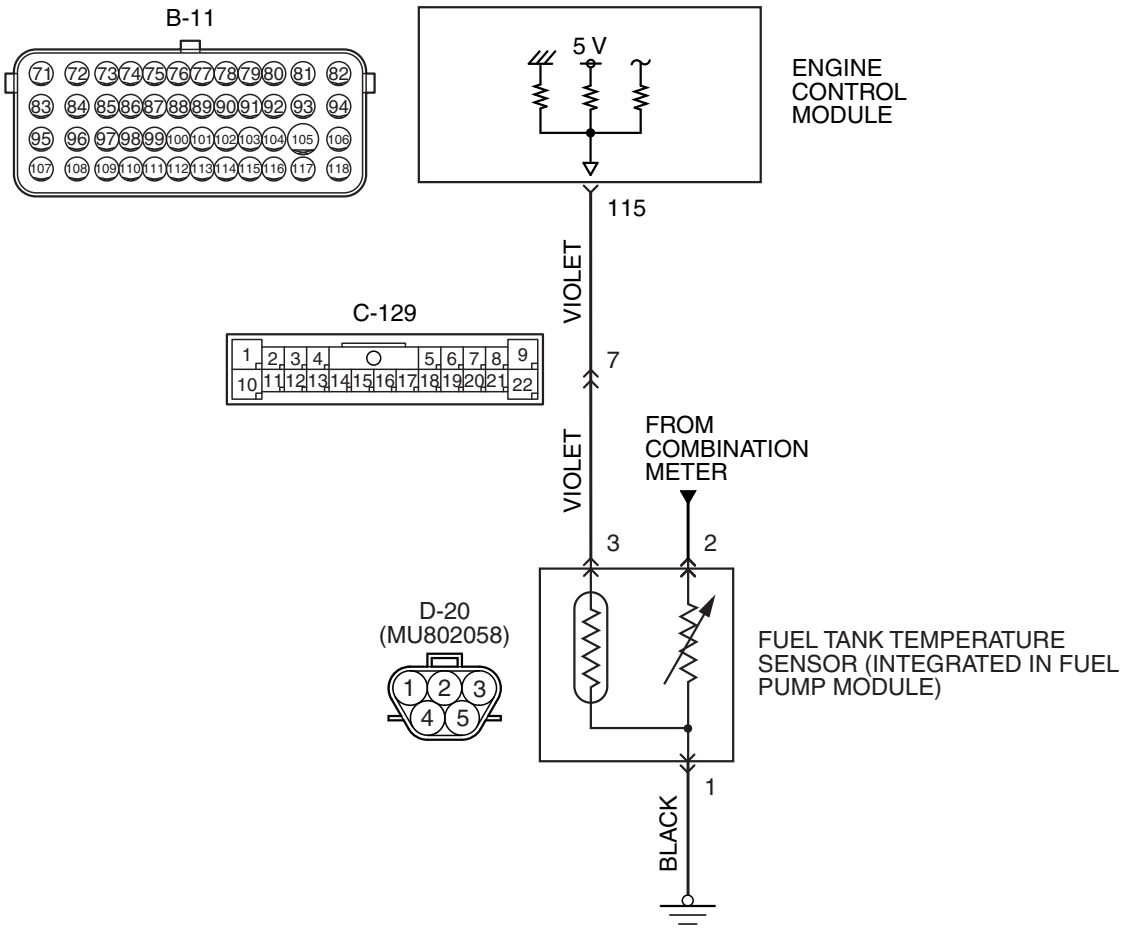
DTC P0181: Fuel Tank Temperature Sensor Circuit Range/Performance

FUEL TANK TEMPERATURE SENSOR CIRCUIT



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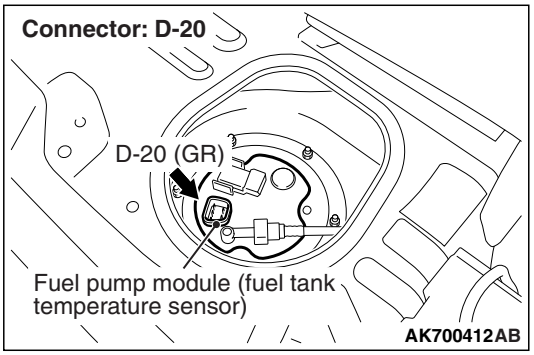
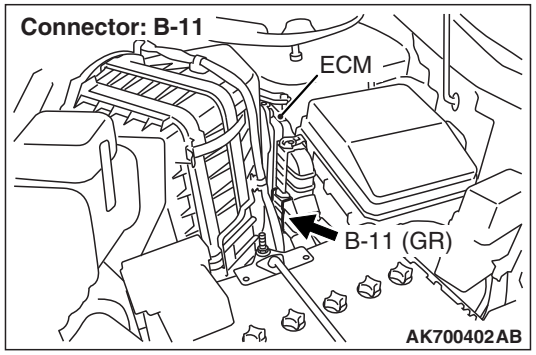
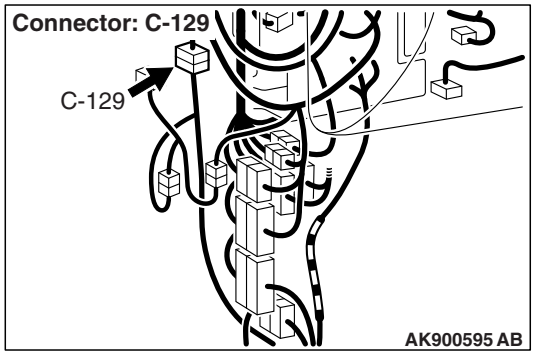




TSB Revision



CIRCUIT OPERATION

- 5-volt voltage is applied to the fuel tank temperature sensor output terminal (terminal No. 3) from the ECM (terminal No. 115) via the resistor in the ECM.
- The fuel tank temperature sensor output voltage increases when the resistance increases and decreases when the resistance decreases. The ground terminal (terminal No. 1) is grounded to the vehicle body.

TECHNICAL DESCRIPTION

- The fuel tank temperature sensor converts the fuel tank temperature to a voltage.
- The ECM detects the fuel tank temperature with this output voltage.

DESCRIPTIONS OF MONITOR METHODS

Fuel tank temperature at engine start is higher than engine coolant temperature at engine start by specified value when engine is cold start condition.

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)

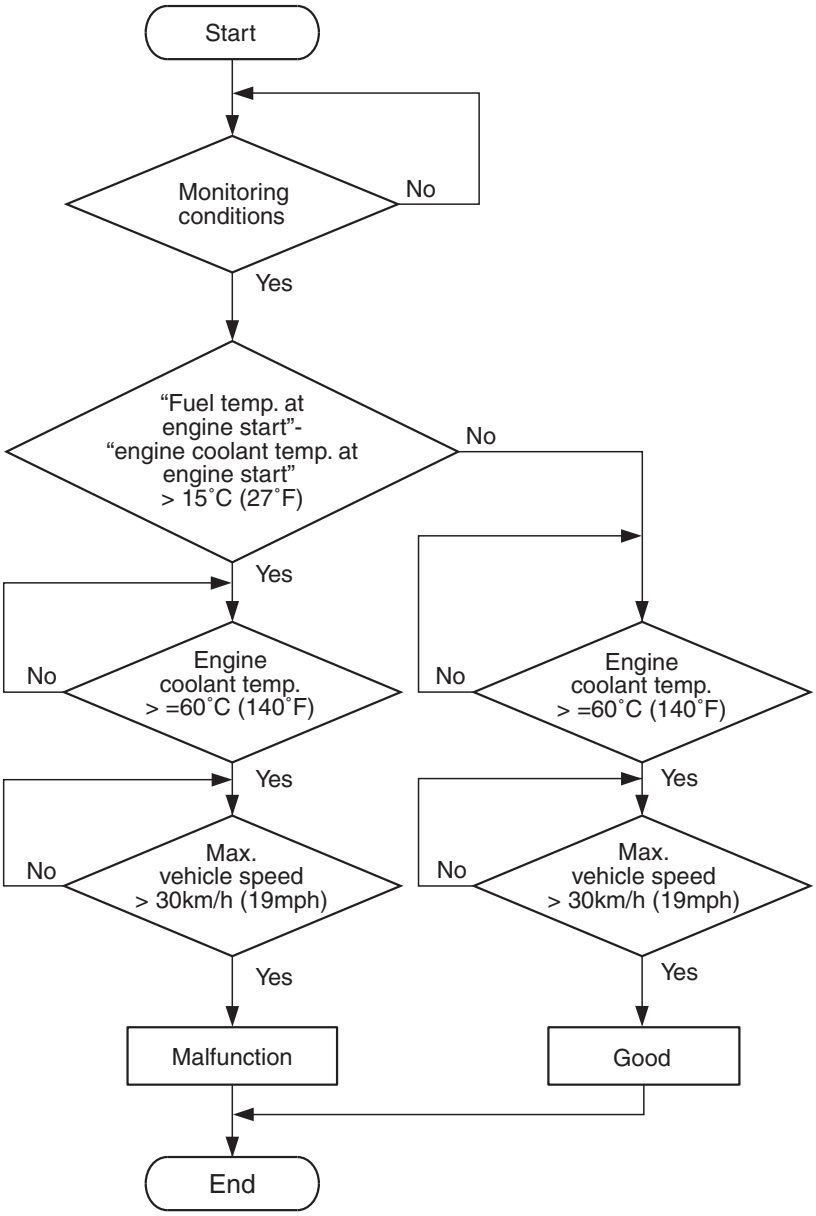
- Not applicable

Sensor (The sensor below is determined to be normal)

- Engine coolant temperature sensor
- Intake air temperature sensor

DTC SET CONDITIONS

Logic Flow Chart



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Check Conditions

- The engine coolant temperature –intake air temperature is 5° C (9° F) or less when the engine is started.
- The engine coolant temperature is between –10° C (14° F) and 36° C (97° F) when the engine is started.
- The engine coolant temperature is higher than 60° C (140° F).
- Maximum vehicle speed is higher than 30 km/h (19 mph) after the engine starting sequence has been completed.

Judgement Criterion

- The fuel tank temperature –engine coolant temperature is 15° C (27° F) or more when the engine is started.

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OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function –OBD-II Drive Cycle – Pattern 14 P.13B-11.

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

- Fuel tank temperature sensor failed.
- Connector damage.
- ECM failed.

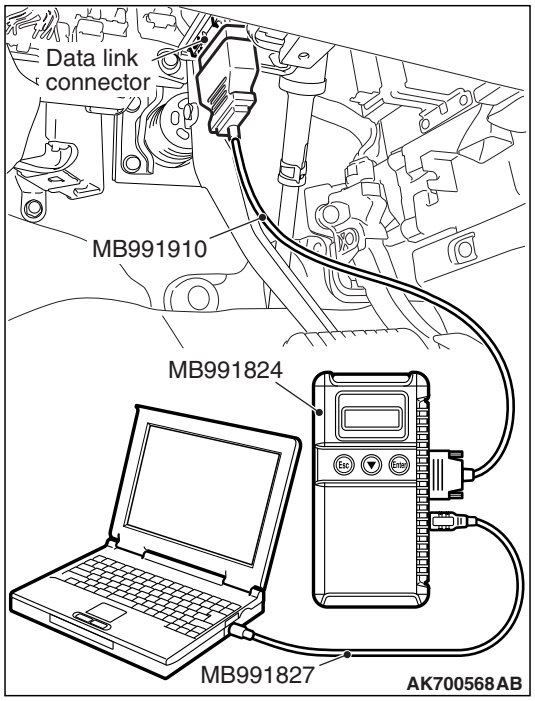
NOTE: A diagnostic trouble code (DTC) could be output if the engine and the radiator have been flushed repeatedly when the engine coolant temperature was high (or the fuel tank temperature was high). Because this is not a failure, the DTC must be erased.
Make sure to test drive the vehicle in accordance with the OBD-II drive cycle pattern in order to verify that a DTC will not be output.

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 data list item 53: Fuel Tank 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) Turn the ignition switch to the "ON" position.
(3) Set scan tool MB991958 to the data reading mode for item 53, Fuel Tank Temperature Sensor.
  - Approximately the same as the ambient air temperature when the engine is cooled.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

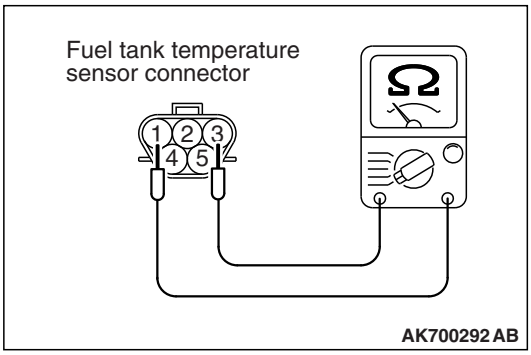
Q: Is the sensor operating properly?

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.00-15.
NO : Go to Step 2.

STEP 2. Check the harness connector D-20 at the fuel tank temperature sensor and harness connector B-11 at the ECM for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 3.
NO : Repair it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 5.



STEP 3. Check the fuel tank temperature sensor.

(1) Disconnect the fuel tank temperature sensor connector D-20.
(2) Measure the resistance between terminal No. 1 and No. 3 of the fuel tank temperature sensor.

Standard value: 0.5 –12.0 kΩ

Q: Is the measured resistance between 0.5 and 12.0 kΩ?

YES : Go to Step 4.
NO : Replace the fuel tank temperature sensor. Then go to Step 5.

STEP 4. Check the trouble symptoms.

(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle –Pattern 14 P.13B-11.
(2) Check the diagnostic trouble code (DTC).

Q: Is DTC P0181 set?

YES : Replace the ECM. When the ECM is replaced, register the ID code. Refer to GROUP 42B, Diagnosis –ID Codes Registration Judgment Table <Vehicles with KOS> P.42B-11 or GROUP 42C, Diagnosis –ID Codes Registration Judgment Table <Vehicles with WCM> P.42C-10. Then go to Step 5.
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.00-15.

STEP 5. Test the OBD-II drive cycle.

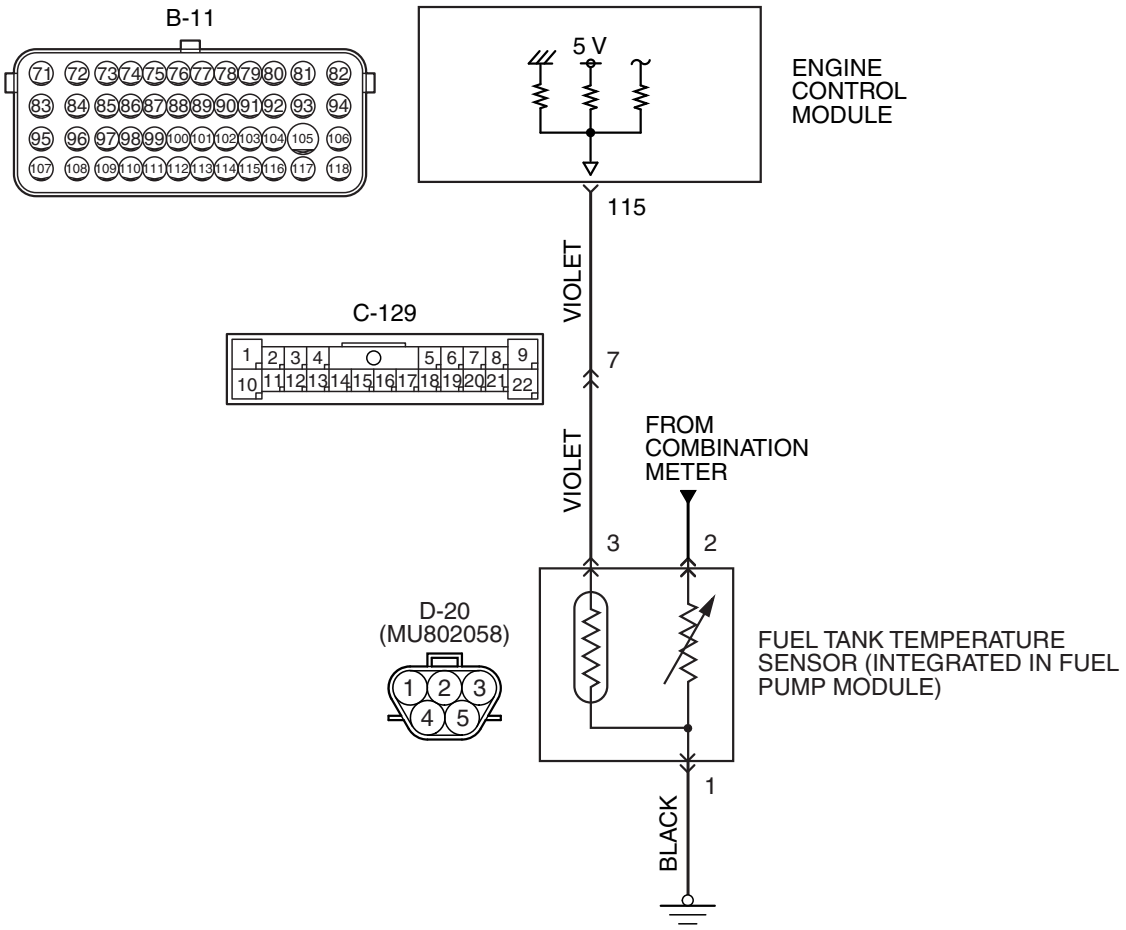
(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle –Pattern 14 P.13B-11.
(2) Check the diagnostic trouble code (DTC).

Q: Is DTC P0181 set?

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

DTC P0182: Fuel Tank Temperature Sensor Circuit Low Input

FUEL TANK TEMPERATURE SENSOR CIRCUIT



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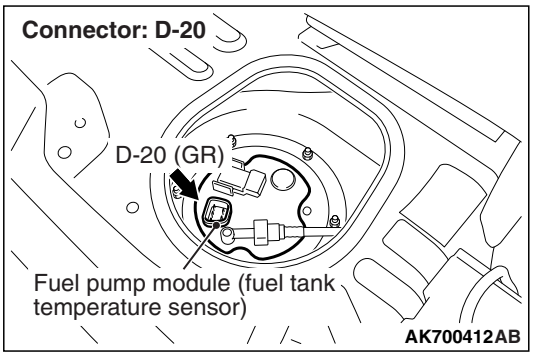

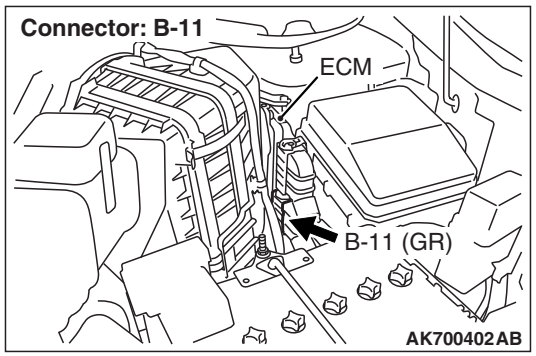

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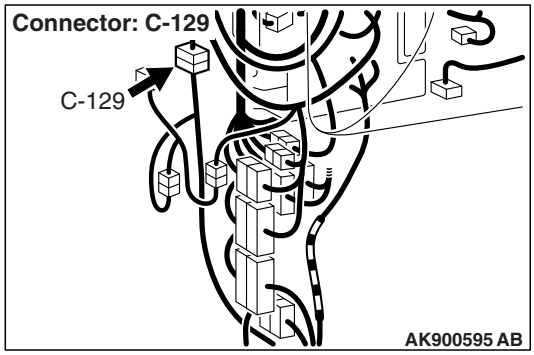


CIRCUIT OPERATION

- 5-volt voltage is applied to the fuel tank temperature sensor output terminal (terminal No. 3) from the ECM (terminal No. 115) via the resistor in the ECM.
- The fuel tank temperature sensor output voltage increases when the resistance increases and decreases when the resistance decreases. The ground terminal (terminal No. 1) is grounded to the vehicle body.

TECHNICAL DESCRIPTION

- The fuel tank temperature sensor converts the fuel tank temperature to a voltage.
- The ECM detects the fuel tank temperature with this output voltage.

DESCRIPTIONS OF MONITOR METHODS

Fuel tank temperature sensor output voltage is out of 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)

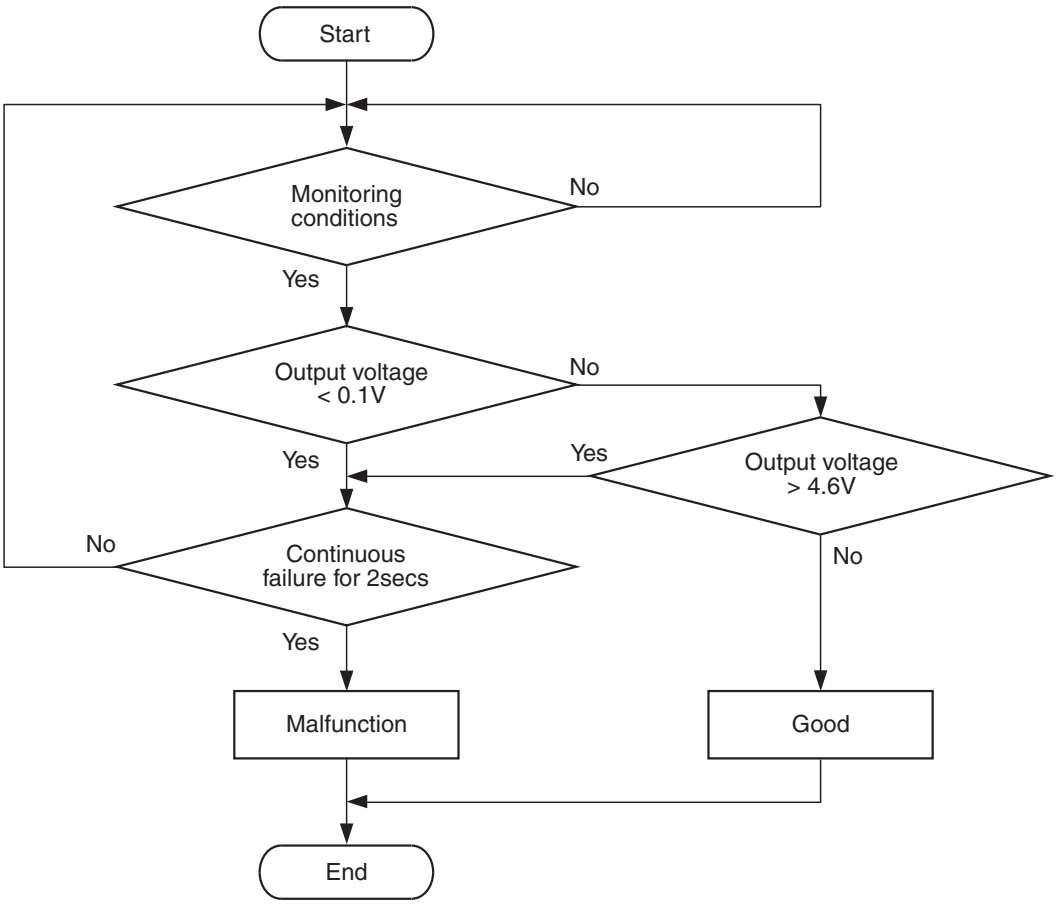
- Not applicable

Sensor (The sensor below is determined to be normal)

- Not applicable

DTC SET CONDITIONS

Logic Flow Chart



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Check Conditions

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

Judgement Criterion

- Sensor output voltage has continued to be 0.1 volt or lower for 2 seconds.

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function –OBD-II Drive Cycle – Pattern 22 P.13B-11.

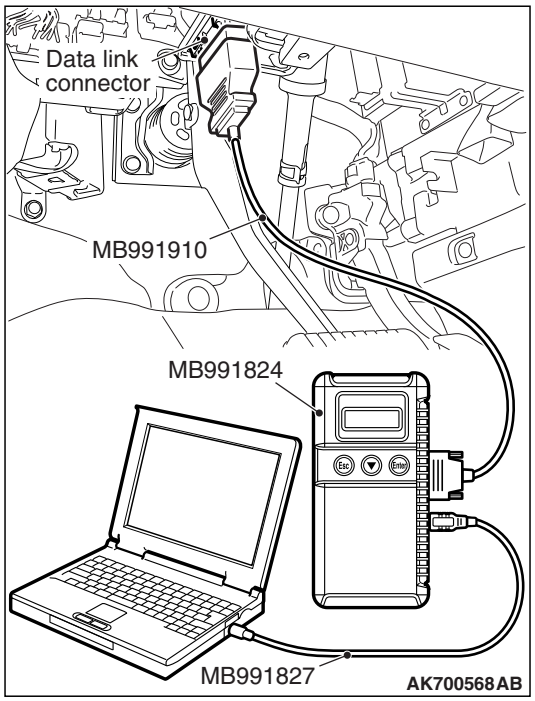
TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)

- Fuel tank temperature sensor failed.
- Connector damage.
- Harness damage.
- ECM 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, check data list item 53: Fuel Tank 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) Turn the ignition switch to the "ON" position.
(3) Set scan tool MB991958 to the data reading mode for item 53, Fuel Tank Temperature Sensor.
- Approximately the same as the ambient air temperature when the engine is cooled.

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

Q: Is the sensor operating properly?

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.00-15.
NO : Go to Step 2.

STEP 2. Check the harness connector D-20 at the fuel tank temperature sensor and harness connector B-11 at ECM for damage.

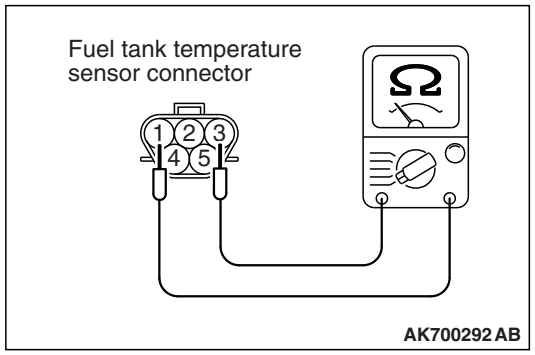
Q: Is the harness connector in good condition?

YES : Go to Step 3.
NO : Repair it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 6.

STEP 3. Check the fuel tank temperature sensor.

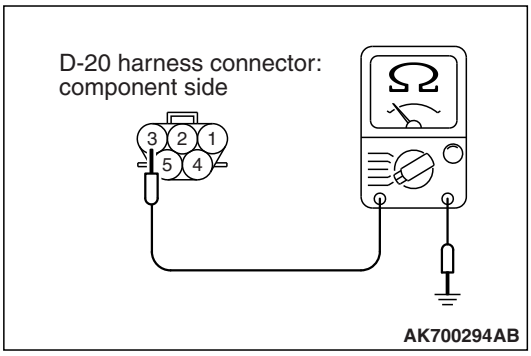
(1) Disconnect the fuel tank temperature sensor connector D-20.
(2) Measure the resistance between terminal No. 1 and No. 3 of the fuel tank temperature sensor.

Standard value: 0.5 –12.0 kΩ



Q: Is the measured resistance between 0.5 and 12.0 kΩ?

YES : Go to Step 4.
NO : Replace the fuel tank temperature sensor. Then go to Step 6.



STEP 4. Check for short circuit to ground between the fuel temperature sensor connector D-20 and the ECM connector B-11.

(1) Disconnect the fuel temperature sensor connector D-20 and the ECM connector B-11.
(2) Check for the continuity between the temperature sensor connector D-20 (terminal No. 3) and ground.
- Not continuity.

Q: Is the harness wire in good condition?

YES : Go to Step 5.
NO : Check harness connector C-129 at Intermediate connector for damage, and repair as required. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. If the Intermediate connector C-129 is good condition, repair harness wire between the temperature sensor connector D-20 (terminal No. 3) and the ECM connector B-11 (terminal No.115) because of open circuit. Then go to Step 6.

STEP 5. Check the trouble symptoms.

(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle –Pattern 22 P.13B-11.
(2) Check the diagnostic trouble code (DTC).

Q: Is DTC P0182 set?

YES : Replace the ECM. When the ECM is replaced, register the ID code. Refer to GROUP 42B, Diagnosis –ID Codes Registration Judgment Table <Vehicles with KOS> P.42B-11 or GROUP 42C, Diagnosis –ID Codes Registration Judgment Table <Vehicles with WCM> P.42C-10. Then go to Step 6.
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.00-15.

STEP 6. Test the OBD-II drive cycle.

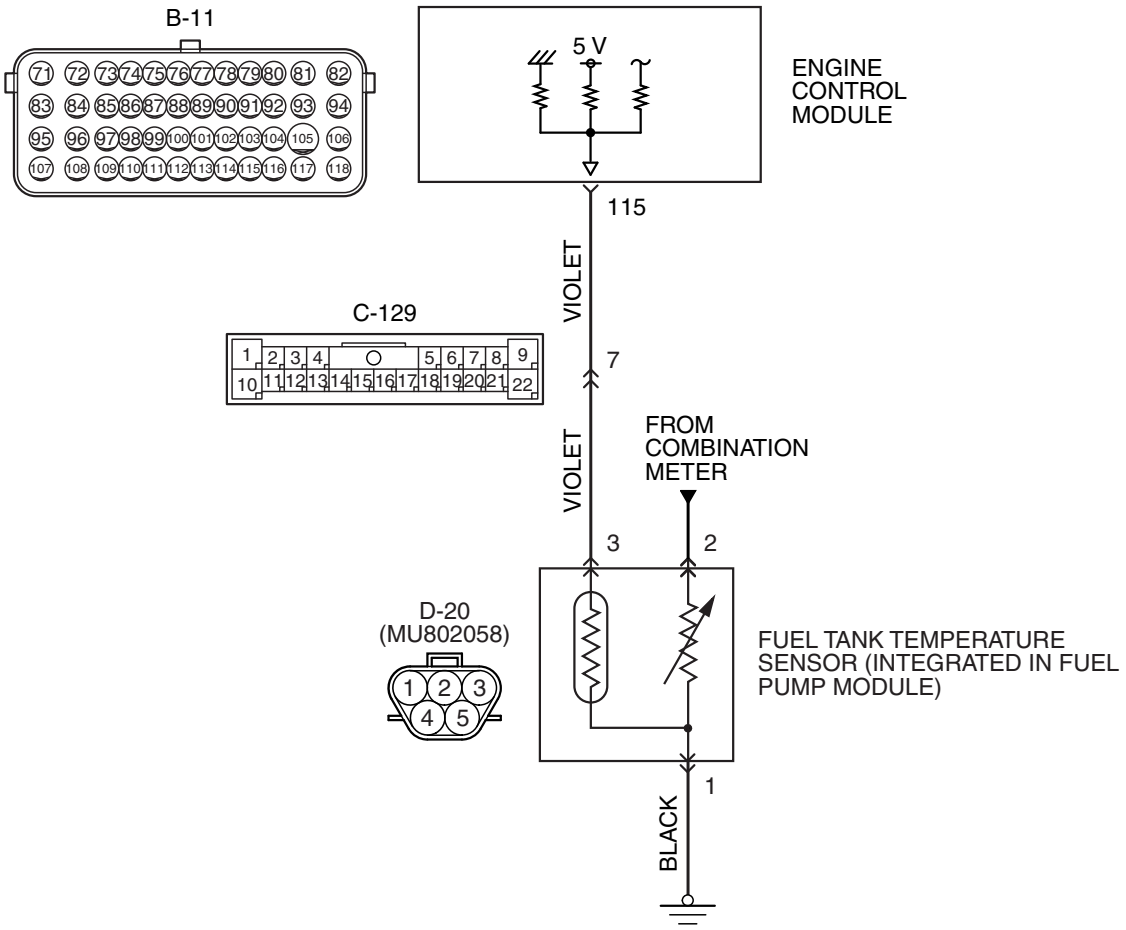
(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle –Pattern 22 P.13B-11.
(2) Check the diagnostic trouble code (DTC).

Q: Is DTC P0182 set?

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

DTC P0183: Fuel Tank Temperature Sensor Circuit High Input

FUEL TANK TEMPERATURE SENSOR CIRCUIT



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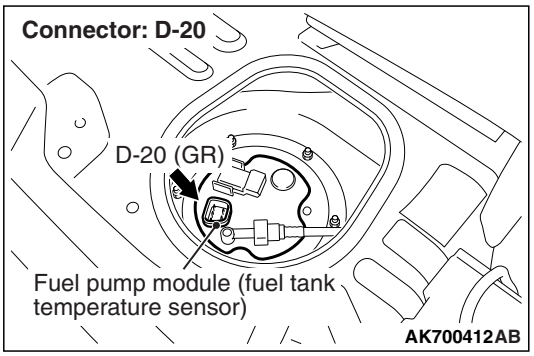

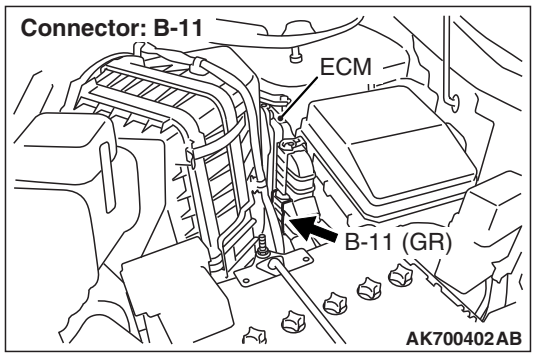

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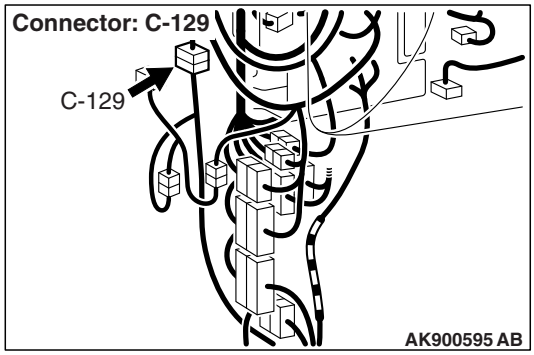


CIRCUIT OPERATION

- 5-volt voltage is applied to the fuel tank temperature sensor output terminal (terminal No. 3) from the ECM (terminal No. 115) via the resistor in the ECM.
- The fuel tank temperature sensor output voltage increases when the resistance increases and decreases when the resistance decreases. The ground terminal (terminal No. 1) is grounded to the vehicle body.

TECHNICAL DESCRIPTION

- The fuel tank temperature sensor converts the fuel tank temperature to a voltage.
- The ECM detects the fuel tank temperature with this output voltage.

DESCRIPTIONS OF MONITOR METHODS

Fuel tank temperature sensor output voltage is out of 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)

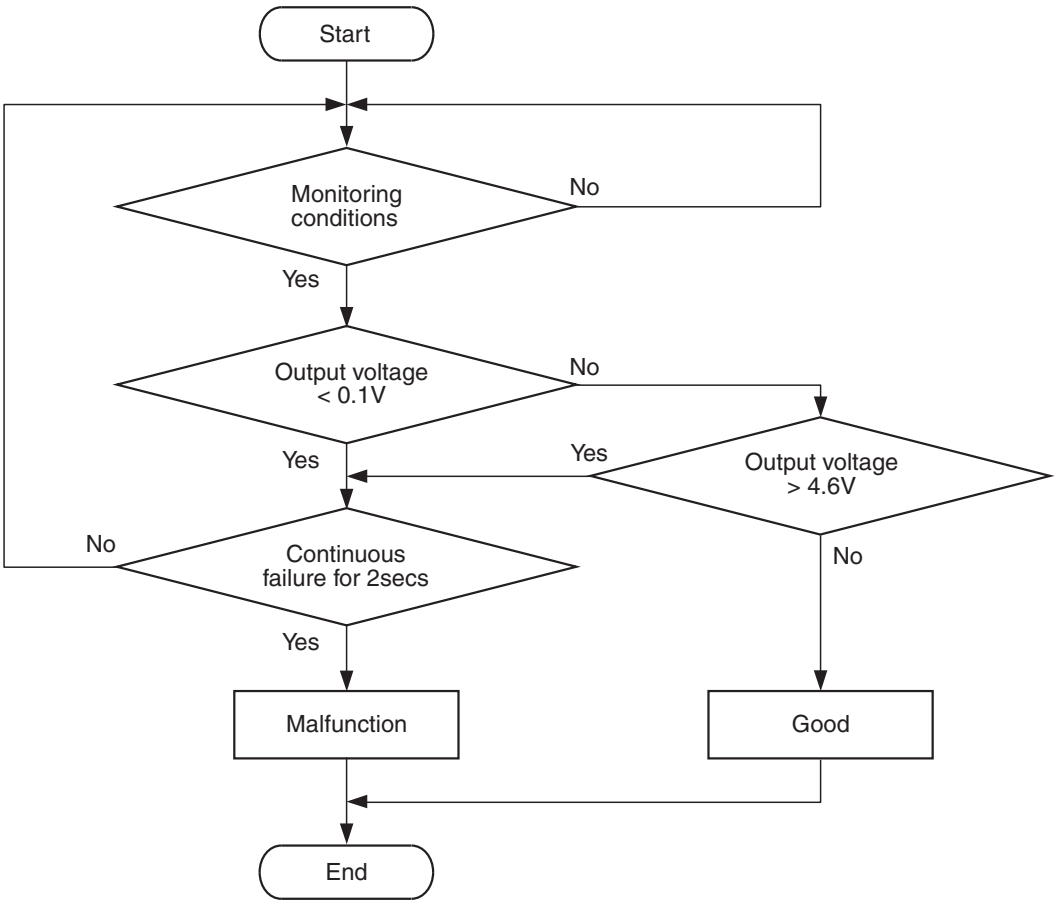
- Not applicable

Sensor (The sensor below is determined to be normal)

- Not applicable

DTC SET CONDITIONS

Logic Flow Chart



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Check Conditions

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

Judgement Criterion

- Sensor output voltage has continued to be 4.6 volts or higher for 2 seconds.

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function –OBD-II Drive Cycle – Pattern 22 P.13B-11.

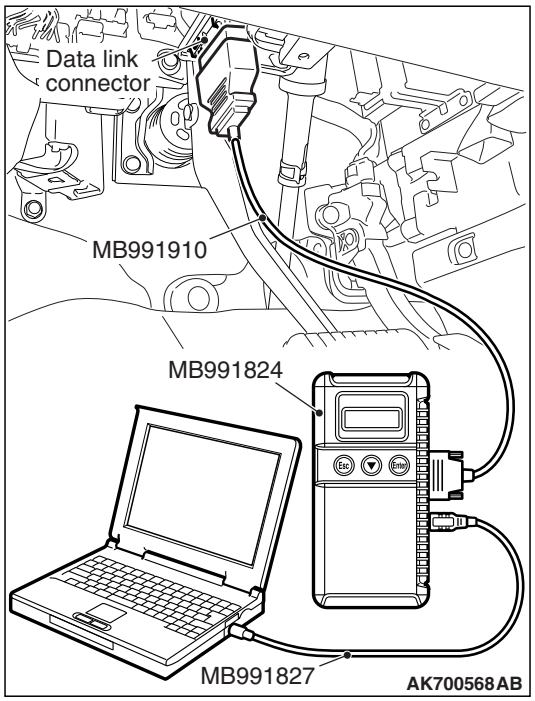
TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)

- Fuel tank temperature sensor failed.
- Connector damage.
- Harness damage.
- ECM 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, check data list item 53: Fuel Tank 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) Turn the ignition switch to the "ON" position.
(3) Set scan tool MB991958 to the data reading mode for item 53, Fuel Tank Temperature Sensor.
- Approximately the same as the ambient air temperature when the engine is cooled.

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

Q: Is the sensor operating properly?

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.00-15.
NO : Go to Step 2.

STEP 2. Check the harness connector D-20 at the fuel tank temperature sensor and harness connector B-11 at the ECM for damage.

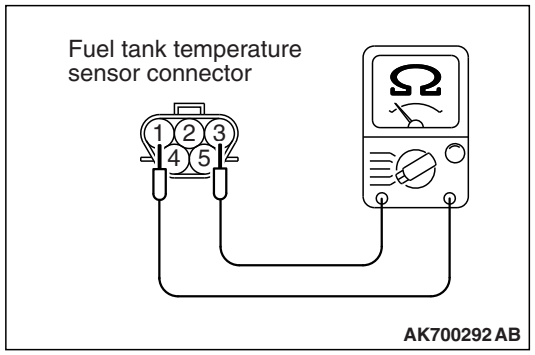
Q: Is the harness connector in good condition?

YES : Go to Step 3.
NO : Repair it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 7.

STEP 3. Check the fuel tank temperature sensor.

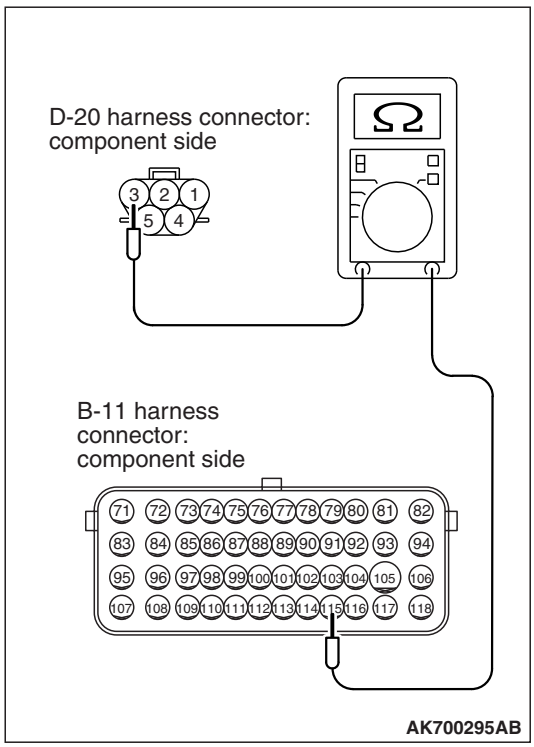
(1) Disconnect the fuel tank temperature sensor connector D-20.
(2) Measure the resistance between terminal No. 1 and No. 3 of the fuel tank temperature sensor.

Standard value: 0.5 –12.0 kΩ



Q: Is the measured resistance between 0.5 and 12.0 kΩ?

YES : Go to Step 4.
NO : Replace the fuel tank temperature sensor. Then go to Step 7.

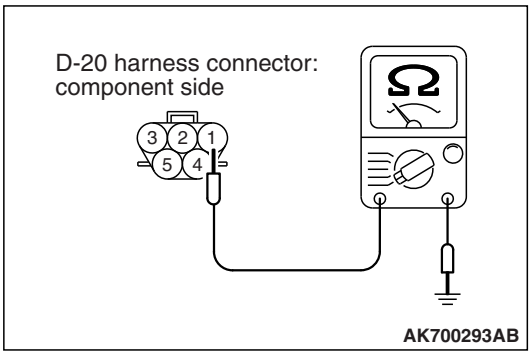


STEP 4. Check for open circuit and harness damage between the fuel temperature sensor connector D-20 and the ECM connector B-11.

(1) Disconnect the fuel temperature sensor connector D-20 and the ECM connector B-11.
(2) Measure the continuity between the fuel temperature sensor connector D-20 (terminal No. 3) and the ECM connector B-11 (terminal No. 115).
- Should be less than 2 ohms.

Q: Is the harness wire in good condition?

YES : Go to Step 5.
NO : Check harness connector C-129 at Intermediate connector for damage, and repair as required. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. If the Intermediate connector C-129 is good condition, repair harness wire between the temperature sensor connector D-20 (terminal No.3) and the ECM connector B-11 (terminal No.115) because of open circuit. Then go to Step 7.



STEP 5. Check for open circuit and harness damage between at the fuel tank temperature sensor connector D-20 (terminal No. 1) and ground.

(1) Disconnect the connector D-20 and measure at the harness side.
(2) Check for the continuity between terminal No. 1 and ground.
- Should be less than 2 ohms.

Q: Does continuity exist?

YES : Go to Step 6.
NO : Repair harness wire between the fuel tank temperature sensor connector D-20 (terminal No. 1) and ground because of open circuit or harness damage. Then go to Step 7.

STEP 6. Check the trouble symptoms.

(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle –Pattern 22 P.13B-11.

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

Q: Is DTC P0183 set?

YES : Replace the ECM. When the ECM is replaced, register the ID code. Refer to GROUP 42B, Diagnosis –ID Codes Registration Judgment Table <Vehicles with KOS> P.42B-11 or GROUP 42C, Diagnosis –ID Codes Registration Judgment Table <Vehicles with WCM> P.42C-10. Then go to Step 7.

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.00-15.

STEP 7. 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 22 P.13B-11.

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

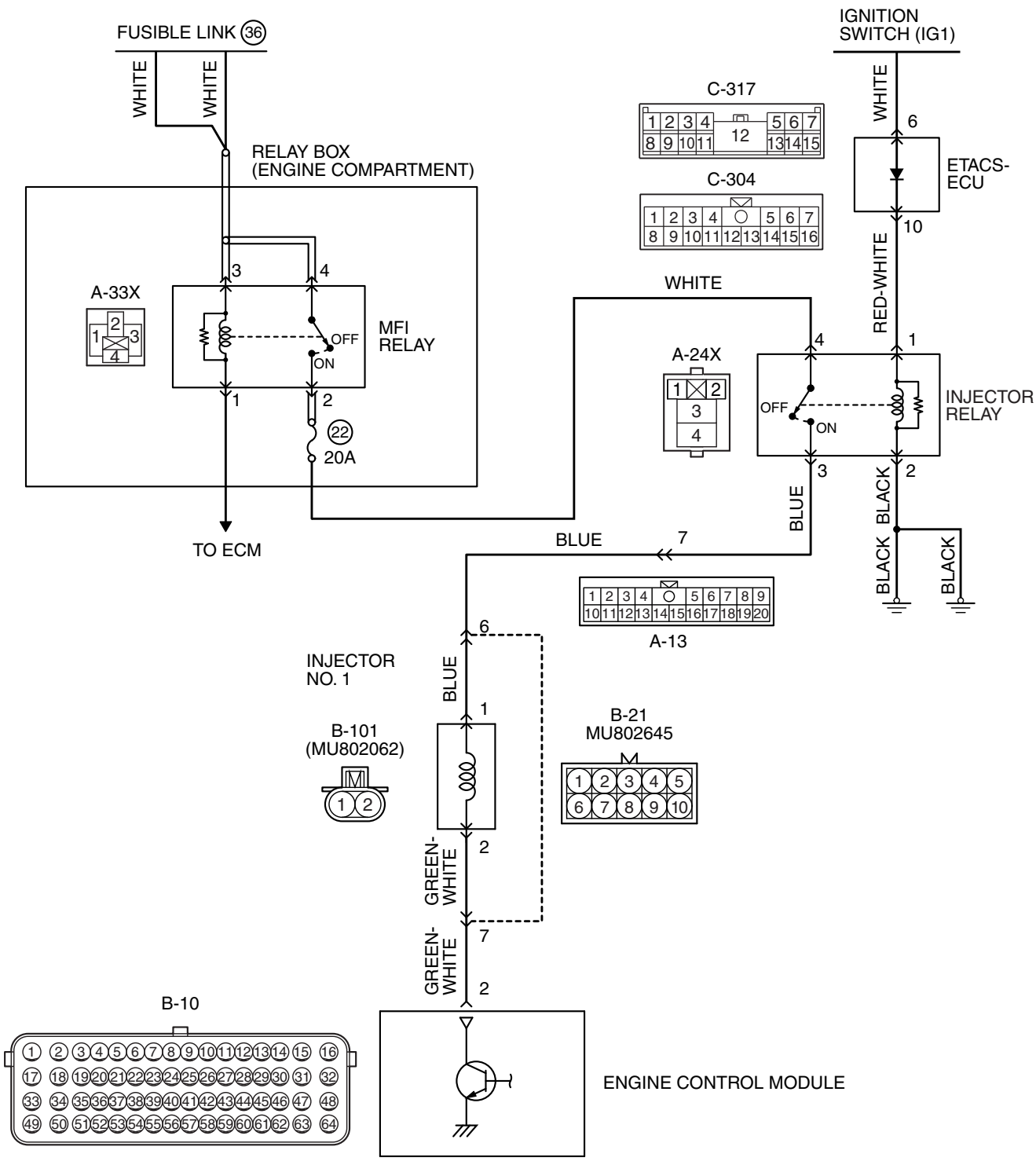
Q: Is DTC P0183 set?

YES : Retry the troubleshooting.

NO : The inspection is complete.

DTC P0201: Injector Circuit - Cylinder 1

INJECTOR CIRCUIT-CYLINDER 1



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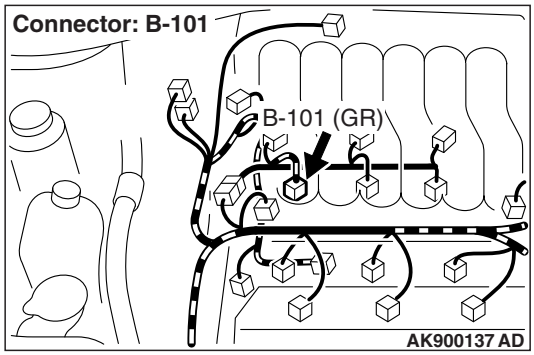
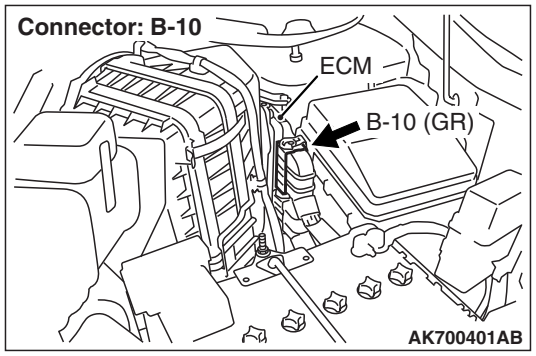
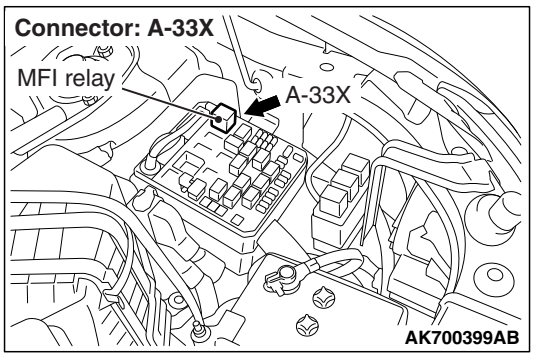
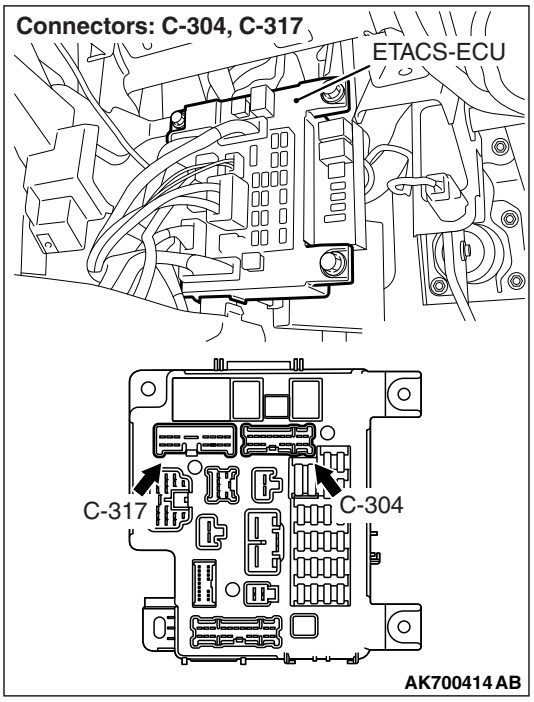
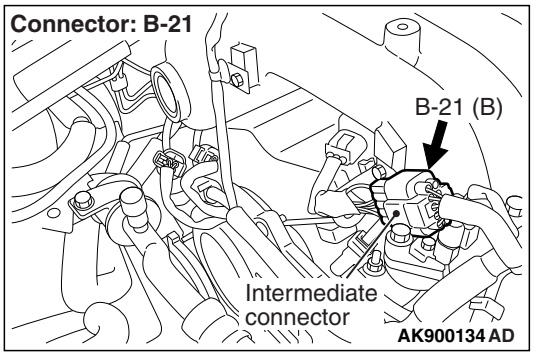
TSB Revision

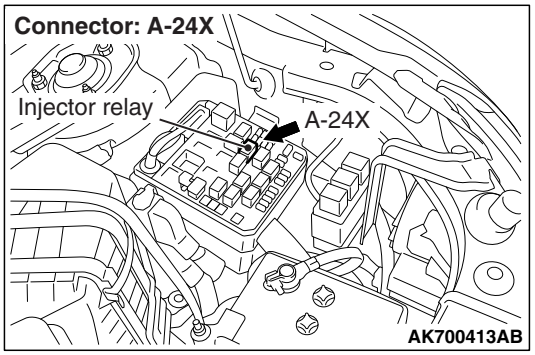


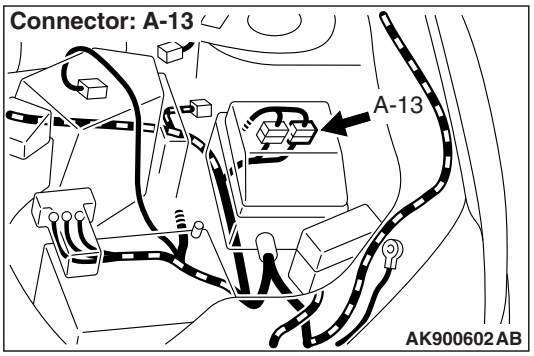












CIRCUIT OPERATION

- The injector power is supplied from the injector relay (terminal No. 3).
- The ECM controls the injector by turning the power transistor in the ECM "ON" and "OFF".

TECHNICAL DESCRIPTION

- The amount of fuel injected by the injector is controlled by the amount of continuity time the coil is grounded by the ECM.

DESCRIPTIONS OF MONITOR METHODS

The ECM detects open circuit and short malfunction.

MONITOR EXECUTION

Continuous

TSB Revision

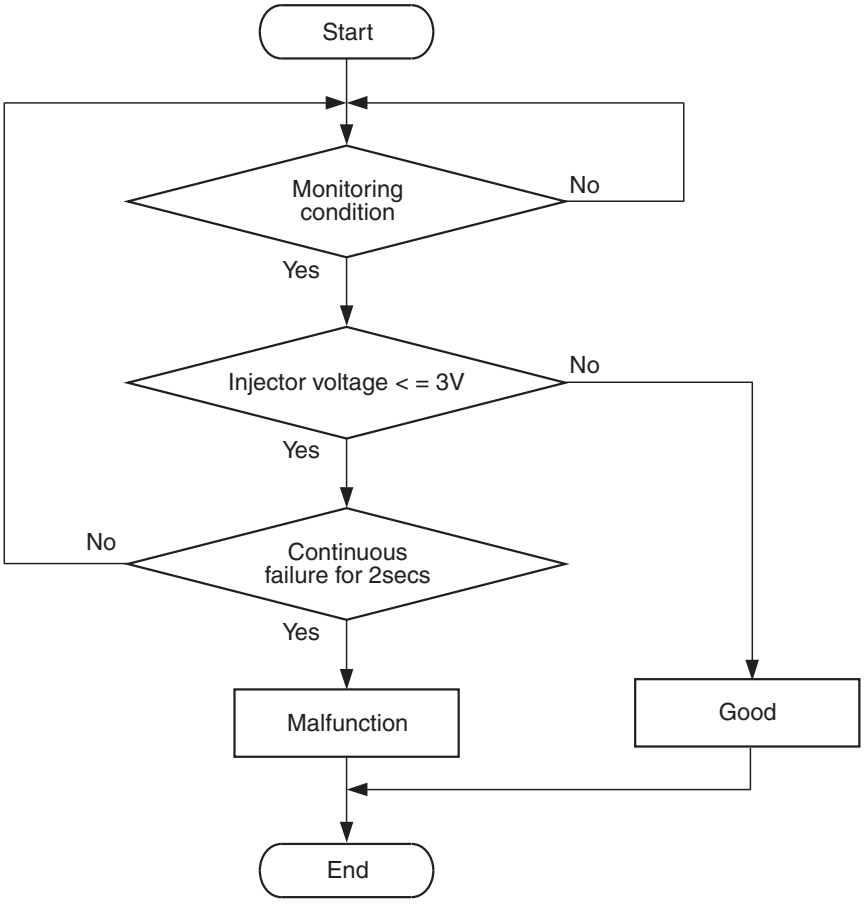
MONITOR EXECUTION CONDITIONS (Other monitor and Sensor)

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 <Circuit continuity –open circuit and shorted low>

Logic Flow Chart



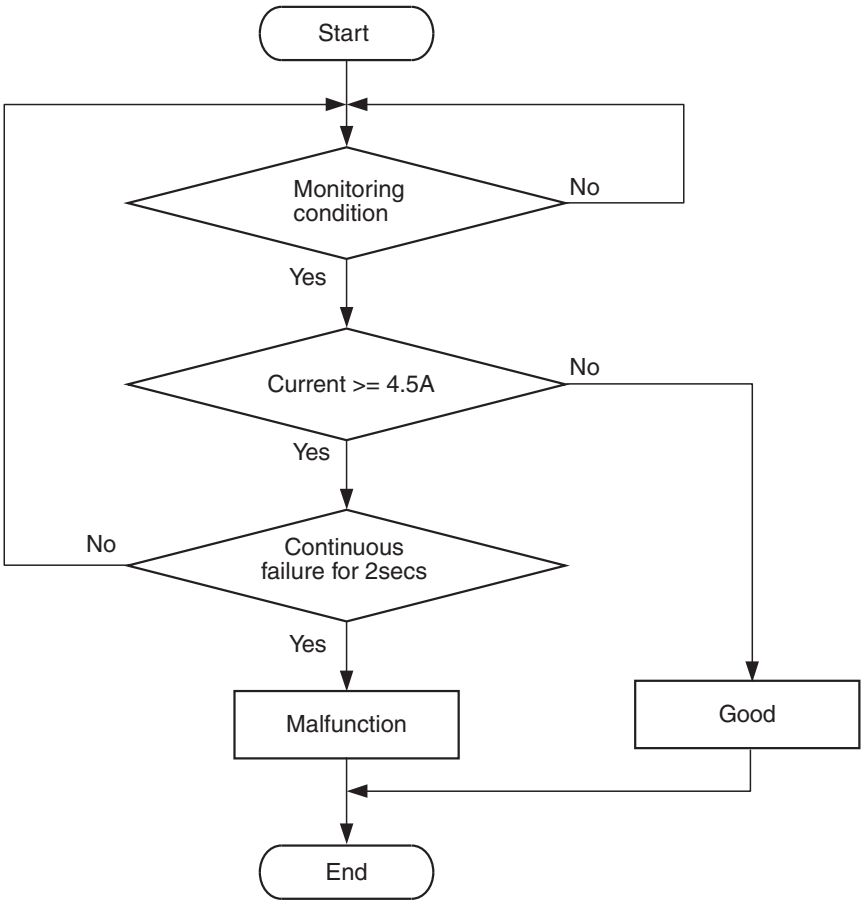
AK700479

Check Condition
- Engine is running.

Judgement Criterion
- The supply voltage is 3 volts or less without the injector driving for 2 seconds.

DTC SET CONDITIONS <Circuit continuity –shorted high>

Logic Flow Chart



AK604332

Check Condition

- Engine is running.

Judgement Criterion

- The coil current is 4.5 ampere or more with the injector driving for 2 seconds.

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

- No. 1 cylinder injector failed.
- Connector damage.
- Harness damage.
- ECM failed.

OBD-II DRIVE CYCLE PATTERN

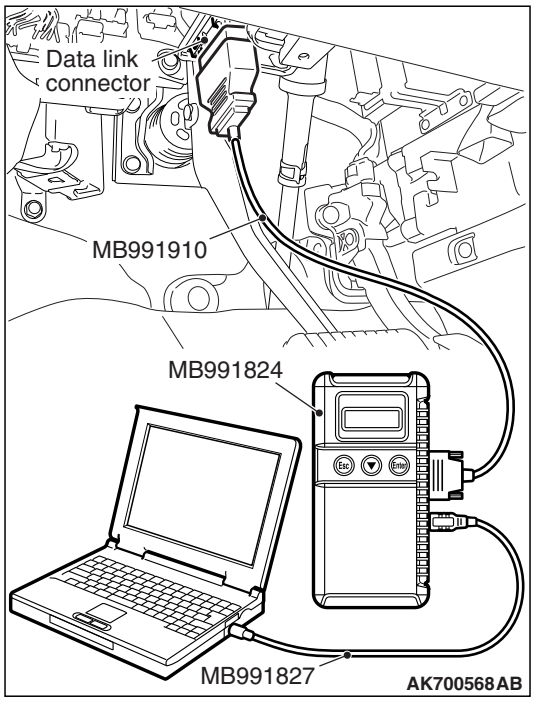
Refer to Diagnostic Function –OBD-II Drive Cycle – Pattern 22 P.13B-11.

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991910: Main Harness A
- MB991658: Test Harness
- MB992110: Power Plant ECU Check Harness

TSB Revision



STEP 1. Using scan tool MB991958, check actuator test item 1: No. 1 Injector.

⚠ CAUTION

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

(1) Connect scan tool MB991958 to the data link connector.
(2) Start the engine and run at idle.
(3) Set scan tool MB991958 to the actuator testing mode for item 1, No. 1 injector.
(4) Warm up the engine to normal operating temperature: 80° C to 95° C (176° F to 203° F).
- The idle should become slightly rougher.

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

Q: Is the actuator operating properly?

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.00-15.

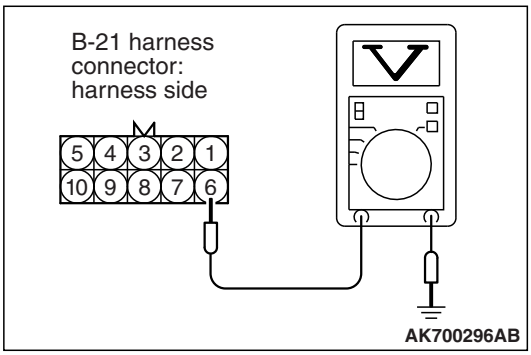
NO : Go to Step 2.

STEP 2. Check for harness connector B- 21 at the intermediate connector and B-10 at the ECM for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 3.

NO : Repair it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 9.



STEP 3. Measure the injector supply voltage at the intermediate connector harness B-21 and ground.

(1) Disconnect the intermediate connector B-21 and measure at the female connector 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.

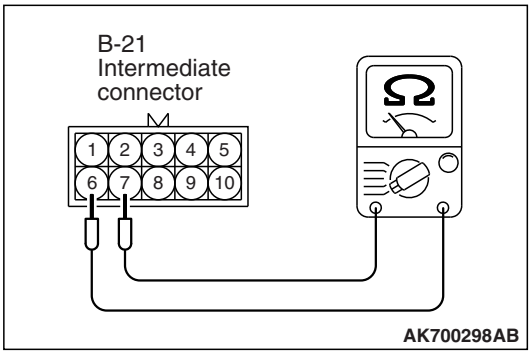
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the measured resistance battery positive voltage?

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 injector relay connector A-24X (terminal No. 3) and intermediate connector B-21 (terminal No. 6) because of open circuit. Then go to Step 9.

TSB Revision



STEP 4. Check the No. 1 cylinder injector resistance at intermediate connector B-21.

(1) Disconnect the intermediate connector B-21 and measure at male connector side.
(2) Measure the resistance between terminal No. 6 and No. 7.
- Resistance should be between 10.5 and 13.5 ohms.

Q: Is the measured resistance between 10.5 and 13.5 ohms?

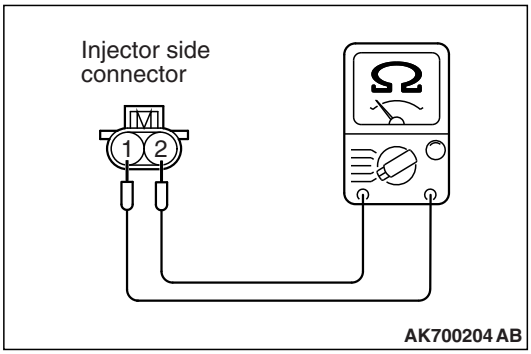
YES : Go to Step 7.
NO : Go to Step 5.

STEP 5. Check the harness connector B-101 at No. 1 cylinder injector for damage.

Remove the intake manifold.

Q: Is the harness connector in good condition?

YES : Go to Step 6.
NO : Repair it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 9.



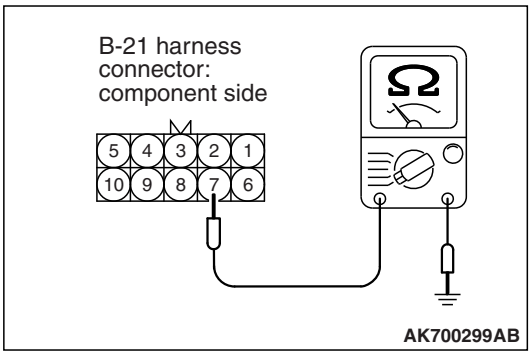
STEP 6. Check the No. 1 cylinder injector B-101.

(1) Disconnect the No. 1 cylinder injector connector B-101.
(2) Measure the resistance between injector side connector terminal No. 1 and No. 2.

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

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

YES : Repair harness wire between the intermediate connector B-21 (terminal No. 6) and the injector connector B-101 (terminal No. 1) and harness wire between injector connector B-101 (terminal No. 2) and intermediate connector B-21 (terminal No. 7) because of open circuit or short circuit to ground or harness damage.
Then go to Step 9.
NO : Replace the No. 1 cylinder injector. Then go to Step 9.



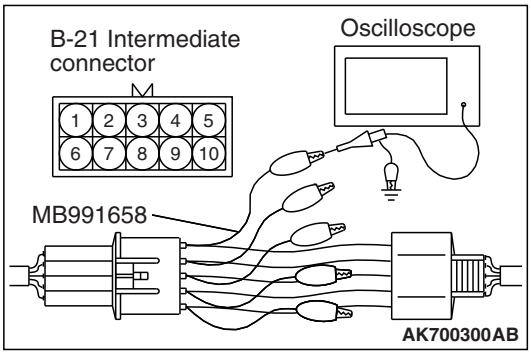
STEP 7. Check for harness between the intermediate connector B-21and the ECM connector B-10.

(1) Disconnect the intermediate connector B-21 and the ECM connector B-10.
(2) Measure the resistance between the intermediate connector B-21 (terminal No. 7) and the ECM connector B-10 (terminal No. 2).
- Should be less than 2 ohms.

(3) Measure the continuity between the intermediate connector B-21 (terminal No. 7) and ground.
- Not continuity

Q: Is the harness wire in good condition?

YES : Go to Step 8.
NO : Repair it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 9.

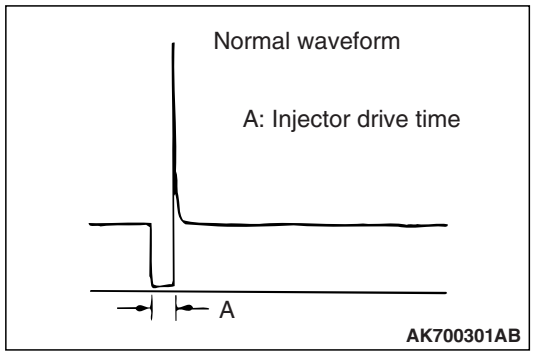


STEP 8. Using the oscilloscope, check the No. 1 cylinder injector.

(1) Disconnect the intermediate connector B-21 and connect the test harness MB991658 between the separated connectors.
(2) Connect the oscilloscope probe to injector intermediate connector terminal to No. 7.

NOTE: When measuring with the ECM side connector, disconnect all ECM connectors. Connect the check harness special tool (MB992110) between the separated connectors. Then connect an oscilloscope probe to the check harness connector terminal No. 2.

(3) Start the engine and run at idle.



(4) Measure the waveform.
- The waveform should show a normal pattern similar to the illustration.

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

Q: Is the waveform normal?

YES : It can be assumed that this malfunction is intermittent. Refer to 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-15.

NO : Replace the ECM. When the ECM is replaced, register the ID code. Refer to GROUP 42B, Diagnosis –ID Codes Registration Judgment Table <Vehicles with KOS> P.42B-11 or GROUP 42C, Diagnosis –ID Codes Registration Judgment Table <Vehicles with WCM> P.42C-10. Then go to Step 9.

STEP 9. 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 22 P.13B-11.

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

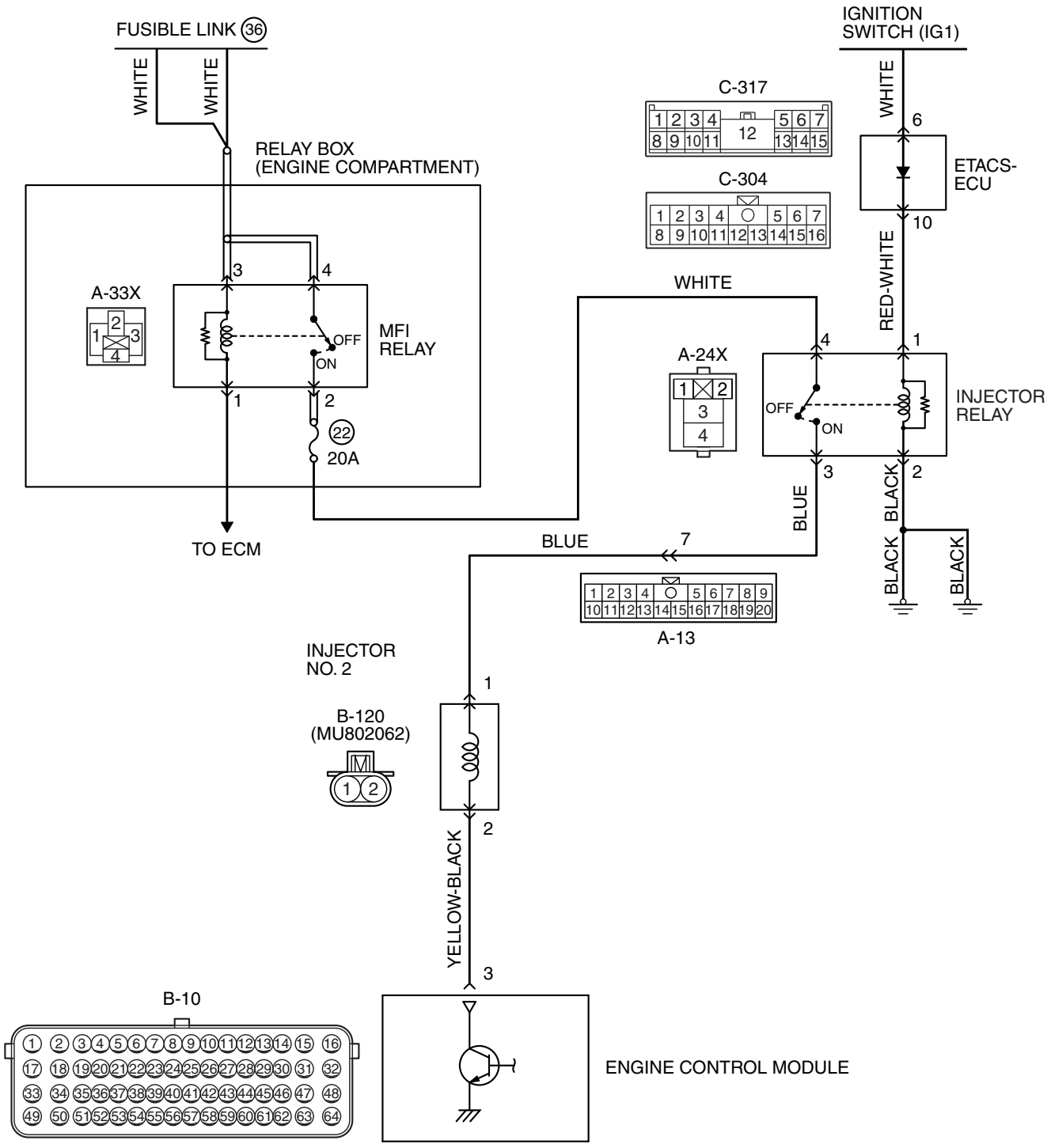
Q: Is DTC P0201 set?

YES : Retry the troubleshooting.

NO : The inspection is complete.

DTC P0202: Injector Circuit - Cylinder 2

INJECTOR CIRCUIT-CYLINDER 2



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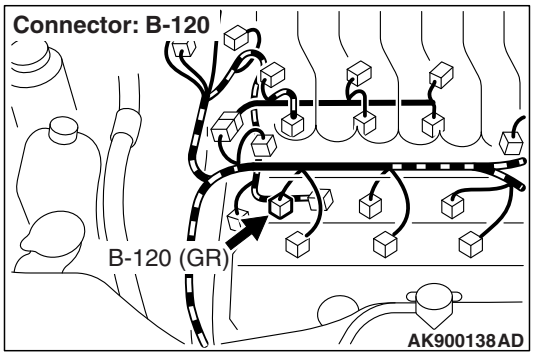
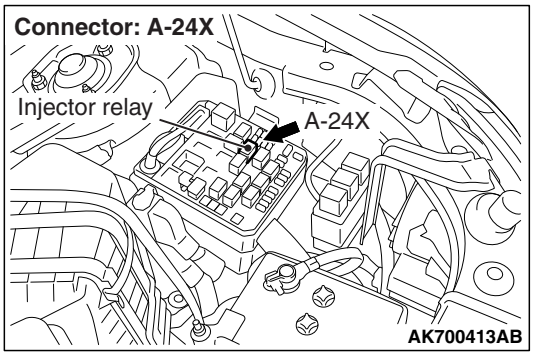
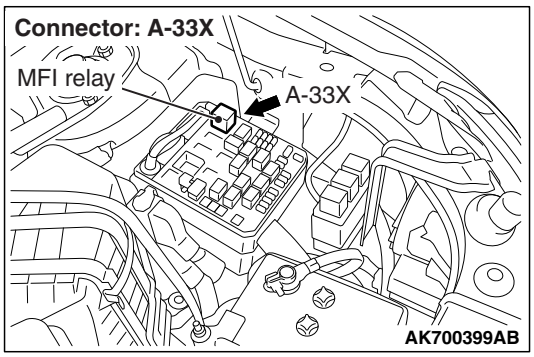
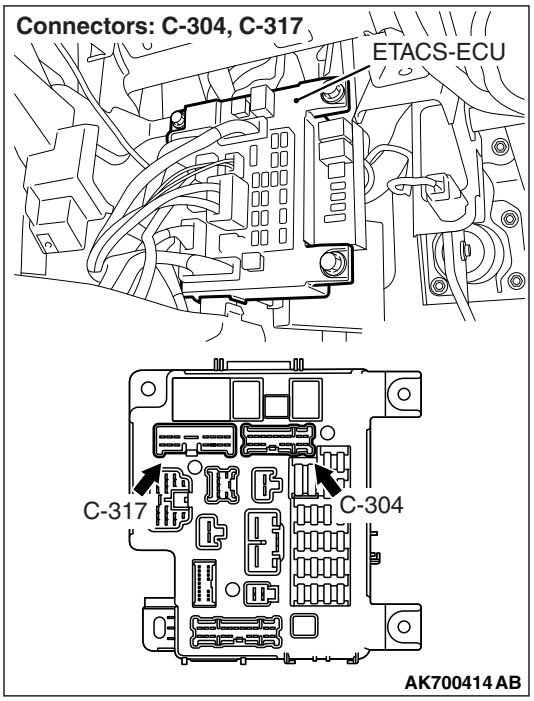
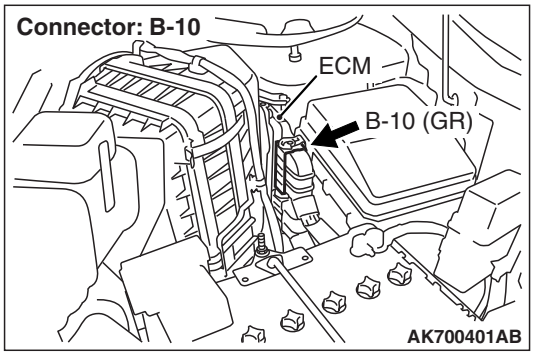
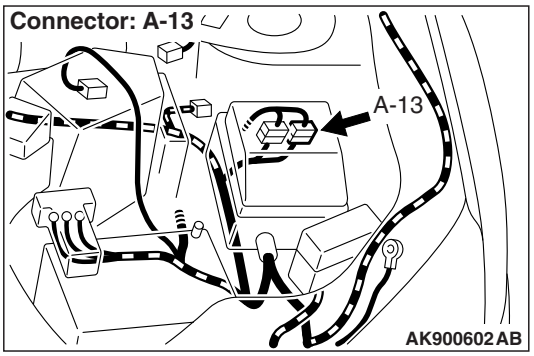












CIRCUIT OPERATION

- The injector power is supplied from the injector relay (terminal No. 3).
- The ECM controls the injector by turning the power transistor in the ECM "ON" and "OFF".

TECHNICAL DESCRIPTION

- The amount of fuel injected by the injector is controlled by the amount of continuity time the coil is grounded by the ECM.

DESCRIPTIONS OF MONITOR METHODS

The ECM detects open circuit and short malfunction.

MONITOR EXECUTION

Continuous

TSB Revision

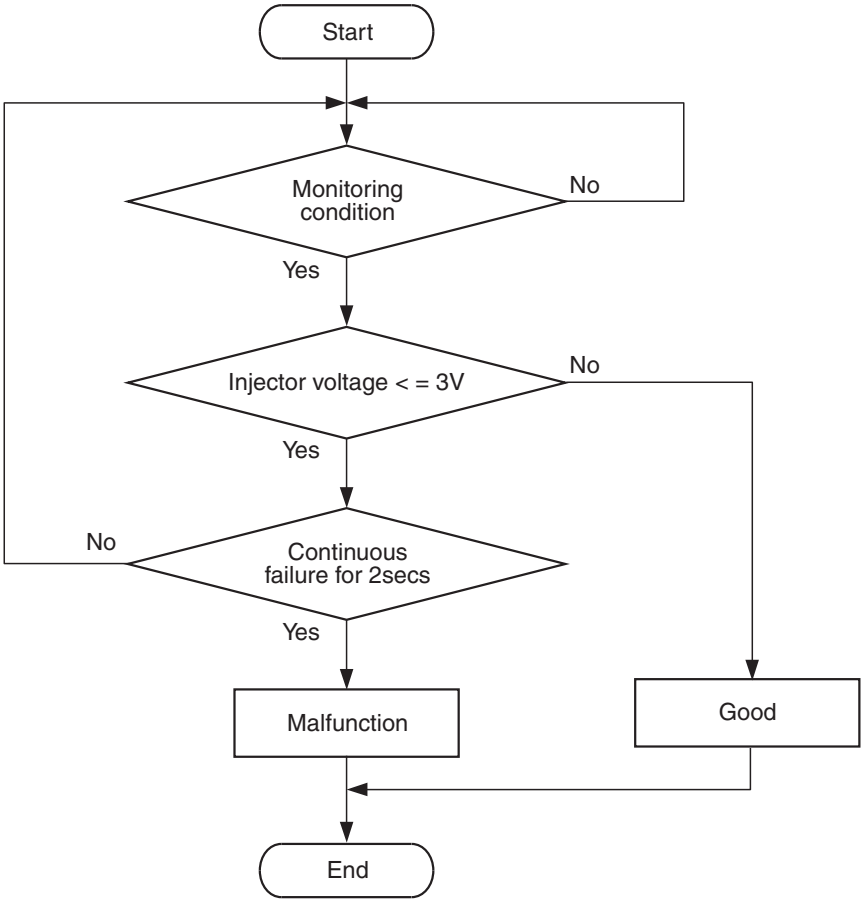
MONITOR EXECUTION CONDITIONS (Other monitor and Sensor)

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 <Circuit continuity –open circuit and shorted low>

Logic Flow Chart



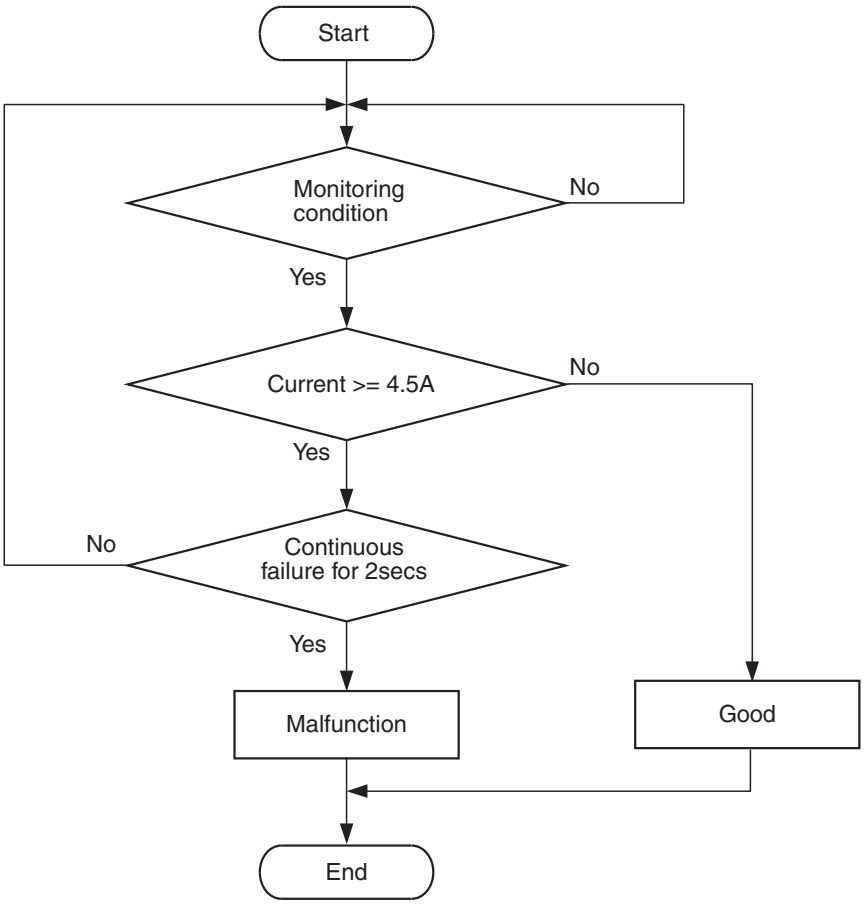
AK700479

Check Condition
- Engine is running.

Judgement Criterion
- The supply voltage is 3 volts or less without the injector driving for 2 seconds.

DTC SET CONDITIONS <Circuit continuity –shorted high>

Logic Flow Chart



AK604332

Check Condition

- Engine is running.

Judgement Criterion

- The coil current is 4.5 ampere or more with the injector driving for 2 seconds.

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

- No. 2 cylinder injector failed.
- Connector damage.
- Harness damage.
- ECM failed.

OBD-II DRIVE CYCLE PATTERN

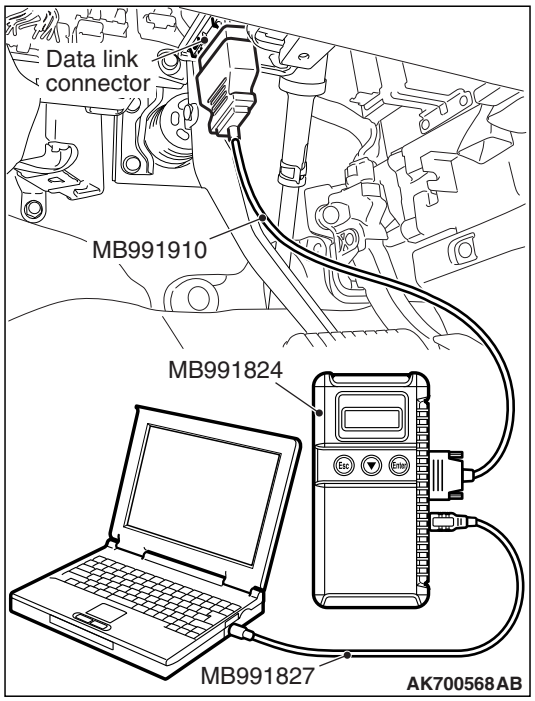
Refer to Diagnostic Function –OBD-II Drive Cycle – Pattern 22 P.13B-11.

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991910: Main Harness A
- MB991658: Test Harness
- MB992110: Power Plant ECU Check Harness

TSB Revision



STEP 1. Using scan tool MB991958, check actuator test item 1: No. 2 Injector.

⚠ CAUTION

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

(1) Connect scan tool MB991958 to the data link connector.
(2) Start the engine and run at idle.
(3) Set scan tool MB991958 to the actuator testing mode for item 1, No. 2 injector.
(4) Warm up the engine to normal operating temperature: 80° C to 95° C (176° F to 203° F).
- The idle should become slightly rougher.

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

Q: Is the actuator operating properly?

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.00-15.

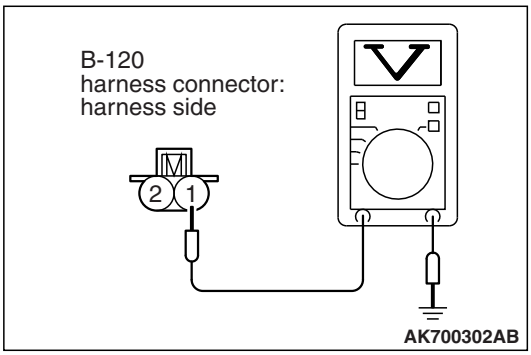
NO : Go to Step 2.

STEP 2. Check the for harness connector B-120 at No. 2 cylinder injector and B-10 at the ECM for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 3.

NO : Repair it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 7.



STEP 3. Measure the power supply voltage at the injector connector B-120.

(1) Disconnect the injector connector B-120 (terminal No. 1) 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.

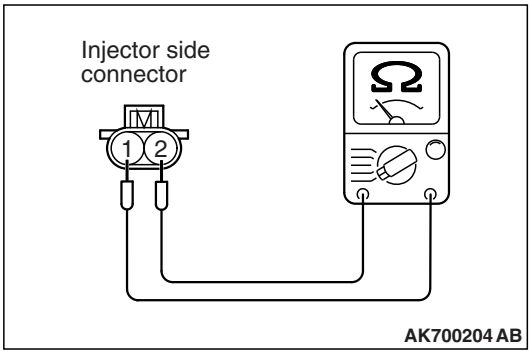
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the measured resistance battery positive voltage?

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 injector relay connector A-24X (terminal No. 3) and injector connector B-120 (terminal No. 1) because of open circuit. Then go to Step 7.

TSB Revision



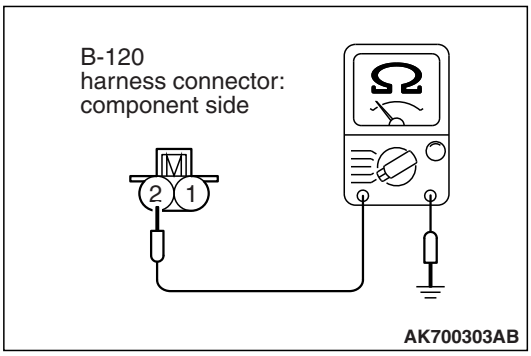
STEP 4. Check the No. 2 cylinder injector.

(1) Disconnect the No. 2 cylinder injector connector B-120.
(2) Measure the resistance between injector side connector terminal No. 1 and No. 2.

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

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

YES : Go to Step 5.
NO : Replace the No. 2 cylinder injector. Then go to Step 7.



STEP 5. Check for harness between the injector connector B-120 and the ECM connector B-10.

(1) Disconnect the injector connector B-120 and the ECM connector B-10.
(2) Measure the resistance between injector connector B-120 (terminal No. 2) and the ECM connector B-10 (terminal No. 3).
  • Should be less than 2 ohms.
(3) Measure the continuity between the injector connector B-120 (terminal No. 2) and ground.
  • Not continuity.

Q: Is the connector wire in good condition?

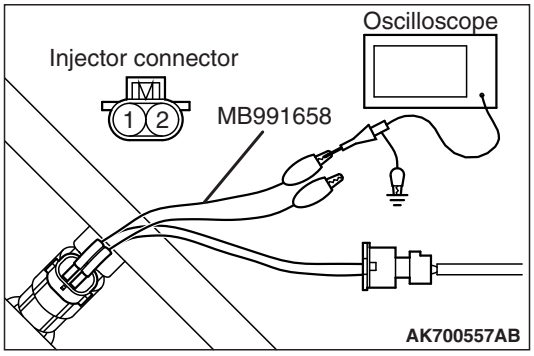
YES : Go to Step 6.
NO : Repair it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 7.

STEP 6. Using the oscilloscope, check the No.2 cylinder injector.

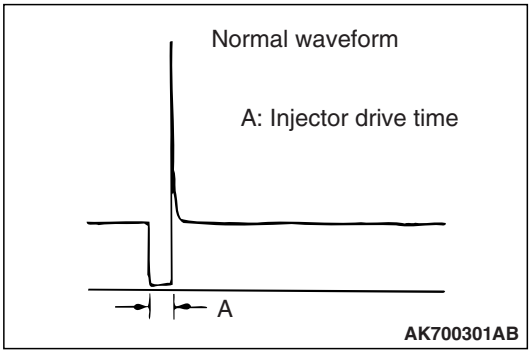
(1) Disconnect the No. 2 cylinder injector connector B-120 and connect the test harness special tool (MB991658) between the separated connectors. (All terminals should be connected)

(2) Connect the oscilloscope probe to the injector side connector terminal No. 2.

NOTE: When measuring with the ECM side connector, disconnect all ECM connectors. Connect the check harness special tool (MB992110) between the separated connectors. Then connect an oscilloscope probe to the check harness connector terminal No. 3.



(3) Start the engine and run at idle.



(4) Measure the waveform.
- The waveform should show a normal pattern similar to the illustration.

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

Q: Is the waveform normal?

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.00-15.

NO : Replace the ECM. When the ECM is replaced, register the ID code. Refer to GROUP 42B, Diagnosis –ID Codes Registration Judgment Table <Vehicles with KOS> P.42B-11 or GROUP 42C, Diagnosis –ID Codes Registration Judgment Table <Vehicles with WCM> P.42C-10. Then go to Step 7.

STEP 7. 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 22 P.13B-11.

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

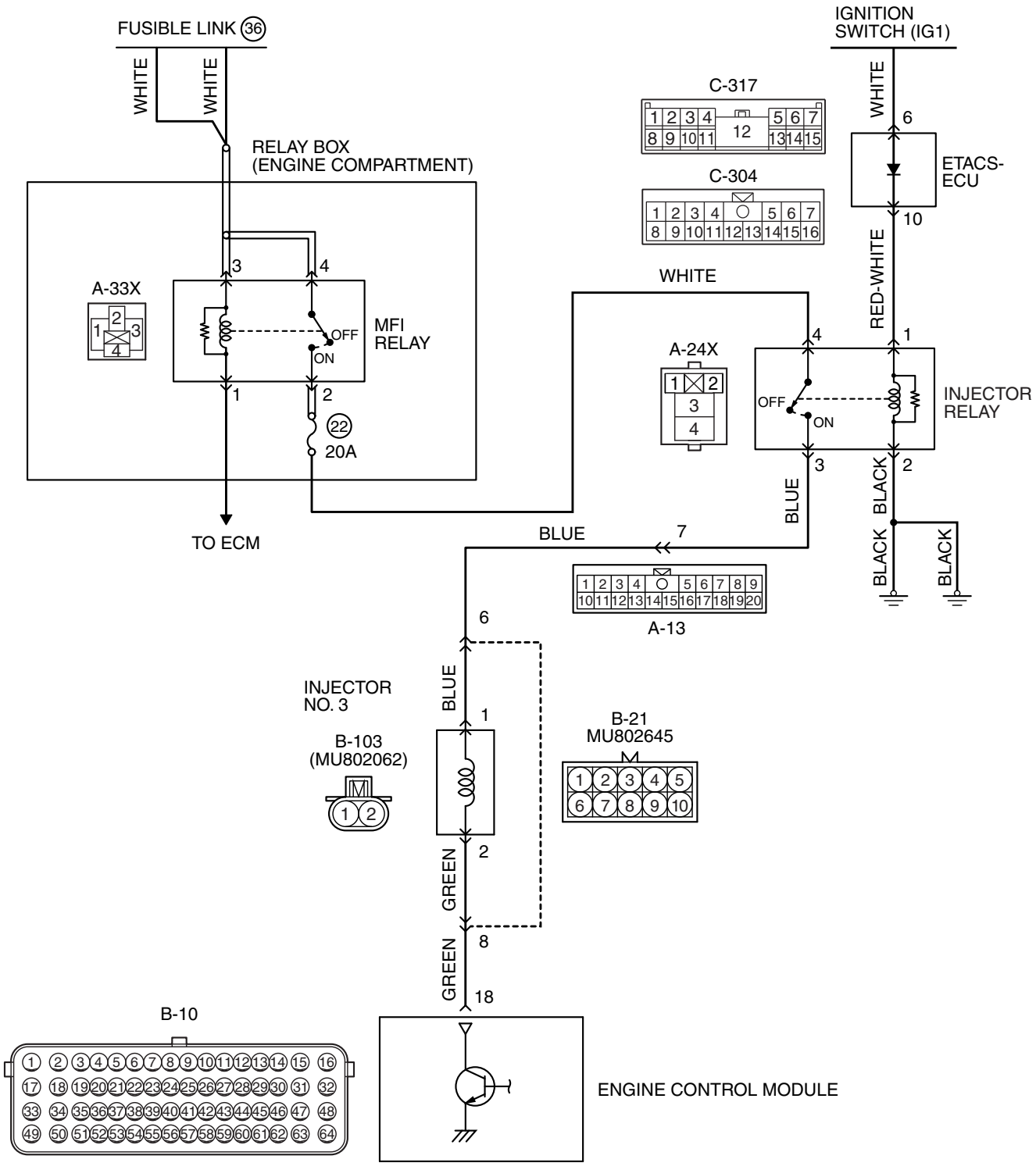
Q: Is DTC P0202 set?

YES : Retry the troubleshooting.

NO : The inspection is complete.

DTC P0203: Injector Circuit - Cylinder 3

INJECTOR CIRCUIT-CYLINDER 3



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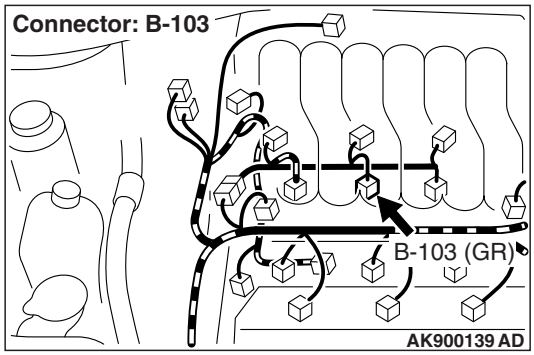
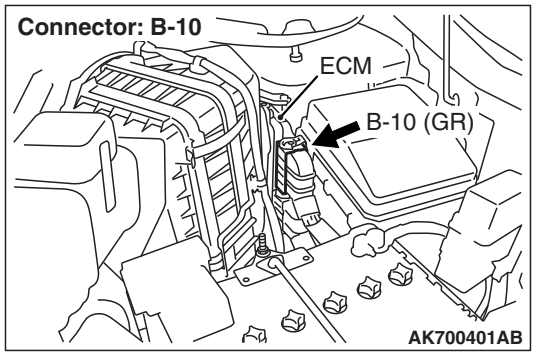
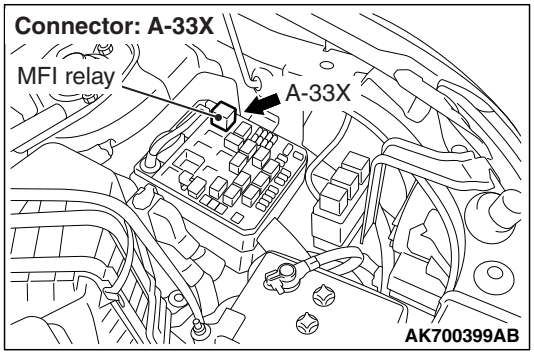
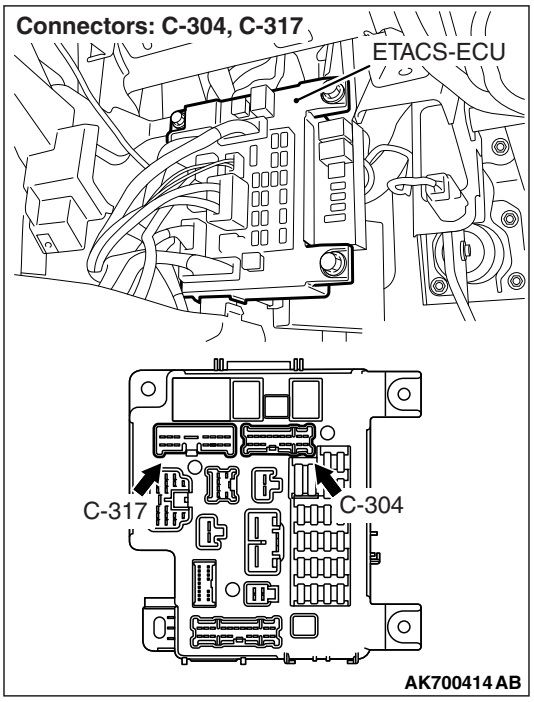
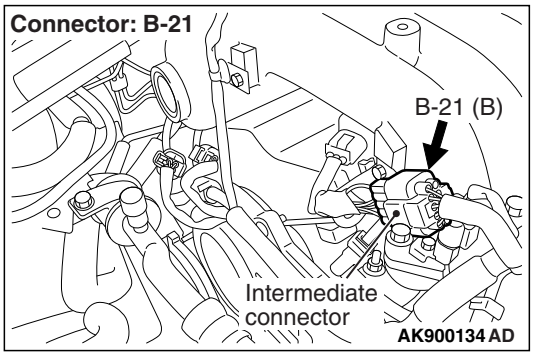
TSB Revision

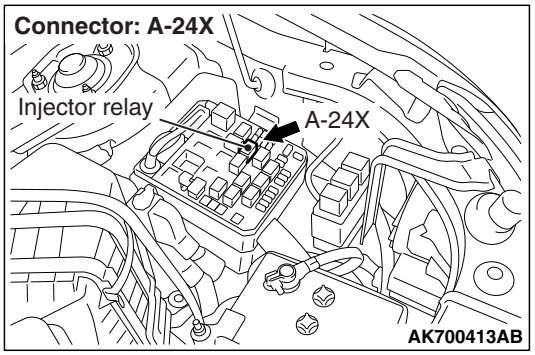


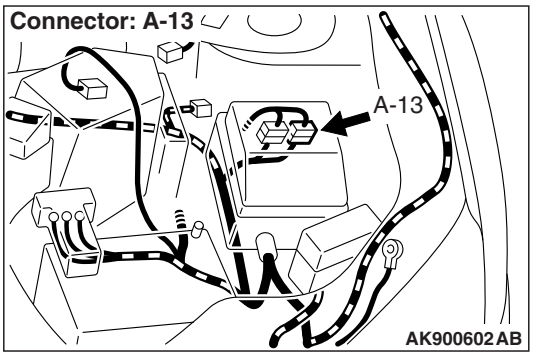












CIRCUIT OPERATION

- The injector power is supplied from the injector relay (terminal No. 3).
- The ECM controls the injector by turning the power transistor in the ECM "ON" and "OFF".

TECHNICAL DESCRIPTION

- The amount of fuel injected by the injector is controlled by the amount of continuity time the coil is grounded by the ECM.

DESCRIPTIONS OF MONITOR METHODS

The ECM detects open circuit and short malfunction.

MONITOR EXECUTION

Continuous

TSB Revision

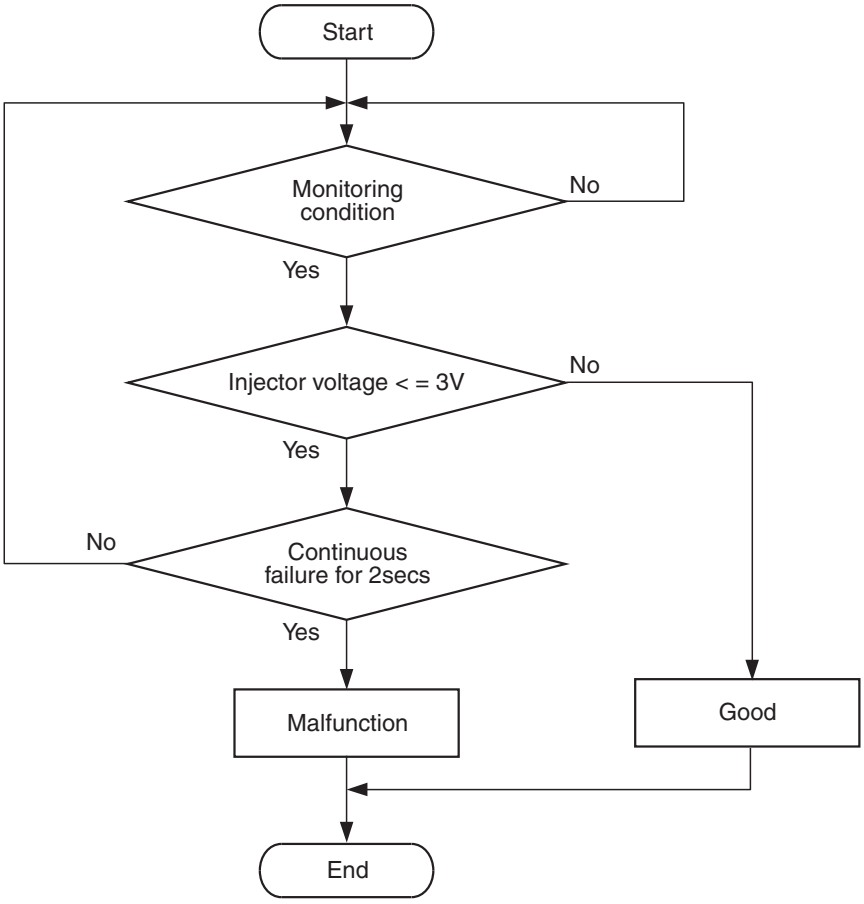
MONITOR EXECUTION CONDITIONS (Other monitor and Sensor)

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 <Circuit continuity –open circuit and shorted low>

Logic Flow Chart



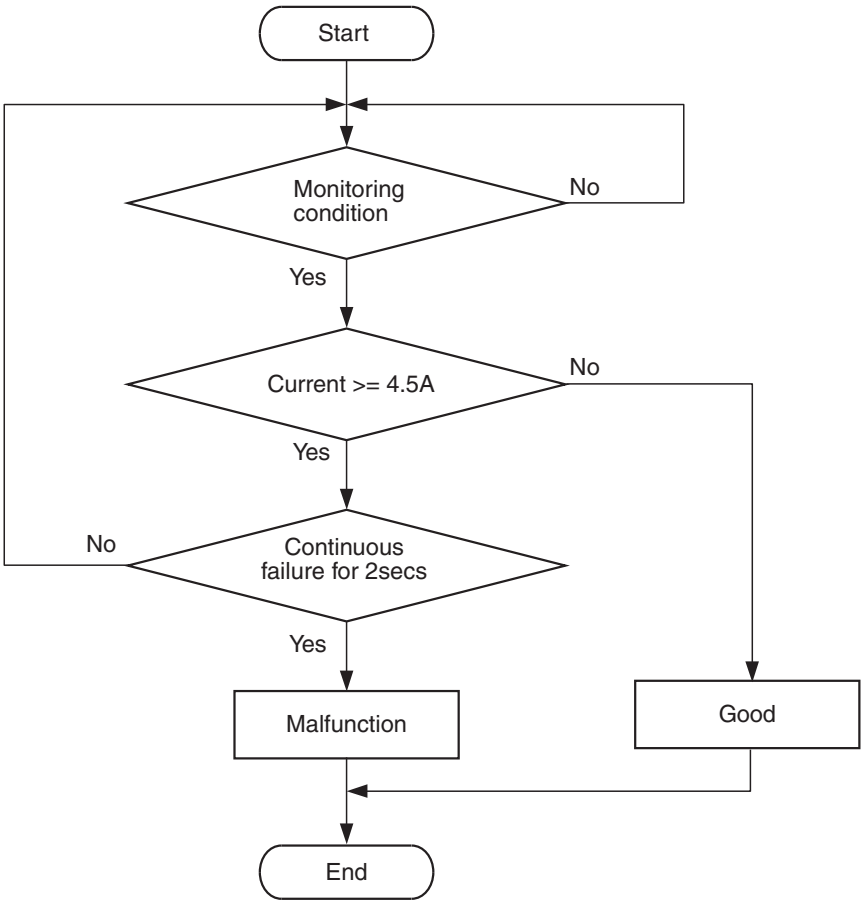
AK700479

Check Condition
- Engine is running.

Judgement Criterion
- The supply voltage is 3 volts or less without the injector driving for 2 seconds.

DTC SET CONDITIONS <Circuit continuity –shorted high>

Logic Flow Chart



AK604332

Check Condition
- Engine is running.

Judgement Criterion
- The coil current is 4.5 ampere or more with the injector driving for 2 seconds.

