

INSPECTION PROCEDURE 9: Idle speed is high (improper idle speed).**COMMENT**

- In such cases as the above, the cause is probably that the intake air volume during idle is too great.

TROUBLESHOOTING HINTS (The most likely causes for this case:)

- Malfunction of the electronic control throttle valve system.
- Malfunction of the throttle body.
- Refer to component locations [GROUP-70](#)
- Refer to configuration diagrams [GROUP-80](#)
- Refer to circuit diagrams [GROUP-90](#)

DIAGNOSIS**Required Special Tools:**

- MB991958: Diagnostic Tool(MUT-III Sub Assembly)
 - MB991824: V.C.I.
 - MB991827: USB Cable
 - MB991910: Main Harness A

STEP 1. Using diagnostic tool, read the diagnostic trouble code (DTC).**⚠ CAUTION**

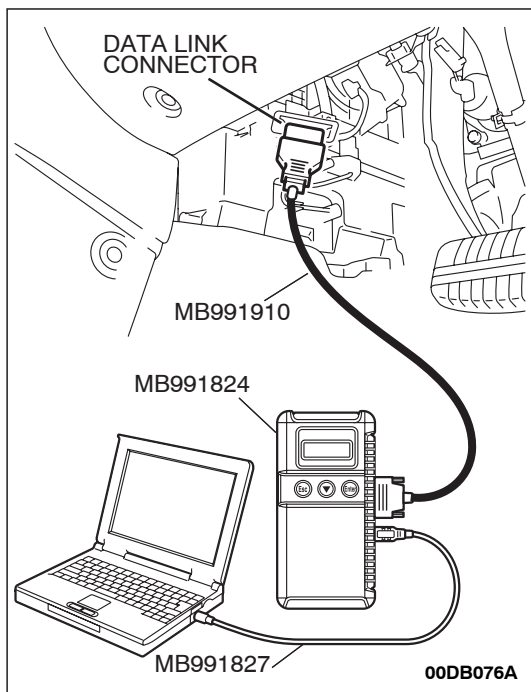
To prevent damage to diagnostic tool, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting diagnostic tool.

- (1) Connect diagnostic tool to the data link connector.
- (2) Turn the ignition switch to the "ON" position.
- (3) Read the DTC.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is DTC set?

YES : Refer to Diagnostic Trouble Code Chart [P.13A-17](#).

NO : Go to Step 2.



STEP 2. Using diagnostic tool, check data list.

⚠ CAUTION

To prevent damage to diagnostic tool, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting diagnostic tool.

- (1) Connect diagnostic tool to the data link connector.
- (2) Turn the ignition switch to the "ON" position.
- (3) Check the following item in the data list. Refer to Data List Reference Table [P.13A-637](#).

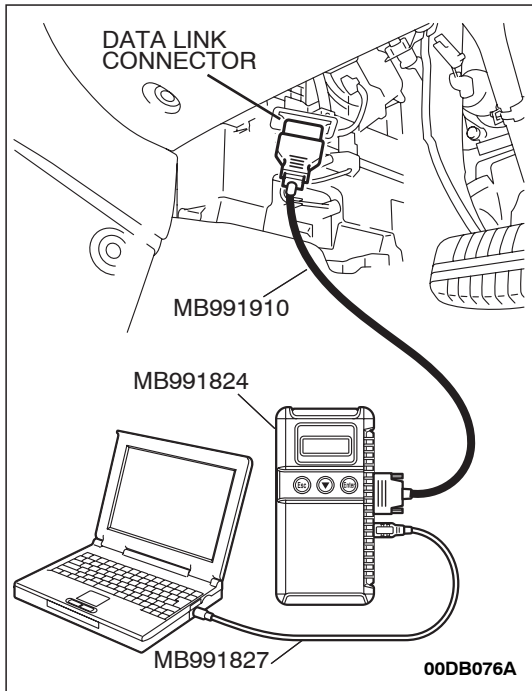
a. Item 6: Engine Coolant Temperature Sensor.

- (4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the sensor operating properly?

YES : Go to Step 3.

NO : Repair or replace it. Then confirm that the malfunction symptom is eliminated.



STEP 3. Using diagnostic tool, check actuator test.

- (1) Turn the ignition switch to the "ON" position.
- (2) Check the following item in the actuator test. Refer to Actuator Test Reference Table [P.13A-644](#).

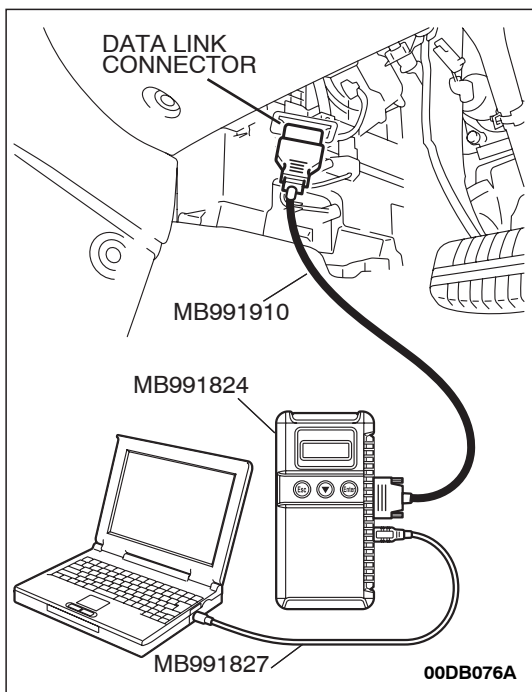
a. Item 10: Evaporative Emission Purge Solenoid.

- (3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the actuator operating properly?

YES : Refer to On-vehicle Service – Throttle Body (Throttle Valve Area) Cleaning. [P.13A-660](#).

NO : Repair or replace it. Then confirm that the malfunction symptom is eliminated.



INSPECTION PROCEDURE 10: Idle Speed Is Low (Improper Idle Speed).

COMMENT

- In cases such as the above, the cause is probably that the intake air volume during idle is too small.

TROUBLESHOOTING HINTS (The most likely causes for this case:)

- Malfunction of the electronic control throttle valve system.
- Malfunction of the throttle body.
- Refer to component locations [GROUP-70](#)
- Refer to configuration diagrams [GROUP-80](#)
- Refer to circuit diagrams [GROUP-90](#)

DIAGNOSIS

Required Special Tools:

- MB991958: Diagnostic Tool(MUT-III Sub Assembly)
 - MB991824: V.C.I.
 - MB991827: USB Cable
 - MB991910: Main Harness A

STEP 1. Using diagnostic tool, read the diagnostic trouble code (DTC).

⚠ CAUTION

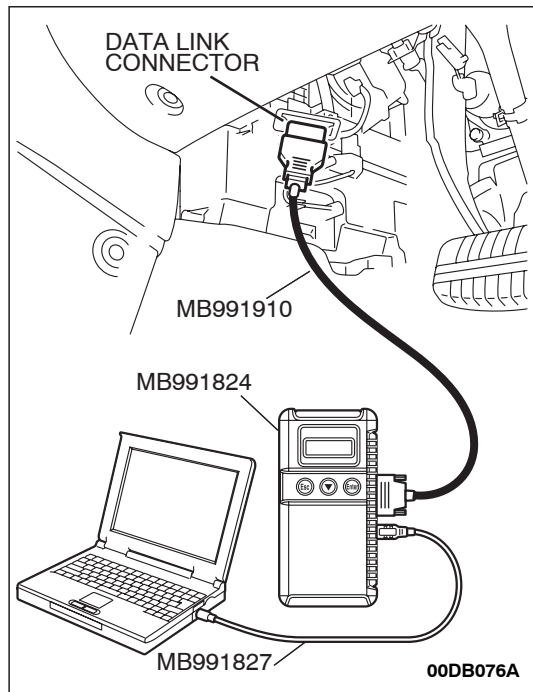
To prevent damage to diagnostic tool, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting diagnostic tool.

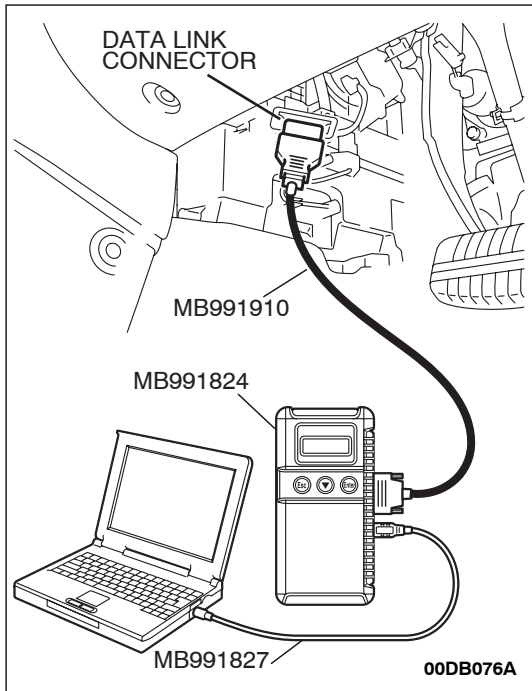
- (1) Connect diagnostic tool to the data link connector.
- (2) Turn the ignition switch to the "ON" position.
- (3) Read the DTC.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Refer to Diagnostic Trouble Code Chart [P.13A-17](#).

NO : Go to Step 2.





STEP 2. Using diagnostic tool, check data list.

⚠ CAUTION

To prevent damage to diagnostic tool, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting diagnostic tool.

- (1) Connect diagnostic tool to the data link connector.
- (2) Turn the ignition switch to the "ON" position.
- (3) Check the following item in the data list. Refer to Data List Reference Table [P.13A-637](#).
 - a. Item 6: Engine Coolant Temperature Sensor.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the sensor operating properly?

YES : Refer to On-vehicle Service – Clean the throttle valve area [P.13A-660](#).

NO : Repair or replace it. Then confirm that the malfunction symptom is eliminated.

INSPECTION PROCEDURE 11: When the engine is cold, it stalls at idle (die out).

COMMENT

- In such cases as the above, the air/fuel mixture may be inappropriate when the engine is cold.

TROUBLESHOOTING HINTS (The most likely causes for this case:)

- Malfunction of the electronic control throttle valve system.

- Malfunction of the throttle body.
- Malfunction of the injector system.
- Malfunction of the ignition system.
- Refer to component locations [GROUP-70](#)
- Refer to configuration diagrams [GROUP-80](#)
- Refer to circuit diagrams [GROUP-90](#)

DIAGNOSIS

Required Special Tools:

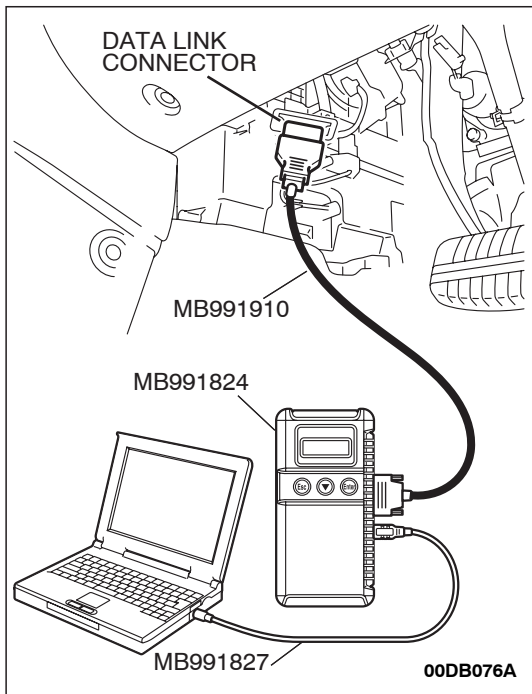
- Diagnostic tool(MUT-III Sub Assembly)
 - MB991824: V.C.I.
 - MB991827: USB Cable
 - MB991910: Main Harness A

STEP 1. Check if the battery terminal is disconnected.

Q: Has the battery terminal been disconnected lately?

YES : Start the engine and let it run at idle for approximate 10 minutes after engine warm up. Then, if a malfunction occurs, go to Step 2.

NO : Go to Step 2.



STEP 2. Using diagnostic tool, read the diagnostic trouble code (DTC).

⚠ CAUTION

To prevent damage to diagnostic tool, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting diagnostic tool.

- (1) Connect diagnostic tool to the data link connector.
- (2) Turn the ignition switch to the "ON" position.
- (3) Read the DTC.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Refer to Diagnostic Trouble Code Chart [P.13A-17](#).

NO : Go to Step 3.

STEP 3. Checking by operating the accelerator pedal.

Q: Does the engine stall right after the accelerator pedal is released?

YES : Refer to GROUP13B, On-vehicle Service – Throttle Body (Throttle Valve Area) Cleaning. [P.13A-660](#).

NO : Go to Step 4.

STEP 4. Check the engine idling.

Q: Is the idling good enough after warm up?

YES : Go to Step 5.

NO : Refer to INSPECTION PROCEDURE 8 – Unstable Idle (Rough Idle, Hunting) [P.13A-566](#).

STEP 5. Using diagnostic tool, check actuator test items 01, 02, 03, 04, 05, 06: Injector.

⚠ CAUTION

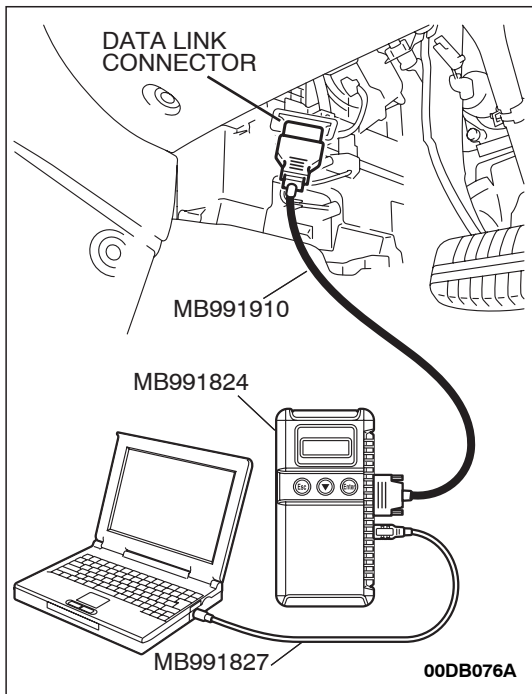
To prevent damage to diagnostic tool, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting diagnostic tool.

- (1) Connect diagnostic tool to the data link connector.
- (2) Turn the ignition switch to the "ON" position.
- (3) Check following items in the actuator test. Refer to Actuator Test Reference Table [P.13A-644](#).
 - a. Item 01, 02, 03, 04, 05, 06: Injector.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Are they operating properly?

YES : Go to Step 6.

NO : Refer to DTC P0201 [P.13A-272](#), P0202 [P.13A-280](#), P0203 [P.13A-287](#), DTC P0204 [P.13A-295](#), P0205 [P.13A-302](#), P0206 [P.13A-310](#) – Injector Circuit.



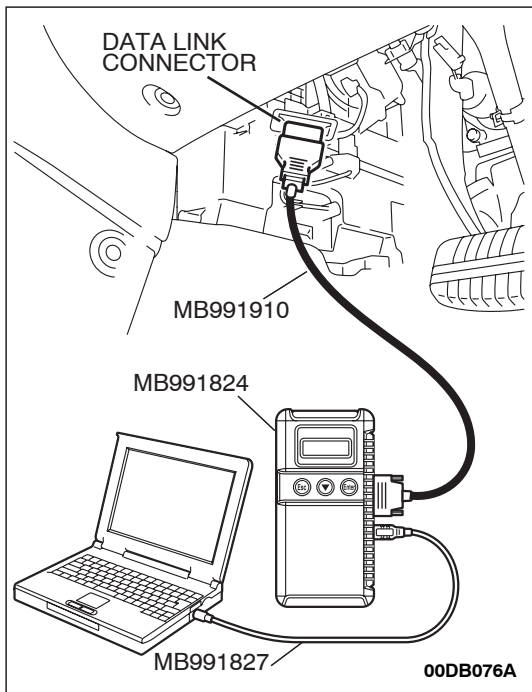
STEP 6. Using diagnostic tool, check data list.

- (1) Turn the ignition switch to the "ON" position.
- (2) Check the following items in the data list. Refer to Data List Reference Table [P.13A-637](#).
 - a. Item 06: Engine Coolant Temperature Sensor.
- (3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the sensor operating properly?

YES : Go to Step 7.

NO : Repair or replace it. Then confirm that the malfunction symptom is eliminated.



STEP 7. Check the fuel pressure.

Refer to On-vehicle Service – Fuel Pressure Test [P.13A-661](#).

Q: Is the fuel pressure normal?

YES : Go to Step 8.

NO : Repair or replace it. Then confirm that the malfunction symptom is eliminated.

STEP 8. Check the advance ignition timing.

Ignition timing is controlled by the ENGINE-ECU and will vary depending on engine requirement..

Q: Is the advance ignition timing normal?

YES : Check the following items, and repair or replace the defective items.

- Check the ignition coil and spark plugs.
- Check compression pressure.
- Check the engine oil viscosity.

Then confirm that the malfunction symptom is eliminated.

NO : Check that the crankshaft position sensor and timing belt cover are in the correct position. Then confirm that the malfunction symptom is eliminated.

INSPECTION PROCEDURE 12: When the Engine Is Hot, It Stalls at Idle (Die Out).

COMMENT

- In cases such as the above, the ignition system, air/fuel mixture, electronic control throttle valve system or compression pressure may be faulty. In addition, if the engine suddenly stalls, the cause may also be a connector damage.

- Malfunction of air/fuel ratio control system.
- Malfunction of the electronic control throttle valve system.
- Vacuum leak.
- Improper connector contact.
- Refer to component locations [GROUP-70](#)
- Refer to configuration diagrams [GROUP-80](#)
- Refer to circuit diagrams [GROUP-90](#)

TROUBLESHOOTING HINTS (The most likely causes for this case:)

- Malfunction of the ignition system.

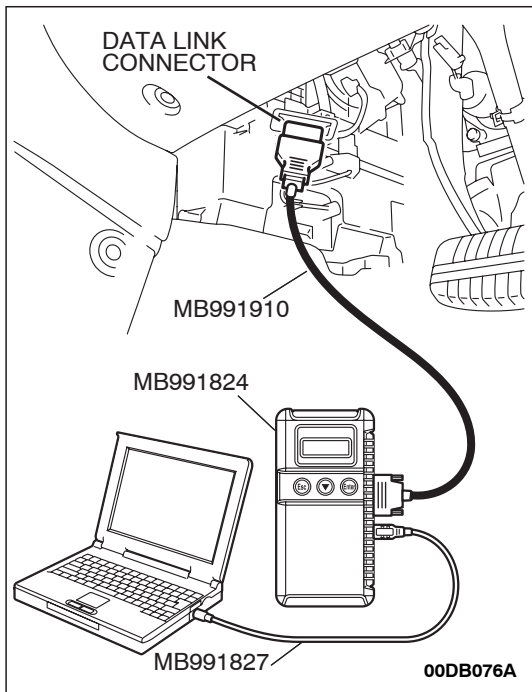
DIAGNOSIS**Required Special Tools:**

- Diagnostic tool(MUT-III Sub Assembly)
 - MB991824: V.C.I.
 - MB991827: USB Cable
 - MB991910: Main Harness A

STEP 1. Check if the battery terminal is disconnected.**Q: Has the battery terminal been disconnected lately?**

YES : Start the engine and let it run at idle for approximate 10 minutes after engine warm up. Then, if a malfunction occurs, go to step 2.

NO : Go to Step 2.



STEP 2. Using diagnostic tool, read the diagnostic trouble code (DTC).

⚠ CAUTION

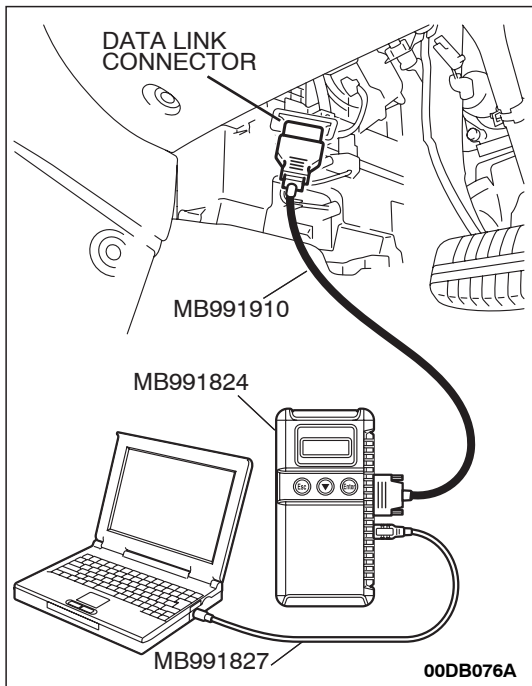
To prevent damage to diagnostic tool, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting diagnostic tool.

- (1) Connect diagnostic tool to the data link connector.
- (2) Turn the ignition switch to the "ON" position.
- (3) Read the DTC.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Refer to Diagnostic Trouble Code Chart [P.13A-17](#).

NO : Go to Step 3.



STEP 3. Using diagnostic tool, check actuator test items 01, 02, 03, 04, 05, 06: Injector.

⚠ CAUTION

To prevent damage to diagnostic tool, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting diagnostic tool.

- (1) Connect diagnostic tool to the data link connector.
- (2) Turn the ignition switch to the "ON" position.
- (3) Check following items in the actuator test. Refer to Actuator Test Reference Table [P.13A-644](#).
 - a. Item 01, 02, 03, 04, 05, 06: Injector.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Are they operating properly?

YES : Go to Step 4.

NO : Refer to DTC P0201 [P.13A-272](#), P0202 [P.13A-280](#), P0203 [P.13A-287](#), DTC P0204 [P.13A-295](#), P0205 [P.13A-302](#), P0206 [P.13A-310](#) – Injector Circuit.

STEP 4. Checking by depressing and releasing the accelerator pedal.

Q: Does the engine stall right after the accelerator pedal is released?

YES : Refer to On-vehicle Service – Throttle Body (Throttle Valve Area) Cleaning [P.13A-660](#).

NO : Go to Step 5.

STEP 5. Engine stall reproduction test.

Q: Is it easy to reproduce the engine stall?

YES : Go to Step 6.

NO : Check if the following signals change suddenly by wiggling the circuit harness and connectors.

- Crankshaft position sensor signal.
- Mass airflow sensor signal.
- Injector drive signal.
- Primary and secondary ignition signal.
- Fuel pump drive signal.
- ECU power supply voltage.

Repair or replace it. Then confirm that the malfunction symptom is eliminated.

STEP 6. Using diagnostic tool, check data list.

⚠ CAUTION

To prevent damage to diagnostic tool, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting diagnostic tool.

- Connect diagnostic tool to the data link connector.
- Turn the ignition switch to the "ON" position.
- Check the following items in the data list. Refer to Data List Reference Table [P.13A-637](#).

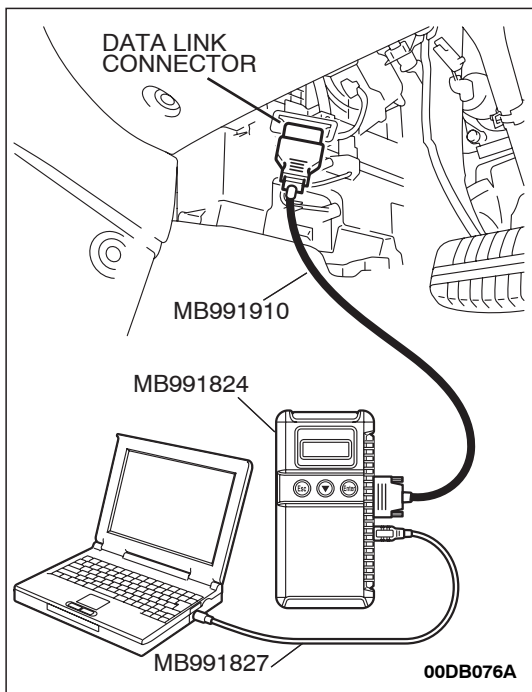
- Item 05: Intake Air Temperature Sensor.
- Item 06: Engine Coolant Temperature Sensor.
- Item AD: Right Bank Heated Oxygen Sensor (rear).
- Item AC: Right Bank Heated Oxygen Sensor (front).
- Item AF: Left Bank Heated Oxygen Sensor (rear).
- Item AE: Left Bank Heated Oxygen Sensor (front).
- Item 83: Power Steering Pressure Switch.
- Item 13: Throttle position sensor (main).

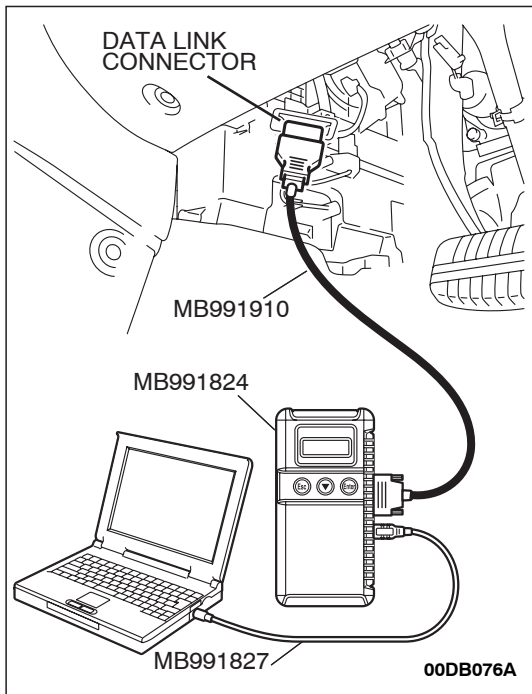
- Turn the ignition switch to the "LOCK" (OFF) position.

Q: Are they operating properly?

YES : Go to Step 7.

NO : Repair or replace it. Then confirm that the malfunction symptom is eliminated.





STEP 7. Using diagnostic tool, check data list.

- (1) Turn the ignition switch to the "ON" position.
- (2) Check the following items of the data list. Refer to Data List Reference Table [P.13A-637](#).
 - a. Item AC: Right Bank Heated Oxygen Sensor (front).
 - b. Item AE: Left Bank Heated Oxygen Sensor (front).
 - Fluctuates between 0 – 0.4 volt and 0.6 – 1.0 volt while idling after the engine has been warmed.
- (3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the sensor operating properly?

YES : Go to Step 9.

NO : Go to Step 8.

STEP 8. Check the fuel pressure.

Refer to On-vehicle Service – Fuel Pressure Test [P.13A-661](#).

Q: Is the fuel pressure normal?

YES : Check the following items, and repair or replace the defective items.

- a. Vacuum leak.
 - Broken intake manifold gasket.
 - Broken air intake hose.
 - Broken vacuum hose.
 - Positive crankcase ventilation valve does not operate.
- b. Injector clogged.

Then confirm that the malfunction symptom is eliminated.

NO : Repair or replace it. Then confirm that the malfunction symptom is eliminated.

STEP 9. Check the advance ignition timing.

Ignition timing is controlled by the ENGINE-ECU and will vary depending on engine requirement..

Q: Is the advance ignition timing normal?

YES : Check the following items, and repair or replace the defective items.

- a. Check the ignition coil and spark plugs.
- b. Check compression pressure.
- c. Check the engine oil viscosity.

Then confirm that the malfunction symptom is eliminated.

NO : Check that the crankshaft position sensor and timing belt cover are in the correct position. Then confirm that the malfunction symptom is eliminated.

INSPECTION PROCEDURE 13: The Engine Stalls when Accelerating (Pass Out).

COMMENT

- In case such as the above, the cause is probably misfiring due to a weak spark, or an inappropriate air/fuel mixture when the accelerator pedal is depressed.

TROUBLESHOOTING HINTS (The most likely causes for this case:)

- Vacuum leak.
- Malfunction of the ignition system.
- Malfunction of emission control system.
- Refer to component locations [GROUP-70](#)
- Refer to configuration diagrams [GROUP-80](#)
- Refer to circuit diagrams [GROUP-90](#)

DIAGNOSIS

Required Special Tools:

- Diagnostic tool(MUT-III Sub Assembly)
 - MB991824: V.C.I.
 - MB991827: USB Cable
 - MB991910: Main Harness A

STEP 1. Using diagnostic tool, read the diagnostic trouble code (DTC).

⚠ CAUTION

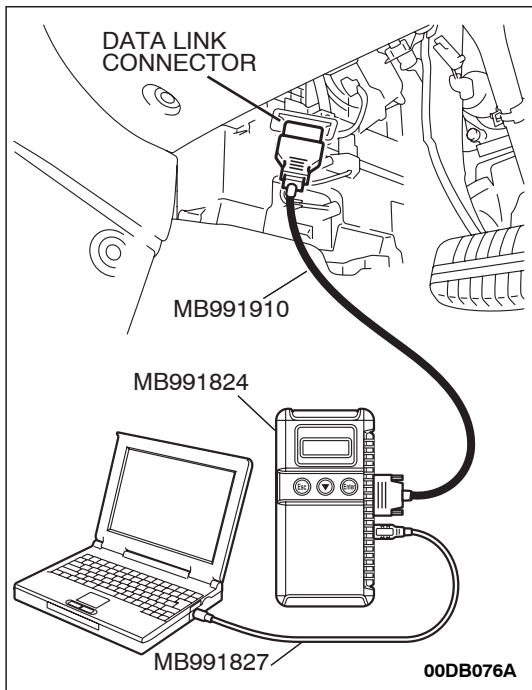
To prevent damage to diagnostic tool, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting diagnostic tool.

- (1) Connect diagnostic tool to the data link connector.
- (2) Turn the ignition switch to the "ON" position.
- (3) Read the DTC.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Refer to Diagnostic Trouble Code Chart [P.13A-17](#).

NO : Go to Step 2.



STEP 2. Using diagnostic tool, check actuator test.

- (1) Turn the ignition switch to the "ON" position.
- (2) Check the following item in the actuator test. Refer to Actuator Test Reference Table [P.13A-644](#).
 - a. Item 10: Evaporative Emission Purge Solenoid.
- (3) Turn the ignition switch to the "LOCK" (OFF) position.

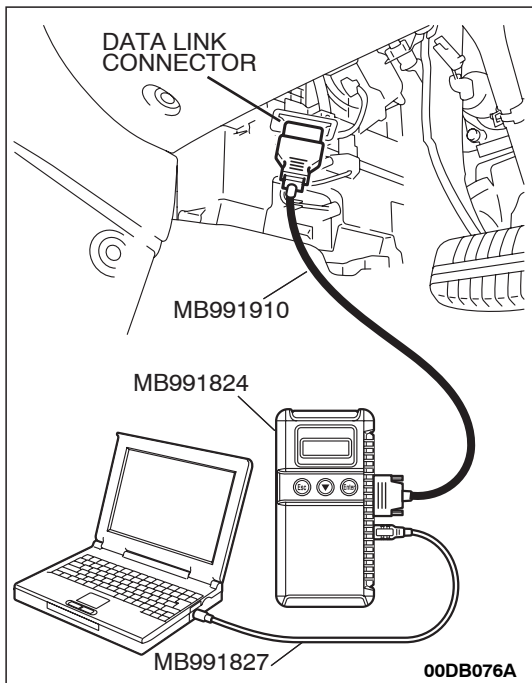
Q: Is the actuator operating properly?

YES : Check the following items, and repair or replace the defective items.

- a. Check the ignition coil, spark plugs.
- b. Check for vacuum leaks.
 - Broken intake manifold gasket.
 - Broken or disconnected vacuum hose.
 - Improper operation of the PCV valve.
 - Broken air intake hose.

Then confirm that the malfunction symptom is eliminated.

NO : Repair or replace it. Then confirm that the malfunction symptom is eliminated.



INSPECTION PROCEDURE 14: The engine stalls when decelerating.

COMMENT

- The intake air volume may be insufficient due to a defective the electronic control throttle valve system.

TROUBLESHOOTING HINTS (The most likely causes for this case:)

- Malfunction of the electronic control throttle valve system.
- Refer to component locations GROUP-70
- Refer to configuration diagrams GROUP-80
- Refer to circuit diagrams GROUP-90

DIAGNOSIS

Required Special Tools:

- Diagnostic tool(MUT-III Sub Assembly)
 - MB991824: V.C.I.
 - MB991827: USB Cable
 - MB991910: Main Harness A

STEP 1. Check if the battery terminal is disconnected.

Q: Has the battery terminal been disconnected lately?

YES : Start the engine and let it run at idle for approximate 10 minutes after engine warm up. Then if a malfunction occurs, go to step 2.

NO : Go to Step 2.

STEP 2. Using diagnostic tool, read the diagnostic trouble code (DTC).

