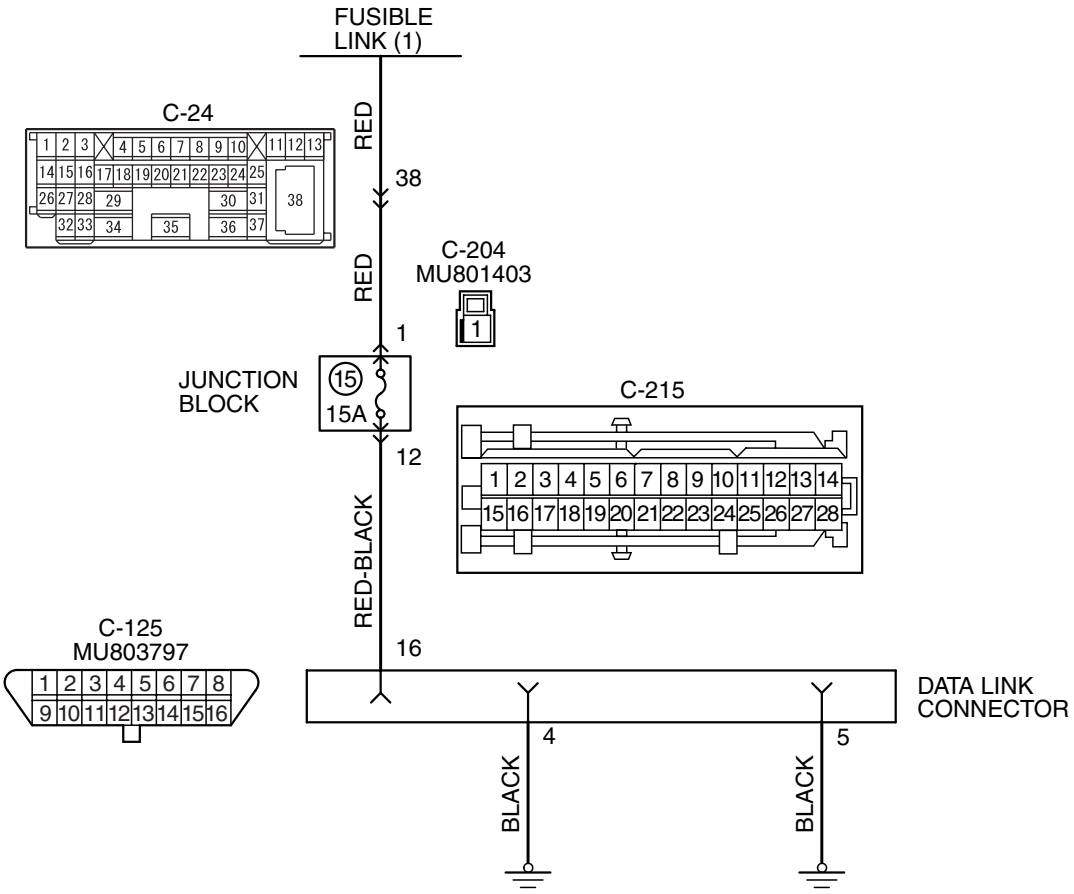
SYMPTOM PROCEDURES

INSPECTION PROCEDURE 1: Communication with Scan Tool Is Not Possible. (Comunication with All Systems Is Not Possible.)

Data Link Connector Circuit



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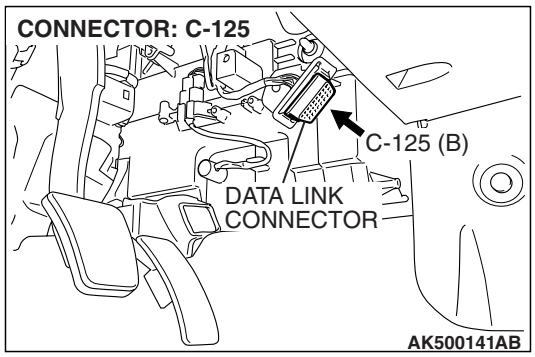
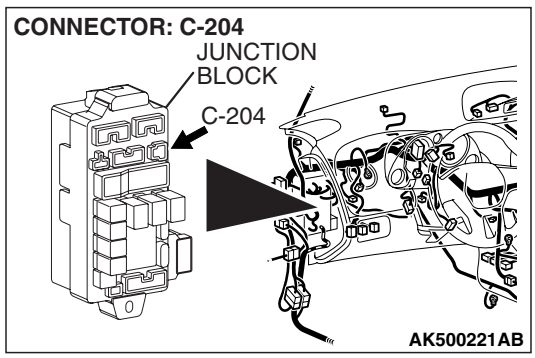
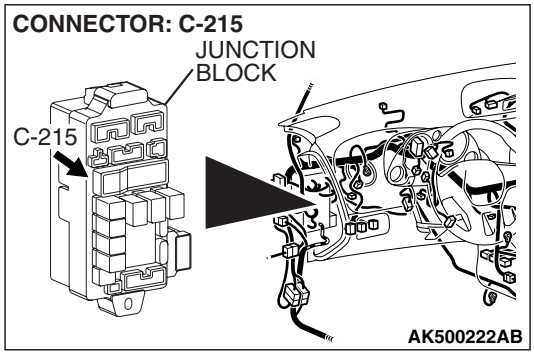
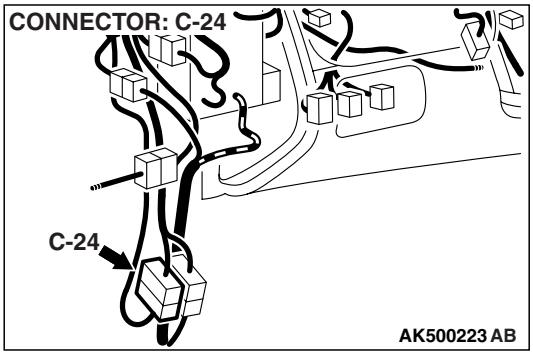




TSB Revision





CIRCUIT OPERATION

- A battery positive voltage is applied on the data link connector power terminal (terminal No. 16). The ground terminals (terminal No. 4, No. 5) are grounded to the vehicle body.

COMMENT

- The cause is probably a defect in power supply system (including ground) for the on-board diagnostic test mode line.

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

- Malfunction of the data link connector.
- Damaged harness wire.

DIAGNOSIS

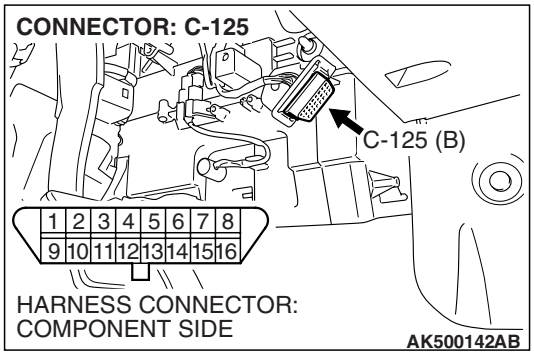
STEP 1. Measure the power supply voltage at data link connector C-125.

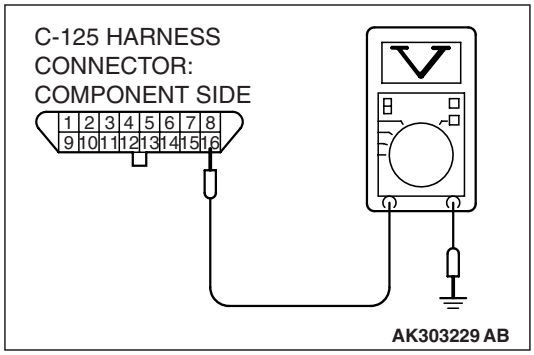
(1) Measure voltage between terminal No. 16 and ground.
- Voltage should be battery positive voltage.

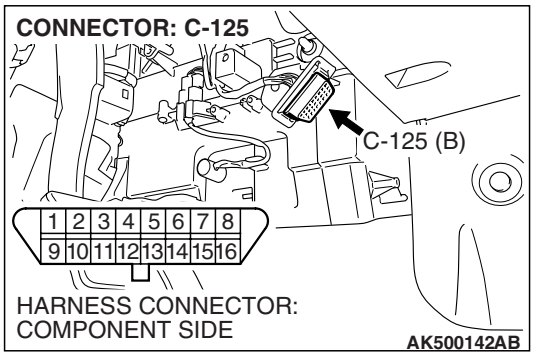
Q: Is battery positive voltage (approximately 12 volts) present?

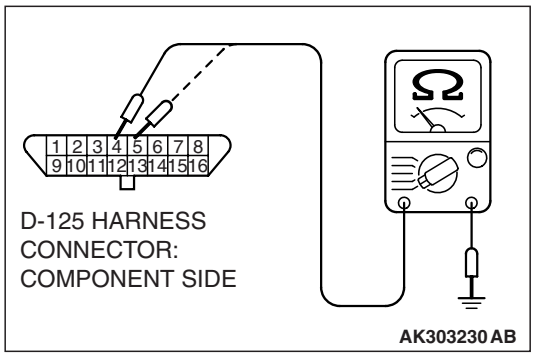
YES : Go to step 2.

NO : Check harness connectors C-215, C-204 and C-24 at intermediate connector for damage, and repair or replace as required. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. If intermediate connector C-215, C-204 and C-24 are in good condition, repair an open circuit between fusible link (1) and data link connector C-125 (terminal No. 16). Then confirm that the malfunction symptom is eliminated.









STEP 2. Check the continuity at data link connector C-125.

(1) Check for the continuity between terminal No. 4, No. 5 and ground.
- Should be less than 2 ohms.

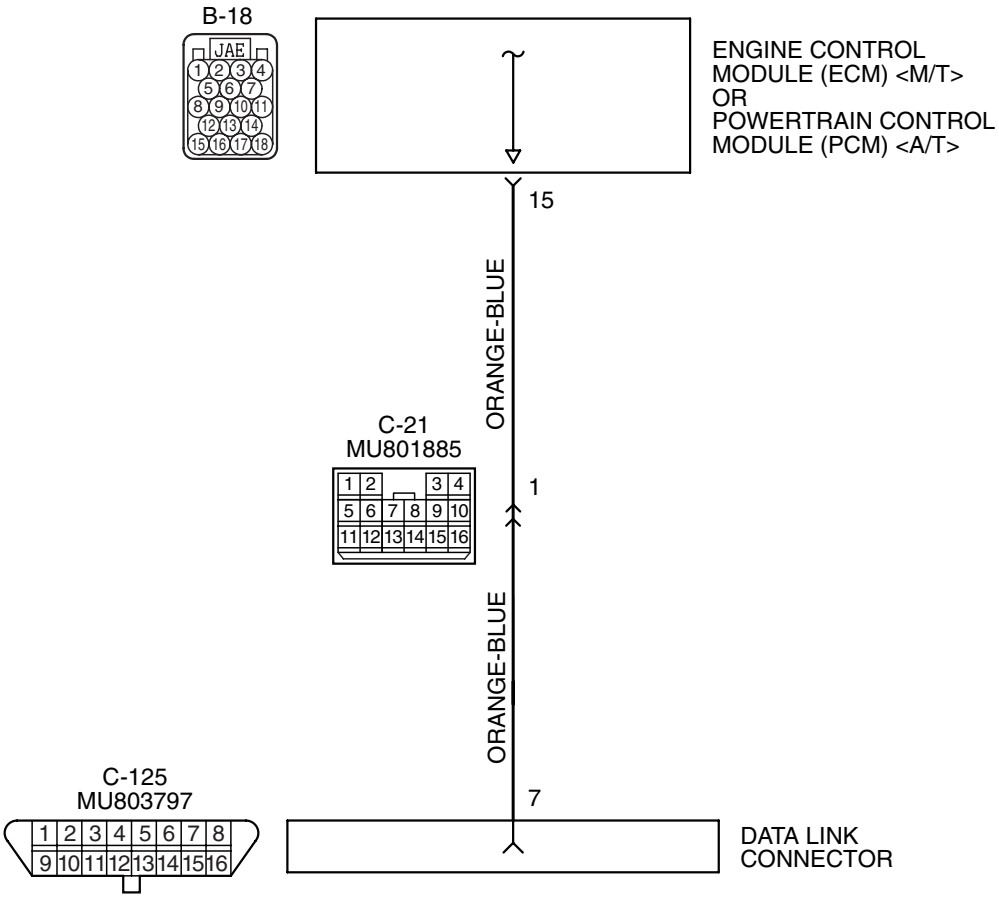
Q: Does continuity exist?

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

NO : Repair an open circuit or harness damage between data link connector C-125 (terminal No. 4, No. 5) and ground. Then confirm that the malfunction symptom is eliminated.

INSPECTION PROCEDURE 2: Scan Tool Communication with ECM <M/T> or PCM <A/T> Is Not Possible.

Data Link Connector Circuit



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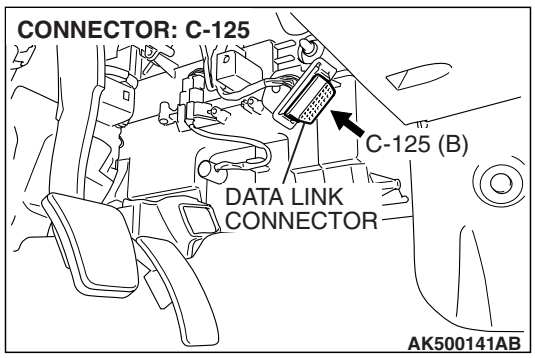
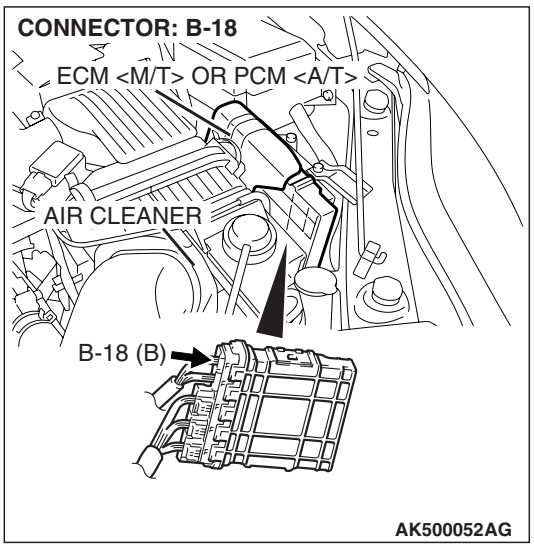
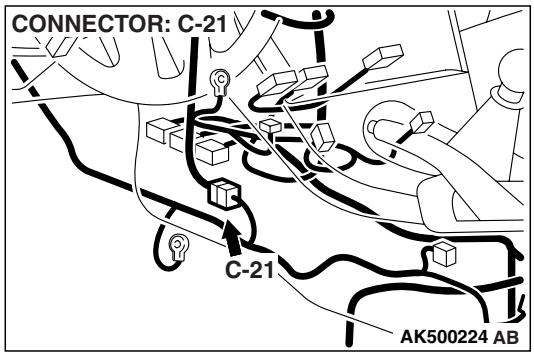




TSB Revision



CIRCUIT OPERATION

- A diagnostic output is made from the ECM <M/T> or the PCM <A/T> (terminal No. 15) to the diagnostic output terminal (terminal No. 7) of the data link connector.

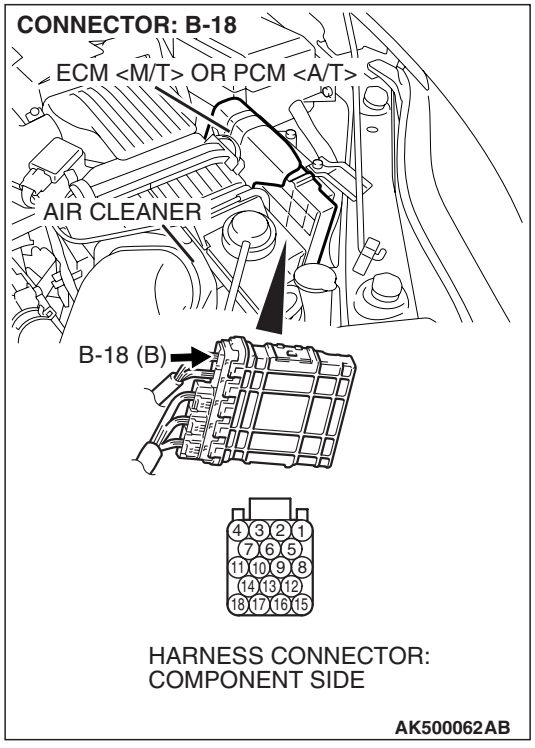
COMMENT

- No power supply to ECM <M/T> or PCM <A/T>.
- Defective ground circuit of ECM <M/T> or PCM <A/T>.
- Defective ECM <M/T> or PCM <A/T>.
- Improper communication line between ECM <M/T> or PCM <A/T> and scan tool.

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

- Malfunction of ECM <M/T> or PCM <A/T> power supply circuit.
- Malfunction of the ECM <M/T> or the PCM <A/T>.
- Open circuit between ECM <M/T> or PCM <A/T> and data link connector.

DIAGNOSIS



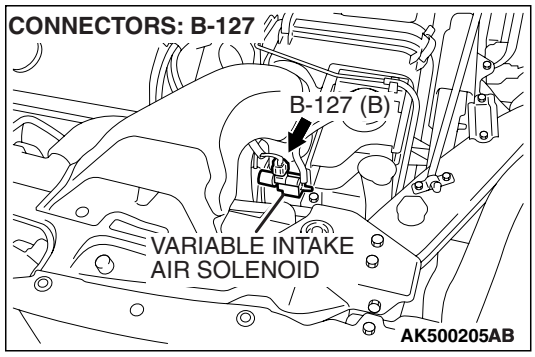
STEP 1. Check harness connector B-18 at ECM <M/T> or PCM <A/T> for damage.

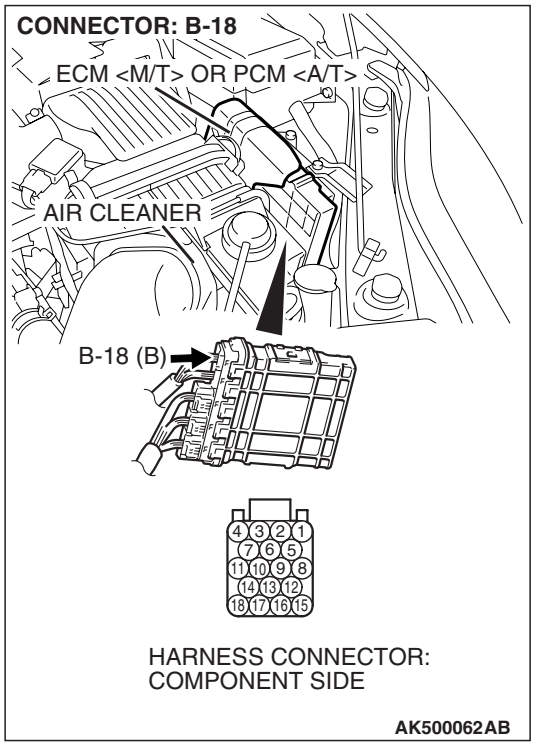
Q: Is the harness connector in good condition?

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.

STEP2. Check for open circuit, short circuit to ground and harness damage between data link connector C-125 (terminal No. 7) and ECM <M/T> or PCM <A/T> connector B-18 (terminal No. 15).





NOTE: Check harness after checking intermediate connectors C-21. If intermediate connector C-21 are damaged, repair or replace it. Refer 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 : Refer to INSPECTION PROCEDURE 28 –Power Supply System and Ignition Switch-IG System P.13B-1180.

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

INSPECTION PROCEDURE 3: The Malfunction Indicator Lamp (SERVICE ENGINE SOON or Check Engine Lamp) Does Not Illuminate Right after the Ignition Switch Is Turned to the "ON" Position.

COMMENT

- The combination meter causes the malfunction indicator lamp (SERVICE ENGINE SOON or Check Engine Lamp) to illuminate for 20 seconds immediately after the ignition switch is turned to the "ON" position occurred.

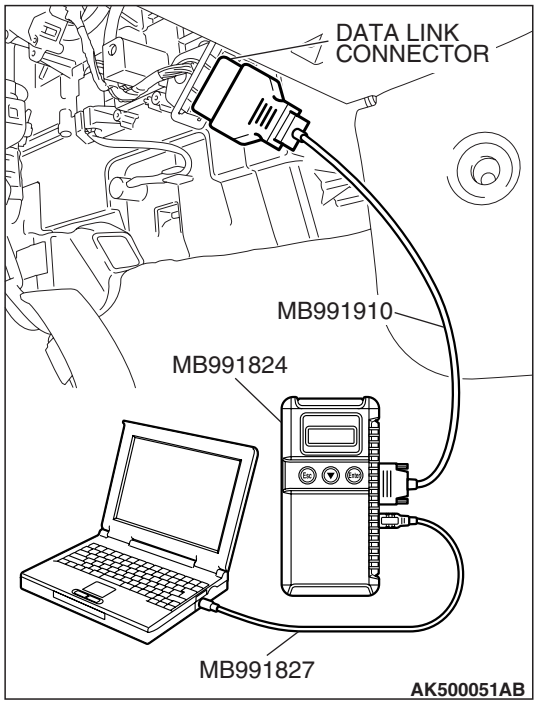
TROUBLESHOOTING HINTS (The most likely causes for this case:)

- Malfunction of the malfunction indicator lamp (SERVICE ENGINE SOON or Check Engine Lamp).
- Open or shorted malfunction indicator lamp (SERVICE ENGINE SOON or Check Engine Lamp) circuit.

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.
NO : Go to step 2.

STEP 2. Check the trouble symptoms.

(1) Turn the ignition switch to the "ON" position.
- The malfunction indicator lamp (SERVICE ENGINE SOON or Check Engine Lamp) should illuminate immediately after the ignition switch is turned to the "ON" position.

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

Q: Does the malfunction indicator lamp (SERVICE ENGINE SOON or Check Engine Lamp) illuminate?

YES : It can be assumed 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 : Replace the combination meter.

INSPECTION PROCEDURE 4: The Malfunction Indicator Lamp (SERVICE ENGINE SOON or Check Engine Lamp) Remains Illuminated and Never Goes Out.

COMMENT

- In cases such as the above, the cause is probably that the ECM <M/T> or the PCM <A/T> is detecting a problem in a sensor or actuator, or that one of the malfunctions listed below has probably occurred.

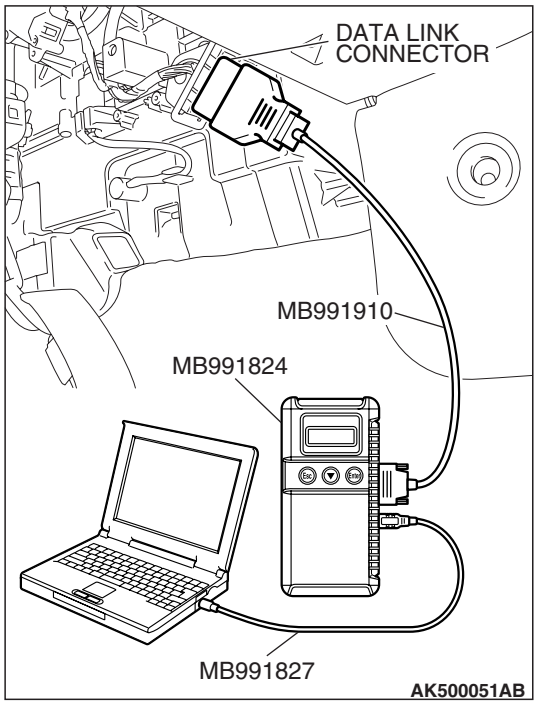
TROUBLESHOOTING HINTS (The most likely causes for this case:)

- Short in the malfunction indicator lamp (SERVICE ENGINE SOON or Check Engine Lamp) circuit.

DIAGNOSIS

Required Special Tools:

- 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 any DTC set?

YES : Refer to Diagnostic Trouble Code Chart P.13B-43.
NO : Go to Step. 2.

STEP 2. Check the trouble symptoms.

(1) Turn the ignition switch to the "ON" position.
- The malfunction indicator lamp (SERVICE ENGINE SOON or Check Engine Lamp) should go out when 20 seconds have passed after the ignition switch was turned to the "ON" position.

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

Q: Does the malfunction indicator lamp (SERVICE ENGINE SOON or Check Engine Lamp) go out?

YES : It can be assumed 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 : Replace the combination meter.

INSPECTION PROCEDURE 5: Cranks, Won't Start

Cranks, Won't Start Circuit

- Refer to Ignition circuit P.13B-1217.

CIRCUIT OPERATION

- Refer to Ignition circuit P.13B-1217.

COMMENT

- In cases such as the above, the cause is probably no spark, fuel delivery, or fuel quality problems. In addition, foreign materials (water, kerosene, etc.) may be mixed with the fuel.

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

- Malfunction of the ignition system.
- Malfunction of the fuel pump system.
- Malfunction of the injector system.
- Malfunction of the ECM <M/T> or the PCM <A/T>.
- Contaminated fuel.
- Malfunction of the immobilizer system.

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991910: Main Harness A
- MB991348: Test Harness Set

STEP 1. Measure the battery positive voltage.

(1) Measure the battery positive voltage during cranking.
- The voltage should be 8 volts or more.

Q: Is the measured voltage 8 volts or more?

YES : Go to Step 2.

NO : Check the battery. Refer to GROUP 54A, Battery – Battery Check P.54A-5. Then confirm that the malfunction symptom is eliminated.

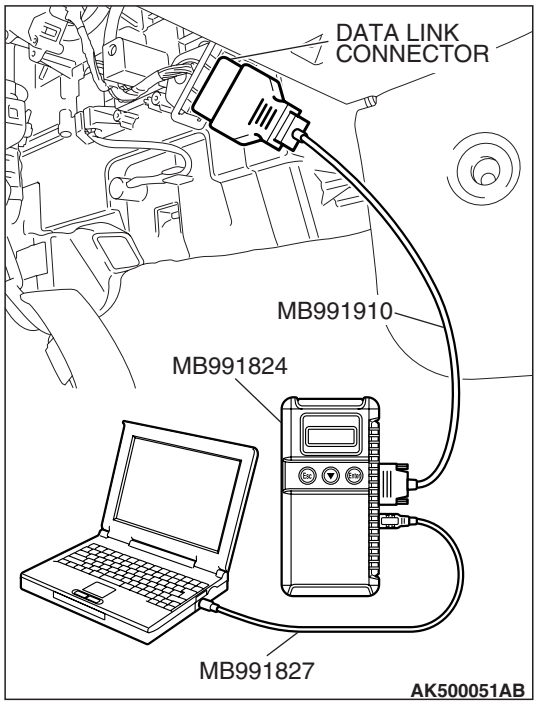
STEP 2. Check the timing belt for breaks.

Q: Is the timing belt in good condition?

YES : Go to Step 3.

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

STEP 3. Using scan tool MB991958, read the diagnostic trouble code (DTC).



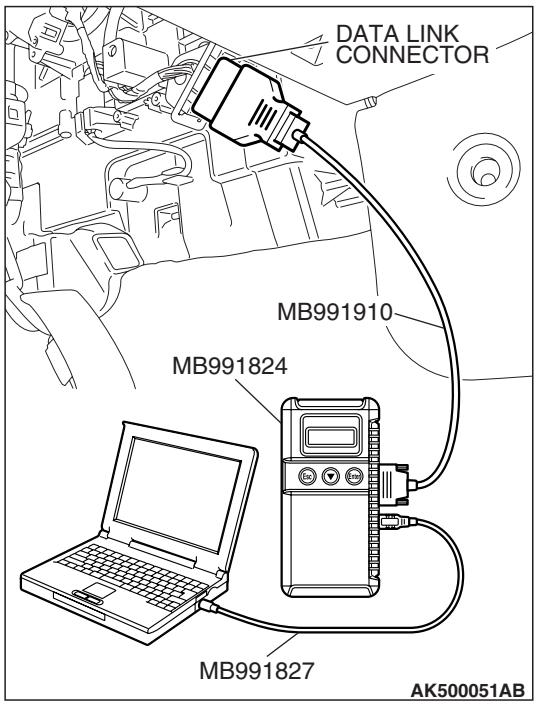
⚠ CAUTION
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(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-43.
NO : Go to Step 4.

STEP 4. Using scan tool MB991958, check data list.

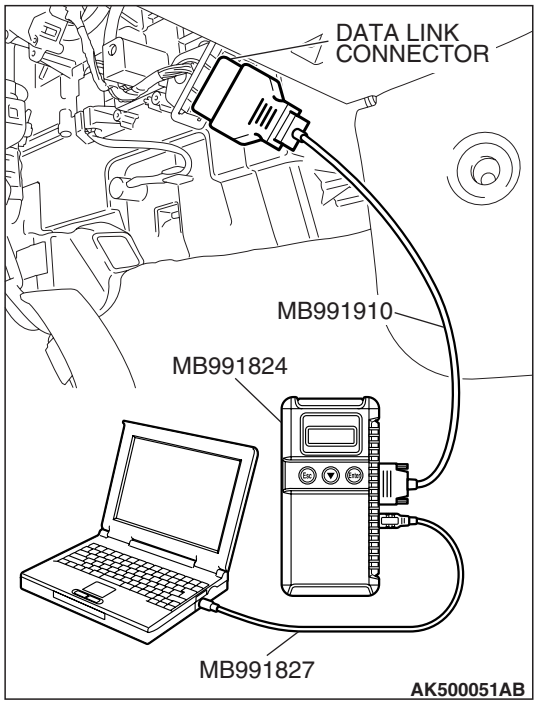


⚠ CAUTION
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(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-1230.
   a. Item 1: Power Supply Voltage.
   b. Item 2: Crankshaft Position Sensor.
   c. Item 6: Engine Coolant Temperature Sensor.
(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.

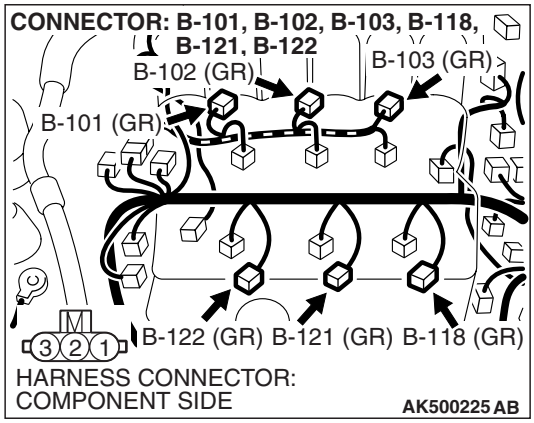


STEP 5. Using scan tool MB991958, check actuator test.

(1) Turn the ignition switch to the "ON" position.
(2) Check the following items in the actuator test. Refer to Actuator Test Reference Table P.13B-1251.
  a. Item 9: Fuel pump.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the actuator operating properly?

YES : Go to Step 6.
NO : Repair or replace it. Then confirm that the malfunction symptom is eliminated.



STEP 6. Check the ignition system.

(1) Connect the timing light to terminal No. 1 of the ignition coil connector B-101, B-102, B-103, B-118, B-121 or B-122 in order.
(2) Crank the engine.
  • The timing light flashes.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Does the timing light flash?

YES : Go to Step 7.
NO : Refer to INSPECTION PROCEDURE 32 –Ignition Circuit System P.13B-1217.

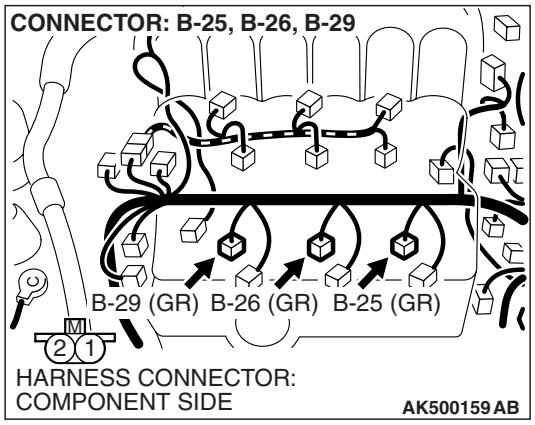
STEP 7. Check the ignition timing.

(1) Check the ignition timing at cranking.

Standard value: 5° BTDC ±3°

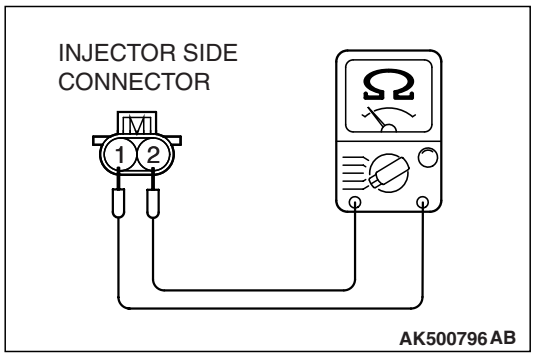
Q: Is the ignition timing normal?

YES : Go to Step 8.
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 8. Check the left bank injector.

(1) Disconnect the left bank injector connector B-25, B-26, B-29.



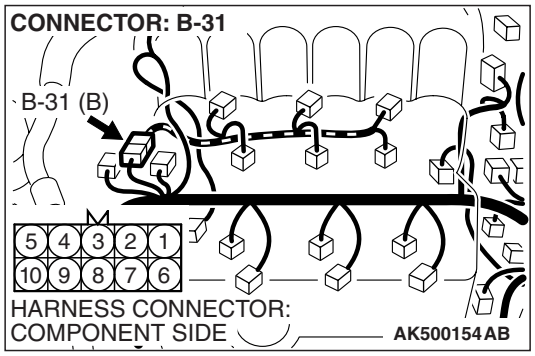
(2) Measure the resistance between each injector side connector terminal No. 1 and No. 2.

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

Q: Is the measured resistance between 10.5 and 13.5 ohms [at 20° C (68° F)]?

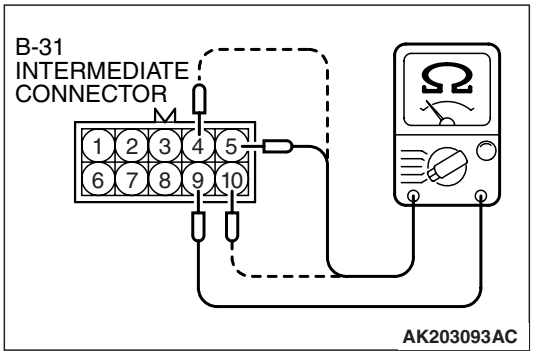
YES : Go to Step 9.

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



STEP 9. Check the right bank injector resistance at intermediate connector B-31.

(1) Disconnect the intermediate connector B-31.



(2) Measure the resistance between each male connector side terminal.

a. Measure the resistance between terminal No. 5 and No. 9 at No. 1 cylinder injector.

b. Measure the resistance between terminal No. 9 and No. 10 at No. 3 cylinder injector.

c. Measure the resistance between terminal No. 4 and No. 9 at No. 5 cylinder injector.

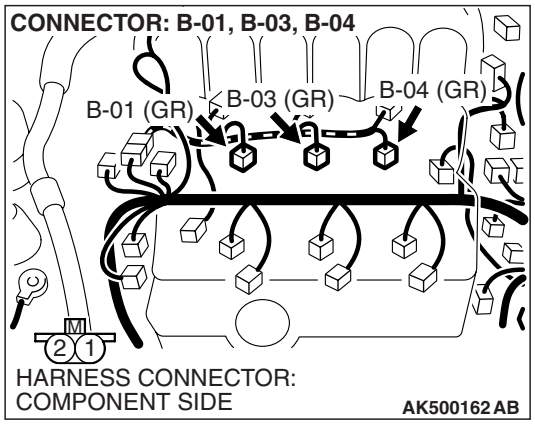
- Resistance should be between 10.5 and 13.5 ohms [at 20° C (68° F)].

Q: Is the measured resistance between 10.5 and 13.5 ohms [at 20° C (68° F)]?

YES : Go to Step 12.

NO : Go to Step 10.

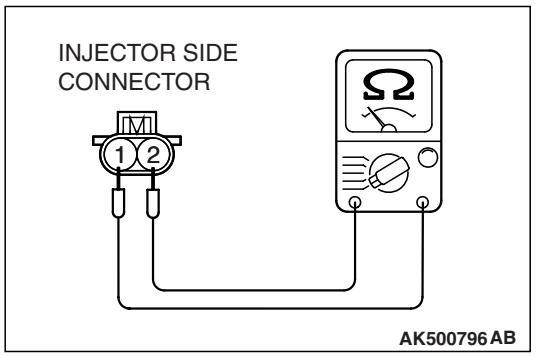
TSB Revision



STEP 10. Check the right bank injector.

(1) Remove the intake manifold.

(2) Disconnect the right bank injector connector, which deviates from the standard value at Step 9.



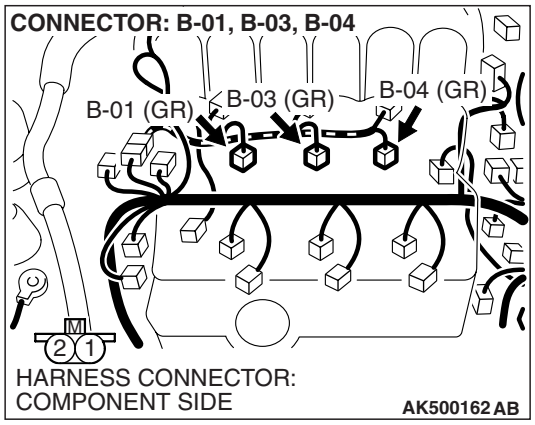
(3) Measure the resistance between injector side connector terminal No. 1 and No. 2.

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

Q: Is the measured resistance between 10.5 and 13.5 ohms [at 20° C (68° F)]?

YES : Go to Step 11.

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



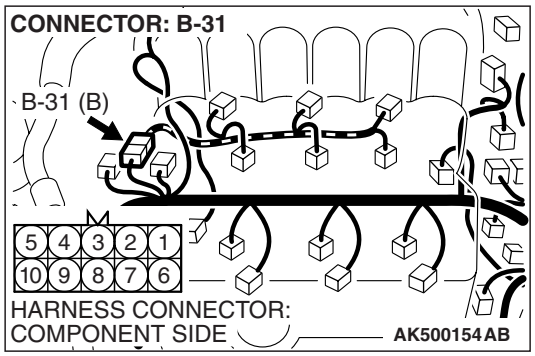
STEP 11. Check harness connector B-01 or B-03 or B-04 at right bank injector for damage.

(1) Check the injector connector, which deviates from the standard value at Step 9.

Q: Is the harness connector in good condition?

YES : Repair harness wire between injector intermediate connector and right bank injector connector because of harness damage. Then confirm that the malfunction symptom is eliminated.

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

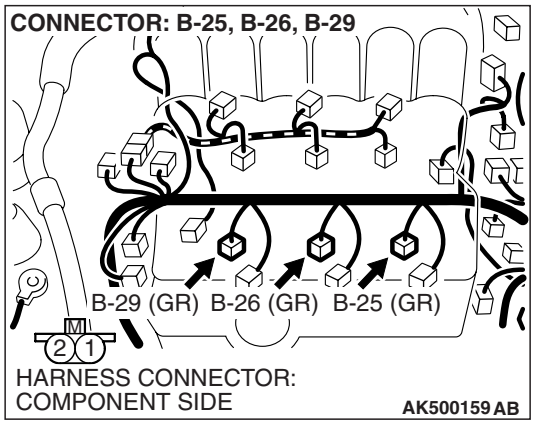


STEP 12. Check harness connector B-31 at intermediate connector for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 13.

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

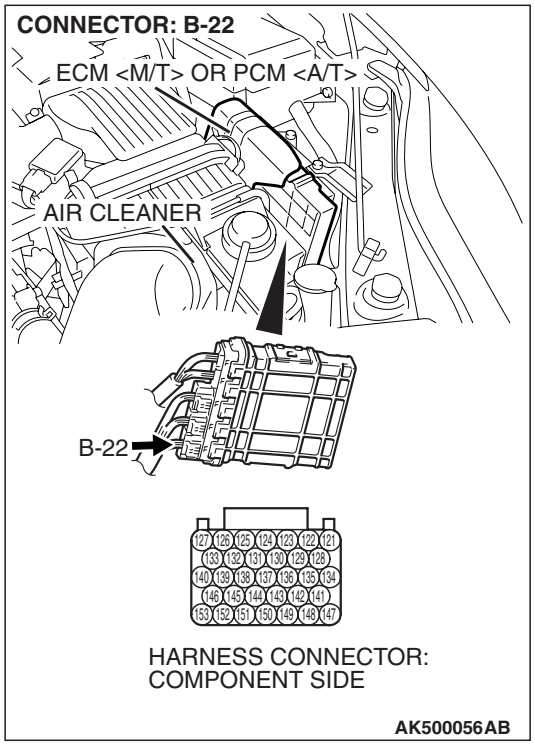


STEP 13. Check harness connector B-25, B-26, B-29 at left bank injector for damage.

Q: Is the harness 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.

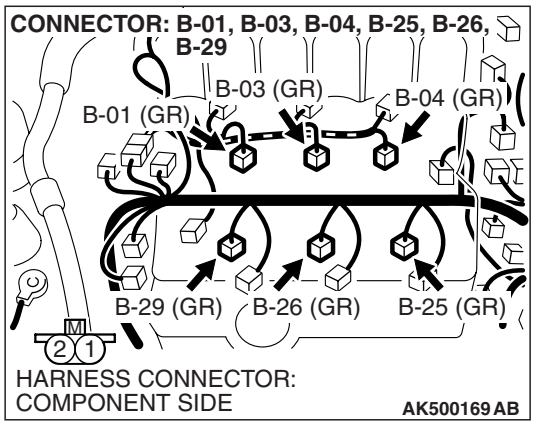


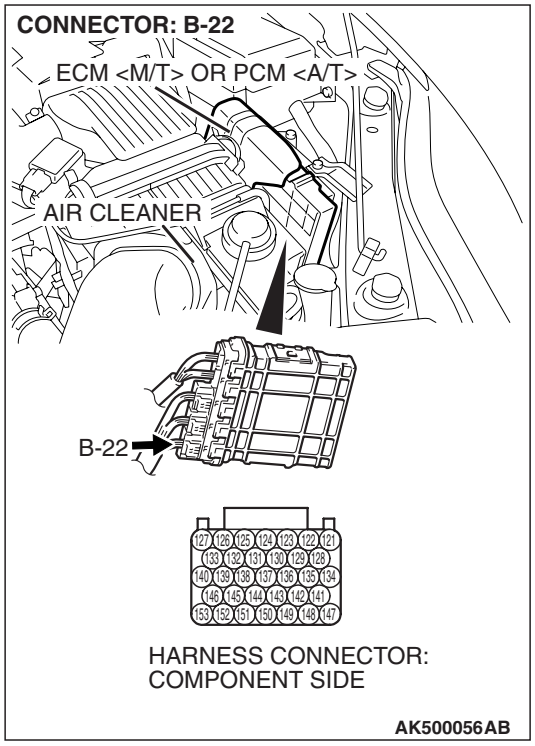
STEP 14. Check harness connector B-22 at ECM <M/T> or PCM <A/T> for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 15.

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





STEP 15. Check for harness damage between injector connector and ECM <M/T> or PCM <A/T> connector.

a. Check the harness wire between injector connector B-01 (terminal No. 2) and ECM <M/T> or PCM <A/T> connector B-22 (terminal No. 153) at No. 1 cylinder injector.
b. Check the harness wire between injector connector B-29 (terminal No. 2) and ECM <M/T> or PCM <A/T> connector B-22 (terminal No. 146) at No. 2 cylinder injector.
c. Check the harness wire between injector connector B-03 (terminal No. 2) and ECM <M/T> or PCM <A/T> connector B-22 (terminal No. 140) at No. 3 cylinder injector.
d. Check the harness wire between injector connector B-26 (terminal No. 2) and ECM <M/T> or PCM <A/T> connector B-22 (terminal No. 139) at No. 4 cylinder injector.
e. Check the harness wire between injector connector B-04 (terminal No. 2) and ECM <M/T> or PCM <A/T> connector B-22 (terminal No. 133) at No. 5 cylinder injector.
f. Check the harness wire between injector connector B-25 (terminal No. 2) and ECM <M/T> or PCM <A/T> connector B-22 (terminal No. 127) at No. 6 cylinder injector.

Q: Is the harness wire in good condition?

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 if fuel is contaminated.
  d. Check compression.

  Then confirm that the malfunction symptom is eliminated.

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

INSPECTION PROCEDURE 6: Starts Up and Dies.

COMMENT

- In such cases as the above, the cause is usually improper air/fuel mixture. It is possible, though less likely, that the spark plugs are generating sparks but the sparks are weak.

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

- Malfunction of the ignition system.
- Malfunction of the injector system.
- Contaminated fuel.
- Poor compression.
- Dirtiness around throttle valve.
- Malfunction of the ECM <M/T> or the PCM <A/T>.

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 fuse No. 23 (junction block).

Check the fuse No. 23 (junction block).

Q: Is the fuse No. 23 (junction block) normal?

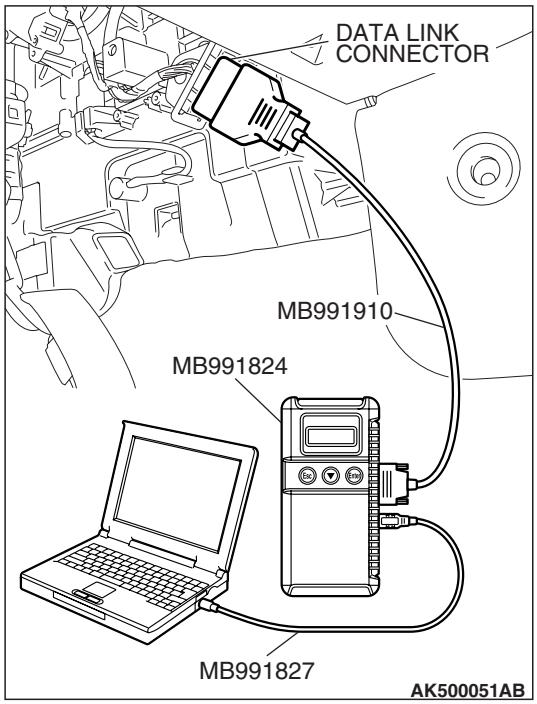
YES : Go to Step 2.
NO : Repair the fuse No. 23 (junction block).

STEP 2. Measure the battery positive voltage.

(1) Measure the battery positive voltage during cranking.
- The voltage should be 8 volts or more.

Q: Does the voltage remain greater than 8 volts while the engine is cranked?

YES : Go to Step 3.
NO : Refer to GROUP 54A, Battery –Battery Check P.54A-5.



STEP 3. Using scan tool MB991958, read the diagnostic trouble code (DTC).

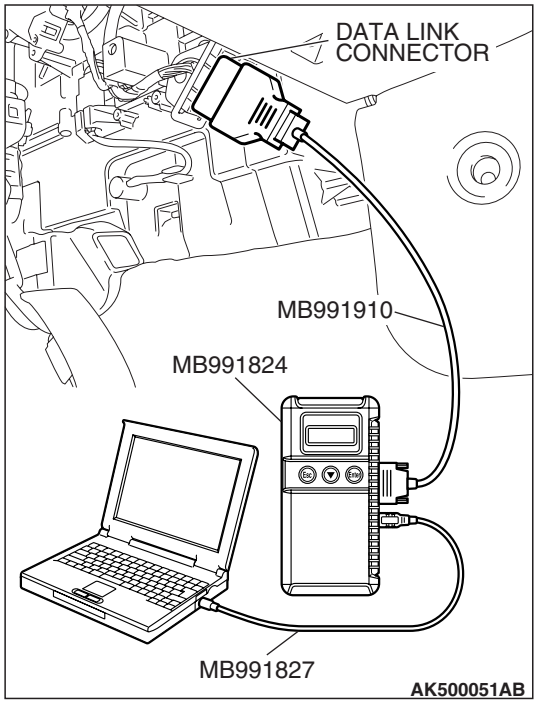
⚠ CAUTION

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 any DTC set?

YES : Refer to Diagnostic Trouble Code Chart P.13B-43.
NO : Go to Step 4.

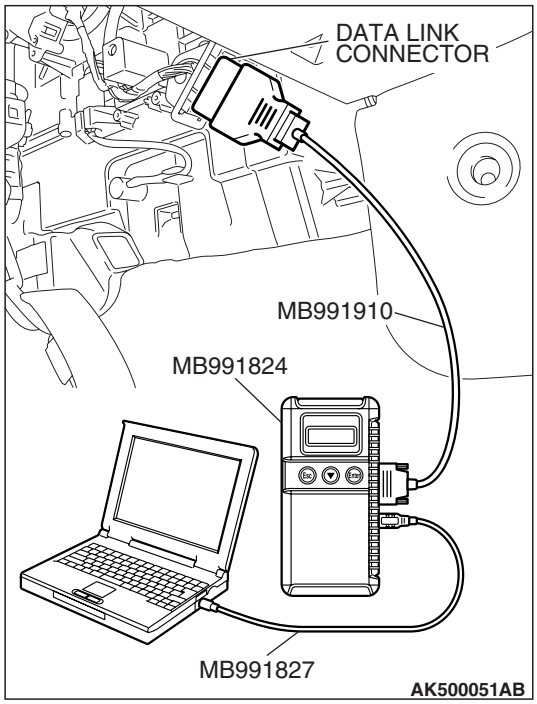


STEP 4. Using scan tool MB991958, check actuator test.

(1) Turn the ignition switch to the "ON" position.
(2) Check the following items in the actuator test. Refer to Actuator Test Reference Table P.13B-1251.
  a. Item 9: Fuel Pump.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the actuator 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 in the data list. Refer to Data List Reference Table P.13B-1230.
  a. Item 6: Engine Coolant Temperature Sensor.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the sensor operating properly?

YES : Go to Step 6.
NO : Repair or replace it. Then confirm that the malfunction symptom is eliminated.

STEP 6. Inspection of throttle body (throttle valve area) for dirtiness.

Q: Is the throttle valve area dirty?

YES : Refer to On-vehicle Service –Throttle Body (Throttle Valve Area) Cleaning. P.13B-1280.
NO : Go to Step 7.

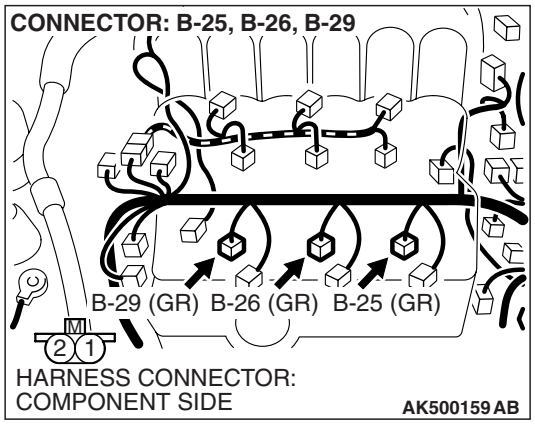
STEP 7. Check the ignition timing.

(1) Check the ignition timing at cranking.

Standard value: 5° BTDC ±3°

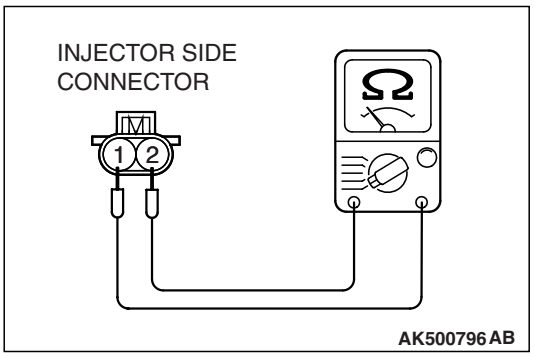
Q: Is the ignition timing normal?

YES : Go to Step 8.
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 8. Check the left bank injector.

(1) Disconnect the left bank injector connector B-25, B-26, B-29.



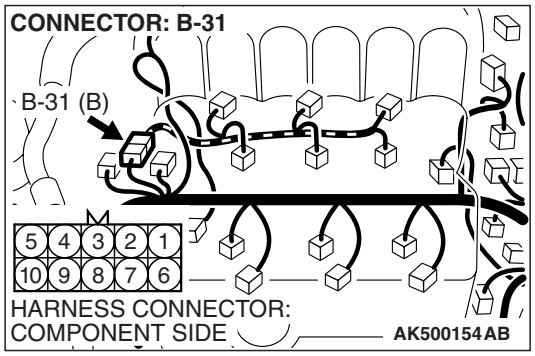
(2) Measure the resistance between each injector side connector terminal No. 1 and No. 2.

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

Q: Is the measured resistance between 10.5 and 13.5 ohms [at 20° C (68° F)]?

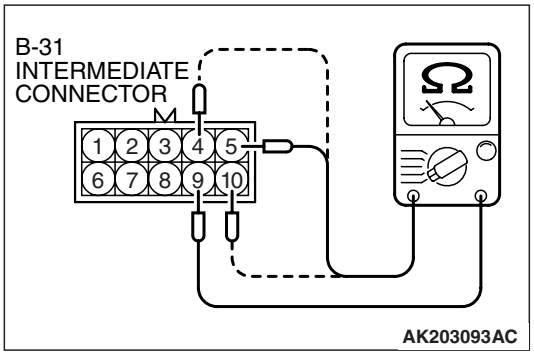
YES : Go to Step 9.

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



STEP 9. Check the right bank injector resistance at intermediate connector B-31.

(1) Disconnect the intermediate connector B-31.



(2) Measure the resistance between each male connector side terminal.

a. Measure the resistance between terminal No. 9 and No. 5 at No. 1 cylinder injector.

b. Measure the resistance between terminal No. 9 and No. 10 at No. 3 cylinder injector.

c. Measure the resistance between terminal No. 9 and No. 4 at No. 5 cylinder injector.

- Resistance should be between 10.5 and 13.5 ohms [at 20° C (68° F)].

Q: Is the measured resistance between 10.5 and 13.5 ohms [at 20° C (68° F)]?

YES : Go to Step 12.

NO : Go to Step 10.

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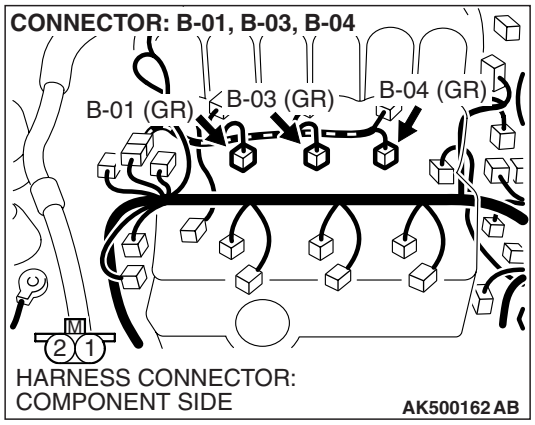
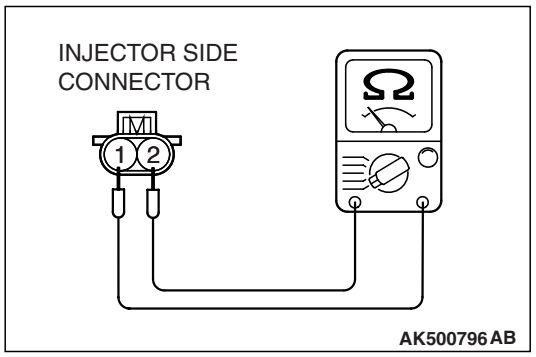


STEP 10. Check the right bank injector.

(1) Remove the intake manifold.

(2) Disconnect the right bank injector connector, which deviates from the standard value at Step 9.



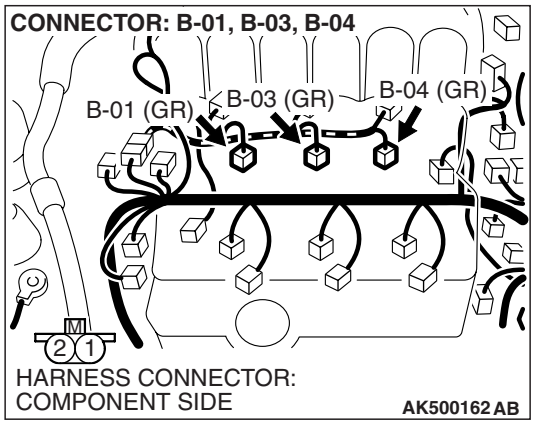
(3) Measure the resistance between injector side connector terminal No. 1 and No. 2.

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

Q: Is the measured resistance between 10.5 and 13.5 ohms [at 20° C (68° F)]?

YES : Go to Step 11.

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



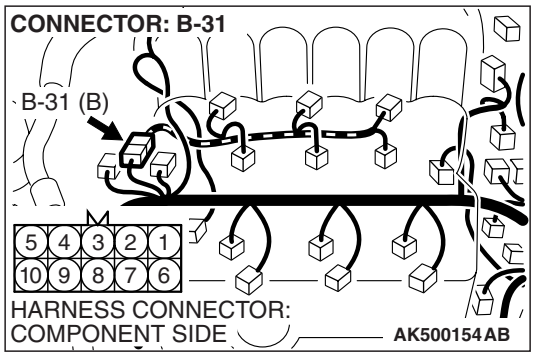
STEP 11. Check harness connector B-01 or B-03 or B-04 at right bank injector for damage.

(1) Check the injector connector, which deviates from the standard value at Step 9.

Q: Is the harness connector in good condition?

YES : Repair harness wire between injector intermediate connector and right bank injector connector because of harness damage. Then confirm that the malfunction symptom is eliminated.

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

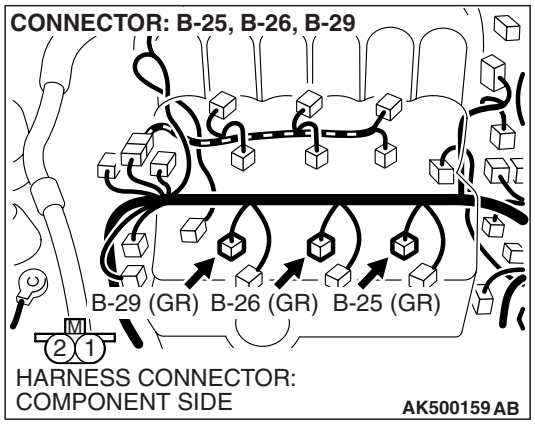


STEP 12. Check harness connector B-31 at intermediate connector for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 13.

