

DIFFICULT TO ENGINE START AND ENGINE STALL

HINT:

Specified values in the following troubleshooting flowchart are for reference only. Variations in the Data List result values may occur depending on the measuring conditions or the vehicle's age. Do not judge the vehicle to be normal even when the Data List values indicate a standard level. There are possibly some concealed factors of the malfunction.

INSPECTION PROCEDURE

1 READ OUTPUT DTCs(RELATED TO ENGINE)

- Connect the intelligent tester II to the DLC3.
- Turn the ignition switch to ON and turn the intelligent tester II ON.
- Select the following menu items: Powertrain / Engine and ECT / DTC.
- Read DTCs.

Result:

Display (DTC Output)	Proceed To
Other than engine-related DTCs (See page 05-458)	A
DTCs related to the engine (See page 05-458)	B

B

REPAIR OR REPLACE ENGINE CONTROL SYSTEM ACCORDING TO DTC OUTPUT (See page 05-458)

A

2 CHECK OPERATION OF ENGINE CRANKING

- Check the operation of the engine cranking.
- Compare the operation with that of a normal engine of the same model, and carefully check if there is any difference between them.

NG

CHECK AND REPAIR BATTERY, CHARGING SYSTEM, STARTER ASSY AND STARTING SYSYTEM

OK

3 READ VALUE OF INTELLIGENT TESTER II(FUEL PRESSURE)

- Connect the intelligent tester II to the DLC3.
- Turn the ignition switch to ON and turn the intelligent tester II ON.
- Select the following menu items: Powertrain / Engine and ECT / Data List / Common Rail Pressure.
- Read the value.

Reference:

Item	Inspection Condition	Reference Value
Common Rail Pressure	Cranking, engine coolant temperature is 0°C (32°F) or more	20 MPa

NG

BLEED AIR FOR FUEL SYSTEM

OK

4 CHECK INITIAL COMBUSTION

(a) Check that initial combustion occurs.

Result:

Result	Proceed To
NG (Cold engine)	A
NG (Hot engine)	B
OK	C

B**Go to step 6****C****Go to step 7****A****5 CHECK INDICATOR LIGHTING TIME AND AFTER GLOW TIME**
(See page 05-518)**HINT:**

DTC P0380 (2 trip detection logic when the engine coolant temperature is less than 40°C [104°F]) is set if there is an open or short malfunction in the glow plug circuit.

NG**REPAIR OR REPLACE PRE-HEATING SYSTEM****OK****6 READ VALUE OF INTELLIGENT TESTER II (FUEL PRESSURE)**

- (a) Connect the intelligent tester II to the DLC3.
- (b) Start the engine and turn the intelligent tester II ON.
- (c) On the intelligent tester II, select the following menu items: Powertrain / Engine and ECT / Data List / Common Rail Pressure.
- (d) Check that the internal fuel pressure of the common rail is within specification below.

Standard:

Engine Speed	Fuel Pressure (MPa)
Idling	Approximately 20 to 40
2,500 rpm (No engine load)	Approximately 40 to 80

NG**Go to step 12****OK**

7 CHECK AIR INTAKE SYSTEM AND EXHAUST SYSTEM

- (a) Remove the air cleaner filter.
- (b) Inspect the EGR valve operation.
 - (1) Start the engine and warm it up.
 - (2) Check that clicking sounds are heard from the EGR valve when the vacuum hose is disconnected from EGR valve with the engine is an idling condition.
- (c) Inspect the intake shutter (throttle valve) operation.
 - (1) Start the engine.
 - (2) Check if the intake shutter (throttle valve) fully opens when accelerating the engine speed.

HINT:

While revving up, the EGR valve is fully closed and the intake shutter is fully opened. If the systems are normal, the volume of black smoke will decrease.

