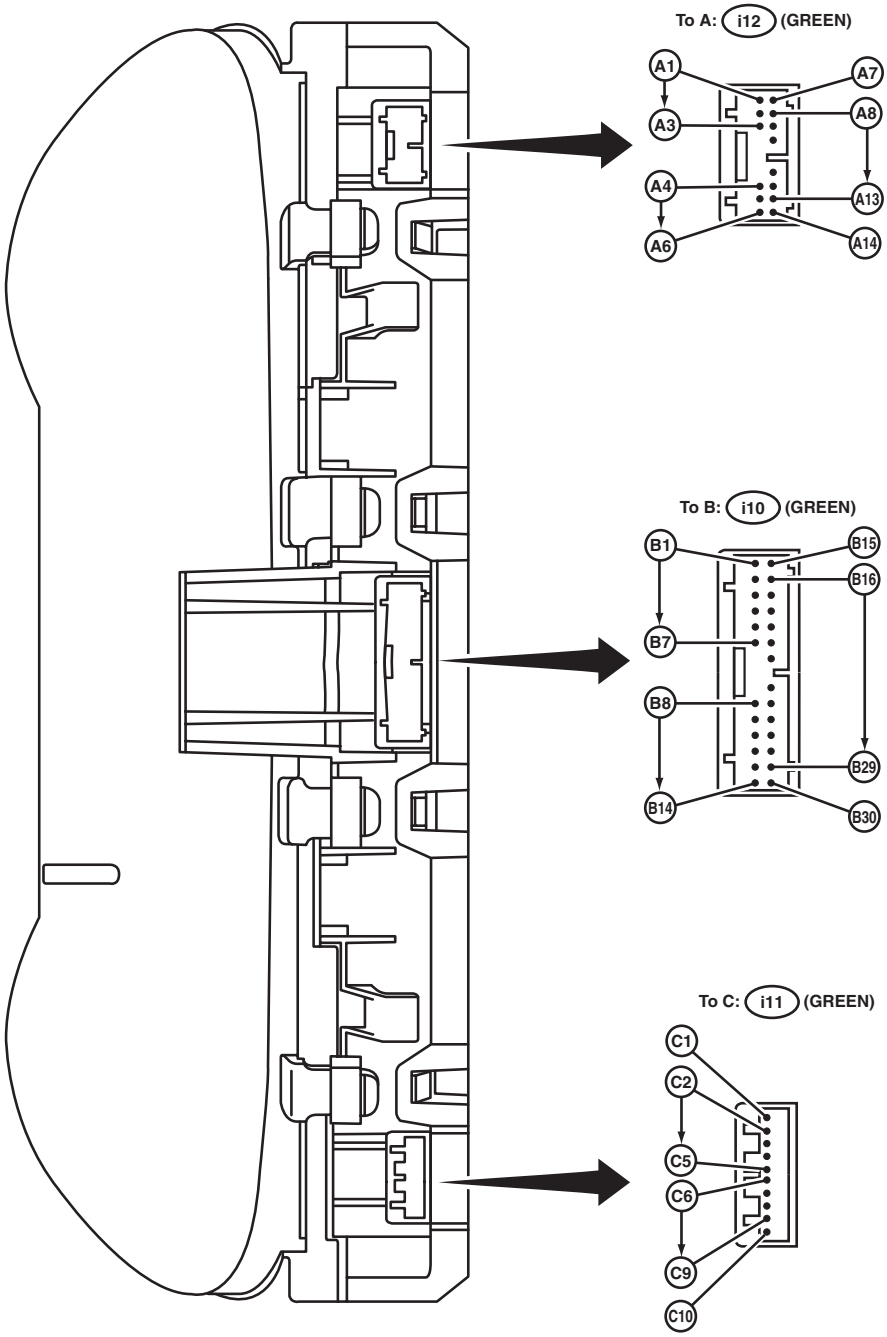
WI-07201

36.Combination Meter System

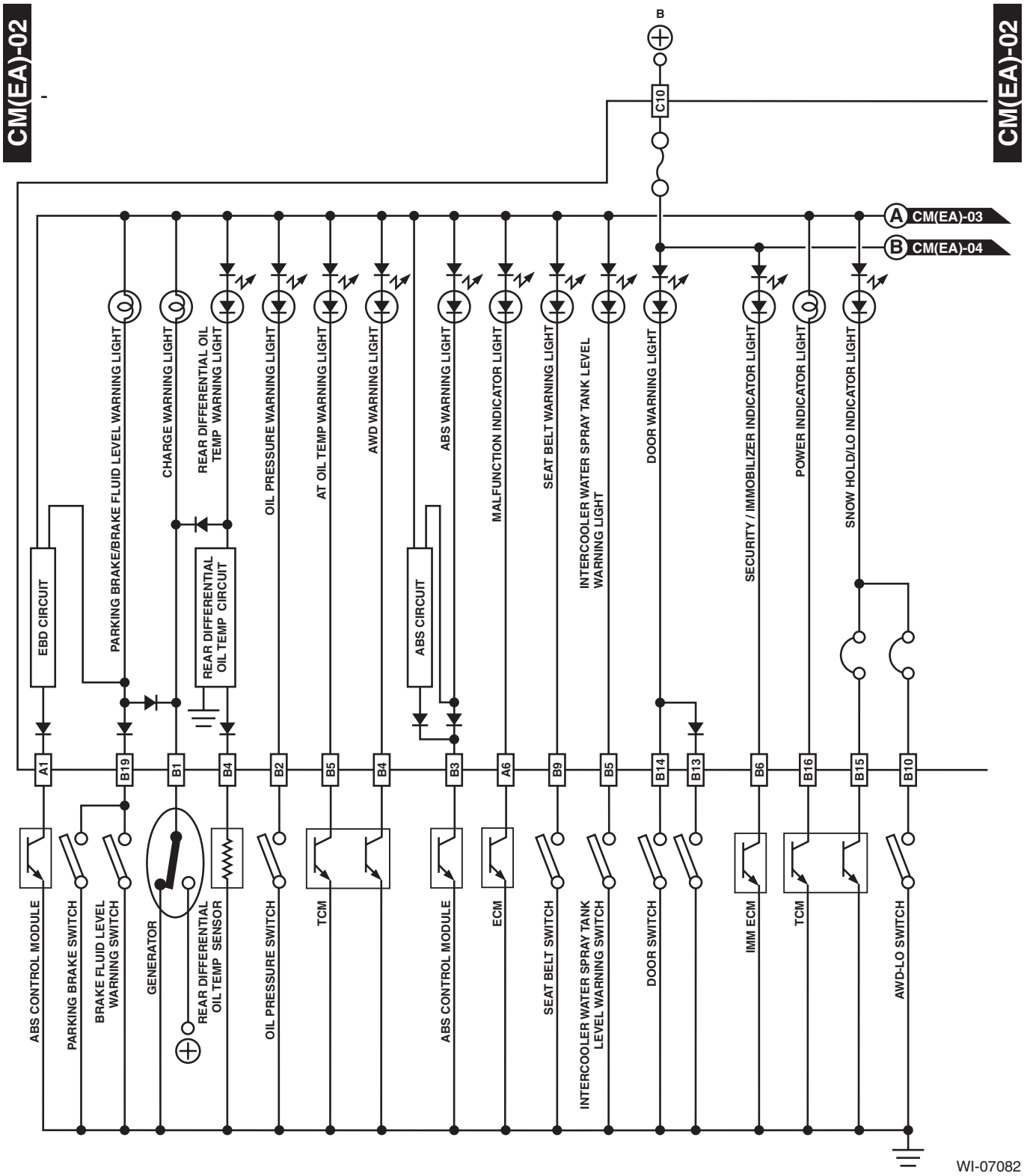
A: WIRING DIAGRAM

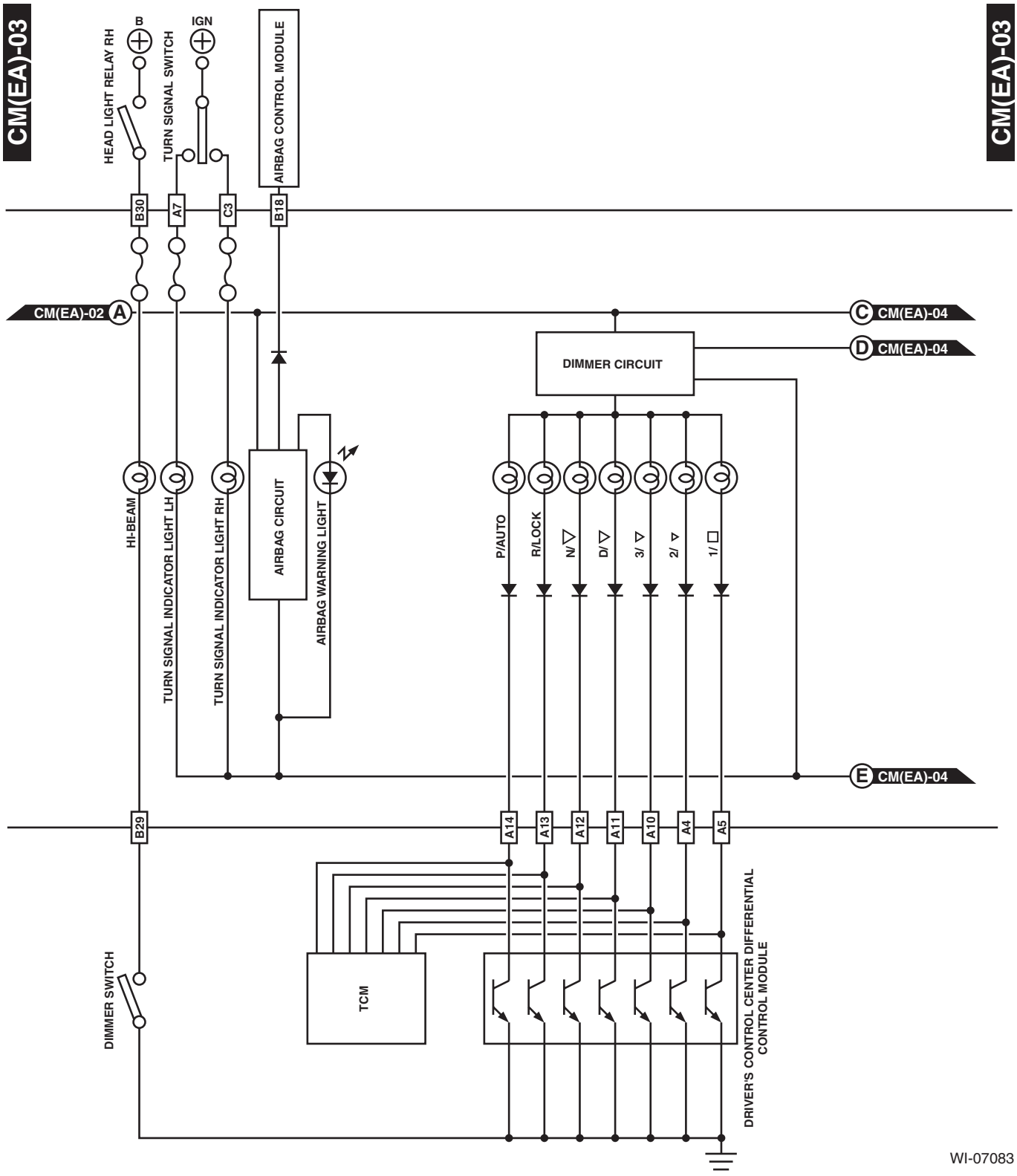
1. EXCEPT FOR AUSTRALIA STi MODEL

CM(EA)-01

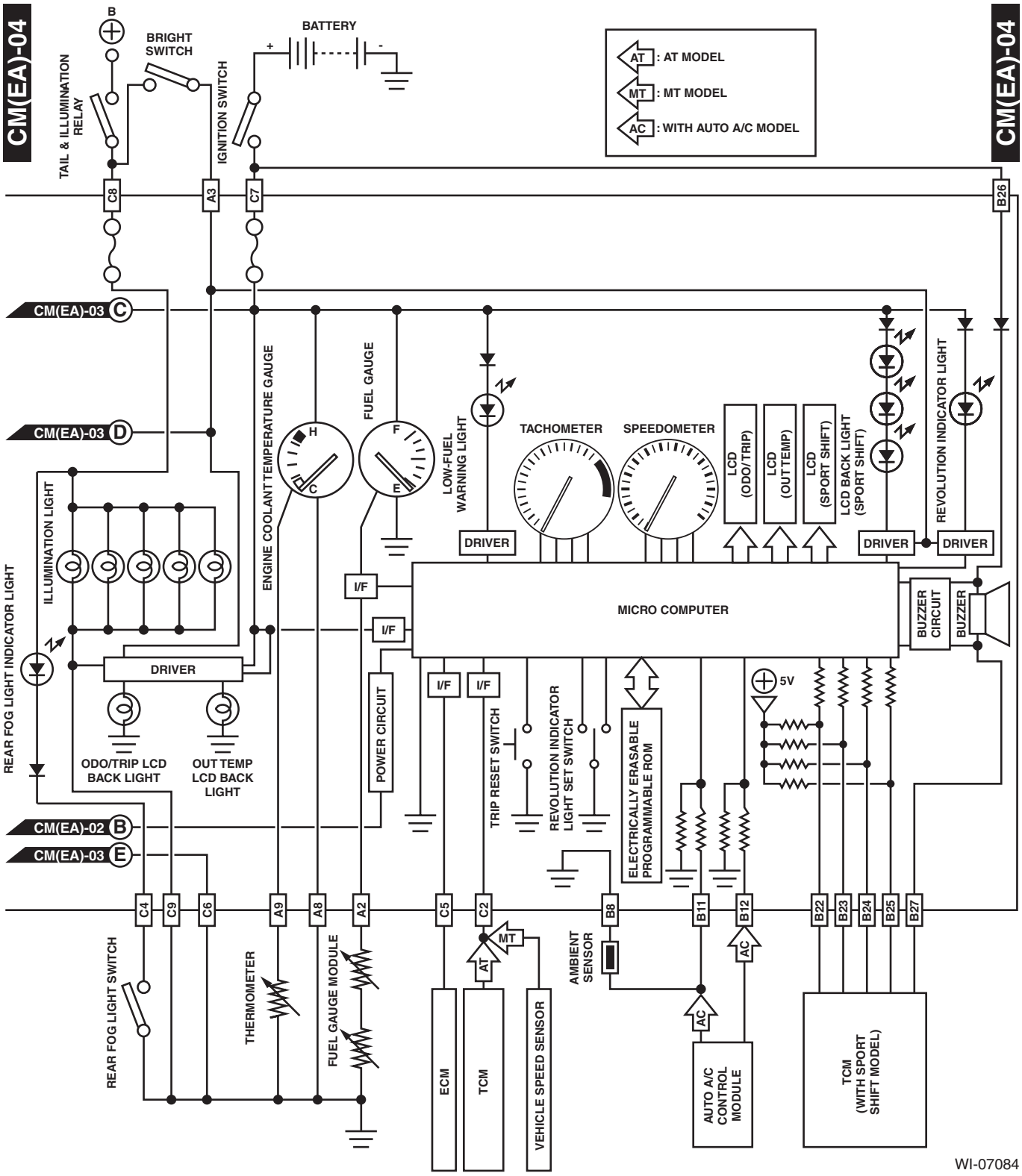


WI-02301


CM(EA)-02
CM(EA)-02
B
C10
A CM(EA)-03
B CM(EA)-04
EBD CIRCUIT
PARKING BRAKE/BRAKE FLUID LEVEL WARNING LIGHT
CHARGE WARNING LIGHT
REAR DIFFERENTIAL OIL TEMP WARNING LIGHT
REAR DIFFERENTIAL OIL TEMP CIRCUIT
OIL PRESSURE WARNING LIGHT
AT OIL TEMP WARNING LIGHT
AWD WARNING LIGHT
ABS CIRCUIT
ABS WARNING LIGHT
MALFUNCTION INDICATOR LIGHT
SEAT BELT WARNING LIGHT
INTERCOOLER WATER SPRAY TANK LEVEL WARNING LIGHT
DOOR WARNING LIGHT
SECURITY / IMMOBILIZER INDICATOR LIGHT
POWER INDICATOR LIGHT
SNOW HOLD/LO INDICATOR LIGHT
A1
B19
B1
B4
B2
B5
B4
B3
A6
B9
B5
B14
B13
B6
B16
B15
B10
ABS CONTROL MODULE
PARKING BRAKE SWITCH
BRAKE FLUID LEVEL WARNING SWITCH
GENERATOR
REAR DIFFERENTIAL OIL TEMP SENSOR
OIL PRESSURE SWITCH
TCM
ABS CONTROL MODULE
ECM
SEAT BELT SWITCH
INTERCOOLER WATER SPRAY TANK LEVEL WARNING SWITCH
DOOR SWITCH
IMM ECM
TCM
AWD-LO SWITCH
WI-07082


CM(EA)-03
CM(EA)-03
B
IGN
HEAD LIGHT RELAY RH
TURN SIGNAL SWITCH
AIRBAG CONTROL MODULE
B30
A7
C3
B18
CM(EA)-02 A
C CM(EA)-04
D CM(EA)-04
DIMMER CIRCUIT
HI-BEAM
TURN SIGNAL INDICATOR LIGHT LH
TURN SIGNAL INDICATOR LIGHT RH
AIRBAG CIRCUIT
AIRBAG WARNING LIGHT
P/AUTO
R/LOCK
N/▽
D/▽
3/▽
2/▽
1/□
E CM(EA)-04
B29
A14
A13
A12
A11
A10
A4
A5
TCM
DRIVER'S CONTROL CENTER DIFFERENTIAL CONTROL MODULE
DIMMER SWITCH
WI-07083

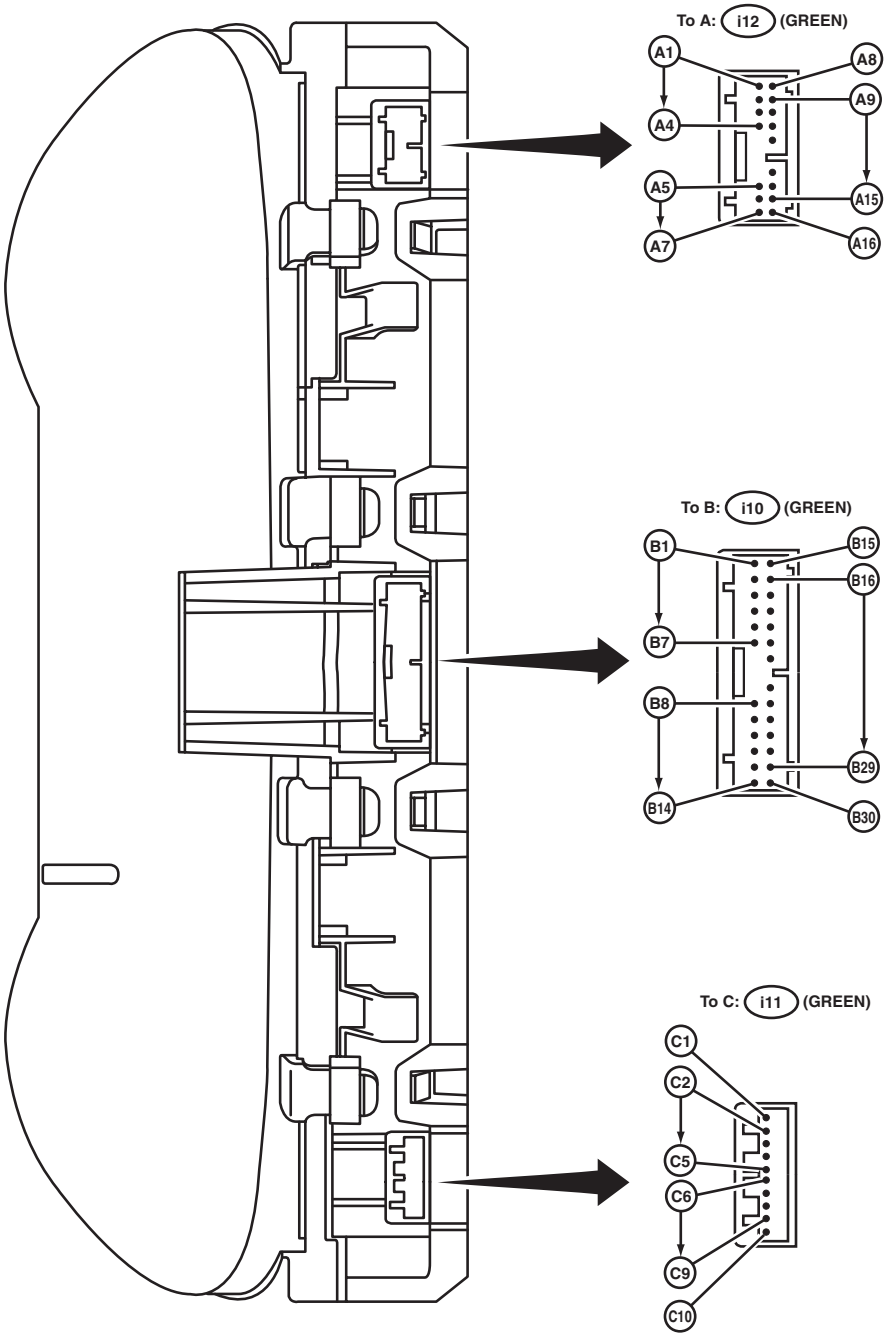
Combination Meter System



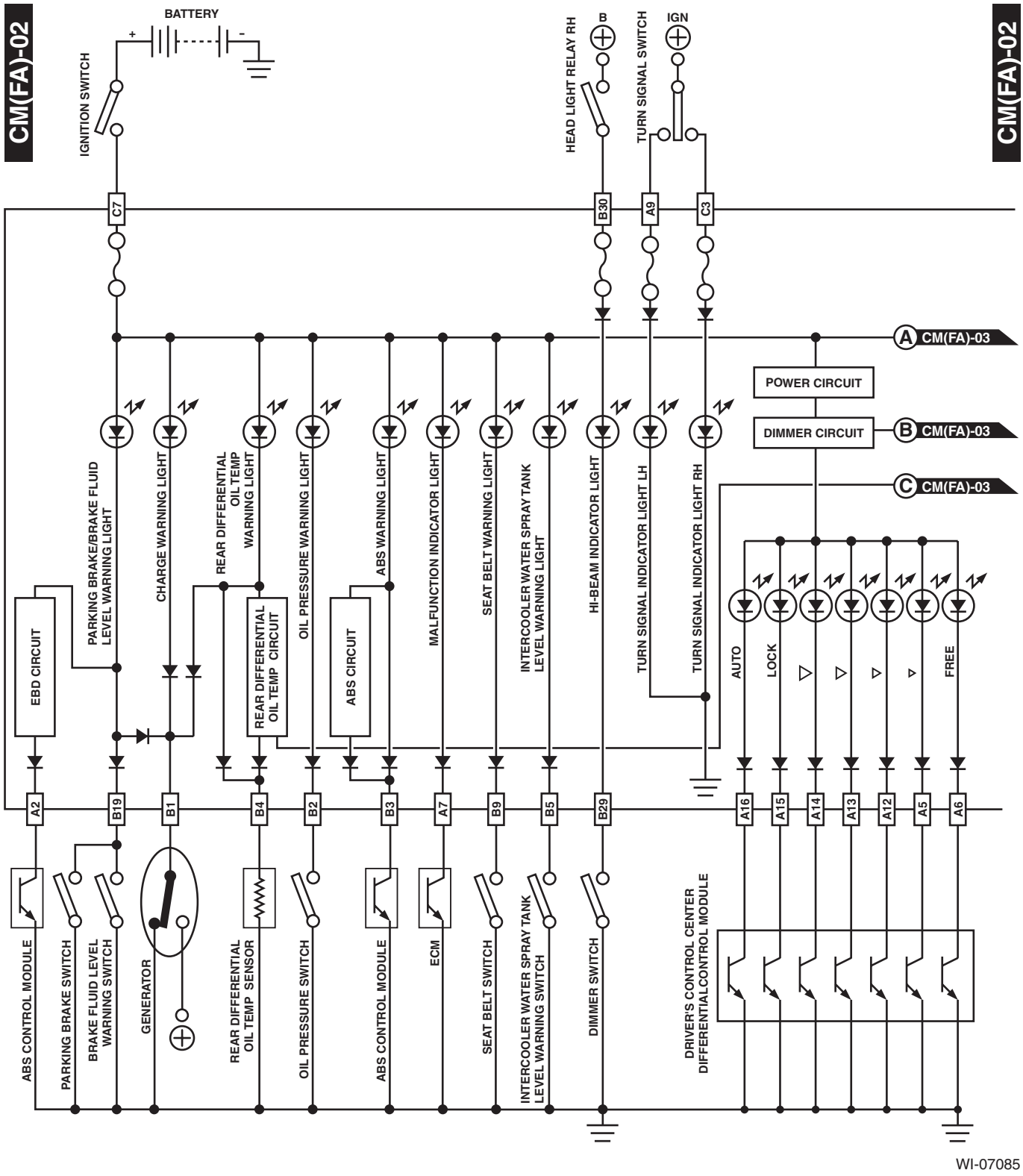
2. FOR AUSTRALIA STi MODEL

CM(FA)-01

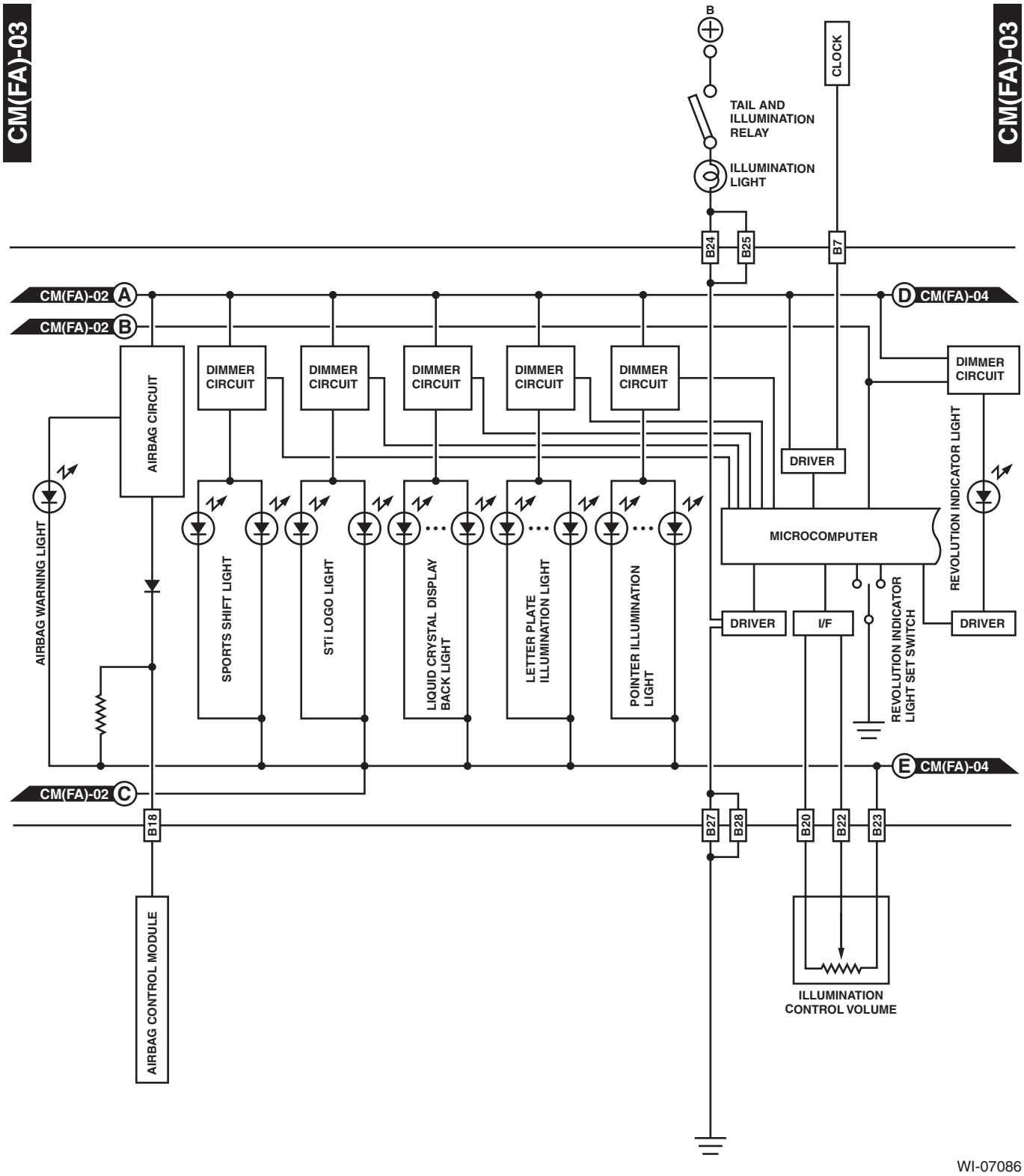
CM(FA)-01



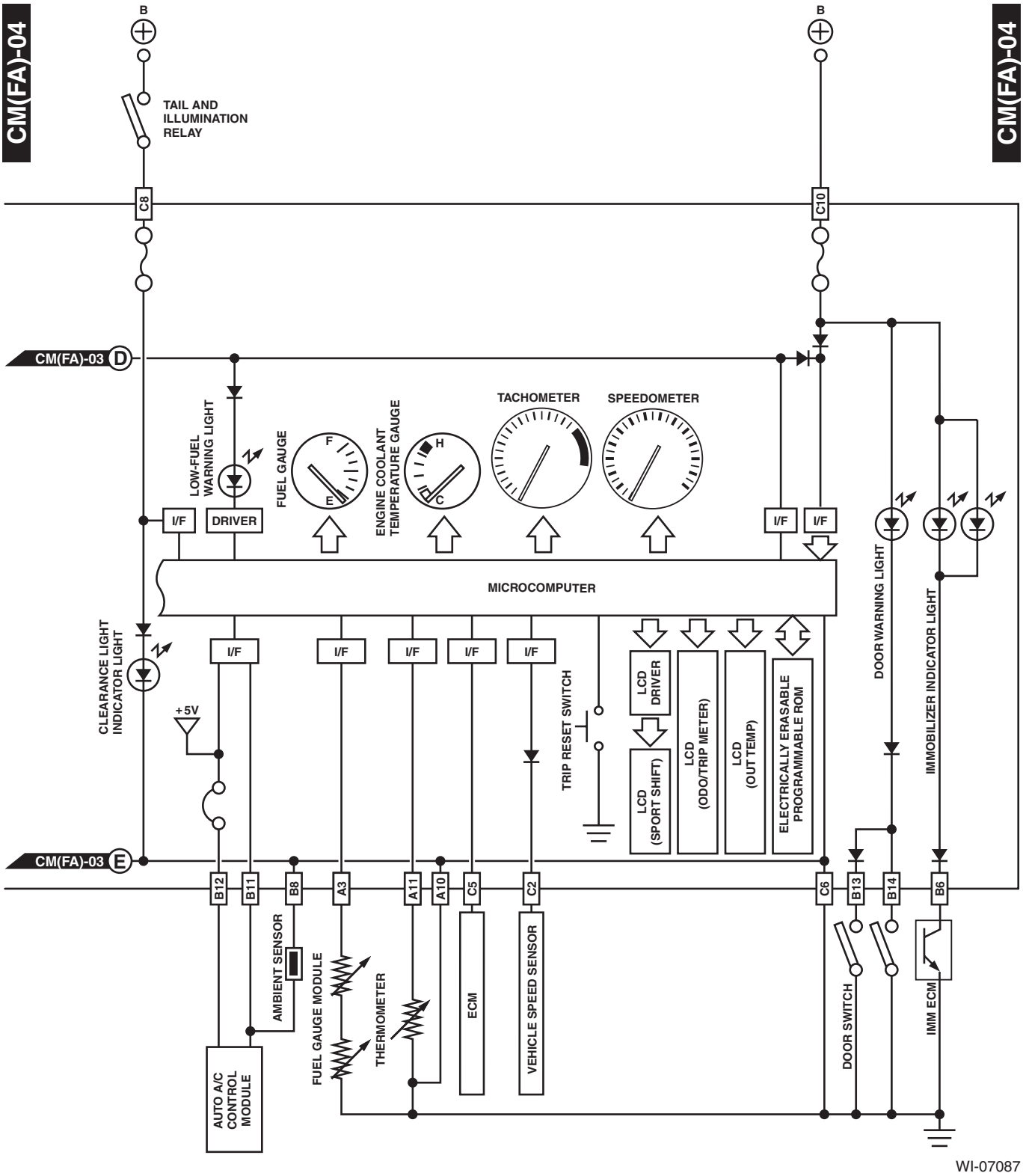
WI-07223


CM(FA)-02
CM(FA)-02
BATTERY
IGNITION SWITCH
HEAD LIGHT RELAY RH
B
TURN SIGNAL SWITCH
IGN
C7
B30
A9
C3
A CM(FA)-03
POWER CIRCUIT
DIMMER CIRCUIT
B CM(FA)-03
C CM(FA)-03
PARKING BRAKE/BRAKE FLUID LEVEL WARNING LIGHT
CHARGE WARNING LIGHT
REAR DIFFERENTIAL OIL TEMP WARNING LIGHT
OIL PRESSURE WARNING LIGHT
ABS WARNING LIGHT
MALFUNCTION INDICATOR LIGHT
SEAT BELT WARNING LIGHT
INTERCOOLER WATER SPRAY TANK LEVEL WARNING LIGHT
HI-BEAM INDICATOR LIGHT
TURN SIGNAL INDICATOR LIGHT LH
TURN SIGNAL INDICATOR LIGHT RH
AUTO
LOCK
FREE
EBD CIRCUIT
REAR DIFFERENTIAL OIL TEMP CIRCUIT
ABS CIRCUIT
A2
B19
B1
B4
B2
B3
A7
B9
B5
B29
A16
A15
A14
A13
A12
A5
A6
ABS CONTROL MODULE
PARKING BRAKE SWITCH
BRAKE FLUID LEVEL WARNING SWITCH
GENERATOR
REAR DIFFERENTIAL OIL TEMP SENSOR
OIL PRESSURE SWITCH
ABS CONTROL MODULE
ECM
SEAT BELT SWITCH
INTERCOOLER WATER SPRAY TANK LEVEL WARNING SWITCH
DIMMER SWITCH
DRIVER'S CONTROL CENTER DIFFERENTIALCONTROL MODULE

WI-07085


CM(FA)-03
CM(FA)-03
B
CLOCK
TAIL AND ILLUMINATION RELAY
ILLUMINATION LIGHT
B24
B25
B7
CM(FA)-02 A
CM(FA)-02 B
D CM(FA)-04
AIRBAG CIRCUIT
DIMMER CIRCUIT
DIMMER CIRCUIT
DIMMER CIRCUIT
DIMMER CIRCUIT
DIMMER CIRCUIT
DIMMER CIRCUIT
DRIVER
REVOLUTION INDICATOR LIGHT
AIRBAG WARNING LIGHT
SPORTS SHIFT LIGHT
STi LOGO LIGHT
LIQUID CRYSTAL DISPLAY BACK LIGHT
LETTER PLATE ILLUMINATION LIGHT
POINTER ILLUMINATION LIGHT
MICROCOMPUTER
DRIVER
I/F
REVOLUTION INDICATOR LIGHT SET SWITCH
DRIVER
E CM(FA)-04
CM(FA)-02 C
B18
B27
B28
B20
B22
B23
AIRBAG CONTROL MODULE
ILLUMINATION CONTROL VOLUME

