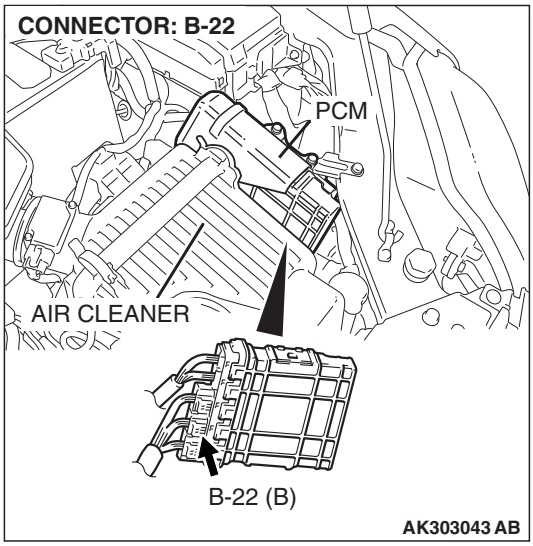
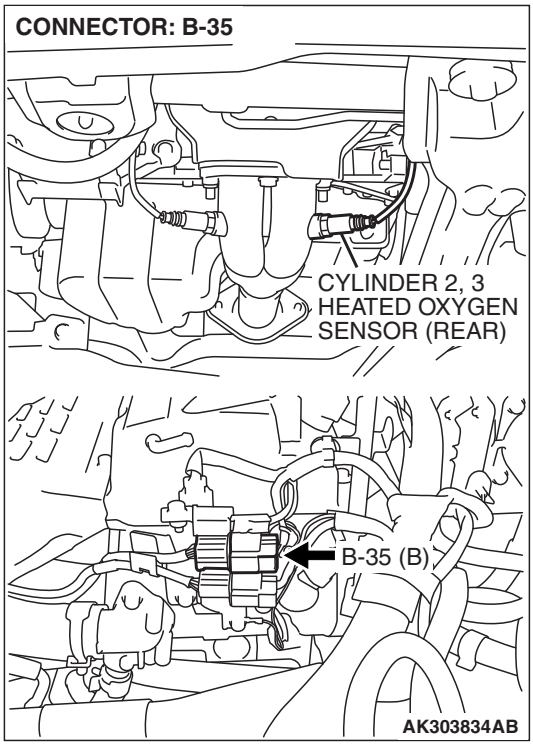
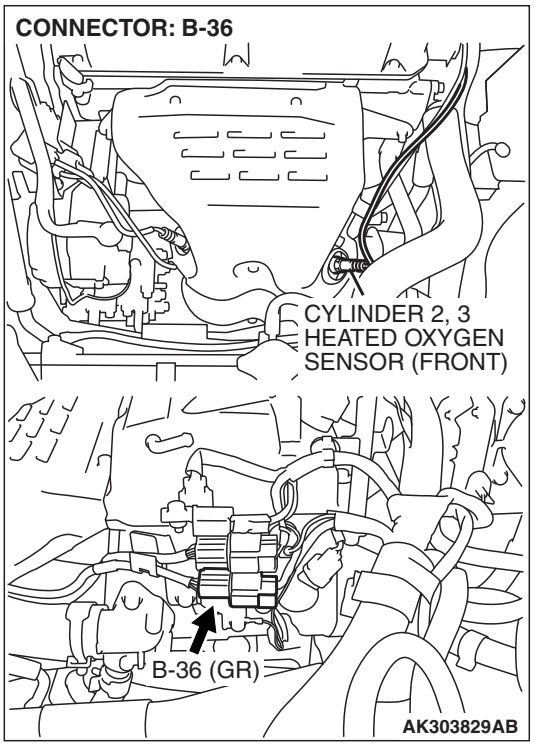
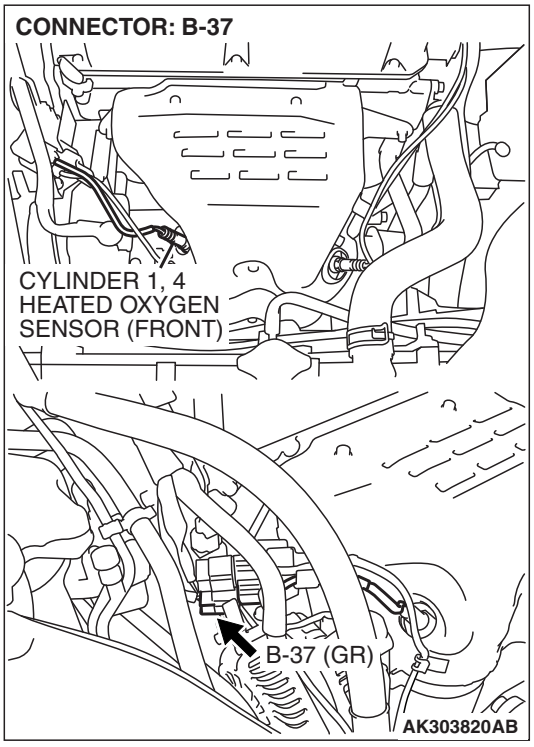
DTC P2252: Heated Oxygen Sensor Offset Circuit Low Voltage

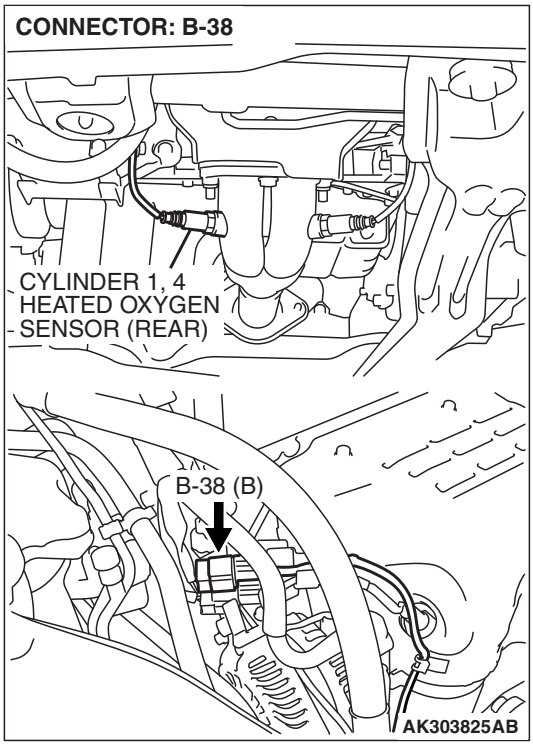








TSB Revision



HEATED OXYGEN SENSOR OFFSET CIRCUIT LOW VOLTAGE CIRCUIT

Refer to DTC P0131 –Cylinder 1, 4 Heated Oxygen Sensor (front) Circuit Low Voltage P.13A-299.
Refer to DTC P0137 –Cylinder 1, 4 Heated Oxygen Sensor (rear) Circuit Low Voltage P.13A-335.
Refer to DTC P0151 –Cylinder 2, 3 Heated Oxygen Sensor (front) Circuit Low Voltage P.13A-365.
Refer to DTC P0157 –Cylinder 2, 3 Heated Oxygen Sensor (rear) Circuit Low Voltage P.13A-401.

CIRCUIT OPERATION

Refer to DTC P0131 –Cylinder 1, 4 Heated Oxygen Sensor (front) Circuit Low Voltage P.13A-299.
Refer to DTC P0137 –Cylinder 1, 4 Heated Oxygen Sensor (rear) Circuit Low Voltage P.13A-335.
Refer to DTC P0151 –Cylinder 2, 3 Heated Oxygen Sensor (front) Circuit Low Voltage P.13A-365.
Refer to DTC P0157 –Cylinder 2, 3 Heated Oxygen Sensor (rear) Circuit Low Voltage P.13A-401.

TECHNICAL DESCRIPTION

- The PCM applies an offset voltage of 0.5 volt to the heated oxygen sensor.
- The PCM checks for heated oxygen sensor offset voltage.

DESCRIPTIONS OF MONITOR METHODS

Heated oxygen sensor offset voltage is under specified range.

MONITOR EXECUTION

Continuous

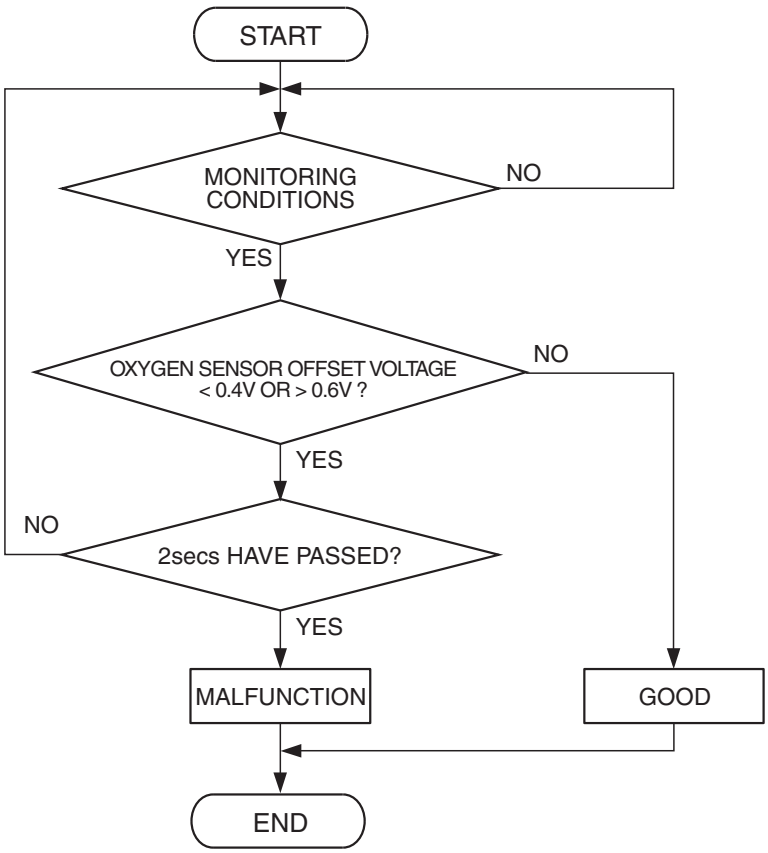
MONITOR EXECUTION CONDITIONS (Other monitor and Sensor)

Other Monitor (There is no temporary DTC stored in memory for the item monitored below)
- Not applicable

Sensor (The sensor below is determined to be normal)
- Not applicable

DTC SET CONDITION

Logic Flow Chart



AK802510

Check Condition

- 2 seconds or more have passed since the engine starting sequence was completed.

Judgement Criterion

- Heated oxygen sensor offset voltage has continued to be 0.4 volt or lower for 2 seconds.

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function –OBD-II Drive Cycle – Pattern 25 P.13A-5.

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

- Cylinder 1, 4 heated oxygen sensor (front) failed.
- Cylinder 1, 4 heated oxygen sensor (rear) failed.
- Cylinder 2, 3 heated oxygen sensor (front) failed.
- Cylinder 2, 3 heated oxygen sensor (rear) failed.
- Shorted cylinder 1, 4 heated oxygen sensor (front) circuit or connector damage.
- Shorted cylinder 1, 4 heated oxygen sensor (rear) circuit or connector damage.
- Shorted cylinder 2, 3 heated oxygen sensor (front) circuit or connector damage.
- Shorted cylinder 2, 3 heated oxygen sensor (rear) circuit or connector damage.
- PCM failed.

TSB Revision

DIAGNOSIS

Required Special Tools:

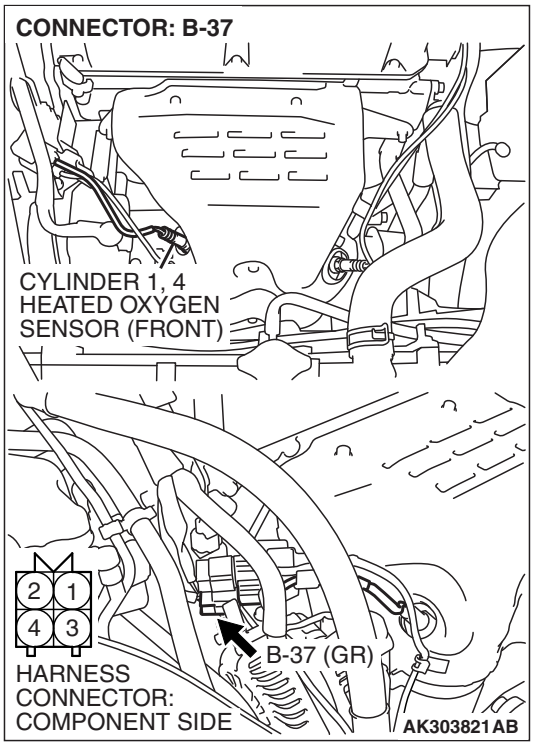
- MB991958: Scan tool (M.U.T.-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991910: Main Harness A
- MB991316: Test Harness
- MD998464: Test Harness

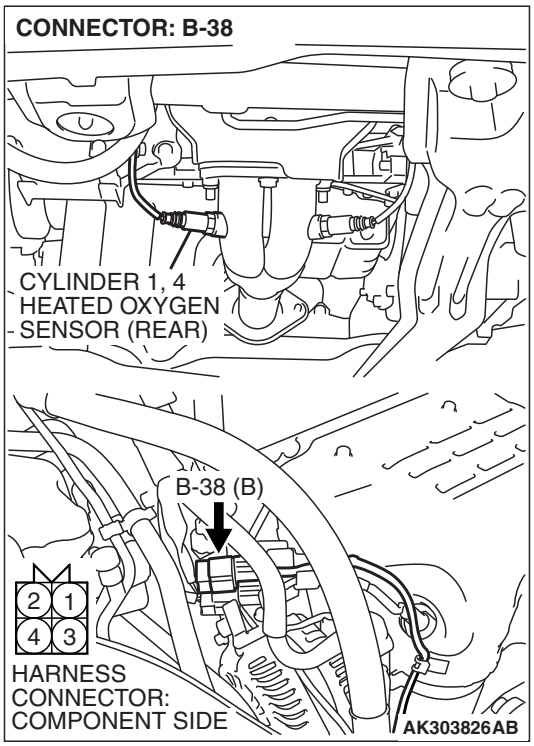
STEP 1. Check harness connector B-37 at cylinder 1, 4 heated oxygen sensor (front) for damage.

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 go to Step 22.



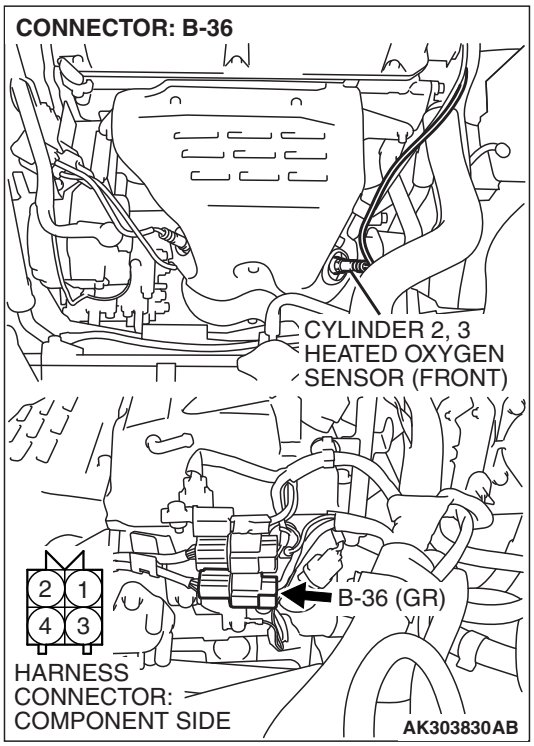


STEP 2. Check harness connector B-38 at cylinder 1, 4 heated oxygen sensor (rear) for damage.

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 go to Step 22.

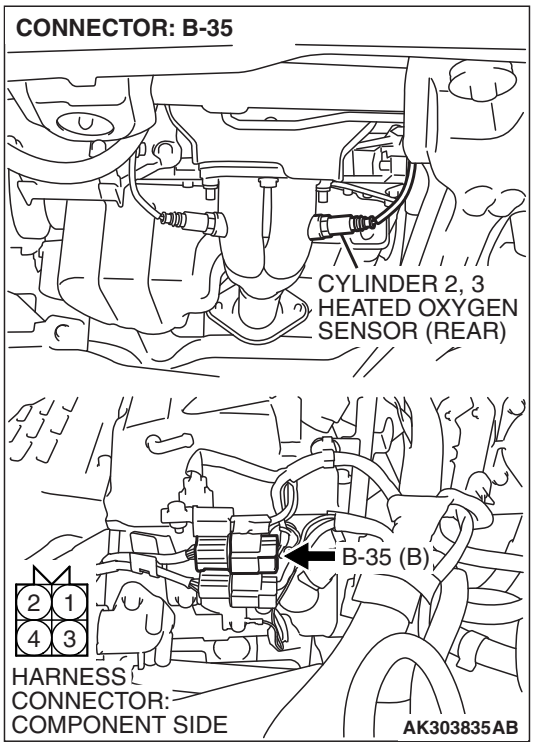


STEP 3. Check harness connector B-36 at cylinder 2, 3 heated oxygen sensor (front) for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 4.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 22.

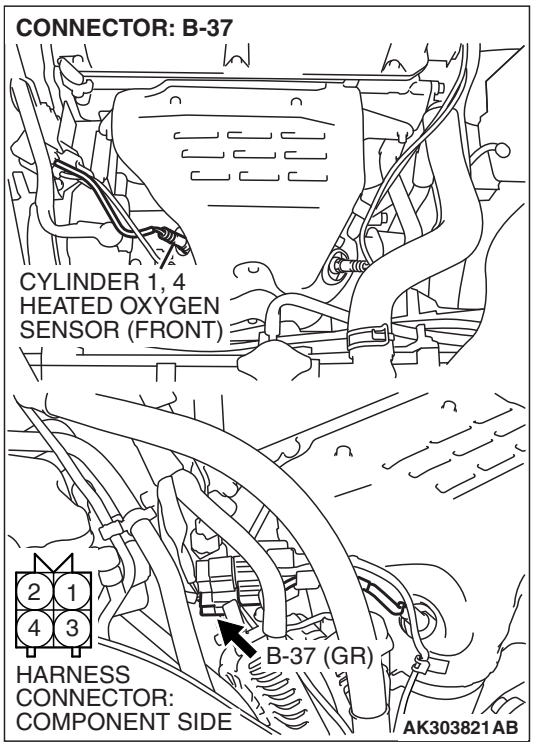


STEP 4. Check harness connector B-35 at cylinder 2, 3 heated oxygen sensor (rear) for damage.

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 go to Step 22.

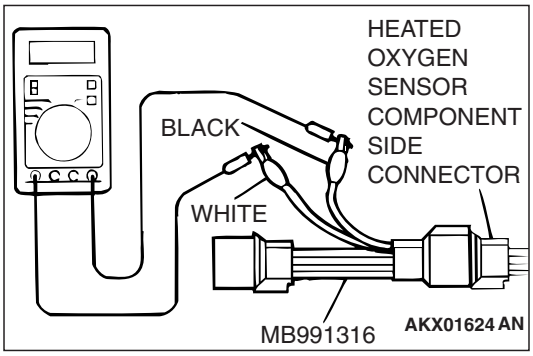


STEP 5. Check the cylinder 1, 4 heated oxygen sensor (front).

(1) Disconnect the cylinder 1, 4 heated oxygen sensor (front) connector B-37 and connect test harness special tool MB991316 to the connector on the cylinder 1, 4 heated oxygen sensor (front) side.

(2) Warm up the engine until engine coolant temperature reaches 80° C (176° F) or higher.

(3) Rev the engine for 5 minutes or more with the engine speed of 2,000 r/min.



(4) Connect a digital voltage meter between terminal No. 2 (black clip) and terminal No. 4 (white clip).
(5) While repeatedly revving the engine, measure the cylinder 1, 4 heated oxygen sensor (front) output voltage.

Standard value: 0.6 – 1.0 V

⚠ CAUTION

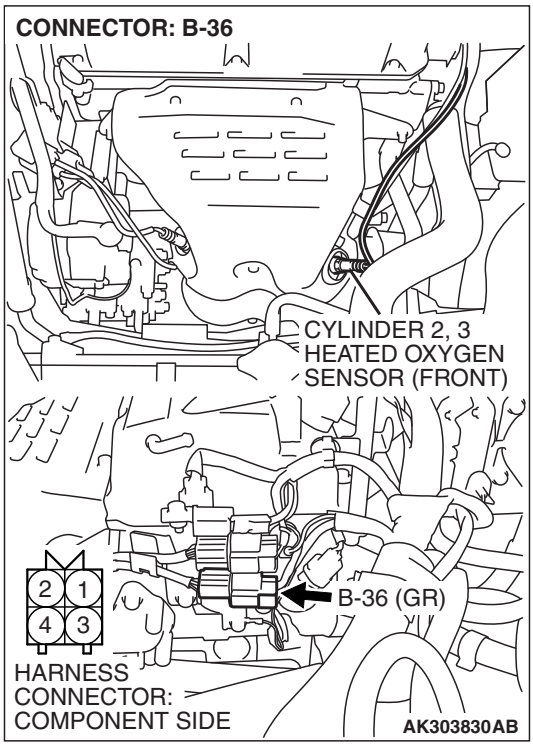
- **Be very careful when connecting the jumper wires; incorrect connection can damage the heated oxygen sensor.**
- **Be careful the heater can be damaged if a voltage beyond 8 volts is applied to the heated oxygen sensor heater.**

NOTE: If the temperature of sensing area does not reach the high temperature [of approximately 400°C (752°F) or more] even though the heated oxygen sensor is normal, the output voltage would be possibly low in spite of the rich air/fuel ratio. Therefore, if the output voltage is low, use a jumper wire to connect the terminal No. 1 (red clip) and the terminal No. 3 (blue clip) of the heated oxygen sensor with the positive terminal and the negative terminal of 8 volts power supply respectively, then check again.

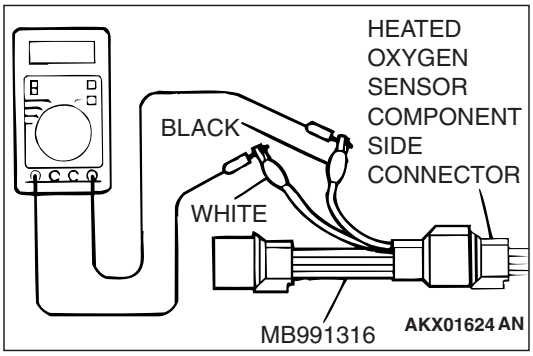
Q: Is the measured voltage between 0.6 and 1.0 volt?

YES : Go to Step 6.
NO : Replace the cylinder 1, 4 heated oxygen sensor (front). Then go to Step 22.

STEP 6. Check the cylinder 2, 3 heated oxygen sensor (front).



(1) Disconnect the cylinder 2, 3 heated oxygen sensor (front) connector B-36 and connect test harness special tool MB991316 to the connector on the cylinder 2, 3 heated oxygen sensor (front) side.
(2) Warm up the engine until engine coolant temperature reaches 80° C (176° C) or higher.
(3) Rev the engine for 5 minutes or more with the engine speed of 2,000 r/min.



(4) Connect a digital voltage meter between terminal No. 2 (black clip) and terminal No. 4 (white clip).
(5) While repeatedly revving the engine, measure the cylinder 2, 3 heated oxygen sensor (front) output voltage.

Standard value: 0.6 – 1.0 V

⚠ CAUTION

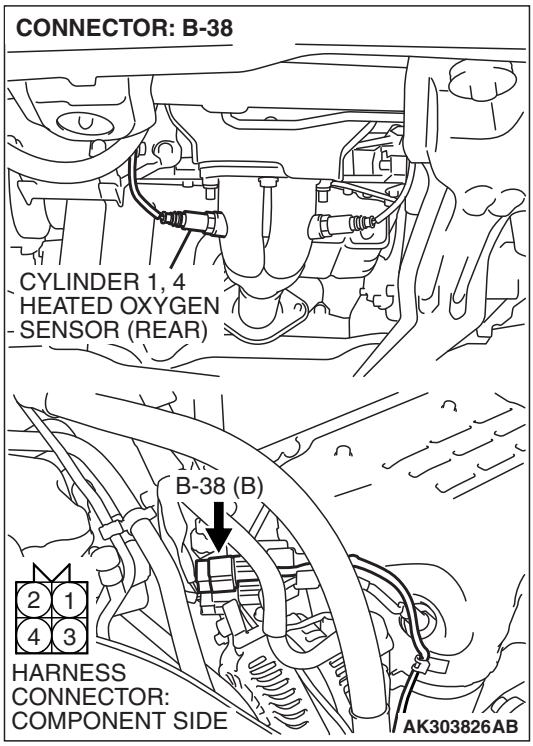
- **Be very careful when connecting the jumper wires; incorrect connection can damage the heated oxygen sensor.**
- **Be careful the heater can be damaged if a voltage beyond 8 volts is applied to the heated oxygen sensor heater.**

NOTE: If the temperature of sensing area does not reach the high temperature [of approximately 400°C (752°F) or more] even though the heated oxygen sensor is normal, the output voltage would be possibly low in spite of the rich air/fuel ratio. Therefore, if the output voltage is low, use a jumper wire to connect the terminal No. 1 (red clip) and the terminal No. 3 (blue clip) of the heated oxygen sensor with the positive terminal and the negative terminal of 8 volts power supply respectively, then check again.

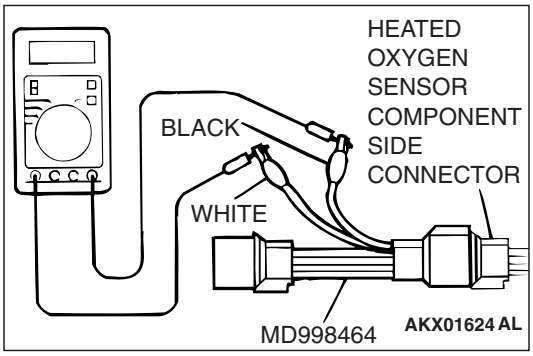
Q: Is the measured voltage between 0.6 and 1.0 volt?

YES : Go to Step 7.
NO : Replace the cylinder 2, 3 heated oxygen sensor (front). Then go to Step 22.

STEP 7. Check the cylinder 1, 4 heated oxygen sensor (rear).



(1) Disconnect the cylinder 1, 4 heated oxygen sensor (rear) connector B-38 and connect test harness special tool MD998464 to the connector on the cylinder 1, 4 heated oxygen sensor (rear) side.
(2) Warm up the engine until engine coolant temperature reaches 80° C (176° F) or higher.
(3) Drive at 50 km/h (31 mph) or more for 10 minutes.



(4) Connect a digital voltage meter between terminal No. 2 (black clip) and terminal No. 4 (white clip).
(5) Measure the output voltage of heated oxygen sensor under the following driving.
- Transaxle: "L" range
- Drive with wide open throttle
- Engine: 3,500 r/min or more

Standard value: 0.6 –1.0 V

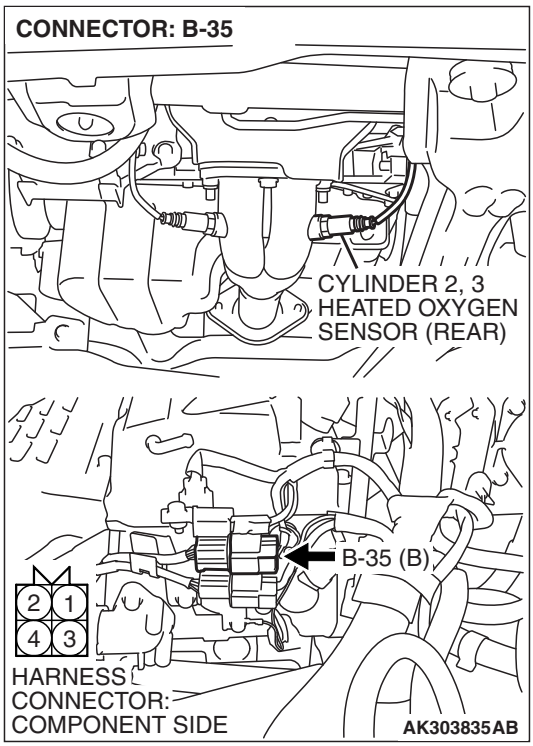
NOTE: If the temperature of sensing area does not reach the high temperature [of approximately 400°C (752°F) or more] even though the heated oxygen sensor is normal, the output voltage would be possibly low in spite of the rich air-fuel ratio.

NOTE: When the vehicle is driven with high loads, the temperature of the sensing area of the heated oxygen sensor is sufficiently high. Thus, it is not necessary to apply the voltage to the heater.

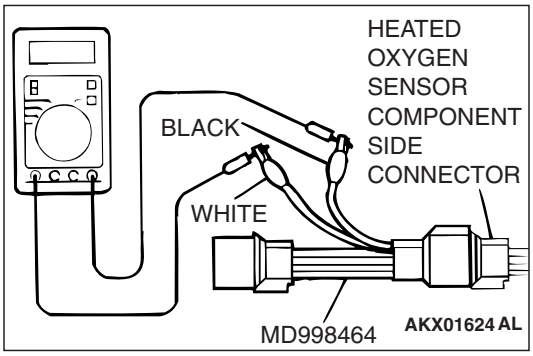
Q: Is the measured voltage between 0.6 and 1.0 volt?

YES : Go to Step 8.
NO : Replace the cylinder 1, 4 heated oxygen sensor (rear). Then go to Step 22.

STEP 8. Check the cylinder 2, 3 heated oxygen sensor (rear).



(1) Disconnect the cylinder 2, 3 heated oxygen sensor (rear) connector B-35 and connect test harness special tool MD998464 to the connector on the cylinder 2, 3 heated oxygen sensor (rear) side.
(2) Warm up the engine until engine coolant temperature reaches 80° C (176° F) or higher.
(3) Drive at 50 km/h (31mph) or more for 10 minutes.



(4) Connect a digital voltage meter between terminal No. 2 (black clip) and terminal No. 4 (white clip).
(5) Measure the output voltage of heated oxygen sensor under the following driving.
- Transaxle: "L" range
- Drive with wide open throttle
- Engine: 3,500 r/min or more

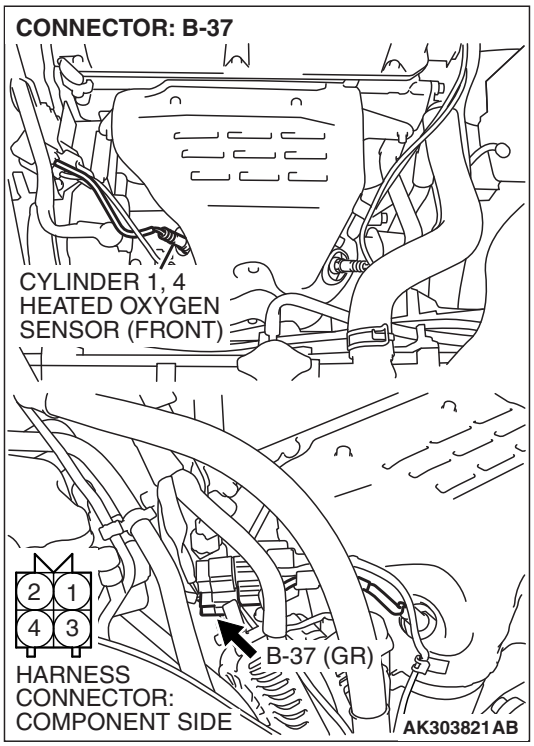
Standard value: 0.6 – 1.0 V

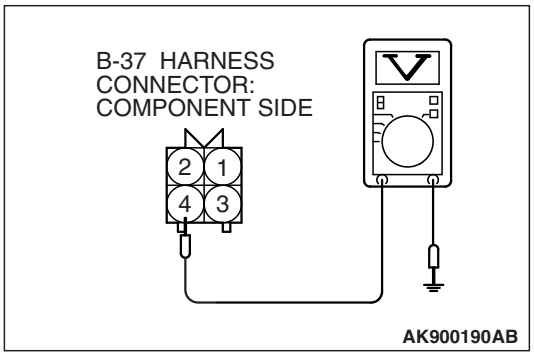
NOTE: If the temperature of sensing area does not reach the high temperature [of approximately 400°C (752°F) or more] even though the heated oxygen sensor is normal, the output voltage would be possibly low in spite of the rich air-fuel ratio.

NOTE: When the vehicle is driven with high loads, the temperature of the sensing area of the heated oxygen sensor is sufficiently high. Thus, it is not necessary to apply the voltage to the heater.

Q: Is the measured voltage between 0.6 and 1.0 volt?

YES : Go to Step 9.
NO : Replace the cylinder 2, 3 heated oxygen sensor (rear). Then go to Step 22.





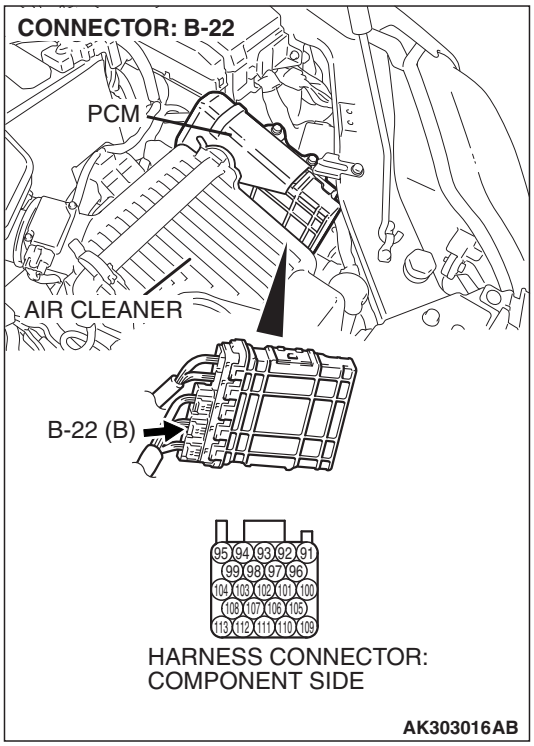
STEP 9. Measure the sensor offset voltage at cylinder 1, 4 heated oxygen sensor (front) harness side connector B-37.

(1) Disconnect the connector B-37 and measure at the harness side.
(2) Turn the ignition switch to the "ON" position.
(3) Measure the voltage between terminal No. 4 and ground.
- Voltage should be between 0.4 and 0.6 volt.

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

Q: Is the measured voltage between 0.4 and 0.6 volt?

YES : Go to Step 12.
NO : Go to Step 10.

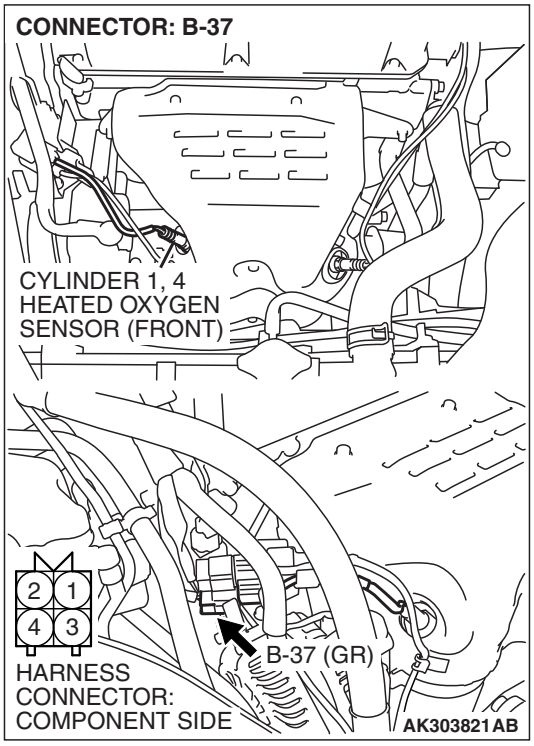


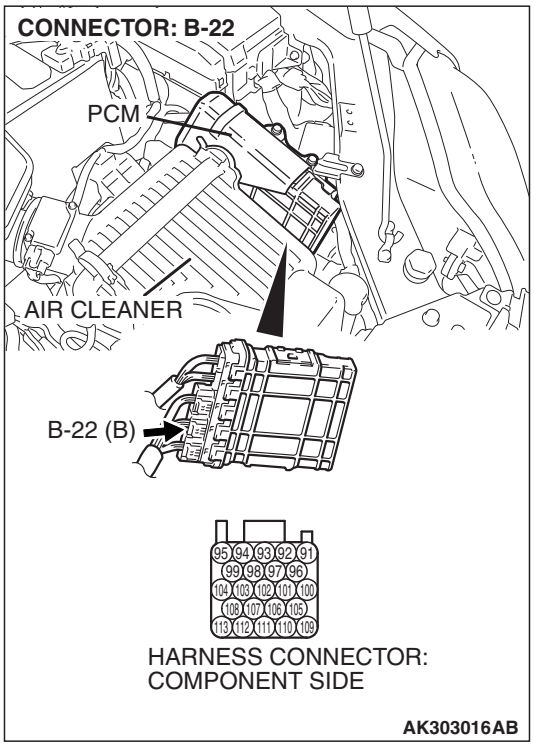
STEP 10. Check harness connector B-22 at PCM for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 11.

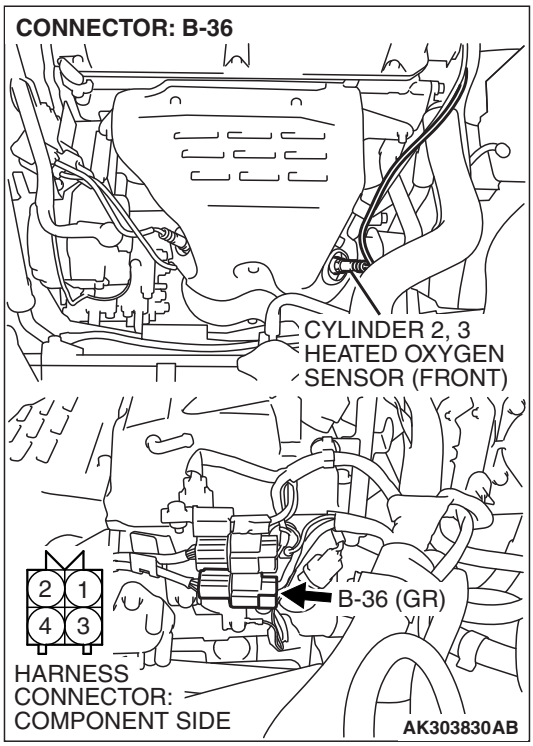
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 22.

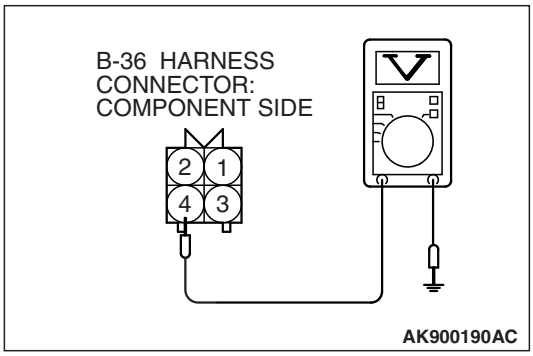




STEP 11. Check for short circuit to ground between cylinder 1, 4 heated oxygen sensor (front) connector B-37 (terminal No. 4) and PCM connector B-22 (terminal No. 92).
Q: Is the harness wire in good condition?

YES : Go to Step 21.
NO : Repair it. Then go to Step 22.





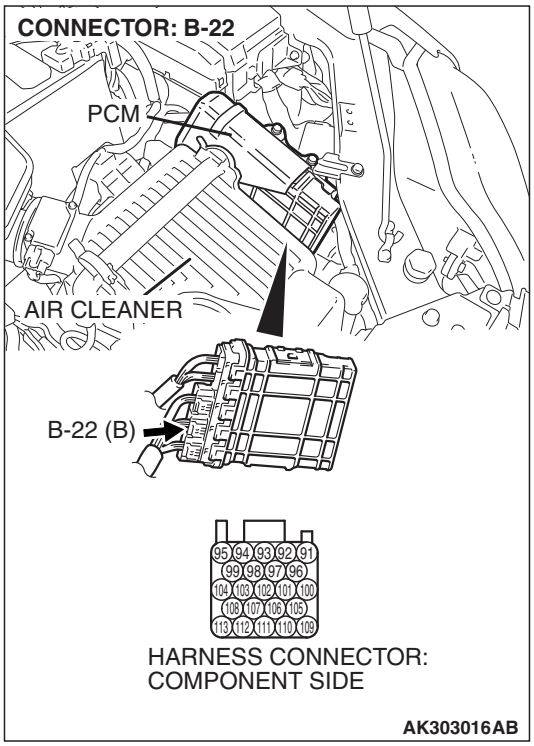
STEP 12. Measure the sensor offset voltage at cylinder 2, 3 heated oxygen sensor (front) harness side connector B-36.

(1) Disconnect the connector B-36 and measure at the harness side.
(2) Turn the ignition switch to the "ON" position.
(3) Measure the voltage between terminal No. 4 and ground.
- Voltage should be between 0.4 and 0.6 volt.

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

Q: Is the measured voltage between 0.4 and 0.6 volt?

YES : Go to Step 15.
NO : Go to Step 13.

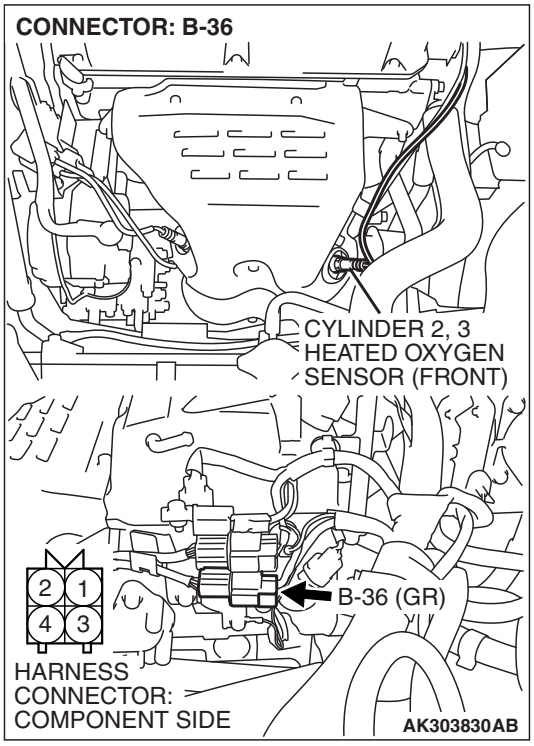


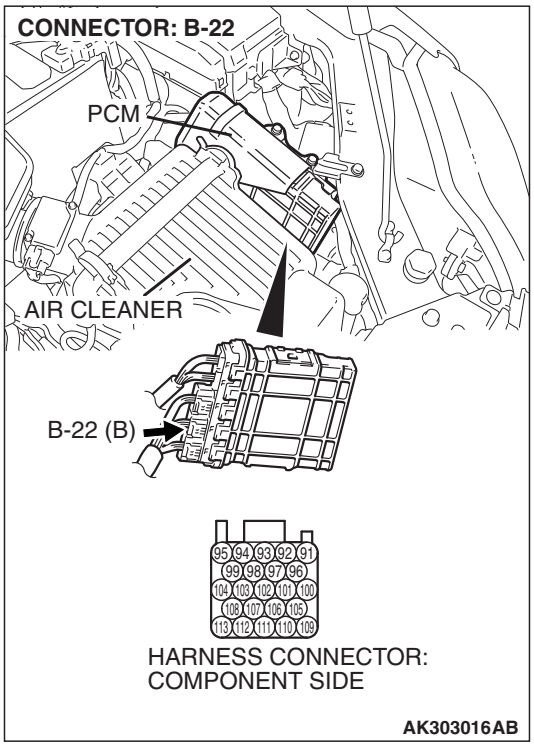
STEP 13. Check harness connector B-22 at PCM for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 14.

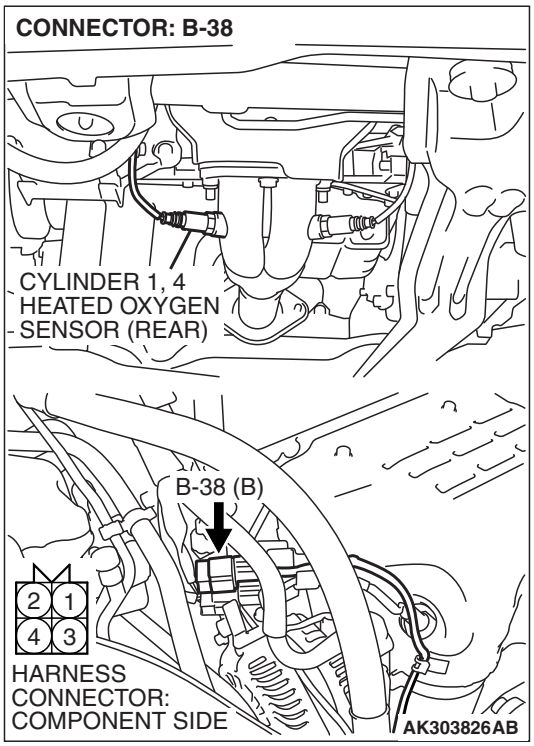
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 22.

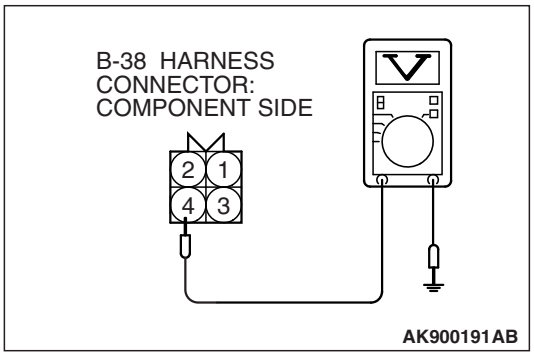




STEP 14. Check for short circuit to ground between cylinder 2, 3 heated oxygen sensor (front) connector B-36 (terminal No. 4) and PCM connector B-22 (terminal No. 91).
Q: Is the harness wire in good condition?

YES : Go to Step 21.
NO : Repair it. Then go to Step 22.





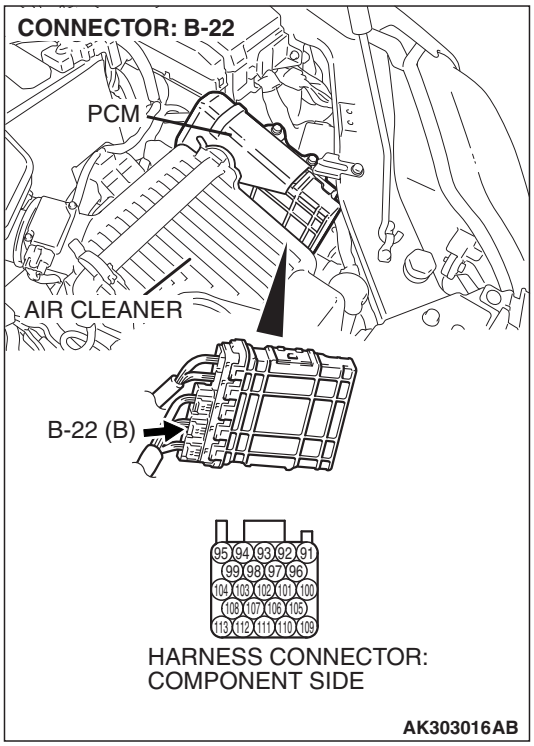
STEP 15. Measure the sensor offset voltage at cylinder 1, 4 heated oxygen sensor (rear) harness side connector B-38.

(1) Disconnect the connector B-38 and measure at the harness side.
(2) Turn the ignition switch to the "ON" position.
(3) Measure the voltage between terminal No. 4 and ground.
- Voltage should be between 0.4 and 0.6 volt.

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

Q: Is the measured voltage between 0.4 and 0.6 volt?

YES : Go to Step 18.
NO : Go to Step 16.

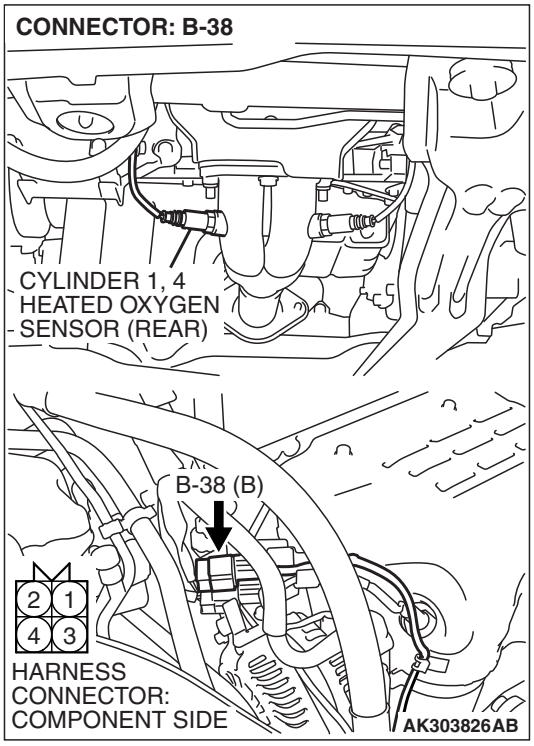


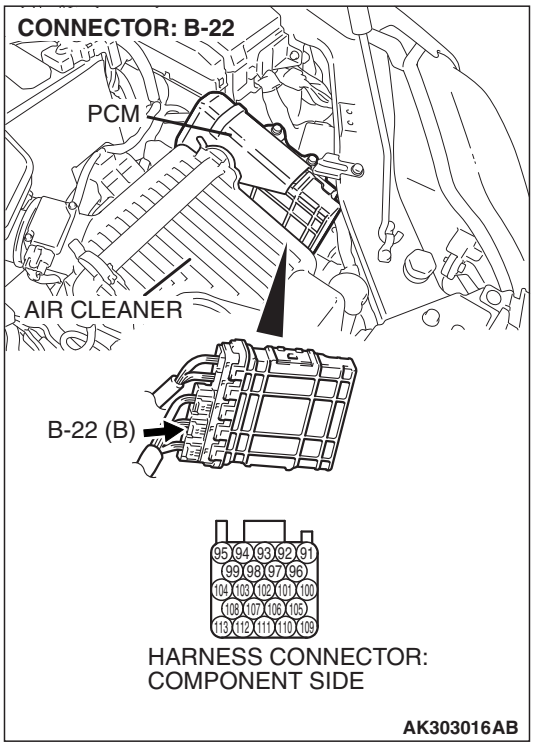
STEP 16. Check harness connector B-22 at PCM for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 17.

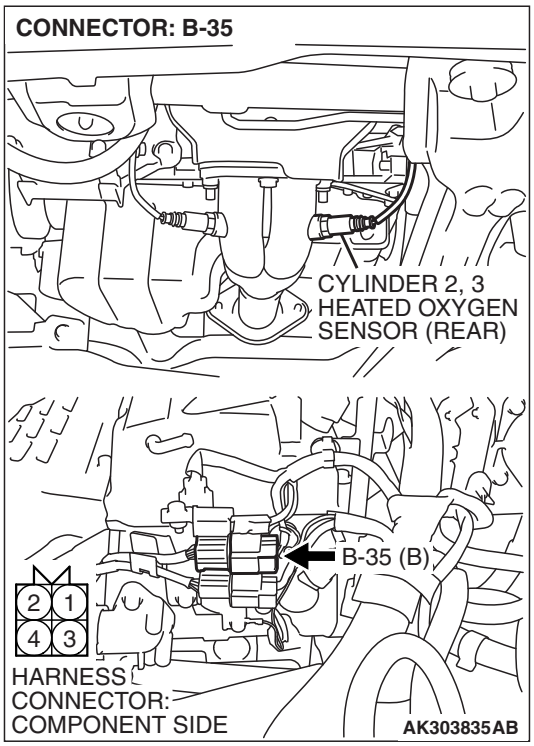
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 22.

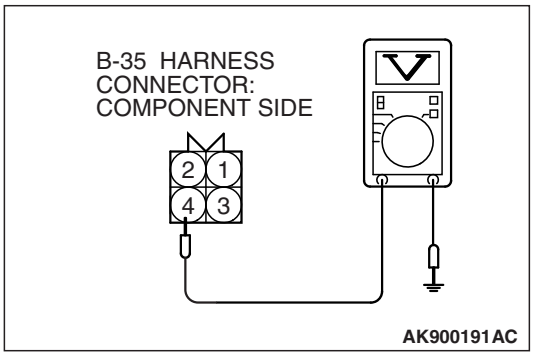




STEP 17. Check for short circuit to ground between cylinder 1, 4 heated oxygen sensor (rear) connector B-38 (terminal No. 4) and PCM connector B-22 (terminal No. 97).
Q: Is the harness wire in good condition?

YES : Go to Step 21.
NO : Repair it. Then go to Step 22.





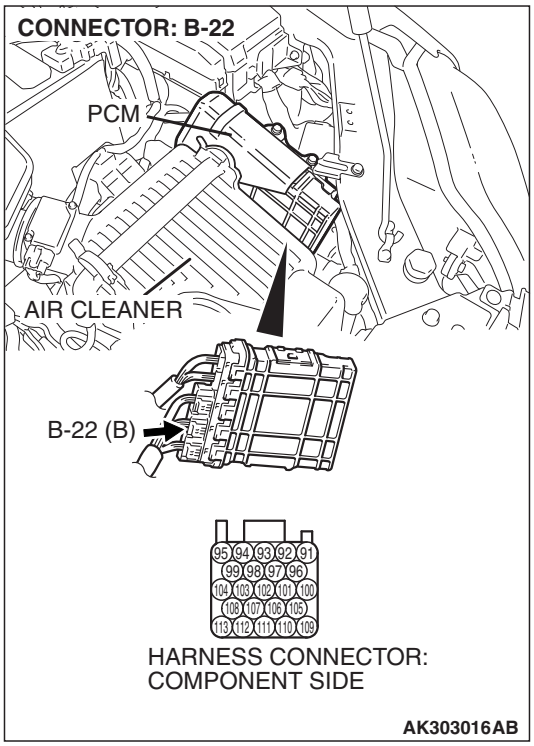
STEP 18. Measure the sensor offset voltage at cylinder 2, 3 heated oxygen sensor (rear) harness side connector B-35.

(1) Disconnect the connector B-35 and measure at the harness side.
(2) Turn the ignition switch to the "ON" position.
(3) Measure the voltage between terminal No. 4 and ground.
- Voltage should be between 0.4 and 0.6 volt.

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

Q: Is the measured voltage between 0.4 and 0.6 volt?

YES : Go to Step 21.
NO : Go to Step 19.

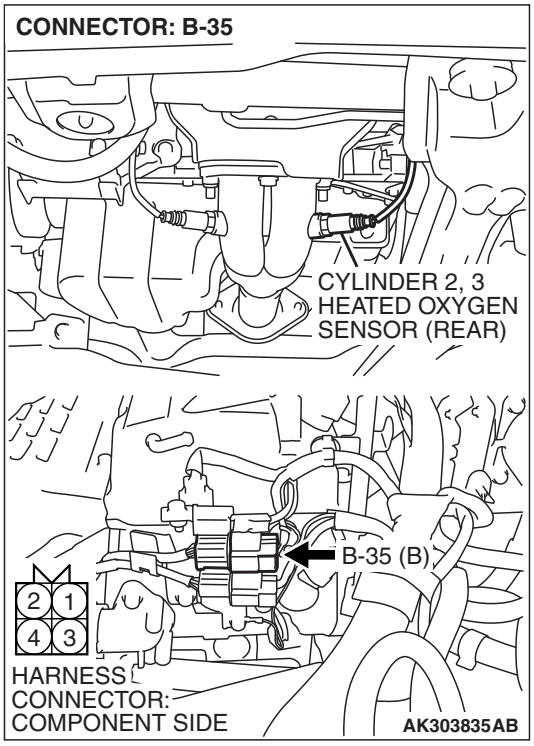


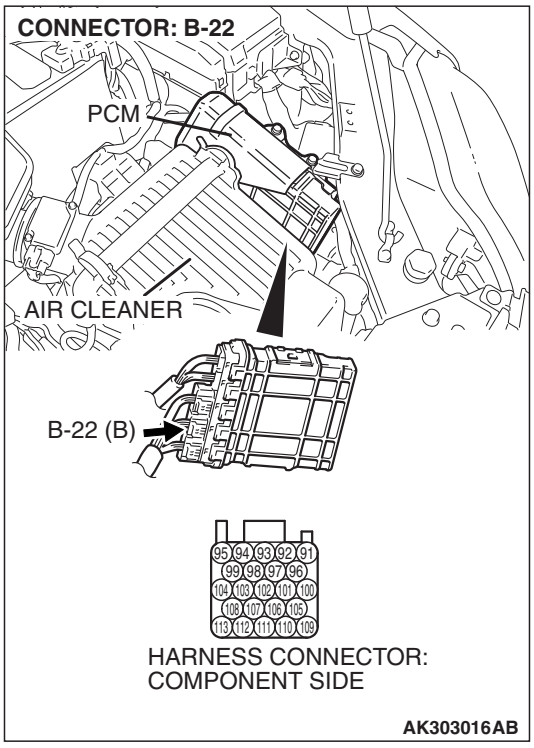
STEP 19. Check harness connector B-22 at PCM for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 20.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 22.





STEP 20. Check for short circuit to ground between cylinder 2, 3 heated oxygen sensor (rear) connector B-35 (terminal No. 4) and PCM connector B-22 (terminal No. 96).
Q: Is the harness wire in good condition?

YES : Go to Step 21.
NO : Repair it. Then go to Step 22.

STEP 21. Check the trouble symptoms.

(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle Pattern 25 P.13A-5.

(2) Check the diagnostic trouble code (DTC).

Q: Is DTC P2252 set?

YES : Replace the PCM. When the PCM is replaced, register the encrypted code. Refer to GROUP 54A, Ignition Switch –Encrypted Code Registration Criteria Table P.54A-10. Then go to Step 22.

NO : 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.

STEP 22. Test the OBD-II drive cycle.

(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle Pattern 25 P.13A-5.

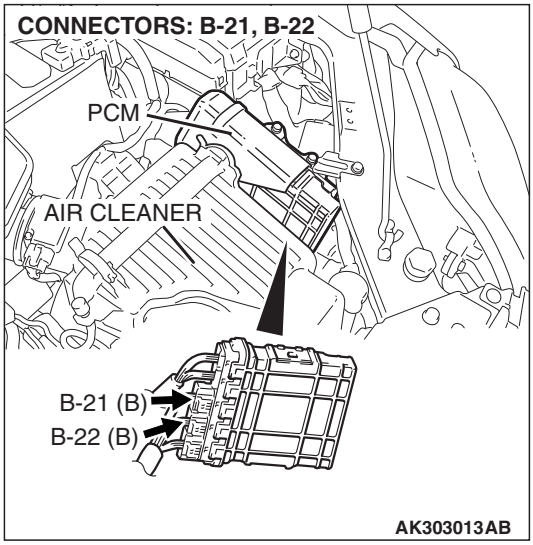
(2) Check the diagnostic trouble code (DTC).

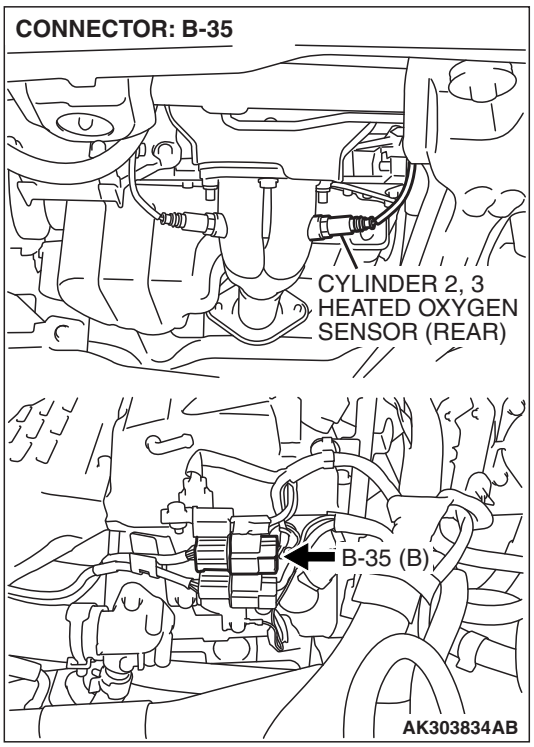
Q: Is DTC P2252 set?

YES : Retry the troubleshooting.

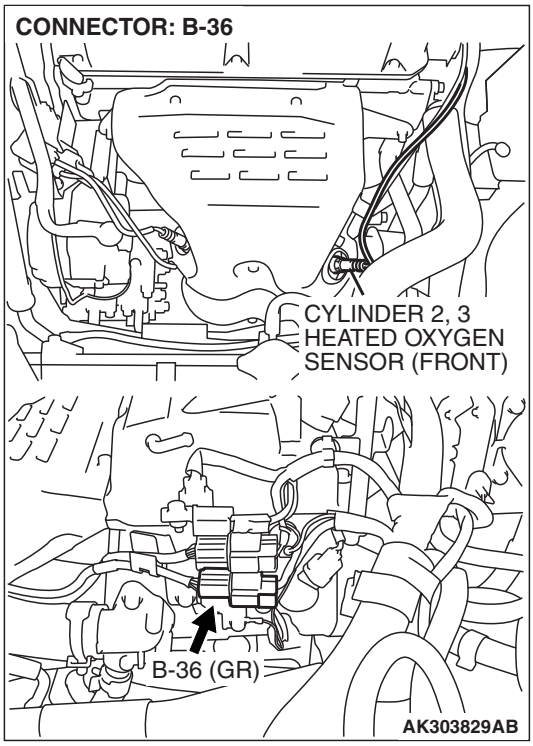
NO : The inspection is complete.

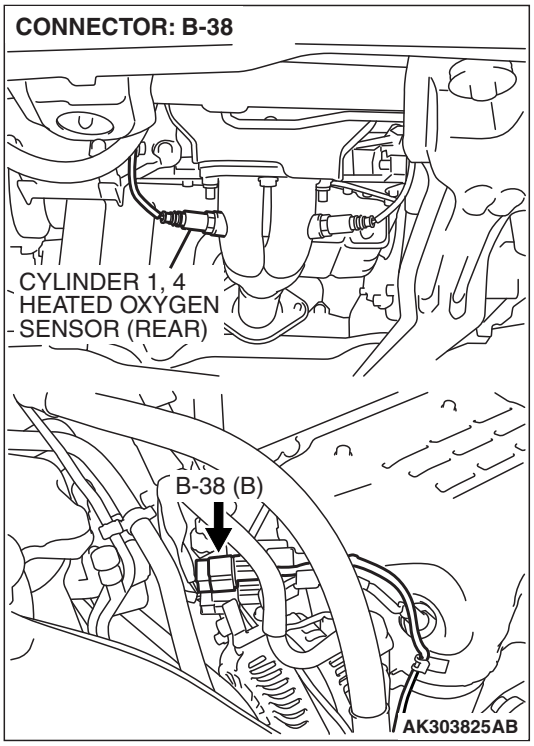
DTC P2253: Heated Oxygen Sensor Offset Circuit High Voltage

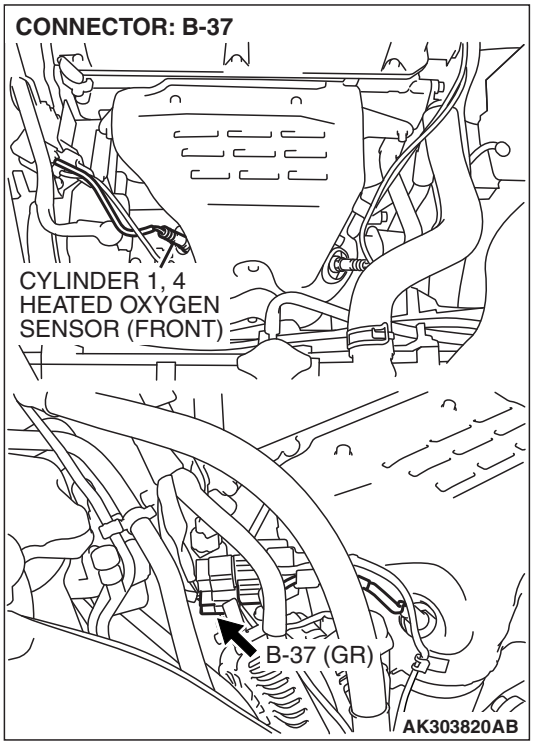




TSB Revision







HEATED OXYGEN SENSOR OFFSET CIRCUIT HIGH VOLTAGE CIRCUIT

Refer to DTC P0131 –Cylinder 1, 4 Heated Oxygen Sensor (front) Circuit Low Voltage P.13A-299.
Refer to DTC P0137 –Cylinder 1, 4 Heated Oxygen Sensor (rear) Circuit Low Voltage P.13A-335.
Refer to DTC P0151 –Cylinder 2, 3 Heated Oxygen Sensor (front) Circuit Low Voltage P.13A-365.
Refer to DTC P0157 –Cylinder 2, 3 Heated Oxygen Sensor (rear) Circuit Low Voltage P.13A-401.

CIRCUIT OPERATION

Refer to DTC P0131 –Cylinder 1, 4 Heated Oxygen Sensor (front) Circuit Low Voltage P.13A-299.
Refer to DTC P0137 –Cylinder 1, 4 Heated Oxygen Sensor (rear) Circuit Low Voltage P.13A-335.

TSB Revision

Refer to DTC P0151 –Cylinder 2, 3 Heated Oxygen Sensor (front) Circuit Low Voltage P.13A-365.
Refer to DTC P0157 –Cylinder 2, 3 Heated Oxygen Sensor (rear) Circuit Low Voltage P.13A-401.

TECHNICAL DESCRIPTION

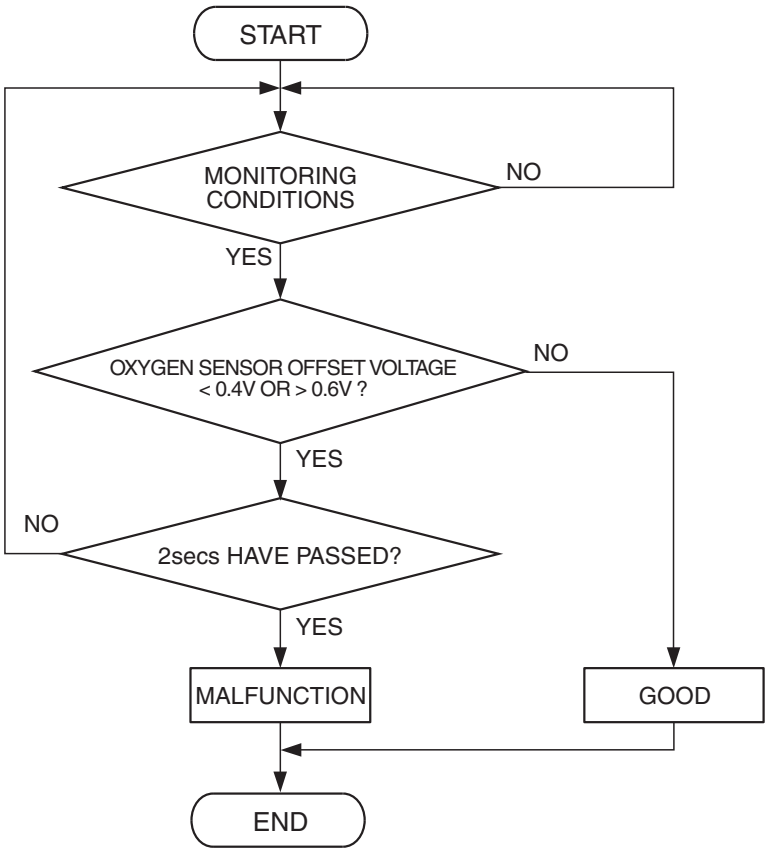
- The PCM applies an offset voltage of 0.5 volt to the heated oxygen sensor
- The PCM checks for heated oxygen sensor offset voltage.

DESCRIPTIONS OF MONITOR METHODS

Heated oxygen sensor offset voltage is over specified range.

DTC SET CONDITION

Logic Flow Chart



AK802510

Check Condition

- 2 seconds or more have passed since the engine starting sequence was completed.

Judgement Criterion

- Heated oxygen sensor offset voltage has continued to be 0.6 volt or higher for 2 seconds.

MONITOR EXECUTION

Continuous

MONITOR EXECUTION CONDITIONS (Other monitor and Sensor)

Other Monitor (There is no temporary DTC stored in memory for the item monitored below)

- Not applicable

Sensor (The sensor below is determined to be normal)

- Not applicable

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function –OBD-II Drive Cycle – Pattern 25 P.13A-5.

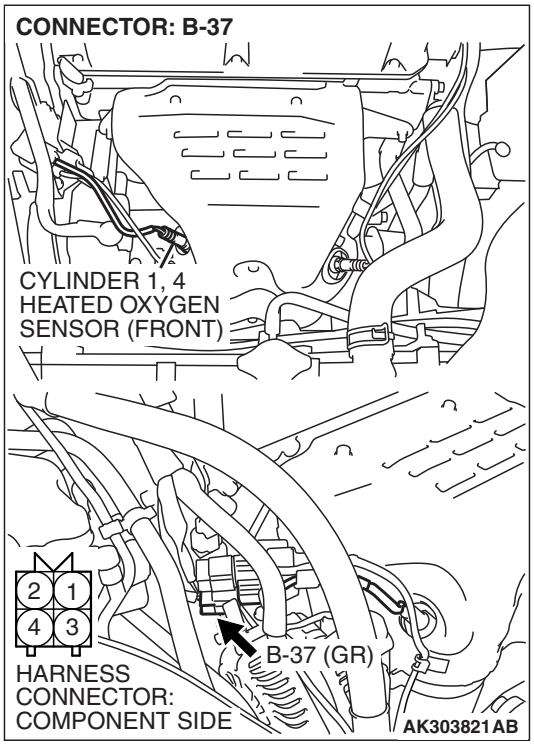
TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)

- Cylinder 1, 4 heated oxygen sensor (front) failed.
- Cylinder 1, 4 heated oxygen sensor (rear) failed.
- Cylinder 2, 3 heated oxygen sensor (front) failed.
- Cylinder 2, 3 heated oxygen sensor (rear) failed.
- Shorted cylinder 1, 4 heated oxygen sensor (front) circuit or connector damage.
- Shorted cylinder 1, 4 heated oxygen sensor (rear) circuit or connector damage.
- Shorted cylinder 2, 3 heated oxygen sensor (front) circuit or connector damage.
- Shorted cylinder 2, 3 heated oxygen sensor (rear) circuit or connector damage.
- PCM failed.

DIAGNOSIS

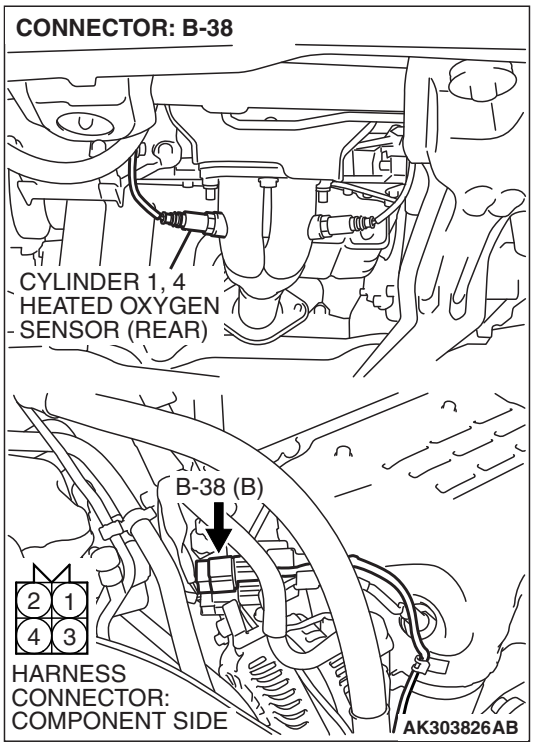
Required Special Tools:

- MB991958: Scan tool (M.U.T.-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991910: Main Harness A
- MB991316: Test Harness
- MB998464: Test Harness
- MB991923: Power Plant ECU Check Harness



STEP 1. Check harness connector B-37 at cylinder 1, 4 heated oxygen sensor (front) 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 go to Step 23.

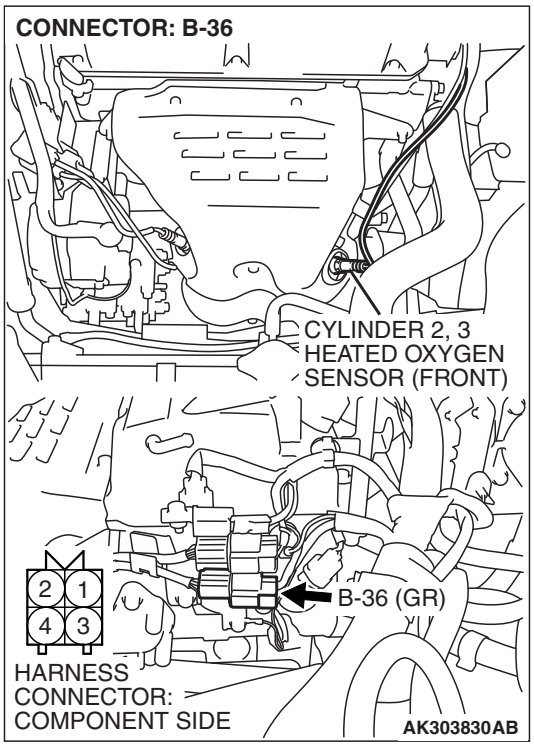


STEP 2. Check harness connector B-38 at cylinder 1, 4 heated oxygen sensor (rear) for damage.

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 go to Step 23.

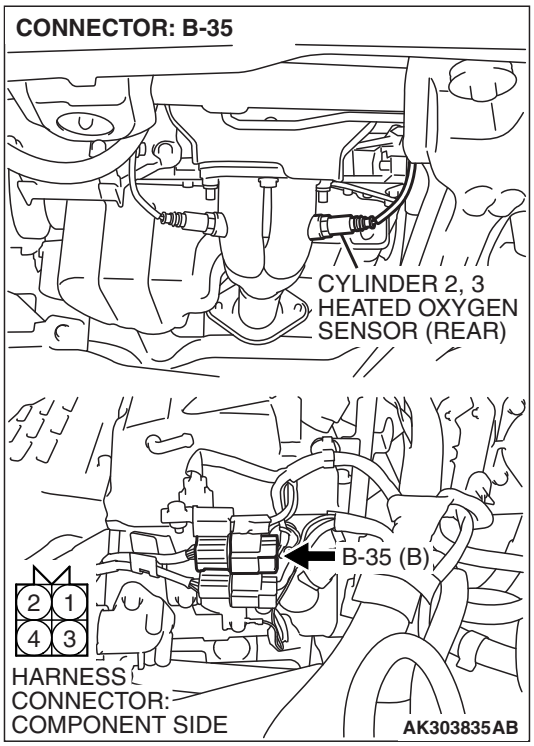


STEP 3. Check harness connector B-36 at cylinder 2, 3 heated oxygen sensor (front) for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 4.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 23.

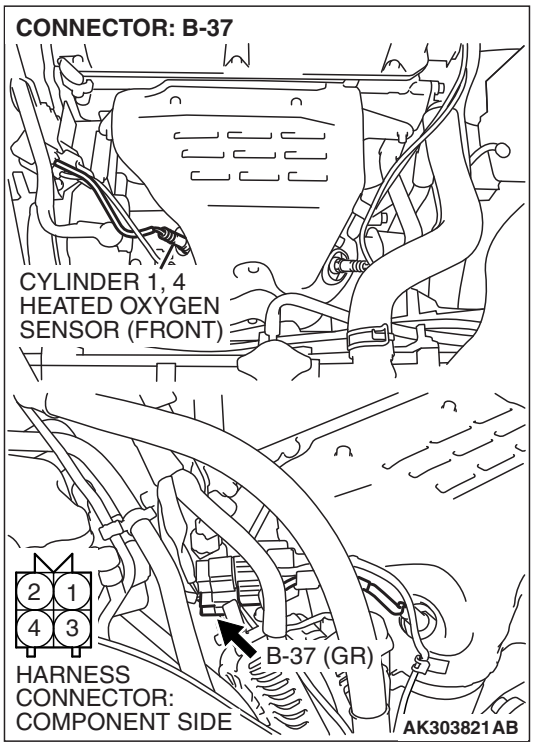


STEP 4. Check harness connector B-35 at cylinder 2, 3 heated oxygen sensor (rear) for damage.

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 go to Step 23.

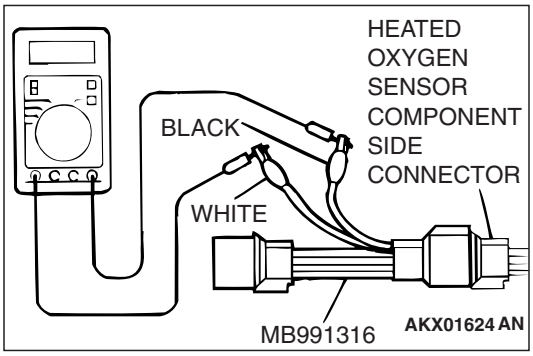


STEP 5. Check the cylinder 1, 4 heated oxygen sensor (front).

