
DTC P0171: System too Lean

Fuel Trim Circuit

- Refer to, DTC P0201 – P0204 Injector Circuit
[P.13B-291](#).

CIRCUIT OPERATION

- Refer to, DTC P0201 – P0204 Injector Circuit
[P.13B-291](#).

TECHNICAL DESCRIPTION

- If a malfunction occurs in the fuel system, the fuel trim value becomes too large.
- The ECM <M/T> or PCM <A/T> checks whether the fuel trim value is within a specified range.

DESCRIPTIONS OF MONITOR METHODS

Air/fuel learning value (long time fuel trim) and air/fuel feedback integral value (short time fuel trim) are too lean.

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)

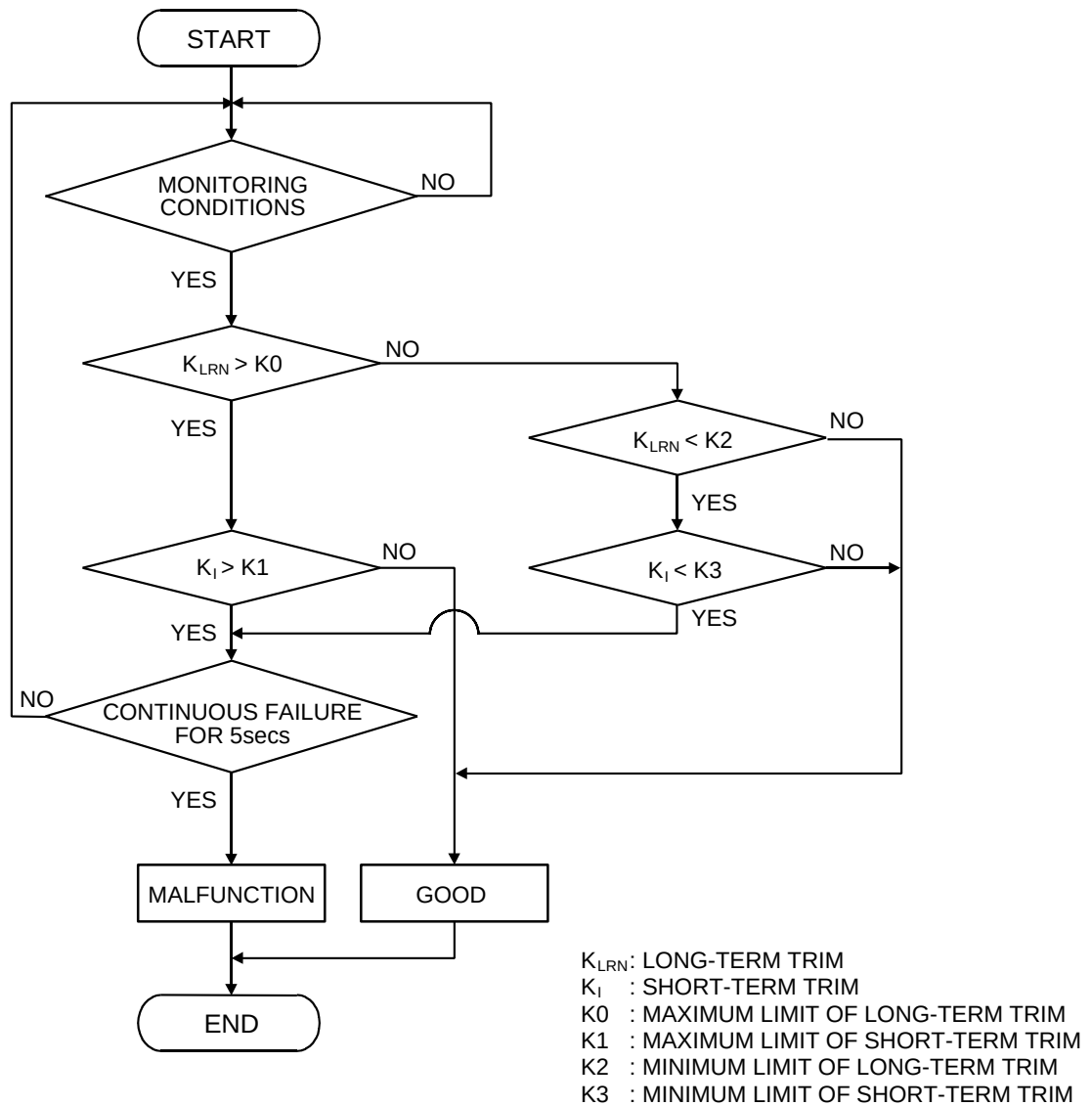
- Misfire monitor

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



AK302028

Check Conditions

- Engine coolant temperature is lower than 100°C (212°F) when the engine is started.
- Intake air temperature is lower than 60°C (140°F) when the engine is started.
- Under the closed loop air/fuel ratio control.
- Engine coolant temperature is higher than 77°C (171°F).
- Mass airflow sensor output is 13 g/sec or more.

Judgment Criteria

- Long-term fuel trim has continued to be higher than +12.5 percent for 5 seconds.

or

- Short-term fuel trim has continued to be higher than +10.0 percent for 5 seconds.

Check Conditions

- Engine coolant temperature is lower than 100°C (212°F) when the engine is started.
- Intake air temperature is lower than 60°C (140°F) when the engine is started.
- Under the closed loop air/fuel ratio control.
- Engine coolant temperature is higher than 77°C (171°F).
- Mass airflow sensor output is 13 g/sec or less.

Judgment Criteria

- Long-term fuel trim has continued to be higher than +12.5 percent for 5 seconds.

or

- Short-term fuel trim has continued to be higher than +15 percent for 5 seconds.

Check Conditions

- Engine coolant temperature is higher than 100°C (212°F) when the engine is started.
- Intake air temperature is higher than 60°C (140°F) when the engine is started.
- Under the closed loop air/fuel ratio control.
- Engine coolant temperature is higher than 77°C (171°F).
- Mass airflow sensor output is 13 g/sec or more.

Judgment Criteria

- Long-term fuel trim has continued to be higher than +12.5 percent for 5 seconds.

or

- Short-term fuel trim has continued to be higher than +20.0 percent for 5 seconds.

Check Conditions

- Engine coolant temperature is higher than 100°C (212°F) when the engine is started.
- Intake air temperature is higher than 60°C (140°F) when the engine is started.
- Under the closed loop air/fuel ratio control.
- Engine coolant temperature is higher than 77°C (171°F).
- Mass airflow sensor output is 13 g/sec or less.

Judgment Criteria

- Long-term fuel trim has continued to be higher than +12.5 percent for 5 seconds.

or

- Short-term fuel trim has continued to be higher than +25.0 percent for 5 seconds.

Check Conditions

- Engine coolant temperature is higher than 77°C (171°F).
- Under the closed loop air/fuel ratio control.

Judgment Criteria

- Long-term fuel trim has continued to be higher than +12.5 percent for 5 seconds.

or

- Short-term fuel trim has continued to be higher than +25.0 percent for 5 seconds.

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function – OBD-II Drive Cycle – Procedure 2 – Fuel Trim Monitor [P.13B-6](#).

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

- Mass airflow sensor failed.
- Injector failed.
- Incorrect fuel pressure.
- Air drawn in from gaps in gasket, seals, etc.
- Engine coolant temperature sensor failed.
- Intake air temperature sensor failed.
- Manifold absolute pressure sensor failed.
- Barometric pressure sensor failed.
- Exhaust leak.
- Use of incorrect or contaminated fuel.
- Harness damage in injector circuit or connector damage.
- ECM failed. <M/T>
- PCM failed. <A/T>

DIAGNOSIS**Required Special Tools:**

- MB991958: Scan Tool (MUT-III Sub Assembly)
 - MB991824: V.C.I.
 - MB991827: USB Cable
 - MB991911: Main Harness B

STEP 1. Check for exhaust leak.**Q: Are there any abnormalities?**

YES : Repair it. Then go to Step 15.

NO : Go to Step 2.

STEP 2. Check for intake system vacuum leak.**Q: Are there any abnormalities?**

YES : Repair it. Then go to Step 15.

NO : Go to Step 3.

STEP 3. Using scan tool MB991958, check data list item 12: Mass Airflow Sensor.**⚠ CAUTION**

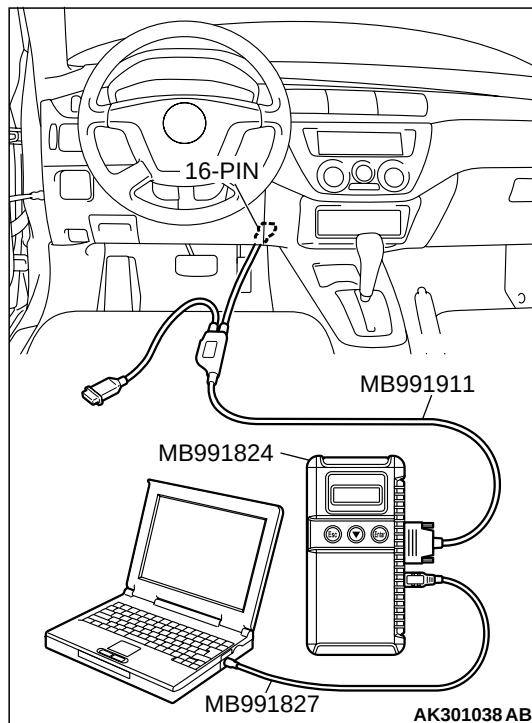
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

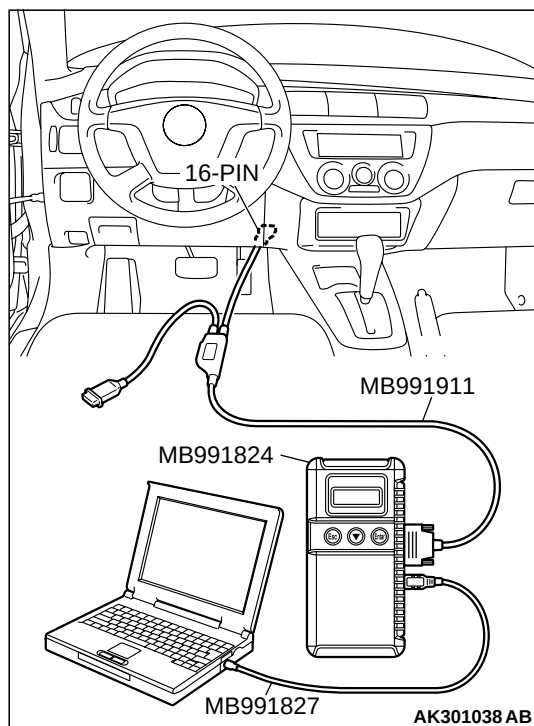
- (1) Connect scan tool MB991958 to the data link connector.
- (2) Start the engine and run at idle.
- (3) Set scan tool MB991958 to the data reading mode for item 12, Mass Airflow Sensor.
- (4) Warm up the engine to normal operating temperature: 85°C to 95°C (185°F to 203°F).
 - When idling, between 2.0 and 6.0 g/sec.
 - When 2,500 r/min, between 8.0 and 16.0 g/sec.
- (5) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the sensor operating properly?

YES : Go to Step 4.

NO : Refer to, DTC P0101 – Mass Airflow Circuit Range/Performance Problem [P.13B-38](#), DTC P0102 – Mass Airflow Circuit Low Input [P.13B-46](#), DTC P0103 – Mass Airflow Circuit High Input [P.13B-54](#).





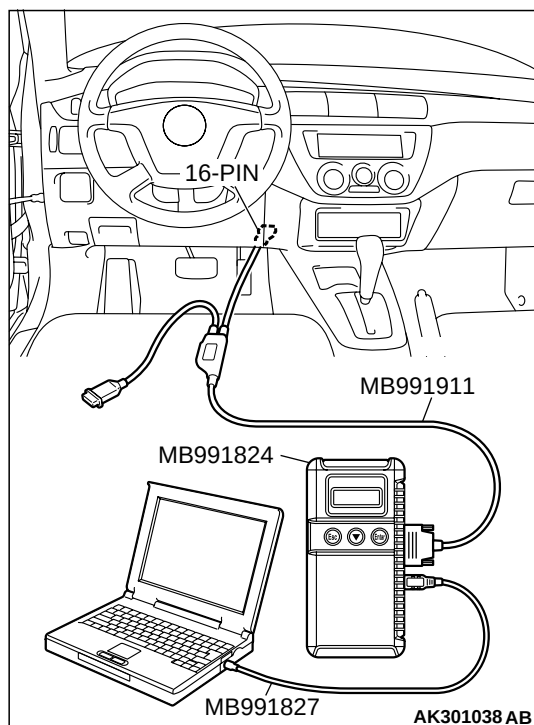
STEP 4. Using scan tool MB991958, check data list item 13: Intake Air Temperature Sensor.

- (1) Turn the ignition switch to the "ON" position.
- (2) Set scan tool MB991958 to the data reading mode for item 13, Intake Air Temperature Sensor.
 - The intake air temperature and temperature shown with the scan tool should approximately match.
- (3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the sensor operating properly?

YES : Go to Step 5.

NO : Refer to, DTC P0111 – Intake Air Temperature Circuit Range/Performance Problem [P.13B-96](#), DTC P0112 – Intake Air Temperature Circuit Low Input [P.13B-103](#), DTC P0113 – Intake Air Temperature Circuit High Input [P.13B-108](#).



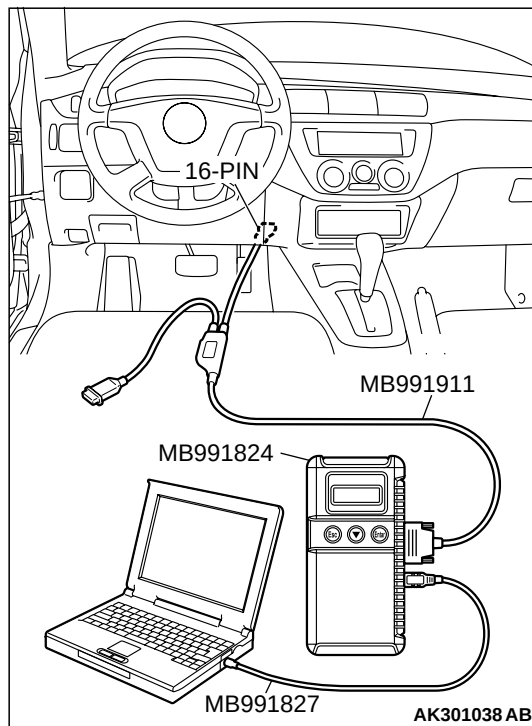
STEP 5. Using scan tool MB991958, check data list item 21: Engine Coolant Temperature Sensor.

- (1) Turn the ignition switch to the "ON" position.
- (2) Set scan tool MB991958 to the data reading mode for item 21, Engine Coolant Temperature Sensor.
 - The engine coolant temperature and temperature shown with the scan tool should approximately match.
- (3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the sensor operating properly?

YES : Go to Step 6.

NO : Refer to, DTC P0116 – Engine Coolant Temperature Circuit Range/Performance Problem [P.13B-115](#), DTC P0117 – Engine Coolant Temperature Circuit Low Input [P.13B-123](#), DTC P0118 – Engine Coolant Temperature Circuit High Input [P.13B-128](#).



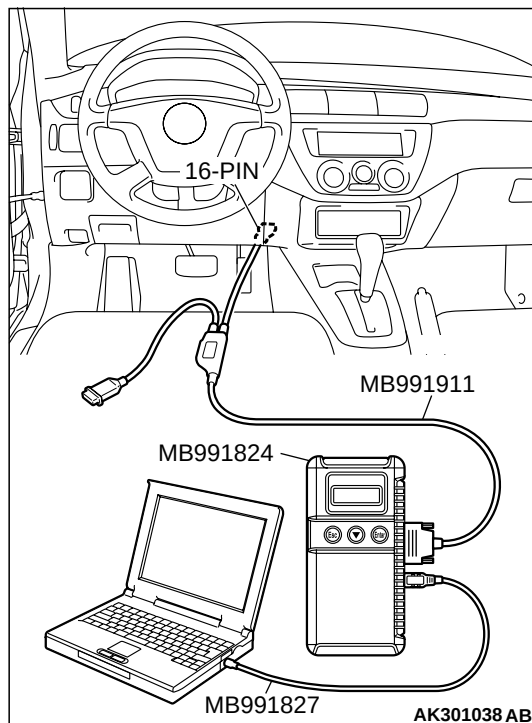
STEP 6. Using scan tool MB991958, check data list item 25: Barometric Pressure Sensor.

- (1) Turn the ignition switch to the "ON" position.
- (2) Set scan tool MB991958 to the data reading mode for item 25, Barometric Pressure Sensor.
 - When altitude is 0 m (0 foot), 101 kPa (29.8 in.Hg).
 - When altitude is 600 m (1,969 feet), 95 kPa (28.1 in.Hg).
 - When altitude is 1,200 m (3,937 feet), 88 kPa (26.0 in.Hg).
 - When altitude is 1,800 m (5,906 feet), 81 kPa (23.9 in.Hg).
- (3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the sensor operating properly?

YES : Go to Step 7.

NO : Refer to, DTC P2227 – Barometric Pressure Circuit Range/Performance Problem [P.13B-721](#), DTC P2228 – Barometric Pressure Circuit Low Input [P.13B-723](#), DTC P2229 – Barometric Pressure Circuit High Input [P.13B-725](#).



STEP 7. Using scan tool MB991958, check data list item 95: Manifold Absolute Pressure Sensor.

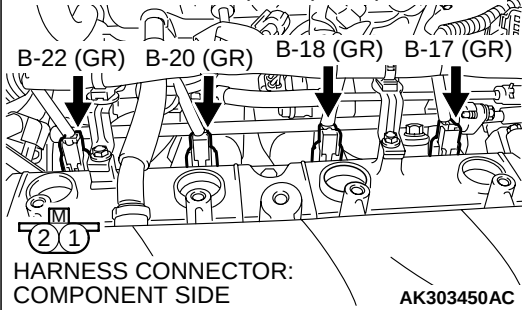
- (1) Turn the ignition switch to the "ON" position.
- (2) Set scan tool MB991958 to the data reading mode for item 95, Manifold Absolute Pressure Sensor.
 - When altitude is 0 m (0 foot), 101 kPa (29.8 in.Hg).
 - When altitude is 600 m (1,969 feet), 95 kPa (28.1 in.Hg).
 - When altitude is 1,200 m (3,937 feet), 88 kPa (26.0 in.Hg).
 - When altitude is 1,800 m (5,906 feet), 81 kPa (23.9 in.Hg).
- (3) Start the engine.
 - When the engine is idling, 16 – 36 kPa (4.7 – 10.6 in.Hg).
 - When the engine is suddenly revved, manifold absolute pressure increases.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the sensor operating properly?

YES : Go to Step 8.

NO : Refer to, DTC P0106 – Manifold Absolute Pressure Circuit Range/Performance Problem [P.13B-61](#), DTC P0107 – Manifold Absolute Pressure Circuit Low Input [P.13B-71](#), DTC P0108 – Manifold Absolute Pressure Circuit High Input [P.13B-85](#).

CONNECTORS: B-17, B-18, B-20, B-22



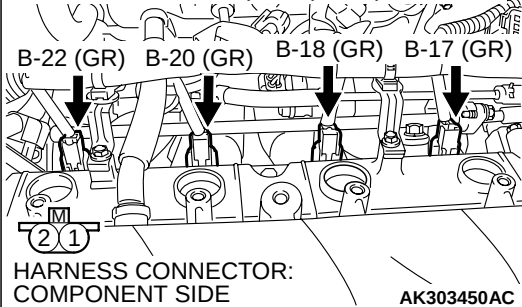
STEP 8. Check harness connector B-17, B-18, B-20, B-22 at injector for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 9.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then go to Step 15.

CONNECTORS: B-17, B-18, B-20, B-22



STEP 9. Check the injector.

(1) Disconnect each injector connector.

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

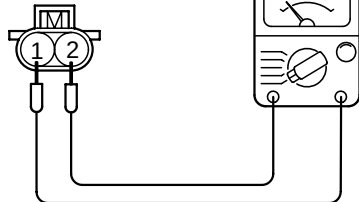
Standard value: 10.5 – 13.5 ohms [at 20°C (68°F)]

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

YES : Go to Step 10.

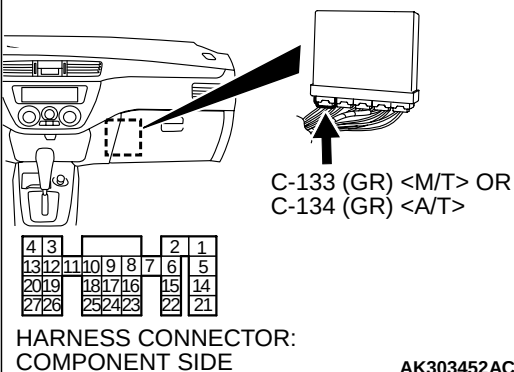
NO : Replace the injector. Then go to Step 15.

INJECTOR SIDE
CONNECTOR



AK000559 AB

CONNECTOR: C-133 <M/T> OR C-134 <A/T>

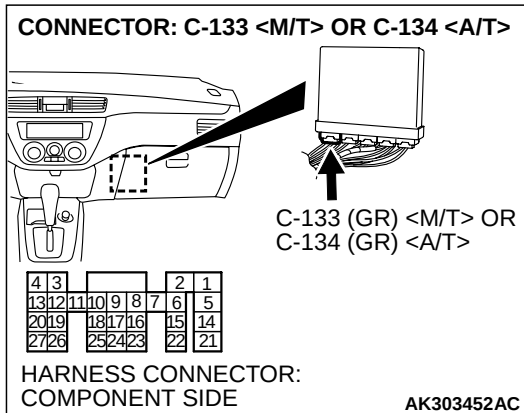
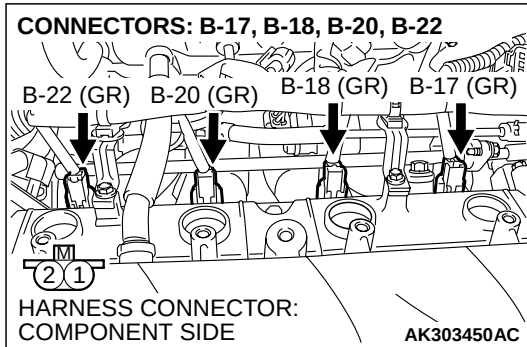


STEP 10. Check harness connector C-133 at ECM <M/T> or C-134 at PCM <A/T> for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 11.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then go to Step 15.



STEP 11. Check for harness damage between injector connector and ECM <M/T> or PCM <A/T> connector.

- Check the harness wire between injector connector B-22 (terminal No. 2) and ECM connector C-133 <M/T> or PCM connector C-134 <A/T> (terminal No. 1) at No. 1 cylinder.
- Check the harness wire between injector connector B-20 (terminal No. 2) and ECM connector C-133 <M/T> or PCM connector C-134 <A/T> (terminal No. 5) at No. 2 cylinder.
- Check the harness wire between injector connector B-18 (terminal No. 2) and ECM connector C-133 <M/T> or PCM connector C-134 <A/T> (terminal No. 14) at No. 3 cylinder.
- Check the harness wire between injector connector B-17 (terminal No. 2) and ECM connector C-133 <M/T> or PCM connector C-134 <A/T> (terminal No. 21) at No. 4 cylinder.

Q: Is the harness wire in good condition?

YES : Go to Step 12.

NO : Repair it. Then go to Step 15.

STEP 12. Check the fuel pressure.

Refer to On-vehicle Service – Fuel Pressure Test [P.13B-903](#).

Q: Is the fuel pressure normal?

YES : Go to Step 13.

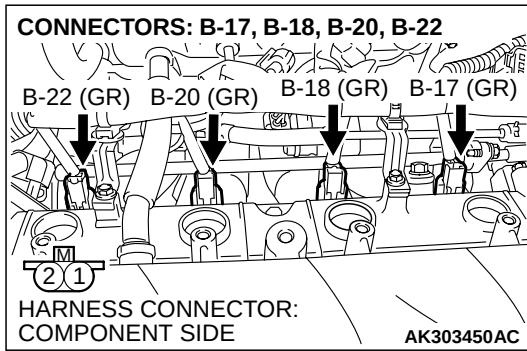
NO : Repair or replace it. Then go to Step 15.

STEP 13. Check for entry of foreign matter (water, kerosene, etc.) into fuel.

Q: Are there any abnormalities?

YES : Replace the fuel. Then go to Step 15.

NO : Go to Step 14.



STEP 14. Replace the injector.

- (1) Replace the injector.
- (2) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function – OBD-II Drive Cycle – Procedure 2 – Fuel Trim Monitor [P.13B-6](#).
- (3) Check the diagnostic trouble code (DTC).

Q: Is DTC P0171 set?

YES : Replace the ECM or PCM. Then go to Step 15.

NO : The inspection is complete.

STEP 15. 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 – Procedure 2 – Fuel Trim Monitor [P.13B-6](#).
- (2) Check the diagnostic trouble code (DTC).

Q: Is DTC P0171 set?

YES : Retry the troubleshooting.

NO : The inspection is complete.

DTC P0172: System too Rich

Fuel Trim Circuit

- Refer to, DTC P0201 – P0204 Injector Circuit [P.13B-291](#).

CIRCUIT OPERATION

- Refer to, DTC P0201 – P0204 Injector Circuit [P.13B-291](#).

TECHNICAL DESCRIPTION

- If a malfunction occurs in the fuel system, the fuel trim value becomes too small.
- The ECM <M/T> or PCM <A/T> checks whether the fuel trim value is within a specified range.

DESCRIPTIONS OF MONITOR METHODS

Air/fuel learning value (long time fuel trim) and air/fuel feedback integral value (short time fuel trim) are too rich.

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)

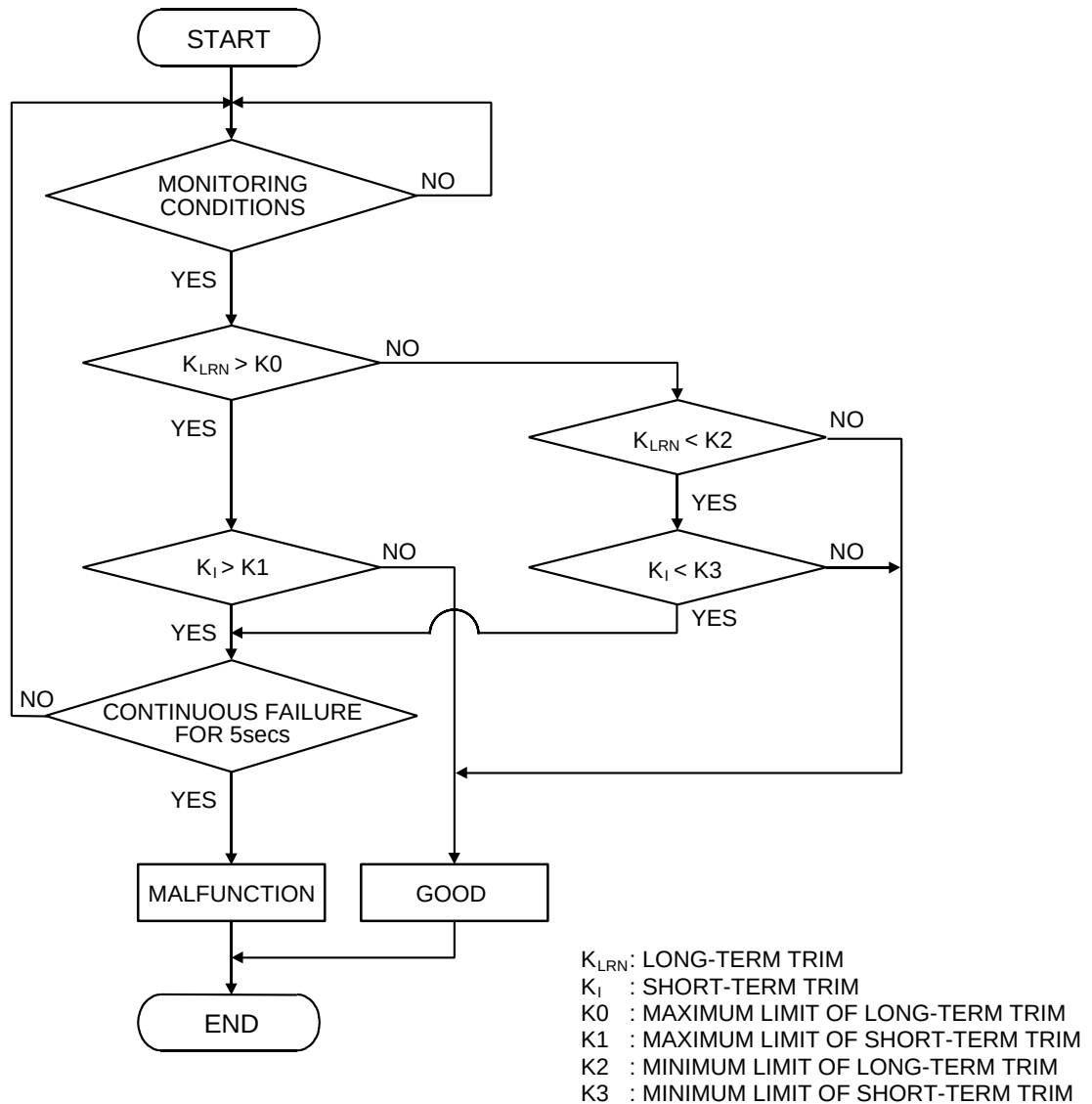
- Misfire monitor

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



AK302028

Check Conditions

- Under the closed loop air/fuel ratio control.
- Engine coolant temperature is higher than 77°C (171°F).
- Mass airflow sensor output is 13 g/sec or more.

Judgment Criteria

- Long-term fuel trim has continued to be lower than -12.5 percent for 5 seconds.
- or
- Short-term fuel trim has continued to be lower than -10.0 percent for 5 seconds.

Check Conditions

- Under the closed loop air/fuel ratio control.
- Engine coolant temperature is higher than 77°C (171°F).
- Mass airflow sensor output is 13 g/sec or less.

Judgment Criteria

- Long-term fuel trim has continued to be lower than -12.5 percent for 5 seconds.
- or
- Short-term fuel trim has continued to be lower than -15.0 percent for 5 seconds.

Check Conditions

- Engine coolant temperature is higher than 77°C (171°F).
- Under the closed loop air/fuel ratio control.

Judgment Criteria

- Long-term fuel trim has continued to be -12.5 percent for 5 seconds.

or

- Short-term fuel trim has continued to be -25.0 percent for 5 seconds.

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function – OBD-II Drive Cycle –
Procedure 2 – Fuel Trim Monitor [P.13B-6](#).

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

- Mass airflow sensor failed.
- Injector failed.
- Incorrect fuel pressure.
- Engine coolant temperature sensor failed.
- Intake air temperature sensor failed.
- Barometric pressure sensor failed.
- Manifold absolute pressure sensor failed.
- ECM failed. <M/T>
- PCM failed. <A/T>

DIAGNOSIS**Required Special Tools:**

- MB991958: Scan Tool (MUT-III Sub Assembly)
 - MB991824: V.C.I.
 - MB991827: USB Cable
 - MB991911: Main Harness B

STEP 1. Using scan tool MB991958, check data list item 12: Mass Airflow Sensor.**⚠ CAUTION**

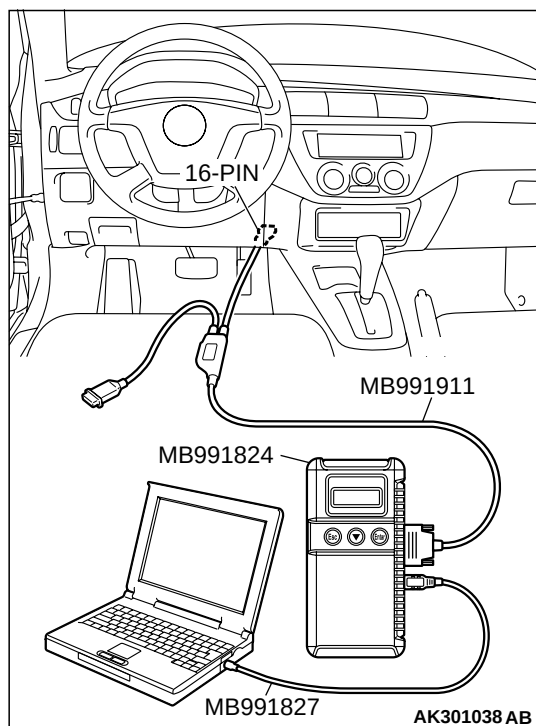
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

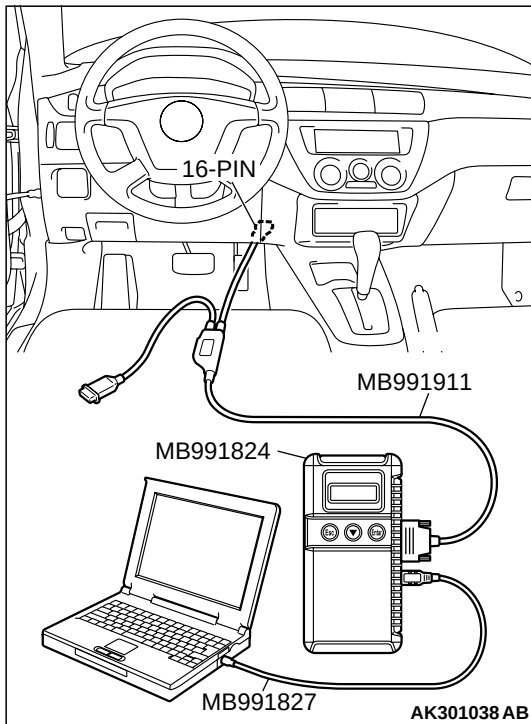
- (1) Connect scan tool MB991958 to the data link connector.
- (2) Start the engine and run at idle.
- (3) Set scan tool MB991958 to the data reading mode for item 12, Mass Airflow Sensor.
- (4) Warm up the engine to normal operating temperature: 85°C to 95°C (185°F to 203°F).
 - When idling, between 2.0 and 6.0 g/sec.
 - When 2,500 r/min, between 8.0 and 16.0 g/sec.
- (5) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the sensor operating properly?

YES : Go to Step 2.

NO : Refer to, DTC P0101 – Mass Airflow Circuit Range/Performance Problem [P.13B-38](#), DTC P0102 – Mass Airflow Circuit Low Input [P.13B-46](#), DTC P0103 – Mass Airflow Circuit High Input [P.13B-54](#).





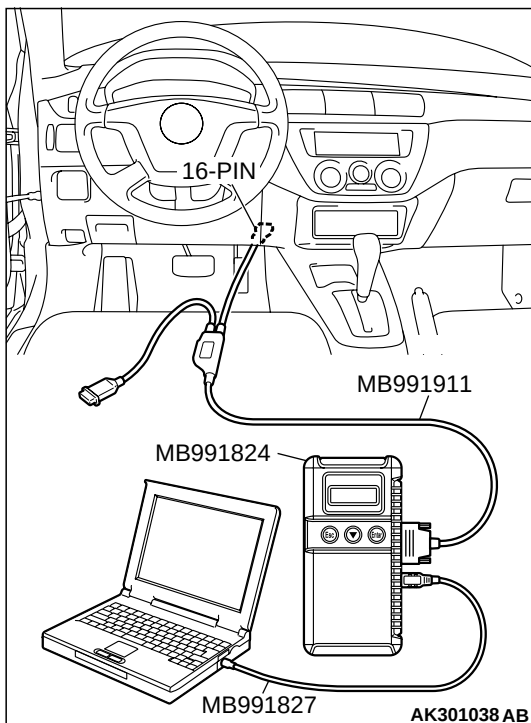
STEP 2. Using scan tool MB991958, check data list item 13: Intake Air Temperature Sensor.

- (1) Turn the ignition switch to the "ON" position.
- (2) Set scan tool MB991958 to the data reading mode for item 13, Intake Air Temperature Sensor.
 - The intake air temperature and temperature shown with the scan tool should approximately match.
- (3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the sensor operating properly?

YES : Go to Step 3.

NO : Refer to, DTC P0111 – Intake Air Temperature Circuit Range/Performance Problem [P.13B-96](#), DTC P0112 – Intake Air Temperature Circuit Low Input [P.13B-103](#), DTC P0113 – Intake Air Temperature Circuit High Input [P.13B-108](#).



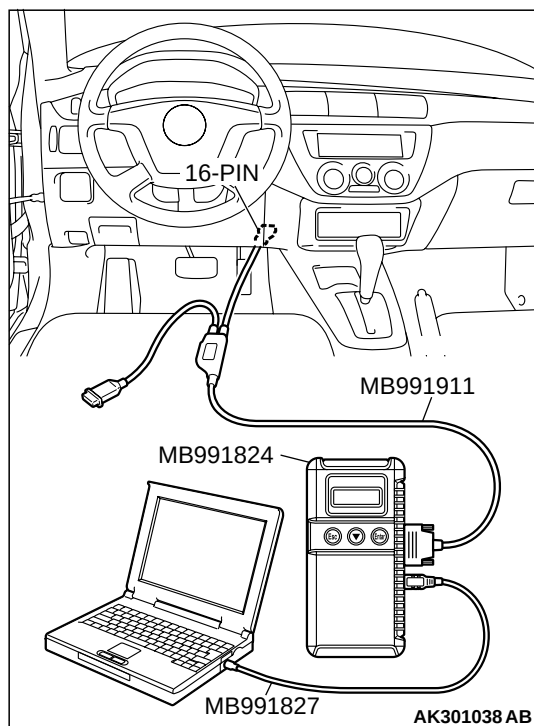
STEP 3. Using scan tool MB991958, check data list item 21: Engine Coolant Temperature Sensor.

- (1) Turn the ignition switch to the "ON" position.
- (2) Set scan tool MB991958 to the data reading mode for item 21, Engine Coolant Temperature Sensor.
 - The engine coolant temperature and temperature shown with the scan tool should approximately match.
- (3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the sensor operating properly?

YES : Go to Step 4.

NO : Refer to, DTC P0116 – Engine Coolant Temperature Circuit Range/Performance Problem [P.13B-115](#), DTC P0117 – Engine Coolant Temperature Circuit Low Input [P.13B-123](#), DTC P0118 – Engine Coolant Temperature Circuit High Input [P.13B-128](#).

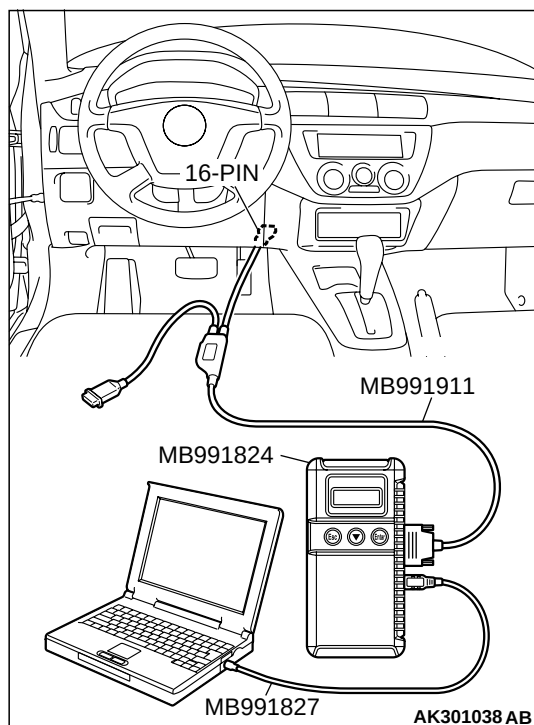

STEP 4. Using scan tool MB991958, check data list item 25: Barometric Pressure Sensor.

- (1) Turn the ignition switch to the "ON" position.
- (2) Set scan tool MB991958 to the data reading mode for item 25, Barometric Pressure Sensor.
 - When altitude is 0 m (0 foot), 101 kPa (29.8 in.Hg).
 - When altitude is 600 m (1,969 feet), 95 kPa (28.1 in.Hg).
 - When altitude is 1,200 m (3,937 feet), 88 kPa (26.0 in.Hg).
 - When altitude is 1,800 m (5,906 feet), 81 kPa (23.9 in.Hg).
- (3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the sensor operating properly?

YES : Go to Step 5.

NO : Refer to, DTC P2227 – Barometric Pressure Circuit Range/Performance Problem [P.13B-721](#), DTC P2228 – Barometric Pressure Circuit Low Input [P.13B-723](#), DTC P2229 – Barometric Pressure Circuit High Input [P.13B-725](#).


STEP 5. Using scan tool MB991958, check data list item 95: Manifold Absolute Pressure Sensor.

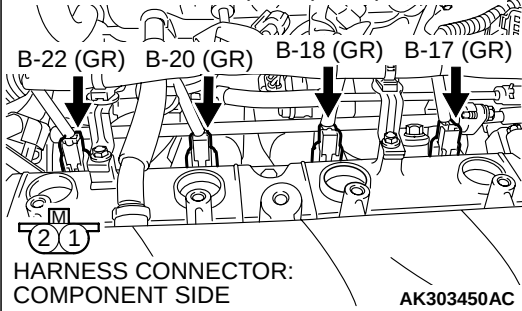
- (1) Turn the ignition switch to the "ON" position.
- (2) Set scan tool MB991958 to the data reading mode for item 95, Manifold Absolute Pressure Sensor.
 - When altitude is 0 m (0 foot), 101 kPa (29.8 in.Hg).
 - When altitude is 600 m (1,969 feet), 95 kPa (28.1 in.Hg).
 - When altitude is 1,200 m (3,937 feet), 88 kPa (26.0 in.Hg).
 - When altitude is 1,800 m (5,906 feet), 81 kPa (23.9 in.Hg).
- (3) Start the engine.
 - When the engine is idling, 16 – 36 kPa (4.7 – 10.6 in.Hg).
 - When the engine is suddenly revved, manifold absolute pressure increases.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the sensor operating properly?

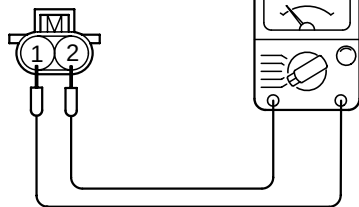
YES : Go to Step 6.

NO : Refer to, DTC P0106 – Manifold Absolute Pressure Circuit Range/Performance Problem [P.13B-61](#), DTC P0107 – Manifold Absolute Pressure Circuit Low Input [P.13B-71](#), DTC P0108 – Manifold Absolute Pressure Circuit High Input [P.13B-85](#).

CONNECTORS: B-17, B-18, B-20, B-22



INJECTOR SIDE
CONNECTOR



STEP 6. Check the injector.

(1) Disconnect each injector connector.

(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 7.

NO : Replace the injector. Then go to Step 9.

STEP 7. Check the fuel pressure.

Refer to On-vehicle Service – Fuel Pressure Test [P.13B-903](#).

Q: Is the fuel pressure normal?

YES : Go to Step 8.

NO : Repair it. Then go to Step 9.

STEP 8. Replace the injector.

(1) Replace the injector.

(2) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function – OBD-II Drive Cycle – Procedure 2 – Fuel Trim Monitor [P.13B-6](#).

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

Q: Is DTC P0172 set?

YES : Replace the ECM or PCM. Then go to Step 9.

NO : The inspection is complete.

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 – Procedure 2 – Fuel Trim Monitor [P.13B-6](#).

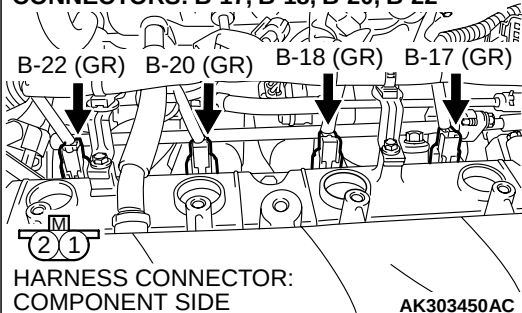
(2) Check the diagnostic trouble code (DTC).

Q: Is DTC P0172 set?

YES : Retry the troubleshooting.

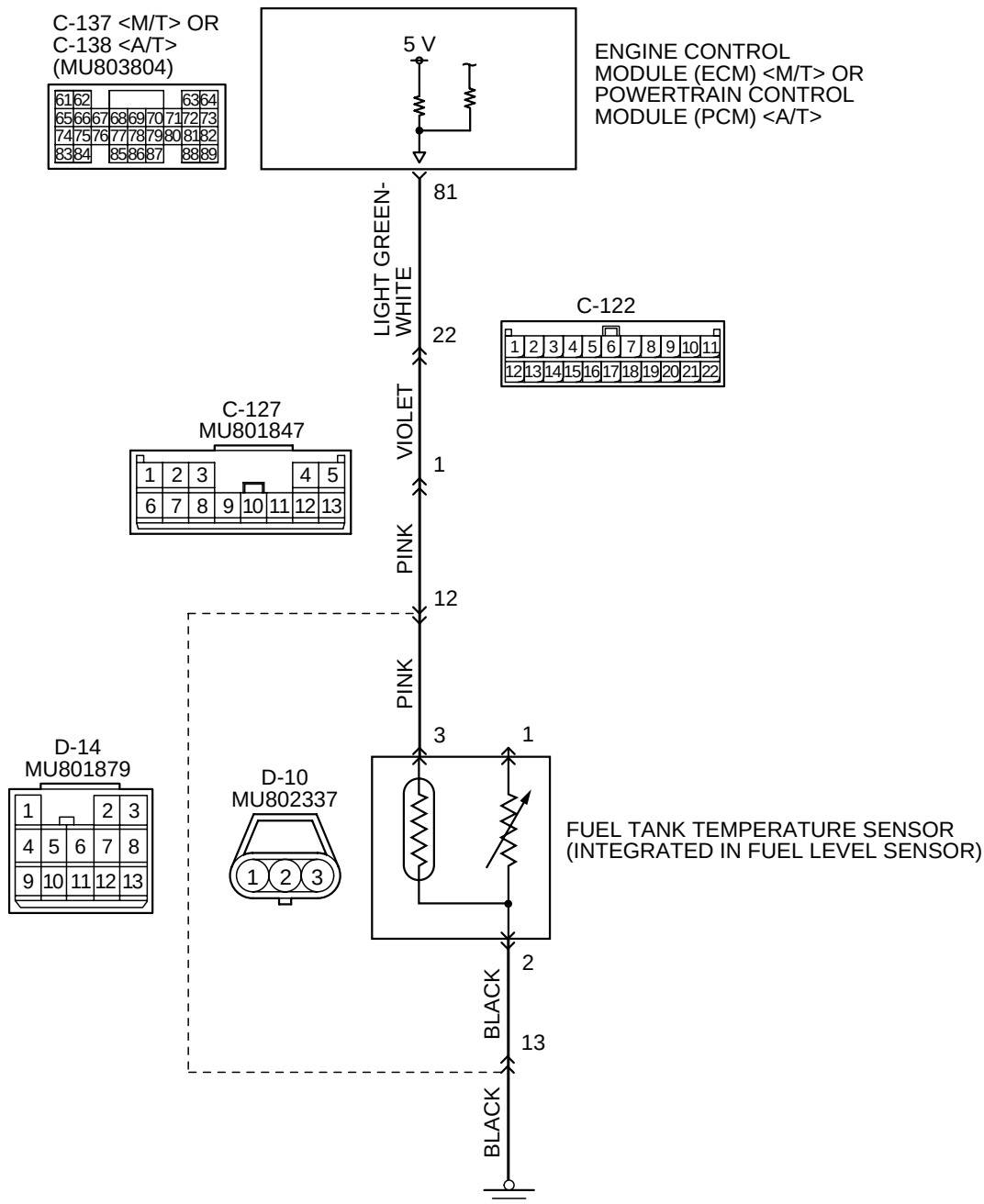
NO : The inspection is complete.

CONNECTORS: B-17, B-18, B-20, B-22

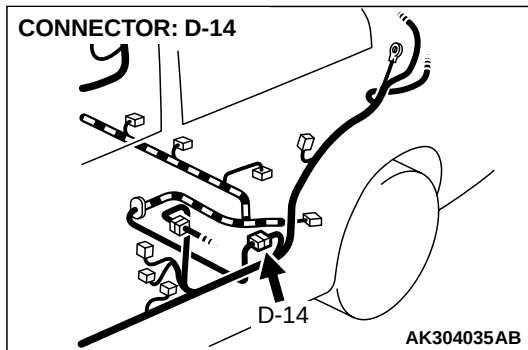
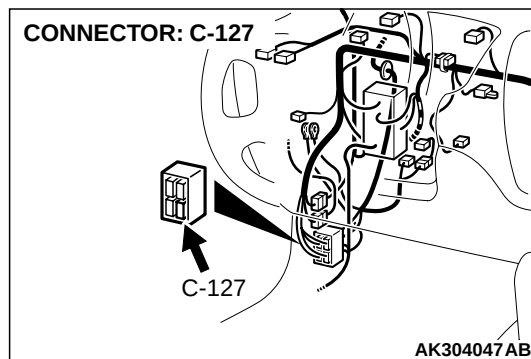
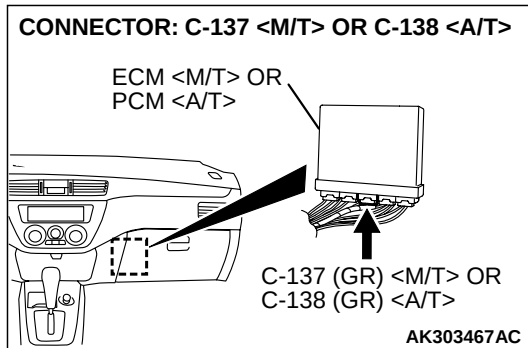
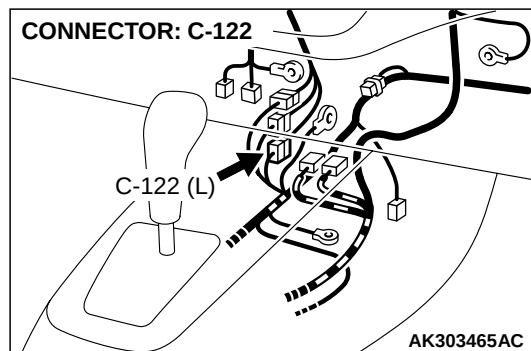
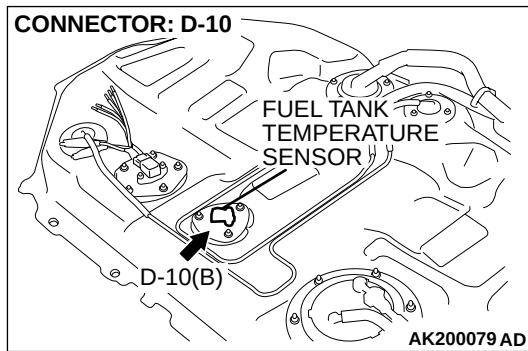


DTC P0181: Fuel Tank Temperature Sensor Circuit Range/Performance

Fuel Tank Temperature Sensor Circuit



AK303987



CIRCUIT OPERATION

- 5-volt voltage is applied to the fuel tank temperature sensor output terminal (terminal No. 3) from the ECM <M/T> or PCM <A/T> (terminal No. 81) via the resistor in the ECM <M/T> or PCM <A/T>.
- The fuel tank temperature sensor output voltage increases when the resistance increases and decreases when the resistance decreases. The ground terminal (terminal No. 2) is grounded to the vehicle body.

TECHNICAL DESCRIPTION

- The fuel tank temperature sensor converts the fuel tank temperature to a voltage.
- The ECM <M/T> or PCM <A/T> 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)

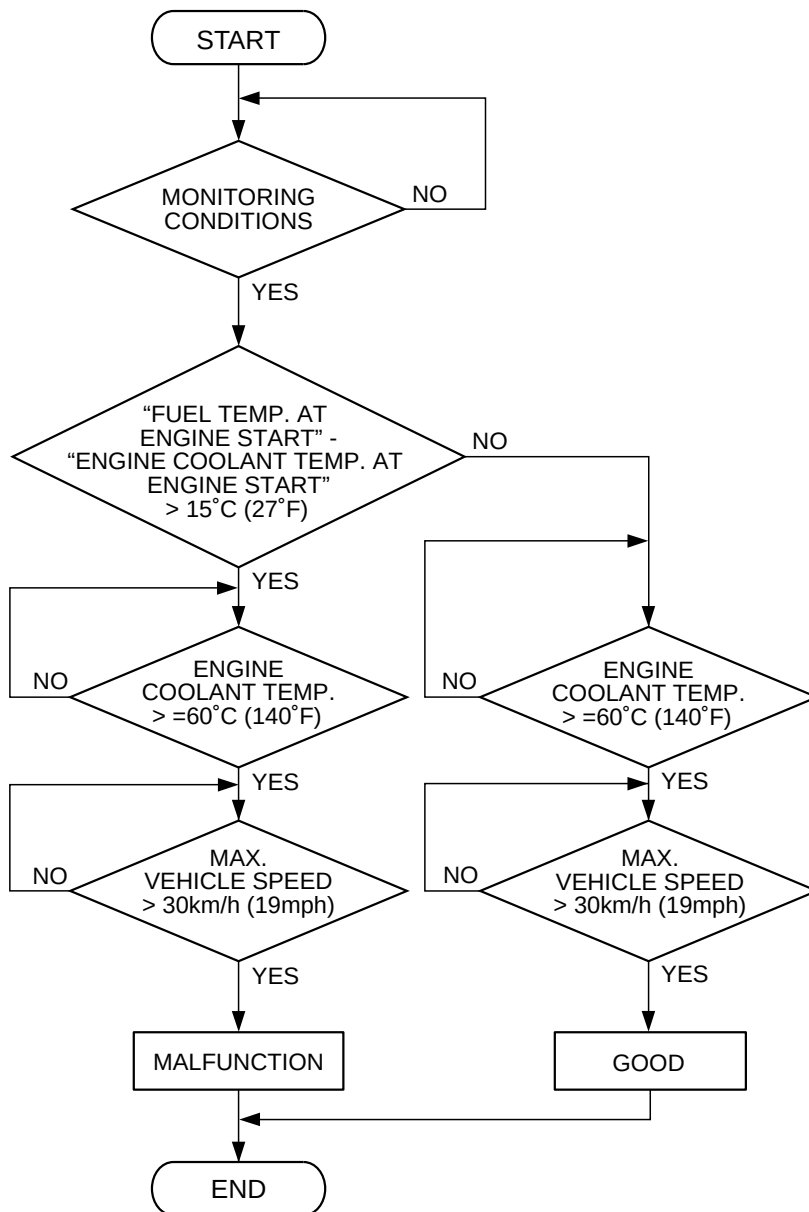
- Not applicable

Sensor (The sensor below is determined to be normal)

- Engine coolant temperature sensor
- Intake air temperature sensor

DTC SET CONDITIONS

Logic Flow Chart



AK302029

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 sensor is higher than 60°C (140°F).
- Maximum vehicle speed is higher than 30 km/h (19 mph) after the starting sequence has been completed.

Judgement Criteria

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

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function – OBD-II Drive Cycle – Procedure 6 – Other Monitor [P.13B-6](#).

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

- Fuel tank temperature sensor failed.

- Harness damage in fuel tank temperature sensor circuit or connector damage.
- ECM failed. <M/T>
- PCM failed. <A/T>

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 drive cycle pattern in order to verify that a DTC will not be output.

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (MUT-III Sub Assembly)
 - MB991824: V.C.I.
 - MB991827: USB Cable
 - MB991911: Main Harness B

STEP 1. Using scan tool MB991958, check data list item 4A: Fuel Tank Temperature Sensor.

CAUTION

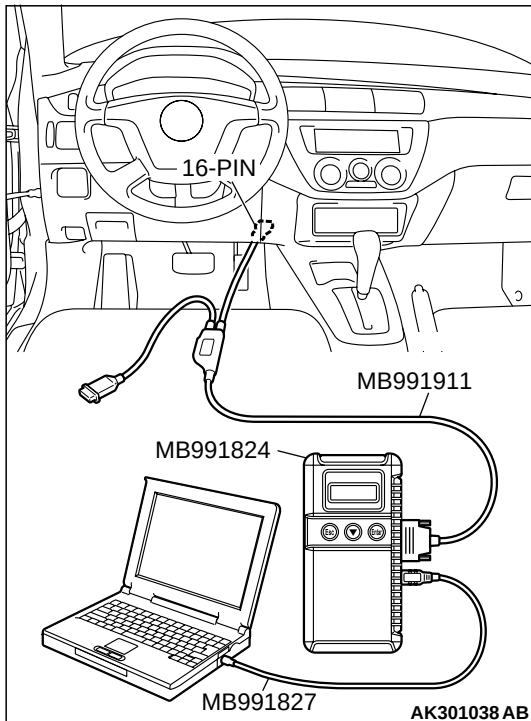
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

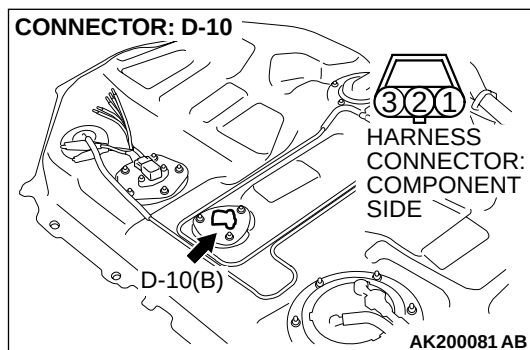
- (1) Connect scan tool MB991958 to the data link connector.
- (2) Turn the ignition switch to the "ON" position.
- (3) Set scan tool MB991958 to the data reading mode for item 4A, Fuel Tank Temperature Sensor.
 - With the engine cool, the fuel tank temperature should be approximately the same as ambient air temperature.
- (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 [P.00-6](#).

NO : Go to Step 2.



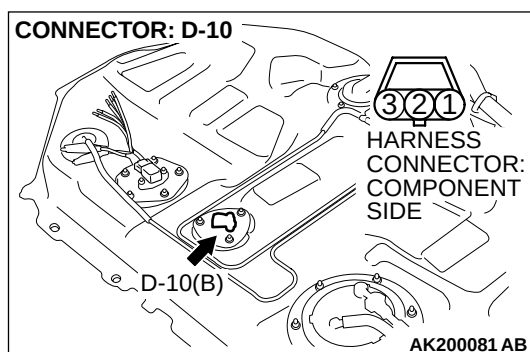


STEP 2. Check harness connector D-10 at the fuel tank temperature sensor for damage.

Q: Is the harness connector in good condition?

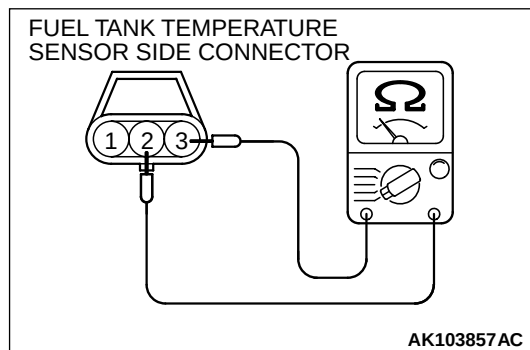
YES : Go to Step 3.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then go to Step 7.



STEP 3. Check the fuel tank temperature sensor.

(1) Disconnect the fuel tank temperature sensor connector D-10.



(2) Measure the resistance between terminal No. 2 and No. 3 of the fuel tank temperature sensor.

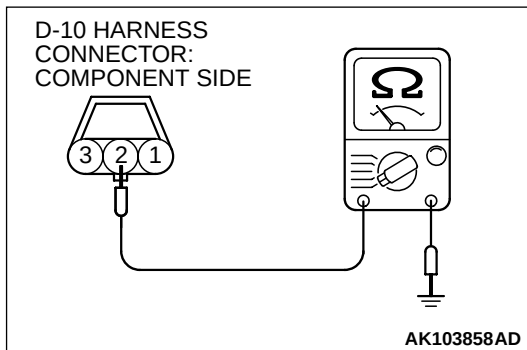
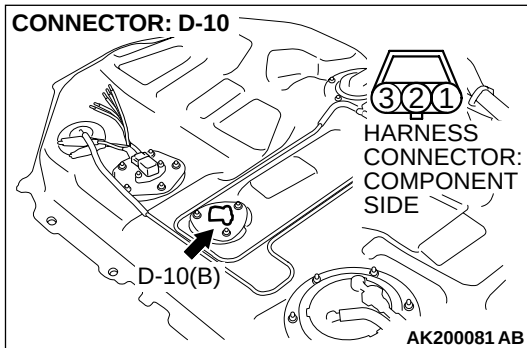
Standard value:

0.5 – 12.0 k Ω

Q: Is the measured resistance between 0.5 and 12.0 k Ω ?

YES : Go to Step 4.

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



STEP 4. Check the continuity at fuel tank temperature sensor harness side connector D-10.

(1) Disconnect the connector D-10 and measure at the harness side.

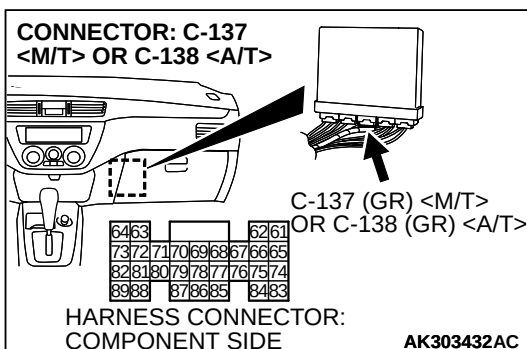
(2) Check for the continuity between terminal No. 2 and ground.

- Should be less than 2 ohms.

Q: Does continuity exist?

YES : Go to Step 5.

NO : Check harness connector D-14 at intermediate connector for damage, and repair or replace as required. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). If intermediate connector is in good condition, repair harness wire between fuel tank temperature sensor connector D-10 (terminal No. 2) and ground because of harness damage. Then go to Step 7.



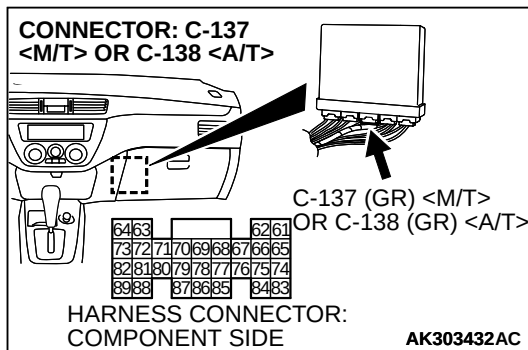
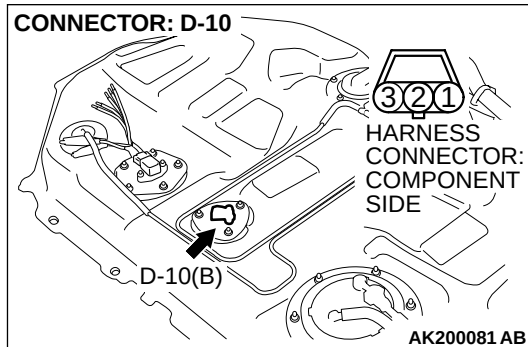
STEP 5. Check harness connector C-137 at ECM <M/T> or C-138 at PCM <A/T> for damage.

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 fuel tank temperature sensor connector D-10 (terminal No. 3) and ECM connector C-137 <M/T> or PCM connector C-138 <A/T> (terminal No. 81).



NOTE: Check harness after checking intermediate connector C-122, C-127 and D-14. If intermediate connector are damaged, repair or replace it. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then go to Step 7.

Q: Is the harness wire in good condition?

YES : Replace the ECM or PCM. 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 – Procedure 6 – Other Monitor [P.13B-6](#).
- (2) Check the diagnostic trouble code (DTC).

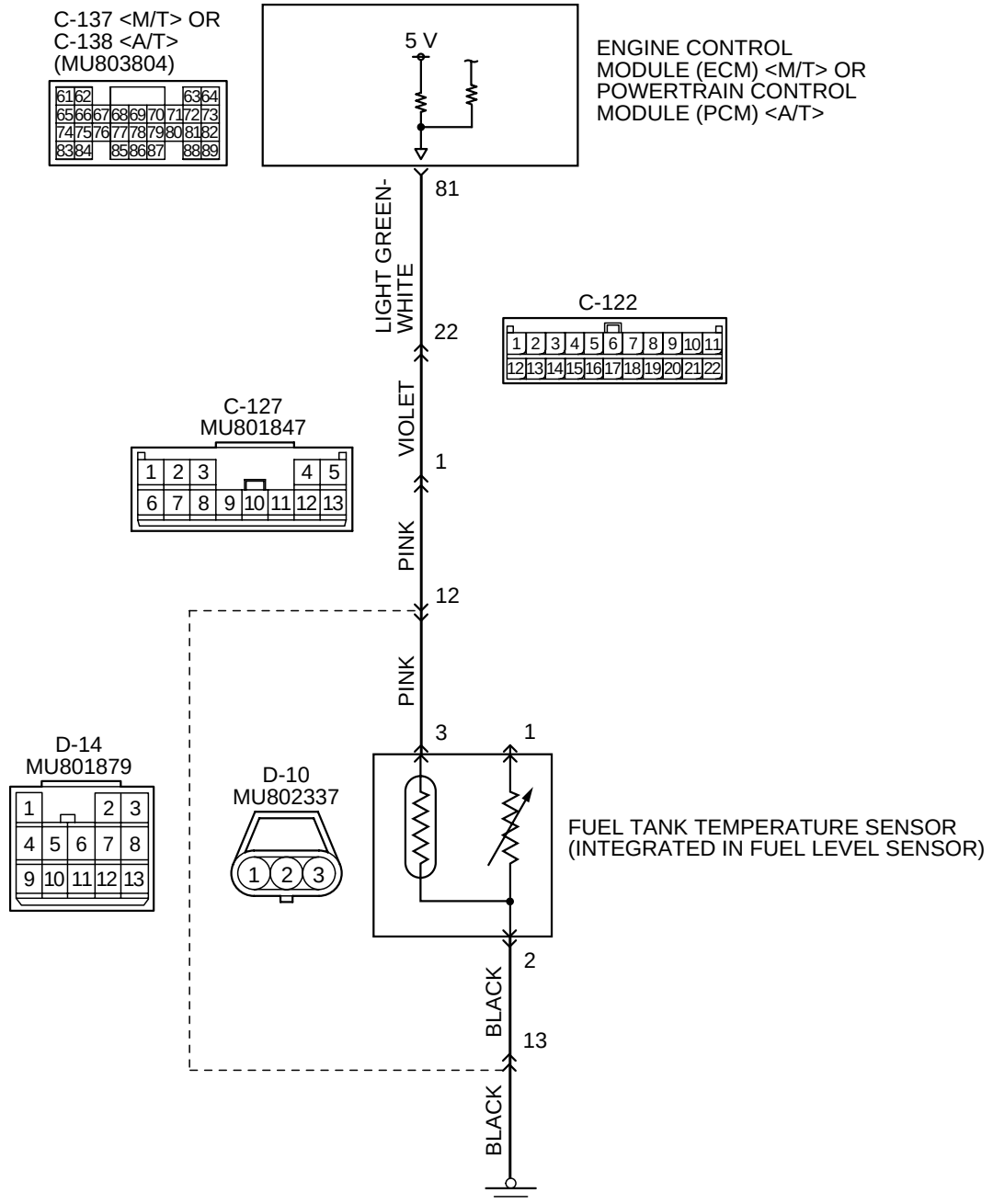
Q: Is DTC P0181 set?

YES : Retry the troubleshooting.

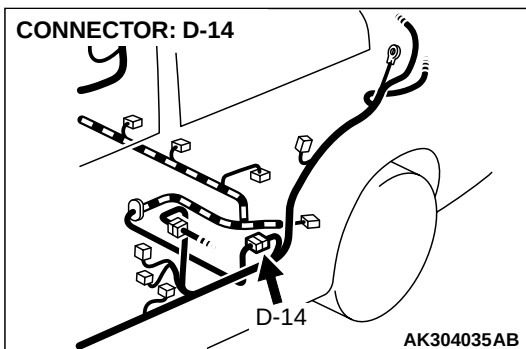
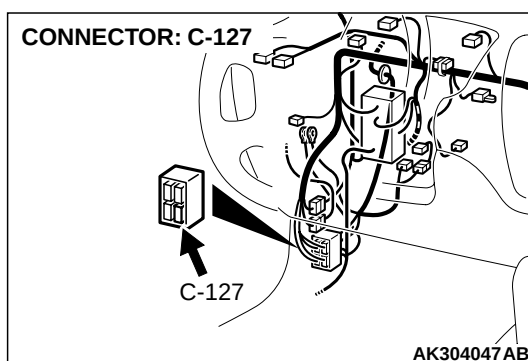
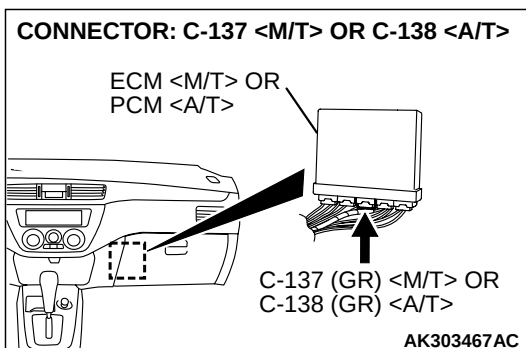
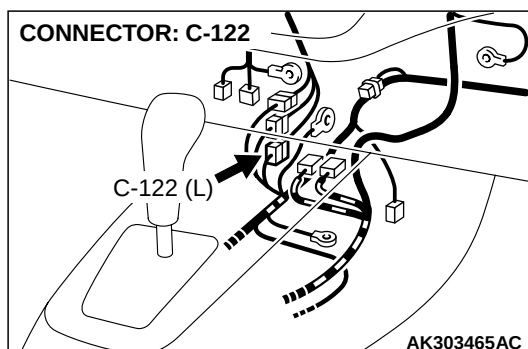
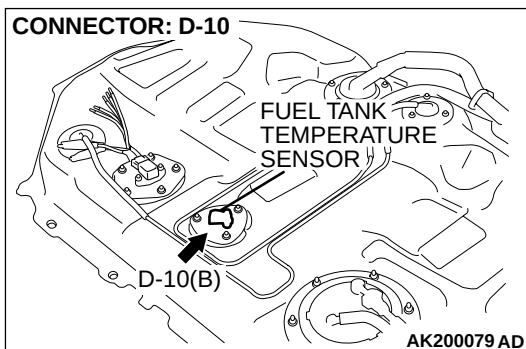
NO : The inspection is complete.

DTC P0182: Fuel Tank Temperature Sensor Circuit Low Input

Fuel Tank Temperature Sensor Circuit



AK303987



CIRCUIT OPERATION

- 5-volt voltage is applied to the fuel tank temperature sensor output terminal (terminal No. 3) from the ECM <M/T> or PCM <A/T> (terminal No. 81) via the resistor in the ECM <M/T> or PCM <A/T>.
- The fuel tank temperature sensor output voltage increases when the resistance increases and decreases when the resistance decreases. The ground terminal (terminal No. 2) is grounded to the vehicle body.

TECHNICAL DESCRIPTION

- The fuel tank temperature sensor converts the fuel tank temperature to a voltage.
- The ECM <M/T> or PCM <A/T> 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)

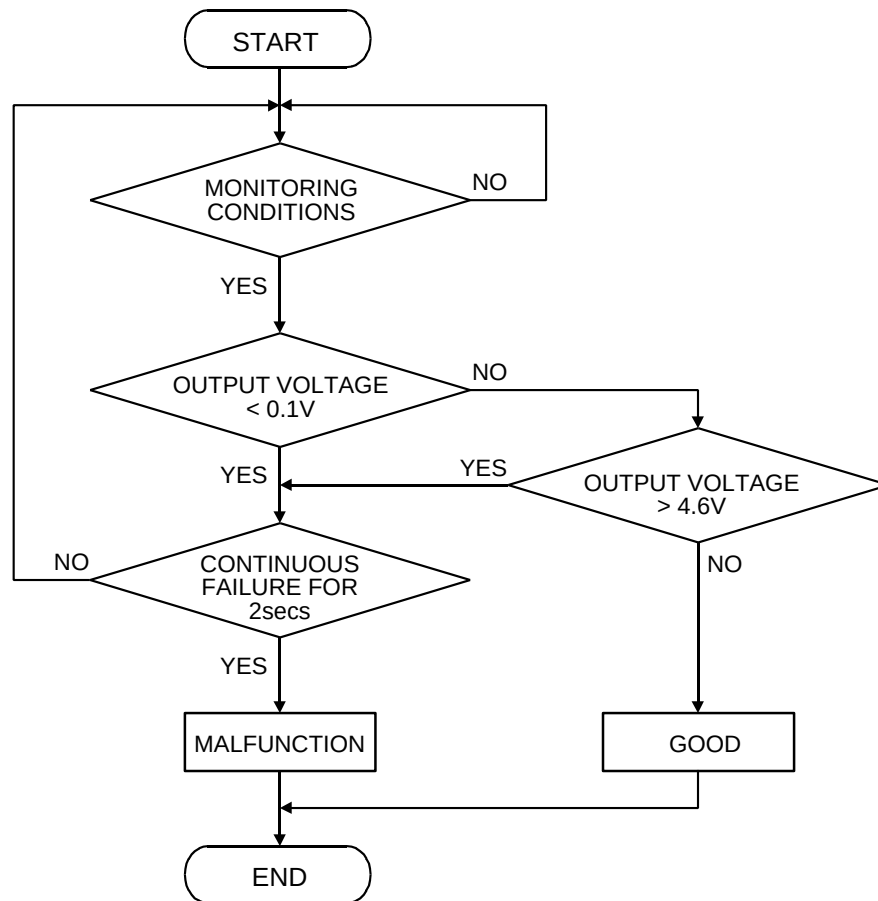
- Not applicable

Sensor (The sensor below is determined to be normal)

- Engine coolant temperature sensor
- Intake air temperature sensor

DTC SET CONDITIONS

Logic Flow Chart



AK302030

Check Conditions

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

Judgement Criteria

- 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 –
Procedure 6 – Other Monitor [P.13B-6](#).

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

- Fuel tank temperature sensor failed.
- Shorted fuel tank temperature sensor circuit or connector damage.
- ECM failed. <M/T>
- PCM failed. <A/T>

DIAGNOSIS**Required Special Tools:**

- MB991958: Scan Tool (MUT-III Sub Assembly)
 - MB991824: V.C.I.
 - MB991827: USB Cable
 - MB991911: Main Harness B

STEP 1. Using scan tool MB991958, check data list item 4A: Fuel Tank Temperature Sensor.

⚠ CAUTION

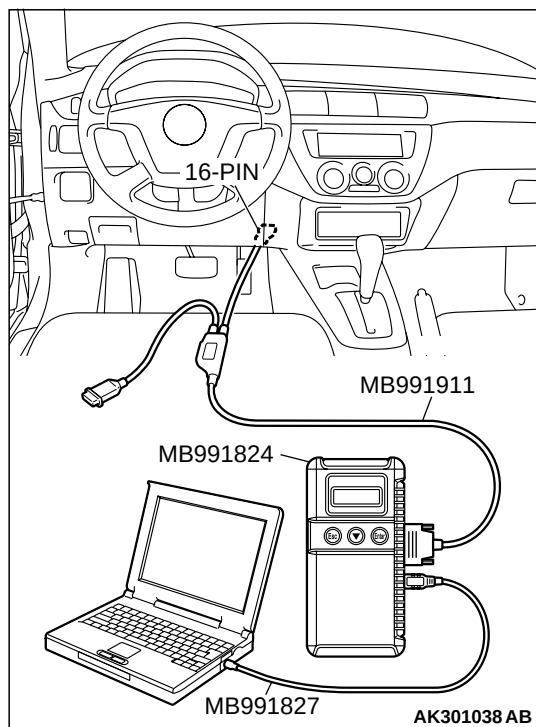
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

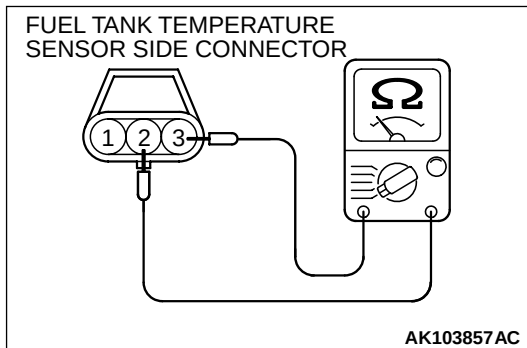
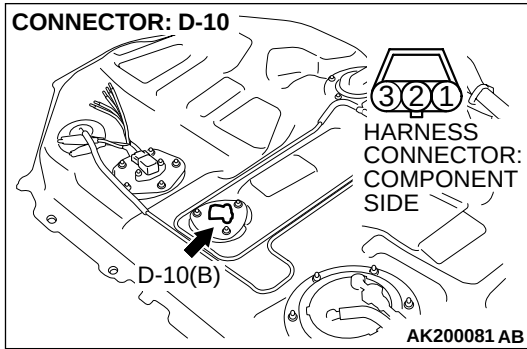
- (1) Connect scan tool MB991958 to the data link connector.
- (2) Turn the ignition switch to the "ON" position.
- (3) Set scan tool MB991958 to the data reading mode for item 4A, Fuel Tank Temperature Sensor.
 - With the engine cool, the fuel tank temperature should be approximately the same as ambient air temperature.
- (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 [P.00-6](#).

NO : Go to Step 2.





STEP 2. Check the fuel tank temperature sensor.

- (1) Disconnect the fuel tank temperature sensor connector D-10.

- (2) Measure the resistance between terminal No. 2 and No. 3 of the fuel tank temperature sensor.

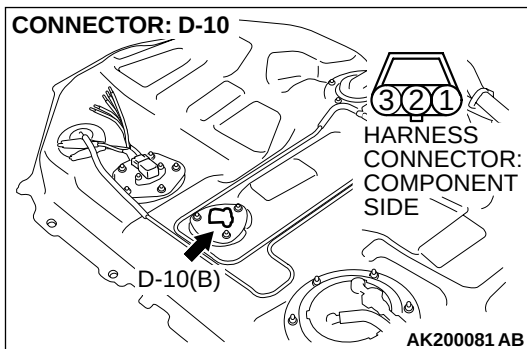
Standard value:

0.5 – 12.0 k Ω

Q: Is the resistance between 0.5 and 12.0 k Ω ?

YES : Go to Step 3.

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

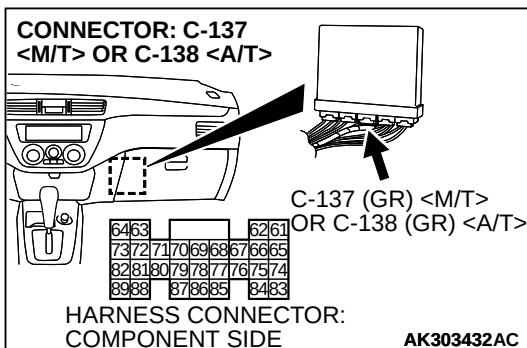


STEP 3. Check harness connector D-10 at the fuel tank temperature sensor and harness connector C-137 at ECM <M/T> or C-138 at PCM <A/T> for damage.

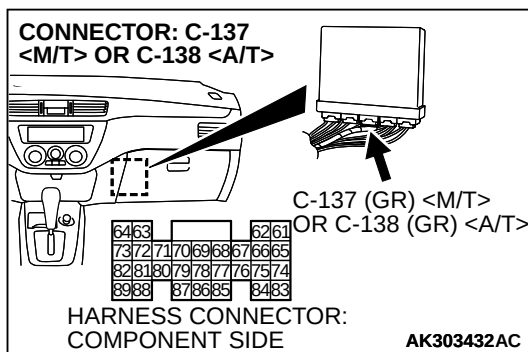
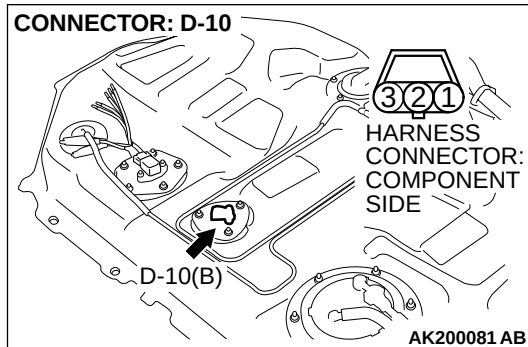
Q: Is the harness connector in good condition?

YES : Go to Step 4.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then go to Step 5.



STEP 4. Check for short circuit to ground between fuel tank temperature sensor connector D-10 (terminal No. 3) and ECM connector C-137 <M/T> or PCM connector C-138 <A/T> (terminal No. 81).



NOTE: Check harness after checking intermediate connector C-122, C-127 and D-14. If intermediate connector are damaged, repair or replace it. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then go to Step 5.

Q: Is the harness wire in good condition?

YES : Replace the ECM or PCM. Then go to Step 5.

NO : Repair it. 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 – Procedure 6 – Other Monitor [P.13B-6](#).
- (2) Check the diagnostic trouble code (DTC).

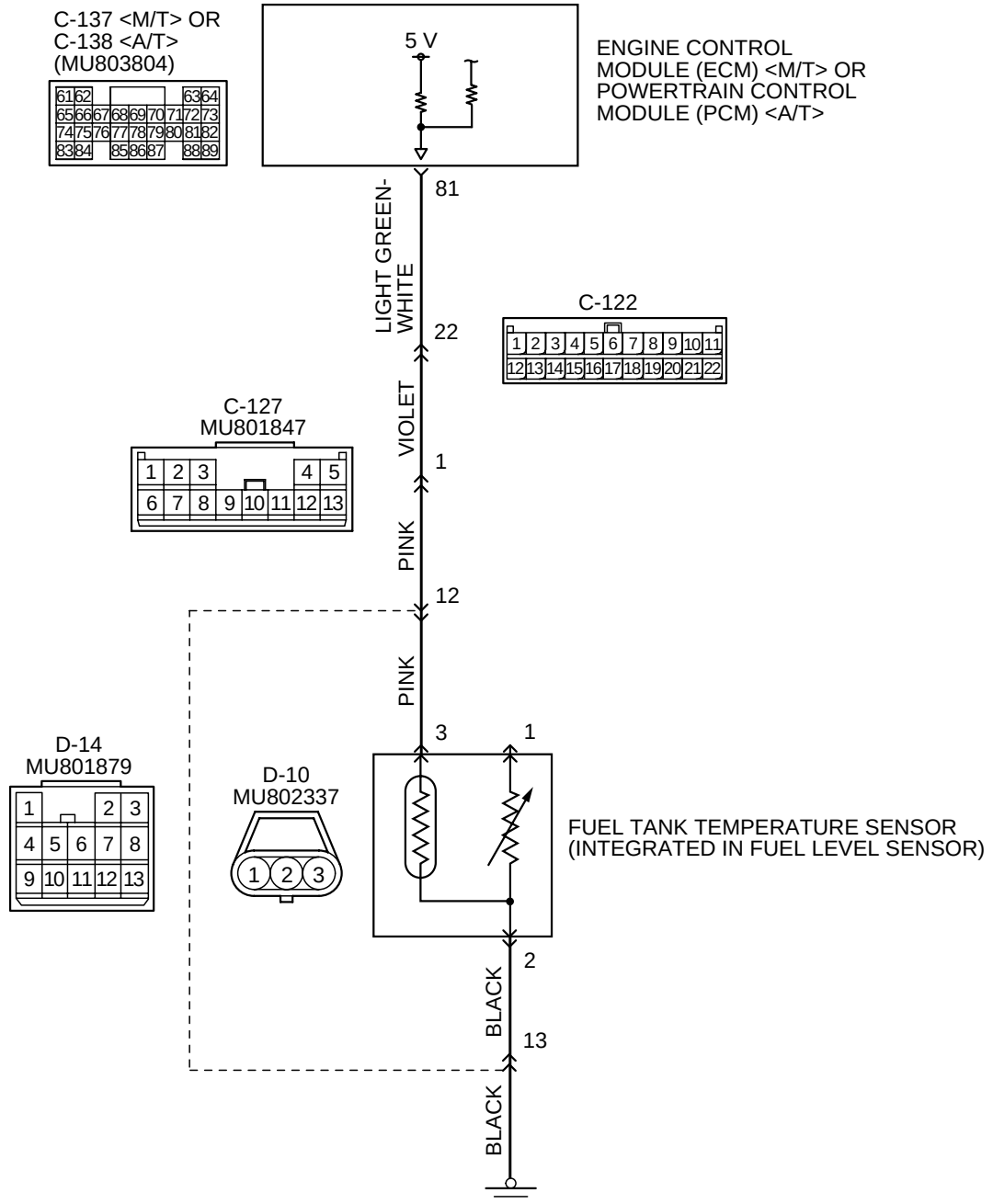
Q: Is DTC P0182 set?