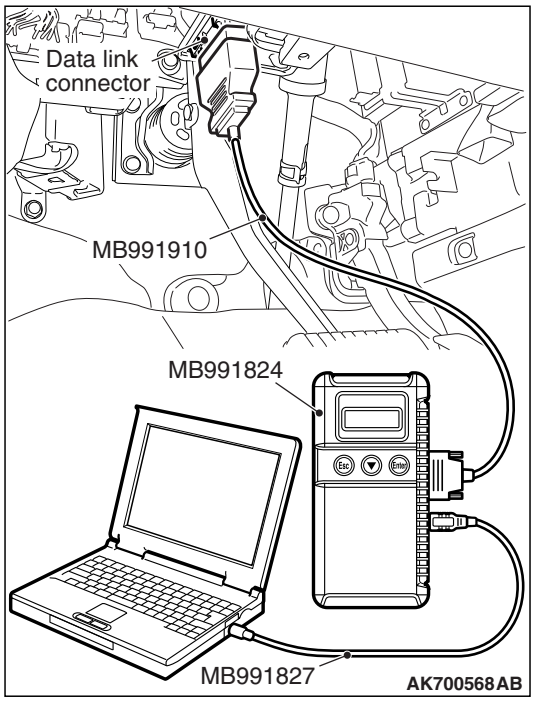
TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)
- No. 3 cylinder injector failed.
- Connector damage.
- Harness damage.
- ECM failed.

OBD-II DRIVE CYCLE PATTERN
Refer to Diagnostic Function –OBD-II Drive Cycle – Pattern 22 P.13B-11.

DIAGNOSIS

Required Special Tools:
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991910: Main Harness A
- MB991658: Test Harness
- MB992110: Power Plant ECU Check Harness

TSB Revision



STEP 1. Using scan tool MB991958, check actuator test item 1: No. 3 Injector.

⚠ CAUTION

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

(1) Connect scan tool MB991958 to the data link connector.
(2) Start the engine and run at idle.
(3) Set scan tool MB991958 to the actuator testing mode for item 1, No. 3 injector.
(4) Warm up the engine to normal operating temperature: 80° C to 95° C (176° F to 203° F).
  • The idle should become slightly rougher.
(5) Turn the ignition switch to the "LOCK" (OFF) position.

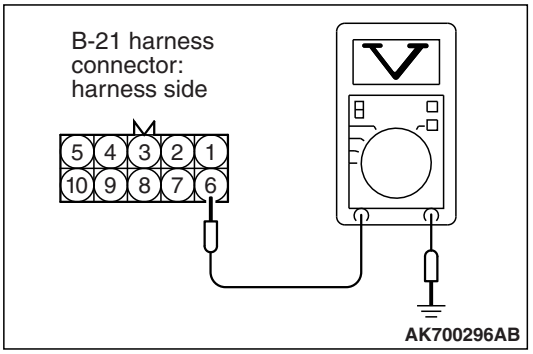
Q: Is the actuator operating properly?

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.00-15.
NO : Go to Step 2.

STEP 2. Check for harness connector B- 21 at the intermediate connector and B-10 at the ECM connector for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 3.
NO : Repair it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 9.



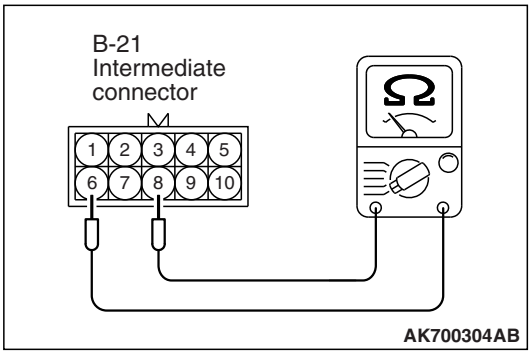
STEP 3. Measure the injector supply voltage at the intermediate connector harness B-21 and ground.

(1) Disconnect the intermediate connector B-21 and measure at the female connector 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 the measured resistance battery positive voltage?

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 injector relay connector A-24X (terminal No. 3) and intermediate connector B-21 (terminal No. 6) because of open circuit. Then go to Step 9.

TSB Revision



STEP 4. Check the No. 3 cylinder injector resistance at intermediate connector B-21.

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

(2) Measure the resistance between terminal No. 6 and No. 8.

- Resistance should be between 10.5 and 13.5 ohms.

Q: Is the measured resistance between 10.5 and 13.5 ohms?

YES : Go to Step 7.

NO : Go to Step 5.

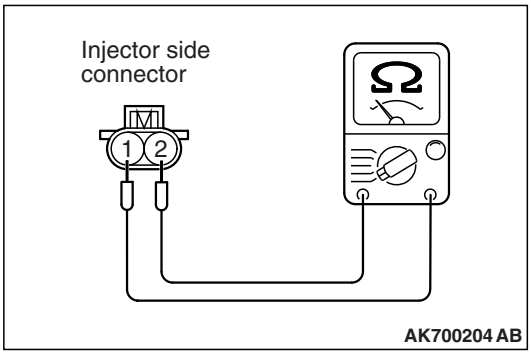
STEP 5. Check the harness connector B-103 at No. 3 cylinder injector for damage.

Remove the intake manifold.

Q: Is the harness connector in good condition?

YES : Go to Step 6.

NO : Repair it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 9.



STEP 6. Check the No. 3 cylinder injector B-103.

(1) Disconnect the No. 3 cylinder injector connector B-103.

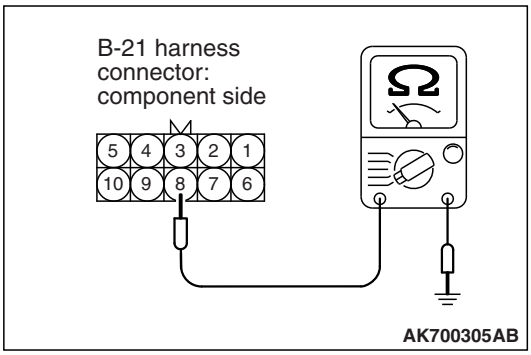
(2) Measure the resistance between injector side connector terminal No. 1 and No. 2.

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

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

YES : Repair harness wire between the intermediate connector B-21 (terminal No. 6) and the injector connector B-103 (terminal No. 1) and harness wire between injector connector B-103 (terminal No. 2) and intermediate connector B-21 (terminal No. 8) because of open circuit or short circuit to ground or harness damage.
Then go to Step 9.

NO : Replace the No. 3 cylinder injector. Then go to Step 9.



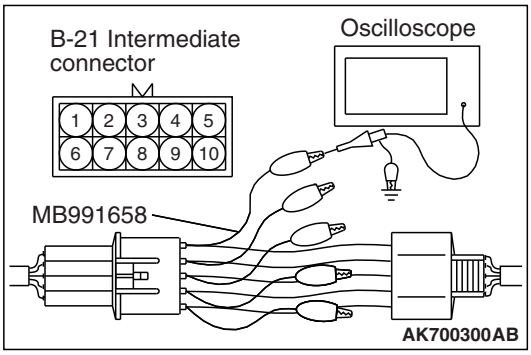
STEP 7. Check for harness between the intermediate connector B-21and the ECM connector B-10.

(1) Disconnect the intermediate connector B-21 and the ECM connector B-10.
(2) Measure the resistance between the intermediate connector B-21 (terminal No. 8) and the ECM connector B-10 (terminal No. 18).
- Should be less than 2 ohms.

(3) Measure the continuity between the intermediate connector B-21 (terminal No. 8) and ground.
- Not continuity

Q: Is the harness wire in good condition?

YES : Go to Step 8.
NO : Repair it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 9.

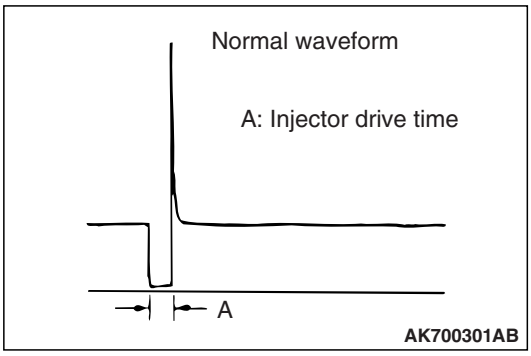


STEP 8. Using the oscilloscope, check the No. 3 cylinder injector.

(1) Disconnect the intermediate connector B-21 and connect the test harness MB991658 between the separated connectors.
(2) Connect the oscilloscope probe to injector intermediate connector terminal to No. 8.

NOTE: When measuring with the ECM side connector, disconnect all ECM connectors. Connect the check harness special tool (MB992110) between the separated connectors. Then connect an oscilloscope probe to the check harness connector terminal No. 18.

(3) Start the engine and run at idle.



(4) Measure the waveform.
- The waveform should show a normal pattern similar to the illustration.

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

Q: Is the waveform normal?

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.00-15.

NO : Replace the ECM. When the ECM is replaced, register the ID code. Refer to GROUP 42B, Diagnosis –ID Codes Registration Judgment Table <Vehicles with KOS> P.42B-11 or GROUP 42C, Diagnosis –ID Codes Registration Judgment Table <Vehicles with WCM> P.42C-10. Then go to Step 9.

STEP 9. 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 22 P.13B-11.

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

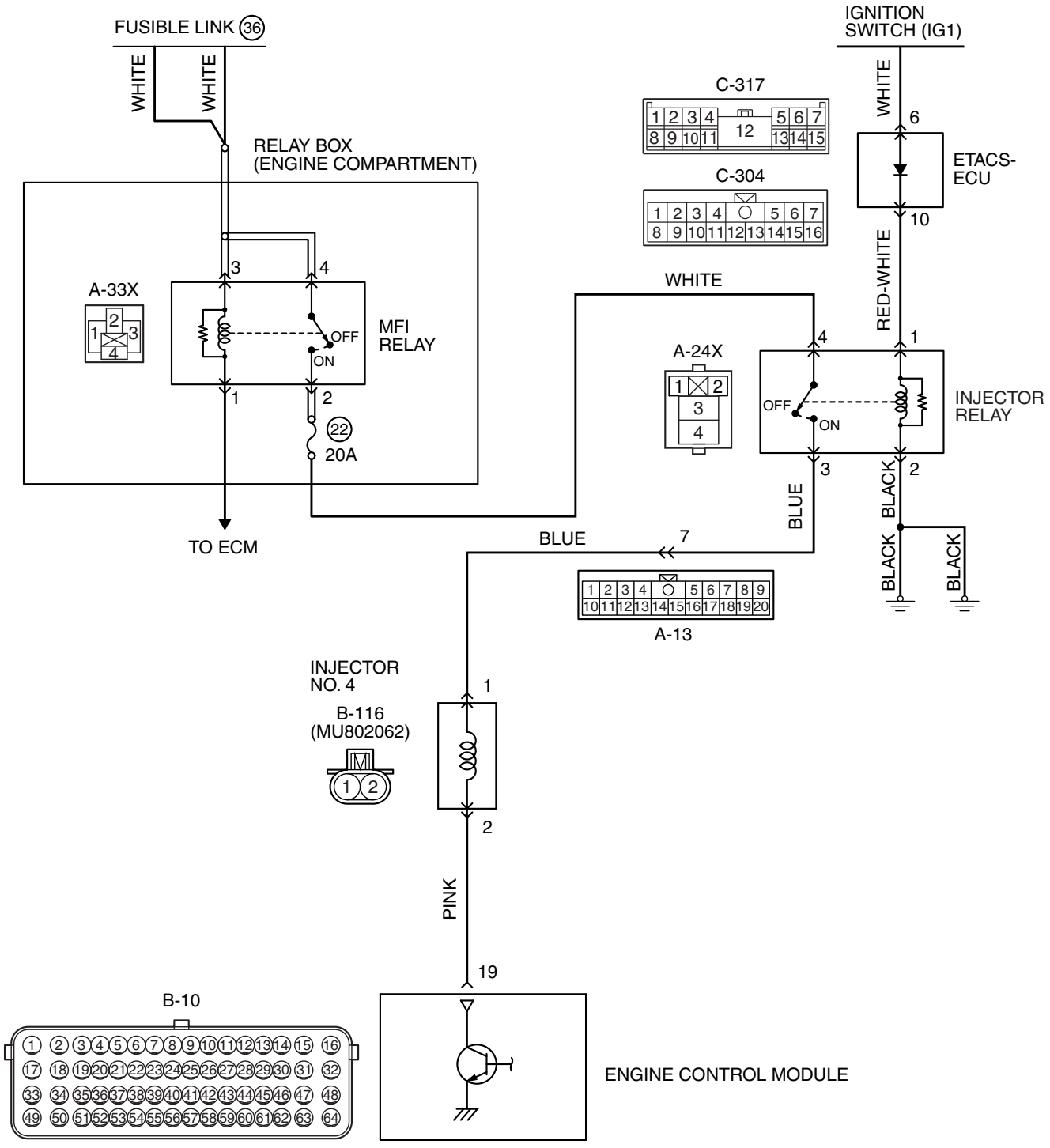
Q: Is DTC P0203 set?

YES : Retry the troubleshooting.

NO : The inspection is complete.

DTC P0204: Injector Circuit - Cylinder 4

INJECTOR CIRCUIT-CYLINDER 4



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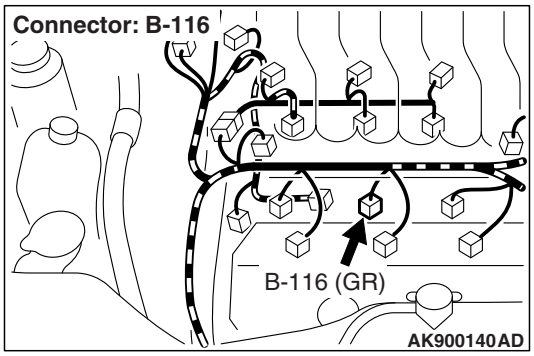
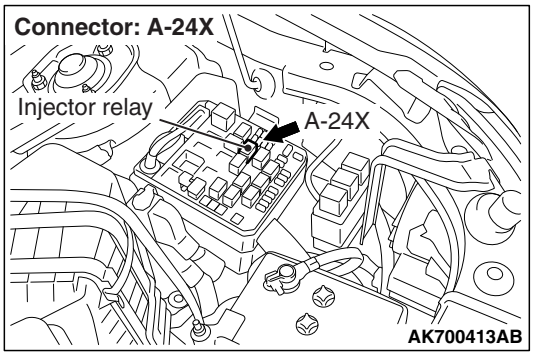
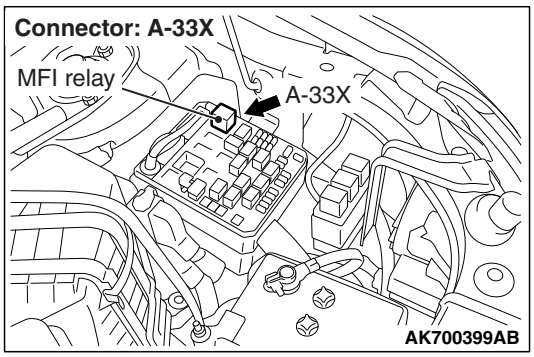
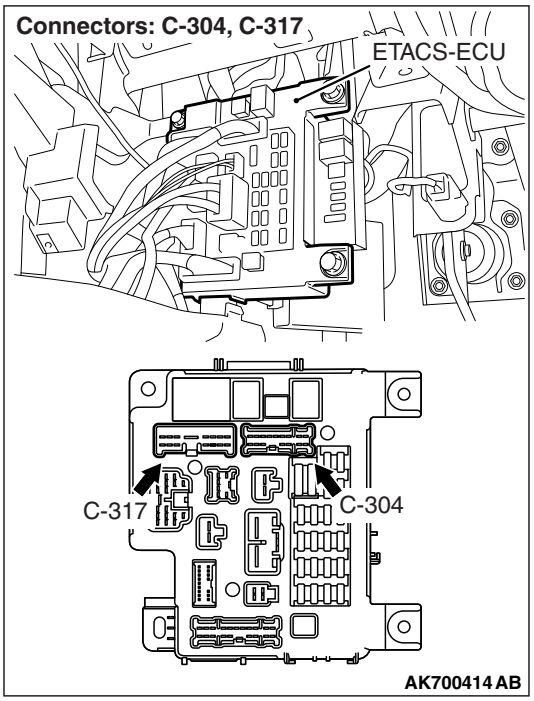
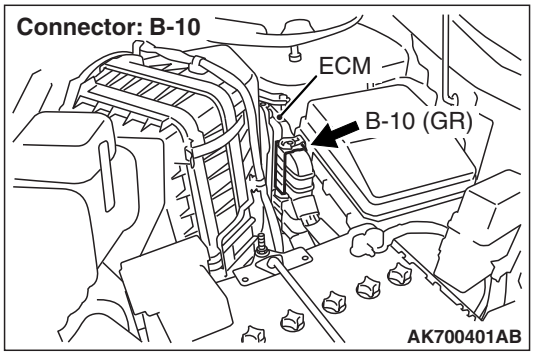
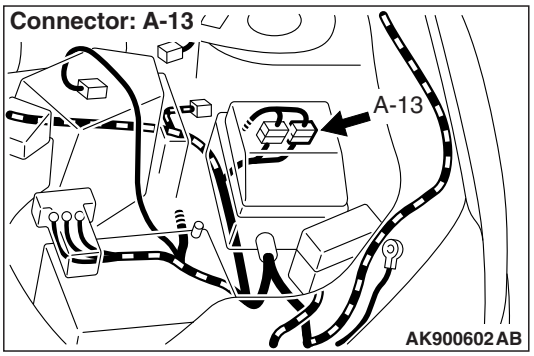












CIRCUIT OPERATION

- The injector power is supplied from the injector relay (terminal No. 3).
- The ECM controls the injector by turning the power transistor in the ECM "ON" and "OFF".

TECHNICAL DESCRIPTION

- The amount of fuel injected by the injector is controlled by the amount of continuity time the coil is grounded by the ECM.

DESCRIPTIONS OF MONITOR METHODS

The ECM detects open circuit and short malfunction.

MONITOR EXECUTION

Continuous

TSB Revision

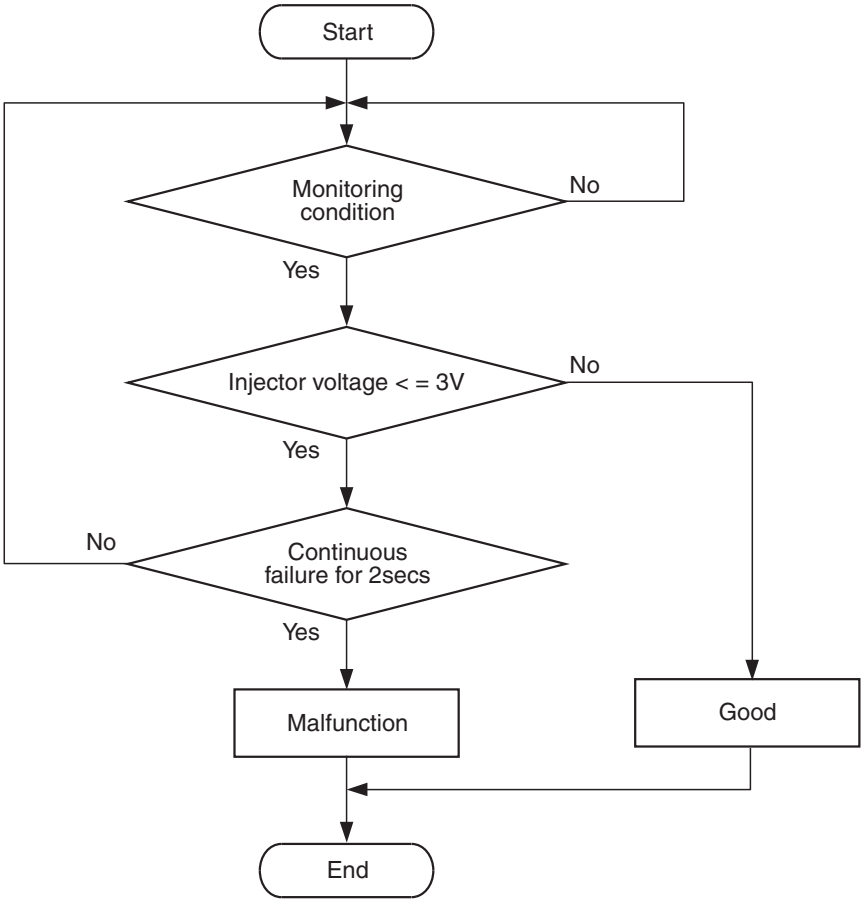
MONITOR EXECUTION CONDITIONS (Other monitor and Sensor)

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 <Circuit continuity –open circuit and shorted low>

Logic Flow Chart



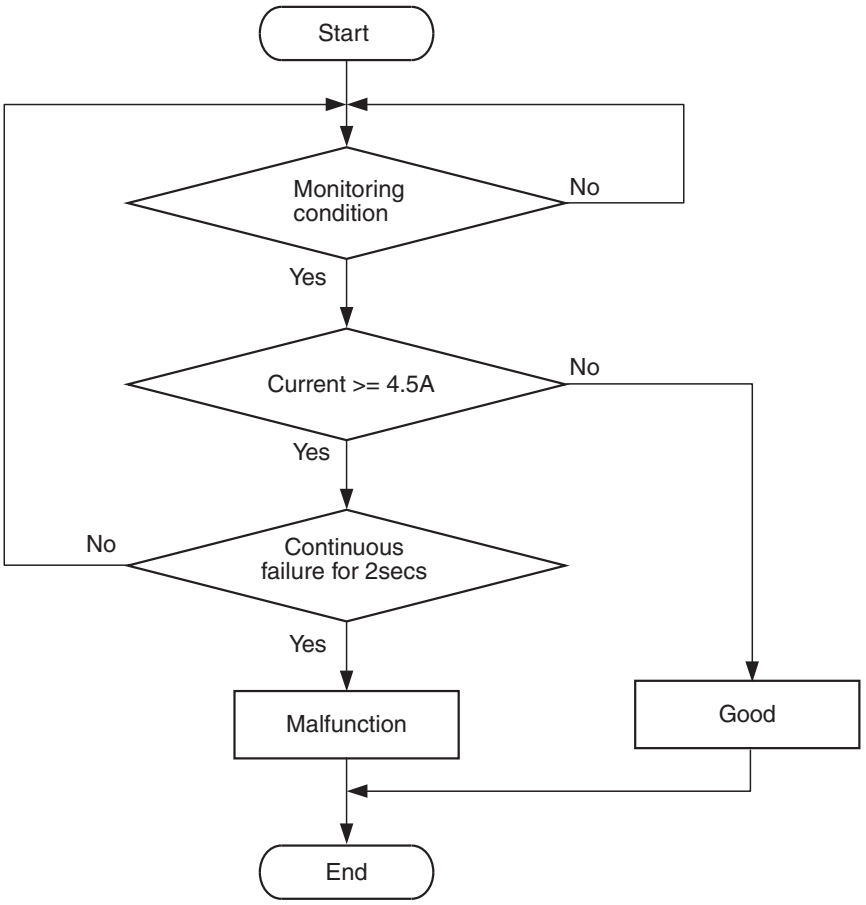
AK700479

Check Condition
- Engine is running.

Judgement Criterion
- The supply voltage is 3 volts or less without the injector driving for 2 seconds.

DTC SET CONDITIONS <Circuit continuity –shorted high>

Logic Flow Chart



AK604332

Check Condition
- Engine is running.

Judgement Criterion
- The coil current is 4.5 ampere or more with the injector driving for 2 seconds.

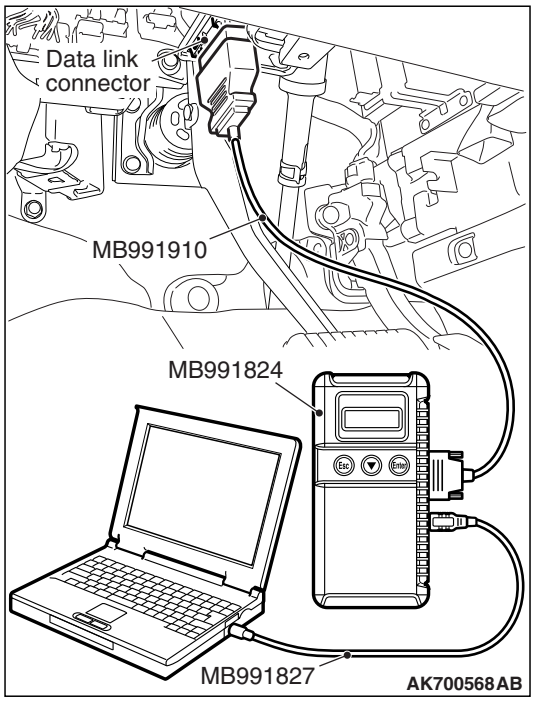
TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)
- No. 4 cylinder injector failed.
- Connector damage.
- Harness damage.
- ECM failed.

OBD-II DRIVE CYCLE PATTERN
Refer to Diagnostic Function –OBD-II Drive Cycle – Pattern 22 P.13B-11.

DIAGNOSIS

Required Special Tools:
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991910: Main Harness A
- MB991658: Test Harness
- MB992110: Power Plant ECU Check Harness

TSB Revision



STEP 1. Using scan tool MB991958, check actuator test item 1: No. 4 Injector.

⚠ CAUTION

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

(1) Connect scan tool MB991958 to the data link connector.
(2) Start the engine and run at idle.
(3) Set scan tool MB991958 to the actuator testing mode for item 1, No. 4 injector.
(4) Warm up the engine to normal operating temperature: 80° C to 95° C (176° F to 203° F).
- The idle should become slightly rougher.

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

Q: Is the actuator operating properly?

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.00-15.

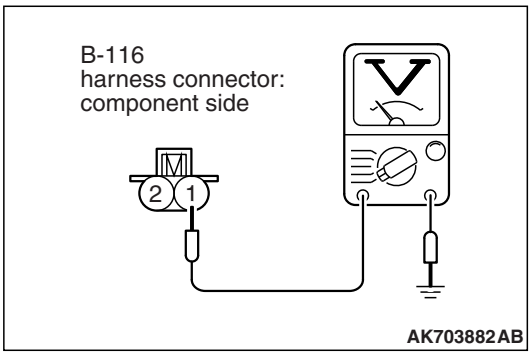
NO : Go to Step 2.

STEP 2. Check the for harness connector B-116 at No. 4 cylinder injector and B-10 at the ECM for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 3.

NO : Repair it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 7.



STEP 3. Measure the power supply voltage at the injector connector B-116.

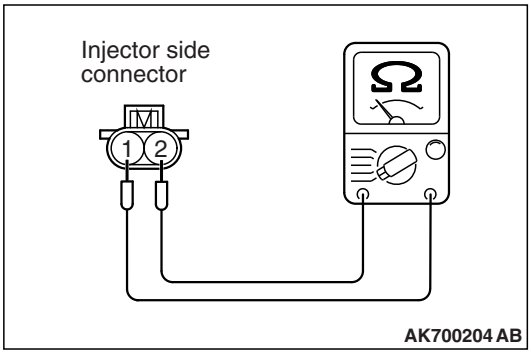
(1) Disconnect the injector connector B-116 (terminal No. 1) and measure at the harness side.
(2) Turn the ignition switch to the "ON" position.
(3) Measure the voltage between terminal No. 1 and ground.
- Voltage should be battery positive voltage.

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

Q: Is the measured resistance battery positive voltage?

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 injector relay connector A-24X (terminal No. 3) and injector connector B-116 (terminal No. 1) because of open circuit. Then go to Step 7.



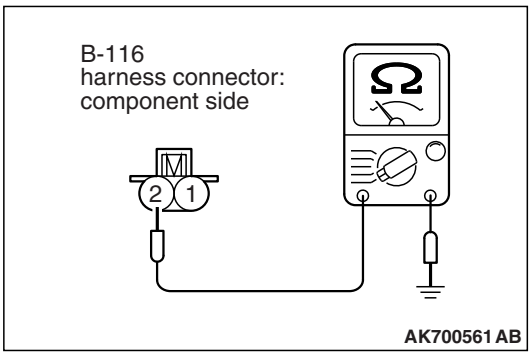
STEP 4. Check the No. 4 cylinder injector.

(1) Disconnect the No. 4 cylinder injector connector B-116.
(2) Measure the resistance between injector side connector terminal No. 1 and No. 2.

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

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

YES : Go to Step 5.
NO : Replace the No. 4 cylinder injector. Then go to Step 7.

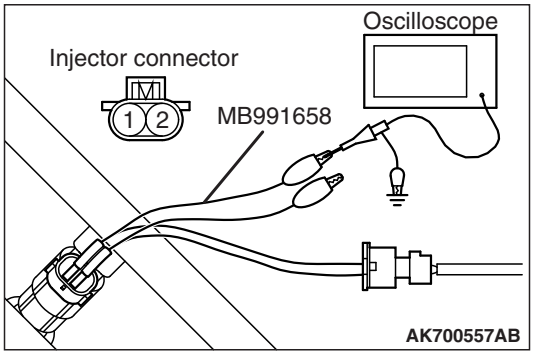


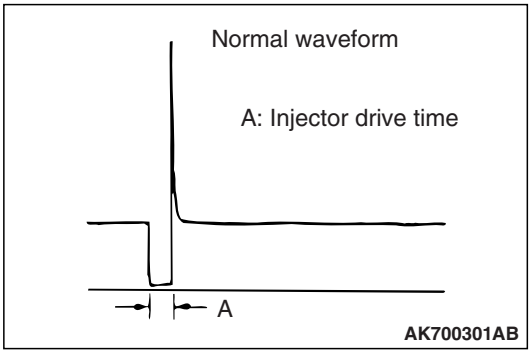
STEP 5. Check for harness between the injector connector B-116 and the ECM connector B-10.

(1) Disconnect the injector connector B-116 and the ECM connector B-10.
(2) Measure the resistance between injector connector B-116 (terminal No. 2) and the ECM connector B-10 (terminal No. 19).
  • Should be less than 2 ohms.
(3) Measure the continuity between the injector connector B-116 (terminal No. 2) and ground.
  • Not continuity.

Q: Is the connector wire in good condition?

YES : Go to Step 6.
NO : Repair it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 7.





STEP 6. Using the oscilloscope, check the No. 4 cylinder injector.

(1) Disconnect the No. 4 cylinder injector connector B-116 and connect the test harness special tool (MB991658) between the separated connectors. (All terminals should be connected)

(2) Connect the oscilloscope probe to the injector side connector terminal No. 2.

NOTE: When measuring with the ECM side connector, disconnect all ECM connectors. Connect the check harness special tool (MB992110) between the separated connectors. Then connect an oscilloscope probe to the check harness connector terminal No. 19.

(3) Start the engine and run at idle.

(4) Measure the waveform.
- The waveform should show a normal pattern similar to the illustration.

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

Q: Is the waveform normal?

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.00-15.

NO : Replace the ECM. When the ECM is replaced, register the ID code. Refer to GROUP 42B, Diagnosis –ID Codes Registration Judgment Table <Vehicles with KOS> P.42B-11 or GROUP 42C, Diagnosis –ID Codes Registration Judgment Table <Vehicles with WCM> P.42C-10. Then go to Step 7.

STEP 7. 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 22 P.13B-11.

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

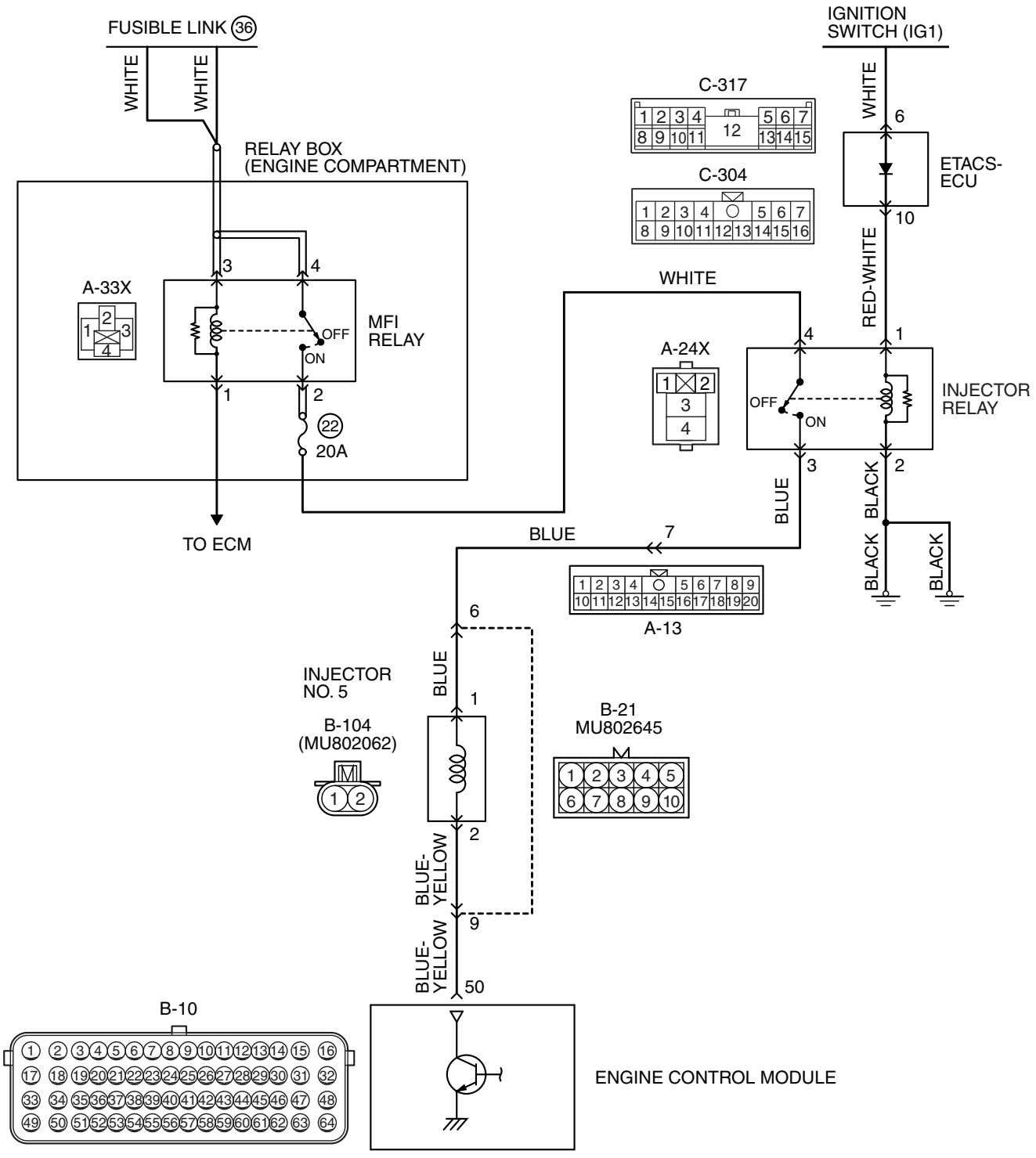
Q: Is DTC P0204 set?

YES : Retry the troubleshooting.

NO : The inspection is complete.

DTC P0205: Injector Circuit - Cylinder 5

INJECTOR CIRCUIT-CYLINDER 5



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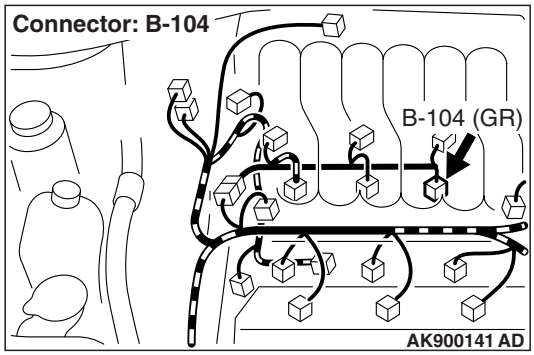
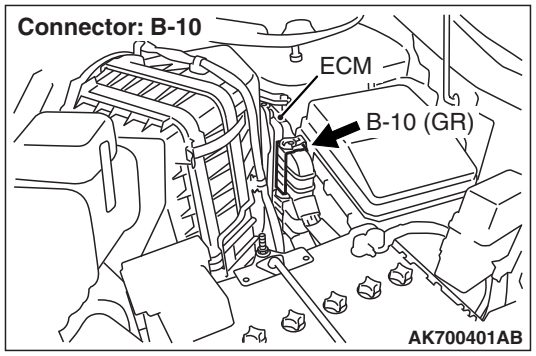
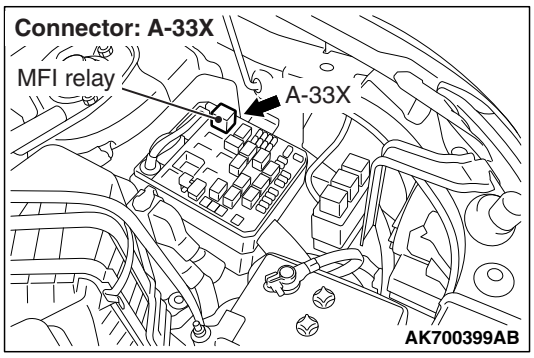
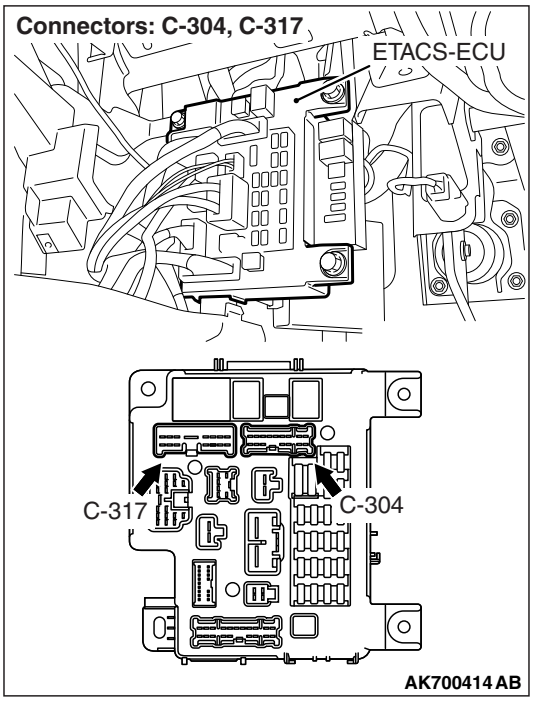
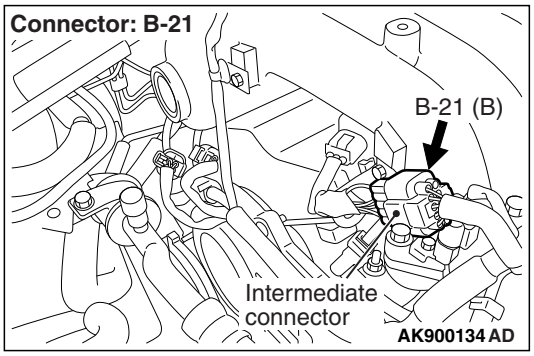
TSB Revision

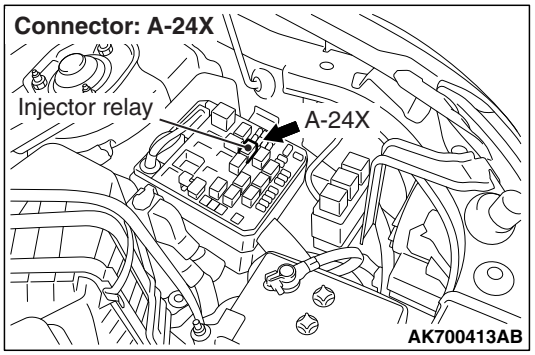


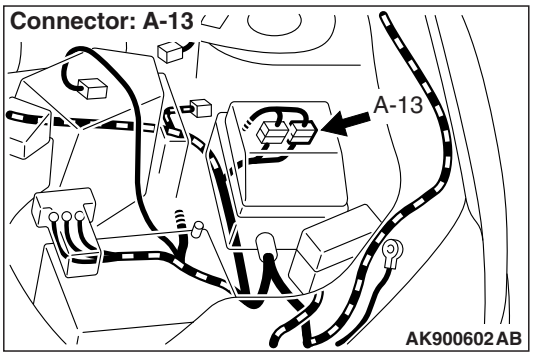












CIRCUIT OPERATION

- The injector power is supplied from the injector relay (terminal No. 3).
- The ECM controls the injector by turning the power transistor in the ECM "ON" and "OFF".

TECHNICAL DESCRIPTION

- The amount of fuel injected by the injector is controlled by the amount of continuity time the coil is grounded by the ECM.

DESCRIPTIONS OF MONITOR METHODS

The ECM detects open circuit and short malfunction.

MONITOR EXECUTION

Continuous

TSB Revision

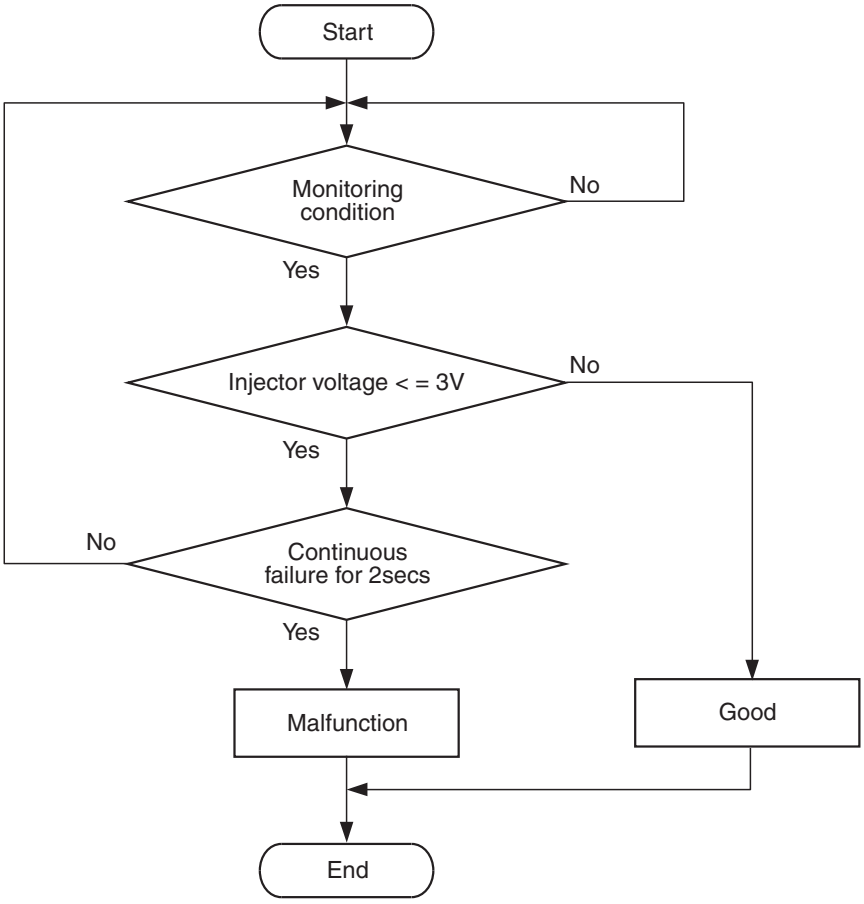
MONITOR EXECUTION CONDITIONS (Other monitor and Sensor)

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 <Circuit continuity –open circuit and shorted low>

Logic Flow Chart



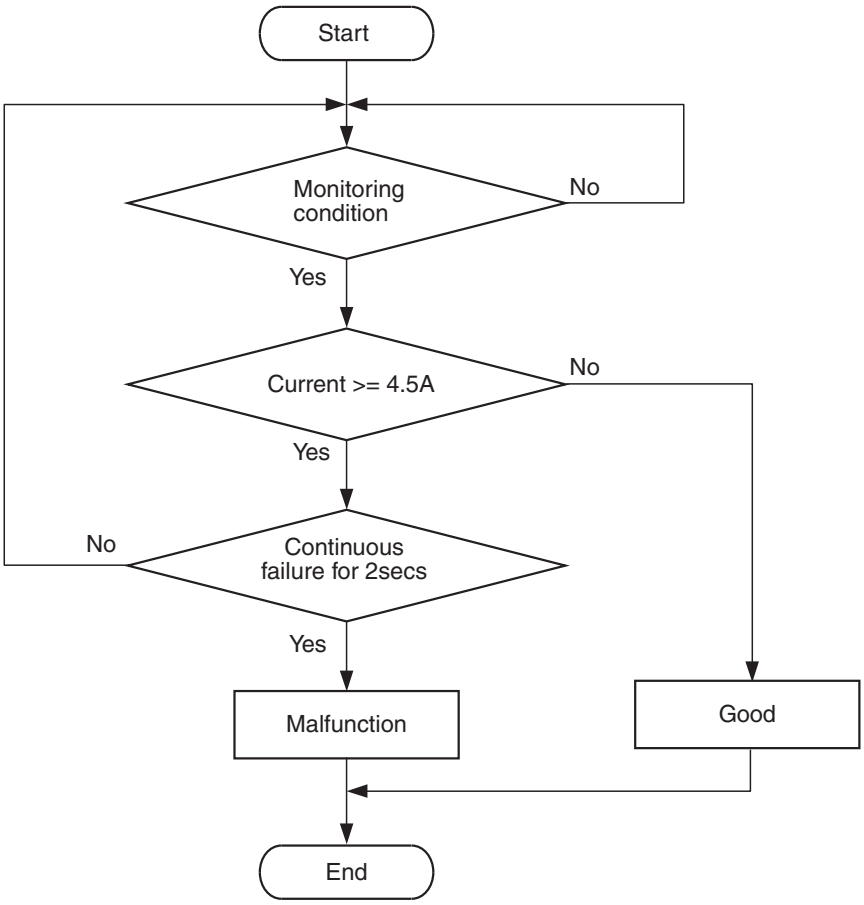
AK700479

Check Condition
- Engine is running.

Judgement Criterion
- The supply voltage is 3 volts or less without the injector driving for 2 seconds.

DTC SET CONDITIONS <Circuit continuity –shorted high>

Logic Flow Chart



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Check Condition

- Engine is running.

Judgement Criterion

- The coil current is 4.5 ampere or more with the injector driving for 2 seconds.

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

- No. 5 cylinder injector failed.
- Connector damage.
- Harness damage.
- ECM failed.

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function –OBD-II Drive Cycle – Pattern 22 P.13B-11.

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991910: Main Harness A
- MB991658: Test Harness
- MB992110: Power Plant ECU Check Harness

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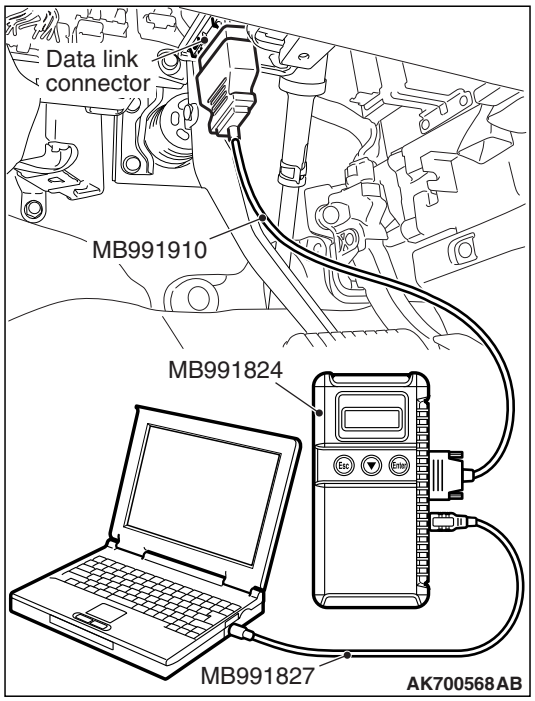


STEP 1. Using scan tool MB991958, check actuator test item 1: No. 5 Injector.

⚠ CAUTION

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

(1) Connect scan tool MB991958 to the data link connector.
(2) Start the engine and run at idle.
(3) Set scan tool MB991958 to the actuator testing mode for item 1, No. 5 injector.
(4) Warm up the engine to normal operating temperature: 80° C to 95° C (176° F to 203° F).
- The idle should become slightly rougher.

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

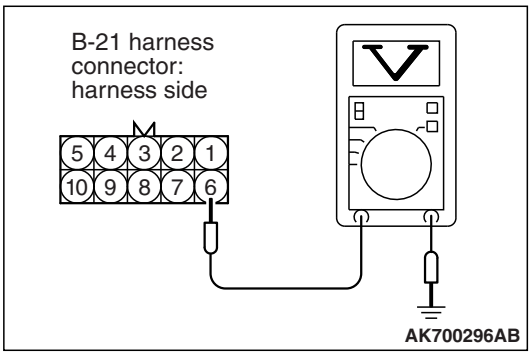
Q: Is the actuator operating properly?

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.00-15.
NO : Go to Step 2.

STEP 2. Check for harness connector B- 21 at the intermediate connector and B-10 at the ECM for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 3.
NO : Repair it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 9.



STEP 3. Measure the injector supply voltage at the intermediate connector harness B-21 and ground.

(1) Disconnect the intermediate connector B-21 and measure at the female connector 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 the measured resistance battery positive voltage?

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 injector relay connector A-24X (terminal No. 3) and intermediate connector B-21 (terminal No. 6) because of open circuit. Then go to Step 9.

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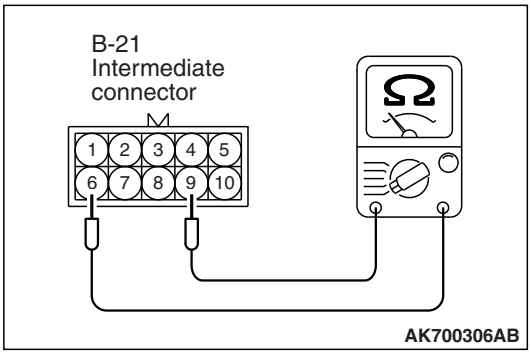


STEP 4. Check the No. 5 cylinder injector resistance at intermediate connector B-21.

(1) Disconnect the intermediate connector B-21 and measure at male connector side.
(2) Measure the resistance between terminal No. 6 and No. 9.
- Resistance should be between 10.5 and 13.5 ohms.

Q: Is the measured resistance between 10.5 and 13.5 ohms?

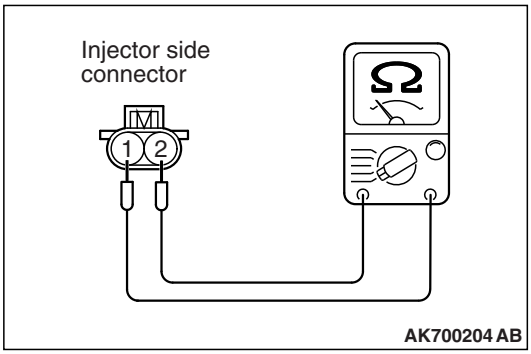
YES : Go to Step 7.
NO : Go to Step 5.

STEP 5. Check the harness connector B-104 at No. 5 cylinder injector for damage.

Remove the intake manifold.

Q: Is the harness connector in good condition?

YES : Go to Step 6.
NO : Repair it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 9.



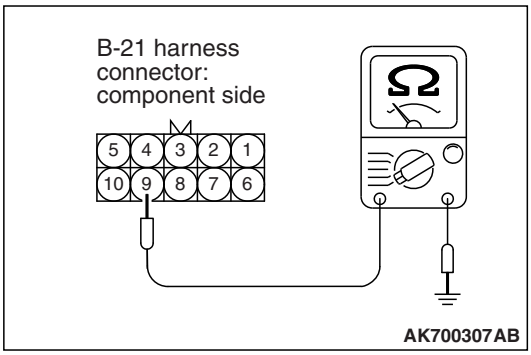
STEP 6. Check the No. 5 cylinder injector B-104.

(1) Disconnect the No. 5 cylinder injector connector B-104.
(2) Measure the resistance between injector side connector terminal No. 1 and No. 2.

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

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

YES : Repair harness wire between the intermediate connector B-21 (terminal No. 6) and the injector connector B-104 (terminal No. 1) and harness wire between injector connector B-104 (terminal No. 2) and intermediate connector B-21 (terminal No. 9) because of open circuit or short circuit to ground or harness damage.
Then go to Step 9.
NO : Replace the No. 5 cylinder injector. Then go to Step 9.



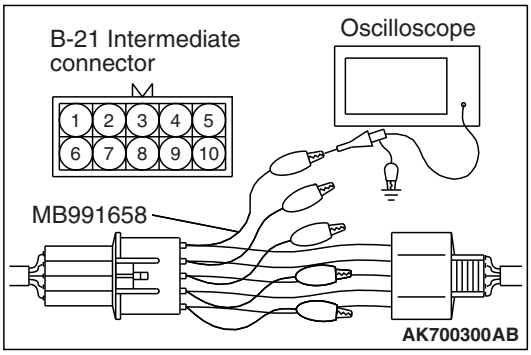
STEP 7. Check for harness between the intermediate connector B-21and the ECM connector B-10.

(1) Disconnect the intermediate connector B-21 and the ECM connector B-10.
(2) Measure the resistance between the intermediate connector B-21 (terminal No. 9) and the ECM connector B-10 (terminal No. 50).
- Should be less than 2 ohms.

(3) Measure the continuity between the intermediate connector B-21 (terminal No. 9) and ground.
- Not continuity

Q: Is the harness wire in good condition?

YES : Go to Step 8.
NO : Repair it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 9.

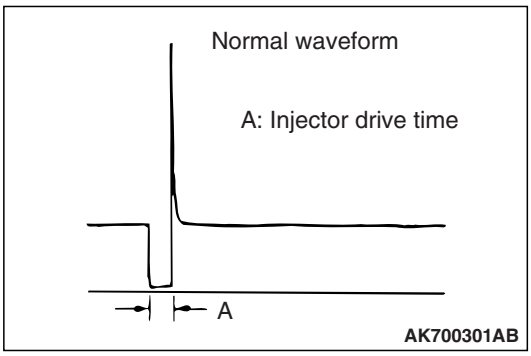


STEP 8. Using the oscilloscope, check the No. 5 cylinder injector.

(1) Disconnect the intermediate connector B-21 and connect the test harness MB991658 between the separated connectors.
(2) Connect the oscilloscope probe to injector intermediate connector terminal to No. 9.

NOTE: When measuring with the ECM side connector, disconnect all ECM connectors. Connect the check harness special tool (MB992110) between the separated connectors. Then connect an oscilloscope probe to the check harness connector terminal No. 50.

(3) Start the engine and run at idle.



(4) Measure the waveform.
- The waveform should show a normal pattern similar to the illustration.

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

Q: Is the waveform normal?

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.00-15.

NO : Replace the ECM. When the ECM is replaced, register the ID code. Refer to GROUP 42B, Diagnosis –ID Codes Registration Judgment Table <Vehicles with KOS> P.42B-11 or GROUP 42C, Diagnosis –ID Codes Registration Judgment Table <Vehicles with WCM> P.42C-10. Then go to Step 9.

STEP 9. 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 22 P.13B-11.

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

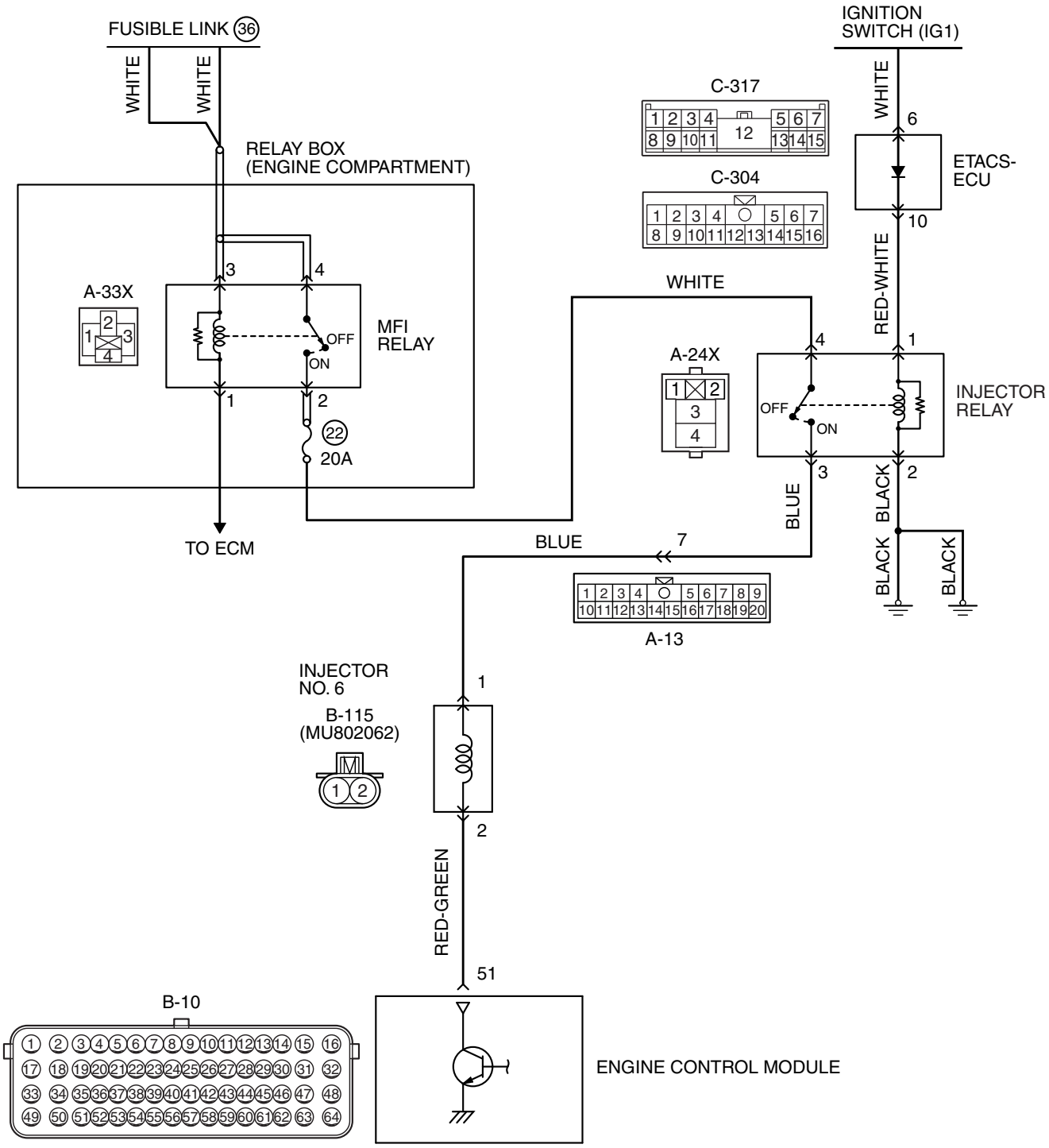
Q: Is DTC P0205 set?

YES : Retry the troubleshooting.

NO : The inspection is complete.

DTC P0206: Injector Circuit - Cylinder 6

INJECTOR CIRCUIT-CYLINDER 6



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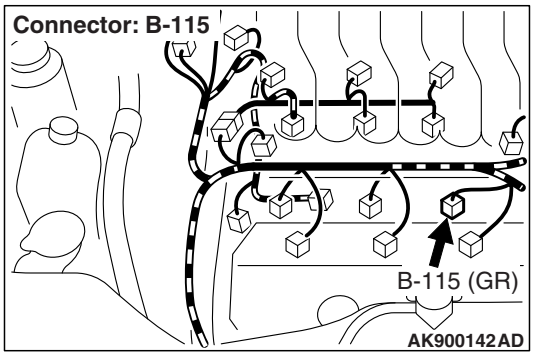

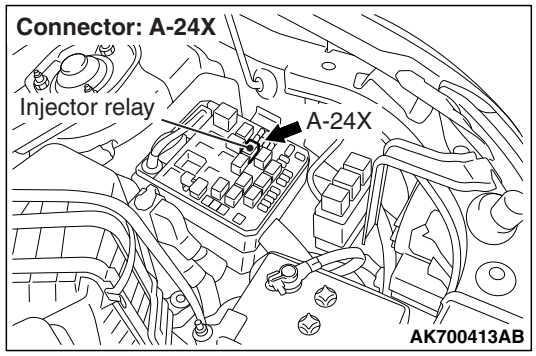

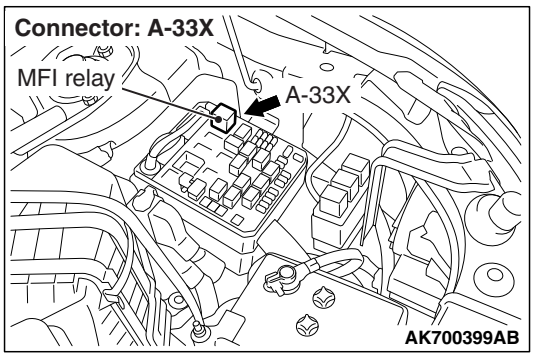

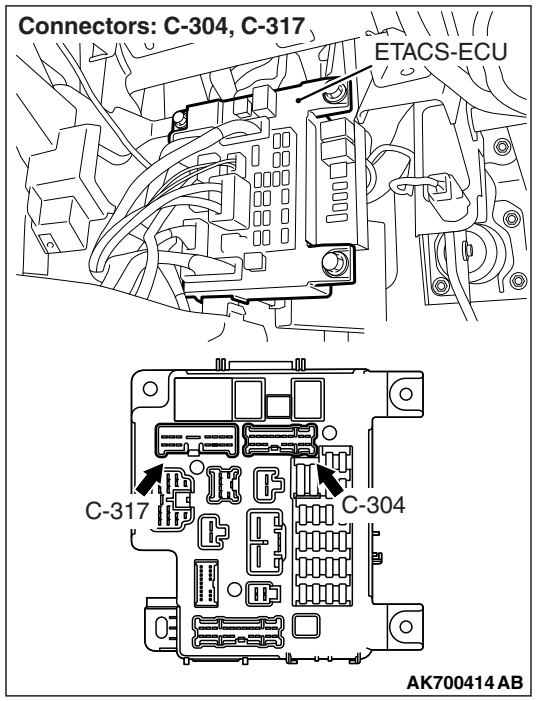

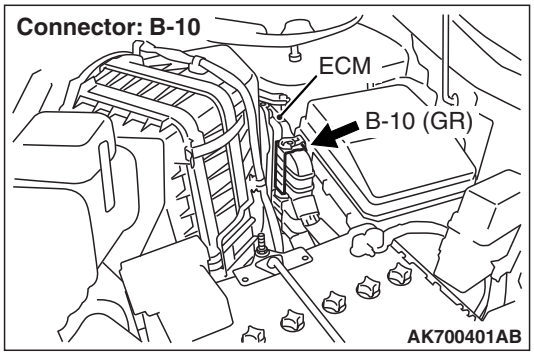

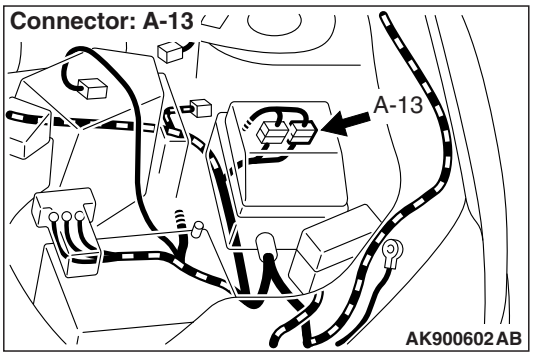

CIRCUIT OPERATION

- The injector power is supplied from the injector relay (terminal No. 3).
- The ECM controls the injector by turning the power transistor in the ECM "ON" and "OFF".

TECHNICAL DESCRIPTION

- The amount of fuel injected by the injector is controlled by the amount of continuity time the coil is grounded by the ECM.

DESCRIPTIONS OF MONITOR METHODS

The ECM detects open circuit and short malfunction.

MONITOR EXECUTION

Continuous

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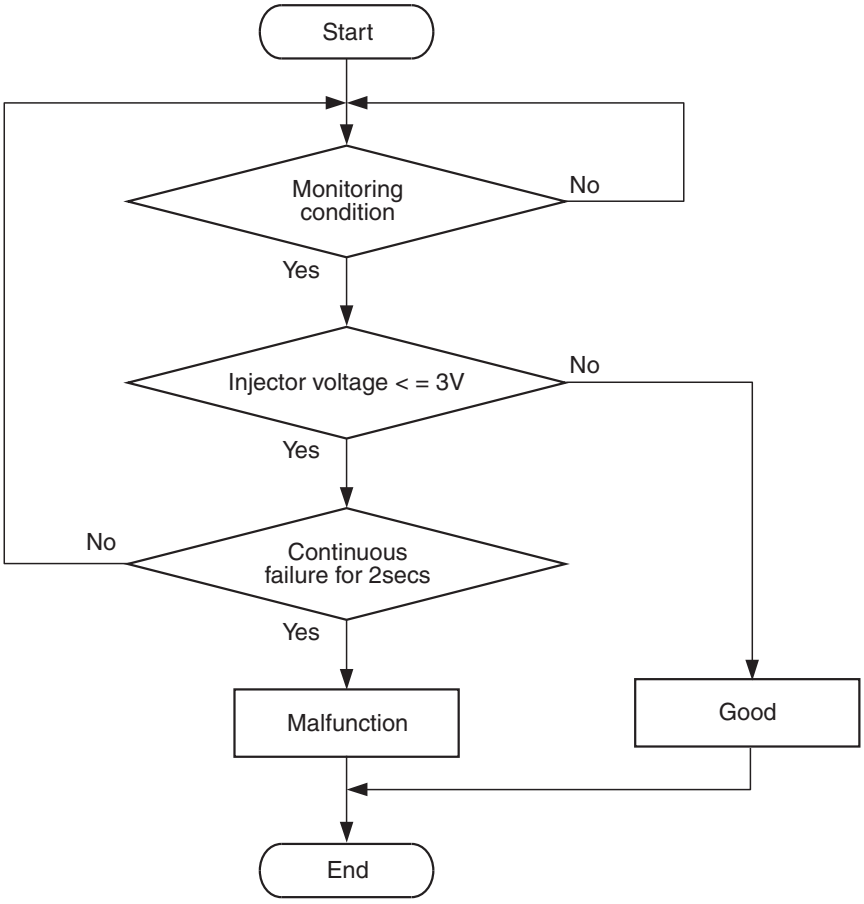
MONITOR EXECUTION CONDITIONS (Other monitor and Sensor)

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 <Circuit continuity –open circuit and shorted low>

Logic Flow Chart



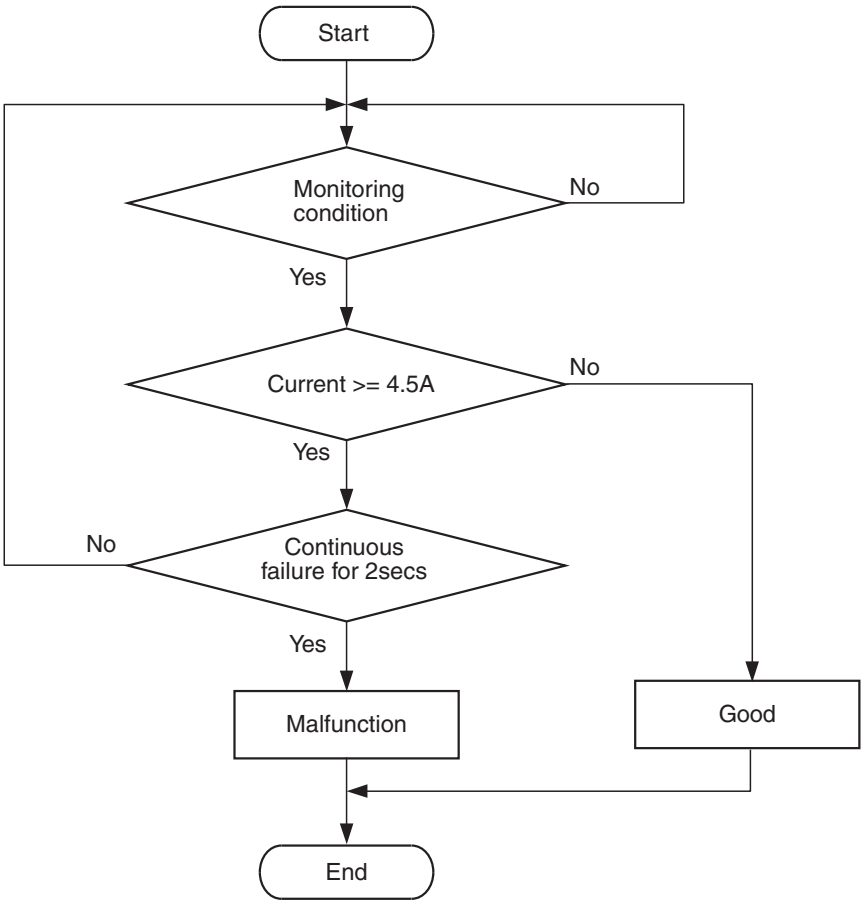
AK700479

Check Condition
- Engine is running.

Judgement Criterion
- The supply voltage is 3 volts or less without the injector driving for 2 seconds.

DTC SET CONDITIONS <Circuit continuity –shorted high>

Logic Flow Chart



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Check Condition

- Engine is running.

Judgement Criterion

- The coil current is 4.5 ampere or more with the injector driving for 2 seconds.

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

- No. 6 cylinder injector failed.
- Connector damage.
- Harness damage.
- ECM failed.

OBD-II DRIVE CYCLE PATTERN

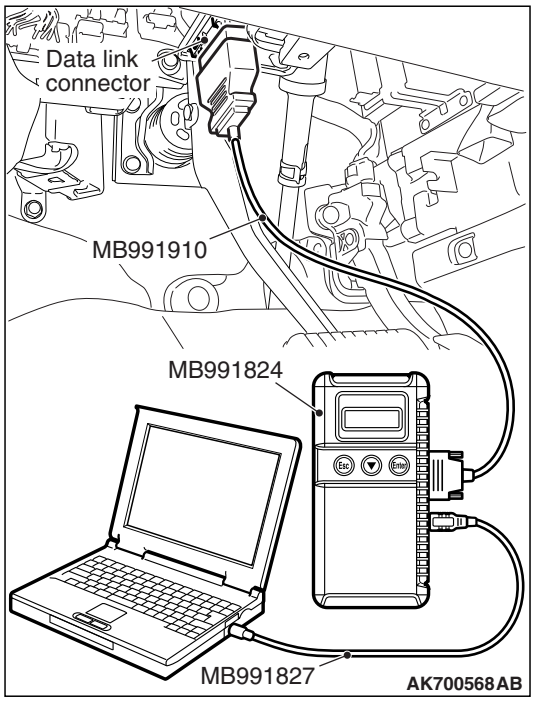
Refer to Diagnostic Function –OBD-II Drive Cycle – Pattern 22 P.13B-11.

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991910: Main Harness A
- MB991658: Test Harness
- MB992110: Power Plant ECU Check Harness

TSB Revision



STEP 1. Using scan tool MB991958, check actuator test item 1: No. 6 Injector.

⚠ CAUTION

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

(1) Connect scan tool MB991958 to the data link connector.
(2) Start the engine and run at idle.
(3) Set scan tool MB991958 to the actuator testing mode for item 1, No. 6 injector.
(4) Warm up the engine to normal operating temperature: 80° C to 95° C (176° F to 203° F).
- The idle should become slightly rougher.

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

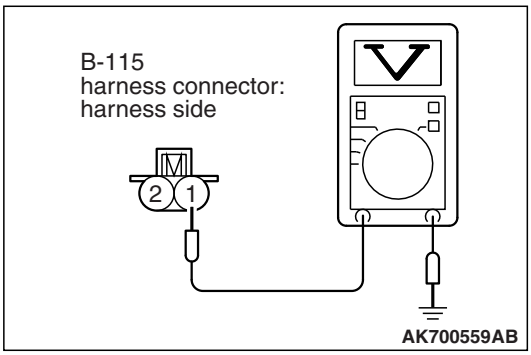
Q: Is the actuator operating properly?

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.00-15.
NO : Go to Step 2.

STEP 2. Check the for harness connector B-115 at No. 6 cylinder injector and B-10 at the ECM for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 3.
NO : Repair it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 7.



STEP 3. Measure the power supply voltage at the injector connector B-115.

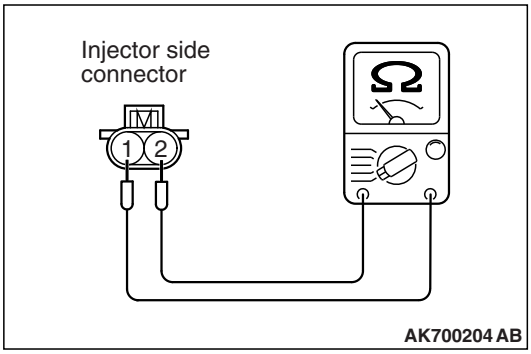
(1) Disconnect the injector connector B-115 (terminal No. 1) and measure at the harness side.
(2) Turn the ignition switch to the "ON" position.
(3) Measure the voltage between terminal No. 1 and ground.
- Voltage should be battery positive voltage.

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

Q: Is the measured resistance battery positive voltage?

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 injector relay connector A-24X (terminal No. 3) and injector connector B-115 (terminal No. 1) because of open circuit. Then go to Step 7.

TSB Revision



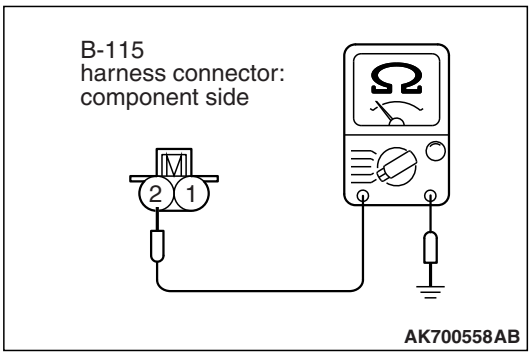
STEP 4. Check the No. 6 cylinder injector.

(1) Disconnect the No. 6 cylinder injector connector B-115.
(2) Measure the resistance between injector side connector terminal No. 1 and No. 2.

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

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

YES : Go to Step 5.
NO : Replace the No. 6 cylinder injector. Then go to Step 7.

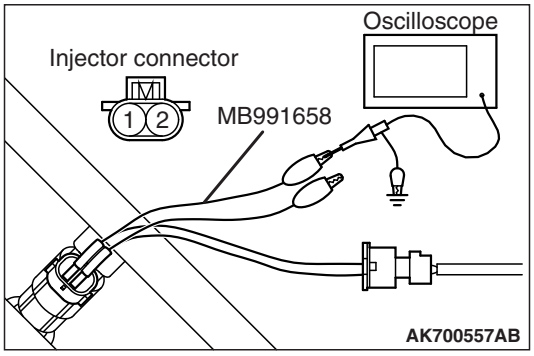


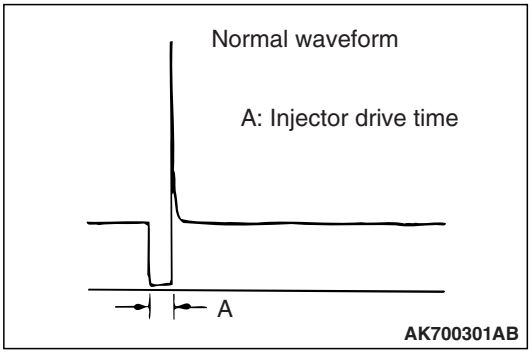
STEP 5. Check for harness between the injector connector B-115 and the ECM connector B-10.

(1) Disconnect the injector connector B-115 and the ECM connector B-10.
(2) Measure the resistance between injector connector B-115 (terminal No. 2) and the ECM connector B-10 (terminal No. 51).
  • Should be less than 2 ohms.
(3) Measure the continuity between the intermediate connector B-115 (terminal No. 2) and ground.
  • Not continuity.

Q: Is the connector wire in good condition?

YES : Go to Step 6.
NO : Repair it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 7.





STEP 6. Using the oscilloscope, check the No. 6 cylinder injector.

(1) Disconnect the No. 6 cylinder injector connector B-115 and connect the test harness special tool (MB991658) between the separated connectors. (All terminals should be connected)

(2) Connect the oscilloscope probe to the injector side connector terminal No. 2.

NOTE: When measuring with the ECM side connector, disconnect all ECM connectors. Connect the check harness special tool (MB992110) between the separated connectors. Then connect an oscilloscope probe to the check harness connector terminal No. 51.

(3) Start the engine and run at idle.

(4) Measure the waveform.
- The waveform should show a normal pattern similar to the illustration.

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

Q: Is the waveform normal?

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.00-15.

NO : Replace the ECM. When the ECM is replaced, register the ID code. Refer to GROUP 42B, Diagnosis –ID Codes Registration Judgment Table <Vehicles with KOS> P.42B-11 or GROUP 42C, Diagnosis –ID Codes Registration Judgment Table <Vehicles with WCM> P.42C-10. Then go to Step 7.

STEP 7. 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 22 P.13B-11.

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

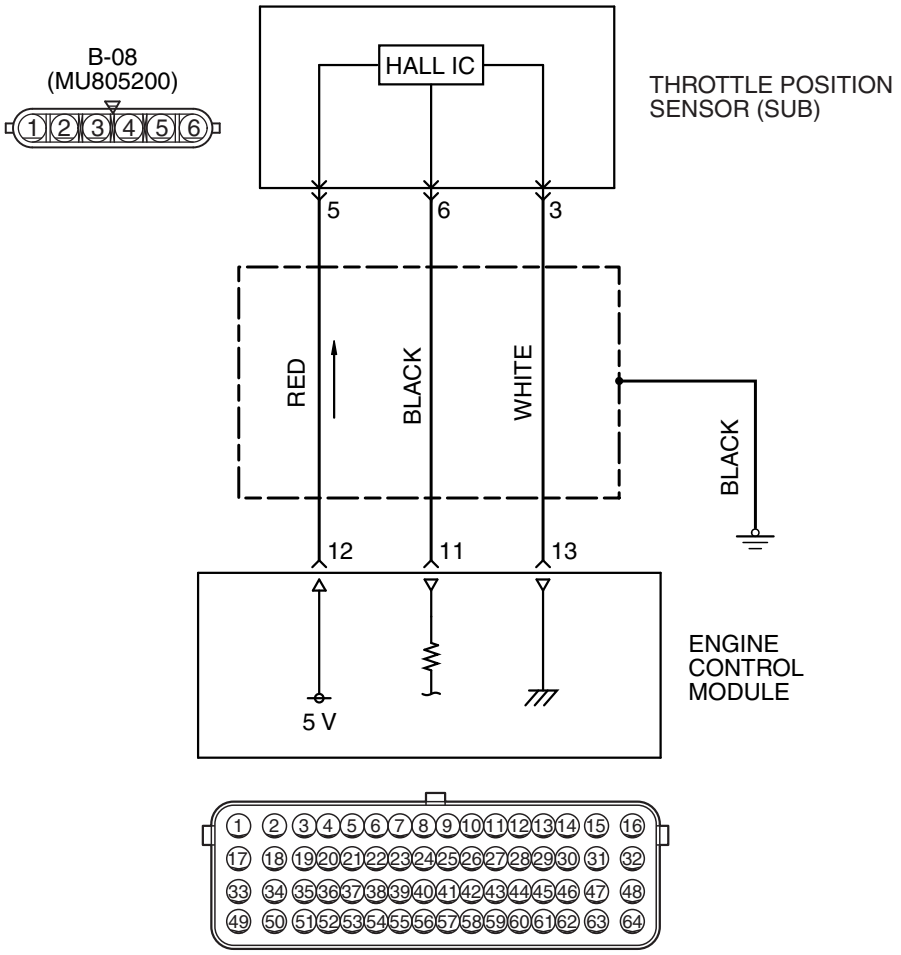
Q: Is DTC P0206 set?

YES : Retry the troubleshooting.

NO : The inspection is complete.

DTC P0222: Throttle Position Sensor (Sub) Circuit Low Input

THROTTLE POSITION SENSOR (SUB) CIRCUIT



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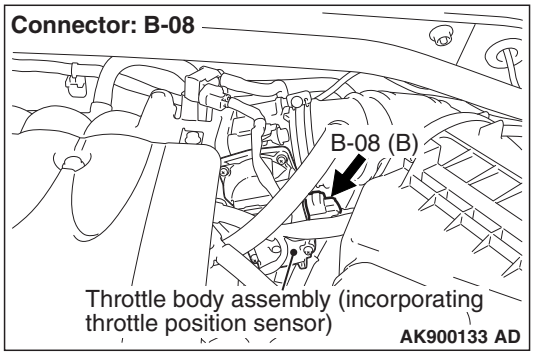
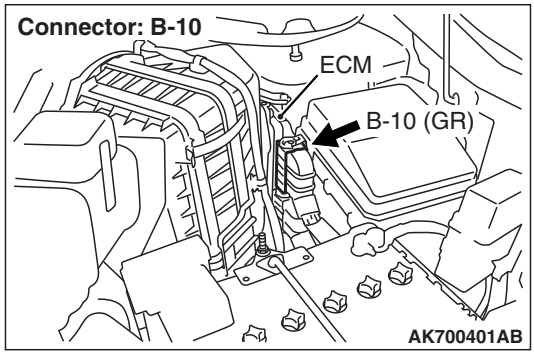




CIRCUIT OPERATION

- A 5-volt power supply is applied on the throttle position sensor (sub) power terminal (terminal No. 5) from the ECM (terminal No. 12).
- A voltage that is according to the throttle opening angle is sent to the ECM (terminal No. 11) from the throttle position sensor (sub) output terminal (terminal No. 6).

TSB Revision

- The ground terminal (terminal No. 3) is grounded with ECM (terminal No. 13).

TECHNICAL DESCRIPTION

- The throttle position sensor (sub) outputs voltage which corresponds to the throttle valve opening angle.
- The ECM checks whether the voltage is within a specified range.

DESCRIPTIONS OF MONITOR METHODS

Throttle position sensor (sub) output voltage is out of 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)

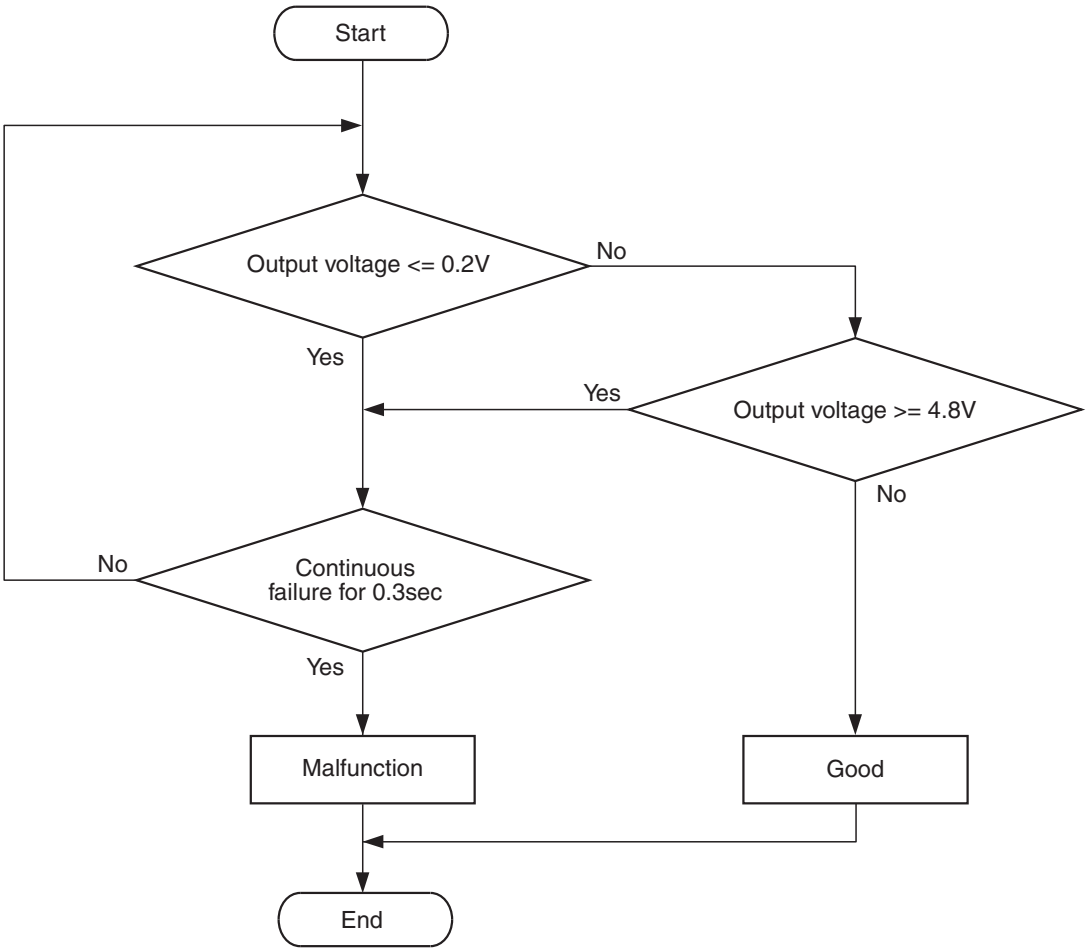
- Not applicable

Sensor (The sensor below is determined to be normal)

- Not applicable

DTC SET CONDITIONS

Logic Flow Chart



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TSB Revision

Check Condition
- Ignition switch is "ON" position.

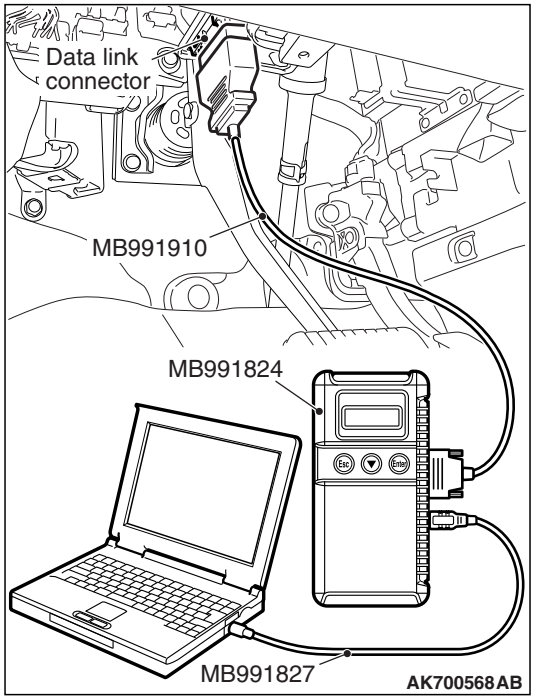
Judgement Criterion
- Throttle position sensor (sub) output voltage should be 0.2 volt or less for 0.3 second.

OBD-II DRIVE CYCLE PATTERN
None.

TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)
- Throttle position sensor failed.
- Connector damage
- Harness damage
- ECM 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
- MB991658: Test Harness



STEP 1. Using scan tool MB991958, check data list item 15: Throttle Position Sensor (sub).

⚠ 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) Detach the intake air hose at the throttle body.
(4) Disconnect the connector of the throttle position sensor.
(5) Use test harness special tool (MB991658) to connect only terminals No. 3, No. 4, No. 5, and No. 6.
(6) Set scan tool MB991958 to the data reading mode for item 15, Throttle Position Sensor (sub).
  - Output voltage should be 4.0 volts or more when the throttle valve is fully closed with your finger.
  - Output voltage should be 1.0 volt or less when the throttle valve is fully open with your finger.
(7) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the sensor operating properly?

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.00-15.

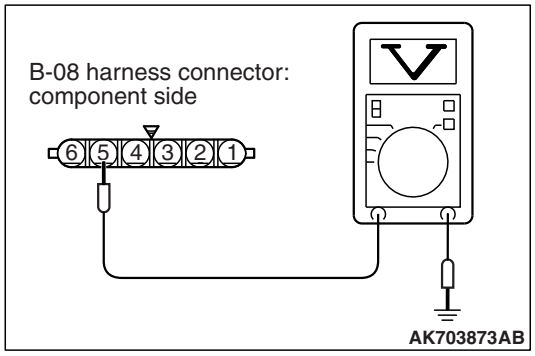
NO : Go to Step 2.

STEP 2. Check harness connector B-08 at the throttle position sensor and harness connector B-10 at the ECM for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 3.

NO : Repair it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 8.



STEP 3. Measure the sensor supply voltage at throttle position sensor harness side connector B-08.

(1) Disconnect the connector B-08 and measure at the harness side.
(2) Turn the ignition switch to the "ON" position.
(3) Measure the voltage between terminal No. 5 and ground
- Voltage should be between 4.9 and 5.1 volts.

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

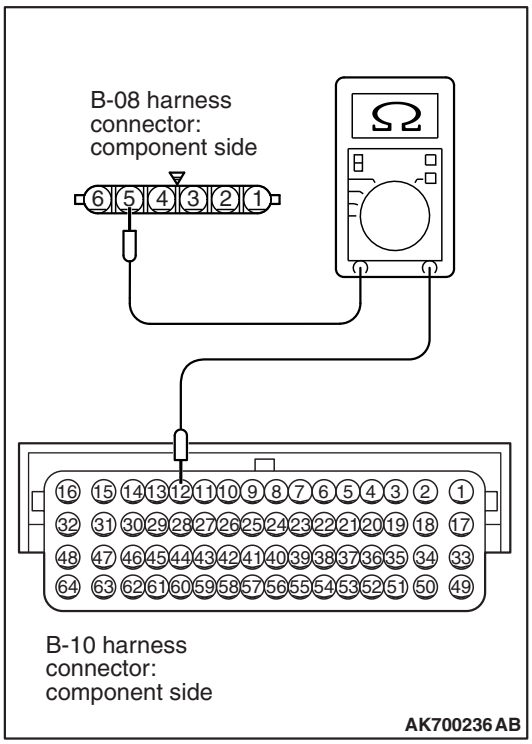
Q: Is the measured voltage between 4.9 and 5.1 volts?

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

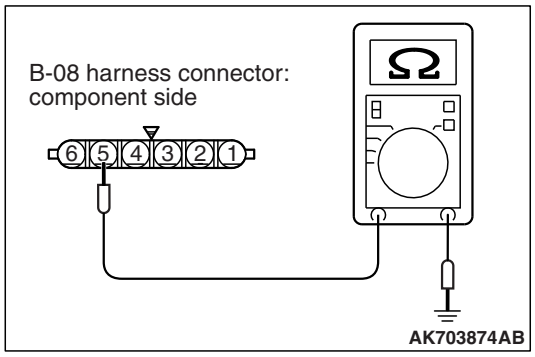
STEP 4. Check for open circuit and harness damage and short circuit to ground between the throttle position sensor connector B-08 and the ECM connector B-10.

(1) Disconnect the throttle position sensor connector B-08 and the ECM connector B-10.

(2) Measure the resistance between the throttle position sensor connector B-08 (terminal No. 5) and the ECM connector B-10 (terminal No. 12).
- Should be less than 2 ohms.



(3) Check for the continuity between the throttle position sensor connector B-08 (terminal No. 5) and ground.
- Not continuity.



Q: Is the harness wire in good condition?

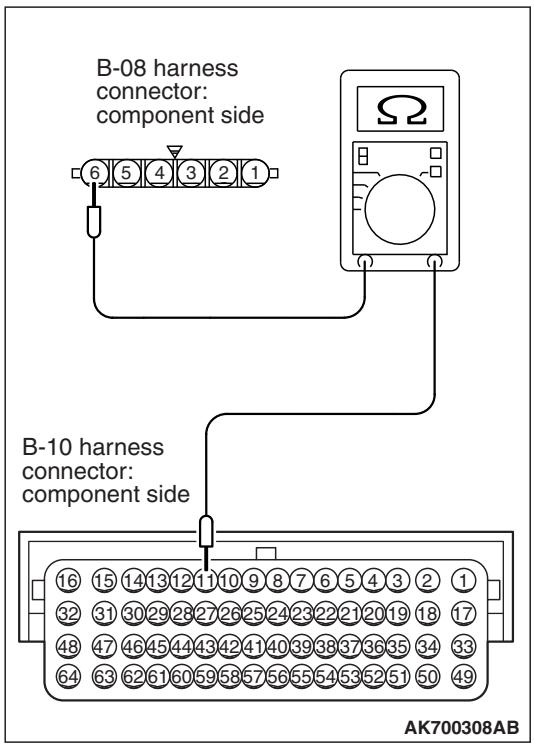
YES : Replace the ECM. When the ECM is replaced, register the ID code. Refer to GROUP 42B, Diagnosis –ID Codes Registration Judgment Table <Vehicles with KOS> P.42B-11 or GROUP 42C, Diagnosis –ID Codes Registration Judgment Table <Vehicles with WCM> P.42C-10. Then go to step 8.

NO : Repair it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 8.

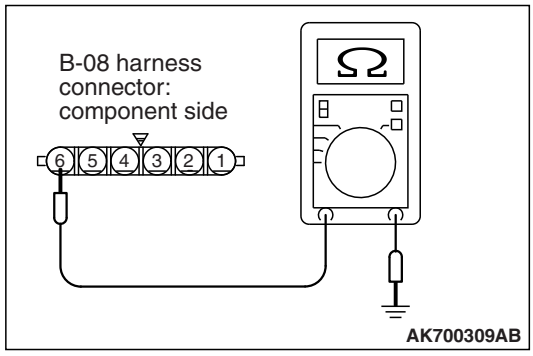
STEP 5. Check for open circuit and short circuit to ground and harness damage between the throttle position sensor connector B-08 and ECM connector B-10.

(1) Disconnect the throttle position sensor connector B-08 and the ECM connector B-10.

(2) Measure the resistance between the throttle position sensor connector B-08 (terminal No. 6) and the ECM connector B-10 (terminal No. 11).
- Should be less than 2 ohms.



(3) Check for the throttle position sensor connector B-08 (terminal No. 6) and ground.
- Not continuity.



Q: Is the harness wire in good condition?

YES : Go to Step 6.

NO : Repair it. Then go to Step 8.

STEP 6. Using scan tool MB991958, check data list item 15: Throttle Position Sensor (sub).

⚠ 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) Detach the intake air hose at the throttle body.
(4) Disconnect the connector of the throttle position sensor.
(5) Use test harness special tool (MB991658) to connect only terminals No. 3, No. 4, No. 5, and No. 6.
(6) Set scan tool MB991958 to the data reading mode for item 15, Throttle Position Sensor (sub).
- Output voltage should be 4.0 volts or more when the throttle valve is fully closed with your finger.
- Output voltage should be 1.0 volt or less when the throttle valve is fully open with your finger.

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

Q: Is the sensor operating properly?

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.00-15.

NO : Go to Step 7.

STEP 7. Replace the throttle body assembly.

(1) Replace the throttle body assembly.
(2) Turn the ignition switch to the "ON" position.
(3) After the DTC has been deleted, read the DTC again.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is DTC P0222 set?

YES : Replace the ECM. When the ECM is replaced, register the ID code. Refer to GROUP 42B, Diagnosis –ID Codes Registration Judgment Table <Vehicles with KOS> P.42B-11 or GROUP 42C, Diagnosis –ID Codes Registration Judgment Table <Vehicles with WCM> P.42C-10. Then go to Step 8.

NO : The inspection is complete.

STEP 8. 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.

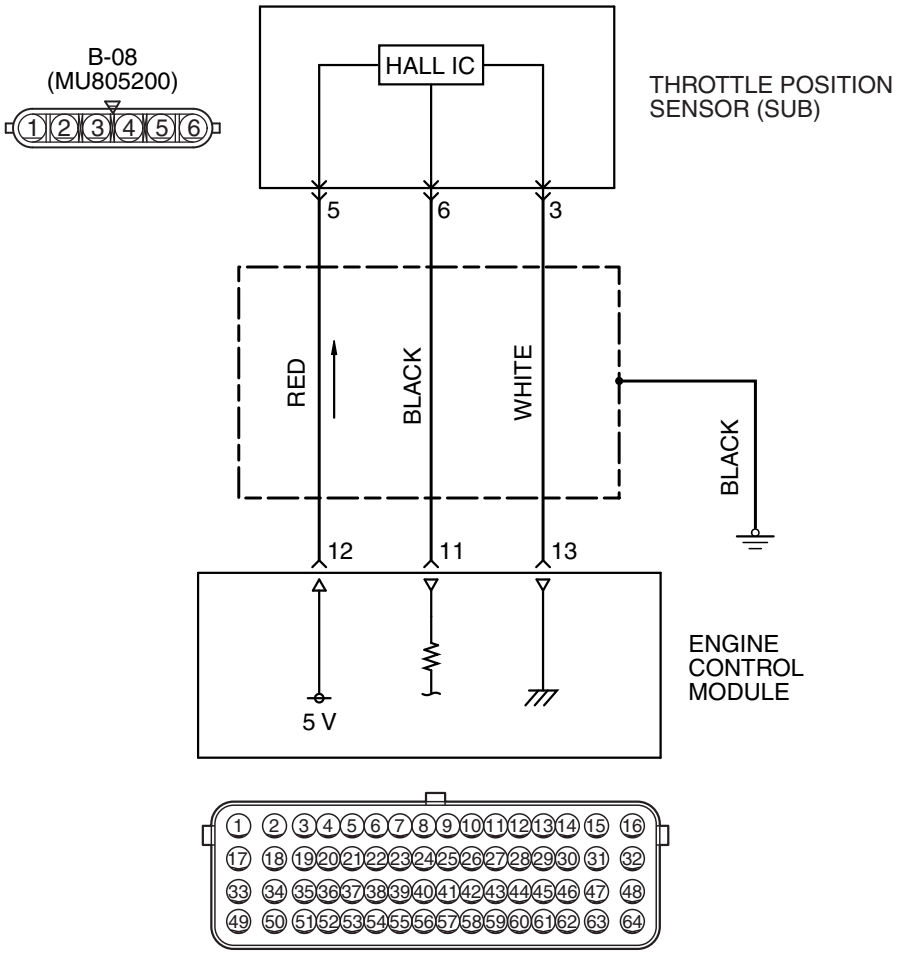
(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) After the DTC has been deleted, read the DTC again.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is DTC P0222 set?

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

DTC P0223: Throttle Position Sensor (Sub) Circuit High Input

THROTTLE POSITION SENSOR (SUB) CIRCUIT



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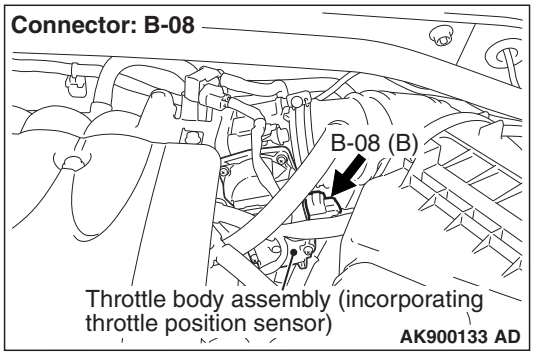
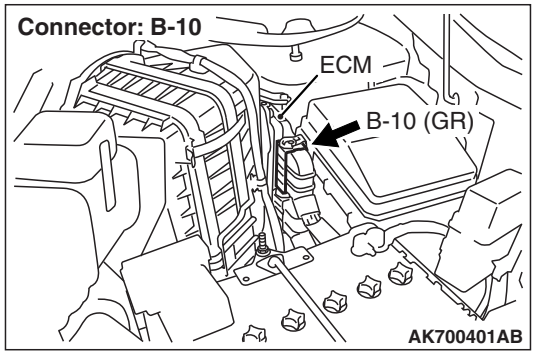




CIRCUIT OPERATION

- A 5-volt power supply is applied on the throttle position sensor (sub) power terminal (terminal No. 5) from the ECM (terminal No. 12).
- A voltage that is according to the throttle opening angle is sent to the ECM (terminal No. 11) from the throttle position sensor (sub) output terminal (terminal No. 6).

TSB Revision

- The ground terminal (terminal No. 3) is grounded with ECM (terminal No. 13).

TECHNICAL DESCRIPTION

- The throttle position sensor (sub) outputs voltage which corresponds to the throttle valve opening angle.
- The ECM checks whether the voltage is within a specified range.

DESCRIPTIONS OF MONITOR METHODS

Throttle position sensor (sub) output voltage is out of 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)

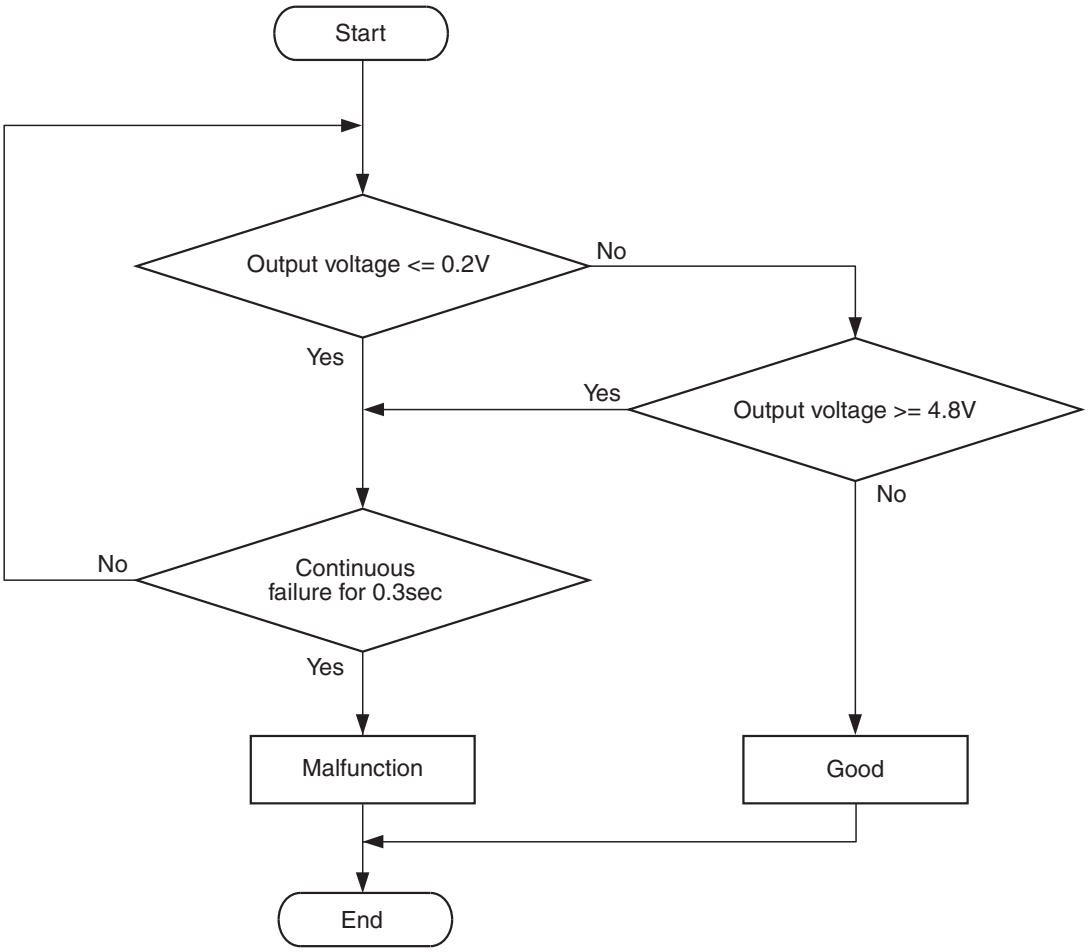
- Not applicable

Sensor (The sensor below is determined to be normal)

- Not applicable

DTC SET CONDITIONS

Logic Flow Chart



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TSB Revision

Check Condition
- Ignition switch is "ON" position.

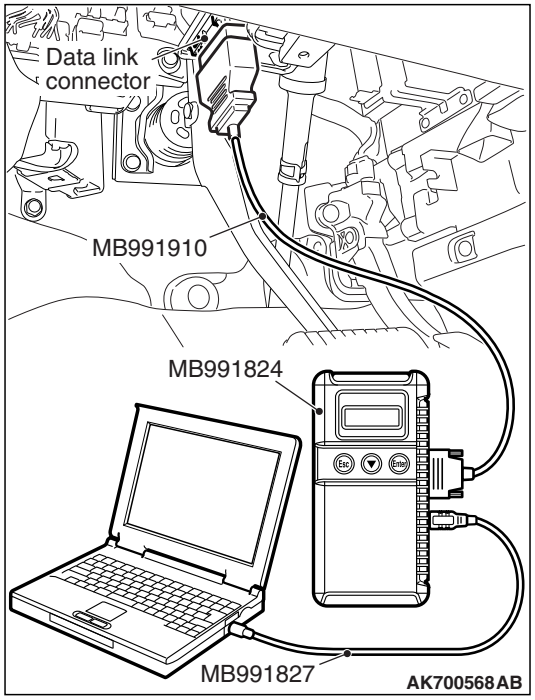
Judgement Criterion
- Throttle position sensor (sub) output voltage should be 4.8 volts or more for 0.3 second.

OBD-II DRIVE CYCLE PATTERN
None.

TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)
- Throttle position sensor failed.
- Harness damage
- Connector damage
- ECM 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
- MB991658: Test Harness



STEP 1. Using scan tool MB991958, check data list item 15: Throttle Position Sensor (sub).