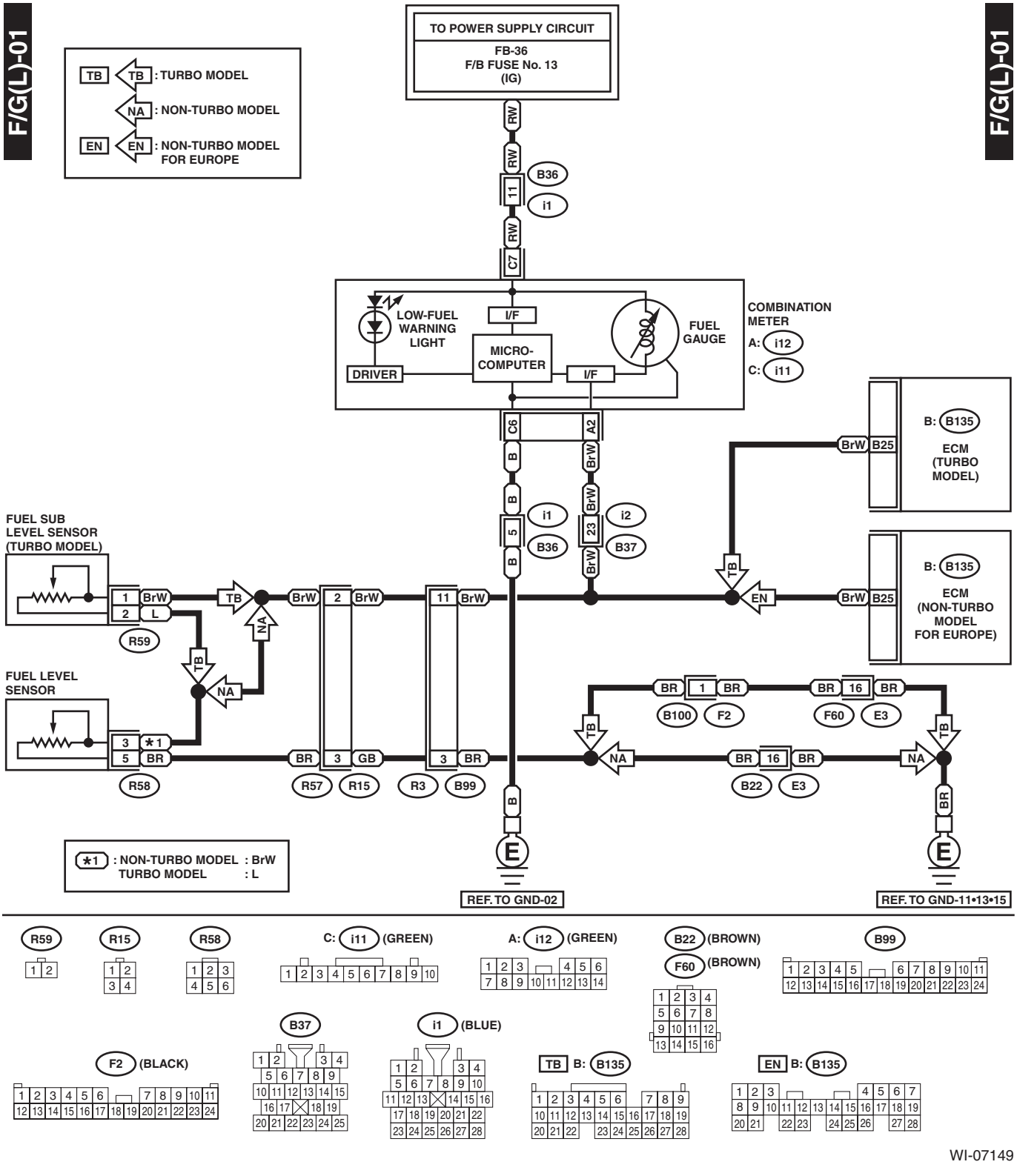
WI-07086


CM(FA)-04
CM(FA)-04
B
B
TAIL AND ILLUMINATION RELAY
C8
C10
CM(FA)-03 D
CM(FA)-03 E
LOW-FUEL WARNING LIGHT
FUEL GAUGE
ENGINE COOLANT TEMPERATURE GAUGE
TACHOMETER
SPEEDOMETER
I/F
DRIVER
MICROCOMPUTER
CLEARANCE LIGHT INDICATOR LIGHT
+5V
TRIP RESET SWITCH
LCD DRIVER
LCD (SPORT SHIFT)
LCD (ODO/TRIP METER)
LCD (OUT TEMP)
ELECTRICALLY ERASABLE PROGRAMMABLE ROM
DOOR WARNING LIGHT
IMMOBILIZER INDICATOR LIGHT
B12
B11
B8
A3
A11
A10
C5
C2
C6
B13
B14
B6
AMBIENT SENSOR
FUEL GAUGE MODULE
THERMOMETER
ECM
VEHICLE SPEED SENSOR
AUTO A/C CONTROL MODULE
DOOR SWITCH
IMM ECM
WI-07087