YES : Retry the troubleshooting.

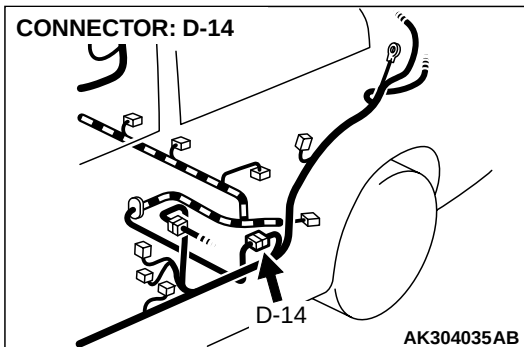
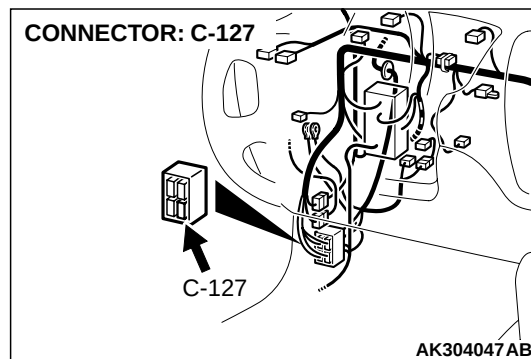
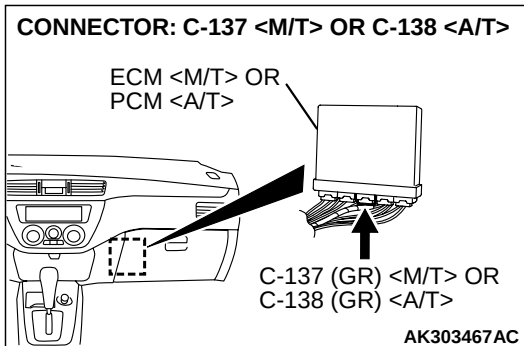
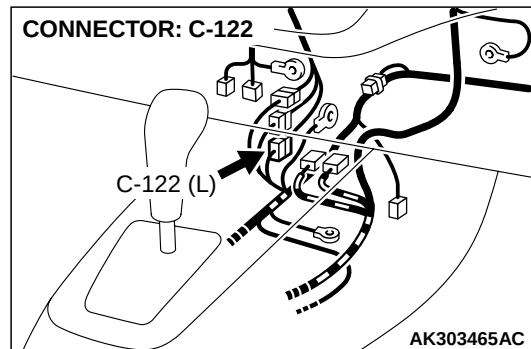
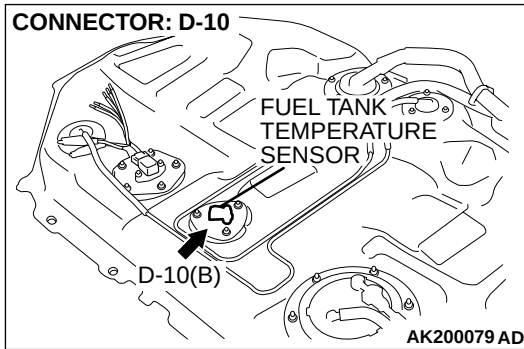
NO : The inspection is complete.

DTC P0183: Fuel Tank Temperature Sensor Circuit High Input

Fuel Tank Temperature Sensor Circuit



AK303987



CIRCUIT OPERATION

- 5-volt voltage is applied to the fuel tank temperature sensor output terminal (terminal No. 3) from the ECM <M/T> or PCM <A/T> (terminal No. 81) via the resistor in the ECM <M/T> or PCM <A/T>.
- The fuel tank temperature sensor output voltage increases when the resistance increases and decreases when the resistance decreases. The ground terminal (terminal No. 2) is grounded to the vehicle body.

TECHNICAL DESCRIPTION

- The fuel tank temperature sensor converts the fuel tank temperature to a voltage.
- The ECM <M/T> or PCM <A/T> 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)

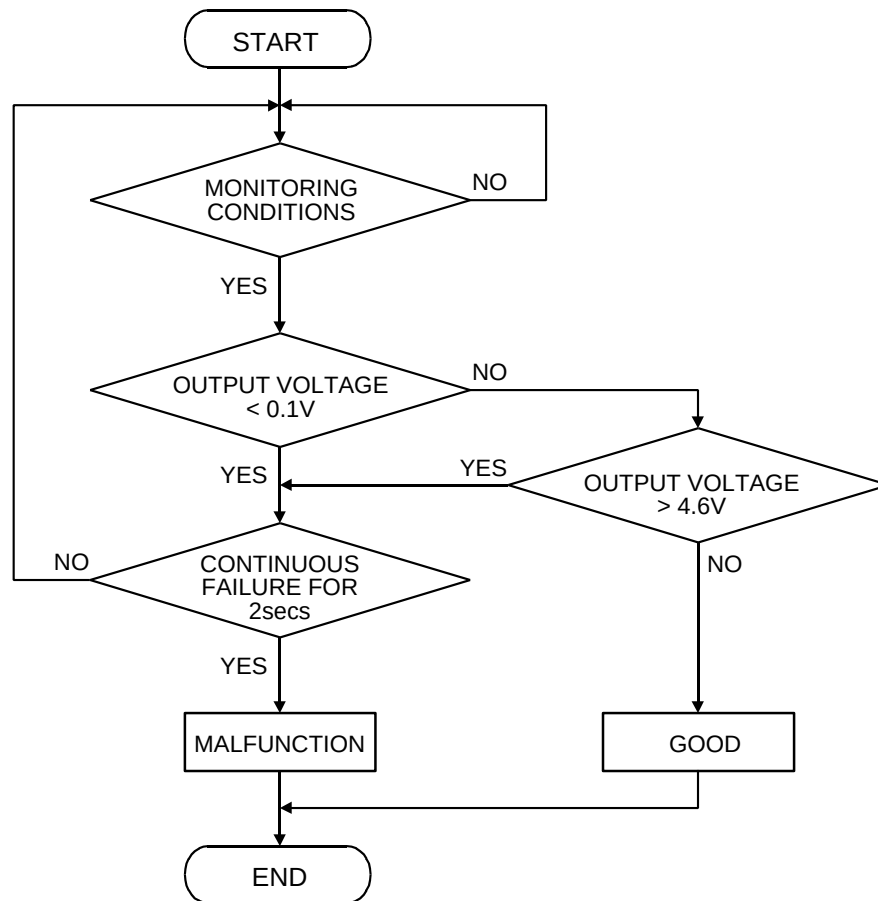
- Not applicable

Sensor (The sensor below is determined to be normal)

- Engine coolant temperature sensor
- Intake air temperature sensor

DTC SET CONDITIONS

Logic Flow Chart



AK302030

Check Conditions

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

Judgement Criteria

- 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 –
Procedure 6 – Other Monitor [P.13B-6](#).

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

- Fuel tank temperature sensor failed.
- Open fuel tank temperature sensor circuit or connector damage.
- ECM failed. <M/T>
- PCM failed. <A/T>

DIAGNOSIS**Required Special Tools:**

- MB991958: Scan Tool (MUT-III Sub Assembly)
 - MB991824: V.C.I.
 - MB991827: USB Cable
 - MB991911: Main Harness B

STEP 1. Using scan tool MB991958, check data list item 4A: Fuel Tank Temperature Sensor.

⚠ CAUTION

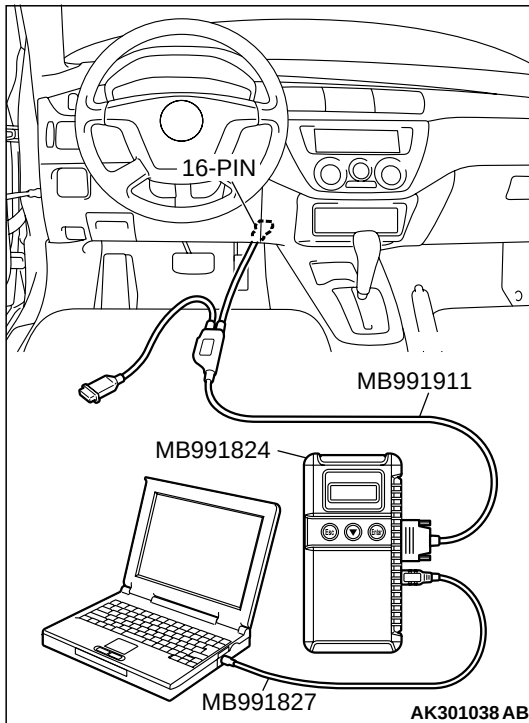
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

- (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 4A, Fuel Tank Temperature Sensor.
 - With the engine cool, the fuel tank temperature should be approximately the same as ambient air temperature.
- (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 [P.00-6](#).

NO : Go to Step 2.

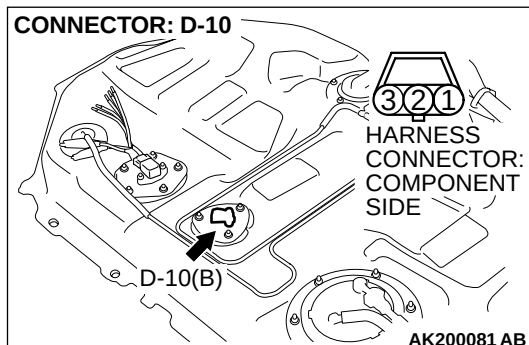


STEP 2. Check harness connector D-10 at the fuel tank temperature sensor for damage.

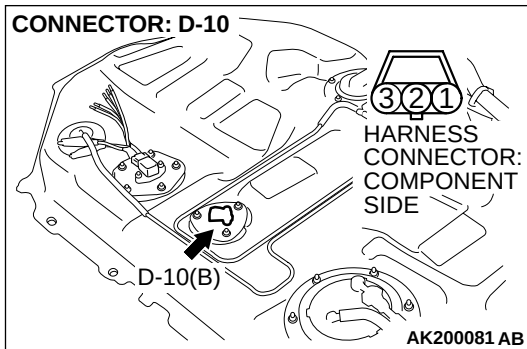
Q: Is the harness connector in good condition?

YES : Go to Step 3.

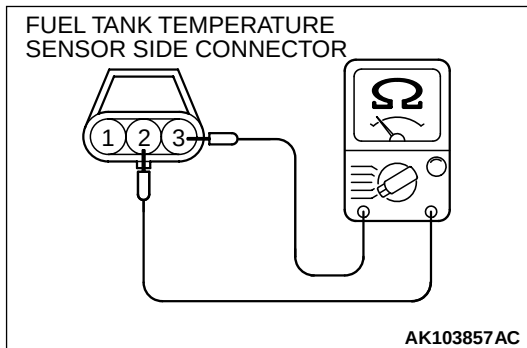
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then go to Step 10.



CONNECTOR: D-10



FUEL TANK TEMPERATURE
SENSOR SIDE CONNECTOR



STEP 3. Check the fuel tank temperature sensor.

- (1) Disconnect the fuel tank temperature sensor connector D-10.

- (2) Measure the resistance between terminal No. 2 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?

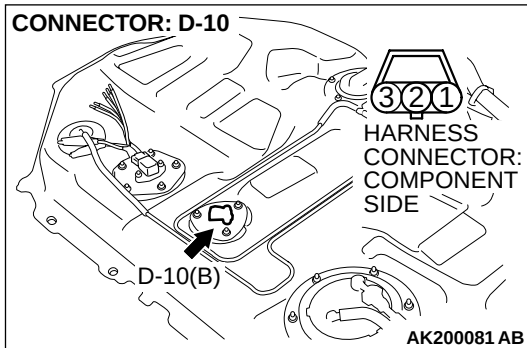
YES : Go to Step 4.

NO : Replace the fuel tank temperature sensor. Then go to Step 10.

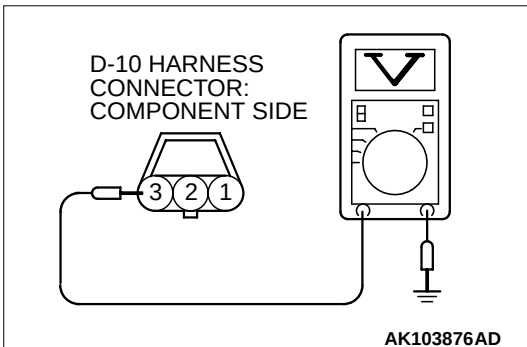
STEP 4. Check the sensor supply voltage at fuel tank temperature sensor harness side connector D-10.

- (1) Disconnect the connector D-10 and measure at the harness side.
(2) Turn the ignition switch to the "ON" position.

CONNECTOR: D-10



D-10 HARNESS
CONNECTOR:
COMPONENT SIDE



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

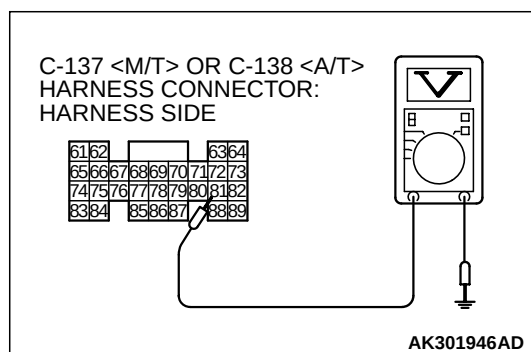
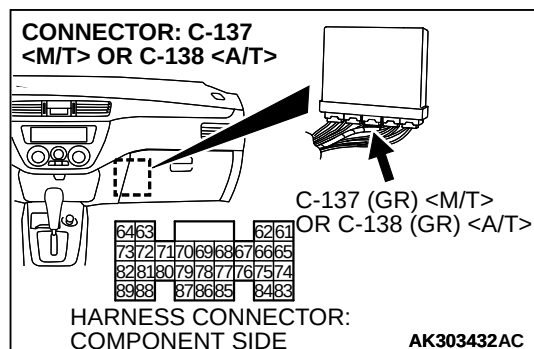
- Voltage should measure between 4.5 and 4.9 volts

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

Q: Is the measured voltage between 4.5 and 4.9 volts?

YES : Go to Step 8.

NO : Go to Step 5.



STEP 5. Measure the sensor supply voltage at ECM connector C-137 <M/T> or PCM connector C-138 <A/T> by backprobing.

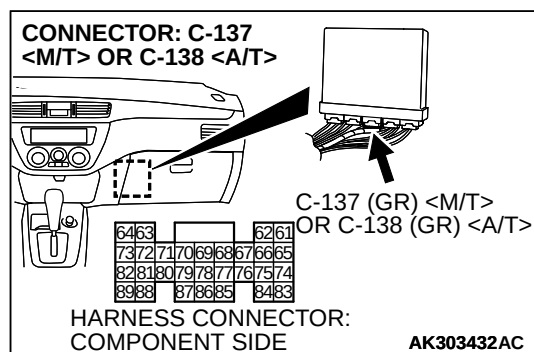
- (1) Do not disconnect the ECM connector C-137 <M/T> or PCM connector C-138 <A/T>.
- (2) Disconnect the fuel tank temperature sensor connector D-10.
- (3) Turn the ignition switch to the "ON" position.

- (4) Measure the voltage between terminal No. 81 and ground by backprobing.
 - Voltage should be between 4.5 and 4.9 volts.
- (5) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the measured voltage between 4.5 and 4.9 volts?

YES : Go to Step 6.

NO : Go to Step 7.

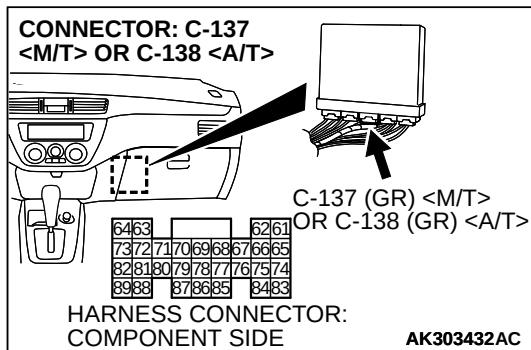


STEP 6. Check harness connector C-137 at ECM <M/T> or C-138 at PCM <A/T> for damage.

Q: Is the harness connector in good condition?

YES : Check harness connector C-122, C-127 and D-14 at intermediate connector for damage, and repair or replace as required. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). If intermediate connectors are in good condition, repair harness wire between fuel tank temperature sensor connector D-10 (terminal No. 3) and ECM connector C-137 <M/T> or PCM connector C-138 <A/T> (terminal No. 81) because of open circuit. Then go to Step 10.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then go to Step 10.

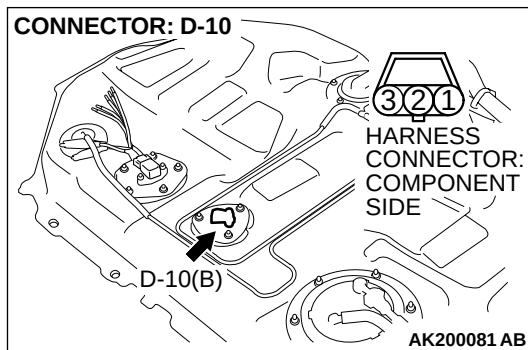


STEP 7. Check harness connector C-137 at ECM <M/T> or C-138 at PCM <A/T> for damage.

Q: Is the harness connector in good condition?

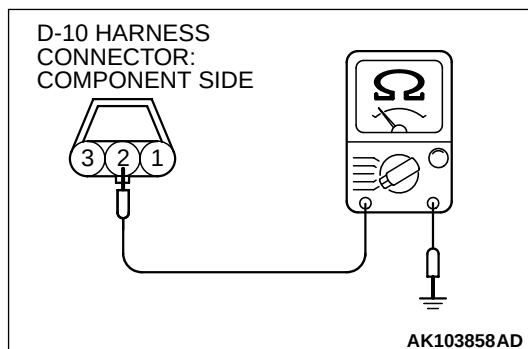
YES : Replace the ECM or PCM. Then go to Step 10.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then go to Step 10.



STEP 8. Check the continuity at fuel tank temperature sensor harness side connector D-10.

(1) Disconnect the connector D-10 and measure at the harness side.



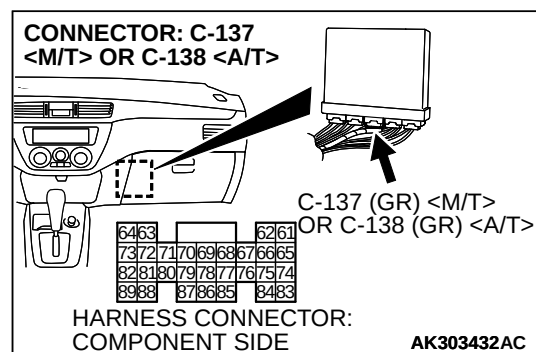
(2) Check for the continuity between terminal No. 2 and ground.

- Should be less than 2 ohms.

Q: Does continuity exist?

YES : Go to Step 9.

NO : Check harness connector D-14 at intermediate connector for damage, and repair or replace as required. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). If intermediate connector is in good condition, repair harness wire between fuel tank temperature sensor connector D-10 (terminal No. 2) and ground because of harness damage. Then go to Step 10.



STEP 9. Check harness connector C-137 at ECM <M/T> or C-138 at PCM <A/T> for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 10.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then go to Step 10.

STEP 10. 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 – Procedure 6 – Other Monitor [P.13B-6](#).

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

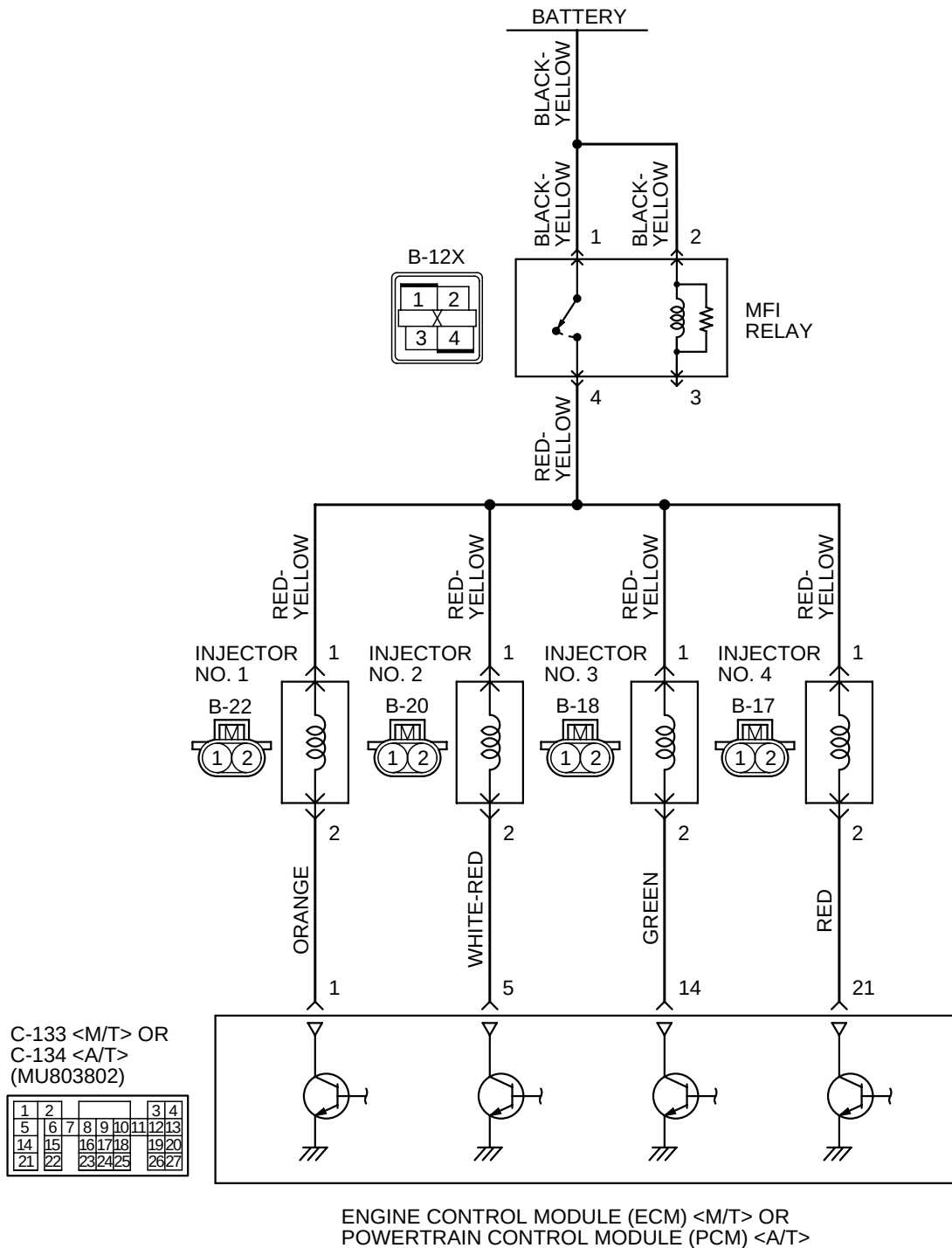
Q: Is DTC P0183 set?

YES : Retry the troubleshooting.

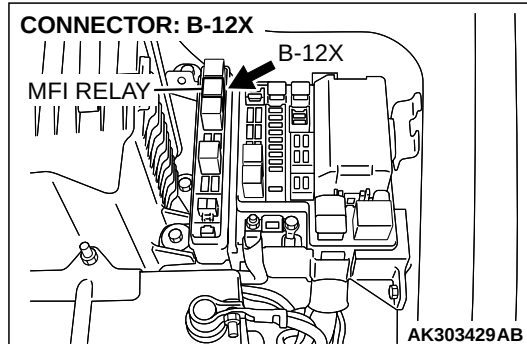
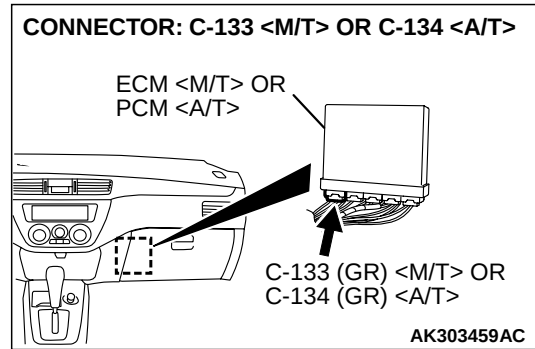
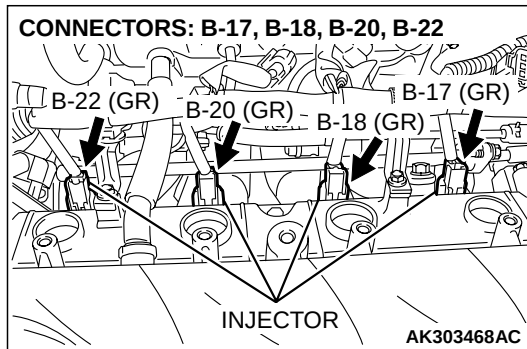
NO : The inspection is complete.

DTC P0201: Injector Circuit – Cylinder 1, DTC P0202: Injector Circuit – Cylinder 2, DTC P0203: Injector Circuit – Cylinder 3, DTC P0204: Injector Circuit – Cylinder 4

Injector Circuit



AK303988



CIRCUIT OPERATION

- The injector power is supplied from the MFI relay (terminal No. 4).
- The ECM <M/T> or PCM <A/T> controls the injector by turning the power transistor in the ECM <M/T> or PCM <A/T> "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 <M/T> or PCM <A/T>.
- A surge voltage is generated when the injectors are driven and the current flowing to the injector coil is shut off.
- The ECM <M/T> or PCM <A/T> checks this surge voltage.

DESCRIPTIONS OF MONITOR METHODS

Off-surge does not occur after injector is operated.

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)

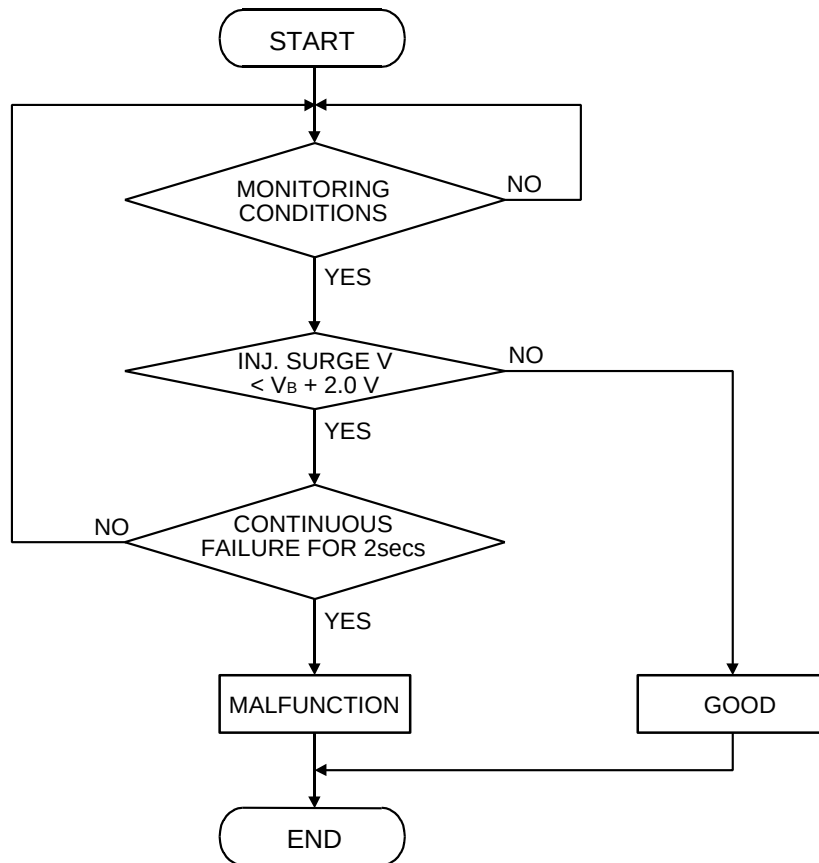
- Not applicable

Sensor (The sensor below is determined to be normal)

- Not applicable

DTC SET CONDITIONS

Logic Flow Chart



AK302031

Check Conditions

- Engine is running.

Judgment Criteria

- Injector coil surge voltage (battery positive voltage + 2 volts) has not been detected for 2 seconds.

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function – OBD-II Drive Cycle –
Procedure 6 – Other Monitor [P.13B-6](#).

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

- Injector failed.
- Open or shorted injector circuit, harness damage or connector damage.
- ECM failed. <M/T>
- PCM failed. <A/T>

DIAGNOSIS**Required Special Tools:**

- MB991958: Scan Tool (MUT-III Sub Assembly)
 - MB991824: V.C.I.
 - MB991827: USB Cable
 - MB991911: Main Harness B
- MB991658: Test Harness

STEP 1. Using scan tool MB991958, check actuator test item 01, 02, 03, 04: Injectors.

⚠ CAUTION

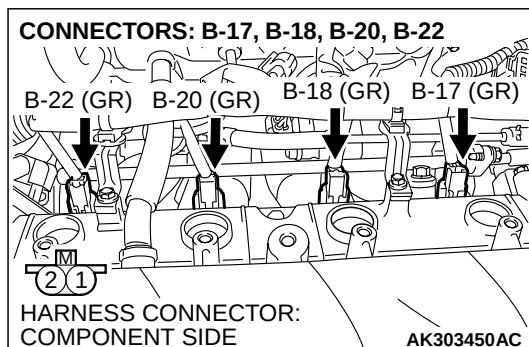
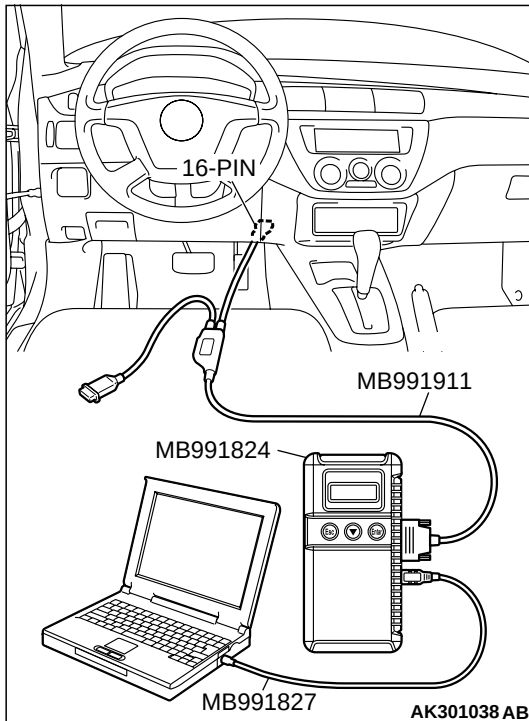
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

- (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 01, 02, 03, 04 Injectors.
- (4) Warm up the engine to normal operating temperature: 85°C to 95°C (185°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 [P.00-6](#).

NO : Go to Step 2.

**STEP 2. Check the connector at injector for damage.**

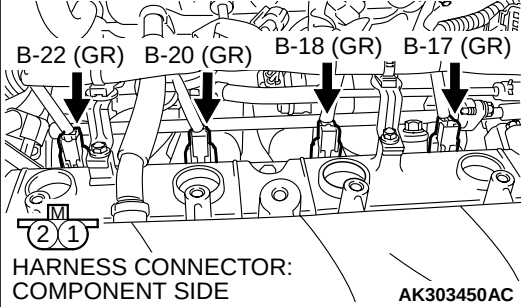
- a. Check the connector B-22 at No. 1 cylinder.
- b. Check the connector B-20 at No. 2 cylinder.
- c. Check the connector B-18 at No. 3 cylinder.
- d. Check the connector B-17 at No. 4 cylinder.

Q: Is the connector in good condition?

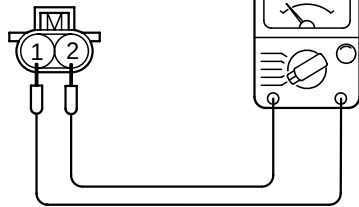
YES : Go to Step 3.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then go to Step 10.

CONNECTORS: B-17, B-18, B-20, B-22



**INJECTOR SIDE
CONNECTOR**



AK000559 AB

STEP 3. Check the injector.

- (1) Disconnect the injector connector B-22 <No. 1 cylinder> or B-20 <No. 2 cylinder> or B-18 <No. 3 cylinder> or B-17 <No. 4 cylinder>.

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

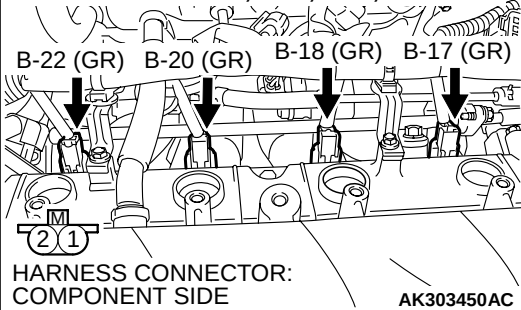
Standard value: 10.5 – 13.5 ohms [at 20°C (68°F)]

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

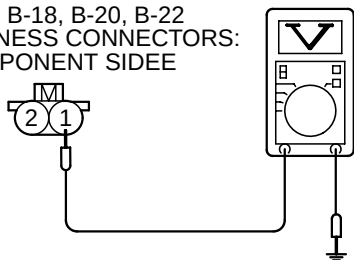
YES : Go to Step 4.

NO : Replace the injector. Then go to Step 10.

CONNECTORS: B-17, B-18, B-20, B-22



**B-17, B-18, B-20, B-22
HARNESS CONNECTORS:
COMPONENT SIDE**



AK000560 AJ

STEP 4. Measure the power supply voltage at injector connector.

- (1) Disconnect connector B-22 <No. 1 cylinder> or B-20 <No. 2 cylinder> or B-18 <No. 3 cylinder> or B-17 <No. 4 cylinder> and measure at the harness side.
- (2) Turn the ignition switch to the "ON" position.

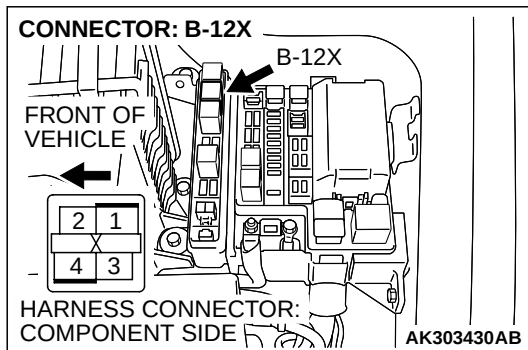
- (3) Measure the voltage between terminal No. 1 and ground.
- Voltage should be battery positive voltage.

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

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

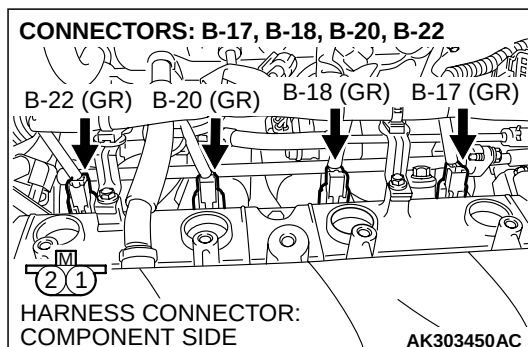
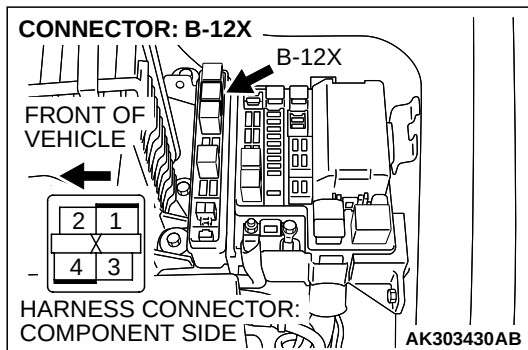
YES : Go to Step 6.

NO : Go to Step 5.

**STEP 5. Check harness connector B-12X at MFI relay for damage.****Q: Is the harness connector in good condition?****YES :** Repair harness wire between MFI relay connector and injector connector because of open circuit or short circuit to ground.

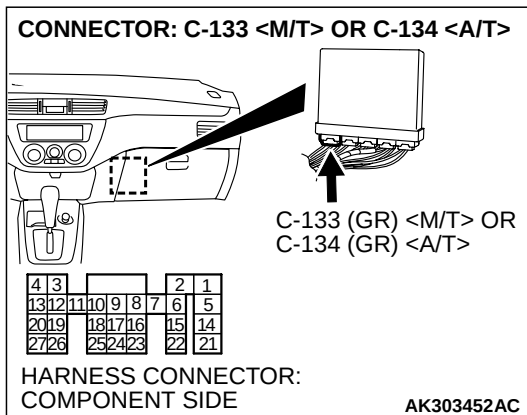
- Repair harness wire between MFI relay connector B-12X (terminal No. 4) and injector connector B-22 (terminal No. 1) at No. 1 cylinder.
- Repair harness wire between MFI relay connector B-12X (terminal No. 4) and injector connector B-20 (terminal No. 1) at No. 2 cylinder.
- Repair harness wire between MFI relay connector B-12X (terminal No. 4) and injector connector B-18 (terminal No. 1) at No. 3 cylinder.
- Repair harness wire between MFI relay connector B-12X (terminal No. 4) and injector connector B-17 (terminal No. 1) at No. 4 cylinder.

Then go to Step 10.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then go to Step 10.**STEP 6. Check for harness damage between MFI relay connector and injector connector.**

- Check the harness wire between MFI relay connector B-12X (terminal No. 1) and injector connector B-22 (terminal No. 1) at No. 1 cylinder.
- Check the harness wire between MFI relay connector B-12X (terminal No. 1) and injector connector B-20 (terminal No. 1) at No. 2 cylinder.
- Check the harness wire between MFI relay connector B-12X (terminal No. 1) and injector connector B-18 (terminal No. 1) at No. 3 cylinder.
- Check the harness wire between MFI relay connector B-12X (terminal No. 1) and injector connector B-17 (terminal No. 1) at No. 4 cylinder.

Q: Is the harness wire in good condition?**YES :** Go to Step 7.**NO :** Repair it. Then go to Step 10.

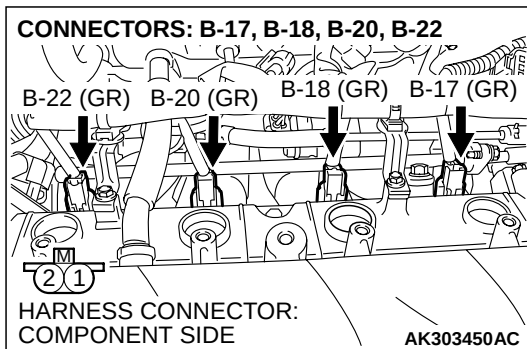


STEP 7. Check harness connector C-133 at ECM <M/T> or C-134 at PCM <A/T> for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 8.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then go to Step 10.



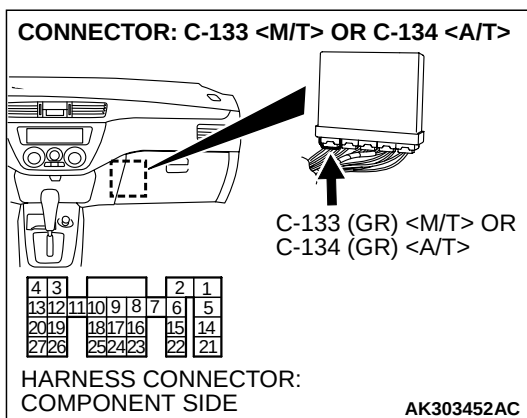
STEP 8. Check for open circuit and short circuit to ground and harness damage between injector connector and PCM connector.

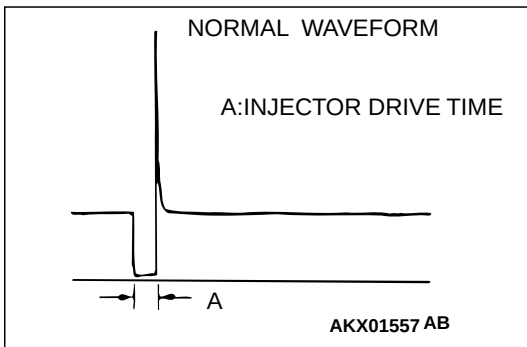
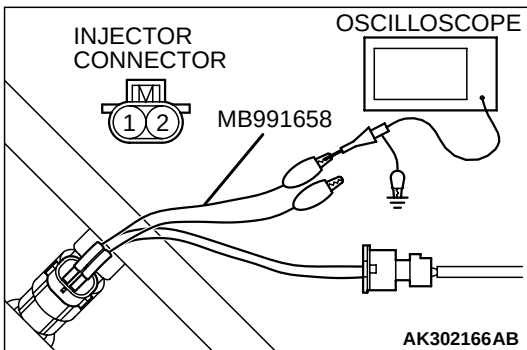
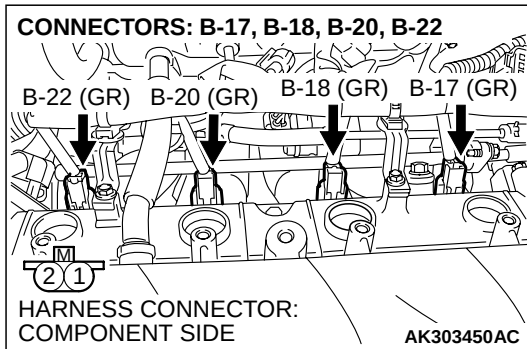
- Check the harness wire between injector connector B-22 (terminal No. 2) and ECM connector C-133 <M/T> or PCM connector C-134 <A/T> (terminal No. 1) at No. 1 cylinder.
- Check the harness wire between injector connector B-20 (terminal No. 2) and ECM connector C-133 <M/T> or PCM connector C-134 <A/T> (terminal No. 5) at No. 2 cylinder.
- Check the harness wire between injector connector B-18 (terminal No. 2) and ECM connector C-133 <M/T> or PCM connector C-134 <A/T> (terminal No. 14) at No. 3 cylinder.
- Check the harness wire between injector connector B-17 (terminal No. 2) and ECM connector C-133 <M/T> or PCM connector C-134 <A/T> (terminal No. 21) at No. 4 cylinder.

Q: Is the harness wire in good condition?

YES : Go to Step 9.

NO : Repair it. Then go to Step 10.



**STEP 9. Using the oscilloscope, check the injector.**

(1) Disconnect the injector connector B-22 <No. 1 cylinder> or B-20 <No. 2 cylinder> or B-18 <No. 3 cylinder> or B-17 <No. 4 cylinder> 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 <M/T> or PCM <A/T> side connector, connect an oscilloscope probe to the each of the following terminals.

- ECM <M/T> or PCM <A/T> terminal No. 1 at No. 1 cylinder.
- ECM <M/T> or PCM <A/T> terminal No. 5 at No. 2 cylinder.
- ECM <M/T> or PCM <A/T> terminal No. 14 at No. 3 cylinder.
- ECM <M/T> or PCM <A/T> terminal No. 21 at No. 4 cylinder.

(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 [P.00-6](#).

NO : Replace the ECM or PCM. Then go to Step 10.

STEP 10. 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 – Procedure 6 – Other Monitor [P.13B-6](#).

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

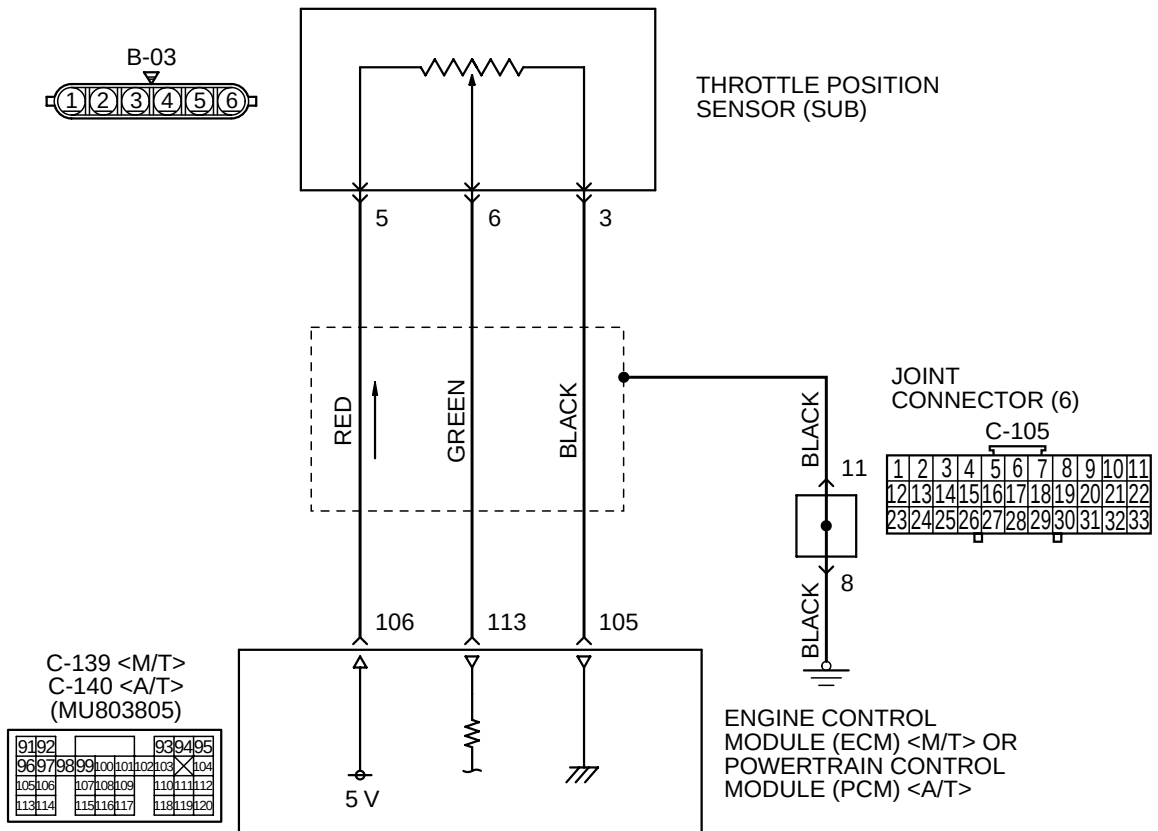
Q: Are DTC P0201, P0202, P0203 and P0204 set?

YES : Retry the troubleshooting.

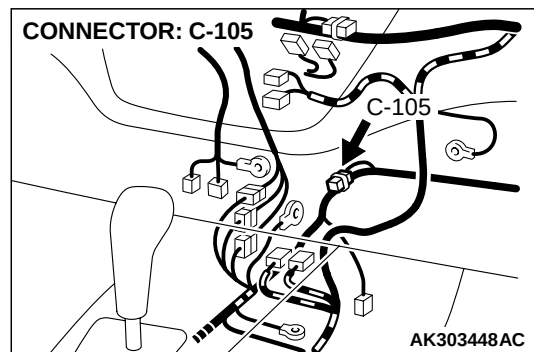
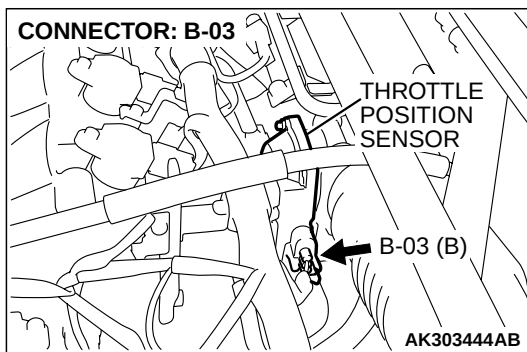
NO : The inspection is complete.

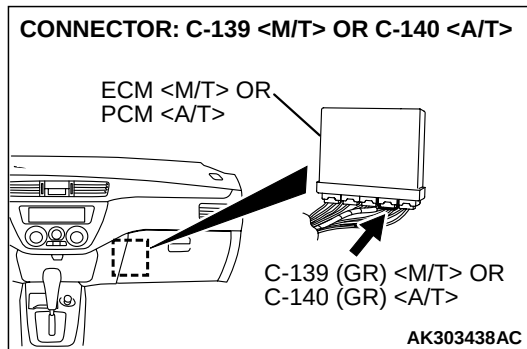
DTC P0222: Throttle Position Sensor (sub) Circuit Low Input

Throttle Position Sensor (sub) Circuit



AK303989



**CIRCUIT OPERATION**

- A 5-volt power supply is applied on the throttle position sensor (sub) power terminal (terminal No. 5) from the ECM <M/T> or PCM <A/T> (terminal No. 106).
The ground terminal (terminal No. 3) is grounded with ECM <M/T> or PCM <A/T> (terminal No. 105).
- When the throttle valve shaft is turned from the idle position to the fully opened position, the resistance between the throttle position sensor (sub) output terminal (terminal No. 6) and ground terminal will increase according to the rotation.

TECHNICAL DESCRIPTION

- The throttle position sensor (sub) outputs voltage which corresponds to the throttle valve opening angle.

- The ECM <M/T> or PCM <A/T> 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)

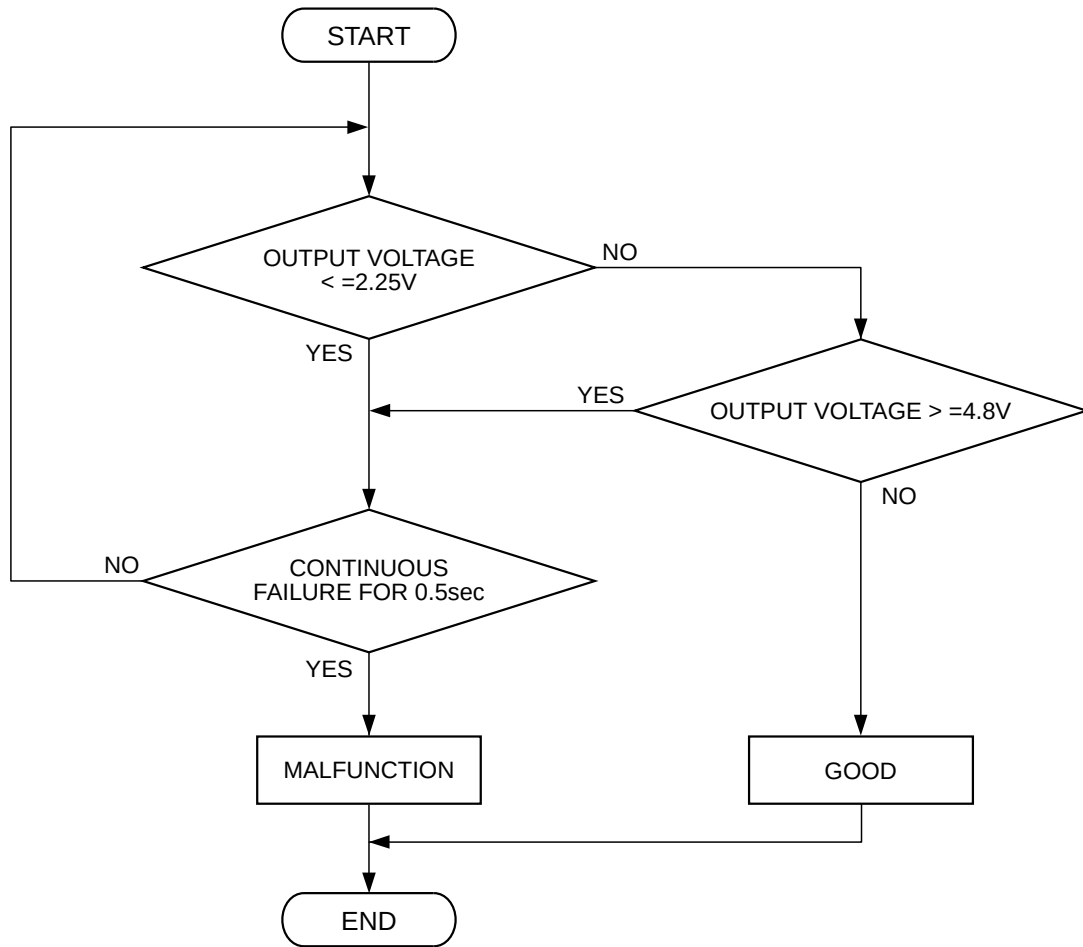
- Not applicable

Sensor (The sensor below is determined to be normal)

- Not applicable

DTC SET CONDITIONS

Logic Flow Chart



AK302032

Check Conditions

- Ignition switch "ON" position.

Judgement Criteria

- Throttle position sensor (sub) output voltage should be 2.25 volts or less for 0.5 second.

OBD-II DRIVE CYCLE PATTERN

None.

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

- Throttle position sensor failed.
- Open or shorted throttle position sensor (sub) circuit, harness damage, or connector damage.
- ECM failed. <M/T>
- PCM failed. <A/T>

DIAGNOSIS**Required Special Tools:**

- MB991958: Scan Tool (MUT-III Sub Assembly)
 - MB991824: V.C.I.
 - MB991827: USB Cable
 - MB991911: Main Harness B
- MB991658: Test Harness

STEP 1. Using scan tool MB991958, check data list item 14: 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 14, Throttle Position Sensor (sub).
 - Output voltage should be between 2.2 and 2.8 volts when the throttle valve is fully closed with your finger.
 - Output voltage should be 4.6 volts or more 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?

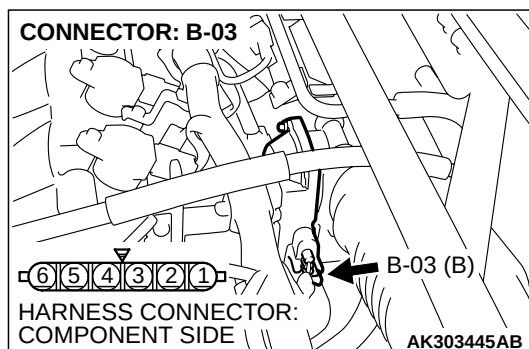
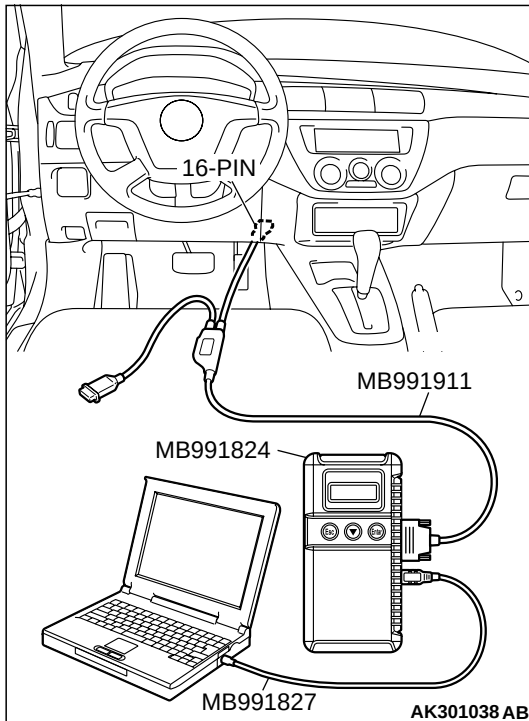
YES : It can be assumed that this malfunction is intermittent.
Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points [P.00-6](#).

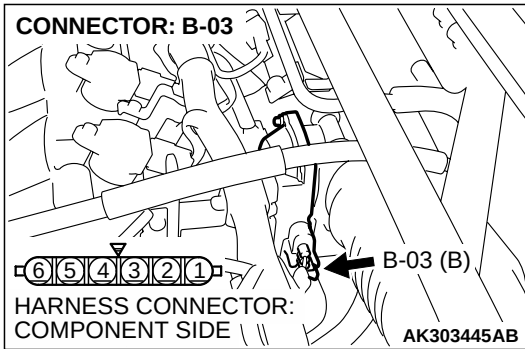
NO : Go to Step 2.

STEP 2. Check harness connector B-03 at throttle position sensor for damage.**Q: Is the harness connector in good condition?**

YES : Go to Step 3.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then go to Step 11.





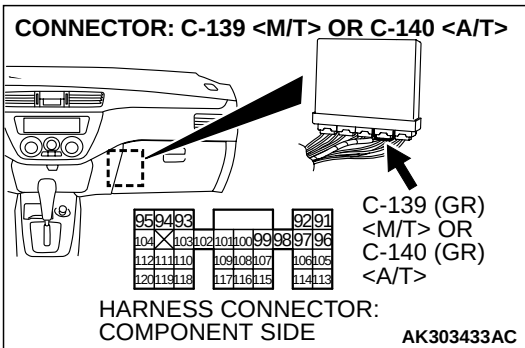
STEP 3. Measure the sensor supply voltage at throttle position sensor harness side connector B-03.

- (1) Disconnect the connector B-03 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 4.8 and 5.2 volts.
- (4) Turn the ignition switch to the "LOCK"(OFF) position.

Q: Is the measured voltage between 4.8 and 5.2 volts?

YES : Go to Step 7.

NO : Go to Step 4.

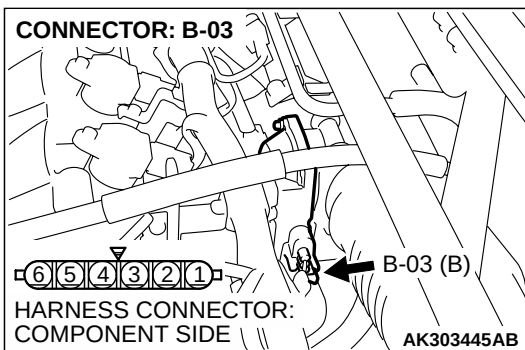


STEP 4. Check harness connector C-139 at ECM <M/T> or C-140 at PCM <A/T> for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 5.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then go to Step 11.

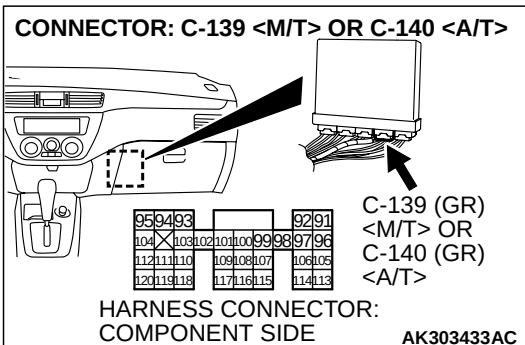


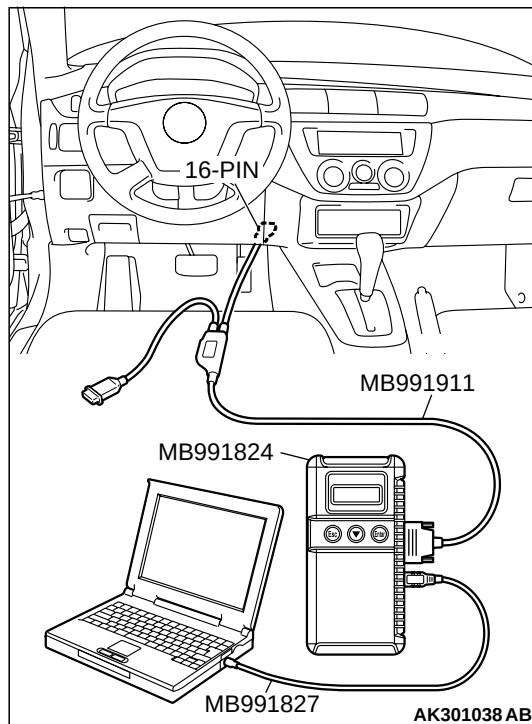
STEP 5. Check for open circuit and short circuit to ground between throttle position sensor connector B-03 (terminal No. 5) and ECM connector C-139 <M/T> or PCM connector C-140 <A/T> (terminal No. 106).

Q: Is the harness wire in good condition?

YES : Go to Step 6.

NO : Repair it. Then go to Step 11.





STEP 6. Using scan tool MB991958, check data list item 14: Throttle Position Sensor (sub).

⚠ CAUTION

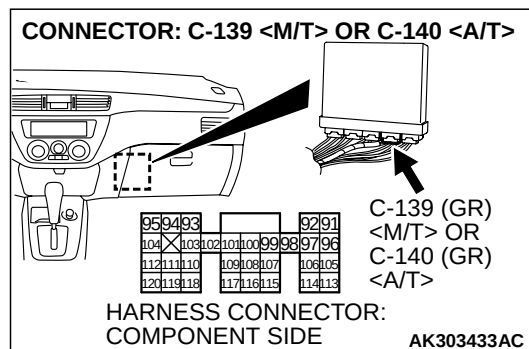
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK"(OFF) position before connecting or disconnecting scan tool MB991958.

- (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 14, Throttle Position Sensor (sub).
 - Output voltage should be between 2.2 and 2.8 volts when the throttle valve is fully closed with your finger.
 - Output voltage should be 4.6 volts or more 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 [P.00-6](#).

NO : Replace the ECM or PCM. Then go to Step 11.



STEP 7. Check harness connector C-139 at ECM <M/T> or C-140 at PCM <A/T> for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 8.

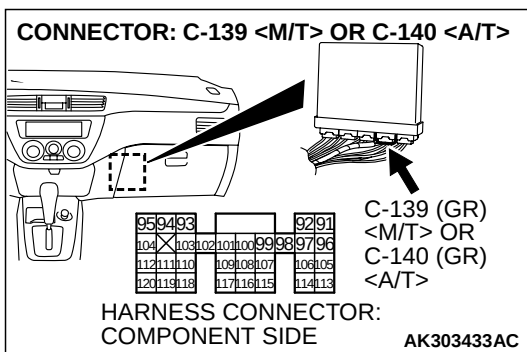
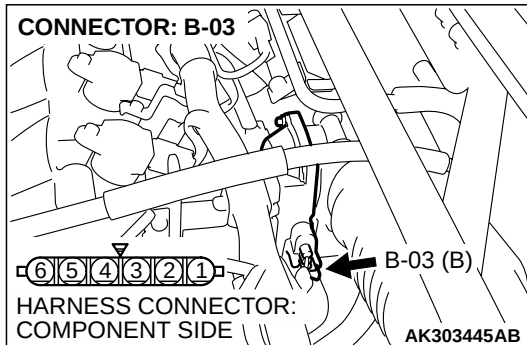
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then go to Step 11.

STEP 8. Check for harness damage between throttle position sensor connector B-03 (terminal No. 5) and ECM connector C-139 <M/T> or PCM connector C-140 <A/T> (terminal No. 106).

Q: Is the harness wire in good condition?

YES : Go to Step 9.

NO : Repair it. Then go to Step 11.

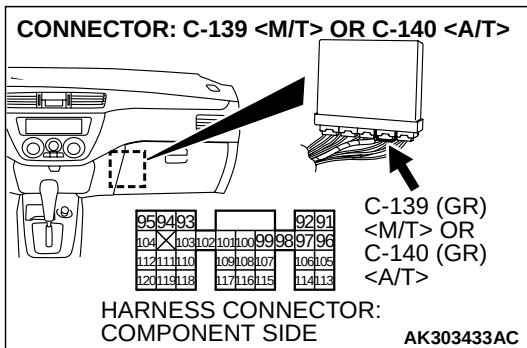
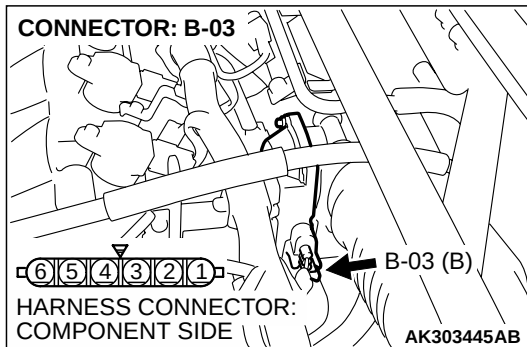


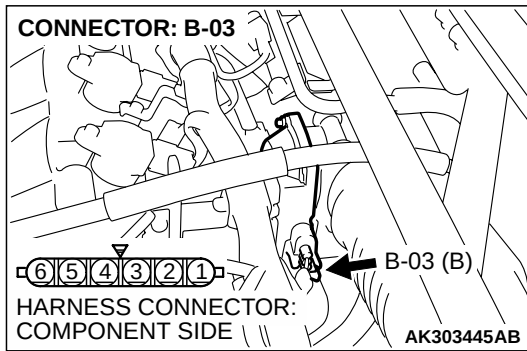
STEP 9. Check for open circuit, short circuit to ground and harness damage between throttle position sensor connector B-03 (terminal No. 6) and ECM connector C-139 <M/T> or PCM connector C-140 <A/T> (terminal No. 113).

Q: Is the harness wire in good condition?

YES : Go to Step 10.

NO : Repair it. Then go to Step 11.



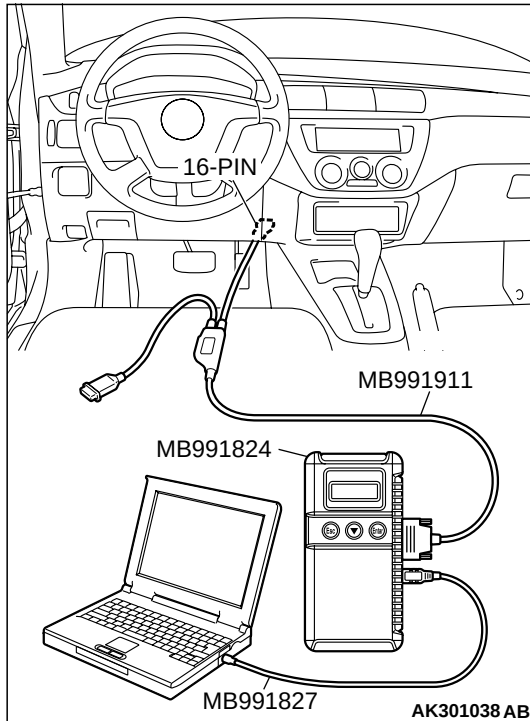
**STEP 10. Replace the throttle body assembly.**

- (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 or PCM. Then go to Step 11.

NO : The inspection is complete.

**STEP 11. 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.

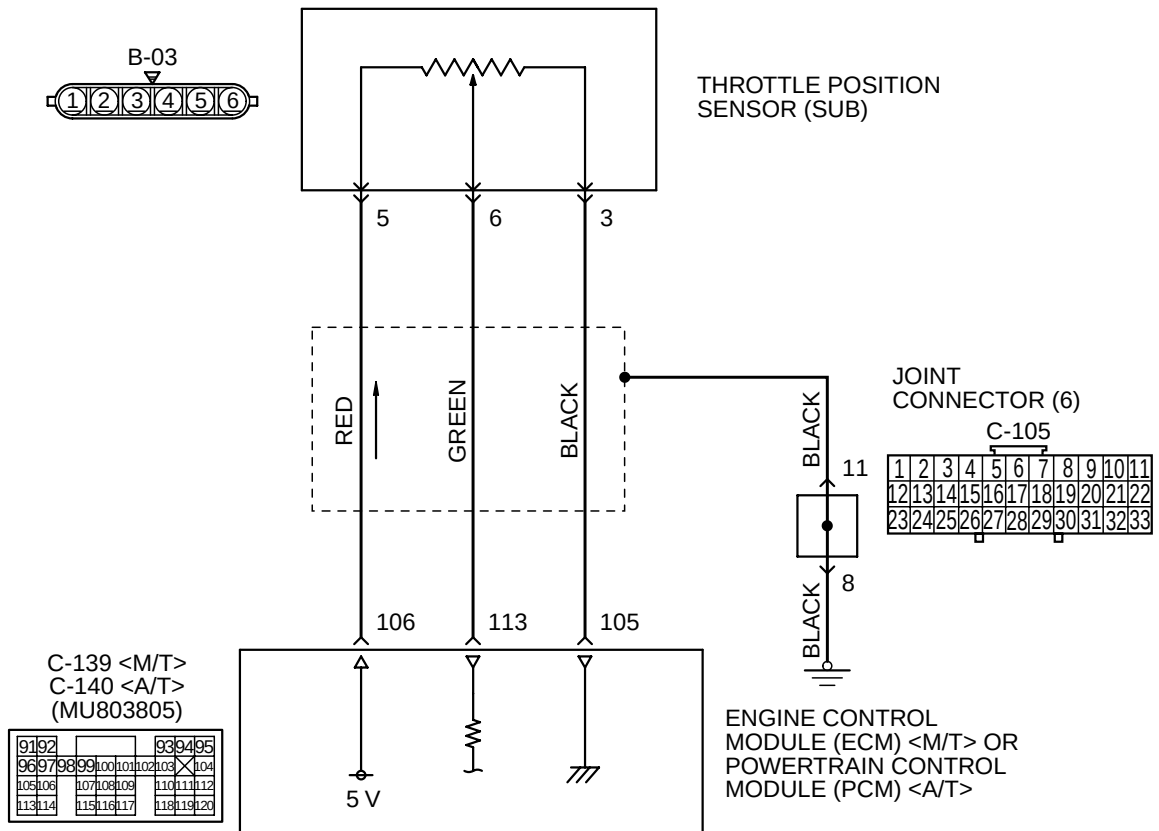
Q: Is DTC P0222 set?

YES : Retry the troubleshooting.

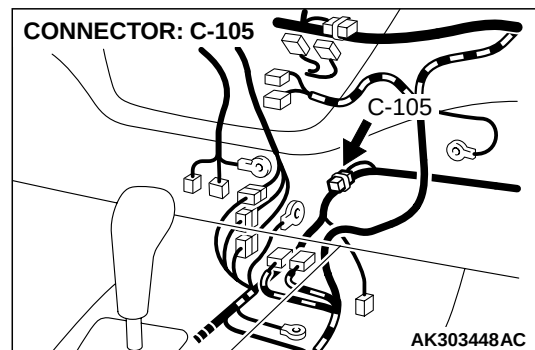
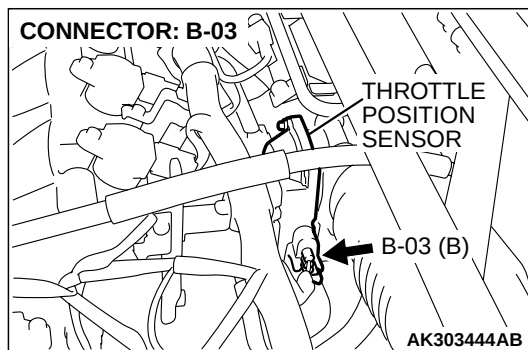
NO : The inspection is complete.

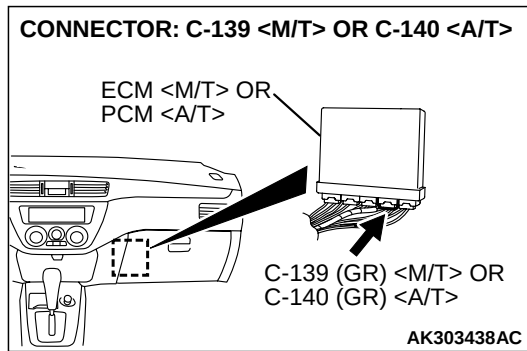
DTC P0223: Throttle Position Sensor (sub) Circuit High Input

Throttle Position Sensor (sub) Circuit



AK303989



**CIRCUIT OPERATION**

- A 5-volt power supply is applied on the throttle position sensor (sub) power terminal (terminal No. 5) from the ECM <M/T> or PCM <A/T> (terminal No. 106).
The ground terminal (terminal No. 3) is grounded with ECM <M/T> or PCM <A/T> (terminal No. 105).
- When the throttle valve shaft is turned from the idle position to the fully opened position, the resistance between the throttle position sensor (sub) output terminal (terminal No. 6) and ground terminal will increase according to the rotation.

TECHNICAL DESCRIPTION

- The throttle position sensor (sub) outputs voltage which corresponds to the throttle valve opening angle.

- The ECM <M/T> or PCM <A/T> 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)

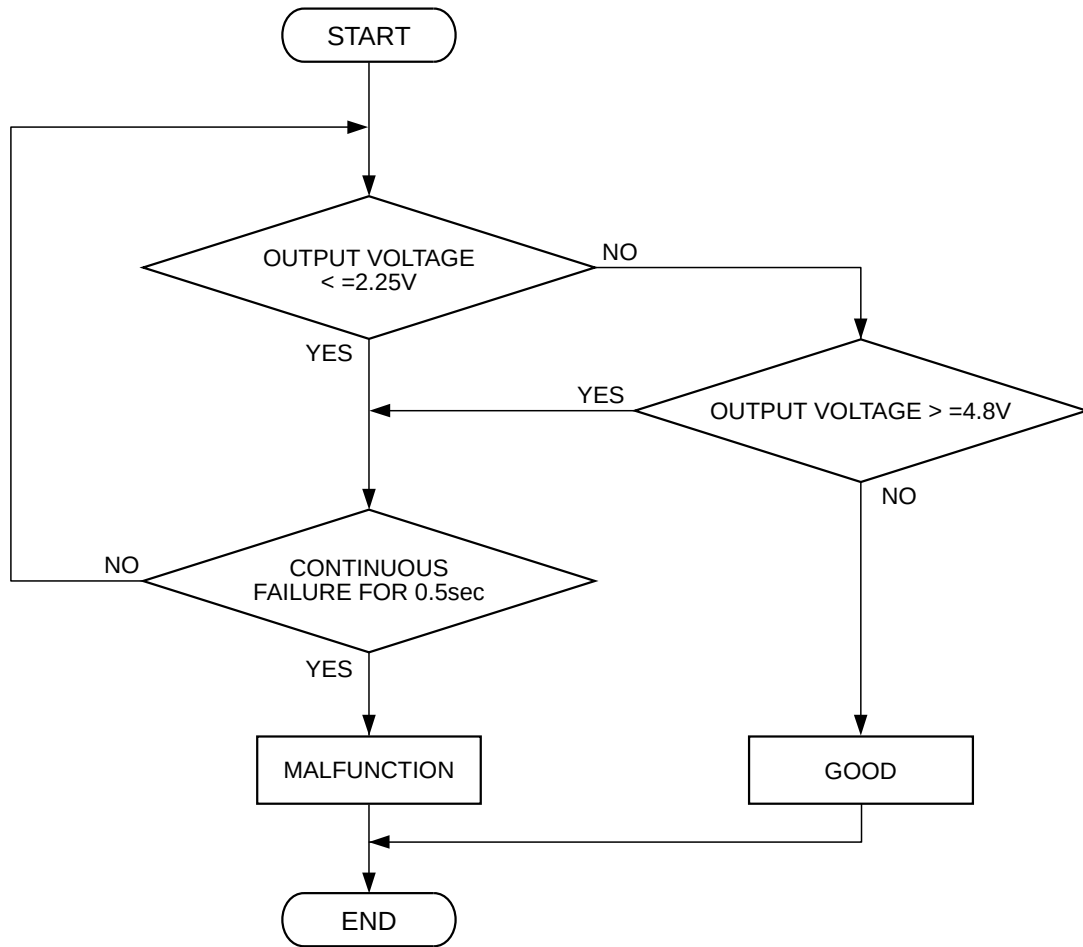
- Not applicable

Sensor (The sensor below is determined to be normal)

- Not applicable

DTC SET CONDITIONS

Logic Flow Chart



AK302032

Check Conditions

- Ignition switch "ON" position.

Judgement Criteria

- Throttle position sensor (sub) output voltage should be 4.8 volts or more for 0.5 second.

OBD-II DRIVE CYCLE PATTERN

None.

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

- Throttle position sensor failed.
- Open throttle position sensor (sub) circuit, harness damage, or connector damage.
- ECM failed. <M/T>
- PCM failed. <A/T>

DIAGNOSIS**Required Special Tools:**

- MB991958: Scan tool (MUT-III Sub Assembly)
 - MB991824: V.C.I.
 - MB991827: USB Cable
 - MB991911: Main Harness B
- MB991658: Test Harness

STEP 1. Using scan tool MB991958, check data list item 14: Throttle Position Sensor (sub).**⚠ CAUTION**

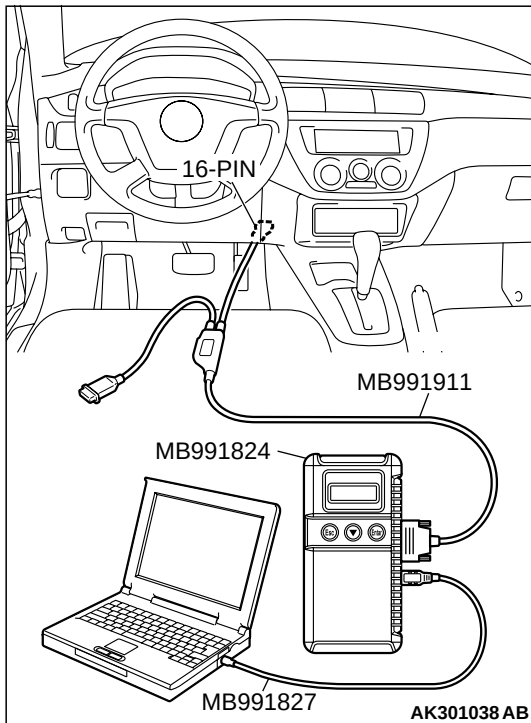
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK"(OFF) position before connecting or disconnecting scan tool MB991958.

- (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 14, Throttle Position Sensor (sub).
 - Output voltage should be between 2.2 and 2.8 volts when the throttle valve is fully closed with your finger.
 - Output voltage should be 4.6 volts or more 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?

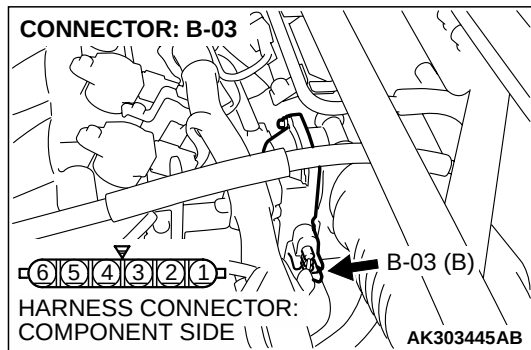
YES : It can be assumed that this malfunction is intermittent.
Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points [P.00-6](#).

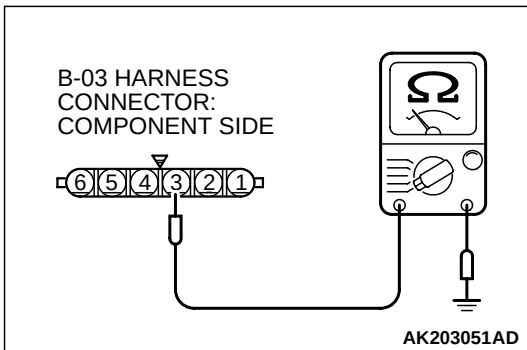
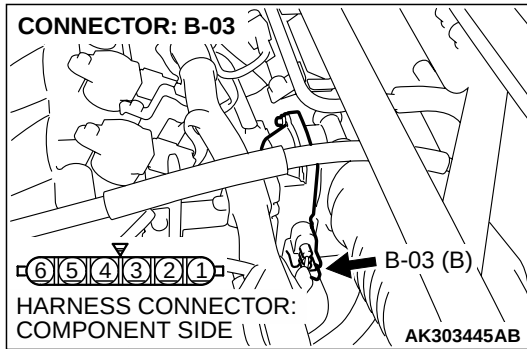
NO : Go to Step 2.

**STEP 2. Check harness connector B-03 at throttle position sensor for damage.****Q: Is the harness connector in good condition?**

YES : Go to Step 3.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then go to Step 8.





STEP 3. Check the continuity at throttle position sensor harness side connector B-03.

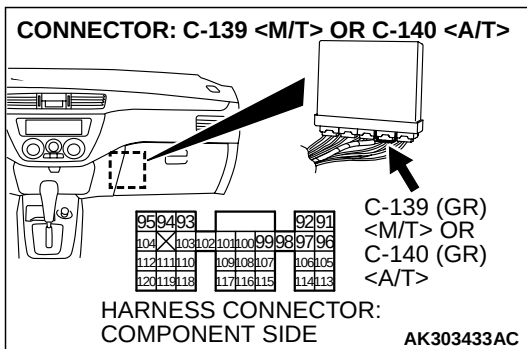
(1) Disconnect the connector B-03 and measure at the harness side.

(2) Measure the continuity between terminal No. 3 and ground.
• Should be less than 2 ohms.

Q: Does continuity exist?

YES : Go to Step 7.

NO : Go to Step 4.



STEP 4. Check harness connector C-139 at ECM <M/T> or C-140 at PCM <A/T> for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 5.

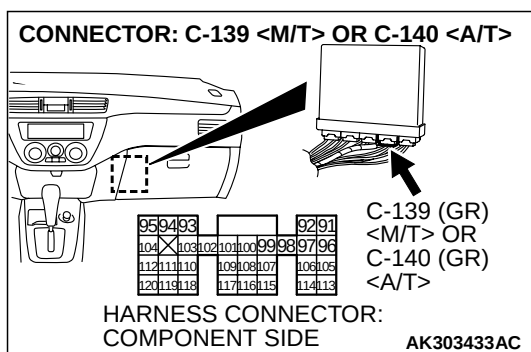
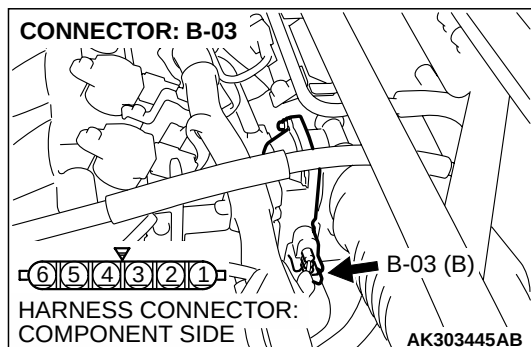
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then go to Step 8.

STEP 5. Check for open circuit and harness damage between throttle position sensor connector B-03 (terminal No. 3) and ECM connector C-139 <M/T> or PCM connector C-140 <A/T> (terminal No. 105).

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 14: Throttle Position Sensor (sub).

⚠ CAUTION

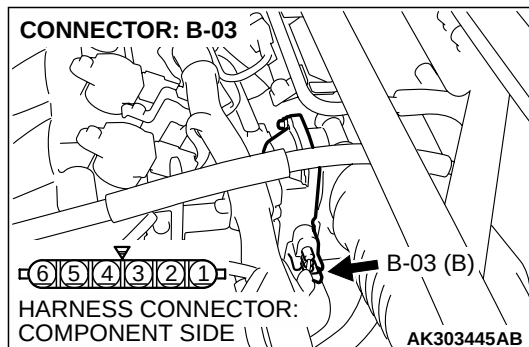
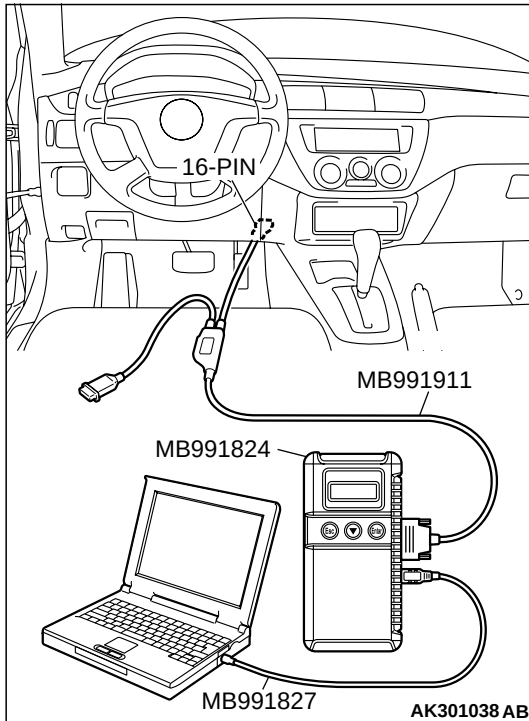
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK"(OFF) position before connecting or disconnecting scan tool MB991958

- (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 14, Throttle Position Sensor (sub).
 - Output voltage should be between 2.2 and 2.8 volts when the throttle valve is fully closed with your finger.
 - Output voltage should be 4.6 volts or more 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 [P.00-6](#).