⚠ CAUTION

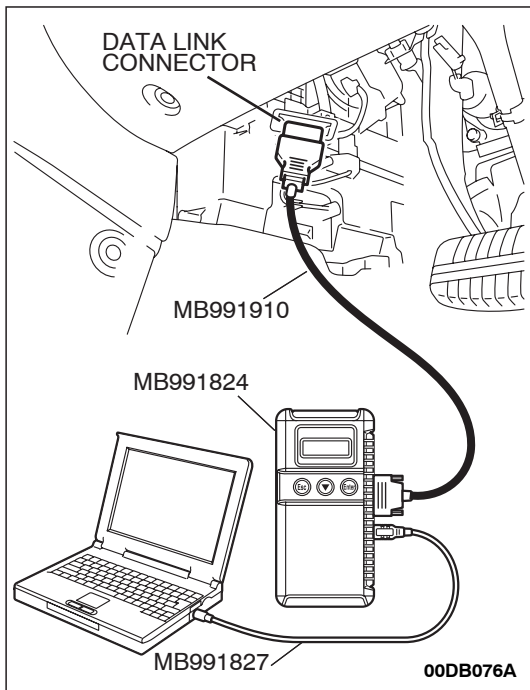
To prevent damage to diagnostic tool, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting diagnostic tool.

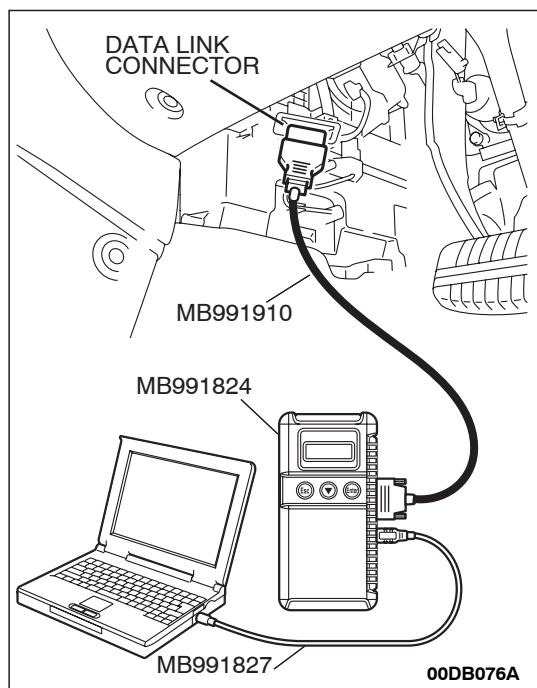
- (1) Connect diagnostic tool to the data link connector.
- (2) Turn the ignition switch to the "ON" position.
- (3) Read the DTC.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Refer to Diagnostic Trouble Code Chart [P.13A-17](#).

NO : Go to Step 3.





STEP 3. Using diagnostic tool, check data list.

- (1) Turn the ignition switch to the "ON" position.
- (2) Check the following items in the data list. Refer to Data List Reference Table [P.13A-637](#).
 - a. Item 13: Throttle Position Sensor (main).
 - b. Item 15: Throttle Position Sensor (sub).
 - c. Item 11: Accelerator Pedal Position Sensor (main).
 - d. Item 12: Accelerator Pedal Position Sensor (sub).
- (3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Are they operating properly?

YES : Go to Step 4.

NO : Repair or replace it. Then confirm that the malfunction symptom is eliminated.

STEP 4. Inspection of throttle body (throttle valve area) for dirtiness.

Q: Is the throttle valve area dirty?

YES : Refer to On-vehicle Service – Clean the throttle valve area [P.13A-660](#).

NO : Check the following items, and repair, replace or clean the defective sections.

- a. Check the ignition coil and spark plugs.

Then confirm that the malfunction symptom is eliminated.

INSPECTION PROCEDURE 15: Hesitation, sag or stumble.

COMMENT

- In cases such as the above, the ignition system, air/fuel mixture compression pressure may be defective.
- Malfunction of air/fuel ratio control system.
- Malfunction of the fuel supply system.
- Poor compression pressure.
- Refer to component locations [GROUP-70](#)
- Refer to configuration diagrams [GROUP-80](#)
- Refer to circuit diagrams [GROUP-90](#)

TROUBLESHOOTING HINTS (The most likely causes for this case:)

- Malfunction of the ignition system.

DIAGNOSIS

Required Special Tools:

- Diagnostic tool(MUT-III Sub Assembly)
 - MB991824: V.C.I.
 - MB991827: USB Cable
 - MB991910: Main Harness A

STEP 1. Using diagnostic tool, read the diagnostic trouble code (DTC).

CAUTION

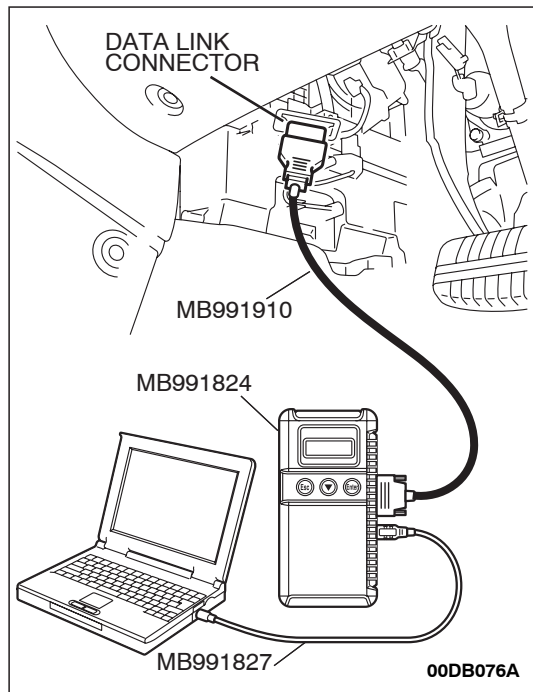
To prevent damage to diagnostic tool, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting diagnostic tool.

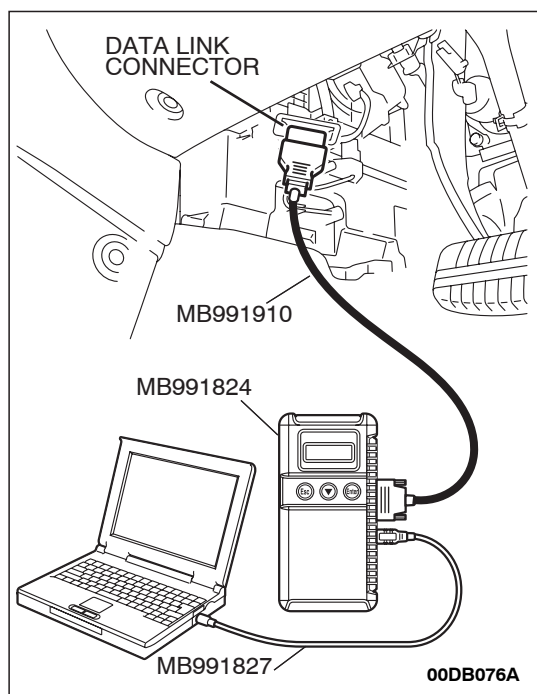
- (1) Connect diagnostic tool to the data link connector.
- (2) Turn the ignition switch to the "ON" position.
- (3) Read the DTC.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Refer to Diagnostic Trouble Code Chart [P.13A-17](#).

NO : Go to Step 2.





STEP 2. Using diagnostic tool, check actuator test items 01, 02, 03, 04, 05, 06: Injector.

(1) Check following items in the actuator test. Refer to Actuator Test Reference Table [P.13A-644](#).

a. Item 01, 02, 03, 04, 05, 06: Injector.

(2) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Are thy operating properly?

YES : Go to Step 3.

NO : Refer to DTC P0201[P.13A-272](#), P0202[P.13A-280](#), P0203[P.13A-287](#), DTC P0204[P.13A-295](#), P0205[P.13A-302](#), P0206[P.13A-310](#) – Injector Circuit.

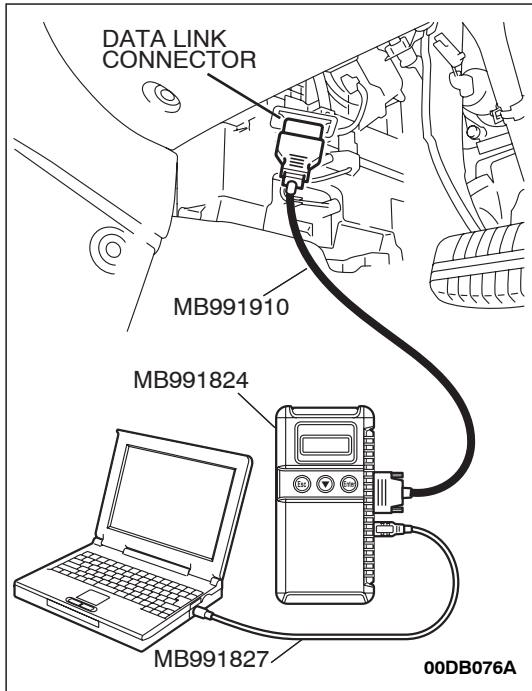
STEP 3. Check the advance ignition timing.

Ignition timing is controlled by the ENGIN-ECU and will vary depending on engine requirement..

Q: Is the advance ignition timing normal?

YES : Got to Step 4.

NO : Check that the crankshaft position sensor and timing belt cover are in the correct position. Then confirm that the malfunction symptom is eliminated.



STEP 4. Using diagnostic tool, check data list and actuator test.

⚠ CAUTION

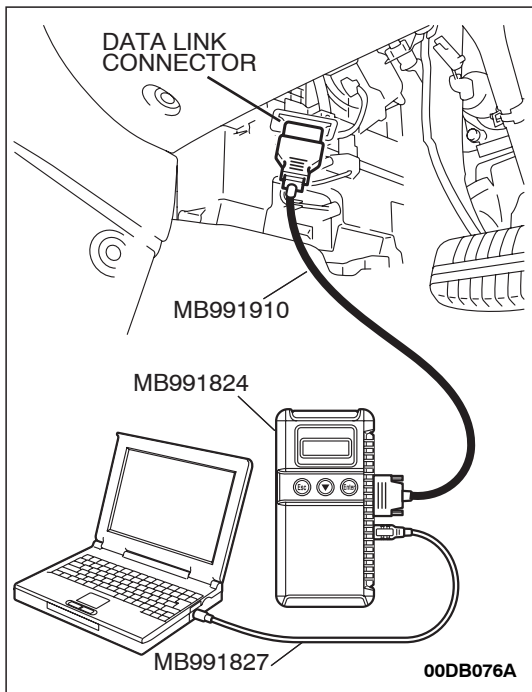
To prevent damage to diagnostic tool, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting diagnostic tool.

- (1) Connect diagnostic tool to the data link connector.
- (2) Turn the ignition switch to the "ON" position.
- (3) Check the following items in the data list. Refer to Data List Reference Table [P.13A-637](#).
 - a. Item 05: Intake Air Temperature Sensor.
 - b. Item 06: Engine Coolant Temperature Sensor.
 - c. Item AD: Right Bank Heated Oxygen Sensor (rear).
 - d. Item AC: Right Bank Heated Oxygen Sensor (front).
 - e. Item AF: Left Bank Heated Oxygen Sensor (rear).
 - f. Item AE: Left Bank Heated Oxygen Sensor (front).
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Are they operating properly?

YES : Go to Step 5.

NO : Repair or replace it. Then confirm that the malfunction symptom is eliminated.



STEP 5. Using diagnostic tool, check data list.

- (1) Turn the ignition switch to the "ON" position.
- (2) Check the following items of data list. Refer to Data List Reference Table [P.13A-637](#).
 - a. Item AC: Right Bank Heated Oxygen Sensor (front).
 - b. Item AE: Left Bank Heated Oxygen Sensor (front).
 - Voltage should fluctuate between 0 – 0.4 volt and 0.6 – 1.0 volt while idling after the engine has warmed-up.
- (3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the sensor operating properly?

YES : Go to Step 7.

NO : Go to Step 6.

STEP 6. Check the fuel pressure.

Refer to On-vehicle Service – Fuel Pressure Test [P.13A-661](#).

Q: Is the fuel pressure normal?

YES : Check the following items, and repair or replace the defective items.

a. Vacuum leak.

- Broken intake manifold gasket.
- Broken air intake hose.
- Broken vacuum hose.
- Positive crankcase ventilation valve does not operate.

b. Injector clogged.

Then confirm that the malfunction symptom is eliminated.

NO : Repair or replace it. Then confirm that the malfunction symptom is eliminated.

STEP 7. Check the fuel pressure.

Refer to On-vehicle Service – Fuel Pressure Test [P.13A-661](#).

Q: Is the fuel pressure normal?

YES : Check the following items, and repair or replace the defective items.

a. Check the ignition coil and spark plugs.

b. Check compression pressure.

c. Check the fuel filter or fuel line for clogging.

Then confirm that the malfunction symptom is eliminated.

NO : Repair or replace it. Then confirm that the malfunction symptom is eliminated.

INSPECTION PROCEDURE 16: Acceleration shock.

COMMENT

- There may be an ignition leak accompanying the increase in the spark plug demand voltage during acceleration or the electronic control throttle valve system failed.

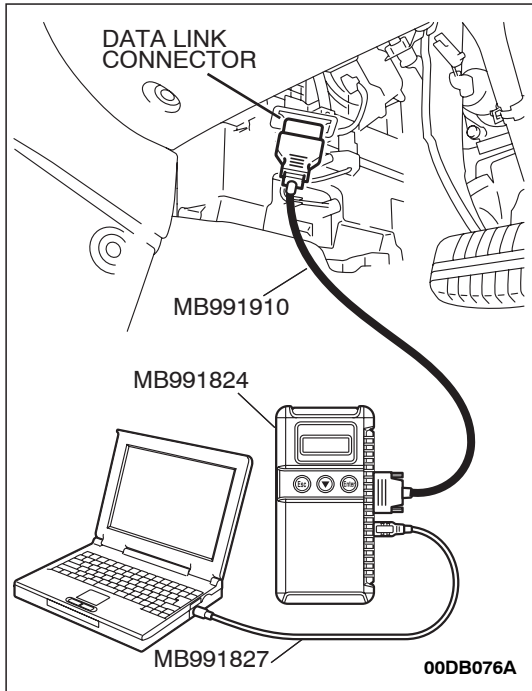
TROUBLESHOOTING HINTS (The most likely causes for this case:)

- Malfunction of the ignition system.
- Malfunction of the electronic control throttle valve system.
- Refer to component locations [GROUP-70](#)
- Refer to configuration diagrams [GROUP-80](#)
- Refer to circuit diagrams [GROUP-90](#)

DIAGNOSIS

Required Special Tools:

- Diagnostic tool(MUT-III Sub Assembly)
 - MB991824: V.C.I.
 - MB991827: USB Cable
 - MB991910: Main Harness A



STEP 1. Using diagnostic tool, read the diagnostic trouble code (DTC).

⚠ CAUTION

To prevent damage to diagnostic tool, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting diagnostic tool.

- (1) Connect diagnostic tool to the data link connector.
- (2) Turn the ignition switch to the "ON" position.
- (3) Read the DTC.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is The DTC set?

YES : Refer to Diagnostic Trouble Code Chart [P.13A-17](#).

NO : Check the following items, and repair or replace the defective items.

- a. Check the ignition coil and spark plugs.
- b. Check for occurrence of ignition leak.

Then confirm that the malfunction symptom is eliminated.

INSPECTION PROCEDURE 17: Deceleration Shock

COMMENT

- There may be a sudden change in air flow through the throttle valve, causing the vehicle to decelerate rapidly for an instant.

TROUBLESHOOTING HINTS (The most likely causes for this case:)

- Malfunction of the electronic control throttle valve system.
- Dirtiness around throttle valve.
- Refer to component locations [GROUP-70](#)
- Refer to configuration diagrams [GROUP-80](#)
- Refer to circuit diagrams [GROUP-90](#)

DIAGNOSIS

Required Special Tools:

- Diagnostic tool(MUT-III Sub Assembly)
 - MB991824: V.C.I.
 - MB991827: USB Cable
 - MB991910: Main Harness A

STEP 1. Using diagnostic tool, read the diagnostic trouble code (DTC).

⚠ CAUTION

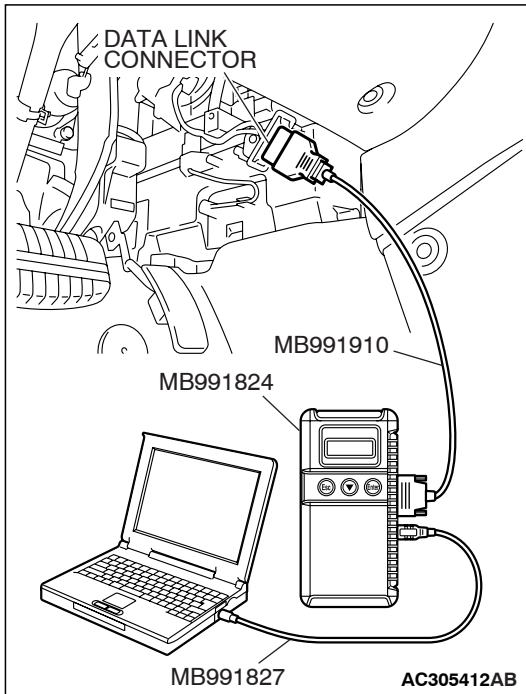
To prevent damage to diagnostic tool, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting diagnostic tool.

- (1) Connect diagnostic tool to the data link connector.
- (2) Turn the ignition switch to the "ON" position.
- (3) Read the DTC.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Refer to Diagnostic Trouble Code Chart [P.13A-17](#).

NO : Refer to On-vehicle Service – Throttle Body (Throttle Valve Area) Cleaning [P.13A-660](#)



INSPECTION PROCEDURE 18: Poor acceleration.

COMMENT

- Defective ignition system, abnormal air/fuel ratio, the electronic control throttle valve system, poor compression pressure, etc. are suspected.

TROUBLESHOOTING HINTS (The most likely causes for this case:)

- Malfunction of the ignition system.

- Malfunction of air/fuel ratio control system.
- Malfunction of the electronic control throttle valve system.
- Malfunction of the fuel supply system.
- Poor compression pressure.
- Clogged exhaust system.
- Refer to component locations [GROUP-70](#)
- Refer to configuration diagrams [GROUP-80](#)
- Refer to circuit diagrams [GROUP-90](#)

DIAGNOSIS

Required Special Tools:

- Diagnostic tool(MUT-III Sub Assembly)
 - MB991824: V.C.I.
 - MB991827: USB Cable
 - MB991910: Main Harness A

STEP 1. Using diagnostic tool, read the diagnostic trouble code (DTC).

⚠ CAUTION

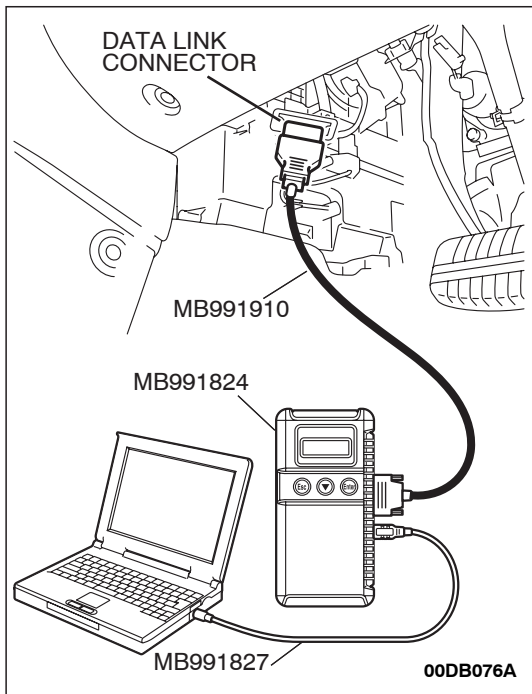
To prevent damage to diagnostic tool, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting diagnostic tool.

- (1) Connect diagnostic tool to the data link connector.
- (2) Turn the ignition switch to the "ON" position.
- (3) Read the DTC.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Refer to Diagnostic Trouble Code Chart [P.13A-17](#).

NO : Go to Step 2.



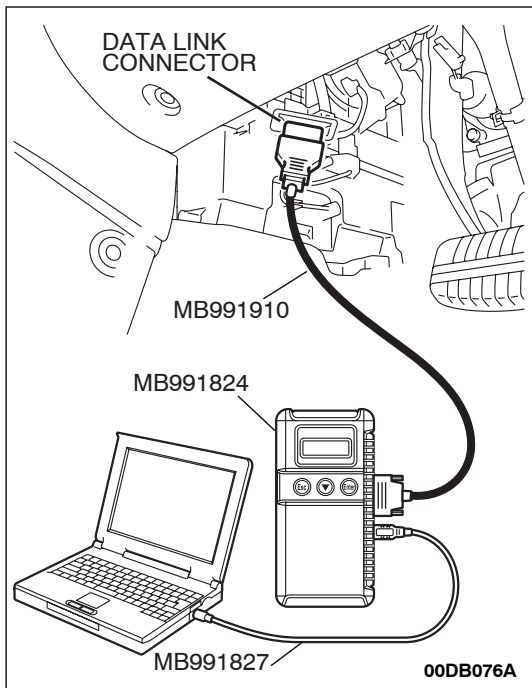
STEP 2. Using diagnostic tool, check actuator test items 01, 02, 03, 04, 05, 06: Injector.

- (1) Turn the ignition switch to the "ON" position.
- (2) Check following items in the actuator test. Refer to Actuator Test Table [P.13A-644](#).
 - a. Item 01, 02, 03, 04, 05, 06: Injector.
- (3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Are they operating properly?

YES : Go to Step 3.

NO : Refer to DTC P0201 [P.13A-272](#), P0202 [P.13A-280](#), P0203 [P.13A-287](#), DTC P0204 [P.13A-295](#), P0205 [P.13A-302](#), P0206 [P.13A-310](#) – Injector Circuit.



STEP 3. Check the advance ignition timing.

Ignition timing is controlled by the ENGIN-ECU and will vary depending on engine requirement..

Q: Is the advance ignition timing normal?

YES : Go to Step 4.

NO : Check that the crankshaft position sensor and timing belt cover are in the correct position. Then confirm that the malfunction symptom is eliminated.

STEP 4. Using diagnostic tool, check data list.

⚠ CAUTION

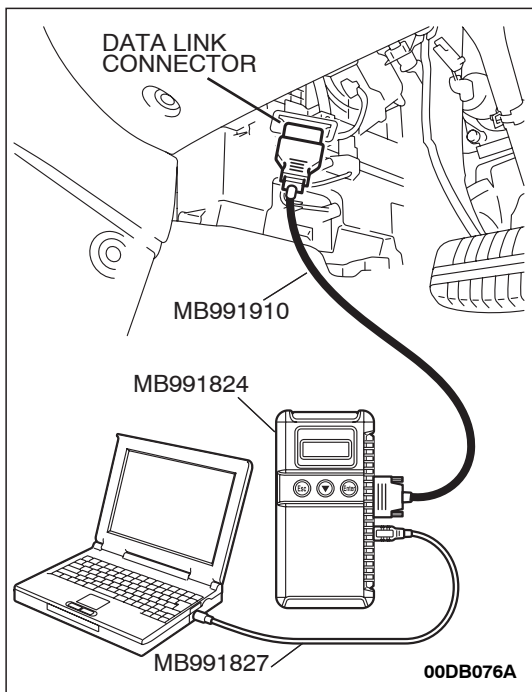
To prevent damage to diagnostic tool, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting diagnostic tool.

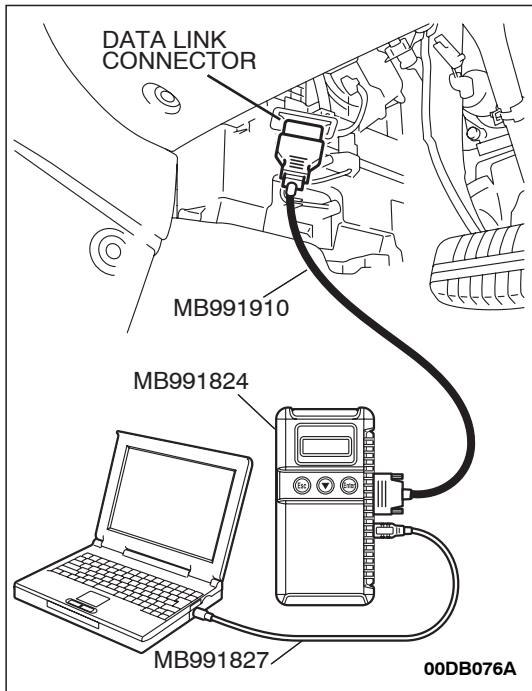
- (1) Connect diagnostic tool to the data link connector.
- (2) Turn the ignition switch to the "ON" position.
- (3) Check the following items in the data list. Refer to Data List Reference Table [P.13A-637](#).
 - a. Item 5: Intake Air Temperature Sensor.
 - b. Item 6: Engine Coolant Temperature Sensor.
 - c. Item AD: Right Bank Heated Oxygen Sensor (rear).
 - d. Item AC: Right Bank Heated Oxygen Sensor (front).
 - e. Item AF: Left Bank Heated Oxygen Sensor (rear).
 - f. Item AE: Left Bank Heated Oxygen Sensor (front).
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Are they operating properly?

YES : Go to Step 5.

NO : Repair or replace it. Then confirm that the malfunction symptom is eliminated.





STEP 5. Using diagnostic tool, check data list.

- (1) Turn the ignition switch to the "ON" position.
- (2) Check the following items of data list. Refer to Data List Reference Table [P.13A-637](#).
 - a. Item AC: Right Bank Heated Oxygen Sensor (front).
 - b. Item AE: Left Bank Heated Oxygen Sensor (front).
 - Voltage should fluctuate between 0 – 0.4 volt and 0.6 – 1.0 volt while idling after the engine has been warmed.
- (3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Are they operating properly?

YES : Go to Step 7.

NO : Go to Step 6.

STEP 6. Check the fuel pressure.

Refer to On-vehicle Service – Fuel Pressure Test [P.13A-661](#).

Q: Is the fuel pressure normal?

YES : Check the following items, and repair or replace the defective items.

- a. Vacuum leak.
 - Broken intake manifold gasket.
 - Broken air intake hose.
 - Broken vacuum hose.
 - Positive crankcase ventilation valve does not operate.
- b. Injector clogged.

Then confirm that the malfunction symptom is eliminated.

NO : Repair or replace it. Then confirm that the malfunction symptom is eliminated.

STEP 7. Check the fuel pressure.

Refer to On-vehicle Service – Fuel Pressure Test [P.13A-661](#).

Q: Is the fuel pressure normal?

YES : Check the following items, and repair or replace the defective items.

- a. Check the ignition coil and spark plugs.
- b. Check compression pressure.
- c. Check the fuel filter or fuel line for clogging.
- d. Broken air intake hose.
- e. Clogged air cleaner.
- f. Clogged exhaust system.

Then confirm that the malfunction symptom is eliminated.

NO : Repair or replace it. Then confirm that the malfunction symptom is eliminated.

INSPECTION PROCEDURE 19: Surge.

COMMENT

- Defective ignition system, abnormal air/fuel ratio, the electronic control throttle valve system failed, etc. are suspected.

- Malfunction of air/fuel ratio control system.
- Malfunction of the electronic control throttle valve system.
- Refer to component locations [GROUP-70](#)
- Refer to configuration diagrams [GROUP-80](#)
- Refer to circuit diagrams [GROUP-90](#)

TROUBLESHOOTING HINTS (The most likely causes for this case:)

- Malfunction of the ignition system.

DIAGNOSIS

Required Special Tools:

- Diagnostic tool(MUT-III Sub Assembly)
 - MB991824: V.C.I.
 - MB991827: USB Cable
 - MB991910: Main Harness A

STEP 1. Using diagnostic tool, read the diagnostic trouble code (DTC).

⚠ CAUTION

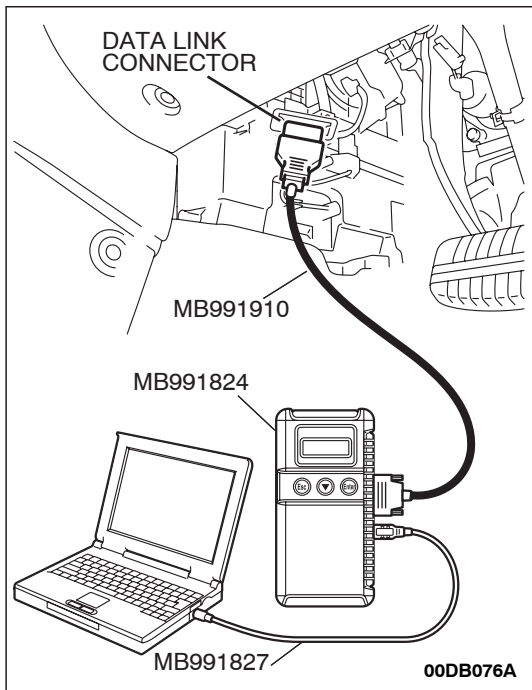
To prevent damage to diagnostic tool, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting diagnostic tool.

- (1) Connect diagnostic tool to the data link connector.
- (2) Turn the ignition switch to the "ON" position.
- (3) Read the DTC.
- (4) Turn the ignition switch to the "ON" position.

Q: Is the DTC set?

YES : Refer to Diagnostic Trouble Code Chart [P.13A-17](#).

NO : Go to Step 2.



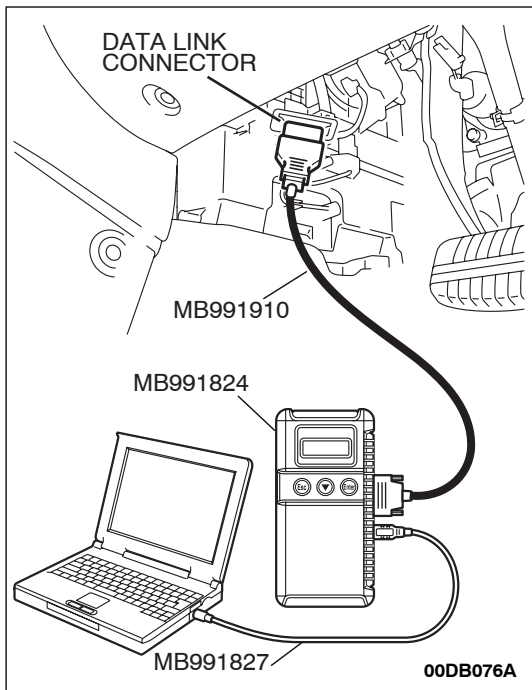
STEP 2. Using diagnostic tool, check actuator test items 01, 02, 03, 04, 05, 06: Injector.

- (1) Turn the ignition switch to the "ON" position.
- (2) Check following items in the actuator test. Refer to Actuator Test Reference Table [P.13A-644](#).
 - a. Item 01, 02, 03, 04, 05, 06: Injector.
- (3) Turn the ignition switch to the "ON" position.

Q: Are they operating properly?

YES : Go to Step 3.

NO : Refer to DTC P0201 [P.13A-272](#), P0202 [P.13A-280](#), P0203 [P.13A-287](#), DTC P0204 [P.13A-295](#), P0205 [P.13A-302](#), P0206 [P.13A-310](#) – Injector Circuit.



STEP 3. Check the advance ignition timing.

Ignition timing is controlled by the ENGIN-ECU and will vary depending on engine requirement..

Q: Is the advance ignition timing normal?

YES : Go to Step 4.

NO : Check that the crankshaft position sensor and timing belt cover are in the correct position. Then confirm that the malfunction symptom is eliminated.

STEP 4. Using diagnostic tool, check data list.

⚠ CAUTION

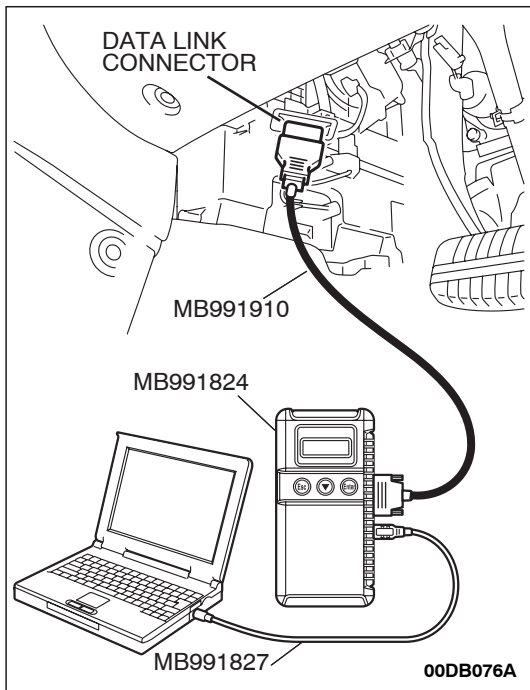
To prevent damage to diagnostic tool, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting diagnostic tool.