⚠ 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) Detach the intake air hose at the throttle body.
(4) Disconnect the connector of the throttle position sensor.
(5) Use test harness special tool (MB991658) to connect only terminals No. 3, No. 4, No. 5, and No. 6.
(6) Set scan tool MB991958 to the data reading mode for item 15, Throttle Position Sensor (sub).
  - Output voltage should be 4.0 volts or more when the throttle valve is fully closed with your finger.
  - Output voltage should be 1.0 volt or less when the throttle valve is fully open with your finger.
(7) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the sensor operating properly?

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.00-15.

NO : Go to Step 2.

STEP 2. Check harness connector B-08 at the throttle position sensor and harness connector B-10 at the ECM for damage.

Q: Is the harness connector in good condition?

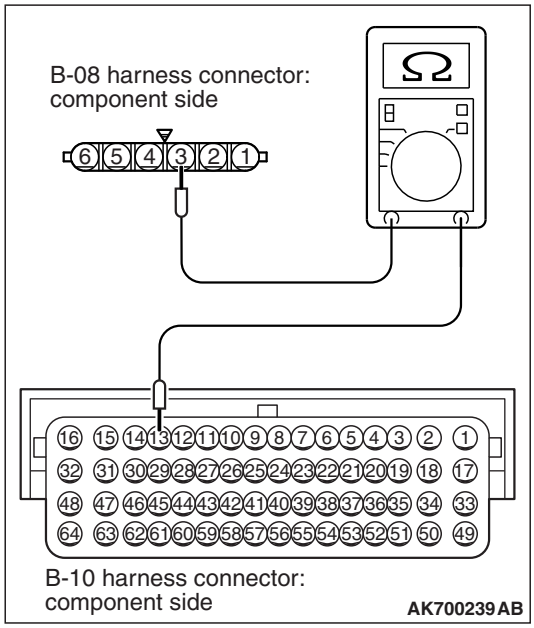
YES : Go to Step 3.

NO : Repair it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 6.

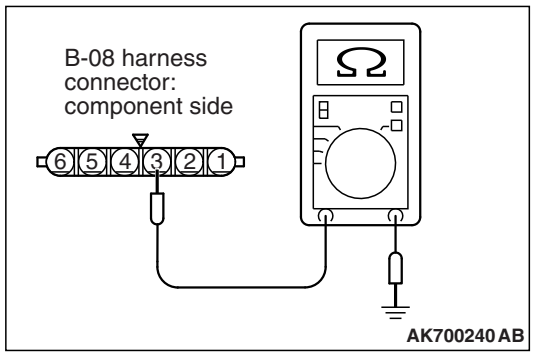
STEP 3. Check for open circuit and harness damage between the throttle position sensor connector B-08 and ECM connector B-10.

(1) Disconnect the throttle position sensor connector B-08 and the ECM connector B-10.

(2) Measure the resistance between the throttle position sensor connector B-08 (terminal No. 3) and the ECM connector B-10 (terminal No. 13).
- Should be less than 2 ohms.



(3) Check for the throttle position sensor connector B-08 (terminal No. 3) and ground.
- Not continuity.



Q: Is the harness wire in good condition?

YES : Go to Step 4.

NO : Repair it. Then go to Step 6.

STEP 4. Using scan tool MB991958, check data list item 15: Throttle Position Sensor (sub).

⚠ 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) Detach the intake air hose at the throttle body.
(4) Disconnect the connector of the throttle position sensor.
(5) Use test harness special tool (MB991658) to connect only terminals No. 3, No. 4, No. 5, and No. 6.
(6) Set scan tool MB991958 to the data reading mode for item 15, Throttle Position Sensor (sub).
- Output voltage should be 4.0 volts or more when the throttle valve is fully closed with your finger.
- Output voltage should be 1.0 volt or less when the throttle valve is fully open with your finger.

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

Q: Is the sensor operating properly?

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.00-15.

NO : Go to Step 5.

STEP 5. Replace the throttle body assembly.

(1) Replace the throttle body assembly.
(2) Turn the ignition switch to the "ON" position.
(3) After the DTC has been deleted, read the DTC again.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is DTC P0223 set?

YES : Replace the ECM. When the ECM is replaced, register the ID code. Refer to GROUP 42B, Diagnosis –ID Codes Registration Judgment Table <Vehicles with KOS> P.42B-11 or GROUP 42C, Diagnosis –ID Codes Registration Judgment Table <Vehicles with WCM> P.42C-10. Then go to Step 6.

NO : The inspection is complete.

STEP 6. 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) After the DTC has been deleted, read the DTC again.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is DTC P0223 set?

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

DTC P0300: Random/Multiple Cylinder Misfire Detected

TECHNICAL DESCRIPTION

- If a misfire occurs while the engine is running, the engine speed changes for an instant.
- The ECM checks for such changes in engine speed.

DESCRIPTIONS OF MONITOR METHODS

Monitor angular acceleration of crankshaft and detect malfunction when negative variation of the angular acceleration is large.

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)

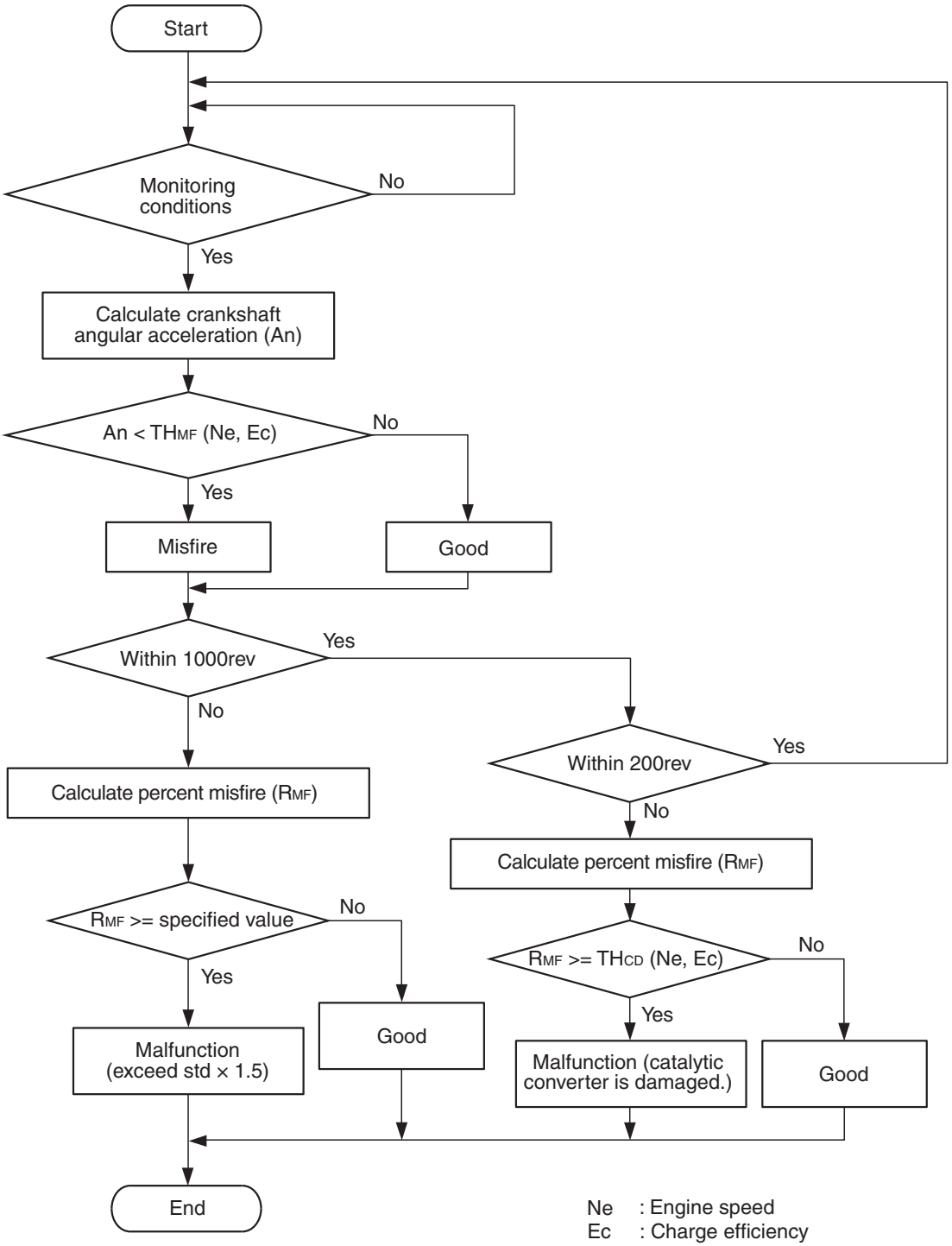
- Not applicable

Sensor (The sensor below is determined to be normal)

- Camshaft position sensor
- Mass airflow sensor
- Engine coolant temperature sensor
- Intake air temperature sensor
- Barometric pressure sensor
- Throttle position sensor

DTC SET CONDITIONS

Logic Flow Chart



Ne : Engine speed
Ec : Charge efficiency
TH_{MF} : Threshold value for misfire
TH_{CD} : Threshold value for catalyst damage

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TSB Revision

Check Conditions
- Engine speed is between 438 and 6,500 r/min.
- Engine coolant temperature is higher than −10° C (14° F).
- Barometric pressure is higher than 76 kPa (22.4 in.Hg).
- The engine load is with in the positive torque load.
- Adaptive learning is complete for the vane which generates a crankshaft position signal.
- While the engine is running, excluding sudden acceleration/deceleration and fuel shut-off operation.

Judgement Criterion (change in the angular acceleration of the crankshaft is used for misfire detection).
- Misfire has occurred more frequently than allowed during the last 200 revolutions [when the catalyst temperature is higher than 1,000° C (1,832° F)].

or
- The occurrence rate of engine misfiring within the 1,000 engine revolutions is more than 1.7 % <Except for California> or 1.8 % <California>.

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function –OBD-II Drive Cycle – Pattern 15 P.13B-11.

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

- Ignition system related part(s) failed.
- Poor crankshaft position sensor.
- Incorrect air/fuel ratio.
- Spark plug failed.
- Low compression pressure.
- Skipping of timing belt teeth.
- EGR valve (stopper motor) failed.
- ECM 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
- MB992110: Power Plant ECU Check Harness

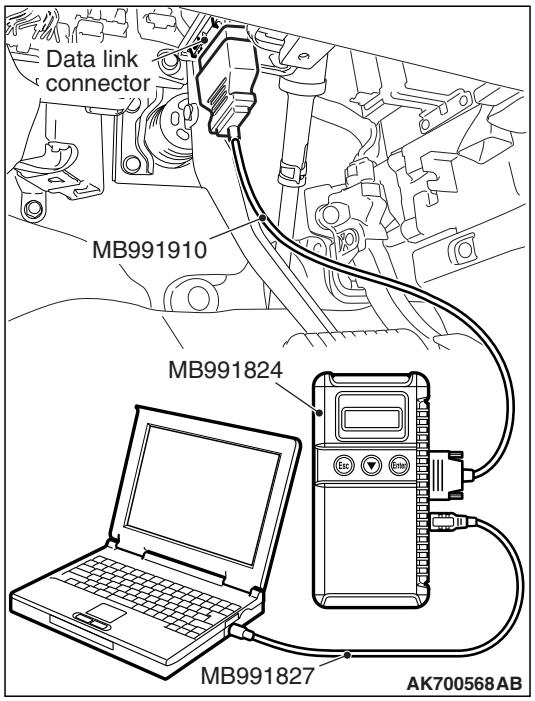
STEP 1. Check the EGR system

Refer to GROUP 17, Emission Control –Exhaust Gas Recirculation (EGR) System –General Information (Exhaust Gas Recirculation System) P.17-81.

Q: Are there any abnormalities?

YES : Replace the EGR valve (stopper motor). Then go to Step 9.

NO : Go to Step 2.



STEP 2. Using scan tool MB991958, check data list item 2: Crankshaft Position 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) Set scan tool MB991958 to the data reading mode for item 2, Crankshaft Position Sensor.
(4) Check the waveform of the crankshaft position sensor while keeping the engine speed constant.
- The pulse width should be constant.

Q: Is the sensor operating properly?

YES : Go to Step 3.
NO : Refer to DTC P0335 –Crankshaft Position Sensor Circuit P.13B-424.

STEP 3. Using scan tool MB991958, check data list item 26 <bank 1> and 27 <bank2>: Long-Term Fuel Trim.

(1) Start the engine and run at idle.
(2) Set scan tool MB991958 to the data reading mode for item 26<bank 1> and 27 <bank2>, Long-Term Fuel Trim.
- The fuel trim should be between –12.5 and +12.5 percent when the engine is 2,500 r/min (during closed loop) after the engine is warmed.

Q: Is the specification normal?

YES : Go to Step 4.
NO : Refer to DTC P0171 –System too Lean (bank 1) P.13B-286, DTC P0172 –System too Rich (bank 1) P.13B-294, DTC P0174 –System too Lean (bank 2) P.13B-299, DTC P0175 –System too Rich (bank 2) P.13B-306.

STEP 4. Using scan tool MB991958, check data list item 28 <bank 1> and 29 <bank2>: Short-Term Fuel Trim.

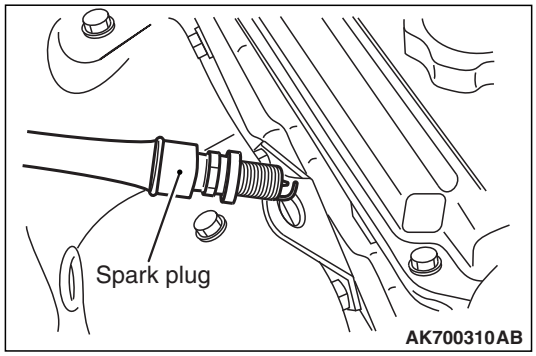
(1) Start the engine and run at idle.
(2) Set scan tool MB991958 to the data reading mode for item 28<bank 1> and 29 <bank2>, Short-Term Fuel Trim.
- The fuel trim should be between −7.4 and 7.4 percent when the engine is 2,500 r/min (during closed loop) after the engine is warmed.

Q: Is the specification normal?

YES : Go to Step 5.
NO : Refer to DTC P0171 −System too Lean (bank 1) P.13B-286, DTC P0172 −System too Rich (bank 1) P.13B-294, DTC P0174 −System too Lean (bank 2) P.13B-299, DTC P0175 −System too Rich (bank 2) P.13B-306.

STEP 5. Check the each ignition coil spark.

(1) Remove the intake manifold.
(2) Remove the ignition coil.
(3) Remove the spark plug and connect to the ignition coil.
(4) Ground the spark plug side electrode securely.
- When the engine is cranked, the spark plug should spark.



Q: Did it spark?

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

STEP 6. Check the spark plugs.

Refer to GROUP 16, Ignition System −On-vehicle Service − Spark Plug Check And Cleaning P.16-44.

Q: Is the spark plug normal?

YES : Refer to INSPECTION PROCEDURE 24 −Ignition Circuit System P.13B-812.
NO : Replace the faulty spark plug. Then go to Step 9.

STEP 7. Check the following items.

(1) Check the following items, and repair or replace the defective component.
a. Check for skipped timing belt teeth.
b. Check compression.
c. EGR valve failed.

Q: Are there any abnormalities?

YES : Repair it. Then go to Step 9.
NO : Go to Step 8.

STEP 8. Check the trouble symptoms.

(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle –Pattern 15 P.13B-11.

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

Q: Is DTC P0300 set?

YES : Replace the ECM. When the ECM is replaced, register the ID code. Refer to GROUP 42B, Diagnosis –ID Codes Registration Judgment Table <Vehicles with KOS> P.42B-11 or GROUP 42C, Diagnosis –ID Codes Registration Judgment Table <Vehicles with WCM> P.42C-10. Then go to Step 9.

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.00-15.

STEP 9. 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 15 P.13B-11.

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

Q: Is DTC P0300 set?

YES : Retry the troubleshooting.

NO : The inspection is complete.

DTC P0301: Cylinder 1 Misfire Detected

TECHNICAL DESCRIPTION

- If a misfire occurs while the engine is running, the engine speed changes for an instant.
- The ECM checks for such changes in engine speed.

DESCRIPTIONS OF MONITOR METHODS

Monitor angular acceleration of crankshaft and detect malfunction when negative variation of the angular acceleration is large.

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)

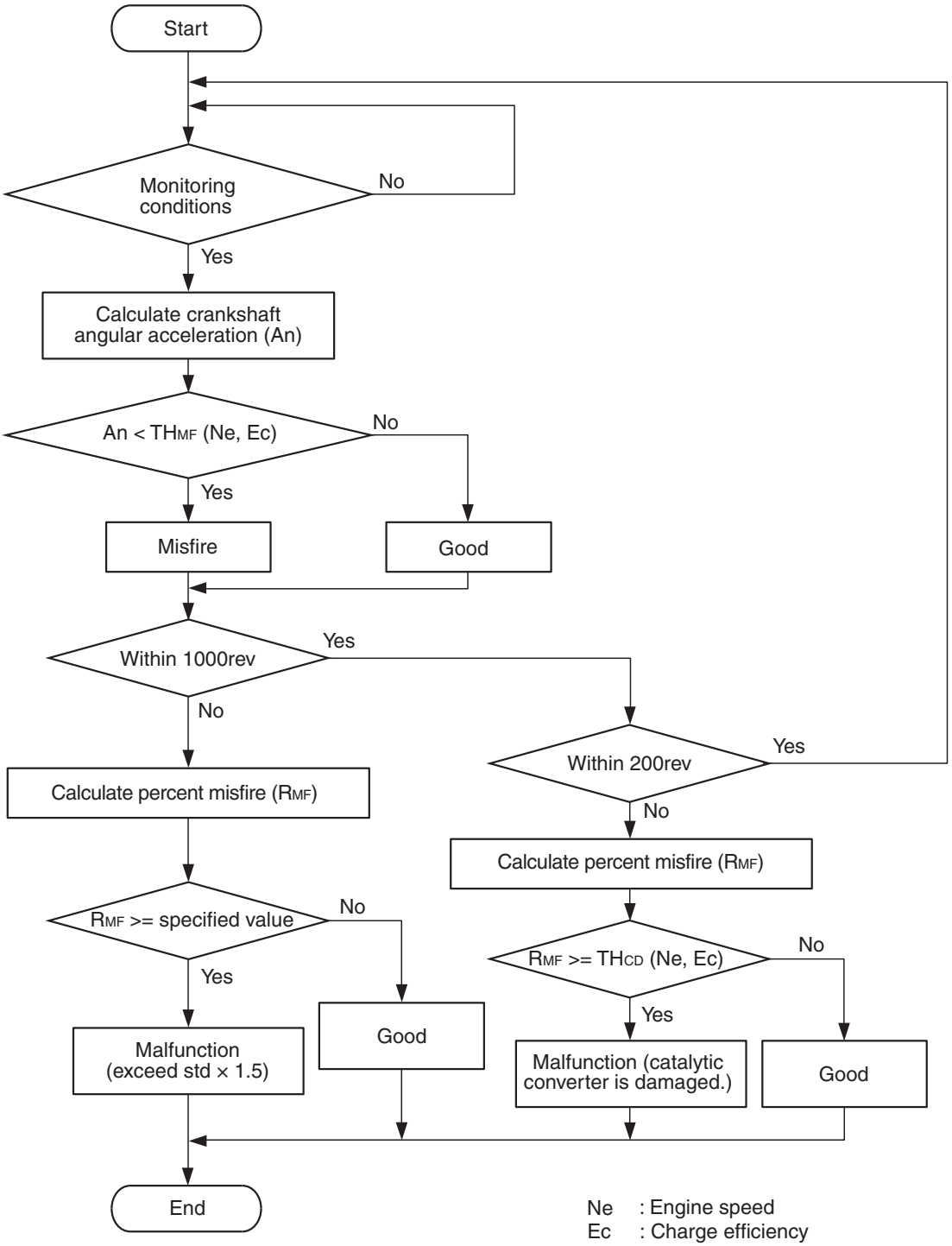
- Not applicable

Sensor (The sensor below is determined to be normal)

- Camshaft position sensor
- Mass airflow sensor
- Engine coolant temperature sensor
- Intake air temperature sensor
- Barometric pressure sensor
- Throttle position sensor

DTC SET CONDITIONS

Logic Flow Chart



Ne : Engine speed
Ec : Charge efficiency
TH_{MF} : Threshold value for misfire
TH_{CD} : Threshold value for catalyst damage

AK800585

TSB Revision

Check Conditions

- Engine speed is between 438 and 6,500 r/min.
- Engine coolant temperature is higher than −10° C (14° F).
- Barometric pressure is higher than 76 kPa (22.4 in.Hg).
- The engine load is with in the positive torque load.
- Adaptive learning is complete for the vane which generates a crankshaft position signal.
- While the engine is running, excluding sudden acceleration/deceleration and fuel shut-off operation.

Judgement Criterion (change in the angular acceleration of the crankshaft is used for misfire detection).

- Misfire has occurred more frequently than allowed during the last 200 revolutions [when the catalyst temperature is higher than 1,000° C (1,832° F)].

or

- The occurrence rate of engine misfiring within the 1,000 engine revolutions is more than 1.7 % <Except for California> or 1.8 % <California>.

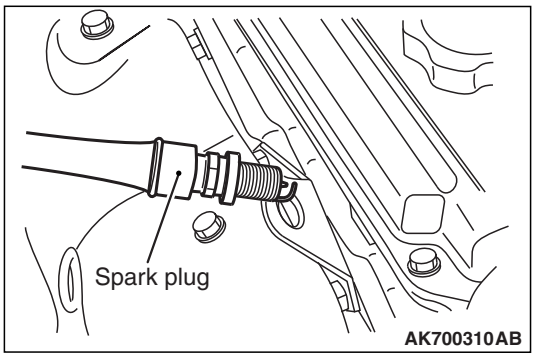
OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function –OBD-II Drive Cycle – Pattern 15 P.13B-11.

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

- Spark plug failed.
- Ignition system related part(s) failed.
- Low compression pressure.
- ECM failed.

DIAGNOSIS



STEP 1. Check the No. 1 cylinder ignition coil spark.

(1) Remove the intake manifold.
(2) Remove the No. 1 cylinder ignition coil.
(3) Remove the spark plug and connect to the No.1 cylinder ignition coil.
(4) Ground the spark plug side electrode securely.
    - When the engine is cranked, the spark plug should spark.

Q: Did it spark?

YES : Go to Step 3.
NO : Go to Step 2.

STEP 2. Check the No. 1 cylinder spark plugs.

Refer to GROUP 16, Ignition System –On-vehicle Service – Spark Plug Check And Cleaning P.16-44.

Q: Is the spark plug normal?

YES : Refer to INSPECTION PROCEDURE 24 –Ignition Circuit System P.13B-812.
NO : Replace the No. 1 cylinder spark plug. Then go to Step 5.

STEP 3. Check the compression.

Refer to GROUP 11C, On-vehicle Service –Compression Pressure Check P.11C-18.

Q: Are there any abnormalities?

YES : Replace it. Then go to Step 5.
NO : Go to Step 4.

TSB Revision

STEP 4. Check the trouble symptoms.

(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle –Pattern 15 P.13B-11.

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

Q: Is DTC P0301 set?

YES : Replace the ECM. When the ECM is replaced, register the ID code. Refer to GROUP 42B, Diagnosis –ID Codes Registration Judgment Table <Vehicles with KOS> P.42B-11 or GROUP 42C, Diagnosis –ID Codes Registration Judgment Table <Vehicles with WCM> P.42C-10. Then go to Step 5.

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.00-15.

STEP 5. 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 15 P.13B-11.

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

Q: Is DTC P0301 set?

YES : Retry the troubleshooting.

NO : The inspection is complete.

DTC P0302: Cylinder 2 Misfire Detected

TECHNICAL DESCRIPTION

- If a misfire occurs while the engine is running, the engine speed changes for an instant.
- The ECM checks for such changes in engine speed.

DESCRIPTIONS OF MONITOR METHODS

Monitor angular acceleration of crankshaft and detect malfunction when negative variation of the angular acceleration is large.

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)

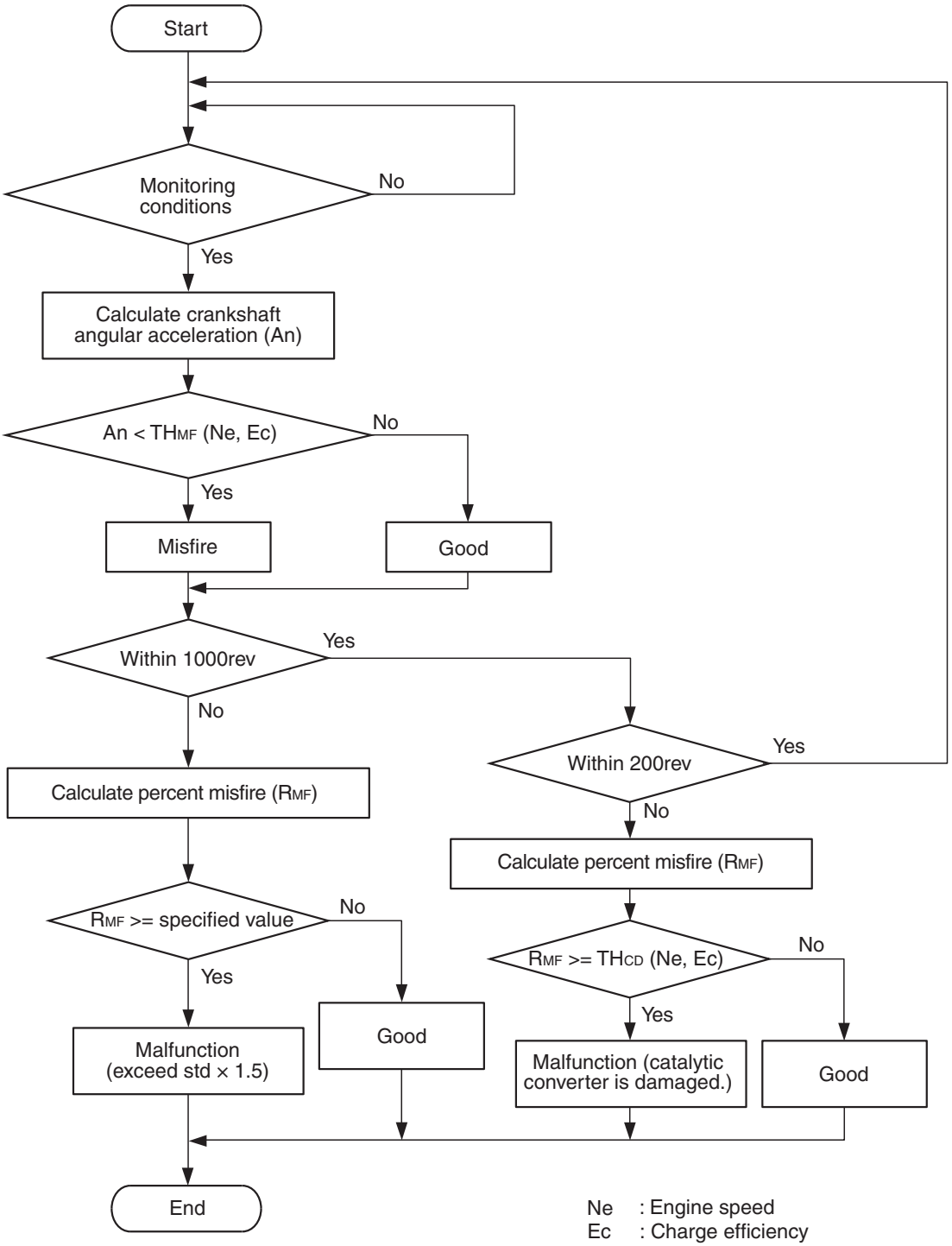
- Not applicable

Sensor (The sensor below is determined to be normal)

- Camshaft position sensor
- Mass airflow sensor
- Engine coolant temperature sensor
- Intake air temperature sensor
- Barometric pressure sensor
- Throttle position sensor

DTC SET CONDITIONS

Logic Flow Chart



Ne : Engine speed
Ec : Charge efficiency
TH_{MF} : Threshold value for misfire
TH_{CD} : Threshold value for catalyst damage

AK800585

TSB Revision

Check Conditions

- Engine speed is between 438 and 6,500 r/min.
- Engine coolant temperature is higher than −10° C (14° F).
- Barometric pressure is higher than 76 kPa (22.4 in.Hg).
- The engine load is with in the positive torque load.
- Adaptive learning is complete for the vane which generates a crankshaft position signal.
- While the engine is running, excluding sudden acceleration/deceleration and fuel shut-off operation.

Judgement Criterion (change in the angular acceleration of the crankshaft is used for misfire detection).

- Misfire has occurred more frequently than allowed during the last 200 revolutions [when the catalyst temperature is higher than 1,000° C (1,832° F)].

or

- The occurrence rate of engine misfiring within the 1,000 engine revolutions is more than 1.7 % <Except for California> or 1.8 % <California>.

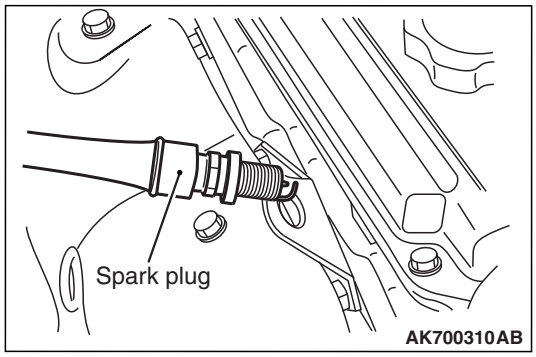
OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function –OBD-II Drive Cycle – Pattern 15 P.13B-11.

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

- Spark plug failed.
- Ignition system related part(s) failed.
- Low compression pressure.
- ECM failed.

DIAGNOSIS



STEP 1. Check the No. 2 cylinder ignition coil spark.

(1) Remove the No. 2 cylinder ignition coil.
(2) Remove the No. 2 cylinder spark plug and connect to the ignition coil.
(3) Ground the No. 2 cylinder spark plug side electrode securely.
  - When the engine is cranked, the spark plug should spark.

Q: Did it spark?

YES : Go to Step 3.
NO : Go to Step 2.

STEP 2. Check the No. 2 cylinder spark plugs.

Refer to GROUP 16, Ignition System –On-vehicle Service – Spark Plug Check And Cleaning P.16-44.

Q: Is the spark plug normal?

YES : Refer to INSPECTION PROCEDURE 24 –Ignition Circuit System P.13B-812.
NO : Replace the No. 2 cylinder spark plug. Then go to Step 5.

STEP 3. Check the compression.

Refer to GROUP 11C, On-vehicle Service –Compression Pressure Check P.11C-18.

Q: Are there any abnormalities?

YES : Replace it. Then go to Step 5.
NO : Go to Step 4.

TSB Revision

STEP 4. Check the trouble symptoms.

(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle –Pattern 15 P.13B-11.

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

Q: Is DTC P0302 set?

YES : Replace the ECM. When the ECM is replaced, register the ID code. Refer to GROUP 42B, Diagnosis –ID Codes Registration Judgment Table <Vehicles with KOS> P.42B-11 or GROUP 42C, Diagnosis –ID Codes Registration Judgment Table <Vehicles with WCM> P.42C-10. Then go to Step 5.

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.00-15.

STEP 5. 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 15 P.13B-11.

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

Q: Is DTC P0302 set?

YES : Retry the troubleshooting.

NO : The inspection is complete.

DTC P0303: Cylinder 3 Misfire Detected

TECHNICAL DESCRIPTION

- If a misfire occurs while the engine is running, the engine speed changes for an instant.
- The ECM checks for such changes in engine speed.

DESCRIPTIONS OF MONITOR METHODS

Monitor angular acceleration of crankshaft and detect malfunction when negative variation of the angular acceleration is large.

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)

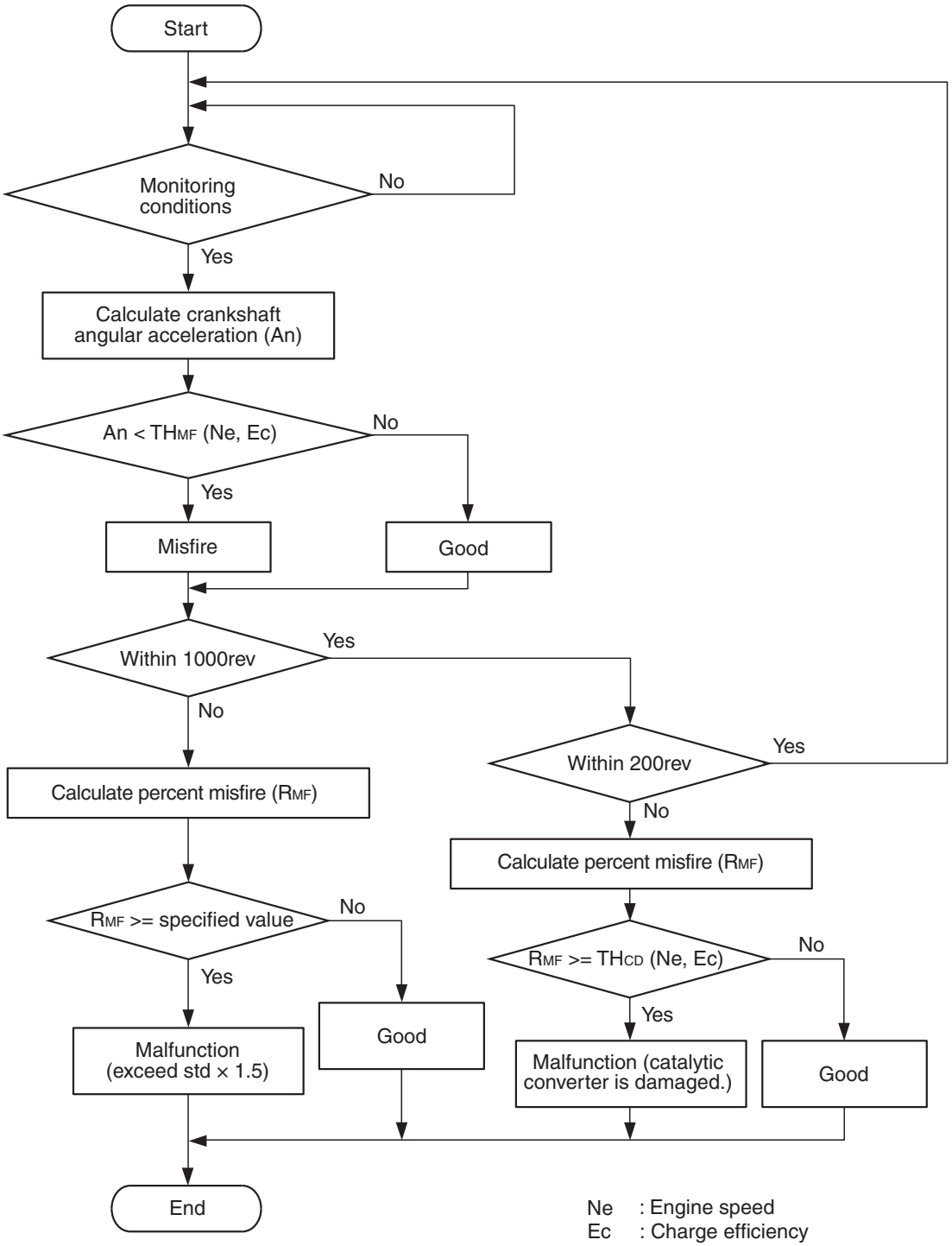
- Not applicable

Sensor (The sensor below is determined to be normal)

- Camshaft position sensor
- Mass airflow sensor
- Engine coolant temperature sensor
- Intake air temperature sensor
- Barometric pressure sensor
- Throttle position sensor

DTC SET CONDITIONS

Logic Flow Chart



Ne : Engine speed
Ec : Charge efficiency
THMF : Threshold value for misfire
THCD : Threshold value for catalyst damage

AK800585

TSB Revision

Check Conditions

- Engine speed is between 438 and 6,500 r/min.
- Engine coolant temperature is higher than −10° C (14° F).
- Barometric pressure is higher than 76 kPa (22.4 in.Hg).
- The engine load is with in the positive torque load.
- Adaptive learning is complete for the vane which generates a crankshaft position signal.
- While the engine is running, excluding sudden acceleration/deceleration and fuel shut-off operation.

Judgement Criterion (change in the angular acceleration of the crankshaft is used for misfire detection).

- Misfire has occurred more frequently than allowed during the last 200 revolutions [when the catalyst temperature is higher than 1,000° C (1,832° F)].

or

- The occurrence rate of engine misfiring within the 1,000 engine revolutions is more than 1.7 % <Except for California> or 1.8 % <California>.

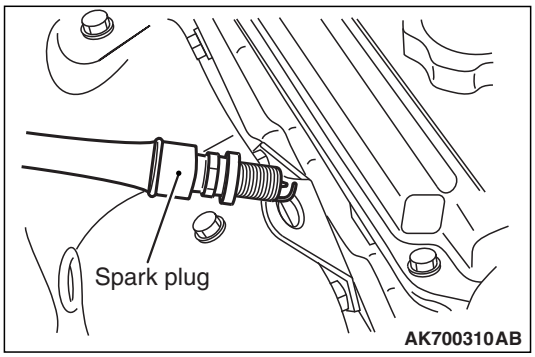
OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function –OBD-II Drive Cycle – Pattern 15 P.13B-11.

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

- Spark plug failed.
- Ignition system related part(s) failed.
- Low compression pressure.
- ECM failed.

DIAGNOSIS



STEP 1. Check the No. 3 cylinder ignition coil spark.

(1) Remove the intake manifold.
(2) Remove the No. 3 cylinder ignition coil.
(3) Remove the spark plug and connect to the No.3 cylinder ignition coil.
(4) Ground the spark plug side electrode securely.
    - When the engine is cranked, the spark plug should spark.

Q: Did it spark?

YES : Go to Step 3.
NO : Go to Step 2.

STEP 2. Check the No. 3 cylinder spark plugs.

Refer to GROUP 16, Ignition System –On-vehicle Service – Spark Plug Check And Cleaning P.16-44.

Q: Is the spark plug normal?

YES : Refer to INSPECTION PROCEDURE 24 –Ignition Circuit System P.13B-812.
NO : Replace the No. 3 cylinder spark plug. Then go to Step 5.

STEP 3. Check the compression.

Refer to GROUP 11C, On-vehicle Service –Compression Pressure Check P.11C-18.

Q: Are there any abnormalities?

YES : Replace it. Then go to Step 5.
NO : Go to Step 4.

TSB Revision

STEP 4. Check the trouble symptoms.

(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle –Pattern 15 P.13B-11.

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

Q: Is DTC P0302 set?

YES : Replace the ECM. When the ECM is replaced, register the ID code. Refer to GROUP 42B, Diagnosis –ID Codes Registration Judgment Table <Vehicles with KOS> P.42B-11 or GROUP 42C, Diagnosis –ID Codes Registration Judgment Table <Vehicles with WCM> P.42C-10. Then go to Step 5.

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.00-15.

STEP 5. 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 15 P.13B-11.

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

Q: Is DTC P0303 set?

YES : Retry the troubleshooting.

NO : The inspection is complete.

DTC P0304: Cylinder 4 Misfire Detected

TECHNICAL DESCRIPTION

- If a misfire occurs while the engine is running, the engine speed changes for an instant.
- The ECM checks for such changes in engine speed.

DESCRIPTIONS OF MONITOR METHODS

Monitor angular acceleration of crankshaft and detect malfunction when negative variation of the angular acceleration is large.

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)

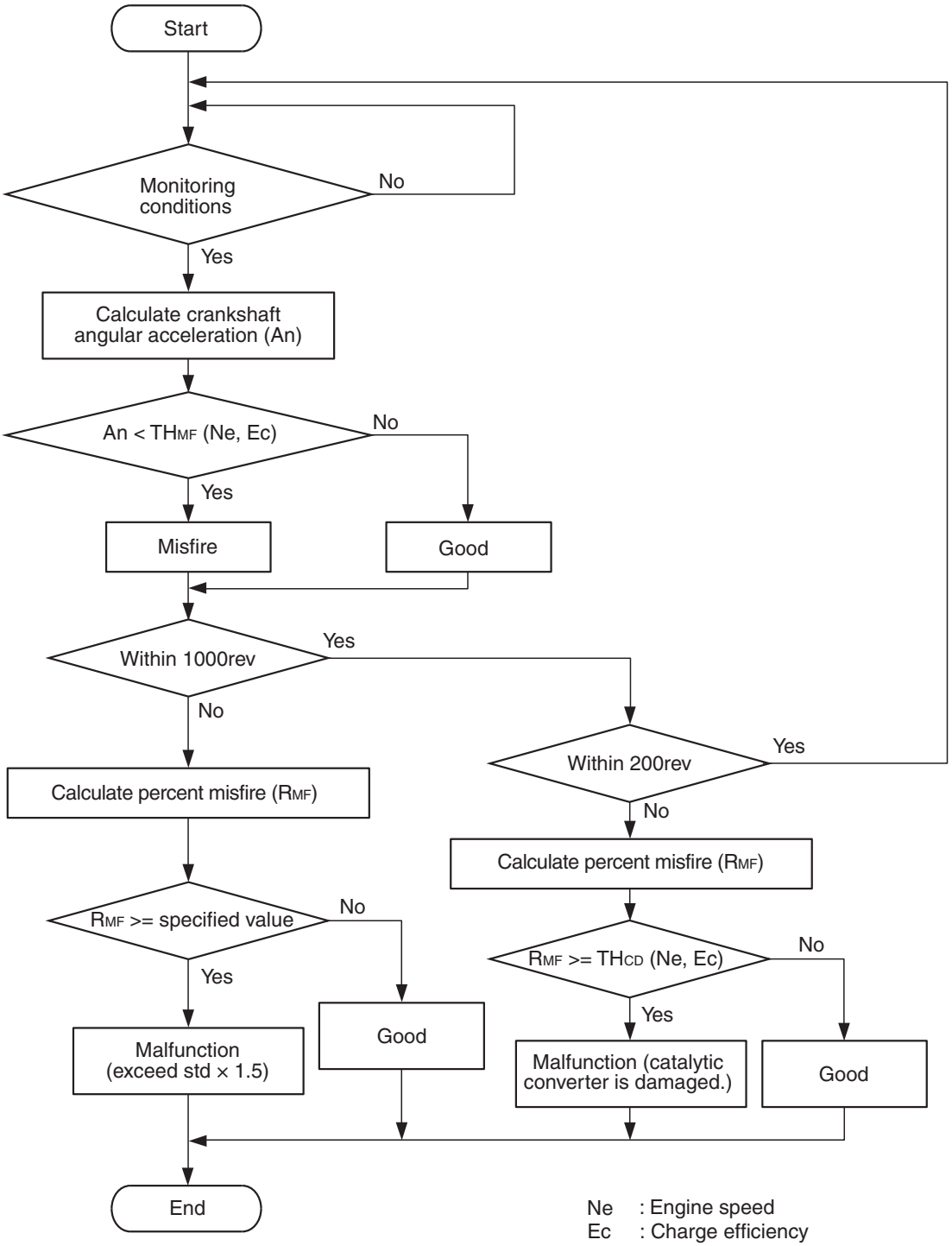
- Not applicable

Sensor (The sensor below is determined to be normal)

- Camshaft position sensor
- Mass airflow sensor
- Engine coolant temperature sensor
- Intake air temperature sensor
- Barometric pressure sensor
- Throttle position sensor

DTC SET CONDITIONS

Logic Flow Chart



Ne : Engine speed
Ec : Charge efficiency
TH_{MF} : Threshold value for misfire
TH_{CD} : Threshold value for catalyst damage

AK800585

TSB Revision

Check Conditions

- Engine speed is between 438 and 6,500 r/min.
- Engine coolant temperature is higher than −10° C (14° F).
- Barometric pressure is higher than 76 kPa (22.4 in.Hg).
- The engine load is with in the positive torque load.
- Adaptive learning is complete for the vane which generates a crankshaft position signal.
- While the engine is running, excluding sudden acceleration/deceleration and fuel shut-off operation.

Judgement Criterion (change in the angular acceleration of the crankshaft is used for misfire detection).

- Misfire has occurred more frequently than allowed during the last 200 revolutions [when the catalyst temperature is higher than 1,000° C (1,832° F)].

or

- The occurrence rate of engine misfiring within the 1,000 engine revolutions is more than 1.7 % <Except for California> or 1.8 % <California>.

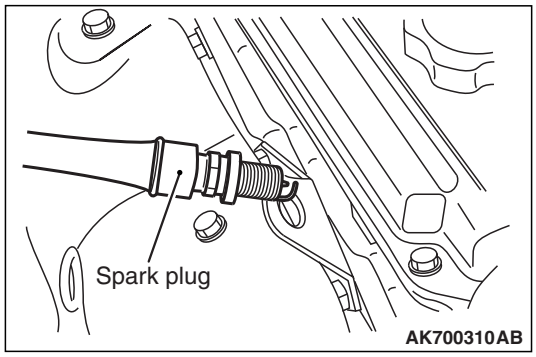
OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function –OBD-II Drive Cycle – Pattern 15 P.13B-11.

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

- Spark plug failed.
- Ignition system related part(s) failed.
- Low compression pressure.
- ECM failed.

DIAGNOSIS



STEP 1. Check the No. 4 cylinder ignition coil spark.

(1) Remove the No. 4 cylinder ignition coil.
(2) Remove the No. 4 cylinder spark plug and connect to the ignition coil.
(3) Ground the No.4 cylinder spark plug side electrode securely.
  - When the engine is cranked, the spark plug should spark.

Q: Did it spark?

YES : Go to Step 3.
NO : Go to Step 2.

STEP 2. Check the No. 4 cylinder spark plugs.

Refer to GROUP 16, Ignition System –On-vehicle Service – Spark Plug Check And Cleaning P.16-44.

Q: Is the spark plug normal?

YES : Refer to INSPECTION PROCEDURE 24 –Ignition Circuit System P.13B-812.
NO : Replace the No. 4 cylinder spark plug. Then go to Step 5.

STEP 3. Check the compression.

Refer to GROUP 11C, On-vehicle Service –Compression Pressure Check P.11C-18.

Q: Are there any abnormalities?

YES : Replace it. Then go to Step 5.
NO : Go to Step 4.

TSB Revision

STEP 4. Check the trouble symptoms.

(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle –Pattern 15 P.13B-11.

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

Q: Is DTC P0304 set?

YES : Replace the ECM. When the ECM is replaced, register the ID code. Refer to GROUP 42B, Diagnosis –ID Codes Registration Judgment Table <Vehicles with KOS> P.42B-11 or GROUP 42C, Diagnosis –ID Codes Registration Judgment Table <Vehicles with WCM> P.42C-10. Then go to Step 5.

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.00-15.

STEP 5. 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 15 P.13B-11.

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

Q: Is DTC P0304 set?

YES : Retry the troubleshooting.

NO : The inspection is complete.

DTC P0305: Cylinder 5 Misfire Detected

TECHNICAL DESCRIPTION

- If a misfire occurs while the engine is running, the engine speed changes for an instant.
- The ECM checks for such changes in engine speed.

DESCRIPTIONS OF MONITOR METHODS

Monitor angular acceleration of crankshaft and detect malfunction when negative variation of the angular acceleration is large.

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)

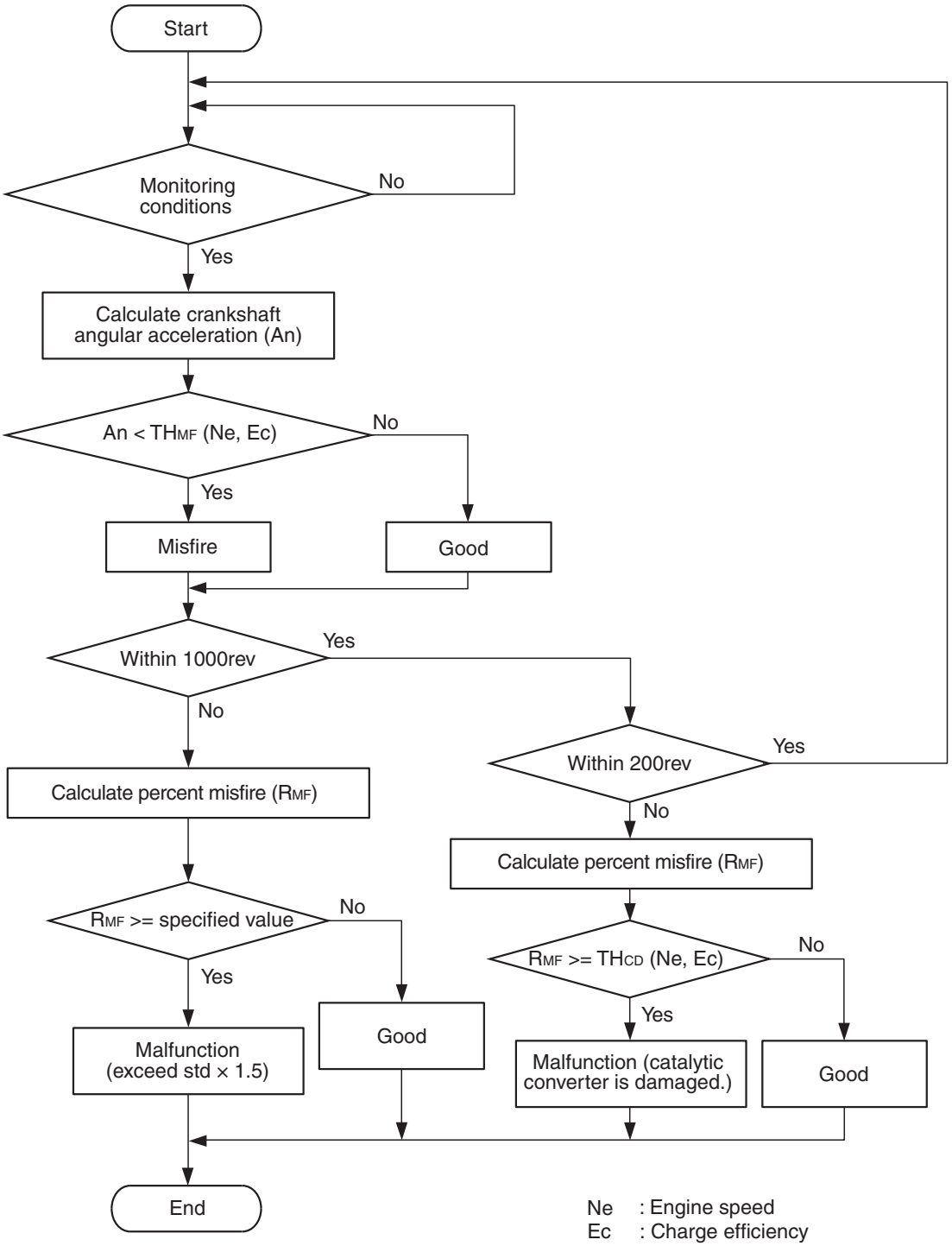
- Not applicable

Sensor (The sensor below is determined to be normal)

- Camshaft position sensor
- Mass airflow sensor
- Engine coolant temperature sensor
- Intake air temperature sensor
- Barometric pressure sensor
- Throttle position sensor

DTC SET CONDITIONS

Logic Flow Chart



Ne : Engine speed
Ec : Charge efficiency
THMF : Threshold value for misfire
THCD : Threshold value for catalyst damage

AK800585

TSB Revision

Check Conditions

- Engine speed is between 438 and 6,500 r/min.
- Engine coolant temperature is higher than −10° C (14° F).
- Barometric pressure is higher than 76 kPa (22.4 in.Hg).
- The engine load is with in the positive torque load.
- Adaptive learning is complete for the vane which generates a crankshaft position signal.
- While the engine is running, excluding sudden acceleration/deceleration and fuel shut-off operation.

Judgement Criterion (change in the angular acceleration of the crankshaft is used for misfire detection).

- Misfire has occurred more frequently than allowed during the last 200 revolutions [when the catalyst temperature is higher than 1,000° C (1,832° F)].

or

- The occurrence rate of engine misfiring within the 1,000 engine revolutions is more than 1.7 % <Except for California> or 1.8 % <California>.

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function –OBD-II Drive Cycle – Pattern 15 P.13B-11.

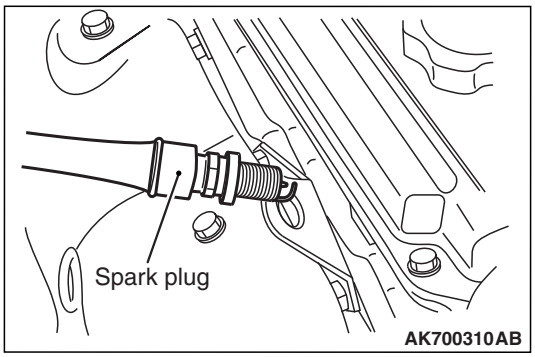
TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)

- Spark plug failed.
- Ignition system related part(s) failed.
- Low compression pressure.
- ECM failed.

DIAGNOSIS

STEP 1. Check the No. 5 cylinder ignition coil spark.

(1) Remove the intake manifold.
(2) Remove the No. 5 cylinder ignition coil.
(3) Remove the No. 5 cylinder spark plug and connect to the ignition coil.
(4) Ground the spark plug side electrode securely.
    - When the engine is cranked, the spark plug should spark.



Q: Did it spark?

YES : Go to Step 3.
NO : Go to Step 2.

STEP 2. Check the No. 5 cylinder spark plugs.

Refer to GROUP 16, Ignition System –On-vehicle Service – Spark Plug Check And Cleaning P.16-44.

Q: Is the spark plug normal?

YES : Refer to INSPECTION PROCEDURE 24 –Ignition Circuit System P.13B-812.
NO : Replace the No. 5 cylinder spark plug. Then go to Step 5.

STEP 3. Check the compression.

Refer to GROUP 11C, On-vehicle Service –Compression Pressure Check P.11C-18.

Q: Are there any abnormalities?

YES : Replace it. Then go to Step 5.
NO : Go to Step 4.

TSB Revision

STEP 4. Check the trouble symptoms.

(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle –Pattern 15 P.13B-11.

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

Q: Is DTC P0305 set?

YES : Replace the ECM. When the ECM is replaced, register the ID code. Refer to GROUP 42B, Diagnosis –ID Codes Registration Judgment Table <Vehicles with KOS> P.42B-11 or GROUP 42C, Diagnosis –ID Codes Registration Judgment Table <Vehicles with WCM> P.42C-10. Then go to Step 5.

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.00-15.

STEP 5. 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 15 P.13B-11.

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

Q: Is DTC P0305 set?

YES : Retry the troubleshooting.

NO : The inspection is complete.

DTC P0306: Cylinder 6 Misfire Detected

TECHNICAL DESCRIPTION

- If a misfire occurs while the engine is running, the engine speed changes for an instant.
- The ECM checks for such changes in engine speed.

DESCRIPTIONS OF MONITOR METHODS

Monitor angular acceleration of crankshaft and detect malfunction when negative variation of the angular acceleration is large.

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)

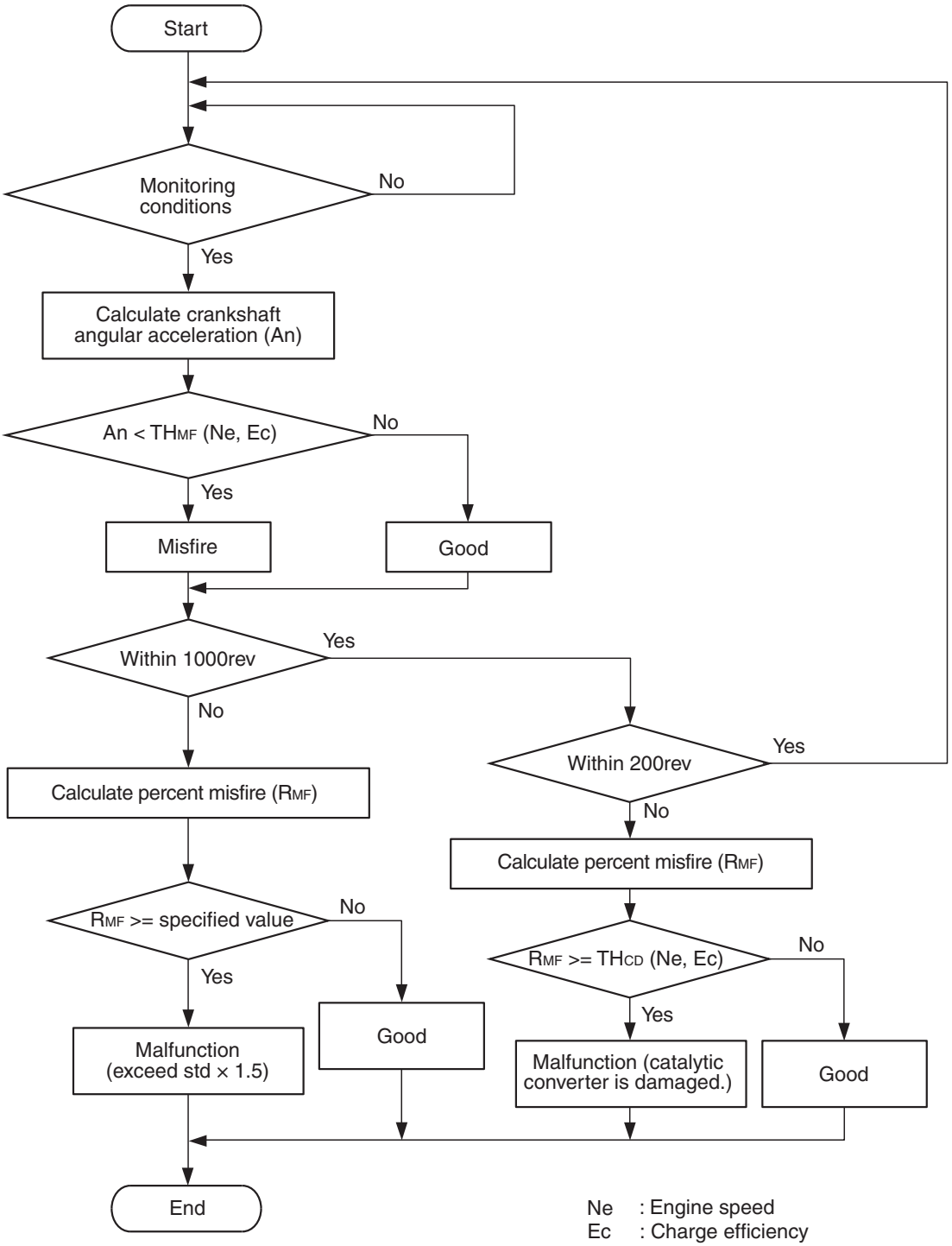
- Not applicable

Sensor (The sensor below is determined to be normal)

- Camshaft position sensor
- Mass airflow sensor
- Engine coolant temperature sensor
- Intake air temperature sensor
- Barometric pressure sensor
- Throttle position sensor

DTC SET CONDITIONS

Logic Flow Chart



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TSB Revision

Check Conditions

- Engine speed is between 438 and 6,500 r/min.
- Engine coolant temperature is higher than −10° C (14° F).
- Barometric pressure is higher than 76 kPa (22.4 in.Hg).
- The engine load is with in the positive torque load.
- Adaptive learning is complete for the vane which generates a crankshaft position signal.
- While the engine is running, excluding sudden acceleration/deceleration and fuel shut-off operation.

Judgement Criterion (change in the angular acceleration of the crankshaft is used for misfire detection).

- Misfire has occurred more frequently than allowed during the last 200 revolutions [when the catalyst temperature is higher than 1,000° C (1,832° F)].

or

- The occurrence rate of engine misfiring within the 1,000 engine revolutions is more than 1.7 % <Except for California> or 1.8 % <California>.

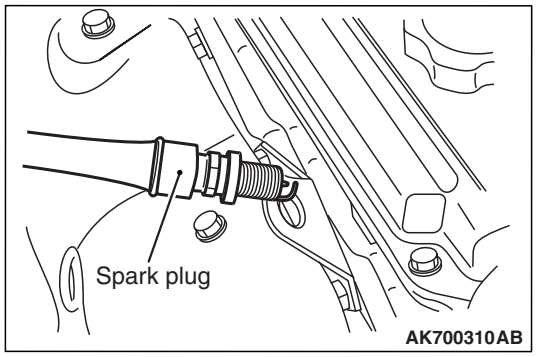
OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function –OBD-II Drive Cycle – Pattern 15 P.13B-11.

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

- Spark plug failed.
- Ignition system related part(s) failed.
- Low compression pressure.
- ECM failed.

DIAGNOSIS



STEP 1. Check the No. 6 cylinder ignition coil spark.

(1) Remove the No. 6 cylinder ignition coil.
(2) Remove the No. 6 cylinder spark plug and connect to the No. 6 cylinder ignition coil.
(3) Ground the spark plug side electrode securely.
  - When the engine is cranked, the spark plug should spark.

Q: Did it spark?

YES : Go to Step 3.
NO : Go to Step 2.

STEP 2. Check the No. 6 cylinder spark plugs.

Refer to GROUP 16, Ignition System –On-vehicle Service – Spark Plug Check And Cleaning P.16-44.

Q: Is the spark plug normal?

YES : Refer to INSPECTION PROCEDURE 24 –Ignition Circuit System P.13B-812.
NO : Replace the No. 6 cylinder spark plug. Then go to Step 5.

STEP 3. Check the compression.

Refer to GROUP 11C, On-vehicle Service –Compression Pressure Check P.11C-18.

Q: Are there any abnormalities?

YES : Replace it. Then go to Step 5.
NO : Go to Step 4.

TSB Revision

STEP 4. Check the trouble symptoms.

(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle –Pattern 15 P.13B-11.

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

Q: Is DTC P0306 set?

YES : Replace the ECM. When the ECM is replaced, register the ID code. Refer to GROUP 42B, Diagnosis –ID Codes Registration Judgment Table <Vehicles with KOS> P.42B-11 or GROUP 42C, Diagnosis –ID Codes Registration Judgment Table <Vehicles with WCM> P.42C-10. Then go to Step 5.

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.00-15.

STEP 5. 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 15 P.13B-11.

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

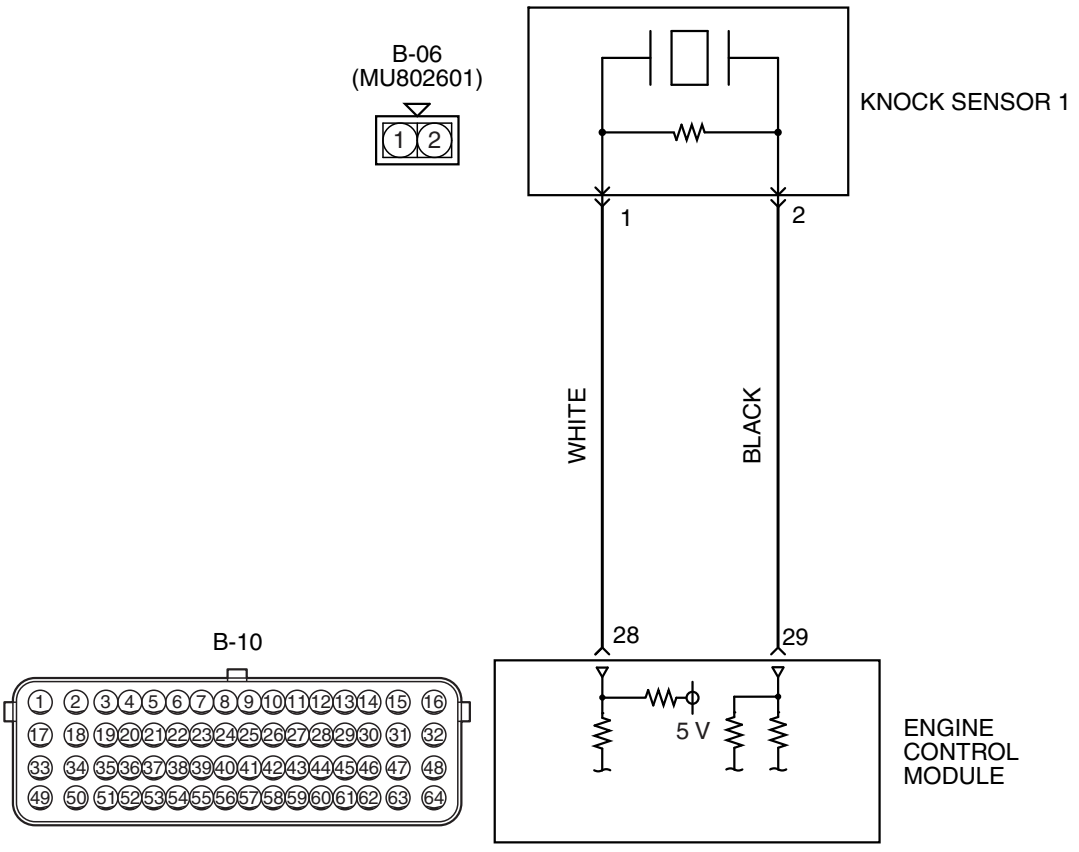
Q: Is DTC P0306 set?

YES : Retry the troubleshooting.

NO : The inspection is complete.

DTC P0327: Knock Sensor Circuit Low (Bank 1)

KNOCK SENSOR 1 CIRCUIT



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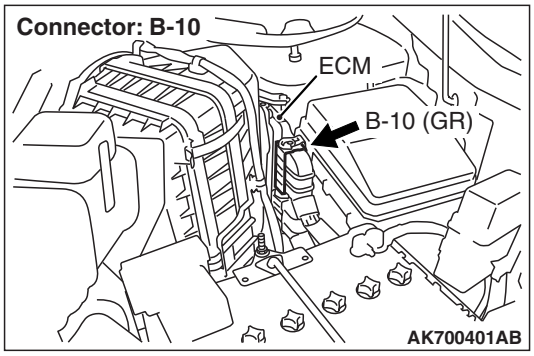
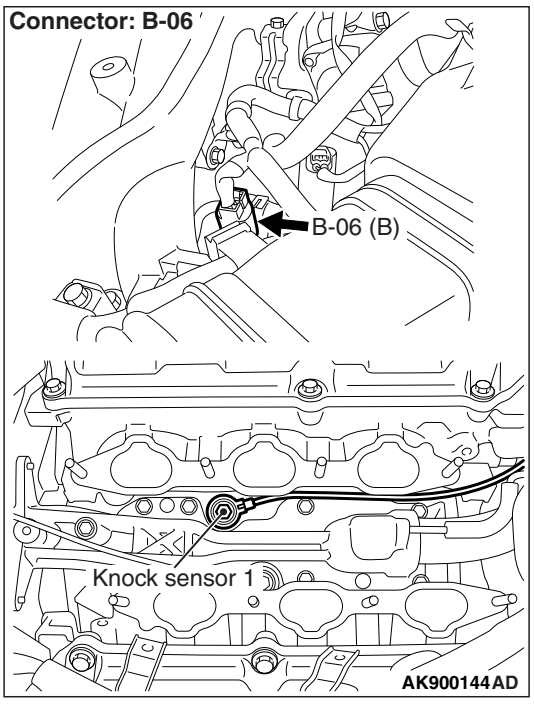




TSB Revision

CIRCUIT OPERATION

- The knock sensor (terminal No. 1) sends a signal voltage to the ECM (terminal No. 28).
- The ground terminal (terminal No. 2) is grounded with ECM (terminal No. 29).

TECHNICAL DESCRIPTION

- The knock sensor converts the vibration of the cylinder block into a voltage and outputs it.
- The ECM checks whether the voltage is within a specified range.

DESCRIPTIONS OF MONITOR METHODS

Knock sensor output voltage is out of 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)

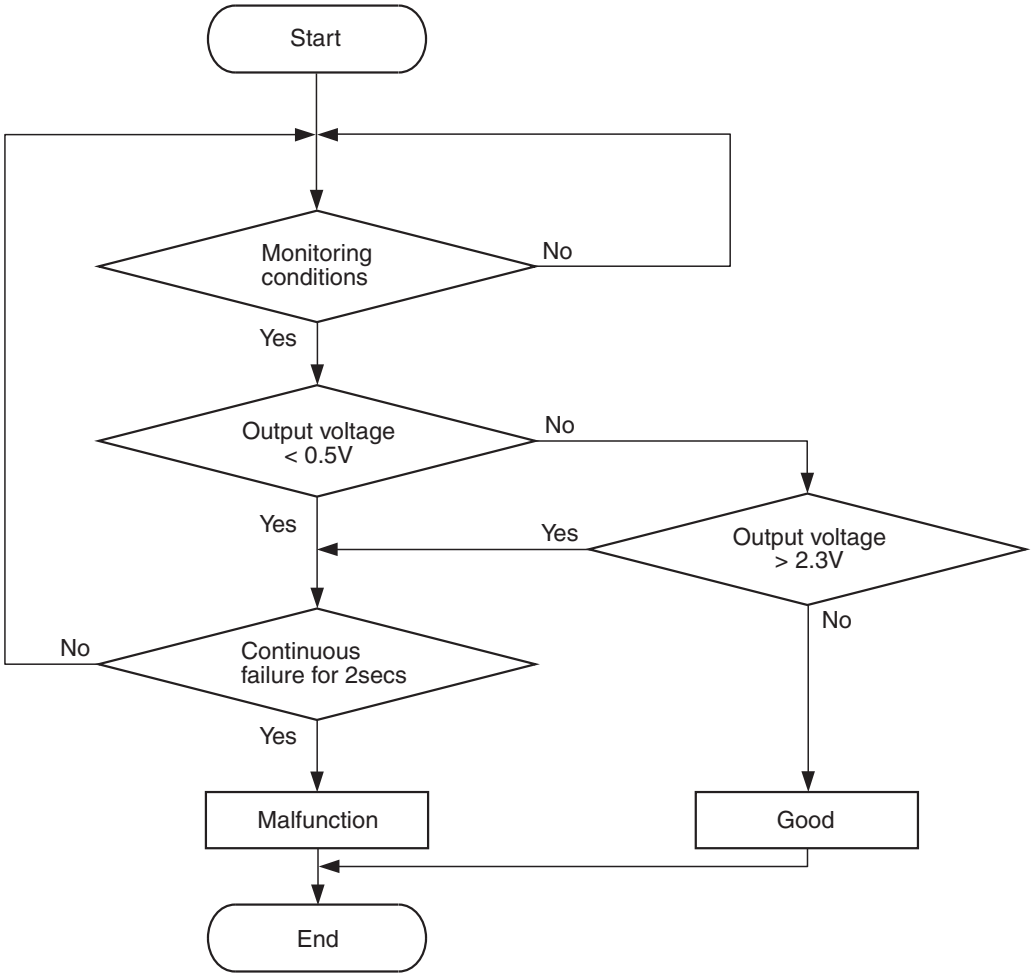
- Not applicable

Sensor (The sensor below is determined to be normal)

- Not applicable

DTC SET CONDITIONS

Logic Flow Chart



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TSB Revision

Check Condition

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

Judgement Criterion

- Knock sensor 1 output voltage has continued to be lower than 0.5 volt for 2 seconds.

FAIL-SAFE AND BACKUP FUNCTION

- Fix the ignition timing with an allowance against knock.

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function –OBD-II Drive Cycle – Pattern 22 P.13B-11.

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

- Knock sensor 1 failed.
- Open or shorted knock sensor 1 circuit or connector damage.
- ECM failed.

DIAGNOSIS

STEP 1. Check harness connector B-06 at the knock sensor 1 and harness connector B-10 at ECM 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 5.

STEP 2. Check for open circuit between knock sensor 1 connector B-06 (terminal No. 2) and ECM connector B-10 (terminal No. 29).

Q: Is the harness wire in good condition?

YES : Go to Step 3.
NO : Repair it. Then go to Step 5.

STEP 3. Check for open circuit and short circuit to ground between knock sensor 1 connector B-06 (terminal No. 1) and ECM connector B-10 (terminal No. 28).

Q: Is the harness wire in good condition?

YES : Go to Step 4.
NO : Repair it. Then go to Step 5.

STEP 4. Replace the knock sensor 1.

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

Q: Is DTC P0327 set?

YES : Replace the ECM. When the ECM is replaced, register the ID code. Refer to GROUP 42B, Diagnosis –ID Code Registration Judgment Table <Vehicles with KOS> P.42B-11 or GROUP 42C, Diagnosis –ID Codes Registration Judgment Table <Vehicles with WCM> P.42C-10. Then go to Step 5.
NO : Replace the knock sensor. Then go to Step 5.

STEP 5. 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 22 P.13B-11.

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

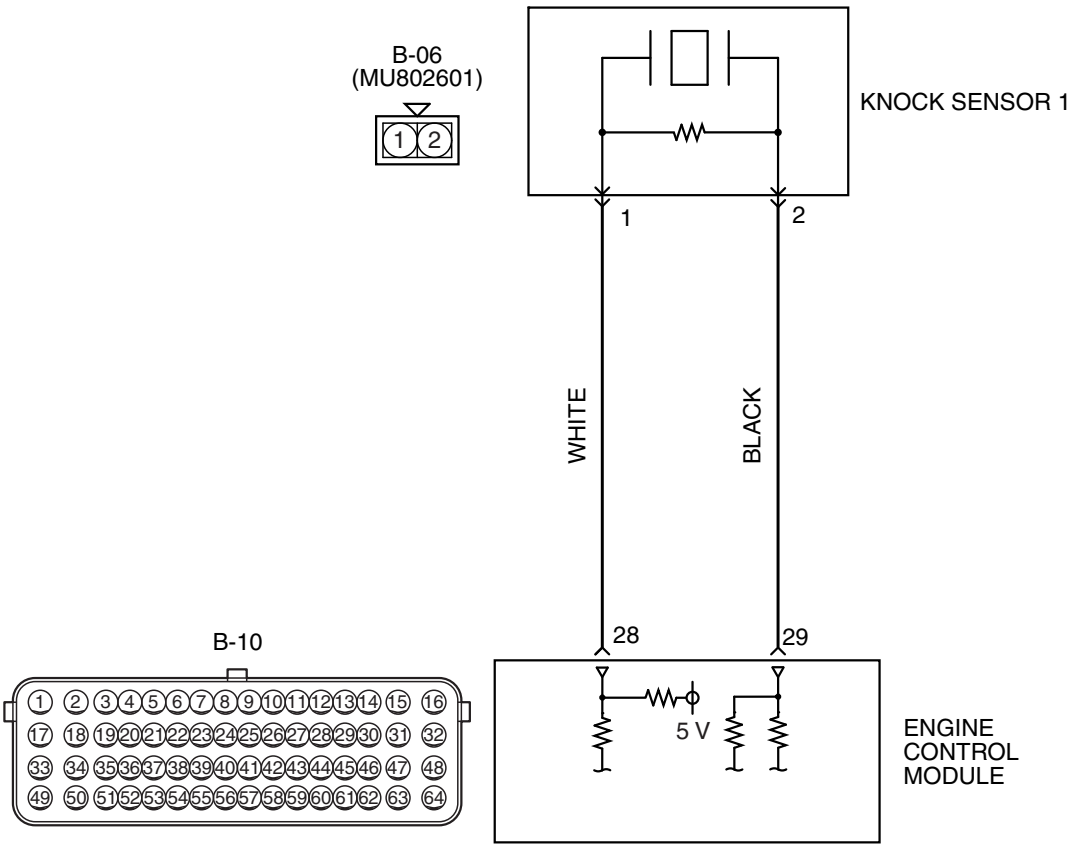
Q: Is DTC P0327 set?

YES : Retry the troubleshooting.

NO : The inspection is complete.

DTC P0328: Knock Sensor Circuit High (Bank 1)

KNOCK SENSOR 1 CIRCUIT



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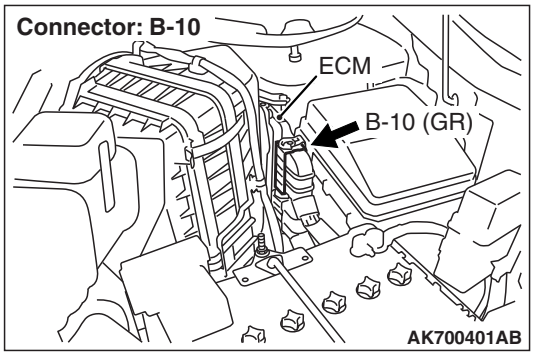
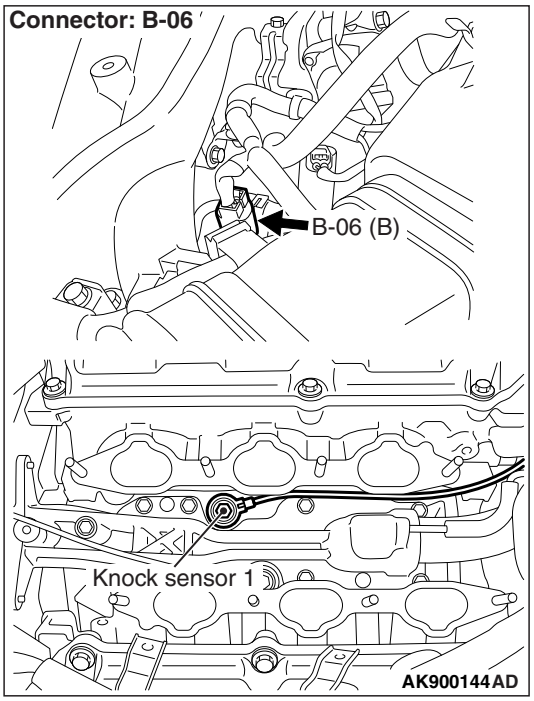




CIRCUIT OPERATION

- The knock sensor (terminal No. 1) sends a signal voltage to the ECM (terminal No. 28).
- The ground terminal (terminal No. 2) is grounded with ECM (terminal No. 29).

TECHNICAL DESCRIPTION

- The knock sensor converts the vibration of the cylinder block into a voltage and outputs it.
- The ECM checks whether the voltage is within a specified range.

DESCRIPTIONS OF MONITOR METHODS

Knock sensor output voltage is out of 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)

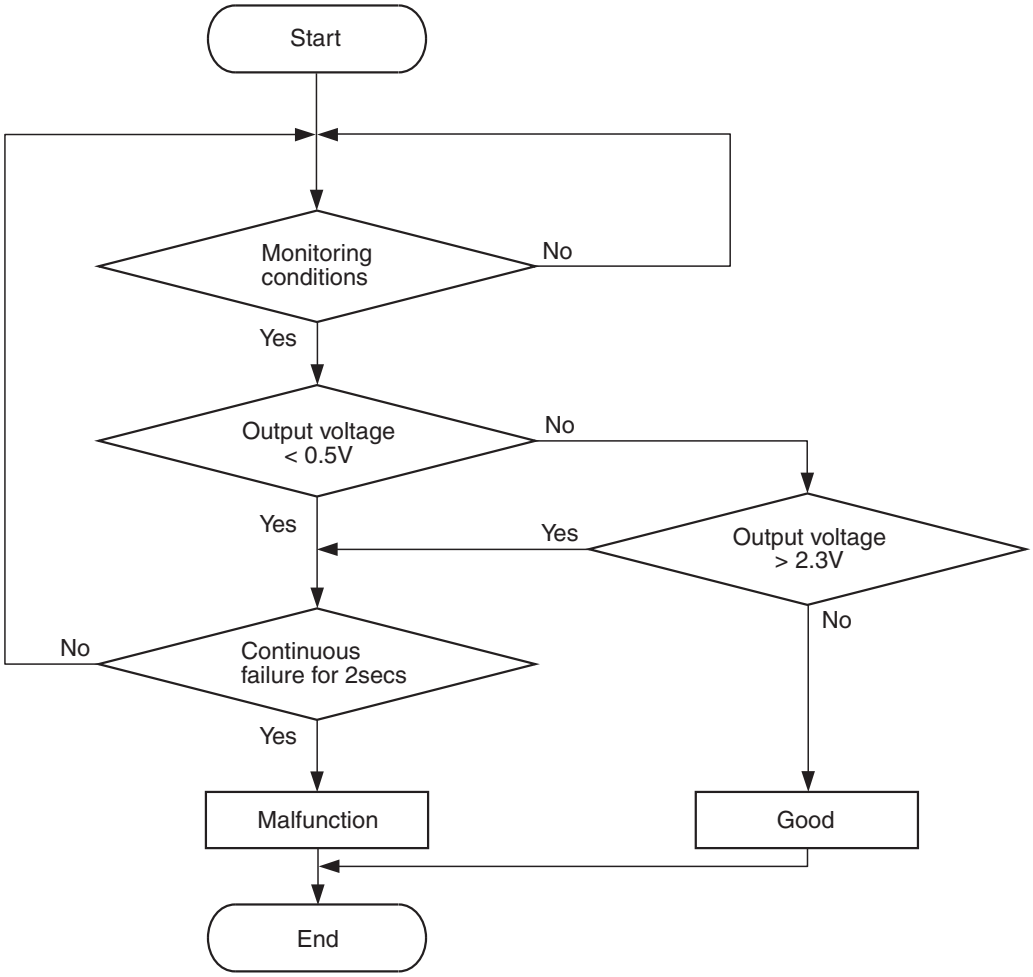
- Not applicable

Sensor (The sensor below is determined to be normal)

- Not applicable

DTC SET CONDITIONS

Logic Flow Chart



AK704271

Check Condition

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

Judgement Criterion

- Knock sensor 1 output voltage has continued to be higher than 2.3 volts for 2 seconds.

FAIL-SAFE AND BACKUP FUNCTION

- Fix the ignition timing with an allowance against knock.

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function –OBD-II Drive Cycle – Pattern 22 P.13B-11.

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

- Shorted knock sensor 1 circuit or connector damage.
- ECM failed.

TSB Revision

DIAGNOSIS

STEP 1. Check harness connector B-06 at the knock sensor 1 and harness connector B-10 at ECM 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 3.

STEP 2. Check for short circuit to power supply between knock sensor 1 connector B-06 (terminal No. 1) and ECM connector B-10 (terminal No. 28).

Q: Is the harness wire in good condition?

YES : Replace the ECM. When the ECM is replaced, register the ID code. Refer to GROUP 42B, Diagnosis –ID Code Registration Judgment Table <Vehicles with KOS> P.42B-11 or GROUP 42C, Diagnosis –ID Codes Registration Judgment Table <Vehicles with WCM> P.42C-10. Then go to Step 3.
NO : Repair it. Then go to Step 3.

STEP 3. Test the OBD-II drive cycle.

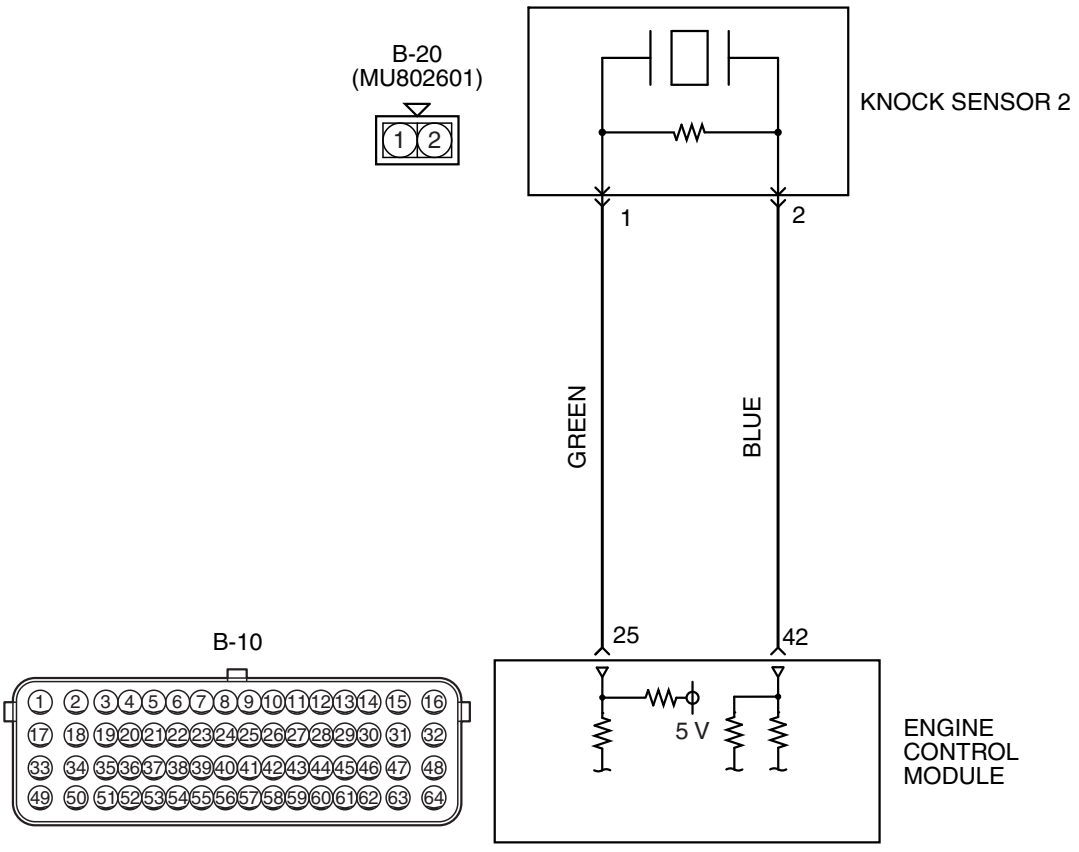
(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle –Pattern 22 P.13B-11.
(2) Check the diagnostic trouble code (DTC).

Q: Is DTC P0328 set?

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

DTC P0332: Knock Sensor Circuit Low (Bank 2)

KNOCK SENSOR 2 CIRCUIT



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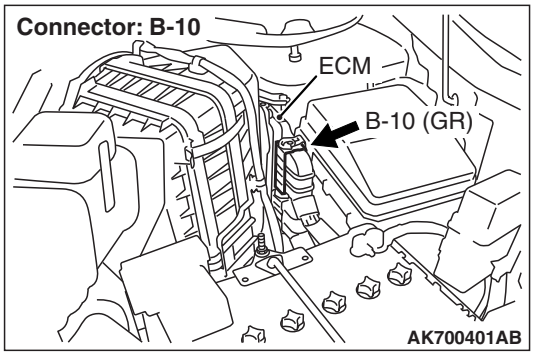
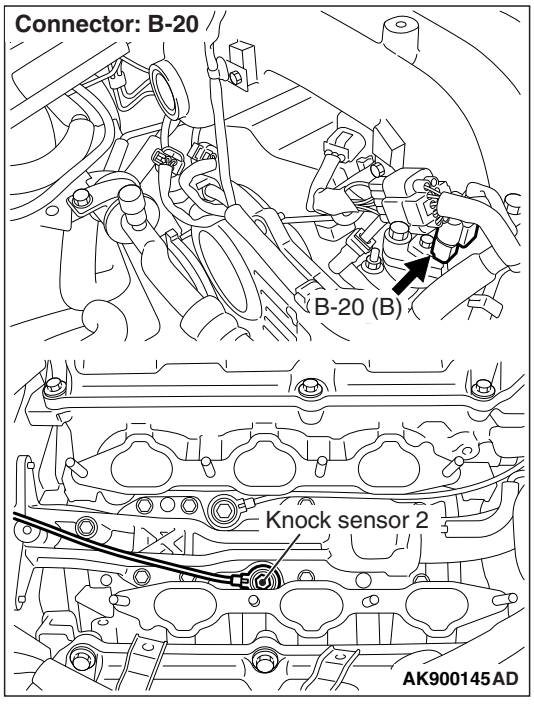




TSB Revision

CIRCUIT OPERATION

- The knock sensor (terminal No. 1) sends a signal voltage to the ECM (terminal No. 25).
- The ground terminal (terminal No. 2) is grounded with ECM (terminal No. 42).

TECHNICAL DESCRIPTION

- The knock sensor converts the vibration of the cylinder block into a voltage and outputs it.
- The ECM checks whether the voltage is within a specified range.

DESCRIPTIONS OF MONITOR METHODS

Knock sensor output voltage is out of 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)

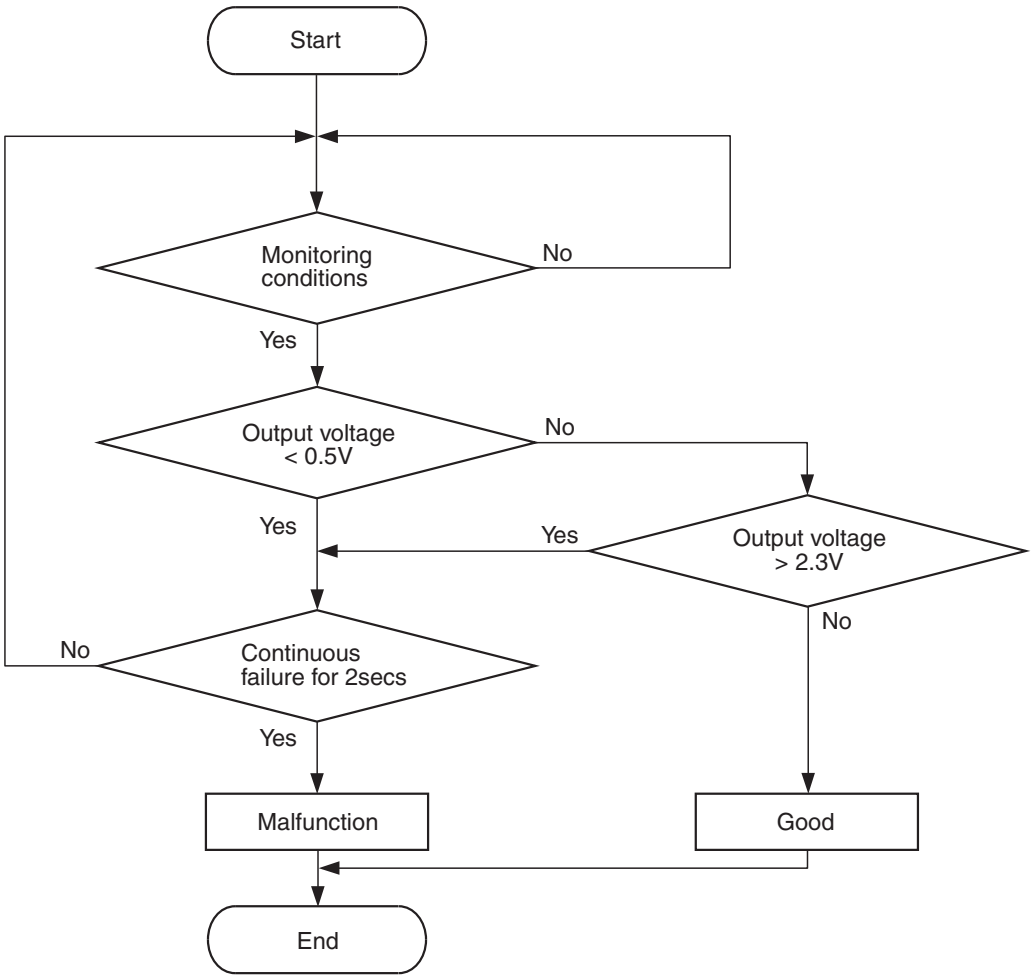
- Not applicable

Sensor (The sensor below is determined to be normal)

- Not applicable

DTC SET CONDITIONS

Logic Flow Chart



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TSB Revision

Check Condition

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

Judgement Criterion

- Knock sensor output voltage has continued to be lower than 0.5 volt for 2 seconds.

FAIL-SAFE AND BACKUP FUNCTION

- Fix the ignition timing with an allowance against knock.

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function –OBD-II Drive Cycle – Pattern 22 P.13B-11.

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

- Knock sensor 2 failed.
- Open or shorted knock sensor 2 circuit or connector damage.
- ECM failed.

DIAGNOSIS

STEP 1. Check harness connector B-20 at the knock sensor 2 and harness connector B-10 at ECM 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 5.

STEP 2. Check for open circuit between knock sensor 2 connector B-20 (terminal No. 2) and ECM connector B-10 (terminal No. 42).

Q: Is the harness wire in good condition?

YES : Go to Step 3.
NO : Repair it. Then go to Step 5.

STEP 3. Check for open circuit and short circuit to ground between knock sensor 2 connector B-20 (terminal No. 1) and ECM connector B-10 (terminal No. 25).

Q: Is the harness wire in good condition?

YES : Go to Step 4.
NO : Repair it. Then go to Step 5.

STEP 4. Replace the knock sensor.

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

Q: Is DTC P0332 set?

YES : Replace the ECM. When the ECM is replaced, register the ID code. Refer to GROUP 42B, Diagnosis –ID Code Registration Judgment Table <Vehicles with KOS> P.42B-11 or GROUP 42C, Diagnosis –ID Codes Registration Judgment Table <Vehicles with WCM> P.42C-10. Then go to Step 5.
NO : Replace the knock sensor. Then go to Step 5.

STEP 5. 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 22 P.13B-11.

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

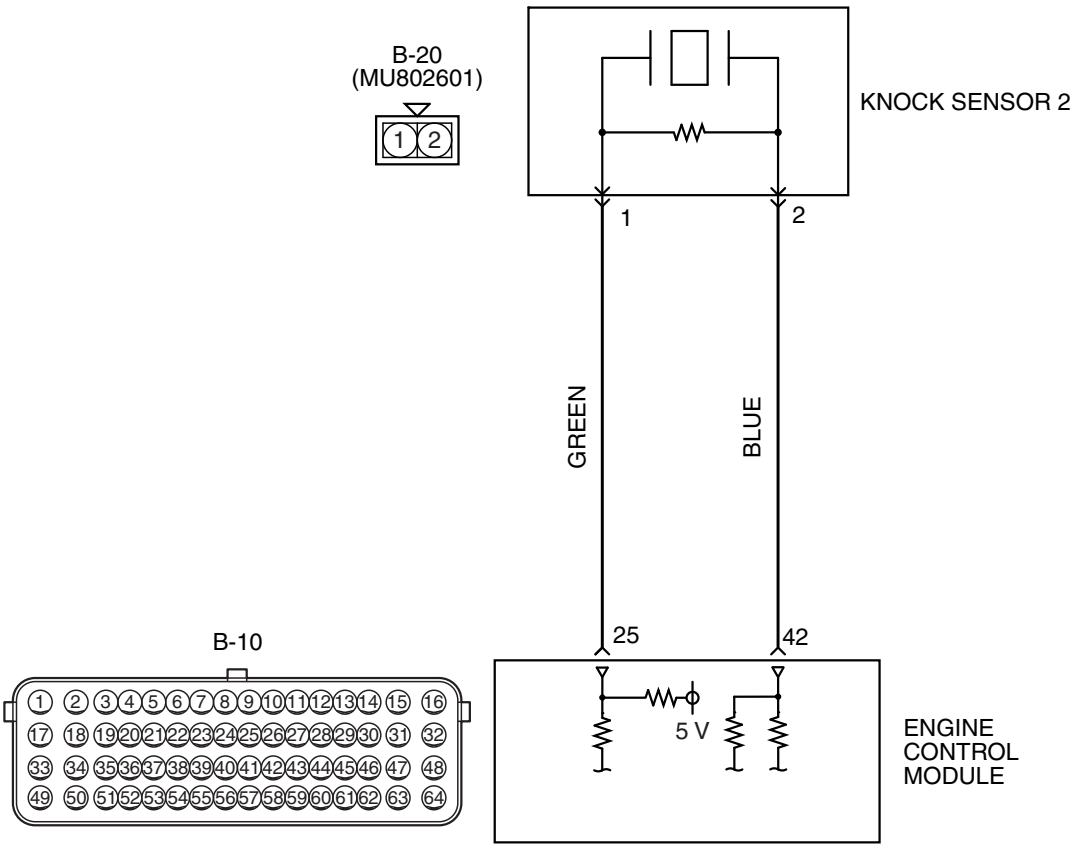
Q: Is DTC P0332 set?

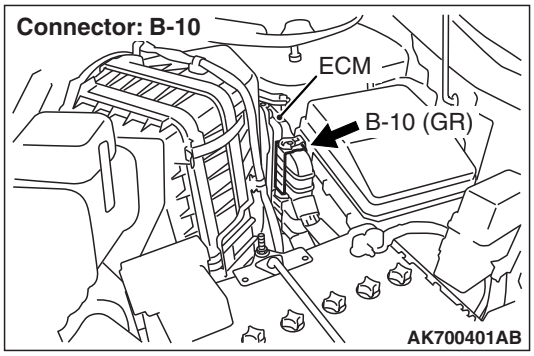
YES : Retry the troubleshooting.

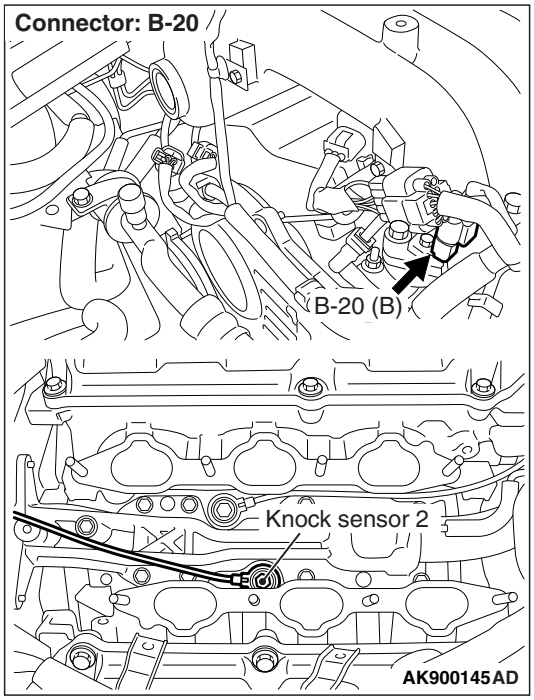
NO : The inspection is complete.

DTC P0333: Knock Sensor Circuit High (Bank 2)

KNOCK SENSOR 2 CIRCUIT







CIRCUIT OPERATION

- The knock sensor (terminal No. 1) sends a signal voltage to the ECM (terminal No. 25).
- The ground terminal (terminal No. 2) is grounded with ECM (terminal No. 42).

TECHNICAL DESCRIPTION

- The knock sensor converts the vibration of the cylinder block into a voltage and outputs it.
- The ECM checks whether the voltage is within a specified range.

DESCRIPTIONS OF MONITOR METHODS

Knock sensor output voltage is out of 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)

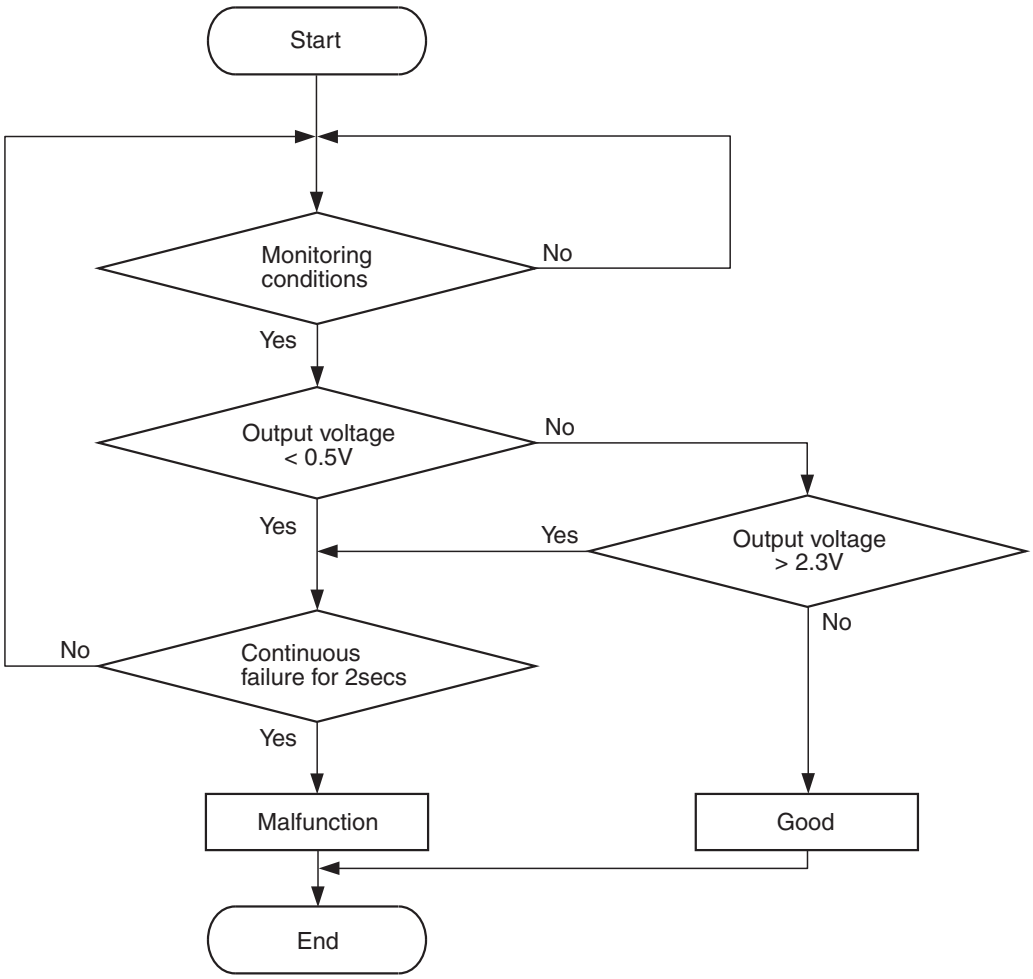
- Not applicable

Sensor (The sensor below is determined to be normal)

- Not applicable

DTC SET CONDITIONS

Logic Flow Chart



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Check Condition

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

Judgement Criterion

- Knock sensor output voltage has continued to be higher than 2.3 volts for 2 seconds.

FAIL-SAFE AND BACKUP FUNCTION

- Fix the ignition timing with an allowance against knock.

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function –OBD-II Drive Cycle – Pattern 22 P.13B-11.

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

- Shorted knock sensor 2 circuit or connector damage.
- ECM failed.

TSB Revision

DIAGNOSIS

STEP 1. Check harness connector B-20 at the knock sensor 2 and harness connector B-10 at ECM 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 3.

STEP 2. Check for short circuit to power supply between knock sensor 2 connector B-20 (terminal No. 1) and ECM connector B-10 (terminal No. 25).

Q: Is the harness wire in good condition?

YES : Replace the ECM. When the ECM is replaced, register the ID code. Refer to GROUP 42B, Diagnosis –ID Code Registration Judgment Table <Vehicles with KOS> P.42B-11 or GROUP 42C, Diagnosis –ID Codes Registration Judgment Table <Vehicles with WCM> P.42C-10. Then go to Step 3.
NO : Repair it. Then go to Step 3.

STEP 3. Test the OBD-II drive cycle.

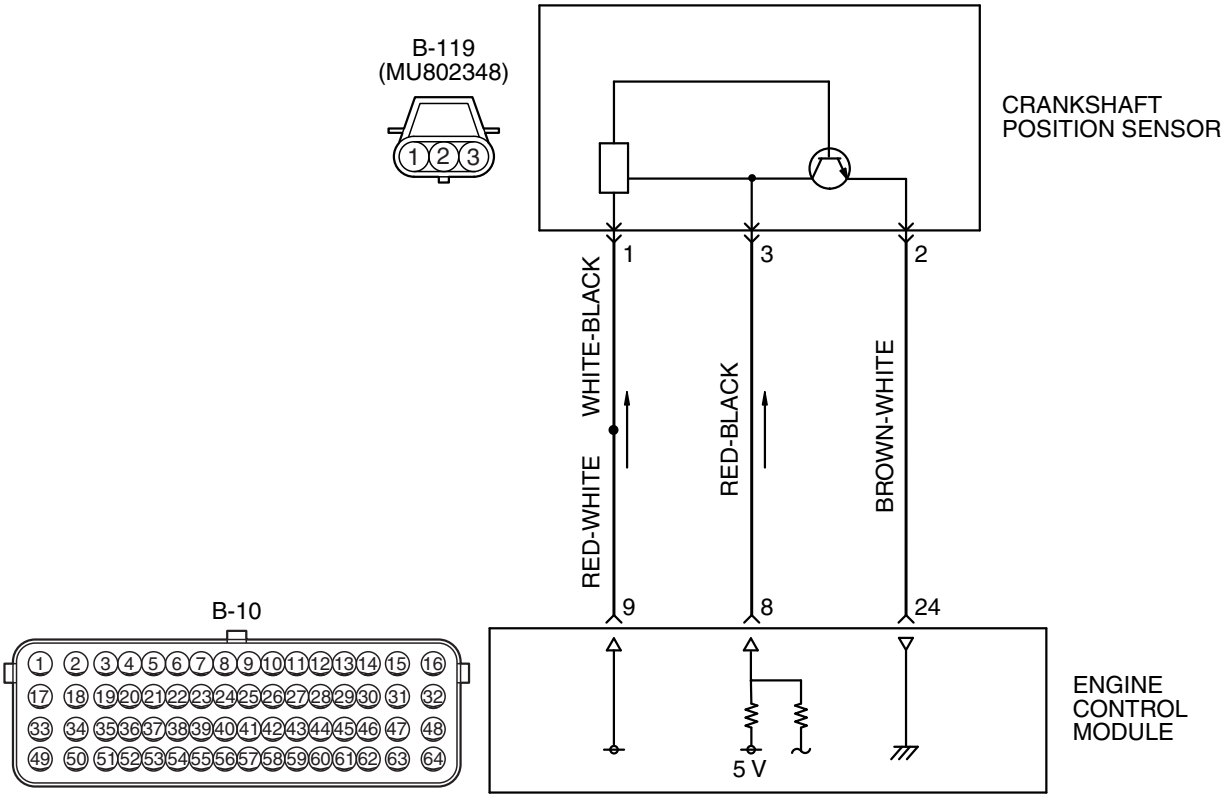
(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle –Pattern 22 P.13B-11.
(2) Check the diagnostic trouble code (DTC).