NO : Replace the ECM or PCM. Then go to Step 8.



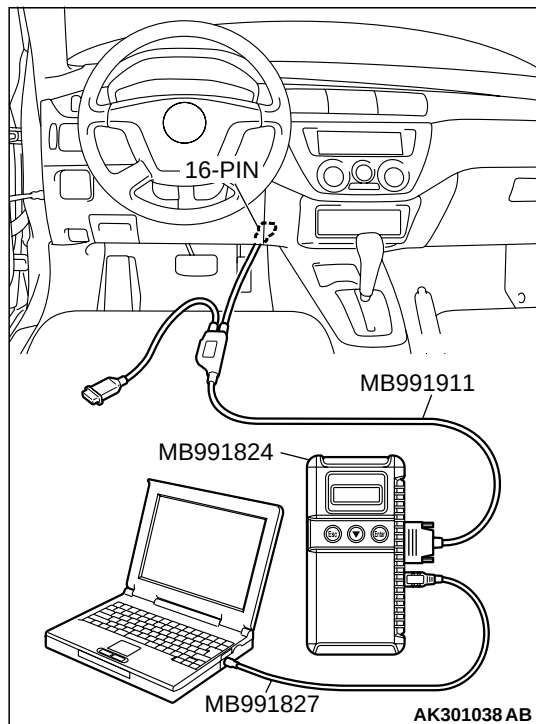
STEP 7. Replace the throttle body assembly.

- (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 P0223 set?

YES : Replace the ECM or PCM. 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 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 <M/T> or PCM <A/T> 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)

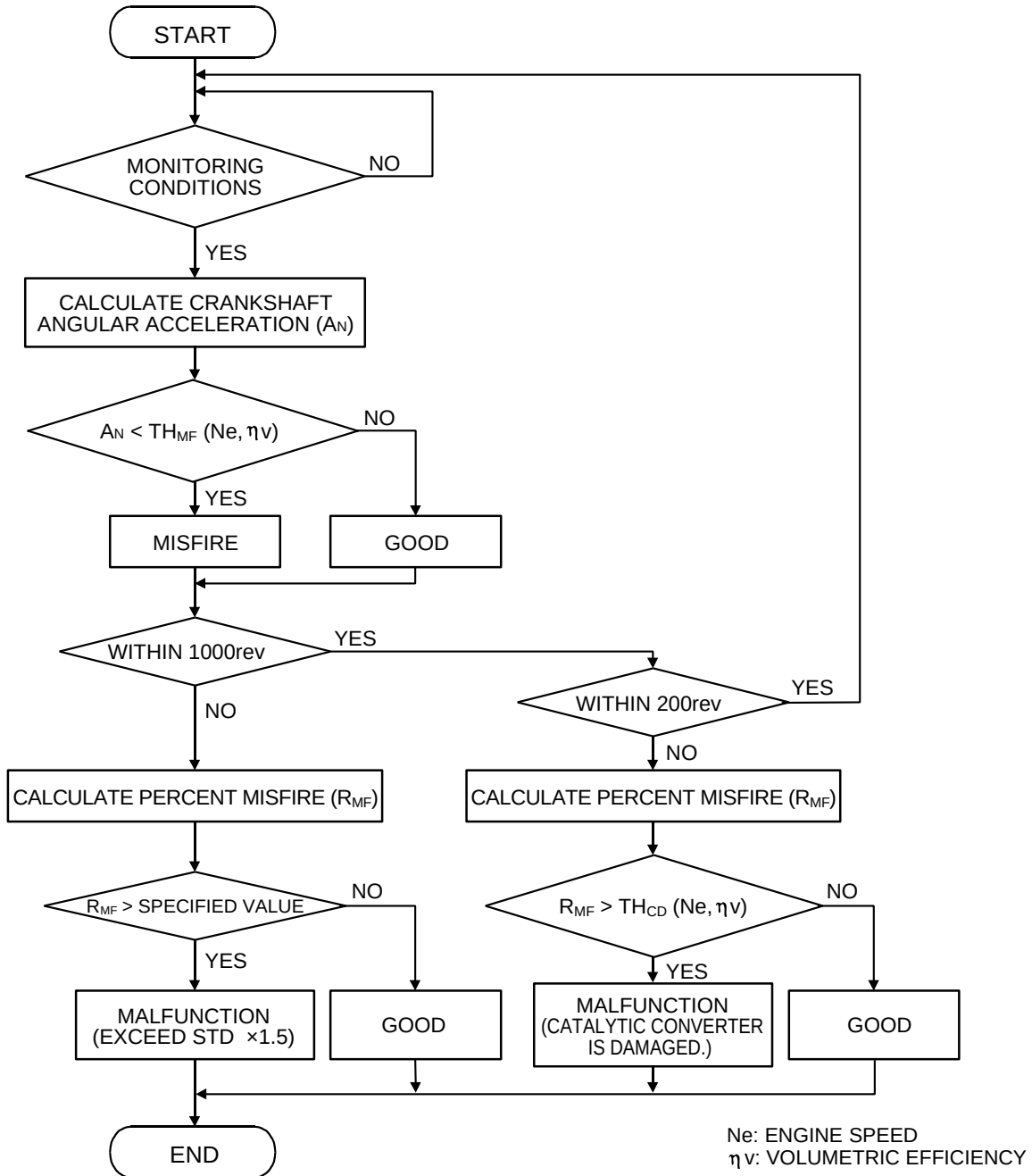
- Not applicable

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



AK302033

Check Conditions

- Engine speed is between 500 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).
- Volumetric efficiency is between 30 and 55 per-cent.
- Adaptive learning is complete for the vane which generates a crankshaft position signal.
- While the engine is running, excluding gear shifting, deceleration, sudden acceleration/deceleration and A/C compressor switching.
- The throttle deviation is $-0.6 \text{ V}/10 \text{ ms}$ to $+0.6 \text{ V}/10 \text{ ms}$.

Judgement Criteria (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 950°C (1742°F)].

or

- Misfire has occurred in 15 or more of the last 1,000 revolutions (corresponding to 1.5 times the limit of emission standard).

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function – OBD-II Drive Cycle – Procedure 6 – Other Monitor [P.13B-6](#).

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.
- Low compression pressure.
- Skipping of timing belt teeth.
- EGR system and EGR valve failed.
- ECM failed. <M/T>
- PCM failed. <A/T>

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (MUT-III Sub Assembly)
 - MB991824: V.C.I.
 - MB991827: USB Cable
 - MB991911: Main Harness B

STEP 1. Using scan tool MB991958, check data list item 22: Crankshaft Position Sensor.

⚠ CAUTION

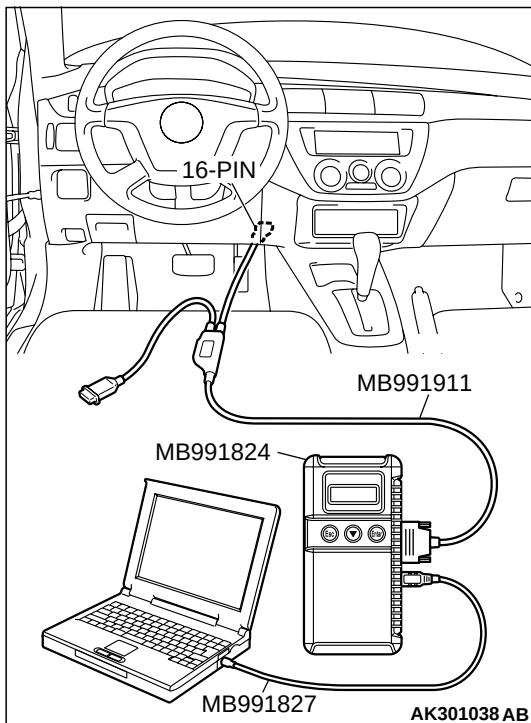
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

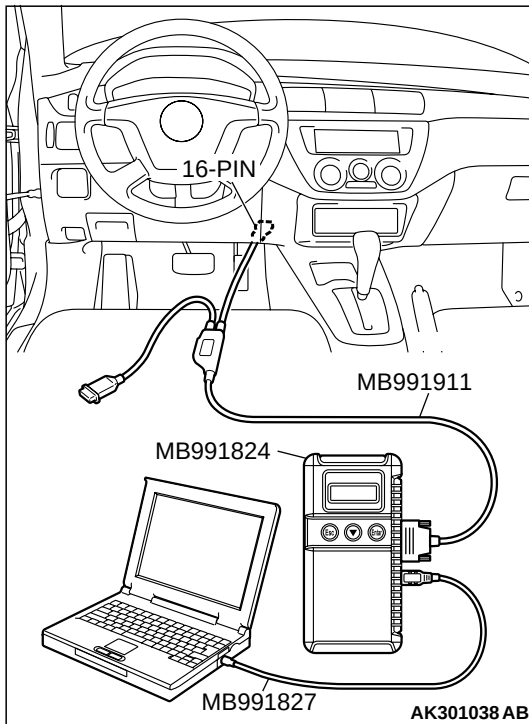
- (1) Connect scan tool MB991958 to the data link connector.
- (2) Start the engine and run at idle.
- (3) Set scan tool MB991958 to the data reading mode for item 22, Crankshaft Position Sensor.
- (4) Check the waveform of the crankshaft position sensor while keeping the engine speed constant.
 - The pulse width should be constant.
- (5) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the sensor operating properly?

YES : Go to Step 2.

NO : Refer to, DTC P0335 – Crankshaft Position Sensor Circuit [P.13B-330](#).





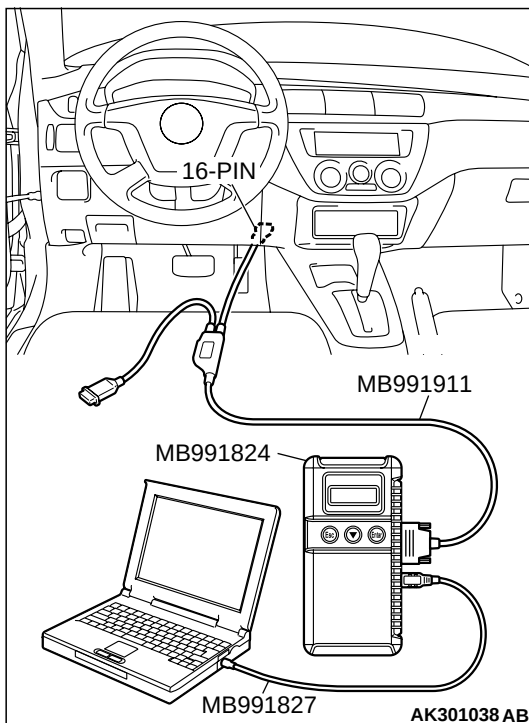
STEP 2. Using scan tool MB991958, check data list item 81: Long-Term Fuel Trim.

- (1) Start the engine and run at idle.
- (2) Set scan tool MB991958 to the data reading mode for item 81, Long-Term Fuel Trim.
 - The fuel trim should be between -12.5 and +12.5 percent when the load is 2,500 r/min (during closed loop) after the engine is warmed.
- (3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the specification normal?

YES : Go to Step 3.

NO : Refer to, DTC P0171 – System too Lean [P.13B-255](#),
DTC P0172 – System too Rich [P.13B-264](#).



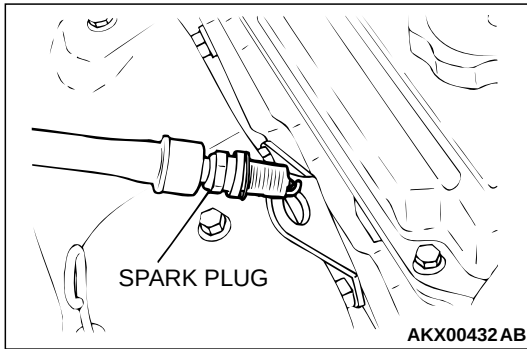
STEP 3. Using scan tool MB991958, check data list item 82: Short-Term Fuel Trim.

- (1) Start the engine and run at idle.
- (2) Set scan tool MB991958 to the data reading mode for item 82, Short-Term Fuel Trim.
 - The fuel trim should be between -25 and +25 percent when the load is 2,500 r/min (during closed loop) after the engine is warmed.
- (3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the specification normal?

YES : Go to Step 4.

NO : Refer to, DTC P0171 – System too Lean [P.13B-255](#),
DTC P0172 – System too Rich [P.13B-264](#).



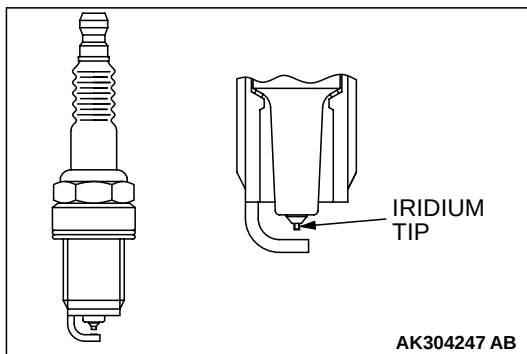
STEP 4. Check the each ignition coil spark.

- (1) Remove the spark plug and connect to the ignition coil.
- (2) 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 6.

NO : Go to Step 5.



STEP 5. Check the spark plugs.

⚠ CAUTION

Do not attempt to adjust the gap of the iridium plug. Cleaning of the iridium plug may result in damage to the iridium tip. Therefore, if carbon deposits must be removed, use a plug cleaner and complete cleaning within 20 seconds to protect the electrode. Do not use a wire brush.

- (1) Check the plug gap and replace if the limit is exceeded.

Standard value: 0.7 – 0.8 mm (0.028 – 0.031 inch)

Limit: 1.0 mm (0.039 inch)

Q: Is the plug gap at the standard value?

YES : Refer to, INSPECTION PROCEDURE 33 – Ignition Circuit System [P.13B-845](#).

NO : Replace the faulty spark plug. Then go to Step 8.

STEP 6. 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 or replace 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 – Procedure 6 – Other Monitor.
- (2) Check the diagnostic trouble code (DTC).

Q: Is DTC P0300 set?

YES : Replace the ECM or PCM. 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 [P.00-6](#).

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 – Procedure 6 – Other Monitor [P.13B-6](#).
- (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, DTC P0302: Cylinder 2 Misfire Detected, DTC P0303: Cylinder 3 Misfire Detected, 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 <M/T> or PCM <A/T> 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)**

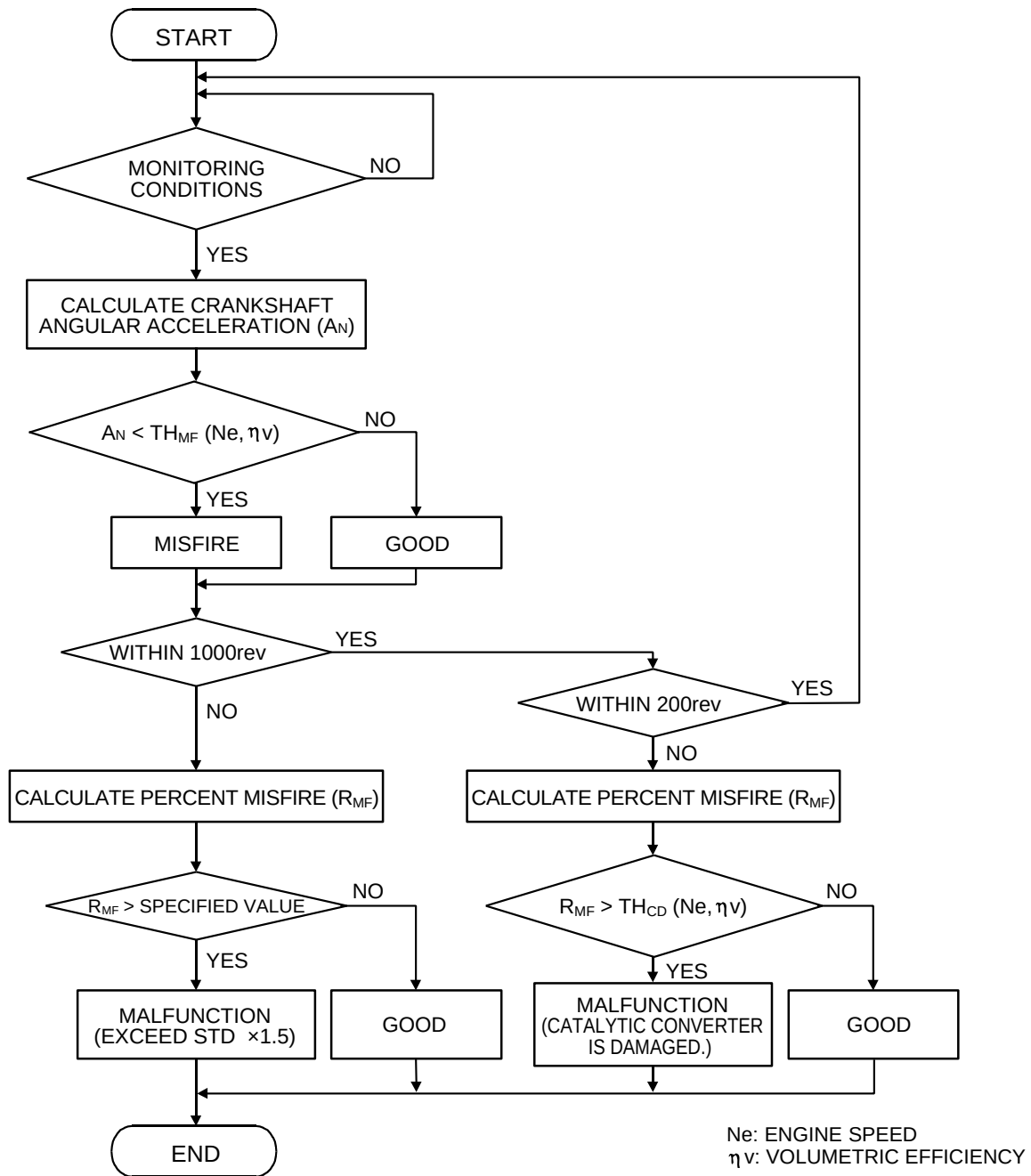
- Not applicable

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



AK302033

Check Conditions

- Engine speed is between 500 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).
- Volumetric efficiency is at between 30 and 55 percent.

- Adaptive learning is complete for the vane which generates a crankshaft position signal.
- While the engine is running, excluding gear shifting, deceleration, sudden acceleration/deceleration and A/C compressor switching.
- The throttle deviation is -0.06 V/10 ms to $+0.06$ V/10 ms.

Judgement Criteria (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 950°C (1,742°F)].

or

- Misfire has occurred in 15 or more of the last 1,000 revolutions (corresponding to 1.5 times the limit of emission standard).

OBD-II DRIVE CYCLE PATTERN

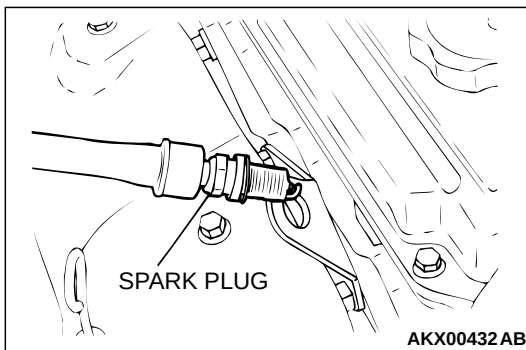
Refer to Diagnostic Function – OBD-II Drive Cycle – Procedure 6 – Other Monitor [P.13B-6](#).

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

- Ignition system related part(s) failed.
- Low compression pressure.
- ECM failed. <M/T>
- PCM failed. <A/T>

DIAGNOSIS**STEP 1. Check the ignition coil spark.**

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

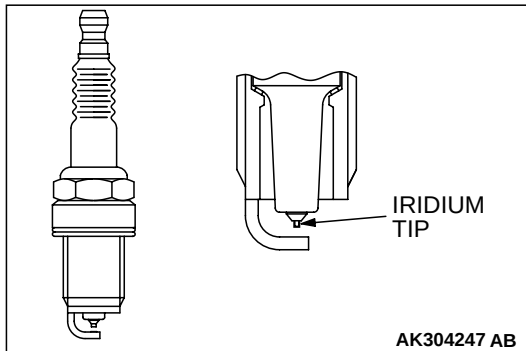
Q: Did it spark?**YES** : Go to Step 3.**NO** : Go to Step 2.**STEP 2. Check the spark plugs.****⚠ CAUTION**

Do not attempt to adjust the gap of the iridium plug. Cleaning of the iridium plug may result in damage to the iridium tip. Therefore, if carbon deposits must be removed, use a plug cleaner and complete cleaning within 20 seconds to protect the electrode. Do not use a wire brush.

- (1) Check the plug gap and replace if the limit is exceeded.

Standard value: 0.7 – 0.8 mm (0.028 – 0.031 inch)**Limit: 1.0 mm (0.039 inch)****Q: Is the plug gap at the standard value?****YES** : Refer to, INSPECTION PROCEDURE 33 – Ignition Circuit System [P.13B-845](#).**NO** : Replace the spark plug. Then go to Step 5.**STEP 3. Check the compression.**

Refer to GROUP11C, On-Vehicle Service – Compression Pressure Check [P.11C-15](#).

Q: Are there any abnormalities?**YES** : Repair or replace 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 – Procedure 6 – Other Monitor [P.13B-6](#).
- (2) Check the diagnostic trouble code (DTC).

Q: Are DTC P0301, P0302, P0303 and P0304 set?

YES : Replace the ECM or PCM. Then go to Step 5.

NO : It can be assumed that this malfunction is intermittent.
Refer to GROUP 00, How to Use
Troubleshooting/Inspectu in Service Points [P.00-6](#).

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 – Procedure 6 – Other Monitor [P.13B-6](#).
- (2) Check the diagnostic trouble code (DTC).

Q: Are DTC P0301, P0302, P0303 and P0304 set?

YES : Retry the troubleshooting.

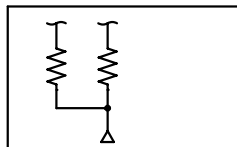
NO : The inspection is complete.

DTC P0325: Knock Sensor Circuit

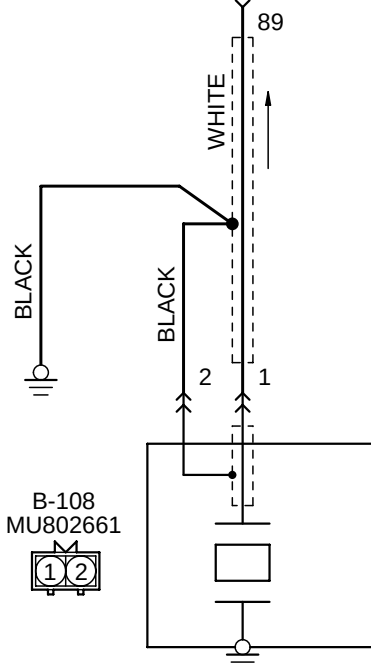
Knock Sensor Circuit

C-137 <M/T> OR
C-138 <A/T>
(MU803804)

61	62			63	64
65	66	67	68	69	70
71	72	73	74	75	76
77	78	79	80	81	82
83	84	85	86	87	88
89					

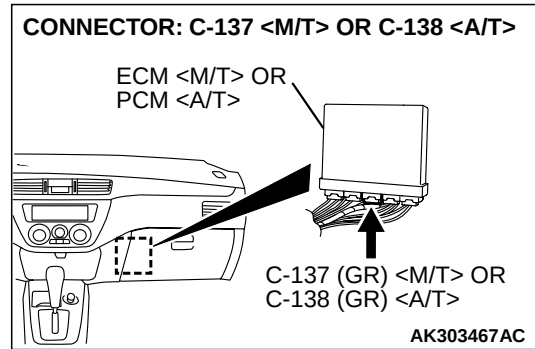
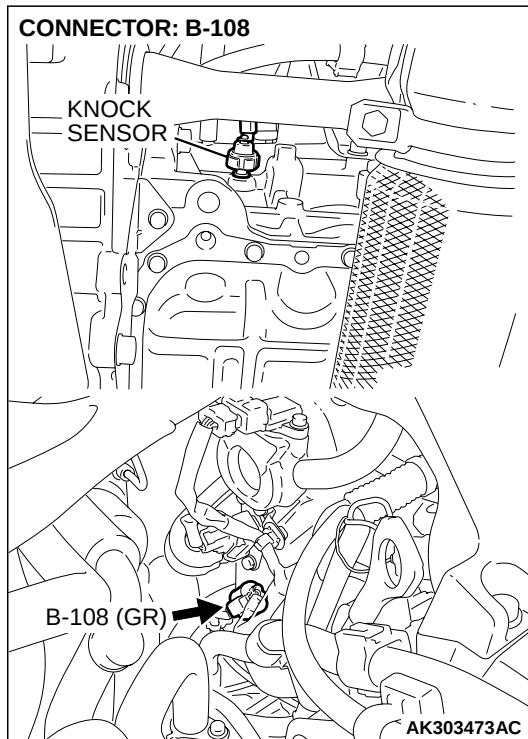


ENGINE CONTROL
MODULE (ECM) <M/T> OR
POWERTRAIN CONTROL
MODULE (PCM) <A/T>



KNOCK SENSOR

AK303990



CIRCUIT OPERATION

- The knock sensor sends a signal voltage to the ECM <M/T> or PCM <A/T> (terminal No. 89).

TECHNICAL DESCRIPTION

- The knock sensor converts the vibration of the cylinder block into a voltage and outputs it. If there is a malfunction of the knock sensor, the voltage output will not change.
- The ECM <M/T> or PCM <A/T> checks whether the voltage output changes.

DTC SET CONDITIONS

Check Conditions

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

- Engine speed is higher than 2,500 r/min.

Judgment Criteria

- Knock sensor output voltage (knock sensor peak voltage in each 1/2 turn of the crankshaft) has not changed more than 0.06 volt in the last consecutive 200 periods.

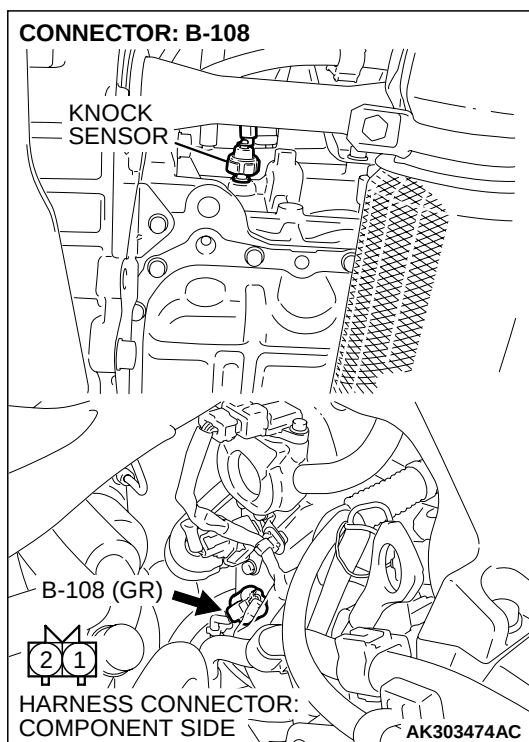
TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)

- Knock sensor failed.
- Open or shorted knock sensor circuit, harness damage or connector damage.
- ECM failed. <M/T>
- PCM failed. <A/T>

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (MUT-III Sub Assembly)
 - MB991824: V.C.I.
 - MB991827: USB Cable
 - MB991911: Main Harness B



STEP 1. Check harness connector B-108 at the knock sensor for damage.

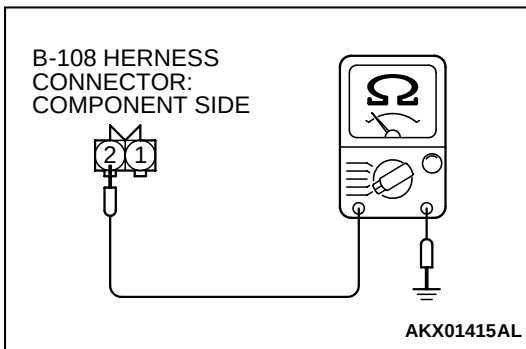
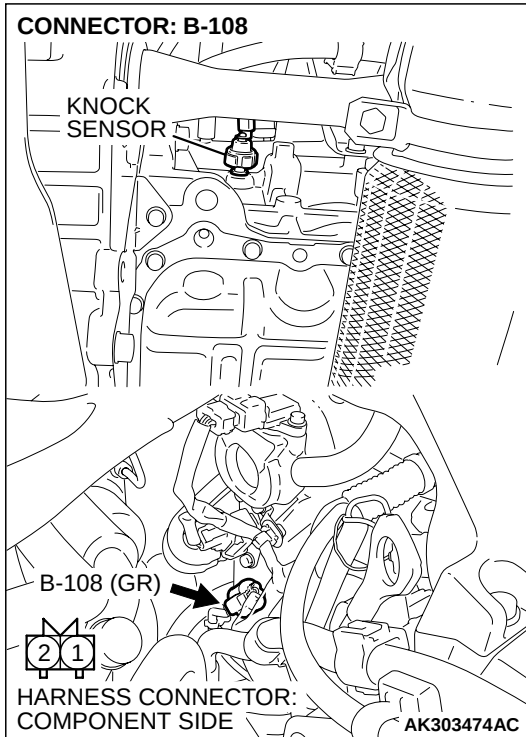
Q: Is the harness connector in good condition?

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. Check the continuity at knock sensor harness side connector B-108.

(1) Disconnect the connector B-108 and measure at the harness side.



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

- Should be less than 2 ohms.

Q: Does continuity exist?

YES : Go to Step 3.

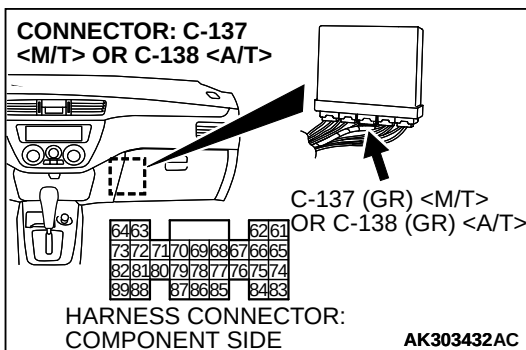
NO : Repair harness wire between knock sensor connector B-108 (terminal No. 2) and ground because of open circuit or harness damage. Then go to Step 6.

STEP 3. Check harness connector C-137 at ECM <M/T> or C-138 at PCM <A/T> for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 4.

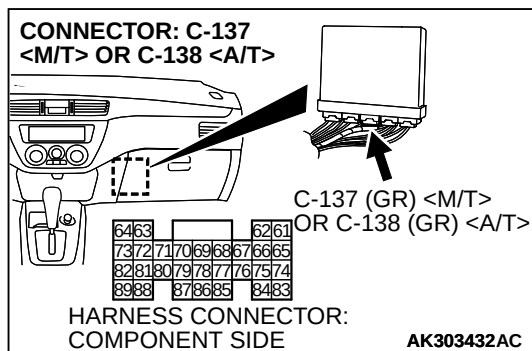
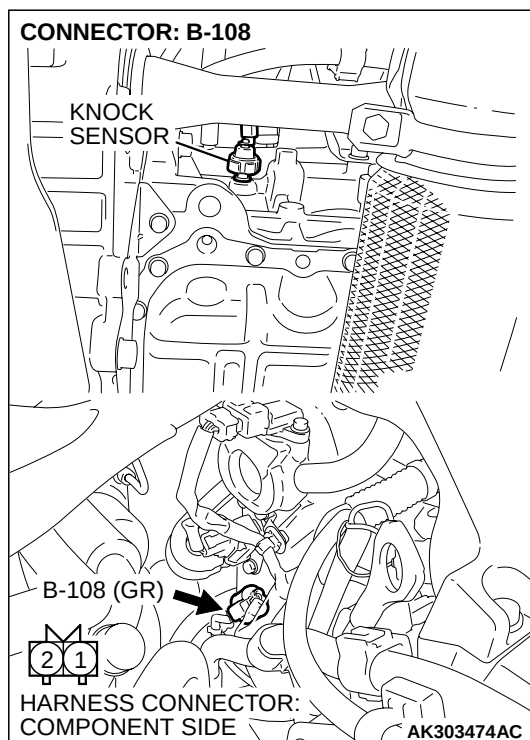
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then go to Step 6.

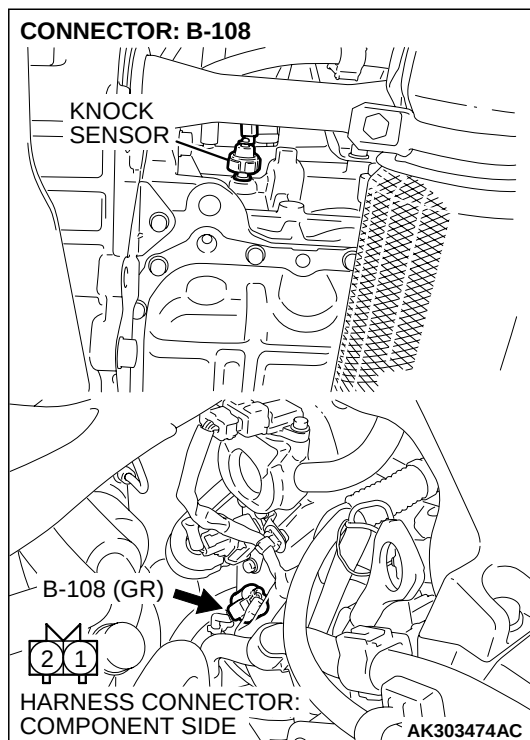


STEP 4. Check for open circuit and short circuit to ground and harness damage between knock sensor connector B-108 (terminal No. 1) and ECM connector C-137 <M/T> or PCM connector C-138 <A/T> (terminal No. 89).
Q: Is the harness wire in good condition?

YES : Go to Step 5.

NO : Repair it. Then go to Step 6.



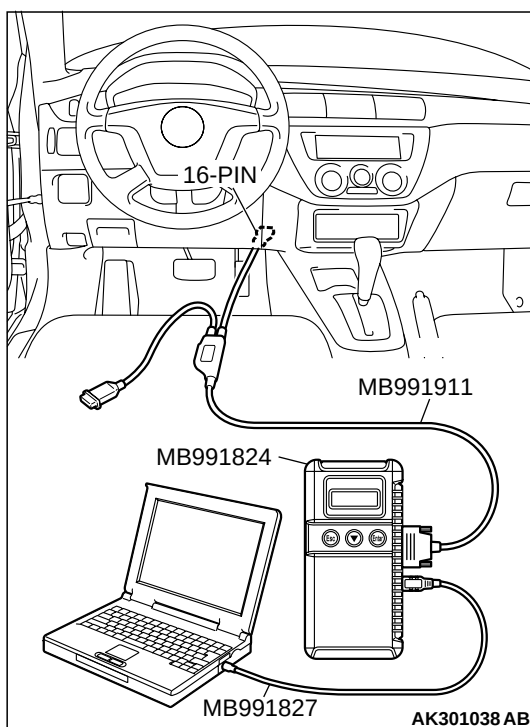


STEP 5. Check the knock sensor.

- (1) Disconnect the knock sensor connector B-108.
- (2) Start the engine and run at idle.
- (3) Measure the voltage between knock sensor side connector terminal No. 1 (output) and No. 2 (ground).
- (4) Gradually increase the engine speed.
 - The voltage increases with the increase in the engine speed.
- (5) Turn the ignition switch to the "LOCK"(OFF) position.

Q: Is the sensor operating properly?

- YES** : Replace the ECM or PCM. Then go to Step 6.
- NO** : Replace the knock sensor. Then go to Step 6.



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.

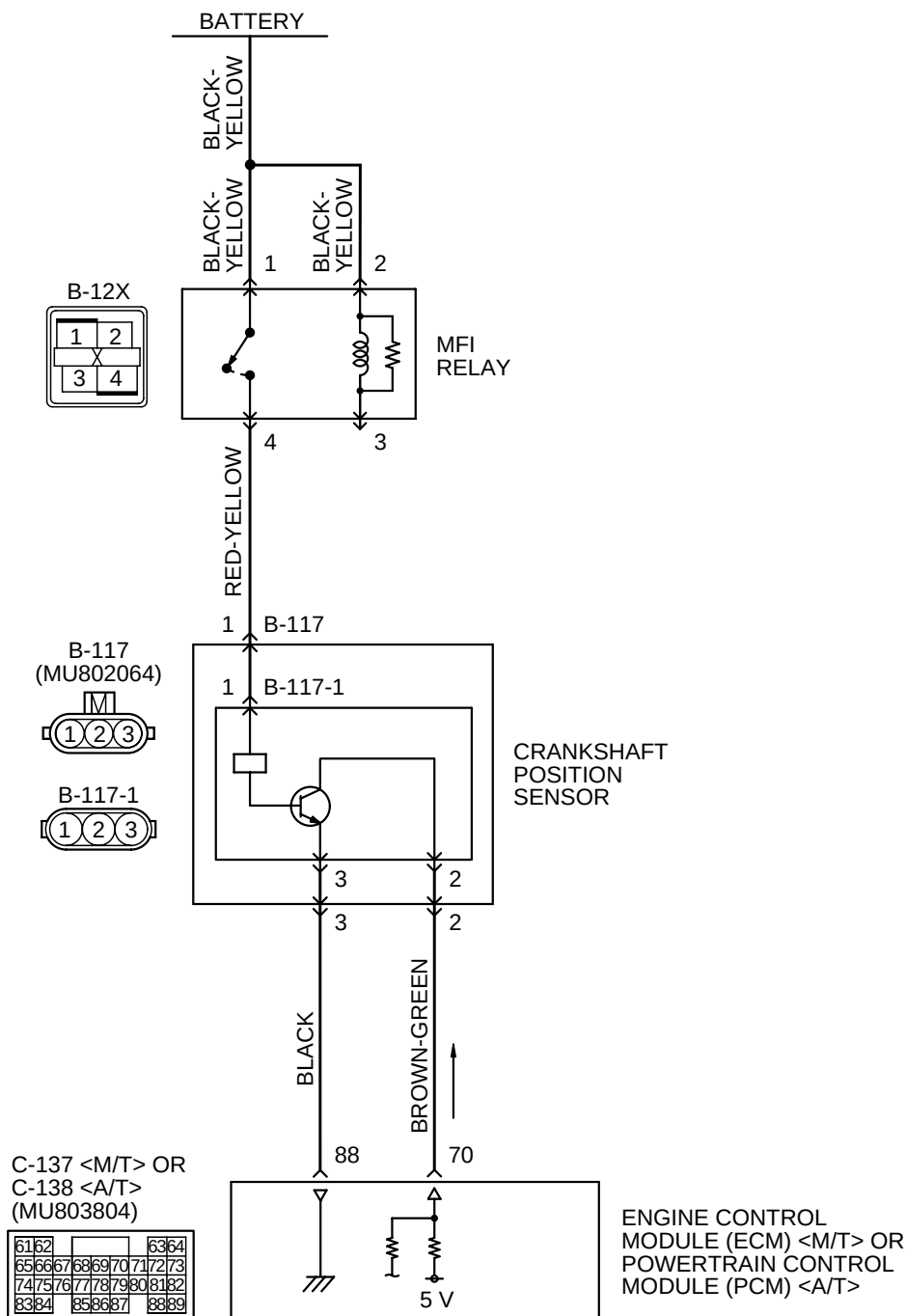
- (1) Connect scan tool MB991958 to the data link connector.
- (2) Turn the ignition switch to the "ON" position.
- (3) Erase the DTC.
- (4) Test drive under the following conditions:
 - Engine speed: 3000 – 5000r/min
 - Engine load : 40 % or more
 - Drive a minimum of 3 seconds after the above conditions have been met.
- (5) After completing the test drive, read the DTC. Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is DTC P0325 set?

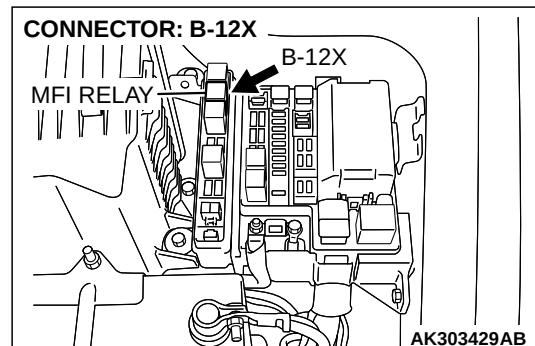
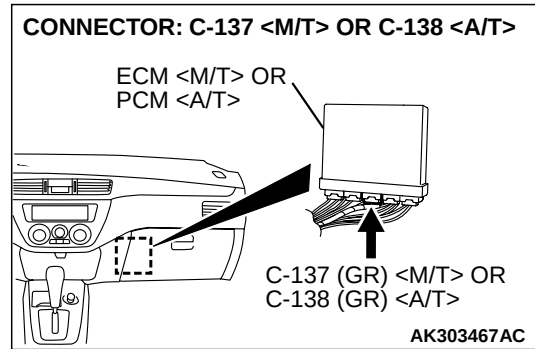
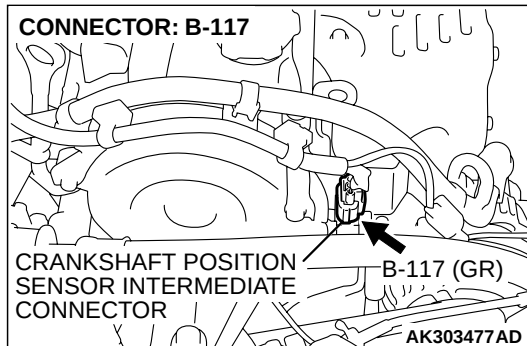
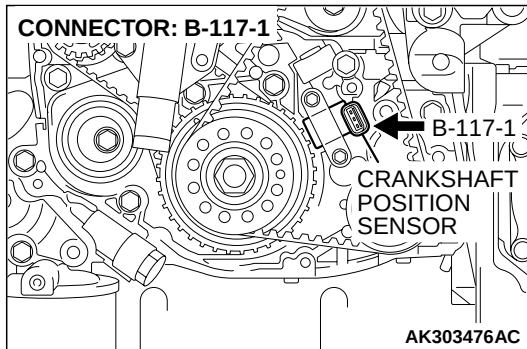
- YES** : Retry the troubleshooting.
- NO** : The inspection is complete.

DTC P0335: Crankshaft Position Sensor Circuit

Crankshaft Position Sensor Circuit



AK303991



CIRCUIT OPERATION

- The crankshaft position sensor power is supplied from the MFI relay (terminal No. 4).
- Terminal No. 3 of the crankshaft position sensor is grounded with ECM <M/T> or PCM <A/T> (terminal No. 88).
- A 5-volt voltage is applied on the crankshaft position sensor output terminal (terminal No. 2) from the ECM <M/T> or PCM <A/T> (terminal No. 70). The crankshaft position sensor generates a pulse signal when the output terminal is opened and grounded.

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 <M/T> or PCM <A/T>.
- When the engine is running, the crankshaft position sensor outputs a pulse signal.

- The ECM <M/T> or PCM <A/T> 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)

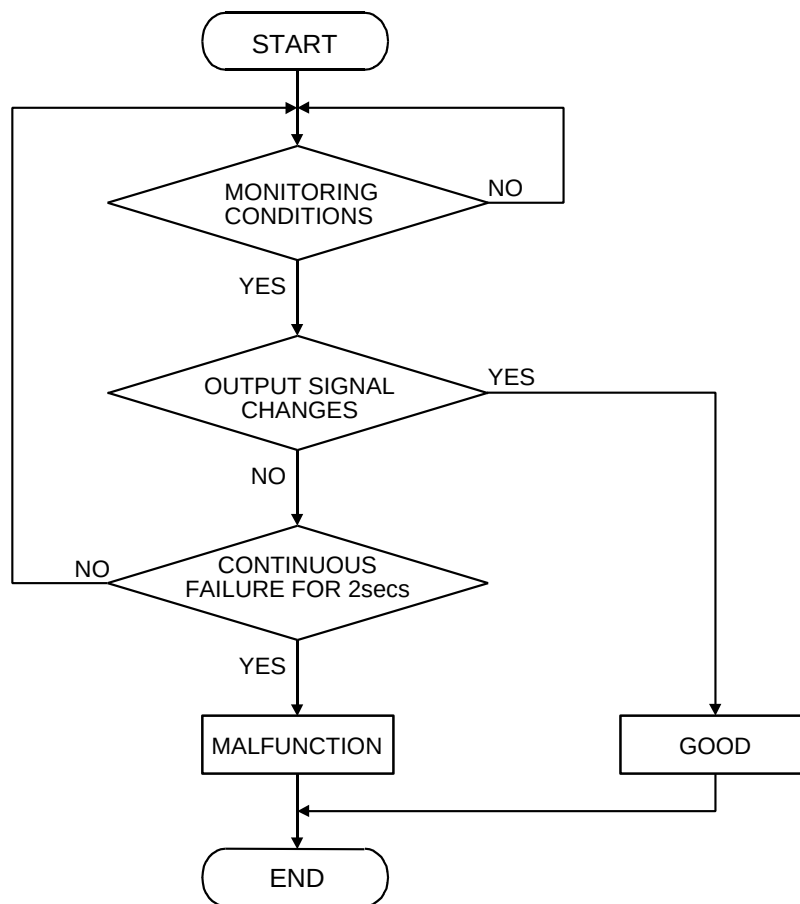
- Not applicable

Sensor (The sensor below is determined to be normal)

- Not applicable

DTC SET CONDITIONS <Circuit continuity>

Logic Flow Chart



AK302034

Check Conditions

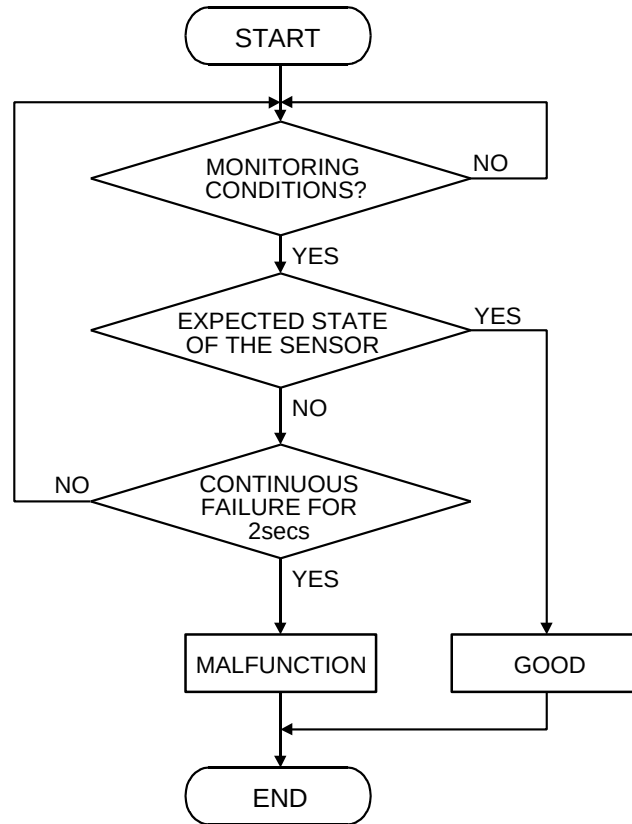
- Engine is being cranked.

Judgment Criteria

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

DTC SET CONDITIONS <Range/Performance problem – alignment>

Logic Flow Chart



AK302035

Check Conditions, Judgment Criteria

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

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function – OBD-II Drive Cycle –
Procedure 6 – Other Monitor [P.13B-6](#).

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

- Crankshaft position sensor failed.
- Open or shorted crankshaft position sensor circuit, or harness damage, or connector damage.
- ECM failed. <M/T>
- PCM failed. <A/T>

DIAGNOSIS**Required Special Tools:**

- MB991958: Scan Tool (MUT-III Sub Assembly)
 - MB991824: V.C.I.
 - MB991827: USB Cable
 - MB991911: Main Harness B
- MB991658: Test Harness

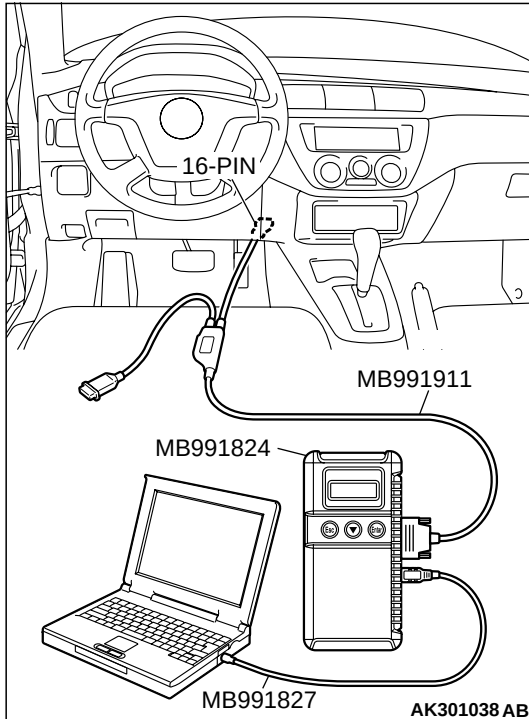
STEP 1. Using scan tool MB991958, check data list item 22: Crankshaft Position Sensor.**⚠ CAUTION**

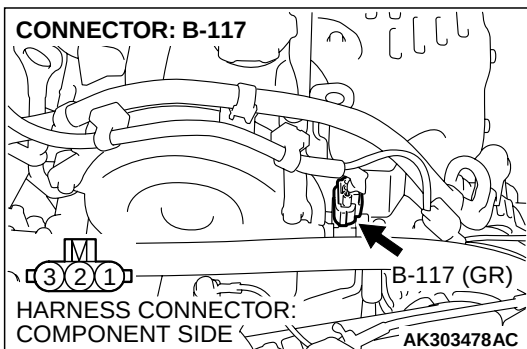
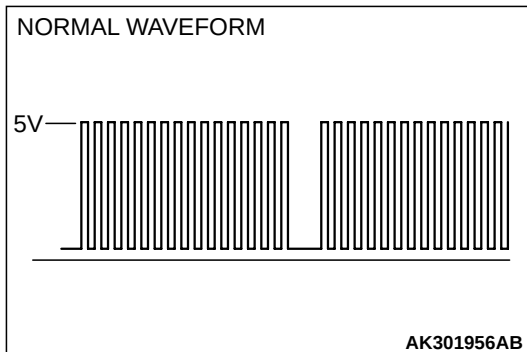
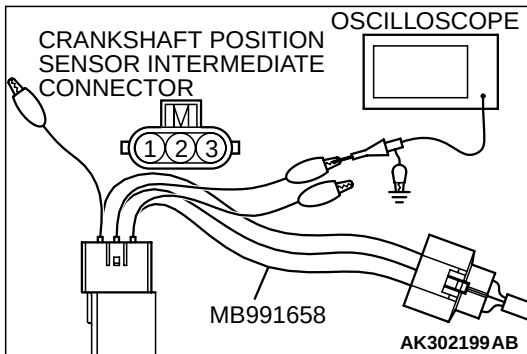
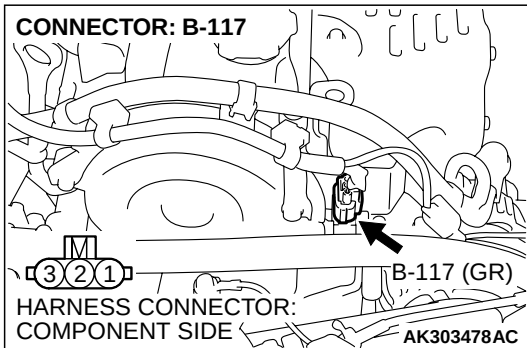
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

- (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 22, 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 [P.00-6](#).
- NO :** Go to Step 2.





STEP 2. Using the oscilloscope, check the crankshaft position sensor.

(1) Disconnect the crankshaft position sensor intermediate connector B-117 and connect the test harness special tool (MB991658) between the separated connectors.

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

NOTE: Connect the oscilloscope probe to terminal No. 70 by backprobing when measuring with the PCM connector.

(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 3.

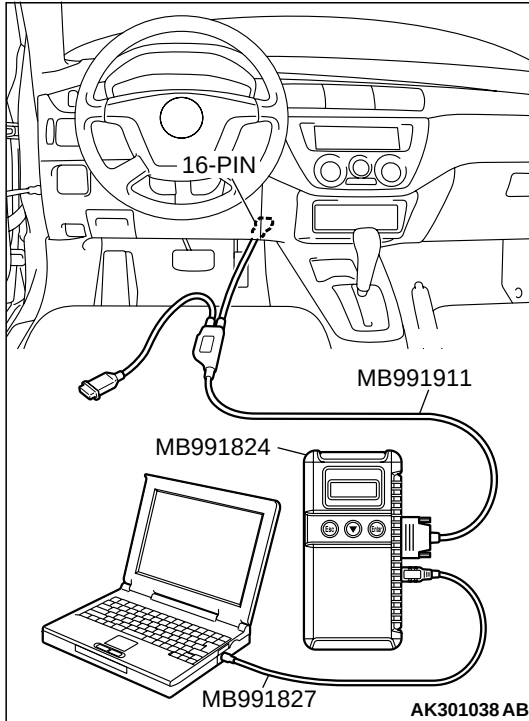
NO : Go to Step 5.

STEP 3. Check harness connector B-117 at the crankshaft position sensor intermediate connector for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 4.

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



STEP 4. Using scan tool MB991958, check data list item 22: Crankshaft Position Sensor.

⚠ CAUTION

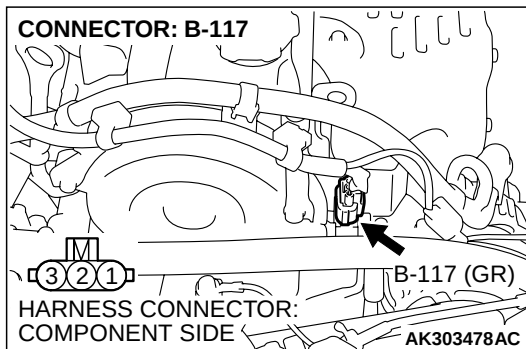
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

- (1) Connect scan tool MB991958 to the data link connector.
- (2) Turn the ignition switch to the "ON" position.
- (3) Set scan tool MB991958 to the data reading mode for item 22, 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 [P.00-6](#).

NO : Replace the ECM or PCM. Then go to Step 22.

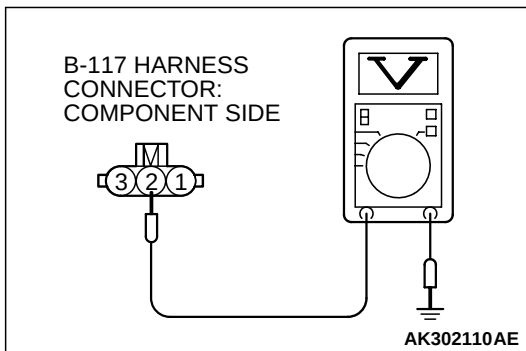
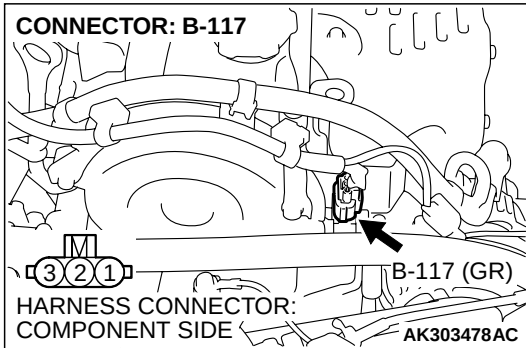


STEP 5. Check harness connector B-117 at the crankshaft position sensor intermediate connector for damage.

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 22.



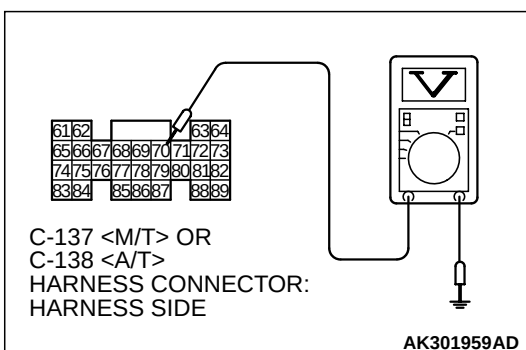
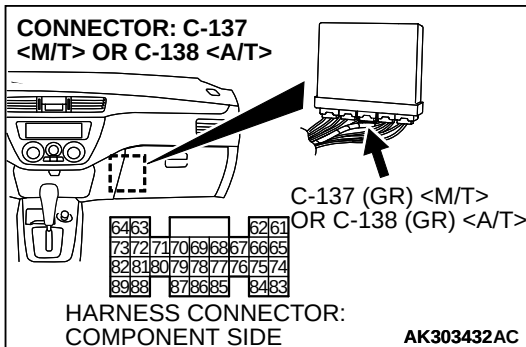
STEP 6. Measure the sensor supply voltage at crankshaft position sensor intermediate harness side connector B-117.

- (1) Disconnect the connector B-117 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 between 4.8 and 5.2 volts.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the measured voltage between 4.8 and 5.2 volts?

- YES :** Go to Step 11.
NO : Go to Step 7.



STEP 7. Measure the sensor supply voltage at ECM connector C-137 <M/T> or PCM connector C-138 <A/T> by backprobing.

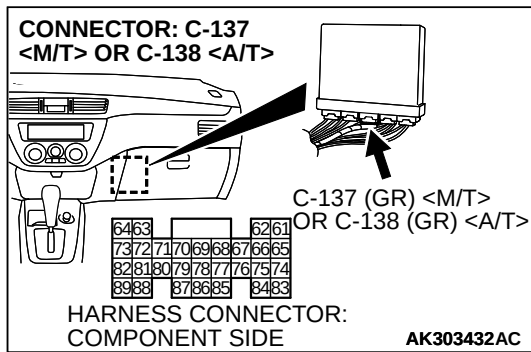
- (1) Do not disconnect the ECM connector C-137 <M/T> or PCM connector C-138 <A/T>.
- (2) Disconnect the crankshaft position sensor intermediate connector B-117.
- (3) Turn the ignition switch to the "ON" position.

- (4) Measure the voltage between terminal No. 70 and ground by backprobing.
 - Voltage should be between 4.8 and 5.2 volts.

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

Q: Is the measured voltage between 4.8 and 5.2 volts?

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

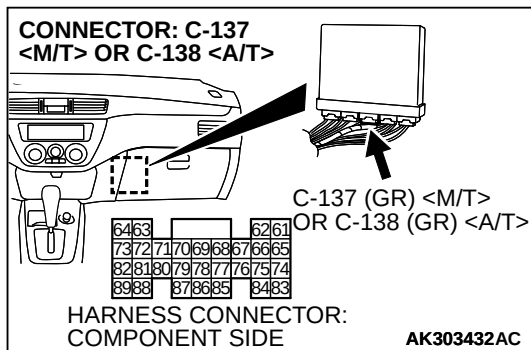


STEP 8. Check harness connector C-137 at ECM <M/T> or C-138 at PCM <A/T> for damage.

Q: Is the harness connector in good condition?

YES : Repair harness wire between crankshaft position sensor connector B-117 (terminal No. 2) and ECM connector C-137 <M/T> or PCM connector C-138 <A/T> (terminal No. 70) because of open circuit. Then go to Step 22.

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



STEP 9. Check harness connector C-137 at ECM <M/T> or C-138 at PCM <A/T> for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 10.

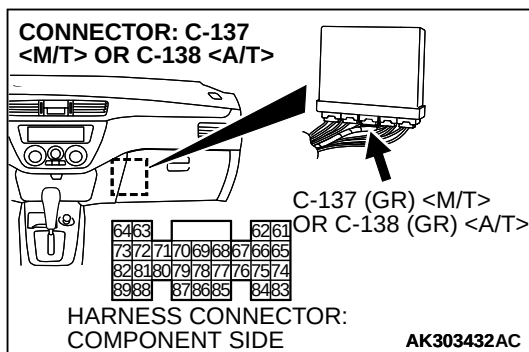
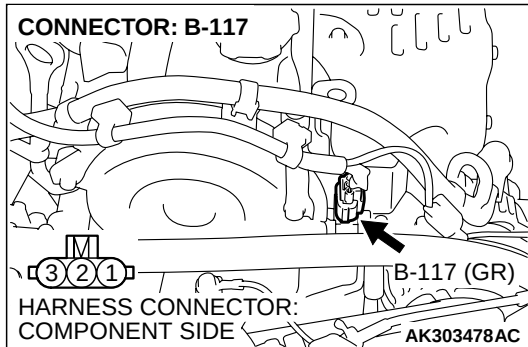
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then go to Step 22.

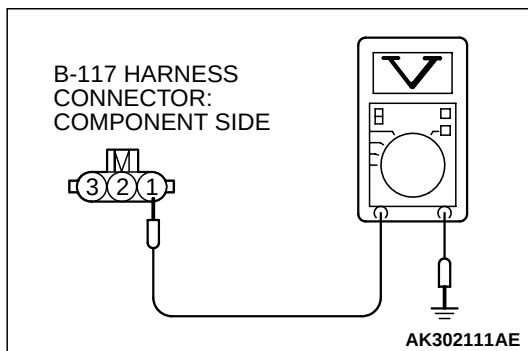
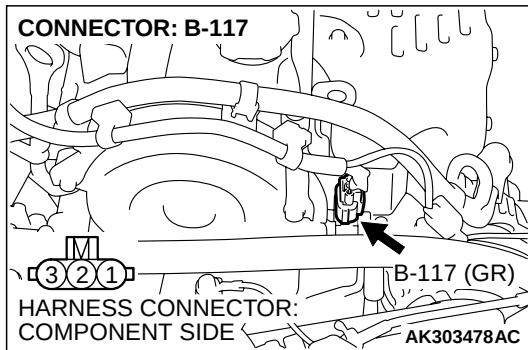
STEP 10. Check for short circuit to ground between crankshaft position sensor intermediate connector B-117 (terminal No. 2) and ECM connector C-137 <M/T> or PCM connector C-138 <A/T> (terminal No. 70).

Q: Is the harness wire in good condition?

YES : Replace the ECM or PCM. Then go to Step 22.

NO : Repair it. Then go to Step 22.





STEP 11. Measure the power supply voltage at crankshaft position sensor intermediate harness side connector B-117.

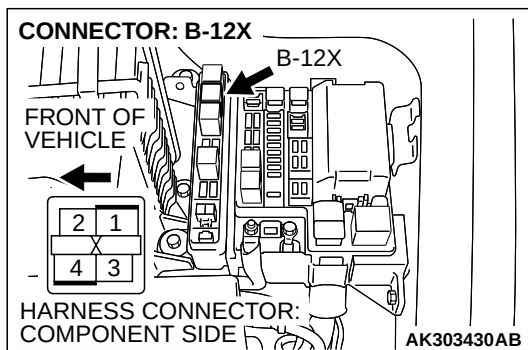
- (1) Disconnect the connector B-117 and measure at the harness side.
- (2) Turn the ignition switch to the "ON" position.

- (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 13.

NO : Go to Step 12.

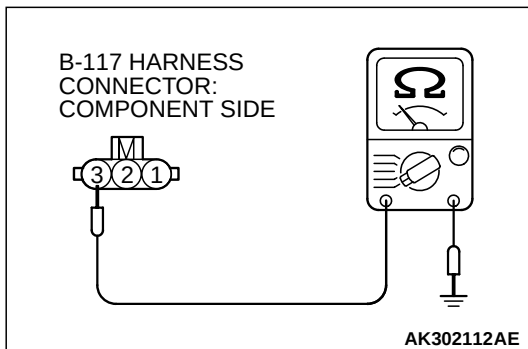
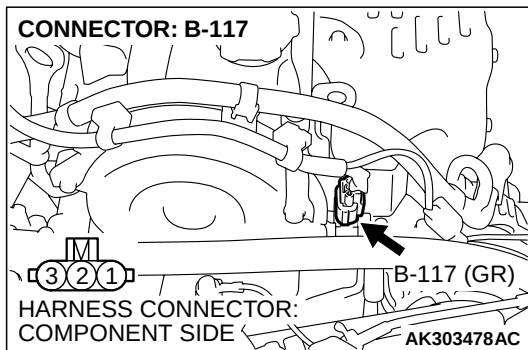


STEP 12. Check harness connector B-12X at MFI relay for damage.

Q: Is the harness connector in good condition?

YES : Repair harness wire between MFI relay connector B-12X (terminal No. 4) and crankshaft position sensor intermediate connector B-117 (terminal No. 1) because of open circuit or short circuit to ground. Then go to Step 22.

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



STEP 13. Check the continuity at crankshaft position sensor intermediate harness side connector B-117.

(1) Disconnect the connector B-117 and measure at the harness side.

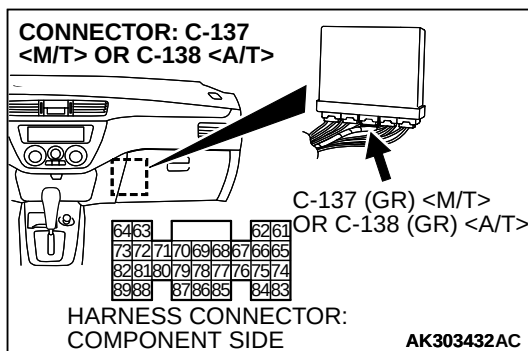
(2) Check for the continuity between terminal No. 3 and ground.

- Should be less than 2 ohms.

Q: Does continuity exist?

YES : Go to Step 16.

NO : Go to Step 14.



STEP 14. Check harness connector C-137 at ECM <M/T> or C-138 at PCM <A/T> for damage.

Q: Is the harness connector in good condition?

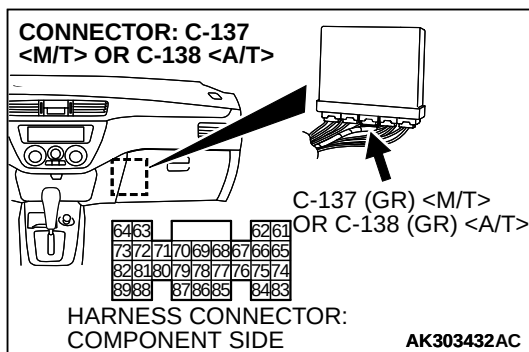
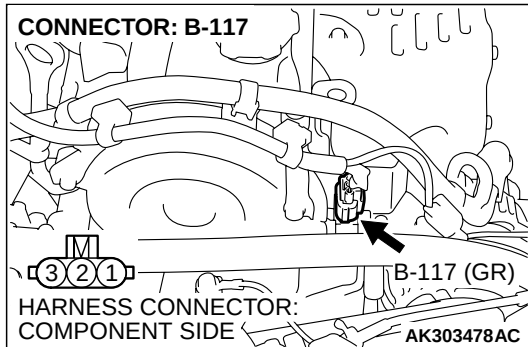
YES : Go to Step 15.

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

STEP 15. Check for open circuit and harness damage between crankshaft position sensor intermediate connector B-117 (terminal No. 3) and ECM connector C-137 <M/T> or PCM connector C-138 <A/T> (terminal No. 88).
Q: Is the harness wire in good condition?

YES : Replace the ECM or PCM. Then go to Step 22.

NO : Repair it. Then go to Step 22.

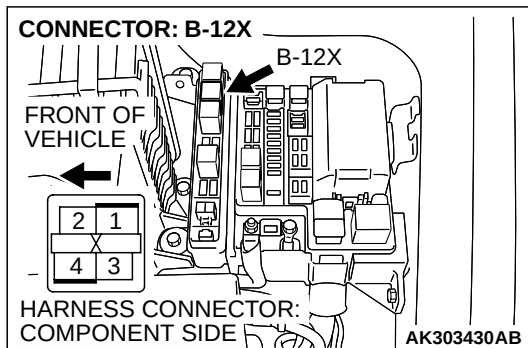


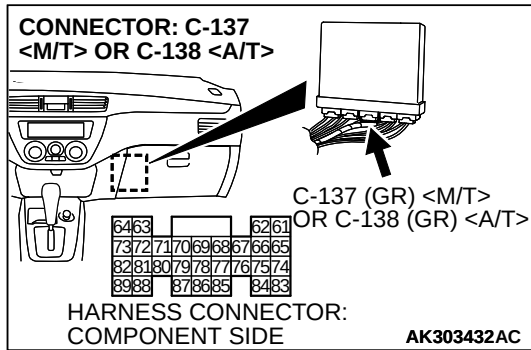
STEP 16. Check harness connector B-12X at the MFI relay for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 17.

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



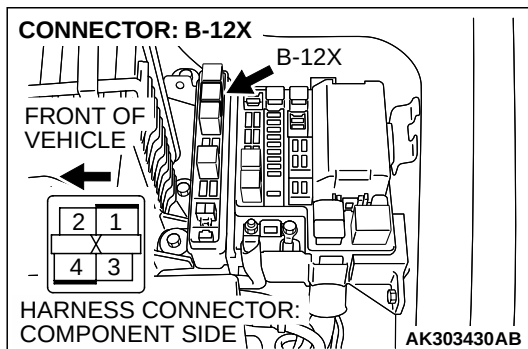


STEP 17. Check harness connector C-137 at ECM <M/T> or C-138 at PCM <A/T> for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 18.

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

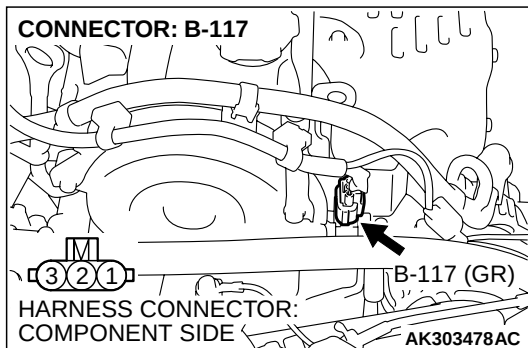


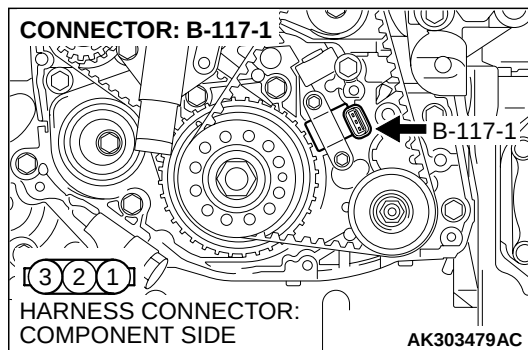
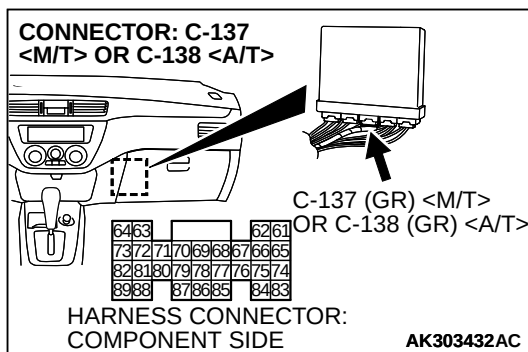
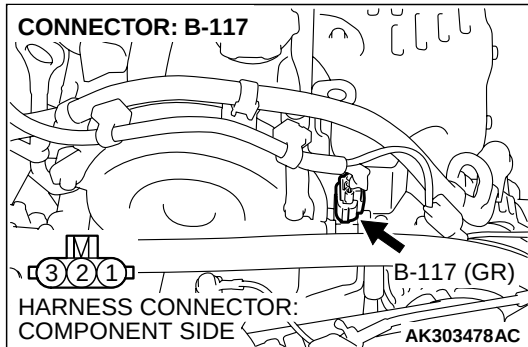
STEP 18. Check for harness damage between MFI relay connector B-12X (terminal No. 4) and crankshaft position sensor intermediate connector B-117 (terminal No. 1).

Q: Is the harness wire in good condition?

YES : Go to Step 19.

NO : Repair it. Then go to Step 22.





STEP 19. Check for harness damage between crankshaft position sensor intermediate connector B-117 (terminal No. 2) and ECM connector C-137 <M/T> or PCM connector C-138 <A/T> (terminal No. 70).

Q: Is the harness wire in good condition?

YES : Go to Step 20.

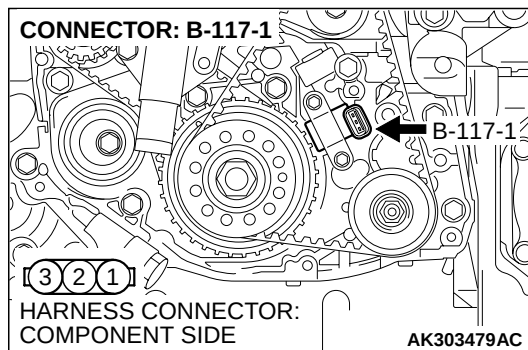
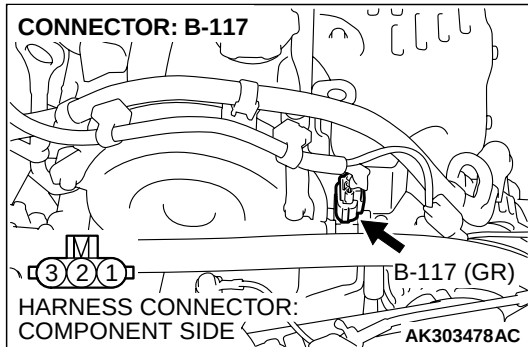
NO : Repair it. Then go to Step 22.

STEP 20. Check harness connector B-117-1 at crankshaft position sensor for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 21.

NO : Repair or replace the timing belt cover (lower). Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then go to Step 22.



STEP 21. Check for open circuit and short circuit to ground and harness damage between crankshaft position sensor intermediate connector B-117 and crankshaft position sensor connector B-117-1.

Q: Is the harness wire in good condition?

YES : Replace the crankshaft position sensor. Then go to Step 22.

NO : Replace the timing belt cover (lower). Then go to Step 22.

STEP 22. Test the OBD-II drive cycle.

(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function – OBD-II Drive Cycle – Procedure 6 – Other Monitor [P.13B-6](#).

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

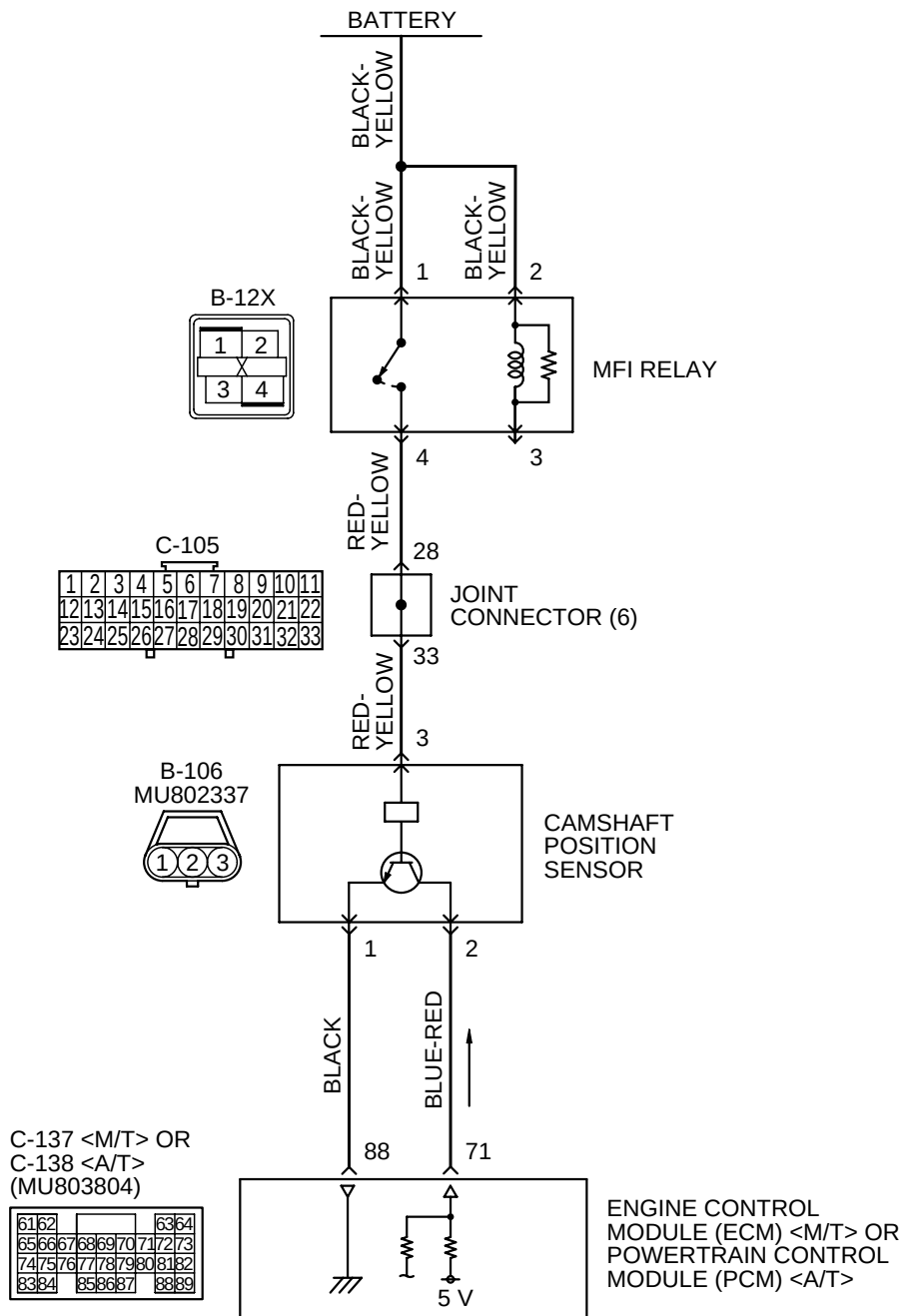
Q: Is DTC P0335 set?

YES : Retry the troubleshooting.

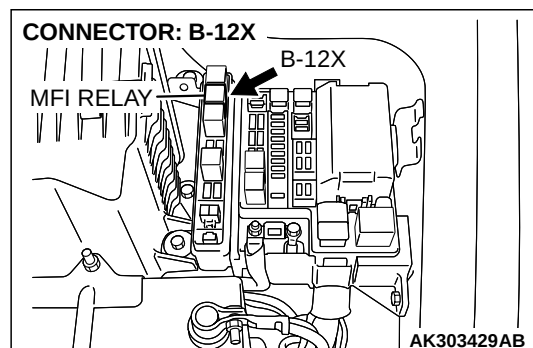
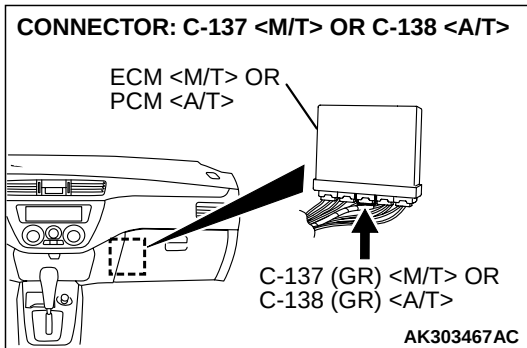
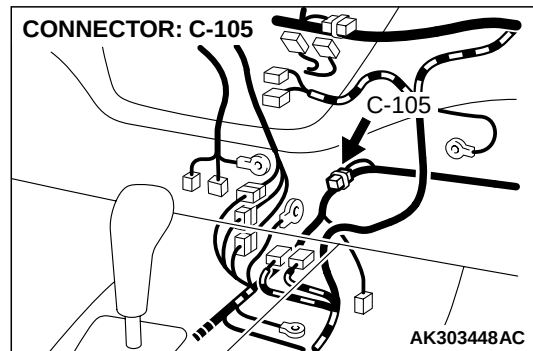
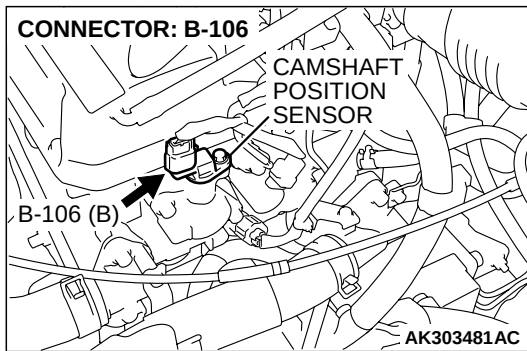
NO : The inspection is complete.

DTC P0340: Camshaft Position Sensor Circuit

Camshaft Position Sensor Circuit



AK303992



CIRCUIT OPERATION

- The camshaft position sensor power is supplied from the MFI relay (terminal No. 4).
- Terminal No. 1 of the camshaft position sensor is grounded with ECM <M/T> or PCM <A/T> (terminal No. 88).
- A 5-volt voltage is applied on the camshaft position sensor output terminal (terminal No. 2) from the ECM <M/T> or PCM <A/T> (terminal No. 71). 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 <M/T> or PCM <A/T>.
- When the engine is running, the camshaft position sensor outputs a pulse signal.

- The ECM <M/T> or PCM <A/T> checks whether pulse signal is input while the engine is cranking.

DESCRIPTIONS OF MONITOR METHODS

- Camshaft position sensor signal does not change.
- Camshaft 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)

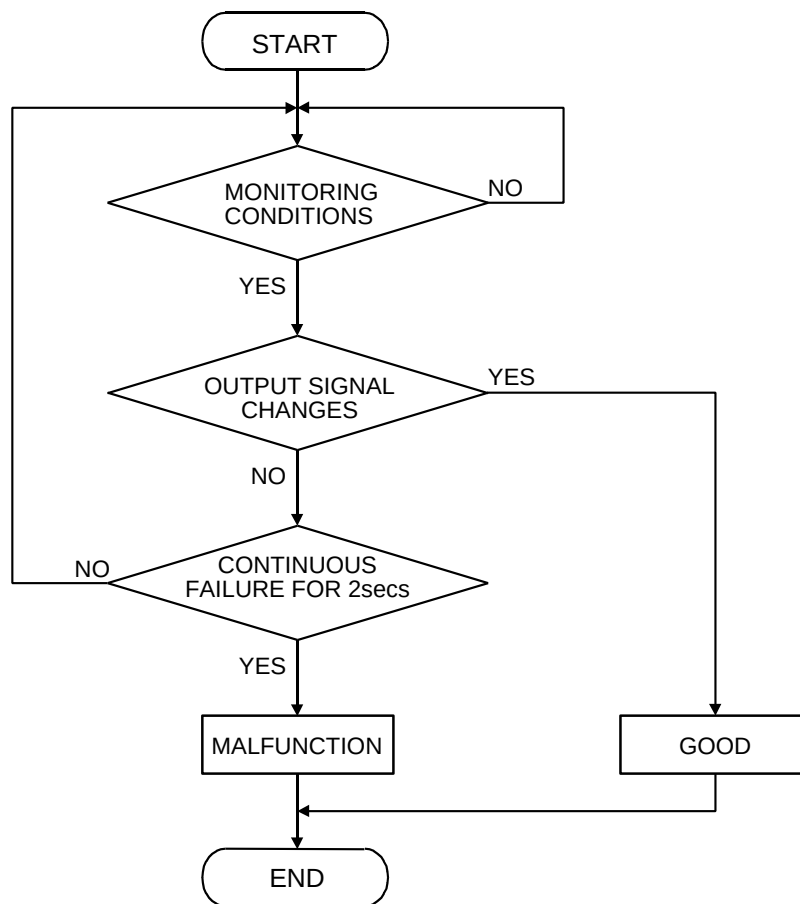
- Not applicable

Sensor (The sensor below is determined to be normal)

- Not applicable

DTC SET CONDITIONS <Circuit continuity>

Logic Flow Chart



AK302034

Check Conditions

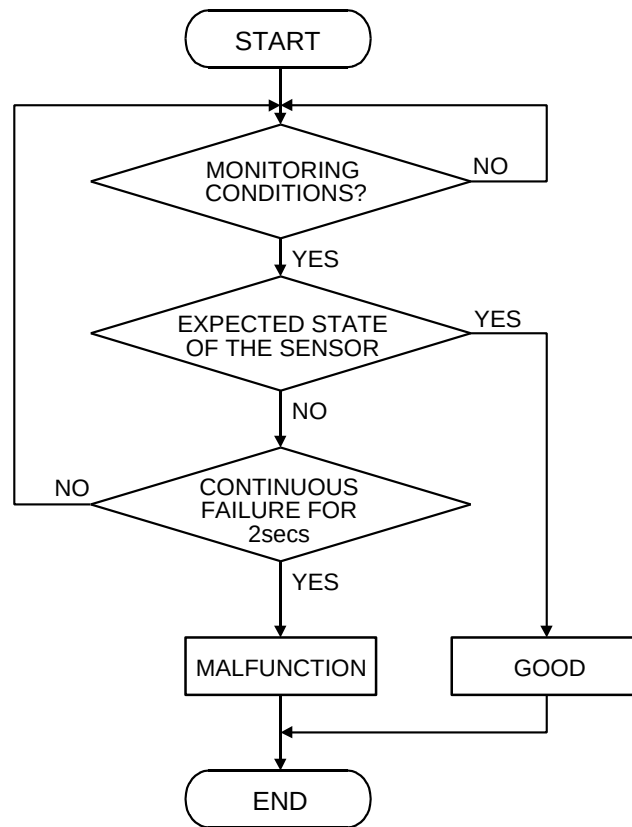
- Engine speed is higher than 50 r/min.