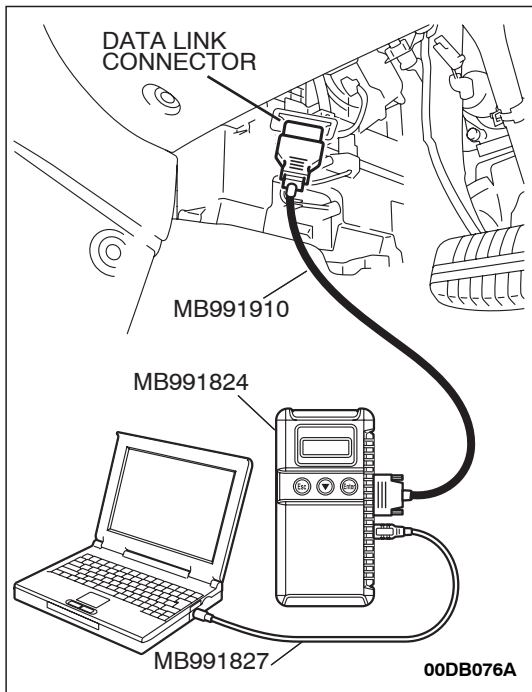
- (1) Connect diagnostic tool to the data link connector.
- (2) Turn the ignition switch to the "ON" position.
- (3) Check the following items in the data list. Refer to Data List Reference Table [P.13A-637](#).
 - a. Item 05: Intake Air Temperature Sensor.
 - b. Item 06: Engine Coolant Temperature Sensor.
 - c. Item AD: Right Bank Heated Oxygen Sensor (rear).
 - d. Item AC: Right Bank Heated Oxygen Sensor (front).
 - e. Item AF: Left Bank Heated Oxygen Sensor (rear).
 - f. Item AE: Left Bank Heated Oxygen Sensor (front).
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Are they operating properly?

YES : Go to Step 5.

NO : Repair or replace it. Then confirm that the malfunction symptom is eliminated.





STEP 5. Using diagnostic tool, check data list.

- (1) Turn the ignition switch to the "ON" position.
- (2) Check the following items of data list. Refer to Data List Reference Table [P.13A-637](#).
 - a. Item AC: Right Bank Heated Oxygen Sensor (front).
 - b. Item AE: Left Bank Heated Oxygen Sensor (front).
 - Voltage should fluctuate between 0 – 0.4 volt and 0.6 – 1.0 volt while idling after the engine has been warmed.
- (3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Are they operating properly?

YES : Go to Step 7.

NO : Go to Step 6.

STEP 6. Check the fuel pressure.

Refer to On-vehicle Service – Fuel Pressure Test [P.13A-661](#).

Q: Is the fuel pressure normal?

YES : Check the following items, and repair or replace the defective items.

- a. Vacuum leak.
 - Broken intake manifold gasket.
 - Broken air intake hose.
 - Broken vacuum hose.
 - Positive crankcase ventilation valve does not operate.
- b. Injector clogged.

Then confirm that the malfunction symptom is eliminated.

NO : Repair or replace it. Then confirm that the malfunction symptom is eliminated.

STEP 7. Check the fuel pressure.

Refer to On-vehicle Service – Fuel Pressure Test [P.13A-661](#).

Q: Is the fuel pressure normal?

YES : Check the following items, and repair or replace the defective items.

- a. Check the ignition coil and spark plugs.
- Then confirm that the malfunction symptom is eliminated.

NO : Repair or replace it. Then confirm that the malfunction symptom is eliminated.

INSPECTION PROCEDURE 20: Knocking

COMMENT

- In case such as the above, the cause is probably that the detonation control is defective or the heat value of the spark plug is inappropriate.

TROUBLESHOOTING HINTS (The most likely causes for this case:)

- Defective knock sensor.
- Incorrect heat value of the spark plug.
- Refer to component locations GROUP-70
- Refer to configuration diagrams GROUP-80
- Refer to circuit diagrams GROUP-90

DIAGNOSIS

Required Special Tools:

- Diagnostic tool(MUT-III Sub Assembly)
 - MB991824: V.C.I.
 - MB991827: USB Cable
 - MB991910: Main Harness A

STEP 1. Using the diagnostic tool, read the diagnostic trouble code (DTC).

CAUTION

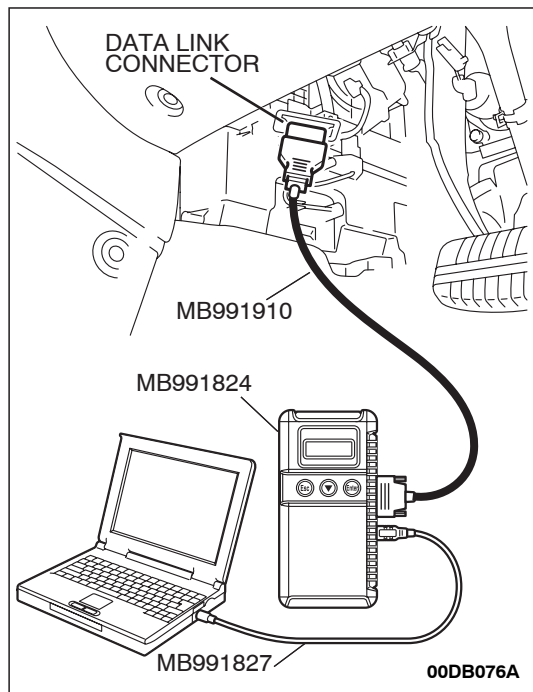
To prevent damage to diagnostic tool, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting diagnostic tool.

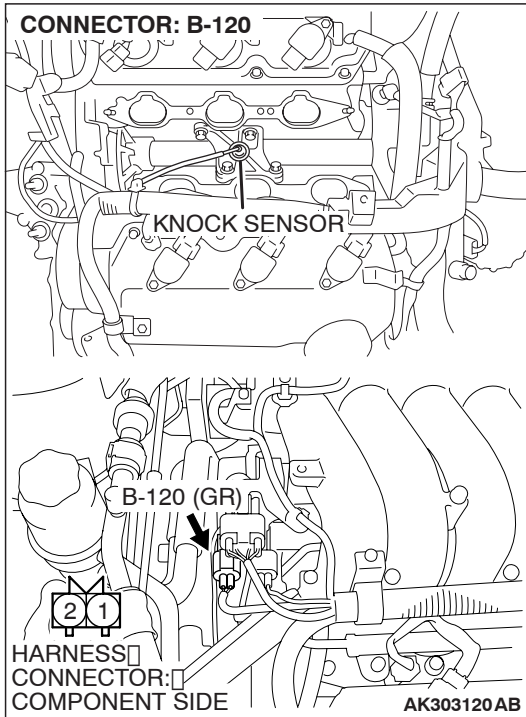
- (1) Connect diagnostic tool to the data link connector.
- (2) Turn the ignition switch to the "ON" position.
- (3) Read the DTC.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Refer to Diagnostic Trouble Code Chart P.13A-17.

NO : Go to Step 2.





STEP 2. Check Data list, Item No. 16 advance ignition timing.

- (1) The advance ignition timing should retard more when knock sensor connector B-120 is disconnected than when it is connected.

Q: When the knock sensor connector B-120 was disconnected, was the advance ignition timing delayed?

YES : Check the following items, and repair or replace the defective items.

- Check the spark plugs.
- Fuel quality, octane level.
- Check if the foreign materials (water, kerosene, etc.) got into fuel.

Then confirm that the malfunction symptom is eliminated.

NO : Refer to DTC P0325 – Knock Sensor Circuit
[P.13A-346.](#)

INSPECTION PROCEDURE 21: Dieseling (Run-on).

COMMENT

- Fuel leakage from injectors is suspected, or carbon build up.

TROUBLESHOOTING HINTS (The most likely causes for this case:)

- Fuel leakage from injectors.

DIAGNOSIS

Replace the leaking injector. Then confirm that the malfunction symptom is eliminated.

INSPECTION PROCEDURE 22: Too high CO and HC concentration when idling

COMMENT

- Abnormal air/fuel ratio is suspected.
- Deteriorated catalyst.
- Refer to component locations GROUP-70
- Refer to configuration diagrams GROUP-80
- Refer to circuit diagrams GROUP-90

TROUBLESHOOTING HINTS (The most likely causes for this case:)

- Malfunction of air/fuel ratio control system.

DIAGNOSIS

Required Special Tools:

- Diagnostic tool(MUT-III Sub Assembly)
 - MB991824: V.C.I.
 - MB991827: USB Cable
 - MB991910: Main Harness A

STEP 1. Using diagnostic tool, read the diagnostic trouble code (DTC).

CAUTION

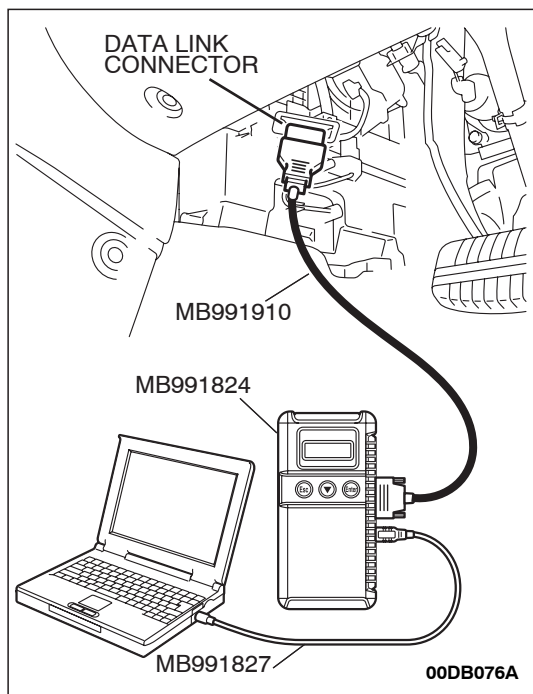
To prevent damage to diagnostic tool, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting diagnostic tool.

- Connect diagnostic tool to the data link connector.
- Turn the ignition switch to the "ON" position.
- Read the DTC.
- Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Refer to Diagnostic Trouble Code Chart P.13A-17.

NO : Go to Step 2.



STEP 2. Check the advance ignition timing.

Ignition timing is controlled by the ENGIN-ECU and will vary depending on engine requirement..

Q: Is the advance ignition timing normal?

YES : Go to Step 3.

NO : Check that the crankshaft position sensor and timing belt cover are in the correct position. Then confirm that the malfunction symptom is eliminated.

STEP 3. Using diagnostic tool, check data list.

⚠ CAUTION

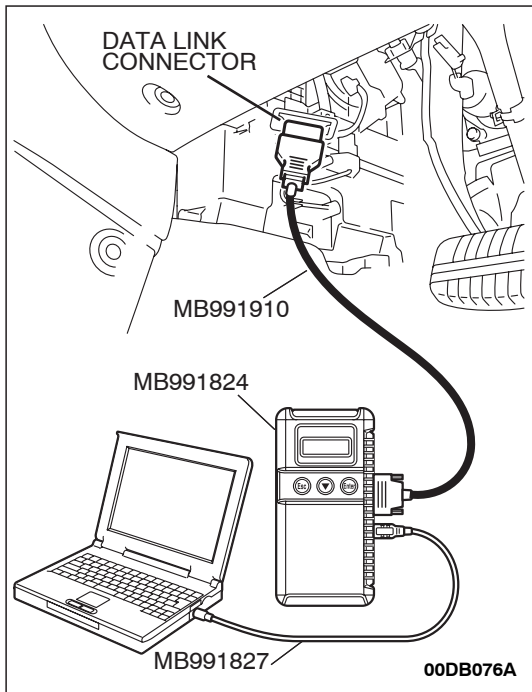
To prevent damage to diagnostic tool, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting diagnostic tool.

- (1) Connect diagnostic tool to the data link connector.
- (2) Turn the ignition switch to the "ON" position.
- (3) Check the following items in the data list. Refer to Data List Reference Table [P.13A-637](#).
 - a. Item 5: Engine Coolant Temperature Sensor.
 - b. Item 6: Intake Air Temperature Sensor.
 - c. Item AD: Right Bank Heated Oxygen Sensor (rear).
 - d. Item AC: Right Bank Heated Oxygen Sensor (front).
 - e. Item AF: Left Bank Heated Oxygen Sensor (rear).
 - f. Item AE: Left Bank Heated Oxygen Sensor (front).
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Are they operating properly?

YES : Go to Step 4.

NO : Repair or replace it. Then confirm that the malfunction symptom is eliminated.



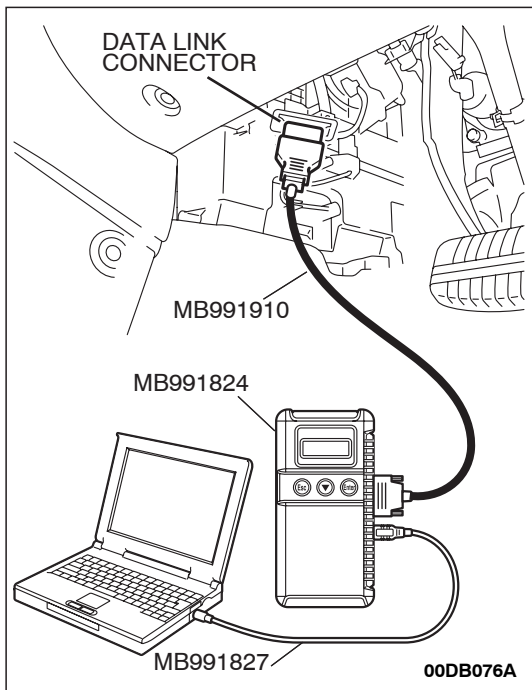
STEP 4. Using diagnostic tool, check data list.

- (1) Turn the ignition switch to the "ON" position.
- (2) Check the following items of the data list. Refer to Data List Reference Table [P.13A-637](#).
 - a. Item AC: Right Bank Heated Oxygen Sensor (front).
 - b. Item AE: Left Bank Heated Oxygen Sensor (front).
 - Voltage should fluctuate between 0 – 0.4 volt and 0.6 – 1.0 volt while idling after the engine has been warmed.
- (3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Are they operating properly?

YES : Replace the heated oxygen sensor (front). Then confirm that the malfunction symptom is eliminated. If not resolved, go to step 6.

NO : Go to Step 5.



STEP 5. Check the fuel pressure.

Refer to On-vehicle Service – Fuel Pressure Test [P.13A-661](#).

Q: Is the fuel pressure normal?

YES : Go to Step 6.

NO : Repair or replace it. Then confirm that the malfunction symptom is eliminated.

STEP 6. Check the following items.

(1) Check the following items, and repair or replace the defective items.

- a. Check the injectors for fuel leakage.
- b. Check the ignition coil and spark plugs.
- c. Check compression pressure.
- d. Check the positive crank case ventilation system.
- e. Check the evaporative emission system.

(2) Then check the malfunction symptom.

Q: Is the malfunction symptom eliminated?

YES : The check is completed.

NO : Replace the catalytic converter. Then confirm that the malfunction symptom is eliminated.

INSPECTION PROCEDURE 23: Purge Flow Test of the Evaporative Emission Canister Failure.

COMMENT

- The test fails when the purge line or purge port is clogged or if the evaporative emission purge solenoid fails.

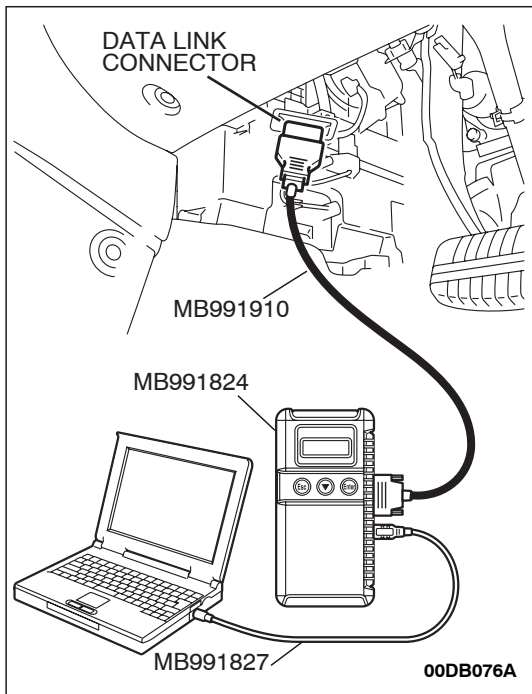
TROUBLESHOOTING HINTS (The most likely causes for this case:)

- Malfunction of the evaporative emission purge solenoid.
- Evaporative emission canister is clogged.
- Refer to component locations [GROUP-70](#)
- Refer to configuration diagrams [GROUP-80](#)
- Refer to circuit diagrams [GROUP-90](#)
- Purge line or purge port is clogged.

DIAGNOSIS

Required Special Tools:

- Diagnostic tool(MUT-III Sub Assembly)
 - MB991824: V.C.I.
 - MB991827: USB Cable
 - MB991910: Main Harness A



STEP 1. Using diagnostic tool, read the diagnostic trouble code (DTC).

⚠ CAUTION

To prevent damage to diagnostic tool, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting diagnostic tool.

- (1) Connect diagnostic tool to the data link connector.
- (2) Turn the ignition switch to the "ON" position.
- (3) Read the DTC.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Refer to Diagnostic Trouble Code Chart [P.13A-17](#).

NO : Refer to GROUP 17, Emission Control System – Purge Control System Check (Purge Flow Check) [P.17-82](#).

INSPECTION PROCEDURE 24: Power supply system and ignition switch - IG system.

CIRCUIT OPERATION

- Battery positive voltage is applied to the MPI relay (terminals No. 1, No. 2).
- When the ignition switch is turned to the "ON" position, the battery positive voltage is applied to the ECU (terminal No. 43). When the battery positive voltage is applied, the ECU turns the power transistor in the ECU "ON" and grounds the MPI relay coil. With this, the MPI relay turns "ON" and the battery positive voltage is supplied to the ECU (terminals No. 51, No. 64) from the MPI relay (terminal No. 4).
- A battery positive voltage is constantly supplied to the ECU (terminal No. 42) as the backup power.

- The ECU (terminals No. 25, No. 29) is grounded to the vehicle body.

TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)

- Malfunction of the ignition switch.
- Malfunction of the MPI relay.
- Improper connector contact, open circuit or short-circuit harness wire.
- Disconnected ECU ground wire.
- Malfunction of the ECU.
- Refer to component locations GROUP-70
- Refer to configuration diagrams GROUP-80
- Refer to circuit diagrams GROUP-90

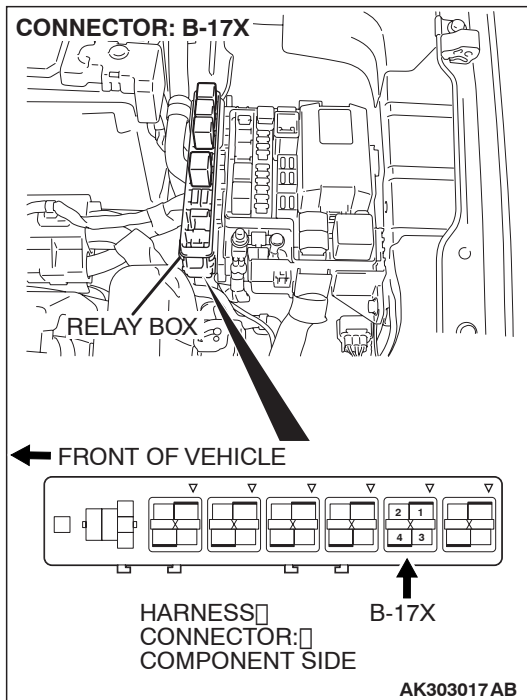
DIAGNOSIS

STEP 1. Check harness connector B-17X at MPI relay for damage.

Q: Is the connector in good condition?

YES : Go to Step 2.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then confirm that the malfunction symptom is eliminated.

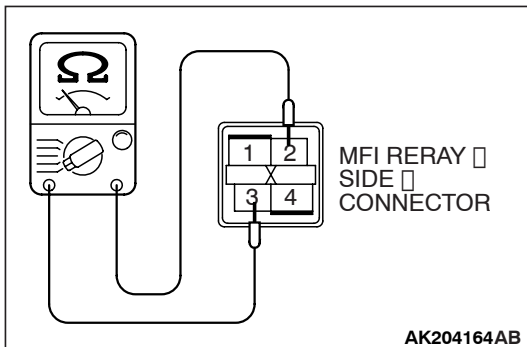
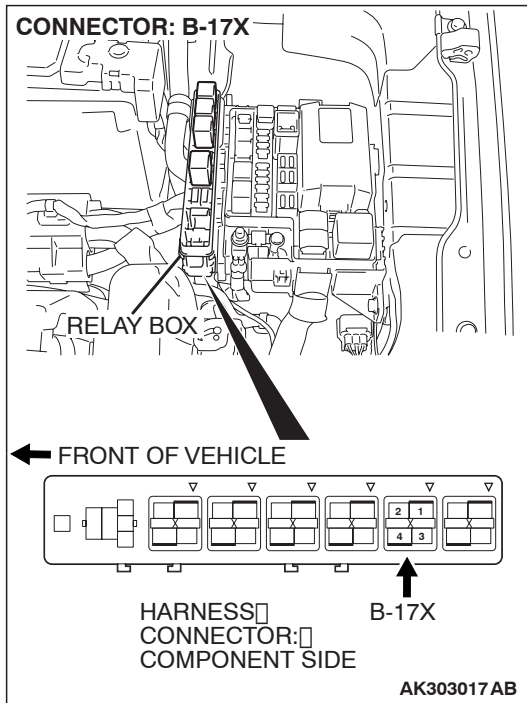


STEP 2. Check the MPI relay.

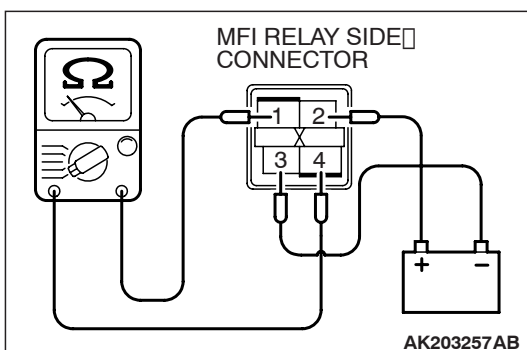
⚠ CAUTION

Because it is not possible to distinguish the top and the bottom of the MPI relay, inspect it with the triangle mark printed on the relay facing upward.

(1) Remove the MPI relay.



- (2) Check for continuity between the MPI relay terminals No. 2 and No. 3.
- There should be continuity. (approximately 70 ohms)



- (3) Use jumper wires to connect MPI relay terminal No. 2 to the positive battery terminal and terminal No. 3 to the negative battery terminal.
- (4) Check for continuity between the MPI relay terminals No. 1 and No. 4 while connecting and disconnecting the jumper wire at the negative battery terminal.
- Should be less than 2 ohms. (Negative battery terminal connected)
 - Should be open loop. (Negative battery terminal disconnected)
- (5) Install the MPI relay.

Q: Is the measured resistance within the specified range?

YES : Go to Step 3.

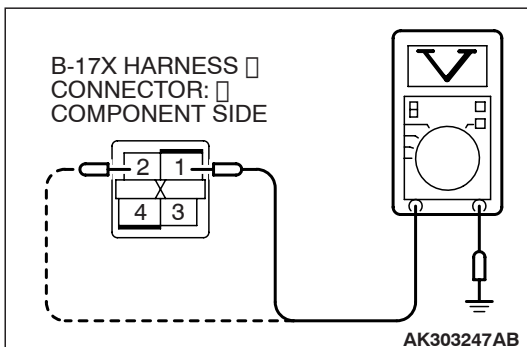
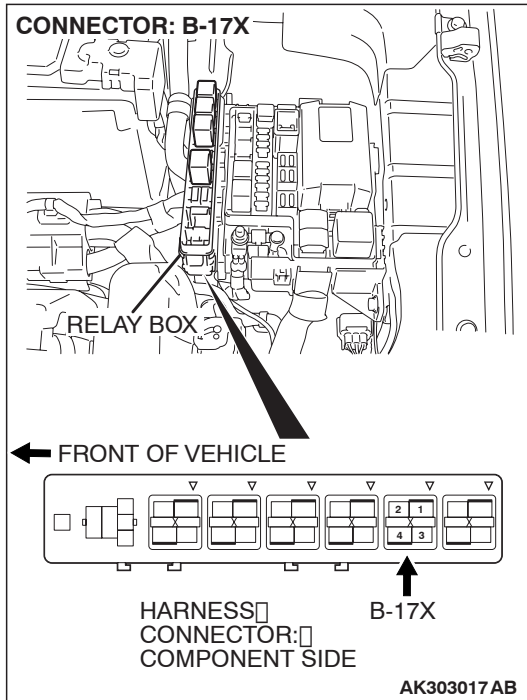
NO : Replace the MPI relay. Then confirm that the malfunction symptom is eliminated.

STEP 3. Measure the power supply voltage at MPI relay harness side connector B-17X.

⚠ CAUTION

Because it is difficult to distinguish the top and bottom of the MPI relay connector at the wiring harness, inspect it by using triangle mark on the junction block as reference.

- (1) Disconnect the connector B-17X and measure at the harness side.



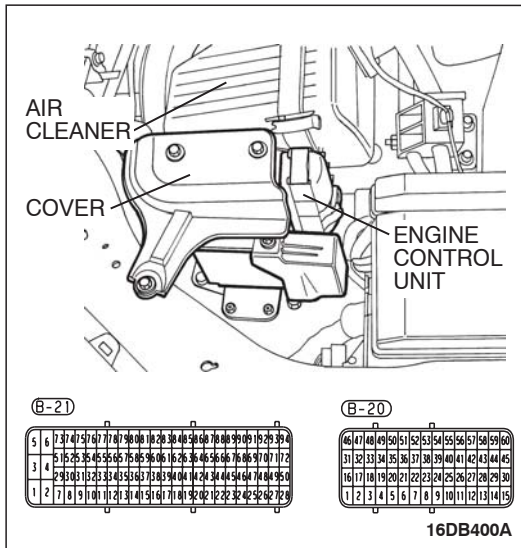
- (2) Measure the voltage between terminals No. 1, No. 2 and ground.

- Voltage should be battery positive voltage.

Q: Is battery positive voltage (approximately 12 volts) present?

YES : Go to Step 4.

NO : Check harness connector A-13 at intermediate connector for damage, and repair or replace as required. Refer to, GROUP 00E, Harness Connector Inspection [P.00E-2](#). If intermediate connector is in good condition, repair harness wire between relay box (9) and MPI relay connector B-17X (terminals No. 1, No. 2) because of open circuit. Then confirm that the malfunction symptom is eliminated.

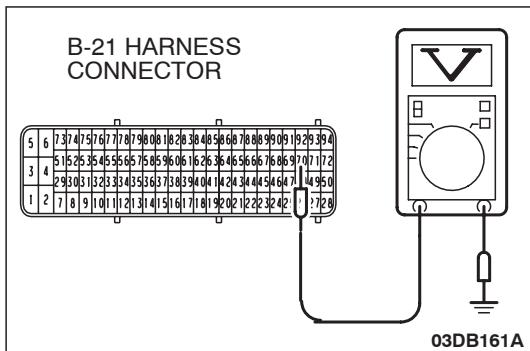
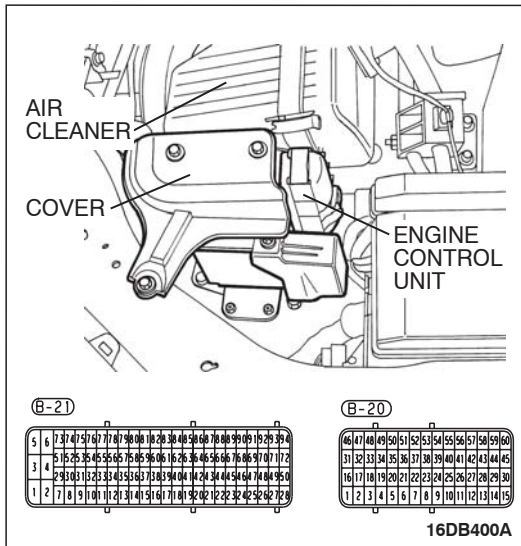


STEP 4. Check harness connector B-20 and B-21 at ECU for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 5.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then confirm that the malfunction symptom is eliminated.



STEP 5. Measure the ignition switch-IG signal voltage at ECU harness side connector B-21.

- (1) Disconnect the connector B-21 and measure at the harness side.
- (2) Turn the ignition switch to the "ON" position.

- (3) Measure the voltage between terminal No. 70 and ground.
 - Voltage should be battery positive voltage.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

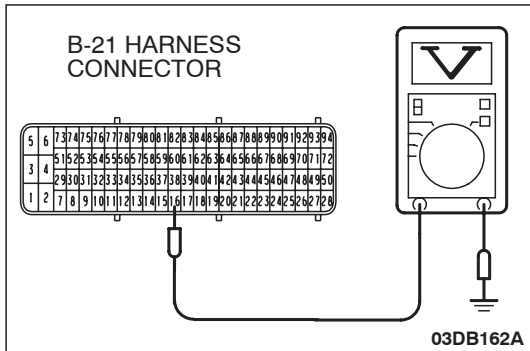
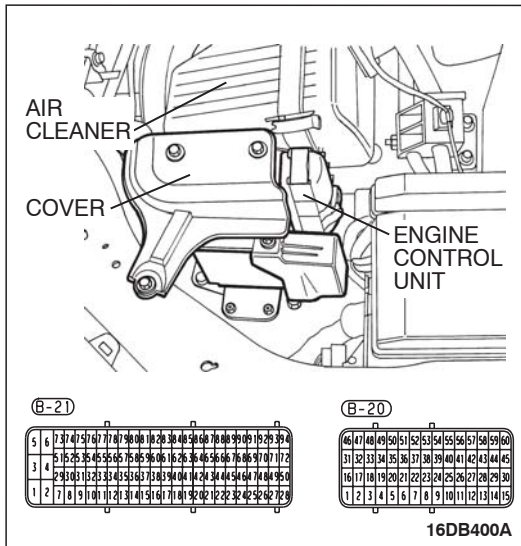
Q: Is battery positive voltage (approximately 12 volts) present?

YES : Go to Step 6.

NO : Check harness connector C-214 and C-215 at intermediate connector for damage, and repair or replace as required. Refer to, GROUP 00E, Harness Connector Inspection [P.00E-2](#). If intermediate connectors are in good condition, repair harness wire between ignition switch connector C-308 (terminal No. 2) and ECU connector B-21 (terminal No. 70) because of open circuit. Then confirm that the malfunction symptom is eliminated.

STEP 6. Measure the backup power supply voltage at ECU harness side connector B-21.

- (1) Disconnect the connector B-21 and measure at the harness side.



- (2) Measure the voltage between terminal No. 16 and ground.
- Voltage should be battery positive voltage.

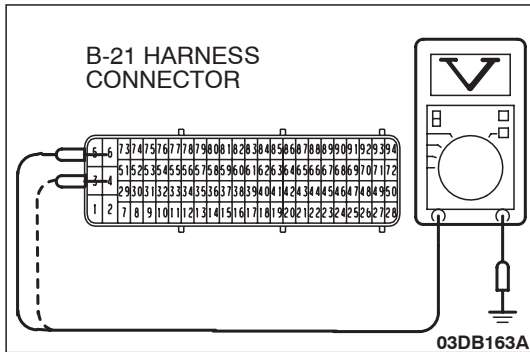
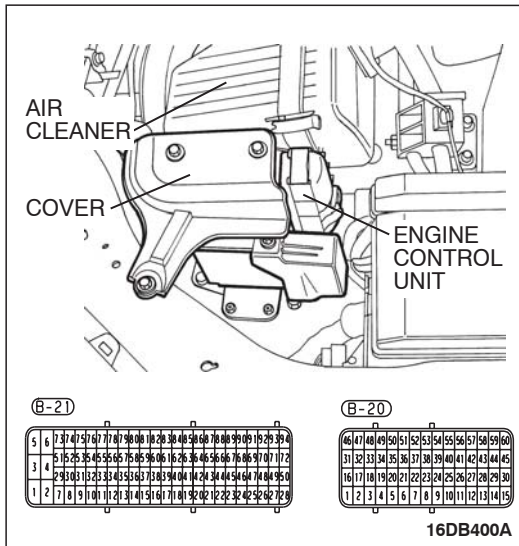
Q: Is battery positive voltage (approximately 12 volts) present?