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

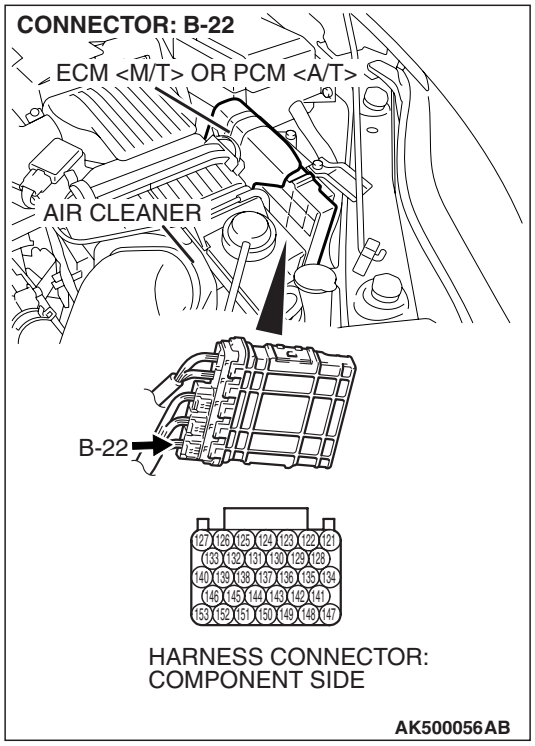


STEP 13. Check harness connector B-25, B-26, B-29 at left bank injector for damage.

Q: Is the harness 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.

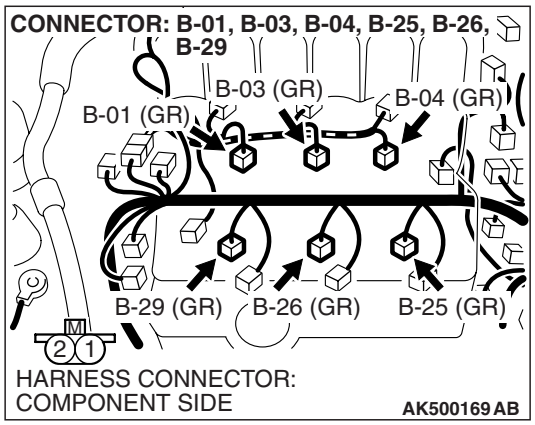


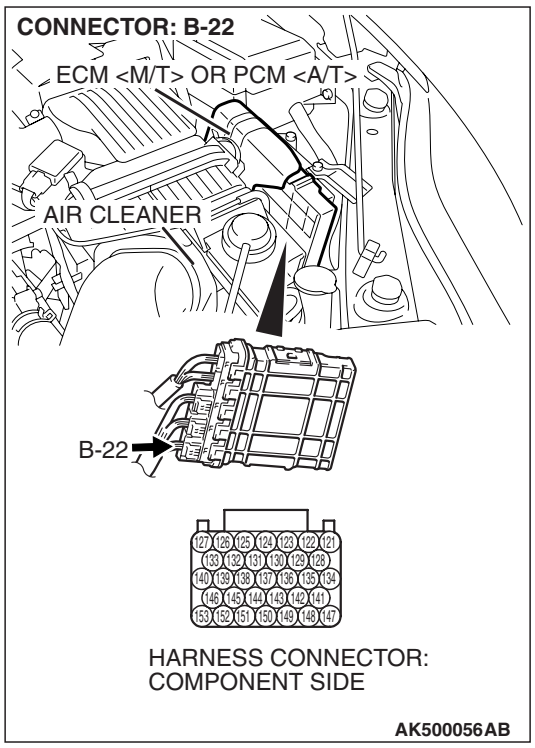
STEP 14. Check harness connector B-22 at ECM <M/T> or PCM <A/T> for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 15.

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





STEP 15. Check for harness damage between injector connector and ECM <M/T> or PCM <A/T> connector.

a. Check the harness wire between injector connector B-01 (terminal No. 2) and ECM <M/T> or PCM <A/T> connector B-22 (terminal No. 153) at No. 1 cylinder injector.
b. Check the harness wire between injector connector B-29 (terminal No. 2) and ECM <M/T> or PCM <A/T> connector B-22 (terminal No. 146) at No. 2 cylinder injector.
c. Check the harness wire between injector connector B-03 (terminal No. 2) and ECM <M/T> or PCM <A/T> connector B-22 (terminal No. 140) at No. 3 cylinder injector.
d. Check the harness wire between injector connector B-26 (terminal No. 2) and ECM <M/T> or PCM <A/T> connector B-22 (terminal No. 139) at No. 4 cylinder injector.
e. Check the harness wire between injector connector B-04 (terminal No. 2) and ECM <M/T> or PCM <A/T> connector B-22 (terminal No. 133) at No. 5 cylinder injector.
f. Check the harness wire between injector connector B-25 (terminal No. 2) and ECM <M/T> or PCM <A/T> connector B-22 (terminal No. 127) at No. 6 cylinder injector.

Q: Is the harness wire in good condition?

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 fuel lines for clogging.
e. Check if the foreign materials (water, kerosene, etc.) got into fuel.
f. Check the EGR valve.

Then confirm that the malfunction symptom is eliminated.

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

INSPECTION PROCEDURE 7: Hard Starting

COMMENT

- In cases such as the above, the cause is usually either weak spark, improper air-fuel mixture or low compression.

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

- Malfunction of the ignition system.
- Malfunction of the injector system.
- Poor fuel quality. (Contamination)
- Poor compression.
- Dirtiness around throttle valve.
- Malfunction of the EGR 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. Measure the battery positive voltage.

(1) Measure the battery positive voltage during cranking.
- The voltage is 8 volts or more.

Q: Does the voltage remain greater than 8 volts while the engine is cranked?

YES : Go to Step 2.
NO : Refer to GROUP 54A, Battery –Battery check P.54A-5.

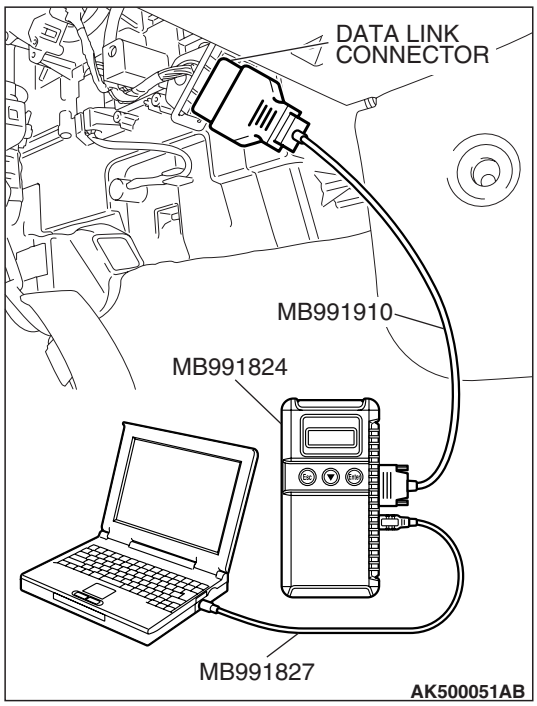
STEP 2. Using scan tool MB991958, read the diagnostic trouble code (DTC).

⚠ 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 the "LOCK" (OFF) position.

Q: Is any DTC set?

YES : Refer to Diagnostic Trouble Code Chart P.13B-43.
NO : Go to Step 3.



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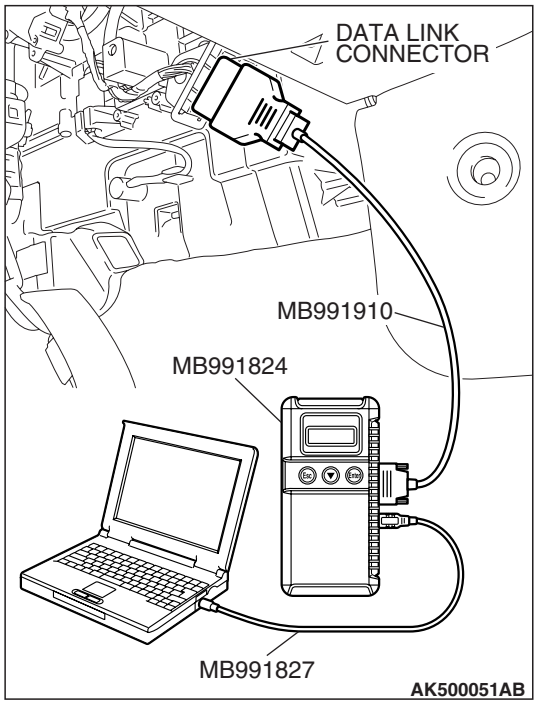
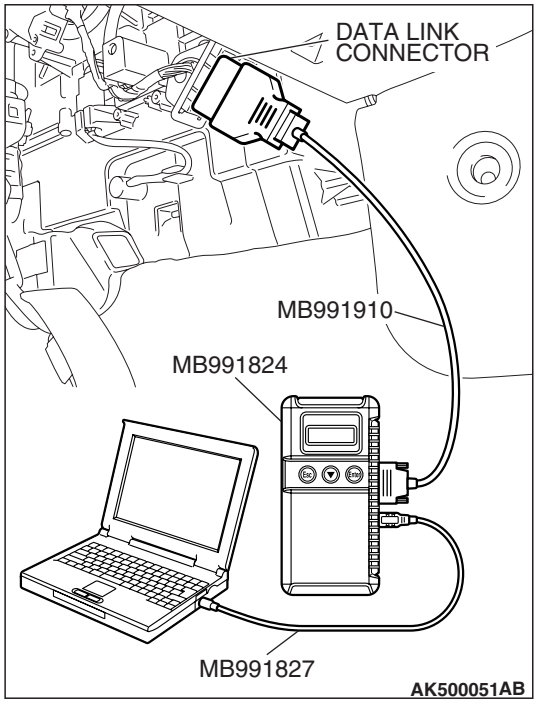


STEP 3. Using scan tool MB991958, check actuator test.

(1) Turn the ignition switch to the "ON" position.
(2) Check the following items in the actuator test. Refer to Actuator Test Reference Table P.13B-1251.
   a. Item 9: Fuel Pump.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the actuator operating properly?

YES : Go to Step 4.
NO : Repair or Replace. Then confirm that the malfunction symptom is eliminated.



STEP 4. Using scan tool MB991958, check data list.

(1) Turn the ignition switch the "ON" position.
(2) Check the following items in the data list. Refer to Data List Reference Table P.13B-1230.
   a. Item 6: Engine Coolant Temperature Sensor.
(3) Turn the ignition switch the "LOCK" (OFF) position.

Q: Is the sensor operating properly?

YES : Go to Step 5.
NO : Repair or Replace. Then confirm that the malfunction symptom is eliminated.

STEP 5. 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-1280.
NO : Go to Step 6.

TSB Revision

STEP 6. Check the ignition timing.

(1) Check the ignition timing at cranking.

Standard value: 5° BTDC ±3°

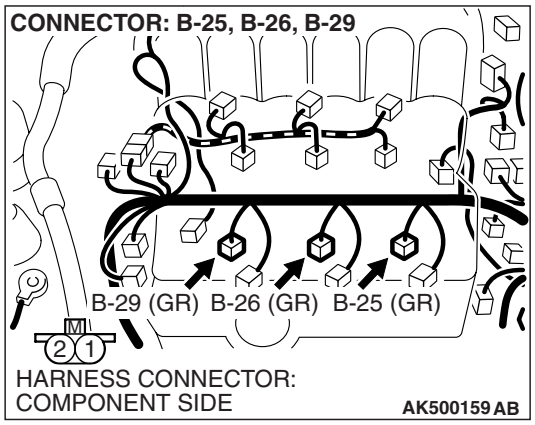
Q: Is the ignition timing normal?

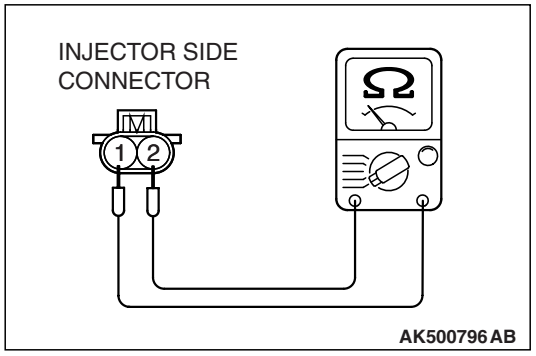
YES : Go to Step 7.

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 7. Check the left bank injector.

(1) Disconnect the left bank injector connector B-25, B-26, B-29.





(2) Measure the resistance between each injector side connector terminal No. 1 and No. 2.

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

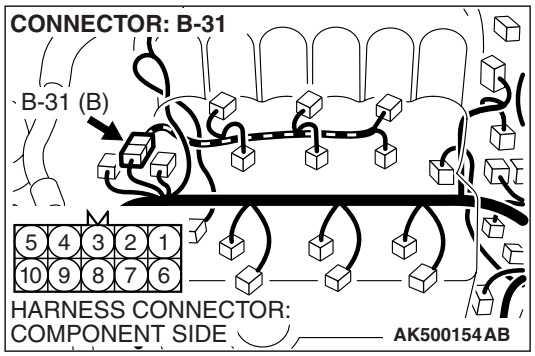
Q: Is the measured resistance between 10.5 and 13.5 ohms [at 20° C (68° F)]?

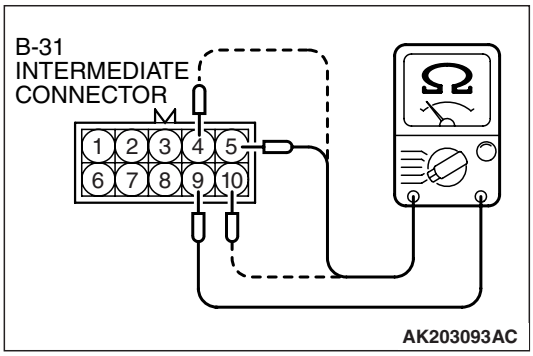
YES : Go to Step 8.

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

STEP 8. Check the right bank injector resistance at intermediate connector B-31.

(1) Disconnect the intermediate connector B-31.





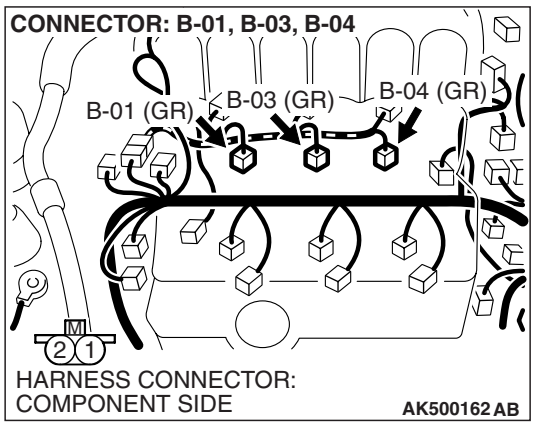
(2) Measure the resistance between each male connector side terminal.
   a. Measure the resistance between terminal No. 9 and No. 5 at No. 1 cylinder injector.
   b. Measure the resistance between terminal No. 9 and No. 10 at No. 3 cylinder injector.
   c. Measure the resistance between terminal No. 9 and No. 4 at No. 5 cylinder injector.
   - Resistance should be between 10.5 and 13.5 ohms [at 20° C (68° F)].

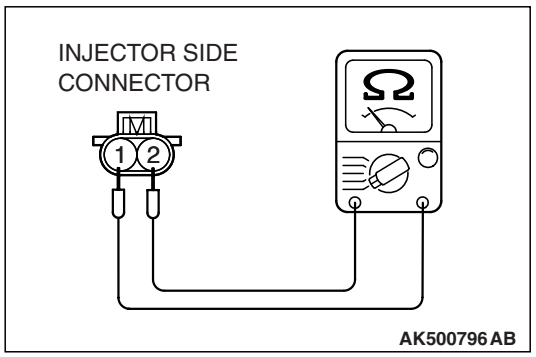
Q: Is the measured resistance between 10.5 and 13.5 ohms [at 20° C (68° F)]?

YES : Go to Step 11.
NO : Go to Step 9.

STEP 9. Check the right bank injector.

(1) Remove the intake manifold.
(2) Disconnect the right bank injector connector, which deviates from the standard value at Step 8.





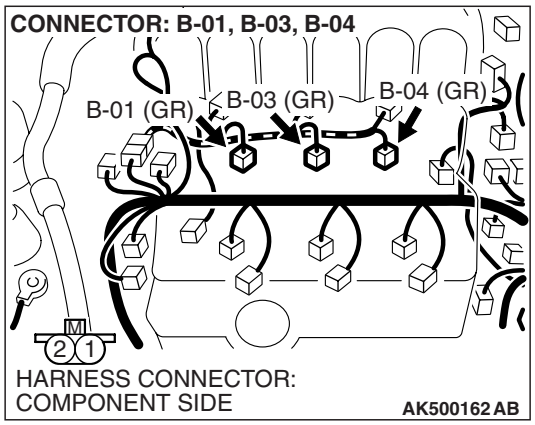
(3) Measure the resistance between injector side connector terminal No. 1 and No. 2.

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

Q: Is the measured resistance between 10.5 and 13.5 ohms [at 20° C (68° F)]?

YES : Go to Step 10.
NO : Replace the injector. Then confirm that the malfunction symptom is eliminated.

TSB Revision



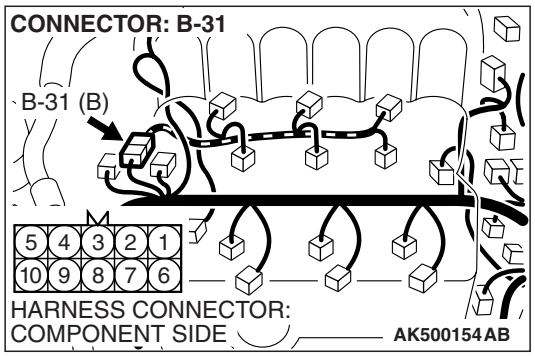
STEP 10. Check harness connector B-01 or B-03 or B-04 at right bank injector for damage.

(1) Check the injector connector, which deviated from the standard value listed in Step 8.

Q: Is the harness connector in good condition?

YES : Repair harness wire between injector intermediate connector and right bank injector connector because of harness damage. Then confirm that the malfunction symptom is eliminated.

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

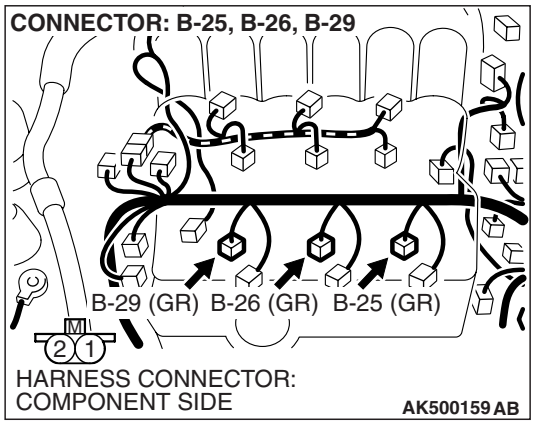


STEP 11. Check harness connector B-31 at the intermediate connector for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 12.

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

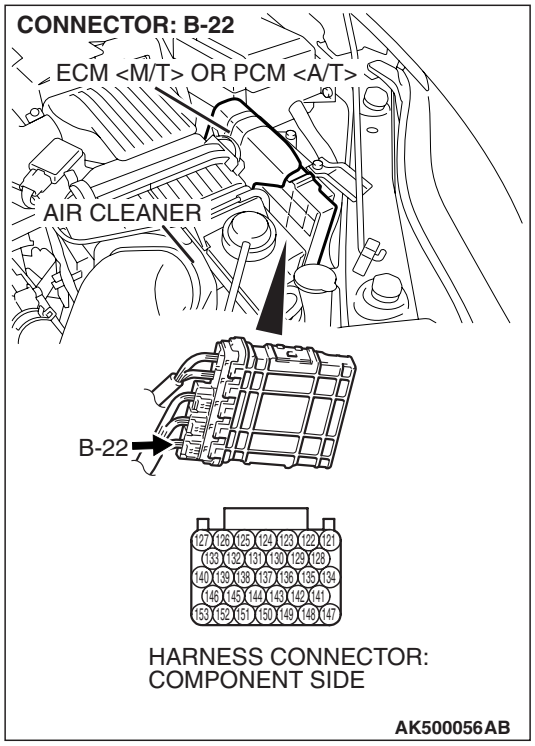


STEP 12. Check harness connector B-25, B-26, B-29 at the left bank injector for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 13.

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

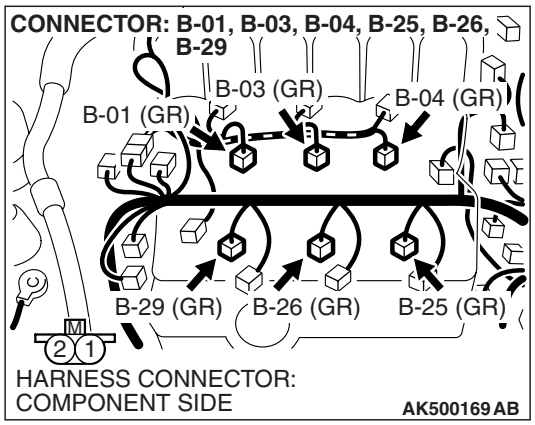


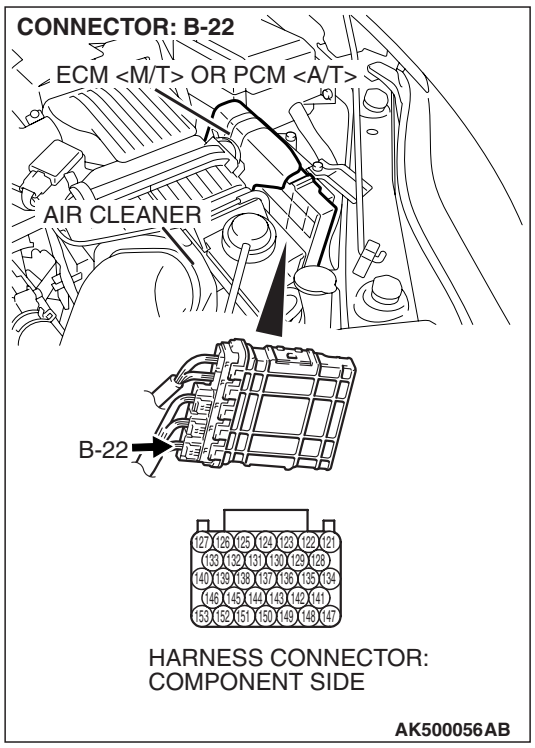
STEP 13. Check the harness connector B-22 at the ECM <M/T> or PCM <A/T> for damage.

Q: Is the harness 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. Check for harness damage between injector connector and ECM <M/T> or PCM <A/T> connector.

a. Check the harness wire between injector connector B-01 (terminal No. 2) and ECM <M/T> or PCM <A/T> connector B-22 (terminal No. 153) at No. 1 cylinder injector.
b. Check the harness wire between injector connector B-29 (terminal No. 2) and ECM <M/T> or PCM <A/T> connector B-22 (terminal No. 146) at No. 2 cylinder injector.
c. Check the harness wire between injector connector B-03 (terminal No. 2) and ECM <M/T> or PCM <A/T> connector B-22 (terminal No. 140) at No. 3 cylinder injector.
d. Check the harness wire between injector connector B-26 (terminal No. 2) and ECM <M/T> or PCM <A/T> connector B-22 (terminal No. 139) at No. 4 cylinder injector.
e. Check the harness wire between injector connector B-04 (terminal No. 2) and ECM <M/T> or PCM <A/T> connector B-22 (terminal No. 133) at No. 5 cylinder injector.
f. Check the harness wire between injector connector B-25 (terminal No. 2) and ECM <M/T> or PCM <A/T> connector B-22 (terminal No. 127) at No. 6 cylinder injector.

Q: Is the harness wire in good condition?

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 the compression pressure.
d. Check if the foreign materials (water, kerosene, etc.) got into fuel.

Then confirm that the malfunction symptom is eliminated.

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

INSPECTION PROCEDURE 8: Unstable Idle (rough idle, hunting).

COMMENT

- In cases such as the above, the cause is probably the air/fuel mixture or electronic control throttle valve system. Other systems affecting idle quality include the ignition system and compression.

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 evaporative emission purge solenoid system.
- Malfunction of the EGR valve.
- Poor compression pressure.
- Vacuum leak.

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

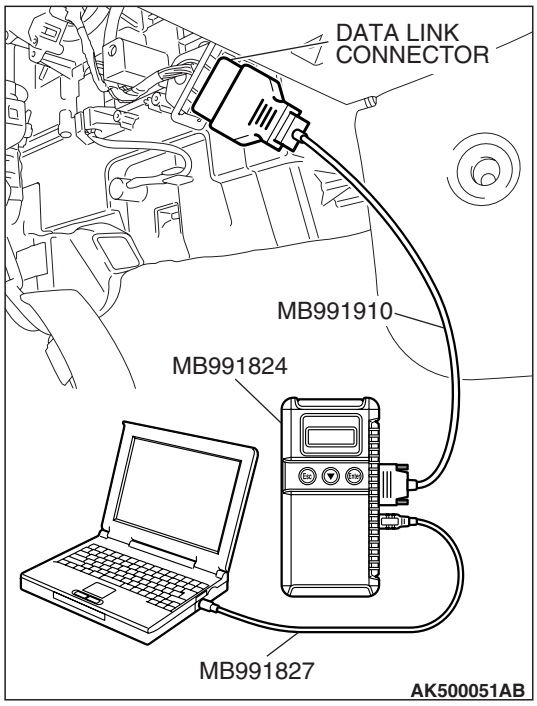
To prevent damage to scan tool MB991958, always turn the ignition switch is to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(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 any DTC set?

YES : Refer to Diagnostic Trouble Code Chart P.13B-43.

NO : Go to Step 3.



STEP 3. Check the engine idling state.

Q: Is it noticeably hunting?

YES : Go to Step 4.
NO : Go to Step 5.

STEP 4. Check the following items.

(1) Carry out the following cleaning.
  a. Refer to On-vehicle Service –Clean the throttle valve area P.13B-1280.
(2) After cleaning, confirm that the malfunction symptom is eliminated.

Q: Is the malfunction symptom resolved?

YES : The check is completed.
NO : Check the following items, and repair or replace the defective items.
  a. Broken intake manifold gasket.
  b. Broken air intake hose.
  c. Broken vacuum hose.
  d. Positive crankcase ventilation valve does not operate.

Then confirm that the malfunction symptom is eliminated.

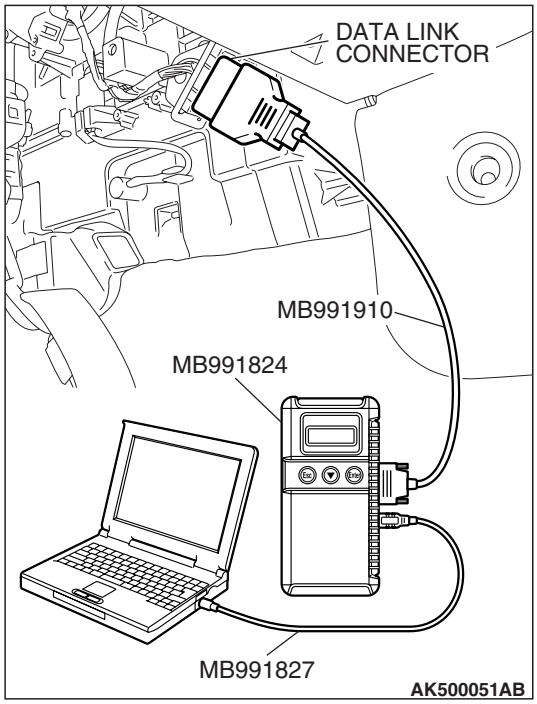
STEP 5. Using scan tool MB991958, check actuator test items 1, 2, 3, 4, 5, 6: Injector.

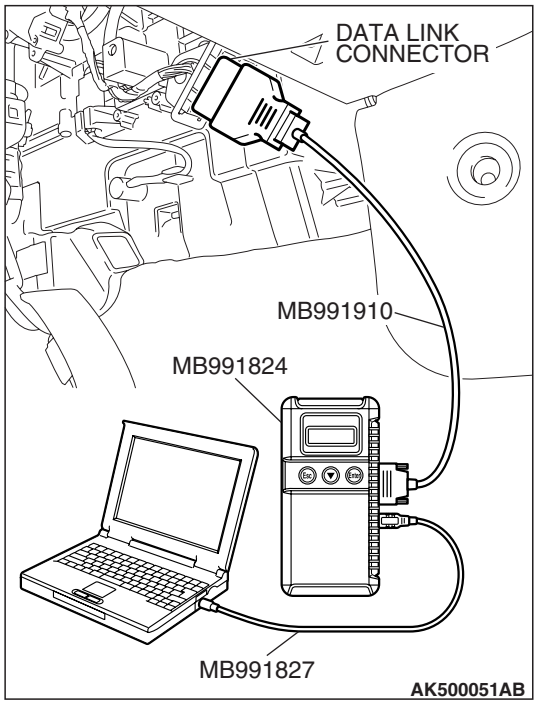
⚠ CAUTION
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(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-1251.
  a. Item 1, 2, 3, 4, 5, 6: 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 P0201P.13B-474, P0202P.13B-486, P0203P.13B-497, DTC P0204P.13B-509, P0205P.13B-520, P0206P.13B-532 –Injector Circuit.



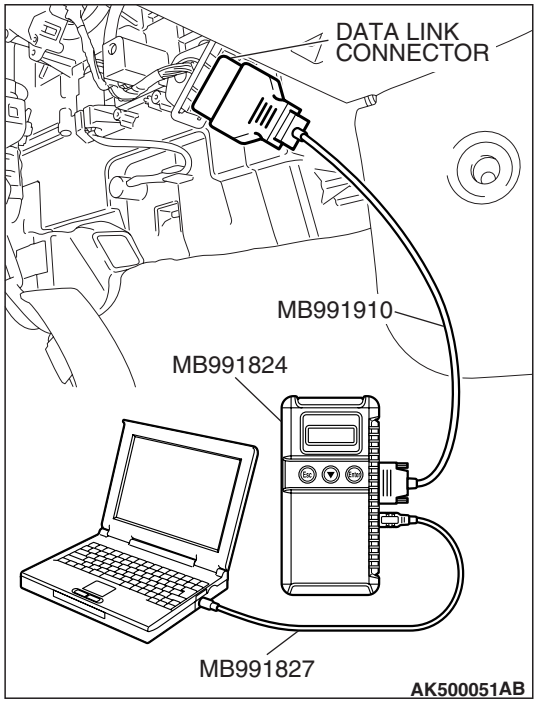


STEP 6. Using scan tool MB991958, check data list.

(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-1230.
   a. Item 5: Intake Air Temperature Sensor.
   b. Item 6: Engine Coolant Temperature Sensor.
   c. Item 83: Power Steering Pressure Switch.
(3) 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 actuator test.

(1) Turn the ignition switch to the "ON" position.
(2) Check the following items in the actuator test. Refer to Actuator Test Reference Table P.13B-1251.
   a. Item 10: Evaporative Emission Purge Solenoid.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the actuator operating properly?

YES : Go to Step 8.
NO : Repair or replace it. Then confirm that the malfunction symptom is eliminated.

STEP 8. Check the fuel pressure.
Refer to On-vehicle Service –Fuel Pressure Test P.13B-1280.

Q: Is the fuel pressure normal?

YES : a. Check the following items, and repair or replace the defective items.
- 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 11C, On-vehicle Service –Ignition Timing Check P.11C-14.

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 the purge control system.
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 belt cover are in the correct position. Then confirm that the malfunction symptom is eliminated.

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).

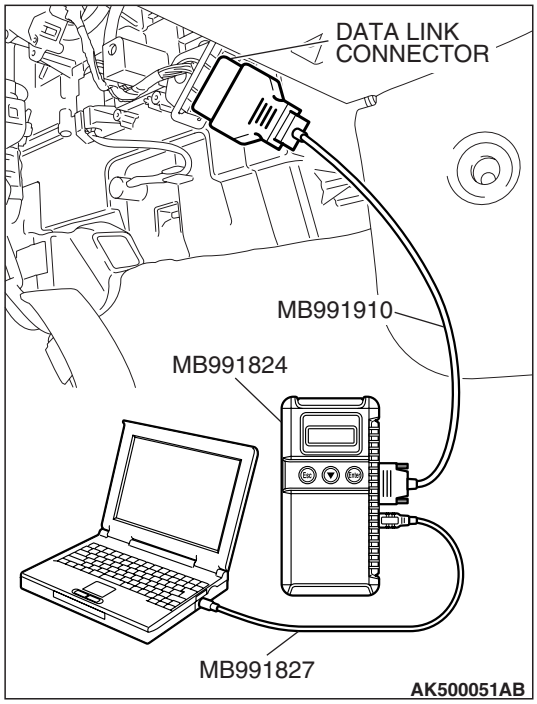
⚠ CAUTION

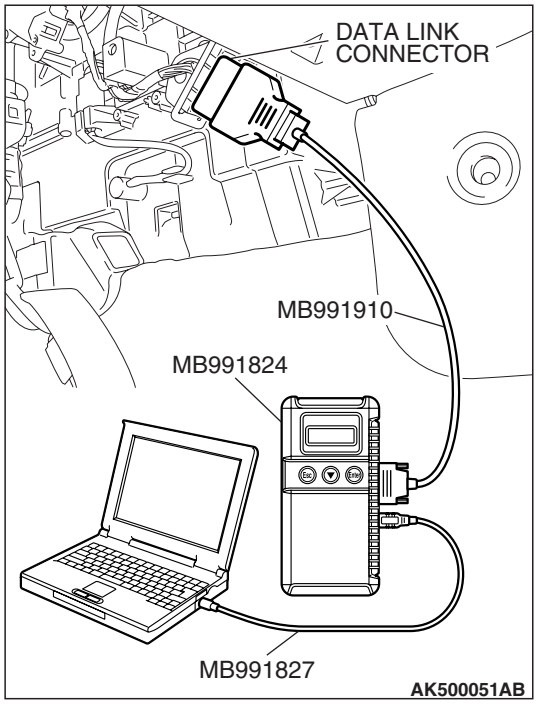
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(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 any DTC set?

YES : Refer to Diagnostic Trouble Code Chart P.13B-43.
NO : Go to Step 2.





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

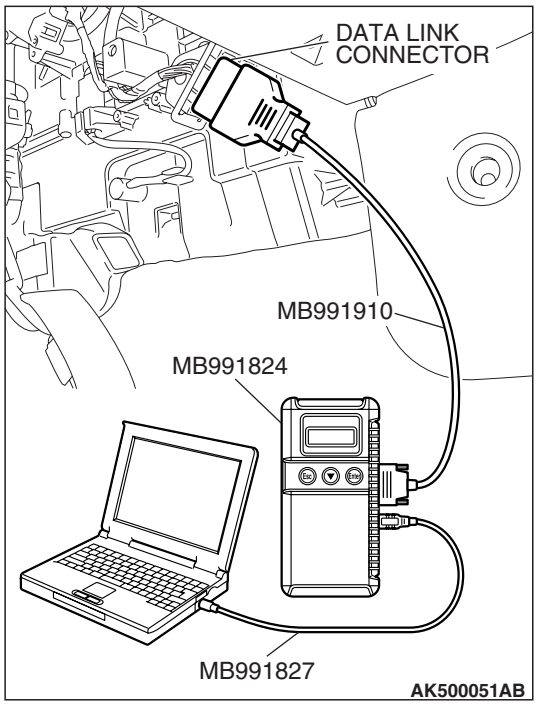
⚠ CAUTION

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-1230.
  a. Item 6: Engine Coolant Temperature Sensor.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the sensor operating properly?

YES : Go to Step 3.
NO : Repair or replace it. Then confirm that the malfunction symptom is eliminated.



STEP 3. Using 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-1251.
  a. Item 10: Evaporative Emission Purge Solenoid.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the actuator operating properly?

YES : Refer to On-vehicle Service –Throttle Body (Throttle Valve Area) Cleaning. P.13B-1280.
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.

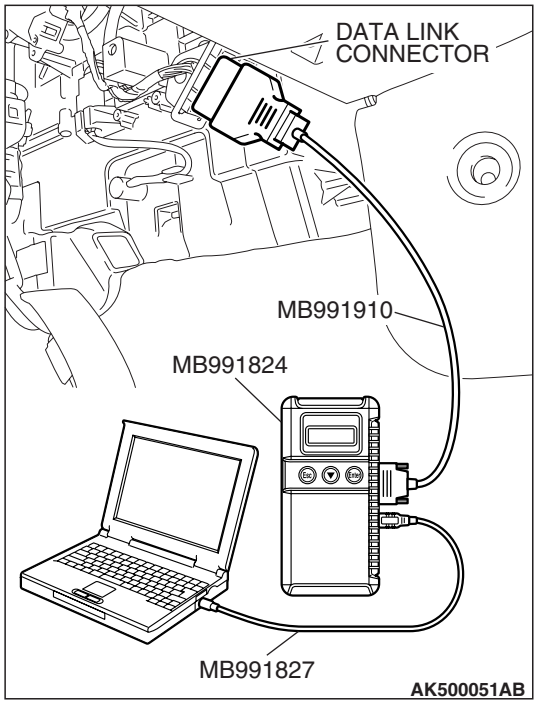
TROUBLESHOOTING HINTS (The most likely causes for this case:)

- 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).

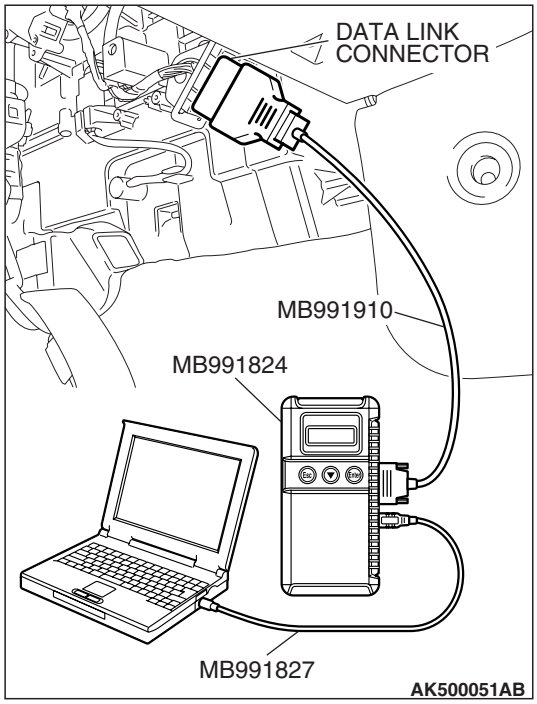
⚠ CAUTION

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 any DTC set?

YES : Refer to Diagnostic Trouble Code Chart P.13B-43.
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-1230.
  a. Item 6: Engine Coolant Temperature Sensor.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the sensor operating properly?

YES : Refer to On-vehicle Service –Clean the throttle valve area P.13B-1280.
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

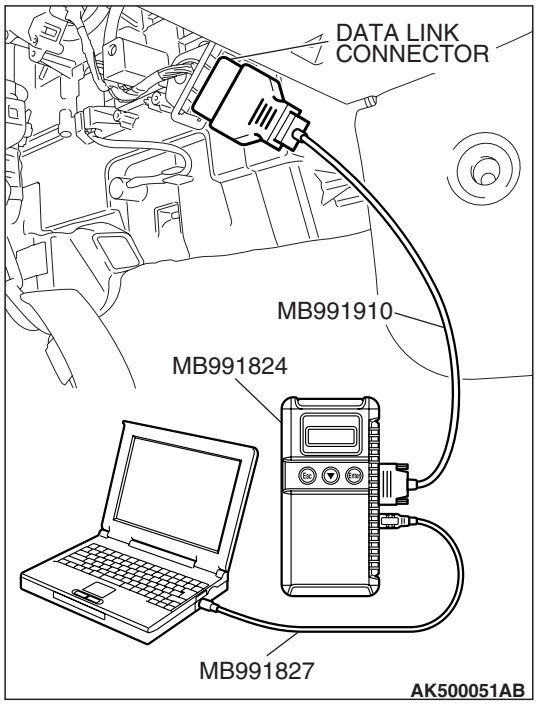
Required Special Tools:

- 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 any DTC set?

YES : Refer to Diagnostic Trouble Code Chart P.13B-43.
NO : Go to Step 3.

STEP 3. Checking by operating the accelerator pedal.

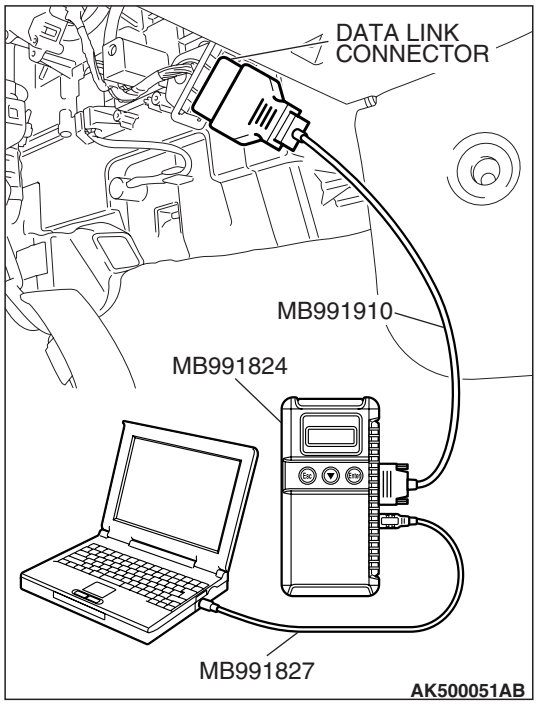
Q: Does the engine stall right after the accelerator pedal is released?

YES : Refer to GROUP13B, On-vehicle Service –Throttle Body (Throttle Valve Area) Cleaning. P.13B-1280.
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-1117.



STEP 5. Using scan tool MB991958, check actuator test items 1, 2, 3, 4, 5, 6: Injector.

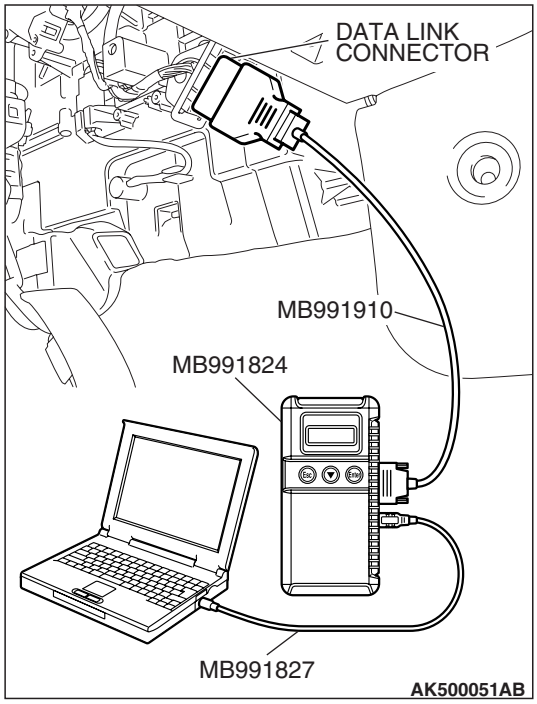
⚠ CAUTION

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-1251.
  a. Item 1, 2, 3, 4, 5, 6: 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 P0201P.13B-474, P0202P.13B-486, P0203P.13B-497, DTC P0204P.13B-509, P0205P.13B-520, P0206P.13B-532 –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-1230.
  a. Item 6: 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-1280.

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 11C, On-vehicle Service –Ignition Timing Check P.11C-14.

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

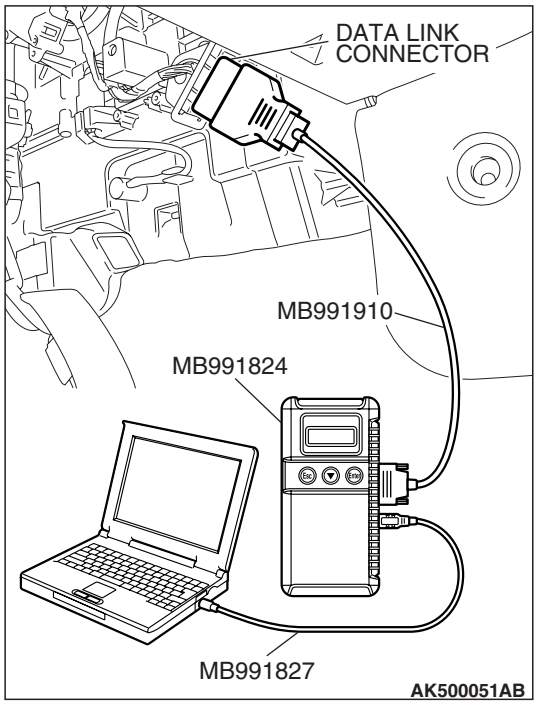
Required Special Tools:

- 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.



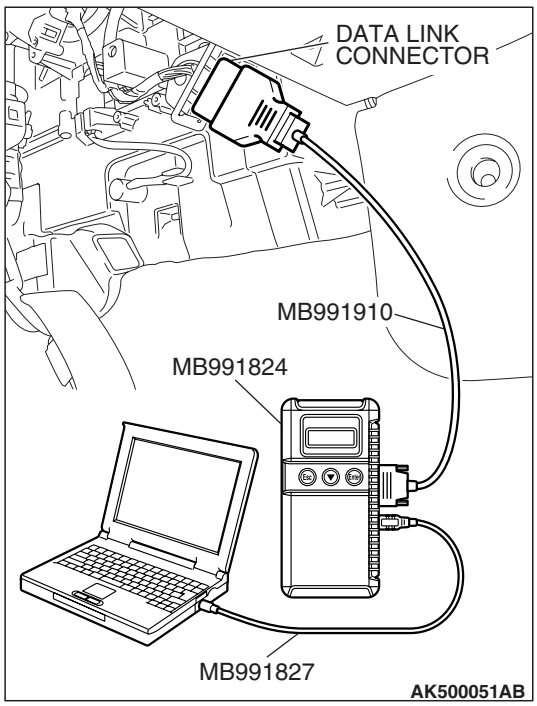
STEP 2. Using scan tool MB991958, read the diagnostic trouble code (DTC).

⚠ 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 any DTC set?

YES : Refer to Diagnostic Trouble Code Chart P.13B-43.
NO : Go to Step 3.



STEP 3. Using scan tool MB991958, check actuator test items 1, 2, 3, 4, 5, 6: 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-1251.
  a. Item 1, 2, 3, 4, 5, 6: 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 P0201P.13B-474, P0202P.13B-486, P0203P.13B-497, DTC P0204P.13B-509, P0205P.13B-520, P0206P.13B-532 –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-1280.

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. ECM or 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

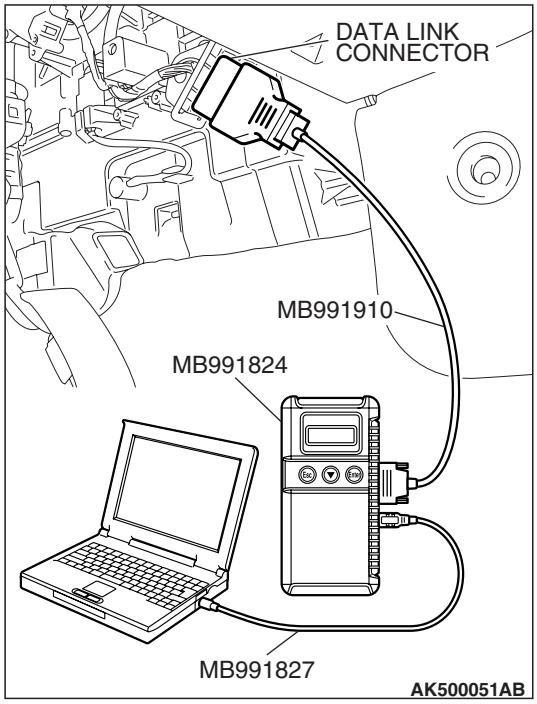
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

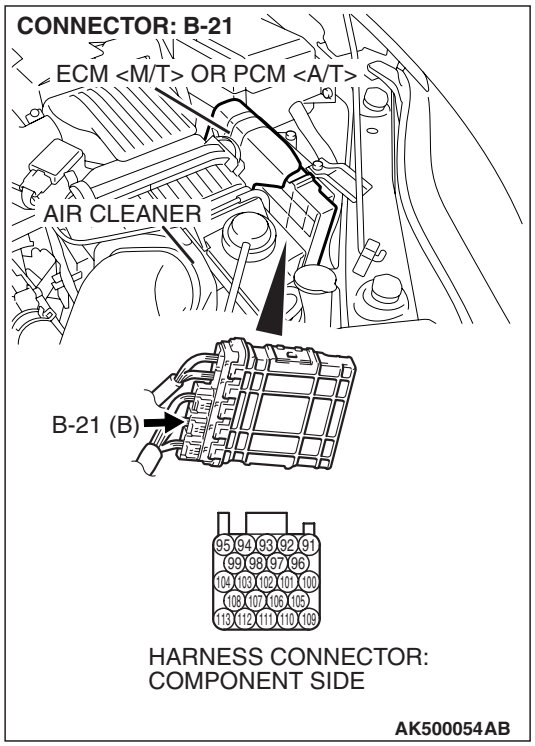
(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Check the following items in the data list. Refer to Data List Reference Table P.13B-1230.
   a. Item 5: Intake Air Temperature Sensor.
   b. Item 6: Engine Coolant Temperature Sensor.
   c. Item 83: Power Steering Pressure Switch.
   d. Item 31: EGR valve (stepper motor).
   e. Item 13: Throttle position sensor (main).
(4) Turn the ignition switch to the "LOCK" (OFF) position.

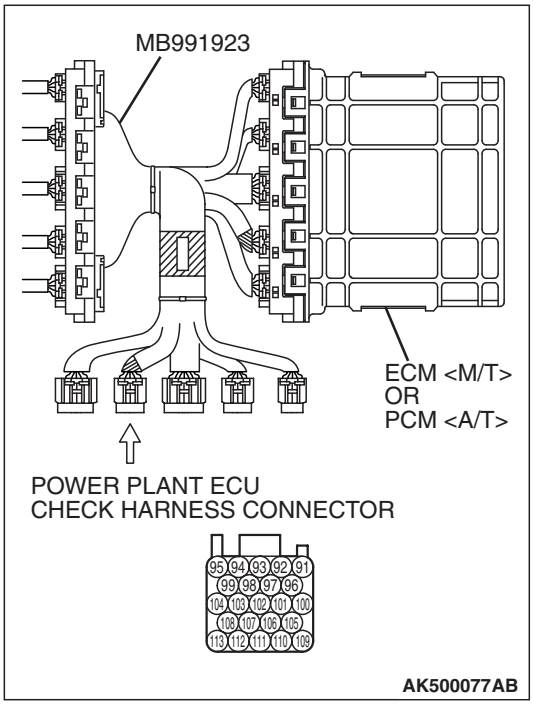
Q: Are they operating properly?

YES : Go to Step 7.

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

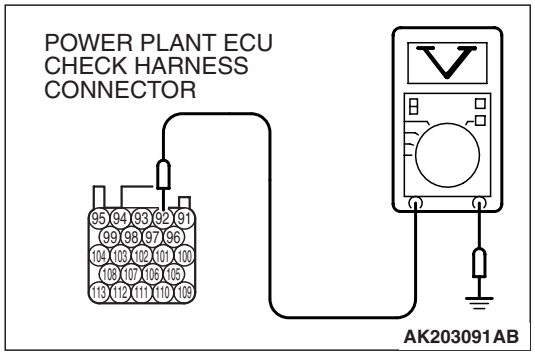




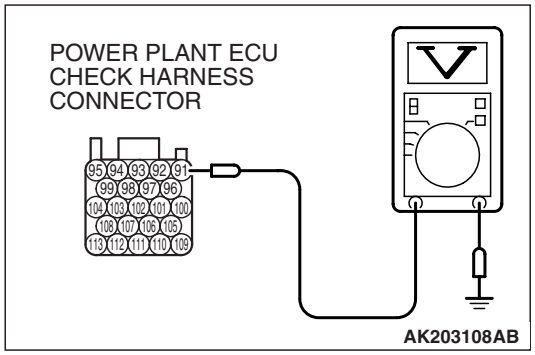


STEP 7. Measure the sensor output voltage at ECM <M/T> or PCM <A/T> connector B-21 by using power plant ECU check harness special tool MB991923.

(1) Disconnect all ECM <M/T> connectors or PCU <A/T> connectors. Connect the power plant ECU check harness special tool MB991923 between the separated connectors.
(2) Start the engine and run at idle.



(3) Measure the voltage between terminal No. 92 and ground.
- Warming up the engine. When the engine is 2,500 r/min, the output voltage should repeat 0.5 to 1.4 volts alternately.



(4) Measure the voltage between terminal No. 91 and ground.
- Warming up the engine. When the engine is 2,500 r/min, the output voltage should repeat 0.5 to 1.4 volts alternately.

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

Q: Is the measured voltage within the specified range?

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-1280.

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 11C, On-vehicle Service –Ignition Timing Check P.11C-14.

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.

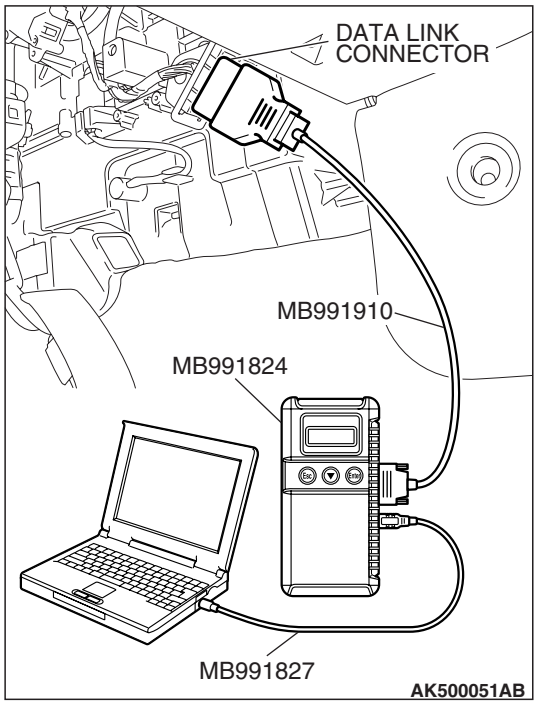
TROUBLESHOOTING HINTS (The most likely causes for this case:)

- 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).

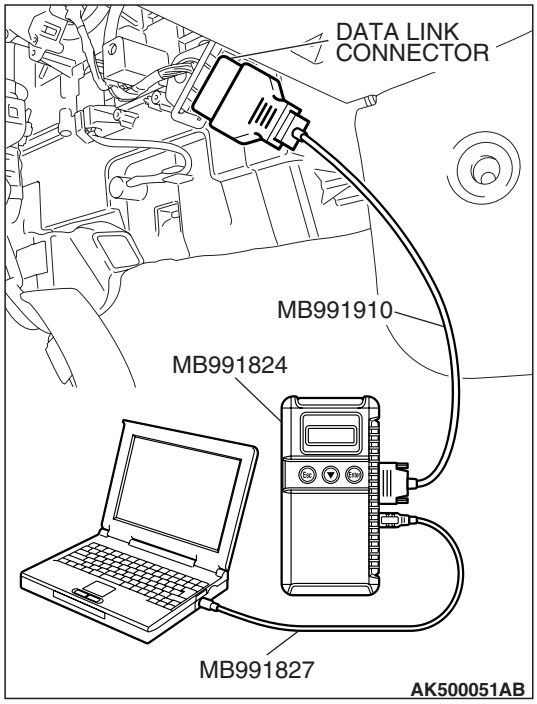
⚠ CAUTION

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 any DTC set?

YES : Refer to Diagnostic Trouble Code Chart P.13B-43.
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-1251.
   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 defect in 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

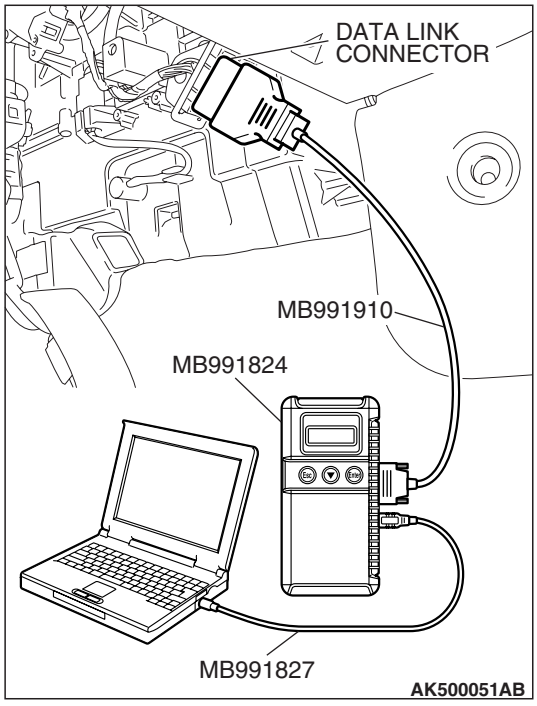
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

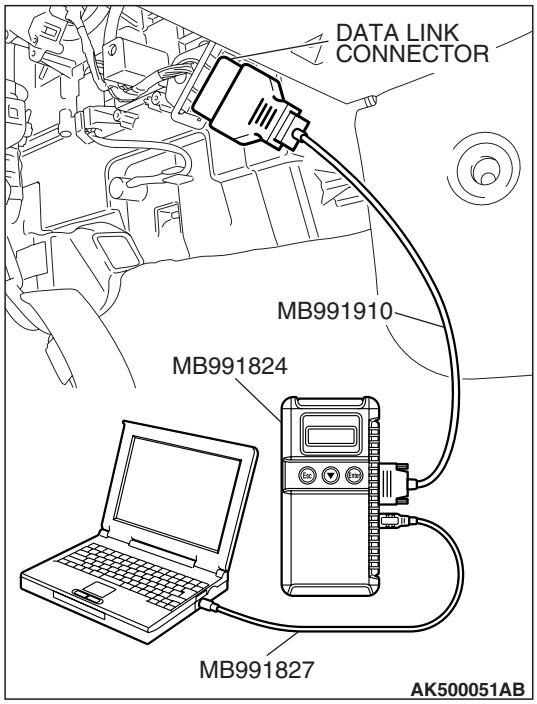
(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Read the DTC.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is any DTC set?