Q: Is DTC P0333 set?

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

DTC P0335: Crankshaft Position Sensor Circuit

CRANKSHAFT POSITION SENSOR CIRCUIT



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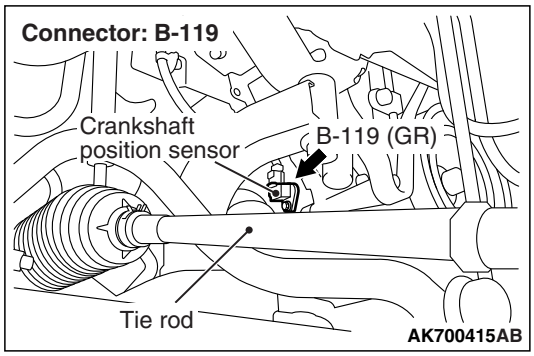
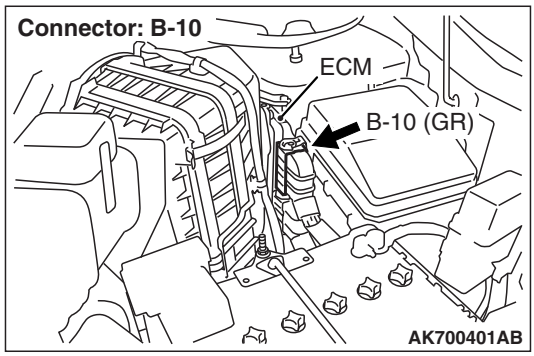




CIRCUIT OPERATION

- The crankshaft position sensor power is supplied from the ECM (terminal No. 9).
- Terminal No. 2 of the crankshaft position sensor is grounded with ECM (terminal No. 24).
- A 5-volt voltage is applied on the crankshaft position sensor output terminal (terminal No. 3) from the ECM (terminal No. 8). The crankshaft position sensor generates a pulse signal when the output terminal is opened and grounded.

TSB Revision

TECHNICAL DESCRIPTION

- The crankshaft position sensor detects the crank angle (position) of each cylinder, and converts that data to pulse signals, then which are input to the ECM.
- When the engine is running, the crankshaft position sensor outputs a pulse signal.
- The ECM checks whether pulse signal is input while the engine is cranking.

DESCRIPTIONS OF MONITOR METHODS

- Crankshaft position sensor signal does not change.
- Crankshaft position sensor signal is not normal pattern.

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)

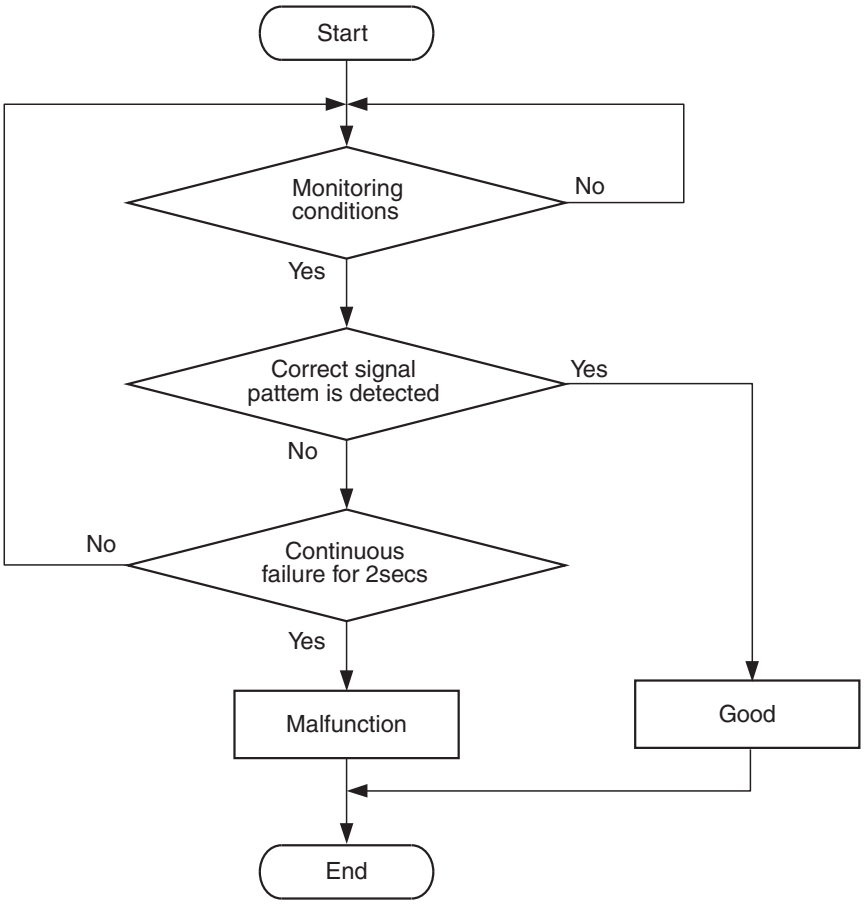
- Not applicable

Sensor (The sensor below is determined to be normal)

- Not applicable

DTC SET CONDITIONS <Range/Performance problem - Alignment>

Logic Flow Chart



AK604335

Check Condition

- Engine is being cranked.

or

- Engine speed is higher than 500 r/min excluding during cranking.

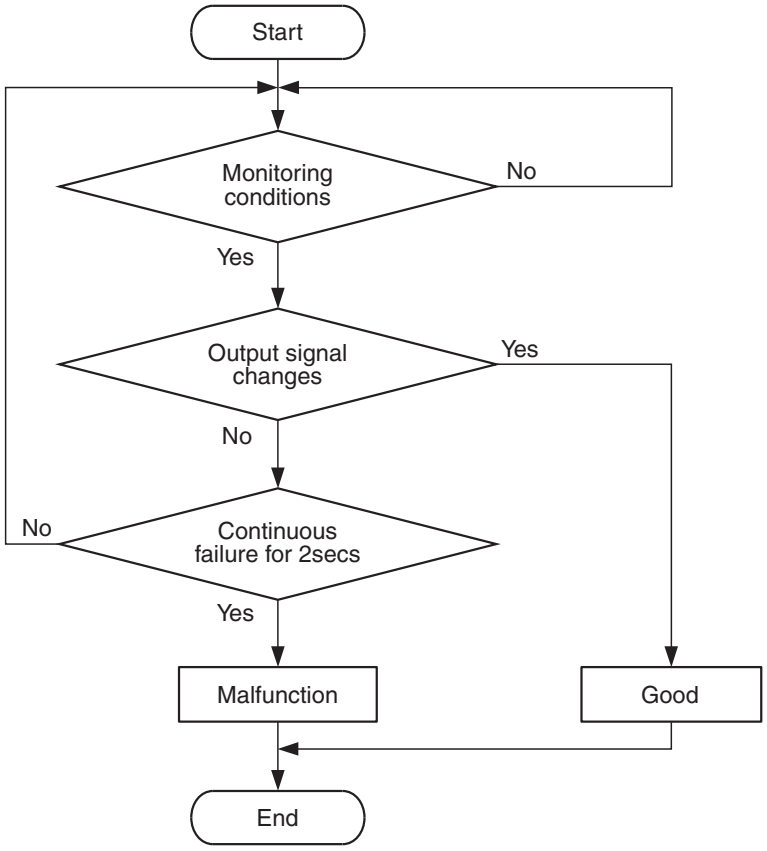
Judgement Criterion

- Normal signal pattern has not been input for cylinder identification from the crankshaft position sensor signal and camshaft position sensor signal for 2 seconds.

TSB Revision

DTC SET CONDITIONS <Range/Performance problem - Circuit continuity>

Logic Flow Chart



AK700485

Check Condition

- Engine is being cranked.

or

- Engine speed is higher than 500 r/min excluding during cranking.

Judgement Criterion

- Crankshaft position sensor output voltage has not changed (no pulse signal is input) for 2 seconds.

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function –OBD-II Drive Cycle – Pattern 22 P.13B-11.

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

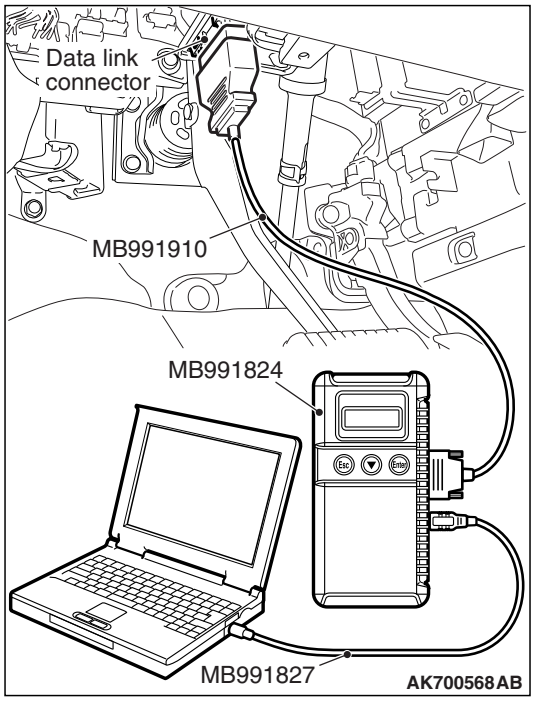
- Crankshaft position sensor failed.
- Connector damage
- Harness damage
- ECM failed.

DIAGNOSIS

Required Special Tools:

- Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991910: Main Harness A
- MB991709: Test Harness
- MB992110: Power Plant ECU Check Harness

STEP 1. Using scan tool MB991958, check data list item 2: Crankshaft Position 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) Set scan tool MB991958 to the data reading mode for item 2, Crankshaft Position Sensor.
  - The tachometer and engine speed indicated on the scan tool should match.

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

Q: Is the sensor operating properly?

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.00-15.

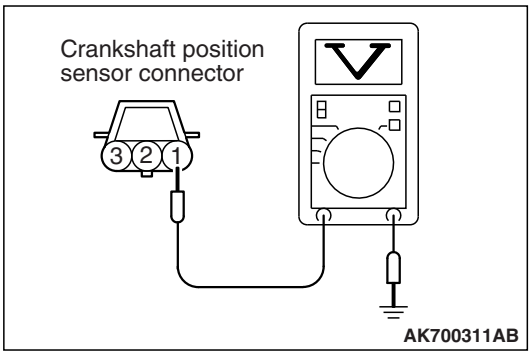
NO : Go to Step 2.

STEP 2. Check harness connector B-119 at the crankshaft position and harness connector B-10 at ECM for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 3.

NO : Repair it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 9.



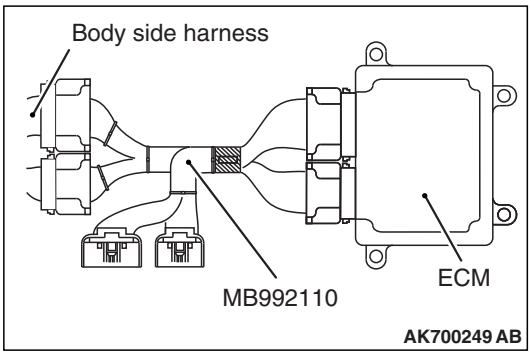
STEP 3. Measure the sensor supply voltage at crankshaft position sensor harness side connector B-119.

(1) Disconnect the connector B-119 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.

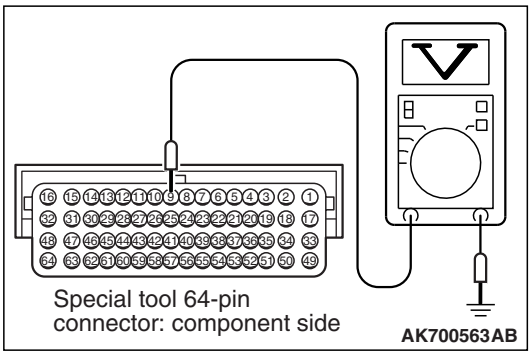
Q: Is battery positive voltage (approximately 12 volts) present?

YES : Go to Step 6.
NO : Go to Step 4.



STEP 4. Measure the sensor supply voltage at ECM connector B-10 by using power plant ECU check harness special tool MB992110.

(1) Disconnect all ECM connectors. Connect the power plant ECU check harness special tool MB992110 between the separated connectors.
(2) Turn the ignition switch to the "ON" position.

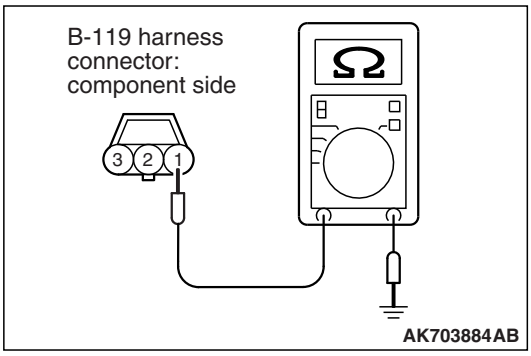


(3) Measure the voltage between terminal No. 9 and ground.
- Voltage should be between 4.9 and 5.1 volts.

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

Q: Is the measured voltage between 4.9 and 5.1 volts?

YES : Repair harness wire between the crankshaft position sensor connector B-119 (terminal No. 1) and the ECM connector B-10 (terminal No. 9) because of open circuit or harness damage. Then go to Step 9.
NO : Go to Step 5.



STEP 5. Check for short circuit to ground between the crankshaft position sensor connector B-119 and the ECM connector B-10.

(1) Disconnect the crankshaft position sensor connector B-119 and the ECM connector B-10.

(2) Check for the crankshaft position sensor connector B-119 (terminal No. 1) and ground.
- Not continuity.

Q: Is the harness wire in good condition?

YES : Replace the ECM. When the ECM is replaced, register the ID code. Refer to GROUP 42B, Diagnosis –ID Codes Registration Judgment Table <Vehicles with KOS> P.42B-11 or GROUP 42C, Diagnosis –ID Codes Registration Judgment Table <Vehicles with WCM> P.42C-10. Then go to step 9.

NO : Repair it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 9.

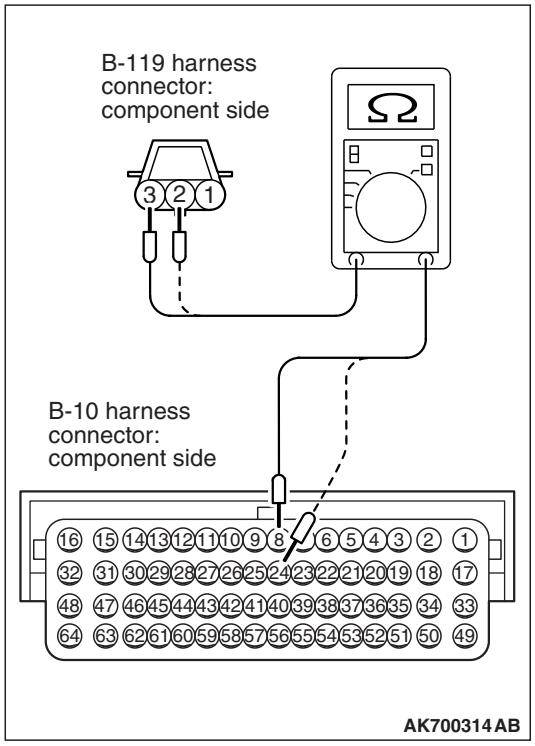
STEP 6. Check for open circuit and short circuit to ground between the crankshaft position sensor connector B-119 and the ECM connector B-10.

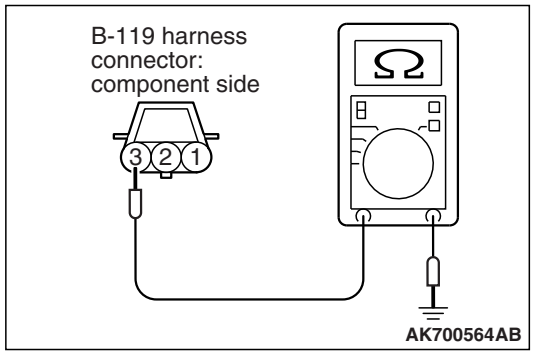
(1) Disconnect the crankshaft position sensor connector B-119 and the ECM connector B-10.

(2) Measure the resistance between the crankshaft sensor connector B-119 and the ECM connector B-10.
- Should be less than 2 ohms.

a. Connector B-119 (terminal No. 3) and Connector B-10 (terminal No. 8).

b. Connector B-119 (terminal No. 2) and Connector B-10 (terminal No. 24).





(3) Check for the crankshaft position sensor connector B-119 (terminal No. 3) and ground.
- Not continuity.

Q: Is the harness wire in good condition?

YES : Go to Step 7.

NO : Repair it. Then go to Step 9.

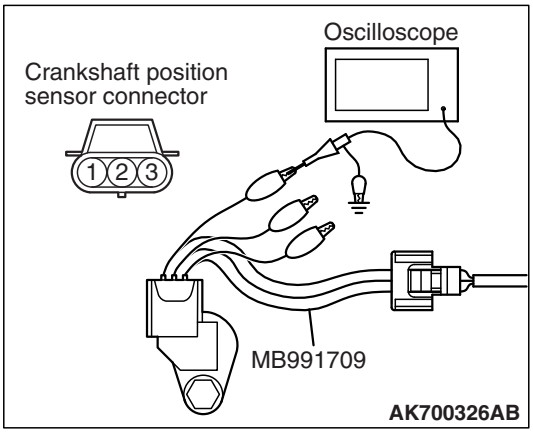
STEP 7. Using the oscilloscope, check the crankshaft position sensor.

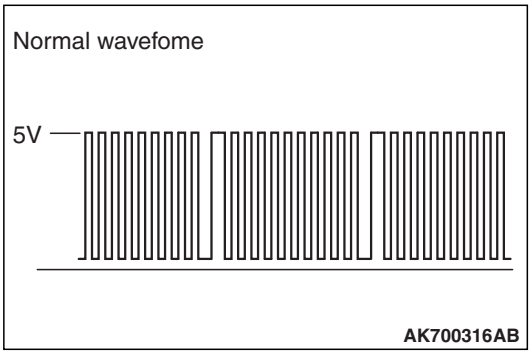
(1) Disconnect the crankshaft position sensor connector B-119, and connect the test harness special tool (MB991709) between the separated connectors.

(2) Connect the oscilloscope probe to crankshaft position sensor connector terminal No. 3.

NOTE: When measuring with the ECM side connector, disconnect all ECM connectors. Connect the check harness special tool (MB992110) between the separated connectors. then connector the oscilloscope probe to the check harness connector terminal No. 8.

(3) Start the engine and run at idle.





(4) Check the waveform.
- The waveform should show a pattern similar to the illustration.

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

Q: Is the waveform normal?

YES : Go to Step 8.

NO : Repair the crankshaft position sensor. Then go to Step 9.

STEP 8. Check the trouble symptoms.

(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle –Pattern 22 P.13B-11.

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

Q: Is DTC P0335 set?

YES : Replace the ECM. When the ECM is replaced, register the ID code. Refer to GROUP 42B, Diagnosis –ID Codes Registration Judgment Table <Vehicles with KOS> P.42B-11 or GROUP 42C, Diagnosis –ID Codes Registration Judgment Table <Vehicles with WCM> P.42C-10. Then go to Step 9.

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.00-15.

STEP 9. 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 22 P.13B-11.

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

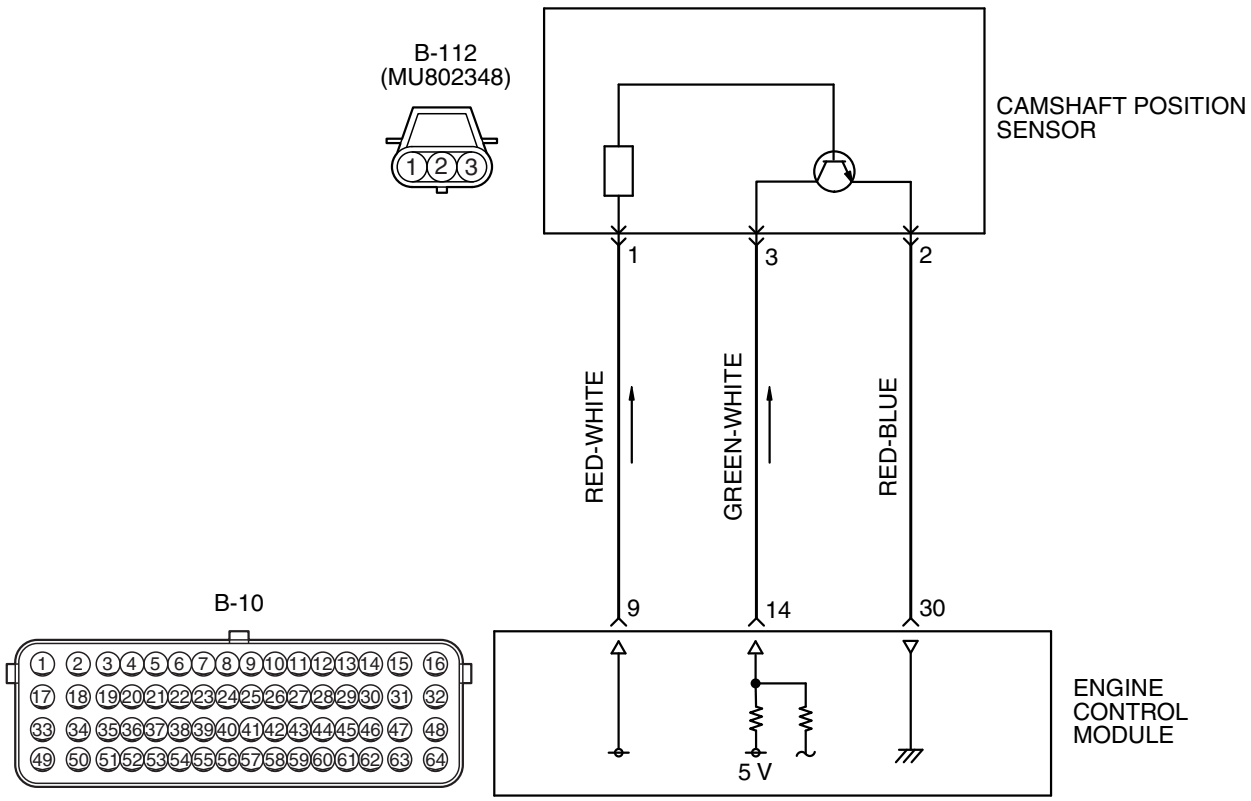
Q: Is DTC P0335 set?

YES : Retry the troubleshooting.

NO : The inspection is complete.

DTC P0340: Camshaft Position Sensor Circuit

CAMSHAFT POSITION SENSOR CIRCUIT



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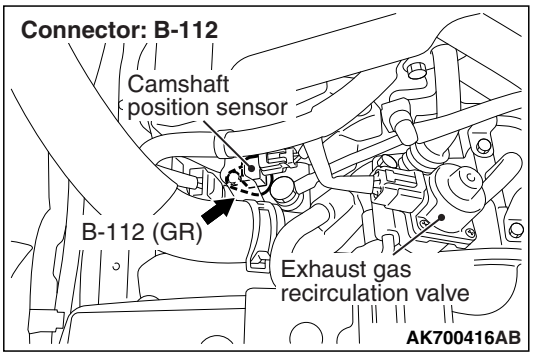
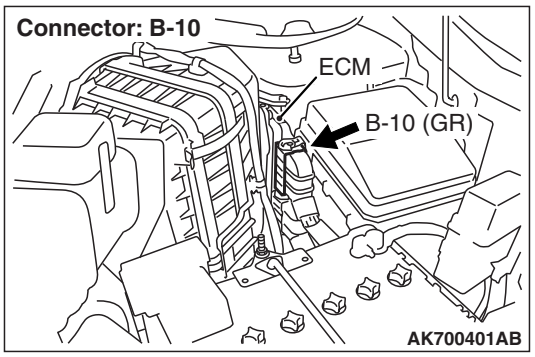




CIRCUIT OPERATION

- The camshaft position sensor power is supplied from the ECM (terminal No. 9).
- Terminal No. 2 of the camshaft position sensor is grounded with ECM (terminal No. 30).
- A 5-volt voltage is applied on the camshaft position sensor output terminal (terminal No. 3) from the ECM (terminal No. 14). The camshaft position sensor generates a pulse signal when the output terminal is opened and grounded.

TECHNICAL DESCRIPTION

- The camshaft position sensor functions to detect the top dead center position of the number 1 cylinder and to convert that data to pulse signals that are input to the ECM.
- When the engine is running, the camshaft position sensor outputs a pulse signal.
- The ECM checks whether pulse signal is input while the engine is cranking.

DESCRIPTIONS OF MONITOR METHODS

- Crankshaft position sensor signal does not change.
- Crankshaft position sensor signal is not normal pattern.

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)

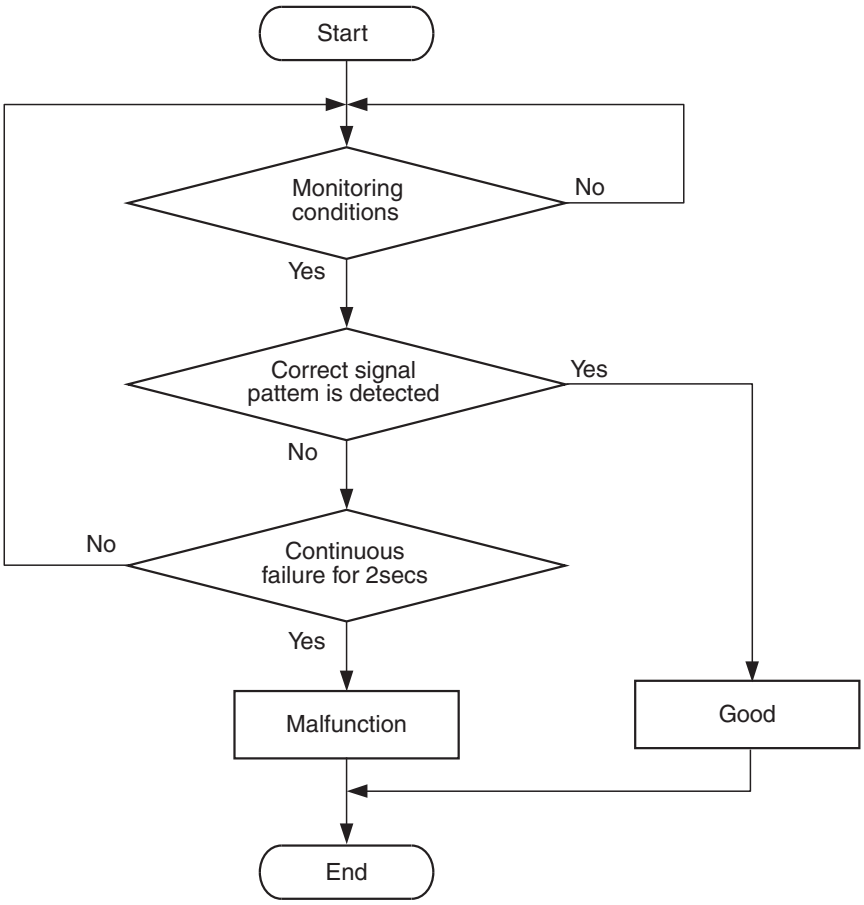
- Not applicable

Sensor (The sensor below is determined to be normal)

- Not applicable

DTC SET CONDITIONS <Range/Performance problem - Alignment>

Logic Flow Chart



AK604335

DTC SET CONDITIONS

Check Condition

- Engine is being cranked.

or

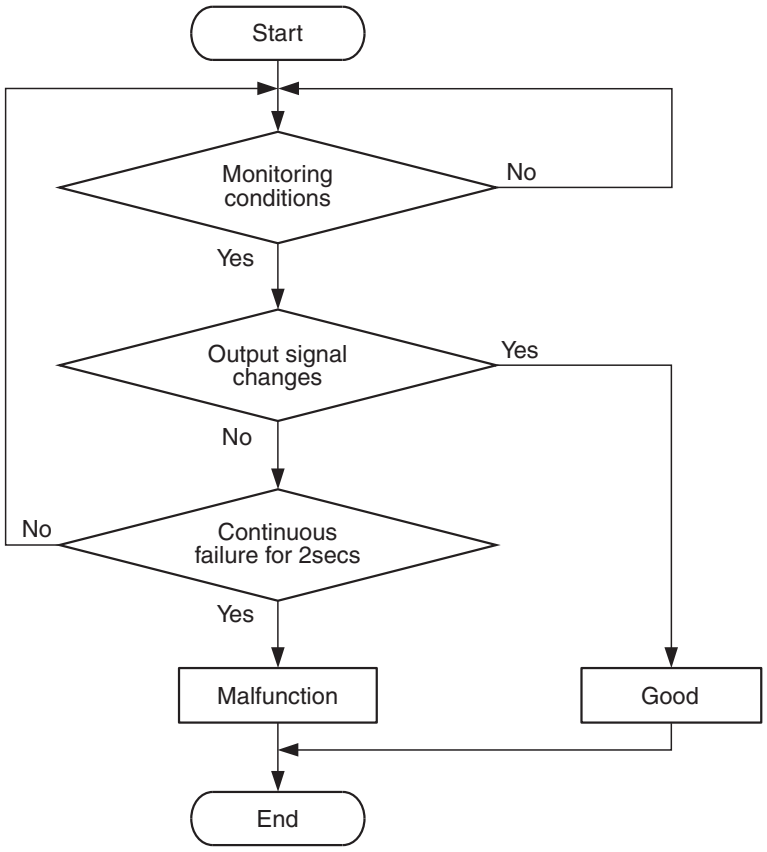
- Engine speed is higher than 500 r/min excluding during cranking.

Judgement Criterion

- Normal signal pattern has not been input for cylinder identification from the crankshaft position sensor signal and camshaft position sensor signal for 2 seconds.

DTC SET CONDITIONS <Range/Performance problem - Circuit continuity>

Logic Flow Chart



AK700485

Check Condition

- Engine is being cranked.

or

- Engine speed is higher than 500 r/min excluding during cranking.

Judgement Criterion

- Camshaft position sensor output voltage has not changed (no pulse signal is input) for 2 seconds.

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function –OBD-II Drive Cycle – Pattern 22 P.13B-11.

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

- Crankshaft position sensor failed.
- Camshaft position sensing cylinder failed.
- Connector damage
- Harness damage
- ECM failed.

DIAGNOSIS

Required Special Tools:
- MB991709: Test Harness
- MB992110: Power Plant ECU Check Harness

STEP 1. Check harness connector B-112 at camshaft position sensor and harness connector B-10 at for damage.

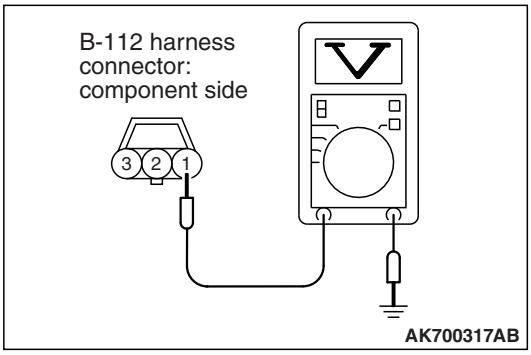
Q: Is the harness connector in good condition?

YES : Go to Step 2.
NO : Repair it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 9.

STEP 2. Measure the sensor supply voltage at camshaft position sensor connector B-112.

(1) Disconnect the connector B-112 and measure at the harness side.
(2) Turn the ignition switch to the "ON" position.
(3) Measure the voltage between terminal No. 1 and ground.
- Voltage should be battery positive voltage.

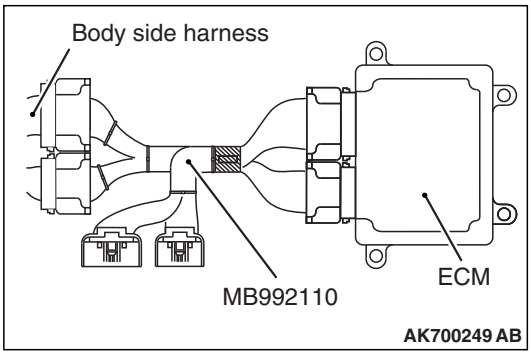
(4) Turn the ignition switch to the "LOCK" (OFF) position.



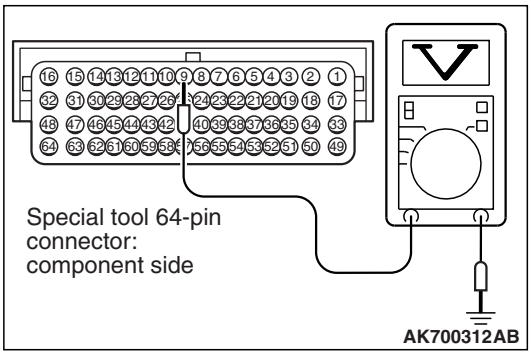
Q: Is battery positive voltage (approximately 12 volts) present?

YES : Go to Step 5.
NO : Go to Step 3.

STEP 3. Measure the sensor supply voltage at ECM connector B-10 by using power plant ECU check harness special tool MB992110.



(1) Disconnect all ECM connectors. Connect the power plant ECU check harness special tool MB992110 between the separated connectors.
(2) Turn the ignition switch to the "ON" position.



(3) Measure the voltage between terminal No. 9 and ground.
- Voltage should be between 4.9 and 5.1 volts.

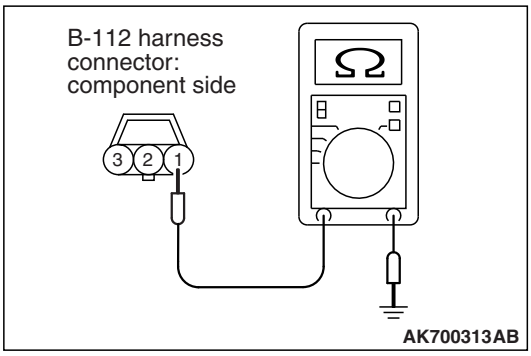
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the measured voltage between 4.9 and 5.1 volts?

YES : Repair harness wire between the camshaft position sensor connector B-112 (terminal No. 1) and the ECM connector B-10 (terminal No. 9) because of open circuit or harness damage. Then go to step 6.

NO : Go to Step 4.

STEP 4. Check for short circuit to ground between the camshaft position sensor connector B-112 and the ECM connector B-10.



(1) Disconnect the camshaft position sensor connector B-112 and the ECM connector B-10.
(2) Check for the camshaft position sensor connector B-112 (terminal No. 1) and ground.
- Not continuity.

Q: Is the harness wire in good condition?

YES : Replace the ECM. When the ECM is replaced, register the ID code. Refer to GROUP 42B, Diagnosis –ID Codes Registration Judgment Table <Vehicles with KOS> P.42B-11 or GROUP 42C, Diagnosis –ID Codes Registration Judgment Table <Vehicles with WCM> P.42C-10. Then go to step 9.

NO : Repair it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 9.

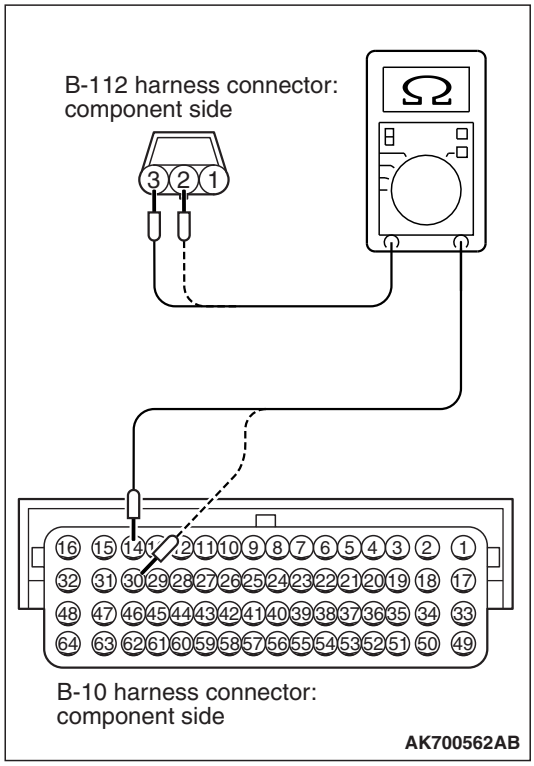
STEP 5. Check for open circuit and short circuit to ground between the camshaft position sensor connector B-112 and the ECM connector B-10.

(1) Disconnect the camshaft position sensor connector B-112 and the ECM connector B-10.

(2) Measure the resistance between the camshaft sensor connector B-112 and the ECM connector B-10.
- Should be less than 2 ohms.

a. Connector B-112 (terminal No. 3) and Connector B-10 (terminal No. 14).

b. Connector B-112 (terminal No. 2) and Connector B-10 (terminal No. 30).

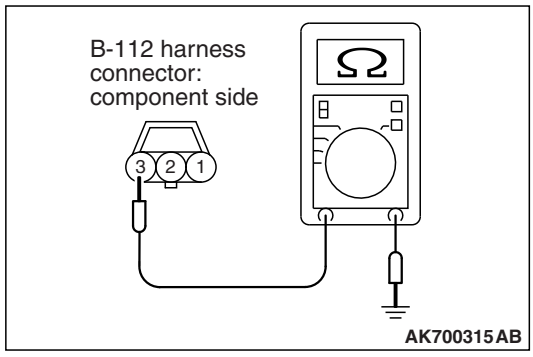


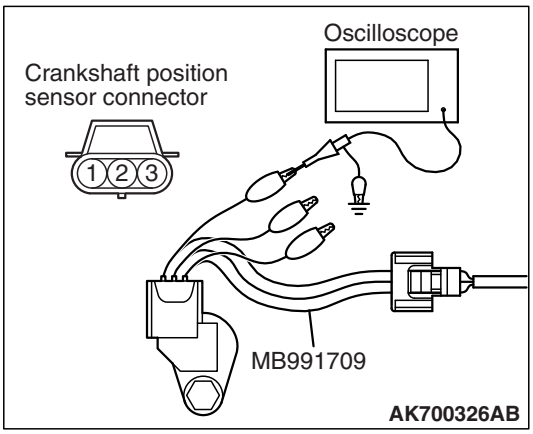
(3) Check for the camshaft position sensor connector B-112 (terminal No. 3) and ground.
- Not continuity.

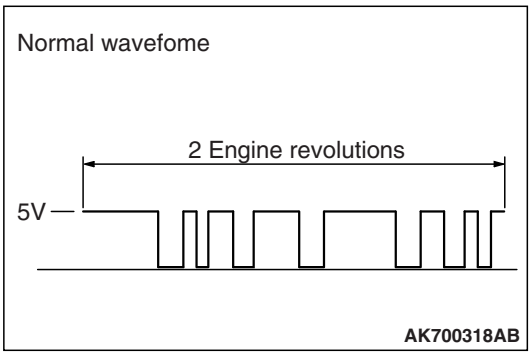
Q: Is the harness wire in good condition?

YES : Go to Step 6.

NO : Repair it. Then go to Step 9.







STEP 6. Using the oscilloscope, check the camshaft position sensor.

(1) Disconnect the camshaft position sensor connector B-112, and connect test harness special tool (MB991709) between the separated connectors (All terminals should be connected).

(2) Connect the oscilloscope probe to the camshaft position sensor side connector terminal No. 3.

NOTE: When measuring with the ECM side connector, disconnect all ECM connectors. Connect the check harness special tool (MB992110) between the separated connectors. then connector the oscilloscope probe to the check harness connector terminal No. 14.

(3) Start the engine and run at idle.

(4) Check the waveform.
- The waveform should show a pattern similar to the illustration.

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

Q: Is the waveform normal?

YES : Go to Step 8.
NO : Go to Step 7.

STEP 7. Check the camshaft position sensing cylinder.

Q: Is the camshaft position sensing cylinder in good condition?

YES : Replace the camshaft position sensor. Then go to Step 8.
NO : Repair it. Then go to Step 8.

STEP 8. Check the trouble symptoms.

(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle –Pattern 22 P.13B-11.

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

Q: Is DTC P0340 set?

YES : Replace the ECM. When the ECM is replaced, register the ID code. Refer to GROUP 42B, Diagnosis –ID Codes Registration Judgment Table <Vehicles with KOS> P.42B-11 or GROUP 42C, Diagnosis –ID Codes Registration Judgment Table <Vehicles with WCM> P.42C-10. Then go to Step 9.
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.00-15.

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STEP 9. 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 22 P.13B-11.

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

Q: Is DTC P0340 set?

YES : Retry the troubleshooting.

NO : The inspection is complete.

DTC P0401: Exhaust Gas Recirculation Flow Insufficient Detected

TECHNICAL DESCRIPTION

- When the EGR valve (stepper motor) is actuated from the fully closed position toward the open position while the engine is running, EGR gas flows.
- The ECM checks how the EGR gas flow signal changes.

DESCRIPTIONS OF MONITOR METHODS

Small manifold pressure change during exhaust gas recirculation (EGR) operation from closed to open.

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)

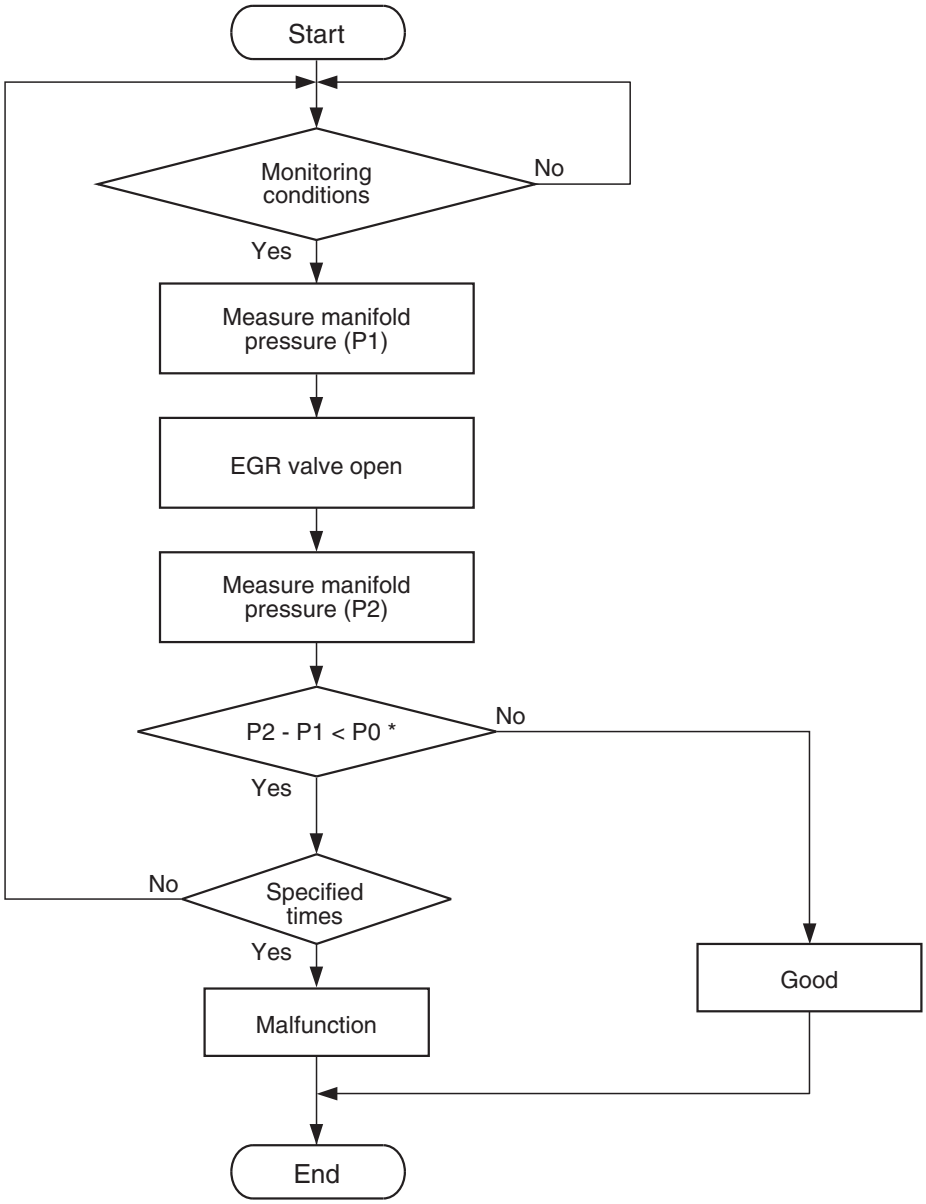
- EGR stepper motor monitor

Sensor (The sensor below is determined to be normal)

- Mass airflow sensor
- Engine coolant temperature sensor
- Intake air temperature sensor
- Barometric pressure sensor
- Manifold absolute pressure sensor
- Accelerator pedal position sensor

DTC SET CONDITIONS

Logic Flow Chart



∗ P0 : Threshold value

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Check Conditions

- At least 15 seconds have passed since the last monitor was complete.
- Engine coolant temperature is higher than 76° C (169° F).
- Engine speed is at between 906 and 2,500 r/min.
- Intake air temperature is higher than −10° C (14° F).
- Barometric pressure is higher than 76 kPa (22.4 in.Hg).
- Fuel is being shut off.
- Vehicle speed is 30 km/h (19 mph) or more.
- At least 90 seconds have passed since manifold absolute pressure sensor output voltage fluctuated 1.5 volts or more.
- Battery positive voltage is higher than 10.3 volts.
- The accelerator pedal is closed.
- Volumetric efficiency is lower than 28 percent.
- The ECM monitors for this condition for 3 cycles of 2.2 seconds each during the drive cycle.

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Judgement Criterion

- When the EGR valve opens to the prescribed opening, when intake manifold pressure fluctuation width is lower than 2.0 kPa (0.59 in.Hg).

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function –OBD-II Drive Cycle – Pattern 3 P.13B-11.

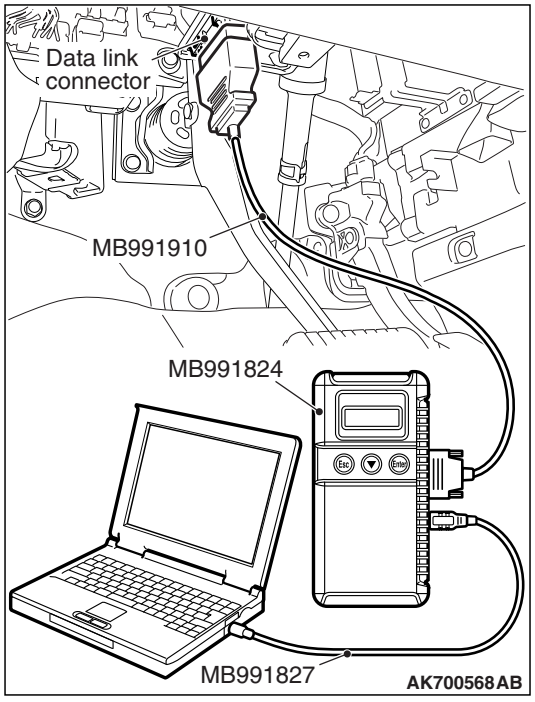
TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)

- EGR valve (stepper motor) failed.
- Open or shorted EGR valve (stepper motor) circuit, or connector damage.
- Manifold absolute pressure sensor failed.
- ECM 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, check data list item 8: Manifold Absolute Pressure 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) Set scan tool MB991958 to the data reading mode for item 8, Manifold Absolute Pressure Sensor.
(4) Warm up the engine to normal operating temperature: 80° C to 95° C (176° F to 203° F).
  - Should be between 16 –36 kPa (4.7 –10.6 in.Hg) at engine idling.
(5) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the sensor operating properly?

YES : Clean the EGR valve and EGR passage. Then go to Step 2.

NO : Refer to DTC P0106 –Manifold Absolute Pressure Sensor Circuit Range/Performance Problem P.13B-137, DTC P0107 –Manifold Absolute Pressure Sensor Circuit Low Input P.13B-143, DTC P0108 – Manifold Absolute Pressure Sensor Circuit High Input P.13B-150.

STEP 2. Check the EGR system

Refer to GROUP 17, Emission Control –Exhaust Gas Recirculation (EGR) System –General Information (Exhaust Gas Recirculation) P.17-81.

Q: Are there any abnormalities?

YES : Repair it. Then go to Step 4.

NO : Go to Step 3.

STEP 3. Check the trouble symptoms.

(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle –Pattern 3 P.13B-11.

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

Q: Is DTC P0401 set?

YES : Replace the ECM. When the ECM is replaced, register the ID code. Refer to GROUP 42B, Diagnosis –ID Codes Registration Judgment Table <Vehicles with KOS> P.42B-11 or GROUP 42C, Diagnosis –ID Codes Registration Judgment Table <Vehicles with WCM> P.42C-10. Then go to Step 4.

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.00-15.

STEP 4. 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 3 P.13B-11.

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

Q: Is DTC P0401 set?

YES : Retry the troubleshooting.

NO : The inspection is complete.

DTC P0421: Warm Up Catalyst Efficiency Below Threshold (bank 1)

TECHNICAL DESCRIPTION

- The signal from the rear heated oxygen sensor differs from the front heated oxygen sensor, because the catalytic converter purifies exhaust gas. When the catalytic converter has deteriorated, the signal from the front heated oxygen sensor becomes similar to the rear heated oxygen sensor.
- The ECM compares the output of the front and rear heated oxygen sensor signals.

DESCRIPTIONS OF MONITOR METHODS

Front and rear heated oxygen sensor rich/lean switching frequencies are nearly equal.

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)

- Heated oxygen sensor (front) monitor
- Heated oxygen sensor (rear) monitor
- Heated oxygen sensor (front) heater monitor
- Heated oxygen sensor (rear) heater monitor
- Heated oxygen sensor (front) inactive monitor
- Heated oxygen sensor offset voltage monitor
- Misfire monitor
- Fuel system monitor
- Air/fuel ratio feedback monitor

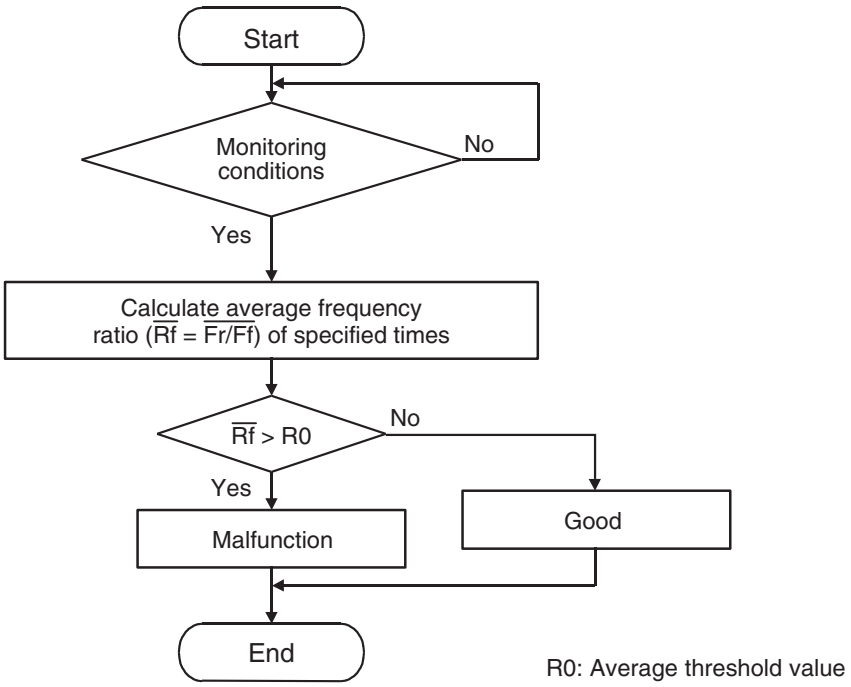
Sensor (The sensor below is determined to be normal)

- Mass airflow sensor
- Engine coolant temperature sensor
- Intake air temperature sensor
- Barometric pressure sensor
- Throttle position sensor
- Accelerator pedal position sensor

TSB Revision

DTC SET CONDITIONS

Logic Flow Chart



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Check Conditions

- Engine speed is lower than 3,500 r/min.
- Accelerator pedal is depressed.
- Mass airflow is between 14 and 41 g/sec.
- More than 3 seconds have elapsed after the above-mentioned three conditions have been met.
- Intake air temperature is higher than −10° C (14° F).
- Barometric pressure is higher than 76 kPa (22.4 in.Hg).
- Under the closed loop air/fuel ratio control.
- Vehicle speed is 1.5 km/h (1.0 mph) or more.
- The ECM monitors for this condition for 5 cycles of 12 seconds each during the drive cycle.
- Short-term fuel trim is higher than −25 percent and lower than +25 percent.
- The cumulative mass airflow is higher than 1,638 g.

Judgement Criteria

- When the right bank heated oxygen sensor (rear) signal frequency is divided by the right bank heated oxygen sensor (front) signal frequency, the average is more than 0.7.
- The right bank heated oxygen sensor (rear) signal frequency divided by the right bank heated oxygen sensor (front) signal frequency is more than 0.2.

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function –OBD-II Drive Cycle – Pattern 4 P.13B-11.

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

- Catalytic converter deteriorated (Exhaust 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. Replace the right bank side catalytic converter.

(1) Replace the catalytic converter.
(2) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle –Pattern 4 P.13B-11.
(3) Check the diagnostic trouble code (DTC).

Q: Is DTC P0421 set?

YES : Replace the ECM. When the ECM is replaced, register the ID code. Refer to GROUP 42B, Diagnosis –ID Codes Registration Judgment Table <Vehicles with KOS> P.42B-11 or GROUP 42C, Diagnosis –ID Codes Registration Judgment Table <Vehicles with WCM> P.42C-10.
NO : The inspection is complete.

DTC P0431: Warm Up Catalyst Efficiency Below Threshold (bank 2)

TECHNICAL DESCRIPTION

- The signal from the rear heated oxygen sensor differs from the front heated oxygen sensor, because the catalytic converter purifies exhaust gas. When the catalytic converter has deteriorated, the signal from the front heated oxygen sensor becomes similar to the rear heated oxygen sensor.
- The ECM compares the output of the front and rear heated oxygen sensor signals.

DESCRIPTIONS OF MONITOR METHODS

Front and rear heated oxygen sensor rich/lean switching frequencies are nearly equal.

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)

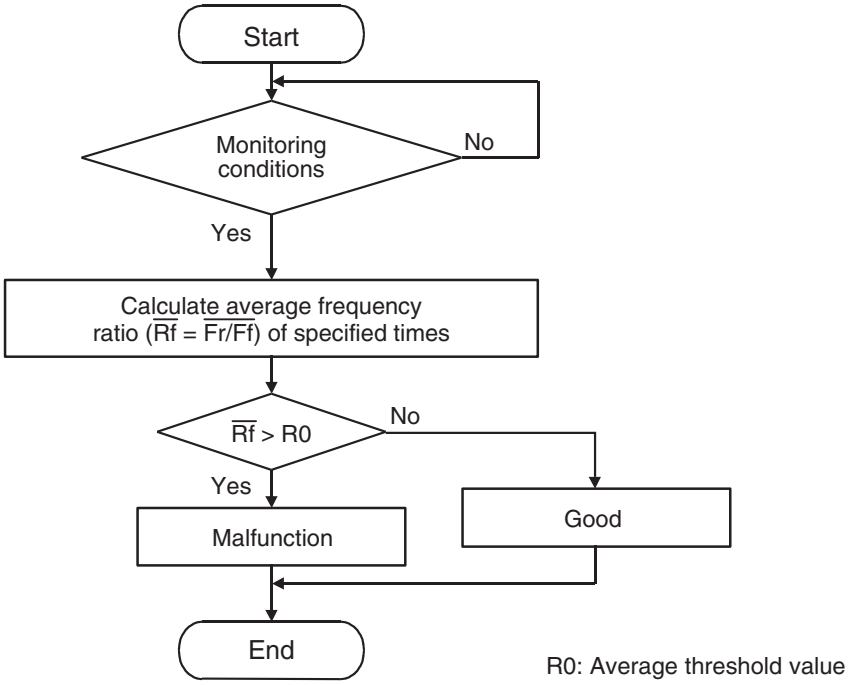
- Heated oxygen sensor (front) monitor
- Heated oxygen sensor (rear) monitor
- Heated oxygen sensor (front) heater monitor
- Heated oxygen sensor (rear) heater monitor
- Heated oxygen sensor (front) inactive monitor
- Heated oxygen sensor offset voltage monitor
- Misfire monitor
- Fuel system monitor
- Air/fuel ratio feedback monitor

Sensor (The sensor below is determined to be normal)

- Mass airflow sensor
- Engine coolant temperature sensor
- Intake air temperature sensor
- Barometric pressure sensor
- Throttle position sensor
- Accelerator pedal position sensor

DTC SET CONDITIONS

Logic Flow Chart



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Check Conditions

- Engine speed is lower than 3,500 r/min.
- Accelerator pedal is depressed.
- Mass airflow is between 14 and 41 g/sec.
- More than 3 seconds have elapsed after the above-mentioned three conditions have been met.
- Intake air temperature is higher than −10° C (14° F).
- Barometric pressure is higher than 76 kPa (22.4 in.Hg).
- Under the closed loop air/fuel ratio control.
- Vehicle speed is 1.5 km/h (1.0 mph) or more.
- The ECM monitors for this condition for 5 cycles of 12 seconds each during the drive cycle.
- Short-term fuel trim is higher than −25 percent and lower than +25 percent.
- The cumulative mass airflow is higher than 1,638 g.

Judgement Criteria

- When the left bank heated oxygen sensor (rear) signal frequency is divided by the left bank heated oxygen sensor (front) signal frequency, the average is more than 0.7.
- The left bank heated oxygen sensor (rear) signal frequency divided by the left bank heated oxygen sensor (front) signal frequency is more than 0.2.

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function –OBD-II Drive Cycle – Pattern 4 P.13B-11.

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

- Catalytic converter deteriorated (Exhaust 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. Replace the left bank side catalytic converter.

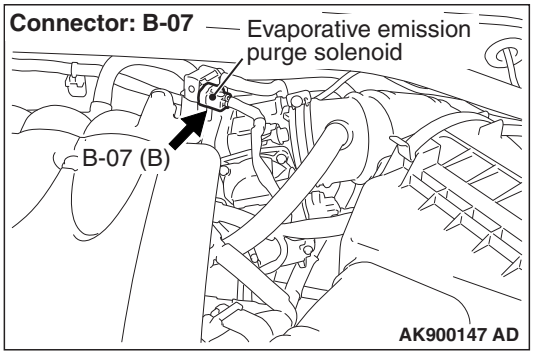
(1) Replace the catalytic converter.
(2) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle –Pattern 4 P.13B-11.
(3) Check the diagnostic trouble code (DTC).

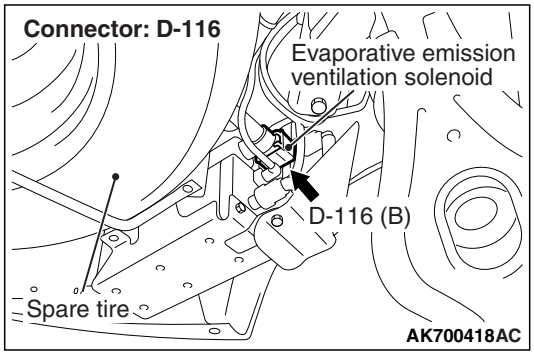
Q: Is DTC P0431 set?

YES : Replace the ECM. When the ECM is replaced, register the ID code. Refer to GROUP 42B, Diagnosis –ID Codes Registration Judgment Table <Vehicles with KOS> P.42B-11 or GROUP 42C, Diagnosis –ID Codes Registration Judgment Table <Vehicles with WCM> P.42C-10.

NO : The inspection is complete.

DTC P0441: Evaporative Emission Control System Incorrect Purge Flow





TECHNICAL DESCRIPTION

- ECM detects a stuck open condition of evaporative emission purge solenoid valve and a stuck closed condition of evaporative emission ventilation solenoid valve by pressure change in fuel tank.
- Stuck open evaporative emission purge solenoid valve is judged through monitoring leak of evaporative emission system.
- Stuck closed evaporative emission ventilation solenoid valve is judged after 20 seconds from end of monitoring leak of evaporative emission system, or of usual operation of evaporative emission purge solenoid from ON to OFF.

DESCRIPTIONS OF MONITOR METHODS

Fuel tank pressure decreases largely during purge-cut.

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)

- Fuel tank pressure sensor monitor

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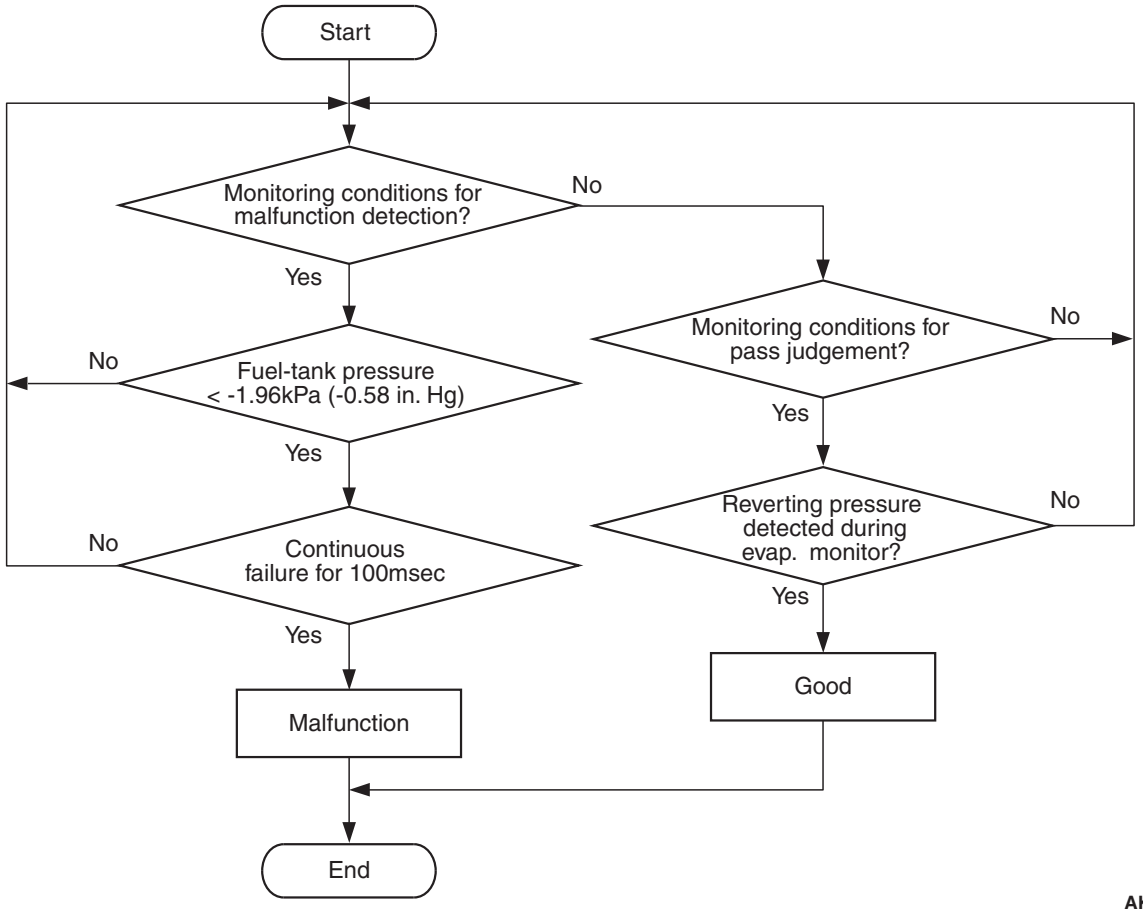
Sensor (The sensor below is determined to be normal)
- Not applicable

DTC SET CONDITION

Logic Flow Chart



Check Conditions
- ON duty cycle of the evaporative emission purge solenoid is 0 percent.
- Engine is running.
- 20 seconds have elapsed since the duty cycle of the evaporative emission purge solenoid has turned to 0 percent.

Judgement Criterion
- The pressure in the fuel tank is –1,961 kPa (–0.58 in.Hg) or less for 0.1 second.

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function –OBD-II Drive Cycle – Pattern 5 P.13B-11.

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

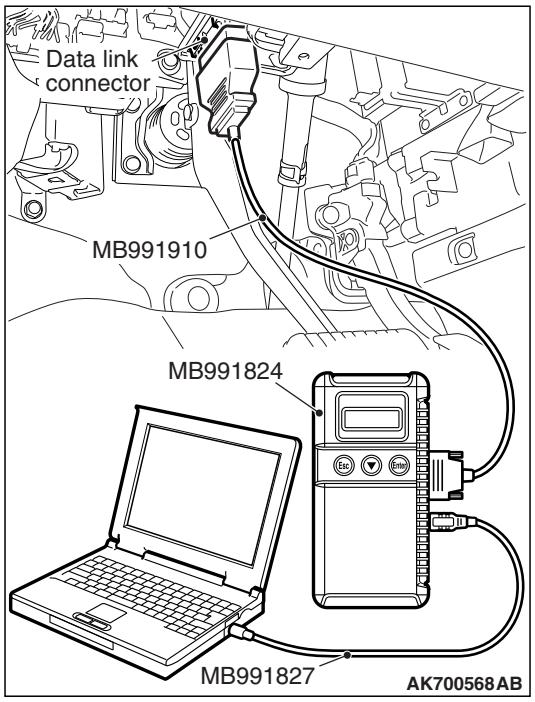
- Evaporative emission purge solenoid failed.
- Evaporative emission ventilation solenoid failed.
- ECM failed.
- Purge line or vapor line seal is leaking.

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 P0451 set?

YES : Refer to DTC P0451 –Evaporative Emission Control System Pressure Sensor Range/Performance P.13B-486.
NO : Go to Step 2.

STEP 2. Using scan tool MB991958, check data list item 52: Fuel Tank Differential Pressure Sensor.

(1) Turn the ignition switch to the "ON" position.
(2) Remove the fuel cap.
(3) Set scan tool MB991958 to the data reading mode for item 52, Fuel Tank Differential Pressure Sensor.
  - The fuel tank differential pressures should be 1,500 and 3,500 millivolts.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the fuel tank pressure between 1,500 and 3,500 millivolts?

YES : Go to Step 3.
NO : Refer to DTC P0451 –Evaporative Emission Control System Pressure Sensor Range/Performance P.13B-486.

STEP 3. Using scan tool MB991958, check actuator test item 10: Evaporative Emission Purge Solenoid.

(1) Turn the ignition switch to the "ON" position.
(2) Set scan tool MB991958 to the actuator test mode for item 10, Evaporative emission purge solenoid.
- An operation sound should be heard and vibration should be felt when the evaporative emission purge solenoid is operated.

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

Q: Is the solenoid operating properly?

YES : Go to Step 4.
NO : Replace the evaporative emission purge solenoid. Then go to Step 6.

STEP 4. Using scan tool MB991958, check actuator test item 15: Evaporative Emission Ventilation Solenoid.

(1) Turn the ignition switch to the "ON" position.
(2) Set scan tool MB991958 to the actuator test mode for item 15, Evaporative emission ventilation solenoid.
- An operation sound should be heard and vibration should be felt when the evaporative emission ventilation solenoid is operated.

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

Q: Is the solenoid operating properly?

YES : Repair or replace the vent hose and air filter. Then go to Step 5.
NO : Replace the evaporative emission ventilation solenoid. Then go to Step 6.

STEP 5. Check the trouble symptoms.

(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle –Pattern 5 P.13B-11.
(2) Check the diagnostic trouble code (DTC).

Q: Is DTC P0441 set?

YES : Replace the ECM. When the ECM is replaced, register the ID code. Refer to GROUP 42B, Diagnosis –ID Codes Registration Judgment Table <Vehicles with KOS> P.42B-11 or GROUP 42C, Diagnosis –ID Codes Registration Judgment Table <Vehicles with WCM> P.42C-10. Then go to Step 6.
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.00-15.

STEP 6. 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 5 P.13B-11.

(2) Read the diagnostic trouble code.

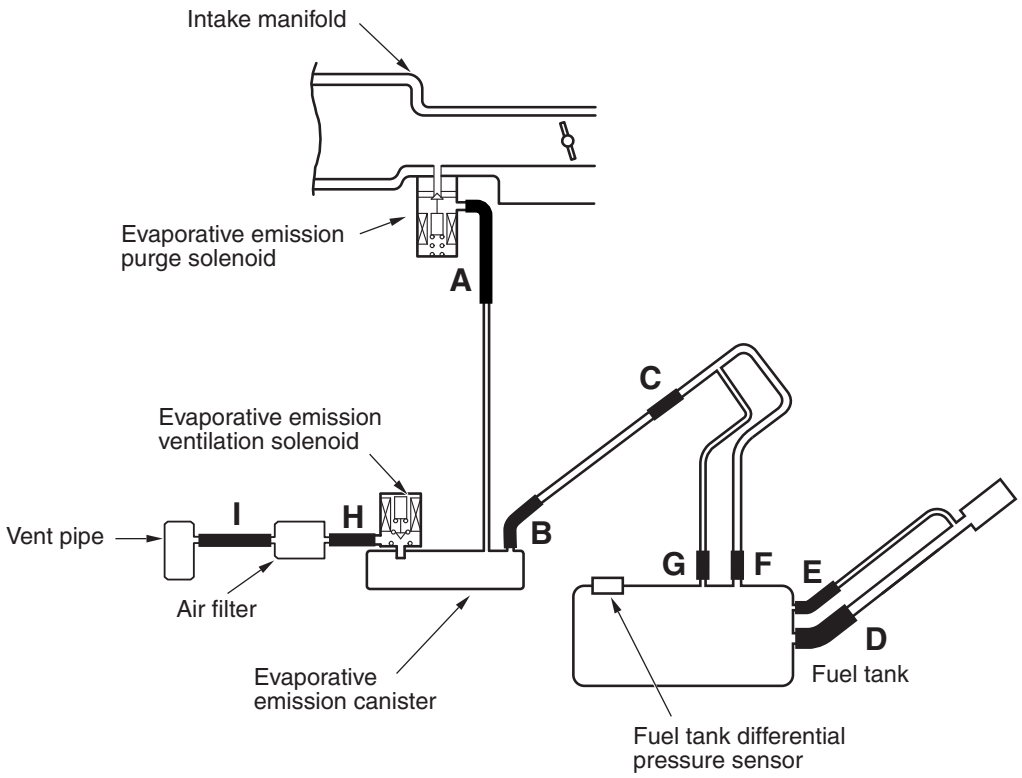
Q: Is DTC P0441 set?

YES : Retry the troubleshooting.

NO : The inspection is complete.

DTC P0442: Evaporative Emission Control System Leak Detected (small leak)

System diagram



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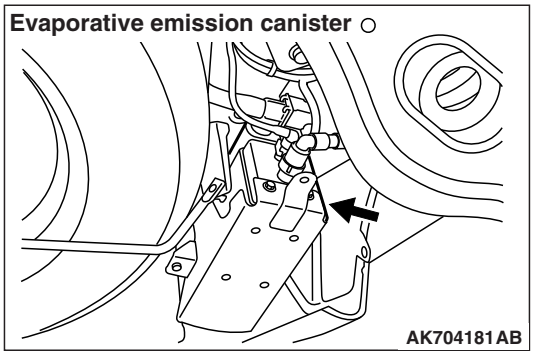
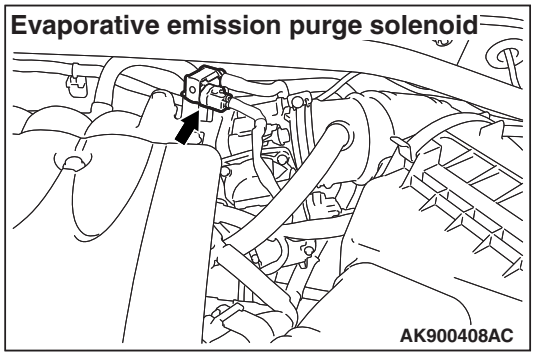
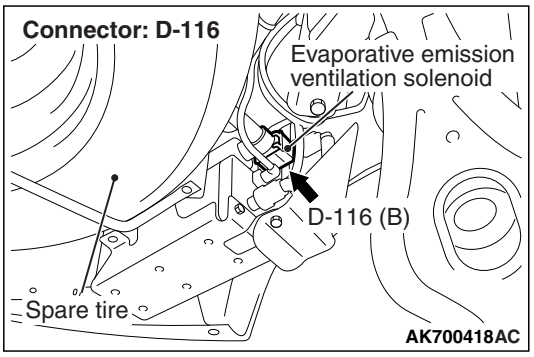




TSB Revision



TECHNICAL DESCRIPTION

- The ECM monitors the Evaporative Emission (EVAP) System pressure.
- The ECM controls the evaporative emission ventilation solenoid. It closes the evaporative emission ventilation solenoid to seal the evaporative emission canister side of the system.
- The evaporative emission purge solenoid is opened to allow manifold vacuum to create low pressure (vacuum) in the EVAP system.
- When the EVAP system develops a vacuum of 2 kPa (0.29 psi), the evaporative emission purge solenoid is closed and the fuel system vacuum is maintained at 2 kPa (0.29 psi).
- The ECM determines whether there is a leak in the EVAP system by monitoring the vacuum inside the fuel tank.
- The test is stopped when fuel vapor pressure exceeds predetermined limits.

DESCRIPTIONS OF MONITOR METHODS

- Measure reverting pressure after depressurizing by intake manifold negative pressure and detect malfunction if reverting pressure rises largely.

MONITOR EXECUTION

- Once per driving cycle.

MONITOR EXECUTION CONDITIONS (OTHER MONITOR AND SENSOR)

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

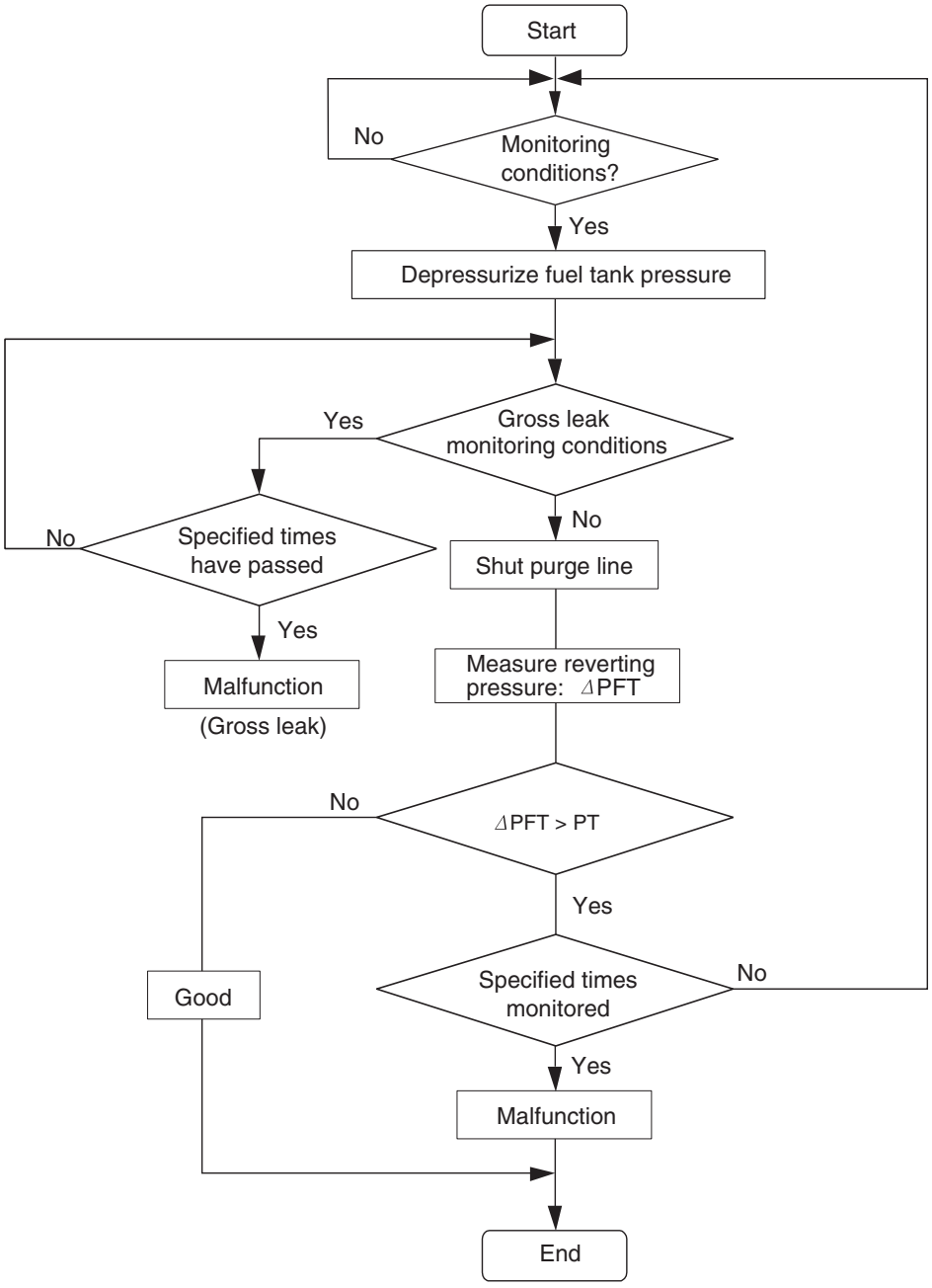
- Evaporative emission purge solenoid monitor
- Evaporative emission purge system monitor
- Fuel tank differential pressure sensor monitor
- Evaporative emission ventilation solenoid monitor
- Fuel level sensor monitor
- Fuel temperature sensor monitor

Sensor (The sensors below are determined to be normal)

- Mass airflow sensor
- Barometric pressure sensor
- Intake air temperature sensor
- Engine coolant temperature sensor

DTC SET CONDITIONS

Logic Flow Chart (Monitor Sequence)



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Check Conditions

- Amount of remaining fuel is 15 –40 percent of capacity when the engine is started.
- Engine coolant temperature is less than 36° C (97° F) when the engine is started.
- Intake air temperature is less than 36° C (97° F) when the engine is started.
- Engine coolant temperature is more than 60° C (140° F).
- Intake air temperature is more than –10° C (14° F).
- Fuel temperature is less than 36° C (97° F).
- Power steering pressure switch: "OFF"
- When the evaporative emission purge solenoid and evaporative emission ventilation solenoid are closed, the change of the pressure in the fuel tank is less than 451 Pa (0.13 in.Hg).
- The pressure fluctuation is less than 647 Pa (0.19 in.Hg).

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- Barometric pressure is more than 76 kPa (22.4 in.Hg).
- Vehicle speed is more than 20 km/h (12 mph).
- Fuel tank differential pressure sensor output voltage is between 1.0 and 4.0 volts.
- At least 10 seconds have passed since the last monitor was complete.
- Monitoring time: 75 –125 seconds

Judgement Criterion

- Internal pressure of the fuel tank has changed more than 1,010 Pa (0.29 in.Hg) in 20 seconds after the tank and vapor lines were closed.

  NOTE:
  - *The monitoring time (75 –125 seconds) depends on the fuel level and the temperature in the fuel tank.*
  - *The next monitoring occurs at least 10 seconds later.*

Check Conditions

- Amount of remaining fuel is 40 –85 percent of capacity when the engine is started.
- Engine coolant temperature is less than 36° C (97° F) when the engine is started.
- Intake air temperature is less than 36° C (97° F) when the engine is started.
- Engine coolant temperature is more than 20° C (68° F).
- Intake air temperature is more than –10° C (14° F).
- Fuel temperature is less than 36° C (97° F).
- When the evaporative emission purge solenoid and evaporative emission ventilation solenoid are closed, the change of the pressure in the fuel tank is less than 324 Pa (0.09 in.Hg).
- Barometric pressure is more than 76 kPa (22.4 in.Hg).
- Fuel tank differential pressure sensor output voltage is between 1.0 and 4.0 volts.
- At least 10 seconds have passed since the last monitor was complete.
- Monitoring time: 10 –14 minutes

Judgement Criterion

- Internal pressure of the fuel tank has changed more than 1,922 Pa (0.56 in.Hg) in 88 seconds after the tank and vapor lines were closed.

  NOTE:
  - *The monitoring time (10 –14 minutes) depends on the fuel level and the temperature in the fuel tank.*
  - *The next monitoring occurs at least 10 seconds later.*

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function –OBD-II Drive Cycle – Pattern 5 P.13B-11.

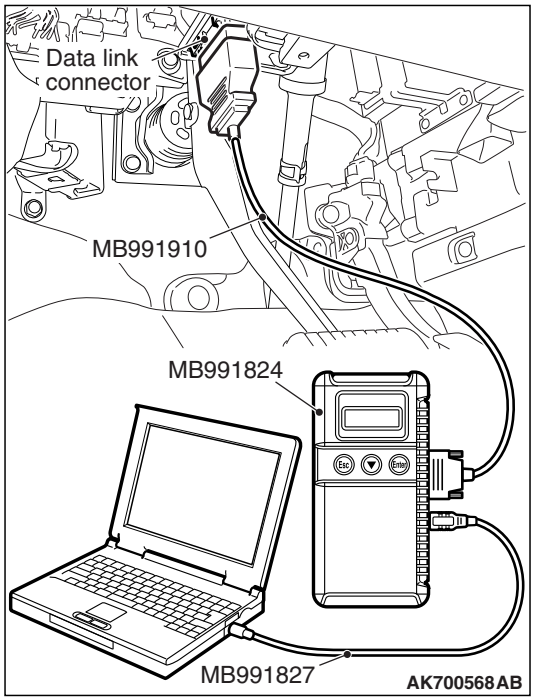
TROUBLESHOOTING HINTS (THE MOST LIKELY CAUSES FOR THIS CODE TO BE SET ARE:)

- Loose fuel cap.
- Fuel cap relief pressure is incorrect.
- Evaporative emission canister seal is leaking.
- Fuel tank, purge line or vapor line seal is leaking.
- Evaporative emission ventilation solenoid does not seal.

DIAGNOSIS

Required Special Tools:

- 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



STEP 1. Using scan tool MB991958, check the evaporative emission system monitor test.

⚠ CAUTION

- **To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.**
- **During this test, the ECM will automatically increase the engine speed to 1,600 r/min or greater. Check that the transaxle is set to "P" position.**

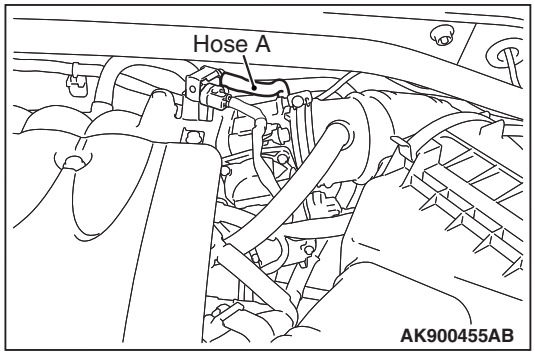
(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Erase the DTCs using scan tool MB991958.
(4) Check that the fuel cap is securely closed (Tighten until three clicks are heard).
(5) Start the engine.
(6) Select "System Test."
(7) Select "Evap Leak Mon."
(8) During this test, keep the accelerator pedal at the idle position.
(9) Keep the engine speed and engine load within the specified range. When the monitor test starts, the "In Progress" item on scan tool MB991958 will change from "NO" to "YES".
(10) Turn the ignition switch to the "LOCK" (OFF) position, and disconnect scan tool MB991958.

Q: Is "Evap Leak was detected." displayed on scan tool MB991958?

YES : A malfunction has been detected during the monitor test. Refer to the Diagnostic Trouble Code Chart and diagnose any other DTCs that are set P.13B-51. If no other DTC's have been set, go to Step 2 .

NO <"Evap Leak Monitor test passed" is displayed on scan tool MB991958.> : The evaporative emission system is working properly at this time. Explain to the customer that an improperly tightened fuel cap can cause the MIL to illuminate. Return the vehicle to the customer.

NO <"Evap Leak Monitor discontinued. Once turn the IG off then retest again from the beginning." is displayed on scan tool MB991958.> : The EVAP monitor has been interrupted during the test. Turn the ignition switch to the "LOCK" (OFF) position once, and repeat the monitoring from Step 1 .



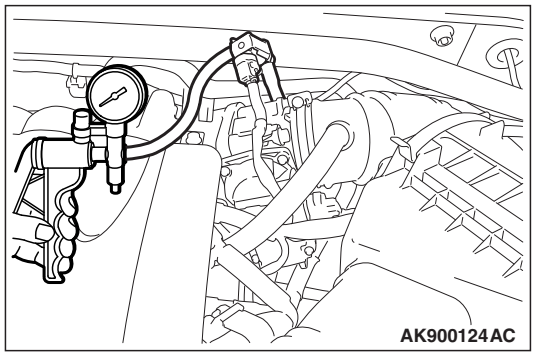
STEP 2. Check for leaks in evaporative emission hose A.

(1) Use a hand vacuum pump to check the hose A.

Q: Do the hose hold vacuum?

YES : Go to Step 3 .

NO : Replace the hose. Then go to Step 12 .



STEP 3. Check the evaporative emission purge solenoid for leaks.

(1) Remove the evaporative emission purge solenoid from the intake manifold.

(2) Connect the hose of the hand vacuum pump to the intake manifold side nipple of the evaporative emission purge solenoid.

(3) Use the hand vacuum pump to confirm that the evaporative emission purge solenoid holds vacuum.

(4) Replace the O-ring of evaporative emission purge solenoid with the new one. Apply a small amount of new engine oil to the O-ring.

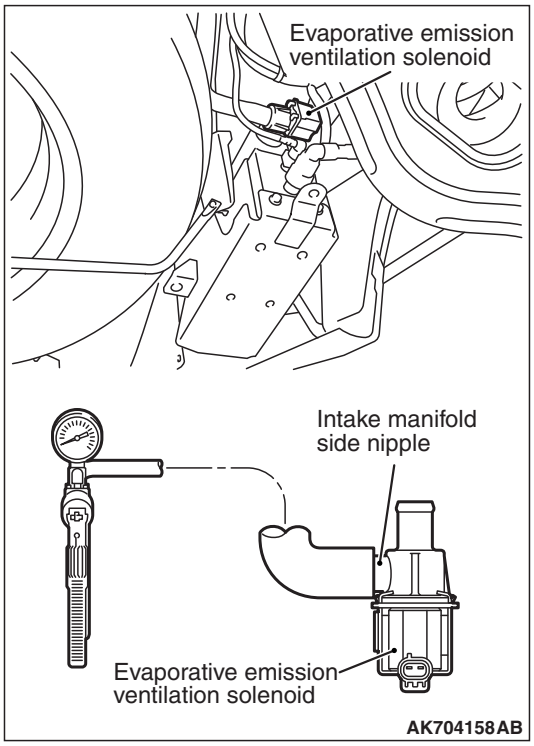
(5) Tighten the mounting bolts of evaporative emission purge solenoid to the specified torque.

Tightening torque: 5.0 ± 1.0 N· m

Q: Does the evaporative emission purge solenoid hold pressure?

YES : Go to Step 4 .

NO : Replace the evaporative emission purge solenoid. Then go to Step 12 .



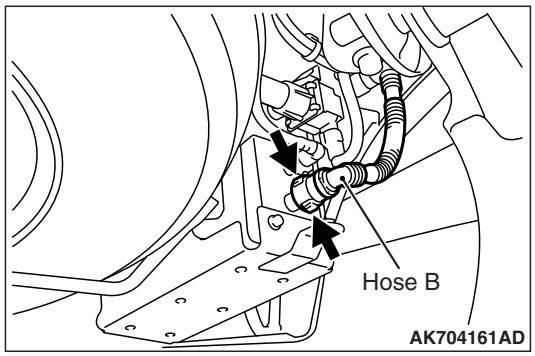
STEP 4. Using scan tool MB991958, check actuator test item 15: Evaporative emission ventilation solenoid.

(1) Remove the canister cover.
(2) Remove the evaporative emission ventilation solenoid. Do not disconnect the connector.
(3) Connect the hose of the hand vacuum pump to the canister side nipple of the evaporative emission ventilation solenoid.
(4) Turn the ignition switch to the "ON" position.
(5) Set scan tool MB991958 to actuator testing mode for item 15: Evaporative Emission Ventilation Solenoid.
  - While the evaporative emission ventilation solenoid is energized, operate the hand vacuum pump and confirm that the solenoid holds vacuum.
(6) Turn the ignition switch to the "LOCK" (OFF) position.
(7) Disconnect the hand vacuum pump, and reinstall the evaporative emission ventilation solenoid.
(8) Reinstall the canister cover.

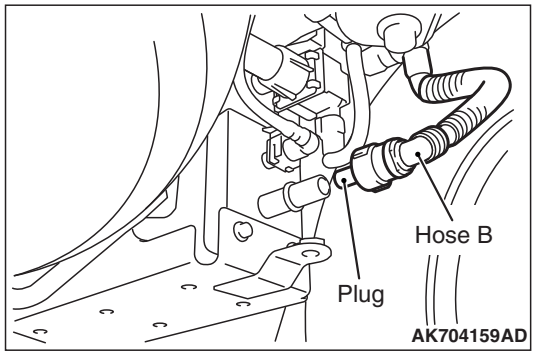
Q: Did the evaporative emission ventilation solenoid hold vacuum?

YES : Go to Step 5 .
NO : Replace the evaporative emission ventilation solenoid (Refer to GROUP 17, Evaporative emission canister and fuel tank pressure relief valve removal and installation P.17-88).Then go to Step 12 .

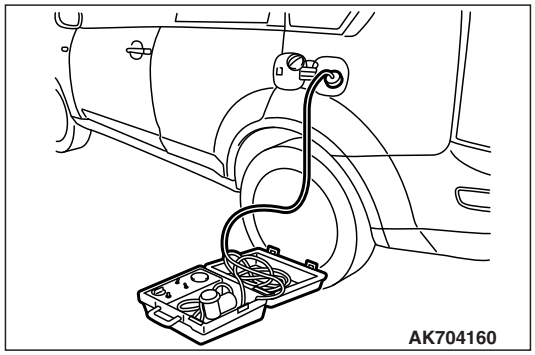
STEP 5. Perform the pressure test on the evaporative emission system.



(1) Disconnect hose B from the canister while holding the release buttons indicated in the illustration pressed by fingers.



(2) Plug the disconnected end of hose B.
(3) Confirm that the evaporative emission system pressure pump (Miller number 6872A) is operating properly. Perform the self-test as described in the pump manufacturer's instructions.
(4) Remove the fuel cap.



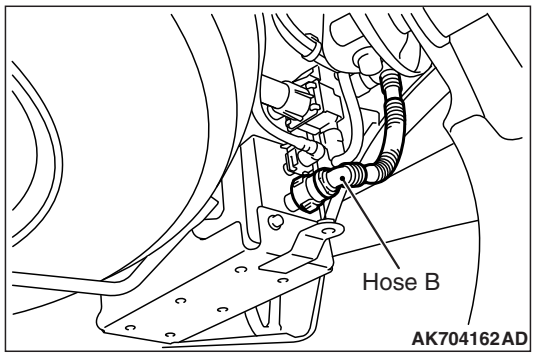
(5) Connect the evaporative emission system pressure pump (Miller number 6872A) to the fuel tank filler tube by using fuel tank adapter (MLR-8382).
(6) Pressure test the system to determine whether any leaks are present.

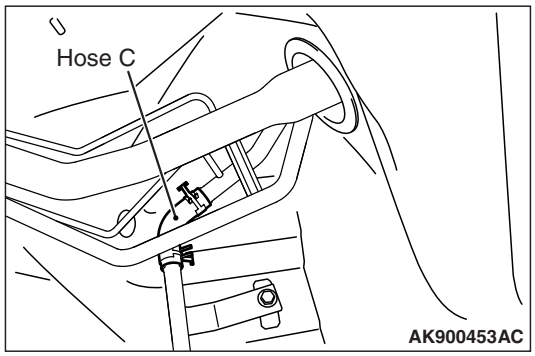
NOTE: The "Pressure test" in this procedure refers to the I/M240 Simulation Test. The eight steps of this test are described in the manufacturer's instructions for the evaporative emission system pressure pump, Miller number 6872A.

(7) Remove the evaporative emission system pressure pump (Miller number 6872A) and the fuel tank adapter (MLR-8382), and reinstall the fuel cap.
(8) Connect hose C to the evaporative emission canister.

Q: Is the evaporative emission system line free of leaks?

YES : Go to Step 10 .
NO : Go to Step 6 .





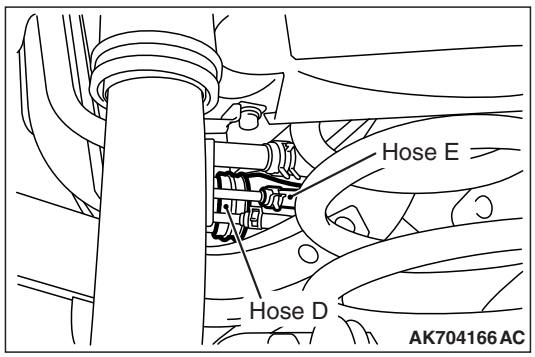
STEP 6. Check for leaks in evaporative emission hoses B and C.

Use a hand vacuum pump to test each hose B and C.

Q: Do the hoses hold vacuum?

YES : Go to Step 7 .

NO : Replace any damaged hose. Then go to Step 12 .



STEP 7. Check for leaks in evaporative emission hoses D and E.

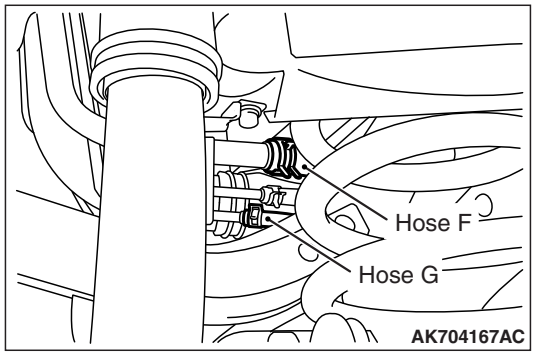
(1) Remove the fuel tank assembly (Refer to GROUP 13C, Fuel Tank <FWD> P.13C-15 or Fuel Tank <AWD> P.13C-20).

(2) Use a hand vacuum pump to test each hose D and E.

Q: Do the hoses hold vacuum?

YES : Go to Step 8 .

NO : Replace any damaged hose. Then go to Step 12 .



STEP 8. Check for leaks in evaporative emission hose F and G.

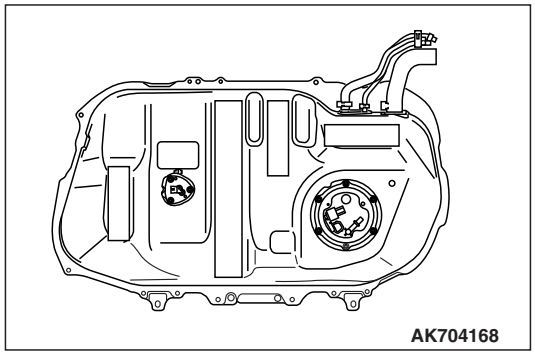
(1) Remove the fuel tank assembly (Refer to GROUP 13C, Fuel Tank <FWD> P.13C-15 or Fuel Tank <AWD> P.13C-20).

(2) Use a hand vacuum pump to test each hose F and G.

Q: Do the hose hold vacuum?

YES : Go to Step 9 .

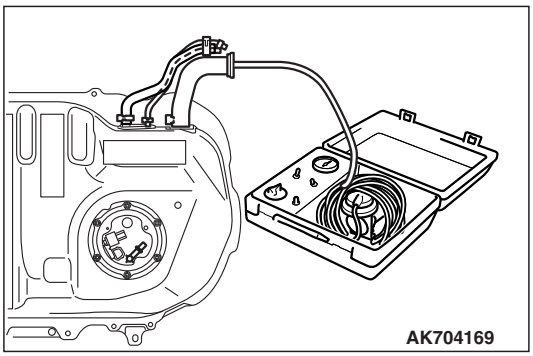
NO : Replace any damaged hose. Then go to Step 12 .



STEP 9. Check for leaks in the fuel tank.

(1) Visually check for cracks or other leaks in the fuel tank.

NOTE: Carefully check the fuel pump module and the fuel tank differential pressure sensor installation in the fuel tank.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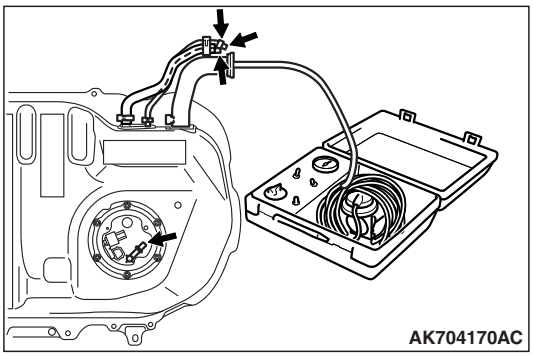
(2) Connect the evaporative emission system pressure pump (Miller number 6872A) to the fuel filler hose.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(3) Plug the hose and the nipple shown in the illustration.

NOTE: If these items are not securely plugged now, the fuel could leak in the next step.

(4) Pressurize the fuel tank with the evaporative emission system pressure pump.
(5) In the pressurized state, check for leaks by applying a soapy water solution to each section and look for bubbles.

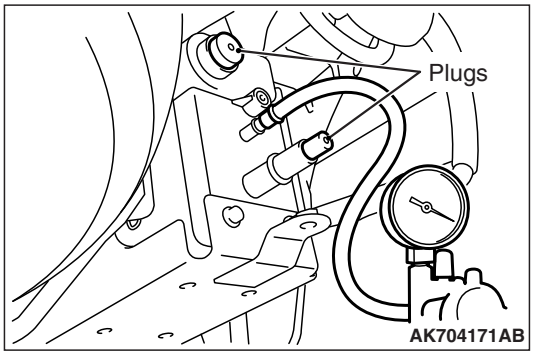
Q: Are any leaks found?

YES <When there is a leak from the attachment points of the fuel pump module, fuel tank differential pressure sensor, fuel level sensor (sub) or leveling valve.> : Repair or replace the leaked parts and check again that there are no leaks. Then reinstall the fuel tank (Refer to GROUP 13C, Fuel Tank <FWD> P.13C-15 or Fuel Tank <AWD> P.13C-20). Then go to Step 12 .

YES <When there is a leak from the fuel tank.> : Replace the fuel tank (Refer to GROUP 13C, Fuel Tank <FWD> P.13C-15 or Fuel Tank <AWD> P.13C-20). Go to Step 12

NO : When there is no leak, reinstall the fuel tank (Refer to GROUP 13C, Fuel Tank <FWD> P.13C-15 or Fuel Tank <AWD> P.13C-20). Then go to Step 11 .

STEP 10. Check the evaporative emission canister for vacuum leaks.



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(1) Connect a hand vacuum pump to the evaporative emission canister and plug the other nipples.
(2) Apply a pressure on the hand vacuum pump, and confirm that air is maintained.
(3) Disconnect the hand vacuum pump and remove the plugs.

Q: Is the evaporative emission canister in good condition?

YES : Go to Step 11 .

NO : Replace the evaporative emission canister (Refer to GROUP 17, Evaporative emission canister and fuel tank pressure relief valve removal and installation P.17-88). Then go to Step 12 .

STEP 11. Using scan tool MB991958, check the evaporative emission system monitor test.

⚠ CAUTION

- **During this test, the ECM automatically increases the engine speed to 1,600 r/min or greater. Check that the transaxle is set to "P" position.**

(1) Turn the ignition switch to the "ON" position.
(2) Erase the DTCs using scan tool MB991958.
(3) Check that the fuel cap is securely closed (Tighten until three clicks are heard).
(4) Start the engine.
(5) Select "System Test."
(6) Select "Evap Leak Mon."
(7) During the test, keep the accelerator pedal at the idle position.
(8) Keep the engine speed and engine load within the specified range. When the monitor test starts, the "In Progress" item on scan tool MB991958 will change from "NO" to "YES".
(9) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is "Evap Leak was detected." displayed on scan tool MB991958?

YES : Replace the ECM. When the ECM is replaced, register the ID code. Refer to GROUP 42B, Diagnosis –ID Code Registration Judgment Table <Vehicles with KOS> P.42B-11 or GROUP 42C, Diagnosis –ID Code Registration Judgment Table <Vehicles with WCM> P.42C-10. Then go to Step 12 .

NO <"Evap Leak Monitor test passed" is displayed on scan tool MB991958.> : The evaporative emission system is working properly at this time. Go to Step 12 .

NO <"Evap Leak Monitor discontinued. Once turn the IG off then retest again from the beginning." is displayed on scan tool MB991958.> : The EVAP monitor has been interrupted during the test. Turn the ignition switch to the "LOCK" (OFF) position once, and repeat the monitoring from Step 11 .

STEP 12. Perform the OBD-II drive cycle.

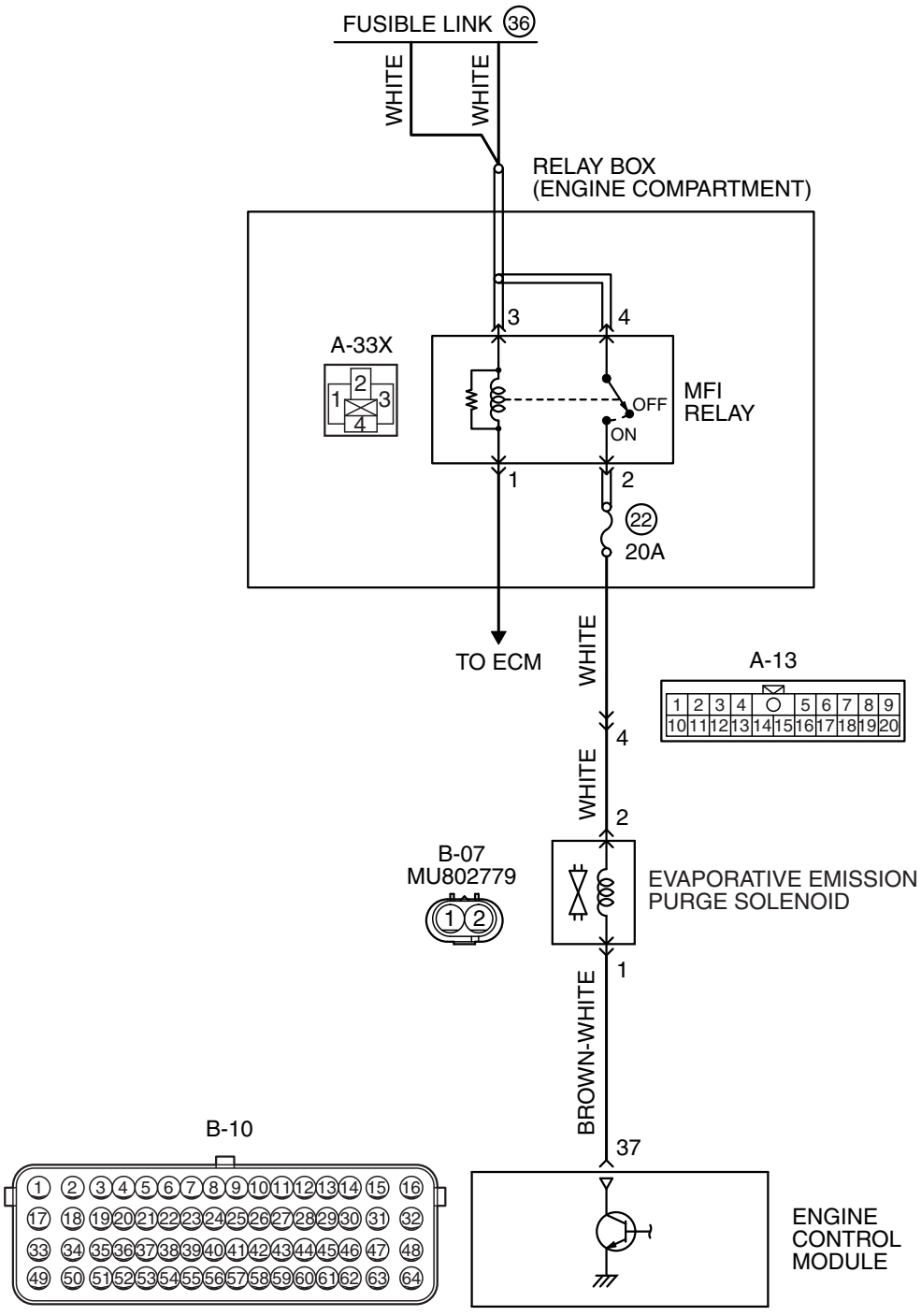
(1) Confirm the repair by performing the appropriate drive cycle (Refer to Diagnostic Function –OBD-II Drive Cycle –Pattern 5 P.13B-11).
(2) Read the DTC.

