

WORKSHOP MANUAL

NHR · NKR · NPR

MANUAL TRANSMISSION AND CLUTCH MSB SERIES

SECTION 7

ISUZU

ISUZU



International Service & Parts
Tokyo, Japan

NOTICE

Before using this Workshop Manual to assist you in performing vehicle service and maintenance operations, it is recommended that you carefully read and thoroughly understand the information contained in Section 0A under the headings "GENERAL REPAIR INSTRUCTIONS" and "HOW TO USE THIS MANUAL".

All material contained in this Manual is based on latest product information available at the time of publication.

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Applicable Model

N Series		
NHR55	NKR55	NPR69
NHR69	NKR69	
	NKR17	

This manual is applicable to 1994 year model and later vehicles.

THIS MANUAL INCLUDES THE FOLLOWING SECTIONS:

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7B	Manual Transmission
7C	Clutch

SECTION 00

SERVICE INFORMATION

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TROUBLESHOOTING

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TROUBLESHOOTING

TRANSMISSION

PROBLEM	POSSIBLE CAUSE	CORRECTION
Abnormal Noise	<ol style="list-style-type: none"> 1. Flywheel pilot bearing worn. 2. Bearing worn or broken (Main shaft or counter shaft). 3. Anti-lash plate malfunction. 4. Gear tooth contact surface worn or scuffed (Main shaft, counter shaft and/or reverse idle gear). 5. Spline worn (Synchronizer clutch hub). 6. Gear, clutch hub or thrust washer thrust face seized. 7. Lack of backlash between mating gears. 	<ol style="list-style-type: none"> 1. Replace. 2. Repair or replace 3. Repair or replace. 4. Repair or replace. 5. Replace. 6. Replace. 7. Replace.
Hard Shifting	<ol style="list-style-type: none"> 1. Improper clutch pedal free play. 2. Wrong oil in use. 3. Gear control linkage misadjust. 4. Change lever sliding portions worn. 5. Shift block, shift rod and/or control box sliding faces worn. 6. Shift arm and/or synchronizer sleeve groove worn. 7. Synchronizer parts worn or weakend. 8. Thrust washer, collar, and/or gear thrust faces worn (Main shaft and/or counter shaft thrust play). 	<ol style="list-style-type: none"> 1. Readjust. 2. Replace with recommended oil. 3. Readjust. 4. Repair or replace. 5. Repair or replace. 6. Replace. 7. Replace. 8. Replace.
Walking or Jumping out of Gear	<ol style="list-style-type: none"> 1. Gear control linkage misadjust. 2. Detent spring weakened or broken. 3. Detent ball worn. 4. Change lever sliding portions worn. 5. Shift block, shift rod and/or control box sliding faces worn. 6. Shift arm and/or synchronizer sleeve groove worn. 7. Synchronizer parts worn or weakened. 8. Thrust washer, collar, and/or gear thrust faces worn (Main shaft and/or counter shaft thrust play). 9. Spline worn (Synchronizer hub). 10. Bearings worn or broken. 	<ol style="list-style-type: none"> 1. Readjust. 2. Replace. 3. Replace. 4. Repair or replace. 5. Repair or replace. 6. Replace. 7. Replace. 8. Replace. 9. Replace. 10. Replace.

TROUBLESHOOTING (CONT.)

CLUTCH

PROBLEM	POSSIBLE CAUSE	CORRECTION
Dragging	<ol style="list-style-type: none"> 1. Hydraulic line leakage. 2. Air in line. 3. Master cylinder and/or slave cylinder piston cup worn. 4. Driven plate worn or warped. 5. Diaphragm spring weak or tip of finger worn. 6. Driven plate sticking on spline. 7. Release bearing worn or damaged. 8. Clutch pedal excessive free play. 	<ol style="list-style-type: none"> 1. Repair. 2. Bleed and check for damage. 3. Replace. 4. Replace driven plate. 5. Replace pressure plate assembly. 6. Clean and free spline and lubricate with grease. 7. Replace release bearing. 8. Readjust.
Slipping	<ol style="list-style-type: none"> 1. Driven plate facing worn or oil soaked. 2. Diaphragm spring weak. 3. Pressure plate and/or flywheel warped. 4. Clutch pedal lack of free play. 	<ol style="list-style-type: none"> 1. Replace driven plate and check for leaks as needed. 2. Replace pressure plate assembly. 3. Repair or replace. 4. Readjust.
Shudder (Chattering)	<ol style="list-style-type: none"> 1. Engine mounting loose or broken. 2. Driven plate facing warped. 3. Driven plate surface of facing hardened. 4. Driven plate facing oil soaked. 5. Driven plate damper spring weakened or broken. 6. Pressure plate and/or flywheel warped. 	<ol style="list-style-type: none"> 1. Tighten or replace. 2. Replace driven plate. 3. Replace driven plate. 4. Replace driven plate and check for leaks. 5. Replace driven plate. 6. Repair or replace.
Noisy	<ol style="list-style-type: none"> 1. Release bearing binding. 2. Release bearing worn or broken. 3. Release bearing insufficiently lubricate. 4. Driven plate damper springs weakened or broken. 5. Pilot bearing worn or broken. 6. Driven plate rivet loosen. 7. Ball stud insufficiently lubricate. 8. Clutch pedal lack of free play. 9. Clutch pedal shaft insufficiently lubricate. 10. Pilot bearing loose or broken. 	<ol style="list-style-type: none"> 1. Clean or replace if damaged, and lubricate. 2. Replace. 3. Lubricate with grease or replace. 4. Replace driven plate. 5. Replace. 6. Replace driven plate. 7. Lubricate with grease. 8. Readjust. 9. Lubricate with grease. 10. Replace.
Pedal is Hard to Push	<ol style="list-style-type: none"> 1. Hydraulic line blocked or crimped. 2. Clutch pedal shaft insufficiently lubricate. 	<ol style="list-style-type: none"> 1. Clean out or replace. 2. Lubricate with grease.

MAIN DATA AND SPECIFICATIONS

TRANSMISSION Type		MSB-5 5 Speed		
Gear Mesh Type		1st to 5th : Synchro-mesh Reverse : Constant-mesh		
Control Type		Floor remote control		
Gear Ratio		(MSB-5S) (MSB-5M)		
		1st :	5.016	5.594
		2nd:	2.672	2.814
		3rd :	1.585	1.660
		4th :	1.000	1.000
		5th :	0.770	0.794
		Reverse:	4.783	5.334
Lubricating Oil		Engine Oil SAE 5W-30		
Oil Capacity	L (US qt/lmp qt)	Approx. 2.7 (2.9/2.4)		
POWER TAKE OFF Allowable Maximum Torque N·m(kg·m)		147 (15) / at output shaft 1000 RPM		
Gear Ratio (to Engine)		1.8214		
Revolution Direction		Clockwise (viewed from rear)		
CLUTCH		NHR55, NKR55	NHR69, NKR69, NPR69	NKR17
Pressure Plate		Diaphragm	Diaphragm	Disphragm
Spring Type		240 (9.4)	250 (9.8)	240 (9.4)
Outside Diameter	mm (in)	4,119 (420/926)	6,276 (640/1,411)	5,492 (560/1,235)
Clamping Force	N (kg/lb)	40.7-42.7	39.0-41.0	37.5-39.5
Spring Finger Height	mm (in)	(1.60-1.68)	(1.54-1.61)	(1.48-1.56)
Driven Plate				
Inside x Outside Diameter	mm (in)	240 x 160 (9.4 x 6.3)	250 x 160 (9.8 x 6.3)	240 x 160 (9.4 x 6.3)
Free Thickness	mm (in)	7.5-8.1 (0.295-0.319)	7.9-8.5 (0.311-0.335)	7.9-8.5 (0.311-0.335)
Clamping Thickness	mm (in)	7.1-7.7 (0.280-0.303)	7.7-8.3 (0.303-0.327)	7.7-8.3 (0.303-0.327)
Clutch Pedal				
Height	mm (in)	160-170 (6.3-6.7)		
Stroke	mm (in)	159-169 (6.3-6.7)		
Free Play	mm (in)	15-25 (0.6-1.0)		
Master Cylinder				
Bore Diameter	mm (in)	ø 19.050-19.102 (0.7500-0.7520)		
Slave Cylinder				
Bore Diameter	mm (in)	ø 26.990-27.042 (1.0626-1.0646)		ø 22.220-22.272 (0.8748-0.8768)

SERVICE STANDARD

TRANSMISSION

Items		Service Standard	Service Limit
Gear Shift Position between Center of Shift Lever Play and Instrument Center Cluster	mm(in)	Standard Cab : 247±15 (9.7±0.6) Wide Cab : 283±15 (11.1±0.6)	
Ball Bearing Run-out	mm(in)		0.2 (0.01)
Gear Inside Diameter	mm(in)	1st Gear : 61 (2.402) 2nd Gear : 54 (2.126) 3rd Gear : 42 (1.654) Reverse Gear : 54 (2.126)	61.1 (2.406) 54.1 (2.130) 42.1 (1.657) 54.1 (2.130)
Clearance between 5th gear and Main Shaft	mm(in)	0.05-0.09 (0.002-0.004)	0.2 (0.01)
Clearance between Reverse Idle Gear and Idle Gear Shaft	mm(in)	0.04-0.08 (0.002-0.003)	0.2 (0.01)
Spline Play between 5th Counter Gear and Counter Shaft at 5th Counter Gear Outer Circumference	mm(in)	0.18-0.43 (0.007-0.017)	0.45 (0.018)
Thrust Washer Thickness	mm(in)	2nd : 3.0 (0.12) 5th : 3.8 (0.15)	2.8 (0.11) 3.6 (0.14)
Main Shaft Run-out	mm(in)	Less than 0.025 (0.0010)	0.1 (0.004)
Clearance between Block Ring and Dog Gear	mm(in)	3rd/4th : 1.0 (0.04) 1st/2nd : 1.5 (0.06) 5th : 1.5 (0.06)	0.5 (0.02) 0.5 (0.02) 0.5 (0.02)
Spline Play between Clutch Hub and Main Shaft at Clutch Hub Outer Circumference	mm(in)	Less than 0.05 (0.002)	0.3 (0.01)
Clearance between Block Ring and Insert	mm(in)	3.59-3.91 (0.141-0.154)	4.1 (0.16)
Clearance between Clutch Hub and Insert	mm(in)	0.09-0.31 (0.004-0.012)	0.4 (0.02)
Shift Arm Thickness	mm(in)	10.0 (0.39)	9.0 (0.35)
Detent Spring Free Length	mm(in)	31.6 (1.24)	30.1 (1.19)

SERVICE STANDARD (CONT.)

CLUTCH

Items		Service Standard	Service Limit
Pressure Plate Distortion	mm (in)		0.3 (0.01)
Pressure Plate Clamping Force	N (kg/lb)		
NHR55, NKR55		4,119 (420/926)	3,785 (386/851)
NHR69, NKR69, NPR69		6,276 (640/1,411)	5,776 (589/1,299)
NKR17		5,492 (560/1,235)	5,050 (515/1,136)
Diaphragm Spring Finger Height	mm (in)		
NHR55, NKR55		40.7-42.7 (1.60-1.68)	
NHR69, NKR69, NPR69		39.0-41.0 (1.54-1.61)	
NKR17		37.5-39.5 (1.48-1.56)	
Driven Plate Warpage	mm (in)	Less than 0.7 (0.03)	1.0 (0.04)
Spline Play between Top Gear Shaft and Driven Plate at Driven Plate Outer Circumference	mm (in)	Less than 0.5 (0.02)	1.0 (0.04)
Driven Plate Rivet Head Depression			
NHR55, NKR55	mm (in)	1.1-1.7 (0.04-0.01)	0.2 (0.01)
NKR17, NHR69, NKR69, NPR69		1.3-1.9 (0.05-0.08)	0.2 (0.01)
Clutch Pedal Height	mm (in)	160-170 (6.3-6.7)	
Clutch Pedal Stroke	mm (in)	159-169 (6.3-6.7)	
Clutch Pedal Free Play	mm (in)	15-25 (0.6-1.0)	
Clearance between Pedal Stopper and Clutch Switch Thread End or Stopper Bolt	mm (in)	0.5-1.0 (0.02-0.04)	
Master Cylinder Bore Diameter	mm (in)	19.050-19.102 (0.7500-0.7520)	
Clearance between Master Cylinder Bore and Piston	mm (in)	0.03-0.11 (0.001-0.004)	0.12 (0.005)
Slave Cylinder Bore Diameter	mm (in)	26.990-27.042 (1.0626-1.0646)	
Clearance between Slave cylinder Bore and Piston	mm (in)	0.02-0.10 (0.0008-0.0039)	0.11 (0.0043)

SERVICING

TRANSMISSION OIL LEVEL CHECK



1. Remove Filler Plug.



2. Check Oil Level.

- Add lubricant to within 0 to 10 mm (0 to 0.4 in) of bottom edge of the filler hole if necessary.



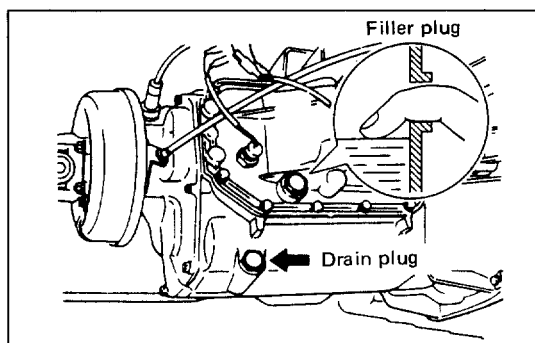
CAUTION:

Use **ENGINE OIL SAE 5W-30 for transmission case.**



3. Install Filler Plug.

Filler Plug Torque	N·m (kg·m/lb·ft)
49 (5.0/36)	



TRANSMISSION OIL CHANGE



1. Drain Oil

- Remove the drain plug from the transmission case and drain the oil.



2. Install Drain Plug.



Drain Plug Torque	N·m (kg·m/lb·ft)
49 (5.0/36)	



3. Remove Filler Plug.

4. Fill Oil

- Fill the transmission case from the filler plug hole with new oil of specified grade.

Oil Capacity	Liters (US·qt/Imp·qt)
2.7 (2.9/2.4)	



CAUTION:

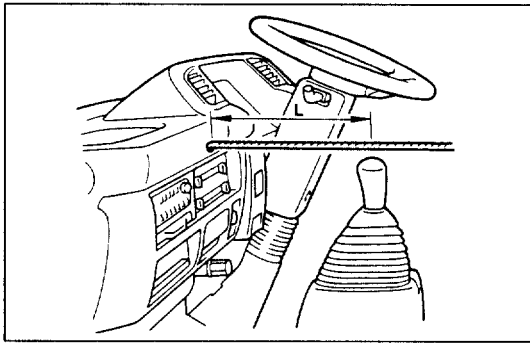
Use **ENGINE OIL SAE 5W-30 for transmission case.**



5. Install Filler Plug



Filler Plug Torque	N·m (kg·m/lb·ft)
49 (5.0/36)	



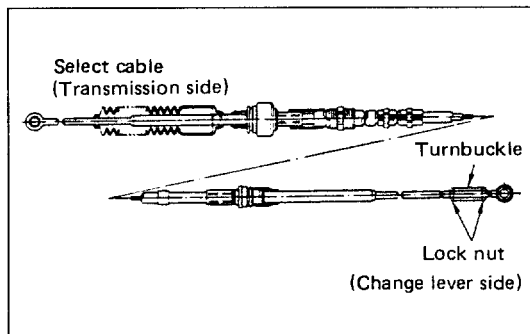
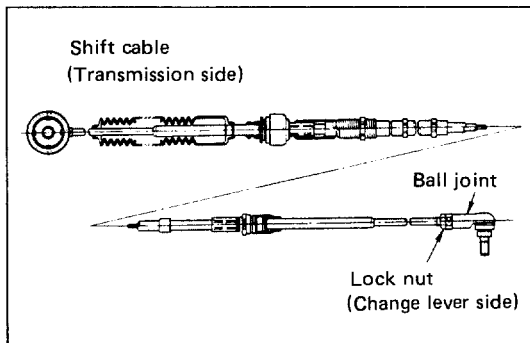
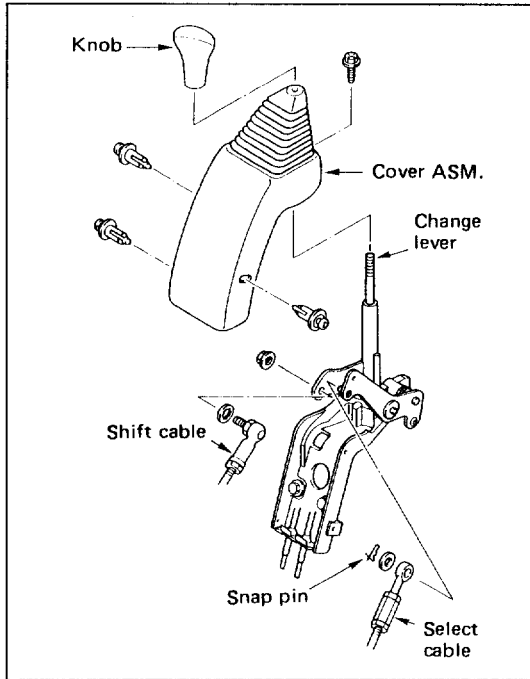
GEAR CONTROL CABLE ADJUSTMENT



1. Measure

- Set the change lever in the neutral position, then confirm if the dimension between the center of the change lever play and the instrument center cluster is within the reference value.

Change Lever Position	mm (in)
Standard cab : 247 ± 15 (9.7 ± 0.6)	
Wide Cab : 238 ± 15 (11.1 ± 0.6)	



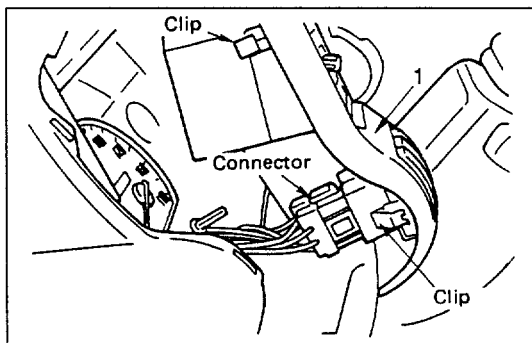
2. Adjust

- If the dimension is out of the reference adjust as required.
- Remove the change lever knob.
 - Remove the cover assembly.
 - Disconnect the shift cable from the change lever.
 - Set the transmission in the neutral position.
 - Loosen the lock nut of the shift cable ball joint and the select cable turnbuckle, then turn the ball joint and turnbuckle as necessary for hole and pin.
 - Tighten the lock nuts and install the shift cable to the change lever.



Lock nut torque	N·m (kg·m/lb·in)
	6 (0.6/52)

- Install the cover assembly and the change lever knob.



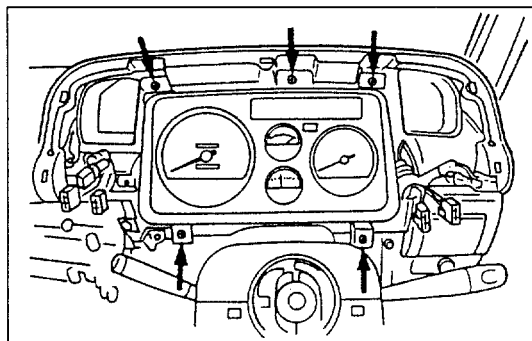
CLUTCH PEDAL TRAVEL AND FREE PLAY ADJUSTMENT

Clutch Pedal Height and Stroke



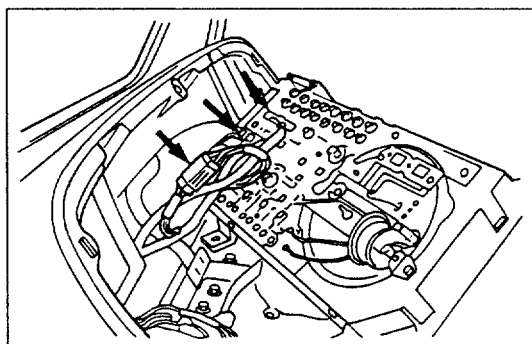
1. Remove Meter Cluster.

- Pull out the meter cluster and disconnect the harness connectors.

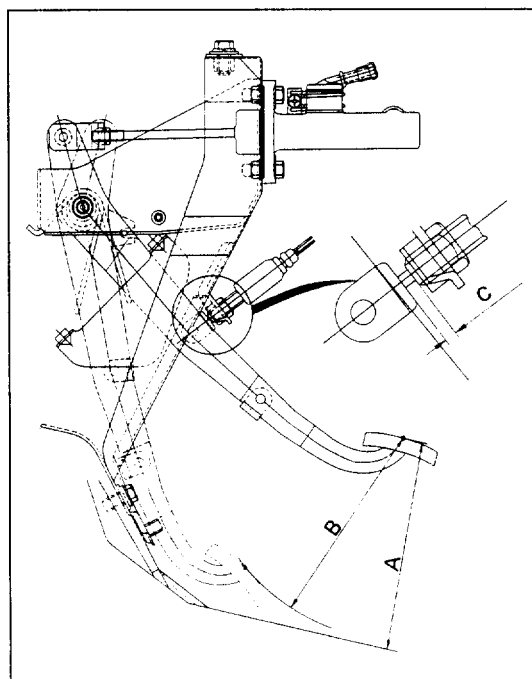


2. Remove Meter Assembly.

- Remove the 5 fixing screws.



- Disconnect the harness connectors.



3. Adjust

- Loosen the lock nut of the clutch master cylinder push rod.
- Adjust the pedal height by turning the push rod.

Clutch Pedal Height and Stroke mm(in)

Height(A) : 160-170 (6.3-6.7)

Stroke(B) : 159-169 (6.3-6.7)

4. Tighten Lock Nut.

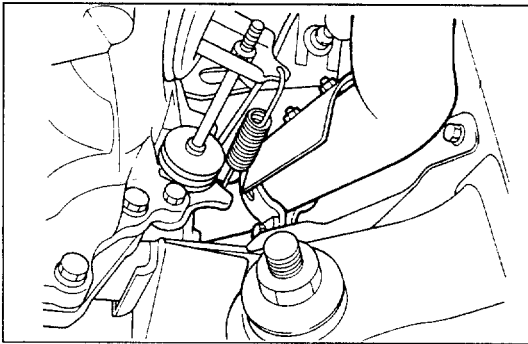


Lock Nut Torque N-m (kg-m/lb-ft)

20 (2.0/14)



5. Install Meter Assembly and Meter Cluster.



Clutch Pedal Free Play



Slave Cylinder

- 1) Remove the slave cylinder return spring.
- 2) Loosen the lock nut of the push rod.
- 3) Turn the adjust nut until it reaches the shift fork.
- 4) Back off the adjust nut 1.5 turns (shift fork free play approximately 2 mm/0.1 in.).
- 5) Tighten the lock nut.



Lock Nut Torque	N·m(kg·m/lb·ft)
16 (1.6/12)	

- 6) Install the return spring.



Clutch Switch or Stopper Bolt

After completion of clutch pedal height adjustment, adjust the clutch switch or stopper bolt clearance.

- 1) Loosen the lock nut of clutch switch or stopper bolt.
- 2) Adjust the clutch switch or stopper bolt clearance by turning clutch switch or stopper bolt.



Clutch Switch or Stopper Bolt Clearance(C)	mm(in)
0.5-1.0 (0.02-0.04)	

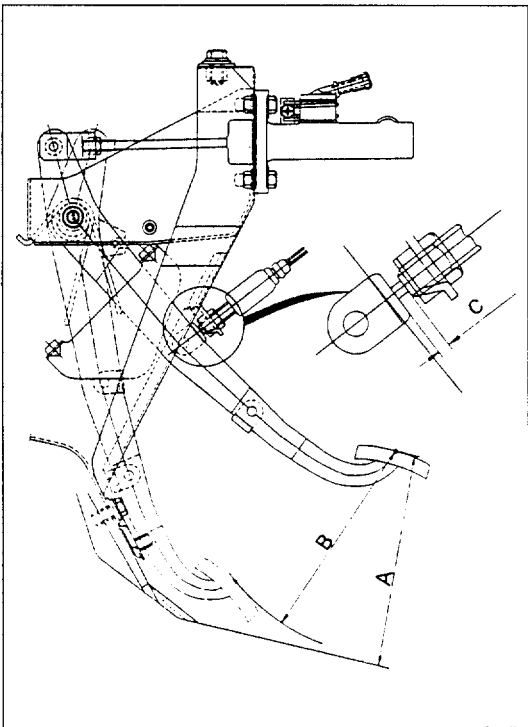


Clutch Pedal Free Play	mm(in)
15-25 (0.6-1.0)	

- 3) Tighten the lock nut.



Lock Nut Torque	N·m(kg·m/lb·ft)
19 (1.9/14)	

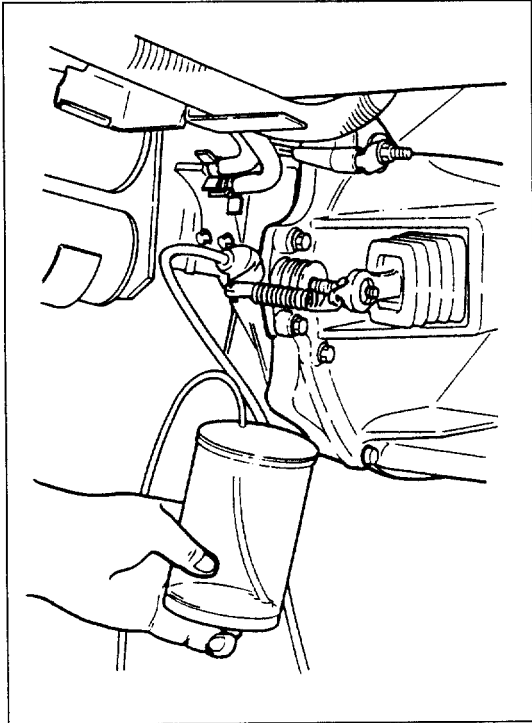


CLUTCH HYDRAULIC CIRCUITS BLEEDING

If air enters the clutch circuit, it will causes clutch dragging. Therefore, bleeding operation should be performed if the clutch fluid reservoir has been emptied due to failure to mal-replenishment or if the hydraulic circuit has been disassembled. Bleeding operation calls for cooperative action of two men.



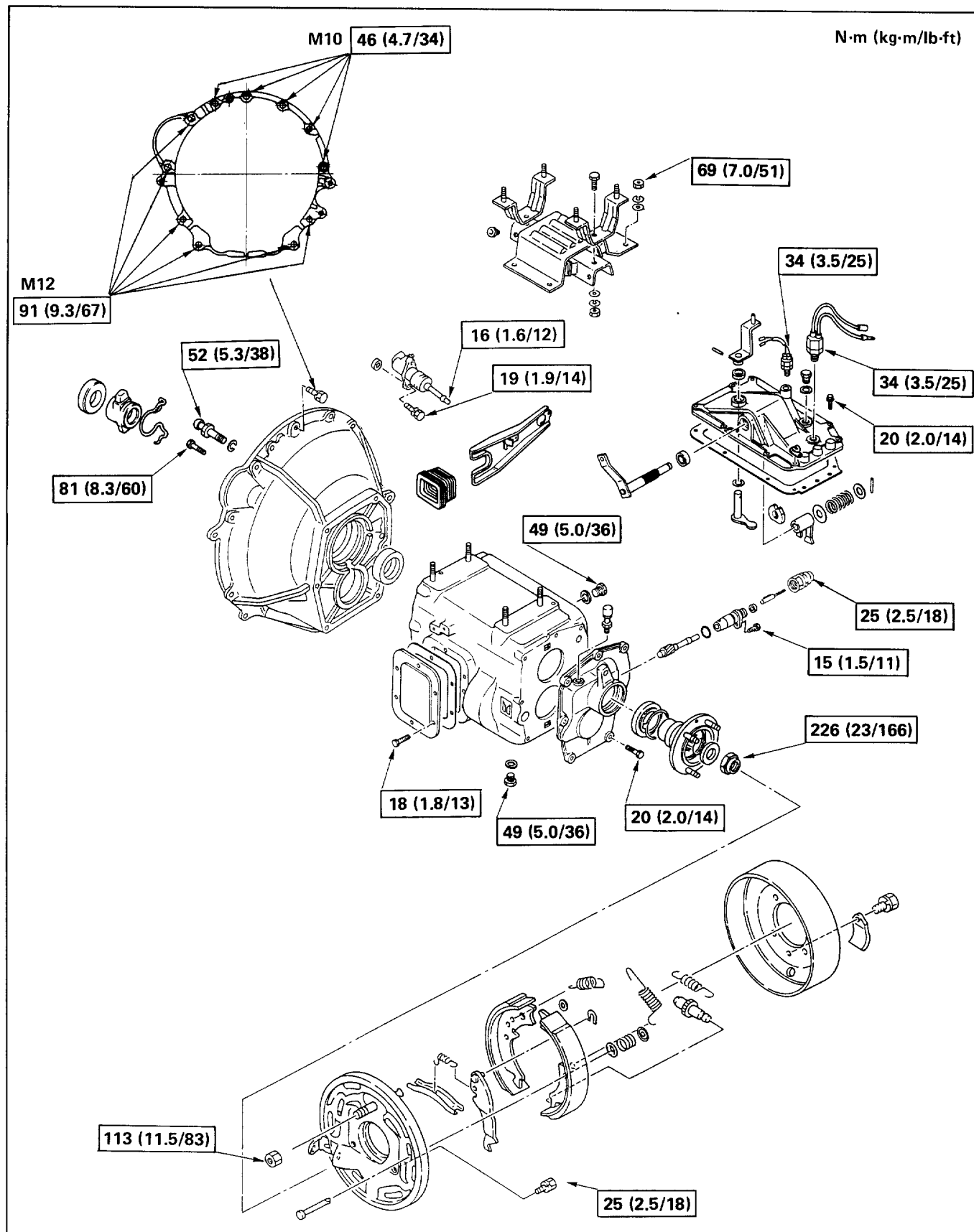
- 1) Check the level of clutch fluid in the reservoir and replenish if necessary.
- 2) Remove the rubber cap from the bleeder screw and wipe clean the bleeder screw.
Connect a vinyl tube to the bleeder screw and insert the other end of the vinyl tube into a transparent container.
- 3) Pump the clutch pedal repeatedly and hold it depressed.
- 4) Loosen the bleeder screw on the clutch slave cylinder to release clutch fluid with air bubbles into the container and tighten the bleeder screw immediately.
- 5) Release the clutch pedal carefully. Repeat the above operation until air bubbles disappear from the clutch fluid being pumped out into the container. During the bleeding operation, keep the clutch fluid reservoir filled to the specified level.
Reinstall the rubber cap.



CAUTION:

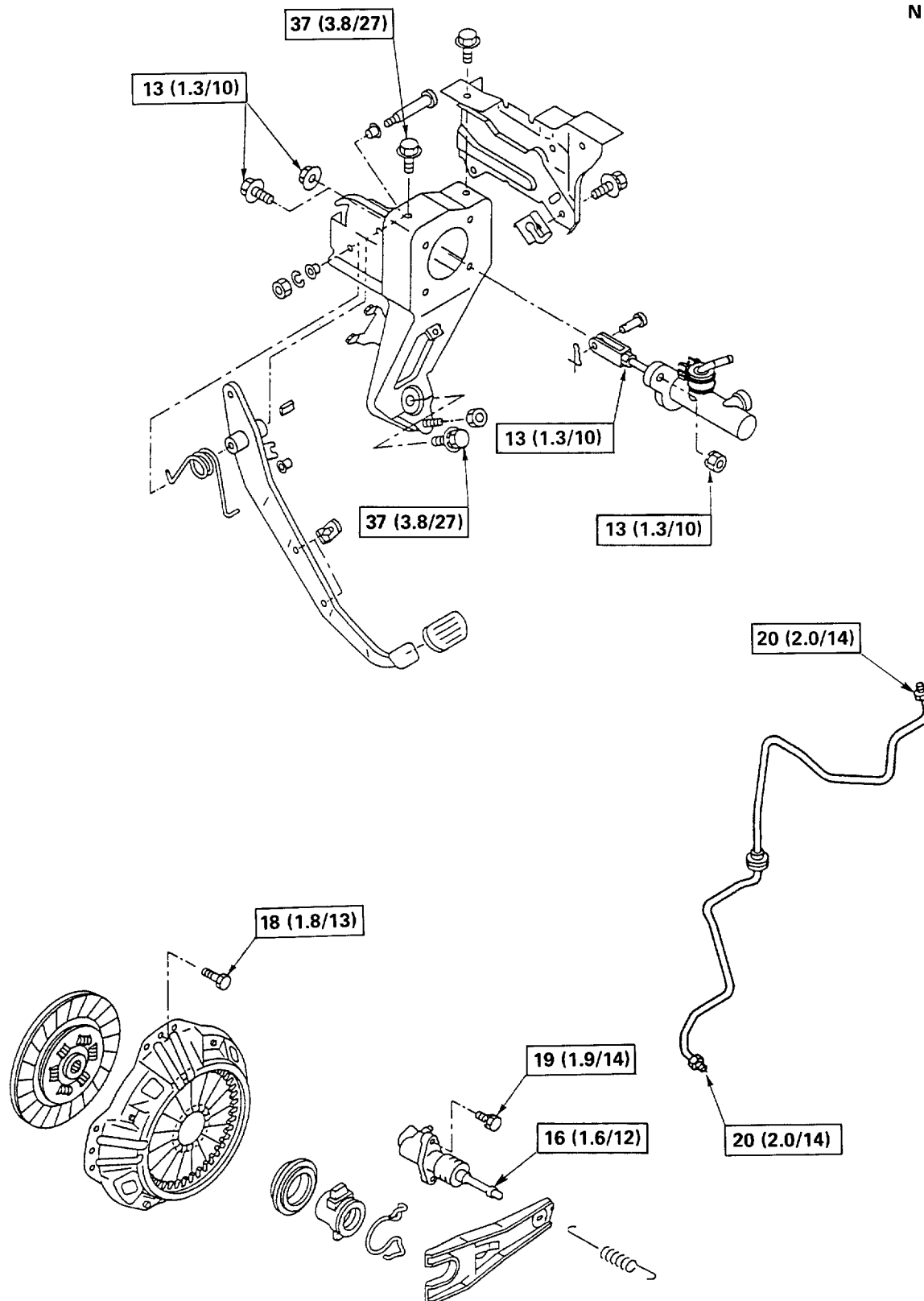
**Do not let clutch fluid remain on a painted surface.
Wash it off immediately.**

FIXING TORQUE TRANSMISSION



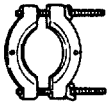
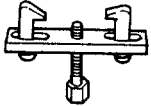
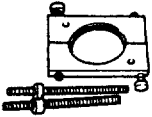
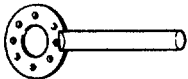
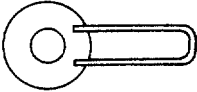
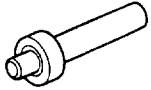
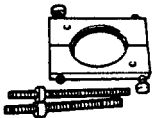
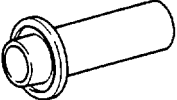
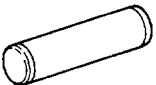
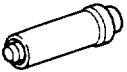
FIXING TORQUE (CONT.)CLUTCH

N·m (kg·m/lb·ft)





SPECIAL TOOL

TRANSMISSION

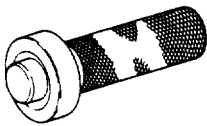
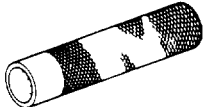
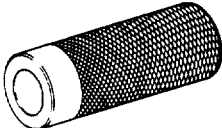
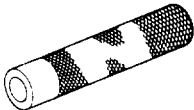

ILLUSTRATION	PART NUMBER	PART NAME	REMARKS
	5-8840-0587-0	Gear Remover	
	5-8840-2027-0	Universal Puller	
	5-8840-2042-0	Bearing Remover	
	5-8840-2043-0	Handle	
	5-8840-2044-0	Anti-lash Plate Installer	
	5-8840-2064-0	Oil Seal Installer	For front cover oil seal install
	5-8840-2078-0	Bearing Remover	
	5-8840-2242-0	Oil Seal Installer	For rear cover oil seal install
	5-8840-2244-0	Bearing Installer	
	5-8840-2245-0	Oil Seal Installer	For control box oil seal (shift and select lever shaft) install

SPECIAL TOOL (CONT.)




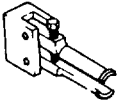
TRANSMISSION (CONT.)

ILLUSTRATION	PART NUMBER	PART NAME	REMARKS
	9-8522-1615-0	Bearing Installer	
	9-8529-2201-0	Spring Pin Remover	

POWER TAKE OFF

ILLUSTRATION	PART NUMBER	PART NAME	REMARKS
	5-8840-2064-0	Oil Seal Installer	For output shaft oil seal
	5-8840-2065-0	Oil Seal Installer	For shift rod oil seal
	5-8840-2066-0	Bearing Installer	For output shaft bearing
	5-8840-2067-0	Plug Installer	For shift rod cap
	9-8529-2201-0	Spring Pin Remover	

SPECIAL TOOL (CONT.)**CLUTCH**

ILLUSTRATION	PART NUMBER	PART NAME	REMARKS
	5-8525-3001-0	Pilot Aligner	
	5-8840-0013-0	Bearing Remover	
	5-8840-0084-0	Sliding Hammer	
	5-8840-2000-0	Pilot Bearing Remover	

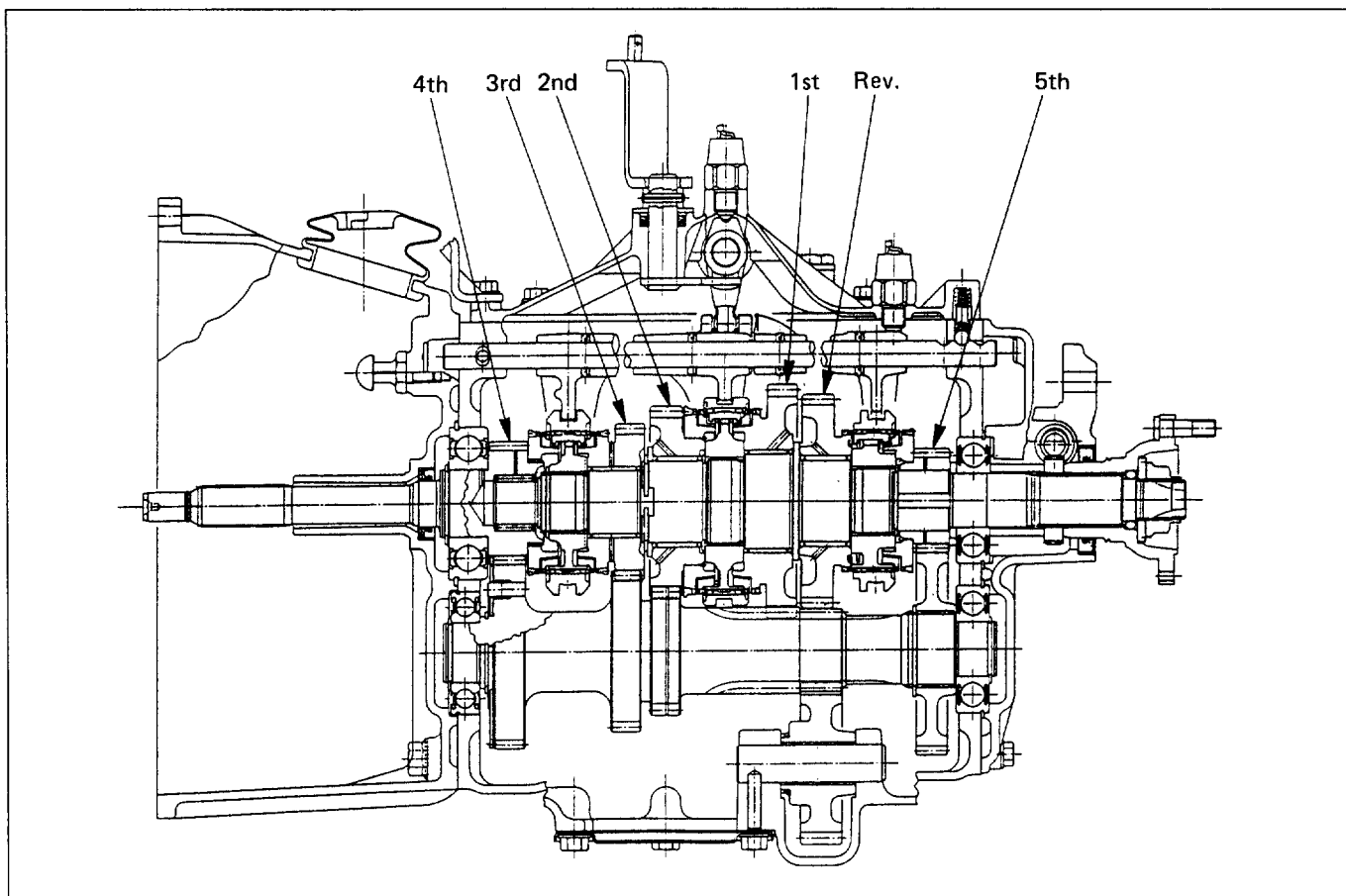
SECTION 7B

MANUAL TRANSMISSION MSB

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Gear Control Cable Replacement	7B- 4
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Back-up Light Switch and Neutral Switch Replacement	7B- 7
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GENERAL DESCRIPTION



For MSB model transmission, a forward 5-shift all synchromesh type and a backward 1-shift constant-mesh type transmission are employed.

The transmission case is made of a high rigidity cast iron, and the front cover integral with the clutch housing is made of aluminum die-cast. An aluminum die-cast control box containing a gear shift and gear select mechanism is installed on the right side of the transmission case. A window for power take-off is also provided on the left side.

For all the gears, helical gears are employed to reduce noises.