YES : Refer to Diagnostic Trouble Code Chart P.13B-43.

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-1230.
   a. Item 13: Throttle Position Sensor (main).
   b. Item 15: Throttle Position Sensor (sub).
   c. Item 11: Accelerator Pedal Position Sensor (main).
   d. Item 12: Accelerator Pedal Position Sensor (sub).
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Are they operating properly?

YES : Go to Step 4.
NO : Repair or replace it. Then confirm that the malfunction symptom is eliminated.

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

Q: Is the throttle valve area dirty?

YES : Refer to On-vehicle Service –Clean the throttle valve area P.13B-1280.
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).

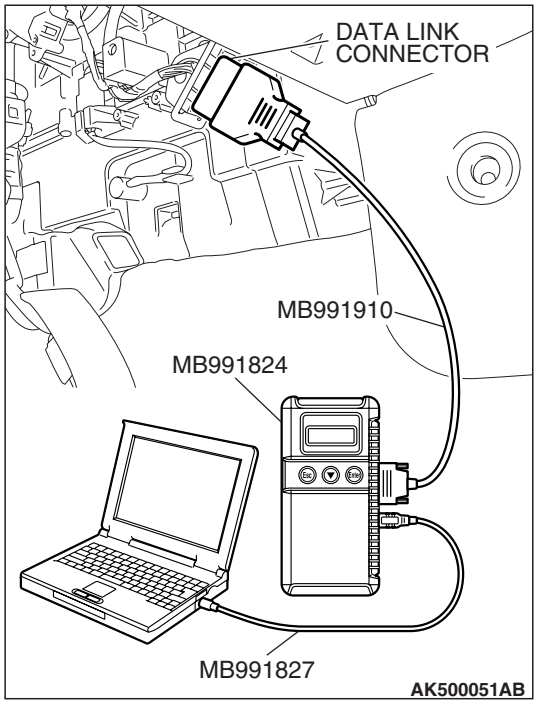
⚠ CAUTION

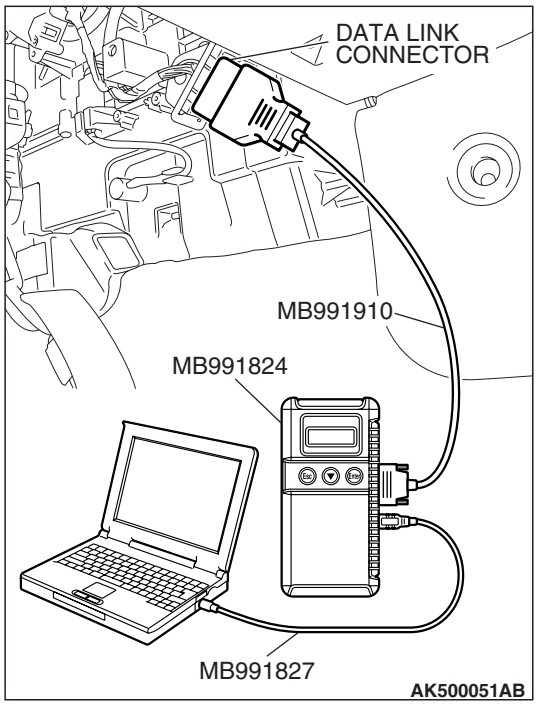
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(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 any DTC set?

YES : Refer to Diagnostic Trouble Code Chart P.13B-43.
NO : Go to Step 2.





STEP 2. Using scan tool MB991958, check actuator test items 1, 2, 3, 4, 5, 6: Injector.

(1) Check following items in the actuator test. Refer to Actuator Test Reference Table P.13B-1251.
   a. Item 1, 2, 3, 4, 5, 6: 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 P0201P.13B-474, P0202P.13B-486, P0203P.13B-497, DTC P0204P.13B-509, P0205P.13B-520, P0206P.13B-532 –Injector Circuit.

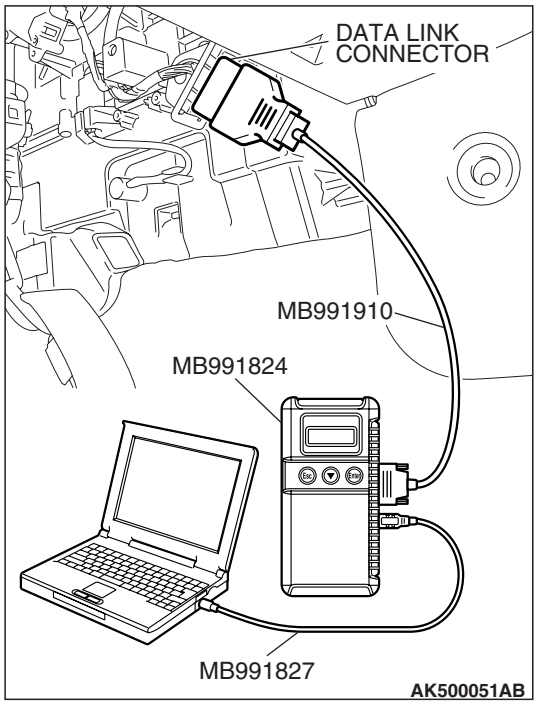
STEP 3. Check the ignition timing.

(1) Refer to GROUP 11C, On-vehicle Service –Ignition Timing Check P.11C-14.

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.

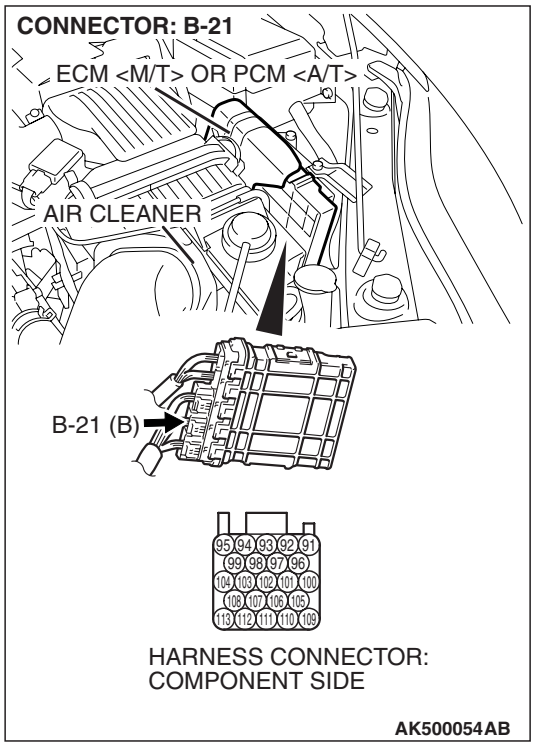
(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Check the following items in the data list. Refer to Data List Reference Table P.13B-1230.
  a. Item 5: Intake Air Temperature Sensor.
  b. Item 6: Engine Coolant Temperature Sensor.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

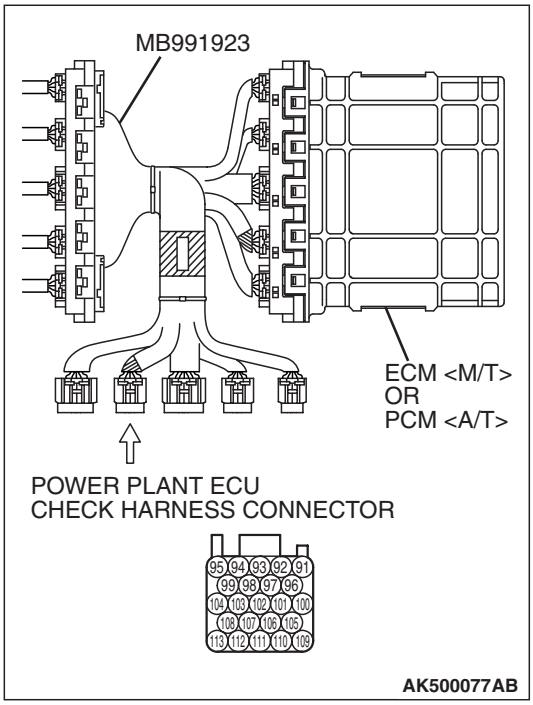
Q: Are they operating properly?

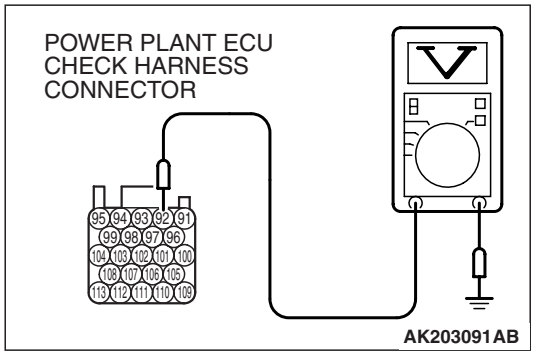
YES : Go to Step 5.
NO : Repair or replace it. Then confirm that the malfunction symptom is eliminated.

STEP 5. Measure the sensor output voltage at ECM <M/T> or PCM <A/T> connector B-21 by using power plant ECU check harness special tool MB991923.

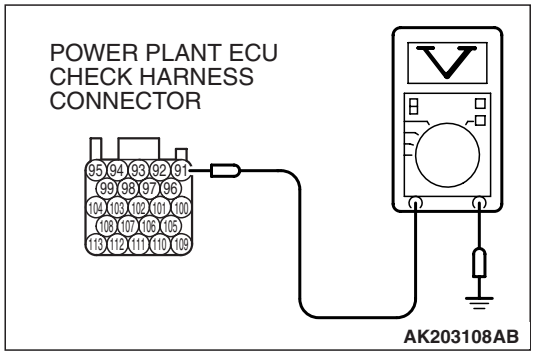
(1) Disconnect all ECM <M/T> connectors or PCM <A/T> connectors. Connect the power plant ECU check harness special tool MB991923 between the separated connectors.
(2) Start the engine and run at idle.







(3) Measure the voltage between terminal No. 92 and ground.
- Warming up the engine. When the engine is 2,500 r/min, the output voltage should repeat 0.5 to 1.4 volts alternately.



(4) Measure the voltage between terminal No. 91 and ground.
- Warming up the engine. When the engine is 2,500 r/min, the output voltage should repeat 0.5 to 1.4 volts alternately.

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

Q: Is the measured voltage within the specified range?

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-1280.

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-1280.

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.

TSB Revision

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.

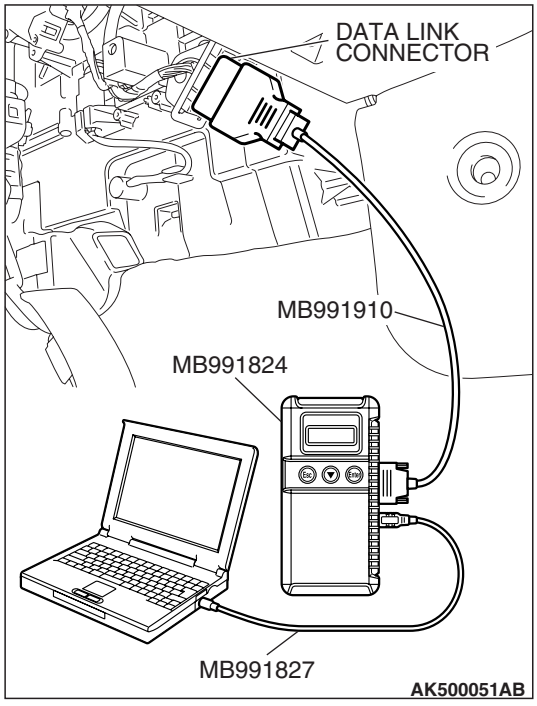
Q: Is any DTC set?

YES : Refer to Diagnostic Trouble Code Chart P.13B-43.

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).

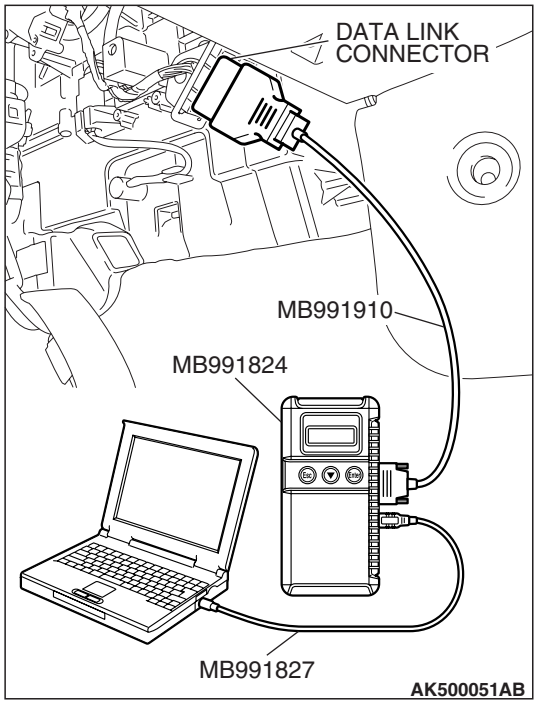
⚠ CAUTION

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 any DTC set?

YES : Refer to Diagnostic Trouble Code Chart P.13B-43.
NO : Refer to On-vehicle Service –Throttle Body (Throttle Valve Area) CleaningP.13B-1280



INSPECTION PROCEDURE 18: Poor acceleration.

COMMENT

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

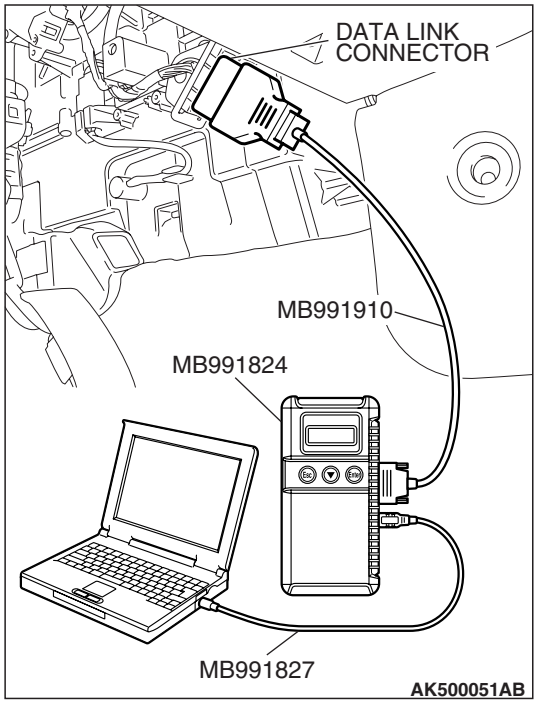
TROUBLESHOOTING HINTS (The most likely causes for this case:)

- Malfunction of the ignition system.
- Malfunction of air/fuel ratio control system.
- Malfunction of the electronic control throttle valve system.
- Malfunction of the fuel supply system.
- Poor compression pressure.
- Clogged exhaust system.

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).

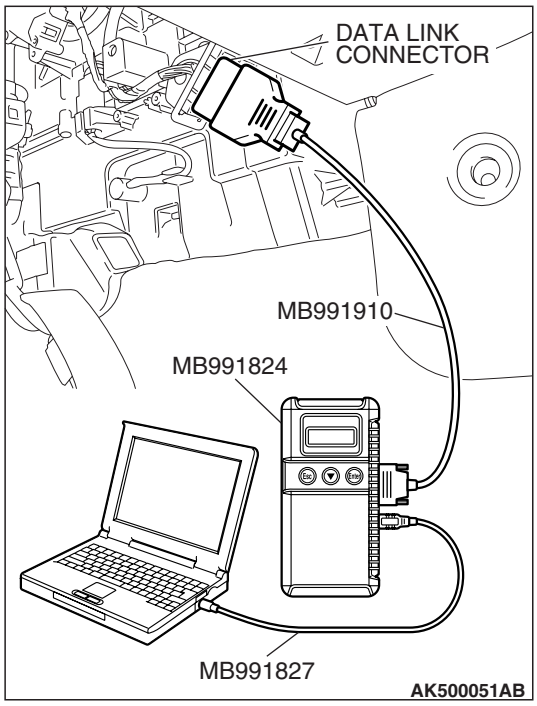
⚠ CAUTION

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 any DTC set?

YES : Refer to Diagnostic Trouble Code Chart P.13B-43.
NO : Go to Step 2.



STEP 2. Using scan tool MB991958, check actuator test items 1, 2, 3, 4, 5, 6: 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-1251.
  a. Item 1, 2, 3, 4, 5, 6: Injector.
(3) Turn they ignition switch to the "LOCK" (OFF) position.

Q: Are they operating properly?

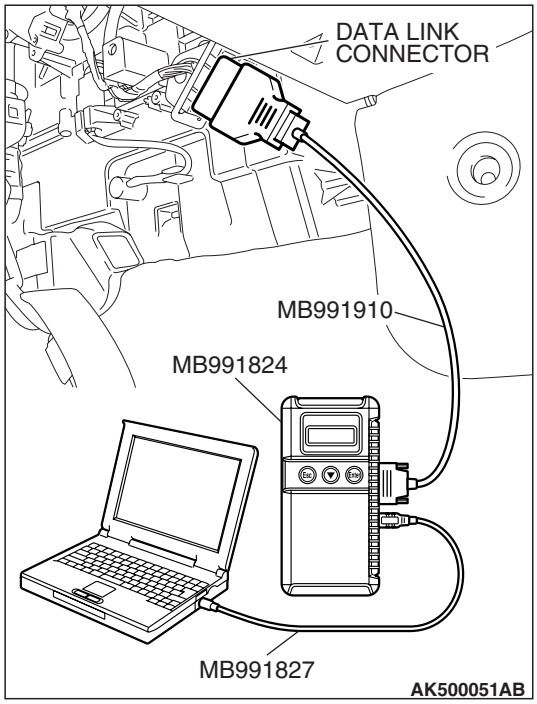
YES : Go to Step 3.
NO : Refer to DTC P0201P.13B-474, P0202P.13B-486, P0203P.13B-497, DTC P0204P.13B-509, P0205P.13B-520, P0206P.13B-532 –Injector Circuit.

STEP 3. Check the ignition timing.

Refer to GROUP 11C, On-vehicle Service –Ignition Timing Check P.11C-14.

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.

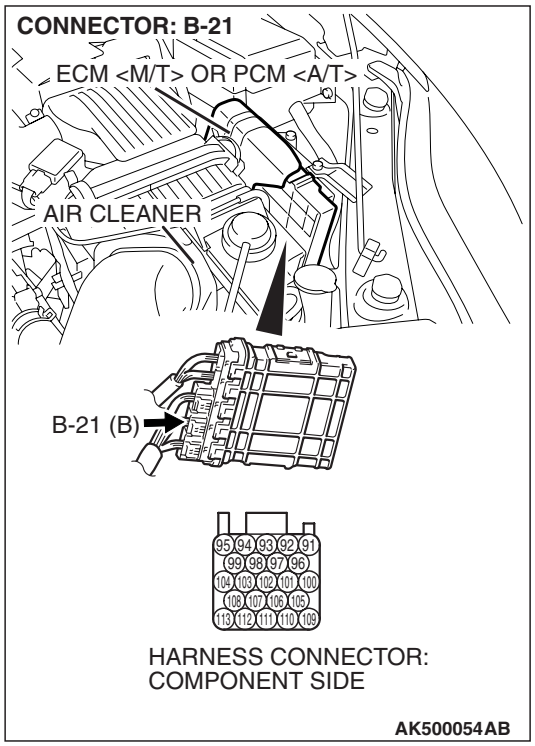
⚠ CAUTION

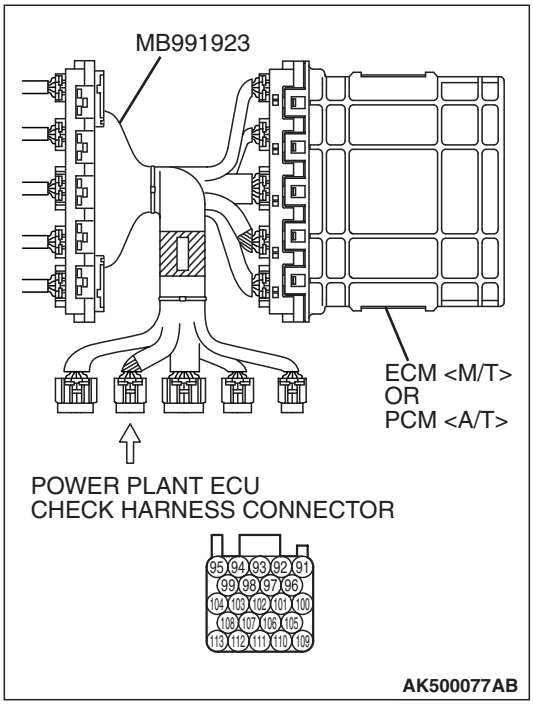
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(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-1230.
   a. Item 5: Intake Air Temperature Sensor.
   b. Item 6: Engine Coolant Temperature Sensor.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Are they operating properly?

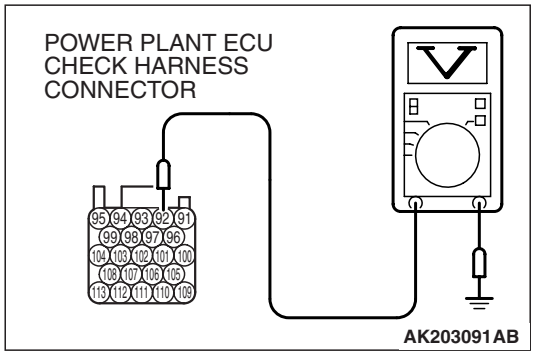
YES : Go to Step 5.
NO : Repair or replace it. Then confirm that the malfunction symptom is eliminated.



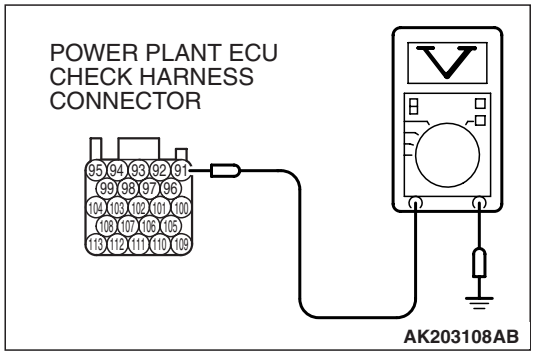


STEP 5. Measure the sensor output voltage at ECM <M/T> or PCM <A/T> connector B-21 by using power plant ECU check harness special tool MB991923.

(1) Disconnect all ECM <M/T> connectors or PCM <A/T> connectors. Connect the power plant ECU check harness special tool MB991923 between the separated connectors.
(2) Start the engine and run at idle.



(3) Measure the voltage between terminal No. 92 and ground.
- Warming up the engine. When the engine is 2,500 r/min, the output voltage should repeat 0.5 to 1.4 volts alternately.



(4) Measure the voltage between terminal No. 91 and ground.
- Warming up the engine. When the engine is 2,500 r/min, the output voltage should repeat 0.5 to 1.4 volts alternately.

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

Q: Is the measured voltage within the specified range?

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-1280.

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-1280.

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.

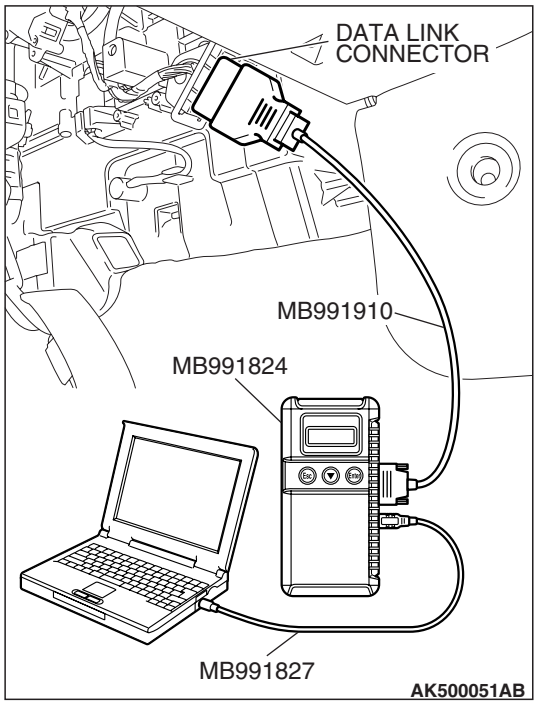
TROUBLESHOOTING HINTS (The most likely causes for this case:)

- 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).

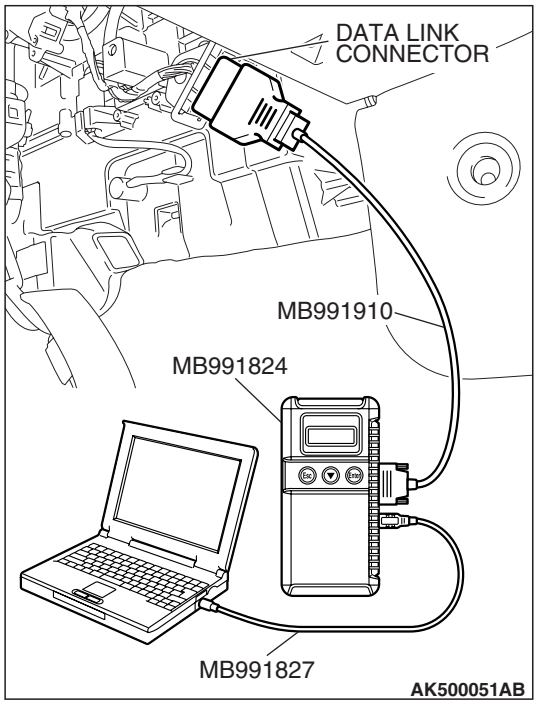
⚠ CAUTION

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 any DTC set?

YES : Refer to Diagnostic Trouble Code Chart P.13B-43.
NO : Go to Step 2.



STEP 2. Using scan tool MB991958, check actuator test items 1, 2, 3, 4, 5, 6: 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-1251.
  a. Item 1, 2, 3, 4, 5, 6: Injector.
(3) Turn the ignition switch to the "ON" position.

Q: Are thy operating properly?

YES : Go to Step 3.
NO : Refer to DTC P0201P.13B-474, P0202P.13B-486, P0203P.13B-497, DTC P0204P.13B-509, P0205P.13B-520, P0206P.13B-532 –Injector Circuit.

STEP 3. Check the ignition timing.

Refer to GROUP 11C, On-vehicle Service –Ignition Timing Check P.11C-14.

Q: Is the ignition timing normal?

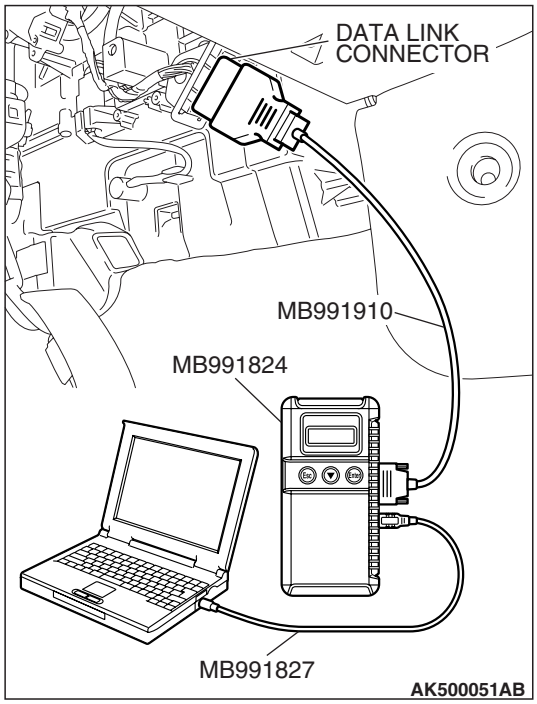
YES : Go to Step 4.

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-1230.
  a. Item 5: Intake Air Temperature Sensor.
  b. Item 6: Engine Coolant Temperature Sensor.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

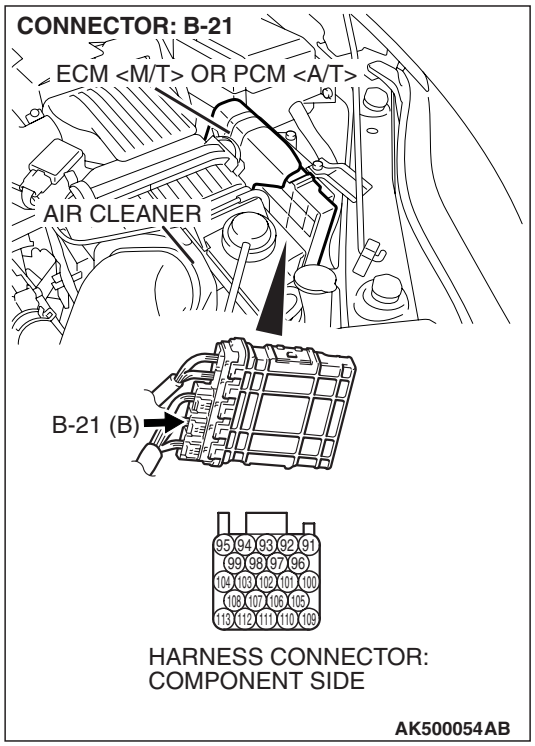
Q: Are they operating properly?

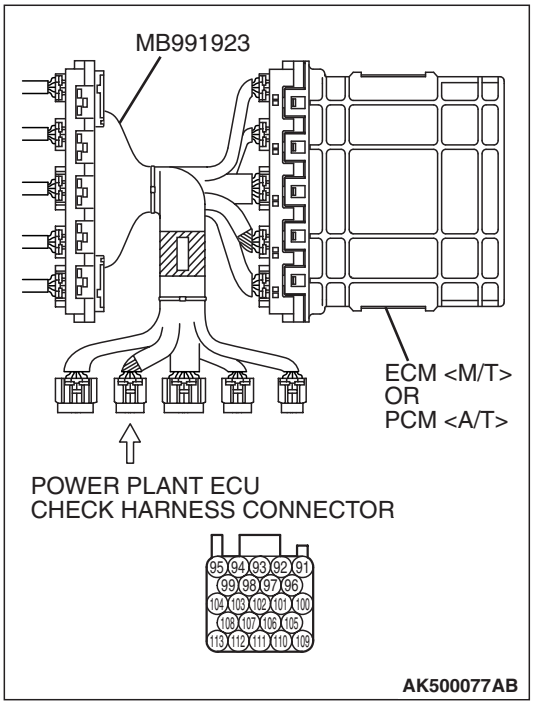
YES : Go to Step 5.

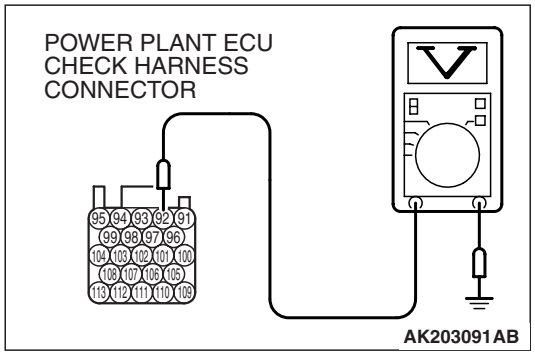
NO : Repair or replace it. Then confirm that the malfunction symptom is eliminated.

STEP 5. Measure the sensor output voltage at ECM <M/T> or PCM <A/T> connector B-21 by using power plant ECU check harness special tool MB991923.

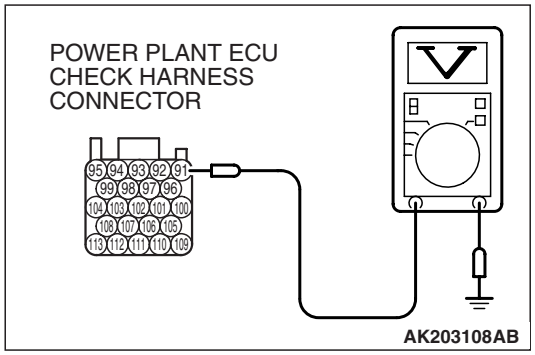
(1) Disconnect all ECM <M/T> connectors or PCM <A/T> connectors. Connect the power plant ECU check harness special tool MB991923 between the separated connectors.
(2) Start the engine and run at idle.







(3) Measure the voltage between terminal No. 92 and ground.
- Warming up the engine. When the engine is 2,500 r/min, the output voltage should repeat 0.5 to 1.4 volts alternately.



(4) Measure the voltage between terminal No. 91 and ground.
- Warming up the engine. When the engine is 2,500 r/min, the output voltage should repeat 0.5 to 1.4 volts alternately.

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

Q: Is the measured voltage within the specified range?

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-1280.

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-1280.

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

- Incases 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).

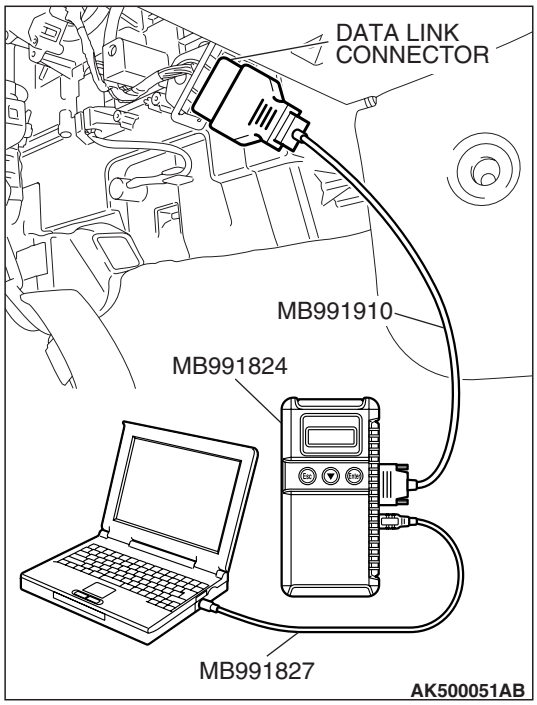
⚠ CAUTION

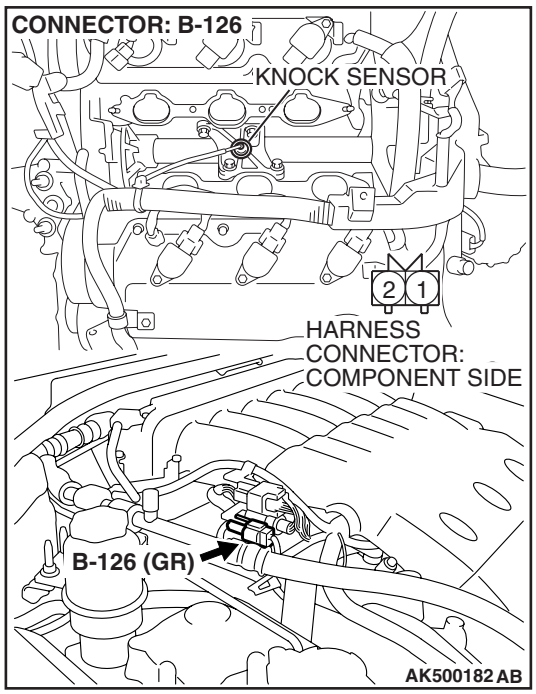
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(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 any DTC set?

YES : Refer to Diagnostic Trouble Code Chart P.13B-43.
NO : Go to Step 2.





STEP 2. Check the ignition timing.

(1) The ignition timing should retard more when knock sensor connector B-126 is disconnected than when it is connected.

Q: When the knock sensor connector B-126 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-589.

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.

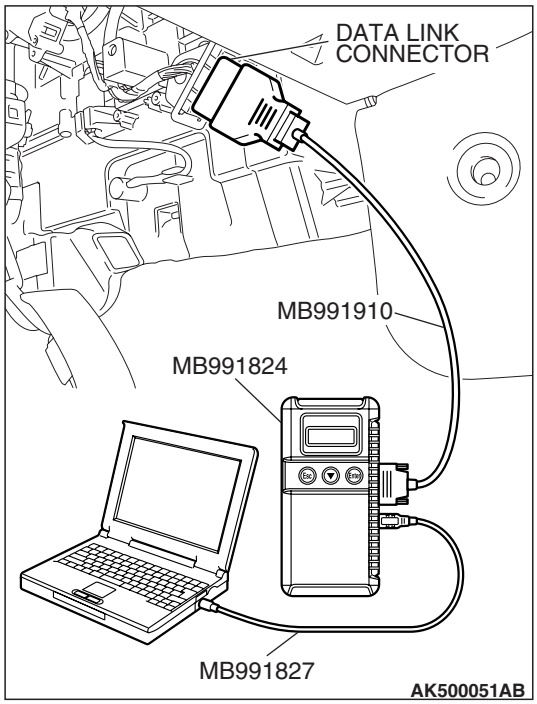
TROUBLESHOOTING HINTS (The most likely causes for this case:)

- 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.

(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 any DTC set?

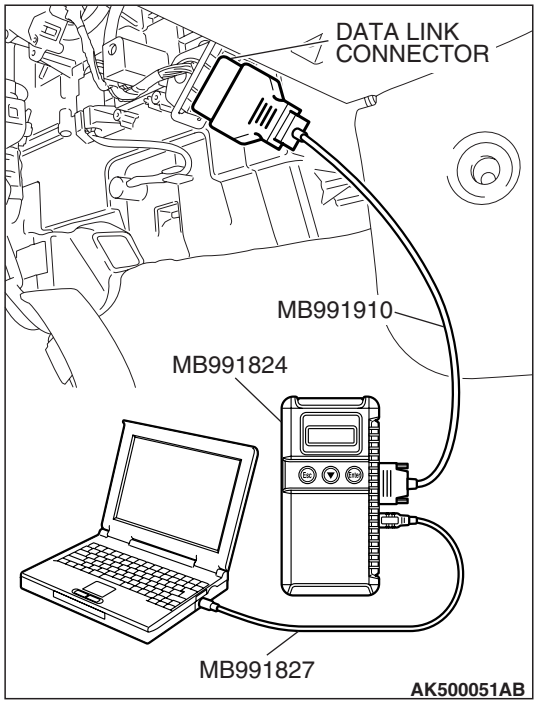
YES : Refer to Diagnostic Trouble Code Chart P.13B-43.
NO : Go to Step 2.

STEP 2. Check the ignition timing.

Refer to GROUP 11C, On-vehicle Service –Ignition Timing Check P.11C-14.

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.

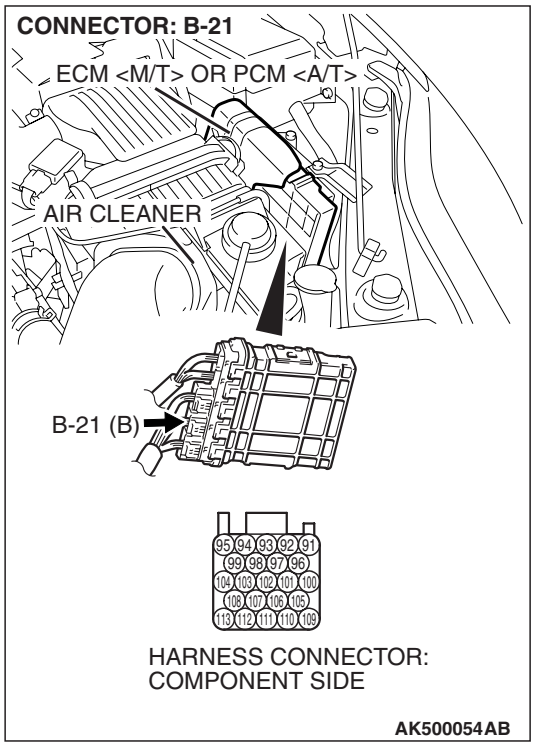
(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Check the following items in the data list. Refer to Data List Reference Table P.13B-1230.
  a. Item 6: Engine Coolant Temperature Sensor.
  b. Item 5: Intake Air Temperature Sensor.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

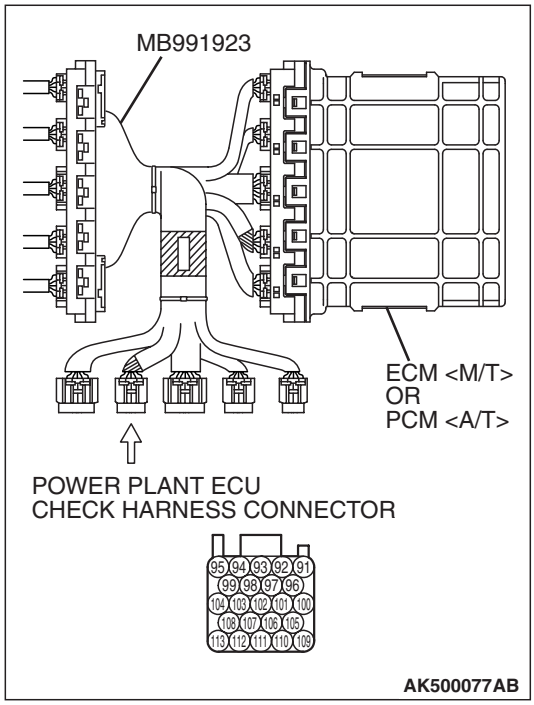
Q: Are they operating properly?

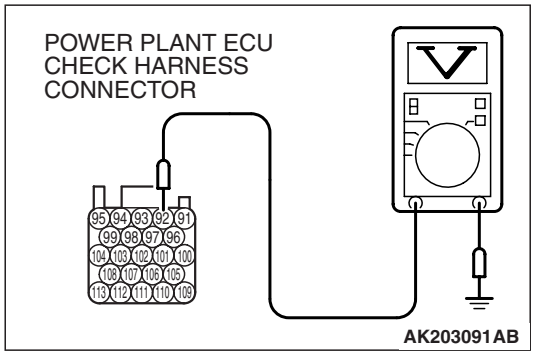
YES : Go to Step 4.
NO : Repair or replace it. Then confirm that the malfunction symptom is eliminated.

STEP 4. Measure the sensor output voltage at ECM <M/T> or PCM <A/T> connector B-21 by using power plant ECU check harness special tool MB991923.

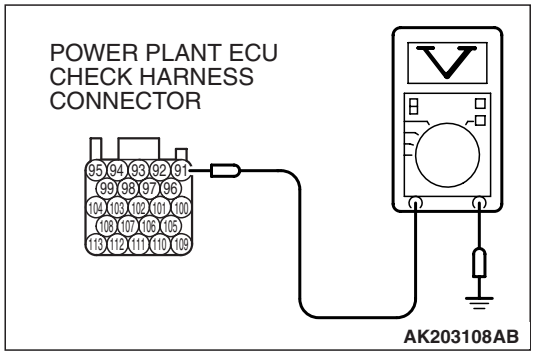
(1) Disconnect all ECM <M/T> connectors or PCM <A/T> connectors. Connect the power plant ECU check harness special tool MB991923 between the separated connectors.
(2) Start the engine and run at idle.







(3) Measure the voltage between terminal No. 92 and ground.
- Warming up the engine. When the engine is 2,500 r/min, the output voltage should repeat 0.5 to 1.4 volts alternately.



(4) Measure the voltage between terminal No. 91 and ground.
- Warming up the engine. When the engine is 2,500 r/min, the output voltage should repeat 0.5 to 1.4 volts alternately.

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

Q: Is the measured voltage within the specified range?

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-1280.

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.

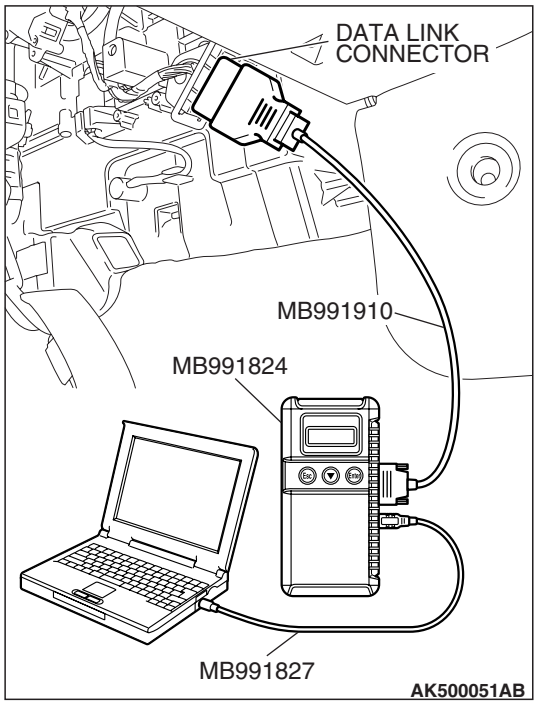
Q: Are they normal?

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-48.



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 any DTC set?

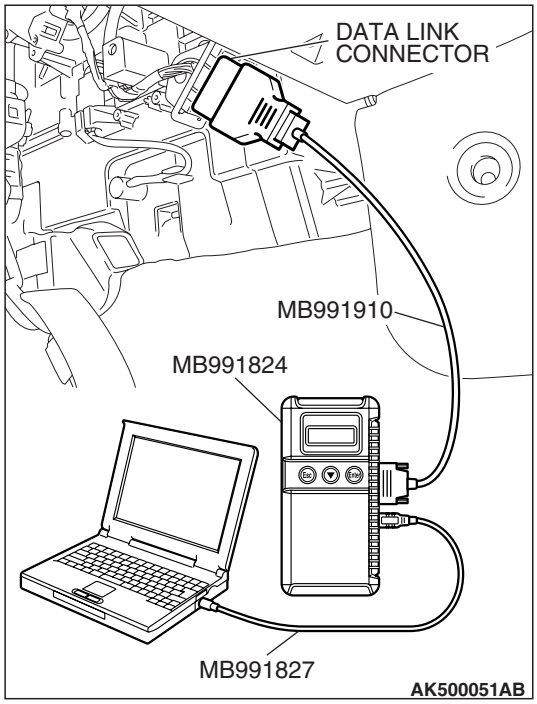
YES : Refer to Diagnostic Trouble Code Chart P.13B-43.
NO : Go to Step 5.

STEP 5. Check the ignition timing.

Refer to GROUP 11C, On-vehicle Service –Ignition Timing Check P.11C-14.

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.

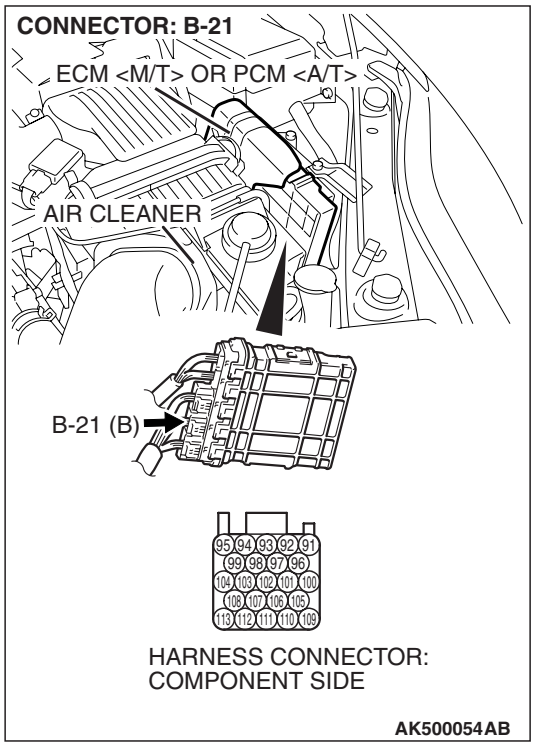
(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Check the following items in the data list. Refer to Data List Reference Table P.13B-1230.
   a. Item 6: Engine Coolant Temperature Sensor.
   b. Item 5: Intake Air Temperature Sensor.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

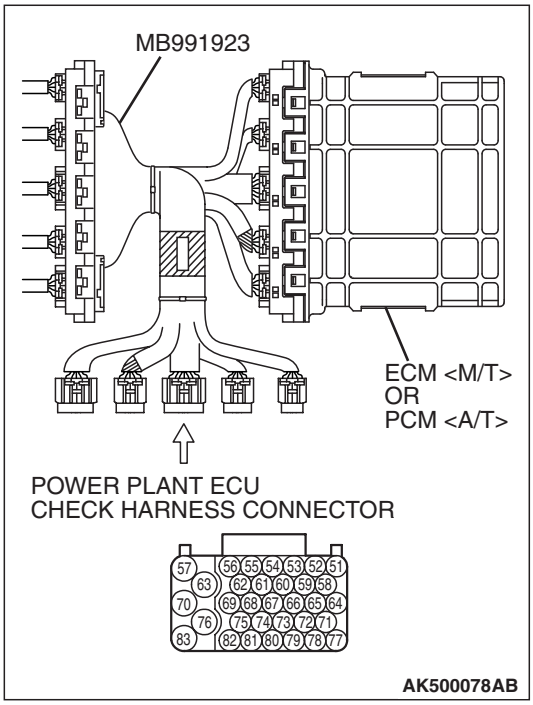
Q: Are they operating properly?

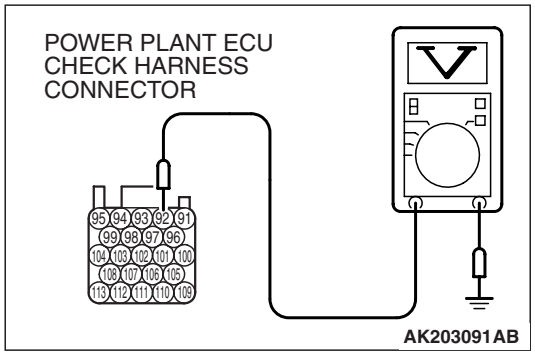
YES : Go to Step 7.
NO : Repair or replace it. Then confirm that the malfunction symptom is eliminated.

STEP 7. Measure the sensor output voltage at ECM <M/T> or PCM <A/T> connector B-21 by using power plant ECU check harness special tool MB991923.

(1) Disconnect all ECM <M/T> connectors or PCM <A/T> connectors. Connect the power plant ECU check harness special tool MB991923 between the separated connectors.
(2) Start the engine and run at idle.







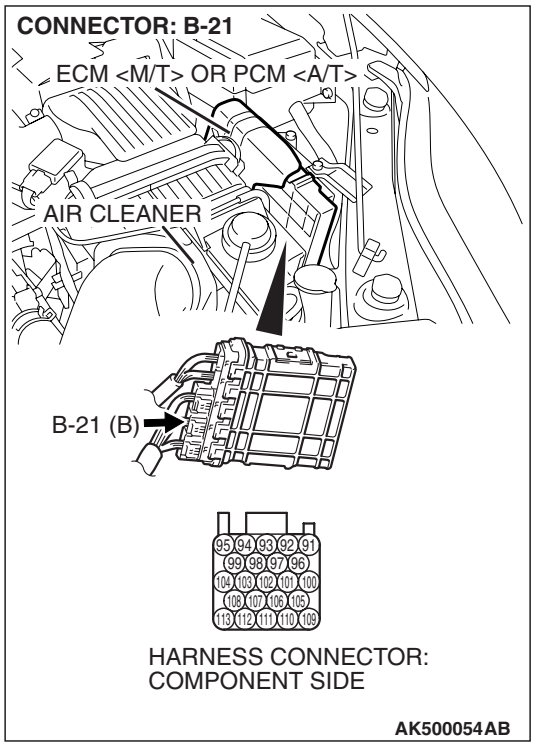
(3) Measure the voltage between terminal No. 92 and ground.
- Warming up the engine. When the engine is 2,500 r/min, the output voltage should repeat 0.5 to 1.4 volts alternately.

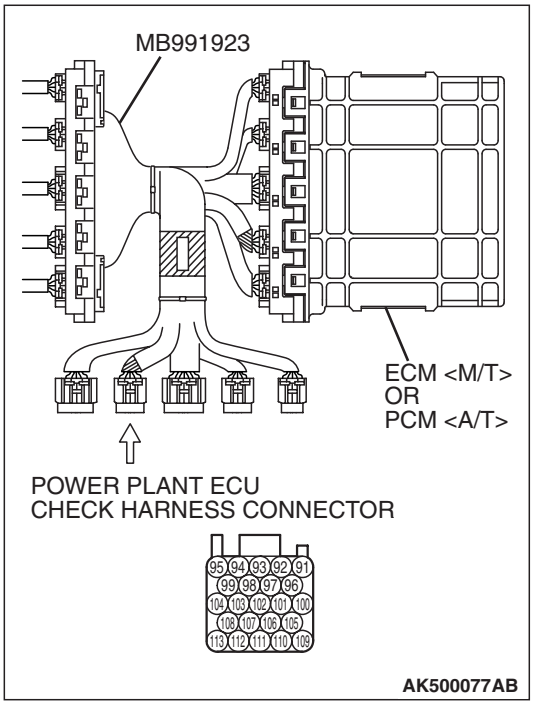
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the measured voltage within the specified range?

YES : Go to Step 8.

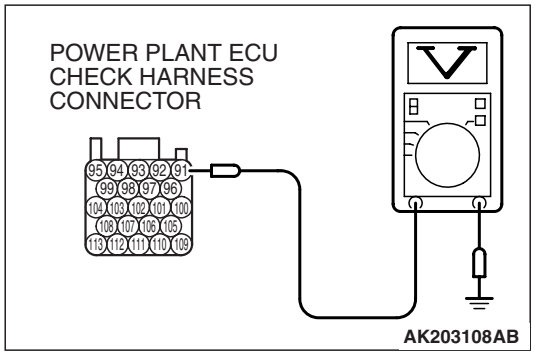
NO : Refer to DTC P0131 - Heated Oxygen Sensor Circuit Low Voltage (bank 1, sensor 1) P.13B-282, DTC P0132 - Heated Oxygen Sensor Circuit High Voltage (bank 1, sensor 1) P.13B-298, DTC P0133 - Heated Oxygen Sensor Circuit Slow Response (bank 1, sensor 1) P.13B-303, DTC P0134 - Heated Oxygen Sensor Circuit No Activity Detected (bank 1, sensor 1) P.13B-309.





STEP 8. Measure the sensor output voltage at ECM <M/T> or PCM <A/T> connector B-21 by using power plant ECU check harness special tool MB991923.

(1) Disconnect all ECM <M/T> connectors or PCM <A/T> connectors. Connect the power plant ECU check harness special tool MB991923 between the separated connectors.
(2) Start the engine and run at idle.



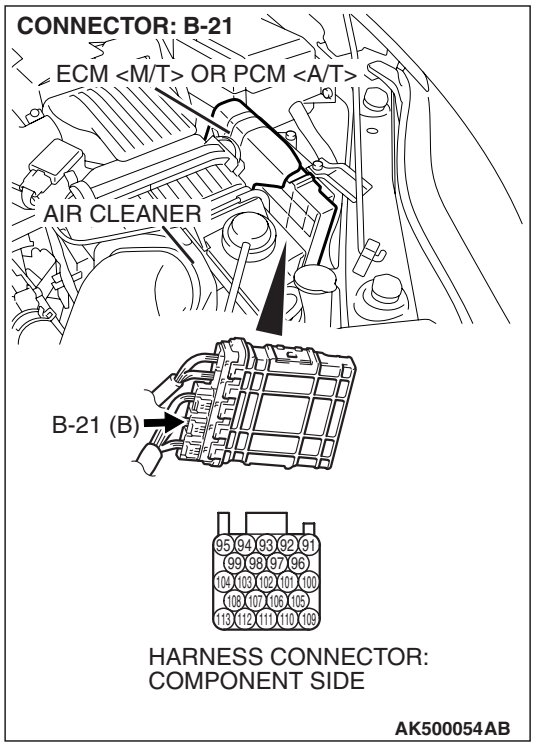
(3) Measure the voltage between terminal No. 91 and ground.
- Warming up the engine. When the engine is 2,500 r/min, the output voltage should repeat 0.5 to 1.4 volts alternately.

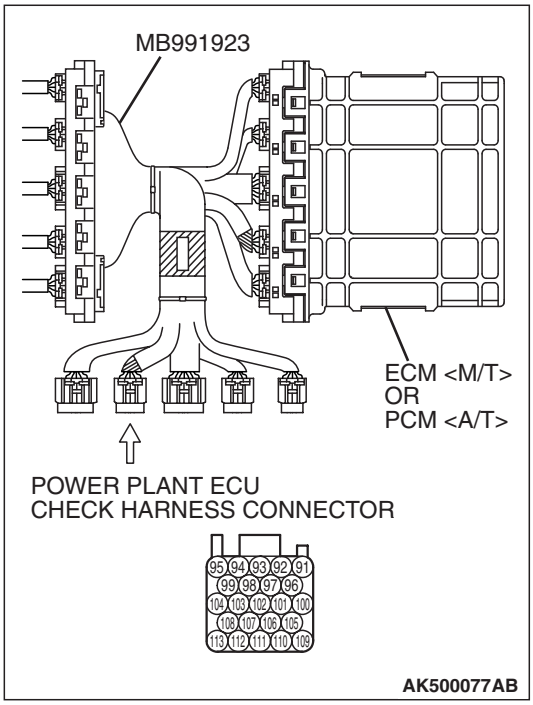
(4) Turn the ignition switch to the "LOCK"(OFF) position.

Q: Is the measured voltage within the specified range?

YES : Go to Step 9.

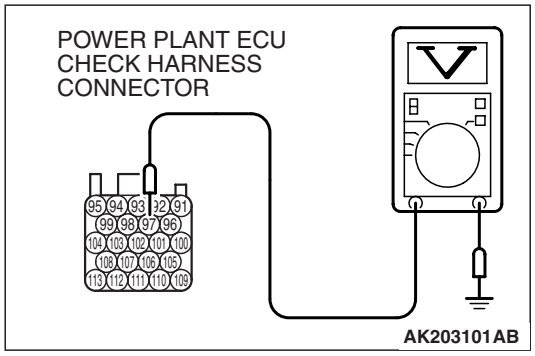
NO : Refer to DTC P0151 - Heated Oxygen Sensor Circuit Low Voltage (bank 2, sensor 1) P.13B-348, DTC P0152 - Heated Oxygen Sensor Circuit High Voltage (bank 2, sensor 1) P.13B-364, DTC P0153 - Heated Oxygen Sensor Circuit Slow Response (bank 2, sensor 1) P.13B-369, DTC P0154 - Heated Oxygen Sensor Circuit No Activity Detected (bank 2, sensor 1) P.13B-375.





STEP 9. Measure the sensor output voltage at ECM <M/T> or PCM <A/T> connector B-21 by using power plant ECU check harness special tool MB991923.