Q: Is DTC P0442 set?

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

DTC P0443: Evaporative Emission Control System Purge Control Valve Circuit

EVAPORATIVE EMISSION PURGE SOLENOID CIRCUIT



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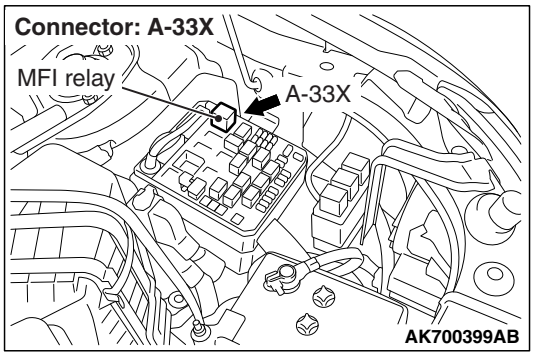
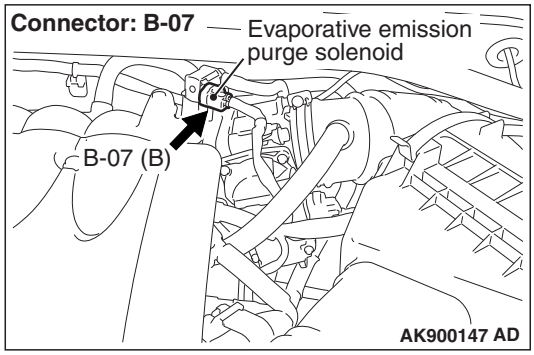
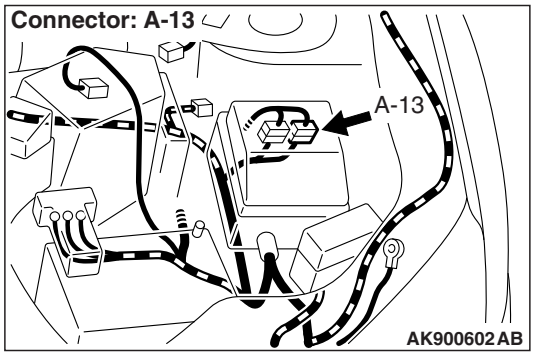
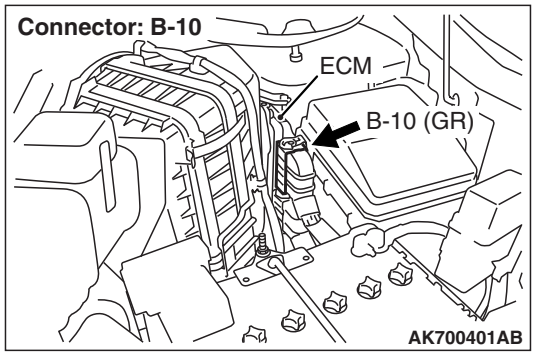








CIRCUIT OPERATION

- The evaporative emission purge solenoid power is supplied from the MFI relay (terminal No. 2).
- The ECM controls ground evaporative emission purge solenoid by turning the power transistor in the ECM "ON" and "OFF".

TECHNICAL DESCRIPTION

- To judge if there is open circuit in the evaporative emission purge solenoid drive circuit, the ECM measures the surge voltage of the evaporative emission purge solenoid coil.

DESCRIPTIONS OF MONITOR METHODS

Off-surge does not occur after solenoid is operated from on to off.

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)

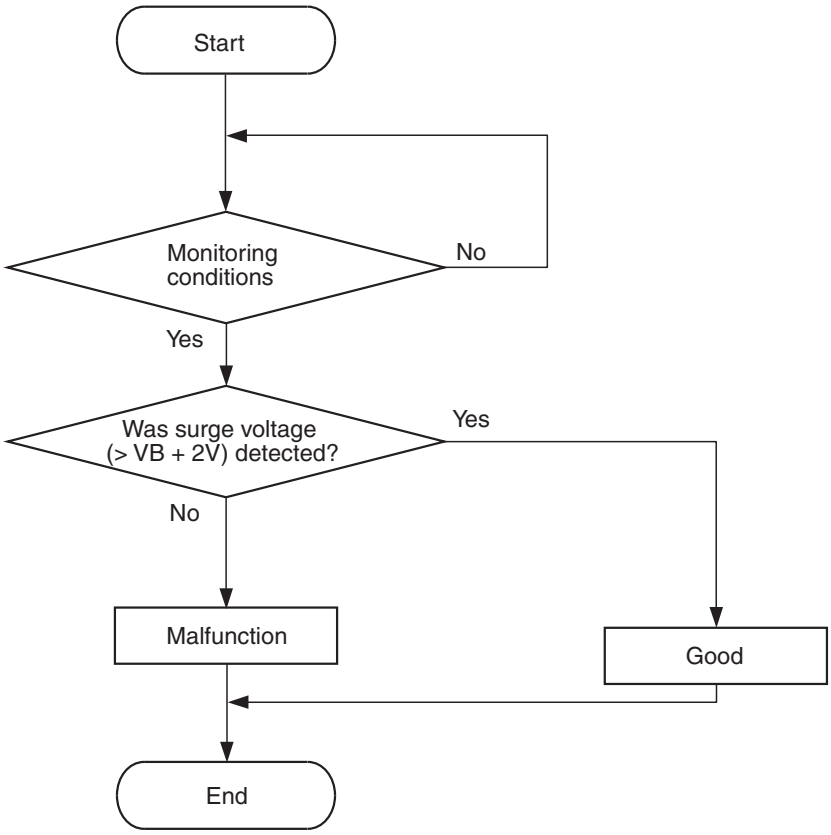
- Not applicable

Sensor (The sensor below is determined to be normal)

- Not applicable

DTC SET CONDITIONS

Logic Flow Chart



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Check Conditions
- Engine is being cranked.
- Battery positive voltage is between 10 and 16.5 volts.

Judgement Criteria
- The evaporative emission purge solenoid coil surge voltage (battery positive voltage + 2 volts) is not detected for 0.2 second.
- The ECM monitors for this condition once during the drive cycle.

Check Conditions
- Battery positive voltage is between 10 and 16.5 volts.
- ON duty cycle of the evaporative emission purge solenoid is between 10 and 90 percent.
- Evaporative emission ventilation solenoid is off.
- More than 1 second has elapsed after the above mentioned conditions have been met.

Judgement Criterion
- The evaporative emission purge solenoid coil surge voltage (battery positive voltage + 2 volts) is not detected for 1 second after the evaporative emission purge solenoid is turned off.

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function –OBD-II Drive Cycle – Pattern 22 P.13B-11.

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

- Evaporative emission purge solenoid failed.
- Harness damage
- Connector damage
- ECM failed.

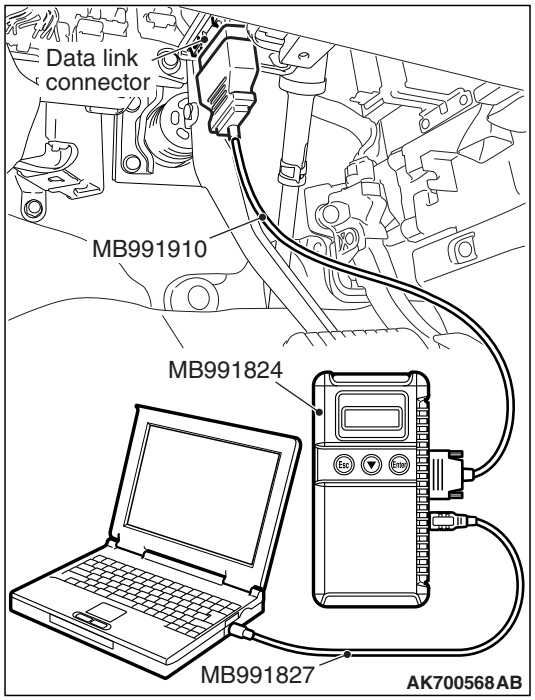
TSB Revision

DIAGNOSIS

Required Special Tools:

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

STEP 1. Using scan tool MB991958, check actuator test item 10: Evaporative Emission Purge Solenoid.



⚠ 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 10, Evaporative emission purge solenoid.
  - An operation sound should be heard and vibration should be felt when the evaporative emission purge solenoid is operated.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

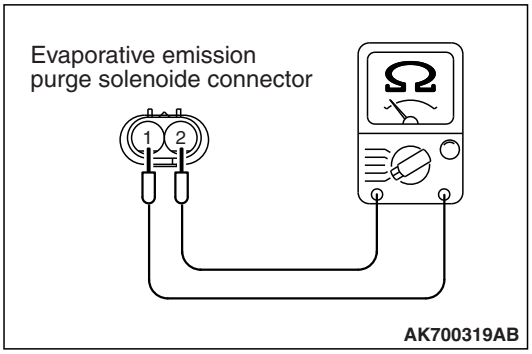
Q: Is the solenoid operating properly?

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.00-15.
NO : Go to Step 2.

STEP 2. Check harness connector A-33X at the MFI relay and harness connector B-07 at the evaporative emission purge solenoid and harness connector B-10 at the ECM for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 3.
NO : Repair it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 7.



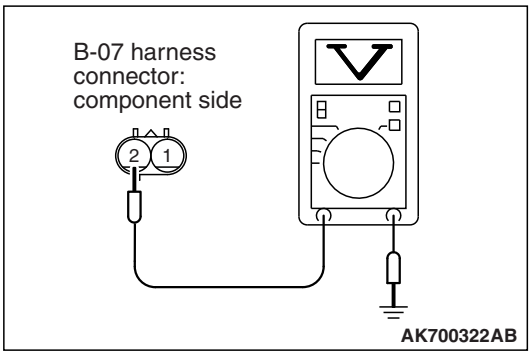
STEP 3. Check the evaporative emission purge solenoid.

(1) Disconnect the evaporative emission purge solenoid connector B-07.
(2) Measure the resistance between evaporative emission purge solenoid side connector terminal No. 1 and No. 2.

Standard value: 22 – 26 Ω [at 20° C (68° F)]

Q: Is the measured resistance between 22 and 26 ohms [at 20° C (68° F)]?

YES : Go to Step 4.
NO : Replace the evaporative emission purge solenoid. Then go to Step 7.



STEP 4. Measure the power supply voltage at the evaporative emission purge solenoid connector B-07.

(1) Disconnect the evaporative emission purge solenoid connector B-07 and measure at the harness side.
(2) Turn the ignition switch to the "ON" position.
(3) Measure the voltage between terminal No. 2 and ground.
    • Voltage should be battery positive voltage.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

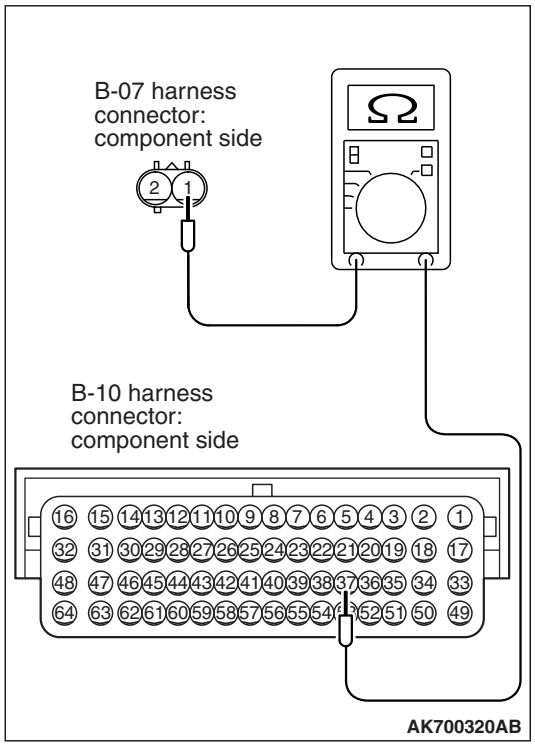
Q: Is the measured voltage between 4.9 and 5.1 volts?

YES : Go to Step 5.
NO : Repair it. Then go to Step 7.

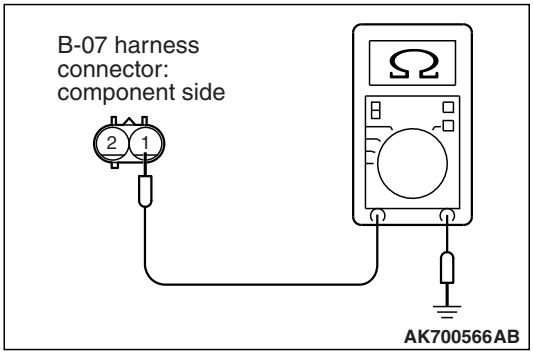
STEP 5. Check for open circuit and short circuit to ground and harness damage between the evaporative emission purge solenoid connector B-07 and the ECM connector B-10.

(1) Disconnect the evaporative emission purge solenoid connector B-07 and the ECM connector B-10.

(2) Measure the evaporative emission purge solenoid connector B-07 (terminal No. 1) and the ECM connector B-10 (terminal No. 37).
- Should be less than 2 ohms.



(3) Check for the evaporative emission purge solenoid connector B-07 (terminal No. 1) and ground.
- Not continuity.



Q: Is the harness wire in good condition?

YES : Go to Step 6.

NO : Repair it. Then go to Step 7.

STEP 6. Check the trouble symptoms.

(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle –Pattern 22 P.13B-11.

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

Q: Is DTC P0443 set?

YES : Replace the ECM. When the ECM is replaced, register the ID code. Refer to GROUP 42B, Diagnosis –ID Codes Registration Judgment Table <Vehicles with KOS> P.42B-11 or GROUP 42C, Diagnosis –ID Codes Registration Judgment Table <Vehicles with WCM> P.42C-10. Then go to Step 7.

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.00-15.

STEP 7. 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 22 P.13B-11.

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

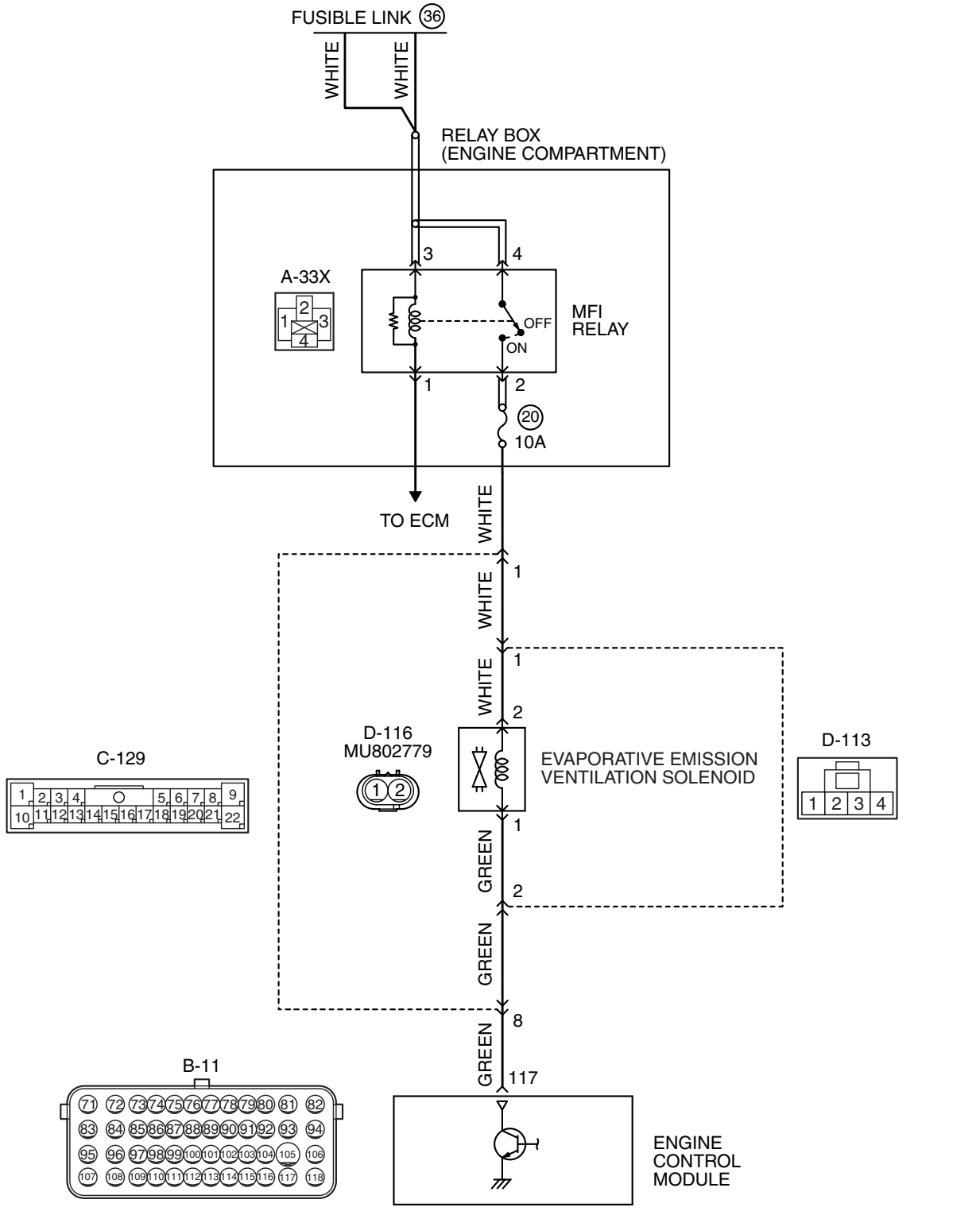
Q: Is DTC P0443 set?

YES : Retry the troubleshooting.

NO : The inspection is complete.

DTC P0446: Evaporative Emission Control System Vent Control Circuit

EVAPORATIVE EMISSION VENTILATION SOLENOID CIRCUIT



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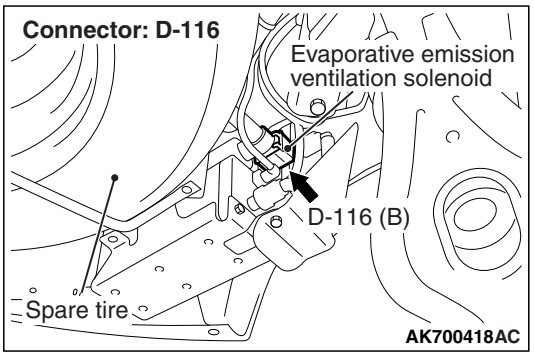

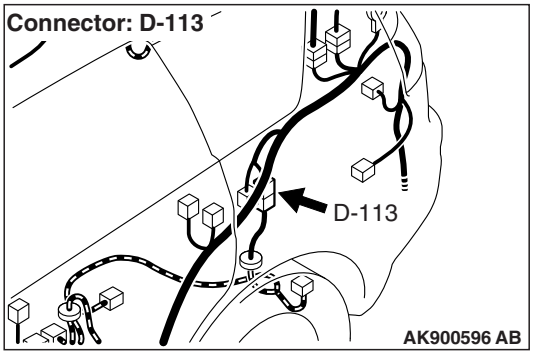

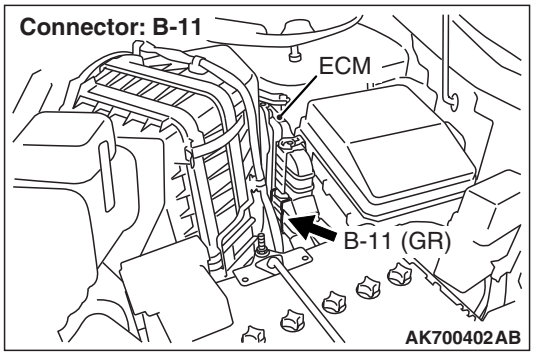

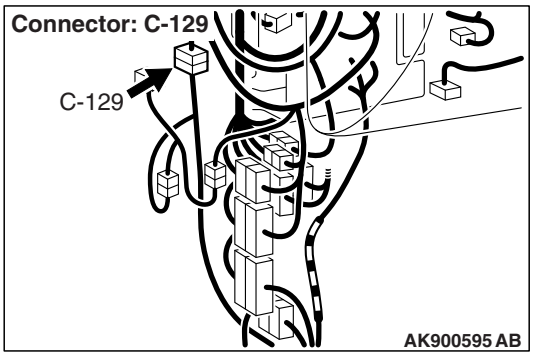

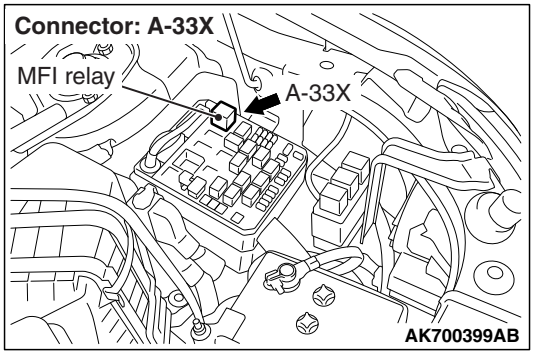

CIRCUIT OPERATION

- The evaporative emission ventilation solenoid power is supplied from the MFI relay (terminal No. 2).
- The ECM controls the evaporative emission ventilation solenoid ground by turning the power transistor in the ECM ON and OFF.

TECHNICAL DESCRIPTION

- To judge if there is open circuit in the evaporative emission ventilation solenoid drive circuit, ECM measures the surge voltage of the evaporative emission ventilation solenoid coil.
- The ECM drives the evaporative emission ventilation solenoid. After the solenoid is turned off, the ECM will check if the solenoid coil produces a surge voltage (battery positive voltage + 2 volts).

DESCRIPTIONS OF MONITOR METHODS

Off-surge does not occur after solenoid is operated on to off.

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

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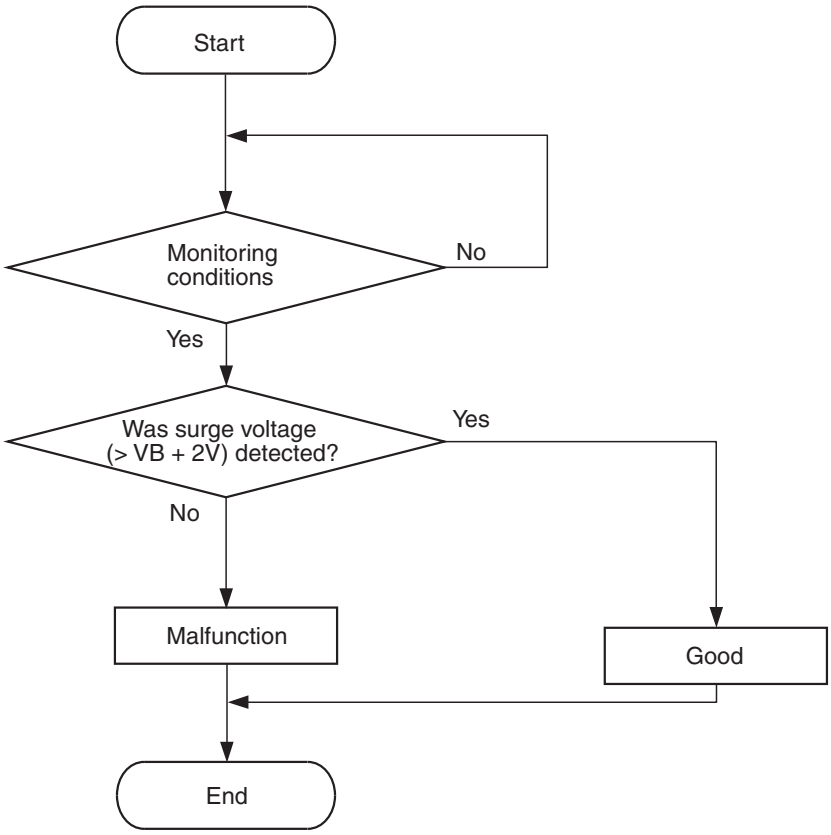
DTC SET CONDITIONS

Logic Flow Chart



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Check Conditions
- Engine is being cranked.
- Battery positive voltage is between 10 and 16.5 volts.

Judgement Criteria
- The evaporative emission ventilation solenoid coil surge voltage (battery positive voltage + 2 volts) is not detected for 0.2 second.
- The ECM monitors for this condition once during the drive cycle.

Check Conditions
- Battery positive voltage is between 10 and 16.5 volts.
- ON duty cycle of the evaporative emission purge solenoid is 0 percent.
- Evaporative emission ventilation solenoid is ON.
- More than 1 second has elapsed after the above mentioned conditions have been met.

Judgement Criterion
- The evaporative emission ventilation solenoid coil surge voltage (battery positive voltage + 2 volts) is not detected for 1 second after the evaporative emission ventilation solenoid is turned OFF.

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function –OBD-II Drive Cycle – Pattern 22 P.13B-11.

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

- Evaporative emission ventilation solenoid failed.
- Harness damage
- Connector damage
- ECM failed.

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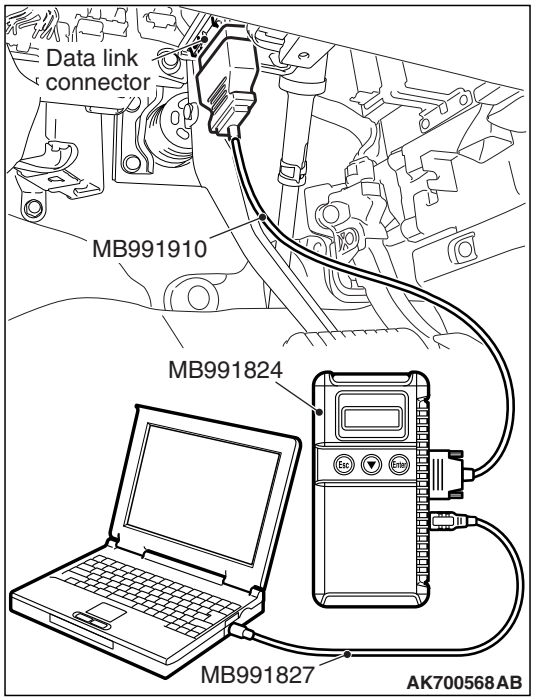
DIAGNOSIS

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 15: Evaporative Emission Ventilation Solenoid.



⚠ 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 15, Evaporative emission ventilation solenoid.
  - An operation sound should be heard and vibration should be felt when the evaporative emission ventilation solenoid is operated.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

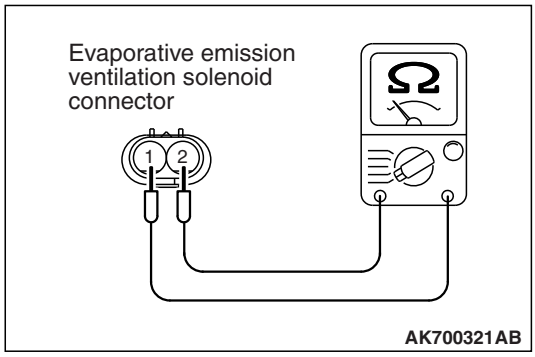
Q: Is the solenoid operating properly?

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.00-15.
NO : Go to Step 2.

STEP 2. Check harness connector A-33X at the MFI relay connector and harness connector B-11 at the ECM for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 3.
NO : Repair it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 7.



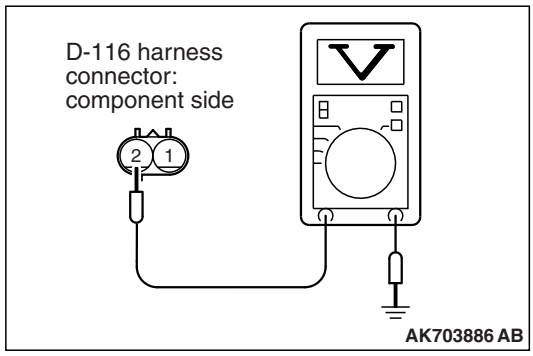
STEP 3. Check the evaporative emission ventilation solenoid.

(1) Disconnect the evaporative emission ventilation solenoid connector D-116.
(2) Measure the resistance between evaporative emission ventilation solenoid side connector terminal No. 1 and No. 2.

Standard value: 17 – 21 Ω [at 20° C (68° F)]

Q: Is the measured resistance between 17 and 21 ohms [at 20° C (68° F)]?

YES : Go to Step 4.
NO : Replace it. Then go to Step 7.



STEP 4. Measure the power supply voltage at the evaporative emission ventilation solenoid connector D-116.

(1) Disconnect the evaporative emission ventilation solenoid connector D-116 and measure at the harness side.
(2) Turn the ignition switch to the "ON" position.
(3) Measure the voltage between terminal No. 2 and ground.
  • Voltage should be battery positive voltage.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

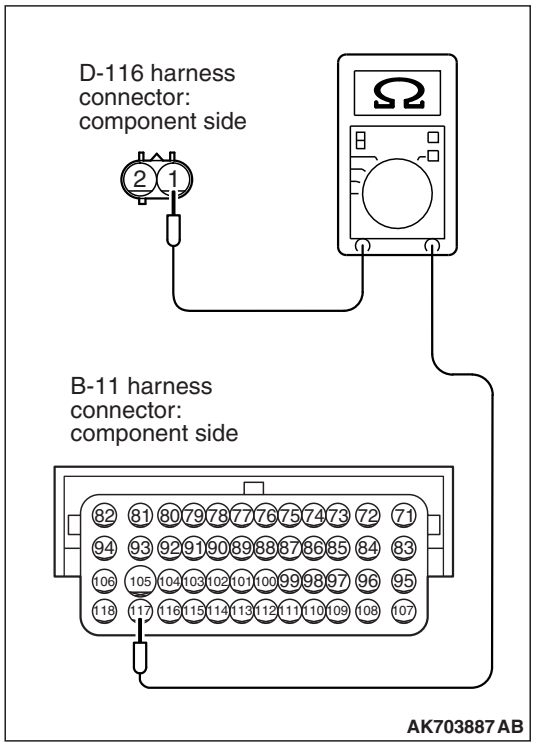
Q: Is the measured voltage battery positive voltage?

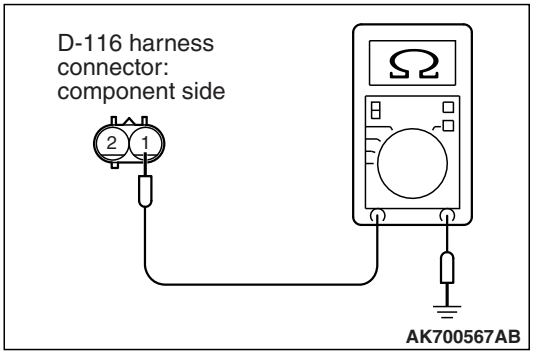
YES : Go to Step 5.
NO : Repair it. Then go to Step 7.

STEP 5. Check for open circuit and short circuit to ground and harness damage between the evaporative emission ventilation solenoid connector D-116 and the ECM connector B-11.

(1) Disconnect the evaporative emission ventilation solenoid connector D-116 and the ECM connector B-11.

(2) Measure the evaporative emission ventilation solenoid connector D-116 (terminal No. 1) and the ECM connector B-11 (terminal No. 117).
- Should be less than 2 ohms.





(3) Check for the evaporative emission ventilation solenoid connector D-116 (terminal No. 1) and ground.
- Not continuity.

Q: Is the harness wire in good condition?

YES : Go to Step 6.

NO : Repair it. Then go to Step 7.

STEP 6. Check the trouble symptoms.

(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle –Pattern 22 P.13B-11.

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

Q: Is DTC P0446 set?

YES : Replace the ECM. When the ECM is replaced, register the ID code. Refer to GROUP 42B, Diagnosis –ID Codes Registration Judgment Table <Vehicles with KOS> P.42B-11 or GROUP 42C, Diagnosis –ID Codes Registration Judgment Table <Vehicles with WCM> P.42C-10. Then go to Step 7.

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.00-15.

STEP 7. 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 22 P.13B-11.

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

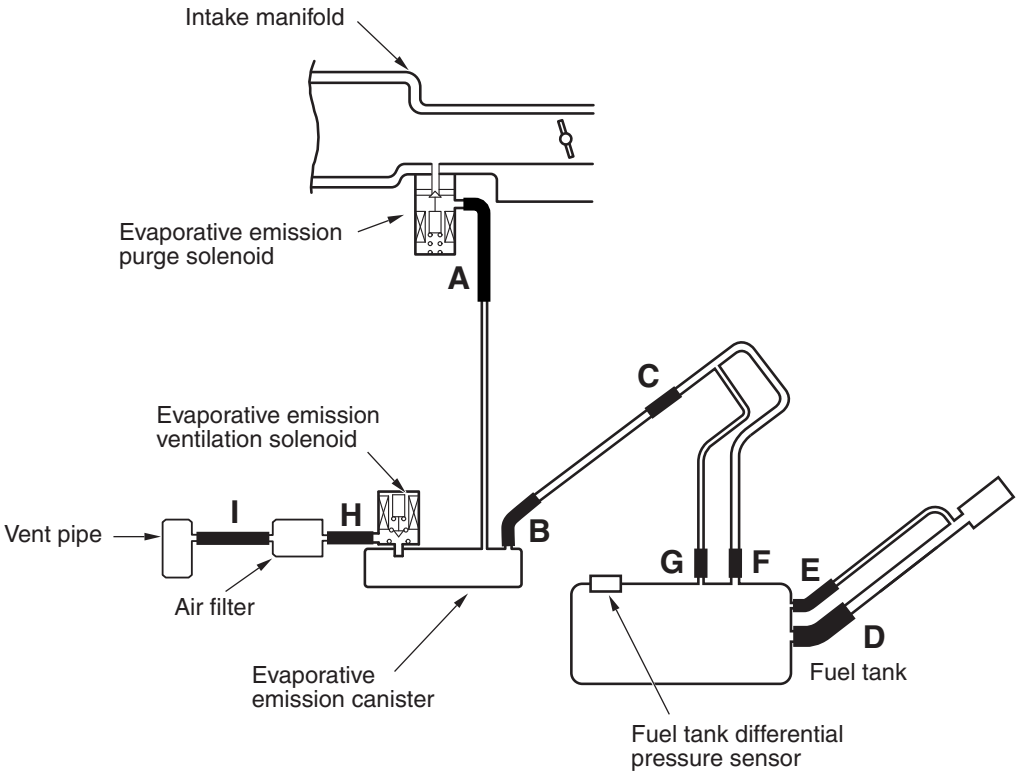
Q: Is DTC P0446 set?

YES : Retry the troubleshooting.

NO : The inspection is complete.

DTC P0450: Evaporative Emission Control System Pressure Sensor Malfunction

System diagram



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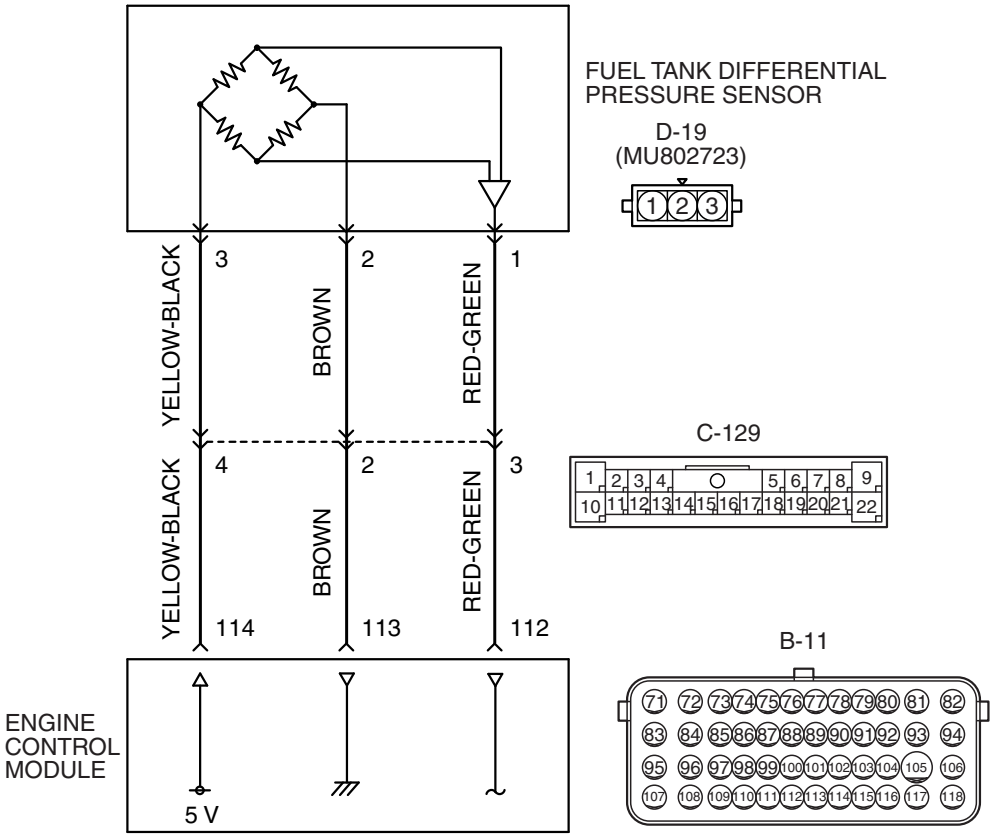
FUEL TANK DIFFERENTIAL PRESSURE SENSOR CIRCUIT



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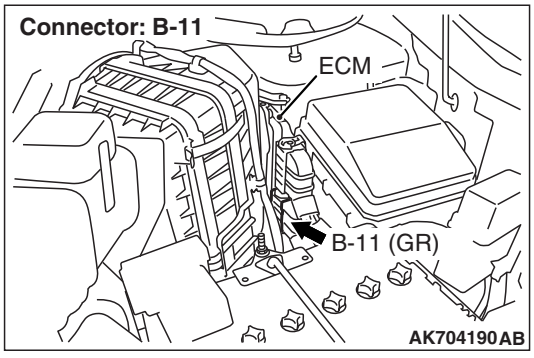
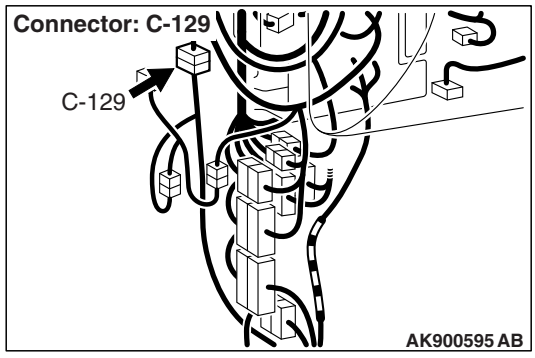
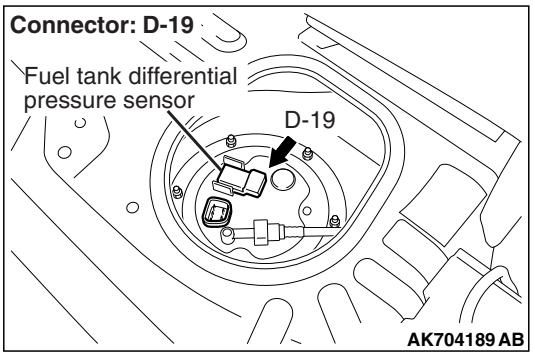






CIRCUIT OPERATION

- The ECM (terminal No. 114) supplies a 5-volt reference signal to the fuel tank differential pressure sensor (terminal No. 3). The fuel tank differential pressure sensor (terminal No. 2) is grounded through the ECM (terminal No. 113).
- The fuel tank differential pressure sensor (terminal No. 1) returns a voltage signal to the ECM (terminal No. 112) that is proportional to the pressure in the fuel tank.

TECHNICAL DESCRIPTION

- The ECM monitors the fuel tank differential pressure sensor output voltage.
- The ECM determines whether the fuel tank differential pressure sensor signal voltage is within normal operating parameters.

DESCRIPTIONS OF MONITOR METHODS

- Compare purge solenoid status with fuel tank differential pressure sensor output voltage.

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)

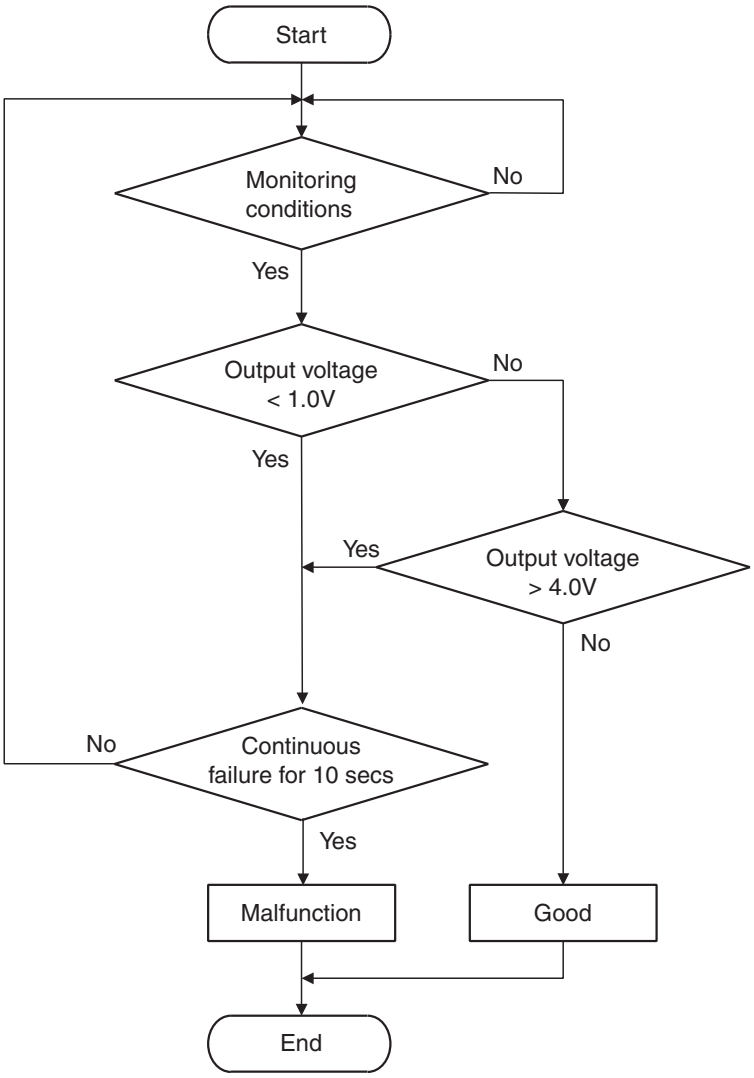
- Evaporative emission purge solenoid monitor
- Evaporative emission ventilation solenoid monitor
- Fuel temperature sensor monitor
- Fuel level sensor monitor

Sensor (The sensors below are determined to be normal)

- Mass airflow sensor
- Barometric pressure sensor
- Intake air temperature sensor
- Engine coolant temperature sensor
- Accelerator pedal position sensor

DTC SET CONDITIONS

Logic Flow Chart



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Check Conditions

- Intake air temperature is greater than 5° C (41° F).
- Engine speed is 1,594 r/min or greater.
- Volumetric efficiency is between 20 and 60 percent.

Judgement Criteria

- When the evaporative emission purge solenoid is off, the fuel tank differential pressure sensor output voltage remains 1.0 volt or less for 10 seconds.

Check Conditions

- Intake air temperature is between 5° C (41° F) and 45° C (113° F).
- Engine speed is 1,594 r/min or greater.
- Volumetric efficiency is between 20 and 60 percent.

Judgement Criterion

- When the evaporative emission purge solenoid valve is fully operational (100 percent ratio), the fuel tank differential pressure sensor output voltage remains at 4.0 volts or greater for 10 seconds.

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function –OBD-II Drive Cycle – Pattern 5 P.13B-11.

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

- Connector damage.
- Harness damage.
- Fuel tank differential pressure sensor failed.
- ECM failed.

OVERVIEW OF TROUBLESHOOTING

- DTC P0450 can be set by a faulty fuel tank differential pressure sensor or related circuit, or ECM failure.
- To check for system blockage, do a performance test which uses a mechanical vacuum gauge and scan tool MB991958 set on the fuel tank differential pressure sensor (52: Fuel tank differential PRS. SNSR). The mechanical gauge reading is used to verify scan tool MB991958 reading. A comparison of the mechanical gauge with the reading on scan tool MB991958 will locate a problem in the system.

DIAGNOSIS

Required Special Tools:

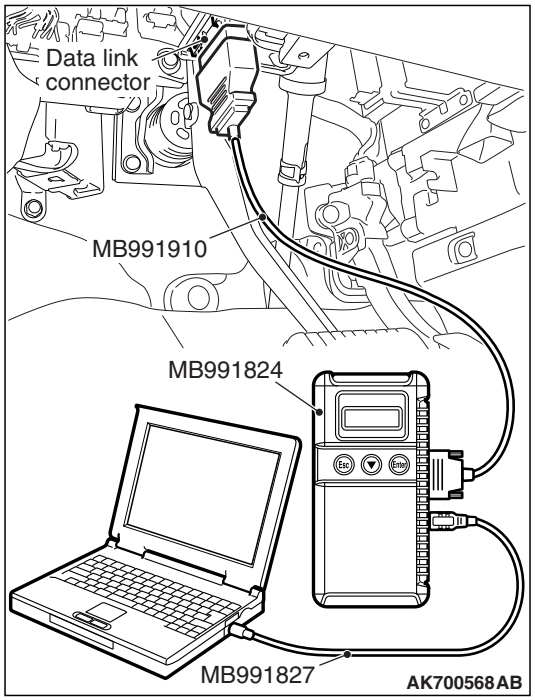
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A
- MB992110: Power Plant ECU Check Harness

STEP 1. Using scan tool MB991958, check data list item 52: Fuel Tank Differential Pressure Sensor.

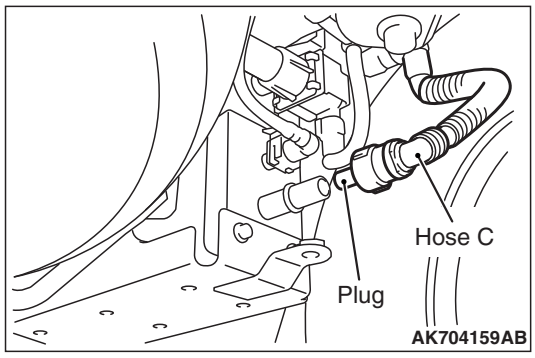
⚠ CAUTION

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.

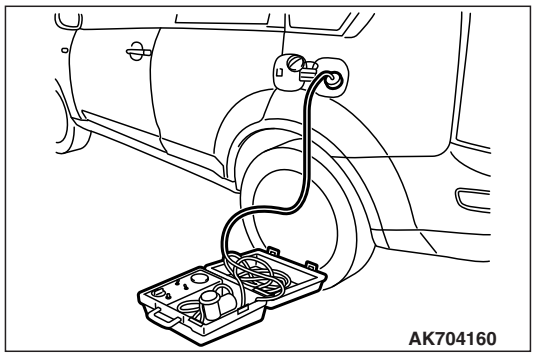


(2) Disconnect hose C from the evaporative emission canister, and plug the hose.
(3) Turn the ignition switch to the "ON" position.
(4) Remove the fuel cap.
(5) Set scan tool MB991958 to the data reading mode.
- Item 52, Fuel Tank Differential Pressure Sensor.
  - The fuel tank pressure reading on the scan tool should be 1,500 to 3,500 mV.



(6) Connect the evaporative emission system pressure pump (Miller number 6872A) to the fuel tank filler tube by using fuel tank adapter (MLR-8382) and pressurize the fuel tank.
- The fuel tank pressure reading should increase.

(7) Turn the ignition switch to the "LOCK" (OFF) position. Then disconnect scan tool MB991958.
(8) Remove the evaporative emission system pressure pump (Miller number 6872A) and the fuel tank adapter (MLR-8382), and reinstall the fuel cap.
(9) Connect hose C to the evaporative emission canister.



Q: Is the fuel tank pressure between 1,500 and 3,500 mV?

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.00-15).

NO : Go to Step 2 .

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STEP 2. Check harness connector B-11 at ECM and harness connector D-19 at fuel tank differential pressure sensor for damage.

Q: Is the harness connector in good condition?

YES : Then go to Step 3 .

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 7 .

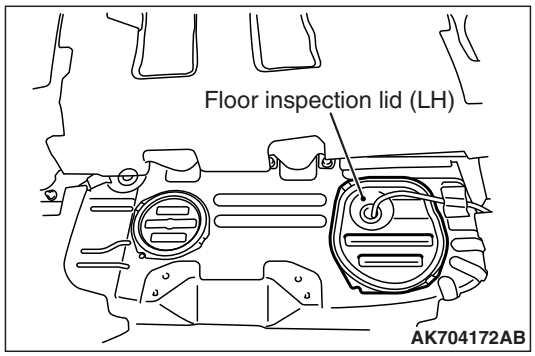
STEP 3. Measure the 5-volt reference signal at fuel tank differential pressure sensor connector D-19.

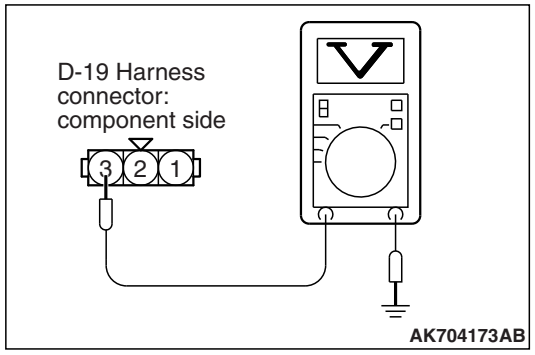
(1) Remove the second seat assembly (Refer to GROUP 52A, Second Seat Assembly P.52A-24).

(2) Remove the floor inspection lid (LH).

(3) Disconnect fuel tank differential pressure sensor connector D-19.

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





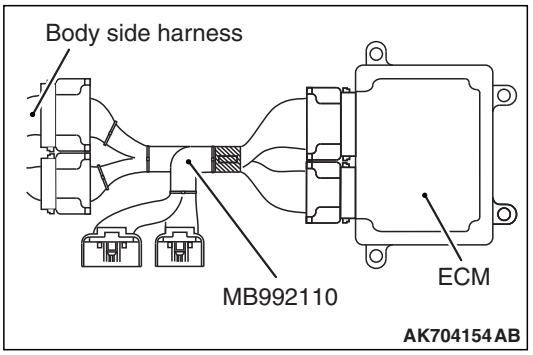
(5) Measure the voltage between terminal 3 and ground.
- The voltage should measure between 4.9 and 5.1 volts.

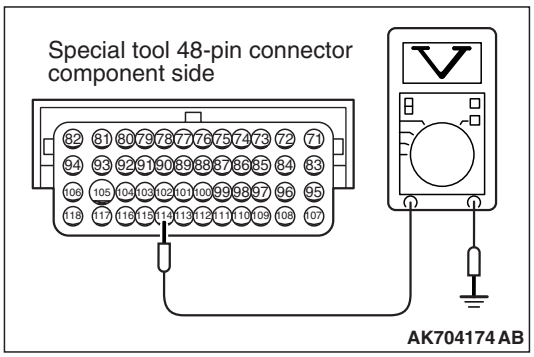
(6) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the measured voltage between 4.9 and 5.1 volts?

YES : Go to Step 5 .

NO : Go to Step 4 .





STEP 4. Measure the 5-volt reference signal at ECM connector B-11 by using check harness special tool MB992110.

(1) Disconnect all ECM connectors. Connect the power plant ECU check harness special tool MB992110 between the separated connectors.
(2) Turn the ignition switch to the "ON" position.
(3) Remove the fuel cap.

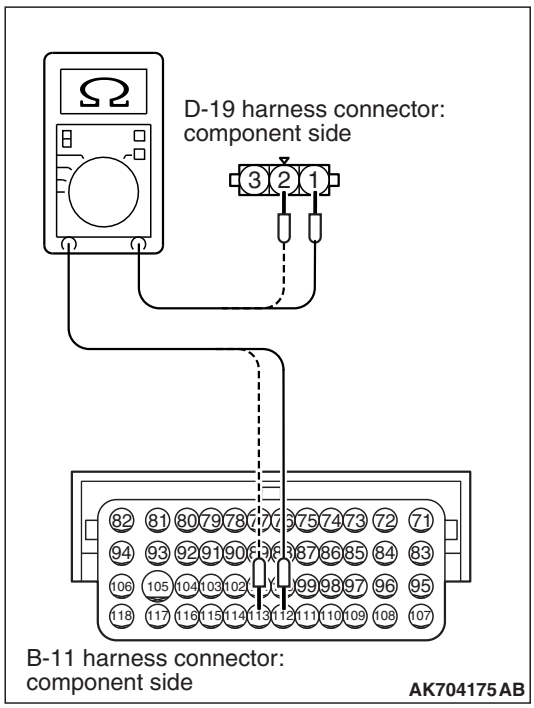
(4) Measure the voltage between terminal 114 and ground.
- The voltage should measure between 4.9 and 5.1 volts.

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

Q: Is the measured voltage between 4.9 and 5.1 volts?

YES : Check harness connector C-129 at intermediate connector for damage, and repair or replace as required. Refer to GROUP 00E, Harness connector Inspection P.00E-2. If intermediate connector C-129 is in good condition, repair it because of harness damage fuel tank differential pressure sensor connector D-19 (terminal No. 3) and ECM connector B-11 (terminal No. 114). Then go to Step 7 .

NO : Replace the ECM. When the ECM is replaced, register the ID code. Refer to GROUP 42B, ID Code Registration Judgment Table <Vehicles with KOS> P.42B-11 or GROUP 42C, ID Code Registration Judgment Table <Vehicles with WCM> P.42C-10. Then go to Step 7 .



STEP 5. Check the harness wire between ECM connector B-11 and fuel tank differential pressure sensor connector D-19 for damage.

(1) Disconnect the connector B-11 and D-19 measure at the harness side.

(2) Measure the resistance between connector B-11 and connector D-19.

a. Connector B-11 (terminal No. 112) and connector D-19 (terminal No. 1).

b. Connector B-11 (terminal No. 113) and connector D-19 (terminal No. 2).

- Should be less than 2 ohms.

Q: Is the measured resistance less than 2 ohms?

YES : Go to Step 6 .

NO : Repair the damaged harness wires. Then go to Step 7 .

STEP 6. Replace the fuel tank differential pressure sensor.

(1) Replace the fuel tank differential pressure sensor.

(2) Carry out test drive with the drive cycle pattern. Refer to Diagnostic Function. OBD-II Drive Cycle. Pattern 5 P.13B-11.

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

Q: Is DTC P0450 set?

YES : Replace the ECM. When the ECM is replaced, register the ID code. Refer to GROUP 42B, ID Code Registration Judgment Table <Vehicles with KOS> P.42B-11 or GROUP 42C, ID Code Registration Judgment Table <Vehicles with WCM> P.42C-10. Then go to Step 7 .

NO : The inspection is complete.

STEP 7. Perform 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 5 P.13B-11.

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

Q: Is DTC P0450 set?

YES : Repeat the troubleshooting.

NO : The procedure is complete.

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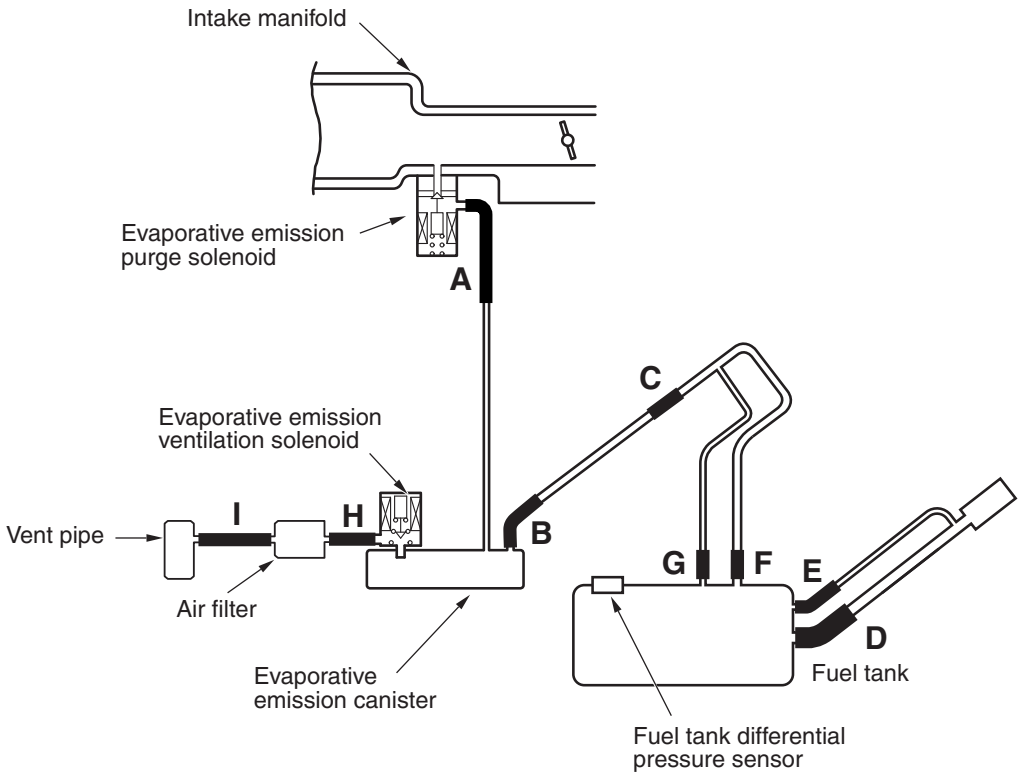
DTC P0451: Evaporative Emission Control System Pressure Sensor Range/Performance

System diagram



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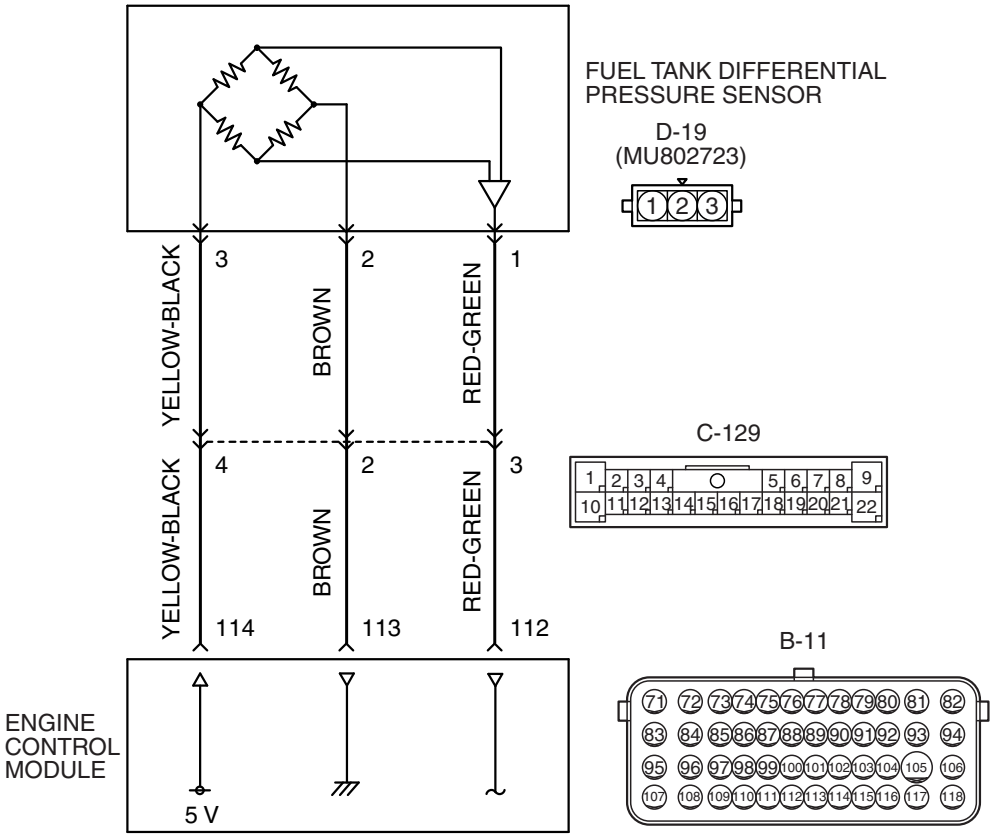
FUEL TANK DIFFERENTIAL PRESSURE SENSOR CIRCUIT



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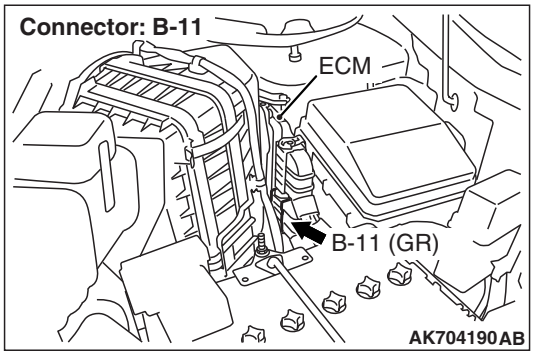
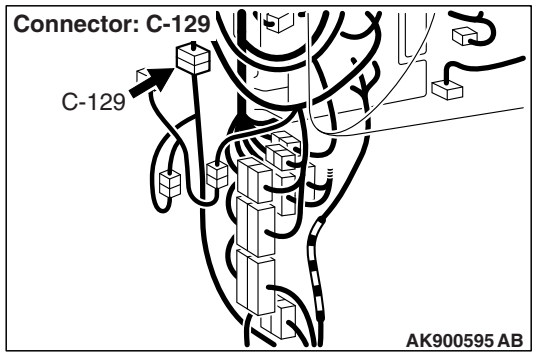
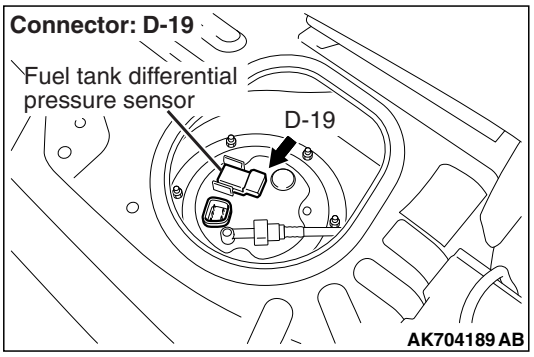




TSB Revision



CIRCUIT OPERATION

- The ECM (terminal No. 114) supplies a 5-volt reference signal to the fuel tank differential pressure sensor (terminal No. 3). The fuel tank differential pressure sensor (terminal No. 2) is grounded through the ECM (terminal No. 113).
- The fuel tank differential pressure sensor (terminal No. 1) returns a voltage signal to the ECM (terminal No. 112) that is proportional to the pressure in the fuel tank.

TECHNICAL DESCRIPTION

- The ECM monitors the fuel tank differential pressure sensor signal voltage.
- The ECM determines whether the fuel tank differential pressure sensor signal voltage is within normal operating parameters.

DESCRIPTIONS OF MONITOR METHODS

- Detect malfunction if change of fuel tank differential pressure sensor output voltage during idling stays large during specified go/stop operations.

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)

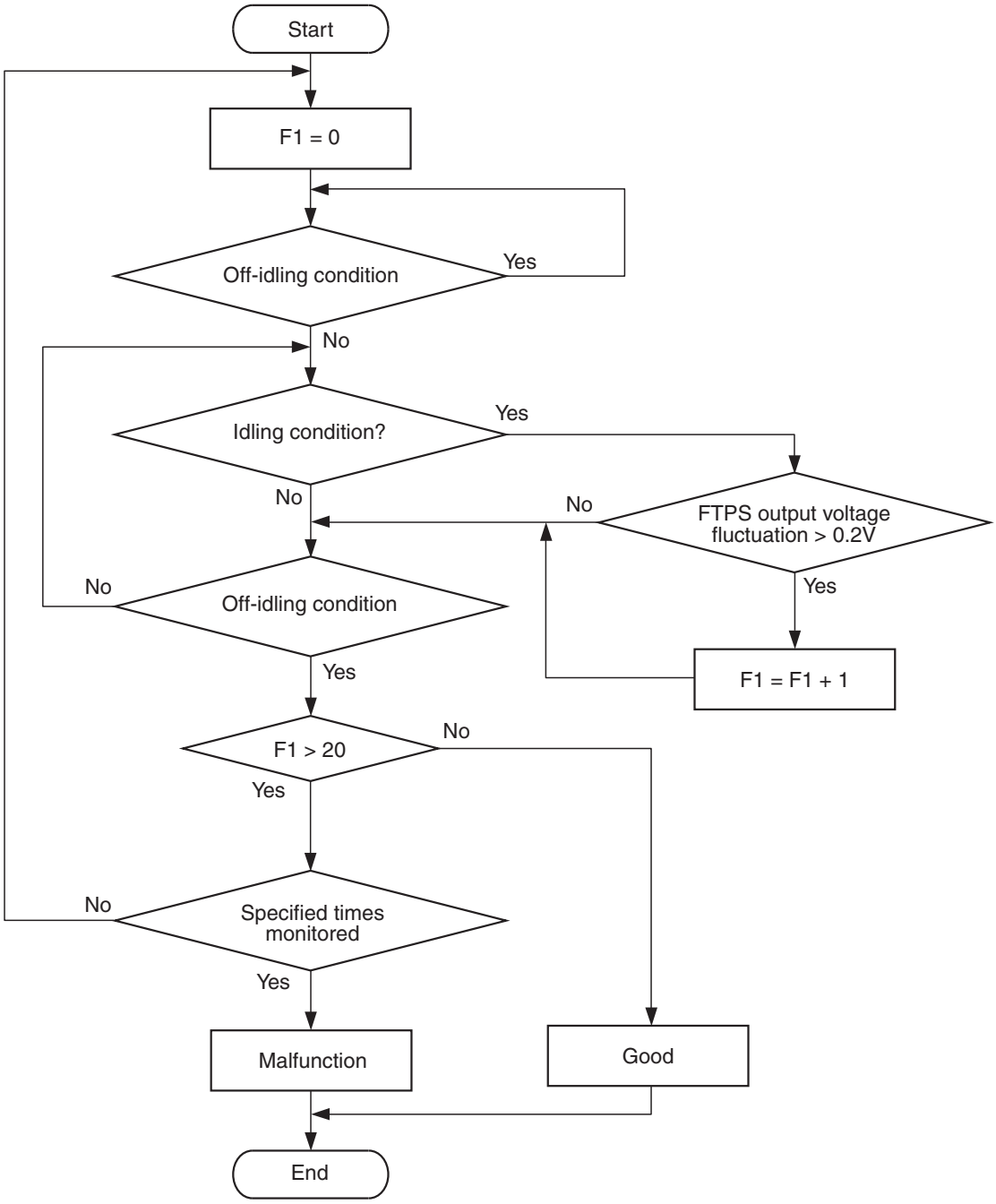
- Evaporative emission purge solenoid monitor
- Evaporative emission ventilation solenoid monitor
- Fuel temperature sensor monitor
- Fuel level sensor monitor

Sensor (The sensors below are determined to be normal)

- Mass airflow sensor
- Barometric pressure sensor
- Intake air temperature sensor
- Engine coolant temperature sensor
- Accelerator pedal position sensor

DTC SET CONDITIONS

Logic Flow Chart



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Check Conditions

- Accelerator pedal is not depressed.
- Vehicle speed is less than 1.5 km/h (1 mph).

  NOTE: The conditions for deviating from idling operation are as follows:

- *Vehicle speed is more than 50 km/h (31 mph).*

Judgement Criteria

- The drastic pressure fluctuation is detected 20 times or more per engine idling, which is that the fuel tank differential pressure sensor output voltage is 0.2 volt or more.

TSB Revision

- The condition described above is consecutively detected 4 times under the normal driving conditions.

  NOTE: If the number of sudden pressure fluctuations does not reach 20 times during any one period of engine idling, or if the ignition switch is turned OFF, the counter will reset to 0.

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function –OBD-II Drive Cycle – Pattern 16 P.13B-11.

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

- Connector damage.
- Harness damage.
- Fuel tank differential pressure sensor failed.
- ECM failed.

OVERVIEW OF TROUBLESHOOTING

- DTC P0451 can be set by a faulty fuel tank differential pressure sensor or related circuit, or ECM failure.
- To check for system blockage, do a performance test which uses a mechanical vacuum gauge and scan tool MB991958 set on the fuel tank differential pressure sensor (52: Fuel tank differential PRS. SNSR). The mechanical gauge reading is used to verify scan tool MB991958 reading. A comparison of the mechanical gauge with the reading on scan tool MB991958 will locate a problem in the system.

DIAGNOSIS

Required Special Tools:

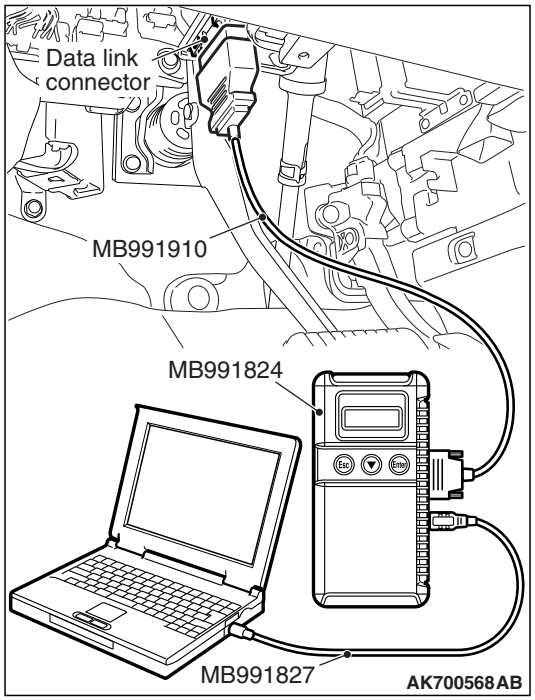
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A
- MB992110: Power Plant ECU Check Harness

STEP 1. Using scan tool MB991958, check data list item 52: Fuel Tank Differential Pressure Sensor.

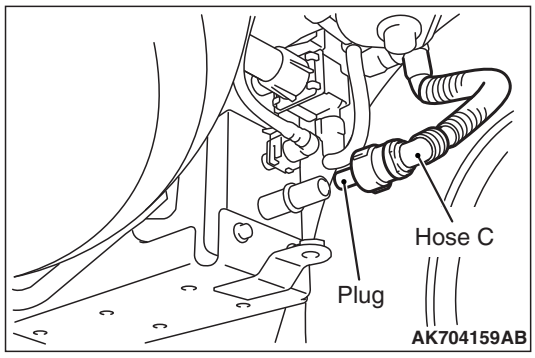
⚠ CAUTION

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.

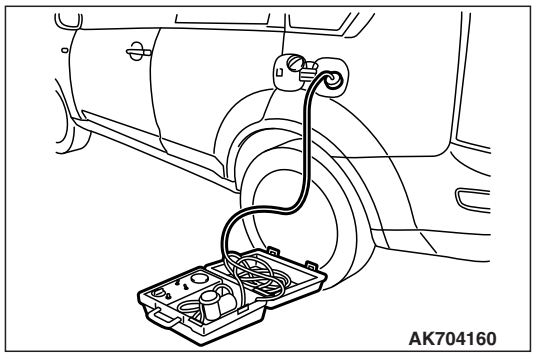


(2) Disconnect hose C from the evaporative emission canister, and plug the hose.
(3) Turn the ignition switch to the "ON" position.
(4) Remove the fuel cap.
(5) Set scan tool MB991958 to the data reading mode.
- Item 52, Fuel Tank Differential Pressure Sensor.
  - The fuel tank pressure reading on the scan tool should be 1,500 to 3,500 mV.



(6) Connect the evaporative emission system pressure pump (Miller number 6872A) to the fuel tank filler tube by using fuel tank adapter (MLR-8382) and pressurize the fuel tank.
- The fuel tank pressure reading should increase.

(7) Turn the ignition switch to the "LOCK" (OFF) position. Then disconnect scan tool MB991958.
(8) Remove the evaporative emission system pressure pump (Miller number 6872A) and the fuel tank adapter (MLR-8382), and reinstall the fuel cap.
(9) Connect hose C to the evaporative emission canister.



Q: Is the fuel tank pressure between 1,500 and 3,500 mV?

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.00-15).

NO : Go to Step 2 .

TSB Revision

STEP 2. Check harness connector B-11 at ECM and harness connector D-19 at fuel tank differential pressure sensor for damage.

Q: Is the harness connector in good condition?

YES : Then go to Step 3 .

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 7 .

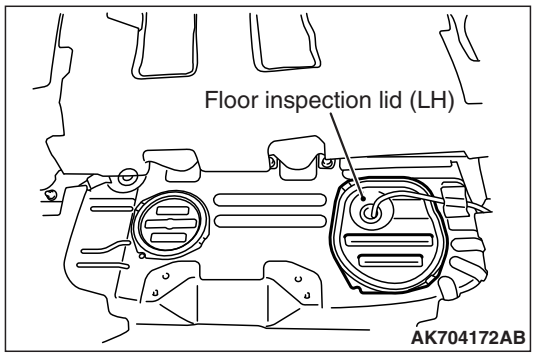
STEP 3. Measure the 5-volt reference signal at fuel tank differential pressure sensor connector D-19.

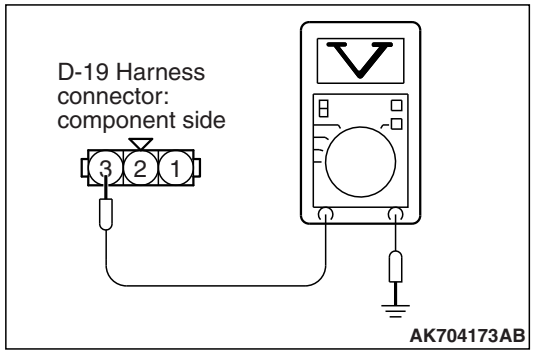
(1) Remove the second seat assembly (Refer to GROUP 52A, Second Seat Assembly P.52A-24).

(2) Remove the floor inspection lid (LH).

(3) Disconnect fuel tank differential pressure sensor connector D-19.

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





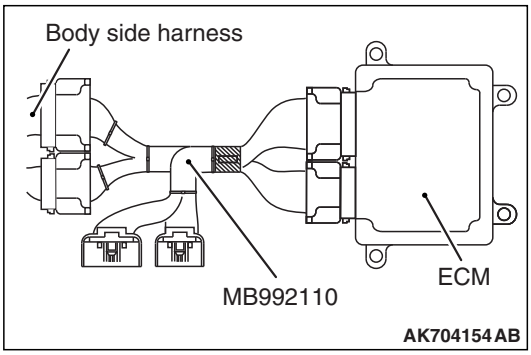
(5) Measure the voltage between terminal 3 and ground.
- The voltage should measure between 4.9 and 5.1 volts.

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

Q: Is the measured voltage between 4.9 and 5.1 volts?

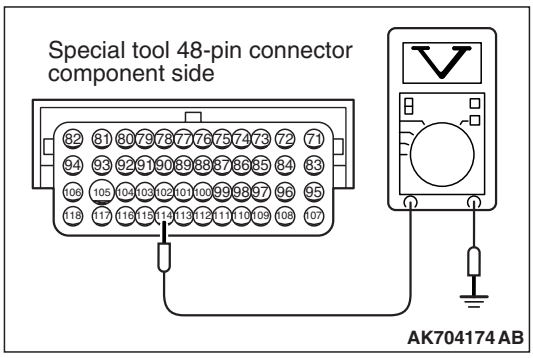
YES : Go to Step 5 .

NO : Go to Step 4 .



STEP 4. Measure the 5-volt reference signal at ECM connector B-11 by using check harness special tool MB992110.

(1) Disconnect all ECM connectors. Connect the power plant ECU check harness special tool MB992110 between the separated connectors.
(2) Turn the ignition switch to the "ON" position.
(3) Remove the fuel cap.



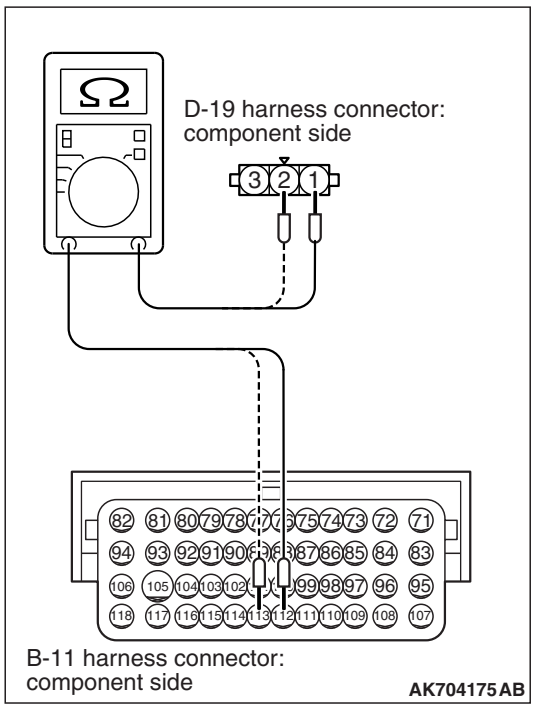
(4) Measure the voltage between terminal 114 and ground.
- The voltage should measure between 4.9 and 5.1 volts.

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

Q: Is the measured voltage between 4.9 and 5.1 volts?

YES : Check harness connector C-129 at intermediate connector for damage, and repair or replace as required. Refer to GROUP 00E, Harness connector Inspection P.00E-2. If intermediate connector C-129 is in good condition, repair it because of harness damage fuel tank differential pressure sensor connector D-19 (terminal No. 3) and ECM connector B-11 (terminal No. 114). Then go to Step 7 .

NO : Replace the ECM. When the ECM is replaced, register the ID code. Refer to GROUP 42B, ID Code Registration Judgment Table <Vehicles with KOS> P.42B-11 or GROUP 42C, ID Code Registration Judgment Table <Vehicles with WCM> P.42C-10. Then go to Step 7 .



STEP 5. Check the harness wire between ECM connector B-11 and fuel tank differential pressure sensor connector D-19 for damage.

(1) Disconnect the connector B-11 and D-19 measure at the harness side.
(2) Measure the resistance between connector B-11 and connector D-19.
  a. Connector B-11 (terminal No. 112) and connector D-19 (terminal No. 1).
  b. Connector B-11 (terminal No. 113) and connector D-19 (terminal No. 2).
    • Should be less than 2 ohms.

Q: Is the measured resistance less than 2 ohms?

YES : Go to Step 6 .
NO : Repair the damaged harness wires. Then go to Step 7 .

STEP 6. Replace the fuel tank differential pressure sensor.

(1) Replace the fuel tank differential pressure sensor.
(2) Carry out test drive with the drive cycle pattern. Refer to Diagnostic Function. OBD-II Drive Cycle. Pattern 16 P.13B-11.
(3) Check the diagnostic trouble code (DTC).

Q: Is DTC P0451 set?

YES : Replace the ECM. When the ECM is replaced, register the ID code. Refer to GROUP 42B, ID Code Registration Judgment Table <Vehicles with KOS> P.42B-11 or GROUP 42C, ID Code Registration Judgment Table <Vehicles with WCM> P.42C-10. Then go to Step 7 .
NO : The inspection is complete.

STEP 7. Perform 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 16 P.13B-11.
(2) Check the diagnostic trouble code (DTC).

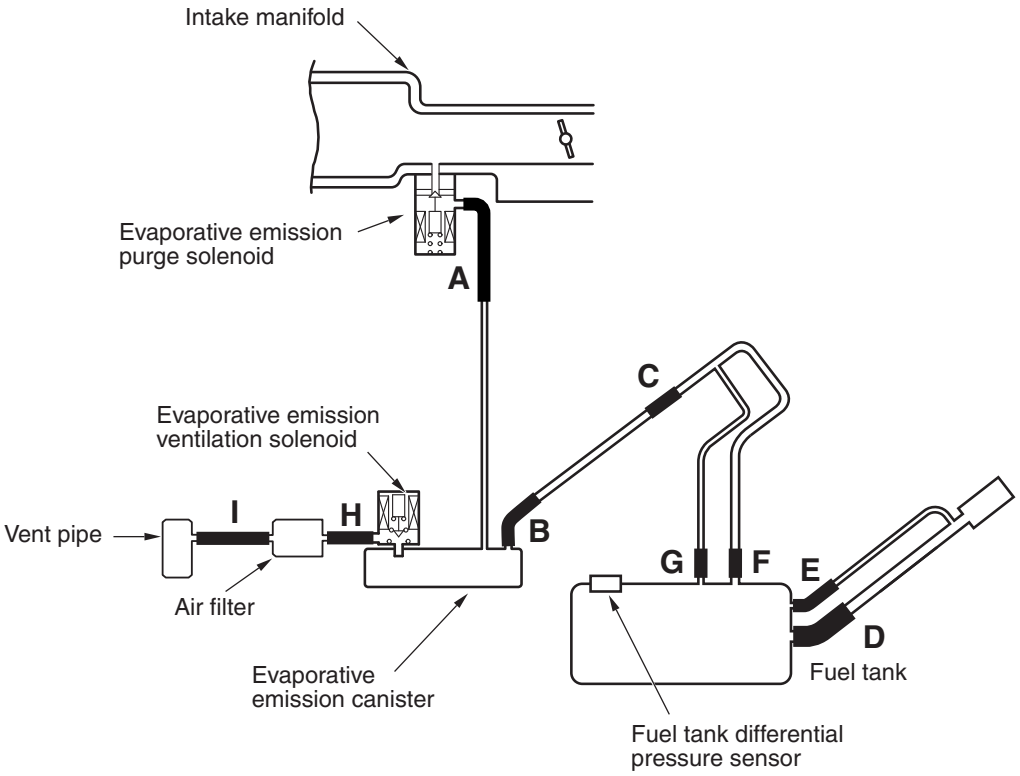
Q: Is DTC P0451 set?

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

TSB Revision

DTC P0452: Evaporative Emission Control System Pressure Sensor Low Input

System diagram



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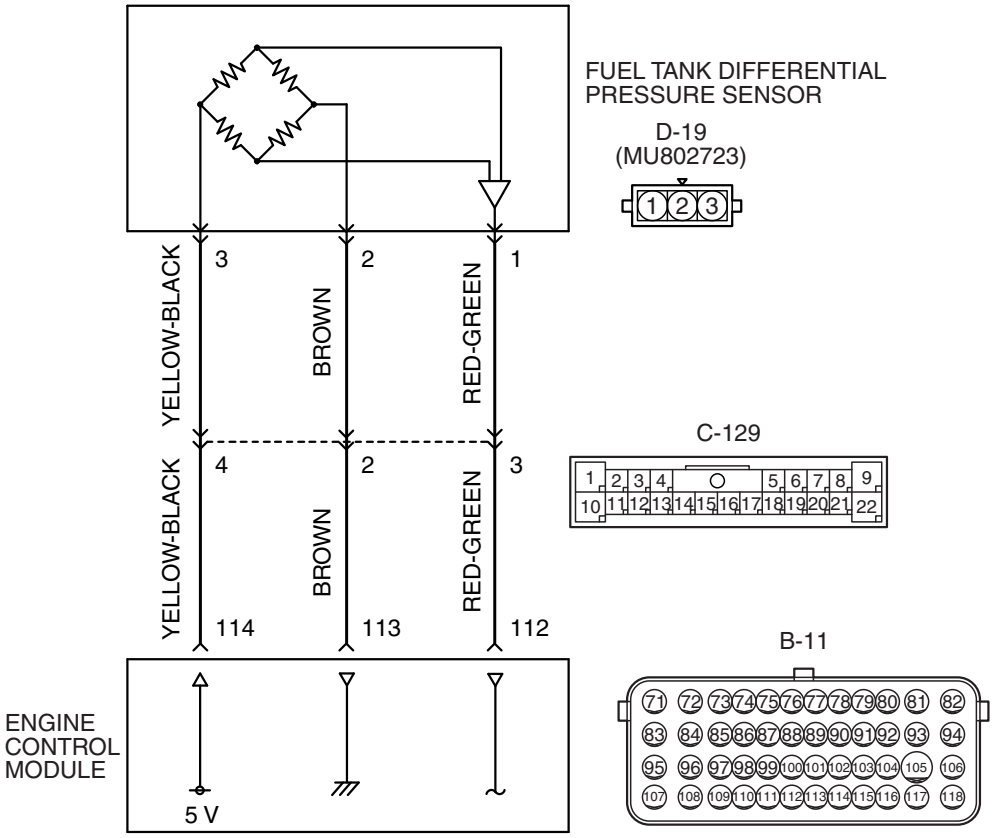
FUEL TANK DIFFERENTIAL PRESSURE SENSOR CIRCUIT



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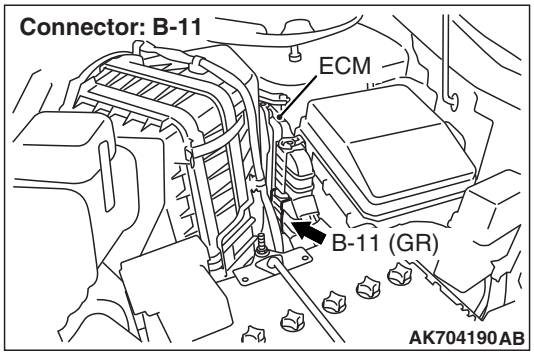
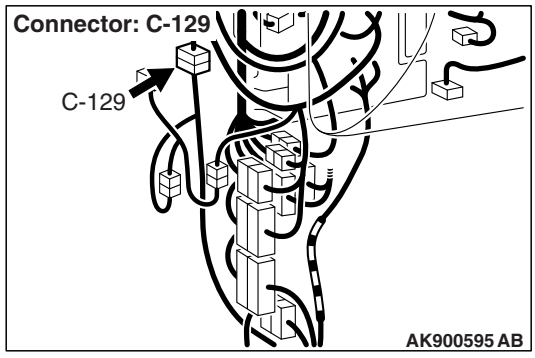
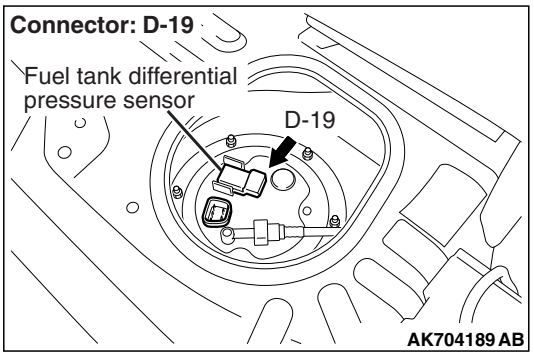






CIRCUIT OPERATION

- The ECM (terminal No. 114) supplies a 5-volt reference signal to the fuel tank differential pressure sensor (terminal No. 3). The fuel tank differential pressure sensor (terminal No. 2) is grounded through the ECM (terminal No. 113).
- The fuel tank differential pressure sensor (terminal No. 1) returns a voltage signal to the ECM (terminal No. 112) that is proportional to the pressure in the fuel tank.

TECHNICAL DESCRIPTION

- The ECM monitors the fuel tank differential pressure sensor output voltage.
- The ECM determines whether the fuel tank differential pressure sensor signal voltage is within normal operating parameters.

DESCRIPTIONS OF MONITOR METHODS

- Compare purge solenoid status with fuel tank differential pressure sensor output voltage.

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)

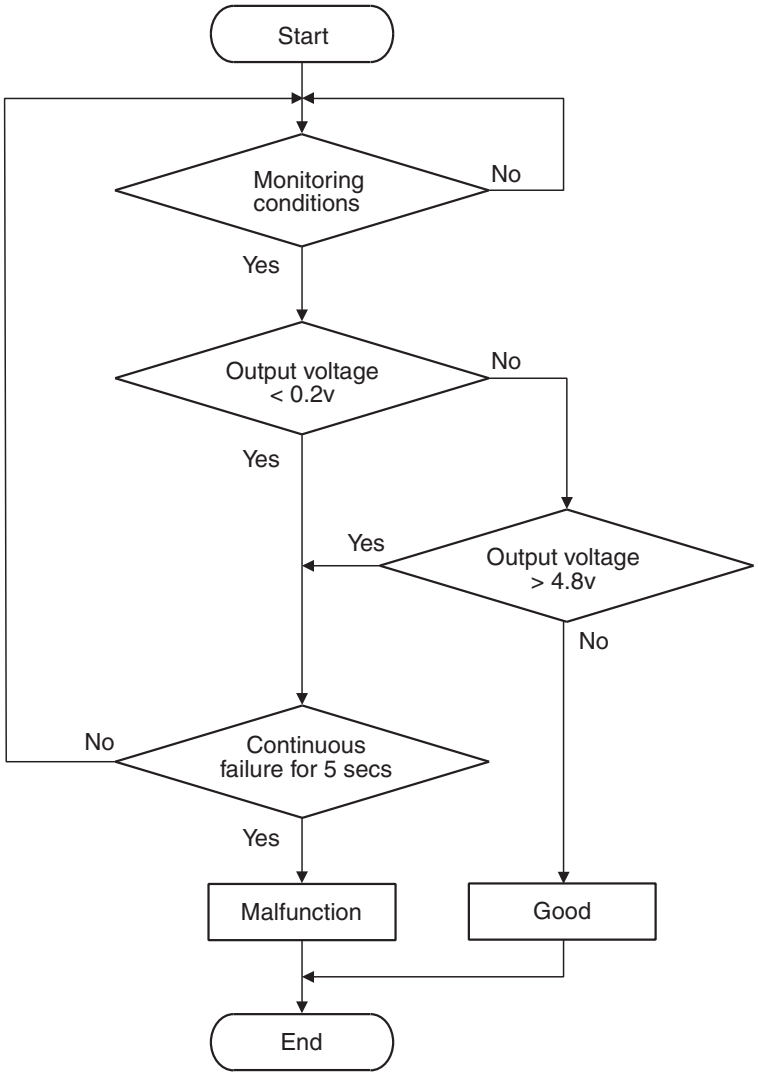
- Evaporative emission purge solenoid monitor
- Evaporative emission ventilation solenoid monitor
- Fuel temperature sensor monitor
- Fuel level sensor monitor

Sensor (The sensors below are determined to be normal)

- Mass airflow sensor
- Barometric pressure sensor
- Intake air temperature sensor
- Engine coolant temperature sensor
- Accelerator pedal position sensor

DTC SET CONDITIONS

Logic Flow Chart



AK704187

Check Conditions

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

Judgement Criteria

- The fuel tank differential pressure sensor output voltage remains 0.2 volt or less for 5 seconds.

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function –OBD-II Drive Cycle – Pattern 22 P.13B-11.

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

- Connector damage.
- Harness damage.
- Fuel tank differential pressure sensor failed.
- ECM failed.

OVERVIEW OF TROUBLESHOOTING

- DTC P0452 can be set by a faulty fuel tank differential pressure sensor or related circuit, or ECM failure.

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- To check for system blockage, do a performance test which uses a mechanical vacuum gauge and scan tool MB991958 set on the fuel tank differential pressure sensor (52: Fuel tank differential PRS. SNSR). The mechanical gauge reading is used to verify scan tool MB991958 reading. A comparison of the mechanical gauge with the reading on scan tool MB991958 will locate a problem in the system.

DIAGNOSIS

Required Special Tools:

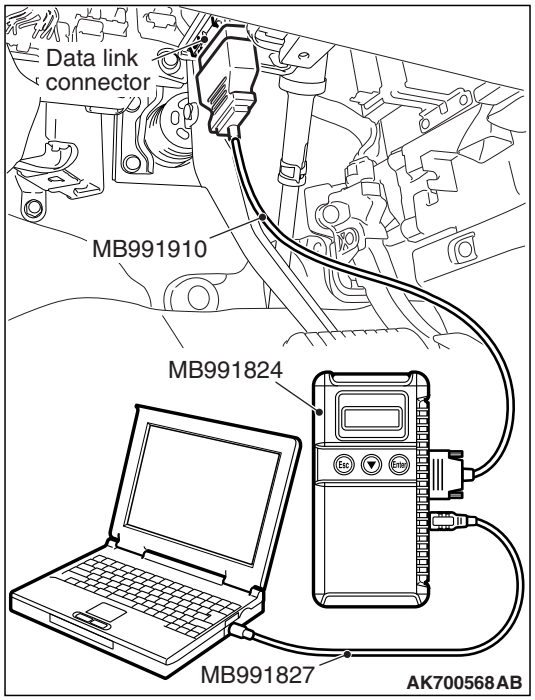
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A
- MB992110: Power Plant ECU Check Harness

STEP 1. Using scan tool MB991958, check data list item 52: Fuel Tank Differential Pressure Sensor.

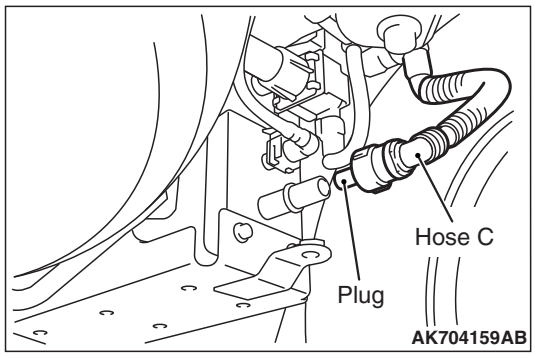
⚠ CAUTION

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.

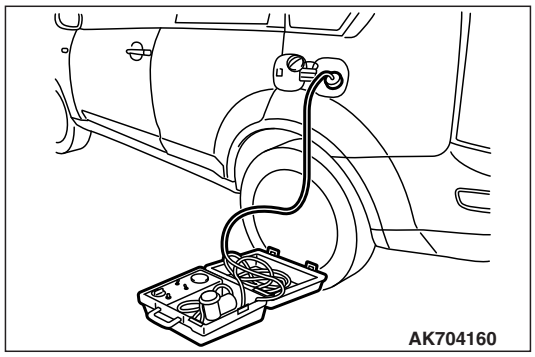


(2) Disconnect hose C from the evaporative emission canister, and plug the hose.
(3) Turn the ignition switch to the "ON" position.
(4) Remove the fuel cap.
(5) Set scan tool MB991958 to the data reading mode.
- Item 52, Fuel Tank Differential Pressure Sensor.
  - The fuel tank pressure reading on the scan tool should be 1,500 to 3,500 mV.



(6) Connect the evaporative emission system pressure pump (Miller number 6872A) to the fuel tank filler tube by using fuel tank adapter (MLR-8382) and pressurize the fuel tank.
- The fuel tank pressure reading should increase.

(7) Turn the ignition switch to the "LOCK" (OFF) position. Then disconnect scan tool MB991958.
(8) Remove the evaporative emission system pressure pump (Miller number 6872A) and the fuel tank adapter (MLR-8382), and reinstall the fuel cap.
(9) Connect hose C to the evaporative emission canister.



Q: Is the fuel tank pressure between 1,500 and 3,500 mV?

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.00-15).

NO : Go to Step 2 .

TSB Revision

STEP 2. Check harness connector B-11 at ECM and harness connector D-19 at fuel tank differential pressure sensor for damage.

Q: Is the harness connector in good condition?

YES : Then go to Step 3 .

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 8 .

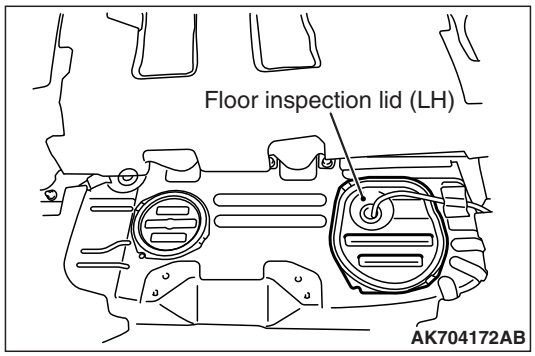
STEP 3. Measure the 5-volt reference signal at fuel tank differential pressure sensor connector D-19.

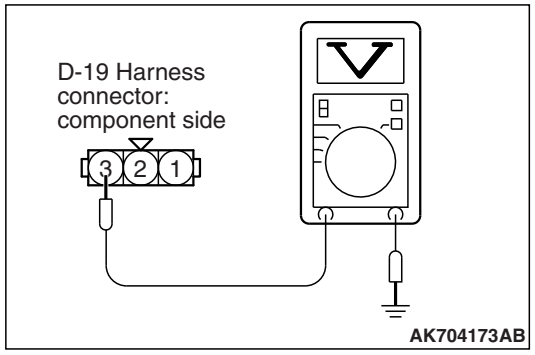
(1) Remove the second seat assembly (Refer to GROUP 52A, Second Seat Assembly P.52A-24).

(2) Remove the floor inspection lid (LH).

(3) Disconnect fuel tank differential pressure sensor connector D-19.

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





(5) Measure the voltage between terminal 3 and ground.
- The voltage should measure between 4.9 and 5.1 volts.

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

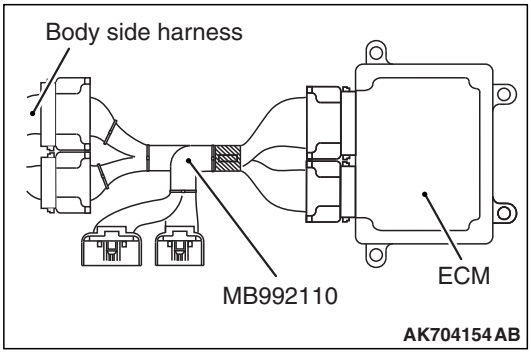
Q: Is the measured voltage between 4.9 and 5.1 volts?

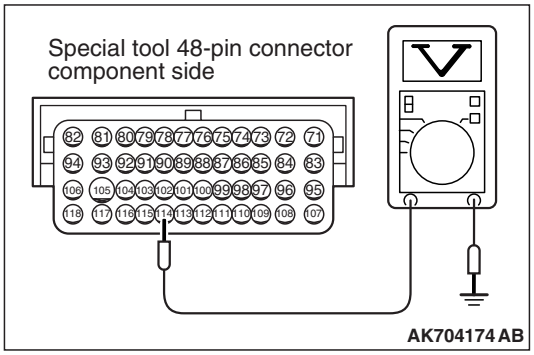
YES : Go to Step 6 .

NO : Go to Step 4 .

STEP 4. Measure the 5-volt reference signal at ECM connector B-11 by using check harness special tool MB992110.

(1) Disconnect all ECM connectors. Connect the power plant ECU check harness special tool MB992110 between the separated connectors.
(2) Turn the ignition switch to the "ON" position.
(3) Remove the fuel cap.





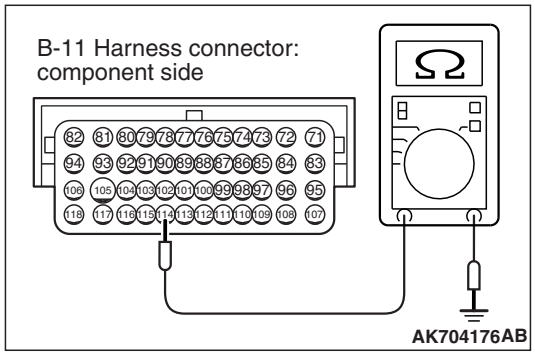
(4) Measure the voltage between terminal 114 and ground.
- The voltage should measure between 4.9 and 5.1 volts.

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

Q: Is the measured voltage between 4.9 and 5.1 volts?

YES : Check harness connector C-129 at intermediate connector for damage, and repair or replace as required. Refer to GROUP 00E, Harness connector Inspection P.00E-2. If intermediate connector C-129 is in good condition, repair it because of harness damage fuel tank differential pressure sensor connector D-19 (terminal No. 3) and ECM connector B-11 (terminal No. 114). Then go to Step 8 .

NO : Go to Step 5 .



STEP 5. Check for short circuit to ground between fuel tank differential pressure sensor connector D-19 and ECM connector B-11.

(1) Disconnect the connector D-19 and B-11 measure at the harness side.
(2) Check for the continuity between connector B-11 (terminal No. 114) and ground.
- Not continuity.

Q: Is the harness wire in good condition?

YES : Replace the ECM. When the ECM is replaced, register the ID code. Refer to GROUP 42B, ID Code Registration Judgment Table <Vehicles with KOS> P.42B-11 or GROUP 42C, ID Code Registration Judgment Table <Vehicles with WCM> P.42C-10. Then go to Step 8 .

NO : Check harness connector C-129 at intermediate connector for damage, and repair or replace as required. Refer to GROUP 00E, Harness connector Inspection P.00E-2. If intermediate connector C-129 is in good condition, repair it because of open circuit or harness damage fuel tank differential pressure sensor connector D-19 (terminal No. 3) and ECM connector B-11 (terminal No. 114). Then go to Step 8 .

STEP 6. Check for open circuit or short circuit to ground or harness damage between fuel tank differential pressure sensor connector D-19 and ECM connector B-11.

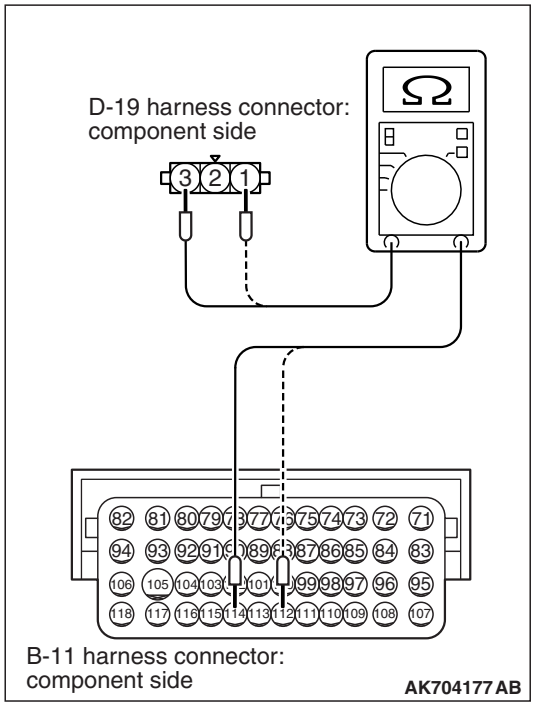
(1) Disconnect the connector D-19 and B-11 measure at the harness side.

(2) Measure the resistance between fuel tank differential pressure sensor connector D-19 and the ECM connector B-11.

a. Connector D-19 (terminal No. 3) and connector B-11 (terminal No. 114).

b. Connector D-19 (terminal No. 1) and connector B-11 (terminal No. 112).

- Should be less than 2 ohms.

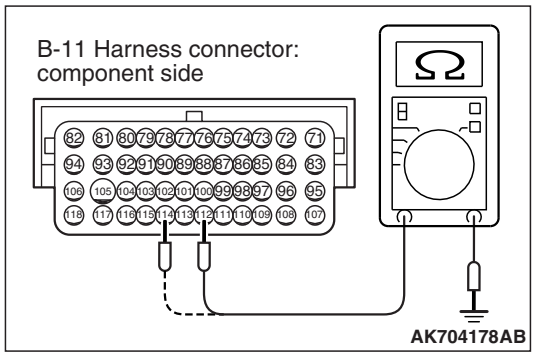


(3) Check for the continuity between the ECM connector B-11 and ground.

a. Connector B-11 (terminal No. 112) and ground

b. Connector B-11 (terminal No. 114) and ground

- Not continuity.



Q: Is the harness connector in good condition?

YES : Then go to Step 7 .

NO : Repair it. Then go to Step 8 .

STEP 7. Replace the fuel tank differential pressure sensor.

(1) Replace the fuel tank differential pressure sensor.

(2) Carry out test drive with the drive cycle pattern. Refer to Diagnostic Function. OBD-II Drive Cycle. Pattern 22 P.13B-11.

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

Q: Is DTC P0452 set?

YES : Replace the ECM. When the ECM is replaced, register the ID code. Refer to GROUP 42B, ID Code Registration Judgment Table <Vehicles with KOS> P.42B-11 or GROUP 42C, ID Code Registration Judgment Table <Vehicles with WCM> P.42C-10. Then go to Step 8 .

NO : The inspection is complete.

TSB Revision

STEP 8. Perform 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 22 P.13B-11.