37.Fuel Gauge System

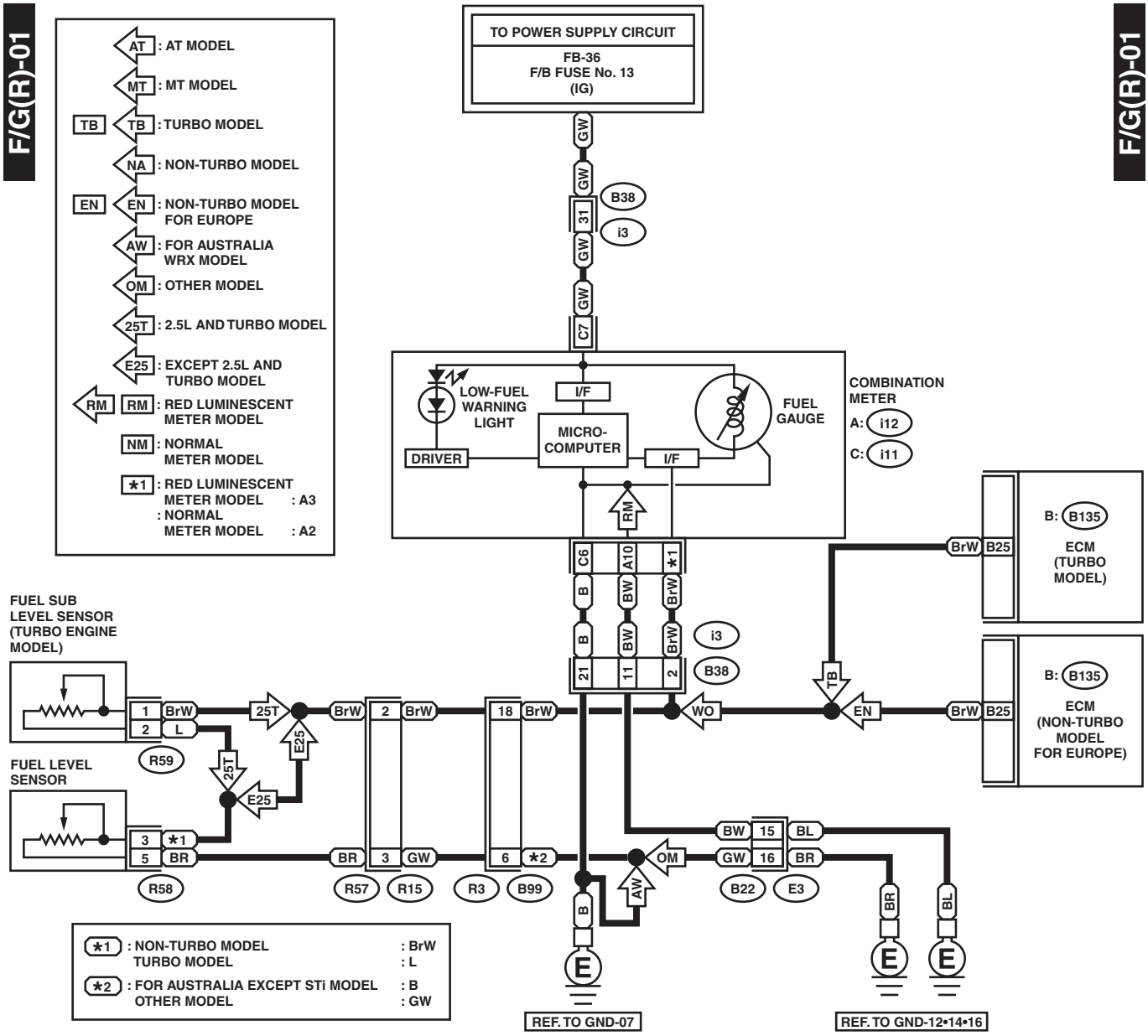
A: WIRING DIAGRAM

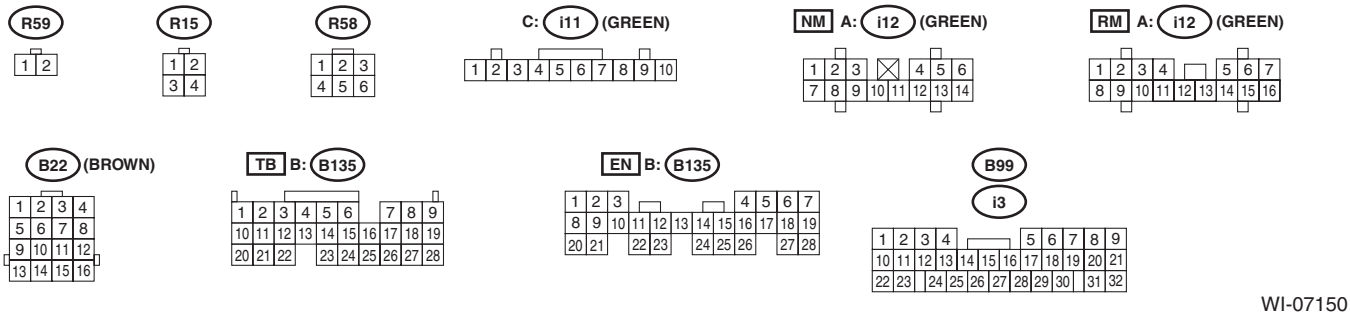
1. LHD MODEL



WI-07149

2. RHD MODEL



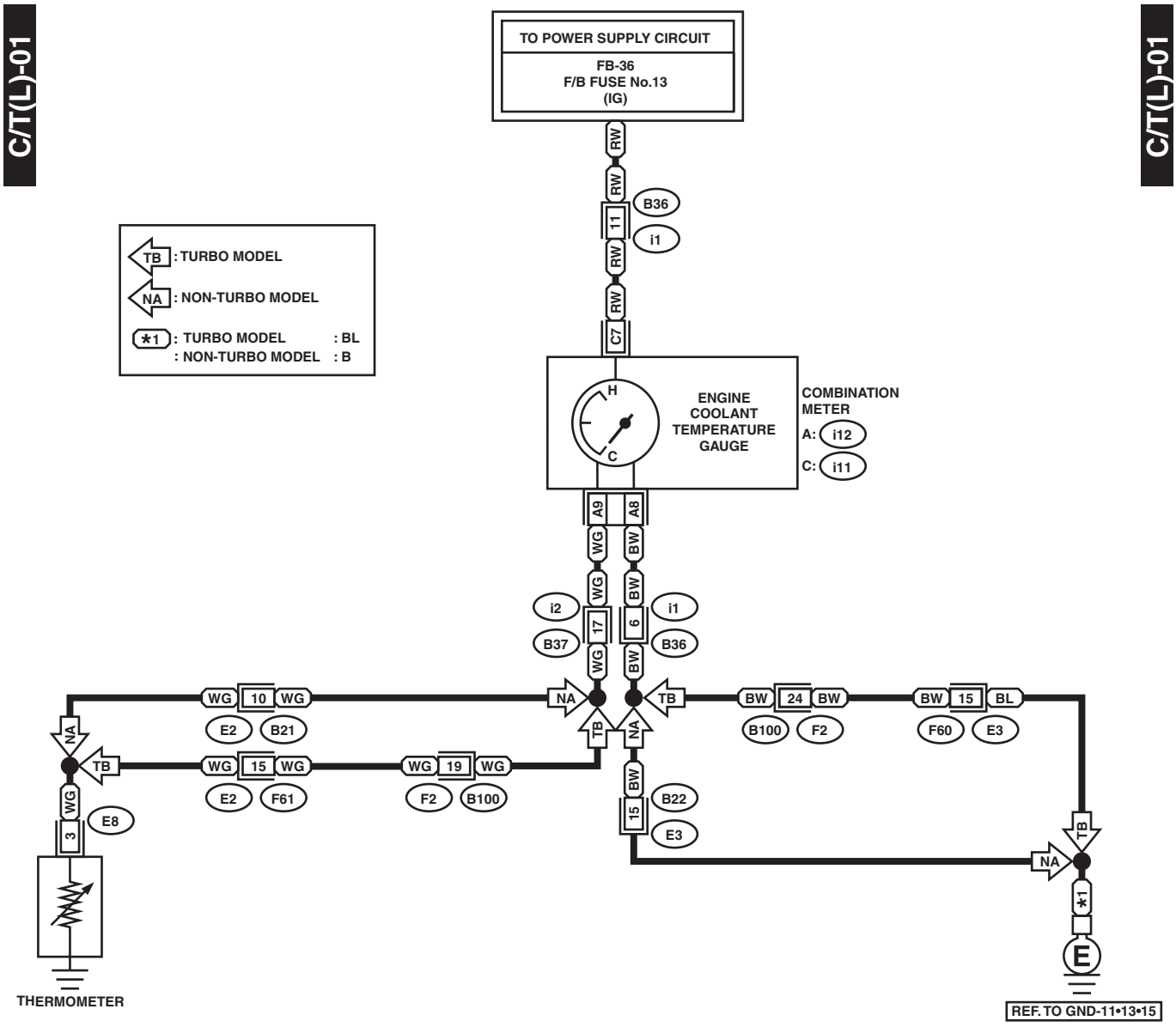


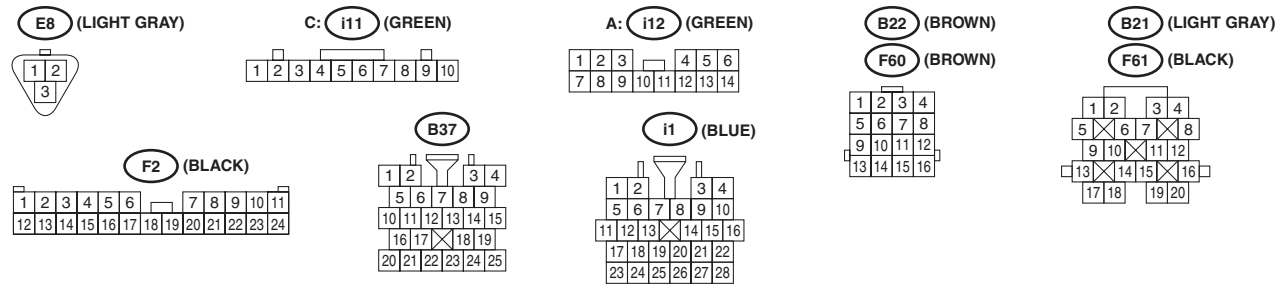
WI-07150

38.Coolant Temperature System

A: WIRING DIAGRAM

1. LHD MODEL

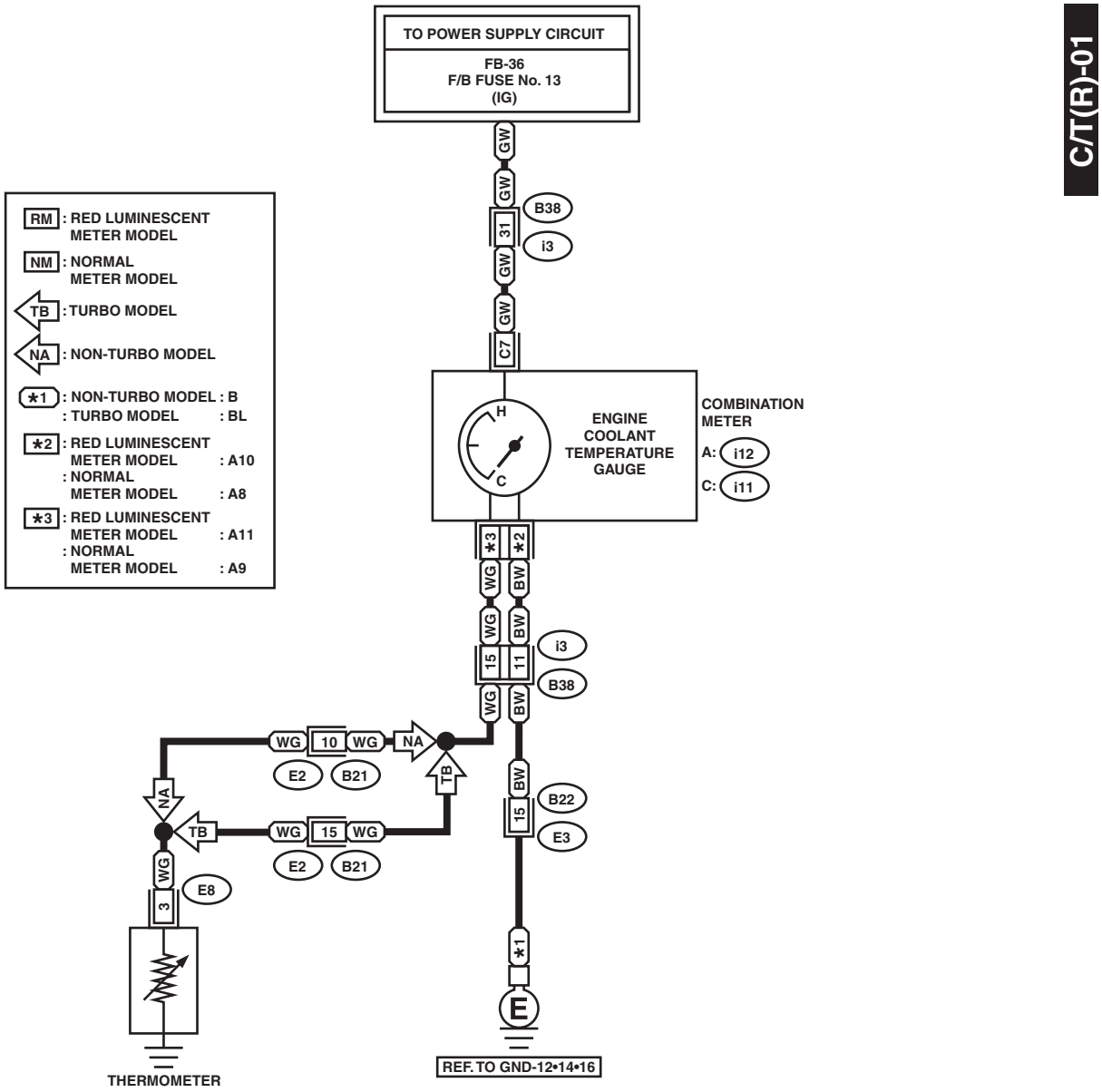


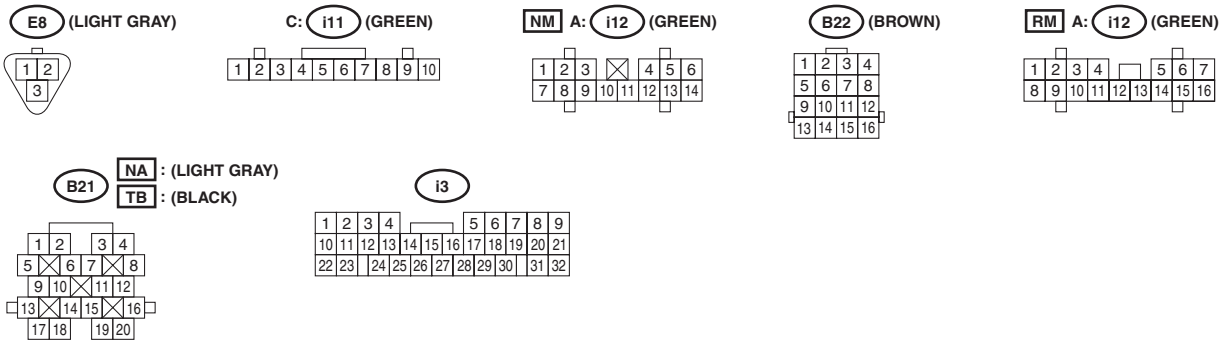


WI-07091

2. RHD MODEL

C/T(R)-01





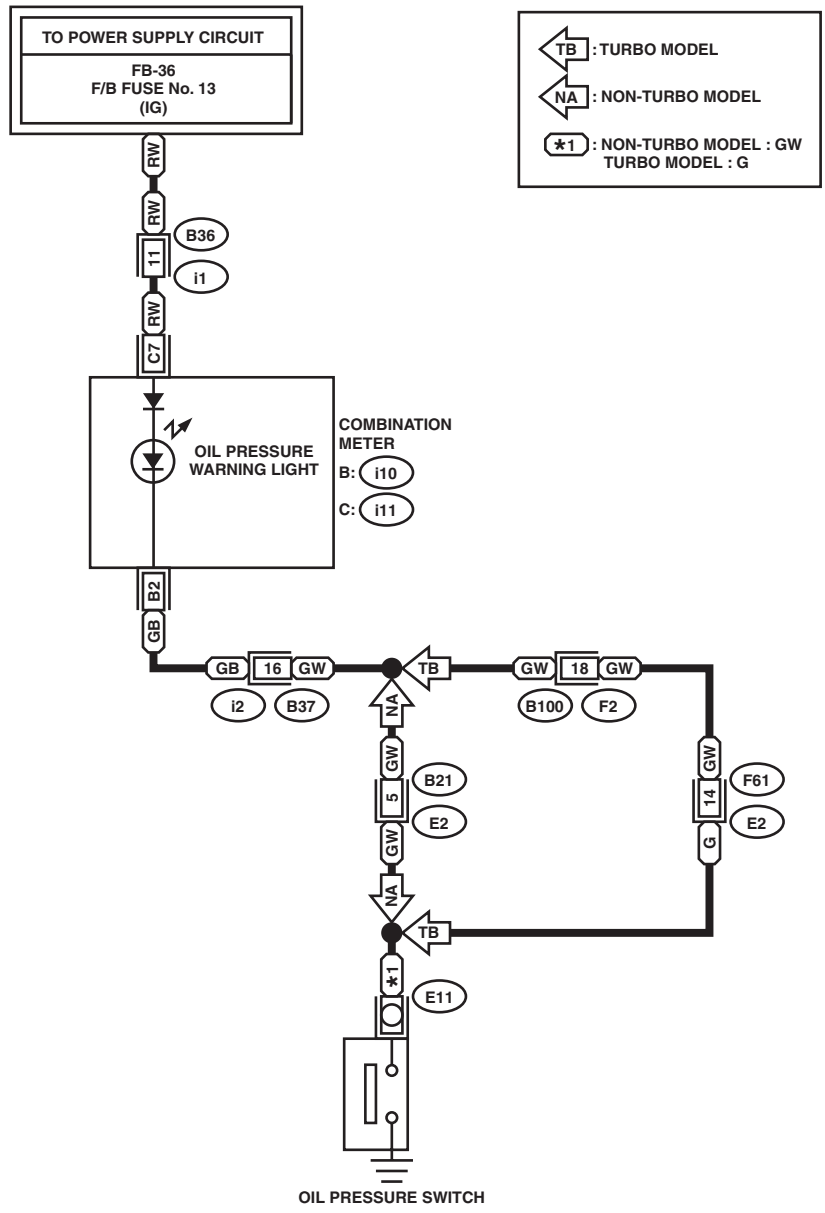
WI-07092

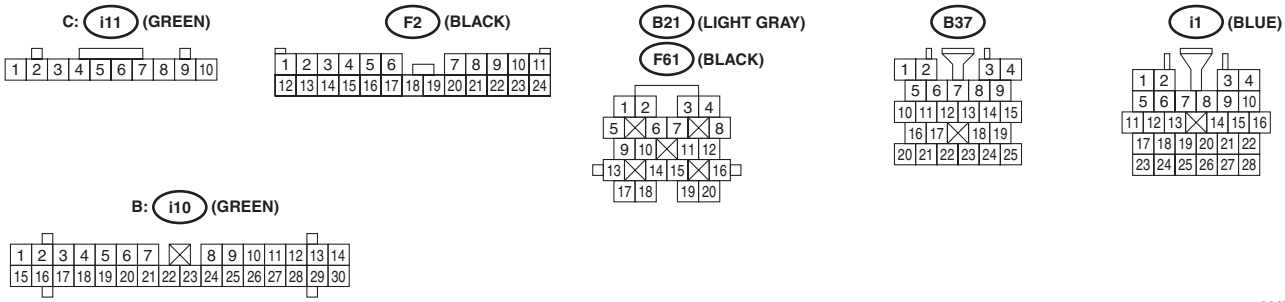
39.Oil Pressure Warning Light System

A: WIRING DIAGRAM

1. LHD MODEL

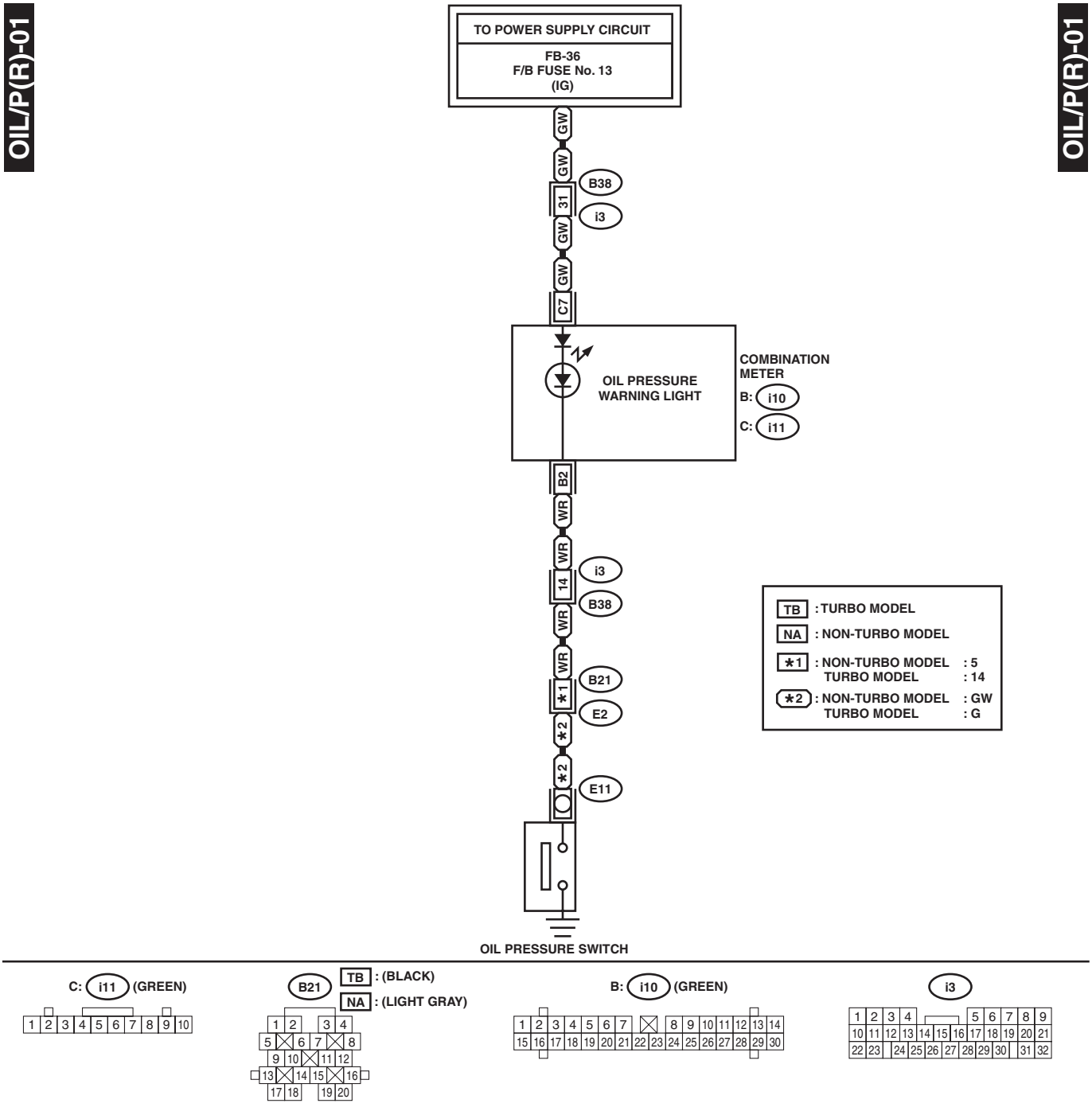
OIL/P(L)-01





WI-07188

2. RHD MODEL

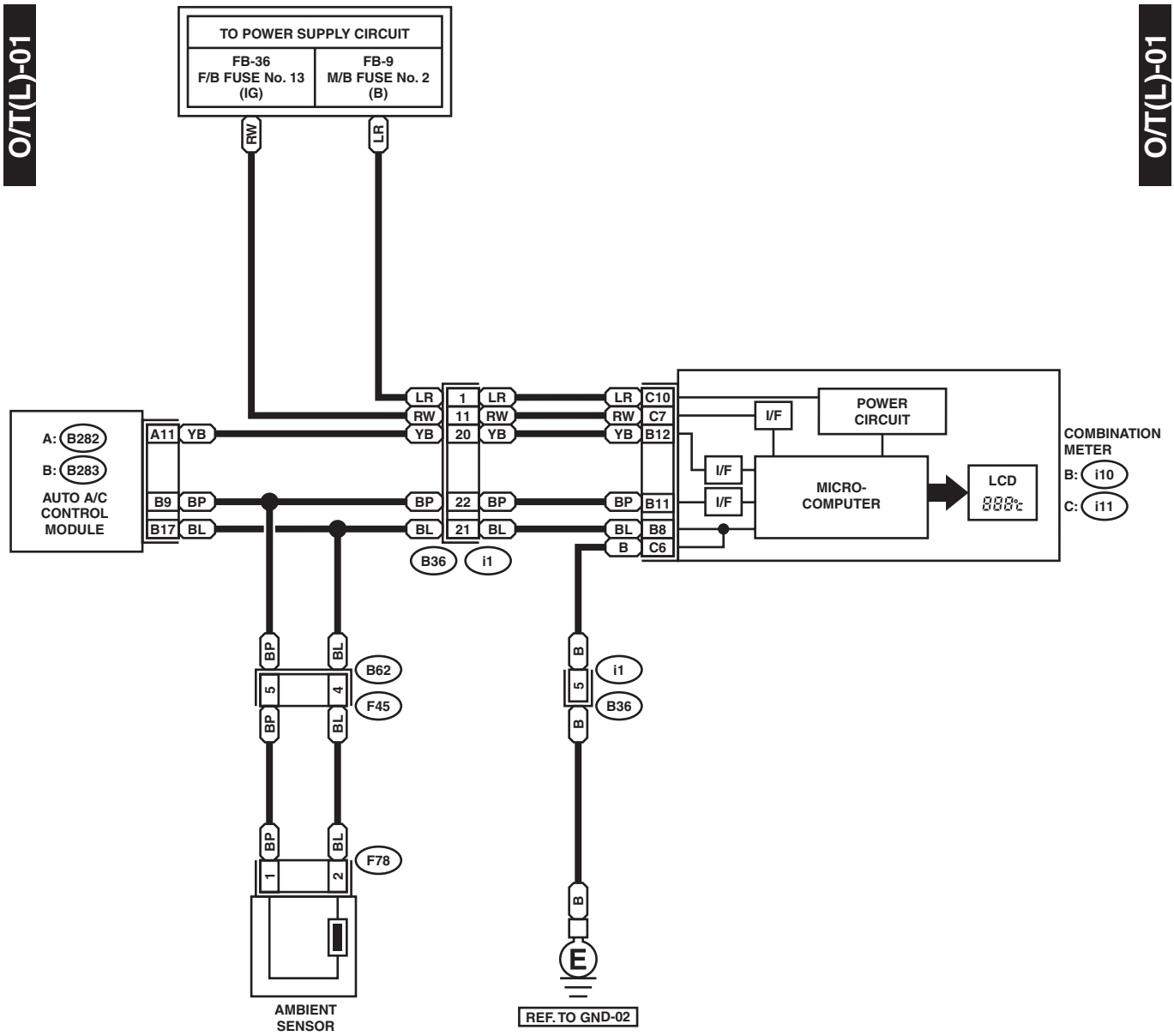


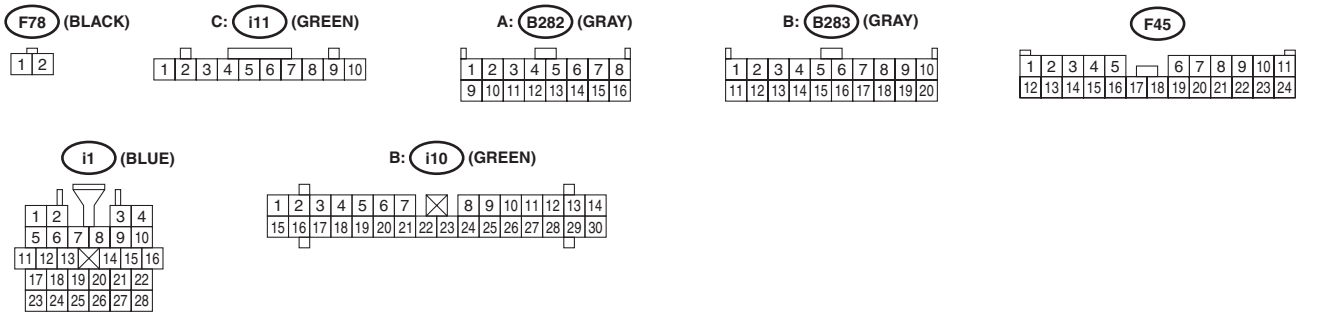
WI-07189

40.Outside Temperature Display System

A: WIRING DIAGRAM

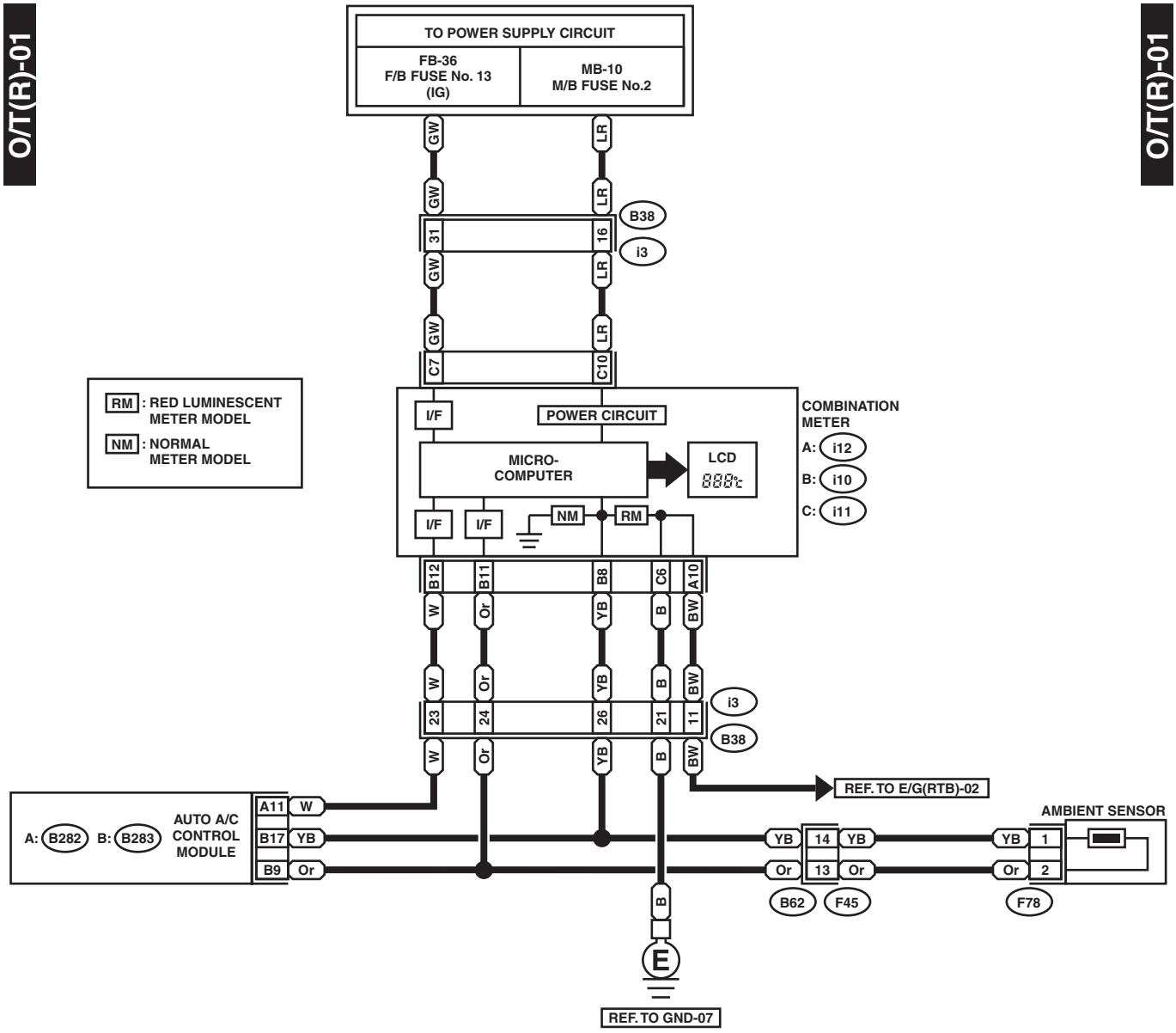
1. LHD MODEL

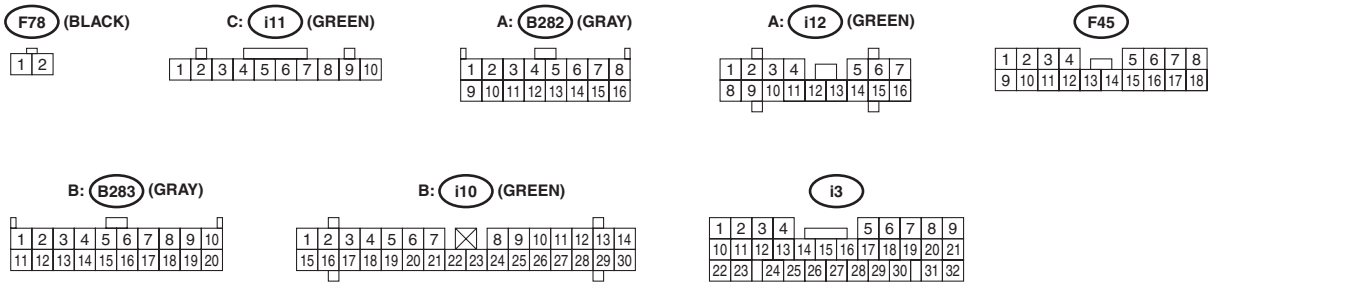




WI-07190

2. RHD MODEL



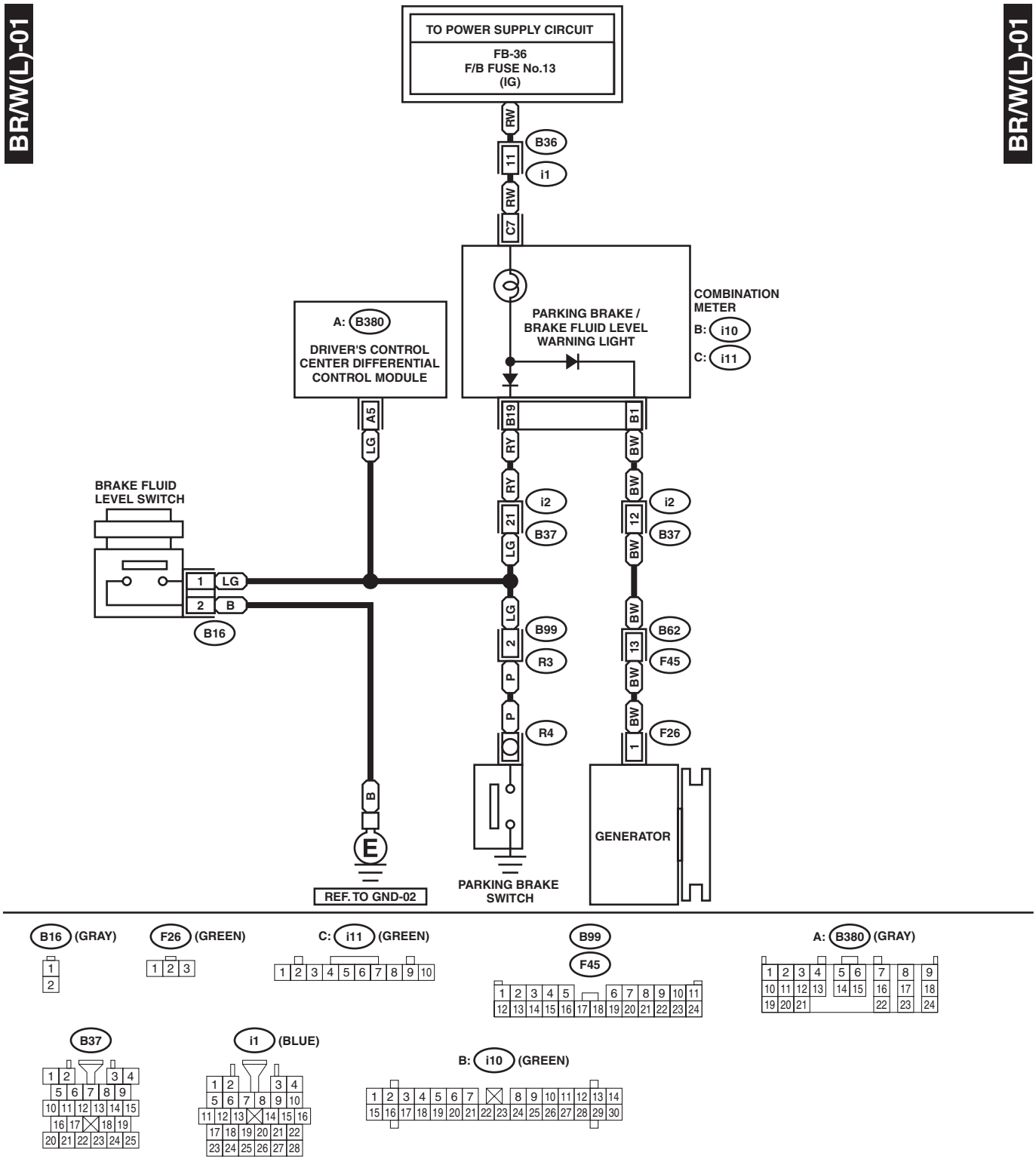


WI-07191

41.Parking Brake / Brake Fluid Level Warning Light System

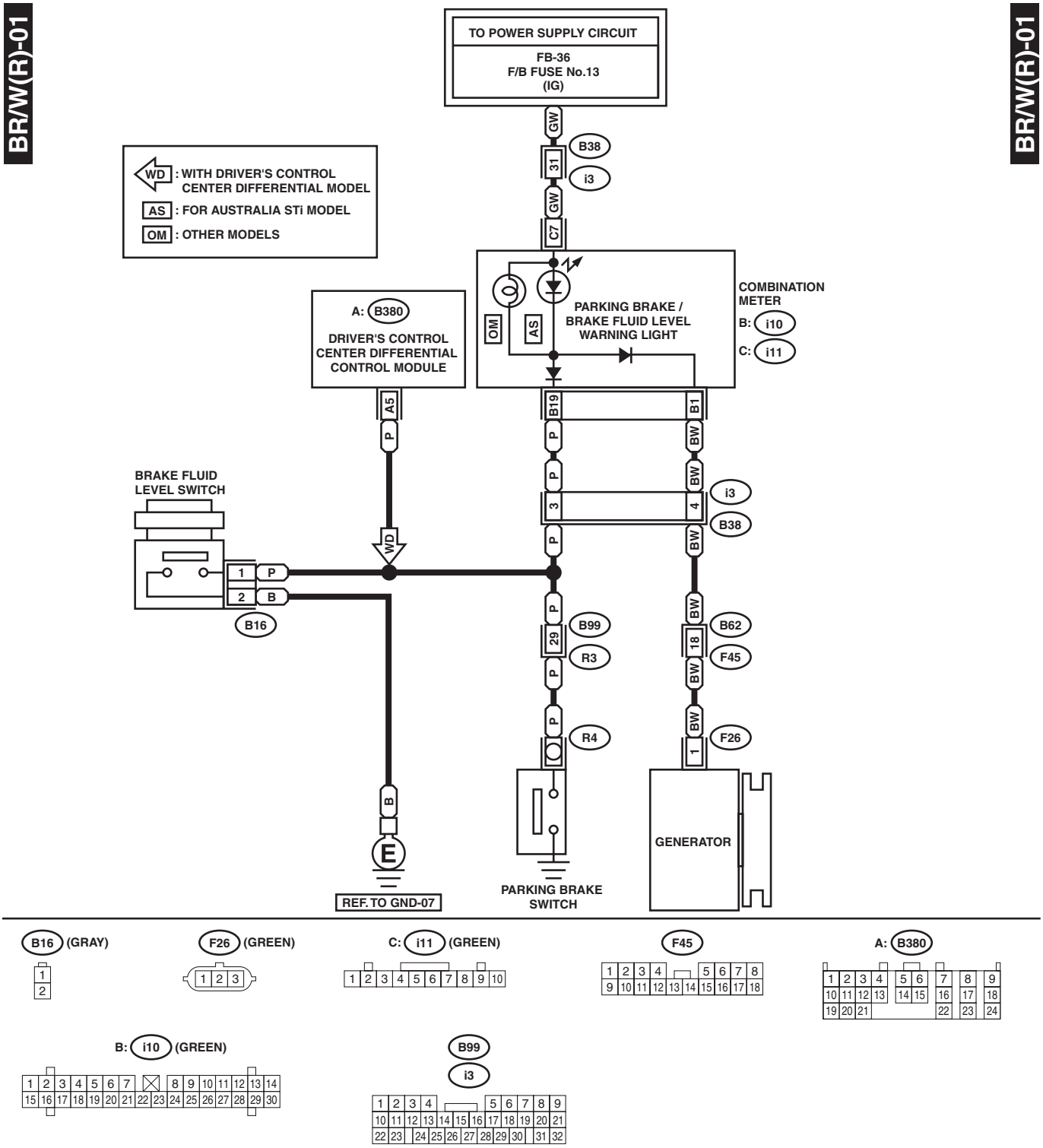
A: WIRING DIAGRAM

1. LHD MODEL



WI-07192

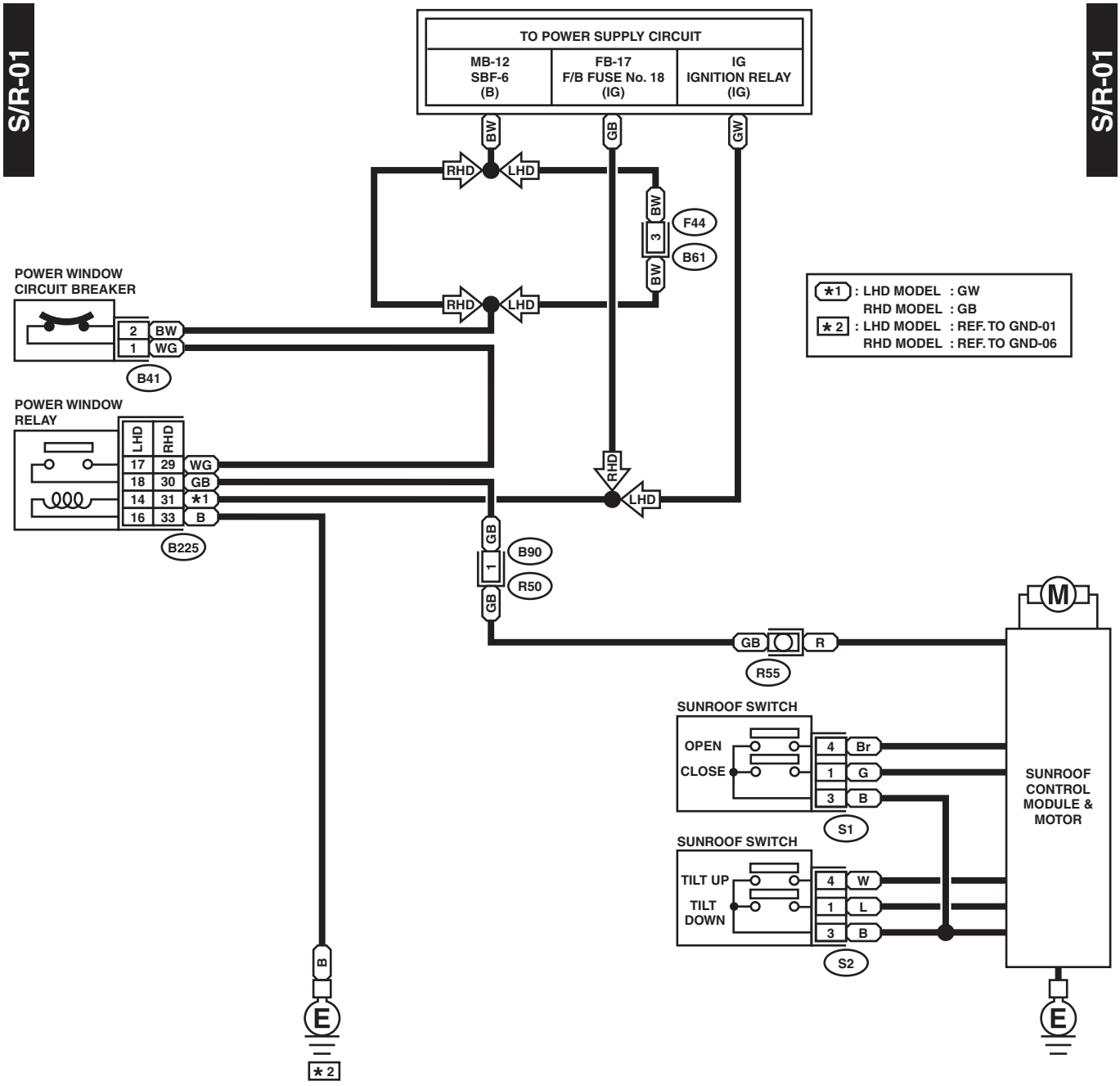
2. RHD MODEL

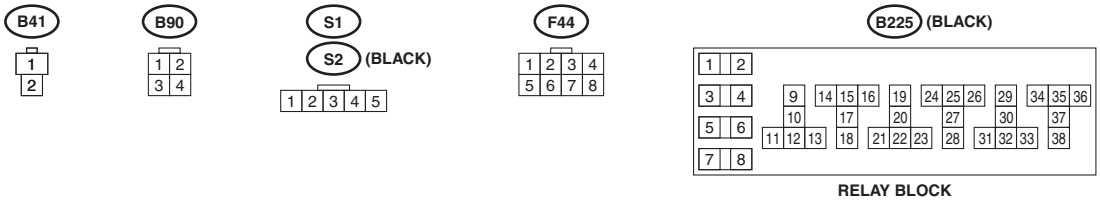


WI-07193

42.Sunroof Control System

A: WIRING DIAGRAM



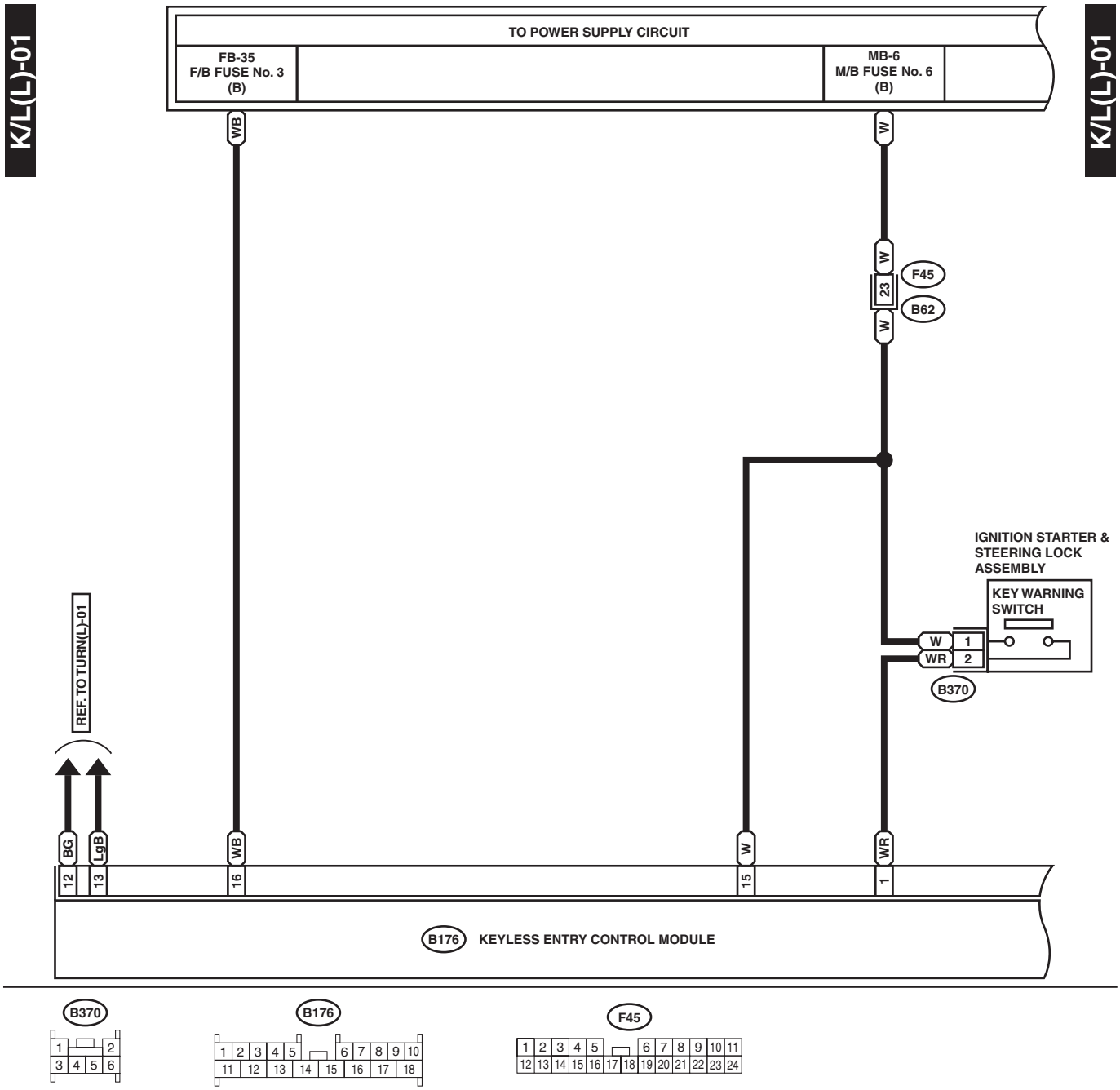


WI-02531

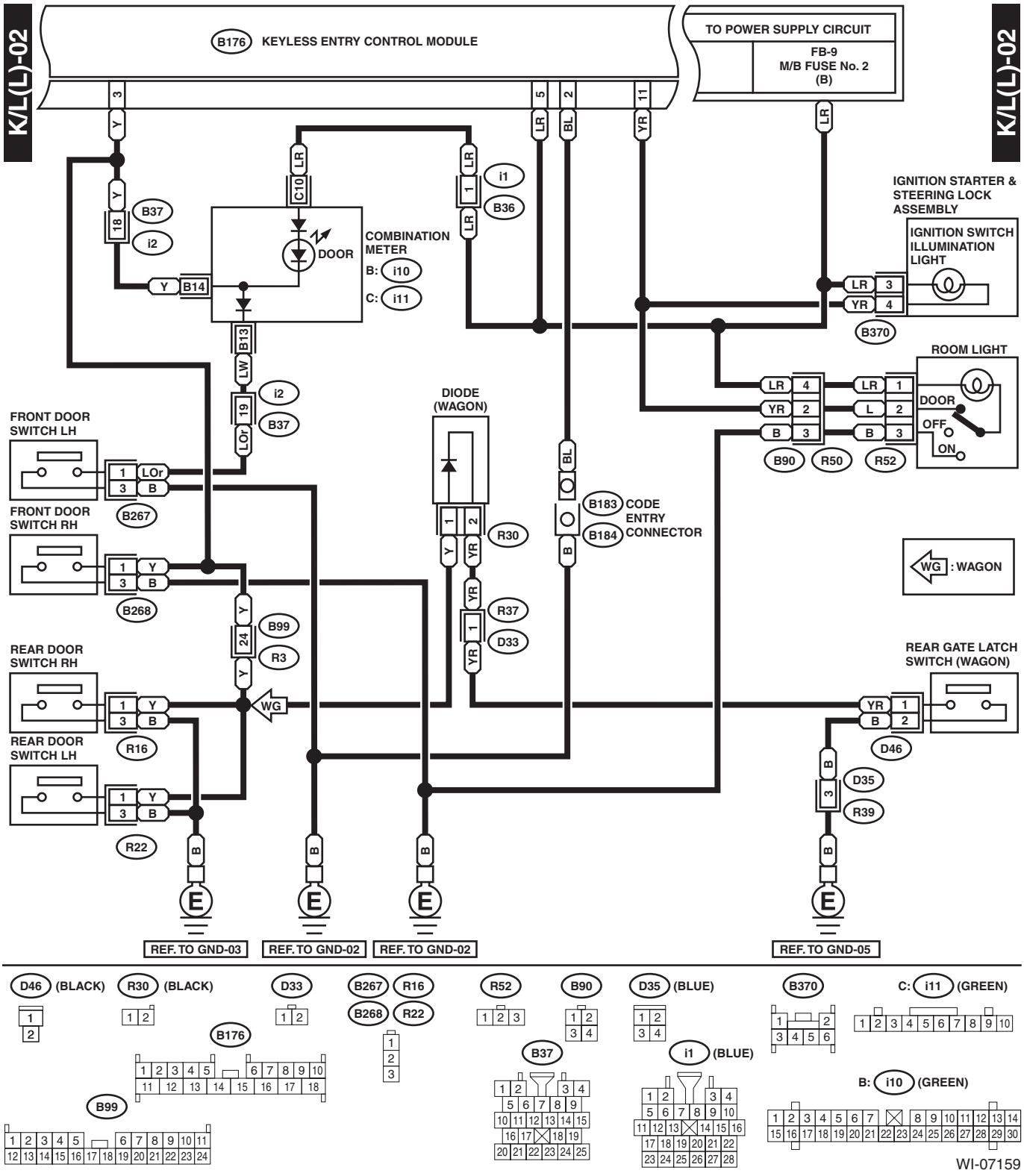
43.Keyless Entry System

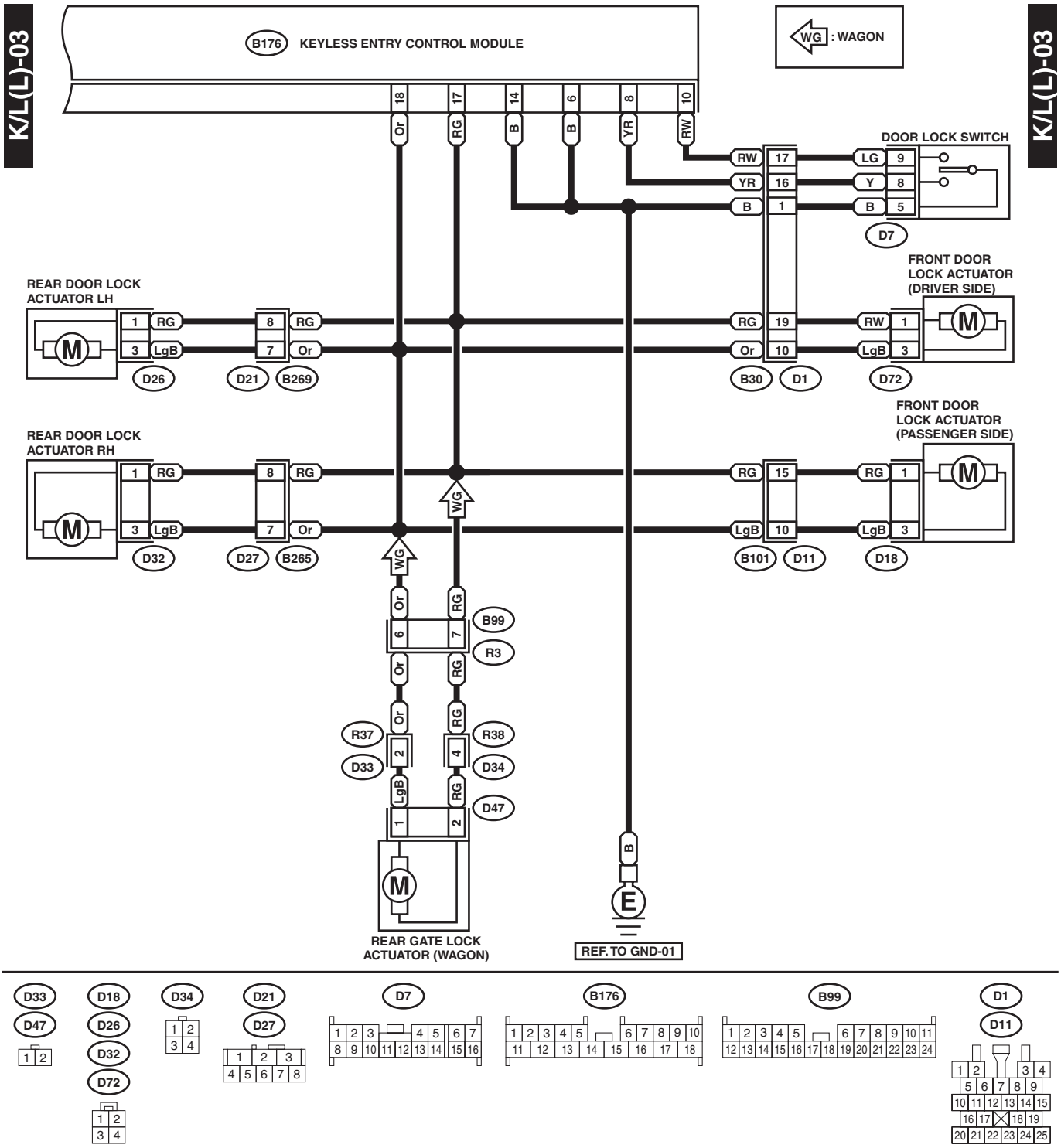
A: WIRING DIAGRAM

1. LHD MODEL



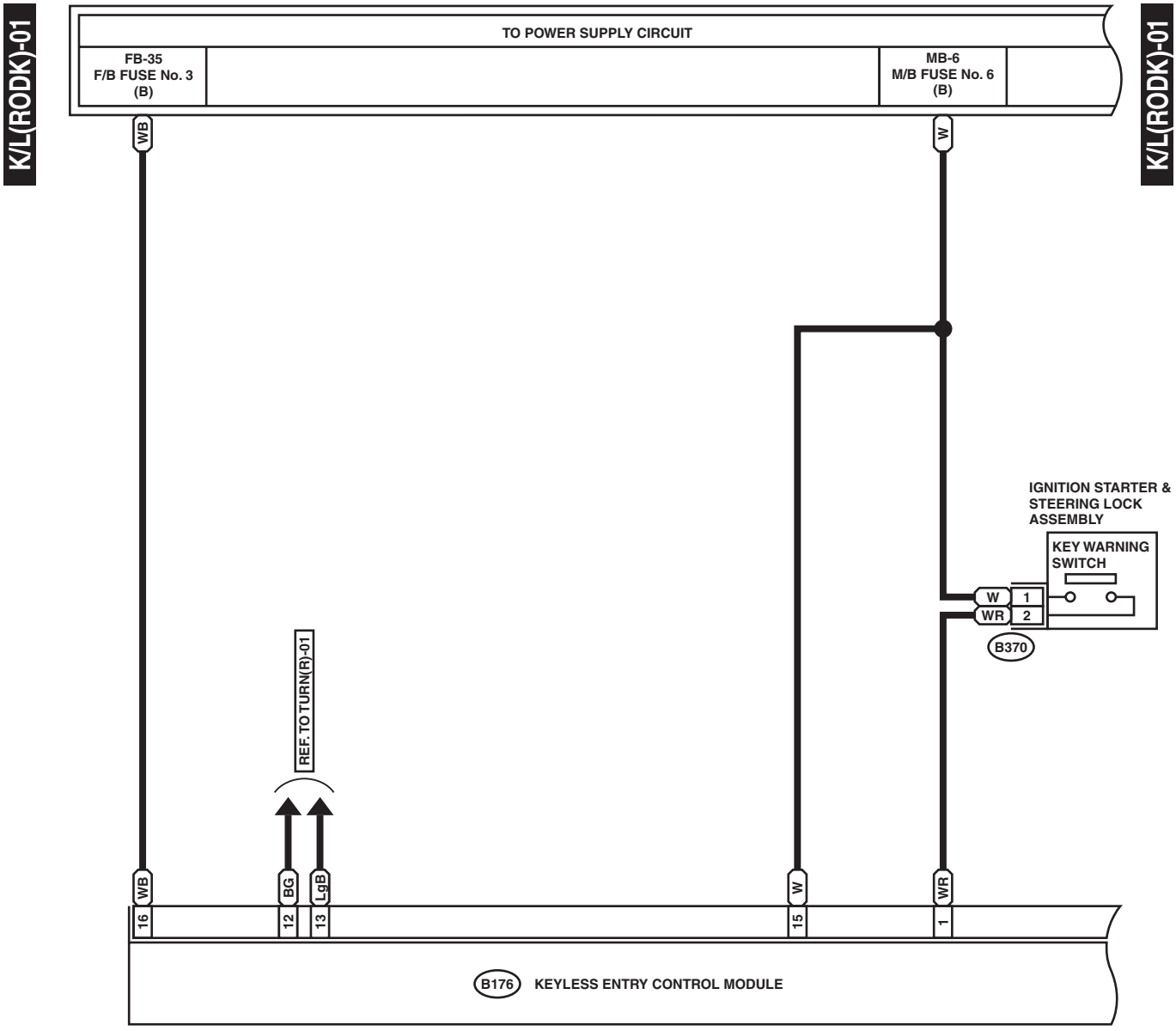
WI-07158

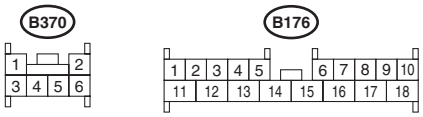

K/L(L)-02
B176 KEYLESS ENTRY CONTROL MODULE
TO POWER SUPPLY CIRCUIT
FB-9
M/B FUSE No. 2
(B)
COMBINATION METER
B: i10
C: i11
DOOR
IGNITION STARTER & STEERING LOCK ASSEMBLY
IGNITION SWITCH ILLUMINATION LIGHT
ROOM LIGHT
DOOR
OFF
ON
DIODE (WAGON)
B183 CODE ENTRY CONNECTOR
B184
WG : WAGON
FRONT DOOR SWITCH LH
FRONT DOOR SWITCH RH
REAR DOOR SWITCH RH
REAR DOOR SWITCH LH
REAR GATE LATCH SWITCH (WAGON)
REF. TO GND-03
REF. TO GND-02
REF. TO GND-02
REF. TO GND-05
D46 (BLACK)
R30 (BLACK)
D33
B267
B268
R16
R22
R52
B90
D35 (BLUE)
B370
C: i11 (GREEN)
B176
B37
i1 (BLUE)
B: i10 (GREEN)
B99
WI-07159


K/L(L)-03
K/L(L)-03
B176 KEYLESS ENTRY CONTROL MODULE
WG : WAGON
DOOR LOCK SWITCH
D7
REAR DOOR LOCK ACTUATOR LH
D26
D21
B269
B30
D1
D72
FRONT DOOR LOCK ACTUATOR (DRIVER SIDE)
REAR DOOR LOCK ACTUATOR RH
D32
D27
B265
B101
D11
D18
FRONT DOOR LOCK ACTUATOR (PASSENGER SIDE)
B99
R3
R37
D33
R38
D34
D47
REAR GATE LOCK ACTUATOR (WAGON)
REF. TO GND-01
D33
D47
D18
D26
D32
D72
D34
D21
D27
D7
B176
B99
D1
D11

