

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.

DIAGNOSIS**Required Special Tools:**

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

STEP 1. Using scan tool MB991958, read the diagnostic trouble code (DTC).**⚠ CAUTION**

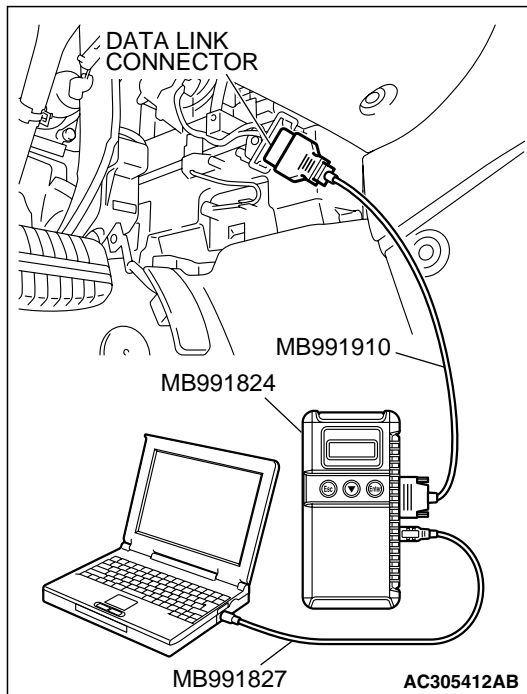
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

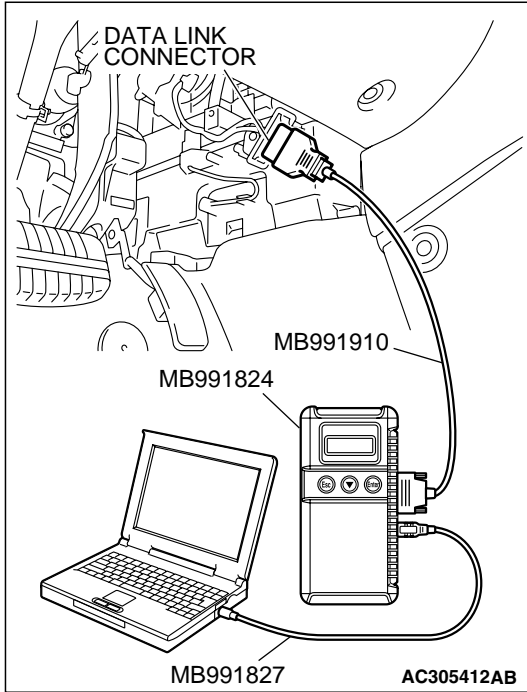
- (1) Connect scan tool MB991958 to the data link connector.
- (2) Turn the ignition switch to the "ON" position.
- (3) Read the DTC.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is DTC set?

YES : Refer to Diagnostic Trouble Code Chart [P.13B-34](#).

NO : Go to Step 2.



**STEP 2. Using scan tool MB991958, check data list.****⚠ CAUTION**

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

- (1) Connect scan tool MB991958 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.13B-1137](#).

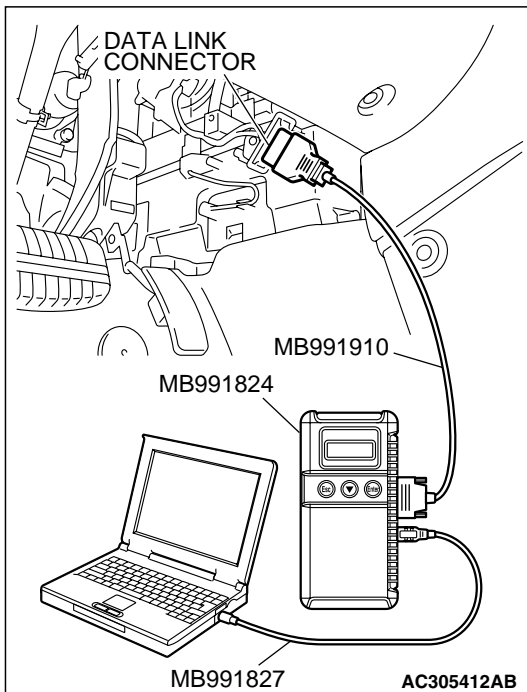
a. Item 21: Engine Coolant Temperature Sensor.

- (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 scan tool MB991958, 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.13B-1152](#).
 - a. Item 08: 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.13B-1178](#).

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.

DIAGNOSIS

Required Special Tools:

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

STEP 1. Using scan tool MB991958, read the diagnostic trouble code (DTC).

⚠ CAUTION

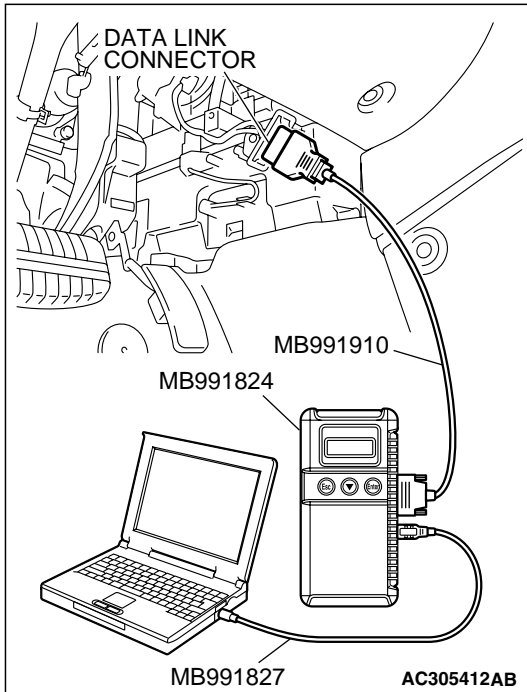
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

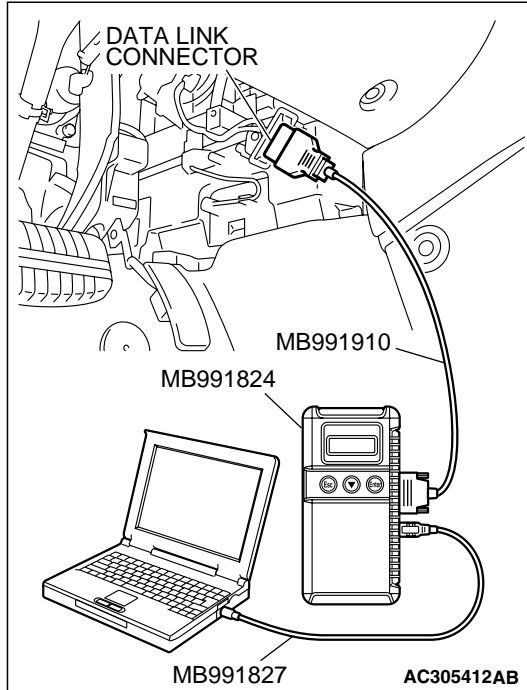
- (1) Connect scan tool MB991958 to the data link connector.
- (2) Turn the ignition switch to the "ON" position.
- (3) Read the DTC.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Refer to Diagnostic Trouble Code Chart [P.13B-34](#).

NO : Go to Step 2.





STEP 2. Using scan tool MB991958, check data list.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

- (1) Connect scan tool MB991958 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.13B-1137](#).

a. Item 21: 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.13B-1178](#).

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.

DIAGNOSIS

Required Special Tools:

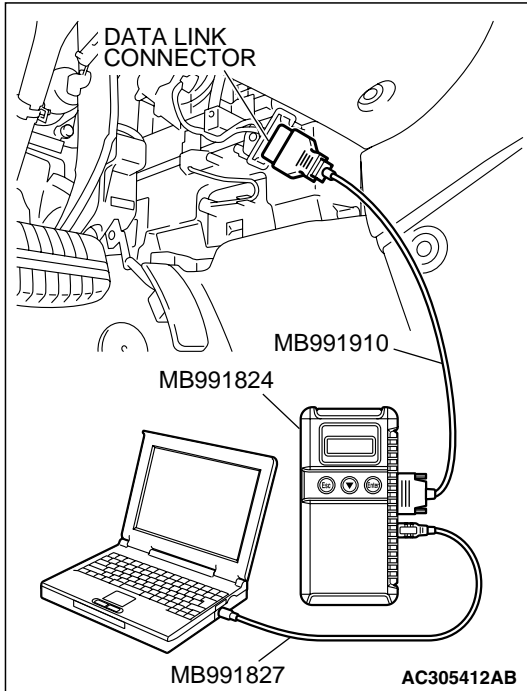
- MB991958: Scan Tool (MUT-III Sub Assembly)
 - MB991824: V.C.I.
 - MB991827: USB Cable
 - MB991910: Main Harness A

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 scan tool MB991958, read the diagnostic trouble code (DTC).

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

- (1) Connect scan tool MB991958 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. 13B-34](#).
NO : Go to Step 3.

STEP 3. Checking by operating the accelerator pedal.

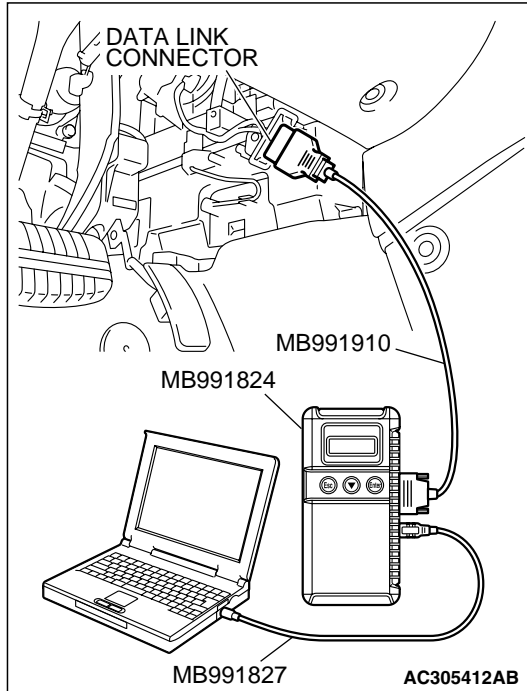
Q: Does the engine stall right after the accelerator pedal is released?

- YES :** Refer to GROUP13B, On-vehicle Service – Throttle Body (Throttle Valve Area) Cleaning. [P. 13B-1178](#).
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. 13B-1042](#).



STEP 5. Using scan tool MB991958, check actuator test items 01, 02, 03, 04, 05, 06: Injector.

⚠ CAUTION

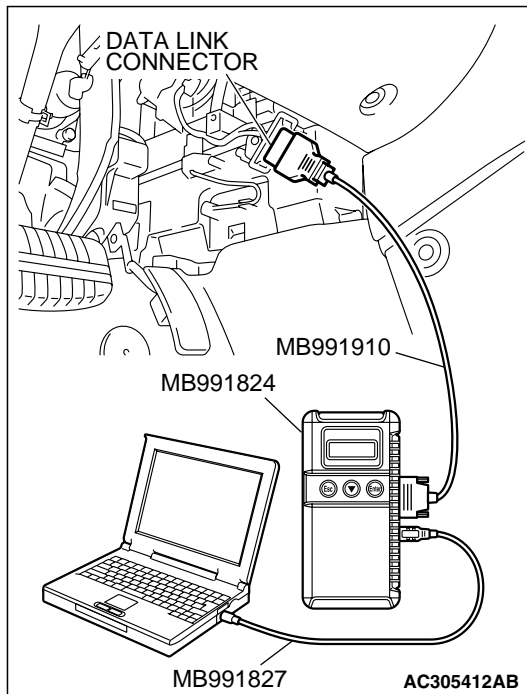
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

- (1) Connect scan tool MB991958 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.13B-1152](#).
 - 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.13B-481](#), P0202 [P.13B-493](#), P0203 [P.13B-504](#), DTC P0204 [P.13B-516](#), P0205 [P.13B-527](#), P0206 [P.13B-539](#) – Injector Circuit.



STEP 6. Using scan tool MB991958, 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.13B-1137](#).
 - a. Item 21: 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.13B-1179](#).

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 ignition timing.

Refer to GROUP 11, On-vehicle Service – Ignition Timing Check [P.11C-8](#).

Q: Is the 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.
- d. Check the EGR valve.

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.

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 EGR valve.
- Vacuum leak.
- Improper connector contact.

DIAGNOSIS

Required Special Tools:

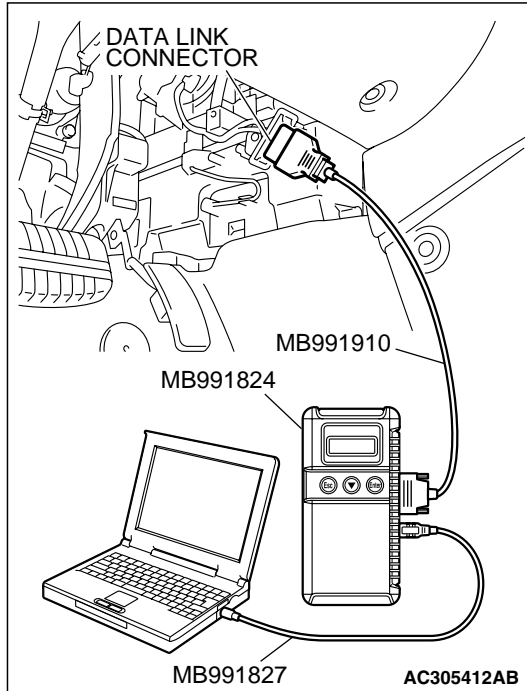
- MB991958: Scan Tool (MUT-III Sub Assembly)
 - MB991824: V.C.I.
 - MB991827: USB Cable
 - MB991910: Main Harness A

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 scan tool MB991958, read the diagnostic trouble code (DTC).

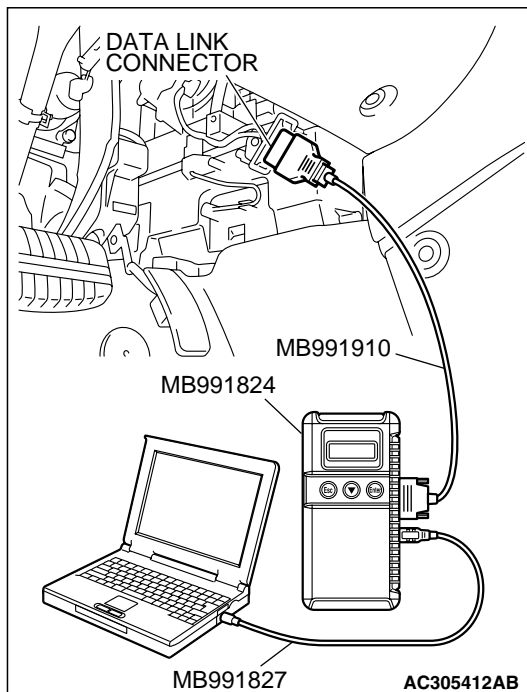
⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

- (1) Connect scan tool MB991958 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.13B-34](#).
NO : Go to Step 3.



STEP 3. Using scan tool MB991958, check actuator test items 01, 02, 03, 04, 05, 06: Injector.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

- (1) Connect scan tool MB991958 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.13B-1152](#).
 - 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.13B-481](#), P0202 [P.13B-493](#), P0203 [P.13B-504](#), DTC P0204 [P.13B-516](#), P0205 [P.13B-527](#), P0206 [P.13B-539](#) – 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.13B-1178](#).

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.

- a. Crankshaft position sensor signal.
- b. Mass airflow sensor signal.
- c. Injector drive signal.
- d. Primary and secondary ignition signal.
- e. Fuel pump drive signal.
- f. PCM power supply voltage.

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

STEP 6. Using scan tool MB991958, check data list.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

- (1) Connect scan tool MB991958 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.13B-1137](#).

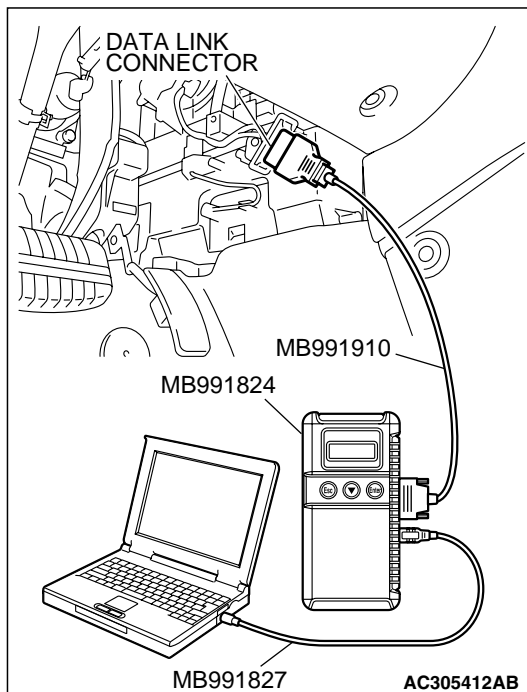
- a. Item 13: Intake Air Temperature Sensor.
- b. Item 25: Barometric Pressure Sensor.
- c. Item 21: Engine Coolant Temperature Sensor.
- d. Item 69: Right Bank Heated Oxygen Sensor (rear).
- e. Item 39: Right Bank Heated Oxygen Sensor (front).
- f. Item 59: Left Bank Heated Oxygen Sensor (rear).
- g. Item 11: Left Bank Heated Oxygen Sensor (front).
- h. Item 27: Power Steering Pressure Switch.
- i. Item 68: EGR valve (stepper motor).
- j. Item 79: Throttle position sensor (main).

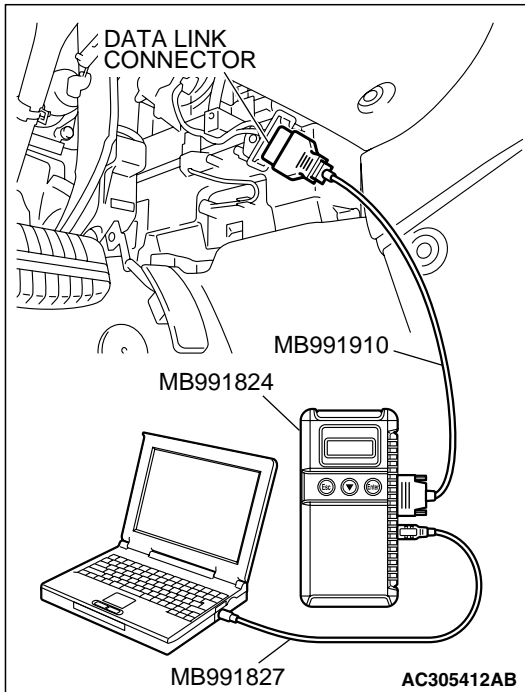
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

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 scan tool MB991958, 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.13B-1137](#).
 - a. Item 39: Right Bank Heated Oxygen Sensor (front).
 - b. Item 11: 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.13B-1179](#).**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 ignition timing.

Refer to GROUP 11, On-vehicle Service – Ignition Timing
Check [P.11C-8](#).

Q: Is the 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 if the injectors are clogged.
- c. Check compression pressure.
- d. Check if the foreign materials (water, kerosene, etc.) got into fuel.
- e. Check the EGR valve.

Then confirm that the malfunction symptom is eliminated.

NO : Check that the crankshaft position sensor and timing 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.

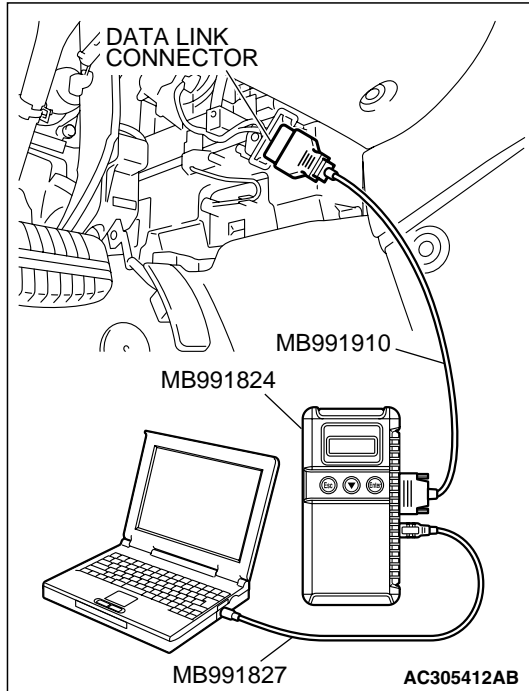
TROUBLESHOOTING HINTS (The most likely causes for this case:)

- Vacuum leak.
- Malfunction of the ignition system.
- Malfunction of emission control system.

DIAGNOSIS

Required Special Tools:

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



STEP 1. Using scan tool MB991958, read the diagnostic trouble code (DTC).

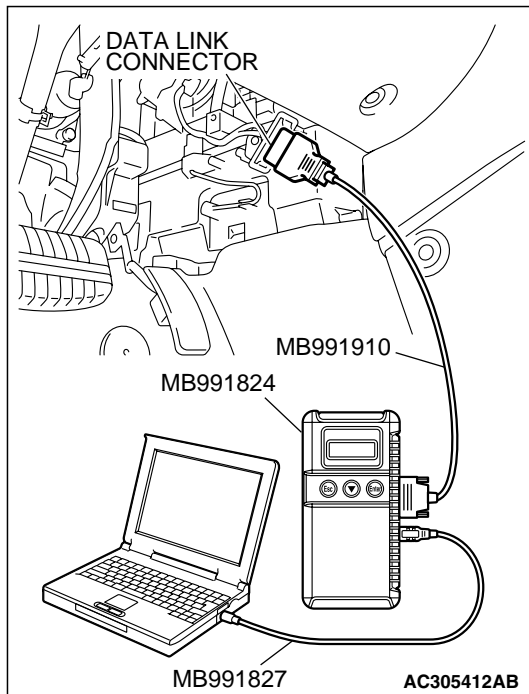
⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

- (1) Connect scan tool MB991958 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.13B-34](#).
NO : Go to Step 2.



STEP 2. Using scan tool MB991958, 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.13B-1152](#).
 - a. Item 08: 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.

c. Check the EGR valve.

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.

DIAGNOSIS

Required Special Tools:

- MB991958: Scan 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 scan tool MB991958, read the diagnostic trouble code (DTC).

⚠ CAUTION

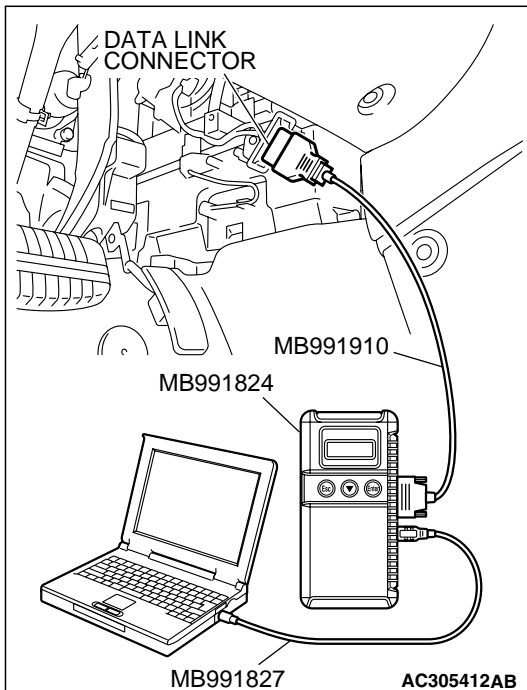
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

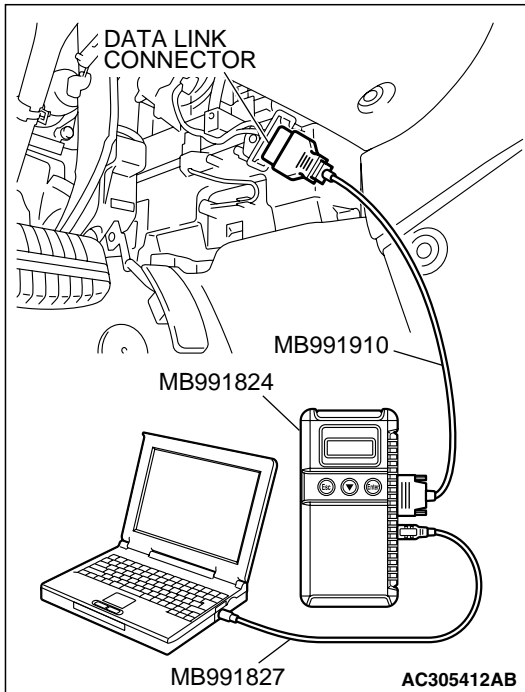
- (1) Connect scan tool MB991958 to the data link connector.
- (2) Turn the ignition switch to the "ON" position.
- (3) Read the DTC.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Refer to Diagnostic Trouble Code Chart [P.13B-34](#).

NO : Go to Step 3.



**STEP 3. Using scan tool MB991958, 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.13B-1137](#).
 - a. Item 79: Throttle Position Sensor (main).
 - b. Item 14: Throttle Position Sensor (sub).
 - c. Item 78: Accelerator Pedal Position Sensor (main).
 - d. Item 77: 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.13B-1178](#).**NO** : Check the following items, and repair, replace or clean the defective sections.

- a. Check the ignition coil and spark plugs.
- b. Check the EGR valve.

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.

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

- Malfunction of the ignition system.
- Malfunction of air/fuel ratio control system.
- Malfunction of the fuel supply system.
- Malfunction of the EGR system.
- Poor compression pressure.

DIAGNOSIS

Required Special Tools:

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

STEP 1. Using scan tool MB991958, read the diagnostic trouble code (DTC).

⚠ CAUTION

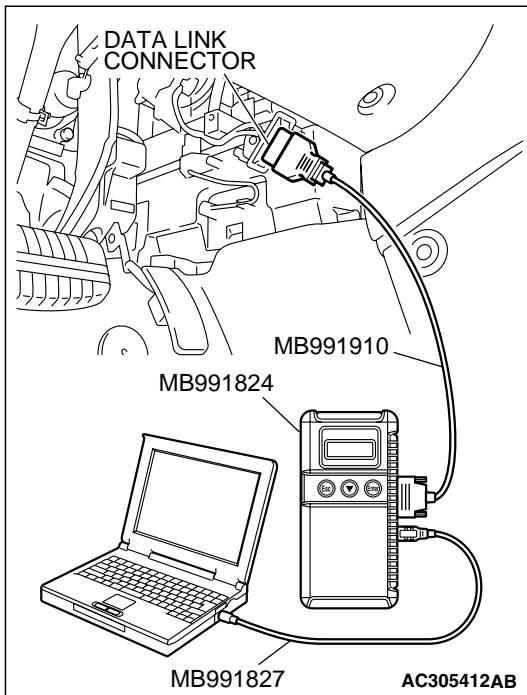
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

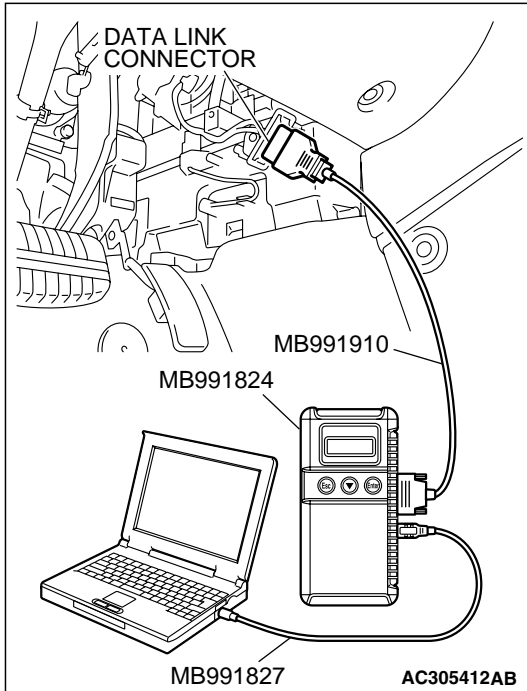
- (1) Connect scan tool MB991958 to the data link connector.
- (2) Turn the ignition switch to the "ON" position.
- (3) Read the DTC.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Refer to Diagnostic Trouble Code Chart [P.13B-34](#).

NO : Go to Step 2.





STEP 2. Using scan tool MB991958, 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.13B-1152](#).
 - 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.13B-481](#), P0202 [P.13B-493](#), P0203 [P.13B-504](#), DTC P0204 [P.13B-516](#), P0205 [P.13B-527](#), P0206 [P.13B-539](#) – Injector Circuit.

STEP 3. Check the ignition timing.

- (1) Refer to GROUP 11, On-vehicle Service – Ignition Timing Check [P.11C-8](#).

Q: Is the 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 scan tool MB991958, check data list and actuator test.

⚠ CAUTION

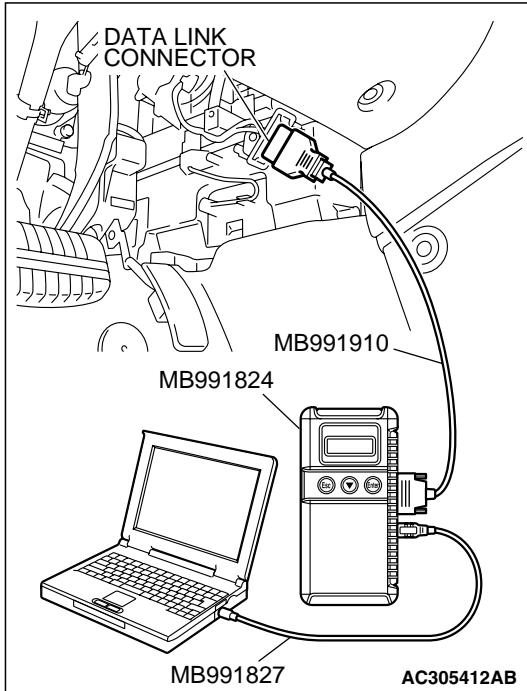
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

- (1) Connect scan tool MB991958 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.13B-1137.
 - a. Item 13: Intake Air Temperature Sensor.
 - b. Item 25: Barometric Pressure Sensor.
 - c. Item 21: Engine Coolant Temperature Sensor.
 - d. Item 69: Right Bank Heated Oxygen Sensor (rear).
 - e. Item 39: Right Bank Heated Oxygen Sensor (front).
 - f. Item 59: Left Bank Heated Oxygen Sensor (rear).
 - g. Item 11: 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.



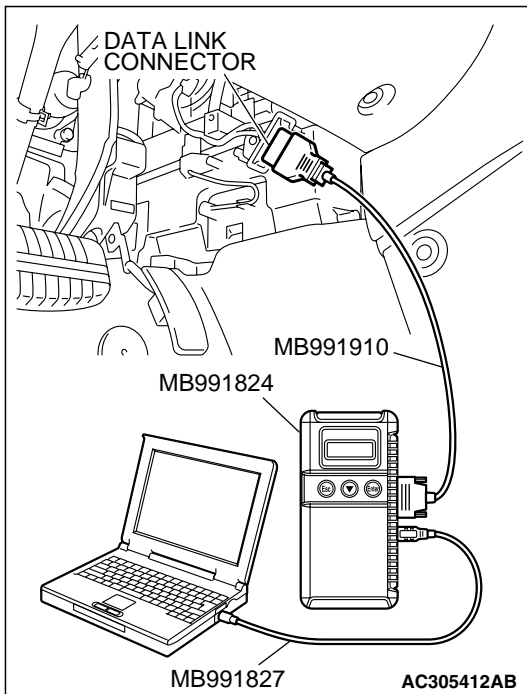
STEP 5. Using scan tool MB991958, check data list.

- (1) Turn the ignition switch to the "ON" position.
- (2) Check the following items of data list. Refer to Data List Reference Table P.13B-1137.
 - a. Item 39: Right Bank Heated Oxygen Sensor (front).
 - b. Item 11: 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.13B-1179](#).**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.13B-1179](#).**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 the EGR system.

c. Check compression pressure.

d. 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.

DIAGNOSIS**Required Special Tools:**

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

STEP 1. Using scan tool MB991958, read the diagnostic trouble code (DTC).

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

- (1) Connect scan tool MB991958 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.

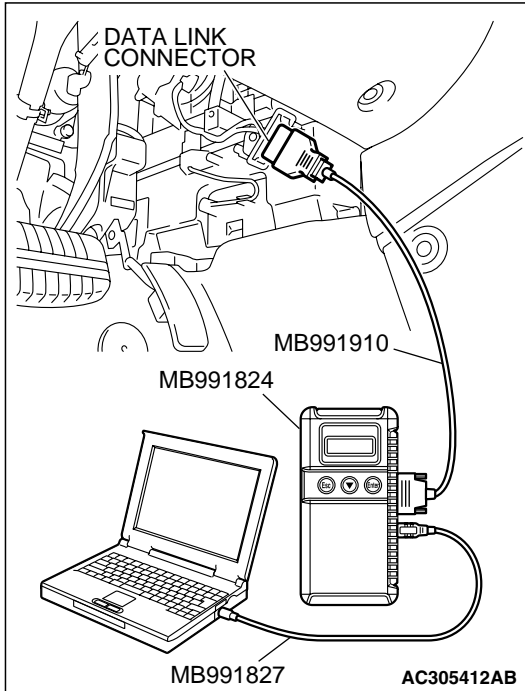
Q: Is The DTC set?

YES : Refer to Diagnostic Trouble Code Chart [P.13B-34](#).

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.

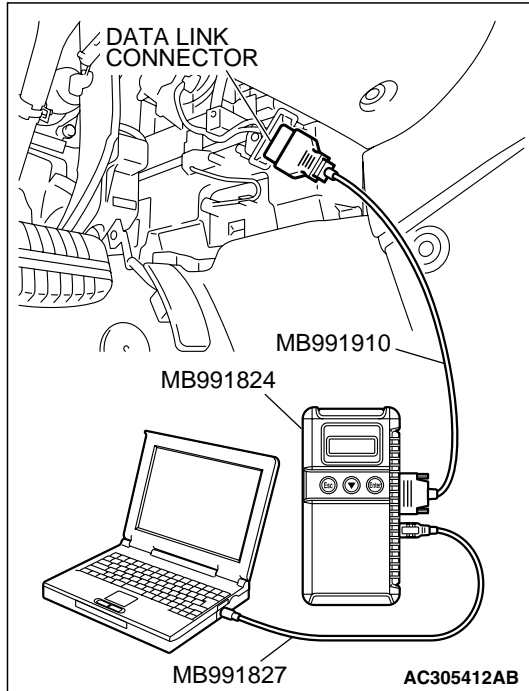
TROUBLESHOOTING HINTS (The most likely causes for this case:)

- Malfunction of the electronic control throttle valve system.
- Dirtiness around throttle valve.

DIAGNOSIS

Required Special Tools:

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



STEP 1. Using scan tool MB991958, read the diagnostic trouble code (DTC).

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

- (1) Connect scan tool MB991958 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.13B-34](#).

NO : Refer to On-vehicle Service – Throttle Body (Throttle Valve Area) Cleaning [P.13B-1178](#)

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.

- 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.

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

- Malfunction of the ignition system.

DIAGNOSIS

Required Special Tools:

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

STEP 1. Using scan tool MB991958, read the diagnostic trouble code (DTC).

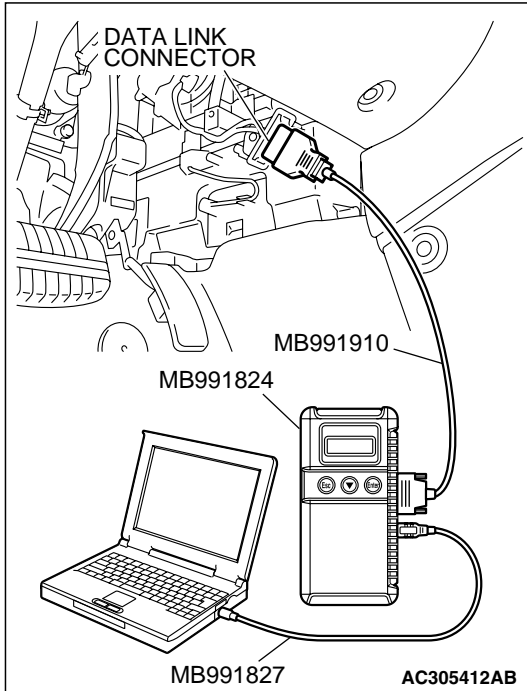
⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

- (1) Connect scan tool MB991958 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.13B-34](#).
NO : Go to Step 2.

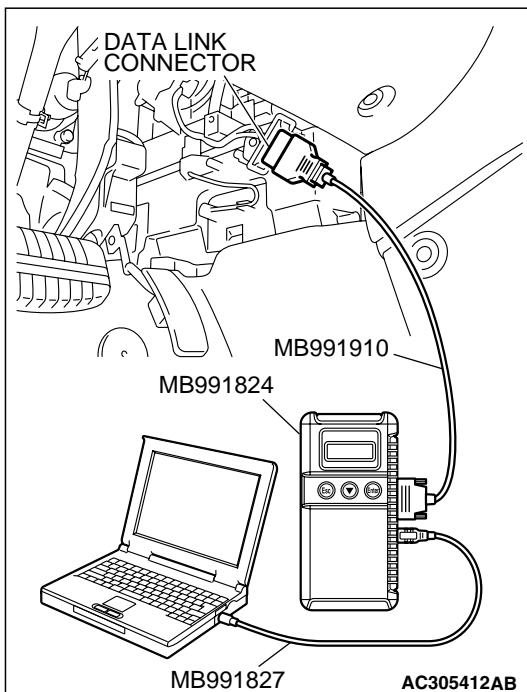


STEP 2. Using scan tool MB991958, check actuator test items 01, 02, 03, 04, 05, 06: Injector.

- (1) Turn the ignition switch to the "ON" position.
- (2) Check following items in the actuator test. Refer to Actuator Test Table [P.13B-1152](#).
 - 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.13B-481](#), P0202 [P.13B-493](#), P0203 [P.13B-504](#), DTC P0204 [P.13B-516](#), P0205 [P.13B-527](#), P0206 [P.13B-539](#) – Injector Circuit.



STEP 3. Check the ignition timing.

Refer to GROUP 11, On-vehicle Service – Ignition Timing
Check [P.11C-8](#).

Q: Is the 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 scan tool MB991958, check data list.**⚠ CAUTION**

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

- (1) Connect scan tool MB991958 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.13B-1137](#).

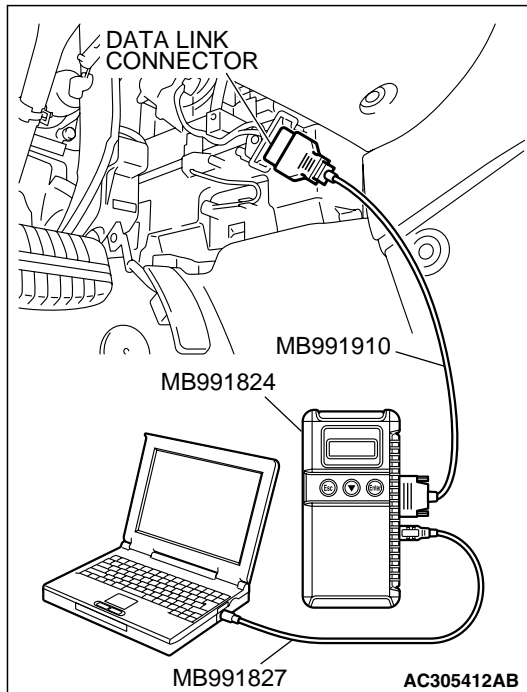
- a. Item 13: Intake Air Temperature Sensor.
- b. Item 25: Barometric Pressure Sensor.
- c. Item 21: Engine Coolant Temperature Sensor.
- d. Item 69: Right Bank Heated Oxygen Sensor (rear).
- e. Item 39: Right Bank Heated Oxygen Sensor (front).
- f. Item 59: Left Bank Heated Oxygen Sensor (rear).
- g. Item 11: Left Bank Heated Oxygen Sensor (front).