Judgment Criteria

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

DTC SET CONDITIONS <Range/Performance problem – alignment>

Logic Flow Chart



AK302035

Check Conditions

- Engine speed is higher than 50 r/min.

Judgment Criteria

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

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function – OBD-II Drive Cycle – Procedure 6 – Other Monitor [P.13B-6](#).

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

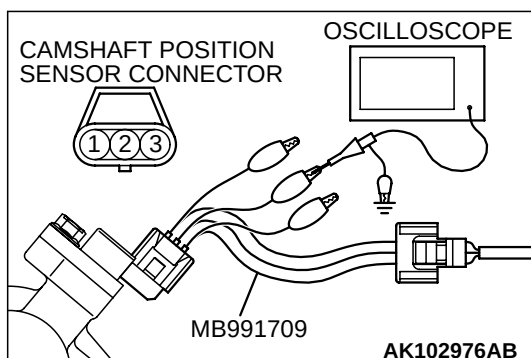
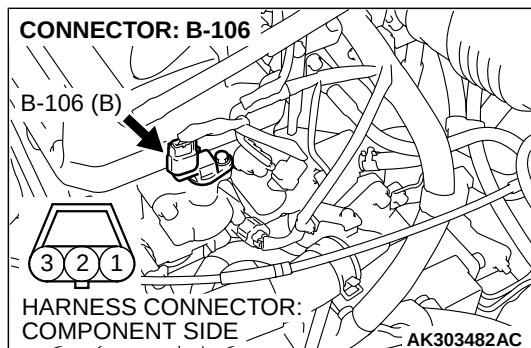
- Camshaft position sensor failed.
- Open or shorted camshaft position sensor circuit, or harness damage, or connector damage.
- ECM failed. <M/T>
- PCM failed. <A/T>

DIAGNOSIS**Required Special Tool:**

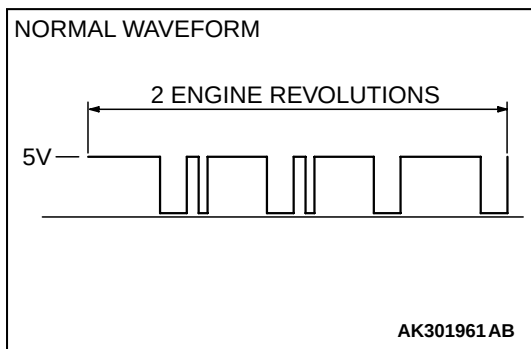
- MB991709: Test Harness

STEP 1. Using the oscilloscope, check the camshaft position sensor.

- (1) Disconnect the camshaft position sensor connector B-106, 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. 2.
NOTE: When measuring with the PCM side connector, connect an oscilloscope probe to terminal No. 71.
- (3) Start the engine and run at idle.

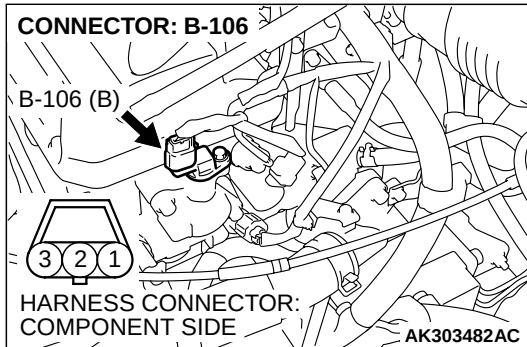


- (4) Check the waveform.
 - The waveform should show a pattern similar to the illustration.
- (5) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the waveform normal?

YES : Go to Step 2.

NO : Go to Step 4.



STEP 2. Check harness connector B-106 at camshaft position sensor for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 3.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then go to Step 20.

STEP 3. Check the trouble symptoms.

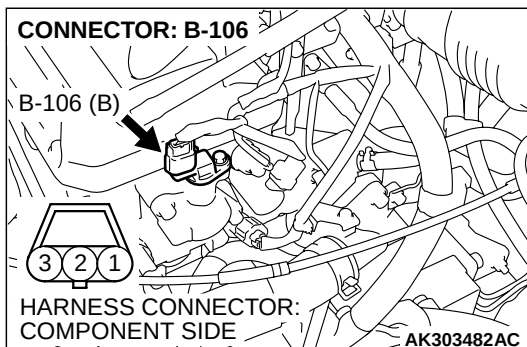
(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function – OBD-II Drive Cycle – Procedure 6 – Other Monitor [P.13B-6](#).

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

Q: Is DTC P0340 set?

YES : Replace the ECM or PCM. Then go to Step 20.

NO : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points [P.00-6](#).

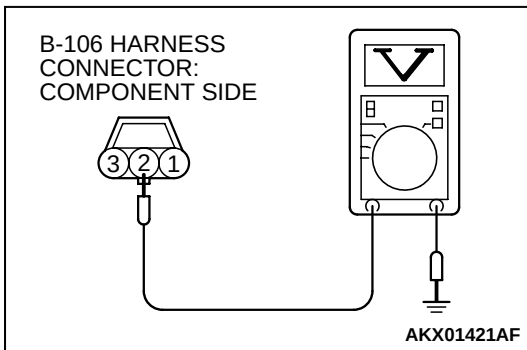
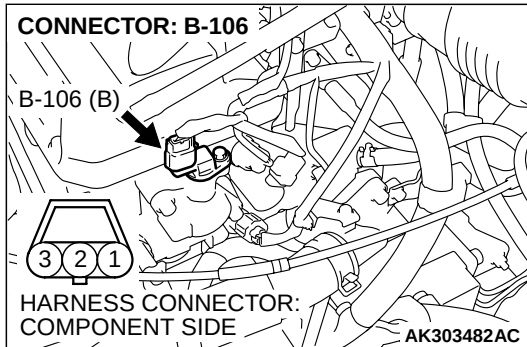


STEP 4. Check harness connector B-106 at camshaft position sensor for damage.

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 20.



STEP 5. Measure the sensor supply voltage at camshaft position sensor connector B-106.

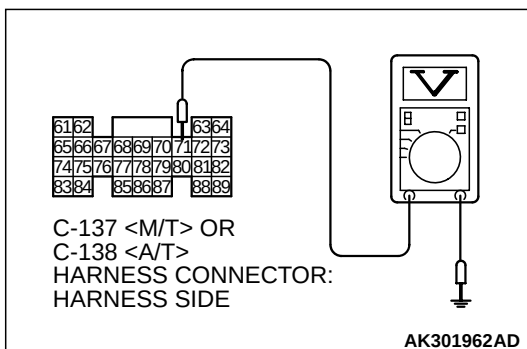
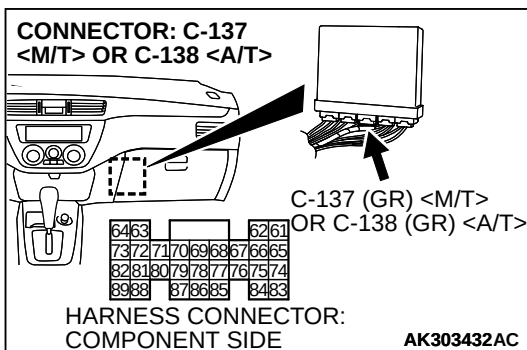
- (1) Disconnect the connector B-106 and measure at the harness side.
- (2) Turn the ignition switch to the "ON" position.

- (3) Measure the voltage between terminal No. 2 and ground.
 - Voltage should be between 4.8 and 5.2 volts.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the measured voltage between 4.8 and 5.2 volts?

YES : Go to Step 10.

NO : Go to Step 6.



STEP 6. Measure the sensor supply voltage at ECM connector C-137 <A/T> or PCM connector C-138 <A/T> by backprobing.

- (1) Do not disconnect the ECM connector C-137 <M/T> or PCM connector C-138 <A/T>.
- (2) Disconnect the camshaft position sensor connector B-106.
- (3) Turn the ignition switch to the "ON" position.

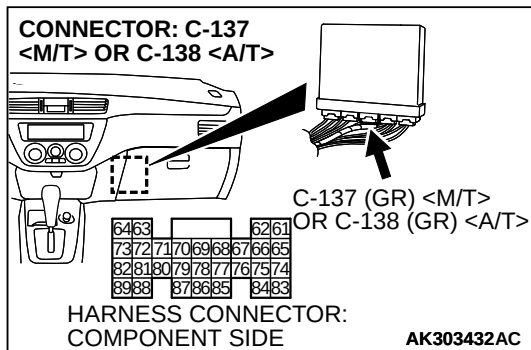
- (4) Measure the voltage between terminal No. 71 and ground by backprobing.
 - Voltage should be between 4.8 and 5.2 volts.

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

Q: Is the measured voltage between 4.8 and 5.2 volts?

YES : Go to Step 7.

NO : Go to Step 8.

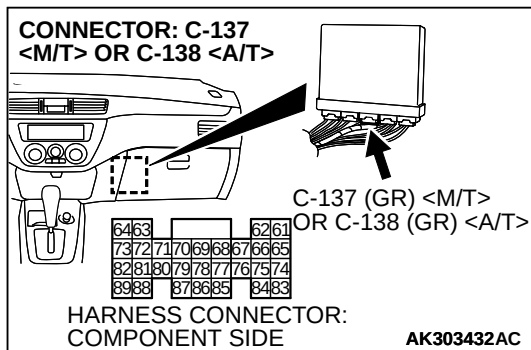


STEP 7. Check harness connector C-137 at ECM <M/T> or C-138 at PCM <A/T> for damage.

Q: Is the harness connector in good condition?

YES : Repair harness wire between camshaft position sensor connector B-106 (terminal No. 2) and ECM connector C-137 <M/T> or PCM connector C-138 <A/T> (terminal No. 71) because of open circuit. Then go to Step 20.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then go to Step 20.



STEP 8. Check harness connector C-137 at ECM <M/T> or C-138 at PCM <A/T> for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 9.

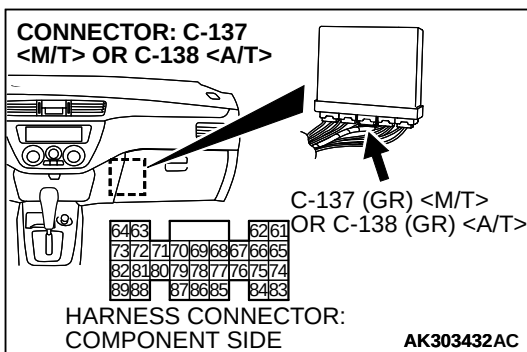
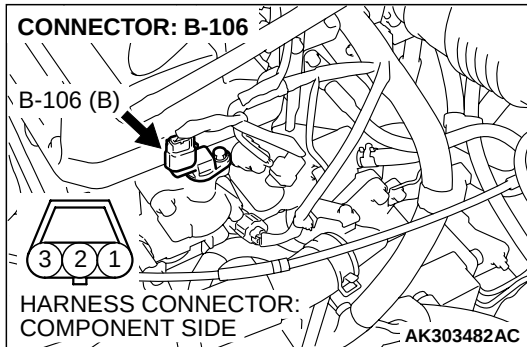
NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then go to Step 20.

STEP 9. Check for short circuit to ground between camshaft position sensor connector B-106 (terminal No. 2) and ECM connector C-137 <A/T> or PCM connector C-138 <A/T> (terminal No. 71).

Q: Is the harness wire in good condition?

YES : Replace the ECM or PCM. Then go to Step 20.

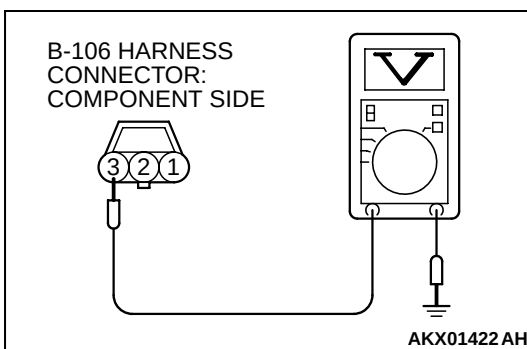
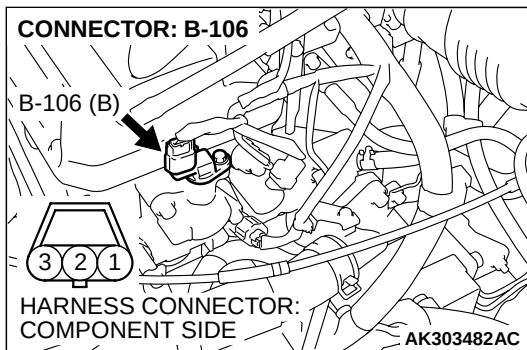
NO : Repair it. Then go to Step 20.



STEP 10. Measure the power supply voltage at camshaft position sensor connector B-106.

(1) Disconnect the connector B-106 and measure at the harness side.

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



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

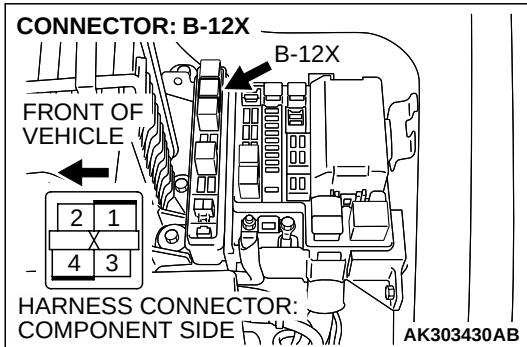
- Voltage should be battery positive voltage.

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

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

YES : Go to Step 12.

NO : Go to Step 11.



STEP 11. Check harness connector B-12X at MFI relay for damage.

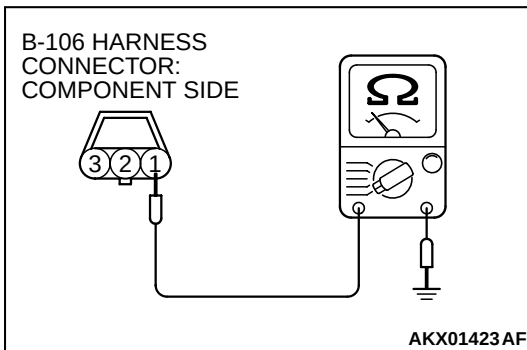
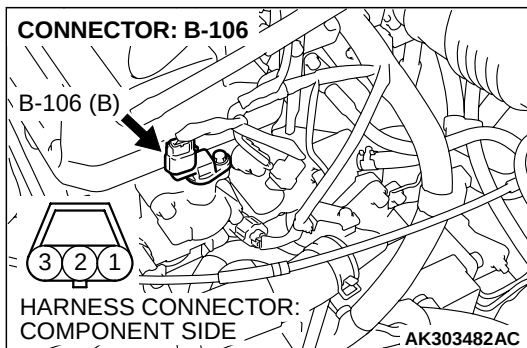
Q: Is the harness connector in good condition?

YES : Check connector C-105 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 MFI relay connector B-12X (terminal No. 4) and camshaft position sensor connector B-106 (terminal No. 3) because of open circuit or short circuit to ground. Then go to Step 20.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then go to Step 20.

STEP 12. Check the continuity at camshaft position sensor connector B-106.

(1) Disconnect the connector B-106 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 15.

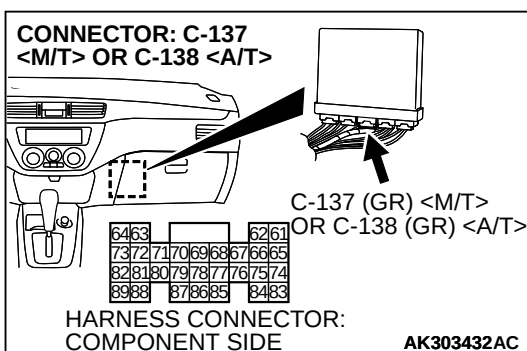
NO : Go to Step 13.

STEP 13. Check harness connector C-137 at ECM <M/T> or C-138 at PCM <A/T> for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 14.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then go to Step 20.

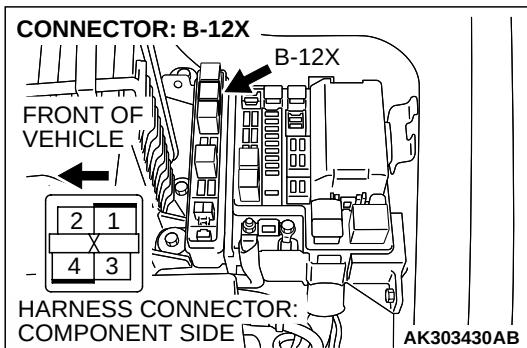
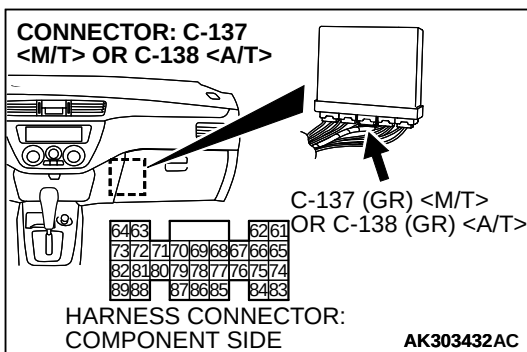
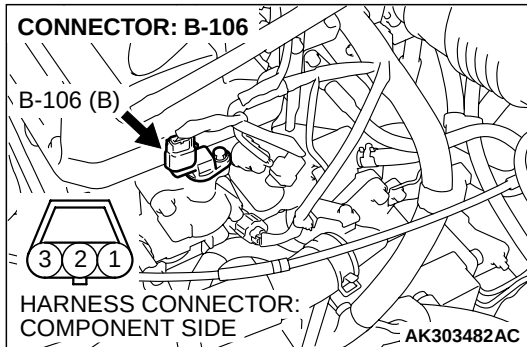


STEP 14. Check for open circuit and harness damage between camshaft position sensor connector B-106 (terminal No. 1) and ECM connector C-137 <A/T> or PCM connector C-138 <A/T> (terminal No. 88).

Q: Is the harness wire in good condition?

YES : Replace the ECM or PCM. Then go to Step 20.

NO : Repair it. Then go to Step 20.

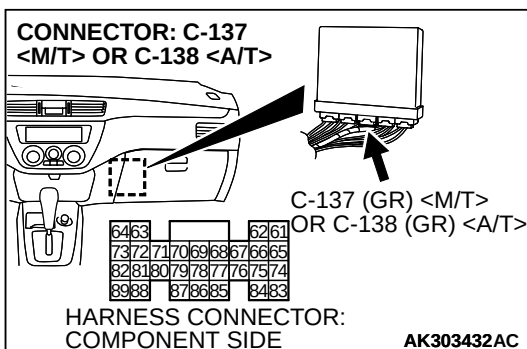


STEP 15. Check harness connector B-12X at the MFI relay for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 16.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then go to Step 20.



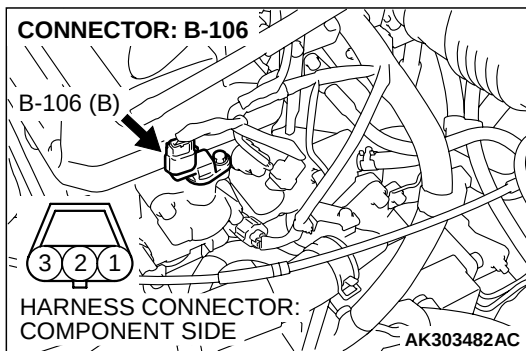
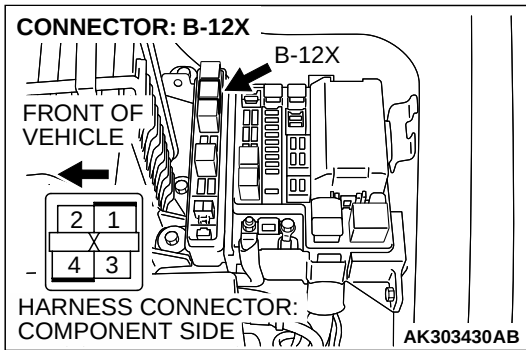
STEP 16. Check harness connector C-137 at ECM <M/T> or C-138 at PCM <A/T> for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 17.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then go to Step 20.

STEP 17. Check for harness damage between MFI relay connector B-12X (terminal No. 4) and camshaft position sensor connector B-106 (terminal No. 3).

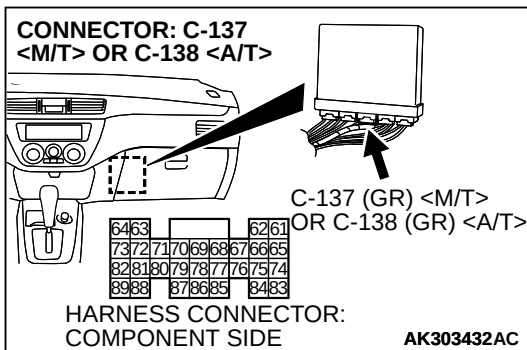
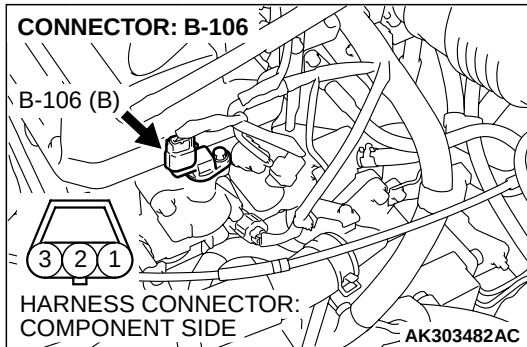


NOTE: Check harness after checking intermediate connector C-105. If intermediate connector is damaged, repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 20.

Q: Is the harness wire in good condition?

YES : Go to Step 18.

NO : Repair it. Then go to Step 20.



STEP 18. Check for harness damage between camshaft position sensor connector B-106 (terminal No. 2) and ECM connector C-137 <A/T> or PCM connector C-138 <A/T> (terminal No. 71).

Q: Is the harness wire in good condition?

YES : Go to Step 19.

NO : Repair it. Then go to Step 20.

STEP 19. 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 20.

NO : Repair it. Then go to Step 20.

STEP 20. 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 – Procedure 6 – Other Monitor [P.13B-6](#).

(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 <M/T> or PCM <A/T> 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)

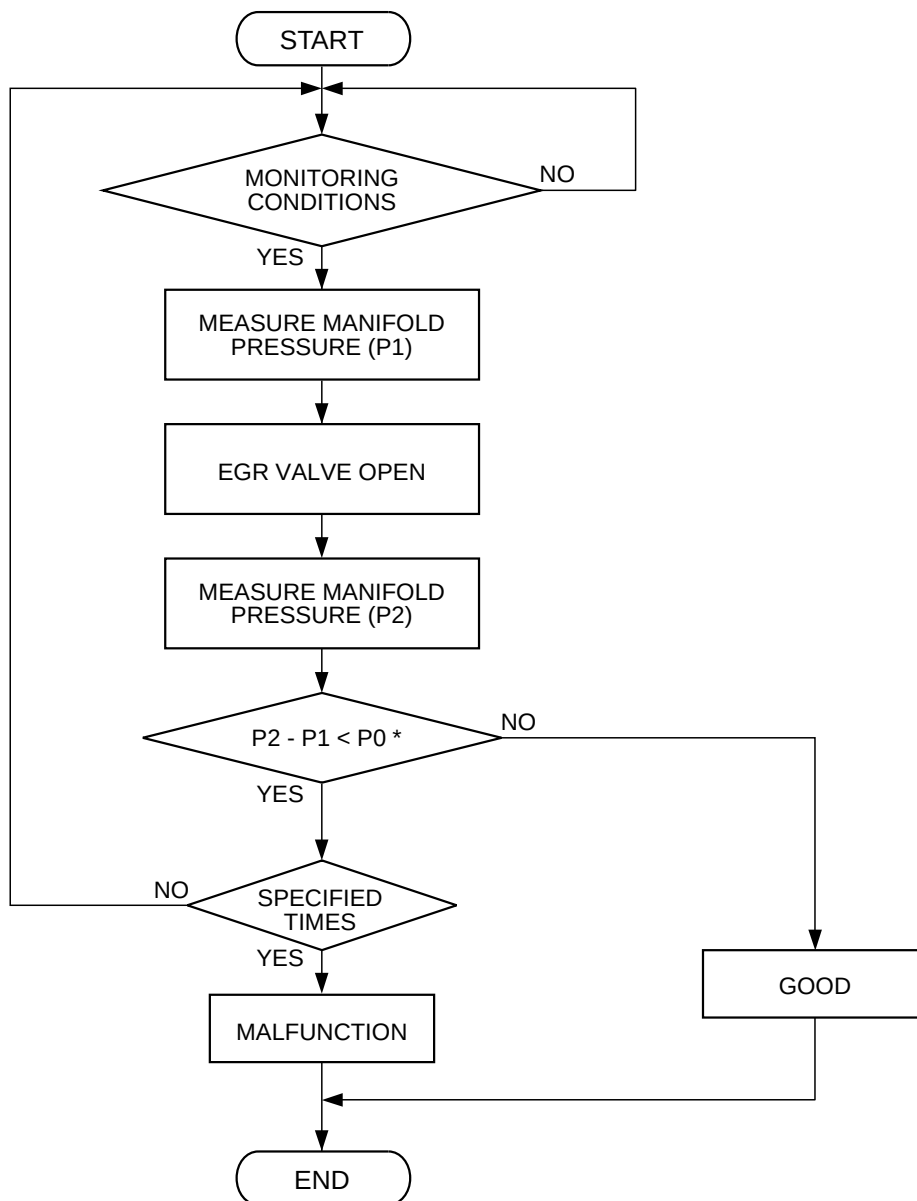
- EGR stepper motor monitor

Sensor (The sensor below is determined to be normal)

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

DTC SET CONDITIONS

Logic Flow Chart



* P0 : THRESHOLD VALUE

AK302036

Check Conditions

- At least 20 seconds have passed since the last monitor was complete.
- Engine coolant temperature is higher than 76°C (169°F).
- Engine speed is at between 940 and 1,650 r/min.
- Intake air temperature is higher than -10°C (14°F).
- Barometric pressure is higher than 76 kPa (22.4 in.Hg).
- 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.
- Accelerator pedal is closed.
- Volumetric efficiency is lower than 24 percent.
- The ECM <M/T> or PCM <A/T> monitors for this condition for 3 cycles of 2.0 seconds each during the drive cycle.

Judgement Criteria

- When the EGR valve opens to the prescribed opening, when intake manifold pressure fluctuation width is lower than 2.5 kPa (0.75 in.Hg).

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function – OBD-II Drive Cycle – Procedure 5 – Exhaust Gas Recirculation (EGR) System Monitor [P.13B-6](#).

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

- Contaminated EGR valve and EGR passage.
- EGR valve (stopper motor) failed.
- Open or shorted EGR valve (stopper motor) circuit, or connector damage.
- Manifold absolute pressure sensor failed.
- ECM failed. <M/T>
- PCM failed. <A/T>

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (MUT-III Sub Assembly)
 - MB991824: V.C.I.
 - MB991827: USB Cable
 - MB991911: Main Harness B

STEP 1. Check the EGR system

Refer to GROUP 17, Emission Control System – Exhaust Gas Recirculation (EGR) System – General Information [P.17-220](#).

Q: Are there any abnormalities?

YES : Repair it. Then go to Step 3.

NO : Go to Step 2.

STEP 2. Using scan tool MB991958, check data list item 95: 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.

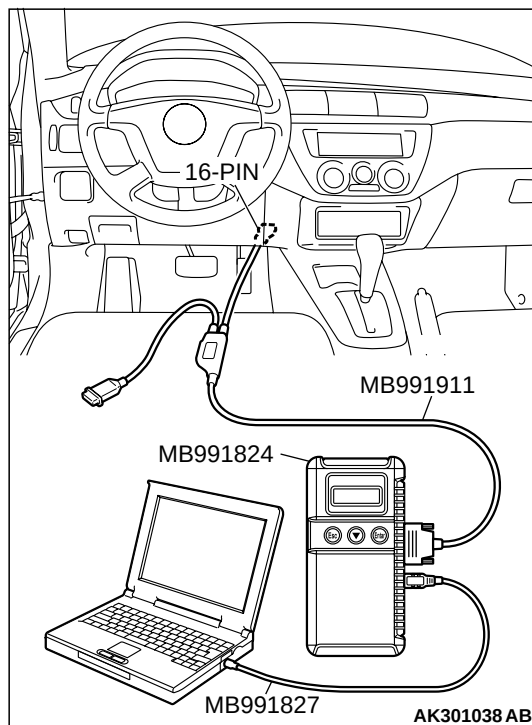
- Connect scan tool MB991958 to the data link connector.
- Start the engine and run at idle.
- Set scan tool MB991958 to the data reading mode for item 95, Manifold Absolute Pressure Sensor.
- Warm up the engine to normal operating temperature: 85°C to 95°C (185°F to 203°F).
 - Should be between 16 – 36 kPa (4.7 – 10.6 in.Hg) at engine idling.
- 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 3.

NO : Refer to DTC P0106 – Manifold Absolute Pressure Sensor Circuit Range/Performance Problem

[P.13B-61](#), DTC P0107 – Manifold Absolute Pressure Sensor Circuit Low Input [P.13B-71](#), DTC P0108 – Manifold Absolute Pressure Sensor Circuit High Input [P.13B-85](#).



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 – Procedure 5 – Exhaust Gas Recirculation (EGR) System Monitor [P.13B-6](#).
- (2) Check the diagnostic trouble code (DTC).

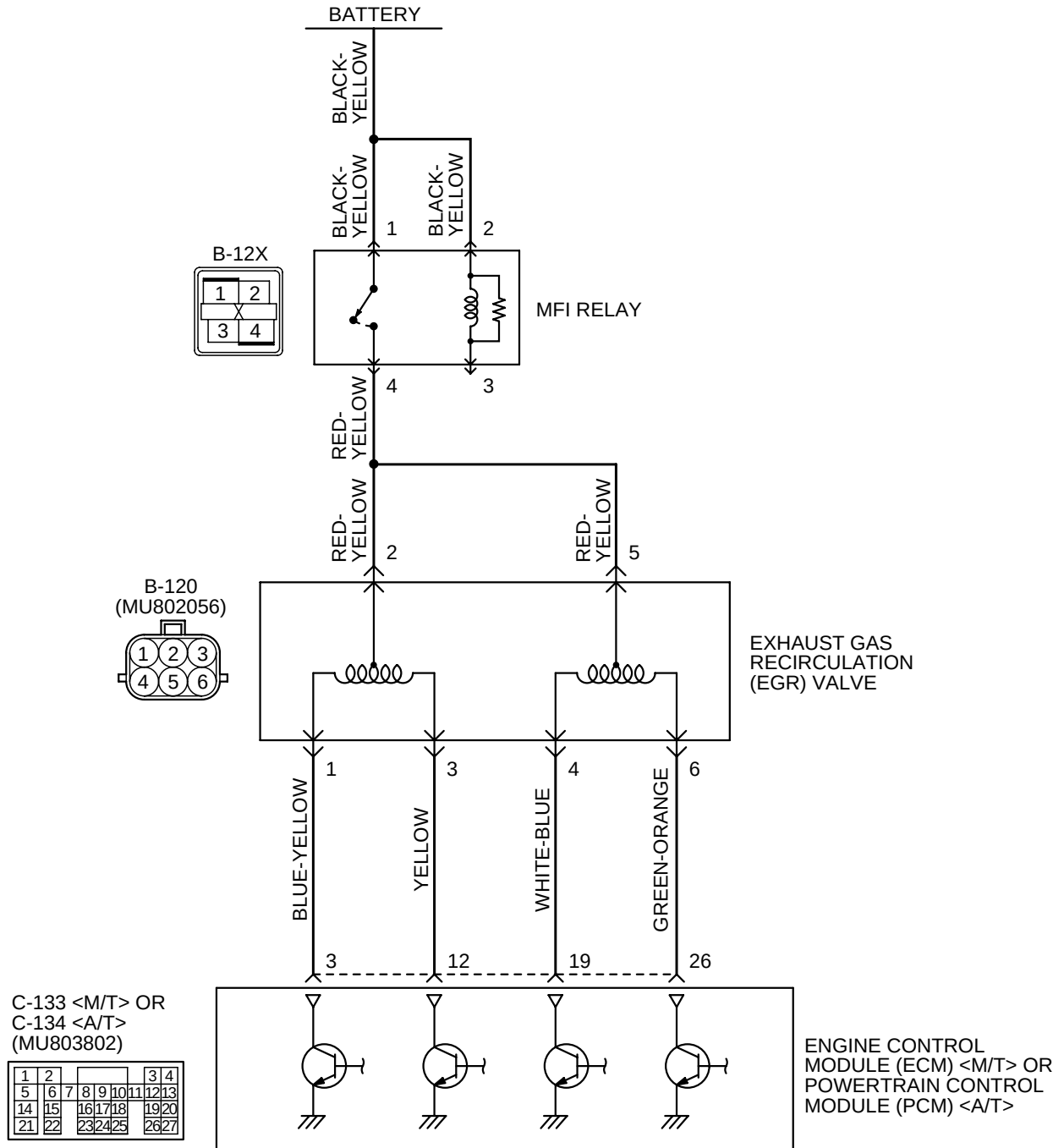
Q: Is DTC P0401 set?

YES : Retry the troubleshooting.

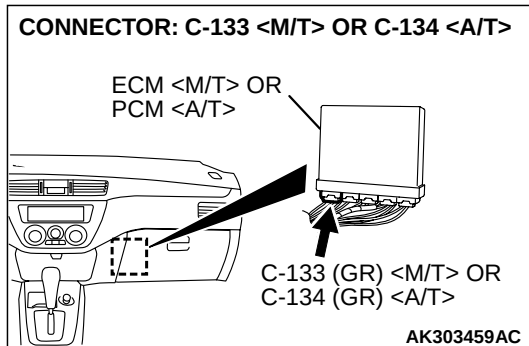
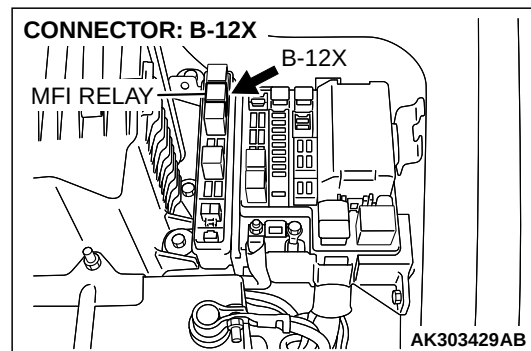
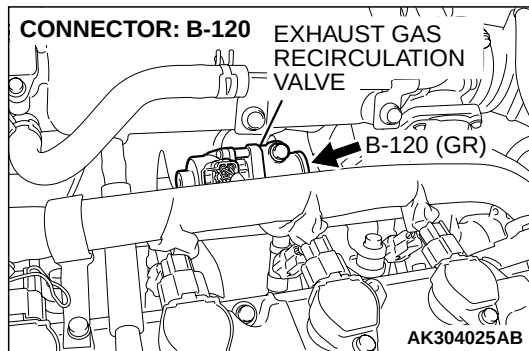
NO : The inspection is complete.

DTC P0403: Exhaust Gas Reculation Control Circuit

EGR Valve Circuit



AK303993



CIRCUIT OPERATION

- The EGR valve power is supplied from the MFI relay (terminal No. 4).
- The ECM <M/T> or PCM <A/T> (terminals No. 3, No. 12, No. 19, No. 26) drives the stepper motor by sequentially turning "ON" the power transistors in the ECM <M/T> or PCM <A/T> and providing ground to the idle air control motor (terminal No. 1, No. 3, No. 4, No. 6).

TECHNICAL DESCRIPTION

- To judge if there is open circuit in the EGR valve (stepper motor) drive circuit, ECM <M/T> or PCM <A/T> measure the surge voltage of the EGR valve motor coil.

DESCRIPTIONS OF MONITOR METHODS

Off-surge does not occur after stepper motor 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)

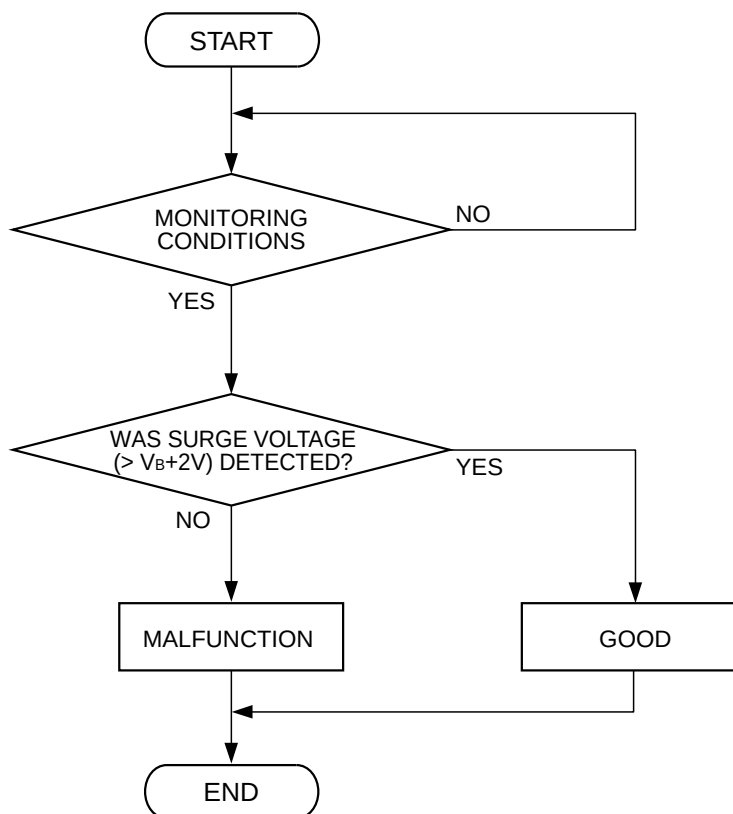
- EGR stepper motor monitor

Sensor (The sensor below is determined to be normal)

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

DTC SET CONDITIONS

Logic Flow Chart



AK302037

Check Conditions

- Battery positive voltage is higher than 10.3 volts.

Judgment Criteria

- The EGR valve motor coil surge voltage (battery positive voltage +2 volts) is not detected for 3 seconds.

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 harness damage, or connector damage.
- ECM failed. <M/T>
- PCM failed. <A/T>

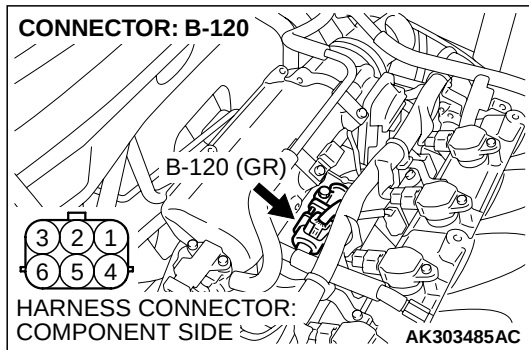
OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function – OBD-II Drive Cycle – Procedure 6 – Other Monitor [P.13B-6](#).

DIAGNOSIS

Required Special Tool:

- MB991658: Test Harness

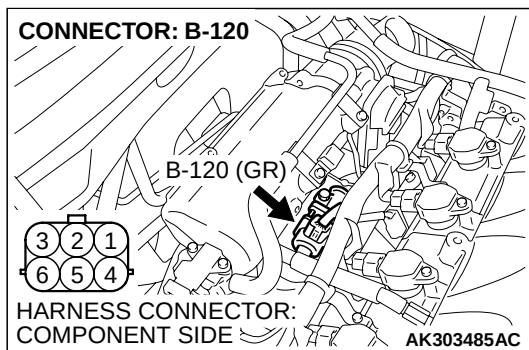


STEP 1. Check harness connector B-120 at EGR valve for damage.

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 12.



STEP 2. Measure the EGR valve motor coil resistance.

(1) Disconnect the EGR valve connector B-120.

(2) Measure the resistance between EGR valve connector terminal No. 2 and either terminal No. 1 or terminal No. 3.

Standard value: 20 – 24 ohms [at 20°C (68°F)]

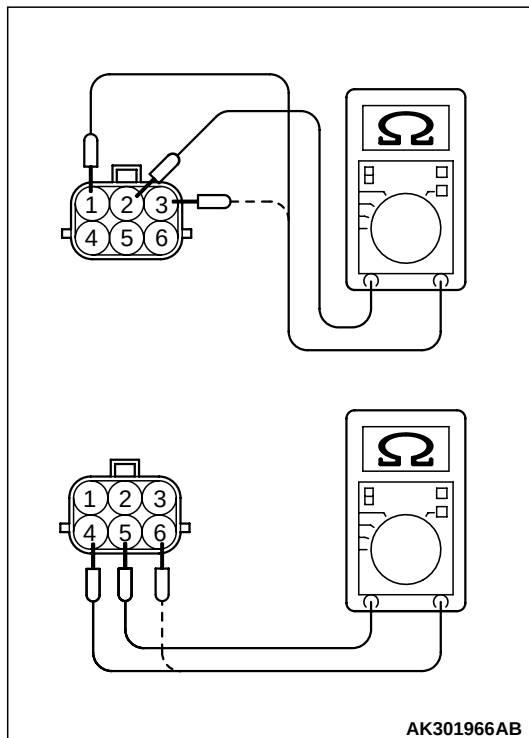
(3) Measure the resistance between EGR valve connector terminal No. 5 and either terminal No. 4 or terminal No. 6.

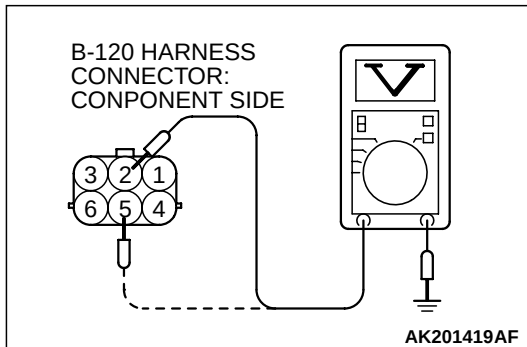
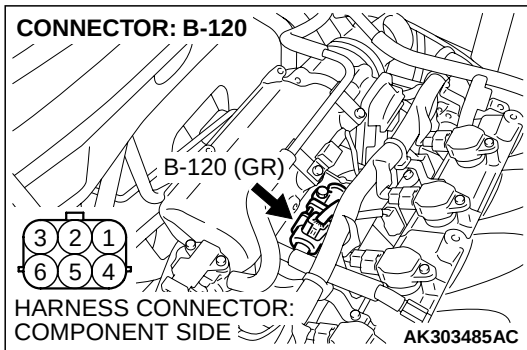
Standard value: 20 – 24 ohms [at 20°C (68°F)]

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 12.





STEP 3. Measure the power supply voltage at EGR valve motor harness side connector B-120.

- (1) Disconnect the connector B-120 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.

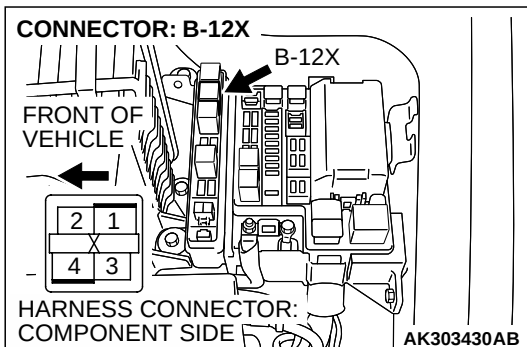
- Voltage should be battery positive voltage.

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

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

YES : Go to Step 5.

NO : Go to Step 4.

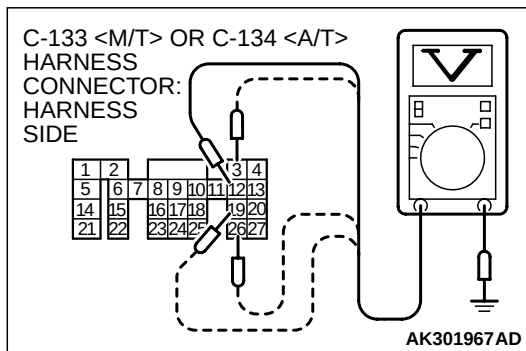
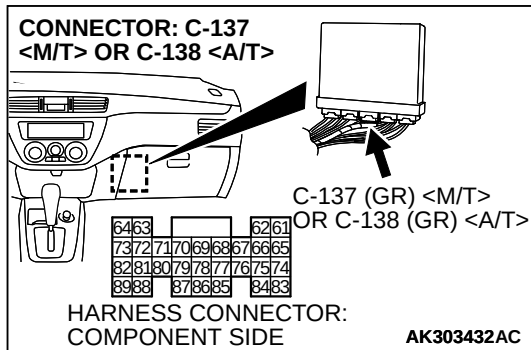


STEP 4. Check harness connector B-12X at MFI relay for damage.

Q: Is the harness connector in good condition?

YES : Repair harness wire between MFI relay connector B-12X (terminal No. 4) and idle air control motor connector B-120 (terminal No. 2, No. 5) because of open circuit or short circuit to ground. Then go to Step 12.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then go to Step 12.



STEP 5. Measure the power supply voltage at ECM connector C-133 <M/T> or PCM connector C-134 <A/T> by backprobing.

(1) Do not disconnect the connector C-133 <M/T> or C-134 <A/T>.

(2) Measure the voltage between terminal (No. 3, No. 12, No. 19, No. 26) and ground by backprobing.

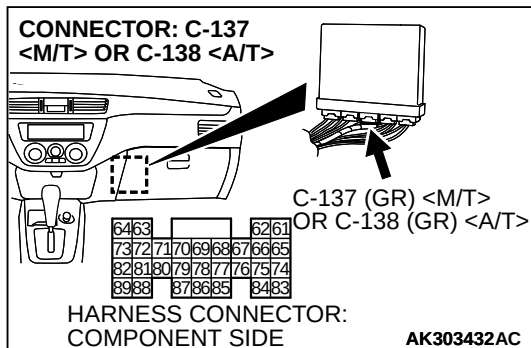
- The voltage should be repeat 5 and 8 volts for approximately 3 seconds. When the Ignition switch is turned from the "LOCK" (OFF) position to the "ON" position.

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

Q: Is the voltage normal?

YES : Go to Step 8.

NO : Go to Step 6.

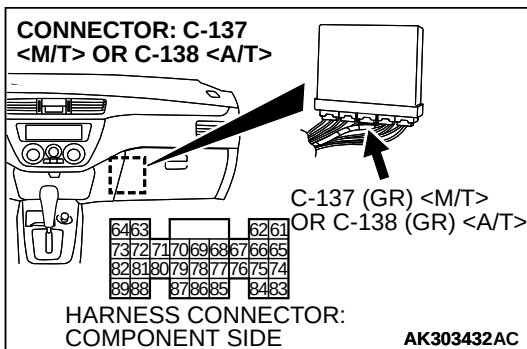
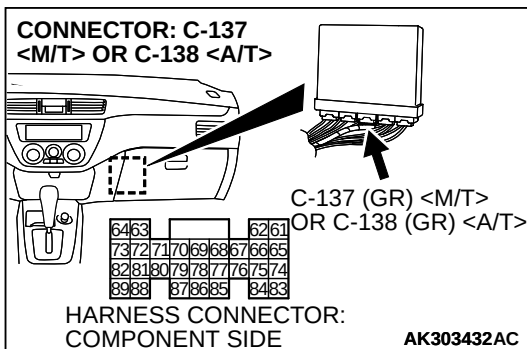
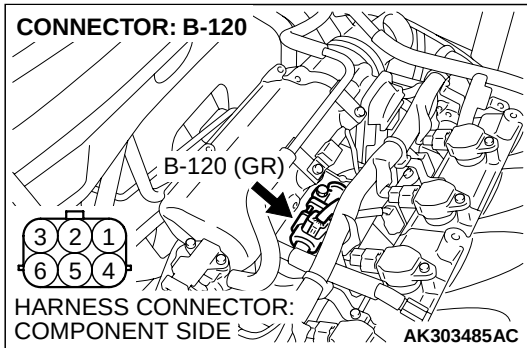


STEP 6. Check harness connector C-133 at ECM <M/T> or C-134 at PCM <A/T> for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 7.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then go to Step 12.



STEP 7. Check for open circuit and short circuit to ground between EGR valve connector B-120 and ECM connector C-133 <M/T> or PCM connector C-134 <A/T>.

- EGR valve connector B-120 (terminal No. 1) and ECM connector C-133 <M/T> or PCM connector C-134 <A/T> (terminal No. 3).
- EGR valve connector B-120 (terminal No. 3) and ECM connector C-133 <M/T> or PCM connector C-134 <A/T> (terminal No. 12).
- EGR valve connector B-120 (terminal No. 4) and ECM connector C-133 <M/T> or PCM connector C-134 <A/T> (terminal No. 19).
- EGR valve connector B-120 (terminal No. 6) and ECM connector C-133 <M/T> or PCM connector C-134 <A/T> (terminal No. 26).

Q: Is the harness wire in good condition?

YES : Replace the ECM or PCM. Then go to Step 12.

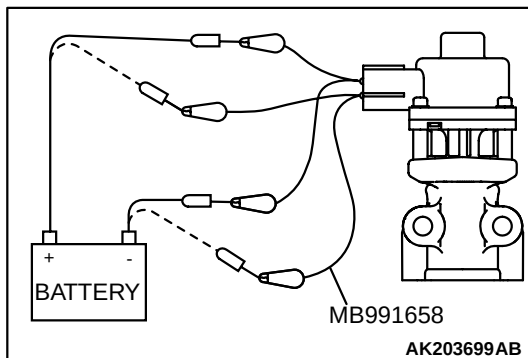
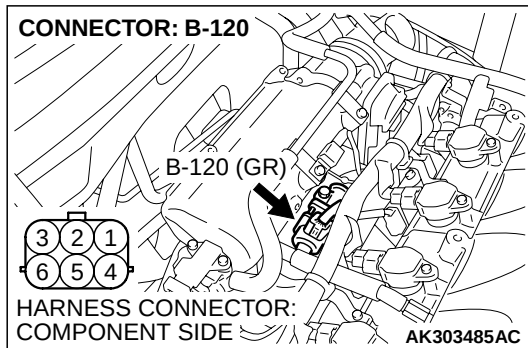
NO : Repair it. Then go to Step 12.

STEP 8. Check harness connector C-133 at ECM <M/T> or C-134 at PCM <A/T> for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 9.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then go to Step 12.



STEP 9. Check the EGR valve operation using special tool MB991658.

(1) Remove the EGR valve.

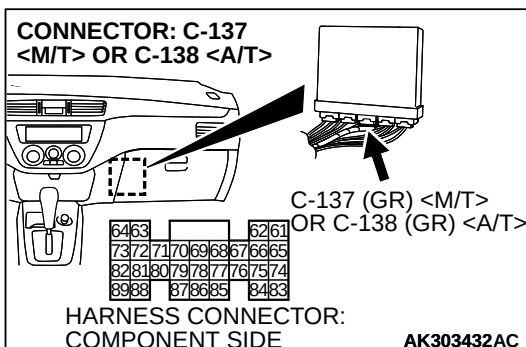
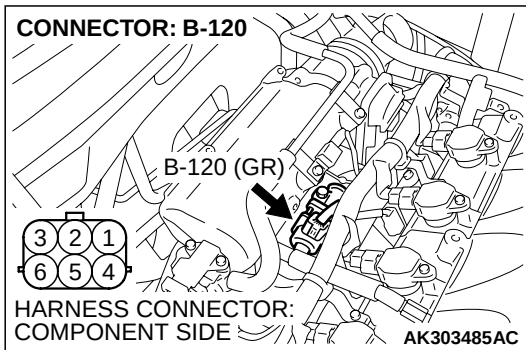
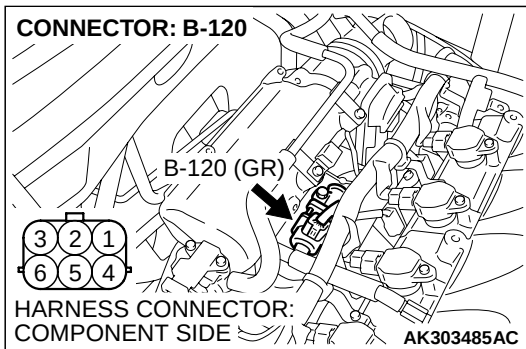
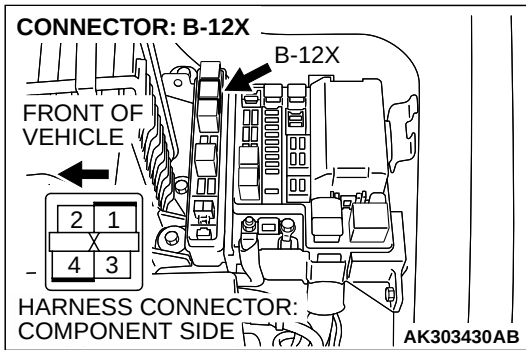
- (2) Connect special tool MB991658 to the EGR valve. (All terminals should be connected.)
- (3) Use the jumper wires to connect terminal No. 2 of the EGR valve connector to the positive battery terminal.
- (4) Check to ensure that the motor operates when the terminal No. 1 and No. 3 of the EGR valve 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 : 24 ± 3 N·m [17 ± 3 ft·lb]

Q: Is the EGR valve operating properly?

YES : Go to Step 10.

NO : Replace the EGR valve. Then go to Step 12.



STEP 10. Check for harness damage between MFI relay connector B-12X (terminal No. 4) and EGR valve connector B-120 (terminal No. 2, No. 5).

Q: Is the harness wire in good condition?

YES : Go to Step 11.

NO : Repair it. Then go to Step 12.

STEP 11. Check for harness damage between EGR valve connector B-120 and ECM connector C-133 <M/T> or PCM connector C-134 <A/T>.

- EGR valve connector B-120 (terminal No. 1) and ECM connector C-133 <M/T> or PCM connector C-134 <A/T> (terminal No. 3).
- EGR valve connector B-120 (terminal No. 3) and ECM connector C-133 <M/T> or PCM connector C-134 <A/T> (terminal No. 12).
- EGR valve connector B-120 (terminal No. 4) and ECM connector C-133 <M/T> or PCM connector C-134 <A/T> (terminal No. 19).
- EGR valve connector B-120 (terminal No. 6) and ECM connector C-133 <M/T> or PCM connector C-134 <A/T> (terminal No. 26).

Q: Is the harness wire in good condition?

YES : Replace the ECM or PCM. Then go to Step 12.

NO : Repair it. Then go to Step 12.

STEP 12. 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 – Procedure 6 – Other Monitor [P.13B-6](#).
- (2) Check the diagnostic trouble code (DTC).

Q: Is DTC P0403 set?**YES :** Retry the troubleshooting.**NO :** The inspection is complete.

DTC P0420: Catalyst Efficiency Below Threshold

TECHNICAL DESCRIPTION

- The signal from the rear heated oxygen sensor differs from the front heated oxygen sensor. That is 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 <M/T> or PCM <A/T> compares the output of the front and rear heated oxygen sensor signals.

DESCRIPTIONS OF MONITOR METHODS

Heated oxygen sensor (front) and heated oxygen sensor (rear) 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)**

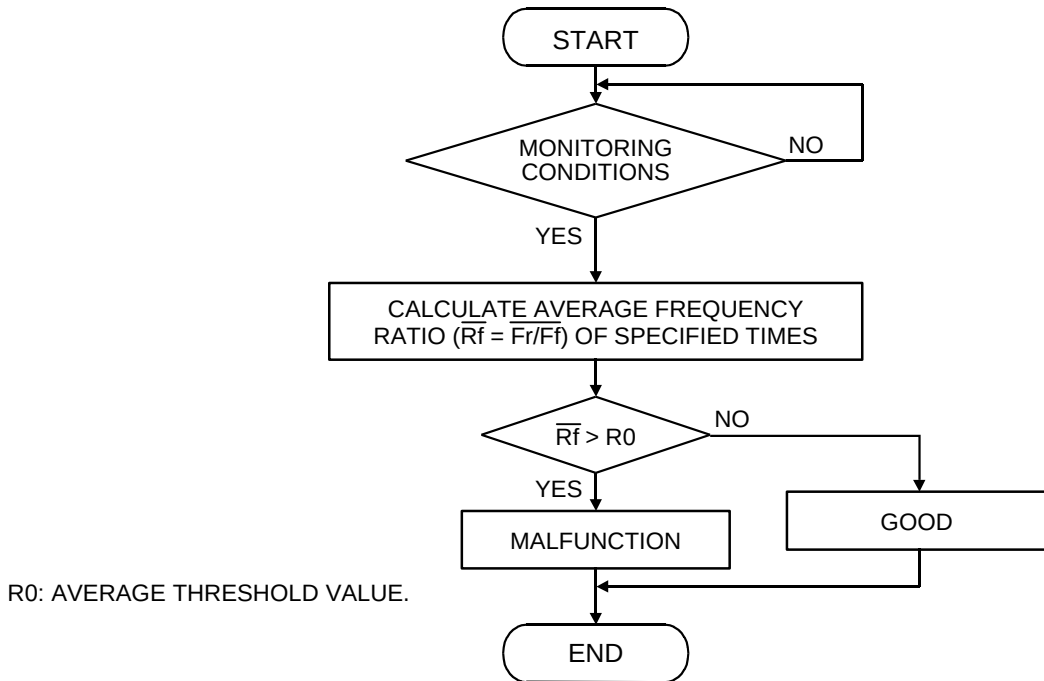
- Heated oxygen sensor (front) monitor
- Heated oxygen sensor (rear) monitor
- Heated oxygen sensor heater (front) monitor
- Heated oxygen sensor heater (rear) monitor
- Misfire monitor
- Fuel system monitor
- Air/fuel ratio feedback monitor

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



AK302038

Check Conditions

- Engine speed is lower than 3,000 r/min.
- Accelerator pedal is open.
- Mass airflow sensor output is at between 8 and 34.5 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 <M/T> or PCM <A/T> monitors for this condition for 7 cycles of 10 seconds each during the drive cycle.
- Short-term fuel trim is higher than -25 percent and lower than $+25$ percent.

- The cumulative mass airflow sensor output is higher than 2,931 g.

Judgment Criteria

- The heated oxygen sensor (rear) signal frequency divided by heated oxygen sensor (front) signal frequency = 0.4 or more.

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function – OBD-II Drive Cycle – Procedure 3 – Catalytic Converter Monitor
[P.13B-6](#).

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

- Catalytic converter deteriorated.
- Heated oxygen sensor failed.
- Exhaust leak.
- ECM failed. <M/T>
- PCM failed. <A/T>

DIAGNOSIS**Required Special Tools:**

- MB991958: Scan Tool (MUT-III Sub Assembly)
 - MB991824: V.C.I.
 - MB991827: USB Cable
 - MB991911: Main Harness B

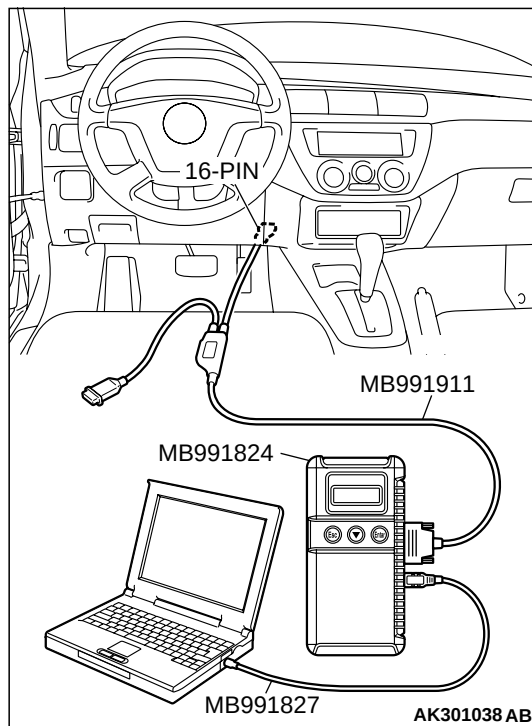
STEP 1. Check for exhaust leak.**Q: Are there any abnormalities?****YES** : Repair it. Then go to Step 7.**NO** : Go to Step 2.**STEP 2. Using scan tool MB991958, check data list item 59: Heated Oxygen Sensor (rear).****⚠ CAUTION**

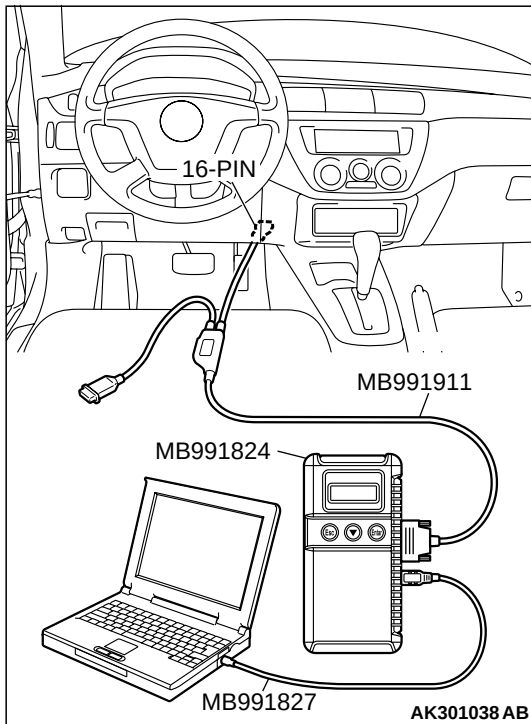
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

- (1) Connect scan tool MB991958 to the data link connector.
- (2) Start the engine and run at idle.
- (3) Set scan tool MB991958 to the data reading mode for item 59, Heated Oxygen Sensor (rear).
 - Warm up the engine. When the engine is revved, the output voltage should repeat 0 volt and 0.6 to 1.0 volt alternately.
- (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 P0136 – Heated Oxygen Sensor Circuit (sensor 2) [P.13B-216](#), DTC P0137 – Heated Oxygen Sensor Circuit Low Voltage (sensor 2) [P.13B-227](#), DTC P0138 – Heated Oxygen Sensor Circuit High Voltage (sensor 2) [P.13B-235](#), DTC P0139 – Heated Oxygen Sensor Circuit Slow Response (sensor 2) [P.13B-240](#).





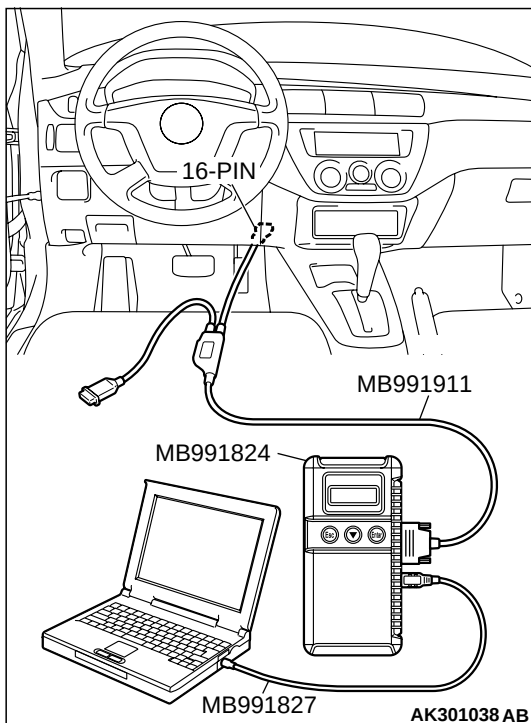
STEP 3. Using scan tool MB991958, check data list item 11: Heated Oxygen Sensor (front).

- (1) Start the engine and run at idle.
- (2) Set scan tool MB991958 to the data reading mode for item 11, Heated Oxygen Sensor (front).
 - Warm up the engine. When the engine is revved, the output voltage should measure 0.6 to 1.0 volt.
- (3) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the sensor operating properly?

YES : Go to Step 4.

NO : Refer to, DTC P0130 – Heated Oxygen Sensor Circuit (sensor 1) [P.13B-167](#), DTC P0131 – Heated Oxygen Sensor Circuit Low Voltage (sensor 1) [P.13B-179](#), DTC P0132 – Heated Oxygen Sensor Circuit High Voltage (sensor 1) [P.13B-187](#), DTC P0133 – Heated Oxygen Sensor Circuit Slow Response (sensor 1) [P.13B-192](#), DTC P0134 – Heated Oxygen Sensor Circuit No Activity Detected (sensor 1) [P.13B-196](#).



STEP 4. Using scan tool MB991958, check data list item 11: Heated Oxygen Sensor (front).

- (1) Start the engine and run at idle.
- (2) Set scan tool MB991958 to the data reading mode for item 11, Heated Oxygen Sensor (front).
- (3) Keep the engine speed at 2,000 r/min.
 - 0 – 0.4 and 0.6 – 1.0 volt should alternate 15 times or more within 10 seconds.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the sensor operating properly?

YES : Go to Step 5.

NO : Replace the heated oxygen sensor (front). Then go to Step 7.

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 – Procedure 3 – Catalytic Converter Monitor and Procedure 6 – Other Monitor [P.13B-6](#).
- (2) Check the diagnostic trouble code (DTC).

Q: Is DTC P0420 set?

YES : Replace the catalytic converter. Then go to Step 6.

NO : The inspection is complete.

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 – Procedure 3 – Catalytic Converter Monitor and Procedure 6 – Other Monitor [P.13B-6](#).
- (2) Check the diagnostic trouble code (DTC).

Q: Is DTC P0420 set?

YES : Replace the ECM or PCM. Then go to Step 7.

NO : The inspection is complete.

STEP 7. Test the OBD-II drive cycle.

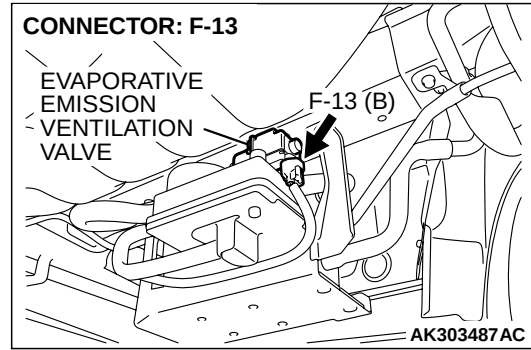
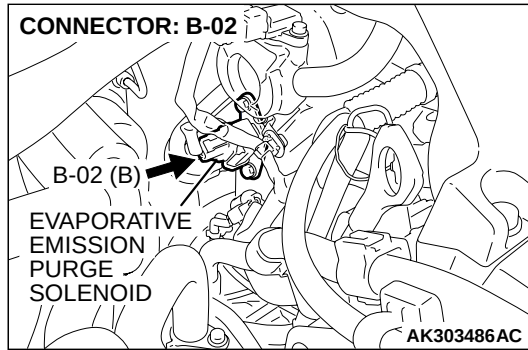
- (1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function – OBD-II Drive Cycle – Procedure 3 – Catalytic Converter Monitor and Procedure 6 – Other Monitor [P.13B-6](#).
- (2) Check the diagnostic trouble code (DTC).

Q: Is DTC P0420 set?

YES : Retry the troubleshooting.

NO : The inspection is complete.

DTC P0441: Evaporative Emission Control System Incorrect Purge Flow



TECHNICAL DESCRIPTION

- ECM <M/T> or PCM <A/T> detects stuck open condition of evaporative emission purge solenoid and stuck close condition of evaporative emission ventilation solenoid valve by pressure change in fuel tank.
- Stuck open evaporative emission purge solenoid is judged through monitoring leak of evaporative emission system.
- Stuck closed evaporative emission ventilation solenoid 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)

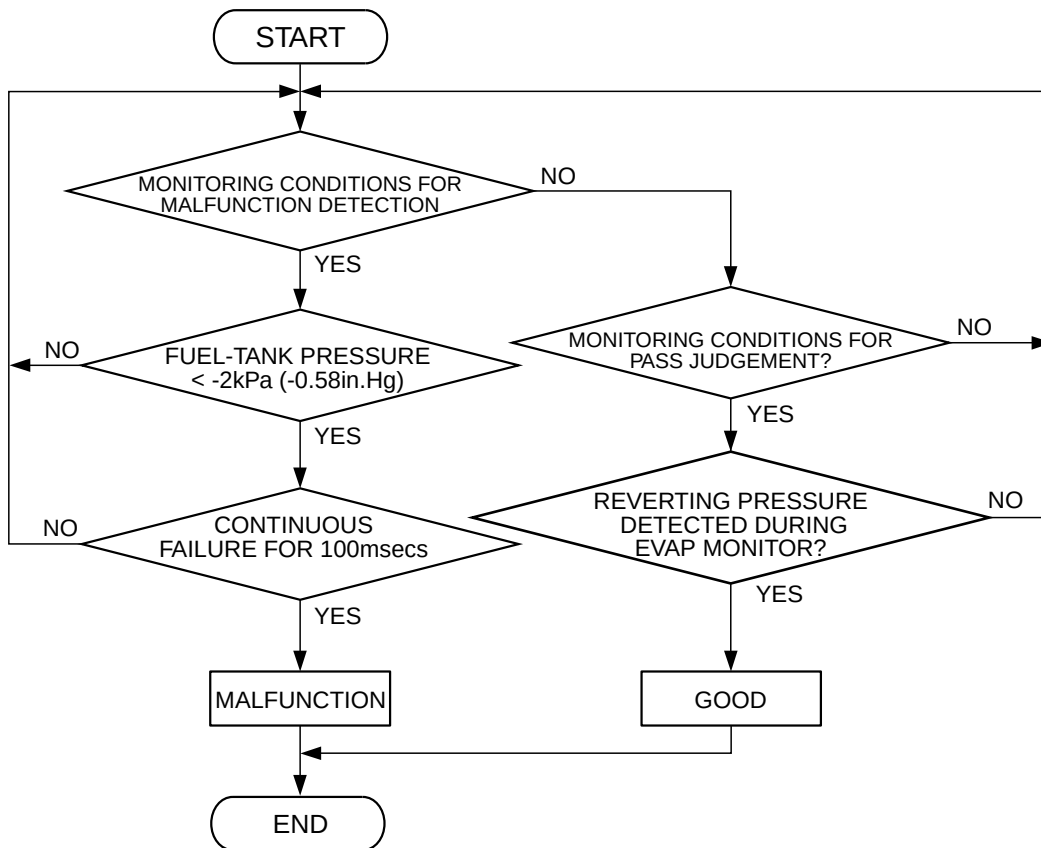
- Fuel tank pressure sensor monitor

Sensor (The sensor below is determined to be normal)

- Not applicable

DTC SET CONDITIONS

Logic Flow Chart



AK204004

Check Conditions

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

Judgment Criteria

- The pressure in the fuel tank is -1.96 kPa (-0.58 in.Hg) or less for 0.1 second.

OBD-II DRIVE CYCLE PATTERN

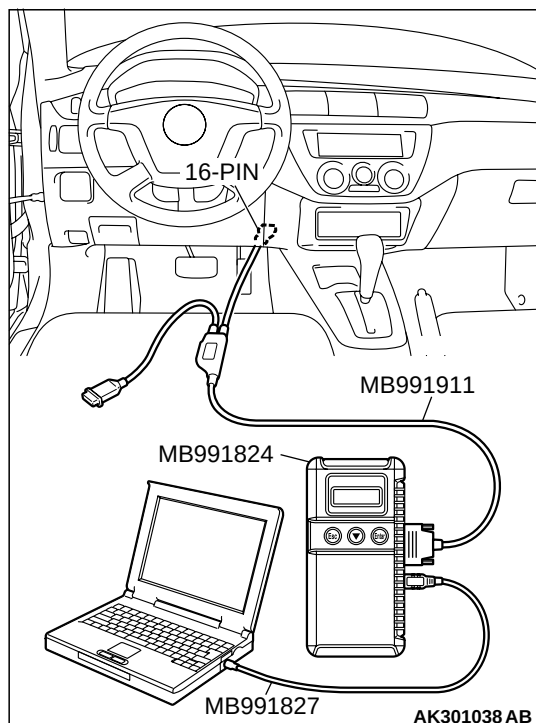
Refer to Diagnostic Function – OBD-II Drive Cycle – Procedure 1 – Evaporative Emission System Leak Monitor [P.13B-6](#).

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

- Evaporative emission purge solenoid failed.
- Evaporative emission ventilation solenoid failed.
- Fuel tank differential pressure sensor circuit related part(s) failed.

DIAGNOSIS**Required Special Tools:**

- MB991958: Scan Tool (MUT-III Sub Assembly)
 - MB991824: V.C.I.
 - MB991827: USB Cable
 - MB991911: Main Harness B



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.

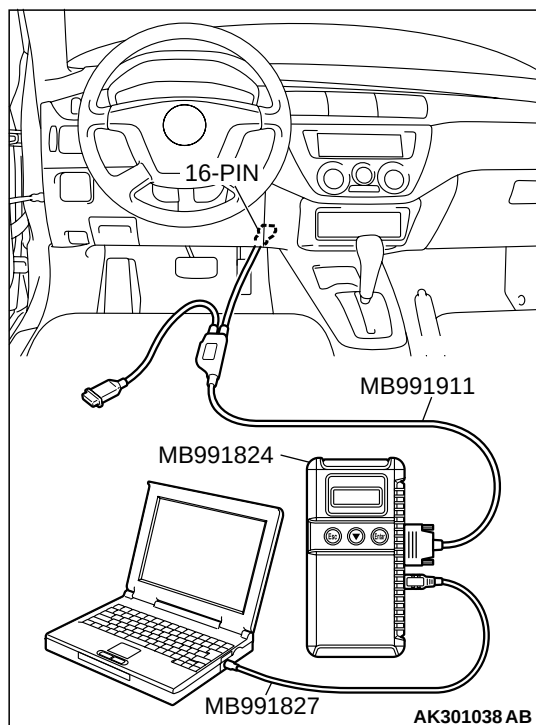
- (1) Connect scan tool MB991958 to the data link connector.
- (2) Turn the ignition switch to the "ON" position.
- (3) Read the DTC.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is DTC P0451 set?

YES : Refer to, DTC P0451 - Evaporative Emission Control System Pressure Sensor Range/Performance

[P.13B-414.](#)

NO : Go to Step 2.



STEP 2. Using scan tool MB991958, check data list item 73: Fuel Tank Differential Pressure Sensor.

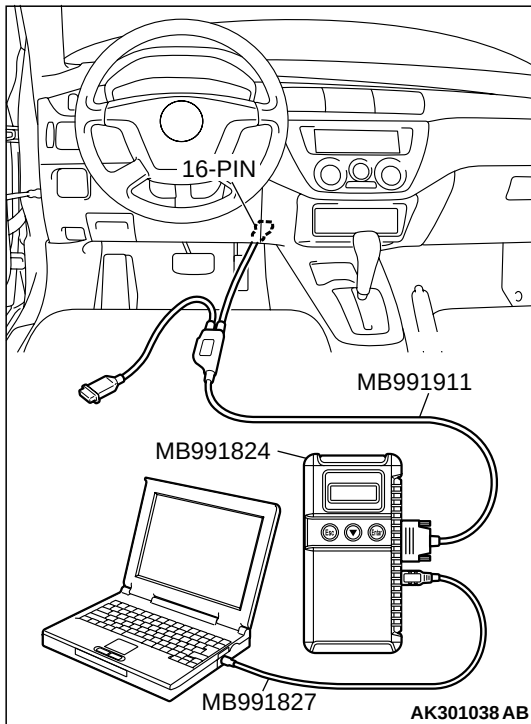
- (1) Turn the ignition switch to the "ON" position.
- (2) Remove the fuel cap.
- (3) Set scan tool MB991958 to the data reading mode for item 73, Fuel Tank Differential Pressure Sensor.
 - The fuel tank differential pressures should be -3.3 to 3.3 kPa (-0.97 to 0.97 in.Hg).
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the fuel tank pressure between -3.3 to 3.3 kPa (-0.97 to 0.97 in.Hg)?

YES : Go to Step 3.

NO : Refer to, DTC P0451 - Evaporative Emission Control System Pressure Sensor Range/Performance

[P.13B-414.](#)

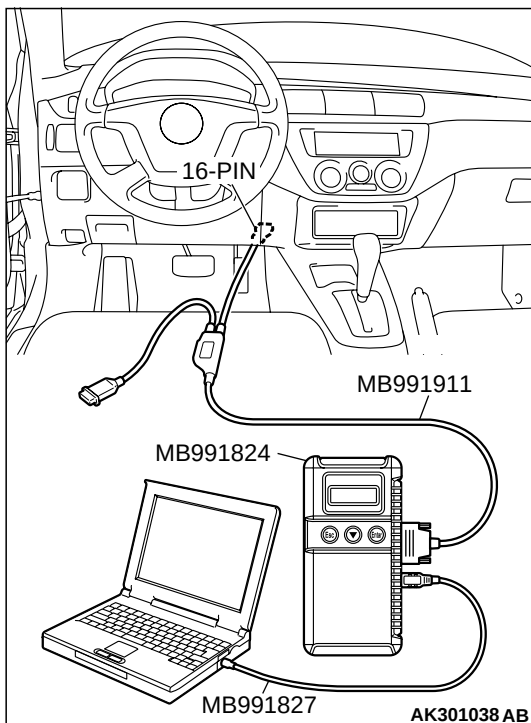
**STEP 3. Using scan tool MB991958, check actuator test item 08: Evaporative Emission Purge Solenoid.**

- (1) Turn the ignition switch to the "ON" position.
- (2) Set scan tool MB991958 to the actuator test mode for item 08, 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 5.

**STEP 4. Using scan tool MB991958, check actuator test item 29: 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 29, 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 5.

STEP 5. Test the OBD-II drive cycle.

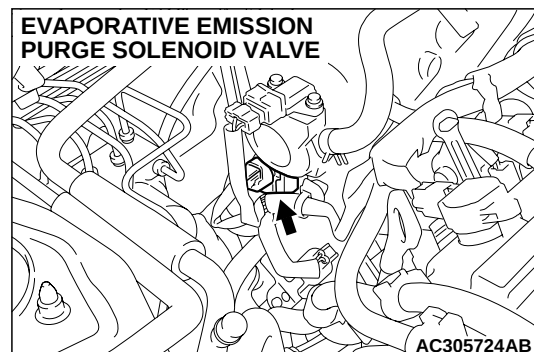
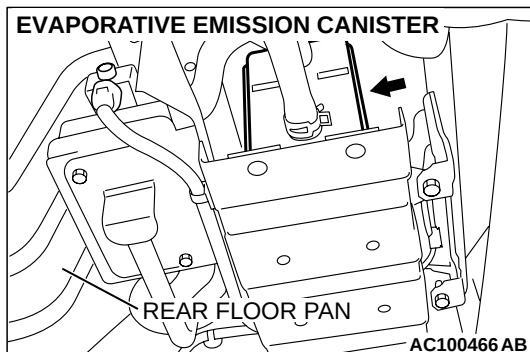
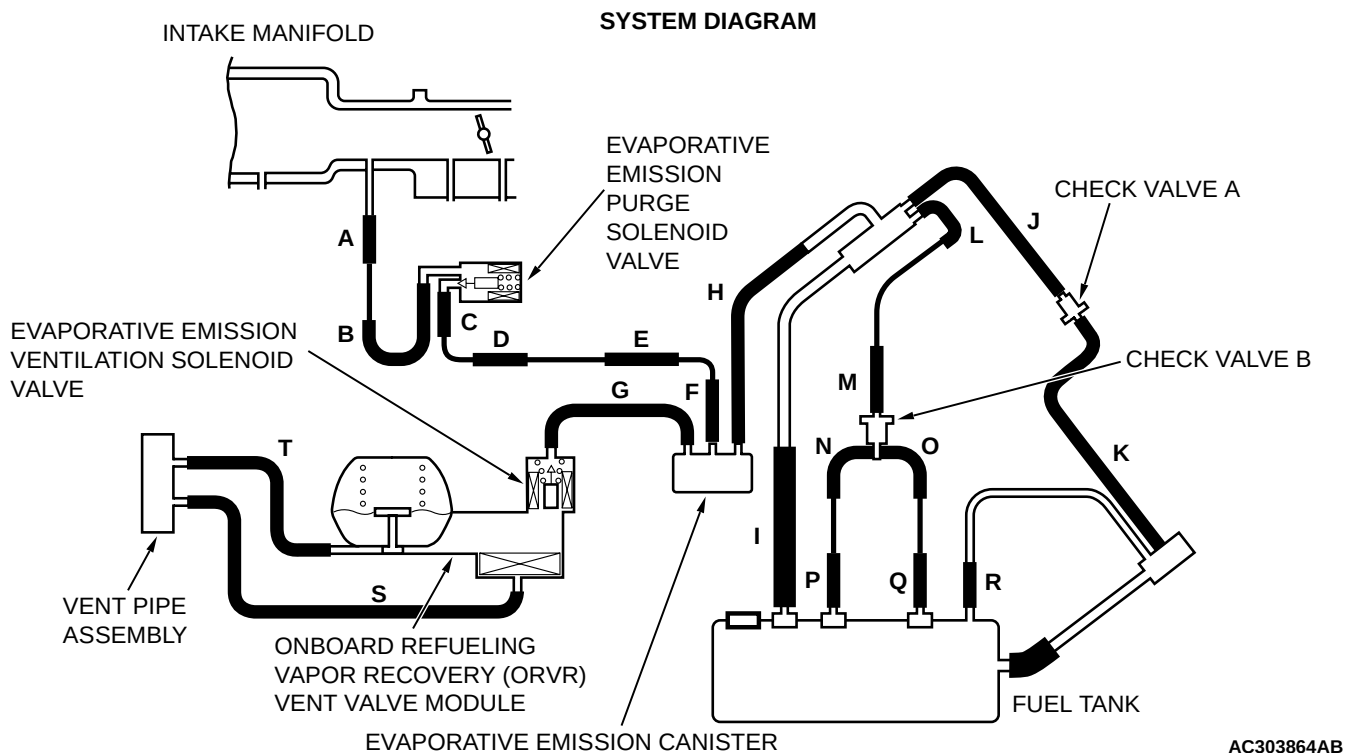
- (1) Carry out a test drive with the drive cycle pattern. (Refer to Trouble Code Diagnosis – OBD-II Drive Cycle – Procedure 1 – Evaporative Emission System Leak Monitor [P.13B-6.](#))
- (2) Read the diagnostic trouble code.