WI-07160

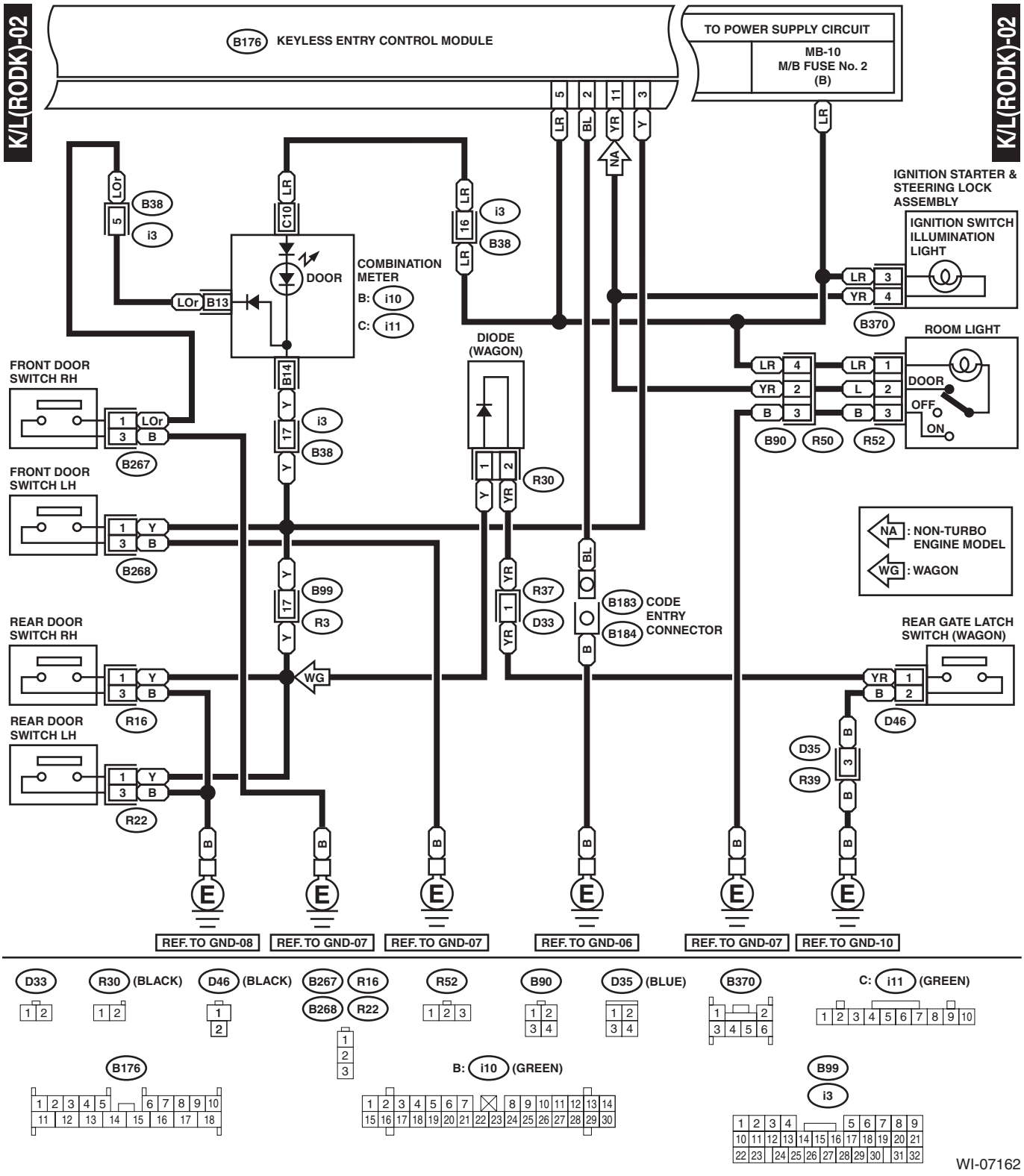
2. RHD WITHOUT DOUBLE LOCK MODEL

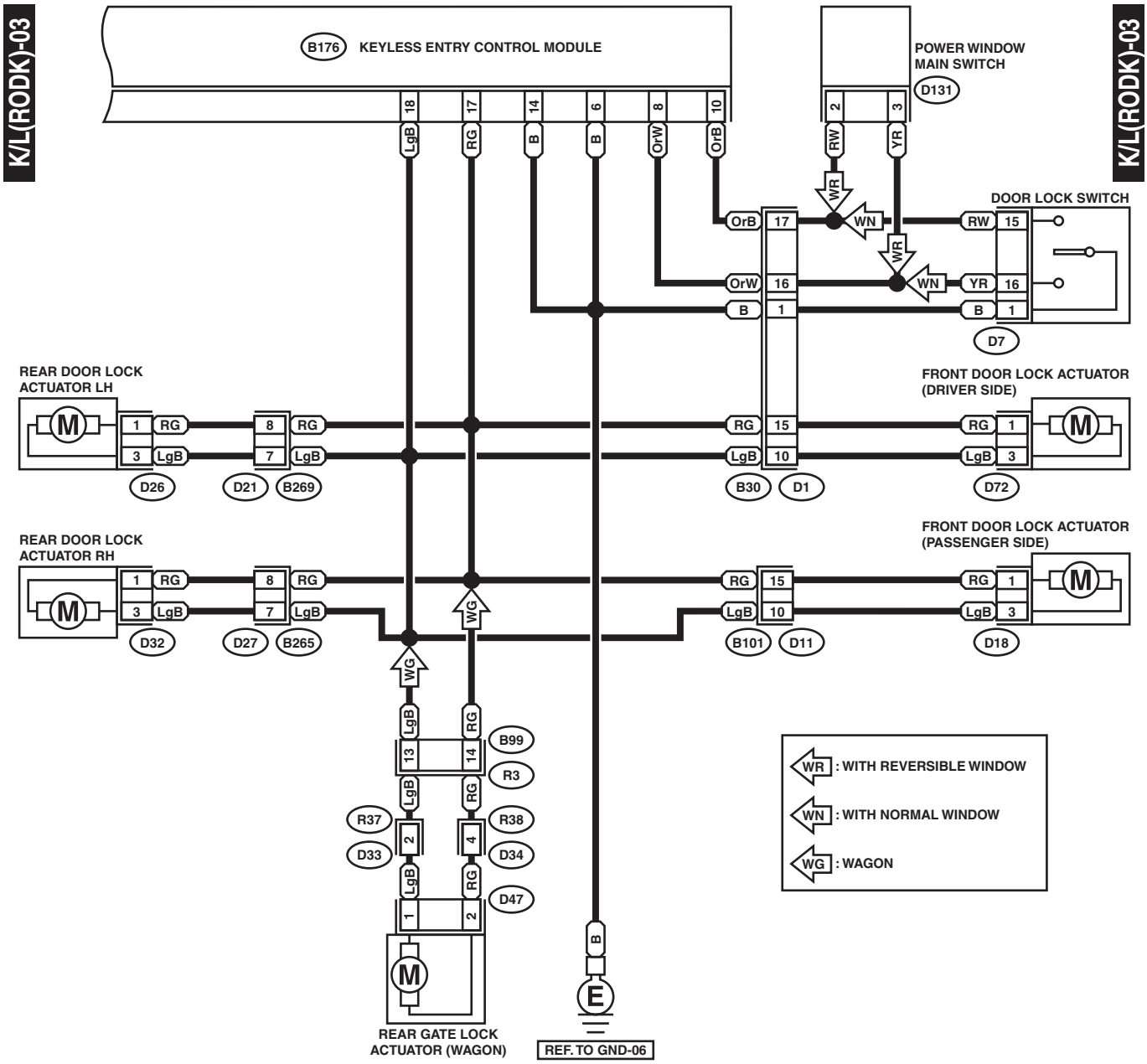


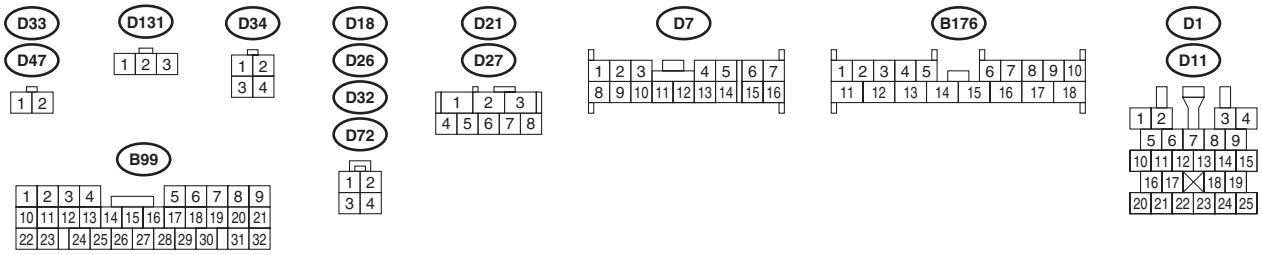


WI-07161

Keyless Entry System

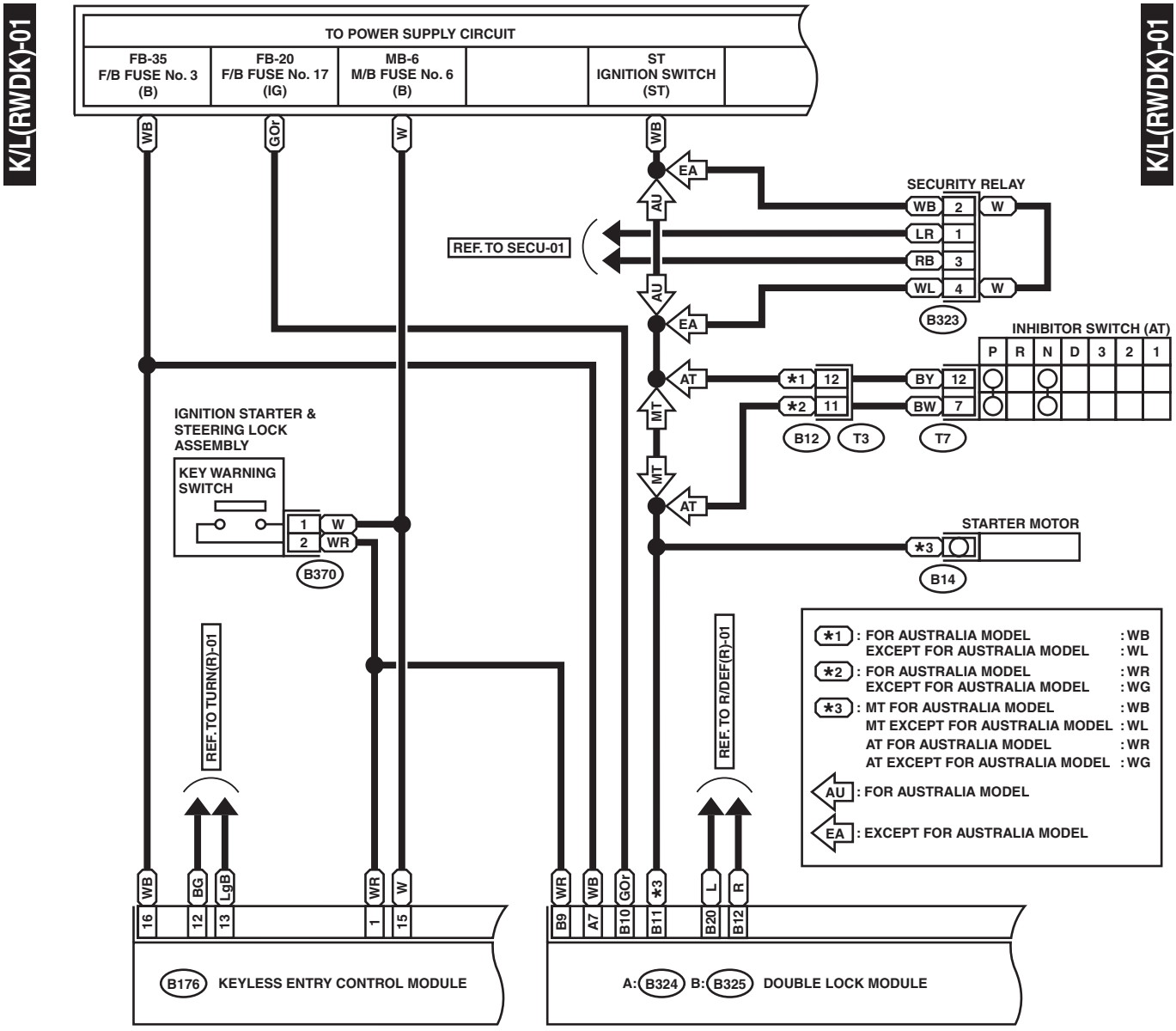


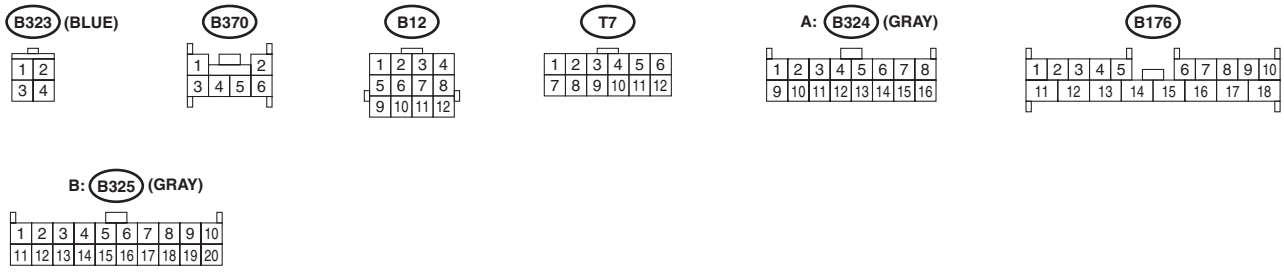

K/L(RODK)-03
K/L(RODK)-03
B176 KEYLESS ENTRY CONTROL MODULE
POWER WINDOW MAIN SWITCH
D131
DOOR LOCK SWITCH
D7
REAR DOOR LOCK ACTUATOR LH
D26
D21
B269
B30
D1
FRONT DOOR LOCK ACTUATOR (DRIVER SIDE)
D72
REAR DOOR LOCK ACTUATOR RH
D32
D27
B265
B101
D11
FRONT DOOR LOCK ACTUATOR (PASSENGER SIDE)
D18
B99
R3
R37
R38
D33
D34
D47
REAR GATE LOCK ACTUATOR (WAGON)
REF. TO GND-06
WR : WITH REVERSIBLE WINDOW
WN : WITH NORMAL WINDOW
WG : WAGON


D33
D47
D131
D34
D18
D26
D32
D72
D21
D27
D7
B176
D1
D11
B99

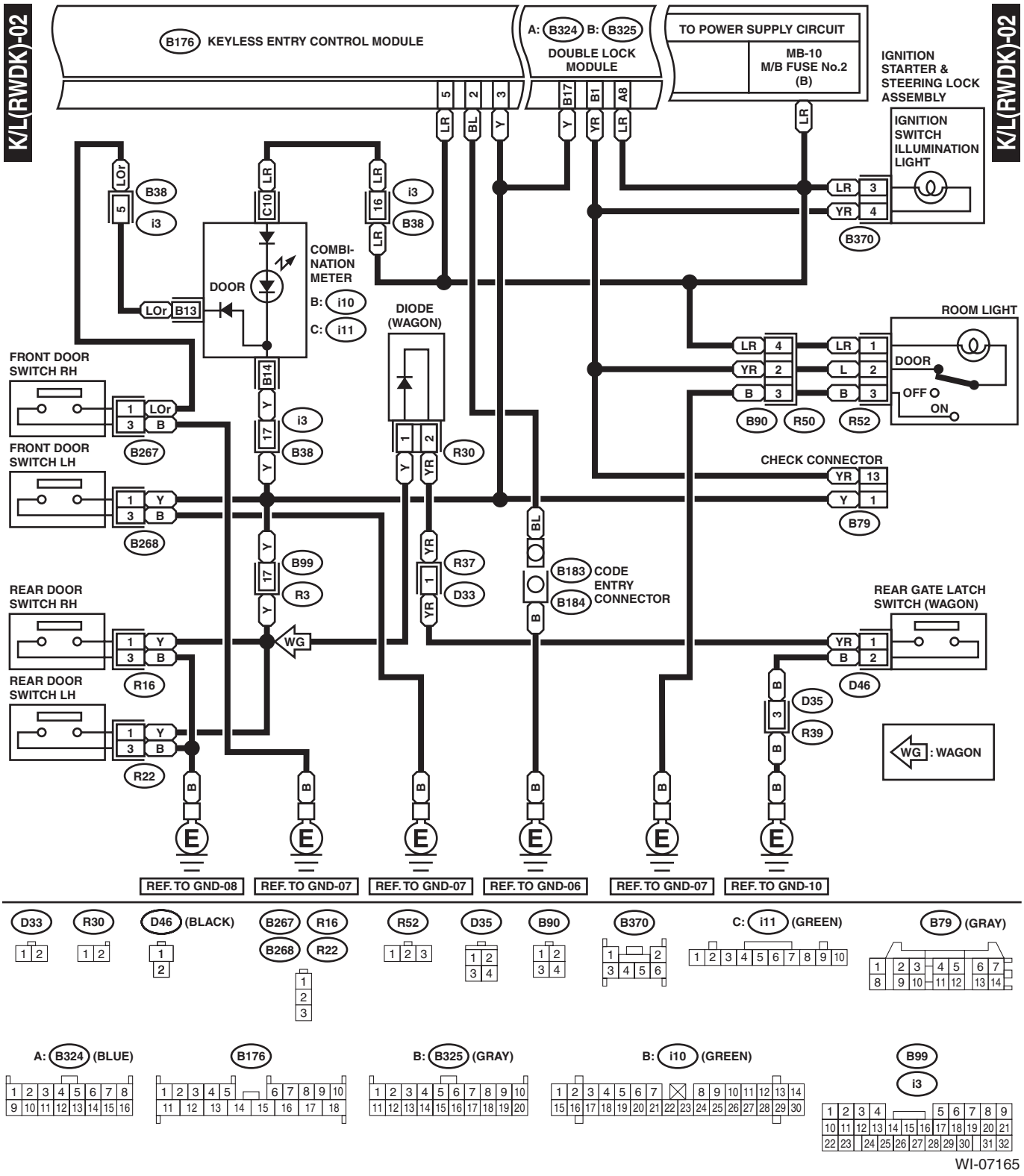
WI-07163

3. RHD WITH DOUBLE LOCK MODEL

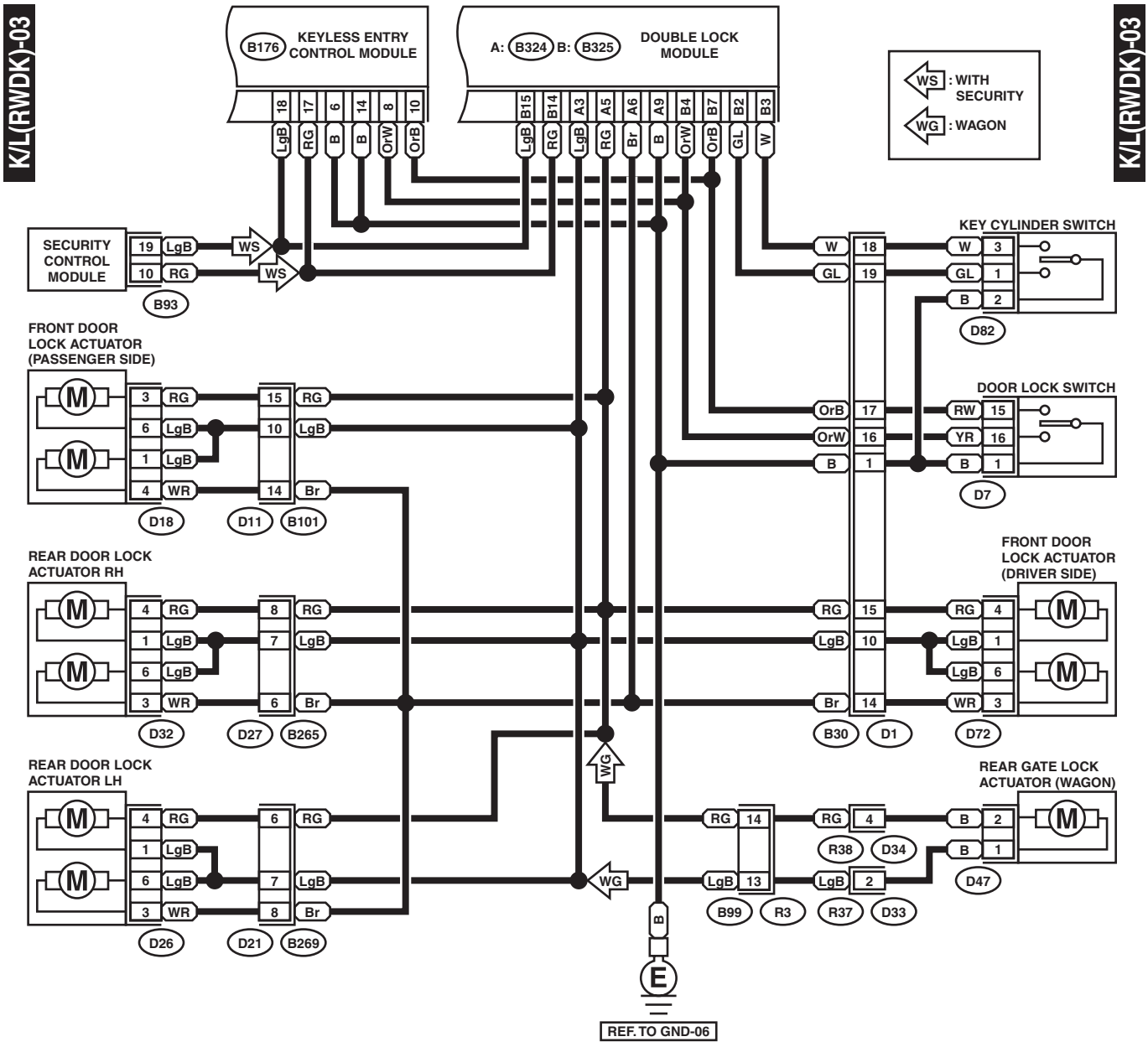


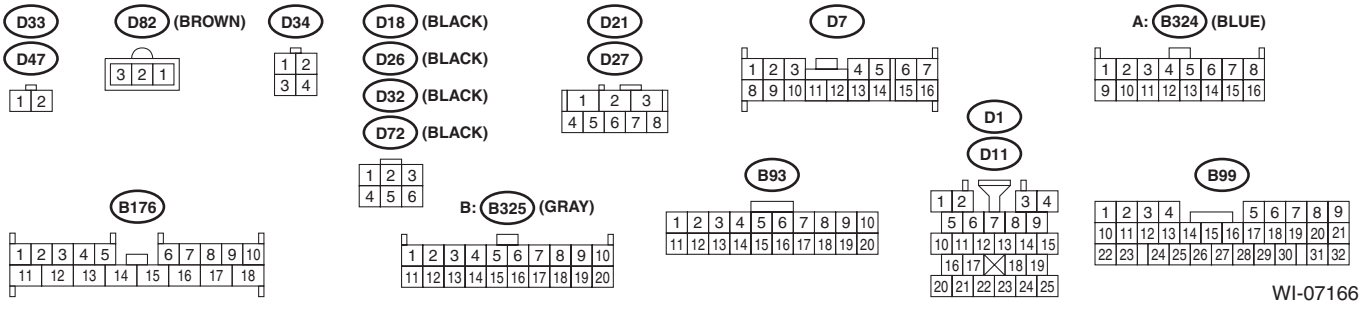


WI-07164


K/L(RWDK)-02
K/L(RWDK)-02
B176 KEYLESS ENTRY CONTROL MODULE
A: B324 B: B325
DOUBLE LOCK MODULE
TO POWER SUPPLY CIRCUIT
MB-10 M/B FUSE No.2 (B)
IGNITION STARTER & STEERING LOCK ASSEMBLY
IGNITION SWITCH ILLUMINATION LIGHT
B370
COMBI-NATION METER
DOOR
B: i10
C: i11
DIODE (WAGON)
ROOM LIGHT
DOOR
OFF
ON
B90
R50
R52
FRONT DOOR SWITCH RH
B267
FRONT DOOR SWITCH LH
B268
R30
CHECK CONNECTOR
B79
B38
i3
B99
R3
R37
D33
B183 CODE ENTRY CONNECTOR
B184
REAR DOOR SWITCH RH
R16
REAR DOOR SWITCH LH
R22
WG
REAR GATE LATCH SWITCH (WAGON)
D46
D35
R39
WG : WAGON
REF. TO GND-08
REF. TO GND-07
REF. TO GND-07
REF. TO GND-06
REF. TO GND-07
REF. TO GND-10
D33
R30
D46 (BLACK)
B267
B268
R16
R22
R52
D35
B90
B370
C: i11 (GREEN)
B79 (GRAY)
A: B324 (BLUE)
B176
B: B325 (GRAY)
B: i10 (GREEN)
B99
i3

WI-07165

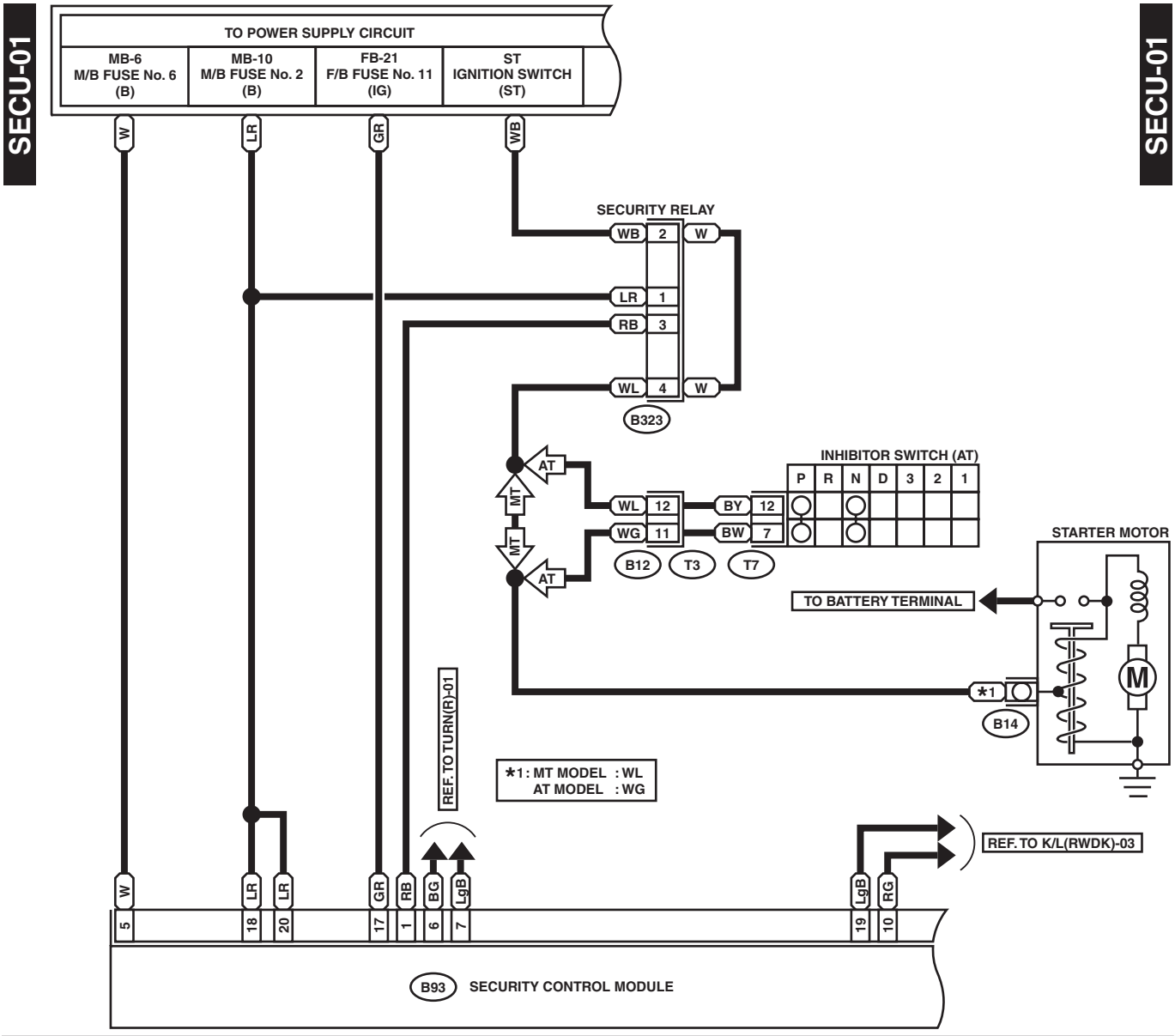

K/L(RWDK)-03
K/L(RWDK)-03
B176 KEYLESS ENTRY CONTROL MODULE
A: B324 B: B325 DOUBLE LOCK MODULE
WS : WITH SECURITY
WG : WAGON
SECURITY CONTROL MODULE
B93
KEY CYLINDER SWITCH
D82
FRONT DOOR LOCK ACTUATOR (PASSENGER SIDE)
D18
D11
B101
DOOR LOCK SWITCH
D7
REAR DOOR LOCK ACTUATOR RH
D32
D27
B265
FRONT DOOR LOCK ACTUATOR (DRIVER SIDE)
B30
D1
D72
REAR DOOR LOCK ACTUATOR LH
D26
D21
B269
REAR GATE LOCK ACTUATOR (WAGON)
R38
D34
D47
B99
R3
R37
D33
REF. TO GND-06

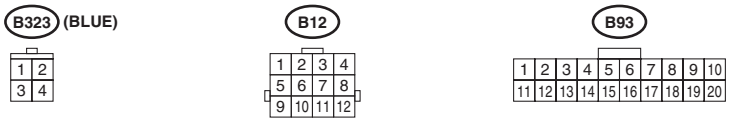

D33
D47
D82 (BROWN)
D34
D18 (BLACK)
D26 (BLACK)
D32 (BLACK)
D72 (BLACK)
D21
D27
D7
A: B324 (BLUE)
D1
D11
B176
B: B325 (GRAY)
B93
B99

WI-07166

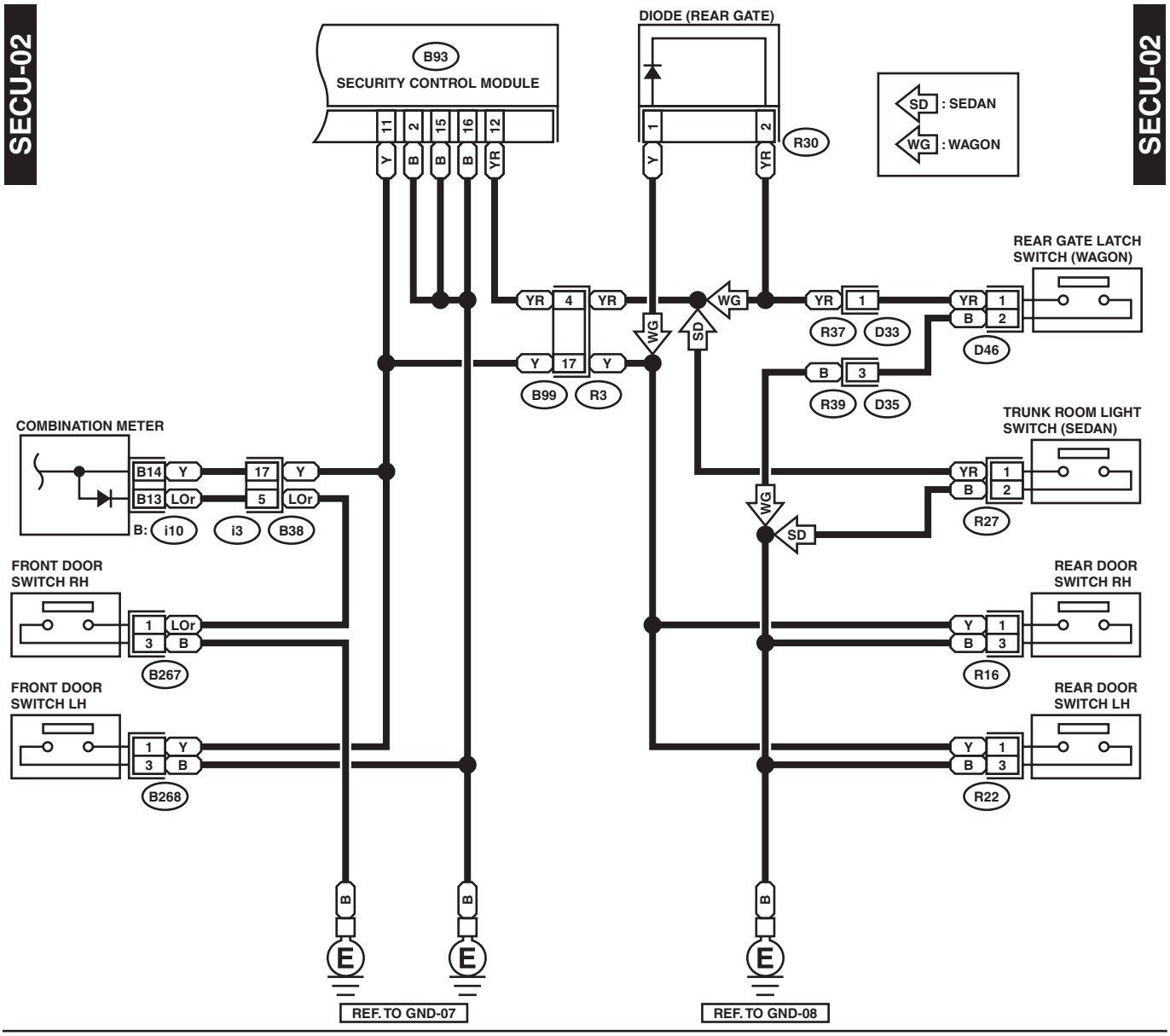
44.Security System

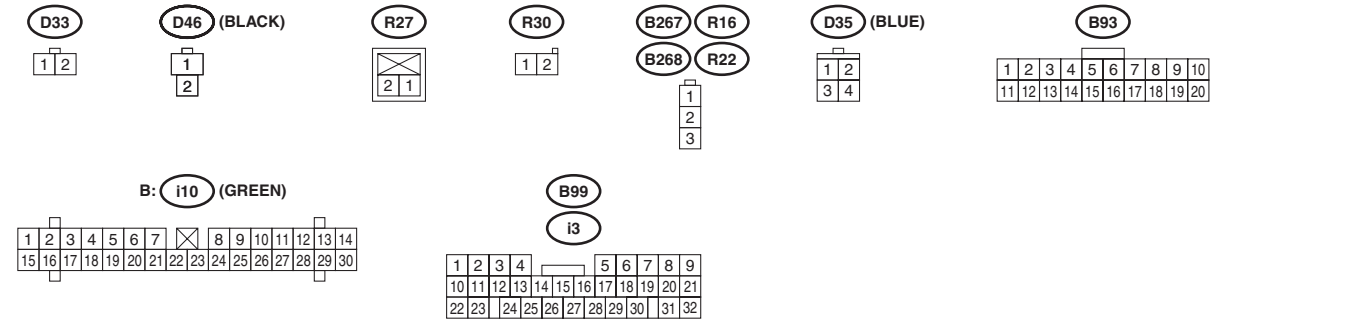
A: WIRING DIAGRAM





WI-04582


SECU-02
SECU-02
B93
SECURITY CONTROL MODULE
DIODE (REAR GATE)
SD : SEDAN
WG : WAGON
R30
REAR GATE LATCH SWITCH (WAGON)
D46
R37
D33
B99
R3
B39
R39
D35
TRUNK ROOM LIGHT SWITCH (SEDAN)
R27
COMBINATION METER
B: i10
i3
B38
FRONT DOOR SWITCH RH
B267
REAR DOOR SWITCH RH
R16
FRONT DOOR SWITCH LH
B268
REAR DOOR SWITCH LH
R22
REF. TO GND-07
REF. TO GND-08