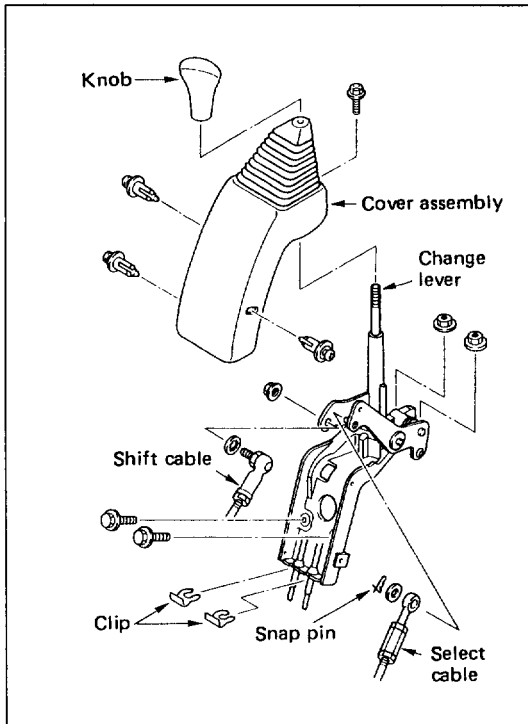
The synchromesh mechanism that employs balking rings use block rings of special brass to obtain improved synchromesh performance.

With the main shaft screwed up at the rear, ball bearings are employed for the bearings on both sides of the main shaft and the counter shaft, and needle roller bearings employed for the bearings at the tip end of the main shaft and also for those of the 1st gear, 2nd gear, 3rd gear and reverse gear to secure improved durability and reduced noises.

Furthermore, with the anti-lash mechanism employed for the engagement of the top gear with the counter gear, fine-pitch gears are also employed for the 4th gear and the 5th gear to reduce noises.

ON-VEHICLE SERVICE

CHANGE LEVER ASSEMBLY REPLACEMENT



Removal Steps

1. **Change Lever Knob**
2. **Cover Assembly**
 - Remove the fixing screw and three clips.
3. **Shift Cable and Select Cable**
 - Disconnect the cables from the change lever.
 - Remove the clips and disconnect the cables from bracket.
4. **Change Lever Assembly**



Installation Steps

1. **Change Lever Assembly**
2. **Shift Cable and Select Cable**



When connecting the shift cable and the select cable to the change lever, adjust the cable.

Refer to "SERVICING: GEAR CONTROL CABLE ADJUSTMENT" given previously in this section.

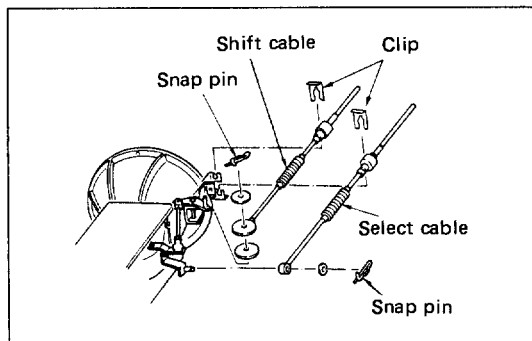
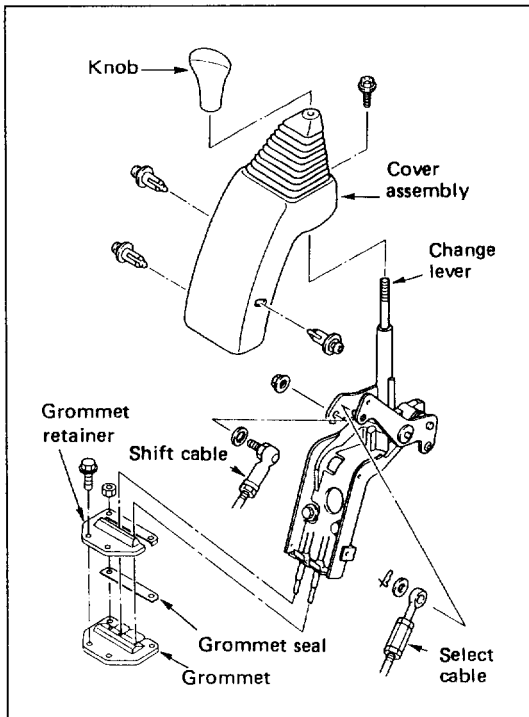
3. **Cover Assembly**
4. **Change Lever Knob**

GEAR CONTROL CABLE REPLACEMENT



Removal Steps

1. **Change Lever Knob**
2. **Cover Assembly**
3. **Shift Cable and Select Cable**
 - 1) Disconnect the shift and select cables from change lever.
 - 2) Remove the clips and disconnect the cables from change lever bracket.
 - 3) Remove the grommet retainer, grommet seal and grommet.
 - 4) Tilt the cab.
- 5) Disconnect the shift cable and the select cable on the transmission side.
- 6) Remove the clips and disconnect the shift cable and the select cable from the bracket.
- 7) Remove the clips that fix the cables to the frames.
- 8) Remove the shift and select cable assemblies.



Inspection and Repair

Check the cables for any deformation, damage or rust, and also check the sliding portion for any abnormal condition.

When there is any abnormal condition found, replace it with a new one.



Installation Steps

1. Shift Cable and Select Cable

- 1) Install temporarily that the shift cable and the select cable.



CAUTION:

Never bend the cables to radius less than 450 mm (18 in) unless it is necessary to do so for wiring purposes. And never bend the cables to radius less than 180 mm (7 in) even during wiring.

Install the cables carefully without unnecessary twisting the cable boots.

- 2) Connect the shift cable and the select cable to the transmission.
- 3) Fasten the cables with clips to the brackets on the transmission side.
- 4) Fasten the cables with clips to the change lever bracket.
- 5) Fasten the cables with clips to the frames. At this time, take care that the select cable comes above the shift cable.
- 6) Install the grommet, grommet seal and grommet retainer.

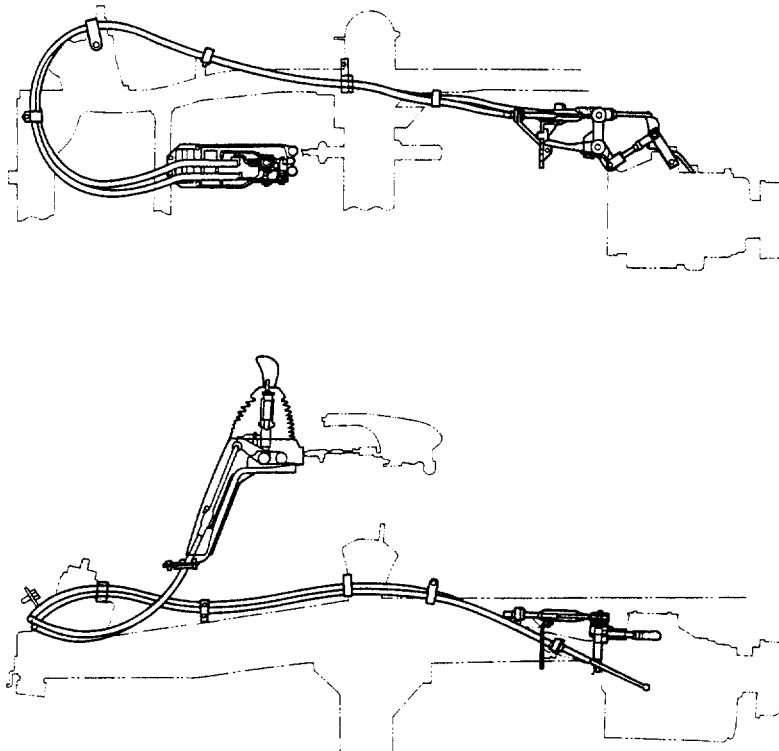


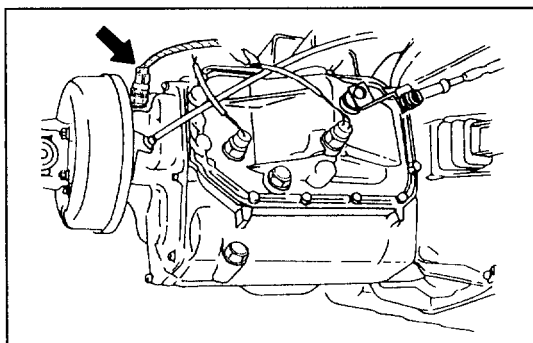
- 7) When connecting the shift cable and the select cable to the change lever, adjust the cables.

Refer to "SERVICING: GEAR CONTROL CABLE ADJUSTMENT" given previously in this section.

2. Cover Assembly

3. Change Lever Knob



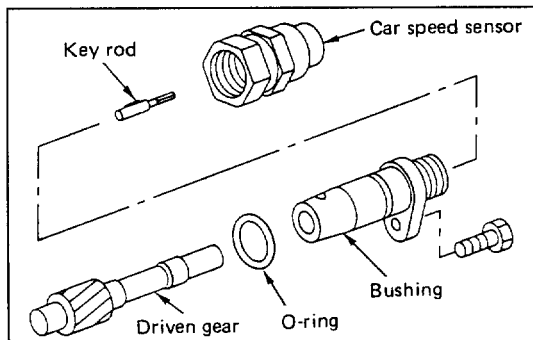


CAR SPEED SENSOR DRIVEN GEAR REPLACEMENT



Removal Steps

1. **Wiring Connector**
2. **Car Speed Sensor with Key Rod**
3. **Car Speed Sensor Driven Gear Assembly**
 - Remove the fixing bolt.
 - Remove the driven gear assembly.



Installation Steps

1. **Car Speed Sensor Driven Gear Assembly**



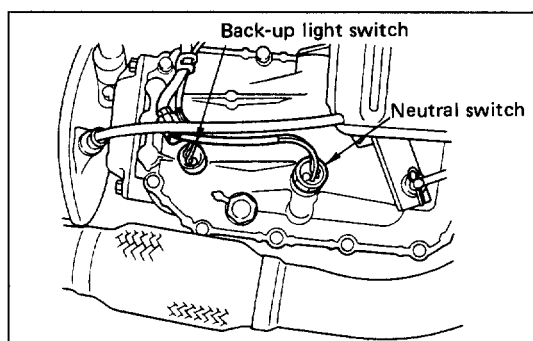
Fixing Bolt Torque	N·m(kg·m/lb·ft)
15 (1.5/11)	

2. **Car speed Sensor with Key Rod**



Fixing Bolt Torque	N·m(kg·m/lb·ft)
25 (2.5/18)	

3. **Wiring Connector**

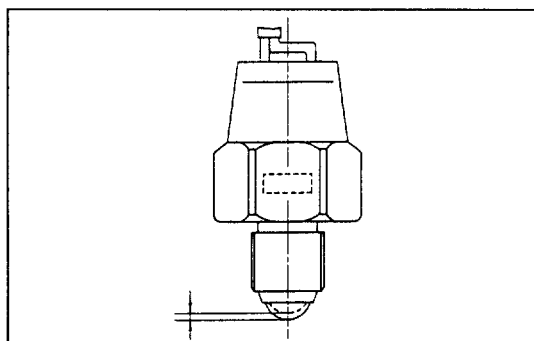


BACK-UP LIGHT SWITCH AND NEUTRAL SWITCH REPLACEMENT



Removal Steps

1. Wiring Connector
2. Switch



Inspection and Repair

- When there is continuity between the terminals in the condition as it is, and when the continuity between the terminals is turned off by pressing the ball of the switch, the switch is normal.



Switch Operating Stroke	mm (in)
0.93 (0.037)	



Installation Steps

1. Switch



- Apply liquid gasket (Three Bond 1141 or equivalent) to the switch's threaded portion to prevent oil leakage, and install the switch to the control box.
- Color of Connector
 - Back-up Light Switch: Brown
 - Neutral Switch: Gray



Switch Torque	N·m (kg·m/lb·ft)
34 (3.5/25)	

2. Wiring Connector

REAR OIL SEAL REPLACEMENT



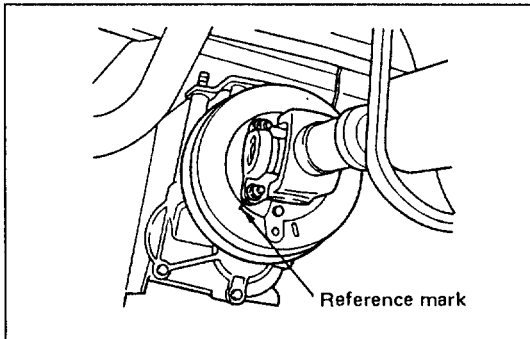
Removal Steps

- Raise vehicle and support with suitable safety stands.



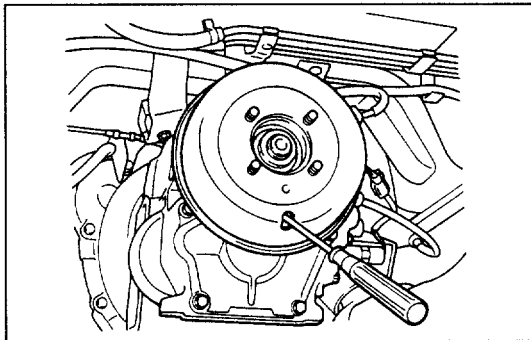
1. Propeller Shaft

- Reference mark the flange yoke to the parking brake drum.
- Disconnect the propeller shaft at flange yoke.
- Put aside the propeller shaft and tie it to the frame so it does not interfere with servicing work.



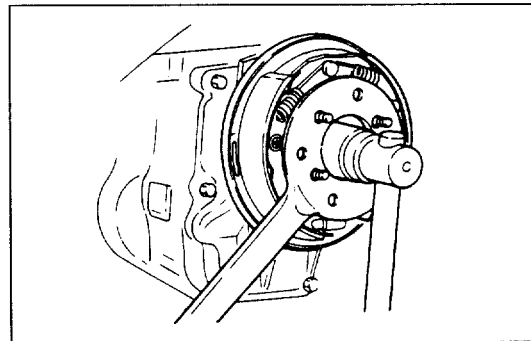
2. Parking Brake Drum

- Remove the screw and the adjust hole cover.
- It may be necessary to back off the shoe adjuster.



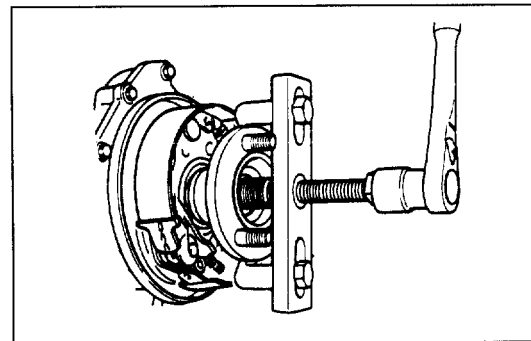
3. Lock Nut

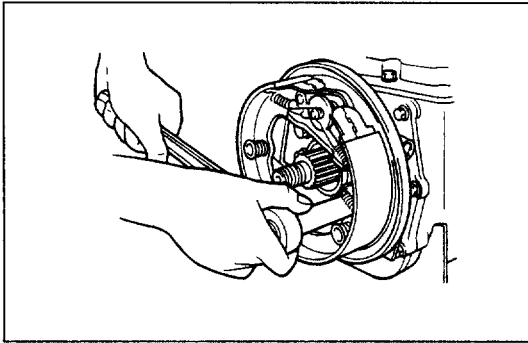
- Make sure to raise the caulking of the coupling driver lock nut, then remove the lock nut.
- Use the handle to remove the lock nut.
Handle: 5-8840-2043-0



4. Coupling Driver

- Remove the coupling driver using the universal puller.
Universal Puller: 5-8840-2027-0
- Remove the conical washer and the o-ring.





5. Parking Brake Assembly

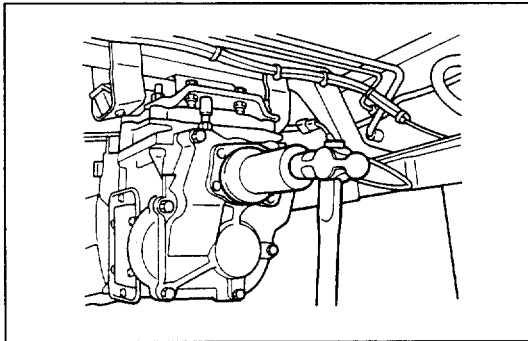
6. Oil Seal

- Use the screwdriver to remove the oil seal from the rear cover.



CAUTION:

Take care not to damage the sealing seat of the rear cover.



Installation Steps

1. Oil Seal

- Apply engine oil to the new oil seal outer circumference and apply multi-purpose grease to the oil seal lip.
- Use the oil seal installer to install the oil seal to the rear cover.

Oil Seal Installer: 5-8840-2242-0

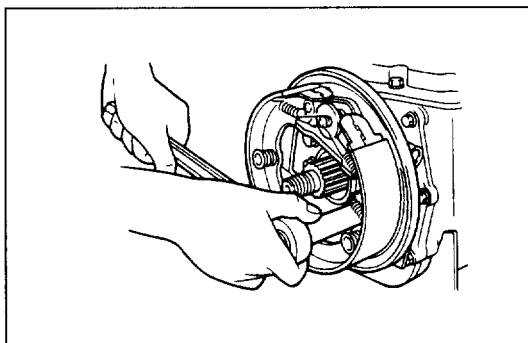
2. Parking Brake Assembly

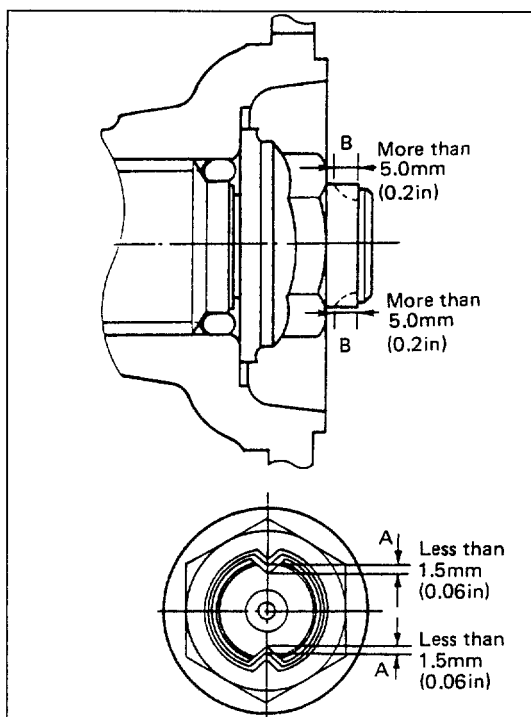


Parking Brake Nut and Bolts Torque N·m (kg·m/lb·ft)

Bolts: 25 (2.5/18)

Nut : 113 (11.5/83)





3. Coupling Driver

4. Lock Nut

- Install the o-ring and the conical washer.
The conical washer is to be set up with its identification groove to the nut side.

CAUTION:

Do not reuse the lock nut.

- Apply the engine oil to the setting face of the new lock nut and tighten it up at the specified torque.
Handle: 5-8840-2043-0

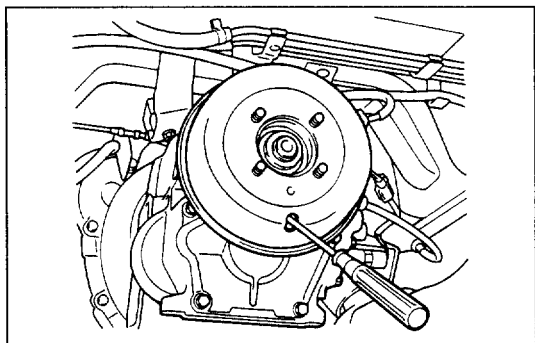
Lock Nut Torque	N·m (kg·m/lb·ft)
226 (23.0/166)	

- Align the lock nut with the V-shaped groove at the tip of the main shaft, and caulk the nut lip portion by using a chisel.
(Round edge approximately 1 mm (0.04 in) x 60°).
- As shown in the illustration, be sure to caulk the nut lip so that the clearance between the V-shaped groove portion at the tip of the main shaft and the caulked up lip(A) is less than 1.5 mm (0.06 in), and the caulking length(B) is 5 mm (0.2 in) or more.



CAUTION:

Be sure to confirm that there is no crack at the caulked portion of the end nut after caulking.

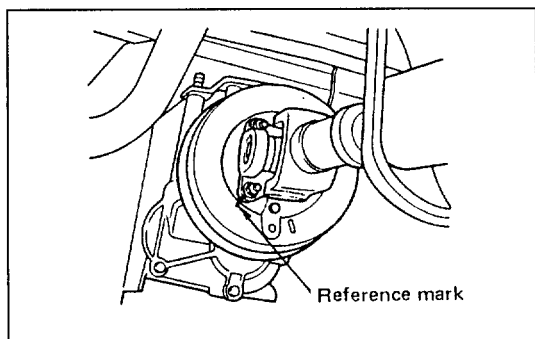


5. Parking Brake Drum

- Adjust the parking brake after installation.
 - Rotate the brake drum to align the adjust hole with the adjuster.
 - Move the camshaft lever from side to side several times to center the brake shoes.
 - Insert a screwdriver into the hole and rotate the adjuster by pushing it upward until the shoes drag on the drum.
 - Back off the adjuster 30 notches.
- Install the adjust hole cover.



Adjust Hole Cover Bolt Torque	N·m (kg·m/lb·in)
8 (0.8/69)	



6. Propeller Shaft

- Line up reference mark.

Propeller Shaft Bolt Torque	N·m (kg·m/lb·ft)
66 (6.7/48)	

- Remove the safety stands.

TRANSMISSION ASSEMBLY REPLACEMENT



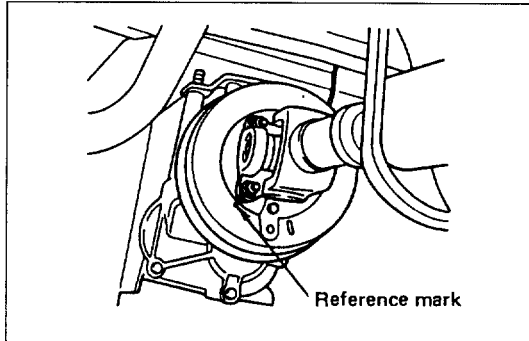
Removal Steps

- Raise vehicle and support with suitable safety stands.

1. Propeller Shaft

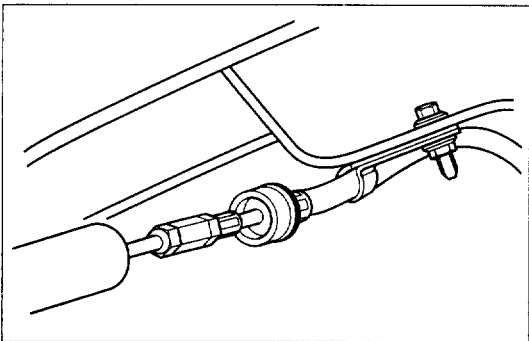
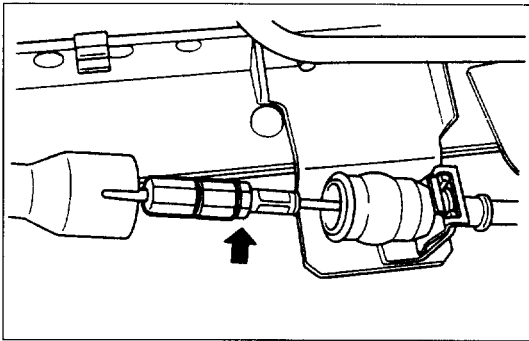


- Reference mark the flange yoke to the parking brake drum.
- Disconnect the propeller shaft at flange yoke.
- Put aside the propeller shaft and tie it to the frame so that it does not interfere with servicing work.



2. Parking Brake Cable

- Move the joint cover.
- Disconnect the joint bolt.
- Remove the clip then disconnect the cable from the bracket.



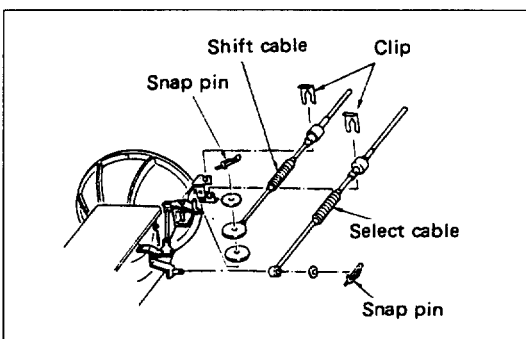
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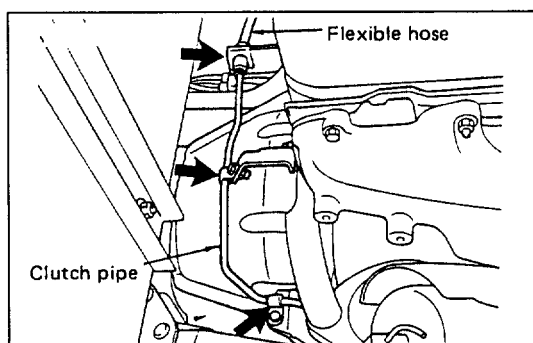
3. Wiring Connector

- Disconnect the wiring connectors from the car speed sensor, the neutral switch and the back-up light switch.

4. Shift Cable and Select Cable

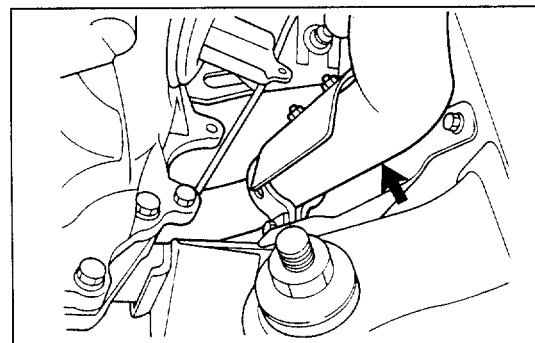
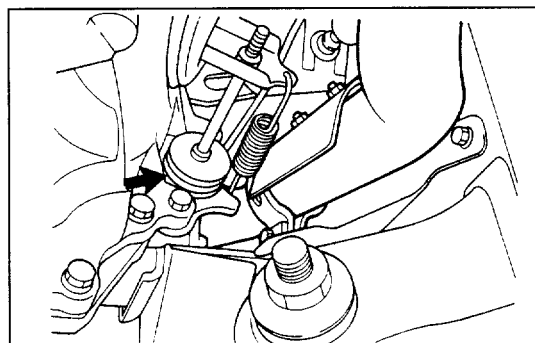
- Disconnect the shift cable and select cable on the transmission side.





5. Clutch Slave Cylinder

- Remove the clutch pipe fixing clips and the clip bracket (Right hand drive models only).
- Remove the slave cylinder assembly with the flexible hose attached, and then tie it to the frame so that it does not interfere with servicing work.



6. Exhaust Brake Assembly

7. Front Exhaust Pipe

8. Transmission Assembly

NOTE:

The exhaust pipe bracket, the gear control bracket and the clips are sometimes installed in the wrong position or direction confusedly. To prevent incorrect installation of these parts, put a correct installation mark on them.

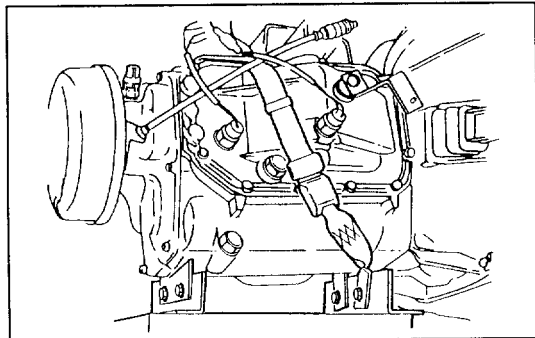
- Support the transmission with mission jack.



CAUTION:

To prevent the falling of the transmission, tie it firmly to the jack with a chain or belt.

Do not allow transmission to hang unsupported from clutch. Damage to the clutch assembly will result.



- Remove the nuts of the transmission mounting bracket on the crossmember side.
- Engine and transmission angles may need to be adjusted for removal.
- Hold the rear section of the engine by the jack or hoist.



CAUTION:

When lifting the engine by the jack, use wood blockes to prevent any possible damage to the oil pan.

- Remove transmission fastening bolts.
- Pull out the transmission assembly rearward.

9. Mounting Bracket

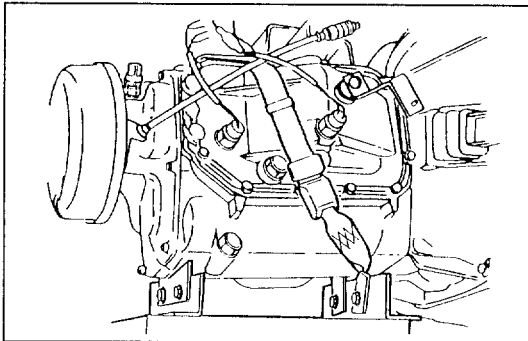


Installation Steps

1. Mounting Bracket



Mounting Bracket Nuts Torque	N·m (kg·m/lb·ft)
69 (7.0/51)	



2. Transmission Assembly

- Support the transmission with mission jack.



CAUTION:

To prevent the falling of the transmission, tie it securely to the jack with a chain or belt.

- Shift transmission into high gear.
- Align transmission with engine slope.
- Turn output parking brake drum to aid clutch spline engagement.

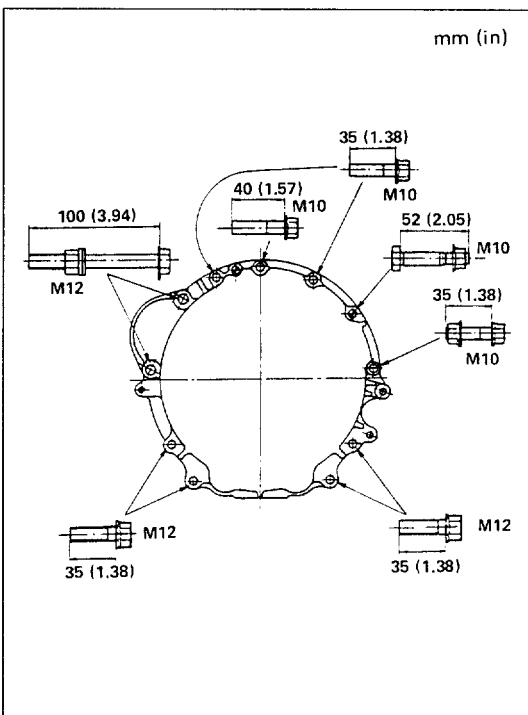


Clutch Housing to Flywheel Hosing Bolts Torque	N·m (kg·m/lb·ft)
M10 : 46 (4.7/34)	
M12 : 91 (9.3/67)	

- Raise engine and transmission up into rear transmission mount.



Engine Rear Mounting Nuts and Bolts Torque	N·m (kg·m/lb·ft)
M10 : 40 (4.1/30)	
M12 : 69 (7.0/51)	



3. Front Exhaust Pipe

Front Exhaust Pipe Bolts Torque	N·m (kg·m/lb·ft)
37 (3.8/27)	

4. Exhaust Brake Assembly

Exhaust Brake Bolts Torque	N·m (kg·m/lb·ft)
17 (1.8/12)	

5. Clutch Slave Cylinder

Slave Cylinder Bolts Torque	N·m (kg·m/lb·ft)
19 (1.9/14)	



- Perform slave cylinder adjustment before installation of the return spring.
- 1) Loosen the lock nut of the push rod.
 - 2) Turn the adjust nut until it reaches the shift fork.
 - 3) Back off the adjust nut 1.5 turns.(shift fork free play Approximately 2 mm/0.1 in).
 - 4) Tighten the lock nut.



Push Rod Lock Nut Torque	N·m(kg·m/lb·ft)
16 (1.6/12)	

6. Shift Cable and Select Cable**7. Wiring Connector**

- Color of Connector
 - Back-up Light Switch : Brown
 - Neutral Switch : Gray

8. Parking Brake Cable**9. Propeller Shaft**

- Line up reference mark.



Propeller Shaft Nuts Torque	N·m (kg·m/lb·ft)
66 (6.7/48)	

FRONT OIL SEAL REPLACEMENT



Removal Steps

1. Transmission Assembly

Refer to "ON-VEHICLE SERVICE: TRANSMISSION ASSEMBLY REPLACEMENT" previously in this section.

2. Clutch Housing

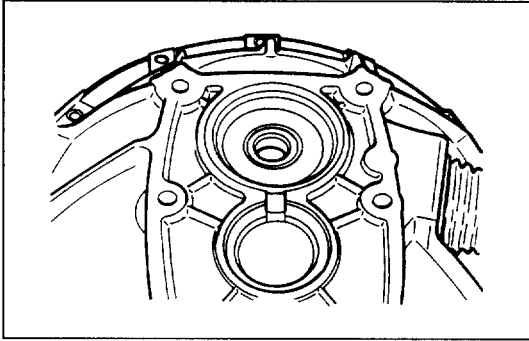
3. Oil Seal

- Use the screwdriver to remove the oil seal from the clutch housing.



CAUTION:

Take care not to damage the sealing seat of the clutch housing.

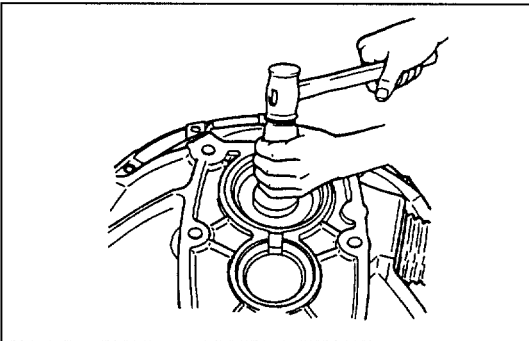


Installation Steps

1. Oil Seal

- Apply engine oil to the new oil seal outer circumference and apply multi-purpose grease to the oil seal lip.
- Use the oil seal installer to install the oil seal to the clutch housing.

Oil Seal Installer: 5-8840-2064-0

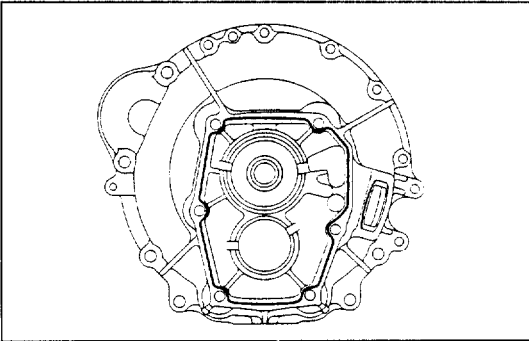


2. Clutch Housing

- Remove water and oil on the mating face before applying the liquid gasket.
- Apply a \varnothing 2 mm (0.1 in) bead of the liquid gasket (Three Bond 1215 or equivalent) to the clutch housing surface shown in the illustration.

NOTE:

Install the clutch housing on the transmission case within 30 minutes after liquid gasket application.



Clutch Housing to Transmission

Case Bolts Torque

N·m (kg·m/lb·ft)

81 (8.3/60)

3. Transmission Assembly

Refer to "ON-VEHICLE SERVICE: TRANSMISSION ASSEMBLY REPLACEMENT" previously in this section.



Clutch Housing to Flywheel

Housing Bolts Torque

N·m (kg·m/lb·ft)

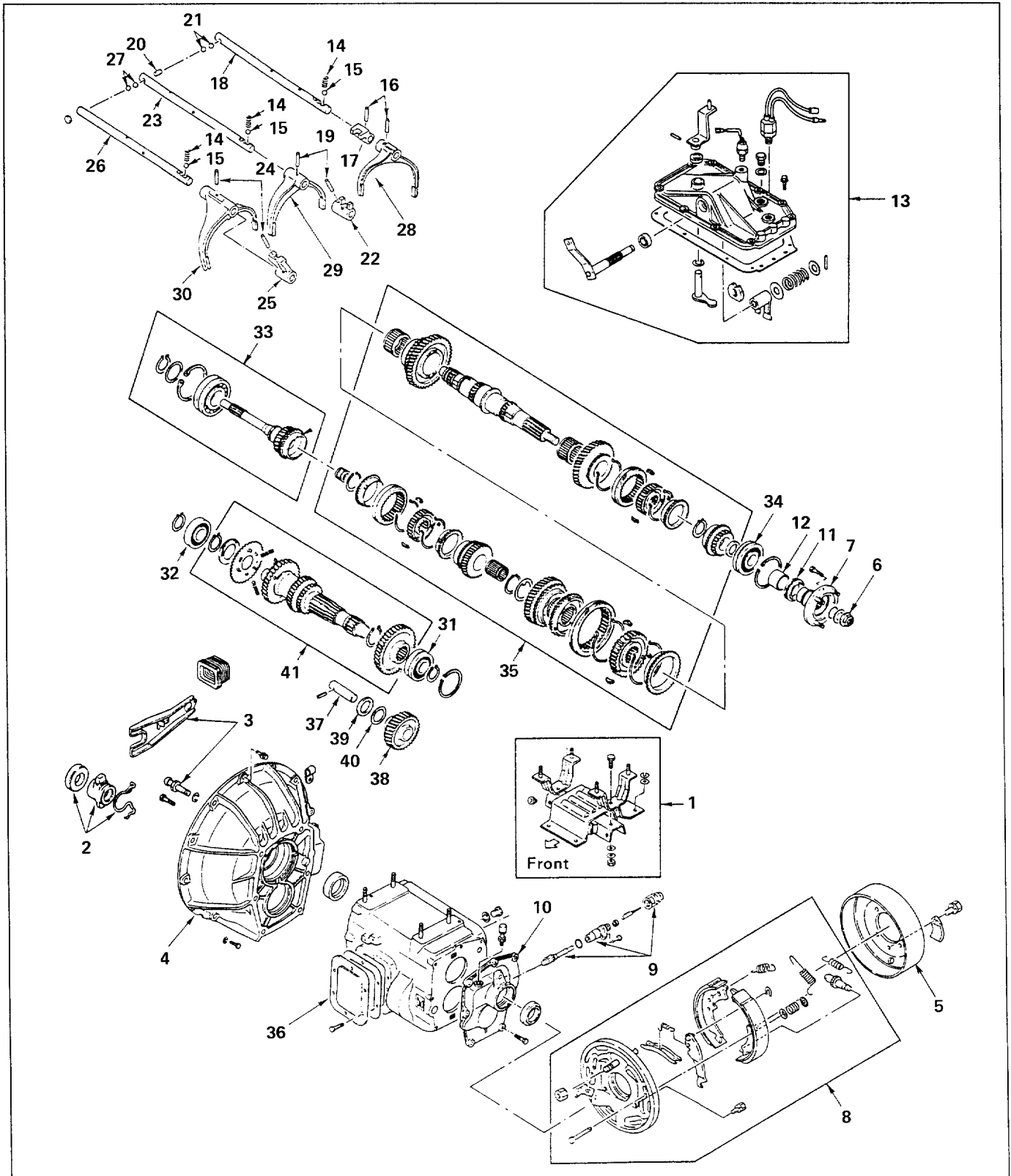
M10 : 46 (4.7/34)

M12 : 91 (9.3/67)

UNIT REPAIR

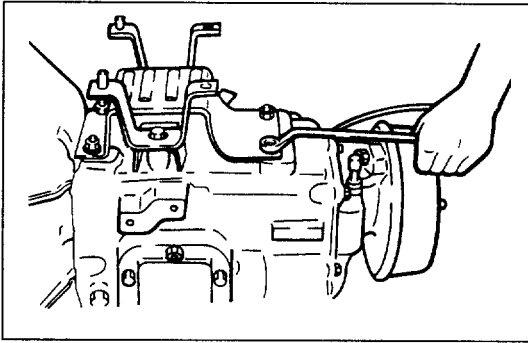
MAJOR COMPONENTS

DISASSEMBLY



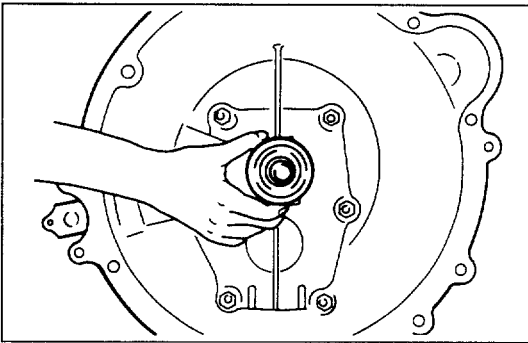
Disassembly Step

1. Mission mounting assembly
2. Shift block assembly
3. Shift fork and support bolt
4. Clutch housing
5. Parking brake drum
6. Lock nut
7. Coupling driver
8. Parking brake assembly
9. Car speed sensor driven gear assembly
10. Rear cover
11. Car speed sensor drive gear
12. Spacer
13. Control box assembly
14. Detent spring
15. Detent ball
16. Spring pin
17. 5th/Reverse shift block
18. 5th/Reverse shift rod
19. Spring pin
20. Interlock pin
21. Interlock ball
22. 3rd/4th shift block
23. 3rd/4th shift rod
24. Spring pin
25. 1st/2nd shift block
26. 1st/2nd shift rod
27. Interlock ball
28. 5th/Reverse shift arm
29. 3rd/4th shift arm
30. 1st/2nd shift arm
31. Counter shaft rear bearing
32. Counter shaft front bearing
33. Top Gear shaft assembly
34. Main shaft rear bearing
35. Main shaft assembly
36. Side cover
37. Reverse idle gear shaft
38. Reverse idle gear
39. Thrust washer
40. Conical washer
41. Counter shaft assembly

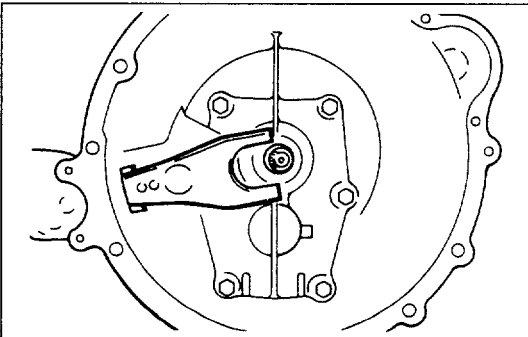


Disassembly Steps

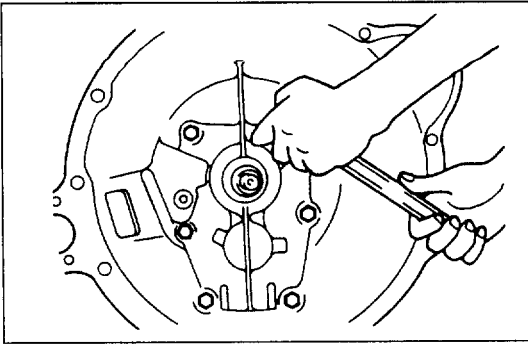
1. Mission Mounting Assembly



2. Shift Block Assembly



3. Shift Fork and Support Bolt



4. Clutch Housing

- Remove the clutch housing from the transmission case.
- Use the screwdriver to remove the oil seal from the clutch housing.