(1) Disconnect the cylinder 1, 4 heated oxygen sensor (front) connector B-37 and connect test harness special tool MB991316 to the connector on the cylinder 1, 4 heated oxygen sensor (front) side.

(2) Warm up the engine until engine coolant temperature reaches 80° C (176° F) or higher.

(3) Rev the engine for 5 minutes or more with the engine speed of 2,000 r/min.



(4) Connect a digital voltage meter between terminal No. 2 (black clip) and terminal No. 4 (white clip).
(5) While repeatedly revving the engine, measure the cylinder 1, 4 heated oxygen sensor (front) output voltage.

Standard value: 0.6 – 1.0 V

⚠ CAUTION

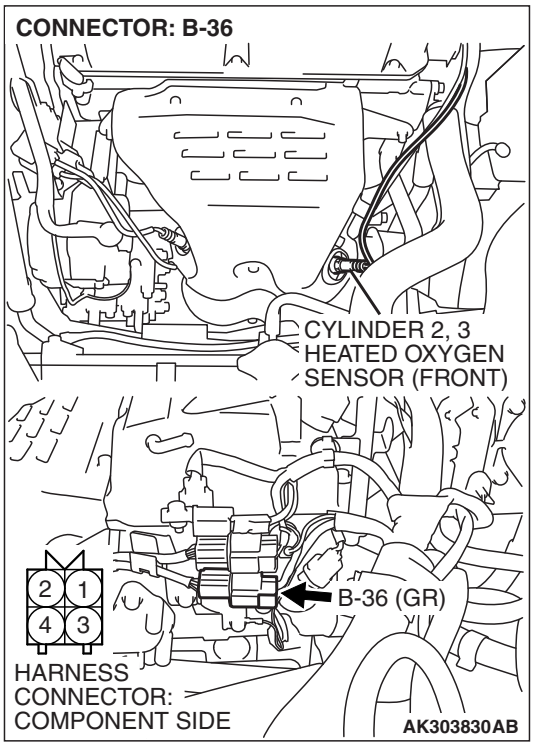
- **Be very careful when connecting the jumper wires; incorrect connection can damage the heated oxygen sensor.**
- **Be careful the heater can be damaged if a voltage beyond 8 volts is applied to the heated oxygen sensor heater.**

NOTE: If the temperature of sensing area does not reach the high temperature [of approximately 400°C (752°F) or more] even though the heated oxygen sensor is normal, the output voltage would be possibly low in spite of the rich air/fuel ratio. Therefore, if the output voltage is low, use a jumper wire to connect the terminal No. 1 (red clip) and the terminal No. 3 (blue clip) of the heated oxygen sensor with the positive terminal and the negative terminal of 8 volts power supply respectively, then check again.

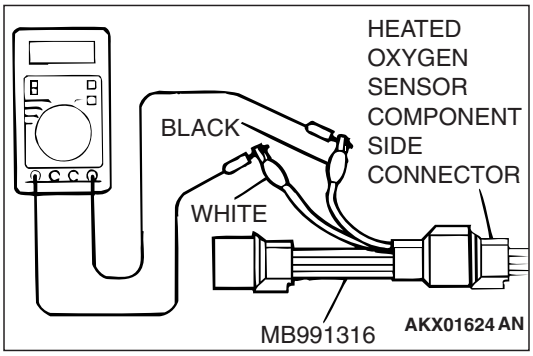
Q: Is the measured voltage between 0.6 and 1.0 volt?

YES : Go to Step 6.
NO : Replace the cylinder 1, 4 heated oxygen sensor (front). Then go to Step 23.

STEP 6. Check the cylinder 2, 3 heated oxygen sensor (front).



(1) Disconnect the cylinder 2, 3 heated oxygen sensor (front) connector B-36 and connect test harness special tool MB991316 to the connector on the cylinder 2, 3 heated oxygen sensor (front) side.
(2) Warm up the engine until engine coolant temperature reaches 80° C (176° F) or higher.
(3) Rev the engine for 5 minutes or more with the engine speed of 2,000 r/min.



(4) Connect a digital voltage meter between terminal No. 2 (black clip) and terminal No. 4 (white clip).
(5) While repeatedly revving the engine, measure the cylinder 2, 3 heated oxygen sensor (front) output voltage.

Standard value: 0.6 – 1.0 V

⚠ CAUTION

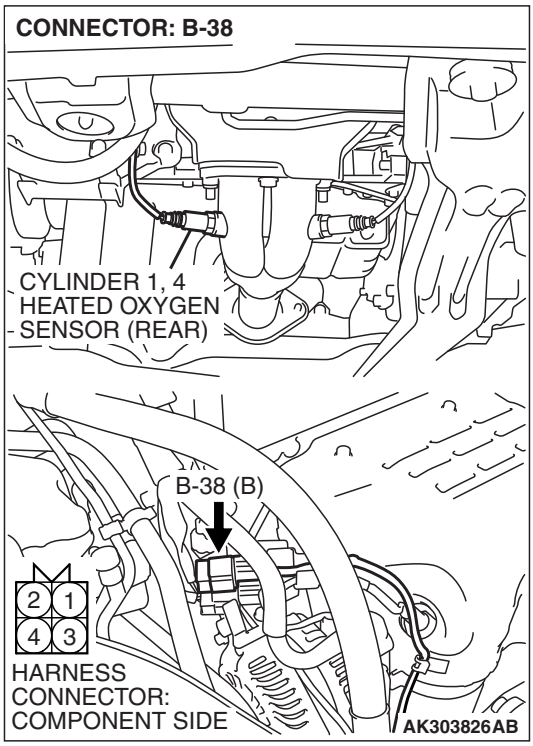
- **Be very careful when connecting the jumper wires; incorrect connection can damage the heated oxygen sensor.**
- **Be careful the heater can be damaged if a voltage beyond 8 volts is applied to the heated oxygen sensor heater.**

NOTE: If the temperature of sensing area does not reach the high temperature [of approximately 400°C (752°F) or more] even though the heated oxygen sensor is normal, the output voltage would be possibly low in spite of the rich air/fuel ratio. Therefore, if the output voltage is low, use a jumper wire to connect the terminal No. 1 (red clip) and the terminal No. 3 (blue clip) of the heated oxygen sensor with the positive terminal and the negative terminal of 8 volts power supply respectively, then check again.

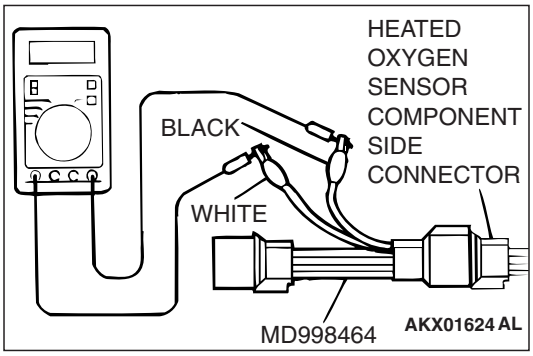
Q: Is the measured voltage between 0.6 and 1.0 volt?

YES : Go to Step 7.
NO : Replace the cylinder 2, 3 heated oxygen sensor (front). Then go to Step 23.

STEP 7. Check the cylinder 1, 4 heated oxygen sensor (rear).



(1) Disconnect the cylinder 1, 4 heated oxygen sensor (rear) connector B-38 and connect test harness special tool MD998464 to the connector on the cylinder 1, 4 heated oxygen sensor (rear) side.
(2) Warm up the engine until engine coolant temperature reaches 80° C (176° F) or higher.
(3) Drive at 50 km/h (31mph) or more for 10 minutes.



(4) Connect a digital voltage meter between terminal No. 2 (black clip) and terminal No. 4 (white clip).
(5) Measure the output voltage of heated oxygen sensor under the following driving.
- Transaxle: "L" range
- Drive with wide open throttle
- Engine: 3,500 r/min or more

Standard value: 0.6 –1.0 V

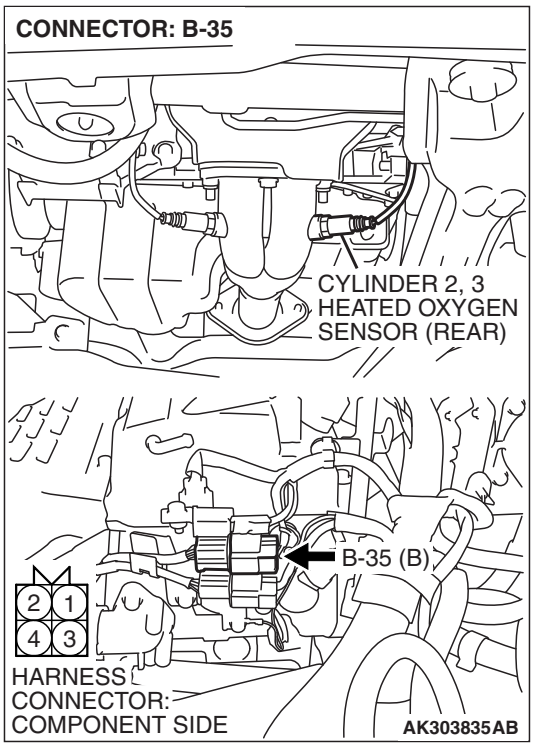
NOTE: If the temperature of sensing area does not reach the high temperature [of approximately 400°C (752°F) or more] even though the heated oxygen sensor is normal, the output voltage would be possibly low in spite of the rich air-fuel ratio.

NOTE: When the vehicle is driven with high loads, the temperature of the sensing area of the heated oxygen sensor is sufficiently high. Thus, it is not necessary to apply the voltage to the heater.

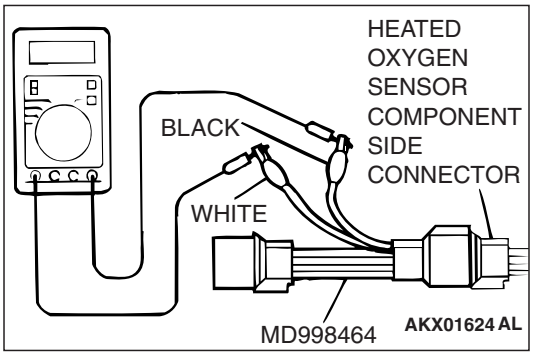
Q: Is the measured voltage between 0.6 and 1.0 volt?

YES : Go to Step 8.
NO : Replace the cylinder 1, 4 heated oxygen sensor (rear). Then go to Step 23.

STEP 8. Check the cylinder 2, 3 heated oxygen sensor (rear).



(1) Disconnect the cylinder 2, 3 heated oxygen sensor (rear) connector B-35 and connect test harness special tool MD998464 to the connector on the cylinder 2, 3 heated oxygen sensor (rear) side.
(2) Warm up the engine until engine coolant temperature reaches 80° C (176° F) or higher.
(3) Drive at 50 km/h (31mph) or more for 10 minutes.



(4) Connect a digital voltage meter between terminal No. 2 (black clip) and terminal No. 4 (white clip).
(5) Measure the output voltage of heated oxygen sensor under the following driving.
- Transaxle: "L" range
- Drive with wide open throttle
- Engine: 3,500 r/min or more

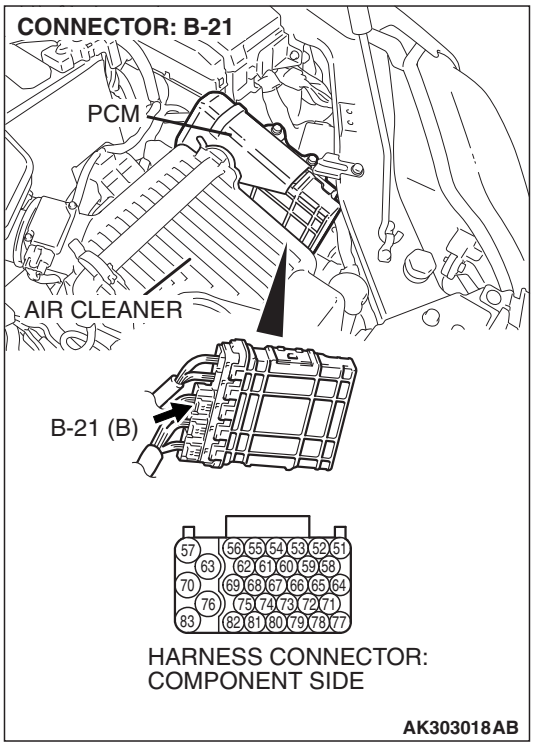
Standard value: 0.6 – 1.0 V

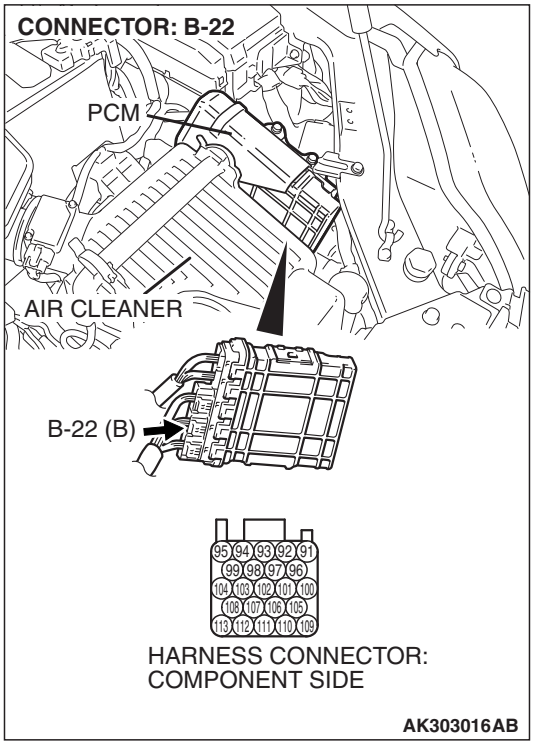
NOTE: If the temperature of sensing area does not reach the high temperature [of approximately 400°C (752°F) or more] even though the heated oxygen sensor is normal, the output voltage would be possibly low in spite of the rich air-fuel ratio.

NOTE: When the vehicle is driven with high loads, the temperature of the sensing area of the heated oxygen sensor is sufficiently high. Thus, it is not necessary to apply the voltage to the heater.

Q: Is the measured voltage between 0.6 and 1.0 volt?

YES : Go to Step 9.
NO : Replace the cylinder 2, 3 heated oxygen sensor (rear). Then go to Step 23.



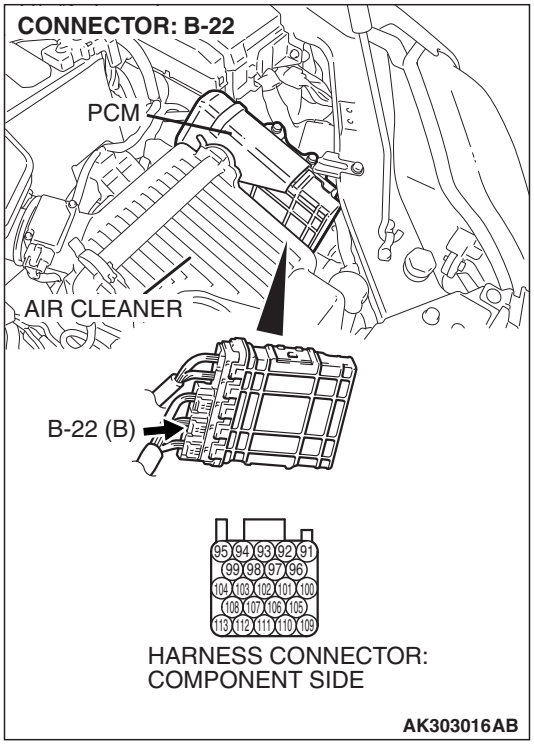


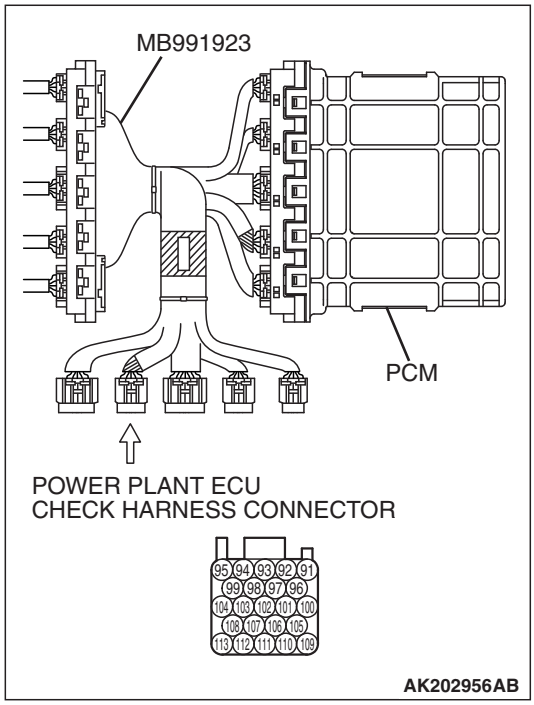
STEP 9. Check harness connector B-21 and B-22 at PCM for damage.

Q: Are the harness connectors in good condition?

YES : Go to Step 10.

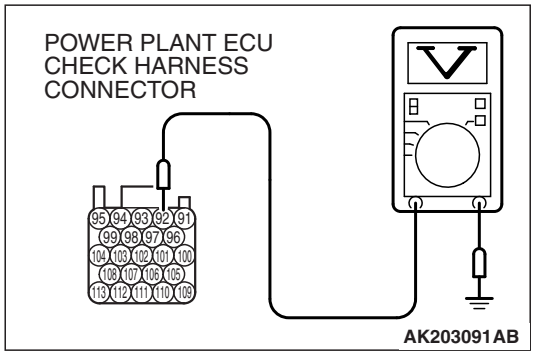
NO : Repair or replace them. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 23.





STEP 10. Measure the sensor offset voltage at PCM connector B-22 by using power plant ECU check harness special tool MB991923.

(1) Disconnect all PCM connectors. Connect the power plant ECU check harness special tool MB991923 between the separated connectors.
(2) Turn the ignition switch to the "ON" position.

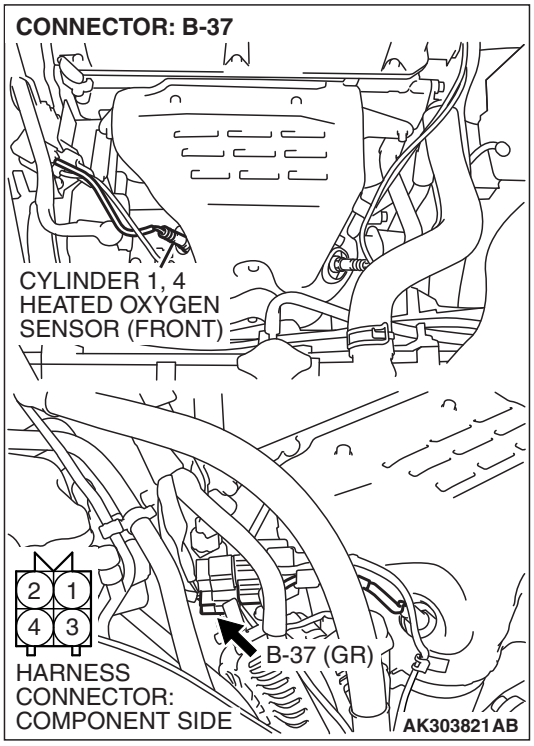


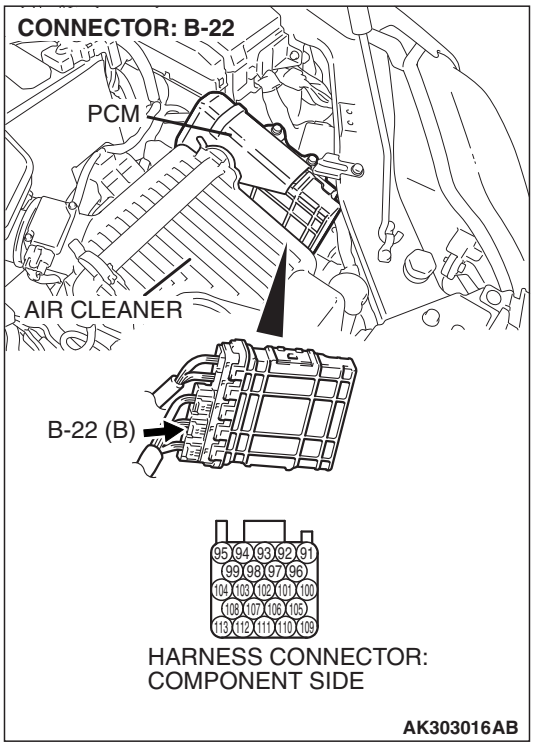
(3) Measure the voltage between terminal No. 92 and ground.
- Voltage should be between 0.4 and 0.6 volt.

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

Q: Is the measured voltage between 0.4 and 0.6 volt?

YES : Go to Step 13.
NO : Go to Step 11.



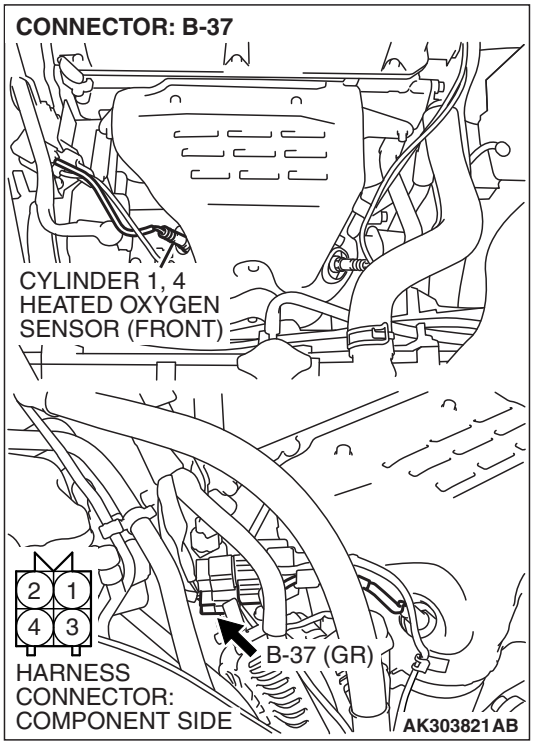


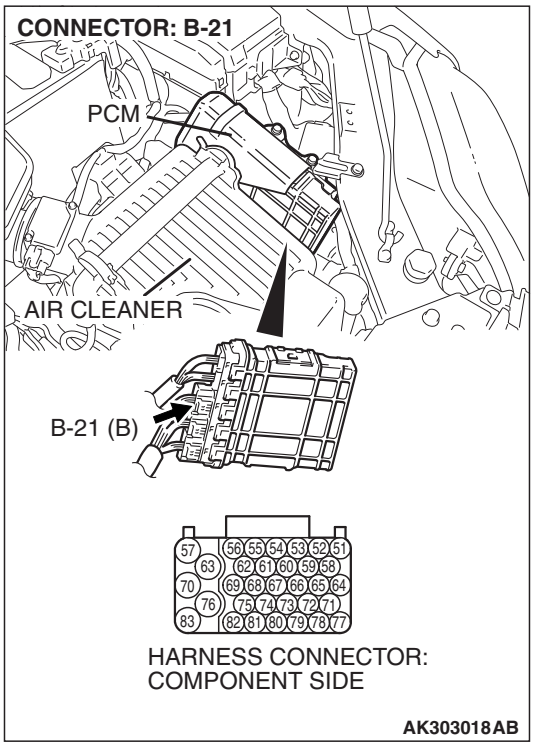
STEP 11. Check for short circuit to power supply between cylinder 1, 4 heated oxygen sensor (front) connector B-37 (terminal No. 4) and PCM connector B-22 (terminal No. 92).
Q: Is the harness wire in good condition?

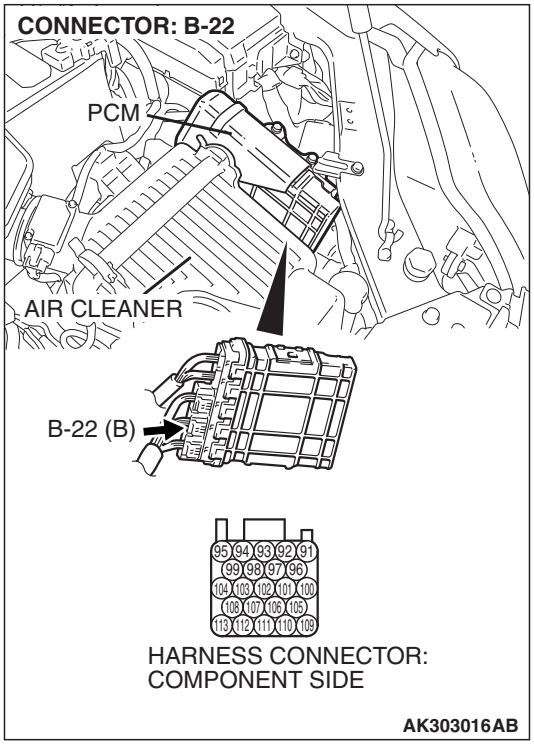
YES : Go to Step 12.
NO : Repair it. Then go to Step 23.

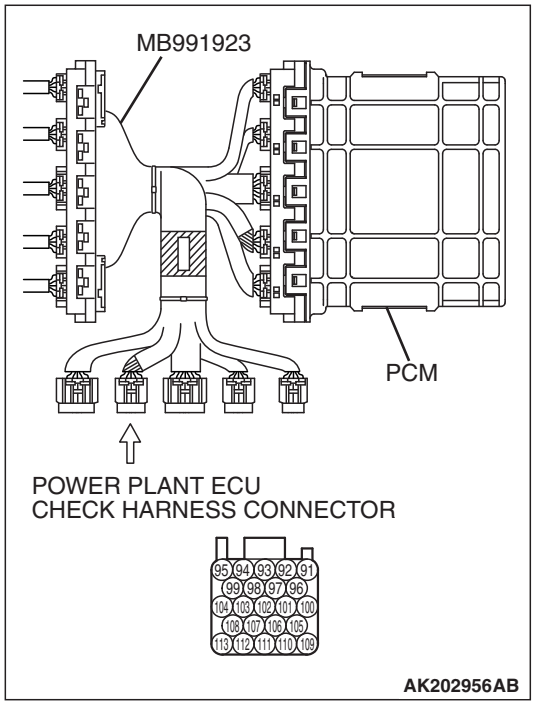
STEP 12. Check for short circuit to power supply between cylinder 1, 4 heated oxygen sensor (front) connector B-37 (terminal No. 2) and PCM connector B-21 (terminal No. 80).
Q: Is the harness wire in good condition?

YES : Go to Step 22.
NO : Repair it. Then go to Step 23.



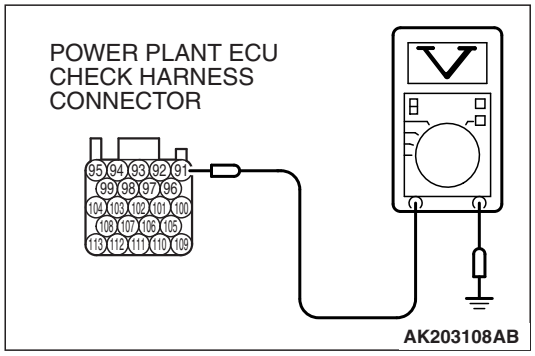






STEP 13. Measure the sensor offset voltage at PCM connector B-22 by using power plant ECU check harness special tool MB991923.

(1) Disconnect all PCM connectors. Connect the power plant ECU check harness special tool MB991923 between the separated connectors.
(2) Turn the ignition switch to the "ON" position.

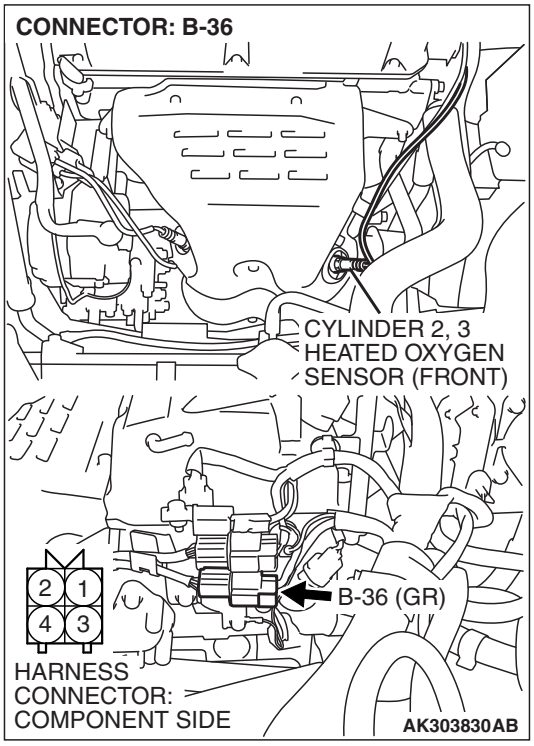


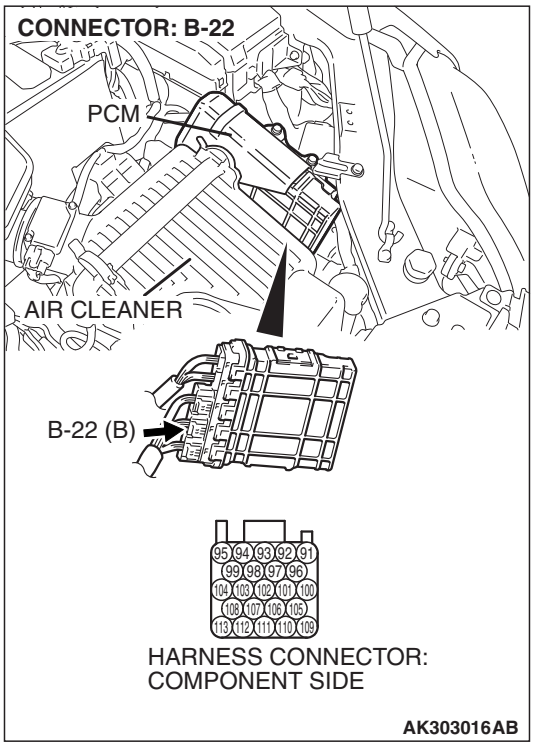
(3) Measure the voltage between terminal No. 91 and ground.
- Voltage should be between 0.4 and 0.6 volt.

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

Q: Is the measured voltage between 0.4 and 0.6 volt?

YES : Go to Step 16.
NO : Go to Step 14.



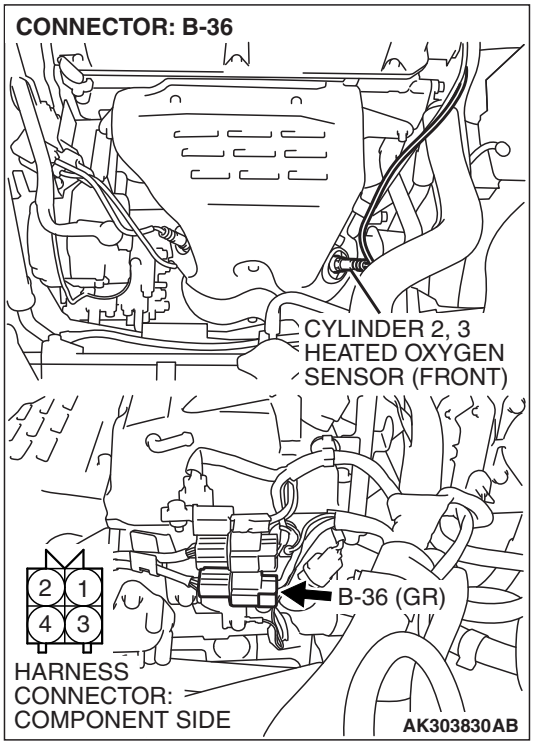


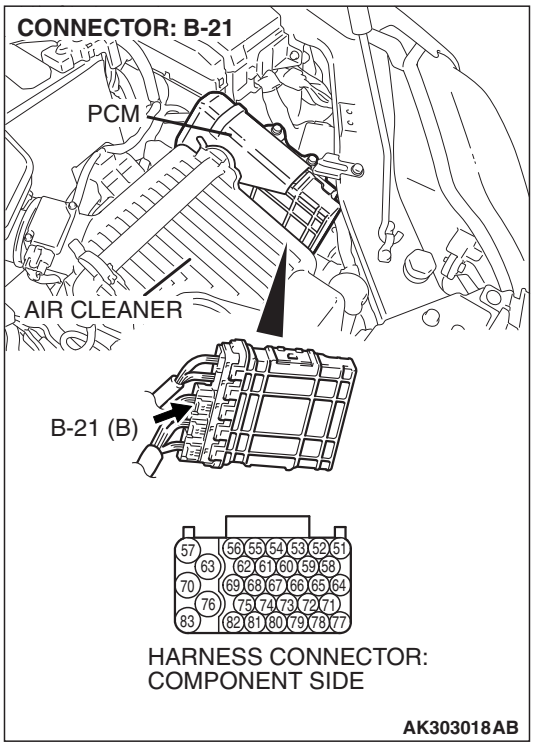
STEP 14. Check for short circuit to power supply between cylinder 2, 3 heated oxygen sensor (front) connector B-36 (terminal No. 4) and PCM connector B-22 (terminal No. 91).
Q: Is the harness wire in good condition?

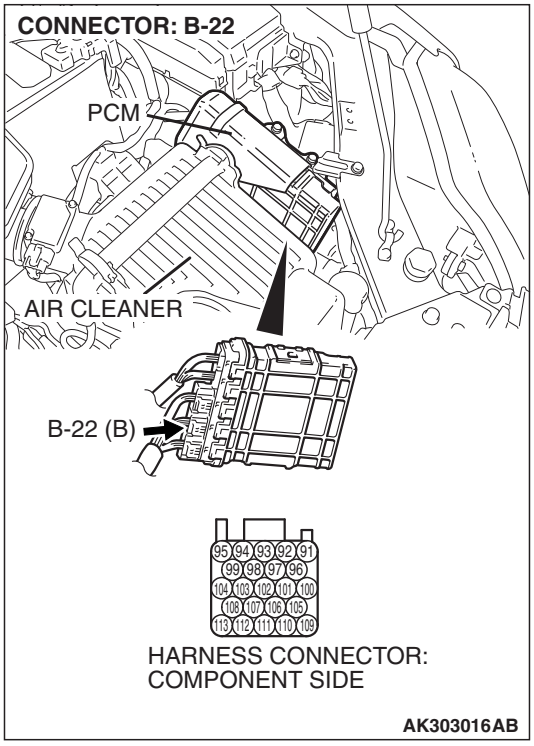
YES : Go to Step 15.
NO : Repair it. Then go to Step 23.

STEP 15. Check for short circuit to power supply between cylinder 2, 3 heated oxygen sensor (front) connector B-36 (terminal No. 2) and PCM connector B-21 (terminal No. 79).
Q: Is the harness wire in good condition?

YES : Go to Step 22.
NO : Repair it. Then go to Step 23.

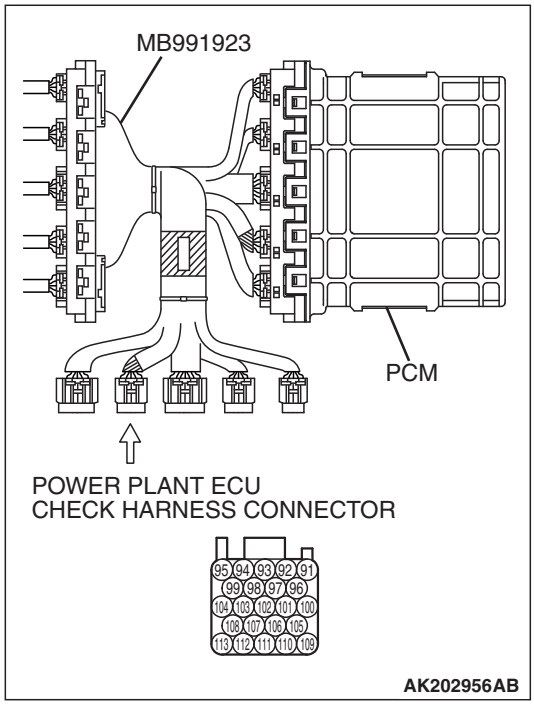


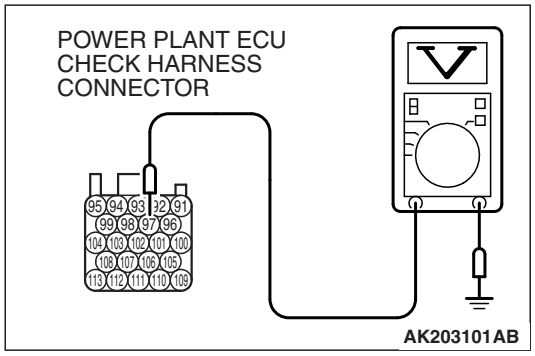




STEP 16. Measure the sensor offset voltage at PCM connector B-22 by using power plant ECU check harness special tool MB991923.

(1) Disconnect all PCM connectors. Connect the power plant ECU check harness special tool MB991923 between the separated connectors.
(2) Turn the ignition switch to the "ON" position.



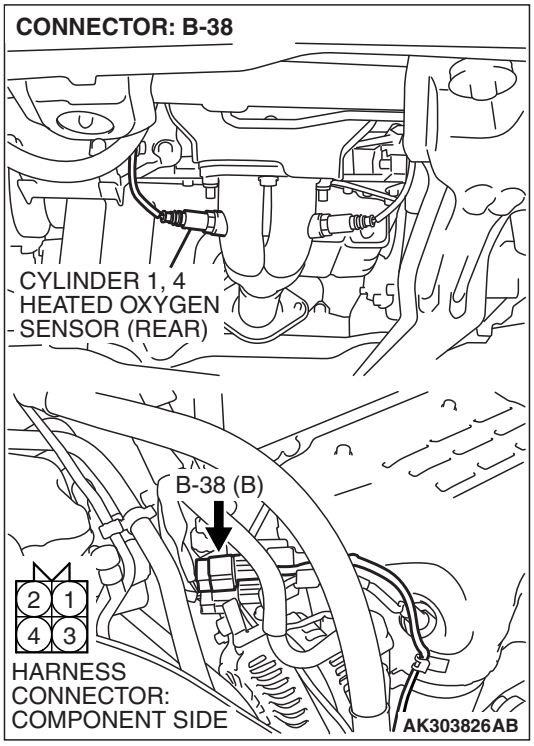


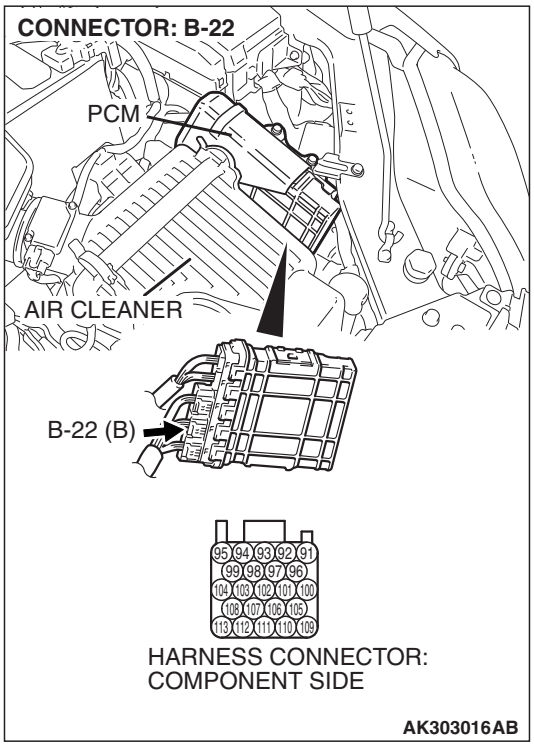
(3) Measure the voltage between terminal No. 97 and ground.
- Voltage should be between 0.4 and 0.6 volt.

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

Q: Is the measured voltage between 0.4 and 0.6 volt?

YES : Go to Step 19.
NO : Go to Step 17.





STEP 17. Check for short circuit to power supply between cylinder 1, 4 heated oxygen sensor (rear) connector B-38 (terminal No. 4) and PCM connector B-22 (terminal No. 97).
Q: Is the harness wire in good condition?

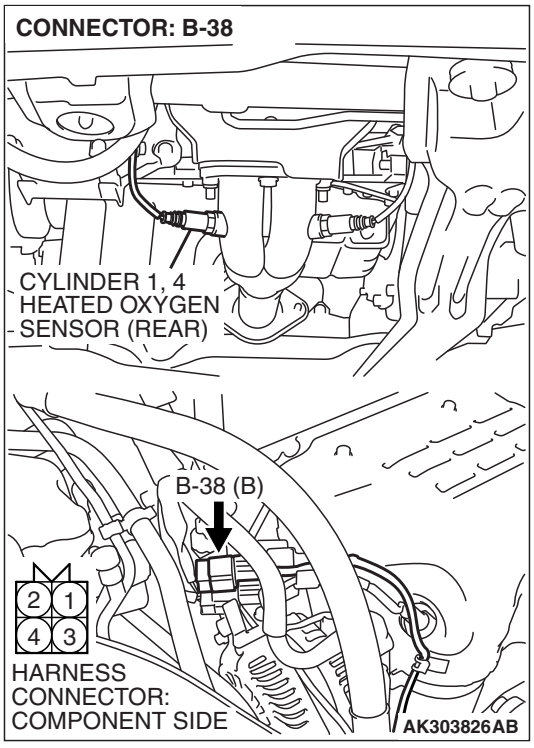
YES : Go to Step 18.
NO : Repair it. Then go to Step 23.

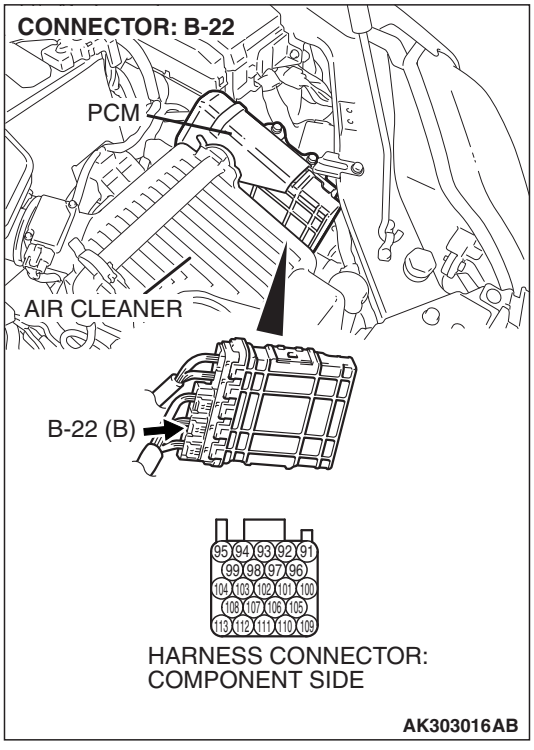
STEP 18. Check for short circuit to power supply between cylinder 1, 4 heated oxygen sensor (rear) connector B-38 (terminal No. 2) and PCM connector B-22 (terminal No. 106).

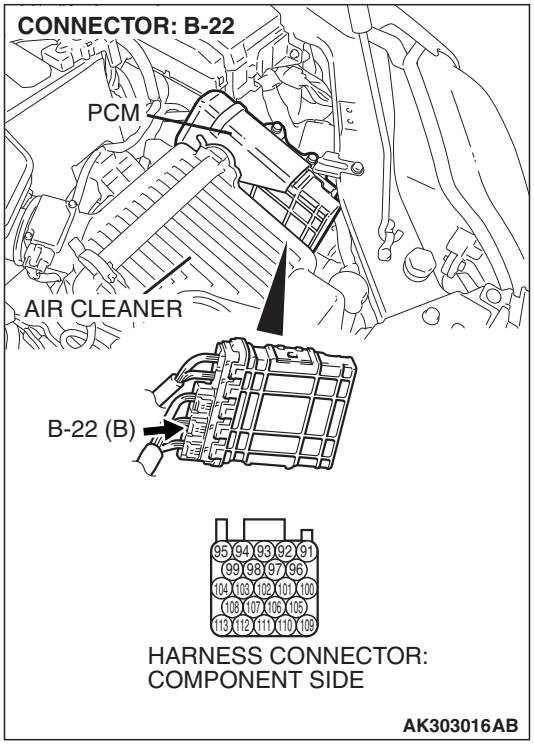
Q: Is the harness wire in good condition?

YES : Go to Step 22.

NO : Repair it. Then go to Step 23.

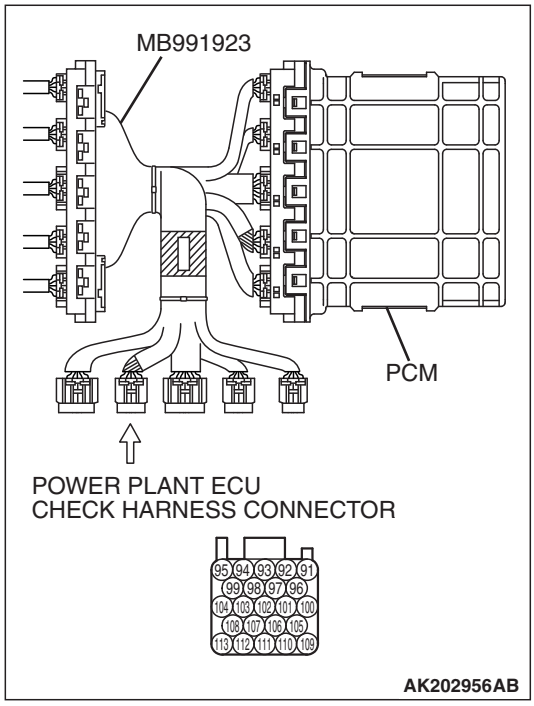


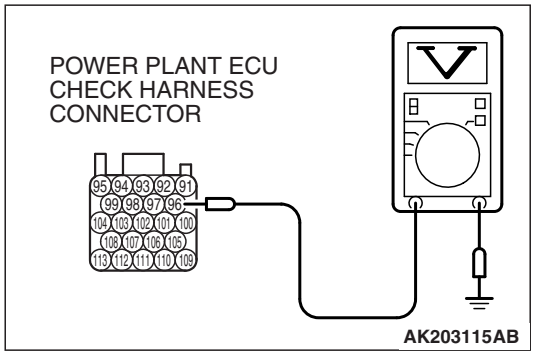




STEP 19. Measure the sensor offset voltage at PCM connector B-22 by using power plant ECU check harness special tool MB991923.

(1) Disconnect all PCM connectors. Connect the power plant ECU check harness special tool MB991923 between the separated connectors.
(2) Turn the ignition switch to the "ON" position.



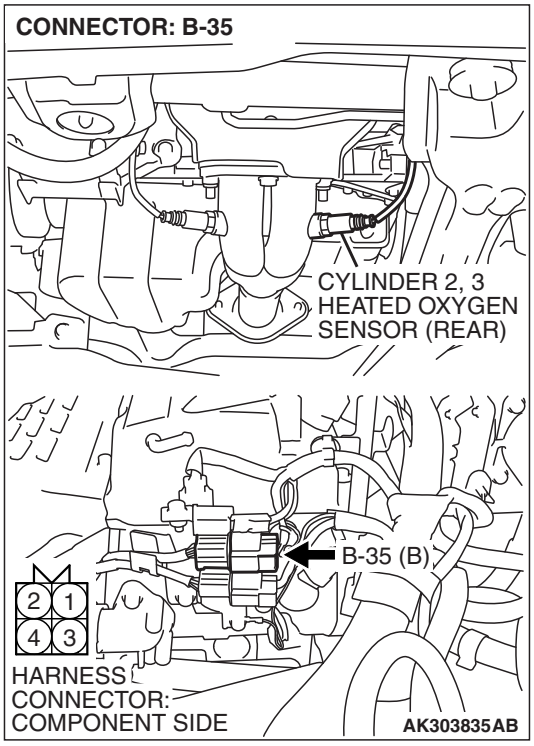


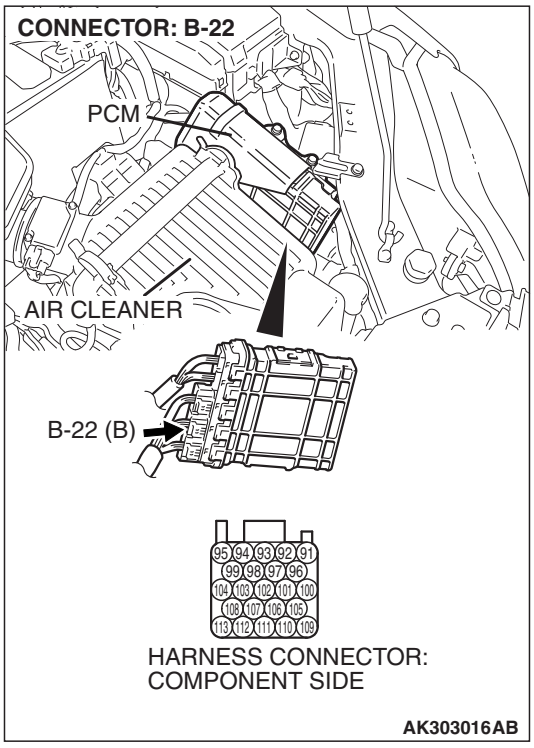
(3) Measure the voltage between terminal No. 96 and ground.
- Voltage should be between 0.4 and 0.6 volt.

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

Q: Is the measured voltage between 0.4 and 0.6 volt?

YES : Go to Step 22.
NO : Go to Step 20.





STEP 20. Check for short circuit to power supply between cylinder 2, 3 heated oxygen sensor (rear) connector B-35 (terminal No. 4) and PCM connector B-22 (terminal No. 96).
Q: Is the harness wire in good condition?

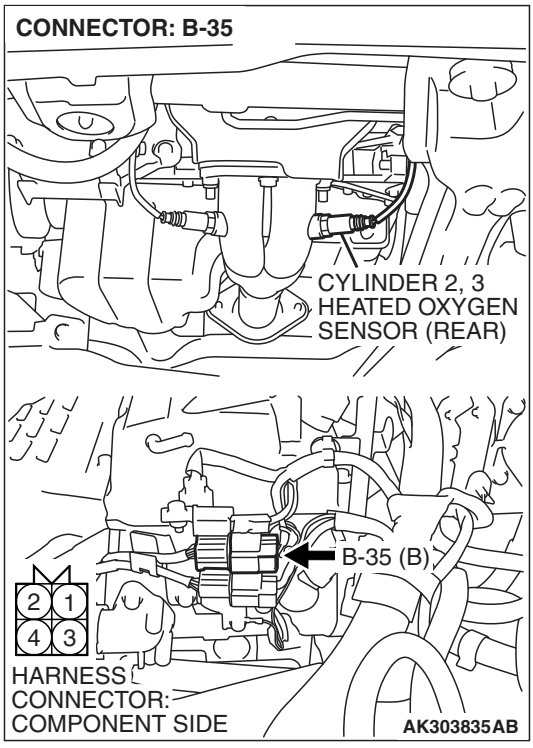
YES : Go to Step 21.
NO : Repair it. Then go to Step 22.

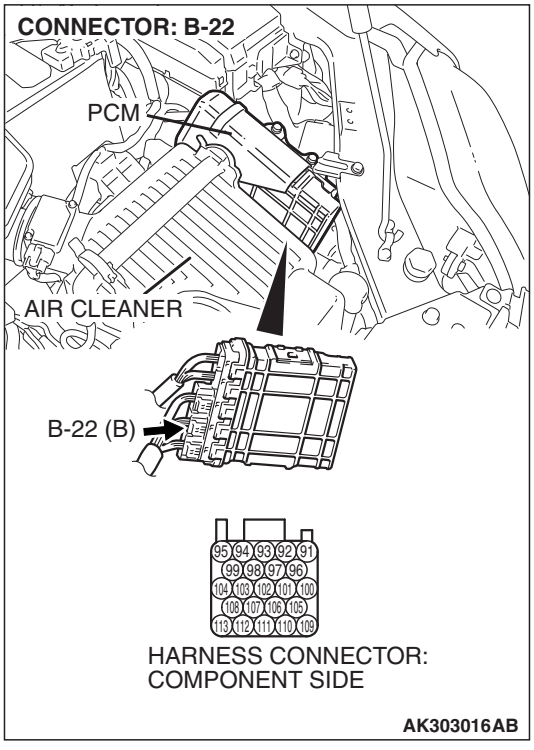
STEP 21. Check for short circuit to power supply between cylinder 2, 3 heated oxygen sensor (rear) connector B-35 (terminal No. 2) and PCM connector B-22 (terminal No. 105).

Q: Is the harness wire in good condition?

YES : Go to Step 22.

NO : Repair it. Then go to Step 23.





STEP 22. Check the trouble symptoms.

(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle Pattern 25 P.13A-5.

(2) Check the diagnostic trouble code (DTC).

Q: Is DTC P2253 set?

YES : Replace the PCM. When the PCM is replaced, register the encrypted code. Refer to GROUP 54A, Ignition Switch –Encrypted Code Registration Criteria Table P.54A-10. Then go to Step 23.

NO : 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.

STEP 23. Test the OBD-II drive cycle.

(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle Pattern 25 P.13A-5.

(2) Check the diagnostic trouble code (DTC).

Q: Is DTC P2253 set?

YES : Retry the troubleshooting.

NO : The inspection is complete.

DTC P2567: LIN Communication Check by Radiator Sensor (Thermistor Error)

RADIATOR SENSOR CIRCUIT

Refer to P.13A-870.

CIRCUIT OPERATION

Refer to P.13A-870.

MONITOR EXECUTION

- Continuous

MONITOR EXECUTION CONDITIONS (OTHER MONITOR AND SENSOR)

Other Monitor (There is no temporary DTC stored in memory for the item monitored below)

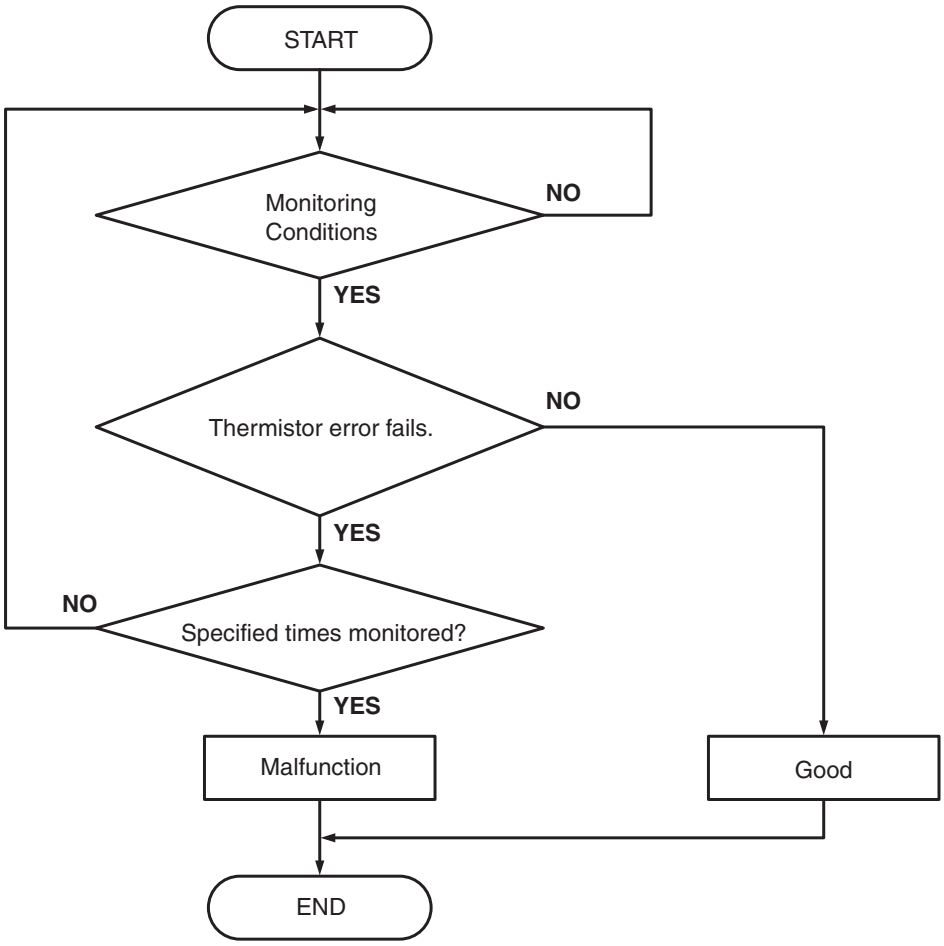
- Not applicable

Sensor (The sensor below is determined to be normal)

- Not applicable

DTC SET CONDITIONS

Logic Flow Chart



AC502906AI

Check Condition

- Ignition switch: "ON"
- Battery positive voltage is higher than 11 volts
- Engine coolant temp -30° C(-22° F) to 110° C(230° F)

Judgement Criteria

- When the radiator sensor is defective
- When the PCM is defective

TROUBLESHOOTING HINTS (THE MOST LIKELY CAUSES FOR THIS CODE TO BE SET ARE:)

- Malfunction of the radiator sensor
- Malfunction of the PCM

DIAGNOSIS

Required Special Tools:

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

TSB Revision

STEP 1. Replace the DOR radiator
Check the diagnostic trouble code (DTC).

Q: Is DTC P2567 set?

YES : Replace the PCM. Then go to Step 2.
NO : The procedure is complete.

STEP 2. Perform the OBD-II drive cycle.
Check the diagnostic trouble code (DTC).

Q: Is DTC P2567 set?

YES : Repeat the troubleshooting.
NO : The procedure is complete.

DTC U1073: Bus Off

⚠ CAUTION
- **If the PCM output the DTC U1073, make sure to diagnose the CAN bus line.**
- **Before replacing the ECU, make sure that the communication circuit is operating normally.**

DTC SET CONDITIONS

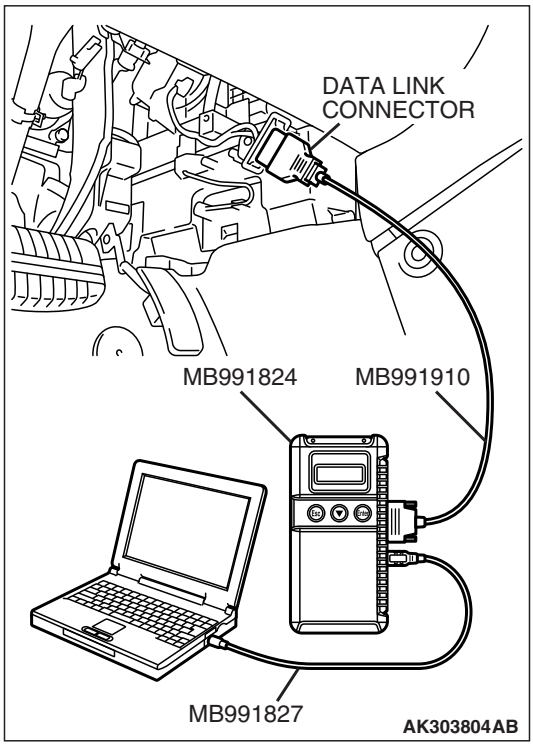
Check Conditions
- Always

Judgement Criteria
- Bus off error detected

TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)
- CAN line harness damage or connector damage.
- PCM failed.

DIAGNOSIS

Required Special Tools:
- MB991958: Scan tool (M.U.T.-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991910: Main Harness A



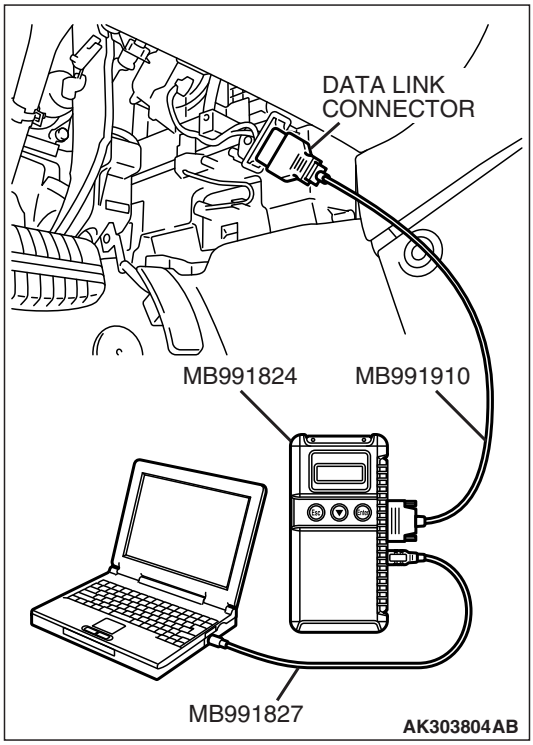
STEP 1. Using scan tool MB991958, diagnose CAN bus line.

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

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

Q: Is the CAN bus line normal?

YES : Go to Step 2.
NO : Repair the CAN bus line. Refer to GROUP 54C, Diagnosis –Can bus Diagnostics Table P.54C-13. Then go to Step 3.

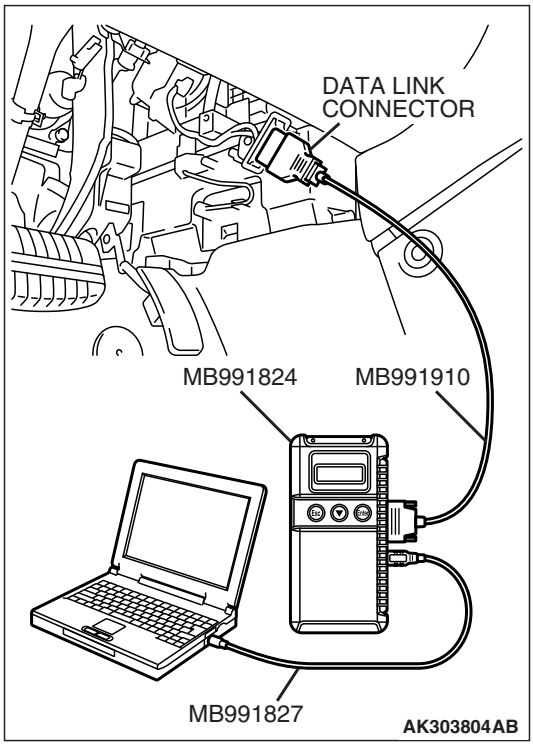


STEP 2. Recheck for diagnostic trouble code.

Check again if the DTC is set.
(1) Erase the DTC.
(2) Turn the ignition switch to the "ON" position.
(3) Check if the DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is DTC U1073 set?

YES : Replace the PCM. When the PCM is replaced, register the encrypted code. Refer to GROUP 54A, Ignition Switch –Encrypted Code Registration Criteria Table P.54A-10. Then go to Step 3.
NO : 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.



STEP 3. Recheck for diagnostic trouble code.

Check again if the DTC is set.
(1) Erase the DTC.
(2) Turn the ignition switch to the "ON" position.
(3) Check if DTC is set.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is DTC U1073 set?

YES : Retry the troubleshooting
NO : The inspection is complete.

DTC U1102: ASC-ECU Time-Out

⚠ CAUTION

- **If the PCM output the DTC U1102, make sure to diagnose the CAN bus line.**
- **Before replacing the ECU, make sure that the communication circuit is operating normally.**

NOTE: When the diagnosis codes relating to the CAN communication error are output, make sure of the vehicle equipment. When the vehicle is not equipped with the system the PCM communicates to, the diagnosis code is always output. This is not abnormal.

DTC SET CONDITIONS

Check Conditions

- Battery positive voltage is 10 volts or higher.
- Engine is not cranked, or at least 3 seconds have passed since engine was cranked.

Judgement Criterion

- Unable to receive ASC-ECU signals through the CAN bus line.

COMMENT

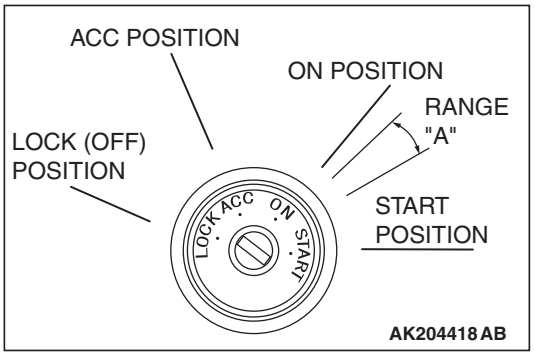
Current Trouble

- Some of the possible causes are a harness or connector damage between the PCM and the ASC-ECU on the CAN bus line, a failure in the ASC-ECU power supply system, a failure in the ASC-ECU, or a failure in the PCM.

Past Trouble

- Proceed to troubleshoot based on a harness or connector damage on the CAN bus line between the PCM and ASC-ECU, and a failure in the ASC power supply system. Refer to "How to cope with past trouble" (Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Treat Past Trouble P.00-16).

⚠ CAUTION



When the ignition key is maintained within the range "A" (i.e., the ignition switch IG2 is in OFF position but the cranking does not start) for more than 1 second, PCM stores DTC U1102 (the past trouble).

NOTE: If a malfunction occurred in the past, a failure cannot be discovered through the MB991958 CAN bus diagnosis even if there might be a problem with the CAN bus. In this case, refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-14. Furthermore, it is possible to narrow down the areas of the possible failures from the DTCs that are output by the ECUs, which are communicating on the CAN bus (Refer to GROUP 54C, Explanation about The Scan Tool (M.U.T.-III) CAN Bus Diagnostics P.54C-6).

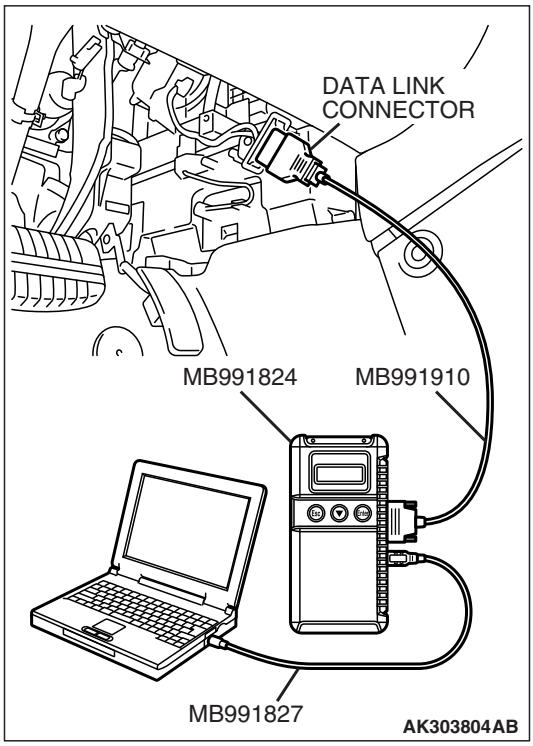
TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)

- CAN line harness damage or connector damage.
- ASC-ECU failed.
- PCM failed.

DIAGNOSIS

Required Special Tools:

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



STEP 1. Using scan tool MB991958, diagnose CAN bus line.

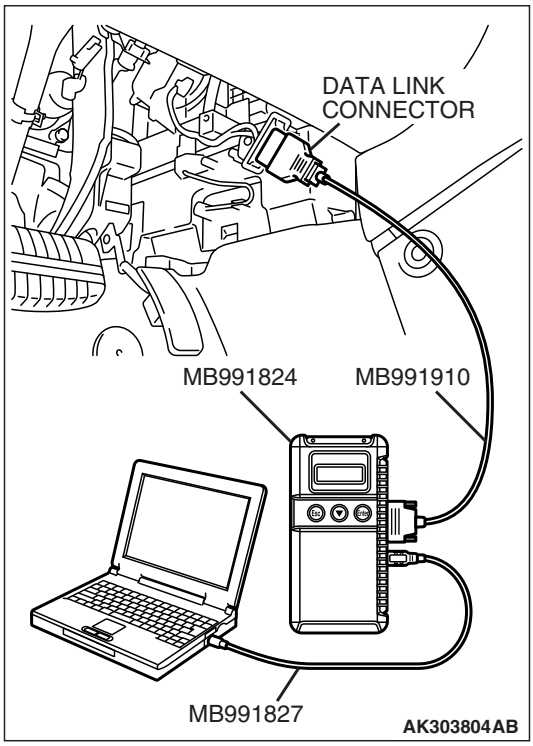
⚠ CAUTION

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) Diagnose CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line normal?

YES : Go to Step 2.
NO : Repair the CAN bus line. Refer to GROUP 54C, Diagnosis –Can Bus Diagnostics Table P.54C-13. Then go to Step 6.

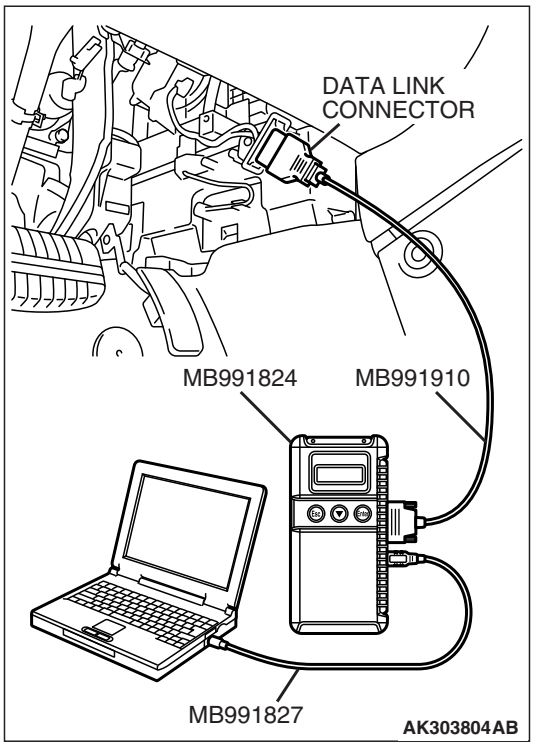


STEP 2. Using scan tool MB991958, read the diagnostic trouble code (DTC).

(1) Turn the ignition switch to the "ON" position.
(2) Read the ASC-DTC.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the ASC-DTC set?

YES : Refer to GROUP 35C, Diagnosis –Diagnostic Trouble Code Chart P.35C-15.
NO : Go to Step 3.

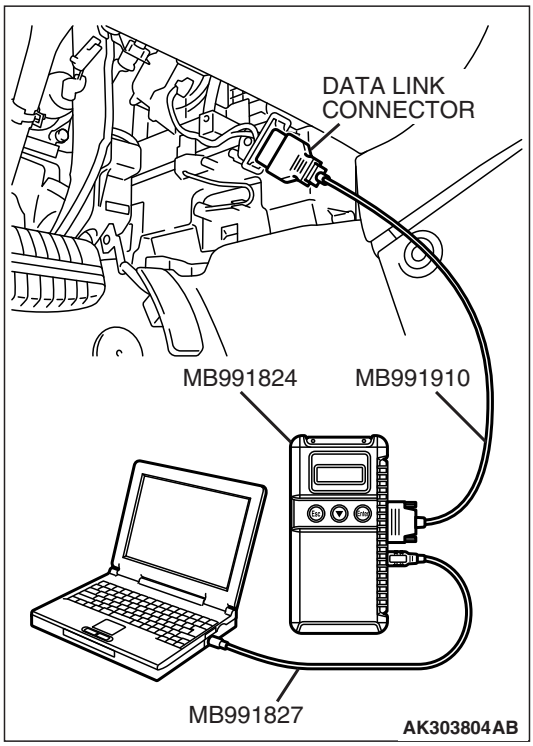


STEP 3. Using scan tool MB991958, read the diagnostic trouble code (DTC).

(1) Turn the ignition switch to the "ON" position.
(2) Read the combination meter-DTC.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is DTC U1102 set?

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

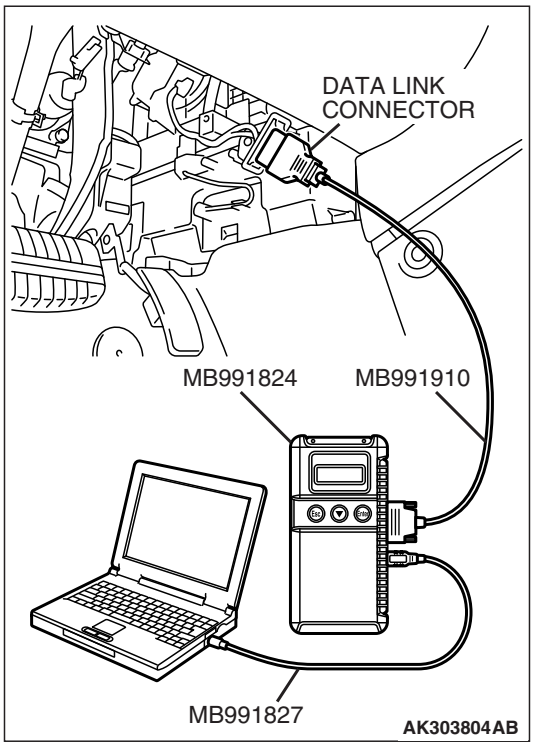


STEP 4. Using scan tool MB991958, read the diagnostic trouble code (DTC).

(1) Turn the ignition switch to the "ON" position.
(2) After the MFI-DTC has been deleted, read the MFI-DTC again.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is DTC U1102 set?

YES : Replace the ASC-ECU. Then go to Step 6.
NO : It can be assumed that this malfunction is intermittent of CAN bus line between PCM and ASC-ECU. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-14.



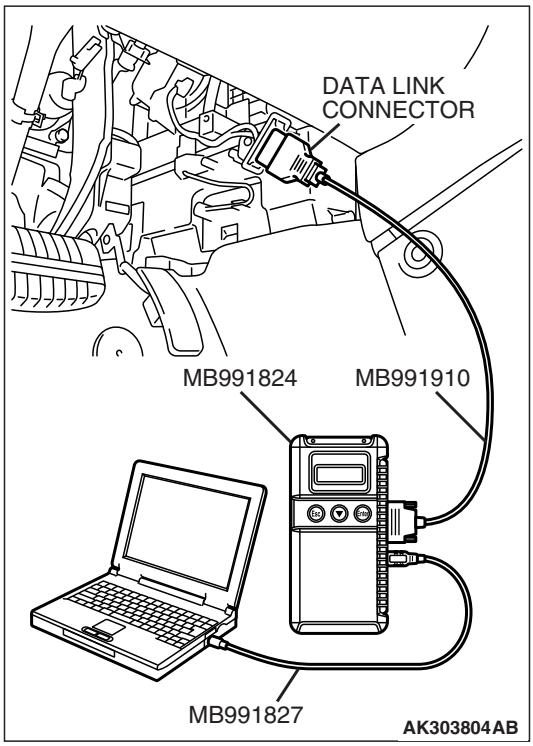
STEP 5. Using scan tool MB991958, read the diagnostic trouble code (DTC).

(1) Turn the ignition switch to the "ON" position.
(2) After the MFI-DTC has been deleted, read the MFI-DTC again.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is DTC U1102 set?

YES : Replace the PCM. When the PCM is replaced, register the encrypted code. Refer to GROUP 54A, Ignition Switch –Encrypted Code Registration Criteria Table P.54A-10. Then go to Step 6.

NO : It can be assumed that this malfunction is intermittent of CAN bus line between PCM and ASC-ECU. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-14.



STEP 6. Using scan tool MB991958, read the diagnostic trouble code (DTC).

(1) Turn the ignition switch to the "ON" position.
(2) After the MFI-DTC has been deleted, read the MFI-DTC again.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is DTC U1102 set?

YES : Retry the troubleshooting.
NO : The inspection is complete.

TSB Revision

DTC U1108: Combination Meter Time-Out

⚠ CAUTION

- **If the PCM output the DTC U1108, make sure to diagnose the CAN bus line.**
- **Before replacing the ECU, make sure that the communication circuit is operating normally.**

NOTE: When the diagnosis codes relating to the CAN communication error are output, make sure of the vehicle equipment. When the vehicle is not equipped with the system the PCM communicates to, the diagnosis code is always output. This is not abnormal.

DESCRIPTIONS OF MONITOR METHODS

There is no data from combination meter for the specified time. (Meter also detect communication error with PCM.)