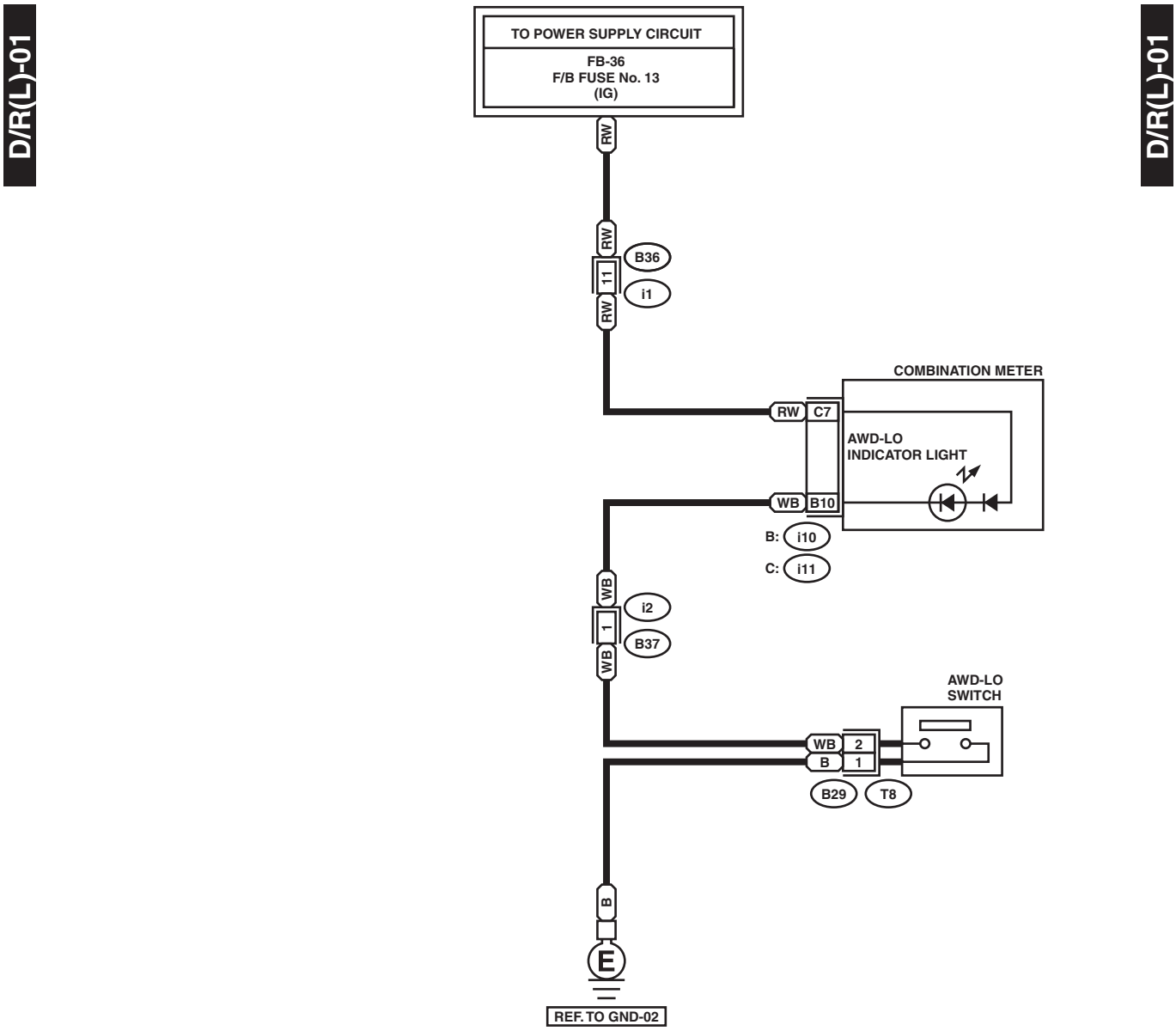

D33
D46 (BLACK)
R27
R30
B267
R16
B268
R22
D35 (BLUE)
B93
B: i10 (GREEN)
B99
i3

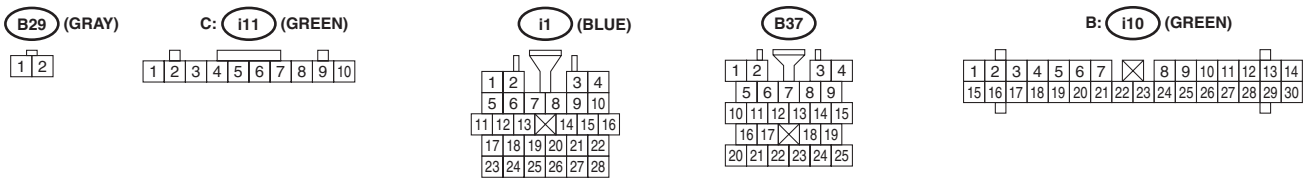
WI-07206

45.Full Time Dual-range System

A: WIRING DIAGRAM

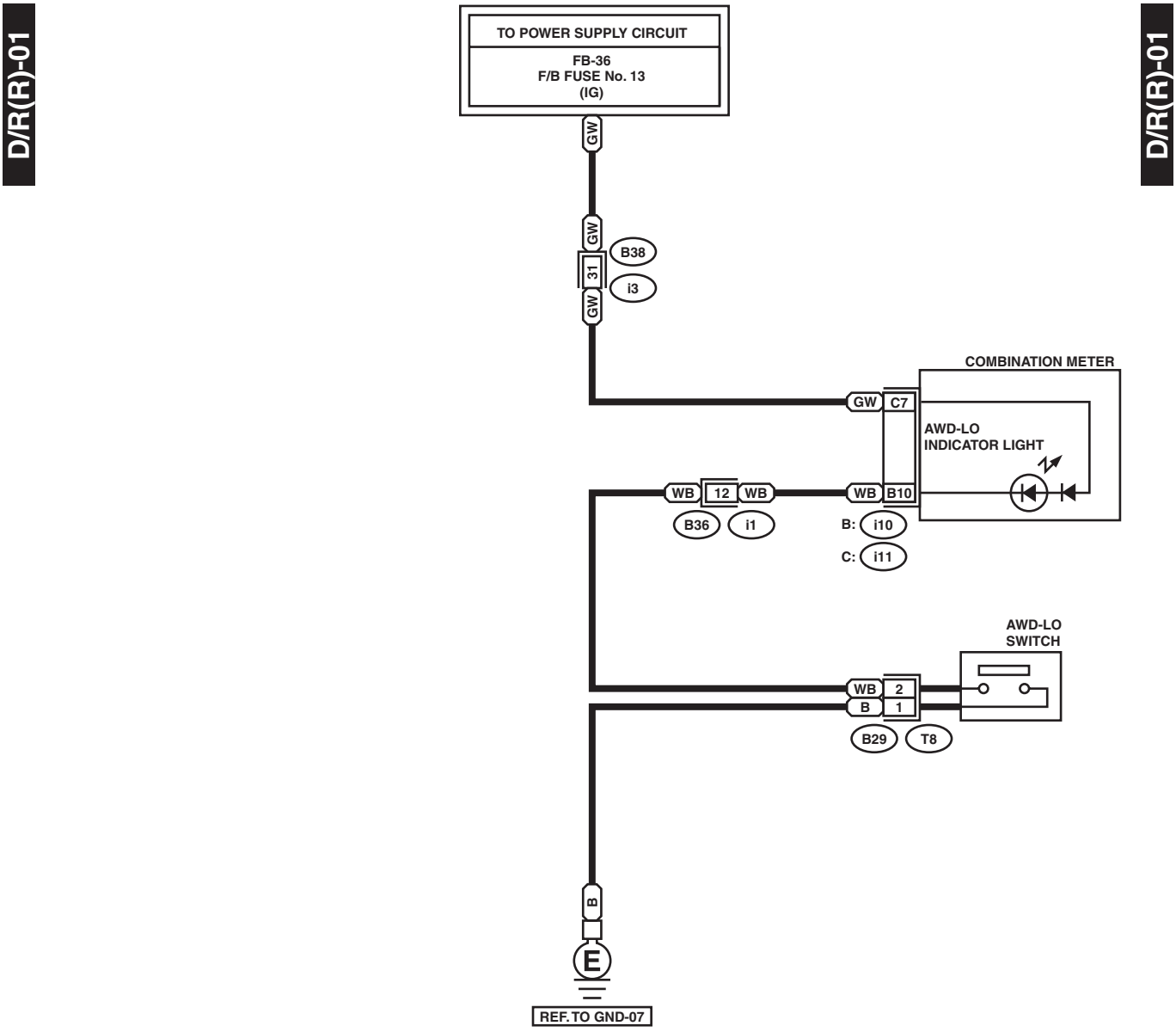
1. LHD MODEL

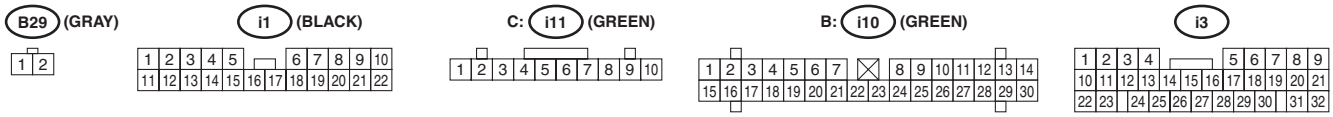




WI-07151

2. RHD MODEL



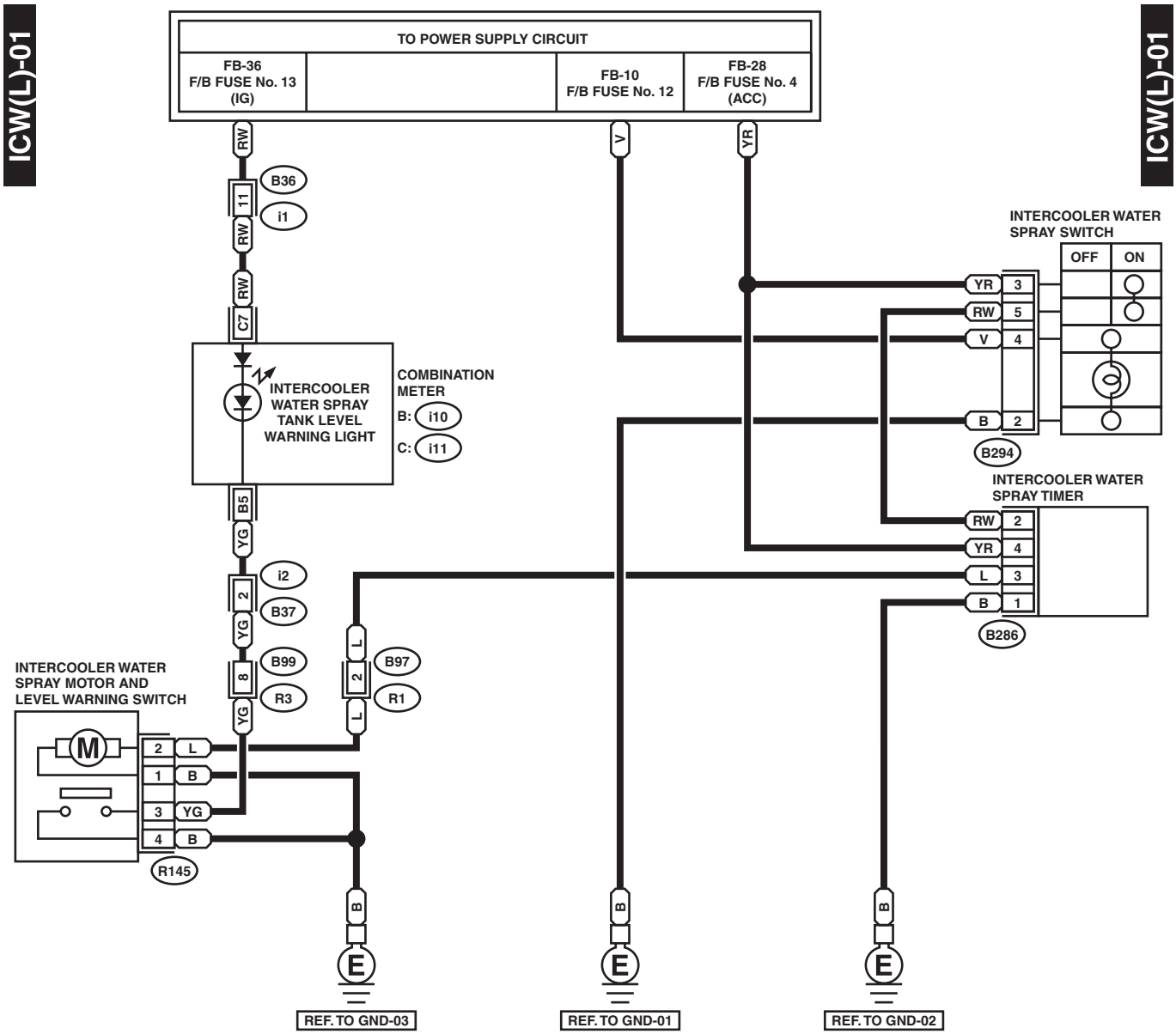


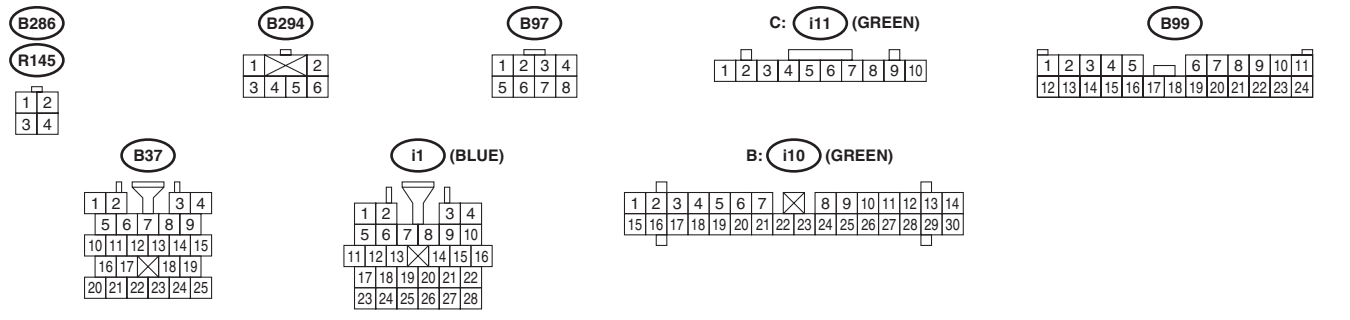
WI-07152

46.Intercooler Water Spray System

A: WIRING DIAGRAM

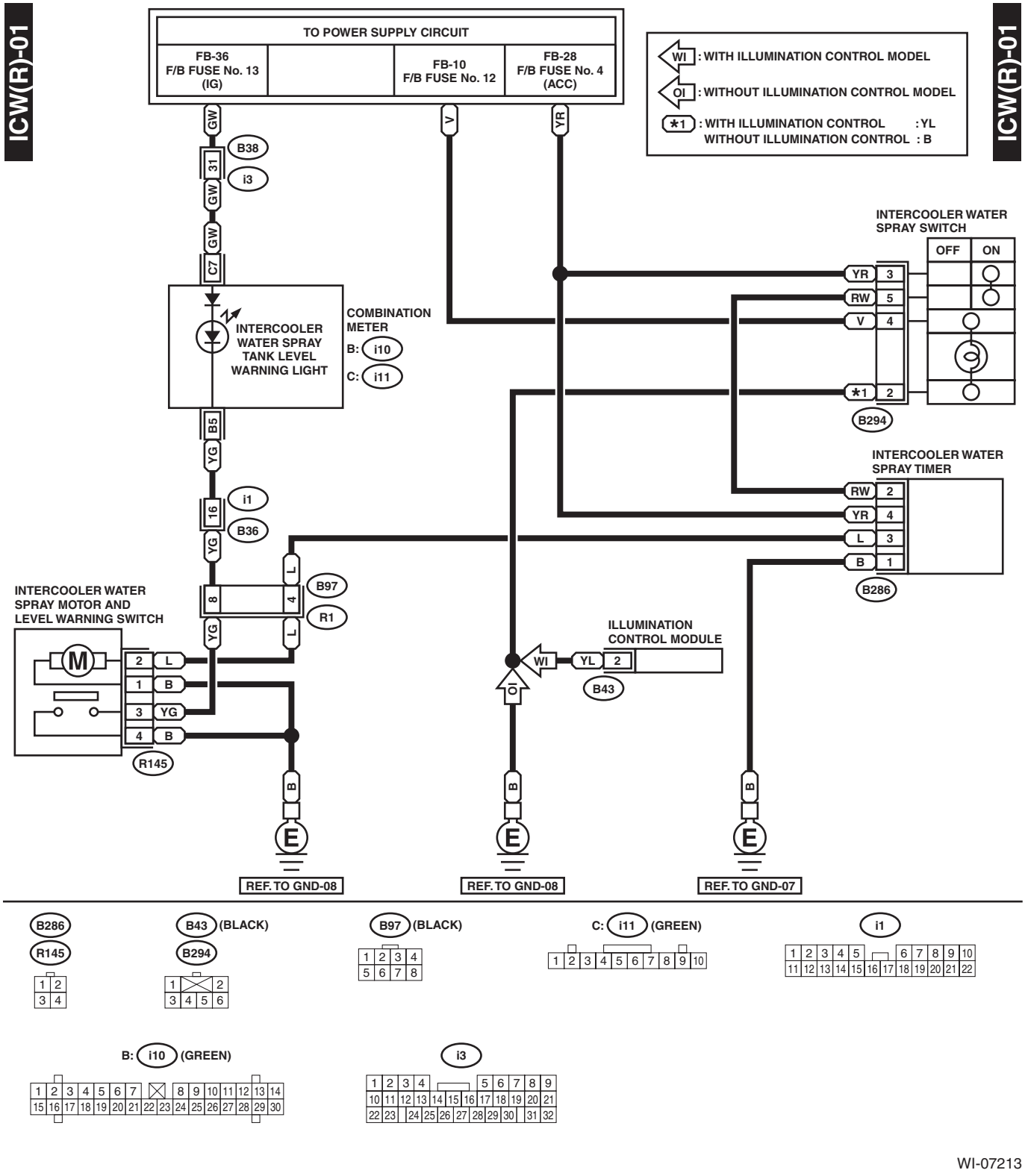
1. LHD MODEL





WI-07212

2. RHD MODEL

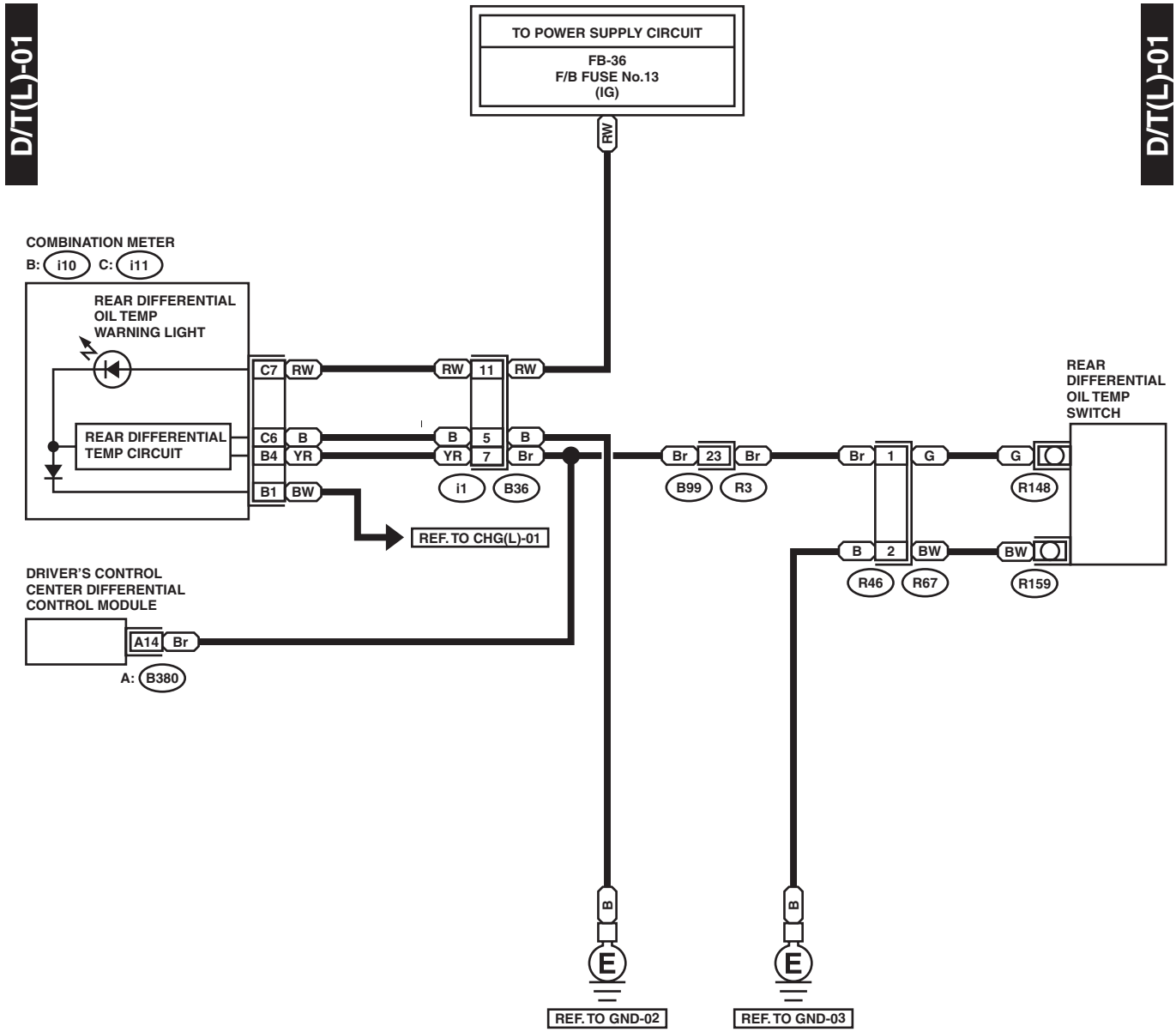


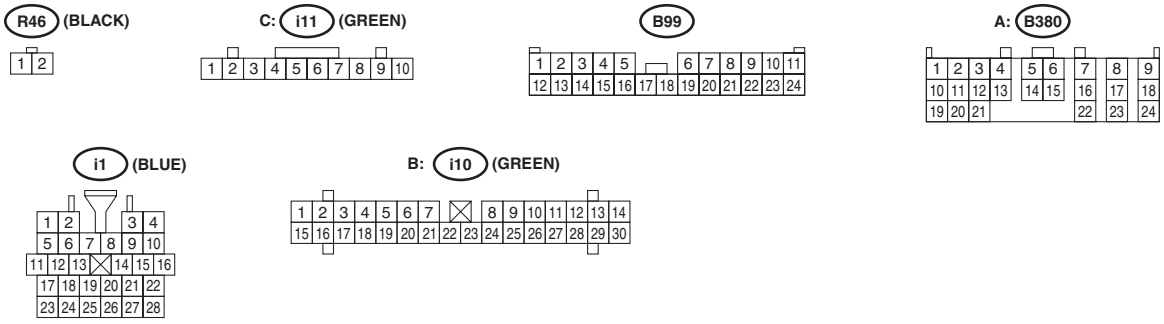
WI-07213

47.Rear Differential Oil Temperature Warning Light System

A: WIRING DIAGRAM

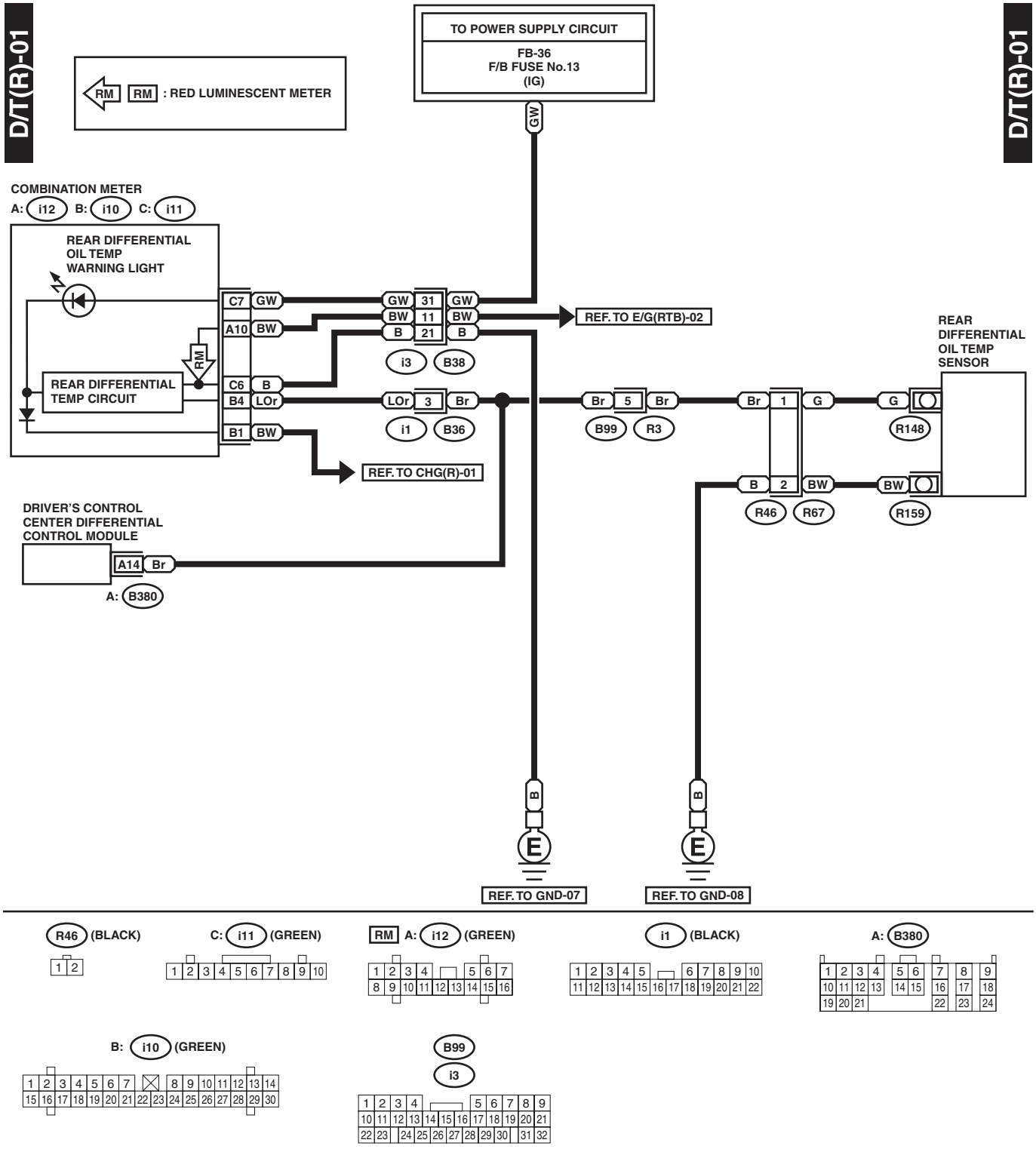
1. LHD MODEL





WI-07218

2. RHD MODEL

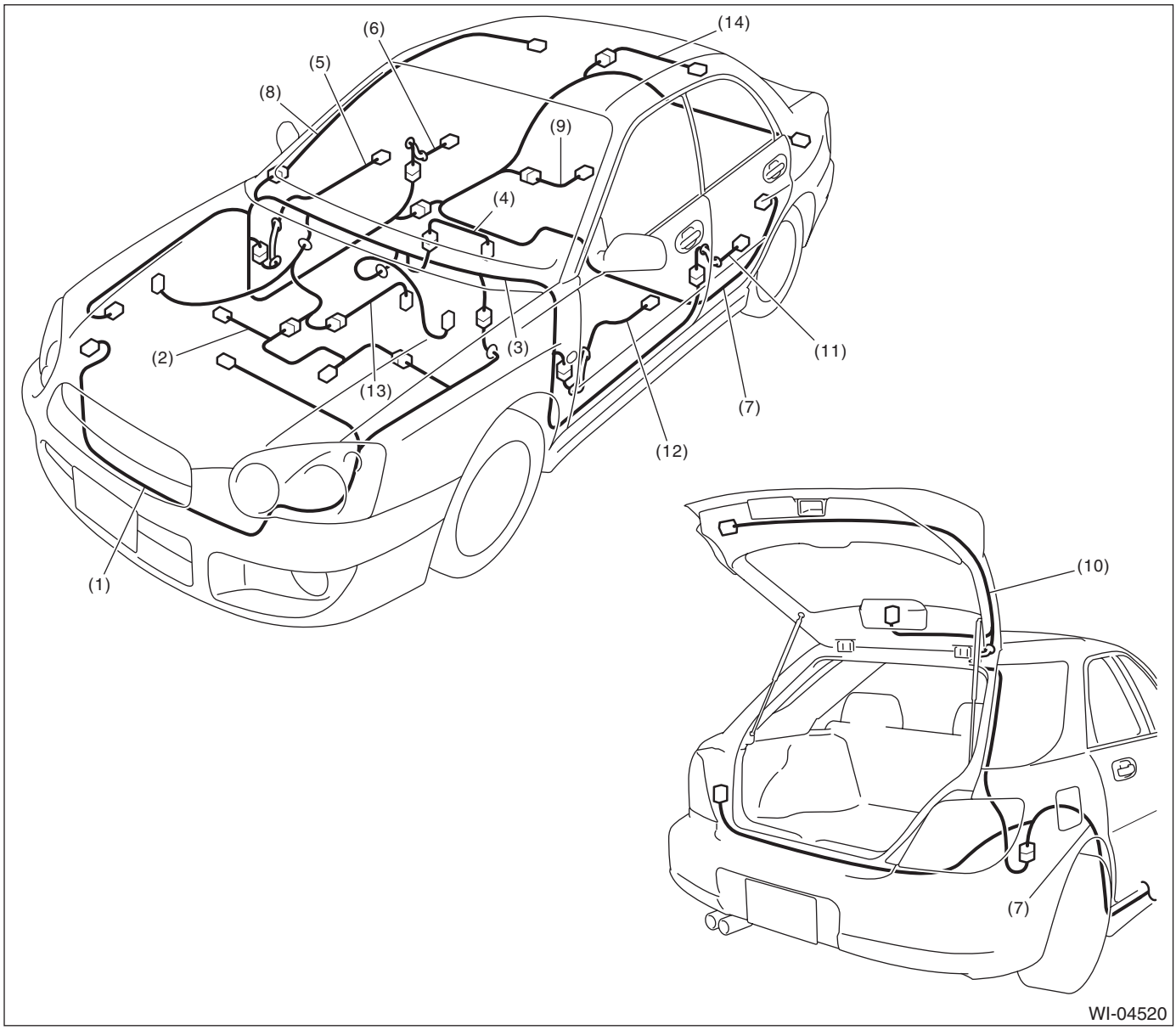


WI-07219

48.Harness Components Location

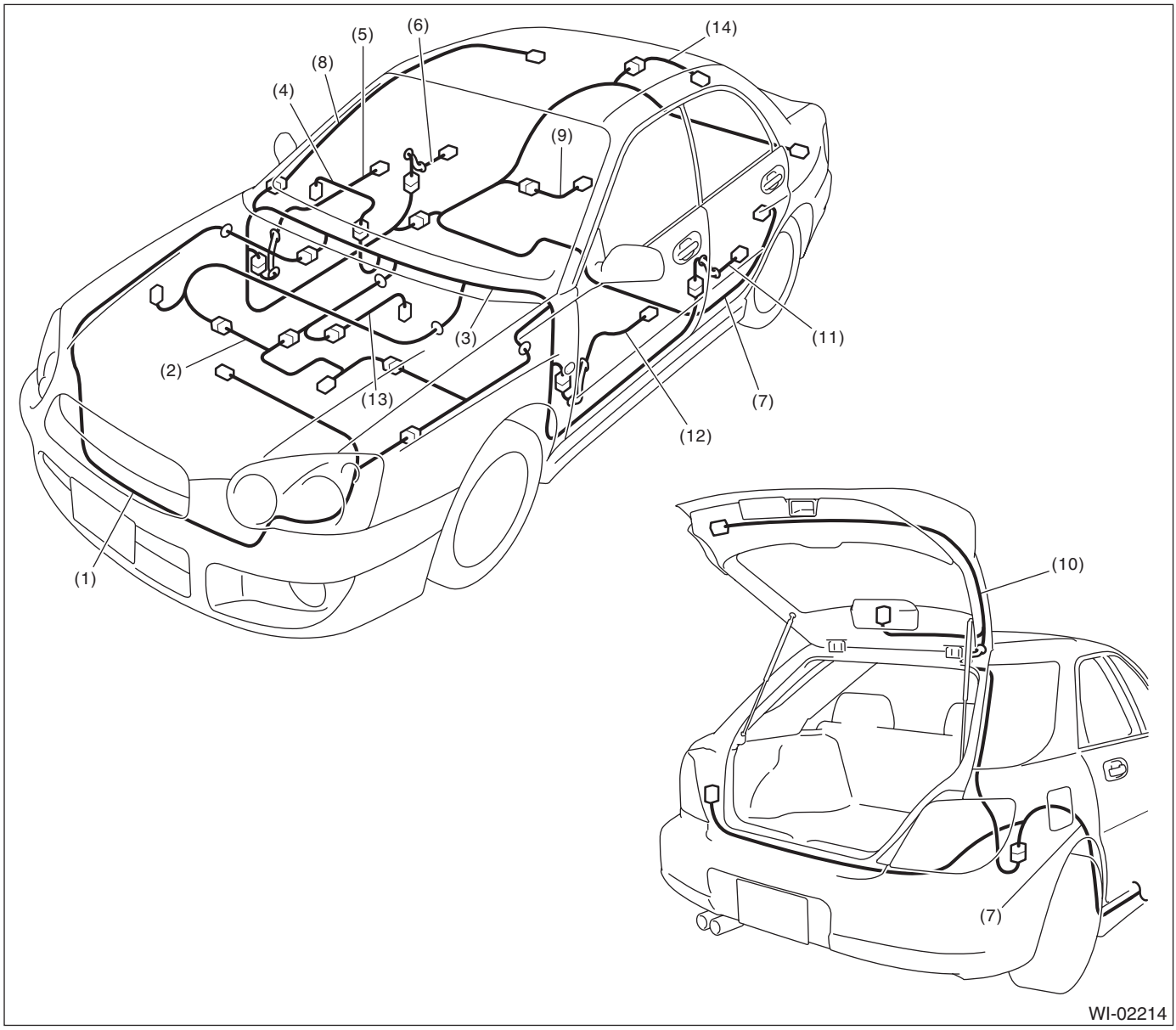
A: LOCATION

1. LHD MODEL



(1) Front wiring harness
(2) Engine wiring harness
(3) Bulkhead wiring harness
(4) Instrument panel wiring harness
(5) Front door cord RH
(6) Rear door cord RH
(7) Rear wiring harness
(8) Roof cord
(9) Fuel tank cord
(10) Rear gate cord
(11) Rear door cord LH
(12) Front door cord LH
(13) Transmission cord
(14) Trunk lid cord

2. RHD MODEL



(1)	Front wiring harness	(6)	Rear door cord RH	(11)	Rear door cord LH
(2)	Engine wiring harness	(7)	Rear wiring harness	(12)	Front door cord LH
(3)	Bulkhead wiring harness	(8)	Roof cord	(13)	Transmission cord
(4)	Instrument panel wiring harness	(9)	Fuel tank cord	(14)	Trunk lid cord
(5)	Front door cord RH	(10)	Rear gate cord		