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

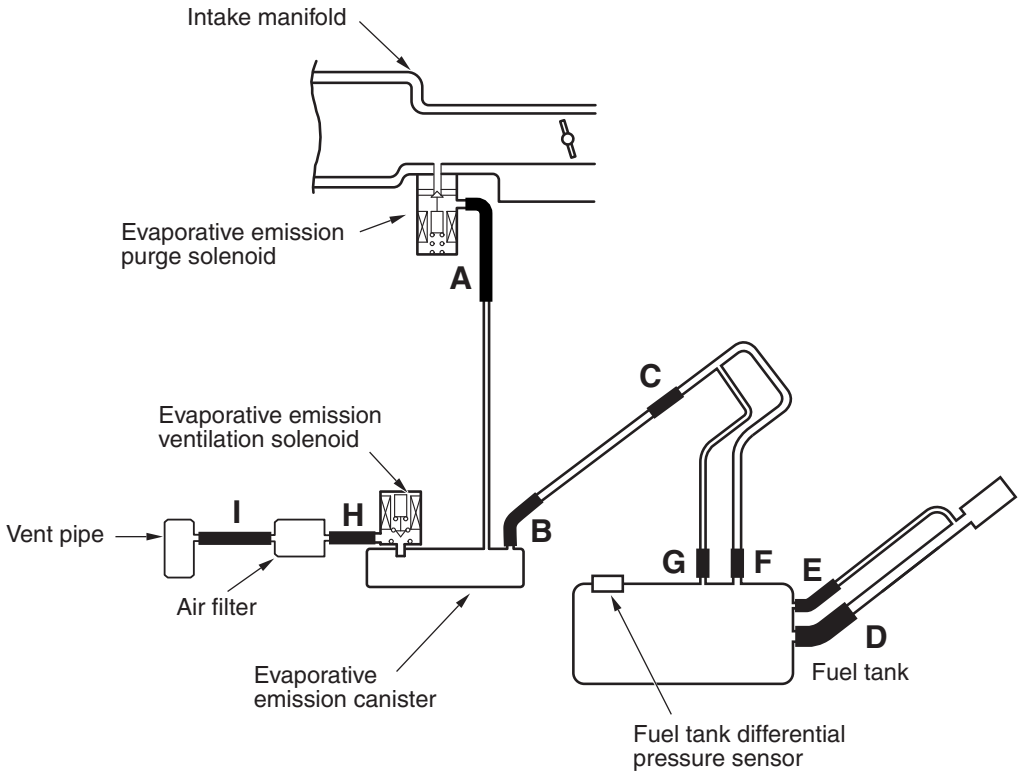
Q: Is DTC P0452 set?

YES : Repeat the troubleshooting.

NO : The procedure is complete.

DTC P0453: Evaporative Emission Control System Pressure Sensor High Input

System diagram



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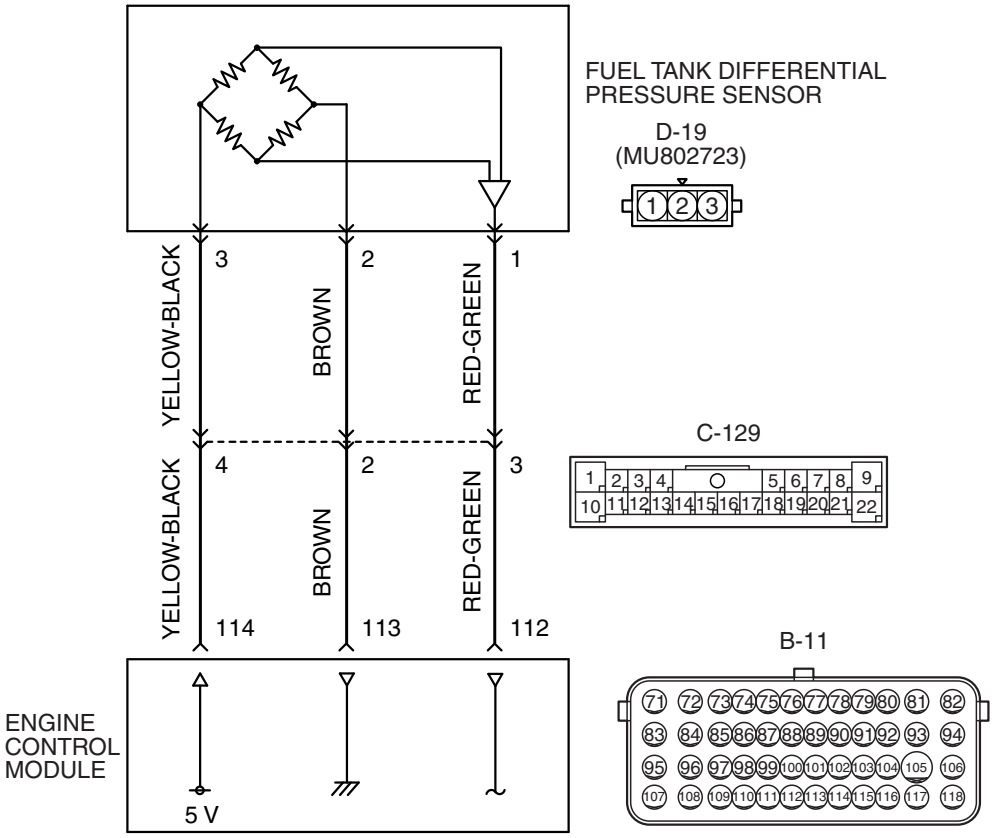
FUEL TANK DIFFERENTIAL PRESSURE SENSOR CIRCUIT



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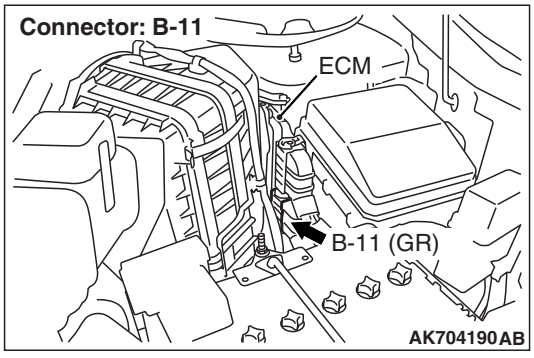
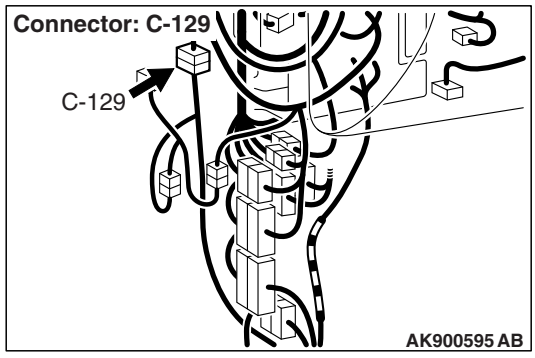
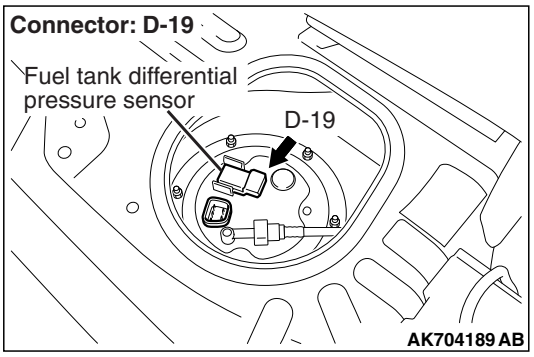






CIRCUIT OPERATION

- The ECM (terminal No. 114) supplies a 5-volt reference voltage to the fuel tank differential pressure sensor (terminal No. 3). The ECM (terminal No. 113) supplies a ground to the fuel tank differential pressure sensor (terminal No. 2).
- The ECM (terminal No. 112) receives a voltage signal proportional to the pressure in the fuel tank from the fuel tank differential pressure sensor (terminal No. 1).

TECHNICAL DESCRIPTION

- To determine whether the fuel tank differential pressure sensor is defective, the ECM monitors the fuel tank differential pressure sensor output voltage.
- The ECM judges if the fuel tank differential pressure sensor output voltage is normal.

NOTE: In rare cases, this DTC may be also set under some fuel and driving conditions regardless of the fuel pressure sensor output voltage when the fuel system is clogged.

DESCRIPTIONS OF MONITOR METHODS

- Compare purge solenoid status with fuel tank differential pressure sensor output voltage.

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)

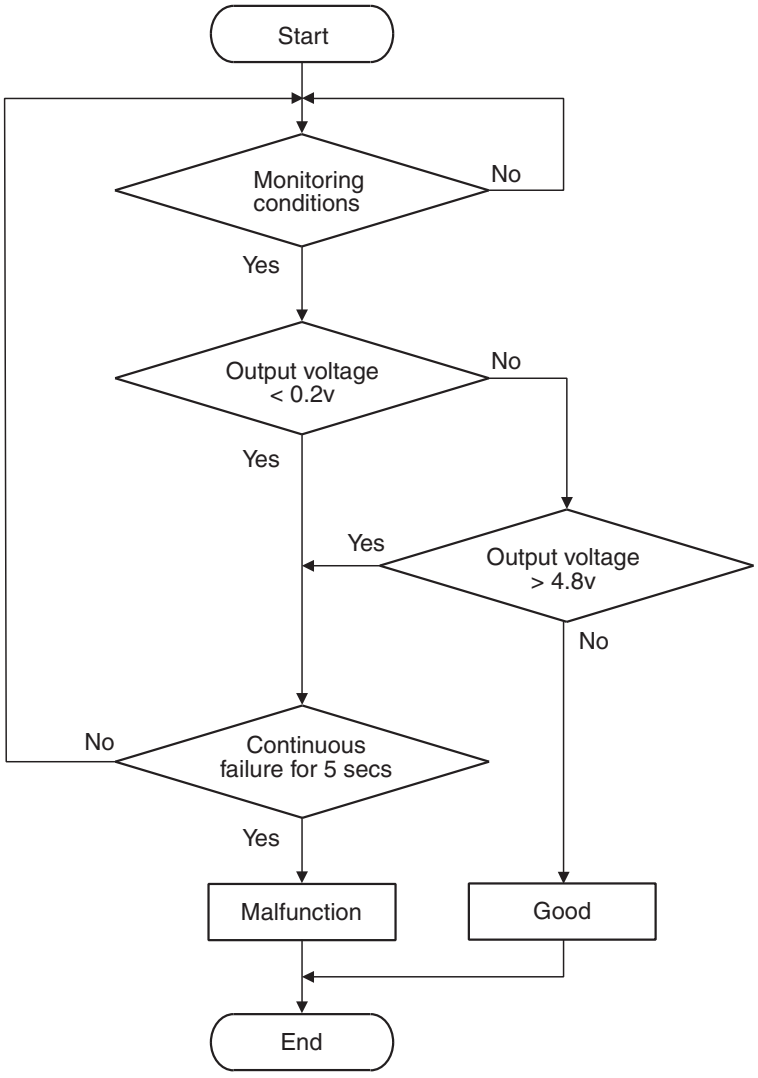
- Evaporative emission purge solenoid monitor
- Evaporative emission ventilation solenoid monitor
- Fuel temperature sensor monitor
- Fuel level sensor monitor

Sensor (The sensors below are determined to be normal)

- Mass airflow sensor
- Barometric pressure sensor
- Intake air temperature sensor
- Engine coolant temperature sensor
- Accelerator pedal position sensor

DTC SET CONDITIONS

Logic Flow Chart



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Check Conditions

- 2 seconds or more have passed since the starting sequence was completed.
- The fuel temperature is 36° C (97° F) or less.
- Remaining fuel level is 85 percent or less when the engine is started.

Judgement Criteria

- The fuel tank differential pressure sensor output voltage remains 4.8 volts or greater for 5 seconds.

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function –OBD-II Drive Cycle – Pattern 22 P.13B-11.

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

- Connector damage.
- Harness damage.
- Fuel tank differential pressure sensor failed.
- ECM failed.

TSB Revision

OVERVIEW OF TROUBLESHOOTING

- DTC P0453 can be set by a faulty fuel tank differential pressure sensor or related circuit, or ECM failure.
- To check for system blockage, do a performance test which uses a mechanical vacuum gauge and scan tool MB991958 set on the fuel tank differential pressure sensor (52: Fuel tank differential PRS. SNSR). The mechanical gauge reading is used to verify scan tool reading. A comparison of the mechanical gauge with the reading on scan tool MB991958 will locate a problem in the system.

DIAGNOSIS

Required Special Tools:

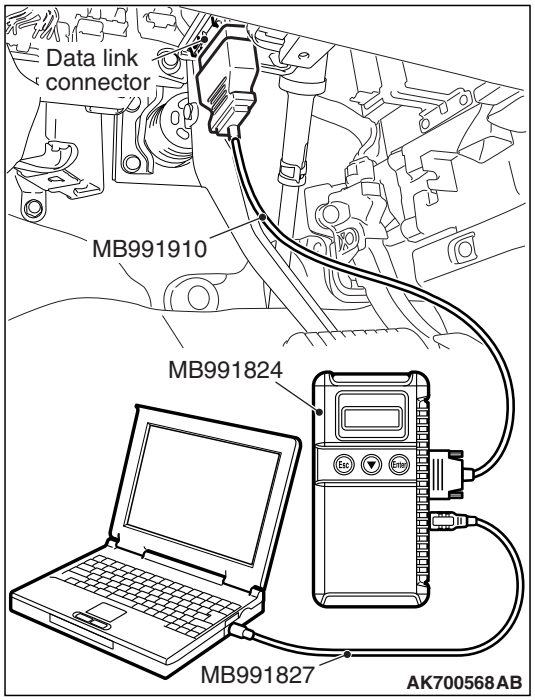
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: M.U.T.-III USB Cable
  - MB991910: M.U.T.-III Main Harness A

STEP 1. Using scan tool MB991958, check data list item 52: Fuel Tank Differential Pressure Sensor.

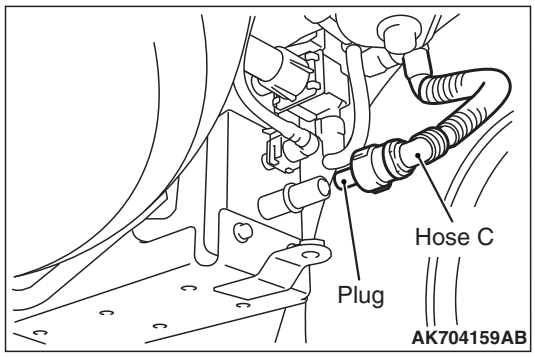
⚠ CAUTION

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.

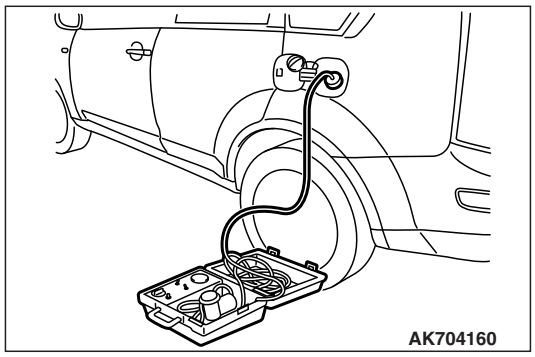


(2) Disconnect hose C from the evaporative emission canister, and plug the hose.
(3) Turn the ignition switch to the "ON" position.
(4) Remove the fuel cap.
(5) Set scan tool MB991958 to the data reading mode.
- Item 52, Fuel Tank Differential Pressure Sensor.
  - The fuel tank pressure reading on the scan tool should be 1,500 to 3,500 mV.



(6) Connect the evaporative emission system pressure pump (Miller number 6872A) to the fuel tank filler tube by using fuel tank adapter (MLR-8382) and pressurize the fuel tank.
- The fuel tank pressure reading should increase.

(7) Turn the ignition switch to the "LOCK" (OFF) position. Then disconnect scan tool MB991958.
(8) Remove the evaporative emission system pressure pump (Miller number 6872A) and the fuel tank adapter (MLR-8382), and reinstall the fuel cap.
(9) Connect hose C to the evaporative emission canister.



Q: Is the fuel tank pressure between 1,500 and 3,500 mV?

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.00-15).

NO : Go to Step 2 .

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STEP. 2 Check harness connector B-11 at ECM and harness connector D-19 at fuel tank differential pressure sensor for damage.

Q: Is the harness connector in good condition?

YES : Then go to Step 3 .

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 5 .

STEP 3. Check for open circuit or harness damage between fuel tank differential pressure sensor connector D-19 and ECM connector B-11.

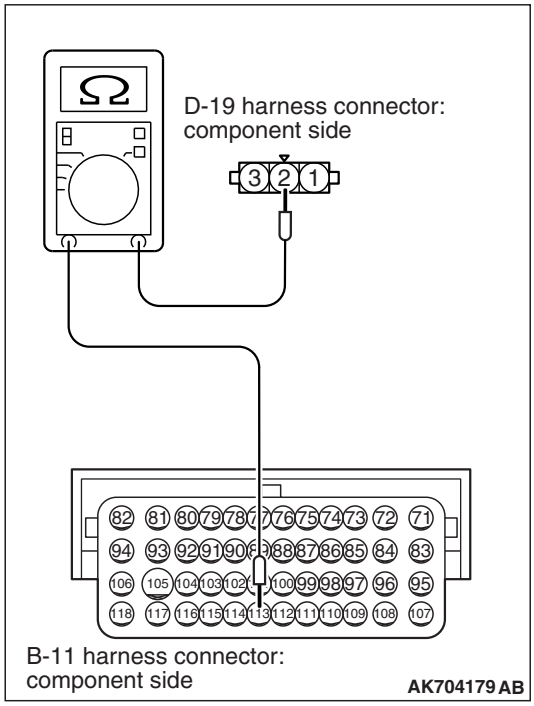
(1) Disconnect the connector D-19 and B-11 measure at the harness side.

(2) Measure the resistance between connector D-19 (terminal No. 2) and connector B-11 (terminal No. 113).
- Should be less than 2 ohms.

Q: Is the measured resistance less than 2 ohms?

YES : Go to Step 4 .

NO : Repair it. Then Go to Step 5 .



STEP 4. Replace the fuel tank differential pressure sensor.

(1) Replace the fuel tank differential pressure sensor.

(2) Carry out test drive with the drive cycle pattern. Refer to Diagnostic Function. OBD-II Drive Cycle. Pattern 22 P.13B-11.

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

Q: Is DTC P0453 set?

YES : Replace the ECM. When the ECM is replaced, register the ID code. Refer to GROUP 42B, ID Code Registration Judgment Table <Vehicles with KOS> P.42B-11 or GROUP 42C, ID Code Registration Judgment Table <Vehicles with WCM> P.42C-10. Then go to Step 5 .

NO : The inspection is complete.

STEP 5. Perform 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 22 P.13B-11.

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

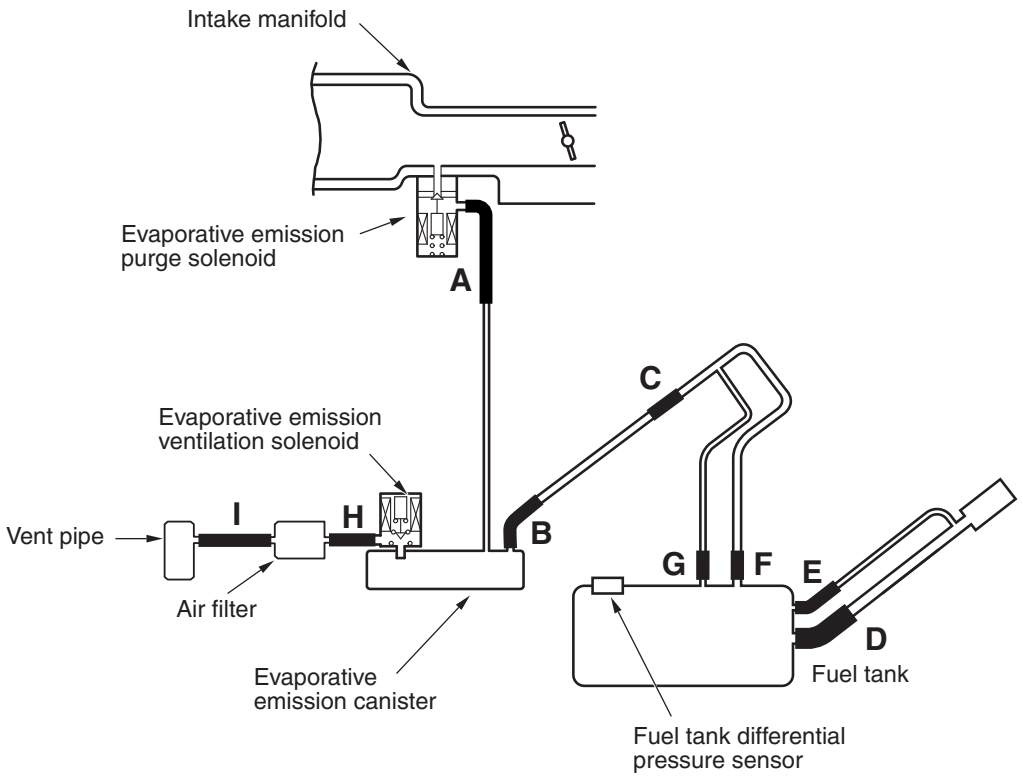
Q: Is DTC P0453 set?

YES : Repeat the troubleshooting.

NO : The procedure is complete.

DTC P0455: Evaporative Emission Control System Leak Detected (gross leak)

System diagram



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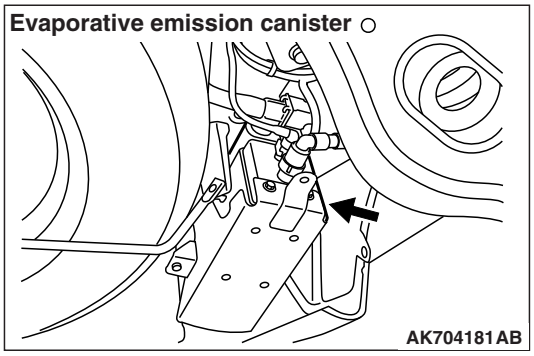
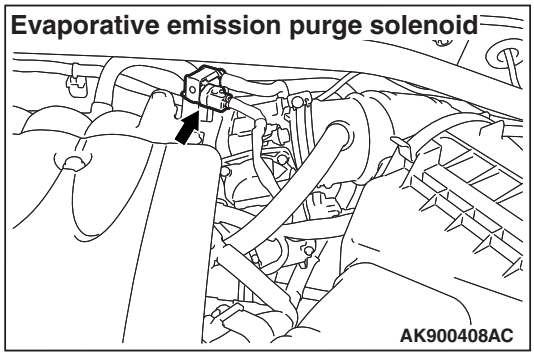
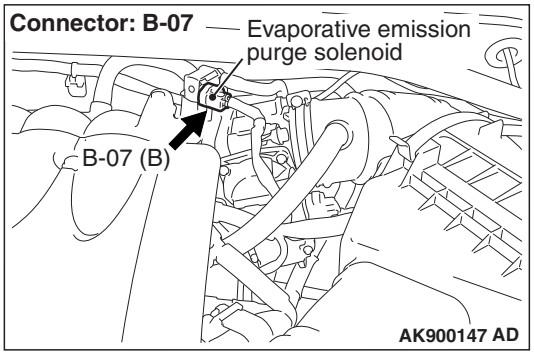




TSB Revision



TECHNICAL DESCRIPTION

- The fuel tank may be under a slight pressure or vacuum depending on the state of the Evaporative Emission (EVAP) System. The ECM monitors and responds to these pressure/vacuum changes. If the pressure/vacuum varies from the specified range, the ECM will set DTC P0455.
- The ECM energizes the evaporative emission ventilation solenoid to shut off the evaporative emission canister outlet port.
- The evaporative emission purge solenoid is activated to apply engine manifold vacuum to the EVAP system.
- When the fuel system develops a vacuum of 2 kPa (0.29 psi), the evaporative emission purge solenoid is turned "off" and the fuel system vacuum is maintained at 2 kPa (0.29 psi).
- The ECM determines whether there is a leak or clog in the fuel system by measuring the change in vacuum inside the fuel tank.
- The test is stopped when fuel vapor pressure is determined to be too high.

DESCRIPTIONS OF MONITOR METHODS

- Depressurizing EVAP system by intake manifold negative pressure is impossible within specified period.

MONITOR EXECUTION

- Once per driving cycle.

MONITOR EXECUTION CONDITIONS (OTHER MONITOR AND SENSOR)

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

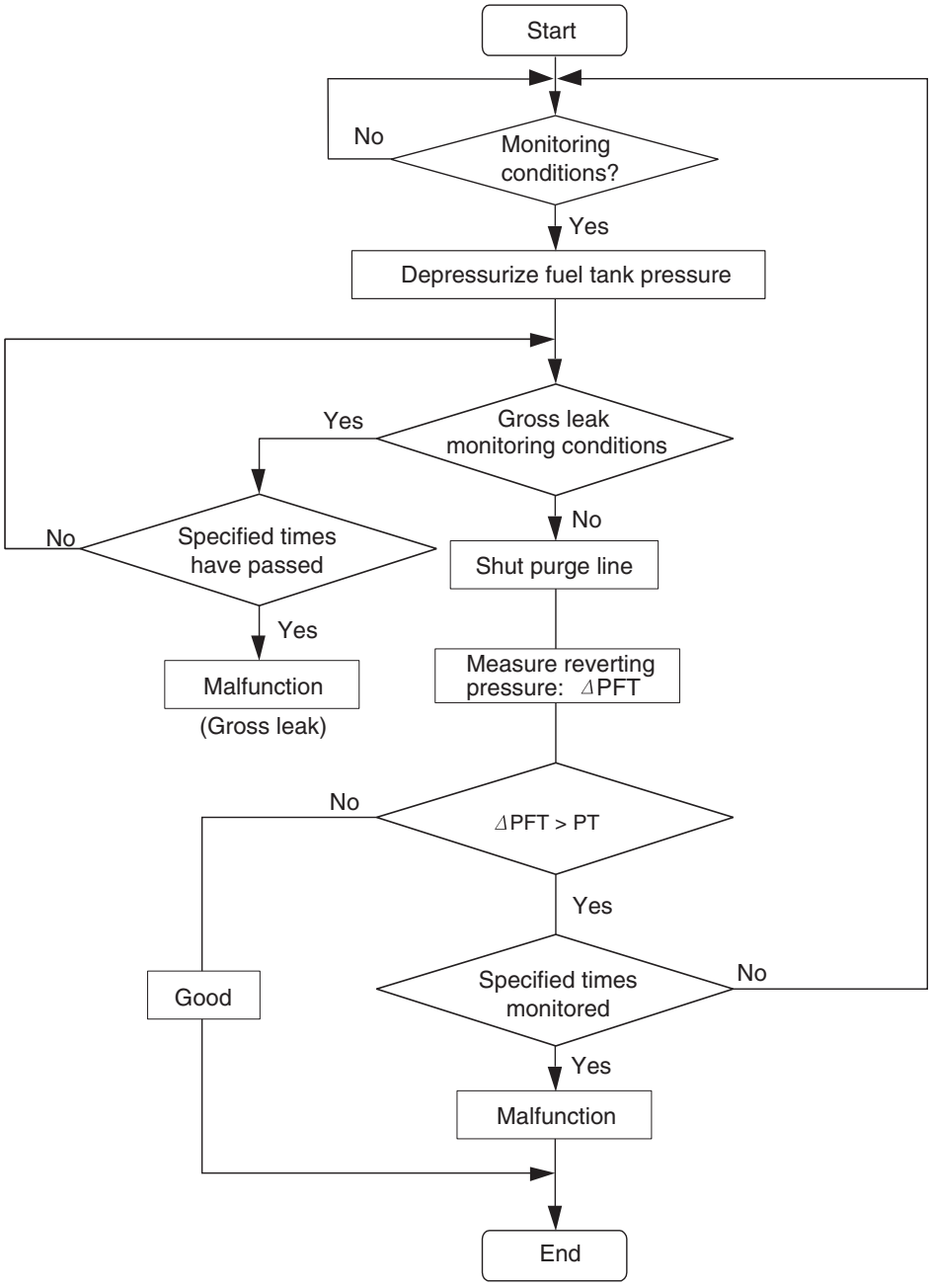
- Not applicable

Sensor (The sensors below are determined to be normal)

- Not applicable

DTC SET CONDITIONS

Logic Flow Chart (Monitor Sequence)



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Check Conditions

- Engine coolant temperature is less than 36° C (97° F) when the engine is started.
- Engine coolant temperature is more than 60° C (140° F). <Amount of remaining fuel is 15 –40 percent of capacity when the engine is started>
- Engine coolant temperature is more than 20° C (68° F). <Amount of remaining fuel is 40 –85 percent of capacity when the engine is started>
- Intake air temperature is less than 36° C (97° F) when the engine is started.
- Volumetric efficiency is between 20 and 60 percent.
- Engine speed is more than 1,594 r/min.

TSB Revision

- When the evaporative emission purge solenoid and evaporative emission ventilation solenoid are closed, the change of the pressure in the fuel tank is less than 451 Pa (0.13 in.Hg). <Amount of remaining fuel is 15 –40 percent of capacity when the engine is started>
- When the evaporative emission purge solenoid and evaporative emission ventilation solenoid are closed, the change of the pressure in the fuel tank is less than 324 Pa (0.09 in.Hg). <Amount of remaining fuel is 40 –85 percent of capacity when the engine is started>
- Barometric pressure is more than 76 kPa (22.4 in.Hg).
- Intake air temperature is more than 5° C (41° F).
- Fuel temperature is less than 36° C (97° F).
- Fuel tank differential pressure sensor output voltage is between 1.0 and 4.0 volts.
- At least 10 seconds have passed since the last monitor was complete.
- Monitoring time: 150 seconds

Judgment Criterion

- The fuel tank internal pressure is more than –1961 Pa (–0.58 in.Hg) after the evaporative emission purge solenoid has been driven when the fuel tank and vapor line were closed.

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function –OBD-II Drive Cycle – Pattern 5 P.13B-11.

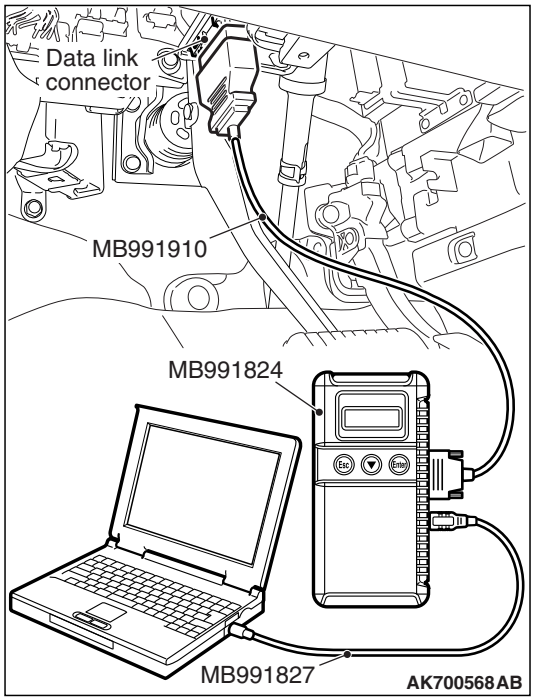
TROUBLESHOOTING HINTS (THE MOST LIKELY CAUSES FOR THIS CODE TO BE SET ARE:)

- Loose fuel cap.
- Fuel cap relief pressure is incorrect.
- Fuel overflow limiter valve failed.
- Purge line or vapor line is clogged.
- Fuel tank, purge line or vapor line seal failed.
- Evaporative emission purge solenoid valve failed.
- Evaporative emission ventilation solenoid valve failed.
- Fuel tank differential pressure sensor failed.
- Evaporative emission canister seal is faulty.
- Evaporative emission canister is clogged.

DIAGNOSIS

Required Special Tools:

- 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



STEP 1. Using scan tool MB991958, check the evaporative emission system monitor test.

⚠ CAUTION

- **To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.**
- **During this test, the ECM will automatically increase the engine speed to 1,600 r/min or greater. Check that the transaxle is set to "P" position.**

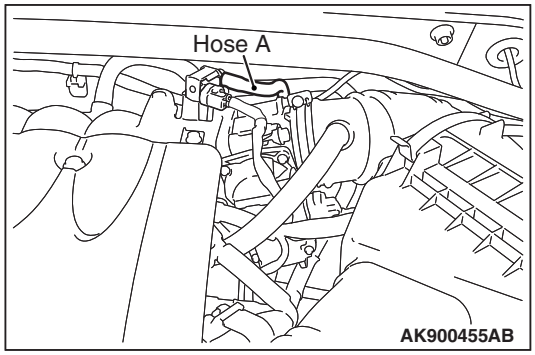
(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Erase the DTCs using scan tool MB991958.
(4) Check that the fuel cap is securely closed (Tighten until three clicks are heard).
(5) Start the engine.
(6) Select "System Test."
(7) Select "Evap Leak Mon."
(8) During this test, keep the accelerator pedal at the idle position.
(9) Keep the engine speed and engine load within the specified range. When the monitor test starts, the "In Progress" item on scan tool MB991958 will change from "NO" to "YES".
(10) Turn the ignition switch to the "LOCK" (OFF) position, and disconnect scan tool MB991958.

Q: Is "Evap Leak was detected." displayed on scan tool MB991958?

YES : A malfunction has been detected during the monitor test. Refer to the Diagnostic Trouble Code Chart and diagnose any other DTCs that are set P.13B-51. If no other DTC's have been set, go to Step 2 .

NO <"Evap Leak Monitor test passed" is displayed on scan tool MB991958.> : The evaporative emission system is working properly at this time. Explain to the customer that an improperly tightened fuel cap can cause the MIL to illuminate. Return the vehicle to the customer.

NO <"Evap Leak Monitor discontinued. Once turn the IG off then retest again from the beginning." is displayed on scan tool MB991958.> : The EVAP monitor has been interrupted during the test. Turn the ignition switch to the "LOCK" (OFF) position once, and repeat the monitoring from Step 1 .



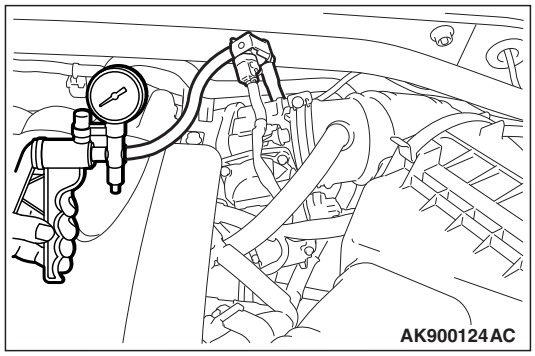
STEP 2. Check for leaks in evaporative emission hose A.

Use a hand vacuum pump to check the hose A.

Q: Do the hose hold vacuum?

YES : Go to Step 3 .

NO : Replace the hose. Then go to Step 12 .



STEP 3. Check the evaporative emission purge solenoid for leaks.

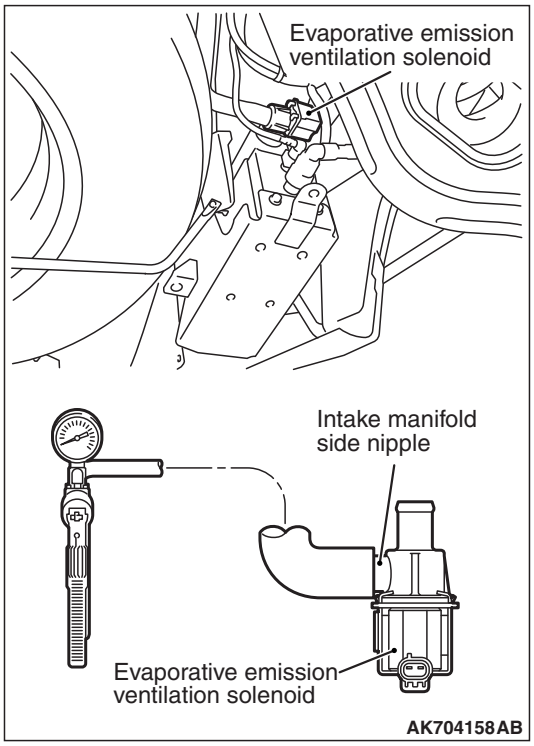
(1) Remove the evaporative emission purge solenoid from the intake manifold.
(2) Connect the hose of the hand vacuum pump to the intake manifold side nipple of the evaporative emission purge solenoid.
(3) Use the hand vacuum pump to confirm that the evaporative emission purge solenoid holds vacuum.
(4) Replace the O-ring of evaporative emission purge solenoid with the new one. Apply a small amount of new engine oil to the O-ring.
(5) Tighten the mounting bolts of evaporative emission purge solenoid to the specified torque.

Tightening torque: 5.0 ± 1.0 N· m

Q: Does the evaporative emission purge solenoid hold pressure?

YES : Go to Step 4 .

NO : Replace the evaporative emission purge solenoid. Then go to Step 12 .



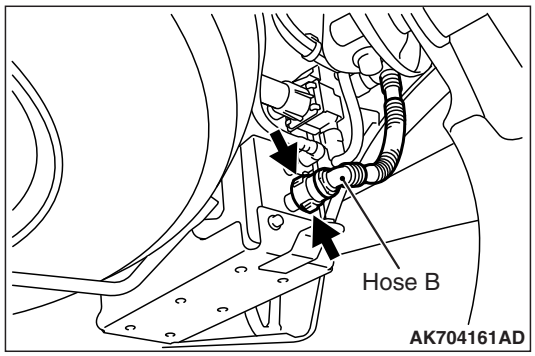
STEP 4. Using scan tool MB991958, check actuator test item 15: Evaporative emission ventilation solenoid.

(1) Remove the canister cover.
(2) Remove the evaporative emission ventilation solenoid. Do not disconnect the connector.
(3) Connect the hose of the hand vacuum pump to the canister side nipple of the evaporative emission ventilation solenoid.
(4) Turn the ignition switch to the "ON" position.
(5) Set scan tool MB991958 to actuator testing mode for item 15: Evaporative Emission Ventilation Solenoid.
  - While the evaporative emission ventilation solenoid is energized, operate the hand vacuum pump and confirm that the solenoid holds vacuum.
(6) Turn the ignition switch to the "LOCK" (OFF) position.
(7) Disconnect the hand vacuum pump, and reinstall the evaporative emission ventilation solenoid.
(8) Reinstall the canister cover.

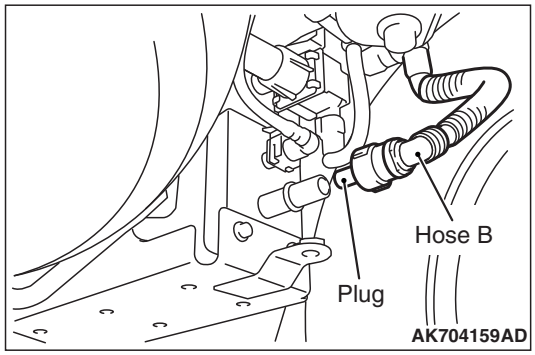
Q: Did the evaporative emission ventilation solenoid hold vacuum?

YES : Go to Step 5 .
NO : Replace the evaporative emission ventilation solenoid (Refer to GROUP 17, Evaporative emission canister and fuel tank pressure relief valve removal and installation P.17-88).Then go to Step 12 .

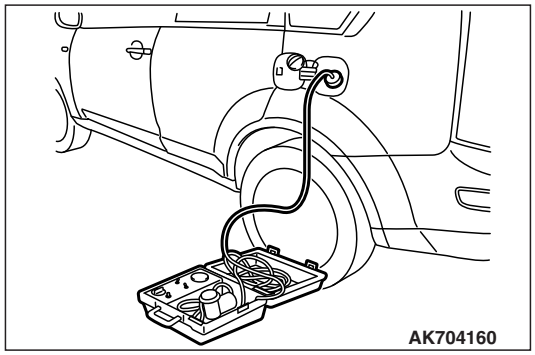
STEP 5. Perform the pressure test on the evaporative emission system.



(1) Disconnect hose B from the canister while holding the release buttons indicated in the illustration pressed by fingers.



(2) Plug the disconnected end of hose B.
(3) Confirm that the evaporative emission system pressure pump (Miller number 6872A) is operating properly. Perform the self-test as described in the pump manufacturer's instructions.
(4) Remove the fuel cap.



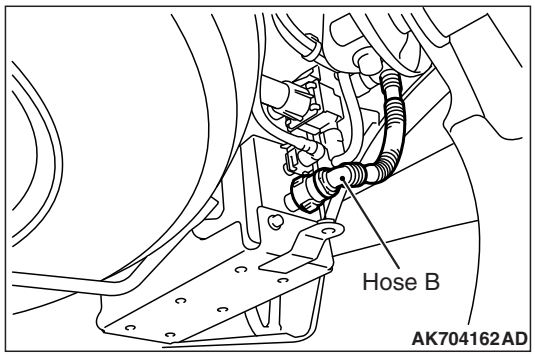
(5) Connect the evaporative emission system pressure pump (Miller number 6872A) to the fuel tank filler tube by using fuel tank adapter (MLR-8382).
(6) Pressure test the system to determine whether any leaks are present.

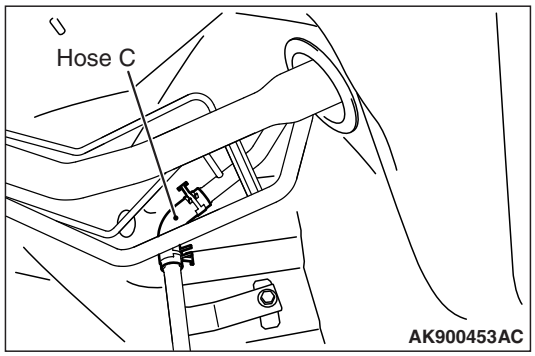
NOTE: The "Pressure test" in this procedure refers to the I/M240 Simulation Test. The eight steps of this test are described in the manufacturer's instructions for the evaporative emission system pressure pump, Miller number 6872A.

(7) Remove the evaporative emission system pressure pump (Miller number 6872A) and the fuel tank adapter (MLR-8382), and reinstall the fuel cap.
(8) Connect hose C to the evaporative emission canister.

Q: Is the evaporative emission system line free of leaks?

YES : Go to Step 10 .
NO : Go to Step 6 .





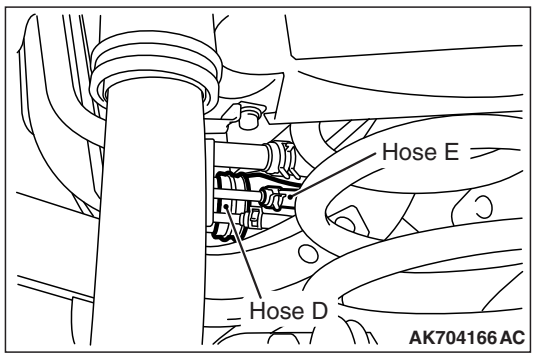
STEP 6. Check for leaks in evaporative emission hoses B and C.

Use a hand vacuum pump to test each hose B and C.

Q: Do the hoses hold vacuum?

YES : Go to Step 7 .

NO : Replace any damaged hose. Then go to Step 12 .



STEP 7. Check for leaks in evaporative emission hoses D and E.

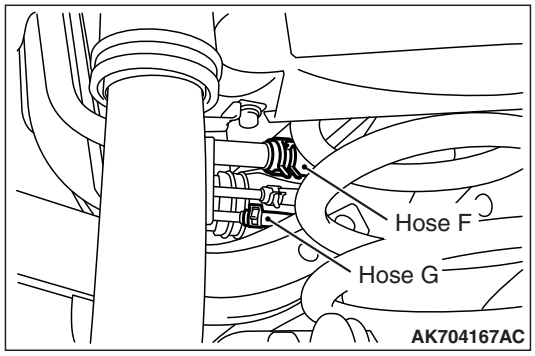
(1) Remove the fuel tank assembly (Refer to GROUP 13C, Fuel Tank <FWD> P.13C-15 or Fuel Tank <AWD> P.13C-20).

(2) Use a hand vacuum pump to test each hose D and E.

Q: Do the hoses hold vacuum?

YES : Go to Step 8 .

NO : Replace any damaged hose. Then go to Step 12 .



STEP 8. Check for leaks in evaporative emission hose F and G.

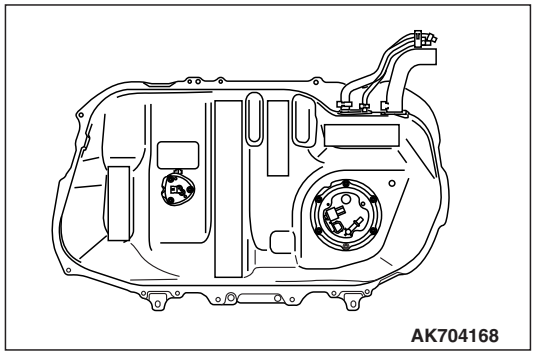
(1) Remove the fuel tank assembly (Refer to GROUP 13C, Fuel Tank <FWD> P.13C-15 or Fuel Tank <AWD> P.13C-20).

(2) Use a hand vacuum pump to test each hose F and G.

Q: Do the hose hold vacuum?

YES : Go to Step 9 .

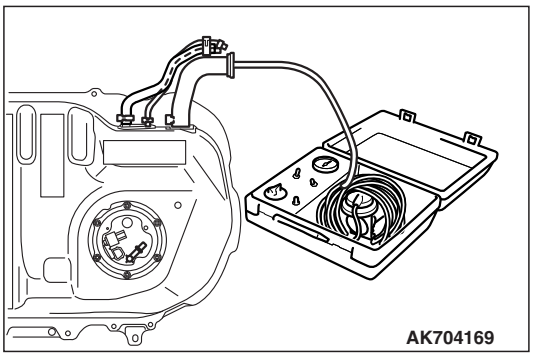
NO : Replace any damaged hose. Then go to Step 12 .



STEP 9. Check for leaks in the fuel tank.

(1) Visually check for cracks or other leaks in the fuel tank.

NOTE: Carefully check the fuel pump module and the fuel tank differential pressure sensor installation in the fuel tank.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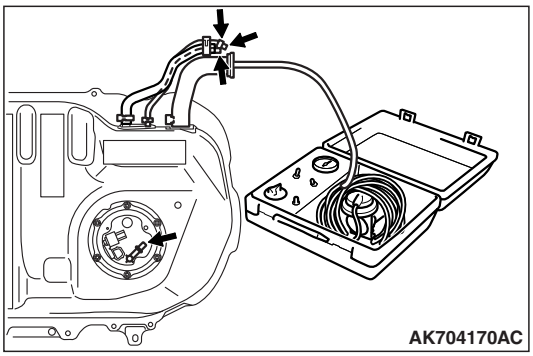
(2) Connect the evaporative emission system pressure pump (Miller number 6872A) to the fuel filler hose.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(3) Plug the hose and the nipple shown in the illustration.

NOTE: If these items are not securely plugged now, the fuel could leak in the next step.

(4) Pressurize the fuel tank with the evaporative emission system pressure pump.
(5) In the pressurized state, check for leaks by applying a soapy water solution to each section and look for bubbles.

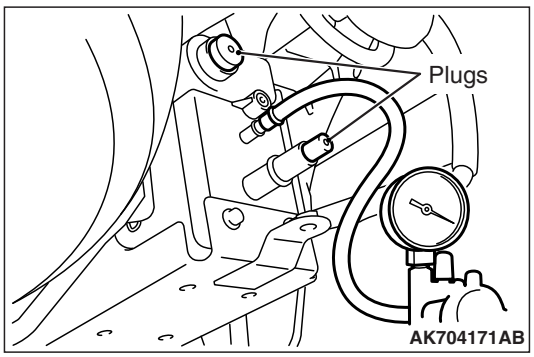
Q: Are any leaks found?

YES <When there is a leak from the attachment points of the fuel pump module, fuel tank differential pressure sensor, fuel level sensor (sub) or leveling valve.> : Repair or replace the leaked parts and check again that there are no leaks. Then reinstall the fuel tank (Refer to GROUP 13C, Fuel Tank <FWD> P.13C-15 or Fuel Tank <AWD> P.13C-20). Then go to Step 12 .

YES <When there is a leak from the fuel tank.> : Replace the fuel tank (Refer to GROUP 13C, Fuel Tank <FWD> P.13C-15 or Fuel Tank <AWD> P.13C-20). Go to Step 12

NO : When there is no leak, reinstall the fuel tank (Refer to GROUP 13C, Fuel Tank <FWD> P.13C-15 or Fuel Tank <AWD> P.13C-20). Then go to Step 11 .

STEP 10. Check the evaporative emission canister for vacuum leaks.



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(1) Connect a hand vacuum pump to the evaporative emission canister and plug the other nipples.
(2) Apply a pressure on the hand vacuum pump, and confirm that air is maintained.
(3) Disconnect the hand vacuum pump and remove the plugs.

Q: Is the evaporative emission canister in good condition?

YES : Go to Step 11 .

NO : Replace the evaporative emission canister (Refer to GROUP 17, Evaporative emission canister and fuel tank pressure relief valve removal and installation P.17-88). Then go to Step 12 .

STEP 11. Using scan tool MB991958, check the evaporative emission system monitor test.

⚠ CAUTION

- **During this test, the ECM automatically increases the engine speed to 1,600 r/min or greater. Check that the transaxle is set to "P" position.**

(1) Turn the ignition switch to the "ON" position.
(2) Erase the DTCs using scan tool MB991958.
(3) Check that the fuel cap is securely closed (Tighten until three clicks are heard).
(4) Start the engine.
(5) Select "System Test."
(6) Select "Evap Leak Mon."
(7) During the test, keep the accelerator pedal at the idle position.
(8) Keep the engine speed and engine load within the specified range. When the monitor test starts, the "In Progress" item on scan tool MB991958 will change from "NO" to "YES".
(9) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is "Evap Leak was detected." displayed on scan tool MB991958?

YES : Replace the ECM. When the ECM is replaced, register the ID code. Refer to GROUP 42B, Diagnosis –ID Code Registration Judgment Table <Vehicles with KOS> P.42B-11 or GROUP 42C, Diagnosis –ID Code Registration Judgment Table <Vehicles with WCM> P.42C-10. Then go to Step 12 .

NO <"Evap Leak Monitor test passed" is displayed on scan tool MB991958.> : The evaporative emission system is working properly at this time. Go to Step 12 .

NO <"Evap Leak Monitor discontinued. Once turn the IG off then retest again from the beginning." is displayed on scan tool MB991958.> : The EVAP monitor has been interrupted during the test. Turn the ignition switch to the "LOCK" (OFF) position once, and repeat the monitoring from Step 11 .

STEP 12. Perform the OBD-II drive cycle.

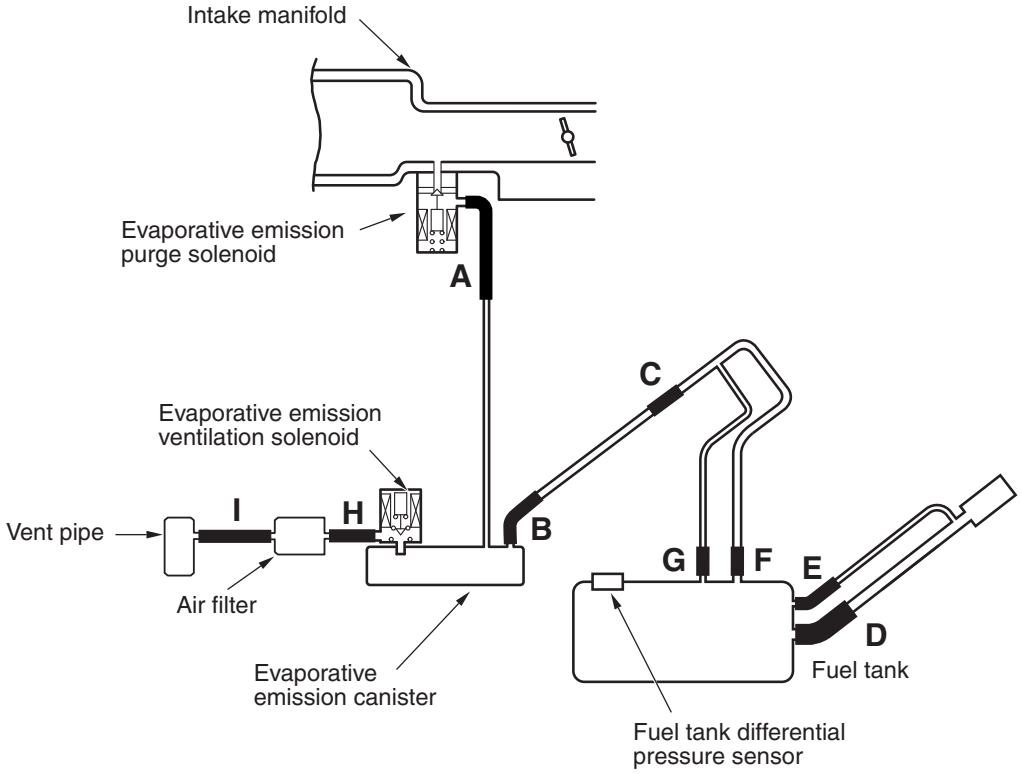
(1) Confirm the repair by performing the appropriate drive cycle (Refer to Diagnostic Function –OBD-II Drive Cycle –Pattern 5 P.13B-11).
(2) Read the DTC.

Q: Is DTC P0455 set?

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

DTC P0456: Evaporative Emission Control System Leak Detected (very small leak)

System diagram



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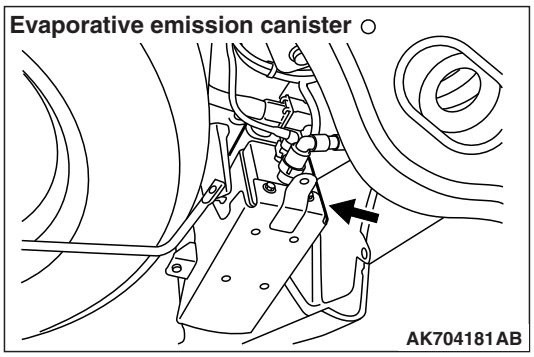
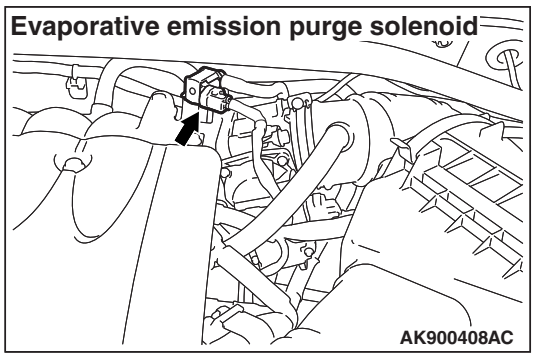
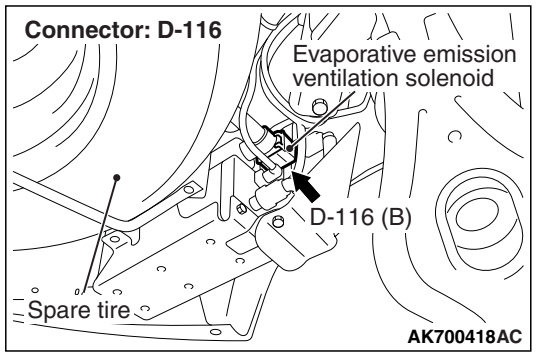






TSB Revision

TECHNICAL DESCRIPTION

- The ECM monitors the Evaporative Emission (EVAP) System pressure.
- The ECM controls the evaporative emission ventilation solenoid. It closes the evaporative emission ventilation solenoid to seal the evaporative emission canister side of the system.
- The evaporative emission purge solenoid is opened to allow manifold vacuum to create low pressure (vacuum) in the EVAP system.
- When the EVAP system develops a vacuum of 2 kPa (0.29 psi), the evaporative emission purge solenoid is closed and the fuel system vacuum is maintained at 2 kPa (0.29 psi).
- The ECM determines whether there is a leak in the EVAP system by monitoring the vacuum inside the fuel tank.
- The test is stopped when fuel vapor pressure exceeds predetermined limits.

DESCRIPTIONS OF MONITOR METHODS

- Measure reverting pressure after depressurizing by intake manifold negative pressure and detect malfunction if reverting pressure rises largely.

MONITOR EXECUTION

- Once per driving cycle.

MONITOR EXECUTION CONDITIONS (OTHER MONITOR AND SENSOR)

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

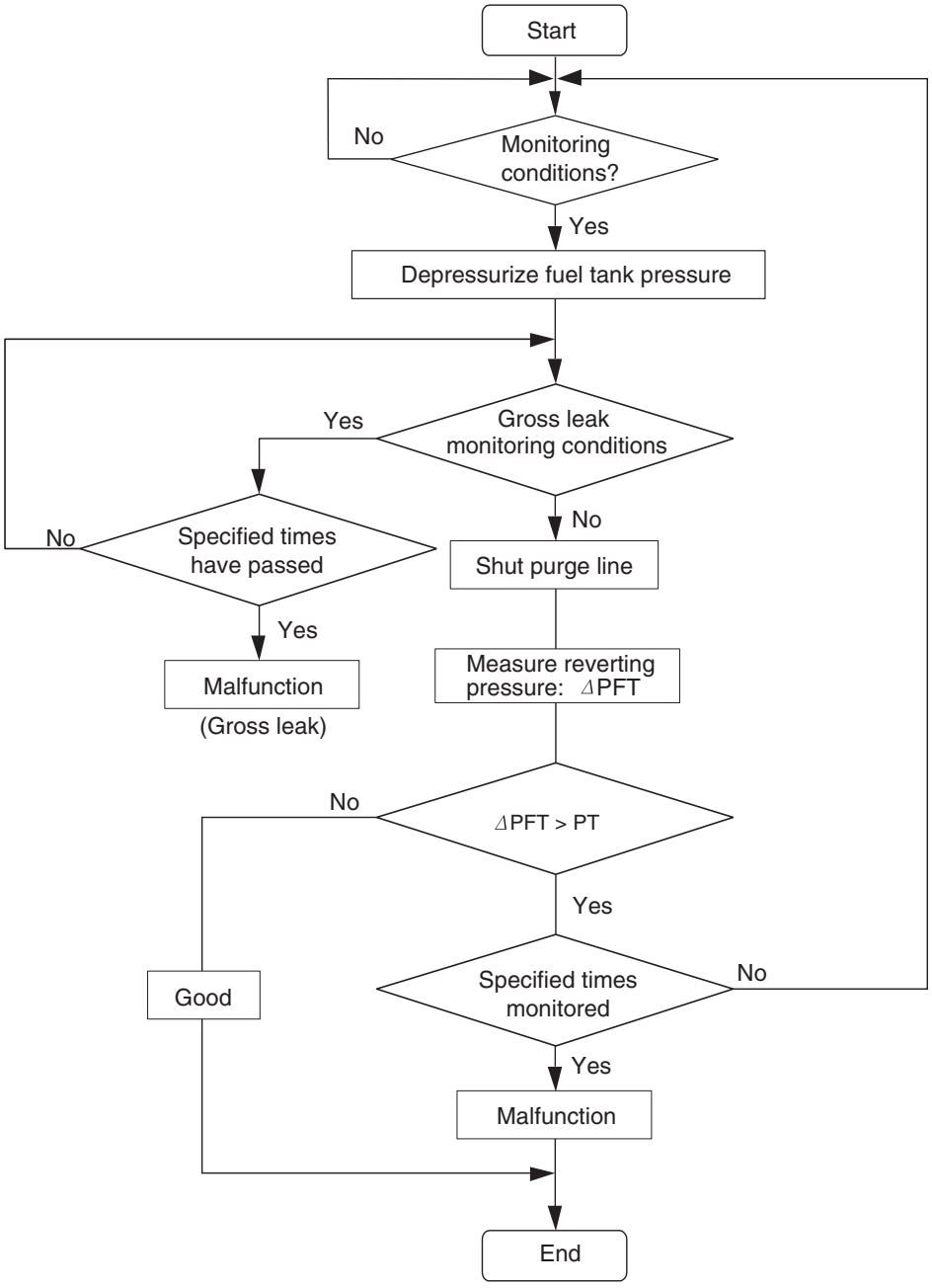
- Evaporative emission purge solenoid monitor
- Evaporative emission purge system monitor
- Fuel tank differential pressure sensor monitor
- Evaporative emission ventilation solenoid monitor
- Fuel level sensor monitor
- Fuel temperature sensor monitor

Sensor (The sensors below are determined to be normal)

- Mass airflow sensor
- Barometric pressure sensor
- Intake air temperature sensor
- Engine coolant temperature sensor

DTC SET CONDITIONS

Logic Flow Chart (Monitor Sequence)



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Check Conditions

- Engine coolant temperature is less than 36° C (97° F) when the engine is started.
- Intake air temperature is less than 36° C (97° F) when the engine is started.
- Engine coolant temperature is more than 20° C (68° F).
- When the evaporative emission purge solenoid and evaporative emission ventilation solenoid are closed, the change of the pressure in the fuel tank is less than 324 Pa (0.09 in.Hg).
- Amount of remaining fuel is 40 –85 percent of capacity when the engine is started.
- Barometric pressure is more than 76 kPa (22.4 in.Hg).
- Intake air temperature is more than –10° C (14° F).
- Fuel temperature is less than 33° C (91° F).

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- Fuel tank differential pressure sensor output voltage is between 1.0 and 4.0 volts.
- At least 10 seconds have passed since the last monitor was complete.
- Monitoring time: 10 –14 minutes

Judgement Criterion

- In case the amount of change in the pressure that is monitored for a given length of time inside the tank is beyond the specified value after sealing off the fuel tank and the vapor line.

  NOTE: The specified value varies depending on the fuel temperature and fuel level.

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function –OBD-II Drive Cycle – Pattern 6 P.13B-11.

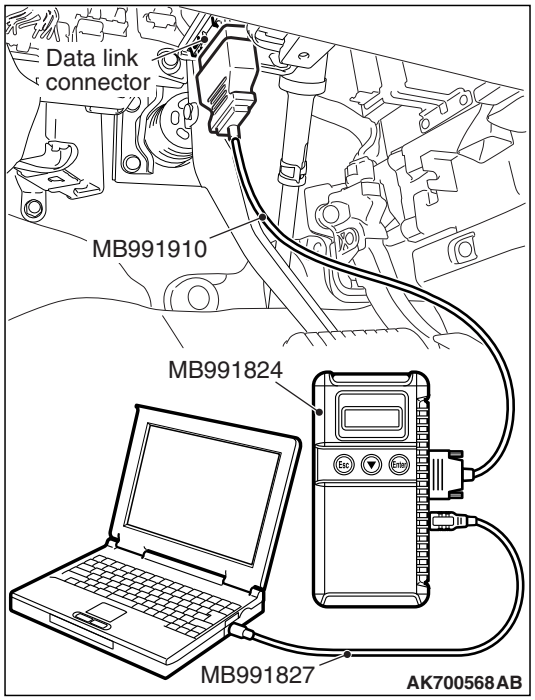
TROUBLESHOOTING HINTS (THE MOST LIKELY CAUSES FOR THIS CODE TO BE SET ARE:)

- Loose fuel cap.
- Fuel cap relief pressure is incorrect.
- Malfunction of the evaporative emission canister seal.
- Malfunction of the fuel tank, purge line or vapor line seal.
- Malfunction of the evaporative emission ventilation solenoid.

DIAGNOSIS

Required Special Tools:

- 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



STEP 1. Using scan tool MB991958, check the evaporative emission system monitor test.

⚠ CAUTION

- **To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.**
- **During this test, the ECM will automatically increase the engine speed to 1,600 r/min or greater. Check that the transaxle is set to "P" position.**

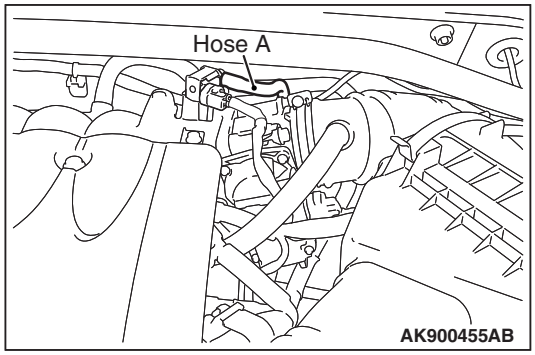
(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Erase the DTCs using scan tool MB991958.
(4) Check that the fuel cap is securely closed (Tighten until three clicks are heard).
(5) Start the engine.
(6) Select "System Test."
(7) Select "Evap Leak Mon."
(8) During this test, keep the accelerator pedal at the idle position.
(9) Keep the engine speed and engine load within the specified range. When the monitor test starts, the "In Progress" item on scan tool MB991958 will change from "NO" to "YES".
(10) Turn the ignition switch to the "LOCK" (OFF) position, and disconnect scan tool MB991958.

Q: Is "Evap Leak Mon. Completed. Test Failed and DTCs Set" displayed on scan tool MB991958?

YES : A malfunction has been detected during the monitor test. Refer to the Diagnostic Trouble Code Chart and diagnose any other DTCs that are set P.13B-51. If no other DTC's have been set, go to Step 2 .

NO <"Evap Leak Mon. Completed. Test Passed" is displayed on scan tool MB991958.> : The evaporative emission system is working properly at this time. Explain to the customer that an improperly tightened fuel cap can cause the MIL to illuminate. Return the vehicle to the customer.

NO <"Evap Leak Mon. Discontinued. Retest again from the first" is displayed on scan tool MB991958.> : The EVAP monitor has been interrupted during the test. Turn the ignition switch to the "LOCK" (OFF) position once, and repeat the monitoring from Step 1 .



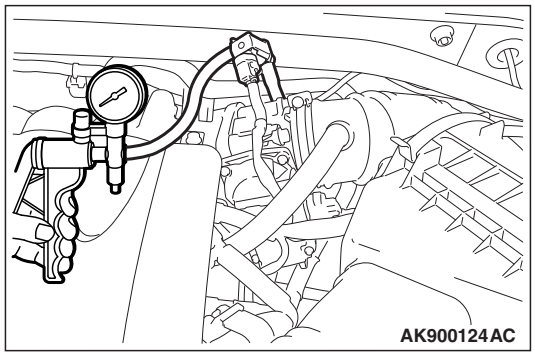
STEP 2. Check for leaks in evaporative emission hose A.

(1) Use a hand vacuum pump to check the hose A.

Q: Do the hose hold vacuum?

YES : Go to Step 3 .

NO : Replace the hose. Then go to Step 12 .



STEP 3. Check the evaporative emission purge solenoid for leaks.

(1) Remove the evaporative emission purge solenoid from the intake manifold.

(2) Connect the hose of the hand vacuum pump to the intake manifold side nipple of the evaporative emission purge solenoid.

(3) Use the hand vacuum pump to confirm that the evaporative emission purge solenoid holds vacuum.

(4) Replace the O-ring of evaporative emission purge solenoid with the new one. Apply a small amount of new engine oil to the O-ring.

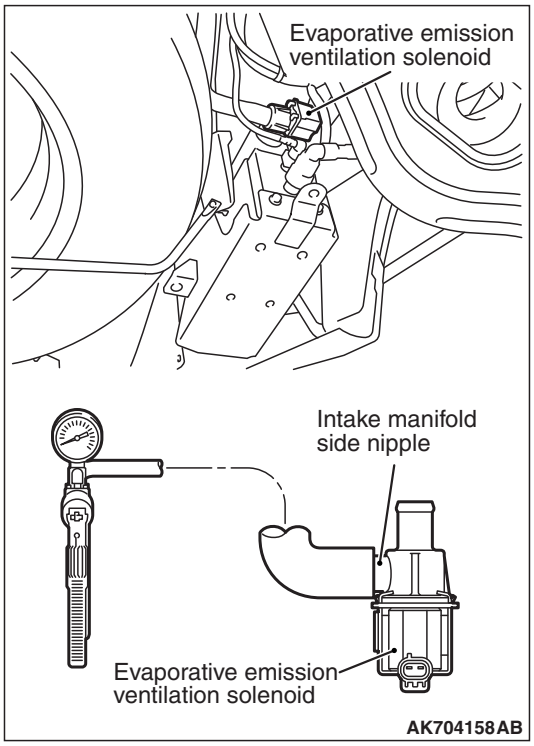
(5) Tighten the mounting bolts of evaporative emission purge solenoid to the specified torque.

Tightening torque: 5.0 ± 1.0 N· m

Q: Does the evaporative emission purge solenoid hold pressure?

YES : Go to Step 4 .

NO : Replace the evaporative emission purge solenoid. Then go to Step 12 .



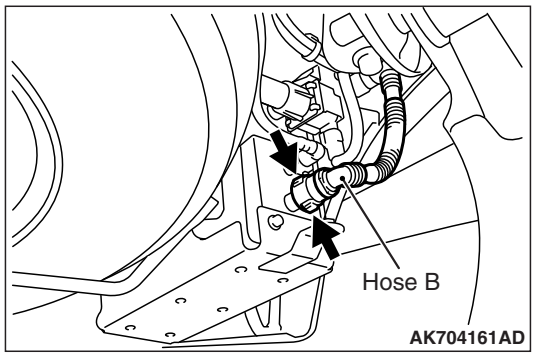
STEP 4. Using scan tool MB991958, check actuator test item 15: Evaporative emission ventilation solenoid.

(1) Remove the canister cover.
(2) Remove the evaporative emission ventilation solenoid. Do not disconnect the connector.
(3) Connect the hose of the hand vacuum pump to the canister side nipple of the evaporative emission ventilation solenoid.
(4) Turn the ignition switch to the "ON" position.
(5) Set scan tool MB991958 to actuator testing mode for item 15: Evaporative Emission Ventilation Solenoid.
  - While the evaporative emission ventilation solenoid is energized, operate the hand vacuum pump and confirm that the solenoid holds vacuum.
(6) Turn the ignition switch to the "LOCK" (OFF) position.
(7) Disconnect the hand vacuum pump, and reinstall the evaporative emission ventilation solenoid.
(8) Reinstall the canister cover.

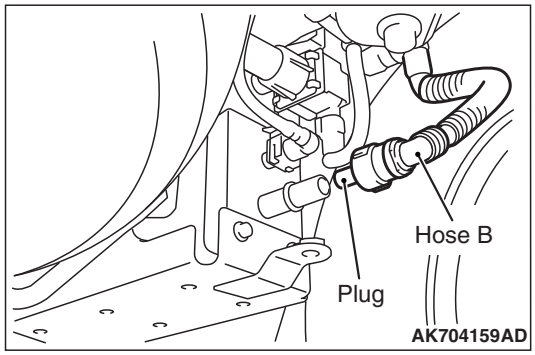
Q: Did the evaporative emission ventilation solenoid hold vacuum?

YES : Go to Step 5 .
NO : Replace the evaporative emission ventilation solenoid (Refer to GROUP 17, Evaporative emission canister and fuel tank pressure relief valve removal and installation P.17-88).Then go to Step 12 .

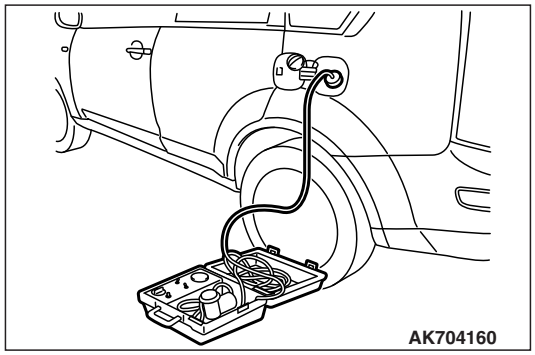
STEP 5. Perform the pressure test on the evaporative emission system.



(1) Disconnect hose B from the canister while holding the release buttons indicated in the illustration pressed by fingers.



(2) Plug the disconnected end of hose B.
(3) Confirm that the evaporative emission system pressure pump (Miller number 6872A) is operating properly. Perform the self-test as described in the pump manufacturer's instructions.
(4) Remove the fuel cap.



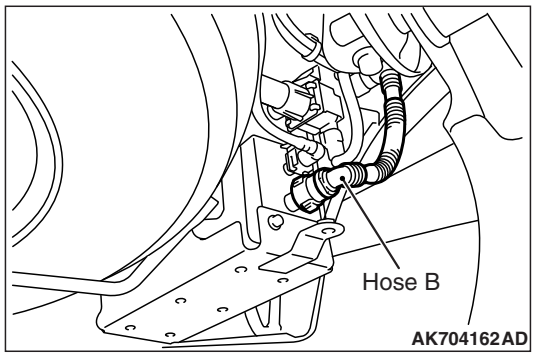
(5) Connect the evaporative emission system pressure pump (Miller number 6872A) to the fuel tank filler tube by using fuel tank adapter (MLR-8382).
(6) Pressure test the system to determine whether any leaks are present.

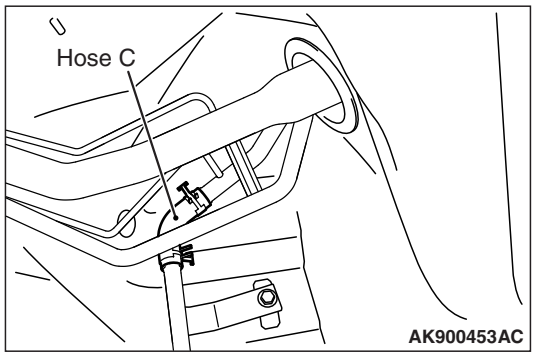
NOTE: The "Pressure test" in this procedure refers to the I/M240 Simulation Test. The eight steps of this test are described in the manufacturer's instructions for the evaporative emission system pressure pump, Miller number 6872A.

(7) Remove the evaporative emission system pressure pump (Miller number 6872A) and the fuel tank adapter (MLR-8382), and reinstall the fuel cap.
(8) Connect hose C to the evaporative emission canister.

Q: Is the evaporative emission system line free of leaks?

YES : Go to Step 10 .
NO : Go to Step 6 .





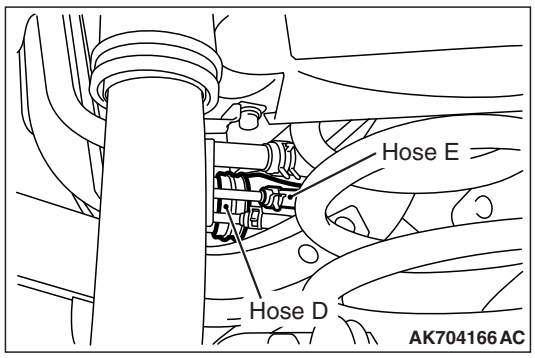
STEP 6. Check for leaks in evaporative emission hoses B and C.

(1) Use a hand vacuum pump to test each hose B and C.

Q: Do the hoses hold vacuum?

YES : Go to Step 7 .

NO : Replace any damaged hose. Then go to Step 12 .



STEP 7. Check for leaks in evaporative emission hoses D and E.

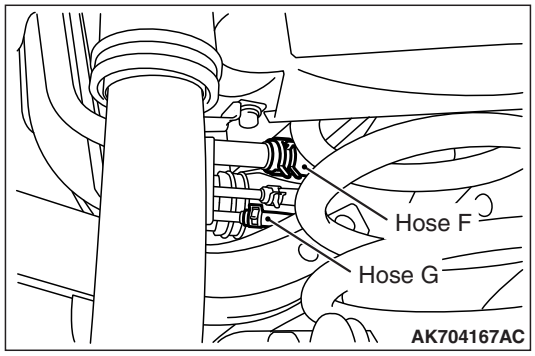
(1) Remove the fuel tank assembly (Refer to GROUP 13C, Fuel Tank <FWD> P.13C-15 or Fuel Tank <AWD> P.13C-20).

(2) Use a hand vacuum pump to test each hose D and E.

Q: Do the hoses hold vacuum?

YES : Go to Step 8 .

NO : Replace any damaged hose. Then go to Step 12 .



STEP 8. Check for leaks in evaporative emission hose F and G.

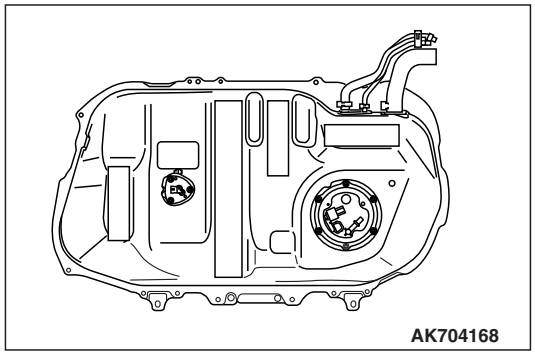
(1) Remove the fuel tank assembly (Refer to GROUP 13C, Fuel Tank <FWD> P.13C-15 or Fuel Tank <AWD> P.13C-20).

(2) Use a hand vacuum pump to test each hose F and G.

Q: Do the hose hold vacuum?

YES : Go to Step 9 .

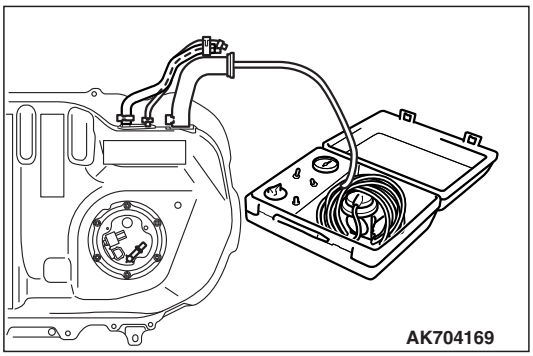
NO : Replace any damaged hose. Then go to Step 12 .



STEP 9. Check for leaks in the fuel tank.

(1) Visually check for cracks or other leaks in the fuel tank.

NOTE: Carefully check the fuel pump module and the fuel tank differential pressure sensor installation in the fuel tank.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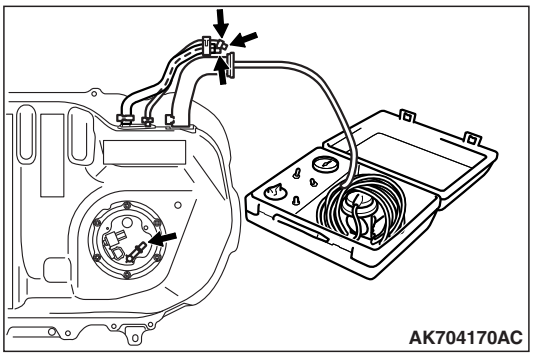
(2) Connect the evaporative emission system pressure pump (Miller number 6872A) to the fuel filler hose.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(3) Plug the hose and the nipple shown in the illustration.

NOTE: If these items are not securely plugged now, the fuel could leak in the next step.

(4) Pressurize the fuel tank with the evaporative emission system pressure pump.
(5) In the pressurized state, check for leaks by applying a soapy water solution to each section and look for bubbles.

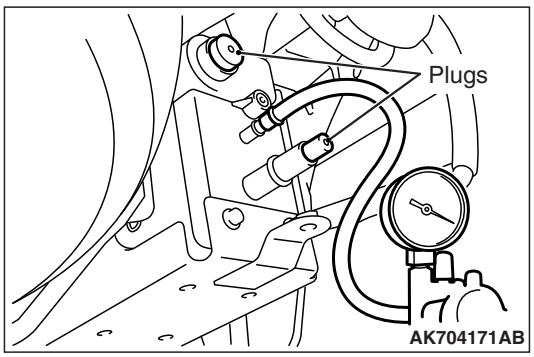
Q: Are any leaks found?

YES <When there is a leak from the attachment points of the fuel pump module, fuel tank differential pressure sensor, fuel level sensor (sub) or leveling valve.> : Repair or replace the leaked parts and check again that there are no leaks. Then reinstall the fuel tank (Refer to GROUP 13C, Fuel Tank <FWD> P.13C-15 or Fuel Tank <AWD> P.13C-20). Then go to Step 12 .

YES <When there is a leak from the fuel tank.> : Replace the fuel tank (Refer to GROUP 13C, Fuel Tank <FWD> P.13C-15 or Fuel Tank <AWD> P.13C-20). Go to Step 12

NO : When there is no leak, reinstall the fuel tank (Refer to GROUP 13C, Fuel Tank <FWD> P.13C-15 or Fuel Tank <AWD> P.13C-20). Then go to Step 12 .

STEP 10. Check the evaporative emission canister for vacuum leaks.



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(1) Connect a hand vacuum pump to the evaporative emission canister and plug the other nipples.
(2) Apply a pressure on the hand vacuum pump, and confirm that air is maintained.
(3) Disconnect the hand vacuum pump and remove the plugs.

Q: Is the evaporative emission canister in good condition?

YES : Go to Step 11 .

NO : Replace the evaporative emission canister (Refer to GROUP 17, Evaporative emission canister and fuel tank pressure relief valve removal and installation P.17-88). Then go to Step 12 .

STEP 11. Using scan tool MB991958, check the evaporative emission system monitor test.

⚠ CAUTION

- **During this test, the ECM automatically increases the engine speed to 1,600 r/min or greater. Check that the transaxle is set to "P" position.**

(1) Turn the ignition switch to the "ON" position.
(2) Erase the DTCs using scan tool MB991958.
(3) Check that the fuel cap is securely closed (Tighten until three clicks are heard).
(4) Start the engine.
(5) Select "System Test."
(6) Select "Evap Leak Mon."
(7) During the test, keep the accelerator pedal at the idle position.
(8) Keep the engine speed and engine load within the specified range. When the monitor test starts, the "In Progress" item on scan tool MB991958 will change from "NO" to "YES".
(9) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is "Evap Leak Mon. Completed. Test Failed and DTCs Set" displayed on scan tool MB991958?

YES : Replace the ECM. When the ECM is replaced, register the ID code. Refer to GROUP 42B, Diagnosis –ID Code Registration Judgment Table <Vehicles with KOS> P.42B-11 or GROUP 42C, Diagnosis –ID Code Registration Judgment Table <Vehicles with WCM> P.42C-10. Then go to Step 12 .

NO <"Evap Leak Mon. Completed. Test Passed" is displayed on scan tool MB991958.> : The evaporative emission system is working properly at this time. Go to Step 12 .

NO <"Evap Leak Mon. Discontinued. Retest again from the first" is displayed on scan tool MB991958.> : The EVAP monitor has been interrupted during the test. Turn the ignition switch to the "LOCK" (OFF) position once, and repeat the monitoring from Step 11 .

STEP 12. Perform the OBD-II drive cycle.

(1) Confirm the repair by performing the appropriate drive cycle (Refer to Diagnostic Function –OBD-II Drive Cycle –Pattern 6 P.13B-11).
(2) Read the DTC.

Q: Is DTC P0456 set?

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

DTC P0461: Fuel Level Sensor <FWD> or Fuel Level Sensor (main) <AWD> Circuit Range/Performance

TECHNICAL DESCRIPTION

- The fuel level sensor converts the rest of the fuel to a voltage and seconds it to the combination meter.
- The combination meter sends the data regarding the rest of the fuel to the ECM.
- The ECM checks whether this data is within a specified range.

DESCRIPTIONS OF MONITOR METHODS

Detect malfunction if change of fuel level sensor output voltage is small when sum of fuel injection is large.

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)

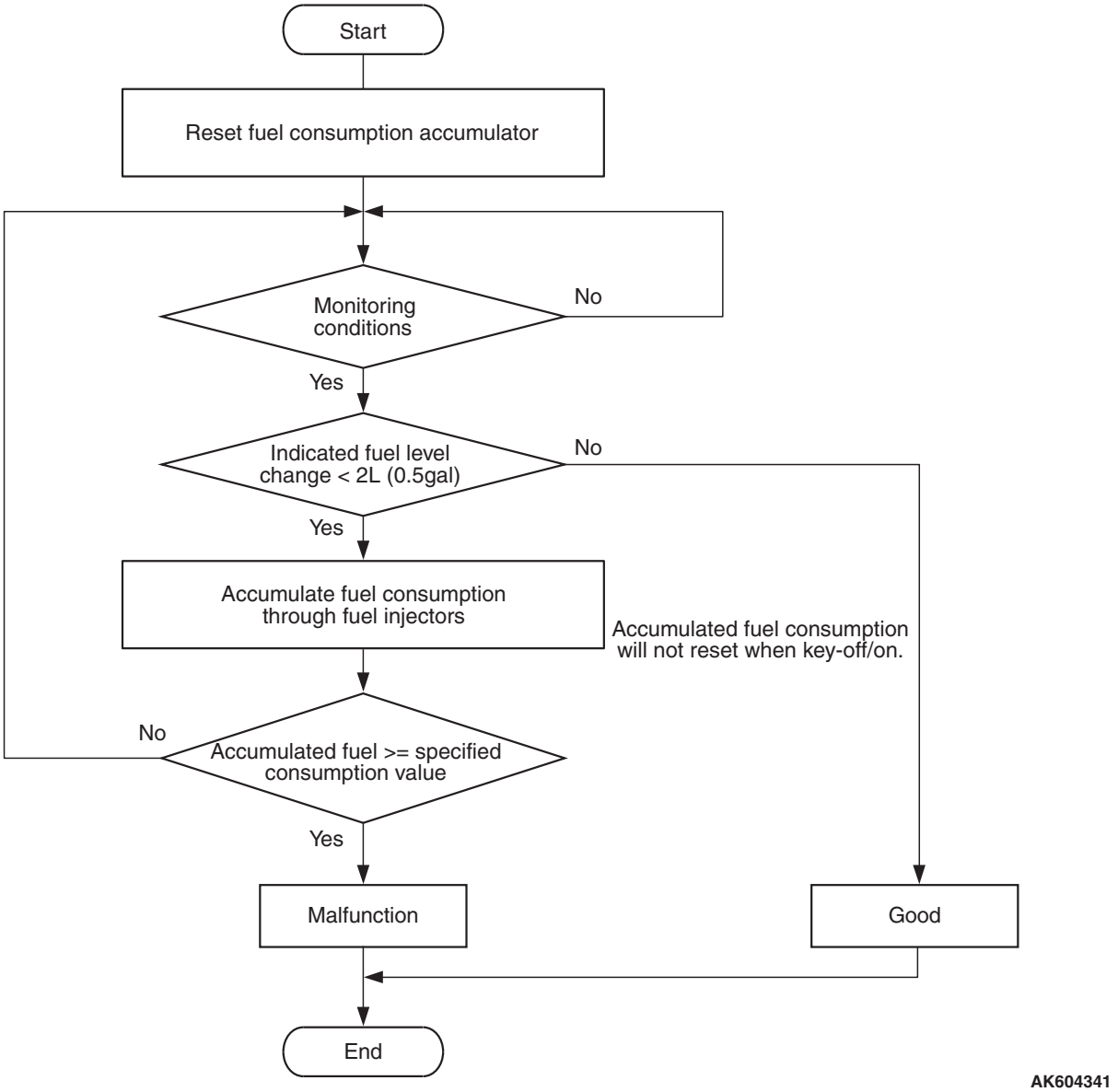
- Not applicable

Sensor (The sensor below is determined to be normal)

- Not applicable

DTC SET CONDITIONS

Logic Flow Chart



Check Condition, Judgement Criterion

- When the fuel consumption calculated from the operation time of the injector amounts to 20 liters (5.2 gal) <FWD> or 30 liters (7.8 gal) <AWD>, the diversity of the amount of fuel in tank calculated from the fuel level sensor is 2 liters (0.5 gal) or less.

OBD-II DRIVE CYCLE PATTERN

None.

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

- Combination meters assembly failed.
- Fuel level sensor failed.
- ECM failed.

DIAGNOSIS

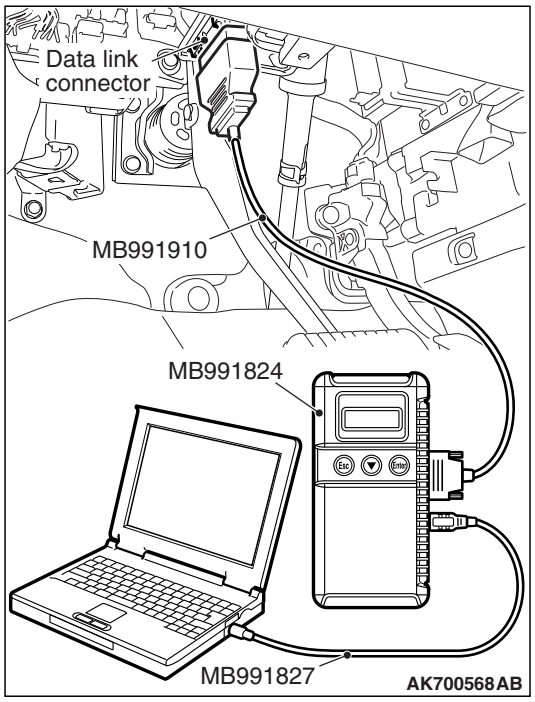
Required Special Tools:

- 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, 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 P2066 set?

YES : Go to Step 2.
NO : Go to Step 4.

STEP 2. Check fuel gauge.

Q: Is the fuel gauge functioning?

YES : Go to Step 3.
NO : Refer to GROUP 54A, Combination Meter –Trouble Symptom Chart P.54A-70.

STEP 3. Check the trouble symptoms.

Check that the fuel gauge operates correctly.

Q: Does the fuel gauge operate correctly?

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.00-15.
NO : Replace the ECM. When the ECM is replaced, register the ID code. Refer to GROUP 42B, Diagnosis –ID Codes Registration Judgment Table <Vehicles with KOS> P.42B-11 or GROUP 42C, Diagnosis –ID Codes Registration Judgment Table <Vehicles with WCM> P.42C-10. Then go to Step 6.

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STEP 4. Check the fuel pump module.
Check to see if the fuel pump module is normal. Refer to GROUP 54A, Combination Meter –On-vehicle Service –Fuel Level Sensor Check P.54A-111.

Q: Is the fuel pump module normal?

YES : Go to Step 5.
NO : Replace the fuel pump module. Then go to Step 6.

STEP 5. Check the trouble symptoms.
Check that the fuel gauge operates correctly.

Q: Does the fuel gauge operate correctly?

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.00-15.
NO : Replace the ECM. When the ECM is replaced, register the ID code. Refer to GROUP 42B, Diagnosis –ID Codes Registration Judgment Table <Vehicles with KOS> P.42B-11 or GROUP 42C, Diagnosis –ID Codes Registration Judgment Table <Vehicles with WCM> P.42C-10. Then go to Step 6.

STEP 6. Check the trouble symptoms.
Check that the fuel gauge operates correctly.

Q: Does the fuel gauge operate correctly?

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

DTC P0462: Fuel Level Sensor <FWD> or Fuel Level Sensor (main) <AWD> Circuit Low Input

TECHNICAL DESCRIPTION

- The fuel level sensor converts the rest of the fuel to a voltage and sends it to the combination meter.
- The combination meter sends the data regarding the rest of the fuel to the ECM.
- The ECM checks whether this data is within a specified range.

DESCRIPTIONS OF MONITOR METHODS

A short circuit is detected while monitoring the fuel level sensor output.

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)

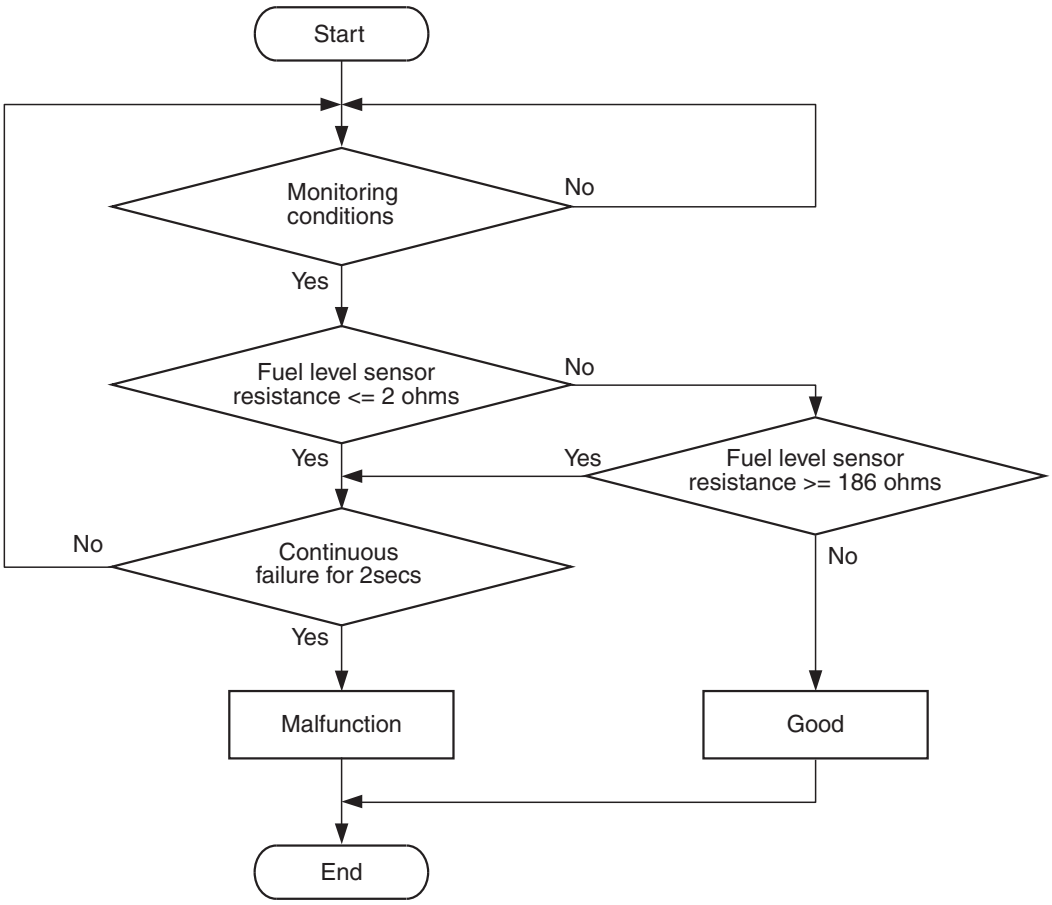
- Not applicable

Sensor (The sensor below is determined to be normal)

- Not applicable

DTC SET CONDITIONS

Logic Flow Chart



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Check Conditions

- Battery positive voltage is between 11 and 16.5 volts.
- 2 seconds or more have passed since the engine staring sequence was completed.

Judgement Criterion

- Fuel level sensor resistance has continued to be lower than 2 ohms for 2 seconds.

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function –OBD-II Drive Cycle – Pattern 22 P.13B-11.

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

- Fuel level sensor failed.
- Combination meters assembly failed.
- Connector damage
- Harness damage
- ECM 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 fuel gauge.

Q: Is the fuel gauge functioning?

YES : Go to Step 2.
NO : Refer to GROUP 54A, Combination Meter –Trouble Symptom Chart P.54A-70.

STEP 2. Check the trouble symptoms.

(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle –Pattern 22 P.13B-11.
(2) Check the diagnostic trouble code (DTC).

Q: Is DTC P0462 set?

YES : Replace the ECM. When the ECM is replaced, register the ID code. Refer to GROUP 42B, Diagnosis –ID Codes Registration Judgment Table <Vehicles with KOS> P.42B-11 or GROUP 42C, Diagnosis –ID Codes Registration Judgment Table <Vehicles with WCM> P.42C-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.00-15.

STEP 3. 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 22 P.13B-11.
(2) Check the diagnostic trouble code (DTC).

Q: Is DTC P0462 set?

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

DTC P0463: Fuel Level Sensor <FWD> or Fuel Level Sensor (main) <AWD> Circuit High Input

TECHNICAL DESCRIPTION

- The fuel level sensor converts the rest of the fuel to a voltage and sends it to the combination meter.
- The combination meter sends the data regarding the rest of the fuel to the ECM.
- The ECM checks whether this data is within a specified range.

DESCRIPTIONS OF MONITOR METHODS

An open circuit is detected while monitoring the fuel level sensor output.

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)

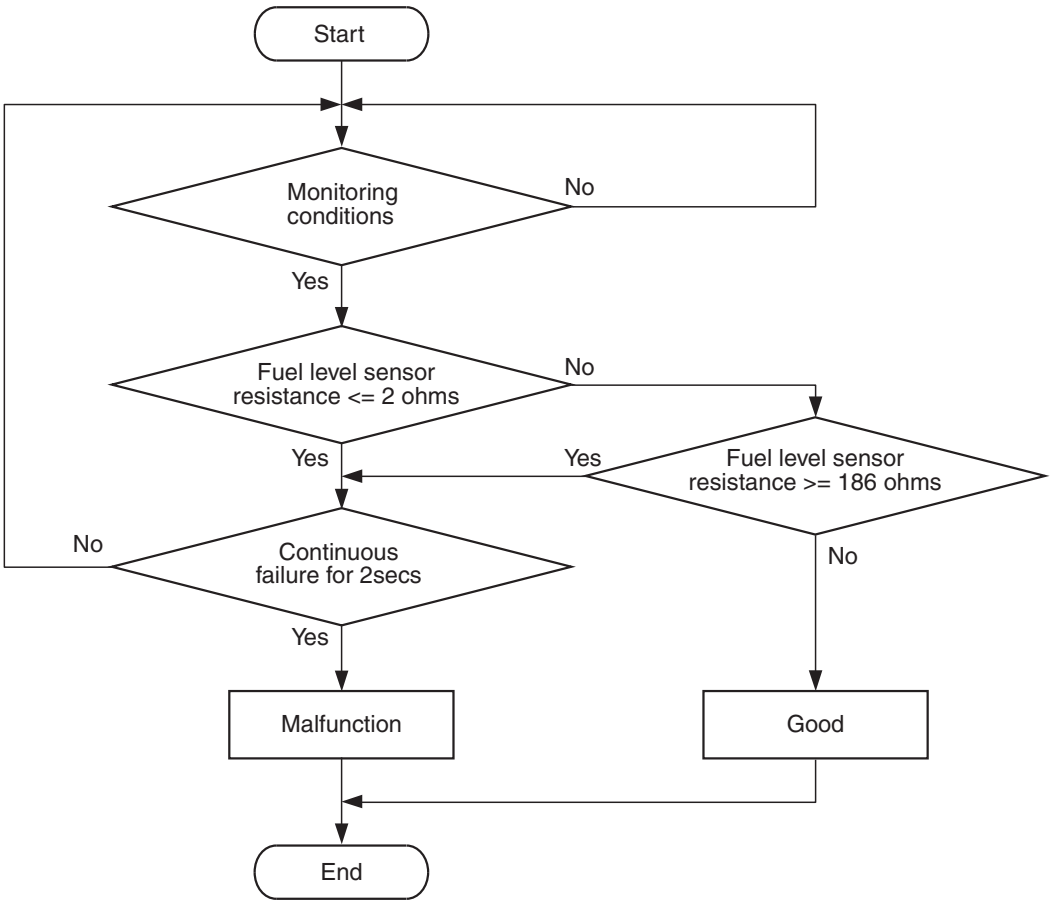
- Not applicable

Sensor (The sensor below is determined to be normal)

- Not applicable

DTC SET CONDITIONS

Logic Flow Chart



AK604342

Check Conditions

- Battery positive voltage is between 11 and 16.5 volts.
- 2 seconds or more have passed since the engine staring sequence was completed.

Judgement Criterion

- Fuel level sensor resistance has continued to be higher than 186 ohms for 2 seconds.

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function –OBD-II Drive Cycle – Pattern 22 P.13B-11.

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

- Fuel level sensor failed.
- Combination meters assembly failed.
- Connector damage
- Harness damage
- ECM 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 fuel gauge.

Q: Is the fuel gauge functioning?

YES : Go to Step 2.
NO : Refer to GROUP 54A, Combination Meter –Trouble Symptom Chart P.54A-70.

STEP 2. Check the trouble symptoms.

(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle –Pattern 22 P.13B-11.
(2) Check the diagnostic trouble code (DTC).

Q: Is DTC P0463 set?

YES : Replace the ECM. When the ECM is replaced, register the ID code. Refer to GROUP 42B, Diagnosis –ID Codes Registration Judgment Table <Vehicles with KOS> P.42B-11 or GROUP 42C, Diagnosis –ID Codes Registration Judgment Table <Vehicles with WCM> P.42C-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.00-15.

STEP 3. Test the OBD-II drive cycle.

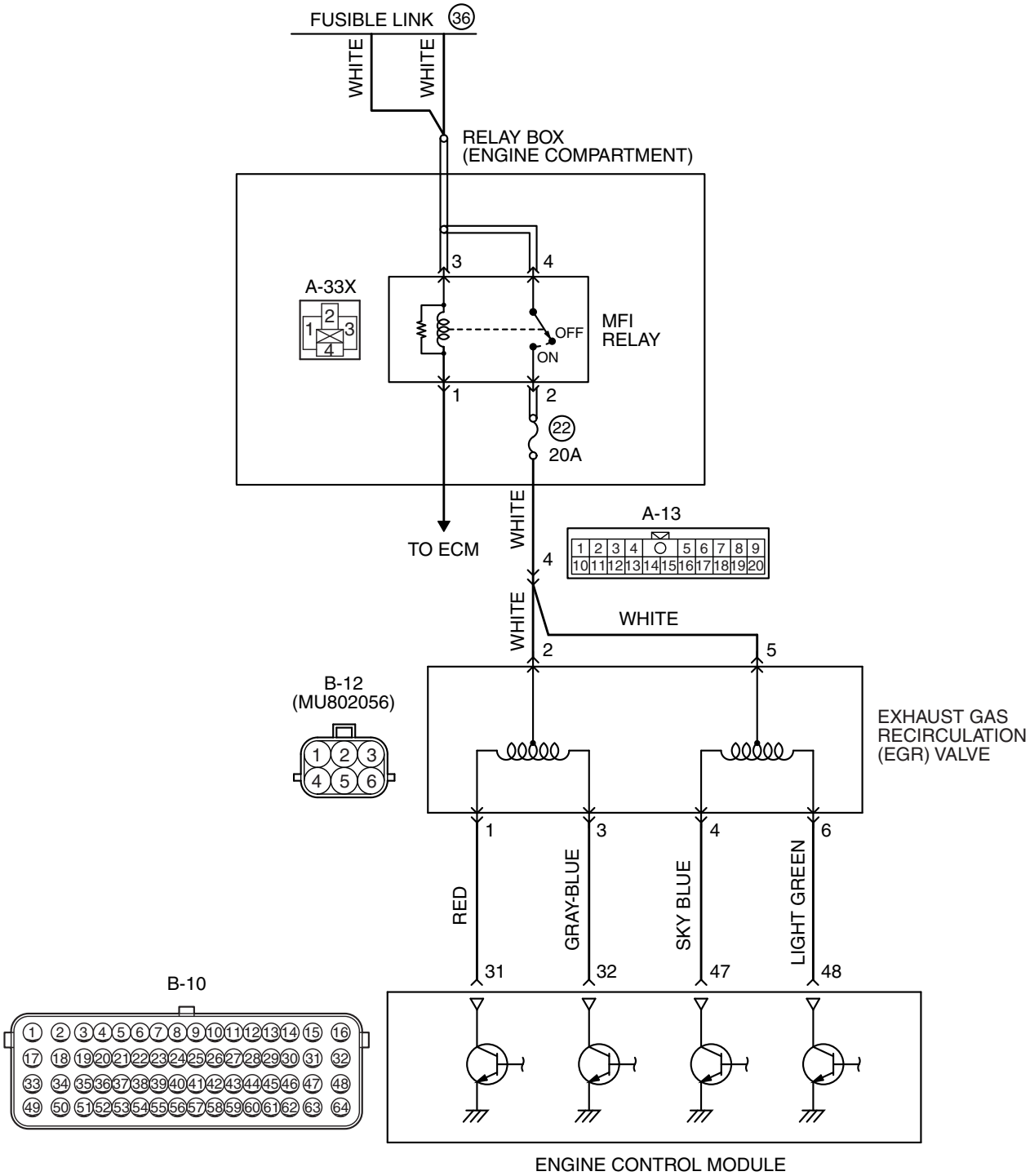
(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle –Pattern 22 P.13B-11.
(2) Check the diagnostic trouble code (DTC).

Q: Is DTC P0463 set?

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

DTC P0489: EGR Valve (Stepper Motor) Circuit Malfunction (Ground Short)

EGR VALVE CIRCUIT



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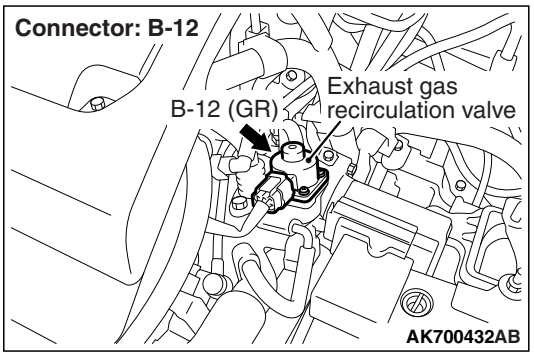
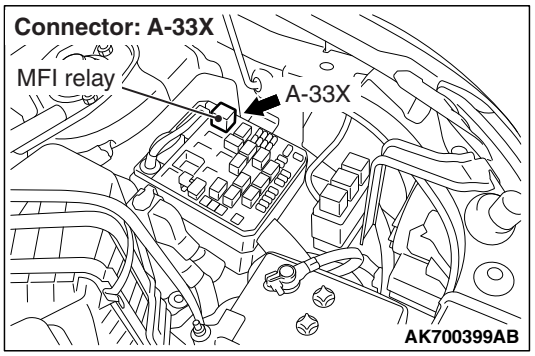
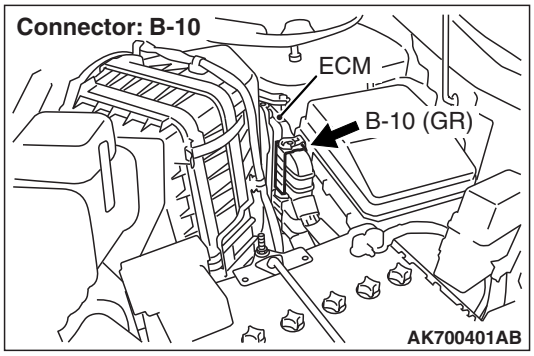
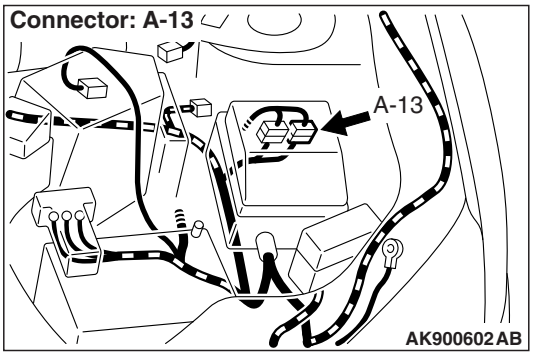








CIRCUIT OPERATION

- The EGR valve power is supplied from the MFI relay (terminal No. 2).
- The ECM (terminals No. 31, No. 32, No. 47, No. 48) drives the stepper motor by sequentially turning "ON" the power transistors in the ECM and providing ground to the EGR valve (terminal No. 1, No. 3, No. 4, No. 6).