MONITOR EXECUTION

Continuous

MONITOR EXECUTION CONDITIONS (Other monitor and Sensor)

Other Monitor (There is no temporary DTC stored in memory for the item monitored below)

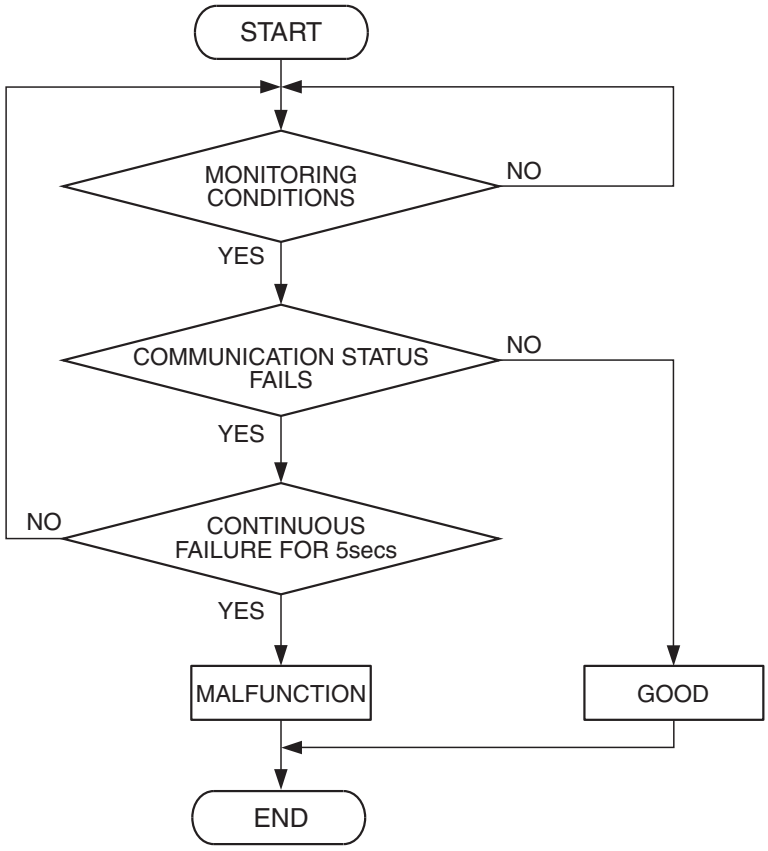
- Not applicable

Sensor (The sensor below is determined to be normal)

- Not applicable

DTC SET CONDITIONS

Lgic Flow Chart



AK204025

TSB Revision

Check Condition
- Battery positive voltage is 10 volts or higher.

Judgement Criterion
- Unable to receive combination meter signals through the CAN bus line for 5 seconds.

COMMENT

Current Trouble
- Some of the possible causes are a harness or connector damage between the PCM and the combination meter on the CAN bus line, a failure in the combination meter power supply system, a failure in the combination meter, or a failure in the PCM.

Past Trouble
- Proceed to troubleshoot based on a harness or connector damage on the CAN bus line between the PCM and combination meter, and a failure in the combination meter power supply system. Refer to "How to cope with past trouble" (Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Treat Past Trouble P.00-16).

NOTE: If a malfunction occurred in the past, a failure cannot be discovered through the M.U.T. –III CAN bus diagnosis even if there might be a problem with the CAN bus. In this case, refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-14. Furthermore, it is possible to narrow down the areas of the possible failures from the DTCs that are output by the ECUs, which are communicating on the CAN bus (Refer to GROUP 54C, Explanation about The Scan Tool (M.U.T.-III) CAN Bus Diagnostics P.54C-6).

OBD-II DRIVE CYCLE PATTERN

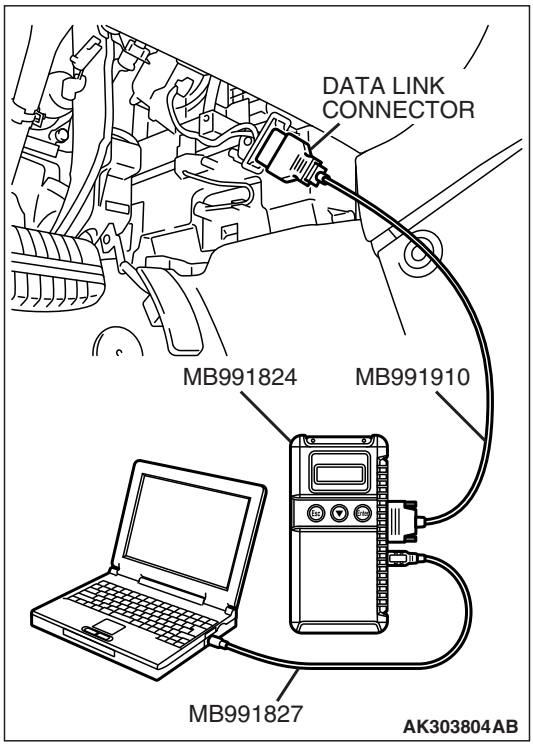
None.

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

- CAN line harness damage or connector damage.
- Combination meter failed.
- PCM failed.

DIAGNOSIS

Required Special Tools:
- MB991958: Scan tool (M.U.T.-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991910: Main Harness A



STEP 1. Using scan tool MB991958, diagnose CAN bus line.

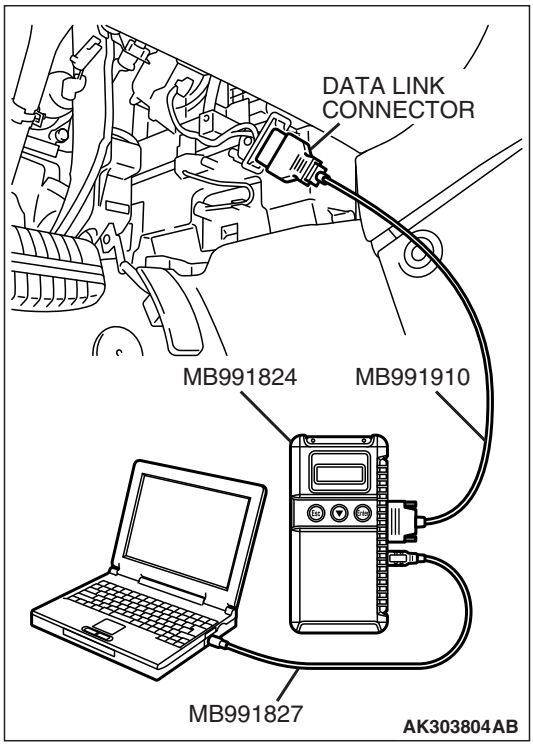
⚠ CAUTION

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) Diagnose CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line normal?

YES : Go to Step 2.
NO : Repair the CAN bus line. Refer to GROUP 54C, Diagnosis –Can Bus Diagnostics Table P.54C-13. Then go to Step 6.

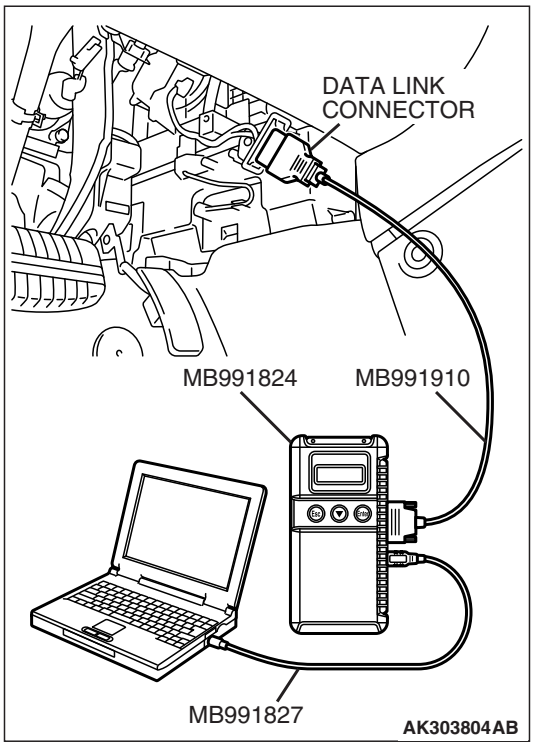


STEP 2. Using scan tool MB991958, read the diagnostic trouble code (DTC).

(1) Turn the ignition switch to the "ON" position.
(2) Read the combination meter-DTC.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the combination meter-DTC set?

YES : Refer to GROUP 54A, Combination Meter Assembly – Diagnostic Trouble Code Chart P.54A-57.
NO : Go to Step 3.

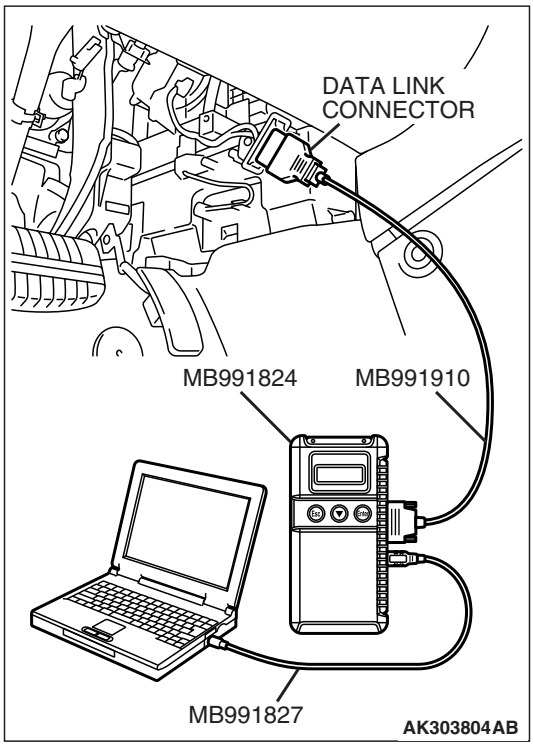


STEP 3. Using scan tool MB991958, read the diagnostic trouble code (DTC).

(1) Turn the ignition switch to the "ON" position.
(2) Read the ETACS-DTC.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is DTC 014 set?

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

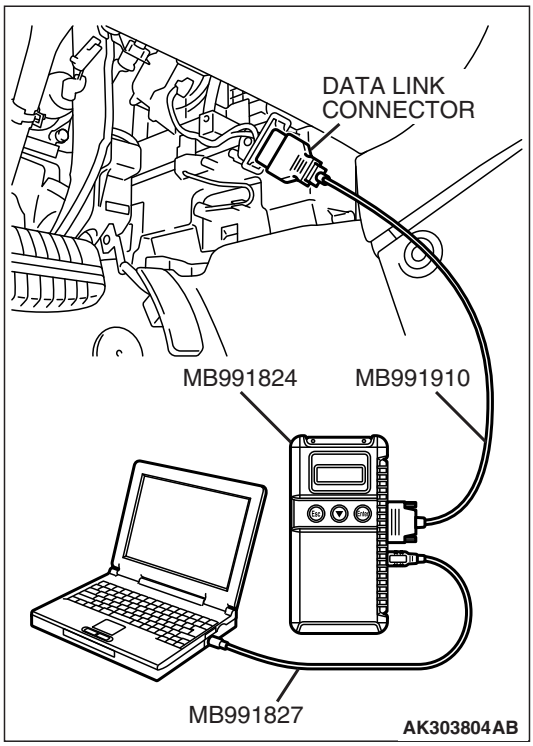


STEP 4. Using scan tool MB991958, read the diagnostic trouble code (DTC).

(1) Turn the ignition switch to the "ON" position.
(2) After the MFI-DTC has been deleted, read the MFI-DTC again.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is DTC U1108 set?

YES : Replace the combination meter. Then go to Step 6.
NO : It can be assumed that this malfunction is intermittent of CAN bus line between PCM and combination meter. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-14.



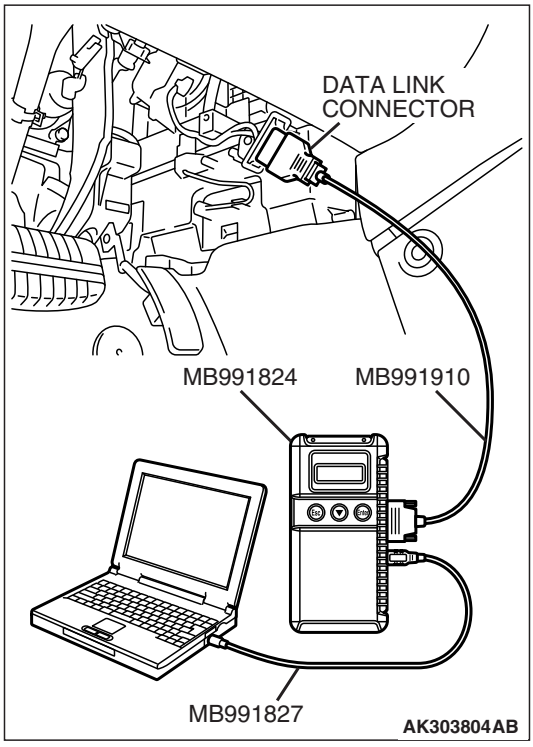
STEP 5. Using scan tool MB991958, read the diagnostic trouble code (DTC).

(1) Turn the ignition switch to the "ON" position.
(2) After the MFI-DTC has been deleted, read the MFI-DTC again.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is DTC U1108 set?

YES : Replace the PCM. When the PCM is replaced, register the encrypted code. Refer to GROUP 54A, Ignition Switch –Encrypted Code Registration Criteria Table P.54A-10. Then go to Step 6.

NO : It can be assumed that this malfunction is intermittent of CAN bus line between PCM and combination meter. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-14.



STEP 6. Using scan tool MB991958, read the diagnostic trouble code (DTC).

(1) Turn the ignition switch to the "ON" position.
(2) After the MFI-DTC has been deleted, read the MFI-DTC again.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is DTC U1108 set?

YES : Retry the troubleshooting.
NO : The inspection is complete.

DTC U1109: ETACS-ECU Time-Out

⚠ CAUTION

- **If the PCM output the DTC U1109, make sure to diagnose the CAN bus line.**
- **Before replacing the ECU, make sure that the communication circuit is operating normally.**

NOTE: When the diagnosis codes relating to the CAN communication error are output, make sure of the vehicle equipment. When the vehicle is not equipped with the system the PCM communicates to, the diagnosis code is always output. This is not abnormal.

DTC SET CONDITIONS

Check Conditions

- Battery positive voltage is 10 volts or higher.
- Engine is not cranked, or at least 3 seconds or more have passed since engine was cranked.

Judgement Criterion

- Unable to receive ETACS-ECU signals through the CAN bus line.

COMMENT

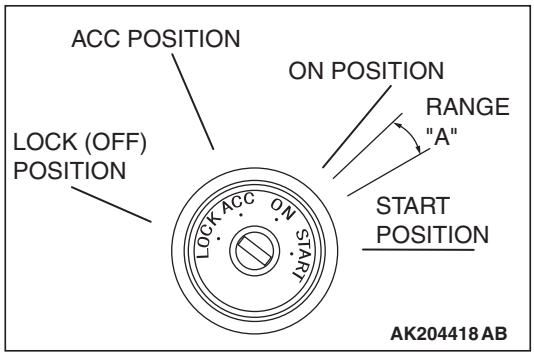
Current Trouble

- Some of the possible causes are a harness or connector damage between the PCM and the ETACS-ECU on the CAN bus line, a failure in the ETACS-ECU power supply system, a failure in the ETACS-ECU, or a failure in the PCM.

Past Trouble

- Proceed to troubleshoot based on a harness or connector damage on the CAN bus line between the PCM and ETACS-ECU, and a failure in the ETACS-ECU power supply system. Refer to "How to cope with past trouble" (Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Treat Past Trouble P.00-16).

⚠ CAUTION



When the ignition key is maintained within the range "A" (i.e., the ignition switch IG2 is in OFF position but the cranking does not start) for more than 1 second, PCM stores DTC U1110 (the past trouble).

NOTE: If a malfunction occurred in the past, a failure cannot be discovered through the MB991958 CAN bus diagnosis even if there might be a problem with the CAN bus. In this case, refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-14. Furthermore, it is possible to narrow down the areas of the possible failures from the DTCs that are output by the ECUs, which are communicating on the CAN bus (Refer to GROUP 54C, Explanation about The Scan Tool (M.U.T.-III) CAN Bus Diagnostics P.54C-6).

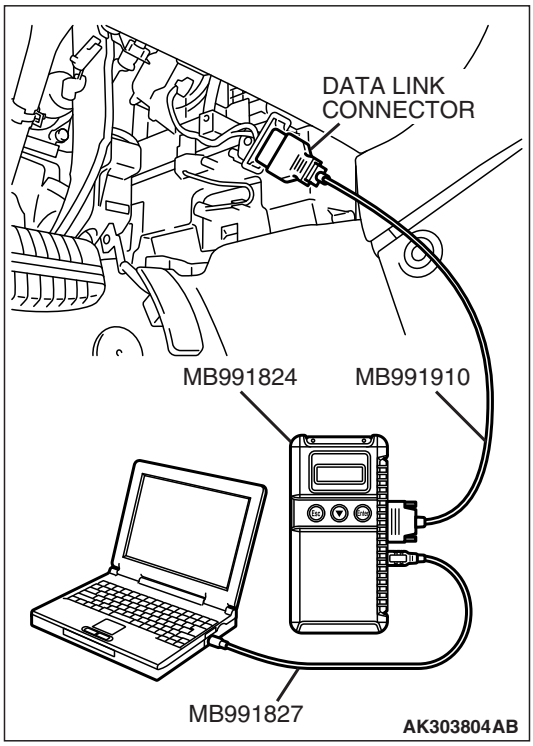
TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)

- CAN line harness damage or connector damage.
- ETACS-ECU failed.
- PCM failed.

DIAGNOSIS

Required Special Tools:

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



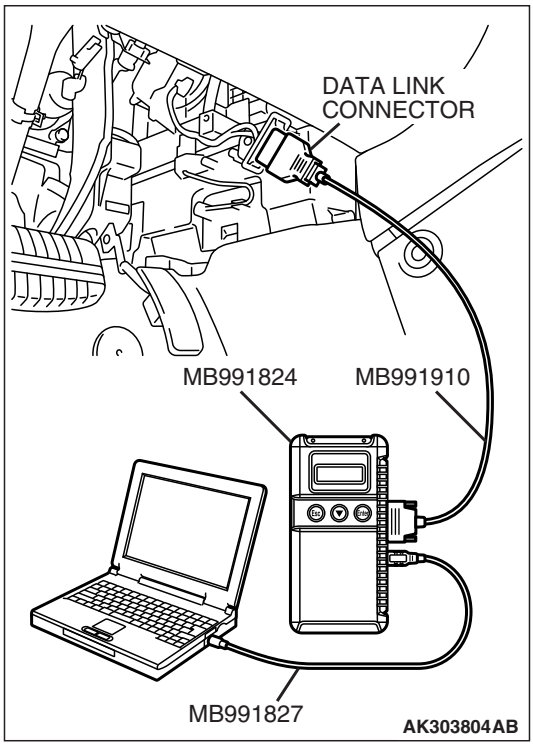
STEP 1. Using scan tool MB991958, diagnose CAN bus line.

⚠ 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) Diagnose CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line normal?

YES : Go to Step 2.
NO : Repair the CAN bus line. Refer to GROUP 54C, Diagnosis –Can Bus Diagnostics Table P.54C-13. Then go to Step 6.



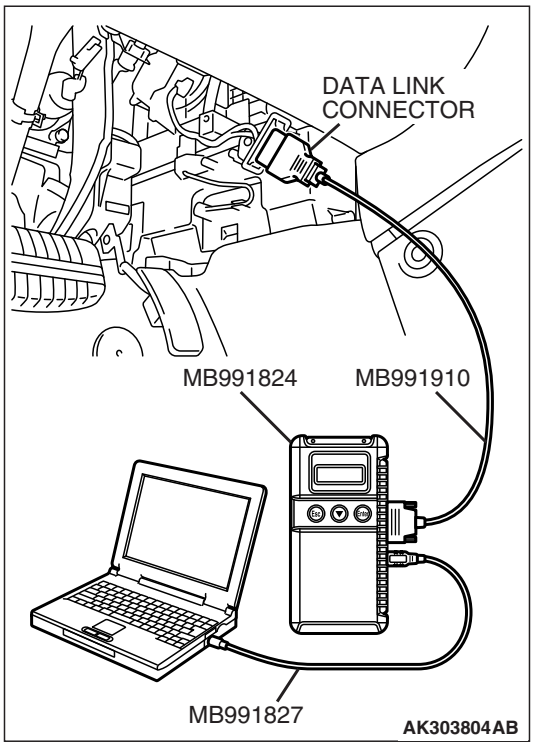
STEP 2. Using scan tool MB991958, read the diagnostic trouble code (DTC).

(1) Turn the ignition switch to the "ON" position.
(2) Read the ETACS-DTC.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the ETACS-DTC set?

YES : Refer to GROUP 54B, Diagnostic Trouble Code Chart P.54B-26.
NO : Go to Step 3.

TSB Revision

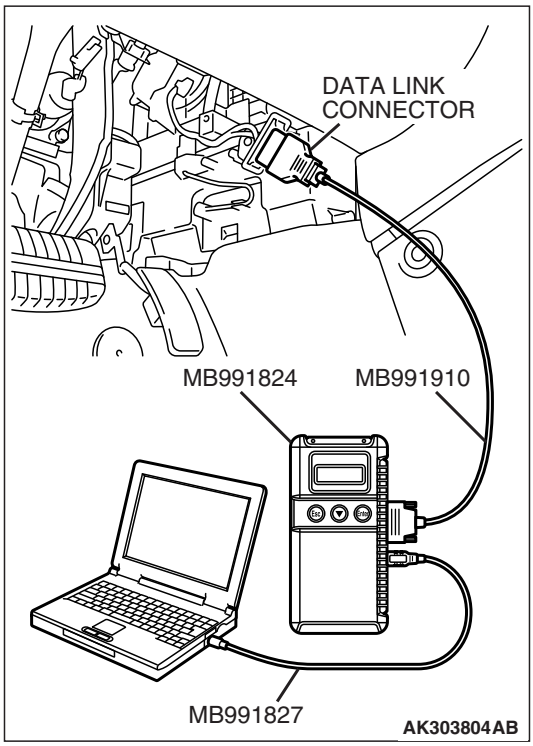


STEP 3. Using scan tool MB991958, read the diagnostic trouble code (DTC).

(1) Turn the ignition switch to the "ON" position.
(2) Read the combination meter-DTC.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is DTC U1109 set?

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

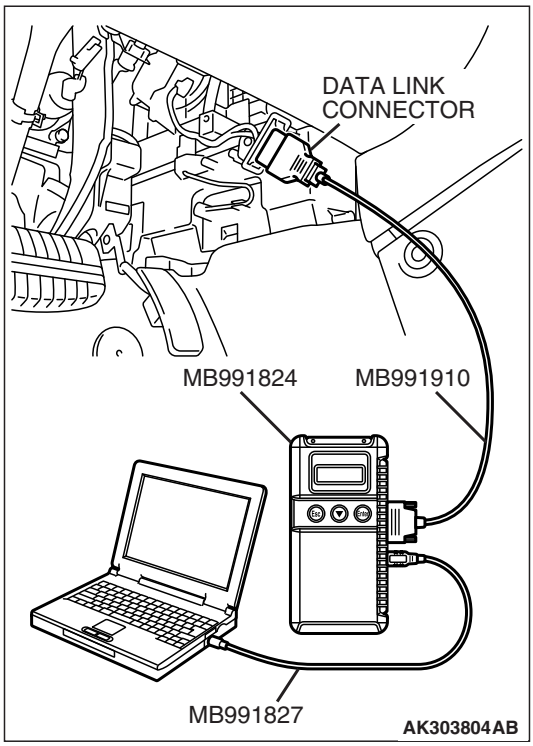


STEP 4. Using scan tool MB991958, read the diagnostic trouble code (DTC).

(1) Turn the ignition switch to the "ON" position.
(2) After the MFI-DTC has been deleted, read the MFI-DTC again.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is DTC U1109 set?

YES : Replace the ETACS-ECU. When the ETACS-ECU is replaced, register the encrypted code. Refer to GROUP 54A, Ignition Switch –Encrypted Code Registration Criteria Table P.54A-10. Then go to Step 6.
NO : It can be assumed that this malfunction is intermittent of CAN bus line between PCM and ETACS-ECU. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-14.



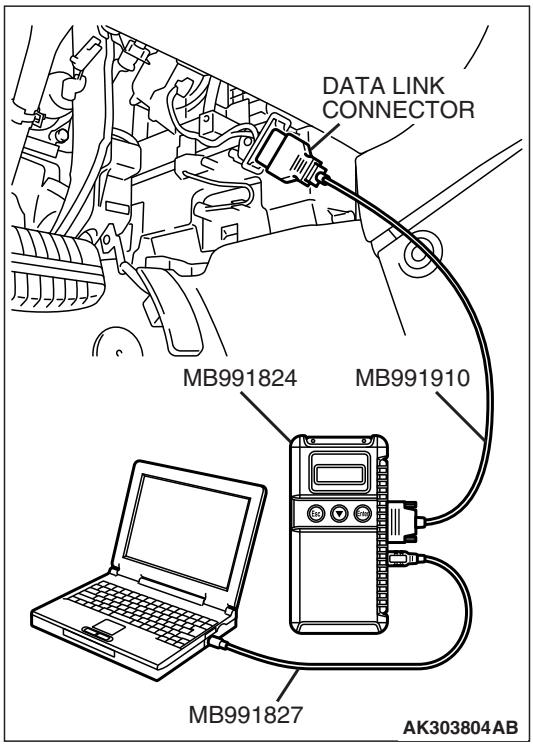
STEP 5. Using scan tool MB991958, read the diagnostic trouble code (DTC).

(1) Turn the ignition switch to the "ON" position.
(2) After the MFI-DTC has been deleted, read the MFI-DTC again.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is DTC U1109 set?

YES : Replace the PCM. When the PCM is replaced, register the encrypted code. Refer to GROUP 54A, Ignition Switch –Encrypted Code Registration Criteria Table P.54A-10. Then go to Step 6.

NO : It can be assumed that this malfunction is intermittent of CAN bus line between PCM and ETACS-ECU. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-14.



STEP 6. Using scan tool MB991958, read the diagnostic trouble code (DTC).

(1) Turn the ignition switch to the "ON" position.
(2) After the MFI-DTC has been deleted, read the MFI-DTC again.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is DTC U1109 set?

YES : Retry the troubleshooting.
NO : The inspection is complete.

DTC U1110: A/C-ECU Time-Out

⚠ CAUTION

- **If the PCM output the DTC U1110, make sure to diagnose the CAN bus line.**
- **Before replacing the ECU, make sure that the communication circuit is operating normally.**

NOTE: When the diagnosis codes relating to the CAN communication error are output, make sure of the vehicle equipment. When the vehicle is not equipped with the system the PCM communicates to, the diagnosis code is always output. This is not abnormal.

DTC SET CONDITIONS

Check Conditions

- Battery positive voltage is 10 volts or higher.
- Engine is not cranked, or at least 3 seconds or more have passed since engine was cranked.

Judgement Criterion

- Unable to receive A/C-ECU signals through the CAN bus line.

COMMENT

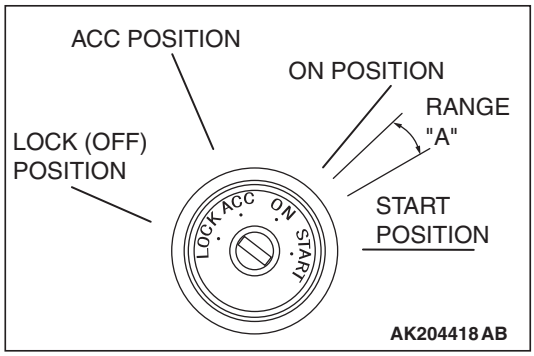
Current Trouble

- Some of the possible causes are a harness or connector damage between the PCM and the A/C-ECU on the CAN bus line, a failure in the A/C-ECU power supply system, a failure in the A/C-ECU, or a failure in the PCM.

Past Trouble

- Proceed to troubleshoot based on a harness or connector damage on the CAN bus line between the PCM and A/C-ECU, and a failure in the A/C power supply system. Refer to "How to cope with past trouble" (Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Treat Past Trouble P.00-16).

⚠ CAUTION



When the ignition key is maintained within the range "A" (i.e., the ignition switch IG2 is in OFF position but the cranking does not start) for more than 1 second, PCM stores DTC U1110 (the past trouble).

NOTE: If a malfunction occurred in the past, a failure cannot be discovered through the MB991958 CAN bus diagnosis even if there might be a problem with the CAN bus. In this case, refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-14. Furthermore, it is possible to narrow down the areas of the possible failures from the DTCs that are output by the ECUs, which are communicating on the CAN bus (Refer to GROUP 54C, Explanation about The Scan Tool (M.U.T.-III) CAN Bus Diagnostics P.54C-6).

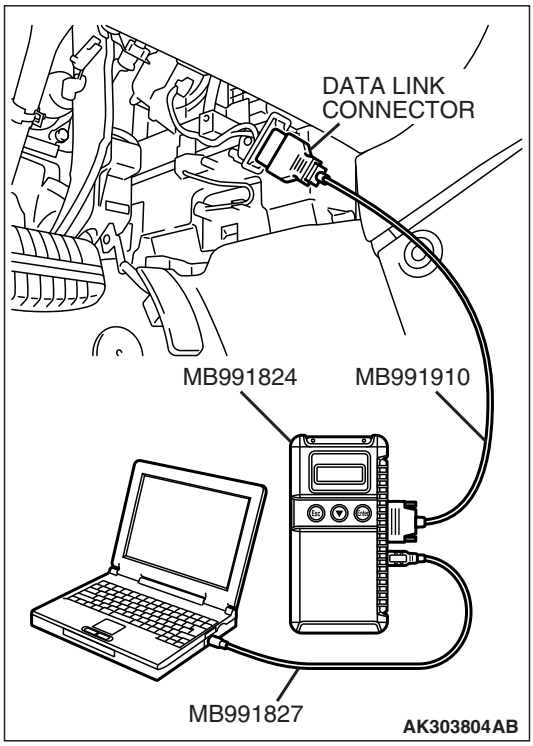
TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)

- CAN line harness damage or connector damage.
- A/C-ECU failed.
- PCM failed.

DIAGNOSIS

Required Special Tools:

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



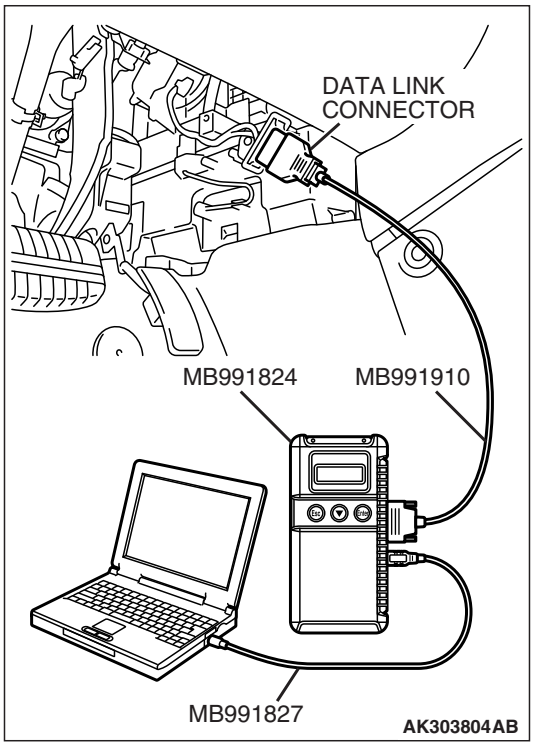
STEP 1. Using scan tool MB991958, diagnose CAN bus line.

⚠ 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) Diagnose CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line normal?

YES : Go to Step 2.
NO : Repair the CAN bus line. Refer to GROUP 54C, Diagnosis –Can Bus Diagnostics Table P.54C-13. Then go to Step 6.

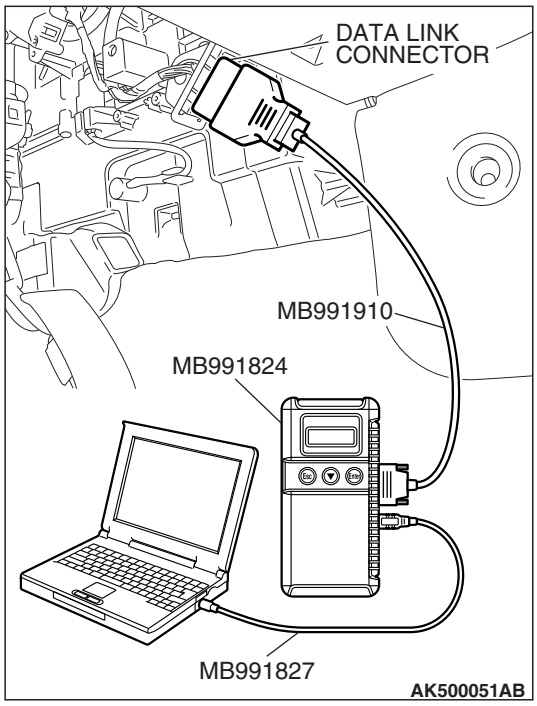


STEP 2. Using scan tool MB991958, read the diagnostic trouble code (DTC).

(1) Turn the ignition switch to the "ON" position.
(2) Read the A/C-DTC.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the A/C-DTC set?

YES : Refer to GROUP 55B, Automatic A/C Diagnosis – Diagnostic Trouble Code Chart P.55B-8.
NO : Go to Step 3.

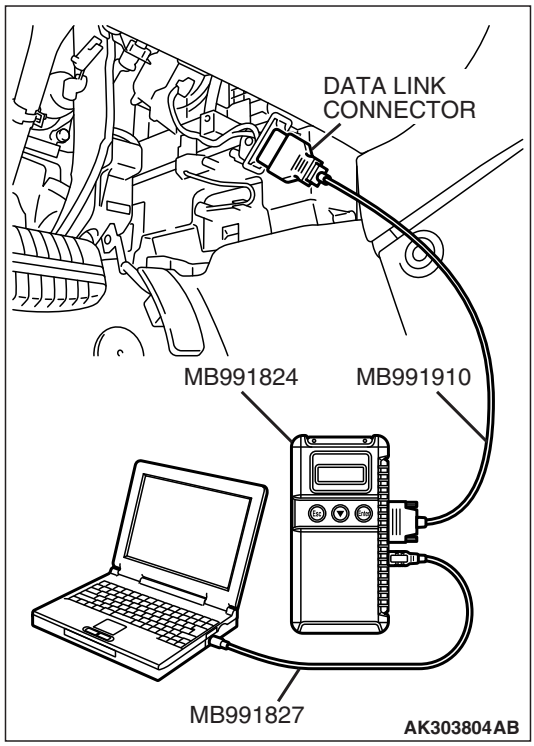


STEP 3. Using scan tool MB991958, read the diagnostic trouble code (DTC).

(1) Turn the ignition switch to the "ON" position.
(2) Read the ETACS-DTC.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is DTC 013 set?

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

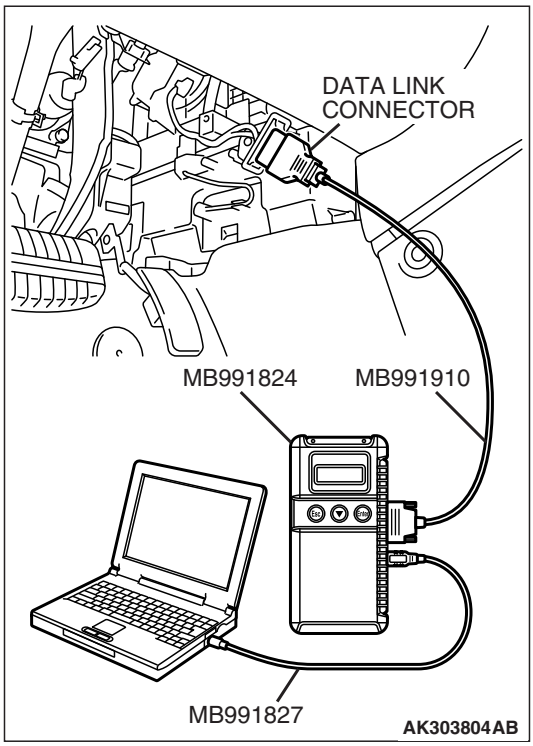


STEP 4. Using scan tool MB991958, read the diagnostic trouble code (DTC).

(1) Turn the ignition switch to the "ON" position.
(2) After the MFI-DTC has been deleted, read the MFI-DTC again.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is DTC U1110 set?

YES : Replace the A/C-ECU. Then go to Step 6.
NO : It can be assumed that this malfunction is intermittent of CAN bus line between PCM and A/C-ECU. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-14.



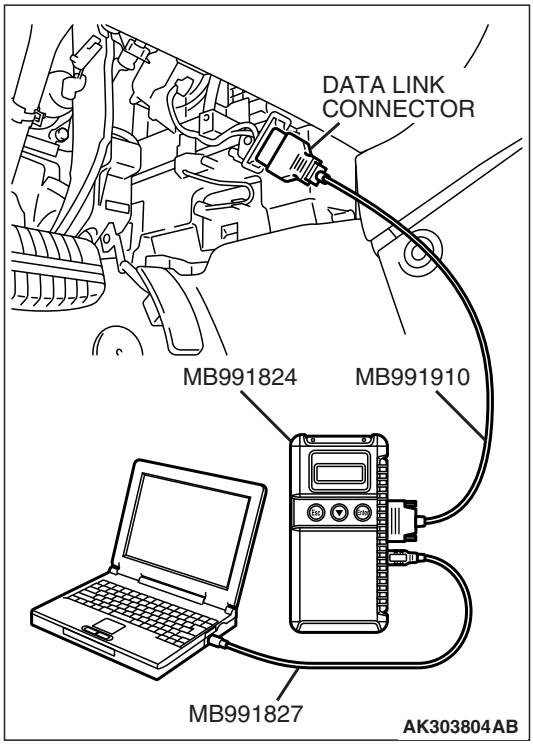
STEP 5. Using scan tool MB991958, read the diagnostic trouble code (DTC).

(1) Turn the ignition switch to the "ON" position.
(2) After the MFI-DTC has been deleted, read the MFI-DTC again.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is DTC U1110 set?

YES : Replace the PCM. When the PCM is replaced, register the encrypted code. Refer to GROUP 54A, Ignition Switch –Encrypted Code Registration Criteria Table P.54A-10. Then go to Step 6.

NO : It can be assumed that this malfunction is intermittent of CAN bus line between PCM and A/C-ECU. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-14.



STEP 6. Using scan tool MB991958, read the diagnostic trouble code (DTC).

(1) Turn the ignition switch to the "ON" position.
(2) After the MFI-DTC has been deleted, read the MFI-DTC again.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is DTC U1110 set?

YES : Retry the troubleshooting.
NO : The inspection is complete.

DTC U1117: Immobilizer-ECU Time-Out

⚠ CAUTION

- **If the PCM output the DTC U1117, make sure to diagnose the CAN bus line.**
- **Before replacing the ECU, make sure that the communication circuit is operating normally.**

NOTE: When the diagnosis codes relating to the CAN communication error are output, make sure of the vehicle equipment. When the vehicle is not equipped with the system the PCM communicates to, the diagnosis code is always output. This is not abnormal.

DTC SET CONDITIONS

Check Condition

- Ignition switch is in ON position.

Judgement Criterion

- Unable to receive ETACS-ECU (immobilizer-ECU) signals through the CAN bus line.

COMMENT

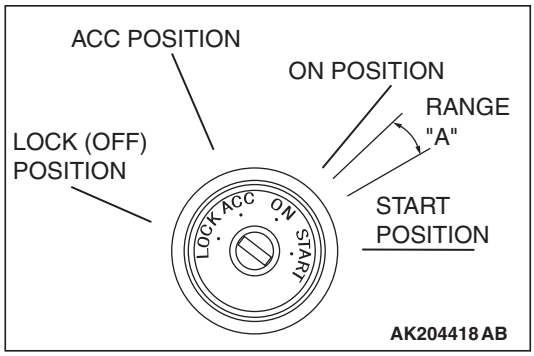
Current Trouble

- Some of the possible causes are a harness or connector damage between the PCM and the ETACS-ECU (immobilizer-ECU) on the CAN bus line, a failure in the ETACS-ECU (immobilizer-ECU) power supply system, a failure in the ETACS-ECU (immobilizer-ECU), or a failure in the PCM.

Past Trouble

- Proceed to troubleshoot based on a harness or connector damage on the CAN bus line between the PCM and ETACS-ECU (immobilizer-ECU), and a failure in the ETACS-ECU (immobilizer-ECU) power supply system. Refer to "How to cope with past trouble" (Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Treat Past Trouble P.00-16).

⚠ CAUTION



When the ignition key is maintained within the range "A" (i.e., the ignition switch IG2 is in OFF position but the cranking does not start) for more than 1 second, PCM stores DTC U1117 (the past trouble).

NOTE: If a malfunction occurred in the past, a failure cannot be discovered through the MB991958 CAN bus diagnosis even if there might be a problem with the CAN bus. In this case, refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-14. Furthermore, it is possible to narrow down the areas of the possible failures from the DTCs that are output by the ECUs, which are communicating on the CAN bus (Refer to GROUP 54C, Explanation about The Scan Tool (M.U.T.-III) CAN Bus Diagnostics P.54C-6).

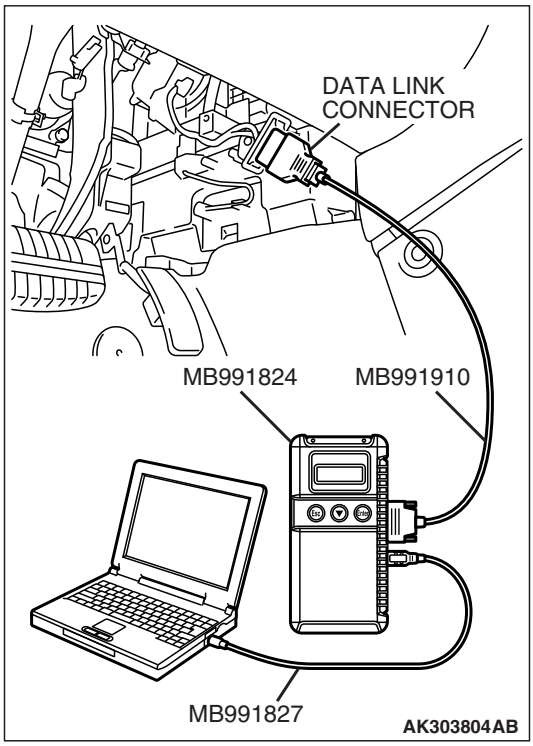
TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)

- CAN line harness damage or connector damage.
- ETACS-ECU (immobilizer-ECU) failed.
- PCM failed.

DIAGNOSIS

Required Special Tools:

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



STEP 1. Using scan tool MB991958, diagnose CAN bus line.

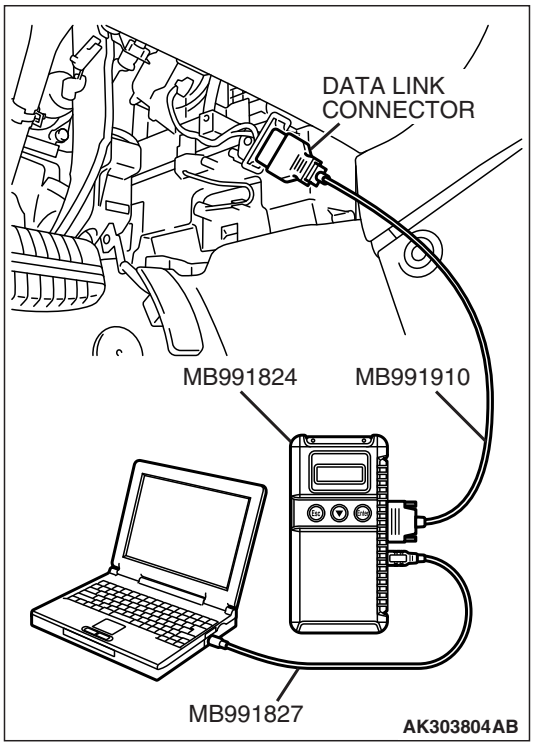
⚠ CAUTION

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) Diagnose CAN bus line.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line normal?

YES : Go to Step 2.
NO : Repair the CAN bus line. Refer to GROUP 54C, Diagnosis –Can Bus Diagnostics Table P.54C-13. Then go to Step 4.

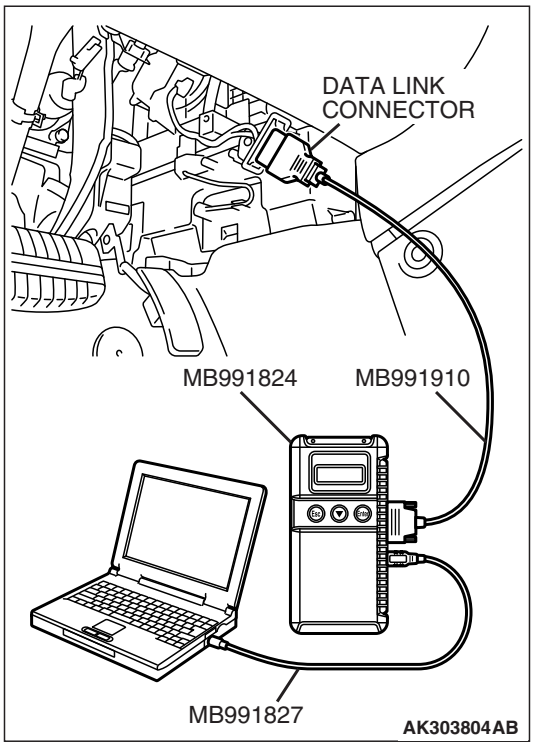


STEP 2. Using scan tool MB991958, read the diagnostic trouble code (DTC).

(1) Turn the ignition switch to the "ON" position.
(2) Read the immobilizer-DTC.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the immobilizer-DTC set?

YES : Refer to GROUP 54A, Ignition Switch –Diagnostic Trouble Code Chart P.54A-15.
NO : Go to Step 3.



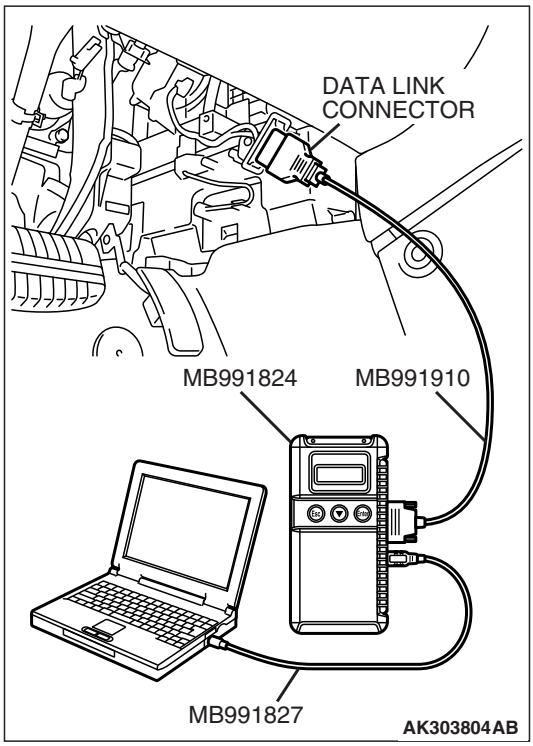
STEP 3. Using scan tool MB991958, read the diagnostic trouble code (DTC).

(1) Turn the ignition switch to the "ON" position.
(2) After the MFI-DTC has been deleted, read the MFI-DTC again.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is DTC U1117 set?

YES : Replace the PCM. When the PCM is replaced, register the encrypted code. Refer to GROUP 54A, Ignition Switch –Encrypted Code Registration Criteria Table P.54A-10. Then go to Step 4.

NO : It can be assumed that this malfunction is intermittent of CAN bus line between PCM and ETACS-ECU (immobilizer-ECU). Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-14.



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

(1) Turn the ignition switch to the "ON" position.
(2) After the MFI-DTC has been deleted, read the MFI-DTC again.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is DTC U1117 set?

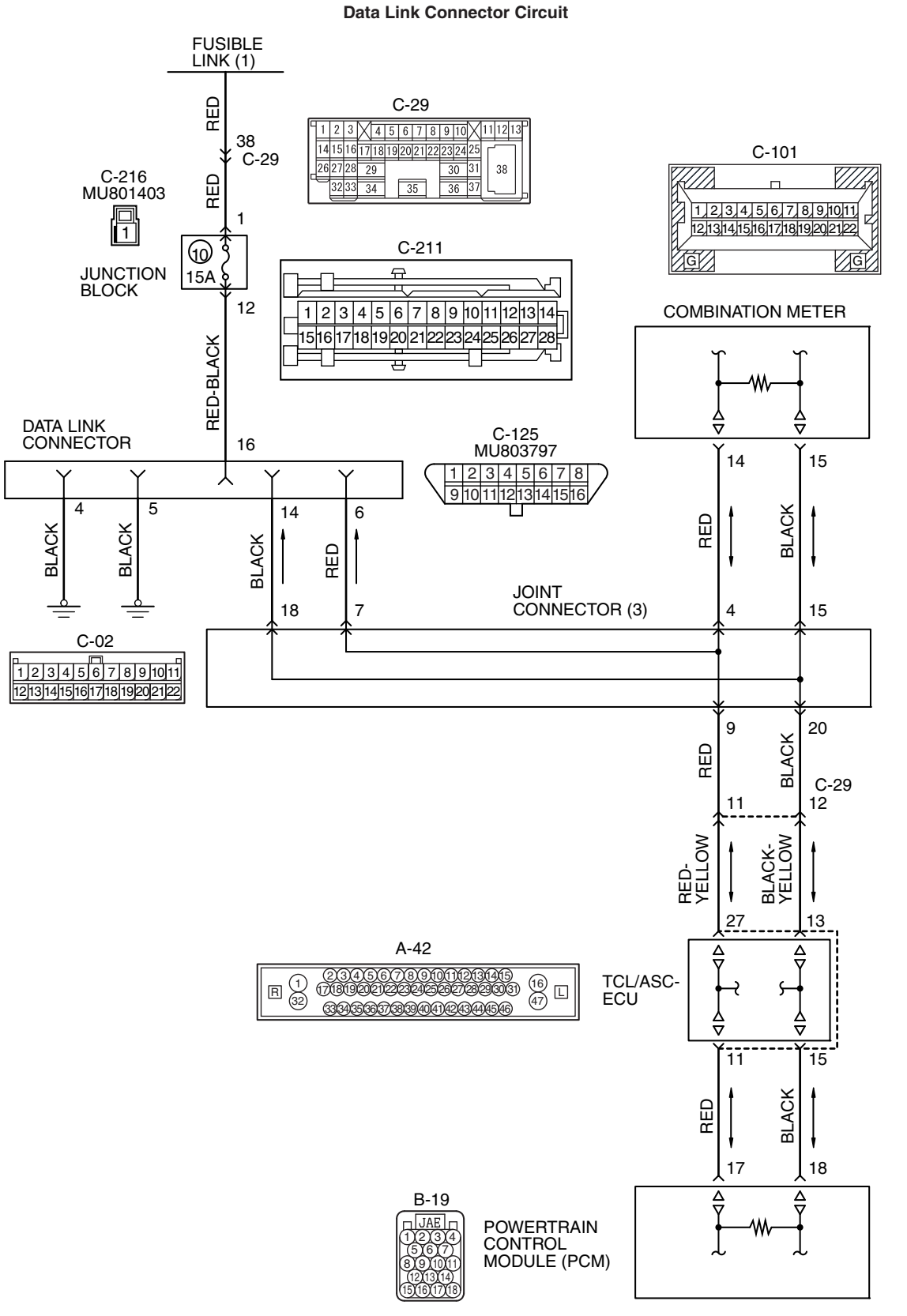
YES : Retry the troubleshooting.

NO : The inspection is complete.

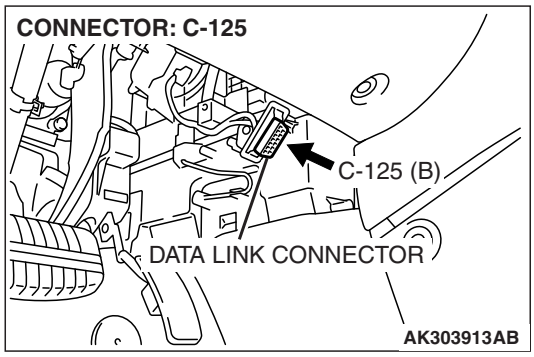
TSB Revision

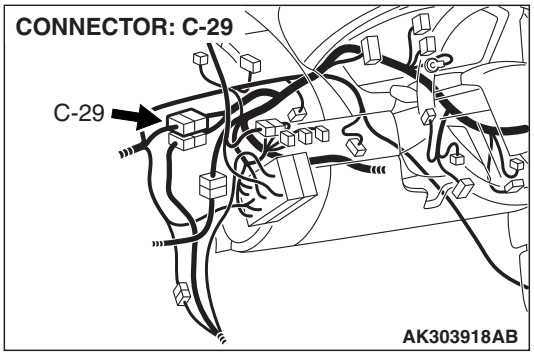
SYMPTOM PROCEDURES

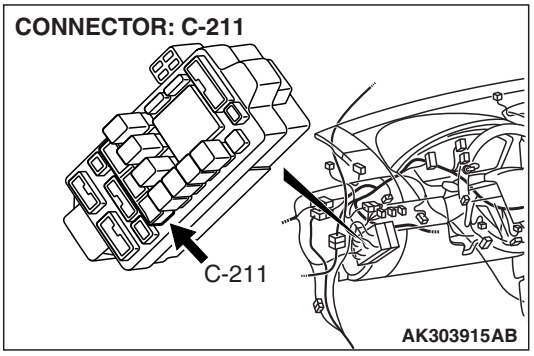
INSPECTION PROCEDURE 1: Communication with PCM Only Is Not Possible

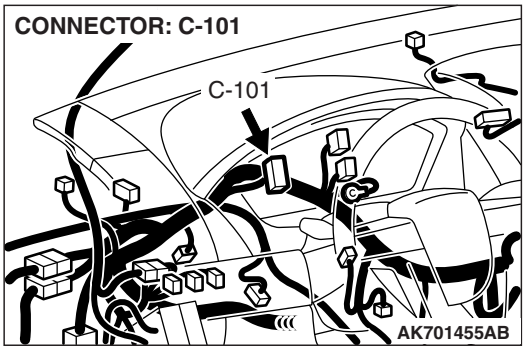


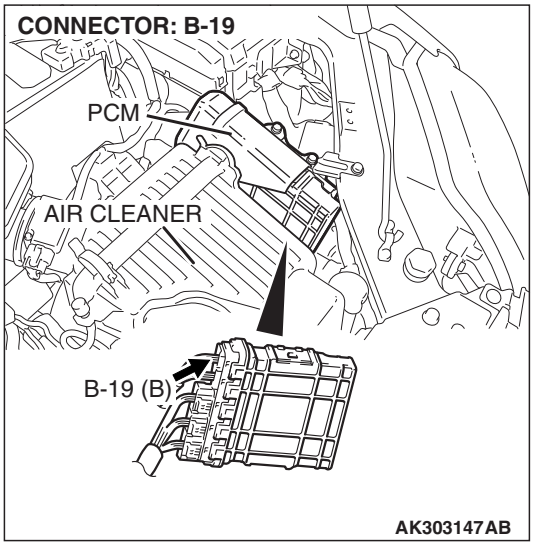
TSB Revision

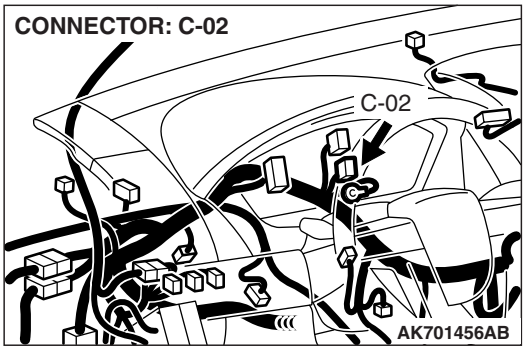


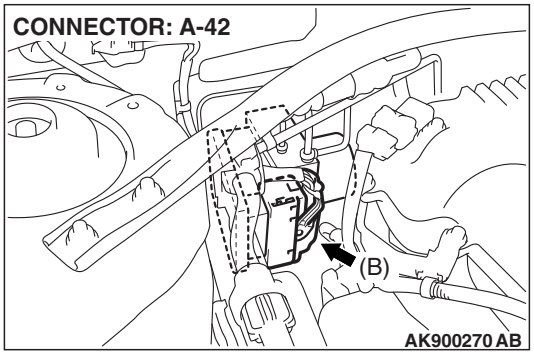


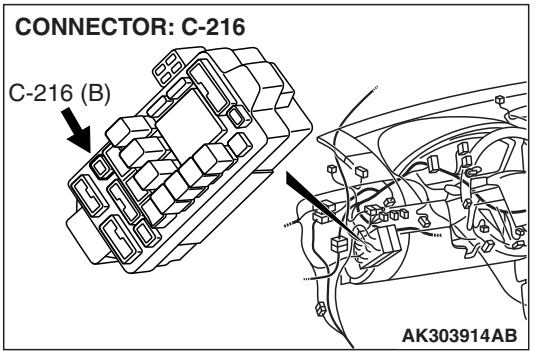












CIRCUIT OPERATION

- Battery voltage is applied to the diagnosis connector (terminal No. 16).
- The diagnosis connector (terminal No. 4 and No. 5) is grounded to the vehicle body.

TSB Revision

COMMENT

- When the communication between scan tool MB991958 and PCM is impossible, it can be suspected that the CAN bus line, power supply circuit of the diagnosis connector, and/or grounding circuit are defective.
- Communication can not be achieved either, if a wrong vehicle type is selected on M.U.T.-III.

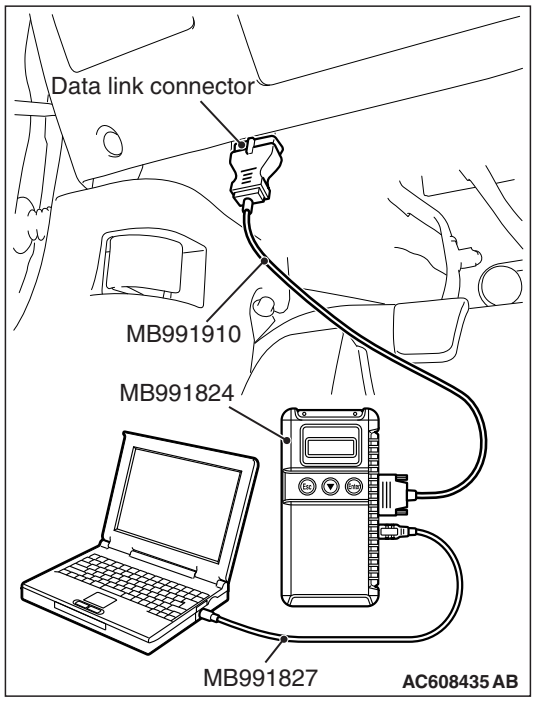
TROUBLESHOOTING HINTS (The most likely causes for this case:)

- Malfunction of the data link connector.
- Open/short circuit or poor contact in the data link connector.
- Malfunction of the CAN communication.
- Malfunction of the scan tool.
- Malfunction of the PCM.

DIAGNOSIS

Required Special Tools:

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



STEP 1. Check the vehicle communication interface (V.C.I.) MB991824 operations.

⚠ 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) When the power of V.C.I. is turned to ON, the indicator lamp of the V.C.I. illuminates in green.
  - The indicator lamp of the V.C.I. illuminates in green.

Q: Is the indicator lamp of the V.C.I. illuminates in green?

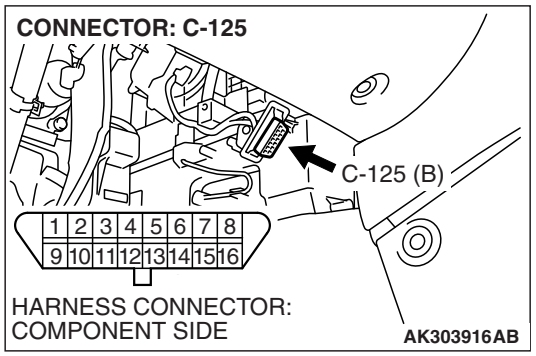
YES : Go to Step 2.
NO : Use scan tool, perform CAN bus line diagnosis.

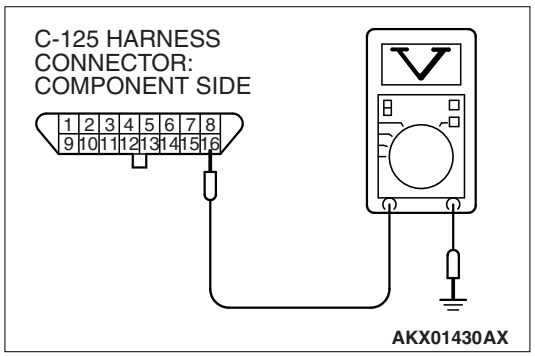
STEP 2. Measure the battery positive voltage.

(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 3.
NO : Check the battery. Refer to GROUP 54A, Battery – On-vehicle Service –Battery Check P.54A-5. Then confirm that the malfunction symptom is eliminated.





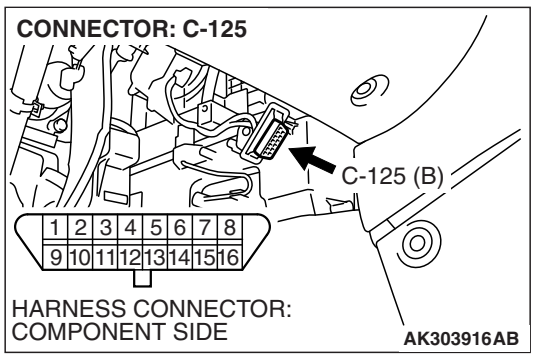
STEP 3. Measure the power supply voltage at data link connector C-125.

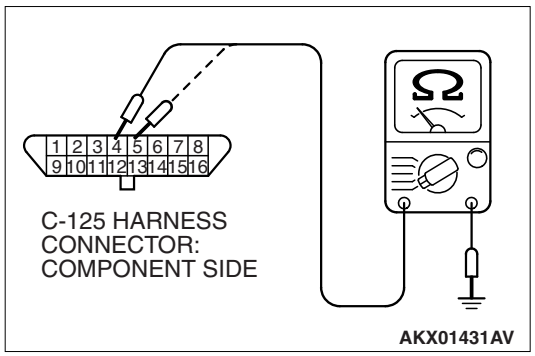
(1) Measure voltage between terminal No. 16 and ground.
- Voltage should be battery positive voltage.

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

YES : Go to Step 4.

NO : Check harness connectors C-211, C-216 and C-29 at intermediate connector for damage, and repair or replace as required. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. If intermediate connectors, C-211, C-216 and C-29 are in good condition, repair an open circuit between battery and data link connector C-125 (terminal No. 16). Then confirm that the malfunction symptom is eliminated.





STEP 4. Check the continuity at data link connector C-125.

(1) Check for the continuity between terminal No. 4, No. 5 and ground.
- Continuity (2 Ω or less).

Q: Does continuity exist?

YES : Check and 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: 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.

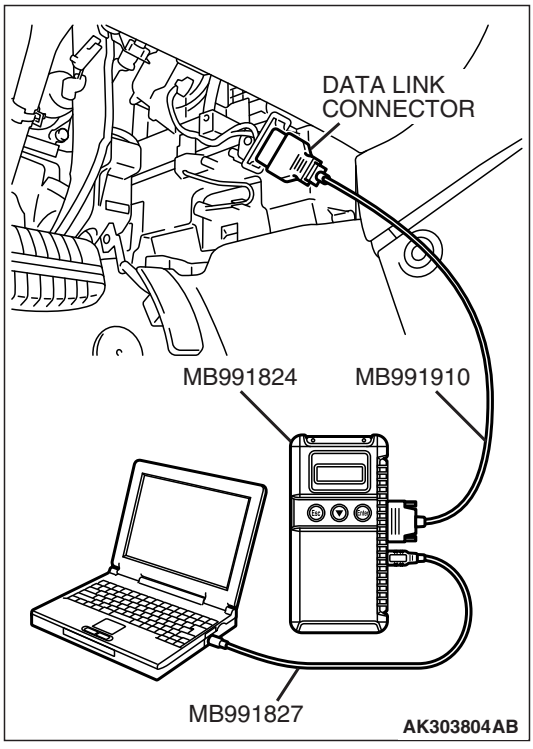
TROUBLESHOOTING HINTS (The most likely causes for this case:)

- 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 (M.U.T.-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991910: Main Harness A



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

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

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

Q: Is DTC set?

YES : Refer to Diagnostic Trouble Code Chart P.13A-46.
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 3: The Malfunction Indicator Lamp (SERVICE ENGINE SOON or Check Engine Lamp) Remains Illuminated and Never Goes Out.

COMMENT

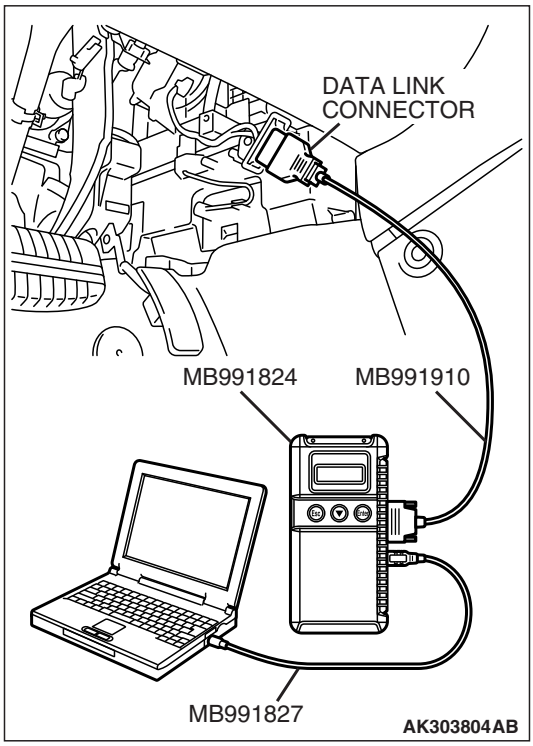
- In cases such as the above, the cause is probably that the PCM is detecting a problem in a sensor or actuator, or that one of the malfunctions listed at next has probably occurred.

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

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

DIAGNOSIS

Required Special Tools:
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991910: Main Harness A



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

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

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

Q: Is DTC set?

YES : Refer to Diagnostic Trouble Code Chart P.13A-46.
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 4: Cranks, Won't Start

CRANKS, WON'T START CIRCUIT

- Refer to Ignition circuit System P.13A-1159.

CIRCUIT OPERATION

- Refer to Ignition circuit System P.13A-1159.

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 PCM.
- Contaminated fuel.

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-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 should remain greater than 8 volts while the engine is cranked.

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

YES : Go to Step 2.

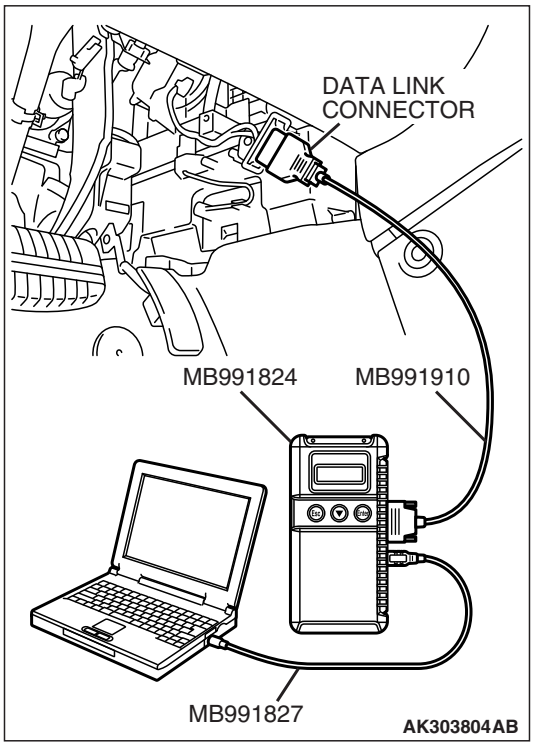
NO : Check the battery. Refer to GROUP 54A, Battery – On-vehicle Service –Battery check P.54A-5. Then confirm that the malfunction symptom is eliminated.

STEP 2. Check the timing belt for breaks.

Q: Is the timing belt good condition?

YES : Go to Step 3.

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



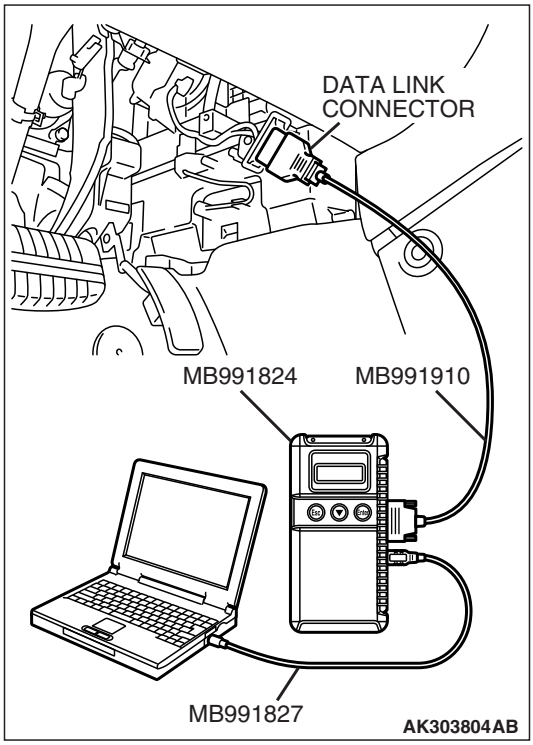
STEP 3. Using scan tool MB991958, read the diagnostic trouble code (DTC).

⚠ 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 the DTC set?

YES : Refer to Diagnostic Trouble Code Chart P.13A-46.
NO : Go to Step 4.

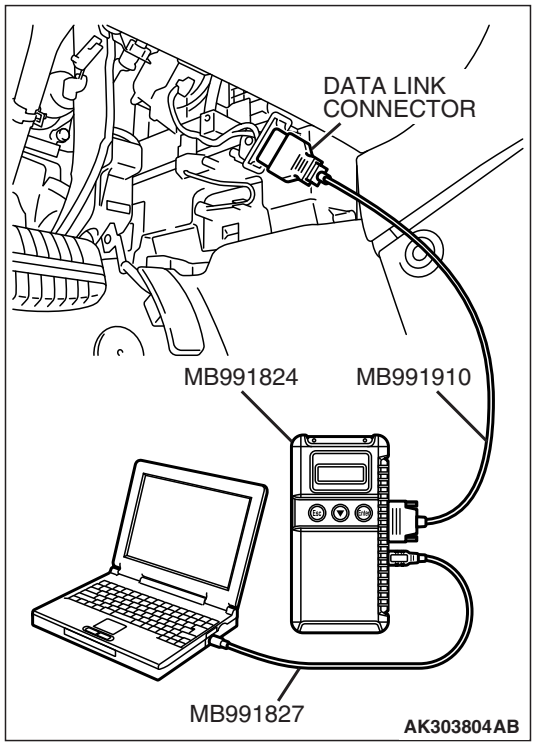


STEP 4. Using scan tool MB991958, check data list.

(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.13A-1169.
   a. Item 1: Power Supply Voltage
   b. Item 2: Crankshaft Position Sensor
   c. Item 6: Engine Coolant Temperature Sensor
(3) 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.

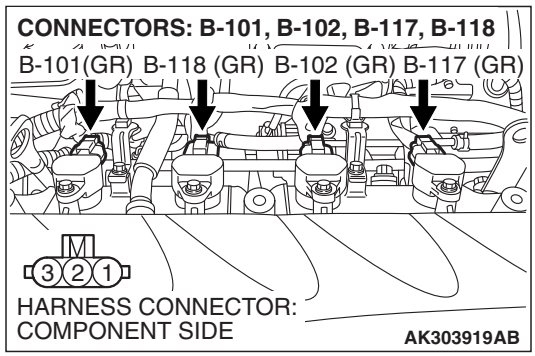


STEP 5. Using scan tool MB991958, check actuator test.

(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.13A-1191.
   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 to terminal No. 1 of the ignition coil connector B-101, B-102, B-117 or B-118 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 30 –Ignition Circuit System P.13A-1159.

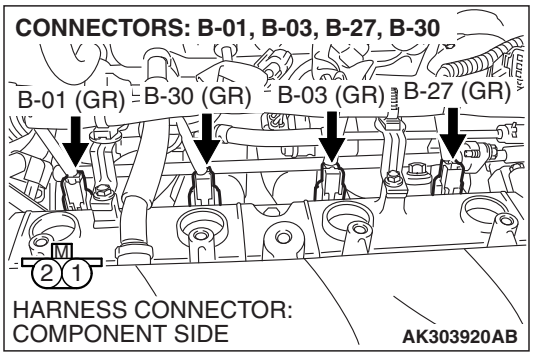
STEP 7. Check the ignition timing.

(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.

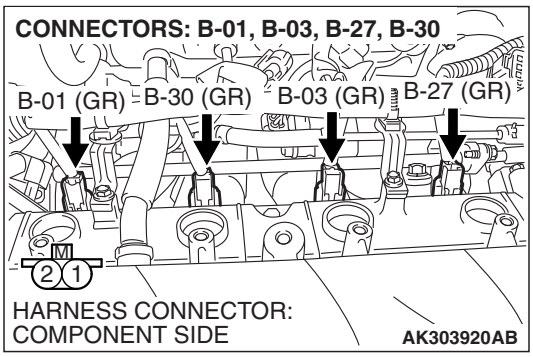


STEP 8. Check harness connector B-01, B-03, B-27 or B-30 at injector for damage.

Q: Is the harness connector in good condition?

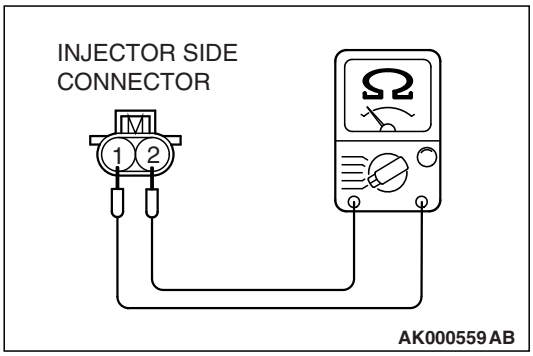
YES : Go to Step 9.

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



STEP 9. Check the injector.

(1) Disconnect the injector connector B-01, B-03, B-27 and B-30.



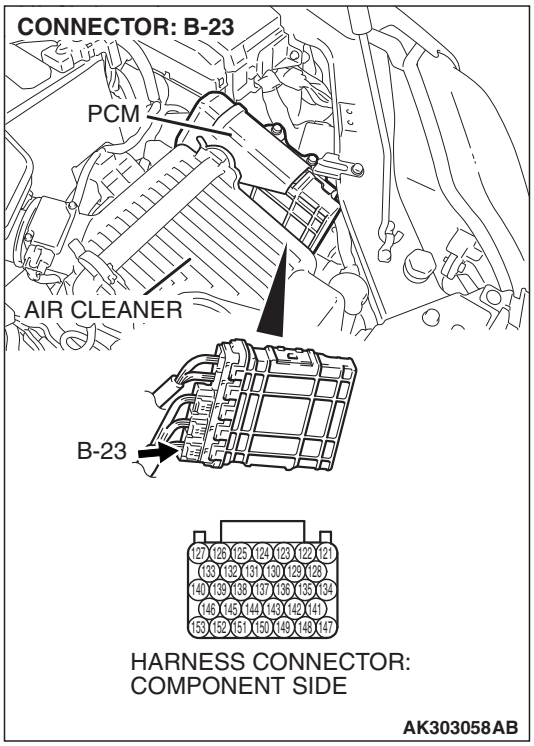
(2) Measure the resistance between each injector side connector terminal No. 1 and No. 2.

Standard value: 10.5 –13.5 Ω [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 : Repair the injector. Then confirm that the malfunction symptom is eliminated.

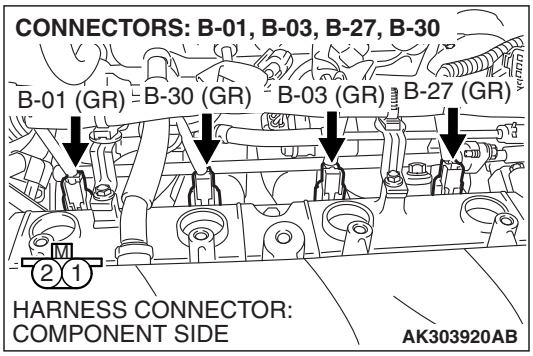


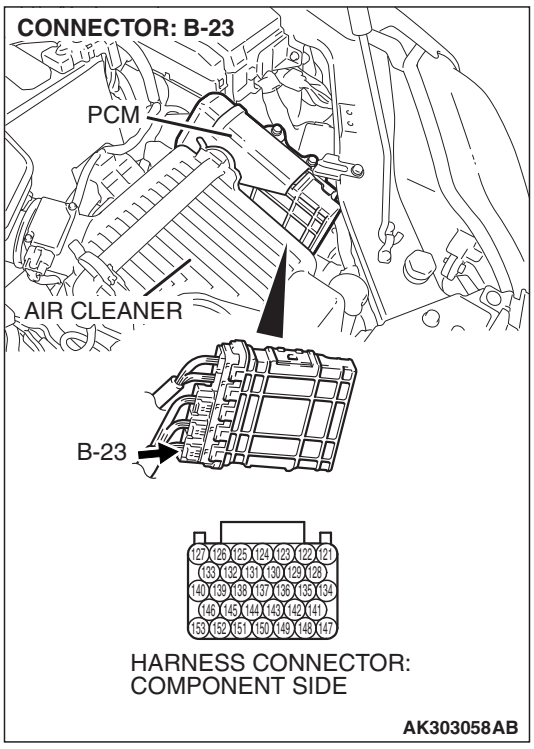
STEP 10. Check harness connector B-23 at PCM for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 11.