YES : Go to Step 7.

NO : Repair harness wire between relay box (9) and ECU connector B-21 (terminal No. 16) because of short circuit. Then confirm that the malfunction symptom is eliminated.

STEP 7. Check for continuity at ECU harness side connector B-21.

- (1) Disconnect the connector B-21 and measure at the harness side.



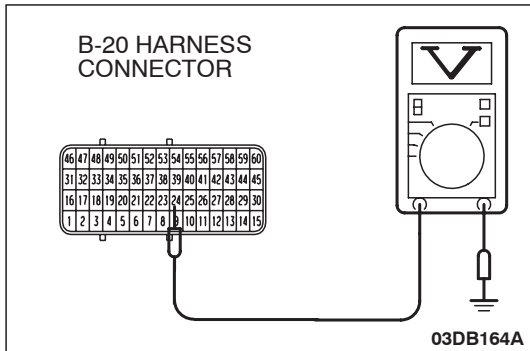
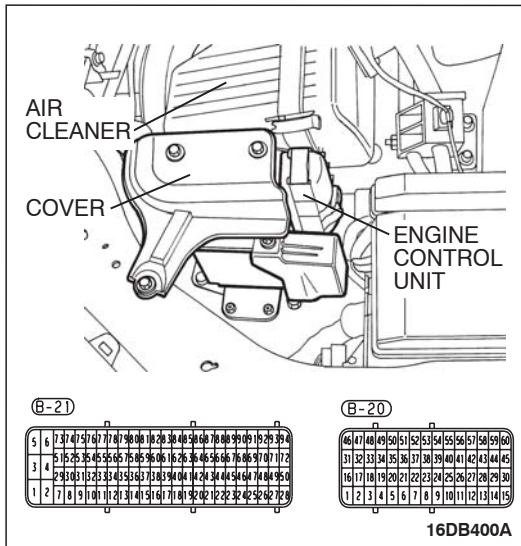
- (2) Check for the continuity between terminals (No. 04, No. 06) and ground.

- Should be less than 2 ohms.

Q: Does continuity exist?

YES : Go to Step 8.

NO : Check harness connector A-14 at grounding connector for damage, and repair or replace as required. Refer to, GROUP 00E, Harness Connector Inspection. If grounding connector is good condition, repair harness wire between ECU connector B-21 (terminal No. 04, No. 06) and ground because of open circuit. Then confirm that the malfunction symptom is eliminated.



STEP 8. Measure the power supply voltage at ECU harness side connector B-20.

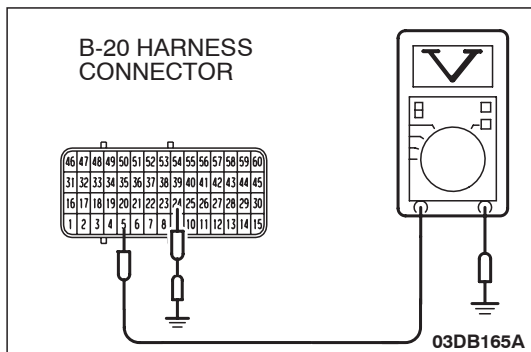
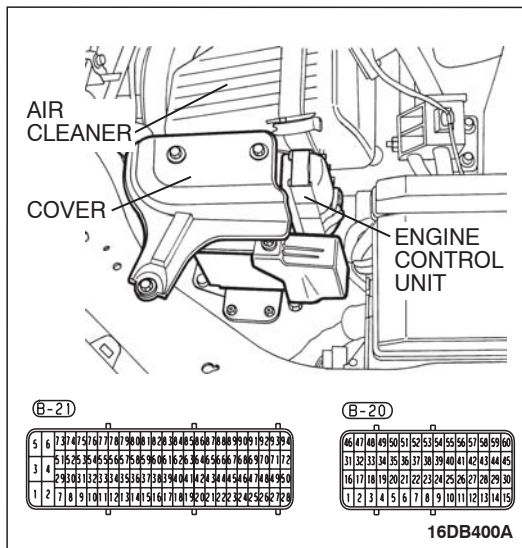
(1) Disconnect the connector B-20 and measure at the harness side.

(2) Measure the voltage between terminal No. 24 and ground.
• Voltage should be battery positive voltage.

Q: Is battery positive voltage (approximately 12 volts) present?

YES : Go to Step 9.

NO : Repair harness wire between MPI relay connector B-17X (terminal No. 3) and ECU connector B-20 (terminal No. 24) because of open circuit. Then confirm that the malfunction symptom is eliminated.



STEP 9. Measure the power supply voltage at ECU harness side connector B-20.

- (1) Disconnect the connector B-20 and measure at the harness side.
- (2) Using a jumper wire, connect terminal No. 24 to ground.

- (3) Measure the voltage between terminals (No. 05) and ground.

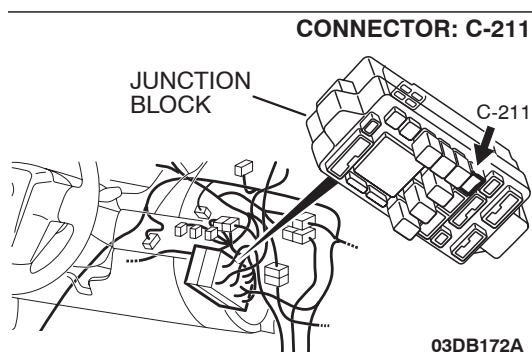
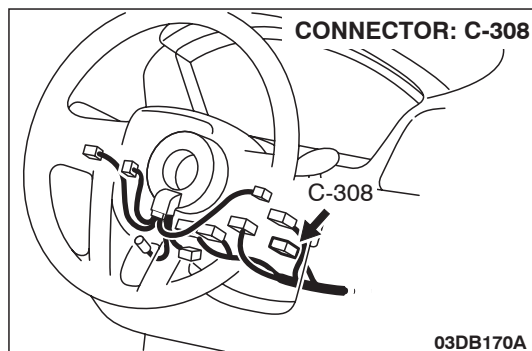
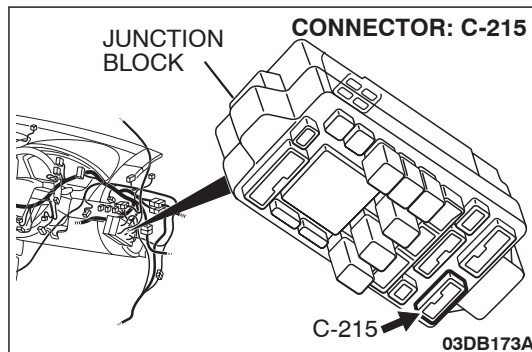
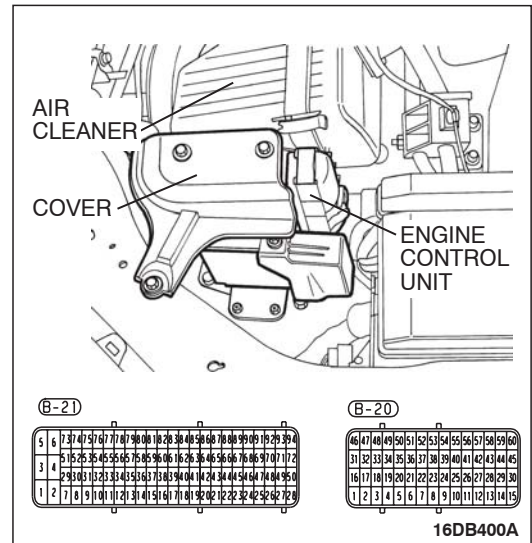
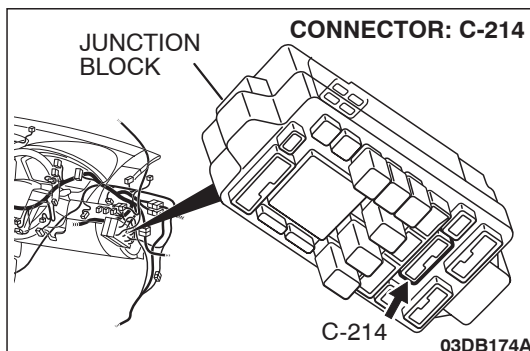
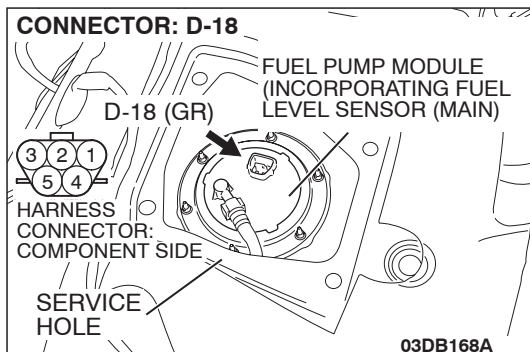
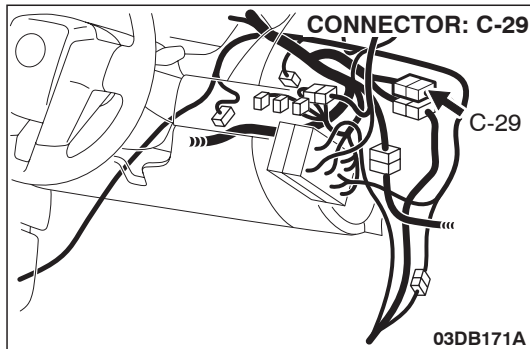
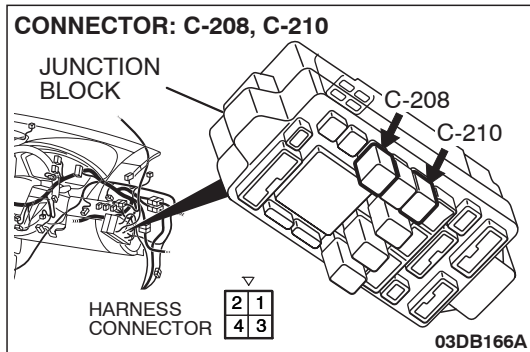
- Voltage should be battery positive voltage.

Q: Is battery positive voltage (approximately 12 volts) present?

YES : Replace the ECU. Then confirm that the malfunction symptom is eliminated.

NO : Repair harness wire between MPI relay connector B-17X (terminal No. 4) and ECU connector B-20 (terminal No. 05) because of open circuit. Then confirm that the malfunction symptom is eliminated.

INSPECTION PROCEDURE 25: Fuel pump system.



CIRCUIT OPERATION

- Battery positive voltage is applied to the fuel pump relay 1 (terminal No. 3) from the ignition

switch-IG.

Ground is provided through terminal No. 2 to chassis ground.

- When the ignition switch is turned to the "ON" position, the battery positive voltage is applied to the fuel pump relay 2 (terminal No. 1) from the fuel pump relay 1 (terminal No. 1).
- Battery positive voltage is applied to the fuel pump relay 2 (terminal No. 3) from the ignition switch-IG.
- During cranking and while the engine is running, the ECU turns the power transistor in the ECU ON to ground the fuel pump relay 2 coil. With this, the fuel pump relay turns ON, and the battery positive voltage is supplied to the fuel pump from the fuel pump relay 2 (terminal No. 4).

TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)

- Malfunction of the fuel pump relay.
- Malfunction of the fuel pump.
- Improper connector contact, open or short-circuited harness wire.
- Malfunction of the ECU.
- Refer to component locations GROUP-70
- Refer to configuration diagrams GROUP-80
- Refer to circuit diagrams GROUP-90

DIAGNOSIS

Required Special Tools:

- Diagnostic tool(MUT-III Sub Assembly)
 - MB991824: V.C.I.
 - MB991827: USB Cable
 - MB991910: Main Harness A

STEP 1. Check fuel pump operation.

- (1) Turn the ignition switch to "ON". Listen for fuel pump running for approximately 2 seconds. Pump will automatically stop after this time.

NOTE: As the fuel pump is an in-tank type, the fuel pump sound is hard to hear. Remove the fuel tank filler tube cap and check from the tank inlet.

- (2) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the fuel pump operating properly?

YES : That this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions [P.00-14](#).

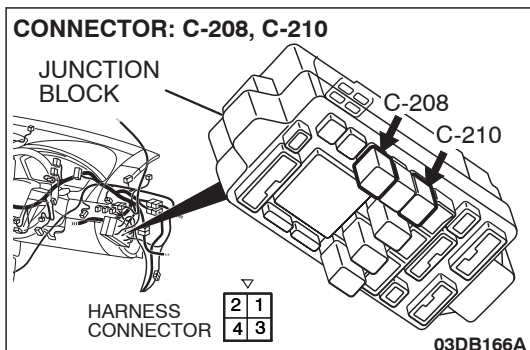
NO : Go to Step 2.

STEP 2. Check harness connector C-210 at fuel pump relay 1 and harness connector C-208 at fuel pump relay 2 for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 3.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then confirm that the malfunction symptom is eliminated.

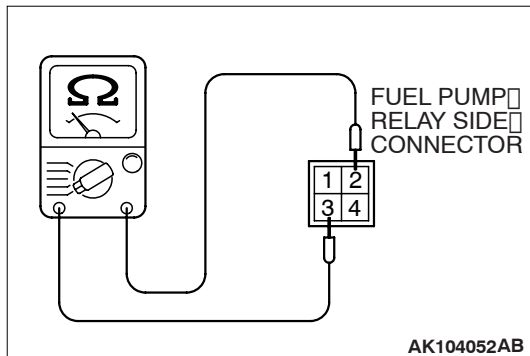
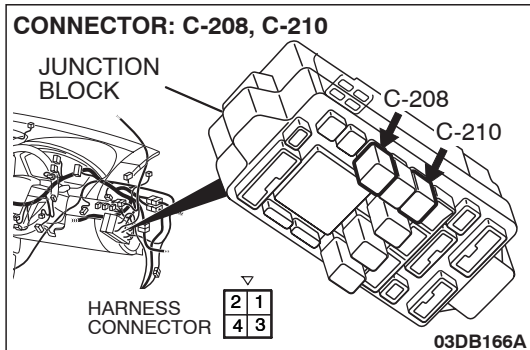


STEP 3. Check the fuel pump relay 1 and 2.

⚠ CAUTION

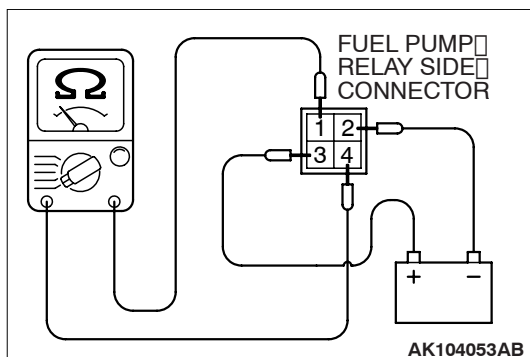
Because it is not possible to distinguish the top and the bottom of the fuel pump relay, inspect it with the triangle mark printed on the relay facing upward.

(1) Remove the fuel pump relay 1 and 2.



(2) Check for continuity between the each fuel pump relay terminals No. 2 and No. 3.

- There should be continuity. (approximately 70 ohms)



(3) Use jumper wires to connect each fuel pump relay terminal No. 3 to the positive battery terminal and terminal No. 2 to the negative battery terminal.

(4) Check for continuity between the each fuel pump relay terminals No. 1 and No. 4 while connecting and disconnecting the jumper wire at the negative battery terminal.

- Should be less than 2 ohms. (Negative battery terminal connected)
- Should be open loop. (Negative battery terminal disconnected)

(5) Install the fuel pump relay 1 and 2.

Q: Is the measured resistance normal?

YES : Go to Step 4.

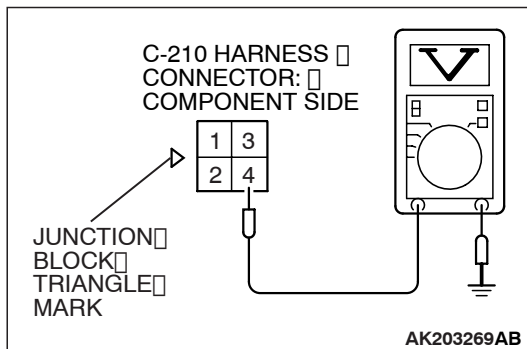
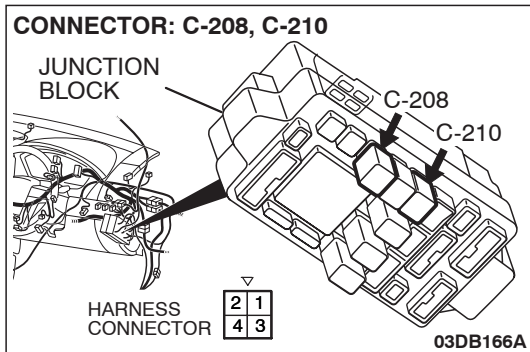
NO : Replace the fuel pump relay 1 and/or 2. Then confirm that the malfunction symptom is eliminated.

STEP 4. Measure the power supply voltage at fuel pump relay 1 harness side connector C-210.

⚠ CAUTION

Because it is difficult to distinguish the top and bottom of the fuel pump relay connector at the wiring harness, inspect it by using the triangle mark on the junction block as a reference.

(1) Disconnect the connector C-210 and measure at the harness side.



(2) Measure the voltage between terminal No. 4 and ground.

- Voltage should measure battery positive voltage.

Q: Is battery positive voltage (approximately 12 volts) present?

YES : Go to Step 5.

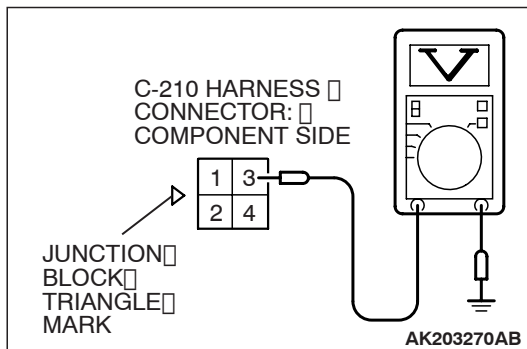
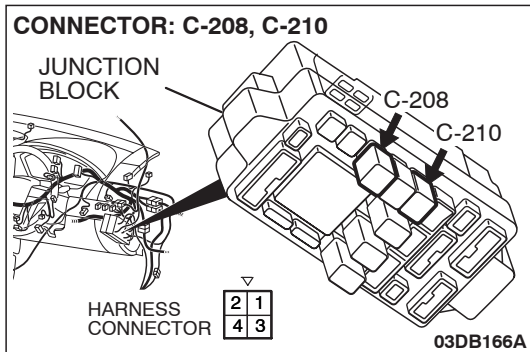
NO : Check harness connector C-214 at intermediate connector for damage, and repair or replace as required. Refer to, GROUP 00E, Harness Connector Inspection [P.00E-2](#). If intermediate connector is in good condition, repair harness wire between relay box and fuel pump relay 1 connector C-210 (terminal No. 4) because of open circuit. Then confirm that the malfunction symptom is eliminated.

STEP 5. Measure the power supply voltage at fuel pump relay 1 harness side connector C-210.

⚠ CAUTION

Because it is difficult to distinguish the top and bottom of the fuel pump relay connector at the wiring harness, inspect it by using the triangle mark on the junction block as a reference.

- (1) Disconnect the connector C-210 and measure at the harness side.
- (2) Turn the ignition switch to the "ON" position.



- (3) Measure the voltage between terminal No. 3 and ground.
 - Voltage should be battery positive voltage.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is battery positive voltage (approximately 12 volts) present?

YES : Go to Step 6.

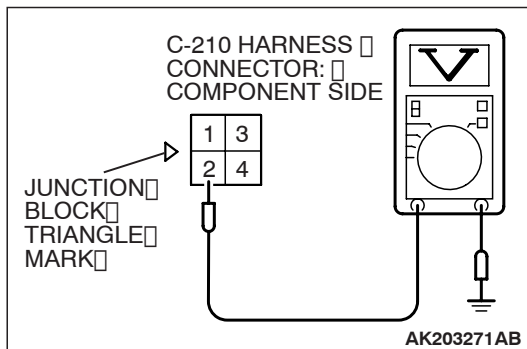
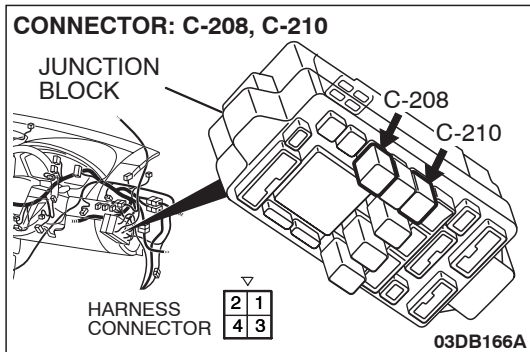
NO : Check harness connector C-215 at intermediate connector for damage, and repair or replace as required. Refer to, GROUP 00E, Harness Connector Inspection [P.00E-2](#). If intermediate connector is in good condition, repair harness wire between ignition switch connector C-308 (terminal No. 2) and fuel pump relay 1 connector C-210 (terminal No. 3) because of open circuit. Then confirm that the malfunction symptom is eliminated.

STEP 6. Check for continuity at fuel pump relay 1 harness side connector C-210.

⚠ CAUTION

Because it is difficult to distinguish the top and bottom of the fuel pump relay connector at the wiring harness, inspect it by using the triangle mark on the junction block as a reference.

(1) Disconnect the connector C-210 and measure at the harness side.



(2) Check for the continuity between terminal No. 2 and ground.

- Should be less than 2 ohms.

Q: Does continuity exist?

YES : Go to Step 7.

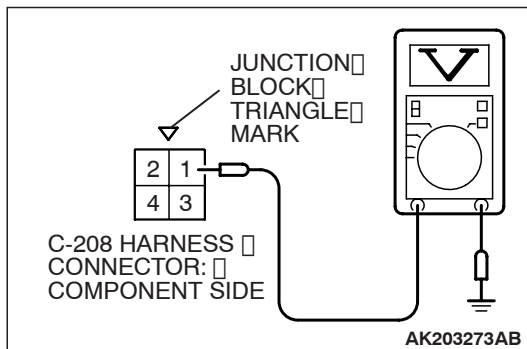
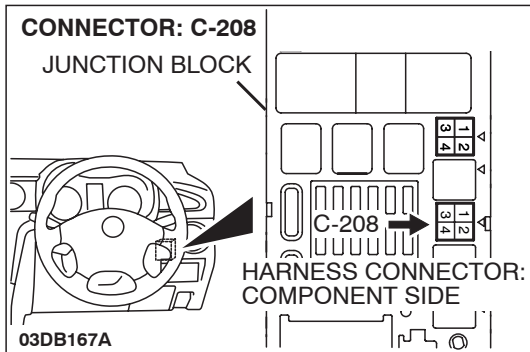
NO : Check connector C-211 at intermediate connector for damage, and repair or replace as required. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). If intermediate connector is in good condition, repair harness wire between fuel pump relay 1 connector C-210 (terminal No. 2) and ground because of open circuit. Then confirm that the malfunction symptom is eliminated.

STEP 7. Measure the power supply voltage at fuel pump relay 2 harness side connector C-208.

⚠ CAUTION

Because it is difficult to distinguish the top and bottom of the fuel pump relay connector at the wiring harness, inspect it by using the triangle mark on the junction block as a reference.

- (1) Disconnect the connector C-208 and measure at the harness side.
- (2) Turn the ignition switch to the "ON" position.



- (3) Measure the voltage between terminal No. 1 and ground.
 - Voltage should be battery positive voltage.

Q: Is battery positive voltage (approximately 12 volts) present?

YES : Go to Step 8.

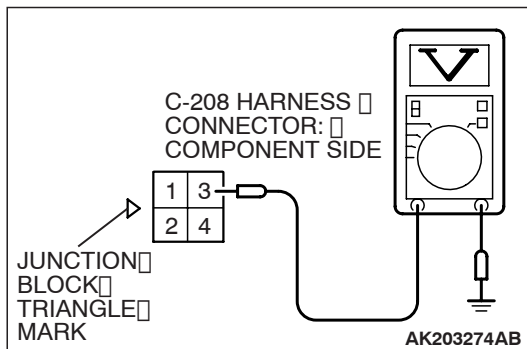
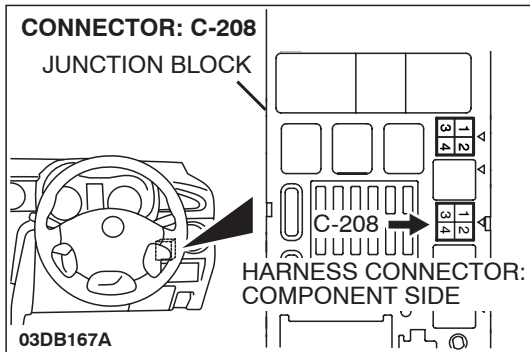
NO : Repair harness wire between fuel pump relay 1 connector C-210 (terminal No. 1) and fuel pump relay 2 connector C-208 (terminal No. 1) because of open circuit. Then confirm that the malfunction symptom is eliminated.

STEP 8. Measure the power supply voltage at fuel pump relay 2 harness side connector C-208.

CAUTION

Because it is difficult to distinguish the top and bottom of the fuel pump relay connector at the wiring harness, inspect it by using the triangle mark on the junction block as a reference.

- (1) Disconnect the connector C-208 and measure at the harness side.
- (2) Turn the ignition switch to the "ON" position.



- (3) Measure the voltage between terminal No. 3 and ground.
 - Voltage should be battery positive voltage.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is battery positive voltage (approximately 12 volts) present?

YES : Go to Step 9.

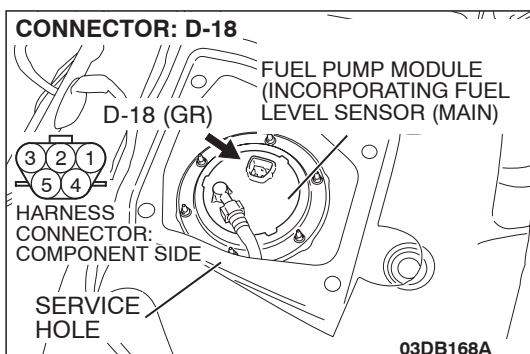
NO : Check harness connector C-215 at intermediate connector for damage, and repair or replace as required. Refer to, GROUP 00E, Harness Connector Inspection [P.00E-2](#). If intermediate connector is in good condition, repair harness wire between ignition switch connector C-308 (terminal No. 2) and fuel pump relay 2 connector C-208 (terminal No. 3) because of open circuit. Then confirm that the malfunction symptom is eliminated.

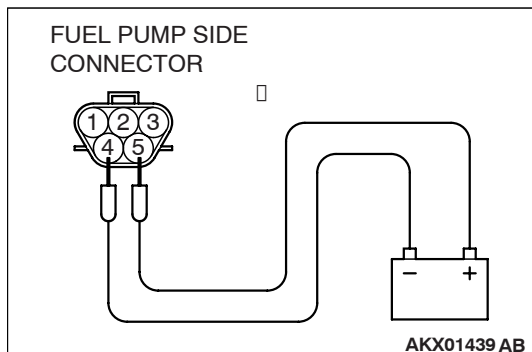
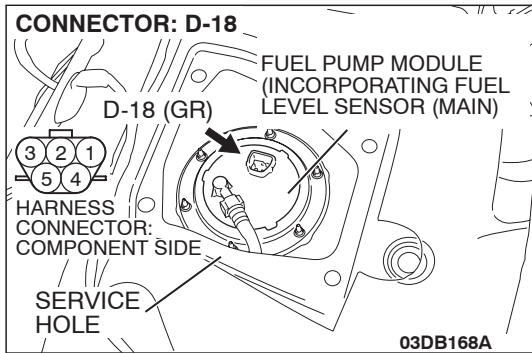
STEP 9. Check connector D-18 at fuel pump for damage.

Q: Is the connector in good condition?

YES : Go to Step 10.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then confirm that the malfunction symptom is eliminated.





STEP 10. Check the fuel pump operation.

(1) Disconnect fuel pump connector D-18.

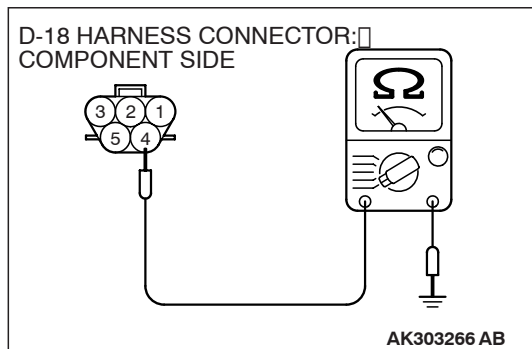
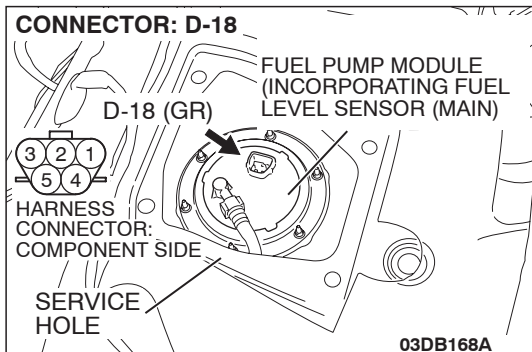
(2) Use jumper wires to connect fuel pump connector terminal No. 5 to the positive battery terminal and terminal No. 4 to the negative battery terminal.

- An operating sound of the fuel pump should be heard.

Q: Is the fuel pump operating properly?

YES : Go to Step 11.

NO : Replace the fuel pump. Then confirm that the malfunction symptom is eliminated.



STEP 11. Check for continuity at fuel pump harness side connector D-18.

(1) Disconnect the connector D-18 and measure at the harness side.

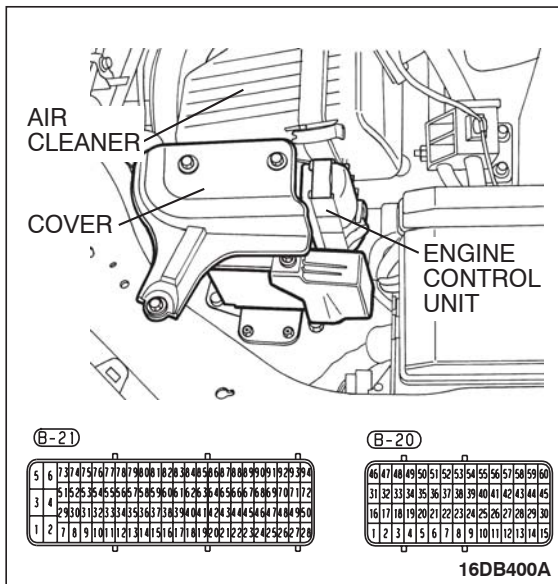
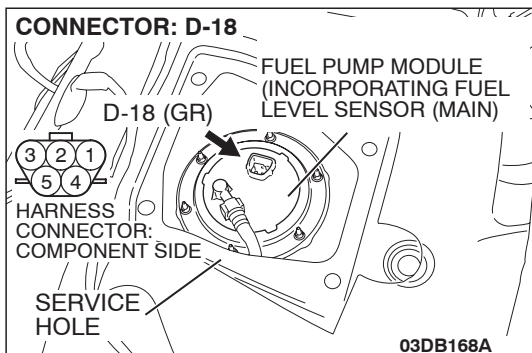
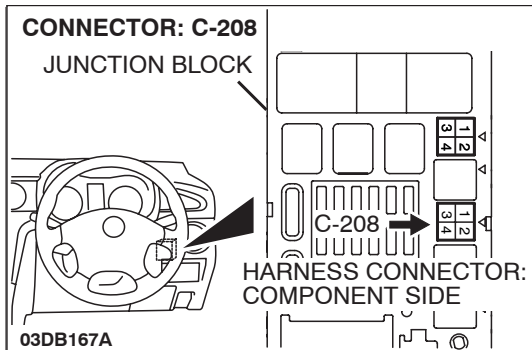
(2) Check for the continuity between terminal No. 4 and ground.

- Should be less than 2 ohms.

Q: Does continuity exist?

YES : Go to Step 12.

NO : Repair harness wire between fuel pump connector D-18 (terminal No. 4) and ground because of open circuit. or harness damage. Then confirm that the malfunction symptom is eliminated.



STEP 12. Check for open circuit and short circuit to ground and harness damage between fuel pump relay 2 connector C-208 (terminal No. 4) and fuel pump connector D-18 (terminal No. 5).

NOTE: Check harness after checking intermediate connector C-204. If intermediate connector is damaged, repair or replace it. After to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then check that the malfunction is eliminated.