49.Front Wiring Harness

A: LOCATION

1. LHD MODEL

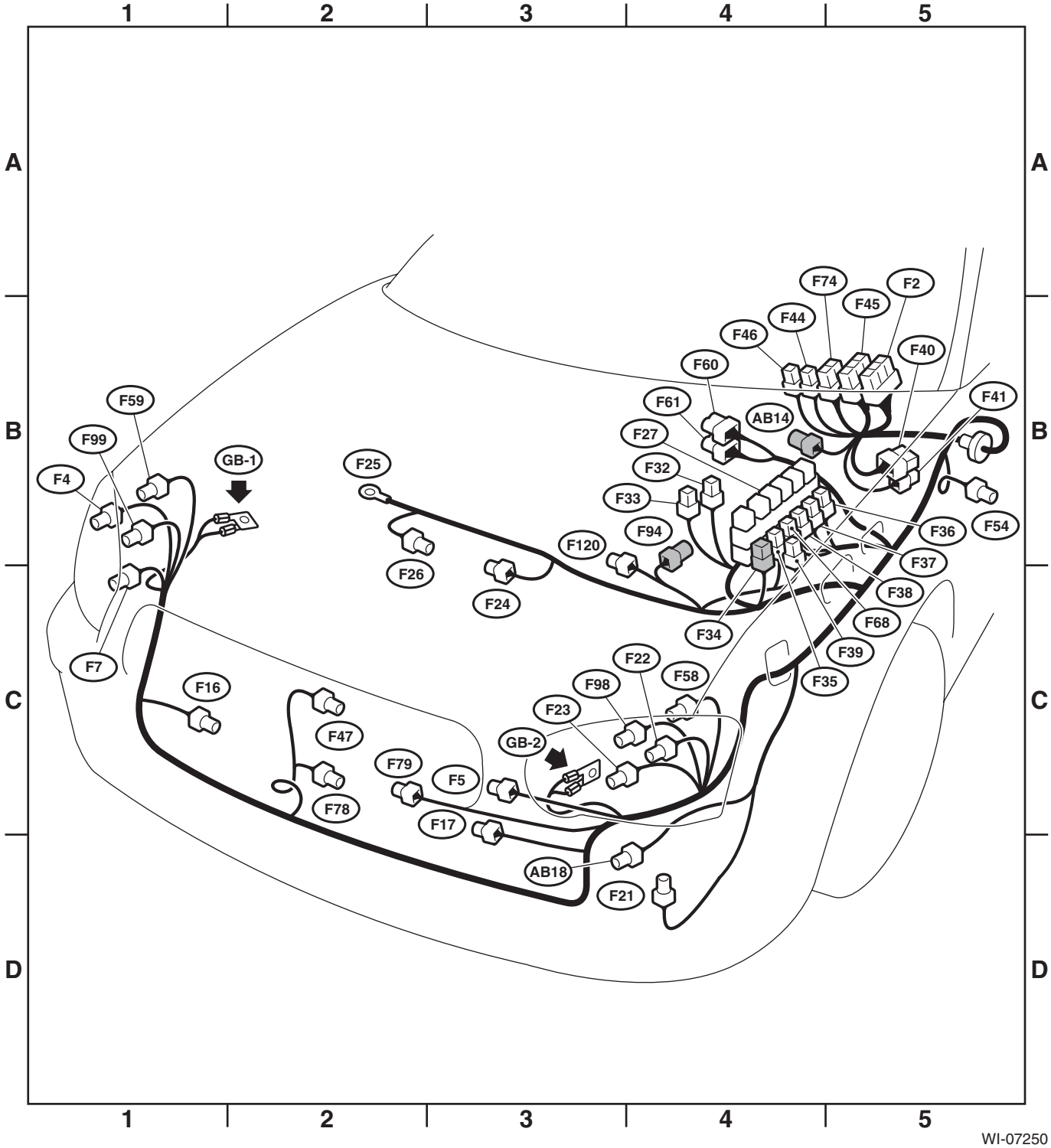
• Front Wiring Harness

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
F2	24	Black	B-5	B100	Bulkhead wiring harness
F4	3	Black	B-1		Front clearance light RH and front turn signal light RH
F5	1	Black	C-3		Horn
F7	2	Gray	C-1		Headlight RH (Low beam)
F16	2	Black	C-1		Sub fan motor (Non-turbo model)
	4	Gray	C-1		Sub fan motor (Turbo model)
F17	2	Gray	C-3		Radiator main fan motor (Non-turbo model)
	4	Gray	C-3		Radiator main fan motor (Turbo model)
F21	2	Black	D-4		Front fog light LH
F22	3	Black	C-4		Front clearance light LH and front turn signal light LH
F23	2	Gray	C-3		Headlight LH (Low beam)
F24	1	Gray	C-3		A/C compressor
F25	1	★	B-2		Generator
F26	3	Green	B-2		
F27	36	Black	B-4		A/C relay holder
F32	2	Green	B-4		Front washer motor
F33	2	★	B-4		Rear washer motor
F34	4	Black	B-4		SBF holder
F35	2	Black	B-4		Main fuse box (M/B)
F36	3	★	B-4		
F37	6	Black	B-4		
F38	1	★	B-4		
F39	8	★	B-4		
F40	9	Brown	B-5		Fuse & relay box (F/B)
F41	7	Gray	B-5		
F44	8	★	B-4	B61	Bulkhead wiring harness
F45	24	★	B-5	B62	Bulkhead wiring harness
F46	2	Black	B-4	B108	Bulkhead wiring harness
F47	1	Black	C-2		Horn
F54	2	★	B-5		Side turn signal light LH
F58	6	Gray	C-4		Headlight leveler LH
F59	6	Gray	B-1		Headlight leveler RH
F60	16	Brown	B-4	E3	Engine wiring harness (Turbo model)
F61	20	Black	B-4	E2	Engine wiring harness (Turbo model)
F68	4	Black	B-4		Main fuse box (M/B)
F74	16	Blue	B-5	B200	Bulkhead wiring harness
F78	2	Black	C-2		Ambient sensor
F79	2	Gray	C-3		A/C pressure switch
F94	2	Gray	B-4		ABS front sensor LH
F98	2	Black	C-4		Headlight LH (High beam)
F99	2	Black	B-1		Headlight RH (High beam)
F120	2	★	B-3		Heater cock

★: Non-colored

• Front Sub Sensor Harness

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
AB14	2	Yellow	B-4	AB13	Airbag wiring harness
AB18	2	Yellow	D-3		Front sub sensor LH



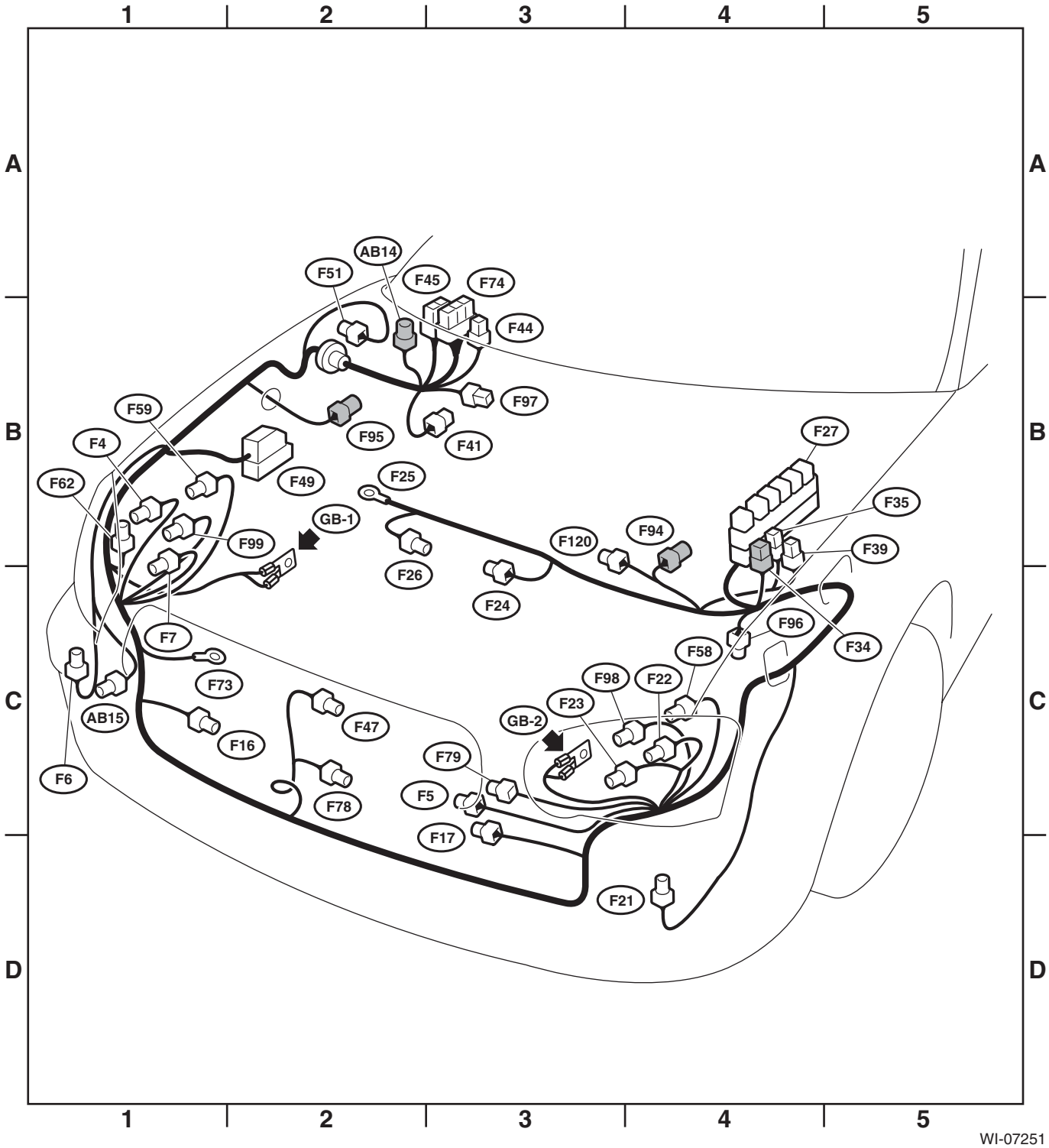
2. RHD MODEL

• Front Wiring Harness

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
F4	3	Black	B-1		Front clearance light RH and front turn signal light RH
F5	1	★	C-3		Horn
F6	2	Black	C-1		Front fog light RH (Turbo model)
	2	Brown	C-1		Front fog light RH (Non-turbo model)
F7	2	Gray	B-1		Headlight RH (Low beam)
F16	2	Black	C-1		Sub fan motor (Non-turbo model)
	4	Gray	C-1		Sub fan motor (Turbo model)
F17	2	Gray	D-3		Radiator main fan motor (Non-turbo model)
	4	Gray	D-3		Radiator main fan motor (Turbo model)
F21	2	Black	D-4		Front fog light LH (Turbo model)
	2	Brown	D-4		Front fog light LH (Non-turbo model)
F22	3	Black	C-4		Front clearance light LH and front turn signal light LH
F23	2	Gray	C-3		Headlight LH (Low beam)
F24	1	Gray	C-3		A/C compressor
F25	1	★	B-2		Generator
F26	3	Green	B-2		
F27	36	Black	B-4		A/C relay holder
F34	4	Black	B-4		SBF holder
F35	2	Black	B-4		Main fuse box (M/B)
F39	8	Black	B-4		
F41	7	Gray	B-3		Fuse & relay box (F/B)
F44	8	Black	B-3	B61	Bulkhead wiring harness
F45	18	★	B-3	B62	Bulkhead wiring harness
F47	1	★	C-2		Horn
F49	31	Black	B-2		ABS control module (ABS 5.3 i)
	26	Black	B-2		ABS control module (ABS 8)
F51	2	★	B-2		Side turn signal light RH
F58	6	Gray	C-4		Headlight leveler LH
F59	6	Gray	B-1		Headlight leveler RH
F62	8	Gray	B-1		Shield joint connector (ABS)
F73	1	★	C-1		ABS motor ground
F74	22	Black	B-3	B200	Bulkhead wiring harness (ABS)
F78	2	Black	C-2		Ambient sensor
F79	2	Gray	C-3		A/C pressure switch
F94	2	Gray	B-4		ABS front sensor LH
F95	2	Gray	B-2		ABS front sensor RH
F96	4	Gray	C-4	B255	Bulkhead wiring harness
F97	2	★	B-3		ABS condenser
F98	2	Black	C-4		Headlight LH (High beam)
F99	2	Black	B-1		Headlight RH (High beam)
F120	2	★	B-3		Heater cock
★: Non-colored					

• Front Sub Sensor Wiring Harness

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
AB14	2	Yellow	B-2	AB13	Airbag wiring harness
AB15	2	Yellow	C-1		Front sub sensor RH



50.Bulkhead Wiring Harness (In Engine Compartment)

A: LOCATION

1. LHD NON-TURBO MODEL

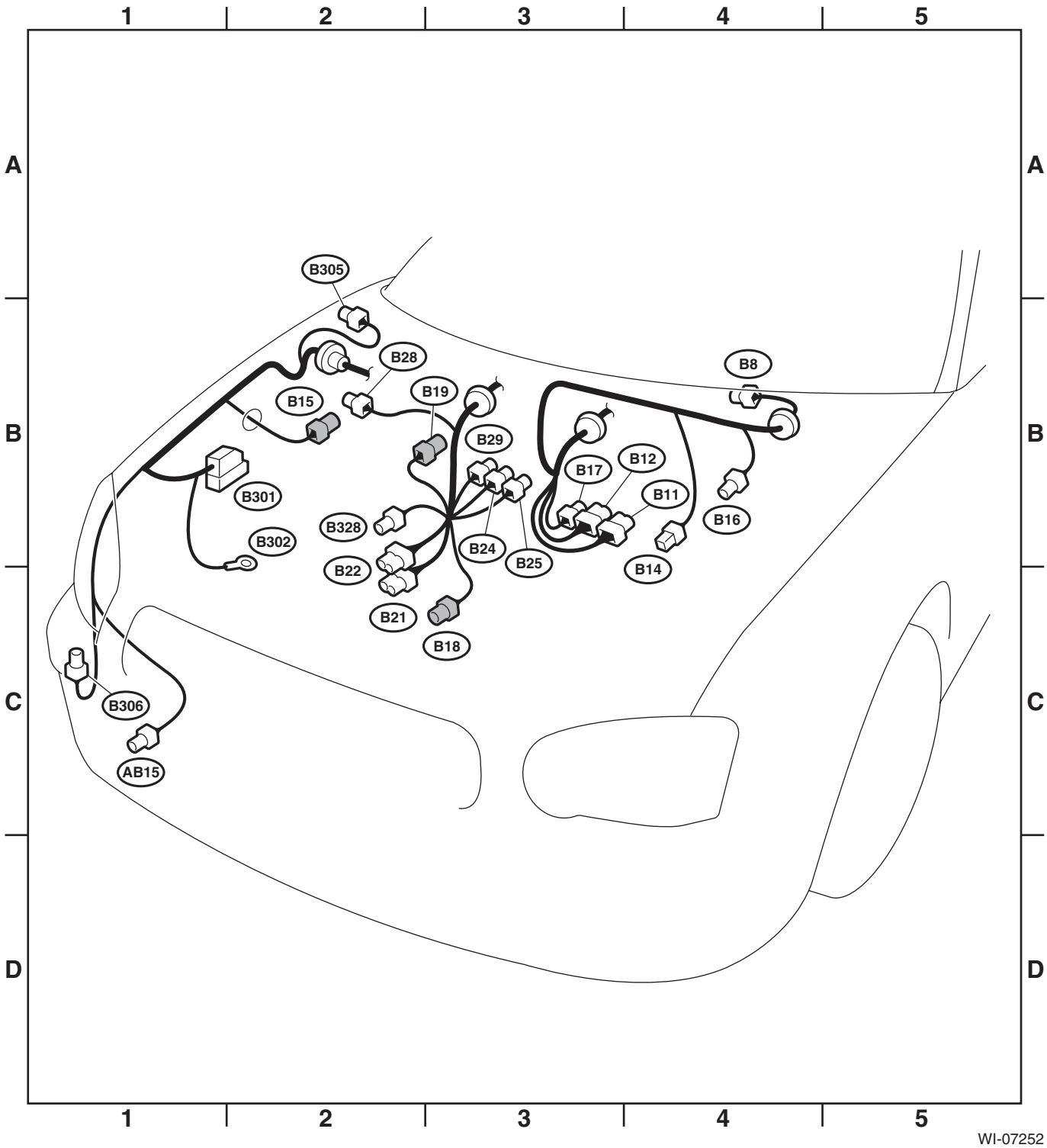
• Bulkhead Wiring Harness

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
B8	5	Gray	B-4		Front wiper motor
B11	20	Black	B-3	T4	Transmission cord (AT)
B12	12	★	B-3	T3	
B14	1	Black	B-4		Starter (Magnet)
B15	2	Gray	B-2		ABS front sensor RH
B16	2	Gray	B-4		Brake fluid level switch
B17	3	★	B-3		Vehicle speed sensor (MT)
B18	4	★	C-3		Front oxygen (A/F) sensor (With OBD)
B19	4	★	B-3	T5	Rear oxygen sensor (With OBD)
B21	20	Gray	C-2	E2	Engine wiring harness
B22	16	Brown	B-2	E3	
B24	2	Gray	B-3	T1	Back-up light switch (MT)
B25	2	Brown	B-3	T2	Neutral position switch (MT)
B28	3	★	B-2		CO resistor
B29	2	★	B-3	T8	Dual range LO switch (MT)
B301	26	Black	B-2		ABS control module
B302	1	★	B-2		ABS motor ground
B305	2	★	B-2		Side turn signal light RH
B306	2	Black	C-1		Front fog light RH
B328	6	Black	B-2	E-58	Engine wiring harness
★: Non-colored					

• Airbag Wiring Harness

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
AB15	2	Yellow	C-1		Front sub sensor RH

Bulkhead Wiring Harness (In Engine Compartment)



2. LHD TURBO MODEL

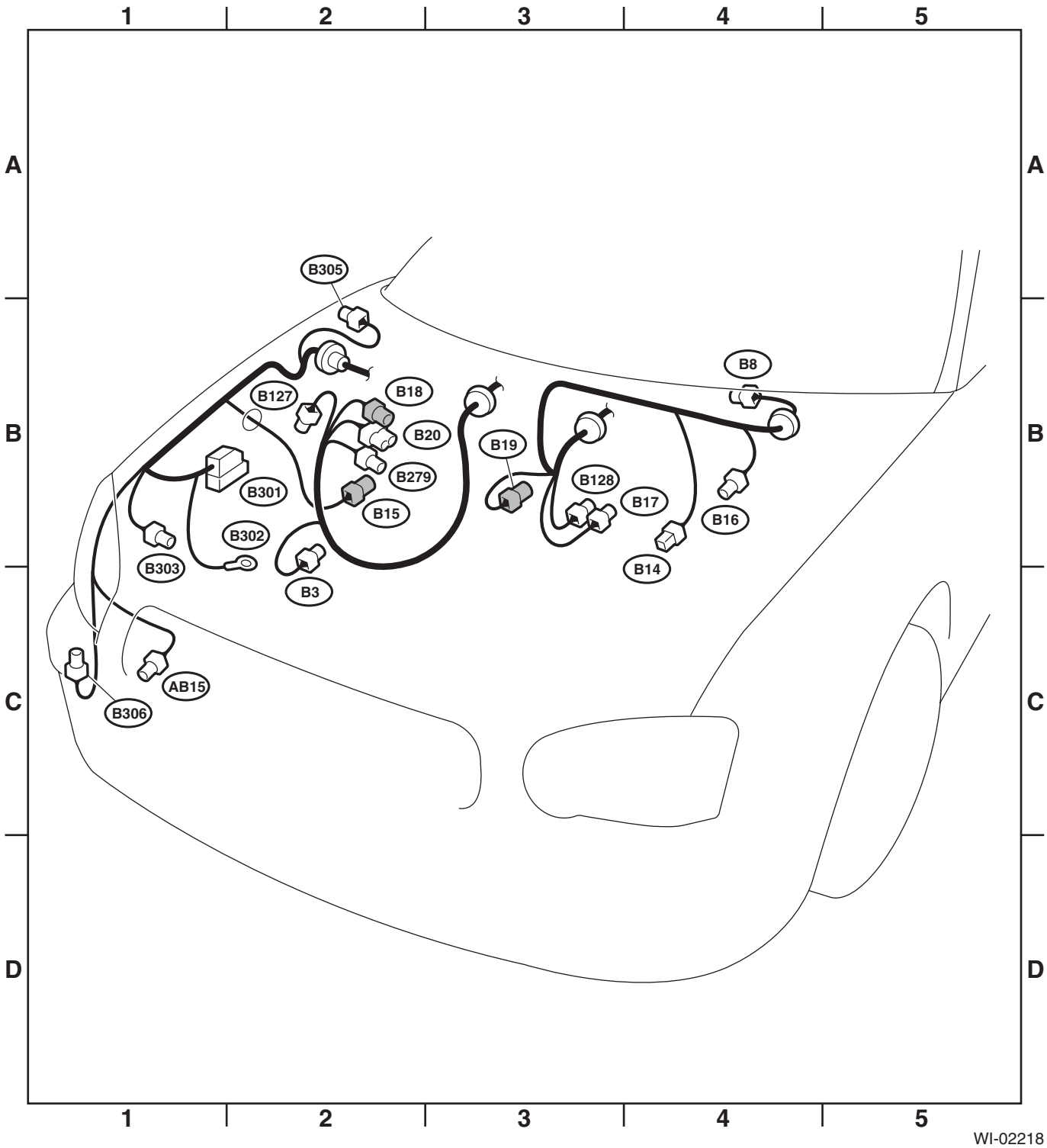
• Bulkhead Wiring Harness

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
B3	5	Gray	B-2		Mass air flow sensor
B8	5	★	B-4		Front wiper motor
B14	1	Black	B-4		Starter (Magnet)
B15	2	Gray	B-2		ABS front sensor RH
B16	2	Gray	B-4		Brake fluid level switch
B17	4	★	B-3		Vehicle speed sensor (Except STi model)
	3	★	B-3		Vehicle speed sensor (STi model)
B18	4	★	B-2		Front oxygen (A/F) sensor
B19	4	★	B-3		Rear oxygen sensor
B20	10	★	B-2	E1	Engine wiring harness
B127	2	Blue	B-2		Wastegate control solenoid valve
B128	6	★	B-3	T9	Transmission (Model with Driver's control center differential)
	4	★	B-3	T9	Transmission (Model without Driver's control center differential)
B279	2	★	B-2		Exhaust temperature sensor
B301	31	Black	B-2		ABS control module (ABS 5.3 i)
	26	Black	B-2		ABS control module (ABS 8)
B302	1	★	B-2		ABS motor ground
B303	8	Gray	B-1		Shield joint connector (ABS)
B305	2	★	B-2		Side turn signal light RH
B306	2	Black	C-1		Front fog light RH
★: Non-colored					

• Airbag Wiring Harness

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
AB15	2	Yellow	C-1		Front sub sensor RH

Bulkhead Wiring Harness (In Engine Compartment)



3. RHD NON-TURBO MODEL

• Bulkhead Wiring Harness

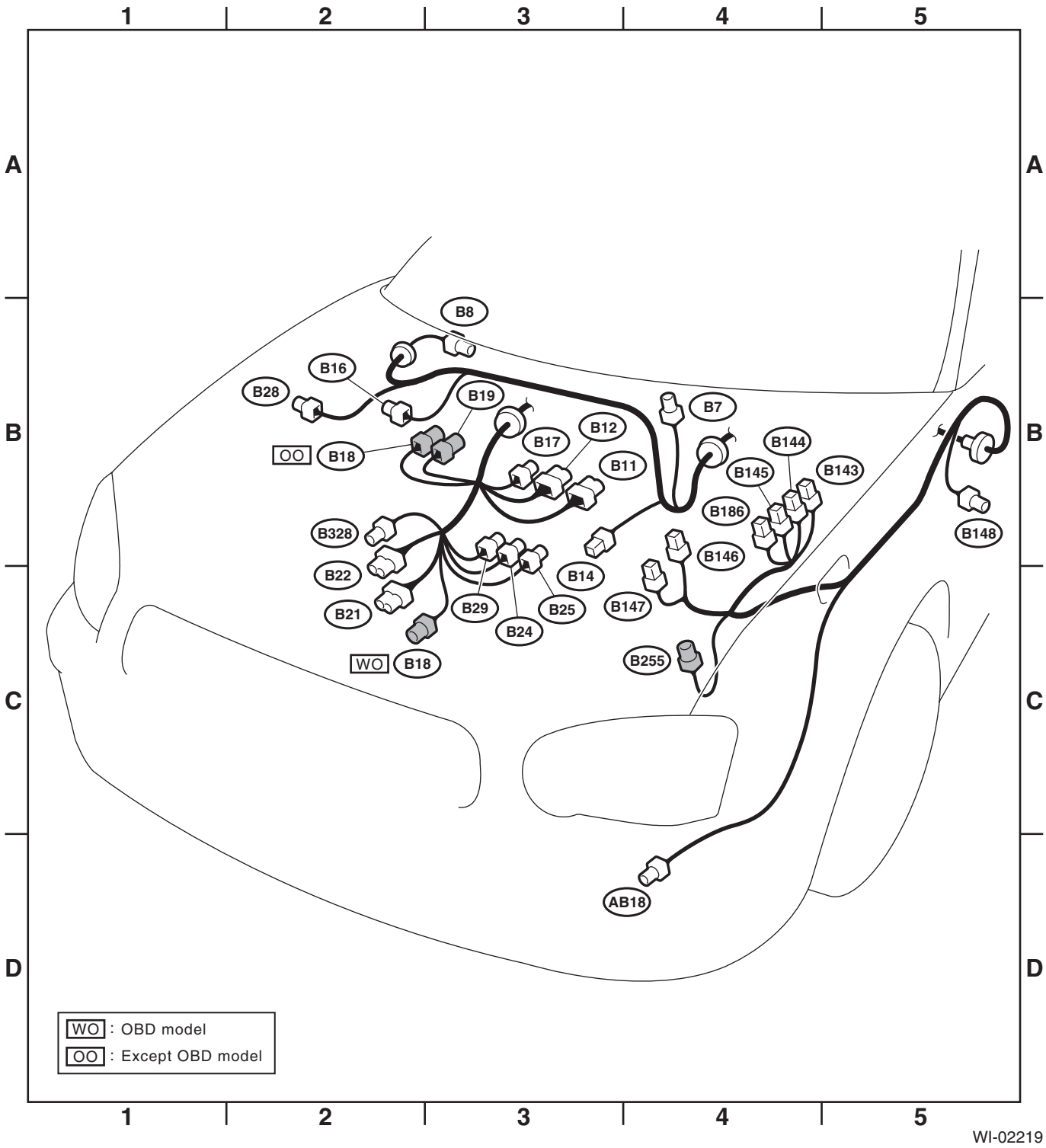
Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
B7	6	Black	B-4		Cruise control actuator
B8	5	Black	B-3		Front wiper motor
B11	20	Black	B-3	T4	Transmission cord (AT)
B12	12	★	B-3	T3	
B14	1	Black	B-3		Starter (Magnet)
B16	2	Gray	B-2		Brake fluid level switch
B17	3	Black	B-3		Vehicle speed sensor (MT)
B18	4	★	B-2		Oxygen sensor (Catalytic converter equipped vehicle without OBD)
	4	★	C-2		Front oxygen (A/F) sensor (With OBD)
B19	4	★	B-3	T5	Rear oxygen sensor (With OBD)
B21	20	Light gray	C-2	E2	Engine wiring harness
B22	16	Brown	B-2	E3	
B24	2	Gray	B-3	T1	Back-up light switch (MT)
B25	2	Brown	B-3	T2	Neutral position switch (MT)
B28	3	★	B-2		CO resistor (Without catalytic converter)
B29	2	★	B-3	T8	Dual range LO switch (MT)
B143	3	★	B-4		Main fuse box (M/B)
B144	6	Black	B-4		
B145	1	★	B-4		
B146	2	Green	B-4		Front washer motor
B147	2	★	C-4		Rear washer motor
B148	2	★	B-5		Side turn signal light LH
B186	4	Black	B-4		Main fuse box (M/B)
B255	4	Gray	C-4	F96	Front wiring harness
B328	6	Black	B-2	E58	Engine wiring harness

★: Non-colored

• Airbag Wiring Harness

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
AB18	2	Yellow	D-4		Front sub sensor LH

Bulkhead Wiring Harness (In Engine Compartment)



4. RHD TURBO MODEL

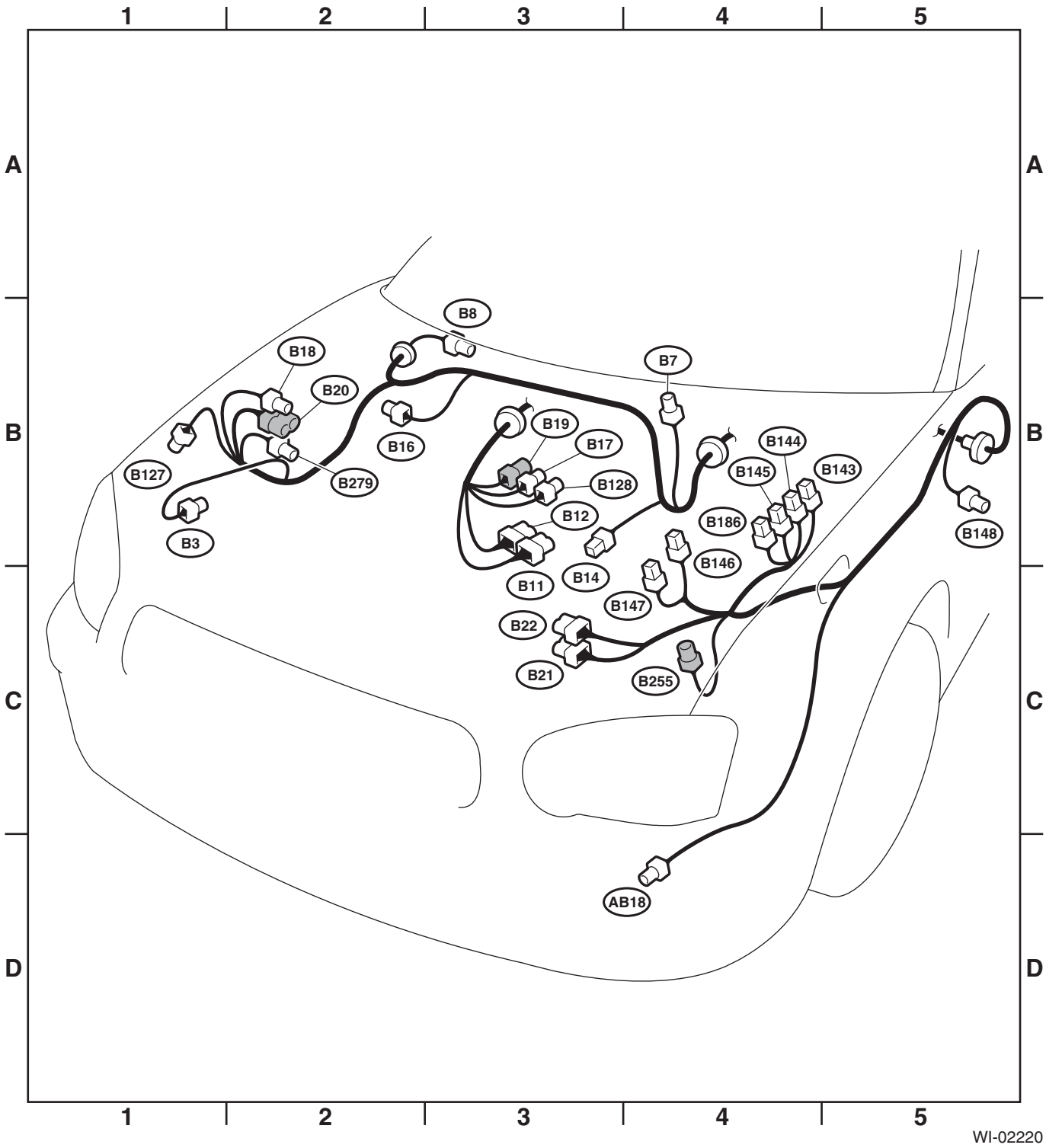
• Bulkhead Wiring Harness

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
B3	5	Black	B-1		Mass air flow sensor
B7	6	Black	B-4		Cruise control actuator
B8	5	Gray	B-3		Front wiper motor
B11	20	Black	B-3	T4	Transmission cord (AT)
B12	12	★	B-3	T3	
B14	1	Black	B-3		Starter (Magnet)
B16	2	Gray	B-2		Brake fluid level switch
B17	3	Black	B-3		Vehicle speed sensor (MT-STi model)
	4	Black	B-3		Vehicle speed sensor (Except for MT-STi model)
B18	4	★	B-2		Front oxygen (A/F) sensor
B19	4	★	B-3		Rear oxygen sensor
B20	10	★	B-2	E1	Engine wiring harness
B21	20	Black	C-3	E2	Engine wiring harness
B22	16	Brown	C-3	E3	
B127	2	★	B-1		Wastegate control solenoid valve
B128	6	Gray	B-3	T9	Transmission cord (MT model with Driver's control center differential)
	4	Gray	B-3	T9	Transmission cord (MT model without Driver's control center differential)
B143	3	★	B-4		Main fuse box (M/B)
B144	6	Black	B-4		
B145	1	★	B-4		
B146	2	Green	B-4		Front washer motor
B147	2	★	C-4		Rear washer motor
B148	2	★	B-5		Side turn signal light LH
B186	4	Black	B-4		Main fuse box (M/B)
B255	4	Gray	C-4	F96	Front wiring harness (With ABS)
B279	2	★	B-2		Exhaust gas temperature sensor
★: Non-colored					

• Airbag Wiring Harness

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
AB18	2	Yellow	D-4		Front sub sensor LH

Bulkhead Wiring Harness (In Engine Compartment)



51.Bulkhead Wiring Harness (In Compartment)

A: LOCATION

1. LHD MODEL

• Bulkhead Wiring Harness

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
B30	25	★	D-1	D1	Front door cord LH
B31	6	Yellow	D-1	AB1	SRS (Airbag) harness
B32	3	Black	B-2		Turn signal and hazard module
B36	28	Blue	B-3	i1	Instrument panel wiring harness
B37	25	★	B-3	i2	
B40	16	Black	C-2		Data link connector
B41	2	★	C-1		Power window circuit breaker
B44	10	★	C-1		Seat belt timer module
B46	4	Green	B-5		Fuel pump relay
B47	6	Brown	B-5		Main relay
B50	4	★	C-1		Blower fan motor relay
B51	8	Blue	C-1		Fuse & relay box (F/B)
B52	7	★	C-1		
B53	12	Black	B-2		Shield joint connector (AT)
B54	24	★	B-3		TCM
B55	24	Gray	B-3		
B56	24	Green	B-2		
B61	8	★	B-1	F44	Front wiring harness
B62	24	★	B-1	F45	
B64	2	Black	B-2		Stop light switch
B68	5	Black	C-3		Steering roll connector
B69	4	★	C-3		Parking switch
B70	18	★	C-3		Combination switch
B71	17	★	C-3		
B72	4	Blue	C-3		Ignition switch
B75	2	Green	C-2		Test mode connector
B76	2	Green	C-2		
B77	3	★	B-4		Mode actuator
B79	14	Gray	C-2		Check connector
B81	1×2	★	C-2		Diagnosis terminal (Ground)
B82	6	Black	C-2		Diagnosis connector
B83	6	★	C-4		Shield & sensor ground joint connector (E/G) (With OBD)
	8	★	C-4		Shield & sensor ground joint connector (E/G) (Without OBD)
B84	31	★	C-4		ECM
B85	4	Brown	B-3		Diode (Rear fog light)