NG

CHECK AND REPAIR LOCATION WHERE MALFUNCTION EXIST

OK

8 READ VALUE OF INTELLIGENT TESTER II

- (a) Connect the intelligent tester II to the DLC3.
- (b) Start the engine and turn the intelligent tester II ON.
- (c) Select the following menu items: Powertrain / Engine and ECT / Data List.
- (d) Select the following items in order and read values displayed on the intelligent tester II respectively.
 - (1) Common Rail Pressure
 - (2) Injection Volume
 - (3) Injection Timing

Standard:

Item	Engine Speed *	Reference Value
Common Rail Pressure	Idling	20 to 40 MPa
Common Rail Pressure	2,000 rpm (No engine load)	40 to 80 MPa
Common Rail Pressure	3,000 rpm (No engine load)	50 to 85 MPa
Injection Volume	Idling	3 to 10 mm ³
Injection Volume	2,000 rpm (No engine load)	3 to 10 mm ³
Injection Volume	3,000 rpm (No engine load)	3 to 15 mm ³
Injection Timing	Idling	-1 to 5°CA
Injection Timing	2,000 rpm (No engine load)	-3 to 1°CA
Injection Timing	3,000 rpm (No engine load)	0 to 5°CA

*: If no conditions are specifically stated for "Idling", it means the A/C switch is OFF and all accessory switches are OFF.

NG

Go to step 13

OK

9 INSPECT CYLINDER COMPRESSION PRESSURE (See page 14-72 of Pub. No. RM864E AVENSIS VERSO/ PICNIC REPAIR MANUAL)

NG

CHECK AND REPAIR ENGINE

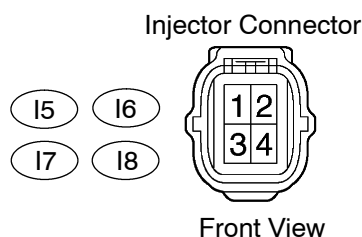
OK

10 CHECK HARNESS AND CONNECTOR(INJECTOR - EDU)

HINT:

DTC P0200 (1 trip detection logic) is set if there is an open or short malfunction in the EDU circuit.

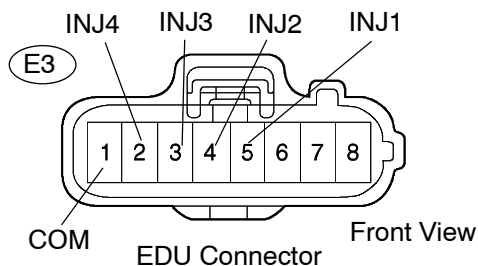
Wire Harness Side:



Y

A84819

Wire Harness Side:



Y

A56874

- (a) Check the harness and connectors between the injector and EDU (INJ terminal).
- (1) Disconnect the I5, I6, I7, and I8 injector connectors.
 - (2) Disconnect the E3 EDU connector.
 - (3) Check the resistance.

Standard (Check for open):

Tester Connection	Specified Condition
Injector (I5-3) - INJ1 (E3-5)	Below 1 Ω
Injector (I6-3) - INJ2 (E3-4)	
Injector (I7-3) - INJ3 (E3-3)	
Injector (I8-3) - INJ4 (E3-2)	
Injector (I5-4) - COM (E3-1)	
Injector (I6-4) - COM (E3-1)	
Injector (I7-4) - COM (E3-1)	
Injector (I8-4) - COM (E3-1)	

Standard (Check for short):

Tester Connection	Specified Condition
Injector (I5-3) or INJ1 (E3-5) - Body ground	10 k Ω or higher
Injector (I6-3) or INJ2 (E3-4) - Body ground	
Injector (I7-3) or INJ3 (E3-3) - Body ground	
Injector (I8-3) or INJ4 (E3-2) - Body ground	
Injector (I5-4) or COM (E3-1) - Body ground	
Injector (I6-4) or COM (E3-1) - Body ground	
Injector (I7-4) or COM (E3-1) - Body ground	
Injector (I8-4) or COM (E3-1) - Body ground	

- (4) Reconnect the injector connector.
- (5) Reconnect the EDU connector.