Q: Is the harness wire in good condition?

YES : Go to Step 13.

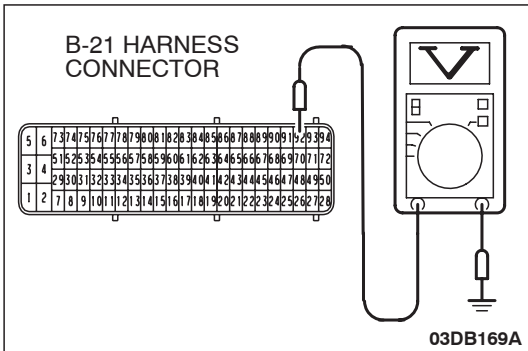
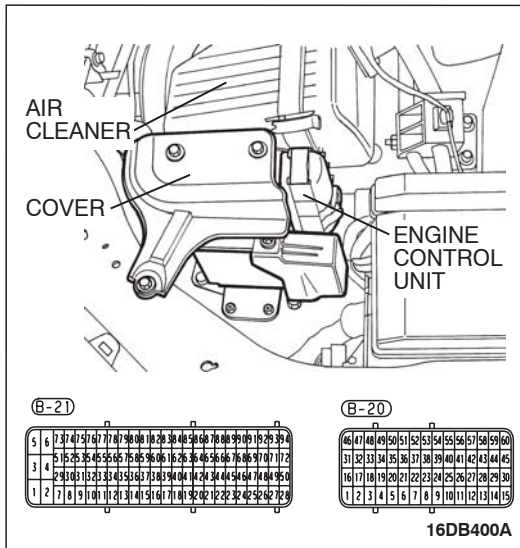
NO : Repair it. Then confirm that the malfunction symptom is eliminated.

STEP 13. Check connector B-21 at ECU for damage.

Q: Is the connector in good condition?

YES : Go to Step 14.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then confirm that the malfunction symptom is eliminated.



STEP 14. Measure the power supply voltage at ECU connector B-21.

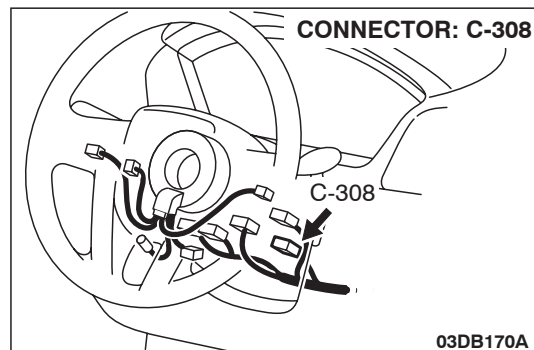
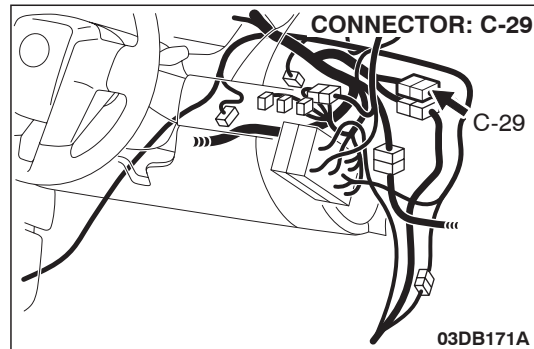
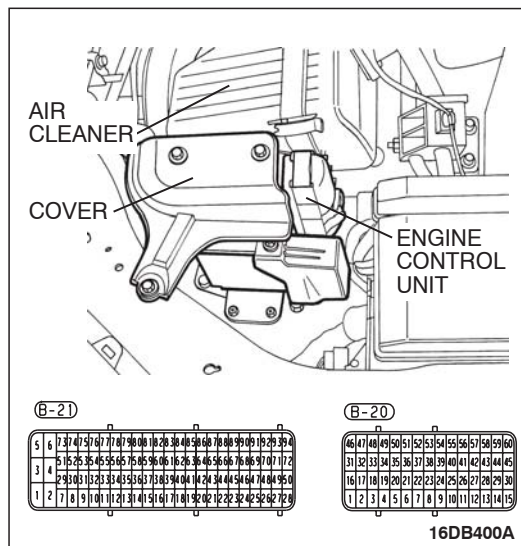
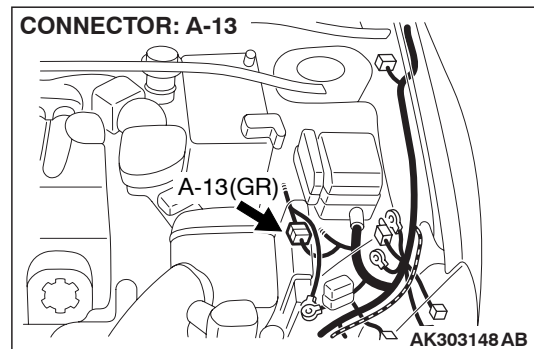
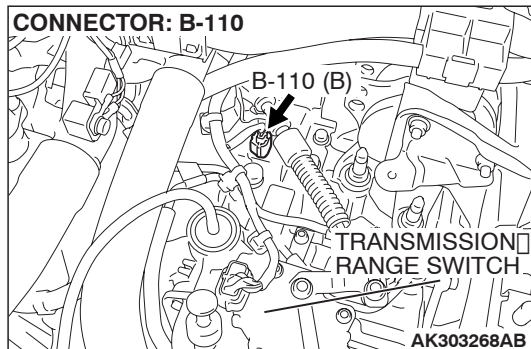
- (1) Disconnect the connector B-21 and measure at the harness side.
- (2) Turn the ignition switch to the "ON" position.

- (3) Measure the voltage between terminal No. 92 and ground.
 - Voltage should be battery positive voltage.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is battery positive voltage (approximately 12 volts) present?

- YES :** Replace the ECU. Then confirm that the malfunction symptom is eliminated.
- NO :** Check harness connectors C-29 and C-211 at intermediate connector for damage, and repair or replace as required. Refer to, GROUP 00E, Harness Connector Inspection [P.00E-2](#). If intermediate connectors are in good condition, repair harness wire between fuel pump relay 2 connector C-208 (terminal No. 2) and ECU connector B-21 (terminal No. 92) because of open circuit. Then confirm that the malfunction symptom is eliminated.

INSPECTION PROCEDURE 26: Ignition Switch-ST System and Transmission Inhibitor Switch System



COMMENT

- If the selector lever is moved to "P" or "N" range and the ignition switch is turned to "START" position, battery positive voltage is supplied to ECU (terminal No. 9) through the ignition switch and transmission inhibitor switch. Because of this, the ECU detects that the engine is cranking.
- The transmission inhibitor switch detects the transmission inhibitor (P, N or other ranges) and converts it to a voltage signal (high or low). Then the transmission inhibitor switch sends that signal to the ECU.

If the selector lever is moved to "P" or "N" range with the ignition switch turned on (except "START" position), continuity will exist between the ECU and ground through the transmission inhibitor switch and starter motor. The terminal voltage of the ECU will become low. If the selector lever is moved to the other ranges, continuity will be lost between the ECU and ground. The terminal voltage of the ECU will become high.

TROUBLESHOOTING HINTS (The most likely caused for this code to be set are:)

- Malfunction of the ignition switch.
- Malfunction of the transmission inhibitor switch.

- Improper connector contact, open circuit or short-circuit in the harness wire.
- Malfunction of the ECU.
- Refer to component locations [GROUP-70](#)
- Refer to configuration diagrams [GROUP-80](#)
- Refer to circuit diagrams [GROUP-90](#)

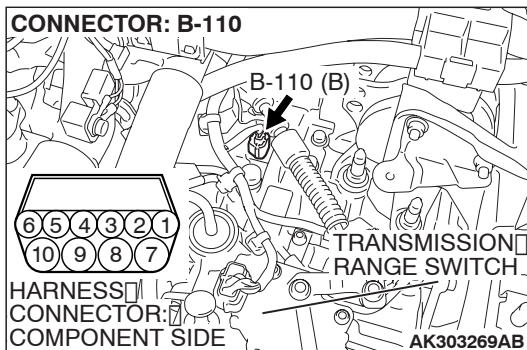
DIAGNOSIS

STEP 1. Check connector B-110 at transmission inhibitor switch for damage.

Q: Is the connector in good condition?

YES : Go to Step 2.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then confirm that the malfunction symptom is eliminated.



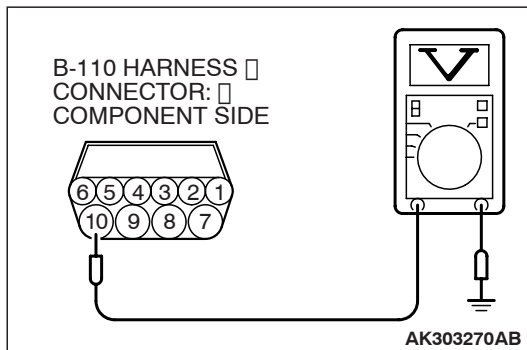
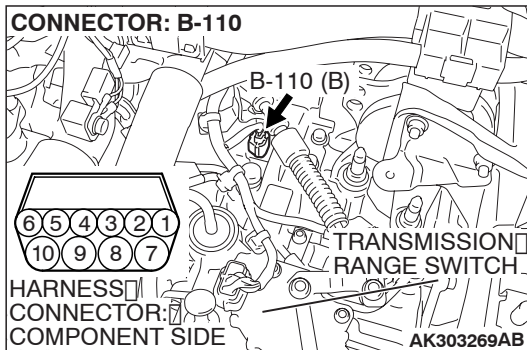
STEP 2. Check the transmission inhibitor switch.

Refer to GROUP 23A, On-vehicle Service – Essential Service – Transmission Inhibitor Switch Continuity Check [P.23A-294](#).

Q: Are there any abnormalities?

YES : Repair or replace it. Then confirm that the malfunction symptom is eliminated.

NO : Go to Step 3.



STEP 3. Measure the power supply voltage at transmission inhibitor switch connector B-110.

- (1) Disconnect the connector B-110 and measure at the harness side.
- (2) Turn the ignition switch to the "START" position.

- (3) Measure the voltage between terminal No. 10 and ground.
 - Voltage should be battery positive voltage.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is battery positive voltage (approximately 12 volts) present?

YES : Go to Step 4.

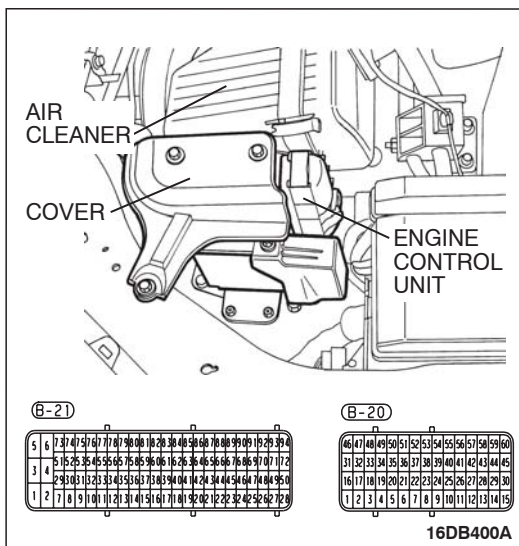
NO : Check connector A-13 and C-29 at intermediate connector for damage, and repair or replace as required. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). If intermediate connector are in good condition, repair harness wire between ignition switch connector C-308 (terminal No. 5) and transmission inhibitor switch connector B-110 (terminal No. 10) because of open circuit. Then confirm that the malfunction symptom is eliminated.

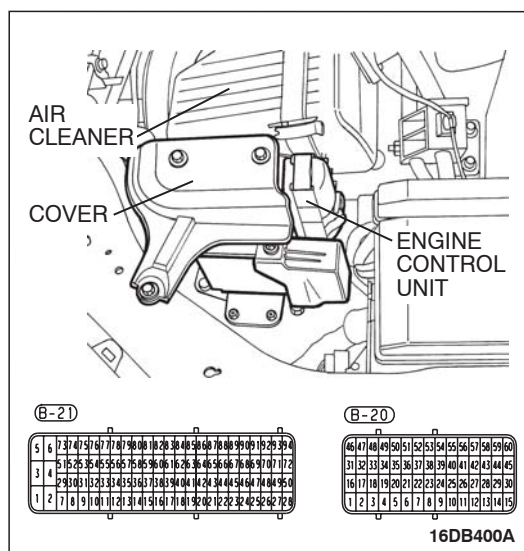
STEP 4. Check connector B-20 at ECU for damage.

Q: Is the connector in good condition?

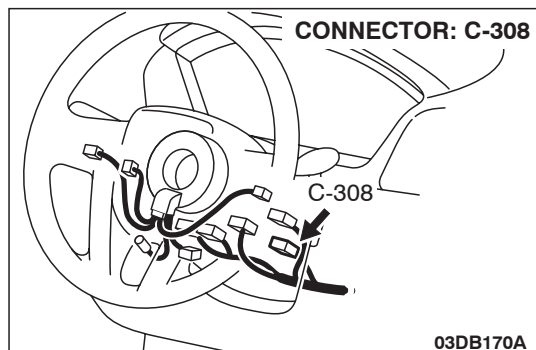
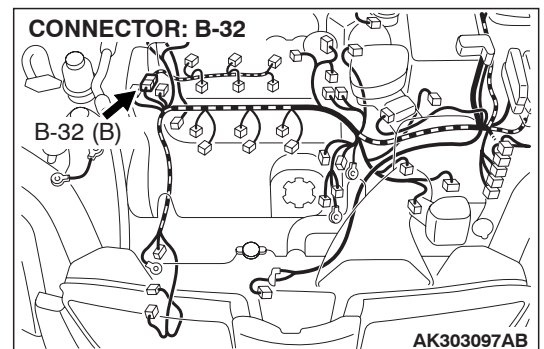
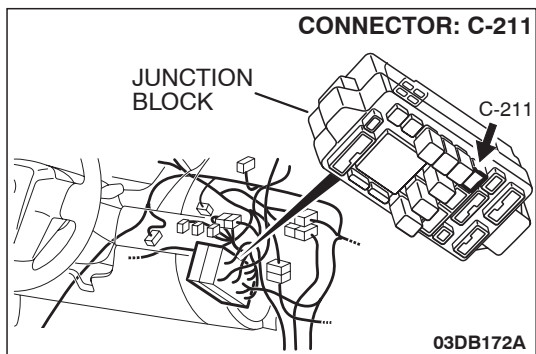
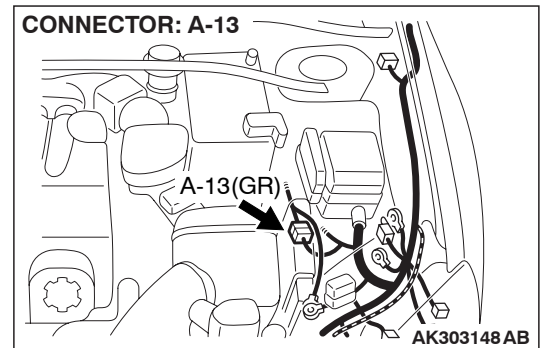
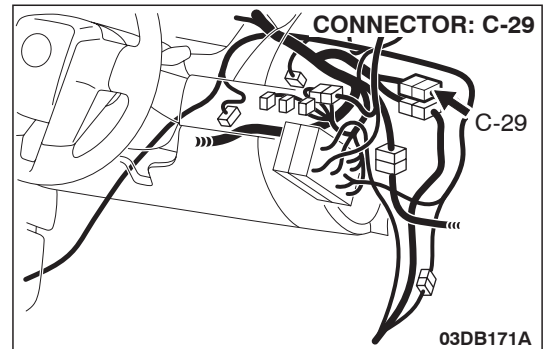
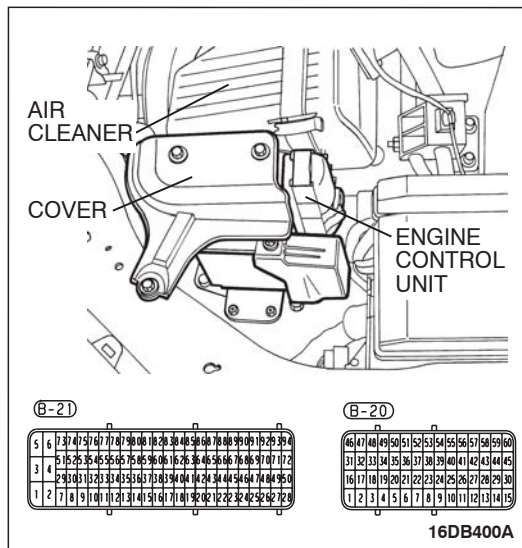
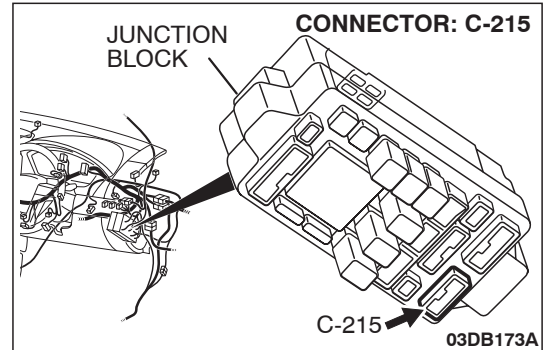
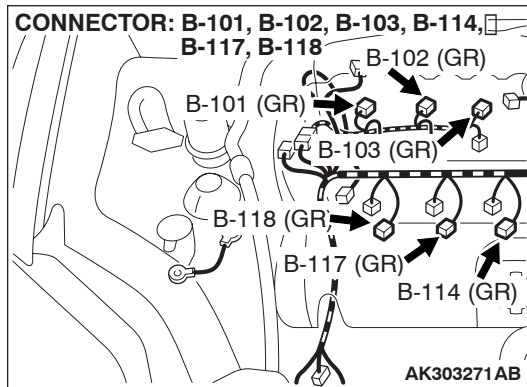
YES : Go to Step 5.

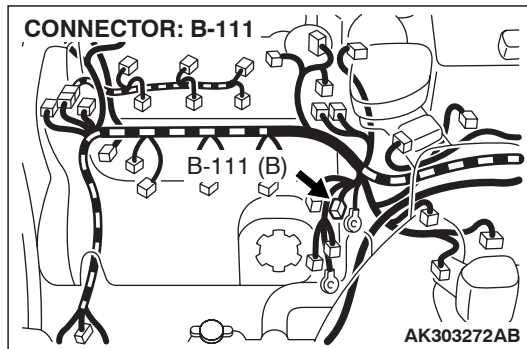
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then confirm that the malfunction symptom is eliminated.





INSPECTION PROCEDURE 27: Ignition Circuit System.





CIRCUIT OPERATION

- The ignition coil is energized by battery positive voltage from the ignition switch.
- When the ECU turns off its internal power transistor, battery positive voltage is applied to the ignition power transistor (terminal No. 3) inside the ignition coil, causing the ignition power transistor to be turned on.
- If the ignition power transistor is turned on, the primary circuit of the ignition coil is energized by grounding the ignition coil through terminal No. 2, causing the primary current to flow to the ignition coil.

TROUBLESHOOTING HINTS (The most likely causes for this case:)

- Malfunction of the ignition coil.
- Malfunction of the ignition power transistor.
- Improper connector contact, open circuit or short-circuit harness wire.
- Malfunction of the ECU.
- Refer to component locations [GROUP-70](#)
- Refer to configuration diagrams [GROUP-80](#)
- Refer to circuit diagrams [GROUP-90](#)

DIAGNOSIS

STEP 1. Check the ignition coil.

- (1) Remove the intake manifold.
- (2) Refer to GROUP 16, Ignition System – On-vehicle service – Ignition Coil Check [P.16-31](#).

Q: Are there any abnormalities?

YES : Replace the ignition coil. Then confirm that the malfunction symptom is eliminated.

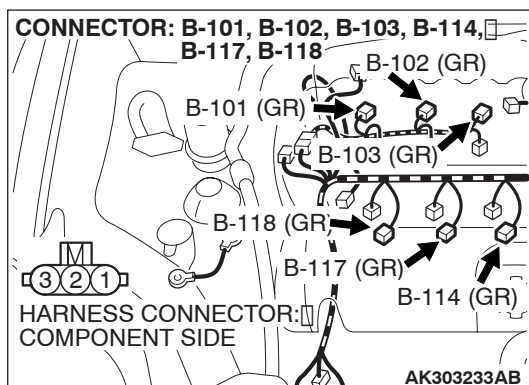
NO : Go to Step 2.

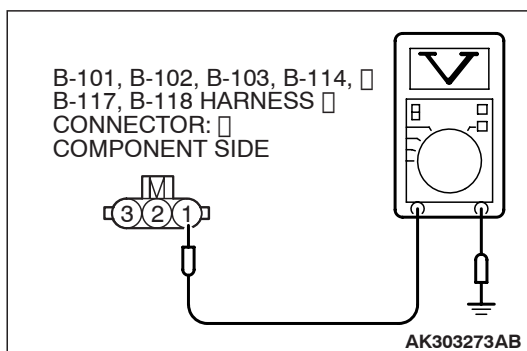
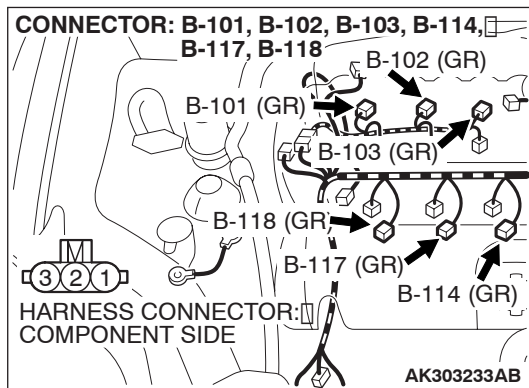
STEP 2. Check harness connectors B-114, B-117, B-118, B-102, B-103, B-101 at ignition coil for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 3.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then confirm that the malfunction symptom is eliminated.





STEP 3. Measure the power supply voltage at ignition coil connectors B-114, B-117, B-118, B-102, B-103, B-101.

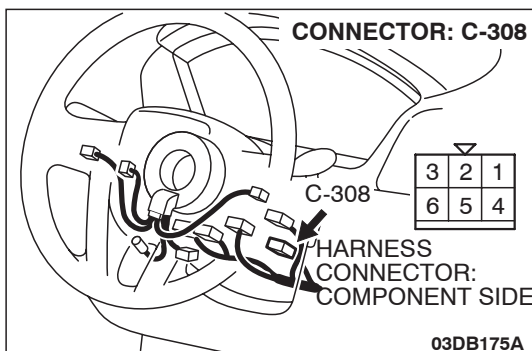
- (1) Disconnect the connector B-114, B-117, B-118, B-102, B-103, B-101 and measure at the harness side.
- (2) Turn the ignition switch to the "ON" position.

- (3) Measure the voltage between terminal No. 1 and ground.
 - Voltage should be battery positive voltage.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is battery positive voltage (approximately 12 volts) present?

YES : Go to Step 5.

NO : Go to Step 4.



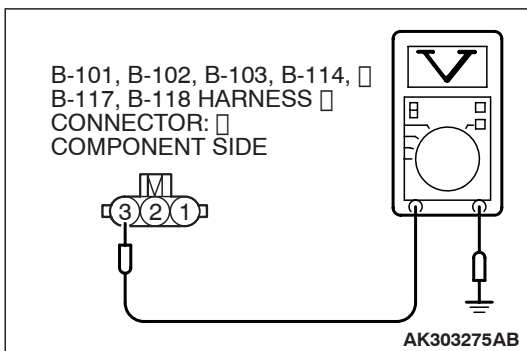
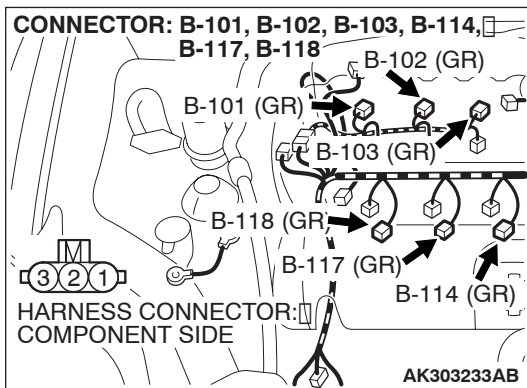
STEP 4. Check for open circuit between ignition switch connector C-308 (terminal No. 2) and ignition coil connectors B-114, B-117, B-118, B-102, B-103, B-101 (terminal No. 1).

NOTE: Check harness after checking intermediate connectors A-13, B-32, C-29, C-211, C-215 and C-308. If intermediate connectors are damaged, repair or replace them. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then confirm that the malfunction symptom is eliminated.

Q: Is the harness wire in good condition?

YES : Repair harness wire between ignition switch connector C-308 (terminal No. 2) and capacitor connector B-111 (terminal No. 1) because of short circuit to ground. Then confirm that the malfunction symptom is eliminated.

NO : Repair it. Then confirm that the malfunction symptom is eliminated.



STEP 5. Check the circuit at ignition coil harness side connectors B-114, B-117, B-118, B-102, B-103, B-101.

- (1) Disconnect the connectors B-114, B-117, B-118, B-102, B-103, B-101 and measure at the harness side.
- (2) Crank the engine.

- (3) Measure the voltage between terminal No. 3 and ground.

NOTE: The average voltage through an analog voltmeter is described in this service manual (because the average voltage is too stable to be shown on a digital voltmeter).

- Voltage should be 0.3 and 3.0 volts.

- (4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the measured voltage between 0.3 and 3.0 volts?

YES : Go to Step 8.

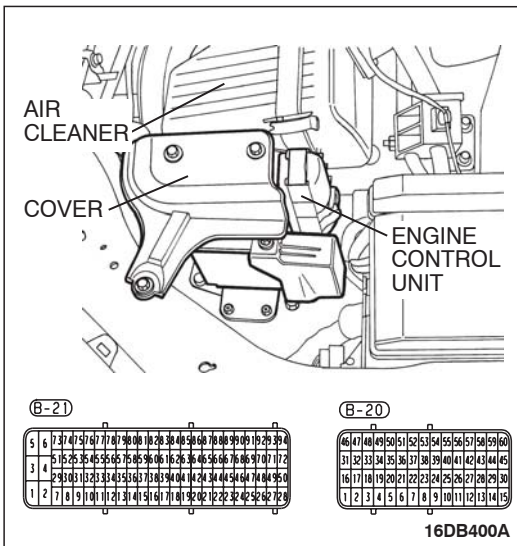
NO : Go to Step 6.

STEP 6. Check connector B-20 at ECU for damage.

Q: Is the connector in good condition?

YES : Go to Step 7.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then confirm that the malfunction symptom is eliminated.



CONNECTOR: B-101, B-102, B-103, B-114, B-117, B-118

B-101 (GR)

B-102 (GR)

B-103 (GR)

B-118 (GR)

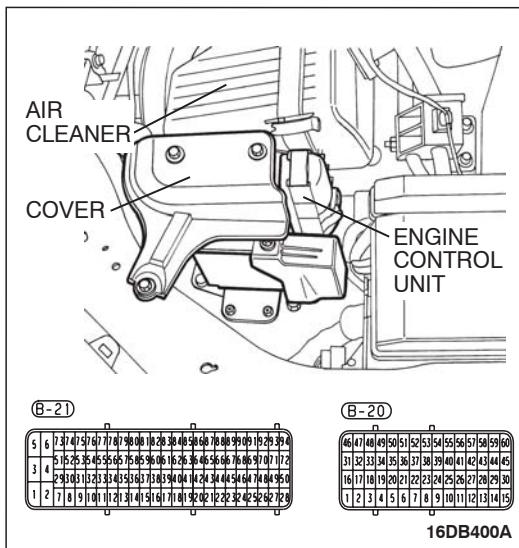
B-117 (GR)

B-114 (GR)

HARNESS CONNECTOR:

COMPONENT SIDE

AK303233AB



NOTE: Check harness after checking intermediate connector B-32. If intermediate connector is damaged, repair or replace it. Refer to GROUP 00E, Harness Connector Inspection. Then confirm that the malfunction symptom is eliminated.

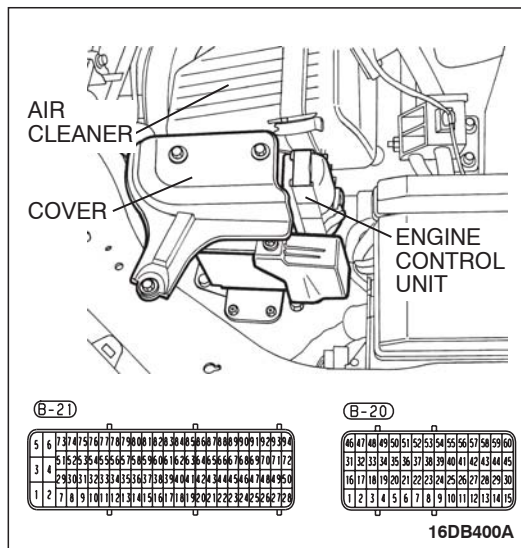
- a. Check the harness wire between ignition coil connector B-101 (terminal No. 3) and ECU connector B-20 (terminal No. 07) at ignition coil 1.
- b. Check the harness wire between ignition coil connector B-118 (terminal No. 3) and ECU connector B-20 (terminal No. 22) at ignition coil 2.
- c. Check the harness wire between ignition coil connector B-102 (terminal No. 3) and ECU connector B-20 (terminal No. 36) at ignition coil 3.
- d. Check the harness wire between ignition coil connector B-117 (terminal No. 3) and ECU connector B-20 (terminal No. 51) at ignition coil 4.
- e. Check the harness wire between ignition coil connector B-103 (terminal No. 3) and ECU connector B-20 (terminal No. 37) at ignition coil 5.
- f. Check the harness wire between ignition coil connector B-114 (terminal No. 3) and ECU connector B-20 (terminal No. 52) at ignition coil 6.

Q: Is the harness wire in good condition?

YES : Replace the ECU. Then confirm that the malfunction symptom is eliminated.

NO : Repair it. Then confirm that the malfunction symptom is eliminated.

INSPECTION PROCEDURE 28: A/C system.



COMMENT

- When the A/C is "ON" the ECU turns "ON" the power transistor in the ECU. The ECU delays A/C engagement momentarily while it increases idle r/min. Then the A/C compressor clutch relay coil will be energized. With this, the A/C compressor clutch relay turns "ON", and the A/C compressor clutch operates.

TROUBLESHOOTING HINTS (The most likely causes for this case:)

- Malfunction of the A/C control system.
- Improper connector contact, open circuit or short-circuited harness wire.
- Malfunction of the ECU.
- Refer to component locations GROUP-70
- Refer to configuration diagrams GROUP-80
- Refer to circuit diagrams GROUP-90

DIAGNOSIS

STEP 1. Using diagnostic tool, check actuator test item 16: A/C Relay.

⚠ CAUTION

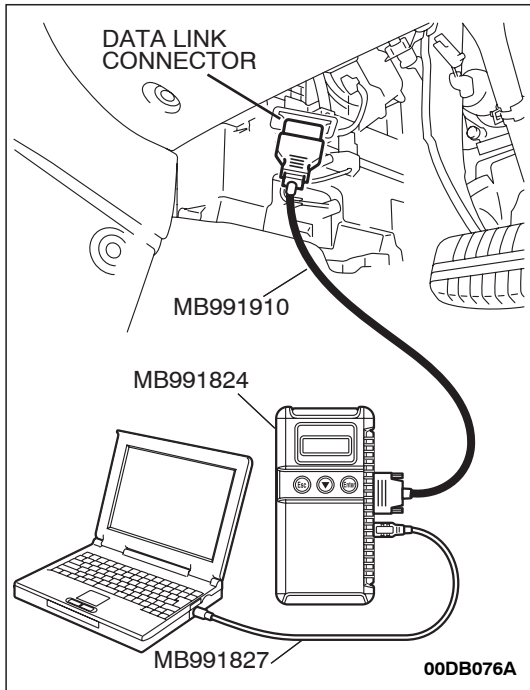
To prevent damage to diagnostic tool, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting diagnostic tool.

- (1) Connect diagnostic tool to the data link connector.
- (2) Turn the ignition switch to the "ON" position.
- (3) Set diagnostic tool to the actuator test mode for item 16, A/C Relay.
 - An operation sound of the relay should be heard.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the A/C Relay operating properly?

YES : Replace the ECU. Then confirm that the malfunction symptom is eliminated.

NO : Go to Step 2.