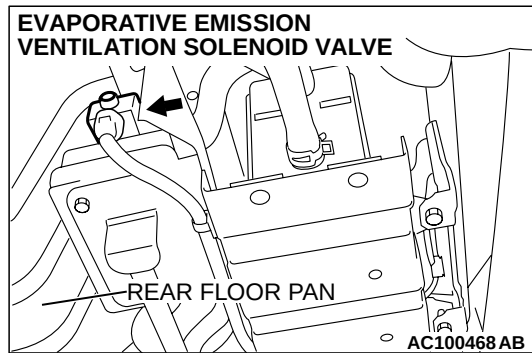
Q: Is DTC P0441 set?

YES : Retry the troubleshooting.

NO : The inspection is complete.

DTC P0442: Evaporative Emission Control System Leak Detected (Small Leak)



**TECHNICAL DESCRIPTION**

- The ECM <M/T> or PCM <A/T> monitors the Evaporative Emission (EVAP) System pressure.
- The ECM <M/T> or PCM <A/T> 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 <M/T> or PCM <A/T> 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)

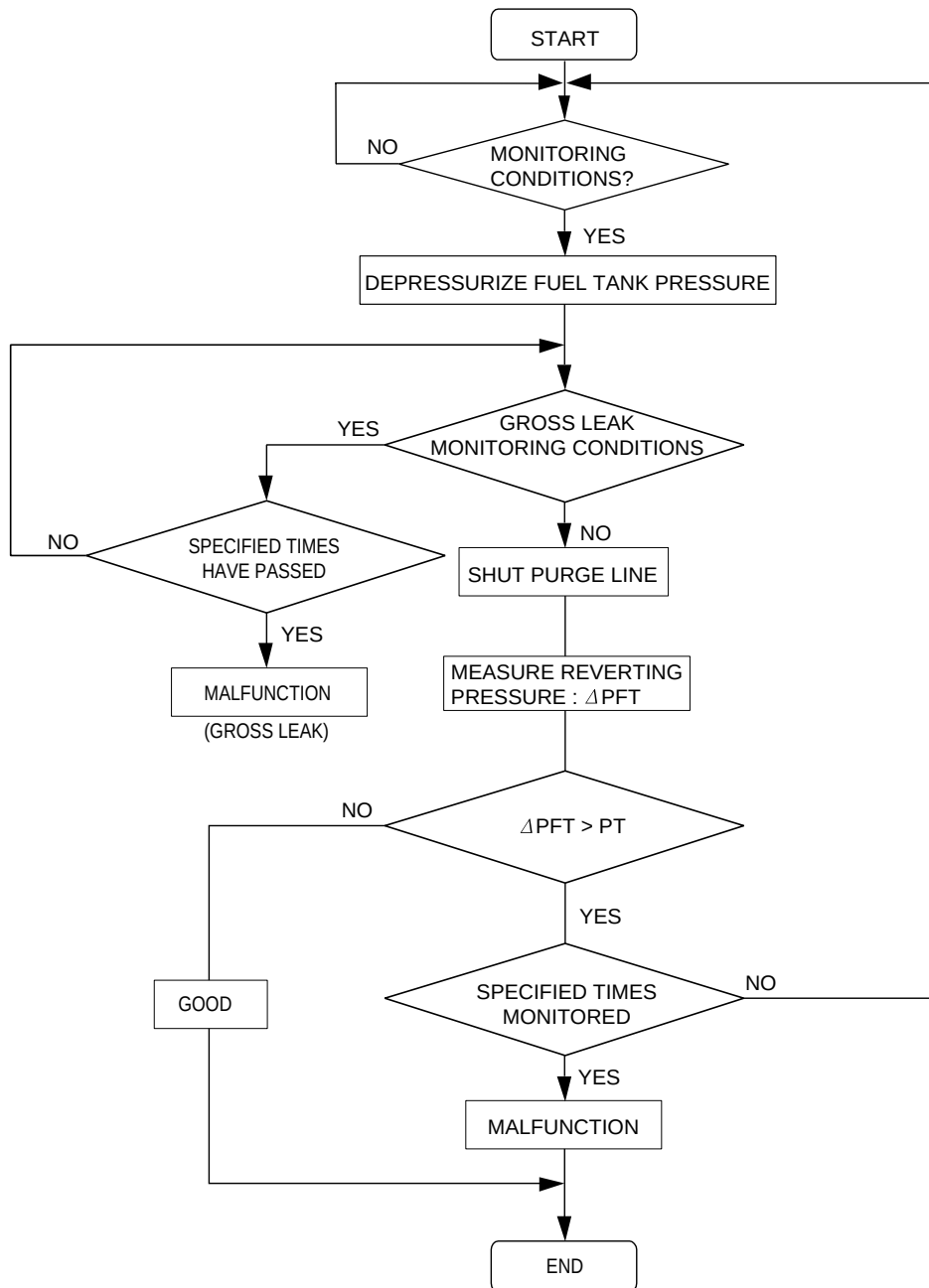
- Evaporative emission purge solenoid monitor
- Evaporative emission purge system monitor
- Fuel tank differential pressure sensor monitor
- Evaporative emission ventilation solenoid monitor
- Fuel level sensor monitor
- Fuel temperature sensor monitor

Sensor (The sensors below are determined to be normal)

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

LOGIC FLOW CHARTS (Monitor Sequence)

0.04in, 0.02in GROSS LEAK MONITOR



AC306649

DTC SET CONDITIONS

Remaining fuel amount is 15 – 40 percent of capacity (fuel level sensor output signal voltage is 1.4 – 2.4 volts).

Check Conditions A: At Start up

- Intake air temperature is 36°C (97°F) or less when the engine is started.
- The engine coolant temperature is 36 °C (97 °F) or less when the engine is started.

Check Conditions B: For Test to Run

- The fuel temperature is 36°C (97°F) or less.
- 14 minutes have elapsed since the engine was started.
- Engine coolant temperature is greater than 60°C (140°F).
- Power steering pressure switch: "OFF"
- Barometric pressure is greater than 76 kPa (11 psi).
- Fuel tank differential pressure sensor output voltage is 1 to 4 volts.
- Vehicle speed is greater than or equal to 20 km/h (12.4 mph).

Check Conditions C: For Test to Stop

- Intake air temperature is greater than -10°C (14°F).
- When the evaporative emission purge solenoid and evaporative emission ventilation solenoid are closed, the pressure in the fuel tank is less than 451 Pa (0.065 psi).
- The pressure fluctuation is less than 647 Pa (0.094 psi).
- 10 seconds have elapsed from the start of the previous monitoring.
- Monitoring time: 75 – 125 seconds.

Judgment Criteria

- Internal pressure of the fuel tank has changed more than 785 Pa (0.114 psi) in 20 seconds after the tank and vapor line were closed.

DTC SET CONDITIONS

Remaining fuel amount is 40 – 85 percent of capacity (fuel level sensor output voltage is 2.4 – 3.7 volts).

Test Conditions A: At Start up

- Intake air temperature is less than 36 °C (97 °F) when the engine is started.
- The engine coolant temperature is less than 36 °C (97°F) when the engine is started.

Test Conditions B: For Test to Run

- The fuel temperature is 36°C (97°F).
- Barometric pressure is greater than 76 kPa. (11 psi).
- Fuel tank differential pressure sensor output voltage is 1 to 4 volts.

Test Conditions C: For Test to Stop

- Intake air temperature is greater than -10°C (14°F).
- Engine coolant temperature is greater than 20°C (68°F).
- When the evaporative emission purge solenoid and evaporative emission ventilation solenoid are closed, the pressure in the fuel tank is less than 324 Pa (0.047 psi).
- 10 seconds have elapsed from the start of the previous monitoring.
- Monitoring time: 10 – 14 minutes.

Judgment Criteria

- Internal pressure of the fuel tank has changed more than 1.9 kPa (0.28 psi) in 128 seconds after the tank and vapor line were closed.

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function – OBD-II Drive Cycle – Procedure 1 – Evaporative Emission System Leak Monitor [P.13B-6](#).

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:

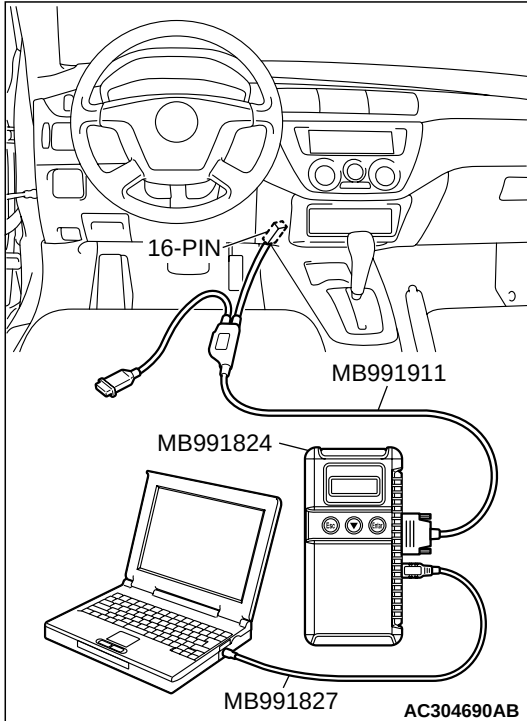
- MB991958: Scan Tool (MUT-III Sub Assembly)
 - MB991824: V.C.I.
 - MB991827: MUT-III USB Cable
 - MB991911: MUT-III Main Harness B

STEP 1. Using scan tool MB991958, check the EVAP 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 <M/T> or PCM <A/T> will automatically increase the engine speed to 1,600 r/min or greater. Check that the transaxle is set to "neutral" <M/T> or "P" <A/T> 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.

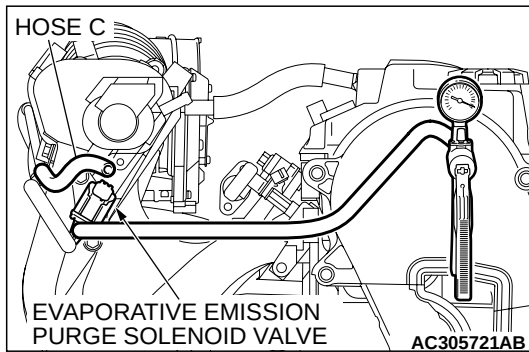


Q: Is "Evap Leak Mon. Completed. Test Failed and DTCs Set" displayed on scan tool MB991958?

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-31](#). If no other DTC's have been set, then 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.

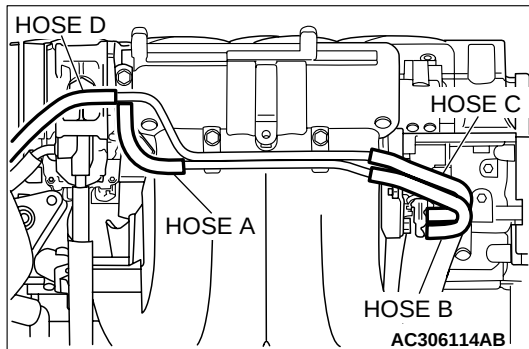
**STEP 2. Check the evaporative emission purge solenoid for leaks.**

- (1) Disconnect hose C from the evaporative emission purge solenoid and connect a hand vacuum pump to the nipple of the evaporative emission purge solenoid.
- (2) Use the hand vacuum pump to confirm that the evaporative emission purge solenoid holds vacuum.
- (3) Disconnect the hand vacuum pump, and connect hose C to the evaporative emission purge solenoid.

Q: Does the evaporative emission purge solenoid hold vacuum?

YES : Go to Step 3.

NO : Replace the evaporative emission purge solenoid.
Then go to Step 15.

**STEP 3. Check for leaks in evaporative emission system hoses A through D.**

Use a hand vacuum pump to test each hose from hose A to hose D.

Q: Do the hoses hold vacuum?

YES : Go to Step 4.

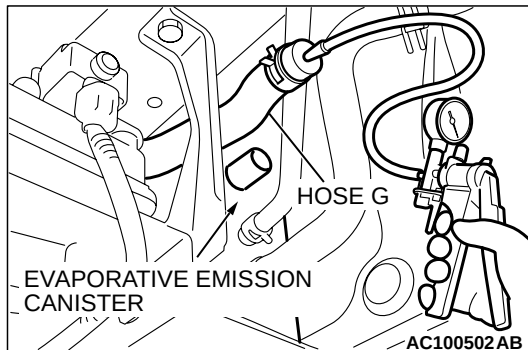
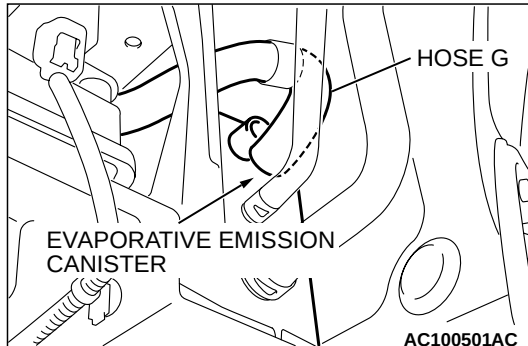
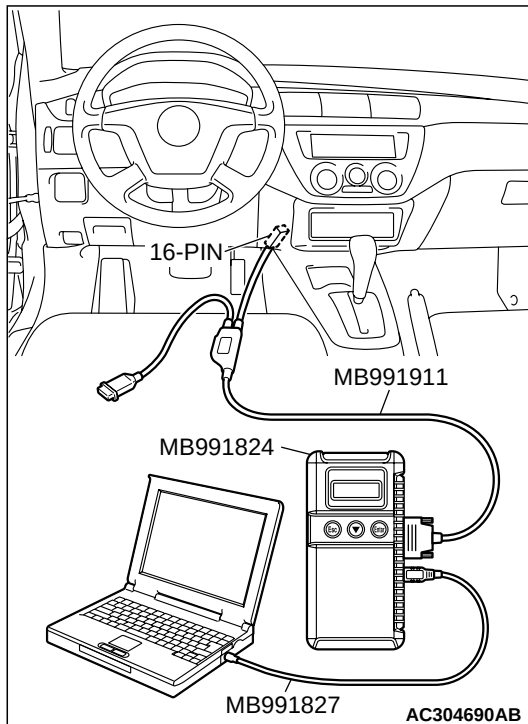
NO : Replace any damaged hose. Then go to Step 15.

STEP 4. Using scan tool MB991958, check data list item 29: 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) Disconnect hose G from the evaporative emission canister side, and connect a hand vacuum pump.

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

(4) Set scan tool MB991958 to actuator test mode.

- Item 29: Evaporative Emission Ventilation Solenoid.
- While the evaporative emission ventilation solenoid is energized, operate the hand vacuum pump and confirm that the solenoid holds vacuum.

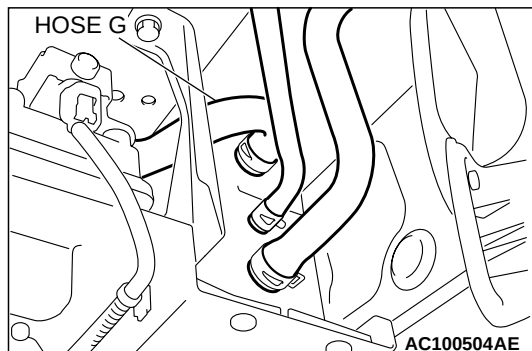
(5) Turn the ignition switch to the "LOCK" (OFF) position, and disconnect scan tool MB991958.

(6) Disconnect the hand vacuum pump, and connect hose G to the evaporative emission canister.

Q: Did the evaporative emission ventilation solenoid hold vacuum?

YES : Go to Step 6.

NO : Go to Step 5.

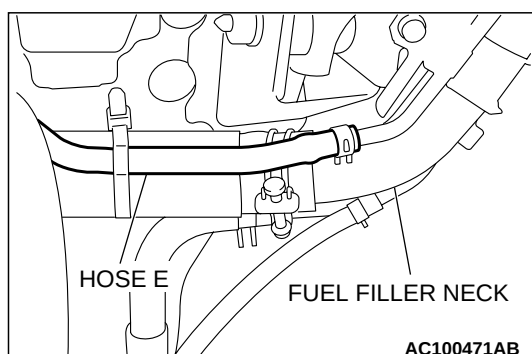


STEP 5. Check for leaks in evaporative emission hose G.
Perform a leakage test using a hand vacuum pump on hose G.

Q: Do the hose hold vacuum?

YES : Replace the evaporative emission ventilation solenoid. Then go to Step 15.

NO : Replace hose G. Then go to Step 15.



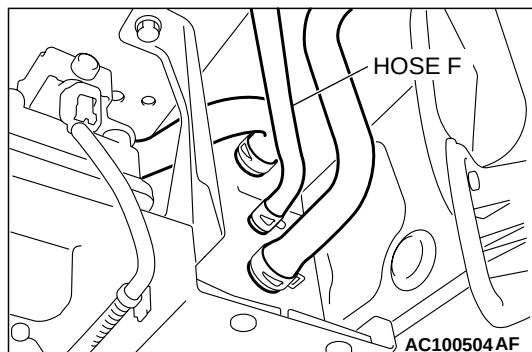
STEP 6. Check for leaks in evaporative emission system hoses E and F.

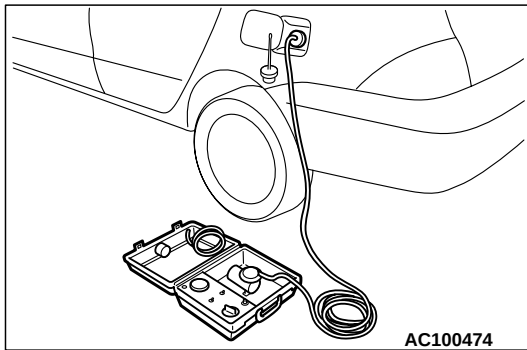
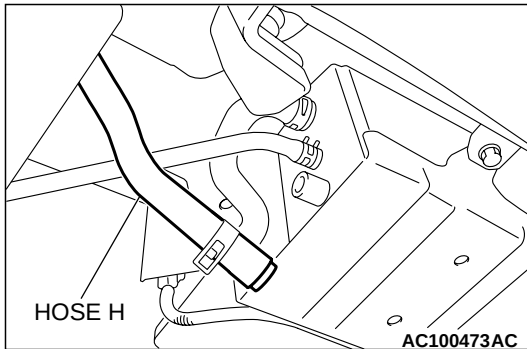
Perform a leakage test with a hand vacuum pump on each hose between hose E and hose F.

Q: Do the hoses hold vacuum?

YES : Go to Step 7.

NO : Replace the damaged hose. Then go to Step 15.





STEP 7. Pressure test for leaks in evaporative system lines from hose H through the fuel tank to hose R.

- (1) Disconnect hose H from the canister, and plug hose H securely.
- (2) Confirm that the evaporative emission system pressure pump (Miller number 6872A) is operating properly. Perform the self-test as described in the manufacturer's instructions.

- (3) Connect the evaporative emission system pressure pump to the fuel filler neck.
- (4) Pressure test the system to determine whether any leaks are present.

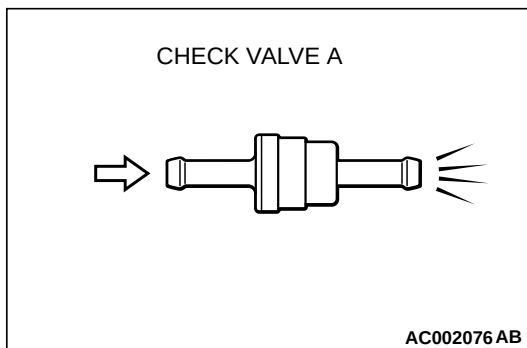
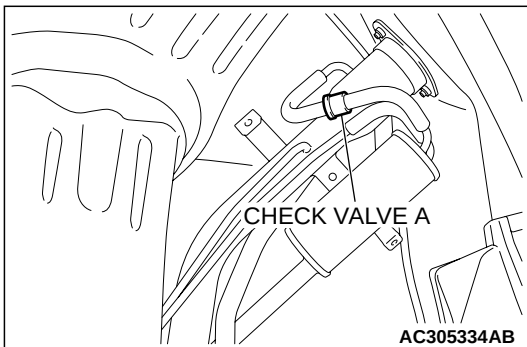
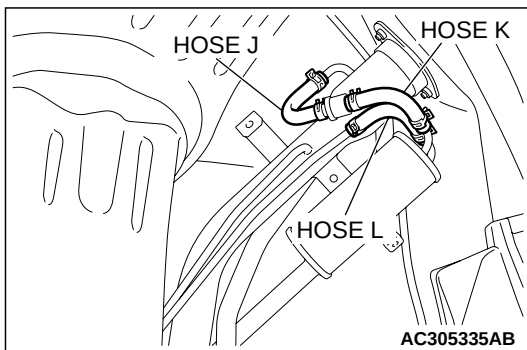
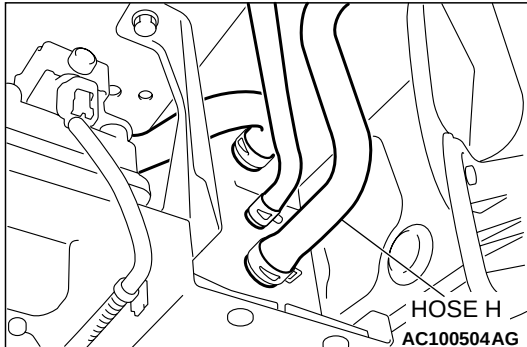
NOTE: The "Pressure test" in this procedure refers to the I/M240 Simulation Test. The eight steps of this test are described in the manufacturer's instructions for the evaporative emission system pressure pump, Miller number 6872A.

- (5) Disconnect the evaporative emission system pressure pump, and reinstall the fuel cap.
- (6) Connect hose H to the canister.

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

YES : Go to Step 13.

NO : Go to Step 8.



STEP 8. Check for leaks in evaporative emission hoses H, J, K and L.

- (1) Remove the fuel filler neck protector. (Refer to GROUP 13C, Fuel Tank [P.13C-9](#).)
- (2) Perform a leakage test with a hand vacuum pump on each hose: H, J, K and L.

Q: Do the hoses hold vacuum?

YES : Go to Step 9.

NO : Replace any damaged hose, and reinstall the fuel filler neck protector. Refer to GROUP 13C, Fuel Tank [P.13C-9](#). Then go to Step 15.

STEP 9. Test check valve A.

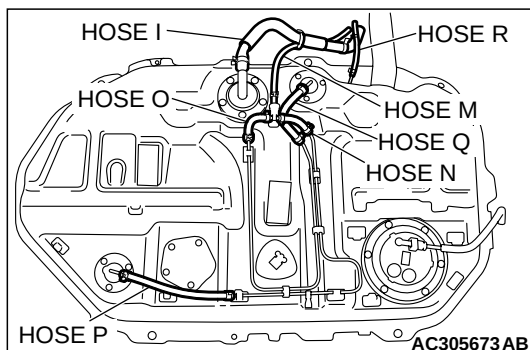
- (1) Check valve A is a one-way check valve.

- (2) Check valve A should allow air to flow in only one direction.

Q: Does check valve A allow air to pass in one direction only?

YES : Go to Step 10.

NO : Replace check valve A, and reinstall the fuel filler neck protector. Refer to GROUP 13C, Fuel Tank [P.13C-9](#). Then go to Step 15.



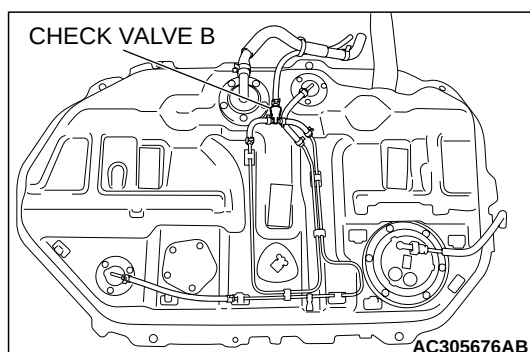
STEP 10. Check for leaks in evaporative emission hoses I, M, N, O, P, Q and R.

- (1) Remove the fuel tank. (Refer to GROUP 13C, Fuel Tank [P.13C-9](#).)
- (2) Perform a leakage test with a hand vacuum pump on each hose I, M, N, O, P, Q and R.

Q: Do the hoses hold vacuum?

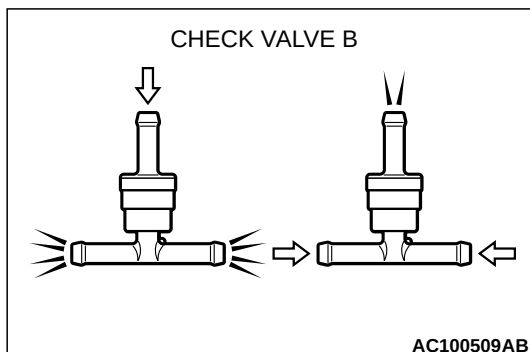
YES : Go to Step 11.

NO : Replace any damaged hose, and reinstall the fuel tank. Refer to GROUP 13C, Fuel Tank [P.13C-9](#). Then go to Step 15.



STEP 11. Test check valve B.

- (1) Check valve B is a one-way check valve.

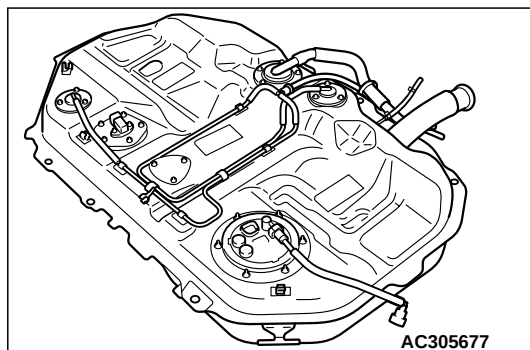


- (2) Check valve B should allow air to flow in only one direction.

Q: Does check valve B allow air to pass in one direction only?

YES : Go to Step 12.

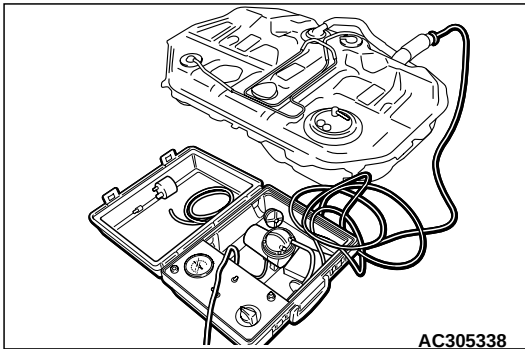
NO : Replace check valve B, and reinstall the fuel tank and the fuel filler neck protector. Refer to GROUP 13C, Fuel Tank [P.13C-9](#). Then go to Step 15.



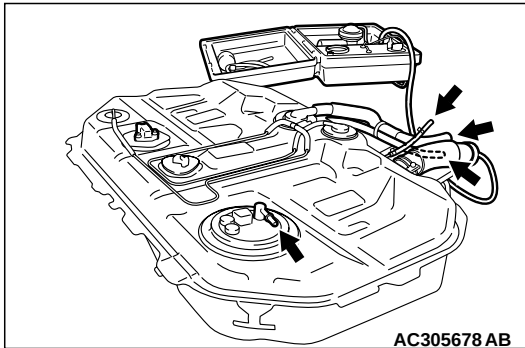
STEP 12. Check for leaks in the fuel tank.

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

NOTE: Carefully check the fuel pump assembly and the differential pressure sensor installation in the fuel tank.



- (2) Connect an evaporative emission system pressure pump (Miller number 6872A) to the filler hose.



- (3) Plug the fuel pump feed nipple, hose I, hose M and hose R connected to the fuel tank.

NOTE: If these items are not securely plugged here, 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.

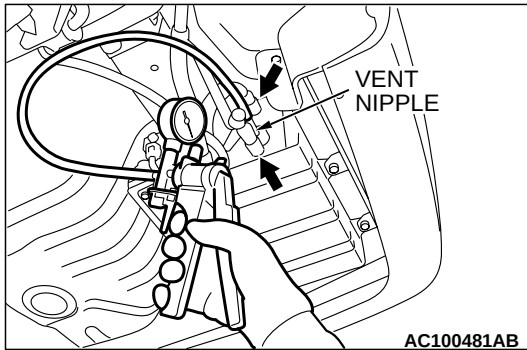
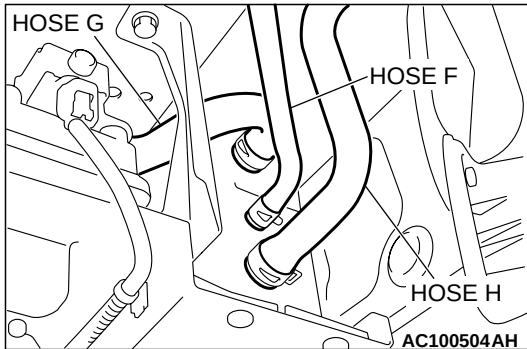
Q: Is any leaks found?

YES <When there is a leak from the attachment points of the fuel pump assembly, fuel tank differential pressure sensor, leveling valve or fuel tank rollover valve.> :

Reassemble the leaked parts and check again that there are no leaks. Then reinstall the fuel tank (Refer to GROUP 13C, Fuel Tank [P.13C-9](#)). Then go to Step 15.

YES <When there is a leak from the fuel tank.> : Replace the fuel tank (Refer to GROUP 13C, Fuel Tank [P.13C-9](#)). Then go to Step 15.

NO : When there is no leak, reinstall the fuel tank (Refer to GROUP 13C, Fuel Tank [P.13C-9](#)). Then go to Step 14.



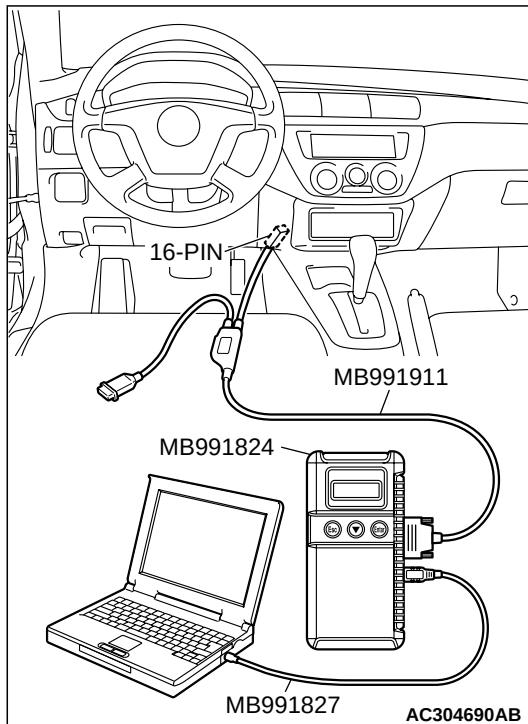
STEP 13. Check the evaporative emission canister for vacuum leaks.

- (1) Disconnect hoses F, G and H from the evaporative emission canister side, and connect a hand vacuum pump to the evaporative emission canister instead of hose F, 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 connect hoses F, G and H to the canister.

Q: Does the evaporative emission canister hold vacuum?

YES : Go to Step 14.

NO : Replace the evaporative emission canister. Refer to GROUP 17, Evaporative Emission Canister and Fuel Tank Pressure Relief Valve [P.17-230](#). Then go to Step 15.



STEP 14. Using scan tool MB991958, check the EVAP 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 <M/T> or PCM <A/T> automatically increases the engine speed to 1,600 r/min or greater. Check that the transaxle is set to "neutral" <M/T> or "P" <A/T> 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 the 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. Disconnect scan tool MB991958.

Q: Is "Evap Leak Mon. Completed. Test Failed and DTCs Set" displayed on scan tool MB991958?

YES : Replace the ECM <M/T> or PCM <A/T> (Refer to [P.13B-919](#)). Then go to Step 15.

NO <"Evap Leak Mon. Completed. Test Passed" is displayed on scan tool MB991958.> : The evaporative emission system is working properly at this time. Then go to Step 15.

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 14.

STEP 15. Perform the OBD-II drive cycle.

- (1) Confirm the repair by performing the appropriate drive cycle (Refer to Diagnostic Function – OBD-II Drive Cycle – Procedure 1 – Evaporative Emission System Leak Monitor [P.13B-6](#)).
- (2) Read the diagnostic trouble code (DTC).

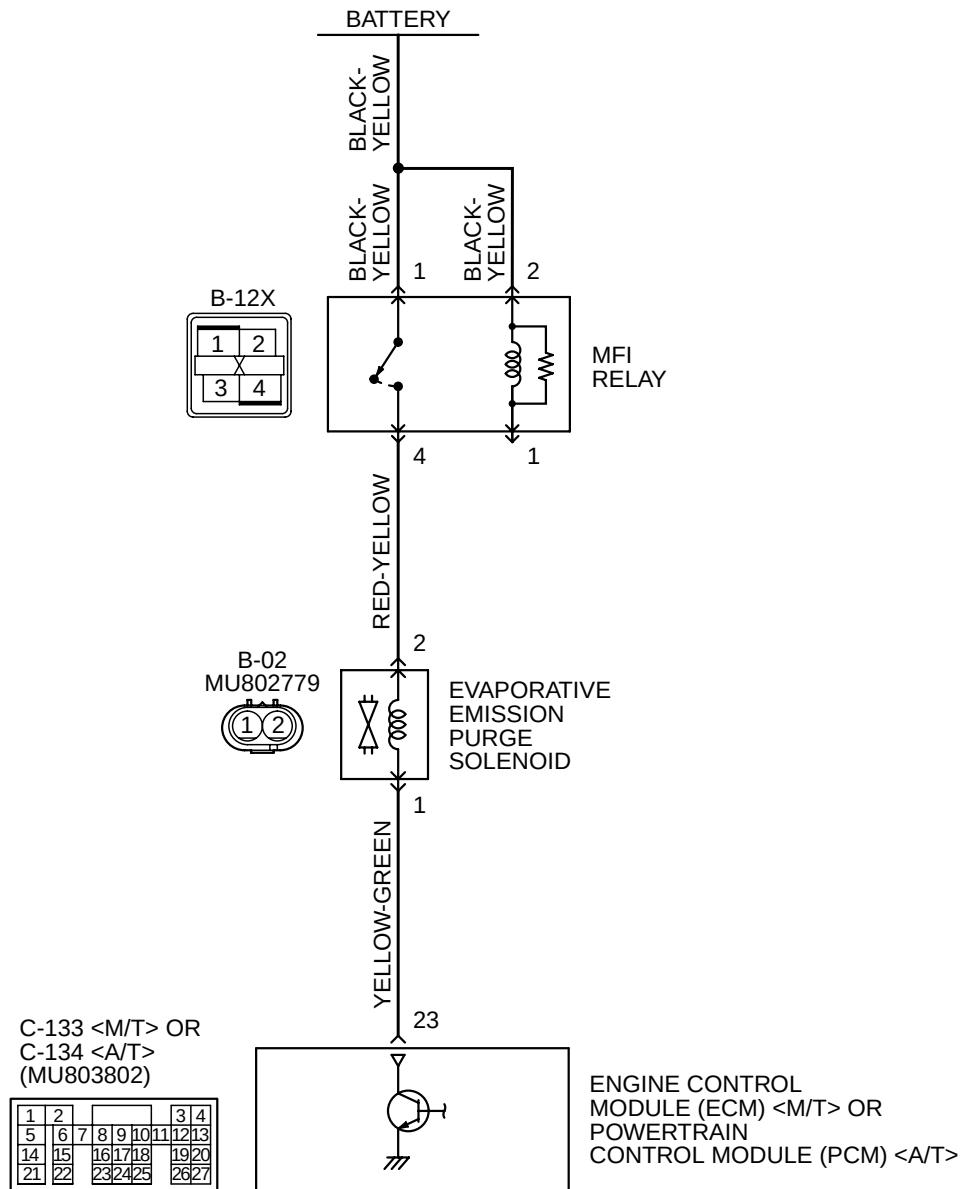
Q: Is DTC P0442 set?

YES : Repeat the troubleshooting from Step 1.

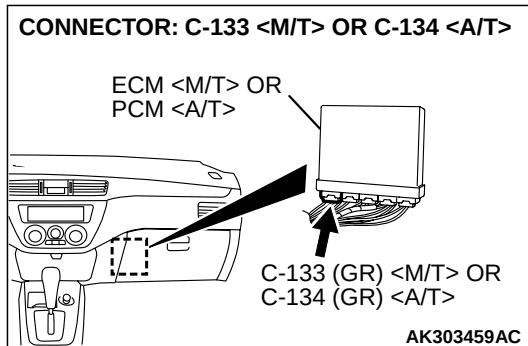
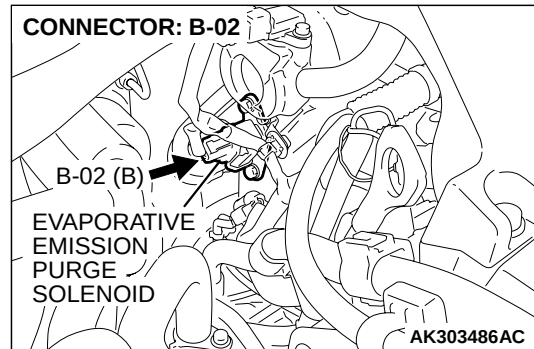
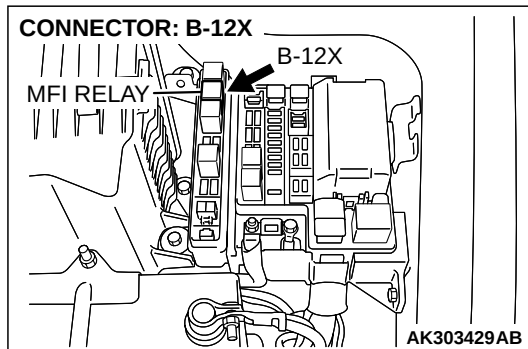
NO : The procedure is complete.

DTC P0443: Evaporative Emission Control System Purge Control Valve Circuit

Evaporative Emission Purge Solenoid Circuit



AK303994



CIRCUIT OPERATION

- The evaporative emission purge solenoid power is supplied from the MFI relay (terminal No. 4).
- The ECM <M/T> or PCM <A/T> controls ground evaporative emission purge solenoid by turning the power transistor in the ECM <M/T> or PCM <A/T> "ON" and "OFF".

TECHNICAL DESCRIPTION

- To judge if there is open circuit in the evaporative emission purge solenoid drive circuit, ECM <M/T> or PCM <A/T> measures the surge voltage of the evaporative emission ventilation 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)

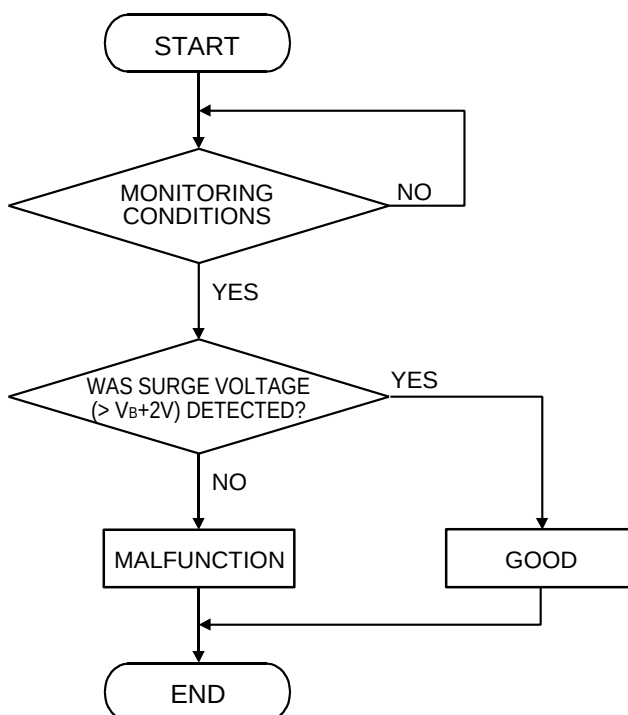
- Not applicable

Sensor (The sensor below is determined to be normal)

- Not applicable

DTC SET CONDITIONS

Logic Flow Chart



AK302039

Check Conditions

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

Judgment Criteria

- Evaporative emission purge solenoid coil surge voltage (battery positive voltage +2 volts) is not detected for 0.2 second.
- The ECM <M/T> or PCM <A/T> monitors for this condition once during the drive cycle.

Check Conditions

- Battery positive voltage is at between 10 and 16.5 volts.
- ON duty cycle of the evaporative emission purge solenoid is between 10 and 90 percent.
- ON duty cycle of the exhaust gas recirculation valve is 0 percent.
- Evaporative emission ventilation solenoid is OFF.

- More than 1 second has elapsed after the above-mentioned conditions have been met.

Judgment Criteria

- 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 – Procedure 6 – Other Monitor [P.13B-6](#).

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

- Evaporative emission purge solenoid failed.
- Open or shorted evaporative emission purge solenoid circuit, harness damage or connector damage.
- ECM failed. <M/T>
- PCM failed. <A/T>

DIAGNOSIS**Required Special Tools:**

- MB991958: Scan Tool (MUT-III Sub Assembly)
 - MB991824: V.C.I.
 - MB991827: USB Cable
 - MB991911: Main Harness B

STEP 1. Using scan tool MB991958, check actuator test item 08: Evaporative Emission Purge Solenoid.

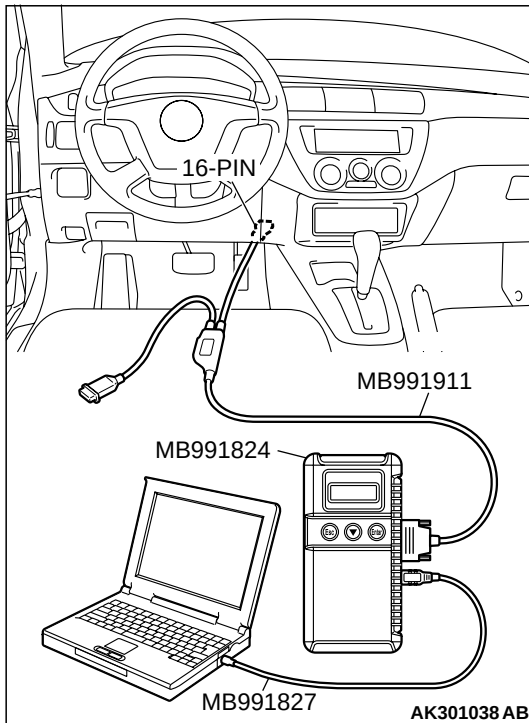
⚠ CAUTION

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 08, 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?

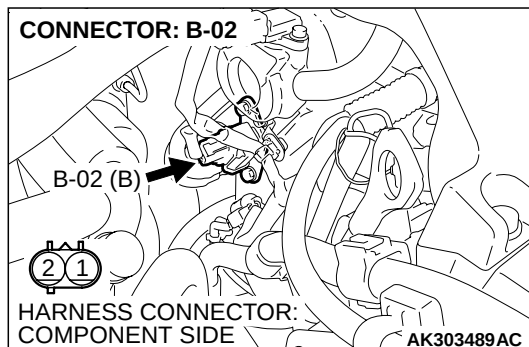
- YES :** It can be assumed that this malfunction is intermittent.
Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points [P.00-6](#).
- NO :** Go to Step 2.

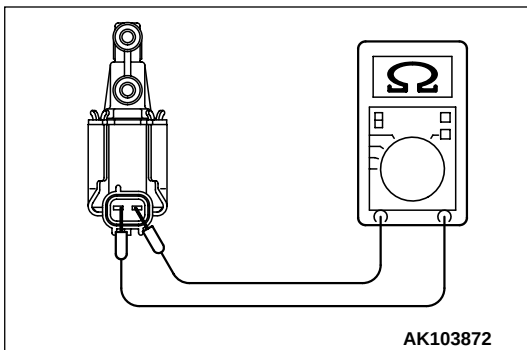
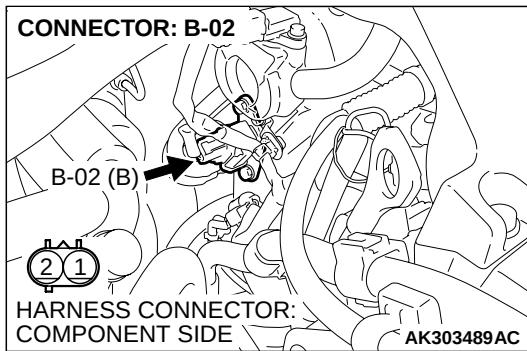


STEP 2. Check harness connector B-02 at the evaporative emission purge solenoid for damage.

Q: Is the harness connector in good condition?

- YES :** Go to Step 3.
- NO :** Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then go to Step 12.





STEP 3. Check the evaporative emission purge solenoid.

- (1) Disconnect the evaporative emission purge solenoid connector B-02.

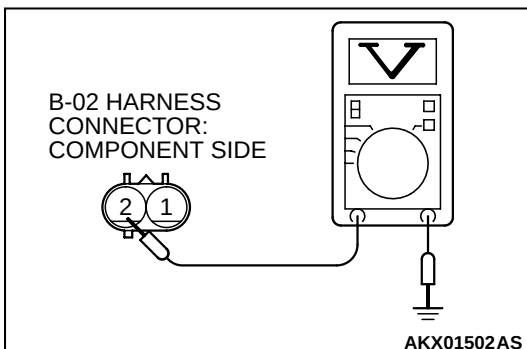
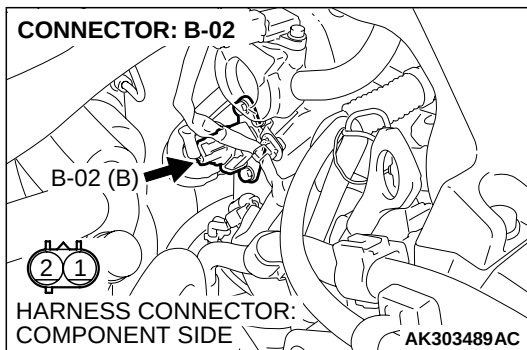
- (2) Measure the resistance between evaporative emission purge solenoid side connector terminal No. 1 and No. 2.

Standard value: 30 – 34 ohms [at 20°C (68°F)]

Q: Is the measured resistance between 30 – 34 ohms [at 20°C (68°F)]?

YES : Go to Step 4.

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



STEP 4. Measure the power supply voltage at evaporative emission purge solenoid harness side connector B-02.

- (1) Disconnect the connector B-02 and measure at the harness side.
(2) Turn the ignition switch to the "ON" position.

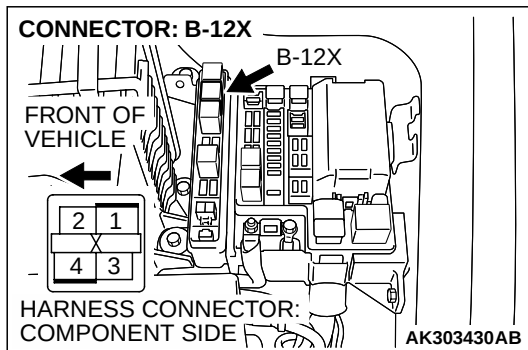
- (3) Measure the voltage between terminal No. 2 and ground.
• Voltage should be battery positive voltage.

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

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

YES : Go to Step 6.

NO : Go to Step 5.

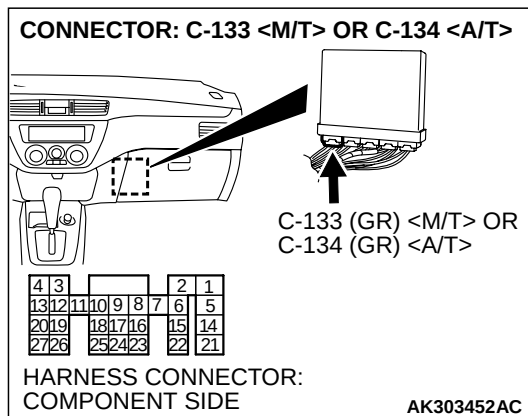


STEP 5. Check harness connector B-12X at MFI relay for damage.

Q: Is the harness connector in good condition?

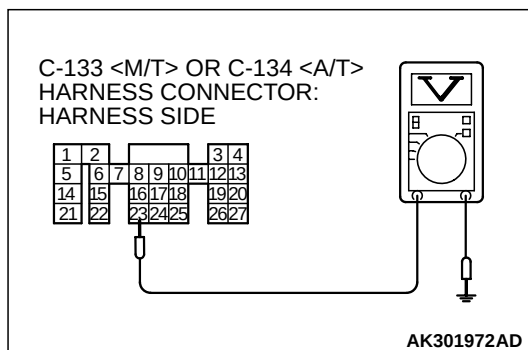
YES : Repair harness wire between MFI relay connector B-12X (terminal No. 4) and evaporative emission purge solenoid connector B-02 (terminal No. 2) because of open circuit or short circuit to ground. Then go to Step 12.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then go to Step 12.



STEP 6. Measure the power supply voltage at ECM connector C-133 <M/T> or PCM connector C-134 <A/T> by backprobing.

- (1) Do not disconnect the connector C-133 <M/T> or C-134 <A/T>.
- (2) Turn the ignition switch to the "ON" position.



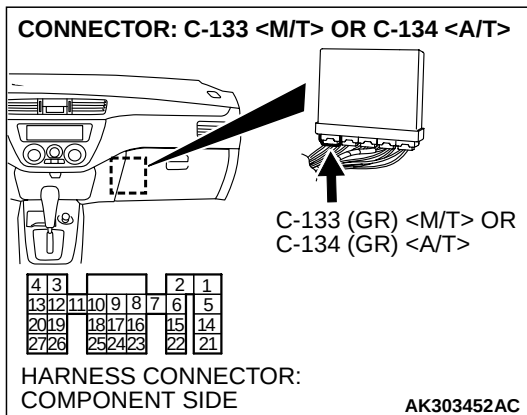
- (3) Measure the voltage between terminal No. 23 and ground by backprobing.
 - Voltage should be battery positive voltage.

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

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

YES : Go to Step 9.

NO : Go to Step 7.

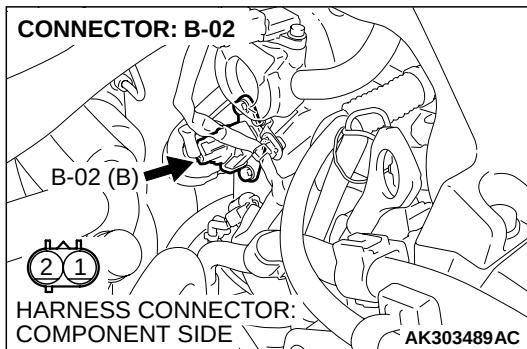


STEP 7. Check harness connector C-133 at ECM <M/T> or C-134 at PCM <A/T> for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 8.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then go to Step 12.

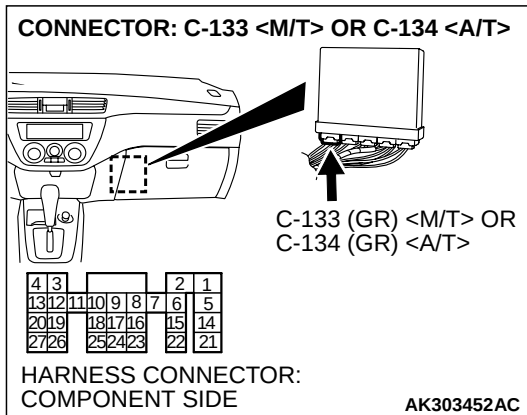


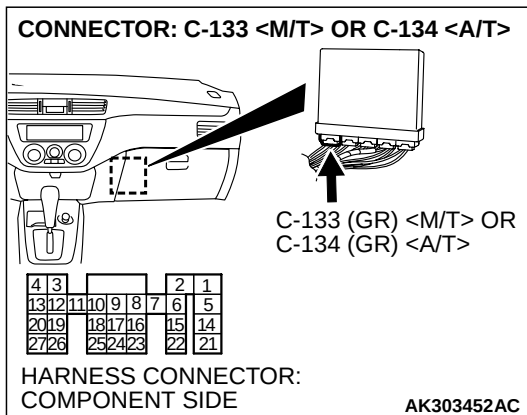
STEP 8. Check for open circuit and short circuit to ground between evaporative emission purge solenoid connector B-02 (terminal No. 1) and ECM connector C-133 <M/T> or PCM connector C-134 <A/T> (terminal No. 23).

Q: Is the harness wire in good condition?

YES : Replace the ECM or PCM. Then go to Step 12.

NO : Repair it. Then go to Step 12.



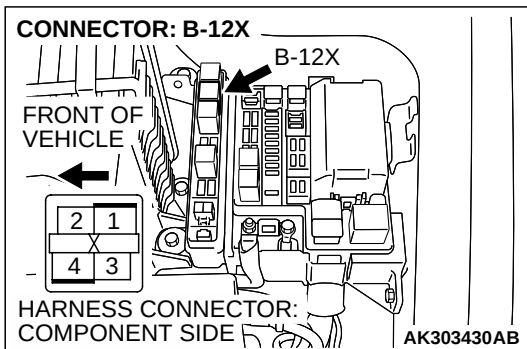


STEP 9. Check harness connector C-133 at ECM <M/T> or C-134 at PCM <A/T> for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 10.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then go to Step 12.

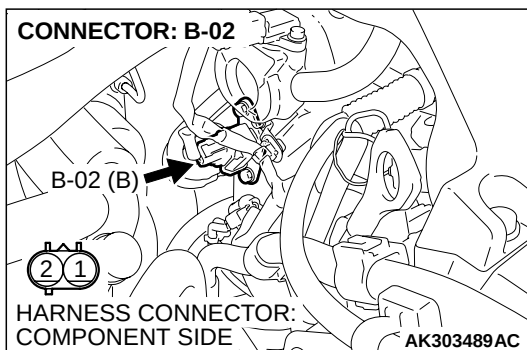


STEP 10. Check for harness damage between MFI relay connector B-12X (terminal No. 4) and evaporative emission purge solenoid connector B-02 (terminal No. 2).

Q: Is the harness wire in good condition?

YES : Go to Step 11.

NO : Repair it. Then go to Step 12.

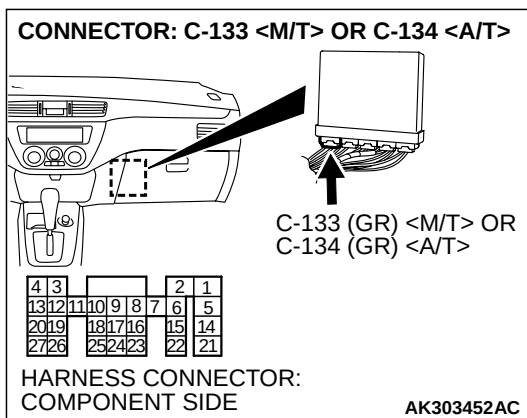
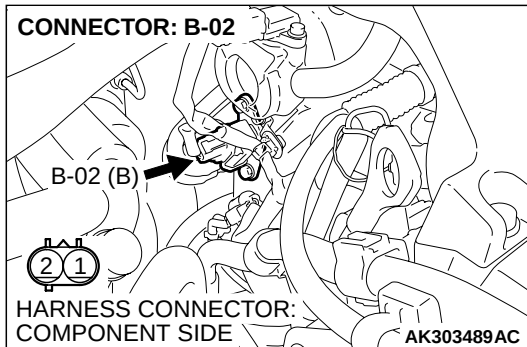


STEP 11. Check for harness damage between evaporative emission purge solenoid connector B-02 (terminal No. 1) and ECM connector C-133 <M/T> or PCM connector C-134 <A/T> (terminal No. 23).

Q: Is the harness wire in good condition?

YES : Replace the ECM or PCM. Then go to Step 12.

NO : Repair it. Then go to Step 12.



STEP 12. 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 – Procedure 6 – Other Monitor [P.13B-6](#).

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

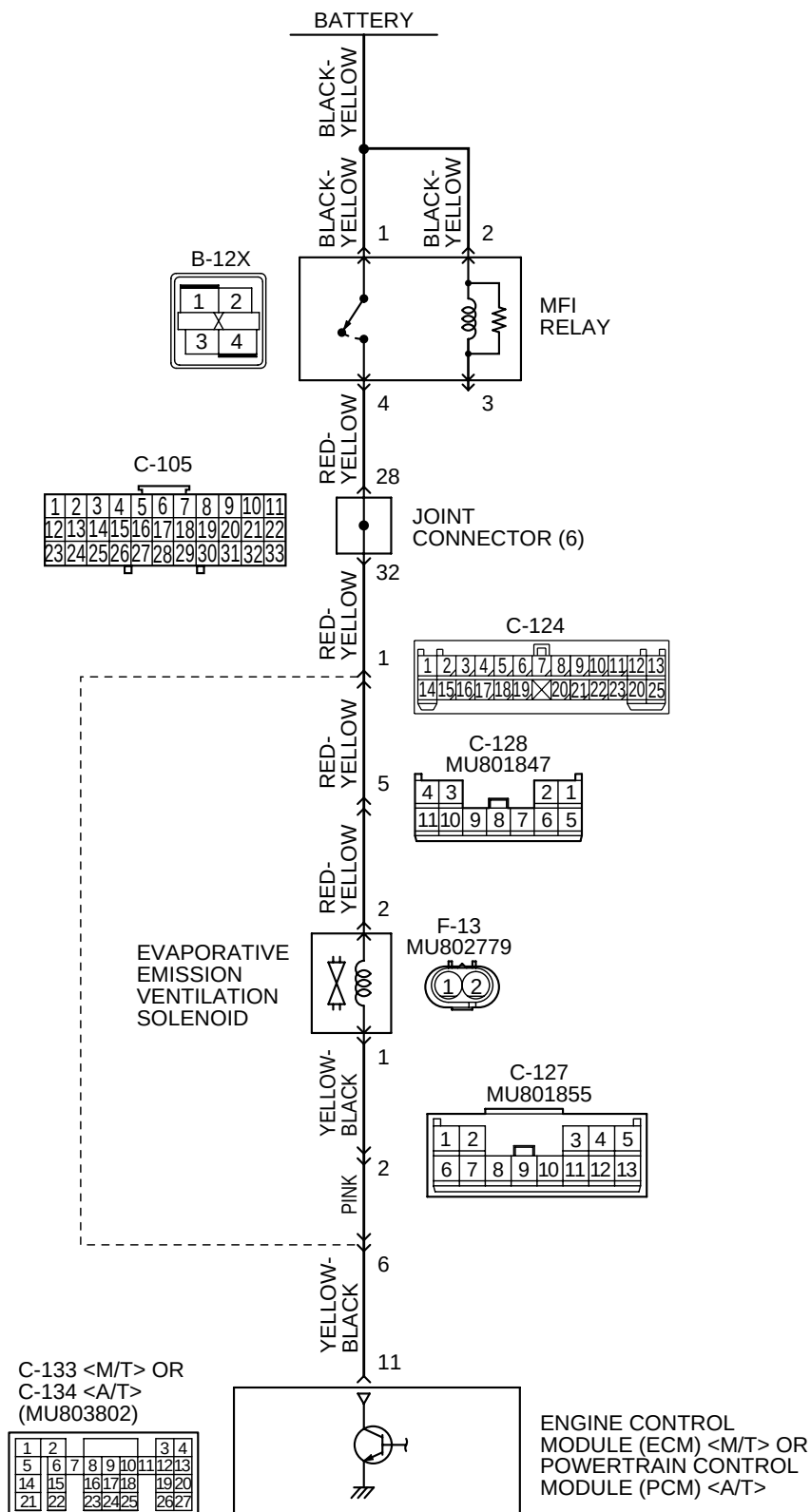
Q: Is DTC P0443 set?

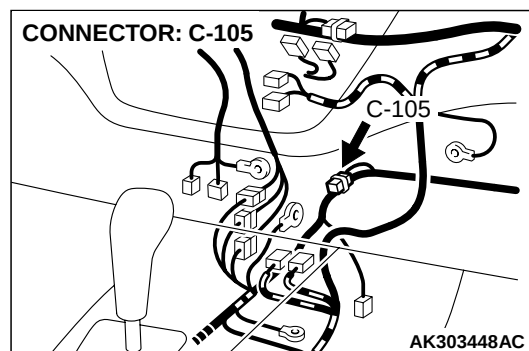
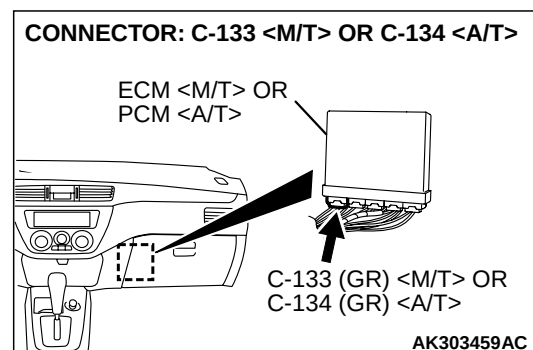
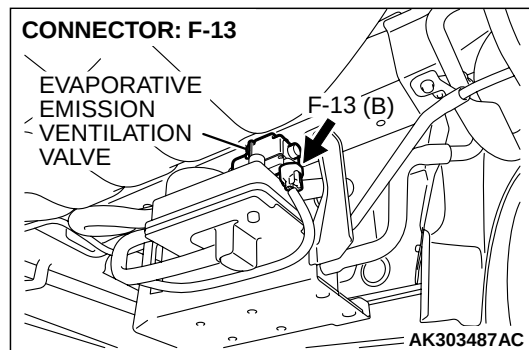
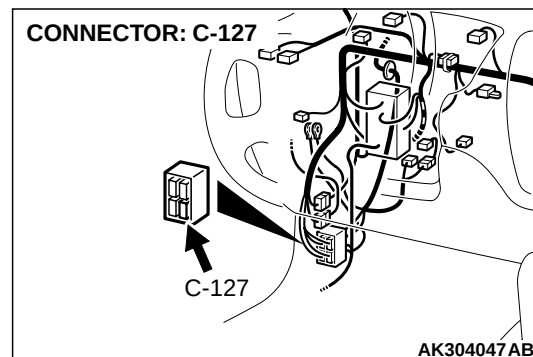
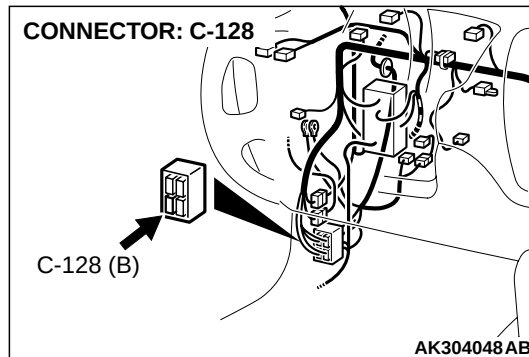
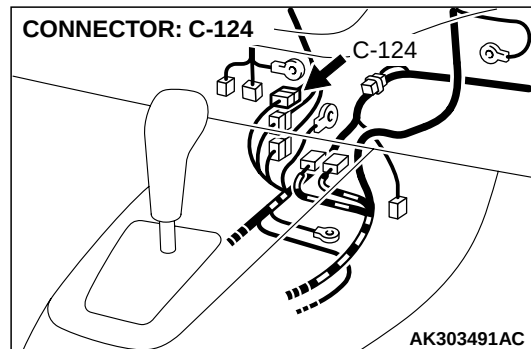
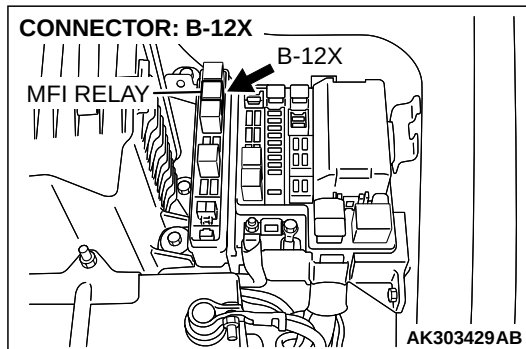
YES : Retry the troubleshooting.

NO : The inspection is complete.

DTC P0446: Evaporative Emission Control System Vent Control Circuit

Evaporative Emission Ventilation Solenoid Circuit





CIRCUIT OPERATION

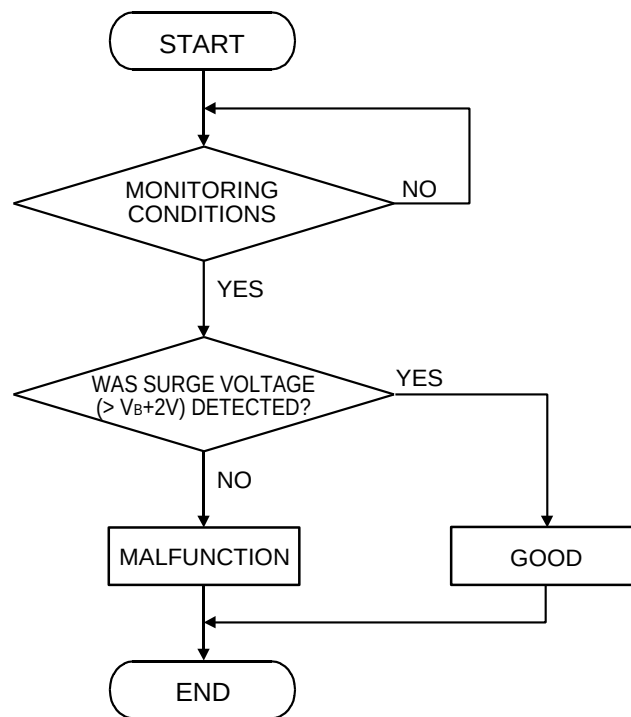
- The evaporative emission ventilation solenoid power is supplied from the MFI relay (terminal No. 4).
- The ECM <M/T> or PCM <A/T> controls the evaporative emission ventilation solenoid ground by turning the power transistor in the ECM <M/T> or PCM <A/T> ON and OFF.

TECHNICAL DESCRIPTION

- To judge if there is open circuit in the evaporative emission ventilation solenoid drive circuit, ECM <M/T> or PCM <A/T> measures the surge voltage of the evaporative emission ventilation solenoid coil.
- The ECM <M/T> or PCM <A/T> drives the evaporative emission ventilation solenoid. After the solenoid is turned off, the ECM <M/T> or PCM <A/T> 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.

DTC SET CONDITIONS**Logic Flow Chart**

AK302039

Check Condition

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

Judgment Criteria

- The evaporative emission ventilation solenoid coil surge voltage (Battery positive voltage + 2 volts) is not detected for 0.2 second.
- The ECM <M/T> or PCM <A/T> monitors for this condition once during the drive cycle.

Check Condition

- 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.

Judgment Criteria

- 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 – Procedure 6 – Other Monitor [P.13B-6](#).

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

- Evaporative emission ventilation solenoid failed.
- Open or shorted evaporative emission ventilation solenoid circuit, harness damage or connector damage.
- ECM failed. <M/T>
- PCM failed. <A/T>

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (MUT-III Sub Assembly)
 - MB991824: V.C.I.
 - MB991827: USB Cable
 - MB991911: Main Harness B

STEP 1. Using scan tool MB991958, check actuator test item 29: Evaporative Emission Ventilation Solenoid.

⚠ CAUTION

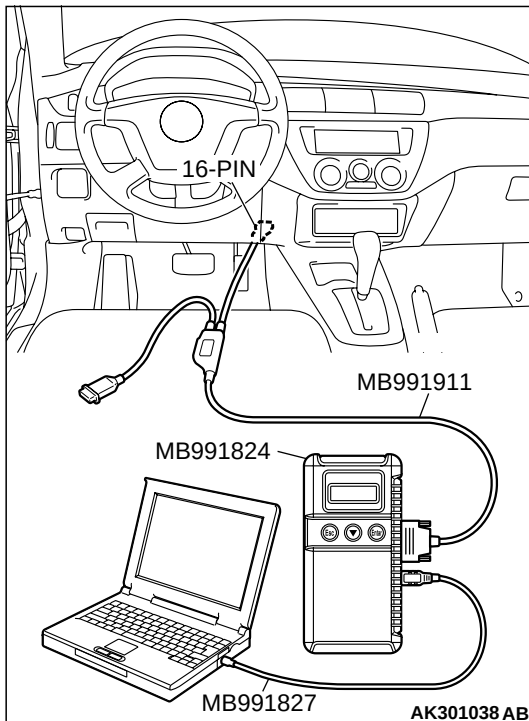
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

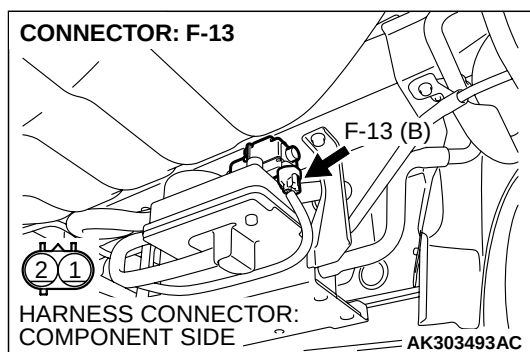
- (1) Connect scan tool MB991958 to the data link connector.
- (2) Turn the ignition switch to the "ON" position.
- (3) Set scan tool MB991958 to the actuator test mode for item 29, Evaporative emission ventilation solenoid.
 - An operation sound should be heard and vibration should be felt when the 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 [P.00-6](#).

NO : Go to Step 2.



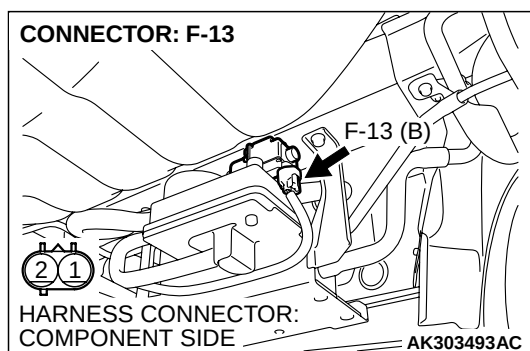


STEP 2. Check harness connector F-13 at the evaporative emission ventilation solenoid for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 3.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then go to Step 12.



STEP 3. Check the evaporative emission ventilation solenoid.

(1) Disconnect the evaporative emission ventilation solenoid connector F-13.

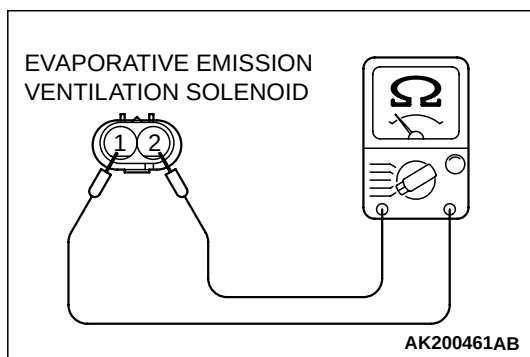
(2) Measure the resistance between evaporative emission ventilation solenoid side connector terminal No. 1 and No. 2.

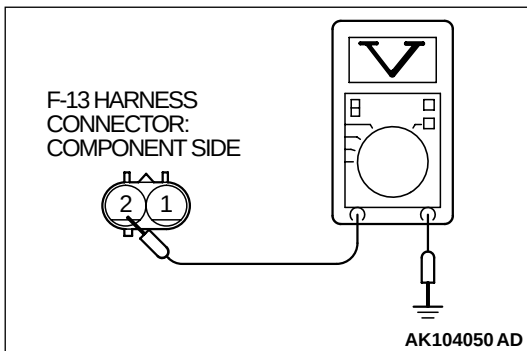
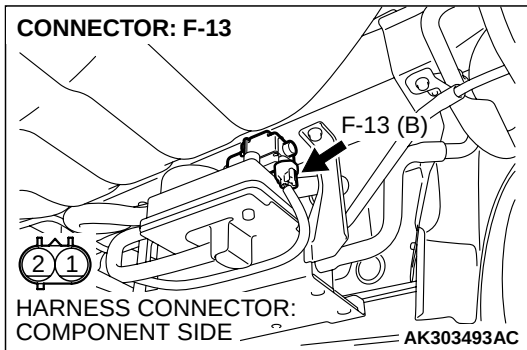
Standard value: 17 – 21 ohms [at 20°C (68°F)]

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 12.





STEP 4. Measure the power supply voltage at evaporative emission ventilation solenoid harness side connector F-13.

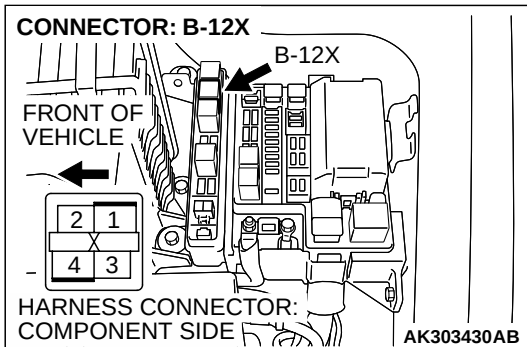
- (1) Disconnect the connector F-13 and measure at the harness side.
- (2) Turn the ignition switch to the "ON" position.

- (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 6.

NO : Go to Step 5.

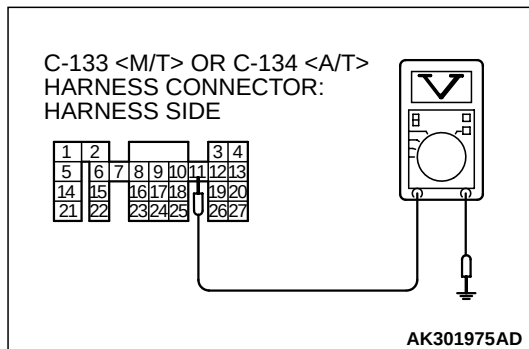
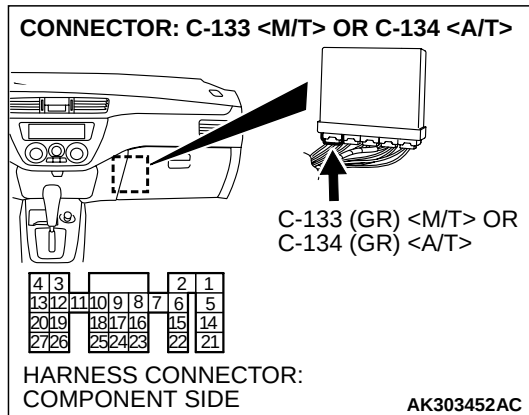


STEP 5. Check harness connector B-12X at MFI relay for damage.

Q: Is the harness connector in good condition?

YES : Check connectors C-105, C-124 and C-128 at intermediate connector for damage, and repair or replace as required. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). If intermediate connectors are in good condition, repair harness wire between MFI relay connector B-12X (terminal No. 4) and evaporative emission ventilation solenoid connector F-13 (terminal No. 2) because of open circuit or short circuit to ground. Then go to Step 12.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then go to Step 12.



STEP 6. Measure the power supply voltage at ECM connector C-133 <M/T> or PCM connector C-134 <A/T> by backprobing.

- (1) Do not disconnect the connector C-133 <M/T> or C-134 <A/T>.
- (2) Turn the ignition switch to the "ON" position.

- (3) Measure the voltage between terminal No. 11 and ground by backprobing.

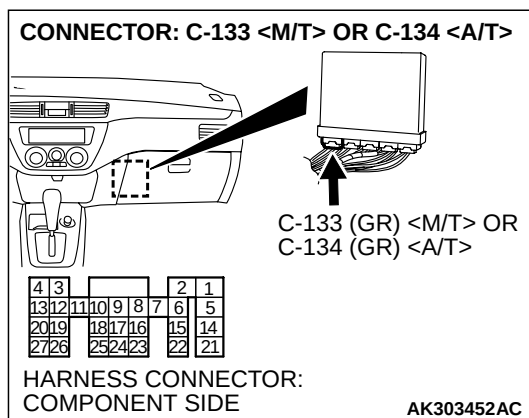
- Voltage should be battery positive voltage.

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

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

YES : Go to Step 9.

NO : Go to Step 7.



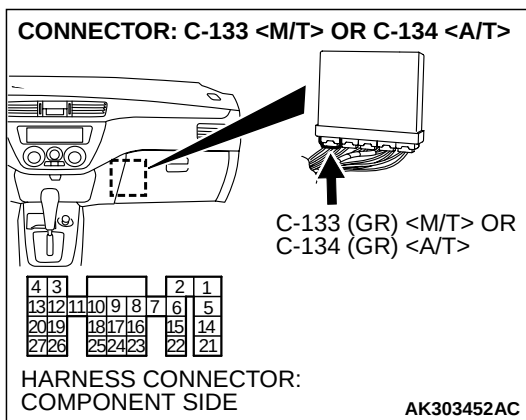
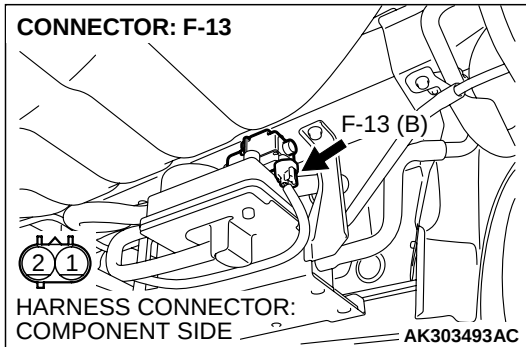
STEP 7. Check harness connector C-133 at ECM <M/T> or C-134 at PCM <A/T> for damage.

Q: Is the harness connector in good condition?

YES : Go to Step 8.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 12.

STEP 8. Check for open circuit and short circuit to ground between evaporative emission ventilation solenoid connector F-13 (terminal No. 1) and ECM connector C-133 <M/T> or PCM connector C-134 <A/T> (terminal No. 11).

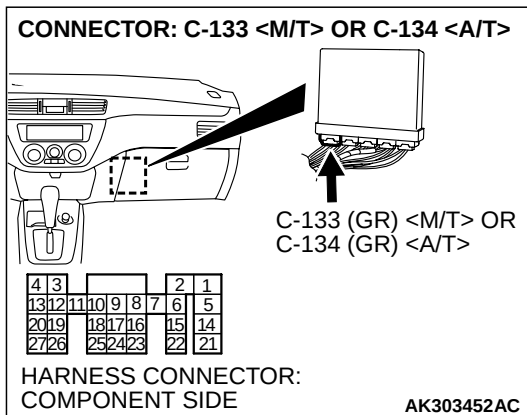


NOTE: Check harness after checking intermediate connectors C-124 and C-127. If intermediate connectors are damaged, repair or replace them. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then go to Step 12.

Q: Is the harness wire in good condition?

YES : Replace the ECM or PCM. Then go to Step 12.

NO : Repair it. Then go to Step 12.

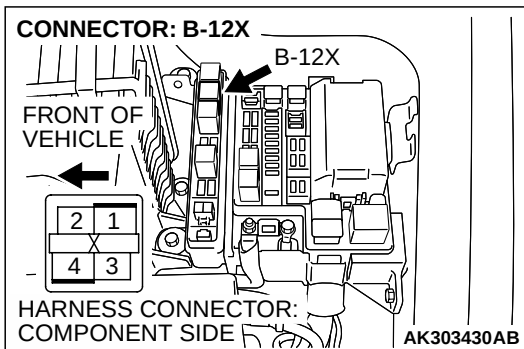


STEP 9. Check harness connector C-133 at ECM <M/T> or C-134 at PCM <A/T> for damage.

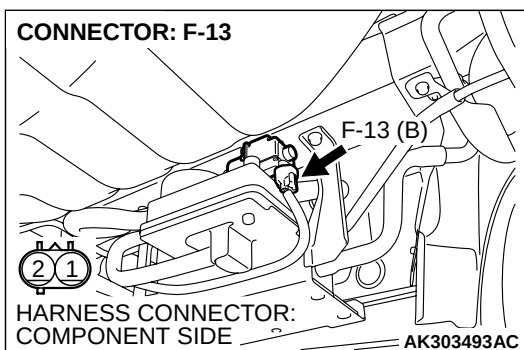
Q: Is the harness connector in good condition?

YES : Go to Step 10.

NO : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then go to Step 12.



STEP 10. Check for harness damage between MFI relay connector B-12X (terminal No. 4) and evaporative emission ventilation solenoid connector F-13 (terminal No. 2).



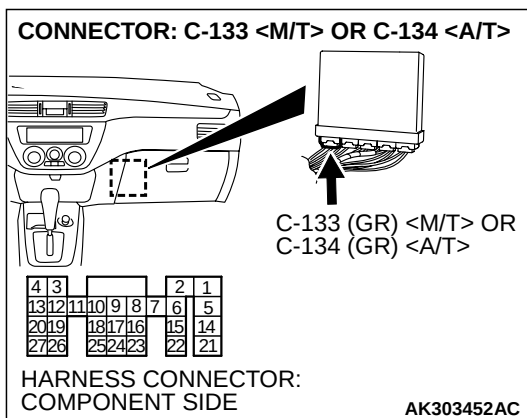
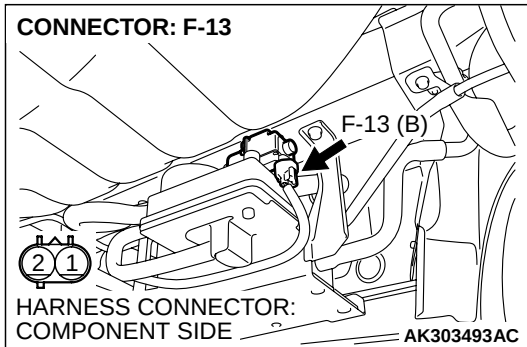
NOTE: Check harness after checking intermediate connectors C-105, C-124 and C-128. If intermediate connectors are damaged, repair or replace them. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then go to Step 12.

Q: Is the harness wire in good condition?

YES : Go to Step 11.

NO : Repair it. Then go to Step 12.

STEP 11. Check for harness damage between evaporative emission ventilation solenoid connector F-13 (terminal No. 1) and ECM connector C-133 <M/T> or PCM connector C-134 <A/T> (terminal No. 11).



NOTE: Check harness after checking intermediate connectors C-124 and C-127. If intermediate connectors are damaged, repair or replace them. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 12.

Q: Is the harness wire in good condition?

YES : Replace the ECM or PCM. Then go to Step 12.

NO : Repair it. Then go to Step 12.

STEP 12. 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 – Procedure 6 – Other Monitor P.13B-6.

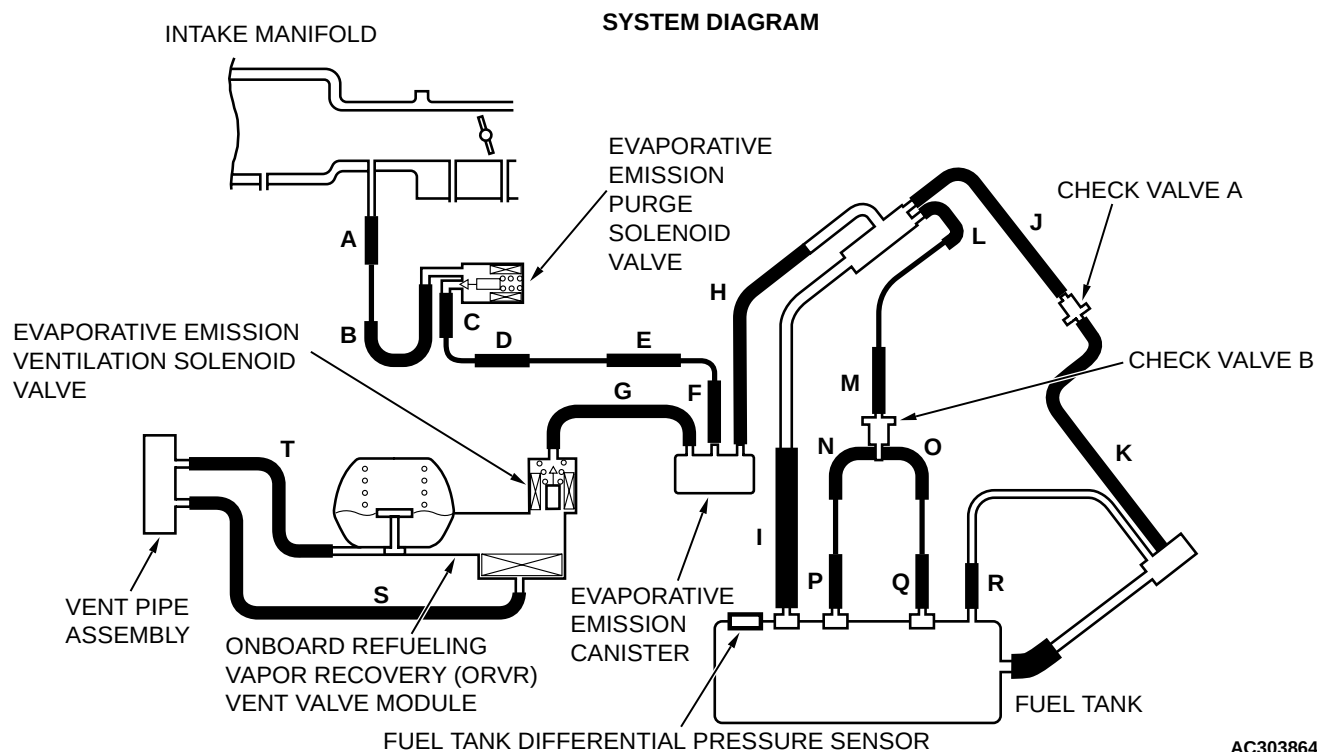
(2) Check the diagnostic trouble code (DTC).