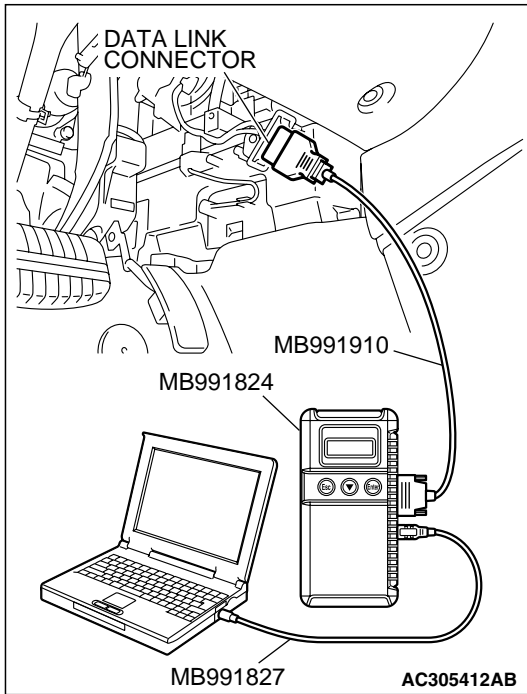
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

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 scan tool MB991958, 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.13B-1137](#).
 - a. Item 39: Right Bank Heated Oxygen Sensor (front).
 - b. Item 11: 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.13B-1179](#).

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.13B-1179](#).

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. Check the EGR system.
- e. Broken air intake hose.
- f. Clogged air cleaner.
- g. 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.

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 EGR system.

DIAGNOSIS**Required Special Tools:**

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

STEP 1. Using scan tool MB991958, read the diagnostic trouble code (DTC).

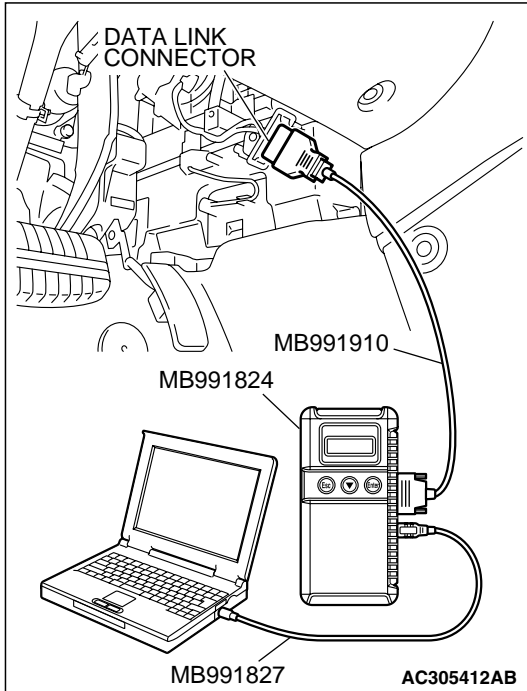
⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

- (1) Connect scan tool MB991958 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.13B-34](#).
NO : Go to Step 2.

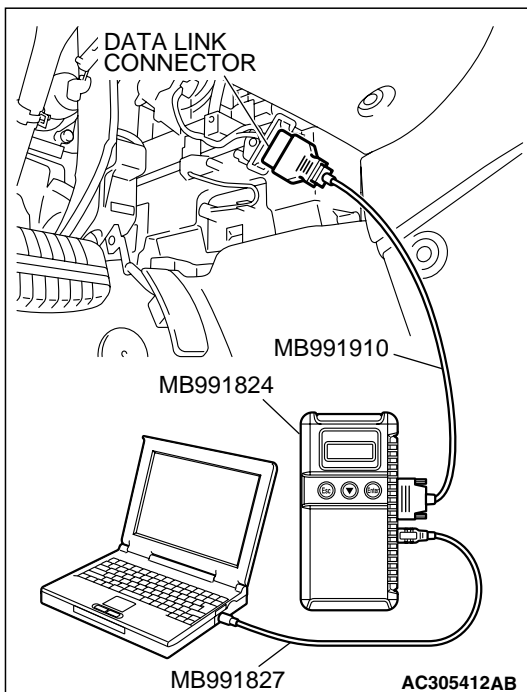


STEP 2. Using scan tool MB991958, check actuator test items 01, 02, 03, 04, 05, 06: Injector.

- (1) Turn the ignition switch to the "ON" position.
- (2) Check following items in the actuator test. Refer to Actuator Test Reference Table [P.13B-1152](#).
 - 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.13B-481](#), P0202 [P.13B-493](#), P0203 [P.13B-504](#), DTC P0204 [P.13B-516](#), P0205 [P.13B-527](#), P0206 [P.13B-539](#) – Injector Circuit.



STEP 3. Check the ignition timing.

Refer to GROUP 11A, On-vehicle Service – Ignition Timing
Check [P.11C-8](#).

Q: Is the 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 scan tool MB991958, check data list.**⚠ CAUTION**

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

- (1) Connect scan tool MB991958 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.13B-1137](#).

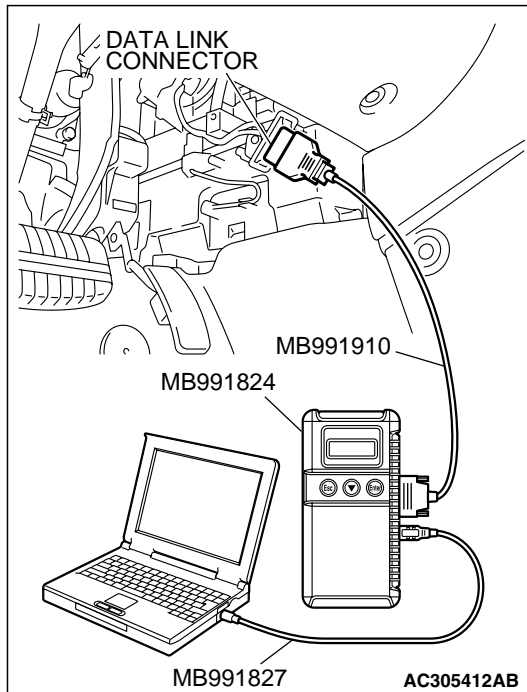
- a. Item 13: Intake Air Temperature Sensor.
- b. Item 25: Barometric Pressure Sensor.
- c. Item 21: Engine Coolant Temperature Sensor.
- d. Item 69: Right Bank Heated Oxygen Sensor (rear).
- e. Item 39: Right Bank Heated Oxygen Sensor (front).
- f. Item 59: Left Bank Heated Oxygen Sensor (rear).
- g. Item 11: Left Bank Heated Oxygen Sensor (front).

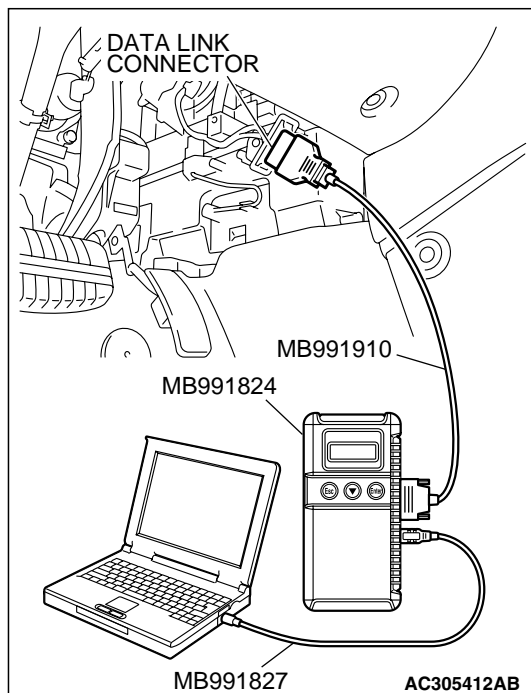
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

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 scan tool MB991958, 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.13B-1137](#).
 - a. Item 39: Right Bank Heated Oxygen Sensor (front).
 - b. Item 11: 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.13B-1179](#).

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.13B-1179](#).

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 the EGR system.

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.

DIAGNOSIS

Required Special Tools:

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

STEP 1. Using the scan tool MB991958, read the diagnostic trouble code (DTC).

⚠ CAUTION

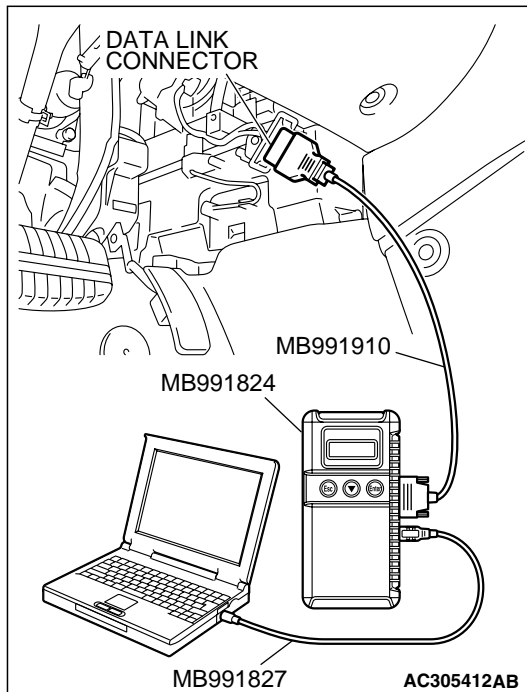
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

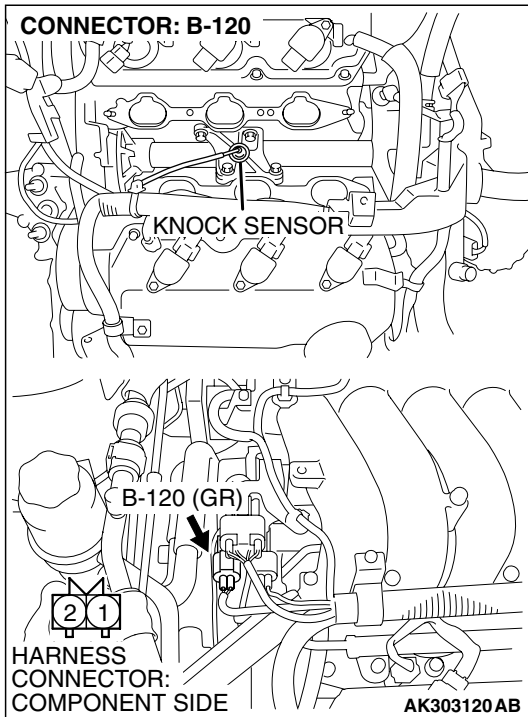
- (1) Connect scan tool MB991958 to the data link connector.
- (2) Turn the ignition switch to the "ON" position.
- (3) Read the DTC.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Refer to Diagnostic Trouble Code Chart [P.13B-34](#).

NO : Go to Step 2.





STEP 2. Check the ignition timing.

(1) The 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 ignition timing delayed?

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

- a. Check the spark plugs.
- b. Fuel quality, octane level.
- c. 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.13B-596.](#)

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.

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

- Malfunction of air/fuel ratio control system.
- Deteriorated catalyst.

DIAGNOSIS**Required Special Tools:**

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

STEP 1. Using scan tool MB991958, read the diagnostic trouble code (DTC).**⚠ CAUTION**

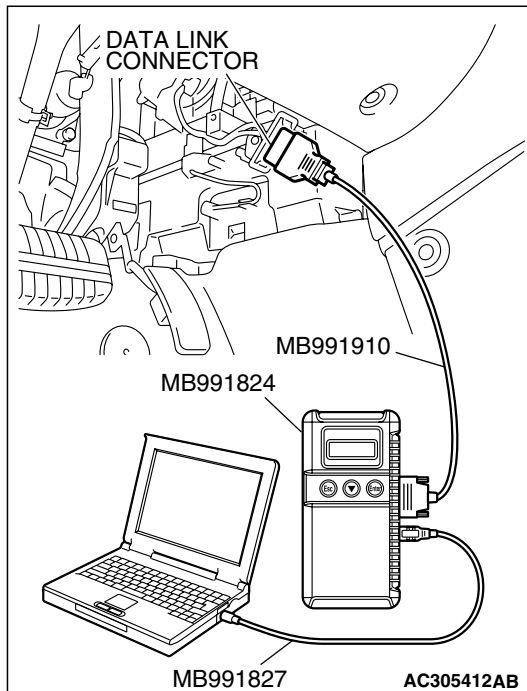
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

- Connect scan tool MB991958 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.13B-34](#).

NO : Go to Step 2.

**STEP 2. Check the ignition timing.**

Refer to GROUP 11, On-vehicle Service – Ignition Timing Check [P.11C-8](#).

Q: Is the 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 scan tool MB991958, check data list.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

- (1) Connect scan tool MB991958 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.13B-1137.

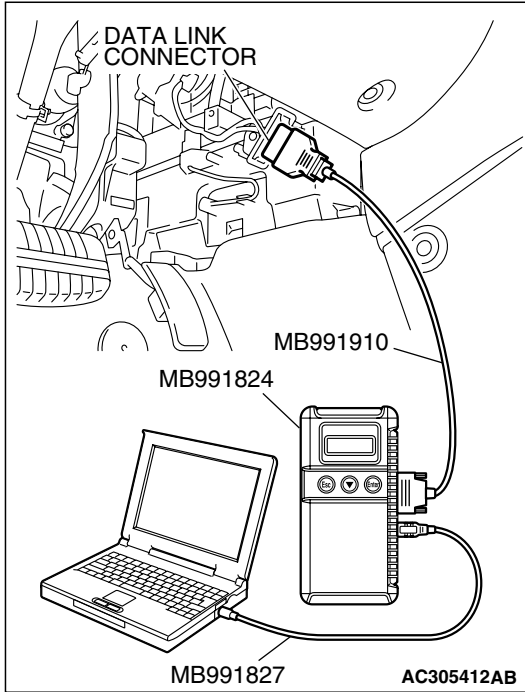
- a. Item 21: Engine Coolant Temperature Sensor.
- b. Item 13: Intake Air Temperature Sensor.
- c. Item 25: Barometric Pressure Sensor.
- d. Item 69: Right Bank Heated Oxygen Sensor (rear).
- e. Item 39: Right Bank Heated Oxygen Sensor (front).
- f. Item 59: Left Bank Heated Oxygen Sensor (rear).
- g. Item 11: 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 scan tool MB991958, 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.13B-1137.

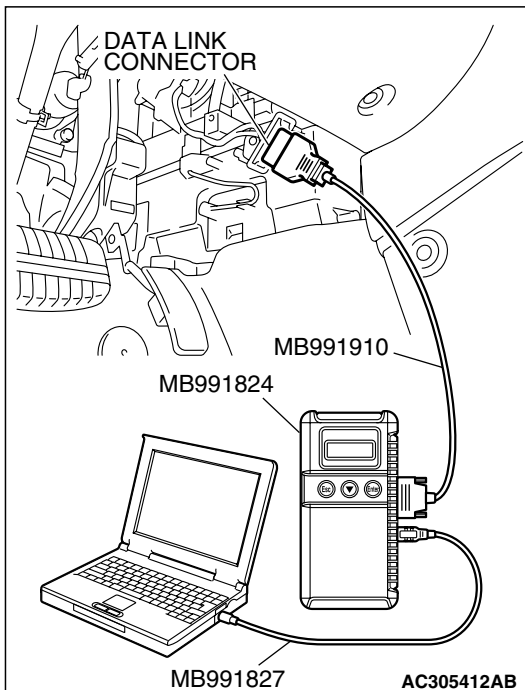
- a. Item 39: Right Bank Heated Oxygen Sensor (front).
- b. Item 11: Left Bank Heated Oxygen Sensor (front).
 - Voltage should fluctuate between 0 – 0.4 volt and 0.6 – 1.0 volt while idling after the engine has been warmed.

- (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.13B-1179](#).

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.
- f. Check the EGR 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: Transient, Mass Emission Tailpipe Test Failure.

COMMENT

- The test is failed when the air/fuel ratio is not controlled to the ideal air/fuel ratio. This occurs due to the feedback control by heated oxygen sensor signals, insufficient EGR flow rate, or deteriorated catalyst.

NOTE: If the three-way catalyst temperature is low when checking the exhaust gas, the three-way catalyst cannot sufficiently clean the emissions. Warm up the engine sufficiently before checking the exhaust, and check immediately.

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

- Malfunction of air/fuel ratio control system.
- Malfunction of the EGR system.
- Deteriorated catalyst.

DIAGNOSIS**Required Special Tools:**

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

STEP 1. Check the exhaust gas with the engine at normal operating temperature.

Q: Was the exhaust gas checked with engine warmed sufficiently?

YES : Go to Step 2.

NO : Check it again after enough warm up.

STEP 2. Check the following items.

(1) Check the following items.

- a. Check all vacuum hoses and connectors.
- b. Check electrical wires and connectors for obvious problems.
- c. Check the exhaust system for missing or damaged parts.

Q: Are they normal?

YES : Go to Step 3.

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

STEP 3. Check the driveability.

Q: Is the driveability normal?

YES : Go to Step 4.

NO : Refer to Trouble Symptom Chart [P. 13B-38](#).

STEP 4. Using scan tool MB991958, read the diagnostic trouble code (DTC).

⚠ CAUTION

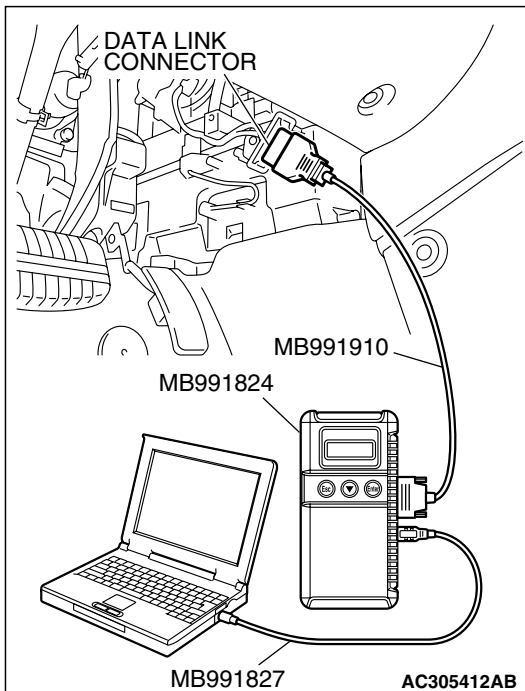
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

- (1) Connect scan tool MB991958 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. 13B-34](#).

NO : Go to Step 5.



STEP 5. Check the ignition timing.

Refer to GROUP 11, On-vehicle Service – Ignition Timing
Check [P.11C-8](#).

Q: Is the ignition timing normal?

YES : Go to Step 6.

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 6. Using scan tool MB991958, check data list.**⚠ CAUTION**

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

- (1) Connect scan tool MB991958 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.13B-1137](#).

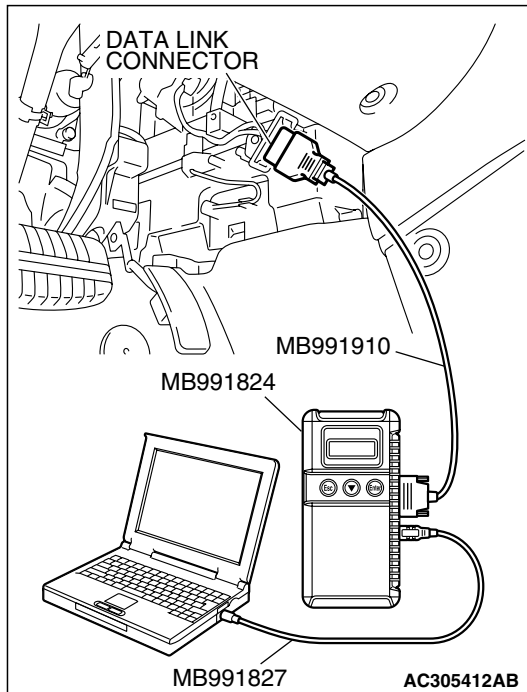
- a. Item 21: Engine Coolant Temperature Sensor.
- b. Item 13: Intake Air Temperature Sensor.
- c. Item 25: Barometric Pressure Sensor.
- d. Item 69: Right Bank Heated Oxygen Sensor (rear).
- e. Item 59: Left Bank Heated Oxygen Sensor (rear).

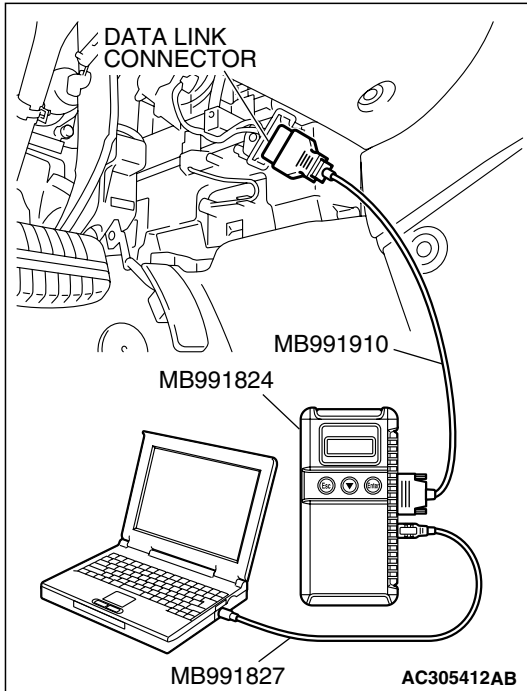
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Are they operating properly?

YES : Go to Step 7.

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





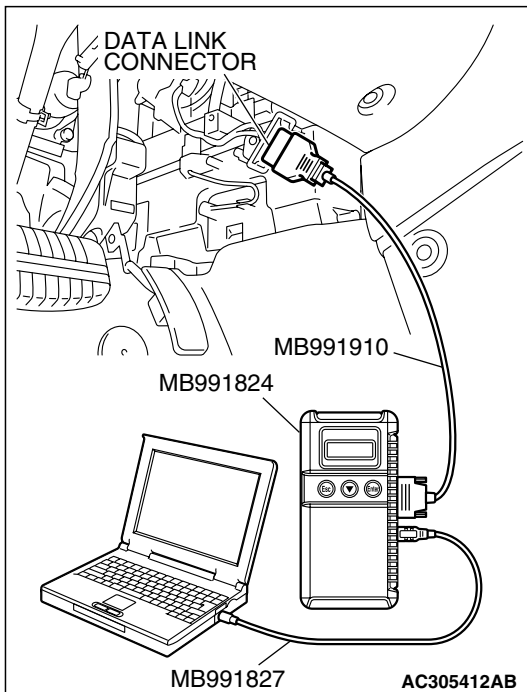
STEP 7. Using scan tool MB991958, check data list item 39: Heated oxygen sensor bank 1, sensor 1 (right front).

- (1) Start the engine and run at idle.
- (2) Set scan tool MB991958 to the data reading mode for item 39, Heated Oxygen Sensor bank 1, sensor 1 (right front).
 - Warm up the engine. When the engine is decelerated suddenly from 4,000 r/min, the output voltage should increase from 0.2 volt or less to 0.6 – 1.0 volt in a few seconds.
- (3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the sensor operating properly?

YES : Go to Step 8.

NO : Refer to DTC P0130 - Heated Oxygen Sensor Circuit (bank 1, sensor 1) [P.13B-195](#), DTC P0131 - Heated Oxygen Sensor Low Voltage (bank 1, sensor 1) [P.13B-213](#), DTC P0132 - Heated Oxygen Sensor Circuit High Voltage (bank 1, sensor 1) [P.13B-220](#), DTC P0133 - Heated Oxygen Sensor Circuit Slow Response (bank 1, sensor 1) [P.13B-225](#), DTC P0134 - Heated Oxygen Sensor Circuit No Activity Detected (bank 1, sensor 1) [P.13B-231](#).



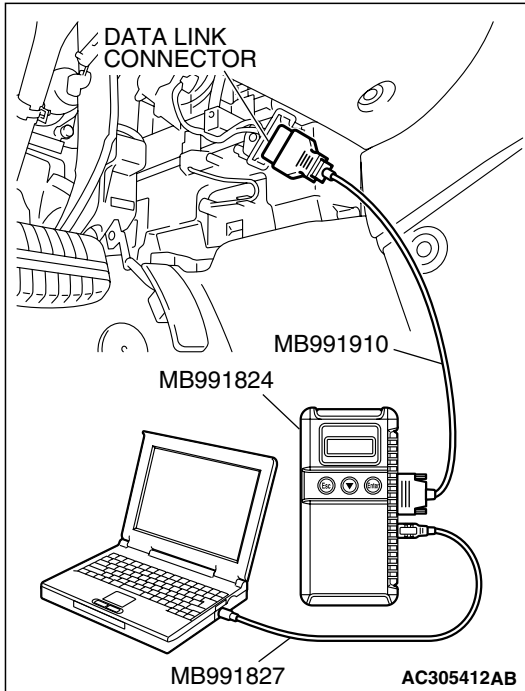
STEP 8. Using scan tool MB991958, check data list item 11: Heated oxygen sensor bank 2, sensor 1 (left front).

- (1) Start the engine and run at idle.
- (2) Set scan tool MB991958 to the data reading mode for item 11, Heated Oxygen Sensor bank 2, sensor 1 (left front).
 - Output voltage should be 0.6 – 1.0 volt at sudden engine revving.
- (3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the sensor operating properly?

YES : Go to Step 9.

NO : Refer to DTC P0150 - Heated Oxygen Sensor Circuit (bank 2, sensor 1) [P.13B-305](#), DTC P0151 - Heated Oxygen Sensor Circuit Low Voltage (bank 2, sensor 1) [P.13B-323](#), DTC P0152 - Heated Oxygen Sensor Circuit High Voltage (bank 2, sensor 1) [P.13B-330](#), DTC P0153 - Heated Oxygen Sensor Circuit Slow Response (bank 2, sensor 1) [P.13B-335](#), DTC P0154 - Heated Oxygen Sensor Circuit No Activity Detected (bank 2, sensor 1) [P.13B-341](#).



STEP 9. Using scan tool MB991958, check data list item 39: Heated oxygen sensor bank 1, sensor 1 (right front).

- (1) Start the engine and run at idle.
- (2) Set scan tool MB991958 to the data reading mode for item 39, Heated Oxygen Sensor bank 1, sensor 1 (right front).
 - Voltage should fluctuate between 0 – 0.4 volt and 0.6 – 1.0 volt while 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 10.

NO : Go to Step 12.

STEP 10. Check the EGR system.

Refer to GROUP 17, Emission Control System – General Description (EGR System) [P.17-89](#).

Q: Is the EGR system normal?

YES : Go to Step 11.

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

STEP 11. Using scan tool MB991958, check data list item 69: Heated oxygen sensor bank 1, sensor 2 (right rear).

CAUTION

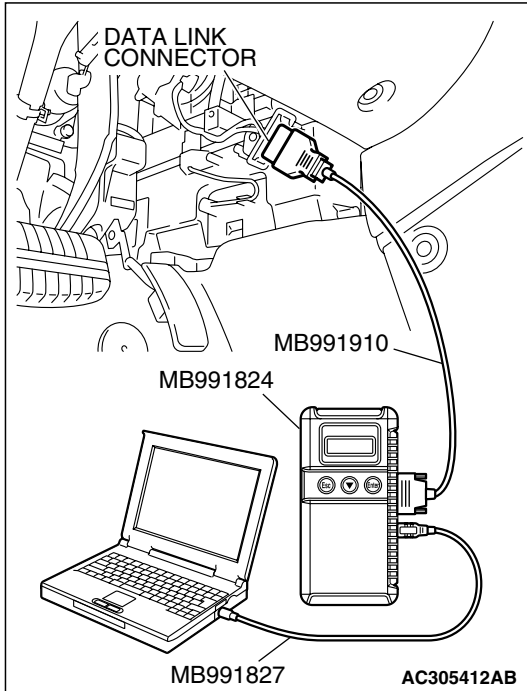
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

- (1) Connect scan tool MB991958 to the data link connector.
- (2) Start the engine and run at idle.
- (3) Set scan tool MB991958 to the data reading mode for item 69, Heated Oxygen Sensor bank 1, sensor 2 (right rear).
 - Average voltage should be 0.6 volt or less, when idling.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the sensor operating properly?

YES : Go to Step 16.

NO : Replace the right bank heated oxygen sensor (front). Then confirm that the malfunction symptom is eliminated.



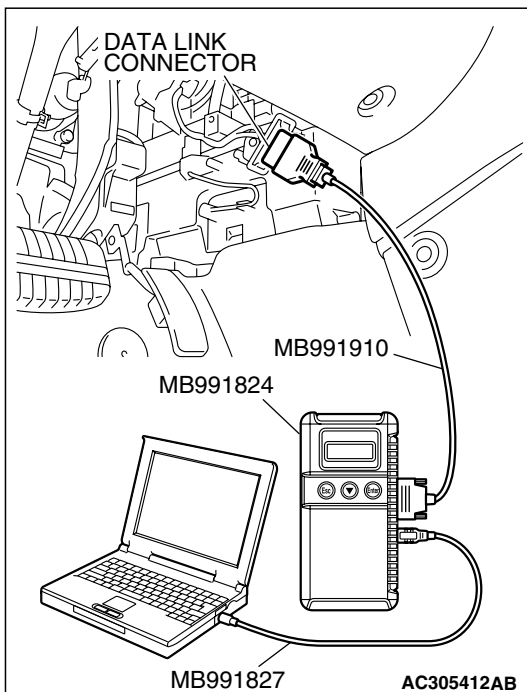
STEP 12. Using scan tool MB991958, check data list item 11: Heated oxygen sensor bank 2, sensor 1 (left front).

- (1) Start the engine and run at idle.
- (2) Set scan tool MB991958 to the data reading mode for item 11, Heated Oxygen Sensor bank 2, sensor 1 (left front).
 - Warm up the engine. When the engine is decelerated suddenly from 4,000 r/min, the output voltage should increase from 0.2 volt or less to 0.6 – 1.0 volt in a few seconds.
- (3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the sensor operating properly?

YES : Go to Step 13.

NO : Go to Step 15.



STEP 13. Check the EGR system.

Refer to GROUP 17, Emission Control System – General Description (EGR System) [P.17-89](#).

Q: Is the EGR system normal?

YES : Go to Step 14.

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

STEP 14. Using scan tool MB991958, check data list item 59: Heated oxygen sensor bank 2, sensor 2 (left rear).**⚠ CAUTION**

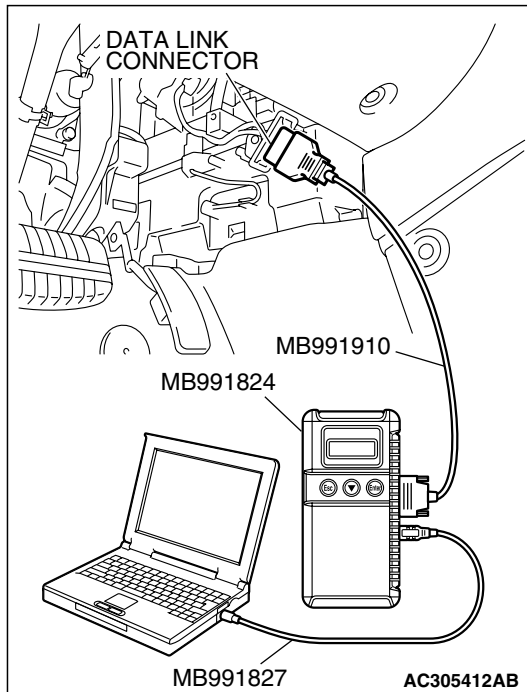
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

- (1) Connect scan tool MB991958 to the data link connector.
- (2) Start the engine and run at idle.
- (3) Set scan tool MB991958 to the data reading mode for item 59, Heated Oxygen Sensor bank 2, sensor 2 (left rear).
 - Average voltage should be 0.6 volt or less, when idling.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the sensor operating properly?

YES : Go to Step 16.

NO : Replace the left bank heated oxygen sensor (front). Then confirm that the malfunction symptom is eliminated.

**STEP 15. Check the fuel pressure.**

Refer to On-vehicle Service – Fuel Pressure Test [P.13B-1179](#).

Q: Is the fuel pressure normal?

YES : Go to Step 16.

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

STEP 16. 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 crankcase 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 24: 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.

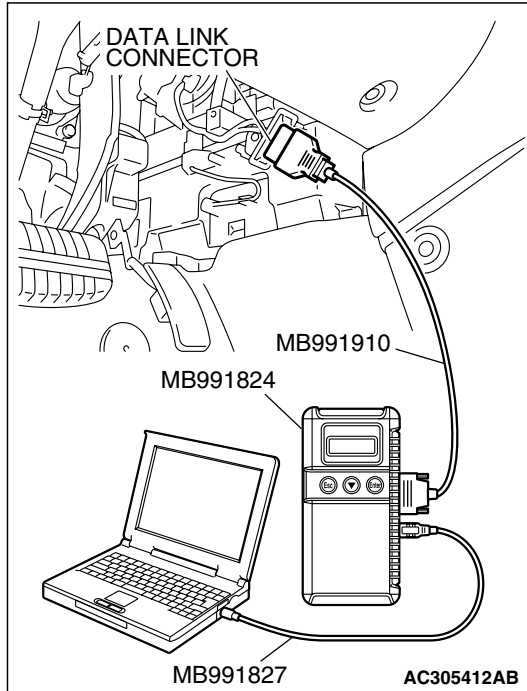
TROUBLESHOOTING HINTS (The most likely causes for this case:)

- Purge line or purge port is clogged.
- Malfunction of the evaporative emission purge solenoid.
- Evaporative emission canister is clogged.

DIAGNOSIS

Required Special Tools:

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



STEP 1. Using scan tool MB991958, read the diagnostic trouble code (DTC).

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

- (1) Connect scan tool MB991958 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.13B-34](#).

NO : Refer to GROUP 17, Emission Control System – Purge Control System Check (Purge Flow Check) [P.17-86](#).

INSPECTION PROCEDURE 25: Pressure Test of the Evaporative System Failure

COMMENT

- The test fails if there is a leak from the fuel tank or vapor line.

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

- Loose fuel tank filler tube cap.
- Broken seal in fuel tank, vapor line evaporative emission canister.

DIAGNOSIS

STEP 1. Check the evaporative emission purge solenoid.

Refer to GROUP 17, Emission Control System – Evaporative Emission Purge Solenoid Check [P.17-87](#).

Q: Is the evaporative emission purge solenoid normal?

YES : Go to Step 2.

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

STEP 2. Check the evaporative emission ventilation solenoid.

Refer to GROUP 17, Emission Control System – Evaporative Emission Ventilation Solenoid Check P.17-88.

Q: Is the evaporative emission ventilation solenoid normal?

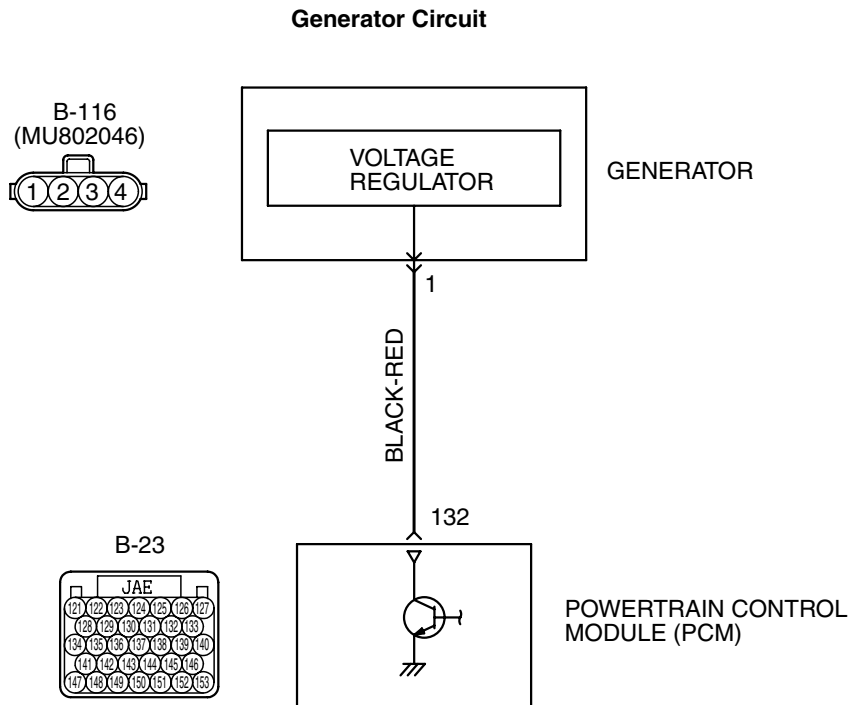
YES : Check the following items, and repair or replace the defective items.

- a. Check for leaks from the vapor line or evaporative emission canister.
- b. Check for leaks from the fuel tank.

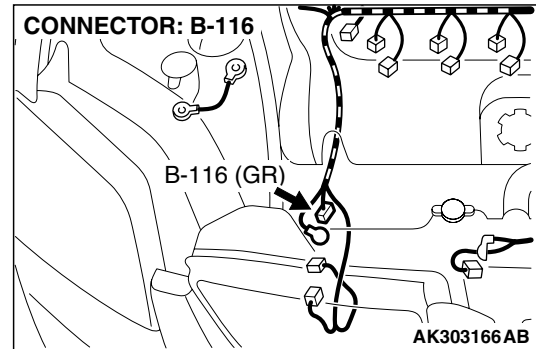
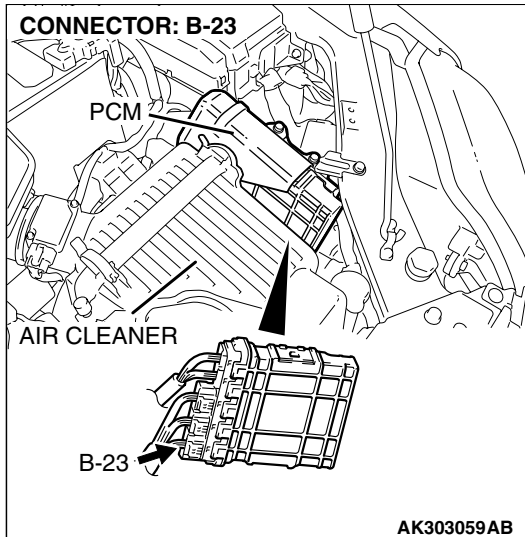
Then confirm that the malfunction symptom is eliminated.

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

INSPECTION PROCEDURE 26: Generator output voltage is low (approximately 12.3 volts).



AK302876



CIRCUIT OPERATION

- The PCM controls generator output current by duty-controlling continuity between the generator G terminal (terminal No. 1) and ground.

TROUBLESHOOTING HINTS (The most likely causes for this charging system:)

- Malfunction of the charging system.
- Short circuit in harness between generator G terminal and PCM.
- PCM failed.