(1) Disconnect all ECM <M/T> connectors or PCM <A/T> connectors. Connect the power plant ECU check harness special tool MB991923 between the separated connectors.
(2) Start the engine and run at idle.



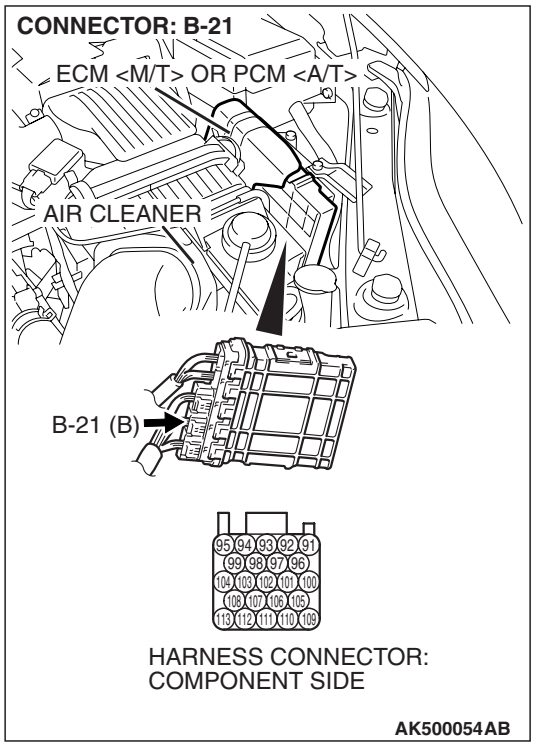
(3) Measure the voltage between terminal No. 97 and ground under the following driving.
   a. Transaxle: 2nd speed (A/T: "L" range)
   b. Drive with wide open throttle
   c. Engine: 3,500 r/min or more
      - The output voltage should be between 1.0 and 1.5 volts.

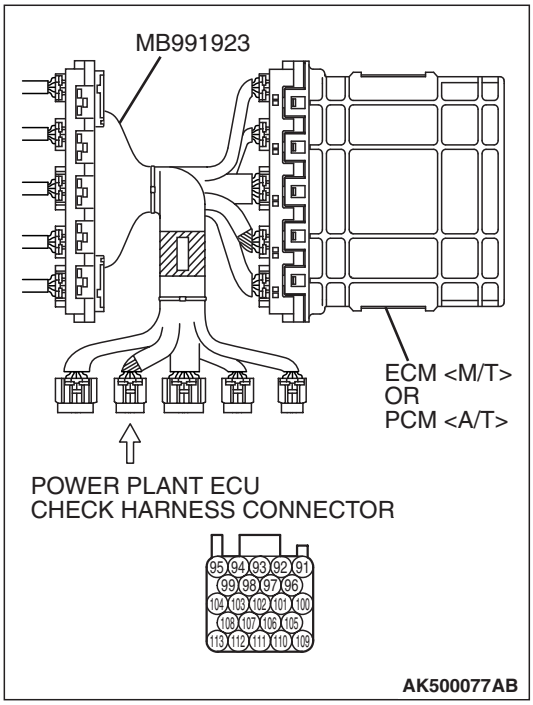
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the measured voltage between 1.0 and 1.5 volts?

YES : Go to Step 10.

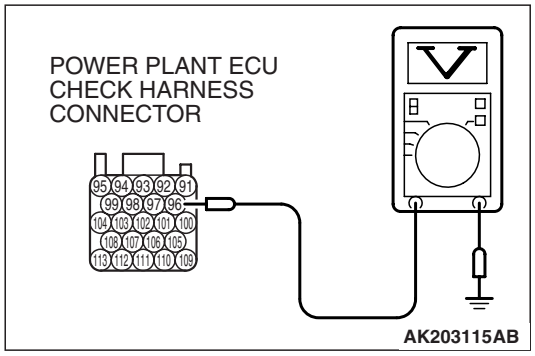
NO : Refer to, P0137 –Heated Oxygen Sensor Circuit Low Voltage (bank 1, sensor 2) P.13B-319, DTC P0138 –Heated Oxygen Sensor Circuit High Voltage (bank 1, sensor 2) P.13B-335, DTC P0139 –Heated Oxygen Sensor Circuit Slow Response (bank 1, sensor 2) P.13B-340, DTC P0140 –Heated Oxygen Sensor Circuit No Activity Detected (bank 1, sensor 2) P.13B-344.





STEP 10. Measure the sensor output voltage at ECM <M/T> or PCM <A/T> connector B-21 by using power plant ECU check harness special tool MB991923.

(1) Disconnect all ECM <M/T> connectors or PCM <A/T> connectors. Connect the power plant ECU check harness special tool MB991923 between the separated connectors.
(2) Start the engine and run at idle.



(3) Measure the voltage between terminal No. 96 and ground under the following driving.
   a. Transaxle: 2nd speed (A/T: "L" range)
   b. Drive with wide open throttle
   c. Engine: 3,500 r/min or more
   • The output voltage should be between 1.0 and 1.5 volts.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the measured voltage between 1.0 and 1.5 volts?

YES : Go to Step 11.
NO : Refer to, P0157 –Heated Oxygen Sensor Circuit Low Voltage (bank 2, sensor 2) P.13B-385, DTC P0158 –Heated Oxygen Sensor Circuit High Voltage (bank 2, sensor 2) P.13B-401, DTC P0159 –Heated Oxygen Sensor Circuit Slow Response (bank 2, sensor 2) P.13B-406, DTC P0160 –Heated Oxygen Sensor Circuit No Activity Detected (bank 2, sensor 2) P.13B-410.

STEP 11. Check the EGR system.

Refer to GROUP 17, Emission Control System –General Description (EGR System) P.17-104.

Q: Is the EGR system normal?

YES : Go to Step 12.
NO : Repair or replace it. Then confirm that the malfunction symptom is eliminated.

STEP 12. Check the fuel pressure.

Refer to On-vehicle Service –Fuel Pressure Test P.13B-1280.

Q: Is the fuel pressure normal?

YES : Go to Step 13.
NO : Repair or replace it. Then confirm that the malfunction symptom is eliminated.

STEP 13. 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).

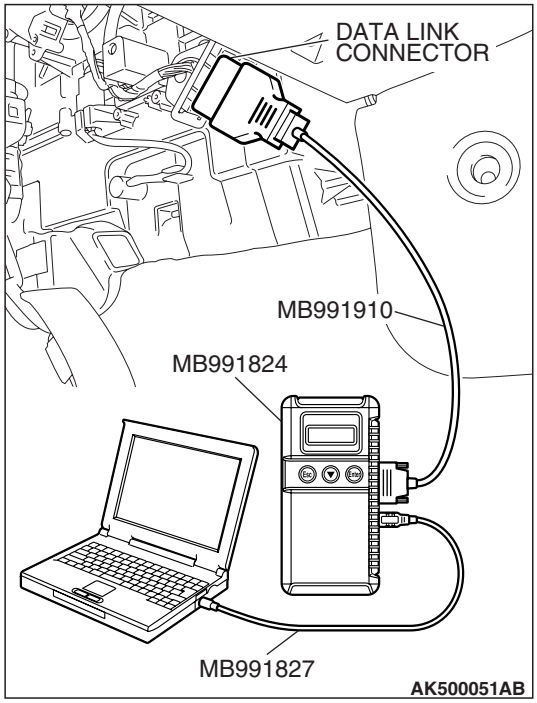
⚠ CAUTION

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 any DTC set?

YES : Refer to Diagnostic Trouble Code Chart P.13B-43.
NO : Refer to GROUP 17, Emission Control System – Purge Control System Check (Purge Flow Check) P.17-101.



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.17-102.

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.

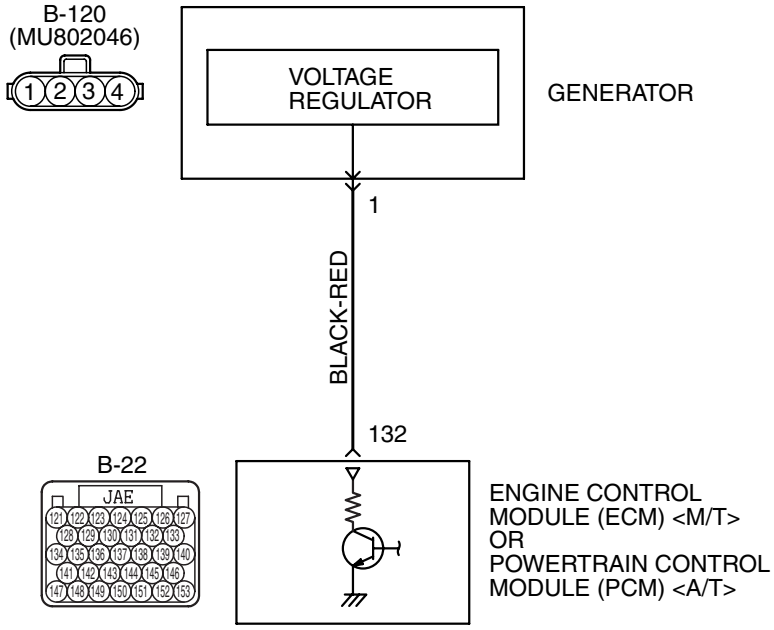
STEP 2. Check the evaporative emission ventilation solenoid.
Refer to GROUP 17, Emission Control System –Evaporative Emission Ventilation Solenoid Check P.17-103.

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).

Generator Circuit



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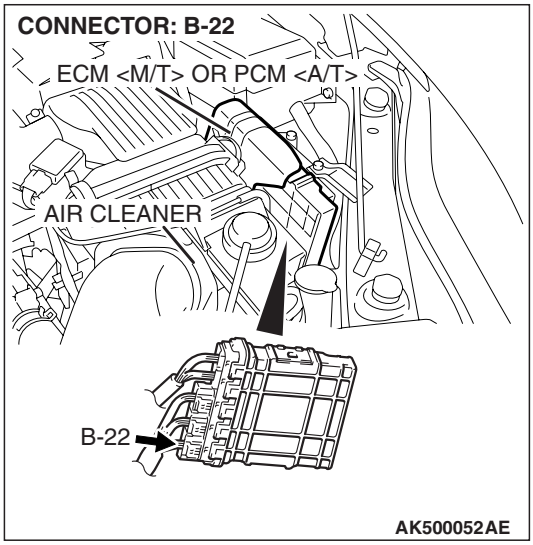

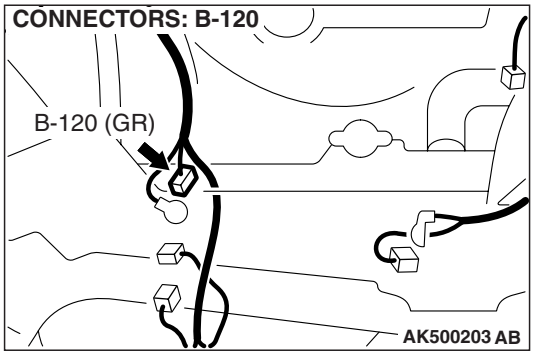

CIRCUIT OPERATION

- The ECM <M/T> or the PCM <A/T> controls generator out put 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 ECM <M/T> or PCM <A/T>.
- ECM failed. <M/T>
- PCM failed. <A/T>

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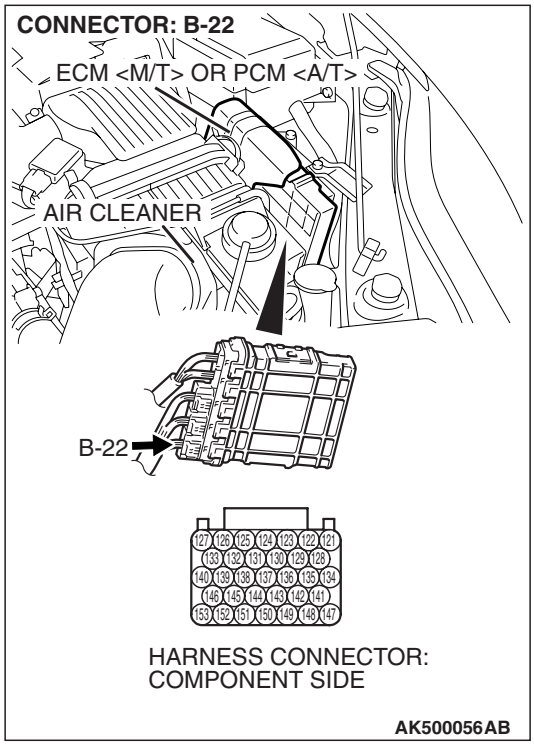
DIAGNOSIS

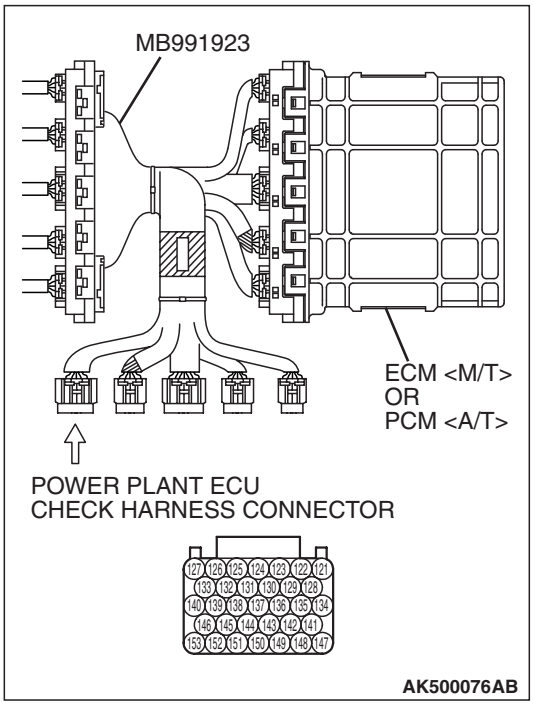
Required Special Tool:

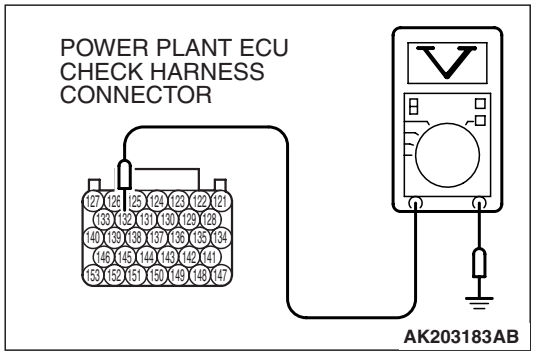
- MB991923: Power Train ECU Check Harness

STEP 1. Measure the voltage at PCM connector B-22 by using check harness special tool MB991923.

(1) Disconnect all ECM <M/T> connectors or PCM <A/T> connectors. Connect the 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.

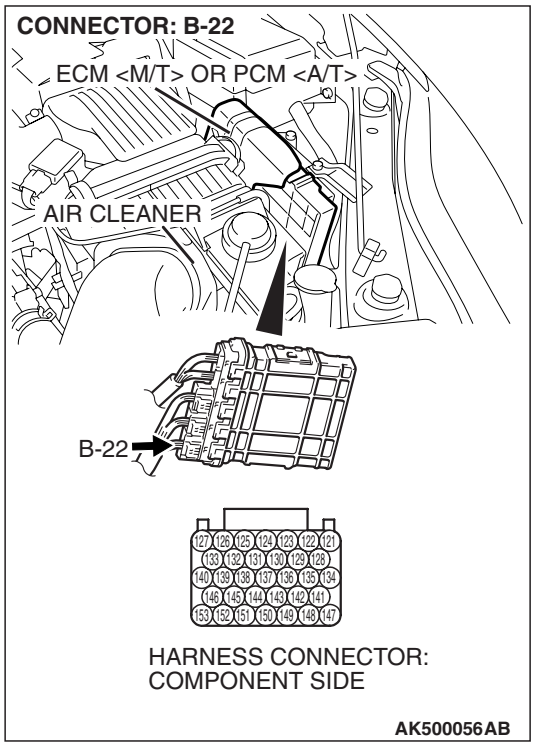
(3) Measure the voltage between terminal No. 132 and ground.
   a. Engine: warming up
   b. Radiator fan: stopped
   c. Headlight switch: OFF to ON
   d. Rear defogger switch: OFF to ON
   e. Stoplight switch: OFF to ON
   - Voltage rises by 0.2 – 3.5 volts.

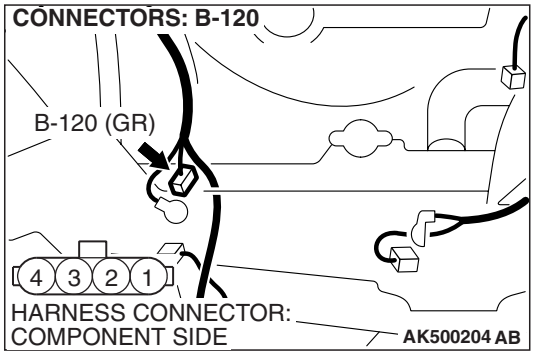
(4) Turn the ignition switch to the "LOCK" (OFF) position.

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.



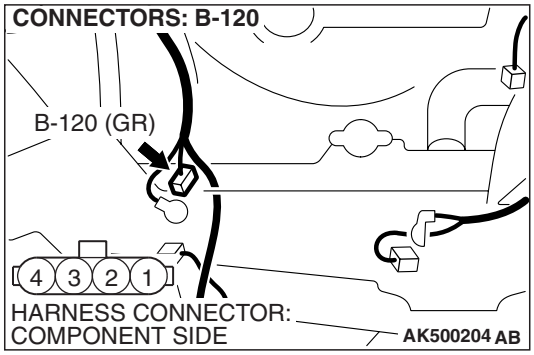


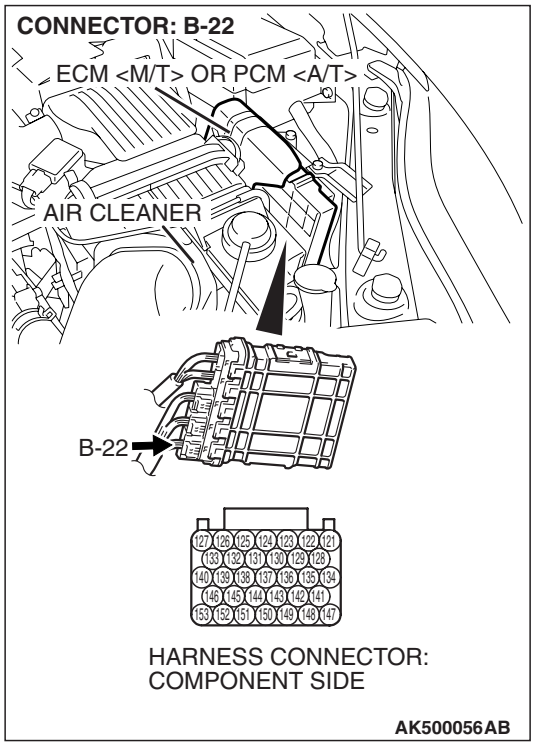
STEP 2. Check harness connector B-22 at ECM <M/T> or PCM <A/T> connector and harness connector B-120 at generator connector for damage.

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-120 (terminal No. 1) and ECM <M/T> or PCM <A/T> connector B-22 (terminal No. 132).

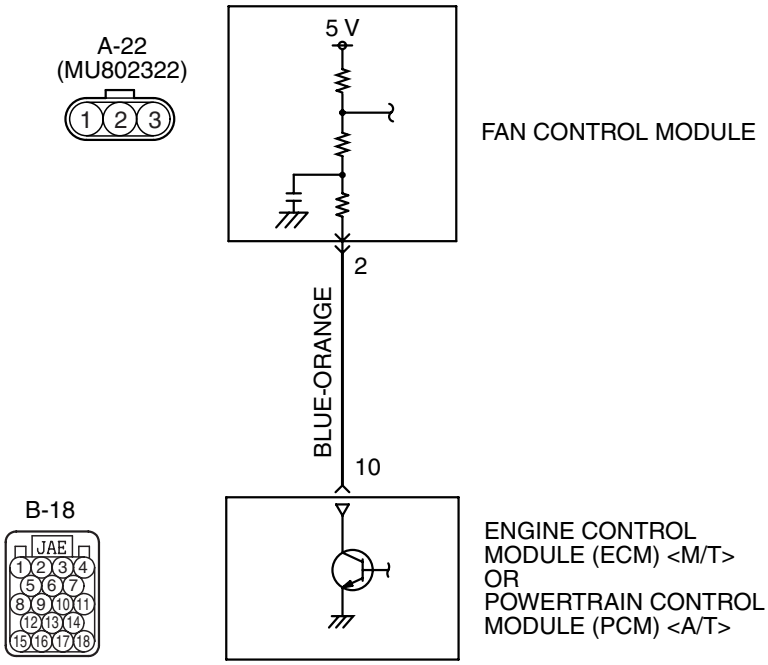
Q: Is the harness wire in good condition?

YES : Replace the ECM or the PCM. When the ECM or the PCM is replaced, register the encrypted code. Refer to GROUP 54A, Encrypted Code Registration Criteria Table P.54A-13. 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

Radiator Fan, A/C Condensor Fan Circuit



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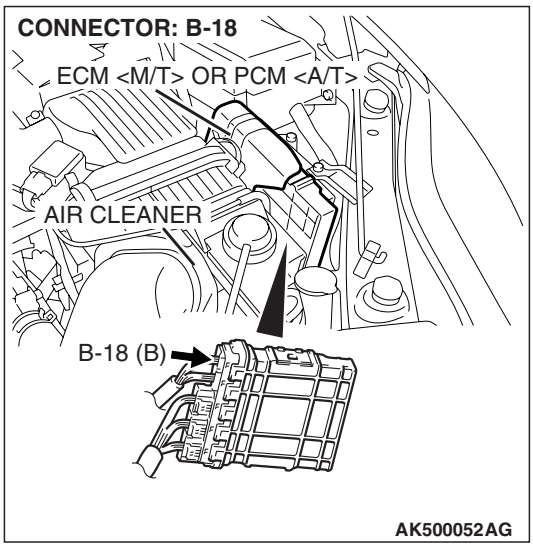

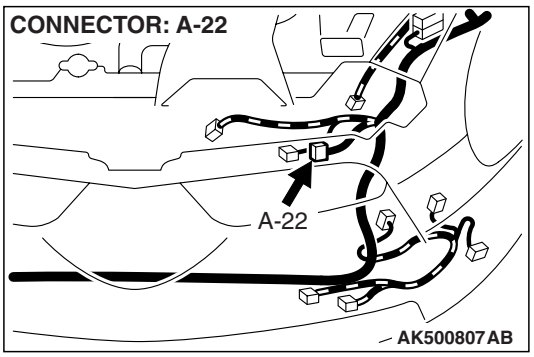

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COMMENT

- The fan control relay is controlled by the power transistor inside the ECM <M/T> or the PCM <A/T> 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.
- ECM failed. <M/T>
- PCM failed. <A/T>

DIAGNOSIS

Required Special Tools:

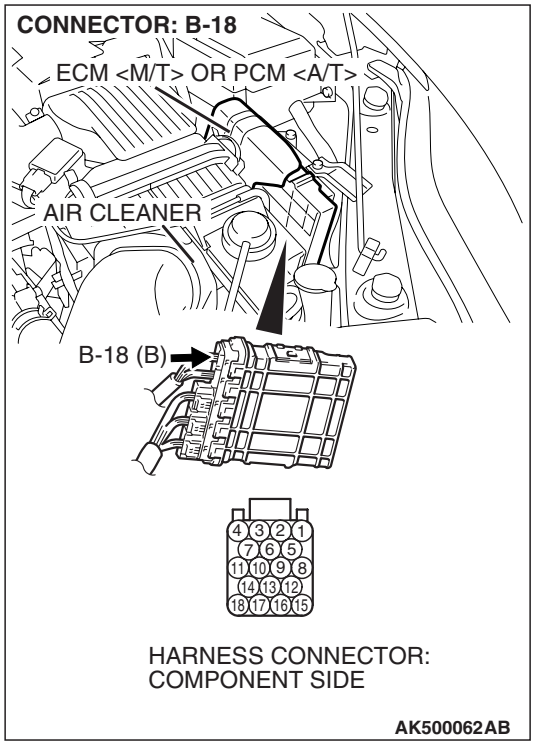
- MB991958: Scan tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991910: Main Harness A

STEP 1. Check harness connector B-18 at ECM <M/T> or PCM <A/T> 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.



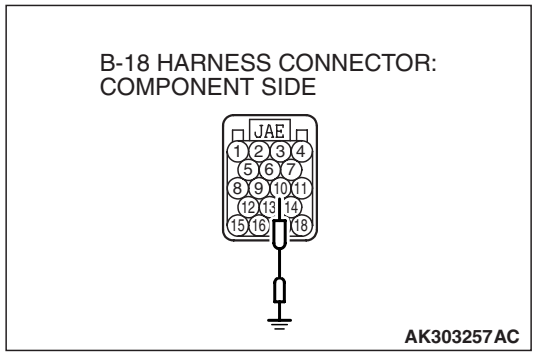
STEP 2. Check the fan condition.

(1) Disconnect the B-18 at ECM <M/T> or PCM <A/T> connector.
(2) Turn the ignition switch to the "ON" position.
(3) Check the fan condition.
  - When terminal No.10 is grounded by the jumper cable, the radiator and condenser fans should run.
(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.



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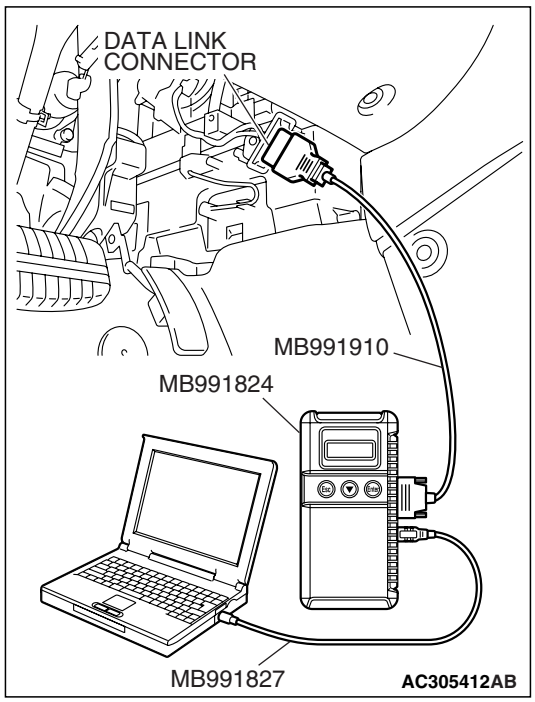


STEP 3. Using scan tool MB991958, check data list item 6: Engine Coolant Temperature Sensor.

⚠ 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 6 Engine Coolant Temperature Sensor.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the sensor operating properly?

YES : Go to Step 4.
NO : Repair and replace. Then confirm that the malfunction symptom is eliminated.

STEP 4. Check the cooling system.

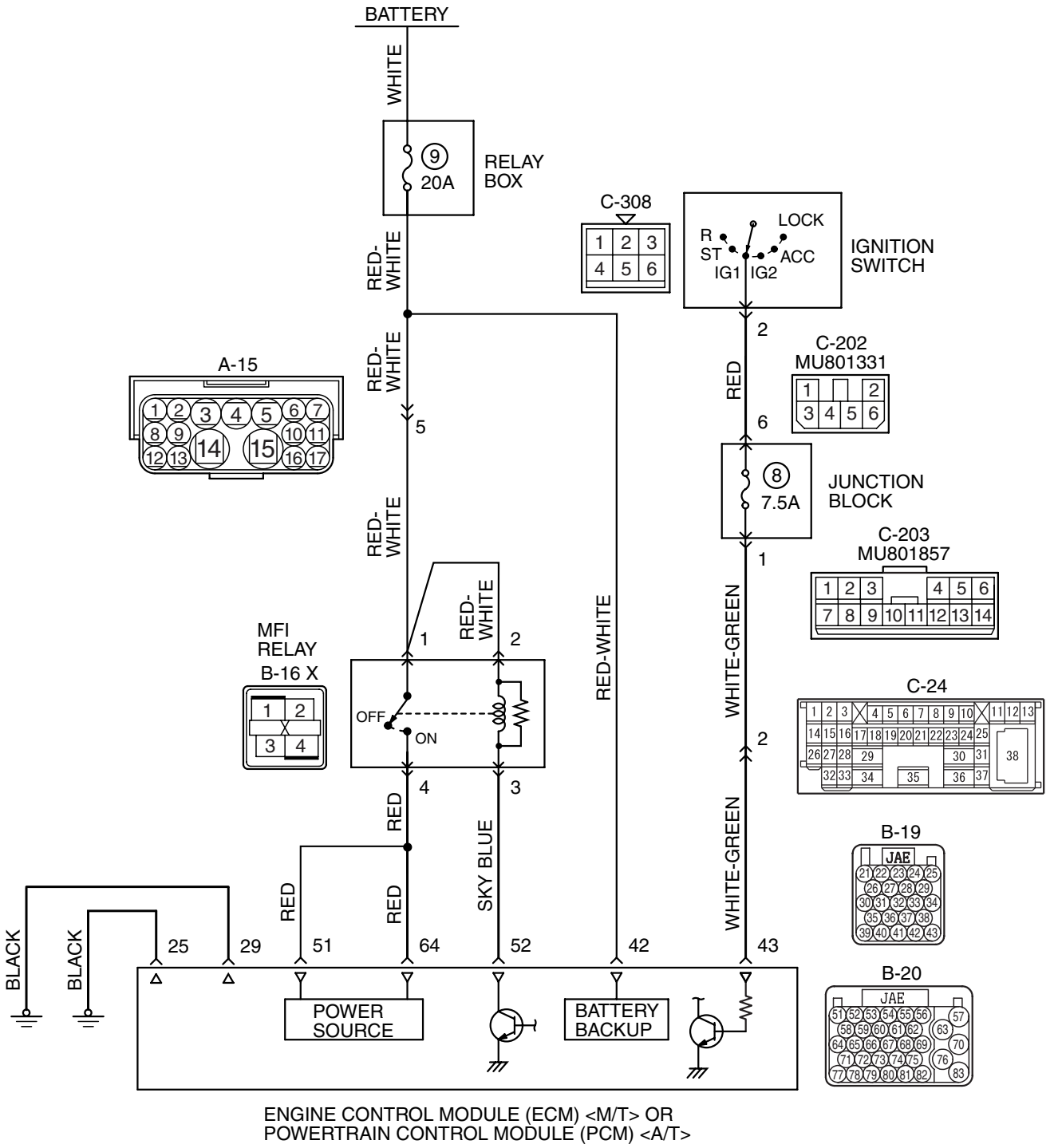
Refer to GROUP 14, Engine Cooling Diagnosis P.14-4.

Q: Is the cooling system normal?

YES : Replace the ECM or the PCM. When the ECM or the PCM is replaced, register the encrypted code. Refer to GROUP 54A, Encrypted Code Registration Criteria Table P.54A-13.
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



ENGINE CONTROL MODULE (ECM) <M/T> OR
POWERTRAIN CONTROL MODULE (PCM) <A/T>

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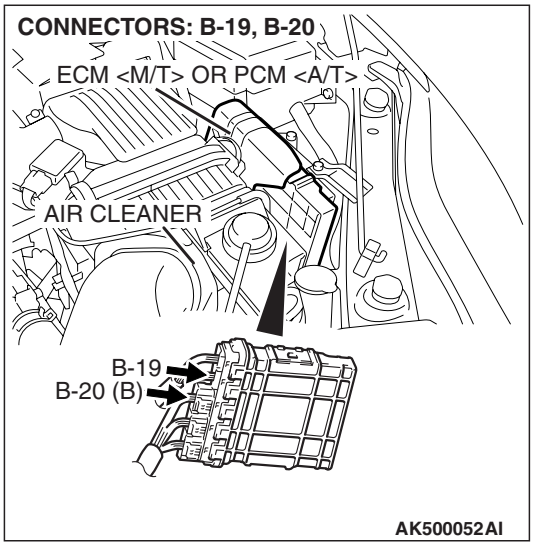

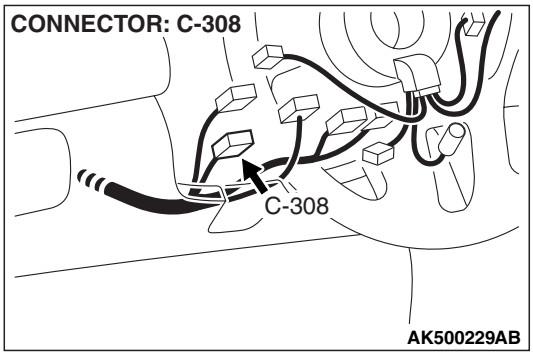

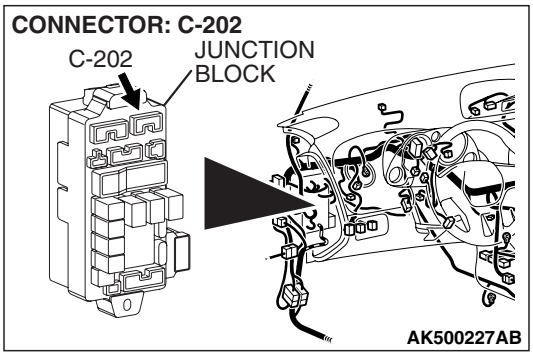

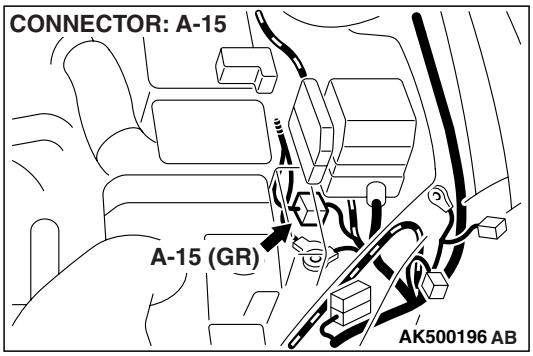

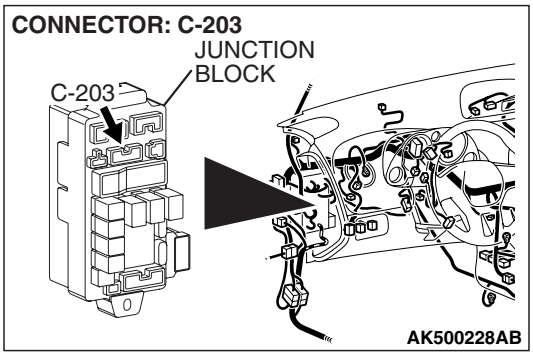

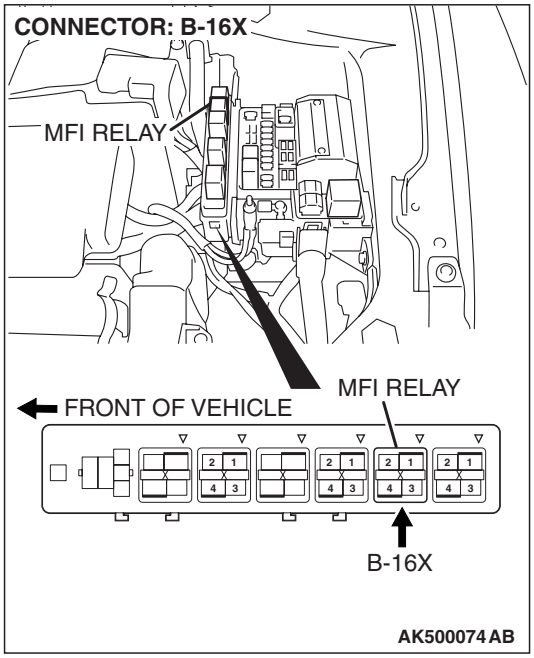

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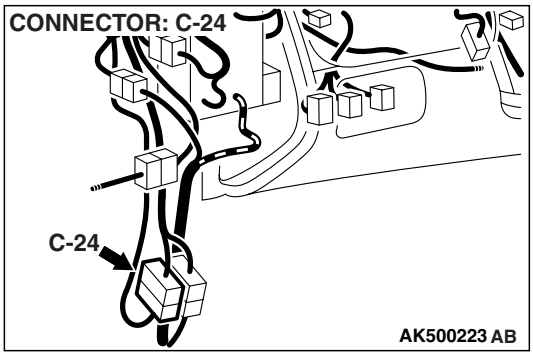


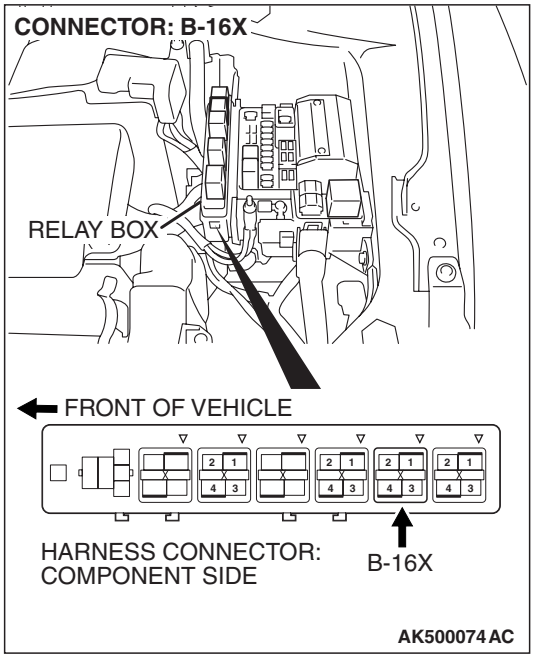
CIRCUIT OPERATION

- Battery positive voltage is applied to the MFI relay (terminals No. 1, No. 2).
- When the ignition switch is turned to the "ON" position, battery positive voltage is applied to the ECM <M/T> or the PCM <A/T> (terminal No. 43). When battery positive voltage is applied, the ECM <M/T> or the PCM <A/T> turns the power transistor in the ECM <M/T> or the PCM <A/T> "ON" and grounds the MFI relay coil. With this, the MFI relay turns "ON" the battery positive voltage is supplied to the ECM <M/T> or the PCM <A/T> (terminals No. 51, No. 64) from the MFI relay (terminal No. 4).
- A battery positive voltage is constantly supplied to the ECM <M/T> or the PCM <A/T> (terminal No. 42) as the backup power.
- The ECM <M/T> or the PCM <A/T> (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 ECM <M/T> or PCM <A/T> ground wire.
- Malfunction of the ECM <M/T> or the PCM <A/T>.

DIAGNOSIS



STEP 1. Check harness connector B-16X at MFI relay for damage.

Q: Is the connector in good condition?

YES : Go to Step 2.

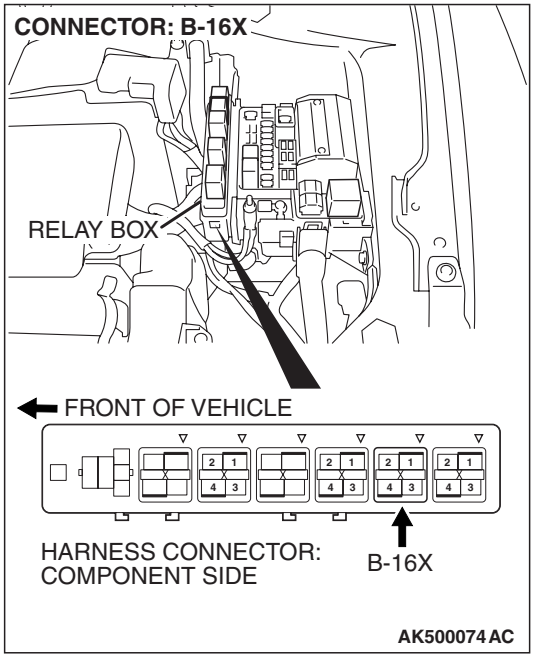
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then confirm that the malfunction symptom is eliminated.

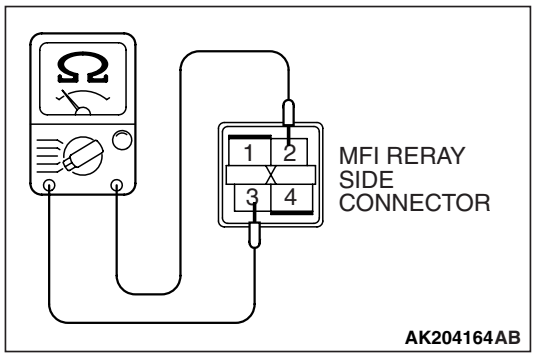
STEP 2. Check the MFI relay.

⚠ CAUTION

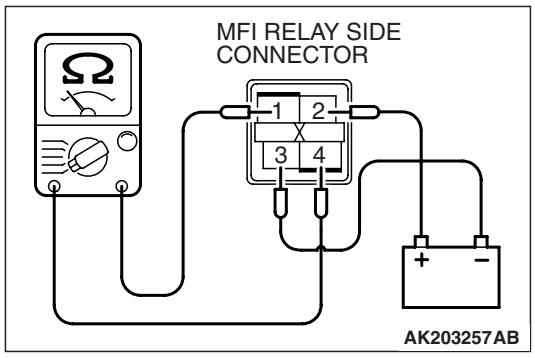
Because it is not possible to distinguish the top and the bottom of the MFI relay, inspect it with the triangle mark printed on the relay facing upward.

(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.

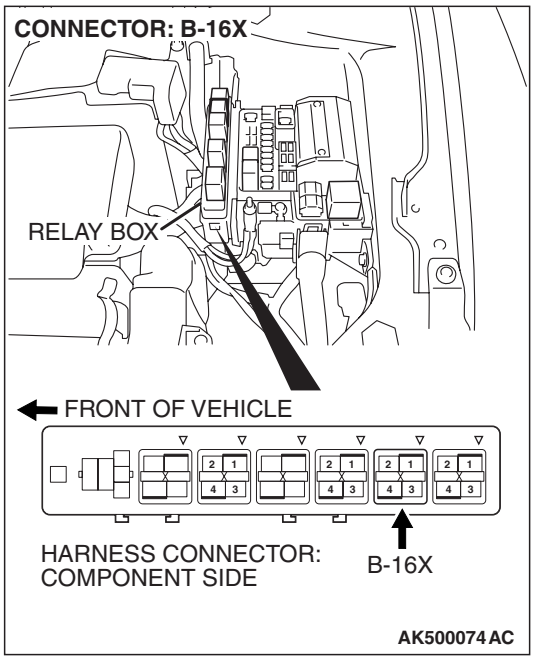
NO : Replace the MFI relay. Then confirm that the malfunction symptom is eliminated.

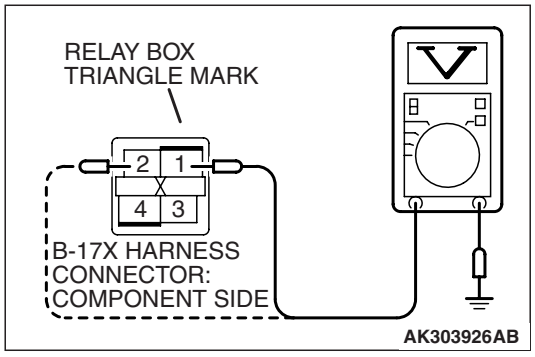
STEP 3. Measure the power supply voltage at MFI relay harness side connector B-16X.

⚠ 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-16X and measure at the harness side.



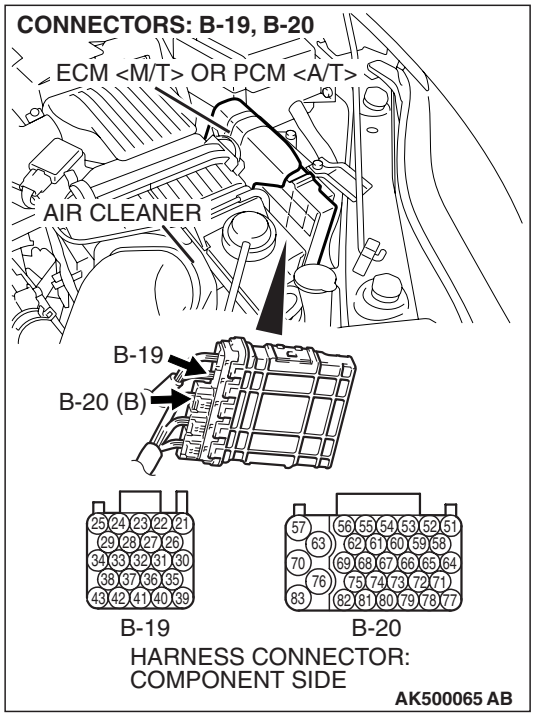


(2) Measure the voltage between terminals No. 1, No. 2 and ground.
- Voltage should be battery positive voltage.

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

YES : Go to Step 4.

NO : Check harness connector A-15 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-16X (terminals No. 1, No. 2) because of open circuit. Then confirm that the malfunction symptom is eliminated.

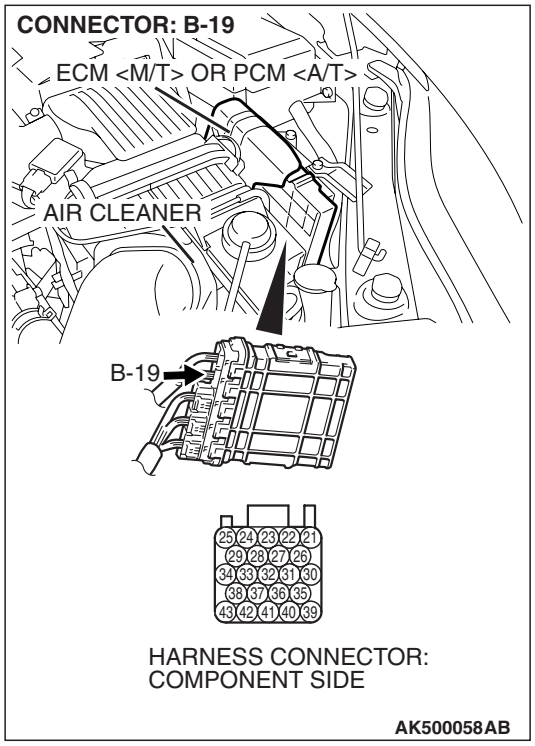


STEP 4. Check harness connector B-19 and B-20 at ECM <M/T> or PCM <A/T> for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 5.

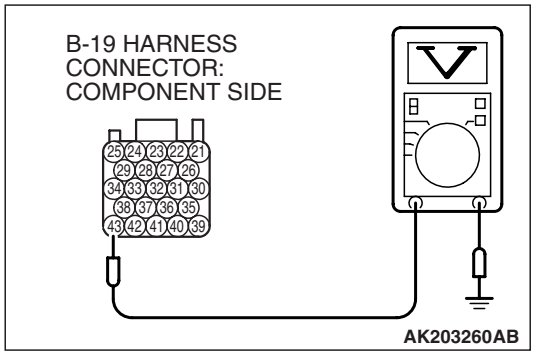
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then confirm that the malfunction symptom is eliminated.



STEP 5. Measure the ignition switch-IG signal voltage at ECM <M/T> or PCM <A/T> harness side 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. 43 and ground.
- Voltage should be battery positive voltage.

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

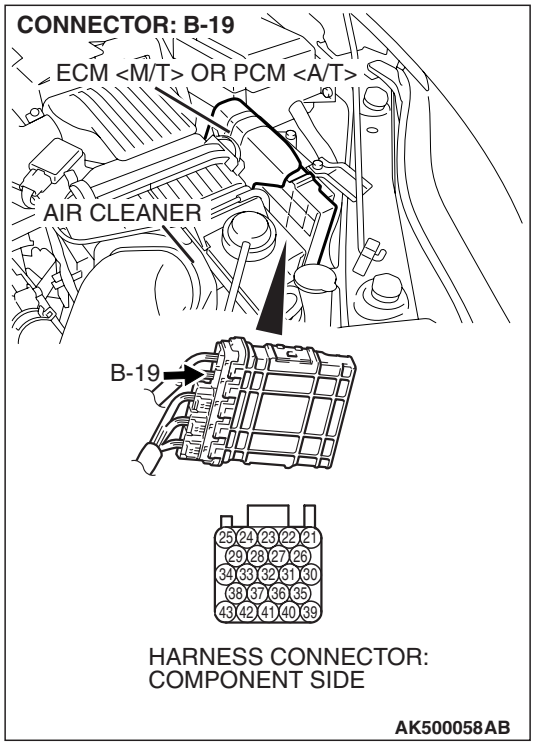
Q: Is battery positive voltage (approximately 12 volts) present?

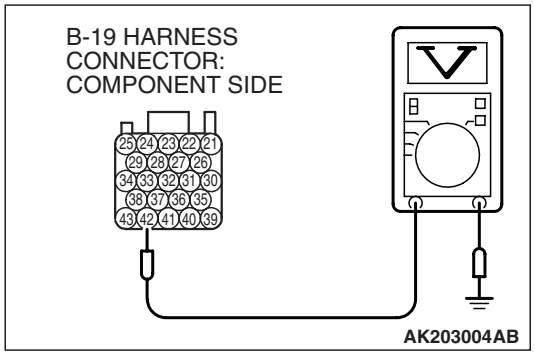
YES : Go to Step 6.

NO : Check harness connector C-203 and C-202 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 ECM <M/T> or PCM <A/T> connector B-20 (terminal No. 43) because of open circuit. Then confirm that the malfunction symptom is eliminated.

STEP 6. Measure the backup power supply voltage at ECM <M/T> or PCM <A/T> harness side connector B-19.

(1) Disconnect the connector B-19 and measure at the harness side.





(2) Measure the voltage between terminal No. 42 and ground.
- Voltage should be battery positive voltage.

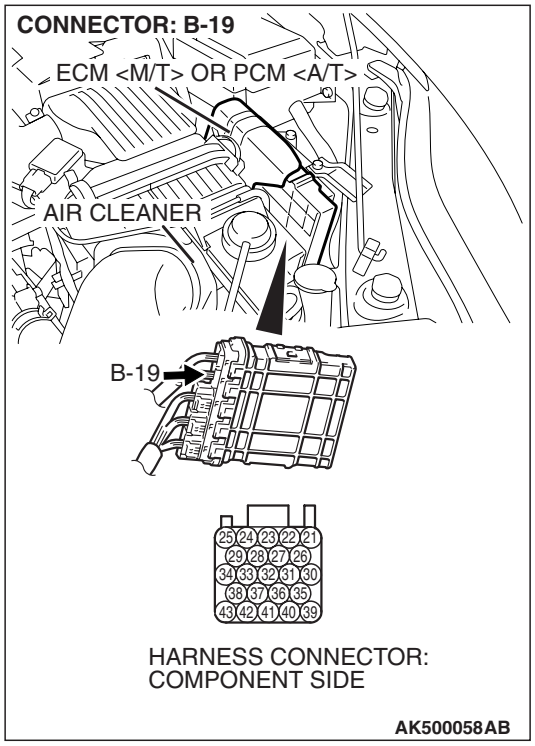
Q: Is battery positive voltage (approximately 12 volts) present?

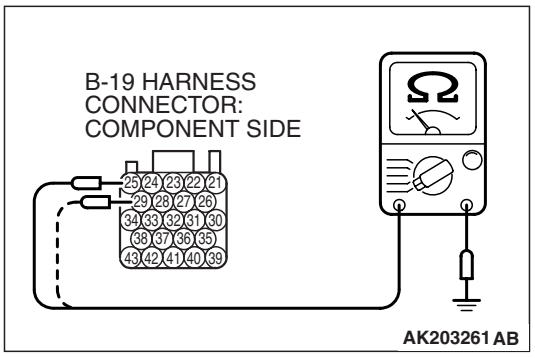
YES : Go to Step 7.

NO : Repair harness wire between relay box (9) and ECM <M/T> or PCM <A/T> connector B-19 (terminal No. 42) because of short circuit. Then confirm that the malfunction symptom is eliminated.

STEP 7. Check for continuity at ECM <M/T> or PCM <A/T> harness side connector B-19.

(1) Disconnect the connector B-19 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.

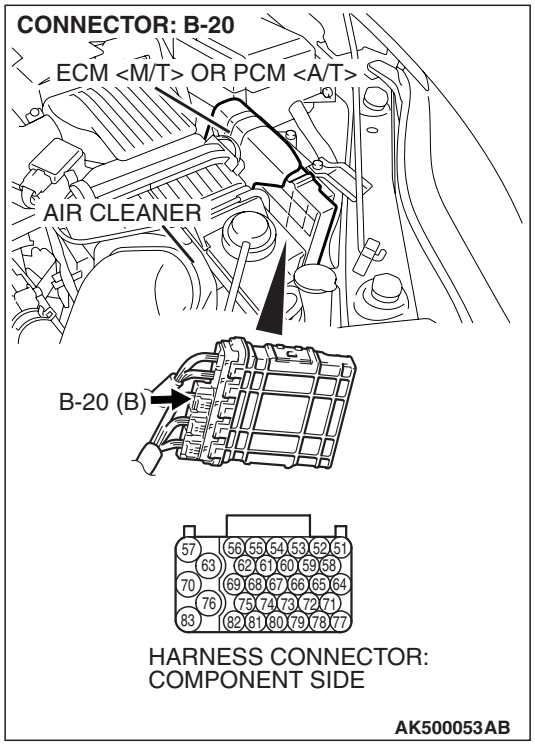
Q: Does continuity exist?

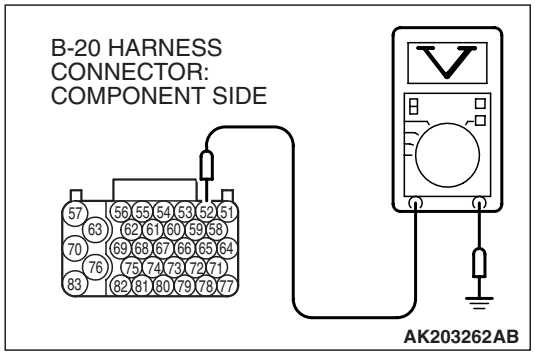
YES : Go to Step 8.

NO : Repair harness wire between ECM <M/T> or PCM <A/T> connector B-19 (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 ECM <M/T> or PCM <A/T> harness side connector B-20.

(1) Disconnect the connector B-20 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?

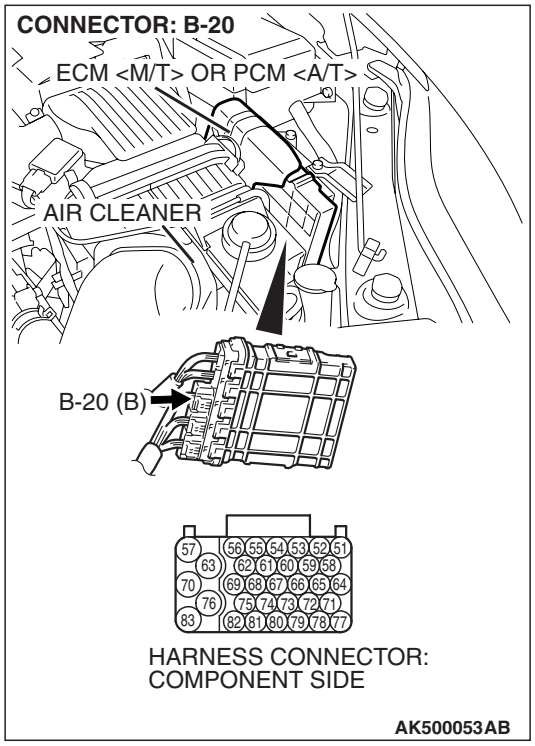
YES : Go to Step 9.

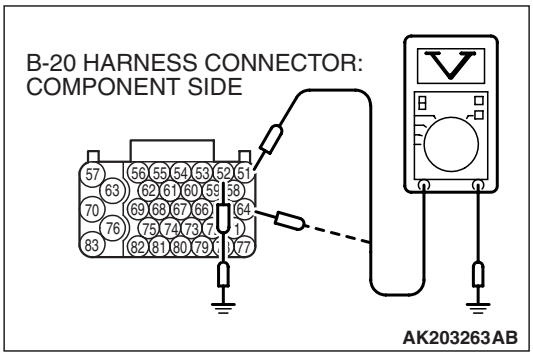
NO : Repair harness wire between MFI relay connector B-16X (terminal No. 3) and ECM <M/T> or PCM <A/T> connector B-20 (terminal No. 52) because of open circuit. Then confirm that the malfunction symptom is eliminated.

STEP 9. Measure the power supply voltage at ECM <M/T> or PCM <A/T> harness side connector B-20.

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

(2) Using a jumper wire, connect terminal No. 52 to ground.





(3) Measure the voltage between terminals (No. 51, No. 64) and ground.
- Voltage should be battery positive voltage.