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
B86	4	Brown	B-4		Blower fan resistor (Manual A/C)
B87	2	★	B-5		Blower fan motor
B88	4	Brown	B-4		Evaporator thermo switch (Manual A/C)
B90	4	★	B-5	R50	Roof cord
B91	6	Black	B-4		FRESH/RECIRC actuator
B100	24	Black	B-1	F2	Front wiring harness
B101	25	★	B-4	D11	Front door cord RH
B108	2	Black	B-1	F46	Front wiring harness
B116	6	★	C-4		Select lever illumination light
B119	4	★	C-4		Front accessory power supply socket
B120	14	★	C-4		Radio
B121	1	Black	C-4		Audio ground
B125	1	Green	C-5	B126	Line end connector
	1	Black	C-2	B126	Read memory connector
B126	1	Green	C-5	B125	Line end connector
	1	Black	C-2	B125	Read memory connector
B129	2	Black	B-3		Kick down switch (AT)
B131	4	Blue	C-1		Rear fog light relay
B132	8	★	C-2		Head light leveler switch
B134	22	★	C-5		ECM (Turbo model)
	35	★	C-5		ECM (Non-turbo model)
B135	28	★	C-4		ECM
B136	17	★	B-4		ECM (Turbo model)
	26	★	B-4		ECM (Non-turbo model)
	30	★	B-4		ECM (Non-turbo model)
B137	20	★	B-4		ECM (Non-turbo model)
	24	★	B-4		ECM (Turbo model)
B141	12	★	B-2		IMM ECM
B152	12	★	C-1		Fuse & relay box (F/B)
B158	10	Gray	D-1		Fuse & relay box (F/B)
B160	6	Gray	C-1		Front fog light switch
B168	10	★	C-4		Mode control switch (Manual A/C)
B169	6	★	C-4		Blower fan motor switch (Manual A/C)

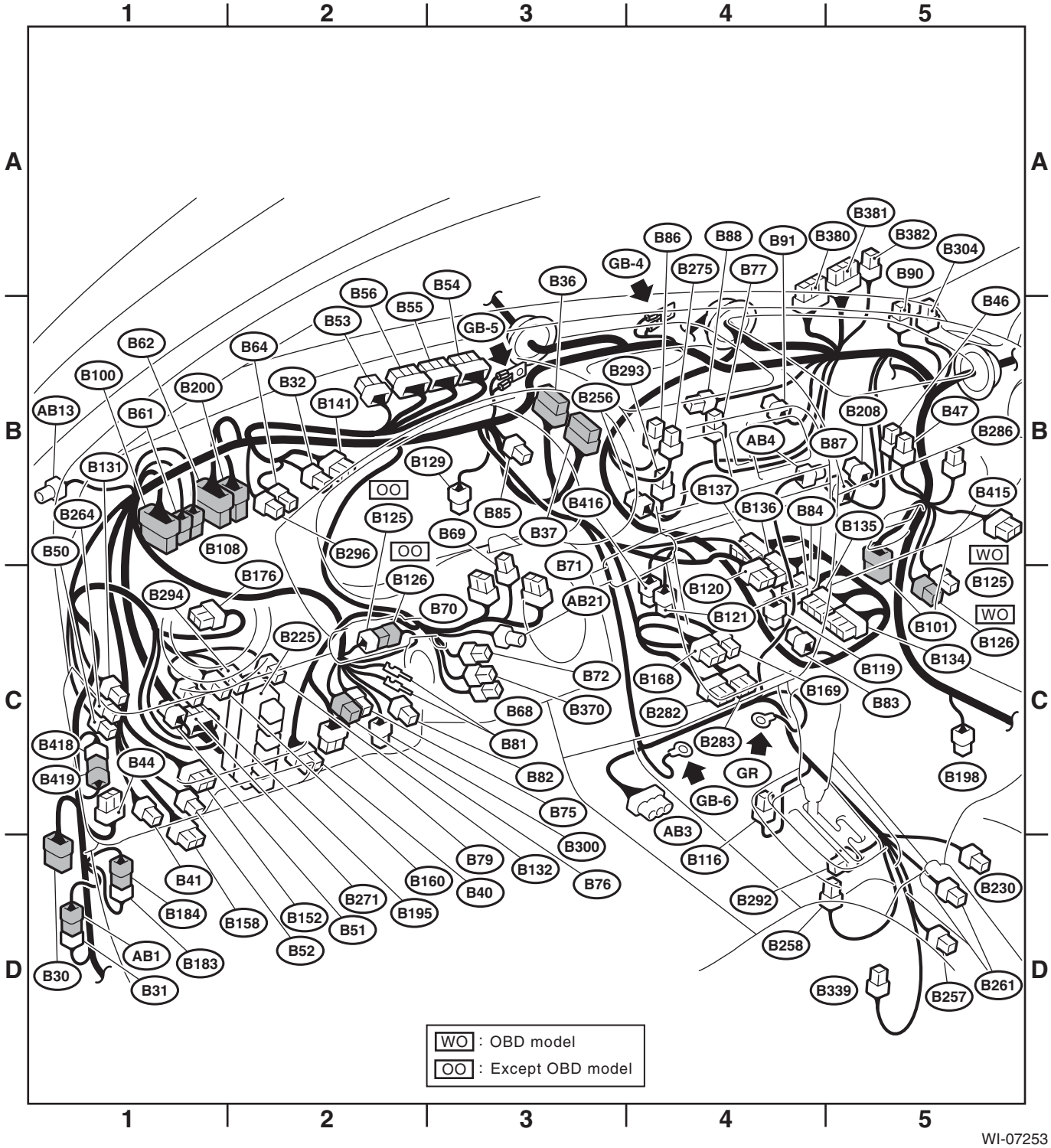
Bulkhead Wiring Harness (In Compartment)

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
B176	18	★	C-1		Keyless entry control module
B183	1	★	D-1	B184	Keyless entry connector
B184	1	★	D-1	B183	
B195	6	★	C-1		Rear fog light switch
B198	5	★	C-5	GB-9	Ground joint connector
B200	16	Blue	B-1	F74	Front wiring harness
B208	2	Black	B-5		Glove box light
B225	38	Black	C-2		Relay block
B230	6	★	D-5		Yawlate sensor
B256	2	★	B-3		Evaporator sensor
B257	3	★	D-5		ABS lateral G sensor (STi model)
B258	3	★	D-5		Driver's control center differential switch
B261	6	★	D-5		Joint connector (ABS STi model)
B264	4	Red	C-1		ABS relay
B271	12	Blue	C-1		Fuse & relay box (F/B)
B275	4	★	B-4		Fan control amp.
B282	16	Gray	C-4		Auto A/C control module
B283	20	Gray	C-4		
B286	4	★	B-5		Intercooler water spray timer
B292	3	★	D-5		ABS G sensor
B293	3	★	B-4		Air mix actuator (Auto A/C)
B294	6	★	C-2		Intercooler water spray switch
B296	4	★	B-2		Rear defogger timer
B300	6	★	C-2		Line end check connector
B304	2	Black	B-5		ABS condenser
B339	6	★	D-5		Manual mode switch
B370	6	★	C-3		Ignition starter and steering lock assembly
B380	24	Gray	B-4		Driver's control center differential control module
B381	24	★	B-5		Driver's control center differential control module
B382	6	★	B-5		Yawlate earth joint connector
B415	12	★	B-5		AT Shift lock module
B416	2	★	C-4		OP connector (Navigation)
B418	2	★	C-1		Joint connector (Key lock)
B419	2	★	C-1		Joint connector (Key lock)

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
★: Non-colored					

• Airbag Wiring Harness

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
AB1	6	Yellow	D-1	B31	Bulkhead wiring harness
AB3	28	Yellow	C-4		Airbag control module
AB4	2	Yellow	B-4		Airbag module (Passenger's seat)
AB13	2	Yellow	B-1	AB14	Front sub sensor harness LH
AB21	2	Yellow	C-3	AB26	Airbag module (Driver's seat)



WI-07253

2. RHD MODEL

• Bulkhead Wiring Harness

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
B30	25	★	C-5	D1	Front door cord RH
B31	6	Yellow	D-5	AB1	SRS (Airbag) harness
B32	3	Black	B-4		Turn signal and hazard module
B36	22	★	B-3	i1	Instrument panel wiring harness
B38	32	Black	B-3	i3	Instrument panel wiring harness
B40	16	Black	C-4		Data link connector
B41	2	★	C-5		Power window circuit breaker
B43	6	Black	C-2		Illumination control module
B44	10	★	D-5		Seat belt timer module
B46	4	Green	B-1		Fuel pump relay
B47	6	★	B-1		Main relay
B50	4	★	C-5		Blower fan motor relay
B51	8	Blue	C-5		Fuse & relay box (F/B)
B52	7	★	C-5		
B53	12	Black	B-4		Shield joint connector (AT)
B54	24	★	B-3		TCM
B55	24	Gray	B-3		
B56	24	Green	B-4		
B61	8	Black	B-5	F44	Front wiring harness
B62	18	★	B-5	F45	
B64	2	Black	C-4		Stop light switch
B65	4	Black	C-4		Stop & brake switch (With cruise control)
B68	5	Black	C-3		Cruise control sub switch
B69	4	★	B-3		Parking switch
B70	18	★	C-3		Combination switch
B71	17	★	B-3		
B72	4	Blue	C-3		Ignition switch
B75	2	Green	C-4	B76	Test mode connector
B76	2	Green	C-4	B75	
B77	3	★	B-2		Mode actuator
B79	14	Gray	C-4		Check connector
B81	1×2	★	C-4		Diagnosis terminal (Ground)
B82	6	Black	C-4		Diagnosis connector

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
B83	4	★	C-2		Shield & sensor ground joint connector (E/G) (Non-turbo model with immobilizer)
	6	★	C-2		Shield & sensor ground joint connector (E/G) (Non-turbo model without immobilizer)
	6	Gray	C-2		Shield & sensor ground joint connector (E/G) (Turbo model)
B84	31	★	B-2		ECM
B85	4	Black	B-4		Diode (Lighting)
B86	4	Brown	B-2		Blower fan motor resistor (Manual A/C)
B87	2	★	B-1		Blower fan motor
B88	4	Brown	B-2		Evaporator thermo switch (Manual A/C)
B90	4	★	B-5	R50	Roof cord
B91	6	Black	B-2		FRESH/RECIRC actuator
B93	20	★	B-1		Security control module
B94	20	Black	D-5		Cruise control module
B101	25	★	B-1	D11	Front door cord LH
B107	2	★	B-3		Clutch switch (Cruise control)
B116	6	★	C-2		Select lever illumination light (AT)
B119	4	★	C-2		Front accessory power supply socket
B120	14	★	B-2		Radio
B121	1	★	B-2		Audio ground
B125	1	Green	B-1	B126	Line end connector
	1	Black	C-4	B126	Read memory connector
B126	1	Green	B-1	B125	Line end connector
	1	Black	C-4	B125	Read memory connector
B129	2	Black	B-5		Kick down switch (AT)
B131	4	Blue	C-5		Rear fog light relay
B132	8	★	C-4		Head light leveler switch
B133	6	Blue	D-1		AT power mode & hold mode switch
B134	22	★	C-1		ECM (Turbo model)
	35	★	C-1		ECM (Non-turbo model)

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
B135	28	★	C-2		ECM (Turbo model)
	28	★	C-2		ECM (Non-turbo model)
B136	17	★	B-2		ECM (Turbo model)
	26	★	B-2		ECM (Non-turbo with OBD model)
	30	★	B-2		ECM (Non-turbo without OBD model)
B137	20	★	B-2		ECM (Non-turbo model)
	24	★	B-2		ECM (Turbo model)
B141	12	★	B-3		IMM ECM
B152	12	★	C-5		Fuse & relay box (F/B)
B158	10	Gray	C-5		Fuse & relay box (F/B)
B159	9	Brown	C-5		Fuse & relay box (F/B)
B160	6	Gray	C-5		Front fog light switch
B161	6	Brown	C-4		Cruise control main switch
B168	10	★	C-2		Mode control panel (Manual A/C)
B169	6	★	C-2		Blower fan motor switch (Manual A/C)
B176	18	★	C-5		Keyless entry control module
B183	1	★	D-5	B184	Keyless entry connector
B184	1	★	D-5	B183	
B195	6	★	C-5		Rear fog light switch
B198	1	★	B-3	B199	Joint connector (Ground)
B199	1	★	B-3	B198	
B200	22	Black	B-5	F74	Front wiring harness
B208	2	★	B-1		Glove box light
B225	38	Black	C-4		Relay block
B230	6	★	C-1		Yawlate sensor
B237	6	Black	C-2		Sports shift switch
B256	2	★	B-2		Evaporator sensor
B257	3	Black	D-1		ABS lateral G sensor
B258	3	★	D-1		Driver's control center differential switch
B261	6	★	B-5		Joint connector (ABS-STi model)
B264	4	Pink	C-5		ABS relay
B271	12	Blue	C-5		Fuse & relay box (F/B)
B275	4	★	B-2		Fan control amp
B282	16	Gray	C-2		Auto A/C control module
B283	20	Gray	C-2		
B286	4	★	B-1		Intercooler water spray timer
B292	3	Black	D-2		ABS G sensor
B293	3	★	B-2		Air mix actuator (Auto A/C)
B294	6	★	C-4		Intercooler water spray switch

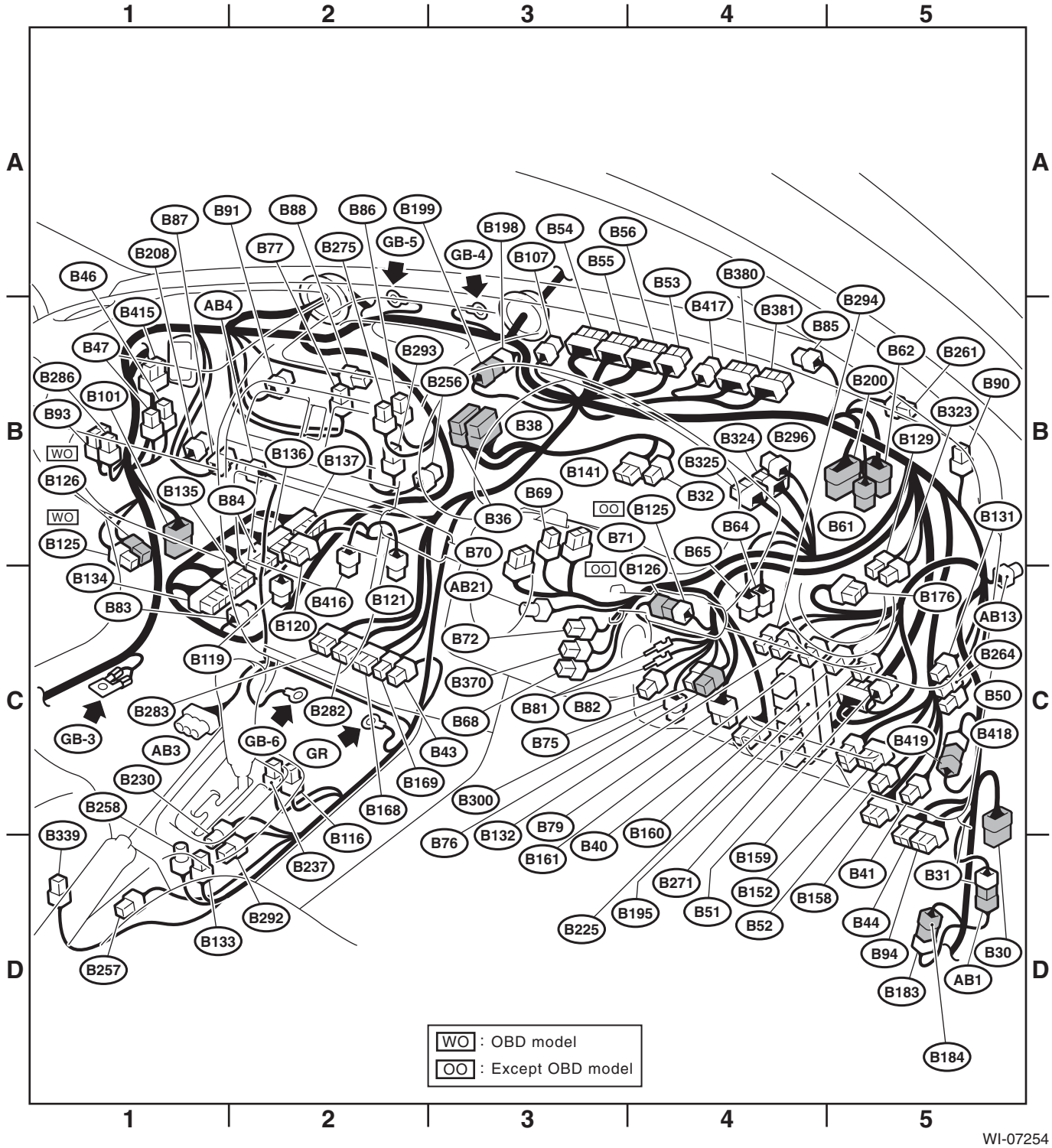
Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
B296	4	★	B-4		Rear defogger timer
B300	6	★	C-4		Line end check connector
B323	4	Blue	B-5		Security relay
B324	16	Gray	B-4		Double lock module
B325	20	Gray	B-4		
B339	6	★	D-1		Manual mode switch
B370	6	★	C-3		Ignition starter and steering lock assembly
B380	24	Gray	B-4		Driver's control center differential control module
B381	24	★	B-4		Driver's control center differential control module
B415	12	★	B-1		AT shift lock module
B416	2	★	B-2		OP connector (Navigation)
B417	4	★	B-4		Yaw joint connector
B418	2	★	C-5		Joint connector (Key lock)
B419	2	★	C-5		Joint connector (Key lock)

★: Non-colored

Bulkhead Wiring Harness (In Compartment)

• Airbag Wiring Harness

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
AB1	6	Yellow	D-5	B31	Bulkhead wiring harness
AB3	28	Yellow	C-1		Airbag control module
AB4	2	Yellow	B-2		Airbag module (Passenger's seat)
AB13	2	Yellow	C-5	AB14	Front sub sensor harness RH
AB21	2	Yellow	C-3	AB26	Airbag module (Driver's seat)



WI-07254

52.Engine Wiring Harness and Transmission Cord

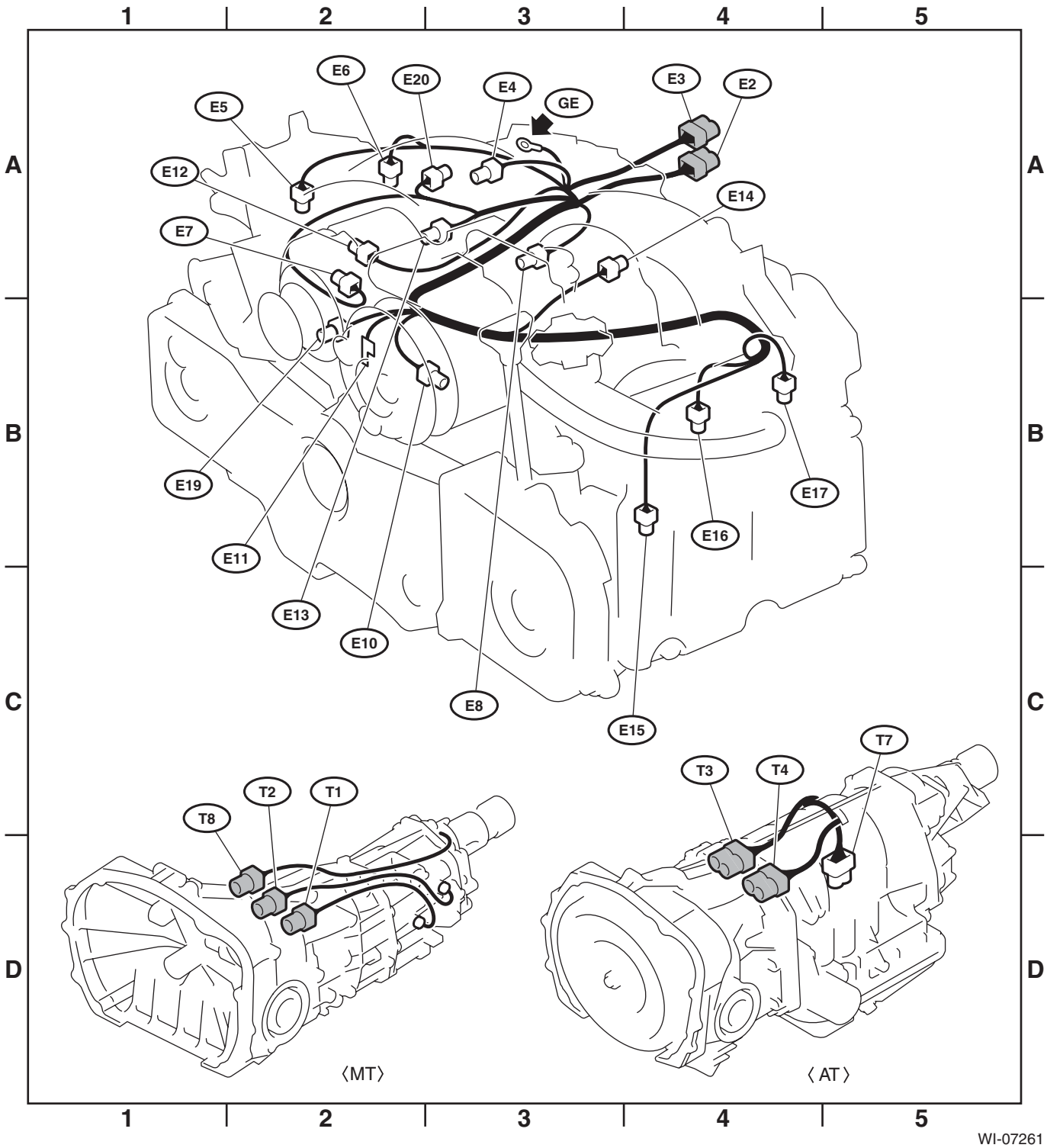
A: LOCATION

1. SOHC WITHOUT OBD MODEL

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
E2	20	Light gray	A-4	B21	Bulkhead wiring harness
E3	16	Brown	A-4	B22	Bulkhead wiring harness
E4	2	Blue	A-3		Purge control solenoid valve
E5	2	Light gray	A-2		Fuel injector No. 1
E6	2	Light gray	A-2		Fuel injector No. 3
E7	6	Black	A-2		Idle air control solenoid valve
E8	3	Light gray	A-3		Engine coolant temperature sensor and thermometer
E10	2	Light gray	B-3		Crankshaft position sensor
E11	1	★	B-2		Oil pressure switch
E12	4	Gray	A-2		Ignition coil and ignitor (1.6 L model)
		Dark gray	A-2		Ignition coil and ignitor (Except 1.6 L model)
E13	3	Brown	A-3		Throttle position sensor
E14	2	★	A-3		Knock sensor
E15	2	Black	B-4		Camshaft position sensor
E16	2	Light gray	B-4		Fuel injector No. 2
E17	2	Light gray	B-4		Fuel injector No. 4
E19	1	★	B-2		Power steering oil pressure switch
E20	4	Black	A-3		Pressure sensor and intake air temperature sensor
★: Non-colored					

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
T1	2	Gray	D-2	B24	Bulkhead wiring harness (MT)
T2	2	Brown	D-2	B25	Bulkhead wiring harness (MT)
T3	12	Black	D-4	B12	Bulkhead wiring harness (AT)
T4	20	Black	D-4	B11	Bulkhead wiring harness (AT)
T7	12	★	D-5		Inhibitor switch (AT)
T8	2	★	D-2	B29	Bulkhead wiring harness (MT)
★: Non-colored					

Engine Wiring Harness and Transmission Cord

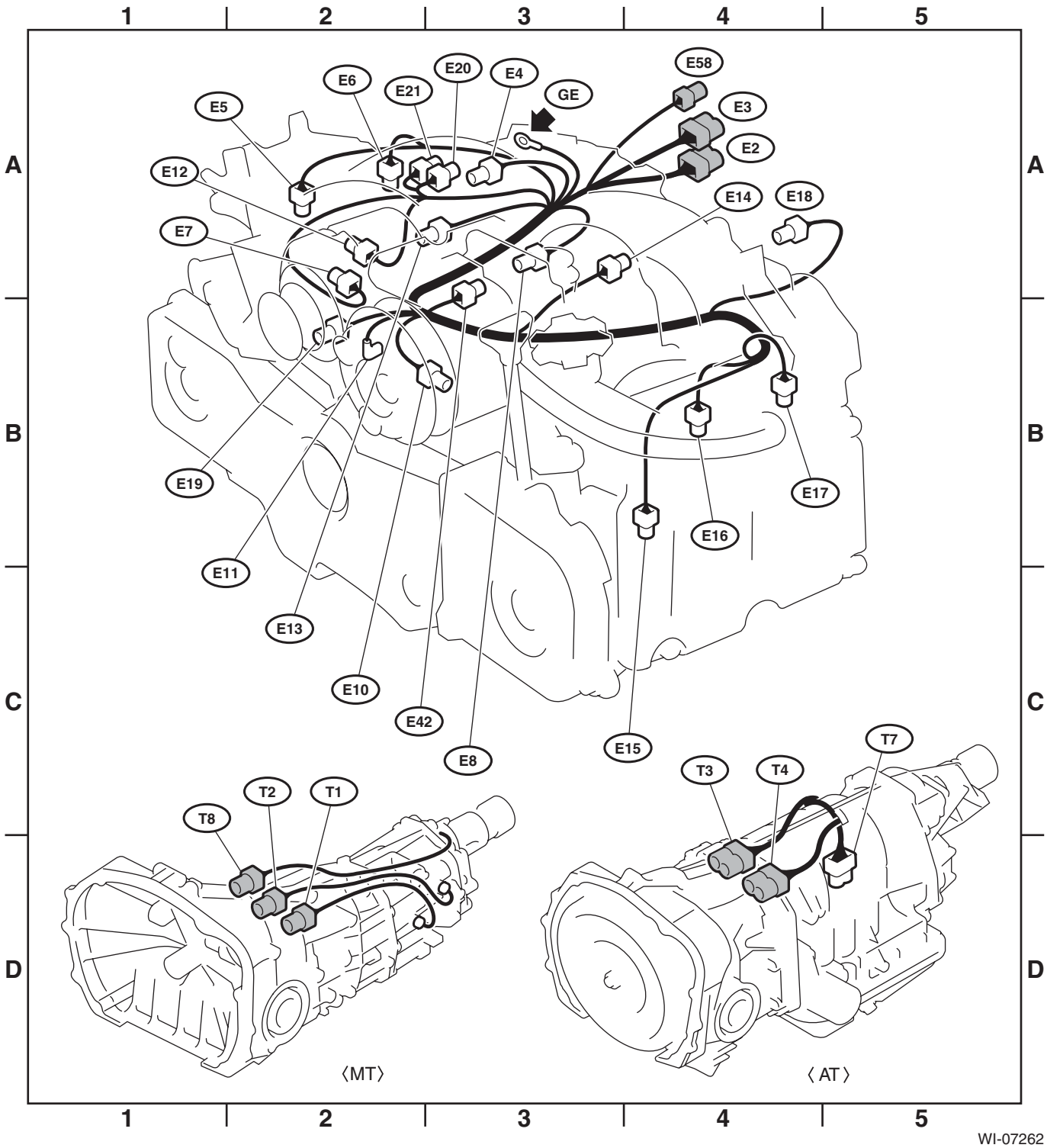


2. SOHC WITH OBD MODEL

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
E2	20	Light gray	A-4	B21	Bulkhead wiring harness
E3	16	Brown	A-4	B22	Bulkhead wiring harness
E4	2	Black	A-3		Purge control solenoid valve
E5	2	Light gray	A-2		Fuel injector No. 1
E6	2	Light gray	A-2		Fuel injector No. 3
E7	6	Black	A-2		Idle air control solenoid valve
E8	3	Light gray	A-3		Engine coolant temperature sensor and thermometer
E10	2	Light gray	B-3		Crankshaft position sensor
E11	1	★	B-2		Oil pressure switch
E12	4	Gray	A-2		Ignition coil and ignitor (1.6 L model)
		Dark gray	A-2		Ignition coil and ignitor (Except 1.6 L model)
E13	3	Brown	A-3		Throttle position sensor
E14	2	Light gray	A-3		Knock sensor
E15	2	Black	B-4		Camshaft position sensor
E16	2	Light gray	B-4		Fuel injector No. 2
E17	2	Light gray	B-4		Fuel injector No. 4
E18	6	Dark gray	A-4		EGR valve
E19	1	★	B-2		Power steering oil pressure switch
E20	2	Black	A-3		Intake air temperature sensor
E21	3	Light gray	A-2		Pressure sensor
E42	2	Purple	A-3		Air assist injector solenoid valve
E58	6	Black	A-4	B328	Bulkhead wiring harness
★: Non-colored					

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
T1	2	Gray	D-2	B24	Bulkhead wiring harness (MT)
T2	2	Brown	D-2	B25	Bulkhead wiring harness (MT)
T3	12	Black	D-4	B12	Bulkhead wiring harness (AT)
T4	20	Black	D-4	B11	Bulkhead wiring harness (AT)
T7	12	★	D-5		Inhibitor switch (AT)
T8	2	★	D-2	B29	Bulkhead wiring harness (MT)
★: Non-colored					

Engine Wiring Harness and Transmission Cord

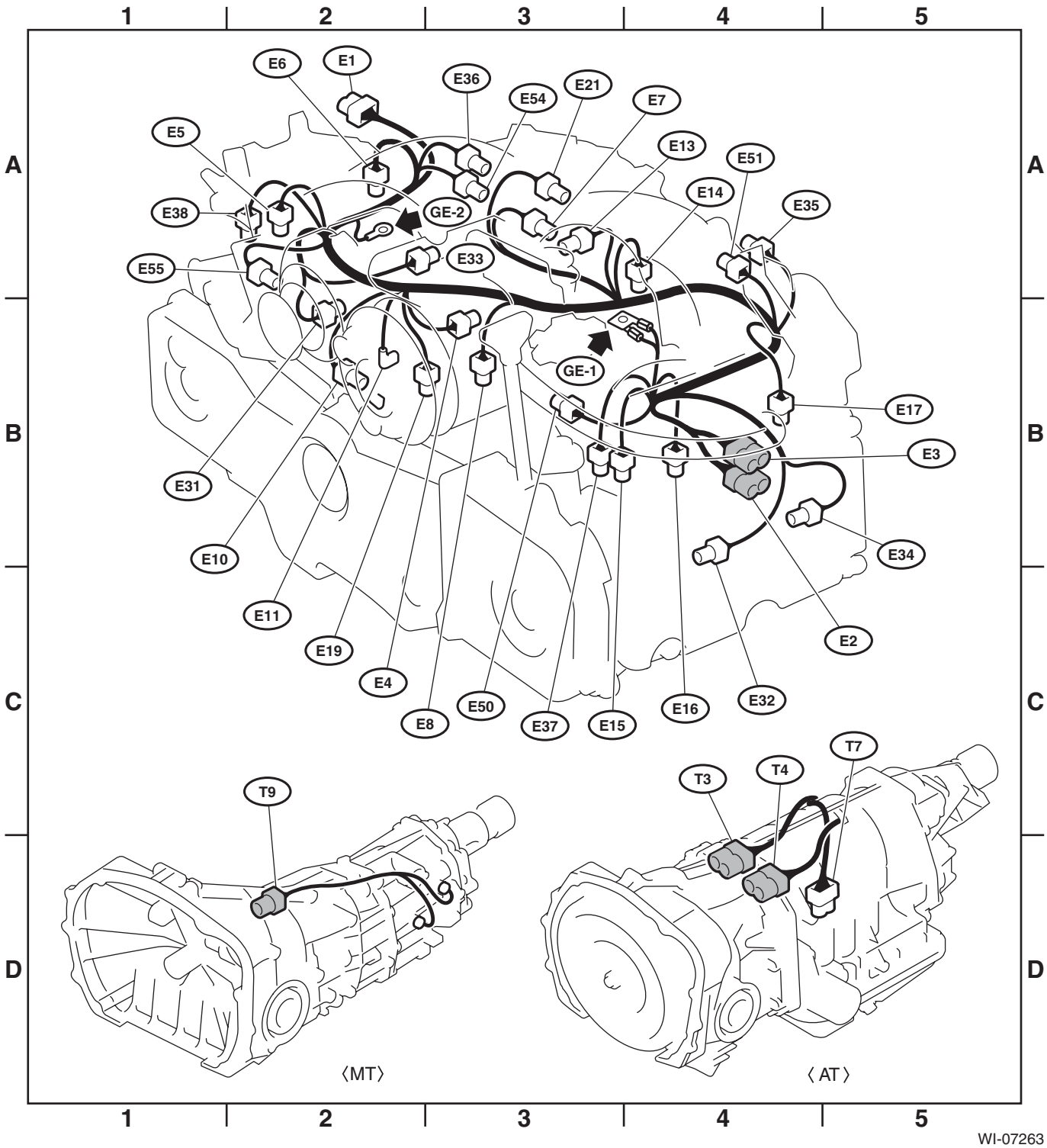


3. DOHC TURBO MODEL

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
E1	10	Light gray	A-2	B20	Bulkhead wiring harness
E2	20	Black	B-4	F61	Front wiring harness (LHD model)
				B21	Bulkhead wiring harness (RHD model)
E3	16	Brown	B-4	F60	Front wiring harness (LHD model)
				B22	Bulkhead wiring harness (RHD model)
E4	2	Black	B-3		Purge control solenoid valve
E5	2	Dark gray	A-2		Fuel injector No. 1
E6	2	Dark gray	A-2		Fuel injector No. 3
E7	3	Light gray	A-3		Idle air control solenoid valve
E8	3	Light gray	B-3		Engine coolant temperature sensor and thermometer
E10	2	Light gray	B-2		Crankshaft position sensor
E11	1	★	B-2		Oil pressure switch
E13	3	Black	A-3		Throttle position sensor
E14	2	Brown	A-4		Knock sensor (STi model and except for Australia STi-model)
	2	Light gray	A-4		Knock sensor (Except for STi model - except for Australia)
E15	2	Light gray	B-3		Camshaft position sensor
E16	2	Dark gray	B-4		Fuel injector No. 2
E17	2	Dark gray	B-4		Fuel injector No. 4
E19	1	Light gray	B-2		Power steering oil pressure switch
E21	3	Black	A-3		Pressure sensor
E31	3	★	B-2		Ignition coil No. 1
E32	3	★	B-4		Ignition coil No. 2
E33	3	Black	A-3		Ignition coil No. 3
E34	3	Black	B-4		Ignition coil No. 4
E35	2	★	A-4		Active valve control camshaft position sensor LH
E36	2	★	A-3		Active valve control camshaft position sensor RH
E37	2	Blue	B-3		Active valve control solenoid valve LH
E38	2	Blue	A-2		Active valve control solenoid valve RH
E50	3	Black	B-3		Tumble generator valve angle sensor LH
E51	2	Black	A-4		Tumble generator valve LH
E54	3	Black	A-3		Tumble generator valve angle sensor RH
E55	2	Black	A-2		Tumble generator valve RH
★: Non-colored					