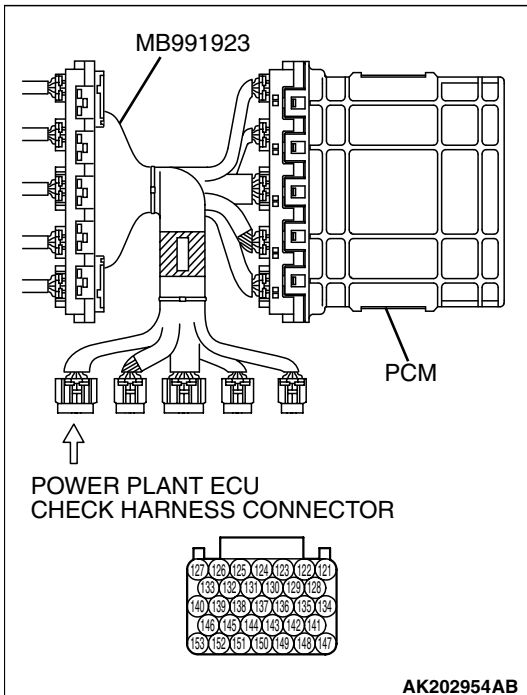
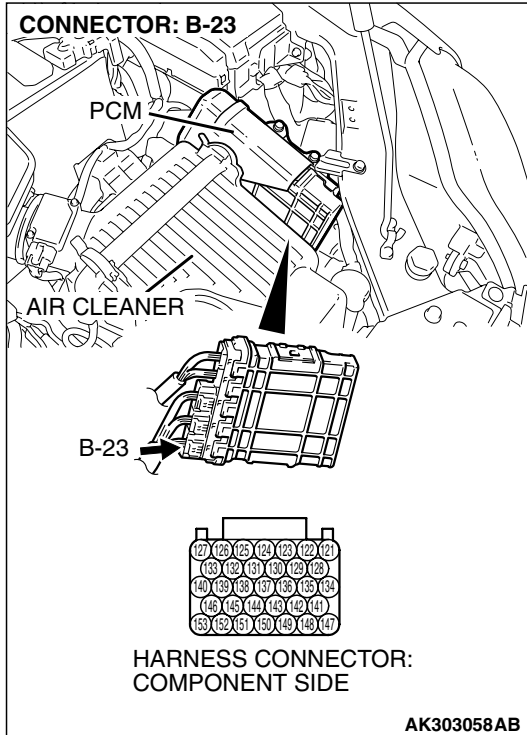
DIAGNOSIS

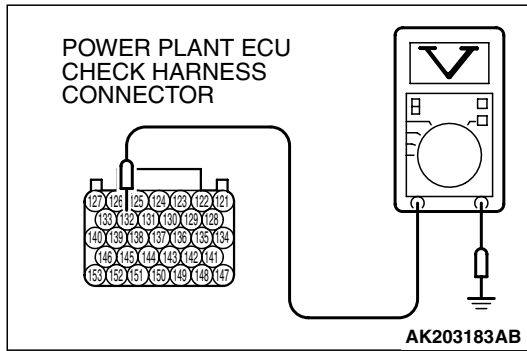
Required Special Tool:

- MB991923: Power Train ECU Check Harness

STEP 1. Measure the voltage at PCM connector B-23 by using check harness special tool MB991923.

- (1) Disconnect the all PCM connectors and connect check harness special tool MB991923 between the separated connectors.
- (2) Start the engine and run at idle.





NOTE: Vehicles for Canada, the headlight, taillight, etc. remain lit even when the lighting switch is in "OFF" position but this is no problem for checks.

- (3) Measure the voltage between terminal No. 132 and ground.
 - a. Engine: warming up
 - b. Radiator fan: stopped
 - c. Headlight switch: OFF to ON
 - d. Rear defogger switch: OFF to ON
 - e. Stoplight switch: OFF to ON
 - Voltage rises by 0.2 – 3.5 volts.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the harness measured voltage within the specified range?

YES : Go to Step 2.

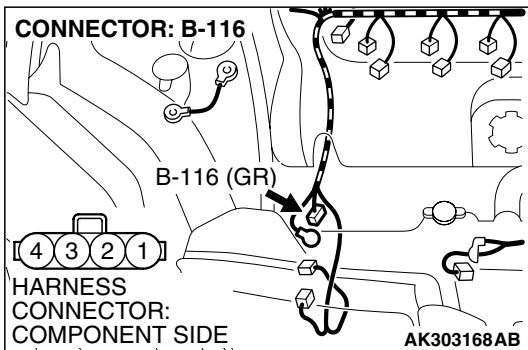
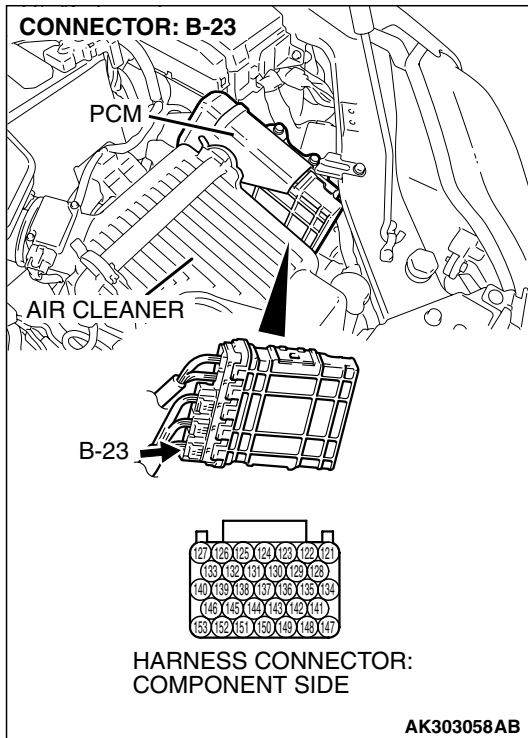
NO : Replace the generator. Then confirm that the malfunction symptom is eliminated.

STEP 2. Check harness connector B-23 at PCM connector and harness connector B-116 at generator connector for damage.

Q: Is the 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.

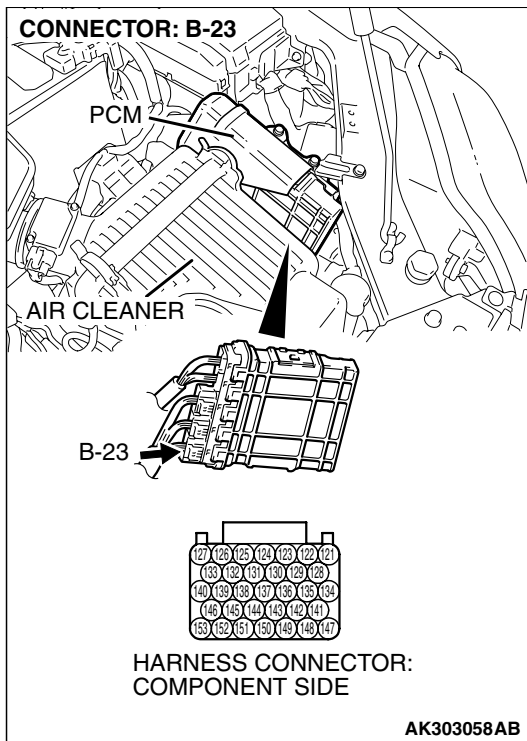
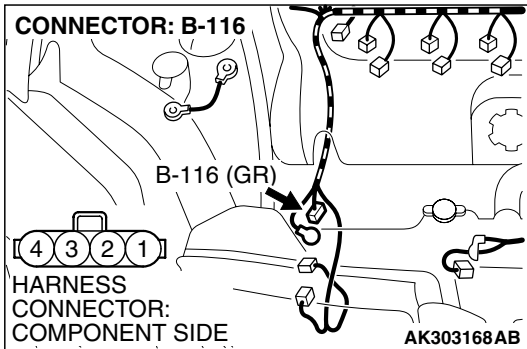


STEP 3. Check for open circuit and short circuit to ground and harness damage between generator connector B-116 (terminal No. 1) and PCM connector B-23 (terminal No. 132).

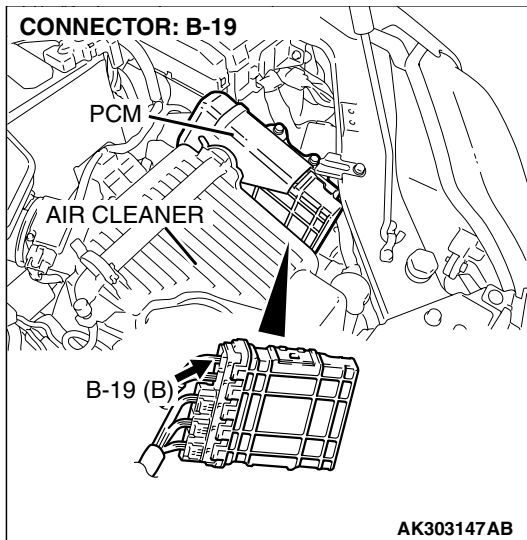
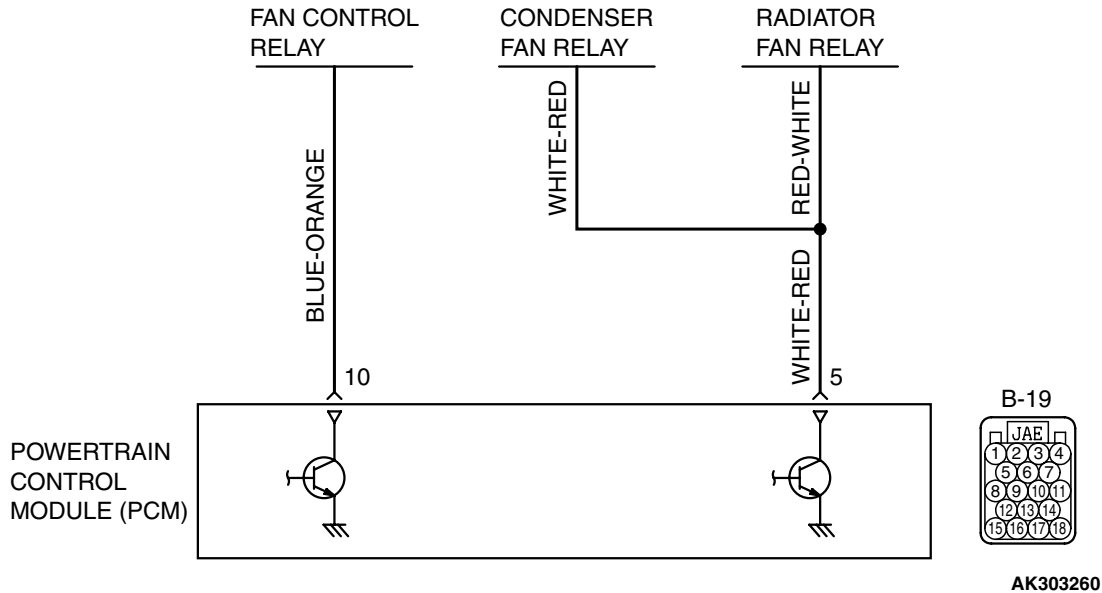
Q: Is the harness wire in good condition?

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

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



INSPECTION PROCEDURE 27: Fans (radiator fan, A/C condenser fan) are inoperative



COMMENT

- The fan control relay is controlled by the power transistor inside the PCM turning "ON" and "OFF".

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

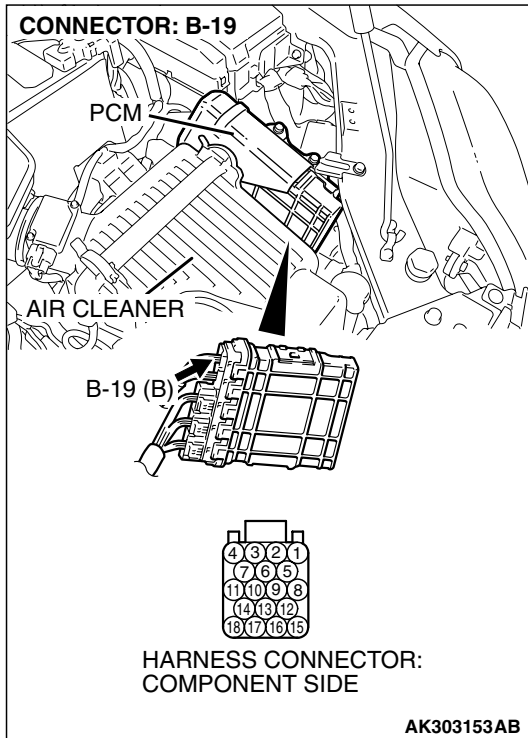
- Malfunction of the fan control relay.

- Malfunction of the fan condenser fan relay.
- Malfunction of the radiator fan relay.
- Malfunction of the condenser fan motor.
- Malfunction of the radiator fan motor.
- Improper connector contact, open or short-circuit harness wire.
- PCM failed.

DIAGNOSIS

Required Special Tools:

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

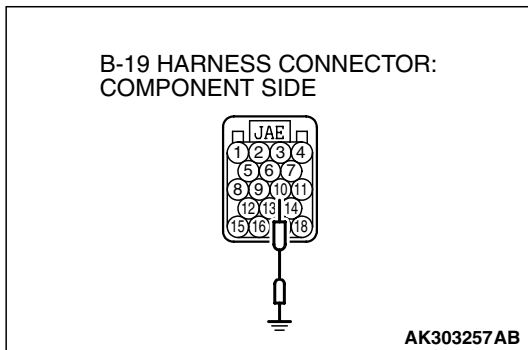


STEP 1. Check harness connector B-19 at PCM for damage.

Q: Is the harness 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 fan condition.

(1) Disconnect the B-19 at PCM connector.

(2) Turn the ignition switch to the "ON" position.

(3) Check the fan condition.

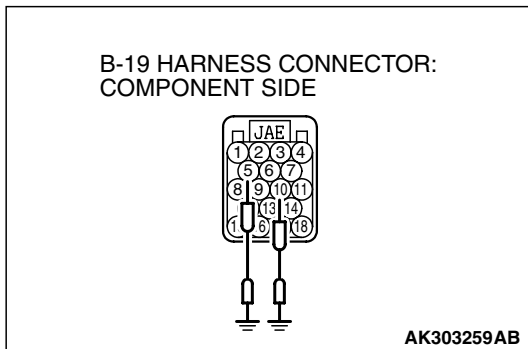
- When the terminal No.10 is grounded by the jumper cable, the radiator and condenser fans should run.
- When the terminal No.10 is grounded first and then both of the terminal No.10 and No.5 are grounded next, check that the rotation speed of fan is higher than the rotation speed when the terminal No.10 is grounded.

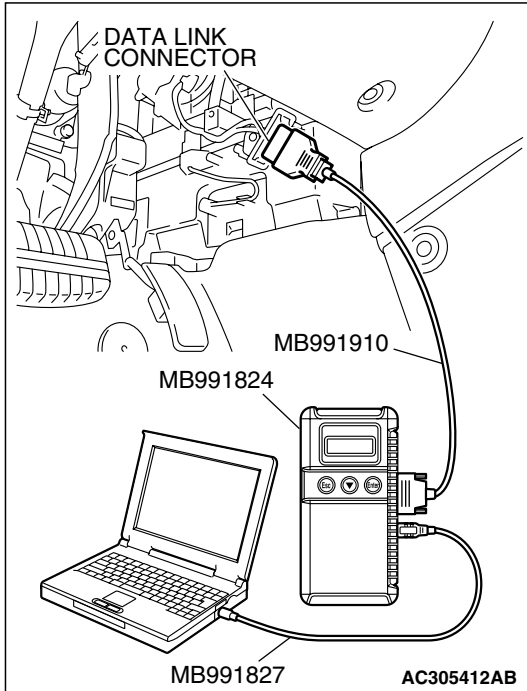
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the fan condition normal?

YES : Go to Step 3.

NO : Refer to GROUP 14, Symptom Chart.





STEP 3. Using scan tool MB991958, check data list item 21: Engine Coolant Temperature Sensor.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

- (1) Connect scan tool MB991958 to the data link connector.
- (2) Start the engine and run at idle.
- (3) Check the following items in the data list. Refer to, Data List Reference Table.
 - a. Item 21 Engine Coolant Temperature Sensor.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the sensor operating properly?

YES : Go to Step 4.

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

STEP 4. Check the cooling system.

Refer to GROUP 14, Engine Cooling Diagnosis [P.143](#).

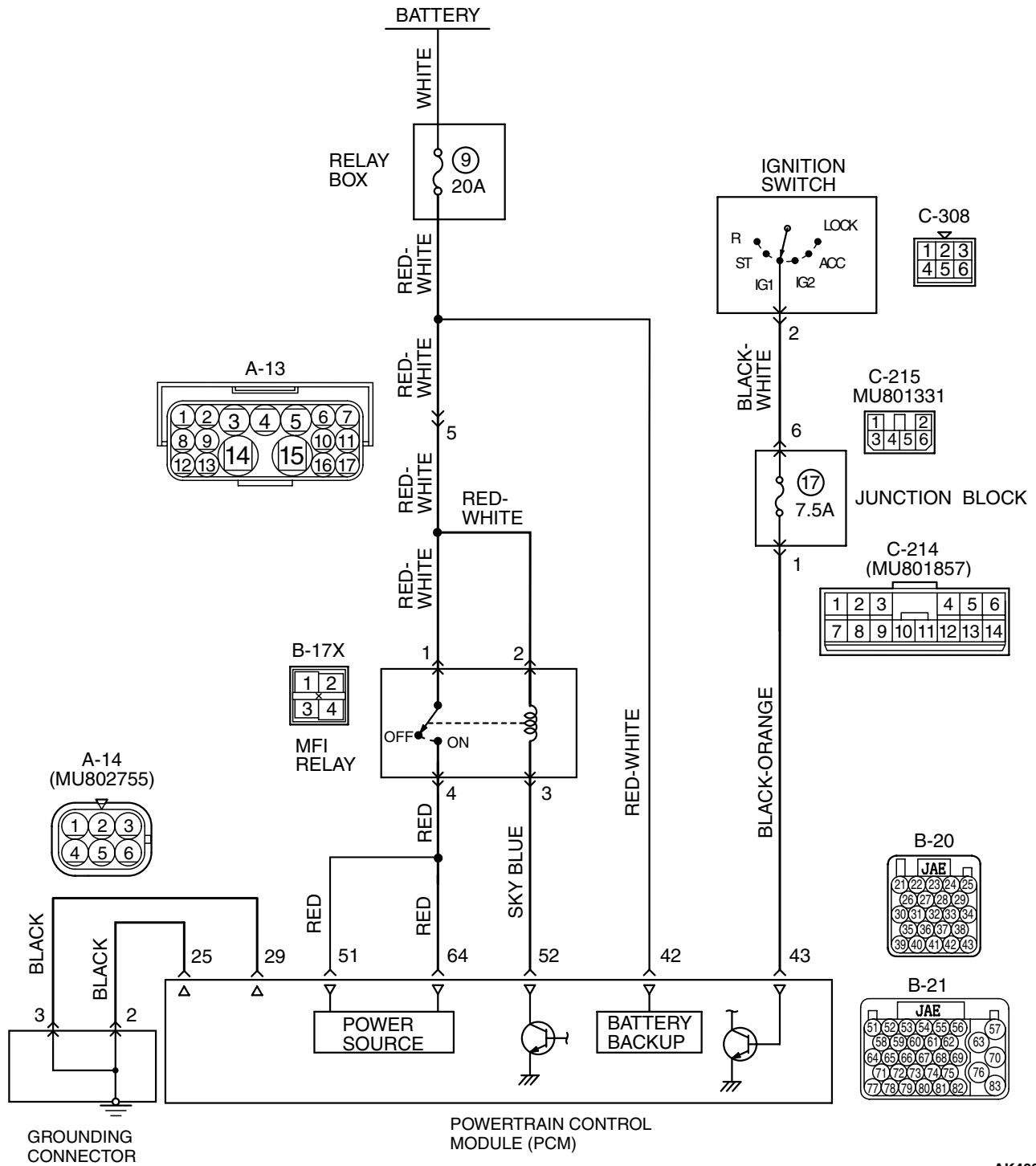
Q: Is the cooling system normal?

YES : . Replace the PCM.

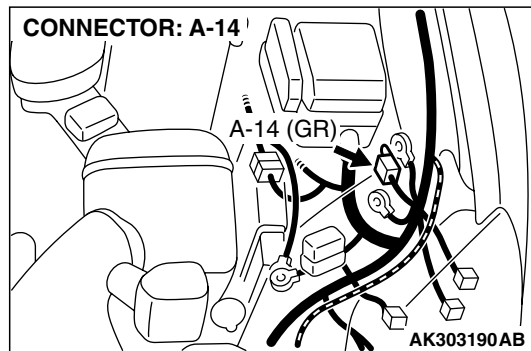
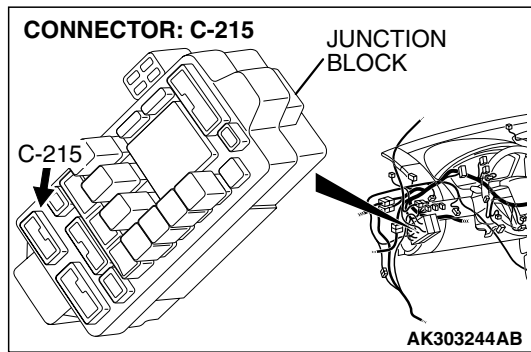
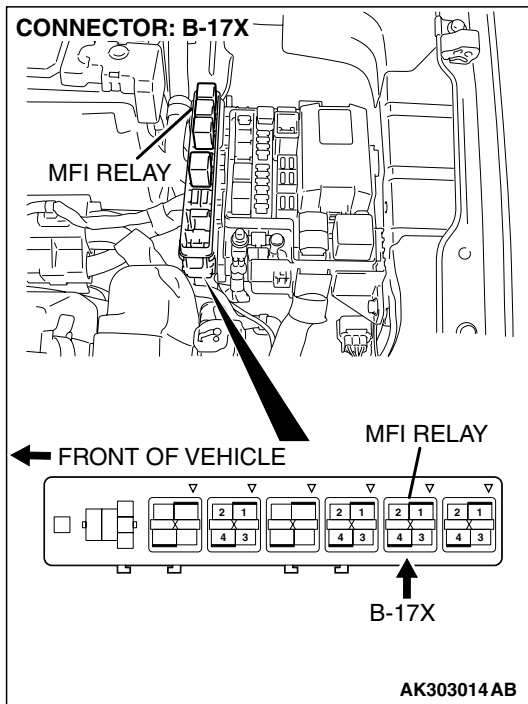
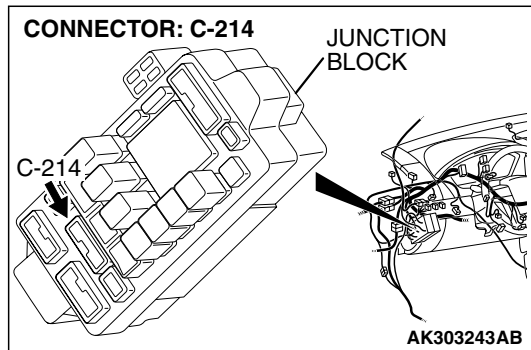
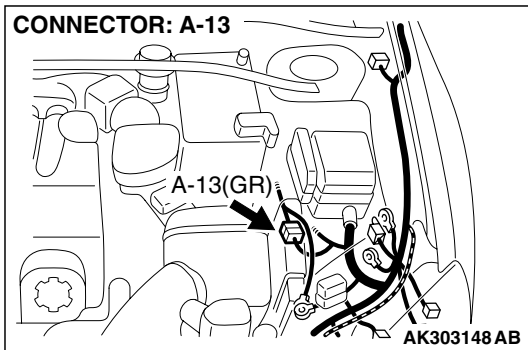
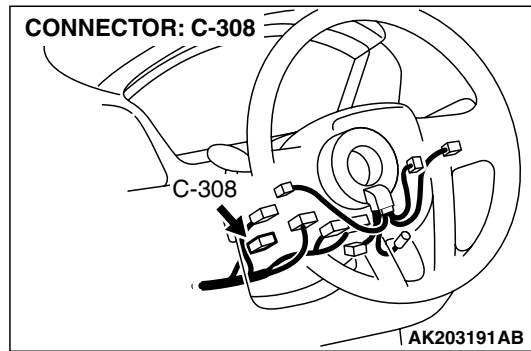
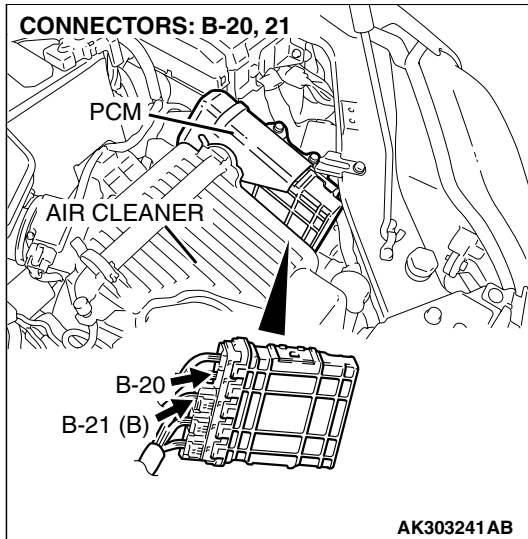
NO : . Replace it. Then confirm that the malfunction symptom is eliminated.

INSPECTION PROCEDURE 28: Power supply system and ignition switch - IG system.

Power Supply and Ignition Switch-IG Circuit



AK400836



CIRCUIT OPERATION

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

- A battery positive voltage is constantly supplied to the PCM (terminal No. 42) as the backup power.
- The PCM (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 MFI relay.
- Improper connector contact, open circuit or short-circuit harness wire.
- Disconnected PCM ground wire.
- Malfunction of the PCM.

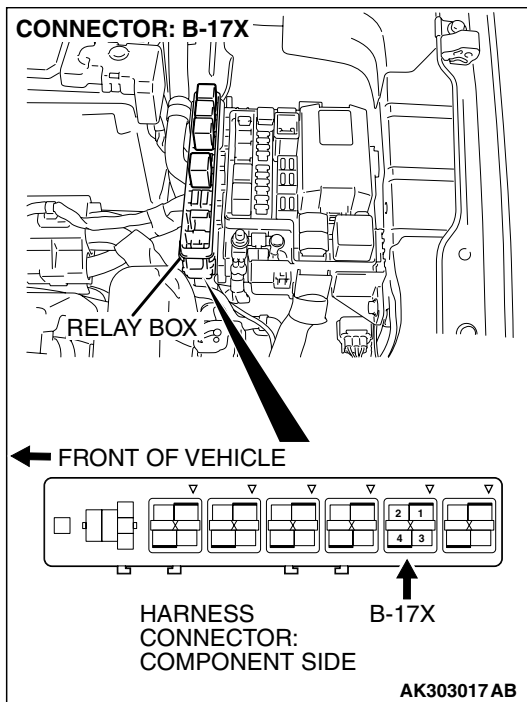
DIAGNOSIS

STEP 1. Check harness connector B-17X at MFI 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.

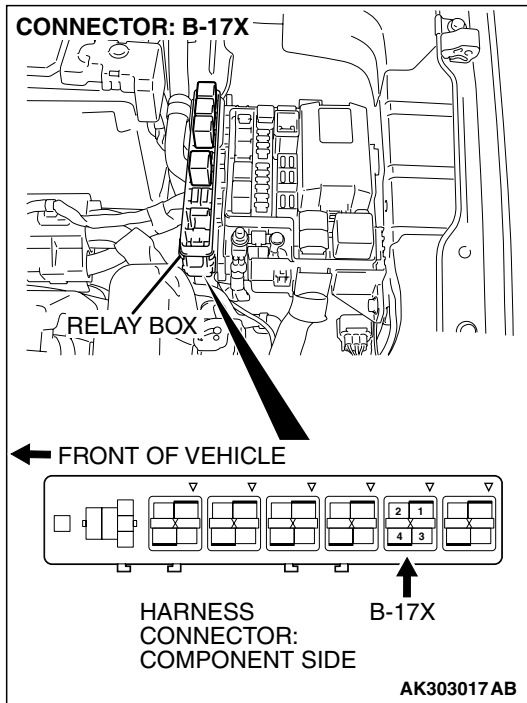


STEP 2. Check the MFI relay.

⚠ CAUTION

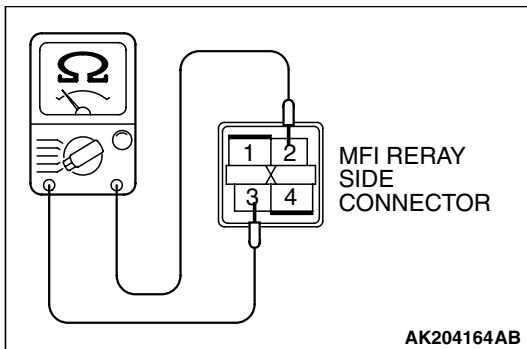
Because it is not possible to distinguish the top and the bottom of the MFI relay, inspect it with the triangle mark printed on the relay facing upward.

(1) Remove the MFI relay.



(2) Check for continuity between the MFI relay terminals No. 2 and No. 3.

- There should be continuity. (approximately 70 ohms)



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

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

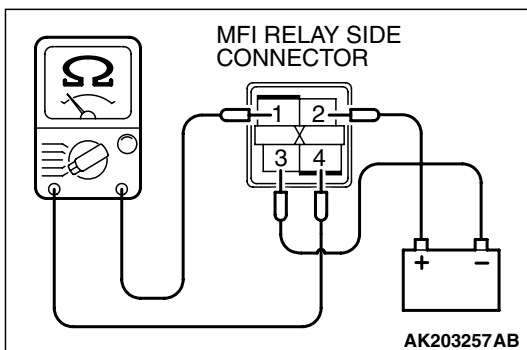
- Should be less than 2 ohms. (Negative battery terminal connected)
- Should be open loop. (Negative battery terminal disconnected)

(5) Install the MFI relay.

Q: Is the measured resistance within the specified range?

YES : Go to Step 3.

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

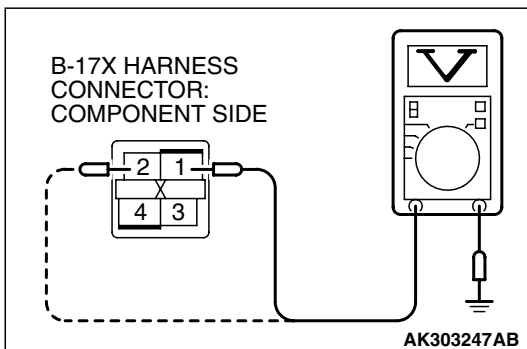
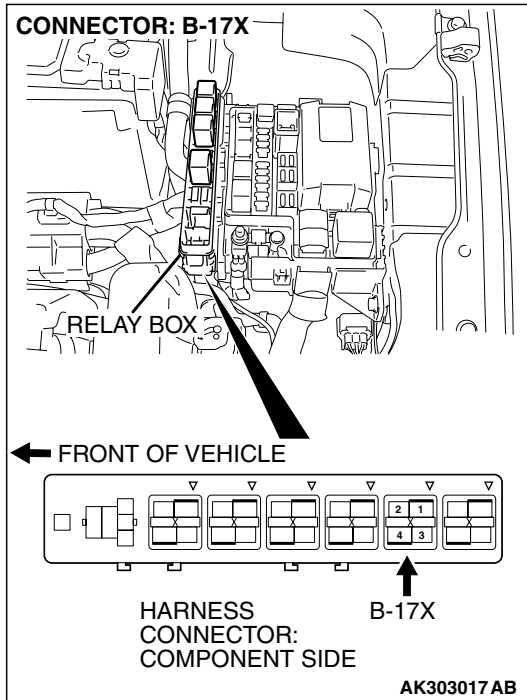


STEP 3. Measure the power supply voltage at MFI relay harness side connector B-17X.

⚠ CAUTION

Because it is difficult to distinguish the top and bottom of the MFI 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.

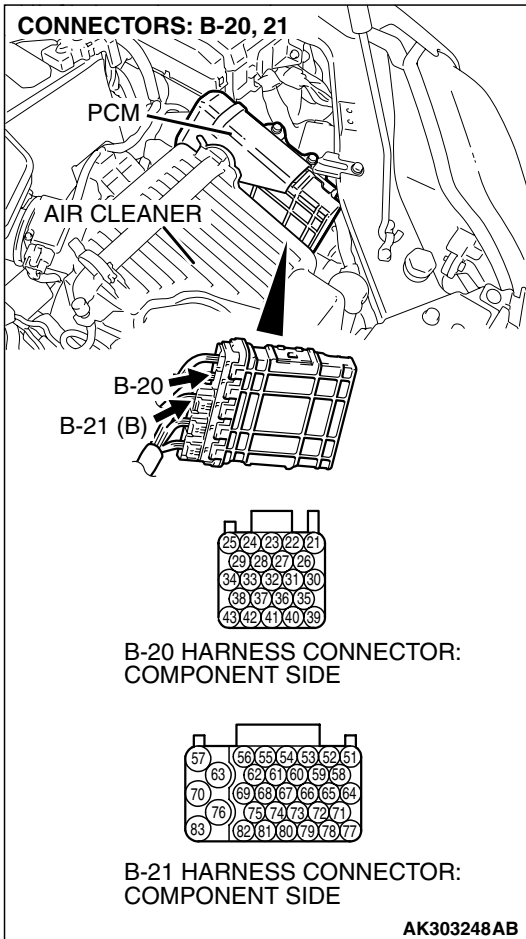
NO : Check harness connector A-13 at intermediate connector for damage, and repair or replace as required. Refer to, GROUP 00E, Harness Connector Inspection [P.00E-2](#). If intermediate connector is in good condition, repair harness wire between relay box (9) and MFI relay connector B-17X (terminals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

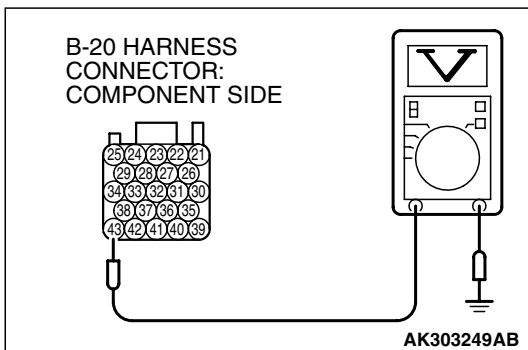
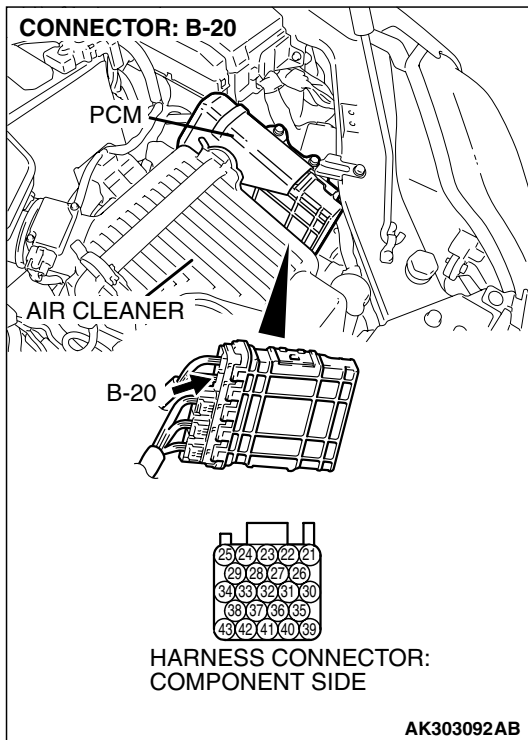
STEP 4. Check harness connector B-20 and B-21 at PCM for damage.

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 PCM harness side connector B-20.

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

- (3) Measure the voltage between terminal No. 43 and ground.
 - Voltage should be battery positive voltage.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

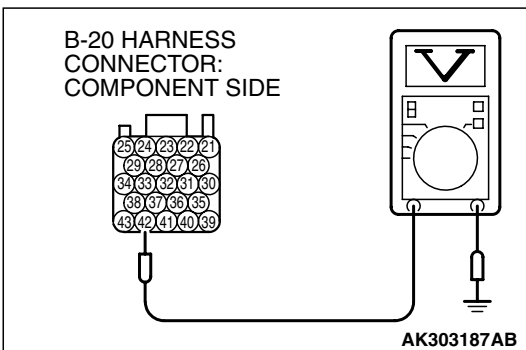
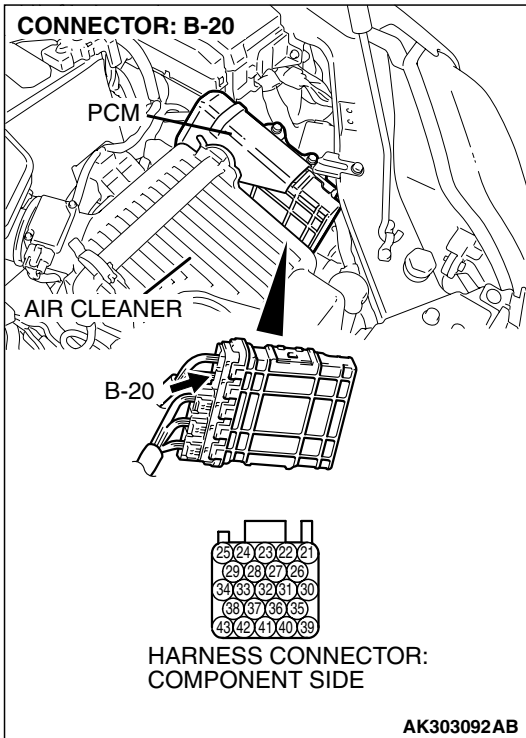
Q: Is battery positive voltage (approximately 12 volts) present?

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 PCM connector B-21 (terminal No. 43) because of open circuit. Then confirm that the malfunction symptom is eliminated.

STEP 6. Measure the backup power supply voltage at PCM harness side connector B-20.

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



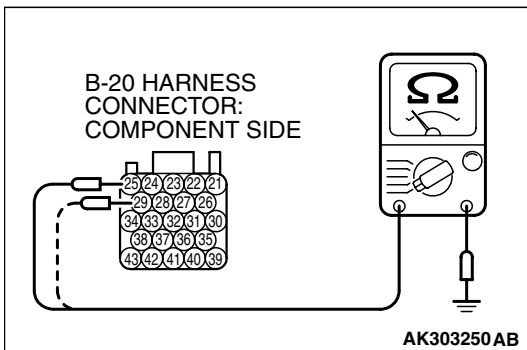
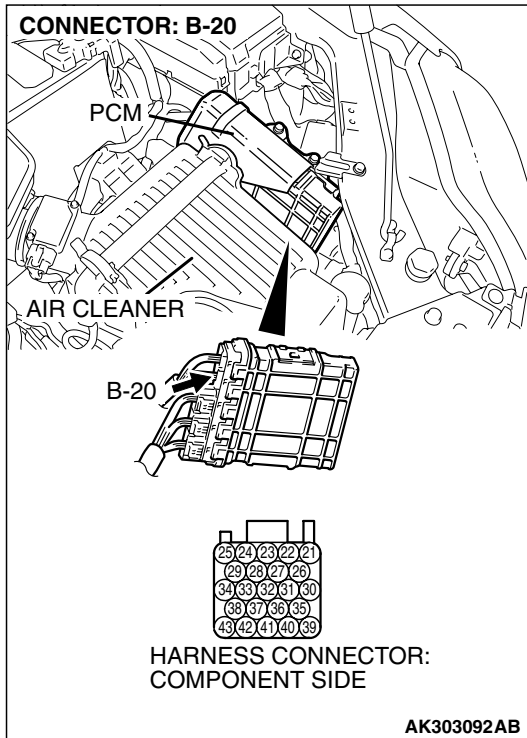
(2) Measure the voltage between terminal No. 42 and ground.

- 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 PCM connector B-20 (terminal No. 42) because of short circuit. Then confirm that the malfunction symptom is eliminated.



STEP 7. Check for continuity at PCM harness side connector B-20.

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

(2) Check for the continuity between terminals (No. 25, No. 29) and ground.

- Should be less than 2 ohms.

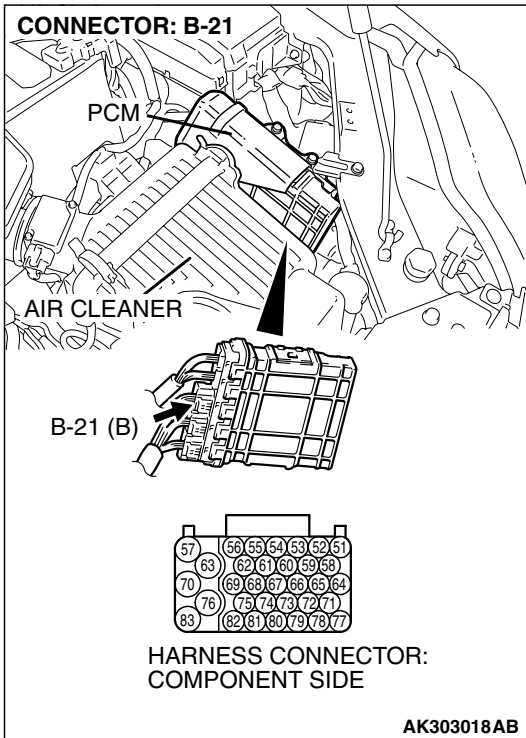
Q: Does continuity exist?