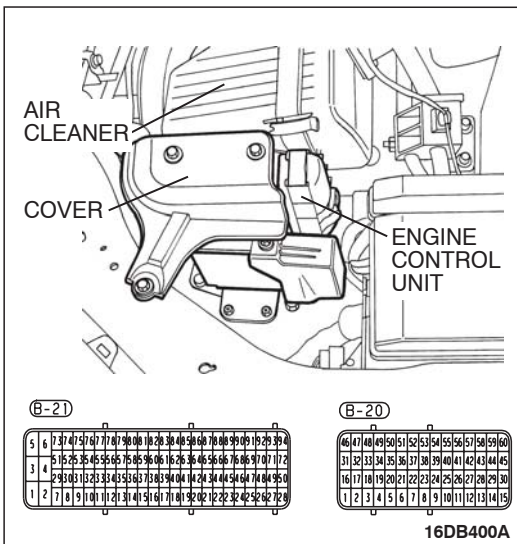


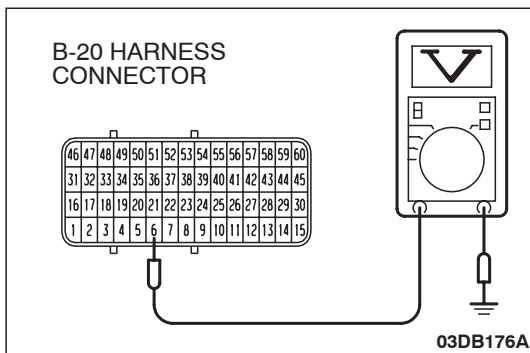
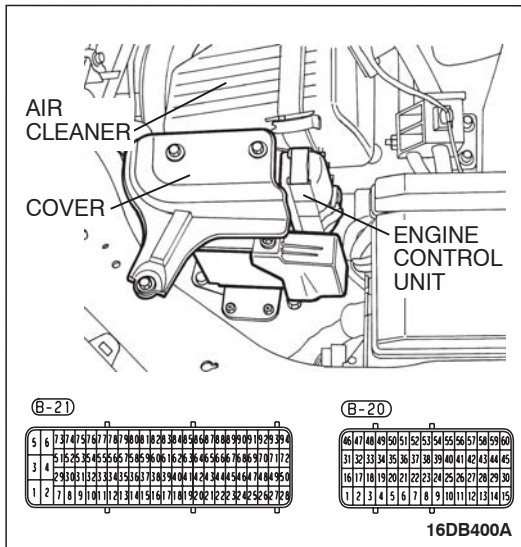
STEP 2. Check harness connector B-21 at ECU for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 3.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then confirm that the malfunction symptom is eliminated.





STEP 3. Check the circuit at ECU connector B-20.

- (1) Disconnect the connectors B-20 and measure at the harness side.
- (2) Turn the ignition switch to the "ON" position.

- (3) Measure the voltage between terminal No. 06 and ground.
 - Voltage should be battery positive voltage.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is there battery voltage at terminal No. 06?

YES : Replace the ECU. Then confirm that the malfunction symptom is eliminated.

NO : Refer to GROUP 55, Diagnosis – Introduction To Heater, Air Conditioning And Ventilation Diagnosis [P.55-5](#). Then confirm that the malfunction symptom is eliminated.

DATA LIST REFERENCE TABLE

M1131152001578

CAUTION

- When shifting the selector lever to D range, the brakes should be applied so that the vehicle does not move forward.
- Driving tests always need two persons: one driver and one observer.

NOTE: Sensor 1 indicates the sensor mounted at a position closest to the engine, and sensor 2 indicates the sensor mounted at the position second close to the engine.

NOTE: Bank 1 indicates the right bank cylinder, and bank 2 indicates the left bank cylinder

NOTE: *2: In a new vehicle [driven approximately 500 km or less], the injector drive time is sometimes 10% longer than the standard time.

ITEM NO.	INSPECTION ITEM	INSPECTION REQUIREMENT		NORMAL CONDITION	INSPECTION PROCEDURE NO.	REFERENCE PAGE
1	Power supply voltage	Ignition switch: "ON"		Battery positive voltage	Procedure No. 24	P.13A-604
2	Crank angle sensor	<ul style="list-style-type: none"> • Engine: cranking • Tachometer: connected 		Engine speeds displayed on the diagnostic tool and tachometer are identical.	Code No. P0335	P.13A-354
		Engine: idling	Engine coolant temperature is -20°C (-40°F)	1,300 – 1,500 r/min		
			Engine coolant temperature is 0°C (32°F)	1,300 – 1,500 r/min		
			Engine coolant temperature is 20°C (68°F)	1,300 – 1,500 r/min		
			Engine coolant temperature is 40°C (104°F)	1,040 – 1,240 r/min		
			Engine coolant temperature is 80°C (176°F)	680 – 750 r/min		
3	Target idle speed	Engine idling Coolant temp <60°C		710 r/pm	Code No. P0506 P0507	P.13A-419 P.13A-421
4	Vehicle speed	Actual vehicle speed matches displayed.		km/h	Code No. P0500	P.13A-399

ITEM NO.	INSPECTION ITEM	INSPECTION REQUIREMENT		NORMAL CONDITION	INSPECTION PROCEDURE NO.	REFERENCE PAGE
5	Intake air temperature sensor	Ignition switch: "ON" or with engine running	Intake air temperature is -20°C	-20°C	Code No. P0112, P0113	P.13A-116 , P.13A-120
			Intake air temperature is 0°C	0°C		
			Intake air temperature is 20°C	20°C		
			Intake air temperature is 40°C	40°C		
			Intake air temperature is 80°C	80°C		
6	Engine coolant temperature sensor	Ignition switch: "ON" or with engine running	Engine coolant temperature is -20°C	-20°C	Code No. P0116, P0117, P0118	P.13A-127 , P.13A-134 , P.13A-139
			Engine coolant temperature is 0°C	0°C		
			Engine coolant temperature is 20°C	20°C		
			Engine coolant temperature is 40°C	40°C		
			Engine coolant temperature is 80°C	80°C		
10	Airflow sensor	<ul style="list-style-type: none"> Engine coolant temperature 80-95°C Accessories off Transmission in "P" 	Engine idling	1348 – 1367 mV	Code No. P0101, P0102, P0103	P.13A-78 P.13A-81 P.13A-87
			2,500 rpm	1943 – 1983 mV		
			Engine revved	Mass airflow rate increases in response to revving		

ITEM NO.	INSPECTION ITEM	INSPECTION REQUIREMENT		NORMAL CONDITION	INSPECTION PROCEDURE NO.	REFERENCE PAGE
11	APS (main)	Ignition switch: "ON"	Release the accelerator pedal	435 to 1035 mV	Code No. P2122, P2123	P.13A-476 , P.13A-485
			Depress the accelerator pedal gradually	Increases in response to the pedal depression stroke		
			Depress the accelerator pedal fully	4000 to 4824 mV		
12	APS (sub)	Ignition switch: "ON"	Release the accelerator pedal	435 to 1035 mV	Code No. P2127, P2128	P.13A-493 , P.13A-502
			Depress the accelerator pedal gradually	Increases in response to the pedal depression stroke		
			Depress the accelerator pedal fully	4000 to 4824 mV		
13	TPS (main)	Ignition switch: "ON"	Release the accelerator pedal	1035 to 1250 mV	Code No. P0122, P0123 P2135	P.13A-148 , P.13A-155 P.13A-510
			Depress the accelerator pedal gradually	Increases in response to the pedal depression stroke		
			Depress the accelerator pedal fully	4000 to 4824 mV		
15	TPS (sub)	Ignition switch: "ON"	Release the accelerator pedal	1035 to 1250 mV	Code No. P0222, P0223 P2135	P.13A-318 P.13A-324 P.13A-510
			Depress the accelerator pedal gradually	Increases in response to the pedal depression stroke		
			Depress the accelerator pedal fully	4000 to 4824 mV		
16	Advance ignition	• Engine: Running	ENGINE ECU controlled	Varies depending on ECU requirement	-	-
		Cranking:	No throttle	-3 to -18 CA		
		Idling:	No throttle	1 to 5 CA		

ITEM NO.	INSPECTION ITEM	INSPECTION REQUIREMENT		NORMAL CONDITION	INSPECTION PROCEDURE NO.	REFERENCE PAGE
17	Injectors*2	<ul style="list-style-type: none"> Engine coolant temperature : 80 – 95°C (176 – 203°F) All accessories : "OFF" Transaxle: "P" range 	Engine is idling	1 - 2 ms	P0201, P0202, P0203, P0204, P0205, P0206	P.13A-272 P.13A-280 P.13A-287 P.13A-295 P.13A-302 P.13A-310
			2,500 r/min	1 - 3 ms		
			When engine is suddenly revved	1 - 4 ms		
23	A/C pressure sensor	<ul style="list-style-type: none"> Engine: running A/C switch: "ON" 		1275 – 1863 kPa	Procedure No. 28	P.13A-634
26	Long-term fuel trim bank 1	N/A				
27	Long-term fuel trim bank 2	N/A				
28	Short-term fuel trim bank 1	Engine: warming up, 2,500 r/min without any load (during closed loop)		-7.0 to 7.0%	Code No. P0171, P0172	P.13A-264 , P.13A-266
29	Short-term fuel trim bank 2	Engine: warming up, 2,500 r/min without any load (during closed loop)		-7.0 to 7.0 %	Code No. P0174, P0175	P.13A-268 , P.13A-270
32	Knock retard	Quick throttle "blips" idle to 3,000 rpm		0 - 4.2	Code No. P0325	P.13A-346
47	Fan duty	Ignition switch: "ON" or with engine running		0 to 100%	-	-
49	Purge control solenoid VAL. duty	Ignition switch: "ON"		0 to 100%	Code No. P0443	P.13A-389
58	Throttle actuator	Ignition switch: "ON"	Release the accelerator pedal	2 to 4 %	Code No. P2100, P2101, P2102, P2103	P.13A-455 P.13A-461 P.13A-466 P.13A-471
			Depress the accelerator pedal fully	100 %		
59	Target ETV value	Ignition switch: "ON"		1.1 V	Procedure No. 10	P.13A-573
72	Absolute engine load value	<ul style="list-style-type: none"> Engine coolant temperature : 80 – 95°C Transaxle:"P" range 	Engine is idling	17.3 %	Code No. P0106, P0107, P0108	P.13A-92 P.13A-101 P.13A-109
			2,500 r/min	14.9 %		
			Revving engine	Volumetric efficiency increases according to amount of revving.		

ITEM NO.	INSPECTION ITEM	INSPECTION REQUIREMENT		NORMAL CONDITION	INSPECTION PROCEDURE NO.	REFERENCE PAGE
73	Calculated load value	Engine: warming up	Engine is idling	22.7 %	—	—
			2,500 r/min	18.8 %		
74	Brake lamp switch	> 8V +		OFF	Code No. P1571	P.17-35
			Pedal applied	ON		
76	A/C switch 1	A/C switch: "ON"	A/C switch "OFF"	OFF	Procedure No. 28	P.13A-634
			A/C switch "ON"	ON		
79	Cranking signal	Ignition switch: "ON"	Engine: stopped	OFF	Procedure No. 26	P.13A-624
			Engine: cranking	ON		
83	Power steering pressure switch	Engine: idling	Steering wheel stationary	OFF	-	-
			Steering wheel turning	ON		
84	Idle position signal	Engine: idling	Signal	ON	Code No. P0506, P0507	P.13A-419 P.13A-421
		Engine: not idling	Signal	OFF		
85	Ignition switch	Ignition switch:	IGN switch "OFF"	OFF	Procedure No. 26	P.13A-624
			IGN switch "ON"	ON		
87	Neutral switch	Ignition switch: "ON"	A/T selector in "P,R,D"	OFF	Procedure No. 27	P.13A-628
			A/T selector in "N"	ON		
89	Normally closed brake switch	> 8V +		OFF	Code No. P1571	P.17-35
			Pedal applied	ON		
93	A/C compressor clutch relay	• Engine: warming up, idling • A/C switch: "OFF"		OFF	Procedure No. 28	P.13A-634
		• Engine: warming up, idling • A/C switch: "ON"	A/C compressor clutch is not operating	OFF		
			A/C compressor clutch is operating	ON		
95	Engine control relay	Battery 8V +		OFF	-	-
			Engine cranking/start	ON		

ITEM NO.	INSPECTION ITEM	INSPECTION REQUIREMENT		NORMAL CONDITION	INSPECTION PROCEDURE NO.	REFERENCE PAGE
97	Fuel pump relay	Ignition switch:"ON"	Fuel pump operates for 2 seconds & then stops	ON	Procedure No. 25	P.13A-613
			Pump stops after 2 seconds	OFF		
AA	Airflow sensor	<ul style="list-style-type: none"> Engine coolant temperature: 80 – 95°C Transaxle:"P" range 	Engine is idling	3 to 5 g/sec	Code No. P0101, P0102, P0103	P.13A-78 P.13A-81 P.13A-87
			2,500 rpm	13 to 16 g/sec		
			Revving engine	Increases in proportion to amount of revving.		
AB	TPS (main)	Ignition switch:"ON"	Release the accelerator pedal	0 %	Code No. P0122, P0123	P.13A-148 P.13A-155
			Depress the accelerator pedal fully	100 %		
AC	Oxygen sensor, bank 1, sensor 1 (front)	Engine: Warming up (Air/fuel mixture is made leaner when decelerating, and is made richer when revving.)	When the engine is running at 4,000 r/min, decelerate suddenly.	200 mV or less	Code No. P0130, P0131, P0132, P0133, P0134	P.13A-160 , P.13A-166 , P.13A-172 , P.13A-177 , P.13A-179
		Engine: Warm	When engine is suddenly revved.	600 – 1,000 mV		
		Engine: Warming up (the heated oxygen sensor signal is used to check the air/fuel mixture ratio, and control condition is also checked by the ECU.)	Engine is idling 2500 r/min	Voltage alternates quickly between 400mV or less and 600 – 1,000mV.		
AD	Oxygen sensor bank 1, sensor 2 (rear)	Engine: warming up	Revving	Alternates slowly between 0 and 600 – 1,000mV .	Code No. P0136, P0137, P0138, P0139	P.13A-186 , P.13A-192 , P.13A-198 , P.13A-203

ITEM NO.	INSPECTION ITEM	INSPECTION REQUIREMENT		NORMAL CONDITION	INSPECTION PROCEDURE NO.	REFERENCE PAGE
AE	Oxygen sensor bank 2, sensor 1 (front)	Engine: Warming up (air/fuel mixture is made leaner when decelerating, and is made richer when revving.)	When the engine is running at 4000 r/min, decelerate suddenly.	200mV or less	Code No. P0150, P0151, P0152, P0153, P0154	P.13A-212 , P.13A-218 , P.13A-224 , P.13A-229 , P.13A-231
		Engine: Warm	When engine is suddenly revved.	600 – 1,000mV		
		Engine: Warming up (the heated oxygen sensor signal is used to check the air/fuel mixture ratio, and control condition is also checked by the ECU)	Engine is idling 2,500 r/min	Voltage alternates quickly between 400mV or less and 600 – 1,000mV.		
AF	Oxygen sensor bank 2, sensor 2 (rear)	Engine: warming up	Revving	Alternates slowly between 0 and 600 – 1,000mV.	Code No. P0156, P0157, P0158, P0159	P.13A-238 , P.13A-244 , P.13A-250 , P.13A-255
BC	Relative TPS	Ignition switch:"ON"	Release the accelerator pedal	12.5 – 16.5%	Code No. P0222, P0223	P.13A-318 P.13A-324
BD	TPS (sub)	Ignition switch:"ON"		0 – 100%	Code No. P0222, P0223	P.13A-318 P.13A-324
105	Fuel system status bank 1 (right)	Engine: warming up	2,500 r/min	Closed loop	Code No. P0134	P.13A-179
			When engine is suddenly revved	Open loop – drive condition		
106	Fuel system status bank 2 (left)	Engine: warming up	2,500 r/min	Closed loop	Code No. P0154	P.13A-231
			When engine is suddenly revved	Open loop – drive condition		
107	Clutch switch	> 8V +		OFF	Code No. P0830	P.17-15
			Pedal applied	ON		

ACTUATOR TEST REFERENCE TABLE

M1131152500570

MUT-III DIAGNOS TIC TOOL DISPLAY	ITEM NO.	INSPECTION ITEM	DRIVE CONTENTS	INSPECTION REQUIREMENT	NORMAL CONDITION	INSPECTION PROCEDURE NO.	REFERENCE PAGE
	1	Injectors	Cut fuel to No.1 injector	Engine: warm up, idle (cut the fuel supply to each injector in turn and check cylinders which don't affect idling.)	Idling becomes unstable.	Code No. P0201	P.13A-272
	2		Cut fuel to No.2 injector			Code No. P0202	P.13A-280
	3		Cut fuel to No.3 injector			Code No. P0203	P.13A-287
	4		Cut fuel to No.4 injector			Code No. P0204	P.13A-295
	5		Cut fuel to No.5 injector			Code No. P0205	P.13A-302
	6		Cut fuel to No.6 injector			Code No. P0206	P.13A-310
	10	Purge control solenoid valve	Solenoid valve turns from OFF to ON.	Ignition switch: "ON"	Clicks when solenoid valve is driven.	Code No. P0443	P.13A-389
	14	PWM Radiator fan	Actuate fan motor	<ul style="list-style-type: none"> Ignition switch "ON" A/C switch "ON" 	Fan motor is rotated	Symptom chart	P.14-3
	16	A/C relay	Activate A/C relay	<ul style="list-style-type: none"> Ignition switch "ON" A/C switch "ON/OFF" 	Relay operates	-	-

CHECK AT THE ELECTRONIC CONTROL UNIT (ECU)

1. Disconnect the ECU connectors B-20 and B-21 and connect check harness special tool MB992044 between the ECU connectors.
2. Measure the voltage between each check harness connector terminal and check harness connector ground terminal (No. 25 or No. 29).

TERMINAL VOLTAGE CHECK CHART

Check Harness Special Tool MB992044 Connector Terminal Arrangement

(B-20)

46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

(B-21)

5	6	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94
3	4	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72
1	2	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
		7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28

03DB159A

(CONNECTOR HOUSING NO.) TERMINAL NO.	INSPECTION ITEM	INSPECTION CONDITION (ENGINE CONDITION)		NORMAL CONDITION
(B-21) - 71	Fan control	Ignition switch: "ON"		5 V fan off
		Carry out the actuator test to revolve the fan at high speed.		1 V or less
(B-21) - 92	Fuel pump relay	Ignition switch: "ON"		B+
		Engine: idling		1 V or less
(B-20) - 25	Sensor supplied voltage	Ignition switch: "ON"		4.9 – 5.1 V
(B-21) - 76				
(B-21) - 59	Accelerator pedal position sensor (main)	Ignition switch: "ON"	Release the accelerator pedal	0.996 V
			Depress the accelerator pedal fully	4.043 V
(B-21) - 81	Accelerator pedal position sensor (sub)	Ignition switch: "ON"	Release the accelerator pedal	0.996 V
			Depress the accelerator pedal fully	4.043 V
(B-21) - 75	Power supply voltage applied to accelerator pedal position sensor	Ignition switch: "ON"		4.9 – 5.1 V
(B-21) - 21	Brake lamp switch	Depress the brake pedal		B+
		Release the brake pedal		1 V or less
(B-21) - 16	Backup power supply	Ignition switch: "LOCK" (OFF)		B+
(B-21) - 70	Ignition switch-IG	Ignition switch: "ON"		B+
(B-20) - 05	Power supply	Ignition switch: "ON"		B+
(B-20) - 24	MPI relay (power supply)	Ignition switch: "LOCK" (OFF)		B+
		Ignition switch: "ON"		1 V or less

(CONNECTOR HOUSING NO.) TERMINAL NO.	INSPECTION ITEM	INSPECTION CONDITION (ENGINE CONDITION)		NORMAL CONDITION
(B-20) - 53	Power steering pressure switch	Engine: warming up, idling	When steering wheel is not turned	B+
			When steering wheel is turned	1V or less
(B-20) - 06	A/C compressor clutch relay	<ul style="list-style-type: none"> Engine: idling A/C switch: OFF→ ON (A/C compressor is operating) 		B+→ 1 V or less as A/C clutch cycles
(B-20) - 09	Ignition switch-ST	Engine: cranking		8 V or more
(B-20) - 15	Left bank heated oxygen sensor (front)	Engine: warming up, 2,500 r/min (check using a digital voltmeter)		0 ⇔ 0.8 V (changes repeatedly)
(B-20) - 45	Right bank heated oxygen sensor (front)	Engine: warming up, 2,500 r/min (check using a digital voltmeter)		0 ⇔ 0.8 V (changes repeatedly)
(B-20) - 56	Engine coolant temperature sensor	Ignition switch: "ON"	When engine coolant temperature is -20°C (-4°F)	3.9 – 4.5 V
			When engine coolant temperature is 0°C (32°F)	3.2 – 3.8 V
			When engine coolant temperature is 20°C (68°F)	2.3 – 2.9 V
			When engine coolant temperature is 40°C (104°F)	1.3 – 1.9 V
			When engine coolant temperature is 60°C (140°F)	0.7 – 1.3 V
			When engine coolant temperature is 80°C (176°F)	0.3 – 0.9 V
(B-20) - 10	Power supply voltage applied to throttle position sensor	Ignition switch: "ON"		4.9 – 5.1 V
(B-20) - 30	Left bank heated oxygen sensor (rear)	<ul style="list-style-type: none"> Engine: warming up Revving 		0 and 0.6 – 1.0 V alternates
(B-20) - 60	Right bank heated oxygen sensor (rear)	<ul style="list-style-type: none"> Engine: warming up Revving 		0 and 0.6 – 1.0 V alternates

(CONNECTOR HOUSING NO.) TERMINAL NO.	INSPECTION ITEM	INSPECTION CONDITION (ENGINE CONDITION)		NORMAL CONDITION
(B-20) - 57	Throttle position sensor (sub)	<ul style="list-style-type: none"> Remove the intake air hose at the throttle body. Ignition switch: "ON" Visually inspect throttle plate for full travel. 	Fully depress and release accelerator pedal. ⚠ WARNING <i>If the air intake duct is removed from the throttle body take great care to keep fingers away from the throttle plate. The drive motor has very high torque and is capable of random movement at any time. Do not under any circumstances activate the throttle plate by hand.</i>	1172 – 4043 mV
(B-20) - 42	Throttle position sensor (main)	<ul style="list-style-type: none"> Remove the intake air hose at the throttle body. Ignition switch: "ON" Visually inspect throttle plate for full travel. 	Fully depress and release accelerator pedal. ⚠ WARNING <i>If the air intake duct is removed from the throttle body take great care to keep fingers away from the throttle plate. The drive motor has very high torque and is capable of random movement at any time. Do not under any circumstances activate the throttle plate by hand.</i>	1172 – 4043 mV
(B-20) - 41	Manifold absolute pressure sensor	Ignition switch: "ON"	AT altitude of 0 m (0 ft.)	3.8 – 4.2 V
			AT altitude of 600 m (1,969 ft.)	3.5 – 3.9 V
			AT altitude of 1,200 m (3,937 ft.)	3.3 – 3.7 V
			AT altitude of 1,800 m (5,906 ft.)	3.0 – 3.4 V
		Engine: warming up, idling		0.6 – 1.4 V
		When engine is suddenly revved		Voltage Varies
(B-20) - 23	Crankshaft position sensor	Engine: cranking		0.4 - 4.0 V
		Engine: idling		2.0 - 3.0 V

(CONNECTOR HOUSING NO.) TERMINAL NO.	INSPECTION ITEM	INSPECTION CONDITION (ENGINE CONDITION)		NORMAL CONDITION
(B-20) - 38	Camshaft position sensor	Engine: cranking		0.4 - 4.0 V
		Engine: idling		2.9 - 3.9 V
(B-20) - 58	Intake air temperature sensor	Ignition switch: "ON"	When Intake air temperature is -20°C (-4°F)	3.8 - 4.4 V
			When Intake air temperature is 0°C (32°F)	3.2 - 3.8 V
			When Intake air temperature is 20°C (68°F)	2.3 - 2.9 V
			When Intake air temperature is 40°C (104°F)	1.5 - 2.1 V
			When Intake air temperature is 60°C (140°F)	0.8 - 1.4 V
			When Intake air temperature is 80°C (176°F)	0.4 - 1.0 V
(B-20) - 26	Mass airflow sensor	Engine: revving		Voltage increase in response to revving
(B-20) - 48	Left bank heated oxygen sensor heater (front)	Engine: warming up, idling (15 seconds after starting engine)		0 - 11 V at slow pulse rate
		Engine: revving		0 - 11 V at slow pulse rate
(B-20) - 47	Right bank heated oxygen sensor heater (front)	Engine: warming up, idling (15 seconds after starting engine)		0 - 11 V at slow pulse rate
		Engine: revving		0 - 11 V at slow pulse rate
(B-20) - 33	Left bank heated oxygen sensor heater (rear)	Engine: warming up, idling		0 - 11 V at slow pulse rate
		Engine: revving		0 - 11 V at slow pulse rate
(B-20) - 32	Right bank heated oxygen sensor heater (rear)	Engine: warming up, idling		0 - 11 V at slow pulse rate
		Engine: revving		0 - 11 V at slow pulse rate
(B-20) - 49	Throttle actuator control motor (-)	<ul style="list-style-type: none"> Ignition switch: "ON" Accelerator pedal: fully closed → fully opened 		Decreases slightly AC voltage.
(B-20) - 50	Throttle actuator control motor (+)	<ul style="list-style-type: none"> Ignition switch: "ON" Accelerator pedal: fully opened → fully closed 		Decreases slightly AC voltage.
(B-20) - 21	Evaporative emission purge solenoid	Ignition switch: "ON"		B+
		Engine: warm up, 3,000 r/min (within 3 minutes after the engine starting sequence is completed)		B+ to 0.1V pulses

(CONNECTOR HOUSING NO.) TERMINAL NO.	INSPECTION ITEM	INSPECTION CONDITION (ENGINE CONDITION)	NORMAL CONDITION
(B-20) - 07	Ignition coil – No. 1 (ignition power transistor)	Engine: 3,000 r/min	0.3 – 3.0 V using oscilloscope
(B-20) - 22	Ignition coil – No. 2 (ignition power transistor)		
(B-20) - 36	Ignition coil – No. 3 (ignition power transistor)		
(B-20) - 51	Ignition coil – No. 4 (ignition power transistor)		
(B-20) - 37	Ignition coil – No. 5 (ignition power transistor)		
(B-20) - 52	Ignition coil – No. 6 (ignition power transistor)		
(B-20) - 03	No. 1 injector	<ul style="list-style-type: none"> • Engine: warming up, idling • Suddenly depress the accelerator pedal 	From 9 – 13 V using oscilloscope
(B-20) - 04	No. 2 injector		
(B-20) - 34	No. 3 injector		
(B-20) - 35	No. 4 injector		
(B-20) - 16	No. 5 injector		
(B-20) - 17	No. 6 injector		

TERMINAL RESISTANCE AND CONTINUITY CHECK

ECU Harness Connector Terminal Arrangement

(B-20)

46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

(B-21)

5	6	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94
		51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72
3	4	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
1	2	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28

03DB160A

(CONNECTOR HOUSING NO.) TERMINAL NO.	INSPECTION ITEM	NORMAL CONDITION (INSPECTION CONDITION)
(B-21) - 04 to Body ground	ECU ground	Continuity (2 Ω or less)
(B-21) - 04 to Body ground	ECU ground	
(B-20) - 12-56	Engine coolant temperature sensor	14.10 – 15.46 kΩ [when engine coolant temperature is –20°C (–4°F)]
		5.47 – 5.90 kΩ [when engine coolant temperature is 0°C (32°F)]
		2.35 – 2.50 kΩ [when engine coolant temperature is 20°C (68°F)]
		1.12 – 1.18 kΩ [when engine coolant temperature is 40°C (104°F)]
		0.573 – 0.596 kΩ [when engine coolant temperature is 60°C (140°F)]
		0.313 – 0.323 kΩ [when engine coolant temperature is 80°C (176°F)]
(B-20) - 11-58	Intake air temperature sensor	12.660 – 15.120 kΩ [when intake air temperature is –20°C (–4°F)]
		5.119 – 5.892 kΩ [when intake air temperature is 0°C (32°F)]
		2.290 – 2.551 kΩ [when intake air temperature is 20°C (68°F)]
		1.096 – 1.238 kΩ [when intake air temperature is 40°C (104°F)]
		0.565 – 0.654 kΩ [when intake air temperature is 60°C (140°F)]
		0.312 – 0.370 kΩ [when intake air temperature is 80°C (176°F)]
(B-20) - 05-48	Left bank heated oxygen sensor heater (front)	9.0 – 11.0 Ω [at 20°C (68°F)]
(B-20) - 05-47	Right bank heated oxygen sensor heater (front)	9.0 – 11.0 Ω [at 20°C (68°F)]
(B-20) - 05-33	Left bank heated oxygen sensor heater (rear)	9.0 – 11.0 Ω [at 20°C (68°F)]

(CONNECTOR HOUSING NO.) TERMINAL NO.	INSPECTION ITEM	NORMAL CONDITION (INSPECTION CONDITION)
(B-20) - 05-32	Right bank heated oxygen sensor heater (rear)	9.0 – 11.0 Ω [at 20°C (68°F)]
(B-20) - 49-50	Throttle actuator control motor	1.5 \pm 0.3 Ω [at 20°C (68°F)]
(B-20) - 05-21	Evaporative emission purge solenoid	16 Ω [at 20°C (68°F)]
(B-20) - 05-03	No. 1 injector	10.5 – 13.5 Ω [at 20°C (68°F)]
(B-20) - 05-04	No. 2 injector	
(B-20) - 05-34	No. 3 injector	
(B-20) - 05-35	No. 4 injector	
(B-20) - 05-16	No. 5 injector	
(B-20) - 05-17	No. 6 injector	

INSPECTION PROCEDURE USING AN OSCILLOSCOPE

M1131154501085

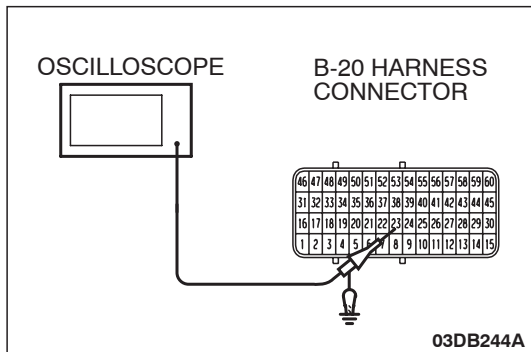
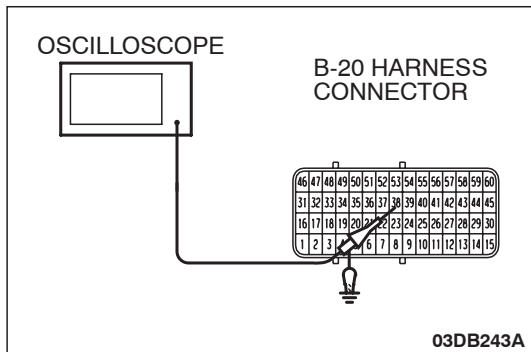
CAMSHAFT POSITION SENSOR AND CRANKSHAFT POSITION SENSOR

Required Special Tools:

- MB992044: ECU Check Harness

Measurement Method

1. Disconnect the all ECU connectors, and connect check harness special tool (MB992044) between the separated connectors.
2. Connect the oscilloscope to check harness terminal No. 38. (Check the camshaft position sensor signal wave pattern.)

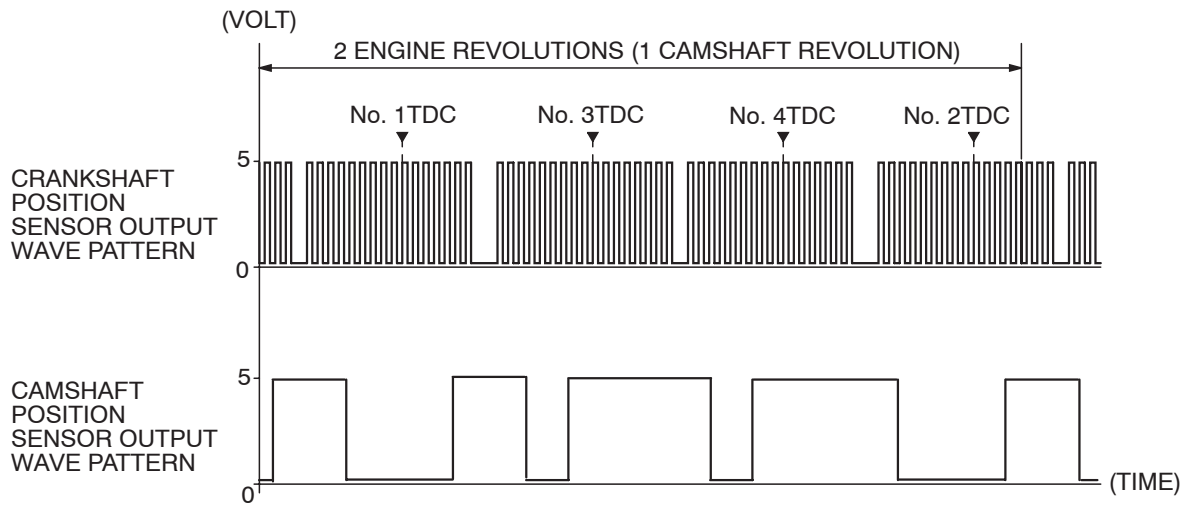


3. Connect the oscilloscope to check harness terminal No. 23. (Check the crankshaft position sensor signal wave pattern.)