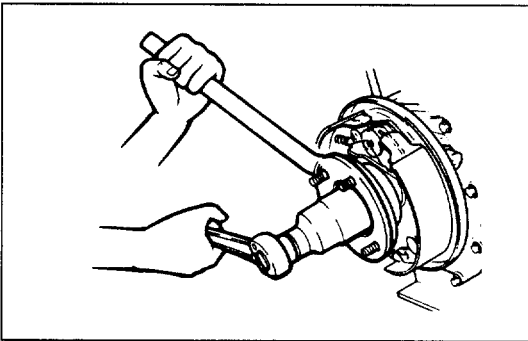


CAUTION:

Take care not to damage the sealing seat of the clutch housing.

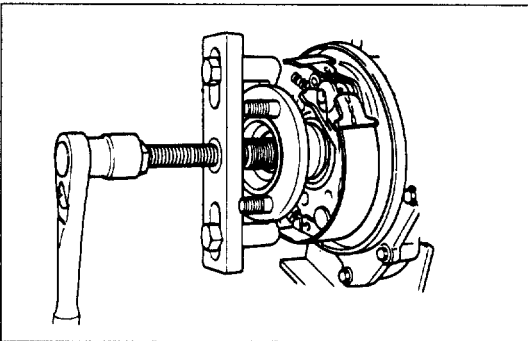
5. Parking Brake Drum

- Remove the screw and the adjust hole cover.
- It may be necessary to back off the shoe adjuster.



6. Lock Nut

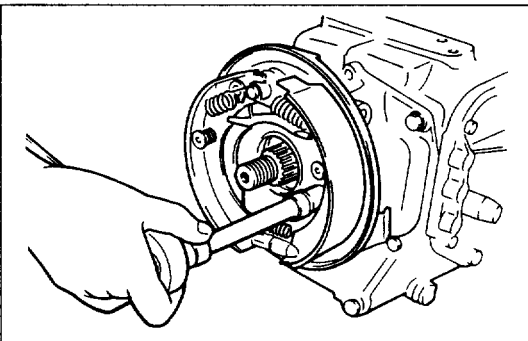
- Make sure to rise the caulking of the coupling driver lock nut.
- Use the handle to remove the lock nut.
Handle : 5-8840-2043-0

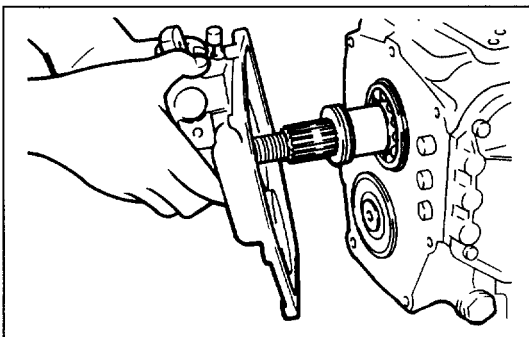
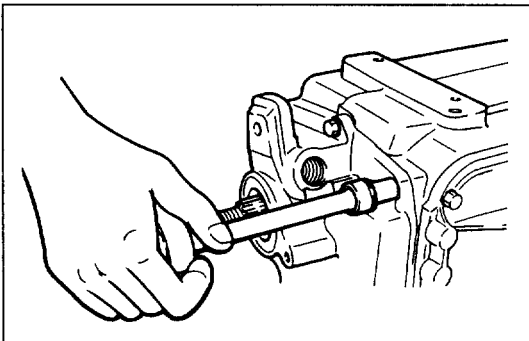
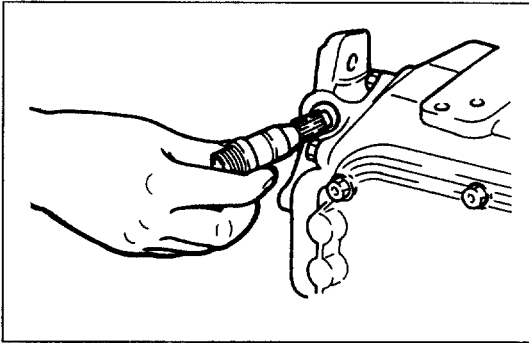
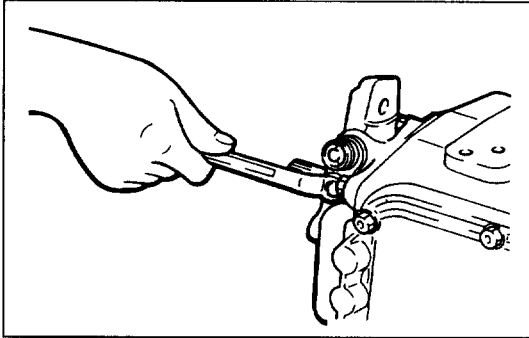
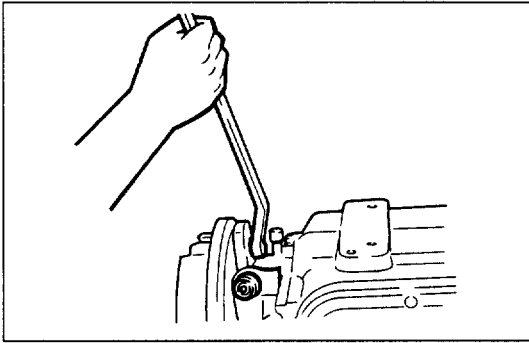


7. Coupling Driver

- Remove coupling driver using the universal puller.
Universal Puller: 5-8840-2027-0
- Remove the conical washer and the o-ring.

8. Parking Brake Assembly





9. Car Speed Sensor Driven Gear Assembly

- Remove the car speed sensor with the key rod.
- Remove the fixing bolt.

- Remove the driven gear assembly.

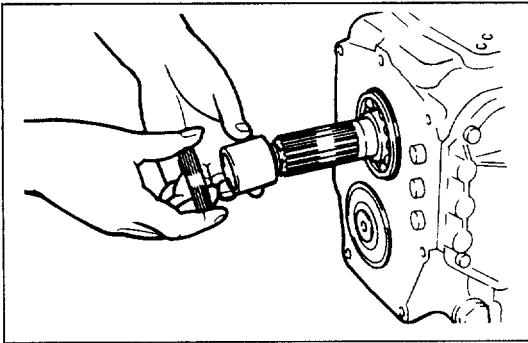
10. Rear Cover

- Remove 7 fixing bolts. Tap the rear cover with a copper or plastic hammer to remove it. The rear cover is provided with lugs for hammering both side.
- Remove the oil seal using the screwdriver.

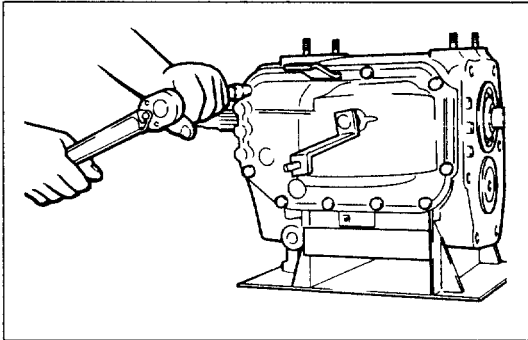


CAUTION:

Take care not to damage the sealing seat of the rear cover with the screwdriver.



11. Car Speed Sensor Drive Gear
12. Spacer

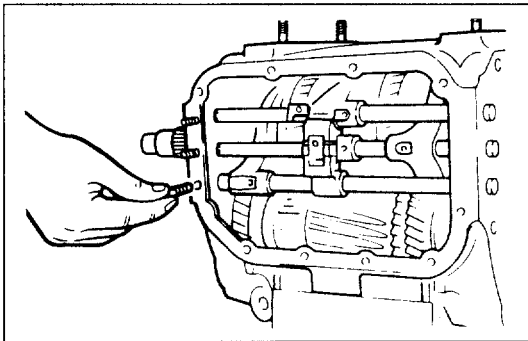


13. Control Box Assembly

- Remove 10 control box fixing bolts, and then prize open the four corners of the control box with a screwdriver to remove the control box assembly.

NOTE:

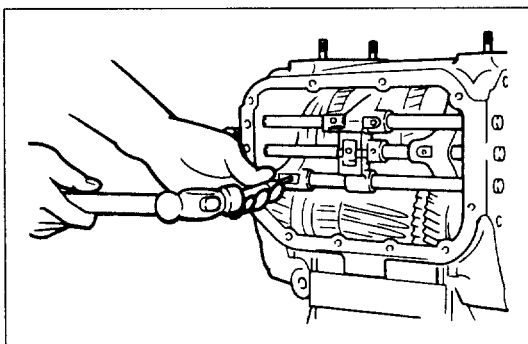
Be careful not lose the detent springs and balls of the transmission case.



14. Detent Spring

15. Detent Ball

- Take out the three detent springs and the three detent balls from the transmission case.

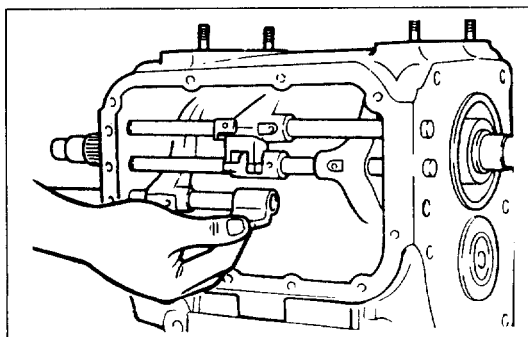


16. Spring Pin



- Before removal, set all shift rods in neutral position.

Spring Pin Remover : 9-8529-2201-0



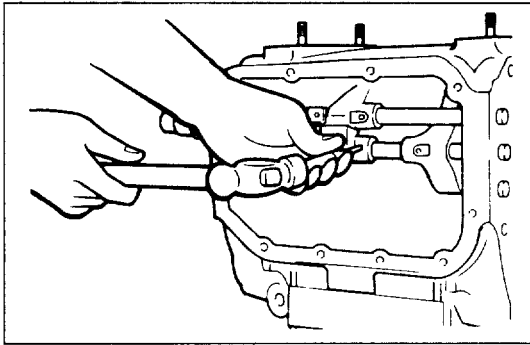
17. 5th/Reverse Shift Block

18. 5th/Reverse Shift Rod

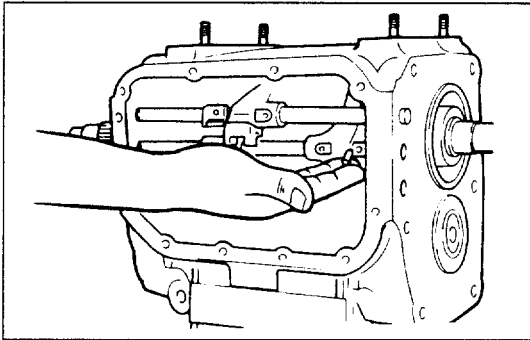
- Move the 5th/reverse shift rod rearward and remove the shift block and shift rod.

NOTE:

When removing the parts, exercise care to prevent the interlock balls and pin fitted to the front part from falling apart.

**19. Spring Pin**

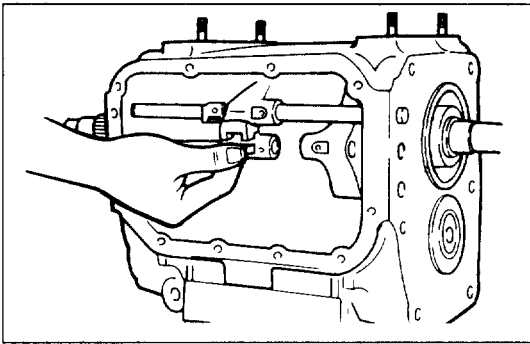
- Spring Pin Remover : 9-8529-2201-0

**20. Interlock Pin**

- Move the 3rd/4th shift rod rearward by pushing its front end.
Then take out the interlock pin from the 3rd/4th shift rod.

21. Interlock Ball

- Take out the 2 interlock balls from the transmission case.

**22. 3rd/4th Shift Block****23. 3rd/4th Shift Rod**

- Move the shift rod rearward and remove the shift block and shift rod.

NOTE:

When removing the parts, exercise care to prevent the interlock balls fitted to the front part from falling apart.

24. Spring Pin

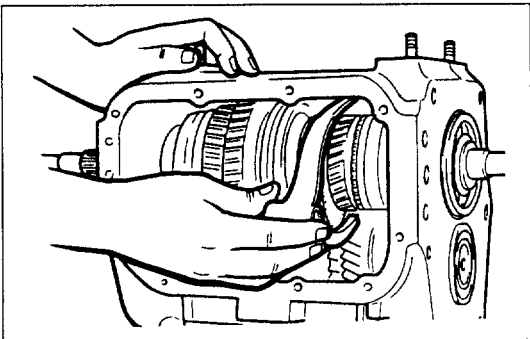
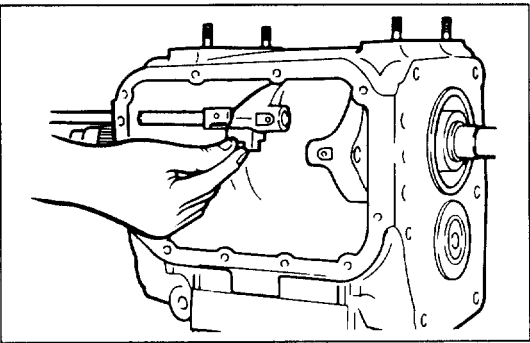
- Spring Pin Remover : 9-8529-2201-0

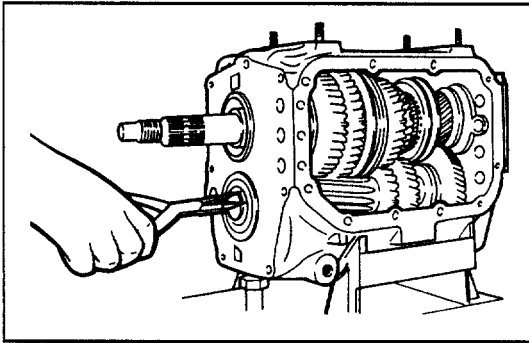
25. 1st/2nd Shift Block**26. 1st/2nd Shift Rod**

- Move the shift rod rearward and remove the shift block and shift rod.

27. Interlock Ball

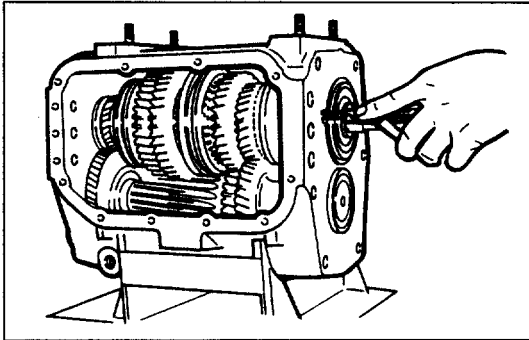
- Take out the 2 interlock balls from the transmission case.

**28. 5th/Reverse Shift Arm****29. 3rd/4th Shift Arm****30. 1st/2nd Shift Arm**

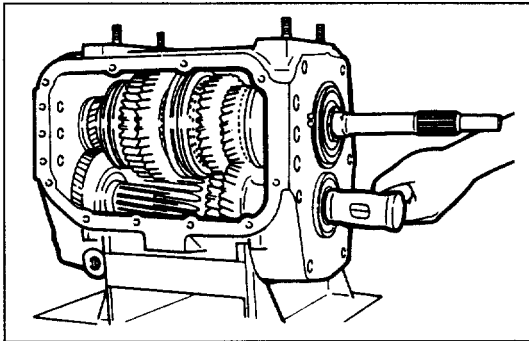


31. Counter Shaft Rear Bearing

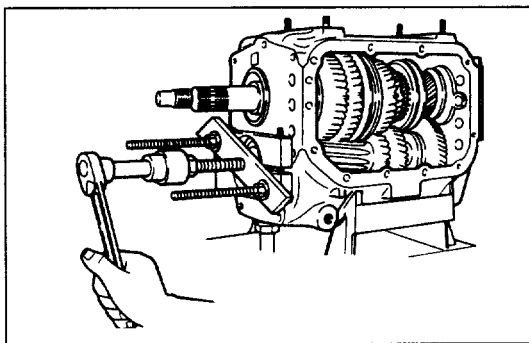
- Remove the snap ring from the countershaft rear end.



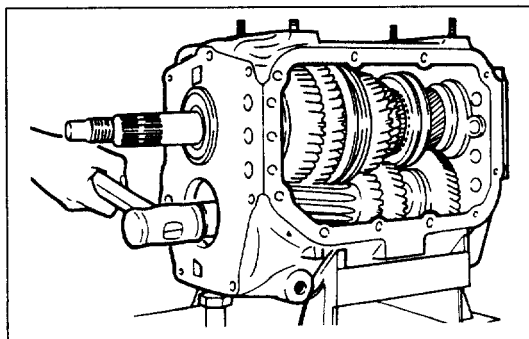
- Remove the snap ring from the top gear shaft bearing outer circumference.



- Move the countershaft approximately 3 mm (0.1 in) rearward by tapping on its front end with brass or plastic hammer.
- Remove the snap ring from the rear bearing outer circumference.

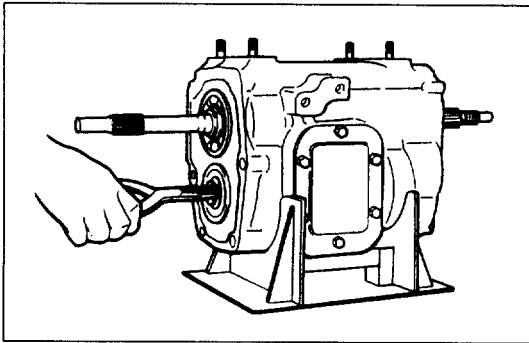


- Set the bearing remover to the snap ring groove to remove the rear bearing.
Bearing Remover : 5-8840-2042-0
Universal Puller : 5-8840-2027-0

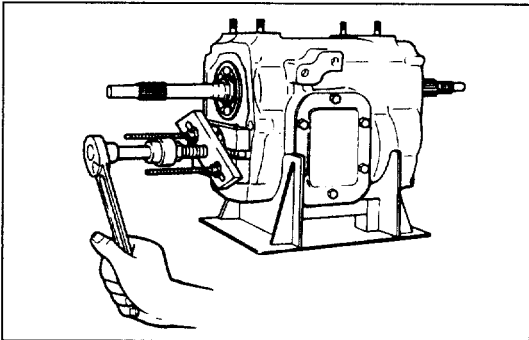


32. Counter Shaft Front Bearing

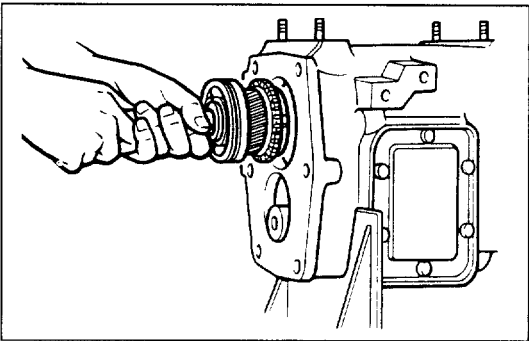
- Move the counter shaft approximately 3 mm (0.1 in) forward by tapping on its rear end with brass or plastic hammer.



- Remove the snap ring from the counter shaft front end.

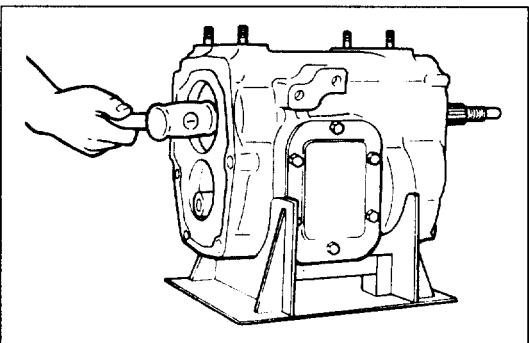


- Set the bearing remover to the snap ring groove to remove the front bearing.
Bearing Remover : 5-8840-2078-0
Universal Puller : 5-8840-2027-0



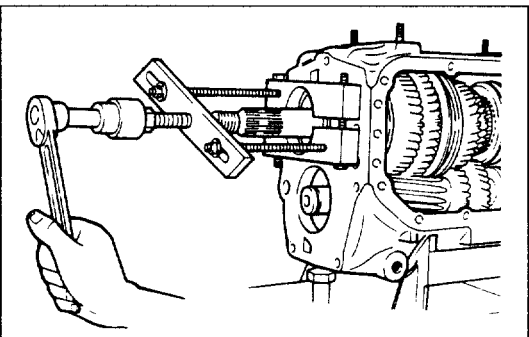
33. Top Gear Shaft Assembly

- Remove the top gear shaft bearing outer race toward front end using a hammer and soft metal bar.
- Remove the block ring and needle bearing.

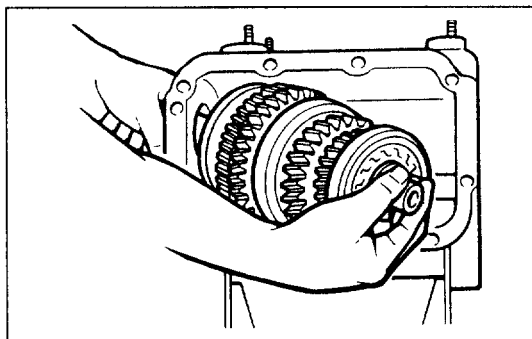


34. Main Shaft Rear Bearing

- Move the main shaft approximately 3 mm (0.1 in) rearward by tapping on its front end with brass or plastic hammer.

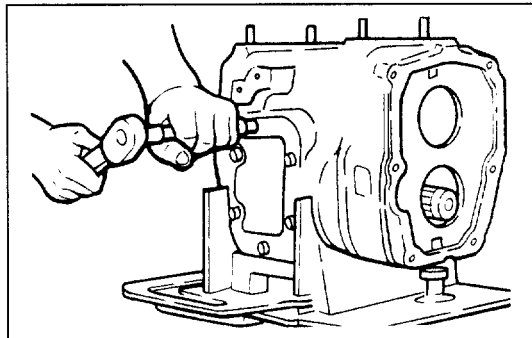


- Remove the snap ring and set the bearing remover to the snap ring groove to remove the bearing.
Bearing Remover : 5-8840-2078-0
Universal Puller : 5-8840-2027-0

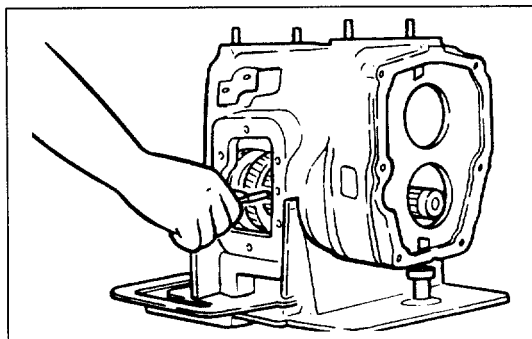


35. Main Shaft Assembly

- Take main shaft assembly out from the transmission case.

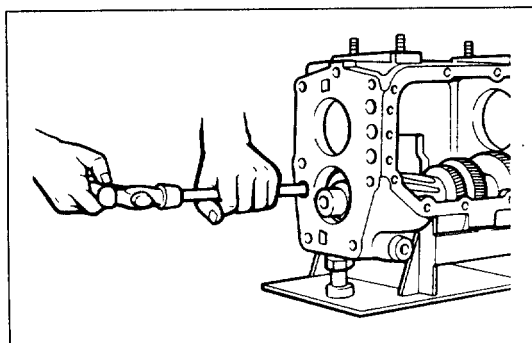


36. Side Cover

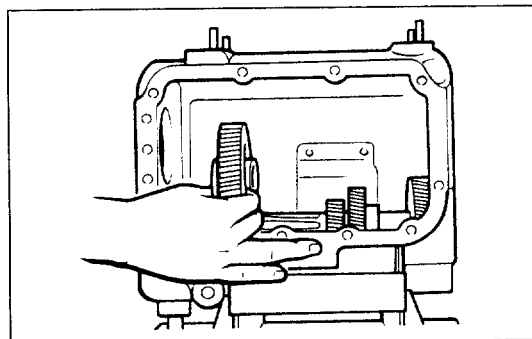


37. Reverse Idle Gear Shaft

- Take out the pin of reverse idle gear shaft from the transmission case.



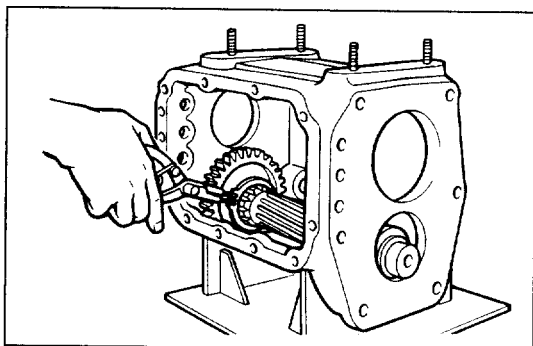
- Drive out the reverse idle gear shaft inward the transmission case, with a suitable bar at the end of reverse gear shaft.



38. Reverse Idle Gear

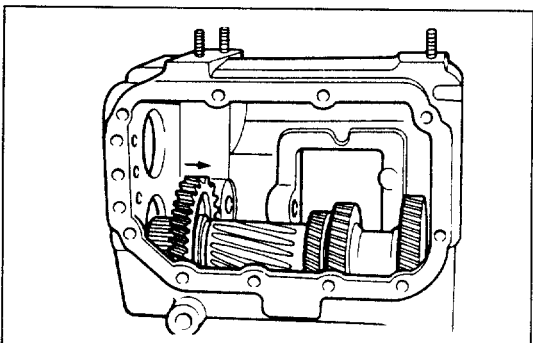
39. Thrust Washer

40. Conical Spring

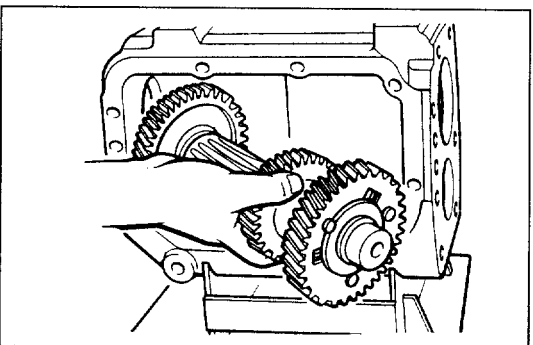


41. Counter Shaft Assembly

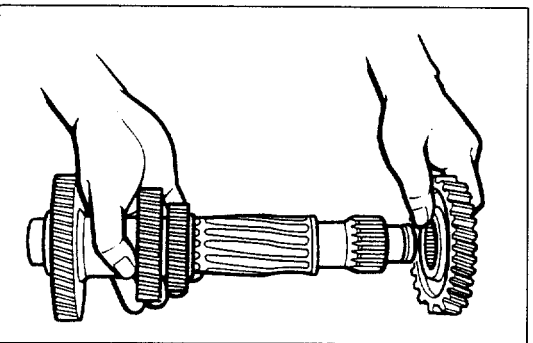
- Remove the snap ring of the counter 5th gear and place aside inward temporarily.



- Move the counter 5th gear inward and take it out together with the counter shaft assembly.

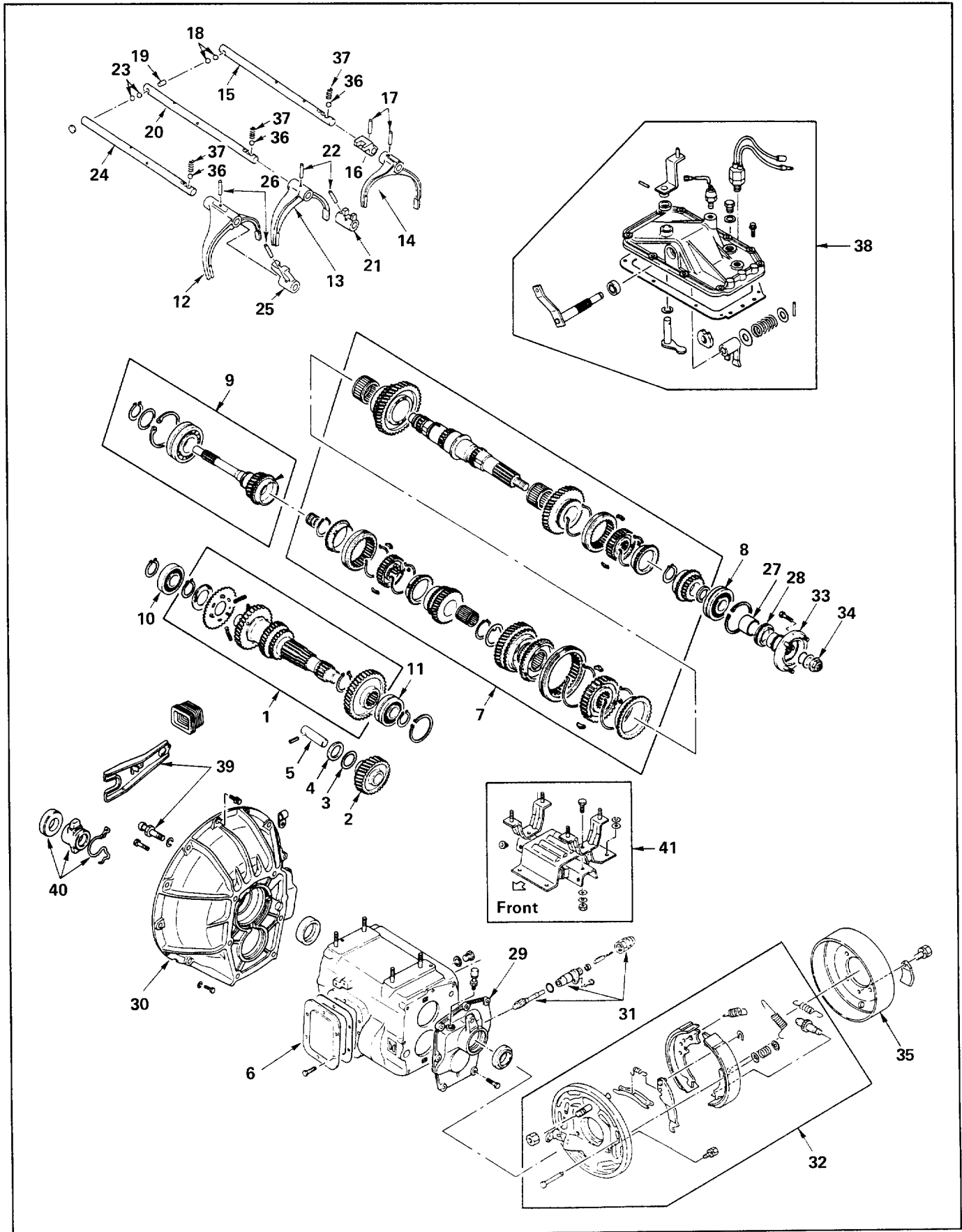


- Remove the counter shaft assembly from the transmission case.



- Remove the counter 5th gear and the snap ring from the counter shaft.

REASSEMBLY



Reassembly Steps

- | | |
|---------------------------------|---|
| 1. Counter shaft assembly | 22. Spring pin |
| 2. Reverse idle gear | 23. Interlock ball |
| 3. Conical washer | 24. 1st/2nd shift rod |
| 4. Thrust washer | 25. 1st/2nd shift block |
| 5. Reverse idle gear shaft | 26. Spring pin |
| 6. Side cover | 27. Spacer |
| 7. Main shaft assembly | 28. Car speed sensor drive gear |
| 8. Main shaft rear bearing | 29. Rear cover |
| 9. Top Gear shaft assembly | 30. Clutch housing |
| 10. Counter shaft front bearing | 31. Car speed sensor driven gear assembly |
| 11. Counter shaft rear bearing | 32. Parking brake assembly |
| 12. 1st/2nd shift arm | 33. Coupling driver |
| 13. 3rd/4th shift arm | 34. Lock nut |
| 14. 5th/Reverse shift arm | 35. Parking brake drum |
| 15. 5th/Reverse shift rod | 36. Detent ball |
| 16. 5th/Reverse shift block | 37. Detent spring |
| 17. Spring pin | 38. Control box assembly |
| 18. Interlock ball | 39. Shift fork and support bolt |
| 19. Interlock pin | 40. Shift block assembly |
| 20. 3rd/4th shift rod | 41. Mission mounting assembly |
| 21. 3rd/4th shift block | |



Reassembly Steps

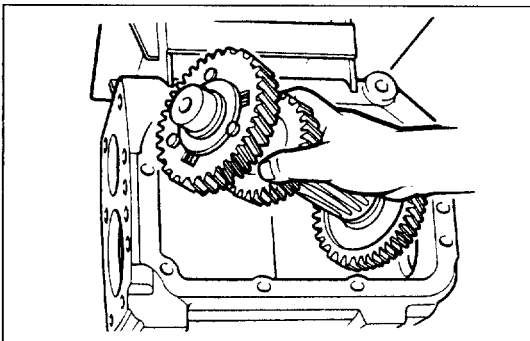
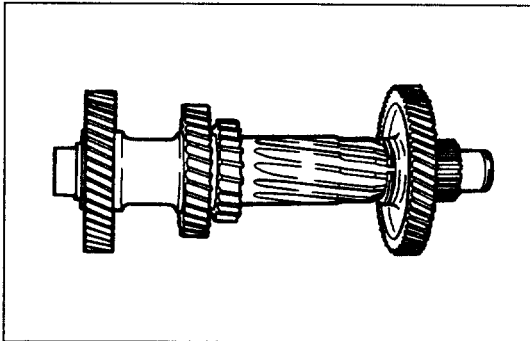
NOTE:

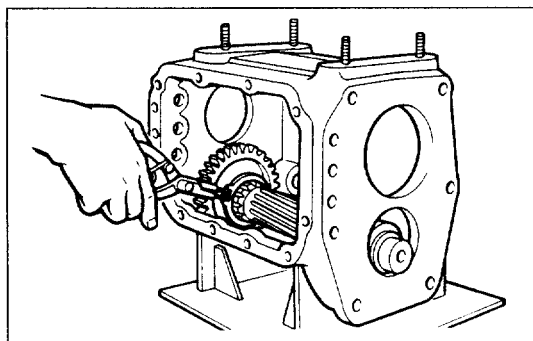
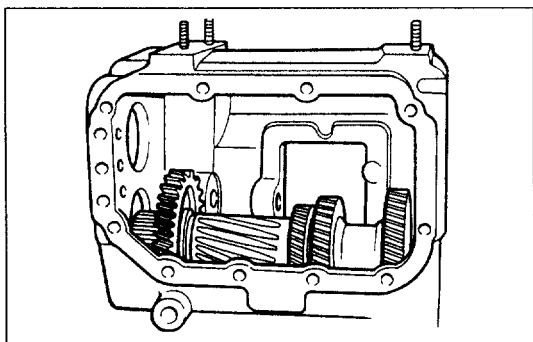
Clean each part thoroughly.

When assembling parts, apply clean engine oil (SAE 5W-30) to their sliding and mating sections.

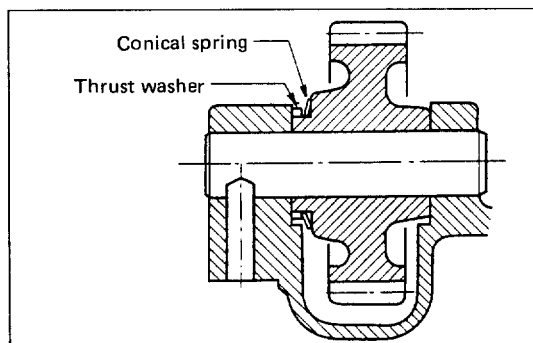
1. Counter Shaft Assembly

- Install the snap ring to the counter shaft and place it aside inward temporarily.
 - Then install the counter 5th gear and move it inward.
-
- Install the counter shaft assembly in the transmission case.





- Install the snap ring to fix the counter 5th gear.

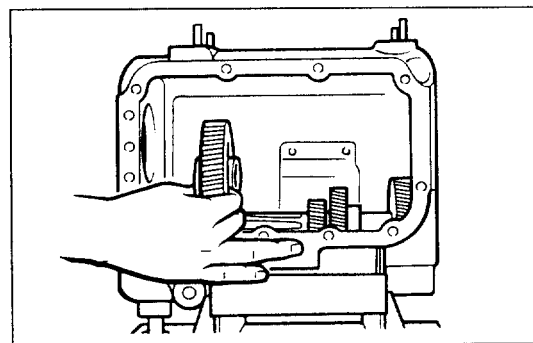


2. Reverse Idle Gear

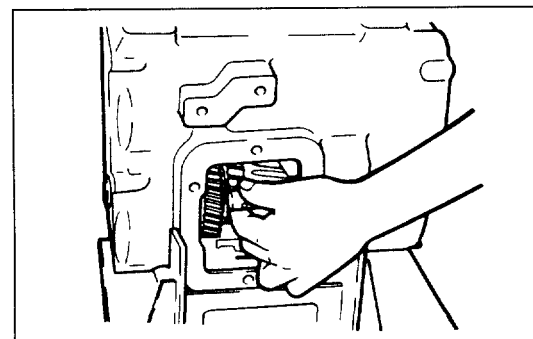
3. Conical Spring

4. Thrust Washer

- Install the conical spring and the thrust washer to the reverse idle gear.
- The conical spring is to be set up with its concave face to the gear side shown in the illustration.

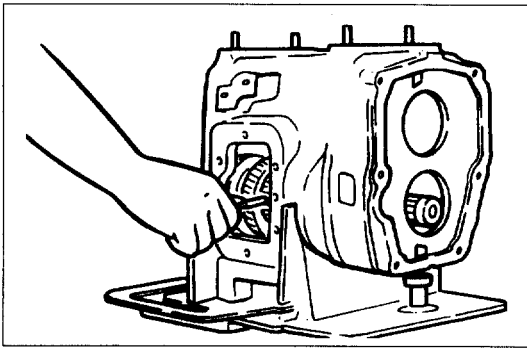


- The reverse idle gear should be installed with the thrust washer side turned to the forward

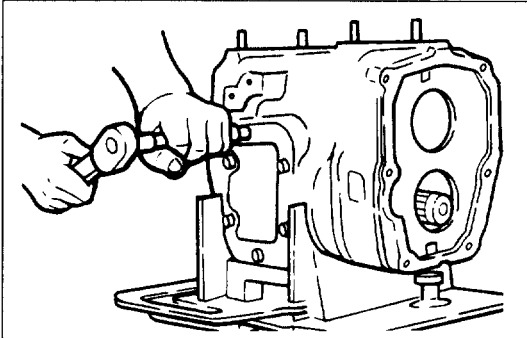


5. Reverse Idle Gear Shaft

- Aligning the knock pin hole on the reverse idle gear shaft with its hole of the transmission case.



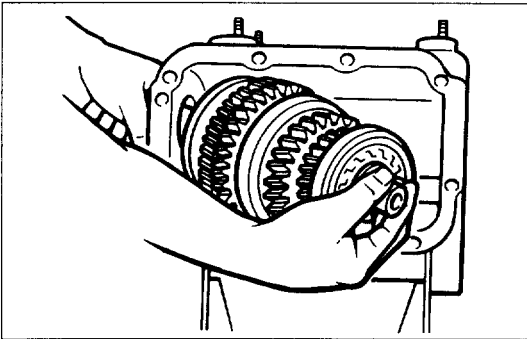
- Then insert the knock pin.



6. Side Cover

- Install the side cover with new gasket.

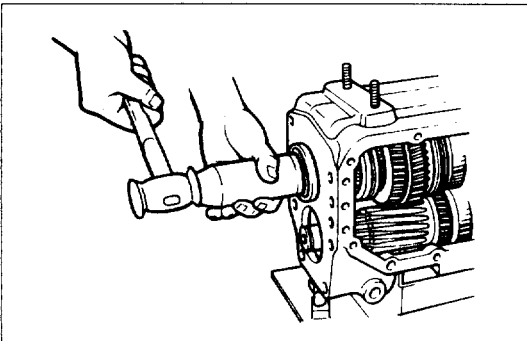
Side Cover Bolt Torque	N·m (kg·m/lb·ft)
18 (1.8/13)	



7. Main Shaft Assembly

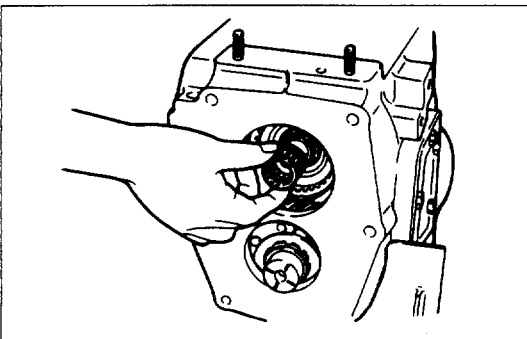
NOTE:

Take care that the thrust washer of the reverse gear does not drop off.



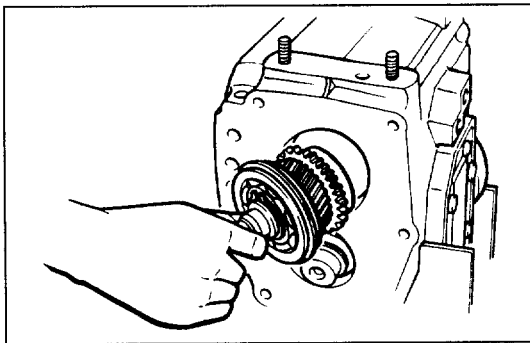
8. Main Shaft Rear Bearing

- Install the snap ring to the rear bearing outer circumference.
- Install the rear bearing using the bearing installer.
Bearing Installer : 9-8522-1615-0
- Check to be certain the block ring on the 5th gear side fitted properly to the inserts.

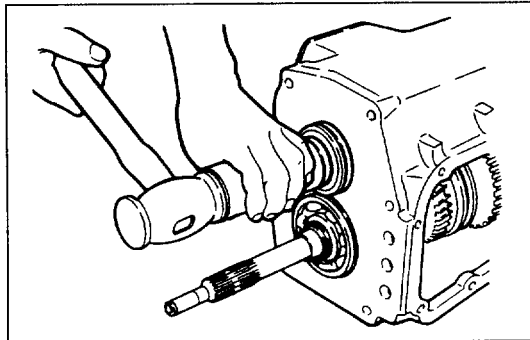


9. Top Gear Shaft Assembly

- Install the needle bearing to the top gear shaft.