NG

REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

11 PERFORM ACTIVE TEST BY INTELLIGENT TESTER II (INJECTOR CUT #1 TO #4)

- Connect the intelligent tester II to the DLC3.
- Start the engine and turn the intelligent tester II ON.
- Select the following menu items: Powertrain / Engine and ECT / Active Test / Injector cut #1, #2, #3 and #4.
- Check the engine idling condition while the fuel injection of each cylinder is cut using the intelligent tester II.

Result:

Engine Idle Condition	Proceed To
Becomes Unstable	A
Does Not Change	B

HINT:

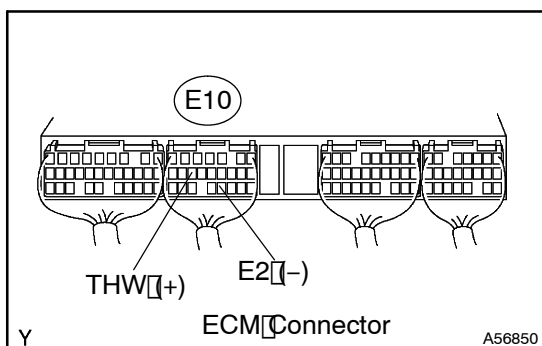
Replace the injector mounted on the cylinder that causes rough idling.

B**GO TO DTC P1238 (See page 05-557)****A****REPLACE INJECTOR DRIVER****12 CHECK IF FUEL IS BEING SUPPLIED TO SUPPLY PUMP**

- Disconnect the inlet hose from the supply pump.
- Operate the priming pump and check that the fuel is being supplied to the supply pump.

OK

REPLACE INJECTION OR SUPPLY PUMP ASSY
(See page 11-31 of Pub. No. RM864E AVENSIS
VERSO/ PICNIC REPAIR MANUAL)

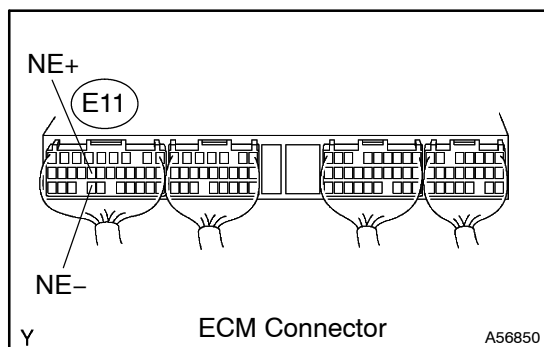
NG**CHECK AND REPAIR FUEL PIPING CLOG (INCLUDING FUEL FREEZING)
(FUEL TANK – SUPPLY PUMP)****13 INSPECT ECM (THW VOLTAGE)**

- Start the engine.
- Measure the voltage between the specified terminals of the E10 ECM connector.

Standard:

Tester Connection	Condition	Specified Condition
THW (E10-14) – E2 (E10-20)	Idling, engine coolant temperature at 60° to 120°C (140° to 248°F)	0.2 to 1.0 V

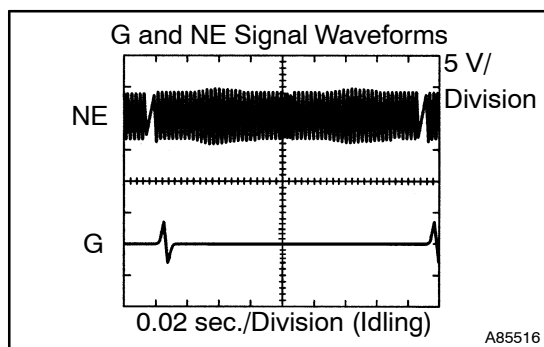
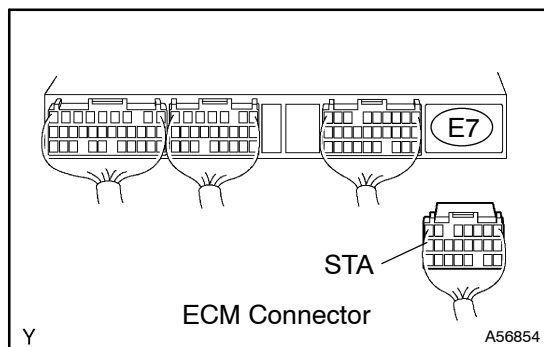
NG**Go to step 17****OK**