Standard Wave Pattern

Observation condition	
Function	Special pattern
Pattern height	Low
Pattern selector	Display
Engine r/min	Idle speed

Standard wave pattern



03DB259A

Wave Pattern Observation Points

1. Check that cycle time becomes shorter when the engine speed increased.

Examples of Abnormal Wave Patterns

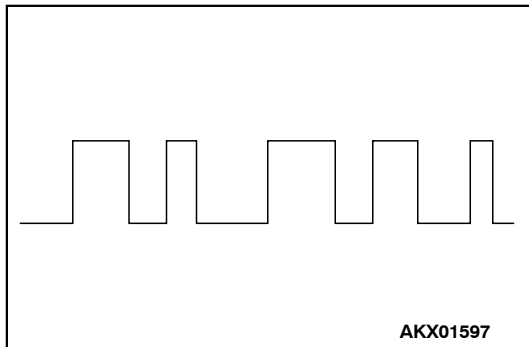
Example 1

Cause of problem

- Sensor interface malfunction.

Wave pattern characteristics

- Rectangular wave pattern is output even when the engine is not started.



AKX01597

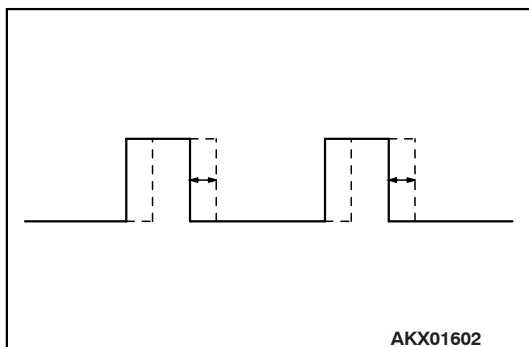
Example 2

Cause of problem

- Loose timing belt.
- Abnormality in sensor disc.

Wave pattern characteristics

- Wave pattern is displaced to the left or right.



AKX01602

INJECTOR

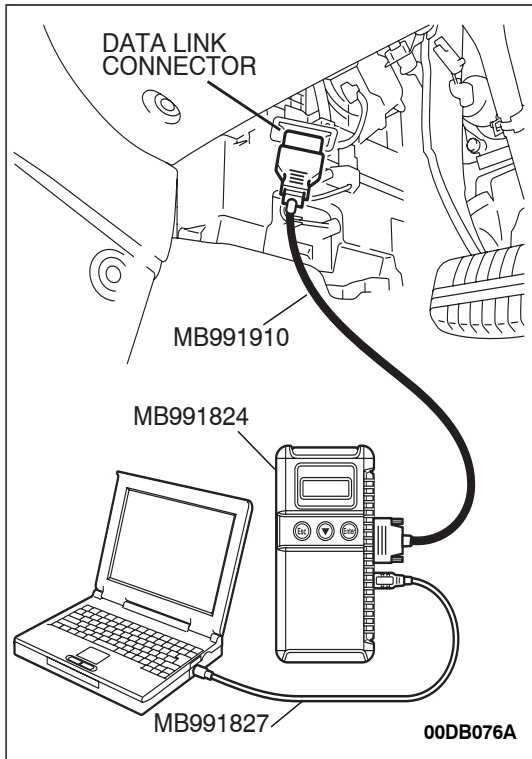
Required Special Tools:

- MB991658: Test Harness
- MB992044: ECU Check Harness

Measurement Method 1

Perform a Power balance Test on all cylinders.

1. Connect MUT III to vehicle and go to Data item list.
2. Scroll to Item No. 72, Absolute load value and lock. Also lock Item No. 2, Crank angle sensor (engine speed).
3. Go to Actuator test and select Item No. 1, No.1 Injector.
4. Start engine and allow to idle.
5. Perform actuator test on each injecto from 1 to 6 and record the engine load and speed during each actuator test.
6. Check recorded values for variations between cylinders. If all injectors are operating correctly there should be minimal difference between load and engine speed values for all cylinders.



Measurement Method 2

<Measure at the right bank (number 1, 3, 5 cylinders)>

1. Disconnect the intermediate connector B-32, and connect the test harness special tool (MB991658) between the separated connector.

2. Connect the oscilloscope probe to each intermediate connector B-32 terminal to analyze each cylinder:

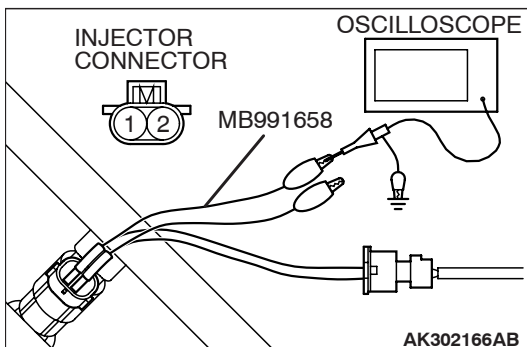
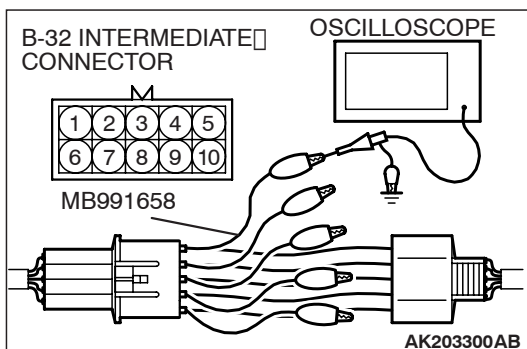
- Terminal No. 5 for the number 1 cylinder
- Terminal No. 10 for the number 3 cylinder
- Terminal No. 4 for the number 5 cylinder

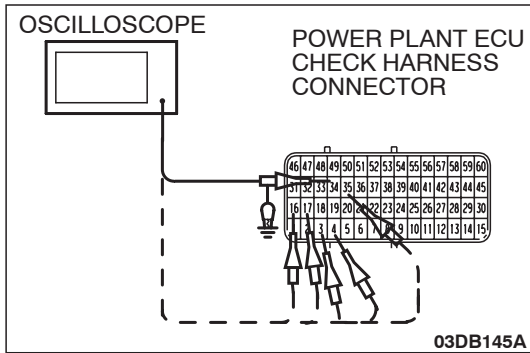
<Measure at the right bank (number 2, 4, 6 cylinders)>

1. Disconnect the injector connector, and connect the test harness special tool (MB991658) between the separated connector. (All terminals should be connected.)
2. Connect the oscilloscope probe to injector connector terminal No. 2.

Alternate method (Measure at the ECU)

Disconnect the all ECU connectors, and connect check harness special tool (MB992044) between the separated connectors.



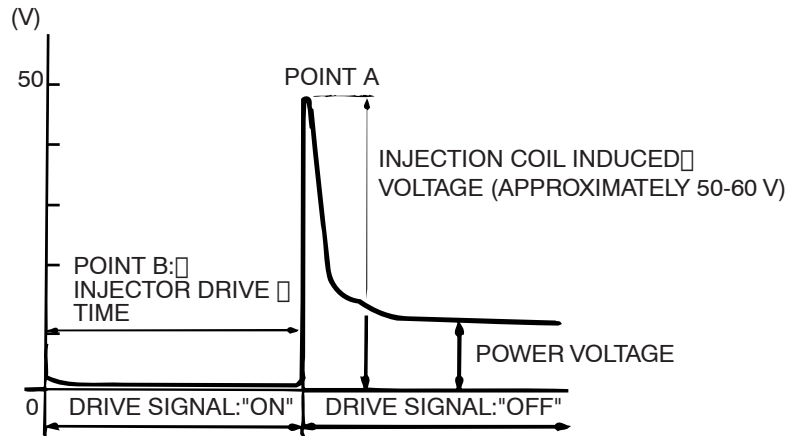


3. Connect the oscilloscope probe to each check harness connector terminal to analyze each cylinder:
- Terminal No. 153 for the number 1 cylinder.
 - Terminal No. 146 for the number 2 cylinder.
 - Terminal No. 140 for the number 3 cylinder.
 - Terminal No. 139 for the number 4 cylinder.
 - Terminal No. 133 for the number 5 cylinder.
 - Terminal No. 127 for the number 6 cylinder.

Standard Wave Pattern

Observation conditions	
Function	Special pattern
Pattern height	Variable
Variable knob	Adjust while viewing the wave pattern
Pattern selector	Display
Engine r/min	Idle speed

Standard wave pattern

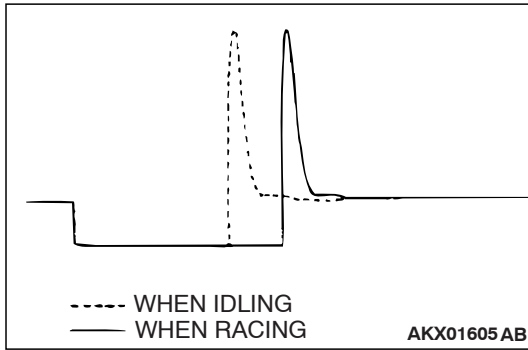


AKX01604 AB

Wave Pattern Observation Points

Point A: Height of injector coil induced voltage.

CONTRAST WITH STANDARD WAVE PATTERN	PROBABLE CAUSE
Injector coil induced voltage is low or doesn't appear at all	Short in the injector solenoid



Point B: Injector drive time

1. The injector drive time should be synchronized with the diagnostic tool display.
2. When the engine is suddenly revved, the drive time will be greatly extended at first, but the drive time will soon return to original length.

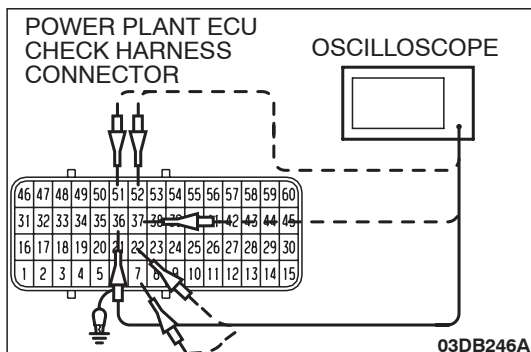
IGNITION COIL AND IGNITION POWER TRANSISTOR

Required Special Tools:

- MB992044: ECU Check Harness

Measurement Method

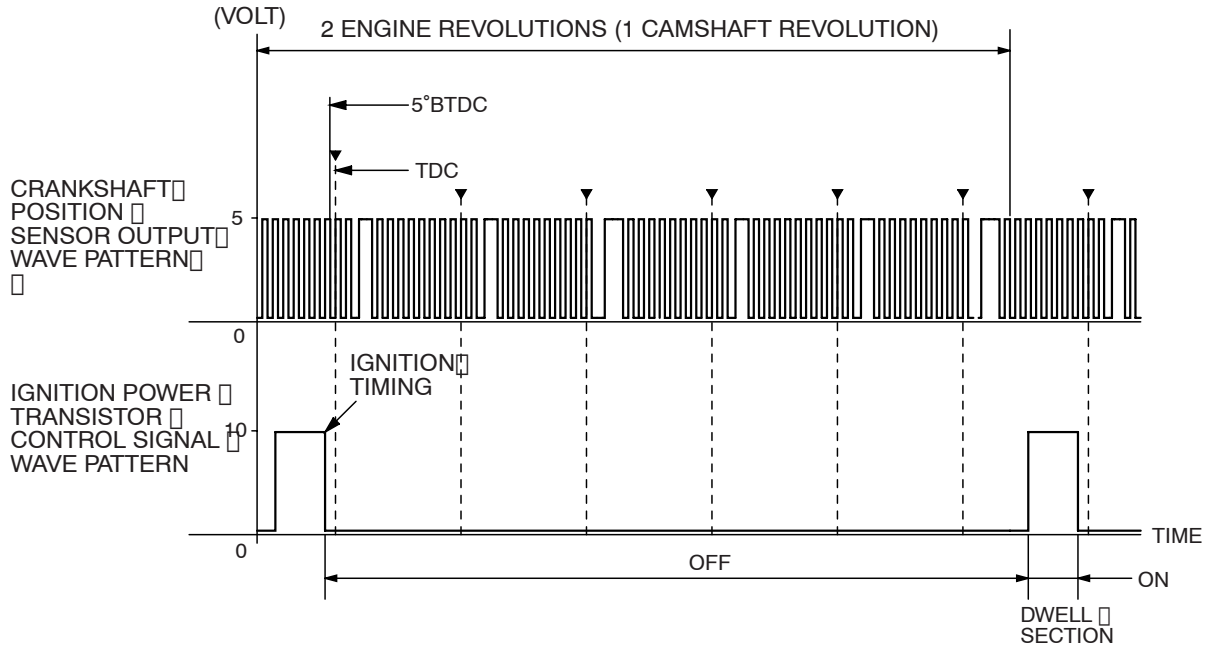
1. Disconnect the all ECU connectors, and connect check harness special tool (MB992044) between the separated connectors.
2. Connect the oscilloscope probe to each check harness connector terminal to analyze each cylinder:
 - Terminal No. 151 for the number 1 cylinder.
 - Terminal No. 150 for the number 2 cylinder.
 - Terminal No. 144 for the number 3 cylinder.
 - Terminal No. 148 for the number 4 cylinder.
 - Terminal No. 143 for the number 5 cylinder.
 - Terminal No. 134 for the number 6 cylinder.



Standard Wave Pattern

Observation condition	
Function	Special pattern
Pattern height	Low
Pattern selector	Display
Engine r/min	Idle speed

Standard wave pattern



AK203308AC

Wave Pattern Observation Points

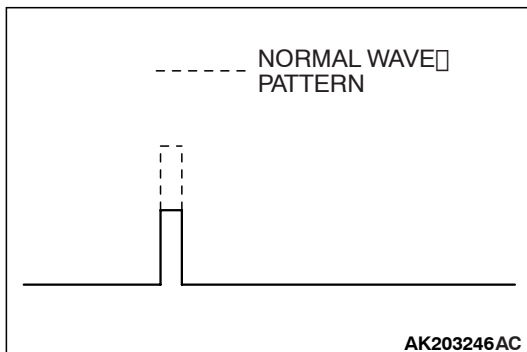
Point: The power transistor control signal (ignition timing) is advanced when the engine speed is increased.

CONDITION OF WAVE PATTERN BUILD-UP SECTION AND MAXIMUM VOLTAGE	PROBABLE CAUSE
Voltage value is too low	Open-circuit in ignition primary circuit

Examples of Abnormal Wave Patterns

Example 1 (Wave pattern during engine cranking)

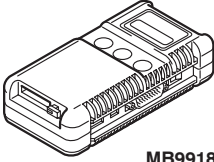
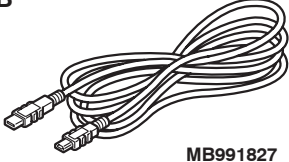
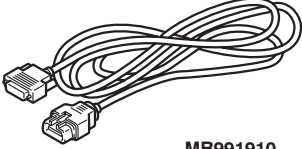
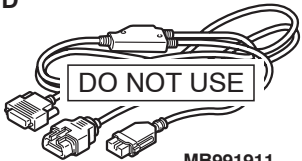
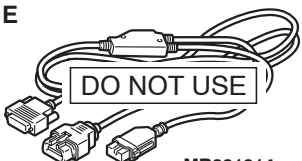
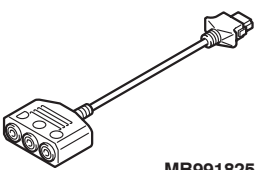
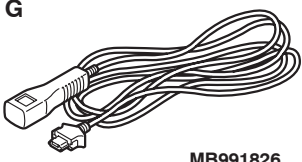
- Cause of problem
Open-circuit in ignition primary circuit
- Wave pattern characteristics
Voltage value is too low.



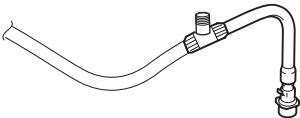


AK203246AC

SPECIAL TOOLS

M1131000601293

TOOL	TOOL NUMBER AND NAME	SUPERSESSION	APPLICATION
<p>A</p>  <p>MB991824</p> <p>B</p>  <p>MB991827</p> <p>C</p>  <p>MB991910</p> <p>D</p>  <p>MB991911</p> <p>E</p>  <p>MB991914</p> <p>F</p>  <p>MB991825</p> <p>G</p>  <p>MB991826 MB991958</p>	<p>A: MB991824 B: MB991827 C: MB991910 D: MB991911 E: MB991914 F: MB991825 G: MB991826</p> <p>MUT-III sub assembly A: Vehicle Communication Interface (V.C.I.) B: MUT-III USB Cable C: MUT-III Main Harness A (Vehicles with CAN communication system) D: MUT-III Main Harness B (Vehicles without CAN communication system) E: MUT-III Main Harness C (for Daimler Chrysler models only) F: MUT-III Measurement Adapter G: MUT-III Trigger Harness</p>	<p>MB991824-KIT <i>NOTE: G: MB991826 MUT-III Trigger Harness is not necessary when pushing V.C.I. ENTER key.</i></p>	<ul style="list-style-type: none"> Reading diagnostic trouble code MFI system inspection Measurement of fuel pressure <p>CAUTION For vehicles with CAN communication, use MUT-III main harness A to send simulated vehicle speed. If you connect MUT-III main harness B instead, the CAN communication does not function correctly.</p>
	<p>MB992044 ECU check harness</p>	<p>MD998478-01</p>	<ul style="list-style-type: none"> Inspection using an oscilloscope Inspection of the electronic control unit (ECU) terminal voltage check

TOOL	TOOL NUMBER AND NAME	SUPERSESSION	APPLICATION
	MD998478 Test harness (3 pin, triangle)	MD998478-01	<ul style="list-style-type: none"> • Inspection using an oscilloscope
 MB991637	MB991637 Fuel pressure gauge set	Tool not available	<ul style="list-style-type: none"> • Measurement of fuel pressure
 03DB257A	TBA Adaptor hose		Measurement of fuel pressure

ON-VEHICLE SERVICE

COMPONENT LOCATION

- Refer to component locations GROUP70

THROTTLE BODY (THROTTLE VALVE AREA) CLEANING

M1131001000503

WARNING

If the air intake duct is removed from the throttle body take great care to keep fingers away from the throttle plate. The drive motor has very high torque and is capable of random movement at any time. Do not under any circumstance activate the throttle plate by hand.

When removing the throttle body from the intake manifold disconnect the wiring first. During replacement connect the wiring last.

Do not activate the throttle body using a DC supply to test the motor, as permanent damage to the throttle body will result.

1. Remove the throttle body.

CAUTION

- Do not spray the cleaning solvent directly to the throttle valve.
 - Make sure the cleaning solvent does not enter the motor and the sensor through the shaft.
2. Spray cleaning solvent on a clean cloth.
 3. Wipe off the dirt around the throttle valve with the cloth sprayed with cleaning solvent.
 4. Attach the throttle body.

FUEL PRESSURE TEST

Required Special Tools:

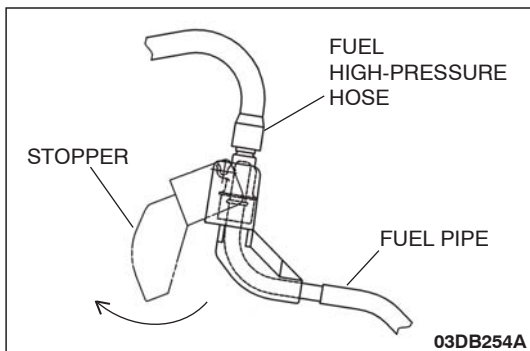
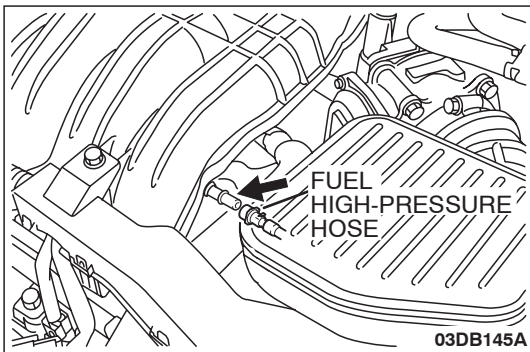
- Diagnostic tool(MUT-III Sub Assembly)
 - MB991824: V.C.I.
 - MB991827: USB Cable
 - MB991910: Main Harness A
- MB991637: Fuel Pressure Gauge Set
- **TBA: Adaptor Hose**

1. Release residual pressure from the fuel line to prevent fuel spray. (Refer to [P.13A-663.](#))

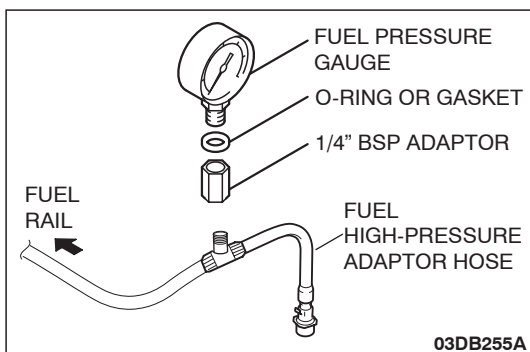
⚠ WARNING

To prevent a fire, cover the hose connection with shop towels to prevent splashing of fuel that could be caused by some residual pressure in the fuel pipe line.

2. Disconnect the fuel high-pressure hose at the fuel rail side.

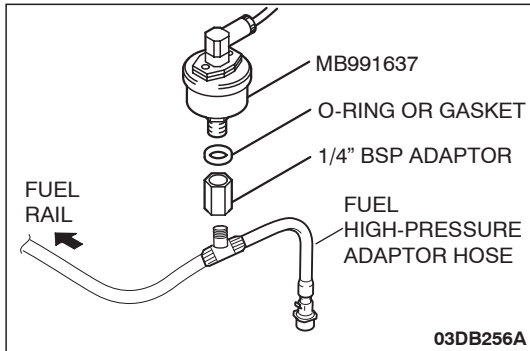


3. Disconnect the fuel high pressure hose at the fuel pipe side by unclipping and rotating up the stopper then releasing the quick release fitting. Remove the high pressure hose from vehicle.



<When using the fuel pressure gauge>

1. Use a suitable 1/4" BSP adaptor between fuel hose and Gauge. Attach the gauge and fitting to the adaptor hose.
2. Install the assembled fuel pressure measurement tools to the vehicle between the fuel rail and fuel pipe. For correct hose fittment Refer to Fuel Hose Installation [P.13A-673](#)



<When using special tool MB991637 (fuel pressure gauge set)>

1. Use a suitable 1/4" BSP adaptor between fuel hose and special tool MB991637. Attach the special tool and fitting to the adaptor hose.
2. Install the assembled fuel pressure measurement tools to the vehicle between the fuel rail and fuel pipe. For correct hose fitment Refer to Fuel Hose Installation [P.13A-673](#)

4. Turn the Ignition to "ON" listen for fuel pump actuation (Approx. 2 seconds). Check that there is no fuel leaking from any section when the fuel pump is operating.

NOTE: As the fuel pump is an in-tank type, the fuel pump sound is hard to hear. Remove the fuel tank filler tube cap and check from the tank inlet.

5. Start the engine and run at idle.
6. Measure fuel pressure while the engine is running at idle.

Standard value: Approximately 324 kPa (95.7 in.Hg) at curb idle

7. Check to see that fuel pressure at idle does not drop even after the engine has been revved several times.
8. If any of fuel pressure measured in steps 8 to 9 is out of specification, troubleshoot and repair according to the table below.

SYMPTOM	PROBABLE CAUSE	REMEDY
<ul style="list-style-type: none"> Fuel pressure too low Fuel pressure drops after racing 	Clogged fuel filter	Replace fuel filter
	Fuel leaking to return side due to poor fuel regulator valve seating or settled spring	Replace fuel pump
	Low fuel pump delivery pressure	Replace fuel pump
Fuel pressure too high	Binding valve in fuel pressure regulator	Replace fuel pump

9. Stop the engine and observe fuel pressure gauge reading. It is normal if the reading does not drop within two minutes. If it does, observe the rate of drop and troubleshoot and repair according to the table below. Start, then stop the engine.
 - (1) Squeeze the fuel supply line closed to confirm leak-down occurs from defective fuel pump check valve.
 - (2) If pressure continues to drop with both fuel lines squeezed closed, injector(s) are leaking.

SYMPTOM	PROBABLE CAUSE	REMEDY
Fuel pressure drops gradually after engine is stopped	Leaky injector	Replace injector
	Leaky fuel regulator valve seat	Replace fuel pressure regulator
Fuel pressure drops sharply immediately after engine is stopped	Check valve in fuel pump is held open	Replace fuel pump

10. Release residual pressure from the fuel pipe line. (Refer to [P.13A-663.](#))

⚠ WARNING

Cover the hose connection with shop towels to prevent splash of fuel that could be caused by some residual pressure in the fuel pipe line.

11. Remove the fuel pressure gauge, and special tools from the fuel rail.
12. Insert fuel hose quick connector onto fuel rail pipe, taking care not to damage or dislodge O-ring. Push connector onto pipe firmly and depress clip to attach. Check that connector does not dislodge when pulled firmly.
13. Check for fuel leaks.
 - (1) Turn the ignition to "ON" to operate the fuel pump.
 - (2) Check the fuel line for leaks and repair as needed.

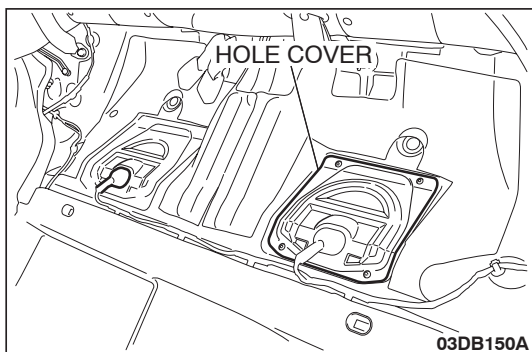
**FUEL PUMP CONNECTOR DISCONNECTION
(HOW TO REDUCE PRESSURIZED FUEL LINES)**

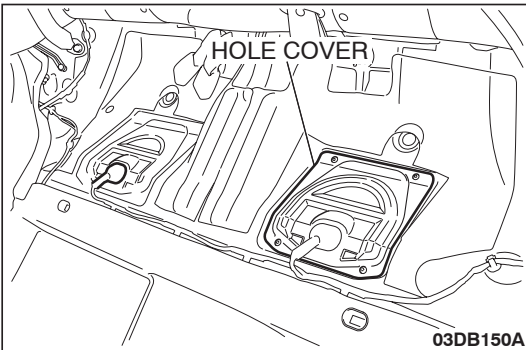
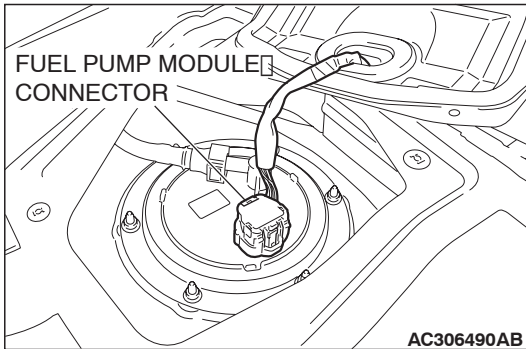
M1131000900622

⚠ WARNING

When removing the fuel pipe, etc., release fuel pressure to prevent fuel spray.

1. Remove the rear seat cushion assembly (Refer to GROUP 52A, Rear Seat [P.52A-55](#)).
2. Remove the hole cover (LHS).





3. Disconnect the fuel pump module connector.
4. After starting the engine and letting it run until it stops naturally, turn the ignition switch to the "LOCK" (OFF) position.
5. Connect the fuel pump module connector.
6. Install the hole cover (LHS).
Tightening torque: 1.5 ± 0.5 N·m (14 ± 4 in-lb)
7. Install the rear seat cushion assembly (Refer to GROUP 52A, Rear Seat Assembly [P.52A-55](#)).

FUEL PUMP OPERATION CHECK

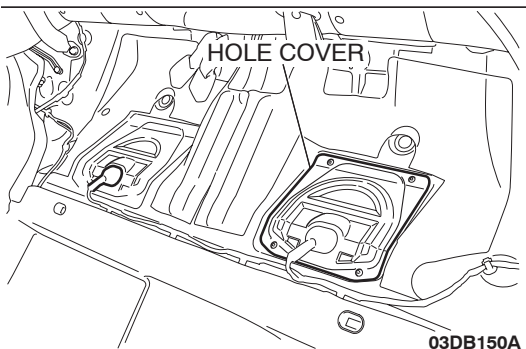
M1131002000692

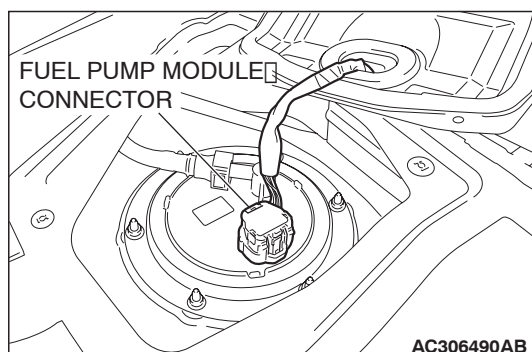
1. If the fuel pump will not operate, check by using the following procedure. If normal, check the fuel pump drive circuit.

- (1) Turn the ignition switch to "ON". Listen for fuel pump running for approximately 2 seconds. Pump will automatically stop after this time.

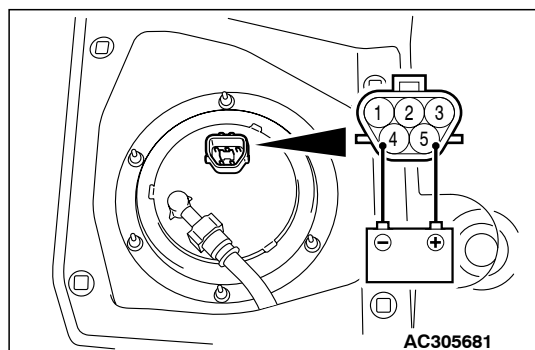
NOTE: As the fuel pump is an in-tank type, the fuel pump sound is hard to hear. Remove the fuel tank filler tube cap and check from the tank inlet.

- (2) Remove the rear seat cushion assembly (Refer to GROUP 52A, Rear Seat [P.52A-55](#)).
- (3) Remove the hole cover (LHS).





- (4) Disconnect the fuel pump module connector.



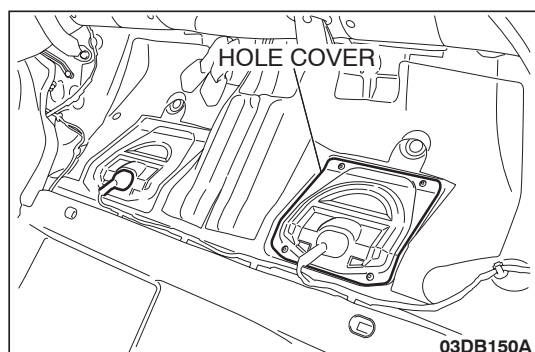
- (5) Attach 12 Volt supply to fuel pump, terminal no. 4 to earth and terminal no.5 to power. Check if the sound of the fuel pump operation can be heard. If no operating sound is heard, replace the fuel pump module (Refer to GROUP 13B, On-vehicle Service – Fuel Pump Module Replacement [P.13B-6](#)).

NOTE: As the fuel pump is an in-tank type, the fuel pump sound is hard to hear. Remove the fuel tank filler tube cap and check from the tank inlet.

- (6) Check for fuel pressure by pinching the fuel hose with fingertips.
(7) Connect the fuel pump module connector.
(8) Install the hole cover (LHS).

Tightening torque: 1.5 ± 0.5 N·m (14 ± 4 in-lb)

- (9) Install the rear seat cushion assembly (Refer to GROUP 52A, Rear Seat Assembly [P.52A-55](#)).