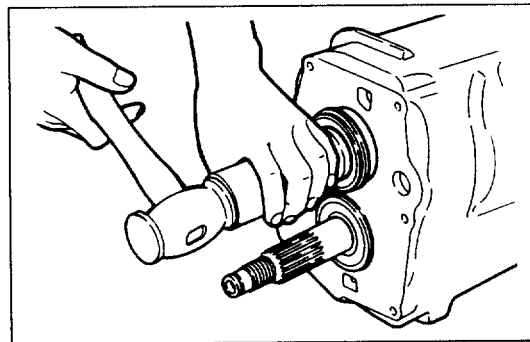


- Install the top gear shaft assembly into the transmission case.
- Check to be certain the block ring on the 4th gear side fitted properly to the inserts.
- Press in the bearing until the snap ring of the bearing outer circumference comes into contact with the transmission case.



10. Counter Shaft Front Bearing

- Use the bearing installer to install the front bearing.
Bearing Installer: 5-8840-2244-0
- Install the counter shaft snap ring



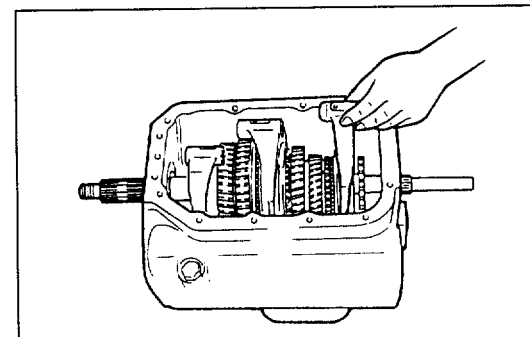
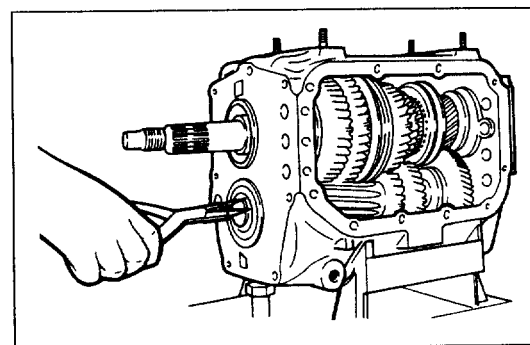
11. Counter Shaft Rear Bearing

- Install the snap ring to the rear bearing outer circumference.
- Install the rear bearing using bearing installer and install the snap ring.
Bearing Installer: 5-8840-2244-0

NOTE:

With each gear set to the neutral position, check to see if the shaft and each gear rotate smoothly.

Check to see if each block ring is free. When it gets caught and stuck in the taper cone, use a screwdriver to make it free.



12. 1st/2nd Shift Arm

- With the longer boss side set to the front.



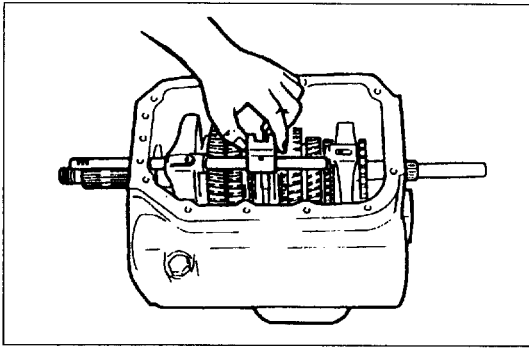
13. 3rd/4th Shift Arm

- With the longer boss side set to the rear.

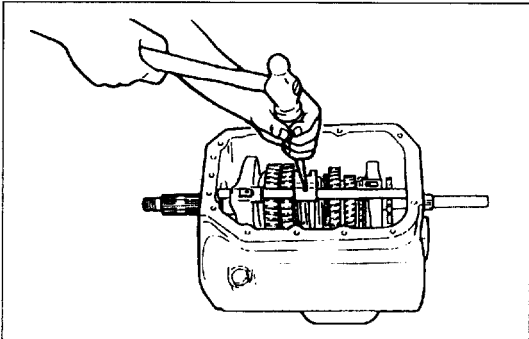


14. 5th/Reverse Shift arm

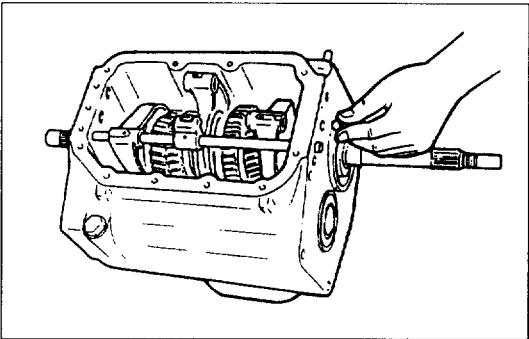
- With the longer boss side set to the front.

**15. 5th/Reverse Shift Rod****16. 5th/Reverse Shift Block**

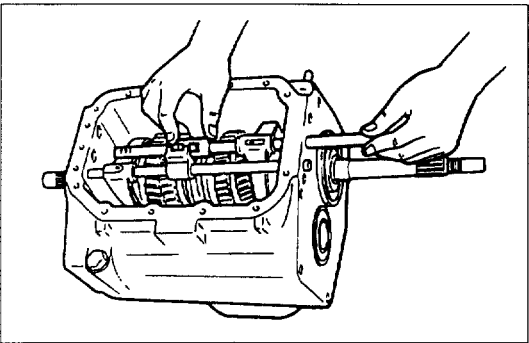
- Turning the detent groove to the outside (detent ball side), insert the shift rod from the rear side with the detent groove side at the rear.

**17. Spring Pin**

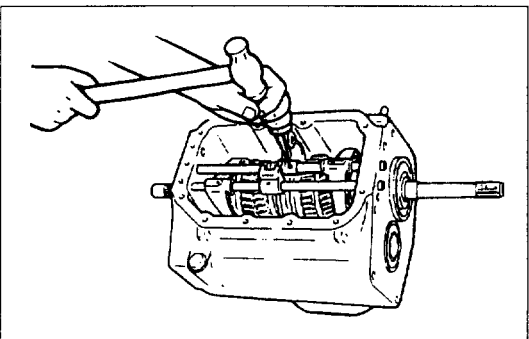
- Setting the hole of the shift arm and shift block to that of the shift rod, fix them with a new spring pin.
- Install spring pin properly with the slit in line with the shaft center line.

**18. Interlock Ball**

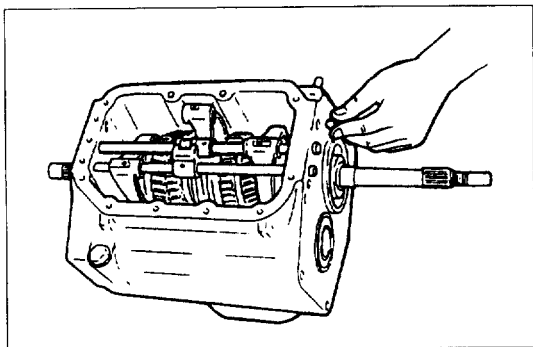
- Apply small amount of multi-purpose grease to the interlock balls.
- Install the 2 interlock balls in position between the 5th/reverse shift rod and 3rd/4th shift rod.

**19. Interlock Pin****20. 3rd/4th Shift Rod****21. 3rd/4th Shift Block**

- Apply small amount of multi-purpose grease to the interlock pin.
- Insert a interlock pin into the 3rd/4th shift rod.
- Turning the detent groove to the outside (detent ball side), insert the shift rod from the front side with the detent groove side at the front.

**22. Spring Pin**

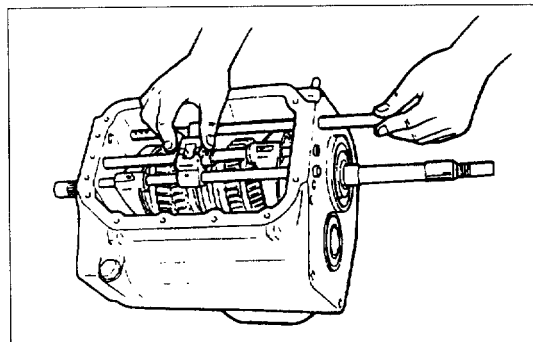
- Setting the hole of the shift arm and shift block to that of the shift rod, fix them with a new spring pin.
- Install spring pin properly with the slit in line with the shaft center line.



23. Interlock Ball



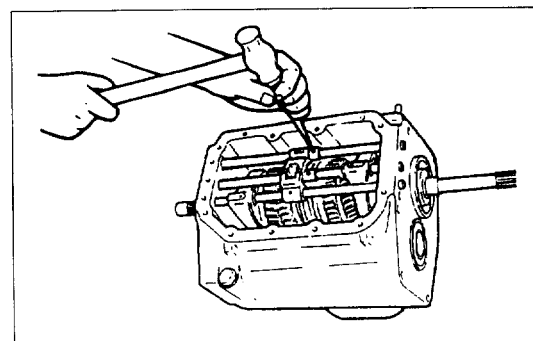
- Apply small amount of multi-purpose grease to the interlock balls.
- Install the 2 interlock balls in position between the 3rd/4th shift rod and 1st/2nd shift rod.



24. 1st/2nd Shift Rod

25. 1st/2nd Shift Block

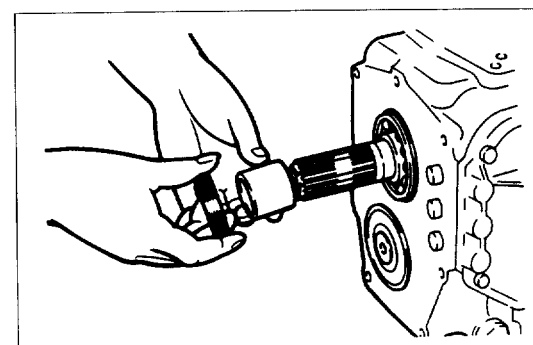
- Before reassembly, set the 5th/reverse and 3rd/4th shift rods already reassembled in neutral position.
- Turning the detent groove to the outside (detent ball side), insert the shift rod from the front side with the detent groove side at the front.



26. Spring Pin

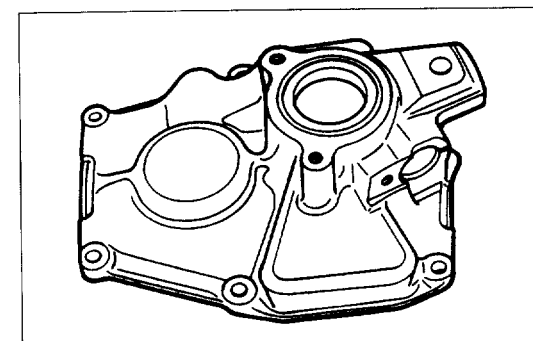


- Setting the hole of the shift arm and shift block to that of the shift rod, fix them with a new spring pin.
- Install spring pin properly with the slit in line with the shaft center line.



27. Spacer

28. Car Speed Sensor Drive Gear

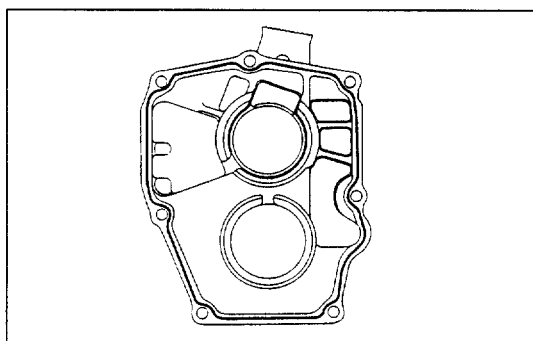


29. Rear Cover



- Apply engine oil to the new oil seal outer circumference and apply multi-purpose grease to the oil seal lip.
- Use the oil seal installer to install the oil seal to the rear cover.

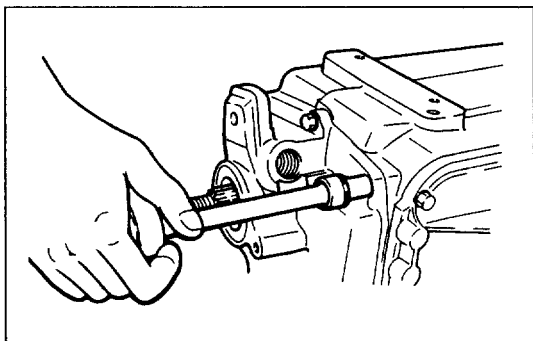
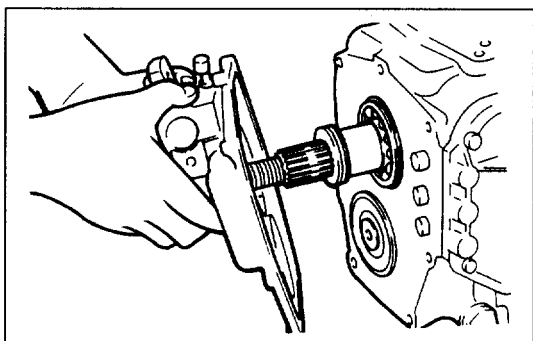
Oil Seal Installer : 5-8840-2242-0



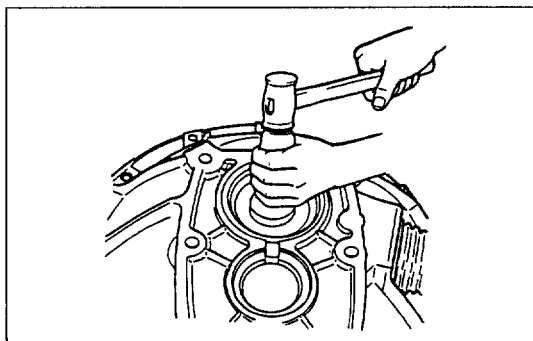
- Remove water and oil on the mating face before applying the liquid gasket.
- Apply a \varnothing 2 mm (0.1 in) bead of the liquid gasket (Three Bond 1215 or equivalent) to the rear cover surface shown in the illustration.

CAUTION:

Install the rear cover on the transmission case within 30 minutes after liquid gasket application.

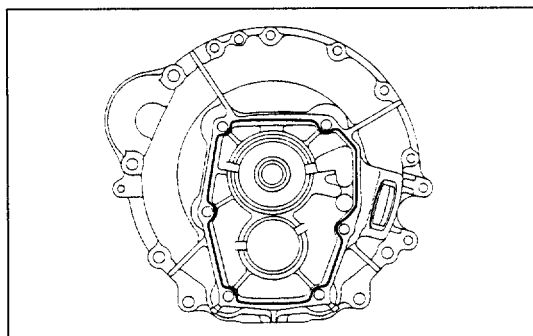


Rear Cover Bolts Torque	N·m (kg·m/lb·ft)
20 (2.0/14)	



30. Clutch Housing

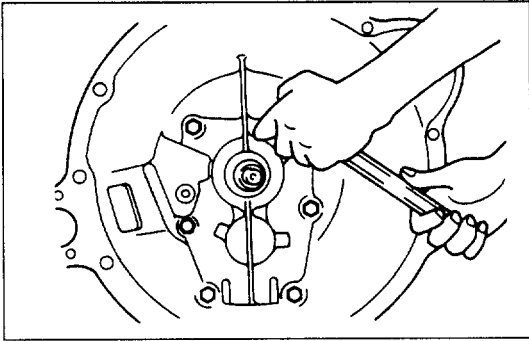
- Apply engine oil to the new oil seal outer circumference and apply multi-purpose grease to the oil seal lip.
- Use the oil seal installer to install the oil seal to the clutch housing.
Oil Seal Installer: 5-8840-2243-0



- Remove water and oil on the mating face before applying the liquid gasket.
- Apply a \varnothing 2 mm (0.1 in) bead of the liquid gasket (Three Bond 1215 or equivalent) to the clutch housing surface shown in the illustration.

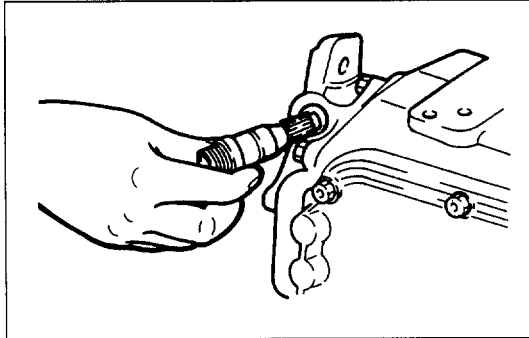
CAUTION:

Install the clutch housing on the transmission case within 30 minutes after liquid gasket application.



Clutch Housing to Transmission

Case Bolts Torque	N·m (kg·m/lb·ft)
81 (8.3/60)	

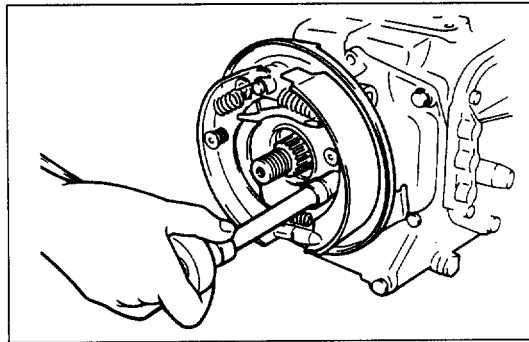


31. Car Speed Sensor Driven Gear Assembly

Driven Gear Lock Plate Bolt Torque	N·m (kg·m/lb·ft)
15 (1.5/11)	

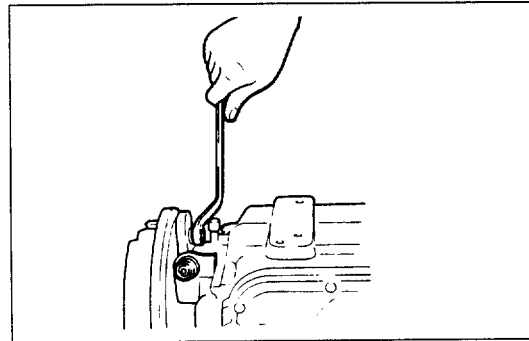
- Install the car speed sensor with key rod.

Car Speed Sensor Torque	N·m (kg·m/lb·ft)
25 (2.5/18)	

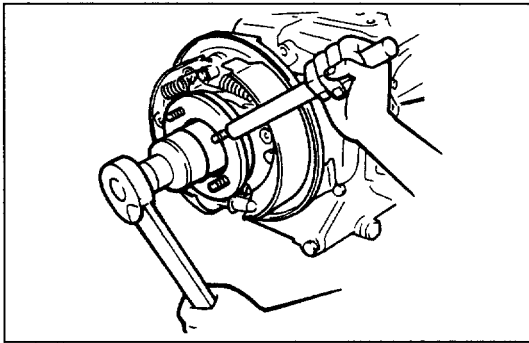


32. Parking Brake Assembly

Parking Brake Bolts Torque	N·m(kg·m/lb·ft)
M8: 25 (2.6/19)	



Parking Brake Nut Torque	N·m (kg·m/lb·ft)
M12: 113 (11.5/83)	



33. Coupling Driver

34. Lock Nut



- Install the o-ring and conical washer. The conical washer is to be set up with its identification groove to the nut side.
- Apply the engine oil to the setting face of the new lock nut and tighten it up at the specified torque.

CAUTION:

Do not reuse the lock nut.



Handle: 5-8840-2043-0

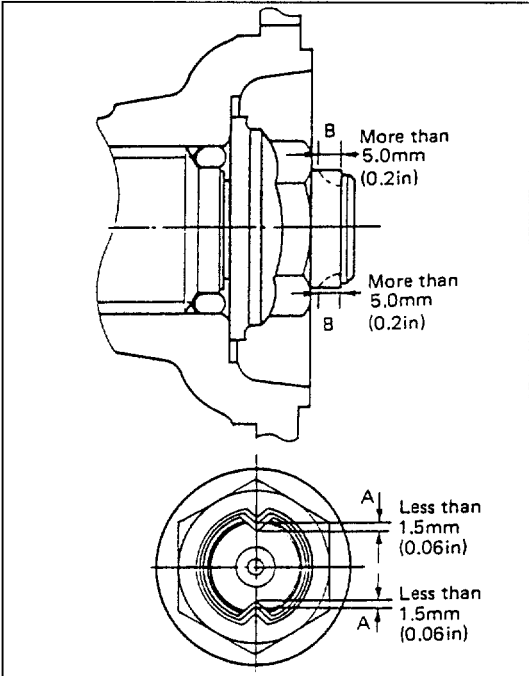
Lock Nut Torque	N·m (kg·m/lb·ft)
226 (23.0/166)	

- Align the lock nut with the V-shaped groove at the tip of the main shaft, and caulk the nut lip portion by using a chisel.
(Round edge approximately 1 mm (0.04 in) x 60°).
- As shown in the illustration, be sure to caulk the nut lip so that the clearance between the V-shaped groove portion at the tip of the main shaft and the caulked up lip(A) is less than 1.5 mm (0.06 in), and the caulking length(B) is 5 mm (0.2 in) or more.



CAUTION:

Be sure to confirm that there is no crack at the caulked portion of the lock nut after caulking.



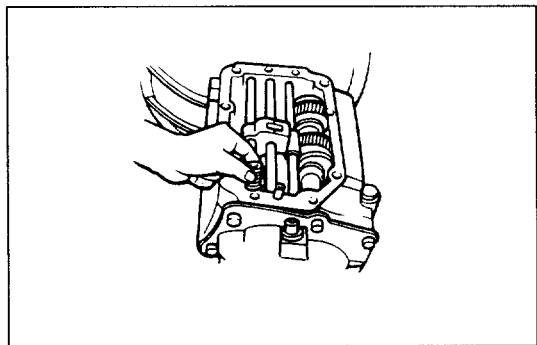
35. Parking Brake Drum



- Adjust the parking brake after installation.
 - 1) Rotate the brake drum to align the adjust hole with the adjuster.
 - 2) Move the camshaft lever from side to side several times to center the brake shoes.
 - 3) Insert a screwdriver into the hole and rotate the adjuster by pushing it upward until the shoes drag on the drum.
 - 4) Back off the adjuster 30 notches.
- Install the adjust hole cover.



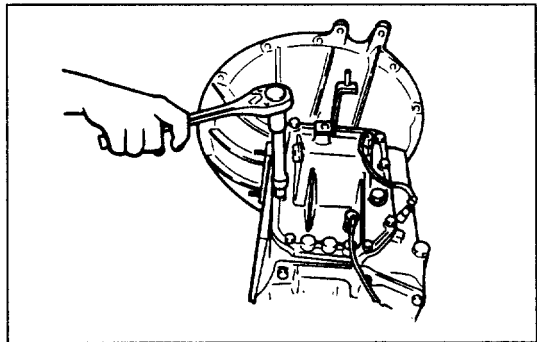
Adjust Hole Cover Bolt Torque	N·m (kg·m/lb·in)
8 (0.8/69)	



- 36. Detent Ball
- 37. Detent Spring
- 38. Control Box Assembly

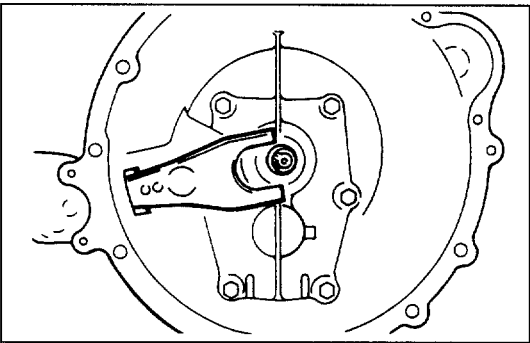


- Apply small amount of multi-purpose grease to the detent balls.
- Install the 3 detent balls and the 3 detent springs to the transmission case.
- Install the control box assembly with new gasket.



Control Box to Transmission Case Bolts Torque	N·m (kg·m/lb·ft)
20 (2.0/14)	

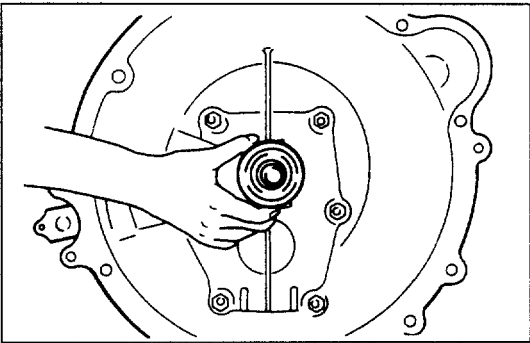
NOTE:
Operating the shift lever and the select lever, make sure that they shift to each position smoothly.



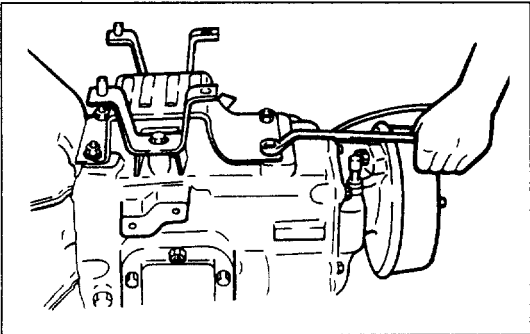
- 39. Shift Fork and Support Bolt



Support Bolt Torque	N·m (kg·m/lb·ft)
52 (5.3/38)	



- 40. Shift Block Assembly



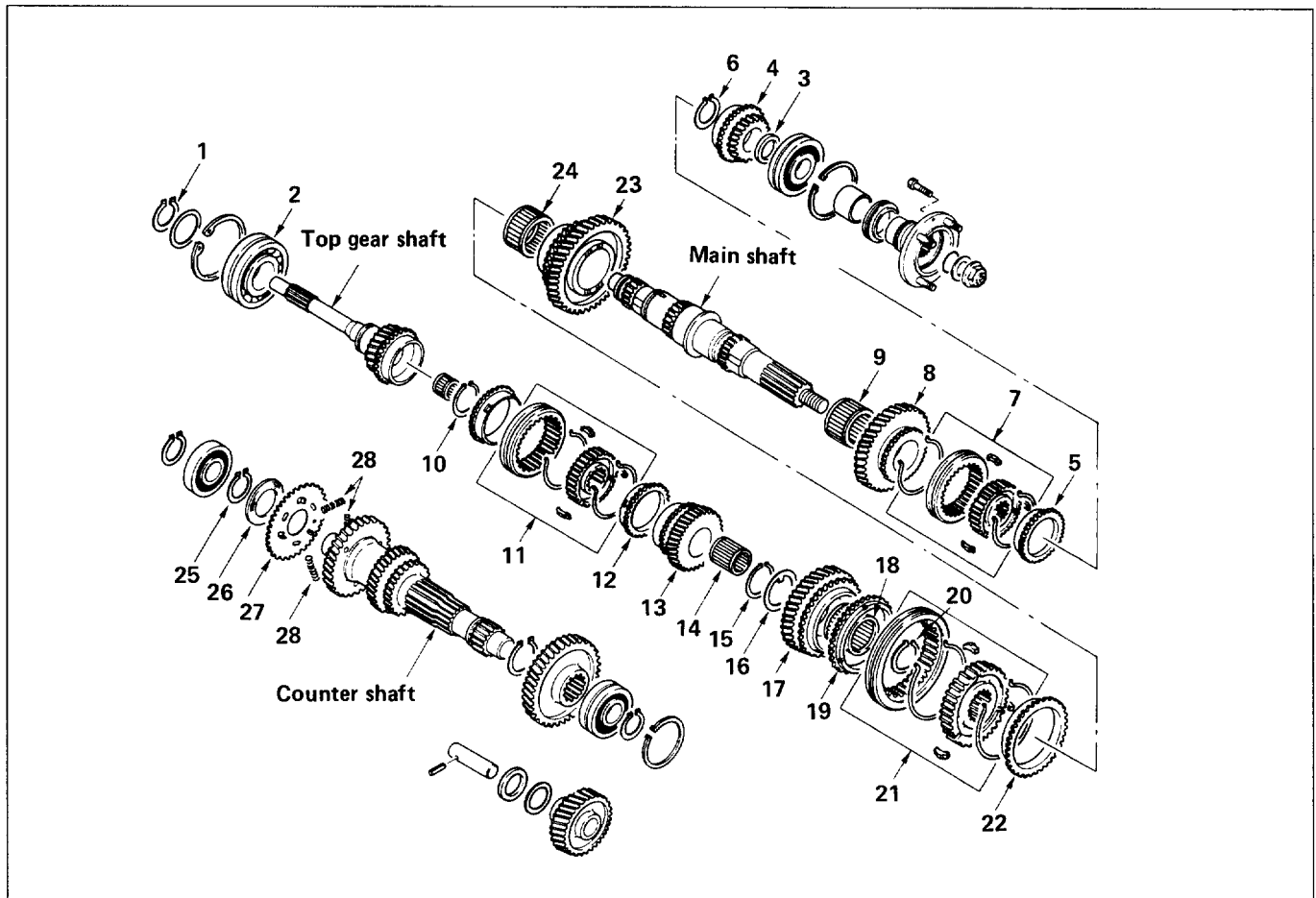
- 41. Mission Mounting Assembly



Mission Mounting Bolt Torque	N·m (kg·m/lb·ft)
69 (7.0/51)	

TOP GEAR SHAFT ASSEMBLY, MAIN SHAFT ASSEMBLY AND COUNTER SHAFT ASSEMBLY

DISASSEMBLY



Disassembly Step

Top gear shaft assembly

1. Snap ring
2. Ball bearing

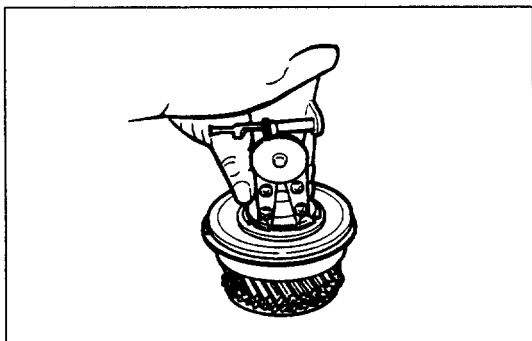
Main shaft assembly

3. Thrust washer
4. 5th gear
5. Block ring
6. Snap ring
7. 5th/reverse synchronizer assembly
8. Reverse gear
9. Needle bearing
10. Snap ring
11. 3rd/4th synchronizer assembly
12. Block ring
13. 3rd gear

14. Needle bearing
15. Snap ring
16. Thrust washer
17. 2nd gear
18. Needle bearing
19. Block ring
20. Snap ring
21. 1st/2nd synchronizer assembly
22. Block ring
23. 1st gear
24. Needle bearing

Counter shaft assembly

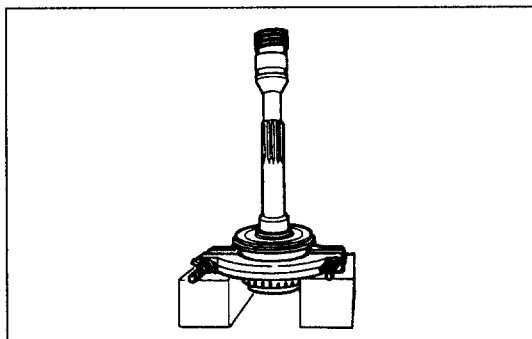
25. Snap ring
26. Conical washer
27. Anti-lash plate
28. Spring



Disassembly Steps

Top Gear Shaft Assembly

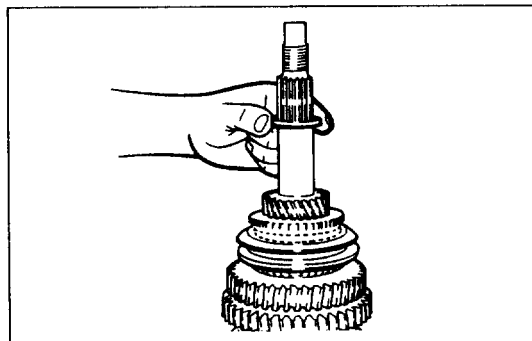
1. Snap Ring



2. Ball Bearing

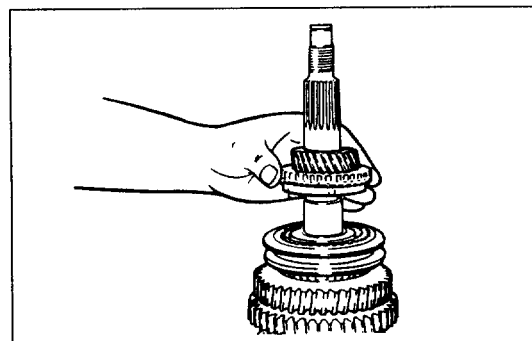


- Use the bearing remover to remove the bearing from top gear shaft.
Bearing Remover : 5-8840-0587-0



Main Shaft Assembly

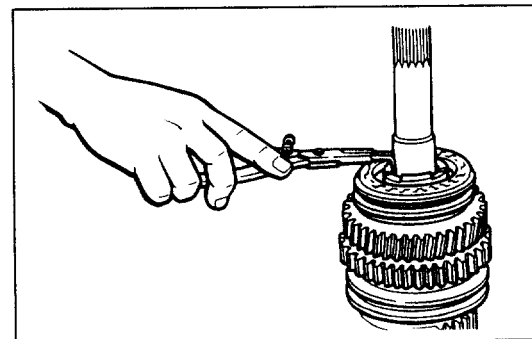
3. Thrust Washer



4. 5th Gear

5. Block Ring

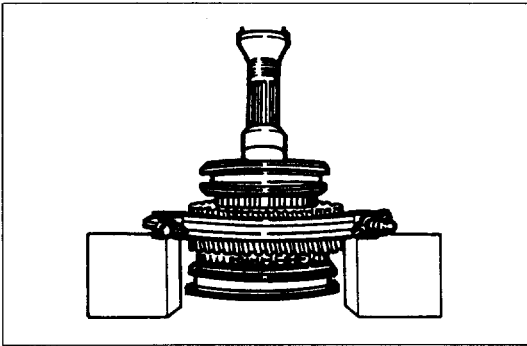
- Attach a backing plate to the vise, secure the main shaft at the top end, and remove the 5th gear and block ring.



6. Snap Ring

NOTE:

Snap ring of appropriate sizes are combined to fill the gap to the clutch hub. Never mix them with other snap rings.



7. 5th/Reverse Synchronizer Assembly

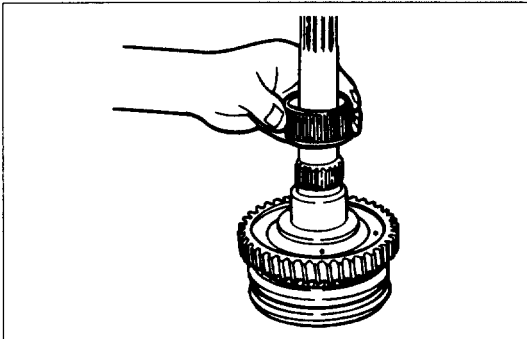
8. Reverse Gear



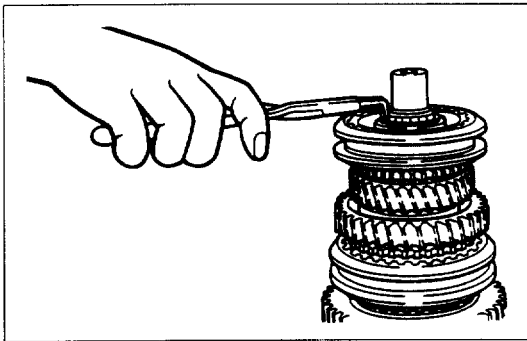
- Use a bench press and the bearing remover to remove the reverse gear together with the 5th/reverse synchronizer assembly.

Bearing Remover : 5-8840-0587-0

- Disassemble synchronizer assemblies into the clutch hub, sleeve, inserts (3 pieces) and insert springs (2 pieces).



9. Needle Bearing

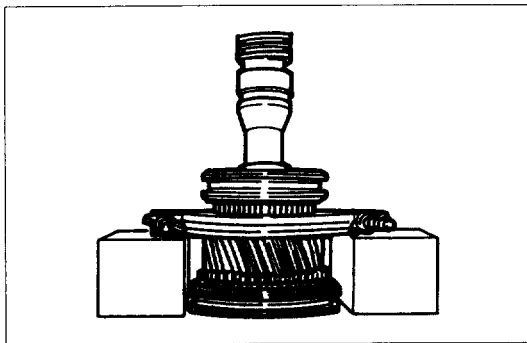


10. Snap Ring

- Attach a backing plate to the vise, secure the main shaft at the spline end, and remove the snap ring at the end.

NOTE:

Snap ring of appropriate sizes are combined to fill the gap to the clutch hub. Never mix them with other snap rings.



11. 3rd/4th Synchronizer Assembly

12. Block Ring

13. 3rd Gear

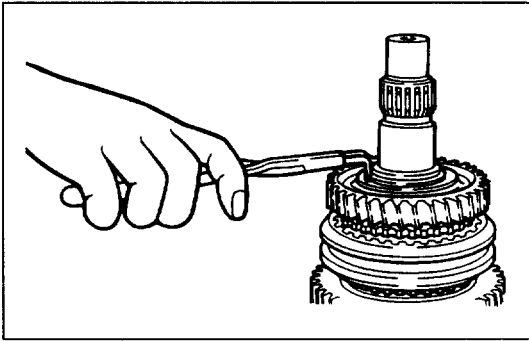


- Use a bench press and the bearing remover to remove the 3rd gear together with the 3rd/4th synchronizer assembly and the block ring.

Bearing Remover : 5-8840-0587-0

- Disassemble synchronizer assemblies into the clutch hub, sleeve, inserts (3 pieces) and insert springs (2 pieces).

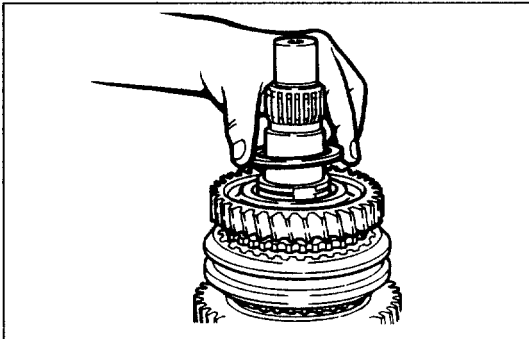
14. Needle Bearing



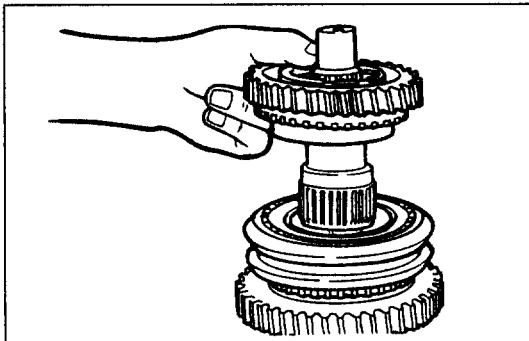
15. Snap Ring

NOTE:

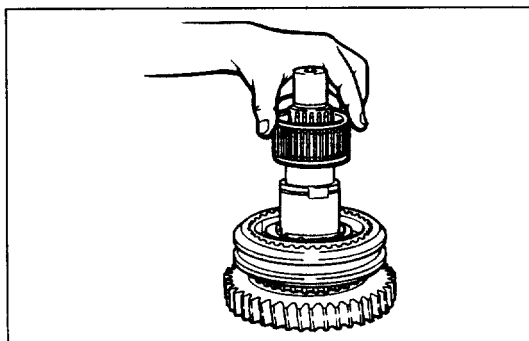
Snap ring of appropriate sizes are combined to fill the gap to the clutch hub. Never mix them with other snap rings.



16. Thrust Washer

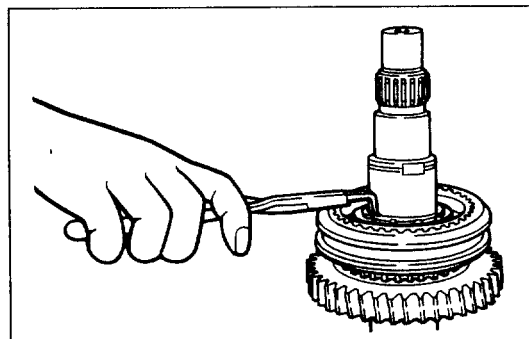


17. 2nd Gear



18. Needle Bearing

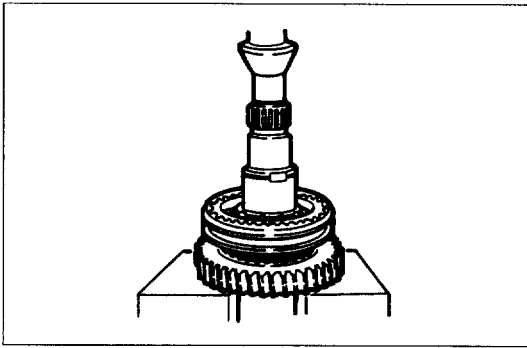
19. Block Ring



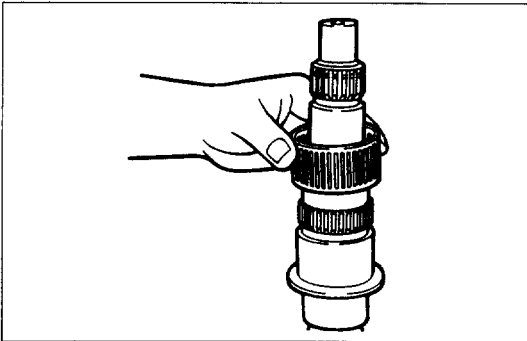
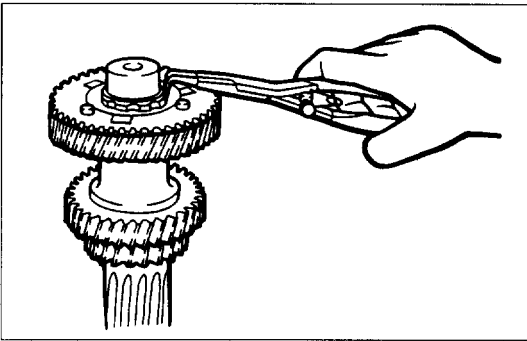
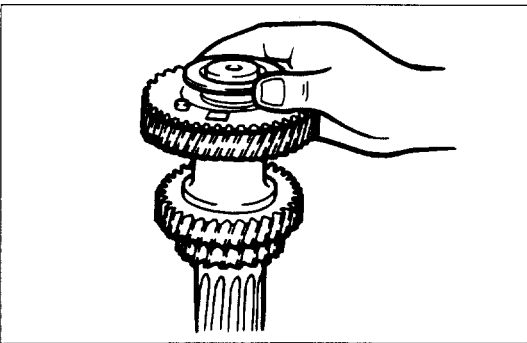
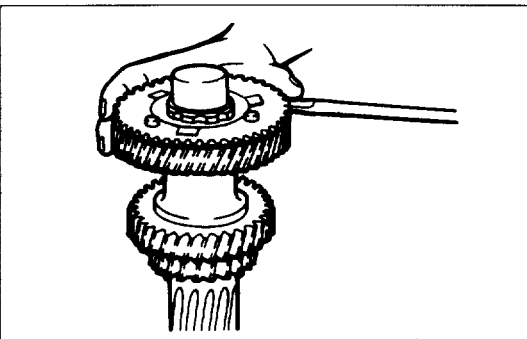
20. Snap Ring

NOTE:

Snap ring of appropriate sizes are combined to fill the gap to the clutch hub. Never mix them with other snap rings.