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 for harness damage between injector connector and PCM connector.

a. Check the harness wire between injector connector B-01 (terminal No. 2) and PCM connector B-23 (terminal No. 153) at No. 1 cylinder.
b. Check the harness wire between injector connector B-30 (terminal No. 2) and PCM connector B-23 (terminal No. 146) at No. 2 cylinder.
c. Check the harness wire between injector connector B-03 (terminal No. 2) and PCM connector B-23 (terminal No. 140) at No. 3 cylinder.
d. Check the harness wire between injector connector B-27 (terminal No. 2) and PCM connector B-23 (terminal No. 139) at No. 4 cylinder.

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 5: 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 PCM.

DIAGNOSIS

Required Special Tools:

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

STEP 1. Check the fuse number 24 (relay box).

Check the fuse number 24

Q: Is the fuse number 23 (relay box) normal?

YES : Go to Step 2.
NO : Replace the fuse number 24 (relay box).

STEP 2. Measure the battery positive voltage.

(1) Measure the battery positive voltage during cranking.
- The voltage should remain greater than 8 volts while the engine is cranked.

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 –On-vehicle Service – Battery check P.54A-5.

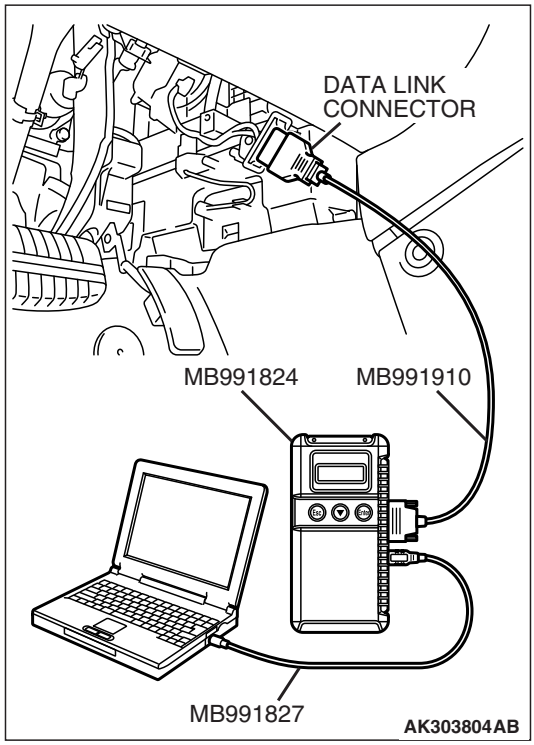
STEP 3. Using scan tool MB991958, read the diagnostic trouble code (DTC).

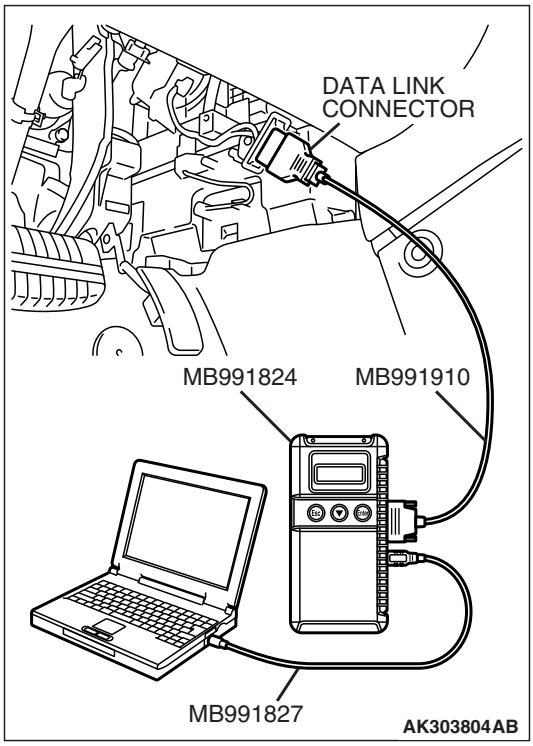
⚠ CAUTION
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(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 the DTC set?

YES : Refer to Diagnostic Trouble Code Chart P.13A-46.
NO : Go to Step 4.



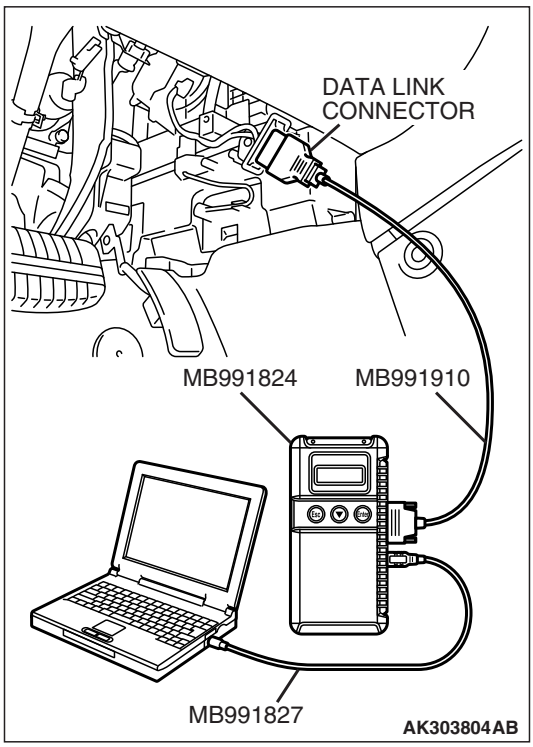


STEP 4. Using scan tool MB991958, check actuator test.

(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.13A-1191.
   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.13A-1169.
   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.13A-1217.

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.

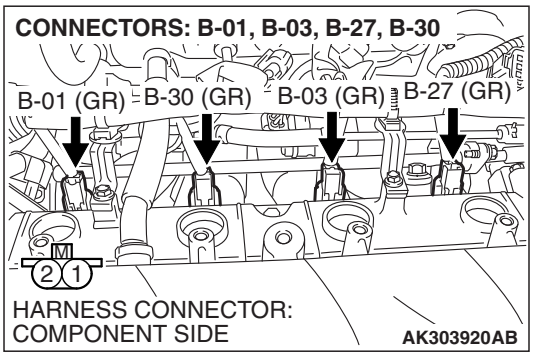
NO : Check that the crankshaft position sensor and timing belt cover are in the correct position. Then confirm that the malfunction symptom is eliminated.

STEP 8. Check harness connector B-01, B-03, B-27 or B-30 at injector for damage.

Q: Is the harness connector in good condition?

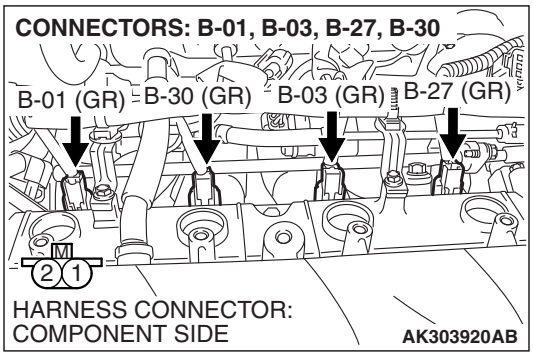
YES : Go to Step 9.

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



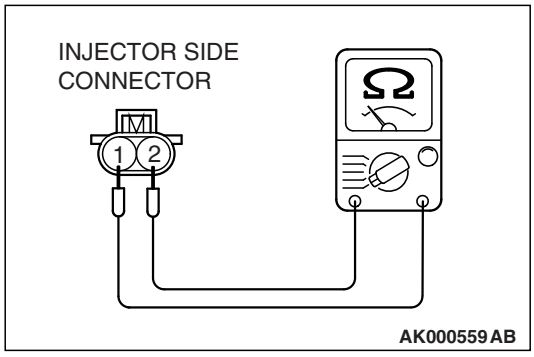
STEP 9. Check the injector.

(1) Disconnect the injector connector B-01, B-03, B-27 and B-30.



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

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

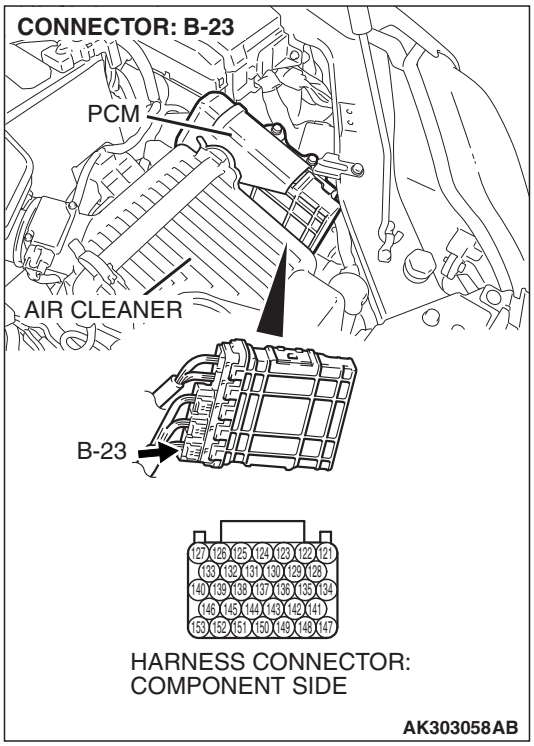


Q: Is the measured resistance between 10.5 and 13.5 ohms [at 20° C (68° F)]?

YES : Go to Step 10.

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

TSB Revision

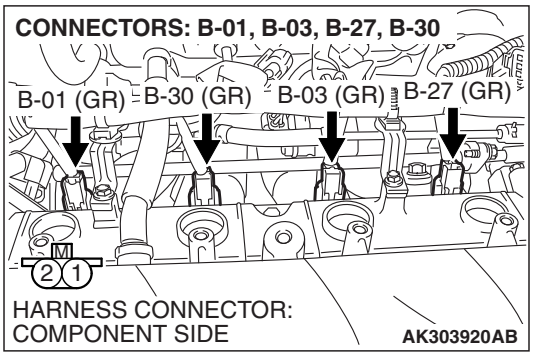


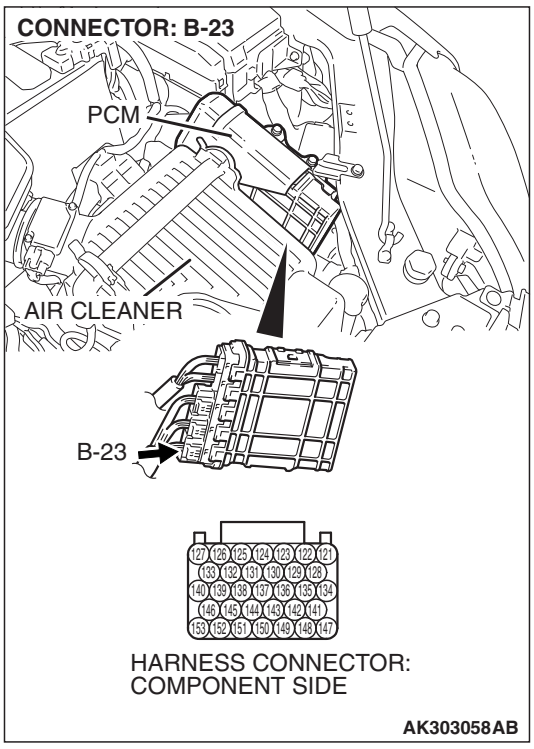
STEP 10. Check harness connector B-23 at PCM for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 11.

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 for harness damage between injector connector and PCM connector.

a. Check the harness wire between injector connector B-01 (terminal No. 2) and PCM connector B-23 (terminal No. 153) at No. 1 cylinder.
b. Check the harness wire between injector connector B-30 (terminal No. 2) and PCM connector B-23 (terminal No. 146) at No. 2 cylinder.
c. Check the harness wire between injector connector B-03 (terminal No. 2) and PCM connector B-23 (terminal No. 140) at No. 3 cylinder.
d. Check the harness wire between injector connector B-27 (terminal No. 2) and PCM connector B-23 (terminal No. 139) at No. 4 cylinder.

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.

Then confirm that the malfunction symptom is eliminated.

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

INSPECTION PROCEDURE 6: 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.

DIAGNOSIS

Required Special Tools:

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

TSB Revision

STEP 1. Measure the battery positive voltage.

(1) Measure the battery positive voltage during cranking.
- The voltage should remain greater than 8 volts while the engine is cranked.

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 –On-vehicle Service – Battery check P.54A-5.

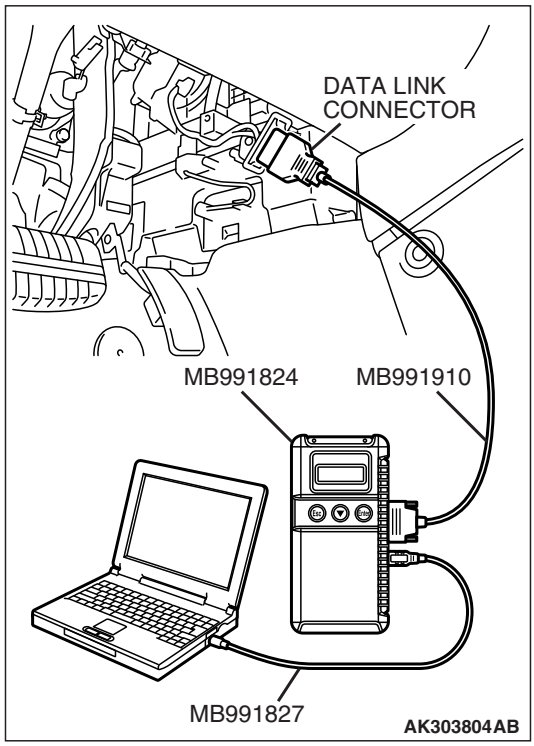
STEP 2. Using scan tool MB991958, read the diagnostic trouble code (DTC).

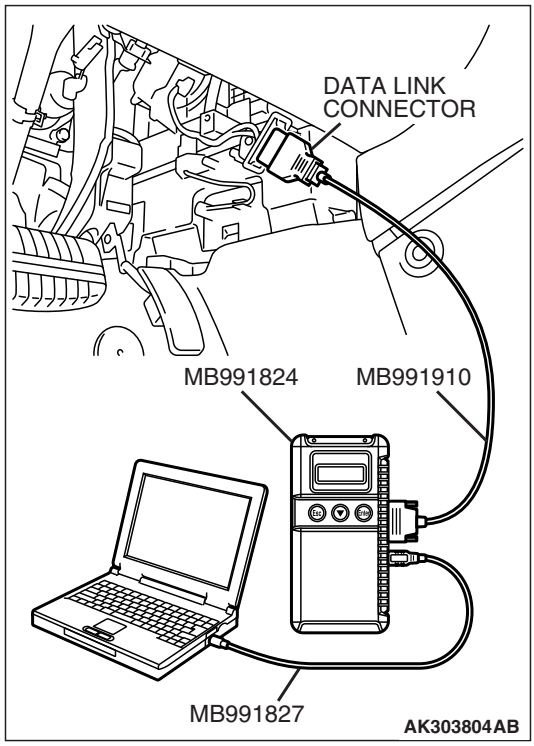
⚠ CAUTION
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(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 to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Refer to Diagnostic Trouble Code Chart P.13A-46.
NO : Go to Step 3.



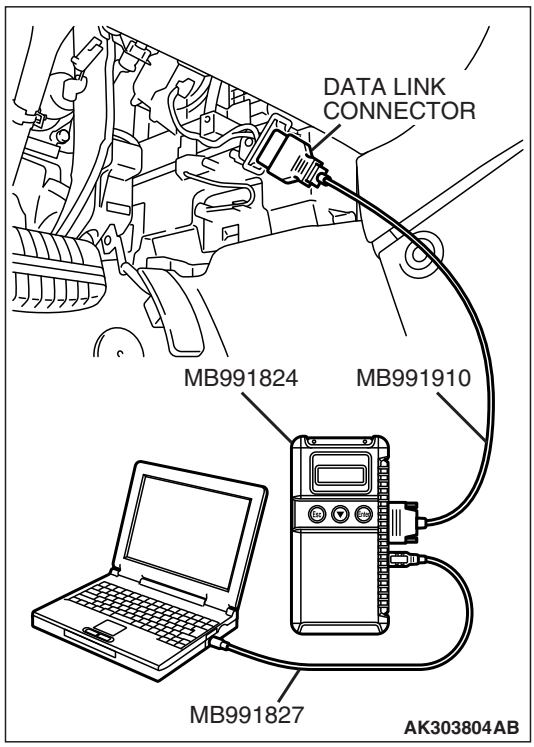


STEP 3. Using scan tool MB991958, check actuator test.

(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.13A-1191.
   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 it. Then confirm that the malfunction symptom is eliminated.



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

(1) Turn the ignition switch to the "ON" position.
(2) Check the following item in the data list. Refer to Data List Reference Table P.13A-1169.
   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 5.
NO : Repair or Replace it. Then confirm that the malfunction symptom is eliminated.

STEP 5. Check the ignition timing.

(1) Check the ignition timing at cranking.

Standard value: 5° BTDC ±3°

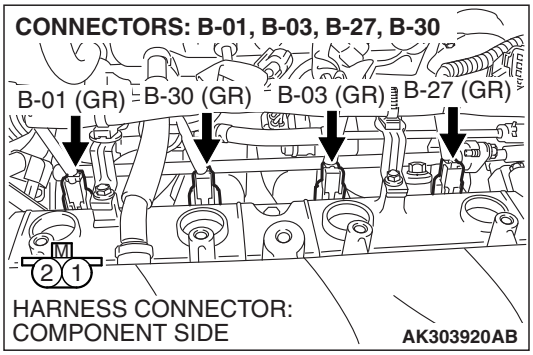
Q: Is the ignition timing normal?

YES : Go to Step 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. Check harness connector B-01, B-03, B-27 or B-30 at injector for damage.

Q: Is the harness connector in good condition?

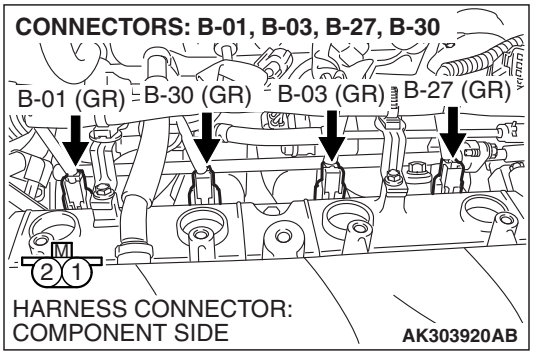


YES : Go to Step 7.

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

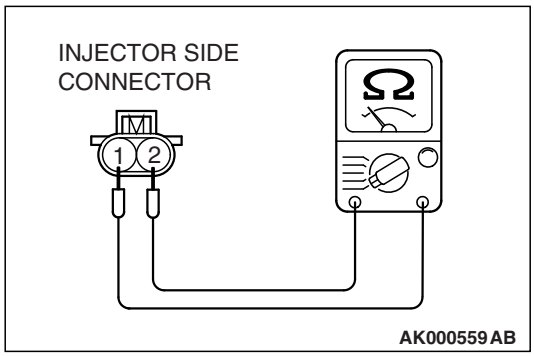
STEP 7. Check the injector.

(1) Disconnect the injector connector B-01, B-03, B-27 and B-30.



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

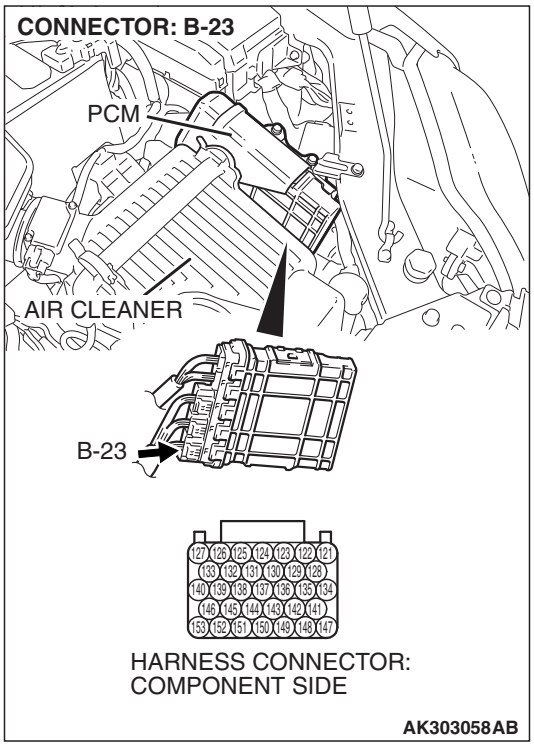
Standard value: 10.5 –13.5 Ω [at 20° C (68° F)]



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

YES : Go to Step 8.

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

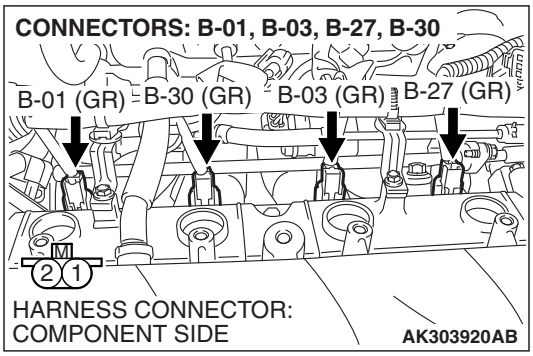


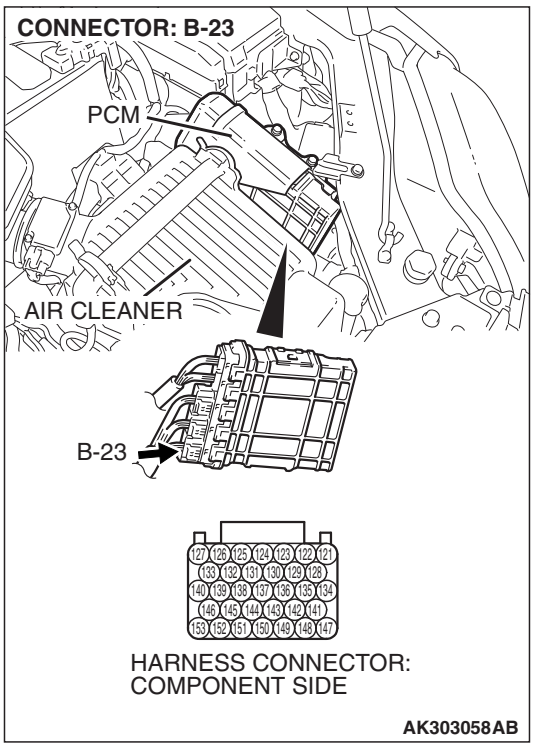
STEP 8. Check harness connector B-23 at PCM for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 9.

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





STEP 9. Check for harness damage between injector connector and PCM connector.

a. Check the harness wire between injector connector B-01 (terminal No. 2) and PCM connector B-23 (terminal No. 153) at No. 1 cylinder.
b. Check the harness wire between injector connector B-30 (terminal No. 2) and PCM connector B-23 (terminal No. 146) at No. 2 cylinder.
c. Check the harness wire between injector connector B-03 (terminal No. 2) and PCM connector B-23 (terminal No. 140) at No. 3 cylinder.
d. Check the harness wire between injector connector B-27 (terminal No. 2) and PCM connector B-23 (terminal No. 139) at No. 4 cylinder.

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 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 7: 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 (M.U.T.-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.

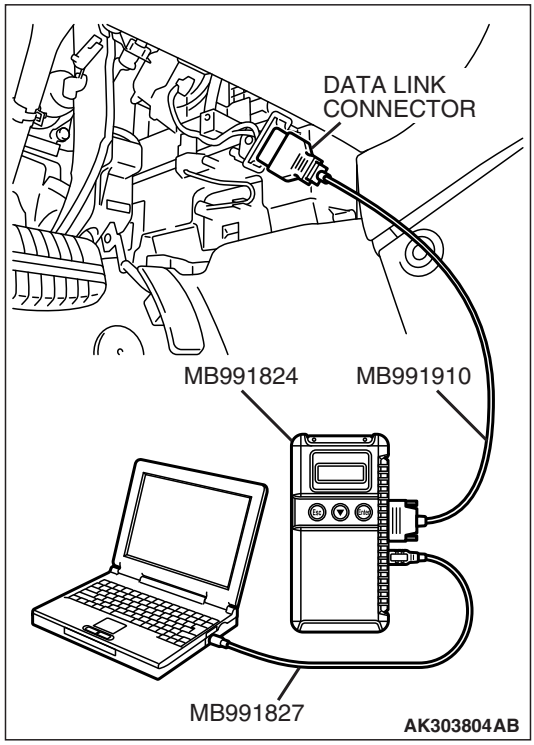
NO : Go to Step 2.

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 the DTC set?

YES : Refer to Diagnostic Trouble Code Chart P.13A-46.

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.13A-1217.

(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: Injector.

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

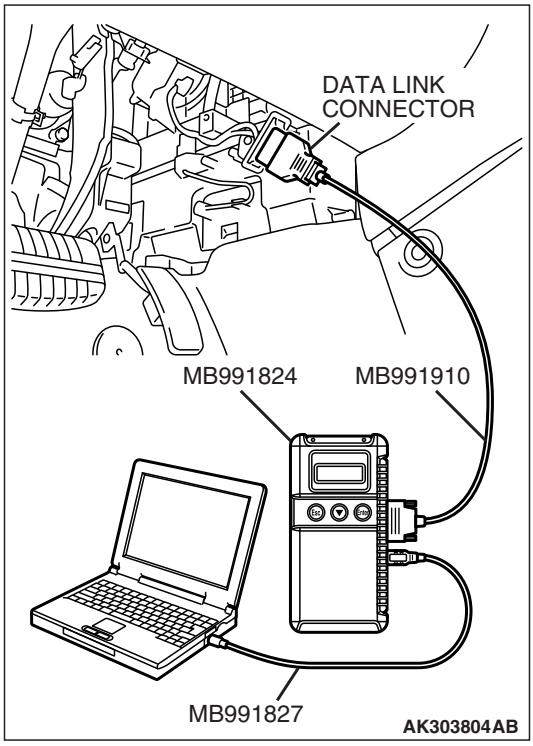
(2) Check following items in the actuator test. Refer to Actuator Test Reference Table P.13A-1191.
   a. Item 1, 2, 3, 4: Injector

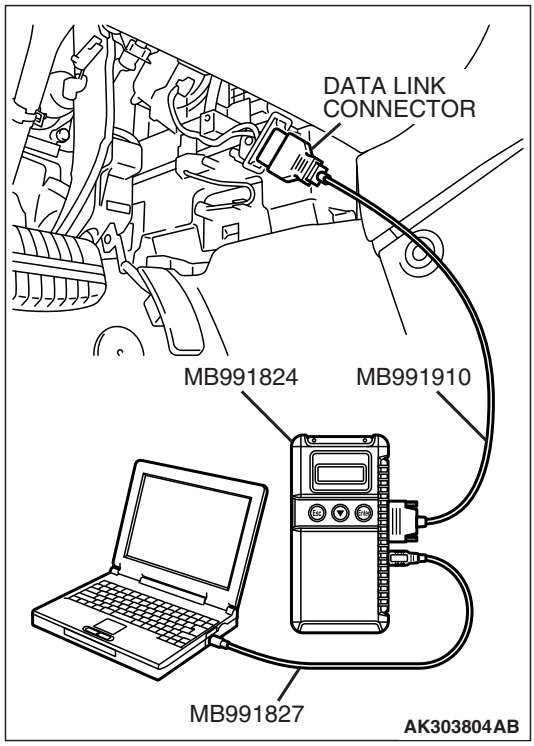
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Are they operating properly?

YES : Go to Step 6.

NO : Refer to DTC P0201 –Injector Circuit-cylinder 1 P.13A-482, DTC P0202 –Injector Circuit-cylinder 2 P.13A-492, DTC P0203 –Injector Circuit-cylinder 3 P.13A-502, DTC P0204 –Injector Circuit-cylinder 4P.13A-512.



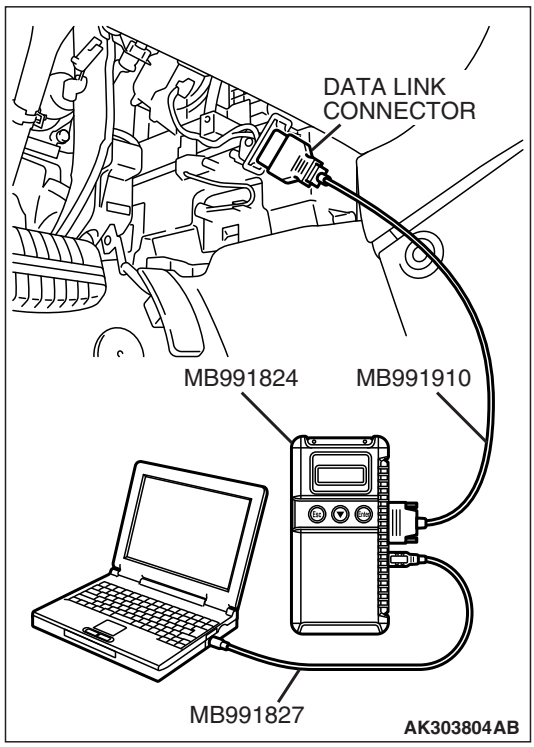


STEP 6. Using scan tool MB991958, check data list.

(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.13A-1169.
   a. Item 5: Intake Air Temperature Sensor
   b. Item 6: Engine Coolant Temperature Sensor
   c. Item 83: Power Steering Pressure Switch
   d. Item AC: Cylinder 1, 4 Heated Oxygen Sensor (front)
   e. Item AD: Cylinder 1, 4 Heated Oxygen Sensor (rear)
   f. Item AE: Cylinder 2, 3 Heated Oxygen Sensor (front)
   g. Item AF: Cylinder 2, 3 Heated Oxygen Sensor (rear)
   h. Item BB: Barometric Pressure Sensor
(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.

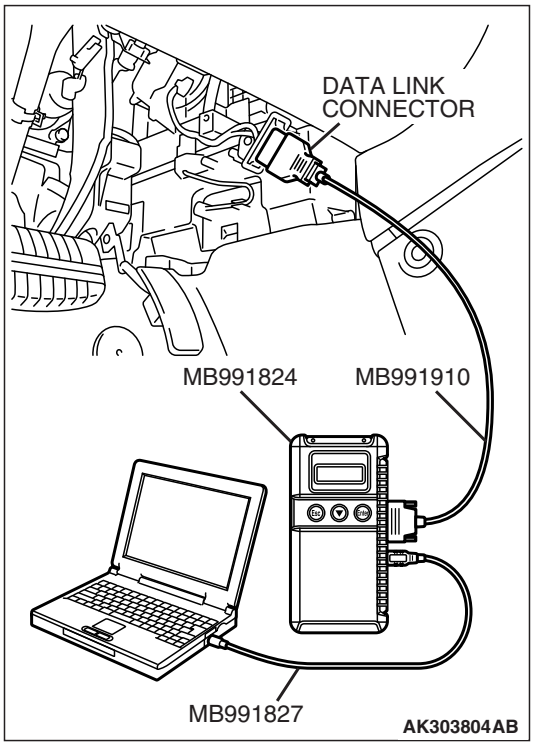


STEP 7. Using scan tool MB991958, check actuator test.

(1) Turn the ignition switch to the "ON" position.
(2) Check the following item in the actuator test. Refer to Actuator Test Reference Table P.13A-1191.
   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. Using scan tool MB991958, check data list.

(1) Turn the ignition switch to the "ON" position.
(2) Check the following items of the data list. Refer to, Data List Reference Table P.13A-1169.
   a. Item AC: Cylinder 1, 4 Heated Oxygen Sensor (front)
   b. Item AE: Cylinder 2, 3 Heated Oxygen Sensor (front)
   - Voltage should fluctuate between 0 –0.4 volt and 0.6 – 1.0 volt while idling after the engine has been warmed.

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

Q: Is the sensor operating properly?

YES : Go to Step 10.
NO : Go to Step 9.

STEP 9. Check the fuel pressure.

Refer to On-vehicle Service –Fuel Pressure Test P.13A-1218.

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 10. Check the ignition timing.
Refer to GROUP 11A, On-vehicle Service –Ignition Timing Check P.11A-11.

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 8: 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.

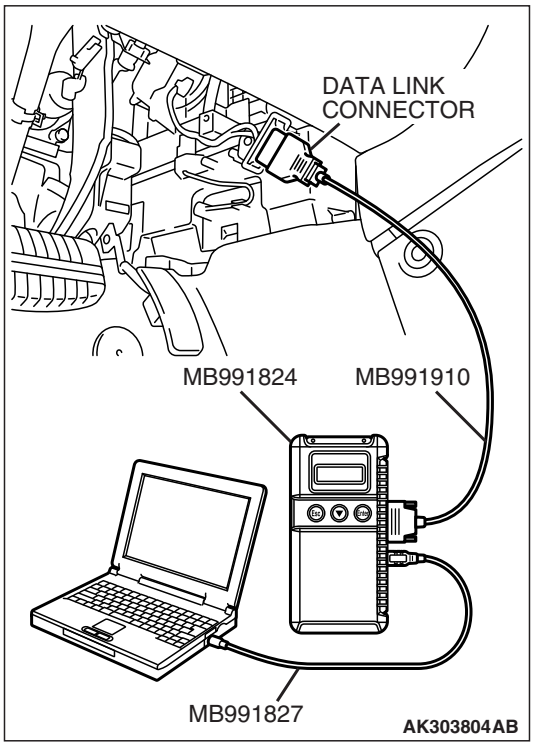
TROUBLESHOOTING HINTS (The most likely causes for this case:)

- Malfunction of the electronic control throttle valve system.
- Malfunction of the throttle body.

DIAGNOSIS

Required Special Tools:

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



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

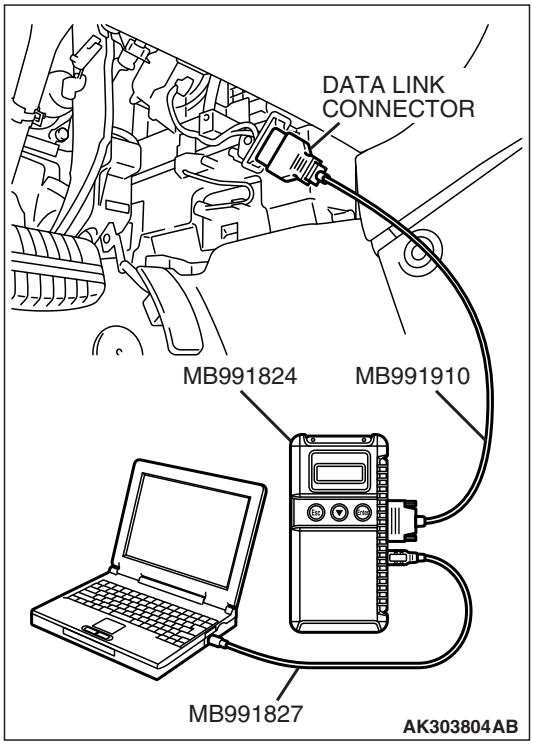
⚠ CAUTION

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

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

Q: Is the DTC set?

YES : Refer to Diagnostic Trouble Code Chart P.13A-46.
NO : Go to Step 2.

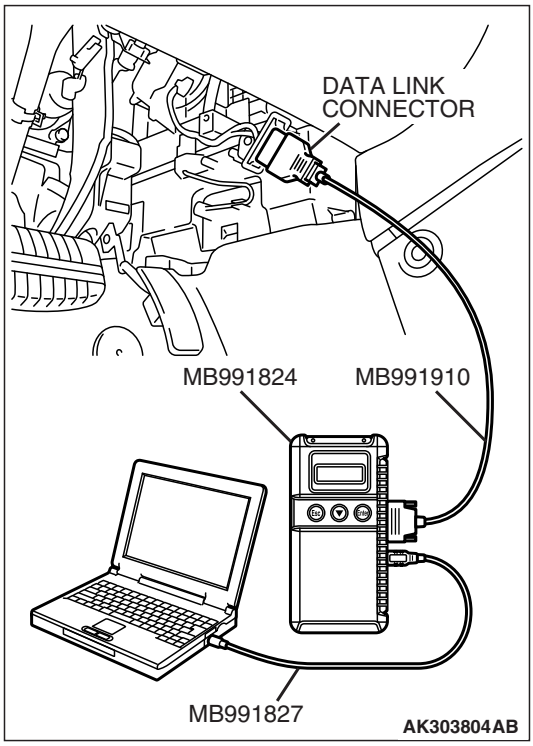


STEP 2. Using scan tool MB991958, check data list.

(1) Turn the ignition switch to the "ON" position.
(2) Check the following item in the data list. Refer to Data List Reference Table P.13A-1169.
   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 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.13A-1191.
  a. Item 10: Evaporative Emission Purge Solenoid
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the actuator operating properly?

YES : Refer to On-vehicle Service –Throttle Body (Throttle Valve Area) Cleaning P.13A-1217.

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

INSPECTION PROCEDURE 9: 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.

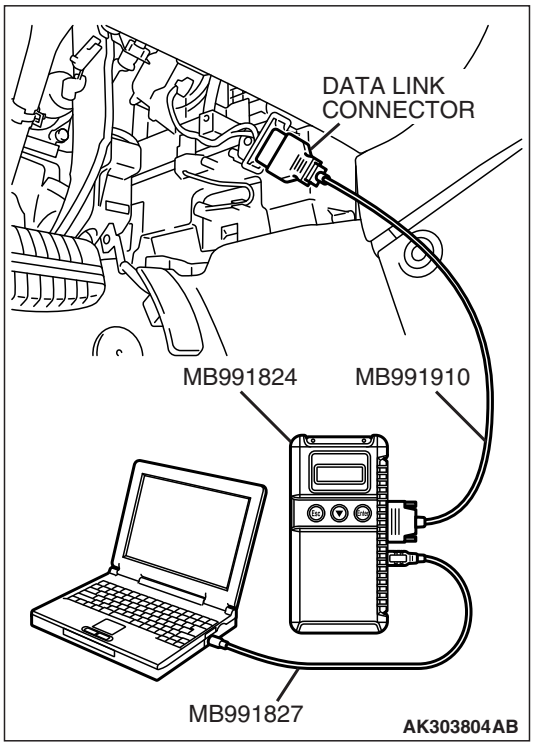
TROUBLESHOOTING HINTS (The most likely causes for this case:)

- Malfunction of the electronic control throttle valve system.
- Malfunction of the throttle body.

DIAGNOSIS

Required Special Tools:

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



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

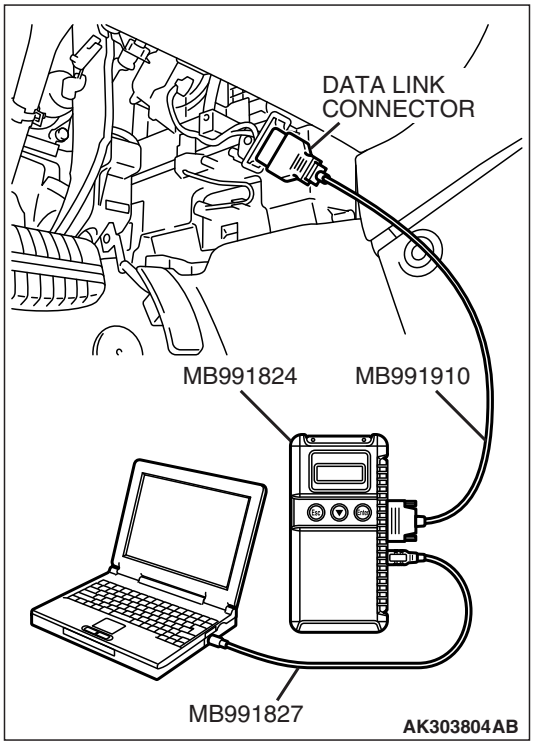
⚠ CAUTION

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

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

Q: Is the DTC set?

YES : Refer to Diagnostic Trouble Code Chart P.13A-46.
NO : Go to Step 2.



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

(1) Turn the ignition switch to the "ON" position.
(2) Check the following item in the data list. Refer to Data List Reference Table P.13A-1169.
  a. Item 6: Engine Coolant Temperature Sensor
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the sensor operating properly?

YES : Refer to On-vehicle Service –Throttle Body (Throttle Valve Area) Cleaning P.13A-1217.
NO : Repair or replace it. Then confirm that the malfunction symptom is eliminated.

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INSPECTION PROCEDURE 10: 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 (M.U.T.-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991910: Main Harness A

STEP 1. Check if the battery terminal is disconnected.

Q: Has the battery terminal been disconnected lately?

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

NO : Go to Step 2.

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

⚠ CAUTION

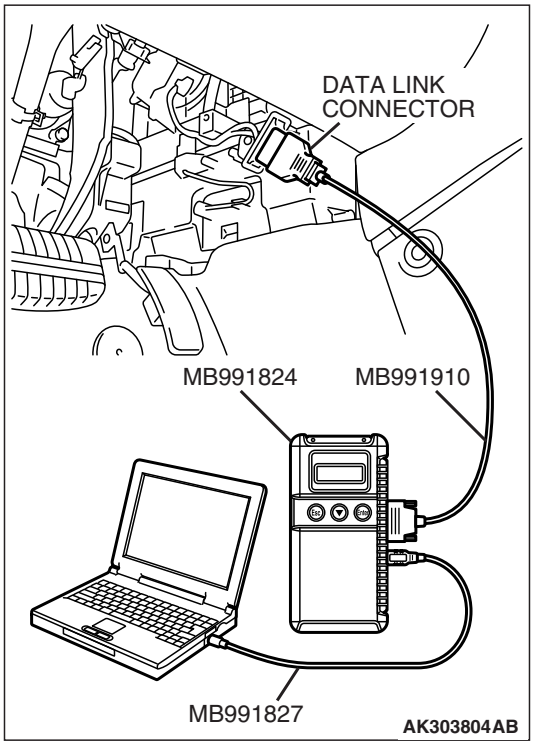
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

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

Q: Is the DTC set?

YES : Refer to Diagnostic Trouble Code Chart P.13A-46.

NO : Go to Step 3.



STEP 3. Checking by depressing and releasing the accelerator pedal.

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

YES : Refer to On-vehicle Service –Throttle Body (Throttle Valve Area) Cleaning P.13A-1217.

NO : Go to Step 4.

STEP 4. Check the engine idling.

Q: Does it idle properly after warming up?

YES : Go to Step 5.

NO : Refer to, INSPECTION PROCEDURE 7 –Unstable Idle (Rough Idle, Hunting) P.13A-1077.

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

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

(2) Check following items in the actuator test. Refer to Actuator Test Reference Table P.13A-1191.

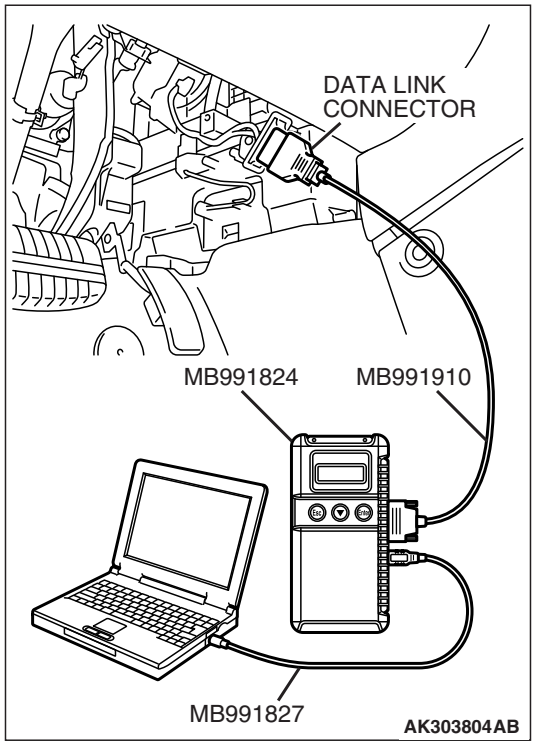
a. Item 1, 2, 3, 4: Injector

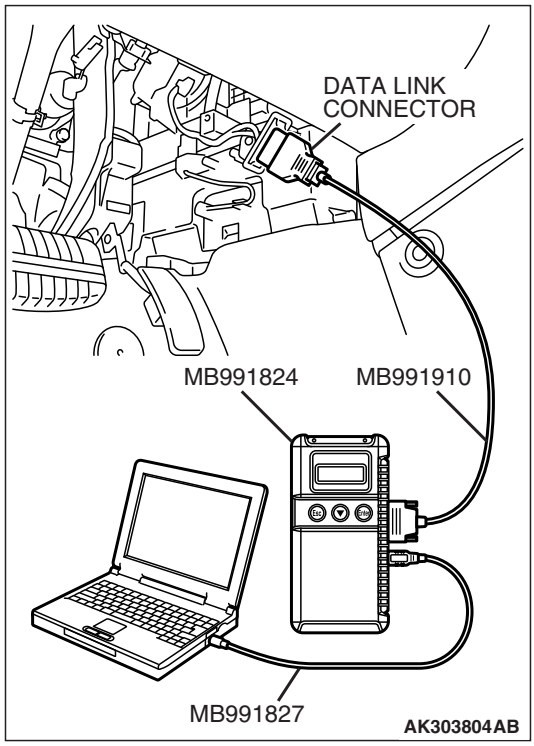
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Are they operating properly?

YES : Go to Step 6.

NO : Refer to DTC P0201 –Injector Circuit-cylinder 1 P.13A-482, DTC P0202 –Injector Circuit-cylinder 2 P.13A-492, DTC P0203 –Injector Circuit-cylinder 3 P.13A-502, DTC P0204 –Injector Circuit-cylinder 4 P.13A-512.





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

(1) Turn the ignition switch to the "ON" position.
(2) Check the following item in the data list. Refer to Data List Reference Table P.13A-1169.
  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.13A-1218.

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

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 11: 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 (M.U.T.-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991910: Main Harness A

STEP 1. Check if the battery terminal is disconnected.

Q: Has the battery terminal been disconnected lately?

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

NO : Go to Step 2.

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

⚠ CAUTION

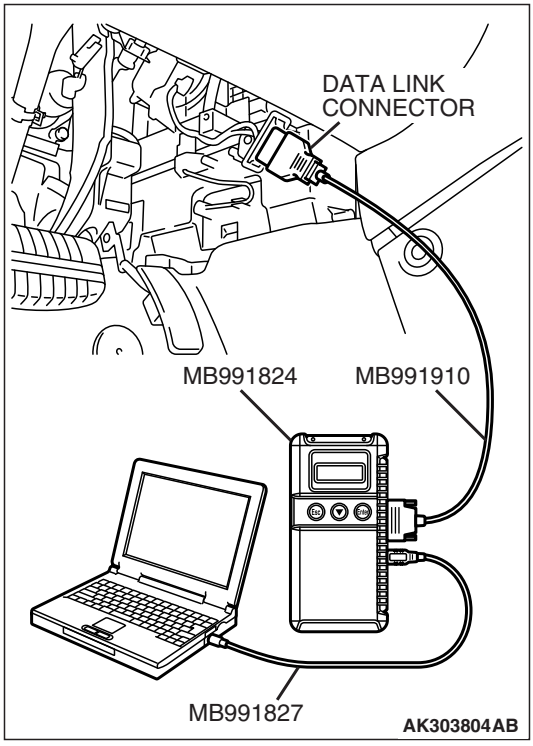
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

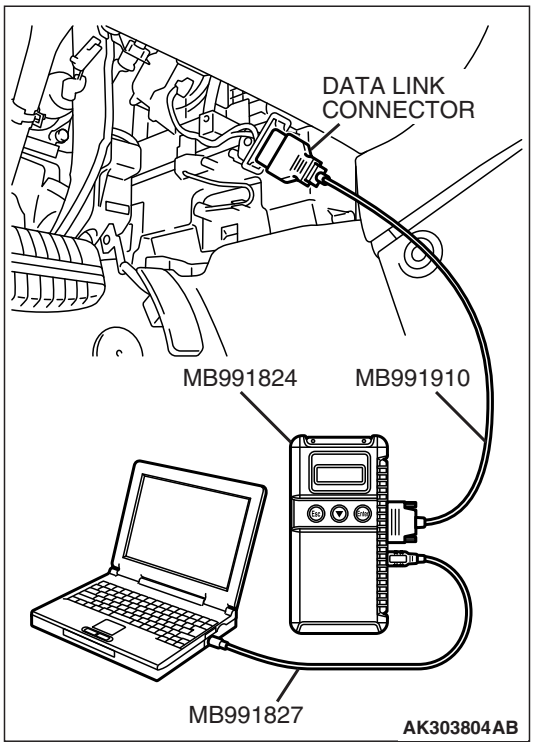
(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Read the DTC.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Refer to Diagnostic Trouble Code Chart P.13A-46.

NO : Go to Step 3.





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

(1) Turn the ignition switch to the "ON" position.
(2) Check following items in the actuator test. Refer to Actuator Test Reference Table P.13A-1191.
  a. Item 1, 2, 3, 4: Injector
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Are they operating properly?

YES : Go to Step 4.
NO : Refer to DTC P0201 –Injector Circuit-cylinder 1 P.13A-482, DTC P0202 –Injector Circuit-cylinder 2 P.13A-492, DTC P0203 –Injector Circuit-cylinder 3 P.13A-502, DTC P0204 –Injector Circuit-cylinder 4 P.13A-512.

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

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

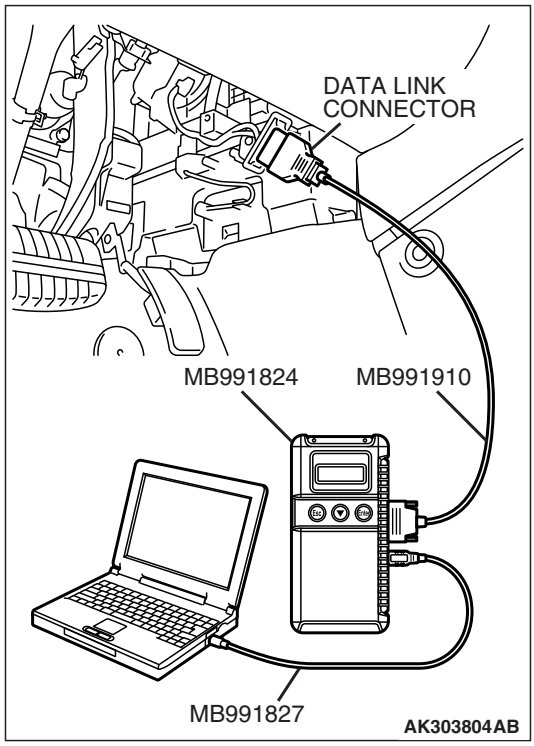
YES : Refer to On-vehicle Service –Throttle Body (Throttle Valve Area) Cleaning P.13A-1217.
NO : Go to Step 5.

STEP 5. Engine stall reproduction test.

Q: Is it easy to reproduce the engine stall?

YES : Go to Step 6.
NO : Check if the following signals change suddenly by wiggling the circuit harness and connectors.
  a. Crankshaft position sensor signal.
  b. Mass airflow sensor signal.
  c. Injector drive signal.
  d. Primary and secondary ignition signal.
  e. Fuel pump drive signal.
  f. PCM power supply voltage.

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

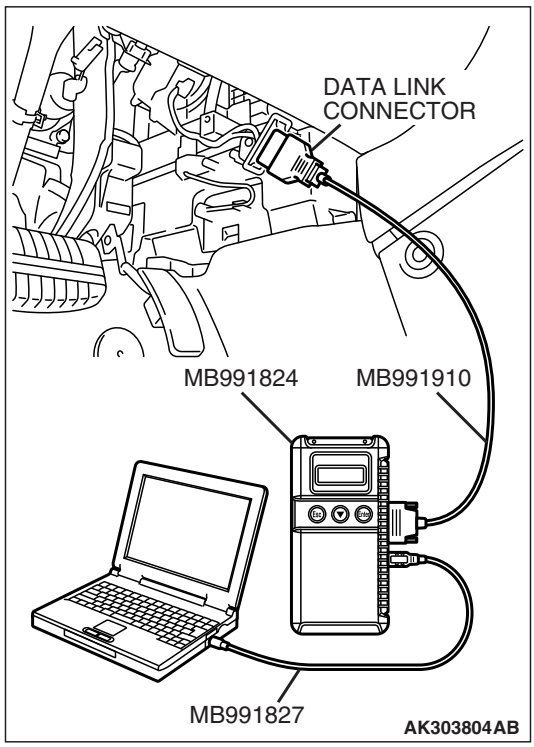


STEP 6. Using scan tool MB991958, check data list.

(1) Turn the ignition switch to the "ON" position.
(2) Check the following items in the data list. Refer to Data List Reference Table P.13A-1169.
   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)
   f. Item AC: Cylinder 1, 4 Heated Oxygen Sensor (front)
   g. Item AD: Cylinder 1, 4 Heated Oxygen Sensor (rear)
   h. Item AE: Cylinder 2, 3 Heated Oxygen Sensor (front)
   i. Item AF: Cylinder 2, 3 Heated Oxygen Sensor (rear)
   j. Item BB: Barometric Pressure Sensor
(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 data list.

(1) Turn the ignition switch to the "ON" position.
(2) Check the following items of the data list. Refer to Data List Reference Table P.13A-1169.
   a. Item AC: Cylinder 1, 4 Heated Oxygen Sensor (front)
   b. Item AE: Cylinder 2, 3 Heated Oxygen Sensor (front)
   • Fluctuates between 0 –0.4 volt and 0.6 –1.0 volt while idling after the engine has been warmed.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Are they operating properly?

YES : Go to Step 9.
NO : Go to Step 8.

STEP 8. Check the fuel pressure.
Refer to On-vehicle Service –Fuel Pressure Test P.13A-1218.

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

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 12: 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 the emission control system.

DIAGNOSIS

Required Special Tools:
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991910: Main Harness A

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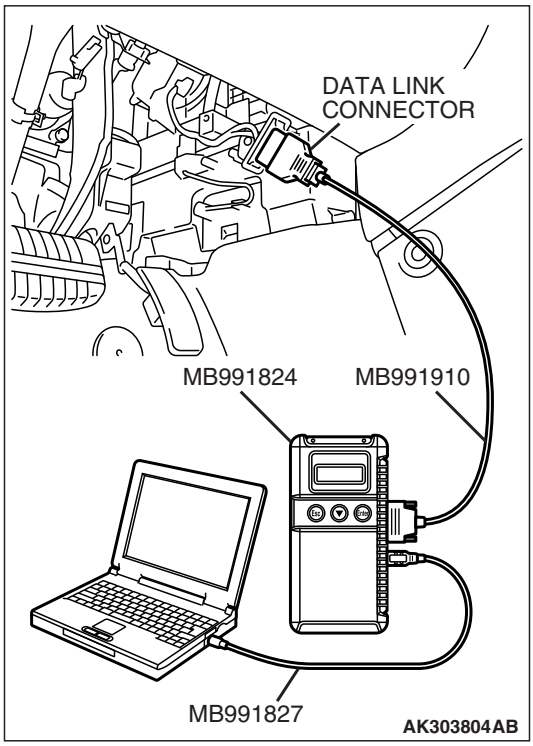


STEP 1. Using scan tool MB991958, read the diagnostic trouble code (DTC).

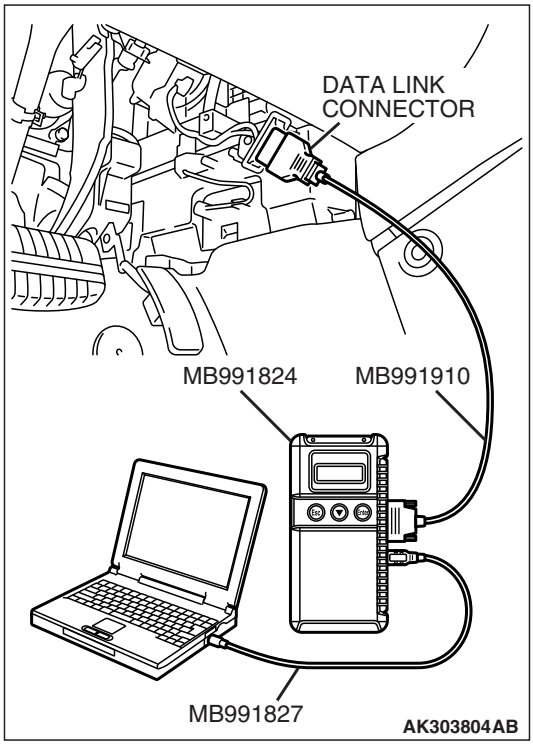
⚠ CAUTION

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

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

Q: Is the DTC set?

YES : Refer to Diagnostic Trouble Code Chart P.13A-46.
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.13A-1191.
  a. Item 10: Evaporative Emission Purge Solenoid
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the actuator operating properly?

YES : Check the following items, and repair or replace the defective items.
  a. Check the ignition coil and 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 13: The Engine Stalls When Decelerating

COMMENT

- The intake air volume may be insufficient due to a defective 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 (M.U.T.-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991910: Main Harness A

STEP 1. Check if the battery terminal is disconnected.

Q: Has the battery terminal been disconnected lately?

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

NO : Go to Step 2.

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

⚠ CAUTION

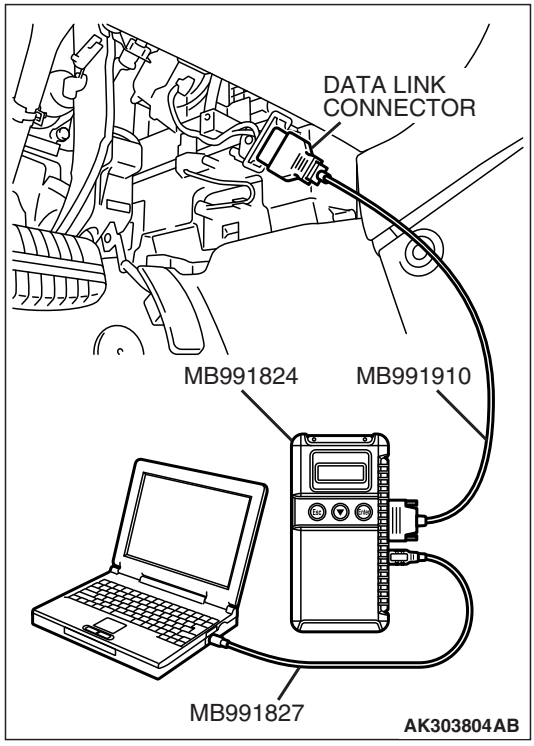
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

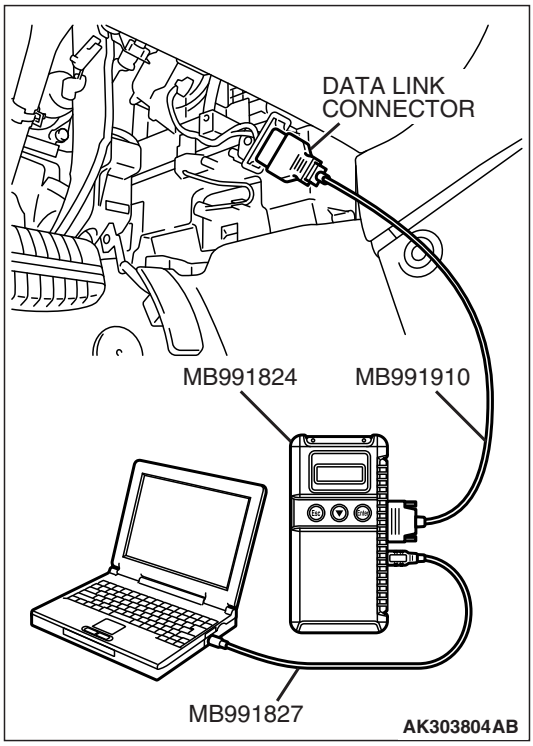
(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Read the DTC.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Refer to Diagnostic Trouble Code Chart P.13A-46.

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.13A-1169.
   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 –Throttle Body (Throttle Valve Area) Cleaning P.13A-1217.
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 14: Hesitation, Sag Or Stumble

COMMENT

- In cases such as the above, the ignition system, air/fuel mixture or compression pressure may be defective.

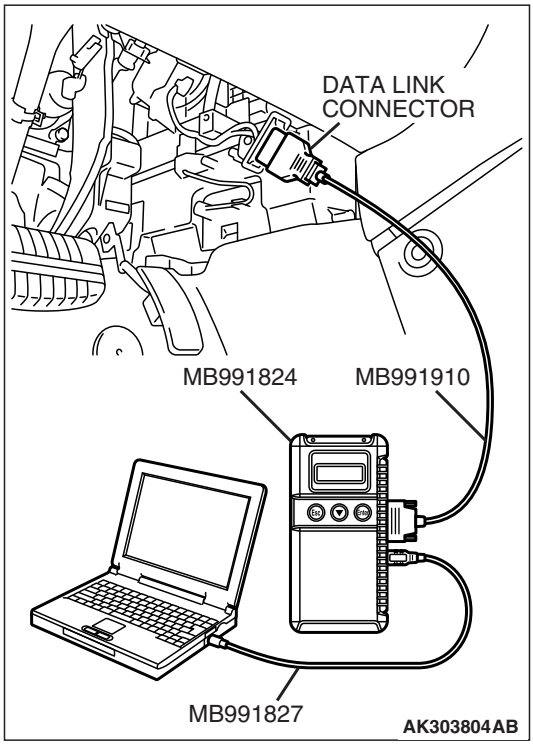
TROUBLESHOOTING HINTS (The most likely causes for this case:)

- 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 (M.U.T.-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991910: Main Harness A



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

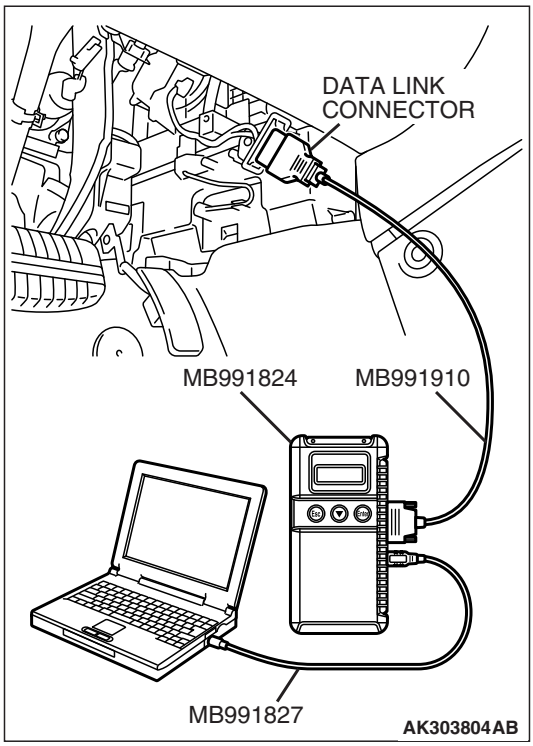
⚠ CAUTION

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

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

Q: Is the DTC set?

YES : Refer to Diagnostic Trouble Code Chart P.13A-46.
NO : Go to Step 2.



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

(1) Turn the ignition switch to the "ON" position
(2) Check following items in the actuator test. Refer to Actuator Test Reference Table P.13A-1191.
  a. Item 1, 2, 3, 4: Injector
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Are they operating properly?

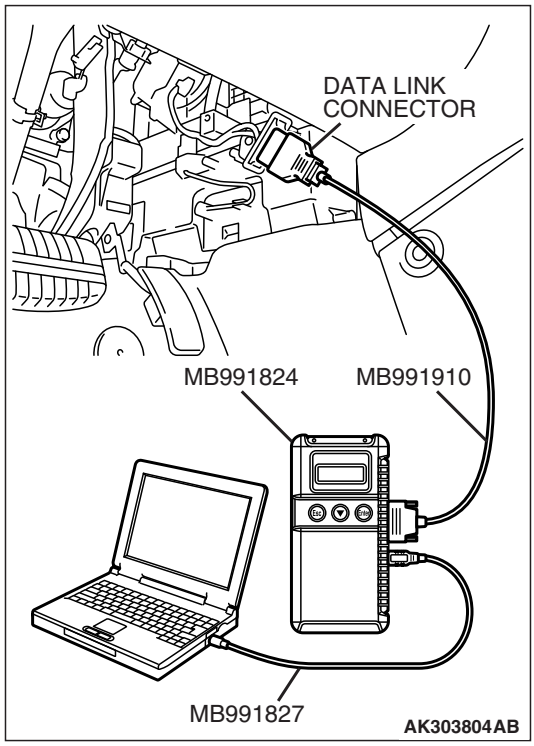
YES : Go to Step 3.
NO : Refer to DTC P0201 –Injector Circuit-cylinder 1 P.13A-482, DTC P0202 –Injector Circuit-cylinder 2 P.13A-492, DTC P0203 –Injector Circuit-cylinder 3 P.13A-502, DTC P0204 –Injector Circuit-cylinder 4 P.13A-512.

STEP 3. Check the ignition timing.

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

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.

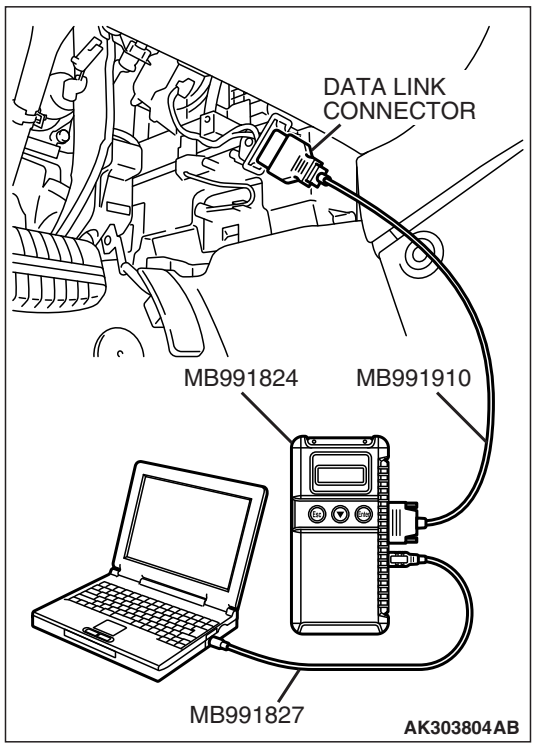


STEP 4. Using scan tool MB991958, check data list.

(1) Turn the ignition switch to the "ON" position.
(2) Check the following items in the data list. Refer to Data List Reference Table P.13A-1169.
   a. Item 5: Intake Air Temperature Sensor
   b. Item 6: Engine Coolant Temperature Sensor
   c. Item AC: Cylinder 1, 4 Heated Oxygen Sensor (front)
   d. Item AD: Cylinder 1, 4 Heated Oxygen Sensor (rear)
   e. Item AE: Cylinder 2, 3 Heated Oxygen Sensor (front)
   f. Item AF: Cylinder 2, 3 Heated Oxygen Sensor (rear)
   g. Item BB: Barometric Pressure Sensor
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Are they operating properly?

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



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

(1) Turn the ignition switch to the "ON" position.
(2) Check the following items of data list. Refer to Data List Reference Table P.13A-1169.
   a. Item AC: Cylinder 1, 4 Heated Oxygen Sensor (front)
   b. Item AE: Cylinder 2, 3 Heated Oxygen Sensor (front)
   • Voltage should fluctuate between 0 –0.4 volt and 0.6 – 1.0 volt while idling after the engine has warmed-up.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Are they operating properly?

YES : Go to Step 7.
NO : Go to Step 6.

STEP 6. Check the fuel pressure.
Refer to On-vehicle Service –Fuel Pressure Test P.13A-1218.

Q: Is the fuel pressure normal?

YES : Check the following items, and repair or replace the defective items.
a. Vacuum leak.
- Broken intake manifold gasket.
- Broken air intake hose.
- Broken vacuum hose.
- Positive crankcase ventilation valve does not operate.

b. Injector clogged.

Then confirm that the malfunction symptom is eliminated.

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

STEP 7. Check the fuel pressure.
Refer to On-vehicle Service –Fuel Pressure Test P.13A-1218.

Q: Is the fuel pressure normal?

YES : Check the following items, and repair or replace the defective items.
a. Check the ignition coil and spark plugs.
b. Check the EGR system.
c. Check compression pressure.
d. Check the fuel filter or fuel line for clogging.

Then confirm that the malfunction symptom is eliminated.

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

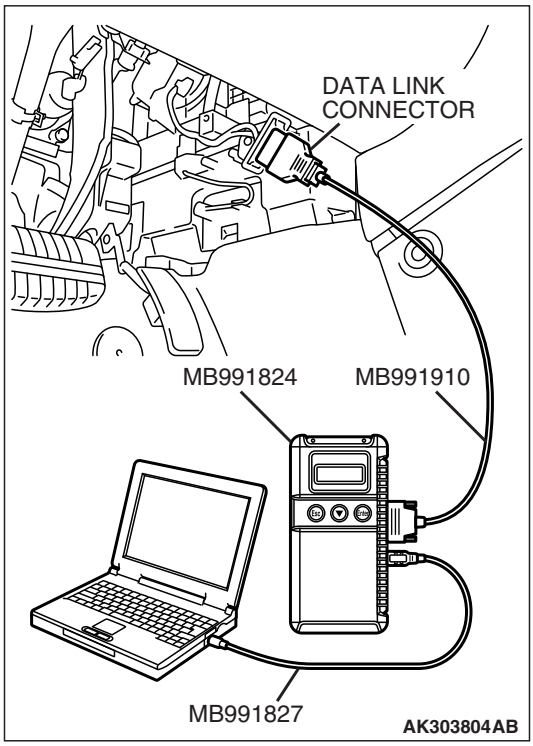
INSPECTION PROCEDURE 15: Acceleration Shock

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 (M.U.T.-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991910: Main Harness A



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

⚠ CAUTION

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

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

Q: Is the DTC set?

YES : Refer to Diagnostic Trouble Code Chart P.13A-46.

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 16: 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.

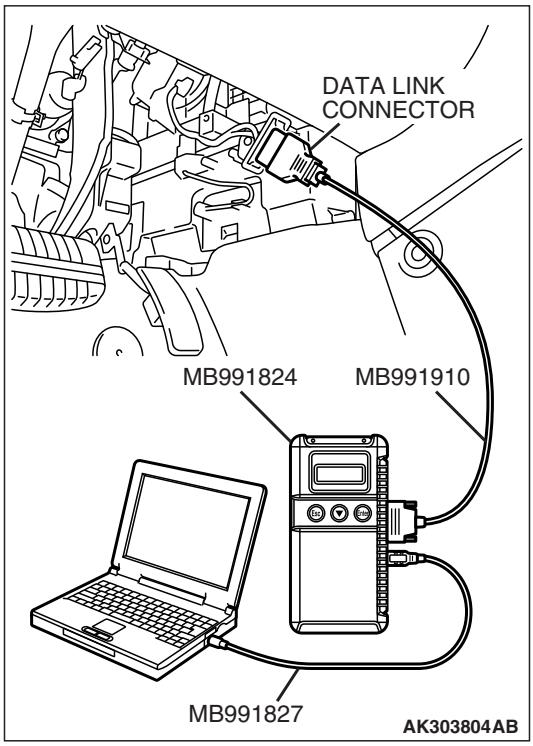
TROUBLESHOOTING HINTS (The most likely causes for this case:)

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

DIAGNOSIS

Required Special Tools:

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



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

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

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

Q: Is the DTC set?

YES : Refer to Diagnostic Trouble Code Chart P.13A-46.
NO : Refer to On-vehicle Service –Throttle Body (Throttle Valve Area) Cleaning P.13A-1217.

INSPECTION PROCEDURE 17: Poor Acceleration

COMMENT

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

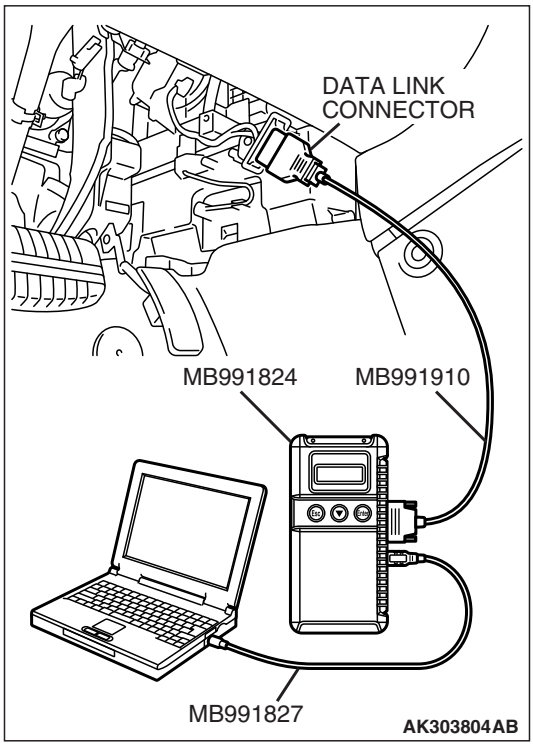
TROUBLESHOOTING HINTS (The most likely causes for this case:)

- 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 (M.U.T.-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991910: Main Harness A



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

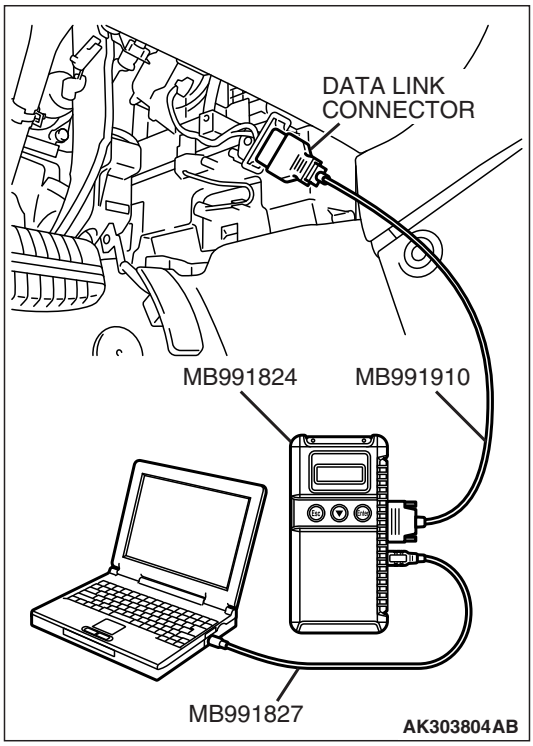
⚠ CAUTION

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

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

Q: Is the DTC set?

YES : Refer to Diagnostic Trouble Code Chart P.13A-46.
NO : Go to Step 2.



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

(1) Turn the ignition switch to the "ON" position.
(2) Check following items in the actuator test. Refer to Actuator Test Reference Table P.13A-1191.
  a. Item 1, 2, 3, 4: Injector
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Are they operating properly?

YES : Go to Step 3.
NO : Refer to DTC P0201 –Injector Circuit-cylinder 1 P.13A-482, DTC P0202 –Injector Circuit-cylinder 2 P.13A-492, DTC P0203 –Injector Circuit-cylinder 3 P.13A-502, DTC P0204 –Injector Circuit-cylinder 4 P.13A-512.

STEP 3. Check the ignition timing.

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

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.

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

(2) Check the following items in the data list. Refer to Data List Reference Table P.13A-1169.

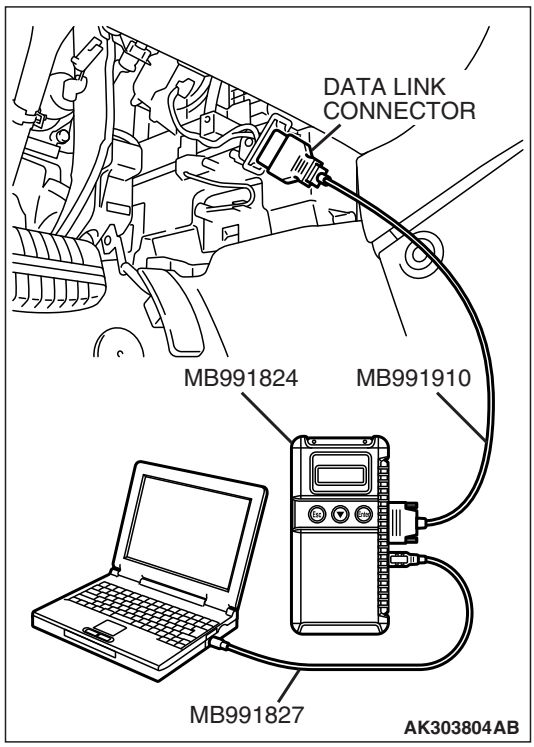
a. Item 5: Intake Air Temperature Sensor
b. Item 6: Engine Coolant Temperature Sensor
c. Item AC: Cylinder 1, 4 Heated Oxygen Sensor (front)
d. Item AD: Cylinder 1, 4 Heated Oxygen Sensor (rear)
e. Item AE: Cylinder 2, 3 Heated Oxygen Sensor (front)
f. Item AF: Cylinder 2, 3 Heated Oxygen Sensor (rear)
g. Item BB: Barometric Pressure Sensor

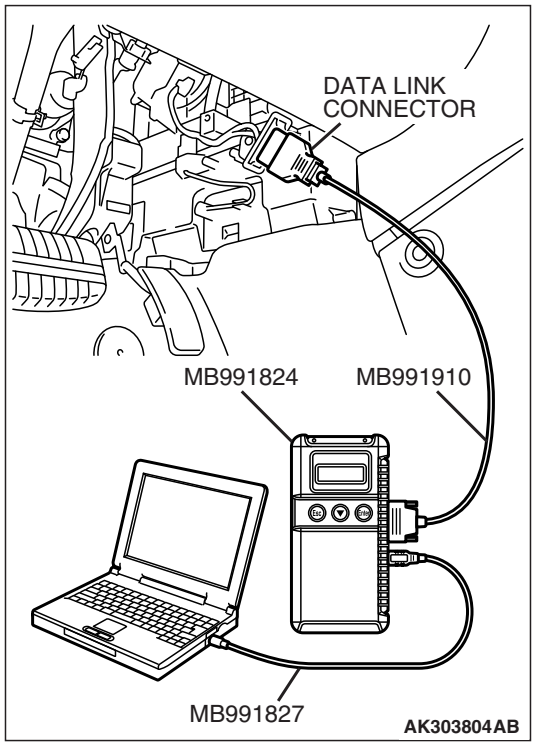
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Are they operating properly?