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 PCM connector B-20 (terminal No. 25, No. 29) and ground because of open circuit. Then confirm that the malfunction symptom is eliminated.

STEP 8. Measure the power supply voltage at PCM harness side connector B-21.

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



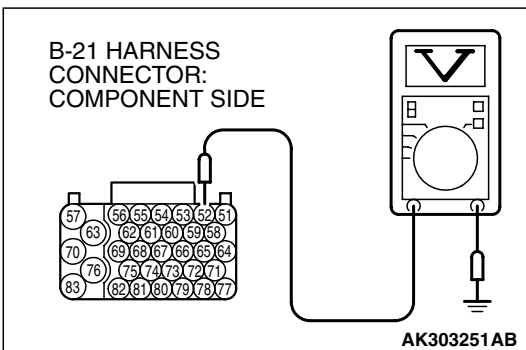
(2) Measure the voltage between terminal No. 52 and ground.

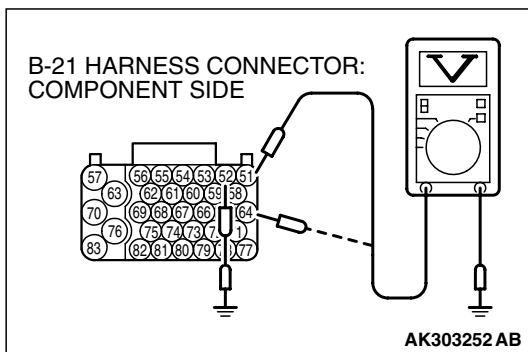
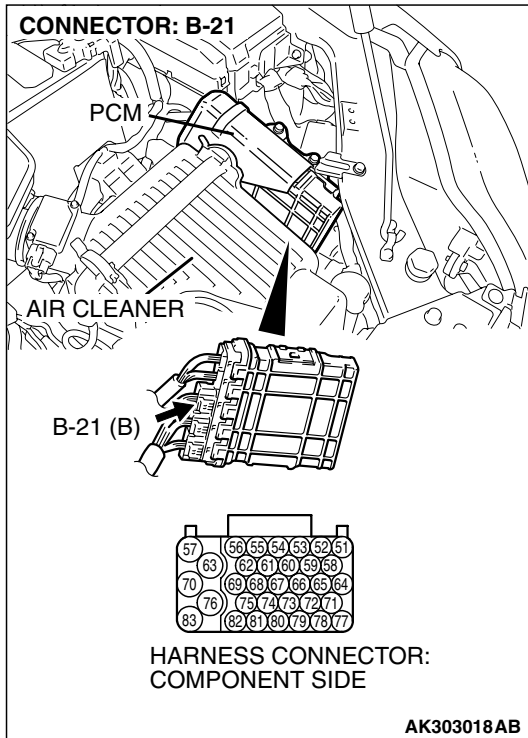
- Voltage should be battery positive voltage.

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

YES : Go to Step 9.

NO : Repair harness wire between MFI relay connector B-17X (terminal No. 3) and PCM connector B-21 (terminal No. 52) because of open circuit. Then confirm that the malfunction symptom is eliminated.





STEP 9. Measure the power supply voltage at PCM harness side connector B-21.

- (1) Disconnect the connector B-21 and measure at the harness side.
- (2) Using a jumper wire, connect terminal No. 52 to ground.

- (3) Measure the voltage between terminals (No. 51, No. 64) and ground.

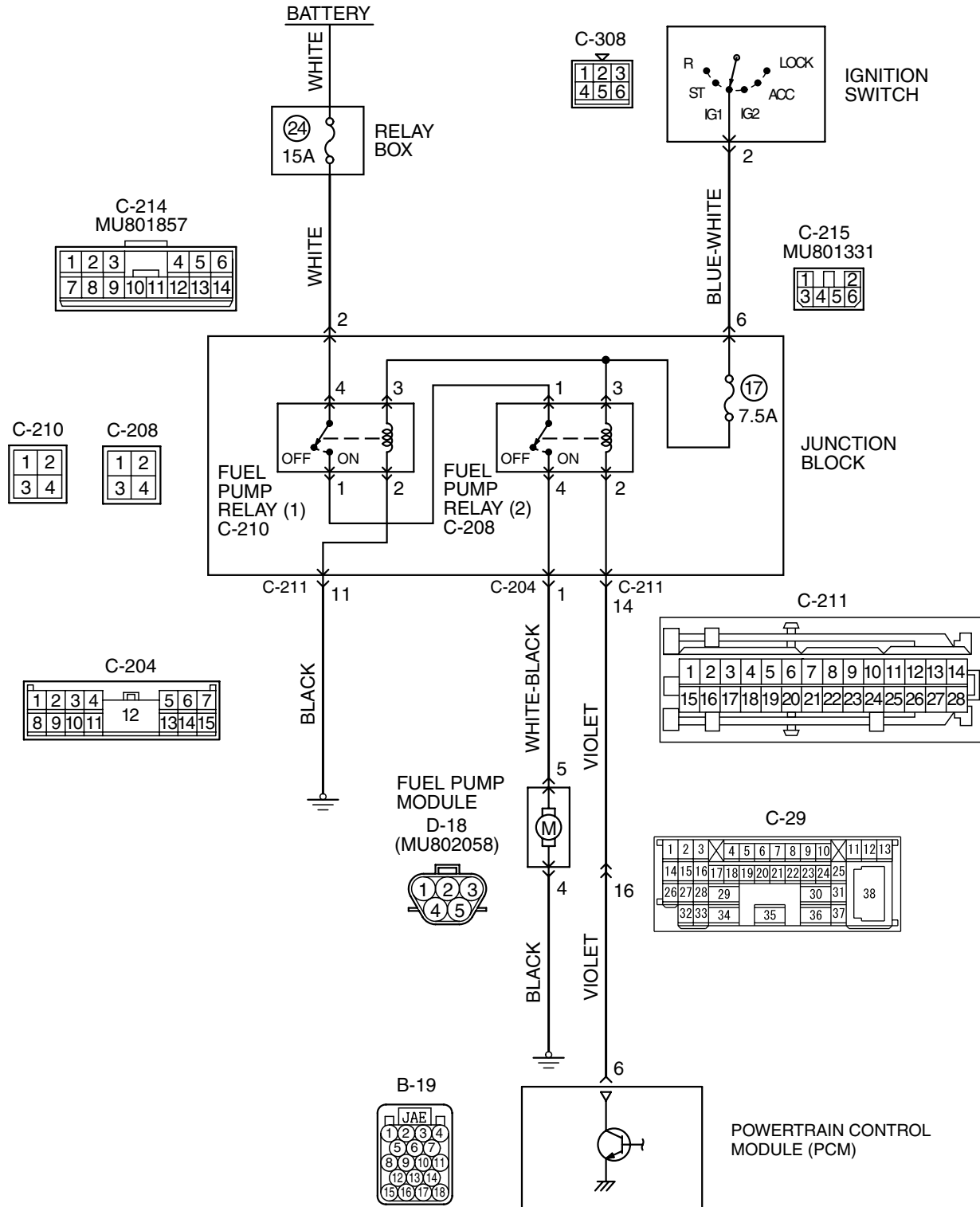
- Voltage should be battery positive voltage.

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

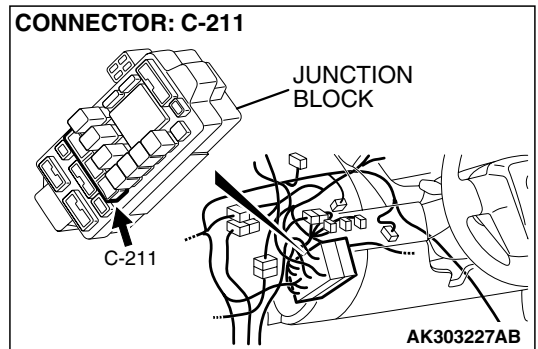
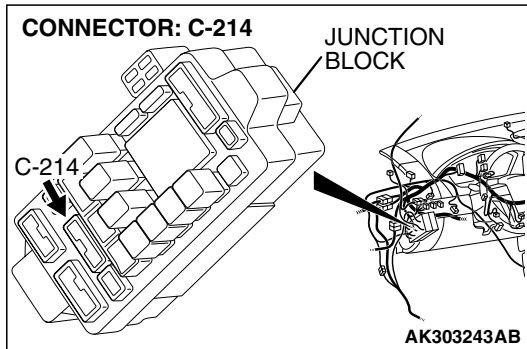
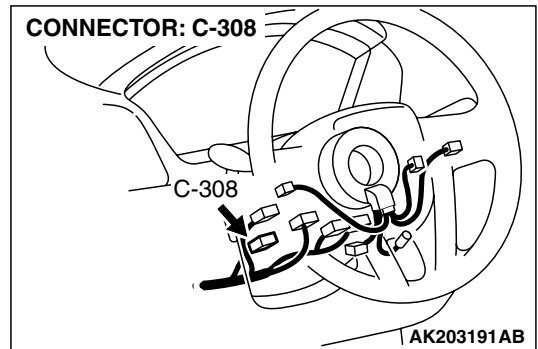
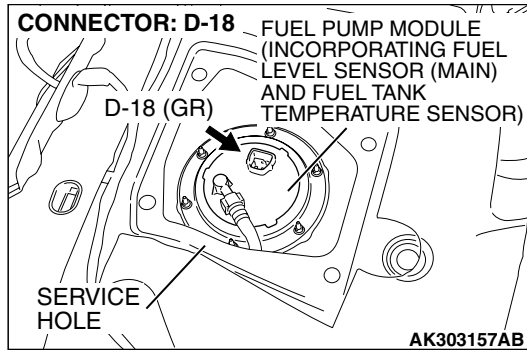
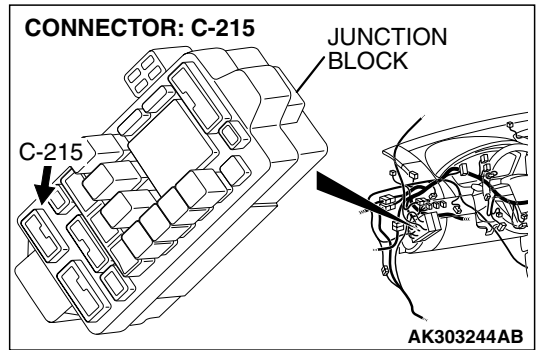
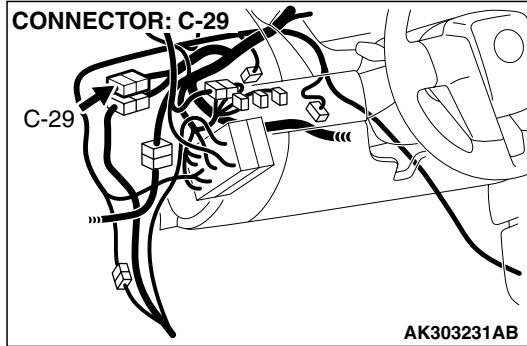
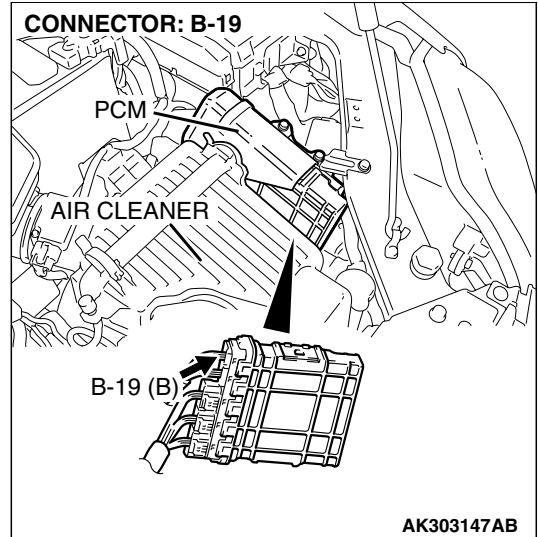
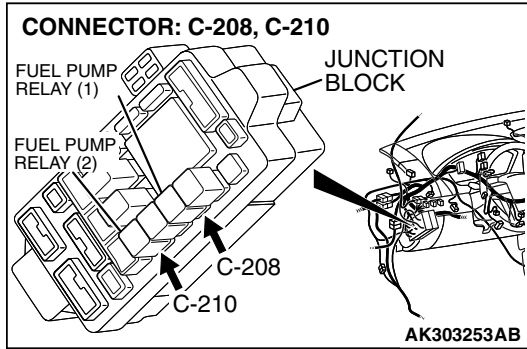
- YES :** Replace the PCM. Then confirm that the malfunction symptom is eliminated.
- NO :** Repair harness wire between MFI relay connector B-17X (terminal No. 4) and PCM connector B-21 (terminals No. 51, No. 64) because of open circuit. Then confirm that the malfunction symptom is eliminated.

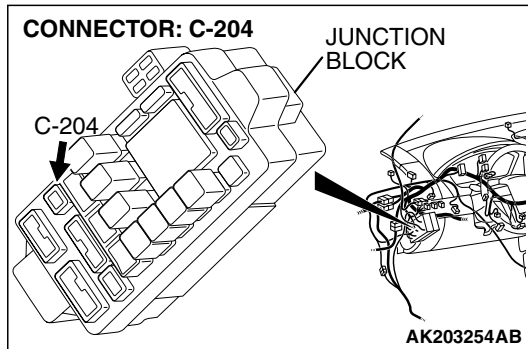
INSPECTION PROCEDURE 29: Fuel pump system.

Fuel Pump Circuit



AK302879





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 PCM turns the power transistor in the PCM 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-circu-
lated harness wire.
- Malfunction of the PCM.

DIAGNOSIS**Required Special Tools:**

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

STEP 1. Using scan tool MB991958, check actuator test item 07: Fuel Pump.

⚠ CAUTION

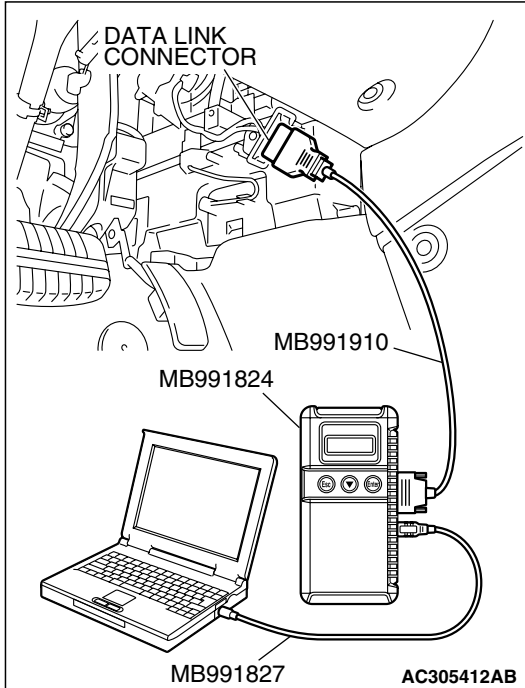
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

- (1) Connect scan tool MB991958 to the data link connector.
- (2) Turn the ignition switch to the "ON" position.
- (3) Set scan tool MB991958 to the actuator test mode for item 07, Fuel Pump.
 - An operation sound of the fuel pump should be heard.
- (4) 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.

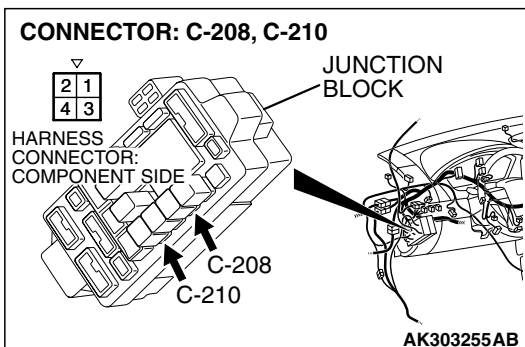


STEP 2. Check harness connector C-210 at fuel pump relay 1 and harness connector C-208 at fuel pump relay 2 for damage.

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.

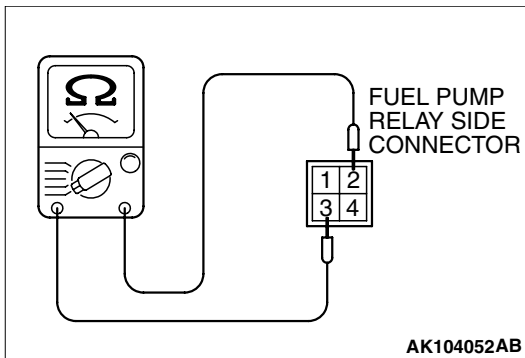
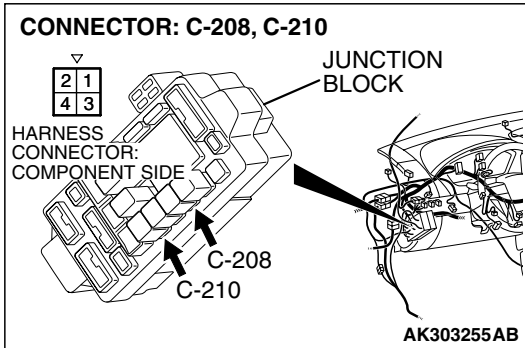


STEP 3. Check the fuel pump relay 1 and 2.

⚠ CAUTION

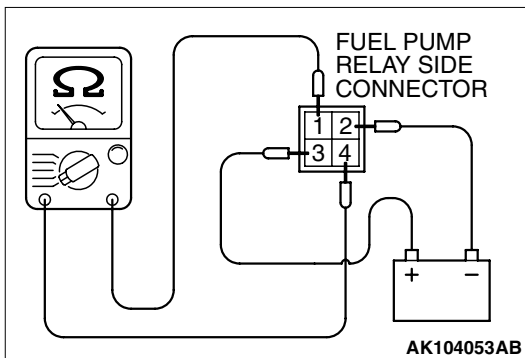
Because it is not possible to distinguish the top and the bottom of the fuel pump relay, inspect it with the triangle mark printed on the relay facing upward.

(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.

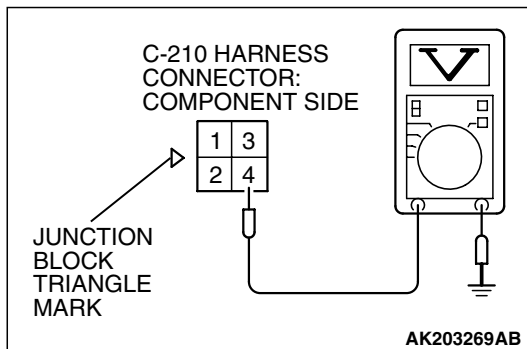
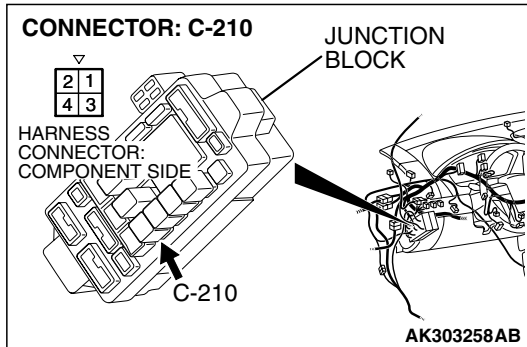
- Should be less than 2 ohms. (Negative battery terminal connected)
- Should be open loop. (Negative battery terminal disconnected)

(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.

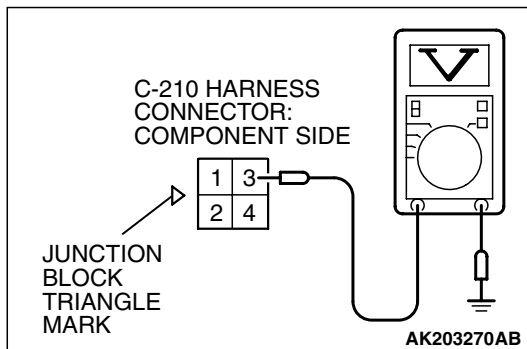
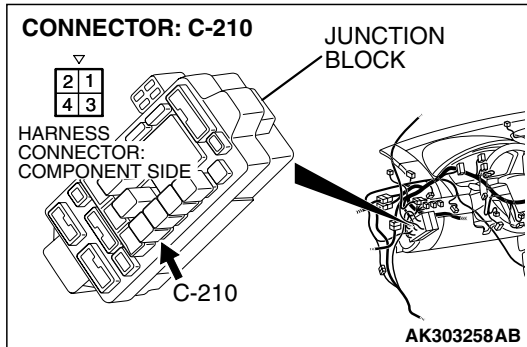
NO : Check harness connector C-214 at intermediate connector for damage, and repair or replace as required. Refer to, GROUP 00E, Harness Connector Inspection [P.00E-2](#). If intermediate connector is in good condition, repair harness wire between relay box and fuel pump relay 1 connector C-210 (terminal 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.

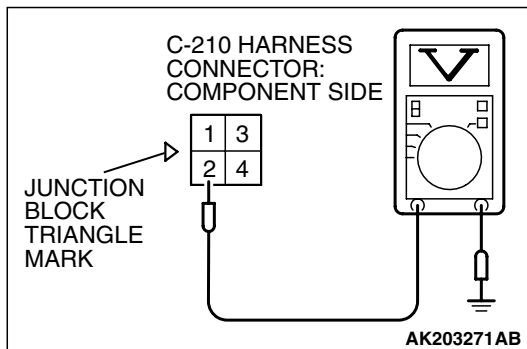
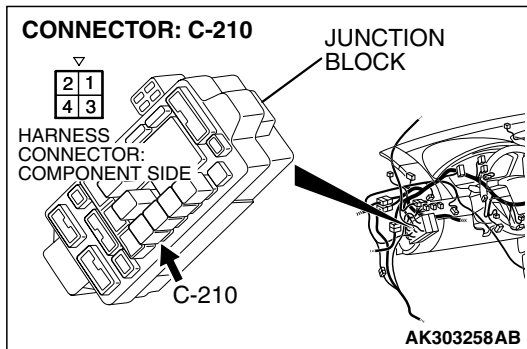


- (3) Measure the voltage between terminal No. 3 and ground.
 - Voltage should be battery positive voltage.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

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.

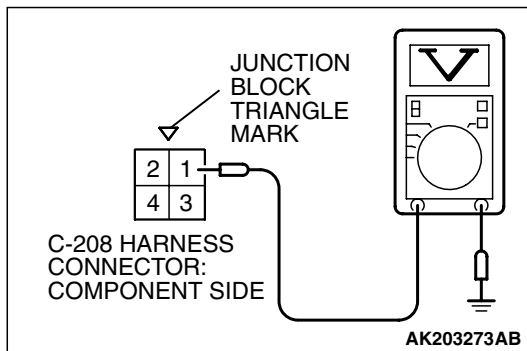
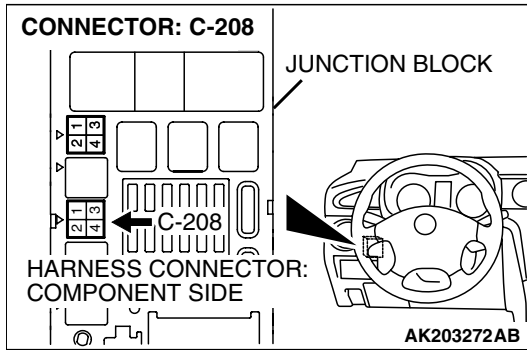
NO : Check connector C-211 at intermediate connector for damage, and repair or replace as required. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). If intermediate connector is in good condition, repair harness wire between fuel pump relay 1 connector C-210 (terminal No. 2) and ground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

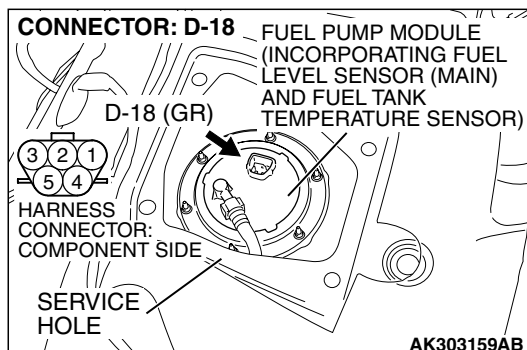
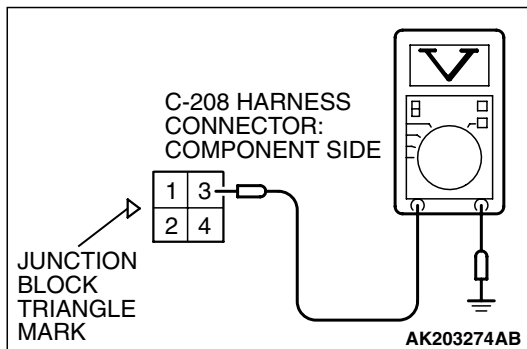
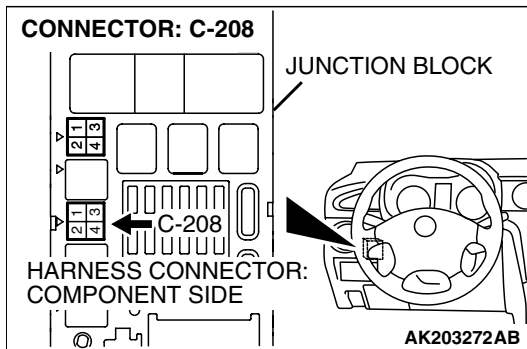


- (3) Measure the voltage between terminal No. 1 and ground.
 - Voltage should be battery positive voltage.

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.

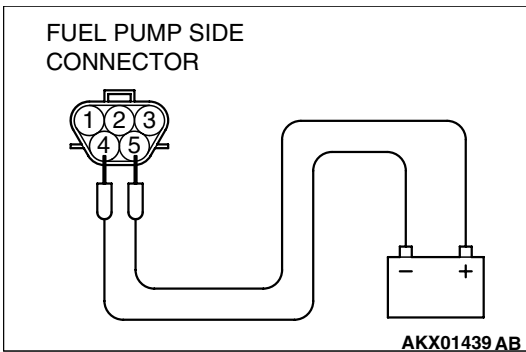
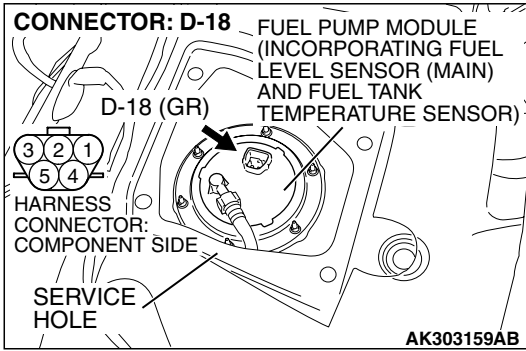
NO : Check harness connector C-215 at intermediate connector for damage, and repair or replace as required. Refer to, GROUP 00E, Harness Connector Inspection [P.00E-2](#). If intermediate connector is in good condition, repair harness wire between ignition switch connector C-308 (terminal No. 2) and 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.

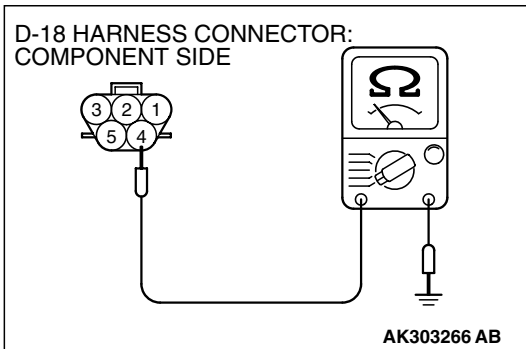
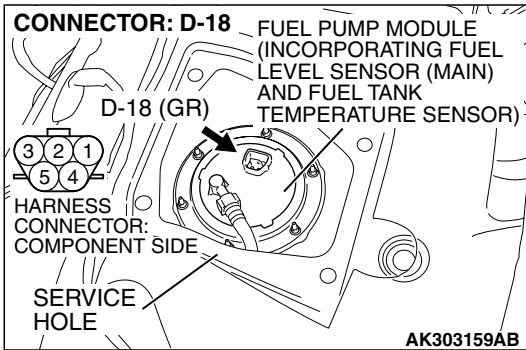
(1) Disconnect fuel pump connector D-18.

- (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.

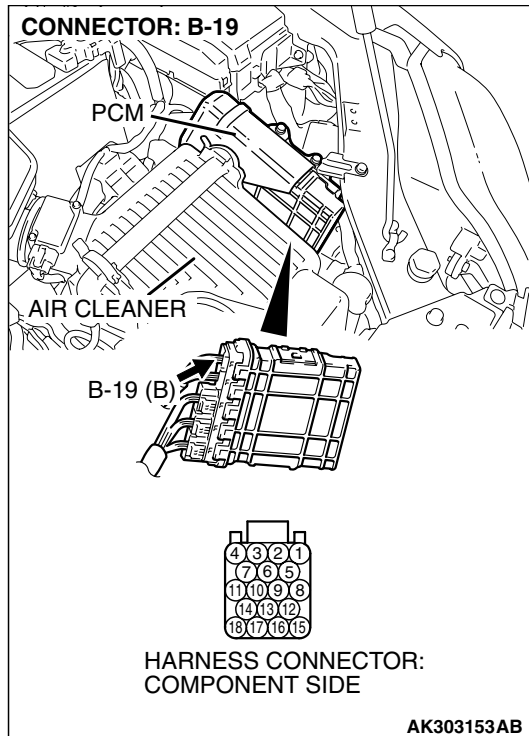
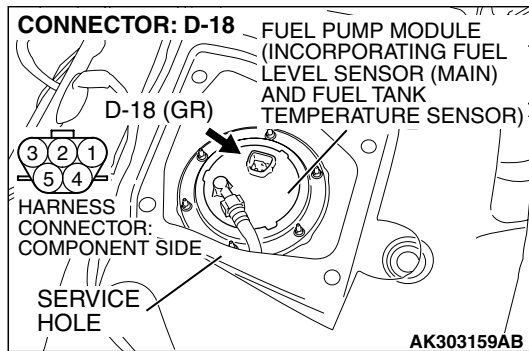
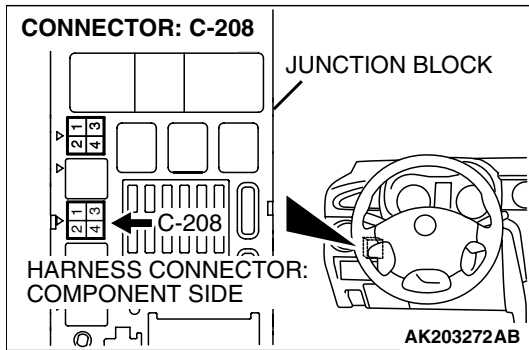
(1) Disconnect the connector D-18 and measure at the harness side.

- (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.

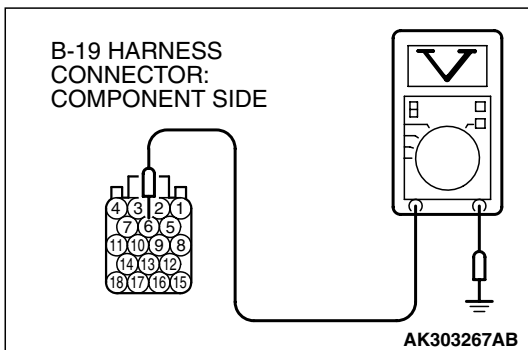
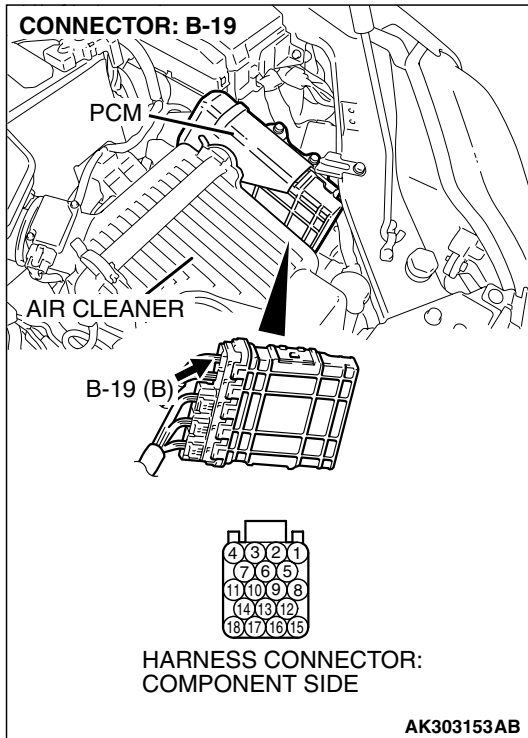
NO : Repair it. Then confirm that the malfunction symptom is eliminated.

STEP 13. Check connector B-19 at PCM 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 PCM connector B-19.

- (1) Disconnect the connector B-19 and measure at the harness side.
- (2) Turn the ignition switch to the "ON" position.

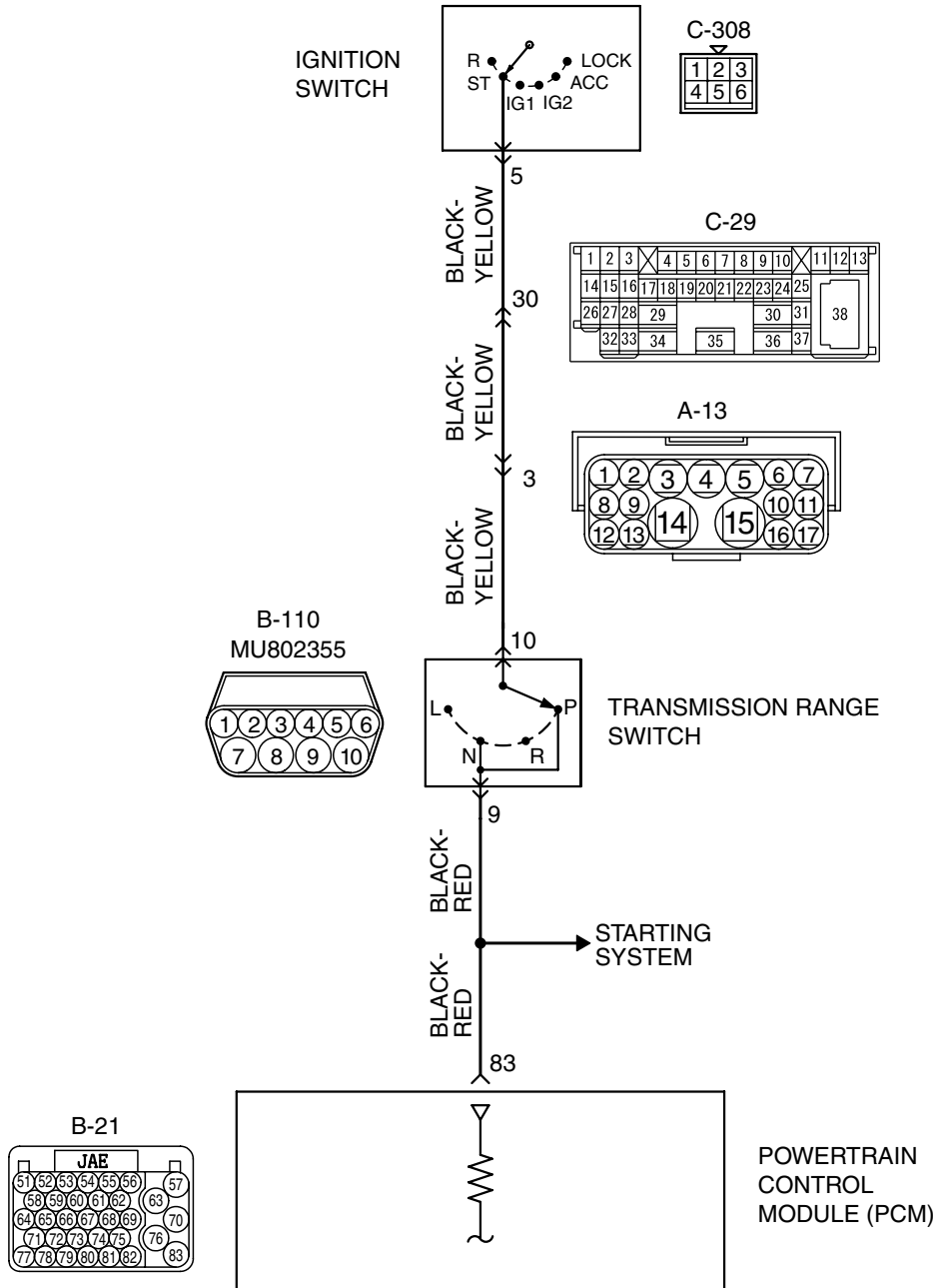
- (3) Measure the voltage between terminal No. 6 and ground.
 - Voltage should be battery positive voltage.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

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

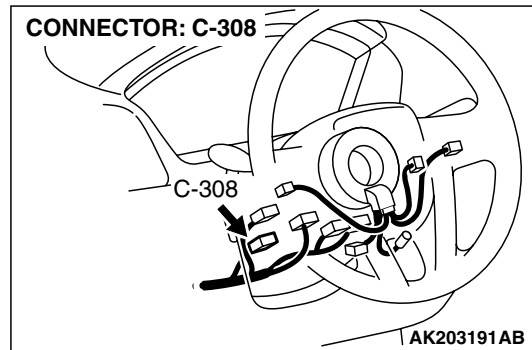
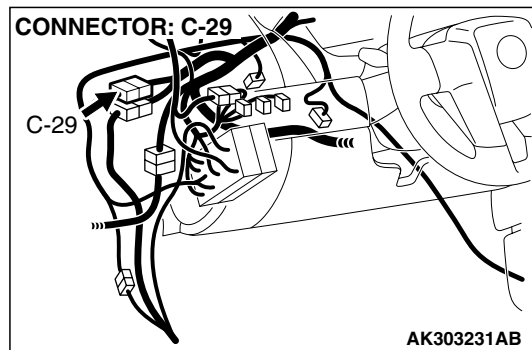
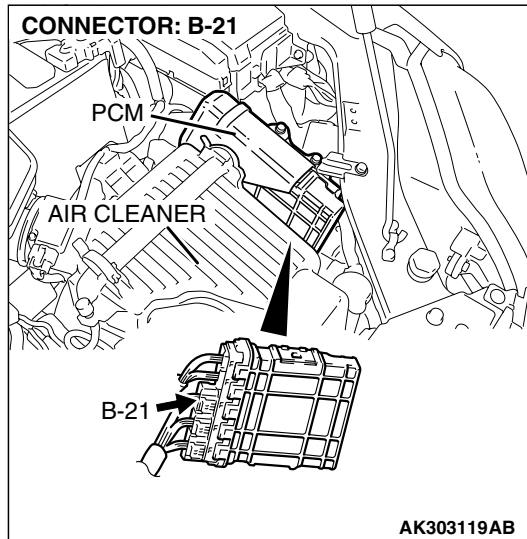
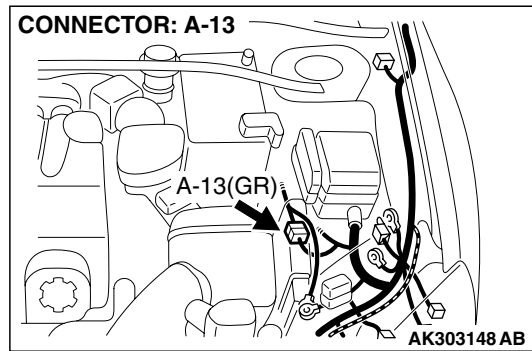
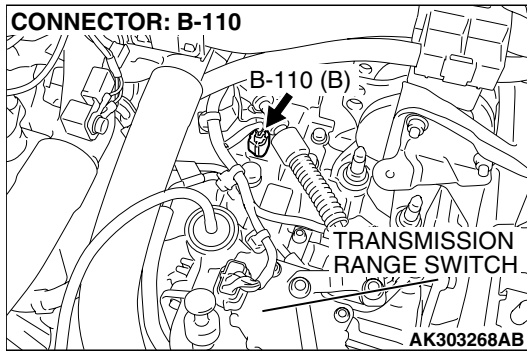
- YES :** Replace the PCM. Then confirm that the malfunction symptom is eliminated.
- NO :** Check harness connectors C-29 and C-211 at intermediate connector for damage, and repair or replace as required. Refer to, GROUP 00E, Harness Connector Inspection [P.00E-2](#). If intermediate connectors are in good condition, repair harness wire between fuel pump relay 2 connector C-208 (terminal No. 2) and PCM connector B-19 (terminal No. 6) because of open circuit. Then confirm that the malfunction symptom is eliminated.