TECHNICAL DESCRIPTION

The ECM checks whether a short circuit to the ground or an open circuit exists or not by measuring the EGR valve (stepper motor) drive circuit voltage when the current is not flowing through the coils of the EGR valve (stepper motor).

DESCRIPTIONS OF MONITOR METHODS

When the EGR valve (stepper motor) drive circuit voltage is under the specified range, it is judged that a malfunction exists.

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)

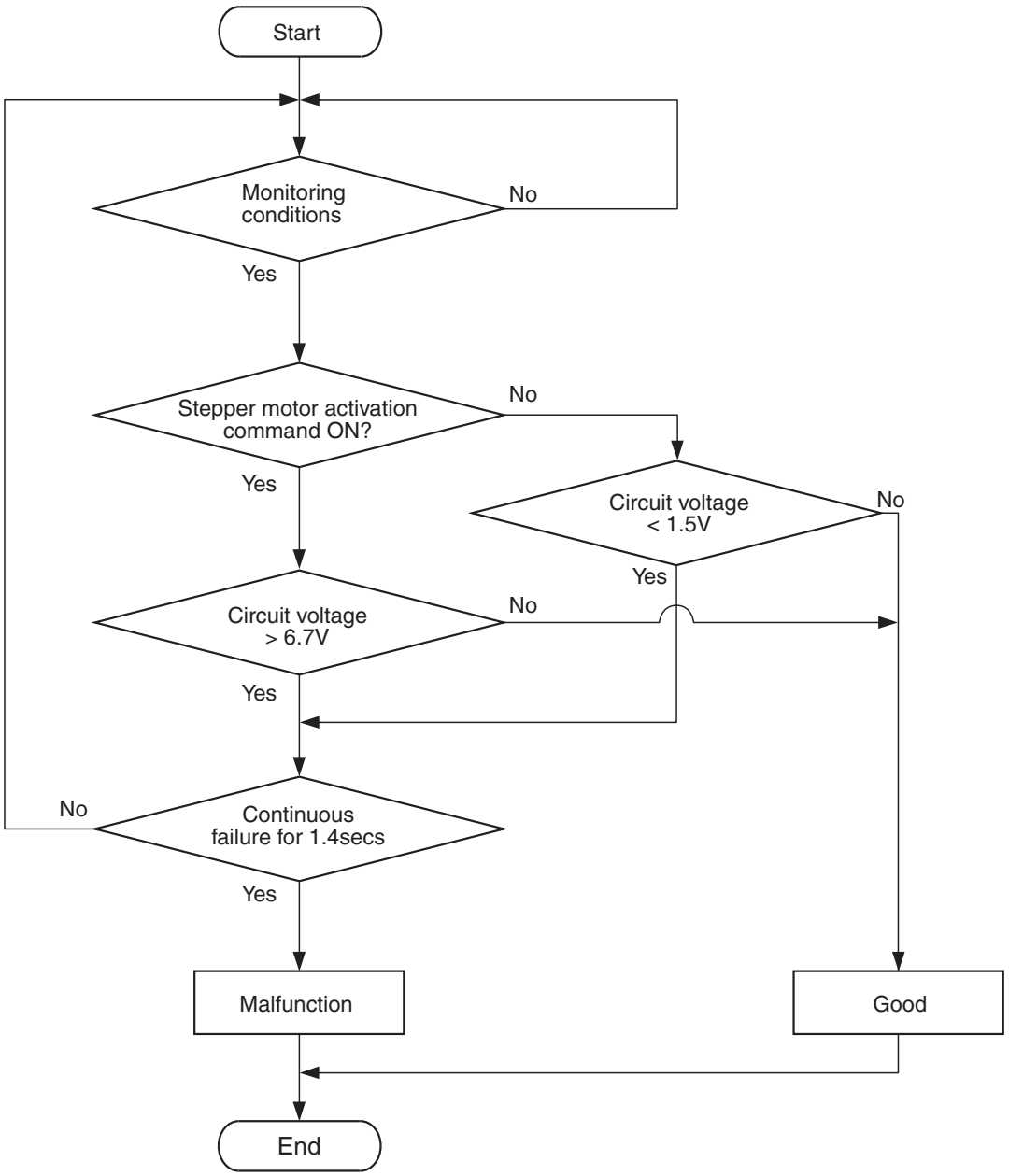
- EGR stepper motor monitor

Sensor (The sensor below is determined to be normal)

- Mass airflow sensor
- Engine coolant temperature sensor
- Intake air temperature sensor
- Barometric pressure sensor
- Manifold absolute pressure sensor
- Accelerator pedal position sensor

DTC SET CONDITIONS

Logic Flow Chart



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Check Conditions

- Ignition switch is "ON" position.
- Battery positive voltage is at between 10 and 16.5 volts.

Judgement Criterion

- When the EGR valve is de-energized, the ECM voltage should be 1.5 volts or less for 1.4 seconds.

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function –OBD-II Drive Cycle – Pattern 3 P.13B-11.

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

- EGR valve (stepper motor) failed.
- Harness damage.
- Connector damage.
- ECM failed.

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DIAGNOSIS

Required Special Tools:

- MB991958: Scan tool (M.U.T.-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991910: Main Harness A
- MB991658: Test Harness Set

STEP 1. Check harness connector B-12 at EGR valve and harness connector B-10 at ECM 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 6.

STEP 2. Measure the EGR valve motor coil resistance.

(1) Disconnect the EGR valve connector B-12.

(2) Measure the resistance between EGR valve connector terminal No. 2 and either terminal No. 1 or terminal No. 3.

Standard value: 20 –24 Ω [at 20° C (68° F)]

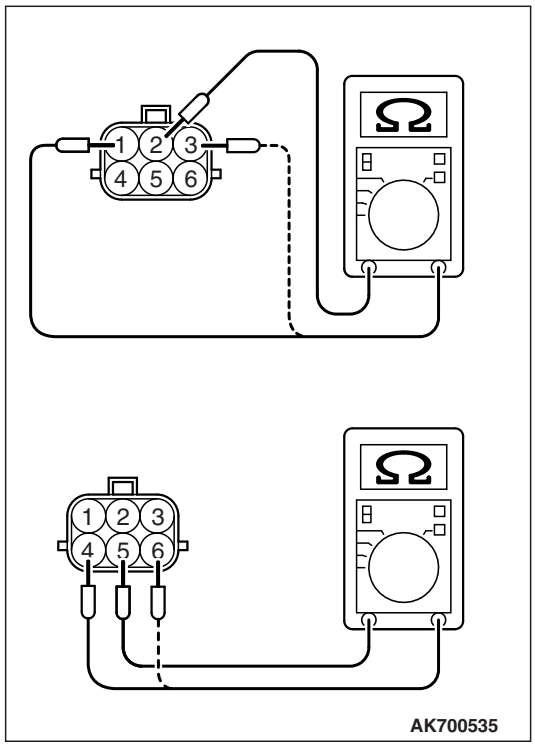
(3) Measure the resistance between EGR valve connector terminal No. 5 and either terminal No. 4 or terminal No. 6.

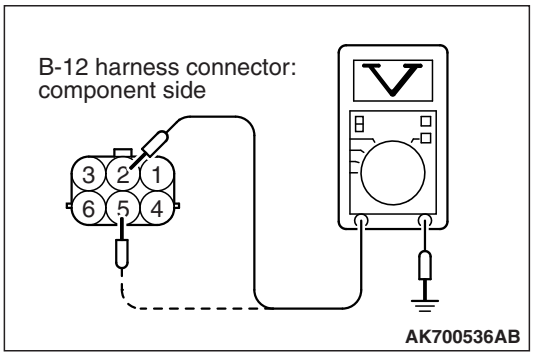
Standard value: 20 –24 Ω [at 20° C (68° F)]

Q: Is the measured resistance between 20 and 24 ohms [at 20° C (68° F)]?

YES : Go to Step 3.

NO : Replace the EGR valve. Then go to Step 6.





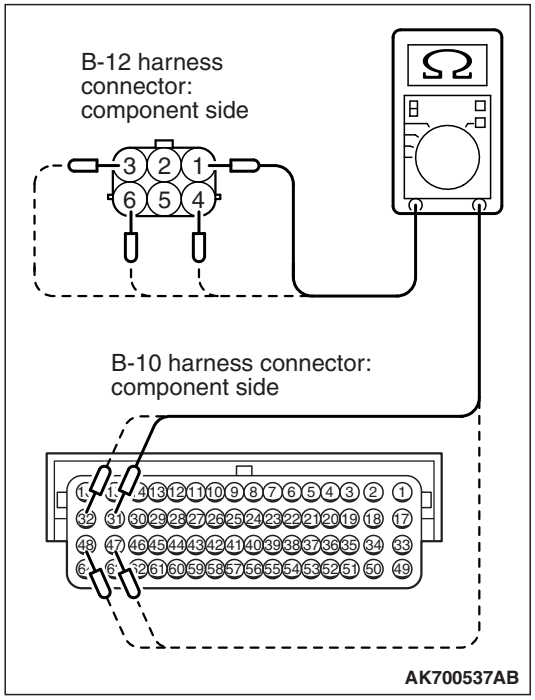
STEP 3. Measure the power supply voltage at EGR valve motor harness side connector B-12.

(1) Disconnect the connector B-12 and measure at the harness side.
(2) Turn the ignition switch to the "ON" position.
(3) Measure the voltage between terminal No. 2, No. 5 and ground.
- Voltage should be battery positive voltage.

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

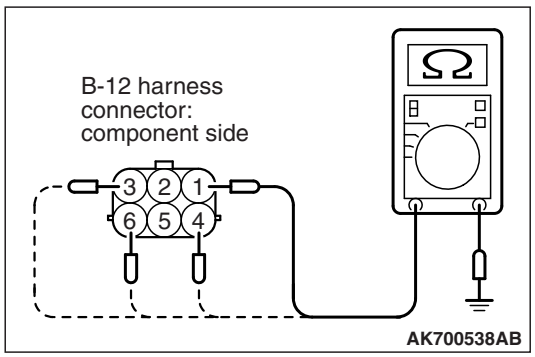
Q: Is battery positive voltage (approximately 12 volts) present?

YES : Go to Step 4.
NO : Repair harness wire between MFI relay connector A-33X (terminal No. 2) and EGR valve connector B-12 (terminal No. 2, No. 5) because of open circuit or short circuit to ground. Then go to Step 6.



STEP 4. Check for open circuit and short circuit to ground and harness damage between EGR valve connector B-12 and ECM connector B-10.

(1) Disconnect the connector B-12 and B-10 measure at the harness side.
(2) Measure the resistance between connector B-12 and connector B-10.
a. Connector B-12 (terminal No. 1) and connector B-10 (terminal No. 31).
b. Connector B-12 (terminal No. 3) and connector B-10 (terminal No. 32).
c. Connector B-12 (terminal No. 4) and connector B-10 (terminal No. 47).
d. Connector B-12 (terminal No. 6) and connector B-10 (terminal No. 48).
- Should be less than 2 ohms.



(3) Check for the continuity between connector B-12 and ground.
a. Connector B-12 (terminal No. 1) and ground.
b. Connector B-12 (terminal No. 3) and ground.
c. Connector B-12 (terminal No. 4) and ground.
d. Connector B-12 (terminal No. 6) and ground.
- Not continuity.

Q: Is the harness wire in good condition?

YES : Then go to Step 5.
NO : Repair it. Then go to Step 6.

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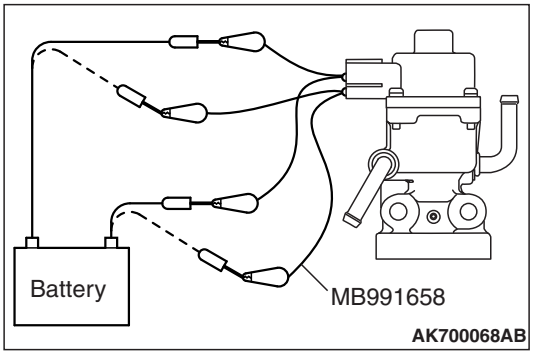


STEP 5. Check the EGR valve operation using special tool MB991658.

(1) Remove the EGR valve.
(2) Connect special tool MB991658 to the EGR valve. (All terminals should be connected.)
(3) Use the jumper wires to connect terminal No. 2 of the EGR valve connector to the positive battery terminal.
(4) Check to ensure that the motor operates when the terminal No. 1 and No. 3 of the EGR valve connector are respectively connected to the negative battery terminal using a jumper wire.
  • Vibration should be present at each application of voltage to test clip combination.
(5) Then, use jumper wires to connect the terminal No. 5 of the EGR valve connector to the positive battery terminal.
(6) Check to ensure that the motor operates when terminal No. 4 and No. 6 of the EGR valve connector are respectively connected to the negative battery terminal using a jumper wire.
  • Vibration should be present at each application of voltage to test clip combination.
(7) Reinstall the EGR valve, using a new gasket, and tighten to the specified torque.

Tighten torque: 23 ±6 N· m [17 ±4 ft· lb]

Q: Is the EGR valve operating properly?

YES : Replace the ECM. When the ECM is replaced, register the ID code. Refer to GROUP 42B, Diagnosis –ID Codes Registration Judgment Table <Vehicles with KOS> P.42B-11 or GROUP 42C, Diagnosis –ID Codes Registration Judgment Table <Vehicles with WCM> P.42C-10.
NO : Replace the EGR valve. Then go to Step 6.

STEP 6. Test the OBD-II drive cycle.

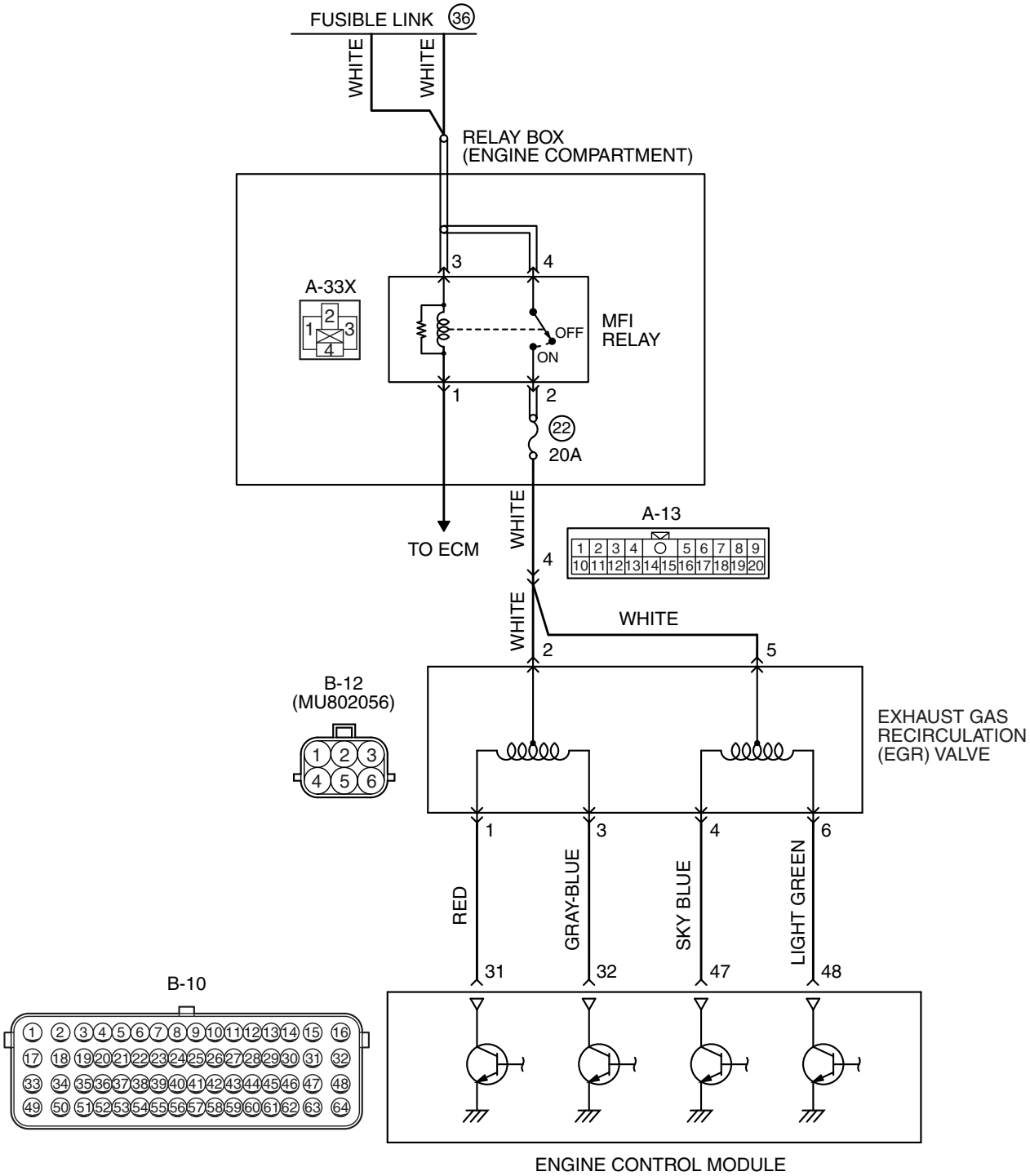
(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle –Pattern 3 P.13B-11.
(2) Check the diagnostic trouble code (DTC).

Q: Is DTC P0489 set?

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

DTC P0490: EGR Value (Stepper Motor) Circuit Malfunction (Battery Short)

EGR VALVE CIRCUIT



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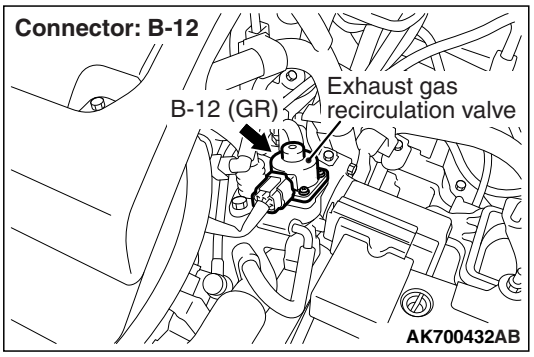
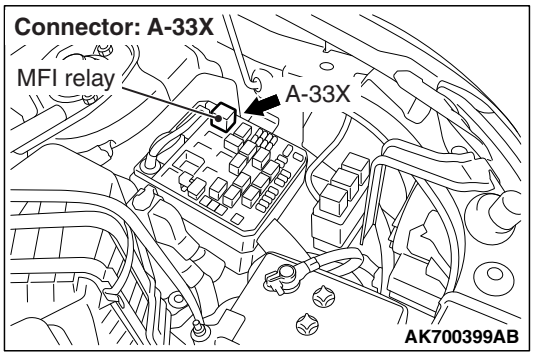
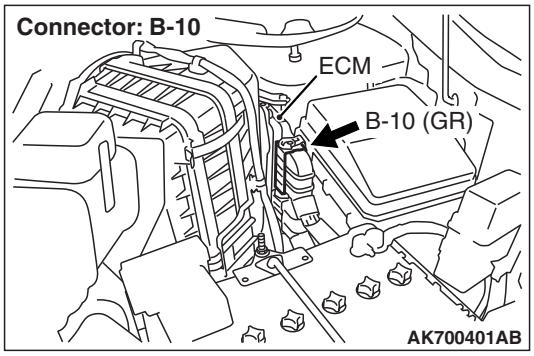
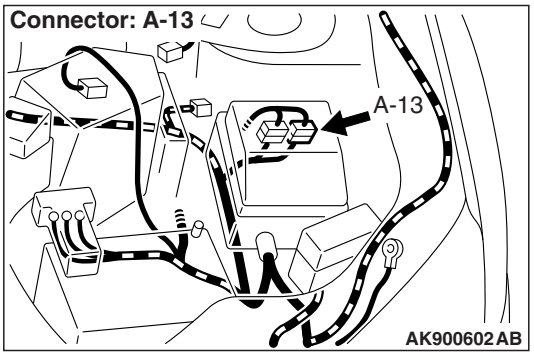
TSB Revision









CIRCUIT OPERATION

- The EGR valve power is supplied from the MFI relay (terminal No. 2).
- The ECM (terminals No. 31, No. 32, No. 47, No. 48) drives the stepper motor by sequentially turning "ON" the power transistors in the ECM and providing ground to the EGR valve (terminal No. 1, No. 3, No. 4, No. 6).

TECHNICAL DESCRIPTION

The ECM checks whether a short circuit to the power supply exists or not by measuring the EGR valve (stepper motor) drive circuit voltage when the current not flowing through the coils of the EGR valve (stepper motor).

DESCRIPTIONS OF MONITOR METHODS

When the EGR valve (stepper motor) drive circuit voltage is over the specified range, it is judged that a malfunction exists.

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)

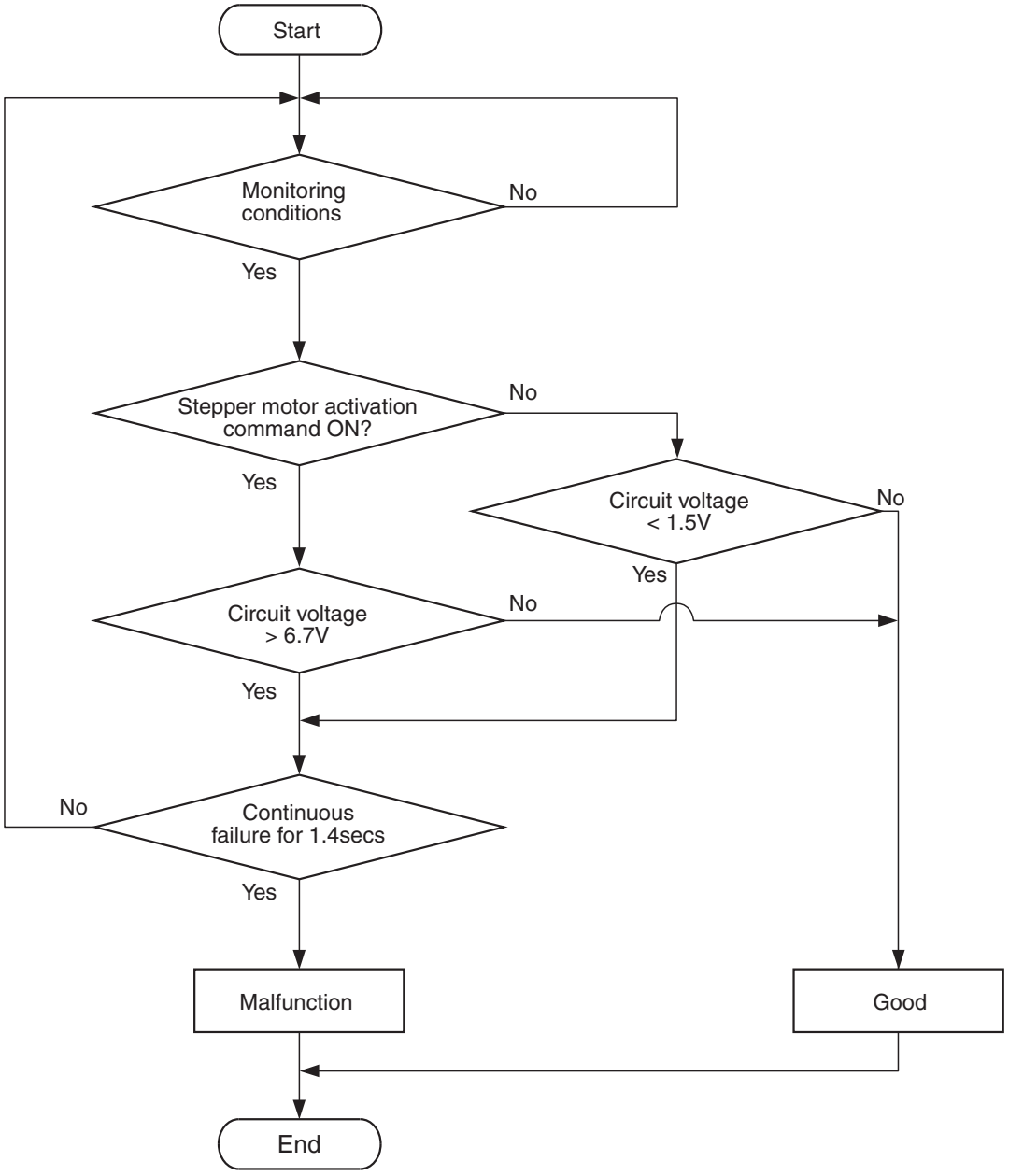
- EGR stepper motor monitor

Sensor (The sensor below is determined to be normal)

- Mass airflow sensor
- Engine coolant temperature sensor
- Intake air temperature sensor
- Barometric pressure sensor
- Manifold absolute pressure sensor
- Accelerator pedal position sensor

DTC SET CONDITIONS

Logic Flow Chart



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Check Conditions

- Ignition switch is "ON" position.
- Battery positive voltage is at between 10 and 16.5 volts.

Judgement Criterion

- When the EGR valve is energized, the ECM voltage should be 6.7 volts or more for 1.4 seconds.

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function –OBD-II Drive Cycle – Pattern 3 P.13B-11.

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

- EGR valve (stepper motor) failed.
- Harness damage.
- Connector damage.
- ECM 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
- MB991658: Test Harness Set

STEP 1. Check harness connector B-12 at EGR valve and harness connector B-10 at ECM 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 5.

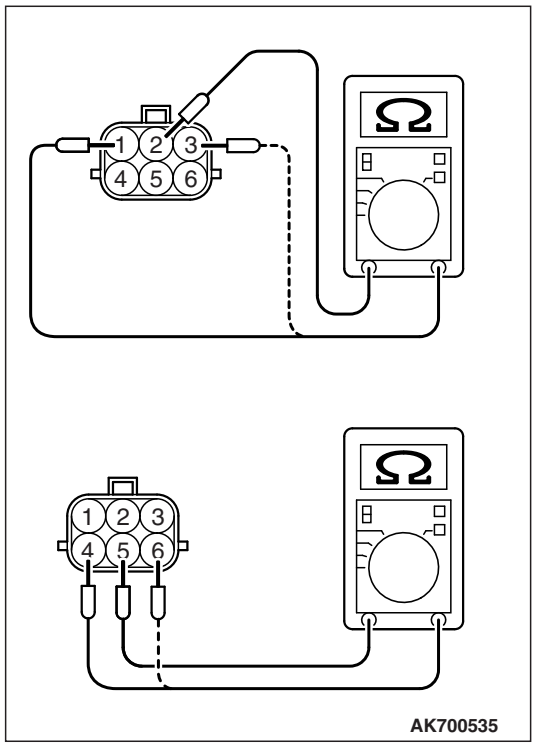
STEP 2. Measure the EGR valve motor coil resistance.

(1) Disconnect the EGR valve connector B-12.
(2) Measure the resistance between EGR valve connector terminal No. 2 and either terminal No. 1 or terminal No. 3.

Standard value: 20 –24 Ω [at 20° C (68° F)]

(3) Measure the resistance between EGR valve connector terminal No. 5 and either terminal No. 4 or terminal No. 6.

Standard value: 20 –24 Ω [at 20° C (68° F)]



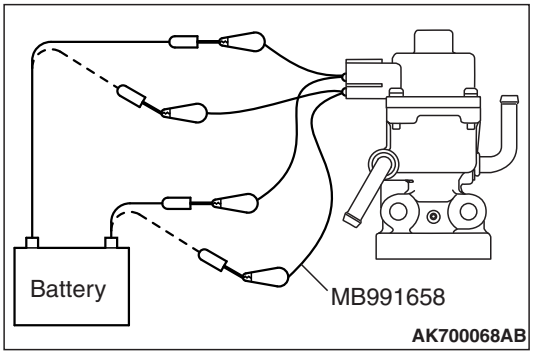
Q: Is the measured resistance between 20 and 24 ohms [at 20° C (68° F)]?

YES : Go to Step 3.
NO : Replace the EGR valve. Then go to Step 5.

STEP 3. Check for short circuit to power supply between EGR valve connector B-12 and ECM connector B-10.

Q: Is the harness wire in good condition?

YES : Then go to Step 4.
NO : Repair it. Then go to Step 5.



STEP 4. Check the EGR valve operation using special tool MB991658.

(1) Remove the EGR valve.
(2) Connect special tool MB991658 to the EGR valve. (All terminals should be connected.)
(3) Use the jumper wires to connect terminal No. 2 of the EGR valve connector to the positive battery terminal.
(4) Check to ensure that the motor operates when the terminal No. 1 and No. 3 of the EGR valve connector are respectively connected to the negative battery terminal using a jumper wire.
- Vibration should be present at each application of voltage to test clip combination.

(5) Then, use jumper wires to connect the terminal No. 5 of the EGR valve connector to the positive battery terminal.
(6) Check to ensure that the motor operates when terminal No. 4 and No. 6 of the EGR valve connector are respectively connected to the negative battery terminal using a jumper wire.
- Vibration should be present at each application of voltage to test clip combination.

(7) Reinstall the EGR valve, using a new gasket, and tighten to the specified torque.

Tighten torque: 23 ±6 N· m [17 ±4 ft· lb]

Q: Is the EGR valve operating properly?

YES : Replace the ECM. When the ECM is replaced, register the ID code. Refer to GROUP 42B, Diagnosis –ID Codes Registration Judgment Table <Vehicles with KOS> P.42B-11 or GROUP 42C, Diagnosis –ID Codes Registration Judgment Table <Vehicles with WCM> P.42C-10. Then go to Step 5.
NO : Replace the EGR valve. Then go to Step 5.

STEP 5. 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 3 P.13B-11.
(2) Check the diagnostic trouble code (DTC).

Q: Is DTC P0490 set?

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

DTC P0506: Idle Control Sytem RPM Lower Than Expected

TECHNICAL DESCRIPTION

- The amount of air taken in during idling is regulated by the opening and closing of the throttle valve.
- The ECM checks the difference between the actual engine speed and the target engine speed.

DESCRIPTIONS OF MONITOR METHODS

Difference between actual and target idle speed is over the specified value.

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)

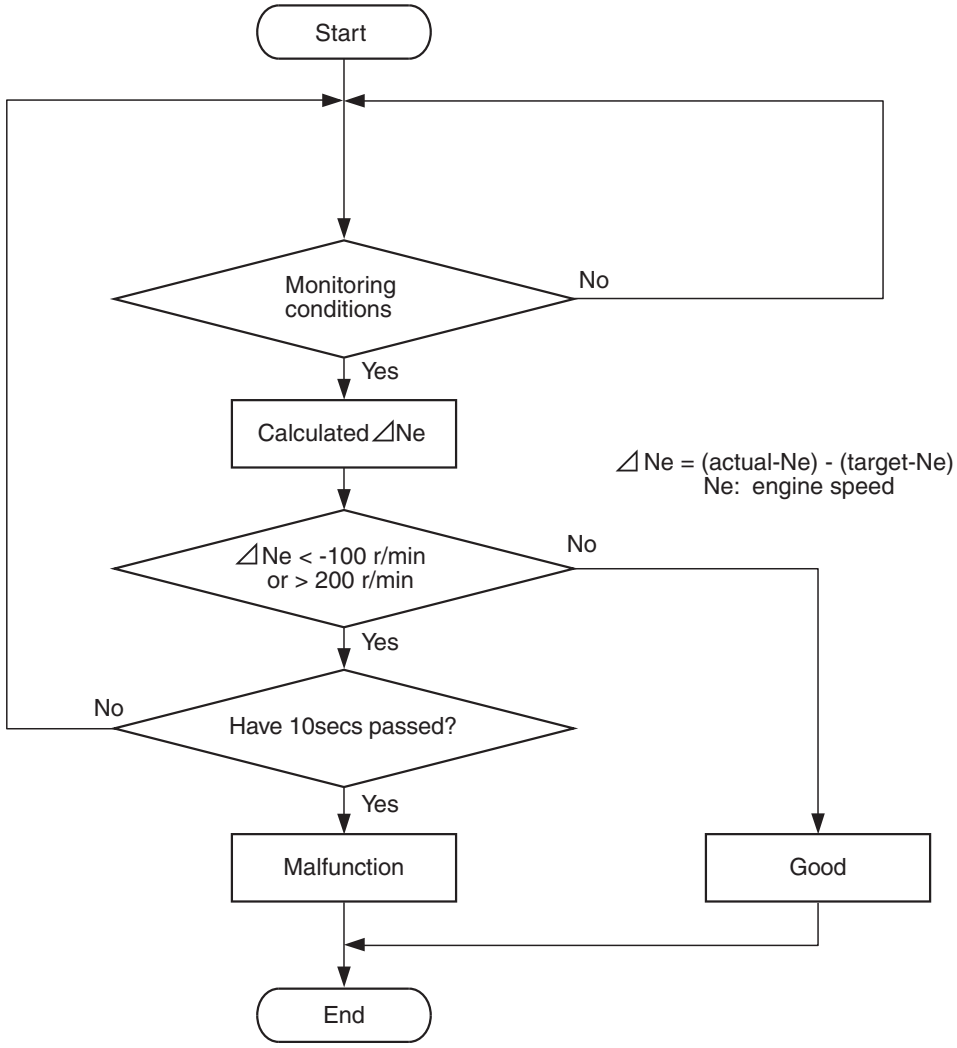
- Misfire monitor
- Exhaust gas recirculation (EGR) system monitor
- Fuel system monitor

Sensor (The sensor below is determined to be normal)

- Mass airflow sensor
- Engine coolant temperature sensor
- Intake air temperature sensor
- Barometric pressure sensor
- Throttle position sensor

DTC SET CONDITIONS

Logic Flow Chart



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Check Conditions

- Under the closed loop idle speed control.
- The engine coolant temperature is more than 41° C (105° F).
- Battery positive voltage is higher than 10 volts.
- Barometric pressure is higher than 76 kPa (22.4 in.Hg).
- Intake air temperature is higher than –10° C (14° F).
- 3 seconds have elapsed from the start of the previous monitoring.
- Target air flow rate is more than 33 g/sec (28 L/sec).

Judgement Criterion

- The actual idle speed is less than the target idle speed by 100 r/min or more for 10 seconds.

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function –OBD-II Drive Cycle – Pattern 18 P.13B-11.

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

- Throttle valve area is dirty.

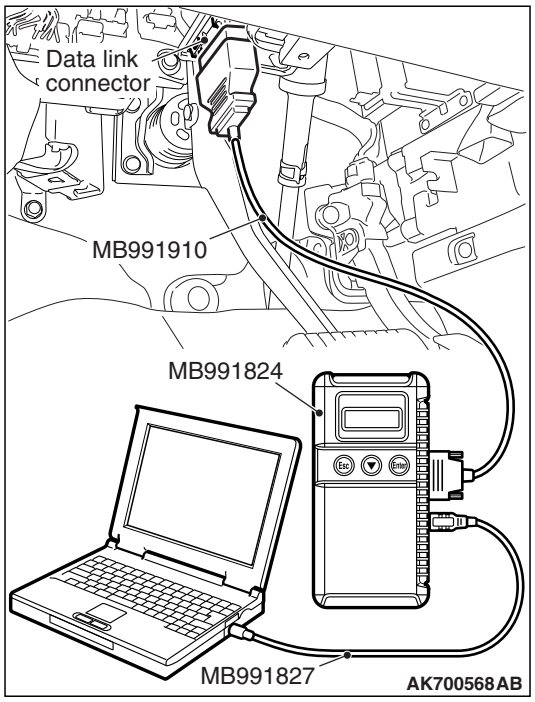
TSB Revision

DIAGNOSIS

Required Special Tools:

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

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) After the DTC has been deleted, read the DTC again.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the diagnostic trouble code other than P0506 set?

YES : Refer to Diagnostic Trouble Code Chart P.13B-51.
NO : Go to Step 2.

STEP 2. Check the throttle body. (throttle valve area)

Q: Is the throttle valve area dirty?

YES : Perform cleaning. Refer to Throttle Body (Throttle Valve Area) Cleaning P.13B-873. Then go to Step 4.
NO : Go to Step 3.

STEP 3. Replace the throttle body assembly.

(1) Replace the throttle body assembly.
(2) Carry out test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle –Pattern 18 P.13B-11.
(3) Check the diagnostic trouble code (DTC).

Q: Is DTC P0506 set?

YES : Replace the ECM. When the ECM is replaced, register the ID code. Refer to GROUP 42B, Diagnosis –ID Codes Registration Judgment Table <Vehicles with KOS> P.42B-11 or GROUP 42C, Diagnosis –ID Codes Registration Judgment Table <Vehicles with WCM> P.42C-10. Then go to Step 4.
NO : The inspection is complete.

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STEP 4. 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 18 P.13B-11.

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

Q: Is DTC P0506 set?

YES : Retry the troubleshooting.

NO : The inspection is complete.

DTC P0507: Idle Control Sytem RPM Higher Than Expected

TECHNICAL DESCRIPTION

- The amount of air taken in during idling is regulated by the opening and closing of the throttle valve.
- The ECM checks the difference between the actual engine speed and the target engine speed.

DESCRIPTIONS OF MONITOR METHODS

Difference between actual and target idle speed is over the specified value.

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)

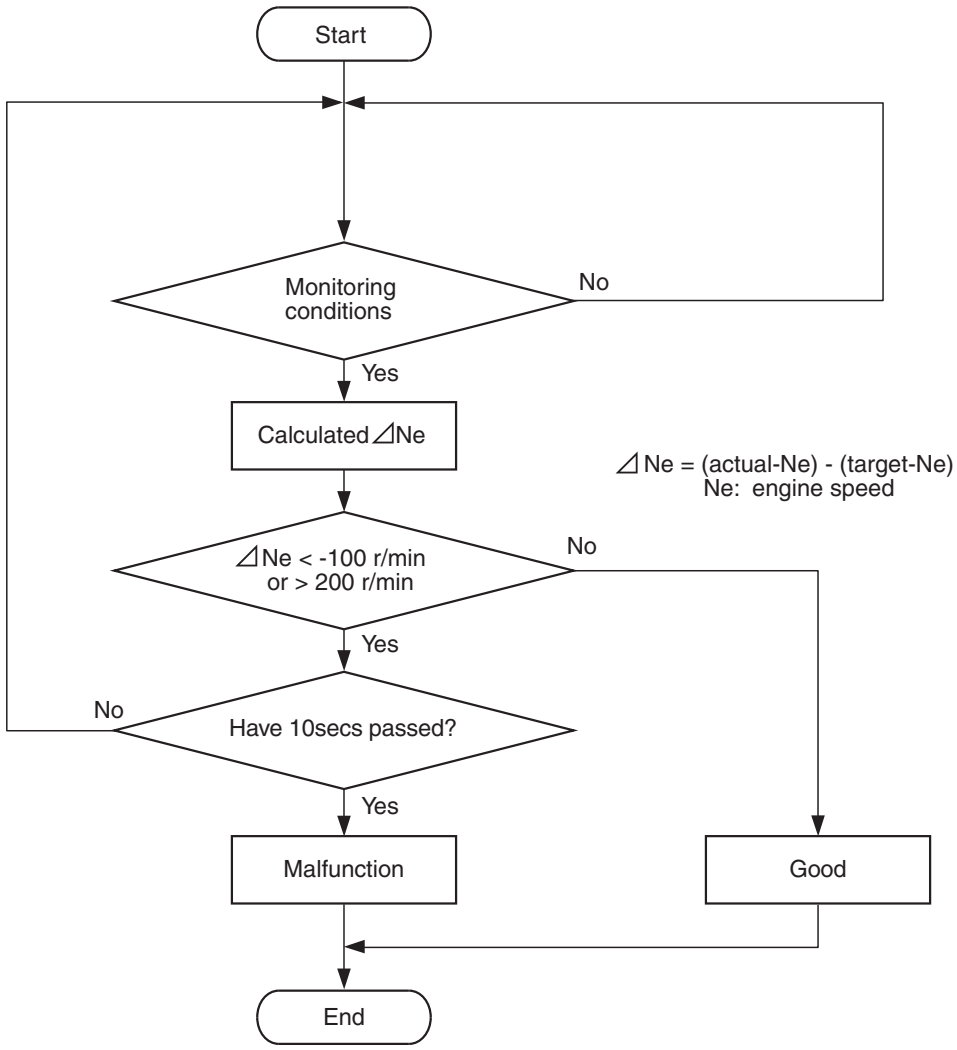
- Misfire monitor
- Exhaust gas recirculation (EGR) system monitor
- Fuel system monitor

Sensor (The sensor below is determined to be normal)

- Mass airflow sensor
- Engine coolant temperature sensor
- Intake air temperature sensor
- Barometric pressure sensor
- Throttle position sensor

DTC SET CONDITIONS

Logic Flow Chart



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Check Conditions

- Under the closed loop idle speed control.
- Engine coolant temperature is higher than 41° C (105° F).
- Battery positive voltage is higher than 10 volts.
- Barometric pressure is higher than 76 kPa (22.4 in.Hg).
- Intake air temperature is higher than −10° C (14° F).
- 3 seconds have elapsed from the start of the previous monitoring.
- Target air flow rate is 0 g/sec (0 L/sec).

Judgement Criterion

- Actual idle speed has continued to be higher than the target idle speed by 200 r/min (300 r/min*) or more for 10 seconds.

*: Specs in parentheses are applicable if the maximum air temperature during the previous operation was more than 45° C (113° F).

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function –OBD-II Drive Cycle – Pattern 18 P.13B-11.

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

- Intake system vacuum leak.
- Throttle body assy failed.
- ECM failed.

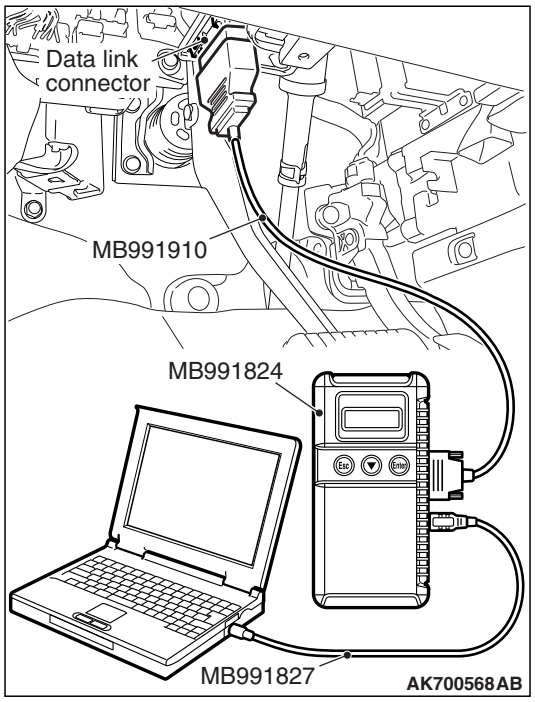
TSB Revision

DIAGNOSIS

Required Special Tools:

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

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) After the DTC has been deleted, read the DTC again.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the diagnostic trouble code other than P0507 set?

YES : Refer to Diagnostic Trouble Code Chart P.13B-51.
NO : Go to Step 2.

STEP 2. Check the intake system vacuum leak.

Q: Are there any abnormalities?

YES : Repair it. Then go to Step 4.
NO : Go to Step 3.

STEP 3. Replace the throttle body assembly.

(1) Replace the throttle body assembly.
(2) Carry out test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle –Pattern 18 P.13B-11.
(3) Check the diagnostic trouble code (DTC).

Q: Is DTC P0507 set?

YES : Replace the ECM. When the ECM is replaced, register the ID code. Refer to GROUP 42B, Diagnosis –ID Codes Registration Judgment Table <Vehicles with KOS> P.42B-11 or GROUP 42C, Diagnosis –ID Codes Registration Judgment Table <Vehicles with WCM> P.42C-10. Then go to Step 4.
NO : The inspection is complete.

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STEP 4. 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 18 P.13B-11.

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

Q: Is DTC P0507 set?

YES : Retry the troubleshooting.

NO : The inspection is complete.

DTC P050B: Ignition Timing Retard Insufficient

TECHNICAL DESCRIPTION

- After starting the engine in the cold state, the ECM retards the ignition timing to early activate the catalyst by letting out the high temperature exhaust gases.
- The ECM monitors whether the retard ignition timing control is normal or not.

DESCRIPTIONS OF MONITOR METHODS

After starting the engine in the cold state, the retard ignition timing control is abnormal, which is caused by a decrease in idle speed and so on.

MONITOR EXECUTION

Once per driving cycle

MONITOR EXECUTION CONDITIONS (Other monitor and Sensor)

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

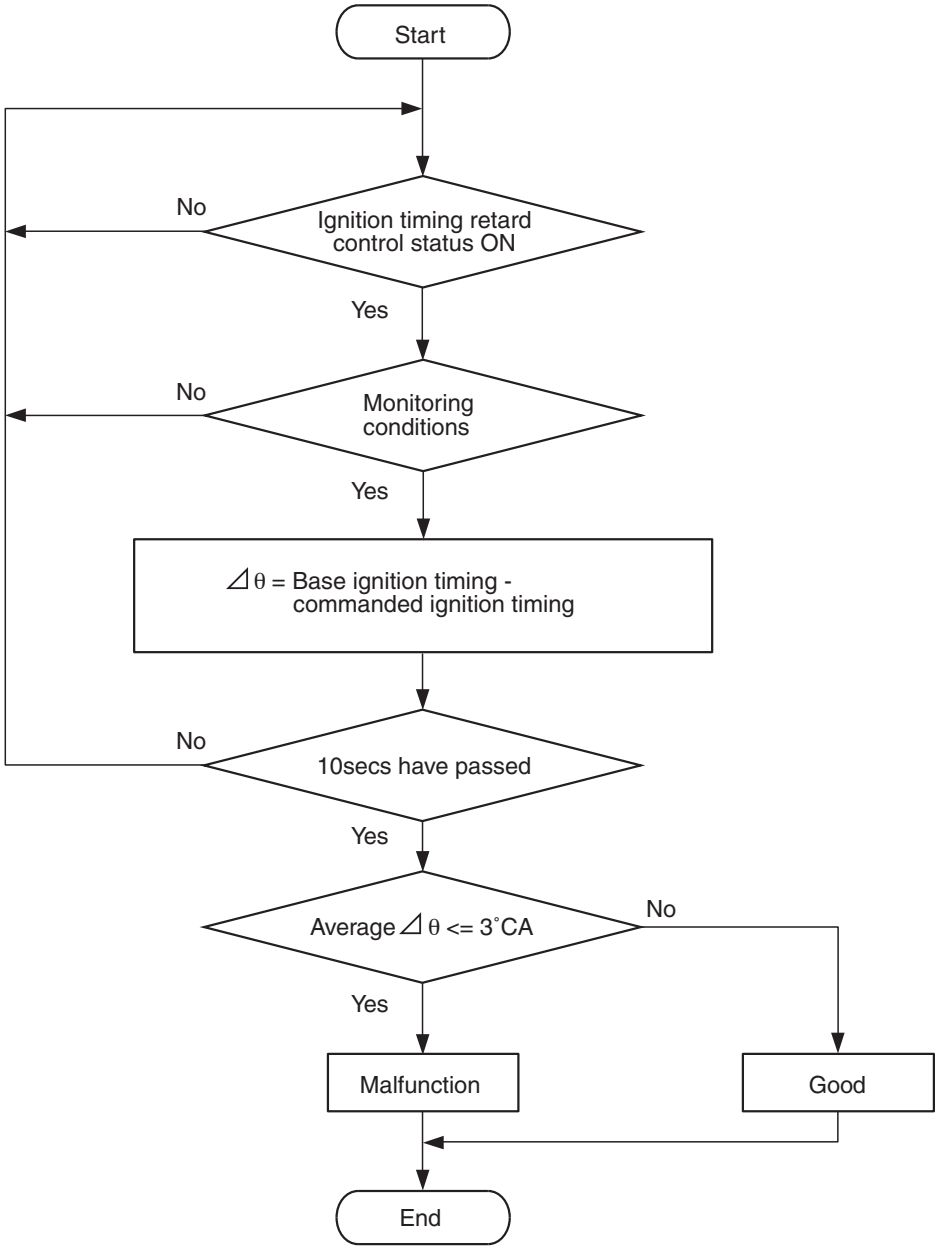
- Not applicable

Sensor (The sensor below is determined to be normal)

- Not applicable

DTC SET CONDITIONS

Logic Flow Chart



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Check Conditions

- Under the ignition timing retard control.
- Engine coolant temperature is between 7° C (45° F) and 41° C (106° F).

Judgement Criteria

- For 10 seconds, the difference between the basic ignition timing and the target/specified ignition timing is 3° CA or less on average during the retard control.

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function –OBD-II Drive Cycle – Pattern 23 P.13B-11.

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

- Dirtiness around throttle valve.
- ECM 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

STEP 1. Check the throttle body. (throttle valve area)

Q: Is the throttle valve area dirty?

YES : Perform cleaning. Refer to Throttle body (throttle valve area) cleaning P.13B-873. Then go to Step 3.

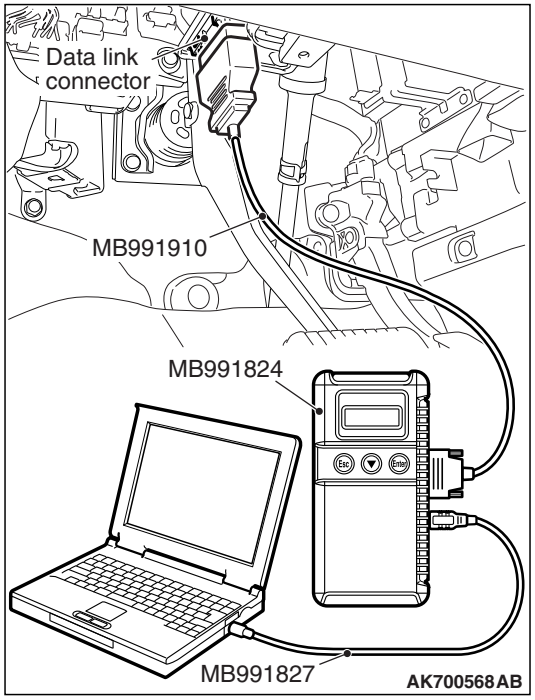
NO : Repair it. Then go to Step 2.

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) After the DTC has been deleted, read the DTC again.
(4) Turn the ignition switch to the "LOCK" (OFF) position.



Q: Is DTC P050B set?

YES : Replace the ECM. When the ECM is replaced, register the ID code. Refer to GROUP 42B, ID Code Registration Judgment Table <Vehicles with KOS> P.42B-11 or GROUP 42C, ID Codes Registration Judgment Table <Vehicles with WCM> P.42C-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.00-15.

STEP 3. Test the OBD-II drive cycle.

(1) Carry out test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle –Pattern 23 P.13B-11.
(2) Check the diagnostic trouble code (DTC).

Q: Is DTC P050B set?

YES : Retry the troubleshooting.

NO : The inspection is complete.

DTC P0513: Immobilizer Malfunction

TECHNICAL DESCRIPTION

- ECM monitors the communication condition with the immobilizer-ECU. When an abnormality in communication is found, ECM prevents engine start.

DTC SET CONDITIONS

Check Condition

- Ignition switch is "ON" position.

Judgment Criterion

- When the communication error between ECM and the immobilizer-ECU continues for 2 seconds or more.

or

- When it was different in the encrypted code sent from immobilizer-ECU and operation result by ECM.

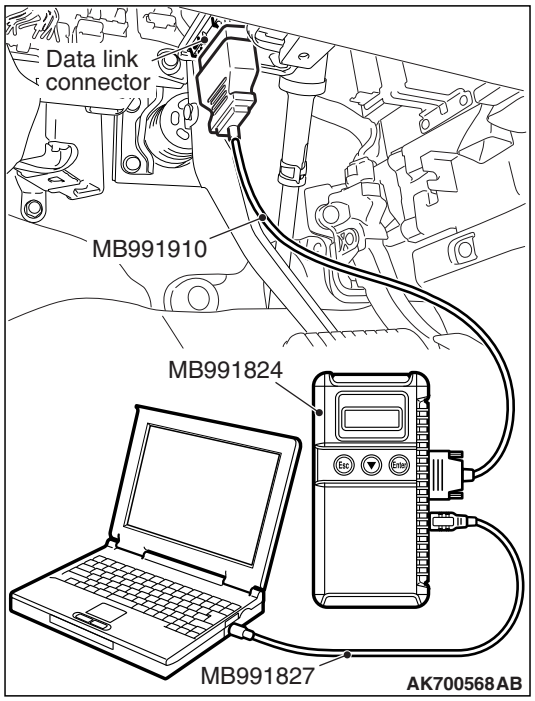
TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)

- Malfunction of CAN system.
- Malfunction of immobilizer system.
- ECM 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, check VIN Information.

⚠ 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) Set scan tool MB991958 to the coding mode for VIN Information.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Has VIN (current) been written?

YES : Go to Step 2.
NO : Write VIN. Then go to Step 3.

STEP 2. Using scan tool MB991958, diagnose CAN bus line.

(1) Turn the ignition switch to the "ON" position.
(2) Diagnose CAN bus line.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the CAN bus line normal?

YES : Go to Step 3.
NO : Repair the CAN bus line. Refer to GROUP 54C, Diagnosis –Can Bus Diagnostics Table P.54C-17. Then go to Step 4.

STEP 3. Using scan tool MB991958, read the immobilizer 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 42B, Diagnosis –Diagnostic Trouble Code Chart <Vehicles with KOS> P.42B-31 or GROUP 42C, diagnosis –Diagnostic Trouble Code Chart <Vehicles with WCM> P.42C-18.
NO : Go to Step 4.

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

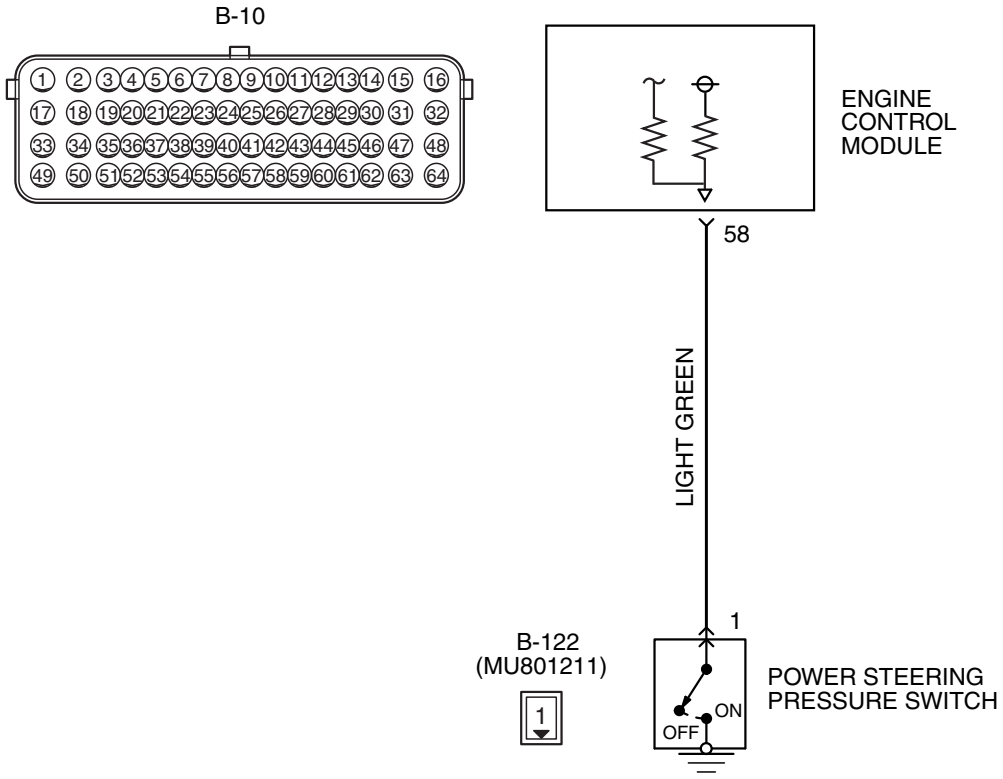
(1) Turn the ignition switch to the "ON" position.
(2) After the DTC has been deleted, read the DTC again.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is DTC P0513 set?

YES : Replace the ECM. When the ECM is replaced, register the ID code. Refer to GROUP 42B, Diagnosis –ID Codes Registration Judgment Table <Vehicles with KOS> P.42B-11 or GROUP 42C, Diagnosis –ID Codes Registration Judgment Table <Vehicles with WCM> P.42C-10.
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.00-15.

DTC P0551: Power Steering Pressure Switch Circuit Range/Performance

POWER STEERING PRESSURE SWITCH CIRCUIT



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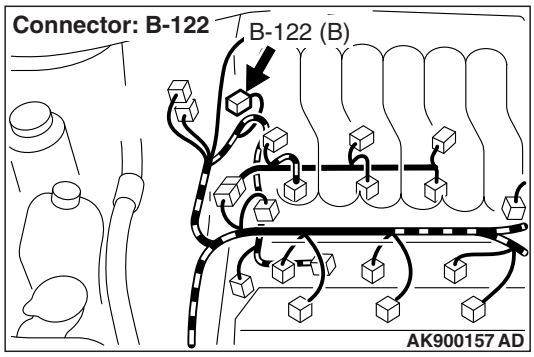
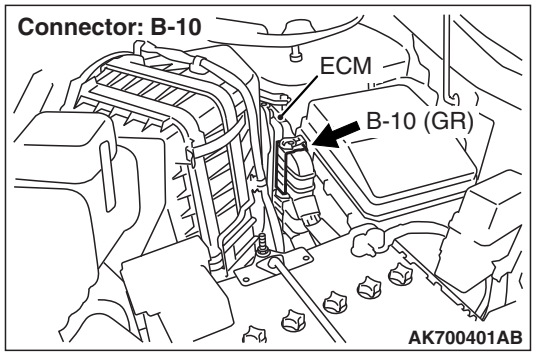




CIRCUIT OPERATION

- A battery positive voltage is applied to the power steering pressure switch output terminal (terminal No. 1) from the ECM (terminal No. 58) via the resistor in the ECM.

TECHNICAL DESCRIPTION

- The power steering pressure switch converts the existence of a power steering load into a high/low voltage, and inputs it into the ECM.
- When the steering wheel is turned, hydraulic pressure rises. The power steering pressure switch closes, and the applied battery positive voltage will be grounded. With this, the power steering pressure switch output voltage will fluctuate between 0 and 12 volts.
- While driving with the steering wheel held straight, the power steering pressure switch turns "OFF".

TSB Revision

- The ECM checks whether the power steering pressure switch turns "OFF" or "ON" during driving.

DESCRIPTIONS OF MONITOR METHODS

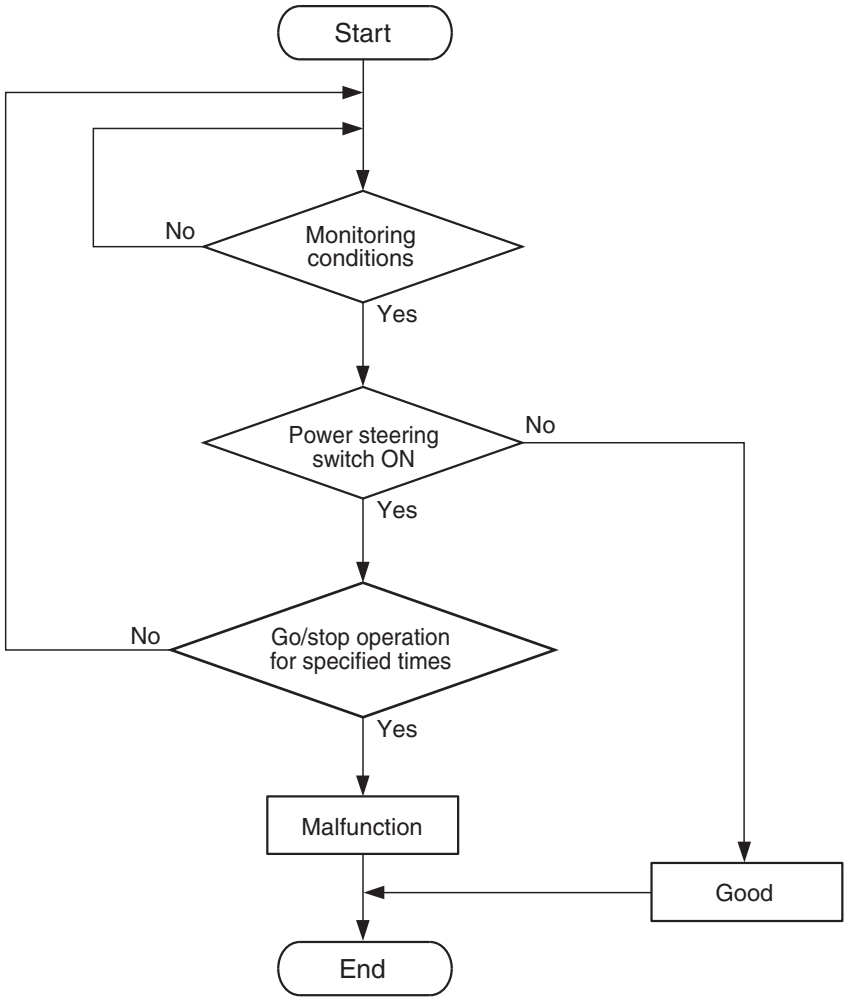
Power steering pressure switch stays "ON" during specified go/stop operations.

MONITOR EXECUTION

Continuous

DTC SET CONDITIONS

Logic Flow Chart



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Check Conditions

- Engine coolant temperature is higher than 20° C (68° F).
- Repeat 10 times or more: drive*1, stop*2.

Drive*1:

- Vehicle speed is more than 50 km/h (31 mph) lasting 4 seconds or more.

Stop*2:

- Vehicle speed is less than 1.5 km/h (1 mph).

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)

- Engine coolant temperature sensor

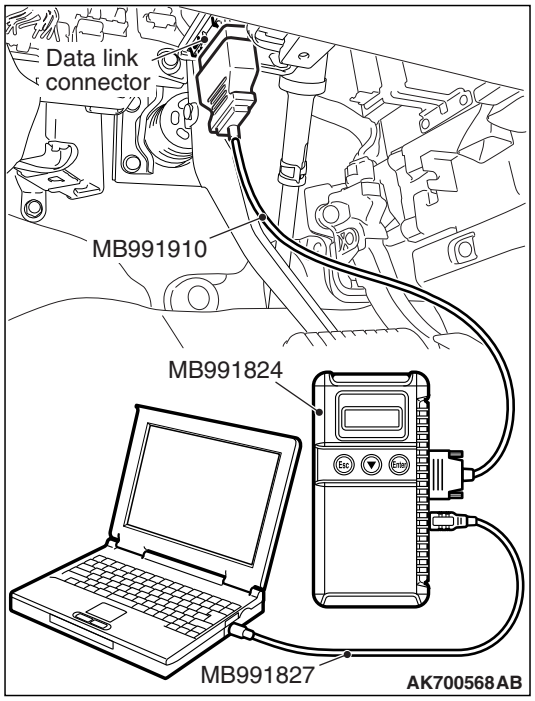
TSB Revision

Judgement Criterion

- Power steering pressure switch continues to be "ON".

OBD-II DRIVE CYCLE PATTERN

None.



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

- Power steering pressure switch failed.
- Connector damage.
- Harness damage.
- ECM 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
- MB992110: Power Plant ECU Check Harness

STEP 1. Using scan tool MB991958, check data list item 83: Power Steering Pressure Switch.

⚠ CAUTION

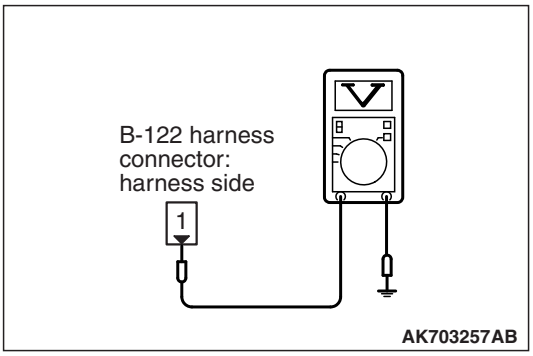
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(1) Connect scan tool MB991958 to the data link connector.
(2) Start the engine and run at idle.
(3) Set scan tool MB991958 to the data reading mode for item 83, Power Steering Pressure Switch.
  - If the steering wheel is not turned while idling, "OFF" will be displayed.
  - If the steering wheel is turned while idling, "ON" will be displayed.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the switch operating properly?

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.00-15.

NO : Go to Step 2.



STEP 2. Measure the power supply voltage at power steering pressure switch connector B-122 by backprobing.

(1) Do not disconnect the connector B-122.
(2) Start the engine and run at idle.
(3) Measure the voltage between terminal No. 1 and ground by backprobing.
- When steering wheel is not turned, voltage should be battery positive voltage.
- When steering wheel is turned, voltage should be 1 volt or less.

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

Q: Is the measured voltage within the specified range?

YES : Go to Step 3.
NO : Go to Step 5.

STEP 3. Check harness connector B-122 at power steering pressure switch and harness connector B-10 at ECM 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 9.

STEP 4. Using scan tool MB991958, check data list item 83: Power Steering Pressure Switch.

(1) Start the engine and run at idle.
(2) Set scan tool MB991958 to the data reading mode for item 83, Power Steering Pressure Switch.
- If the steering wheel is not turned while idling, "OFF" will be displayed.
- If the steering wheel is turned while idling, "ON" will be displayed.

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

Q: Is the switch operating properly?

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.00-15.
NO : Replace the ECM. When the ECM is replaced, register the ID code. Refer to GROUP 42B, ID Code Registration Judgment Table <Vehicles with KOS> P.42B-11 or GROUP 42C, ID Codes Registration Judgment Table <Vehicles with WCM> P.42C-10. Then go to Step 9.

STEP 5. Check harness connector B-122 at power steering pressure switch and harness connector B-10 at ECM 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 go to Step 9.

STEP 6. Check for harness damage between power steering pressure switch connector B-122 and ECM connector B-10.

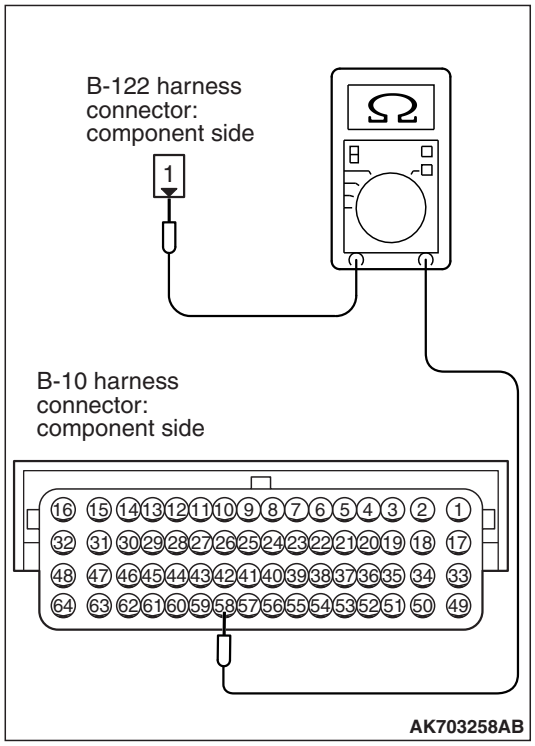
(1) Disconnect the connector B-122 and B-10 measure at the harness side.

(2) Measure the resistance between connector B-122 (terminal No. 1) and connector B-10 (terminal No. 58).
- Should be less than 2 ohms.

Q: Is the measured resistance less than 2 ohms?

YES : Then go to Step 7.

NO : Repair it. Then go to Step 9.



STEP 7. Check for short circuit to ground between power steering pressure switch connector B-122 and ECM connector B-10.

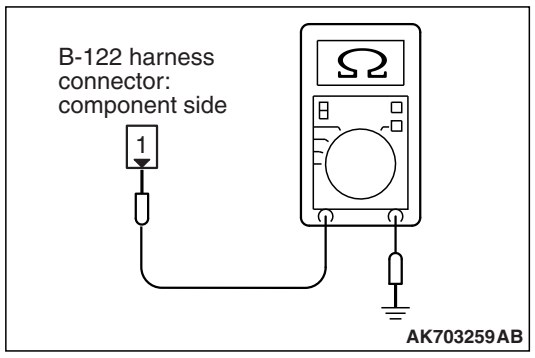
(1) Disconnect the connector B-122 and B-10 measure at the harness side.

(2) Check for the continuity between connector B-122 (terminal No. 1) and ground.
- Not continuity.

Q: Is the harness wire in good condition?

YES : Then go to Step 8.

NO : Repair it. Then go to Step 9.



STEP 8. Replace the power steering pressure switch.

(1) Replace the power steering pressure switch.
(2) Check the trouble symptoms.
(3) Read in the diagnostic trouble code (DTC).

Q: Is DTC P0551 set?

YES : Replace the ECM. When the ECM is replaced, register the ID code. Refer to GROUP 42B, ID Code Registration Judgment Table <Vehicles with KOS> P.42B-11 or GROUP 42C, ID Codes Registration Judgment Table <Vehicles with WCM> P.42C-10. Then go to Step 9.
NO : Go to Step 9.

STEP 9. Using scan tool MB991958, check data list item 83: Power Steering Pressure Switch.

(1) Start the engine and run at idle.
(2) Set scan tool MB991958 to the data reading mode for item 83, Power Steering Pressure Switch.
- If the steering wheel is not turned while idling, "OFF" will be displayed.
- If the steering wheel is turned while idling, "ON" will be displayed.

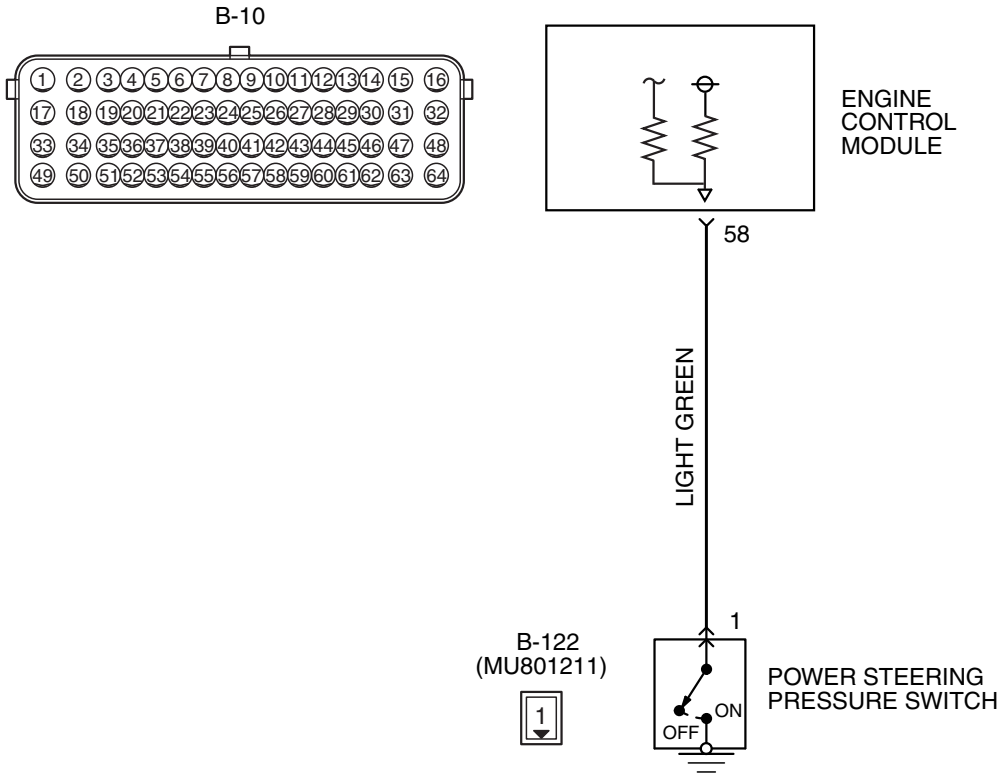
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the switch operating properly?

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

DTC P0554: Power Steering Pressure Switch Circuit Intermittent

POWER STEERING PRESSURE SWITCH CIRCUIT



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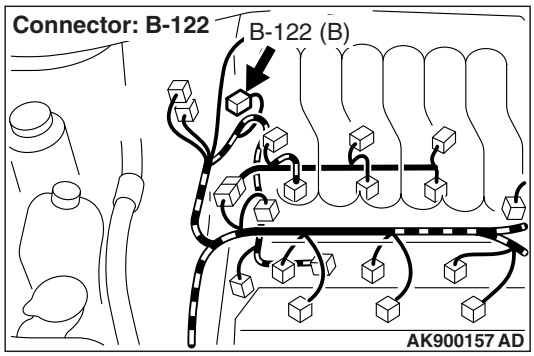
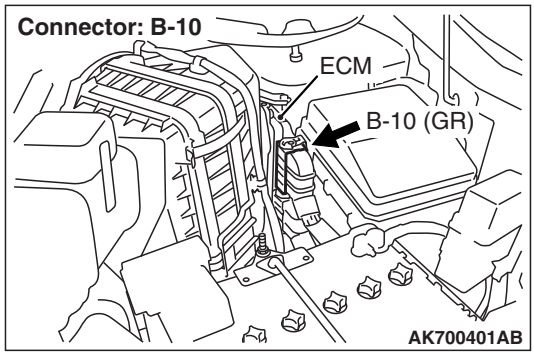




CIRCUIT OPERATION

- A battery positive voltage is applied to the power steering pressure switch output terminal (terminal No. 1) from the ECM (terminal No. 58) via the resistor in the ECM.

TECHNICAL DESCRIPTION

- The power steering pressure switch converts the existence of a power steering load into a high/low voltage, and inputs it into the ECM.
- When the steering wheel is turned, hydraulic pressure rises. The power steering pressure switch closes, and the applied battery positive voltage will be grounded. With this, the power steering pressure switch output voltage will fluctuate between 0 and 12 volts.
- While driving with the steering wheel held straight, the power steering pressure switch turns "OFF".
- The ECM checks whether the power steering pressure switch turns "OFF" or "ON" during driving.

TSB Revision

DESCRIPTIONS OF MONITOR METHODS

Power steering pressure switch changes from off to on more than 10 times for 1 second.

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)

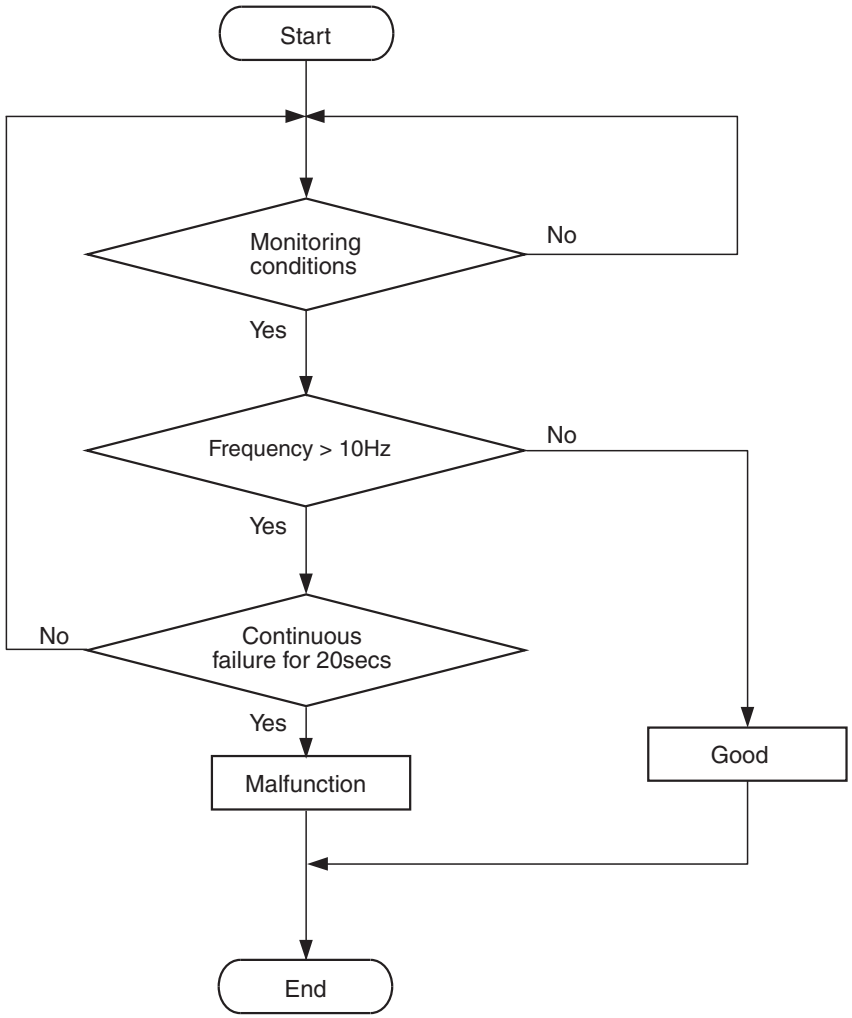
- Not applicable

Sensor (The sensor below is determined to be normal)

- Engine coolant temperature sensor

DTC SET CONDITIONS

Logic Flow Chart



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TSB Revision

Check Conditions

- Engine coolant temperature is higher than 20° C (68° F).
- Vehicle speed is higher than 50 km/h (31 mph).

Judgement Criterion

- The ON/OFF frequency of a power steering pressure switch is 10 Hz or more for 20 seconds.

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function –OBD-II Drive Cycle – Pattern 17 P.13B-11.

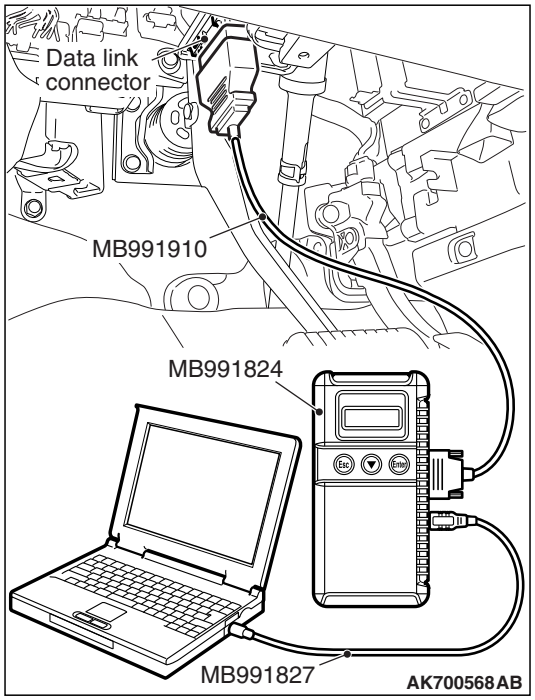
TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)

- Power steering pressure switch failed.
- Incorrect power steering fluid level.
- Incorrect oil pump pressure.
- Harness damage.
- Connector damage.
- ECM 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, check data list item 83: Power Steering Pressure Switch.

⚠ CAUTION

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

(1) Connect scan tool MB991958 to the data link connector.
(2) Start the engine and run at idle.
(3) Set scan tool MB991958 to the data reading mode for item 83, Power Steering Pressure Switch.
  - If the steering wheel is not turned while idling, "OFF" will be displayed.
  - If the steering wheel is turned while idling, "ON" will be displayed.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the sensor operating properly?

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.00-15.
NO : Go to Step 2.

STEP 2. Check the power steering fluid level.

Refer to GROUP 37, On-vehicle Service –Fluid Level Check P.37-20.

Q: Are there any abnormalities?

YES : Repair it. Then go to Step 7.
NO : Go to Step 3.

STEP 3. Check the power steering pressure switch.
Refer to GROUP 37, On-vehicle Service –Power Steering Pressure Switch Check P.37-26.

Q: Are there any abnormalities?

YES : Replace the power steering pressure switch. Then go to Step 7.
NO : Go to Step 4.

STEP 4. Check the oil pump pressure.
Refer to GROUP 37, On-vehicle Service –Oil Pump Pressure Test P.37-25.

Q: Are there any abnormalities?

YES : Repair it. Then go to Step 7.
NO : Go to Step 5.

STEP 5. Check harness connector B-122 at the power steering pressure switch and harness connector B-10 at ECM for damage.

Q: Is the harness connector in good condition?

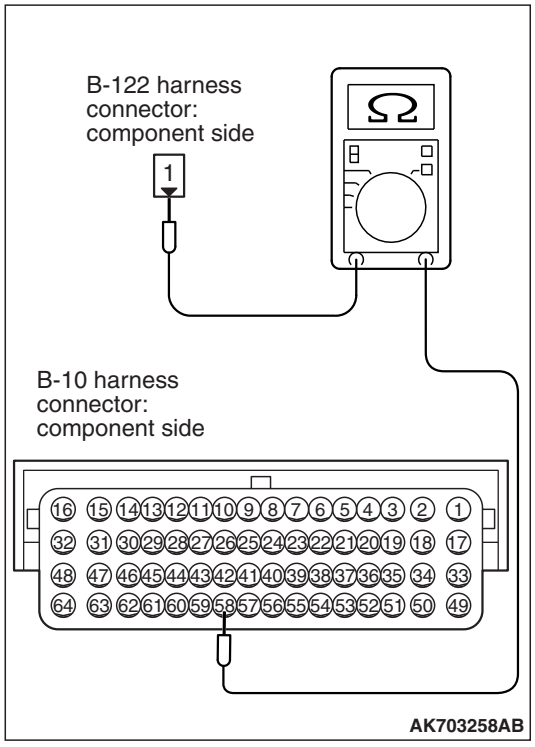
YES : Go to Step 6.
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 7.

STEP 6. Check for harness damage between power steering pressure switch connector B-122 and ECM connector B-10.

(1) Disconnect the connector B-122 and B-10 measure at the harness side.
(2) Measure the resistance between connector B-122 (terminal No. 1) and connector B-10 (terminal No. 58).
- Should be less than 2 ohms.

Q: Is the measured resistance less than 2 ohms?

YES : Replace the ECM. When the ECM is replaced, register the ID code. Refer to GROUP 42B, ID Code Registration Judgment Table <Vehicles with KOS> P.42B-11 or GROUP 42C, ID Codes Registration Judgment Table <Vehicles with WCM> P.42C-10. Then go to Step 7.
NO : Repair it. Then go to Step 7.



STEP 7. 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 17 P.13B-11.

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

Q: Is DTC P0554 set?

YES : Retry the troubleshooting.

NO : The inspection is complete.

DTC P0603: EEP ROM Malfunction

TECHNICAL DESCRIPTION

- ECM stored the information such as the idle learned value and so on in the memory of ECM.

DESCRIPTIONS OF MONITOR METHODS

To check whether the information such as the idle learned value and so on is stored in the memory of ECM.

MONITOR EXECUTION

Once per driving cycle

MONITOR EXECUTION CONDITIONS (Other monitor and Sensor)

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

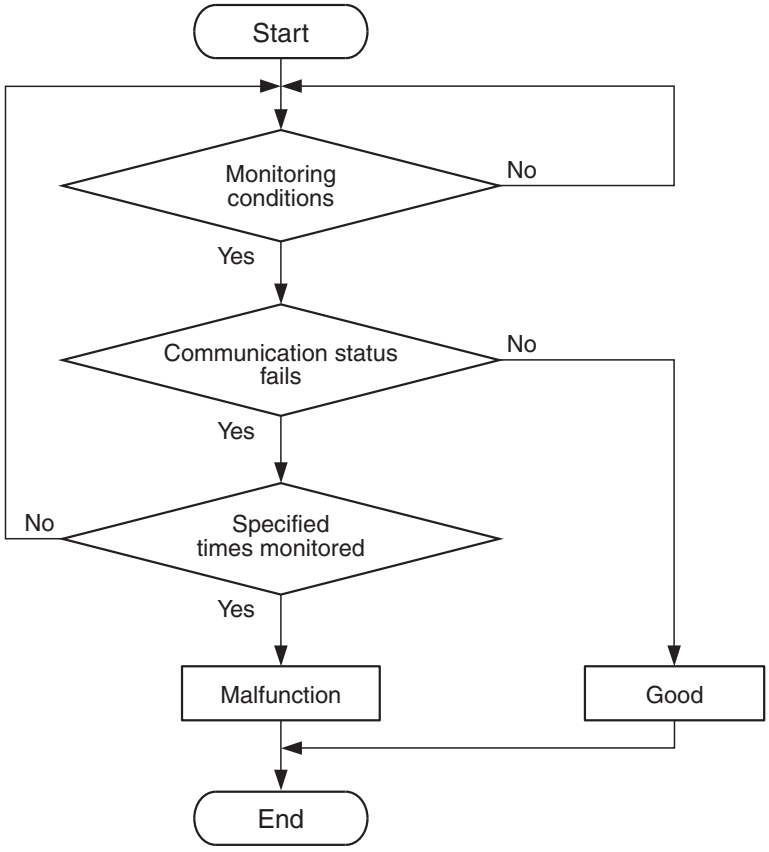
- Not applicable

Sensor (The sensor below is determined to be normal)

- Not applicable

DTC SET CONDITIONS

Logic Flow Chart



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Check Condition
- Ignition switch is in "ON" position.

Judgement Criterion
- The latest data that was flashed while the ignition switch was in "LOCK" (OFF) position are not stored correctly.

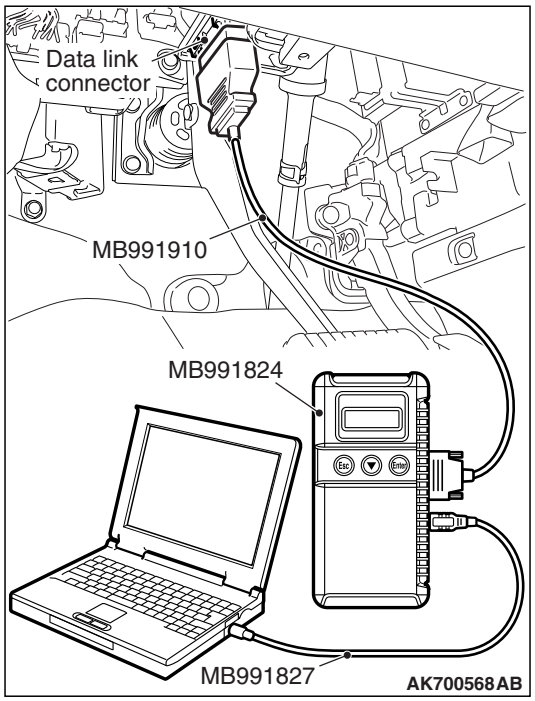
OBD-II DRIVE CYCLE PATTERN
None.

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

TSB Revision



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.

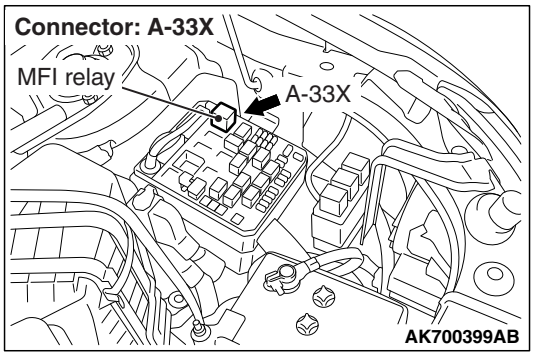
(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) After the DTC has been deleted, read the DTC again.
(4) Turn the ignition switch to the "LOCK"(OFF) position.

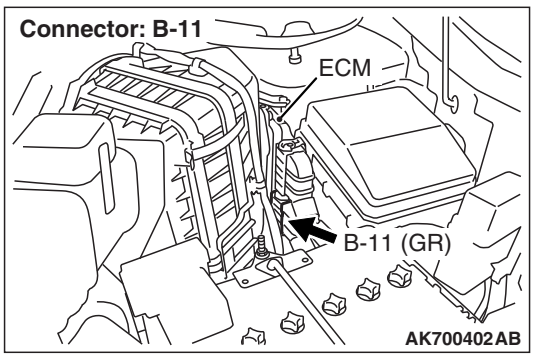
Q: Is DTC P0603 set?

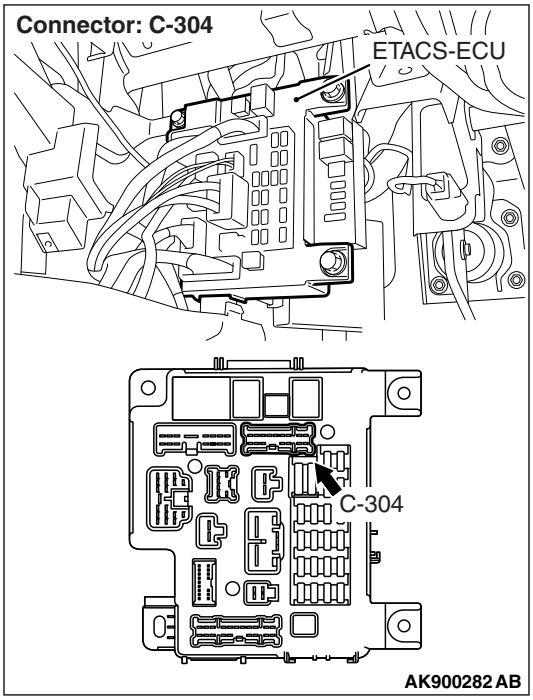
YES : Replace the ECM. When the ECM is replaced, register the ID code. Refer to GROUP 42B, Diagnosis –ID Codes Registration Judgment Table <Vehicles with KOS> P.42B-11 or GROUP 42C, Diagnosis –ID Codes Registration Judgment Table <Vehicles with WCM> P.42C-10.

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.00-15.

DTC P0606: Engine Control Module Main Processor Malfunction







TSB Revision

ENGINE CONTROL MODULE MAIN PROCESSOR MALFUNCTION CIRCUIT

- Refer to Inspection Procedure 21 –Power Supply System and Ignition Switch-IG System P.13B-793.

CIRCUIT OPERATION

- Refer to Inspection Procedure 21 –Power Supply System and Ignition Switch-IG System P.13B-793.

TECHNICAL DESCRIPTION

- Throttle actuator control processor checks the ECM for abnormal conditions.

DESCRIPTIONS OF MONITOR METHODS

No watch dog pulse is detected.

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

Check Condition

- Ignition switch is "ON" position.

Judgement Criterion

- No surveillance pulse signals is inputted for 0.5 second.

OBD-II DRIVE CYCLE PATTERN

None.

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

- MFI relay failed.
- Shorted MFI relay circuit or connector damage.
- Open or shorted ignition switch-IG circuit, harness damage or connector damage.
- ECM failed.

DIAGNOSIS

Required Special Tool:

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

STEP 1. Check the battery.

Refer to GROUP 54A, Battery –On-vehicle Service –Battery Test P.54A-8.

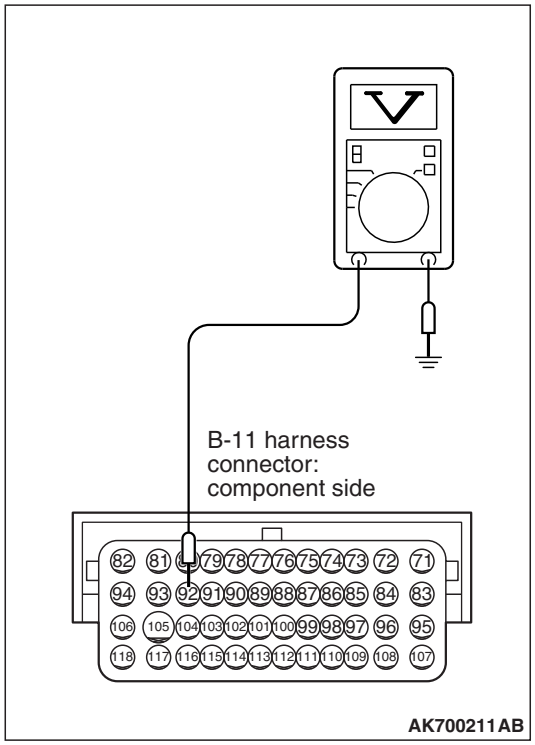
Q: Are there any abnormalities?

YES : Replace the battery. Then go to Step 8.
NO : Go to Step 2.

STEP 2. Check harness connector A-33X at MFI relay, harness connector B-11 at ECM and harness connector C-304 at ETACS-ECU for damage.

Q: Are the harness connectors in good condition?

YES : Go to Step 3.
NO : Repair or replace them. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 8.



STEP 3. Measure the ignition switch-IG signal voltage at ECM harness side connector B-11.

(1) Disconnect the connector B-11 and measure at the harness side.
(2) Turn the ignition switch to the "ON" position.
(3) Measure the voltage between terminal No. 92 and ground.
- Voltage should be battery positive voltage.

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

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

YES : Go to Step 4.
NO : Repair harness wire between ETACS-ECU connector C-304 (terminal No. 10) and ECM connector B-11 (terminal No. 92) because of open circuit or short circuit to ground. Then go to Step 8.

STEP 4. Check for harness damage between ETACS-ECU connector C-304 (terminal No. 10) and ECM connector B-11 (terminal No. 92).

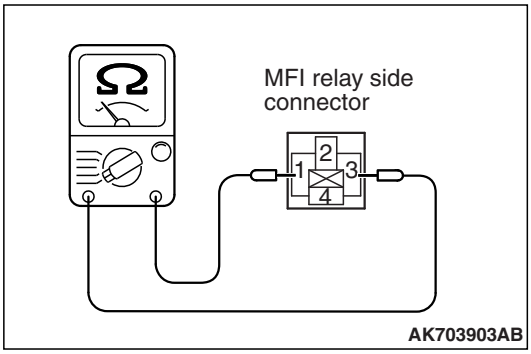
Q: Is the harness wire in good condition?

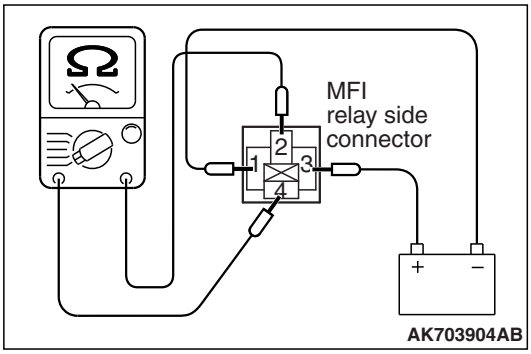
YES : Go to Step 5.
NO : Repair it. Then go to Step 8.

STEP 5. Check the MFI relay.

(1) Remove the MFI relay.

(2) Check for continuity between the MFI relay terminals No. 1 and No. 3.
- There should be continuity.





(3) Use jumper wires to connect MFI relay terminal No. 3 to the positive battery terminal and terminal No. 1 to the negative battery terminal.

(4) Check for continuity between the MFI relay terminals No. 4 and No. 2 while connecting and disconnecting the jumper wire at the negative battery terminal.
- Continuity (2 ohms 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 6.

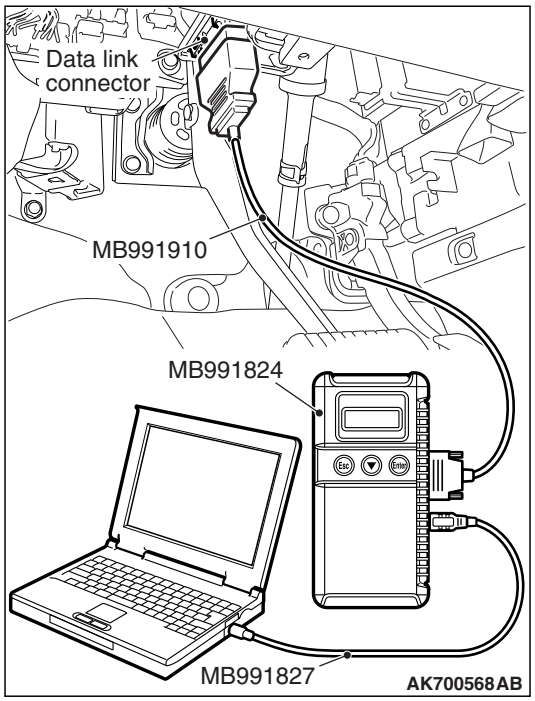
NO : Replace the MFI relay. Then go to Step 8.

STEP 6. Check for short circuit to ground between MFI relay connector A-33X (terminal No. 1) and ECM connector B-11 (terminal No. 73).

Q: Is the harness wire in good condition?

YES : Go to Step 7.

NO : Repair it. Then go to Step 8.



STEP 7. 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) After the DTC has been deleted, read the DTC again.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is DTC P0606 set?

YES : Replace the ECM. When the ECM is replaced, register the ID code. Refer to GROUP 42B, Diagnosis –ID Codes Registration Judgment Table <Vehicles with KOS> P.42B-11 or GROUP 42C, Diagnosis –ID Codes Registration Judgment Table <Vehicles with WCM> P.42C-10. Then go to Step 8.

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.00-15.

STEP 8. Using scan tool MB991958, read the diagnostic trouble code (DTC).

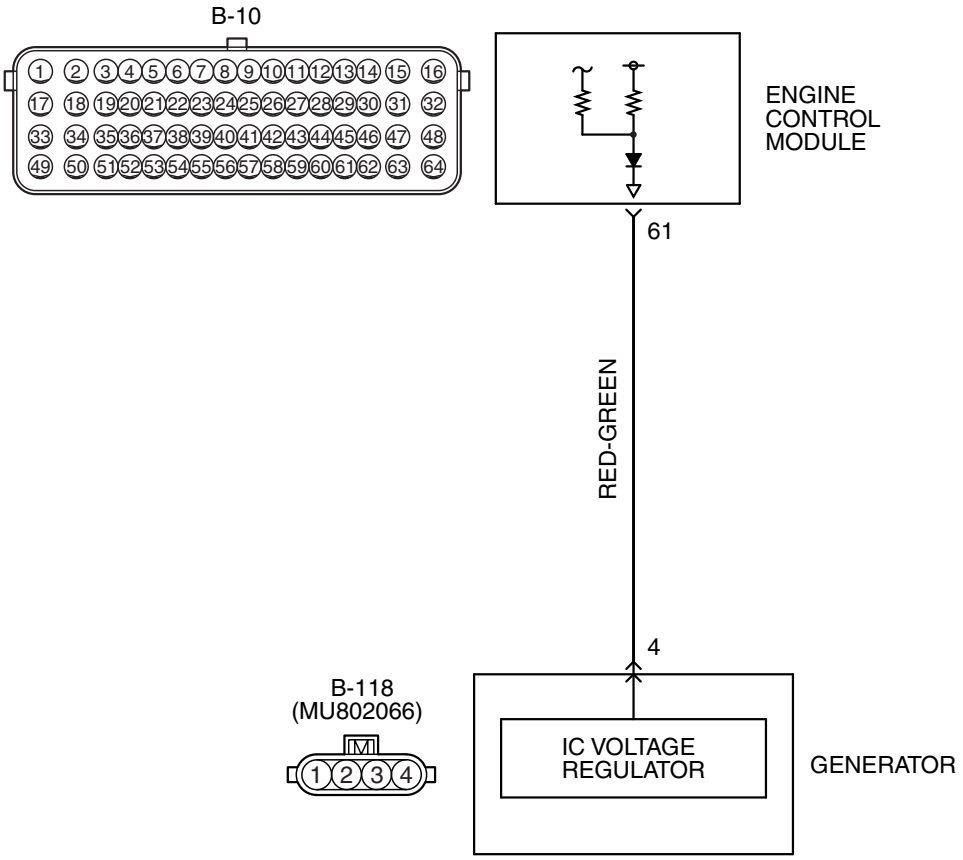
(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) After the DTC has been deleted, read the DTC again.
(4) Turn the ignition switch to the "LOCK"(OFF) position.

Q: Is DTC P0606 set?

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

DTC P0622: Generator FR Terminal Circuit Malfunction

GENERATOR CIRCUIT



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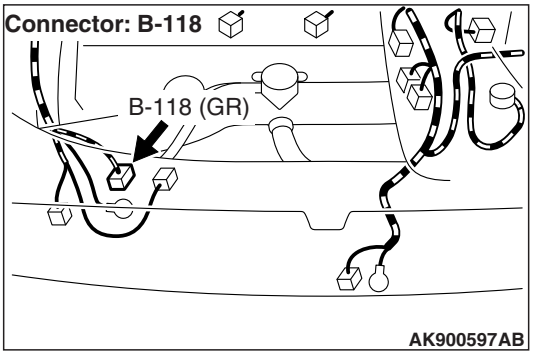
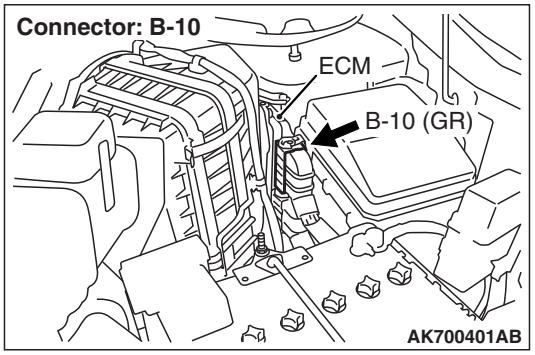




CIRCUIT OPERATION

- The ECM (terminal No. 61) apply a battery positive voltage into the generator FR terminal No. 4 via resistance inside the unit.

TECHNICAL DESCRIPTION

- When the generator field coils are controlled, the generator FR terminal inputs signal to the ECM.
- The ECM detects the generator output with the input signal, and controls the idle air control motor according to the generator output.

TSB Revision

DTC SET CONDITIONS

Check Condition

- Engine speed is higher than 50 r/min.

Judgement Criterion

- Input voltage from the generator FR terminal has continued to be battery positive voltage for 20 seconds.

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

- Generator failed.
- Connector damage.
- Harness damage.
- ECM 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
  - MB992110: Power Plant ECU Check Harness

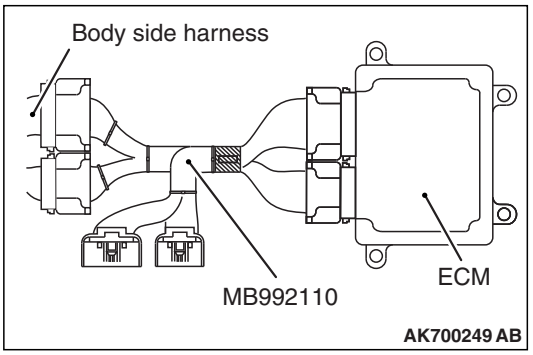
STEP 1. Check harness connector B-10 at ECM connector for damage.

Q: Is the harness connector in good condition?

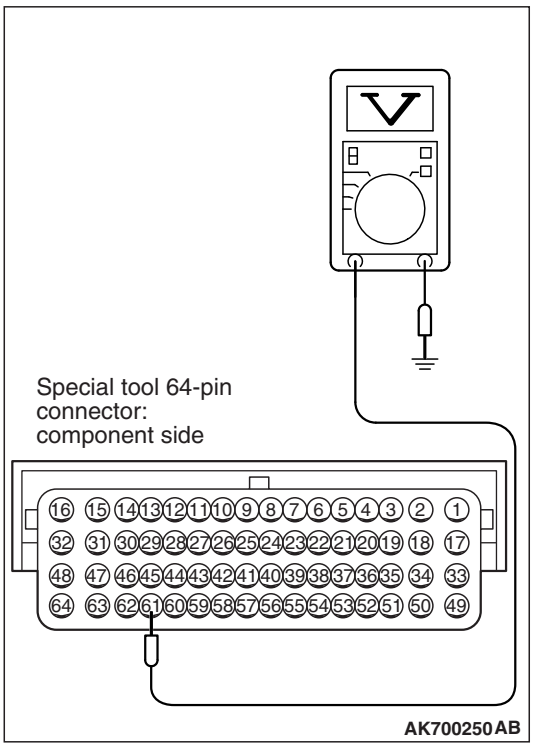
YES : Go to Step 2.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 8.

STEP 2. Measure the voltage at ECM connector B-10 by using power plant ECU check harness special tool MB992110.



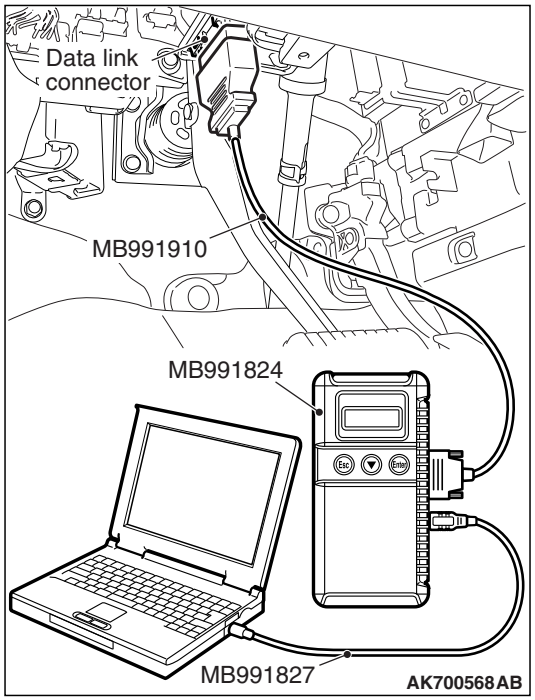
(1) Disconnect all ECM connectors. Connect the power plant ECU check harness special tool MB992110 between the separated connectors.
(2) Start the engine and run at idle.