YES : Go to Step 5.

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





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

(1) Turn the ignition switch to the "ON" position.
(2) Check the following items of data list. Refer to Data List Reference Table P.13A-1169.
   a. Item AC: Cylinder 1, 4 Heated Oxygen Sensor (front)
   b. Item AE: Cylinder 2, 3 Heated Oxygen Sensor (front)
   - Voltage should fluctuate between 0 –0.4 volt and 0.6 – 1.0 volt while idling after the engine has been warmed.

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

Q: Are they operating properly?

YES : Go to Step 7.
NO : Go to Step 6.

STEP 6. Check the fuel pressure.

Refer to On-vehicle Service –Fuel Pressure Test P.13A-1218.

Q: Is the fuel pressure normal?

YES : Check the following items, and repair or replace the defective items.
   a. Vacuum leak.
      - Broken intake manifold gasket.
      - Broken air intake hose.
      - Broken vacuum hose.
      - Positive crankcase ventilation valve does not operate.
   b. Injector clogged.

Then confirm that the malfunction symptom is eliminated.

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

STEP 7. Check the fuel pressure.
Refer to On-vehicle Service –Fuel Pressure Test P.13A-1218.

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 18: Surge

COMMENT

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

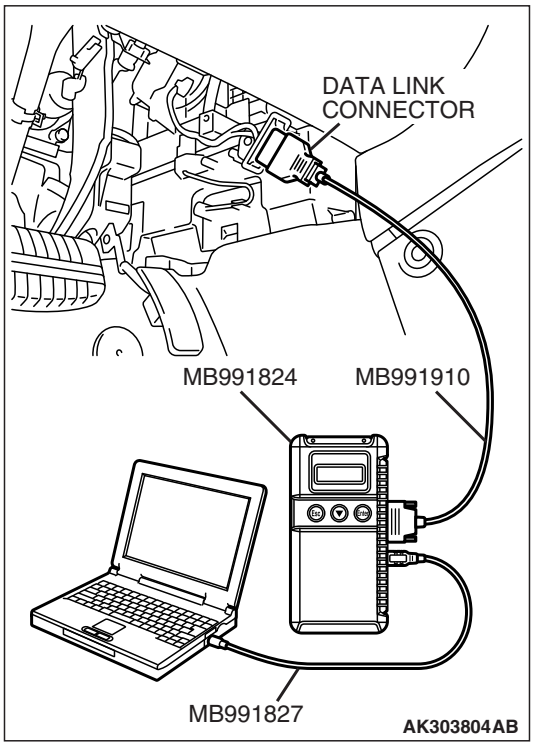
TROUBLESHOOTING HINTS (The most likely causes for this case:)

- 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 (M.U.T.-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991910: Main Harness A



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

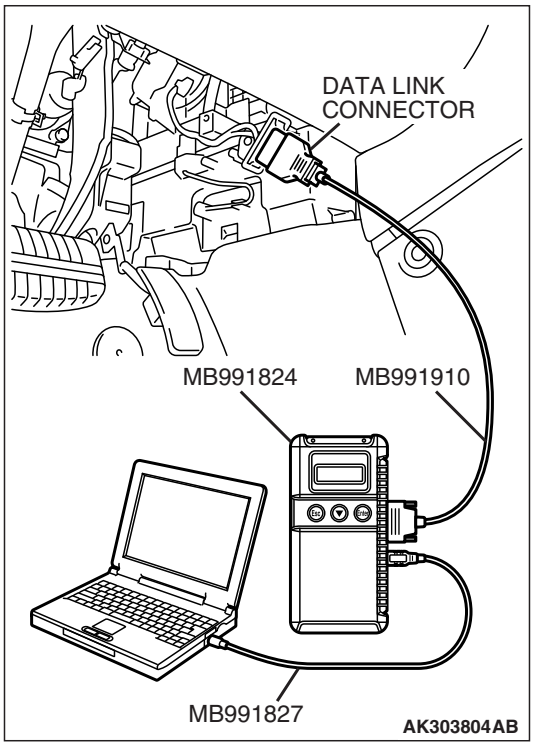
⚠ CAUTION

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

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

Q: Is the DTC set?

YES : Refer to Diagnostic Trouble Code Chart P.13A-46.
NO : Go to Step 2.



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

(1) Turn the ignition switch to the "ON" position.
(2) Check following items in the actuator test. Refer to Actuator Test Reference Table P.13A-1191.
  a. Item 1, 2, 3, 4: Injector
(3) Turn the ignition switch to the "ON" position.

Q: Are they operating properly?

YES : Go to Step 3.
NO : Refer to DTC P0201 –Injector Circuit-cylinder 1 P.13A-482, DTC P0202 –Injector Circuit-cylinder 2 P.13A-492, DTC P0203 –Injector Circuit-cylinder 3 P.13A-502, DTC P0204 –Injector Circuit-cylinder 4 P.13A-512.

STEP 3. Check the ignition timing.

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

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.

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

(2) Check the following items in the data list. Refer to Data List Reference Table P.13A-1169.

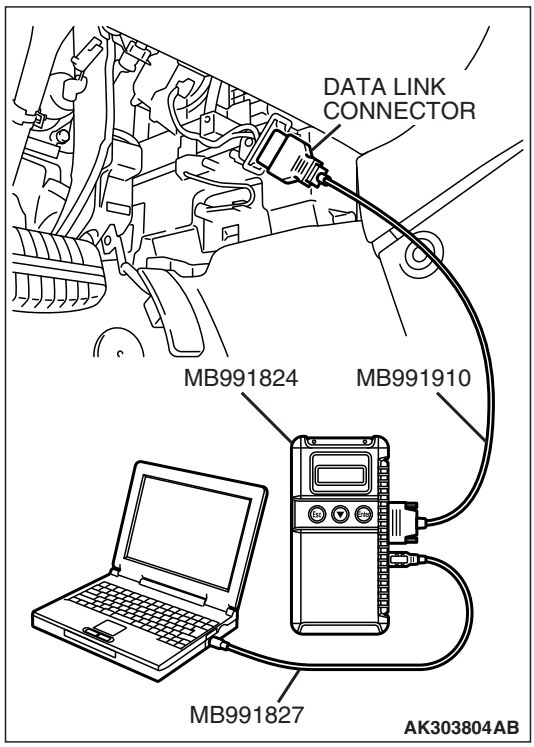
a. Item 5: Intake Air Temperature Sensor
b. Item 6: Engine Coolant Temperature Sensor
c. Item AC: Cylinder 1, 4 Heated Oxygen Sensor (front)
d. Item AD: Cylinder 1, 4 Heated Oxygen Sensor (rear)
e. Item AE: Cylinder 2, 3 Heated Oxygen Sensor (front)
f. Item AF: Cylinder 2, 3 Heated Oxygen Sensor (rear)
g. Item BB: Barometric Pressure Sensor

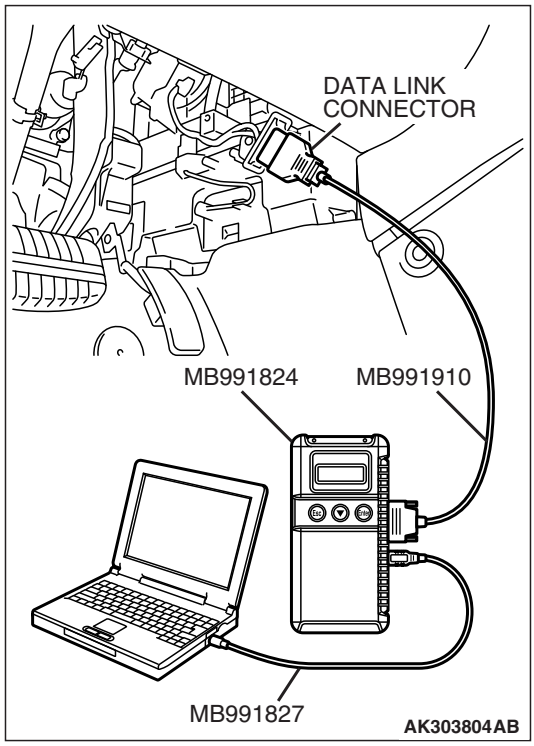
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Are they operating properly?

YES : Go to Step 5.

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





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

(1) Turn the ignition switch to the "ON" position.
(2) Check the following items of data list. Refer to Data List Reference Table P.13A-1169.
   a. Item AC: Cylinder 1, 4 Heated Oxygen Sensor (front)
   b. Item AE: Cylinder 2, 3 Heated Oxygen Sensor (front)
   - Voltage should fluctuate between 0 –0.4 volt and 0.6 – 1.0 volt while idling after the engine has been warmed.

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

Q: Are they operating properly?

YES : Go to Step 7.
NO : Go to Step 6.

STEP 6. Check the fuel pressure.

Refer to On-vehicle Service –Fuel Pressure Test P.13A-1218.

Q: Is the fuel pressure normal?

YES : Check the following items, and repair or replace the defective items.
   a. Vacuum leak.
      - Broken intake manifold gasket.
      - Broken air intake hose.
      - Broken vacuum hose.
      - Positive crankcase ventilation valve does not operate.
   b. Injector clogged.

Then confirm that the malfunction symptom is eliminated.

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

STEP 7. Check the fuel pressure.

Refer to On-vehicle Service –Fuel Pressure Test P.13A-1218.

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.

TSB Revision

INSPECTION PROCEDURE 19: 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.

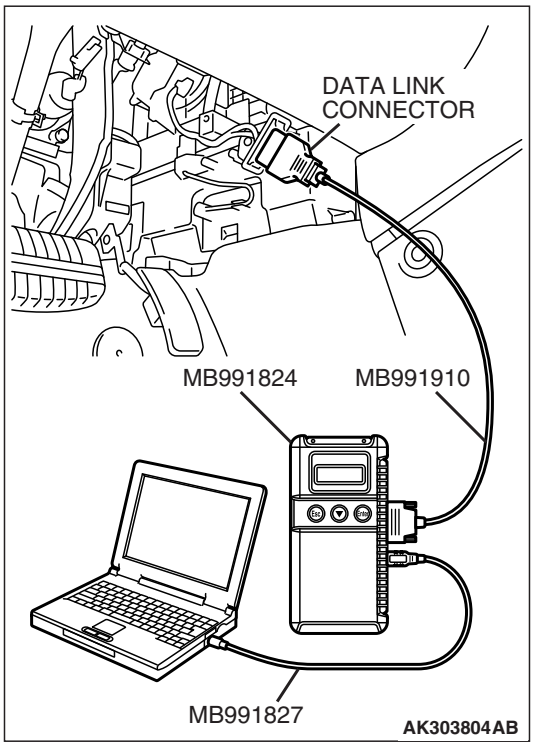
TROUBLESHOOTING HINTS (The most likely causes for this case:)

- Defective knock sensor.
- Incorrect heat value of the spark plug.

DIAGNOSIS

Required Special Tools:

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



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

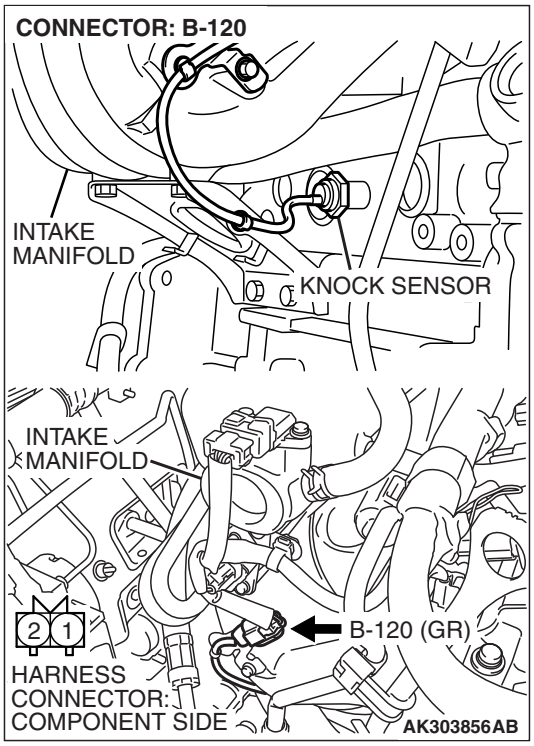
⚠ CAUTION

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

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

Q: Is the DTC set?

YES : Refer to Diagnostic Trouble Code Chart P.13A-46.
NO : Go to Step 2.



STEP 2. Check the ignition timing.

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

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

YES : Check the following items, and repair or replace the defective items.
- a. Check the spark plugs.
- b. Fuel quality, octane level.
- c. Check if the foreign materials (water, kerosene, etc.) got into fuel.

Then confirm that the malfunction symptom is eliminated.

NO : Refer to DTC P0325 –Knock Sensor Circuit P.13A-559.

INSPECTION PROCEDURE 20: 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

STEP 1. Check the injectors for fuel leakage.

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

INSPECTION PROCEDURE 21: Too High CO And HC Concentration When Idling

COMMENT

- Abnormal air/fuel ratio is suspected.

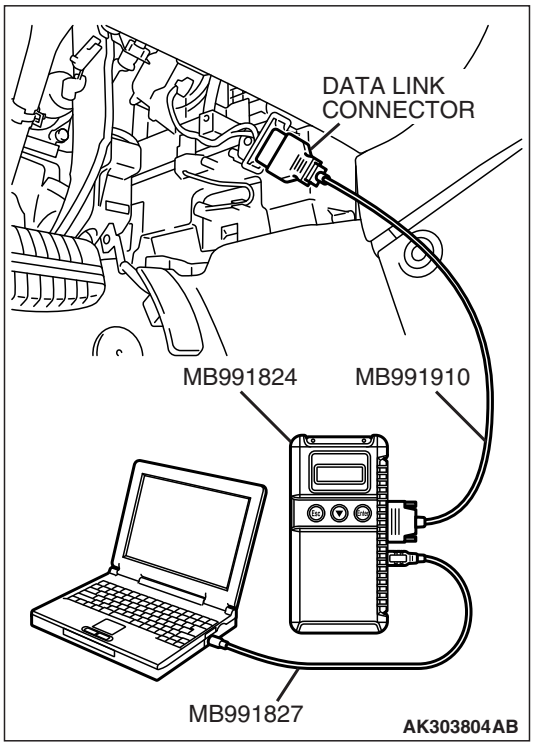
TROUBLESHOOTING HINTS (The most likely causes for this case:)

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

DIAGNOSIS

Required Special Tools:

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



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

⚠ CAUTION

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

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

Q: Is the DTC set?

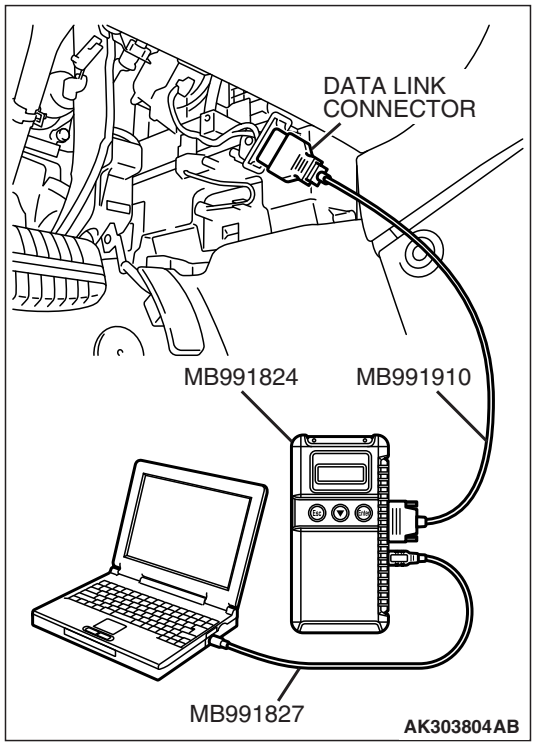
YES : Refer to Diagnostic Trouble Code Chart P.13A-46.
NO : Go to Step 2.

STEP 2. Check the ignition timing.

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

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.

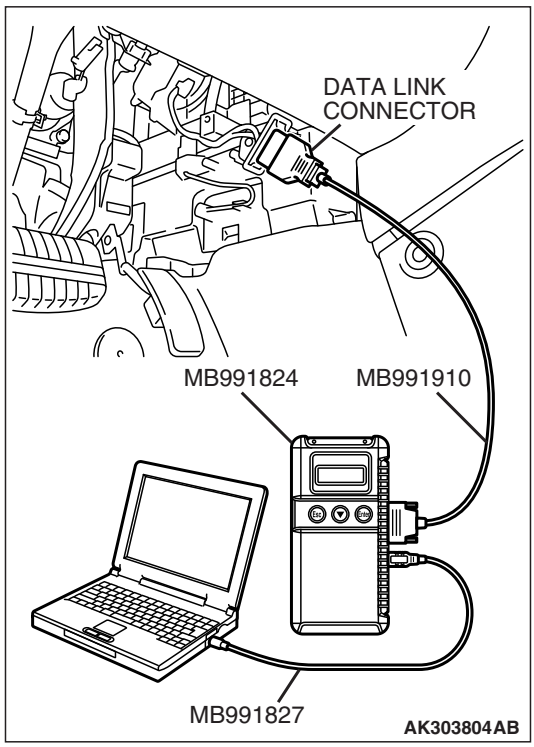


STEP 3. Using scan tool MB991958, check data list.

(1) Turn the ignition switch to the "ON" position.
(2) Check the following items in the data list. Refer to Data List Reference Table P.13A-1169.
   a. Item 6: Engine Coolant Temperature Sensor
   b. Item 5: Intake Air Temperature Sensor
   c. Item AC: Cylinder 1, 4 Heated Oxygen Sensor (front)
   d. Item AD: Cylinder 1, 4 Heated Oxygen Sensor (rear)
   e. Item AE: Cylinder 2, 3 Heated Oxygen Sensor (front)
   f. Item AF: Cylinder 2, 3 Heated Oxygen Sensor (rear)
   g. Item BB: Barometric Pressure Sensor
(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. Using scan tool MB991958, check data list.

(1) Turn the ignition switch to the "ON" position.
(2) Check the following items of the data list. Refer to Data List Reference Table P.13A-1169.
   a. Item AC: Cylinder 1, 4 Heated Oxygen Sensor (front)
   b. Item AE: Cylinder 2, 3 Heated Oxygen Sensor (front)
   • Voltage should fluctuate between 0 –0.4 volt and 0.6 – 1.0 volt while idling after the engine has been warmed.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Are they operating properly?

YES : Replace the heated oxygen sensor (front). Then confirm that the malfunction symptom is eliminated. If not resolved, go to Step 6.
NO : Go to Step 5.

STEP 5. Check the fuel pressure.
Refer to On-vehicle Service –Fuel Pressure Test P.13A-1218.

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 22: 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 (M.U.T.-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.13A-51.

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

⚠ CAUTION

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

(1) Connect scan tool MB991958 to the data link connector.

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

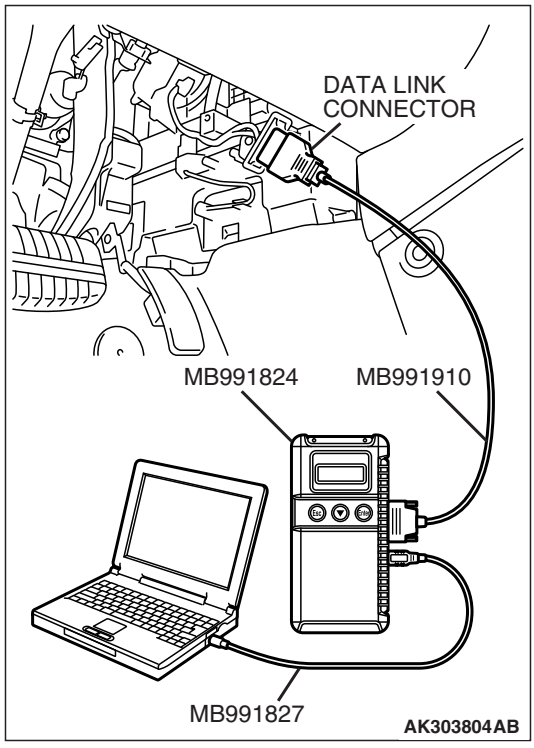
(3) Read the DTC.

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

Q: Is the DTC set?

YES : Refer to Diagnostic Trouble Code Chart P.13A-46.

NO : Go to Step 5.



STEP 5. Check the ignition timing.

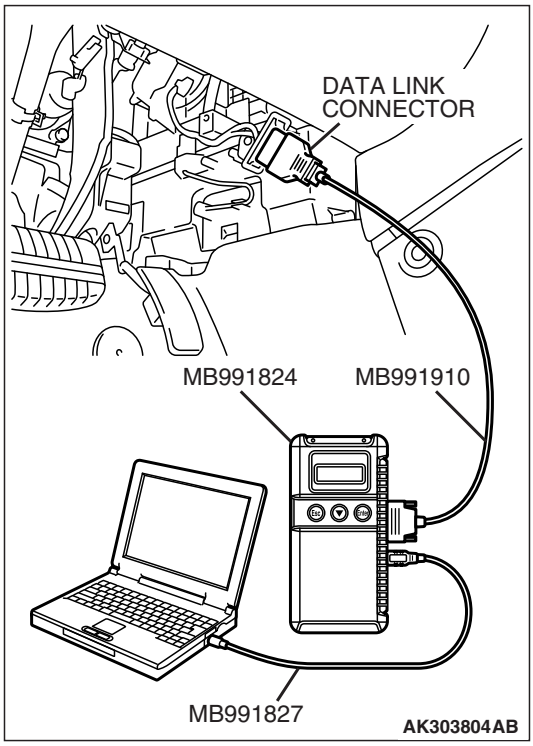
Refer to GROUP 11A, On-vehicle Service –Ignition Timing Check P.11A-11.

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.

TSB Revision

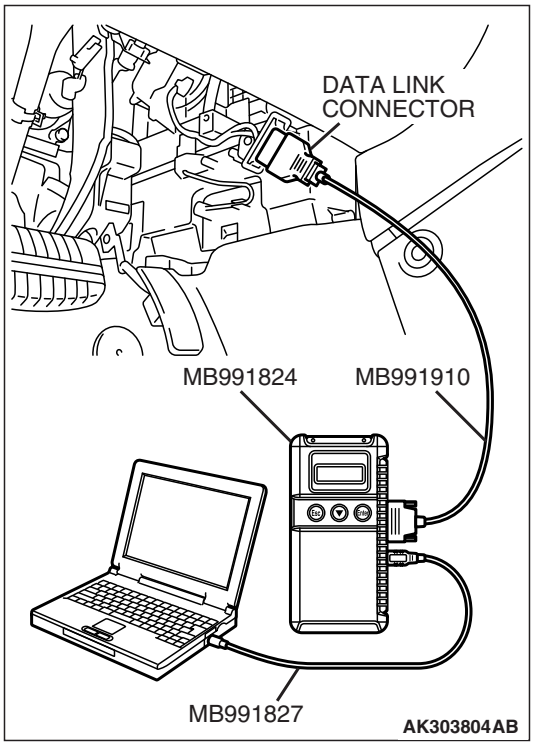


STEP 6. Using scan tool MB991958, check data list.

(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.13A-1169.
   a. Item 6: Engine Coolant Temperature Sensor
   b. Item 5: Intake Air Temperature Sensor
   c. Item AD: Cylinder 1, 4 Heated Oxygen Sensor (rear)
   d. Item AF: Cylinder 2, 3 Heated Oxygen Sensor (rear)
   e. Item BB: Barometric Pressure Sensor
(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.

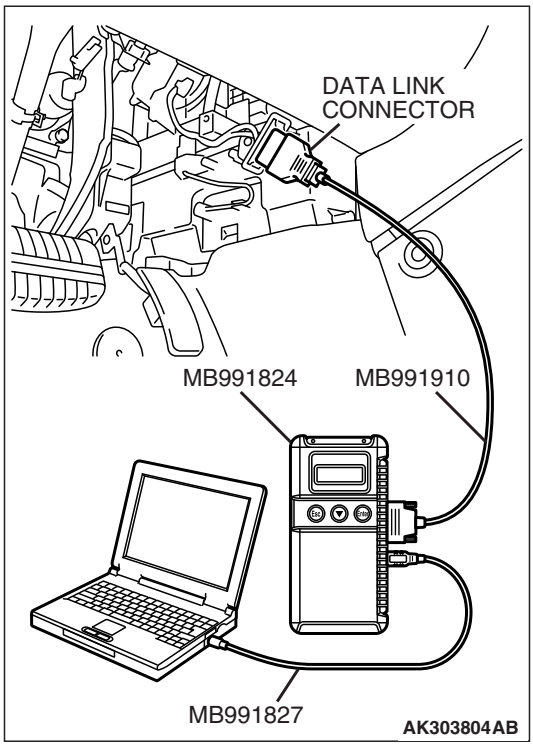


STEP 7. Using scan tool MB991958, check data list item AC: Cylinder 1, 4 Heated oxygen sensor (front).

(1) Start the engine and run at idle.
(2) Set scan tool MB991958 to the data reading mode for item AC, Cylinder 1, 4 Heated Oxygen Sensor (front).
   • Warm up the engine. When the engine is 2,500 r/min, the output voltage changes repeatedly between 0.4 volt or less and 0.6 –1.0 volt.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the sensor operating properly?

YES : Go to Step 8.
NO : Refer to DTC P0131 –Cylinder 1, 4 Heated Oxygen Sensor (front) Circuit Low Voltage P.13A-299, DTC P0132 –Cylinder 1, 4 Heated Oxygen Sensor (front) Circuit High Voltage P.13A-315, DTC P0133 – Cylinder 1, 4 Heated Oxygen Sensor (front) Circuit Slow Response P.13A-320, DTC P0134 –Cylinder 1, 4 Heated Oxygen Sensor (front) Circuit No Activity Detected P.13A-326.



STEP 8. Using scan tool MB991958, check data list item AE: Cylinder 2, 3 Heated oxygen sensor (front).

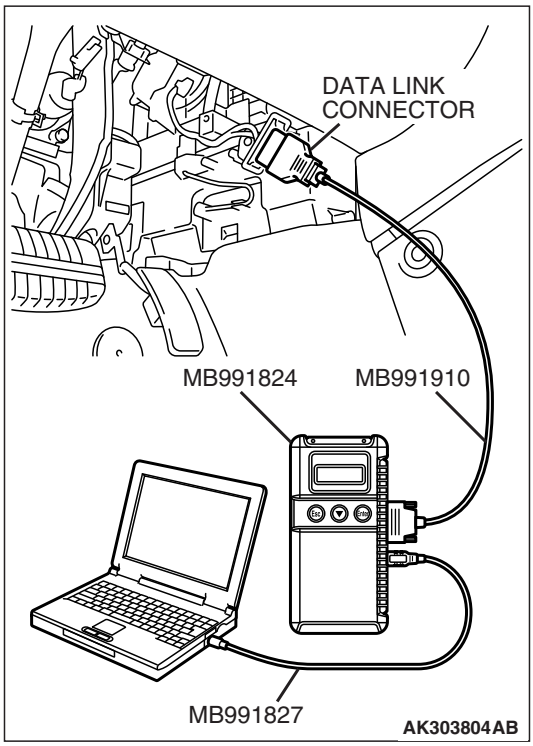
(1) Start the engine and run at idle.
(2) Set scan tool MB991958 to the data reading mode for item AE, Cylinder 2, 3 Heated Oxygen Sensor (front).
- Warm up the engine. When the engine is 2,500 r/min, the output voltage changes repeatedly between 0.4 volt or less and 0.6 –1.0 volt.

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

Q: Is the sensor operating properly?

YES : Go to Step 9.

NO : Refer to DTC P0151 –Cylinder 2, 3 Heated Oxygen Sensor (front) Circuit Low Voltage P.13A-365, DTC P0152 –Cylinder 2, 3 Heated Oxygen Sensor (front) Circuit High Voltage P.13A-381, DTC P0153 –Cylinder 2, 3 Heated Oxygen Sensor (front) Circuit Slow Response P.13A-386, DTC P0154 –Cylinder 2, 3 Heated Oxygen Sensor (front) Circuit No Activity Detected P.13A-392.



STEP 9. Using scan tool MB991958, check data list item AD: Cylinder 1, 4 Heated oxygen sensor (rear).

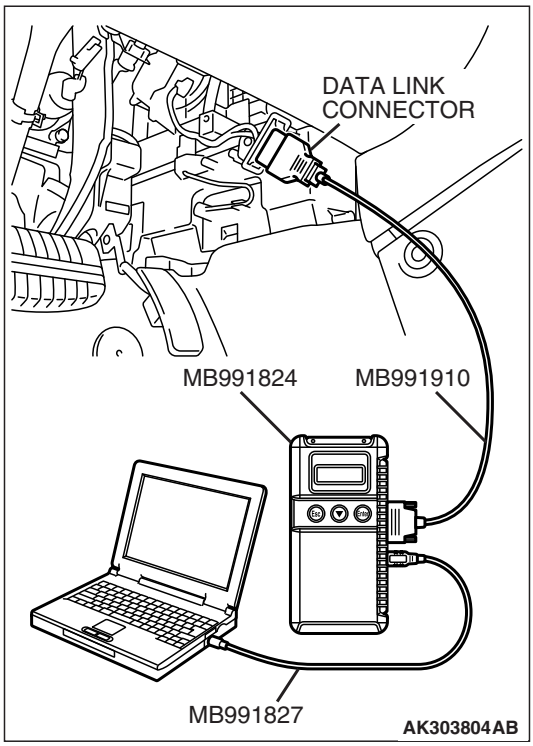
(1) Start the engine and run at idle.
(2) Set scan tool MB991958 to the data reading mode for item AD, Cylinder 1, 4 Heated Oxygen Sensor (rear).
   a. Transaxle: A/T: "L" range
   b. Drive with wide open throttle
   c. Engine: 3,500 r/min
      - The output voltages should be between 0.6 and 1.0 volt.

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

Q: Is the sensor operating properly?

YES : Go to Step 10.

NO : Refer to DTC P0137 –Cylinder 1, 4 Heated Oxygen Sensor (rear) Circuit Low Voltage P.13A-335, DTC P0138 –Cylinder 1, 4 Heated Oxygen Sensor (rear) Circuit High Voltage P.13A-351, DTC P0139 –Cylinder 1, 4 Heated Oxygen Sensor (rear) Circuit Slow Response P.13A-356, DTC P0140 –Cylinder 1, 4 Heated Oxygen Sensor (rear) Circuit No Activity Detected P.13A-361.



STEP 10. Using scan tool MB991958, check data list item AF: Cylinder 2, 3 Heated oxygen sensor (rear).

(1) Start the engine and run at idle.
(2) Set scan tool MB991958 to the data reading mode for item AF, Cylinder 2, 3 Heated Oxygen Sensor (rear).
  a. Transaxle: A/T: "L" range
  b. Drive with wide open throttle
  c. Engine: 3,500 r/min
    • The output voltages should be between 0.6 and 1.0 volt.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the sensor operating properly?

YES : Go to Step 11.
NO : Refer to DTC P0157 –Cylinder 2, 3 Heated Oxygen Sensor (rear) Circuit Low Voltage P.13A-401, DTC P0158 –Cylinder 2, 3 Heated Oxygen Sensor (rear) Circuit High Voltage P.13A-417, DTC P0159 –Cylinder 2, 3 Heated Oxygen Sensor (rear) Circuit Slow Response P.13A-422, DTC P0160 –Cylinder 2, 3 Heated Oxygen Sensor (rear) Circuit No Activity Detected P.13A-427.

STEP 11. Check the EGR system.

Refer to GROUP 17, Emission Control –Exhaust Gas Recirculation (EGR) System –General Description (EGR System) P.17-93.

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.13A-1218.

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 23: Purge Flow Test Of The Evaporative Emission Canister Failure

COMMENT

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

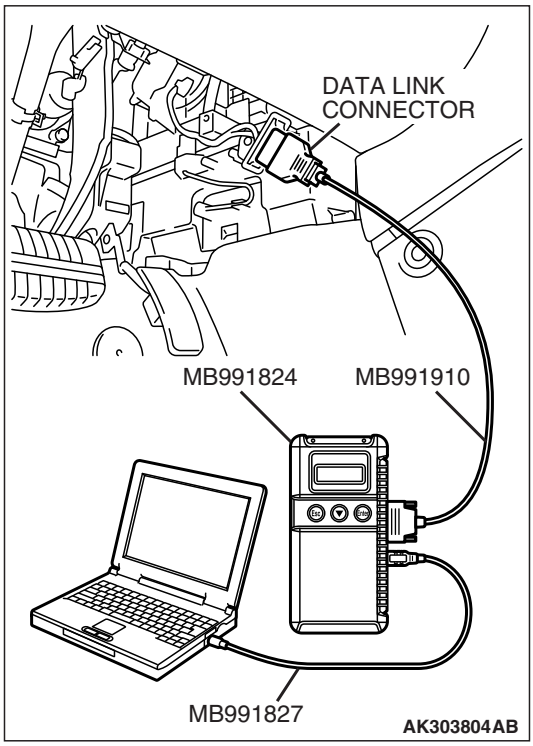
TROUBLESHOOTING HINTS (The most likely causes for this case:)

- 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 (M.U.T.-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991910: Main Harness A



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

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

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

Q: Is the DTC set?

YES : Refer to Diagnostic Trouble Code Chart P.13A-46.
NO : Refer to GROUP 17, Emission Control –Evaporative Emission Control System –Purge Control System Check (Purge Flow Check) P.17-90.

INSPECTION PROCEDURE 24: 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 –Evaporative Emission Control System –Evaporative Emission Purge Solenoid Check P.17-91.

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 –Evaporative Emission Control System –Evaporative Emission Ventilation Solenoid Check P.17-92.

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.

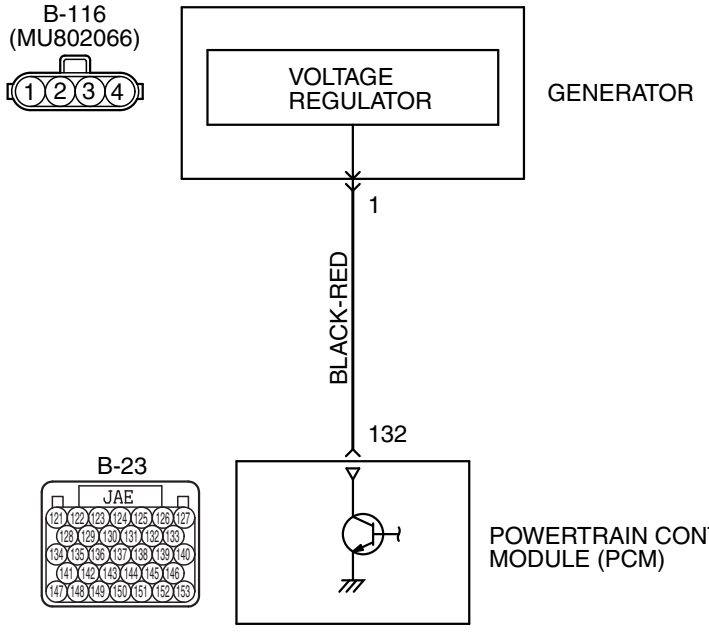
b. Check for leaks from the fuel tank.

Then confirm that the malfunction symptom is eliminated.

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

INSPECTION PROCEDURE 25: Generator Output Voltage Is Low (approximately 12.3 volts).

Generator Circuit



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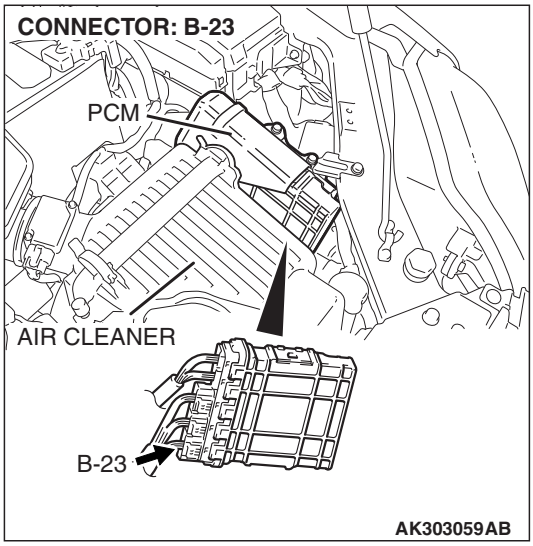
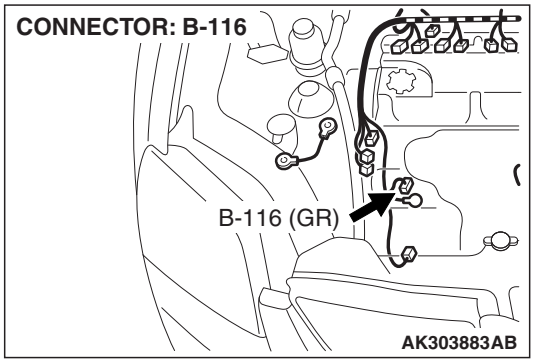




CIRCUIT OPERATION

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

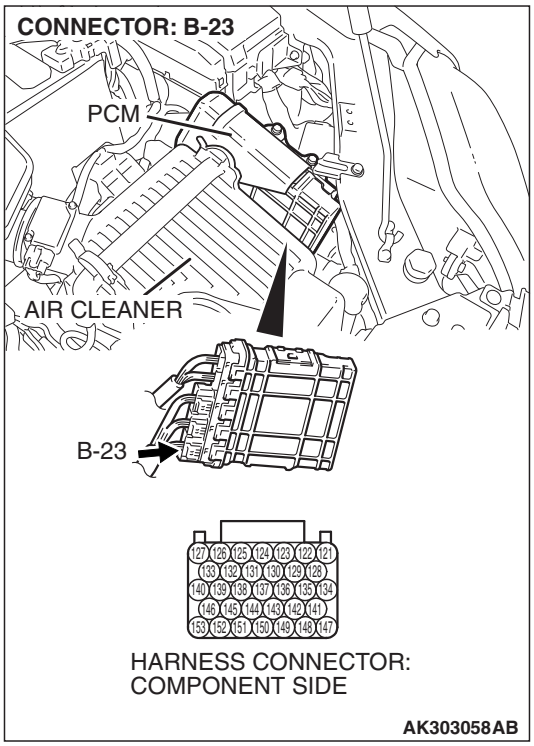
TROUBLESHOOTING HINTS (The most likely causes for this charging system:)

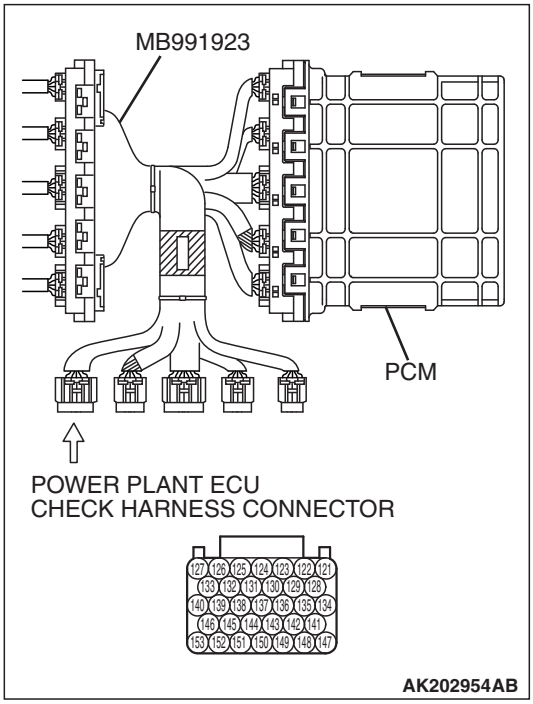
- Malfunction of the charging system.
- Short circuit in harness between generator G terminal and PCM.
- PCM failed.

DIAGNOSIS

Required Special Tool:

- MB991923: Power Train ECU Check Harness

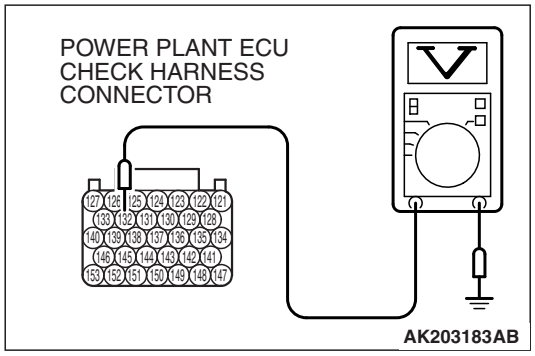




STEP 1. Measure the voltage at PCM connector B-23 by using check harness special tool MB991923.

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

(2) Start the engine and run at idle.



(3) Measure the voltage between terminal No. 132 and ground.

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

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.

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

Q: Is the measured voltage within the specified range?

YES : Go to Step 2.

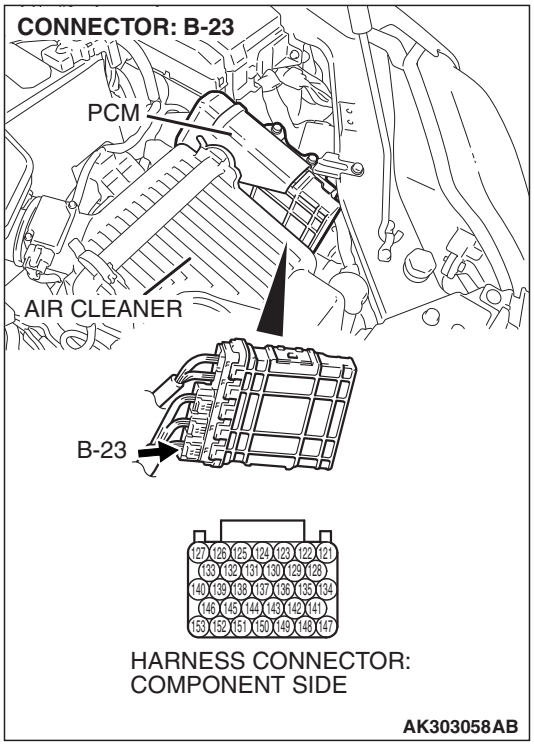
NO : Replace the generator. Then confirm that the malfunction symptom is eliminated.

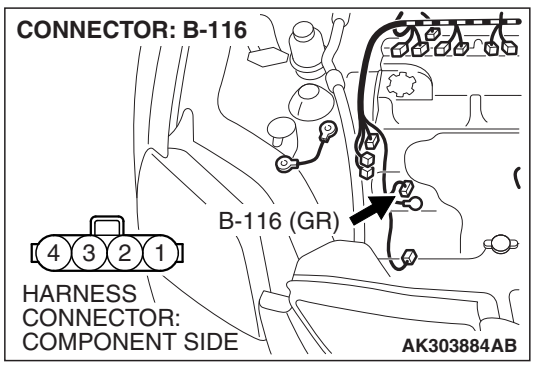
STEP 2. Check harness connector B-23 at PCM connector and harness connector B-116 at generator connector for damage.

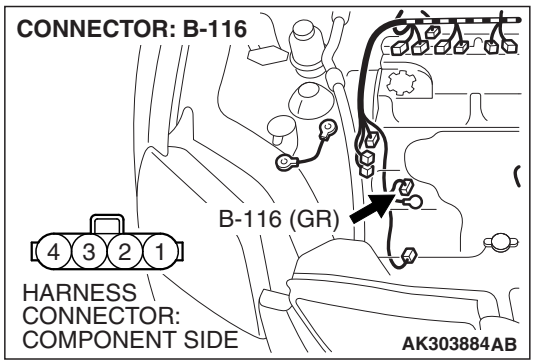
Q: Is the harness connector in good condition?

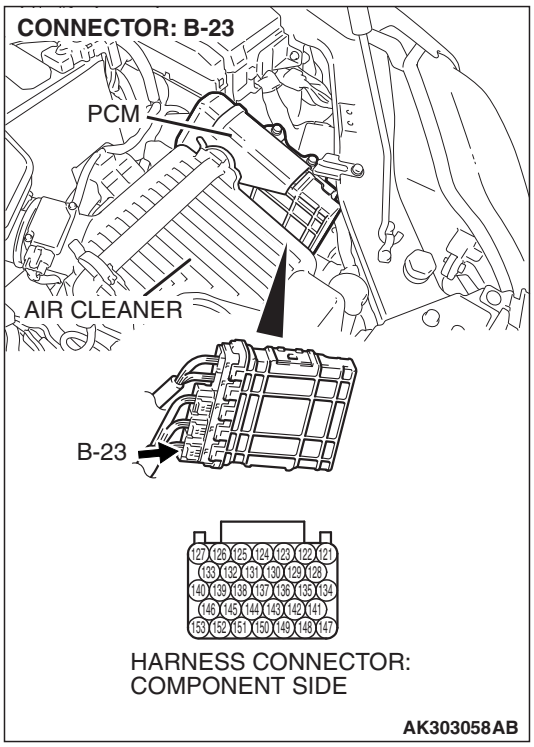
YES : Go to Step 3.

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









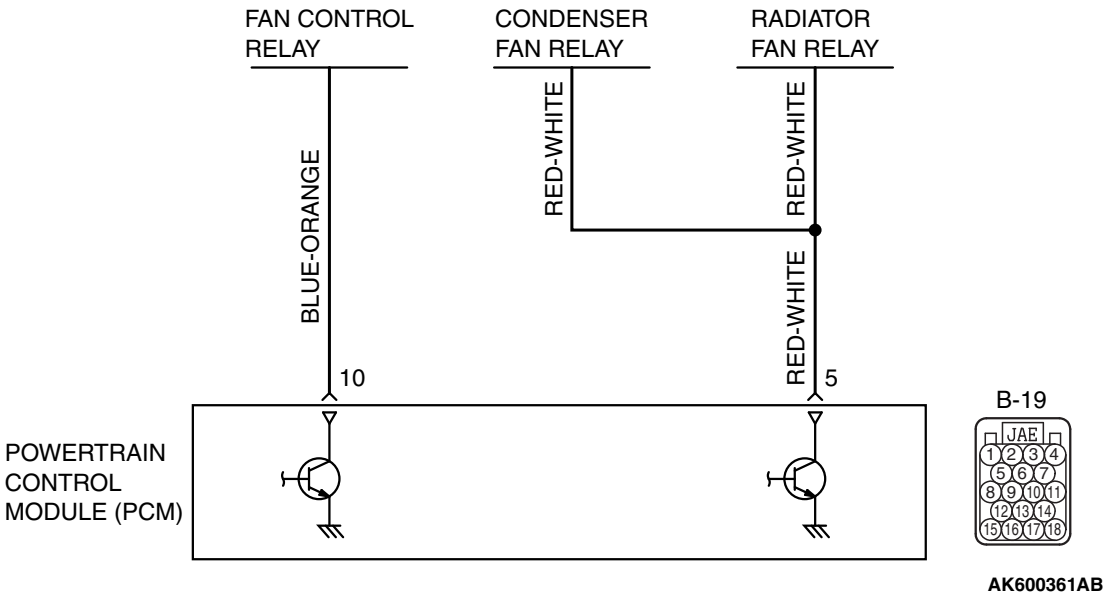
STEP 3. Check for short circuit to ground between generator connector B-116 (terminal No. 1) and PCM connector B-23 (terminal No. 132).

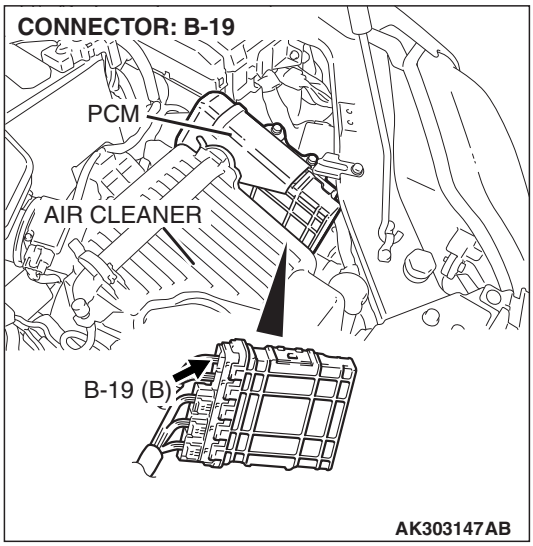
Q: Is the harness wire in good condition?

YES : Replace the PCM. When the PCM is replaced, register the encrypted code. Refer to GROUP 54A, Ignition Switch –Encrypted Code Registration Criteria Table P.54A-10. Then confirm that the malfunction symptom is eliminated.

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

INSPECTION PROCEDURE 26: Fans (radiator fan, A/C condenser fan) Are Inoperative





COMMENT

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

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

- Malfunction of the fan control relay.
- Malfunction of the 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 shorted harness wire.
- PCM failed.

DIAGNOSIS

Required Special Tools:

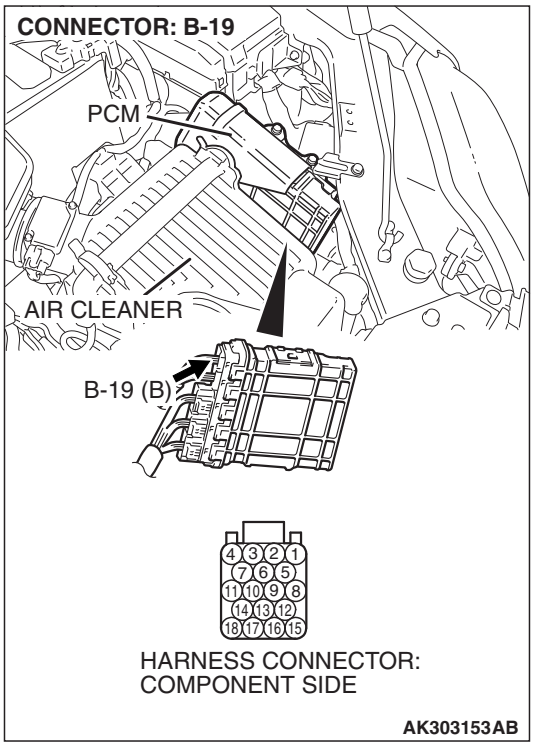
- MB991958: Scan tool (M.U.T.-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991910: Main Harness A

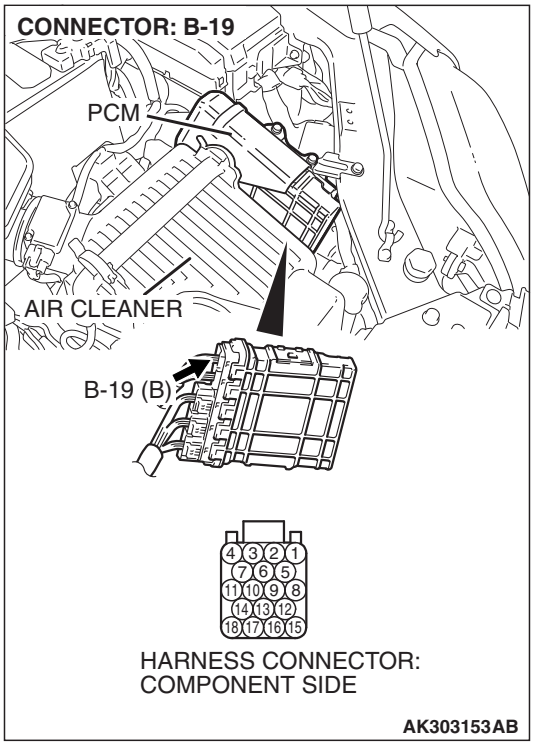
STEP 1. Check harness connector B-19 at PCM for damage.

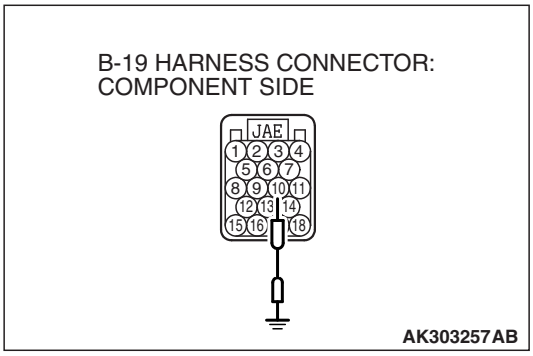
Q: Is the harness connector in good condition?

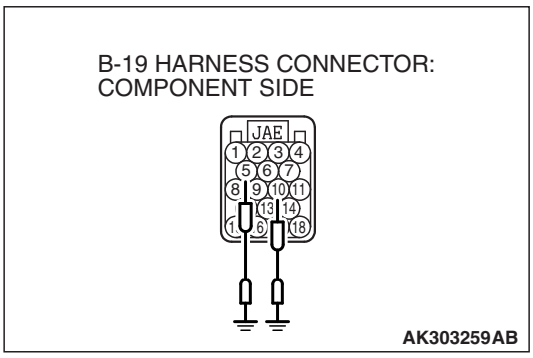
YES : Go to Step 2.

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









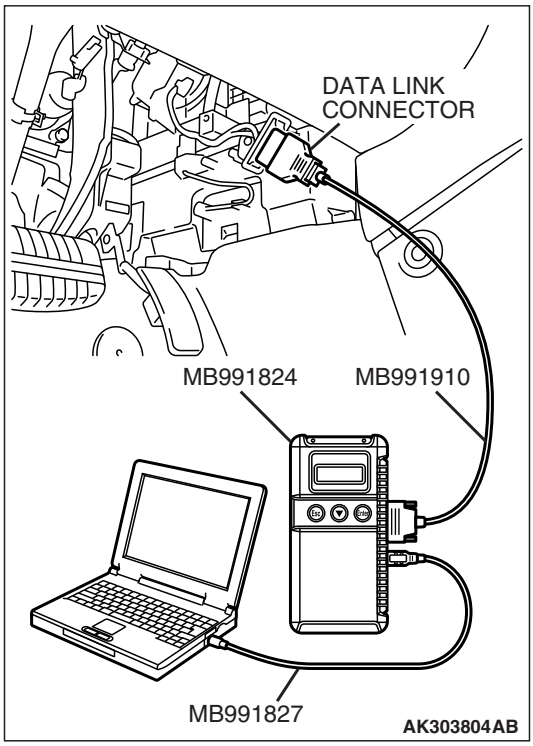
STEP 2. Check the fan condition.

(1) Disconnect the B-19 at PCM connector.
(2) Turn the ignition switch to the "ON" position.
(3) Check the fan condition.
- When the terminal No.10 is grounded by the jumper cable, the radiator and condenser fans should run.
- When the terminal No.10 is grounded first and then both of the terminal No.10 and No.5 are grounded next, check that the rotation speed of fan is higher than the rotation speed when the terminal No.10 is grounded.

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

Q: Is the fan condition normal?

YES : Go to Step 3.
NO : Refer to GROUP 14, Engine Cooling Diagnosis – Symptom Chart P.14-3.



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 P.13A-1169.
  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.

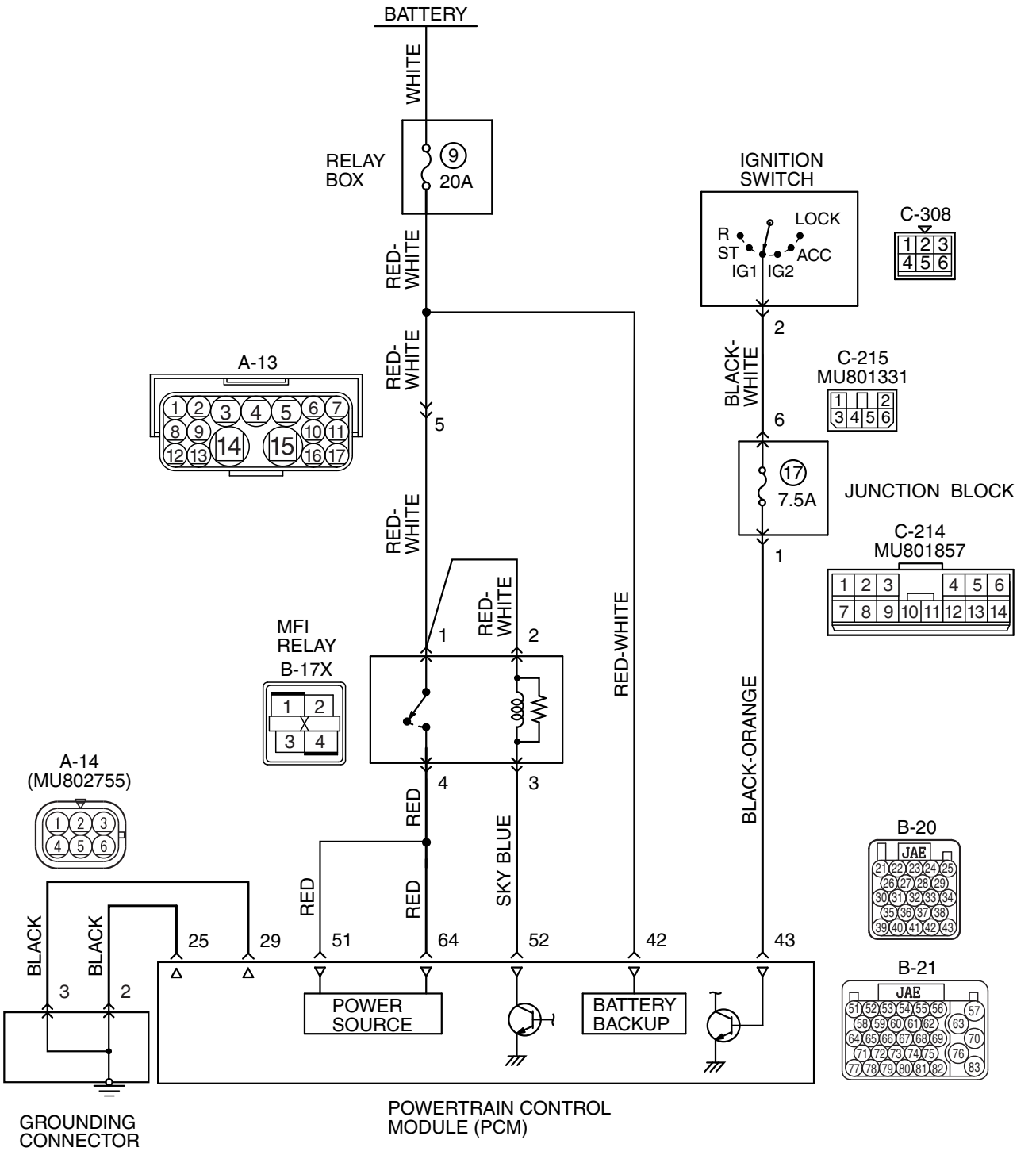
STEP 4. Check the cooling system.
Refer to GROUP 14, Engine Cooling Diagnosis –Symptom Chart P.14-3.

Q: Is the cooling system normal?

YES : Replace the PCM. When the PCM is replaced, register the encrypted code. Refer to GROUP 54A, Ignition Switch –Encrypted Code Registration Criteria Table P.54A-10.
NO : Replace it. Then confirm that the malfunction symptom is eliminated.

INSPECTION PROCEDURE 27: Power Supply System And Ignition Switch-IG System

Power Supply and Ignition Switch-IG Circuit



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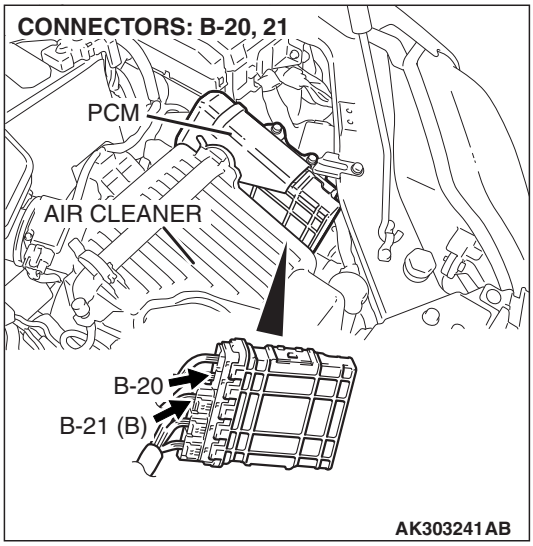

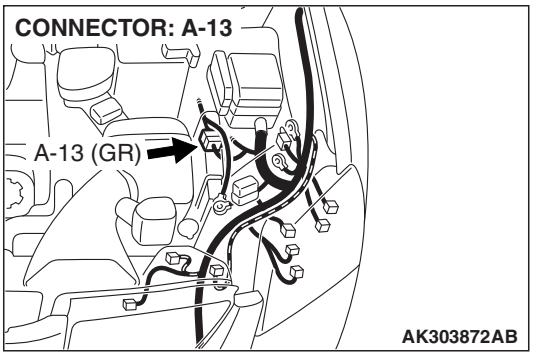

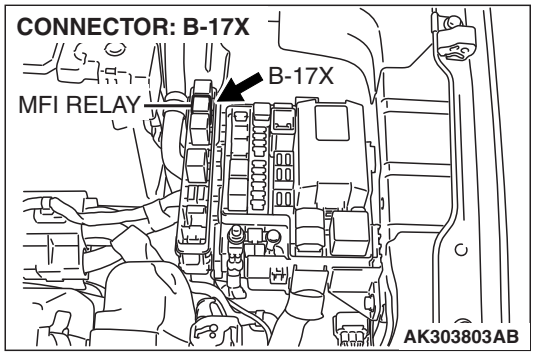

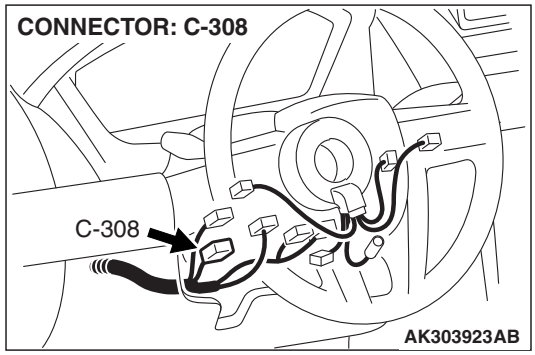

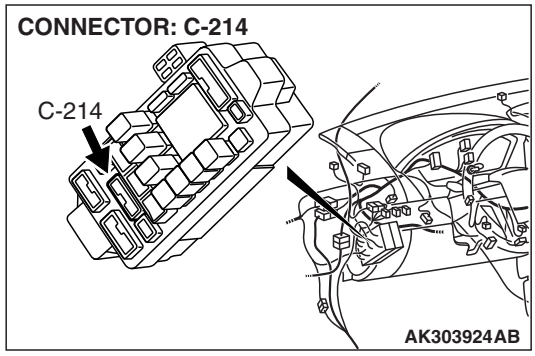

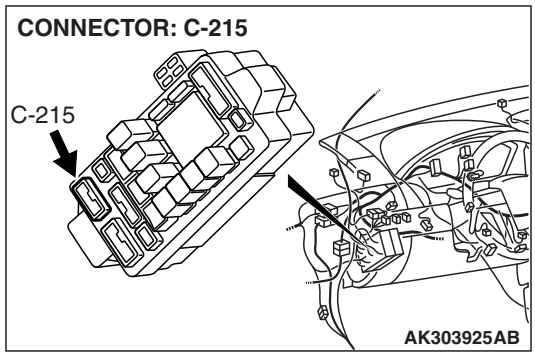

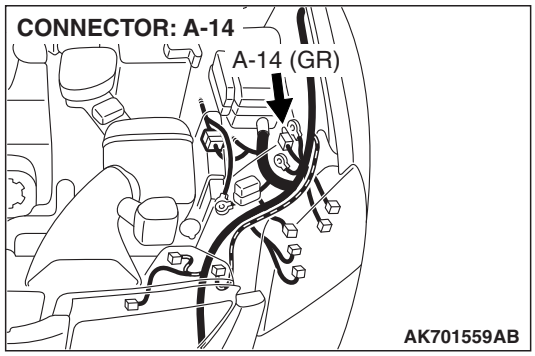

CIRCUIT OPERATION

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

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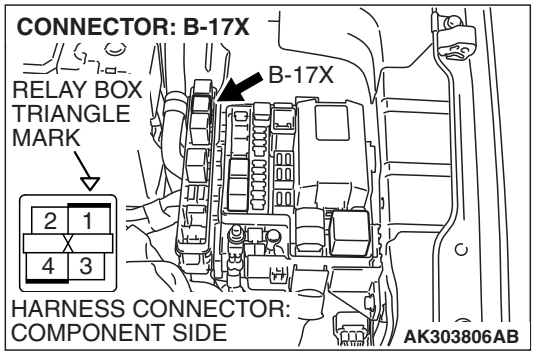
- A battery positive voltage is constantly supplied to the PCM (terminal No. 42) as the backup power.
- The PCM (terminals No. 25, No. 29) is grounded to the vehicle body.

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

- Malfunction of the ignition switch.
- Malfunction of the MFI relay.
- Improper connector contact, open or shorted harness wire.
- Disconnected PCM ground wire.
- Malfunction of the PCM.

DIAGNOSIS



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

Q: Is the connector in good condition?

YES : Go to Step 2.

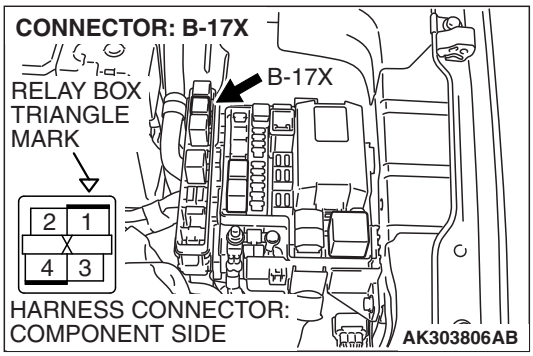
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then confirm that the malfunction symptom is eliminated.

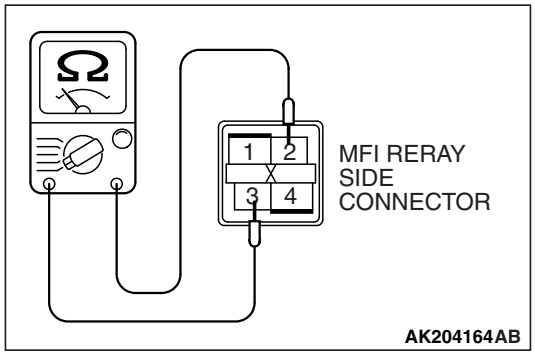
STEP 2. Check the MFI relay.

⚠ CAUTION

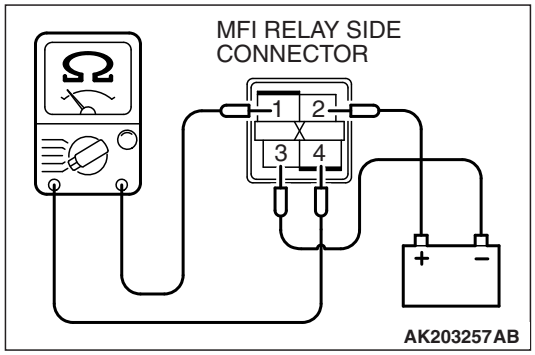
Because it is not possible to distinguish the top and the bottom of the MFI relay, inspect it with the triangle mark printed on the relay facing upward.

(1) Remove the MFI relay.





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



(3) Use jumper wires to connect MFI relay terminal No. 2 to the positive battery terminal and terminal No. 3 to the negative battery terminal.
(4) Check for continuity between the MFI relay terminals No. 1 and No. 4 while connecting and disconnecting the jumper wire at the negative battery terminal.
- Continuity (2 Ω or less) <Negative battery terminal connected>
- Should be open loop. <Negative battery terminal disconnected>

(5) Install the MFI relay.

Q: Is the measured resistance within the specified range?

YES : Go to Step 3.

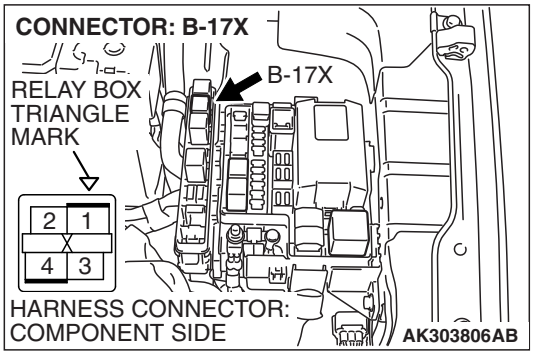
NO : Replace the MFI relay. Then confirm that the malfunction symptom is eliminated.

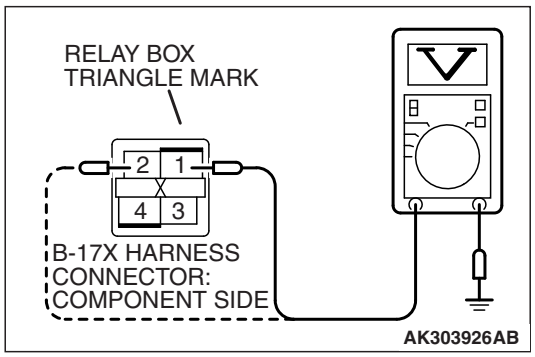
STEP 3. Measure the power supply voltage at MFI relay harness side connector B-17X.

⚠ CAUTION

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

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



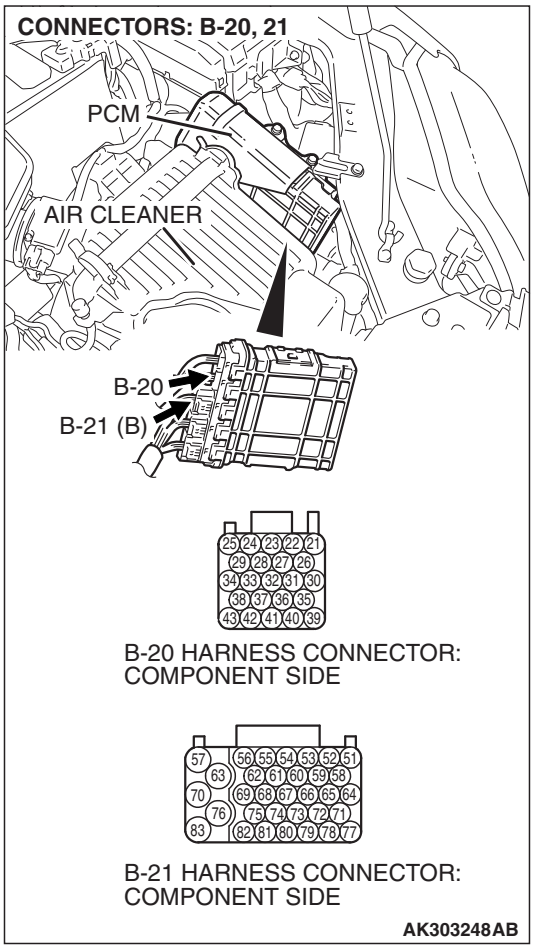


(2) Measure the voltage between terminals No. 1, No. 2 and ground.
- Voltage should be battery positive voltage.

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

YES : Go to Step 4.

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

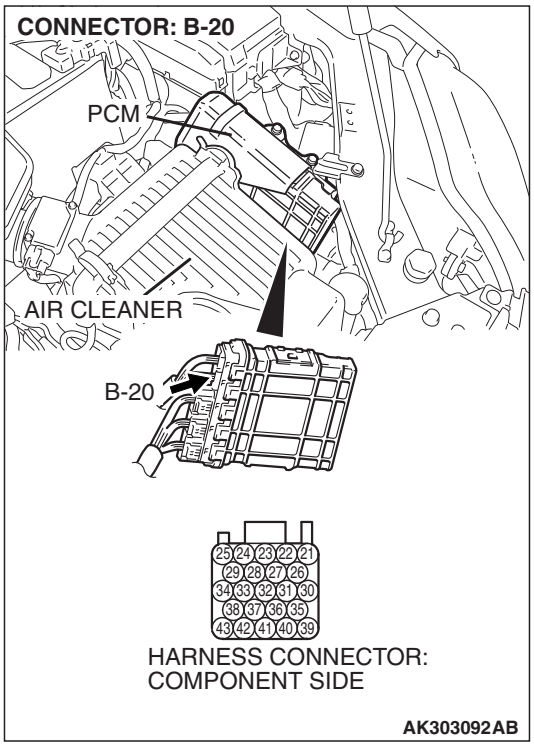


STEP 4. Check harness connector B-20 and B-21 at PCM for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 5.

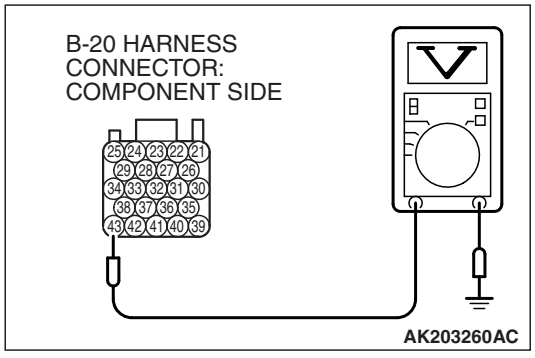
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then confirm that the malfunction symptom is eliminated.



STEP 5. Measure the ignition switch-IG signal voltage at PCM harness side connector B-20.

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

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



(3) Measure the voltage between terminal No. 43 and ground.
- Voltage should be battery positive voltage.

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

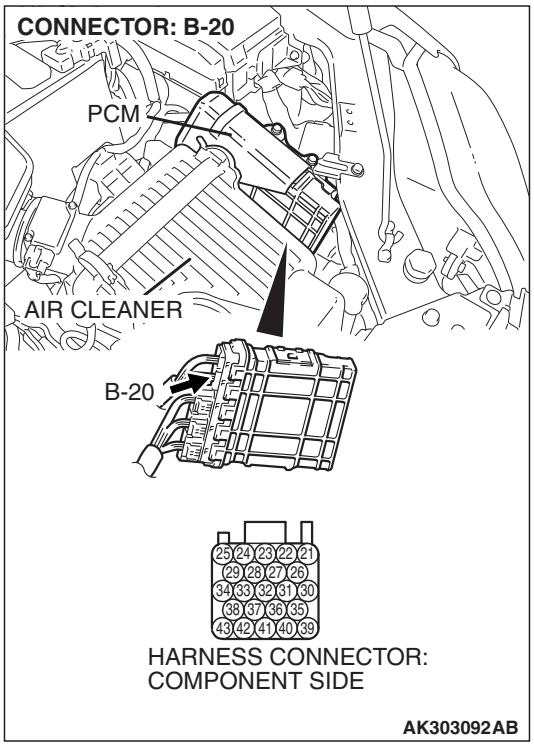
Q: Is battery positive voltage (approximately 12 volts) present?

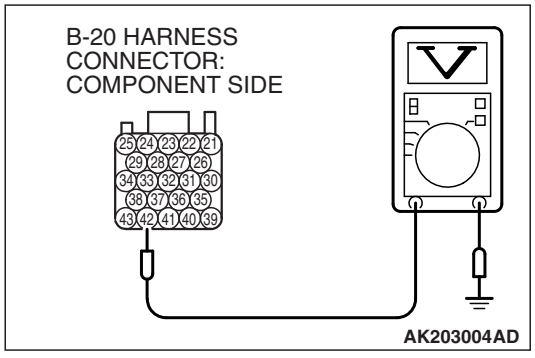
YES : Go to Step 6.

NO : Check harness connectors C-214 and C-215 at intermediate connector for damage, and repair or replace as required. Refer to, GROUP 00E, Harness Connector Inspection P.00E-2. If intermediate connectors are in good condition, repair harness wire between ignition switch connector C-308 (terminal No. 2) and PCM connector B-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 PCM harness side connector B-20.

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





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

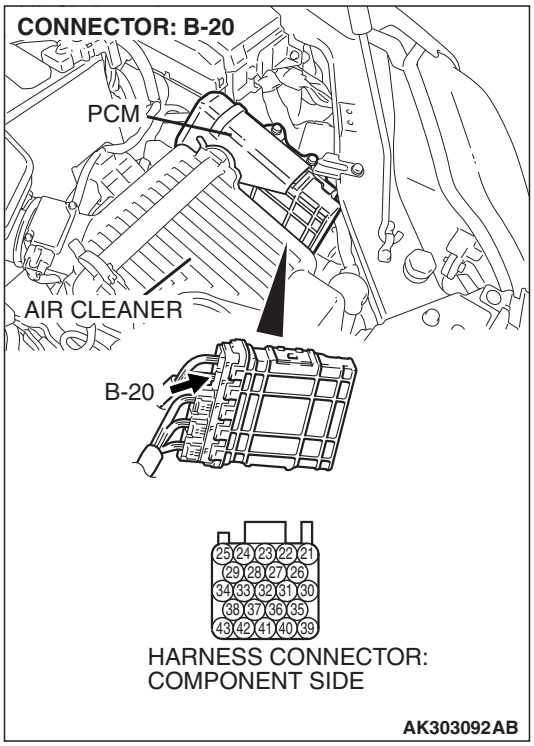
Q: Is battery positive voltage (approximately 12 volts) present?