INSPECTION PROCEDURE 30: Ignition Switch-ST System and Transmission Range Switch System

Ignition Switch-ST and Transmission Range Switch Circuit



AK400837



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 PCM (terminal No. 83) through the ignition switch and transmission range switch. Because of this, the PCM detects that the engine is cranking.
- The transmission range switch detects the transmission range (P, N or other ranges) and converts it to a voltage signal (high or low). Then the transmission range switch sends that signal to the PCM.

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 PCM and ground through the transmission range switch and starter motor. The terminal voltage of the PCM will become low. If the selector lever is moved to the other ranges, continuity will be lost between the PCM and ground. The terminal voltage of the PCM 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 range switch.
- Improper connector contact, open circuit or short-circuit in the harness wire.
- Malfunction of the PCM.

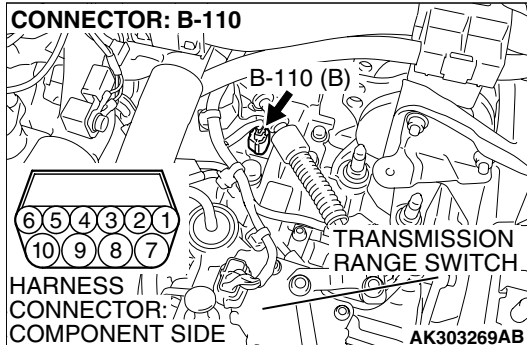
DIAGNOSIS

STEP 1. Check connector B-110 at transmission range 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 range switch.

Refer to GROUP 23A, On-vehicle Service – Essential Service – Transmission Range Switch Continuity Check [P.23A-372](#).

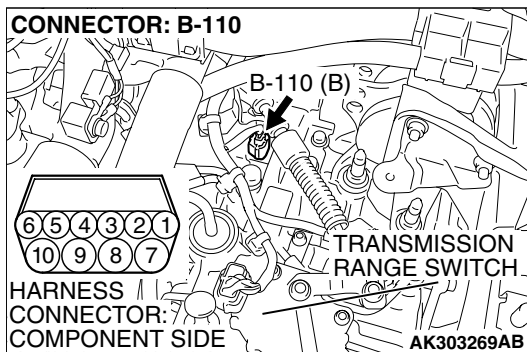
Q: Are there any abnormalities?

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 range 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.

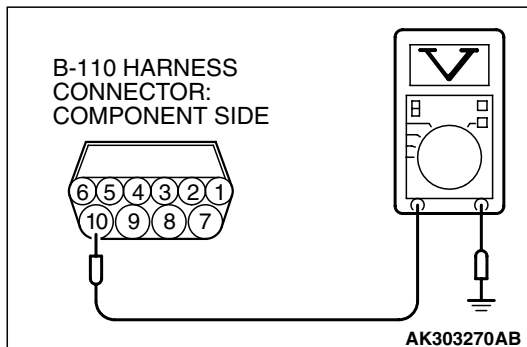


- (3) Measure the voltage between terminal No. 10 and ground.
 - Voltage should be battery positive voltage.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

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 range switch connector B-110 (terminal No. 10) because of open circuit. Then confirm that the malfunction symptom is eliminated.

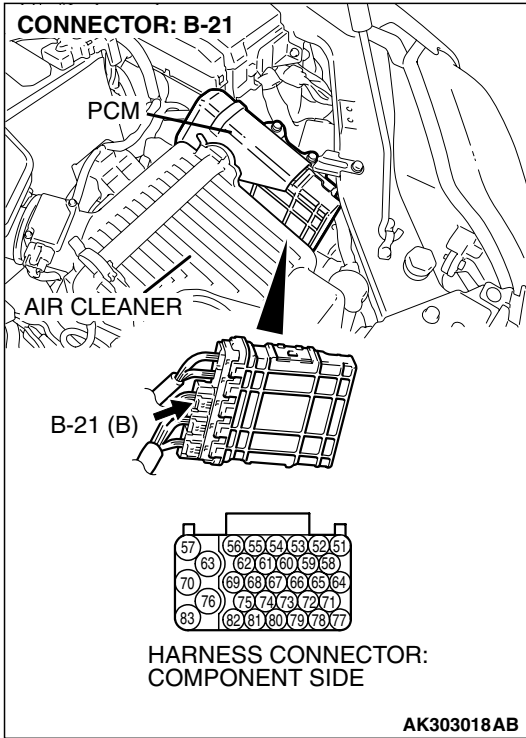


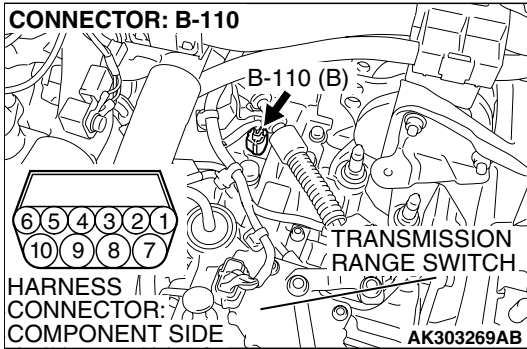
STEP 4. Check connector B-21 at PCM for damage.

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.



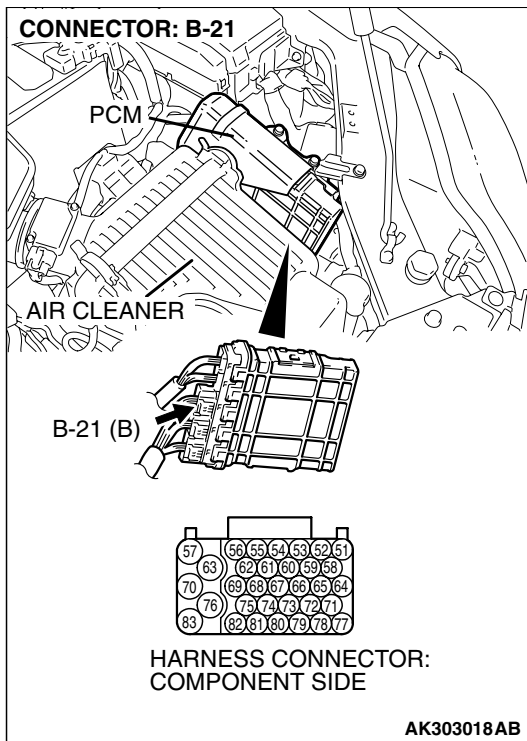


STEP 5. Check for open circuit and short circuit to ground and harness damage between transmission range switch connector B-110 (terminal No. 9) and PCM connector B-21 (terminal No. 83).

Q: Is the harness wire in good condition?

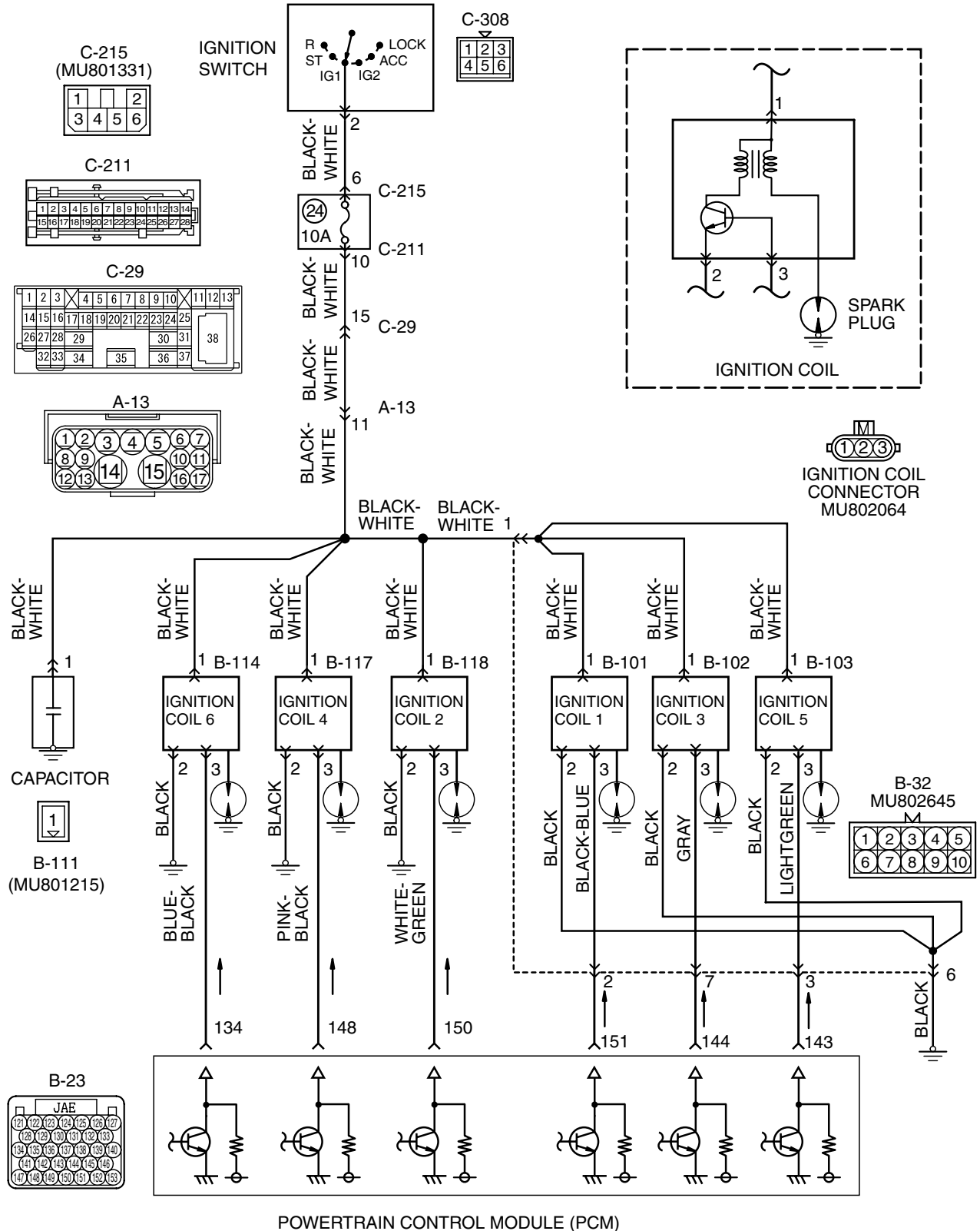
YES : Replace the PCM. Then confirm that the malfunction symptom is eliminated.

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



INSPECTION PROCEDURE 31: Ignition Circuit System.

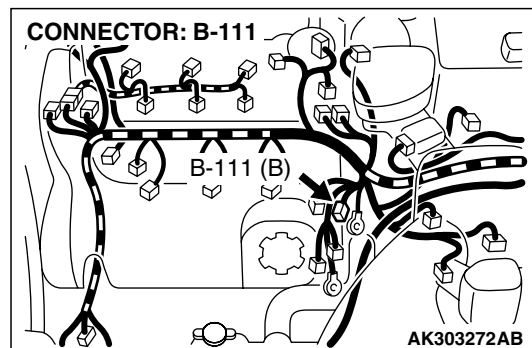
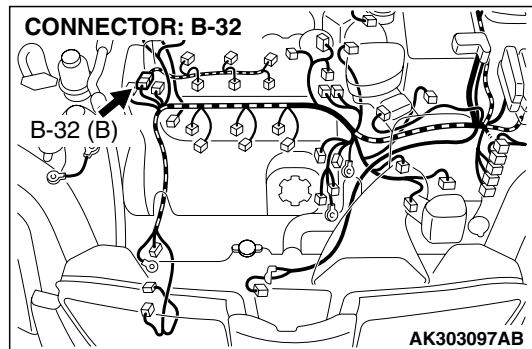
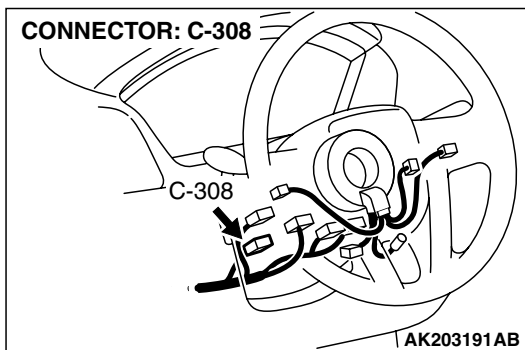
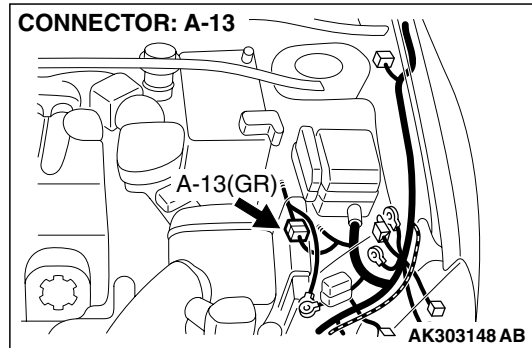
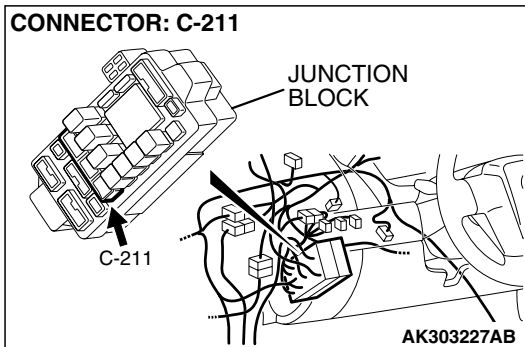
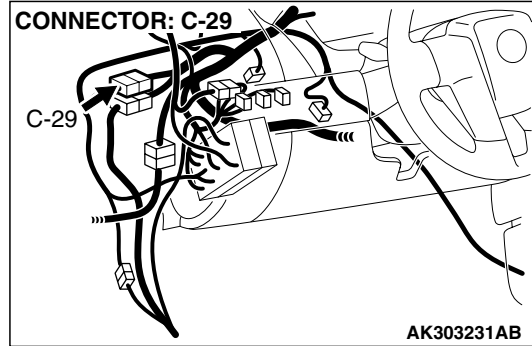
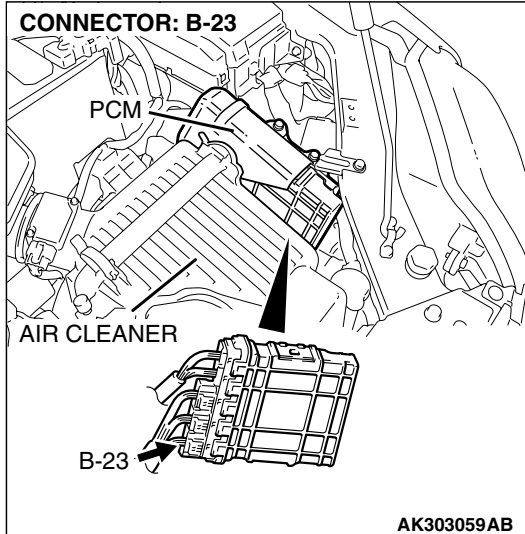
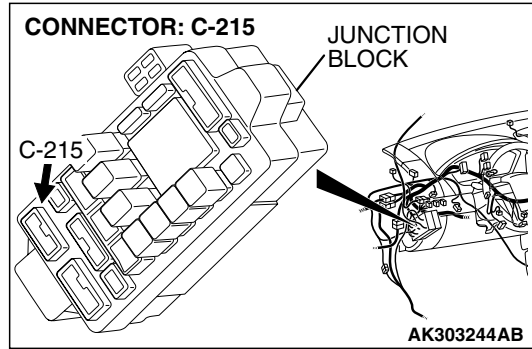
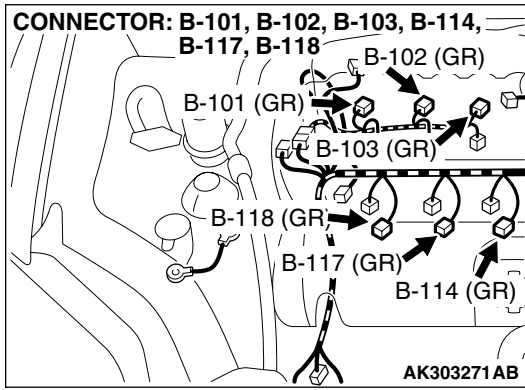
Ignition Circuit



POWERTRAIN CONTROL MODULE (PCM)

AK400838

TSB Revision



CIRCUIT OPERATION

- The ignition coil is energized by battery positive voltage from the ignition switch.
- When the PCM 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 PCM.

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. 16-38](#).

Q: Are there any abnormalities?

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

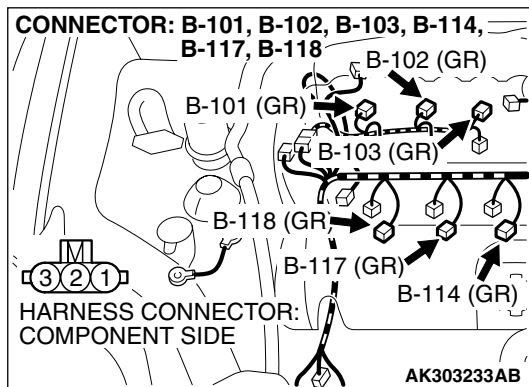
NO : Go to Step 2.

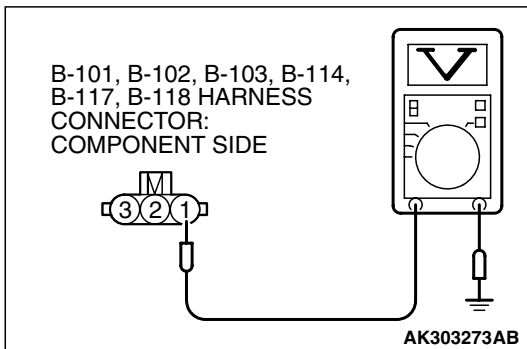
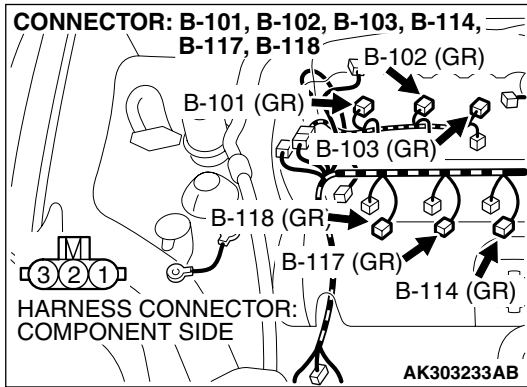
STEP 2. Check harness connectors B-114, B-117, B-118, B-102, B-103, B-101 at ignition coil for damage.

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.

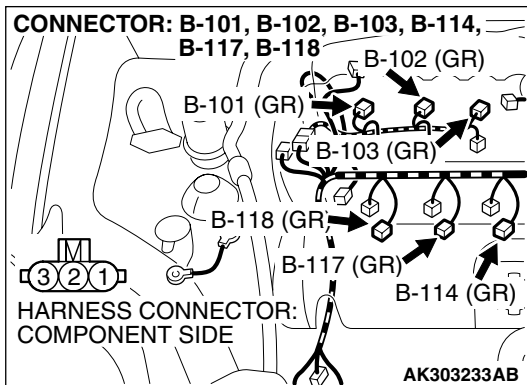
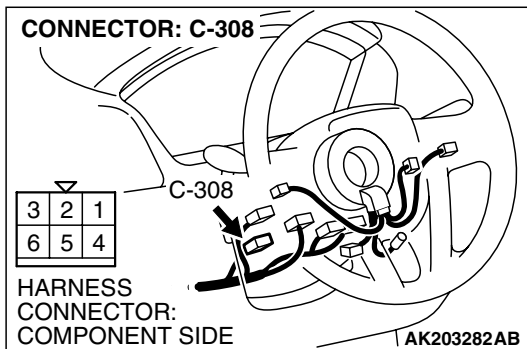
- (1) Disconnect the connector B-114, B-117, B-118, B-102, B-103, B-101 and measure at the harness side.
- (2) Turn the ignition switch to the "ON" position.

- (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.

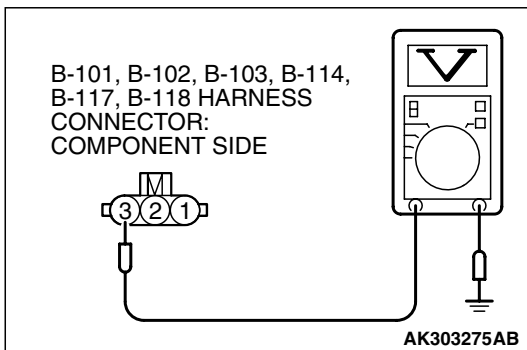
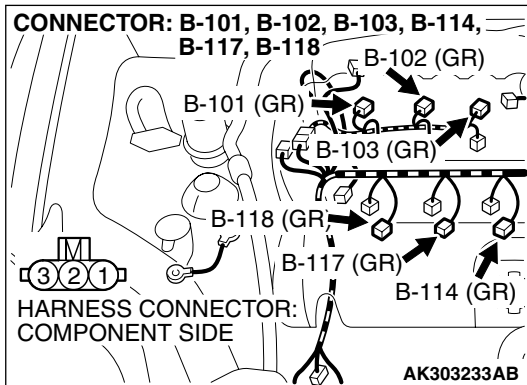
Q: Is the harness wire in good condition?

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).

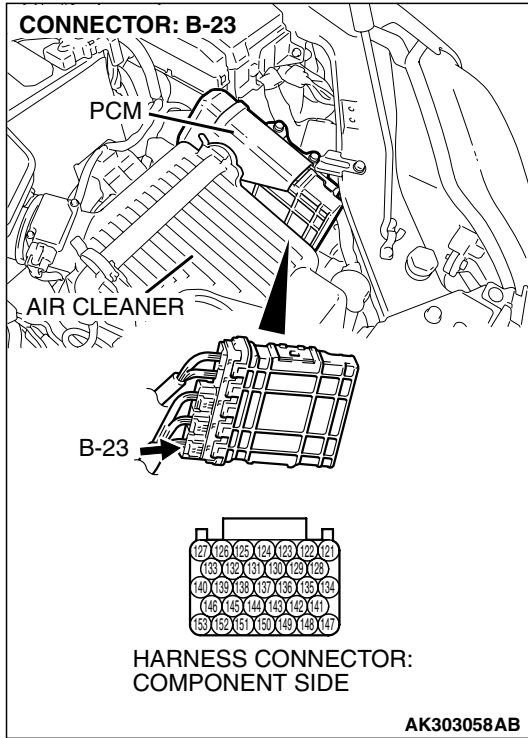
- Voltage should be 0.3 and 3.0 volts.

- (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.



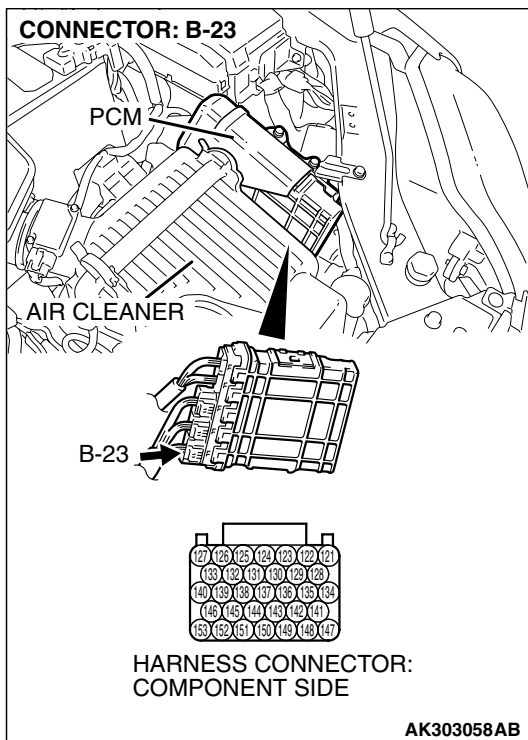
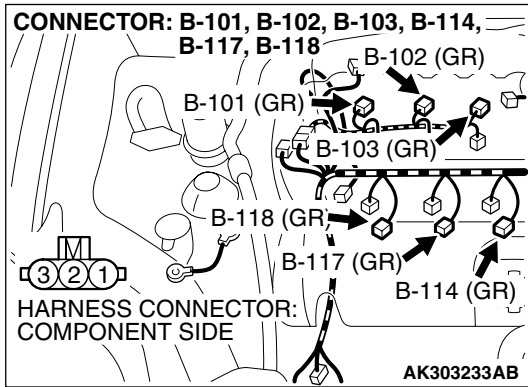
STEP 6. Check connector B-23 at PCM for damage.

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.

STEP 7. Check for open circuit and short circuit to ground between ignition coil connector and PCM connector.



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.

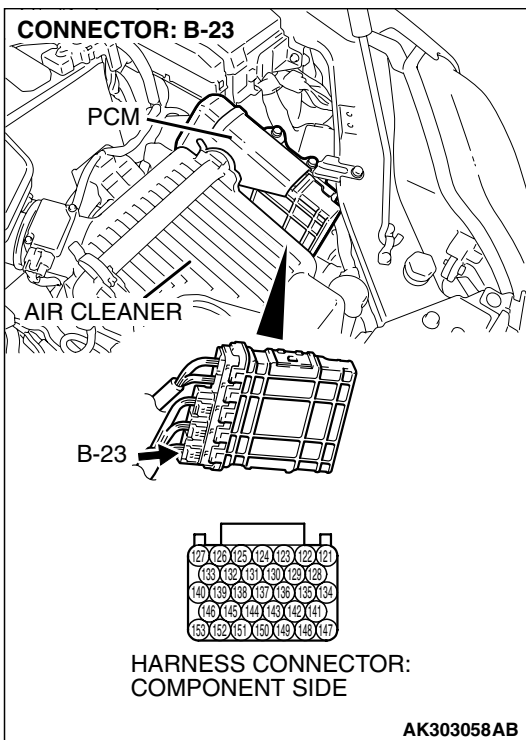
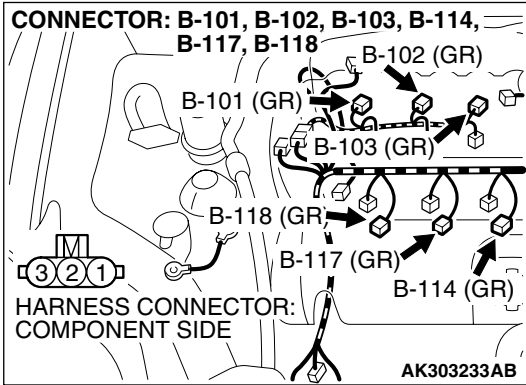
- a. Check the harness wire between ignition coil connector B-101 (terminal No. 3) and PCM connector B-23 (terminal No. 151) at ignition coil 1.
- b. Check the harness wire between ignition coil connector B-118 (terminal No. 3) and PCM connector B-23 (terminal No. 150) at ignition coil 2.
- c. Check the harness wire between ignition coil connector B-102 (terminal No. 3) and PCM connector B-23 (terminal No. 144) at ignition coil 3.
- d. Check the harness wire between ignition coil connector B-117 (terminal No. 3) and PCM connector B-23 (terminal No. 148) at ignition coil 4.
- e. Check the harness wire between ignition coil connector B-103 (terminal No. 3) and PCM connector B-23 (terminal No. 143) at ignition coil 5.
- f. Check the harness wire between ignition coil connector B-114 (terminal No. 3) and PCM connector B-23 (terminal No. 134) at ignition coil 6.

Q: Is the harness wire in good condition?

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

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

STEP 8. Check for harness damage between ignition coil connector and PCM connector.



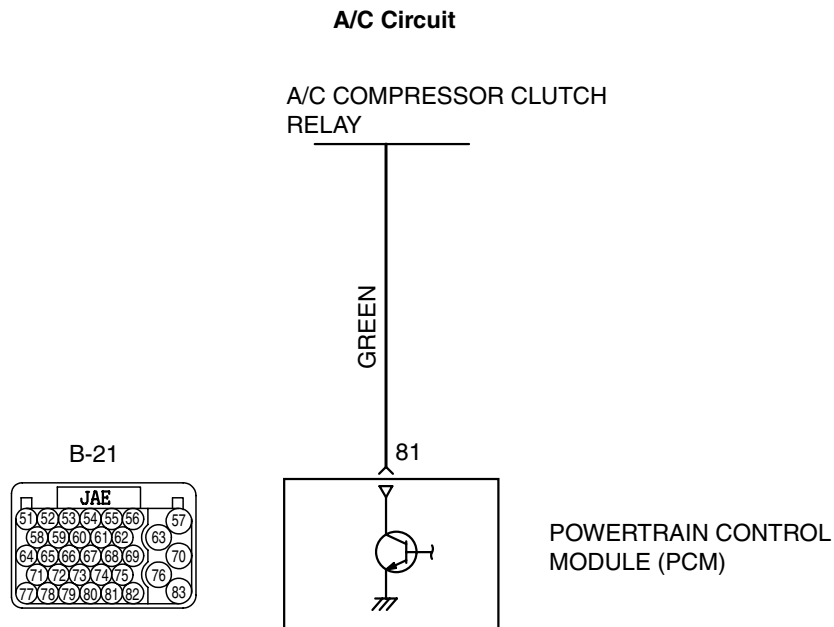
NOTE: Check harness after checking intermediate connector B-32. If intermediate connector is damaged, repair or replace it. Refer to GROUP 00E, Harness Connector Inspection. Then confirm that the malfunction symptom is eliminated.

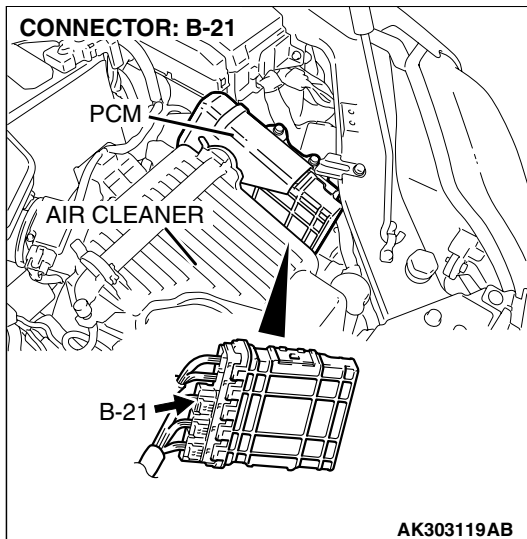
- a. Check the harness wire between ignition coil connector B-101 (terminal No. 3) and PCM connector B-23 (terminal No. 151) at ignition coil 1.
- b. Check the harness wire between ignition coil connector B-118 (terminal No. 3) and PCM connector B-23 (terminal No. 150) at ignition coil 2.
- c. Check the harness wire between ignition coil connector B-102 (terminal No. 3) and PCM connector B-23 (terminal No. 144) at ignition coil 3.
- d. Check the harness wire between ignition coil connector B-117 (terminal No. 3) and PCM connector B-23 (terminal No. 148) at ignition coil 4.
- e. Check the harness wire between ignition coil connector B-103 (terminal No. 3) and PCM connector B-23 (terminal No. 143) at ignition coil 5.
- f. Check the harness wire between ignition coil connector B-114 (terminal No. 3) and PCM connector B-23 (terminal No. 134) at ignition coil 6.

Q: Is the harness wire in good condition?

- YES :** Replace the PCM. Then confirm that the malfunction symptom is eliminated.
- NO :** Repair it. Then confirm that the malfunction symptom is eliminated.

INSPECTION PROCEDURE 32: A/C system.





COMMENT

- When the A/C is "ON" the PCM turns "ON" the power transistor in the PCM. The PCM 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 PCM.

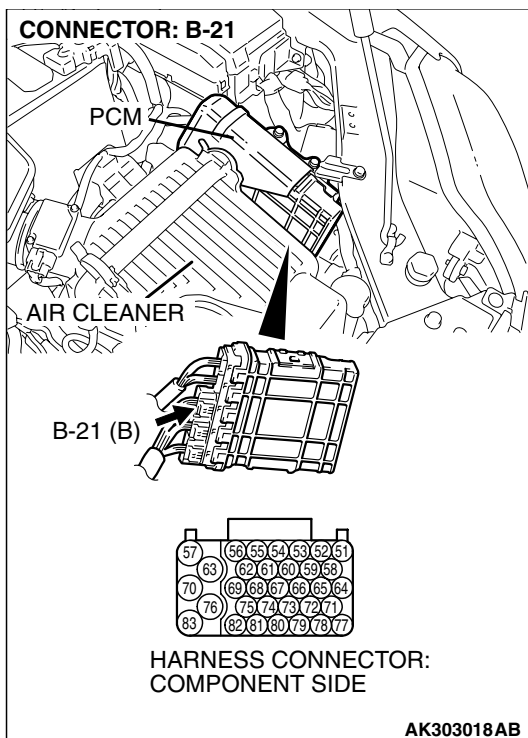
DIAGNOSIS

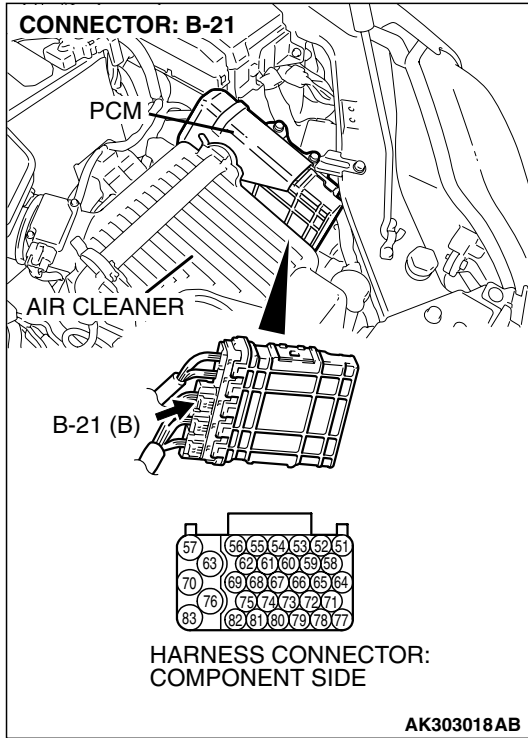
STEP 1. Check harness connector B-21 at PCM for damage.

Q: Is the harness connector in good condition?

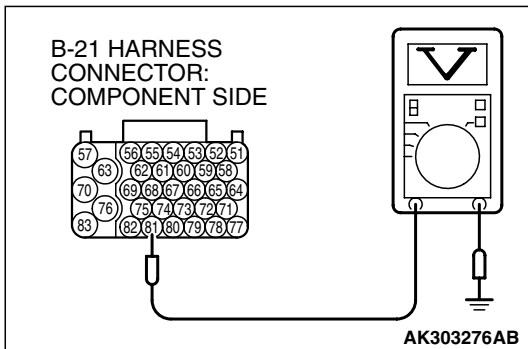
YES : Go to Step 2.

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



- (3) Measure the voltage between terminal No. 81 and ground.
 - Voltage should be battery positive voltage.
- (4) Using a jumper wire, connect terminal No. 81 to ground.
 - A/C compressor clutch relay should turn "ON".
- (5) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the voltage and A/C compressor relay condition normal?

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

DATA LIST REFERENCE TABLE

⚠ 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: *¹: In a new vehicle [driven approximately 500 km (311 mile) or less], the mass airflow sensor output value is sometimes 10% higher than the standard value.

NOTE: *²: The injector drive time represents the time when the cranking speed is at 250 r/min or below when the power supply voltage is 11 volts.

NOTE: *³: In a new vehicle [driven approximately 500 km (311 mile) or less], the injector drive time is sometimes 10% longer than the standard time.

NOTE: *⁴: Applicable to GST

NOTE: *⁵: Vehicles for Canada, the headlight, taillight, etc. remain lit even when the lighting switch is in "OFF" position but this is no problem for checks.