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
T3	12	Black	D-4	B12	Bulkhead wiring harness (AT)
T4	20	Black	D-4	B11	Bulkhead wiring harness (AT)
T7	12	★	D-5		Inhibitor switch (AT)
T9	4	★	D-2	B128	Bulkhead wiring harness (MT model without Driver's control center differential)
	6	★	D-2	B128	Bulkhead wiring harness (MT model with Driver's control center differential)
★: Non-colored					

Engine Wiring Harness and Transmission Cord



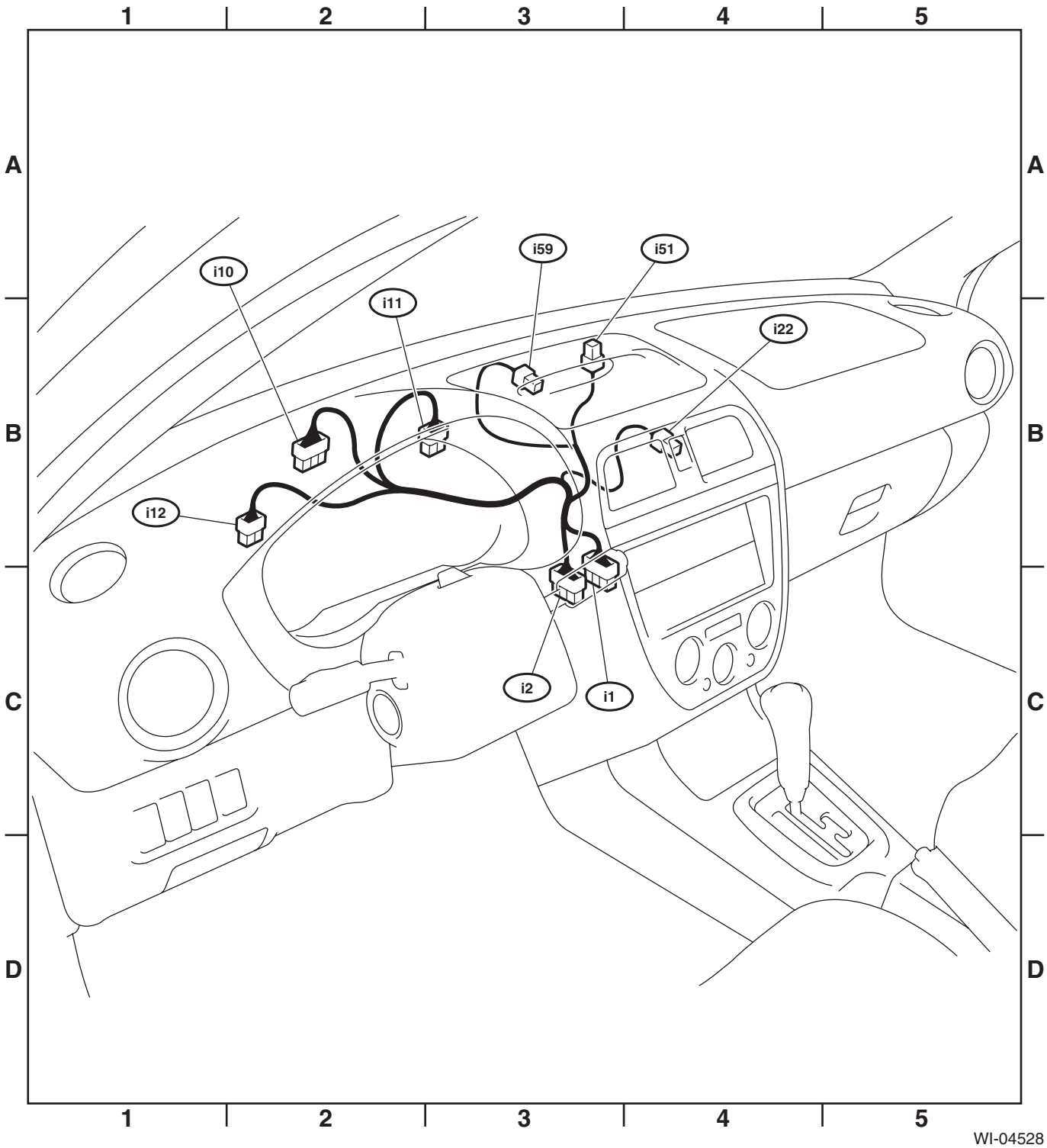
53.Instrument Panel Wiring Harness

A: LOCATION

1. LHD MODEL

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
i1	28	Blue	C-3	B36	Bulkhead wiring harness
i2	25	★	C-3	B37	
i10	30	Green	B-2		Combination meter
i11	10	Green	B-3		
i12	14	Green	B-2		
i22	8	★	B-4		Hazard switch
i51	2	★	B-3		Sunload sensor
i59	4	★	B-3		Clock
★: Non-colored					

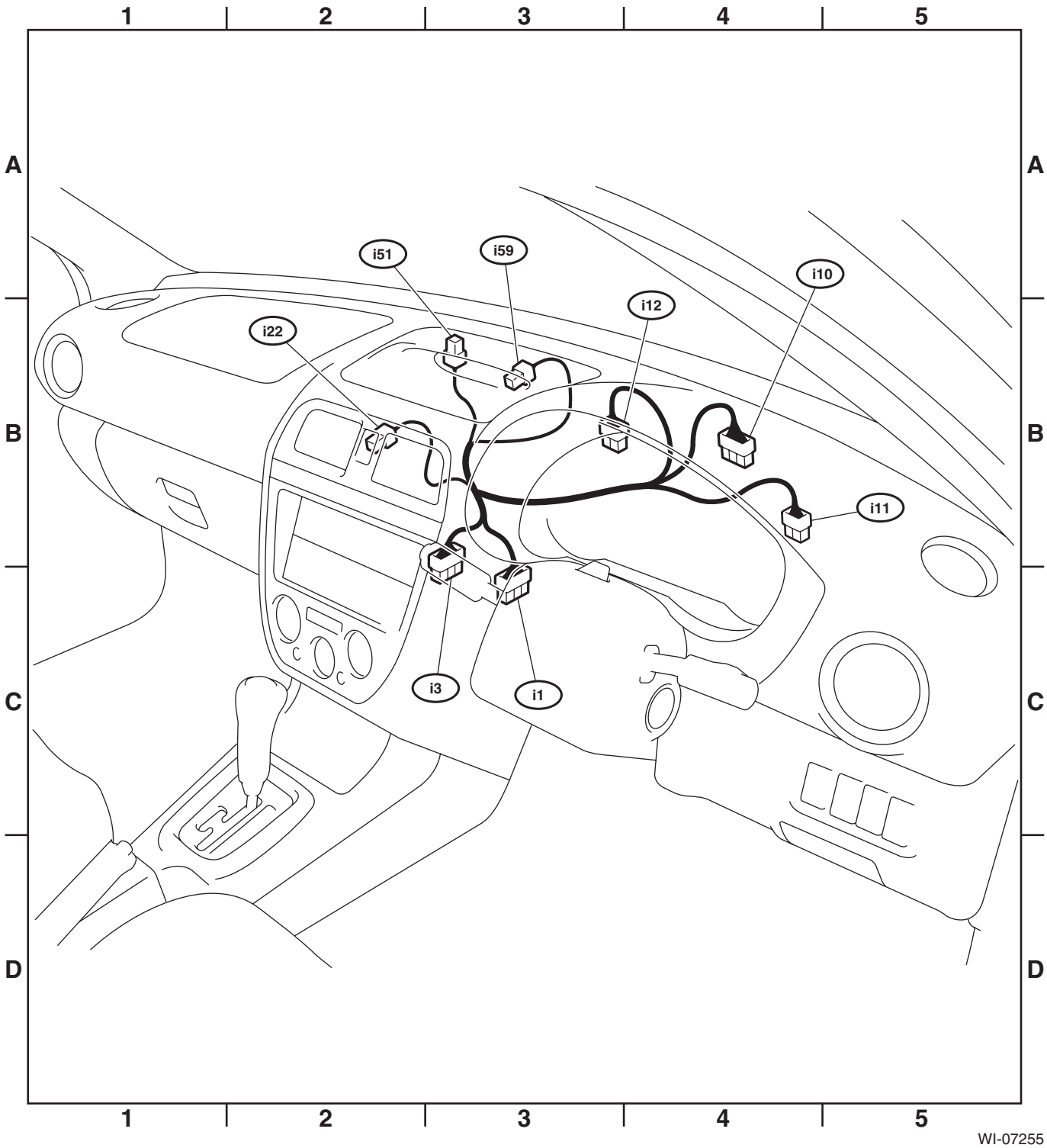
Instrument Panel Wiring Harness



2. RHD MODEL

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
i1	22	Black	C-3	B36	Bulkhead wiring harness
i3	32	Black	C-3	B38	Bulkhead wiring harness (AT model and MT model with Driver's control center differential)
i10	30	Green	B-4		Combination meter
i11	10	Green	B-4		
i12	14	Green	B-3		Combination meter (Normal meter)
	16	Green	B-3		Combination meter (Red luminescent meter)
i22	8	★	B-2		Hazard switch
i51	2	★	B-3		Sunload sensor
i59	4	★	B-3		Clock
★: Non-colored					

Instrument Panel Wiring Harness



54.Rear Wiring Harness

A: LOCATION

1. LHD MODEL

• Rear Wiring Harness

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
R1	8	★	B-2	B97	Bulkhead wiring harness
R3	24	★	B-2	B99	Bulkhead wiring harness
R4	1	Black	B-3		Parking brake switch
R8	2	★	C-4		Seat belt switch
R15	4	★	B-3	R57	Fuel tank cord
R22	3	★	B-5		Rear door switch LH
R41	4	Blue	B-2		Seat heater RH
R42	4	★	B-3		Seat heater switch RH
R43	4	Blue	B-3		Seat heater switch LH
R44	4	Blue	C-4		Seat heater LH
R46	2	Black	B-3	R67	Fuel tank cord
R72	2	★	B-3		Rear ABS sensor RH
R73	2	★	B-5		Rear ABS sensor LH
R97	2	★	B-5		Antenna amp. (Sedan model)
R240	6	★	C-3		AT power mode & hold mode switch
★: Non-colored					

• Bulkhead Wiring Harness

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
B97	8	★	B-2	R1	Rear wiring harness
B99	24	★	B-2	R3	Rear wiring harness
B265	8	★	A-2	D27	Rear door cord RH
B267	3	★	C-4		Front door switch LH
B268	3	★	B-2		Front door switch RH
B269	8	★	B-5	D21	Rear door cord LH
★: Non-colored					

• Roof Cord

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
R50	4	★	B-1	B90	Bulkhead wiring harness
R52	3	★	A-3		Room light
R55	1	Gray	A-2		Sunroof
R56	2	★	A-3		Spot map light
★: Non-colored					

• Fuel Tank Cord

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
R57	4	★	B-3	R15	Rear wiring harness
R58	6	★	B-3		Fuel pump assembly
R59	2	★	B-4		Fuel sub level sensor (Turbo model)
R67	2	Black	B-3	R46	Rear wiring harness
R148	1	★	B-4		Rear differential gear oil temperature sensor (+)
R159	1	Black	B-4		Rear differential gear oil temperature sensor (–)
★: Non-colored					

• Airbag Wiring Harness

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
AB7	12	Yellow	C-2		Airbag control module
AB8	12	Yellow	B-2		Airbag control module
AB9	2	Yellow	C-4	AB29	Side airbag module LH
AB10	4	Yellow	B-5		Side sensor LH
AB11	2	Yellow	B-2	AB28	Side airbag module RH
AB12	4	Yellow	B-2		Side sensor RH
AB19	2	Yellow	C-4		Pretensioner LH
AB20	2	Yellow	B-2		Pretensioner RH

Rear Wiring Harness

2. RHD MODEL

• Rear Wiring Harness

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
R1	8	Black	B-2	B97	Bulkhead wiring harness
R3	32	★	B-2	B99	Bulkhead wiring harness
R4	1	★	B-3		Parking brake switch
R8	2	★	B-2		Seat belt switch
R15	4	★	B-3	R57	Fuel tank cord
R22	3	★	B-5		Rear door switch LH
R41	4	Blue	B-2		Seat heater RH
R42	4	★	B-3		Seat heater switch RH
R43	4	Blue	B-3		Seat heater switch LH
R44	4	Blue	C-4		Seat heater LH
R46	2	Black	B-3	R67	Fuel tank cord
R72	2	★	B-3		Rear ABS sensor RH
R73	2	★	B-5		Rear ABS sensor LH
R97	2	★	B-5		Antenna amp. (Sedan model)
★: Non-colored					

• Bulkhead Wiring Harness

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
B97	8	Black	B-2	R1	Rear wiring harness
B99	32	★	B-2	R3	Rear wiring harness
B265	8	★	B-2	D27	Rear door cord RH
B267	3	★	B-2		Front door switch RH
B268	3	★	C-4		Front door switch LH
B269	8	★	B-5	D21	Rear door cord LH
★: Non-colored					

• Roof Cord

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
R50	4	★	B-1	B90	Bulkhead wiring harness
R52	3	★	A-3		Room light
R55	1	Gray	A-2		Sunroof
R56	2	★	A-3		Spot map light
★: Non-colored					

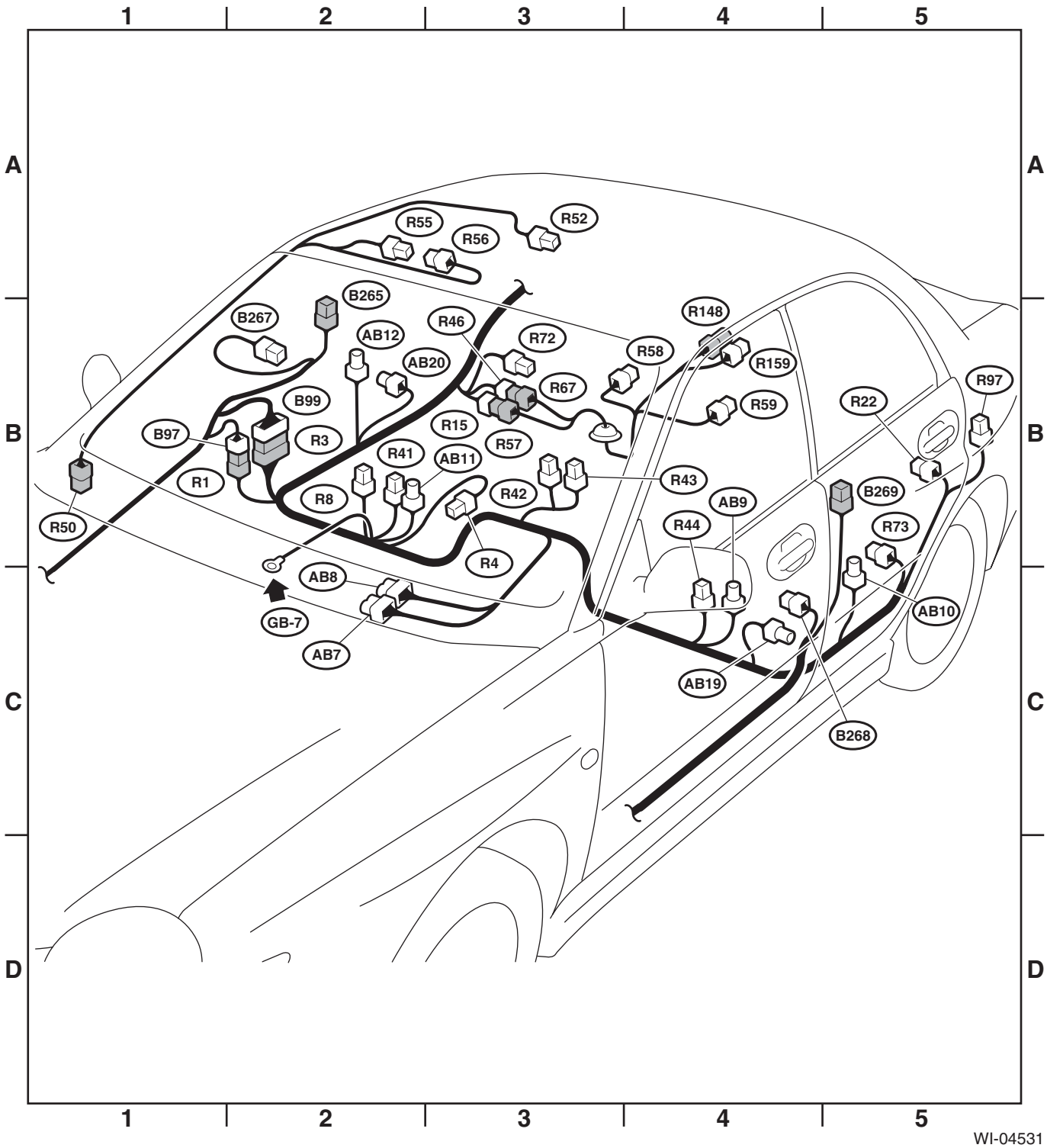
• Fuel Tank Cord

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
R57	4	★	B-3	R15	Rear wiring harness
R58	6	★	B-3		Fuel pump assembly
R59	2	★	B-4		Fuel sub level sensor (Turbo and 2.5 L model)
R67	2	Black	B-3	R46	Rear wiring harness
R148	1	★	B-4		Rear differential gear oil temperature sensor (+)
R159	1	Black	B-4		Rear differential gear oil temperature sensor (−)
★: Non-colored					

• Airbag Wiring Harness

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
AB7	12	Yellow	C-2		Airbag control module
AB8	12	Yellow	C-2		Airbag control module
AB9	2	Yellow	C-4	AB29	Side airbag module LH
AB10	4	Yellow	C-5		Side sensor LH
AB11	2	Yellow	B-2	AB28	Side airbag module RH
AB12	4	Yellow	B-2		Side sensor RH
AB19	2	Yellow	C-4		Pretensioner LH
AB20	2	Yellow	B-2		Pretensioner RH

Rear Wiring Harness



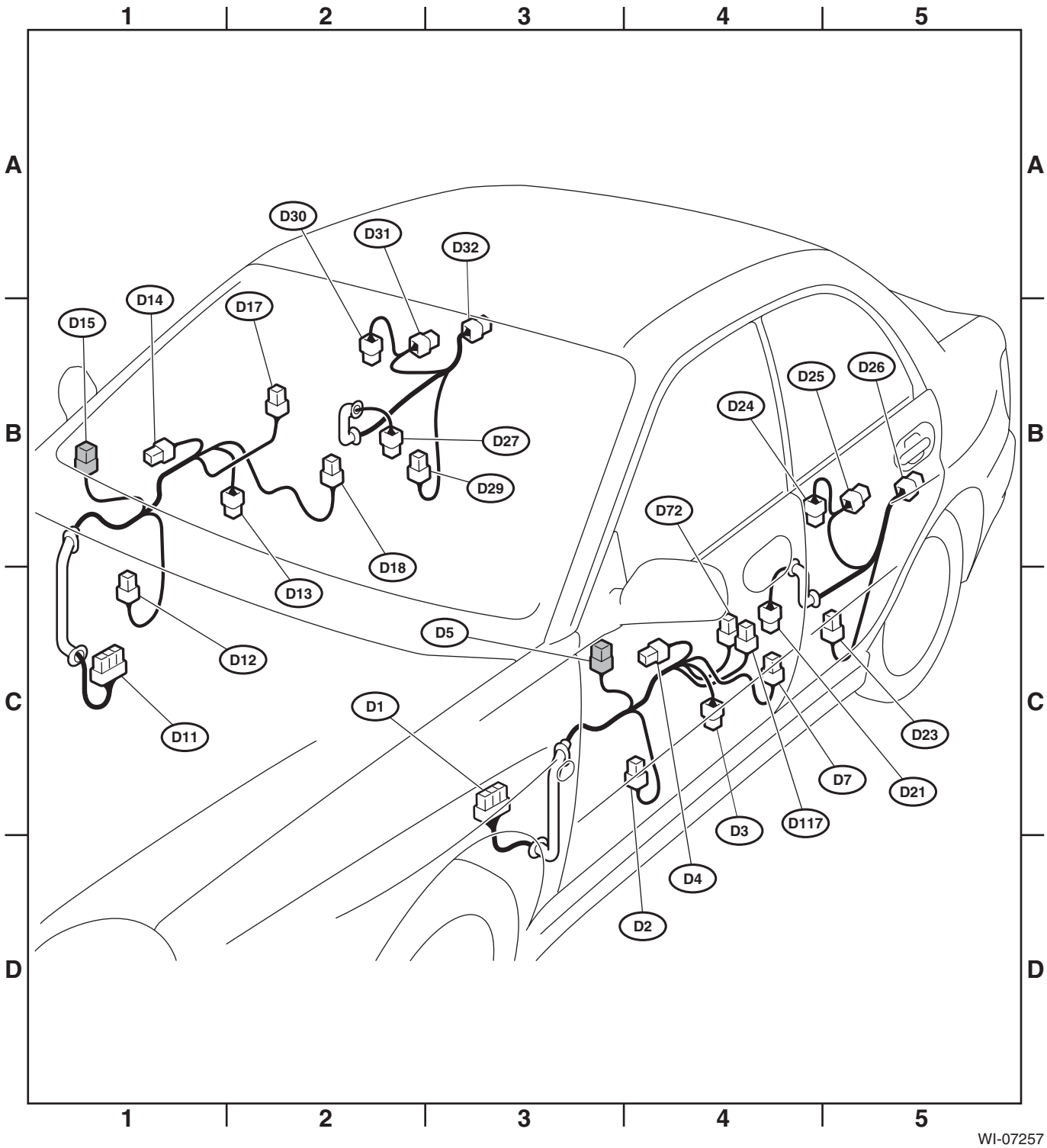
55.Door Cord

A: LOCATION

1. LHD MODEL

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
D1	25	★	C-3	B30	Bulkhead wiring harness
D2	2	★	C-4		Front door speaker (Driver side)
D3	2	Black	C-4		Front power window motor (Driver side)
D4	2	Black	C-4		Front door tweeter (Driver side)
D5	6	★	C-3		Rearview mirror LH (Without mirror heater)
	8	Black	C-3		Rearview mirror LH (With mirror heater)
D7	16	★	C-4		Power window main switch
D11	25	★	C-1	B101	Bulkhead wiring harness
D12	2	★	C-1		Front door speaker RH
D13	2	Black	B-2		Front power window motor RH
D14	2	★	B-1		Front door tweeter RH
D15	6	★	B-1		Rearview mirror RH (Without mirror heater)
	8	Black	B-1		Rearview mirror RH (With mirror heater)
D17	8	Brown	B-2		Front power window sub switch RH
D18	4	★	B-2		Front door lock actuator RH
D21	8	★	C-4	B269	Bulkhead wiring harness
D23	2	★	C-5		Rear door speaker LH
D24	2	Black	B-4		Rear power window motor LH
D25	8	★	B-5		Rear power window sub switch LH
D26	4	★	B-5		Rear door lock actuator LH
D27	8	★	B-2	B265	Bulkhead wiring harness
D29	2	★	B-2		Rear door speaker RH
D30	2	Black	B-2		Rear power window motor RH
D31	8	★	B-2		Rear power window sub switch RH
D32	4	★	B-3		Rear door lock actuator RH
D72	4	★	C-4		Front door lock actuator LH
D117	10	★	C-4		Remote control mirror switch
★: Non-colored					

Door Cord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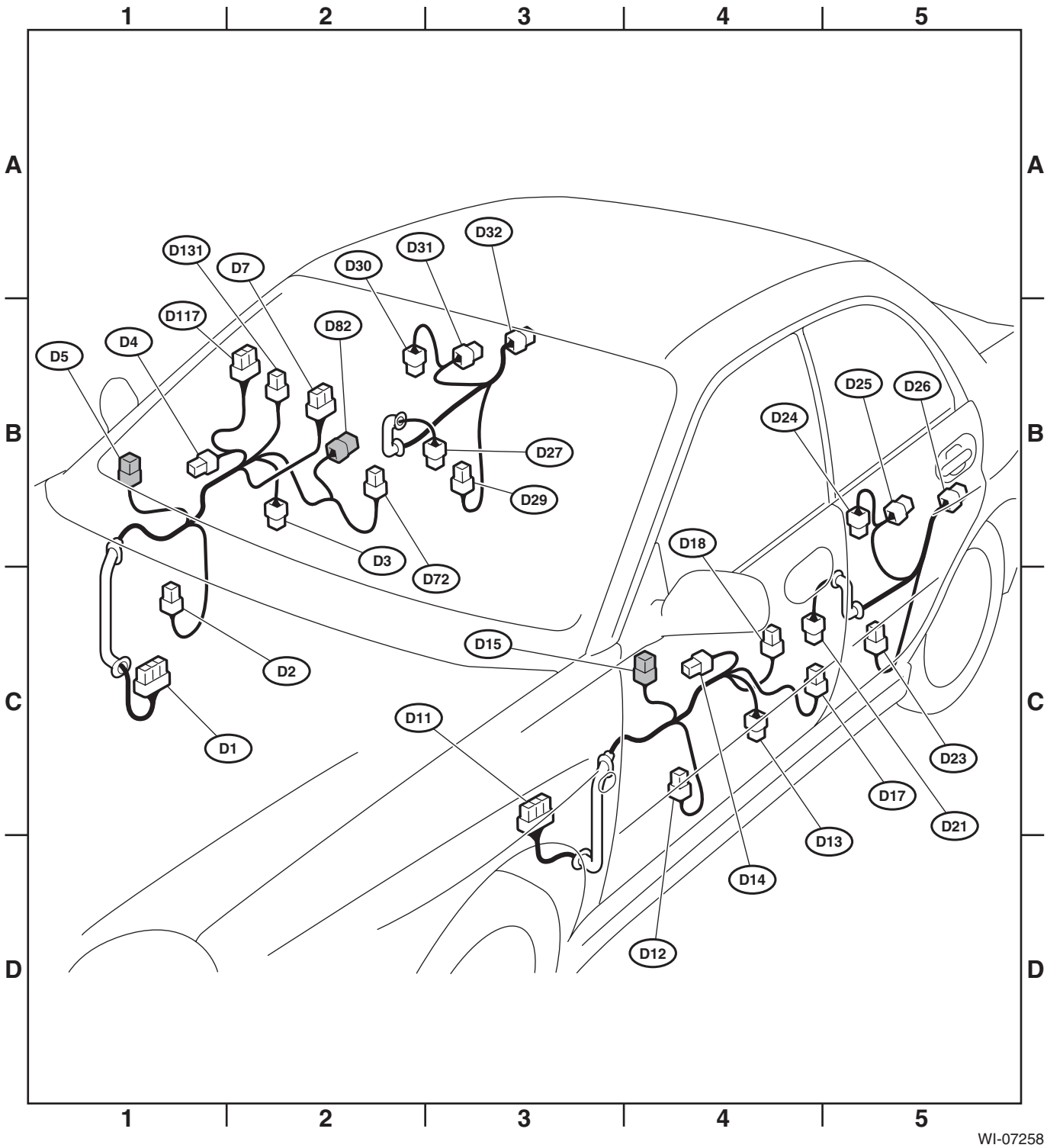
2. RHD MODEL

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
D1	25	★	C-1	B30	Bulkhead wiring harness
D2	2	★	C-1		Front door speaker (Driver side)
D3	2	Black	B-2		Front power window motor (Driver side)
D4	2	★	B-1		Front door tweeter (Driver side)
D5	6	★	B-1		Rearview mirror RH (Without mirror heater)
	8	Black	B-1		Rearview mirror RH (With mirror heater)
D7	16	★	B-2		Power window main switch
D11	25	★	C-3	B101	Bulkhead wiring harness
D12	2	★	C-4		Front door speaker LH
D13	2	Black	C-4		Front power window motor LH
D14	2	★	C-4		Front door tweeter LH
D15	6	★	C-4		Rearview mirror LH (Without mirror heater)
	8	Black	C-3		Rearview mirror LH (With mirror heater)
D17	8	Brown	C-4		Front power window sub switch LH
D18	4	★	C-4		Front door lock actuator LH (Without double lock)
	6	Black	C-4		Front door lock actuator LH (With double lock)
D21	8	★	C-4	B267	Bulkhead wiring harness
D23	2	★	C-5		Rear door speaker LH
D24	2	Black	B-5		Rear power window motor LH
D25	8	★	B-5		Rear power window sub switch LH
D26	4	★	B-5		Rear door lock actuator LH (Without double lock)
	6	Black	B-5		Rear door lock actuator LH (With double lock)
D27	8	★	B-2	B265	Bulkhead wiring harness
D29	2	★	B-3		Rear door speaker RH
D30	2	Black	B-2		Rear power window motor RH
D31	8	★	B-3		Rear power window sub switch RH
D32	4	★	B-3		Rear door lock actuator RH (Without double lock)
	6	Black	B-3		Rear door lock actuator RH (With double lock)
D72	4	★	B-2		Front door lock actuator RH (Without double lock)
	6	Black	B-2		Front door lock actuator RH (With double lock)
D82	3	Brown	B-2		Key cylinder switch
D117	10	★	B-2		Remote control mirror switch
D131	3	★	B-2		Power window main switch
★: Non-colored					

Door Cord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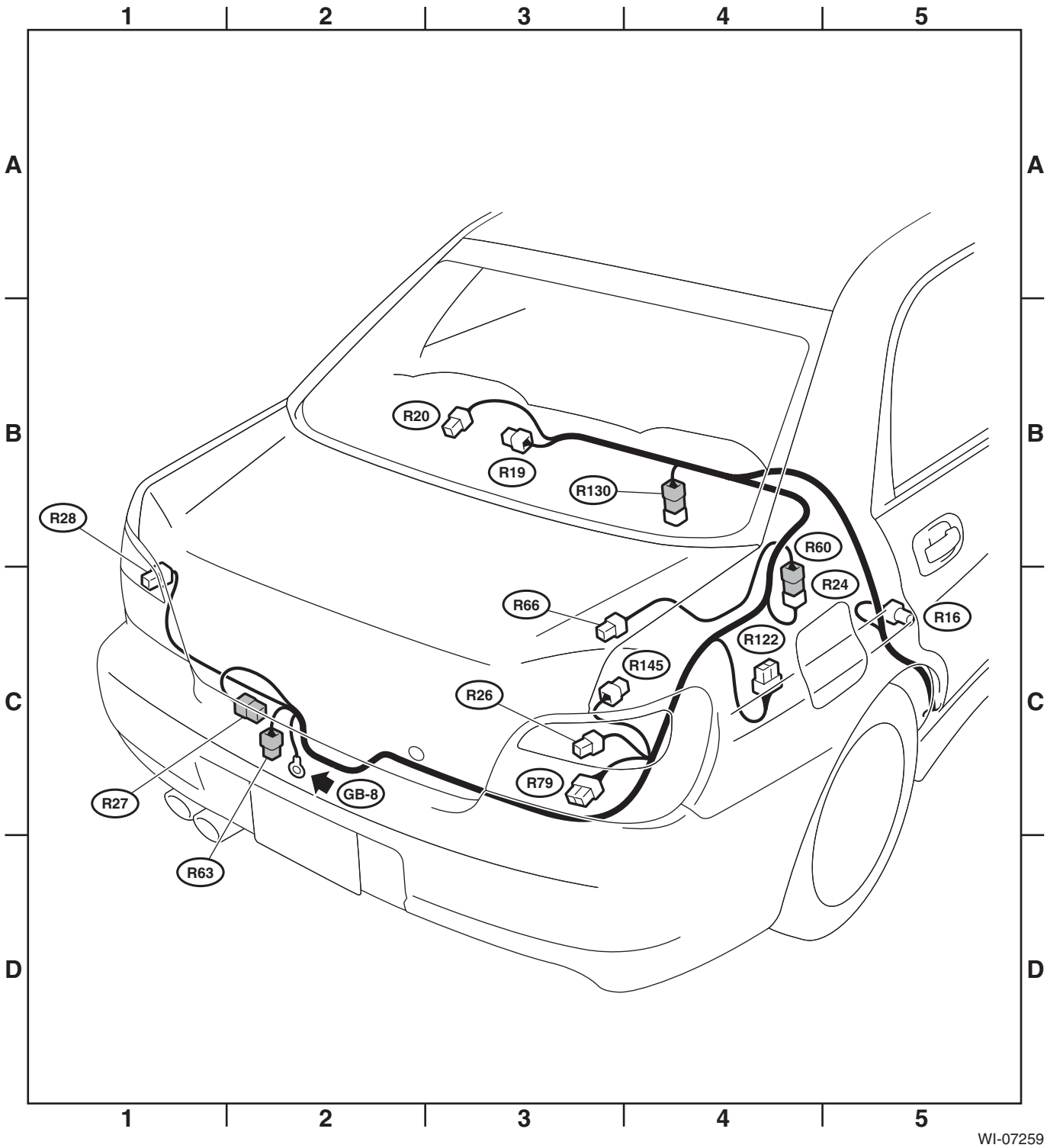
WI-07258

56.Rear Wiring Harness and Trunk Lid Cord

A: LOCATION

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
R16	3	★	C-5		Rear door switch RH
R19	2	★	B-3		High-mounted stop light
R20	2	Black	B-3		Trunk room light
R24	2	★	C-4	R60	Trunk lid cord
R26	6	★	C-3		Rear combination light RH
R27	2	★	C-2		Trunk room light switch
R28	6	★	C-1		Rear combination light LH
R60	2	★	C-4	R24	Rear wiring harness
R63	2	Black	C-2		License plate light
R66	2	Black	C-3		High-mounted stop light (Rear spoiler)
R79	10	★	C-3		Trailer connector
R122	10	Black	C-4		Fuel pump control module (Turbo model)
R130	2	★	B-4		Rear defogger choke coil
R145	4	★	C-3		Intercooler water spray motor
★: Non-colored					

Rear Wiring Harness and Trunk Lid Cord



57.Rear Wiring Harness and Rear Gate Cord

A: LOCATION

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
R16	3	★	C-5		Rear door switch RH
R26	6	★	C-4		Rear combination light RH
R28	6	★	C-1		Rear combination light LH
R30	2	★	D-4		Diode (Luggage room light)
R37	2	★	D-4	D33	Rear gate cord
R38	4	★	D-4	D34	Rear gate cord
R39	4	Blue	D-4	D35	Rear gate cord
R63	2	Black	D-2		License plate light
R79	10	★	D-3		Trailer connector
R97	2	★	C-1		Antenna amp.
R116	8	★	C-4		Rear wiper intermittent module
R122	10	Black	C-4		Fuel pump control module (Turbo model)
R141	2	★	C-3		Luggage room light
★: Non-colored					

Connector				Connecting to	
No.	Pole	Color	Area	No.	Name
D33	2	★	D-4	R37	Rear wiring harness
D34	4	★	D-4	R38	Rear wiring harness
D35	4	Blue	D-4	R39	Rear wiring harness
D39	2	★	B-3		High-mounted stop light
D43	4	★	A-2		Rear wiper motor
D46	2	Black	A-2		Rear gate latch switch
D47	2	Blue	A-3		Rear gate lock actuator cord
D48	1	Black	A-3		Rear defogger (–)
D74	2	★	A-4		Rear defogger choke coil
★: Non-colored					

Rear Wiring Harness and Rear Gate Cord