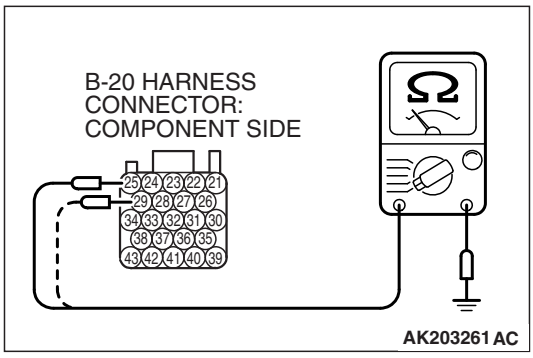
YES : Go to Step 7.

NO : Repair harness wire between fusible link (9) and PCM connector B-20 (terminal No. 42) because of open circuit. Then confirm that the malfunction symptom is eliminated.

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

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





(2) Check for the continuity between terminals (No. 25, No. 29) and ground.
- Continuity (2 Ω or less)

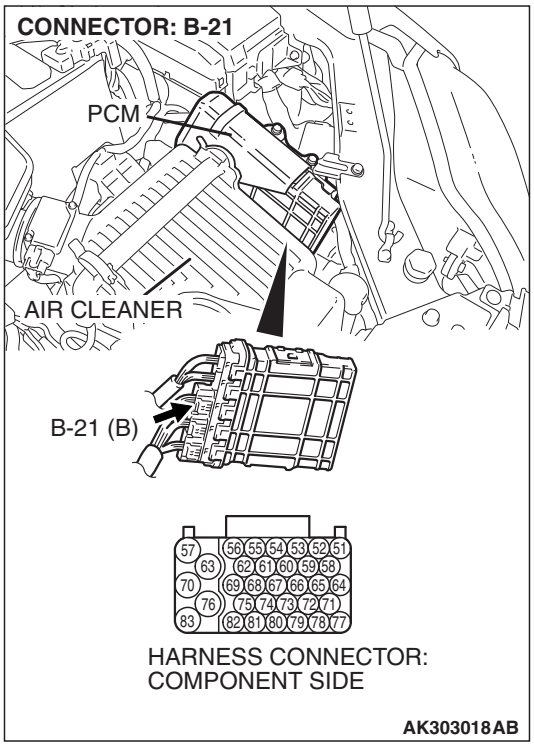
Q: Does continuity exist?

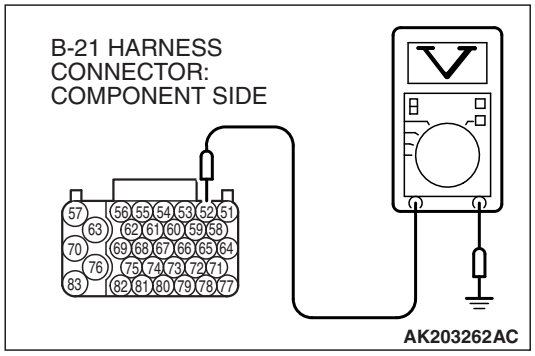
YES : Go to Step 8.

NO : Repair harness wire between PCM connector B-20 (terminal No. 25, No. 29) and ground because of open circuit or harness damage. Then confirm that the malfunction symptom is eliminated.

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

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





(2) Measure the voltage between terminal No. 52 and ground.
- Voltage should be battery positive voltage.

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

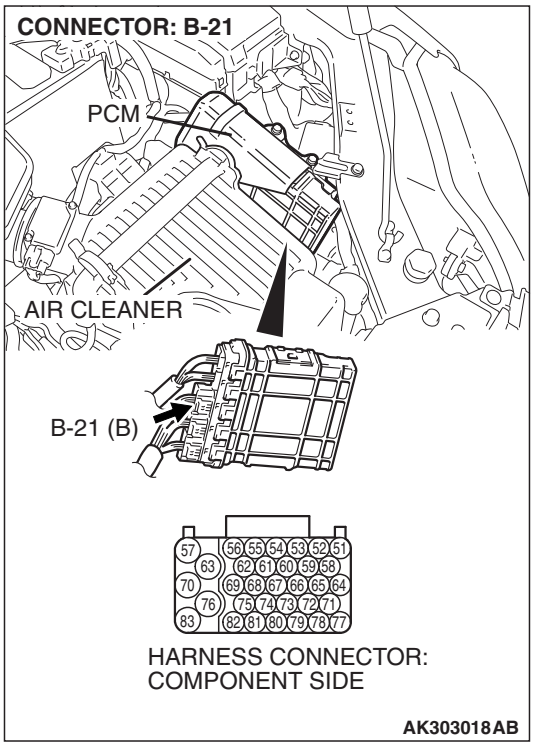
YES : Go to Step 9.

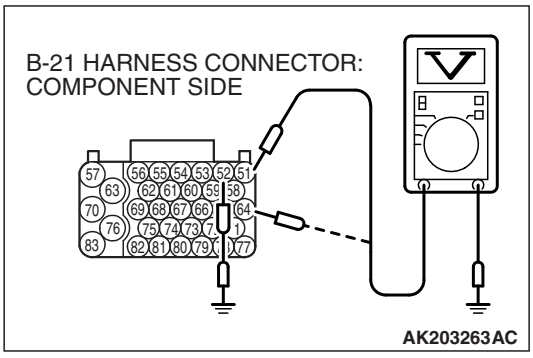
NO : Repair harness wire between MFI relay connector B-17X (terminal No. 3) and PCM connector B-21 (terminal No. 52) because of open circuit. Then confirm that the malfunction symptom is eliminated.

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

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

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





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

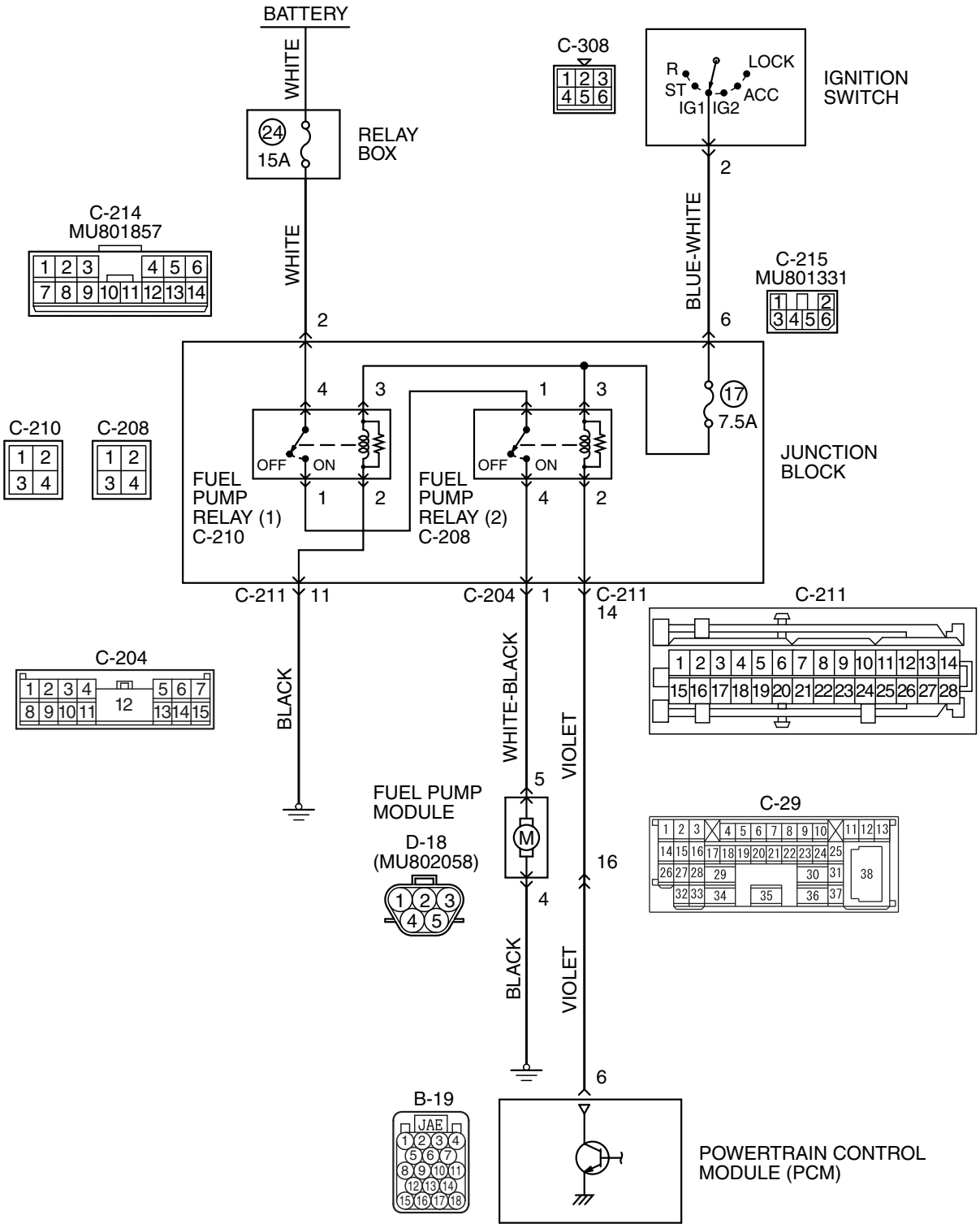
Q: Is battery positive voltage (approximately 12 volts) present?

YES : Replace the PCM. When the PCM is replaced, register the encrypted code. Refer to GROUP 54A, Ignition Switch –Encrypted Code Registration Criteria Table P.54A-10.

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

INSPECTION PROCEDURE 28: Fuel Pump System

Fuel Pump Circuit



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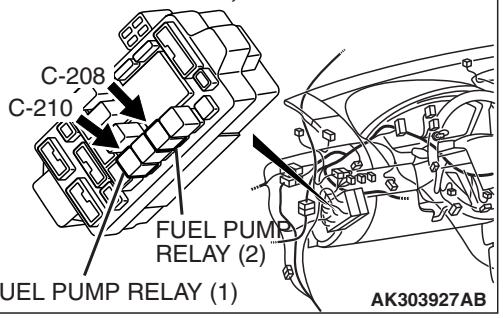
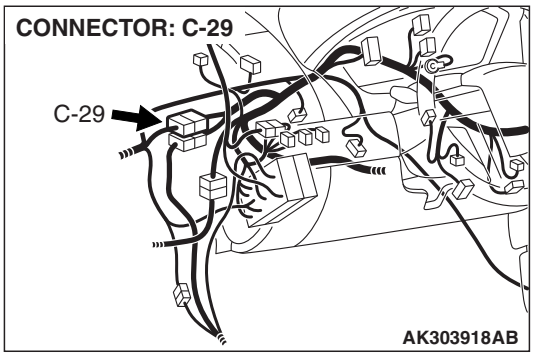
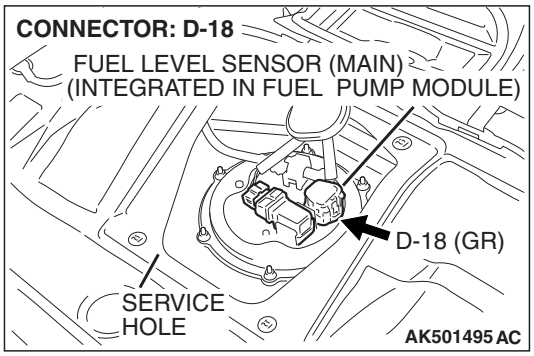
CONNECTORS: C-208, C-210



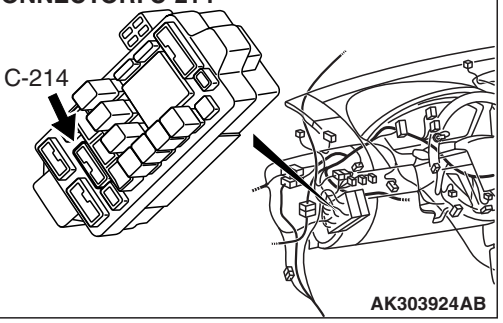
CONNECTOR: C-29



CONNECTOR: D-18



CONNECTOR: C-214



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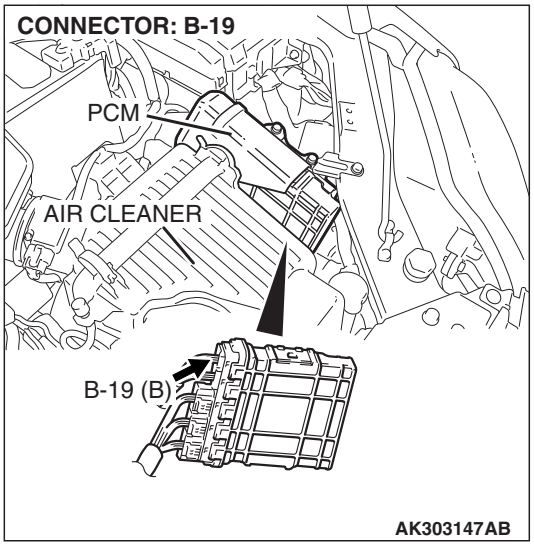
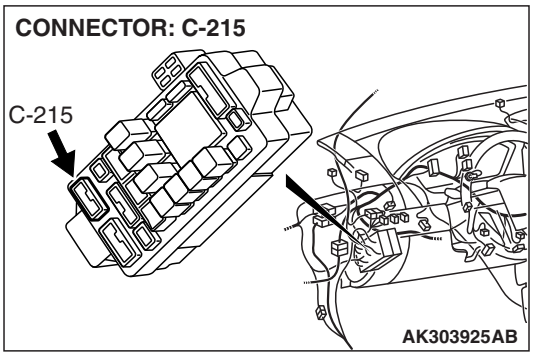
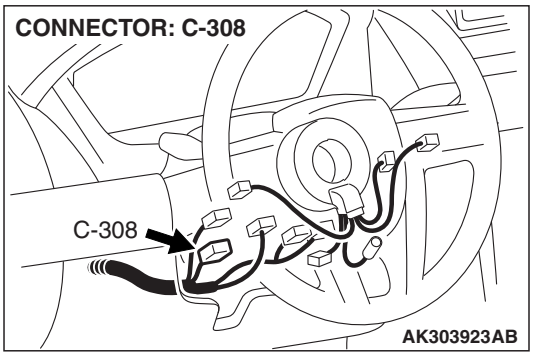


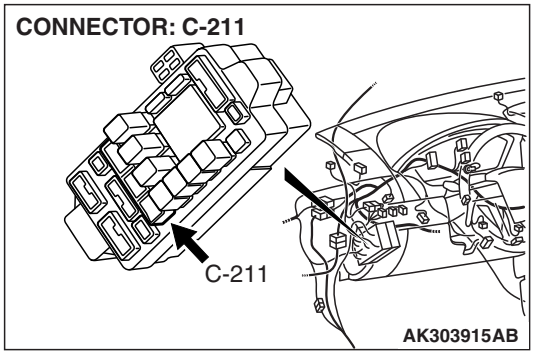
CONNECTOR: C-215



CONNECTOR: C-308



CONNECTOR: C-211



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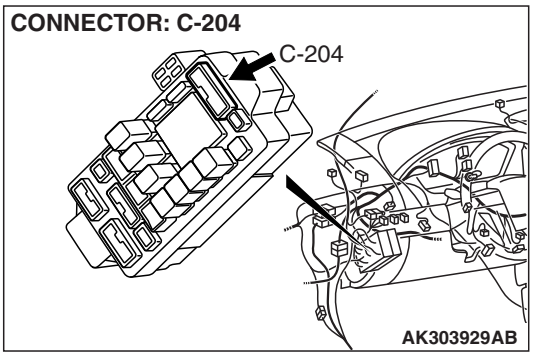


CIRCUIT OPERATION

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

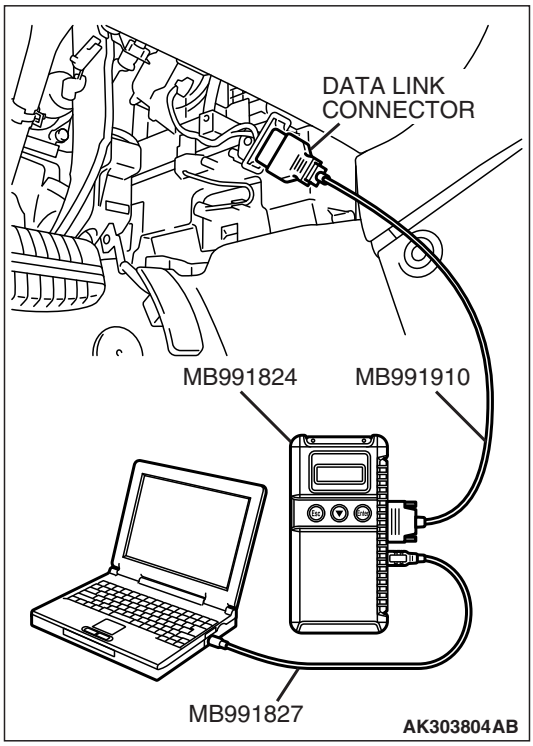
TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)

- Malfunction of the fuel pump relay.
- Malfunction of the fuel pump.
- Improper connector contact, open or short-circulated harness wire.
- Malfunction of the PCM.

DIAGNOSIS

Required Special Tools:

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



STEP 1. Using scan tool MB991958, check actuator test item 9: 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.

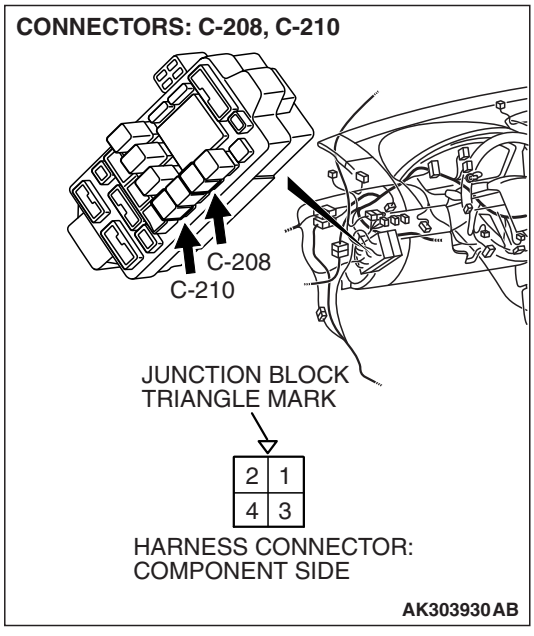
(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Set scan tool MB991958 to the actuator test mode for item 9, Fuel Pump.
- An operation sound of the fuel pump should be heard.

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

Q: Is the harness connector in good condition?

YES : Go to Step 3.

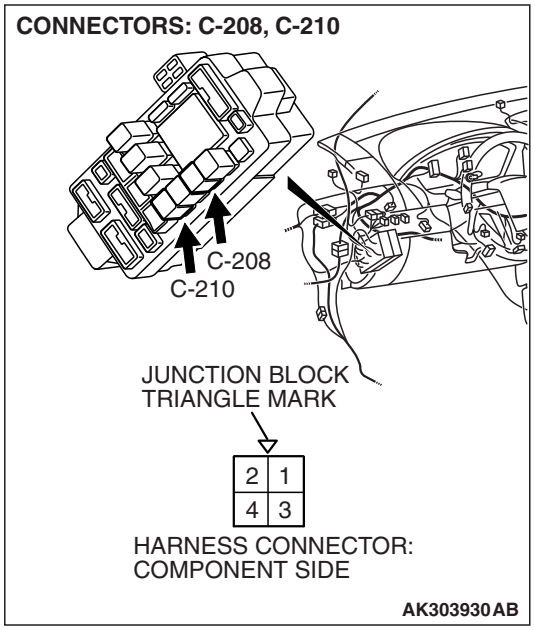
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then confirm that the malfunction symptom is eliminated.

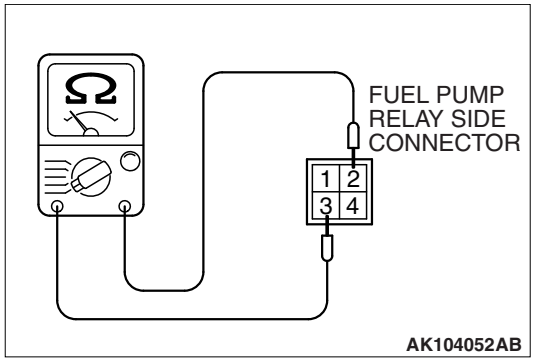
STEP 3. Check the fuel pump relay 1 and 2.

⚠ CAUTION

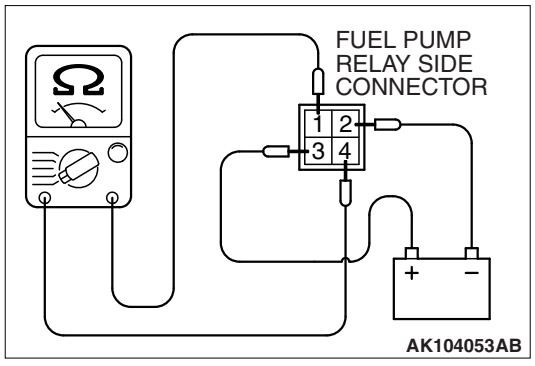
Because it is not possible to distinguish the top and the bottom of the fuel pump relay, inspect it with the triangle mark printed on the relay facing upward.

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





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



(3) Use jumper wires to connect each fuel pump relay terminal No. 3 to the positive battery terminal and terminal No. 2 to the negative battery terminal.
(4) Check for continuity between the each fuel pump relay terminals No. 1 and No. 4 while connecting and disconnecting the jumper wire at the negative battery terminal.
- Continuity (2 Ω or less) <Negative battery terminal connected>
- Should be open loop. <Negative battery terminal disconnected>

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

Q: Is the measured resistance normal?

YES : Go to Step 4.

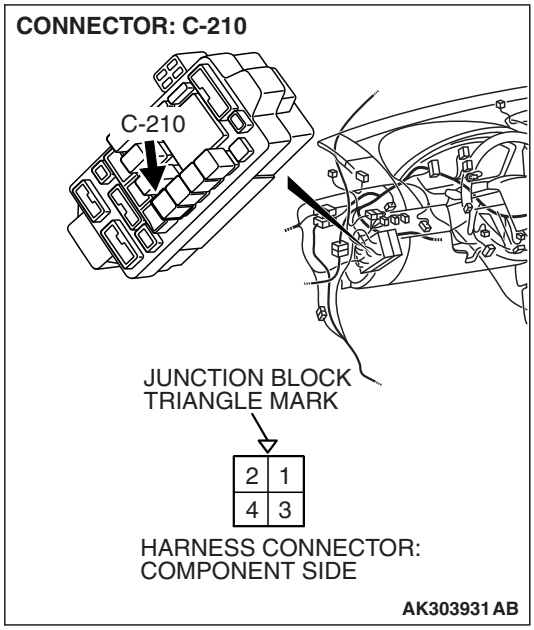
NO : Replace the fuel pump relay 1 and/or 2. Then confirm that the malfunction symptom is eliminated.

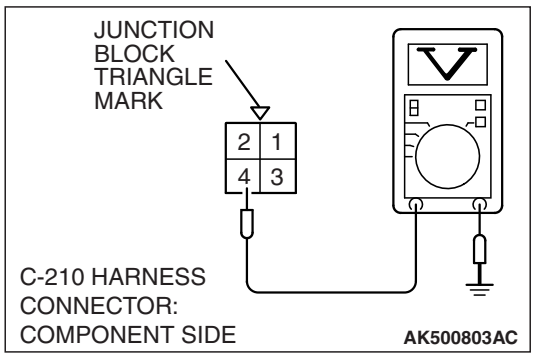
STEP 4. Measure the power supply voltage at fuel pump relay 1 harness side connector C-210.

⚠ CAUTION

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

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





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

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

YES : Go to Step 5.

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

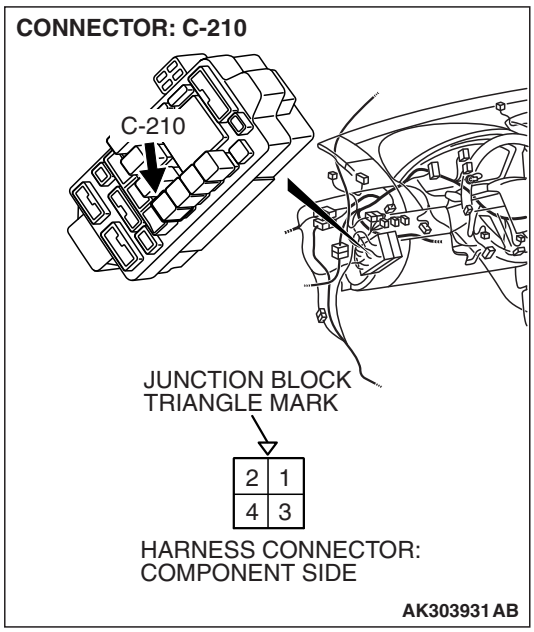
STEP 5. Measure the power supply voltage at fuel pump relay 1 harness side connector C-210.

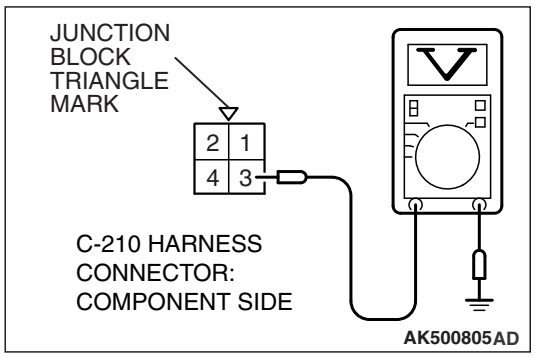
⚠ CAUTION

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

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

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





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

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

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

YES : Go to Step 6.

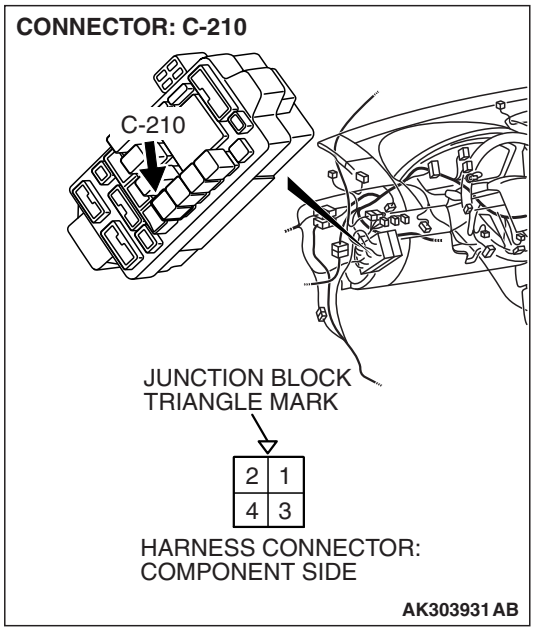
NO : Check harness connector C-215 at intermediate connector for damage, and repair or replace as required. Refer to, GROUP 00E, Harness Connector Inspection P.00E-2. If intermediate connector is in good condition, repair harness wire between ignition switch connector C-308 (terminal No. 2) and fuel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

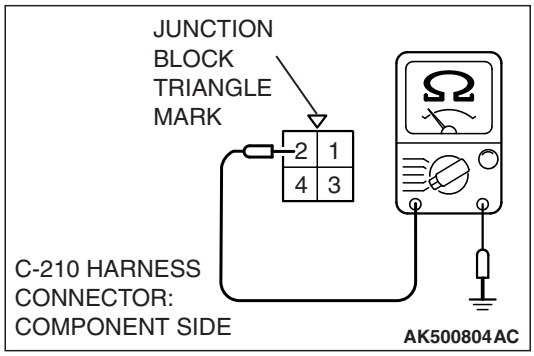
STEP 6. Check for continuity at fuel pump relay 1 harness side connector C-210.

⚠ CAUTION

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

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





(2) Check for the continuity between terminal No. 2 and ground.
- Continuity (2 Ω or less)

Q: Does continuity exist?

YES : Go to Step 7.

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

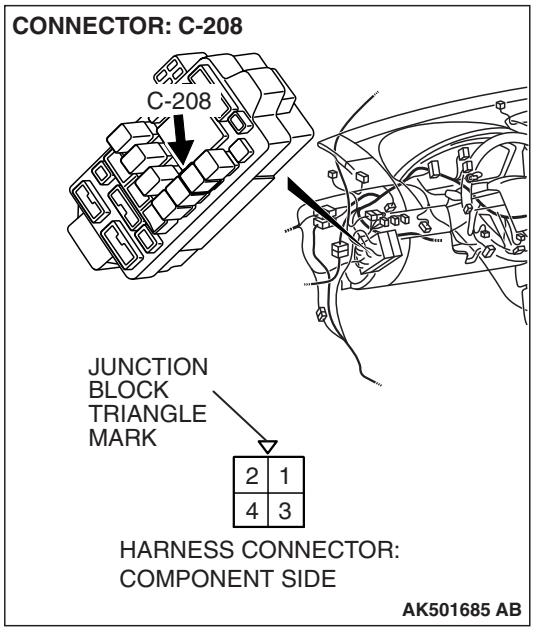
STEP 7. Measure the power supply voltage at fuel pump relay 2 harness side connector C-208.

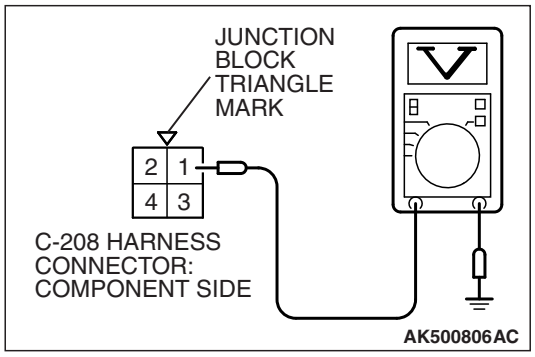
⚠ CAUTION

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

(1) Disconnect the connector C-208 and measure at the harness side.

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





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

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

YES : Go to Step 8.

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

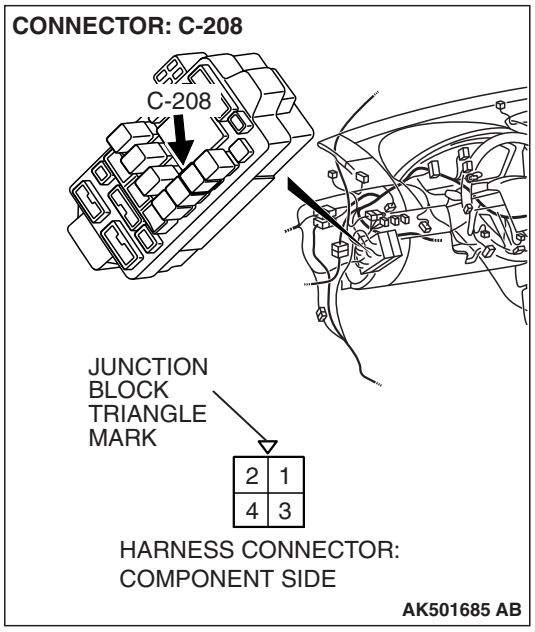
STEP 8. Measure the power supply voltage at fuel pump relay 2 harness side connector C-208.

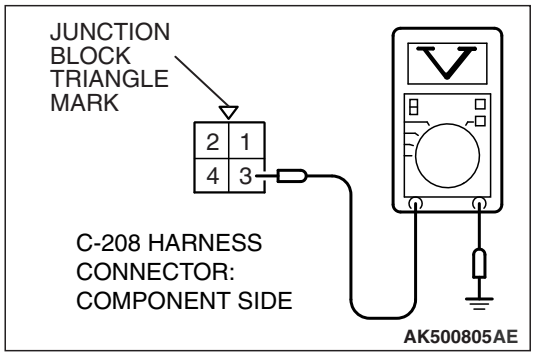
⚠ CAUTION

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

(1) Disconnect the connector C-208 and measure at the harness side.

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





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

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

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

YES : Go to Step 9.

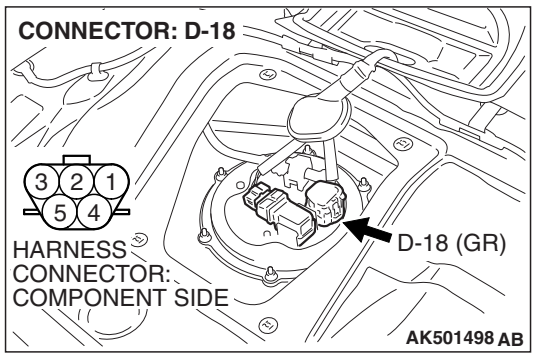
NO : Check harness connector C-215 at intermediate connector for damage, and repair or replace as required. Refer to, GROUP 00E, Harness Connector Inspection P.00E-2. If intermediate connector is in good condition, repair harness wire between ignition switch connector C-308 (terminal No. 2) and fuel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

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

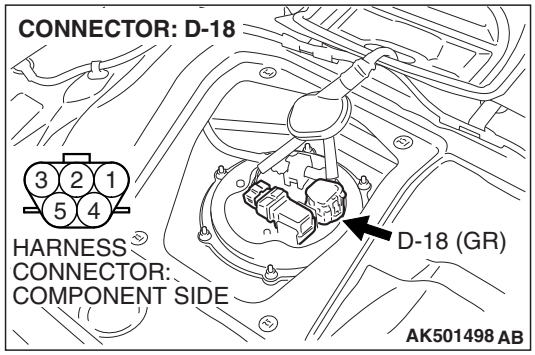
Q: Is the connector in good condition?

YES : Go to Step 10.

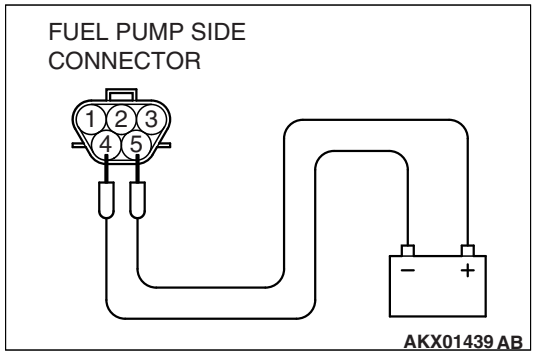
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then confirm that the malfunction symptom is eliminated.



STEP 10. Check the fuel pump operation.



(1) Disconnect fuel pump connector D-18.



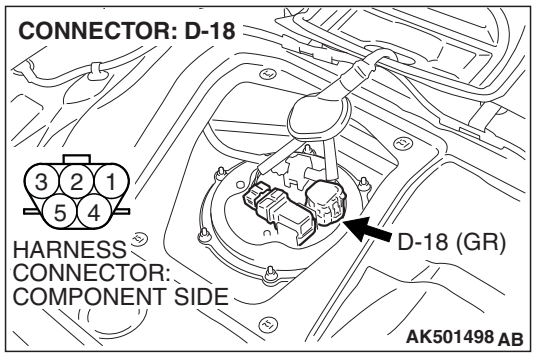
(2) Use jumper wires to connect fuel pump connector terminal No. 5 to the positive battery terminal and terminal No. 4 to the negative battery terminal.
- An operating sound of the fuel pump should be heard.

Q: Is the fuel pump operating properly?

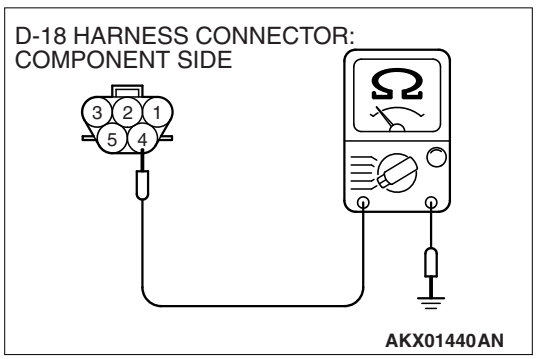
YES : Go to Step 11.

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

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



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

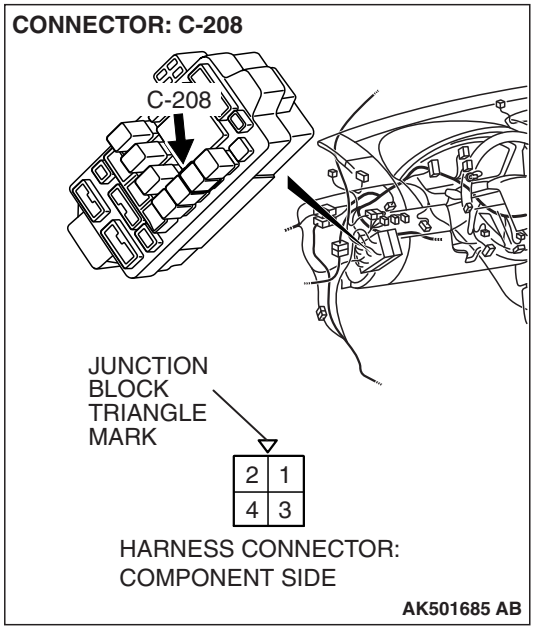


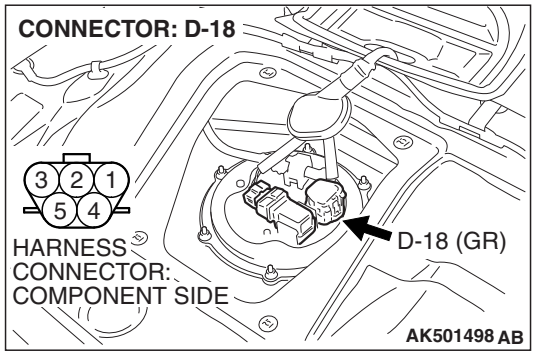
(2) Check for the continuity between terminal No. 4 and ground.
- Continuity (2 Ω or less)

Q: Does continuity exist?

YES : Go to Step 12.

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





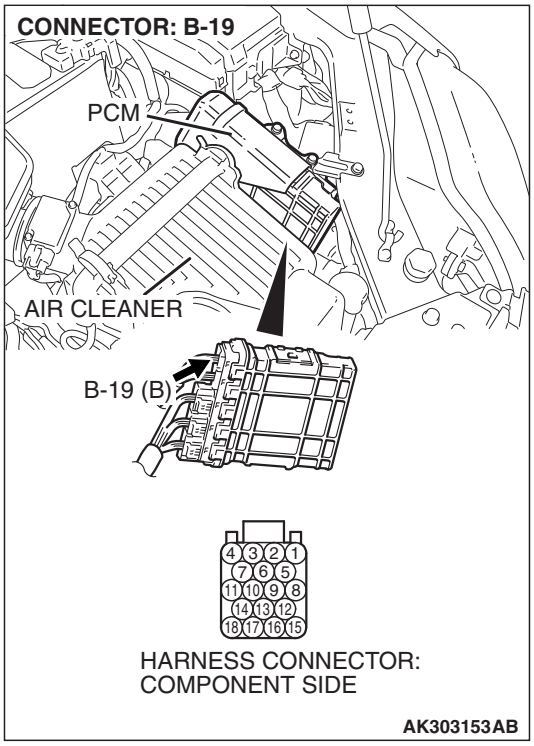
STEP 12. Check for open circuit and short circuit to ground and harness damage between fuel pump relay 2 connector C-208 (terminal No. 4) and fuel pump connector D-18 (terminal No. 5).

NOTE: Check harness after checking intermediate connector C-204. If intermediate connector is damaged, repair or replace it. 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 : Go to Step 13.

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

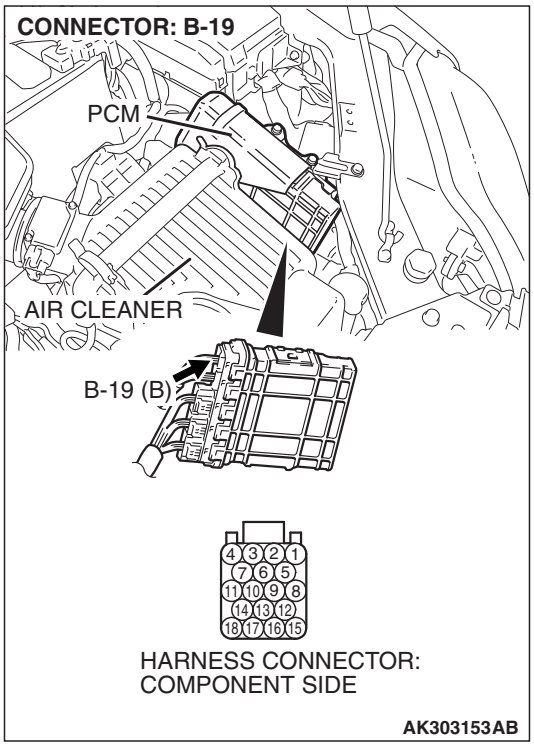


STEP 13. Check connector B-19 at PCM for damage.

Q: Is the connector in good condition?

YES : Go to Step 14.

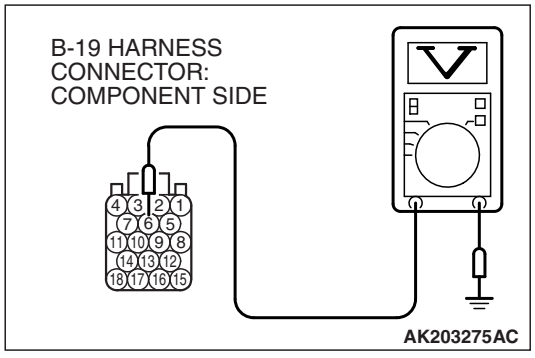
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then confirm that the malfunction symptom is eliminated.



STEP 14. Measure the power supply voltage at PCM connector B-19.

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

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



(3) Measure the voltage between terminal No. 6 and ground.
- Voltage should be battery positive voltage.

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

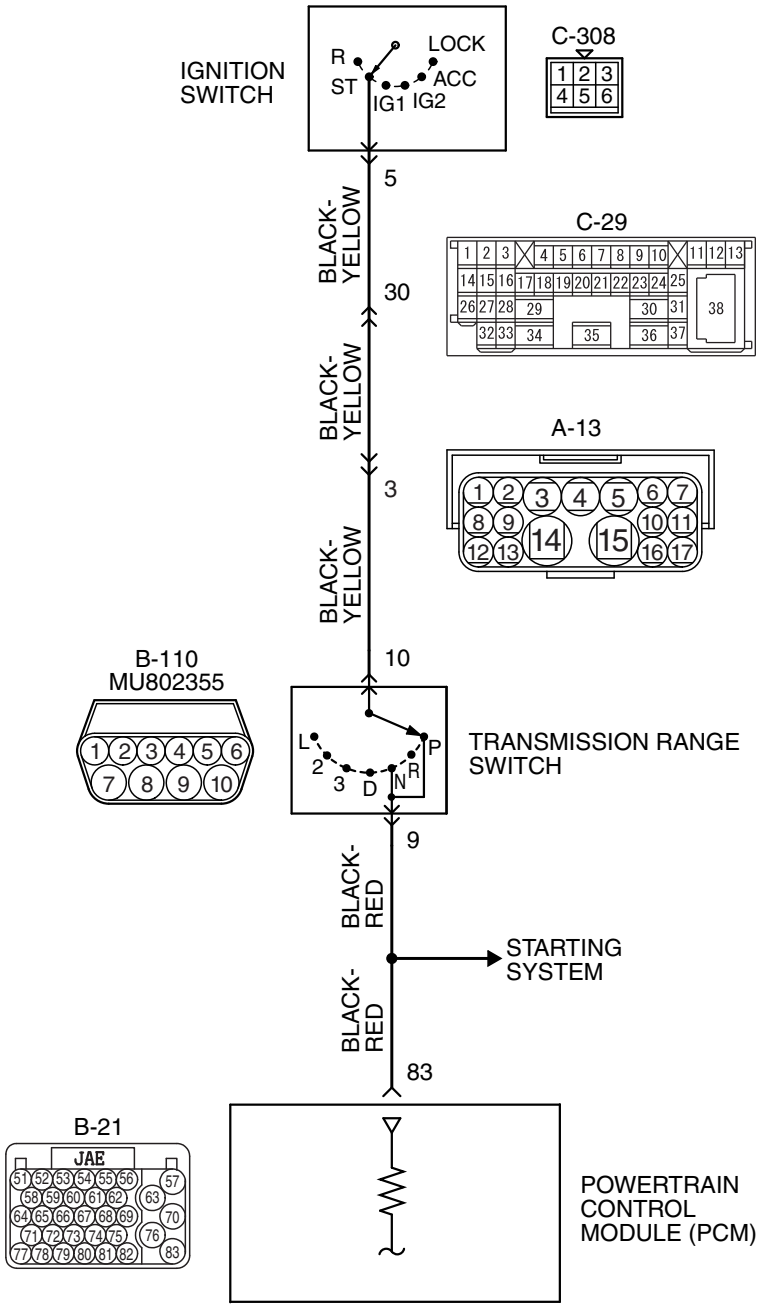
Q: Is battery positive voltage (approximately 12 volts) present?

YES : Replace the PCM. When the PCM is replaced, register the encrypted code. Refer to GROUP 54A, Ignition Switch –Encrypted Code Registration Criteria Table P.54A-10. Then confirm that the malfunction symptom is eliminated.

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

INSPECTION PROCEDURE 29: Ignition Switch-ST System and Transmission Range Switch System

Ignition Switch-ST and Transmission Range Switch Circuit



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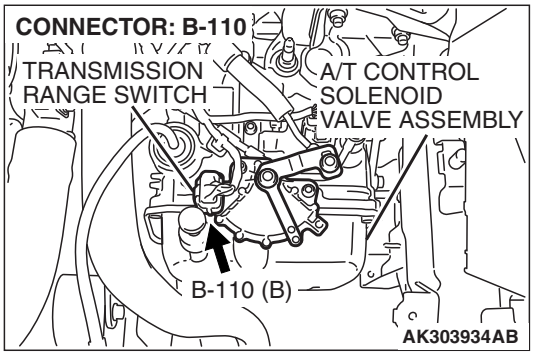
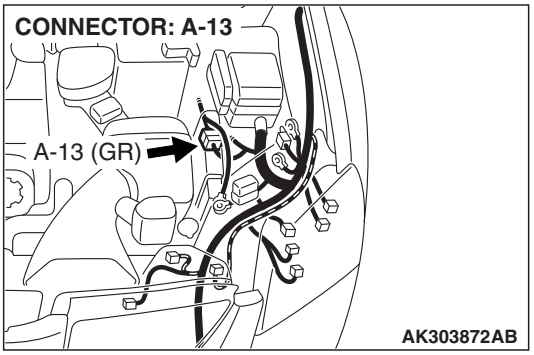
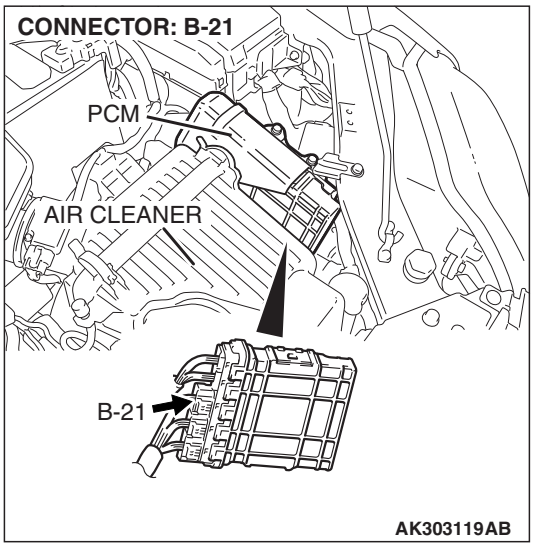
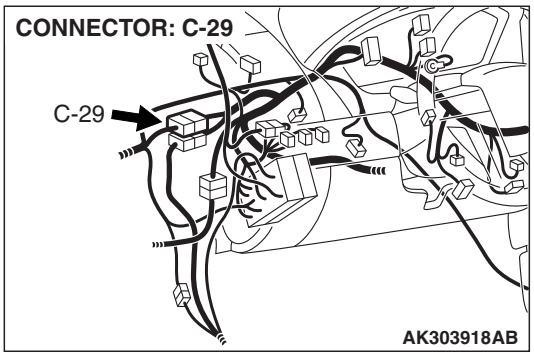
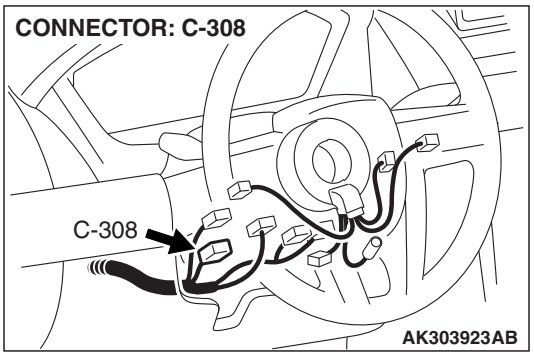










COMMENT

- 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.

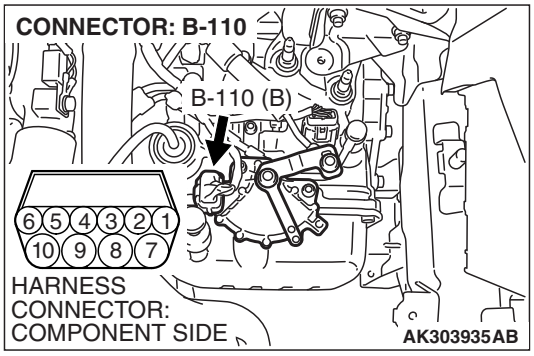
DIAGNOSIS

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

Q: Is the connector in good condition?

YES : Go to Step 2.

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



STEP 2. Check the transmission range switch.

Refer to GROUP 23A, On-vehicle Service –Essential Service – Transmission Range Switch Check P.23A-400.

Q: Are there any abnormalities?

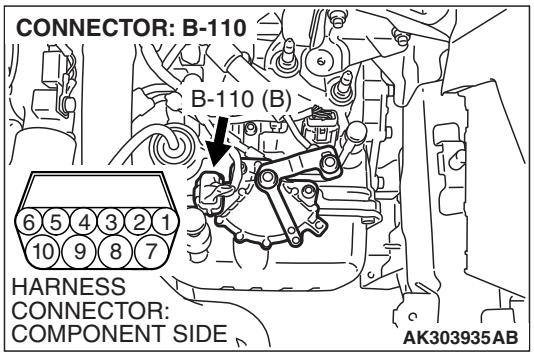
YES : Repair or replace it. Then confirm that the malfunction symptom is eliminated.

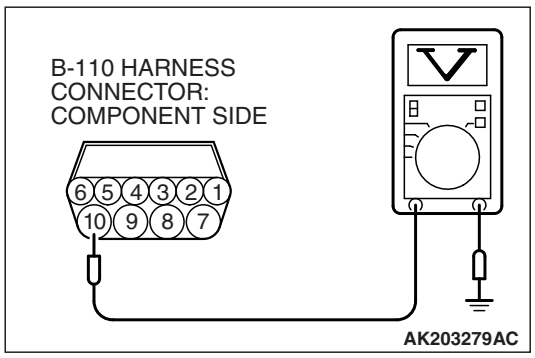
NO : Go to Step 3.

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

(1) Disconnect the connector B-110 and measure at the harness side.

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





(3) Measure the voltage between terminal No. 10 and ground.
- Voltage should be battery positive voltage.

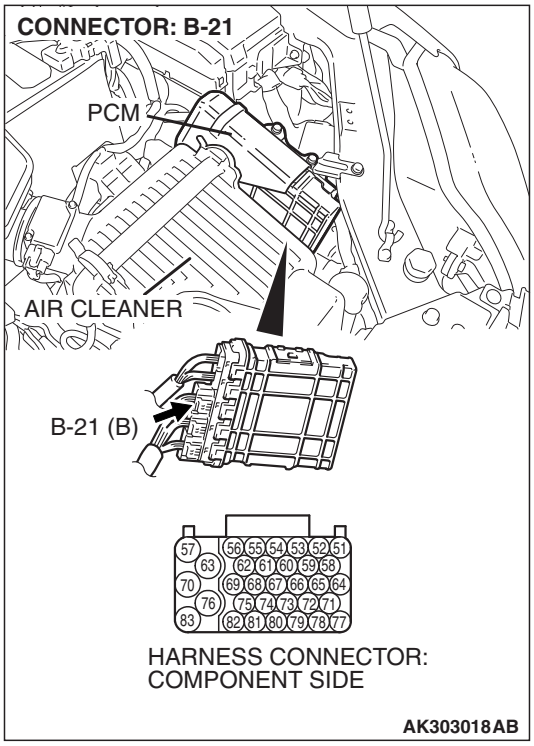
(4) Turn the ignition switch to the "LOCK" (OFF) position.

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

YES : Go to Step 4.

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

TSB Revision

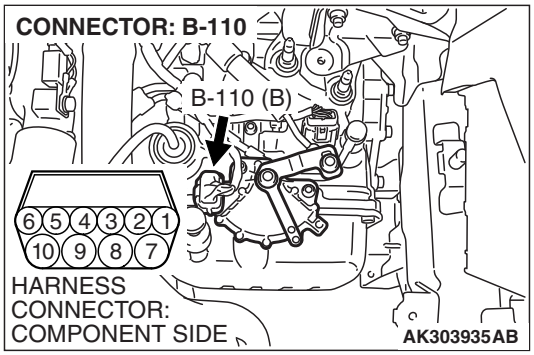


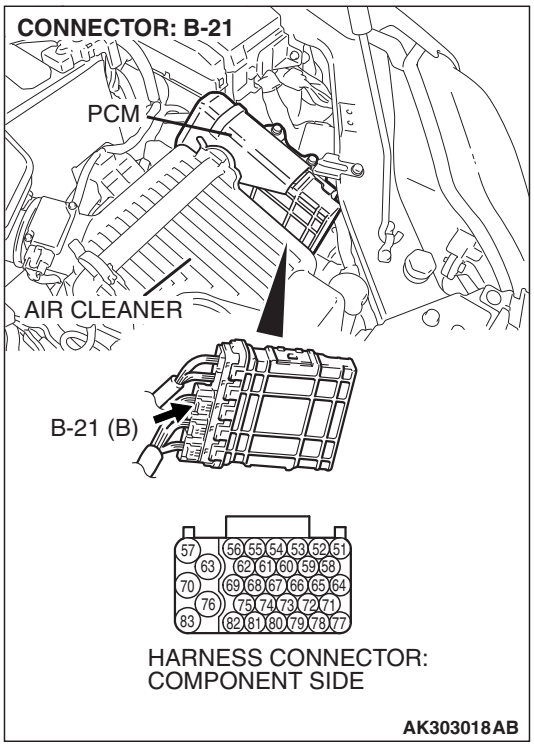
STEP 4. Check connector B-21 at PCM for damage.

Q: Is the connector in good condition?

YES : Go to Step 5.

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





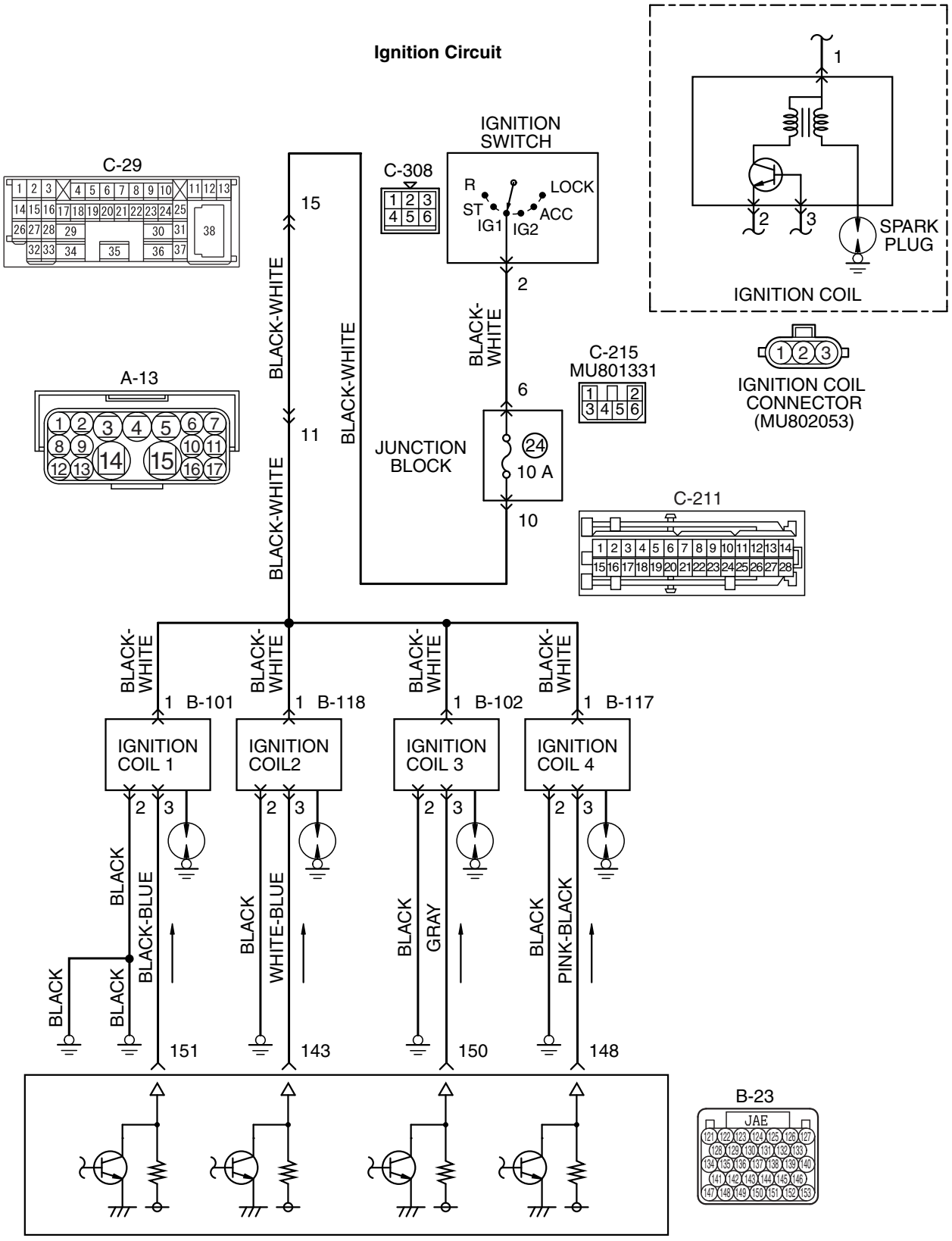
STEP 5. Check for open circuit and short circuit to ground and harness damage between transmission range switch connector B-110 (terminal No. 9) and PCM connector B-21 (terminal No. 83).

Q: Is the harness wire in good condition?

YES : Replace the PCM. When the PCM is replaced, register the encrypted code. Refer to GROUP 54A, Ignition Switch –Encrypted Code Registration Criteria Table P.54A-10. Then confirm that the malfunction symptom is eliminated.

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

INSPECTION PROCEDURE 30: Ignition Circuit System



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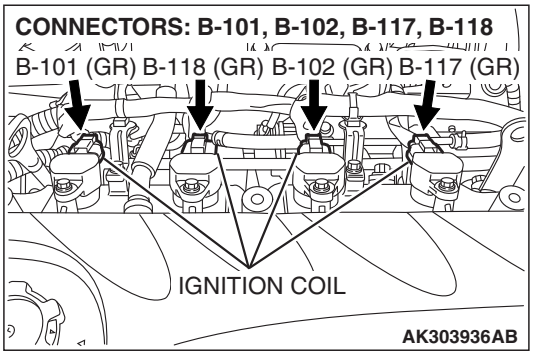
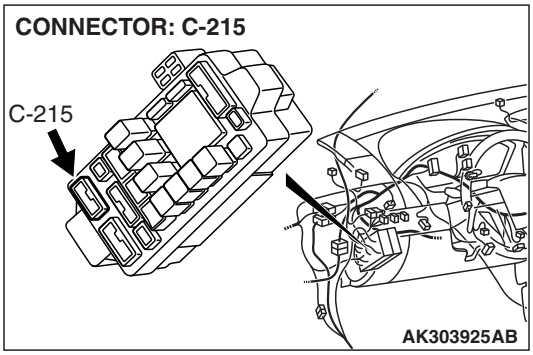
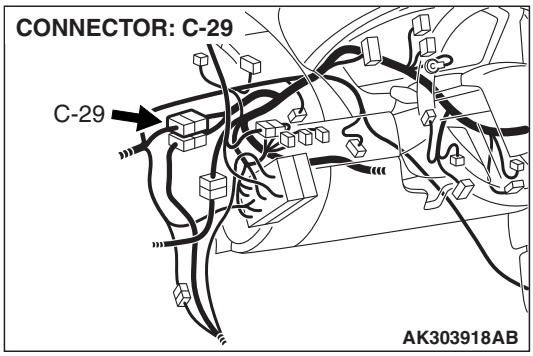
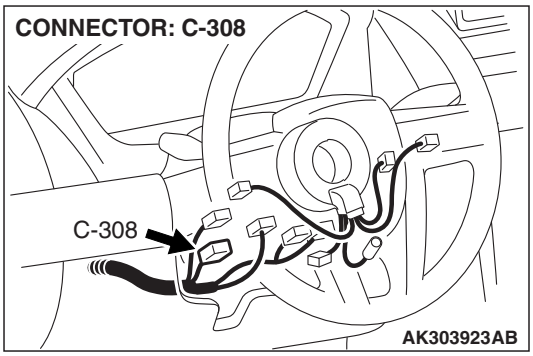
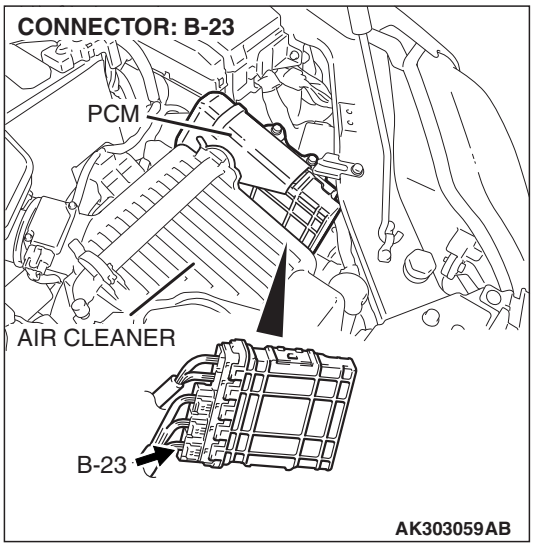
TSB Revision

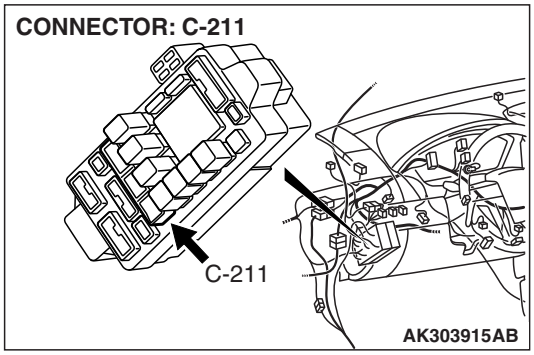


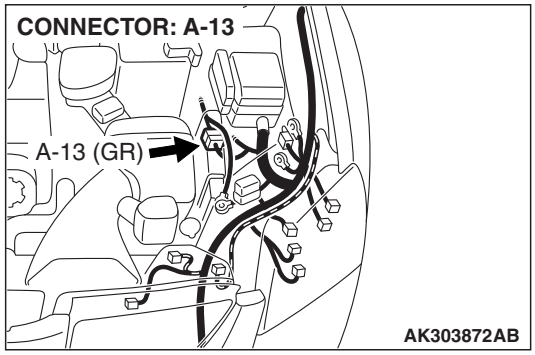












CIRCUIT OPERATION

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

TSB Revision

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 shorted harness wire.
- Malfunction of the PCM.

DIAGNOSIS

STEP 1. Check the ignition coil.

Refer to GROUP 16, Ignition System –On-vehicle service –Ignition Coil Check P.16-37.

Q: Are there any abnormalities?

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

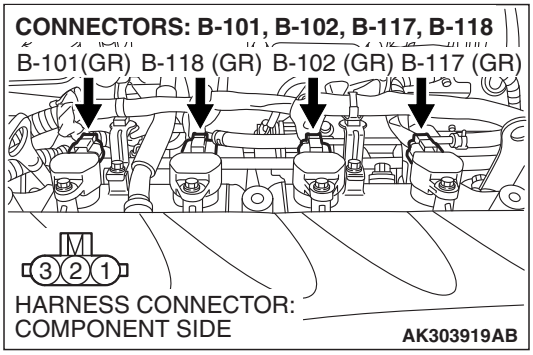
NO : Go to Step 2.

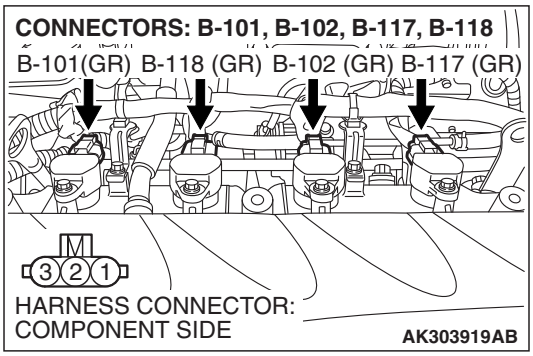
STEP 2. Check harness connector B-101, B-102, B-117 and B-118 at ignition coil for damage.

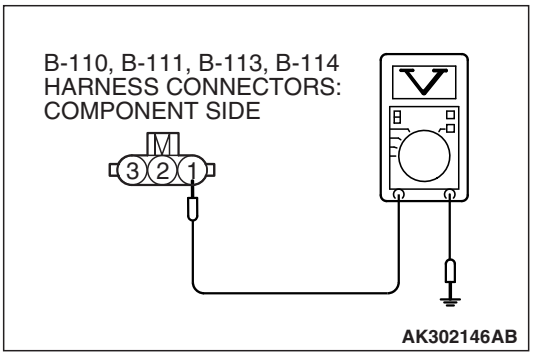
Q: Is the harness connector in good condition?

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-117 and B-118.

(1) Disconnect the connector B-101, B-102, B-117 and B-118 and measure at the harness side.

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

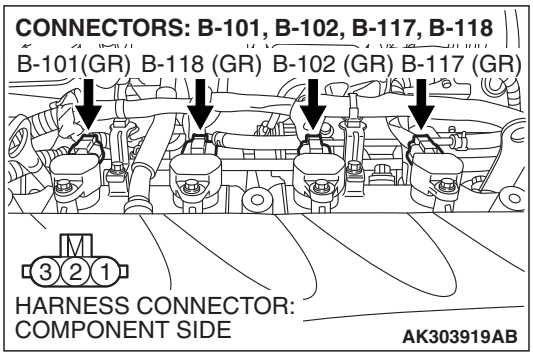
(3) Measure the voltage between terminal No. 1 and ground.
- Voltage should be battery positive voltage.

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

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

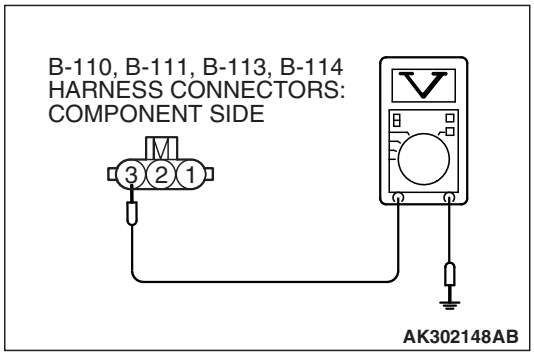
YES : Go to Step 4.

NO : Check harness connectors A-13, C-29, C-211, 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 connector is in good condition, repair harness wire between ignition switch connector C-308 (terminal No. 2) and ignition coil connectors B-101, B-102, B-117 and B-118 (terminal No. 1) because of open circuit. Then confirm that the malfunction symptom is eliminated.



STEP 4. Check the circuit at ignition coil harness side connector B-101, B-102, B-117 and B-118.

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



(3) Measure the voltage between terminal No. 3 and ground.
- Voltage should be 0.3 and 3.0 volts.

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

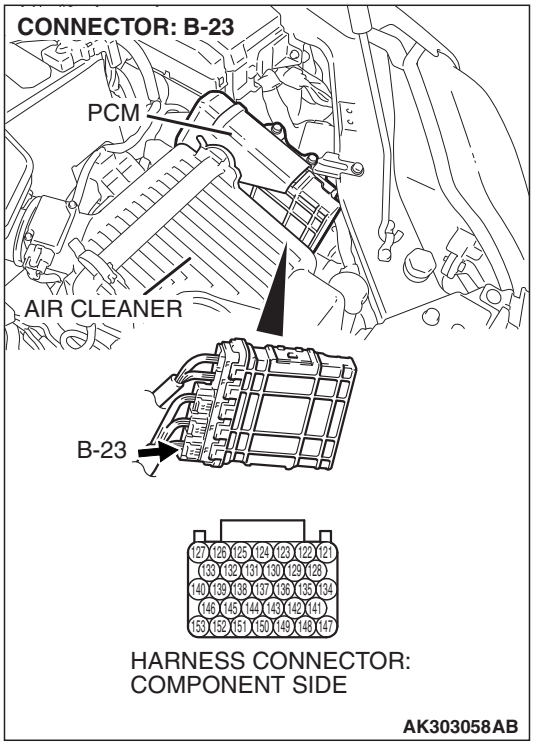
Q: Is the measured voltage between 0.3 and 3.0 volts?

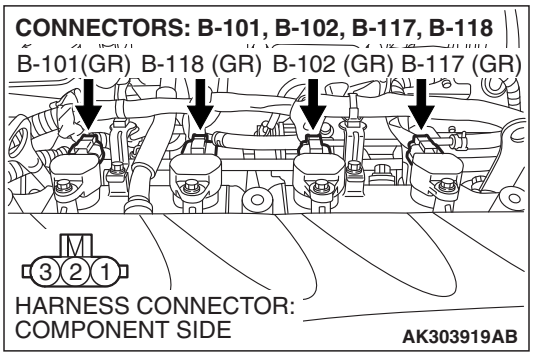
YES : Go to Step 7.
NO : Go to Step 5.

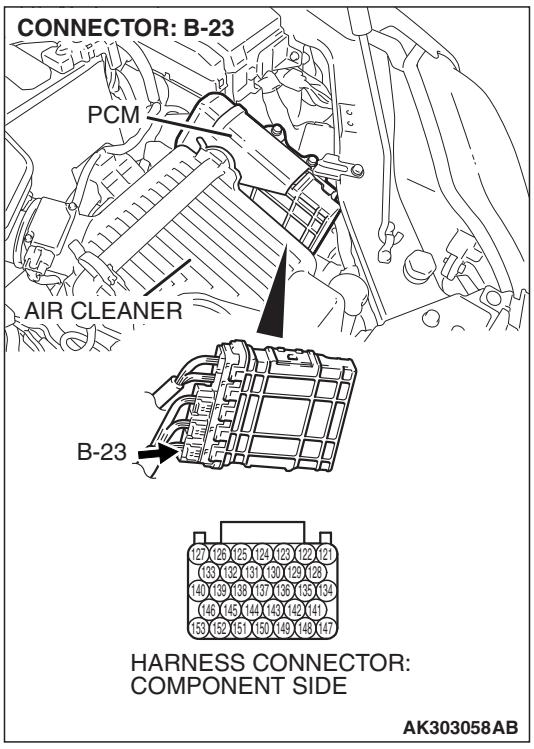
STEP 5. Check harness connector B-23 at PCM for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 6.
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then confirm that the malfunction symptom is eliminated.







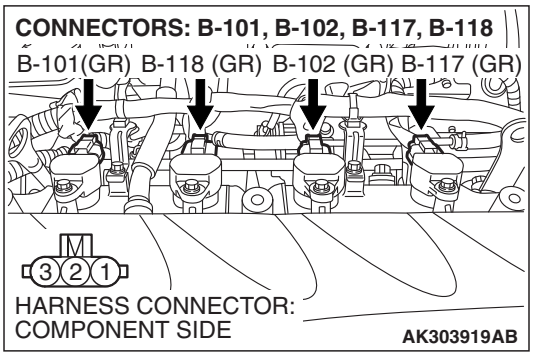
STEP 6. Check for open circuit and short circuit to ground between ignition coil connector and PCM connector.

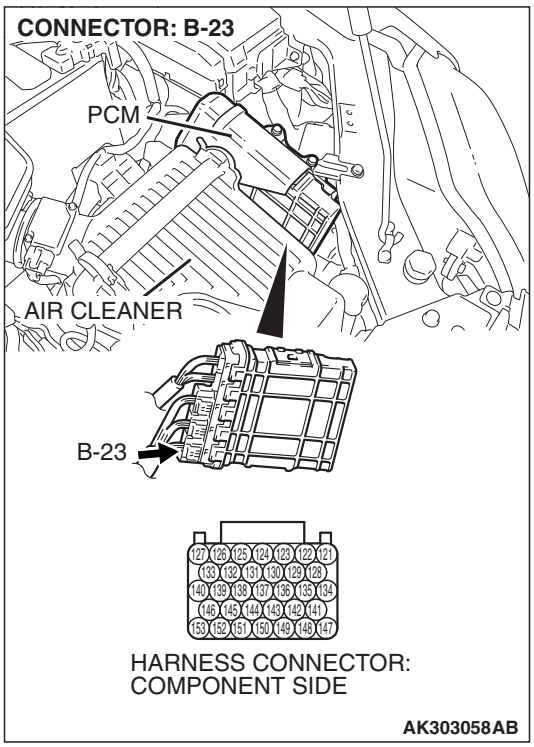
a. Check the harness wire between ignition coil connector B-101 (terminal No. 3) and PCM connector B-23 (terminal No. 151) at ignition coil 1.
b. Check the harness wire between ignition coil connector B-118 (terminal No. 3) and PCM connector B-23 (terminal No. 143) at ignition coil 2.
c. Check the harness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

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, Ignition Switch –Encrypted Code Registration Criteria Table P.54A-10. Then confirm that the malfunction symptom is eliminated.

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





STEP 7. Check for harness damage between ignition coil connector and PCM connector.

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

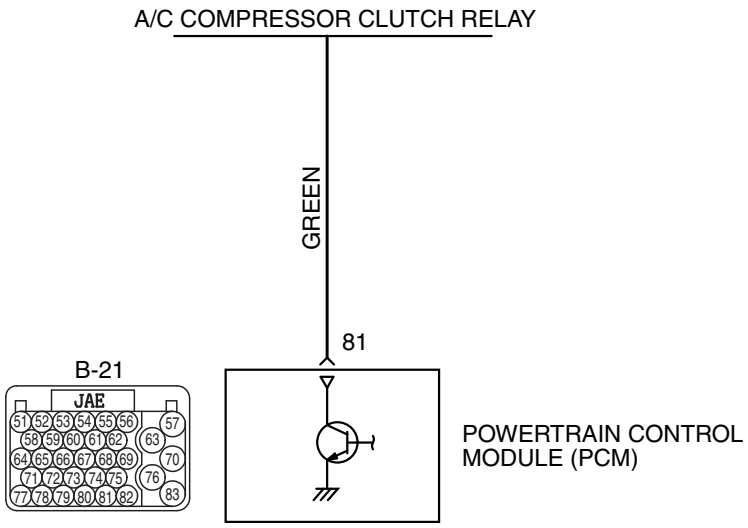
Q: Is the harness wire in good condition?

YES : Replace the PCM. When the PCM is replaced, register the encrypted code. Refer to GROUP 54A, Ignition Switch –Encrypted Code Registration Criteria Table P.54A-10. Then confirm that the malfunction symptom is eliminated.

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

INSPECTION PROCEDURE 31: A/C System

A/C Circuit



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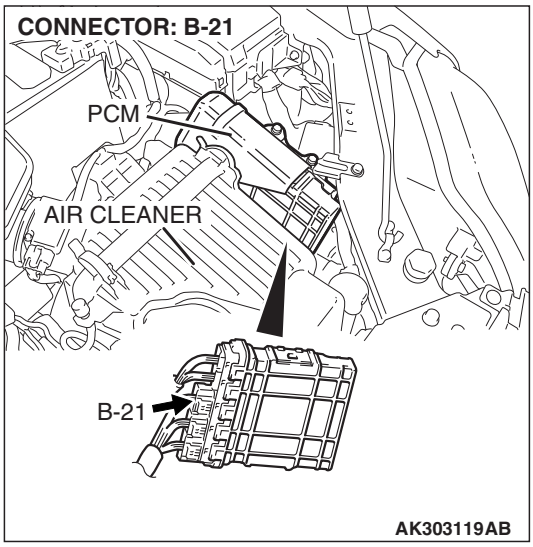

COMMENT

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

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

- Malfunction of the A/C control system.
- Improper connector contact, open circuit or shorted harness wire.
- Malfunction of the PCM.