MUT-III SCAN TOOL DISPLAY	ITEM NO.	INSPECTION ITEM	INSPECTION REQUIREMENT	NORMAL CONDITION	INSPECTION PROCEDURE NO.	REFERENCE PAGE	
A/C RELAY	49	A/C compressor clutch relay	<ul style="list-style-type: none"> • Engine: warming up, idling • A/C switch: "OFF" 	OFF	Procedure No. 32	P.13B-1134	
			<ul style="list-style-type: none"> • Engine: warming up, idling • A/C switch: "ON" 	A/C compressor clutch is not operating			OFF
				A/C compressor clutch is operating			ON
APP SNS (MAIN)	78	Accelerator pedal position sensor (main)	Ignition switch: "ON"	Release the accelerator pedal	735 – 1,335 mV	Code No. P2122, P2123	P.13B-938, P.13B-948
				Depress the accelerator pedal gradually	Increases in response to the pedal depression stroke		
				Depress the accelerator pedal fully	4,000 mV or more		

MUT-III SCAN TOOL DISPLAY	ITEM NO.	INSPECTION ITEM	INSPECTION REQUIREMENT	NORMAL CONDITION	INSPECTION PROCEDURE NO.	REFERENCE PAGE	
APP SNSR (SUB)	77	Accelerator pedal position sensor (sub)	Ignition switch: "ON"	Release the accelerator pedal	435 – 1,035 mV	Code No. P2127, P2128	P.13B-955 , P.13B-965
				Depress the accelerator pedal gradually	Increases in response to the pedal depression stroke		
				Depress the accelerator pedal fully	3,700 mV or more		
BARO SENSOR	25	Barometric pressure sensor	Ignition switch: "ON"	At altitude of 0 m (0 ft)	101 kPa (29.8 in.Hg)	Code No. P2228, P2229	P.13B-992 , P.13B-994
				At altitude of 600 m (1,969 ft)	95 kPa (28.1 in.Hg)		
				At altitude of 1,200 m (3,937 ft)	88 kPa (26.0 in.Hg)		
				At altitude of 1,800 m (5,906 ft)	81 kPa (23.9 in.Hg)		
BATT VOLTAGE	16	Power supply voltage	Ignition switch: "ON"	Battery positive voltage	Procedure No. 28	P.13B-109 6	
CKP SENSOR	22	Crankshaft position sensor	<ul style="list-style-type: none"> Engine: cranking Tachometer: connected 		Engine speeds displayed on the scan tool and tachometer are identical.	Code No. P0335	P.13B-604
			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)	580 – 780 r/min		

**MULTIPOINT FUEL INJECTION (MFI) <3.8L ENGINE>
MULTIPOINT FUEL INJECTION (MFI) DIAGNOSIS**

13B-1139

MUT-III SCAN TOOL DISPLAY	ITEM NO.	INSPECTION ITEM	INSPECTION REQUIREMENT	NORMAL CONDITION	INSPECTION PROCEDURE NO.	REFERENCE PAGE	
CKP SNSR 2	38	Crankshaft position sensor	<ul style="list-style-type: none"> Engine: cranking (at less than 2,000 r/min) Tachometer: connected 	The speeds indicated by the scan tool and tachometer match.	Code No. P0335	P.13B-604	
CRANK. SIGNAL	18	Cranking signal (ignition switch -ST)	Ignition switch: "ON"	Engine: stopped	OFF	Procedure No. 30	P.13B-1120
				Engine: cranking	ON		
ECT SENSOR	21	Engine coolant temperature sensor	Ignition switch: "ON" or with engine running	Engine coolant temperature is -20°C (-4°F)	-20°C (-4°F)	Code No. P0116, P0117, P0118	P.13B-135, P.13B-144, P.13B-151
				Engine coolant temperature is 0°C (32°F)	0°C (32°F)		
				Engine coolant temperature is 20°C (68°F)	20°C (68°F)		
				Engine coolant temperature is 40°C (104°F)	40°C (104°F)		
				Engine coolant temperature is 80°C (176°F)	80°C (176°F)		
ECT SENSOR	21*4	Engine coolant temperature sensor	Ignition switch: "ON" or with engine running	Engine coolant temperature is -20°C (-4°F)	-20°C (-4°F)	Code No. P0116, P0117, P0118	P.13B-135, P.13B-144, P.13B-151
				Engine coolant temperature is 0°C (32°F)	0°C (32°F)		
				Engine coolant temperature is 20°C (68°F)	20°C (68°F)		
				Engine coolant temperature is 40°C (104°F)	40°C (104°F)		
				Engine coolant temperature is 80°C (176°F)	80°C (176°F)		

MUT-III SCAN TOOL DISPLAY	ITEM NO.	INSPECTION ITEM	INSPECTION REQUIREMENT	NORMAL CONDITION	INSPECTION PROCEDURE NO.	REFERENCE PAGE	
EGR STEP. MTR.	68	EGR valve (stepper motor)	<ul style="list-style-type: none"> • Engine coolant temperature :80 – 95°C (176 – 203°F) • Lights and all accessories : "OFF"*5 • Transaxle:"P" range 	Engine is idling	2 – 8 STEP	Code No. P0403	P.13B-646
				2,500 r/min	2 – 8 STEP		
ENGINE LOAD	37	Engine load (volumetric efficiency)	<ul style="list-style-type: none"> • Engine coolant temperature : 80 – 95°C (176 – 203°F) • Lights, electric cooling fan and all accessories : "OFF"*6 • Transaxle:"P" range 	Engine is idling	14 – 24%	–	–
				2,500 r/min	11 – 21%		
				Rewing engine	Volumetric efficiency increases according to amount of rewing.		
ENGINE LOAD	87*4	Calculated load value	Engine: warming up	Engine is idling	14 – 24%	–	–
				2,500 r/min	11 – 21%		

**MULTIPOINT FUEL INJECTION (MFI) <3.8L ENGINE>
MULTIPOINT FUEL INJECTION (MFI) DIAGNOSIS**

13B-1141

MUT-III SCAN TOOL DISPLAY	ITEM NO.	INSPECTION ITEM	INSPECTION REQUIREMENT	NORMAL CONDITION	INSPECTION PROCEDURE NO.	REFERENCE PAGE	
ENGINE SPEED	22*4	Crankshaft position sensor	<ul style="list-style-type: none"> • Engine: cranking • Tachometer: connected 	Engine speeds displayed on the scan tool and tachometer are identical.	Code No. P0335	P.13B-604	
			Engine: idling	Engine coolant temperature is -20°C (-4°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)			580 – 780 r/min
FUEL TEMP	4A	Fuel tank temperature sensor	<ul style="list-style-type: none"> • In cooled state • Ignition switch: "ON" 	Approximately the same as the outdoor temperature	Code No. P0181, P0182, P0183	P.13B-449 , P.13B-462 , P.13B-470	

MUT-III SCAN TOOL DISPLAY	ITEM NO.	INSPECTION ITEM	INSPECTION REQUIREMENT		NORMAL CONDITION	INSPECTION PROCEDURE NO.	REFERENCE PAGE
HO2S BANK1 S1	39	Heated oxygen sensor bank 1, sensor 1 (right 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.13B-195 , P.13B-213 , P.13B-220 , P.13B-225 , P.13B-231
				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 PCM.)	Engine is idling 2500 r/min	Voltage changes repeatedly between 400 mV or less and 600 – 1,000 mV.		
HO2S BANK1 S1	A1*4	Heated oxygen sensor bank 1, sensor 1 (right 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.	0.2 V or less	Code No. P0130, P0131, P0132, P0133, P0134	P.13B-195 , P.13B-213 , P.13B-220 , P.13B-225 , P.13B-231
				When engine is suddenly revved.	0.6 – 1 V		
			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 PCM.)	Engine is idling 2500 r/min	Voltage changes repeatedly between 0.4 V or less and 0.6 – 1 V.		

**MULTIPOINT FUEL INJECTION (MFI) <3.8L ENGINE>
MULTIPOINT FUEL INJECTION (MFI) DIAGNOSIS**

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MUT-III SCAN TOOL DISPLAY	ITEM NO.	INSPECTION ITEM	INSPECTION REQUIREMENT		NORMAL CONDITION	INSPECTION PROCEDURE NO.	REFERENCE PAGE
HO2S BANK1 S2	69	Heated oxygen sensor bank 1, sensor 2 (right rear)	Engine: warming up	Rewing	0 and 600 – 1,000 mV alternate.	Code No. P0136, P0137, P0138, P0139	P.13B-255 , P.13B-273 , P.13B-280 , P.13B-285
HO2S BANK1 S2	A2*4	Heated oxygen sensor bank 1, sensor 2 (right rear)	Engine: warming up	Rewing	0 and 0.6 – 1 V alternate.	Code No. P0136, P0137, P0138, P0139	P.13B-255 , P.13B-273 , P.13B-280 , P.13B-285
HO2S BANK2 S1	11	Heated oxygen sensor bank 2, sensor 1 (left front)	Engine: Warming up (air/fuel mixture is made leaner when decelerating, and is made richer when rewing.)	When the engine is running at 4000 r/min, decelerate suddenly.	200 mV or less	Code No. P0150, P0151, P0152, P0153, P0154	P.13B-305 , P.13B-323 , P.13B-330 , P.13B-335 , P.13B-341
				When engine is suddenly revved.	600 – 1,000 mV		
				Engine is idling 2,500 r/min	Voltage changes repeatedly between 400 mV or less and 600 – 1,000 mV.		

MUT-III SCAN TOOL DISPLAY	ITEM NO.	INSPECTION ITEM	INSPECTION REQUIREMENT		NORMAL CONDITION	INSPECTION PROCEDURE NO.	REFERENCE PAGE
HO2S BANK2 S1	A3*4	Heated oxygen sensor bank 2, sensor 1 (left front)	Engine: Warming up (air/fuel mixture is made leaner when decelerating, and is made richer when rewing.)	When the engine is running at 4,000 r/min, decelerate suddenly.	0.2 V or less	Code No. P0150, P0151, P0152, P0153, P0154	P.13B-305 , P.13B-323 , P.13B-330 , P.13B-335 , P.13B-341
				When engine is suddenly rewed.	0.6 – 1 V		
			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 PCM)	Engine is idling 2500 r/min	Voltage changes repeatedly between 0.4 V or less and 0.6 – 1 V.		
HO2S BANK2 S2	59	Heated oxygen sensor bank 2, sensor 2 (left rear)	Engine: warming up	Rewing	0 and 600 – 1,000 mV alternate.	Code No. P0156, P0157, P0158, P0159	P.13B-365 , P.13B-382 , P.13B-389 , P.13B-394
HO2S BANK2 S2	A4*4	Heated oxygen sensor bank 2, sensor 2 (left rear)	Engine: warming up	Rewing	0 and 0.6 – 1 V alternate.	Code No. P0156, P0157, P0158, P0159	P.13B-365 , P.13B-382 , P.13B-389 , P.13B-394

**MULTIPOINT FUEL INJECTION (MFI) <3.8L ENGINE>
MULTIPOINT FUEL INJECTION (MFI) DIAGNOSIS**

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MUT-III SCAN TOOL DISPLAY	ITEM NO.	INSPECTION ITEM	INSPECTION REQUIREMENT	NORMAL CONDITION	INSPECTION PROCEDURE NO.	REFERENCE PAGE
IAT SENSOR	13	Intake air temperature sensor	Ignition switch: "ON" or with engine running	Intake air temperature is -20°C (-4°F)	Code No. P0111, P0112, P0113	P.13B-109 , P.13B-118 , P.13B-125
				Intake air temperature is 0°C (32°F)		
				Intake air temperature is 20°C (68°F)		
				Intake air temperature is 40°C (104°F)		
				Intake air temperature is 80°C (176°F)		
IAT SENSOR	13*4	Intake air temperature sensor	Ignition switch: "ON" or with engine running	Intake air temperature is -20°C (-4°F)	Code No. P0111, P0112, P0113	P.13B-109 , P.13B-118 , P.13B-125
				Intake air temperature is 0°C (32°F)		
				Intake air temperature is 20°C (68°F)		
				Intake air temperature is 40°C (104°F)		
				Intake air temperature is 80°C (176°F)		
IG. TIMING ADV	44	Ignition coils and ignition power transistor	<ul style="list-style-type: none"> Engine: warming up Timing light is set (to check actual ignition timing) 	Engine is idling	-	-
				2,500 r/min		
IG. TIMING ADV	44*4	Ignition coils and ignition power transistor	<ul style="list-style-type: none"> Engine: warming up Timing light is set (to check actual ignition timing) 	Engine is idling	-	-
				2,500 r/min		

MUT-III SCAN TOOL DISPLAY	ITEM NO.	INSPECTION ITEM	INSPECTION REQUIREMENT	NORMAL CONDITION	INSPECTION PROCEDURE NO.	REFERENCE PAGE
INJECTOR BNK1	47	Injectors bank 1 (right)*2	Engine: cranking	When engine coolant temperature is 0 °C (32 °F)	80 – 140 ms	–
				When engine coolant temperature is 20 °C (68 °F)	20 – 80 ms	
				When engine coolant temperature is 80 °C (176 °F)	8 – 16 ms	
		Injectors bank 1 (right)*3	<ul style="list-style-type: none"> • Engine coolant temperature : 80 – 95°C (176 – 203°F) • Lights, electric cooling fan and all accessories : "OFF"*5 • Transaxle: "P" range 	Engine is idling	1.2 – 3.2 ms	
				2,500 r/min	1.0 – 3.0 ms	
				When engine is suddenly rewed	Increases	

MUT-III SCAN TOOL DISPLAY	ITEM NO.	INSPECTION ITEM	INSPECTION REQUIREMENT		NORMAL CONDITION	INSPECTION PROCEDURE NO.	REFERENCE PAGE
INJECTOR BNK2	41	Injectors bank 2 (left)* ²	Engine: cranking	When engine coolant temperature is 0°C (32°F)	80 – 140 mS	-	-
				When engine coolant temperature is 20°C (68°F)	20 – 80 mS		
				When engine coolant temperature is 80°C (176°F)	8 – 16 mS		
		Injectors bank 2 (left)* ³	<ul style="list-style-type: none"> • Engine coolant temperature : 80 – 95°C (176 – 203°F) • Lights, electric cooling fan and all accessories : "OFF"*⁶ • Transmission : "P" range 	Engine is idling	1.2 – 3.2 mS		
				2,500 r/min	1.0 – 3.0 mS		
When engine is suddenly reved	Increases						
LONG TRIM B1	81* ⁴	Long-term fuel trim bank 1	Engine: warming up, 2,500 r/min without any load (during closed loop)		-12.5 to 12.5%	Code No. P0171, P0172	P.13B-414 , P.13B-425
LONG TRIM B2	83* ⁴	Long-term fuel trim bank 2	Engine: warming up, 2,500 r/min without any load (during closed loop)		-12.5 to 12.5%	Code No. P0174, P0175	P.13B-432 , P.13B-442
MAF SENSOR	12	Mass airflow sensor* ¹	<ul style="list-style-type: none"> • Engine coolant temperature : 80 – 95°C (176 – 203°F) • Lights, electric cooling fan and all accessories : "OFF"*⁵ • Transaxle: "P" range 	Engine is idling	2.0 – 6.0 g/sec	-	-
				2,500 r/min	8.0 – 16.0 g/sec		
				Engine is reved	Mass airflow rate increases in response to rewing		

MUT-III SCAN TOOL DISPLAY	ITEM NO.	INSPECTION ITEM	INSPECTION REQUIREMENT	NORMAL CONDITION	INSPECTION PROCEDURE NO.	REFERENCE PAGE	
MAP SENSOR	95	Manifold absolutel pressure (MAP) sensor	<ul style="list-style-type: none"> Ignition switch: "ON" 	Engine stopped [At altitude of 0m (0ft.)]	101 kPa (29.8 in.Hg)	Code No. P0106, P0107, P0108	P.13B-74, P.13B-88, P.13B-100
				Engine stopped [At altitude of 600m (1,969ft.)]	95 kPa (28.1 in. Hg)		
				Engine stopped [At altitude of 1,200m (3,937ft.)]	88 kPa (26.0 in. Hg)		
				Engine stopped [At altitude of 1,800m (5,906ft.)]	81 kPa (23.9 in. Hg)		
			Engine: warming up, idling	16 - 36 kPa (4.7 - 10.6 in. Hg)			
			When engine is suddenly reved	Manifold pressure varies			

**MULTIPOINT FUEL INJECTION (MFI) <3.8L ENGINE>
MULTIPOINT FUEL INJECTION (MFI) DIAGNOSIS**

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MUT-III SCAN TOOL DISPLAY	ITEM NO.	INSPECTION ITEM	INSPECTION REQUIREMENT		NORMAL CONDITION	INSPECTION PROCEDURE NO.	REFERENCE PAGE
MAP/MDP SNSR.	32*4	Manifold absolute pressure (MAP) sensor	• Ignition switch: "ON"	Engine stopped [At altitude of 0m (0ft.)]	101 kPa (29.8 in.Hg)	Code No. P0106, P0107, P0108	P.13B-74, P.13B-88, P.13B-100
				Engine stopped [At altitude of 600m (1,969ft.)]	95 kPa (28.1 in. Hg)		
				Engine stopped [At altitude of 1,200m (3,937ft.)]	88 kPa (26.0 in. Hg)		
				Engine stopped [At altitude of 1,800m (5,906ft.)]	81 kPa (23.9 in. Hg)		
				Engine: warming up, idling	16 - 36 kPa (4.7 - 10.6 in. Hg)		
			When engine is suddenly revved	Manifold pressure varies			
MIL DISTANCE	A9*4	MIL distance	Running distance in the malfunction indicator lamp (SERVICE ENGINE SOON or Check Engine Lamp)		-	-	-
PSP SWITCH	27	Power steering pressure switch	Engine: idling	Steering wheel stationary	OFF	Code No. P0551	P.13B-854
				Steering wheel turning	ON		
SHORT TRIM B1	82*4	Short-term fuel trim bank 1	Engine: warming up, 2,500 r/min without any load (during closed loop)		-7.4 to 7.4%	Code No. P0171, P0172	P.13B-414 , P.13B-425
SHORT TRIM B2	84*4	Short-term fuel trim bank 2	Engine: warming up, 2,500 r/min without any load (during closed loop)		-7.4 to 7.4%	Code No. P0174, P0175	P.13B-432 , P.13B-442
SYS. STATUS B1	88*4	Fuel control system status bank 1 (right)	Engine: warming up	2,500 r/min	Closed loop	Code No. P0134	P.13B-231
				When engine is suddenly revved	Open loop – drive condition		
SYS. STATUS B2	89*4	Fuel control system status bank 2 (left)	Engine: warming up	2,500 r/min	Closed loop	Code No. P0154	P.13B-341
				When engine is suddenly revved	Open loop – drive condition		

MUT-III SCAN TOOL DISPLAY	ITEM NO.	INSPECTION ITEM	INSPECTION REQUIREMENT	NORMAL CONDITION	INSPECTION PROCEDURE NO.	REFERENCE PAGE		
TANK PRS. SNSR	73	Fuel tank differential pressure sensor	<ul style="list-style-type: none"> Ignition switch: "ON" Fuel cap removal 	-3.3 to 3.3 kPa (-0.97 to 0.97 in.Hg)	-	-		
TP LEARN MID	9A	Throttle position sensor (main) mid opening learning value	Ignition switch: "ON"	600 – 1,200 mV	Code No. P0122, P0123	P.13B-162, P.13B-172		
TP SNSR (MAIN)	79	Throttle position sensor (main)	<ul style="list-style-type: none"> Remove the intake air hose at the throttle body Disconnect the throttle position sensor connector, and then connect terminal numbers No. 3, No. 4, No. 5 and No. 6 with the use of the special tool: MB991658. Ignition switch: "ON" 	Fully close the throttle valve with your finger	300 – 700 mV	Code No. P0122, P0123	P.13B-162, P.13B-172	
				Fully open the throttle valve with your finger	4,000 mV or more			
				Engine: warming up, idling	No load			520 – 620 mV
					A/C switch: "off" → "ON"			Voltage rise
	Shift lever: "N" → "D"							

**MULTIPOINT FUEL INJECTION (MFI) <3.8L ENGINE>
MULTIPOINT FUEL INJECTION (MFI) DIAGNOSIS**

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MUT-III SCAN TOOL DISPLAY	ITEM NO.	INSPECTION ITEM	INSPECTION REQUIREMENT	NORMAL CONDITION	INSPECTION PROCEDURE NO.	REFERENCE PAGE	
TP SNSR (SUB)	14	Throttle position sensor (sub)	<ul style="list-style-type: none"> Remove the intake air hose at the throttle body Disconnect the throttle position sensor connector, and then connect terminal numbers No. 3, No. 4, No. 5 and No. 6 with the use of the special tool: MB991658. Ignition switch: "ON" 	Fully close the throttle valve with your finger	2,200 – 2,800 mV	Code No. P0222, P0223	P.13B-550 , P.13B-560
				Fully open the throttle valve with your finger	4,000 mV or more		
TP SENSOR	8A*4	Throttle position sensor	<ul style="list-style-type: none"> Remove the intake air hose at the throttle body Disconnect the throttle position sensor connector, and then connect terminal numbers No. 3, No. 4, No. 5 and No. 6 with the use of the special tool: MB991658. Ignition switch: "ON" 	Fully close the throttle valve with your finger	0 – 5 %	Code No. P0122, P0123	P.13B-162 , P.13B-172
				Fully open the throttle valve with your finger	88 % or more		
TR SWITCH	29	Transmission range switch	P or N	P, N	P0705 (DTC27), P0705 (DTC28)	P.23A-120 ,P.23A-165	
			Except P or N	D, 2, L, R			

MUT-III SCAN TOOL DISPLAY	ITEM NO.	INSPECTION ITEM	INSPECTION REQUIREMENT	NORMAL CONDITION	INSPECTION PROCEDURE NO.	REFERENCE PAGE	
VAF/MAF SNSR.	12* ⁵	Mass airflow sensor* ¹	<ul style="list-style-type: none"> • Engine coolant temperature : 80 – 95°C (176 – 203°F) • Lights, electric cooling fan and all accessories : "OFF"*⁶ • Transmission : "P" range 	Engine is idling	2.0 – 6.0 gm/s	–	–
				2,500 r/min	8.0 – 16.0 gm/s		
				Engine is revved	Mass airflow rate increases in response to rewing		
VSS	24* ⁵	Vehicle speed signal	Drive at 40 km/h (25 mph).	Approximately 40 km/h (25 mph)	–	–	

ACTUATOR TEST REFERENCE TABLE

M1131152500570

NOTE: *: Continues for 27 minutes. Can be released by pressing the CLEAR key.

MUT-III SCAN TOOL DISPLAY	ITEM NO.	INSPECTION ITEM	DRIVE CONTENTS	INSPECTION REQUIREMENT	NORMAL CONDITION	INSPECTION PROCEDURE NO.	REFERENCE PAGE
BASIC TIMING	17*	Basic ignition timing	Set to ignition timing adjustment mode	<ul style="list-style-type: none"> • Engine: idling • Connect timing light 	5°BTDC	–	–
EVAP PURG SOL	08	Evaporative emission purge solenoid	Solenoid valve turns from OFF to ON.	Ignition switch: "ON"	Clicks when solenoid valve is driven.	Code No. P0443	P.13B-68 8
EVAP VENT SOL	29	Evaporative emission ventilation solenoid	Solenoid valve turns from OFF to ON.	Ignition switch: "ON"	Clicks when solenoid valve is driven.	Code No. P0446	P.13B-70 0
FUEL PUMP	07	Fuel pump	Fuel pump operates and fuel is recirculated	Ignition switch: "ON"	Listen near the fuel tank for the sound of fuel pump operation	Procedure No. 29	P.13B-11 07

MUT-III SCAN TOOL DISPLAY	ITEM NO.	INSPECTION ITEM	DRIVE CONTENTS	INSPECTION REQUIREMENT	NORMAL CONDITION	INSPECTION PROCEDURE NO.	REFERENCE PAGE
NO. 1 INJECTOR	01	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.13B-48 1
NO. 2 INJECTOR	02		Cut fuel to No. 2 injector			Code No. P0202	P.13B-49 3
NO. 3 INJECTOR	03		Cut fuel to No. 3 injector			Code No. P0203	P.13B-50 4
NO. 4 INJECTOR	04		Cut fuel to No. 4 injector			Code No. P0204	P.13B-52 7
NO. 5 INJECTOR	05		Cut fuel to No. 5 injector			Code No. P0205	P.13B-51 6
NO. 6 INJECTOR	06		Cut fuel to No. 6 injector			Code No. P0206	P.13B-53 9
RADIAT. FAN HI	20	Radiator fan, A/C condenser fan	Drive the fan motor	Ignition switch: "ON"	Radiator fan and condenser fan rotate at high speed.	Procedure No. 27	P.13B-10 93
RADIAT. FAN LO	21				Radiator fan and A/C condenser fan rotate		
TCA FAIL SAFE	34	Throttle actuator control system	Stop the throttle actuator control motor	Ignition switch: "ON"	Throttle valve is opened slightly	Code No. P0638	P.13B-88 7

CHECK AT THE POWERTRAIN CONTROL MODULE (PCM)

M1131153600484

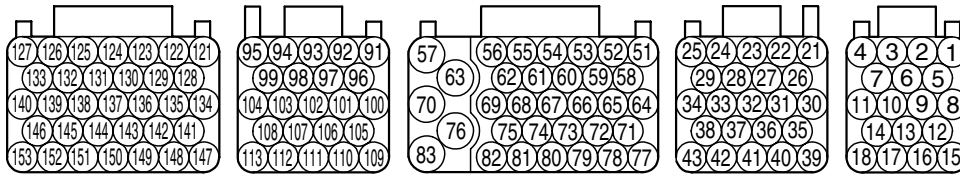
1. Disconnect the PCM connectors B-19, B-20, B-21, B-22 and B-23, and connect check harness special tool MB991923 between the PCM connectors.
2. Measure the voltage between each check harness connector terminal and check harness connector ground terminal (No. 25 or No. 29).

TERMINAL VOLTAGE CHECK CHART

*NOTE: *1: 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).*

NOTE: Vehicles for Canada, the headlight, taillight, etc. remain lit even when the lighting switch is in "OFF" position but is no problem for checks.

Check Harness Special Tool MB991923 Connector Terminal Arrangement



AK203309AB

TERMINAL NO.	INSPECTION ITEM	INSPECTION CONDITION (ENGINE CONDITION)		NORMAL CONDITION
2	Evaporative emission ventilation solenoid	Ignition switch: "ON"		B+
		Carry out the actuator test to drive the solenoid valve.		For approximately 6 seconds 1 V or less
5	Fan control relay (high)	Ignition switch: "ON"		B+
		Carry out the actuator test to revolve the fan at high speed.		1 V or less
6	Fuel pump relay	Ignition switch: "ON"		B+
		Engine: idling		1 V or more
10	Fan control relay (low)	Ignition switch: "ON"		B+
		Carry out the actuator test to revolve the fan at low speed.		1 V or less
21	Sensor supplied voltage	Ignition switch: "ON"		4.9 – 5.1 V
68				
23	Fuel tank differential pressure sensor	Engine: idling		1.2 – 3.8 V
26	Accelerator pedal position sensor (main)	Ignition switch: "ON"	Release the accelerator pedal	0.735 – 1.335 V
			Depress the accelerator pedal fully	4.0 V or more
27	Accelerator pedal position sensor (sub)	Ignition switch: "ON"	Release the accelerator pedal	0.435 – 1.035 V
			Depress the accelerator pedal fully	3.7 V or more
30	Power supply voltage applied to accelerator pedal position sensor (main)	Ignition switch: "ON"		4.9 – 5.1 V
33	Brake lamp switch	Depress the brake pedal		B+
		Release the brake pedal		1 V or less

TERMINAL NO.	INSPECTION ITEM	INSPECTION CONDITION (ENGINE CONDITION)		NORMAL CONDITION
41	Fuel tank temperature sensor	Ignition switch: "ON"	When fuel tank temperature is 0°C (32°F)	2.7 – 3.1 V
			When fuel tank temperature is 20°C (68°F)	2.1 – 2.5 V
			When fuel tank temperature is 40°C (104°F)	1.6 – 2.0 V
			When fuel tank temperature is 80°C (176°F)	0.8 – 1.2 V
42	Backup power supply	Ignition switch: "LOCK" (OFF)		B+
43	Ignition switch-IG	Ignition switch: "ON"		B+
51	Power supply	Ignition switch: "ON"		B+
64				
52	MFI relay (power supply)	Ignition switch: "LOCK" (OFF)		B+
		Ignition switch: "ON"		1 V or less
78	Power steering pressure switch	Engine: warming up, idling	When steering wheel is not turned	B+
			When steering wheel is turned	1V or less
81	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
83	Ignition switch-ST	Engine: cranking		8 V or more
91	Left bank heated oxygen sensor (front)	Engine: warming up, 2,500 r/min (check using a digital voltmeter)		0 ↔ 0.8 V (changes repeatedly)
92	Right bank heated oxygen sensor (front)	Engine: warming up, 2,500 r/min (check using a digital voltmeter)		0 ↔ 0.8 V (changes repeatedly)
93	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
94	Power supply voltage applied to throttle position sensor	Ignition switch: "ON"		4.9 – 5.1 V

TERMINAL NO.	INSPECTION ITEM	INSPECTION CONDITION (ENGINE CONDITION)		NORMAL CONDITION
96	Left bank heated oxygen sensor (rear)	<ul style="list-style-type: none"> • Engine: warming up • Revving 		0 and 0.6 – 1.0 V alternates
97	Right bank heated oxygen sensor (rear)	<ul style="list-style-type: none"> • Engine: warming up • Revving 		0 and 0.6 – 1.0 V alternates
98	Throttle position sensor (sub)	<ul style="list-style-type: none"> • Remove the intake air hose at the throttle body • Disconnect the throttle position sensor connector, and then connect terminal numbers No. 3, No. 4, No. 5 and No. 6 with the use of the special tool: MB991658. • Ignition switch: "ON" 	Fully close the throttle valve with your finger	2.2 – 2.8 V
			Fully open the throttle valve with your finger	4.0 V or more
99	Throttle position sensor (main)	<ul style="list-style-type: none"> • Remove the intake air hose at the throttle body • Disconnect the throttle position sensor connector, and then connect terminal numbers No. 3, No. 4, No. 5 and No. 6 with the use of the special tool: MB991658. • Ignition switch: "ON" 	Fully close the throttle valve with your finger	0.3 – 0.7 V
			Fully open the throttle valve with your finger	4.0 V or more

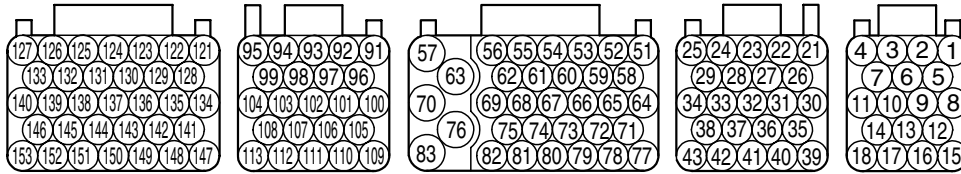
TERMINAL NO.	INSPECTION ITEM	INSPECTION CONDITION (ENGINE CONDITION)		NORMAL CONDITION
102	Manifold absolute pressure sensor	Ignition switch: "ON"	AT altitude of 0 m (0 ft.)	3.8 – 4.2 V
			AT altitude of 600 m (1,969 ft.)	3.5 – 3.9 V
			AT altitude of 1,200 m (3,937 ft.)	3.3 – 3.7 V
			AT altitude of 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
103	Crankshaft position sensor	Engine: cranking	0.4 – 4.0 V *1	
		Engine: idling	2.0 – 3.0 V *1	
104	Camshaft position sensor	Engine: cranking	0.4 – 4.0 V *1	
		Engine: idling	2.9 – 3.9 V *1	
107	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
108	Mass airflow sensor	Engine: revving	Voltage increase in response to revving	
122	Power supply voltage applied to throttle actuator control motor	Ignition switch: "ON"	B+	
123	Throttle actuator control motor relay	Ignition switch: "ON" → "LOCK(OFF)"	1 V or less → B+ → 1 V or less	
125	Left bank heated oxygen sensor heater (front)	Engine: warming up, idling (15 seconds after starting engine)	9 – 11 V*1	
		Engine: revving	9 – 11 V*1 → B+ (momentarily)	
126	Right bank heated oxygen sensor heater (front)	Engine: warming up, idling (15 seconds after starting engine)	9 – 11 V*1	
		Engine: revving	9 – 11 V*1 → B+ (momentarily)	

TERMINAL NO.	INSPECTION ITEM	INSPECTION CONDITION (ENGINE CONDITION)	NORMAL CONDITION
131	Generator FR terminal	<ul style="list-style-type: none"> • Engine: warming up, idling (radiator fan: stopped) • Headlight: OFF to ON*² • Rear defogger switch: OFF to ON • Stop light switch: OFF to ON 	Voltage drops
132	Generator G terminal	<ul style="list-style-type: none"> • Engine: warming up, idling (radiator fan: stopped) • Headlight: OFF to ON*² • Rear defogger switch: OFF to ON • Stop light switch: OFF to ON 	Voltage rises
137	Left bank heated oxygen sensor heater (rear)	Engine: warming up, idling	1 V or less
		Engine: revving	B+
138	Right bank heated oxygen sensor heater (rear)	Engine: warming up, idling	1 V or less
		Engine: revving	B+
141	Throttle actuator control motor (-)	<ul style="list-style-type: none"> • Ignition switch: "ON" • Accelerator pedal: fully closed → fully opened 	Decreases slightly (Approximately. 2V) from battery voltage.
147	Throttle actuator control motor (+)	<ul style="list-style-type: none"> • Ignition switch: "ON" • Accelerator pedal: fully opened → fully closed 	Decreases slightly (Approximately. 2V) from battery voltage.
142	EGR valve (Stepper motor coil <A1>)	Ignition switch: "LOCK(OFF)" → "ON"	5 – 8 V * ¹ (changes about three seconds repeatedly)
136	EGR valve (Stepper motor coil <A2>)		
130	EGR valve (Stepper motor coil <B1>)		
124	EGR valve (Stepper motor coil <B2>)		
149	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)	Voltage drop

TERMINAL NO.	INSPECTION ITEM	INSPECTION CONDITION (ENGINE CONDITION)	NORMAL CONDITION
151	Ignition coil – No. 1 (ignition power transistor)	Engine: 3,000 r/min	0.3 – 3.0 V *1
150	Ignition coil – No. 2 (ignition power transistor)		
144	Ignition coil – No. 3 (ignition power transistor)		
148	Ignition coil – No. 4 (ignition power transistor)		
143	Ignition coil – No. 5 (ignition power transistor)		
134	Ignition coil – No. 6 (ignition power transistor)		
153	No. 1 injector	<ul style="list-style-type: none"> • Engine: warming up, idling • Suddenly depress the accelerator pedal 	From 9 – 13 V *1 momentarily drops slightly
146	No. 2 injector		
140	No. 3 injector		
139	No. 4 injector		
133	No. 5 injector		
127	No. 6 injector		

TERMINAL RESISTANCE AND CONTINUITY CHECK

PCM Harness Side Connector Terminal Arrangement



AK203310AB

TERMINAL NO.	INSPECTION ITEM	NORMAL CONDITION (INSPECTION CONDITION)
25 – Body ground	PCM ground	Continuity (2 Ω or less)
29 – Body ground	PCM ground	
34 – Body ground	PCM ground	
38 – Body ground	PCM ground	
2 – 51	Evaporative emission ventilation solenoid	17 – 21 Ω [at 20°C (68°F)]
69 – 93	Engine coolant temperature sensor	14 – 17 kΩ [when engine coolant temperature is –20°C (–4°F)]
		5.1 – 6.5 kΩ [when engine coolant temperature is 0°C (32°F)]
		2.1 – 2.7 kΩ [when engine coolant temperature is 20°C (68°F)]
		0.9 – 1.3 kΩ [when engine coolant temperature is 40°C (104°F)]
		0.48 – 0.68 kΩ [when engine coolant temperature is 60°C (140°F)]
		0.26 – 0.36 kΩ [when engine coolant temperature is 80°C (176°F)]
69 – 107	Intake air temperature sensor	13 – 17 kΩ [when intake air temperature is –20°C (–4°F)]
		5.3 – 6.7 kΩ [when intake air temperature is 0°C (32°F)]
		2.3 – 3.0 kΩ [when intake air temperature is 20°C (68°F)]
		1.0 – 1.5 kΩ [when intake air temperature is 40°C (104°F)]
		0.56 – 0.76 kΩ [when intake air temperature is 60°C (140°F)]
		0.30 – 0.45 kΩ [when intake air temperature is 80°C (176°F)]
51 – 125	Left bank heated oxygen sensor heater (front)	4.5 – 8.0 Ω [at 20°C (68°F)]

TERMINAL NO.	INSPECTION ITEM	NORMAL CONDITION (INSPECTION CONDITION)
51 – 126	Right bank heated oxygen sensor heater (front)	4.5 – 8.0 Ω [at 20°C (68°F)]
51 – 137	Left bank heated oxygen sensor heater (rear)	11 – 18 Ω [at 20°C (68°F)]
51 – 138	Right bank heated oxygen sensor heater (rear)	11 – 18 Ω [at 20°C (68°F)]
141 – 147	Throttle actuator control motor	0.3 – 80 Ω [at 20°C (68°F)]
51 – 142	Stepper motor coil (A1)	20 – 24 Ω [at 20°C (68°F)]
51 – 136	Stepper motor coil (A2)	
51 – 130	Stepper motor coil (B1)	
51 – 124	Stepper motor coil (B2)	
51 – 149	Evaporative emission purge solenoid	30 – 34 Ω [at 20°C (68°F)]
51 – 153	No. 1 injector	10.5 – 13.5 Ω [at 20°C (68°F)]
51 – 146	No. 2 injector	
51 – 140	No. 3 injector	
51 – 139	No. 4 injector	
51 – 133	No. 5 injector	
51 – 127	No. 6 injector	

INSPECTION PROCEDURE USING AN OSCILLOSCOPE

M1131154501085

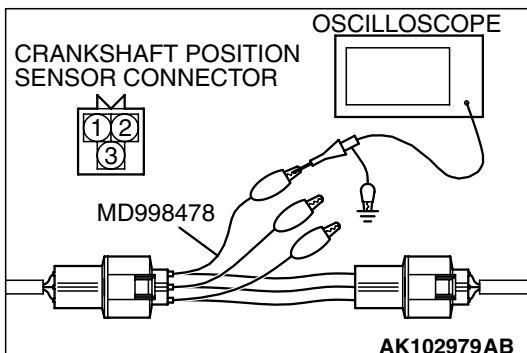
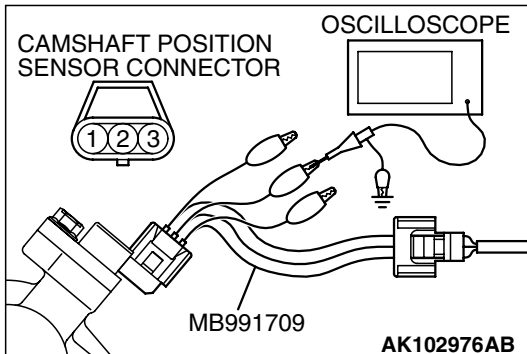
CAMSHAFT POSITION SENSOR AND CRANKSHAFT POSITION SENSOR

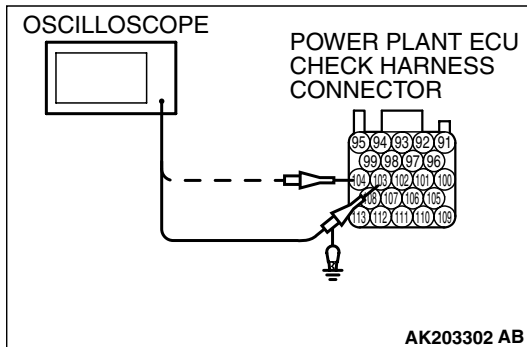
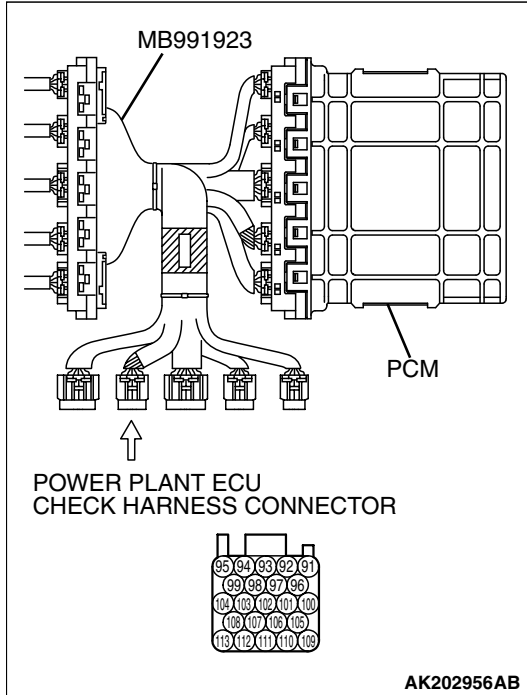
Required Special Tools:

- MB991709: Test Harness
- MD998478: Test Harness
- MB991923: Power Plant ECU Check Harness

Measurement Method

1. Disconnect the camshaft position sensor connector, and connect the test harness special tool (MB991709) between the separated connector (All terminals should be connected).
2. Connect the oscilloscope probe to camshaft position sensor connector terminal No. 2.
3. Disconnect the crankshaft position sensor connector, and connect the test harness special tool (MD998478) between the separated connector.
4. Connect the oscilloscope probe to crankshaft position sensor connector terminal No. 2 (black clip of special tool).





Alternate method (Measure at the PCM)

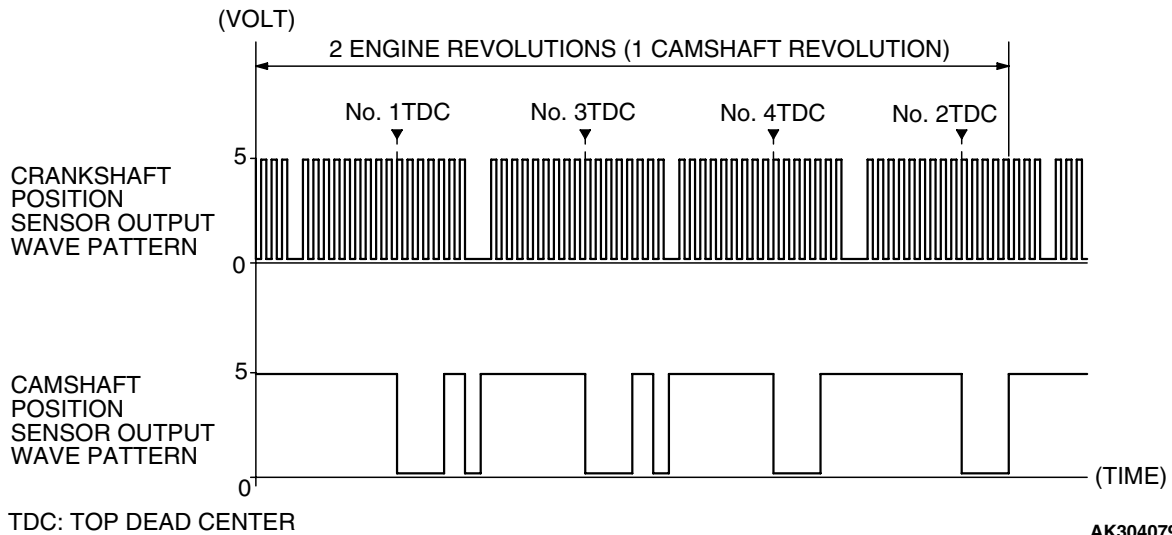
1. Disconnect the all PCM connectors, and connect check harness special tool (MB991923) between the separated connectors.