14 INSPECT ECM(NE SIGNAL)

- Inspect using the oscilloscope.
- During idling, check the waveform between the specified terminals of the E11 ECM connector.

Standard:

Tester Connection	Specified Condition
NE+ (E11-17) - NE- (E11-28)	Correct waveform is as shown

**NG****Go to step 18****OK****15 CHECK HARNESS AND CONNECTOR(ECM - STARTER RELAY)**

- Disconnect the E7 ECM connector.
- Remove the ST relay from the engine room R/B No. 2.
- Check the resistance.

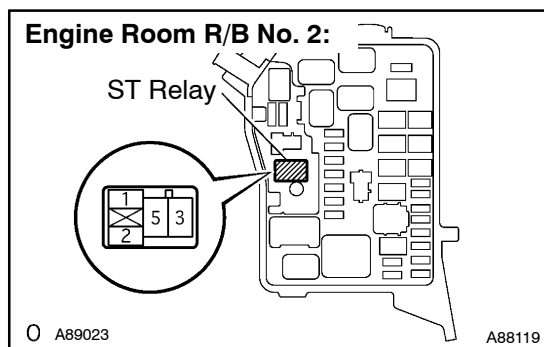
Standard (Check for open):

Tester Connection	Specified Condition
ST relay (1) - STA (E7-15)	Below 1 Ω

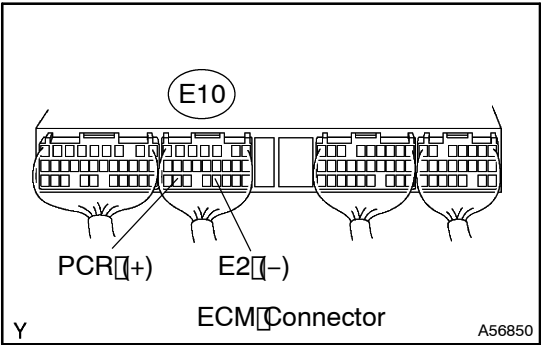
Standard (Check for short):

Tester Connection	Specified Condition
ST relay (1) or STA (E7-15) - Body ground	10 k Ω or higher

- Reconnect the ECM connector.
- Reinstall the ST relay.

**NG****REPAIR OR REPLACE HARNESS OR CONNECTOR****OK**

16 INSPECT ECM (PCR VOLTAGE)



- (a) Turn the ignition switch to ON.
- (b) Measure the voltage between the specified terminals of the E10 ECM connector.

Standard:

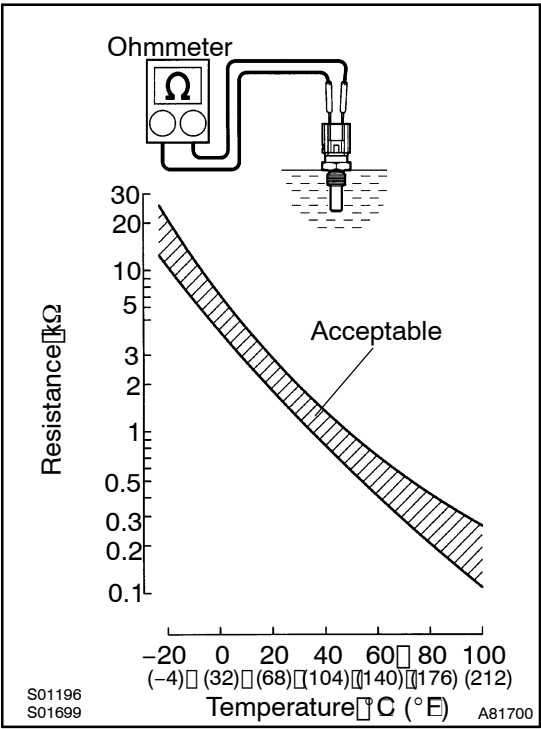
Tester Connection	Specified Condition
PCR(E10-23) - E2(E10-20)	1.0 to 4.0 V