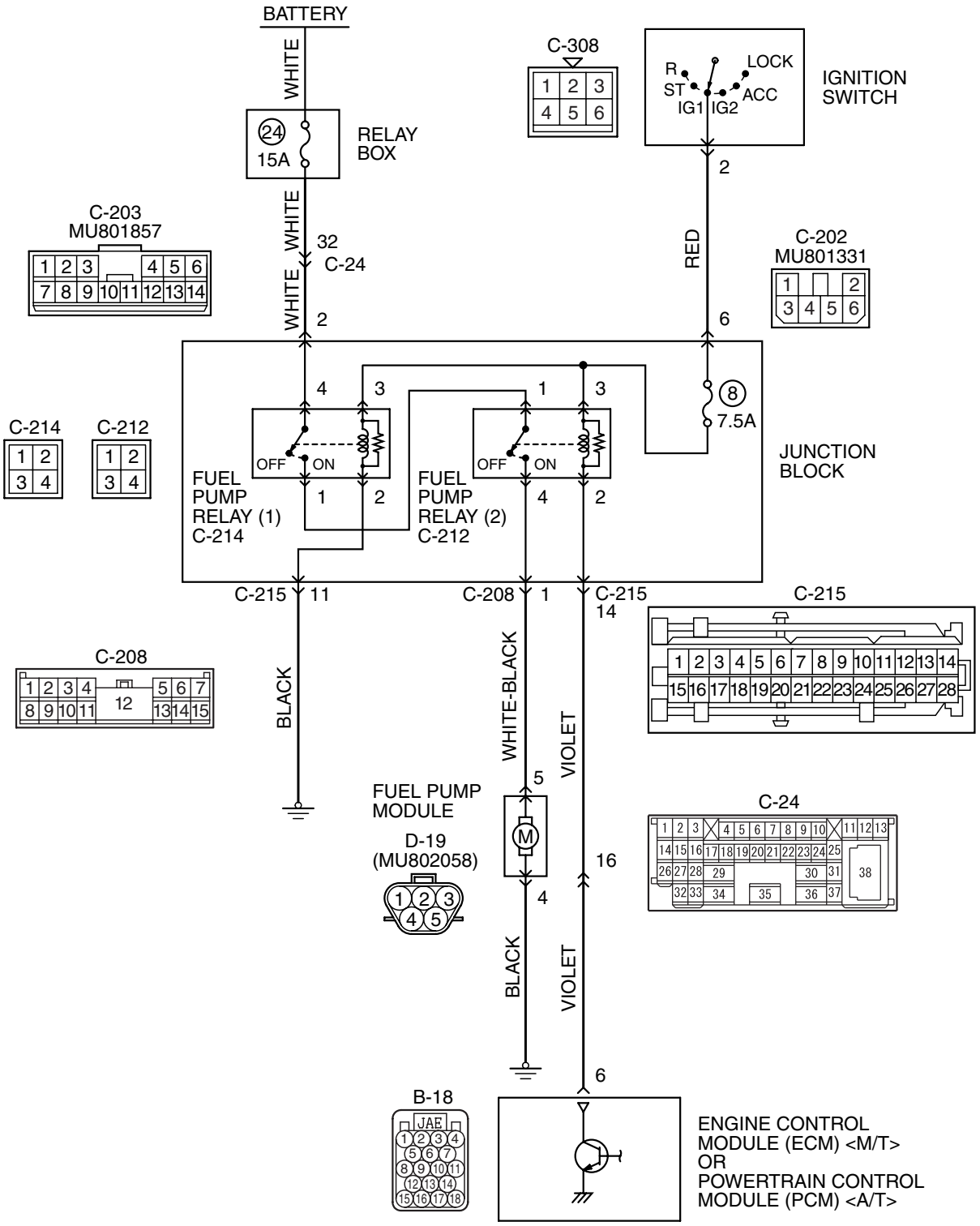
Q: Is battery positive voltage (approximately 12 volts) present?

YES : Replace the ECM or the PCM. When the ECM or the PCM is replaced, register the encrypted code. Refer to GROUP 54A, Encrypted Code Registration Criteria Table P.54A-13. Then confirm that the malfunction symptom is eliminated.

NO : Repair harness wire between MFI relay connector B-16X (terminal No. 4) and ECM <M/T> or PCM <A/T> connector B-20 (terminals No. 51, No. 64) because of open circuit. Then confirm that the malfunction symptom is eliminated.

INSPECTION PROCEDURE 29: Fuel pump system.

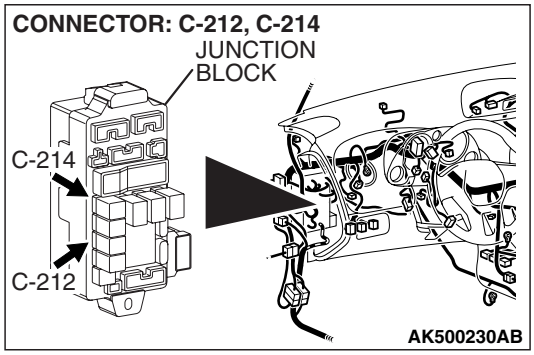
Fuel Pump Circuit



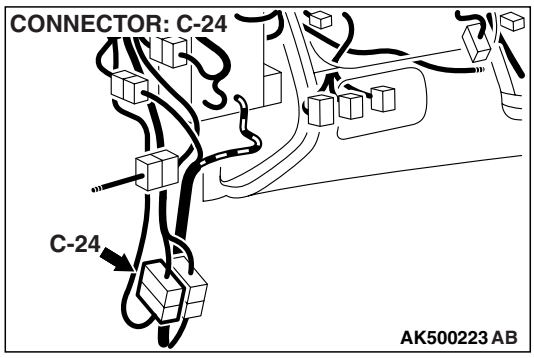
AK403712

TSB Revision

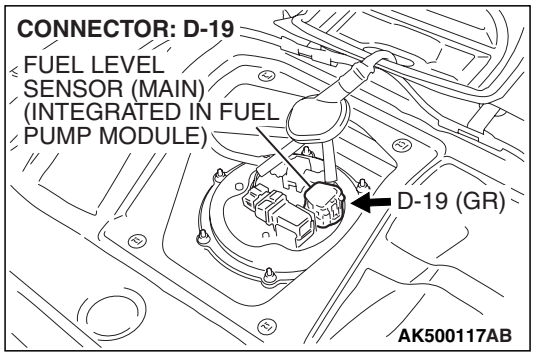
CONNECTOR: C-212, C-214



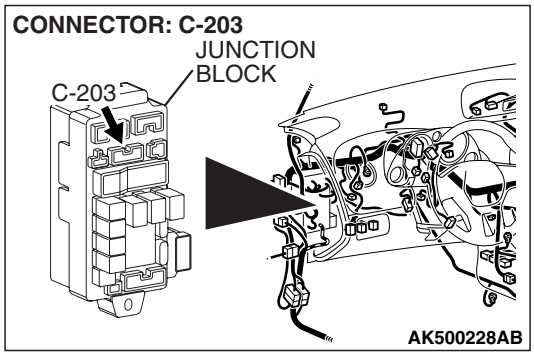
CONNECTOR: C-24



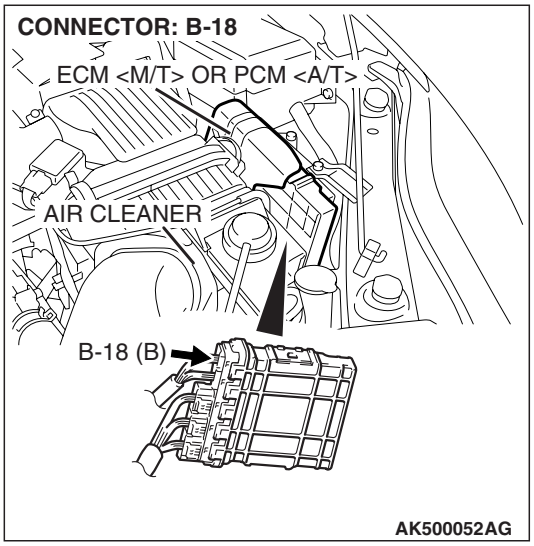
CONNECTOR: D-19



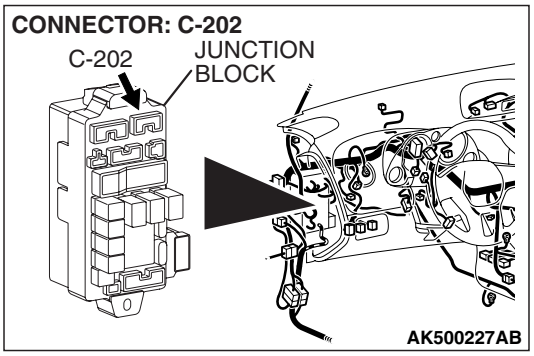
CONNECTOR: C-203



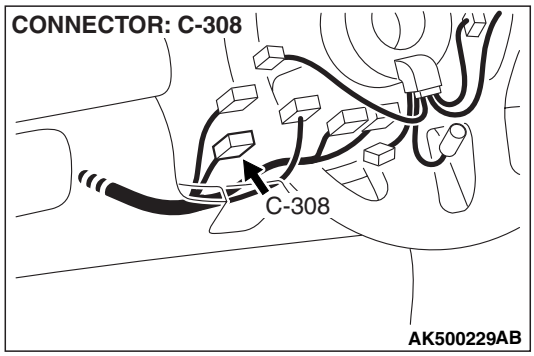
CONNECTOR: B-18



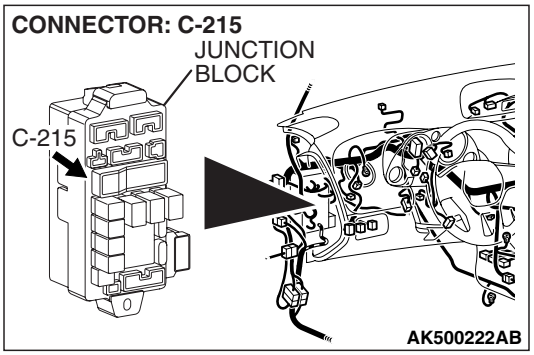
CONNECTOR: C-202



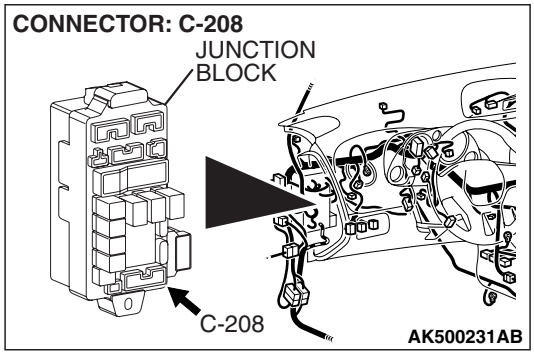
CONNECTOR: C-308



CONNECTOR: C-215



TSB Revision



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 ECM <M/T> or the PCM <A/T> turns the power transistor in the ECM <M/T> or the PCM <A/T> 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).

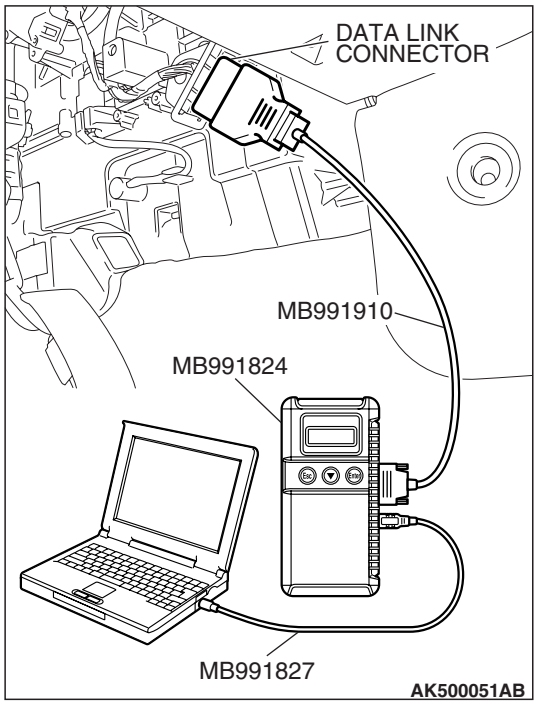
TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)

- Malfunction of the fuel pump relay.
- Malfunction of the fuel pump.
- Improper connector contact, open or short-circulated harness wire.
- Malfunction of the ECM <M/T> or the PCM <A/T>.

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.

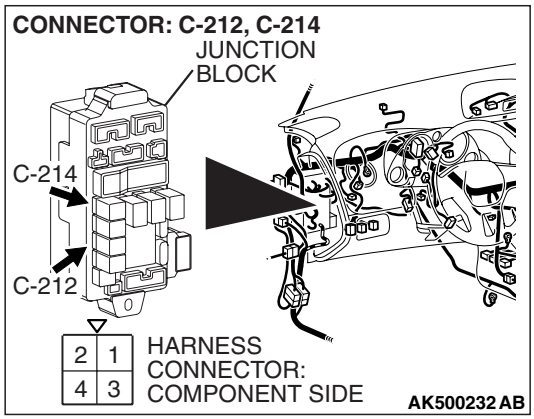
(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Set scan tool MB991958 to the actuator test mode for item 9, Fuel Pump.
- An operation sound of the fuel pump should be heard.

(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.



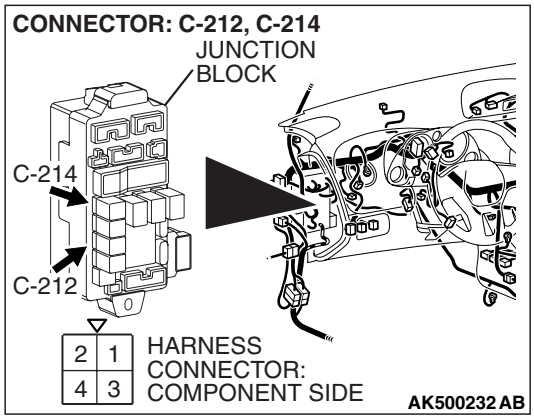
STEP 2. Check harness connector C-214 at fuel pump relay 1 and harness connector C-212 at fuel pump relay 2 for damage.

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.

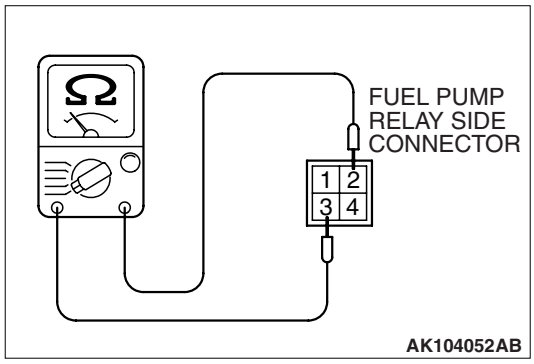
STEP 3. Check the fuel pump relay 1 and 2.



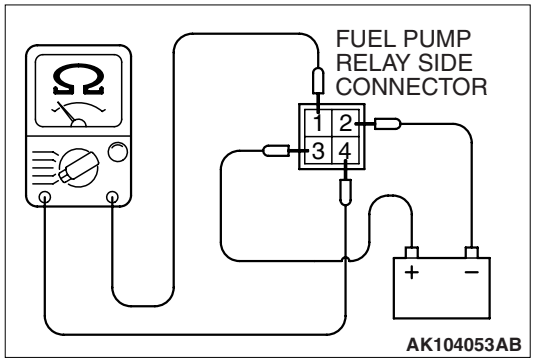
⚠ CAUTION

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)

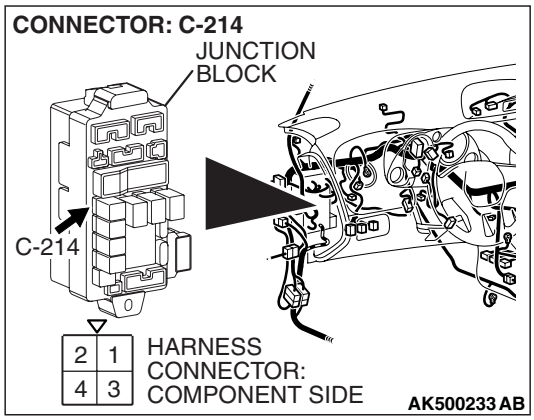
(5) Install the fuel pump relay 1 and 2.

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.

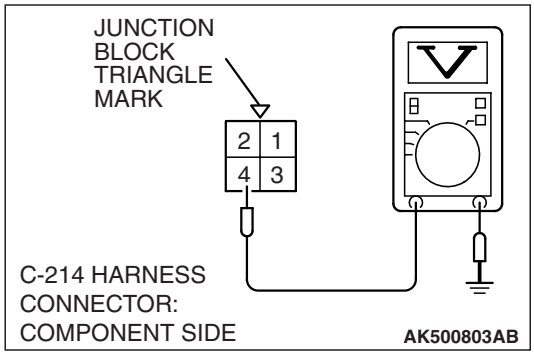
STEP 4. Measure the power supply voltage at fuel pump relay 1 harness side connector C-214.



⚠ 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-214 and measure at the harness side.



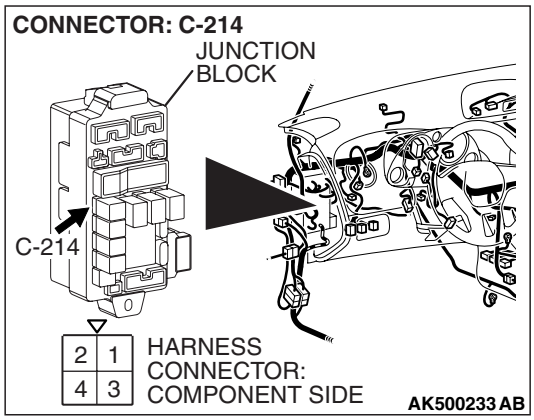
(2) Measure the voltage between terminal No. 4 and ground.
- Voltage should measure battery positive voltage.

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

YES : Go to Step 5.

NO : Check harness connector C-203 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-214 (terminal No. 4) because of open circuit. Then confirm that the malfunction symptom is eliminated.

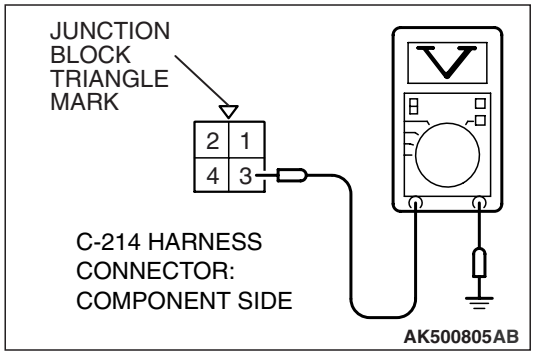
STEP 5. Measure the power supply voltage at fuel pump relay 1 harness side connector C-214.



⚠ 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-214 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.

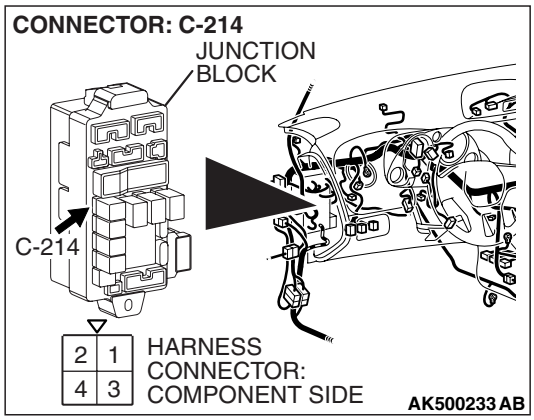
(4) Turn the ignition switch to the "LOCK" (OFF) position.

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

YES : Go to Step 6.

NO : Check harness connector C-202 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-214 (terminal No. 3) because of open circuit. Then confirm that the malfunction symptom is eliminated.

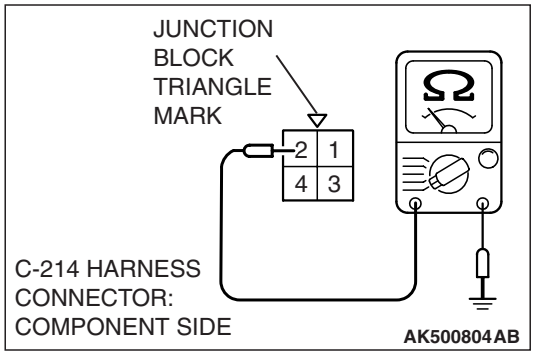
STEP 6. Check for continuity at fuel pump relay 1 harness side connector C-214.



⚠ 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-214 and measure at the harness side.



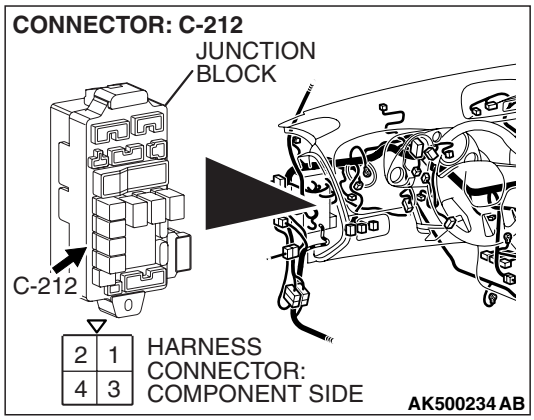
(2) Check for the continuity between terminal No. 2 and ground.
- Should be less than 2 ohms.

Q: Does continuity exist?

YES : Go to Step 7.

NO : Check connector C-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 fuel pump relay 1 connector C-214 (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-212.

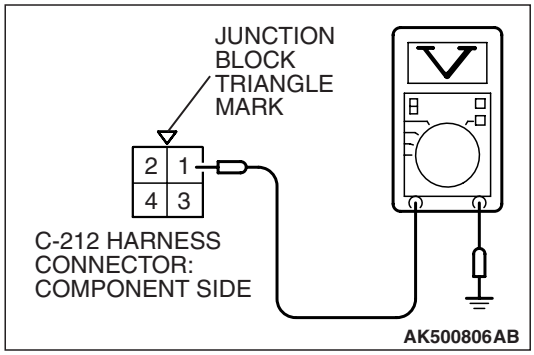


⚠ CAUTION

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-212 and measure at the harness side.

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



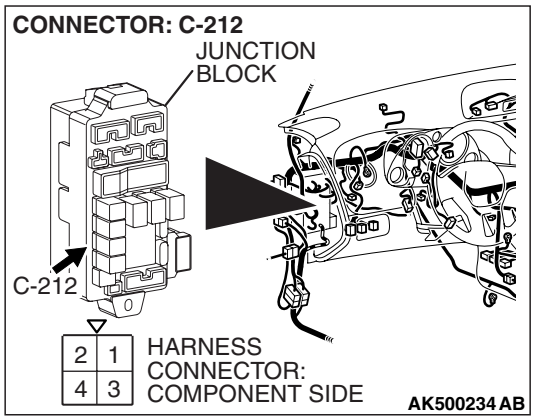
(3) Measure the voltage between terminal No. 1 and ground.
- Voltage should be battery positive voltage.

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-214 (terminal No. 1) and fuel pump relay 2 connector C-212 (terminal No. 1) because of open circuit. Then confirm that the malfunction symptom is eliminated.

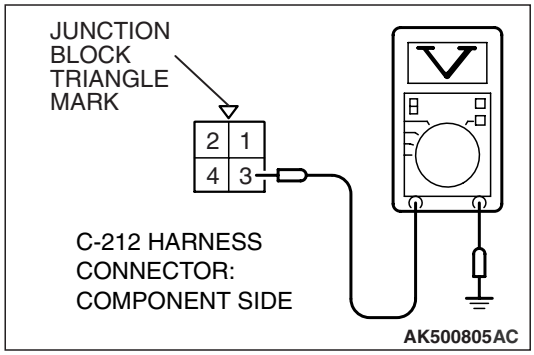
STEP 8. Measure the power supply voltage at fuel pump relay 2 harness side connector C-212.



⚠ 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-212 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.

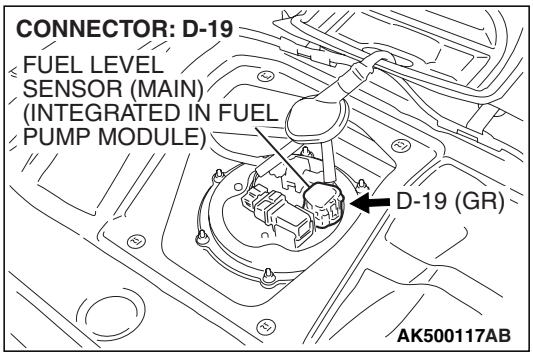
NO : Check harness connector C-202 at intermediate connector for damage, and repair or replace as required. Refer to, GROUP 00E, Harness Connector Inspection P.00E-2. If intermediate connector is in good condition, repair harness wire between ignition switch connector C-308 (terminal No. 2) and fuel pump relay 2 connector C-212 (terminal No. 3) because of open circuit. Then confirm that the malfunction symptom is eliminated.

STEP 9. Check connector D-19 at fuel pump for damage.

Q: Is the connector in good condition?

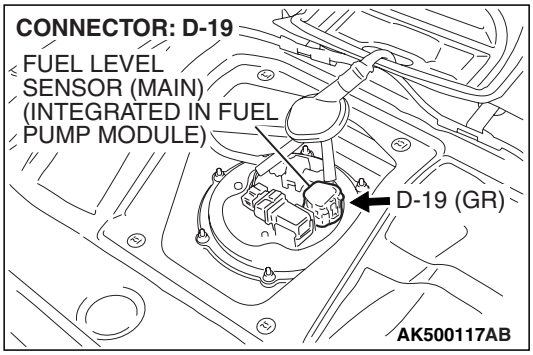
YES : Go to Step 10.

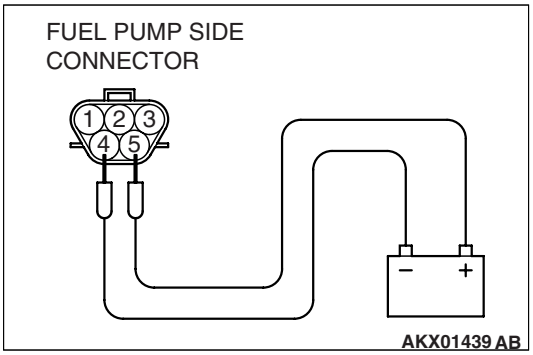
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then confirm that the malfunction symptom is eliminated.



STEP 10. Check the fuel pump operation.

(1) Disconnect fuel pump connector D-19.





(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.

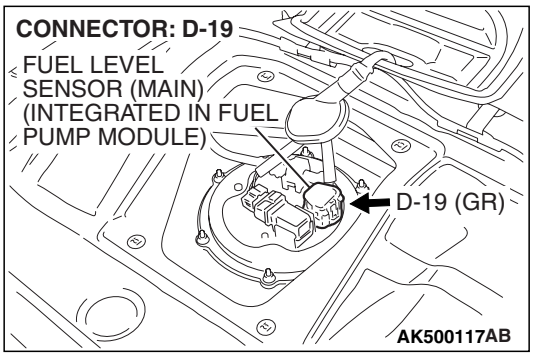
Q: Is the fuel pump operating properly?

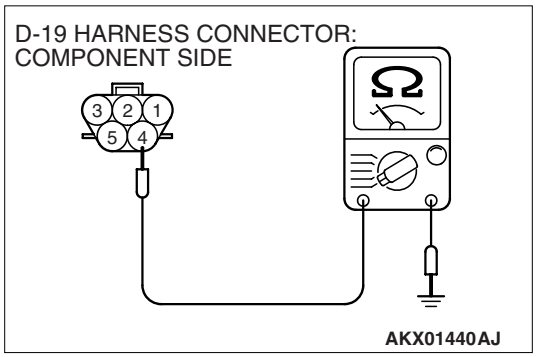
YES : Go to Step 11.

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-19.

(1) Disconnect the connector D-19 and measure at the harness side.



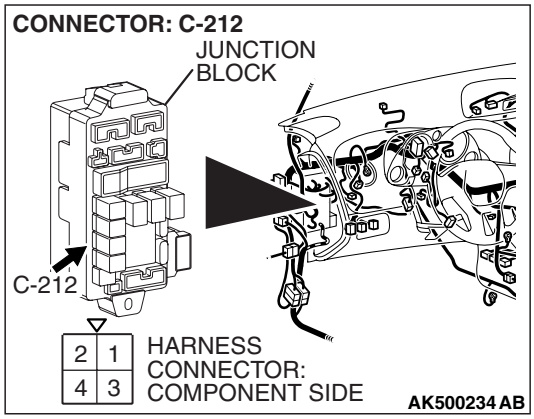


(2) Check for the continuity between terminal No. 4 and ground.
- Should be less than 2 ohms.

Q: Does continuity exist?

YES : Go to Step 12.

NO : Repair harness wire between fuel pump connector D-19 (terminal No. 4) and ground because of open circuit or harness damage. Then confirm that the malfunction symptom is eliminated.



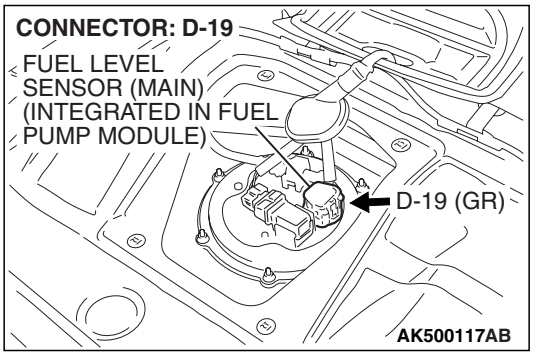
STEP 12. Check for open circuit and short circuit to ground and harness damage between fuel pump relay 2 connector C-212 (terminal No. 4) and fuel pump connector D-18 (terminal No. 5).

NOTE: Check harness after checking intermediate connector C-208. 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.

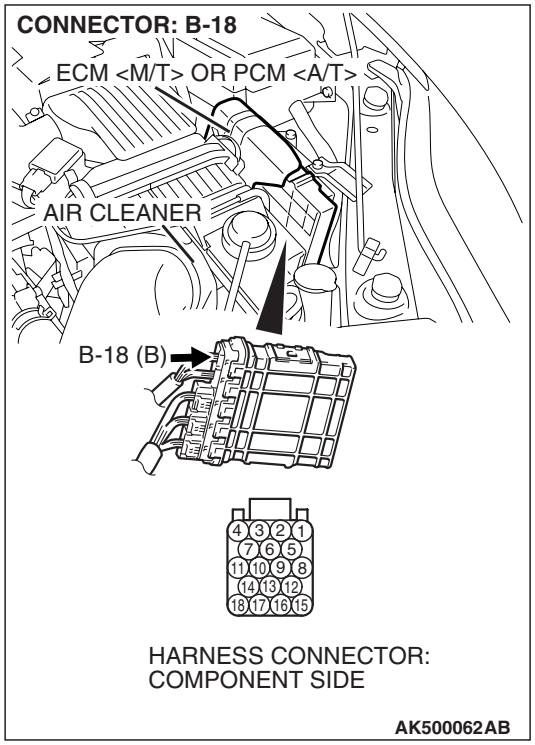


STEP 13. Check connector B-18 at ECM <M/T> or PCM <A/T> for damage.

Q: Is the connector in good condition?

YES : Go to Step 14.

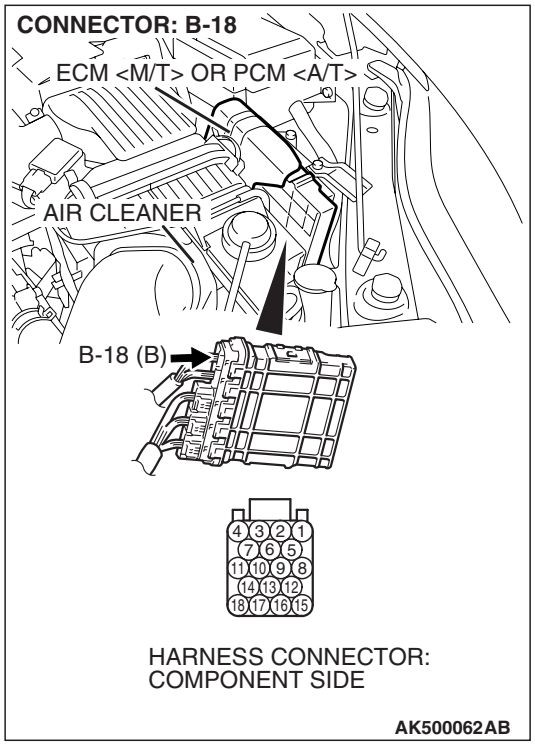
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then confirm that the malfunction symptom is eliminated.

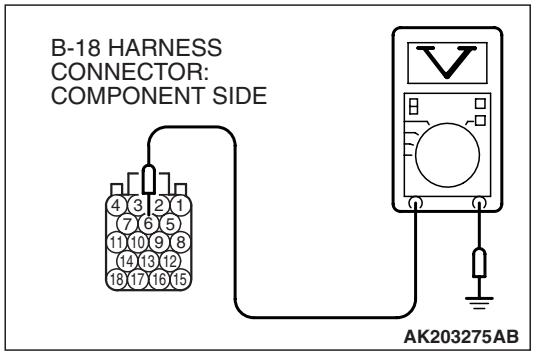


STEP 14. Measure the power supply voltage at ECM <M/T> or PCM <A/T> connector B-18.

(1) Disconnect the connector B-18 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.

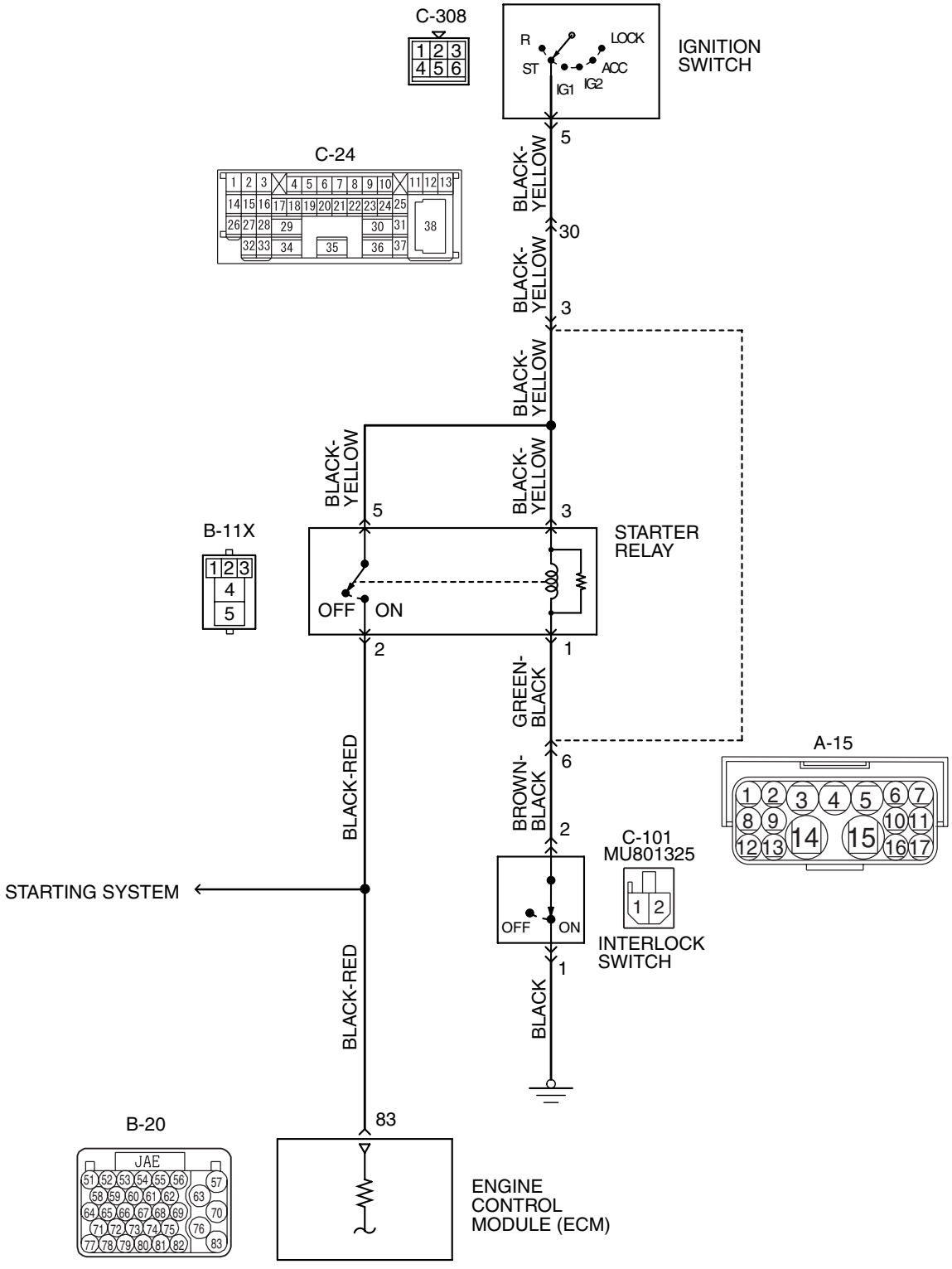
Q: Is battery positive voltage (approximately 12 volts) present?

YES : Replace the ECM or the PCM. When the ECM or the PCM is replaced, register the encrypted code. Refer to GROUP 54A, Encrypted Code Registration Criteria Table P.54A-13. Then confirm that the malfunction symptom is eliminated.

NO : Check harness connectors C-24 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 fuel pump relay 2 connector C-212 (terminal No. 2) and ECM <M/T> or PCM <A/T> connector B-18 (terminal No. 6) because of open circuit. Then confirm that the malfunction symptom is eliminated.

INSPECTION PROCEDURE 30: Ignition Switch-ST System. <M/T>

Ignition Switch-ST Circuit



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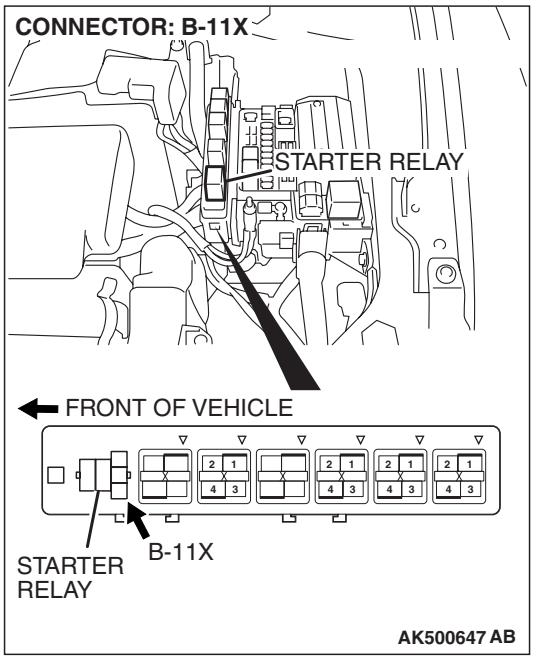

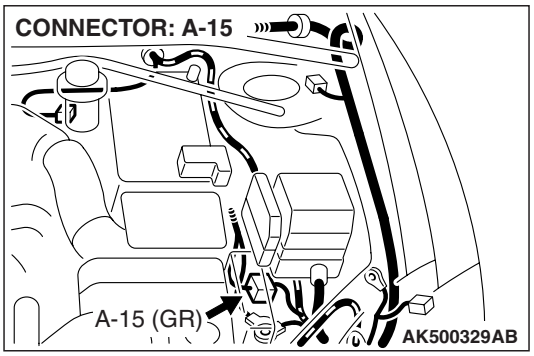

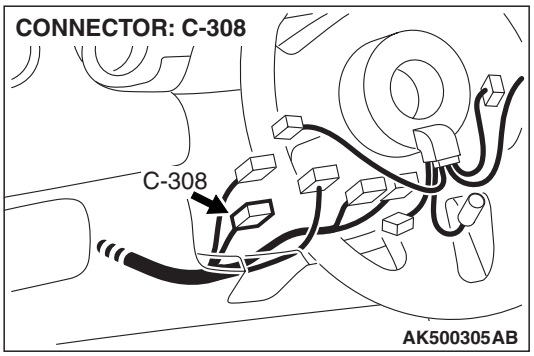

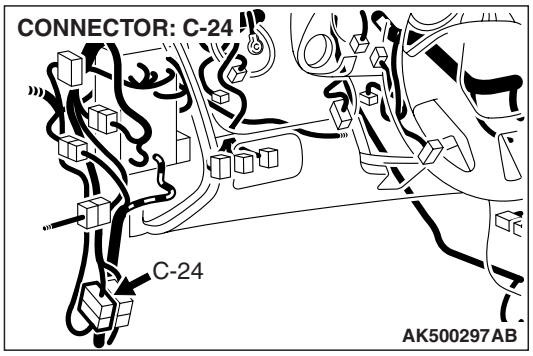

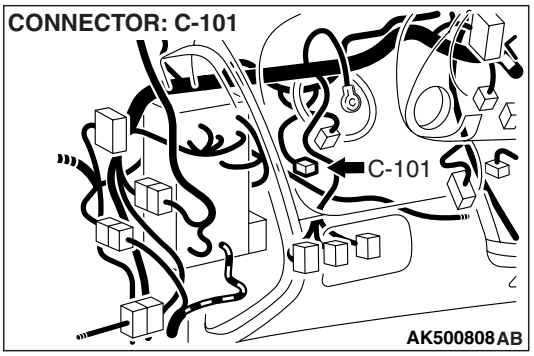

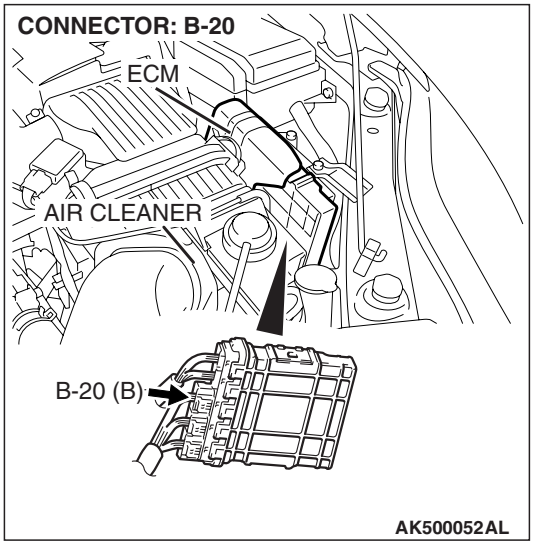

CIRCUIT OPERATION

- The battery positive voltage is supplied to the ECM (terminal No. 83) via the starter relay during engine cranking. With this, the ECM detects that the engine is being cranked.

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

- Malfunction of the ignition switch.
- Malfunction of the starter relay.
- Improper connector contact, open circuit or short-circuited harness wire.
- Malfunction of the ECM.

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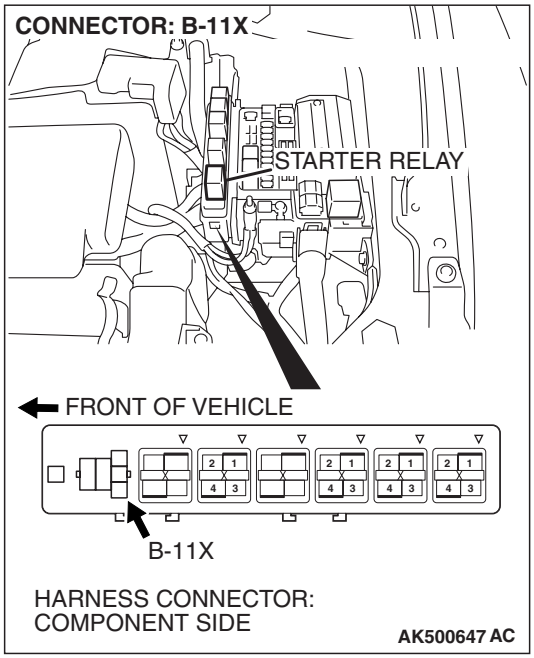
DIAGNOSIS



STEP 1. Check connector B-11X at starter 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 starter relay.

Refer to GROUP 16, Starting system –On-vehicle Service – Starter relay check P.16-26.

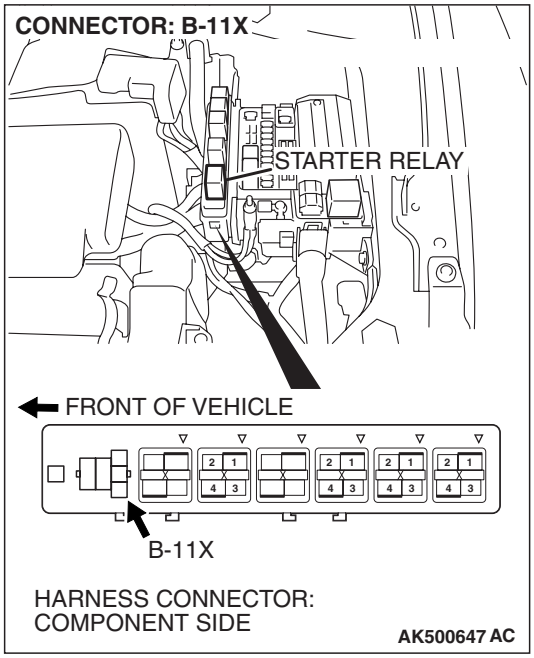
Q: Are there any abnormalities?

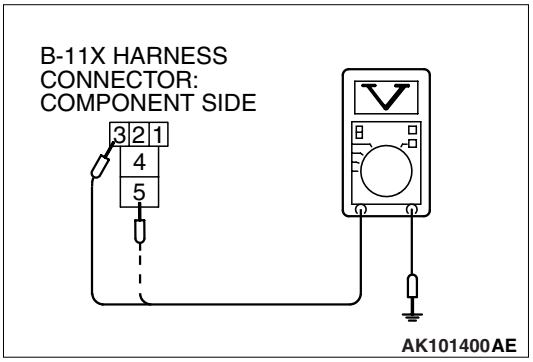
YES : Go to Step 3.

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

STEP 3. Measure the power supply voltage at starter relay connector B-11X.

(1) Disconnect the connector B-11X and measure at the harness side.
(2) Turn the ignition switch to the "START" position.





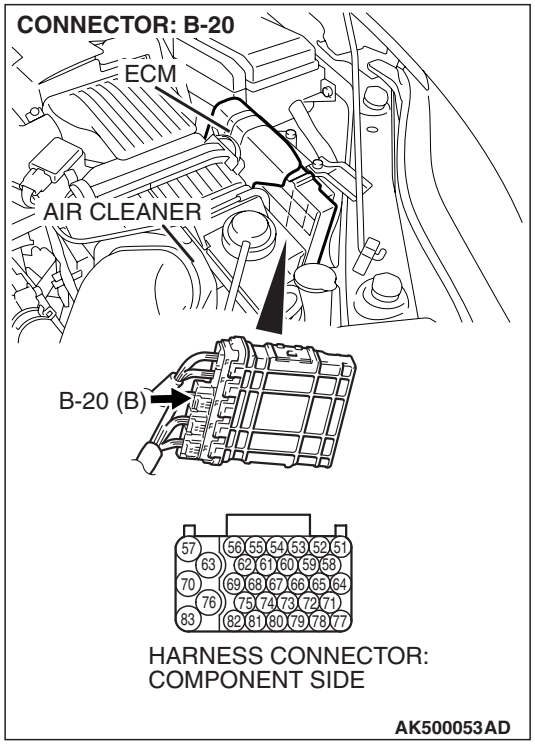
(3) Measure the voltage between terminal No. 3, No. 5 and ground.
- Voltage should be battery positive voltage.

(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 connectors A-15 and C-24 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. 5) and starter relay connector B-11X (terminal No. 3, No. 5) because of open circuit. Then confirm that the malfunction symptom is eliminated.



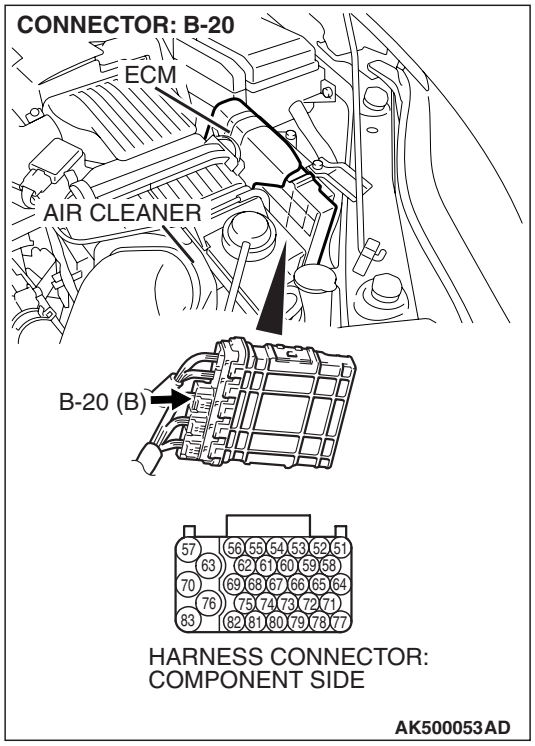
STEP 4. Check connector B-20 at ECM for damage.

Q: Is the connector in good condition?

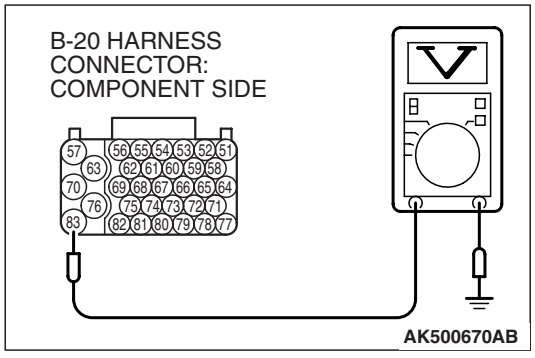
YES : Go to Step 5.

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. Measure the power supply voltage at ECM connector B-20.



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



(3) Measure the voltage between terminal No. 83 and ground.
- Voltage should be battery positive voltage.

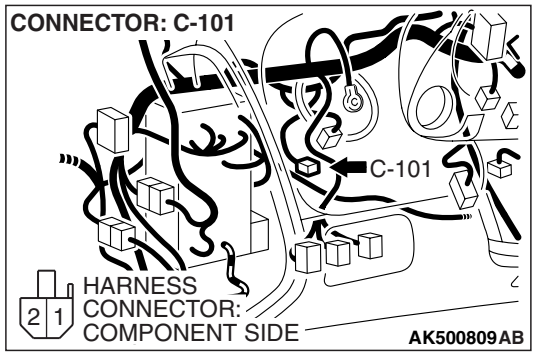
(4) Turn the ignition switch to the "LOCK" (OFF) position.

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

YES : Go to Step 6.

NO : Repair harness wire between starter relay connector B-11X (terminal No. 2) and ECM connector B-20 (terminal No. 83) because of open circuit. Then confirm that the malfunction symptom is eliminated.

STEP 6. Check connector C-101 at interlock switch 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 the interlock switch.

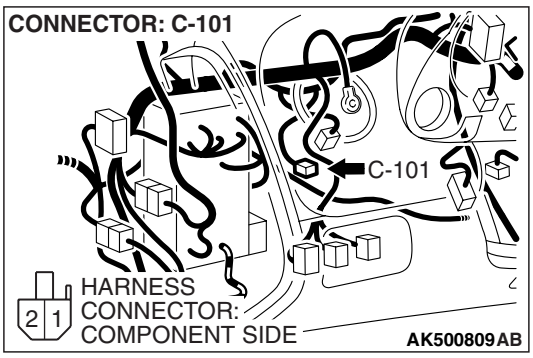
Refer to GROUP 21A, On-vehicle Service –Interlock switch check and adjustment P.21A-11.

Q: Are there any abnormalities?

YES : Go to Step 8.

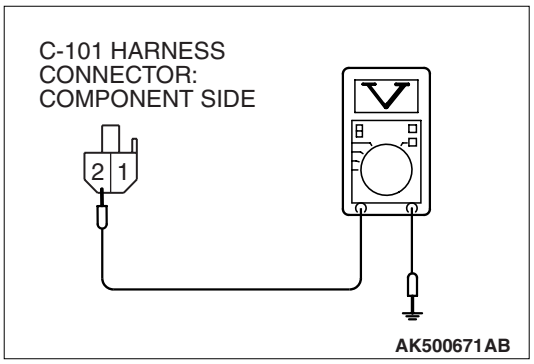
NO : Repair or replace it. Then confirm that the malfunction symptom is eliminated.

STEP 8. Measure the power supply voltage at interlock switch connector C-101.



(1) Disconnect the connector C-101 and measure at the harness side.

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



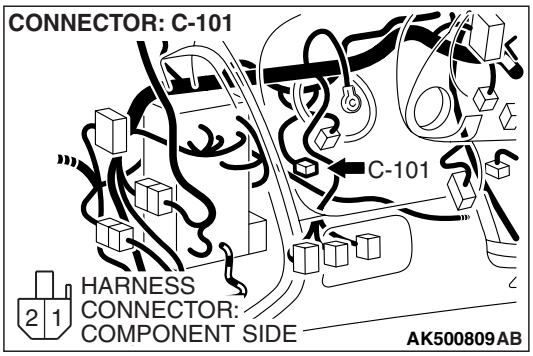
(3) Measure the voltage between terminal No. 2 and ground.
- Voltage should be battery positive voltage.

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

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

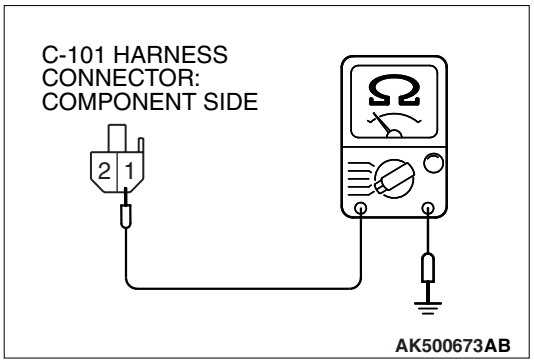
YES : Go to Step 9.

NO : Check connector A-15 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 starter relay connector B-11X (terminal No. 1) and interlock switch connector C-101 (terminal No. 2) because of open circuit. Then confirm that the malfunction symptom is eliminated.



STEP 9. Check the continuity at interlock switch harness side connector C-101.

(1) Disconnect the connector C-101 and measure at the harness side.



(2) Check for the continuity between terminal No. 1 and ground.
- Should be less than 2 ohms.

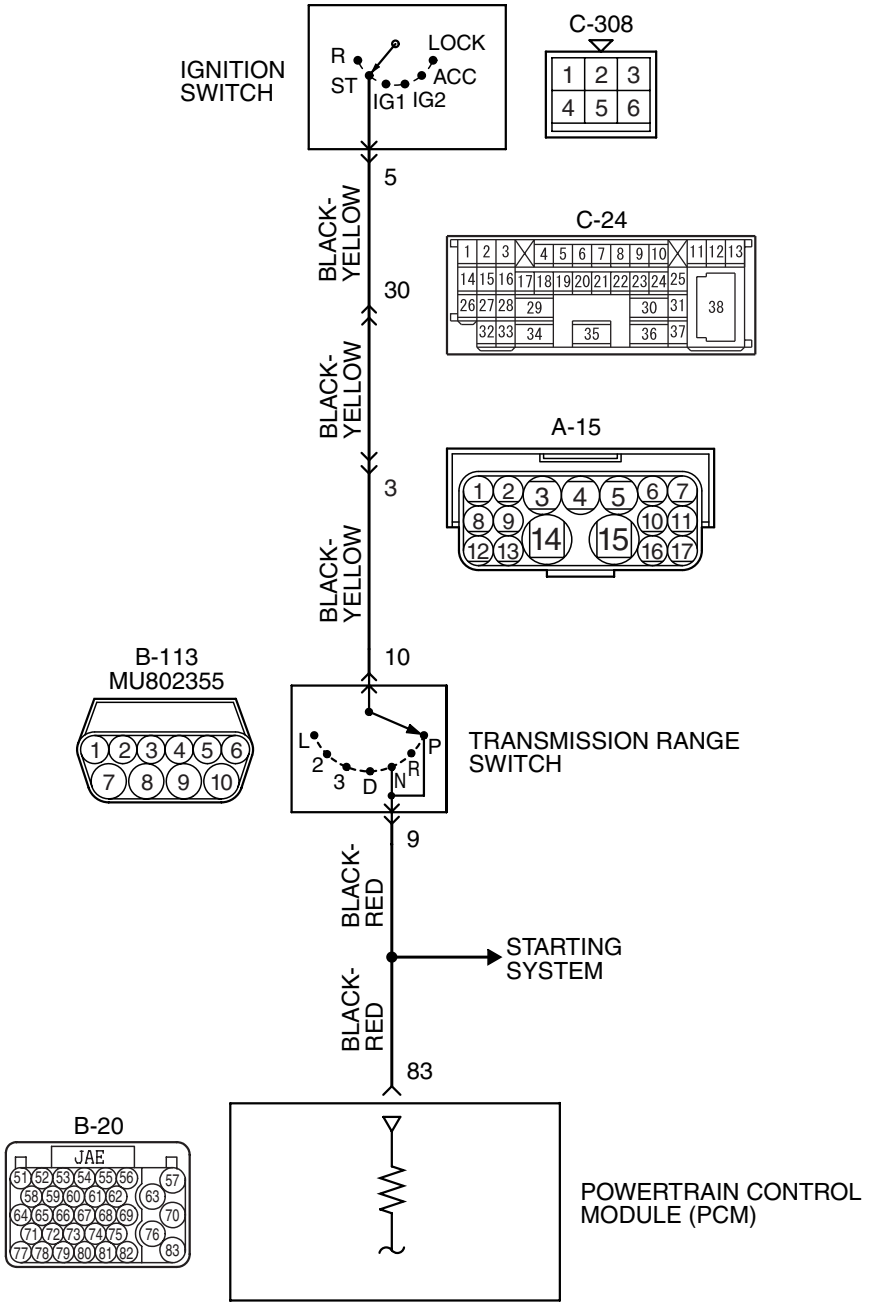
Q: Is the continuity normal?

YES : Replace the ECM. When the ECM is replaced, register the encrypted code. Refer to GROUP 54A, Encrypted Code Registration Criteria Table. Then confirm that the malfunction symptom is eliminated.

NO : Repair harness wire between interlock switch connector C-101 (terminal No. 1) and ground because of open circuit or harness damage. Then confirm that the malfunction symptom is eliminated.