**21. 1st/2nd Synchronizer Assembly****22. Block Ring****23. 1st Gear**

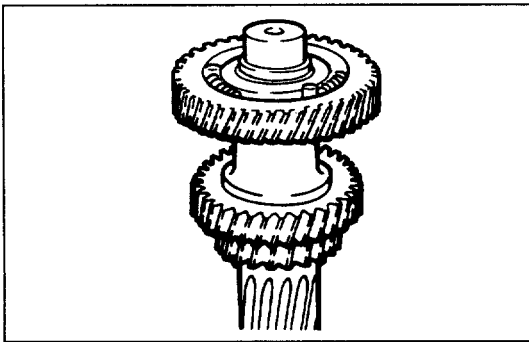
- Use a bench press to remove the 1st gear together with the 1st/2nd synchronizer assembly and the block ring.
- Disassemble synchronizer assemblies into the clutch hub, sleeve, inserts (3 pieces) and insert springs (2 pieces).

**24. Needle Bearing****Counter Shaft Assembly****25. Snap Ring****26. Conical Washer****27. Anti-lash Plate**

- Insert a flat-end screwdriver between the anti-lash plate and the counter drive gear, and remove the anti-lash plate.

**WARNING:**

THE ANTI-LASH PLATE SHOULD BE REMOVED VERY SLOWLY WITH SPECIAL CARE OTHERWISE SOME SPRINGS INSTALLED INSIDE THE PLATE COULD POP OUT AND CAUSE INJURY.

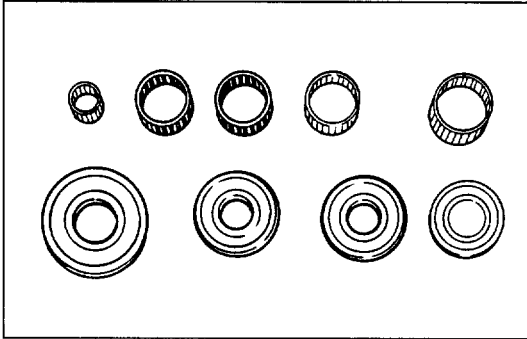


28. Spring

- Remove the 3 springs that are assembled to the counter drive gear side.

INSPECTION AND REPAIR

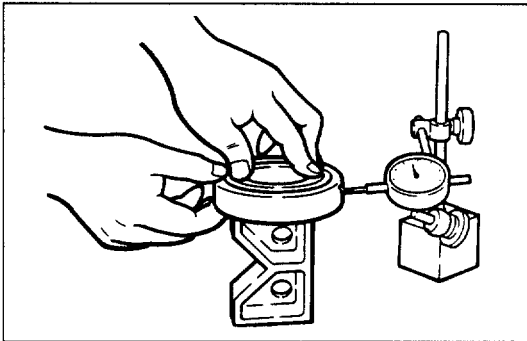
Make the necessary adjustment, repairs, and part replacements if excessive wear or damage is discovered during inspection.



Bearings

Check each bearing, and replace in either of the following cases.

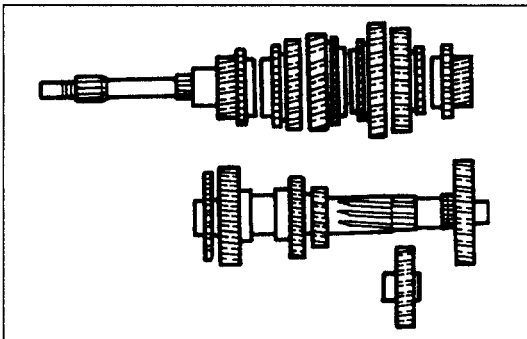
- Rotation is not smooth.
- Abnormal sound is generated.
- There is extreme damage or rust.
- Rolling element or rolling contact surface of needle roller bearing is discolored, extremely worn or pitted.



Ball Bearing Run-out

mm (in)

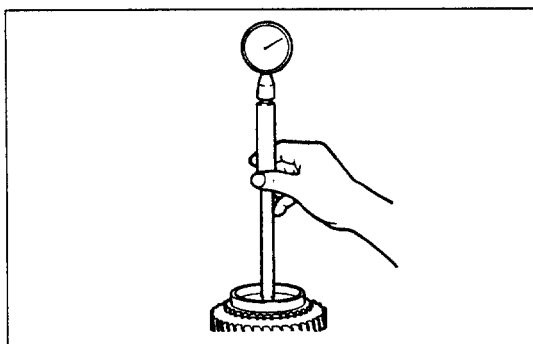
Limit
0.2 (0.01)



Gears

Check each gear for the following points. Correct a slight stepped wear or surface roughness with an oil stone or pencil grinder, or replace the gear if unrecoverable damage is found.

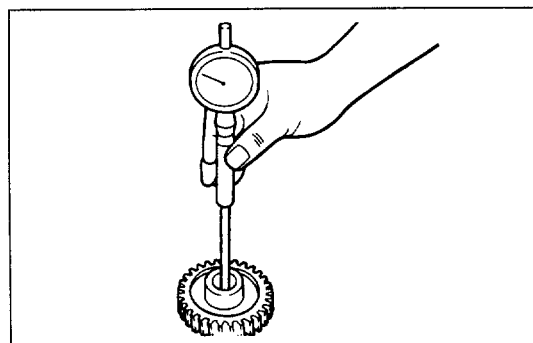
- Break or damage of tooth.
- Roughness or damage of taper cone (contact surface with block ring).
- Extreme wear of tooth.
- Inspect the dog gear teeth, and replace if hard contact is found on the force receive side (coast side) during engine braking.


Gear Inside Diameter mm (in)

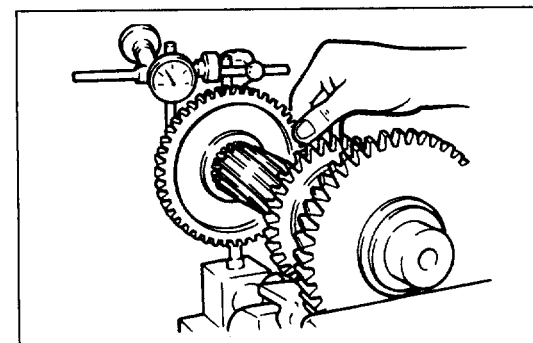
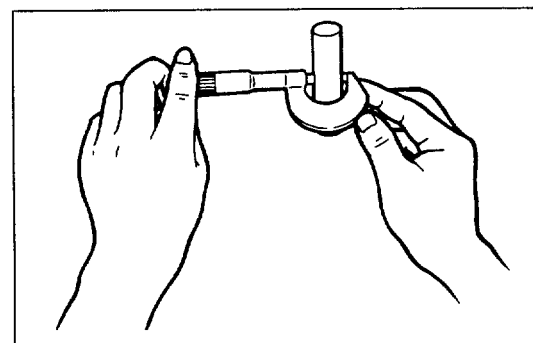
Gear	Nominal	Limit
3rd Gear	42.0 (1.654)	42.1 (1.657)
2nd Gear	54.0 (2.126)	54.1 (2.130)
1st Gear	61.0 (2.402)	61.1 (2.406)
Reverse Gear	54.0 (2.126)	54.1 (2.130)


5th Gear Bushing and Main Shaft Clearance mm (in)

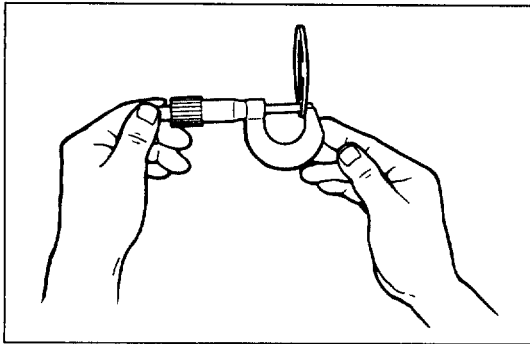
Standard	Limit
0.05-0.09 (0.002-0.004)	0.2 (0.01)


Reverse Idle Gear Bushing and Reverse Idle Shaft Clearance mm (in)

Standard	Limit
0.04-0.08 (0.002-0.003)	0.2 (0.01)

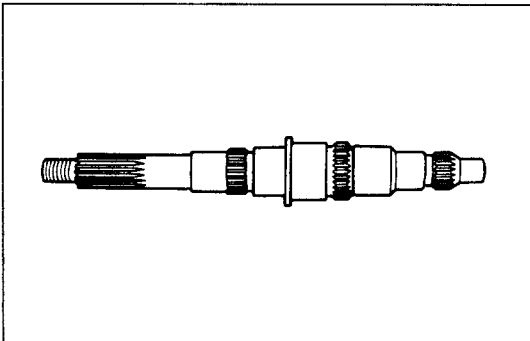
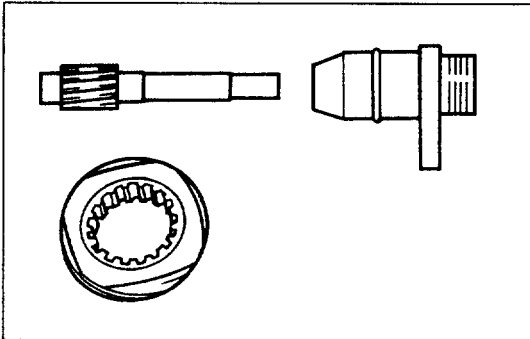

Counter 5th Gear Spline Play (At counter 5th gear outer circumference) mm (in)

Standard	Limit
0.18 -0.43 (0.007-0.017)	0.45 (0.018)



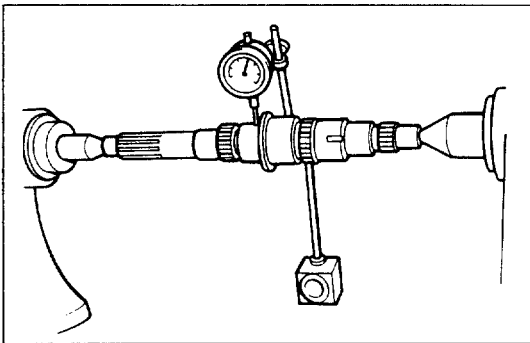
Thrust Washer Thickness		mm (in)
Gear	Nominal	Limit
For 2nd Gear	3.0 (0.12)	2.8 (0.11)
For 5th Gear	3.8 (0.15)	3.6 (0.14)

- Wear or damage of the car speed sensor drive gear and driven gear bushing.

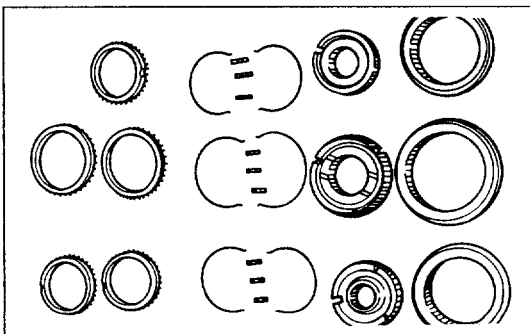


Main Shaft

Check the main shaft external surface for any damage or wear, and its spline sections for wear, damage or bent. When there is any abnormal condition found, or when it is used excessively beyond a proper use limit, replace it with new one.



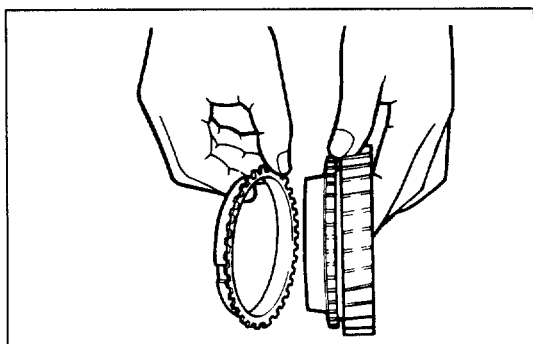
Main shaft Run-out		mm (in)
Standard	Limit	
0.025 (0.0010) or Less	0.1 (0.004)	



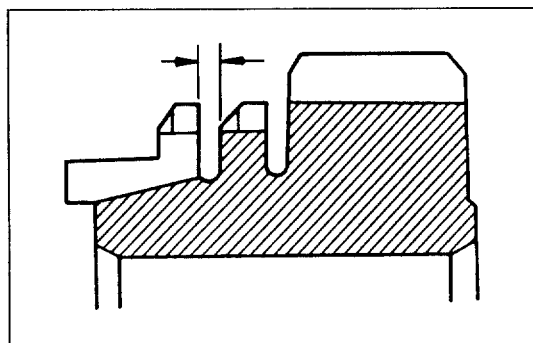
Synchromesh

Check the components of the synchronizer for any abnormal conditions. When there are uneven slight wears or rough surfaces found, improve them with an oil stone or pencil grinder.

When they are abnormally damaged, or when they are used excessively beyond a proper use limit, replace them with new one.

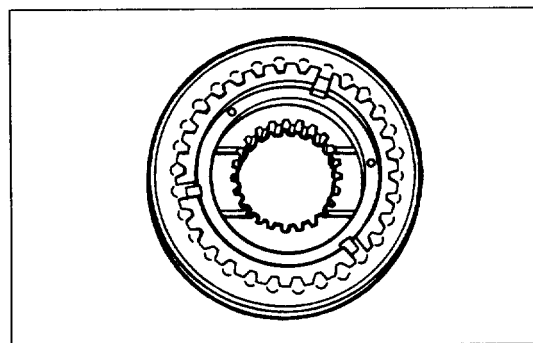


- Damages or wears found on the taper, gear and insert groove sections of the block ring.

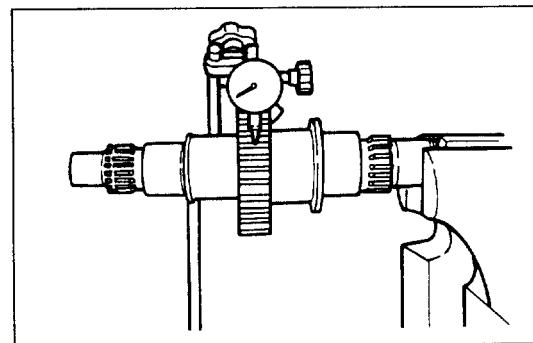


Block Ring and Dog Gear Teeth Clearance

		mm(in)
Gear	Nominal	Limit
3rd/4th	1.0 (0.04)	0.5 (0.02)
1st/2nd	1.5 (0.06)	0.5 (0.02)
5th	1.5 (0.06)	0.5 (0.02)



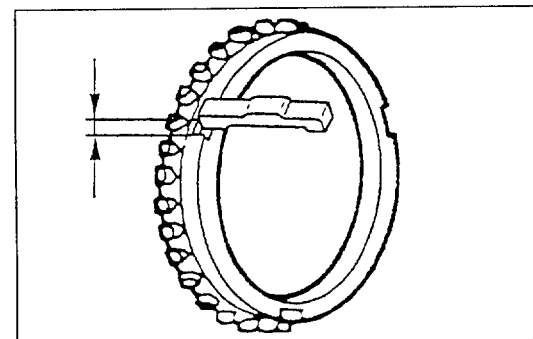
- Wears or damages found on the clutch hub, the sliding sections of the sleeve, the spline sections and insert grooves.



Clutch Hub Spline Play

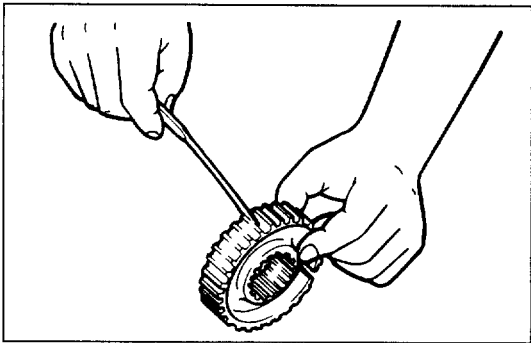
(At clutch hub outer circumference)

		mm (in)
Standard	Limit	
0-0.05 (0-0.002)	0.3 (0.01)	

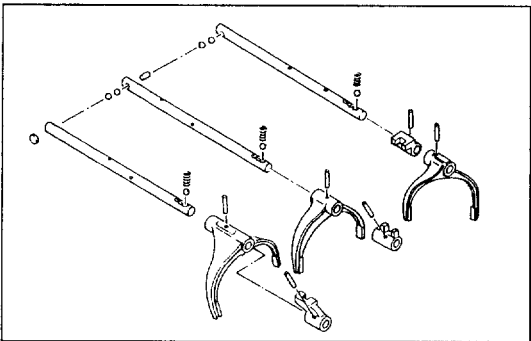


Block Ring Groove and Insert Clearance

		mm (in)
Standard	Limit	
3.59-3.91 (0.141-0.154)	4.1 (0.16)	

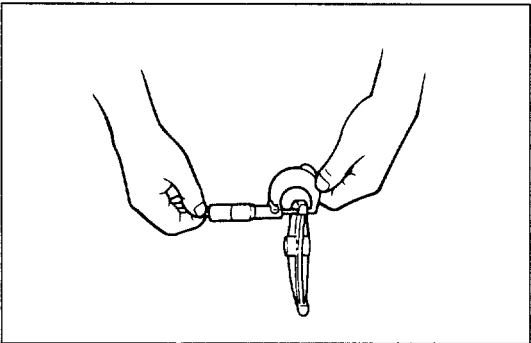


Clutch Hub Groove and Insert Clearance		mm (in)
Standard		Limit
0.09-0.31 (0.004-0.012)		0.4 (0.02)



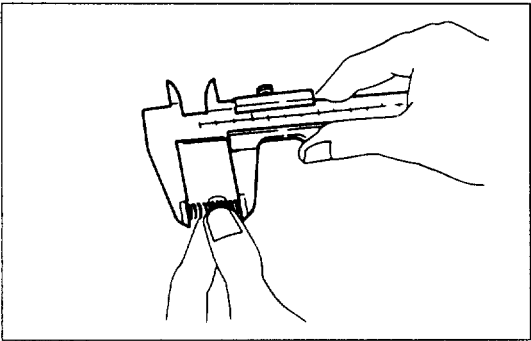
Shift Mechanism
Inspect all disassembled parts for wear, damage or other abnormal conditions.

- Check the shift rod wear, bent and damage.



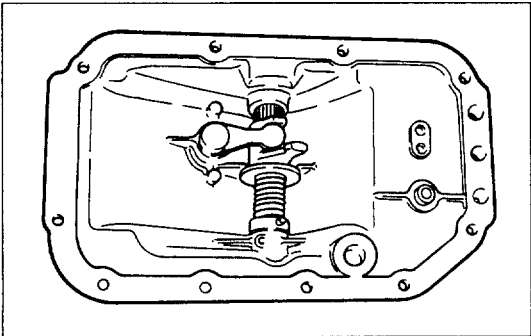
- Check the shift arm and shift block groove for wear or deformation.

Shift Arm Thickness		mm(in)
Standard		Limit
10.0 (0.39)		9.0 (0.35)



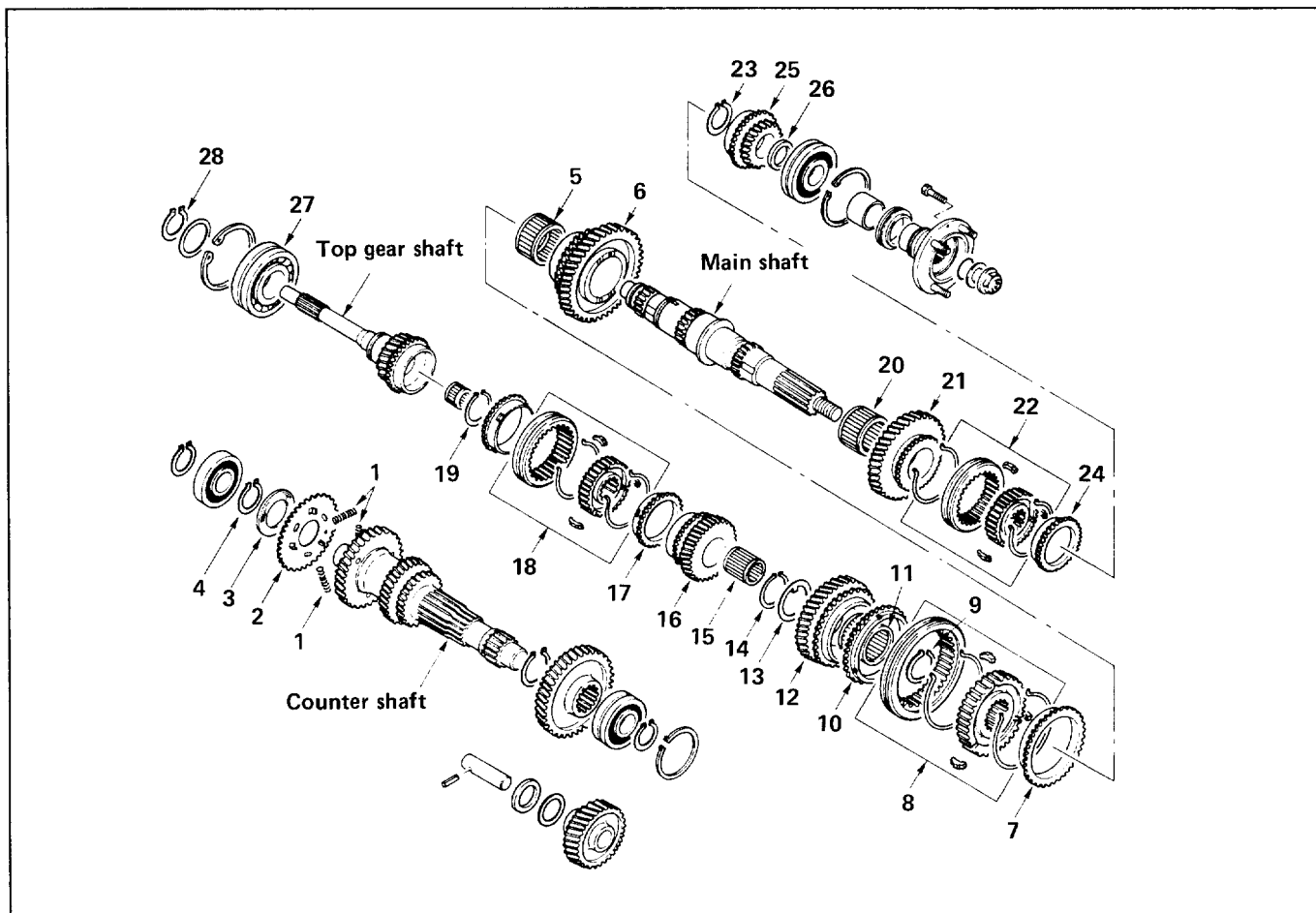
- Check the detent spring for weakening and deformation.

Free Length of Detent Spring		mm(in)
Nominal		Limit
31.6 (1.24)		30.1 (1.19)



- The wear of the select lever, and the backlash and awkward operation of the control box.

REASSEMBLY



Reassembly Steps

Counter shaft assembly

1. Spring
2. Anti-lash plate
3. Conical washer
4. Snap ring

Main shaft assembly

5. Needle bearing
6. 1st gear
7. Block ring
8. 1st/2nd synchronizer assembly
9. Snap ring
10. Block ring
11. Needle bearing
12. 2nd gear
13. Thrust washer

14. Snap ring
15. Needle bearing
16. 3rd gear
17. Block ring
18. 3rd/4th synchronizer assembly
19. Snap ring
20. Needle bearing
21. Reverse gear
22. 5th/reverse synchronizer assembly
23. Snap ring
24. Block ring
25. 5th gear
26. Thrust washer

Top gear shaft assembly

27. Ball bearing
28. Snap ring



Reassembly Steps

NOTE:

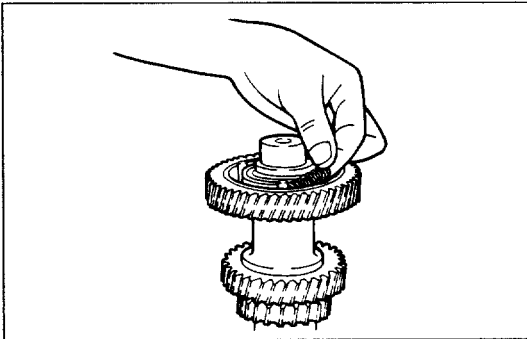
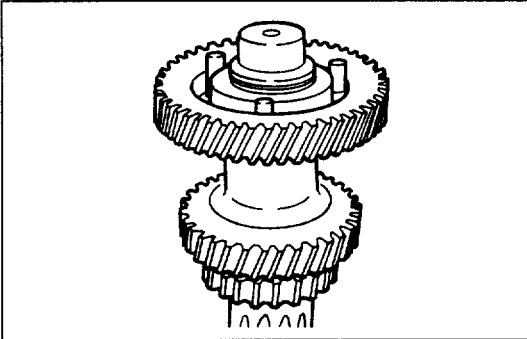
Clean each part thoroughly.

When assembling parts, apply clean engine oil (SAE 5W-30) to their sliding and mating sections.

Counter Shaft Assembly

1. Spring

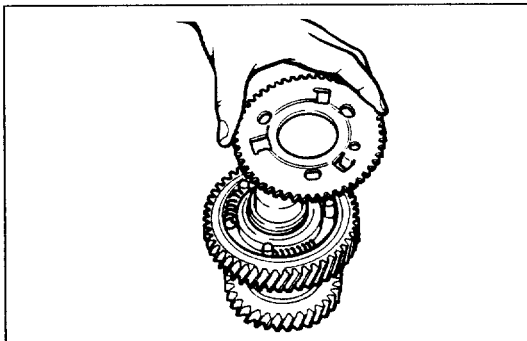
- Attach a backing plate to the vise, secure the counter shaft rear end, and install the springs.



- The spring should be installed to the left of the inside counter drive gear pin.

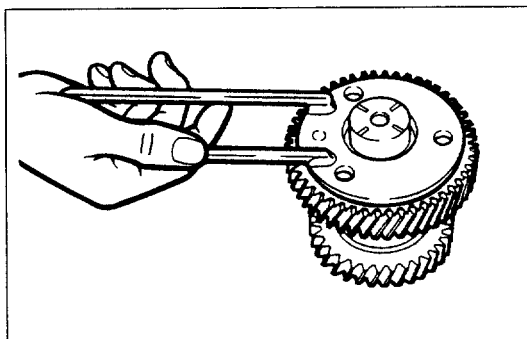
NOTE:

When replacing the pin with a new one, hammer it in until its height becomes 3 mm (0.12 in) from the gear end face.

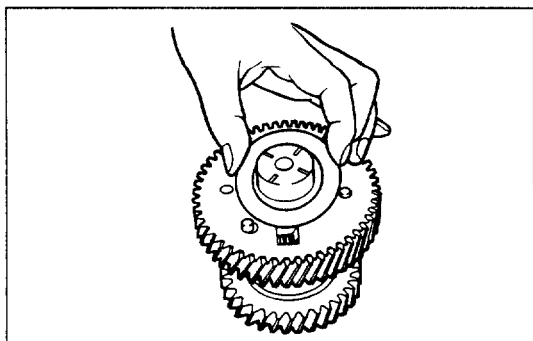


2. Anti-lash Plate

- Assemble the anti-lash plate to the drive gear so that the drive gear hole (\varnothing 7.7 mm/0.3 in) comes roughly in line with the hole (\varnothing 7.7 mm/0.3 in) of the anti-lash plate.



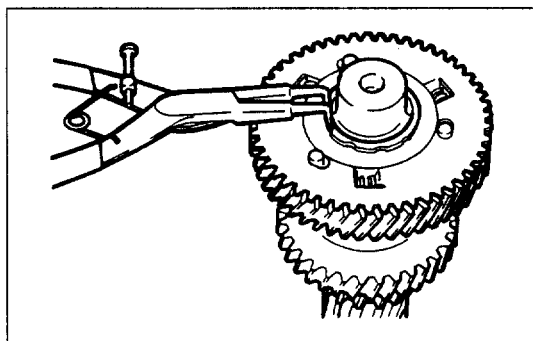
- With the guide pin aligned with the drive gear hole (\varnothing 7.7 mm/0.3 in), set the installer to the guide pin. Anti-lash Plate Installer: 5-8840-2044-0
- Turn the installer clockwise. When the drive gear pin comes to the position where it can be seen fully, put the installer into the drive gear side to fix the anti-lash plate to the drive gear.



3. Conical Washer



- Install the conical washer above the anti-lash plate with the convex side (front side) up.



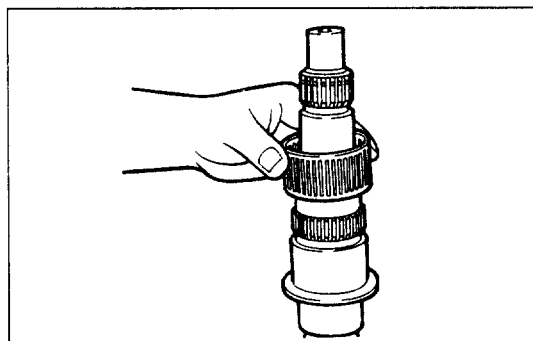
4. Snap Ring

- Use a new snap ring to fix the conical washer.

NOTE:

Avoid the reuse of snap ring.

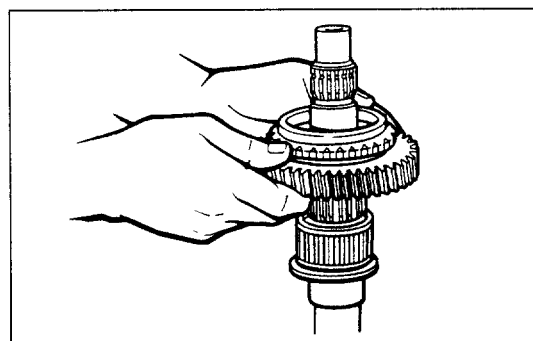
Check visually the anti-lash plate for a warp or curve after assembly.



Main Shaft Assembly

5. Needle Bearing

- Attach a backing plate to the vise, secure the main shaft at the spline end.



6. 1st Gear

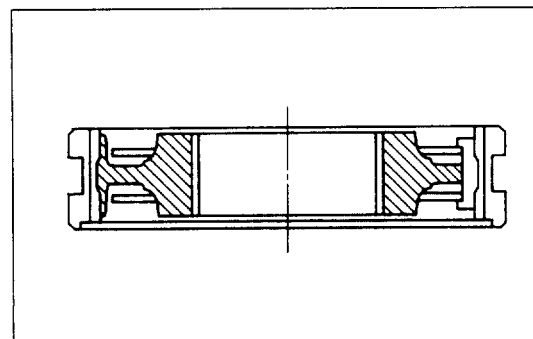


- Install the 1st gear with its taper cone side upward (front of transmission).

7. Block Ring

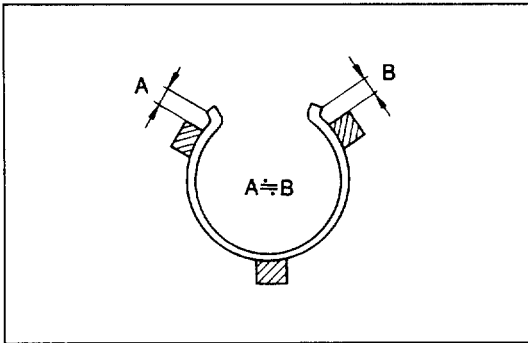


- Align the insert groove of the block ring with the insert.

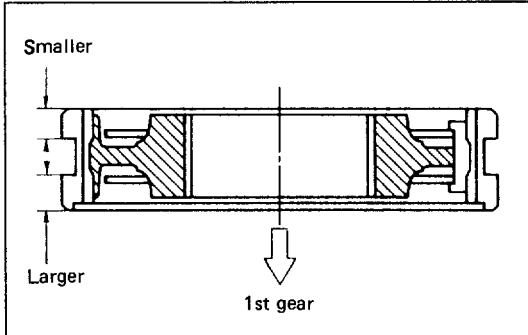


8. 1st/2nd Synchronizer Assembly

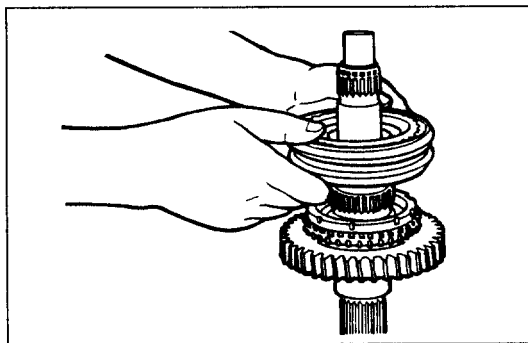
- Assemble the sleeve to the clutch hub. The clutch hub has no specific directionality.
- Put the inserts into the clutch hub groove, and install the insert spring.



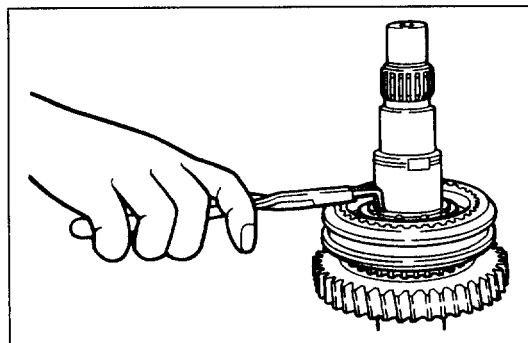
- Assemble the insert springs so that the distances (A and B) between inserts and the opening of the spring can be nearly equal, and also this opening may not be the same direction on both side.



- Larger width side of the sleeve outer circumference should be positioned toward the 1st gear side (rear of transmission).
- Align the insert with the insert groove of the block ring.



- Tap the clutch hub boss section with a plastic hammer to press it in until it contacts closely with the main shaft stepped section.
- When it is difficult to engage the clutch hub boss with the main shaft spline, heat the clutch hub boss section to a temperature between 80 and 120°C (176 and 248°F) with the piston heater before assembling.
- Check to see if the 1st gear rotates smoothly.



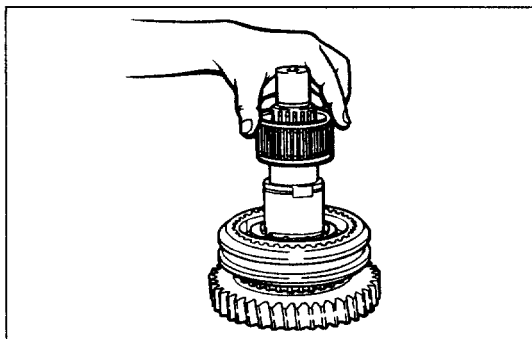
9. Snap Ring

- Install the built-in snap ring and measure the clearance between the snap ring and the clutch hub.

Clutch Hub and Snap Ring Clearance	mm(in)
0-0.09 (0-0.004)	

- When the clearance is out of the reference value, select a snap ring with the maximum thickness that can be inserted from among the following three types, and built it in.

Snap Ring		mm(in)
Color	Thickness (Reference)	
Pink	1.75-1.80 (0.069-0.071)	
White	1.80-1.85 (0.071-0.073)	
Yellow	1.85-1.90 (0.073-0.075)	

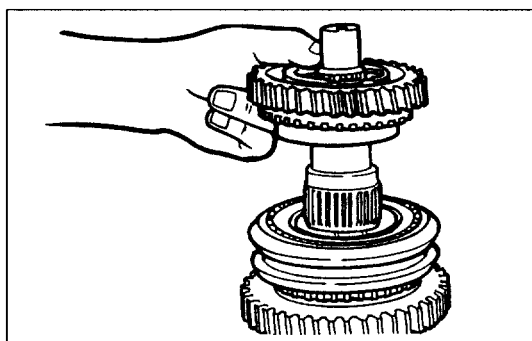


10. Block Ring



- Align the insert groove of the block ring with the insert.

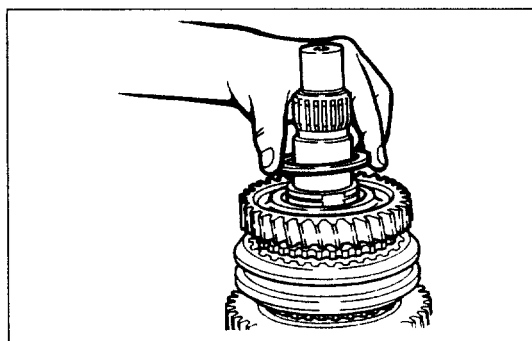
11. Needle Bearing



12. 2nd Gear



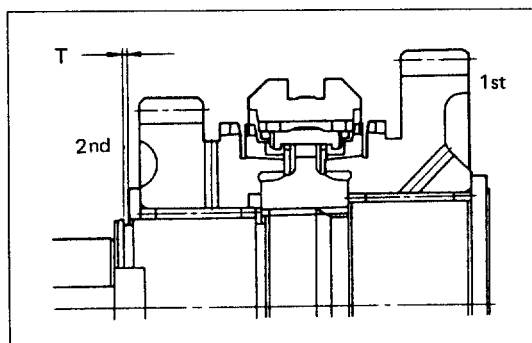
- Install the 2nd gear with the taper cone side turned to the 1st gear side (to the bottom).



13. Thrust Washer



- With the thrust washer set to main shaft groove, assemble it.

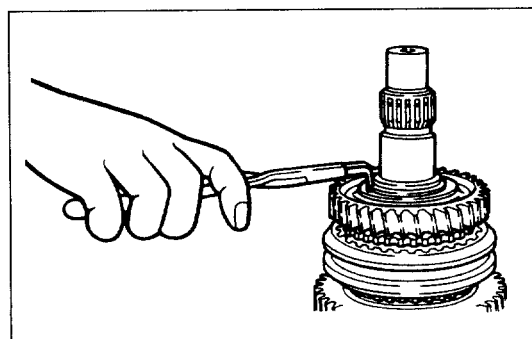


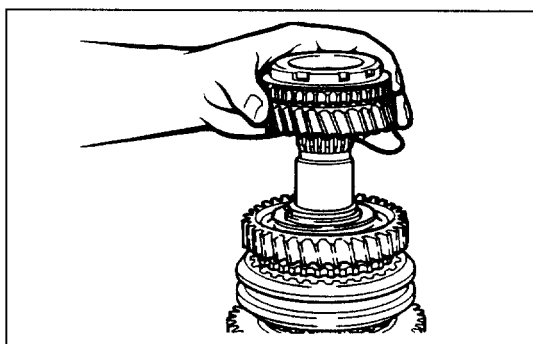
14. Snap Ring



- After installation, measure distance (T) and select the optimum snap ring from the table.

Snap Ring		mm (in)
Distance (T)	Color	Thickness (Reference)
2.20-2.27 (0.087-0.089)	Yellow	1.85-1.90 (0.073-0.075)
2.27-2.32 (0.089-0.091)	Blue	1.90-1.95 (0.075-0.077)
2.32-2.37 (0.091-0.093)	Brown	1.95-2.00 (0.077-0.079)
2.37-2.43 (0.093-0.096)	Green	2.00-2.05 (0.079-0.081)





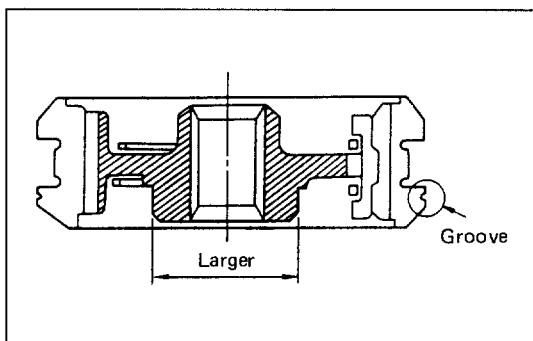
15. Needle Bearing

16. 3rd Gear



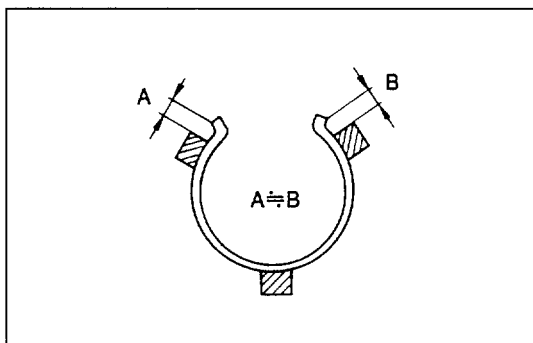
- Install with the taper cone side turned upward (front of transmission).

17. Block Ring

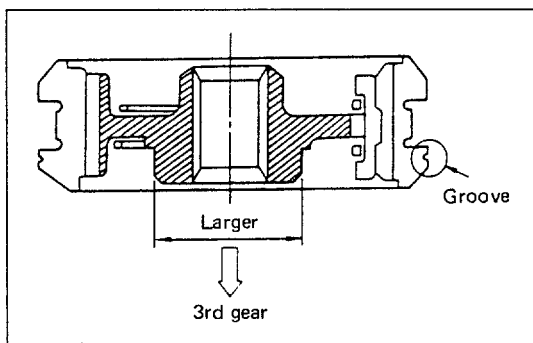


18. 3rd/4th Synchronizer Assembly

- Mate the clutch hub and the sleeve so that the larger diameter side of the clutch hub boss and the identification groove of the sleeve outer circumference point to the same direction.
- Put the inserts into the clutch hub groove, and install the insert spring.



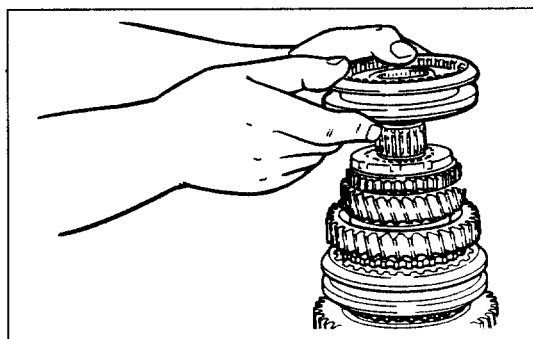
- Assemble the insert springs so that the distances (A and B) between inserts and the opening of the spring can be nearly equal, and also this opening may not be the same direction on both side.