Q: Is DTC P0446 set?

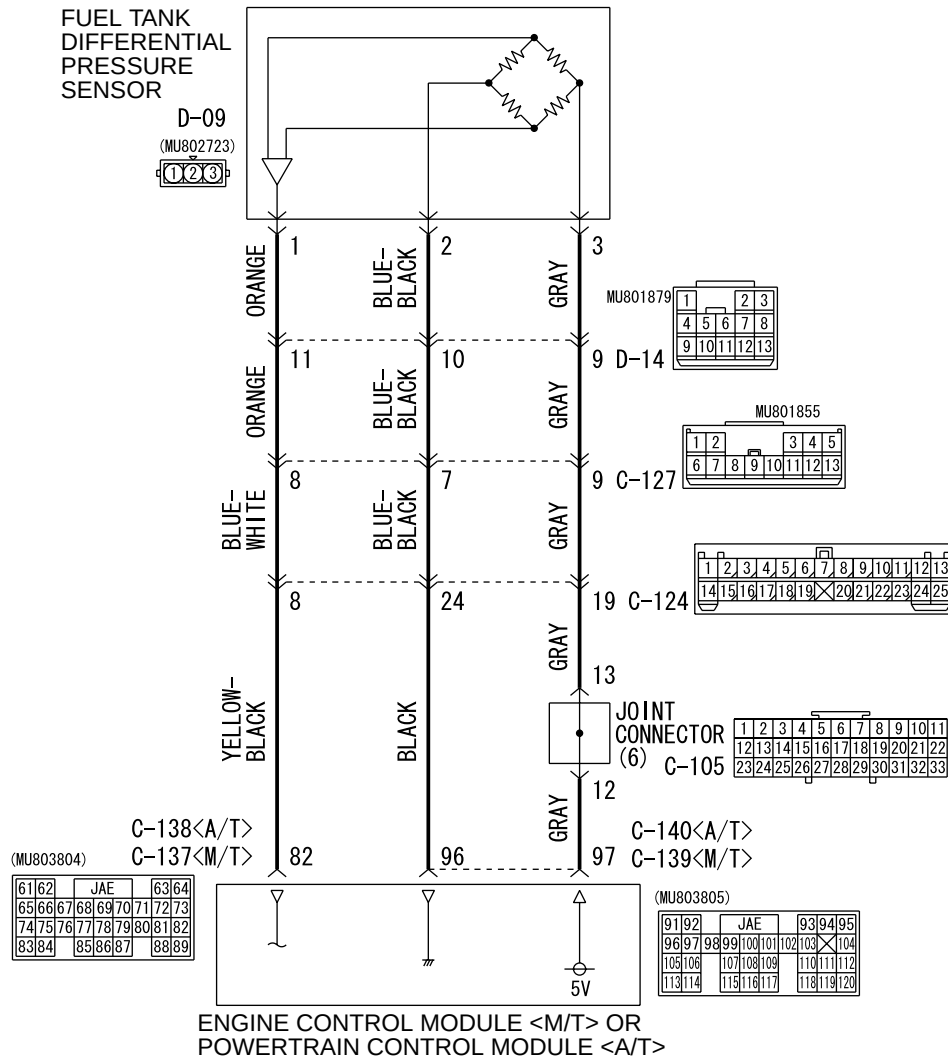
YES : Retry the troubleshooting.

NO : The inspection is complete.

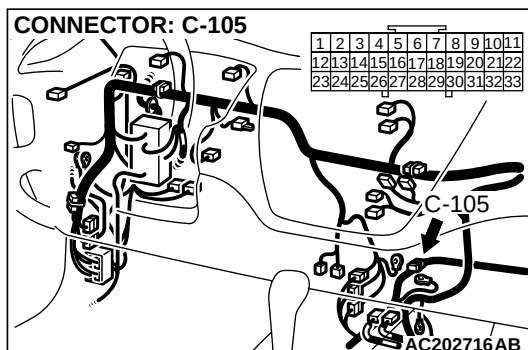
DTC P0451: Evaporative Emission Control System Pressure Sensor Range/Performance

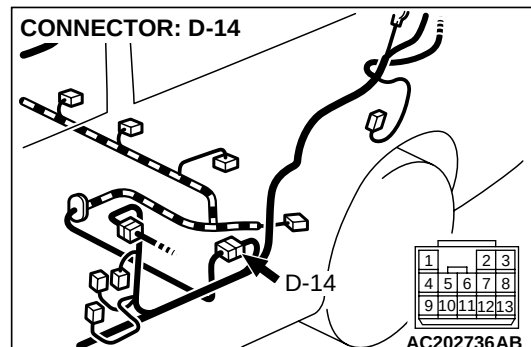
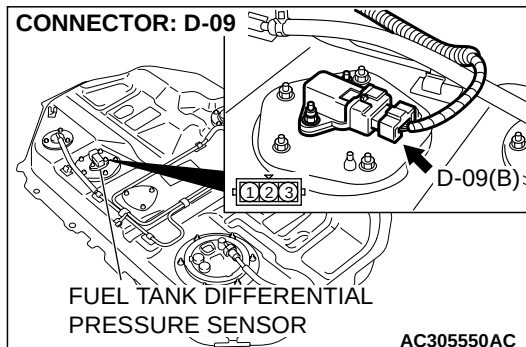
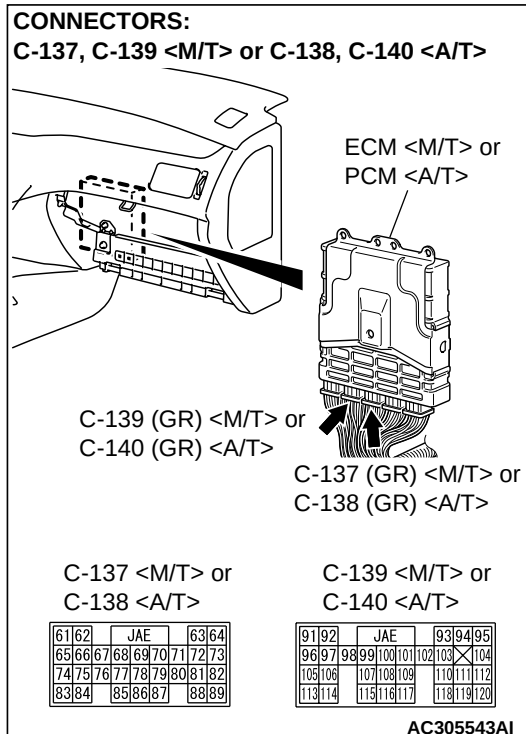
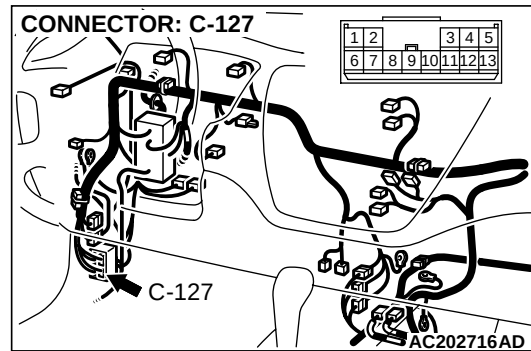
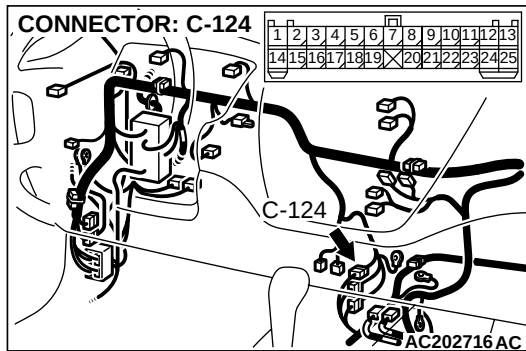


Fuel Tank Differential Pressure Sensor Circuit



AC308189
W4J13M01AA



**CIRCUIT OPERATION**

- The ECM <M/T> or PCM <A/T> (terminal 97) supplies a 5-volt reference signal to the fuel tank differential pressure sensor (terminal 3). The fuel tank differential pressure sensor (terminal 2) is grounded through the ECM <M/T> or PCM <A/T> (terminal 96).
- The fuel tank differential pressure sensor (terminal 1) returns a voltage signal to The ECM <M/T> or PCM <A/T> (terminal 82) that is proportional to the pressure in the fuel tank.

TECHNICAL DESCRIPTION

- The ECM <M/T> or PCM <A/T> monitors the fuel tank differential pressure sensor signal voltage.
- The ECM <M/T> or PCM <A/T> 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)

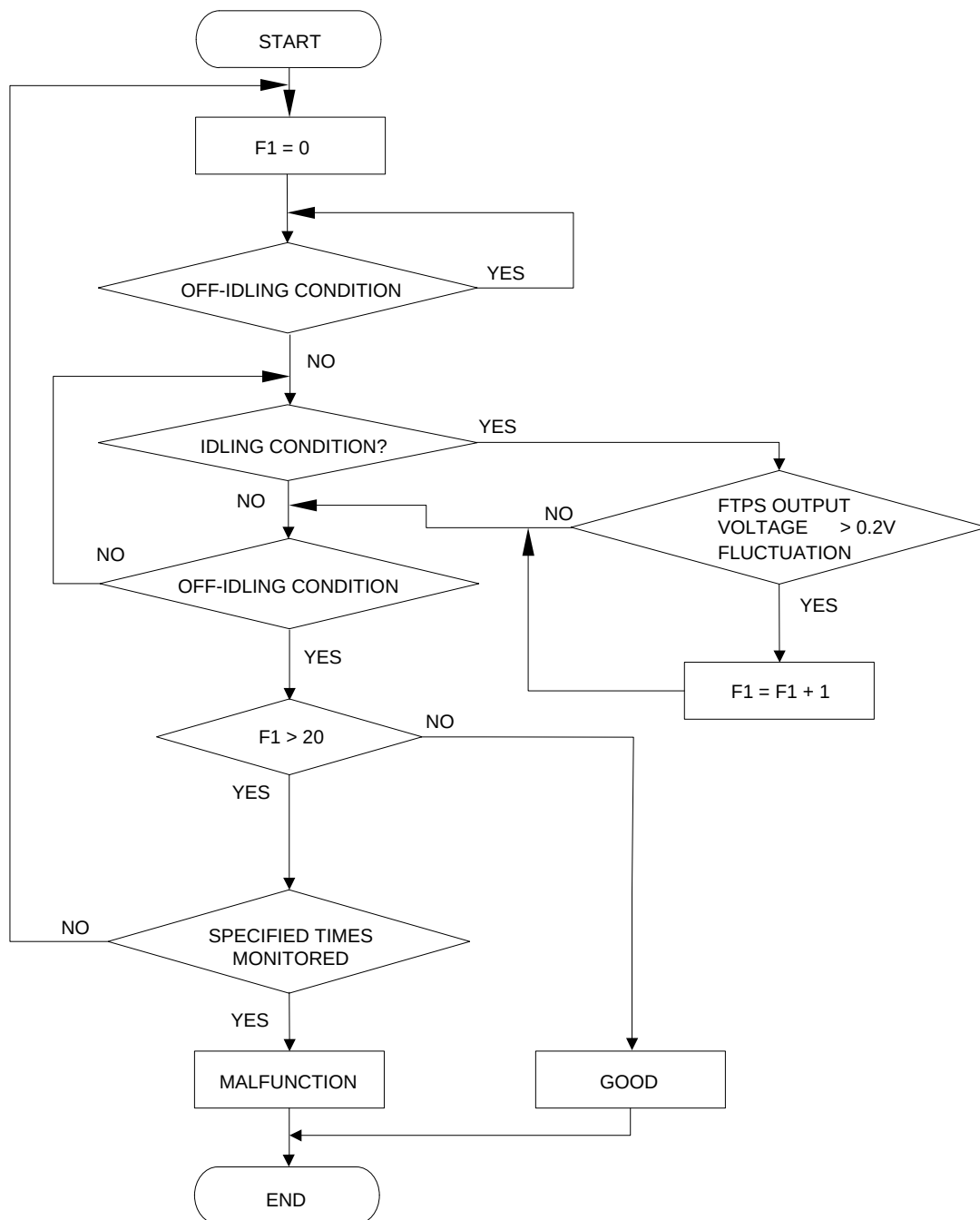
- Evaporative emission purge solenoid monitor
- Evaporative emission ventilation solenoid monitor

Sensor (The sensors below are determined to be normal)

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

LOGIC FLOW CHARTS (Monitor Sequence)

RATIONALITY - NOISE



AC306647

DTC SET CONDITIONS

- Vehicle speed is 1.5 km/h (0.93 mph) or less.

Check Conditions

- Throttle valve is closed.

Judgment Criteria

- If the voltage signal from the fuel tank differential pressure sensor changes by 0.2 volt or more, DTC P0451 will set. The code may also set if a sudden pressure fluctuation occurs twenty times while the engine is idling, and then eight consecutive times during normal driving.

NOTE: If the number of sudden pressure fluctuations does not reach twenty during any one period of engine idling, or if the ignition switch is turned OFF, the counter will reset to zero.

NOTE: The conditions for deviating from idling operation are as follows:

- Engine speed is greater than 2,500 r/min.
- Vehicle speed is 15 km/h (9.3 mph) or greater.
- Volumetric efficiency is 55 percent or greater.

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function – OBD-II Drive Cycle – Procedure 1 – Evaporative Emission System Leak Monitor [P.13B-6](#).

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

- Malfunction of the fuel tank differential pressure sensor.
- A damaged harness in the fuel tank differential pressure sensor circuit.
- Malfunction of the ECM <M/T> or PCM <A/T>.

OVERVIEW OF TROUBLESHOOTING

- DTC P0451 can be set by a faulty fuel tank differential pressure sensor or related circuit, or ECM <M/T> or PCM <A/T> 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 (TANK PRS SNSR 73). 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:

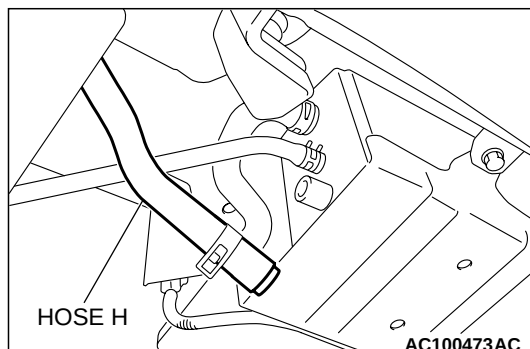
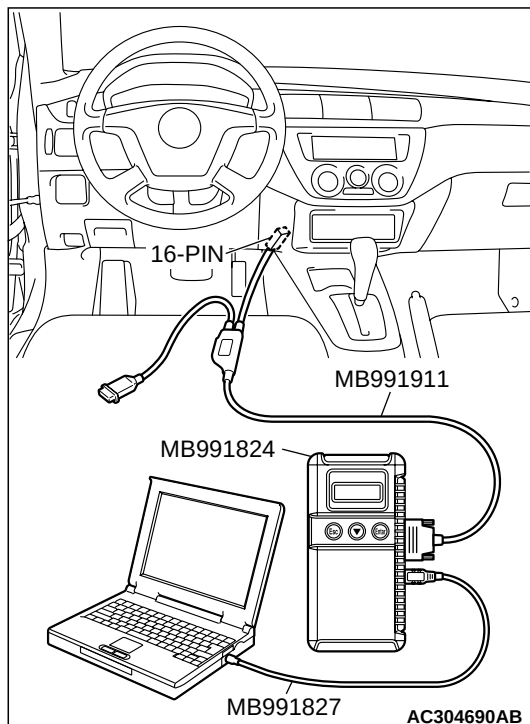
- MB991958: Scan Tool (MUT-III Sub Assembly)
 - MB991824: V.C.I.
 - MB991827: MUT-III USB Cable
 - MB991911: MUT-III Main Harness B
- MB991658: Test Harness Set

STEP 1. Using scan tool MB991958, check data list item 73: Fuel Tank Differential Pressure Sensor.

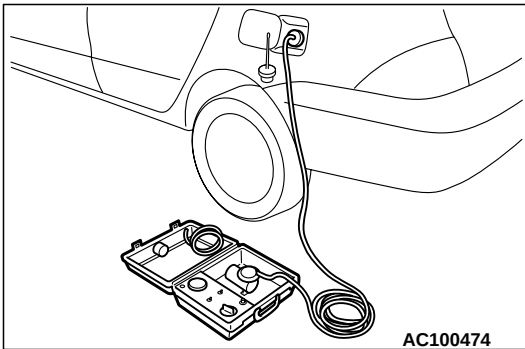
⚠ CAUTION

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 H 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 73, Fuel Tank Differential Pressure Sensor.
 - The fuel tank pressure reading on the scan tool should be -1.5 to 1.5 kPa (-0.443 to 0.443 inHg).

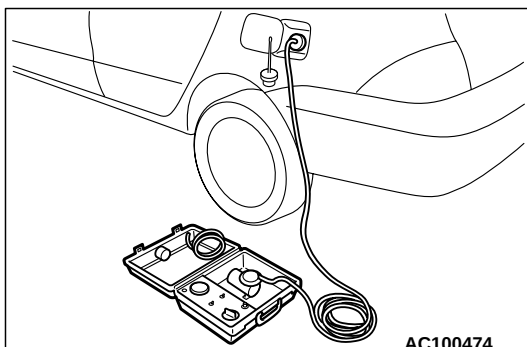
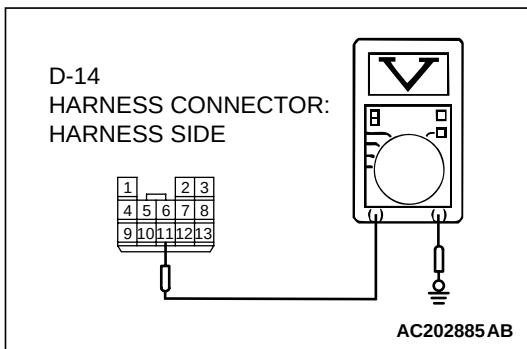
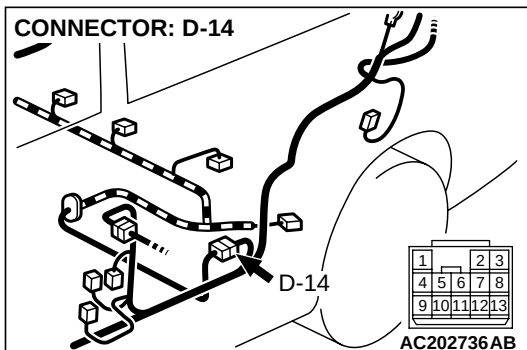
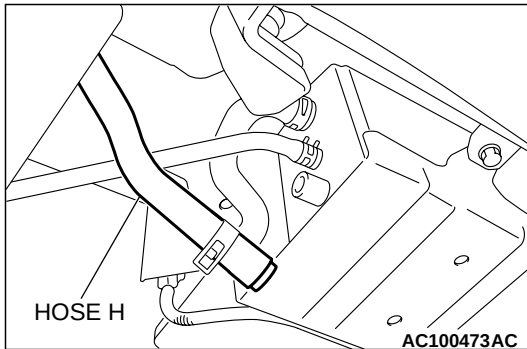


- (6) Connect an evaporative emission system pressure pump (Miller number 6872A) to the fuel filler neck and pressurize the fuel tank.
 - The fuel tank pressure reading should increase.
- (7) Turn the ignition switch to the "LOCK" (OFF) position. Then disconnect scan tool MB991958.
- (8) Disconnect the evaporative emission system pressure pump, and reinstall the fuel cap.
- (9) Connect hose H to the canister.

Q: Is the fuel tank pressure between –1.5 and 1.5 kPa (–0.443 and 0.443 inHg)?

YES : It can be assumed that this malfunction is intermittent (Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – Intermittent Malfunction [P.00-6](#)). Then go to Step 27.

NO : Go to Step 2.



STEP 2. Measure the signal voltage at intermediate connector D-14 by backprobing.

- (1) Disconnect hose H from the evaporative emission canister side, and plug the hose.
- (2) Remove the rear seat cushion. (Refer to GROUP 52A, Rear Seat P.52A-23.)
- (3) Pull up the carpet.
- (4) Turn the ignition switch to the "ON" position.
- (5) Remove the fuel cap.

- (6) Measure the voltage between connector D-14 terminal 11 and ground by backprobing.
 - The measured voltage should be between 2.0 and 3.0 volts.

- (7) Connect an evaporative emission system pressure pump (Miller number 6872A) to the fuel filler neck and pressurize the fuel tank.
 - The fuel tank pressure reading should increase.
- (8) Turn the ignition switch to the "LOCK" (OFF) position.
- (9) Disconnect the evaporative emission system pressure pump, and reinstall the fuel cap.
- (10) Connect hose H to the canister.

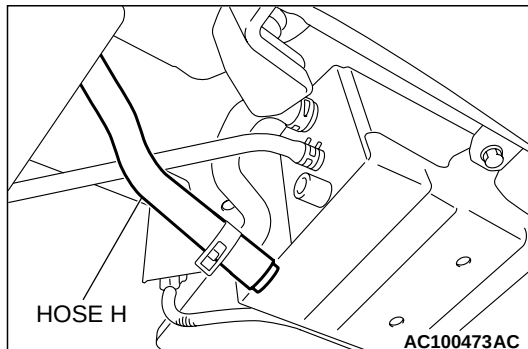
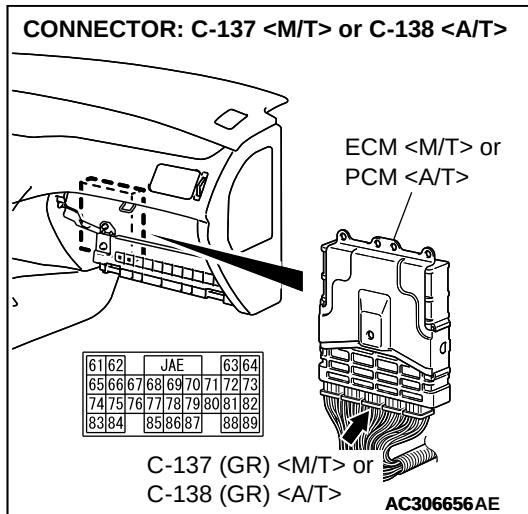
Q: Is the measured voltage between 2.0 and 3.0 volts?

YES : Go to Step 3.

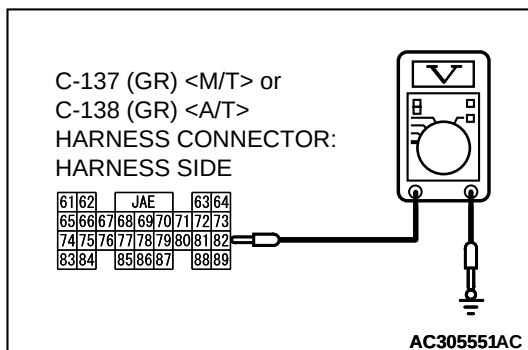
NO : Go to Step 7.

STEP 3. Measure the signal voltage at ECM connector C-137 <M/T> or PCM connector C-138 <A/T> by backprobing.

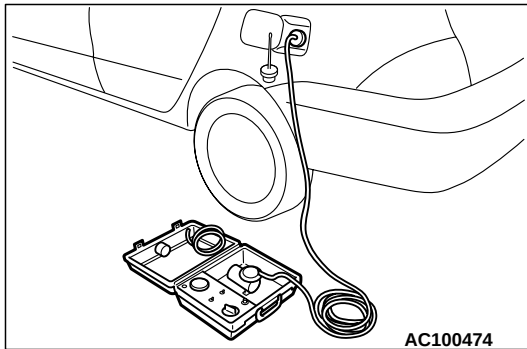
- (1) Do not disconnect ECM connector C-137 <M/T> or PCM connector C-138 <A/T>.



- (2) Disconnect hose H from the evaporative emission canister side, and plug the hose.
(3) Turn the ignition switch to the "ON" position.
(4) Remove the fuel cap.



- (5) Measure the voltage between connector C-137 <M/T> or C-138 <A/T> terminal 82 and ground by backprobing.
- The measured voltage should be between 2.0 and 3.0 volts.



- (6) Connect an evaporative emission system pressure pump (Miller number 6872A) to the fuel filler neck and pressurize the fuel tank.
 - The fuel tank pressure reading should increase.
- (7) Turn the ignition switch to the "LOCK" (OFF) position.
- (8) Disconnect the evaporative emission system pressure pump, and reinstall the fuel cap.
- (9) Connect hose G to the canister.

Q: Is the measured voltage between 2.0 and 3.0 volts?

YES : Go to Step 4.

NO : Go to Step 5.

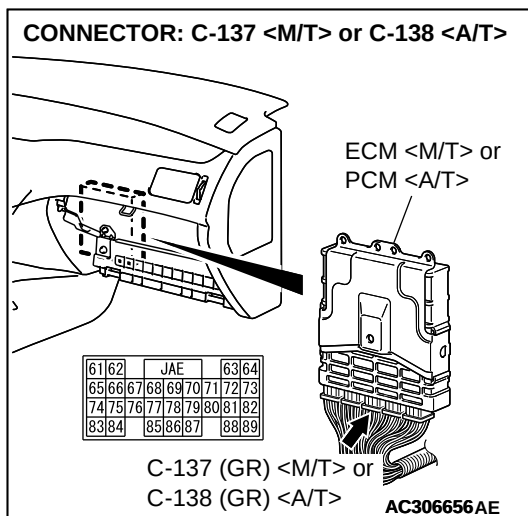
STEP 4. Check ECM connector C-137 <M/T> or PCM connector C-138 <A/T> for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 26.

NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection

[P.00E-2](#). Then go to Step 27.



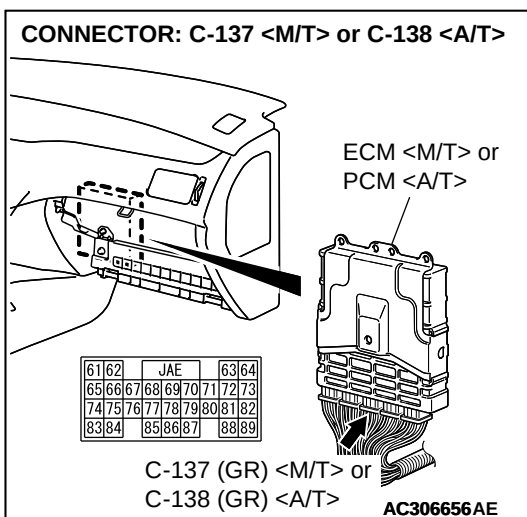
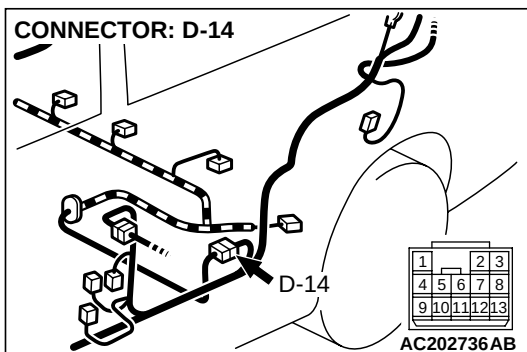
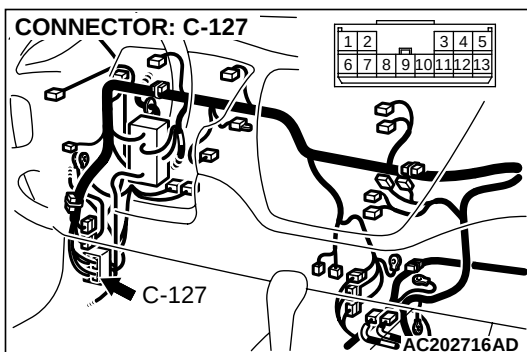
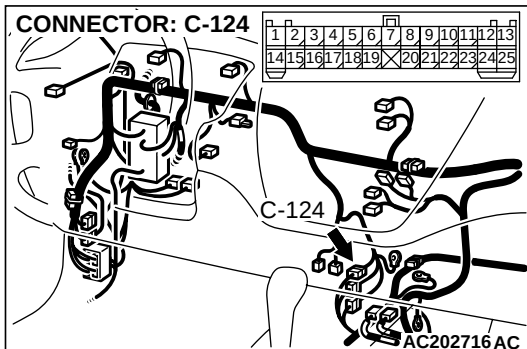
STEP 5. Check intermediate connectors C-124, C-127, D-14 and ECM connector C-137 <M/T> or PCM connector C-138 <A/T> for loose, corroded or damaged terminals, or terminals pushed back in the connector.

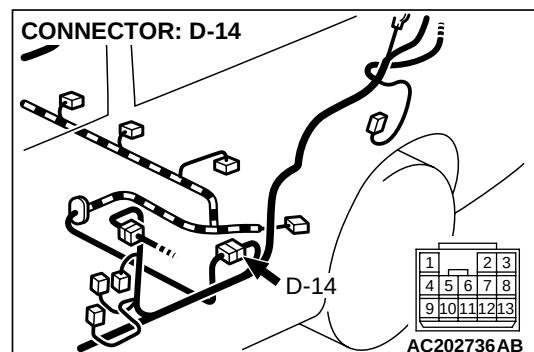
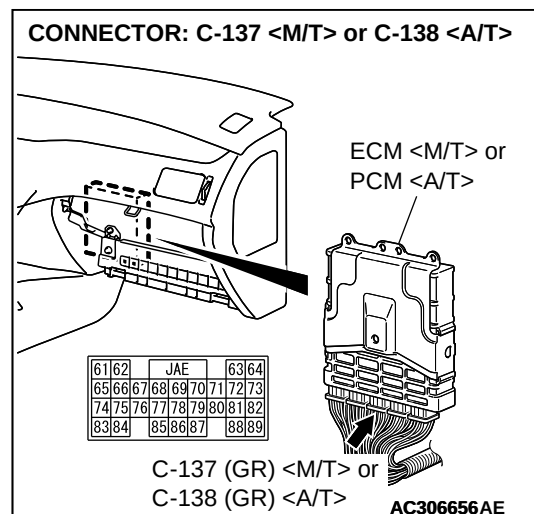
Q: Are the connectors and terminals in good condition?

YES : Go to Step 6.

NO : Repair or replace the faulty component. Refer to GROUP 00E, Harness Connector Inspection

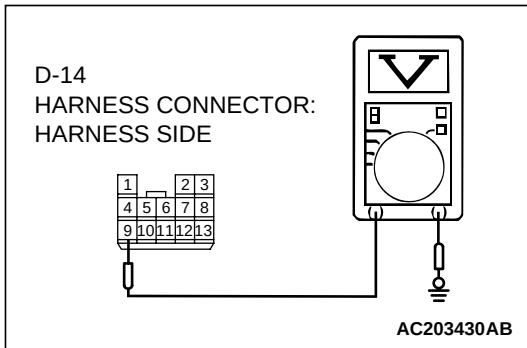
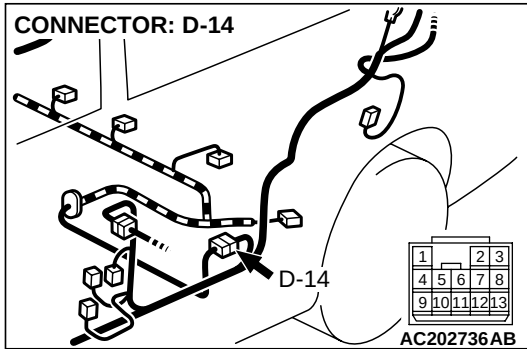
[P.00E-2](#). Go to Step 27.





STEP 6. Check the harness wire between ECM connector C-137 <M/T> or PCM connector C-138 <A/T> terminal 82 and intermediate connector D-14 terminal 11 for damage.
Q: Is the harness wire in good condition?

- 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 Malfunction [P.00-6](#). Then go to Step 27.
- NO :** Repair the damaged harness wire. Then go to Step 27.



STEP 7. Measure the 5-volt reference signal at intermediate connector D-14 by backprobing.

- (1) Do not disconnect intermediate connector D-14.
- (2) Turn the ignition switch to the "ON" position.

- (3) Measure the voltage between connector D-14 terminal 9 and ground.

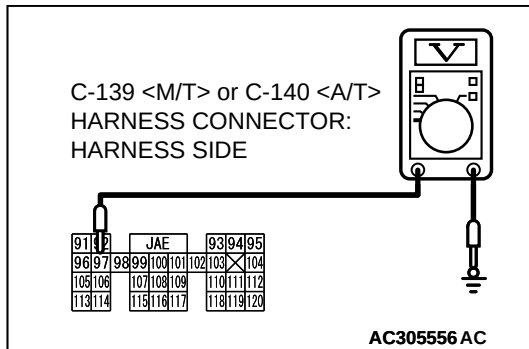
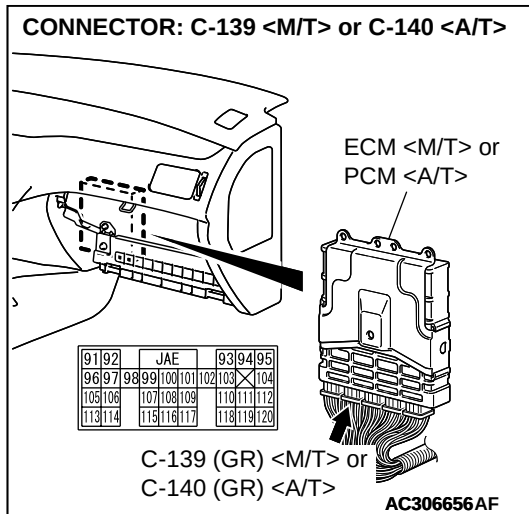
- The voltage should be between 4.9 and 5.1 volts.

- (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 11.

NO : Go to Step 8.



STEP 8. Measure the 5-volt reference signal at ECM connector C-139 <M/T> or PCM connector C-140 <A/T> by backprobing.

- (1) Do not disconnect ECM connector C-139 <M/T> or PCM connector C-140 <A/T>.
- (2) Turn the ignition switch to the "ON" position.

- (3) Measure the voltage between connector C-139 <M/T> or connector C-140 <A/T> terminal 97 and ground by backprobing.

- The measured voltage should be between 4.9 and 5.1 volts.

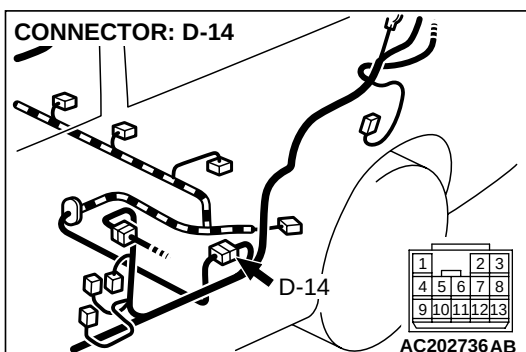
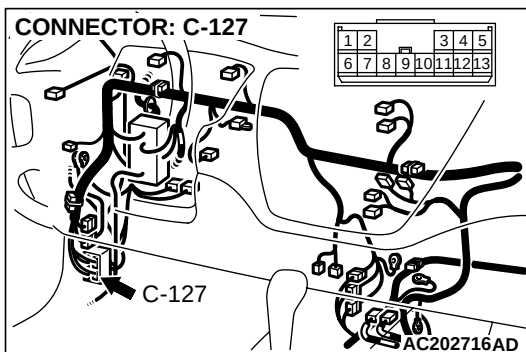
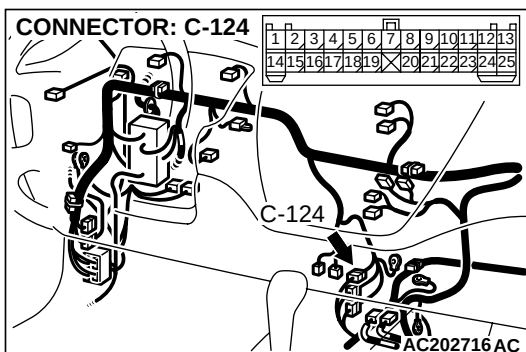
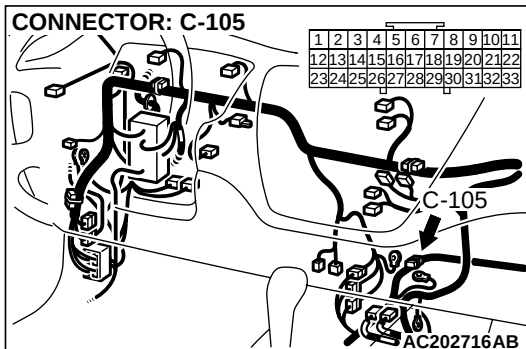
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

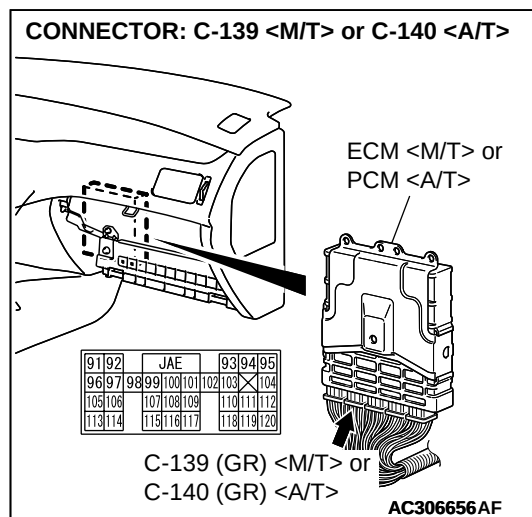
Q: Is the measured voltage between 4.9 and 5.1 volts?

YES : Go to Step 9.

NO : Go to Step 25.

STEP 9. Check intermediate connectors C-105, C-124, C-127, and D-14 and ECM connector C-139 <M/T> or PCM connector C-140 <A/T> loose, corroded or damaged terminals, or terminals pushed back in the connector.



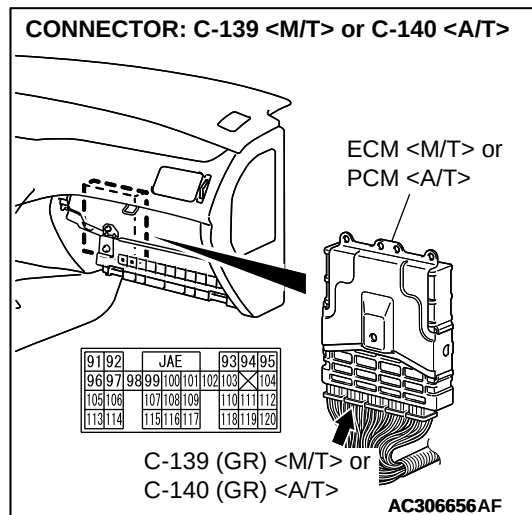


Q: Are the connectors and terminals in good condition?

YES : Go to Step 10.

NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection

[P.00E-2](#). Then go to Step 27.



STEP 10. Check the harness wire between ECM connector C-139 <M/T> or PCM connector C-140 <A/T> terminal 97 and intermediate connector D-14 terminal 9 for damage.

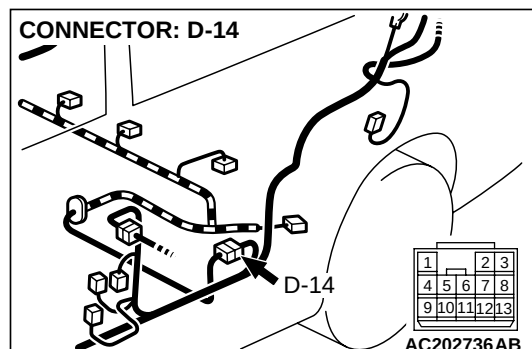
Q: Is the harness wire in good condition?

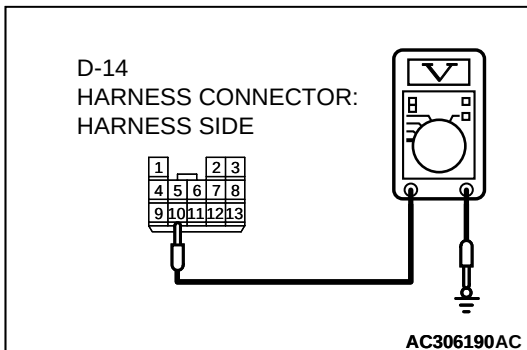
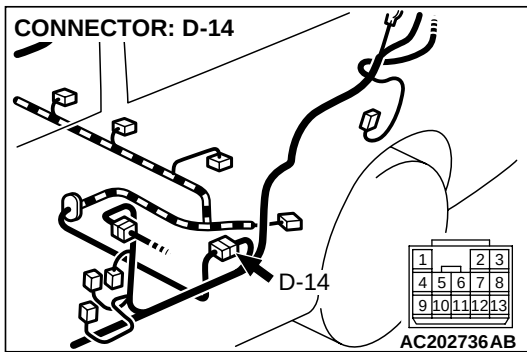
YES : It can be assumed that this malfunction is intermittent.

Refer to GROUP 00, How to Use

Troubleshooting/Inspection Service Points - How to Cope with Intermittent Malfunction [P.00-6](#). Then go to Step 27.

NO : Repair the damaged harness wire. Then go to Step 27.





STEP 11. Check the sensor ground at intermediate connector D-14 by backprobing.

- (1) Do not disconnect connector D-14.
- (2) Turn the ignition switch to the "ON" position.

- (3) Measure the voltage between connector D-14 terminal 10 and ground by backprobing.

- The measured voltage should be 0.5 volt or less.

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

Q: Is the measured voltage 0.5 volt or less?

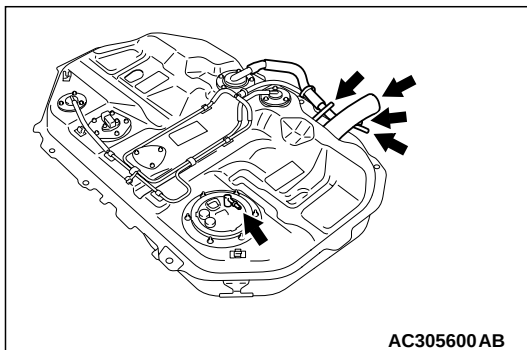
YES : Go to Step 15.

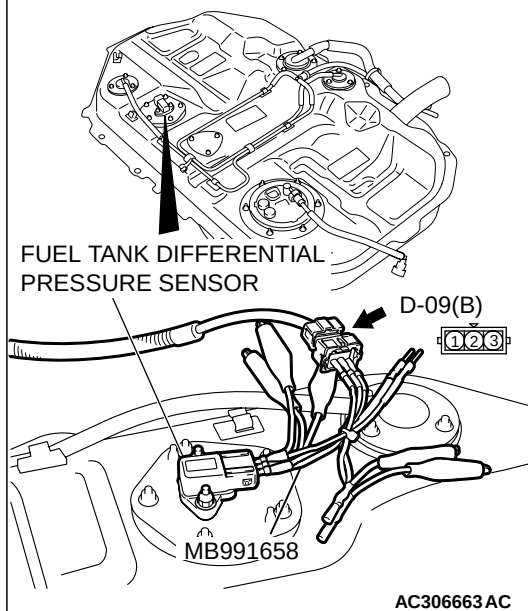
NO : Go to Step 12.

STEP 12. Check the signal voltage at fuel tank differential pressure sensor connector D-09.

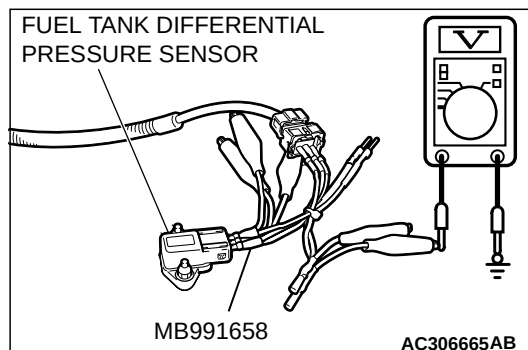
- (1) Remove the fuel tank. (Refer to GROUP 13C, Fuel Tank [P.13C-9](#).)
- (2) Plug the filler hose, fuel pump feed nipple, hose I, hose M and hose R connected to the fuel tank.

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

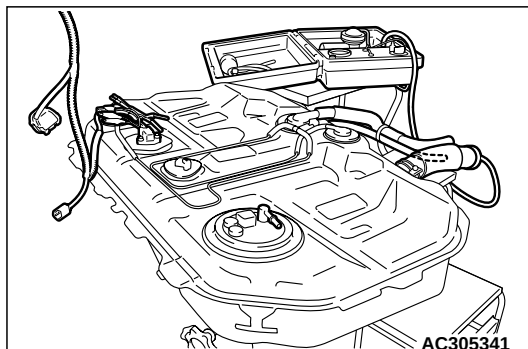


CONNECTOR: D-09

- (3) Lift the fuel tank.
- (4) Connect special tool MB991658 to both halves of connector D-09.
- (5) Turn the ignition switch to the "ON" position.



- (6) Measure the voltage between connector D-09 terminal 2 and ground.
 - The measured voltage should be 0.5 volt or less.

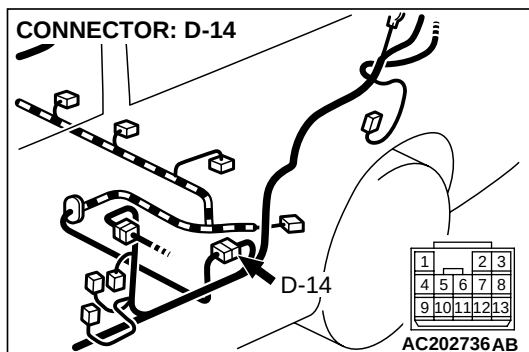
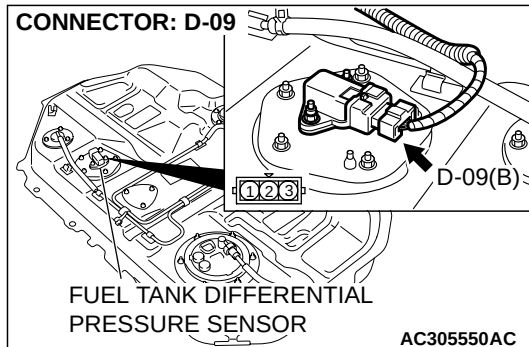


- (7) Connect an evaporative emission system pressure pump (Miller number 6872A) to the fuel filler neck and pressurize the fuel tank.
 - The fuel tank pressure reading should increase.
- (8) Turn the ignition switch to the "LOCK" (OFF) position.
- (9) Disconnect the evaporative emission system pressure pump.

Q: Is the measured voltage 0.5 volt or less?

YES : Go to Step 13.

NO : Go to Step 19.

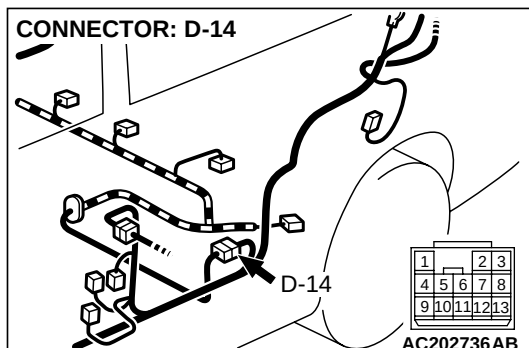
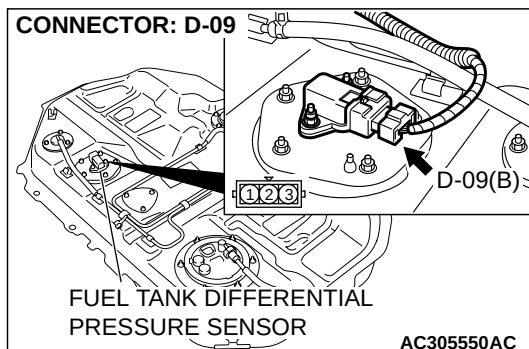


STEP 13. Check fuel tank differential pressure sensor connector D-09 and intermediate connector for D-14 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 14.

NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Reinstall the fuel tank. Refer to GROUP 13C, Fuel Tank [P.13C-9](#). Then go to Step 27.

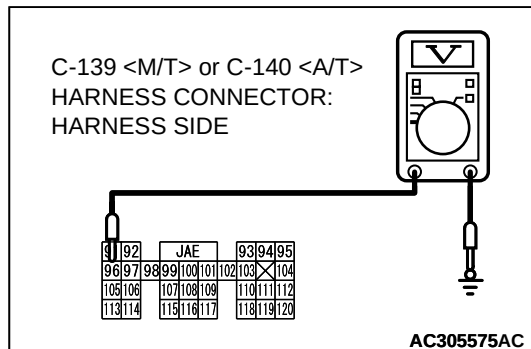
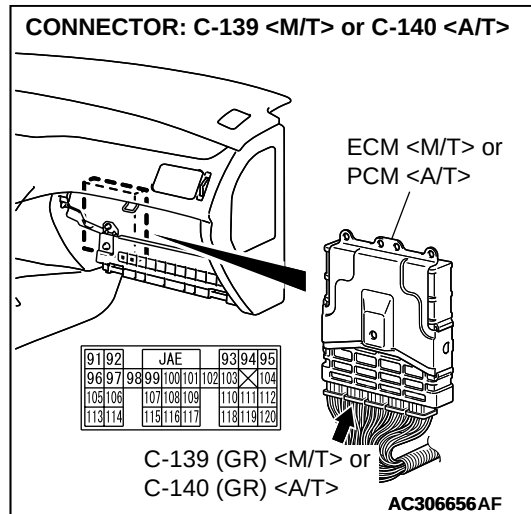


STEP 14. Check the harness wire between fuel tank differential pressure sensor connector D-09 terminal 2 and intermediate connector D-14 terminal 10 for damage.

Q: Is the harness wire in good condition?

YES : It can be assumed that this malfunction is intermittent, and reinstall the fuel tank. Refer to GROUP 13C, Fuel Tank [P.13C-9](#). Then go to Step 27.

NO : Repair the damaged harness wire, and reinstall the fuel tank. Refer to GROUP 13C, Fuel Tank [P.13C-9](#). Then go to Step 27.



STEP 15. Check the sensor ground at ECM connector C-139 <M/T> or PCM connector C-140 <A/T> by backprobing.

- (1) Do not disconnect ECM connector C-139 <M/T> or PCM connector C-140 <A/T>.
- (2) Turn the ignition switch to the "ON" position.

- (3) Measure the voltage between connector C-139 <M/T> or connector C-140 <A/T> terminal 96 and ground by backprobing.

- The measured voltage should be 0.5 volt or less.

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

Q: Is the measured voltage 0.5 volt or less?

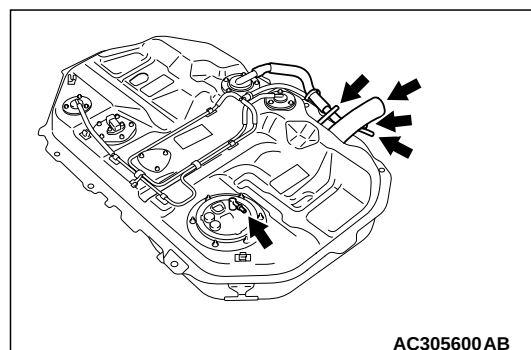
YES : Go to Step 16.

NO : Go to Step 23.

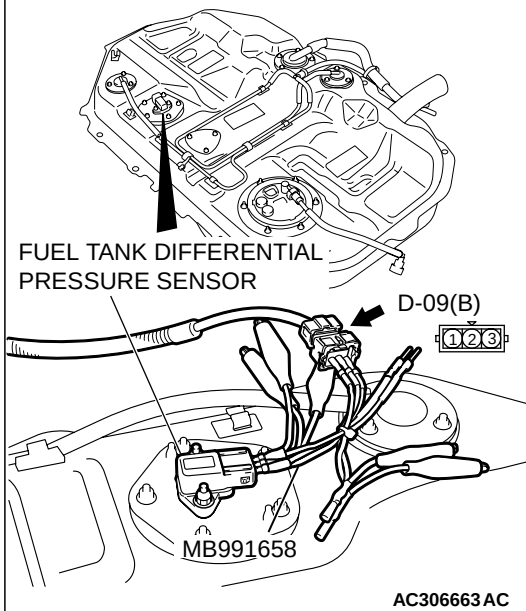
STEP 16. Check the signal voltage at fuel tank differential pressure sensor connector D-09.

- (1) Remove the fuel tank. (Refer to GROUP 13C, Fuel Tank [P.13C-9](#).)
- (2) Plug the filler hose, fuel pump feed nipple, hose I, hose M and hose R connected to the fuel tank.

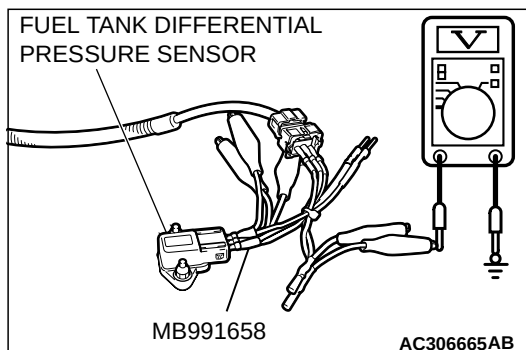
NOTE: If these items are not securely plugged here, the fuel could leak in the next step.



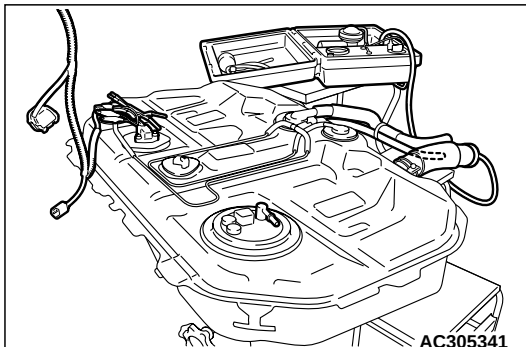
CONNECTOR: D-09



- (3) Lift the fuel tank.
- (4) Connect special tool MB991658 to both halves of connector D-09.
- (5) Turn the ignition switch to the "ON" position.



- (6) Measure the voltage between connector D-09 terminal 1 and ground.
 - The measured voltage should be between 2.0 and 3.0 volts.

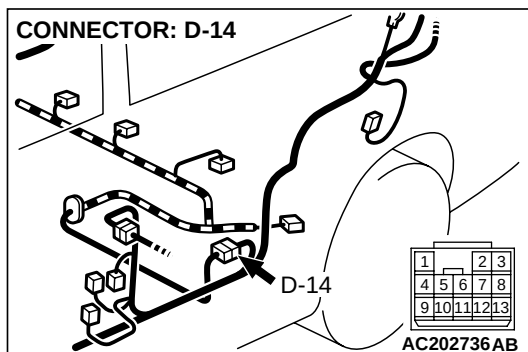
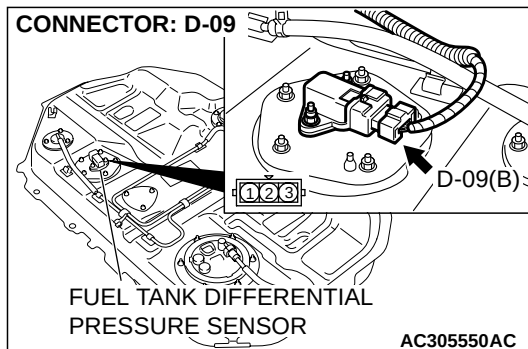


- (7) Connect an evaporative emission system pressure pump (Miller number 6872A) to the fuel filler neck and pressurize the fuel tank.
 - The fuel tank pressure reading should increase.
- (8) Turn the ignition switch to the "LOCK" (OFF) position.
- (9) Disconnect the evaporative emission system pressure pump.

Q: Is the measured voltage between 2.0 and 3.0 volts?

YES : Go to Step 17.

NO : Go to Step 20.

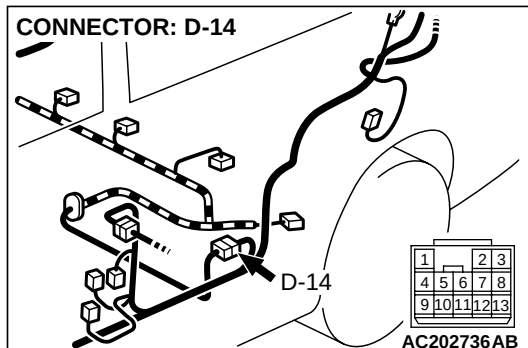
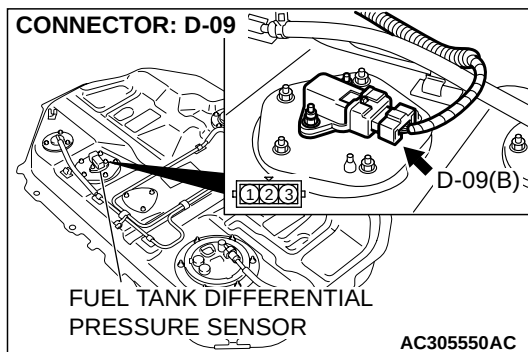


STEP 17. Check fuel tank differential pressure sensor connector D-09 and intermediate connector D-14 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 18.

NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Reinstall the fuel tank. Refer to GROUP 13C, Fuel Tank [P.13C-9](#). Then go to Step 27.

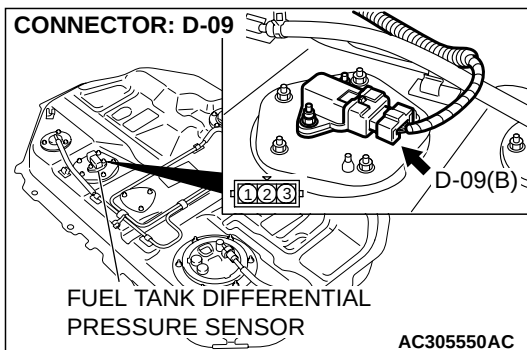
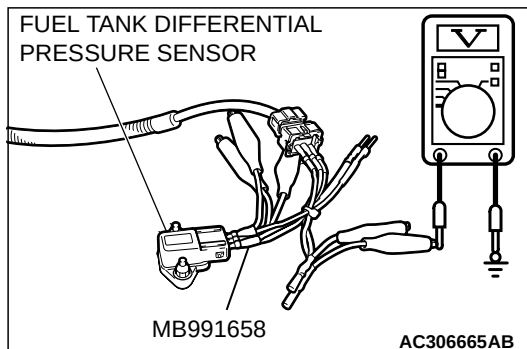
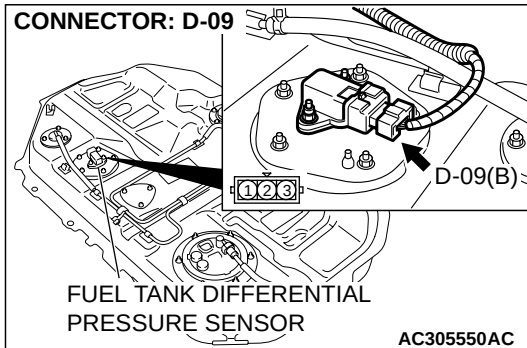


STEP 18. Check the harness wire between fuel tank differential pressure sensor connector D-09 terminal 1 and intermediate connector D-14 terminal 11 for damage.

Q: Is the harness wire in good condition?

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 Malfunction [P.00-6](#). Reinstall the fuel tank. Refer to GROUP 13C, Fuel Tank [P.13C-9](#). Then go to Step 27.

NO : Repair or replace the harness wire, and reinstall the fuel tank. Refer to GROUP 13C, Fuel Tank [P.13C-9](#). Then go to Step 27.



STEP 19. Measure the 5-volt reference signal at fuel tank differential pressure sensor connector D-09.

- (1) Turn the ignition switch to the "ON" position.
- (2) Measure the voltage between connector D-09 terminal 3 and ground.

- The voltage should be between 4.9 and 5.1 volts.

- (3) 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 20.

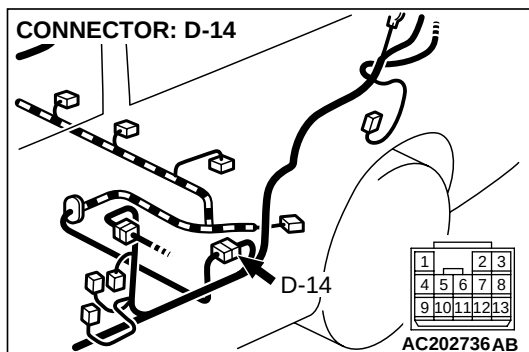
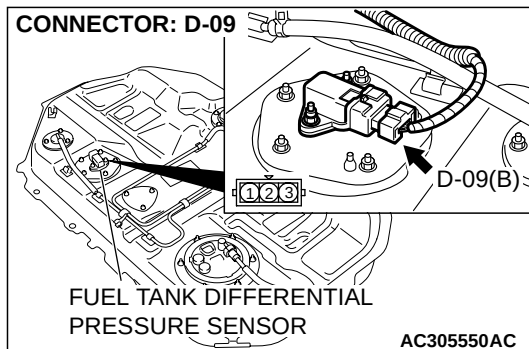
NO : Go to Step 21.

STEP 20. Check fuel tank differential pressure sensor connector D-09 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Replace the fuel tank differential pressure sensor, and reinstall the fuel tank. Refer to GROUP 13C, Fuel Tank [P.13C-9](#). Then go to Step 27.

NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Reinstall the fuel tank. Refer to GROUP 13C, Fuel Tank [P.13C-9](#). Then go to Step 27.



STEP 21. Check fuel tank differential pressure sensor connector D-09 and intermediate connector D-14 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

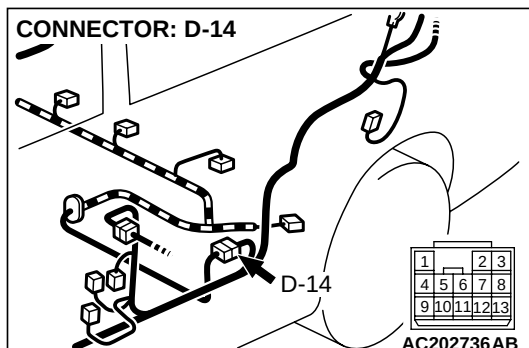
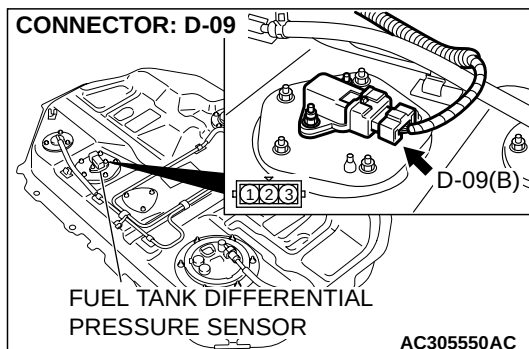
Q: Are the connectors and terminals in good condition?

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 Malfunction [P.00-6](#). Reinstall the fuel tank. Refer to GROUP 13C, Fuel Tank [P.13C-9](#). Then go to Step 22.

NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Reinstall the fuel tank. Refer to GROUP 13C, Fuel Tank [P.13C-9](#). Then go to Step 27.



STEP 22. Check the harness wire between fuel tank differential pressure sensor connector D-09 terminal 3 and intermediate connector D-14 terminal 9 for damage.

Q: Is the harness wire in good condition?

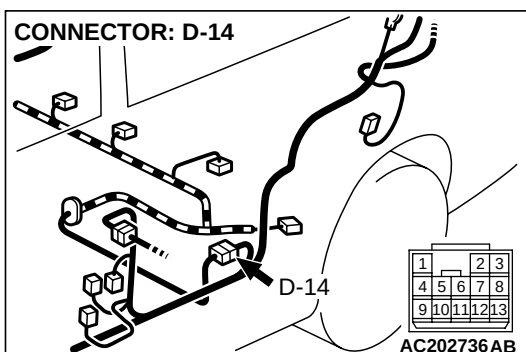
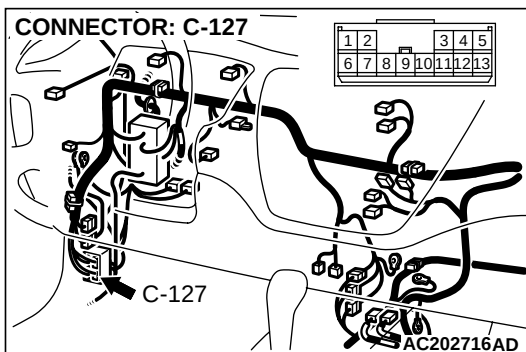
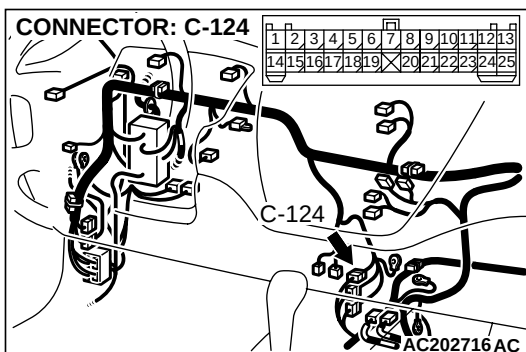
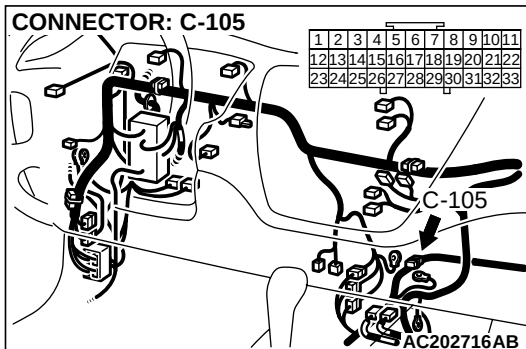
YES : It can be assumed that this malfunction is intermittent.

Refer to GROUP 00, How to Use

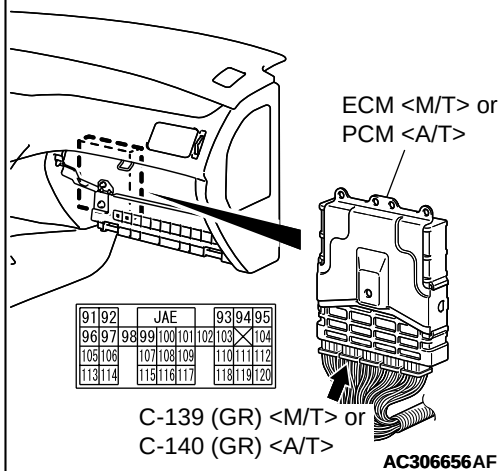
Troubleshooting/Inspection Service Points - How to Cope with Intermittent Malfunction [P.00-6](#). Reinstall the fuel tank. Refer to GROUP 13C, Fuel Tank [P.13C-9](#). Then go to Step 27.

NO : Repair or replace the harness wire, and reinstall the fuel tank. Refer to GROUP 13C, Fuel Tank [P.13C-9](#). Then go to Step 27.

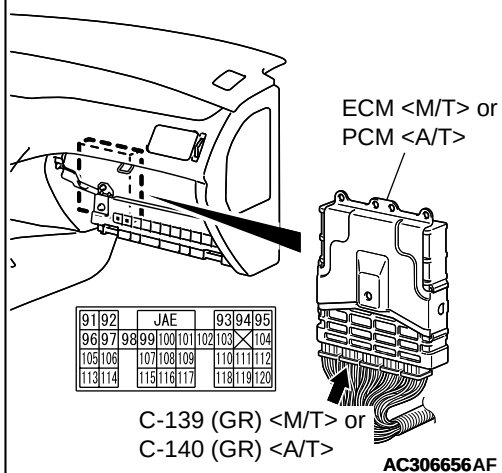
STEP 23. Check intermediate connectors C-105, C-124, C-127, and D-14, and ECM connector C-139 <M/T> or PCM connector C-140 <A/T> for loose, corroded or damaged terminals, or terminals pushed back in the connector.



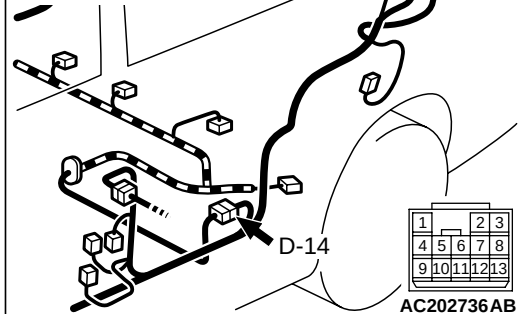
CONNECTOR: C-139 <M/T> or C-140 <A/T>

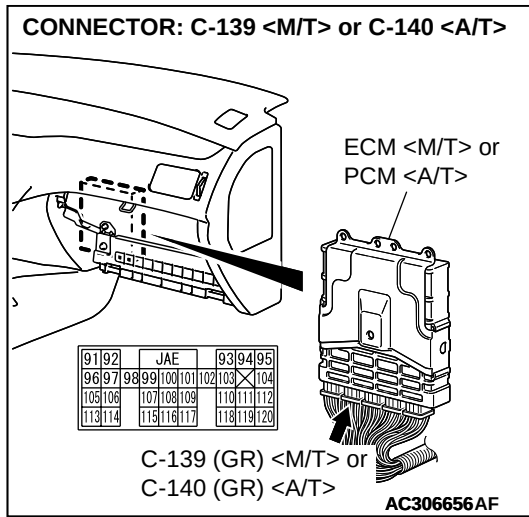
**Q: Are the connectors and terminals in good condition?****YES :** Go to Step 24.**NO :** Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then go to Step 27.**STEP 24. Check the harness wire between ECM connector C-139 <M/T> or PCM connector C-140 <A/T> terminal 96 and intermediate connector D-14 terminal 10 for damage.****Q: Is the harness wire in good condition?****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 Malfunction [P.00-6](#). Then go to Step 27.**NO :** Repair the damaged harness wire. Then go to Step 27.

CONNECTOR: C-139 <M/T> or C-140 <A/T>



CONNECTOR: D-14





STEP 25. Check ECM connector C-139 <M/T> or PCM connector C-140 <A/T> for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 26.

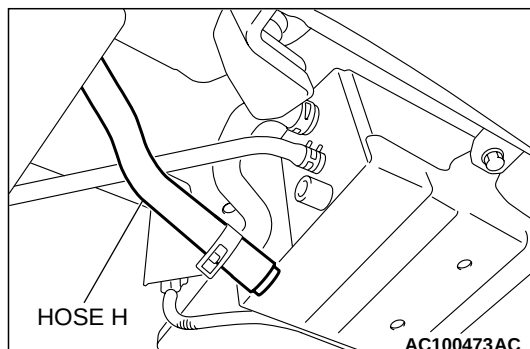
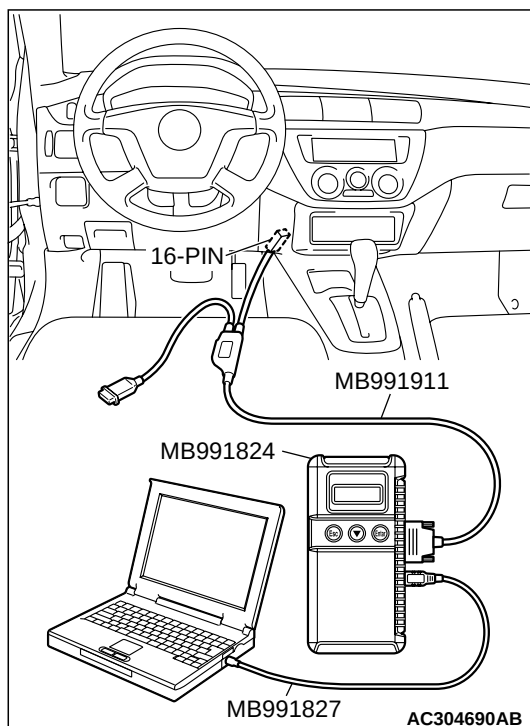
NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then go to Step 27.

STEP 26. Using scan tool MB991958, check data list item 73: Fuel Tank Differential Pressure Sensor.

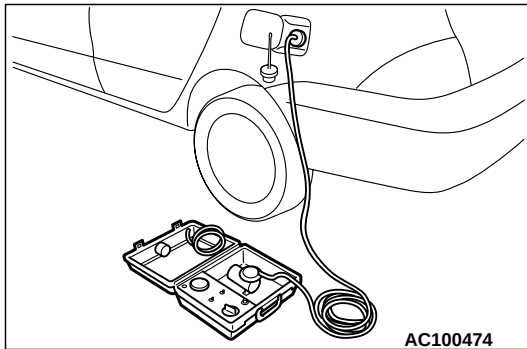
⚠ CAUTION

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 H 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 73, Fuel Tank Differential Pressure Sensor.
 - The fuel tank pressure reading on the scan tool should be -1.5 to 1.5 kPa (-0.443 to 0.443 inHg).



- (6) Connect an evaporative emission system pressure pump (Miller number 6872A) to the fuel filler neck 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) Disconnect the evaporative emission system pressure pump, and reinstall the fuel cap.
- (9) Connect hose H to the canister.

Q: Is the fuel tank pressure between –1.5 and 1.5 kPa (–0.443 and 0.443 inHg)?

YES : It can be assumed that this malfunction is intermittent (Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – Intermittent Malfunction [P.00-6](#)). Then go to Step 27.

NO : Replace the ECM <M/T> or PCM <A/T> (Refer to [P.13B-919](#)). Then go to Step 27.

STEP 27. Perform the OBD-II drive cycle.

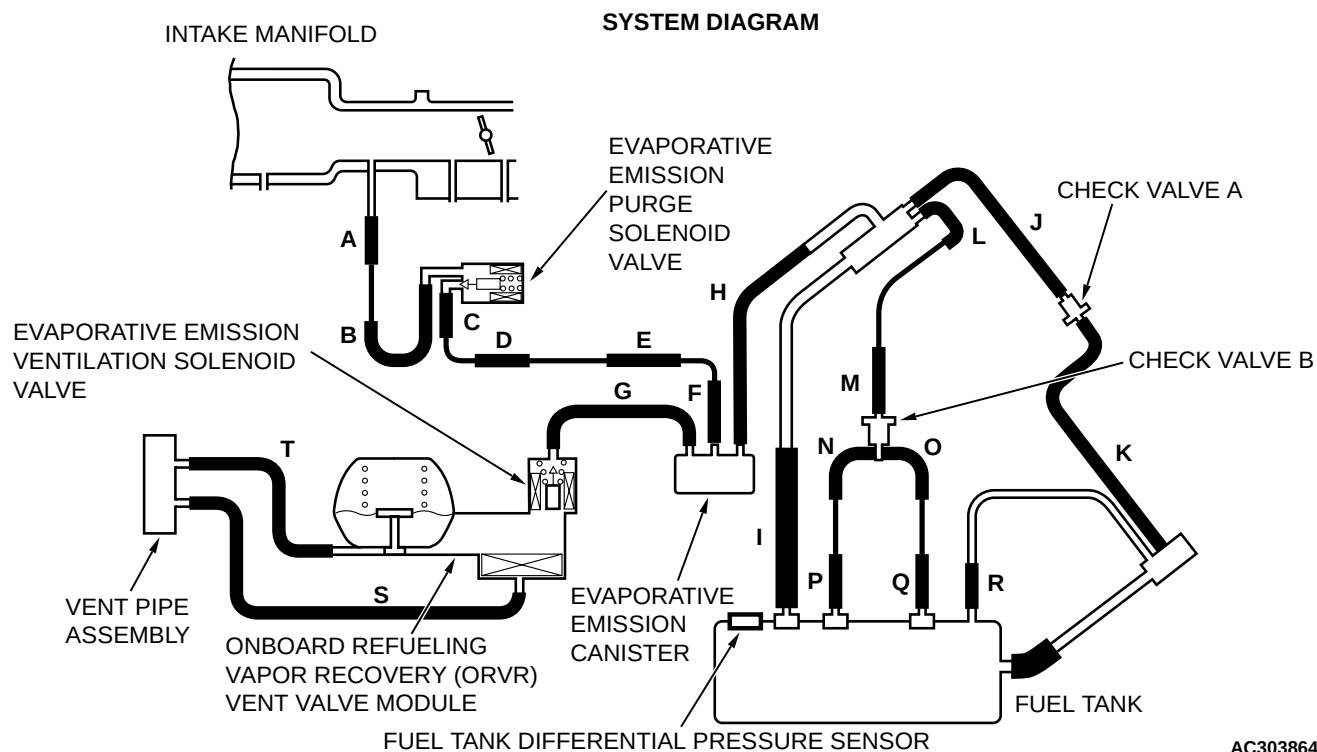
- (1) Carry out a test drive with the drive cycle pattern (Refer to Diagnostic Function – OBD-II Drive Cycle – Procedure 1 – Evaporative Emission System Leak Monitor [P.13B-6](#)).
- (2) Read the diagnostic trouble code (DTC).

Q: Is DTC P0451 set?

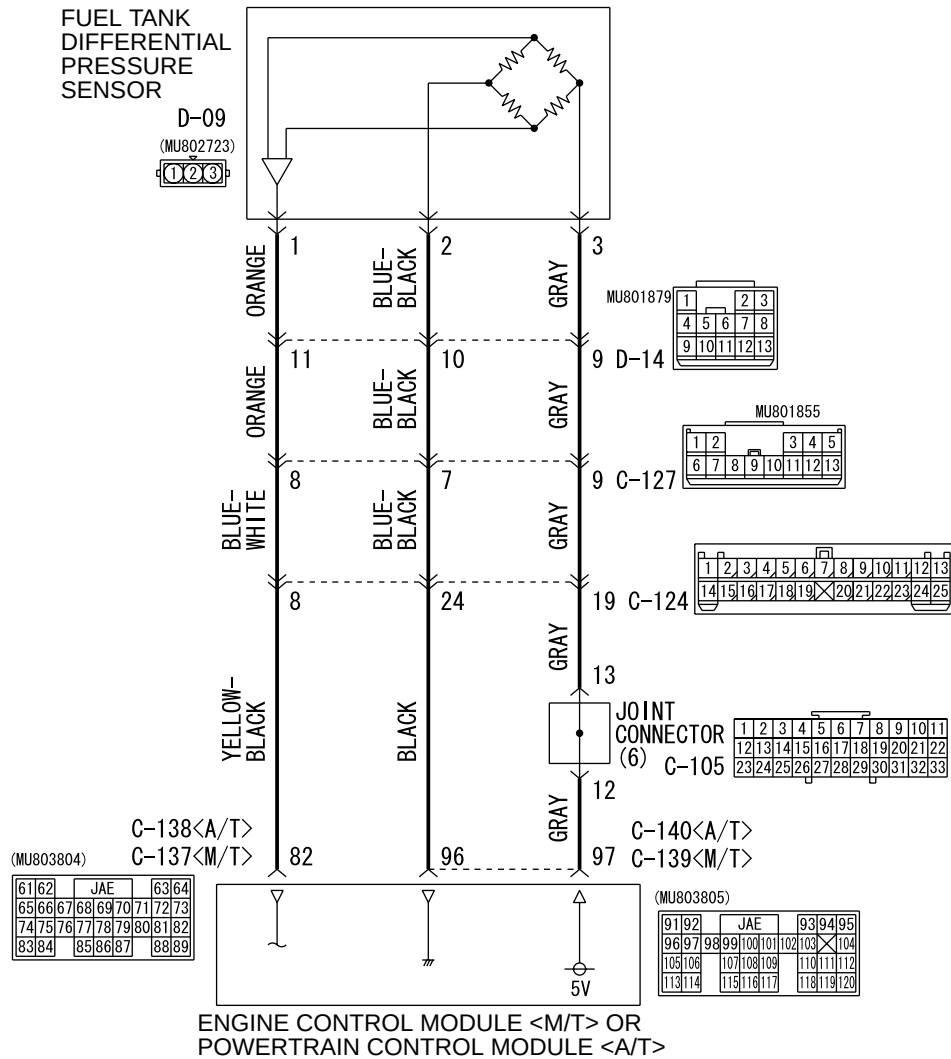
YES : Go to Step 2.

NO : The procedure is complete.

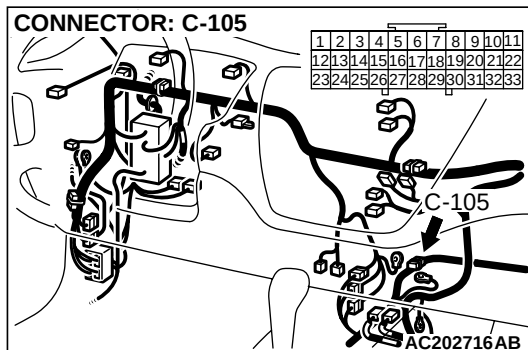
DTC P0452: Evaporative Emission Control System Pressure Sensor Low Input

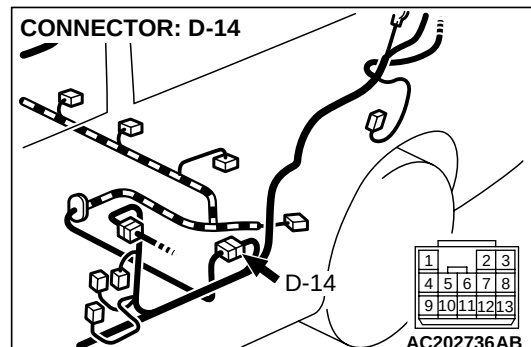
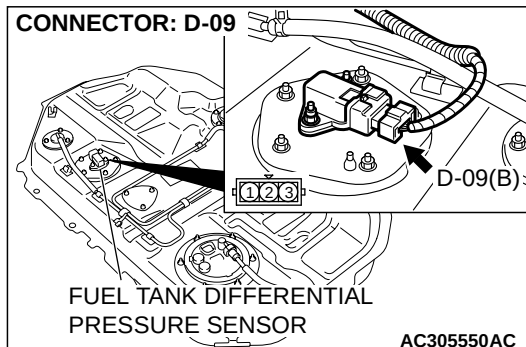
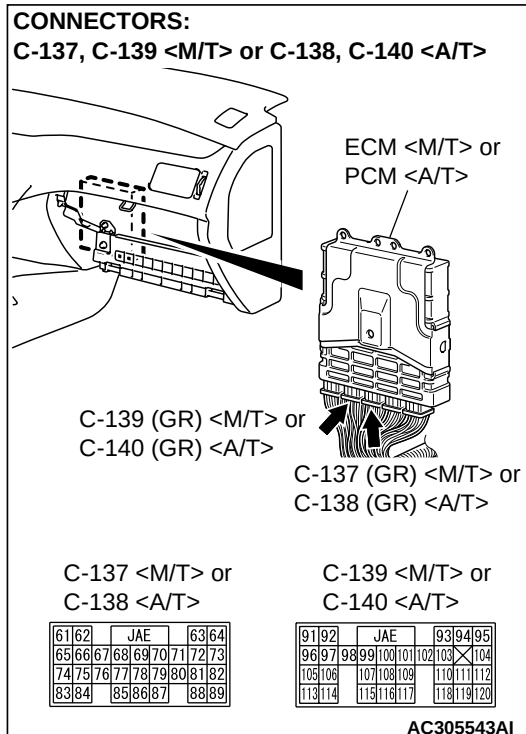
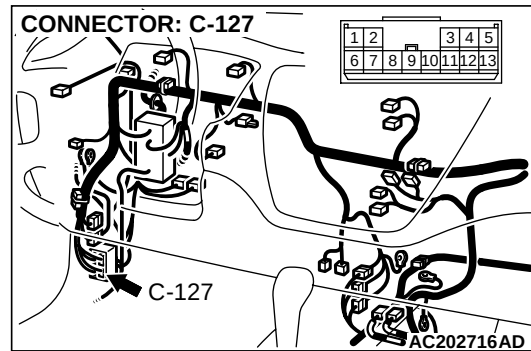
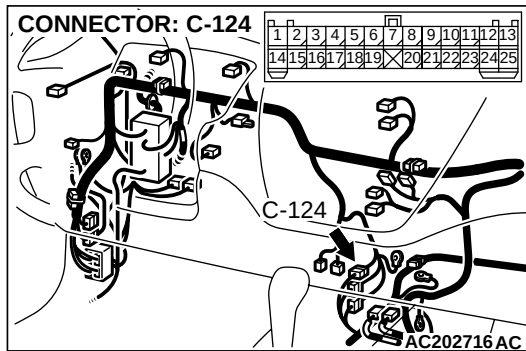


Fuel Tank Differential Pressure Sensor Circuit



AC308189
W4J13M01AA



**CIRCUIT OPERATION**

- The ECM <M/T> or PCM <A/T> (terminal 97) supplies a 5-volt reference signal to the fuel tank differential pressure sensor (terminal 3). The fuel tank differential pressure sensor (terminal 2) is grounded through the ECM <M/T> or PCM <A/T> (terminal 96).
- The fuel tank differential pressure sensor (terminal 1) returns a voltage signal to the ECM <M/T> or PCM <A/T> (terminal 82) that is proportional to the pressure in the fuel tank.