INSPECTION PROCEDURE 31: Ignition Switch-ST System and Transmission Range Switch System <A/T>

Ignition Switch-ST and Transmission Range Switch Circuit



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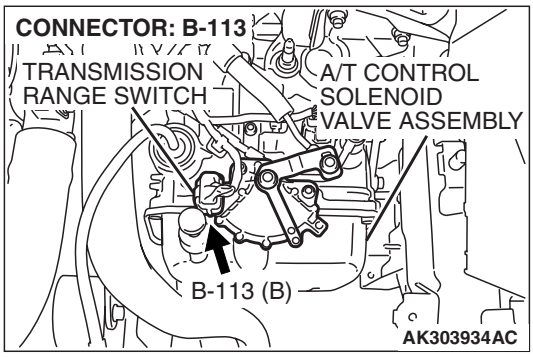
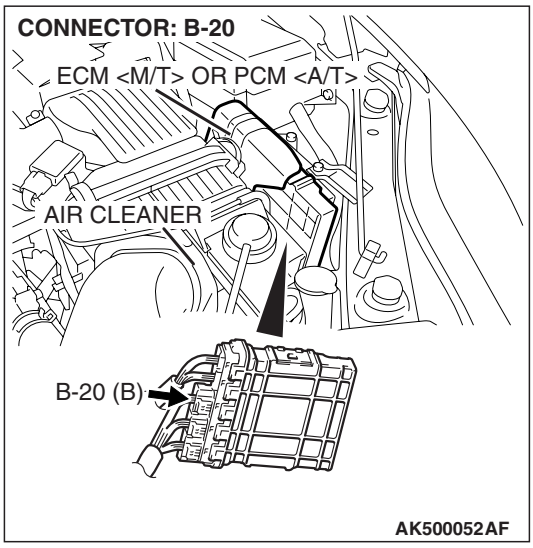
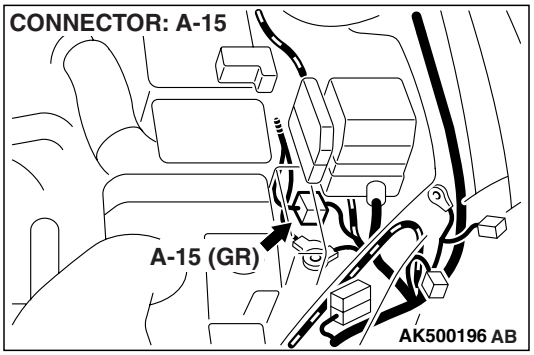
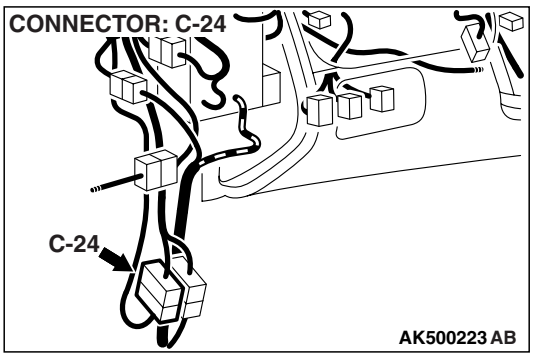
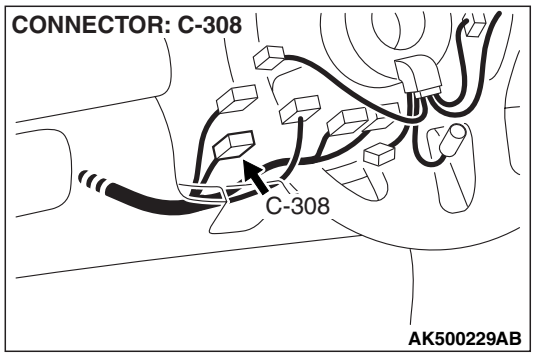










COMMENT

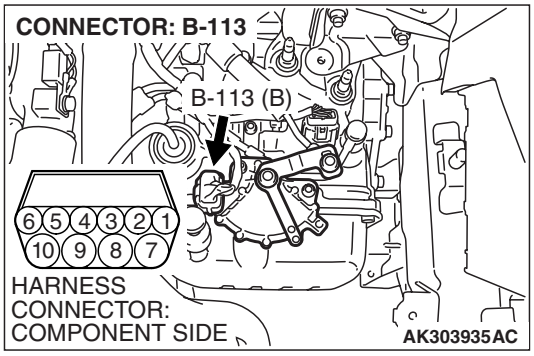
- If the selector lever is moved to "P" or "N" range and the ignition switch is turned to "START" position, battery positive voltage is supplied to PCM (terminal No. 83) through the ignition switch and transmission range switch. Because of this, the PCM detects that the engine is cranking.
- The transmission 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-113 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.

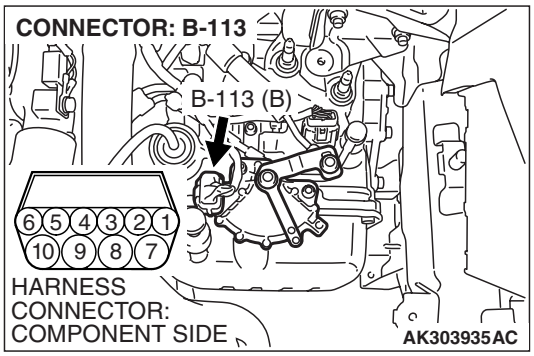
Refer to GROUP 23A, On-vehicle Service –Essential Service – Transmission Range Switch Continuity Check P.23A-387.

Q: Are there any abnormalities?

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

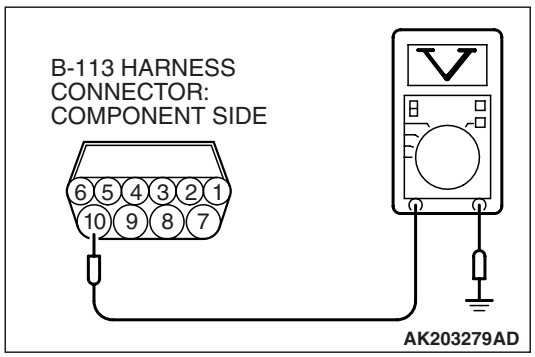
NO : Go to Step 3.

STEP 3. Measure the power supply voltage at transmission range switch connector B-113.



(1) Disconnect the connector B-113 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-15 and C-24 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-113 (terminal No. 10) because of open circuit. Then confirm that the malfunction symptom is eliminated.

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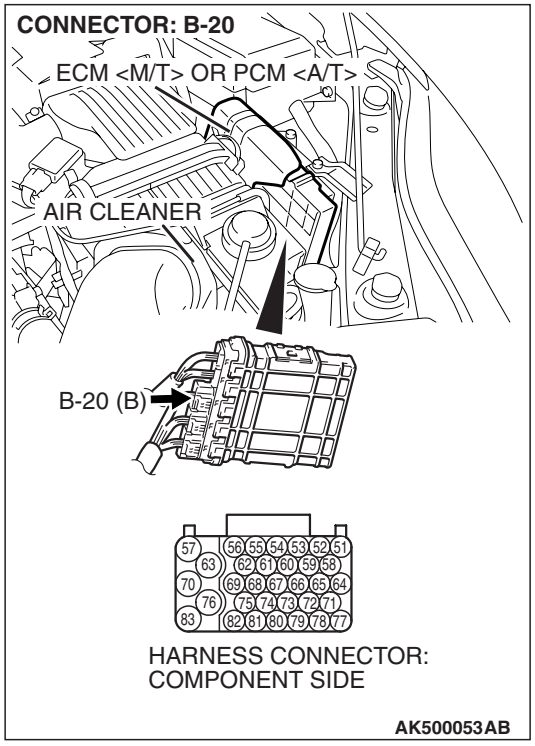
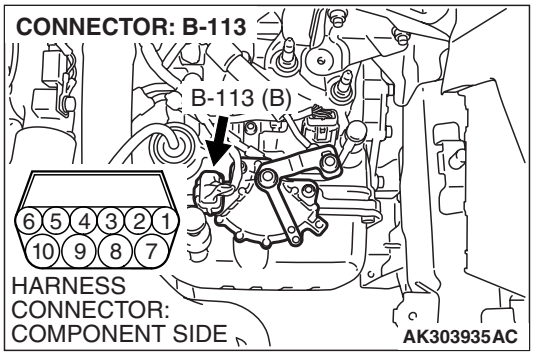


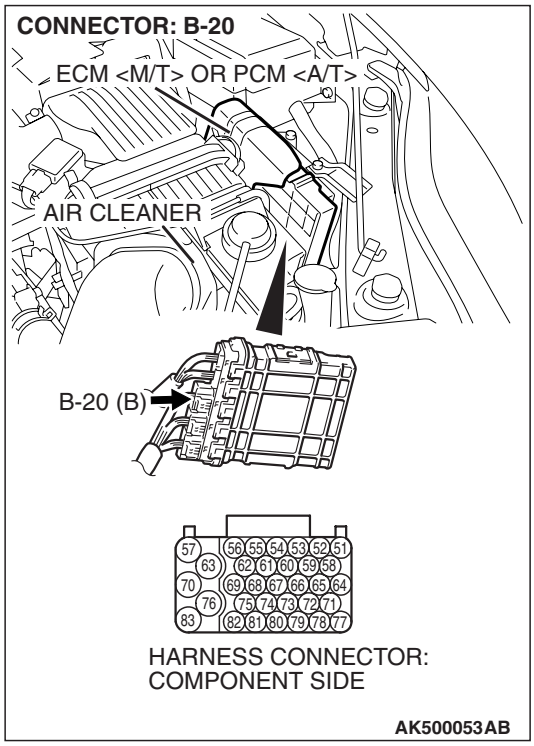
STEP 4. Check connector B-20 at PCM for damage.

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.





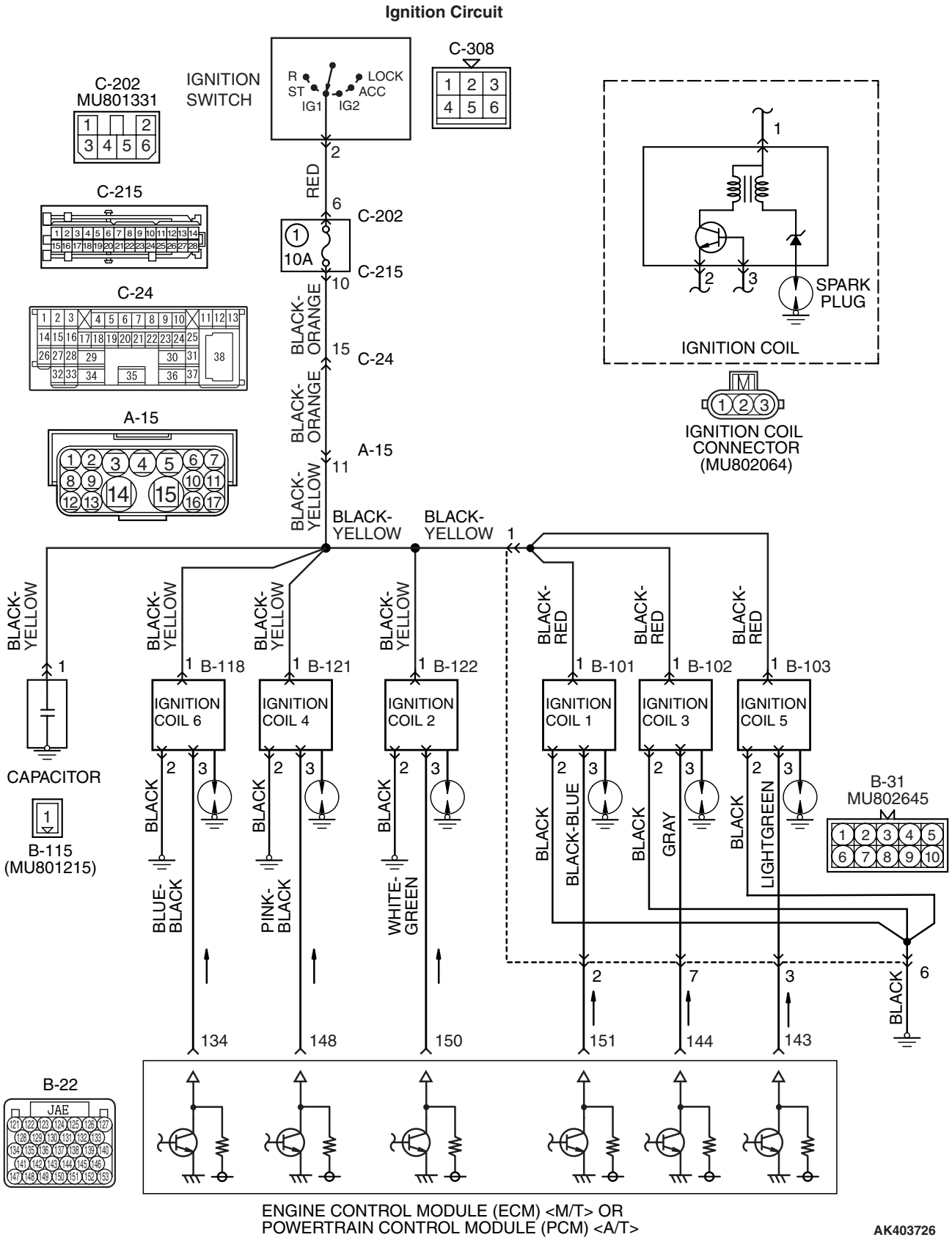
STEP 5. Check for open circuit and short circuit to ground and harness damage between transmission range switch connector B-113 (terminal No. 9) and PCM connector B-20 (terminal No. 83).

Q: Is the harness wire in good condition?

YES : Replace the PCM. When the PCM is replaced, register the encrypted code. Refer to GROUP 54A, Encrypted Code Registration Criteria Table P.54A-13. Then confirm that the malfunction symptom is eliminated.

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

INSPECTION PROCEDURE 32: Ignition Circuit System.



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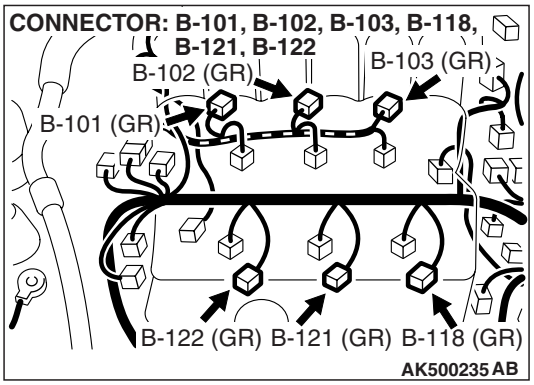

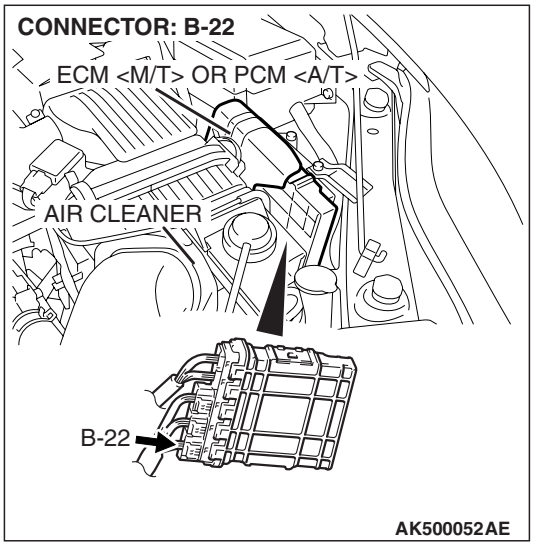

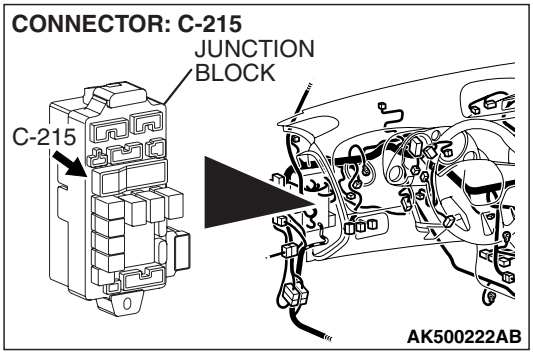

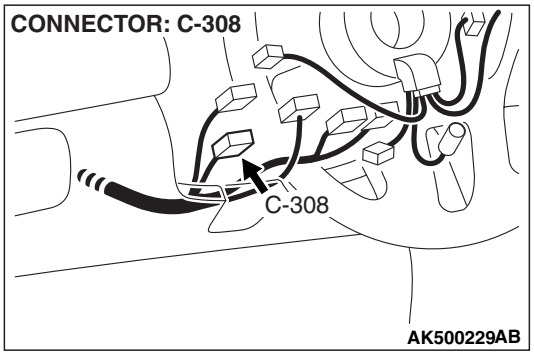

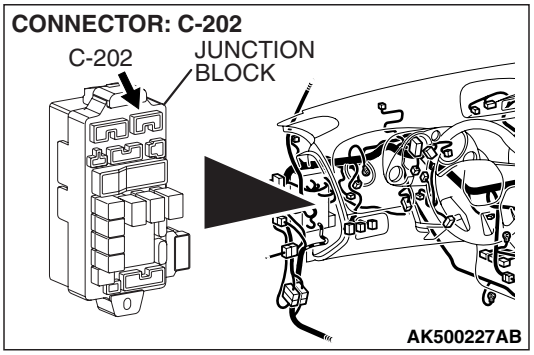

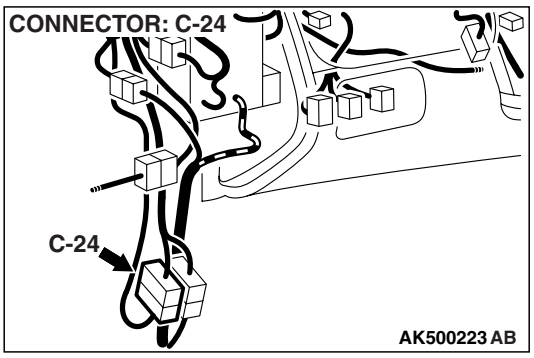

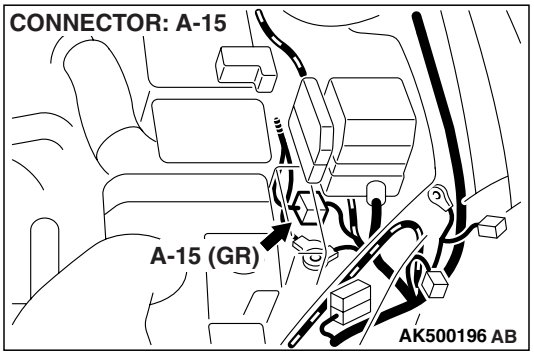

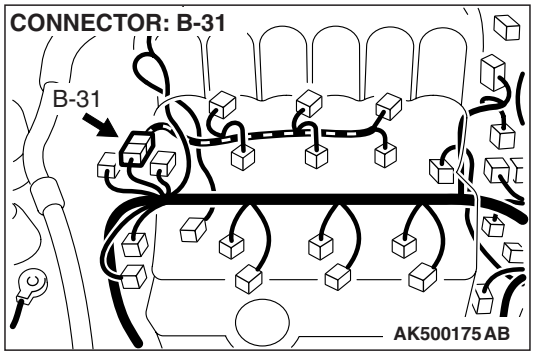

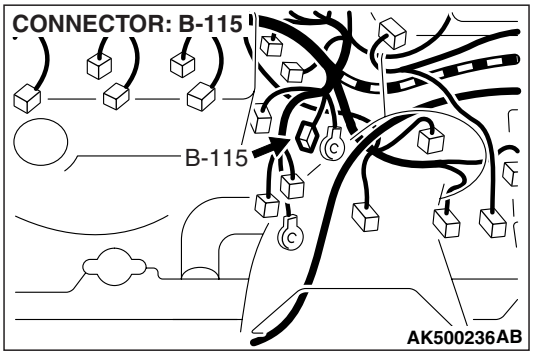

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CIRCUIT OPERATION

- The ignition coil is energized by battery positive voltage from the ignition switch.
- When the ECM <M/T> or the PCM <A/T> 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 ECM <M/T> or the PCM <A/T>.

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.16-40.

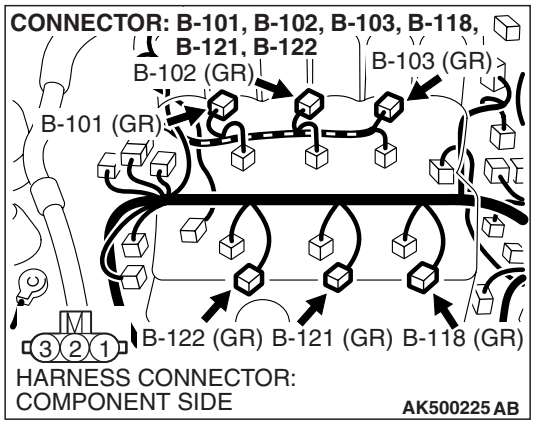
Q: Are there any abnormalities?

YES : Replace the ignition coil. Then confirm that the malfunction symptom is eliminated.
NO : Go to Step 2.

STEP 2. Check harness connectors B-101, B-102, B-103, B-118, B-121, B-122 at ignition coil for damage.

Q: Is the harness connector in good condition?

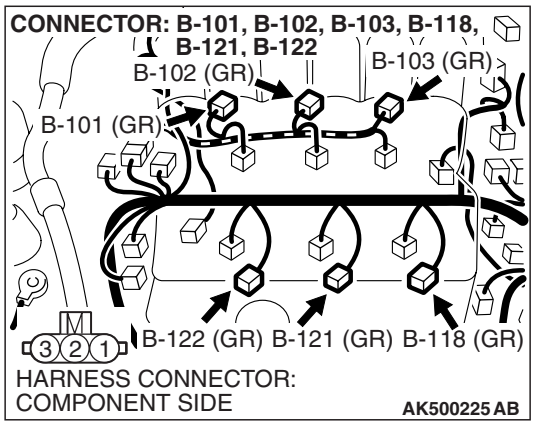
YES : Go to Step 3.
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then confirm that the malfunction symptom is eliminated.

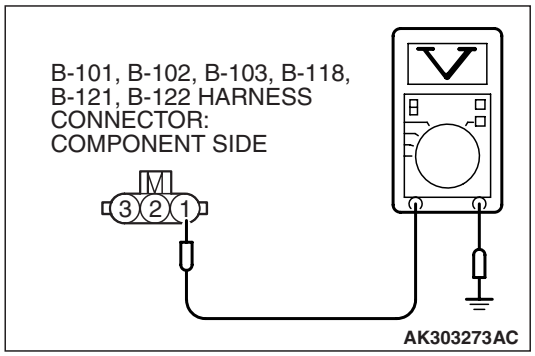


STEP 3. Measure the power supply voltage at ignition coil connectors B-101, B-102, B-103, B-118, B-121, B-122.

(1) Disconnect the connector B-101, B-102, B-103, B-118, B-121 and B-122 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.

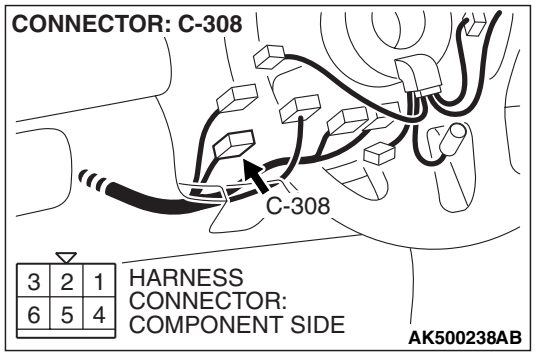
(4) Turn the ignition switch to the "LOCK" (OFF) position.

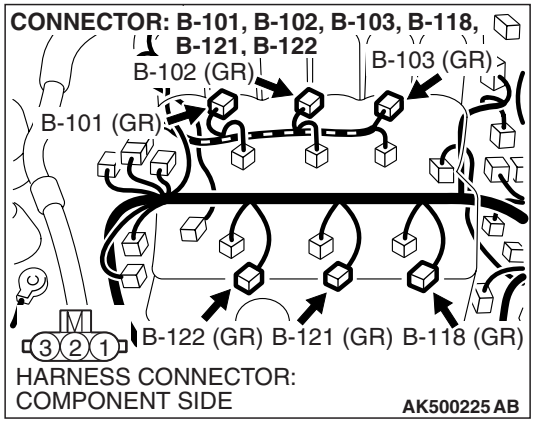
Q: Is battery positive voltage (approximately 12 volts) present?

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-101, B-102, B-103, B-118, B-121, B-122 (terminal No. 1).



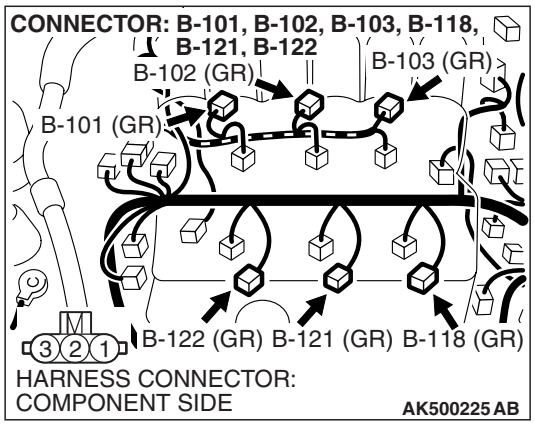


NOTE: Check harness after checking intermediate connectors A-15, B-31, C-24, C-215, C-202 and C-308. If intermediate connectors are damaged, repair or replace them. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then confirm that the malfunction symptom is eliminated.

Q: Is the harness wire in good condition?

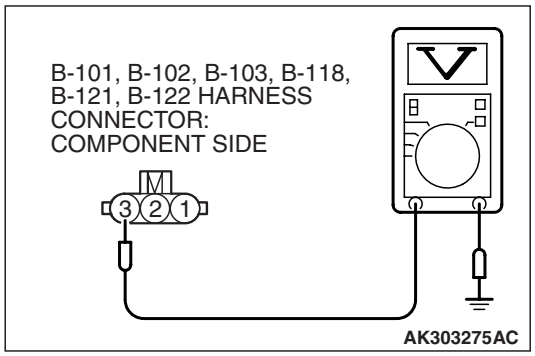
YES : Repair harness wire between ignition switch connector C-308 (terminal No. 2) and capacitor connector B-115 (terminal No. 1) because of short circuit to ground. Then confirm that the malfunction symptom is eliminated.

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



STEP 5. Check the circuit at ignition coil harness side connectors B-101, B-102, B-103, B-118, B-121, B-122.

(1) Disconnect the connectors B-101, B-102, B-103, B-118, B-121, B-122 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.

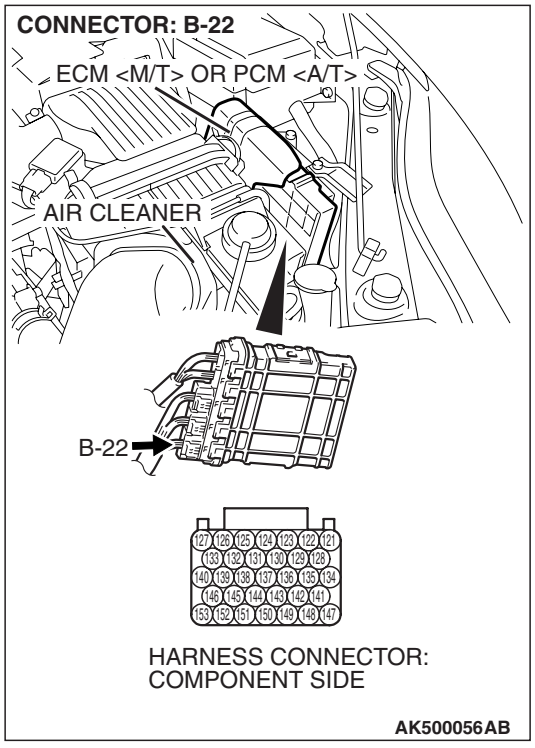
Q: Is the measured voltage between 0.3 and 3.0 volts?

YES : Go to Step 8.
NO : Go to Step 6.

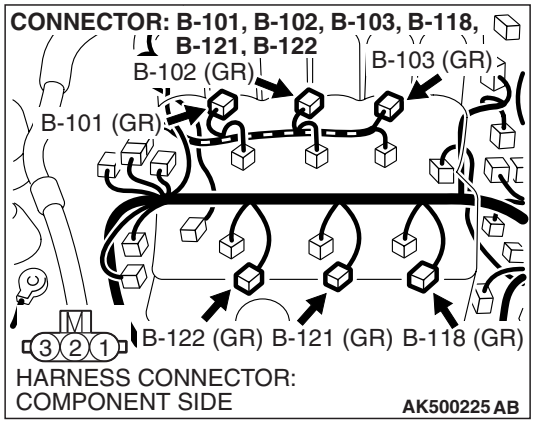
STEP 6. Check connector B-22 at ECM <M/T> or PCM <A/T> for damage.

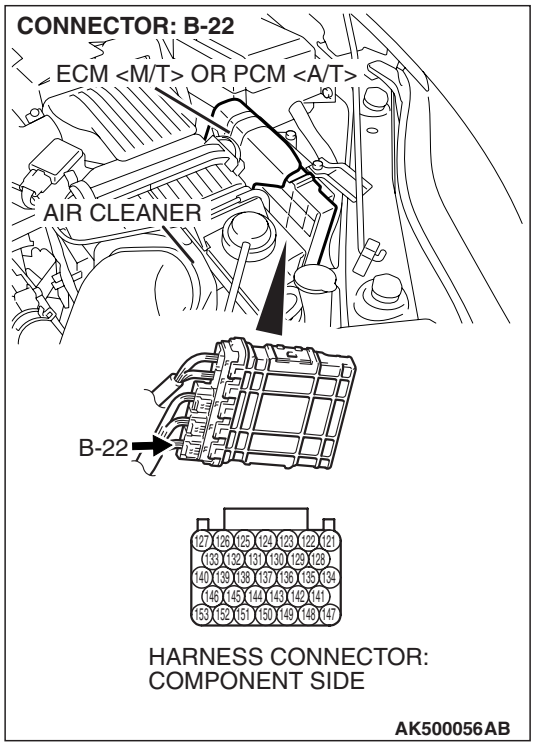
Q: Is the connector in good condition?

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 ECM <M/T> or PCM <A/T> connector.





NOTE: Check harness after checking intermediate connector B-31. If intermediate connector is damaged, repair or replace it. Refer to GROUP 00E, Harness Connector Inspection. Then confirm that the malfunction symptom is eliminated.

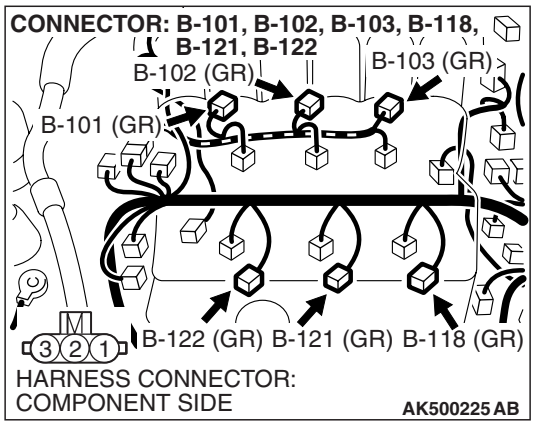
a. Check the harness wire between ignition coil connector B-101 (terminal No. 3) and ECM <M/T> or PCM <A/T> connector B-22 (terminal No. 151) at ignition coil 1.
b. Check the harness wire between ignition coil connector B-122 (terminal No. 3) and ECM <M/T> or PCM <A/T> connector B-22 (terminal No. 150) at ignition coil 2.
c. Check the harness wire between ignition coil connector B-102 (terminal No. 3) and ECM <M/T> or PCM <A/T> connector B-22 (terminal No. 144) at ignition coil 3.
d. Check the harness wire between ignition coil connector B-121 (terminal No. 3) and ECM <M/T> or PCM <A/T> connector B-22 (terminal No. 148) at ignition coil 4.
e. Check the harness wire between ignition coil connector B-103 (terminal No. 3) and ECM <M/T> or PCM <A/T> connector B-22 (terminal No. 143) at ignition coil 5.
f. Check the harness wire between ignition coil connector B-118 (terminal No. 3) and ECM <M/T> or PCM <A/T> connector B-22 (terminal No. 134) at ignition coil 6.

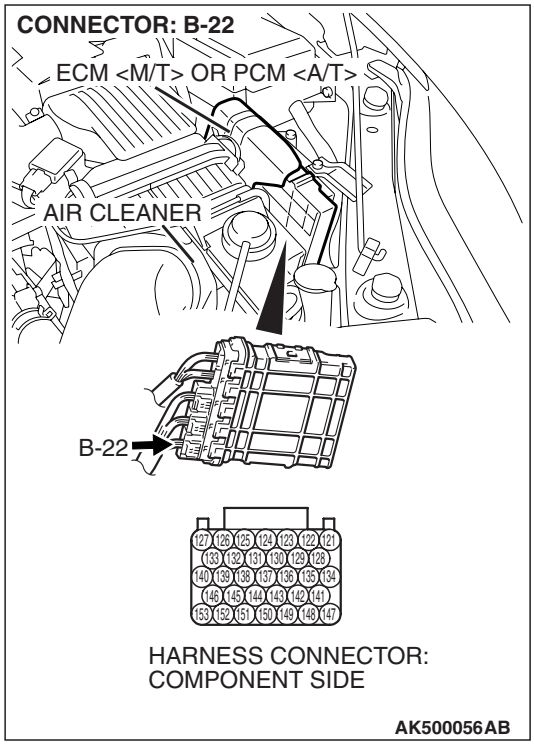
Q: Is the harness wire in good condition?

YES : Replace the ECM or the PCM. When the ECM or the PCM is replaced, register the encrypted code. Refer to GROUP 54A, Encrypted Code Registration Criteria Table P.54A-13. 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 ECM <M/T> or PCM <A/T> connector.





NOTE: Check harness after checking intermediate connector B-31. 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 ECM <M/T> or PCM <A/T> connector B-22 (terminal No. 151) at ignition coil 1.
b. Check the harness wire between ignition coil connector B-122 (terminal No. 3) and ECM <M/T> or PCM <A/T> connector B-22 (terminal No. 150) at ignition coil 2.
c. Check the harness wire between ignition coil connector B-102 (terminal No. 3) and ECM <M/T> or PCM <A/T> connector B-22 (terminal No. 144) at ignition coil 3.
d. Check the harness wire between ignition coil connector B-121 (terminal No. 3) and ECM <M/T> or PCM <A/T> connector B-22 (terminal No. 148) at ignition coil 4.
e. Check the harness wire between ignition coil connector B-103 (terminal No. 3) and ECM <M/T> or PCM <A/T> connector B-22 (terminal No. 143) at ignition coil 5.
f. Check the harness wire between ignition coil connector B-118 (terminal No. 3) and ECM <M/T> or PCM <A/T> connector B-22 (terminal No. 134) at ignition coil 6.

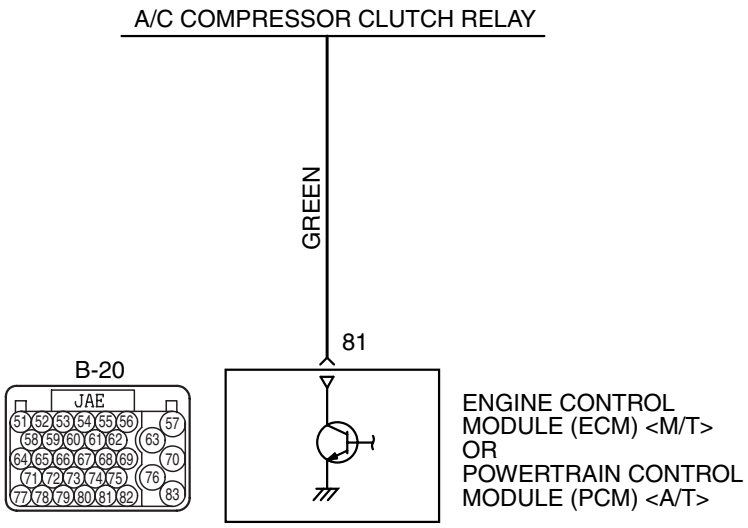
Q: Is the harness wire in good condition?

YES : Replace the ECM or the PCM. When the ECM or the PCM is replaced, register the encrypted code. Refer to GROUP 54A, Encrypted Code Registration Criteria Table P.54A-13. Then confirm that the malfunction symptom is eliminated.

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

INSPECTION PROCEDURE 33: A/C system.

A/C Circuit



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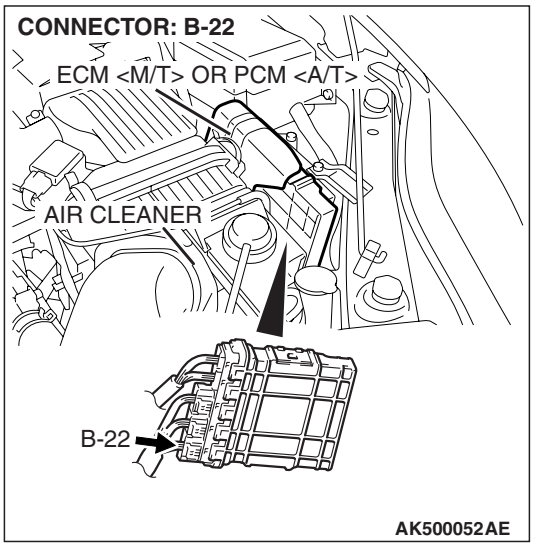

COMMENT

- When the A/C is "ON" the ECM <M/T> or the PCM <A/T> turns "ON" the power transistor in the ECM <M/T> or the PCM <A/T>. The ECM <M/T> or the PCM <A/T> 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.

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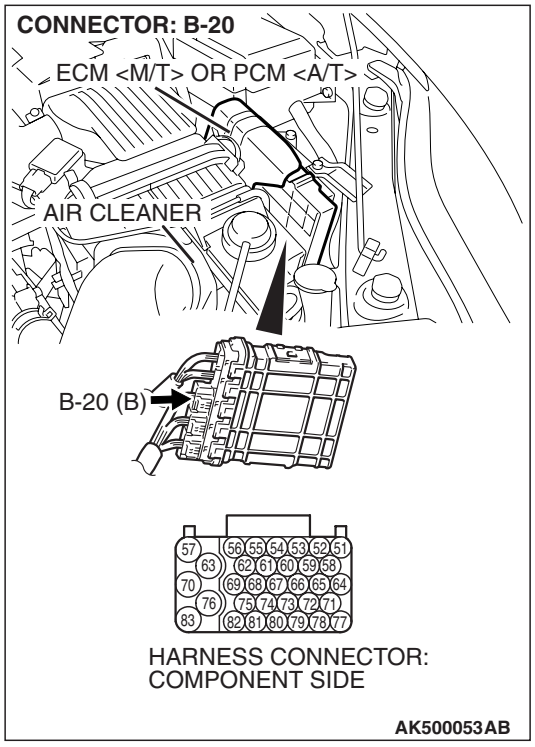
TROUBLESHOOTING HINTS (The most likely causes for this case:)

- Malfunction of the A/C control system.
- Improper connector contact, open circuit or short-circuited harness wire.
- Malfunction of the ECM <M/T> or the PCM <A/T>.

DIAGNOSIS

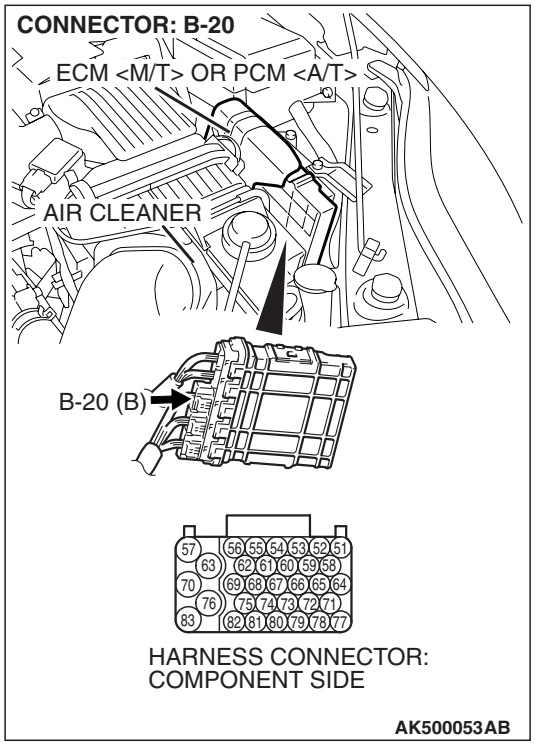


STEP 1. Check harness connector B-20 at ECM <M/T> or PCM <A/T> for damage.

Q: Is the harness connector in good condition?

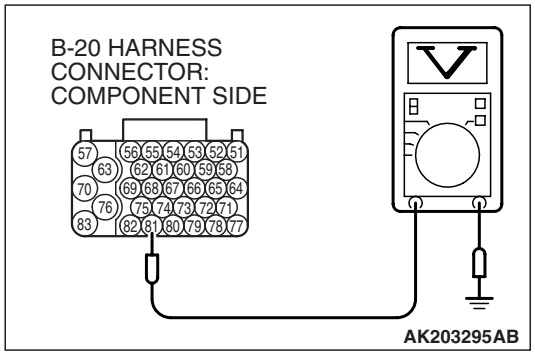
YES : Go to Step 2.

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 ECM <M/T> or PCM <A/T> connector B-20.

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



(3) Measure the voltage between terminal No. 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 ECM or the PCM. When the ECM or the PCM is replaced, register the encrypted code. Refer to GROUP 54A, Encrypted Code Registration Criteria Table P.54A-13. Then confirm that the malfunction symptom is eliminated.

NO : Refer to GROUP 55A, Manual A/C Diagnosis – Introduction To Heater, Air Conditioning And Ventilation Diagnosis P.55A-6 <Manual A/C>, 55B, Automatic A/C Diagnosis –Introduction To Heater, Air Conditioning And Ventilation Diagnosis P.55B-5 <Automatic A/C>. Then confirm that the malfunction symptom is eliminated.

DATA LIST REFERENCE TABLE

M1131152001824

⚠ 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: *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: 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.*

*NOTE: *5Not applied to 3.8L engines.*

MUT-III SCAN TOOL DISPLAY	ITEM NO.	INSPECTION ITEM	INSPECTION REQUIREMENT		NORMAL CONDITION	INSPECTION PROCEDURE NO.	REFERENCE PAGE
A/C compressor relay	93	A/C compressor relay	• Engine: warming up, idling • A/C switch: "OFF"		OFF	Procedure No. 33	P.13B-1227
			• Engine: warming up, idling • A/C switch: "ON"	A/C compressor clutch is not operating	OFF		
				A/C compressor clutch is operating	ON		
A/C SW1	76	A/C switch	• Engine: warming up, idling • A/C switch: "OFF"		OFF	Procedure No. 33	P.13B-1227
			• Engine: warming up, idling • A/C switch: "ON"	A/C compressor clutch is not operating	OFF		
				A/C compressor clutch is operating	ON		
Absolute load value	72	Absolute load value	Engine: warming up	Engine idling	10 – 20%	–	–
				2,500 r/min	10 – 20%		
				Revving engine	Load value increases according to amount of revving.		

MUT-III SCAN TOOL DISPLAY	ITEM NO.	INSPECTION ITEM	INSPECTION REQUIREMENT		NORMAL CONDITION	INSPECTION PROCEDURE NO.	REFERENCE PAGE
Airflow sensor	10	Mass airflow sensor*1	• Engine coolant temperature: 80 – 95° C (176 – 203° F) • Lights, electric cooling fan and all accessories: "OFF"*4 • Transaxle: neutral (A/T: "P" range)	Engine is idling	1,360 – 1,650 mV	–	–
				2,500 r/min	1,760 – 2,090 mV		
				Engine is revved	Increase in response to revving		
APP sensor (main)	11	Accelerator pedal position sensor (main)	Ignition switch: "ON"	Release the accelerator pedal	800 – 1,200 mV	Code No. P2122, P2123	P.13B-995, P.13B-1005
				Depress the accelerator pedal gradually	Increases in response to the pedal depression stroke		
				Depress the accelerator pedal fully	4,000 mV or more		
APP sensor (sub)	12	Accelerator pedal position sensor (sub)	Ignition switch: "ON"	Release the accelerator pedal	400 –1,000 mV	Code No. P2127, P2128	P.13B-1059, P.13B-1061
				Depress the accelerator pedal gradually	Increases in response to the pedal depression stroke		
				Depress the accelerator pedal fully	3,600 mV or more		
Brake light switch	74	Brake light switch	Ignition switch: "ON"	Depress the brake pedal	ON	–	–
				Release the brake pedal	OFF		
Calculated load value	73	Calculated load value	Engine: warming up	Engine is idling	10% –20%	–	–
				2,500 r/min	10% –20%		

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MUT-III SCAN TOOL DISPLAY	ITEM NO.	INSPECTION ITEM	INSPECTION REQUIREMENT		NORMAL CONDITION	INSPECTION PROCEDURE NO.	REFERENCE PAGE
Closed throttle position switch	84	Closed throttle position switch	Ignition switch: "ON"	Release the accelerator pedal	ON	–	–
				Depress the accelerator pedal	OFF		
Cranking signal	79	Cranking signal (ignition switch-ST)	Ignition switch: "ON"	Engine: stopped	OFF	Procedure No. 30, No. 31	P.13B-1204 <M/T>, P.13B-1212 <A/T>
				Engine: cranking	ON		
Crankshaft position sensor	2	Crankshaft position sensor	• Engine: cranking • Tachometer: connected		Engine speeds displayed on the scan tool and tachometer are identical.	Code No.P0335	P.13B-597
			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		

MUT-III SCAN TOOL DISPLAY	ITEM NO.	INSPECTION ITEM	INSPECTION REQUIREMENT		NORMAL CONDITION	INSPECTION PROCEDURE NO.	REFERENCE PAGE
ECT sensor	6	Engine coolant temperature sensor	Ignition switch: "ON" or with engine running	Engine coolant temperature is –20° C (–40° F)	–20° C (–40° F)	Code No. P0116, P0117, P0118	P.13B-221, P.13B-230, P.13B-237
				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)		
EGR step motor	31	EGR valva (stepper motor)	• Engine coolant temperature: 80 – 95° C (176 – 203° F) • Lights, electric cooling fan and all accessories: "OFF"*4 • Transaxle: neutral (A/T: "P" range)	Engine is idling	2 – 8 Step	Code No. P0403	P.13B-639
				2,500 r/min	2 – 8 Step		
Engine control realy	95	Engine control realy	Ignition switch: "ON"		ON	–	–
ETV relay	96	Throttle actuator control motor relay	Ignition switch: "ON"		ON	–	–
EVAP. emission purge SOL. duty	49	Evaporative emission purge solenoid duty	Engine: warming up with Open loop drive condition, without EVAP leak monitor		1% or more	–	–
Fan duty	47	Fan motor duty	Engine: warming up • The duty ratio of the fan motor driving is shown.		0 – 100% (Display range)	–	–

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MUT-III SCAN TOOL DISPLAY	ITEM NO.	INSPECTION ITEM	INSPECTION REQUIREMENT		NORMAL CONDITION	INSPECTION PROCEDURE NO.	REFERENCE PAGE
Fuel level gauge	51	Fuel level gage	Ignition switch: "ON" • The residual fuel amount in the tank is shown. • "0%" means "Empty" and "100%" means "Full".		0 – 100% (Display range)	–	–
Fuel pump relay	97	Fuel pump relay	Ignition switch: "ON"		OFF	–	–
			Engine:cranking		ON		
Fuel system status (bank 1)	105	Fuel control system status (bank 1)	Engine: warming up	2,500 r/min	CL: Using O2S	–	–
				When engine is suddenly revved	OL: DRV condition		
Fuel system status (bank 2)	106	Fuel control system status (bank 2)	Engine: warming up	2,500 r/min	CL: Using O2S	–	–
				When engine is suddenly revved	OL: DRV condition		
Fuel tank differential PRS. SNSR	52	Fuel tank differential pressure sensor	• Ignition switch: "ON" • Fuel cap removal		1,200 – 3,800 mV	–	–
Fuel tank temperature sensor	53	Fuel tank temperature sensor	• In cooled state • Ignition switch: "ON"		Approximately the same as the outdoor temperature	Code No. P0181, P0182, P0183	P.13B-444, P.13B-456, P.13B-463
Ignition switch	85	Ignition switch (IG1)	Ignition switch: "ON"		ON	–	–

MUT-III SCAN TOOL DISPLAY	ITEM NO.	INSPECTION ITEM	INSPECTION REQUIREMENT		NORMAL CONDITION	INSPECTION PROCEDURE NO.	REFERENCE PAGE
Injectors	17	Injectors*2	Engine: cranking	When engine coolant temperature is 0° C (32° F)	67 – 107 ms	–	–
				When engine coolant temperature is 20° C (68° F)	30 – 50 ms		
				When engine coolant temperature is 80° C (176° F)	8 – 16 ms		
		Injectors*3	• Engine coolant temperature: 80 –95° C (176 – 203° F) • Lights, electric cooling fan and all accessories: "OFF"*4 • Transaxle: neutral (A/T "P" range)	Engine is idling	1.6 – 3.6 ms		
				2,500 r/min	1.3 – 3.3 ms		
				When engine is suddenly revved	Increases		
Intake air temperature sensor	5	Intake air temperature sensor	Ignition switch: "ON" or with engine running	Intake air temperature is –20° C (–40° F)	–20° C (–40° F)	Code No. P0111, P0112, P0113	P.13B-195, P.13B-204, P.13B-211
				Intake air temperature is 0° C (32° F)	0° C (32° F)		
				Intake air temperature is 20° C (68° F)	20° C (68° F)		
				Intake air temperature is 40° C (104° F)	40° C (104° F)		
				Intake air temperature is 80° C (176° F)	80° C (176° F)		

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MUT-III SCAN TOOL DISPLAY	ITEM NO.	INSPECTION ITEM	INSPECTION REQUIREMENT	NORMAL CONDITION	INSPECTION PROCEDURE NO.	REFERENCE PAGE
ISC learned value (A/C OFF)	19	Idle speed control learned value (at A/C OFF)	Ignition switch: "ON" • The learning value is shown, which compensates the idle speed control throttle opening degree (the throttle valve opening degree). • " –128 Step" means "the fully closed side" and "128 Step" means "the fully open side".	–128 to128 Step (Display range)	–	–
ISC learned value (A/C ON)	20	Idle speed control learned value (at A/C ON)	Ignition switch: "ON" • When A/C is in "ON" position, the learning value is shown, which compensates the idle speed control throttle opening degree (the throttle valve opening degree). • "–128 Step" means "the fully closed side" and "128 Step" means "the fully open side".	–128 to128 Step (Display range)	–	–
Knock retard	32	Knock retard	Engine: warming up, sudden racing	According to acceleration, knock retard is increased.	–	–
Learned knock retard	33	Knock control learned value	Ignition switch: "ON" • The learning value is shown, which compensates the ignition time based on the knock sensor. • "0%" means "retard angle" and "100%" means "advance angle".	0 –100 % (Display range)	–	–
Long term fuel trim (bank 1)	26	Long term fuel tirm (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-423
Long term fuel trim (bank 2)	27	Long term fuel tirm (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-430, P.13B-438

MUT-III SCAN TOOL DISPLAY	ITEM NO.	INSPECTION ITEM	INSPECTION REQUIREMENT		NORMAL CONDITION	INSPECTION PROCEDURE NO.	REFERENCE PAGE
MAP sensor	8	Manifold absolute pressure sensor	Ignition switch: "ON"	Engine stopped [At altitude of 0 m (0 ft.)]	101 kPa (29.8 in.Hg)	Code No. P0106, P0107, P0108	P.13B-159, P.13B-174, P.13B-186
				Engine stopped [At altitude of 600 m (1,969 ft.)]	95 kPa (28.1 in.Hg)		
				Engine stopped [At altitude of 1,200 m (3,937 ft.)]	88 kPa (26.0 in.Hg)		
				Engine stopped [At altitude of 1,800 m (5,906 ft.)]	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		
Normally closed brake switch	89	Normally closed brake switch	Ignition switch: "ON"	Depress the brake pedal	OFF	–	–
				Release the brake pedal	ON		
Oil control valve (bank 1)	98	Engine oil control valve (bank 1)	Engine: warming up	Engine is idling	OFF	–	–
				4,500 r/min	ON		
Oil control valve (bank 2)	99	Engine oil control valve (bank 2)	Engine: warming up	Engine is idling	OFF	–	–
				4,500 r/min	ON		
Power steering switch	83	Power steering pressure switch	Engine: idling	Steering wheel stationary	OFF	Code No.P0551	P.13B-854
				Steering wheel turning	ON		
Power supply voltage	1	Power supply voltage	Ignition switch: "ON"		Battery positive voltage	Procedure No. 28	P.13B-1180
Radiator fan control relay (high)	100	Radiator fan relay, condenser fan relay*5	–		–	–	–
Radiator fan control relay (low)	101	Fan control relay*5	–		–	–	–

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MUT-III SCAN TOOL DISPLAY	ITEM NO.	INSPECTION ITEM	INSPECTION REQUIREMENT		NORMAL CONDITION	INSPECTION PROCEDURE NO.	REFERENCE PAGE
Short term fuel trim (bank 1)	28	Short-term fuel trim (bank 1)	Engine: warming up, 2,500 r/min without any load (during closed loop)		–30 to 25%	Code No. P0171, P0172	P.13B-414, P.13B-423
Short term fuel trim (bank 2)	29	Short-term fuel trim (bank 2)	Engine: warming up, 2,500 r/min without any load (during closed loop)		–30 to 25%	Code No. P0174, P0175	P.13B-430, P.13B-438
Spark advance	16	Ignition timing advance	• Engine: warming up • Timing light is set (to check actual ignition timing)	Engine is idling	2 – 18 CA	–	–
				2,500 r/min	19 – 45 CA		
Starter relay	102	Starter relay <M/T>	Ignition switch: "ON"	Engine: stopped	OFF	–	–
				Engine: cranking	ON		
Target ETV value	59	Throttle actuator control motor target value	Engine: warming up • The target opening degree of the throttle valve is shown. • "0 V" means "fully closed throttle valve" and "5 V" means "fully opened throttle valve".		0 – 5 V (Display range)	–	–
Target idle speed	3	Target idle speed	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		

MUT-III SCAN TOOL DISPLAY	ITEM NO.	INSPECTION ITEM	INSPECTION REQUIREMENT		NORMAL CONDITION	INSPECTION PROCEDURE NO.	REFERENCE PAGE
Throttle actuator	58	Throttle actuator control motor	Engine: warming up • The target opening degree of the throttle valve is shown. • "0%" means "fully closed throttle valve" and "100%" means "fully opened throttle valve".		0 – 100% (Display range)	–	–
TP sensor (main)	13	Throttle position sensor (main)	• Remove the intake air hose at the throttle body • Disconnect the throttle position sensor connector, and then connect terminals 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-248, P.13B-259
				Fully open the throttle valve with your finger	4,000 mV or more		
			Engine: warming up, idling	No load	500 – 660 mV		
				A/C switch: "OFF" → "ON"	Voltage vise		
				Shift lever: "N" → "D"			
TP sensor (main) learned value	14	Throttle position sensor (main) mid opening learning value	This item shows the throttle valve opening learning value when the vehicle enters into the limp home mode.			–	–

MUT-III SCAN TOOL DISPLAY	ITEM NO.	INSPECTION ITEM	INSPECTION REQUIREMENT		NORMAL CONDITION	INSPECTION PROCEDURE NO.	REFERENCE PAGE
TP sensor (sub)	15	Throttle position sensor (sub)	• Remove the intake air hose at the throttle body • Disconnect the throttle position sensor connector, and then connect terminals 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-543, P.13B-554
				Fully open the throttle valve with your finger	4,000 mV or more		
Variable intake solenoid	103	Variable intake air solenoid	Engine warning up	Engine is idling	OFF	–	–
				4,500 r/min	ON	–	–
Vehicle speed	4	Vehicle speed	Drive at 40 km/h (25 mph).		Approximately 40 km/h (25 mph)	–	–

GENERAL SCAN TOOL (GST) MODE 01 REFERENCE TABLE

M1131156000027

The purpose of this service of to allow access to current emission-related data values, including analogue inputs and outputs, digital inputs and outputs, and system status information.
The request for information includes a parameter identification (PID) value that indicates to the on-board system the specific information requested.
The ECM <M/T> or the PCM <A/T> will respond to this message by transmitting the requested data value last determined by the system. All data values returned for sensor readings will be actual readings, not default or substitute values used by the system because of a fault with that sensor.

NOTE: GST MODE 01 can be accessed through the use of a general scan tool.

PARAMETER IDENTIFICATION (PID)	DESCRIPTION	COMMON EXAMPLE OF GENERAL SCAN TOOL DISPLAY	INSPECTION CONDITION	NORMAL CONDITION
01	Number of emission-related DTCs and MIL status	DTC and MIL status:	–	
	Number of DTCs stored in this ECU	DTC_CNT: xxxd		
	Malfunction Indicator Lamp (MIL) status	MIL: OFF or ON		
	Supported tests which are continuous	Support status of continuous monitors:		
	Misfire monitoring	MIS_SUP: YES		
	Fuel system monitoring	FUEL_SUP: YES		
	Comprehensive component monitoring	CCM_SUP: YES		
	Status of continuous monitoring tests since DTC cleared	Completion status of continuous monitors since DTC cleared:		
	Misfire monitoring	MIS_RDY: YES or NO		
	Fuel system monitoring	FUEL_RDY: YES or NO		
	Comprehensive component monitoring	CCM_RDY: YES or NO		

PARAMETER IDENTIFICATION (PID)	DESCRIPTION	COMMON EXAMPLE OF GENERAL SCAN TOOL DISPLAY	INSPECTION CONDITION	NORMAL CONDITION
01	Supported tests run at least once per trip	Support status of non-continuous monitors:	–	
	Catalyst monitoring	CAT_SUP: YES		
	Heated catalyst monitoring	HCAT_SUP: NO		
	Evaporative system monitoring	EVAP_SUP: YES		
	Secondary air system monitoring	AIR_SUP: NO		
	A/C system refrigerant monitoring	ACRF_SUP: NO		
	Oxygen sensor monitoring	O2S_SUP: YES		
	Oxygen sensor heater monitoring	HTR_SUP: YES		
	EGR system monitoring	EGR_SUP: YES		
	Status of tests run at least once per trip	Completion status of non-continuous monitors since DTC cleared:		
	Catalyst monitoring	CAT_RDY: YES or NO		
	Heated catalyst monitoring	HCAT_RDY: YES		
	Evaporative system monitoring	EVAP_RDY: YES or NO		
	Secondary air system monitoring	AIR_RDY: YES		
	A/C system refrigerant monitoring	ACRF_RDY: YES		
	Oxygen sensor monitoring	O2S_RDY: YES or NO		
	Oxygen sensor heater monitoring	HTR_RDY: YES or NO		
	EGR system monitoring	EGR_RDY: YES or NO		
03	Fuel system 1 status	FUELSYS1: OL/CL/OL-Drive/OL-Fault/CL-Fault	See MUT-III item No. 105.	
	Fuel system 2 status	FUELSYS2: OL/CL/OL-Drive/OL-Fault/CL-Fault	See MUT-III item No. 106.	
04	Calculated LOAD Value	LOAD_PCT: xxx.x%	See MUT-III item No. 73.	
05	Engine Coolant Temperature	ECT: xxx° C (xxx° F)	See MUT-III item No. 6.	
06	Short Term Fuel Trim–Bank 1	SHRTFT1: xxx.x%	See MUT-III item No. 28.	