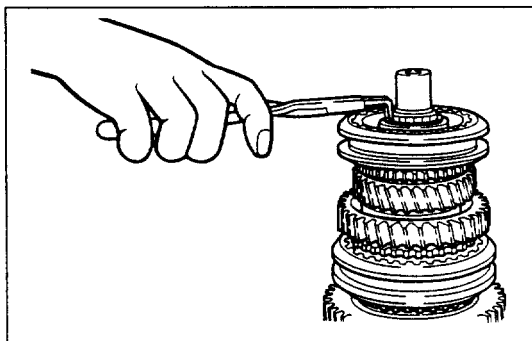
- Grooved face of the sleeve and the havey boss of clutch hub should be positioned toward the 3rd gear (rear of transmission).



- Align the insert groove of the block ring with the insert.



- Tap the clutch hub boss section with a plastic hammer to press it in until it contacts closely with the main shaft stepped section.
- When it is difficult to engage the clutch hub boss with the main shaft spline, heat the clutch hub boss section to a temperature between 80 and 120°C (176 and 248°F) with the piston heater before assembling.
- Check to see if the 3rd gear rotates smoothly.

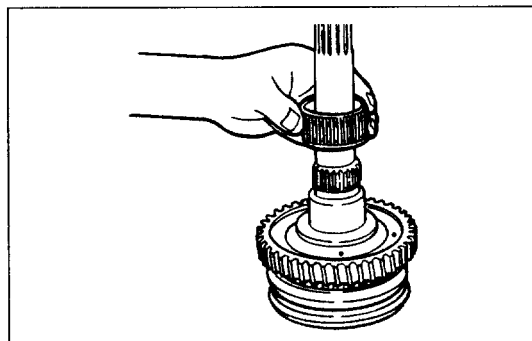
**19. Snap Ring**

- Install the built-in snap ring and measure the clearance between the snap ring and the clutch hub.

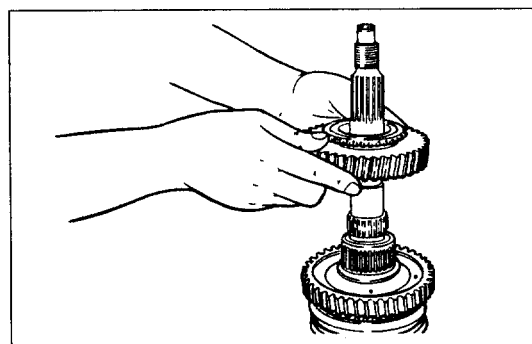
Clutch Hub and Snap Ring Clearance	mm(in)
0-0.09 (0-0.004)	

- When the clearance is out of the reference value, select a snap ring with the maximum thickness that can be inserted from among the following three types, and built it in.

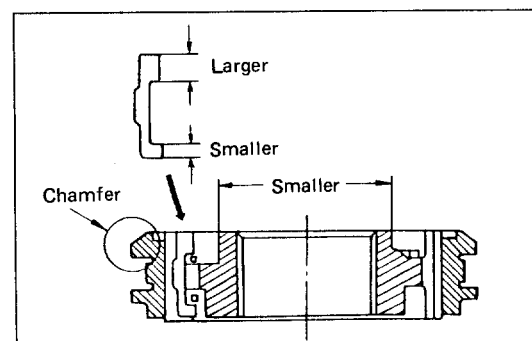
Snap Ring		mm(in)
Color	Thickness (Reference)	
Pink	1.75-1.80 (0.069-0.071)	
White	1.80-1.85 (0.071-0.073)	
Yellow	1.85-1.90 (0.073-0.075)	

**20. Needle Bearing**

- Attach a backing plate to the vise, secure the main shaft at the top end.

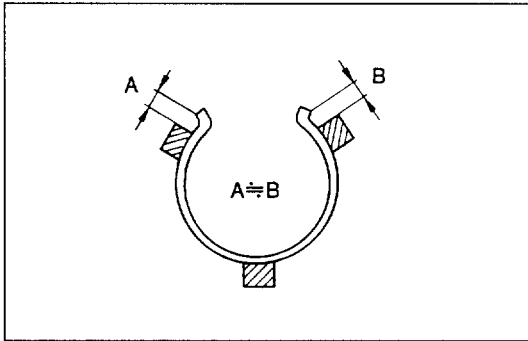
**21. Reverse Gear**

- Install with the taper cone side turned upward (rear of transmission).

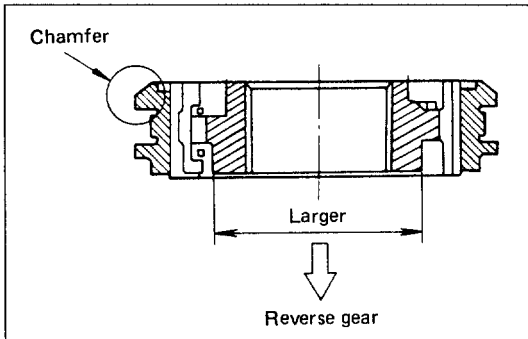
**22. 5th/Reverse Synchronizer Assembly**

- Mate the clutch hub and the sleeve so that the smaller diameter side of the clutch hub boss and the chamfer of the sleeve outer circumference point to the same direction.
- Put the inserts into the clutch hub groove so that the smaller catch of the insert should be positioned toward the reverse gear (larger diameter side of the clutch hub boss), and install the insert spring.

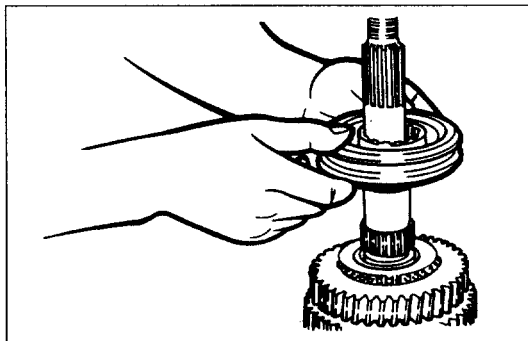




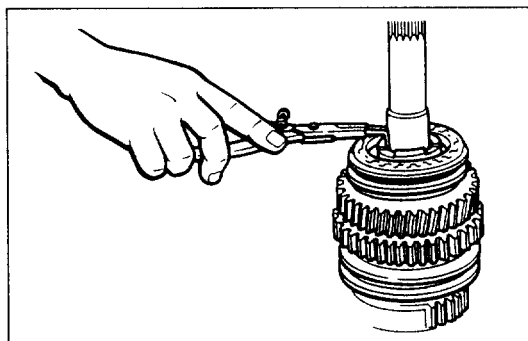
- Assemble the insert springs so that the distances (A and B) between inserts and the opening of the spring can be nearly equal, and also this opening may not be the same direction on both side.



- Face of the clutch hub with larger boss should be positioned toward reverse gear (front of transmission).
- Align the insert with the insert groove of the block ring.



- Tap the clutch hub boss section with a plastic hammer to press it in until it contacts closely with the main shaft stepped section.
- When it is difficult to engage the clutch hub boss with the main shaft spline, heat the clutch hub boss section to a temperature between 80 and 120°C (176 and 248°F) with the piston heater before assembling.
- Check to see if the Reverse gear rotates smoothly.



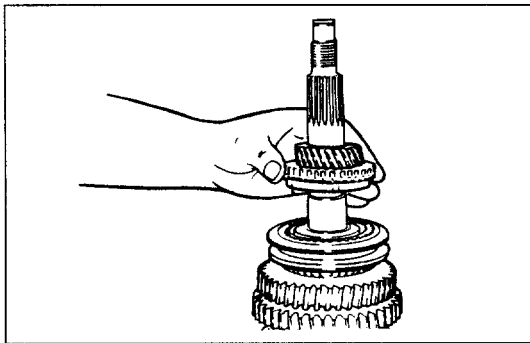
23. Snap Ring

- Install the built-in snap ring and measure the clearance between the snap ring and the clutch hub.

Clutch Hub and Snap Ring Clearance	mm(in)
0-0.09 (0-0.004)	

- When the clearance is out of the reference value, select a snap ring with the maximum thickness that can be inserted from among the following three types, and built it in.

Snap Ring	mm(in)
Color	Thickness (Reference)
Pink	1.75-1.80 (0.069-0.071)
White	1.80-1.85 (0.071-0.073)
Yellow	1.85-1.90 (0.073-0.075)



24. Block Ring

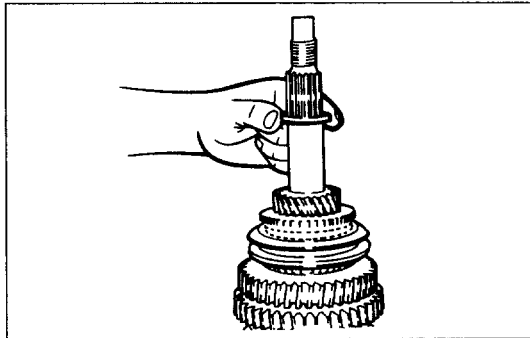


- Align the insert groove of the block ring with the insert.

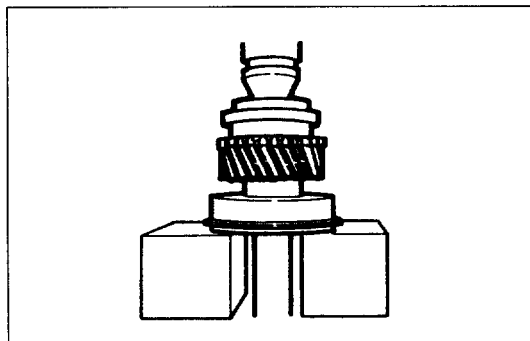
25. 5th Gear



- Install with the taper cone side turned reverse gear side (front of transmission).



26. Thrust Washer

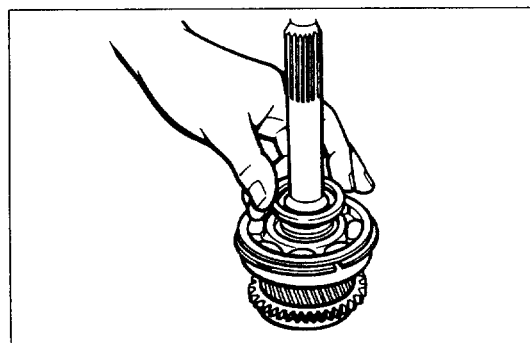


Top Gear Shaft Assembly

27. Ball bearing

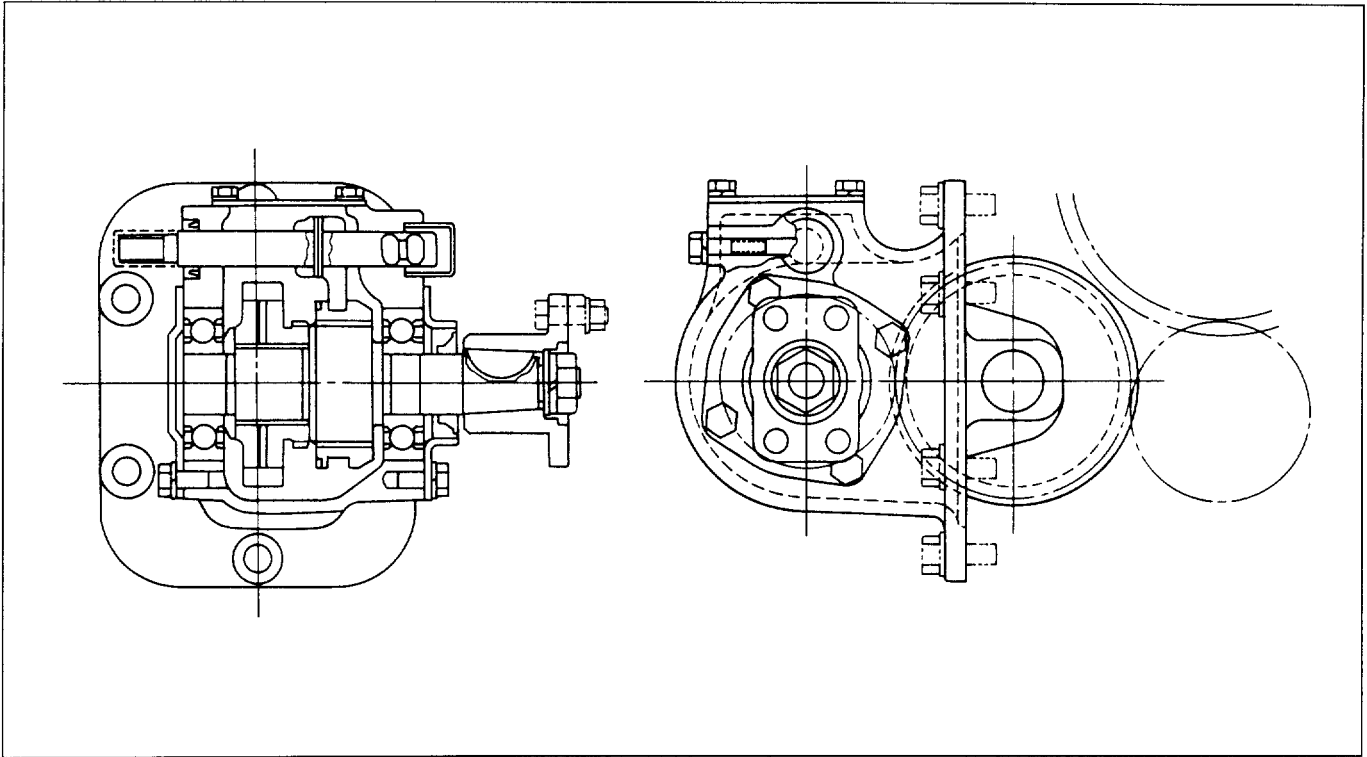


- Install the ball bearing to the top gear shaft and press it in so that the outer circumference snap ring side turns to the outside (in the direction opposite to the gear).



28. Snap Ring

POWER TAKE OFF (PTO) GENERAL DESCRIPTION



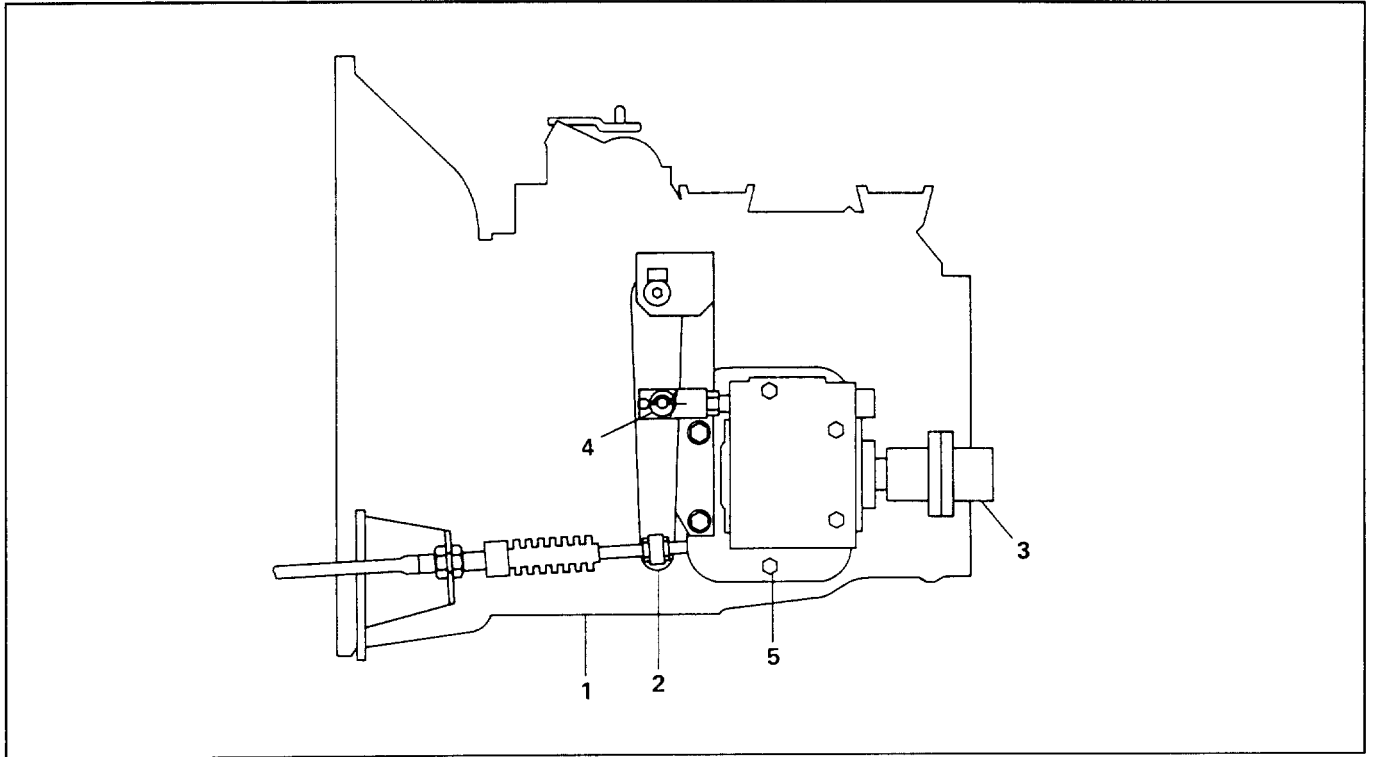
The side PTO is provided at the left side of the transmission.

For the gear, the same helical gear as the one used for the transmission is employed to reduce noises.

The roller type needle bearing is employed for the idle shaft and the ball bearing for the output shaft to obtain the increased durability and quietness.

The gear employed is of a constant-mesh type. The gear engagement control (ON/OFF) by a cable is made by the shift rod provided at the upper section of the case, which slides the sleeve on the output shaft through the shaft arm.

POWER TAKE OFF (PTO) REPLACEMENT



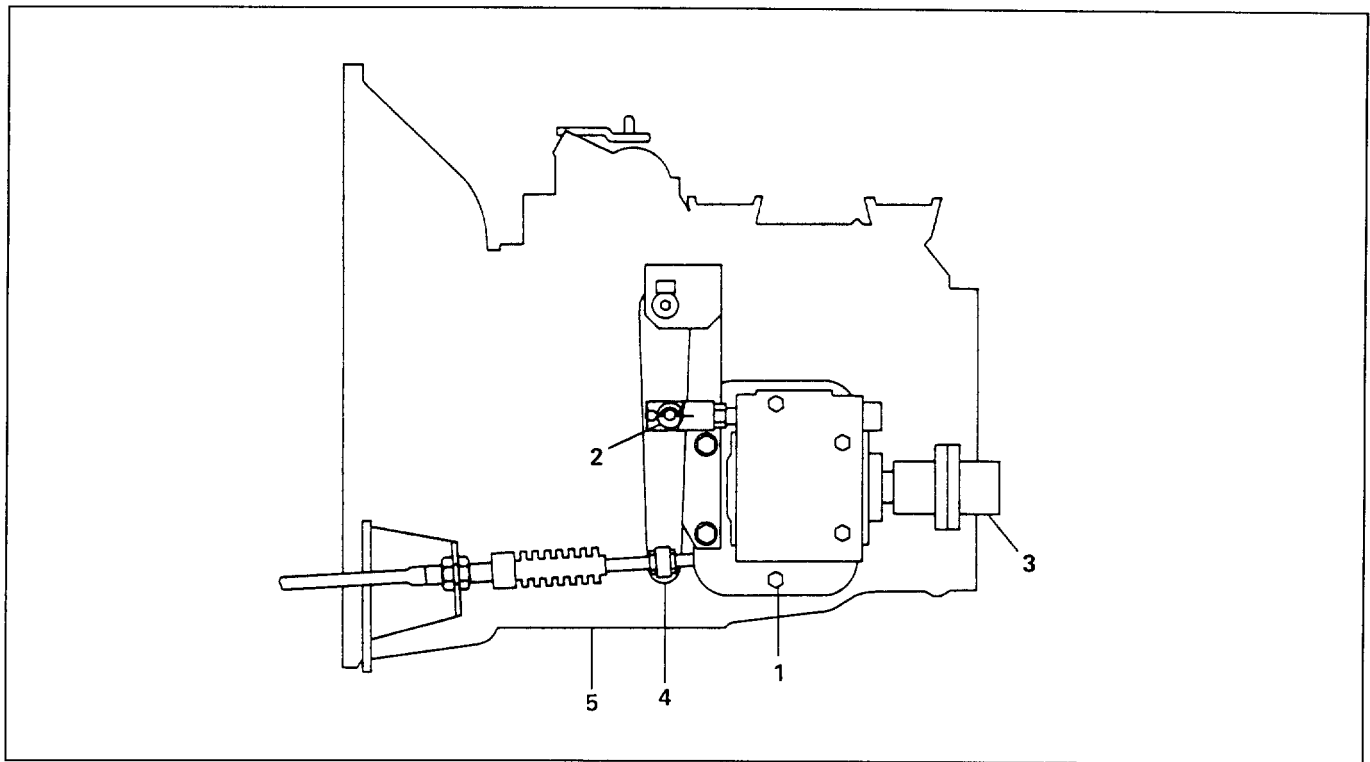
Removal Steps

- | | |
|-------------------------------|-------------------|
| 1. Transmission oil | 4. Connecting pin |
| 2. Control cable | 5. PTO assembly |
| 3. PTO output propeller shaft | |



Removal Steps

1. **Transmission Oil**
 - Remove the drain plug from the transmission case and drain the oil.
2. **Control Cable**
 - Disconnect the control cable from the PTO shift lever.
3. **PTO Output Propeller Shaft**
 - Disconnect the propeller shaft from the PTO output flange.
4. **Connecting Pin**
 - Remove the snap pin, washer and the connecting pin from the shift rod and the shift lever.
5. **PTO Assembly**
 - Remove the 6 PTO fixing bolts, and the PTO assembly.



Installation Steps

1. PTO assembly
2. Connecting pin
3. PTO output propeller shaft
4. Control cable
5. Transmission oil



Installation Steps



1. PTO Assembly

- Clean and dry on the mating faces before applying the liquid gasket.
- Apply liquid gasket (Three Bond 1141E or equivalent) to the PTO and transmission surfaces, and both sides of the distance plate (if installed).
- Install the distance plate (if installed) and PTO with new gasket(s).

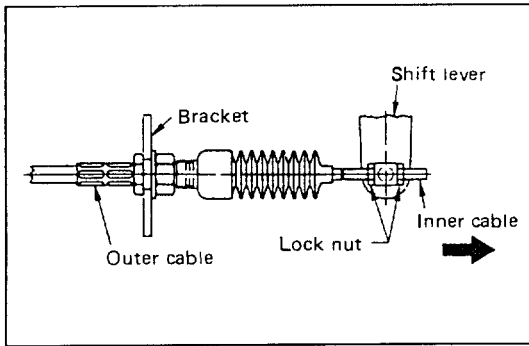


PTO Bolt Torque	N·m(kg·m/lb·ft)
	37(3.8/27)

2. Connecting Pin

- Install the connecting pin to the shift rod and shift lever and install the snap pin with washer.

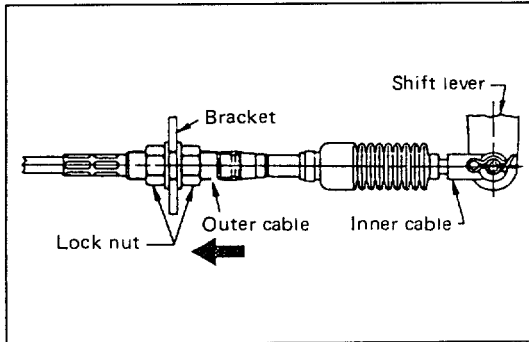
3. PTO Output Propeller Shaft



4. Control Cable

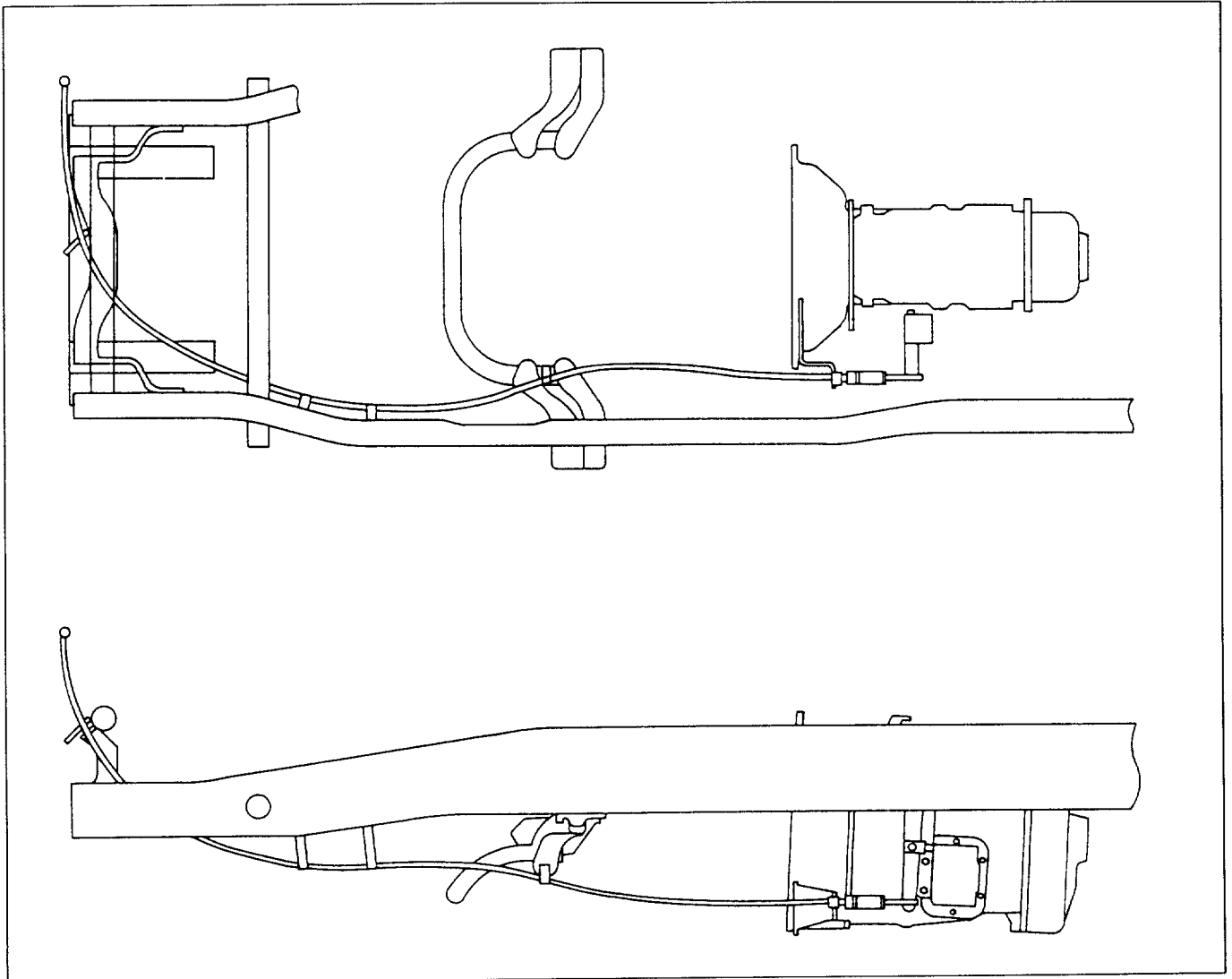
Inner Cable Adjustment Type

- 1) Fix the outer cable.
- 2) Set the PTO shift lever in the OFF position. Be sure to confirm the PTO control lever is in the OFF position (PTO indicator light turned off).
- 3) Remove slack from the inner cable by pulling the inner cable in the direction of the arrow.
- 4) Tighten the lock nuts.



Outer Cable Adjustment Type

- 1) Set the PTO shift lever in the OFF position. Be sure to confirm the PTO control lever is in the OFF position (PTO indicator light turned off).
- 2) Connect the inner cable to the PTO shift lever.
- 3) Remove slack from the inner cable by pulling the outer cable in the direction of the arrow.
- 4) Tighten the lock nuts.



5. Transmission Oil

- 1) Install the drain plug.



Drain Plug Torque	N·m(kg·m/lb·ft)
49(5.0/36)	

- 2) Remove the filler plug and fill the transmission case with the specified engine oil through the filler plug hole.

Oil Capacity	Liters(US·qt/Imp·qt)
2.7(2.9/2.4)	

CAUTION:

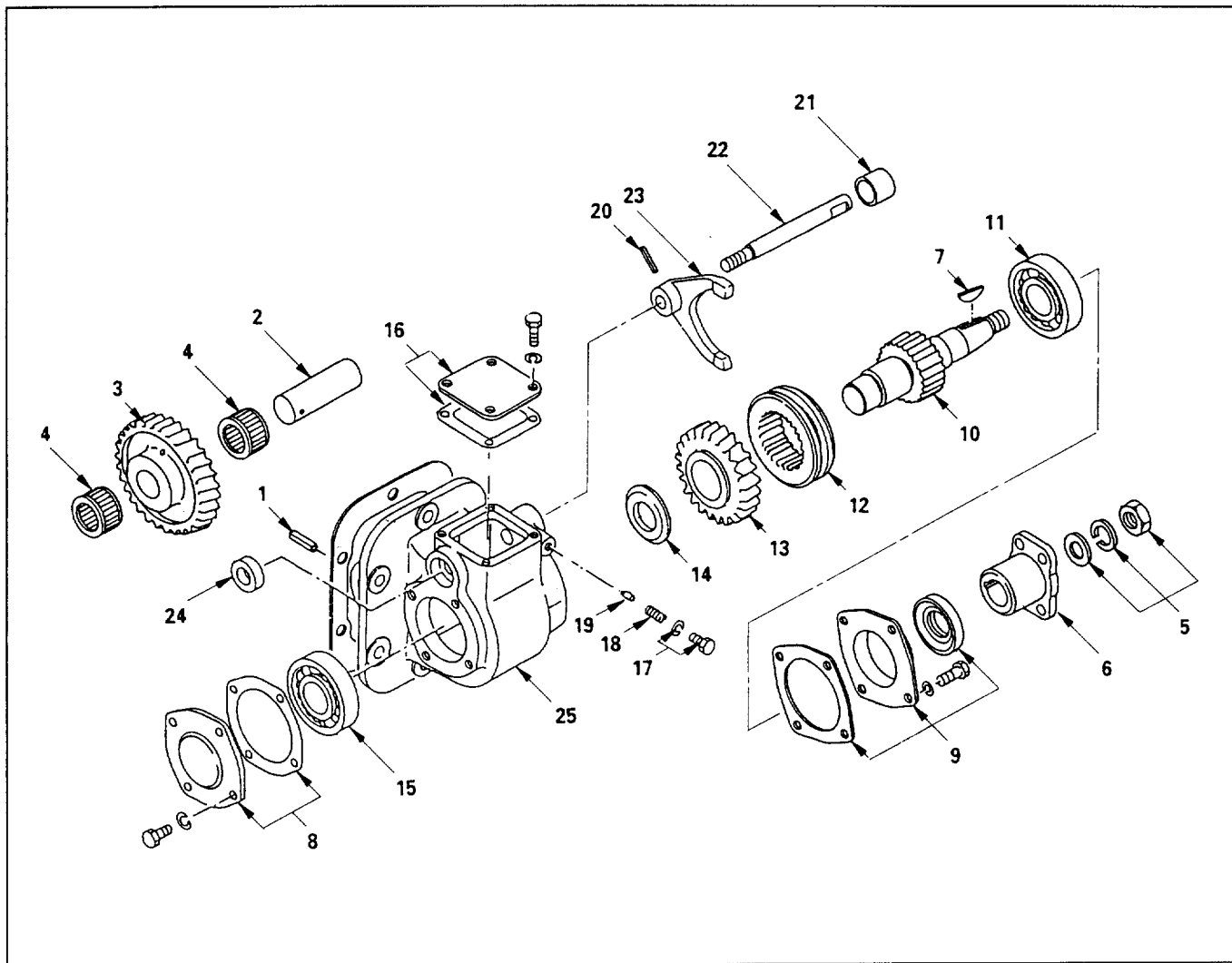
Use ENGINE OIL SAE 5W-30 for transmission case.

- 3) Install the filler plug.

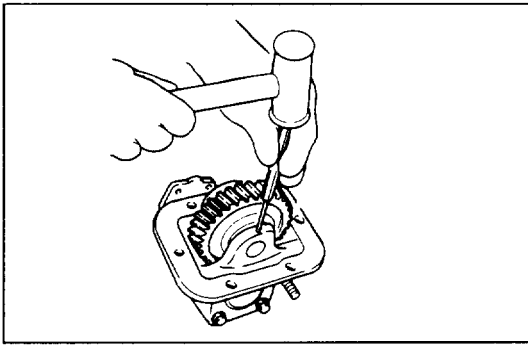


Filler Plug Torque	N·m(kg·m/lb·ft)
49(5.0/36)	

UNIT REPAIR

**Disassembly Steps**

- | | |
|------------------------------|----------------------------|
| 1. Spring pin | 14. Thrust collar |
| 2. Idle gear shaft | 15. Front bearing |
| 3. Idle gear | 16. Upper cover |
| 4. Needle bearing | 17. Plug and spring washer |
| 5. Lock nut and washer | 18. Detent spring |
| 6. Coupling driver | 19. Detent pin |
| 7. Key | 20. Spring pin |
| 8. Front cover | 21. Shift rod cap |
| 9. Rear cover with oil seal | 22. Shift rod |
| 10. Output shaft | 23. Shift arm |
| 11. Rear bearing | 24. Shift rod oil seal |
| 12. Sleeve | 25. Gear case |
| 13. Output gear with bushing | |

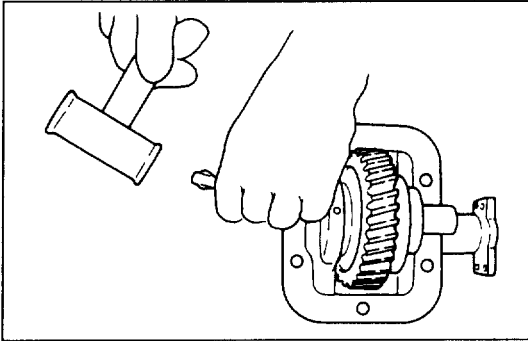


Disassembly Steps

1. Spring Pin



- Tap the spring pin into the idle shaft.
Spring Pin Remover: 9-8529-2201-0



2. Idle Gear Shaft

- Drive out the idle gear shaft by tapping on its front end with a suitable bar and hammer.
- Remove the spring pin from the idle gear shaft.
Spring Pin Remover: 9-8529-2201-0

3. Idle Gear

4. Needle Bearing

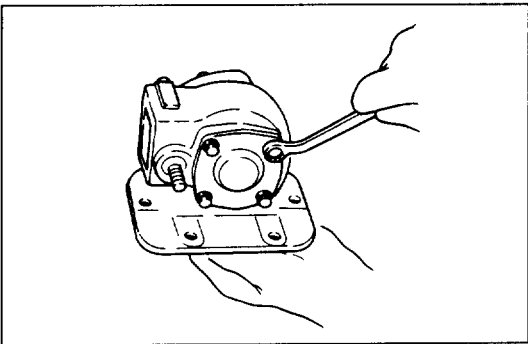
5. Lock Nut and Washer

- Attach a backing plate to the vice, secure the coupling driver, and remove the lock nut, spring washer and plane washer.

6. Coupling Driver

7. Key

8. Front Cover



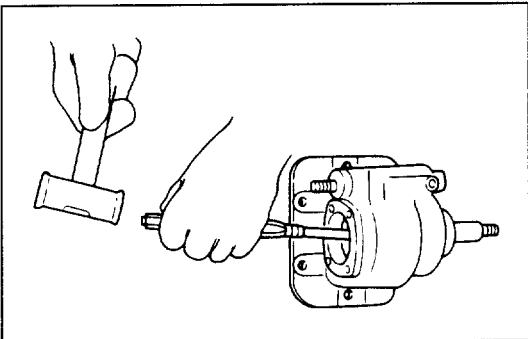
9. Rear Cover (with Oil Seal)

- Remove the oil seal from the rear cover.

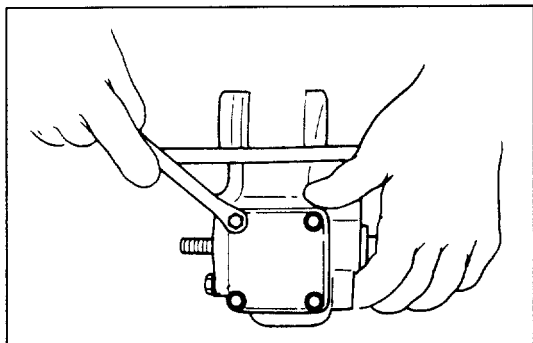
10. Output Shaft

11. Rear Bearing

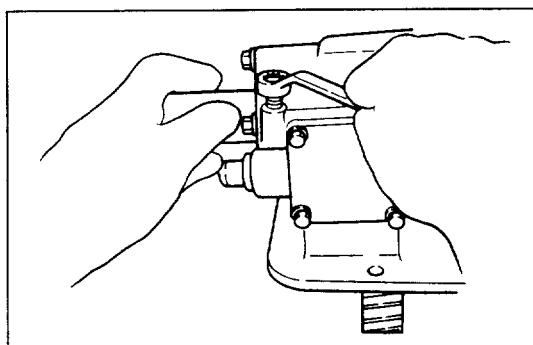
- Drive out the output shaft by tapping on its front end with a suitable bar and hammer.
- Remove the rear bearing from the output shaft.



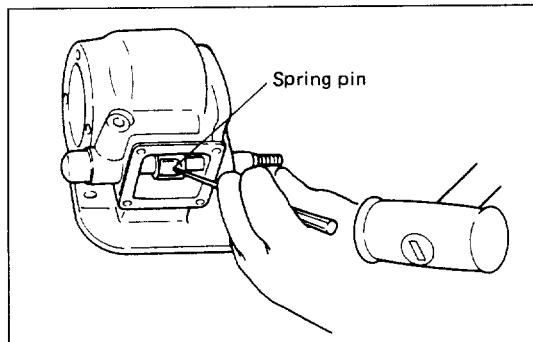
12. Sleeve
13. Output Gear with Bushing
14. Thrust Collar
15. Front Bearing
16. Upper Cover



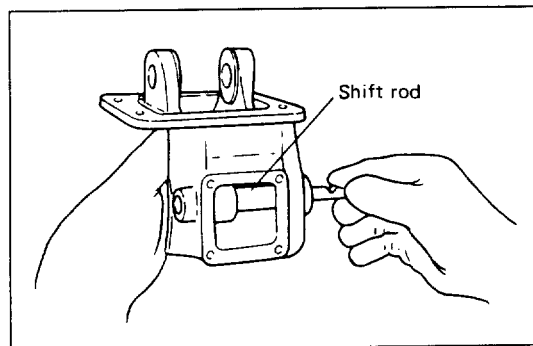
17. Plug and Spring Washer
18. Detent Spring
19. Detent Pin



20. Spring Pin
- Spring Pin Remover: 9-8529-2201-0



21. Shift Rod Cap
 22. Shift Rod
 23. Shift Arm
- Move the shift rod rearward by tapping on its front end. then, remove the each parts.



24. Shift Rod Oil Seal
25. Gear Case



Inspection and Repair

Make the necessary adjustments, repairs and part replacement if excessive wear or damage is discovered during inspection.

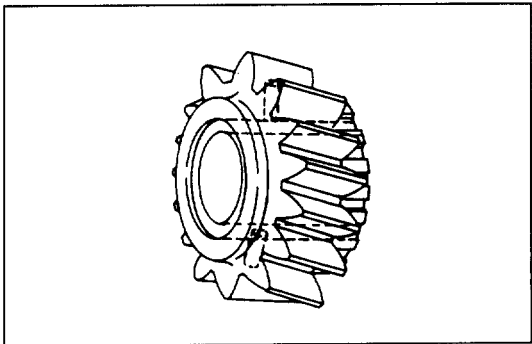
Bearings

Check the each bearing, and replace in either of the following cases.

- Rotation is not smooth.
- Abnormal sound is generated.
- There is extreme damage or rust.
- Rolling element or rolling contact surface of needle roller bearing is discolored, extremely worn or pitted.



Ball Bearing Run-out	mm(in)
Limit	
0.2 (0.01)	



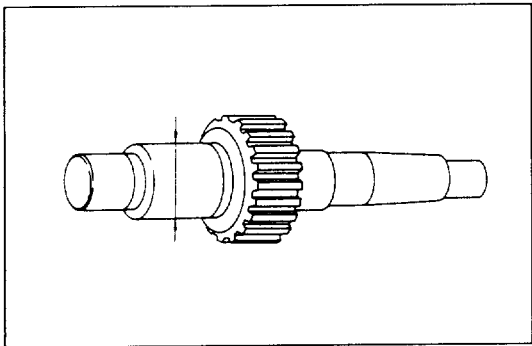
Gears

Check each gear for the following points. Correct a slight stepped wear or surface roughness with an oil stone or pencil grinder, or replace the gear if unrecoverable damage is found.

- Break or damage of tooth.
- Extreme wear of tooth.



Output Shaft and Output Gear Bushing Clearance	mm(in)
Limit	
0.2 (0.01)	



Idle Gear Shaft and Output Shaft

Check the shaft external surface for any damage or wear, and its spline section for wear, damage or bent. When there is any abnormal condition found, or when it is used excessively beyond a proper use limit, replace it with new one.

Shift Mechanism

Inspect all disassembled parts for wear, damage or other abnormal conditions.

- Check the shift rod for wear, bent and damage.
- Check the shift arm for wear or deformation.