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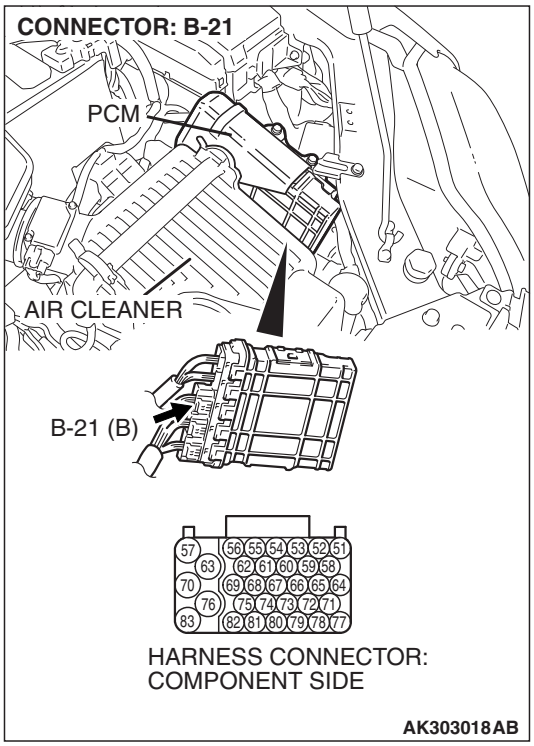
DIAGNOSIS

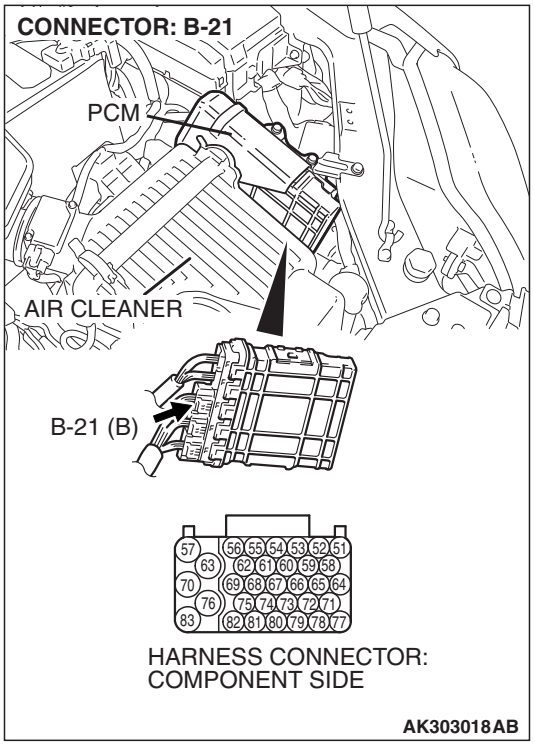


STEP 1. Check harness connector B-21 at PCM for damage.

Q: Is the harness connector in good condition?

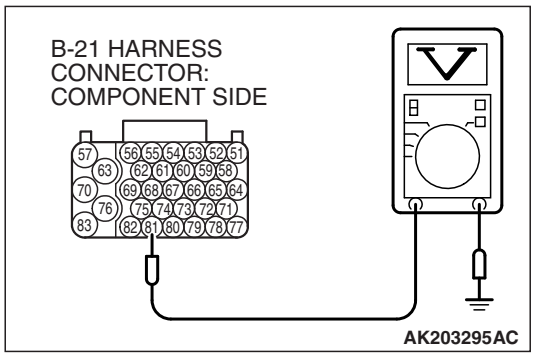
YES : Go to Step 2.

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



STEP 2. Check the circuit at PCM connector B-21.

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



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

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

YES : Replace the PCM. When the PCM is replaced, register the encrypted code. Refer to GROUP 54A, Ignition Switch –Encrypted Code Registration Criteria Table P.54A-10. 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-5 <Manual A/C>, 55B, Automatic A/C Diagnosis –Introduction To Heater, Air Conditioning And Ventilation Diagnosis P.55B-4 <Automatic A/C>. Then confirm that the malfunction symptom is eliminated.

DATA LIST REFERENCE TABLE

M1131152004351

⚠ 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.*

M.U.T.-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 clutch relay	• Engine: warming up, idling • A/C switch: "OFF"		OFF	Procedure No. 31	P.13A-1166
			• 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 load signal	77	A/C load signal	• Engine: idling • A/C switch: "OFF"		OFF	–	–
			• Engine: idling • A/C switch: "ON"	A/C ECU judged low load	OFF		
				A/C ECU judged high load	ON		
A/C SW	76	A/C switch	• Engine: warming up, idling • A/C switch: "OFF"		OFF	Procedure No. 31	P.13A-1166
			• Engine: warming up, idling • A/C switch: "ON"	A/C compressor clutch is not operating	OFF		
				A/C compressor clutch is operating	ON		

M.U.T.-III SCAN TOOL DISPLAY	ITEM NO.	INSPECTION ITEM	INSPECTION REQUIREMENT		NORMAL CONDITION	INSPECTION PROCEDURE NO.	REFERENCE PAGE
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.		
Airflow sensor	AA	Mass airflow sensor*1	• Engine coolant temperature: 80 – 95° C (176 – 203° F) • Lights, electric cooling fan and all accessories: "OFF"*4 • Transaxele: "P" range	Engine is idling	1.3 –5.3 g/s	–	–
				2,500 r/min	5.0 –13.0 g/s		
				Engine is revved	Increases in response to revving		
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: "P" range	Engine is idling	1,300 –1,620 mV	–	–
				2,500 r/min	1,600 –1,970 mV		
				Engine is revved	Increase in response to revving		
APP sensor (main)	BE	Accelerator pedal position sensor (main)	Ignition switch: "ON"	Release the accelerator pedal	15 –25%	Code No. P2122, P2123	P.13A-916, P.13A-926
				Depress the accelerator pedal gradually	Increases in response to the pedal depression stroke		
				Depress the accelerator pedal fully	80% or more		

M.U.T.-III SCAN TOOL DISPLAY	ITEM NO.	INSPECTION ITEM	INSPECTION REQUIREMENT		NORMAL CONDITION	INSPECTION PROCEDURE NO.	REFERENCE PAGE
APP sensor (main)	11	Accelerator pedal position sensor (main)	Ignition switch: "ON"	Release the accelerator pedal	735 –1,335 mV	Code No. P2122, P2123	P.13A-916, P.13A-926
				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)	BF	Accelerator pedal position sensor (sub)	Ignition switch: "ON"	Release the accelerator pedal	9–19%	Code No. P2127, P2128	P.13A-933, P.13A-943
				Depress the accelerator pedal gradually	Increases in response to the pedal depression stroke		
				Depress the accelerator pedal fully	74% or more		
APP sensor (sub)	12	Accelerator pedal position sensor (sub)	Ignition switch: "ON"	Release the accelerator pedal	435 –1,035 mV	Code No. P2127, P2128	P.13A-976, P.13A-978
				Depress the accelerator pedal gradually	Increases in response to the pedal depression stroke		
				Depress the accelerator pedal fully	3,600 mV or more		

M.U.T.-III SCAN TOOL DISPLAY	ITEM NO.	INSPECTION ITEM	INSPECTION REQUIREMENT		NORMAL CONDITION	INSPECTION PROCEDURE NO.	REFERENCE PAGE
Barometric pressure sensor	BB	Barometric pressure sensor	Ignition switch: "ON"	Engine stopped [At altitude of 0 m (0 ft.)]	101 kPa (29.8 in.Hg)	Code No. P2228, P2229	P.13A-976, P.13A-978
				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)		
Brake light switch	74	Brake light switch	Ignition switch: "ON"	Depress the brake pedal fully	ON	–	–
				Release the brake pedal	OFF		
Calculated load value	73	Calculated load value	Engine: warming up	Engine: idling	10% –30%	–	–
				2,500 r/min	10% –30%		
Closed throttle position switch	84	Closed throttle position switch	Ignition switch: "ON"	Depress the accelerator pedal fully	OFF	–	–
				Release the accelerator pedal	ON		
Cranking signal	79	Cranking signal (ignition switch-ST)	Ignition switch: "ON"	Engine: stopped	OFF	Procedure No. 29	P.13A-1154
				Engine: cranking	ON		

M.U.T.-III SCAN TOOL DISPLAY	ITEM NO.	INSPECTION ITEM	INSPECTION REQUIREMENT		NORMAL CONDITION	INSPECTION PROCEDURE NO.	REFERENCE PAGE
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.13A-567
			Engine: idling	Engine coolant temperature is −20° C (-4° F)	1,275–1,475 r/min		
				Engine coolant temperature is 0° C (32° F)	1,220 –1,420 r/min		
				Engine coolant temperature is 20° C (68° F)	1,200 –1,400 r/min		
				Engine coolant temperature is 40° C (104° F)	1,150 –1,350 r/min		
				Engine coolant temperature is 80° C (176° F)	600 –800 r/min		
ECT sensor	6	Engine coolant temperature sensor	Ignition switch: "ON" or with engine running	Engine coolant temperature is −20° C (-4° F)	−20° C (-4° F)	Code No. P0116, P0117, P0118	P.13A-238, P.13A-247, P.13A-254
				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)		
Target EGR	BA	Target EGR valve (stepper motor)	• The target 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)	–	–

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M.U.T.-III SCAN TOOL DISPLAY	ITEM NO.	INSPECTION ITEM	INSPECTION REQUIREMENT		NORMAL CONDITION	INSPECTION PROCEDURE NO.	REFERENCE PAGE
EGR step motor	31	EGR valve (stepper motor)	• Engine coolant temperature: 80 – 95° C (176 – 203° F) • Lights, electric cooling fan and all accessories : "OFF"*4 • Transaxle: "P" range	Engine is idling	2 –8 Step	Code No. P0403	P.13A-606
				2,500 r/min	2 –8 Step		
Engine control relay	95	MFI relay	Ignition switch: "ON"		ON	–	–
Engine load	9	Engine load	Engine: warming up		0 –160%	–	–
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	–	–
Fuel level gauge	51	Fuel level gauge	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	Cylinder 1, 4 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	Cylinder 2, 3 fuel control system status (bank 2)	Engine: warming up	2,500 r/min	CL: Using O2S	–	–
				When engine is suddenly revved	OL: DRV condition		

M.U.T.-III SCAN TOOL DISPLAY	ITEM NO.	INSPECTION ITEM	INSPECTION REQUIREMENT		NORMAL CONDITION	INSPECTION PROCEDURE NO.	REFERENCE PAGE
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.13A-458, P.13A-465, P.13A-471
Ignition switch	85	Ignition switch (IG1)	Ignition switch: "ON"		ON	–	–
Injectors	17	Injectors*2	Engine: cranking	When engine coolant temperature is 0° C (32° F)	74 –94 ms	–	–
				When engine coolant temperature is 20° C (68° F)	26.9 –46.9 ms		
				When engine coolant temperature is 80° C (176° F)	7 –13 ms		
		Injectors*3	• Engine coolant temperature: 80 – 95° C (176 – 203° F) • Lights, electric cooling fan and all accessories: "OFF" • Transaxle: "P" range	Engine is idling	1.3 –3.3 ms		
				2,500 r/min	1.0 –3.0 ms		
				When engine is suddenly revved	Increases		

M.U.T.-III SCAN TOOL DISPLAY	ITEM NO.	INSPECTION ITEM	INSPECTION REQUIREMENT		NORMAL CONDITION	INSPECTION PROCEDURE NO.	REFERENCE PAGE
Intake air temperature sensor	5	Intake air temperature sensor	Ignition switch: "ON" or with engine running	Intake air temperature is −20° C (−4° F)	−20° C (−4° F)	Code No. P0111, P0112, P0113	P.13A-212, P.13A-221, P.13A-228
				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)		
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 to 128 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 to 128 Step (Display range)	–	–
Knock retard	32	Knock retard	Engine: warming up, sudden racing		According to acceleration, knock retard is increased.	–	–

M.U.T.-III SCAN TOOL DISPLAY	ITEM NO.	INSPECTION ITEM	INSPECTION REQUIREMENT		NORMAL CONDITION	INSPECTION PROCEDURE NO.	REFERENCE PAGE
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	Cylinder 1, 4 long-term fuel trim	Engine: warming up, 2,500 r/min without any load (during closed loop)		–12.5 to 12.5%	Code No. P0171, P0172	P.13A-431, P.13A-439
Long term fuel trim (bank 2)	27	Cylinder 2, 3 long-term fuel trim	Engine: warming up, 2,500 r/min without any load (during closed loop)		–12.5 to 12.5%	Code No. P0174, P0175	P.13A-444, P.13A-452
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.13A-177, P.13A-191, P.13A-203
				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		
Neutral switch	87	Neutral switch	Ignition switch: "ON"	Selector lever: "N" or "P"	ON	–	–
				Selector lever: "R" or "D"	OFF		

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M.U.T.-III SCAN TOOL DISPLAY	ITEM NO.	INSPECTION ITEM	INSPECTION REQUIREMENT		NORMAL CONDITION	INSPECTION PROCEDURE NO.	REFERENCE PAGE
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	Engine: warming up	Engine is idling	OFF	–	–
				4,500 r/min	ON		
Oxygen sensor (bank1 sensor1)	AC	Cylinder 1, 4 heated oxygen sensor (front)	Engine:warming up (Air/fuel mixture is made leaner when decelerating and is made richer when revving)	When the engine is running at 4,000 r/min, decelerate suddenly.	0.2V or less → 0.6 –1.0V (After several seconds have elapsed)	Code No. P0131, P0132, P0133, P0134, P2195	P.13A-299, P.13A-315, P.13A-320, P.13A-326, P.13A-970
				When engine is suddenly revved	0.6 –1.0V		
			Engine:warming up (the heated oxygen sensor signal is used to check the air/fuel mixture ratio, and control condition is also checked by the PCM.)	Engine is idling	Voltage changes repeatedly between 0.4V or less and 0.6 –1.0V.		
				2,500 r/min			
Oxygen sensor (bank1 sensor2)	AD	Cylinder 1, 4 heated oxygen sensor (rear)	Engine: warming up	• Transaxle: "L" range • Drive with wide open throttle • Engine: 3,500 r/min or more	0.6 –1.0V	Code No. P0137, P0138, P0139, P0140	P.13A-335, P.13A-351, P.13A-356, P.13A-361

M.U.T.-III SCAN TOOL DISPLAY	ITEM NO.	INSPECTION ITEM	INSPECTION REQUIREMENT		NORMAL CONDITION	INSPECTION PROCEDURE NO.	REFERENCE PAGE
Oxygen sensor (bank2 sensor1)	AE	Cylinder 2, 3 heated oxygen sensor (front)	Engine:warming up (Air/fuel mixture is made leaner when decelerating and is made richer when revving)	When the engine is running at 4,000 r/min, decelerate suddenly.	0.2V or less → 0.6 –1.0V (After several seconds have elapsed)	Code No. P0151, P0152, P0153, P0154, P2197	P.13A-365, P.13A-381, P.13A-386, P.13A-392, P.13A-973
				When engine is suddenly revved	0.6 –1.0V		
			Engine:warming up (the heated oxygen sensor signal is used to check the air/fuel mixture ratio, and control condition is also checked by the PCM.)	Engine is idling	Voltage changes repeatedly between 0.4V or less and 0.6 –1.0V.		
				2,500 r/min			
Oxygen sensor (bank2 sensor2)	AF	Cylinder 2, 3 heated oxygen sensor (rear)	Engine: warming up	• Transaxle: "L" range • Drive with wide open throttle • Engine: 3,500 r/min or more	0.6 –1.0V	Code No. P0157, P0158, P0159, P0160	P.13A-401, P.13A-417, P.13A-422, P.13A-427
Power steering switch	83	Power steering pressure switch	Engine: idling	Steering wheel stationary	OFF	Code No.P0551	P.13A-802
				Steering wheel turning	ON		
Power supply voltage	1	Power supply voltage	Ignition switch: "ON"		Battery positive voltage	Procedure No. 27	P.13A-1129
Radiator fan control relay (high)	100	Radiator fan relay, condenser fan relay	Ignition switch: "ON"		OFF	–	–
			Carry out the actuator test to revolve the fan at high speed.		ON		
Radiator fan control relay (low)	101	Fan control relay	Ignition switch: "ON"		OFF	–	–
			Carry out the actuator test to revolve the fan at low speed.		ON		

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M.U.T.-III SCAN TOOL DISPLAY	ITEM NO.	INSPECTION ITEM	INSPECTION REQUIREMENT		NORMAL CONDITION	INSPECTION PROCEDURE NO.	REFERENCE PAGE
Radiator sensor temperature 1	111	Radiator sensor temperature 1 <California>	Ignition switch: "ON"		Approximately the same as the engine coolant temperature in the radiator	Code No. P2567	P.13A-1030
Radiator sensor temperature 2	112	Radiator sensor temperature 2 <California>	Ignition switch: "ON"		Approximately the same as the engine coolant temperature in the radiator	Code No. P2567	P.13A-1030
Relative APP sensor	DD	Relative accelerator pedal position sensor	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	95 –100 %		
Relative TP sensor	BC	Relative throttle position sensor	• 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		

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M.U.T.-III SCAN TOOL DISPLAY	ITEM NO.	INSPECTION ITEM	INSPECTION REQUIREMENT		NORMAL CONDITION	INSPECTION PROCEDURE NO.	REFERENCE PAGE
Short term fuel trim (bank 1)	28	Cylinder 1, 4 short-term fuel trim	Engine: warming up, 2,500 r/min without any load (during closed loop)		–25 to 25%	Code No. P0171, P0172	P.13A-431, P.13A-439
Short term fuel trim (bank 2)	29	Cylinder 2, 3 short-term fuel trim	Engine: warming up, 2,500 r/min without any load (during closed loop)		–25 to 25%	Code No. P0174, P0175	P.13A-444, P.13A-452
Spark advance	16	Ignition timing advance	• Engine: warming up • Timing light is set (to check actual ignition timing) • Transaxle: "P" range	Engine is idling	2 –18° CA (BTDC)	–	–
				2,500 r/min	28 –48° CA (BTDC)		
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 (–4° F)	1,275 –1,475 r/min	–	–
				Engine coolant temperature is 0° C (32° F)	1,220 –1,420 r/min		
				Engine coolant temperature is 20° C (68° F)	1,200 –1,400 r/min		
				Engine coolant temperature is 40° C (104° F)	1,150 –1,350 r/min		
				Engine coolant temperature is 80° C (176° F)	600 –800 r/min		

M.U.T.-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)	AB	Throttle position sensor (main)	• 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	5 –15%	Code No. P0122, P0123	P.13A-265, P.13A-276
				Fully open the throttle valve with your finger	80% or more		

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M.U.T.-III SCAN TOOL DISPLAY	ITEM NO.	INSPECTION ITEM	INSPECTION REQUIREMENT		NORMAL CONDITION	INSPECTION PROCEDURE NO.	REFERENCE PAGE
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 terminal numbers No. 3, No. 4, No. 5 and No. 6 with the use of the special tool: MB991658. • Ignition switch: "ON"	Fully close the throttle valve with your finger	300 –700 mV	Code No. P0122, P0123	P.13A-265, P.13A-276
				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 rises		
				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.			–	–

M.U.T.-III SCAN TOOL DISPLAY	ITEM NO.	INSPECTION ITEM	INSPECTION REQUIREMENT		NORMAL CONDITION	INSPECTION PROCEDURE NO.	REFERENCE PAGE
TP sensor(sub)	BD	Throttle position sensor (sub)	• 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	45 –55%	Code No. P0222, P0223	P.13A-522, P.13A-533
				Fully open the throttle valve with your finger	80% or more		

M.U.T.-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 terminal numbers No. 3, No. 4, No. 5 and No. 6 with the use of the special tool: MB991658. • Ignition switch: "ON"	Fully close the throttle valve with your finger	2,200 –2,800 mV	Code No. P0222, P0223	P.13A-522, P.13A-533
				Fully open the throttle valve with your finger	4,600 mV or more		
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

M1131156000403

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 PCM 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:	–	
	# of DTCs stored in this ECU	DTC_CNT: xxd		
	Malfunction Indicator Lamp (MIL) Status	MIL: OFF or ON		
	Supported tests which are continuous	Support status of continuous monitors:		
	Misfire monitoring supported	MIS_SUP: YES		
	Fuel system monitoring supported	FUEL_SUP: YES		
	Comprehensive component monitoring supported	CCM_SUP: YES		
	Status of continuous monitoring tests since DTC cleared	Completion status of continuous monitors since DTC cleared:		
	Misfire monitoring ready	MIS_RDY: YES or NO		
	Fuel system monitoring ready	FUEL_RDY: YES or NO		
	Comprehensive component monitoring ready	CCM_RDY: YES or NO		
	Supported tests run at least once per trip	Support status of non-continuous monitors:		
	Catalyst monitoring supported	CAT_SUP: YES		
	Heated catalyst monitoring supported	HCAT_SUP: NO		
	Evaporative system monitoring supported	EVAP_SUP: YES		

PARAMETER IDENTIFICATION (PID)	DESCRIPTION	COMMON EXAMPLE OF GENERAL SCAN TOOL DISPLAY	INSPECTION CONDITION	NORMAL CONDITION
01	Secondary air system monitoring supported	AIR_SUP: NO	–	
	Oxygen sensor monitoring supported	O2S_SUP: YES		
	Oxygen sensor heater monitoring supported	HTR_SUP: YES		
	EGR and/or VVT system monitoring supported	EGR_SUP: YES		
	Status of tests run at least once per trip	Completion status of non-continuous monitors since DTC cleared:		
	Catalyst monitoring ready	CAT_RDY: YES or NO		
	Heated catalyst monitoring ready	HCAT_RDY: YES		
	Evaporative system monitoring ready	EVAP_RDY: YES or NO		
	Secondary air system monitoring ready	AIR_RDY: YES		
	Oxygen sensor monitoring ready	O2S_RDY: YES or NO		
	Oxygen sensor heater monitoring ready	HTR_RDY: YES or NO		
	EGR and/or VVT system monitoring ready	EGR_RDY: YES or NO		
03	Fuel system 1 status	FUELSYS1: OL/CL/OL-Drive/OL-Fault/CL-Fault	See M.U.T.-III item No. 105.	
	Fuel system 2 status	FUELSYS2: OL/CL/OL-Drive/OL-Fault/CL-Fault	See M.U.T.-III item No. 106.	
04	Calculated LOAD Value	LOAD_PCT: xxx.x%	See M.U.T.-III item No. 73.	
05	Engine Coolant Temperature	ECT: xxx° C (xxx° F)	See M.U.T.-III item No. 6.	
06	Short Term Fuel Trim-Bank 1	SHRTFT1: xxx.x%	See M.U.T.-III item No. 28.	
07	Long Term Fuel Trim-Bank 1	LONGFT1: xxx.x%	See M.U.T.-III item No. 26.	
08	Short Term Fuel Trim-Bank 2	SHRTFT2: xxx.x%	See M.U.T.-III item No. 29.	
09	Long Term Fuel Trim-Bank 2	LONGFT2: xxx.x%	See M.U.T.-III item No. 27.	
0B	Intake Manifold Absolute Pressure	MAP: xxxx.x kPa (xxx.x inHg)	See M.U.T.-III item No. 8.	

PARAMETER IDENTIFICATION (PID)	DESCRIPTION	COMMON EXAMPLE OF GENERAL SCAN TOOL DISPLAY	INSPECTION CONDITION	NORMAL CONDITION
0C	Engine RPM	RPM: xxxxx min $^{-1}$	See M.U.T.-III item No. 2.	
0D	Vehicle Speed Sensor	VSS: xxx km/h (xxx mph)	See M.U.T.-III item No. 4.	
0E	Ignition Timing Advance for #1 Cylinder	SPARKADV: xx.x°	See M.U.T.-III item No. 16.	
0F	Intake Air Temperature	IAT: xxx° C (xxx° F)	See M.U.T.-III item No. 5.	
10	Air Flow Rate from Mass Air Flow Sensor	MAF: xxxx.xx g/s (xxxx.x lb/min)	See M.U.T.-III item No. AA.	
11	Absolute Throttle Position	TP: xxx.x%	See M.U.T.-III item No. AB.	
13	Location of Oxygen Sensors	O2SLOC: O2Sxx	Ignition switch: "ON"	O2S11/O2S12/O2S21/O2S22
14	Bank 1 –Sensor 1	O2S11: x.xxx V	See M.U.T.-III item No. AC.	
		SHRTFT11: xxx.x%	Engine: warming up, 2,500 r/min without any load (during closed loop)	–25 to 25%
15	Bank 1 –Sensor 2	O2S12: x.xxx V	See M.U.T.-III item No. AD.	
18	Bank 2 –Sensor 1	O2S21: x.xxx V	See M.U.T.-III item No. AE.	
		SHRTFT21: xxx.x%	Engine: warming up, 2,500 r/min without any load (during closed loop)	–25 to 25%
19	Bank 2 –Sensor 2	O2S22: x.xxx V	See M.U.T.-III item No. AF.	
1C	OBD requirements to which vehicle or engine is certified	OBDSUP: OBD II	Ignition switch: "ON"	OBD II
1F	Time Since Engine Start	RUNTM: xxxxx sec.	–	
21	Distance Traveled While MIL is Actived	MIL_DIST: xxxxx km (xxxxx miles)	–	
2C	Commanded EGR	EGR_PCT: xxx.x%	See M.U.T.-III item No. BA.	
2E	Commanded Evaporative Purge	EVAP_PCT: xxx.x%	See M.U.T.-III item No. 49.	
2F	Fuel Level Input	FLI: xxx.x%	See M.U.T.-III item No. 51.	
30	Number of warm-ups since DTCs cleared	WARM_UPS: xxx	–	
31	Distance traveled since DTCs cleared	CLR_DIST: xxxxx km (xxxxx miles)	–	

PARAMETER IDENTIFICATION (PID)	DESCRIPTION	COMMON EXAMPLE OF GENERAL SCAN TOOL DISPLAY	INSPECTION CONDITION	NORMAL CONDITION
32	Evap System Vapor Pressure	EVAP_VP: xxxx.x Pa (xx.xxx in H2O)	• Ignition switch: "ON" • Fuel cap removal	–3.3 to 3.3 kPa (–13.2 to 13.2 in.H2O)
33	Barometric Pressure	BARO: xxx kPa (xx.x inHg)	See M.U.T.-III item No. BB.	
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 enabled	MIS_ENA: NO or YES		
	Fuel system monitoring enabled	FUEL_ENA: NO or YES		
	Comprehensive component monitoring enabled	CCM_ENA: NO or YES		
	Completion status of continuous monitors this monitoring cycle:	Completion status of continuous monitors this monitoring cycle:		
	Misfire monitoring completed	MIS_CMPL: YES or NO		
	Fuel system monitoring completed	FUELCMPL: YES or NO		
	Comprehensive component monitoring completed	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		
	Heated catalyst monitoring	HCAT_ENA: NO		
	Evaporative system monitoring	EVAP_ENA: YES		
	Secondary air system monitoring	AIR_ENA: NO		
	Oxygen sensor monitoring	O2S_ENA: YES		
	Oxygen sensor heater monitoring	HTR_ENA: YES		
	EGR and/or VVT system monitoring	EGR_ENA: YES		

PARAMETER IDENTIFICATION (PID)	DESCRIPTION	COMMON EXAMPLE OF GENERAL SCAN TOOL DISPLAY	INSPECTION CONDITION	NORMAL CONDITION
41			–	
	Completion status of non-continuous monitors this monitoring cycle:	Completion status of non-continuous monitors this monitoring cycle:		
	Catalyst monitoring completed	CAT_CMPL: YES or NO		
	Heated catalyst monitoring completed	HCATCMPL: YES		
	Evaporative system monitoring completed	EVAPCMPL: YES or NO		
	Secondary air system monitoring completed	AIR_CMPL: YES		
	Oxygen sensor monitoring completed	O2S_CMPL: YES or NO		
	Oxygen sensor heater monitoring completed	HTR_CMPL: YES or NO		
	EGR and/or VVT system monitoring completed	EGR_CMPL: YES or NO		
42	Control module voltage	VPWR: xx.xx V	See M.U.T.-III item No. 1.	
43	Absolute Load Value	LOAD_ABS: xxxxx.x %	See M.U.T.-III item No. 72.	
44	Fuel/Air Commanded Equivalence Ratio	LAMBDA: xxx.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%	See M.U.T.-III item No. BC.	
46	Ambient air temperature	AAT: xxx° C (xxx° F)	• Ignition switch: "ON" • Engine is cold state	The value displayed approximately matches the ambient temperature
47	Absolute Throttle Position B	TP_B: xxx.x%	See M.U.T.-III item No. BD.	
49	Accelerator Pedal Position D	APP_D: xxx.x%	See M.U.T.-III item No. BE.	

PARAMETER IDENTIFICATION (PID)	DESCRIPTION	COMMON EXAMPLE OF GENERAL SCAN TOOL DISPLAY	INSPECTION CONDITION	NORMAL CONDITION
4A	Accelerator Pedal Position E	APP_E: xxx.x%	See M.U.T.-III item No. BF.	
4C	Commanded Throttle Actuator Control	TAC_PCT: xxx.x%	See M.U.T.-III item No. 58.	
5A	Relative Accelerator Pedal Position	APP_R: xxx.x%	See M.U.T.-III item No. DD.	

ACTUATOR TEST REFERENCE TABLE

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

M.U.T.-III SCAN TOOL DISPLAY	ITEM NO.	INSPECTION ITEM	DRIVE CONTENTS	INSPECTION REQUIREMENT	NORMAL CONDITION	INSPECTION PROCEDURE NO.	REFERENCE PAGE
A/C relay	16	A/C compressor clutch relay	A/C compressor clutch relay turns from OFF to ON.	Ignition switch: "ON"	Clicks when A/C compressor clutch is driven.	Procedure No. 31	P.13A-1166
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.13A-640
EVAP. emission ventilation SOL.	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.13A-651
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. 28	P.13A-1140
Ignition timing 5 BTDC	11*	Basic ignition timing	Set to ignition timing adjustment mode	• Engine: idling • Connect timing light	5° BTDC	–	–

M.U.T.-III SCAN TOOL DISPLAY	ITEM NO.	INSPECTION ITEM	DRIVE CONTENTS	INSPECTION REQUIREMENT	NORMAL CONDITION	INSPECTION PROCEDURE NO.	REFERENCE 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.13A-482
No. 2 injector	2		Cut fuel to No. 2 injector			Code No. P0202	P.13A-492
No. 3 injector	3		Cut fuel to No. 3 injector			Code No. P0203	P.13A-502
No. 4 injector	4		Cut fuel to No. 4 injector			Code No. P0204	P.13A-512
Radiator fan (high)	12	Radiator fan, A/C condenser fan	Drive the fan motor	Ignition switch: "ON"	Radiator fan and A/C condenser fan rotate at high speed.	Procedure No. 26	P.13A-1125
Radiator fan (low)	13				Radiator fan and A/C condenser fan rotate.		
Oil control valve	17	Engine oil control valve	Engine oil control valve turns from OFF to ON	Engine: warming up, idle	The engine speed is changed.	Code No. P001A	P.13A-55

CHECK AT THE POWERTRAIN CONTROL MODULE (PCM)

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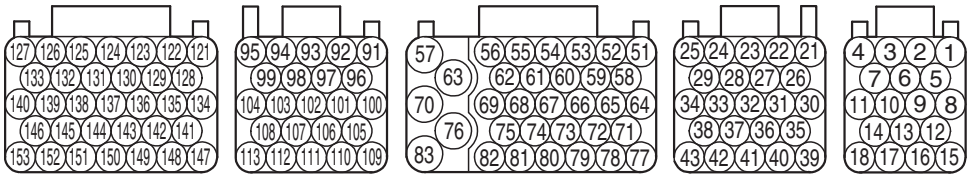
1. Disconnect the PCM connectors B-19, B-20, B-21, B-22 and B-23, and connect check harness special tool MB991923 between the PCM connectors.
2. Measure the voltage between each check harness connector terminal and check harness connector ground terminal (No. 25 or No. 29).

TERMINAL VOLTAGE CHECK CHART

*NOTE: *1: The average voltage through an analog voltmeter is described in this service manual (because the average voltage is too stable to be shown on a digital voltmeter).*

*NOTE: *2: 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.*

Check Harness Special Tool MB991923 Connector Terminal Arrangement



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TERMINAL NO.	INSPECTION ITEM	INSPECTION CONDITION (ENGINE CONDITION)		NORMAL CONDITION
2	Evaporative emission ventilation solenoid	Ignition switch: "ON"		B+
		Carry out the actuator test to drive the solenoid valve.		For approximately 6 seconds 1 V or less
5	Fan control relay (high)	Ignition switch: "ON"		B+
		Carry out the actuator test to revolve the fan at high speed.		1 V or less
6	Fuel pump relay	Ignition switch: "ON"		B+
		Engine: idling		1 V or less
10	Fan control relay (low)	Ignition switch: "ON"		B+
		Carry out the actuator test to revolve the fan at low speed.		1 V or less
21	Sensor supplied voltage	Ignition switch: "ON"		4.9 –5.1 V
68				
23	Fuel tank differential pressure sensor	• Ignition switch: "ON" • Fuel cap removal		1.2 –3.8 V
26	Accelerator pedal position sensor (main)	Ignition switch: "ON"	Release the accelerator pedal	0.7 –1.4 V
			Depress the accelerator pedal fully	4.0 V or more
27	Accelerator pedal position sensor (sub)	Ignition switch: "ON"	Release the accelerator pedal	0.4 –1.1 V
			Depress the accelerator pedal fully	3.6 V or more
30	Power supply voltage applied to accelerator pedal position sensor (main)	Ignition switch: "ON"		4.9 –5.1 V

TERMINAL NO.	INSPECTION ITEM	INSPECTION CONDITION (ENGINE CONDITION)		NORMAL CONDITION
41	Fuel tank temperature sensor	Ignition switch: "ON"	When fuel tank temperature is 0° C (32° F)	2.7 –3.1 V
			When fuel tank temperature is 20° C (68° F)	2.1 –2.5 V
			When fuel tank temperature is 40° C (104° F)	1.6 –2.0 V
			When fuel tank temperature is 80° C (176° F)	0.8 –1.2 V
42	Backup power supply	Ignition switch: "LOCK" (OFF)		B+
43	Ignition switch-IG	Ignition switch: "ON"		B+
51	Power supply	Ignition switch: "ON"		B+
64				
52	MFI relay (power supply)	Ignition switch: "LOCK" (OFF)		B+
		Ignition switch: "ON"		1 V or less
78	Power steering pressure switch	Engine: warming up, idling	When steering wheel is not turned	B+
			When steering wheel is turned	1 V or less
79	Cylinder 2, 3 heated oxygen sensor (front) offset voltage	Ignition switch: "ON"		0.4 –0.6 V
80	Cylinder 1, 4 heated oxygen sensor (front) offset voltage	Ignition switch: "ON"		0.4 –0.6 V
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	Ignition switch-ST	Engine: cranking		8 V or more
91	Cylinder 2, 3 heated oxygen sensor (front)	Engine: warming up, 2,500 r/min		0.5 ←→1.4 V (changes repeatedly)
92	Cylinder 1, 4 heated oxygen sensor (front)	Engine: warming up, 2,500 r/min		0.5 ←→1.4 V (changes repeatedly)

TERMINAL NO.	INSPECTION ITEM	INSPECTION CONDITION (ENGINE CONDITION)		NORMAL CONDITION
93	Engine coolant temperature sensor	Ignition switch: "ON"	When engine coolant temperature is −20° C (−4° F)	3.9 –4.5 V
			When engine coolant temperature is 0° C (32° F)	3.2 –3.8 V
			When engine coolant temperature is 20° C (68° F)	2.3 –2.9 V
			When engine coolant temperature is 40° C (104° F)	1.3 –1.9 V
			When engine coolant temperature is 60° C (140° F)	0.7 –1.3 V
			When engine coolant temperature is 80° C (176° F)	0.3 –0.9 V
94	Power supply voltage applied to throttle position sensor	Ignition switch: "ON"		4.9 –5.1 V
96	Cylinder 2, 3 heated oxygen sensor (rear)	• Transaxle: "L" range • Drive with wide open throttle • Engine:3,500 r/min or more		1.0 –1.5 V
97	Cylinder 1, 4 heated oxygen sensor (rear)	• Transaxle: "L" range • Drive with wide open throttle • Engine:3,500 r/min or more		1.0 –1.5 V
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	4.6 V or more

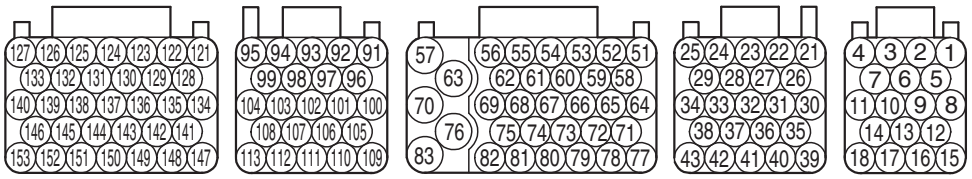
TERMINAL NO.	INSPECTION ITEM	INSPECTION CONDITION (ENGINE CONDITION)		NORMAL CONDITION
99	Throttle position sensor (main)	• Remove the intake air hose at the throttle body • Disconnect the throttle position sensor connector, and then connect terminal numbers No. 3, No. 4, No. 5 and No. 6 with the use 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
102	Manifold absolute pressure sensor	Ignition switch: "ON"	At altitude of 0 m (0 ft.)	3.8 –4.2 V
			At altitude of 600 m (1,969 ft.)	3.5 –3.9 V
			At altitude of 1,200 m (3,937 ft.)	3.3 –3.7 V
			At altitude of 1,800 m (5,906 ft.)	3.0 –3.4 V
		Engine: warming up, idling		0.6 –1.4 V
		When engine is suddenly revved.		Voltage varies
103	Crankshaft position sensor	Engine: cranking		0.4 –4.0 V*1
		Engine: idling		2.0 –3.0 V*1
104	Camshaft position sensor	Engine: cranking		2.0 –4.8 V*1
		Engine: idling		3.0 –4.0 V*1
105	Cylinder 2, 3 heated oxygen sensor (rear) offset voltage	Ignition switch: "ON"		0.4 –0.6 V
106	Cylinder 1, 4 heated oxygen sensor (rear) offset voltage	Ignition switch: "ON"		0.4 –0.6 V

TERMINAL NO.	INSPECTION ITEM	INSPECTION CONDITION (ENGINE CONDITION)		NORMAL CONDITION
107	Intake air temperature sensor	Ignition switch: "ON"	When Intake air temperature is −20° C (−4° F)	3.8 −4.4 V
			When Intake air temperature is 0° C (32° F)	3.2 −3.8 V
			When Intake air temperature is 20° C (68° F)	2.3 −2.9 V
			When Intake air temperature is 40° C (104° F)	1.5 −2.1 V
			When Intake air temperature is 60° C (140° F)	0.8 −1.4 V
			When Intake air temperature is 80° C (176° F)	0.4 −1.0 V
108	Mass airflow sensor	Engine: revving		Voltage increase in response to revving
110	Engine oil pressure switch	Engine: warming up, idling		1 V or less
		Engine: 4,500 r/min		B+
122	Power supply voltage applied to throttle actuator control motor	Ignition switch: "ON"		B+
123	Throttle actuator control motor relay	Ignition switch: "ON" →"LOCK" (OFF)		1 V or less →B+ →1 V or less
125	Cylinder 2, 3 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	Cylinder 1, 4 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	Engine oil control 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	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	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

TERMINAL NO.	INSPECTION ITEM	INSPECTION CONDITION (ENGINE CONDITION)	NORMAL CONDITION
137	Cylinder 2, 3 heated oxygen sensor heater (rear)	Engine: warming up, idling	1 V or less
		Engine: revving	B+
138	Cylinder 1, 4 heated oxygen sensor heater (rear)	Engine: warming up, idling	1 V or less
		Engine: revving	B+
141	Throttle actuator control motor (–)	• Ignition switch: "ON" • Accelerator pedal: fully closed →fully opened	Decreases slightly (approximately 2 V) from battery voltage.
147	Throttle actuator control motor (+)	• Ignition switch: "ON" • Accelerator pedal: fully opened →fully closed	Decreases slightly (approximately 2 V) from battery voltage.
142	EGR valve (Stepper motor coil <A1>)	Ignition switch: "LOCK" (OFF) →"ON"	5 –8 V*1 (changes about three seconds repeatedly)
136	EGR valve (Stepper motor coil <A2>)		
130	EGR valve (Stepper motor coil <B1>)		
124	EGR valve (Stepper motor coil <B2>)		
149	Evaporative emission purge solenoid	Ignition switch: "ON"	B+
		Engine: warm up, 3,000 r/min (within 3 minutes after the engine starting sequence is completed)	Voltage drops
151	Ignition coil –No. 1 (ignition power transistor)	Engine: 3,000 r/min	0.3 –3.0 V*1
143	Ignition coil –No. 2 (ignition power transistor)		
150	Ignition coil –No. 3 (ignition power transistor)		
148	Ignition coil –No. 4 (ignition power transistor)		
153	No. 1 injector	• Engine: warming up, idling • Suddenly depress the accelerator pedal	From 9 –13 V*1 momentarily drops slightly
146	No. 2 injector		
140	No. 3 injector		
139	No. 4 injector		

TERMINAL RESISTANCE AND CONTINUITY CHECK

PCM Harness Side Connector Terminal Arrangement



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TERMINAL NO.	INSPECTION ITEM	NORMAL CONDITION (INSPECTION CONDITION)
25 –Body ground	PCM ground	Continuity (less than 2 ohms)
29 –Body ground	PCM ground	
34 –Body ground	PCM ground	
38 –Body ground	PCM ground	
2 –51	Evaporative emission ventilation solenoid	17 –21 Ω [at 20° C (68° F)]
69 –93	Engine coolant temperature sensor	14 –17 kΩ [when engine coolant temperature is -20° C (-4° F)]
		5.1 –6.5 kΩ [when engine coolant temperature is 0° C (32° F)]
		2.1 –2.7 kΩ [when engine coolant temperature is 20° C (68° F)]
		0.9 –1.3 kΩ [when engine coolant temperature is 40° C (104° F)]
		0.48 –0.68 kΩ [when engine coolant temperature is 60° C (140° F)]
		0.26 –0.36 kΩ [when engine coolant temperature is 80° C (176° F)]
69 –107	Intake air temperature sensor	13 –17 kΩ [when intake air temperature is -20° C (-4° F)]
		5.3 –6.7 kΩ [when intake air temperature is 0° C (32° F)]
		2.3 –3.0 kΩ [when intake air temperature is 20° C (68° F)]
		1.0 –1.5 kΩ [when intake air temperature is 40° C (104° F)]
		0.56 –0.76 kΩ [when intake air temperature is 60° C (140° F)]
		0.30 –0.45 kΩ [when intake air temperature is 80° C (176° F)]
51 –125	Cylinder 2, 3 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	Cylinder 1, 4 heated oxygen sensor heater (front)	4.5 –8.0 Ω [at 20° C (68° F)]
51 –128	Engine oil control valve	6.9 –7.9 Ω [at 20° C (68° F)]
51 –137	Cylinder 2, 3 heated oxygen sensor heater (rear)	11 –18 Ω [at 20° C (68° F)]
51 –138	Cylinder 1, 4 heated oxygen sensor heater (rear)	11 –18 Ω [at 20° C (68° F)]
141 –147	Throttle actuator control motor	0.3 –80 Ω [at 20° C (68° F)]
51 –142	Stepper motor coil (A1)	20 –24 Ω [at 20° C (68° F)]
51 –136	Stepper motor coil (A2)	
51 –130	Stepper motor coil (B1)	
51 –124	Stepper motor coil (B2)	
51 –149	Evaporative emission purge solenoid	22 –26 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	

INSPECTION PROCEDURE USING AN OSCILLOSCOPE

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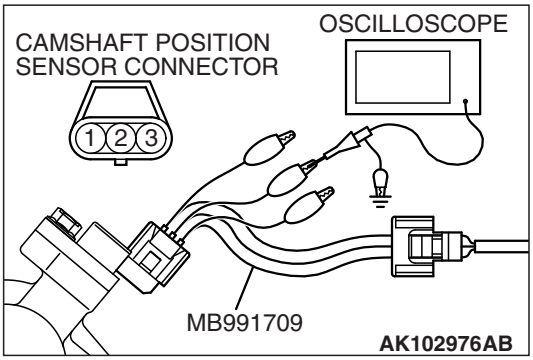
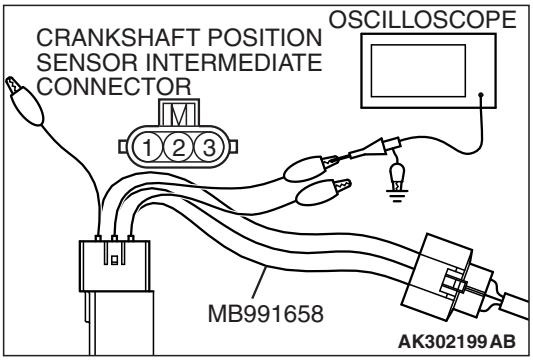
CAMSHAFT POSITION SENSOR AND CRANKSHAFT POSITION SENSOR





Required Special Tools:

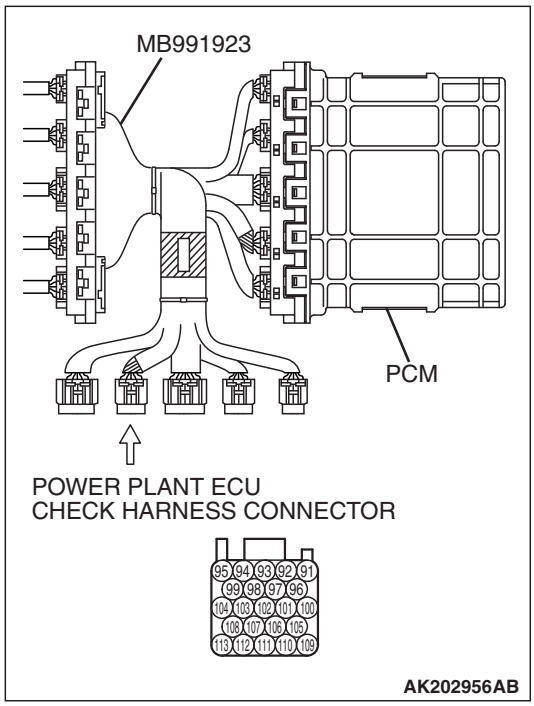
- MB991709: Test Harness
- MB991658: Test Harness
- MB991923: Power Plant ECU Check Harness

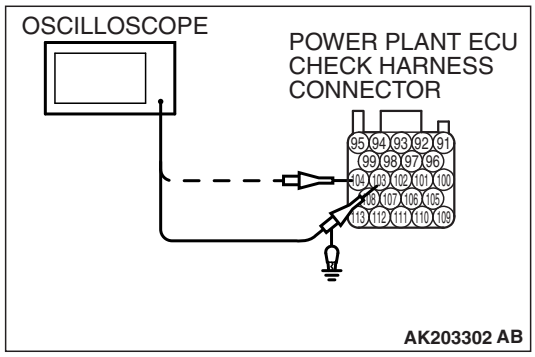
Measurement Method

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 intermediate connector, and connect the test harness special tool (MB991658) between the separated connector (All terminals should be connected).
4. Connect the oscilloscope probe to crankshaft position sensor intermediate connector terminal No. 2.

Alternate method

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





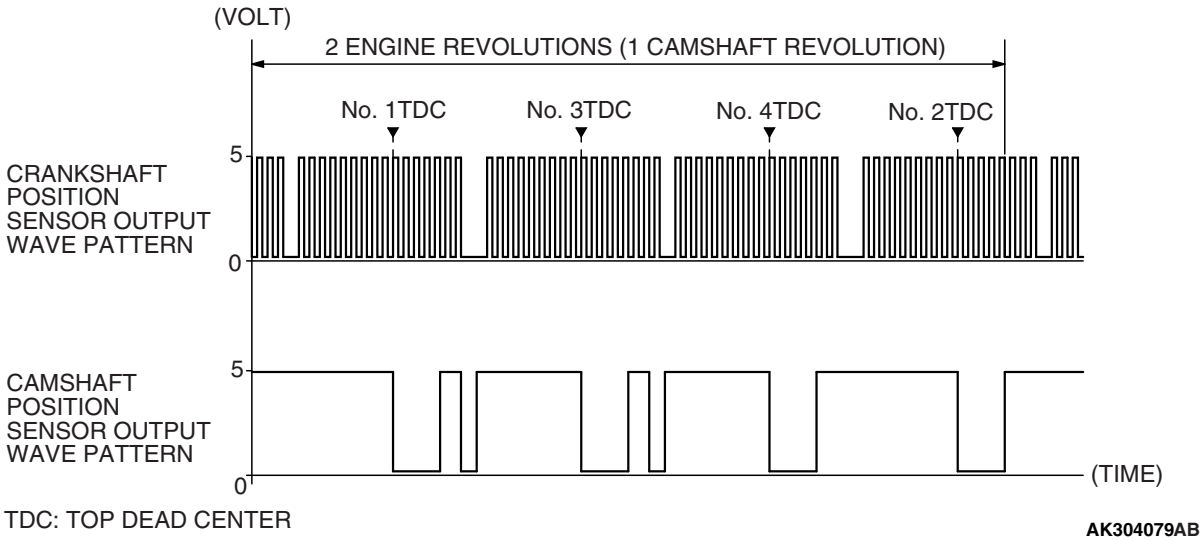
2. Connect the oscilloscope to check harness terminal No. 104. (Check the camshaft position sensor signal wave pattern.)
3. Connect the oscilloscope to check harness terminal No. 103. (Check the crankshaft position sensor signal wave pattern.)

Standard Wave Pattern

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

TSB Revision

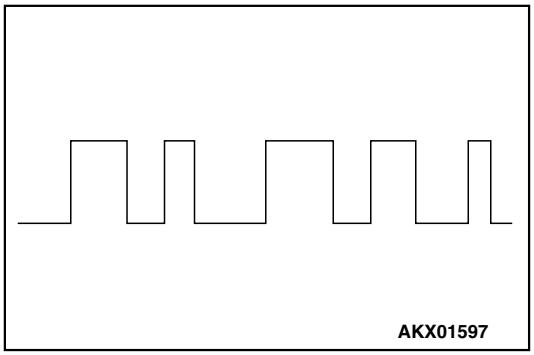
Standard wave pattern



Wave Pattern Observation Points

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

Examples of Abnormal Wave Patterns



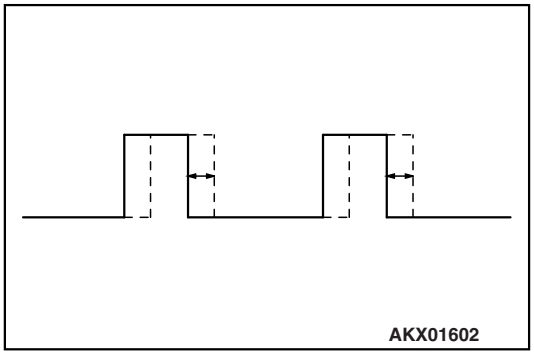
Example 1

Cause of problem

- Sensor interface malfunction.

Wave pattern characteristics

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



Example 2

Cause of problem

- Loose timing belt.
- Abnormality in sensor disc.

Wave pattern characteristics

- Wave pattern is displaced to the left or right.

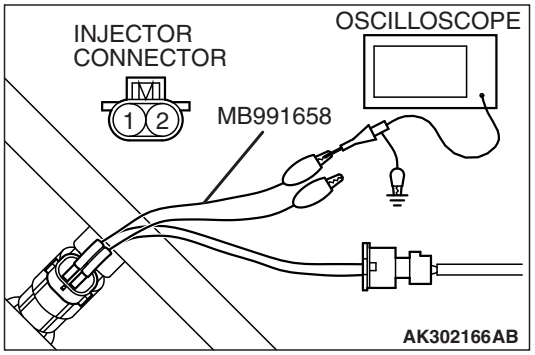
TSB Revision

INJECTOR

Required Special Tools:

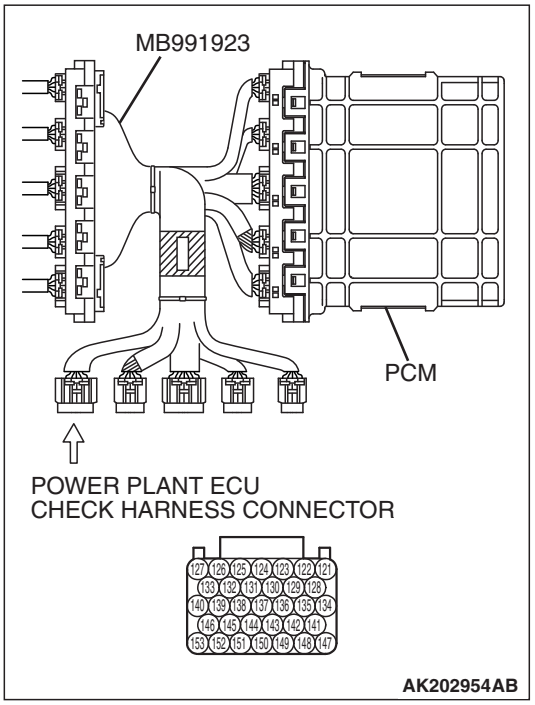
- MB991658: Test Harness
- MB991923: Power Plant ECU Check Harness

Measurement Method

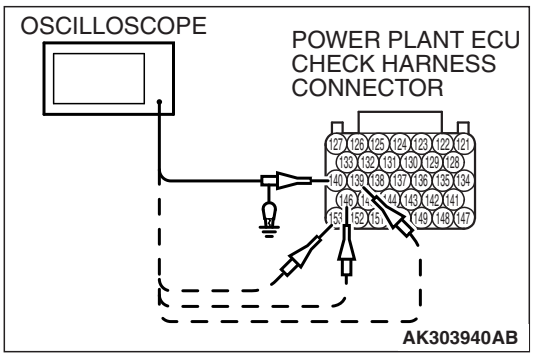


1. Disconnect the injector connector, and connect the test harness special tool (MB991658) between the separated connector. (All terminals should be connected.)
2. Connect the oscilloscope probe to injector connector terminal No. 2.

Alternate method



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

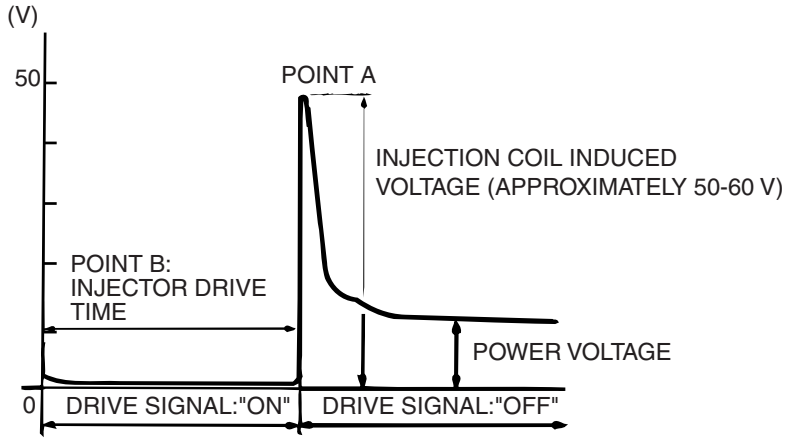


2. Connect the oscilloscope probe to each check harness connector terminal to analyze each cylinder:
   - Terminal No. 153 for the number 1 cylinder.
   - Terminal No. 146 for the number 2 cylinder.
   - Terminal No. 140 for the number 3 cylinder.
   - Terminal No. 139 for the number 4 cylinder.

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

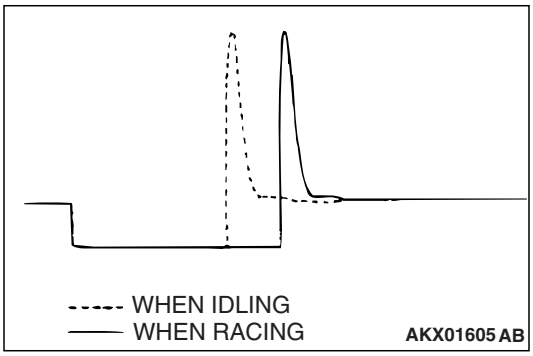
Wave Pattern Observation Points

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

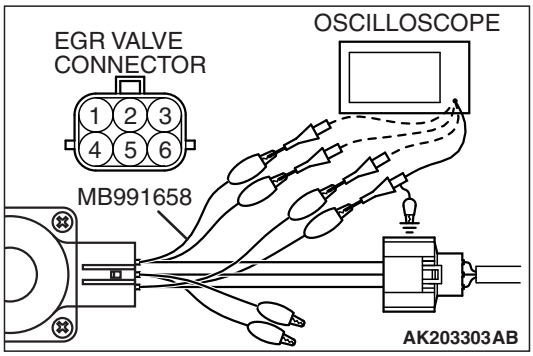
TSB Revision

EGR VALVE (STEPPER MOTOR)

Required Special Tools:

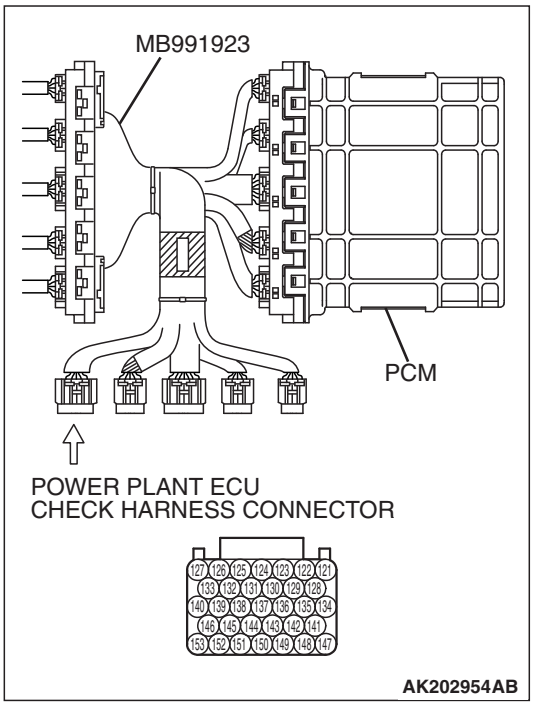
- MB991658: Test Harness
- MB991923: Power Plant ECU Check Harness

Measurement Method

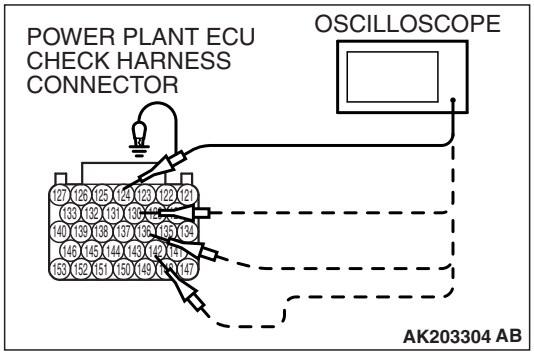


1. Disconnect the EGR valve connector, and connect the test harness special tool (MB991658) between the separated connector (All terminals should be connected).
2. Connect the oscilloscope probe to the EGR valve connector terminal No. 1, terminal No. 3, terminal No. 4, terminal No. 6 respectively.

Alternate method



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

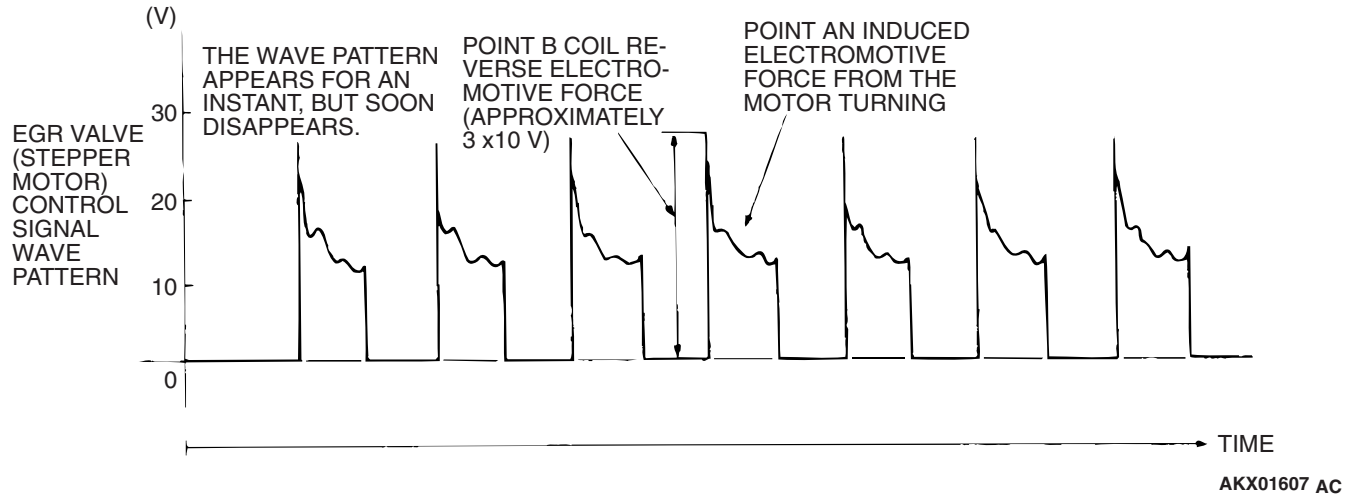


2. Connect the oscilloscope probe to check harness terminal No. 124, No. 130, No. 136 and No. 142.

Standard Wave Pattern

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

Standard wave pattern



Wave Pattern Observation Points

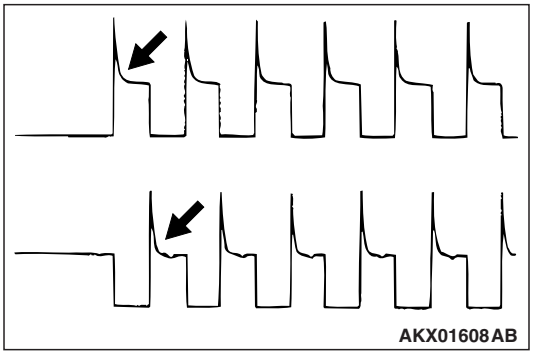
1. Check that the standard wave pattern appears when the EGR valve is operating.

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


AKX01608AB

Examples of Abnormal Wave Patterns

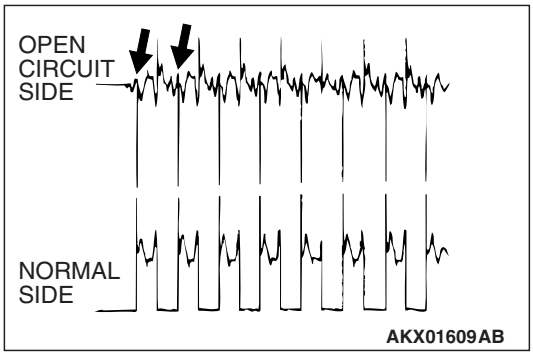
Example 1

Cause of problem

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

Wave pattern characteristics

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



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Example 2

Cause of problem

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

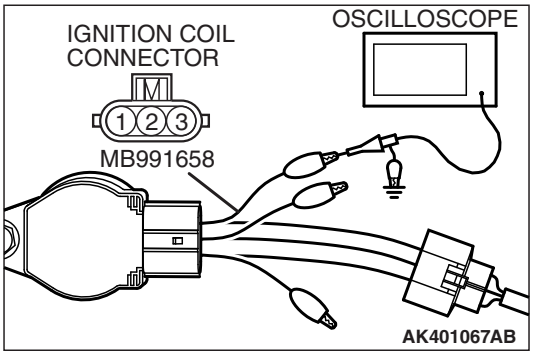
Wave pattern characteristics

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

IGNITION COIL AND IGNITION POWER TRANSISTOR

Required Special Tools:

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

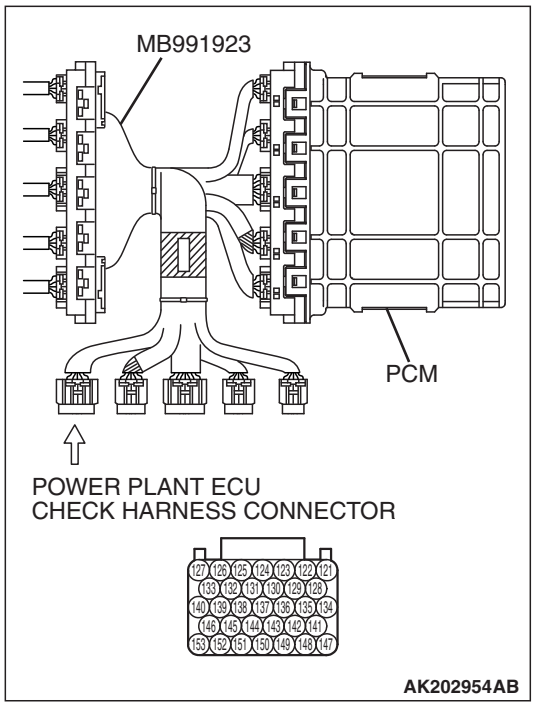


AK401067AB

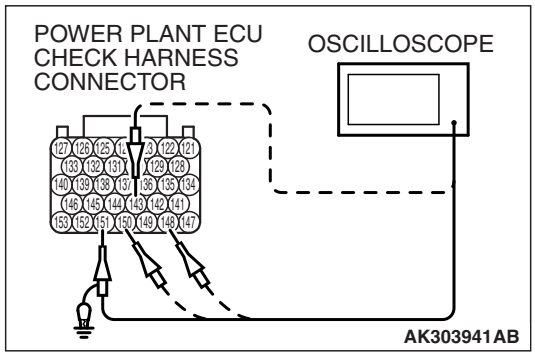
Measurement Method

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

Alternate method



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



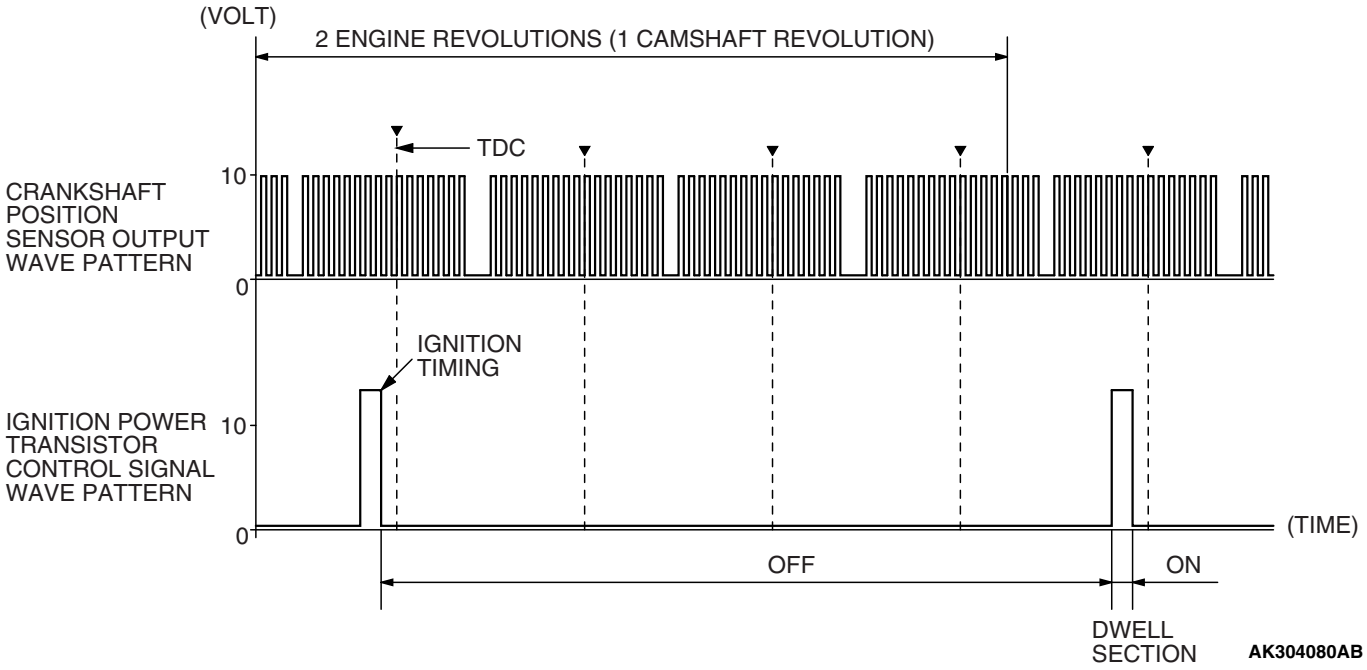
2. Connect the oscilloscope probe to each check harness connector terminal to analyze each cylinder:
   - Terminal No. 151 for the number 1 cylinder.
   - Terminal No. 143 for the number 2 cylinder.
   - Terminal No. 150 for the number 3 cylinder.
   - Terminal No. 148 for the number 4 cylinder.

Standard Wave Pattern

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

TSB Revision

Standard wave pattern



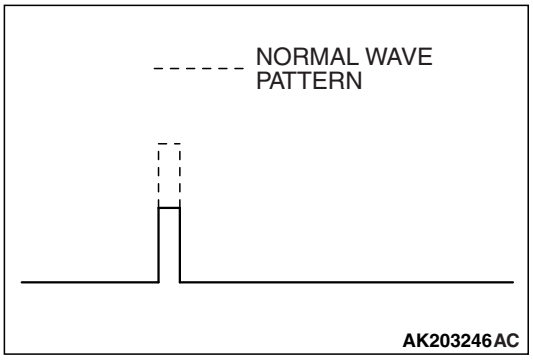
Wave Pattern Observation Points

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

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

Examples of Abnormal Wave Patterns

Example 1 (Wave pattern during engine cranking)

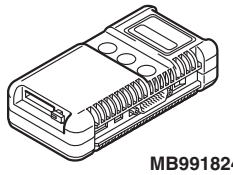
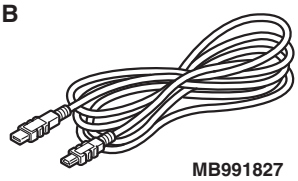
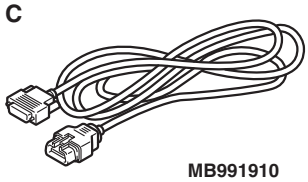
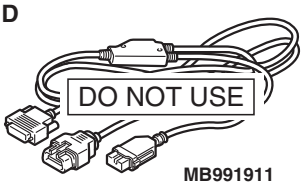
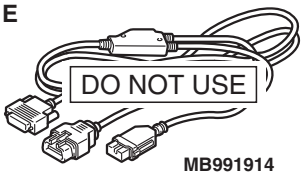
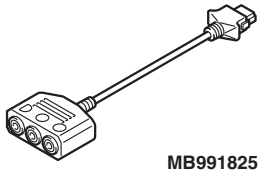
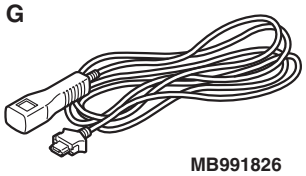


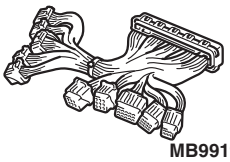
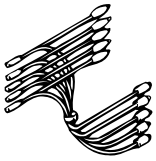
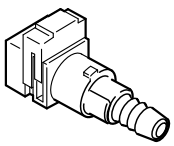
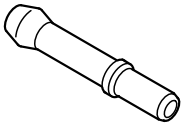
- Cause of problem
  Open-circuit in ignition primary circuit
- Wave pattern characteristics
  Voltage value is too low.