PARAMETER IDENTIFICATION (PID)	DESCRIPTION	COMMON EXAMPLE OF GENERAL SCAN TOOL DISPLAY	INSPECTION CONDITION		NORMAL CONDITION
07	Long Term Fuel Trim–Bank 1	LONGFT1: xxx.x%	See MUT-III item No. 26.		
08	Short Term Fuel Trim–Bank 2	SHRTFT2: xxx.x%	See MUT-III item No. 29.		
09	Long Term Fuel Trim–Bank 2	LONGFT2: xxx.x%	See MUT-III item No. 27.		
0B	Intake Manifold Absolute Pressure	MAP: xxx kPa (xx.x inHg)	See MUT-III item No. 8.		
0C	Engine RPM	RPM: xxxxx min^{-1}	See MUT-III item No. 2.		
0D	Vehicle Speed Sensor	VSS: xxx km/h (xxx mph)	See MUT-III item No. 4.		
0E	Ignition Timing Advance for #1 Cylinder	SPARKADV: xx°	See MUT-III item No. 16.		
0F	Intake Air Temperature	IAT: xxx° C (xxx° F)	See MUT-III item No. 5.		
10	Air Flow Rate from Mass Air Flow Sensor	MAF: xxx.xx g/s (xxxx.x lb/min)	• 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/s (0.3 – 0.8 lb/min)
				2,500 r/min	8.0 – 16.0 g/s (1.1 – 2.2 lb/min)
				Engine is revved	Increase in response to revving

PARAMETER IDENTIFICATION (PID)	DESCRIPTION	COMMON EXAMPLE OF GENERAL SCAN TOOL DISPLAY	INSPECTION CONDITION		NORMAL CONDITION
11	Absolute Throttle Position	TP: xxx.x%	• Remove the intake air hose at the throttle body • Disconnect the throttle position sensor connector, and then connect terminals 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%
				Fully open the throttle valve with your finger	88% or more
13	Location of Oxygen Sensor	O2SLOC: OxSxx	• Ignition switch: "ON"		O2S11/O2S12/O2S21/O2S22
14	Bank 1 – Sensor 1	O2S11: x.xxx V	Engine: Warming up, 2,500 r/min	Voltage changes repeatedly between 0.5 V and 1.4 V.	
		SHRTFT11: xxx.x%	Engine: warming up, 2,500 r/min without any load (during closed loop)	–30 to 25%	
15	Bank 1 – Sensor 2	O2S12: x.xxx V	• Transaxle: 2nd speed (A/T: "L" range) • Drive with wide open throttle • Engine: 3,500 r/min or more		1.0 – 1.5 V
		SHRTFT12: xxx.x%	Engine: warming up, 2,500 r/min without any load (during closed loop)		–30 to 25%

PARAMETER IDENTIFICATION (PID)	DESCRIPTION	COMMON EXAMPLE OF GENERAL SCAN TOOL DISPLAY	INSPECTION CONDITION	NORMAL CONDITION
18	Bank 2 – Sensor 1	O2S21: x.xxx V	Engine: Warming up, 2,500 r/min	Voltage changes repeatedly between 0.5 V and 1.4 V.
		SHRTFT21: xxx.x%	Engine: warming up, 2,500 r/min without any load (during closed loop)	–30 to 25%
19	Bank 2 – Sensor 2	O2S22: x.xxx V	• Transaxle: 2nd speed (A/T: "L" range) • Drive with wide open throttle • Engine: 3,500 r/min or more	1.0 – 1.5 V
		SHRTFT22: xxx.x%	Engine: warming up, 2,500 r/min without any load (during closed loop)	–30 to 25%
1C	OBD requirements to which vehicle is designed	OBDSUP: OBD II	Ignition switch: "ON"	OBD II
1F	Time Since Engine Start	RUNTM: xxxxx sec.	–	
21	Distance Travelled While MIL is Active	MIL DIST: xxxxx km (xxxxx miles)	–	
2C	Commanded EGR	EGR_PCT: xxx.x%	Engine: warming up • The duty ratio of the EGR valve driving is shown. • "0%" means "fully closed EGR valve" and "100%" means "fully opened EGR valve".	0 – 100% (Display range)
2E	Commanded Evaporative Purge	EVAP_PCT: xxx.x%	See MUT-III item No. 49.	
2F	Fuel Level Input	FLI: xxx.x%	See MUT-III item No. 51.	
30	Number of warm-ups since diagnostic trouble codes cleared	WARM_UPS: xxx	–	
31	Distance since diagnostic trouble codes cleared	CLR_DIST: xxxxx km (xxxxx miles)	–	
32	Evap System Vapor Pressure	EVAP_VP: xxxx.xx Pa (xx.xxx in H2O)	• Ignition switch: "ON" • Fuel cap removal	–3.3 to 3.3 kPa (–13.3 to 13.3 in.H2O)

PARAMETER IDENTIFICATION (PID)	DESCRIPTION	COMMON EXAMPLE OF GENERAL SCAN TOOL DISPLAY	INSPECTION CONDITION		NORMAL CONDITION
33	Barometric Pressure	BARO: xxx kPa (xx.x inHg)	Ignition switch: "ON"	Engine stopped [At altitude of 0 m (0 ft.)]	101 kPa (29.8 in.Hg)
				Engine stopped [At altitude of 600 m (1,969 ft.)]	95 kPa (28.1 in.Hg)
				Engine stopped [At altitude of 1,200 m (3,937 ft.)]	88 kPa (26.0 in.Hg)
				Engine stopped [At altitude of 1,800 m (5,906 ft.)]	81 kPa (23.9 in.Hg)
41	Monitor status this driving cycle		–		
	Enable status of continuous monitors this monitoring cycle:	Enable status of continuous monitors this monitoring cycle: NO means disable for rest of this monitoring cycle or not supported in PID 01, YES means enable for this monitoring cycle.			
	Misfire monitoring	MIS_ENA: NO or YES			
	Fuel system monitoring	FUEL_ENA: NO or YES			
	Comprehensive component monitoring	CCM_ENA: YES			

PARAMETER IDENTIFICATION (PID)	DESCRIPTION	COMMON EXAMPLE OF GENERAL SCAN TOOL DISPLAY	INSPECTION CONDITION	NORMAL CONDITION
41	Completion status of continuous monitors this monitoring cycle:	Completion status of continuous monitors this monitoring cycle:	–	
	Misfire monitoring	MIS_CMPL: YES or NO		
	Fuel system monitoring	FUEL_CMPL: YES or NO		
	Comprehensive component monitoring	CCM_CMPL: YES or NO		
	Enable status of non-continuous monitors this monitoring cycle:	Enable status of non-continuous monitors this monitoring cycle:		
	Catalyst monitoring	CAT_ENA: YES or NO		
	Heated catalyst monitoring	HCAT_ENA: NO		
	Evaporative system status	EVAP_ENA: YES or NO		
	Secondary air system monitoring	AIR_ENA: YES or NO		
	A/C system refrigerant monitoring	ACRF_ENA: YES or NO		
	Oxygen sensor monitoring	O2S_ENA: YES or NO		
	Oxygen sensor heater monitoring	HTR_ENA: YES or NO		
	EGR system monitoring	EGR_ENA: YES or NO		
	Completion status of non-continuous monitors this monitoring cycle:	Completion status of non-continuous monitors this monitoring cycle:		
	Catalyst monitoring	CAT_CMPL: YES or NO		
	Evaporative system status	EVAP_CMPL: YES or NO		
	Oxygen sensor monitoring	O2S_CMPL: YES or NO		
	Oxygen sensor heater monitoring	HTR_CMPL: YES or NO		
	EGR system monitoring	EGR_CMPL: YES or NO		
42	Control module voltage	VPWR: xx.xxx V	See MUT-III item No.1.	
43	Absolute Load Value	LOAD_ABS: xxx.x%	See MUT-III item No.72.	

PARAMETER IDENTIFICATION (PID)	DESCRIPTION	COMMON EXAMPLE OF GENERAL SCAN TOOL DISPLAY	INSPECTION CONDITION		NORMAL CONDITION
44	Commanded Equivalence Ratio	EQ_RAT: x.xxx	Engine: running • "1" means "stoichiometric air fuel ratio". The smaller air fuel ratio, the rich return. The more air fuel ratio, the lean return.		0 – 1.999 (Display range)
45	Relative Throttle Position	TP_R: xxx.x%	• Remove the intake air hose at the throttle body • Disconnect the throttle position sensor connector, and then connect terminals 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%
				Fully open the throttle valve with your finger	88% or more
46	Ambient air temperature	AAT: xxx° C (xxx° F)	–		

PARAMETER IDENTIFICATION (PID)	DESCRIPTION	COMMON EXAMPLE OF GENERAL SCAN TOOL DISPLAY	INSPECTION CONDITION		NORMAL CONDITION
47	Absolute Throttle Position B	TP_B: xxx.x%	• Remove the intake air hose at the throttle body • Disconnect the throttle position sensor connector, and then connect terminals 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%
				Fully open the throttle valve with your finger	88% or more
49	Accelerator Pedal Position D	APP_D: xxx.x%	Ignition switch: "ON"	Release the accelerator pedal	0 – 5%
				Depress the accelerator pedal gradually	Increases in response to the pedal depression stroke
				Depress the accelerator pedal fully	88% or more

PARAMETER IDENTIFICATION (PID)	DESCRIPTION	COMMON EXAMPLE OF GENERAL SCAN TOOL DISPLAY	INSPECTION CONDITION		NORMAL CONDITION
4A	Accelerator Pedal Position E	APP_E: xxx.x%	Ignition switch: "ON"	Release the accelerator pedal	0 – 5%
				Depress the accelerator pedal gradually	Increases in response to the pedal depression stroke
				Depress the accelerator pedal fully	88% or more
4C	Commanded Throttle Actuator Control	TAC_PCT: xxx.x%	See MUT-III item No.58.		

ACTUATOR TEST REFERENCE TABLE

M1131152501205

*NOTE: *1: Continues for 27 minutes. Can be released by pressing the CLEAR key.*

*NOTE: *2: Not applied to 2.4L engines.*

MUT-III SCAN TOOL DISPLAY	ITEM NO.	INSPECTION ITEM	DRIVE CONTENTS	INSPECTION REQUIRMENT	NORMAL CONDITION	INSPECTION PROCEDURE NO.	PEFERECE PAGE
A/C relay	16	A/C compressor clutch relay	A/C compresso r clutch relay turns from OFF to ON.	Ignition switch: "ON"	Clicks when A/C compresso r clutch is driven.	Procedure No. 33	P.13B-1227
EVAP. emission purge SOL. Valve	10	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-673
EVAP. emission ventilation SOL. Valve	15	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-685
FUEL PUMP	9	Fuel pump	Fuel pump operate and fuel is recirculated	Ignition switch: "ON" Listen near the fuel tank for the sound of fuel pump operation	Sound of operation is heard	Procedure No. 29	P.13B-1191
Ignition timing 5 BTDC	11*1	Basic ignition timing	Set to ignition timing adjustment mode	• Engine: idling • Connect timing light	5° BTDC	–	–

MUT-III SCAN TOOL DISPLAY	ITEM NO.	INSPECTION ITEM	DRIVE CONTENTS	INSPECTION REQUIRMENT	NORMAL CONDITION	INSPECTION PROCEDURE NO.	PEFERECE PAGE
No. 1 injector	1	Injectors	Cut fuel to No. 1 injector	Engine: warm up, idle (cut the fuel supply to each injector in turn and check cylinders which don't affect idling.)	Idling becomes unstable	Code No. P0201	P.13B-474
No. 2 injector	2		Cut fuel to No. 2 injector			Code No. P0202	P.13B-486
No. 3 injector	3		Cut fuel to No. 3 injector			Code No. P0203	P.13B-497
No. 4 injector	4		Cut fuel to No. 4 injector			Code No. P0204	P.13B-509
No. 5 injector	5		Cut fuel to No. 5 injector			Code No. P0205	P.13B-520
No. 6 injector	6		Cut fuel to No. 6 injector			Code No. P0206	P.13B-532
PWM Radiator fan	14	Radiator fan, A/C condenser fan	Drive the fan motor	Ignition switch: "ON"	Radiator fan and A/C condenser fan rotate.	Procedure No. 27	P.13B-1177
Radiator fan (high)	12*2	Radiator fan, A/C condenser fan	–				
Radiator fan (low)	13*2						
Variable intake solenoid	21	Variable intake air solenoid	Solenoid valve turns from OFF or ON.	Engine: idling	The variable intake air valve is operated.	Code No. P0660	P.13B-909
VVT oil control valve	17	Engine oil control valve	Engine oil control valve turns from OFF to ON	Engine: warming up, 2,000 r/min	The engine speed is changed.	Code No. P1021, P1023	P.13B-929, P.13B-940

CHECK AT THE ENGINE CONTROL MODULE (ECM) <M/T> OR THE POWERTRAIN CONTROL MODULE (PCM) <A/T>

M1131153600514

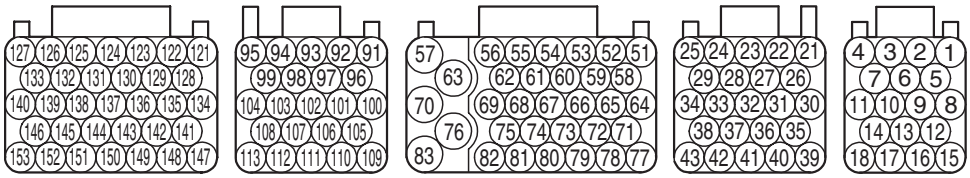
1. Disconnect the ECM <M/T> or the PCM <A/T> connectors B-19, B-20, B-21, B-22 and B-23, and connect check harness special tool MB991923 between the ECM <M/T> connectors or the PCM <A/T> connectors.
2. Measure the voltage between each check harness connector terminal and check harness connector ground 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



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TERMINAL NO. <M/T>	TERMINAL NO. <A/T>	INSPECTION ITEM	INSPECTION CONDITION (ENGINE CONDITION)	NORMAL CONDITION
2	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	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	6	Fuel pump relay	Ignition switch: "ON"	B+
			Engine: idling	1 V or more
10	10	Fan controller	Radiator fan and A/C condenser fan are not operating	0 – 0.3 V
			Radiator fan and A/C condenser fan are operating	0.7 V or more
14	–	Vehicle speed sensor	• Ignition switch: "ON" • Move the vehicle slowly forward	0 ⟷ 8 – 12V(changes repeatedly)
21	21	Sensor supplied voltage	Ignition switch: "ON"	4.9 – 5.1 V
68	68			
23	23	Fuel tank differential pressure sensor	• Ignition switch: "ON" • Fuel cap removal	1.2 – 3.8 V

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TERMINAL NO. <M/T>	TERMINAL NO. <A/T>	INSPECTION ITEM	INSPECTION CONDITION (ENGINE CONDITION)		NORMAL CONDITION
26	26	Accelerator pedal position sensor (main)	Ignition switch: "ON"	Release the accelerator pedal	0.8 – 1.2 V
				Depress the accelerator pedal fully	4.0 V or more
27	27	Accelerator pedal position sensor (sub)	Ignition switch: "ON"	Release the accelerator pedal	0.4 – 1.0 V
				Depress the accelerator pedal fully	3.6 V or more
30	30	Power supply voltage applied to accelerator pedal position sensor (main)	Ignition switch: "ON"		4.9 – 5.1 V
41	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	42	Backup power supply	Ignition switch: "LOCK" (OFF)		B+
43	43	Ignition switch-IG	Ignition switch: "ON"		B+
51	51	Power supply	Ignition switch: "ON"		B+
64	64				
52	52	MFI relay (power supply)	Ignition switch: "LOCK" (OFF)		B+
			Ignition switch: "ON"		1 V or less
78	78	Power steering pressure switch	Engine: warming up, idling	When steering wheel is not turned	B+
				When steering wheel is turned	1V or less
79	79	Left bank heated oxygen sensor (front) offset voltage	Ignition switch: "ON"		0.4 – 0.6 V
80	80	Right bank heated oxygen sensor (front) offset voltage	Ignition switch: "ON"		0.4 – 0.6 V

TERMINAL NO. <M/T>	TERMINAL NO. <A/T>	INSPECTION ITEM	INSPECTION CONDITION (ENGINE CONDITION)		NORMAL CONDITION
81	81	A/C compressor clutch relay	• Engine: idling • A/C switch: OFF → ON (A/C compressor is operating)		B+→ 1 V or less as A/C clutch cycles
83	83	Ignition switch-ST	Engine: cranking		8 V or more
91	91	Left bank heated oxygen sensor (front)	Engine: warming up, 2,500 r/min		0.5 ⟷ 1.4V (changes repeatedly)
92	92	Right bank heated oxygen sensor (front)	Engine: warming up, 2,500 r/min		0.5 ⟷ 1.4V (changes repeatedly)
93	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	94	Power supply voltage applied to throttle position sensor	Ignition switch: "ON"		4.9 – 5.1 V
96	96	Left bank heated oxygen sensor (rear)	• Transaxle: 2nd speed (A/T: "L" range) • Drive with wide open throttle • Engine:3,500 r/min or more		1.0 – 1.5V
97	97	Right bank heated oxygen sensor (rear)	• Transaxle: 2nd speed (A/T: "L" range) • Drive with wide open throttle • Engine:3,500 r/min or more		1.0 – 1.5V

TERMINAL NO. <M/T>	TERMINAL NO. <A/T>	INSPECTION ITEM	INSPECTION CONDITION (ENGINE CONDITION)		NORMAL CONDITION
98	98	Throttle position sensor (sub)	• 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	99	Throttle position sensor (main)	• 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. <M/T>	TERMINAL NO. <A/T>	INSPECTION ITEM	INSPECTION CONDITION (ENGINE CONDITION)		NORMAL CONDITION
102	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	103	Crankshaft position sensor	Engine: cranking		0.4 – 4.0 V *1
			Engine: idling		2.0 – 3.0 V *1
104	104	Camshaft position sensor	Engine: cranking		0.4 – 4.0 V *1
			Engine: idling		2.9 – 3.9 V *1
105	105	Left bank heated oxygen sensor (rear) offsetvoltage	Ignition switch: "ON"		0.4 – 0.6 V
106	106	Right bank heated oxygen sensor (rear) offsetvoltage	Ignition switch: "ON"		0.4 – 0.6 V
107	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	108	Mass airflow sensor	Engine: revving		Voltage increase in response to revving

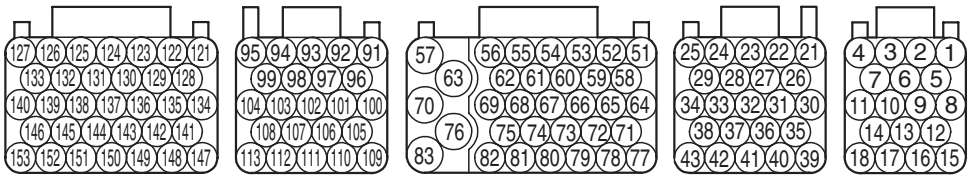
TERMINAL NO. <M/T>	TERMINAL NO. <A/T>	INSPECTION ITEM	INSPECTION CONDITION (ENGINE CONDITION)	NORMAL CONDITION
109	109	Right bank engine oilpressure switch	Engine: warming up, idling	1 V or less
			Engine: 4,500 r/min	B+
110	110	Left bank engine oilpressure switch	Engine: warming up, idling	1 V or less
			Engine: 4,500 r/min	B+
122	122	Power supply voltage applied to throttle actuator control motor	Ignition switch: "ON"	B+
123	123	Throttle actuator control motor relay	Ignition switch: "ON" → "LOCK(OFF)"	1 V or less → B+ → 1 V or less
125	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	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)
128	128	Left bank engine oilcontrol valve	Engine: warming up, idling	B+
			Engine: 4,500 r/min	1 V or less → 4.0 – 10 V*1(After a few seconds pass)
131	131	Generator FR terminal	• 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	132	Generator G terminal	• 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
135	135	Right bank engine oilcontrol valve	Engine: warming up, idling	B+
			Engine: 4,500 r/min	1 V or less → 4.0 – 10 V*1(After a few seconds pass)

TERMINAL NO. <M/T>	TERMINAL NO. <A/T>	INSPECTION ITEM	INSPECTION CONDITION (ENGINE CONDITION)	NORMAL CONDITION
137	137	Left bank heated oxygen sensor heater (rear)	Engine: warming up, idling	1 V or less
			Engine: revving	B+
138	138	Right bank heated oxygen sensor heater (rear)	Engine: warming up, idling	1 V or less
			Engine: revving	B+
141	141	Throttle actuator control motor (-)	• Ignition switch: "ON" • Accelerator pedal: fully closed → fully opened	Decreases slightly (Approximately. 2V) from battery voltage.
145	145	Variable intake airsolenoid	Engine: warming up, idling	B+
			Engine: 4,500 r/min	1 V or less
147	147	Throttle actuator control motor (+)	• Ignition switch: "ON" • Accelerator pedal: fully opened → fully closed	Decreases slightly (Approximately. 2V) from battery voltage.
142	142	EGR valve (Stepper motor coil <A1>)	Ignition switch: "LOCK(OFF)" → "ON"	5 – 8 V *1 (changes about three seconds repeatedly)
136	136	EGR valve (Stepper motor coil <A2>)		
130	130	EGR valve (Stepper motor coil <B1>)		
124	124	EGR valve (Stepper motor coil <B2>)		
149	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. <M/T>	TERMINAL NO. <A/T>	INSPECTION ITEM	INSPECTION CONDITION (ENGINE CONDITION)	NORMAL CONDITION
151	151	Ignition coil – No. 1 (ignition power transistor)	Engine: 3,000 r/min	0.3 – 3.0 V *1
150	150	Ignition coil – No. 2 (ignition power transistor)		
144	144	Ignition coil – No. 3 (ignition power transistor)		
148	148	Ignition coil – No. 4 (ignition power transistor)		
143	143	Ignition coil – No. 5 (ignition power transistor)		
134	134	Ignition coil – No. 6 (ignition power transistor)		
153	153	No. 1 injector	• Engine: warming up, idling • Suddenly depress the accelerator pedal	From 9 – 13 V *1 momentarily drops slightly
146	146	No. 2 injector		
140	140	No. 3 injector		
139	139	No. 4 injector		
133	133	No. 5 injector		
127	127	No. 6 injector		

TERMINAL RESISTANCE AND CONTINUITY CHECK

ECM <M/T> or PCM <A/T> Harness Side Connector Terminal Arrangement



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TERMINAL NO.	INSPECTION ITEM	NORMAL CONDITION (INSPECTION CONDITION)
25 – Body ground	ECM <M/T> or PCM <A/T> ground	Continuity (2 Ω or less)
29 – Body ground	ECM <M/T> or PCM <A/T> ground	
34 – Body ground	ECM <M/T> or PCM <A/T> ground	
38 – Body ground	ECM <M/T> or PCM <A/T> 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)]

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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 – 128	Left bank engine oil control valve	6.9 – 7.9 Ω [at 20° C (68° F)]
51 – 135	Right bank engine oil control valve	6.9 – 7.9 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)]
51 – 145	Variable intake air solenoid	29 – 35 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

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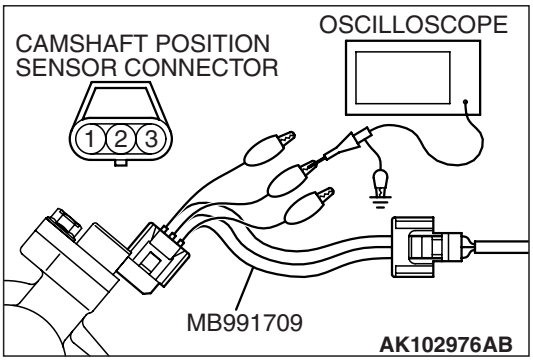
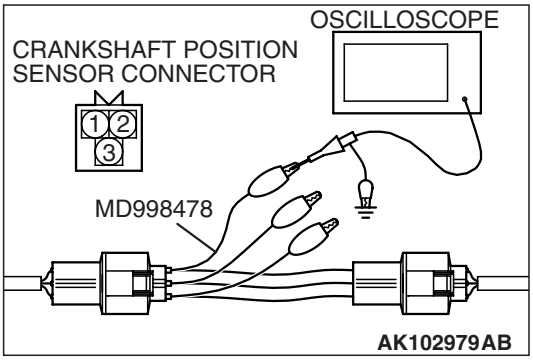
CAMSHAFT POSITION SENSOR AND CRANKSHAFT POSITION SENSOR





Required Special Tools:

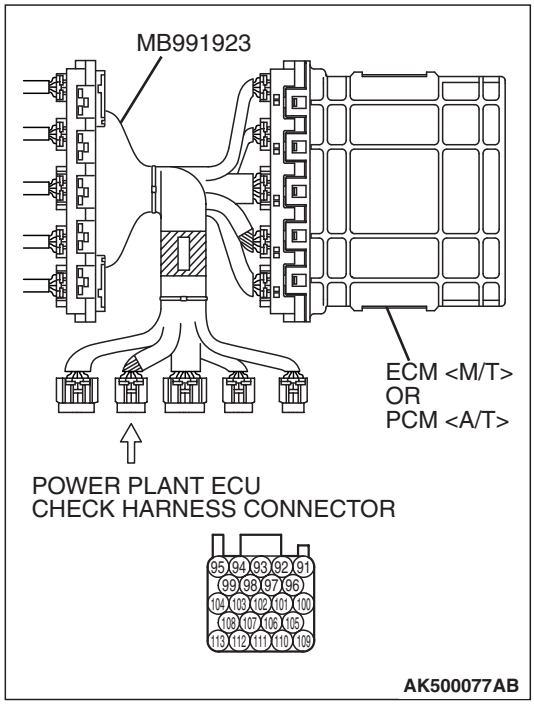
- MB991709: Test Harness
- MD998478: Test Harness
- MB991923: Power Plant ECU Check Harness

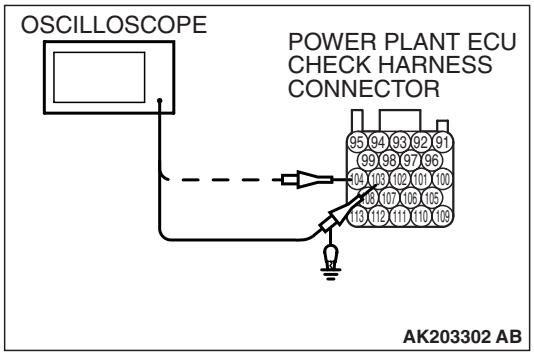
Measurement Method

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

1. Disconnect all ECM <M/T> connectors or PCM <A/T> connectors. Connect the check harness special tool (MB991923) between the separated connectors.



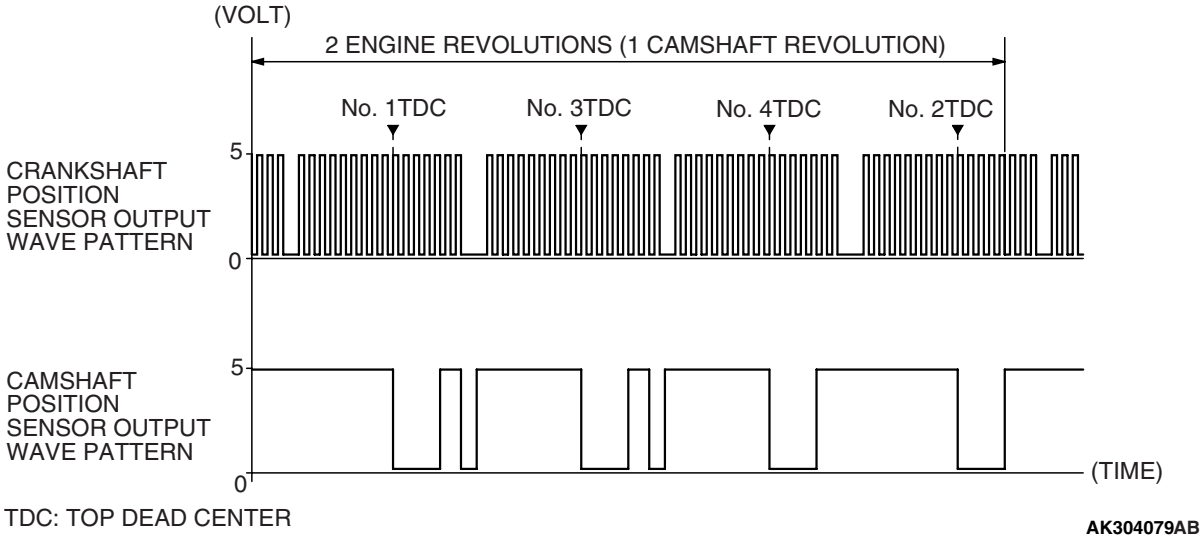


2. Connect the oscilloscope to check harness terminal No. 104. (Check the camshaft position sensor signal wave pattern.)
3. Connect the oscilloscope to check harness terminal No. 103. (Check the crankshaft position sensor signal wave pattern.)

Standard Wave Pattern

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

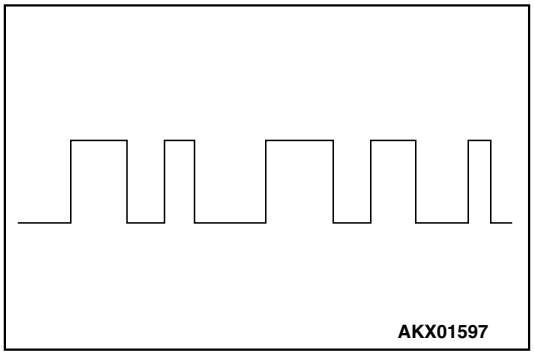
Standard wave pattern



Wave Pattern Observation Points

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

Examples of Abnormal Wave Patterns



Example 1

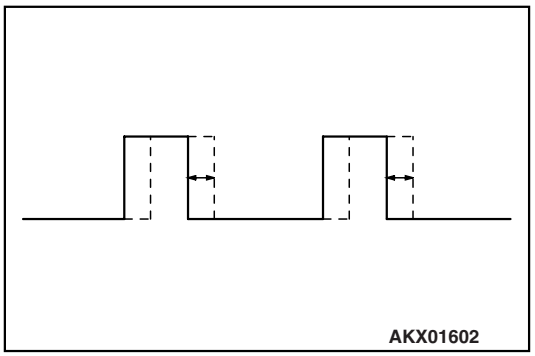
Cause of problem

- Sensor interface malfunction.

Wave pattern characteristics

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

TSB Revision



Example 2

Cause of problem

- Loose timing belt.
- Abnormality in sensor disc.

Wave pattern characteristics

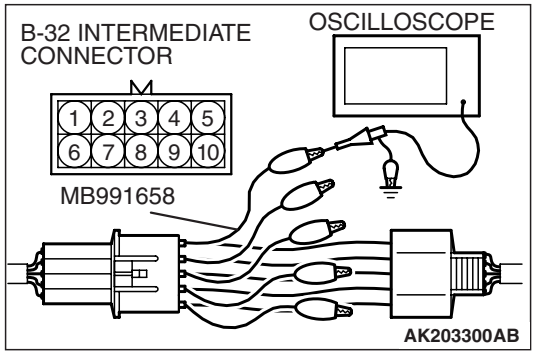
- Wave pattern is displaced to the left or right.

INJECTOR

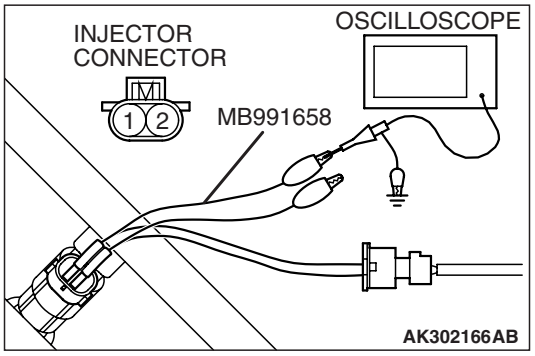
Required Special Tools:

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

Measurement Method



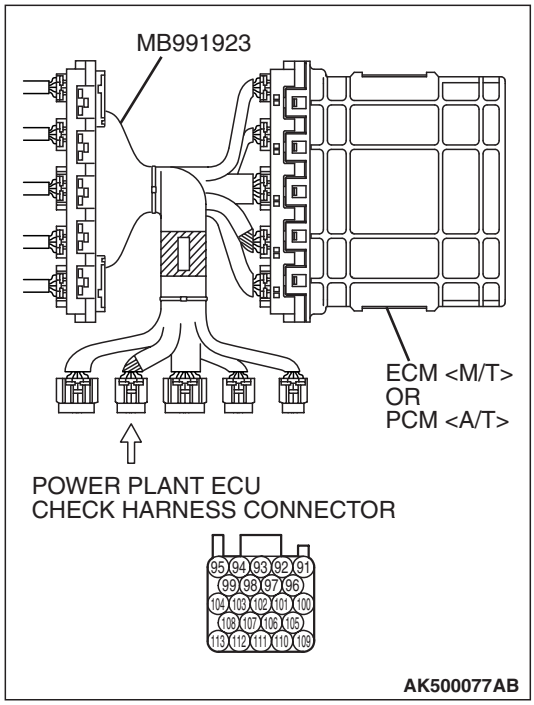
<Measure at the right bank (number 1, 3, 5 cylinders)>



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

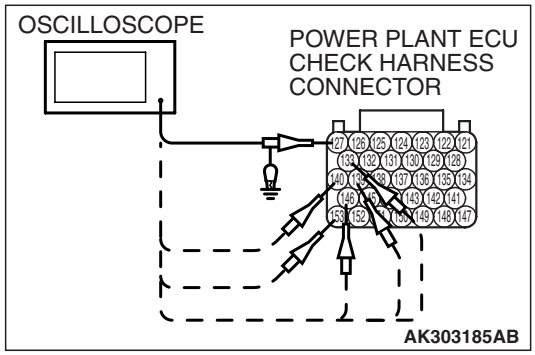
<Measure at the right bank (number 2, 4, 6 cylinders)>

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

1. Disconnect all ECM <M/T> connectors or PCM <A/T> connectors. Connect the check harness special tool (MB991923) between the separated connectors.

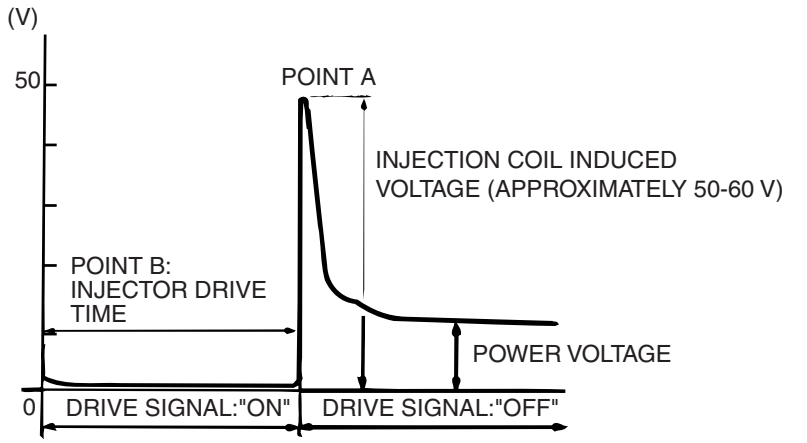


2. Connect the oscilloscope probe to each check harness connector terminal to analyze each cylinder:
   - Terminal No. 153 for the number 1 cylinder.
   - Terminal No. 146 for the number 2 cylinder.
   - Terminal No. 140 for the number 3 cylinder.
   - Terminal No. 139 for the number 4 cylinder.
   -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



AKX01604 AB

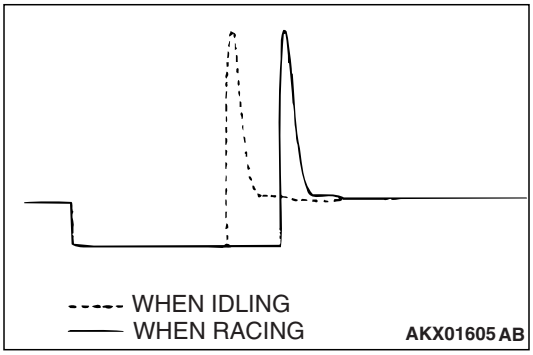
Wave Pattern Observation Points

Point A: Height of injector coil induced voltage.

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

Point B: Injector drive time

1. The injector drive time should be synchronized with the 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.

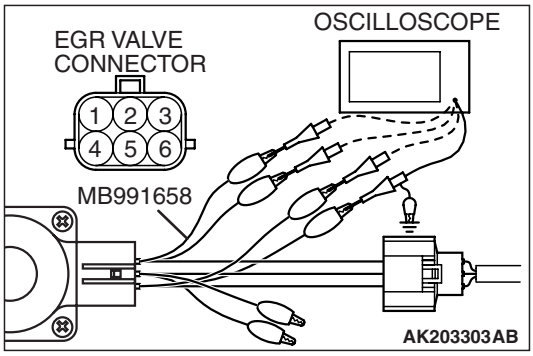


AKX01605 AB

EGR VALVE (STEPPER MOTOR)

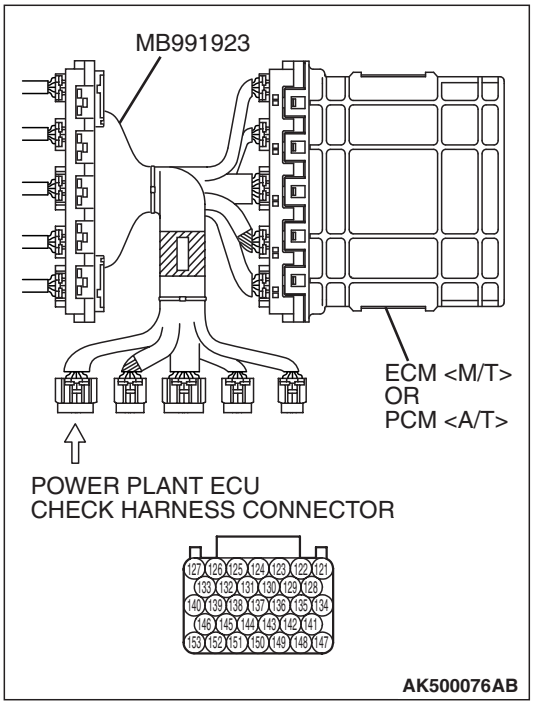
Required Special Tools:

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



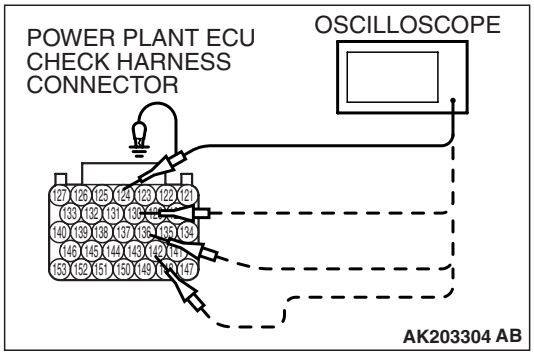
Measurement Method

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

1. Disconnect all ECM <M/T> connectors or PCM <A/T> connectors. Connect the check harness special tool (MB991923) between the separated connectors.

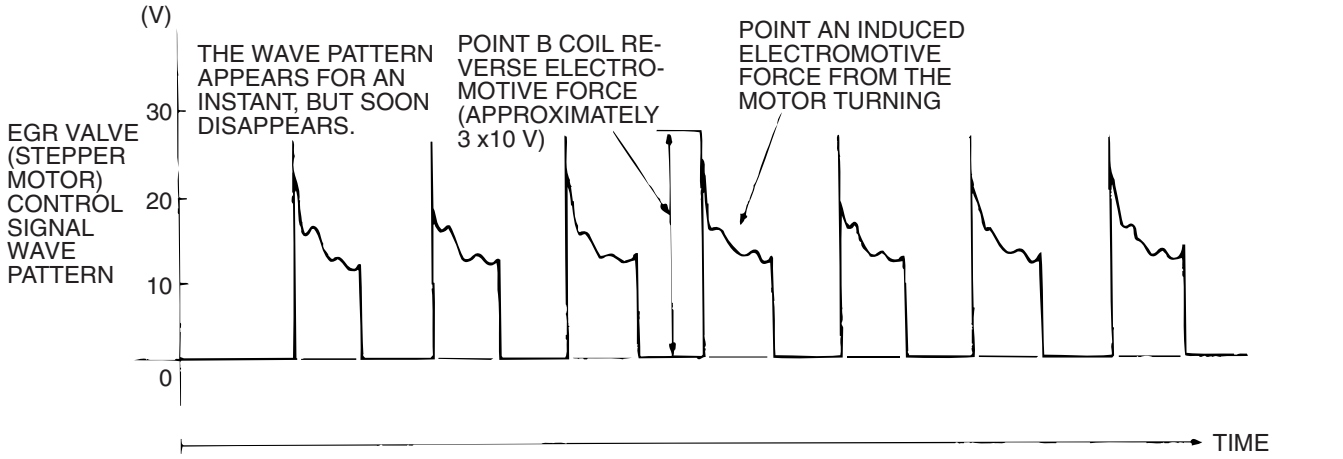


2. Connect the oscilloscope probe to check harness terminal No. 124, No. 130, No. 136 and No. 142.

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.

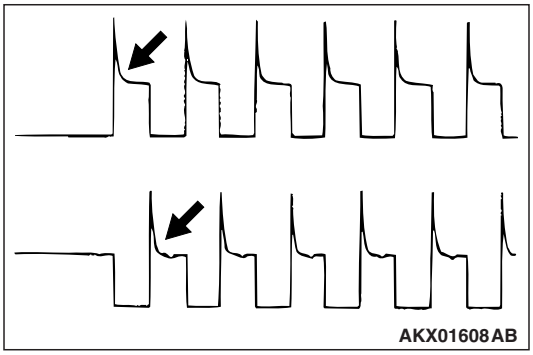
Point A: Presence or absence of induced electromotive force from the motor turning. (Refer to abnormal wave pattern.)

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



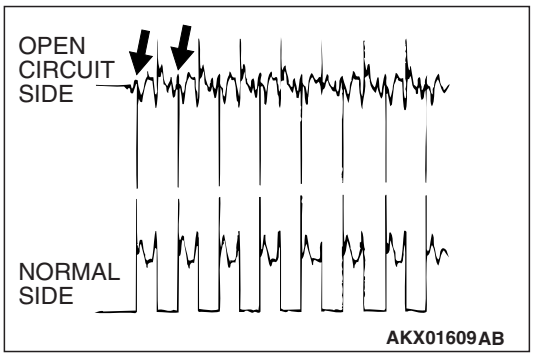
Example 1

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 ECM <M/T> or the PCM <A/T>.

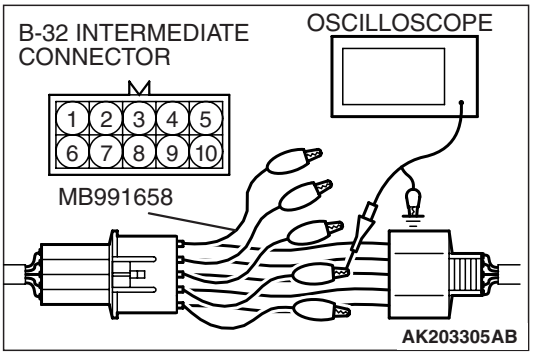
Wave pattern characteristics

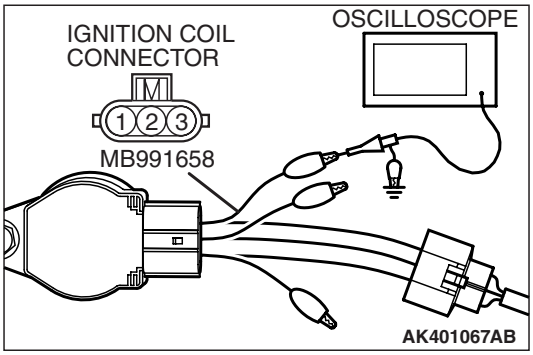
- Current is not supplied to the motor coil on the open circuit side. (Voltage does not drop to 0 volt.) Furthermore, the induced electromotive force wave pattern at the normal side is slightly different from the normal wave pattern.

IGNITION COIL AND IGNITION POWER TRANSISTOR

Required Special Tools:

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





Measurement Method

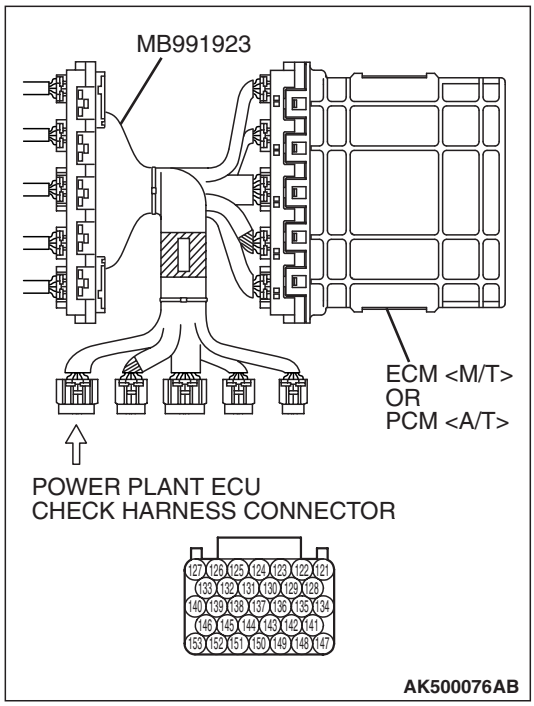
<Measure at the right bank (number 1, 3, 5 cylinders)>

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.

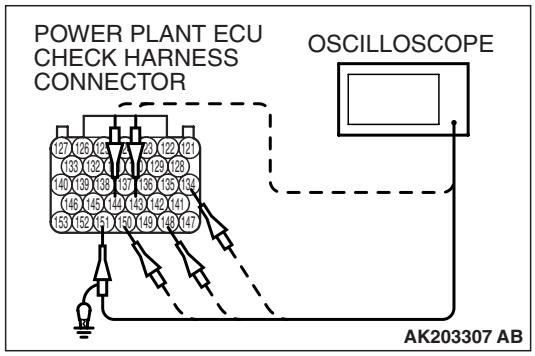
<Measure at the left bank (number 2, 4, 6 cylinders)>

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



1. Disconnect all ECM <M/T> connectors or PCM <A/T> connectors. Connect the check harness special tool (MB991923) between the separated connectors.

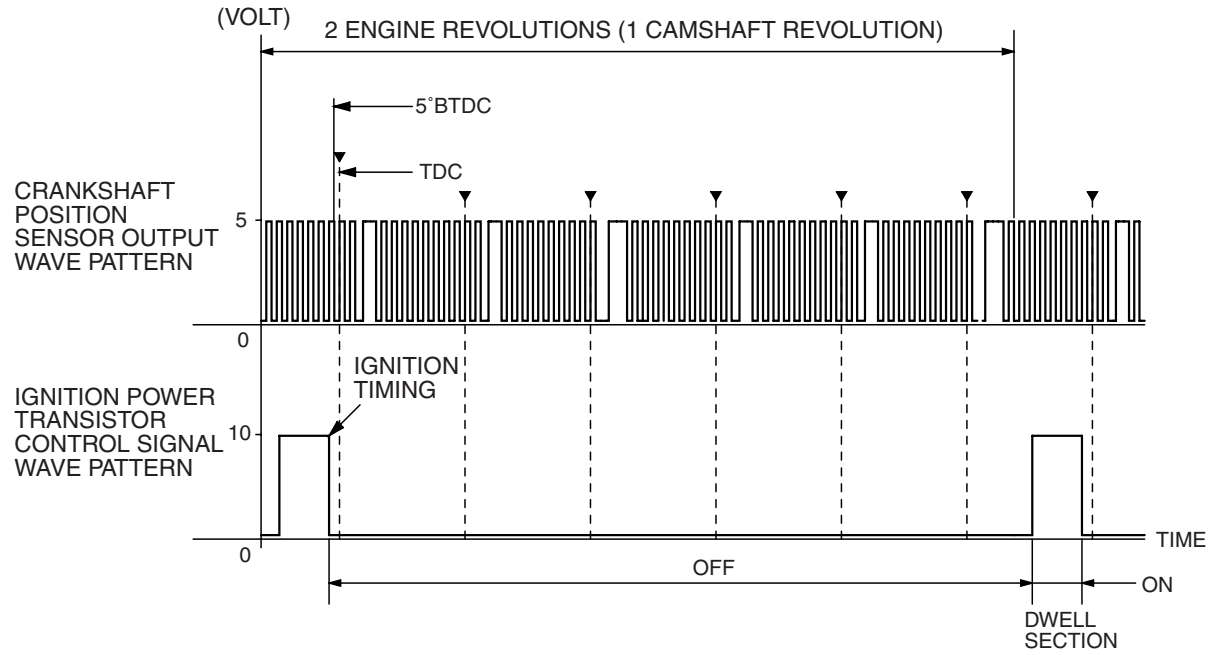


2. Connect the oscilloscope probe to each check harness connector terminal to analyze each cylinder:
   - Terminal No. 151 for the number 1 cylinder.
   - Terminal No. 150 for the number 2 cylinder.
   - Terminal No. 144 for the number 3 cylinder.
   - Terminal No. 148 for the number 4 cylinder.
   -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



AK203308AC

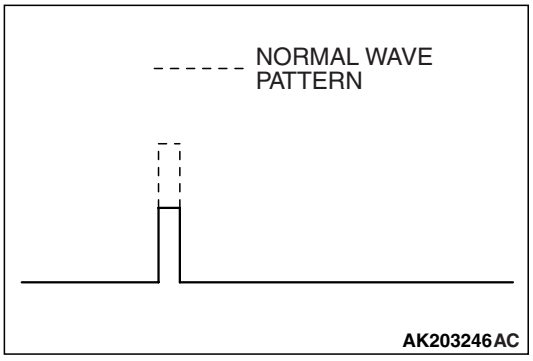
Wave Pattern Observation Points

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

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

Examples of Abnormal Wave Patterns

Example 1 (Wave pattern during engine cranking)

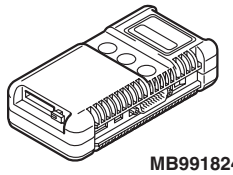
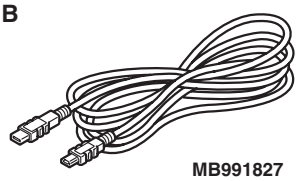
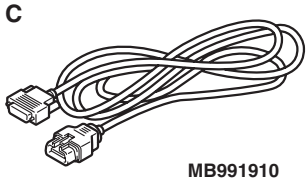
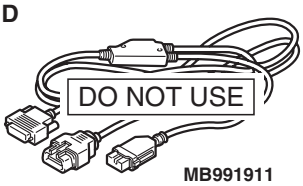
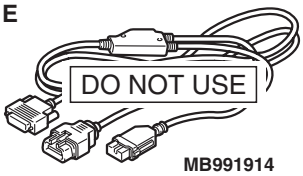
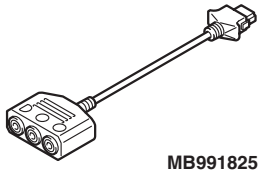
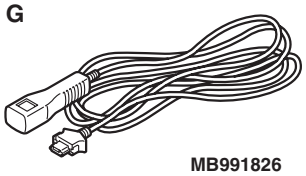
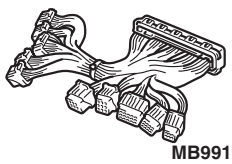


AK203246AC

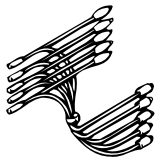
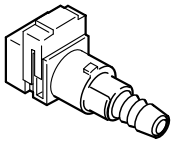
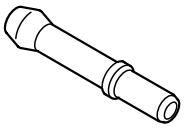
- Cause of problem
  Open-circuit in ignition primary circuit
- Wave pattern characteristics
  Voltage value is too low.