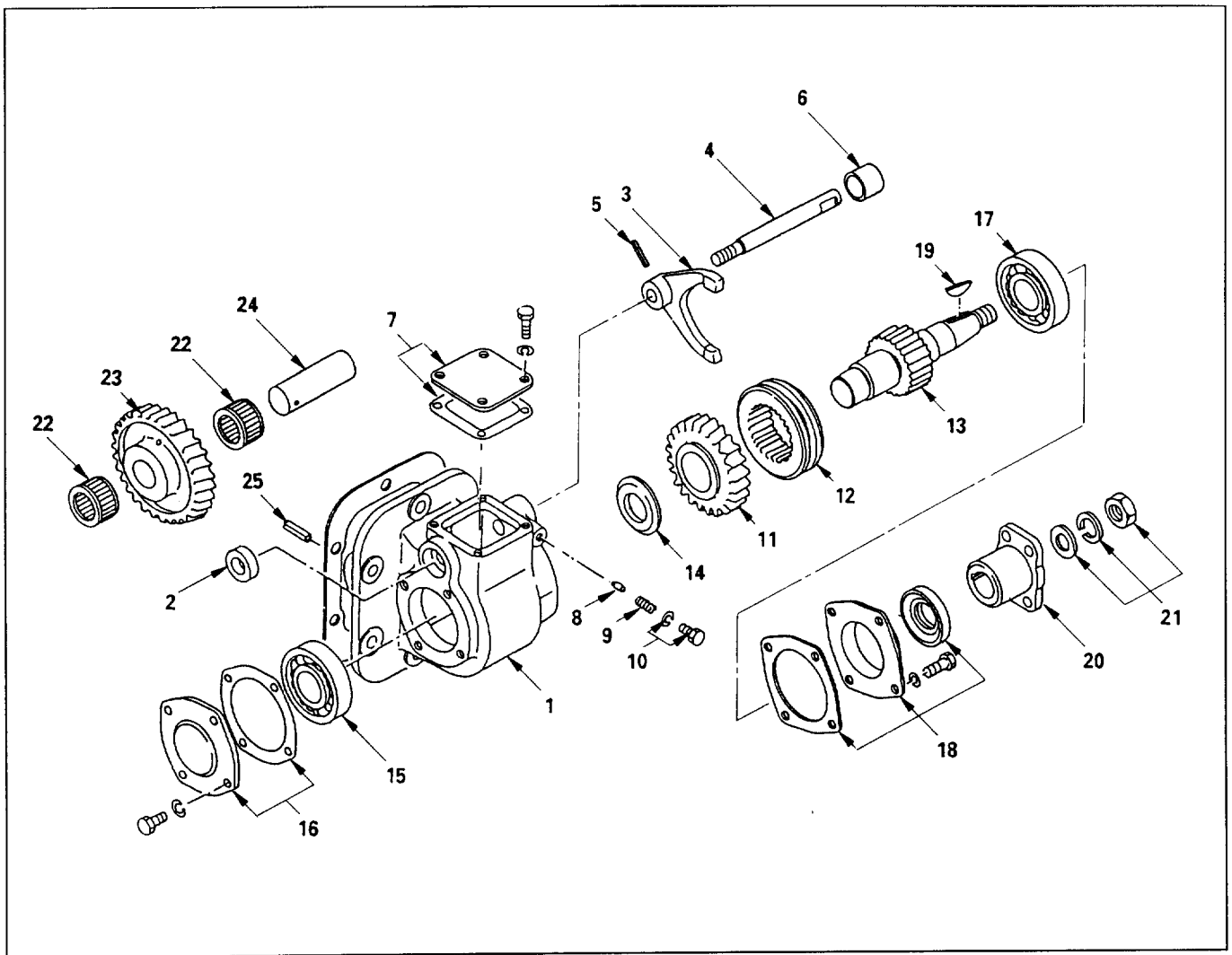


Shift Arm Thickness		mm(in)
Nominal	Limit	
9.0 (0.35)	8.0 (0.31)	

- Check the detent spring and detent pin for wear, weakening and deformation.
- The wear of the shift rod, and the awkward operation of the gear case.

Sleeve

Check the sleeve for any abnormal conditions. Correct a slight stepped wear or surface roughness with an oil stone or pencil grinder, or replace the sleeve if unrecoverable damage is found.



Reassembly Step

- | | |
|------------------------------|-------------------------|
| 1. Gear Case | 14. Thrust Collar |
| 2. Shift Rod Oil Seal | 15. Front Bearing |
| 3. Shift Arm | 16. Front Cover |
| 4. Shift Rod | 17. Rear Bearing |
| 5. Spring Pin | 18. Rear Cover |
| 6. Shift Rod Cap | 19. Key |
| 7. Upper Cover | 20. Coupling Driver |
| 8. Detent Pin | 21. Lock Nut and Washer |
| 9. Detent Spring | 22. Needle Bearing |
| 10. Plug and Spring Washer | 23. Idle Gear |
| 11. Output Gear with Bushing | 24. Idle Gear Shaft |
| 12. Sleeve | 25. Spring Pin |
| 13. Output Shaft | |



Reassembly Steps

NOTE:

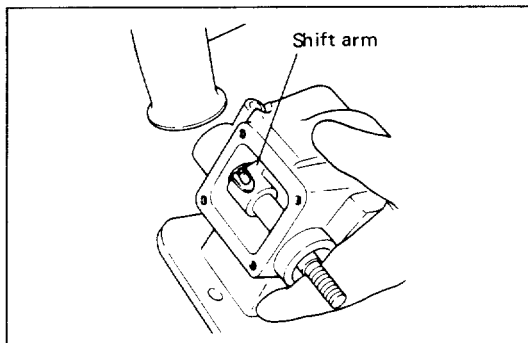
Clean each part thoroughly.

When assembling parts, apply clean engine oil (SAE 5W-30) to their sliding and mating sections.

1. Gear Case
2. Shift Rod Oil Seal



- Clean and dry on the mating faces before applying the liquid gasket.
- Apply liquid gasket (Three Bond 1141E or equivalent) to the new oil seal outer circumference and apply multi-purpose grease to the oil seal lip.
- Use the oil seal installer to install the oil seal.
Oil Seal Installer: 5-8840-2065-0



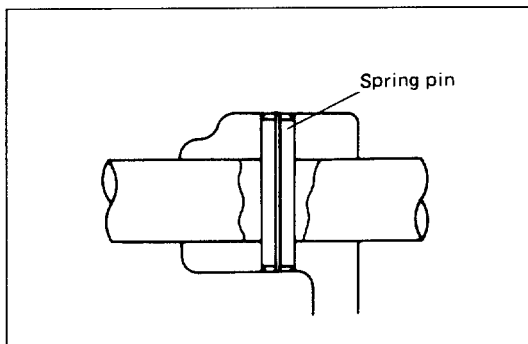
3. Shift Arm



4. Shift Rod



- With the boss side of the shift arm set to the rear.
- Turning the detent groove to the outside (detent pin side), insert the shift rod from the front side with the detent groove side at the front.



5. Spring Pin

- Setting the hole of the shift arm to that of the shift rod, fix them with a new spring pin.

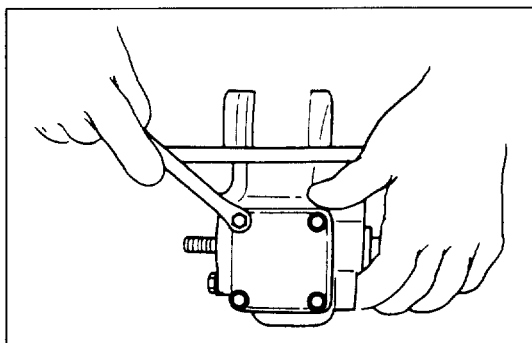
6. Shift Rod Cap



- Clean and dry on the mating faces before applying the liquid gasket.
- Apply liquid gasket (Three Bond 1141E or equivalent) to the cap outer circumference.
- Use the plug installer to install the shift rod cap.
Plug Installer: 5-8840-2067-0

NOTE:

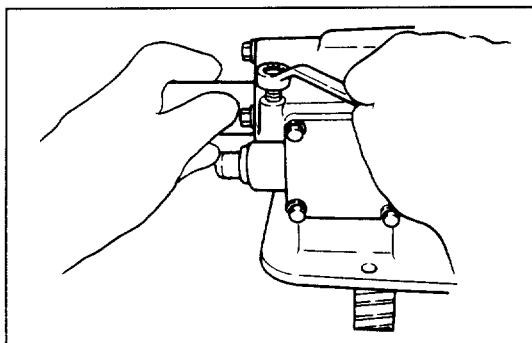
When there is any warp or flaw found with the shift rod cap, replace it with new one.



7. Upper Cover

- Clean and dry on the mating faces before applying the liquid gasket.
- Apply liquid gasket (Three Bond 1141E or equivalent) to the gear case and upper cover surfaces.
- Install the upper cover with new gasket.

Upper Cover Bolt Torque	N·m(kg·m/lb·ft)
18(1.8/13)	



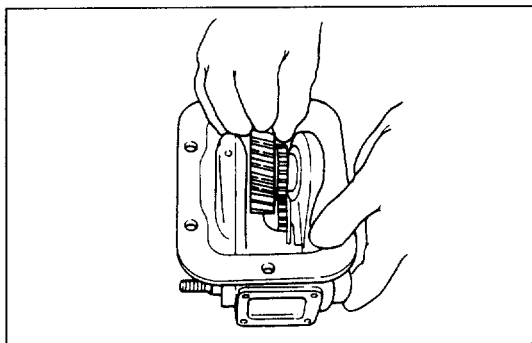
8. Detent Pin

9. Detent Spring

10. Plug and Spring Washer

- Remove sealant from the plug and female threaded surfaces and the surfaces must be perfectly dry.
- Apply liquid gasket (LOCTITE 242 or equivalent) to the plug's threaded portion.

Detent Pin Plug Torque	N·m(kg·m/lb·ft)
25(2.5/18)	



11. Output Gear with Bushing

- Install with the dog gear side turned to the coupling driver side (to the rear).

12. Sleeve



- Chamfer face of the sleeve outer circumference should be positioned toward the coupling driver and assemble the sleeve groove to the shift arm.

13. Output Shaft

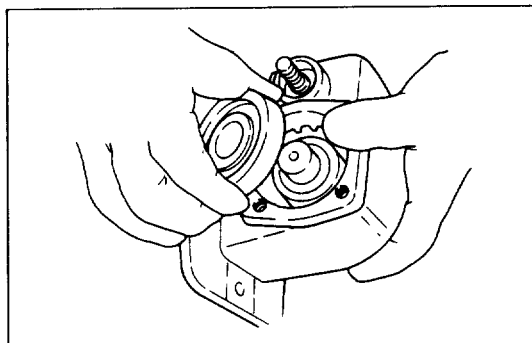
14. Thrust Collar

15. Front Bearing



- Install the thrust collar and front bearing using bearing installer.

Bearing Installer: 5-8840-2066-0



16. Front Cover



- Clean and dry on the mating faces before applying the liquid gasket.



- Apply liquid gasket (Three Bond 1141E or equivalent) to the gear case and front cover surfaces.

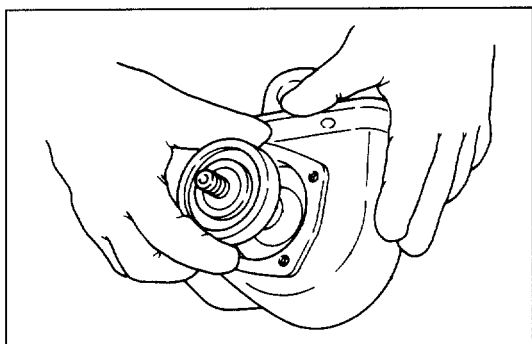


- Install the front cover with new gasket.



- Apply liquid gasket (LOCTITE 242 or equivalent) to the fixing bolt's threaded portion.

Upper Cover Bolt Torque	N·m(kg·m/lb·ft)
	18(1.8/13)

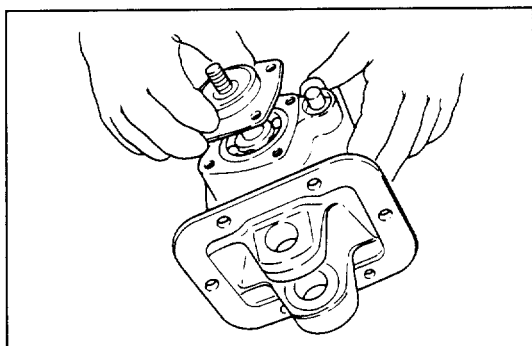


17. Rear Bearing



- Use the bearing installer to install the rear bearing.

Bearing Installer:5-8840-2066-0



18. Rear Cover



- Apply liquid gasket (Three Bond 1141E or equivalent) to the new oil seal outer circumference and apply multi-purpose grease to the oil seal lip.



- Use oil seal installer to install the oil seal to the rear cover.

Oil Seal Installer: 5-8840-2064-0



- Apply approx. 3 grams (0.1 ounce) of the Multi-purpose with MOS2 type grease to the inside of rear cover.



- Clean and dry on the mating faces before applying the liquid gasket.

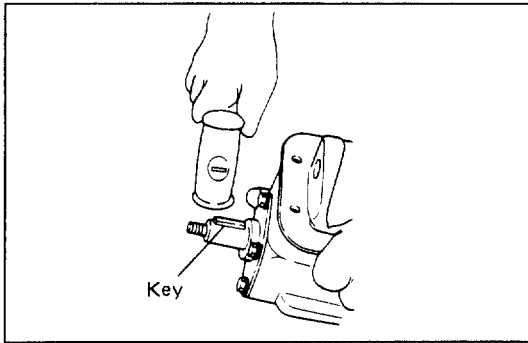


- Apply liquid gasket (Three Bond 1141E or equivalent) to the rear cover and gear case surfaces.

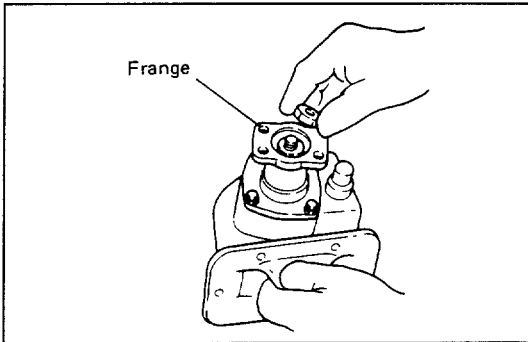


- Install the rear cover with new gasket.

Rear Cover Bolt Torque	N·m(kg·m/lb·ft)
	18(1.8/13)



19. Key



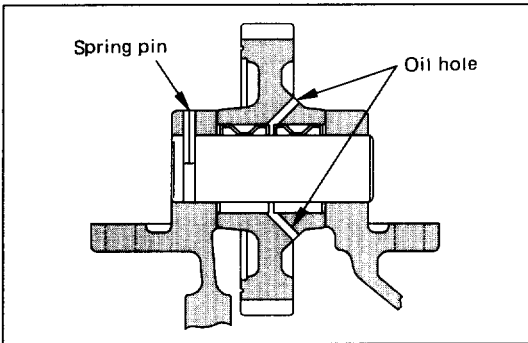
20. Coupling Driver

21. Lock Nut and Washer

- Attach a backing plate to the vice, secure the coupling driver, and tighten the lock nut.



Lock Nut Torque	N·m(kg·m/lb·ft)
105(10.7/77)	



22. Needle Bearing

23. Idle Gear

- Install with the oil holes side turned to the rear.



24. Idle Gear Shaft

25. Spring Pin

SECTION 7C

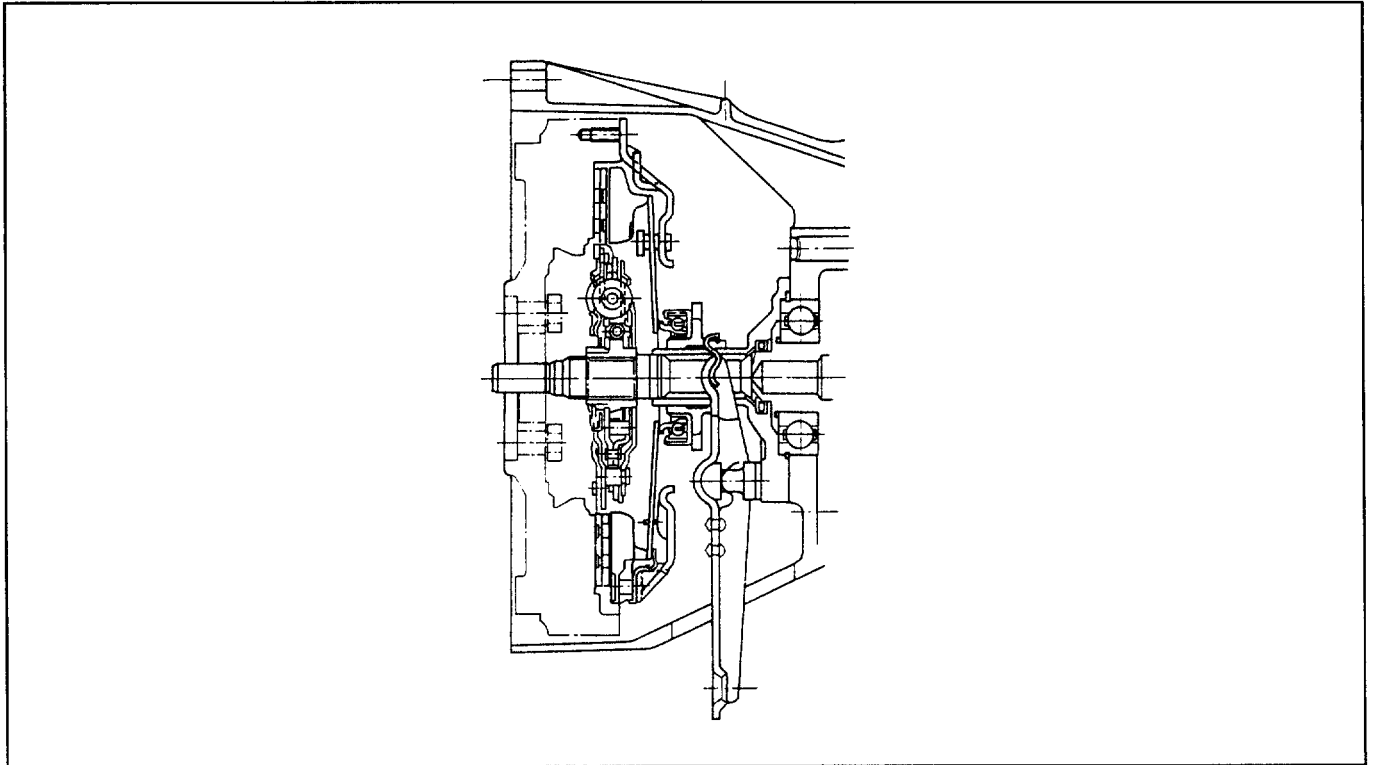
CLUTCH

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Pressure Plate Assembly and Driven Plate	7C- 2
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Slave Cylinder	7C- 3
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Disassembly	7C-24
Inspection and Repair	7C-25
Reassembly	7C-26

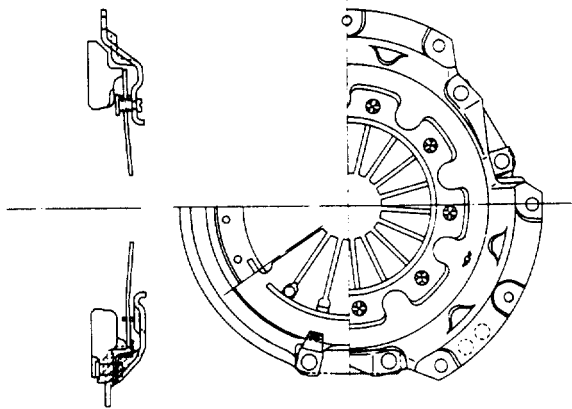
GENERAL DESCRIPTION

CLUTCH ASSEMBLY

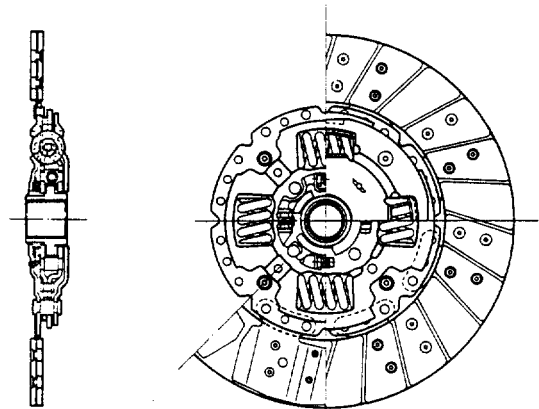


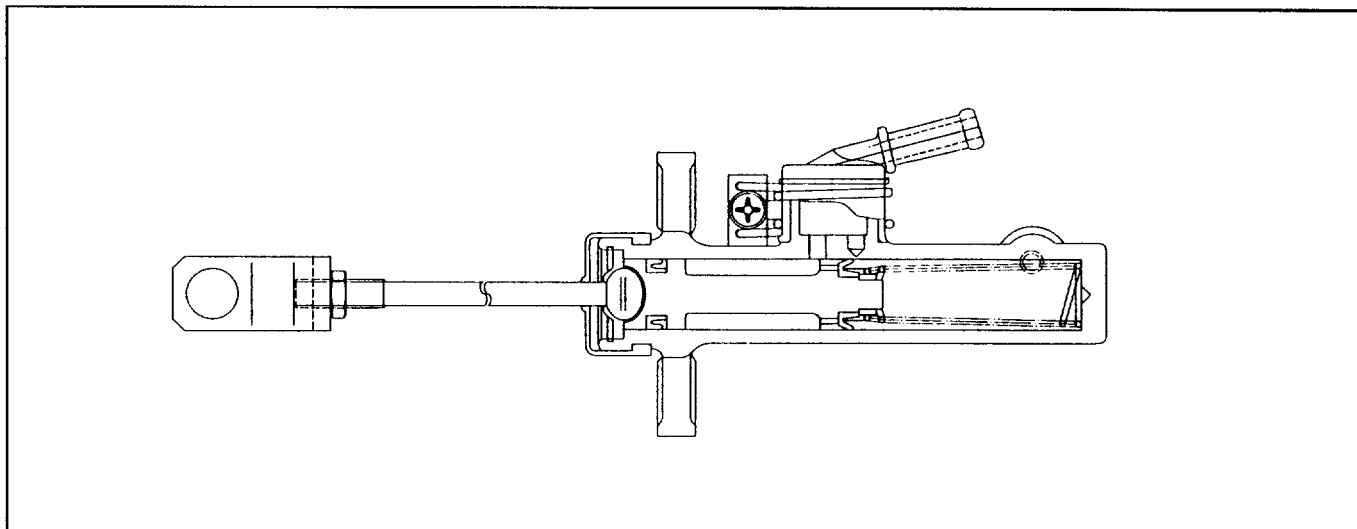
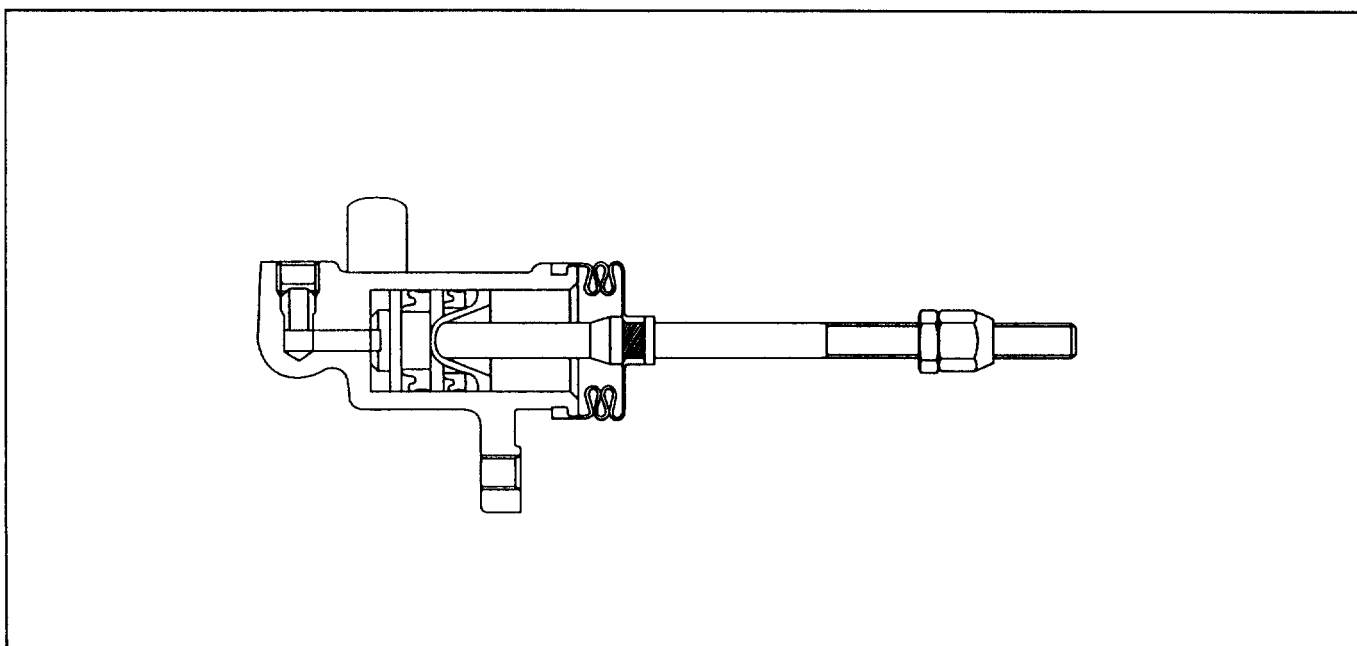
PRESSURE PLATE ASSEMBLY AND DRIVEN PLATE

Pressure plate assembly



Driven plate assembly

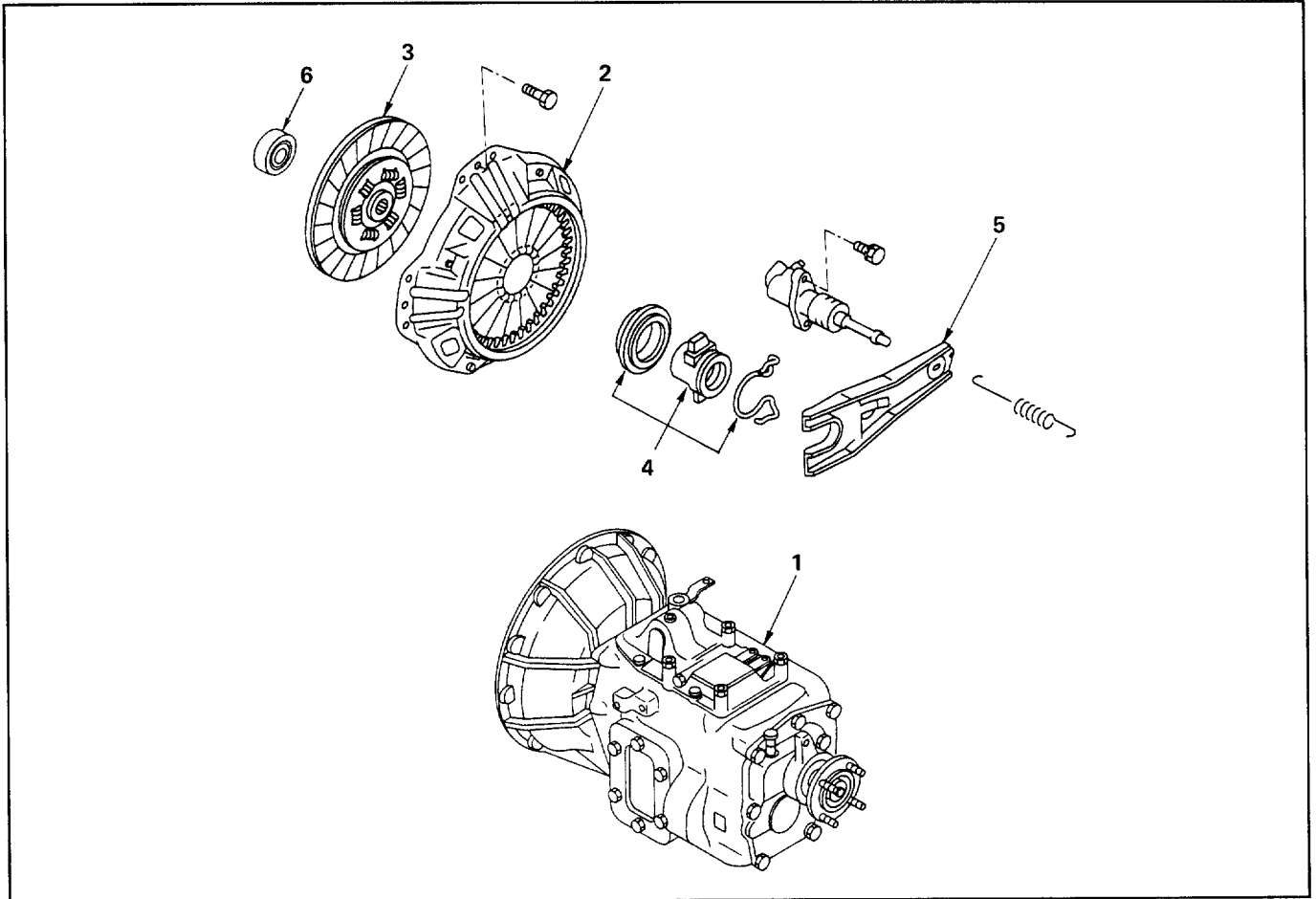


MASTER CYLINDER**SLAVE CYLINDER**

ON-VEHICLE SERVICE

CLUTCH ASSEMBLY

REMOVAL



Removal Steps

1. Transmission assembly
2. Pressure plate assembly
3. Driven plate assembly
4. Shift block assembly
5. Shift fork
6. Pilot bearing



Removal Steps

- Raise vehicle and support with suitable safety stands.



CAUTION:

Do not let clutch fluid remain on a painted surface. Wash it off immediately.

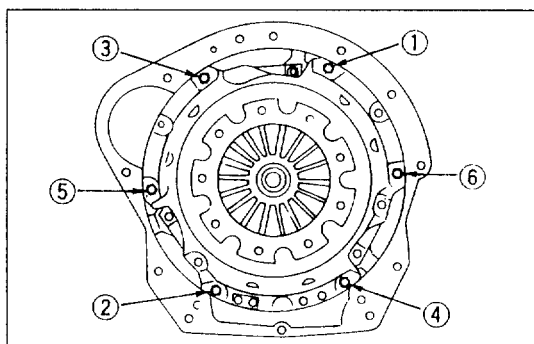
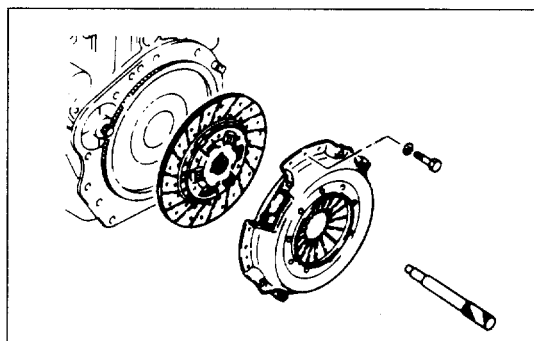
1. Transmission Assembly

Refer to "SECTION 7B ON-VEHICLE SERVICE: TRANSMISSION ASSEMBLY REPLACEMENT" in this manual.

2. Pressure Plate Assembly

3. Driven Plate Assembly

- Use the pilot aligner to prevent the driven plate assembly from falling free.
Pilot Aligner: 5-8525-3001-0
- Mark the flywheel and pressure plate lug for alignment when installing.

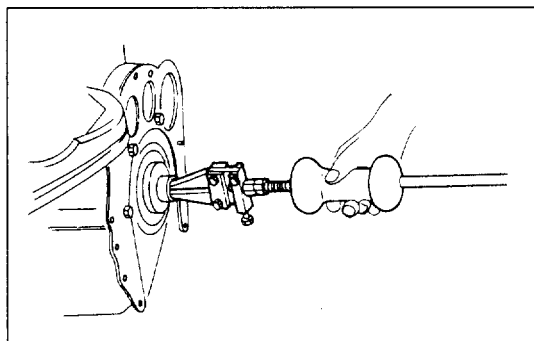


- Loosen the pressure plate assembly fixing bolts in the numerical order shown in the illustration.

4. Shift Fork

5. Shift Block Assembly

- Take out the shift block and support spring together.



6. Pilot Bearing

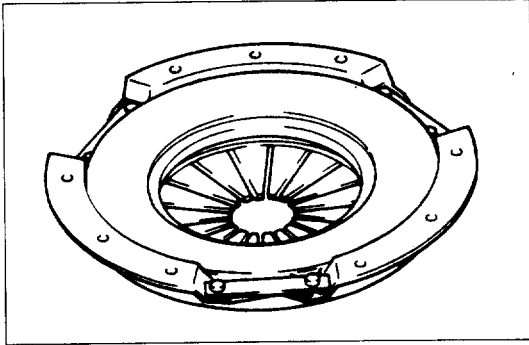
NOTE:

Do not remove pilot bearing when unless absolutely necessary.

- Use the pilot bearing remover to remove the pilot bearing.
Pilot Bearing Remover : 5-8840-2000-0
Sliding Hammer : 5-8840-0084-0

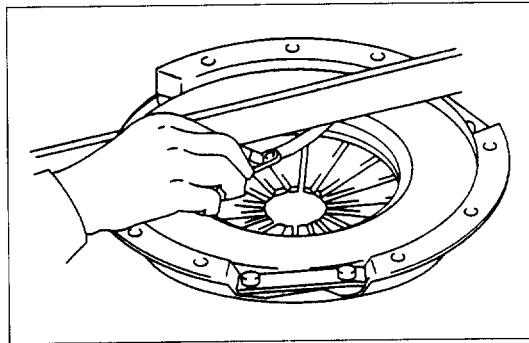
INSPECTION AND REPAIR

Make the necessary adjustments, repairs, and part replacement if excessive wear or damage is discovered during inspection.



Pressure Plate Assembly

- Visually inspect the pressure plate friction surface for excessive wear and heat cracks. If excessive wear or deep heat cracks are present, the pressure plate assembly must be replaced.

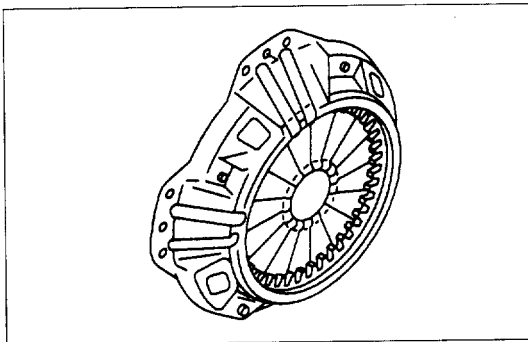


Pressure Plate Warpage

- Use a straight edge and a feeler gauge to measure the pressure plate friction surface flatness in four directions.
If any of the measured values exceed the specified limit, the pressure plate assembly must be replaced.

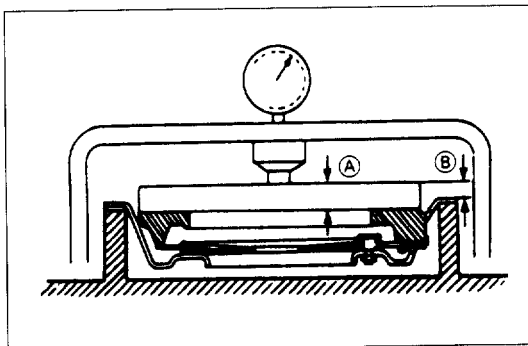


Pressure Plate Warpage	mm (in)
Limit	
0.3 (0.01)	



Clutch Cover

- Visually inspect the entire clutch cover for excessive wear, cracking, and other damage.
The Pressure plate assembly must be replaced if any of these conditions are present.



Clutch Set Force

- Invert the pressure plate assembly.
- Place a metal sheet with "A" thickness of 8.0 mm (0.31 in) on the pressure plate.
- Compress the pressure plate assembly until the distance "B" becomes specified.

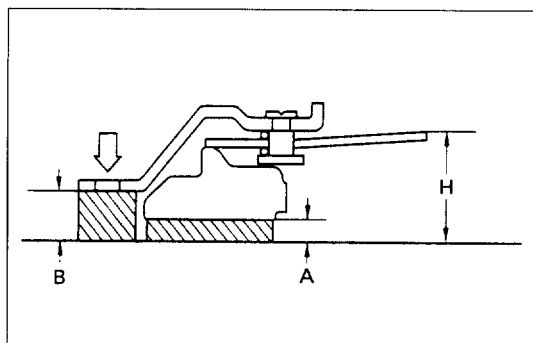
Thickness and Distance	mm (in)	
	A	B
NHR55, HKR55	7.4 (0.29)	18 (0.71)
NHR69, NKR69, NPR69	8.0 (0.31)	18 (0.71)
NKR17	8.0 (0.31)	4 (0.16)

- 4) Note the pressure plate gauge reading.



Clutch Set Force N (kg/lb)

	Nominal	Limit
NHR55, NKR55	4,119 (420/926)	3,785 (386/851)
NHR69, NKR69, NPR69	6,276 (640/1,411)	5,776 (589/1,299)
NKR17	5,492 (560/1,235)	5,050 (515/1,136)



Diaphragm Spring Finger Height

- 1) Place distance pieces beneath the pressure plate and clutch cover.

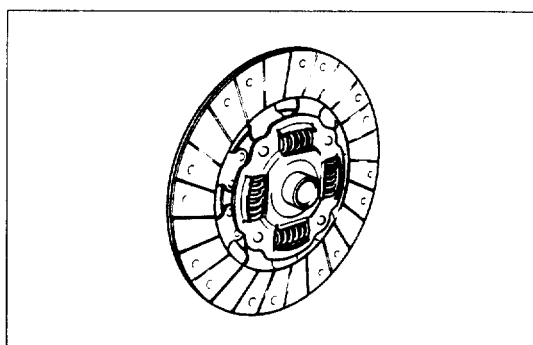
Distance Piece	mm (in)	
	A	B
NHR55, NKR55	7.4 (0.29)	18 (0.71)
NHR69, NKR69, NPR69	8.0 (0.31)	18 (0.71)
NKR17	8.0 (0.31)	4 (0.16)

- 2) Fully compress the pressure plate assembly.
There are two ways to do this.
- Use a bench press to press down on the pressure plate assembly from the top.
 - Tighten the pressure plate assembly fixing bolts.
- 3) Measure the spring finger height from base to spring tip.



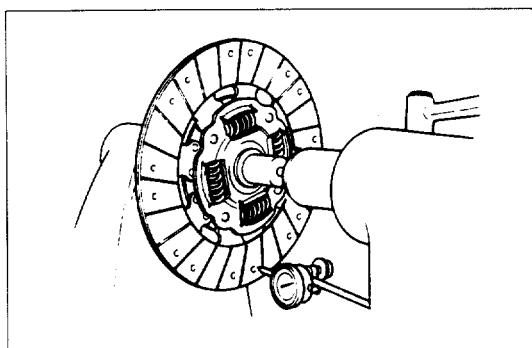
Spring Finger Height (H) mm (in)

Standard	
NHR55, NKR55	: 40.7-42.7 (1.60-1.68)
NHR69, NKR69, NPR69	: 39.0-41.0 (1.54-1.61)
NKR17	: 37.5-39.5 (1.48-1.56)



Driven Plate Assembly

- Visually inspect the torsion spring for looseness, breakage, and weakening.
If any of these conditions are discovered, the driven plate assembly must be replaced.
- Visually inspect the facing surfaces for cracking and excessive scorching.
Visually inspect the facing surfaces for the presence of oil or grease.
If any of these conditions are discovered, the facing must be cleaned or the driven plate assembly replaced.
- Check that the driven plate moves smoothly on the transmission top gear shaft spline.
Minor ridges on the top gear shaft spline may be removed with an oil stone or pencil grinder.



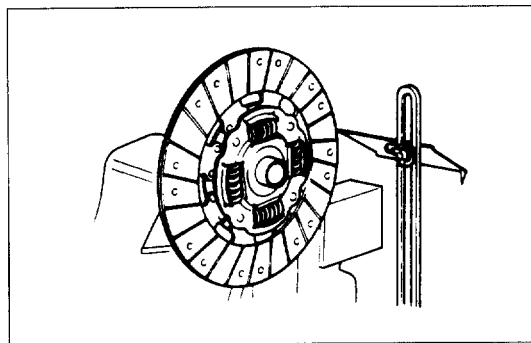
Driven Plate Warpage

- Insert the pilot aligner into the driven plate spline hub.
The pilot aligner must be held perfectly horizontal.
Pilot Aligner : 5-8525-3001-0
- Set a dial indicator to the driven plate outside circumference.
- Slowly turn the driven plate.
Read the dial indicator as you turn the driven plate.
If the measured value exceeds the specified limit, the driven plate assembly must be replaced.



Driven Plate Warpage mm (in)

Standard	Limit
Less than 0.7 (0.03)	1.0 (0.04)

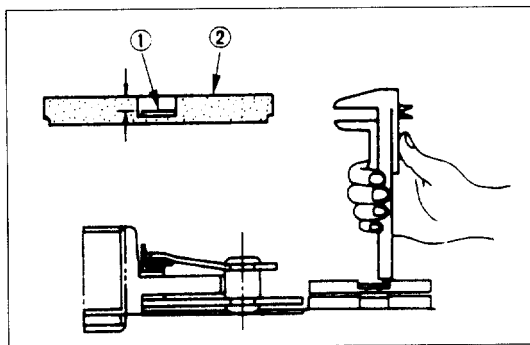


Driven Plate Splined Hub Spline Wear

- Clean the driven plate splined hub.
- Install the driven plate to the transmission top gear shaft spline.
- Set a surface gauge to the driven plate outside circumference.
- Slowly turn the driven plate. Measure the spline rotation play as you turn the driven plate.
If the measured value exceeds the specified limit, the driven plate assembly must be replaced.

Driven Plate Splined Hub Spline Wear mm (in)

Standard	Limit
Less than 0.5 (0.02)	1.0 (0.04)

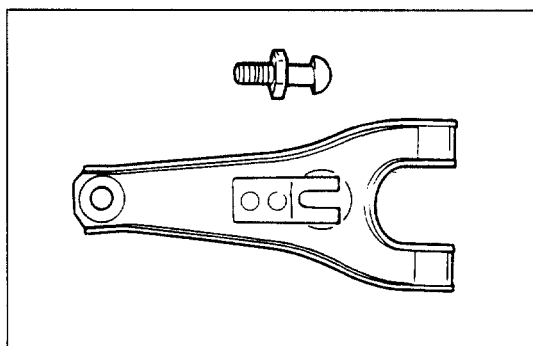


Driven Plate Rivet Head Depression

- Use the depth gauge or a straight edge with steel rule to measure the rivet head depression from the facing surface.
Be sure to measure the rivet head depression on both sides of the driven plate.
If the measured value is less than the specified limit, the driven plate must be replaced.