2. Connect the oscilloscope to check harness terminal No. 104. (Check the camshaft position sensor signal wave pattern.)
3. Connect the oscilloscope to check harness terminal No. 103. (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



Wave Pattern Observation Points

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

Examples of Abnormal Wave Patterns

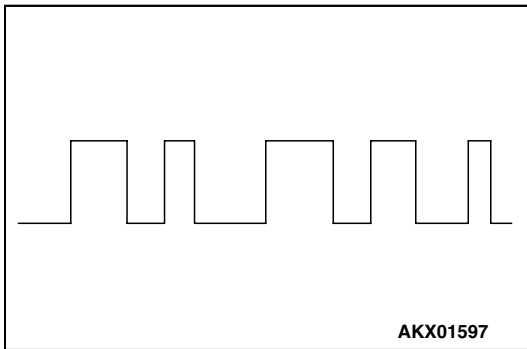
Example 1

Cause of problem

- Sensor interface malfunction.

Wave pattern characteristics

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



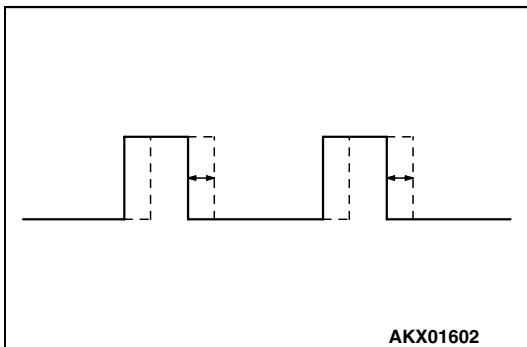
Example 2

Cause of problem

- Loose timing belt.
- Abnormality in sensor disc.

Wave pattern characteristics

- Wave pattern is displaced to the left or right.



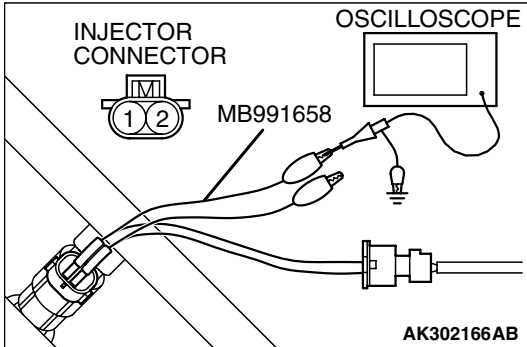
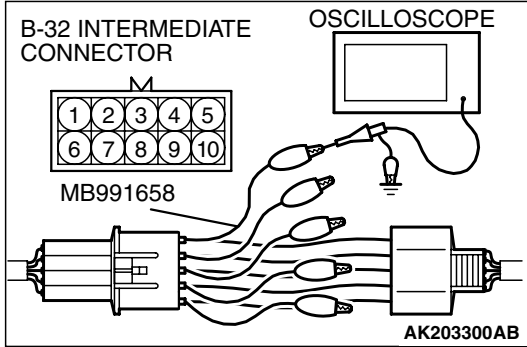
INJECTOR

Required Special Tools:

- MB991658: Test Harness
- MB991923: Power Plant ECU Check Harness

Measurement Method

<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

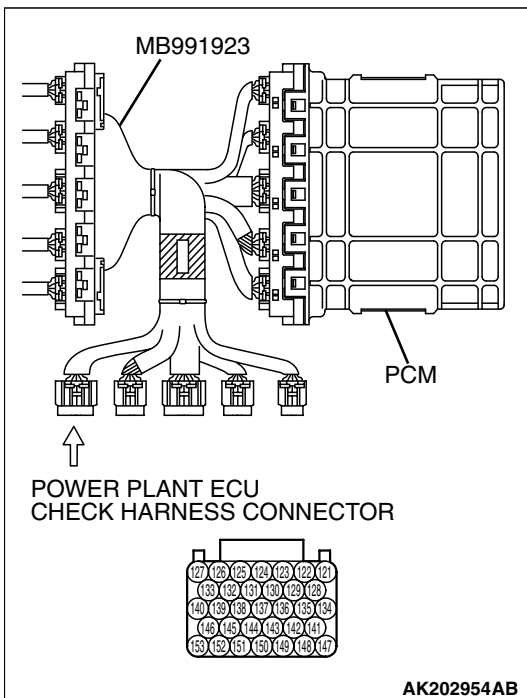
<Measure at the right bank (number 2, 4, 6 cylinders)>

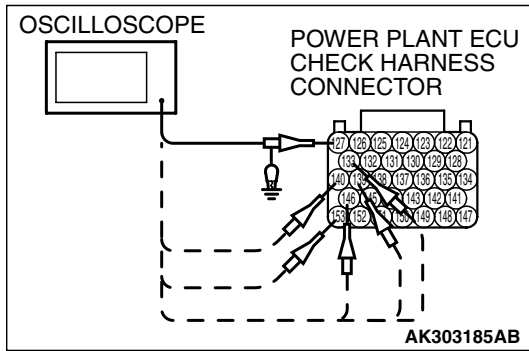
1. Disconnect the injector connector, and connect the test harness special tool (MB991658) between the separated connector. (All terminals should be connected.)

2. Connect the oscilloscope probe to injector connector terminal No. 2.

Alternate method (Measure at the PCM)

1. Disconnect the all PCM connectors, and connect check harness special tool (MB991923) between the separated connectors.



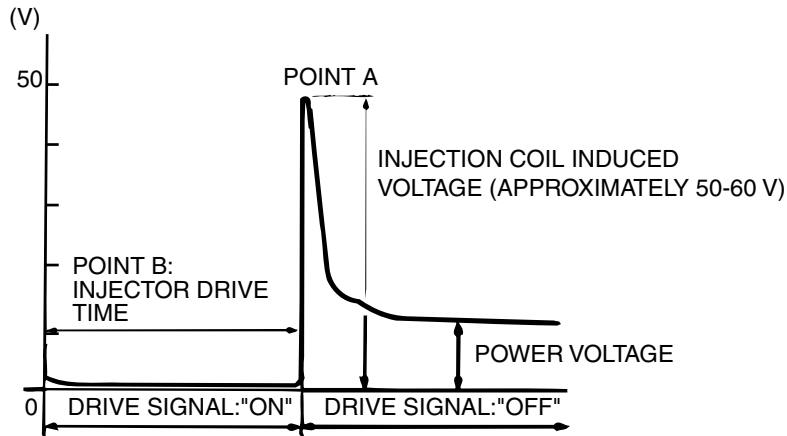


2. Connect the oscilloscope probe to each check harness connector terminal to analyze each cylinder:
 - Terminal No. 153 for the number 1 cylinder.
 - Terminal No. 146 for the number 2 cylinder.
 - Terminal No. 140 for the number 3 cylinder.
 - Terminal No. 139 for the number 4 cylinder.
 - Terminal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

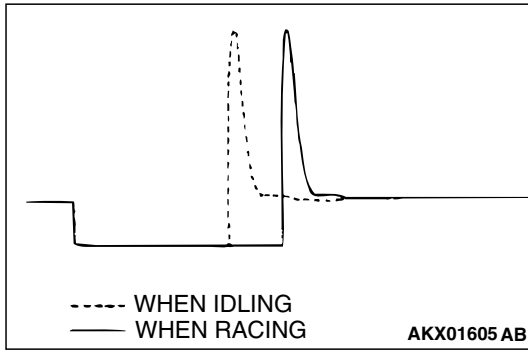


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Wave Pattern Observation Points

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 scan tool tester 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.

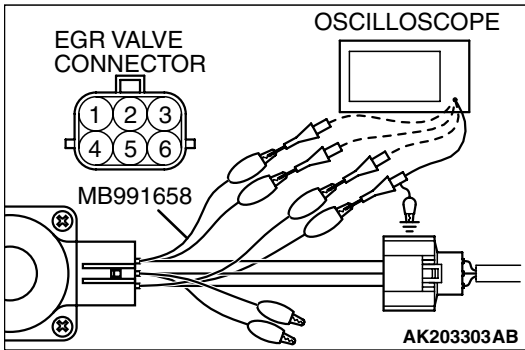
EGR VALVE (STEPPER MOTOR)

Required Special Tools:

- MB991658: Test Harness
- MB991923: Power Plant ECU Check Harness

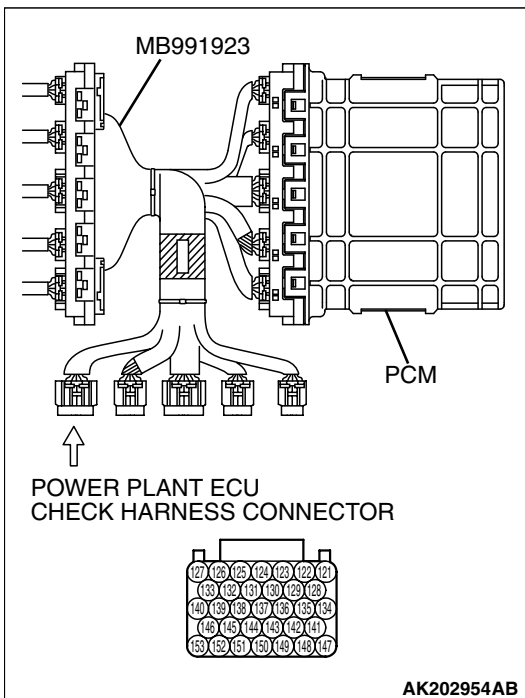
Measurement Method

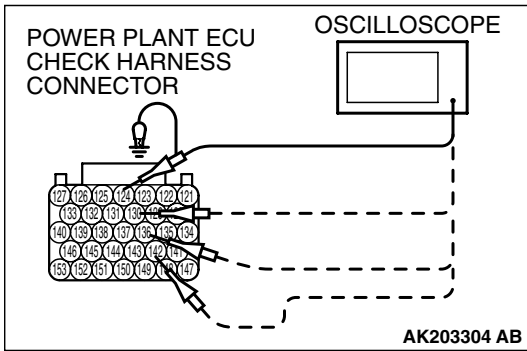
1. Disconnect the EGR valve connector, and connect the test harness special tool (MB991658) between the separated connector (All terminals should be connected).
2. Connect the oscilloscope probe to the EGR valve connector terminal No. 1, terminal No. 3, terminal No. 4, terminal No. 6 respectively.



Alternate method (Measure at the PCM)

1. Disconnect the all PCM connectors, and connect check harness special tool (MB991923) between the separated connectors.



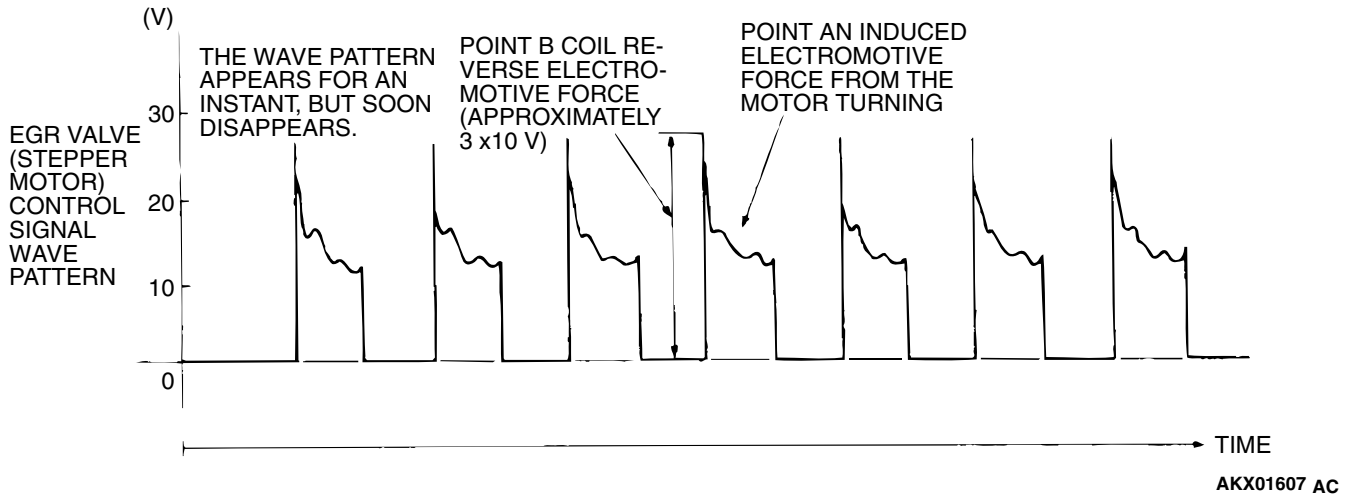


2. Connect the oscilloscope probe to check harness terminal No. 124, No. 130, No. 136 and No. 142.

Standard Wave Pattern

Observation condition	
Function	Special pattern
Pattern height	High
Pattern selector	Display
Engine condition	Revving

Standard wave pattern



Wave Pattern Observation Points

1. Check that the standard wave pattern appears when the EGR valve is operating.
- Point A: Presence or absence of induced electromotive force from the motor turning. (Refer to abnormal wave pattern.)

CONTRAST WITH STANDARD WAVE PATTERN	PROBABLE CAUSE
Induced electromotive force does not appear or is extremely small	Malfunction of motor

Point B: Height of coil back electromotive force

CONTRAST WITH STANDARD WAVE PATTERN	PROBABLE CAUSE
Coil reverse electromotive force does not appear or is extremely small	Short in the coil

Examples of Abnormal Wave Patterns

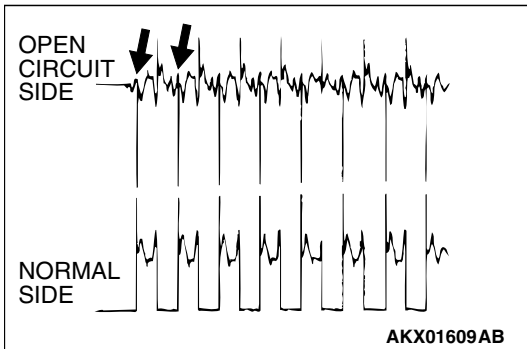
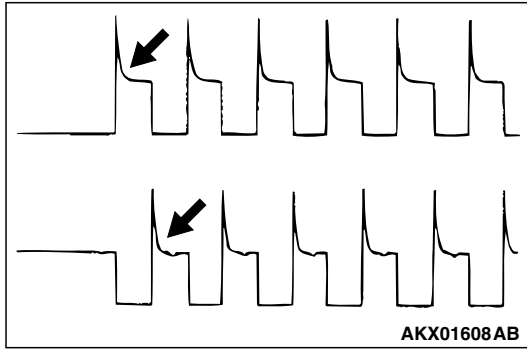
Example 1

Cause of problem

- Malfunction of motor. (Motor is not operating.)

Wave pattern characteristics

- Induced electromotive force from the motor turning does not appear.



Example 2

Cause of problem

- Open circuit in the line between the EGR valve and the PCM.

Wave pattern characteristics

- Current is not supplied to the motor coil on the open circuit side. (Voltage does not drop to 0 volt.) Furthermore, the induced electromotive force wave pattern at the normal side is slightly different from the normal wave pattern.

IGNITION COIL AND IGNITION POWER TRANSISTOR

Required Special Tools:

- MB991658: Test Harness
- MB991923: Power Plant ECU Check Harness

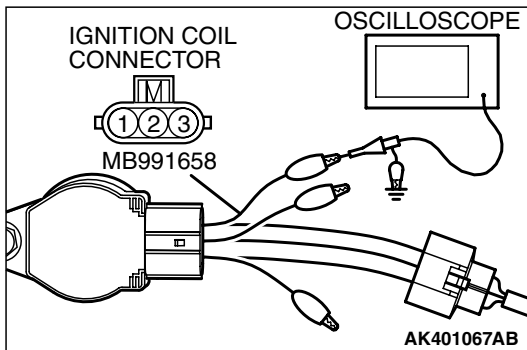
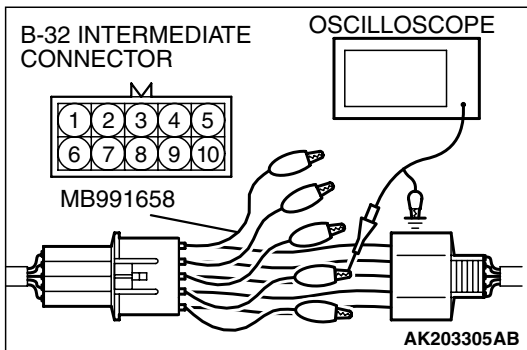
Measurement Method

<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. 2 for the number 1 cylinder.
 - Terminal No. 7 for the number 3 cylinder.
 - Terminal No. 3 for the number 5 cylinder.

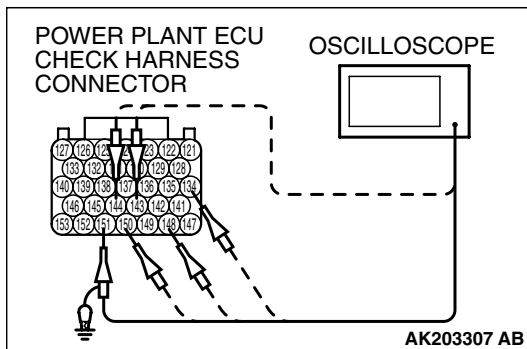
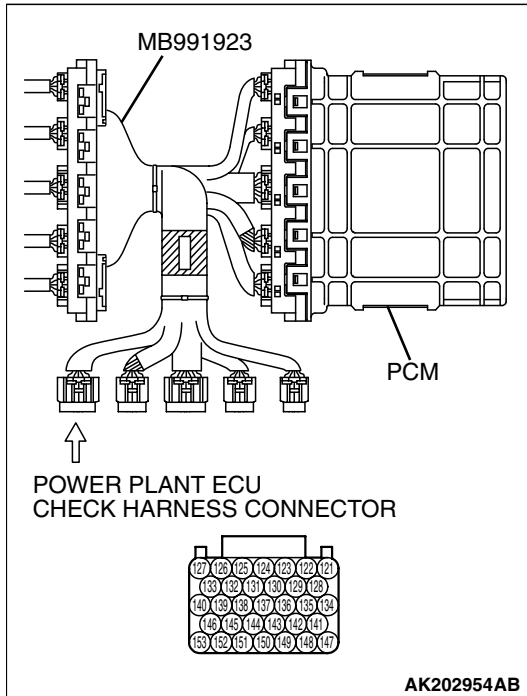
<Measure at the left bank (number 2, 4, 6 cylinders)>

1. Disconnect the ignition coil connector, and connect test harness special tool (MB991658) between the separated connector. (All terminals should be connected.)
2. Connect the oscilloscope probe to ignition coil connector terminal No. 3.



Alternate method (Measure at the PCM)

1. Disconnect the all PCM connectors, and connect check harness special tool (MB991923) between the separated connectors.

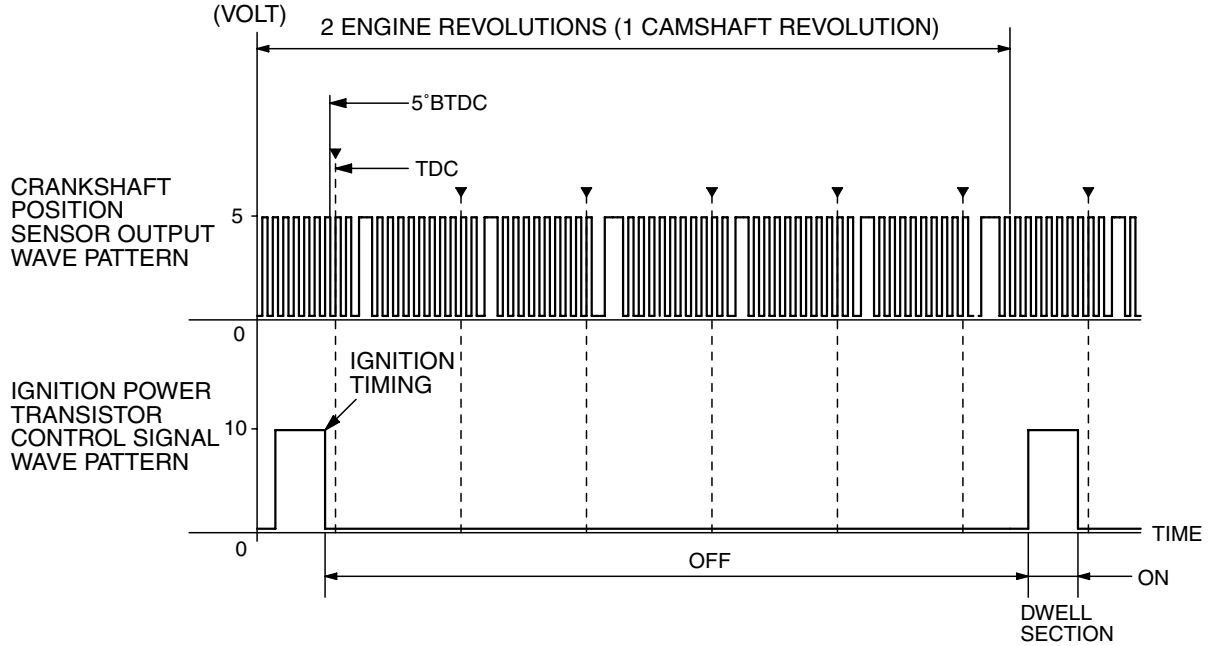


2. Connect the oscilloscope probe to each check harness connector terminal to analyze each cylinder:
 - Terminal No. 151 for the number 1 cylinder.
 - Terminal No. 150 for the number 2 cylinder.
 - Terminal No. 144 for the number 3 cylinder.
 - Terminal No. 148 for the number 4 cylinder.
 - Terminal 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



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Wave Pattern Observation Points

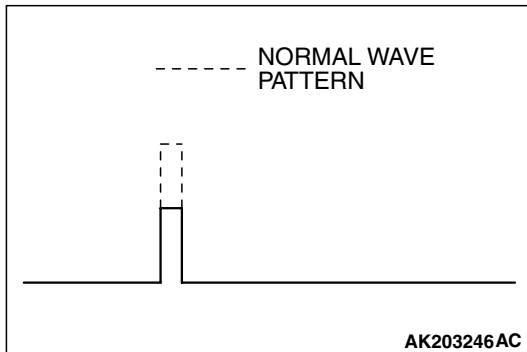
Point: The power transistor control signal (ignition timing) is advanced when the engine speed is increased.

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

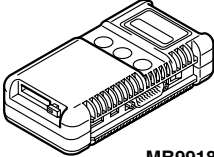
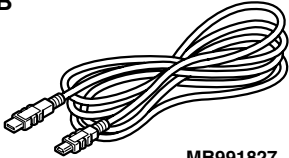
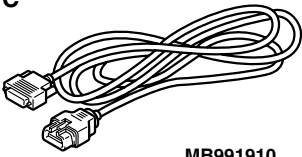
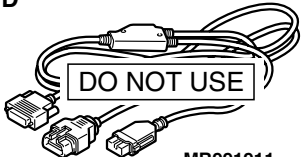
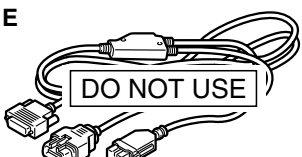
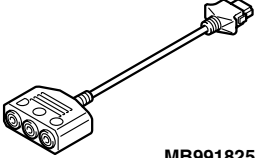
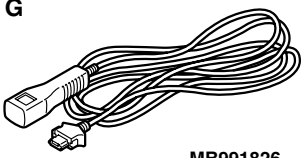
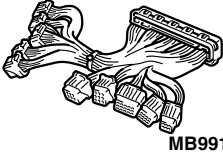
Examples of Abnormal Wave Patterns


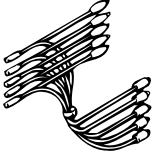




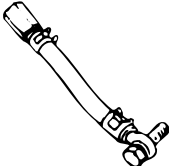

Example 1 (Wave pattern during engine cranking)

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



SPECIAL TOOLS

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>MB991958 A: MB991824 B: MB991827 C: MB991910 D: MB991911 E: MB991914 F: MB991825 G: MB991826 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>MB991923</p>	<p>MB991923 Power plant ECU check harness</p>	<p>MD998478-01</p>	<ul style="list-style-type: none"> • Inspection using an oscilloscope • Inspection of the powertrain control module (PCM) terminal voltage check

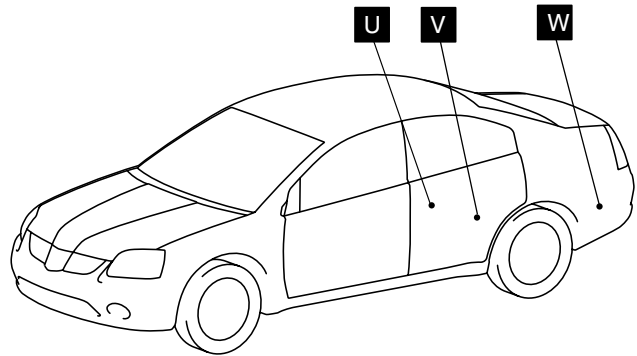
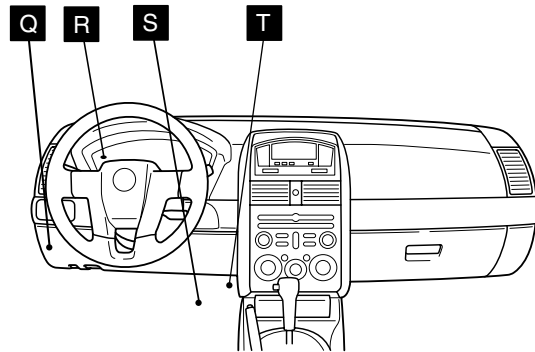
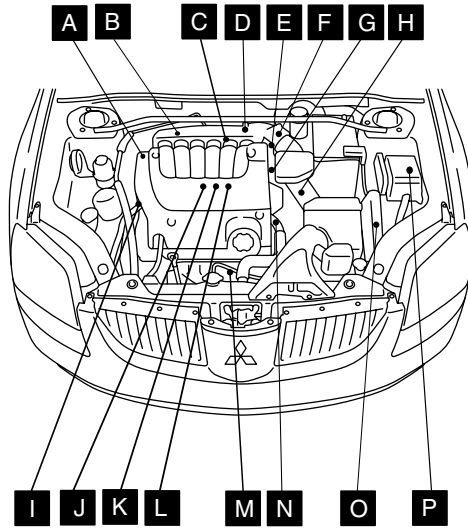
TOOL	TOOL NUMBER AND NAME	SUPERSESSION	APPLICATION
	MB991709 Test harness set	MB991709-01	Inspection using an oscilloscope
 MB991658	MB991658 Test harness set	Tool not available	<ul style="list-style-type: none"> • Inspection using an oscilloscope • Adjustment of accelerator pedal position sensor
	MD998464 Test harness (4 pin, square)	MD998464-01	<ul style="list-style-type: none"> • Inspection of heated oxygen sensor
	MB991316 Test harness (4 pin, square)	Tool not available	Inspection of heated oxygen sensor
	MD998478 Test harness (3 pin, triangle)	MD998478-01	Inspection using an oscilloscope
 MB991637	MB991637 Fuel pressure gauge set	Tool not available	Measurement of fuel pressure
	MD998709 Adaptor hose	MIT210196	Measurement of fuel pressure
	MD998742 Hose adaptor	MD998742-01	Measurement of fuel pressure

ON-VEHICLE SERVICE

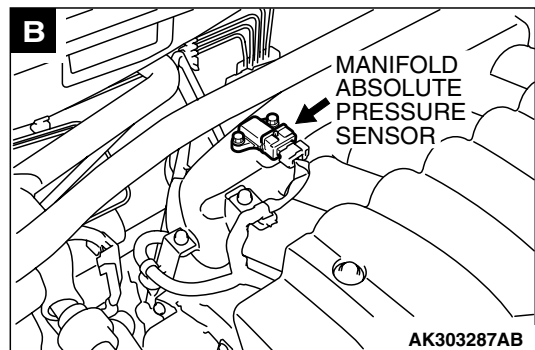
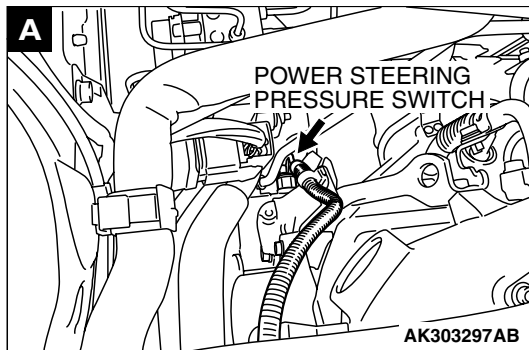
COMPONENT LOCATION

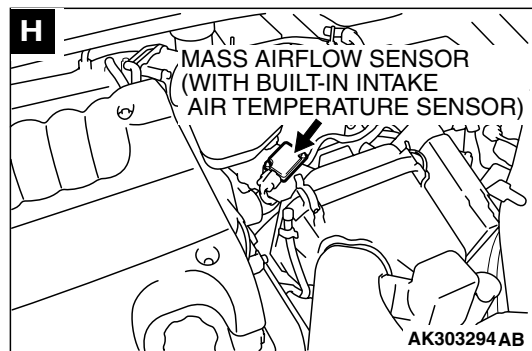
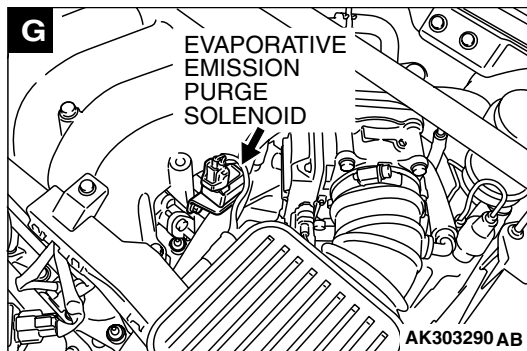
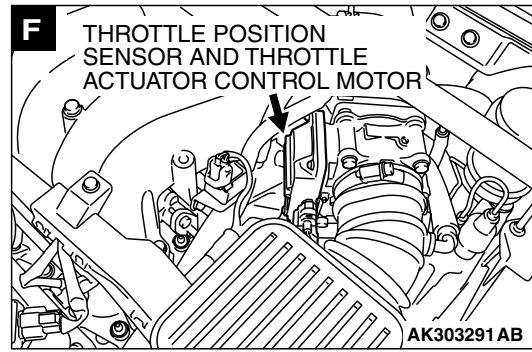
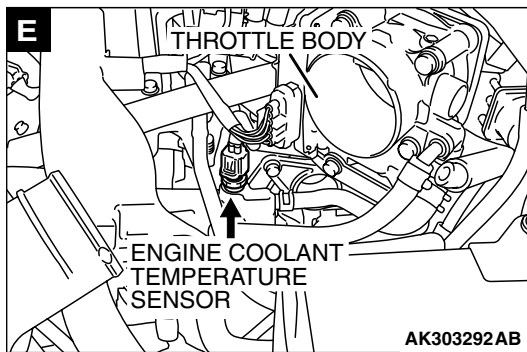
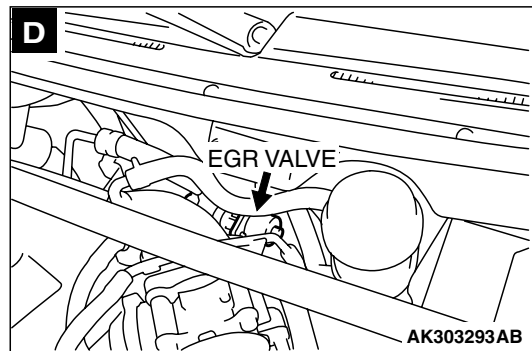
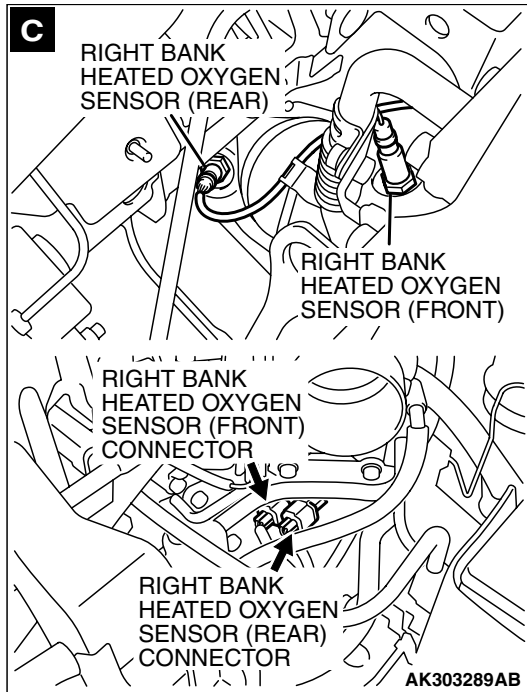
M1131002100837

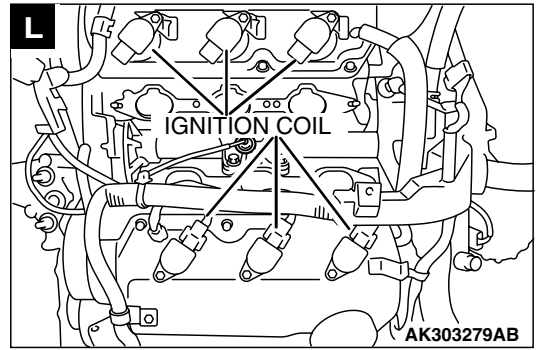
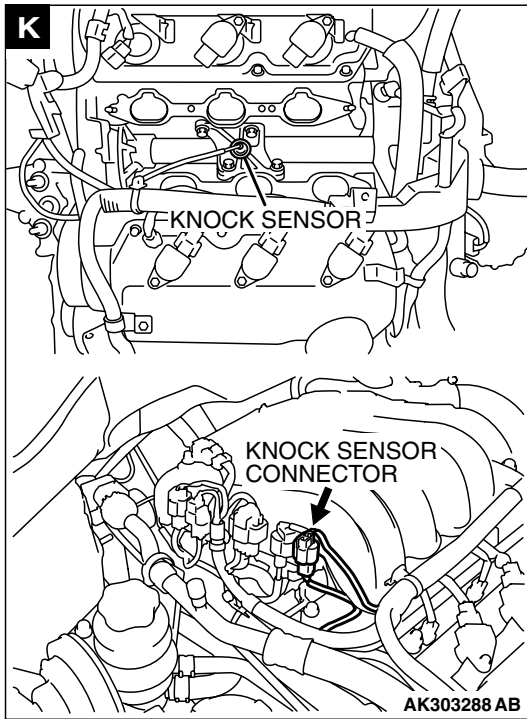
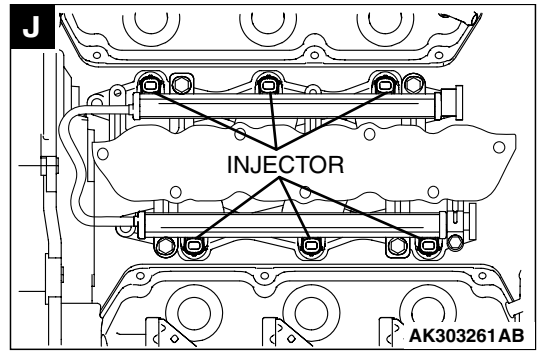
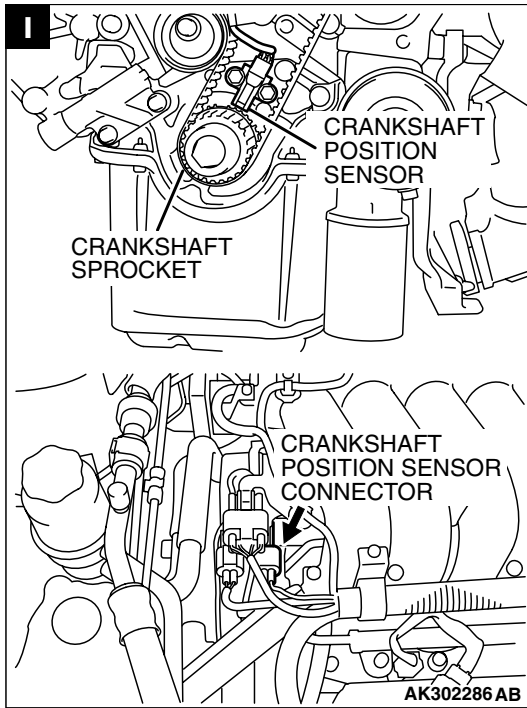
NAME	SYMBOL	NAME	SYMBOL
Accelerator pedal position sensor	S	Knock sensor	K
Camshaft position sensor	N	Left bank heated oxygen sensor (front)	M
Crankshaft position sensor	I	Left bank heated oxygen sensor (rear)	M
Data link connector	T	Malfunction Indicator Lamp (SERVICE ENGINE SOON or Check Engine Lamp)	R
Exhaust gas recirculation (EGR) valve	D	Manifold absolute pressure sensor	B
Engine coolant temperature sensor	E	Mass airflow sensor (with built-in intake air temperature sensor)	H
Evaporative emission purge solenoid	G	Multiport fuel injection (MFI) relay	P
Evaporative emission ventilation solenoid	W	Powertrain control module (PCM)	O
Fuel level sensor (main)	V	Power steering pressure switch	A
Fuel level sensor (sub)	U	Right bank heated oxygen sensor (front)	C
Fuel pump relay	Q	Right bank heated oxygen sensor (rear)	C
Fuel tank differential pressure sensor	U	Throttle actuator control motor	F
Fuel tank temperature sensor	V	Throttle actuator control motor relay	P
Ignition coil	L	Throttle position sensor	F
Injector	J		

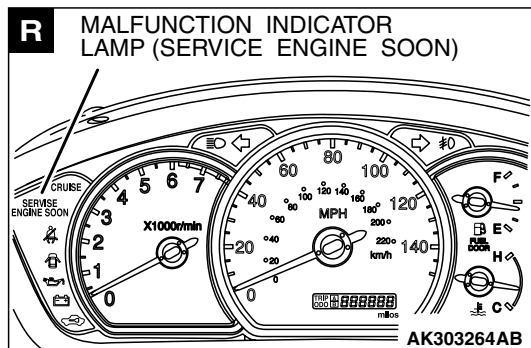
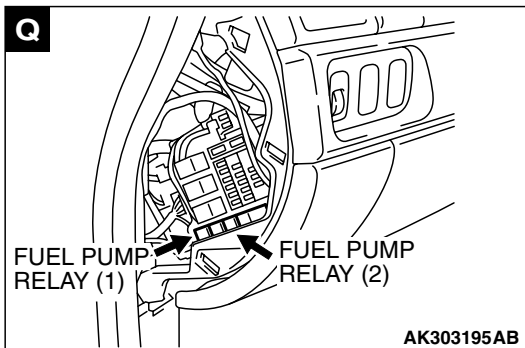
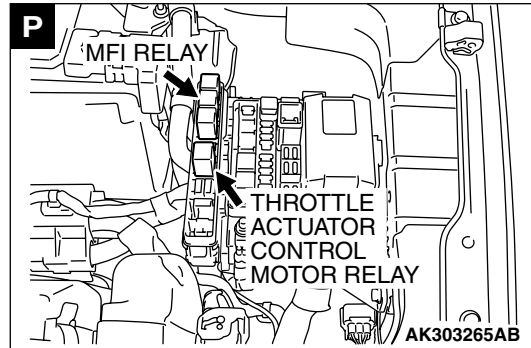
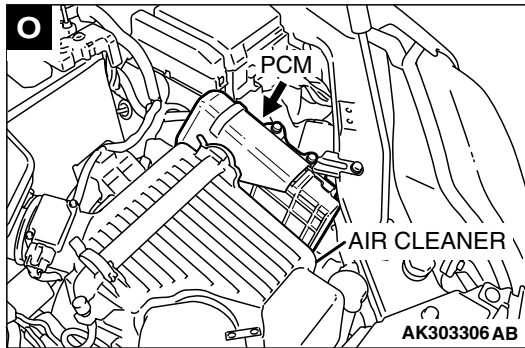
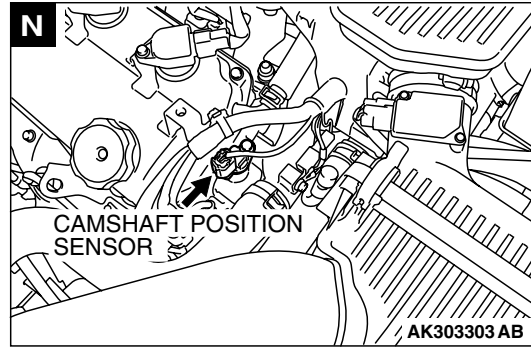
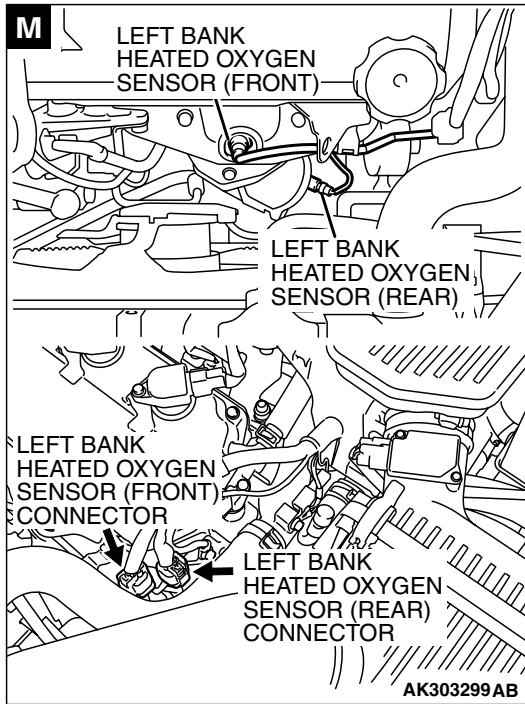


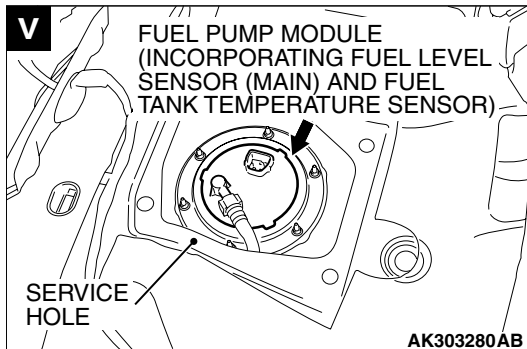
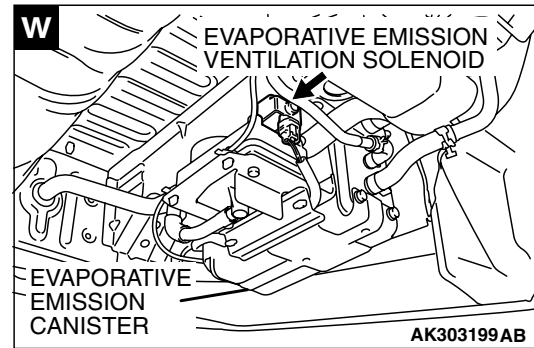
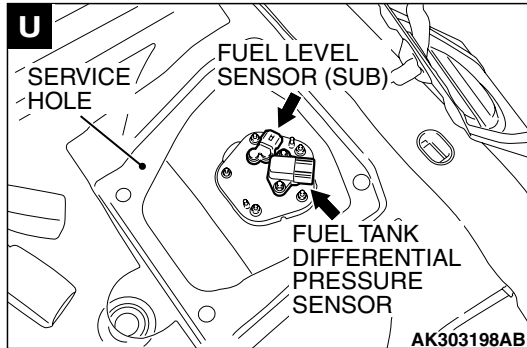
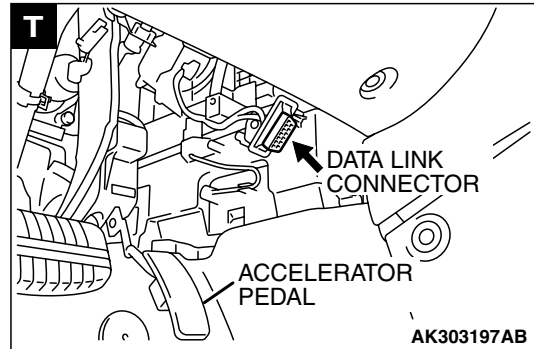
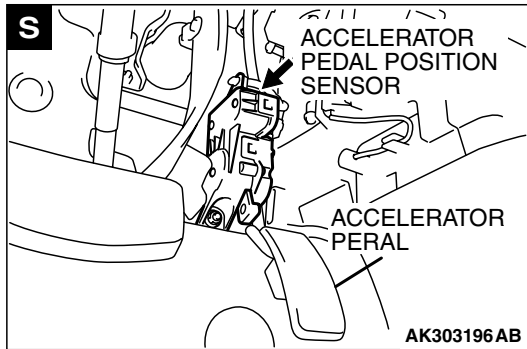
AK303200AB











THROTTLE BODY (THROTTLE VALVE AREA) CLEANING

M1131001000503

⚠ WARNING

If the throttle valve is operation in service, a finger might be injured as the result of being caught by the throttle valve. Make sure that the ignition switch is surely in "LOCK"(OFF) position before the service in order that the throttle valve cannot be operation.