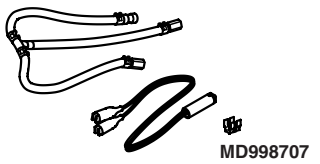
SPECIAL TOOLS

M1131000601453

TOOL	TOOL NUMBER AND NAME	SUPERSESSION	APPLICATION
A  MB991824 B  MB991827 C  MB991910 D  MB991911 E  MB991914 F  MB991825 G  MB991826 MB991958	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	MB991824-KIT *NOTE: G: MB991826 MUT-III Trigger Harness is not necessary when pushing V.C.I. ENTER key.*	• Reading diagnostic trouble code • MFI system inspection • Measurement of fuel pressure **⚠ 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.**
 MB991923	MB991923 Power plant ECU check harness	MD998478-01	• Inspection using an oscilloscope • Inspection of the engine control module (ECM) <M/T> the powertrain control module (PCM) <A/T> terminal voltage check

TSB Revision

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	• Inspection using an oscilloscope • Adjustment of accelerator pedal position sensor
	MD998464 Test harness (4 pin, square)	MD998464-01	• 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
 MB992049	MB992049	Quick connector	• Measurement of fuel pressure
 MB992001	MB992001	Hose adaptor	• Measurement of fuel pressure
 MB991637	MB991637 Fuel pressure gauge set	Tool not available	Measurement of fuel pressure

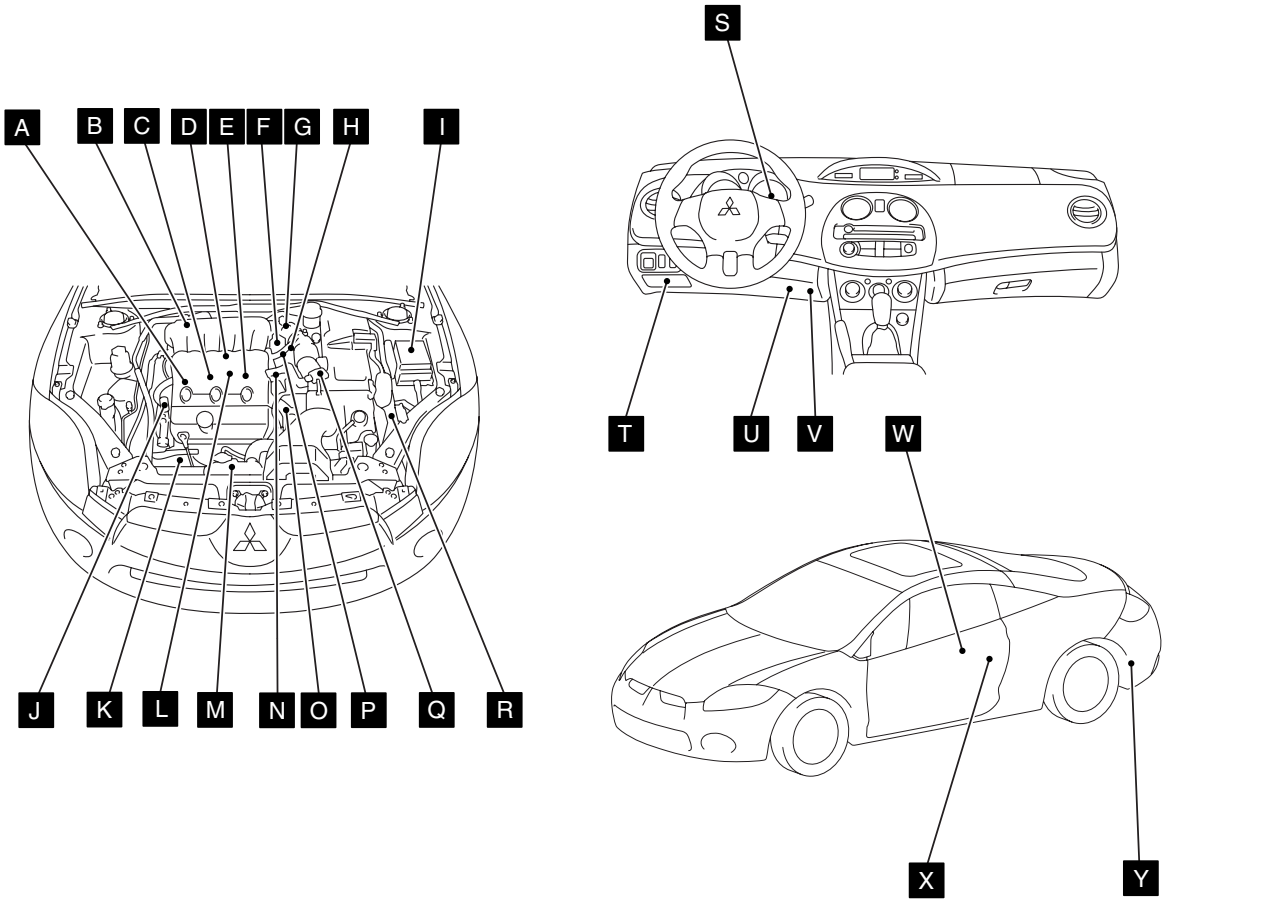
TOOL	TOOL NUMBER AND NAME	SUPERSESSION	APPLICATION
 MD998707	MD998707	Injector test set	• Measurement of fuel pressure

ON-VEHICLE SERVICE

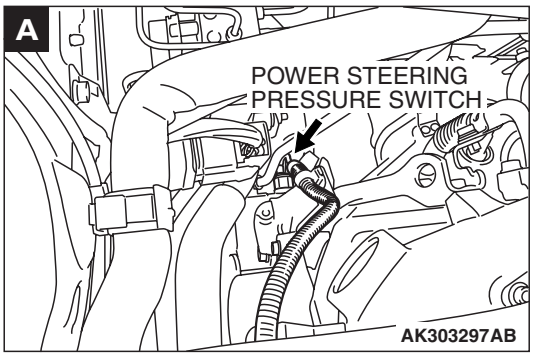
COMPONENT LOCATION

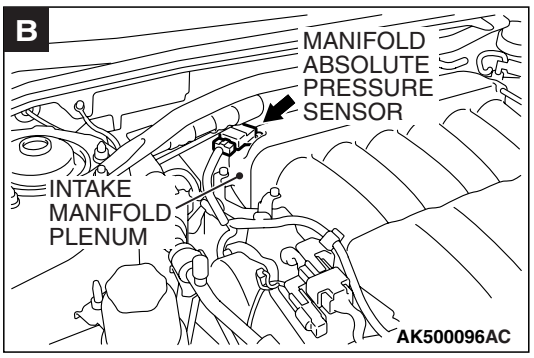
M1131002101454

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

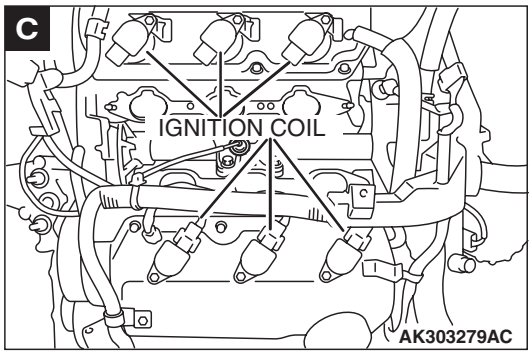

A
B
C
D
E
F
G
H
I
J
K
L
M
N
O
P
Q
R
S
T
U
V
W
X
Y

AK500240AB

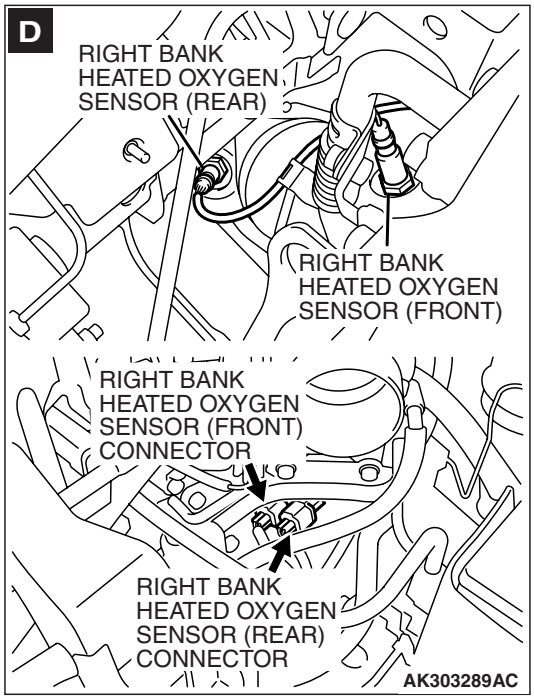

A
POWER STEERING
PRESSURE SWITCH
AK303297AB


B
MANIFOLD
ABSOLUTE
PRESSURE
SENSOR
INTAKE
MANIFOLD
PLENUM
AK500096AC

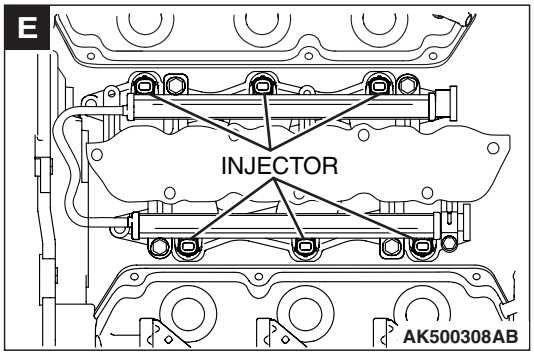
C



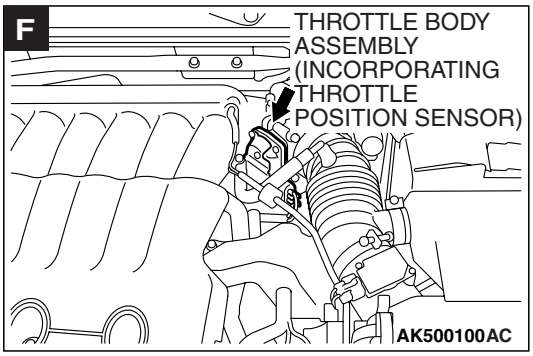
D



E



F



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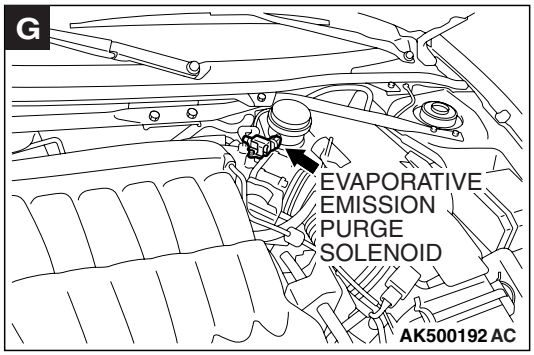

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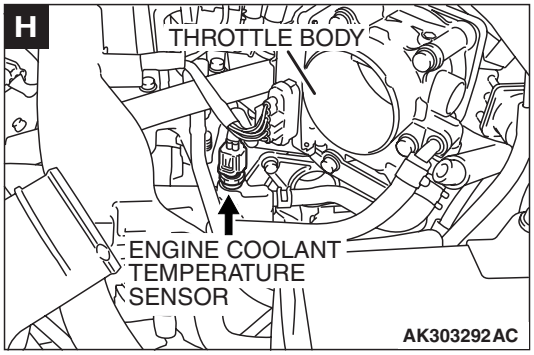

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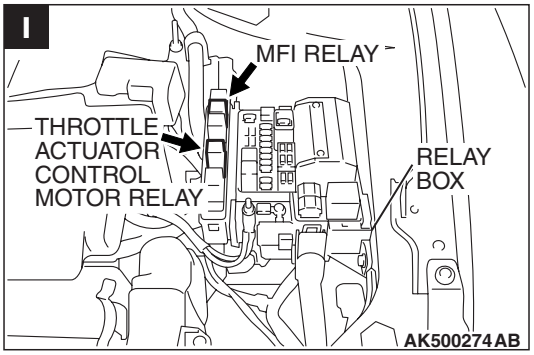

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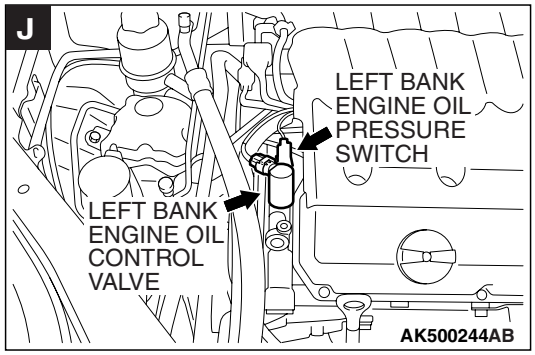
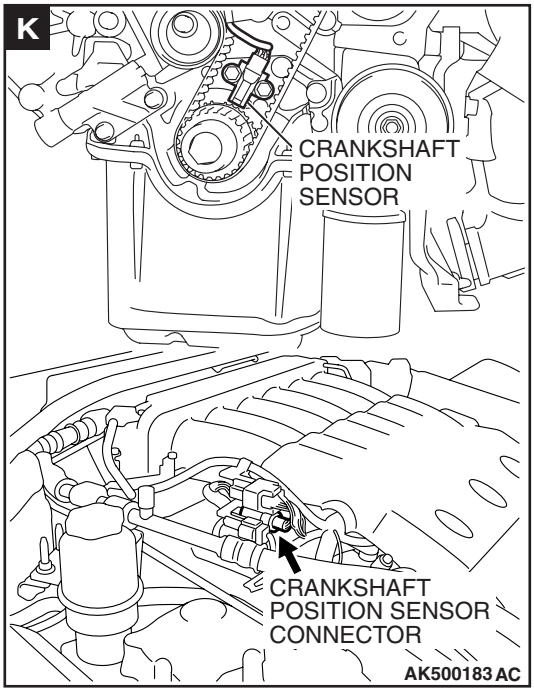


TSB Revision

K



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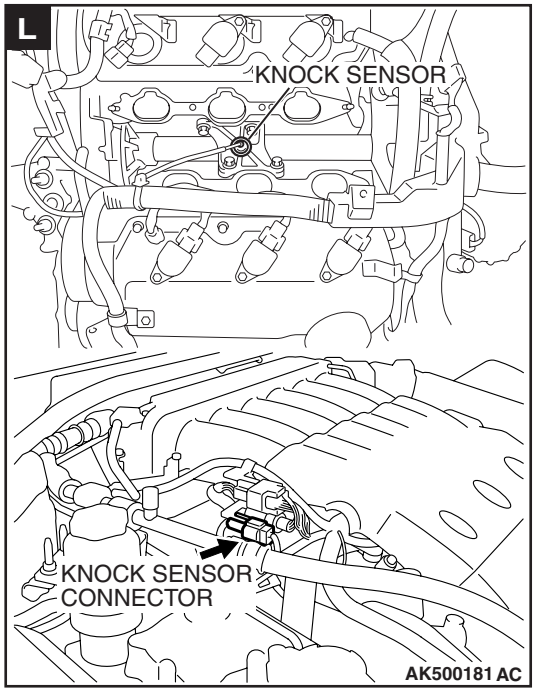

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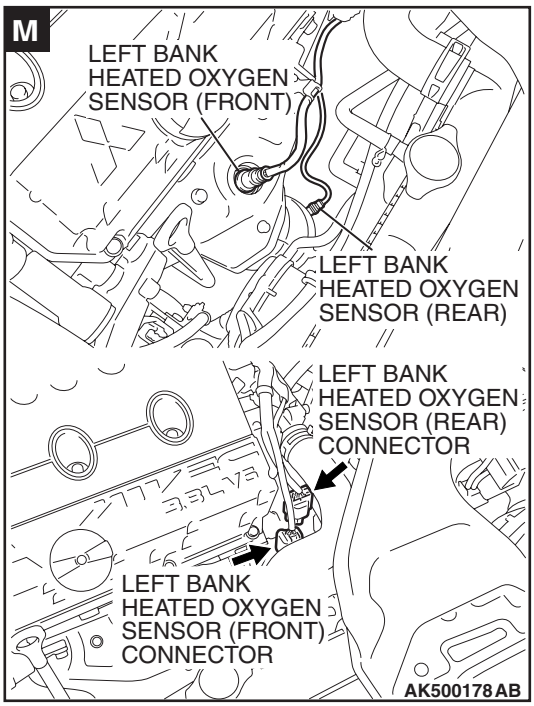

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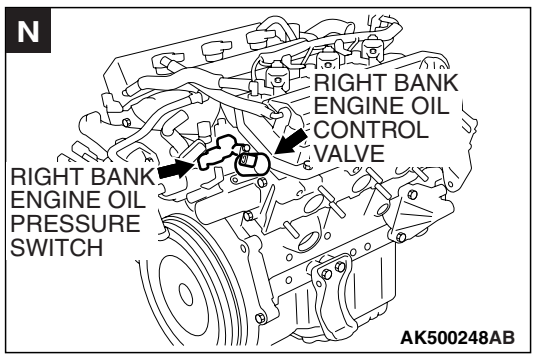

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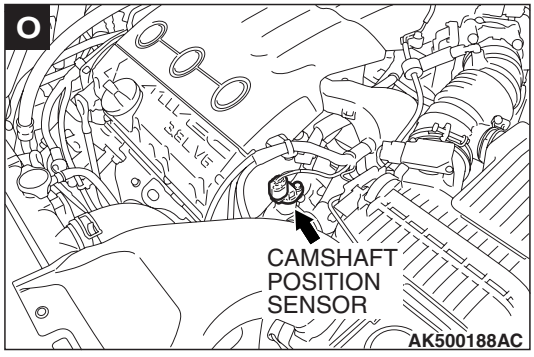

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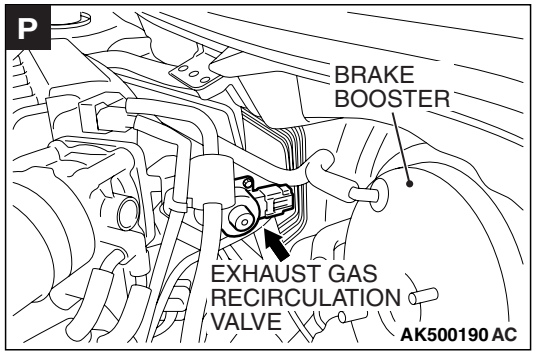
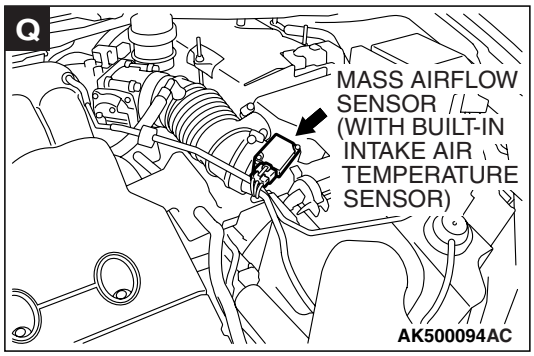
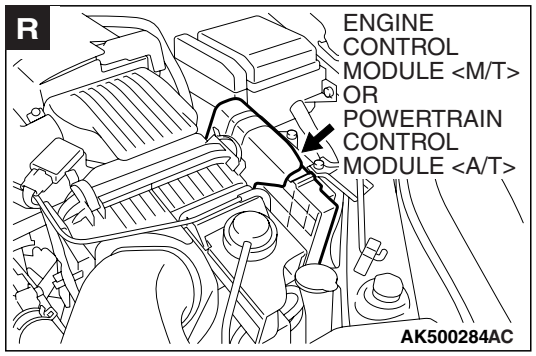


TSB Revision

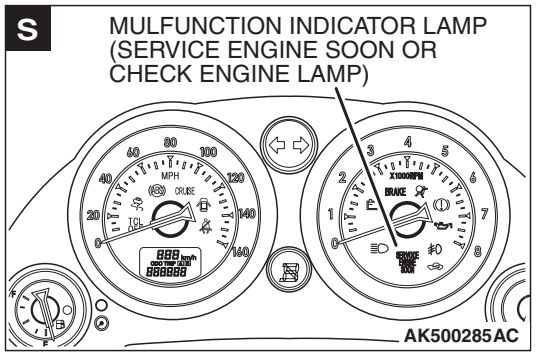
Q


MASS AIRFLOW SENSOR (WITH BUILT-IN INTAKE AIR TEMPERATURE SENSOR)
AK500094AC

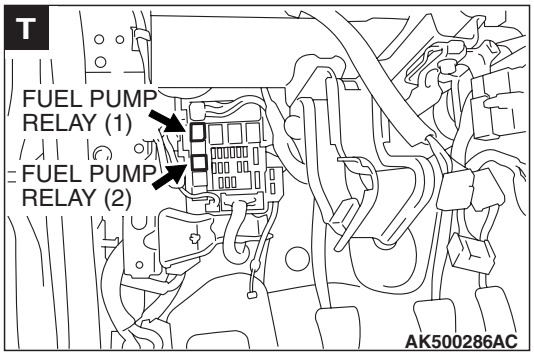
R


ENGINE CONTROL MODULE <M/T> OR POWERTRAIN CONTROL MODULE <A/T>
AK500284AC

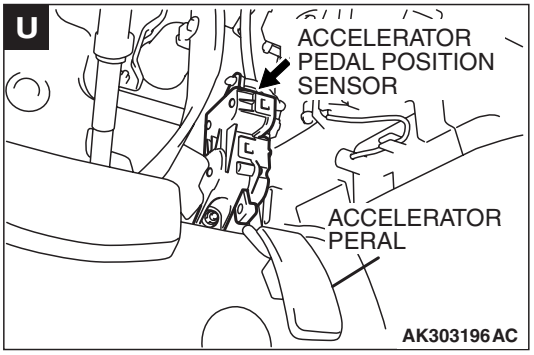
S


MULFUNCTION INDICATOR LAMP (SERVICE ENGINE SOON OR CHECK ENGINE LAMP)
AK500285AC

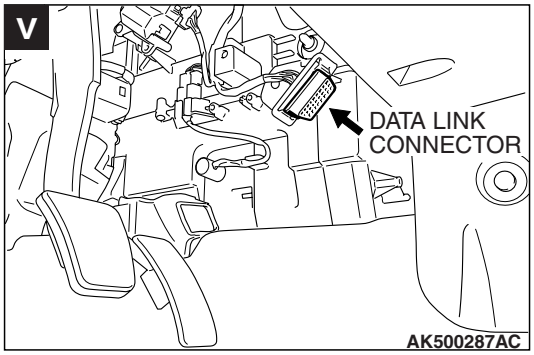
T


FUEL PUMP RELAY (1)
FUEL PUMP RELAY (2)
AK500286AC

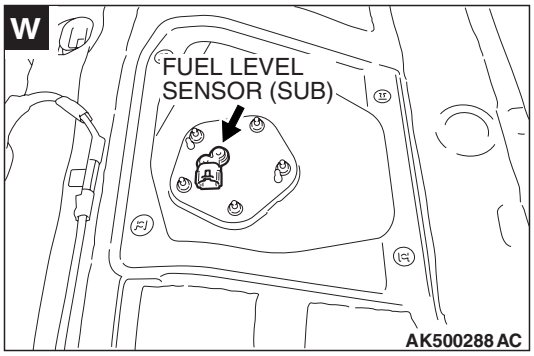
U


ACCELERATOR PEDAL POSITION SENSOR
ACCELERATOR PERAL
AK303196AC

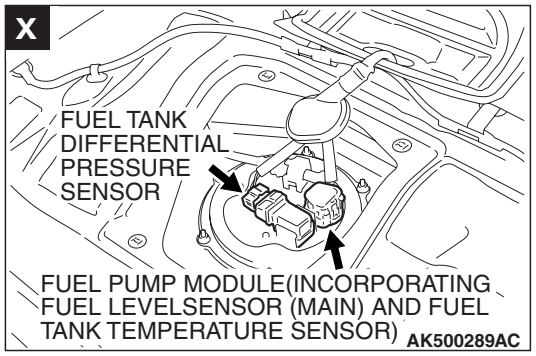
V

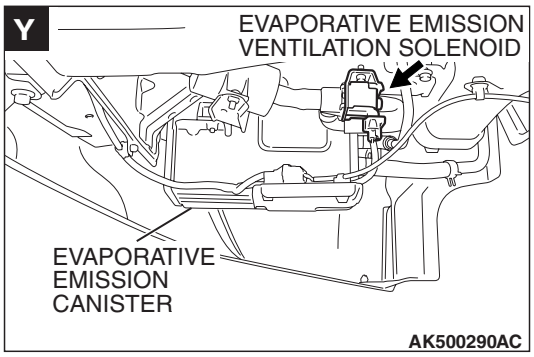

DATA LINK CONNECTOR
AK500287AC

W


FUEL LEVEL SENSOR (SUB)
AK500288AC

X


FUEL TANK DIFFERENTIAL PRESSURE SENSOR
FUEL PUMP MODULE(INCORPORATING FUEL LEVELSENSOR (MAIN) AND FUEL TANK TEMPERATURE SENSOR)
AK500289AC



THROTTLE BODY (THROTTLE VALVE AREA) CLEANING

M1131001000945

⚠ ***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

M1131001901178

Required Special Tools:

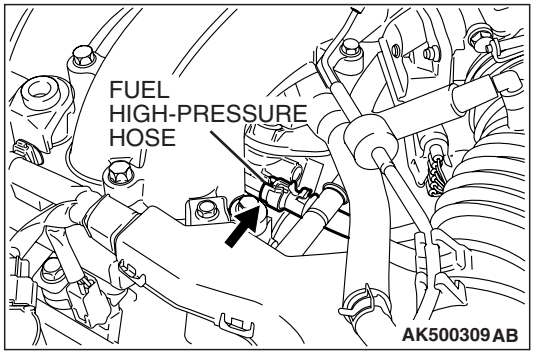
- MB991958: Scan tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991910: Main Harness A
- MB991637: Fuel Pressure Gauge Set
- MB992001: Hose Adaptor
- MB992049: Quick Connector
- MD998707: Test Device

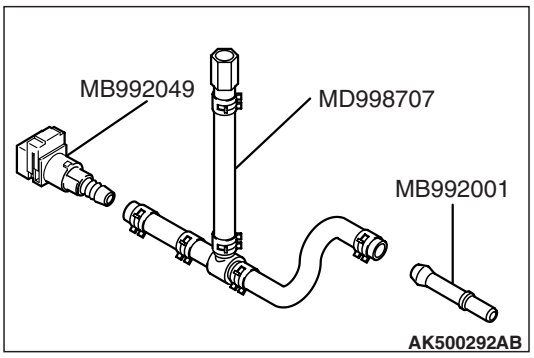
1. Release residual pressure from the fuel line to prevent fuel spray. (Refer to P.13B-1283.)

⚠ ***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.

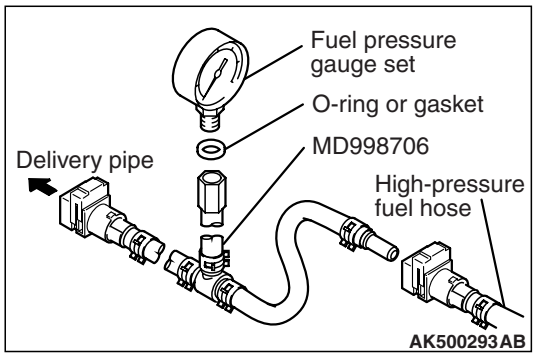




3. Assemble the special tool MD998707 (test device) of special tool as shown in figure.
4. Remove either the instillation adopter for the injector or another adopter.
5. Install the special tool MB992049 (quick connector) and the special tool MB992001 (hose adapter) to the hose without the adopter.
6. Assemble the fuel pressure measurement tools as follows.

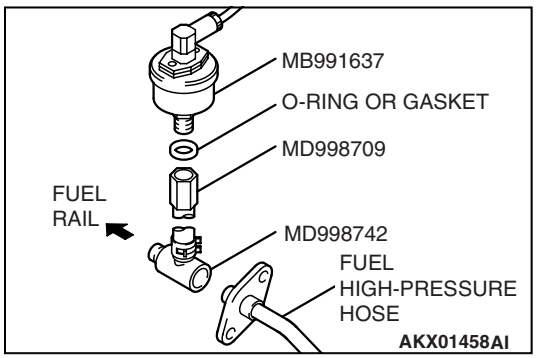
<When using the fuel pressure gauge>

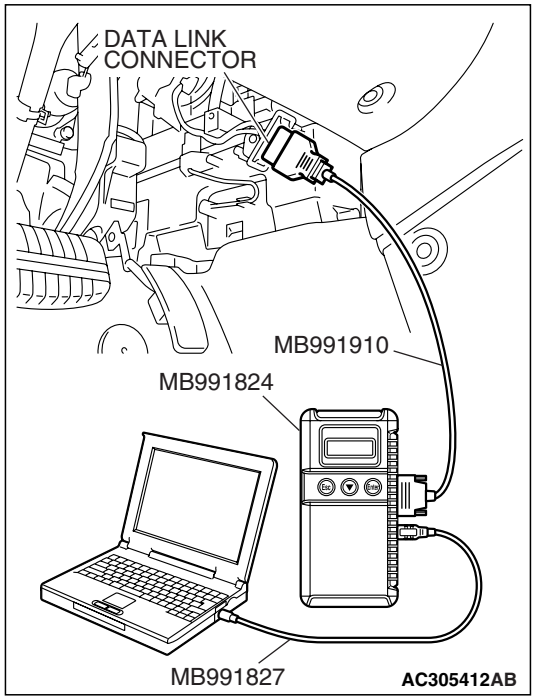
1. Via a suitable O-ring or gasket, install the fuel pressure gauge to the special tool that has already assembled as described.
2. Install the assembled fuel pressure measurement tools between the fuel rail and fuel high-pressure hose.



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

1. Via a gasket, install the special tool MB991637 (fuel pressure gauge set) into the special tool that has already assembled as described.
2. 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.

7. Connect scan tool MB991958 to the data link connector.
8. Use Actuator test 9 to drive the fuel pump. Check that there is no fuel leaking from any section when the fuel pump is operating.
9. Stop the fuel pump.
10. Start the engine and run at idle.
11. Measure fuel pressure while the engine is running at idle.
    Standard value: Approximately 324 kPa (47 psi) at curb idle
12. Check to see that fuel pressure at idle does not drop even after the engine has been revved several times.
13. If any of fuel pressure measured in steps 11 to 12 is out of specification, troubleshoot and repair according to the table below.

SYMPTOM	PROBABLE CAUSE	REMEDY
• 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

14. 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

15. Release residual pressure from the fuel pipe line. (Refer to P.13B-1283.)

TSB Revision

⚠ ***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.

16.Remove the fuel pressure gauge and special tool from the delivery pipe.

17.Fit the fuel high-pressure hose to the delivery pipe.

18.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.

19.Disconnect scan tool MB991958.

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

M1131000901056

Refer to GROUP 13A, On-vehicle Service –Fuel Pump Connector Disconnection (How to Reduce Pressurized Fuel Lines) P.13A-1200.

FUEL PUMP OPERATION CHECK

M1131002001156

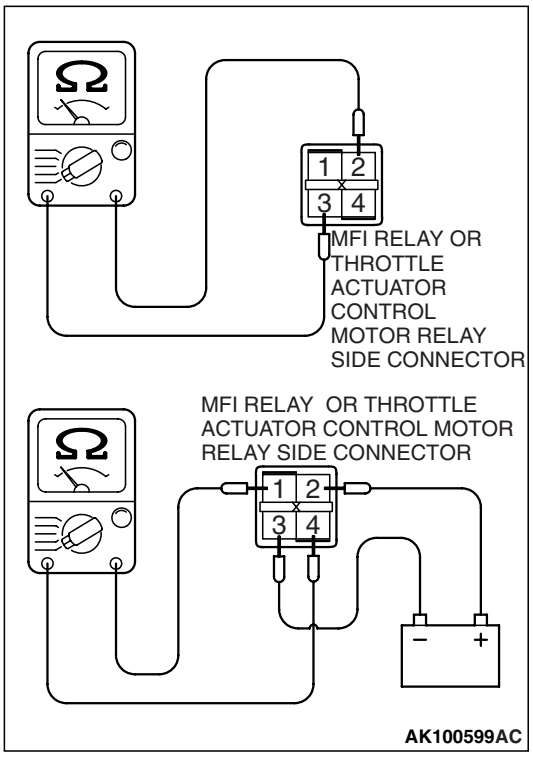
Refer to GROUP 13A, On-vehicle Service –Fuel Pump Operation Check P.13A-1200.

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

M1131050000709

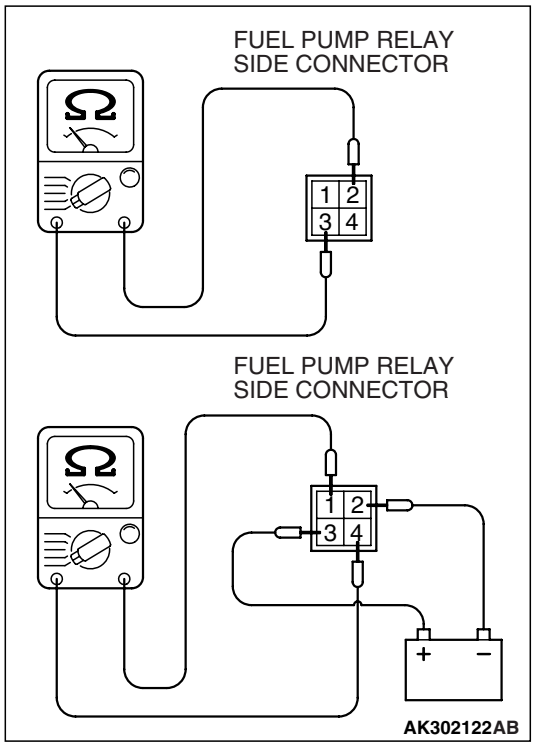
Inspect the MFI relay and throttle actuator control motor relay for continuity in accordance with the chart shown below.

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

M1131033000706

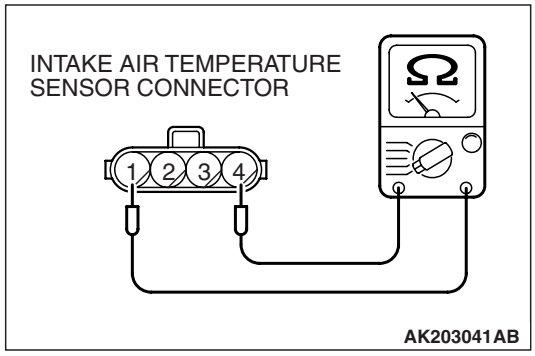


Inspect the fuel pump relay for continuity in accordance with the chart shown below.

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

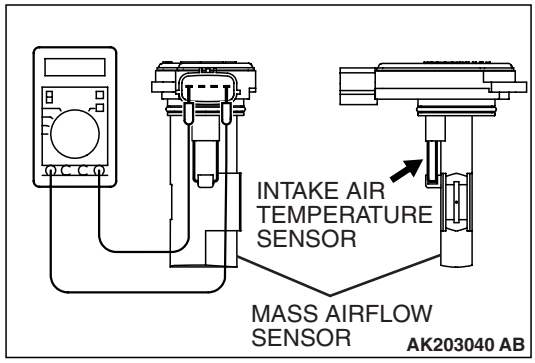
M1131002801022



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

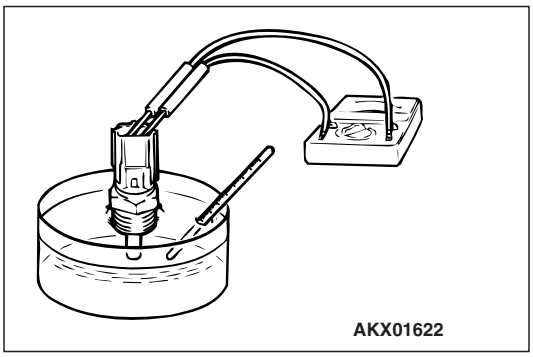
M1131003100971

⚠ CAUTION

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

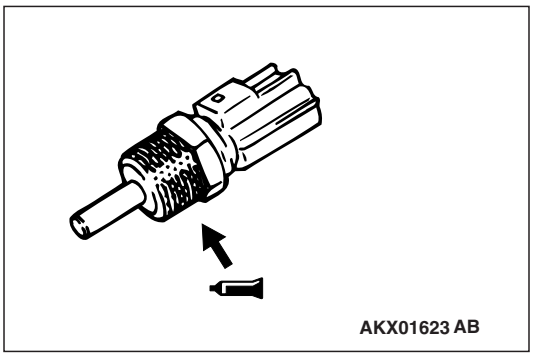
1. Drain engine coolant, then remove the engine coolant temperature sensor.
2. With the temperature sensing portion of engine coolant temperature sensor immersed in hot water, check the resistance.

   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)]


AKX01622

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: 30 ± 9 N· m (22 ± 7 ft-lb)

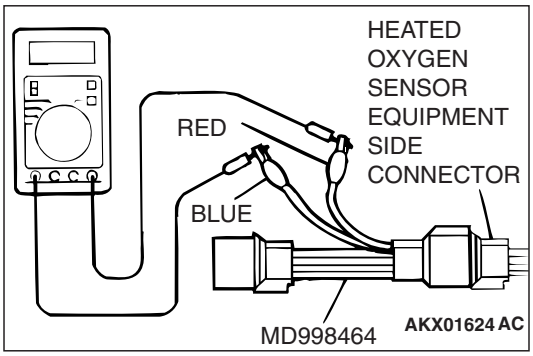

AKX01623 AB

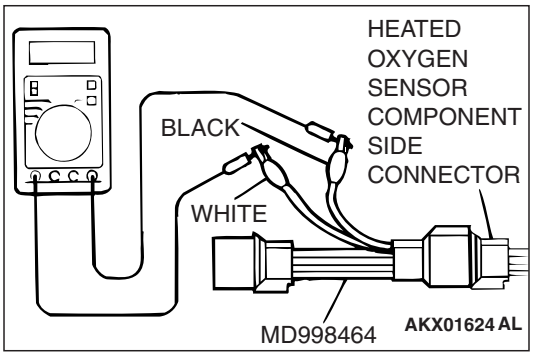
HEATED OXYGEN SENSOR CHECK

M1131005001304

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. 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. Rev the engine 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).
7. 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.

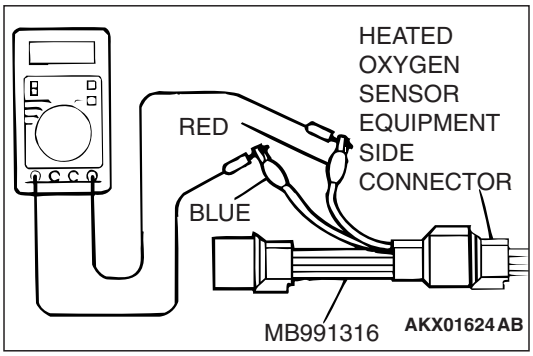
⚠ CAUTION

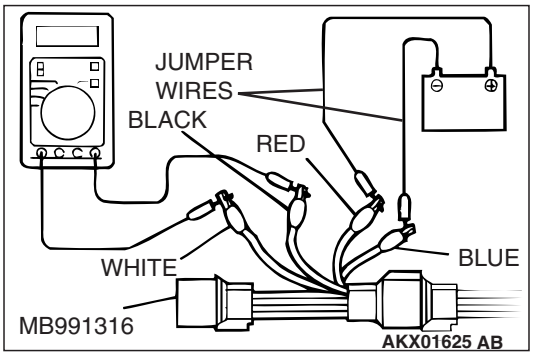
- **Be very careful when connecting the jumper wire; incorrect connection can damage the oxygen sensor.**
- **Be careful the heater is broken when voltage of beyond 8V is applied to the oxygen sensor heater.**

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.

8. 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.15-24.*





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

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. Drive at 50 km/h (31 mph) or more for 10 minutes.
6. Connect a digital voltage meter between terminal No. 2 (black clip) and terminal No. 4 (white clip).
7. Measure the output voltage of the heated oxygen sensor under the following driving.
   - Transaxle: 2nd speed (A/T: "L" range)
   - Drive with wide open throttle
   - Engine: 3,500 r/min or more

   Standard value:

HEATED OXYGEN SENSOR OUTPUT VOLTAGE	REMARKS
0.6 –1.0 V	High load operation makes air/fuel ratio richer ant normal heated oxygen sensor also can output voltage of 0.6 – 1.0 V.

8. If the output voltage is not within the standard value, replace the heated oxygen sensor.

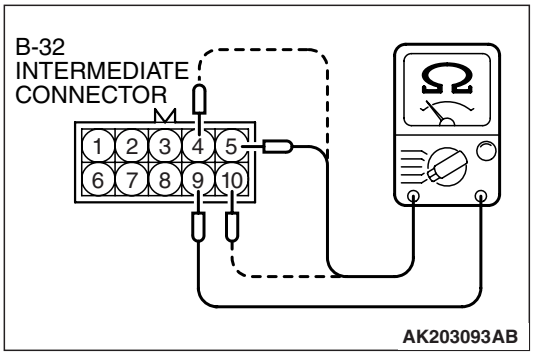
NOTE: If the sufficiently high temperature (of approximate 400°C or more) is not reached although the oxygen sensor is normal, the output voltage would be possibly low although the rich air-fuel ratio.

NOTE: For removal and installation of the heated oxygen sensor, refer to GROUP 15, Exhaust Pipe and Main Muffler *P.15-24.*

INJECTOR CHECK

M1131005201126

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



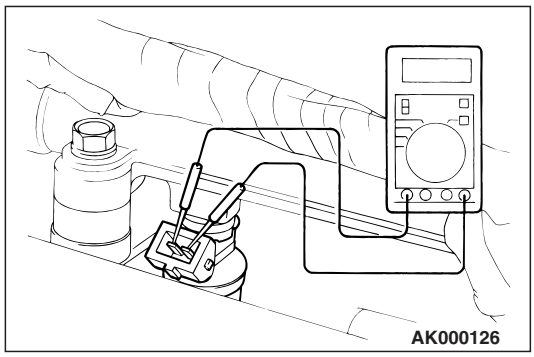
1. Disconnect the intermediate connector B-32.
2. Measure the resistance between the injector intermediate connector terminals.

   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.

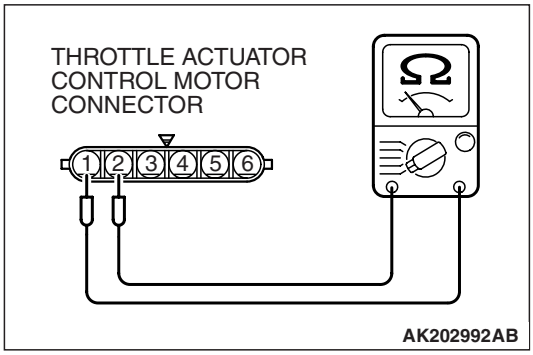
THROTTLE ACTUATOR CONTROL MOTOR CHECK

M1131051000382

<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.

ENGINE OIL CONTROL VALVE CHECK

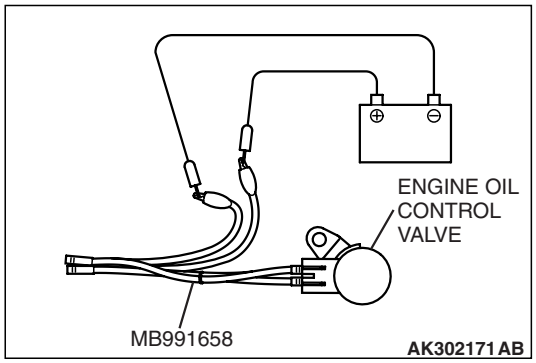
M1131053200274

Checking the Operation Sound

1. Disconnect the engine oil control valve connector.

⚠ CAUTION

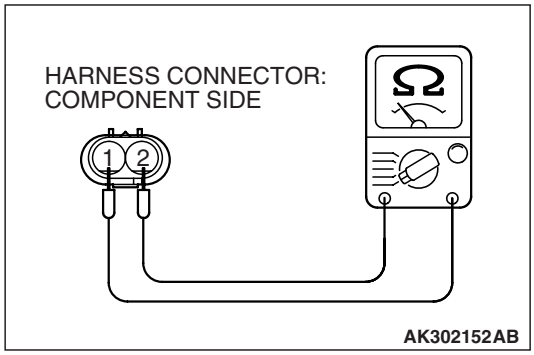
To prevent the coil from burning, keep the duration of the voltage application as short as possible.



2. Check that the operation sound of the engine oil control valve can be heard when the positive battery voltage is supplied to the engine oil control valve. (Use the jumper wires to connect terminal No. 2 of the engine oil control valve connector to the positive battery terminal and terminal No. 1 to the negative battery terminal.)
3. If the operation sound cannot be heard, replace the engine oil control valve.

Checking the Coil Resistance

1. Disconnect the engine oil control valve connector.
2. Measure resistance between terminal No. 1 and terminal No. 2 of the connector at the engine oil control valve side.



Standard value: 6.9 – 7.9 ohms [at 20° C (68° F)]

3. If resistance is not within the standard value, replace the engine oil control valve.

EVAPORATIVE EMISSION PURGE SOLENOID CHECK

M1131005600400

Refer to GROUP 17, Emission Control System –Evaporative Emission System –Evaporative Emission Purge Solenoid Check P.17-102.

EVAPORATVE EMISSION VENTILATION SOLENOID CHECK

M1131012800321

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.17-111.

EGR VALVE CHECK

M1131051500105

Refer to GROUP 17, Emission Control System – Exhaust Gas Recirculation (EGR) System –EGR Valve Check.P.17-105

INJECTOR

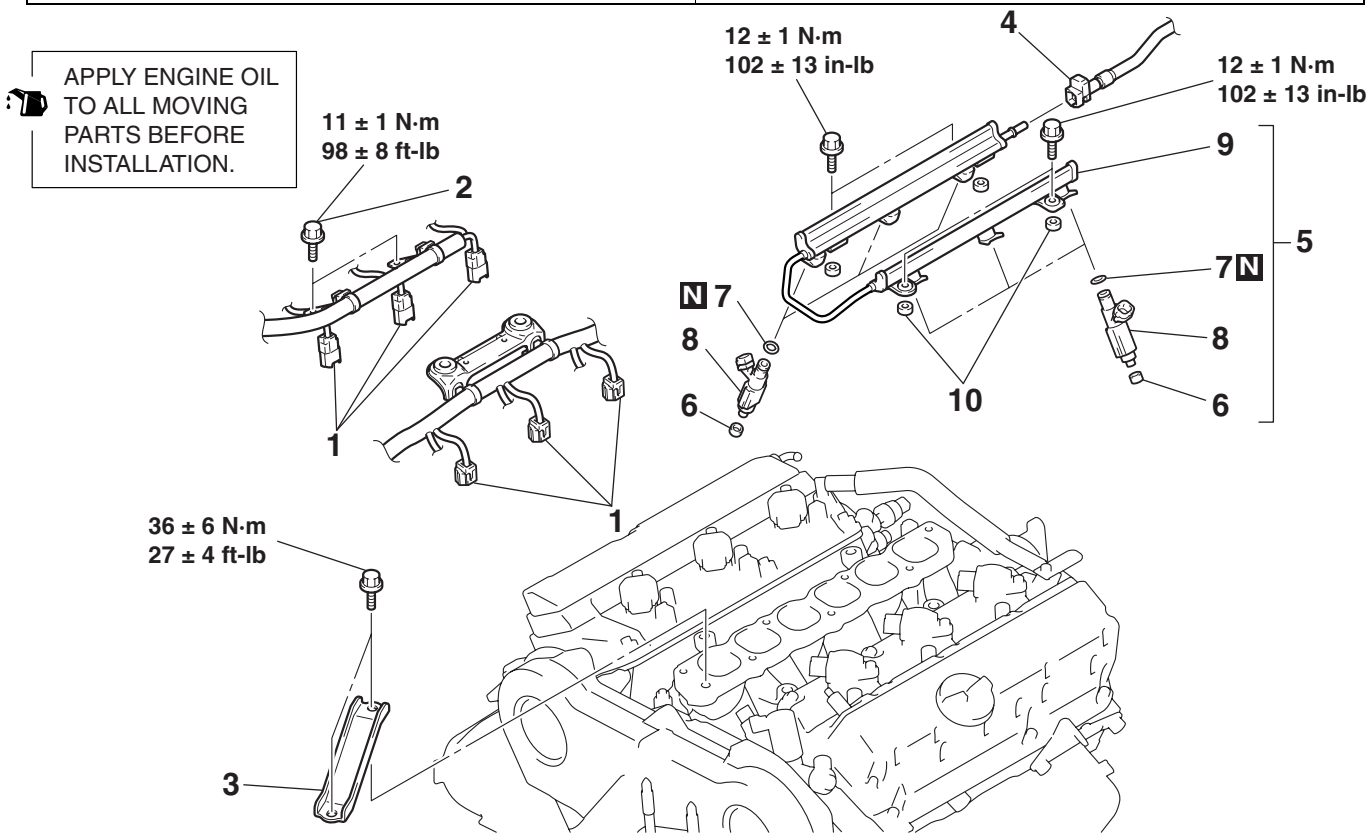
REMOVAL AND INSTALLATION

M1131007101266

⚠ CAUTION

When the fuel injector replacement is performed, use scan tool MB991958 to initialize the learning value (Refer to GROUP 00, Initialization Procedure for Learning Value in MFI Engine P.00-30).

Pre-removal Operation	Post-installation Operation
• Fuel Discharge Prevention (Refer to P.13B-1283). • Intake Manifold Plenum Removal (Refer to GROUP 15, Intake Manifold Plenum P.15-7).	• Intake Manifold Plenum Installation (Refer to GROUP 15, Intake Manifold Plenum P.15-7). • Fuel Leakage Inspection.



AC500409AB

REMOVAL STEPS

1. FUEL INJECTOR CONNECTORS
2. CONTROL WIRING HARNESS BRACKET MOUNTING BOLTS
3. ENGINE MOUNTING STAY

<<A>> >>B<< 4. FUEL HIGH-PRESSURE HOSE CONNECTION (FUEL RAIL SIDE)

<<B>>

REMOVAL STEPS (Continued)

5. FUEL RAIL AND FUEL INJECTOR ASSEMBLY
6. INSULATORS

>>A<< 7. O-RINGS

>>A<< 8. FUEL INJECTORS

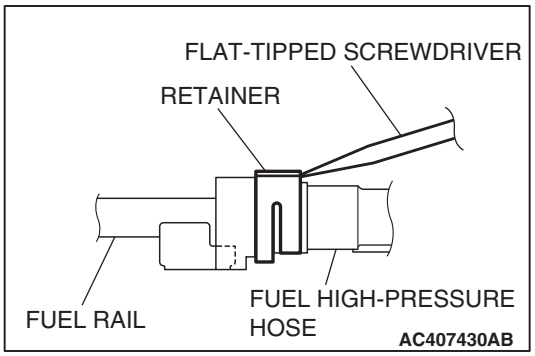
9. FUEL RAIL
10. INSULATORS

TSB Revision

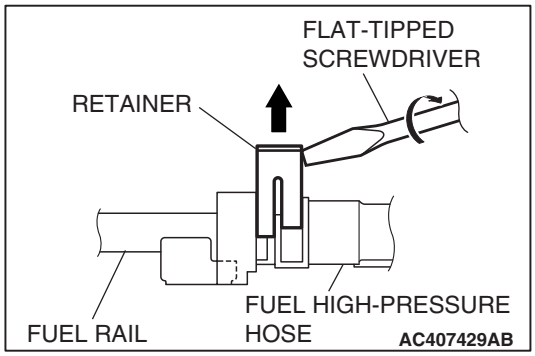
REMOVAL SERVICE POINTS

<<A>> FUEL HIGH-PRESSURE HOSE DISCONNECTION

⚠ CAUTION
Do not kink the fuel high-pressure hose as it is made of plastics and will become damaged.



1. Insert a flat-tipped screwdriver [width 6 mm (0.24 inch), thickness 1 mm (0.04 inch)] to the retainer.



2. Turn the flat-tipped screwdriver approximately 90° to the arrowed direction, and lift the retainer to unlock and disconnect the fuel high-pressure hose.

<<B>> 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 POINTS

>>A<< FUEL INJECTORS/O-RING INSTALLATION

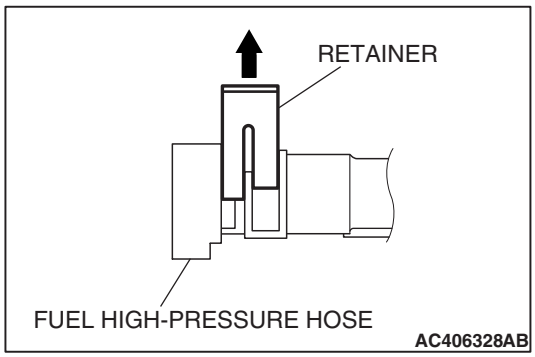
⚠ CAUTION
Do not let the engine oil get into the fuel rail.

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. Be careful not to damage the O-ring. After installing, check that they turn smoothly.
3. If it dose not turn smoothly, the O-ring may be trapped, remove the item, re-install it into the fuel rail and check again.

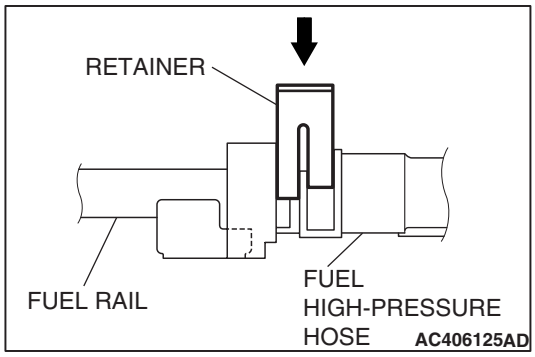
>>B<< FUEL HIGH-PRESSURE HOSE CONNECTION

⚠ CAUTION

Do not kink the fuel high-pressure hose as it is made of plastics and will become damaged.



1. Pull up the lock of fuel high-pressure hose to unlock before installing.



2. Install the fuel high-pressure hose to the fuel rail securely and push the lock of fuel high-pressure hose downward and lock thoroughly.
3. After installing, slightly pull the fuel high-pressure hose and ensure that there is no disengaged fuel high-pressure hose. Also confirm that there is approximately 1 mm (0.04 inch) play at this time.

THROTTLE BODY ASSEMBLY

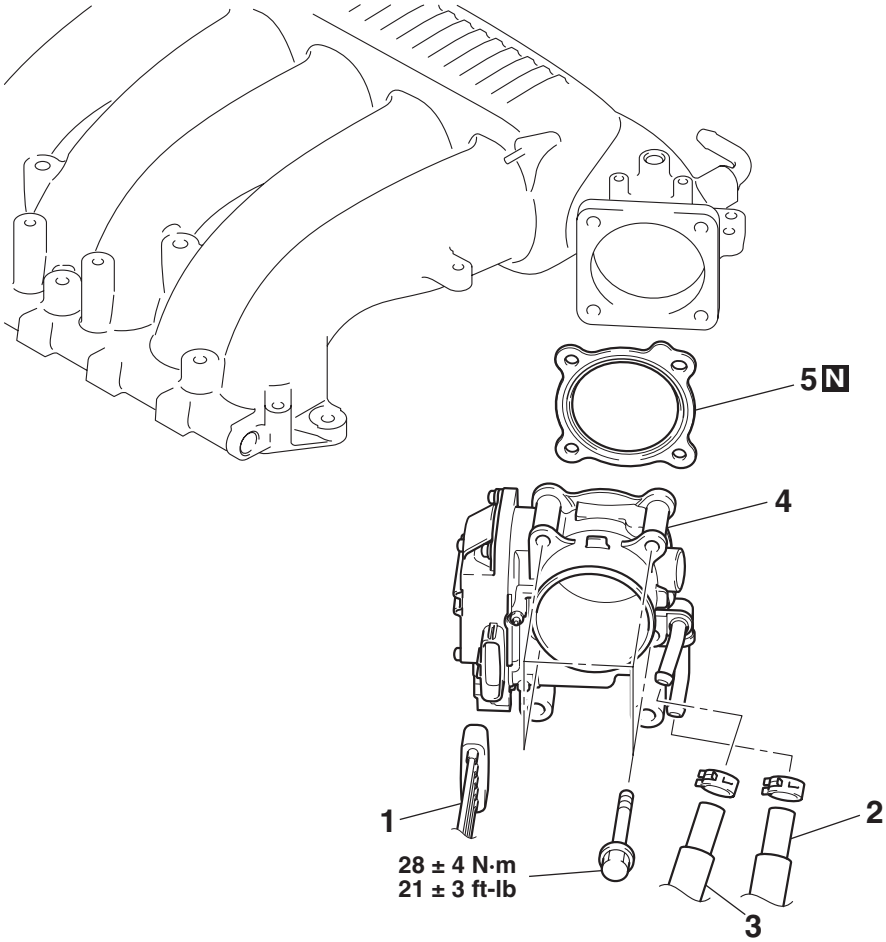
REMOVAL AND INSTALLATION

M1131007701086

⚠ CAUTION

- **When the throttle body assembly replacement is performed, use scan tool MB991958 to initialize the learning value (Refer to GROUP 00, Initialization Procedure for Learning Value in MFI Engine P.00-30).**
- **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 can not work normally.**

Pre-removal Operation	Post-installation Operation
• Engine Coolant Draining [Refer to GROUP 00, Maintenance Service –Engine Coolant (Change) P.00-63]. • Air Intake Hose Removal (Refer to GROUP 15, Air Cleaner P.15-5).	• Air Intake Hose Installation (Refer to GROUP 15, Air Cleaner P.15-5). • Engine Coolant Refilling [Refer to GROUP 00, Maintenance Service –Engine Coolant (Change) P.00-63].



AC406284 AB

REMOVAL STEPS

>>B<< • INITIALIZATION PROCEDURE (INSTALLATION ONLY)
1. THROTTLE POSITION SENSOR CONNECTOR
2. WATER FEED HOSE CONNECTION

REMOVAL STEPS (Continued)

3. WATER RETURN HOSE CONNECTION
4. THROTTLE BODY ASSEMBLY
>>A<< 5. THROTTLE BODY GASKET

TSB Revision

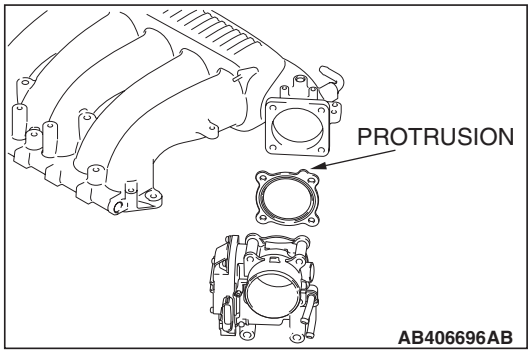
INSTALLATION SERVICE POINTS

>>A<<THROTTLE BODY GASKET INSTALLATION

⚠ CAUTION

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

Install the gasket with its protrusion in the direction shown.



>>B<< INITIALIZATION PROCEDURE

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

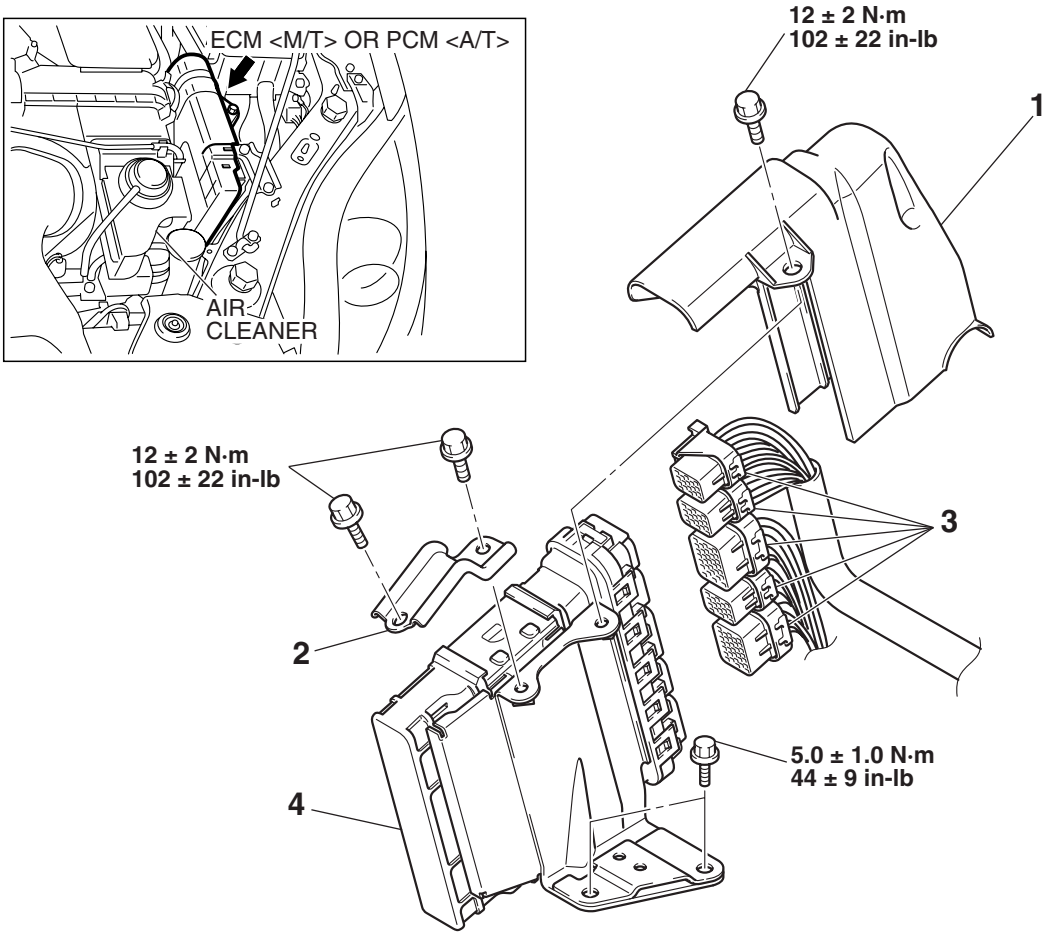
ENGINE CONTROL MODULE (ECM) AND POWERTRAIN CONTROL MODULE (PCM)

REMOVAL AND INSTALLATION

M1131034000033

⚠ CAUTION

Do not replace the ECM <M/T> or PCM <A/T> and the ETACS-ECU simultaneously. Always replace either one of the ECUs first, and register the encrypted code (Refer to GROUP 54A, Encrypted Code Registration Criteria Table P.54A-13). Then, replace the other ECU.



AC406270AB

REMOVAL STEPS

>>A<< • INITIALIZATION PROCEDURE (INSTALLATION ONLY)

1. ECM <M/T> OR PCM <A/T> CONNECTOR COVER

REMOVAL STEPS (Continued)

2. ECM <M/T> OR PCM <A/T> BRACKET
3. ECM <M/T> OR PCM <A/T> CONNECTORS

<<A>>

4. ECM <M/T> OR PCM <A/T>

REMOVAL SERVICE POINT

<<A>> ECM <M/T> OR PCM <A/T> REMOVAL

⚠ CAUTION
Do not replace the engine-ECU <M/T> or the engine-A/T-ECU <A/T> and the ETACS-ECU simultaneously. Always replace either one of the ECUs first, and register the encrypted code (Refer to GROUP 54A, Encrypted Code Registration Criteria Table P.54A-13). Then, replace the other ECU.

INSTALLATION SERVICE POINT

>>A<< INITIALIZATION PROCEDURE

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

FASTENER TIGHTENING SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

M1131011600658

ITEM	SPECIFICATION
Control wiring harness bracket bolts	11 ±1 N· m (98 ±8 ft-lb)
ECM <M/T> or PCM <A/T> bracket bolts	12 ±2 N· m (102 ± 22 in-lb)
ECM <M/T> or PCM <A/T> connector cover bolt	12 ±2 N· m (102 ± 22 in-lb)
ECM <M/T> or PCM <A/T> mounting bolts	5.0 ±1.0 N· m (44 ± 9 in-lb)
Engine mount stay bolt	36 ±6 N· m (27 ± 4 ft-lb)
Fuel rail bolt	12 ±1 N· m (102 ± 13 in-lb)
Throttle body mounting bolt	28 ±4 N· m (21 ± 3 ft-lb)

GENERAL SPECIFICATIONS

M1131000200902

ITEMS		SPECIFICATIONS
Throttle body	Throttle bore mm (in.)	65 (2.48)
	Throttle position sensor	Hall element type
	Throttle actuator control motor	DC motor type, having brushes
Engine control module (ECM) <M/T>	Identification model No.	E6T45373
Powertrain control module (PCM) <A/T>	Identification model No.	E6T45374
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
	Vehicle speed sensor <M/T>	Electromagnetic resistance element type
	Transmission range switch <A/T>	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

M1131000301333

ITEMS		STANDARD VALUE
Fuel pressure kPa (psi)		Approximately 324 (47) 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)]
Engine oil control valve coil resistance Ω		6.9 – 7.9 [at 20° C (68° F)]

SEALANT AND ADHESIVE

M1131000500442

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

NOTES