(3) Measure the voltage between terminal No. 61 and ground.
NOTE: Vehicles for Canada, the headlight, taillight, etc. remain lit even when the lighting switch is in "OFF" position but this is no problem for checks.
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 should be drop.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Did the measured voltage drop?

YES : Go to Step 3.
NO : Go to Step 4.



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) Start the engine and run at idle.
(3) Read the DTC.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is DTC P0622 set?

YES : Replace the ECM. When the ECM is replaced, register the ID code. Refer to GROUP 42B, Diagnosis –ID Codes Registration Judgment Table <Vehicles with KOS> P.42B-11 or GROUP 42C, Diagnosis –ID Codes Registration Judgment Table <Vehicles with WCM> P.42C-10. Then go to Step 8.

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.00-15.

STEP 4. Check harness connector B-118 at generator connector for damage.

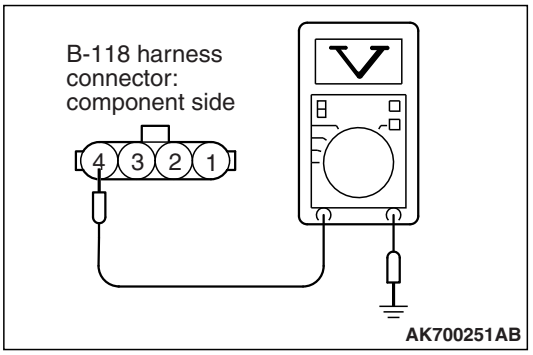
Q: Is the harness connector in good condition?

YES : Go to Step 5.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 8.

STEP 5. Measure the voltage at generator harness side connector B-118.

(1) Disconnect the connector B-118 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 measure battery positive voltage.
(4) Turn the ignition switch to the "LOCK" (OFF) position.



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

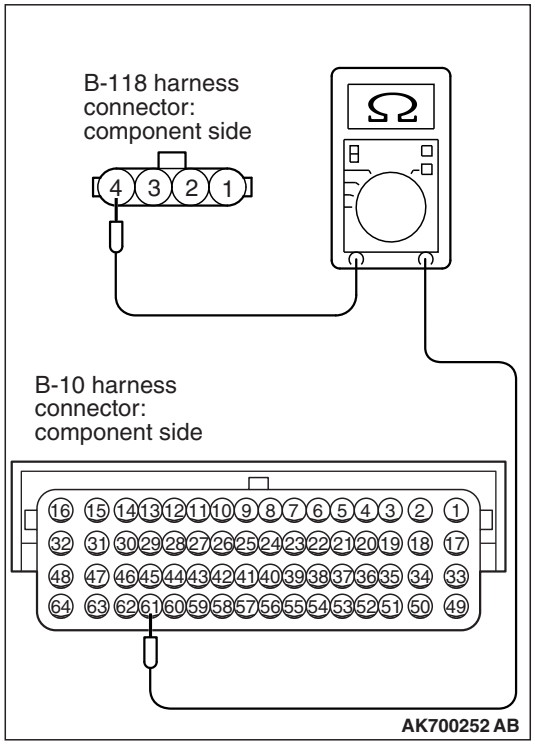
YES : Go to Step 7.

NO : Go to Step 6.

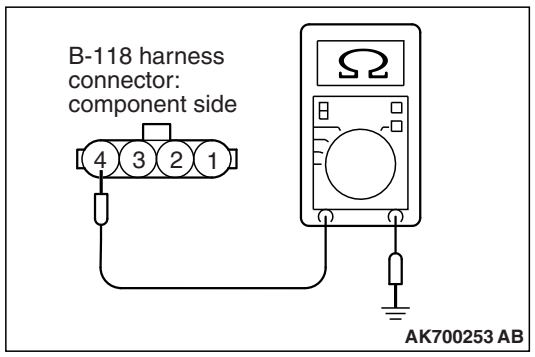
STEP 6. Check for open circuit and short circuit to ground between generator connector B-118 and ECM connector B-10.

(1) Disconnect the connector B-118 and B-10 measure at the harness side.

(2) Measure the resistance between connector B-118 (terminal No. 4) and connector B-10 (terminal No. 61).
- Should be less than 2 ohms.



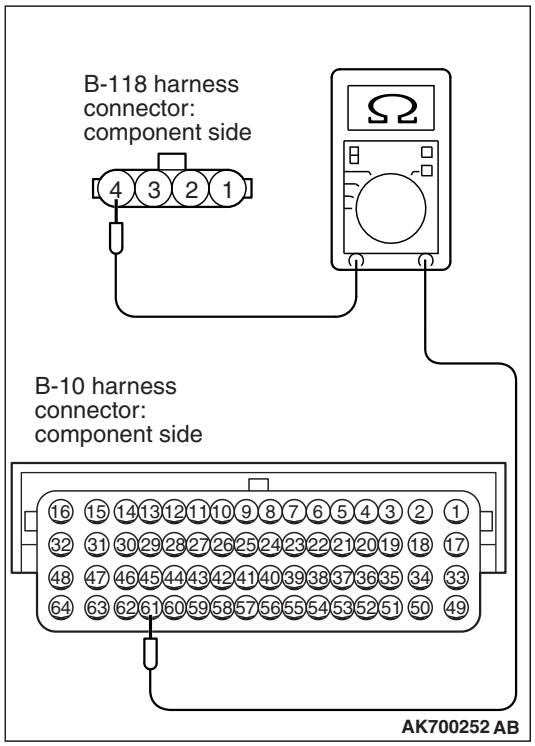
(3) Check for the continuity between connector B-118 (terminal No. 4) and ground.
- Not continuity.



Q: Is the harness wire in good condition?

YES : Replace the ECM. When the ECM is replaced, register the ID code. Refer to GROUP 42B, Diagnosis –ID Codes Registration Judgment Table <Vehicles with KOS> P.42B-11 or GROUP 42C, Diagnosis –ID Codes Registration Judgment Table <Vehicles with WCM> P.42C-10. Then go to Step 8.

NO : Repair it. Then go to Step 8.



STEP 7. Check for harness damage between generator connector B-118 and ECM connector B-10.

(1) Disconnect the connector B-118 and B-10 measure at the harness side.
(2) Measure the resistance between connector B-118 (terminal No. 4) and connector B-10 (terminal No. 61).
- Should be less than 2 ohms.

Q: Is the measured resistance less than 2 ohms?

YES : Replace the generator. Then go to Step 8.
NO : Repair it. Then go to Step 8.

STEP 8. Using scan tool MB991958, read the diagnostic trouble code (DTC).

(1) Start the engine and run at idle.
(2) Read the DTC.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is DTC P0622 set?

YES : Replace the ECM. When the ECM is replaced, register the ID code. Refer to GROUP 42B, Diagnosis –ID Codes Registration Judgment Table <Vehicles with KOS> P.42B-11 or GROUP 42C, Diagnosis –ID Codes Registration Judgment Table <Vehicles with WCM> P.42C-10.
NO : The inspection is complete.

DTC P0630: Vehicle Identification Number (VIN) Malfunction

TECHNICAL DESCRIPTION

- The Vehicle Identification Number (VIN) is stored in the ECM by the vehicle manufacturer.

DESCRIPTIONS OF MONITOR METHODS

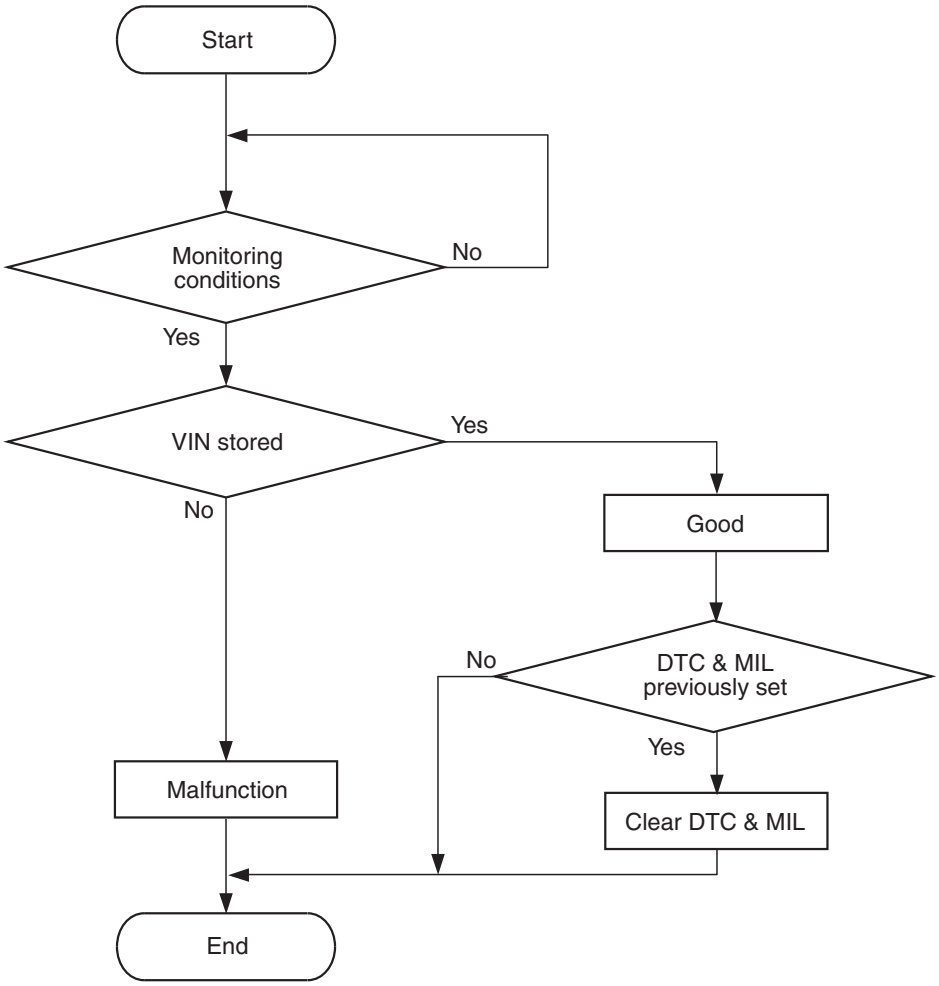
The ECM checks whether the VIN is being entered or not.

MONITOR EXECUTION

Continuous

DTC SET CONDITIONS

Logic Flow Chart



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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

TSB Revision

Check Conditions
- Ignition switch is in "ON" position.

Judgement Criterion
- VIN (current) has not been written.

OBD-II DRIVE CYCLE PATTERN
None.

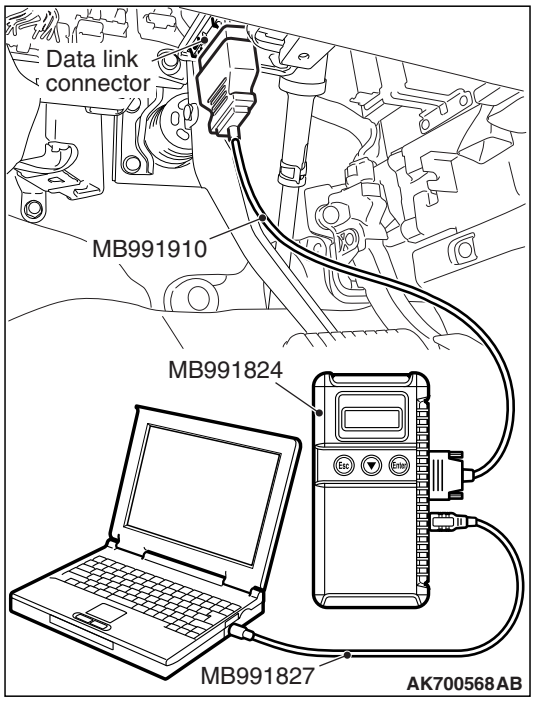
TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)
- ECM failed.

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, check VIN Information.

⚠ 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) Set scan tool MB991958 to the coding mode for VIN Information.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Has VIN (current) been written?

YES : Go to Step 2.
NO : Write VIN. Then go to Step 3.

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

(1) Turn the ignition switch to the "ON" position.
(2) Check the diagnostic trouble code (DTC).

Q: Is DTC P0630 set?

YES : Replace the ECM. When the ECM is replaced, register the ID code. Refer to GROUP 42B, Diagnosis –ID Codes Registration Judgment Table <Vehicles with KOS> P.42B-11 or GROUP 42C, Diagnosis –ID Codes Registration Judgment Table <Vehicles with WCM> P.42C-10.
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.00-15.

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STEP 3. Using scan tool MB991958, read the diagnostic trouble code (DTC)
(1) Turn the ignition switch to the "ON" position.
(2) Check the diagnostic trouble code (DTC).

Q: Is DTC P0630 set?

YES : Replace the ECM. When the ECM is replaced, register the ID code. Refer to GROUP 42B, Diagnosis –ID Codes Registration Judgment Table <Vehicles with KOS> P.42B-11 or GROUP 42C, Diagnosis –ID Codes Registration Judgment Table <Vehicles with WCM> P.42C-10.

NO : The inspection is complete.

DTC P0638: Throttle Actuator Control Motor Circuit Range/Performance Problem

THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT RANGE/PERFORMANCE PROBLEM CIRCUIT

- Refer to DTC P2101 –Throttle Actuator Control Motor Magneto Malfunction P.13B-660.

CIRCUIT OPERATION

- Refer to DTC P2101 –Throttle Actuator Control Motor Magneto Malfunction P.13B-660.

TECHNICAL DESCRIPTION

- ECM checks the electronic controlled throttle system for abnormal conditions.

DESCRIPTIONS OF MONITOR METHODS

Difference between throttle position sensor (main) output and target opening is greater than the specified value.

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

Check Conditions

- Battery positive voltage is higher than 8.3 volts.
- Throttle position sensor (main) output voltage is between 0.2 and 4.8 volts.
- Drop of throttle position sensor (main) output voltage per 100 milliseconds is more than 0.04 volt.

Judgement Criterion

- Throttle position sensor (main) output voltage has continued to be higher than the target throttle position sensor (main) voltage by 0.5 volt or more for 0.4 second.

Check Conditions

- Battery positive voltage is higher than 8.3 volts.
- Throttle position sensor (main) output voltage is between 0.2 and 4.8 volts.
- Target throttle position sensor (main) output voltage is 1.5 volts or lower.

Judgement Criteria

- Difference between throttle position sensor (main) output voltage and target throttle position sensor (main) voltage is 0.6 volt or higher for 0.4 second.

Check Conditions

- Battery positive voltage is higher than 8.3 volts.
- Throttle position sensor (main) output voltage is between 0.2 and 4.8 volts.

Judgement Criterion

- Difference between throttle position sensor (main) output voltage and target throttle position sensor (main) voltage is 1 volt or higher for 0.4 second.

Check Condition
- Battery positive voltage is higher than 8.3 volts.

Judgement Criterion
- Throttle position sensor (main) default opening learnt value is higher than 4 volts or higher.

OBD-II DRIVE CYCLE PATTERN
None.

TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)
- Throttle actuator control motor failed.
- Connector damage.
- Harness damage.
- ECM 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-08 at throttle actuator control motor and harness connector B-10 at ECM for damage.

Q: Is the harness connector in good condition?

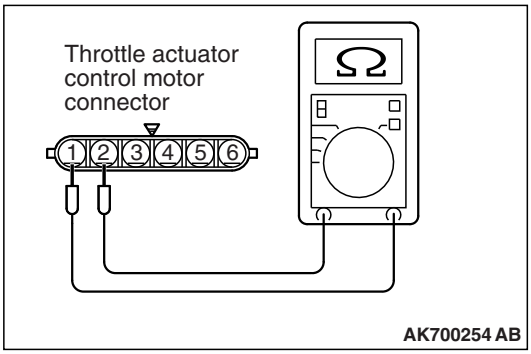
YES : Go to Step 2.
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 5.

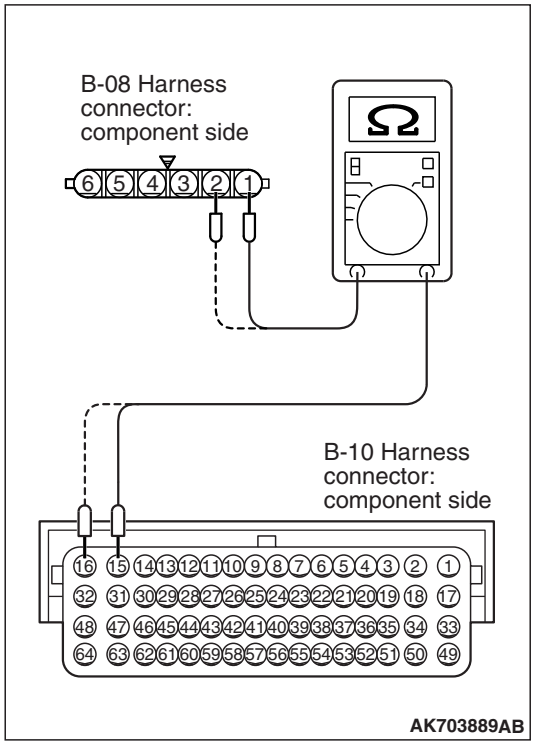
STEP 2. Check the throttle actuator control motor.
(1) Disconnect the connector B-08.
(2) Measure the resistance between throttle actuator control motor side connector terminal No. 1 and No. 2.

Standard value: 0.3 – 80 Ω [at 20° C (68° F)]

Q: Is the measured resistance between 0.3 and 80 ohms [at 20° C (68° F)]?

YES : Go to Step 3.
NO : Replace the throttle body assembly. Then go to Step 5.



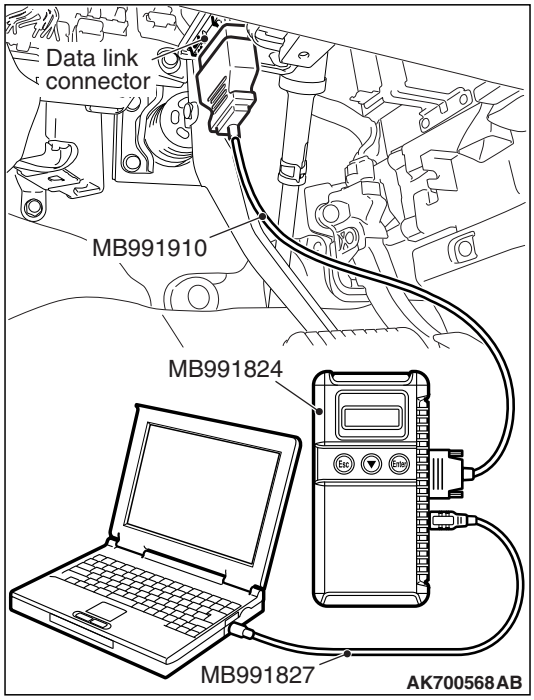


STEP 3. Check for harness damage between throttle actuator control motor connector B-08 and ECM connector B-10.

(1) Disconnect the connector B-08 and B-10 measure at the harness side.
(2) Measure the resistance between B-08 connector and B-10 connector.
  a. Connector B-08 (terminal No. 1) and connector B-10 (terminal No. 15).
  b. Connector B-08 (terminal No. 2) and connector B-10 (terminal No. 16).
  • Should be less than 2 ohms.

Q: Is the measured resistance less than 2 ohms?

YES : Then go to Step 4.
NO : Repair it. Then go to Step 5.



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) After the DTC has been deleted, read the DTC again.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is DTC P0638 set?

YES : Replace the ECM. When the ECM is replaced, register the ID code. Refer to GROUP 42B, Diagnosis –ID Codes Registration Judgment Table <Vehicles with KOS> P.42B-11 or GROUP 42C, Diagnosis –ID Codes Registration Judgment Table <Vehicles with WCM> P.42C-10. Then go to Step 5.
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.00-15.

TSB Revision

STEP 5. Using scan tool MB991958, read the diagnostic trouble code (DTC).
(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) After the DTC has been deleted, read the DTC again.
(4) Turn the ignition switch to the "LOCK"(OFF) position.

Q: Is DTC P0638 set?

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

DTC P0642: Throttle Position Sensor Power Supply

TECHNICAL DESCRIPTION

- ECM checks the throttle position sensor power voltage for abnormal conditions.

DESCRIPTIONS OF MONITOR METHODS

Throttle position sensor source voltage is smaller than the specified value.

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

Check Condition

- Battery positive voltage is higher than 6.3 volts.

Judgement Criterion

- Throttle position sensor power voltage should be 4.1 volts or less for 0.3 second.

OBD-II DRIVE CYCLE PATTERN

None.

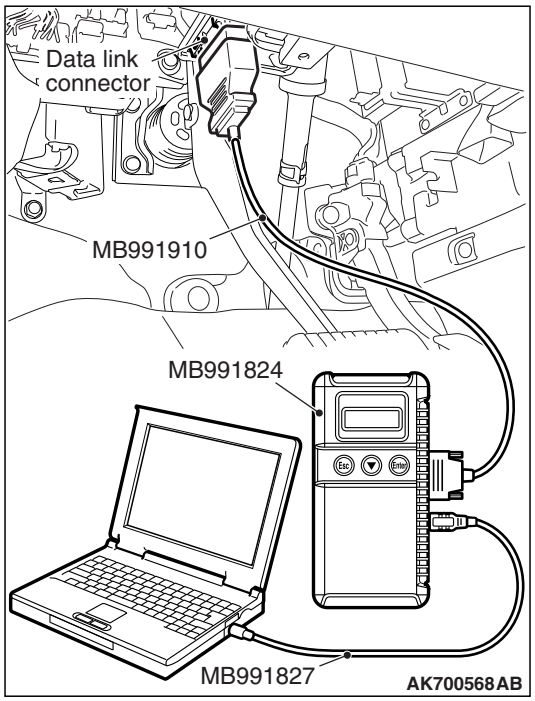
TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)

- ECM 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, 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) After the DTC has been deleted, read the DTC again.
(4) Turn the ignition switch to the "LOCK"(OFF) position.

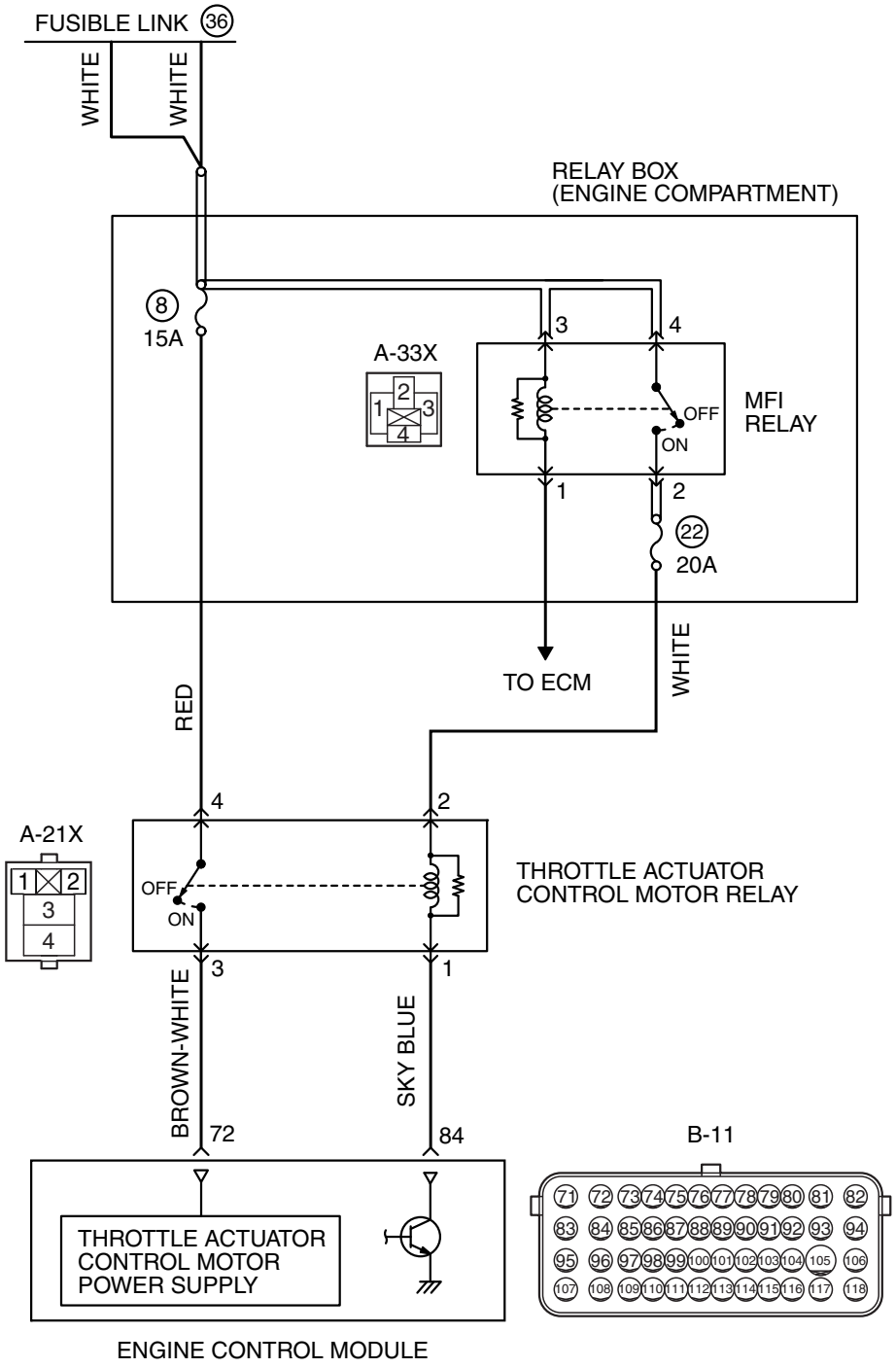
Q: Is DTC P0642 set?

YES : Replace the ECM. When the ECM is replaced, register the ID code. Refer to GROUP 42B, Diagnosis –ID Codes Registration Judgment Table <Vehicles with KOS> P.42B-11 or GROUP 42C, Diagnosis –ID Codes Registration Judgment Table <Vehicles with WCM> P.42C-10.

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.00-15.

DTC P0657: Throttle Actuator Control Motor Relay Circuit Malfunction

THROTTLE ACTUATOR CONTROL MOTOR RELAY CIRCUIT



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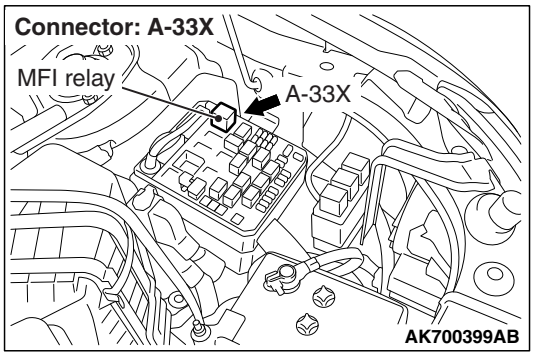
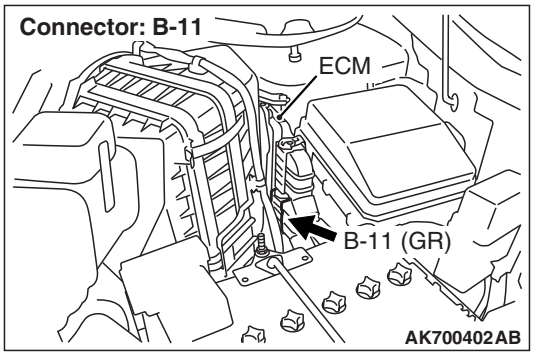
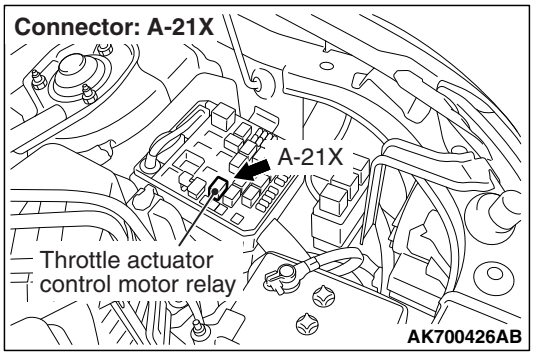






CIRCUIT OPERATION

- Battery positive voltage is applied to the throttle actuator control motor relay terminal (terminal No. 4).
- Battery positive voltage is applied to the throttle actuator control motor relay terminal (terminal No. 2) from the MFI relay (terminal No. 2).
- ECM (terminal No. 84) applies current to the throttle actuator control motor relay coil by turning ON the power transistor in the unit in order to turn the relay ON.
- When the throttle actuator control motor relay turns ON, battery positive voltage is supplied by the throttle actuator control motor relay (terminal No. 3) to the ECM (terminal No. 72).

TECHNICAL DESCRIPTION

- When the ignition switch ON signal is input into the ECM, the ECM turns ON the throttle actuator control motor relay.

DESCRIPTIONS OF MONITOR METHODS

- Throttle actuator control motor relay circuit voltage is smaller than the specified value.

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

Check Condition

- Battery positive voltage is higher than 8.3 volts.

Judgement Criterion

- The power line voltage of the electronic controlled throttle system should be 6.0 volts or less for 0.35 seconds.

OBD-II DRIVE CYCLE PATTERN

None.

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

- Malfunction of throttle actuator control motor relay.
- Connector damage.
- Harness damage.
- ECM 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

STEP 1. Check harness connector A-21X at throttle actuator control motor relay and harness connector B-10 at ECM for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 2.

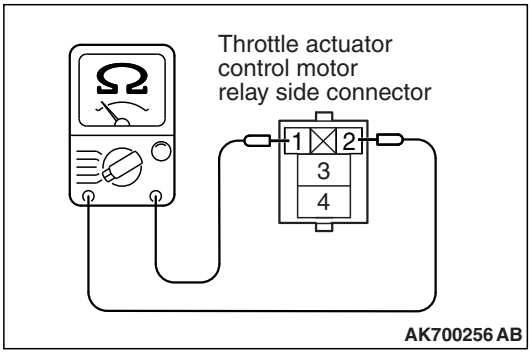
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 7.

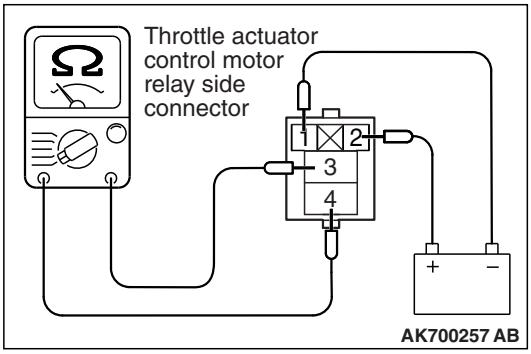
STEP 2. Check the throttle actuator control motor relay.

(1) Remove the throttle actuator control motor relay.

(2) Check for continuity between the throttle actuator control motor relay terminal No. 1 and No. 2.

- There should be continuity (approximately 70 ohms).





(3) Use jumper wires to connect throttle actuator control motor relay terminal No. 2 to the positive battery terminal and terminal No. 1 to the negative battery terminal.

(4) Check the continuity between the throttle actuator control motor relay terminal No. 3 and No. 4 while connecting and disconnecting the jumper wire at the negative battery terminal.

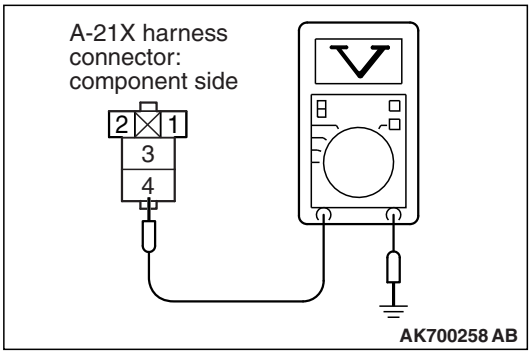
- Should be less than 2 ohms. (Negative battery terminal connected.)
- Should be open loop. (Negative battery terminal disconnected.)

(5) Install the throttle actuator control motor relay.

Q: Is the measured resistance normal?

YES : Go to Step 3.

NO : Replace the throttle actuator control motor relay. Then go to Step 7.

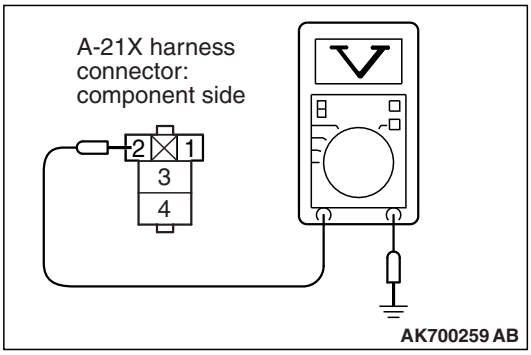


STEP 3. Measure the power supply voltage at throttle actuator control motor relay harness side connector A-21X

(1) Disconnect the connector A-21X and measure at the harness side.
(2) Measure the voltage between terminal No. 4 and ground.
- Voltage should be battery positive voltage.

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

YES : Go to Step 4.
NO : Repair it because of open circuit between relay box (fuse No. 8) and throttle actuator control motor relay connector A-21X (terminal No. 4). Then go to Step 7.



STEP 4. Measure the power supply voltage at throttle actuator control motor relay harness side connector A-21X.

(1) Disconnect the connector A-21X and measure at the harness side.
(2) Turn the ignition switch to the "ON" position.
(3) Measure the voltage between terminal No. 2 and ground.
- Voltage should be battery positive voltage.

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

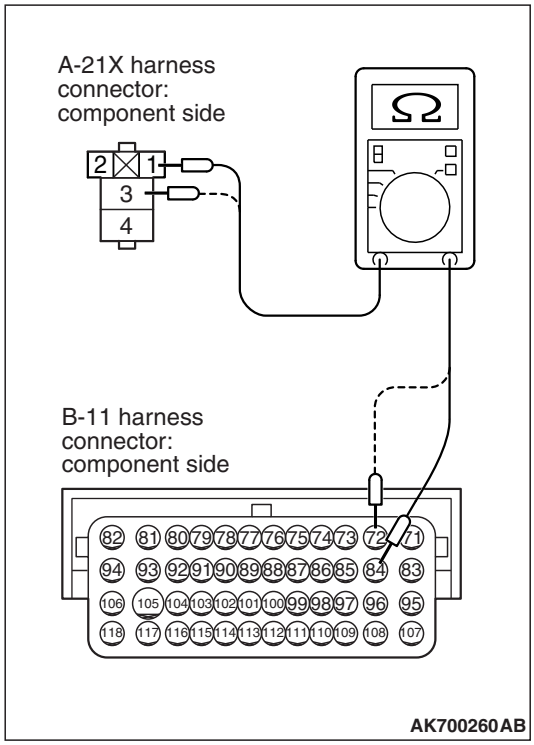
Q: Is battery positive voltage (approximately 12 volts) present?

YES : Go to Step 5.
NO : Repair it because of open circuit or harness damage between relay box (fuse No. 22) and throttle actuator control motor relay connector A-21X (terminal No. 2). Then go to Step 7.

STEP 5. Check for open circuit and short circuit to ground and harness damage between throttle actuator control motor relay connector A-21X and ECM connector B-11.

(1) Disconnect the connector A-21X and B-11 measure at the harness side.

(2) Measure the resistance between connector A-21X and connector B-11.
   a. Connector A-21X (terminal No. 1) and connector B-11 (terminal No. 84).
   b. Connector A-21X (terminal No. 3) and connector B-11 (terminal No. 72).
   • Should be less than 2 ohms.

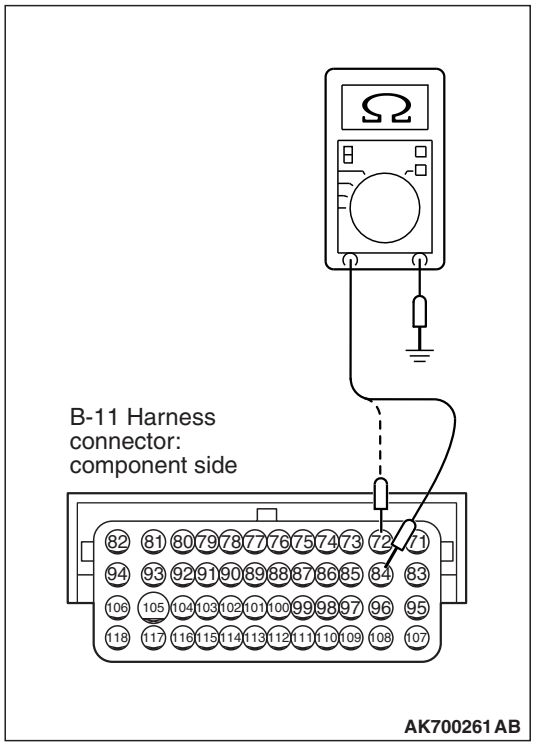


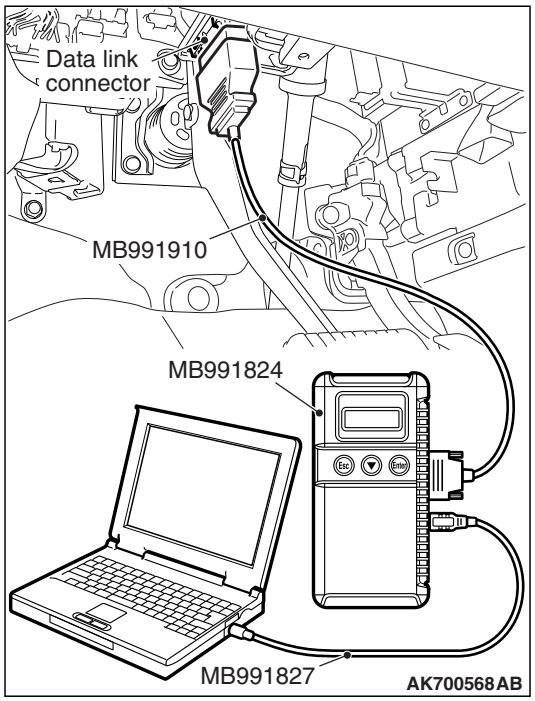
(3) Check for the continuity between connector B-11 and ground.
   a. Connector B-11 (terminal No. 72) and ground.
   b. Connector B-11 (terminal No. 84) and ground.
   • Not continuity.

Q: Is the harness wire in good condition?

YES : Go to Step 6.

NO : Repair it. Then go to Step 7.





STEP 6. 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) After the DTC has been deleted, read the DTC again.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is DTC P0657 set?

YES : Replace the ECM. When the ECM is replaced, register the ID code. Refer to GROUP 42B, Diagnosis –ID Codes Registration Judgment Table <Vehicles with KOS> P.42B-11 or GROUP 42C, Diagnosis –ID Codes Registration Judgment Table <Vehicles with WCM> P.42C-10. Then go to Step 7.

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.00-15.

STEP 7. Using scan tool MB991958, read the diagnostic trouble code (DTC).

(1) Connect scan tool MB991958 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) After the DTC has been deleted, read the DTC again.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is DTC P0657 set?

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

DTC P1231: Active Stability Control Plausibility <Vehicles with ASC>

TECHNICAL DESCRIPTION

- Checks for an abnormal signal of active stability control (ASC) via the CAN communication.

DTC SET CONDITIONS

Check Condition

- Ignition switch is "ON" position.

Judgment Criterion

- A torque demand signal from the active stability control is not normal.

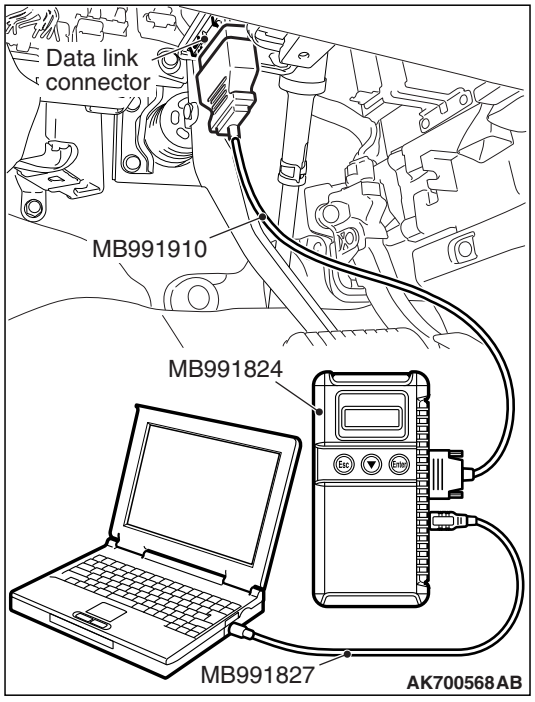
TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)

- Active stability control system failed.
- ECM 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, 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 P1231 set?

YES : Go to Step 2.
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.00-15.

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

(1) Turn the ignition switch to the "ON" position.
(2) After the DTC has been deleted, 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-24.

NO : Replace the ECM. When the ECM is replaced, register the ID code. Refer to GROUP 42B, Diagnosis –ID Codes Registration Judgment Table <Vehicles with KOS> P.42B-11 or GROUP 42C, Diagnosis –ID Codes Registration Judgment Table <Vehicles with WCM> P.42C-10.

DTC P1232: Fail Safe System

TECHNICAL DESCRIPTION

- To judge whether fail-safe control can be performed, check that power supply to the throttle actuator control motor circuit can be stopped by turning the throttle actuator control motor relay to OFF position momentarily.

DTC SET CONDITIONS

Check Condition

- Ignition switch is "ON" position.

Judgment Criterion

- Power supply to the throttle actuator control motor cannot be shut down (though power supply is stopped).

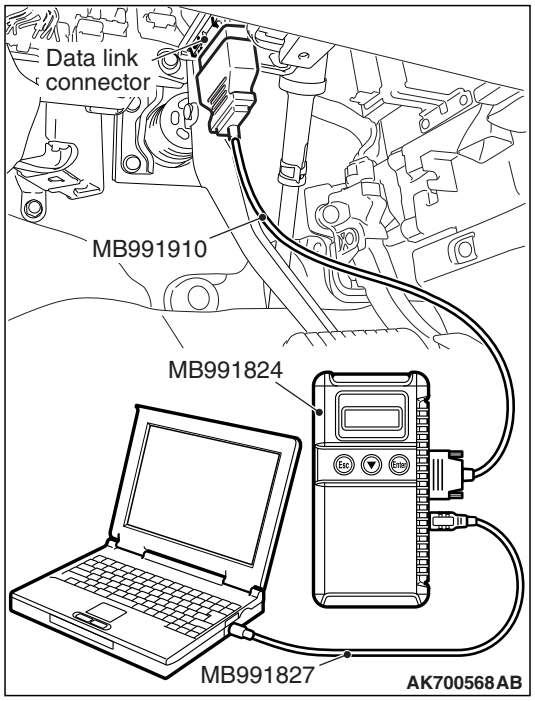
TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)

- Throttle actuator control motor relay circuit failed.
- ECM 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, 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 P1232 set?

YES : Go to Step 2.
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.00-15.

STEP 2. Using scan tool MB991958, read the diagnostic trouble code (DTC).
(1) Turn the ignition switch to the "ON" position.
(2) After the DTC has been deleted, read the DTC again.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is DTC P0657 set?

YES : Refer to DTC P0657 –Throttle Actuator Control Motor Relay Circuit Malfunction P.13B-596.

NO : Replace the ECM. When the ECM is replaced, register the ID code. Refer to GROUP 42B, Diagnosis –ID Codes Registration Judgment Table <Vehicles with KOS> P.42B-11 or GROUP 42C, Diagnosis –ID Codes Registration Judgment Table <Vehicles with WCM> P.42C-10.

DTC P1233: Throttle Position Sensor (main) Plausibility

TECHNICAL DESCRIPTION

Compare the actual measurement of volumetric efficiency by a mass airflow sensor signal with volumetric efficiency estimated from a throttle position sensor (main) signal.

MONITOR EXECUTION

Continuous

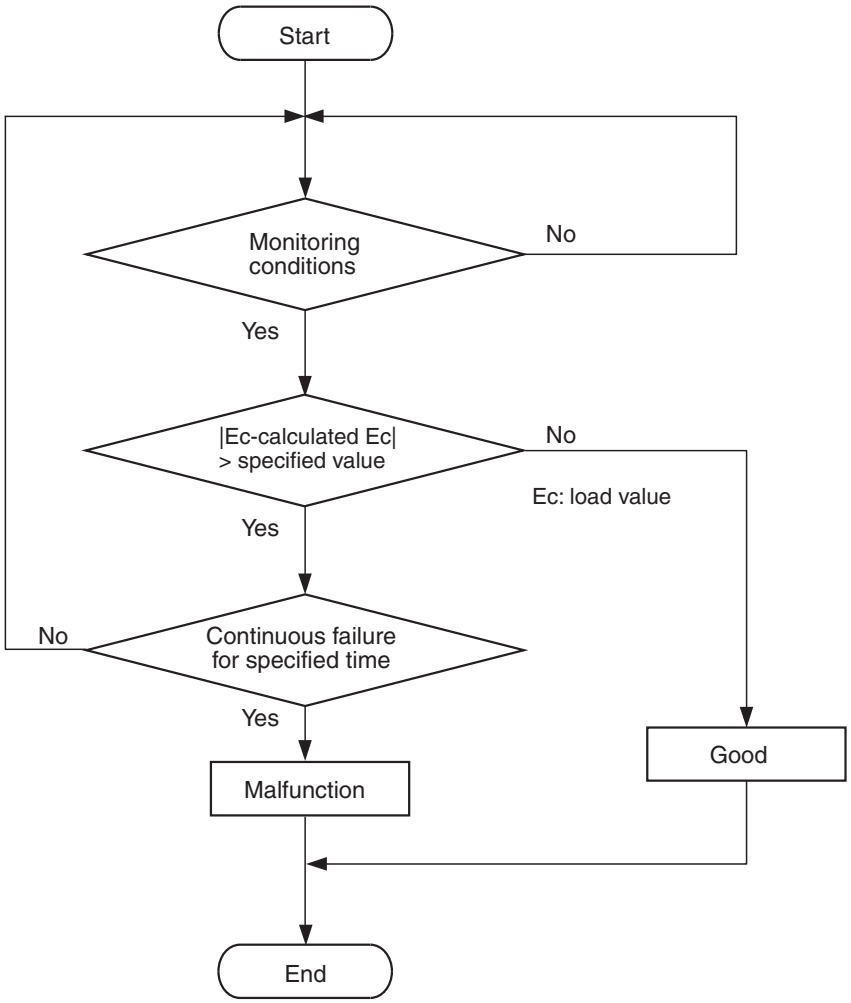
MONITOR EXECUTION CONDITIONS (Other monitor and Sensor)

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



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Check Conditions

- The difference between the actual volumetric efficiency and the volumetric efficiency estimated by the throttle position sensor (main) is 0 % or more. Or, the volumetric efficiency is 60 % or less.
- The engine speed is between 750 and 3,000 r/min. Or, the throttle position sensor (main) output voltage is 3 volts or less.

Judgment Criterion

- For 0.4 second, the difference between the actual volumetric efficiency and the volumetric efficiency estimated by the throttle position sensor (main) is 33 % or more.

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function –OBD-II Drive Cycle Pattern 17 P.13B-11.

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

- Throttle position sensor (main) system failed.
- Intake system vacuum leak.
- ECM 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

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

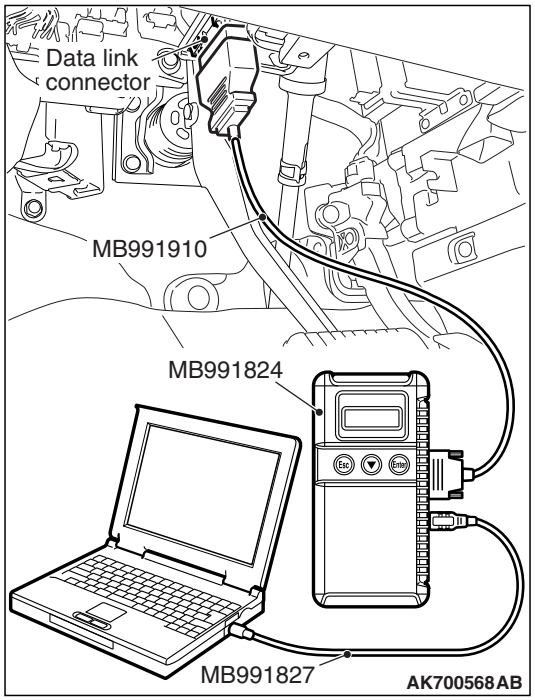
⚠ CAUTION

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 diagnostic trouble code other than P1233 set?

YES : Refer to Diagnostic Trouble Code Chart P.13B-51.
NO : Go to Step 2.



STEP 2. Using scan tool MB991958, check data list item 13: Throttle Position Sensor (main).

(1) Turn the ignition switch to the "ON" position.
(2) Detach the intake air hose at the throttle body.
(3) Disconnect the connector of the throttle position sensor.
(4) Use test harness special tool (MB991658) to connect only terminals No. 3, No. 4, No. 5, and No. 6.
(5) Set scan tool MB991958 to the data reading mode for item 13, Throttle Position Sensor (main).
  - Output voltage should be between 0.3 and 0.7 volt when the throttle valve is fully closed with your finger.
  - Output voltage should be 4.0 volts or more when the throttle valve is fully open with your finger.
(6) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the sensor operating properly?

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.00-15.
NO : Go to Step 3.

TSB Revision

STEP 3. Check for intake system vacuum leak.

Q: Are there any abnormalities?

YES : Repair it. Then go to Step 5.
NO : Go to Step 4.

STEP 4. Check the trouble symptoms.

(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle Pattern 17 P.13B-11.
(2) Check the diagnostic trouble code (DTC).

Q: Is DTC P1233 set?

YES : Replace the ECM. When the ECM is replaced, register the ID code. Refer to GROUP 42B, Diagnosis –ID Codes Registration Judgment Table <Vehicles with KOS> P.42B-11 or GROUP 42C, Diagnosis –ID Codes Registration Judgment Table <Vehicles with WCM> P.42C-10. Then go to Step 5.
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.00-15.

STEP 5. 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 17 P.13B-11.
(2) Check the diagnostic trouble code (DTC).

Q: Is DTC P1233 set?

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

DTC P1234: Throttle Position Sensor (Sub) Plausibility

TECHNICAL DESCRIPTION

Compare the actual measurement of volumetric efficiency by a mass airflow sensor signal with volumetric efficiency estimated from a throttle position sensor (sub) signal.

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)

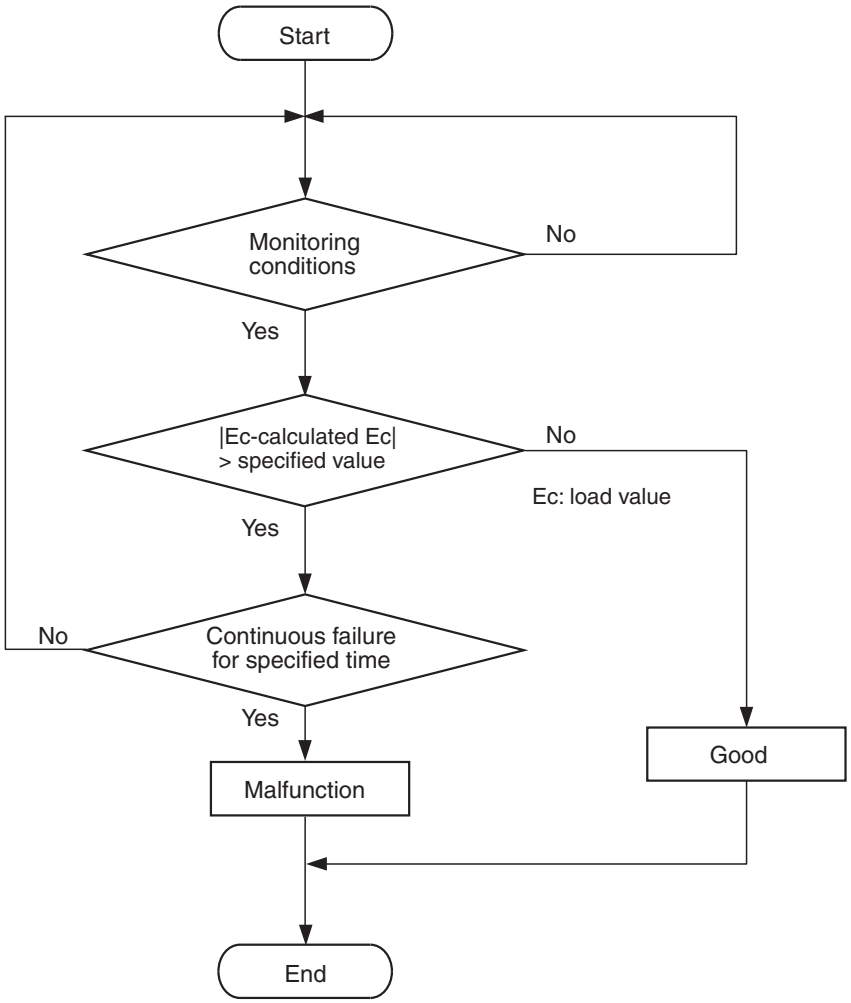
- Not applicable

Sensor (The sensor below is determined to be normal)

- Not applicable

DTC SET CONDITIONS

Logic Flow Chart



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Check Conditions

- The difference between the actual volumetric efficiency and the volumetric efficiency estimated by the throttle position sensor (sub) is 0 % or more. Or, the volumetric efficiency is 60 % or less.
- The engine speed is between 750 and 3000r/min. Or, the throttle position sensor (main) output voltage is 3 volts or less.

Judgment Criterion

- For 0.4 second, the difference between the actual volumetric efficiency and the volumetric efficiency estimated by the throttle position sensor (sub) is 33 % or more.

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function –OBD-II Drive Cycle Pattern 17 P.13B-11.

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

- Throttle position sensor (sub) system failed.
- Intake system vacuum leak.
- ECM failed.

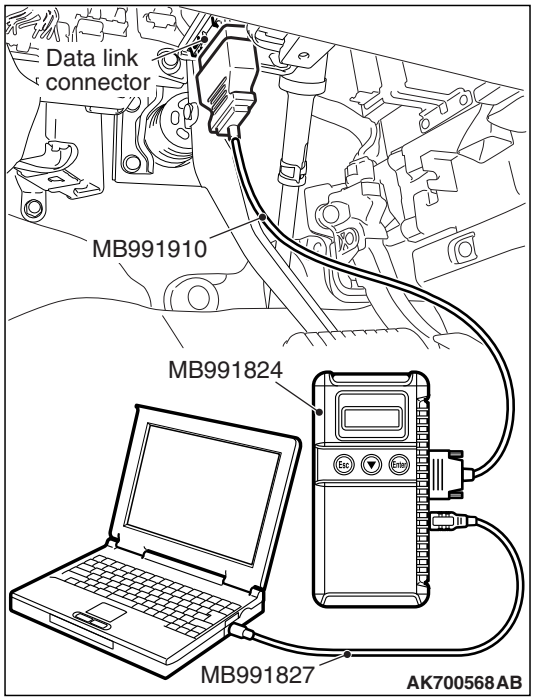
TSB Revision

DIAGNOSIS

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

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 diagnostic trouble code other than P1234 set?

YES : Refer to Diagnostic Trouble Code Chart P.13B-51.
NO : Go to Step 2.

STEP 2. Using scan tool MB991958, check data list item 15: Throttle Position Sensor (sub).

(1) Turn the ignition switch to the "ON" position.
(2) Detach the intake air hose at the throttle body.
(3) Disconnect the connector of the throttle position sensor.
(4) Use test harness special tool (MB991658) to connect only terminals No. 3, No. 4, No. 5, and No. 6.
(5) Set scan tool MB991958 to the data reading mode for item 15, Throttle Position Sensor (sub).
  - Output voltage should be 4.0 volts or more when the throttle valve is fully closed with your finger.
  - Output voltage should be 1.0 volt or less when the throttle valve is fully open with your finger.
(6) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the sensor operating properly?

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.00-15.
NO : Go to Step 3.

TSB Revision

STEP 3. Check for intake system vacuum leak.

Q: Are there any abnormalities?

YES : Repair it. Then go to Step 5.
NO : Go to Step 4.

STEP 4. Check the trouble symptoms.

(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle Pattern 17 P.13B-11.
(2) Check the diagnostic trouble code (DTC).

Q: Is DTC P1234 set?

YES : Replace the ECM. When the ECM is replaced, register the ID code. Refer to GROUP 42B, Diagnosis –ID Codes Registration Judgment Table <Vehicles with KOS> P.42B-11 or GROUP 42C, Diagnosis –ID Codes Registration Judgment Table <Vehicles with WCM> P.42C-10. The go to Step 5.
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.00-15.

STEP 5. 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 17 P.13B-11.
(2) Check the diagnostic trouble code (DTC).

Q: Is DTC P1234 set?

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

DTC P1235: Mass Airflow Sensor Plausibility

TECHNICAL DESCRIPTION

Compare the actual measurement of volumetric efficiency by a mass airflow sensor signal with volumetric efficiency estimated from a throttle position sensor (main or sub) signal.

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)

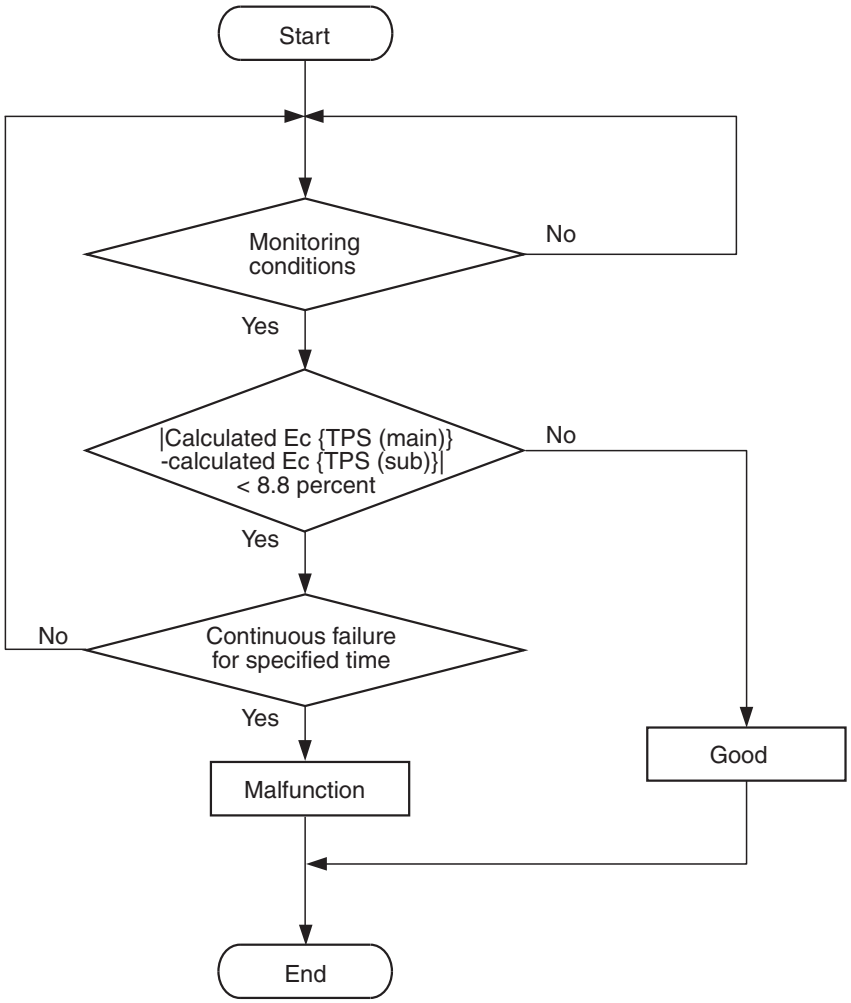
- Not applicable

Sensor (The sensor below is determined to be normal)

- Not applicable

DTC SET CONDITIONS

Logic Flow Chart



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Check Conditions

- The plausibility error of the throttle position sensor (main) is detected.
- The plausibility error of the throttle position sensor (sub) is detected.

Judgment Criterion

- For 0.36 second, the difference between the volumetric efficiency estimated by the (main) throttle position sensor and the volumetric efficiency estimated by the (sub) throttle position sensor is 8.8 % or less.

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function –OBD-II Drive Cycle Pattern 17 P.13B-11.

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

- Mass airflow sensor system failed.
- ECM failed.

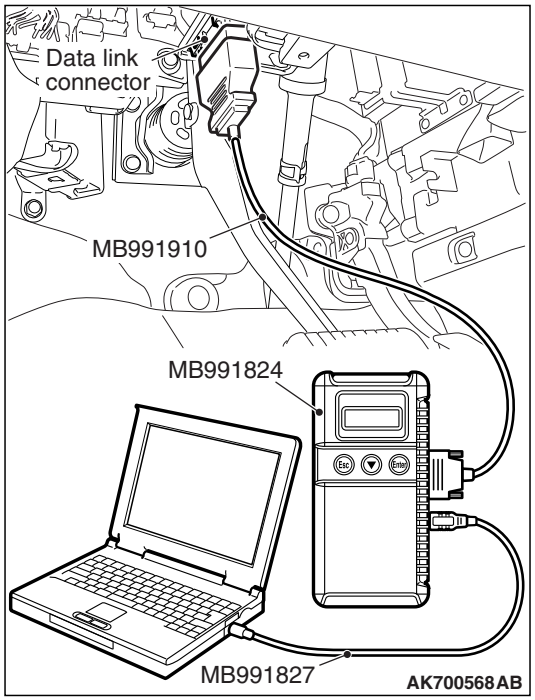
TSB Revision

DIAGNOSIS

Required Special Tools:

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

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 diagnostic trouble code other than P1235 set?

YES : Refer to Diagnostic Trouble Code Chart P.13B-51.
NO : Go to Step 2.

STEP 2. Using scan tool MB991958, check data list item 10: Mass Airflow Sensor.

(1) Start the engine and run at idle.
(2) Set scan tool MB991958 to the data reading mode for item 10, Mass Airflow Sensor.
(3) Warm up the engine to normal operating temperature: 80° C to 95° C (176° F to 203° F).
  - The standard value during idling should be between 1,350 and 1,670 millivolts.
  - When the engine is revved, the mass airflow rate should increase according to the increase in engine speed.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the sensor operating properly?

YES : Go to Step 3.
NO : Refer to DTC P0101 –Mass Airflow Circuit Range/Performance Problem P.13B-119, DTC P0102 –Mass Airflow Circuit Low Input P.13B-126, DTC P0103 –Mass Airflow Circuit High Input P.13B-132.

STEP 3. Check the trouble symptoms.

(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle Pattern 17 P.13B-11.

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

Q: Is DTC P1235 set?

YES : Replace the ECM. When the ECM is replaced, register the ID code. Refer to GROUP 42B, Diagnosis –ID Codes Registration Judgment Table <Vehicles with KOS> P.42B-11 or GROUP 42C, Diagnosis –ID Codes Registration Judgment Table <Vehicles with WCM> P.42C-10. Then go to Step 4.

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.00-15.

STEP 4. 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 17 P.13B-11.

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

Q: Is DTC P1235 set?

YES : Replace the troubleshooting.

NO : The procedure is complete.

DTC P1236: A/D Converter

TECHNICAL DESCRIPTION

Monitors whether input voltage from the accelerator pedal position sensor (sub) is normally converted into a digital signal in the engine control module.

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

Check Condition

- Ignition switch is "ON" position.

Judgment Criterion

- When the input voltage from the accelerator pedal position sensor (sub) is periodically 0 V for 0.45 second, the digital value of the input voltage indicates 0.2 V or more.

OBD-II DRIVE CYCLE PATTERN

None.

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

- ECM 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, read the diagnostic trouble code (DTC).

⚠ CAUTION

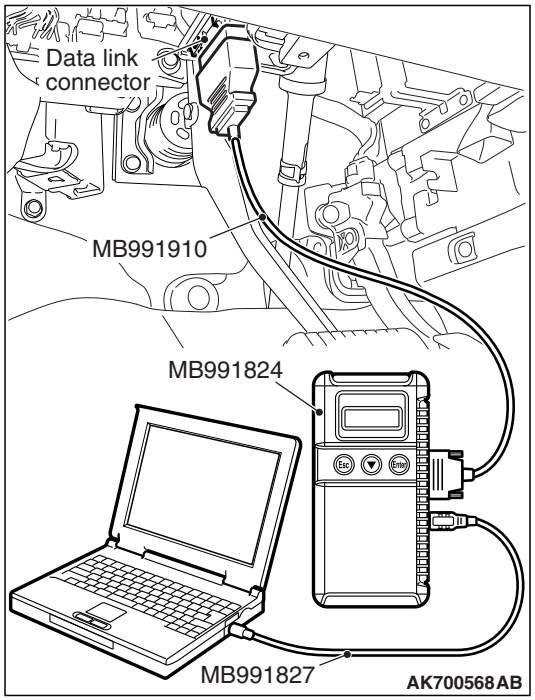
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

(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 P1236 set?

YES : Replace the ECM. When the ECM is replaced, register the ID code. Refer to GROUP 42B, Diagnosis –ID Codes Registration Judgment Table <Vehicles with KOS> P.42B-11 or GROUP 42C, Diagnosis –ID Codes Registration Judgment Table <Vehicles with WCM> P.42C-10.

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.00-15.



DTC P1237: Accelerator Pedal Position Sensor Plausibility

TECHNICAL DESCRIPTION

Compare the output value of the accelerator pedal position sensor (main) with that of the accelerator pedal position sensor (sub).

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)

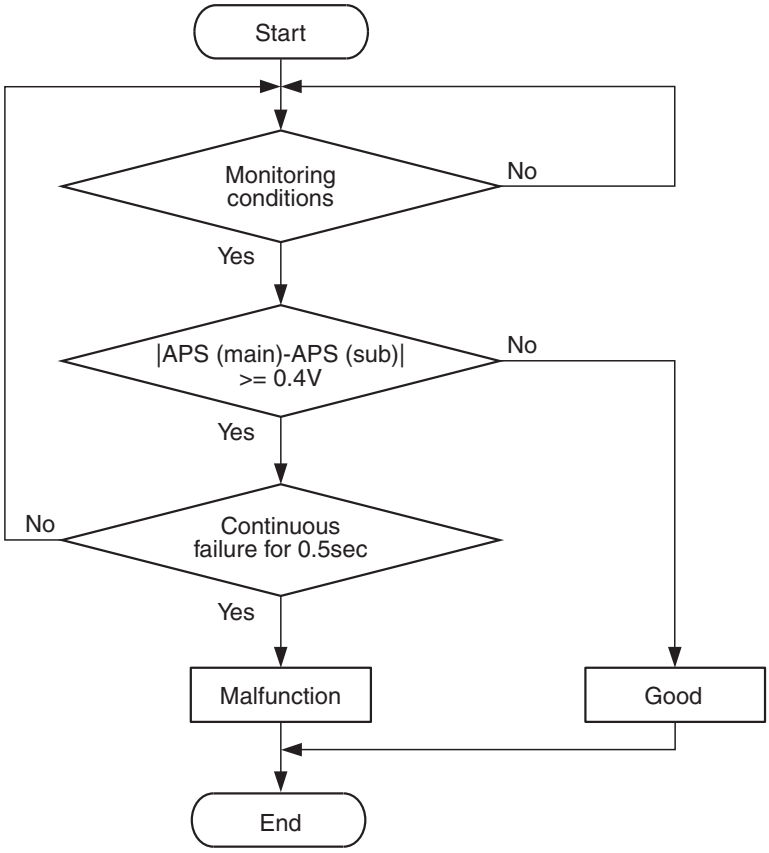
- Not applicable

Sensor (The sensor below is determined to be normal)

- Not applicable

DTC SET CONDITIONS

Logic Flow Chart



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Check Condition

- Change of accelerator pedal position sensor (sub) output voltage per 40 milliseconds is lower than 0.06 volt.
- Range/performance error of accelerator pedal position sensor (main and sub) circuit is not detected.

Judgment Criterion

- Voltage obtained with the formula given below is 0.4 volt or higher for 0.5 second: accelerator pedal position sensor (main) output voltage – accelerator pedal position sensor (sub) output voltage.

NOTE: The accelerator pedal position sensor voltage used for the judgement is converted into the accelerator pedal position sensor voltage for the internal processing by the ECM.

OBD-II DRIVE CYCLE PATTERN

None.

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

- Accelerator pedal position sensor failed.
- ECM 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, read the diagnostic trouble code (DTC).

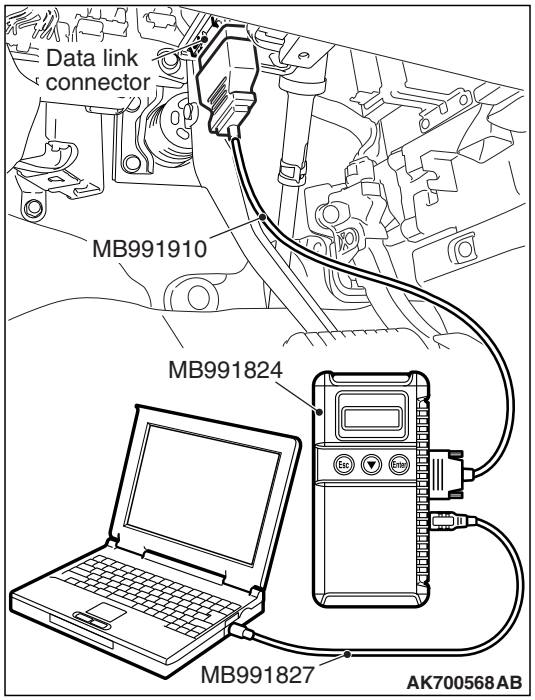
⚠ CAUTION

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 diagnostic trouble code other than P1237 set?

YES : Refer to Diagnostic Trouble Code Chart P.13B-51.
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.13B-826.
  a. Item 11: Accelerator pedal position sensor (main)
  b. Item 12: Accelerator pedal position sensor (sub)
(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 go to Step 4.

STEP 3. Using scan tool MB991958, read the diagnostic trouble code (DTC).
(1) Turn the ignition switch to the "ON" position.
(2) After the DTC has been deleted, read the DTC again.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is DTC P1237 set?

YES : Replace the ECM. When the ECM is replaced, register the ID code. Refer to GROUP 42B, Diagnosis –ID Codes Registration Judgment Table <Vehicles with KOS> P.42B-11 or GROUP 42C, Diagnosis –ID Codes Registration Judgment Table <Vehicles with WCM> P.42C-10. Then go to Step 4.

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.00-15.

STEP 4. Using scan tool MB991958, read the diagnostic trouble code (DTC).
(1) Turn the ignition switch to the "ON" position.
(2) Read the DTC.
(3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is DTC P1237 set?

YES : Replace the troubleshooting.

NO : The procedure is complete.

DTC P1238: Mass Airflow Sensor Plausibility (Torque Monitor)

TECHNICAL DESCRIPTION

Compare the actual measurement of volumetric efficiency by a mass airflow sensor signal with volumetric efficiency estimated from a throttle position sensor (main or sub) signal.

MONITOR EXECUTION

Continuous

MONITOR EXECUTION CONDITIONS (Other monitor and Sensor)

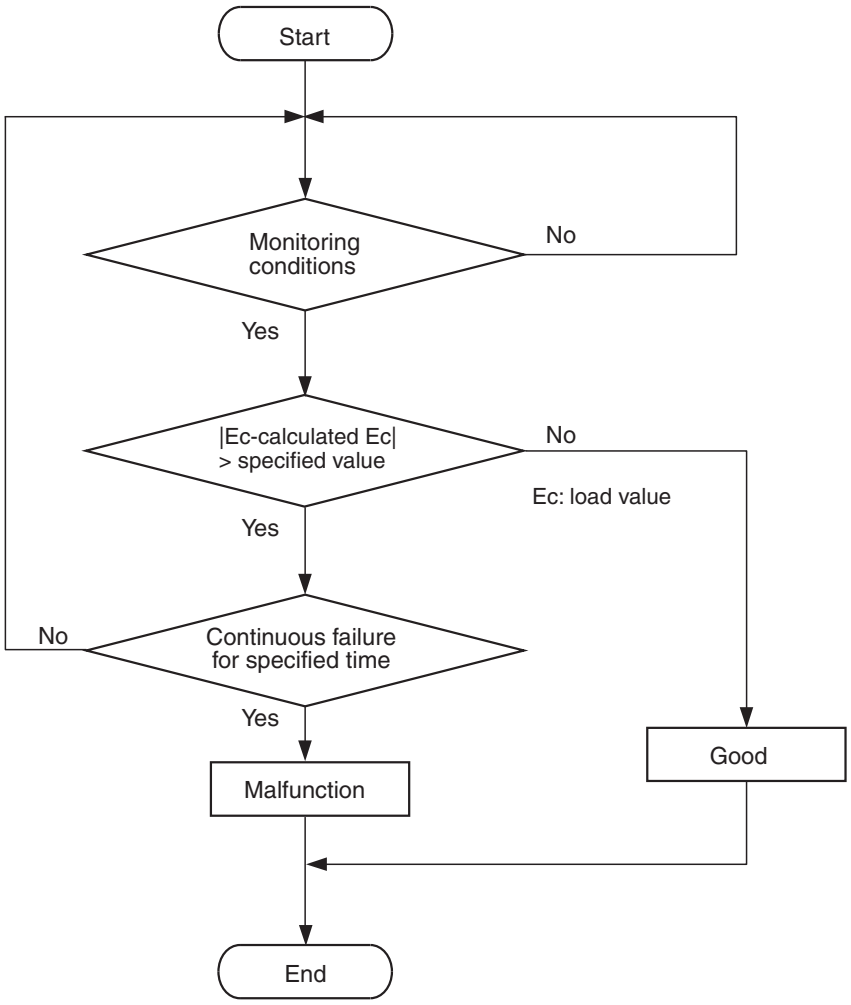
Other Monitor (There is no temporary DTC stored in memory for the item monitored below)

- Not applicable

Sensor (The sensor below is determined to be normal)

- Not applicable

DTC SET CONDITIONS



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Check Conditions

- The difference between the actual volumetric efficiency and the volumetric efficiency estimated by the throttle position sensor (main) is 0 % or more. Or, the volumetric efficiency is 60 % or less.
- Engine speed is 750 r/min or higher.

Judgment Criterion

- For 0.5 second, the difference between the actual volumetric efficiency and the volumetric efficiency estimated by the throttle position sensor (main) is 35 % or more.

Check Condition

- The difference between the actual volumetric efficiency and the volumetric efficiency estimated by the throttle position sensor (sub) is 0% or more. Or, the volumetric efficiency is 60% or less.
- Engine speed is 750 r/min or higher.

Judgment Criterion

- For 0.5 second, the difference between the actual volumetric efficiency and the volumetric efficiency estimated by the throttle position sensor (sub) is 35 % or more.

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function –OBD-II Drive Cycle Pattern 17 P.13B-11.

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

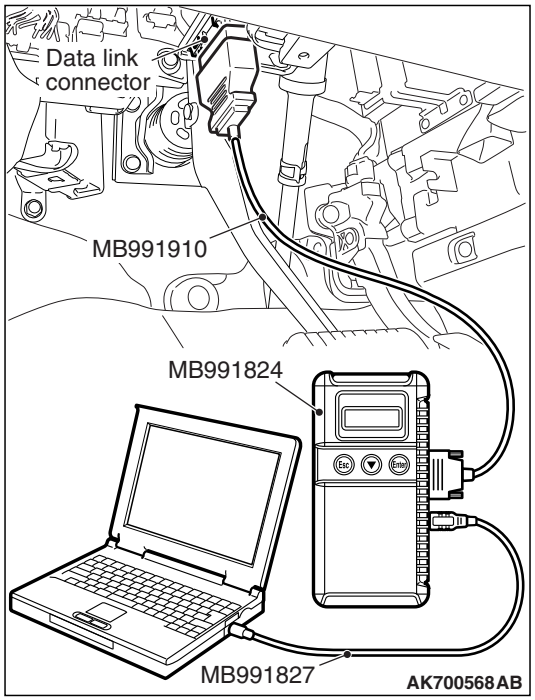
- Mass airflow sensor system failed.
- ECM failed.

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, 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 diagnostic trouble code other than P1238 set?

YES : Refer to Diagnostic Trouble Code Chart P.13B-51.
NO : Go to Step 2.

STEP 2. Using scan tool MB991958, check data list item 10: Mass Airflow Sensor.

(1) Start the engine and run at idle.
(2) Set scan tool MB991958 to the data reading mode for item 10, Mass Airflow Sensor.
(3) Warm up the engine to normal operating temperature: 80° C to 95° C (176° F to 203° F).
- The standard value during idling should be between 1,350 and 1,670 millivolts.
- When the engine is revved, the mass airflow rate should increase according to the increase in engine speed.

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

Q: Is the sensor operating properly?

YES : Go to Step 3.
NO : Refer to DTC P0101 –Mass Airflow Circuit Range/Performance Problem P.13B-119, DTC P0102 –Mass Airflow Circuit Low Input P.13B-126, DTC P0103 –Mass Airflow Circuit High Input P.13B-132.

TSB Revision

STEP 3. Check the trouble symptoms.

(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle Pattern 17 P.13B-11.

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

Q: Is DTC P1238 set?

YES : Replace the ECM. When the ECM is replaced, register the ID code. Refer to GROUP 42B, Diagnosis –ID Codes Registration Judgment Table <Vehicles with KOS> P.42B-11 or GROUP 42C, Diagnosis –ID Codes Registration Judgment Table <Vehicles with WCM> P.42C-10. Then go to Step 4.

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.00-15.

STEP 4. 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 17 P.13B-11.

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

Q: Is DTC P1238 set?

YES : Replace the troubleshooting.

NO : The procedure is complete.

DTC P1239: Engine RPM Plausibility

TECHNICAL DESCRIPTION

Compares the actual engine speed calculated from the crankshaft position sensor signal cycle with the estimated engine speed calculated from the number of the crankshaft position sensor signal pulses after a lapse of the specified time.

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)

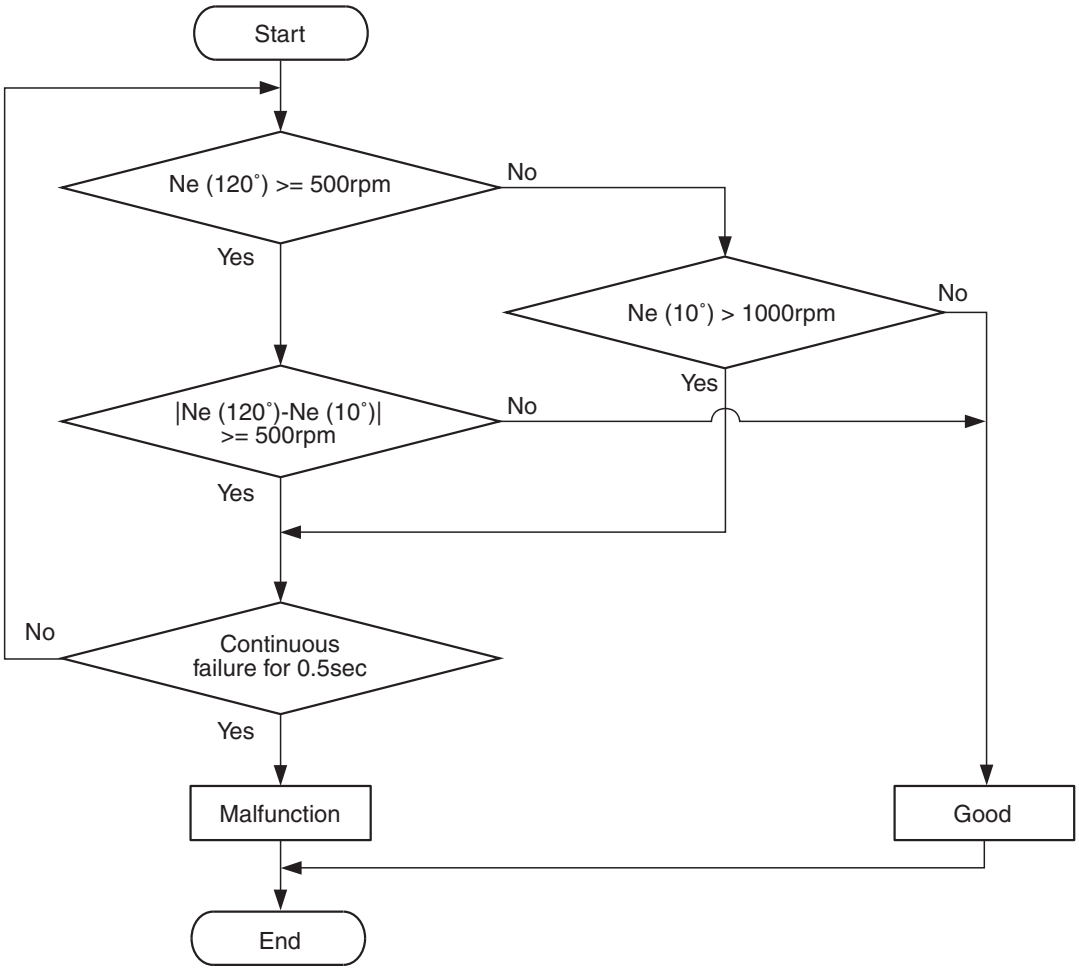
- Not applicable

Sensor (The sensor below is determined to be normal)

- Not applicable

DTC SET CONDITIONS

Logic Flow Chart



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Check Condition
- The engine speed monitored with a 120 degree-cycle pulse is 500 r/min or more.

Judgment Criterion
- The difference between the engine speed monitored with a 120 degree-cycle pulse and the engine speed monitored with a 10 degree-cycle pulse is 500 r/min or more.

Check Condition
- The engine speed monitored with a 120 degree-cycle pulse is 500 r/min or less.

Judgment Criterion
- The engine speed monitored with a 10 degree-cycle pulse is 1,000 r/min or more.

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function –OBD-II Drive Cycle Pattern 22 P.13B-11.

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

- Crankshaft position sensor system failed.
- ECM 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

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

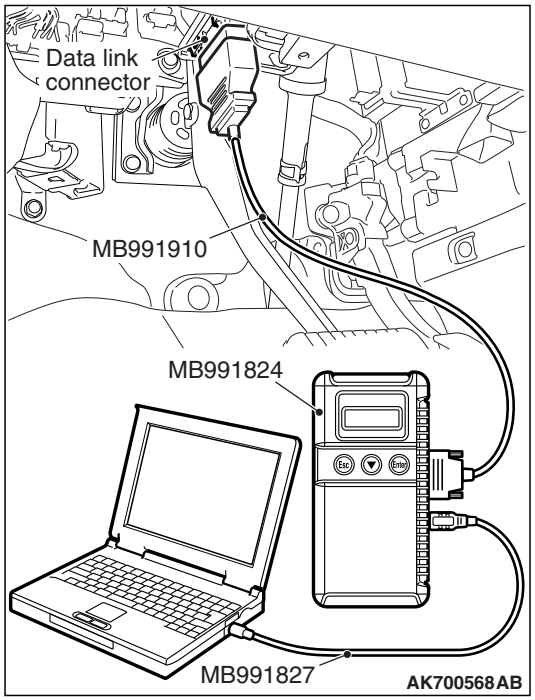
⚠ CAUTION

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 diagnostic trouble code other than P1239 set?

YES : Refer to Diagnostic Trouble Code Chart P.13B-51.
NO : Go to Step 2.



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

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

Q: Is DTC P1239 set?

YES : Replace the ECM. When the ECM is replaced, register the ID code. Refer to GROUP 42B, Diagnosis –ID Codes Registration Judgment Table <Vehicles with KOS> P.42B-11 or GROUP 42C, Diagnosis –ID Codes Registration Judgment Table <Vehicles with WCM> P.42C-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.00-15.

STEP 3. 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 22 P.13B-11.

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

Q: Is DTC P1239 set?

YES : Retry the troubleshooting.

NO : The inspection is complete.

DTC P1240: Ignition Angle

TECHNICAL DESCRIPTION

Checks for an abnormal ignition timing retard angle demand signal from the active stability control (ASC).

DTC SET CONDITIONS

Check Condition

- Ignition switch is "ON" position.

Judgment Criterion

- The ignition timing retard angle demand signal is not normal.

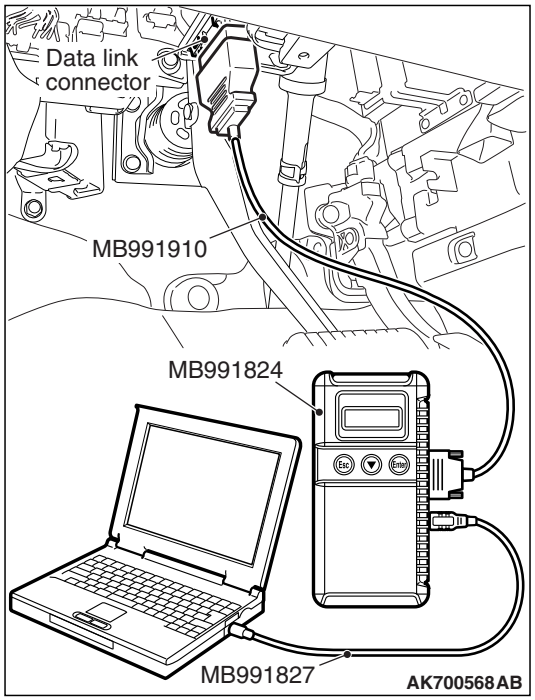
TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)

- ECM 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, 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 ASC-DTC set?

YES : Refer to GROUP 35C, ASC Diagnosis –Diagnosis Code Chart P.35C-24.

NO : Replace the ECM. When the ECM is replaced, register the ID code. Refer to GROUP 42B, Diagnosis –ID Codes Registration Judgment Table <Vehicles with KOS> P.42B-11 or GROUP 42C, Diagnosis –ID Codes Registration Judgment Table <Vehicles with WCM> P.42C-10.

DTC P1241: Torque Monitoring

TECHNICAL DESCRIPTION

Compares the actual torque signal computed from a mass air flow sensor signal with the driver demand torque signal computed from an accelerator pedal position sensor signal.

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)

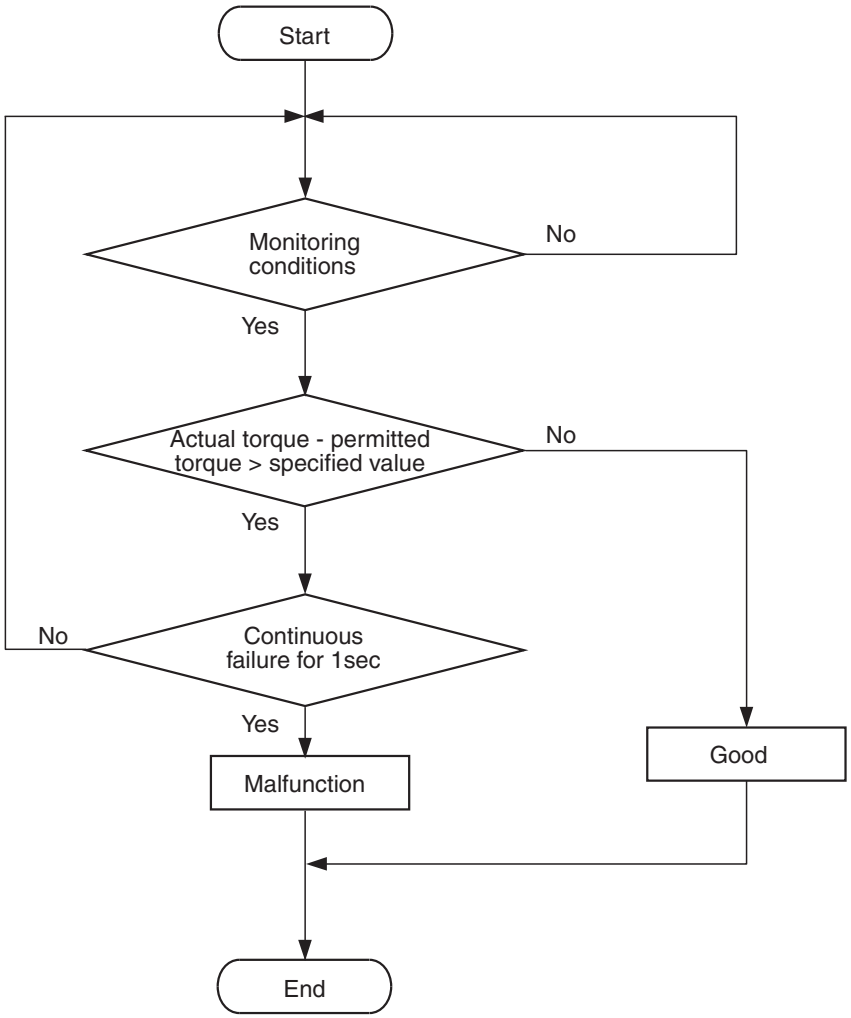
- Not applicable

Sensor (The sensor below is determined to be normal)

- Not applicable

DTC SET CONDITIONS

Logic Flow Chart



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Check Conditions
- Engine speed is 500 r/min or higher.
- Volumetric efficiency is 16 percent or higher.

Judgement Criterion
- For 1 second, the difference between the actual torque signal and the requested torque signal is 50N· m (37 ft-lb) or more.

TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)
- Throttle actuator control motor failed.
- Connector damage.
- Harness damage.
- Vacuum leak.
- ECM failed

OBD-II DRIVE CYCLE PATTERN
Refer to Diagnostic Function –OBD-II Drive Cycle – Pattern 17 P.13B-11.

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

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

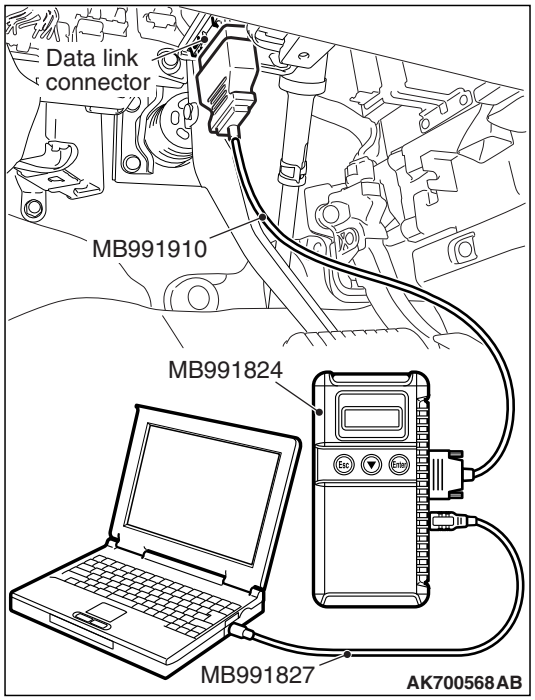
⚠ CAUTION

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 diagnostic trouble code other than P1241 set?

YES : Refer to Diagnostic Trouble Code Chart P.13B-51.
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 items in the data list. Refer to Data List Reference Table P.13B-826.
  a. Item 10: Mass Airflow Sensor.
  b. Item 11: Accelerator Pedal Position Sensor (main).
  c. 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 3.
NO : Repair or replace it. Then go to Step 8.

STEP 3. Check harness connector B-08 at throttle actuator control motor and harness connector B-10 at ECM 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 8.

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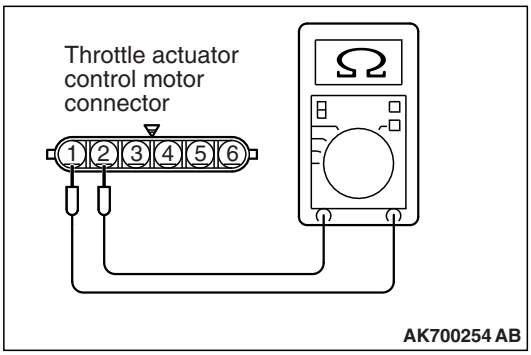


STEP 4. Check the throttle actuator control motor.

(1) Disconnect the connector B-08.

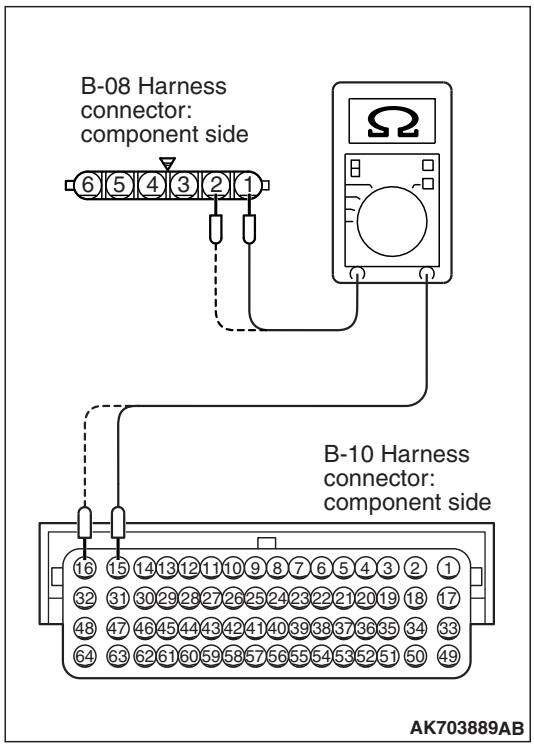
(2) Measure the resistance between throttle actuator control motor side connector terminal No. 1 and No. 2.

Standard value: 0.3 – 80 Ω [at 20° C (68° C)]

Q: Is the measured resistance between 0.3 and 80 ohms [at 20° C (68° C)?

YES : Go to Step 5.

NO : Replace the throttle body assembly. Then go Step 8.



STEP 5. Check for harness damage between throttle actuator control motor connector B-08 and ECM connector B-10.

(1) Disconnect the connector B-08 and B-10 measure at the harness side.

(2) Measure the resistance between B-08 connector and B-10 connector.

a. Connector B-08 (terminal No. 1) and connector B-10 (terminal No. 15).

b. Connector B-08 (terminal No. 2) and connector B-10 (terminal No. 16).

- Should be less than 2 ohms.

Q: Is the measured resistance less than 2 ohms?

YES : Then go to Step 6.

NO : Repair it. Then go to Step 8.

STEP 6. Check for intake system vacuum leak.

Q: Are there any abnormalities?

YES : Repair it. Then go to Step 8.

NO : Go to Step 7.

STEP 7. Check the trouble symptoms.

(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle Pattern 17 P.13B-11.

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

Q: Is DTC P1241 set?

YES : Replace the ECM. When the ECM is replaced, register the ID code. Refer to GROUP 42B, Diagnosis –ID Codes Registration Judgment Table <Vehicles with KOS> P.42B-11 or GROUP 42C, Diagnosis –ID Codes Registration Judgment Table <Vehicles with WCM> P.42C-10. Then go to Step 8.

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.00-15.

STEP 8. 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 17 P.13B-11.

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

Q: Is DTC P1241 set?

YES : Retry the troubleshooting.

NO : The inspection is complete.

DTC P1242: Fail Safe Control Monitor

TECHNICAL DESCRIPTION

Monitors the engine speed during fail-safe control.

DTC SET CONDITIONS

Check Condition

- During fail safe control.

Judgment Criterion

- The engine speed is higher than assumed.

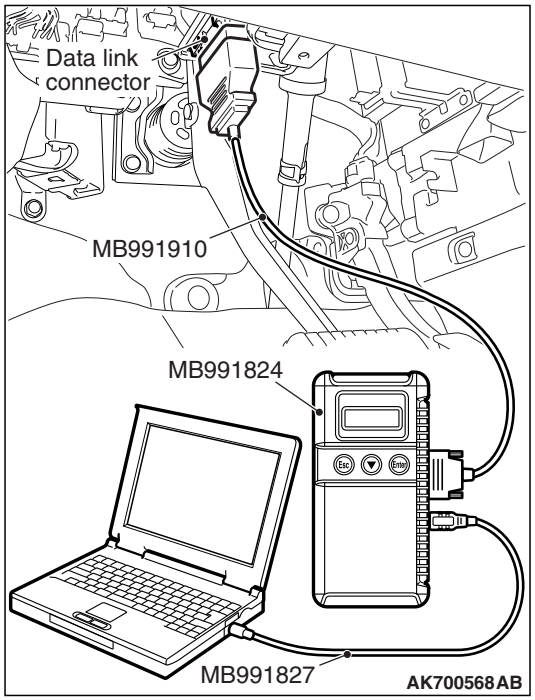
TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)

- ECM 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, 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 diagnostic trouble code other than P1242 set?

YES : Refer to Diagnostic Trouble Code Chart P.13B-51.
NO : Go to Step 2 .

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

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

Q: Is DTC P1242 set?

YES : Replace the ECM. When the ECM is replaced, register the ID code. Refer to GROUP 42B, Diagnosis –ID Codes Registration Judgment Table <Vehicles with KOS> P.42B-11 or GROUP 42C, Diagnosis –ID Codes Registration Judgment Table <Vehicles with WCM> P.42C-10.
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.00-15.

DTC P1243: Inquiry/Response Error

TECHNICAL DESCRIPTION

Monitors the computation function of the engine control module.

DTC SET CONDITIONS

Check Condition

- Ignition switch is "ON" position.

Judgment Criterion

- ECM can not calculate input data.

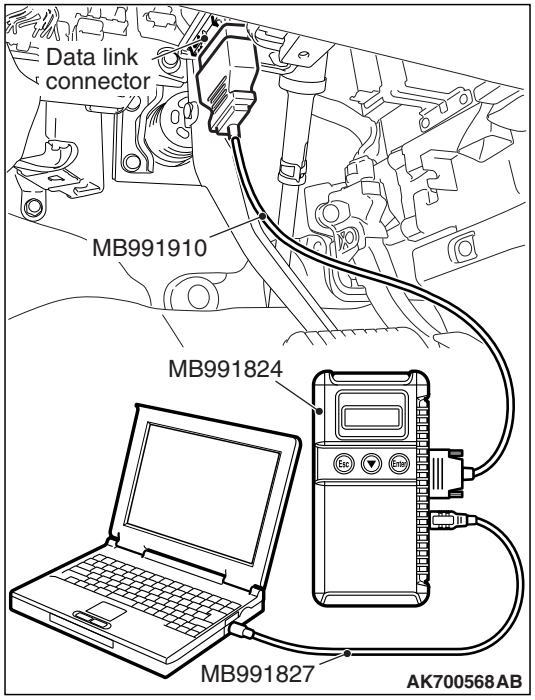
TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)

- ECM 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, 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 P1243 set?

YES : Replace the ECM. When the ECM is replaced, register the ID code. Refer to GROUP 42B, Diagnosis –ID Codes Registration Judgment Table <Vehicles with KOS> P.42B-11 or GROUP 42C, Diagnosis –ID Codes Registration Judgment Table <Vehicles with WCM> P.42C-10.

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.00-15.

DTC P1244: RAM Test For All Area

TECHNICAL DESCRIPTION

Monitors the computation function of the engine control module periodically.

DTC SET CONDITIONS

Check Condition

- Ignition switch is "ON" position.

Judgment Criterion

- All RAM data of ECM are defect.

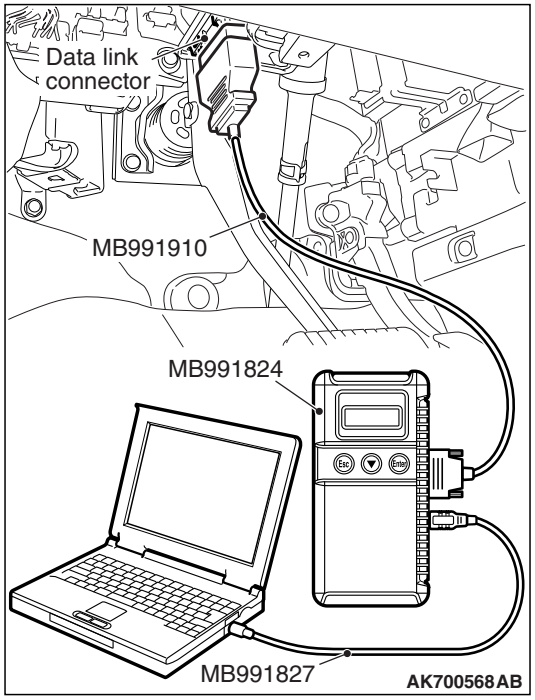
TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)

- ECM 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, 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 P1244 set?

YES : Replace the ECM. When the ECM is replaced, register the ID code. Refer to GROUP 42B, Diagnosis –ID Codes Registration Judgment Table <Vehicles with KOS> P.42B-11 or GROUP 42C, Diagnosis –ID Codes Registration Judgment Table <Vehicles with WCM> P.42C-10.

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.00-15.

DTC P1245: Cycle RAM Test (Engine)

TECHNICAL DESCRIPTION

Monitors the computation function of the engine control module periodically.

DTC SET CONDITIONS

Check Condition

- Ignition switch is "ON" position.

Judgment Criterion

- RAM data (engine) is defect.

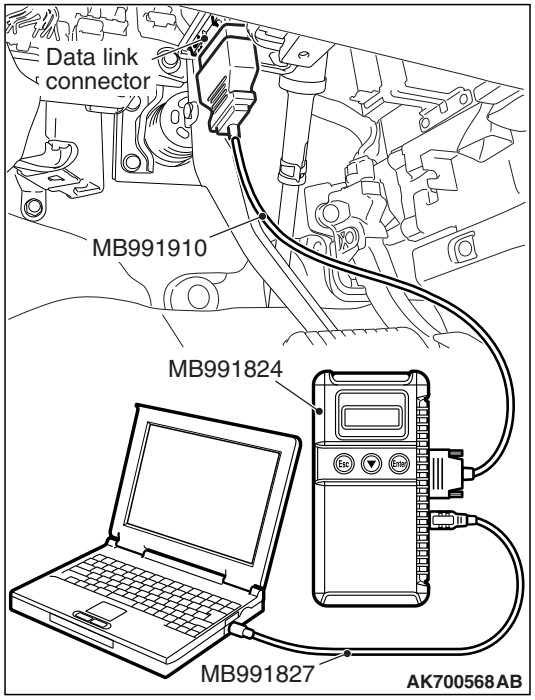
TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)

- ECM 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, 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 P1245 set?

YES : Replace the ECM. When the ECM is replaced, register the ID code. Refer to GROUP 42B, Diagnosis –ID Codes Registration Judgment Table <Vehicles with KOS> P.42B-11 or GROUP 42C, Diagnosis –ID Codes Registration Judgment Table <Vehicles with WCM> P.42C-10.

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.00-15.

DTC P1247: A/T Plausibility

TECHNICAL DESCRIPTION

Checks for an abnormal signal of transmission control module.

DTC SET CONDITIONS

Check Condition

- Ignition switch is "ON" position.

Judgment Criterion

- A torque demand signal from TCM is not normal.

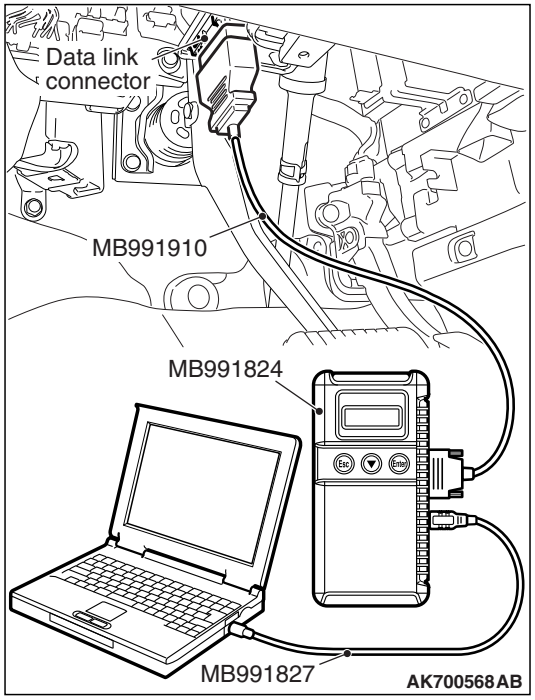
TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)

- Automatic transaxle system failed.
- ECM 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, 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 A/T-DTC.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the A/T-DTC set?

YES : Refer to GROUP 23C, Automatic Transaxle Diagnosis –Diagnostic Trouble Code Chart P.23C-26.

NO : Go to Step 2 .

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

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

Q: Is DTC P1247 set?

YES : Replace the ECM. When the ECM is replaced, register the ID code. Refer to GROUP 42B, Diagnosis –ID Codes Registration Judgment Table <Vehicles with KOS> P.42B-11 or GROUP 42C, Diagnosis –ID Codes Registration Judgment Table <Vehicles with WCM> P.42C-10.

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.00-15.