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

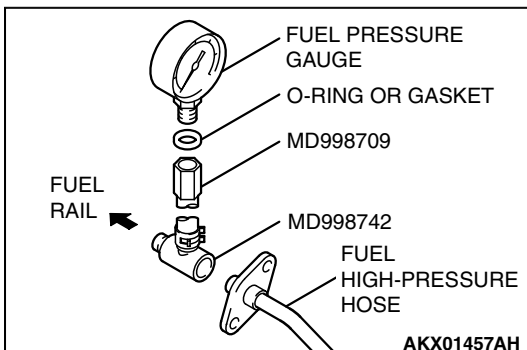
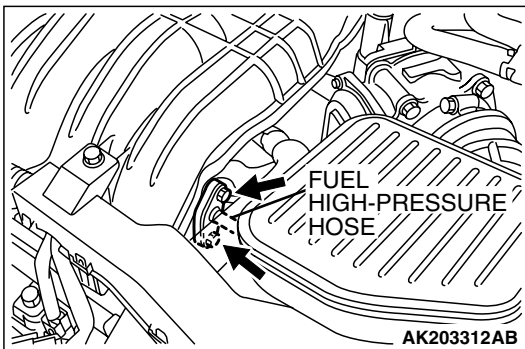
Required Special Tools:

- MB991958: Scan tool (MUT-III Sub Assembly)
 - MB991824: V.C.I.
 - MB991827: USB Cable
 - MB991910: Main Harness A
 - MB991637: Fuel Pressure Gauge Set
 - MD998709: Adaptor Hose
 - MD998742: Hose Adaptor
1. Release residual pressure from the fuel line to prevent fuel spray. (Refer to [P.13B-1181.](#))

⚠ 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. Assemble the fuel pressure measurement tools as follows.

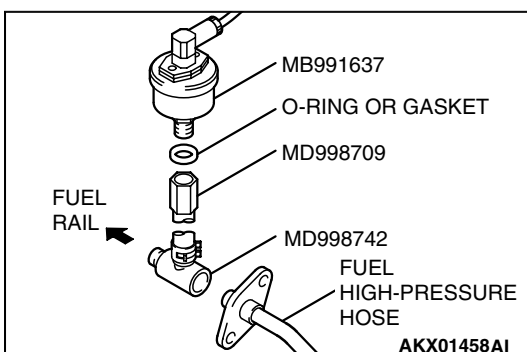


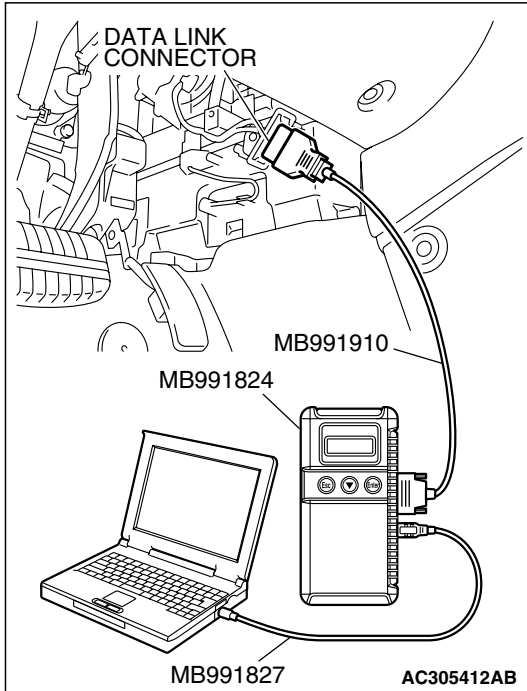
<When using the fuel pressure gauge>

1. Remove the union joint and bolt from special tool MD998709 (adapter hose) and instead attach special tool MD998742 (hose adaptor) to the adapter hose.
2. Place a suitable O-ring or gasket on the assembled special tools MD998709 and MD998742 and install the fuel pressure gauge.
3. Install the assembled fuel pressure measurement tools between the fuel rail and fuel high-pressure hose.

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

1. Remove the union joint and bolt from special tool MD998709 (adapter hose) and instead attach special tool MD998742 (hose adaptor) to the adapter hose.
2. Install special tool MB991637 (fuel pressure gauge set) into assembled special tools MD998709 and MD998742 via a gasket.
3. Install the assembled fuel pressure measurement tools between the fuel rail and fuel high-pressure hose.





CAUTION

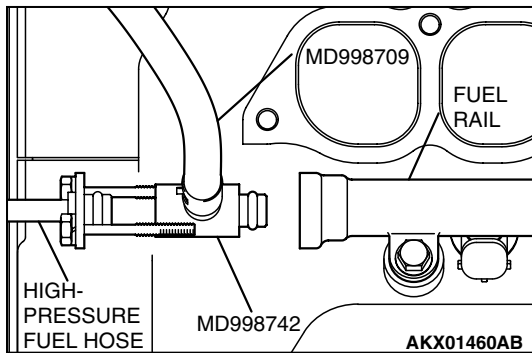
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

4. Connect scan tool MB991958 to the data link connector.
5. Use Actuator test 07 to drive the fuel pump. Check that there is no fuel leaking from any section when the fuel pump is operating.
6. Stop the fuel pump.
7. Start the engine and run at idle.
8. Measure fuel pressure while the engine is running at idle.
Standard value: Approximately 324 kPa (95.7 in.Hg) at curb idle
9. Check to see that fuel pressure at idle does not drop even after the engine has been revved several times.
10. 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 pressure regulator
	Low fuel pump delivery pressure	Replace fuel pump
Fuel pressure too high	Binding valve in fuel pressure regulator	Replace fuel pressure regulator

11. 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



12. Release residual pressure from the fuel pipe line. (Refer to [P.13B-1181.](#))

⚠ 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.

13. Remove the fuel pressure gauge, and special tools MD998709, MD998742 and MB991637 from the fuel rail.

14. Replace the O-ring at the end of the fuel high-pressure hose with a new one.

15. Fit the fuel high-pressure hose into the fuel rail and tighten the bolts to specified torque.

Tightening torque: 5.0 ± 1.0 N·m (44 ± 8 in·lb)

16. Check for fuel leaks.

(1) Use scan tool MB991958 to operate the fuel pump.

(2) Check the fuel line for leaks and repair as needed.

17. Disconnect scan tool MB991958.

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

M1131000900633

Refer to GROUP 13A, On-vehicle Service – Fuel Pump Relay Disconnection (How to Reduce Pressurized Fuel Lines)

[P.13A-1127.](#)

FUEL PUMP OPERATION CHECK

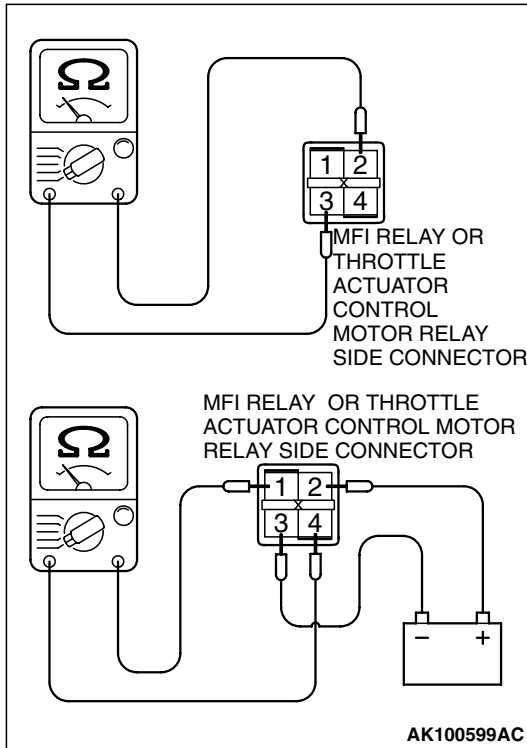
M1131002000700

Refer to GROUP 13A, On-vehicle Service – Fuel Pump Operation Check [P.13A-1128.](#)

MULTIPOINT FUEL INJECTION (MFI) RELAY AND THROTTLE ACTUATOR CONTROL MOTOR RELAY CONTINUITY CHECK

M1131050000345

Inspect the MFI relay and throttle actuator control motor relay for continuity in accordance with the chart shown below.

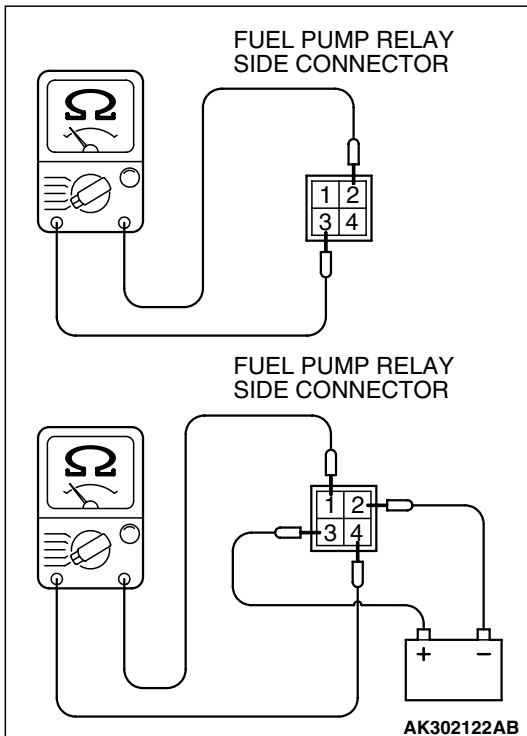


BATTERY VOLTAGE	TERMINAL NO. TO BE CONNECTED TO BATTERY	TERMINAL NO. TO BE CONDUCTED
Not supplied	–	2 – 3
Supplied	2 – 3	1 – 4

FUEL PUMP RELAY CONTINUITY CHECK

M1131033000342

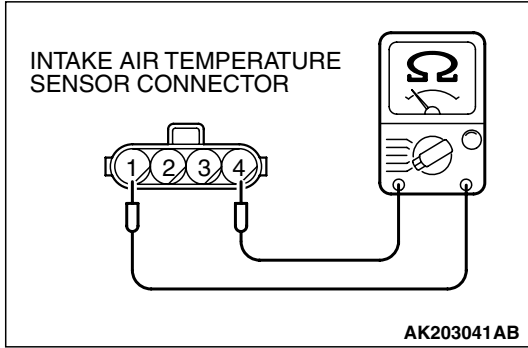
Inspect the fuel pump relay for continuity in accordance with the chart shown below.



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

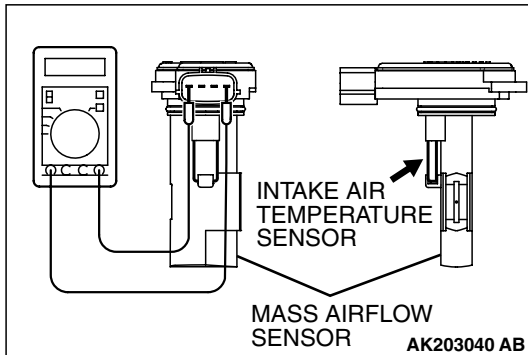
M1131002800557



1. Disconnect the mass airflow sensor connectors.
2. Measure resistance between terminals 1 and 4.

Standard value:

- 13 – 17 kΩ [at -20°C (-4°F)]
- 5.3 – 6.7 kΩ [at 0°C (32°F)]
- 2.3 – 3.0 kΩ [at 20°C (68°F)]
- 1.0 – 1.5 kΩ [at 40°C (104°F)]
- 0.56 – 0.76 kΩ [at 60°C (140°F)]
- 0.30 – 0.45 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.

ENGINE COOLANT TEMPERATURE SENSOR CHECK

M1131003100528

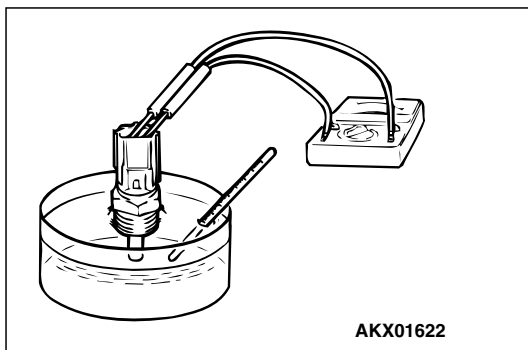
CAUTION

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.

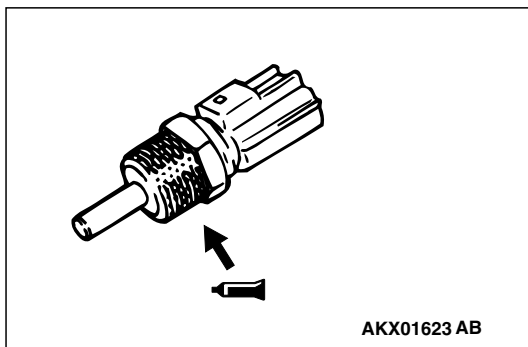
Standard value:

- 14 – 17 kΩ [at -20°C (-4°F)]
- 5.1 – 6.5 kΩ [at 0°C (32°F)]
- 2.1 – 2.7 kΩ [at 20°C (68°F)]
- 0.9 – 1.3 kΩ [at 40°C (104°F)]
- 0.48 – 0.68 kΩ [at 60°C (140°F)]
- 0.26 – 0.36 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: 29 ± 10 N·m (22 ± 7 ft-lb)



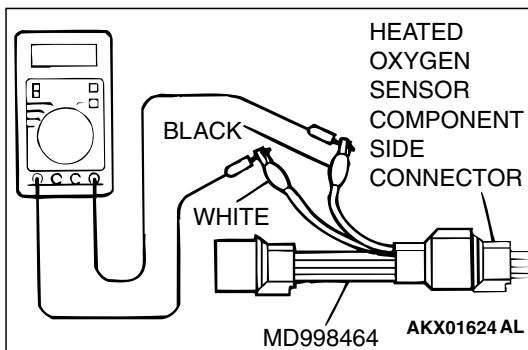
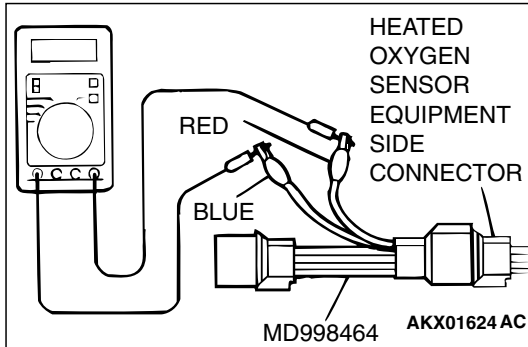
HEATED OXYGEN SENSOR CHECK

M1131005000691

Required Special Tools:

- MB991958: Scan tool (MUT-III Sub Assembly)
 - MB991824: V.C.I.
 - MB991827: USB Cable
 - MB991910: Main Harness A
- MB991316: Test Harness
- MD998464: Test Harness

<Right bank and left bank heated oxygen sensor (front)>



1. Using scan tool MB991958, observe HO₂S reading. If values are unsatisfactory, or if a scan tool is not available, use the following procedure:
 - (1) Disconnect the heated oxygen sensor connector and connect special tool MD998464 to the connector on the heated oxygen sensor side.
 - (2) Make sure that there is continuity [4.5-8.0 ohms at 20°C (68°F)] between terminal No. 1 (red clip) and terminal No. 3 (blue clip) on the heated oxygen sensor connector.
 - (3) If there is no continuity, replace the heated oxygen sensor.
 - (4) Warm up the engine until engine coolant is 80°C (176°F) or higher.
 - (5) Perform a tracing for 5 minutes or more with the engine speed of 4,500 r/min.
 - (6) Connect a digital voltage meter between terminal No. 2 (black clip) and terminal No. 4 (white clip).
2. While repeatedly revving the engine, measure the 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.

CAUTION

- Be very careful when connecting the jumper wire; incorrect connection can damage the oxygen sensor.
- Be careful the heater is broken when voltage of beyond 8V is applied to the oxygen sensor heater.

NOTE: If the sufficiently high temperature (of approximate 400°C or more) is not reached although the oxygen sensor is normal, the output voltage would be possibly low although the rich air-fuel ratio. Therefore, if the output voltage is low, use a jumper wire to connect the terminal No.1 (red clip of special tool) and the terminal No. 3 (blue clip of special tool) of the oxygen sensor with a (+) terminal and (-) terminal of 8 V power supply respectively, then check again.

3. If the output voltage is not within the standard 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.15-20.

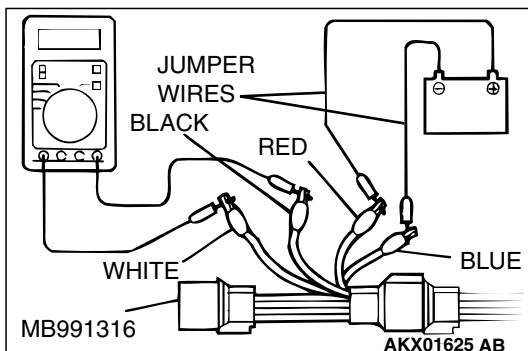
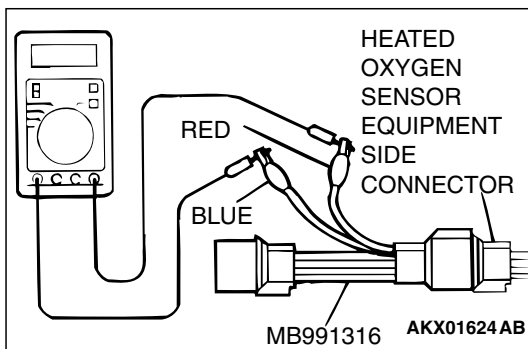
<Right bank and left bank heated oxygen sensor (rear)>

1. Using scan tool MB991958, observe HO₂S reading. If values are unsatisfactory, or if Scan tool is not available, use the following procedure:

- (1) Disconnect the heated oxygen sensor connector and connect special tool MB991316 to the connector on the heated oxygen sensor side.
- (2) Make sure that there is continuity [11-18 ohms at 20°C (68°F)] between terminal No. 1 (red clip) and terminal No. 3 (blue clip) on the heated oxygen sensor connector.
- (3) If there is no continuity, replace the heated oxygen sensor.
- (4) Warm up the engine until engine coolant is 80°C (176°F) or higher.
- (5) Perform a tracing for 5 minutes or more with the engine speed of 4,500 r/min.
- (6) Connect a digital voltage meter between terminal No. 2 (black clip) and terminal No. 4 (white clip).

2. While repeatedly revving the engine, measure the 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.

⚠ CAUTION

- Be very careful when connecting the jumper wire; incorrect connection can damage the oxygen sensor.
 - Be careful the heater is broken when voltage of beyond 8V is applied to the oxygen sensor heater.
3. If the output voltage is not within the standard value, replace the heated oxygen sensor.

NOTE: If the sufficiently high temperature (of approximate 400°C or more) is not reached although the oxygen sensor is normal, the output voltage would be possibly low although the rich air-fuel ratio. Therefore, if the output voltage is low, use a jumper wire to connect the terminal No.2 and the terminal No. 1 of the oxygen sensor with a (+) terminal and (-) terminal of 12 V power supply respectively, then check again.

NOTE: For removal and installation of the heated oxygen sensor, refer to GROUP 15, Exhaust Pipe and Main Muffler P.15-20.

INJECTOR CHECK

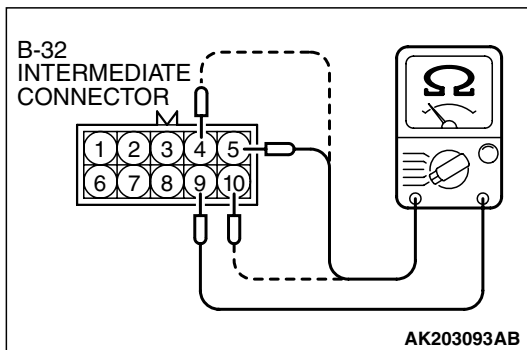
M1131005200521

<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:

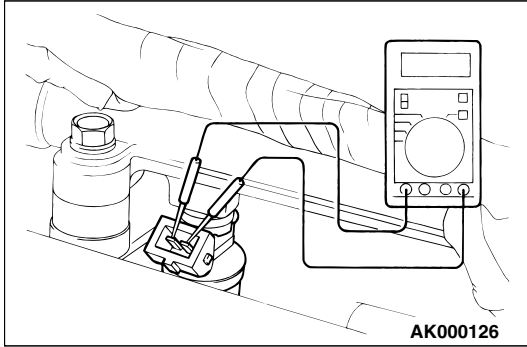
INJECTOR NO.	MEASUREMENT TERMINAL	RESISTANCE
NO.1	5 – 9	10.5 – 13.5 Ω [20°C (68°F)]
NO.3	9 – 10	
NO.5	4 – 9	



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

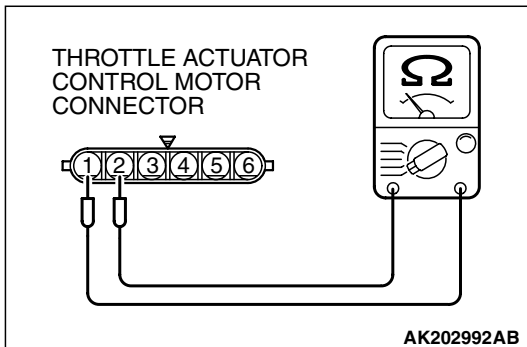
M1131051000070

<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.

<Checking the Terminal Resistance>

1. Disconnect the throttle position sensor connector.
2. Measure the resistance between terminal No. 1 and No. 2.
Standard value: 0.3 – 80 ohms [at 20°C (68°F)]
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.17-87](#).

EVAPORATIVE EMISSION VENTILATION SOLENOID CHECK

M1131012800224

Refer to GROUP 17, Emission Control System – Evaporative Emission Canister and Fuel Tank Pressure Relief Valve – Evaporative Emission Canister and Fuel Tank Pressure Relief Valve Inspection [P.17-96](#).

EGR VALVE CHECK

M1131051500031

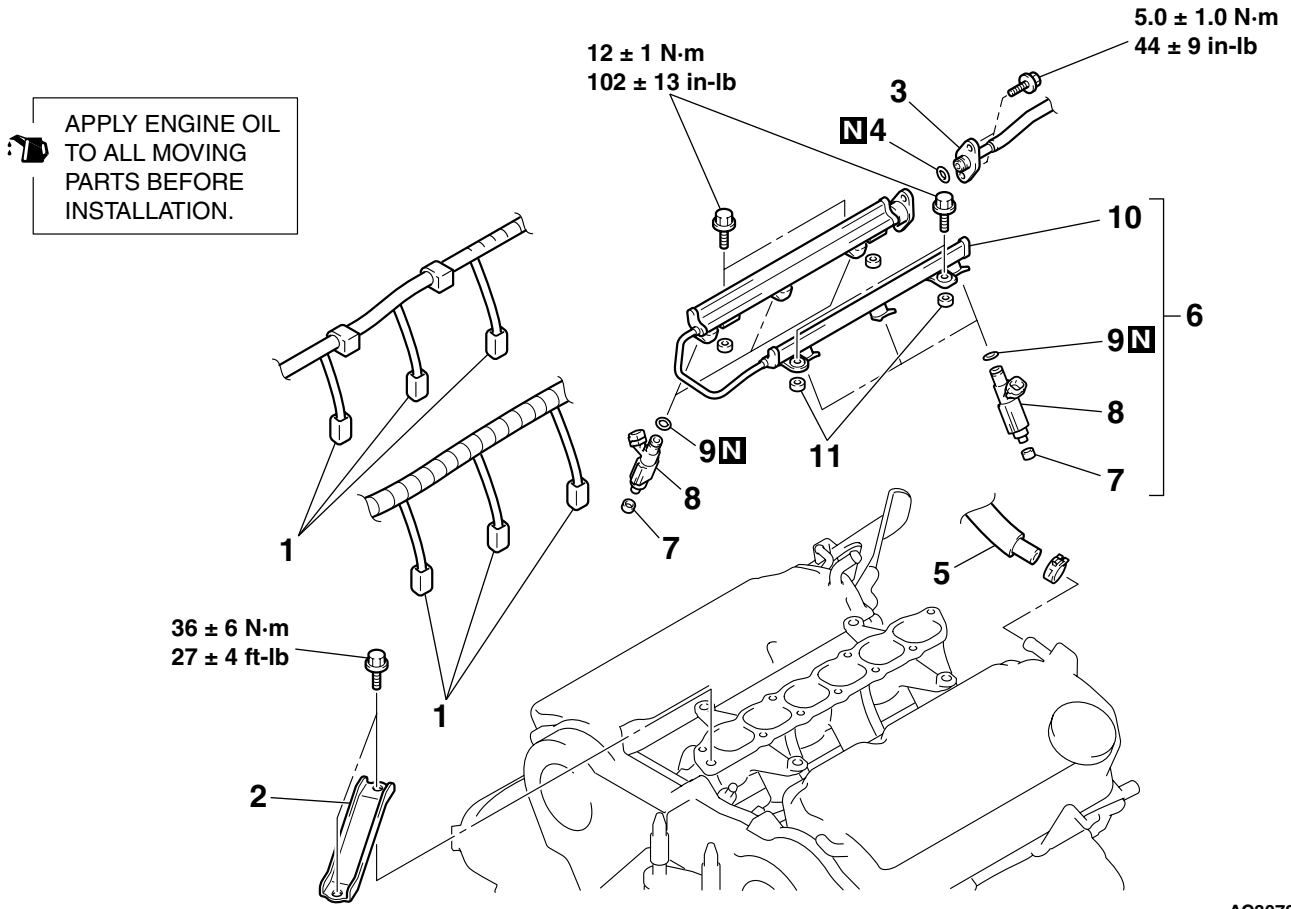
Refer to GROUP 17, Emission Control System – Exhaust Gas Recirculation (EGR) System – EGR Valve Check. P.17-90

INJECTOR

REMOVAL AND INSTALLATION

M1131007100768

<p>Pre-removal Operation</p> <ul style="list-style-type: none"> Fuel Discharge Prevention (Refer to P.13B-1181). Intake Manifold Plenum Removal (Refer to GROUP 15, Intake Manifold Plenum P.15-6). 	<p>Post-installation Operation</p> <ul style="list-style-type: none"> Intake Manifold Plenum Installation (Refer to GROUP 15, Intake Manifold Plenum P.15-6). Fuel Leakage Inspection.
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AC307253AB

- REMOVAL STEPS**
- INJECTOR CONNECTOR
 - ENGINE MOUNT STAY
 - FUEL HIGH-PRESSURE HOSE CONNECTION (FUEL RAIL SIDE)
 - O-RING
 - BLOW-BY HOSE CONNECTION

<<A>>

- REMOVAL STEPS (Continued)**
- FUEL RAIL AND INJECTOR ASSEMBLY
 - INSULATORS
 - FUEL INJECTORS
 - O-RING
 - FUEL RAIL
 - INSULATORS

>>A<<
>>A<<

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 do not turn smoothly, the O-ring may be trapped, remove it, re-install it into the fuel rail and check again.
 4. Tighten the fuel high-pressure hose to the specified torque.
Tightening torque: 5.0 ± 1.0 N·m (44 ± 9 in-lb)

THROTTLE BODY ASSEMBLY

REMOVAL AND INSTALLATION

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CAUTION

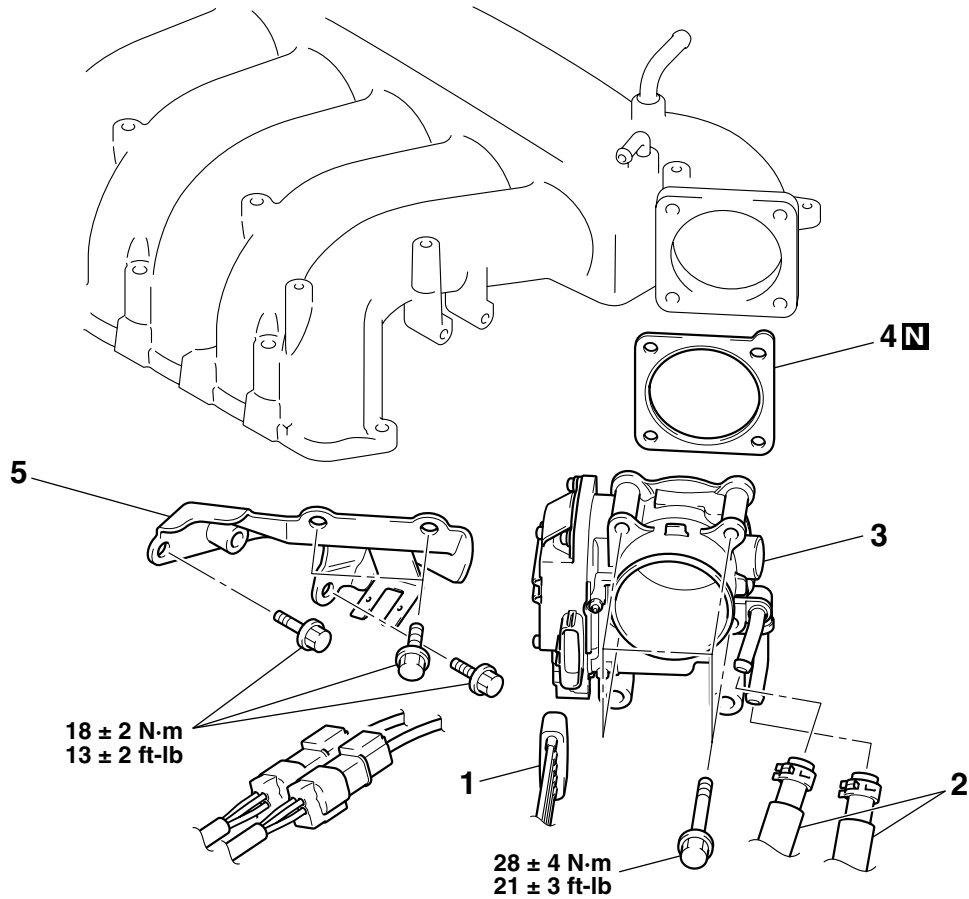
Do not loosen the fixing screws for the resin cover of throttle body assembly. If the screws are loosened, the sensor incorporated in the resin cover becomes misaligned and the throttle body cannot work normally.

Pre-removal Operation

- Engine Coolant Draining [Refer to GROUP 00, Maintenance Service – Engine Coolant (Change) P.00-56].
- 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).
- Engine Coolant Refilling [Refer to GROUP 00, Maintenance Service – Engine Coolant (Change) P.00-56].



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- >>B<<**
- REMOVAL STEPS**
- INITIALIZATION PROCEDURE (INSTALLATION ONLY)
1. THROTTLE POSITION SENSOR CONNECTOR

- >>A<<**
- REMOVAL STEPS (Continued)**
2. WATER HOSE CONNECTION
 3. THROTTLE BODY
 4. THROTTLE BODY GASKET
 5. THROTTLE BODY STAY

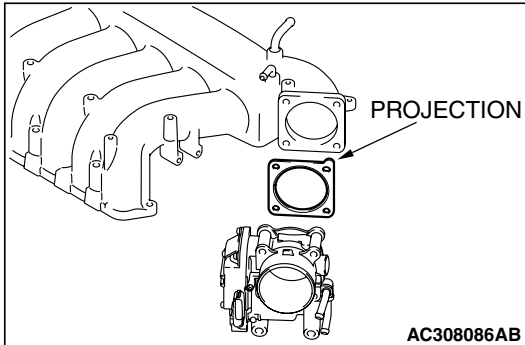
INSTALLATION SERVICE POINT

>>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.



>>B<< INITIALIZATION PROCEDURE

Turn the ignition switch on then off, and keep it off for at least 10 seconds.

POWERTRAIN CONTROL MODULE (PCM)**REMOVAL AND INSTALLATION**

Refer to GROUP 13A, Powertrain Control Module (PCM) P. 13A-1140.

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SPECIFICATIONS**FASTENER TIGHTENING SPECIFICATIONS**

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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)
Fuel high-pressure hose bolt	5.0 ± 1.0 N·m (44 ± 9 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)
Throttle body stay bolt	18 ± 2 N·m (13 ± 2 ft-lb)

GENERAL SPECIFICATION(S)

M1131000200827

ITEMS	SPECIFICATIONS	
Throttle body	Throttle bore mm (in.)	63 (2.48)
	Throttle position sensor	Hall element type
	Throttle actuator control motor	DC motor type, having brushes
Powertrain control module (PCM)	Identification model No.	E6T40079
Sensors	Mass airflow sensor	Heat sensitizing type
	Barometric pressure sensor	Semiconductor type
	Intake air temperature sensor	Thermistor type
	Engine coolant temperature sensor	Thermistor type
	Heated oxygen sensor	Zirconia type
	Accelerator pedal position sensor	Hall element type
	Transmission range switch	Contact switch type
	Camshaft position sensor	Magneto resistance element type
	Crankshaft position sensor	Magneto resistance element type
	Knock sensor	Piezoelectric type
	Power steering pressure switch	Contact switch type
Manifold absolute pressure sensor	Semiconductor type	

ITEMS		SPECIFICATIONS
Actuators	Multiport fuel injection (MFI) 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
	Exhaust gas recirculation (EGR) valve	Stepper motor type
	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)	13 – 17
	0°C (32°F)	5.3 – 6.7
	20°C (68°F)	2.3 – 3.0
	40°C (104°F)	1.0 – 1.5
	60°C (140°F)	0.56 – 0.76
	80°C (176°F)	0.30 – 0.45
Engine coolant temperature sensor resistance kΩ	-20°C (-4°F)	14 – 17
	0°C (32°F)	5.1 – 6.5
	20°C (68°F)	2.1 – 2.7
	40°C (104°F)	0.9 – 1.3
	60°C (140°F)	0.48 – 0.68
	80°C (176°F)	0.26 – 0.36
Heated oxygen sensor output voltage V		0.6 – 1.0
Heated oxygen sensor heater resistance Ω	<Front>	4.5 – 8.0 [at 20°C (68°F)]
	<Rear>	11 – 18 [at 20°C (68°F)]
Injector coil resistance Ω		10.5 – 13.5 [at 20°C (68°F)]
Throttle actuator control motor coil resistance Ω		0.3 – 80 [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