NG Go to step 19

OK

REPLACE ECM (See page 10-30)

17 INSPECT ENGINE COOLANT TEMPERATURE SENSOR



- (a) Remove the engine coolant temperature sensor.
- (b) Measure the resistance between the terminals.

Standard:

2.32 to 2.59 kΩ at 20°C (68°F)
0.310 to 0.326 kΩ at 80°C (176°F)

NOTICE:
If you check the engine coolant temperature sensor in water, be careful not to allow water to get in contact with the terminals. After checking, dry the sensor.

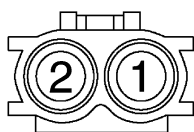
HINT:
Alternative procedure: Connect an ohmmeter to the installed engine coolant temperature sensor and read the resistance. Use an infrared thermometer to measure the engine temperature in the immediate vicinity of the sensor. Compare these values against the resistance/temperature graph. Change the engine temperature (warm up or allow to cool down) and repeat the test.

- (c) Reinstall the engine coolant temperature sensor.

NG REPLACE ENGINE COOLANT TEMPERATURE SENSOR

OK

REPAIR OR REPLACE HARNESS OR CONNECTOR

18 INSPECT CRANKSHAFT POSITION SENSOR**Component Side:**

Crankshaft Position Sensor

A78431

- (a) Disconnect the C4 crankshaft position sensor connector.
- (b) Measure the resistance between terminals 1 and 2.

Standard:

Tester Connection	Specified Condition
1 - 2	1,630 to 2,740 Ω at cold
	2,065 to 3,225 Ω at hot

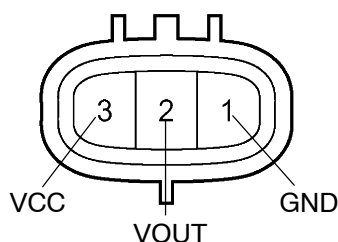
NOTICE:

Terms "cold" and "hot" refer to the temperature of the coils. "Cold" means approximately -10° to 50°C (14° to 122°F). "Hot" means approximately 50° to 100°C (122° to 212°F).

- (c) Reconnect the crankshaft position sensor connector.

NG**REPLACE CRANKSHAFT POSITION SENSOR****OK****REPAIR OR REPLACE HARNESS OR CONNECTOR****19 INSPECT COMMON RAIL ASSY(FUEL PRESSURE SENSOR)****Component Side:**

Fuel Pressure Sensor



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- (a) Disconnect the F13 fuel pressure sensor connector.
- (b) Measure the resistance between the terminals of the fuel pressure sensor.

Standard:

Tester Connection	Specified Condition
GND (F13-1) - VOUT (F13-2)	16.4 k Ω or less
VOUT (F13-2) - VCC (F13-3)	3 k Ω or less

- (c) Reconnect the fuel pressure sensor connector.

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REPLACE COMMON RAIL ASSY
(See page 14-91 of Pub. No. RM864E AVENSIS
VERSO/PICNIC REPAIR MANUAL)

OK

20 ☐

- Standard (Check for open):**

Standard (Check for short):

(d) Reconnect the ECM connector.

(e) Reconnect the fuel pressure sensor connector.

NG

REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

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REPLACE INJECTION OR SUPPLY PUMP ASSY
(See page 11–31 of Pub. No. RM864E AVENSIS
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OK

END