TECHNICAL DESCRIPTION

- The ECM <M/T> or PCM <A/T> monitors the fuel tank differential pressure sensor output voltage.
- The ECM <M/T> or PCM <A/T> 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)

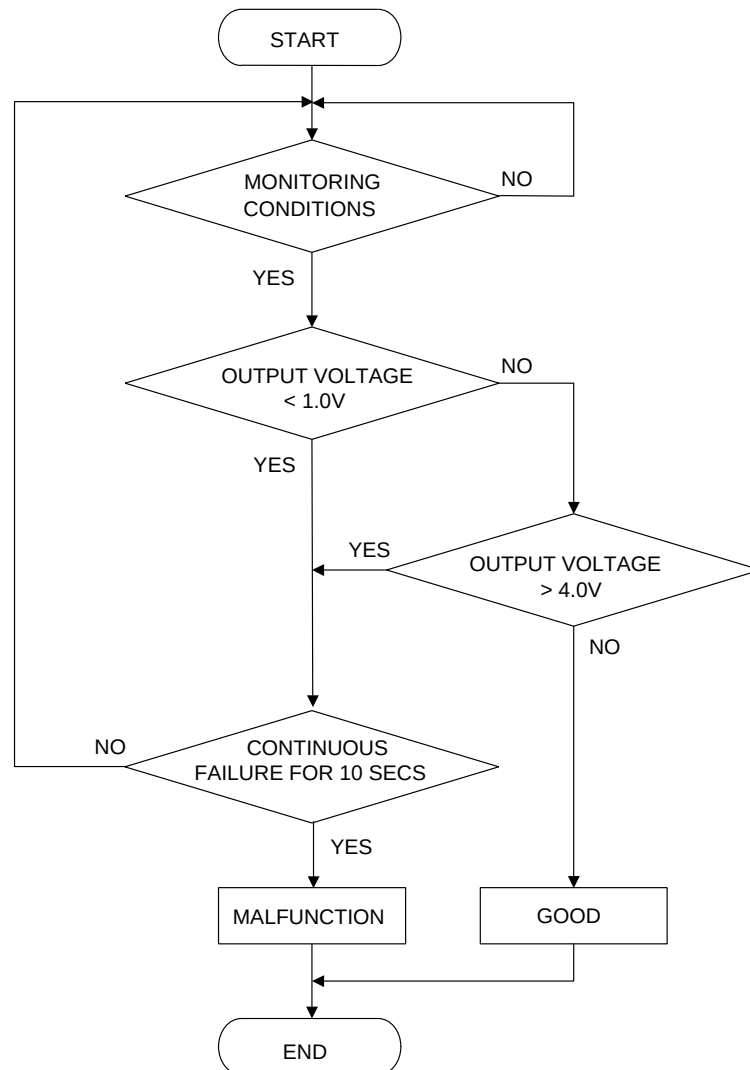
- Evaporative emission purge solenoid monitor
- Evaporative emission ventilation solenoid monitor

Sensor (The sensors below are determined to be normal)

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

LOGIC FLOW CHARTS (Monitor Sequence)

RANGE CHECK - MIN/MAX



AC306648

DTC SET CONDITIONS**Check Conditions**

- Intake air temperature is greater than 5°C (41°F).
- Engine speed is 1,600 r/min or greater.
- Volumetric efficiency is between 20 and 80 per-cent.

Judgment Criteria

- When the evaporative emission purge solenoid is off, the fuel differential pressure sensor output voltage remains 1.0 volt or less for ten seconds.

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function – OBD-II Drive Cycle – Procedure 1 – Evaporative Emission System Leak Monitor [P.13B-6](#).

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

- Malfunction of the fuel tank differential pressure sensor.
- A damaged harness in the fuel tank differential pressure sensor circuit.
- Malfunction of the ECM <M/T> or PCM <A/T>.

OVERVIEW OF TROUBLESHOOTING

- DTC P0452 can be set by a faulty fuel tank differential pressure sensor or related circuit, or ECM <M/T> or PCM <A/T> 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 (TANK PRS SNSR 73). 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:**

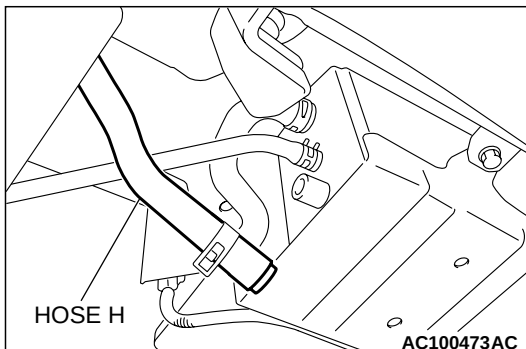
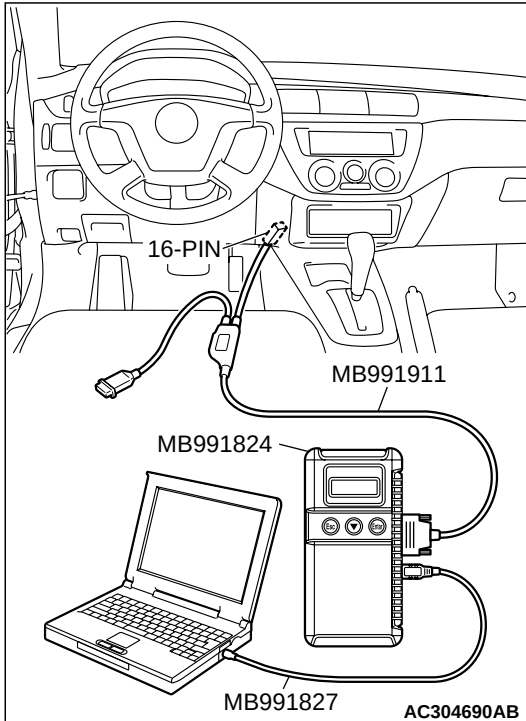
- MB991958: Scan Tool (MUT-III Sub Assembly)
 - MB991824: V.C.I.
 - MB991827: MUT-III USB Cable
 - MB991911: MUT-III Main Harness B
- MB991658: Test Harness Set

STEP 1. Using scan tool MB991958, check data list item 73: Fuel Tank Differential Pressure Sensor.

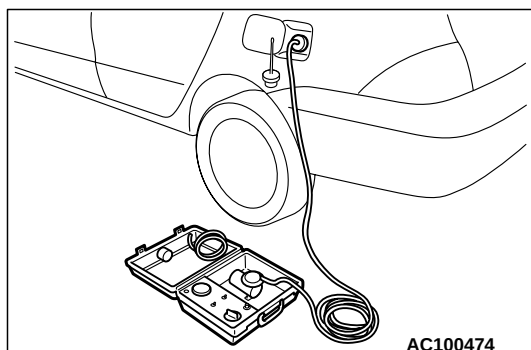
⚠ CAUTION

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 H 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 73, Fuel Tank Differential Pressure Sensor.
 - The fuel tank pressure reading on the scan tool should be -1.5 to 1.5 kPa (-0.443 to 0.443 inHg).

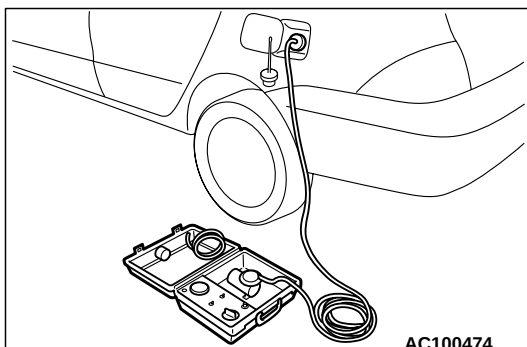
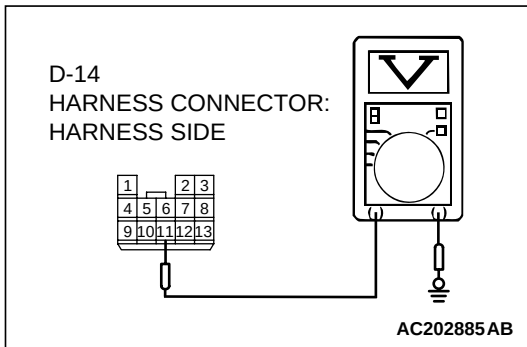
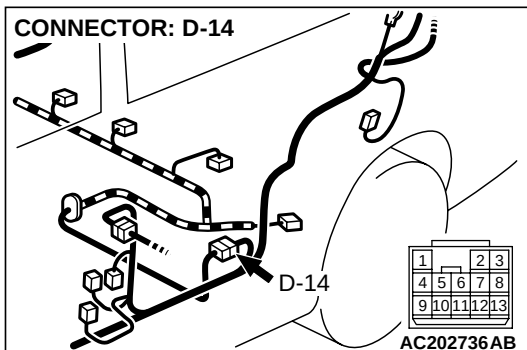
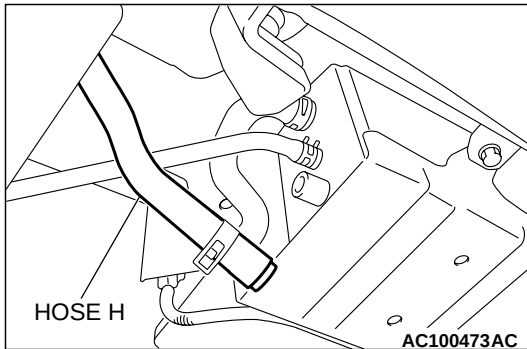


- (6) Connect an evaporative emission system pressure pump (Miller number 6872A) to the fuel filler neck and pressurize the fuel tank.
 - The fuel tank pressure reading should increase.
- (7) Turn the ignition switch to the "LOCK" (OFF) position. Then disconnect scan tool MB991958.
- (8) Disconnect the evaporative emission system pressure pump, and reinstall the fuel cap.
- (9) Connect hose H to the canister.

Q: Is the fuel tank pressure between –1.5 and 1.5 kPa (–0.443 and 0.443 inHg)?

YES : It can be assumed that this malfunction is intermittent (Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – Intermittent Malfunction [P.00-6](#)). Then go to Step 27.

NO : Go to Step 2.



STEP 2. Measure the signal voltage at intermediate connector D-14 by backprobing.

- (1) Disconnect hose H from the evaporative emission canister side, and plug the hose.
- (2) Remove the rear seat cushion. (Refer to GROUP 52A, Rear Seat P.52A-23.)
- (3) Pull up the carpet.
- (4) Turn the ignition switch to the "ON" position.
- (5) Remove the fuel cap.

- (6) Measure the voltage between connector D-14 terminal 11 and ground by backprobing.
 - The measured voltage should be between 2.0 and 3.0 volts.

- (7) Connect an evaporative emission system pressure pump (Miller number 6872A) to the fuel filler neck and pressurize the fuel tank.
 - The fuel tank pressure reading should increase.
- (8) Turn the ignition switch to the "LOCK" (OFF) position.
- (9) Disconnect the evaporative emission system pressure pump, and reinstall the fuel cap.
- (10) Connect hose H to the canister.

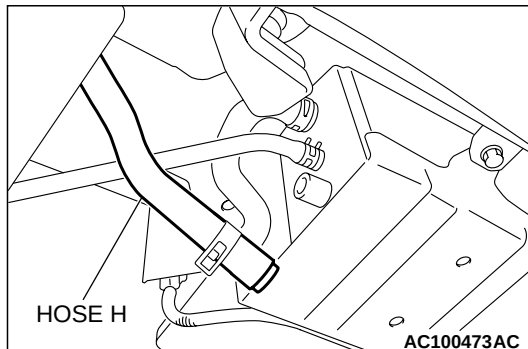
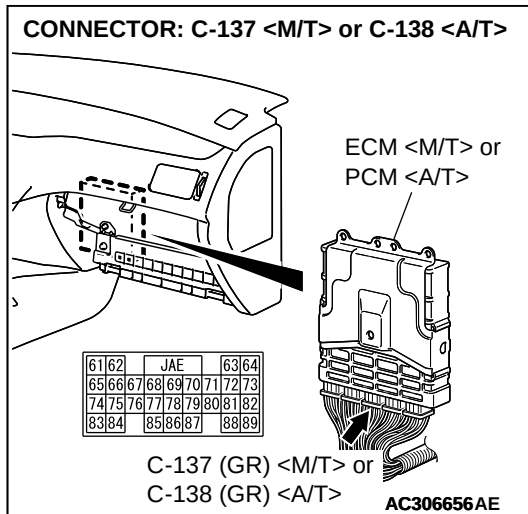
Q: Is the measured voltage between 2.0 and 3.0 volts?

YES : Go to Step 3.

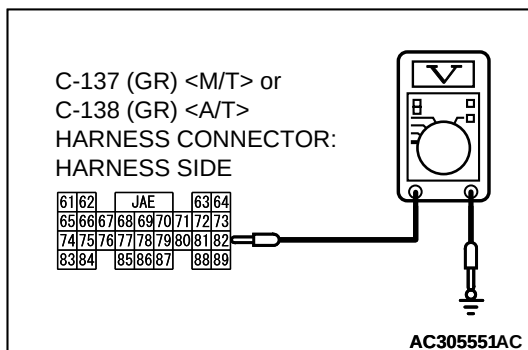
NO : Go to Step 7.

STEP 3. Measure the signal voltage at ECM connector C-137 <M/T> or PCM connector C-138 <A/T> by backprobing.

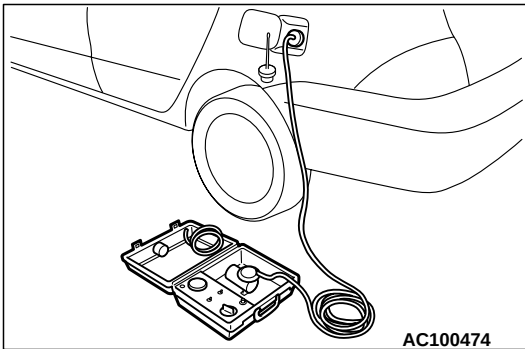
- (1) Do not disconnect ECM connector C-137 <M/T> or PCM connector C-138 <A/T>.



- (2) Disconnect hose H from the evaporative emission canister side, and plug the hose.
- (3) Turn the ignition switch to the "ON" position.
- (4) Remove the fuel cap.



- (5) Measure the voltage between connector C-137 <M/T> or C-138 <A/T> terminal 82 and ground by backprobing.
- The measured voltage should be between 2.0 and 3.0 volts.



- (6) Connect an evaporative emission system pressure pump (Miller number 6872A) to the fuel filler neck and pressurize the fuel tank.
 - The fuel tank pressure reading should increase.
- (7) Turn the ignition switch to the "LOCK" (OFF) position.
- (8) Disconnect the evaporative emission system pressure pump, and reinstall the fuel cap.
- (9) Connect hose G to the canister.

Q: Is the measured voltage between 2.0 and 3.0 volts?

YES : Go to Step 4.

NO : Go to Step 5.

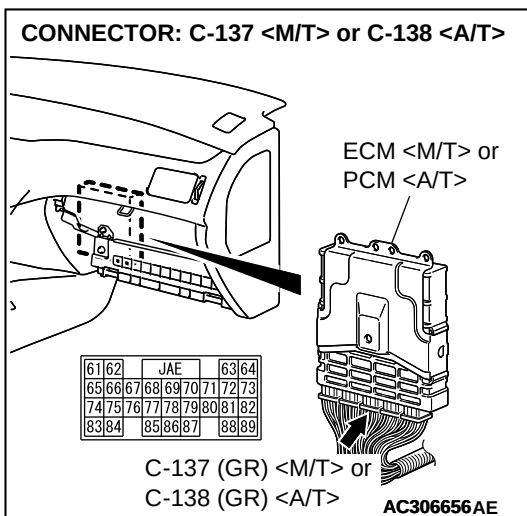
STEP 4. Check ECM connector C-137 <M/T> or PCM connector C-138 <A/T> for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 26.

NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection

[P.00E-2](#). Then go to Step 27.



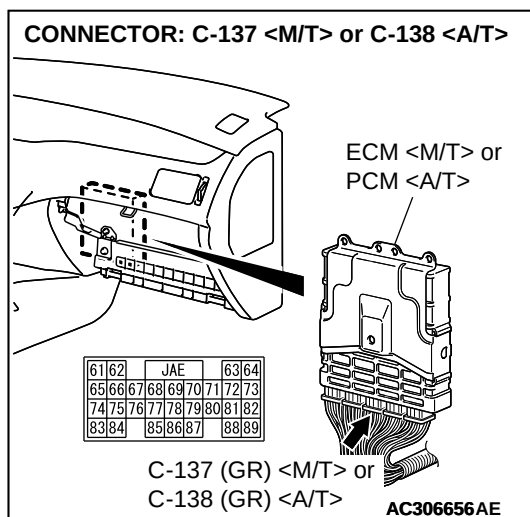
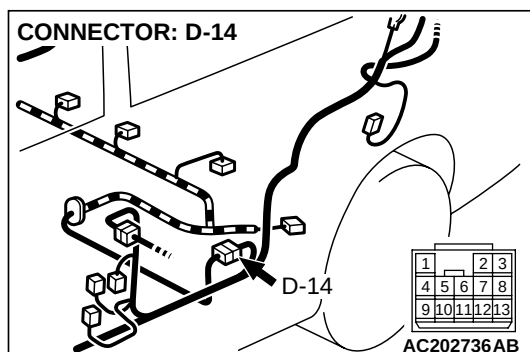
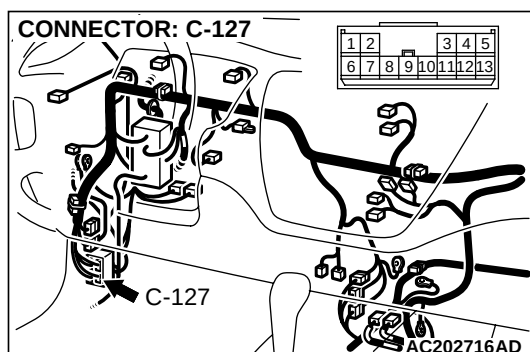
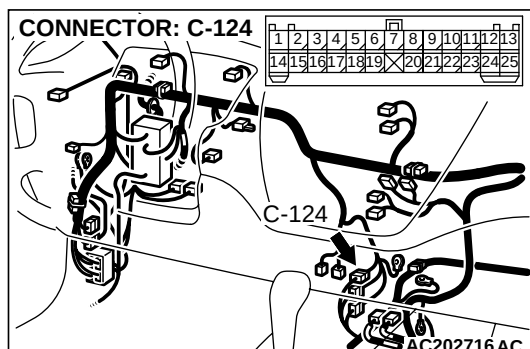
STEP 5. Check intermediate connectors C-124, C-127, D-14 and ECM connector C-137 <M/T> or PCM connector C-138 <A/T> for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 6.

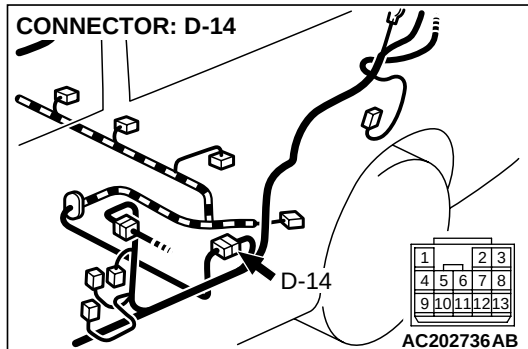
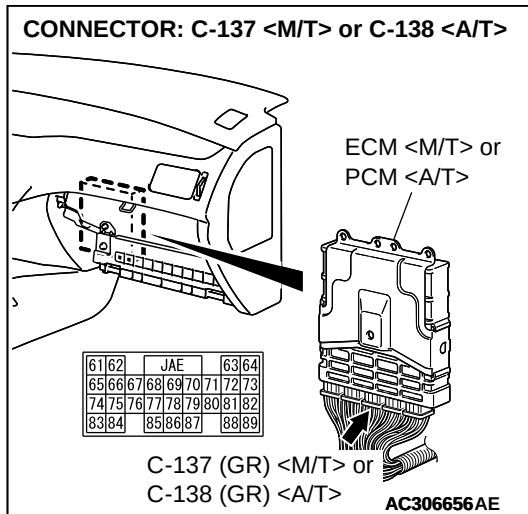
NO : Repair or replace the faulty component. Refer to GROUP 00E, Harness Connector Inspection

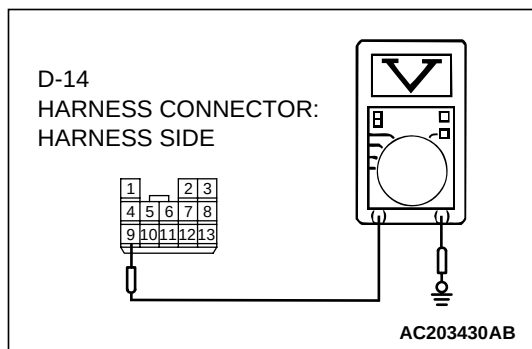
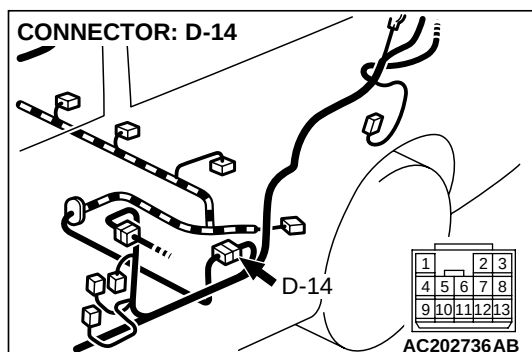
[P.00E-2](#). Go to Step 27.



STEP 6. Check the harness wire between ECM connector C-137 <M/T> or PCM connector C-138 <A/T> terminal 82 and intermediate connector D-14 terminal 11 for damage.
Q: Is the harness wire in good condition?

- 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 Malfunction [P.00-6](#). Then go to
Step 27.
- NO :** Repair the damaged harness wire. Then go to Step 27.



**STEP 7. Measure the 5-volt reference signal at intermediate connector D-14 by backprobing.**

- (1) Do not disconnect intermediate connector D-14.
- (2) Turn the ignition switch to the "ON" position.

- (3) Measure the voltage between connector D-14 terminal 9 and ground.

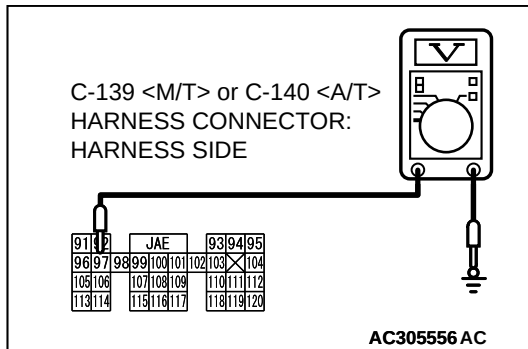
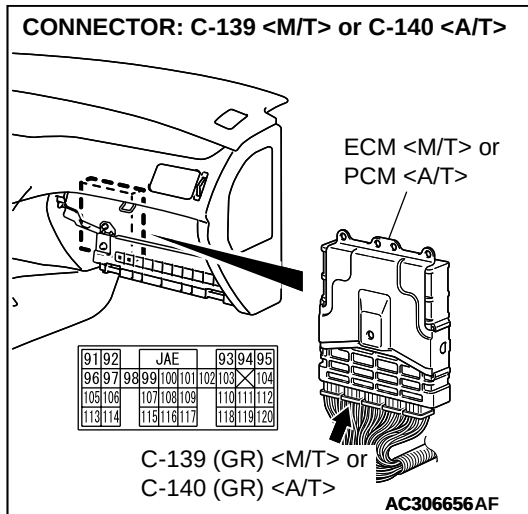
- The voltage should be between 4.9 and 5.1 volts.

- (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 11.

NO : Go to Step 8.



STEP 8. Measure the 5-volt reference signal at ECM connector C-139 <M/T> or PCM connector C-140 <A/T> by backprobing.

- (1) Do not disconnect ECM connector C-139 <M/T> or PCM connector C-140 <A/T>.
- (2) Turn the ignition switch to the "ON" position.

- (3) Measure the voltage between connector C-139 <M/T> or connector C-140 <A/T> terminal 97 and ground by backprobing.

- The measured voltage should be between 4.9 and 5.1 volts.

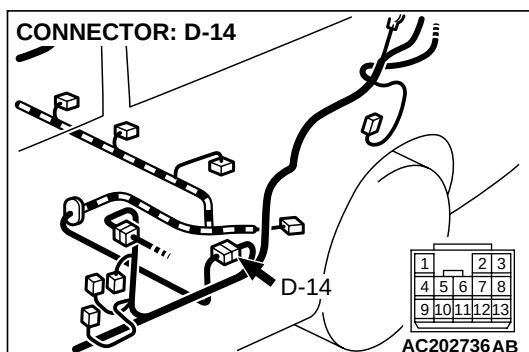
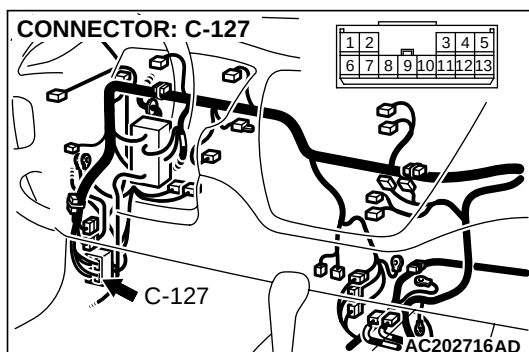
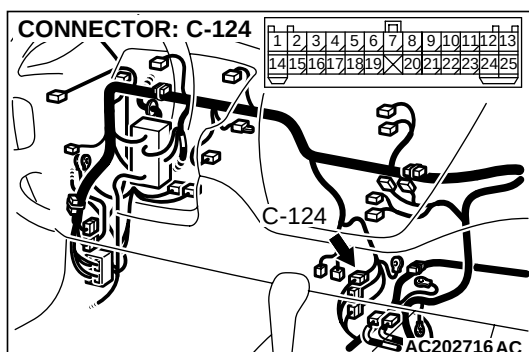
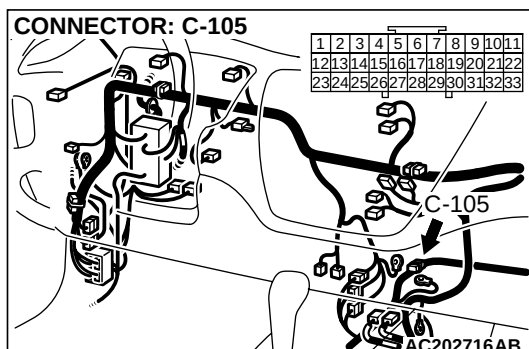
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

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

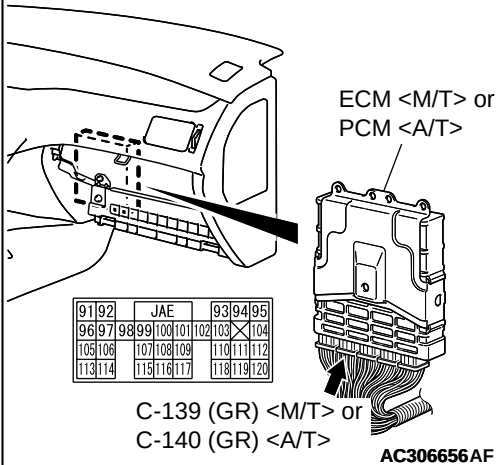
YES : Go to Step 9.

NO : Go to Step 25.

STEP 9. Check intermediate connectors C-105, C-124, C-127, and D-14 and ECM connector C-139 <M/T> or PCM connector C-140 <A/T> loose, corroded or damaged terminals, or terminals pushed back in the connector.



CONNECTOR: C-139 <M/T> or C-140 <A/T>



Q: Are the connectors and terminals in good condition?

YES : Go to Step 10.

NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection

[P.00E-2](#). Then go to Step 27.

STEP 10. Check the harness wire between ECM connector C-139 <M/T> or PCM connector C-140 <A/T> terminal 97 and intermediate connector D-14 terminal 9 for damage.

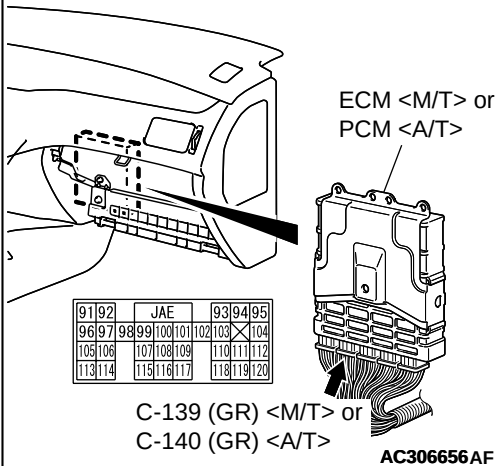
Q: Is the harness wire in good condition?

YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use

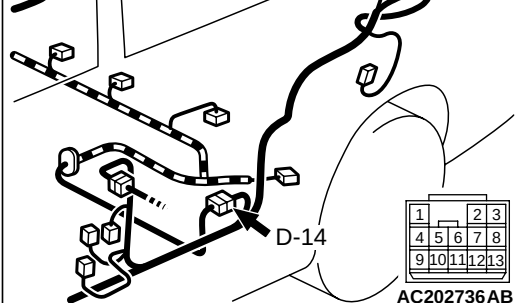
Troubleshooting/Inspection Service Points - How to Cope with Intermittent Malfunction [P.00-6](#). Then go to Step 27.

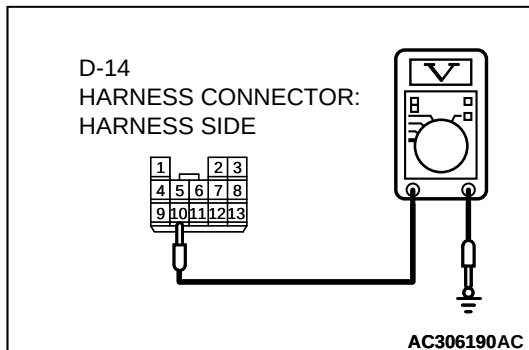
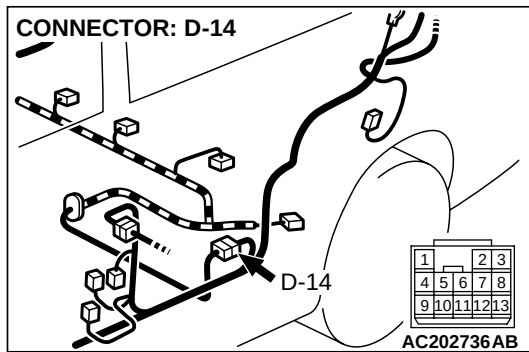
NO : Repair the damaged harness wire. Then go to Step 27.

CONNECTOR: C-139 <M/T> or C-140 <A/T>



CONNECTOR: D-14



**STEP 11. Check the sensor ground at intermediate connector D-14 by backprobing.**

- (1) Do not disconnect connector D-14.
- (2) Turn the ignition switch to the "ON" position.

- (3) Measure the voltage between connector D-14 terminal 10 and ground by backprobing.

- The measured voltage should be 0.5 volt or less.

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

Q: Is the measured voltage 0.5 volt or less?

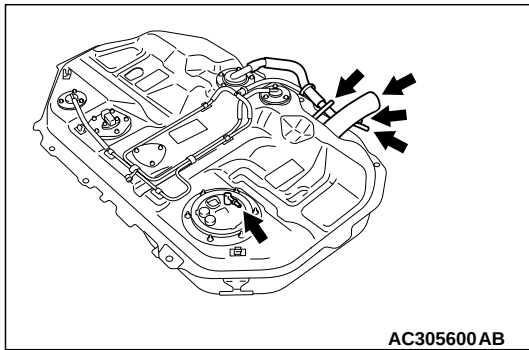
YES : Go to Step 15.

NO : Go to Step 12.

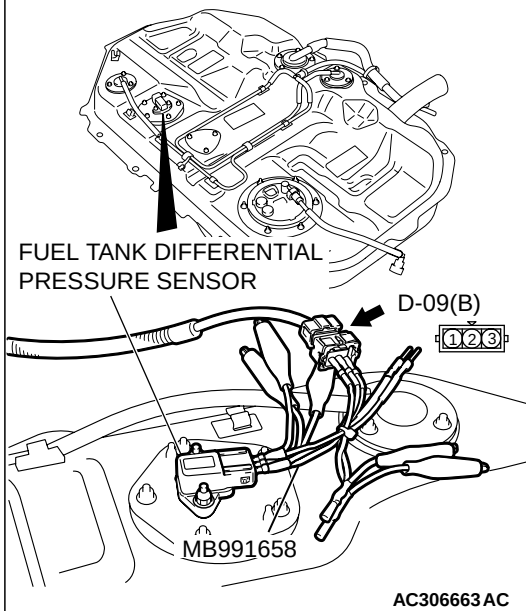
STEP 12. Check the signal voltage at fuel tank differential pressure sensor connector D-09.

- (1) Remove the fuel tank. (Refer to GROUP 13C, Fuel Tank [P.13C-9](#).)
- (2) Plug the filler hose, fuel pump feed nipple, hose I, hose M and hose R connected to the fuel tank.

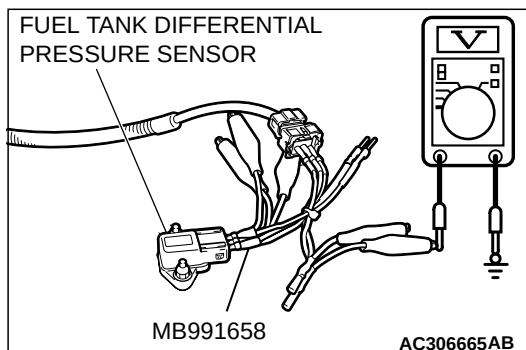
NOTE: If these items are not securely plugged here, the fuel could leak in the next step.



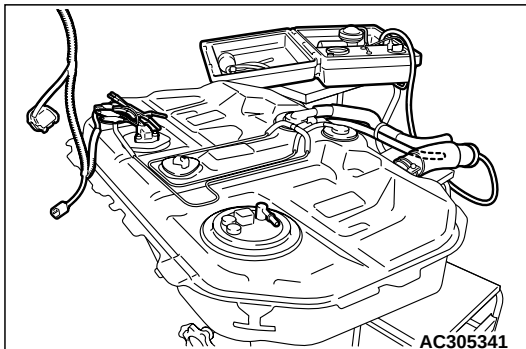
CONNECTOR: D-09



- (3) Lift the fuel tank.
- (4) Connect special tool MB991658 to both halves of connector D-09.
- (5) Turn the ignition switch to the "ON" position.



- (6) Measure the voltage between connector D-09 terminal 2 and ground.
 - The measured voltage should be 0.5 volt or less.

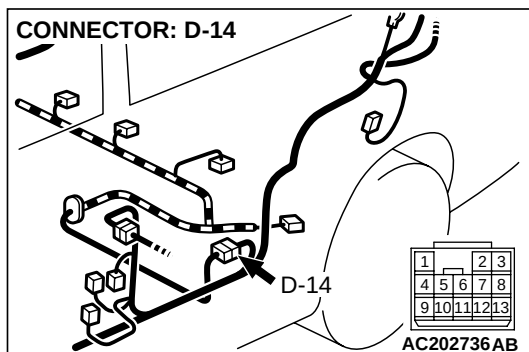
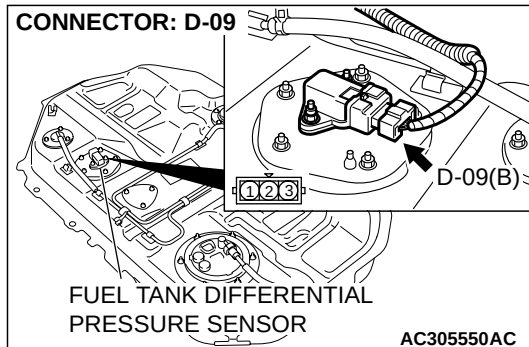


- (7) Connect an evaporative emission system pressure pump (Miller number 6872A) to the fuel filler neck and pressurize the fuel tank.
 - The fuel tank pressure reading should increase.
- (8) Turn the ignition switch to the "LOCK" (OFF) position.
- (9) Disconnect the evaporative emission system pressure pump.

Q: Is the measured voltage 0.5 volt or less?

YES : Go to Step 13.

NO : Go to Step 19.

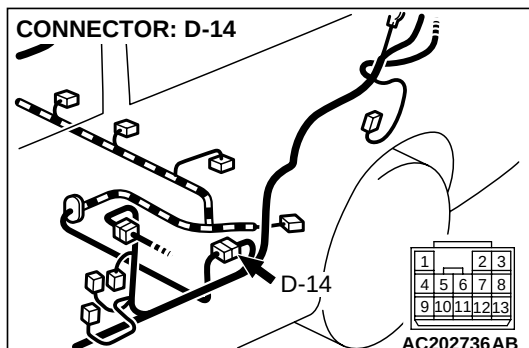
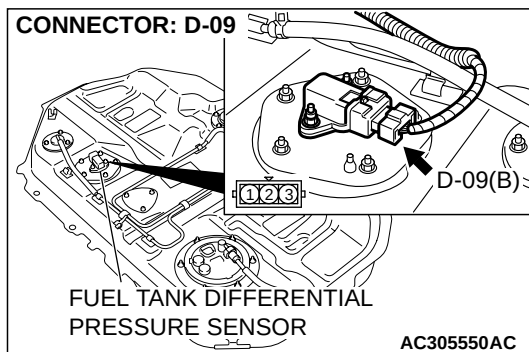


STEP 13. Check fuel tank differential pressure sensor connector D-09 and intermediate connector for D-14 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 14.

NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Reinstall the fuel tank. Refer to GROUP 13C, Fuel Tank [P.13C-9](#). Then go to Step 27.

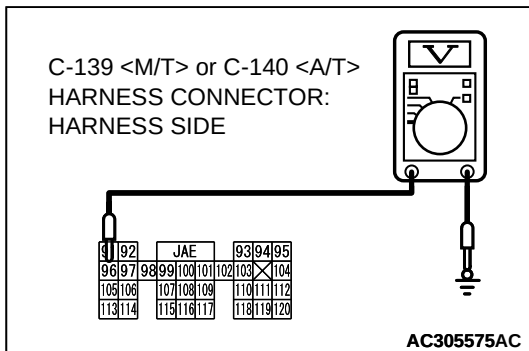
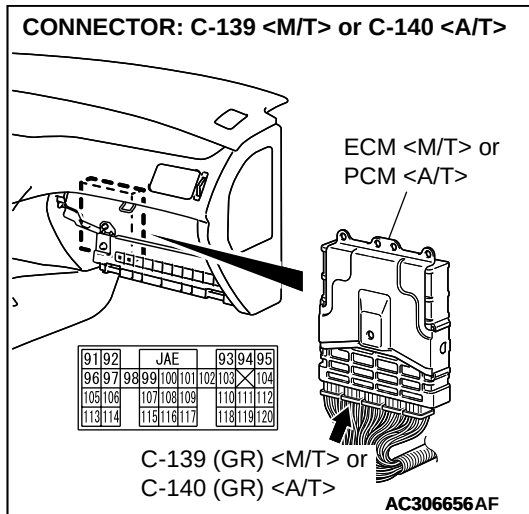


STEP 14. Check the harness wire between fuel tank differential pressure sensor connector D-09 terminal 2 and intermediate connector D-14 terminal 10 for damage.

Q: Is the harness wire in good condition?

YES : It can be assumed that this malfunction is intermittent, and reinstall the fuel tank. Refer to GROUP 13C, Fuel Tank [P.13C-9](#). Then go to Step 27.

NO : Repair the damaged harness wire, and reinstall the fuel tank. Refer to GROUP 13C, Fuel Tank [P.13C-9](#). Then go to Step 27.



STEP 15. Check the sensor ground at ECM connector C-139 <M/T> or PCM connector C-140 <A/T> by backprobing.

- (1) Do not disconnect ECM connector C-139 <M/T> or PCM connector C-140 <A/T>.
- (2) Turn the ignition switch to the "ON" position.

- (3) Measure the voltage between connector C-139 <M/T> or connector C-140 <A/T> terminal 96 and ground by backprobing.

- The measured voltage should be 0.5 volt or less.

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

Q: Is the measured voltage 0.5 volt or less?

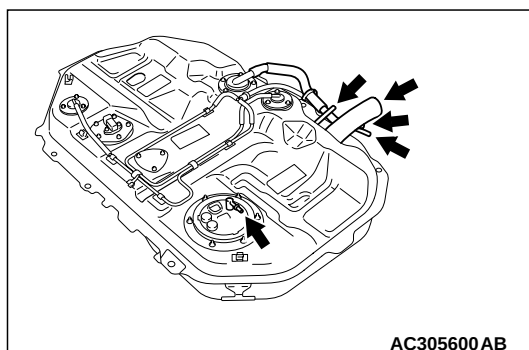
YES : Go to Step 16.

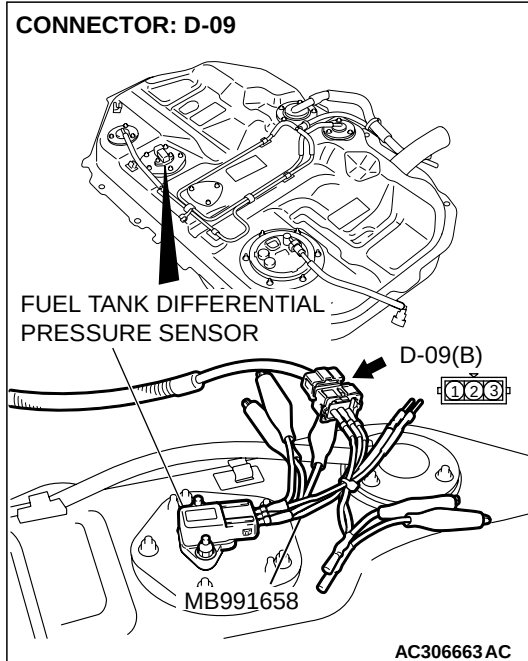
NO : Go to Step 23.

STEP 16. Check the signal voltage at fuel tank differential pressure sensor connector D-09.

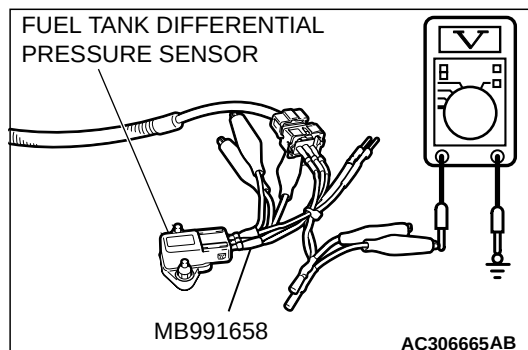
- (1) Remove the fuel tank. (Refer to GROUP 13C, Fuel Tank [P.13C-9](#).)
- (2) Plug the filler hose, fuel pump feed nipple, hose I, hose M and hose R connected to the fuel tank.

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

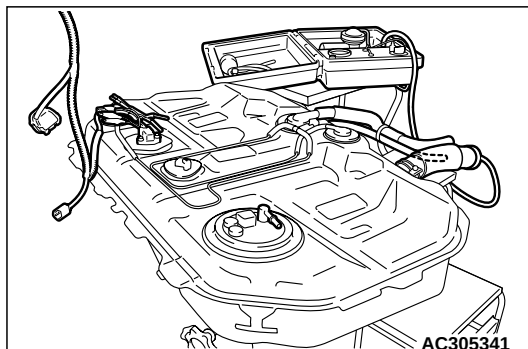




- (3) Lift the fuel tank.
- (4) Connect special tool MB991658 to both halves of connector D-09.
- (5) Turn the ignition switch to the "ON" position.



- (6) Measure the voltage between connector D-09 terminal 1 and ground.
 - The measured voltage should be between 2.0 and 3.0 volts.

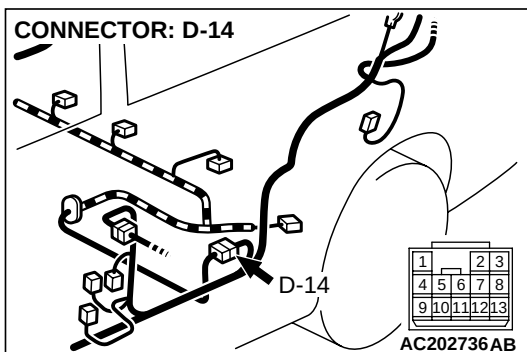
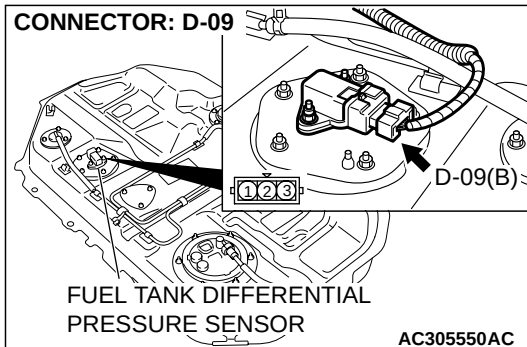


- (7) Connect an evaporative emission system pressure pump (Miller number 6872A) to the fuel filler neck and pressurize the fuel tank.
 - The fuel tank pressure reading should increase.
- (8) Turn the ignition switch to the "LOCK" (OFF) position.
- (9) Disconnect the evaporative emission system pressure pump.

Q: Is the measured voltage between 2.0 and 3.0 volts?

YES : Go to Step 17.

NO : Go to Step 20.

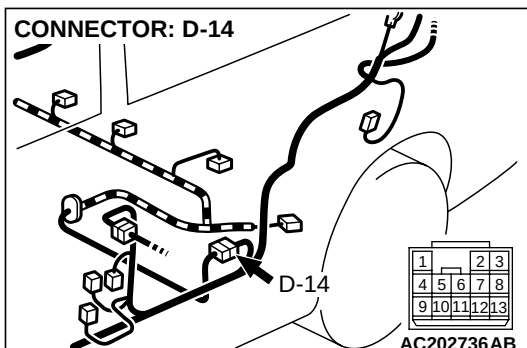
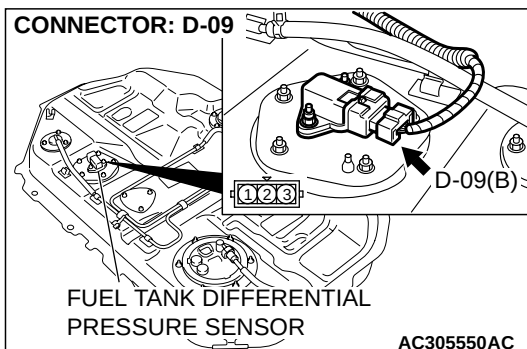


STEP 17. Check fuel tank differential pressure sensor connector D-09 and intermediate connector D-14 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 18.

NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Reinstall the fuel tank. Refer to GROUP 13C, Fuel Tank [P.13C-9](#). Then go to Step 27.

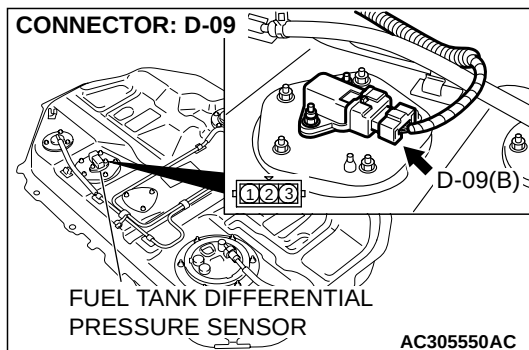
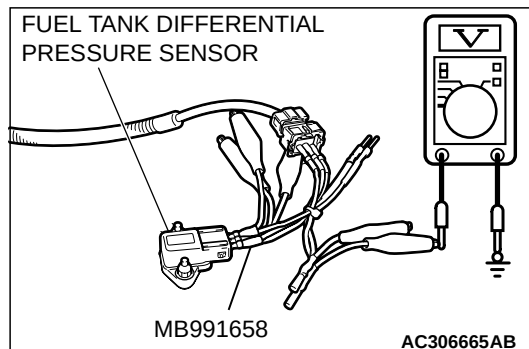
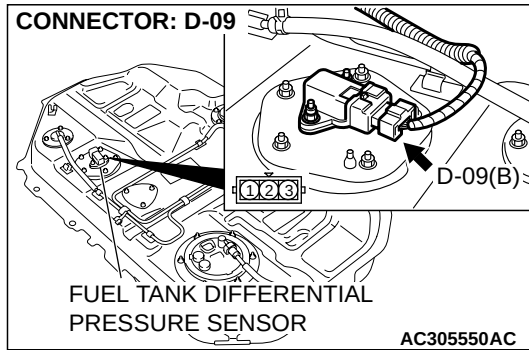


STEP 18. Check the harness wire between fuel tank differential pressure sensor connector D-09 terminal 1 and intermediate connector D-14 terminal 11 for damage.

Q: Is the harness wire in good condition?

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 Malfunction [P.00-6](#). Reinstall the fuel tank. Refer to GROUP 13C, Fuel Tank [P.13C-9](#). Then go to Step 27.

NO : Repair or replace the harness wire, and reinstall the fuel tank. Refer to GROUP 13C, Fuel Tank [P.13C-9](#). Then go to Step 27.

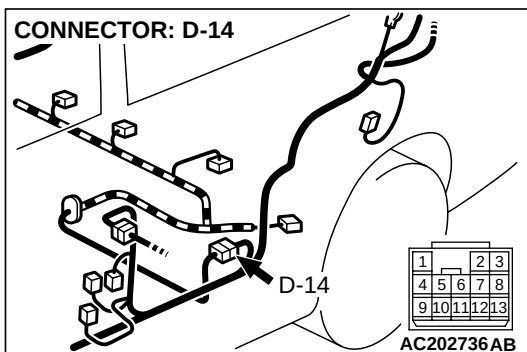
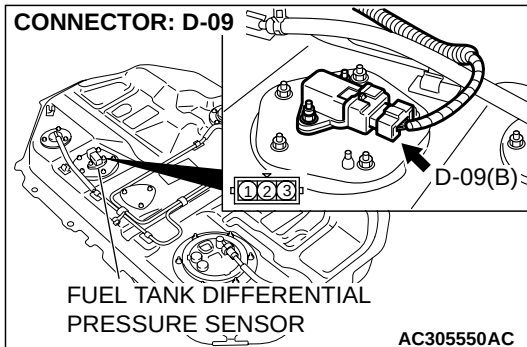
**STEP 19. Measure the 5-volt reference signal at fuel tank differential pressure sensor connector D-09.**

- (1) Turn the ignition switch to the "ON" position.
- (2) Measure the voltage between connector D-09 terminal 3 and ground.

- The voltage should be between 4.9 and 5.1 volts.

- (3) 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 20.**NO :** Go to Step 21.**STEP 20. Check fuel tank differential pressure sensor connector D-09 for loose, corroded or damaged terminals, or terminals pushed back in the connector.****Q: Are the connectors and terminals in good condition?****YES :** Replace the fuel tank differential pressure sensor, and reinstall the fuel tank. Refer to GROUP 13C, Fuel Tank [P.13C-9](#). Then go to Step 27.**NO :** Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Reinstall the fuel tank. Refer to GROUP 13C, Fuel Tank [P.13C-9](#). Then go to Step 27.



STEP 21. Check fuel tank differential pressure sensor connector D-09 and intermediate connector D-14 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

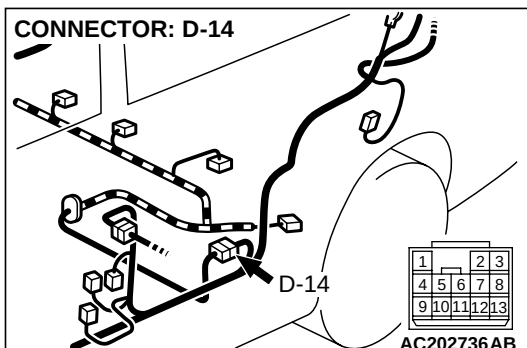
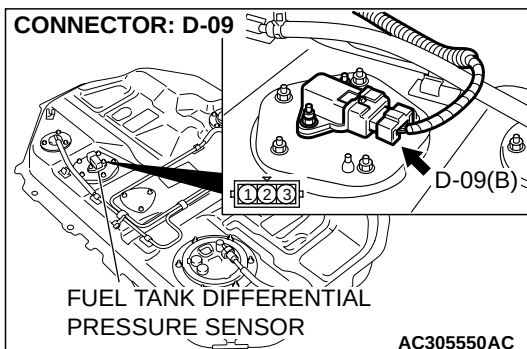
Q: Are the connectors and terminals in good condition?

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 Malfunction [P.00-6](#). Reinstall the fuel tank. Refer to GROUP 13C, Fuel Tank [P.13C-9](#). Then go to Step 22.

NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Reinstall the fuel tank. Refer to GROUP 13C, Fuel Tank [P.13C-9](#). Then go to Step 27.



STEP 22. Check the harness wire between fuel tank differential pressure sensor connector D-09 terminal 3 and intermediate connector D-14 terminal 9 for damage.

Q: Is the harness wire in good condition?

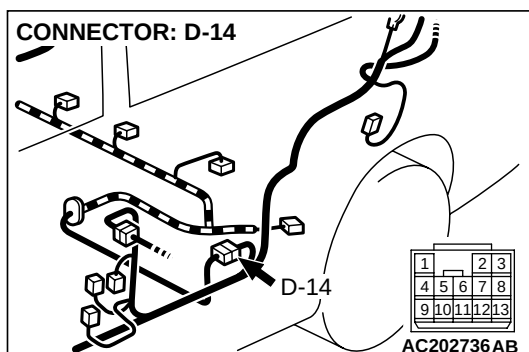
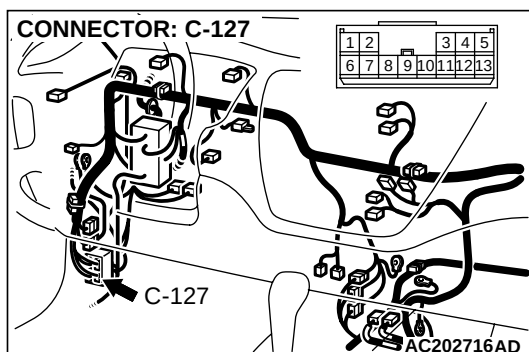
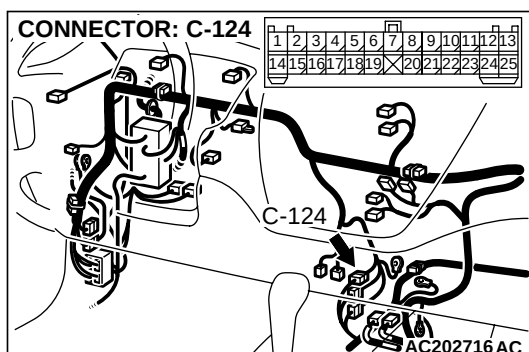
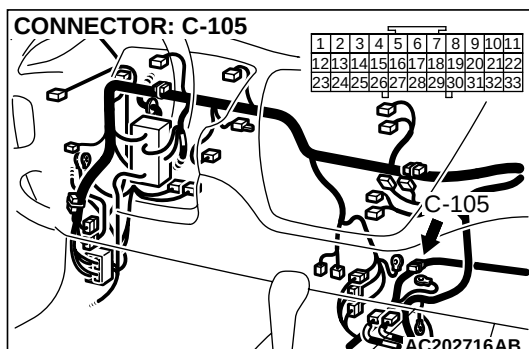
YES : It can be assumed that this malfunction is intermittent.

Refer to GROUP 00, How to Use

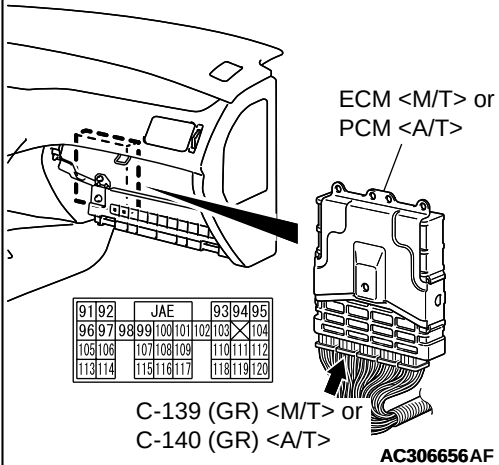
Troubleshooting/Inspection Service Points - How to Cope with Intermittent Malfunction [P.00-6](#). Reinstall the fuel tank. Refer to GROUP 13C, Fuel Tank [P.13C-9](#). Then go to Step 27.

NO : Repair or replace the harness wire, and reinstall the fuel tank. Refer to GROUP 13C, Fuel Tank [P.13C-9](#). Then go to Step 27.

STEP 23. Check intermediate connectors C-105, C-124, C-127, and D-14, and ECM connector C-139 <M/T> or PCM connector C-140 <A/T> for loose, corroded or damaged terminals, or terminals pushed back in the connector.



CONNECTOR: C-139 <M/T> or C-140 <A/T>



Q: Are the connectors and terminals in good condition?

YES : Go to Step 24.

NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection

[P.00E-2](#). Then go to Step 27.

STEP 24. Check the harness wire between ECM connector C-139 <M/T> or PCM connector C-140 <A/T> terminal 96 and intermediate connector D-14 terminal 10 for damage.

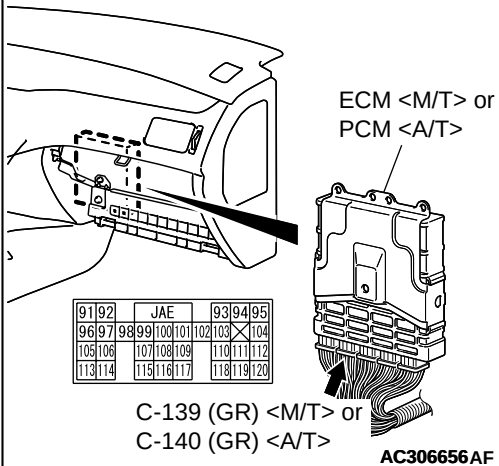
Q: Is the harness wire in good condition?

YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use

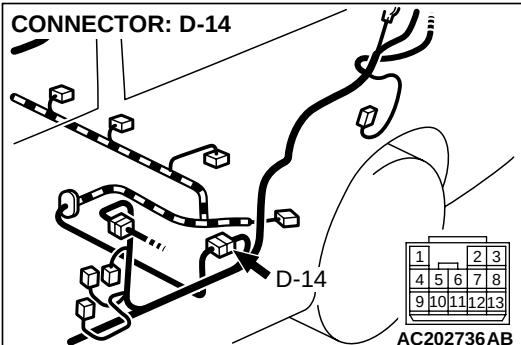
Troubleshooting/Inspection Service Points - How to Cope with Intermittent Malfunction [P.00-6](#). Then go to Step 27.

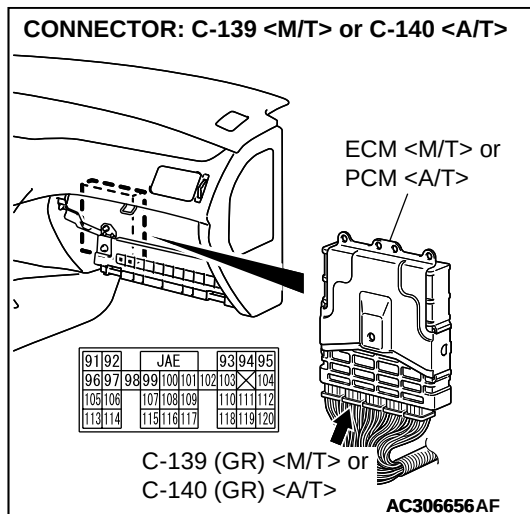
NO : Repair the damaged harness wire. Then go to Step 27.

CONNECTOR: C-139 <M/T> or C-140 <A/T>



CONNECTOR: D-14





STEP 25. Check ECM connector C-139 <M/T> or PCM connector C-140 <A/T> for loose, corroded or damaged terminals, or terminals pushed back in the connector.
Q: Are the connectors and terminals in good condition?

YES : Go to Step 26.

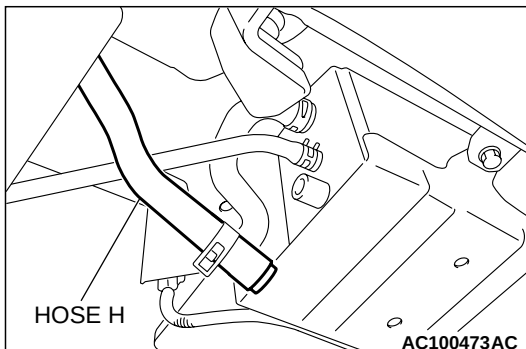
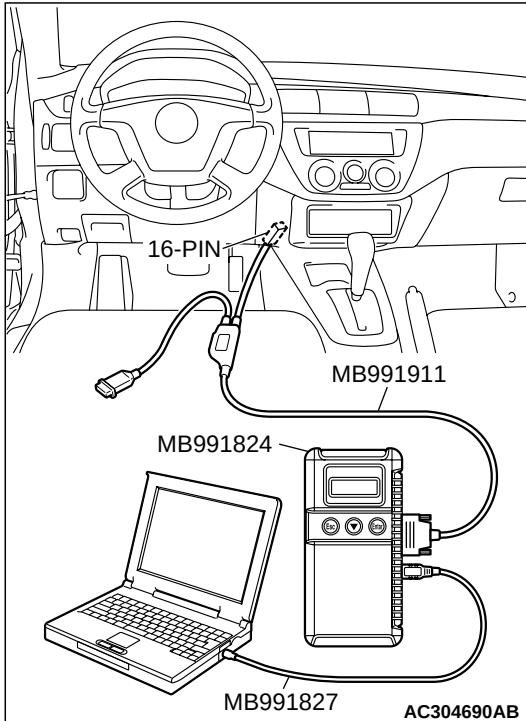
NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then go to Step 27.

STEP 26. Using scan tool MB991958, check data list item 73: Fuel Tank Differential Pressure Sensor.

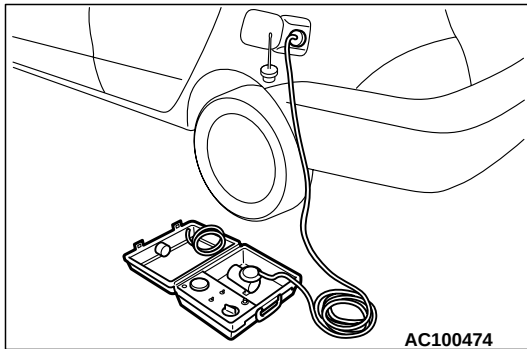
⚠ CAUTION

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 H 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 73, Fuel Tank Differential Pressure Sensor.
 - The fuel tank pressure reading on the scan tool should be -1.5 to 1.5 kPa (-0.443 to 0.443 inHg).



- (6) Connect an evaporative emission system pressure pump (Miller number 6872A) to the fuel filler neck 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) Disconnect the evaporative emission system pressure pump, and reinstall the fuel cap.
- (9) Connect hose H to the canister.

Q: Is the fuel tank pressure between –1.5 and 1.5 kPa (–0.443 and 0.443 inHg)?

YES : It can be assumed that this malfunction is intermittent (Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – Intermittent Malfunction [P.00-6](#)). Then go to Step 27.

NO : Replace the ECM <M/T> or PCM <A/T> (Refer to [P.13B-919](#)). Then go to Step 27.

STEP 27. Perform the OBD-II drive cycle.

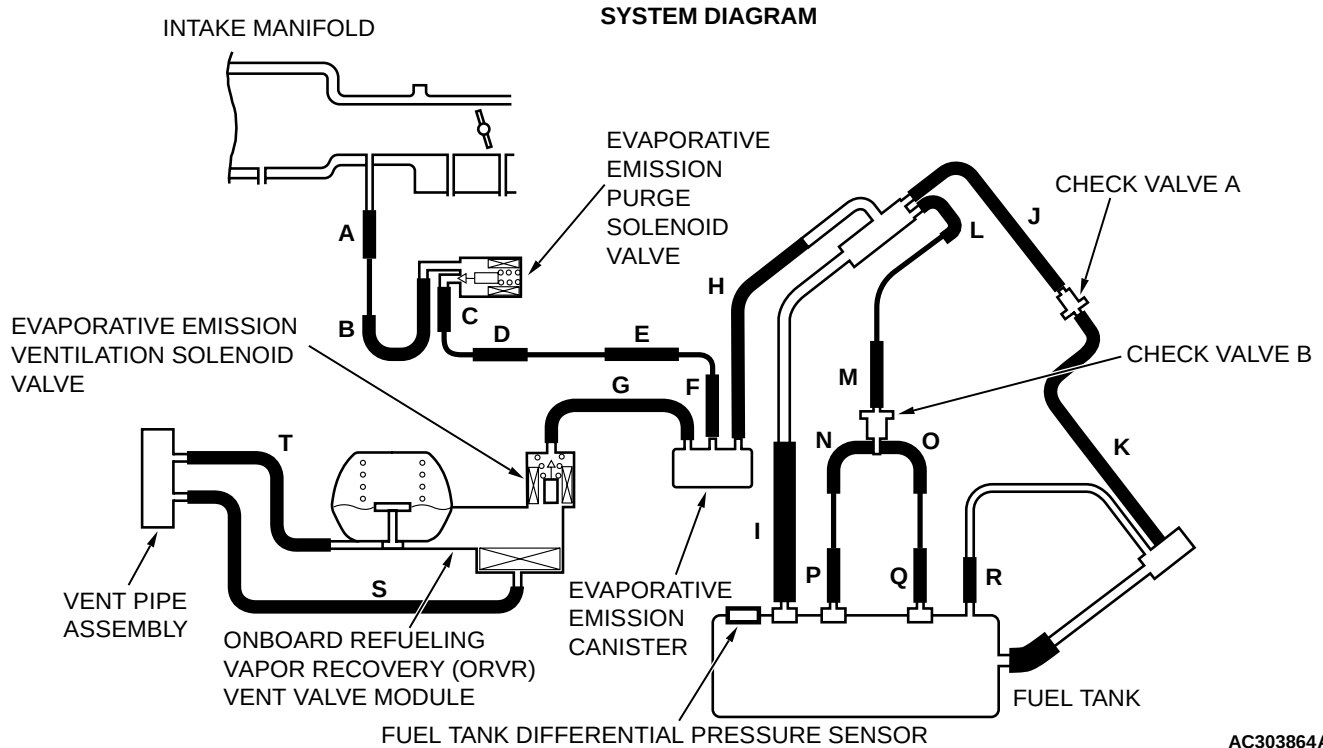
- (1) Carry out a test drive with the drive cycle pattern (Refer to Diagnostic Function – OBD-II Drive Cycle – Procedure 1 – Evaporative Emission System Leak Monitor [P.13B-6](#)).
- (2) Read the diagnostic trouble code (DTC).

Q: Is DTC P0452 set?

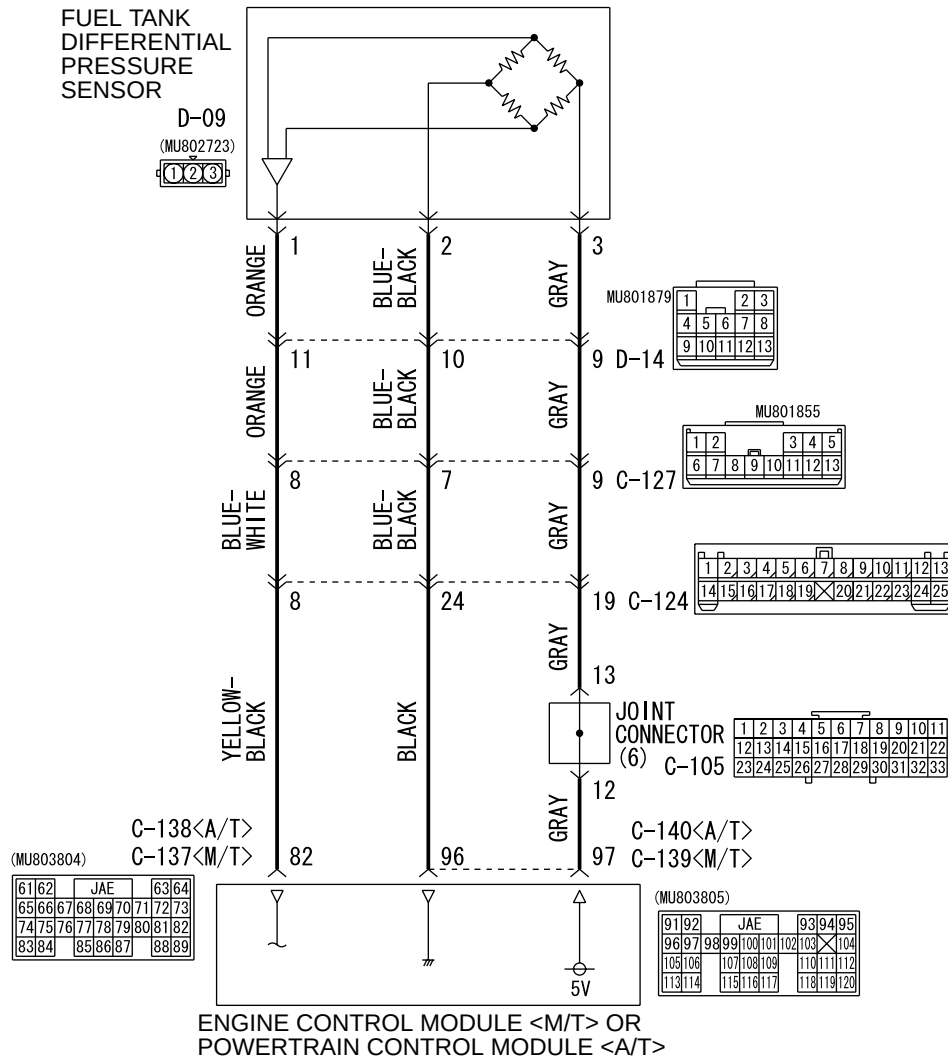
YES : Go to Step 2.

NO : The procedure is complete.

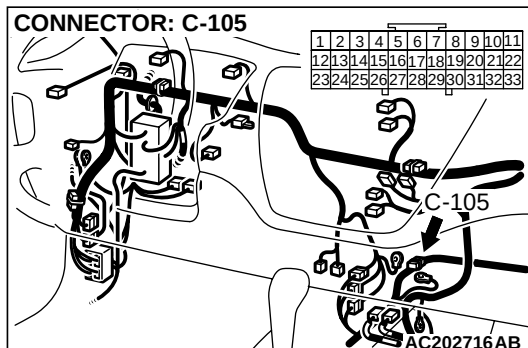
DTC P0453: Evaporative Emission Control System Pressure Sensor High Input

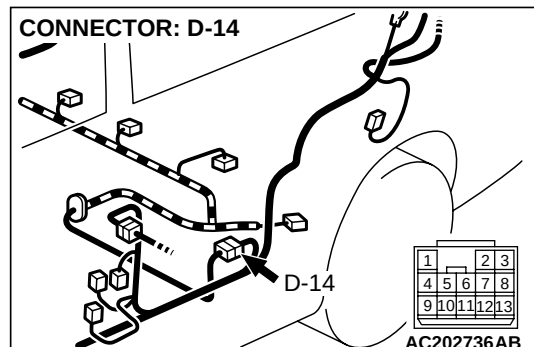
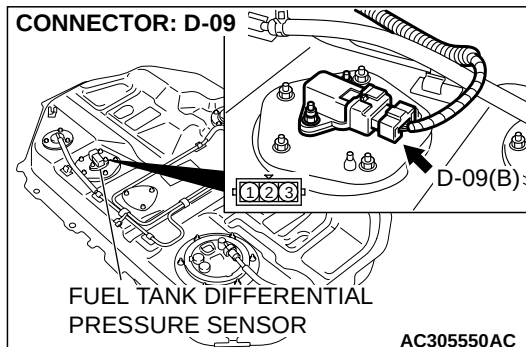
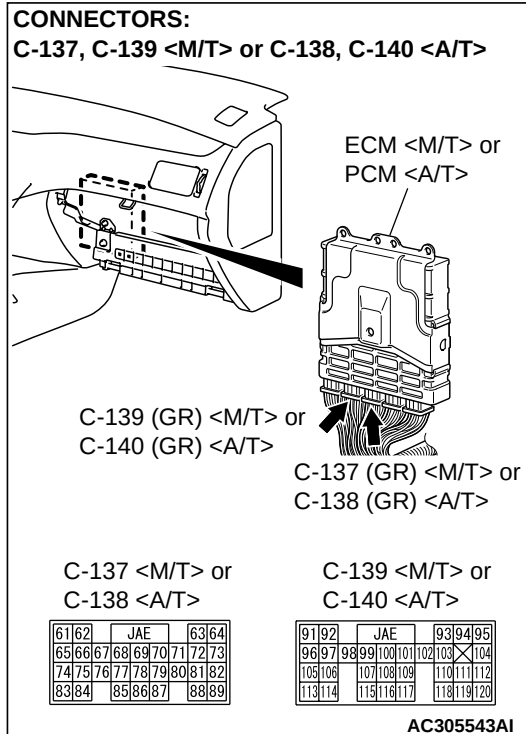
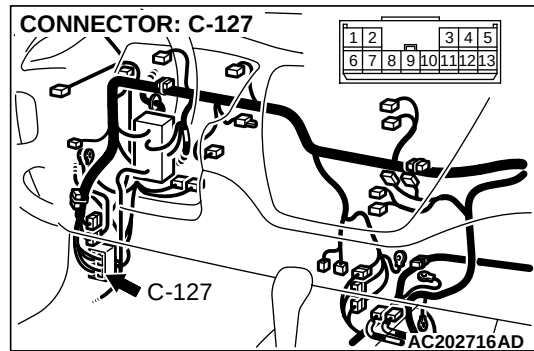
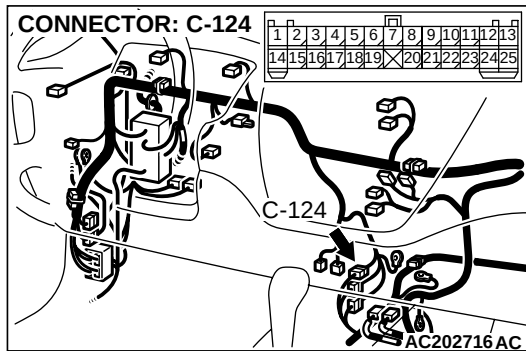


Fuel Tank Differential Pressure Sensor Circuit



AC308189
W4J13M01AA





CIRCUIT OPERATION

- The ECM <M/T> or PCM <A/T> (terminal 97) supplies a 5-volt reference voltage to the fuel tank differential pressure sensor (terminal 3). The ECM <M/T> or PCM <A/T> (terminal 96) supplies a ground to the fuel tank differential pressure sensor (terminal 2).
- The ECM <M/T> or PCM <A/T> (terminal 82) receives a voltage signal proportional to the pressure in the fuel tank from the fuel tank differential pressure sensor (terminal 1).

TECHNICAL DESCRIPTION

- To determine whether the fuel tank differential pressure sensor is defective, the ECM <M/T> or PCM <A/T> monitors the fuel tank differential pressure sensor output voltage.
- The ECM <M/T> or PCM <A/T> 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)

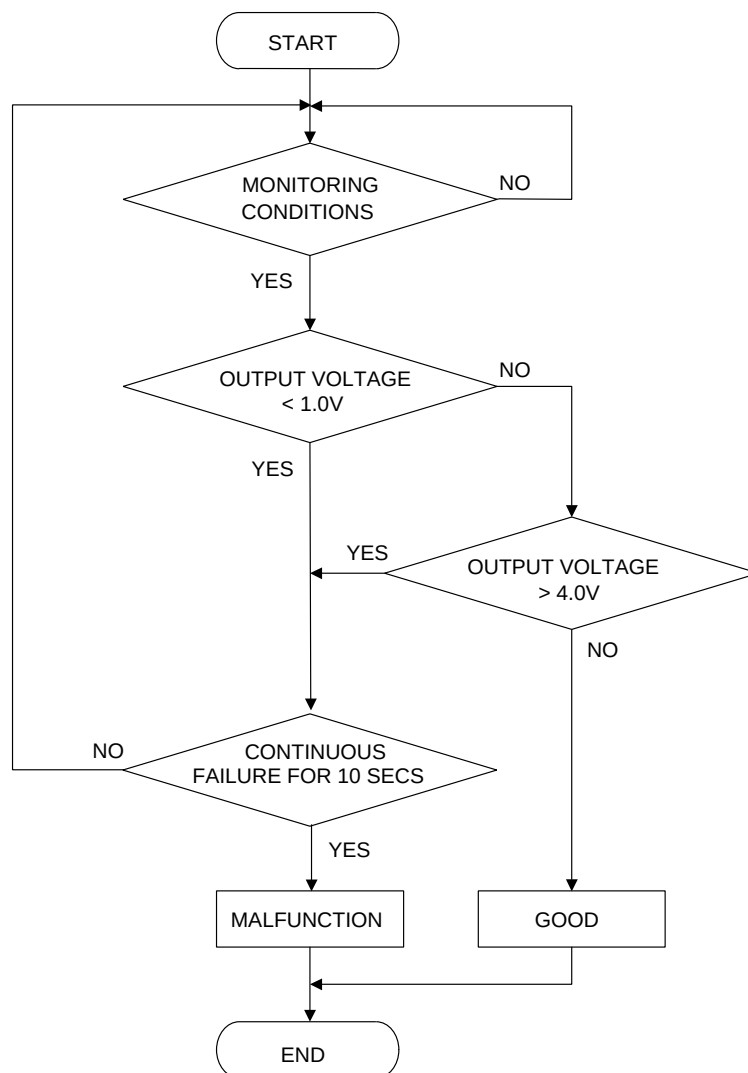
- Evaporative emission purge solenoid monitor
- Evaporative emission ventilation solenoid monitor

Sensor (The sensors below are determined to be normal)

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

LOGIC FLOW CHARTS (Monitor Sequence)

RANGE CHECK - MIN/MAX



AC306648

DTC SET CONDITIONS

Test Conditions: For Test to Run

- Intake air temperature is between 5°C (41°F) and 45°C (113°F) or greater.
- Engine speed is 1,600 r/min or greater.
- Volumetric efficiency is between 20 to 80 percent.

Judgment Criteria

- When the evaporative emission purge solenoid valve is fully operational (100 percent ratio), the fuel differential pressure sensor output voltage remains at 4.0 volts or greater for ten seconds.

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function – OBD-II Drive Cycle – Procedure 1 – Evaporative Emission System Leak Monitor [P.13B-6](#).

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

- Malfunction of the fuel tank differential pressure sensor.
- Open or shorted fuel tank differential pressure sensor circuit.
- Malfunction of the ECM <M/T> or PCM <A/T>.

OVERVIEW OF TROUBLESHOOTING

- DTC P0453 can be set by a faulty fuel tank differential pressure sensor or related circuit, or PCM 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 (TANK PRS SNSR 73). 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.

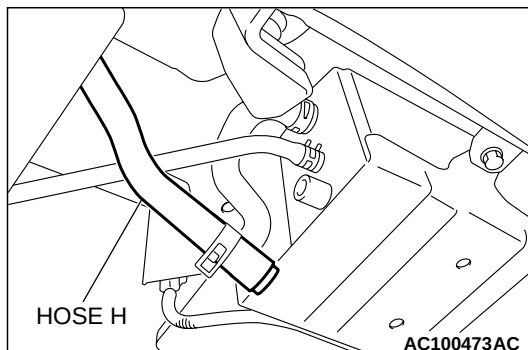
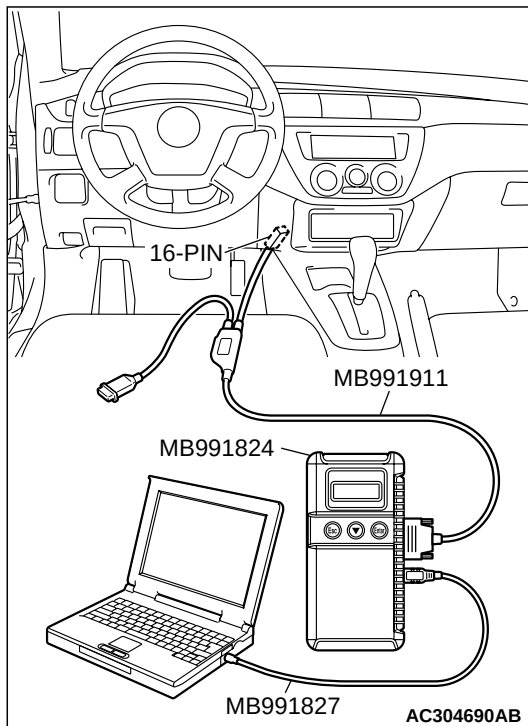
DIAGNOSIS**Required Special Tools:**

- MB991958: Scan Tool (MUT-III Sub Assembly)
 - MB991824: V.C.I.
 - MB991827: MUT-III USB Cable
 - MB991911: MUT-III Main Harness B
- MB991658: Test Harness Set

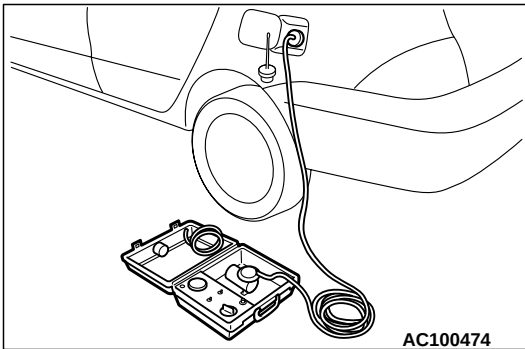
STEP 1. Using scan tool MB991958, check data list item 73: Fuel Tank Differential Pressure Sensor.**⚠ CAUTION**

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 H 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 73, Fuel Tank Differential Pressure Sensor.
 - The fuel tank pressure reading on the scan tool should be -1.5 to 1.5 kPa (-0.443 to 0.443 inHg).