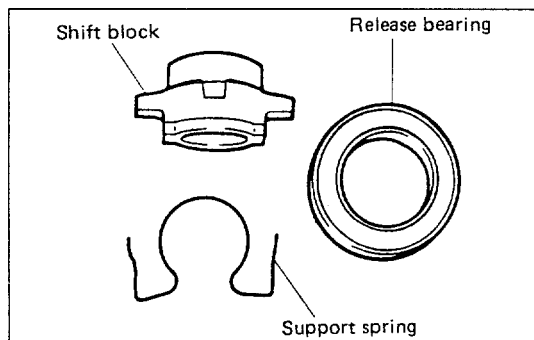
Rivet Head Depression mm (in)

	A	B
NHR55, NKR55	1.1-1.7 (0.04-0.07)	0.2 (0.01)
NKR17, NHR69, NKR69, NPR69	1.3-1.9 (0.05-0.08)	0.2 (0.01)



Shift Fork and Support Bolt

- Visually inspect the surfaces of the shift fork making contact with the shift block and support bolt.
- Correct a slight stepped wear or surfaces roughness with an oil stone or pencil grinder, or replace the shift fork and/or support bolt if unrecoverable damage is found.



Shift Block Assembly

- Before disassembly, check the shift block assembly for the following point. Correct a slight stepped wear or surface roughness with an oil stone or pencil grinder, or replace the part if unrecoverable damage is found.
 - a. Release bearing for roughness or noise by rotating the bearing race under light pressure.
 - b. Roughness or damage of shift block (contact surfaces with shift fork or front cover).

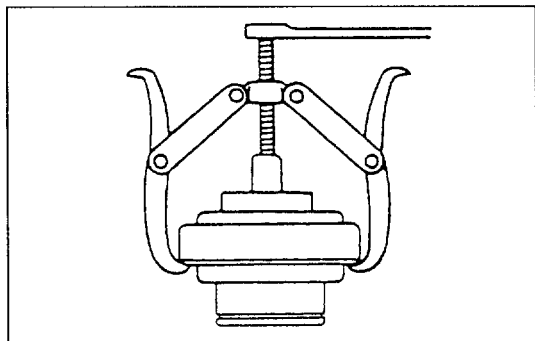


CAUTION:

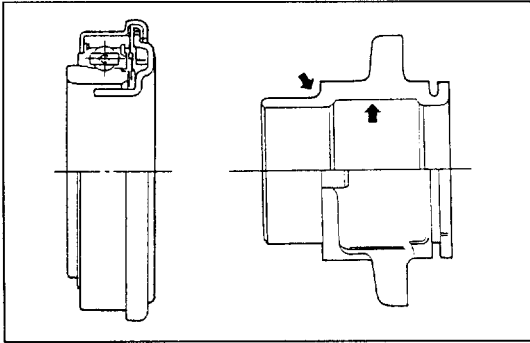
The release bearing is permanently packed with lubricant and should not be soaked in cleaning solvent, as this will dissolve the lubricant.

NOTE:

Do not disassemble the shift block assembly if no fault is apparent.



- Use the bearing remover and bench press to remove the release bearing.
Bearing Remover : 5-8840-0013-0



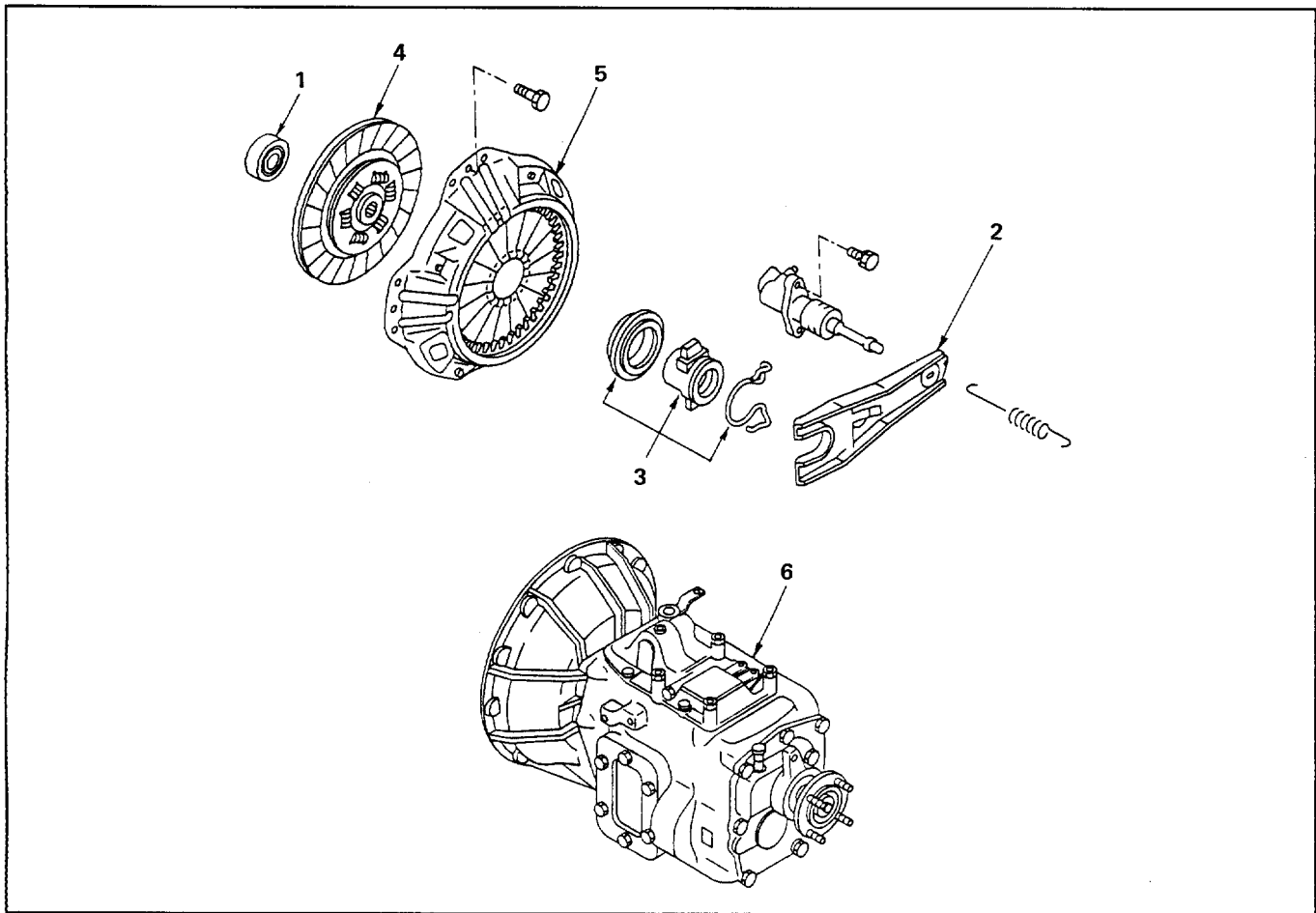
- Install the parts as shown after applying multi-purpose with MOS2 type grease. Use a bench press.



Support Spring

- Visually inspect the support spring for breakage and weakening.
- If any of these condition are discovered, parts must be replaced.

INSTALLATION



Installation Steps

1. Pilot bearing
2. Shift fork
3. Shift block assembly
4. Driven plate assembly
5. Pressure plate assembly
6. Transmission assembly



Installation Steps

1. Pilot Bearing



- Use the pilot bearing installer to install the clutch pilot bearing.
Pilot Bearing Installer: 5-8522-0024-0

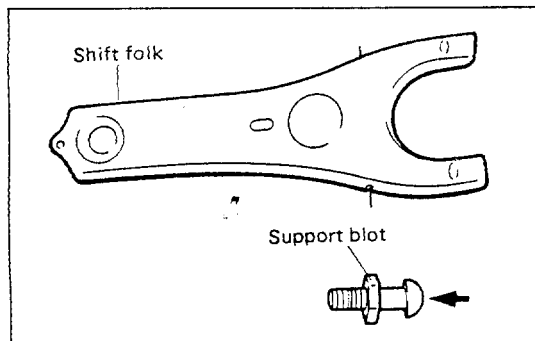
2. Shift Block Assembly

- Install the shift block and support spring together.

3. Shift Fork



- Apply multi-purpose with MOS2 type grease to the contact surfaces with the shift block and support bolt head.



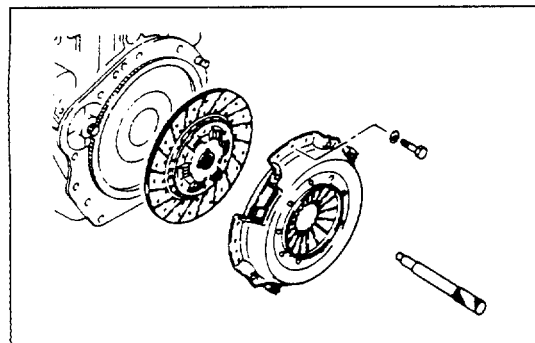
4. Driven Plate Assembly



- Apply multi-purpose with MOS2 type grease to the driven plate hub spline.



- Use the pilot aligner to install the driven plate assembly.
Pilot Aligner : 5-8525-3001-0



5. Pressure Plate Assembly

- Tighten pressure plate assembly fixing bolts in numerical order.



Pressure Plate Fixing Bolt Torque	N·m (kg·m/lb·ft)
18 (1.8/13)	

- Remove the pilot aligner.

NOTE:

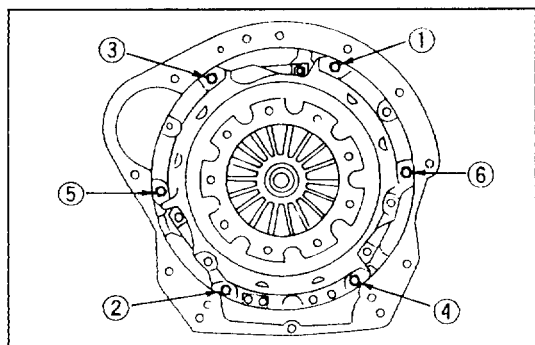
In case a new pressure plate assembly is mounted, after tightening a pressure plate at the specified torque, be sure to remove the wire for protection of a diaphragm spring.

6. Transmission Assembly

Refer to "SECTION 7B ON-VEHICLE SERVICE: TRANSMISSION ASSEMBLY REPLACEMENT" in this manual.



Clutch Housing to Flywheel Housing Bolts Torque	N·m (kg·m/lb·ft)
M10 : 46 (4.7/34)	
M12 : 91 (9.3/67)	




**Engine Rear Mounting Nuts
and Bolts Torque**

N·m (kg·m/lb·ft)

M10 : 40 (4.1/30)

M12 : 69 (7.0/51)


Front Exhaust Pipe Bolts Torque

N·m (kg·m/lb·ft)

37 (3.8/27)


Exhaust Brake Bolts Torque

N·m (kg·m/lb·ft)

17 (1.7/12)


Slave Cylinder Bolts Torque

N·m (kg·m/lb·ft)

16 (1.6/12)



Perform slave cylinder adjustment before installation
of the return spring.

- 1) Loosen the lock nut of the push rod.
- 2) Turn the adjust nut until it reaches the shift fork.
- 3) Back off the adjust nut 1.5 turns (shift fork free play
Approximately 2 mm/0.1 in).
- 4) Tighten the lock nut.


Push Rod Lock Nut Torque

N·m (kg·m/lb·ft)

19 (1.9/14)

Wiring Connector Color

Back-up Light Switch :Brown

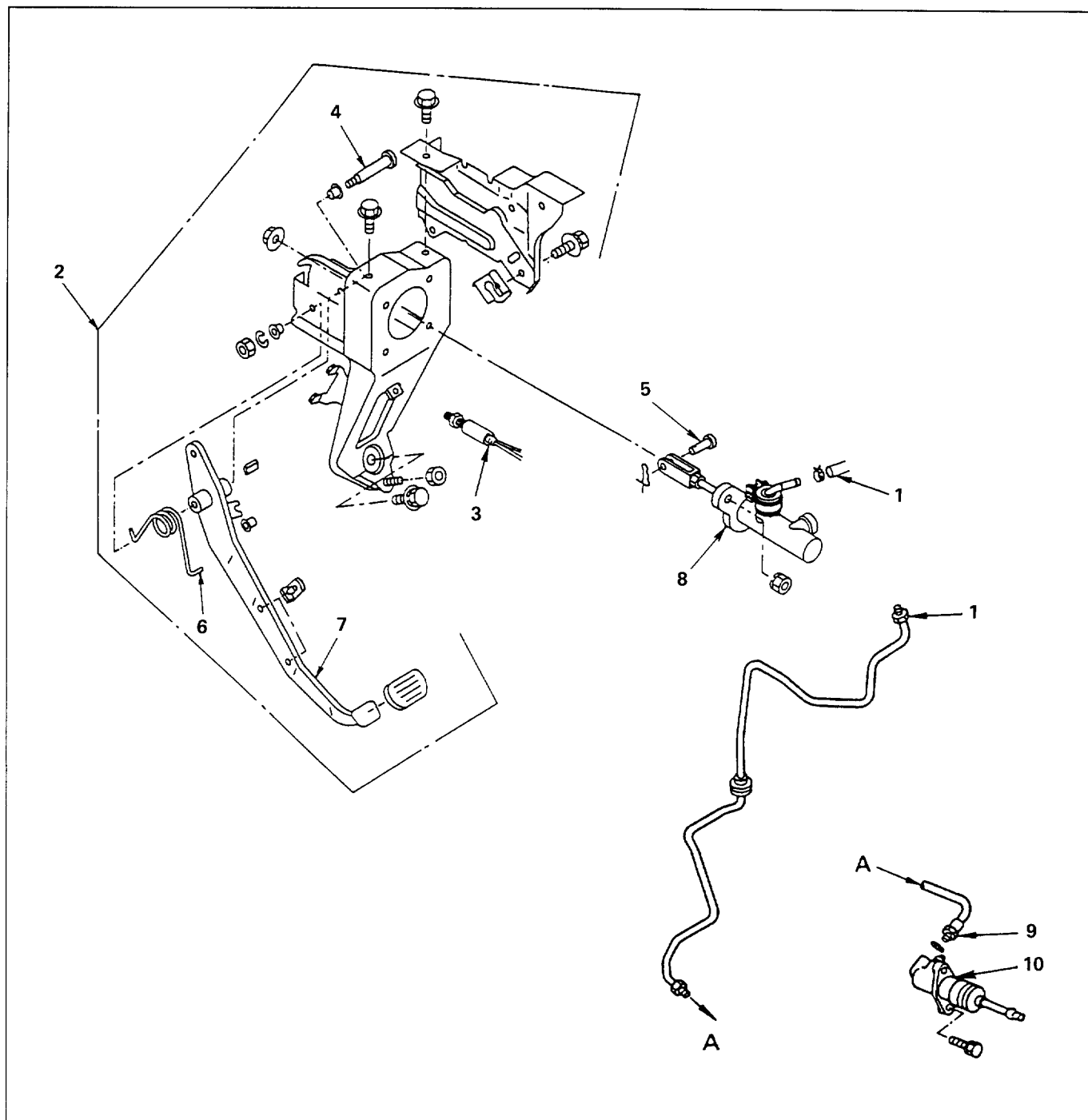
Neutral Switch :Gray


Propeller Shaft Nuts Torque

N·m (kg·m/lb·ft)

66 (6.7/48)

CLUTCH CONTROL REMOVAL



Removal Steps

1. Clutch pipe and hose
2. Clutch pedal and bracket assembly
3. Clutch switch or stopper bolt
4. Shaft

5. Crevis pin
6. Return spring
7. Clutch pedal
8. Master cylinder
9. Flexible hose
10. Slave cylinder

Preparation

1. Meter Cluster

- Pull out the meter cluster and disconnect the harness connectors.

2. Meter Assembly

- Remove the 5 fixing screws, then remove the meter assembly and disconnect the harness connector.



Removal Steps

- Drain the clutch fluid from the clutch hydraulic line.



CAUTION:

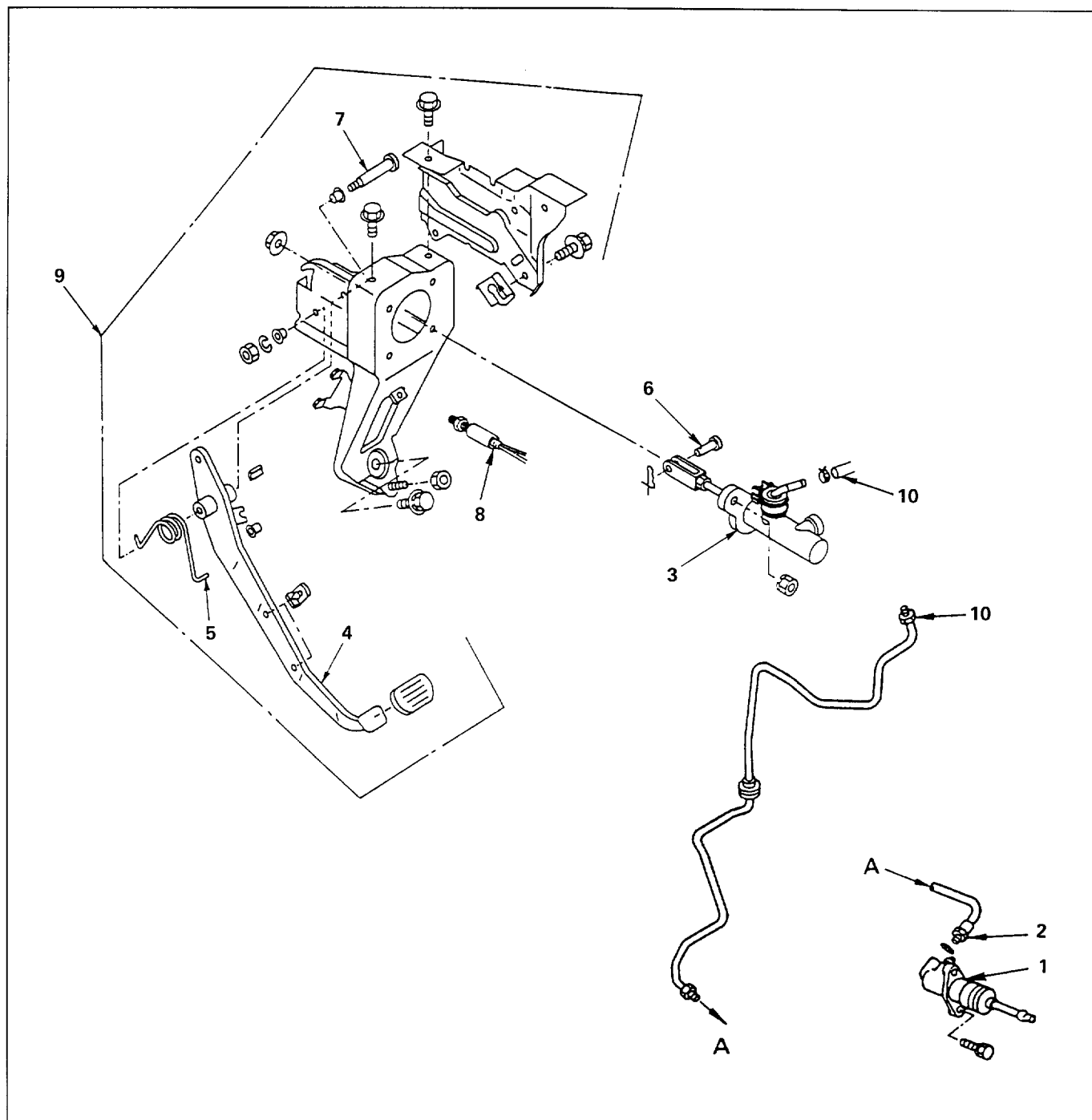
Do not let clutch fluid remain on a painted surface. Wash it off immediately.

1. Clutch Pipe and Hose
2. Clutch Pedal and Bracket Assembly
3. Clutch Switch or Stopper Bolt
4. Shaft
5. Crevis Pin
6. Return Spring
7. Clutch Pedal
8. Master Cylinder
9. Flexible Hose
10. Slave Cylinder

INSPECTION AND REPAIR

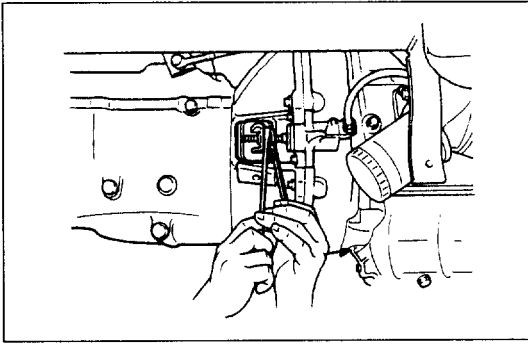
Make the necessary adjustment, repairs, and part replacement if excessive wear or damage is discovered during inspection.

INSTALLATION



Installation Steps

1. Slave cylinder
2. Flexible hose
3. Master cylinder
4. Clutch pedal
5. Return spring
6. Crevis pin
7. Shaft
8. Clutch switch or stopper bolt
9. Clutch pedal and bracket assembly
10. Clutch pipe and hose



Installation Steps

1. Slave Cylinder



Slave Cylinder Bolt Torque	N·m (Kg·m/lb·ft)
19 (1.9/14)	



- Perform slave cylinder adjustment before installation of the return spring.
- 1) Loosen the lock nut of the push rod.
 - 2) Turn the adjust nut until it reaches the shift fork.
 - 3) Back off the adjust nut 1.5 turns. (shift fork free play approximately 2 mm/0.1 in).
 - 4) Tighten the lock nut.



Push Rod Lock Nut Torque	N·m (kg·m/lb·ft)
16 (1.6/12)	

2. Flexible Hose

3. Master Cylinder

- Install the master cylinder assembly to the clutch pedal bracket.



Fixing Nuts Torque	N·m (kg·m/lb·in)
13 (1.3/113)	

4. Clutch Pedal

5. Return Spring

6. Crevis Pin

7. Shaft

8. Clutch Switch or Stopper Bolt

9. Clutch Pedal and Bracket Assembly



Clutch Bracket Bolts Torque	N·m(kg·m/lb·ft)
37 (3.8/27)	

- Perform the clutch pedal adjustment after installation of clutch control.



Clutch Pedal Height and Stroke

- 1) Loosen the lock nut of the master cylinder push rod.
- 2) Adjust the pedal height by turning the push rod.

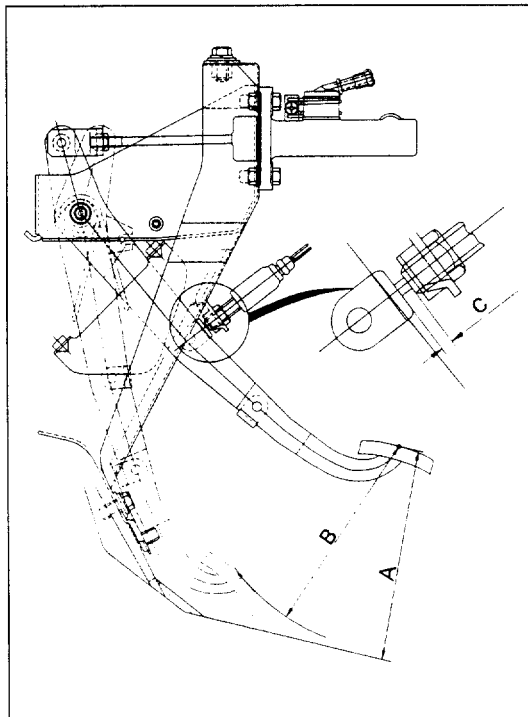
Clutch Pedal Height and Stroke	mm (in)
Height(A) : 160-170 (6.3-6.7)	
Stroke(B) : 159-169 (6.2-6.7)	

- 3) Tighten the lock nut.



Lock Nut Torque	N·m(kg·m/lb·in)
13 (1.3/113)	

- 4) Install the meter assembly and meter cluster.



**Clutch Pedal Free Play****Clutch Switch or Stopper Bolt**

After completion of clutch pedal height and slave cylinder adjustment, adjust the clutch switch or stopper bolt clearance.

- 1) Loosen the lock nut of clutch switch or stopper bolt.
- 2) Adjust the clutch switch or stopper bolt clearance by turning clutch switch or stopper bolt.

**Clutch Switch or Stopper Bolt**

Clearance (C)	mm (in)
0.5-1.0 (0.02-0.04)	

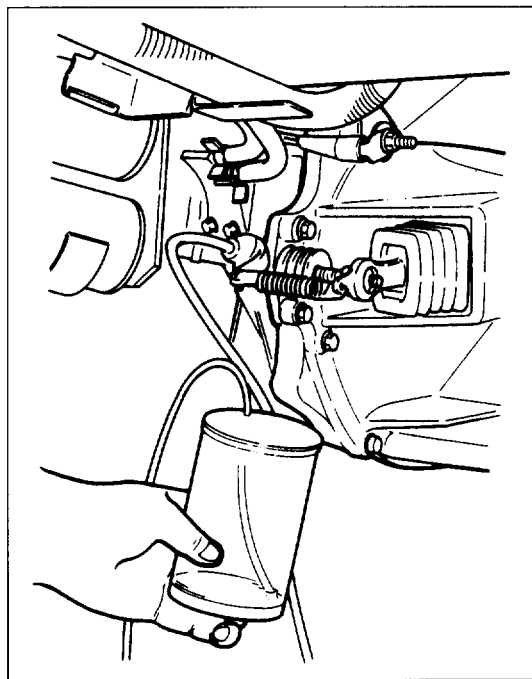
**Clutch Pedal Free Play**

	mm (in)
15-25 (0.6-1.0)	

- 3) Tighten the lock nut.

**Lock Nut Torque**

	N•m (kg•m/lb•ft)
19 (1.9/14)	

**10. Clutch Pipe and Hose**

- Perform the clutch hydraulic circuit bleeding after installation of the clutch control.

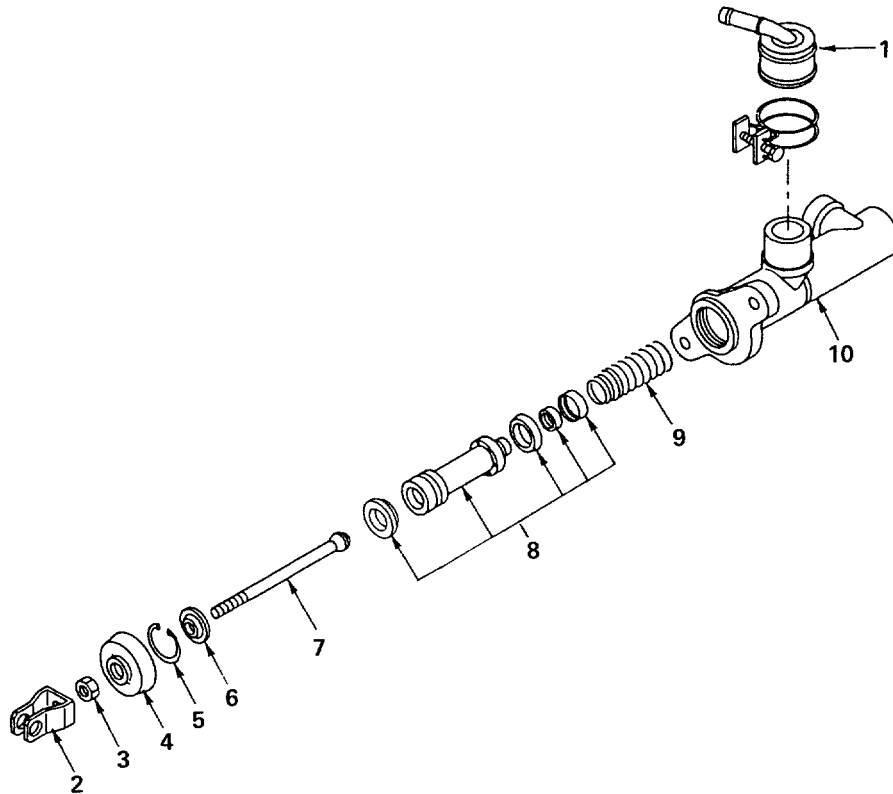
Bleeding operation calls for cooperative action of two men.

- 1) Check the level of clutch fluid in the reservoir and replenish if necessary.
- 2) Remove the rubber cap from the bleeder screw and wipe clean the bleeder screw.
Connect a vinyl tube to the bleeder screw and insert the other end of the vinyl tube into a transparent container.
- 3) Pump the clutch pedal repeatedly and hold it depressed.
- 4) Loosen the bleeder screw on the clutch slave cylinder to release clutch fluid with air bubbles into the container and tighten the bleeder screw immediately.
- 5) Release the clutch pedal carefully. Repeat the above operation until air bubbles disappear from the clutch fluid being pumped out into the container. During the bleeding operation, keep the clutch fluid reservoir filled to the specified level. Reinstall the rubber cap.

UNIT REPAIR

MASTER CYLINDER

DISASSEMBLY



Disassembly Steps

- | | |
|----------------|--------------------|
| 1. Pipe joint | 6. Stopper |
| 2. Crevis yoke | 7. Push rod |
| 3. Lock nut | 8. Piston assembly |
| 4. Dust cover | 9. Return spring |
| 5. Snap ring | 10. Cylinder body |

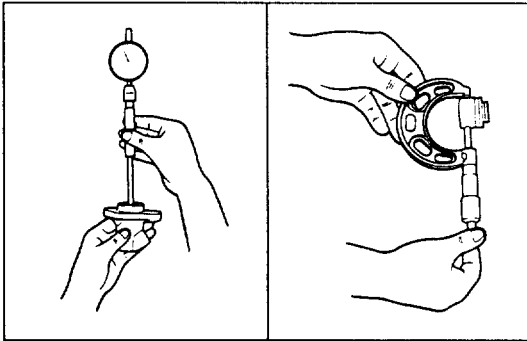


Disassembly Step

- 1. Pipe Joint**
- 2. Crevis Yoke**
- 3. Lock Nut**
- 4. Dust Cover**
- 5. Snap Ring**
 - Press down the piston with your finger to prevent it from jumping out.
- 6. Stopper**
- 7. Push Rod**
- 8. Piston Assembly**
- 9. Return Spring**
- 10. Cylinder Body**

INSPECTION AND REPAIR

Make the necessary adjustments, repairs, and parts replacements if excessive wear or damage is discovered during inspection.



Cylinder Body

- Wash clean the cylinder body in brake fluid.
- Check the fluid return port for restrictions and clean it if necessary.
- Measure the cylinder bore diameter.



Master Cylinder Bore Diameter mm (in)

Standard

ø 19.050-19.102 (0.7500-0.7520)



Clearance between Cylinder Bore and Piston Clearance mm (in)

Standard	Limit
0.03-0.11 (0.001-0.004)	0.12 (0.005)

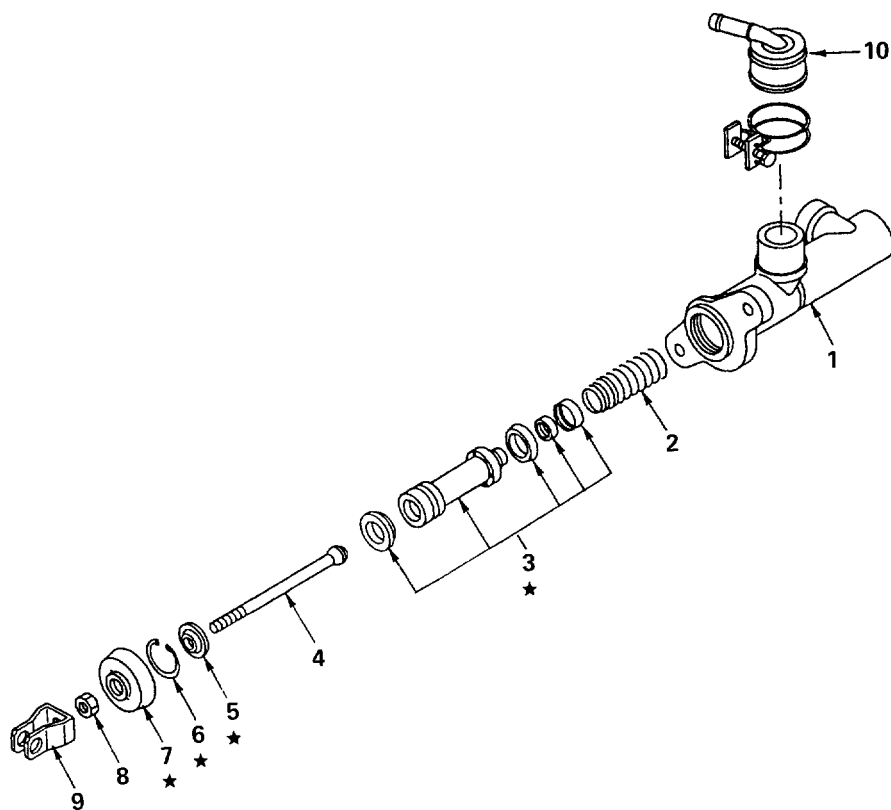
- If excessive wear or any abnormal conditions are present, the master cylinder assembly must be replaced with new one.



CAUTION:

If the master cylinder has been disassembled, the repair kit must be replaced with new one.

REASSEMBLY



★ Indicates repair kit

Reassembly Steps

- | | |
|--------------------|----------------|
| 1. Cylinder body | 6. Snap ring |
| 2. Return spring | 7. Dust cover |
| 3. Piston assembly | 8. Lock nut |
| 4. Push rod | 9. Crevis yoke |
| 5. Stopper | 10. Pipe joint |

**Reassembly Steps****1. Cylinder Body**

- Immerse the cylinder body in clean brake fluid.

2. Return Spring

- Install the return spring to the piston assembly.

3. Piston Assembly

- Before installing, apply a thin coat of rubber grease to the piston.

**CAUTION:**

Use care to prevent damaging the lip of the piston cup.

4. Push Rod**5. Stopper****6. Snap Ring****7. Dust Cover****8. Lock Nut**

Lock Nut Torque	N·m (kg·m/lb·in)
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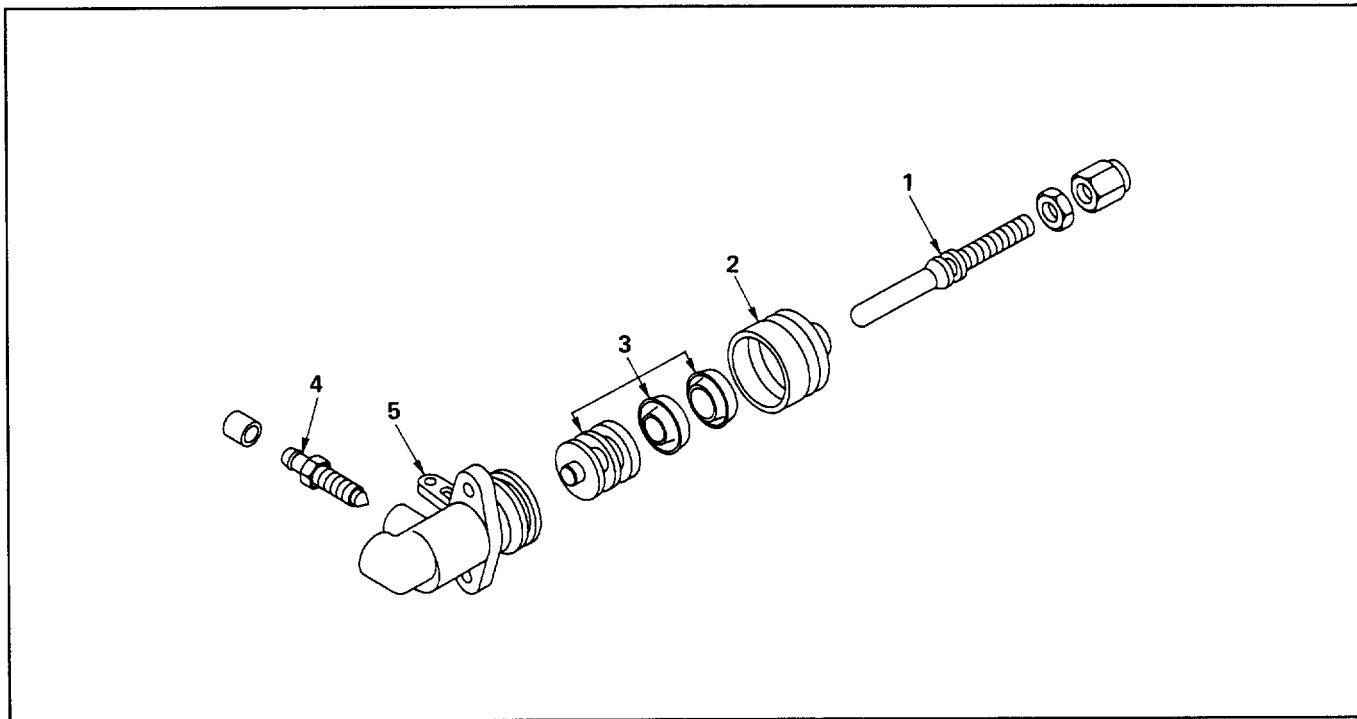
13 (1.3/113)

9. Crevis Yoke**10. Pipe Joint**

Pipe Joint Torque	N·m (kg·m/lb·in)
-------------------	------------------

5 (0.5/43)

SLAVE CYLINDER DISASSEMBLY



Disassembly Steps

1. Push rod
2. Boot
3. Piston assembly
4. Bleeder screw
5. Cylinder body

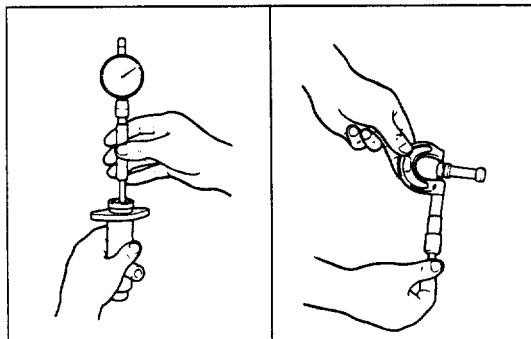


Disassembly Steps

1. Push Rod
2. Boot
3. Piston Assembly
4. Bleeder Screw
5. Cylinder Body

INSPECTION AND REPAIR

Make the necessary adjustments, repairs, and parts replacements if excessive wear or damage is discovered during inspection.



Cylinder Body

- Wash clean the cylinder body in brake fluid.
- Measure the cylinder bore diameter.



Cylinder Bore Diameter mm (in)

Standard

ø 26.990-27.042 (1.0626-1.0646)

Clearance between Cylinder Bore and Piston Clearance mm (in)

Standard	Limit
0.02-0.10 (0.0008-0.0039)	0.11 (0.0043)

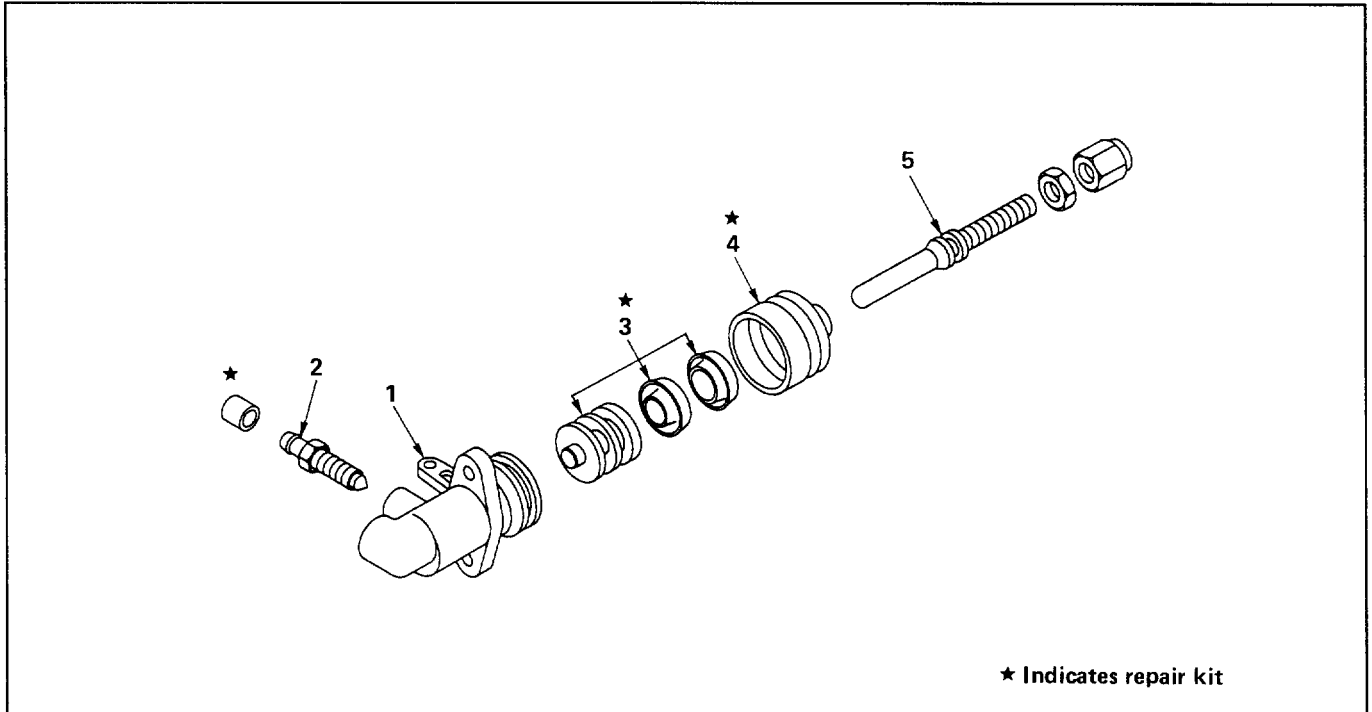
- If excessive wear or any abnormal conditions are present, the slave cylinder assembly must be replaced with new one.



CAUTION:

If the slave cylinder has been disassembled, the repair kit must be replaced with new one.

REASSEMBLY



Reassembly Steps

1. Cylinder body
2. Bleeder screw
3. Piston assembly
4. Boot
5. Push rod



Reassembly Steps

1. Cylinder Body
2. Bleeder Screw
3. Piston Assembly



- Before installing, apply a thin coat of rubber grease to the piston.



CAUTION:

Use care to prevent damaging the lip of the piston cup.

4. Boot
5. Push Rod

LGMSB-WE-441

You are requested to order this manual using the manual number that is shown above.

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