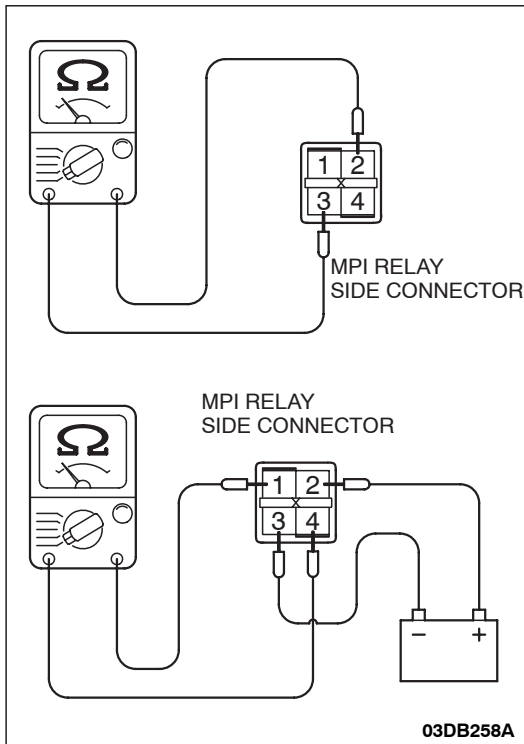


MULTIPOINT FUEL INJECTION (MPI) RELAY CONTINUITY CHECK

M1131050000345

Inspect the MPI relay for continuity in accordance with the chart shown below.

BATTERY VOLTAGE	TERMINAL NO. TO BE CONNECTED TO BATTERY	TERMINAL NO. TO BE CONDUCTED
Not supplied	–	2 – 3
Supplied	2 – 3	1 – 4

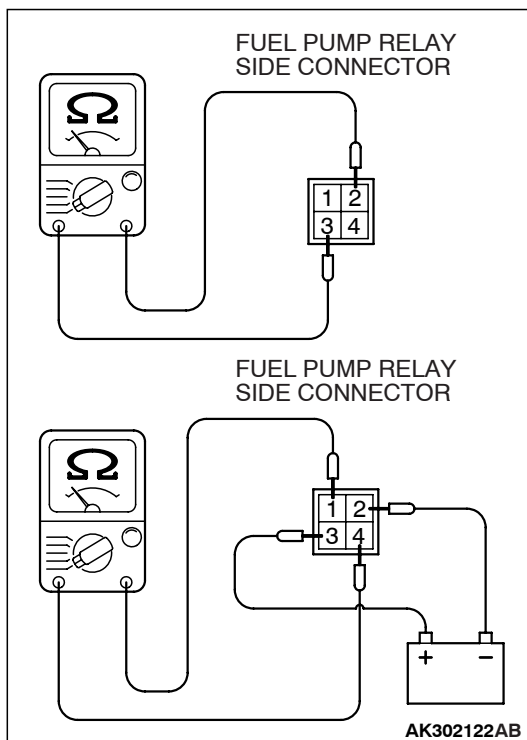


FUEL PUMP RELAY CONTINUITY CHECK

M1131033000342

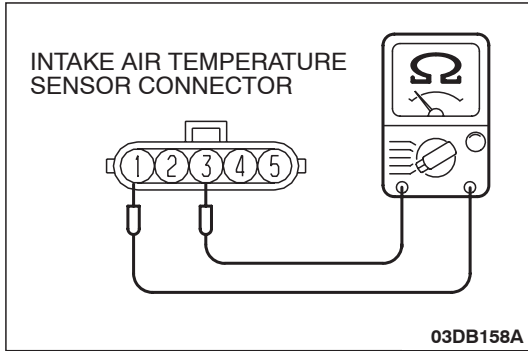
Inspect the fuel pump relay for continuity in accordance with the chart shown below.

BATTERY VOLTAGE	TERMINAL NO. TO BE CONNECTED TO BATTERY	TERMINAL NO. TO BE CONDUCTED
Not supplied	–	2 – 3
Supplied	2 – 3	1 – 4



INTAKE AIR TEMPERATURE SENSOR CHECK

M1131002800557



1. Disconnect the mass airflow sensor connector. (Refer to GROUP 15, Air Cleaner, Removal and Installation P.15-4)
2. Measure resistance between terminals 1 and 3.

Standard value:

12.66 – 15.12 kΩ [at -20°C (-4°F)]
5.119 – 5.892 kΩ [at 0°C (32°F)]
2.290 – 2.551 kΩ [at 20°C (68°F)]
1.096 – 1.258 kΩ [at 40°C (104°F)]
0.565 – 0.654 kΩ [at 60°C (140°F)]
0.312 – 0.370 kΩ [at 80°C (176°F)]

3. If not within specifications, replace the mass airflow sensor.
4. Measure resistance while heating the sensor using a hair dryer.

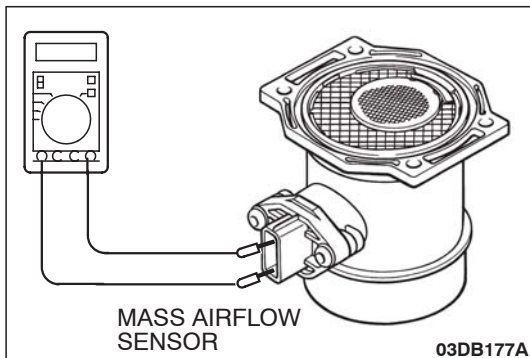
Normal condition:

TEMPERATURE	RESISTANCE (kΩ)
Higher	Smaller

5. If resistance does not decrease as heat increases, replace the mass airflow sensor.

⚠ CAUTION

Do not remove Air Temperature Sensor unit from the housing. If sensor is faulty replace complete Air Flow Sensor assembly.



ENGINE COOLANT TEMPERATURE SENSOR CHECK

M1131003100528

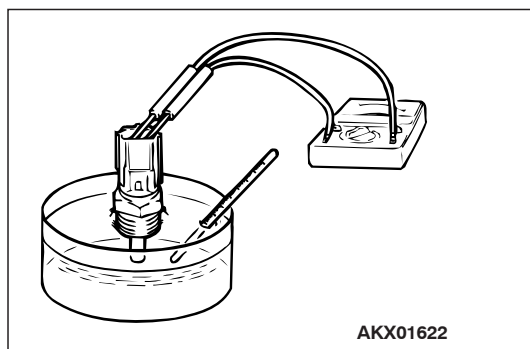
⚠ CAUTION

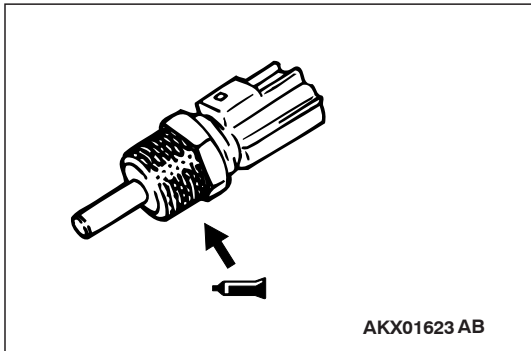
Be careful not to touch the connector (resin section) with the tool when removing and installing.

1. Drain engine coolant, then remove the engine coolant temperature sensor.
2. With the temperature sensing portion of engine coolant temperature sensor immersed in hot water, check the resistance.

Standard value:

14 – 17 kΩ [at -20°C (-4°F)]
5.5 – 6.3 kΩ [at 0°C (32°F)]
2.35 – 2.65 kΩ [at 20°C (68°F)]
1.12 – 1.23 kΩ [at 40°C (104°F)]
0.573 – 0.618 kΩ [at 60°C (140°F)]
0.313 – 0.332 kΩ [at 80°C (176°F)]





3. If resistance deviates from the standard value greatly, replace the sensor.
4. Apply 3M™ AAD part number 8731 or equivalent to threaded portion.
5. Install the engine coolant temperature sensor and tighten it to the specified torque.

Tightening torque: 18 to 25 N·m

HEATED OXYGEN SENSOR CHECK

M1131005000691

Required Special Tools:

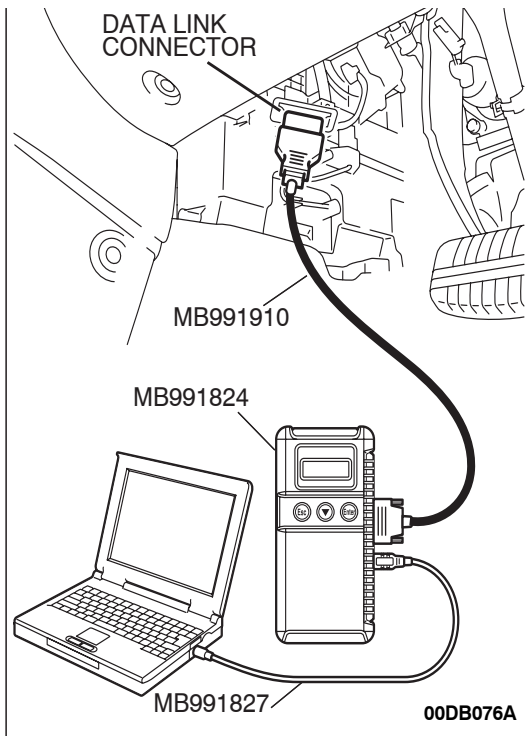
- Diagnostic tool(MUT-III Sub Assembly)
 - MB991824: V.C.I.
 - MB991827: USB Cable
 - MB991910: Main Harness A
- MB992044: Test Harness

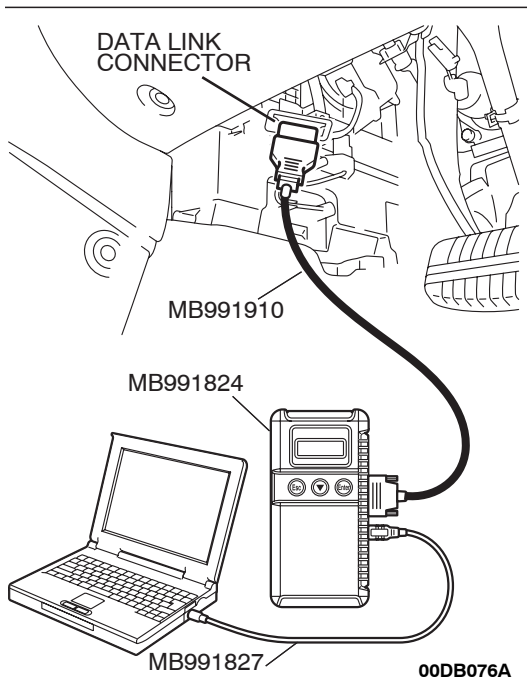
STEP 1. Using diagnostic tool, check data list.

CAUTION

To prevent damage to diagnostic tool, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting diagnostic tool.

1. Connect diagnostic tool to the data link connector.
2. Start the engine and run at idle.
3. Set the diagnostic tool to display the Data List for MPI. Check the following items in the data list. Refer to Data List Reference Table [P.13A-637](#).
 - (1) Item AC: Right Bank Heated Oxygen Sensor (front).
 - (2) Item AD: Right Bank Heated Oxygen Sensor (rear).
 - (3) Item AE: Left Bank Heated Oxygen Sensor (front).
 - (4) Item AF: Left Bank Heated Oxygen Sensor (rear).

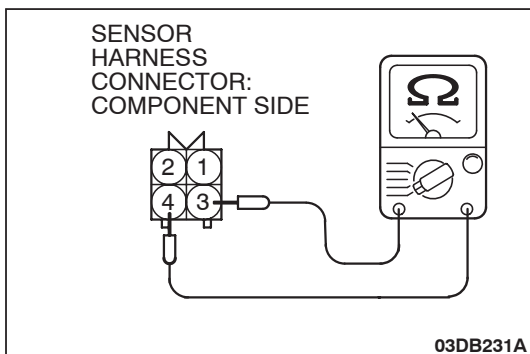




4. Using diagnostic tool, observe HO₂S reading. If values are unsatisfactory, check for malfunctioning sensor or damaged connector/wiring.
 - (1) Warm up the engine until engine coolant is 80°C (176°F) or higher.
5. While repeatedly revving the engine, check each heated oxygen sensor output voltage.

Standard value:

ENGINE	HEATED OXYGEN SENSOR OUTPUT VOLTAGE	REMARKS
When revving engine	0.6 – 1.0 V	If you make the air/fuel ratio rich by revving the engine repeatedly, a normal heated oxygen sensor will output a voltage of 0.6 – 1.0 V.



6. If the output voltage for a sensor is not within the standard value:
 - (1) Turn "OFF" engine.
 - (2) Disconnect the heated oxygen sensor connector and measure the resistance between terminal No. 3 and No. 4 on heated oxygen sensor side.
 - (3) Make sure that there is a resistance of: .
9.0 - 11.0 ohms at 20°C (68°F).
 - (4) If the sensor voltage is unsatisfactory or the resistance of heater is outside value, replace the heated oxygen sensor.

NOTE: For removal and installation of the heated oxygen sensor, refer to GROUP 15, Exhaust Pipe and Main Muffler P.15-14.

INJECTOR CHECK

M1131005200521

<Right bank side (number 1, 3, 5 cylinders)>

1. Disconnect the intermediate connector B-32.
2. Measure the resistance between the injector intermediate connector terminals.

Standard value:

INJECTOR NO.	MEASUREMENT TERMINAL	RESISTANCE
NO.1	5 – 9	10.5 – 13.5 Ω [20°C (68°F)]
NO.3	10 – 9	
NO.5	4 – 9	

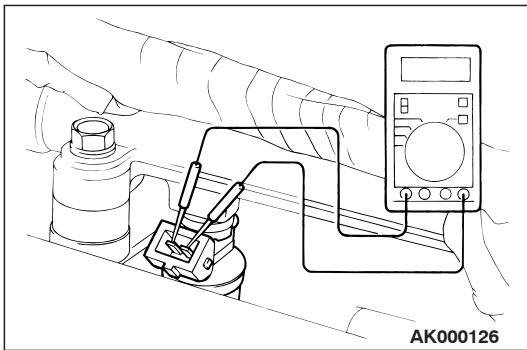
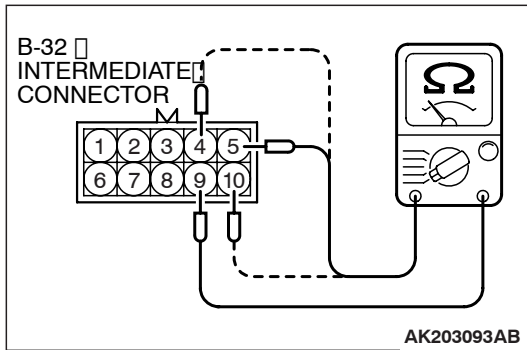
3. Connect the injector intermediate connector.

<Left bank side (number 2, 4, 6 cylinders)>

1. Disconnect the injector connector.
2. Measure the resistance between injector side connector terminals 1 and 2.

Standard value: 10.5 – 13.5 ohms [at 20°C (68°F)]

3. Connect the injector connector.



THROTTLE ACTUATOR CONTROL MOTOR CHECK

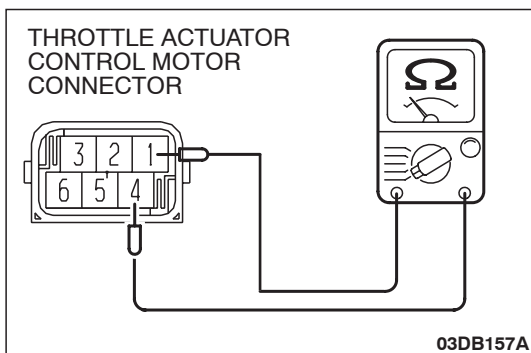
M1131051000070

<Operation Inspection>

1. Disconnect the air intake hose from the throttle body.
2. Set the ignition switch to the "ON" position.
3. Operate the accelerator pedal and confirm that the throttle valve is opening and closing accordingly.

⚠ WARNING

If the air intake duct is removed from the throttle body take great care to keep fingers away from the throttle plate. The drive motor has very high torque and is capable of random movement at any time. Do not under any circumstances activate the throttle plate by hand. When removing the throttle body from the intake manifold disconnect the wiring first. During replacement connect the wiring last. Do not activate the throttle body using a DC supply to test the motor, as permanent damage to the throttle body will result.



<Checking the Terminal Resistance>

1. Disconnect the throttle position sensor connector.
2. Measure the resistance between terminal No. 1 and No. 4.
Standard value: $1.5\Omega \pm 0.3\Omega$
3. If resistance is outside the standard value, replace the throttle body assembly.

EVAPORATIVE EMISSION PURGE SOLENOID CHECK

M1131005600240

Refer to GROUP 17, Emission Control System – Evaporative Emission System – Evaporative Emission Purge Solenoid Check [P.17-83](#).

INJECTOR

REMOVAL AND INSTALLATION

M1131007100768

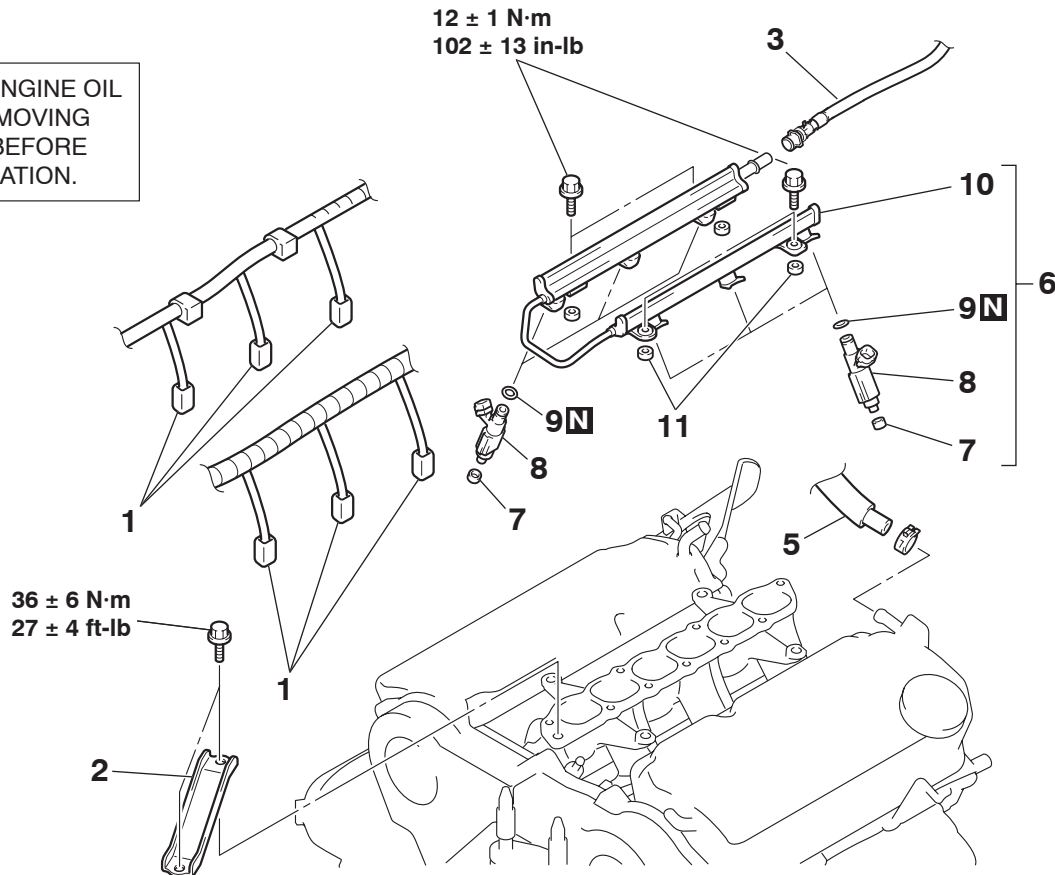
Pre-removal Operation

- Fuel Discharge Prevention (Refer to P.13A-663).
- Intake Manifold Plenum Removal (Refer to GROUP 15, Intake Manifold Plenum P.15-5).

Post-installation Operation

- Intake Manifold Plenum Installation (Refer to GROUP 15, Intake Manifold Plenum P.15-5).
- Fuel Leakage Inspection.

APPLY ENGINE OIL
TO ALL MOVING
PARTS BEFORE
INSTALLATION.



REMOVAL STEPS

1. INJECTOR CONNECTOR
2. ENGINE MOUNT STAY
3. FUEL HIGH-PRESSURE HOSE CONNECTION (FUEL RAIL SIDE)
5. BLOW-BY HOSE CONNECTION
6. FUEL RAIL AND INJECTOR ASSEMBLY

REMOVAL STEPS (Continued)

7. INSULATORS
8. FUEL INJECTORS
9. O-RING
10. FUEL RAIL
11. INSULATORS

03DB144A

REMOVAL SERVICE POINTS

<<A>> FUEL RAIL AND INJECTOR ASSEMBLY REMOVAL

CAUTION

Do not drop the fuel injector.

Remove the fuel rail with the fuel injectors attached to it.

INSTALLATION SERVICE POINT

>>A<< O-RING/FUEL INJECTORS/FUEL HIGH-PRESSURE HOSE CONNECTION (FUEL RAIL SIDE) INSTALLATION

CAUTION

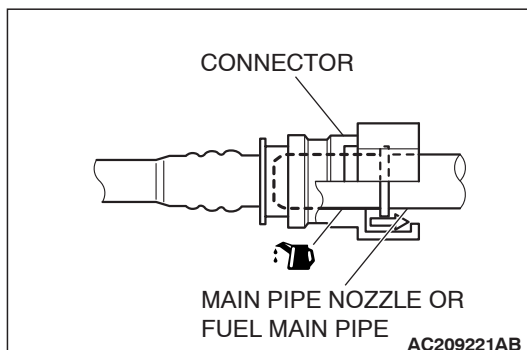
- Do not kink the fuel high-pressure hose as it is made of plastics.
- Do not let the engine oil get into the fuel rail.

1. Apply a drop of new engine oil to the O-ring.
2. Turn the fuel injector to the right and left to install to the fuel rail. Repeat for fuel damper and fuel high-pressure hose. Be careful not to damage the O-ring. After installing, check that they turn smoothly.
3. If some of them dose not turn smoothly, the O-ring may be trapped, remove it, re-install it into the fuel rail and check again.
4. Connect fuel hose to rail.

CAUTION

Connect the fuel high-pressure hose, and then pull it gently in the direction of removal to check that the hose is firmly connected.

Apply clean engine oil to the tips of the main pipe nozzle and the fuel main pipe, and connect connector of the fuel high-pressure hose to them.



THROTTLE BODY ASSEMBLY

REMOVAL AND INSTALLATION

M1131007700652

⚠ WARNING

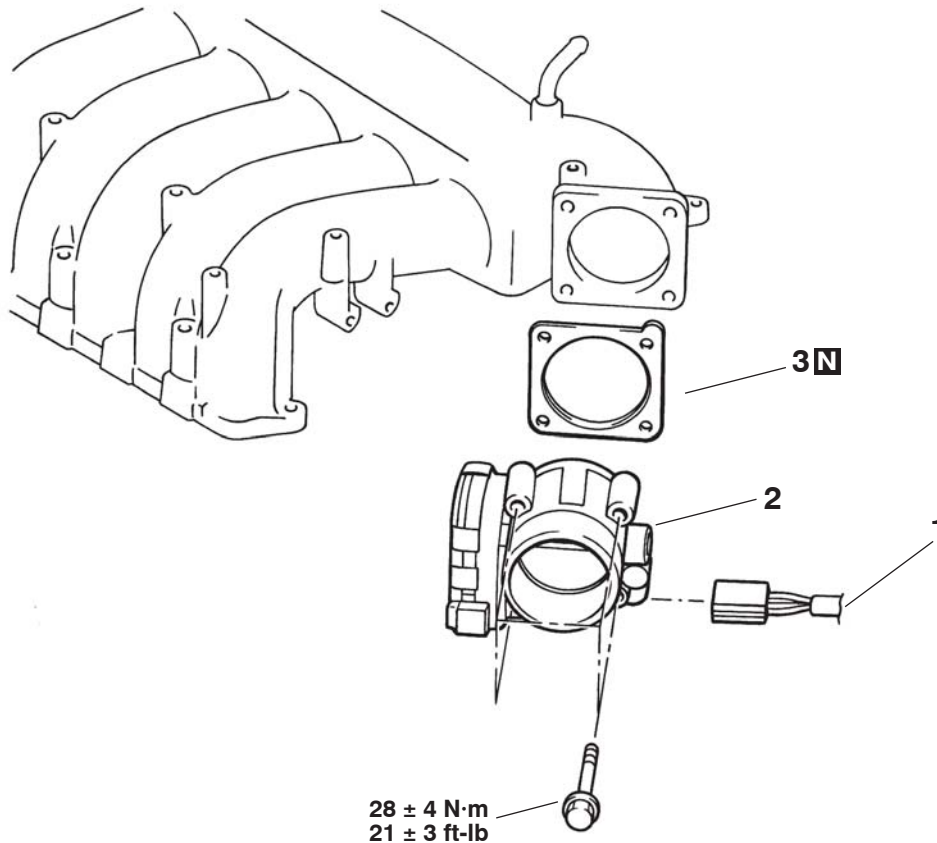
If the air intake duct is removed from the throttle body take great care to keep fingers away from the throttle plate. The drive motor has very high torque and is capable of random movement at any time. Do not under any circumstances activate the throttle plate by hand. When removing the throttle body from the intake manifold disconnect the wiring first. During replacement connect the wiring last. Do not activate the throttle body using a DC supply to test the motor, as permanent damage to the throttle body will result.

Pre-removal Operation

- Air Intake Hose Removal (Refer to GROUP 15, Air Cleaner P.15-4).

Post-installation Operation

- Air Intake Hose Installation (Refer to GROUP 15, Air Cleaner P.15-4).



03DB155A

REMOVAL STEPS

1. THROTTLE POSITION SENSOR CONNECTOR

REMOVAL STEPS (Continued)

2. THROTTLE BODY
 3. THROTTLE BODY GASKET
- >>A<<

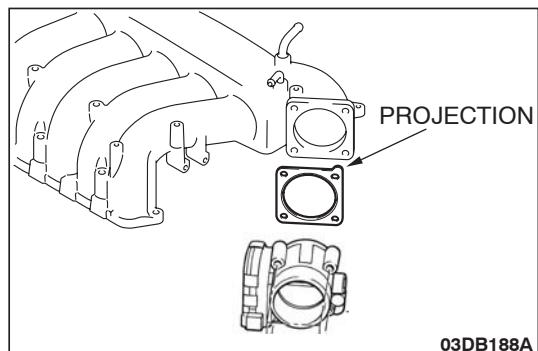
INSTALLATION SERVICE POINT

>>A<<THROTTLE BODY GASKET INSTALLATION

CAUTION

Poor idling etc. may result if the throttle body gasket is installed incorrectly.

Install the gasket as its protrusion is in the direction shown.



ENGINE CONTROL UNIT (ECU)

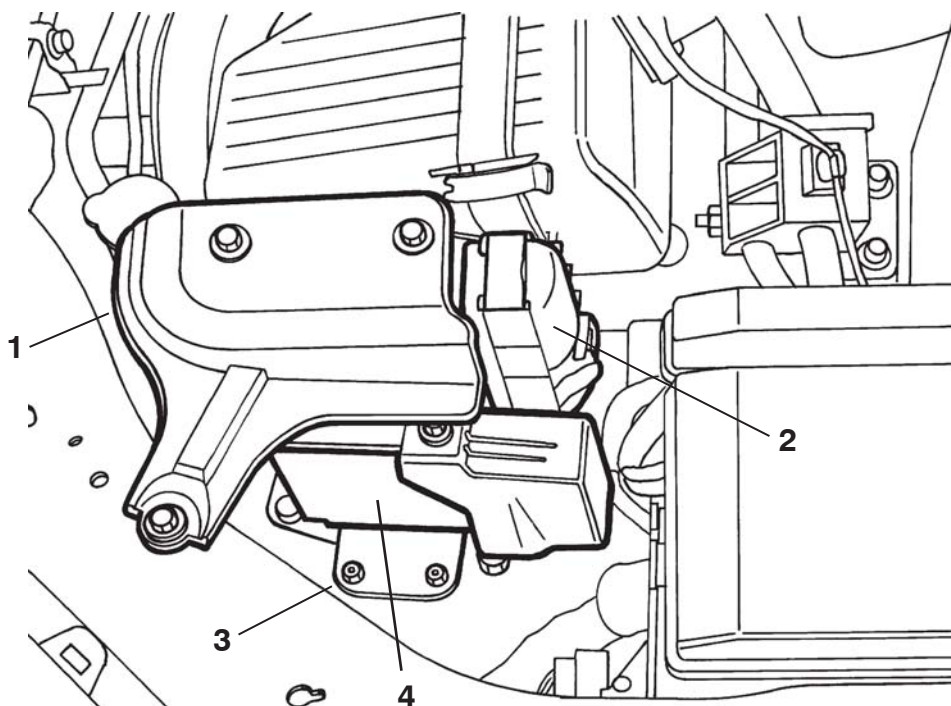
REMOVAL AND INSTALLATION

M1131033400243

CAUTION

Ensure Ignition key is turned "OFF" and battery terminals are disconnected prior to removal of the ENGINE ECU.

NOTE: When replacing ENGINE-ECU with a new unit VIN Writing and Key Registration will be required.



03DB264A

REMOVAL STEPS

1. COVER
2. ENGINE-ECU CONNECTOR

REMOVAL STEPS (Continued)

3. ECU MOUNTING BRACKET
4. A/T ECU - A/T VEHICLE ONLY

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

M1131011600517

ITEM	SPECIFICATION
Engine mount stay bolt	36 ± 6 N·m (27 ± 4 ft-lb)
Fuel rail and injector assembly bolt	12 ± 1 N·m (102 ± 13 in-lb)
Hole cover screw	1.5 ± 0.5 N·m (14 ± 4 in-lb)
Throttle body mounting bolt	28 ± 4 N·m (21 ± 3 ft-lb)

GENERAL SPECIFICATION(S)

M1131000200827

ITEMS		SPECIFICATIONS
Throttle body	Throttle bore mm	68
	Throttle position sensor	Potentiometer type
	Throttle actuator control motor	DC motor type, 2-stage gear train
Electronic control unit (ECU)	Identification model No.	
Sensors	Mass airflow sensor	Thermal flow meter type- hot film.
	Intake air temperature sensor	Thermistor type
	Engine coolant temperature sensor	Thermistor type
	Heated oxygen sensor	"Planar" type sensor
	Accelerator pedal position sensor	Hall element type
	Transmission range switch	Contact switch type
	Camshaft position sensor	Hall element type
	Crankshaft position sensor	Magneto resistance element type
	Knock sensor	Piezoelectric type
	Power steering pressure switch	Contact switch type
	Manifold absolute pressure sensor	Piezo-resistive type
Actuators	Multiport fuel injection (MPI) relay	Contact switch type
	Fuel pump relay	Contact switch type
	Throttle actuator control motor relay	Contact switch type
	Injector type and number	Electromagnetic type, 6
	Injector identification mark	HDB305F
	Evaporative emission purge solenoid	Duty cycle type solenoid valve

SERVICE SPECIFICATIONS

M1131000300705

ITEMS		STANDARD VALUE
Fuel pressure kPa (in.Hg)		Approximately 324 (95.7) at curb idle
Intake air temperature sensor resistance kΩ	-20°C (-4°F)	12.66 – 15.12
	0°C (32°F)	5.119 – 5.892
	20°C (68°F)	2.290 – 2.5510
	40°C (104°F)	1.096 – 1.238
	60°C (140°F)	0.565 – 0.654
	80°C (176°F)	0.312 – 0.370
Engine coolant temperature sensor resistance kΩ	-20°C (-4°F)	14.1 – 16.83
	0°C (32°F)	5.47 – 6.33
	20°C (68°F)	2.35 – 2.65
	40°C (104°F)	1.12 – 1.23
	60°C (140°F)	0.573 – 0.618
	80°C (176°F)	0.313 – 0.332
Heated oxygen sensor output voltage V		0.6 – 1.0
Heated oxygen sensor heater resistance Ω	<Front>	9.0 - 11.0 [at 20°C (68°F)]
	<Rear>	9.0 - 11.0 [at 20°C (68°F)]
Heated oxygen sensor - Heater current A		<2.1A
Injector coil resistance Ω		10.5 – 13.5 [at 20°C (68°F)]
Throttle actuator control motor coil resistance Ω		1.5 ± 0.3 [at 20°C (68°F)]

SEALANT AND ADHESIVE

M1131000500442

ITEM	SPECIFIED SEALANT
Engine coolant temperature sensor threaded portion	3M™ AAD part number 8731 or equivalent

NOTES