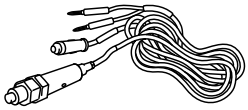
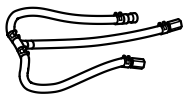
TSB Revision

SPECIAL TOOLS

M1131000602326

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 M.U.T.-III sub assembly A: Vehicle Communication Interface (V.C.I.) B: M.U.T.-III USB Cable C: M.U.T.-III Main Harness A (Vehicles with CAN communication system) D: M.U.T.-III Main Harness B (Vehicles without CAN communication system) E: M.U.T.-III Main Harness C (for Chrysler models only) F: M.U.T.-III Measurement Adapter G: M.U.T.-III Trigger Harness	MB991824-KIT *NOTE: G: MB991826 M.U.T.-III Trigger Harness is not necessary when pushing V.C.I. ENTER key.*	**⚠ CAUTION** **For vehicles with CAN communication, use M.U.T.-III main harness A to send simulated vehicle speed. If you connect M.U.T.-III main harness B instead, the CAN communication does not function correctly.** • Reading diagnostic trouble code • MFI system inspection • Measurement of fuel pressure

TOOL	TOOL NUMBER AND NAME	SUPERSESSION	APPLICATION
 MB991923	MB991923 Power plant ECU check harness	MD998478-01	• Measurement of voltage during troubleshooting • Inspection using an oscilloscope • Inspection of the powertrain control module (PCM) terminal voltage check
	MB991709 Test harness	MB991709-01	• Measurement of voltage during troubleshooting • Inspection using an oscilloscope
 MB991658	MB991658 Test harness	Tool not available	• Measurement of voltage during troubleshooting • Inspection using an oscilloscope • inspection of engine oil control valve
	MD998464 Test harness (4 pin, square)	MD998464-01	• Measurement of voltage during troubleshooting • Inspection of heated oxygen sensor
	MB991316 Test harness (4 pin, square)	Tool not available	• Measurement of voltage during troubleshooting • Inspection of heated oxygen sensor
 MB992049	MB992049	Quick connector	Measurement of fuel pressure
 MB992001	MB992001	Hose adaptor	Measurement of fuel pressure

TOOL	TOOL NUMBER AND NAME	SUPERSESSION	APPLICATION
 MB991981	MB991981 Fuel pressure gauge set	Tool not available	Measurement of fuel pressure
 MB992076	MB992076	Injector test set	Measurement of fuel pressure

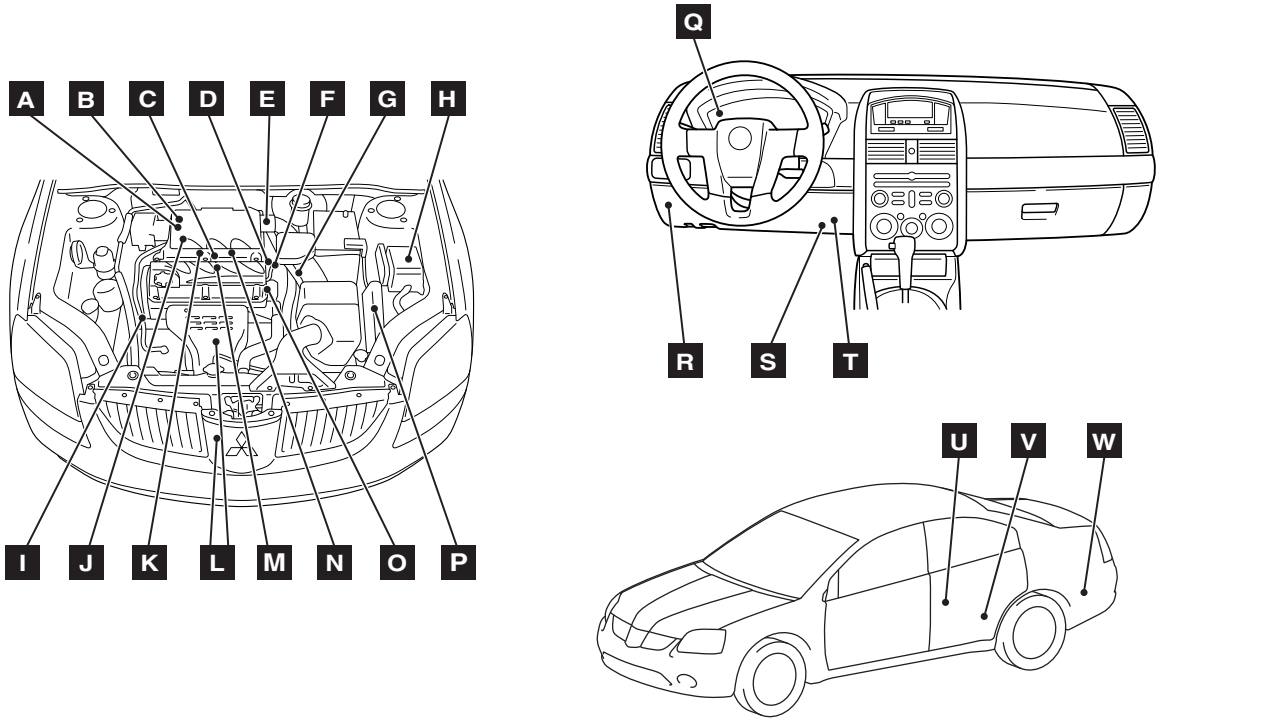
ON-VEHICLE SERVICE

COMPONENT LOCATION

M1131002102190

NAME	SYMBOL	NAME	SYMBOL
Accelerator pedal position sensor	S	Fuel pump relay	R
Camshaft position sensor	O	Fuel tank differential pressure sensor	V
Crankshaft position sensor	I	Fuel tank temperature sensor	V
Cylinder 1, 4 heated oxygen sensor (front)	L	Ignition coil	K
Cylinder 1, 4 heated oxygen sensor (rear)	L	Injector	N
Cylinder 2, 3 heated oxygen sensor (front)	L	Knock sensor	M
Cylinder 2, 3 heated oxygen sensor (rear)	L	Malfunction Indicator Lamp (SERVICE ENGINE SOON or Check Engine Lamp)	Q
Data link connector	T	Manifold absolute pressure sensor	B
Engine coolant temperature sensor	D	Mass airflow sensor (with built-in intake air temperature sensor)	G
Engine oil control valve	F	Multiport fuel injection (MFI) relay	H
Engine oil pressure switch	F	Powertrain control module (PCM)	P
Evaporative emission purge solenoid	A	Power steering pressure switch	J
Evaporative emission ventilation solenoid	W	Throttle actuator control motor	E
Exhaust gas recirculation (EGR) valve	C	Throttle actuator control motor relay	H
Fuel level sensor (main)	V	Throttle position sensor	E
Fuel level sensor (sub)	U		

TSB Revision


A
B
C
D
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V
W

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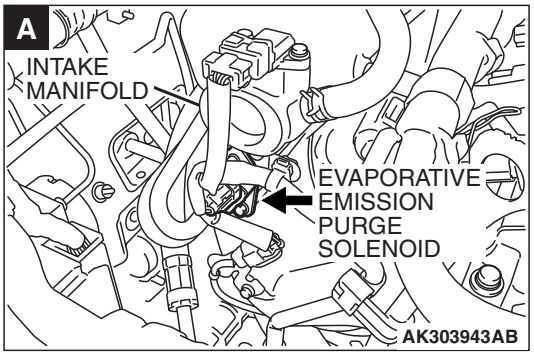
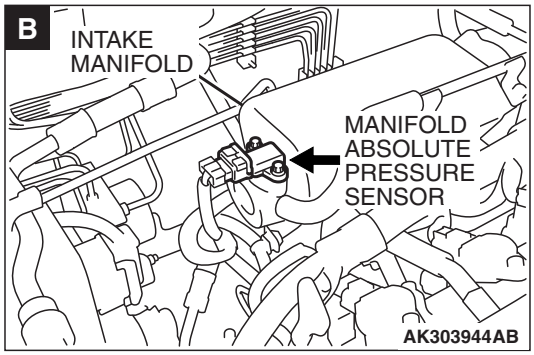
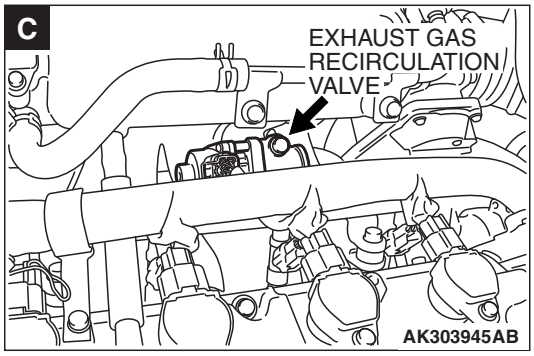
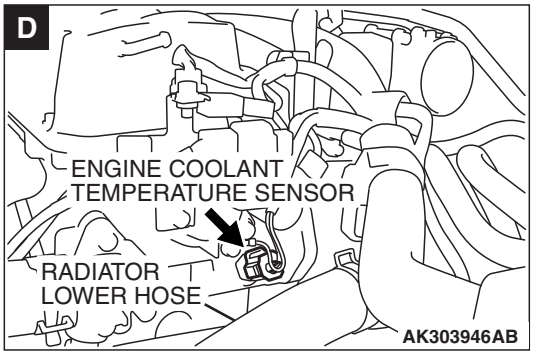
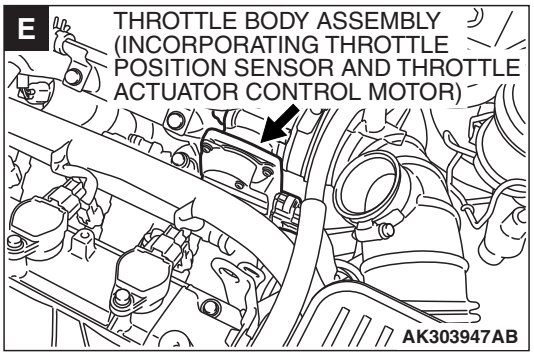

A
INTAKE MANIFOLD
EVAPORATIVE EMISSION PURGE SOLENOID
AK303943AB


B
INTAKE MANIFOLD
MANIFOLD ABSOLUTE PRESSURE SENSOR
AK303944AB


C
EXHAUST GAS RECIRCULATION VALVE
AK303945AB


D
ENGINE COOLANT TEMPERATURE SENSOR
RADIATOR LOWER HOSE
AK303946AB

E



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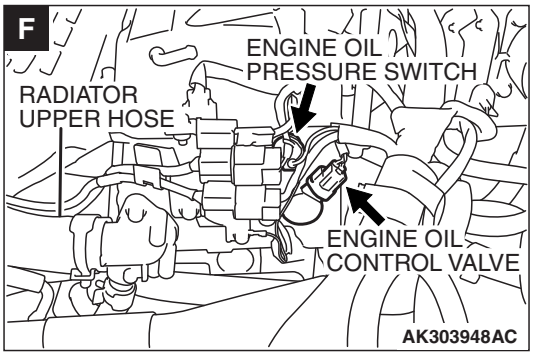
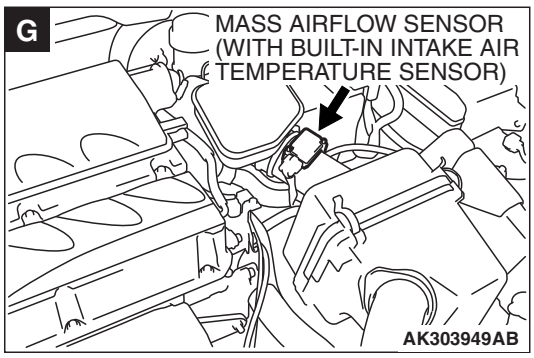
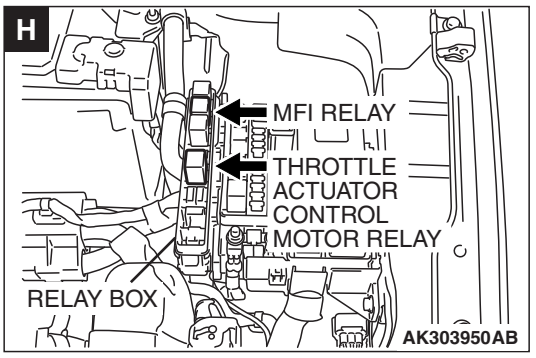


G



H



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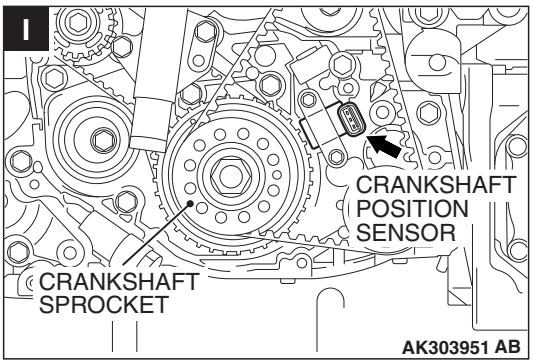
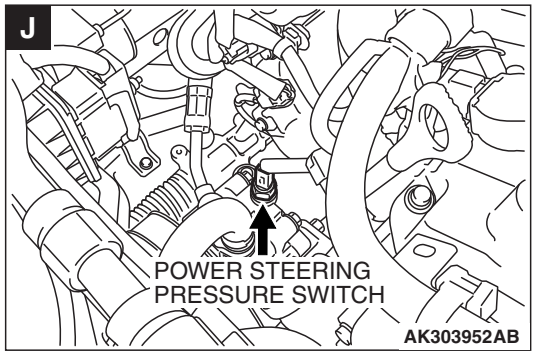
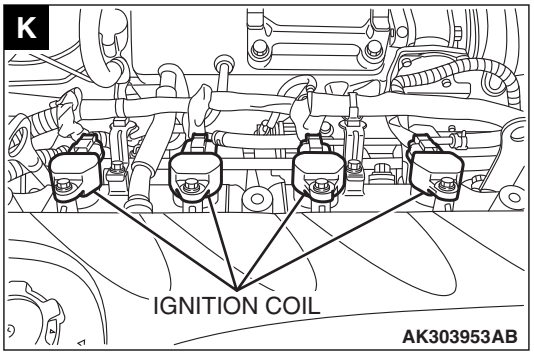


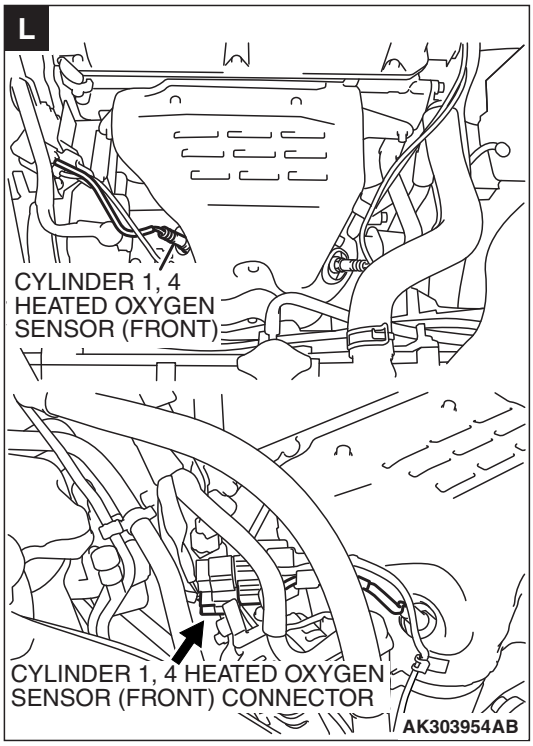
J



K



TSB Revision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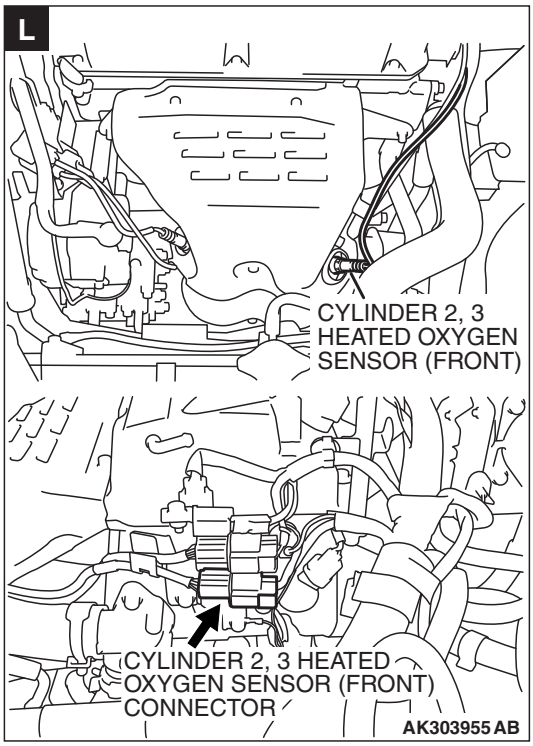
CYLINDER 1, 4 HEATED OXYGEN SENSOR (FRONT)
CYLINDER 1, 4 HEATED OXYGEN SENSOR (FRONT) CONNECTOR
AK303954AB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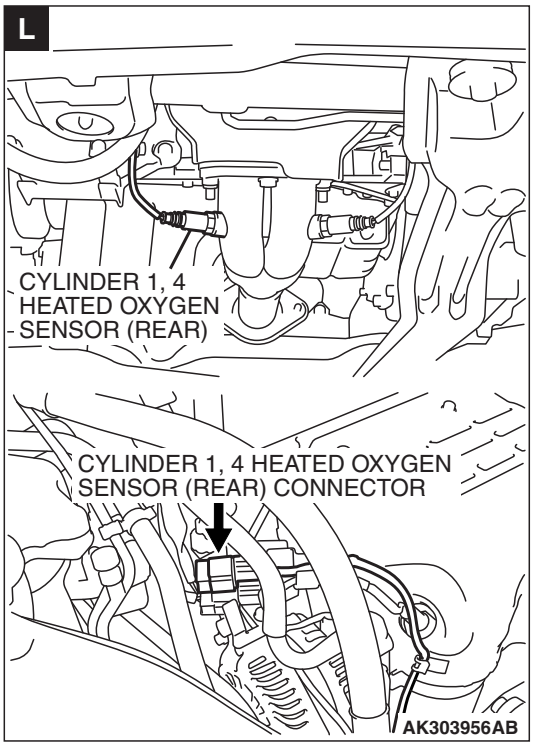
CYLINDER 2, 3 HEATED OXYGEN SENSOR (FRONT) CONNECTOR
AK303955AB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CYLINDER 1, 4 HEATED OXYGEN SENSOR (REAR) CONNECTOR
AK303956AB

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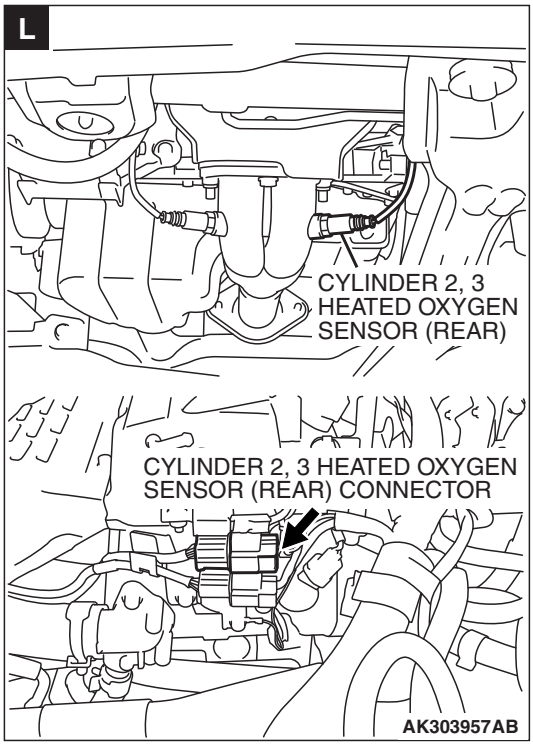
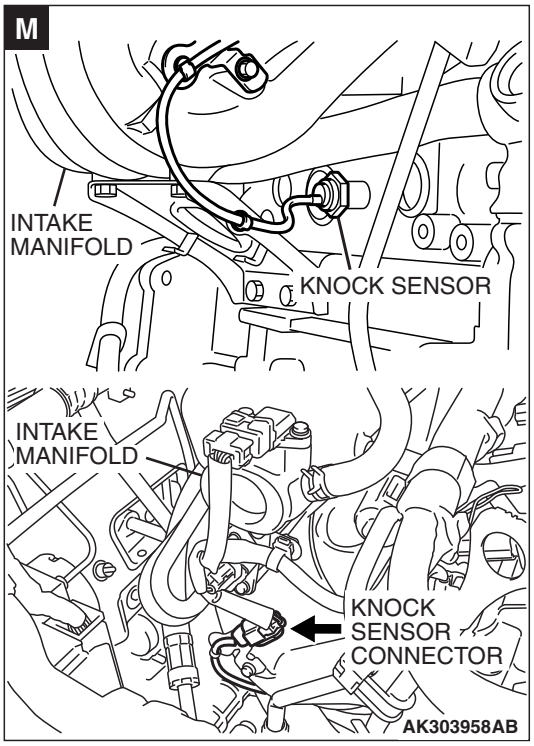
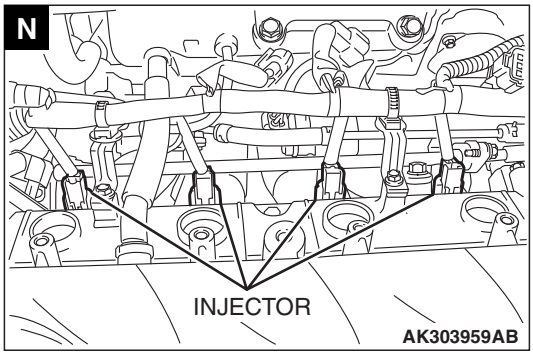

CYLINDER 2, 3 HEATED OXYGEN SENSOR (REAR)
CYLINDER 2, 3 HEATED OXYGEN SENSOR (REAR) CONNECTOR
AK303957AB

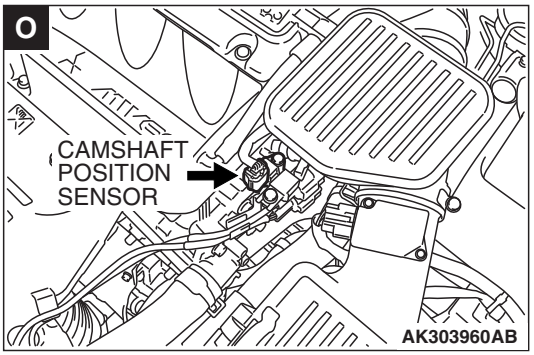
M


INTAKE MANIFOLD
KNOCK SENSOR
INTAKE MANIFOLD
KNOCK SENSOR CONNECTOR
AK303958AB

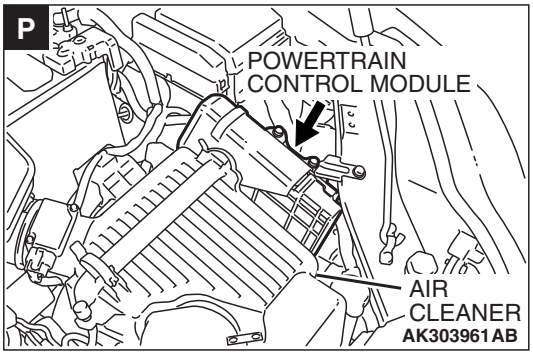
N


INJECTOR
AK303959AB

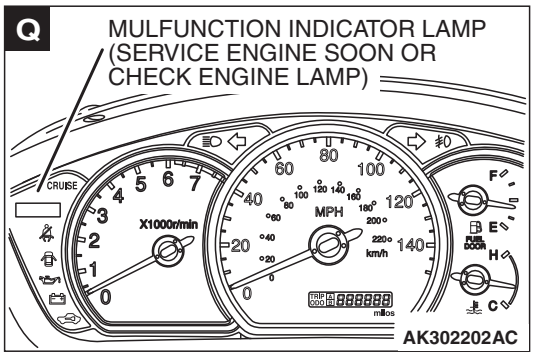
O


CAMSHAFT POSITION SENSOR
AK303960AB

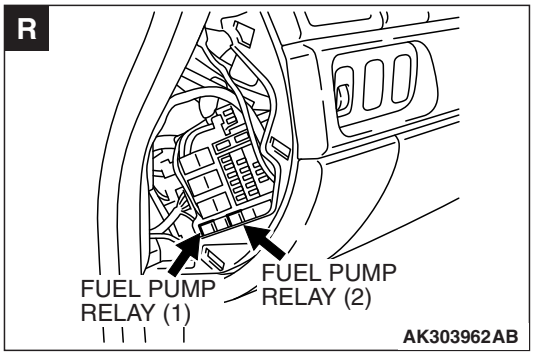
P


POWERTRAIN CONTROL MODULE
AIR CLEANER
AK303961AB

Q


MULFUNCTION INDICATOR LAMP (SERVICE ENGINE SOON OR CHECK ENGINE LAMP)
CRUISE
X1000r/min
MPH
km/h
AK302202AC

R



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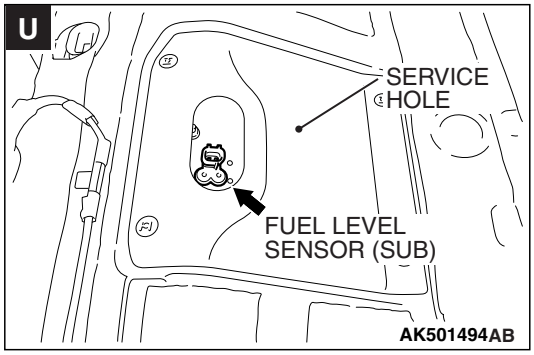

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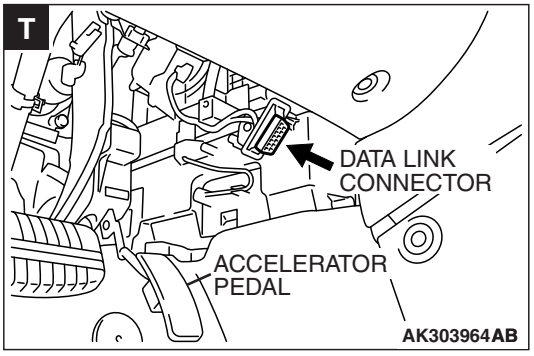

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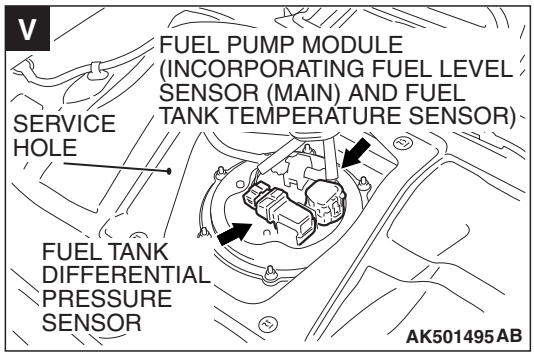

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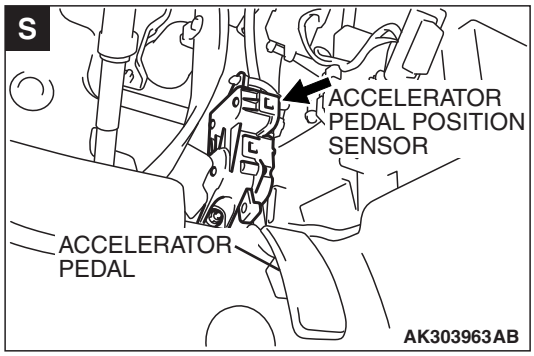

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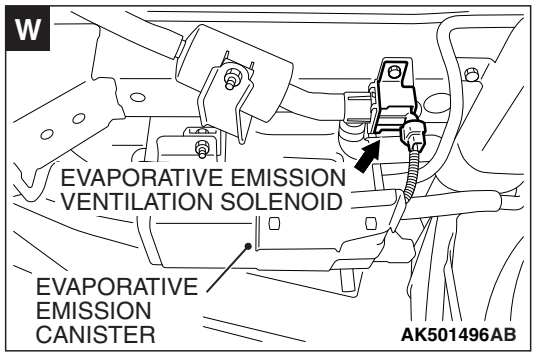


THROTTLE BODY (THROTTLE VALVE AREA) CLEANING

M1131001001432

⚠ ***WARNING***

When touching the throttle valve, surely shut off the driving circuits of the throttle valve. In the event that the throttle valve is operated, a finger might be injured as the result of being caught by the throttle valve.

⚠ **CAUTION**

- **When the throttle body cleaning is performed, use scan tool MB991958 to initialize the learning value (Refer to GROUP 00, Precautions Before Service Initialization Procedure for Learning Value in MFI Engine P.00-27).**
- **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.**

TSB Revision

1. Remove the air intake hose from the throttle body.
2. Disconnect the electronic-controlled throttle valve connector.
3. Remove the throttle body assembly.
4. Spray cleaning solvent on a clean cloth.
5. Wipe off the dirt around the throttle valve with the cloth sprayed with cleaning solvent.
6. Install the throttle body assembly.
7. Connect electronic-controlled throttle valve connector.
8. Attach the air intake hose.

FUEL PRESSURE TEST

M1131001901844

Required Special Tools:

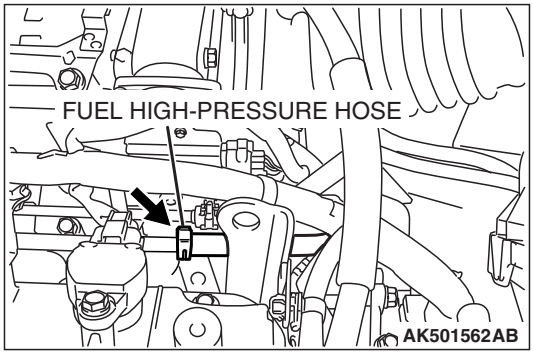
- MB991958: Scan tool (M.U.T.-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991910: Main Harness A
- MB991981: Fuel Pressure Gauge Set
- MB992001: Hose Adaptor
- MB992049: Quick Connector
- MB992076: Injector Test Set

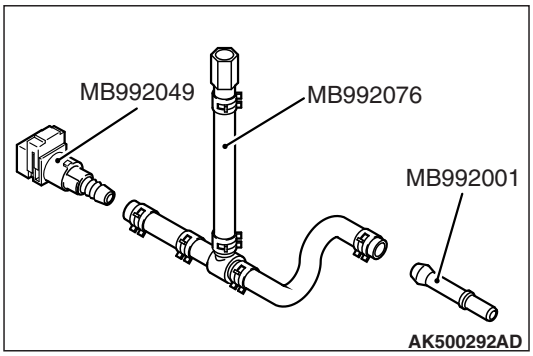
1. Release residual pressure from the fuel line to prevent fuel spray. (Refer to P.13A-1220.)

⚠ WARNING

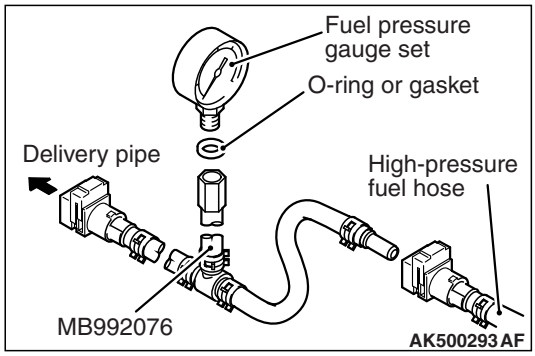
To prevent a fire, cover the hose connection with shop towels to prevent splashing of fuel that could be caused by some residual pressure in the fuel pipe line.

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



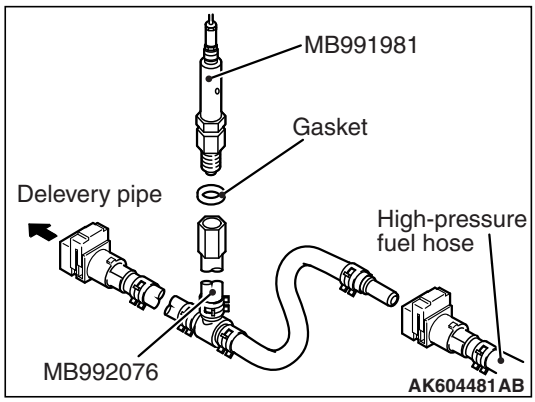


3. Assemble the special tool MB992076 of special tool as shown in figure.
4. Remove either the instillation adopter for the injector or another adopter.
5. Install the special tool MB992049 (quick connector) and the special tool MB992001 (hose adapter) to the hose without the adopter.
6. Assemble the fuel pressure measurement tools as follows.



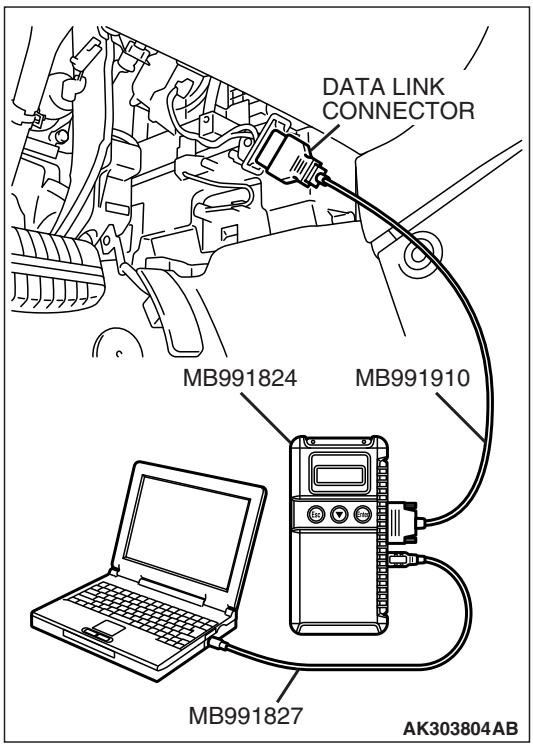
<When using the fuel pressure gauge>

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 MB991981 (fuel pressure gauge set)>

1. Via a gasket, install the special tool MB991981 (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.13A-1220.)

⚠ ***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.

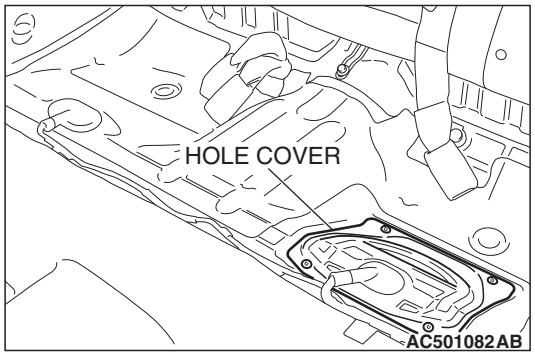
16.Remove the fuel pressure gauge and special tool from the delivery rail.
17.Fit the fuel high-pressure hose to the delivery pipe.
18.Check for fuel leaks.
(1) Use scan tool MB991958 to operate the fuel pump.
(2) Check the fuel line for leaks and repair as needed.
19.Disconnect scan tool MB991958.

REDUCE PRESSURIZED FUEL LINES

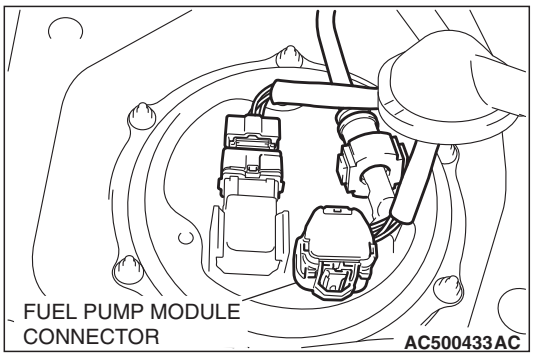
M1131000901681

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

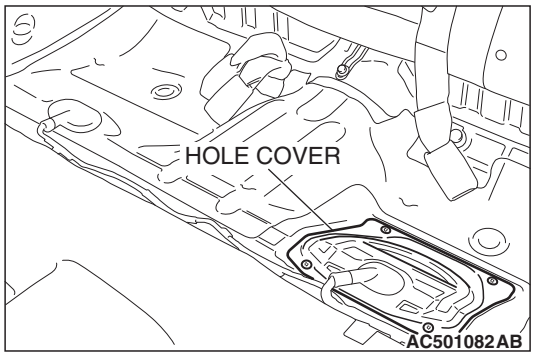
1. Remove the rear seat cushion assembly (Refer to GROUP 52A, Rear Seat P.52A-42).



2. Remove the hole cover.



3. Disconnect the fuel pump module connector.
4. After starting the engine and letting it run until it stops naturally, turn the ignition switch to the "LOCK" (OFF) position.
5. Connect the fuel pump module connector.



6. Install the hole cover.

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

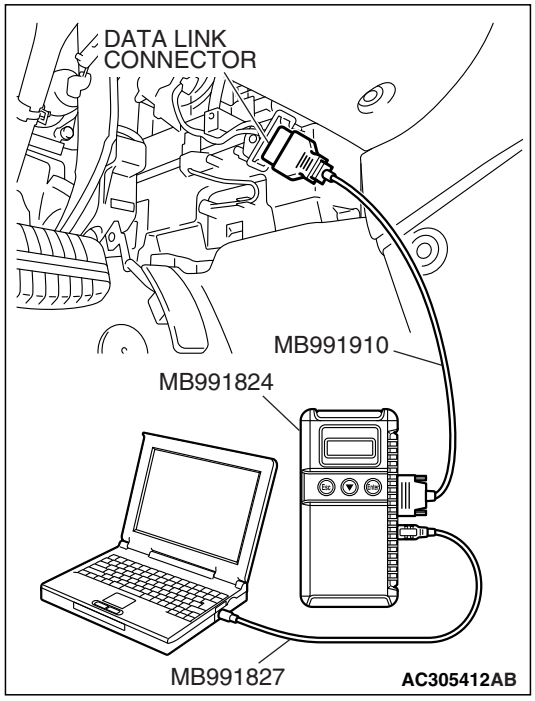
7. Install the rear seat cushion assembly (Refer to GROUP 52A, Rear Seat Assembly P.52A-42).

FUEL PUMP OPERATION CHECK

M1131002001963

Required Special Tool:

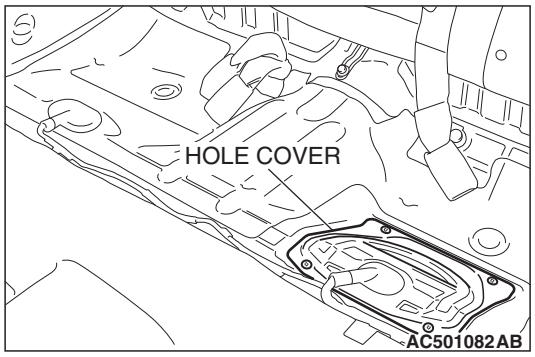
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A



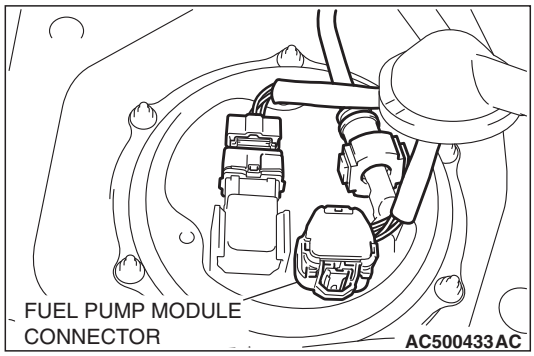
⚠ CAUTION

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

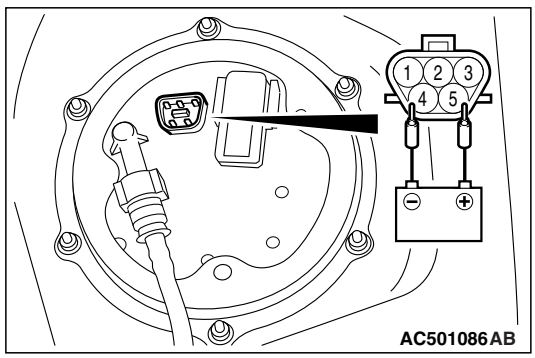
1. Check the operating of the fuel pump by using scan tool MB991958 to force-drive the fuel pump.
2. If the fuel pump will not operate, check by using the following procedure. If normal, check the fuel pump drive circuit.
   (1) Turn the ignition switch to the "LOCK" (OFF) position.
   (2) Remove the rear seat cushion assembly (Refer to GROUP 52A, Rear Seat P.52A-42).



(3) Remove the hole cover.



(4) Disconnect the fuel pump module connector.



(5) When the fuel pump drive connector is attached directly to the battery, check if the sound of the fuel pump operation can be heard. If no operating sound is heard, replace the fuel pump module (Refer to GROUP 13C, On-vehicle Service –Fuel Pump Module Replacement P.13C-7).

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

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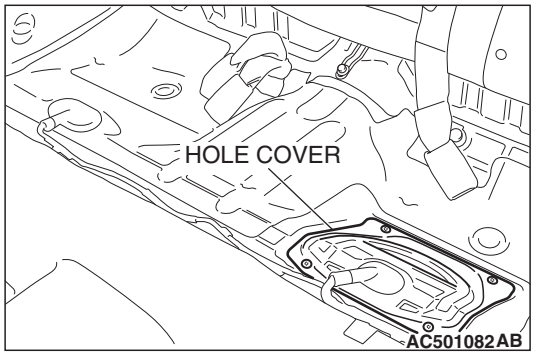


(6) Check for fuel pressure by pinching the fuel hose with fingertips.
(7) Connect the fuel pump module connector.
(8) Install the hole cover.

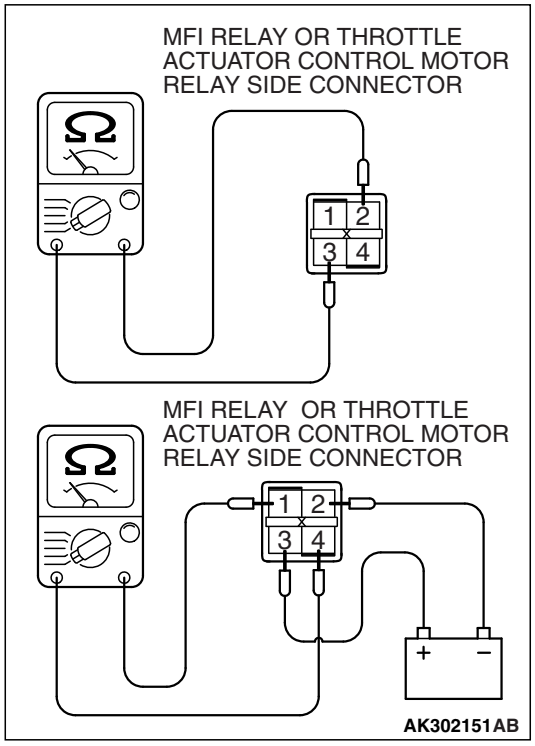
Tightening torque: 1.5 ±0.5 N· m (14 ±4 in-lb)

(9) Install the rear seat cushion assembly (Refer to GROUP 52A, Rear Seat Assembly P.52A-42).

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

M1131050000721

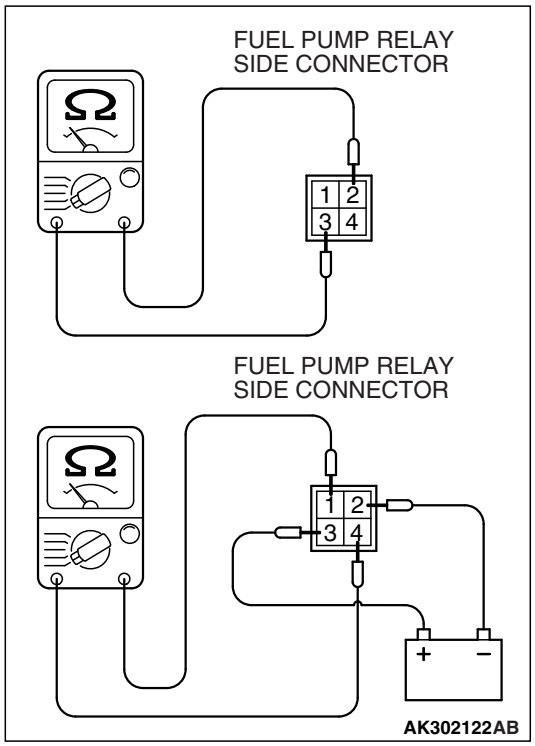
Inspect the MFI relay and throttle actuator control motor relay for continuity in accordance with the chart shown below.



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

M1131033000728

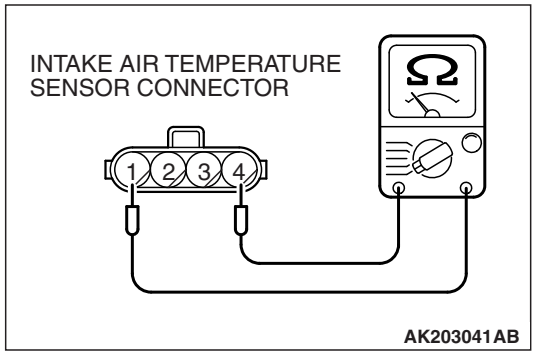


Inspect the fuel pump relay for continuity in accordance with the chart shown below.

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

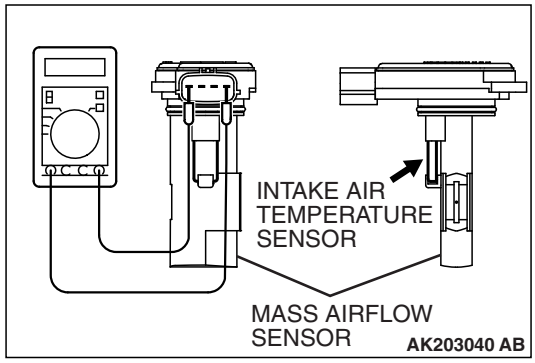
INTAKE AIR TEMPERATURE SENSOR CHECK

M1131002801077



1. Disconnect the mass airflow sensor connector.
2. Measure resistance between terminal No. 1 and No. 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

M1131003101026

⚠ CAUTION

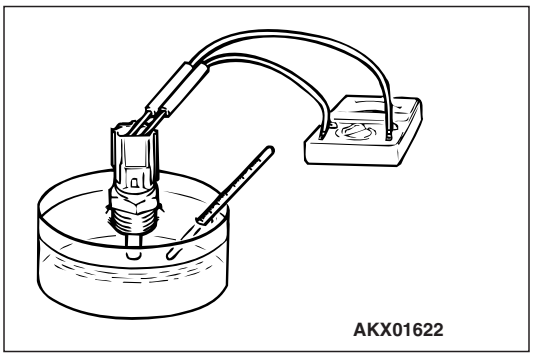
Be careful not to touch the connector (resin section) with the tool when removing and installing.

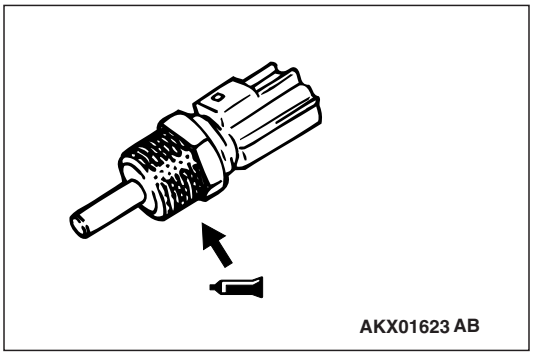
1. Drain engine coolant, then remove the engine coolant temperature sensor.
2. With the temperature sensing portion of engine coolant temperature sensor immersed in hot water, check the resistance.

   Standard value:
   14 – 17 kΩ [at –20° C (–4° F)]
   5.1 – 6.5 kΩ [at 0° C (32° F)]
   2.1 – 2.7 kΩ [at 20° C (68° F)]
   0.9 – 1.3 kΩ [at 40° C (104° F)]
   0.48 – 0.68 kΩ [at 60° C (140° F)]
   0.26 – 0.36 kΩ [at 80° C (176° F)]

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

   Tightening torque: 30 ± 9 N· m (22 ± 7 ft-lb)





HEATED OXYGEN SENSOR CHECK

M1131005002921

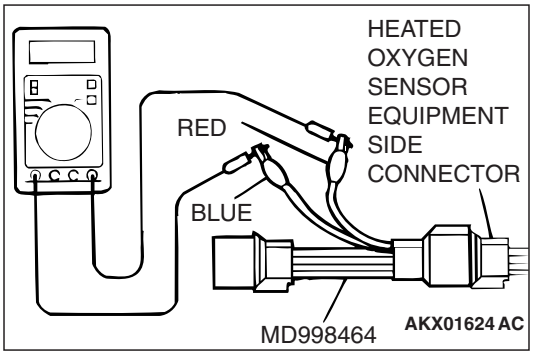
Required Special Tools:
- MD998464: Test Harness
- MB991316: Test Harness

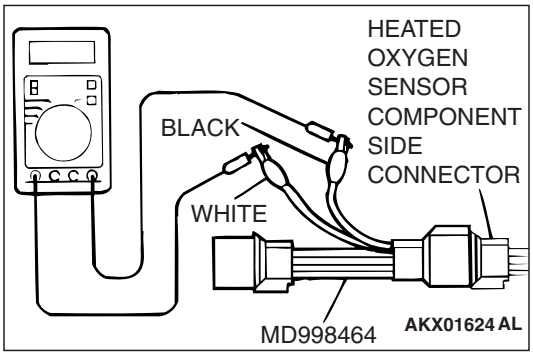
<Heated oxygen sensor (rear)>

1. Disconnect the heated oxygen sensor connector and connect special tool MD998464 to the connector on the heated oxygen sensor side.
2. Measure the resistance between terminal No. 1 (red clip) and terminal No. 3 (blue clip) on the heated oxygen sensor connector.

   Standard value: 11 – 18 Ω [at 20° C (68° F)]

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 (31mph) 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: "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 and normal heated oxygen sensor also can output voltage of 0.6 – 1.0 V.

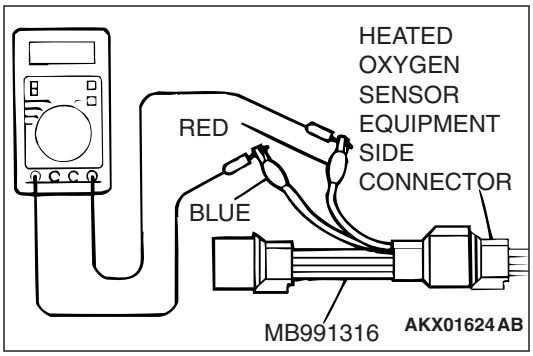
NOTE: If the temperature of sensing area does not reach the high temperature [of approximately 400 °C (752 °F) or more] even though the heated oxygen sensor is normal, the output voltage would be possibly low in spite of the rich air-fuel ratio.

NOTE: When the vehicle is driven with high loads, the temperature of the sensing area of the heated oxygen sensor is sufficiently high. Thus, it is not necessary to apply the voltage to the heater.

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

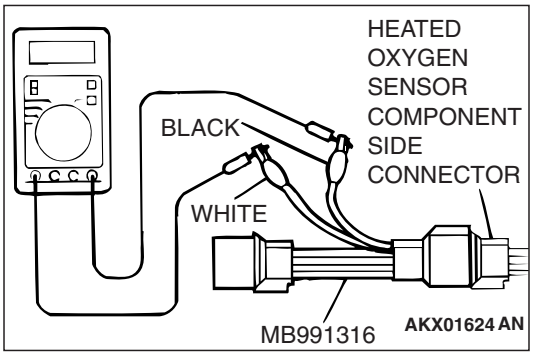
NOTE: For removal and installation of the heated oxygen sensor, refer to GROUP 15, Exhaust Pipe and Main Muffler – Removal And Installation P.15-22.

<Heated oxygen sensor (front)>



1. Disconnect the heated oxygen sensor connector and connect special tool MB991316 to the connector on the heated oxygen sensor side.
2. Measure the resistance between terminal No. 1 (red clip) and terminal No. 3 (blue clip) on the heated oxygen sensor connector.

   Standard value: 4.5 –8.0 Ω [at 20° C (68° F)]
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 2,000 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 heated oxygen sensor.**
- **Be careful the heater is broken when voltage of beyond 8 volts is applied to the heated oxygen sensor heater.**

NOTE: If the temperature of sensing area does not reach the high temperature [of approximately 400°C (752°F) or more] even though the heated oxygen sensor is normal, the output voltage would be possibly low in spite of the rich air-fuel ratio. Therefore, if the output voltage is low, use jumper wires to connect the terminal No. 1 (red clip) and the terminal No. 3 (blue clip) of the heated oxygen sensor with a (+) terminal and (–) terminal of 8 volts power supply respectively, then check again.

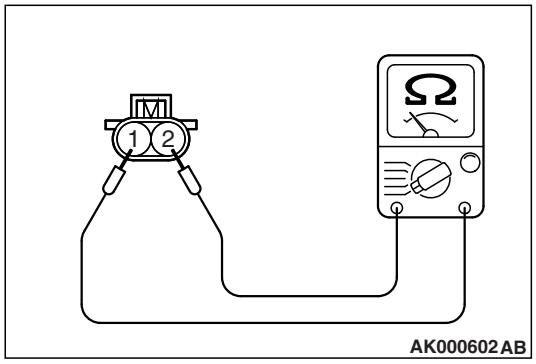
8. If the output voltage is not within the standard value, replace the heated oxygen sensor.

NOTE: For removal and installation of the heated oxygen sensor, refer to GROUP 15, Exhaust Pipe and Main Muffler – Removal And Installation <2.4L engine> P.15-16.

INJECTOR CHECK

M1131005201397

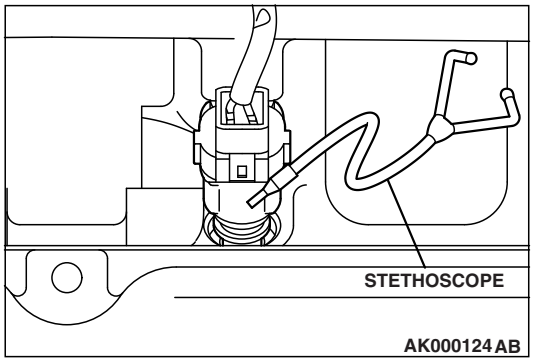
Measurement of Resistance between Terminals



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

   Standard value: 10.5 – 13.5 Ω [at 20° C (68° F)]
3. If not within specification, replace the injector.
4. Install the injector connector.

Checking operation sound



Using a stethoscope or long blade screwdriver, check the operation sound ("tick-tick-tick") of injectors during idling or during cranking. Check that as the engine speed increases, the frequency of the operating sound also increases.

1. If the injector you are checking is not operating, you may hear the operating sound of the other injectors.
2. If no operating sound is heard from the injector that is being checked, check the injector drive circuit. If there is nothing wrong with the circuit, a defective injector or powertrain control module (PCM) is suspected.

THROTTLE ACTUATOR CONTROL MOTOR CHECK

M1131051000887

<Operation Inspection>

⚠ WARNING

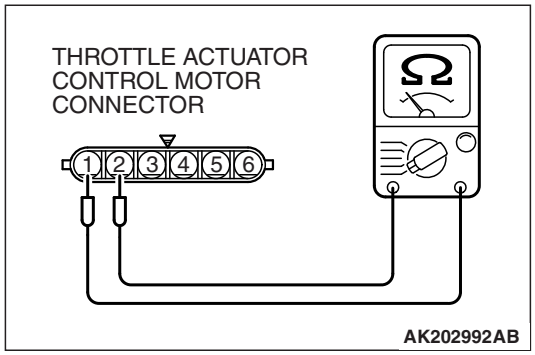
When checking the throttle valve operation, never insert fingers into the throttle valve. The extremely strongpower of the throttle valve motor might trap and injure fingers.

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>

⚠ *WARNING*

When touching the throttle valve, surely shut off the driving circuits of the throttle valve. In the event that the throttle valve is operated, a finger might be injured as the result of being caught by the throttle valve.



1. Disconnect the throttle position sensor connector.
2. Measure the resistance between terminal No. 1 and No. 2.

   Standard value: 0.3 – 80 Ω [at 20° C (68° F)]
3. If resistance is outside the standard value, replace the throttle body assembly.

ENGINE OIL CONTROL VALVE CHECK

M1131053200519

Required Special Tool:

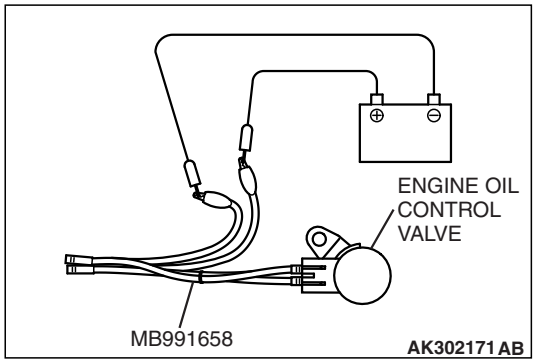
- MB991658: Test Harness

Checking the Operation Sound

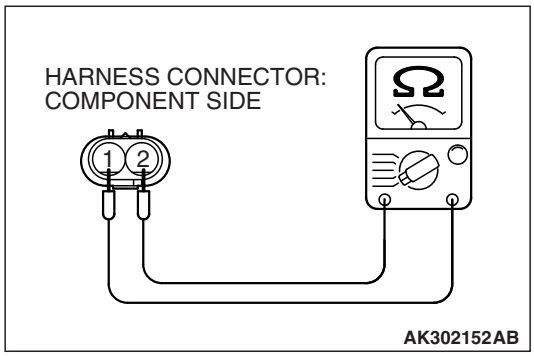
1. Disconnect the engine oil control valve connector and connect special tool MB991658 to the connector on the engine oil control valve side.

⚠ 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. 1 of the engine oil control valve connector to the positive battery terminal and terminal No. 2 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 Ω [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

M1131005600488

Refer to GROUP 17, Emission Control –Evaporative Emission Control System –Evaporative Emission Purge Solenoid Check P.17-91.

EVAPORATVE EMISSION VENTILATION SOLENOID CHECK

M1131012800417

Refer to GROUP 17, Emission Control –Evaporative Emission Canister and Fuel Tank Pressure Relief Valve –Inspection P.17-100.

EGR VALVE CHECK

M1131051500172

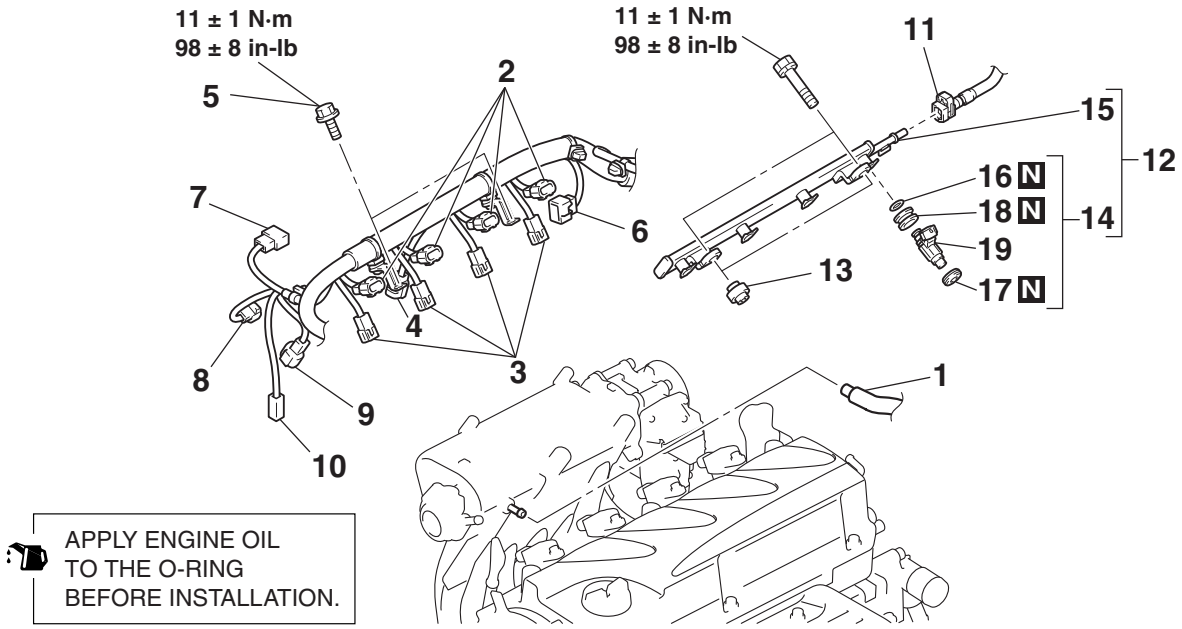
Refer to GROUP 17, Emission Control –Exhaust Gas Recirculation (EGR) System –EGR Valve (stepper motor) Check.P.17-94

INJECTOR

REMOVAL AND INSTALLATION

M1131007102270

Pre-removal Operation	Post-installation Operation
• Fuel Discharge Prevention (Refer to P.13A-1220). • Air Cleaner Cover and Air Intake Hose Removal (Refer to GROUP 15, Air Cleaner P.15-4).	• Air Cleaner Cover and Air Intake Hose Installation (Refer to GROUP 15, Air Cleaner P.15-4). • Fuel Leakage Inspection.



AC500488AB

REMOVAL STEPS

1. PCV HOSE CONNECTION
2. IGNITION COIL CONNECTORS
3. INJECTOR CONNECTORS
4. EGR VALVE CONNECTOR
5. ROCKER COVER BRACKET INSTALLATION BOLTS
6. THROTTLE POSITION SENSOR CONNECTOR
7. MANIFOLD ABSOLUTE PRESSURE SENSOR
8. EVAPORATIVE EMISSION PURGE SOLENOID CONNECTOR
9. KNOCK SENSOR CONNECTOR

<<A>> >>B<<

<<B>>

REMOVAL STEPS (Continued)

10. POWER STEERING PRESSURE SWITCH CONNECTOR

>>A<<

11. FUEL HIGH-PRESSURE HOSE CONNECTION
12. FUEL RAIL AND FUEL INJECTOR ASSEMBLY
13. INSULATORS
14. FUEL INJECTOR ASSEMBLY
15. FUEL RAIL
16. O-RINGS
17. INSULATORS
18. GROMMETS
19. FUEL INJECTORS

TSB Revision

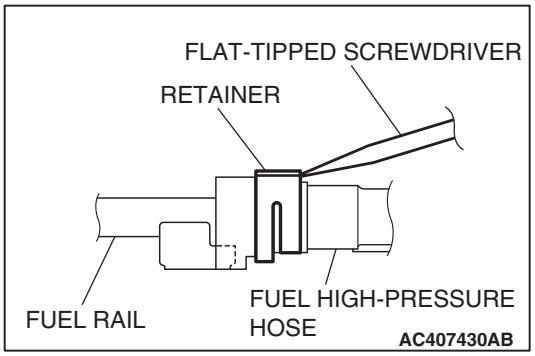
REMOVAL SERVICE POINTS

<<A>> FUEL HIGH-PRESSURE HOSE DISCONNECTION

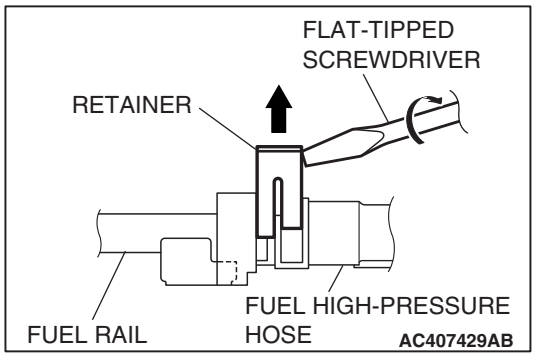
⚠ CAUTION

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 degrees to the arrowed direction, and lift the retainer to unlock and disconnect the fuel high-pressure hose.



<<B>> FUEL RAIL AND FUEL INJECTOR ASSEMBLY REMOVAL

⚠ CAUTION

Do not drop the injector.

Remove the fuel rail with the injectors attached to it.

INSTALLATION SERVICE POINTS

>>A<< FUEL INJECTOR ASSEMBLY INSTALLATION

⚠ CAUTION

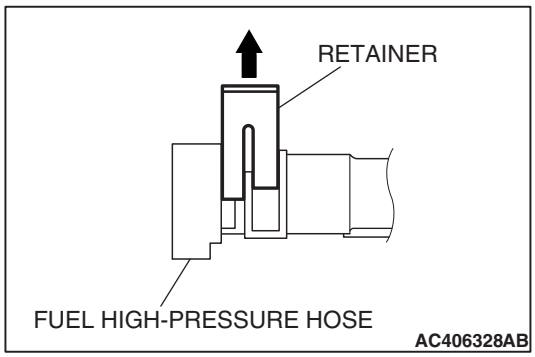
Do not let the engine oil get into the fuel rail.

1. Apply a drop of new engine oil to the O-ring.
2. Turn the injector to the right and left to install to the fuel rail. Be careful not to damage the O-ring. After installing, check that the item turns 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.

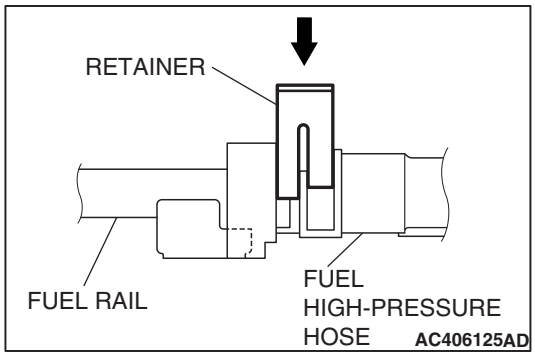
>>B<< FUEL HIGH-PRESSURE HOSE CONNECTION

⚠ CAUTION

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



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



2. Install the fuel high-pressure hose to the fuel rail securely and push the retainer 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

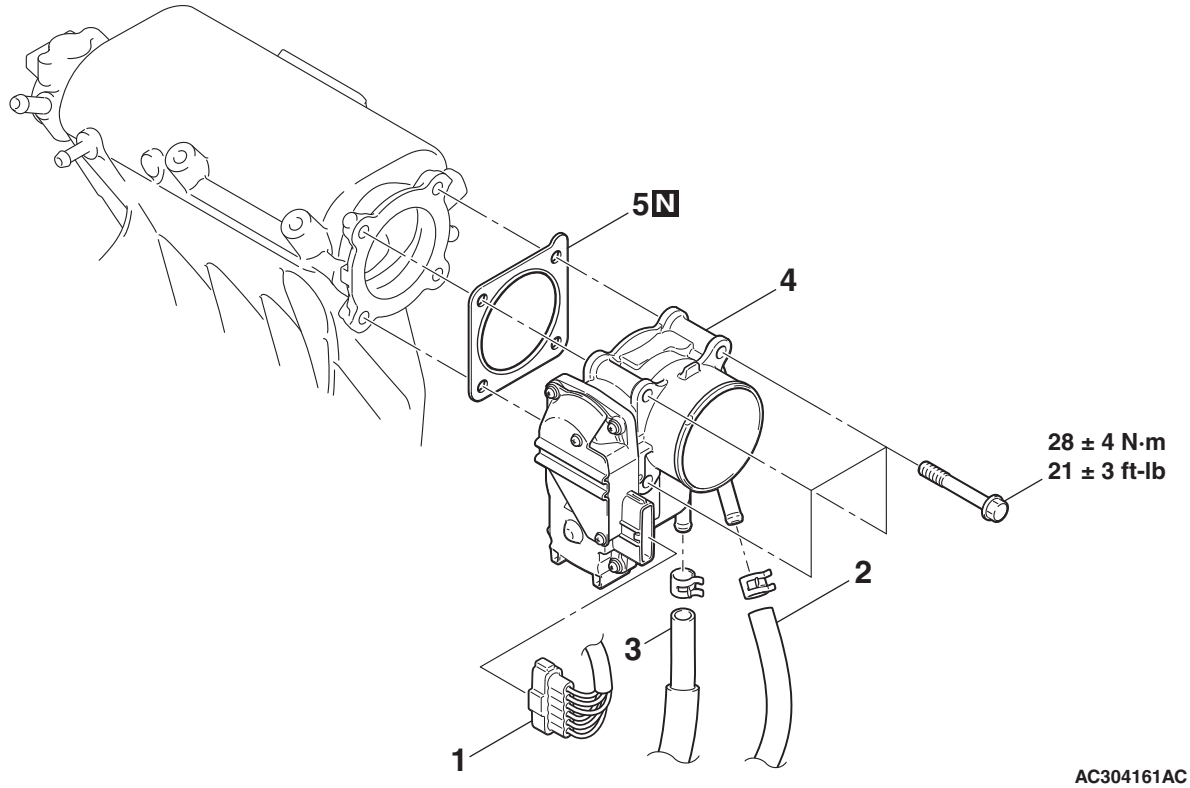
REMOVAL AND INSTALLATION

M1131007702001

⚠ 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.00-27).**
- **Do not loosen the fixing screws for the resin cover of throttle body assembly. If the screws are loosened, the sensor incorporated in the resin cover becomes misaligned and the throttle body cannot work normally.**

Pre-removal Operation	Post-installation Operation
• Engine Coolant Draining [Refer to GROUP 00, Maintenance Service –Engine Coolant (Change) P.00-54]. • Air Cleaner Cover and Air Intake Hose Removal (Refer to GROUP 15, Air Cleaner P.15-4). • Battery Removal	• Battery Installation • Air Cleaner Cover and Air Intake Hose Installation (Refer to GROUP 15, Air Cleaner P.15-4). • Engine Coolant Refilling [Refer to GROUP 00, Maintenance Service –Engine Coolant (Change) P.00-54].



AC304161AC

REMOVAL STEPS

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

REMOVAL STEPS (Continued)

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

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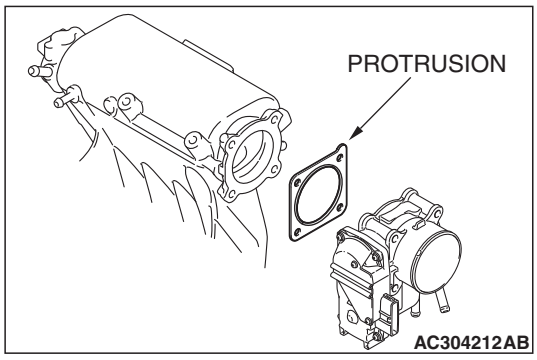
INSTALLATION SERVICE POINTS

>>A<< THROTTLE BODY GASKET INSTALLATION

⚠ CAUTION

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

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



>>B<< INITIALIZATION PROCEDURE

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

POWERTRAIN CONTROL MODULE (PCM)

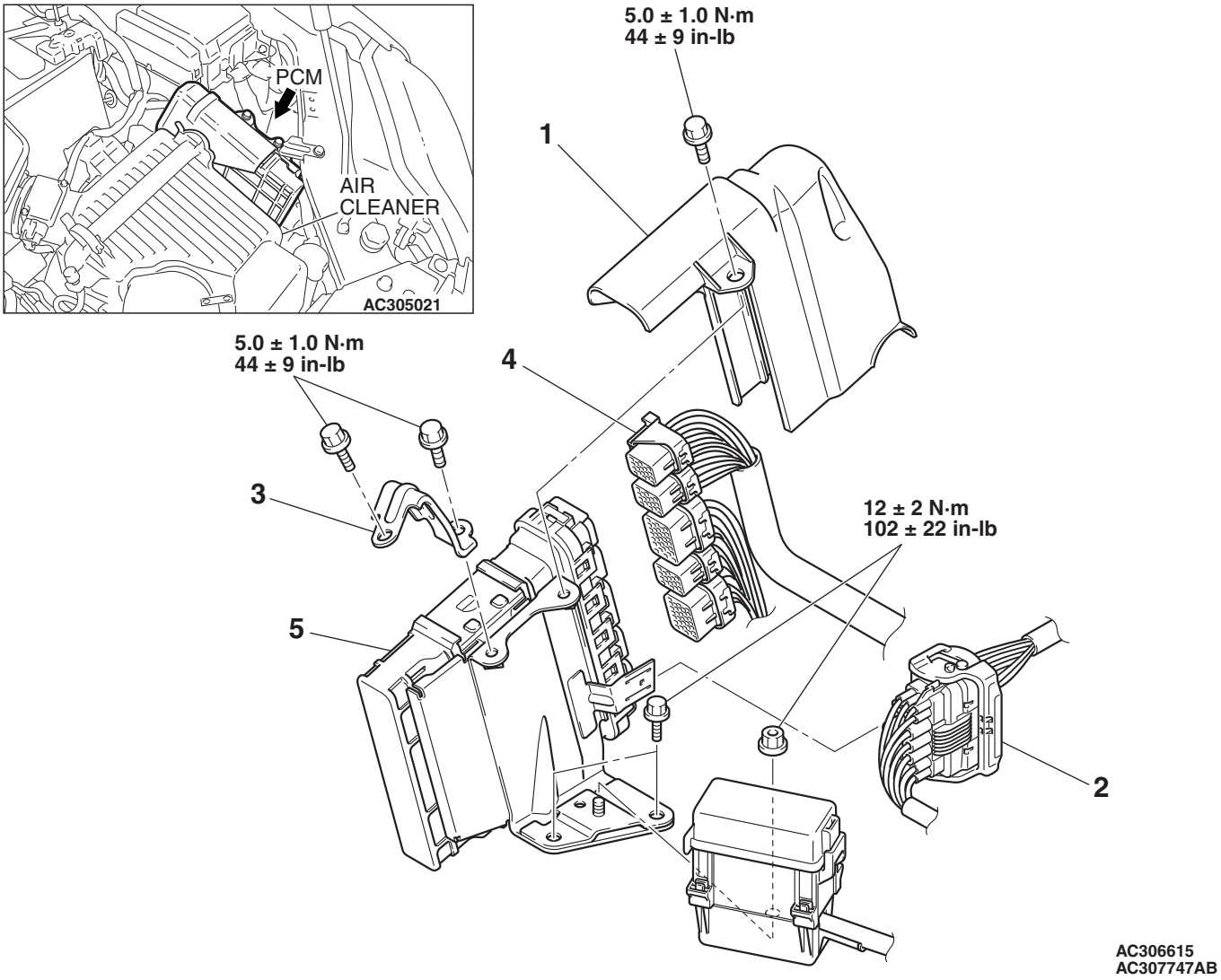
REMOVAL AND INSTALLATION

M1131033400889

⚠ CAUTION

- **Do not replace the PCM and the ETACS-ECU simultaneously. Always replace either one of the ECUs first, and register the encrypted code (Refer to GROUP 54A, Ignition Switch –Encrypted Code Registration Criteria Table P.54A-10). Then, replace the other ECU.**
- **After the PCM is replaced, idling speed may be unstable because the MFI engine learning is not completed. To make it stable, make the system learn the idling (Refer to GROUP 00, Precautions before Service –Learning Procedure for Idling in MFI Engine P.00-28).**

<VEHICLES FOR USA>



REMOVAL STEPS

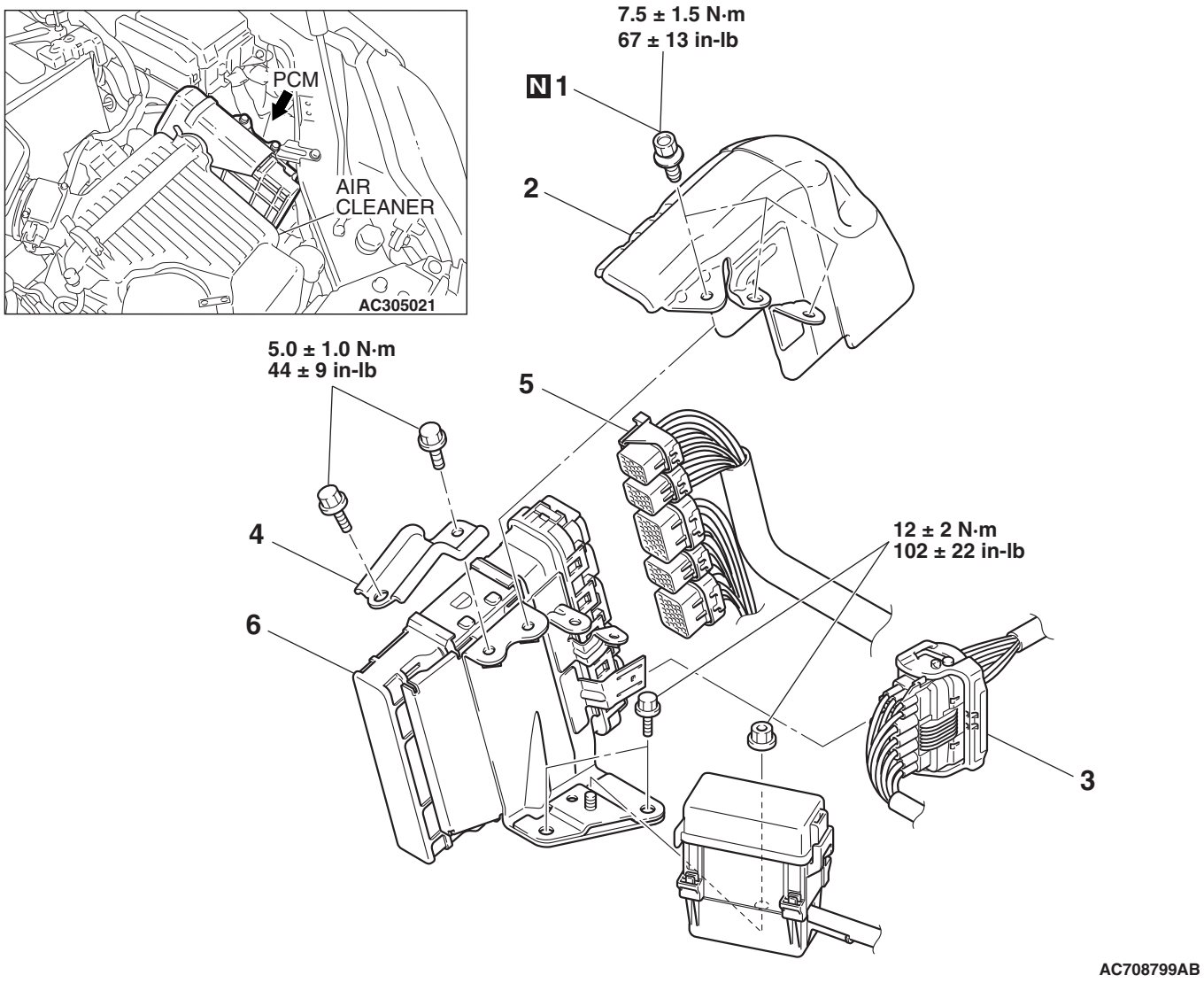
>>B<< • INITIALIZATION PROCEDURE (INSTALLATION ONLY)
1. PCM CONNECTOR COVER
2. CONTROL WIRING HARNESS CONNECTOR CLAMP

REMOVAL STEPS (Continued)

3. PCM BRACKET
4. PCM CONNECTORS
5. PCM

TSB Revision

<VEHICLES FOR CANADA>



REMOVAL STEPS

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

<<A>> >>A<< 1. BREAK-OFF BOLTS

2. PCM CONNECTOR COVER

REMOVAL STEPS (Continued)

3. CONTROL WIRING HARNESS CONNECTOR CLAMP
4. PCM BRACKET
5. PCM CONNECTORS
6. PCM

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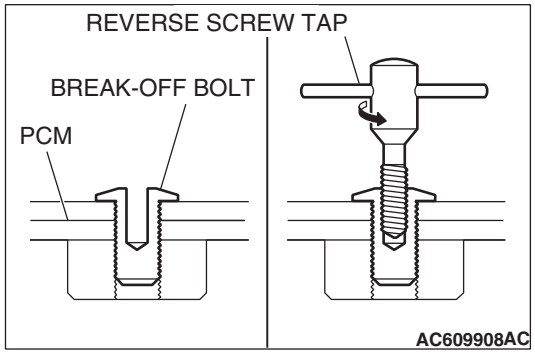

REMOVAL SERVICE POINT

<<A>> BREAK-OFF BOLTS REMOVAL

1. Drill in the break-off bolt a hole deep enough for the tap to stand.
2. Remove the break-off bolt with a left-hand tap.

INSTALLATION SERVICE POINTS

>>A<< BREAK-OFF BOLTS INSTALLATION

Tighten until the head of break-off bolt is broken off.

>>B<< INITIALIZATION PROCEDURE

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

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

M1131011600733

ITEM	SPECIFICATION
Break-off bolt <Vehicles for CANADA>	7.5 ± 1.5 N· m (67 ± 13 in-lb)
Fuel rail bolt	11 ± 1 N· m (98 ± 8 in-lb)
Hole cover screw	1.5 ± 0.5 N· m (14 ± 4 in-lb)
PCM bracket bolt	5.0 ± 1.0 N· m (44 ± 9 in-lb)
PCM connector cover bolt <Vehicles for USA>	5.0 ± 1.0 N· m (44 ± 9 in-lb)
PCM mounting bolt	12 ± 2 N· m (102 ± 22 in-lb)
Relay box mounting nut	12 ± 2 N· m (102 ± 22 in-lb)
Rocker cover bracket bolt	11 ± 1 N· m (98 ± 8 in-lb)
Throttle body mounting bolt	28 ± 4 N· m (21 ± 3 ft-lb)

GENERAL SPECIFICATIONS

M1131000201530

ITEM			SPECIFICATION
Throttle body	Throttle bore mm (in.)		60 (2.4)
	Throttle position sensor		Hall element type
	Throttle actuator control motor		DC motor type, having brushes
Powertrain contorl module (PCM)	Identification model No.	Except vehicles for California and Canada	E6T72587
		Vehicles for California	E6T72588
		Vehicles for Canada	E6T72589
Sensors	Mass airflow sensor		Heat sensitizing type
	Barometric pressure sensor		Semiconductor type
	Intake air temperature sensor		Thermistor type
	Engine coolant temperature sensor		Thermistor type
	Heated oxygen sensor		Zirconia type
	Accelerator pedal position sensor		Hall element type
	Transmission range switch		Contact switch type
	Camshaft position sensor		Magneto resistance element type
	Crankshaft position sensor		Magneto resistance element type
	Knock sensor		Piezoelectric type
	Power steering pressure switch		Contact switch type
	Manifold absolute pressure sensor		Semiconductor type
	Engine oil pressure switch		Contact switch type
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, 4
	Injector identification mark		IDH322S
	Engine oil control valve		Duty cycle type solenoid valve
	Exhaust gas recirculation (EGR) valve		Stepper motor type
	Evaporative emission purge solenoid		Duty cycle type solenoid valve

SERVICE SPECIFICATIONS

M1131000301407

ITEM		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 (86° 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 (86° 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

M1131000500969

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