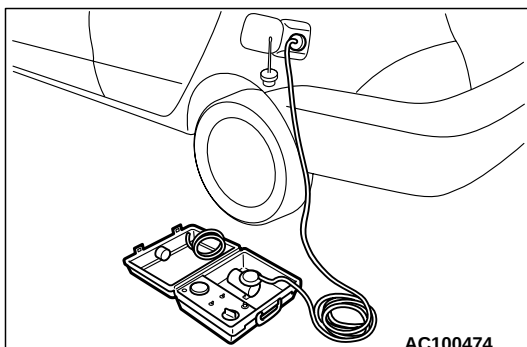
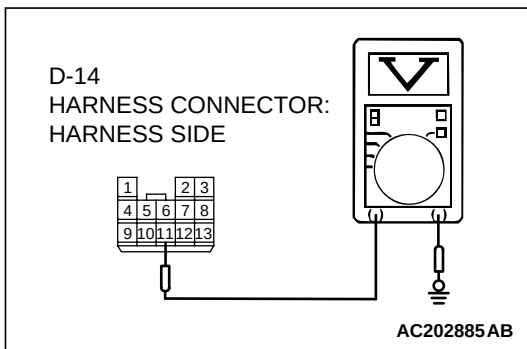
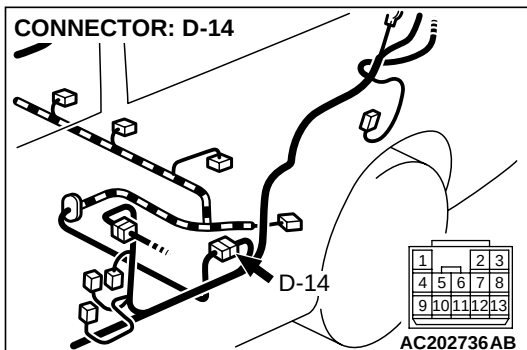
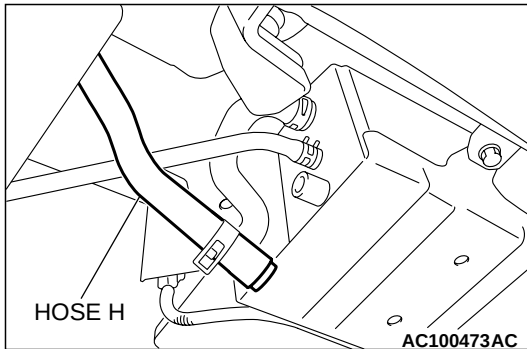


- (6) Connect an evaporative emission system pressure pump (Miller number 6872A) to the fuel filler neck and pressurize the fuel tank.
 - The fuel tank pressure reading should increase.
- (7) Turn the ignition switch to the "LOCK" (OFF) position. Then disconnect scan tool MB991958.
- (8) Disconnect the evaporative emission system pressure pump, and reinstall the fuel cap.
- (9) Connect hose H to the canister.

Q: Is the fuel tank pressure between –1.5 and 1.5 kPa (–0.443 and 0.443 inHg)?

YES : It can be assumed that this malfunction is intermittent (Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – Intermittent Malfunction [P.00-6](#)). Then go to Step 27.

NO : Go to Step 2.



STEP 2. Measure the signal voltage at intermediate connector D-14 by backprobing.

- (1) Disconnect hose H from the evaporative emission canister side, and plug the hose.
- (2) Remove the rear seat cushion. (Refer to GROUP 52A, Rear Seat P.52A-23.)
- (3) Pull up the carpet.
- (4) Turn the ignition switch to the "ON" position.
- (5) Remove the fuel cap.

- (6) Measure the voltage between connector D-14 terminal 11 and ground by backprobing.
 - The measured voltage should be between 2.0 and 3.0 volts.

- (7) Connect an evaporative emission system pressure pump (Miller number 6872A) to the fuel filler neck and pressurize the fuel tank.
 - The fuel tank pressure reading should increase.
- (8) Turn the ignition switch to the "LOCK" (OFF) position.
- (9) Disconnect the evaporative emission system pressure pump, and reinstall the fuel cap.
- (10) Connect hose H to the canister.

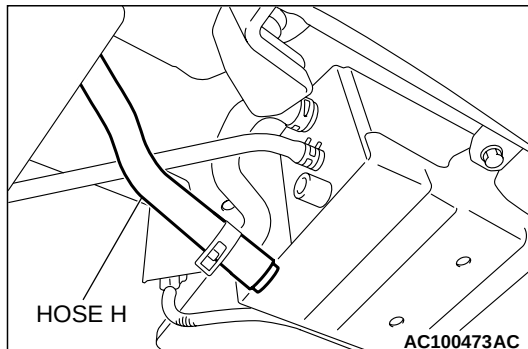
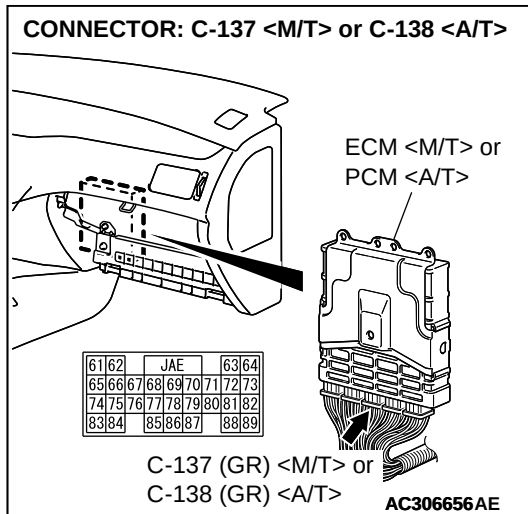
Q: Is the measured voltage between 2.0 and 3.0 volts?

YES : Go to Step 3.

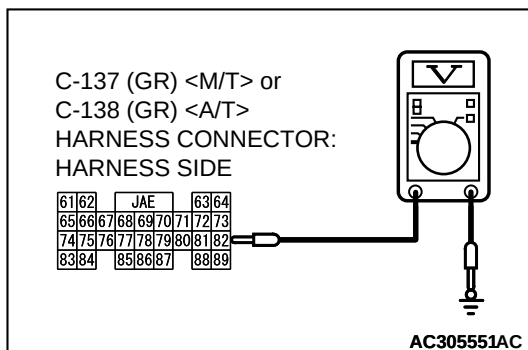
NO : Go to Step 7.

STEP 3. Measure the signal voltage at ECM connector C-137 <M/T> or PCM connector C-138 <A/T> by backprobing.

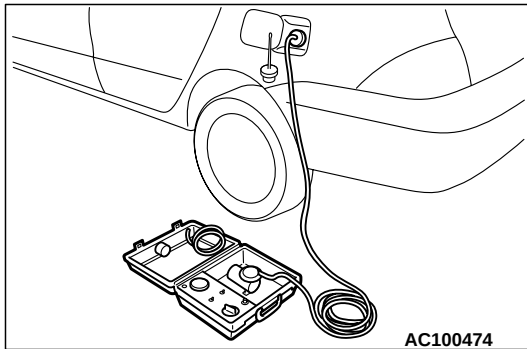
- (1) Do not disconnect ECM connector C-137 <M/T> or PCM connector C-138 <A/T>.



- (2) Disconnect hose H from the evaporative emission canister side, and plug the hose.
(3) Turn the ignition switch to the "ON" position.
(4) Remove the fuel cap.



- (5) Measure the voltage between connector C-137 <M/T> or C-138 <A/T> terminal 82 and ground by backprobing.
- The measured voltage should be between 2.0 and 3.0 volts.



- (6) Connect an evaporative emission system pressure pump (Miller number 6872A) to the fuel filler neck and pressurize the fuel tank.
 - The fuel tank pressure reading should increase.
- (7) Turn the ignition switch to the "LOCK" (OFF) position.
- (8) Disconnect the evaporative emission system pressure pump, and reinstall the fuel cap.
- (9) Connect hose G to the canister.

Q: Is the measured voltage between 2.0 and 3.0 volts?

YES : Go to Step 4.

NO : Go to Step 5.

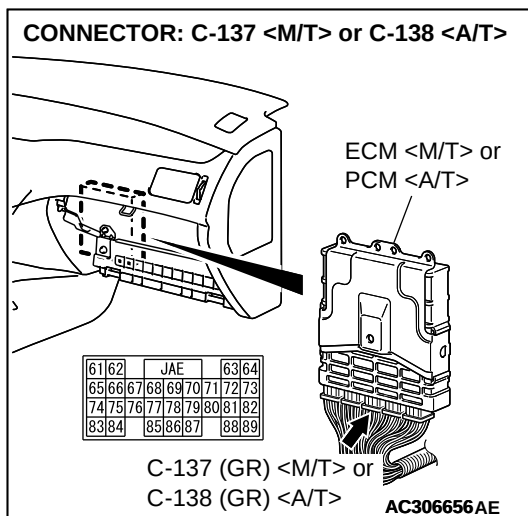
STEP 4. Check ECM connector C-137 <M/T> or PCM connector C-138 <A/T> for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 26.

NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection

[P.00E-2](#). Then go to Step 27.



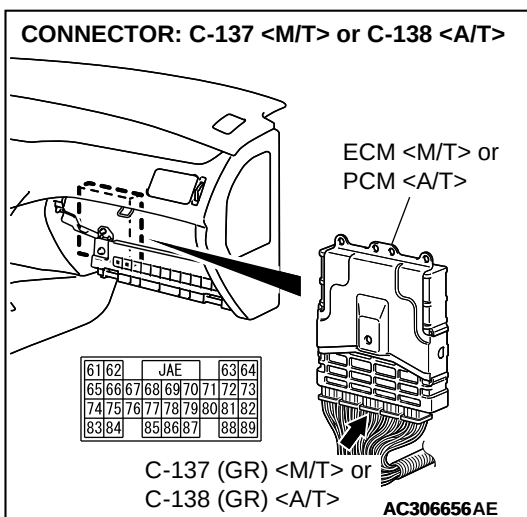
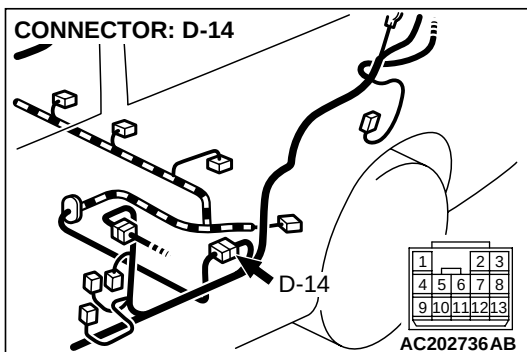
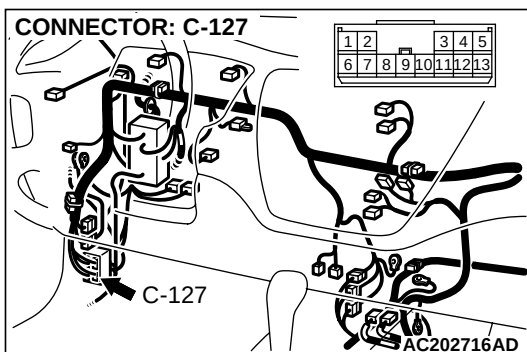
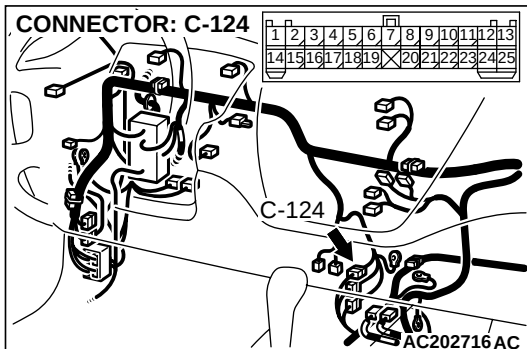
STEP 5. Check intermediate connectors C-124, C-127, D-14 and ECM connector C-137 <M/T> or PCM connector C-138 <A/T> for loose, corroded or damaged terminals, or terminals pushed back in the connector.

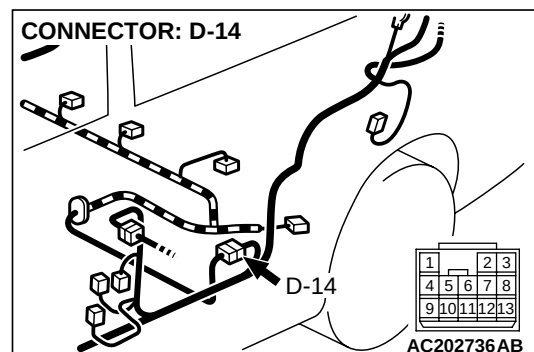
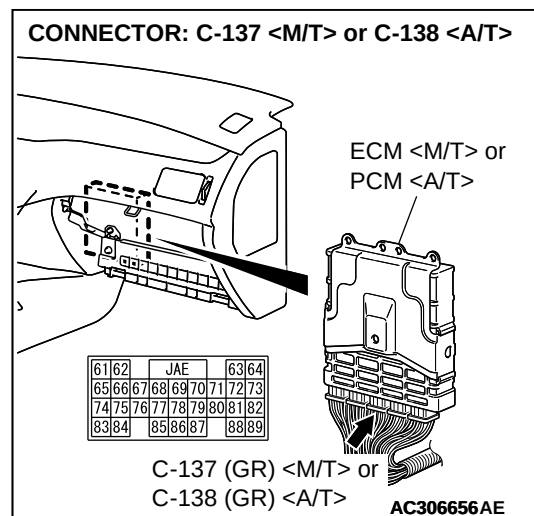
Q: Are the connectors and terminals in good condition?

YES : Go to Step 6.

NO : Repair or replace the faulty component. Refer to GROUP 00E, Harness Connector Inspection

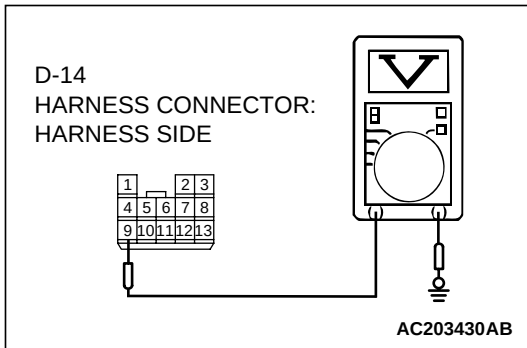
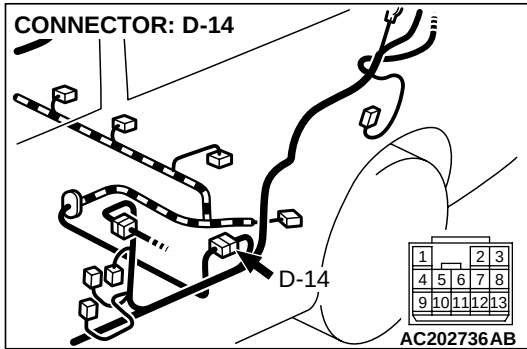
[P.00E-2](#). Go to Step 27.





STEP 6. Check the harness wire between ECM connector C-137 <M/T> or PCM connector C-138 <A/T> terminal 82 and intermediate connector D-14 terminal 11 for damage.
Q: Is the harness wire in good condition?

- 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 Malfunction [P.00-6](#). Then go to Step 27.
- NO :** Repair the damaged harness wire. Then go to Step 27.



STEP 7. Measure the 5-volt reference signal at intermediate connector D-14 by backprobing.

- (1) Do not disconnect intermediate connector D-14.
- (2) Turn the ignition switch to the "ON" position.

- (3) Measure the voltage between connector D-14 terminal 9 and ground.

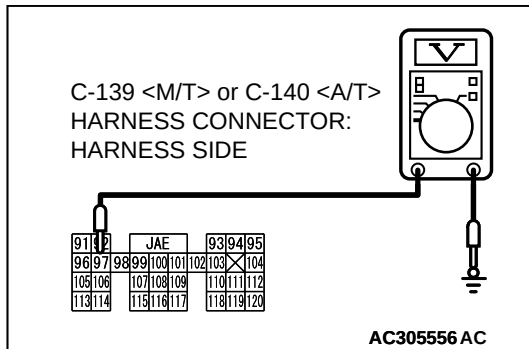
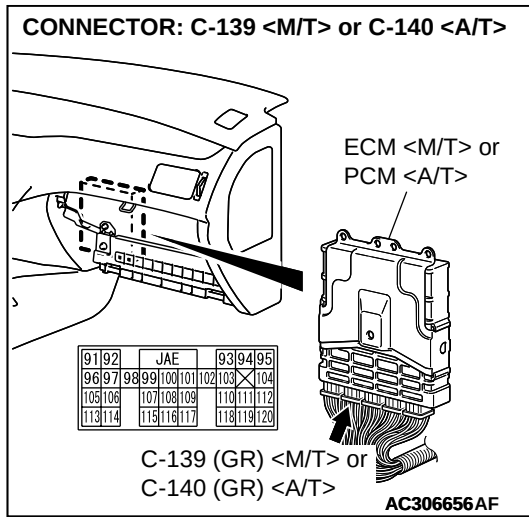
- The voltage should be between 4.9 and 5.1 volts.

- (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 11.

NO : Go to Step 8.



STEP 8. Measure the 5-volt reference signal at ECM connector C-139 <M/T> or PCM connector C-140 <A/T> by backprobing.

- (1) Do not disconnect ECM connector C-139 <M/T> or PCM connector C-140 <A/T>.
- (2) Turn the ignition switch to the "ON" position.

- (3) Measure the voltage between connector C-139 <M/T> or connector C-140 <A/T> terminal 97 and ground by backprobing.

- The measured voltage should be between 4.9 and 5.1 volts.

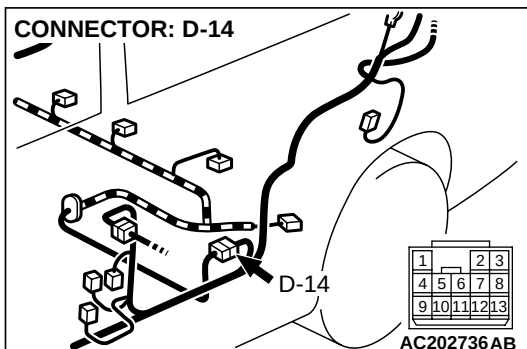
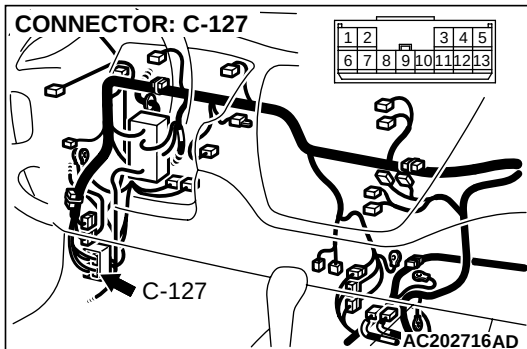
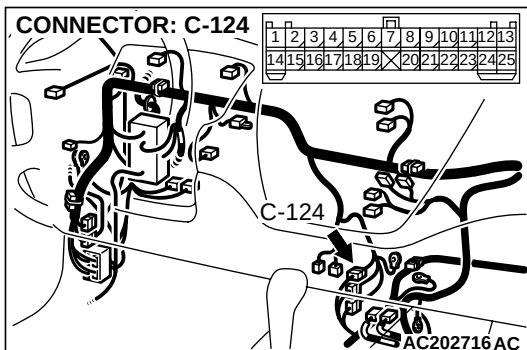
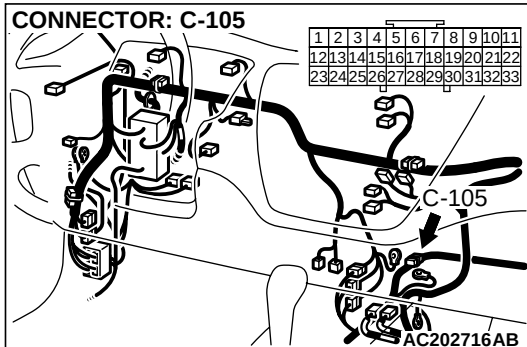
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

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

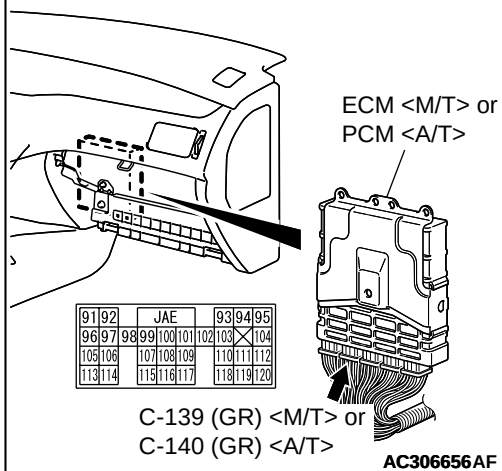
YES : Go to Step 9.

NO : Go to Step 25.

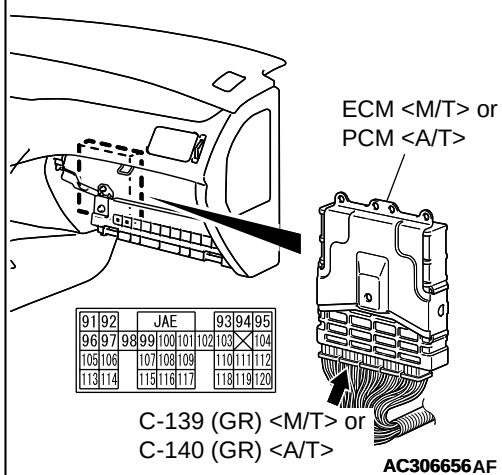
STEP 9. Check intermediate connectors C-105, C-124, C-127, and D-14 and ECM connector C-139 <M/T> or PCM connector C-140 <A/T> loose, corroded or damaged terminals, or terminals pushed back in the connector.



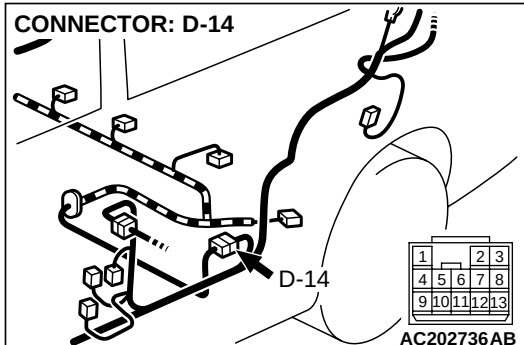
CONNECTOR: C-139 <M/T> or C-140 <A/T>

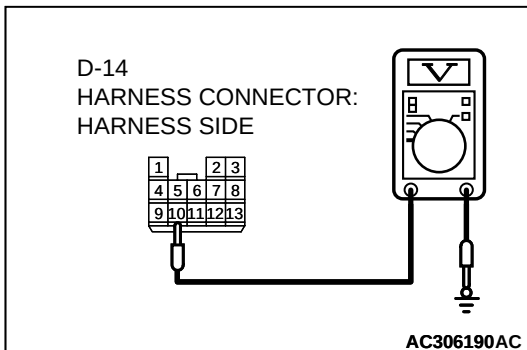
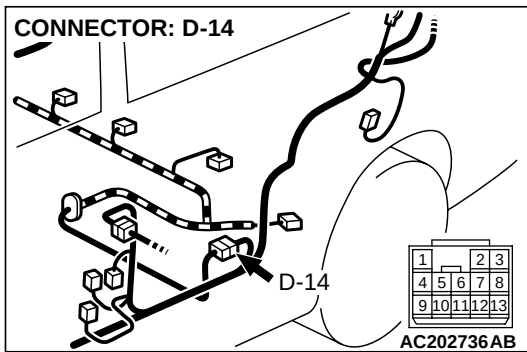
**Q: Are the connectors and terminals in good condition?****YES :** Go to Step 10.**NO :** Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection[P.00E-2](#). Then go to Step 27.**STEP 10. Check the harness wire between ECM connector C-139 <M/T> or PCM connector C-140 <A/T> terminal 97 and intermediate connector D-14 terminal 9 for damage.****Q: Is the harness wire in good condition?****YES :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to UseTroubleshooting/Inspection Service Points - How to Cope with Intermittent Malfunction [P.00-6](#). Then go to Step 27.**NO :** Repair the damaged harness wire. Then go to Step 27.

CONNECTOR: C-139 <M/T> or C-140 <A/T>



CONNECTOR: D-14





STEP 11. Check the sensor ground at intermediate connector D-14 by backprobing.

- (1) Do not disconnect connector D-14.
- (2) Turn the ignition switch to the "ON" position.

- (3) Measure the voltage between connector D-14 terminal 10 and ground by backprobing.

- The measured voltage should be 0.5 volt or less.

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

Q: Is the measured voltage 0.5 volt or less?

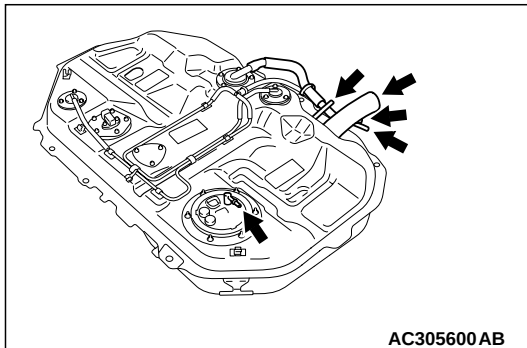
YES : Go to Step 15.

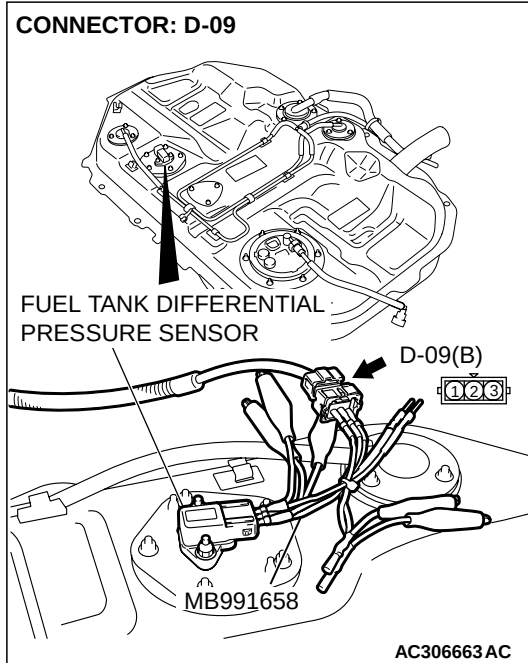
NO : Go to Step 12.

STEP 12. Check the signal voltage at fuel tank differential pressure sensor connector D-09.

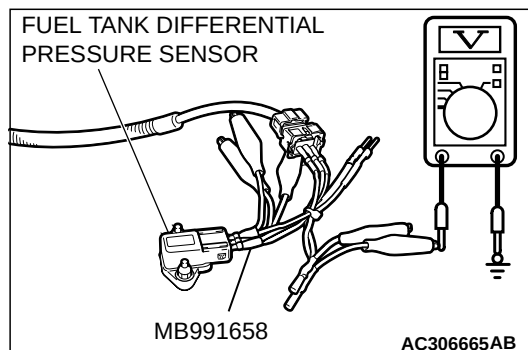
- (1) Remove the fuel tank. (Refer to GROUP 13C, Fuel Tank [P.13C-9](#).)
- (2) Plug the filler hose, fuel pump feed nipple, hose I, hose M and hose R connected to the fuel tank.

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

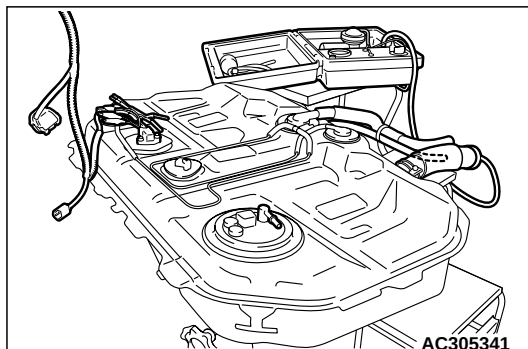




- (3) Lift the fuel tank.
- (4) Connect special tool MB991658 to both halves of connector D-09.
- (5) Turn the ignition switch to the "ON" position.



- (6) Measure the voltage between connector D-09 terminal 2 and ground.
 - The measured voltage should be 0.5 volt or less.



- (7) Connect an evaporative emission system pressure pump (Miller number 6872A) to the fuel filler neck and pressurize the fuel tank.
 - The fuel tank pressure reading should increase.
- (8) Turn the ignition switch to the "LOCK" (OFF) position.
- (9) Disconnect the evaporative emission system pressure pump.

Q: Is the measured voltage 0.5 volt or less?

YES : Go to Step 13.

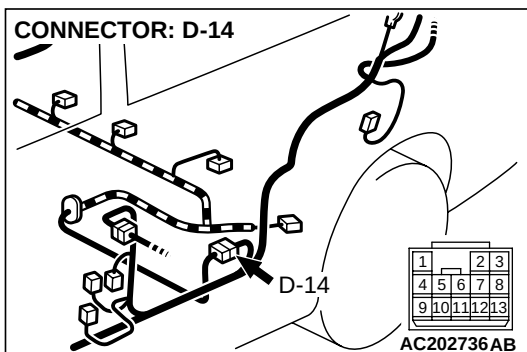
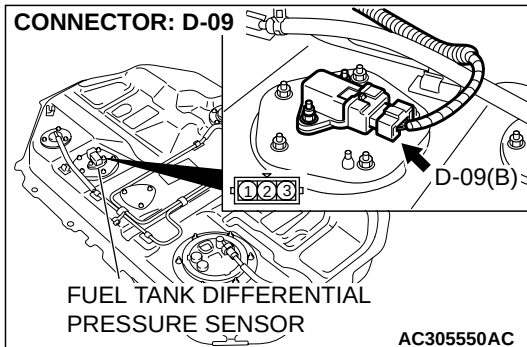
NO : Go to Step 19.

STEP 13. Check fuel tank differential pressure sensor connector D-09 and intermediate connector for D-14 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 14.

NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Reinstall the fuel tank. Refer to GROUP 13C, Fuel Tank [P.13C-9](#). Then go to Step 27.

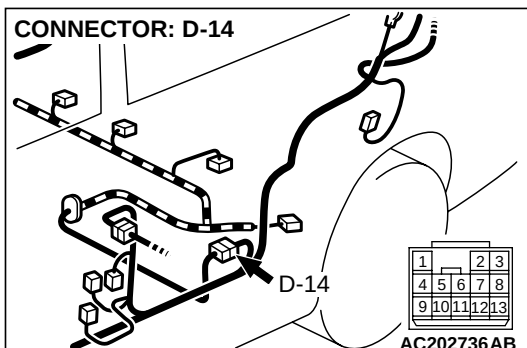
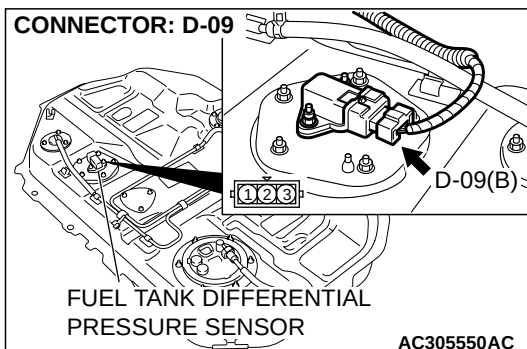


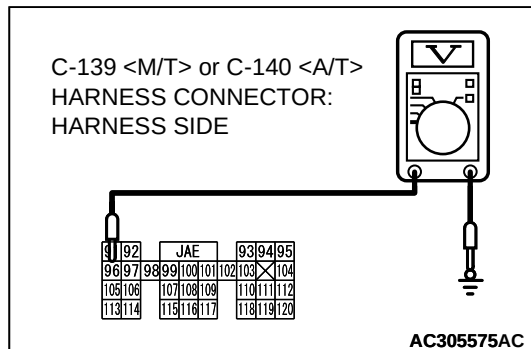
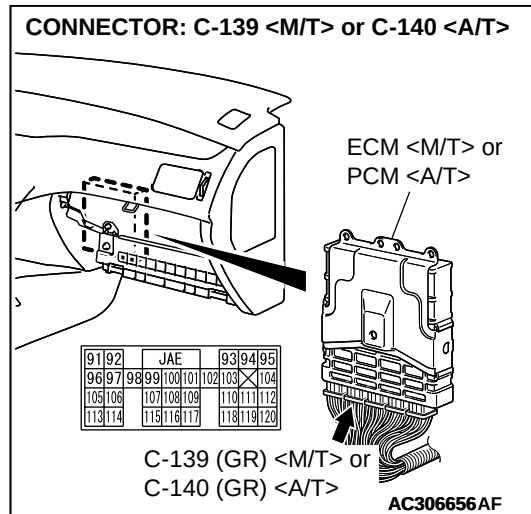
STEP 14. Check the harness wire between fuel tank differential pressure sensor connector D-09 terminal 2 and intermediate connector D-14 terminal 10 for damage.

Q: Is the harness wire in good condition?

YES : It can be assumed that this malfunction is intermittent, and reinstall the fuel tank. Refer to GROUP 13C, Fuel Tank [P.13C-9](#). Then go to Step 27.

NO : Repair the damaged harness wire, and reinstall the fuel tank. Refer to GROUP 13C, Fuel Tank [P.13C-9](#). Then go to Step 27.





STEP 15. Check the sensor ground at ECM connector C-139 <M/T> or PCM connector C-140 <A/T> by backprobing.

- (1) Do not disconnect ECM connector C-139 <M/T> or PCM connector C-140 <A/T>.
- (2) Turn the ignition switch to the "ON" position.

- (3) Measure the voltage between connector C-139 <M/T> or connector C-140 <A/T> terminal 96 and ground by backprobing.

- The measured voltage should be 0.5 volt or less.

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

Q: Is the measured voltage 0.5 volt or less?

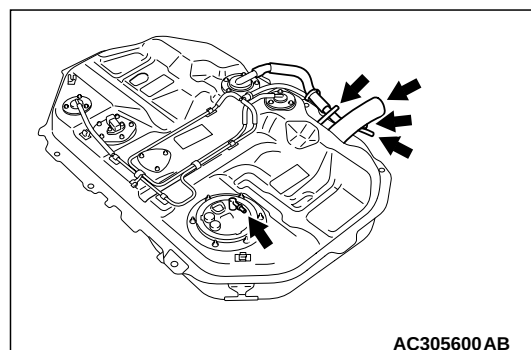
YES : Go to Step 16.

NO : Go to Step 23.

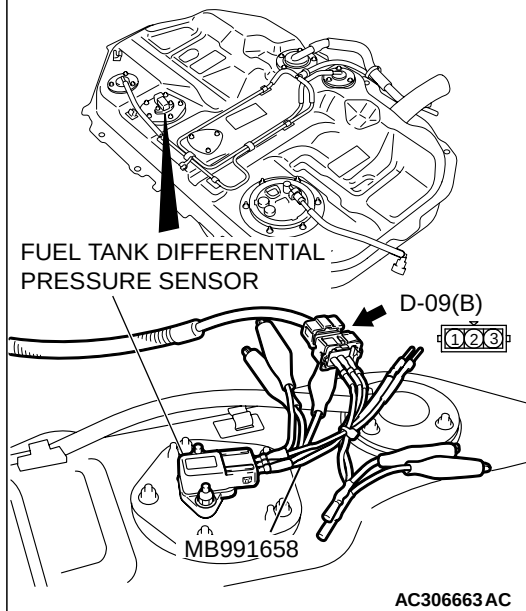
STEP 16. Check the signal voltage at fuel tank differential pressure sensor connector D-09.

- (1) Remove the fuel tank. (Refer to GROUP 13C, Fuel Tank [P.13C-9](#).)
- (2) Plug the filler hose, fuel pump feed nipple, hose I, hose M and hose R connected to the fuel tank.

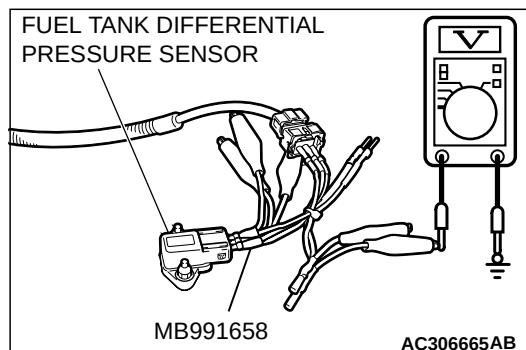
NOTE: If these items are not securely plugged here, the fuel could leak in the next step.



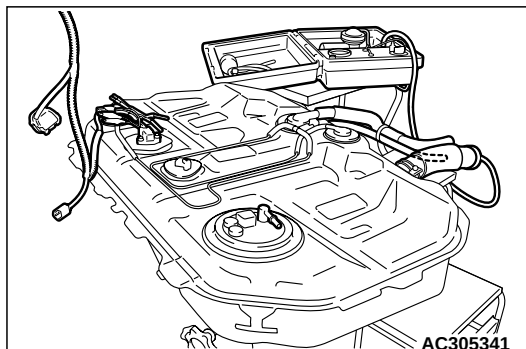
CONNECTOR: D-09



- (3) Lift the fuel tank.
- (4) Connect special tool MB991658 to both halves of connector D-09.
- (5) Turn the ignition switch to the "ON" position.



- (6) Measure the voltage between connector D-09 terminal 1 and ground.
 - The measured voltage should be between 2.0 and 3.0 volts.

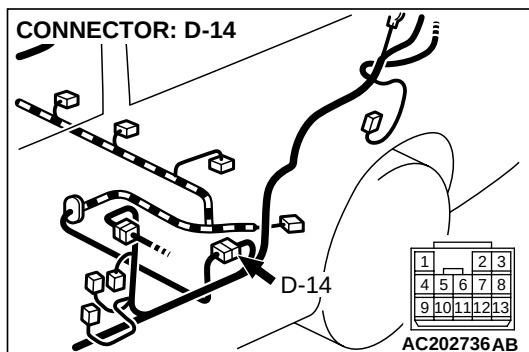
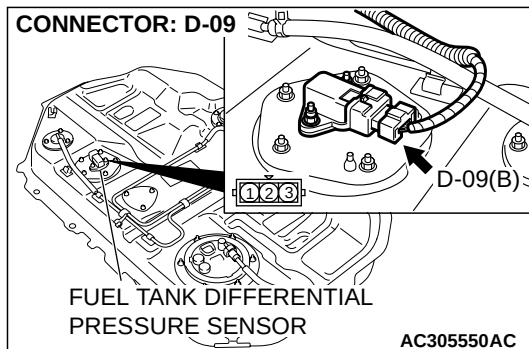


- (7) Connect an evaporative emission system pressure pump (Miller number 6872A) to the fuel filler neck and pressurize the fuel tank.
 - The fuel tank pressure reading should increase.
- (8) Turn the ignition switch to the "LOCK" (OFF) position.
- (9) Disconnect the evaporative emission system pressure pump.

Q: Is the measured voltage between 2.0 and 3.0 volts?

YES : Go to Step 17.

NO : Go to Step 20.

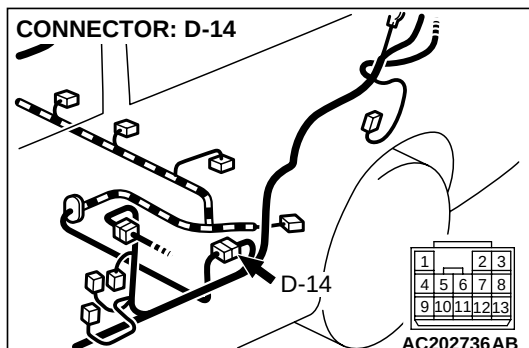
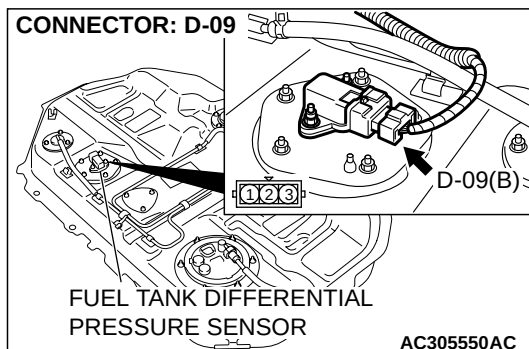


STEP 17. Check fuel tank differential pressure sensor connector D-09 and intermediate connector D-14 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 18.

NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Reinstall the fuel tank. Refer to GROUP 13C, Fuel Tank [P.13C-9](#). Then go to Step 27.

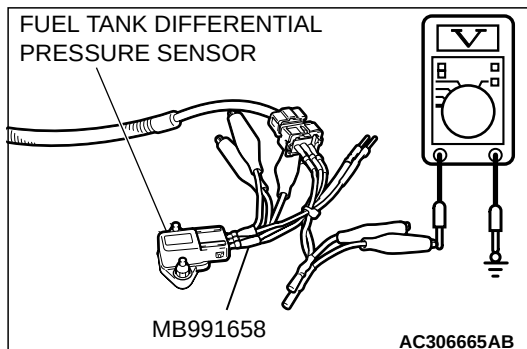
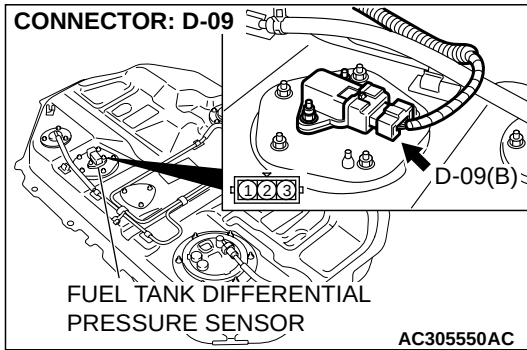


STEP 18. Check the harness wire between fuel tank differential pressure sensor connector D-09 terminal 1 and intermediate connector D-14 terminal 11 for damage.

Q: Is the harness wire in good condition?

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 Malfunction [P.00-6](#). Reinstall the fuel tank. Refer to GROUP 13C, Fuel Tank [P.13C-9](#). Then go to Step 27.

NO : Repair or replace the harness wire, and reinstall the fuel tank. Refer to GROUP 13C, Fuel Tank [P.13C-9](#). Then go to Step 27.



STEP 19. Measure the 5-volt reference signal at fuel tank differential pressure sensor connector D-09.

- (1) Turn the ignition switch to the "ON" position.
- (2) Measure the voltage between connector D-09 terminal 3 and ground.

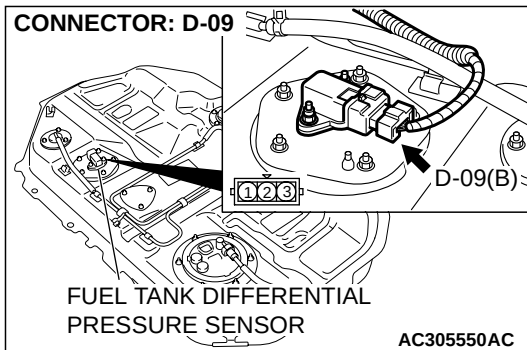
- The voltage should be between 4.9 and 5.1 volts.

- (3) 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 20.

NO : Go to Step 21.

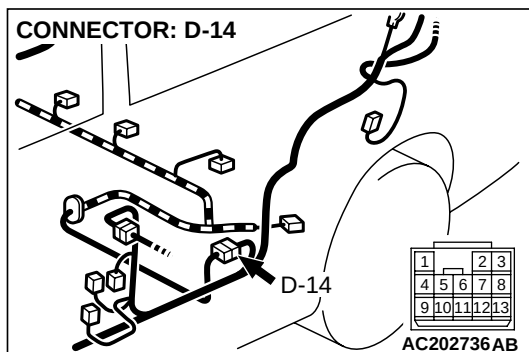
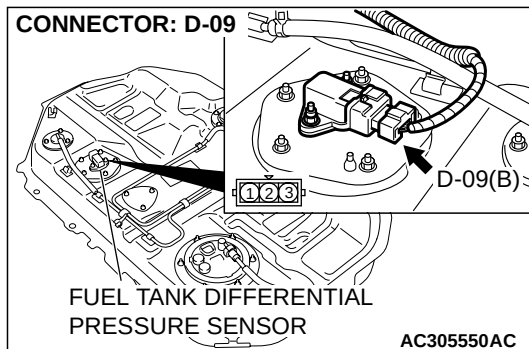


STEP 20. Check fuel tank differential pressure sensor connector D-09 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Replace the fuel tank differential pressure sensor, and reinstall the fuel tank. Refer to GROUP 13C, Fuel Tank [P.13C-9](#). Then go to Step 27.

NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Reinstall the fuel tank. Refer to GROUP 13C, Fuel Tank [P.13C-9](#). Then go to Step 27.



STEP 21. Check fuel tank differential pressure sensor connector D-09 and intermediate connector D-14 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

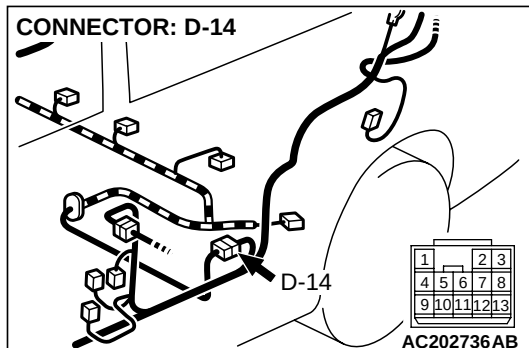
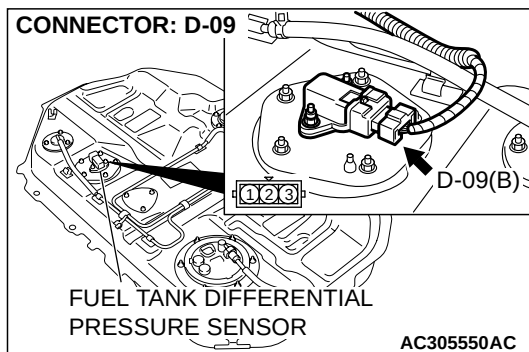
Q: Are the connectors and terminals in good condition?

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 Malfunction [P.00-6](#). Reinstall the fuel tank. Refer to GROUP 13C, Fuel Tank [P.13C-9](#). Then go to Step 22.

NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Reinstall the fuel tank. Refer to GROUP 13C, Fuel Tank [P.13C-9](#). Then go to Step 27.



STEP 22. Check the harness wire between fuel tank differential pressure sensor connector D-09 terminal 3 and intermediate connector D-14 terminal 9 for damage.

Q: Is the harness wire in good condition?

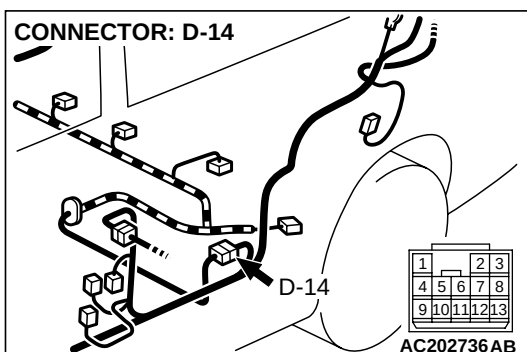
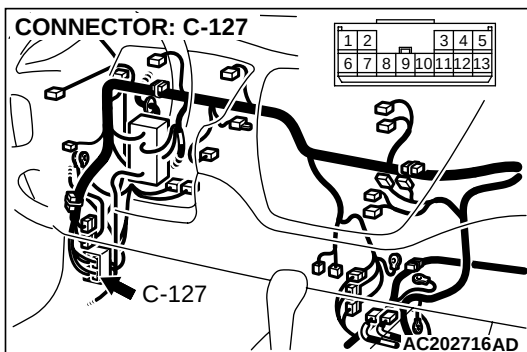
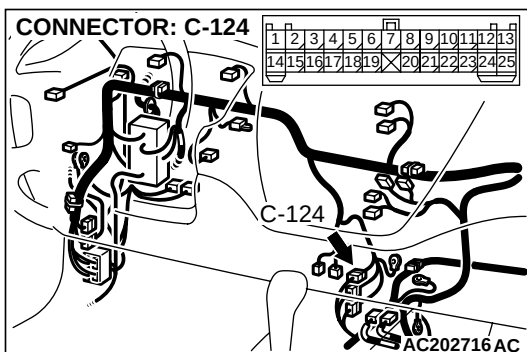
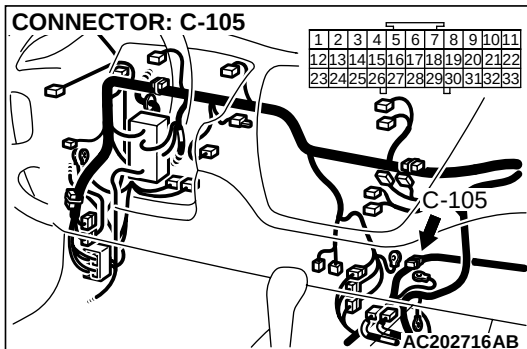
YES : It can be assumed that this malfunction is intermittent.

Refer to GROUP 00, How to Use

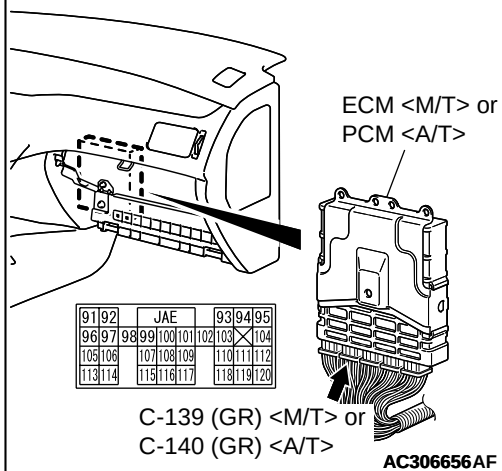
Troubleshooting/Inspection Service Points - How to Cope with Intermittent Malfunction [P.00-6](#). Reinstall the fuel tank. Refer to GROUP 13C, Fuel Tank [P.13C-9](#). Then go to Step 27.

NO : Repair or replace the harness wire, and reinstall the fuel tank. Refer to GROUP 13C, Fuel Tank [P.13C-9](#). Then go to Step 27.

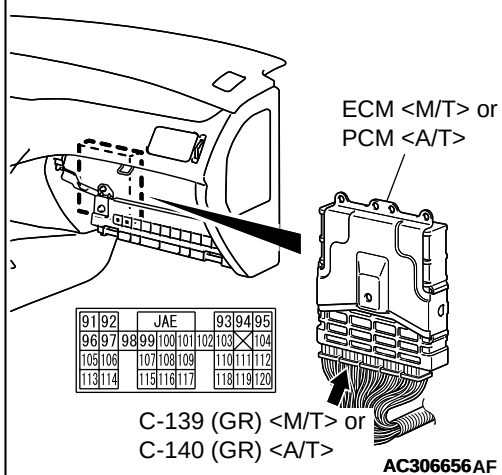
STEP 23. Check intermediate connectors C-105, C-124, C-127, and D-14, and ECM connector C-139 <M/T> or PCM connector C-140 <A/T> for loose, corroded or damaged terminals, or terminals pushed back in the connector.



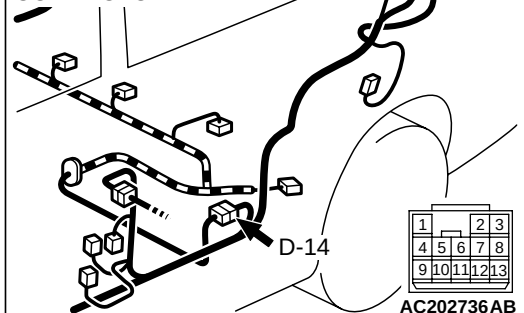
CONNECTOR: C-139 <M/T> or C-140 <A/T>

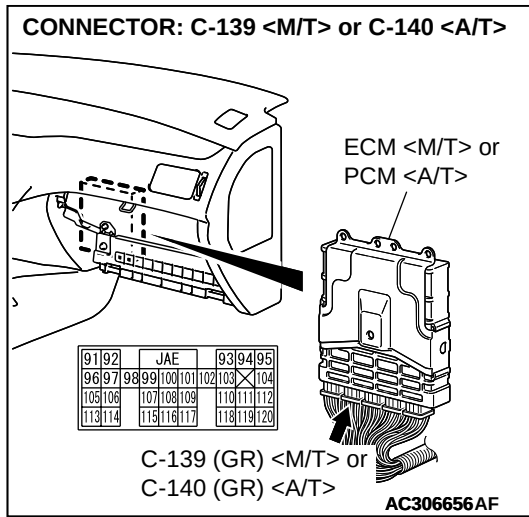
**Q: Are the connectors and terminals in good condition?****YES :** Go to Step 24.**NO :** Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection[P.00E-2](#). Then go to Step 27.**STEP 24. Check the harness wire between ECM connector C-139 <M/T> or PCM connector C-140 <A/T> terminal 96 and intermediate connector D-14 terminal 10 for damage.****Q: Is the harness wire in good condition?****YES :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to UseTroubleshooting/Inspection Service Points - How to Cope with Intermittent Malfunction [P.00-6](#). Then go to Step 27.**NO :** Repair the damaged harness wire. Then go to Step 27.

CONNECTOR: C-139 <M/T> or C-140 <A/T>



CONNECTOR: D-14





STEP 25. Check ECM connector C-139 <M/T> or PCM connector C-140 <A/T> for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 26.

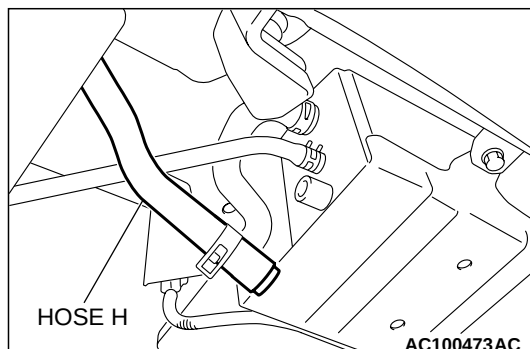
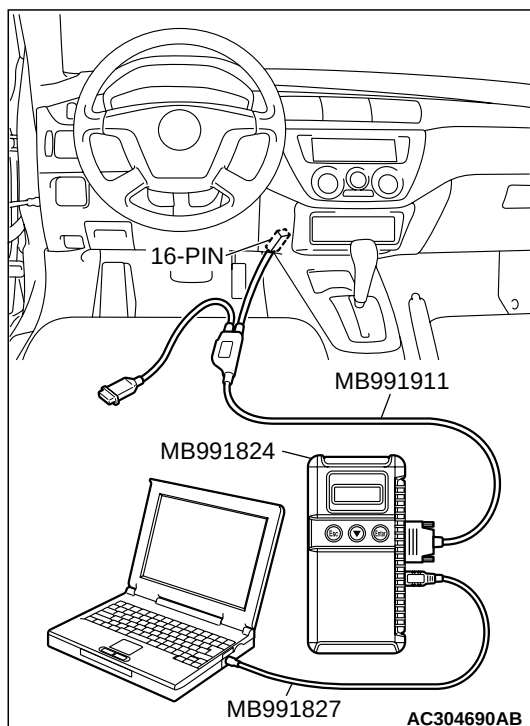
NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then go to Step 27.

STEP 26. Using scan tool MB991958, check data list item 73: Fuel Tank Differential Pressure Sensor.

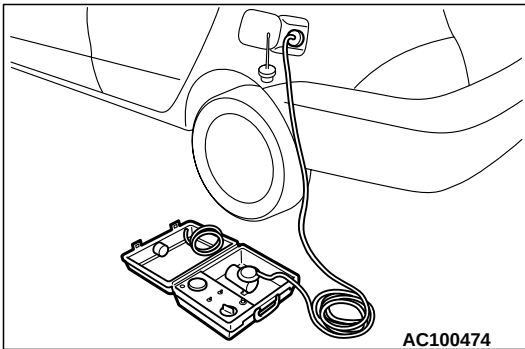
⚠ CAUTION

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 H 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 73, Fuel Tank Differential Pressure Sensor.
 - The fuel tank pressure reading on the scan tool should be -1.5 to 1.5 kPa (-0.443 to 0.443 inHg).



- (6) Connect an evaporative emission system pressure pump (Miller number 6872A) to the fuel filler neck 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) Disconnect the evaporative emission system pressure pump, and reinstall the fuel cap.
- (9) Connect hose H to the canister.

Q: Is the fuel tank pressure between -1.5 and 1.5 kPa (-0.443 and 0.443 inHg)?

YES : It can be assumed that this malfunction is intermittent (Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – Intermittent Malfunction [P.00-6](#)). Then go to Step 27.

NO : Replace the ECM <M/T> or PCM <A/T> (Refer to [P.13B-919](#)). Then go to Step 27.

STEP 27. Perform the OBD-II drive cycle.

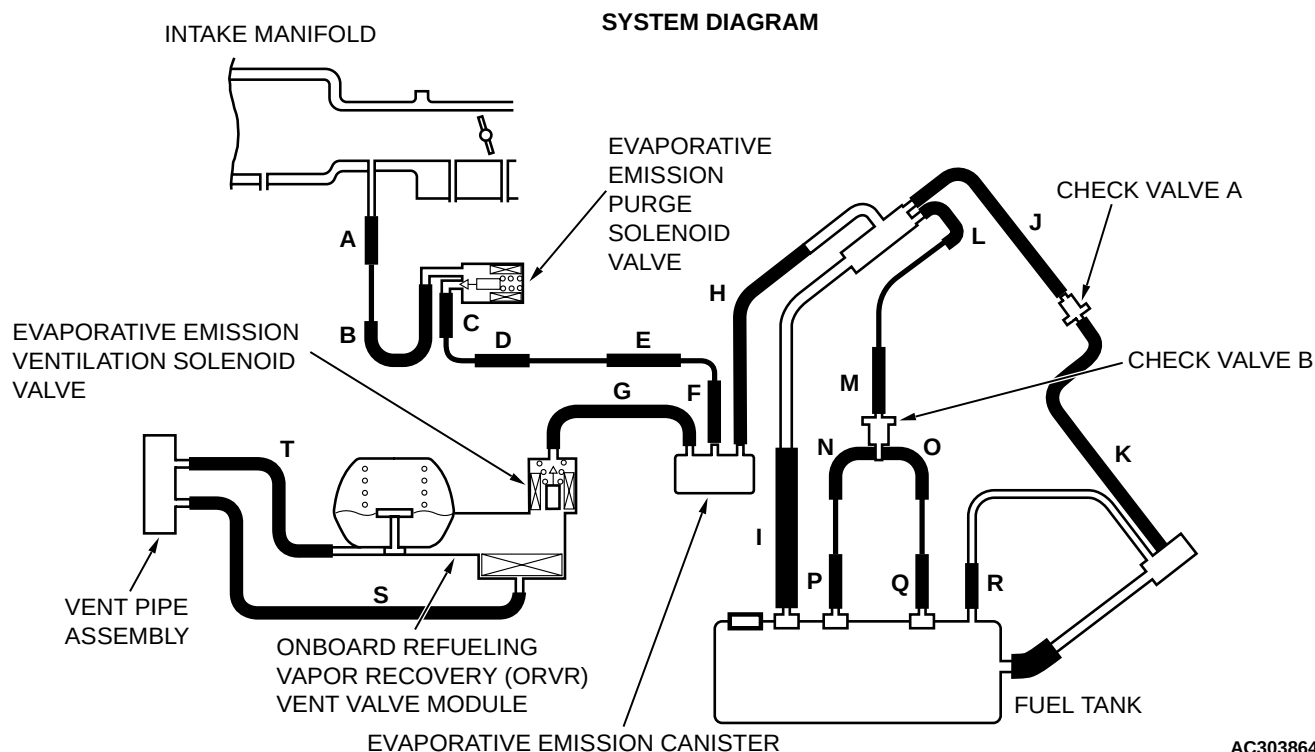
- (1) Carry out a test drive with the drive cycle pattern (Refer to Diagnostic Function – OBD-II Drive Cycle – Procedure 1 – Evaporative Emission System Leak Monitor [P.13B-6](#)).
- (2) Read the diagnostic trouble code (DTC).

Q: Is DTC P0453 set?

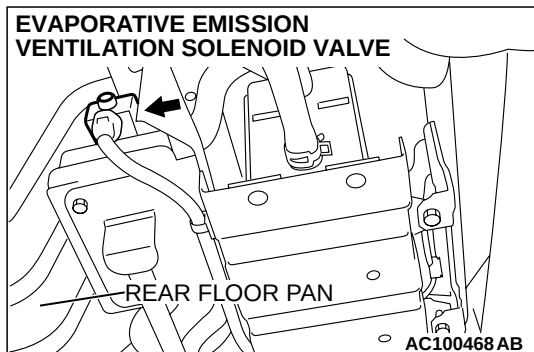
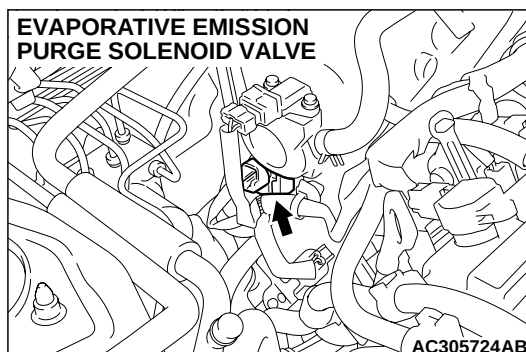
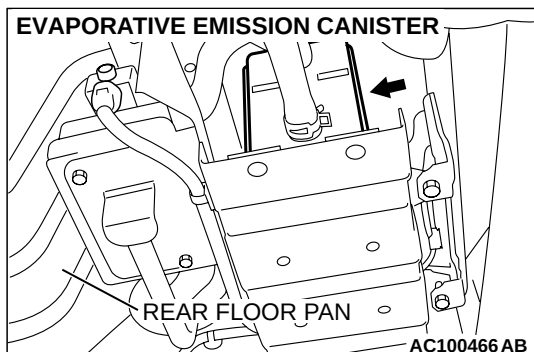
YES : Go to Step 2.

NO : The procedure is complete.

DTC P0455: Evaporative Emission Control System Leak Detected (Gross Leak)



AC303864AB



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 <M/T> or PCM <A/T> monitors and responds to these pressure/vacuum changes. If the pressure/vacuum varies from the specified range, the ECM <M/T> or PCM <A/T> will set DTC P0455.
- The ECM <M/T> or PCM <A/T> 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 <M/T> or PCM <A/T> 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)

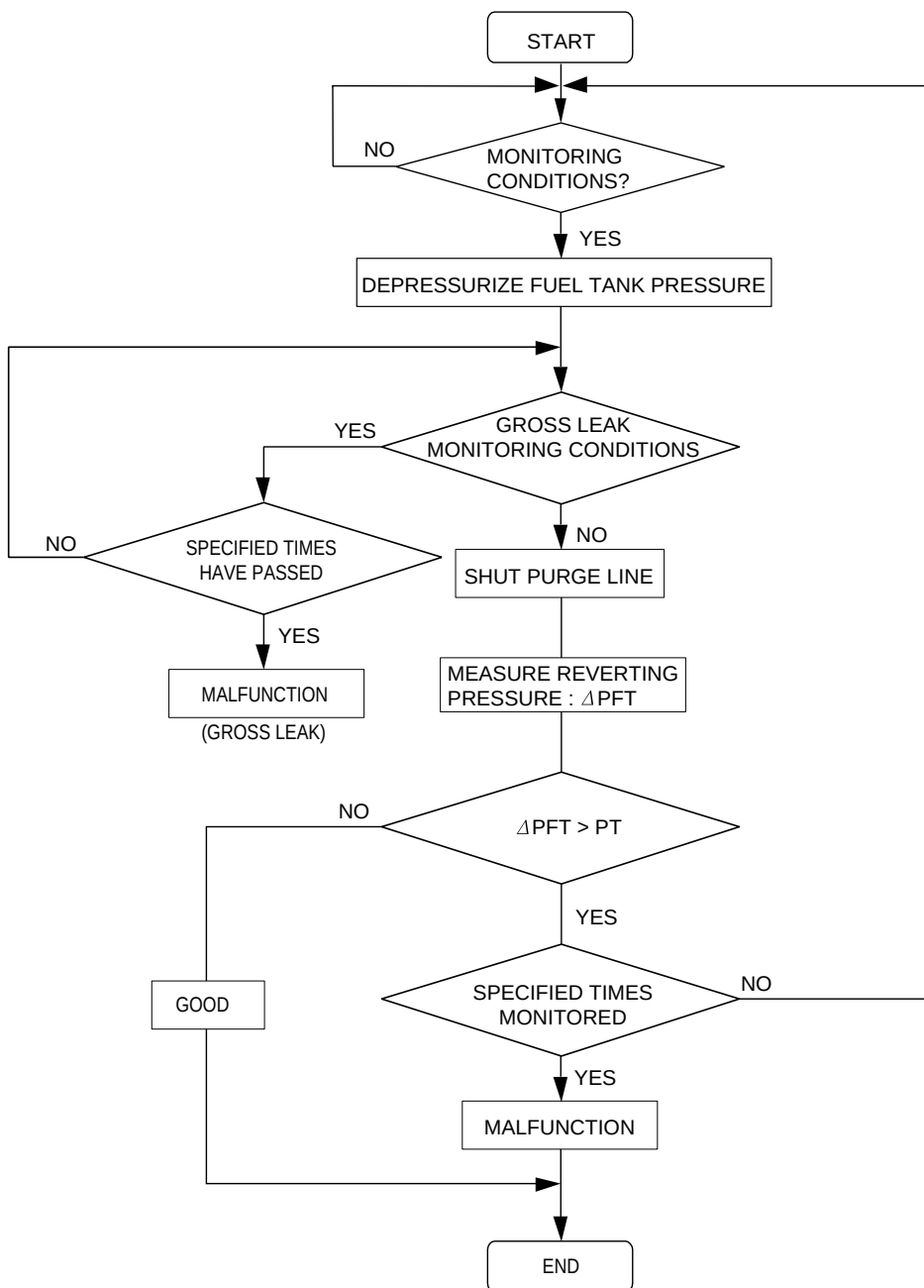
- Evaporative emission purge solenoid monitor
- Evaporative emission purge system monitor
- Fuel tank differential pressure sensor monitor
- Evaporative emission ventilation solenoid monitor
- Fuel level sensor monitor
- Fuel temperature sensor monitor

Sensor (The sensors below are determined to be normal)

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

LOGIC FLOW CHARTS (Monitor Sequence)

0.04in, 0.02in GROSS LEAK MONITOR



AC306649

DTC SET CONDITIONS

Check Conditions A: At Start up

- Intake air temperature is 36°C (97°F) or less upon engine start up.

- The engine coolant temperature is 36°C (97°F) or less upon engine start up.

Check Conditions B: For Test to Run

- The engine coolant temperature is 60°C (140°F) or greater and the fuel tank is 15 – 40 percent full.
- The engine coolant temperature is 20°C (68°F) or greater and the fuel tank is 40 – 85 percent full.
- The engine speed is greater than or equal to 1,600 r/min.
- Barometric pressure is greater than 76 kPa (11 psi).
- Volumetric efficiency is between 20 and 80 percent.
- The fuel temperature is 36°C (97°F) or less.
- The fuel tank differential pressure sensor output voltage is 1 – 4 volts.

Check Conditions C: For Test to Stop

- The intake air temperature is greater than 5°C (41°F).
- When the evaporative emission purge solenoid and evaporative emission ventilation solenoid are closed, the pressure in the fuel tank rises to 451 Pa (0.065 psi) or less and the amount of remaining fuel is 15 – 40 percent of capacity upon engine start up.
- When the evaporative emission purge solenoid and evaporative emission ventilation solenoid are closed, the pressure in the fuel tank rises to 324 Pa (0.047 psi) or less and the amount of remaining fuel is 40 – 85 percent of capacity upon engine start up.

- 10 seconds have elapsed from the start of the previous monitoring.
- Monitoring time: 170 seconds.

Judgment Criteria

- The fuel tank internal pressure is 2kPa (0.29 psi) or more after the evaporative emission purge solenoid valve 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 – Procedure 1 – Evaporative Emission System Leak Monitor [P.13B-6](#).

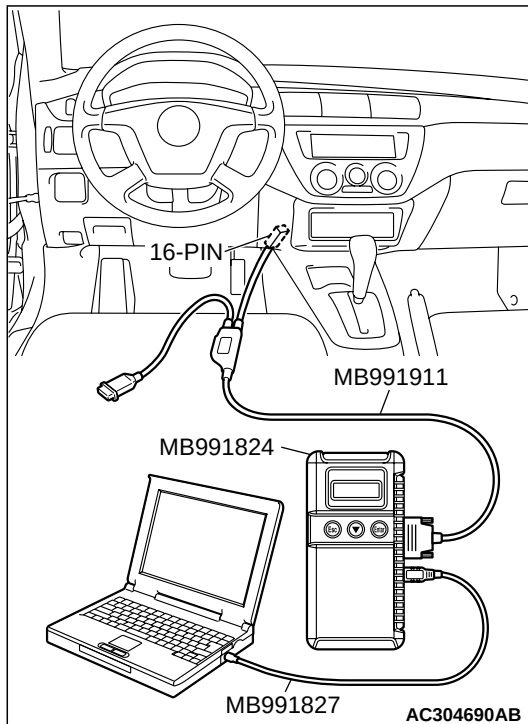
TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)

- 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 (MUT-III Sub Assembly)
 - MB991824: V.C.I.
 - MB991827: MUT-III USB Cable
 - MB991911: MUT-III Main Harness B



STEP 1. Using scan tool MB991958, check the EVAP 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 <M/T> or PCM <A/T> will automatically increase the engine speed to 1,600 r/min or greater. Check that the transaxle is set to "neutral" <M/T> or "P" <A/T> 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-31](#). If no other DTC's have been set, then 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.

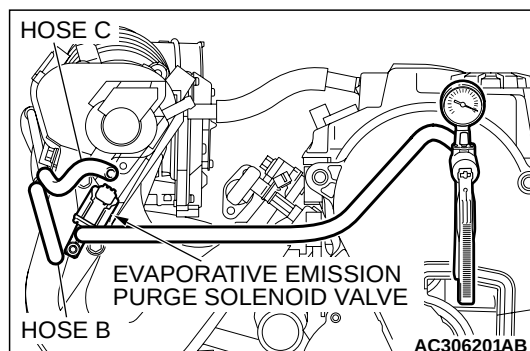
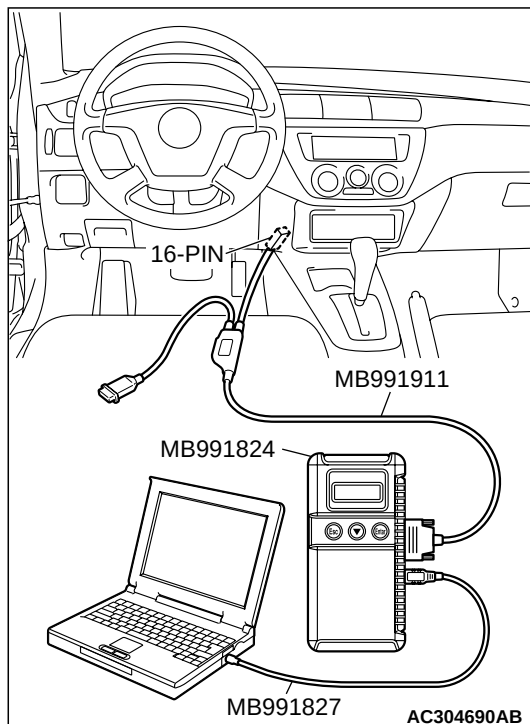
NO <"Evap Leak Mon. Discontinued. Retest again from the first" is displayed on scan tool MB991958.> : The EVAP monitor has been interrupted during the test. Turn the ignition switch to the "LOCK" (OFF) position once, and repeat the monitoring from Step 1.

STEP 2. Using scan tool MB991958, check actuator test item 08: Evaporative Emission Purge Solenoid Valve.

⚠ 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 hoses B and C from the evaporative emission purge solenoid valve side, and connect the hand vacuum pump to the evaporative emission purge solenoid valve instead of hose C.

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

(4) Set scan tool MB991958 to actuator test mode.

- Item 08: Evaporative Emission Purge Solenoid Valve.
 - When the evaporative emission purge solenoid valve is operated, apply a pressure on the hand vacuum pump and confirm that air is blown from the other side nipple.

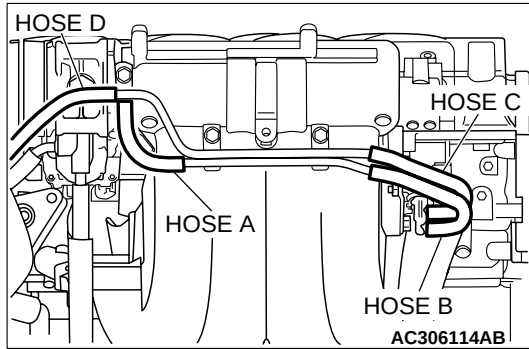
(5) Turn the ignition switch to the "LOCK" (OFF) position.

(6) Disconnect the hand vacuum pump, and connect hoses B and C to the evaporative emission purge solenoid valve.

Q: Is the solenoid valve in good condition?

YES : Go to Step 3.

NO : Replace the evaporative emission purge solenoid valve. Go to Step 19.



STEP 3. Check for leaks and clogging in evaporative emission hoses A through D.

Q: Are the hoses in good condition?

YES : Go to Step 4.

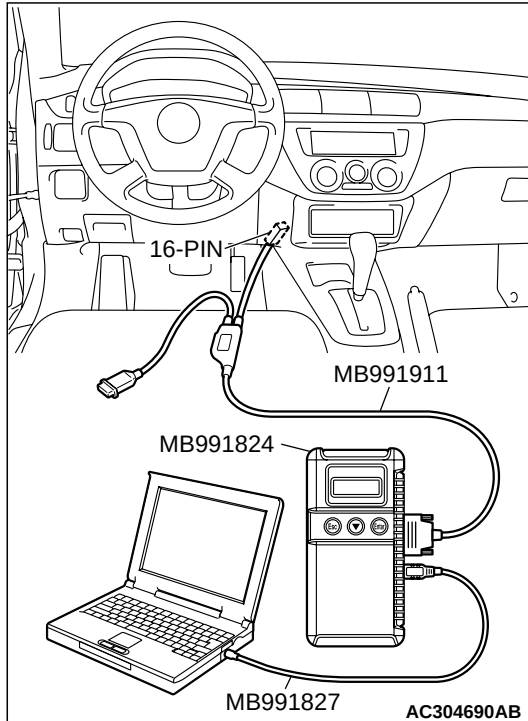
NO : Replace the damaged hose. Go to Step 19.

STEP 4. Using scan tool MB991502, check data list item 29: Evaporative emission ventilation solenoid.

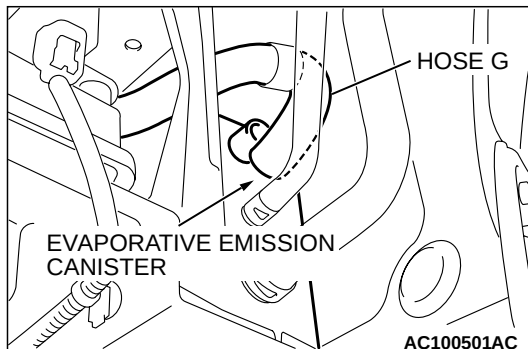
⚠ CAUTION

To prevent damage to scan tool MB991502, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991502.

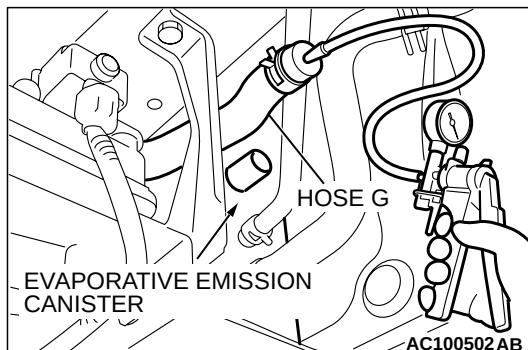
(1) Connect scan tool MB991502 to the data link connector.



(2) Disconnect hose G from the evaporative emission Ventilation solenoid.



(3) Connect a hand vacuum pump to the nipple of the evaporative emission ventilation solenoid from which the hose was disconnected.

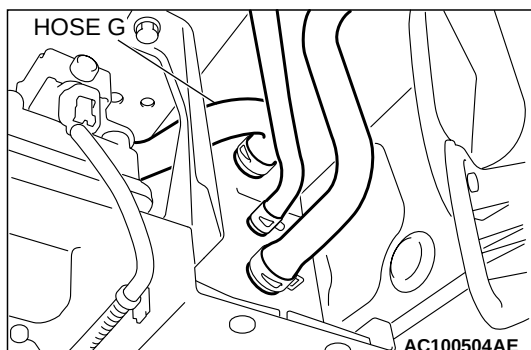


- (4) Turn the ignition switch to the "ON" position.
- (5) Set scan tool MB991958 to actuator test mode.
 - Item 29: Evaporative Emission Ventilation Solenoid.
 - While the evaporative emission ventilation solenoid is activated, operate the hand vacuum pump and confirm that the solenoid holds vacuum.
- (6) Turn the ignition switch to the "LOCK" (OFF) position and disconnect scan tool MB991958.
- (7) Disconnect the hand vacuum pump, and connect hose G to the evaporative emission ventilation solenoid.

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 [P.17-230](#)). Then go to Step 19.



STEP 5. Check for leaks and clogging in the evaporative emission hose G.

Perform a vacuum test using a hand vacuum pump on hose G.

Q: Is the hose in good condition?

YES : Go to Step 6.

NO : Replace the damaged hose. Go to Step 19.

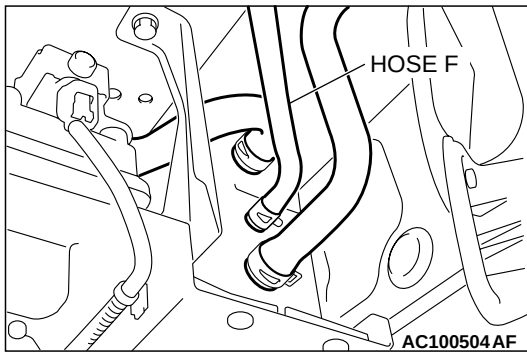
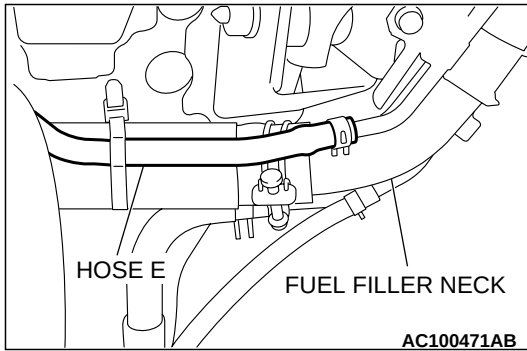
STEP 6. Check for leaks and clogging in evaporative emission hoses E through F.

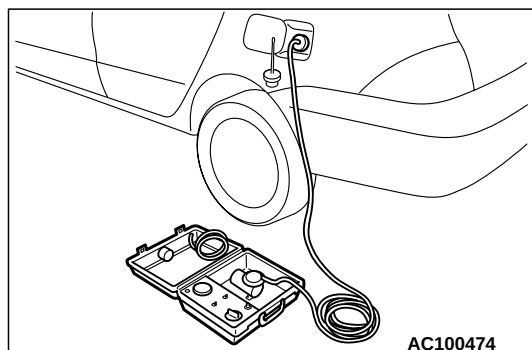
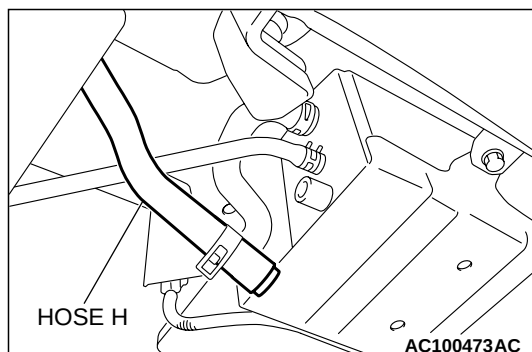
Perform a vacuum test using a hand vacuum pump on hoses E through F.

Q: Are the hoses in good condition?

YES : Go to Step 7.

NO : Replace the damaged hose. Go to Step 19.



**STEP 7. Pressure test for leaks in evaporative system lines from hose H through the fuel tank to hose R.**

- (1) Disconnect hose H from the canister, and plug hose H securely.
- (2) Confirm that the evaporative emission system pressure pump (Miller number 6872A) is operating properly. Perform the self-test as described in the manufacturer's instructions.

- (3) Connect the evaporative emission system pressure pump to the fuel filler neck.
- (4) 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.

- (5) Disconnect the evaporative emission system pressure pump, and reinstall the fuel cap.
- (6) Connect hose H to the canister.

Q: Is the evaporative emission line free of leaks?

YES : Go to Step 13.

NO : Go to Step 8.

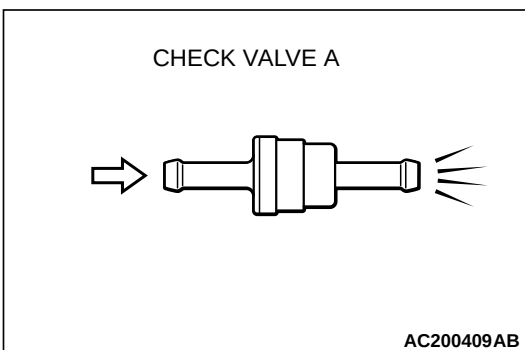
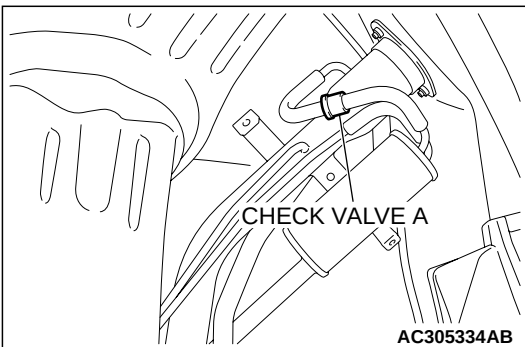
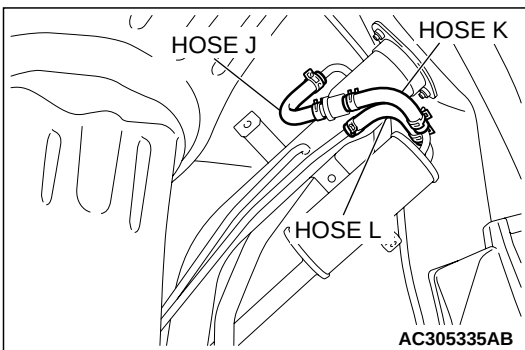
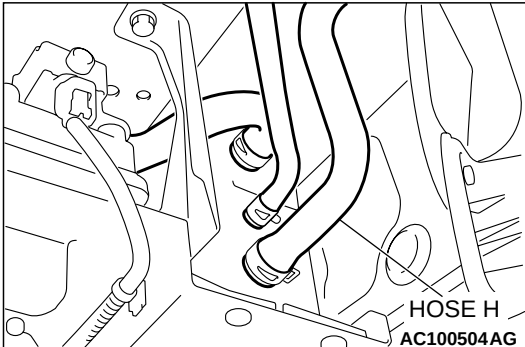
STEP 8. Check for vacuum leaks in evaporative emission system hoses H, J, K and L.

- (1) Remove the fuel filler neck protector (Refer to GROUP 13C, Fuel Tank [P.13C-9](#)).
- (2) Perform a leakage test with a hand vacuum pump on each hose from hoses H, J, K and L.

Q: Do the hoses hold vacuum?

YES : Go to Step 9.

NO : Replace the damaged hose, and reinstall the fuel filler neck protector (Refer to GROUP 13C, Fuel Tank [P.13C-9](#)). Go to Step 19.



STEP 9. Test check valve A.

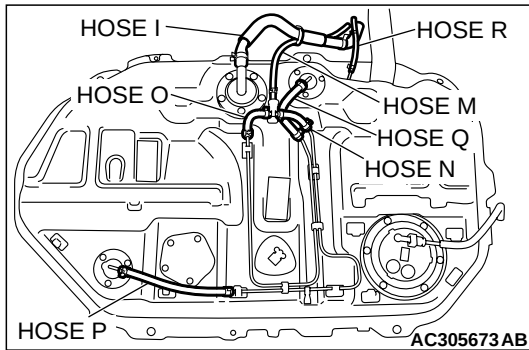
- (1) Check valve A is a one-way check valve.

- (2) Check valve A should allow air to flow in only one direction.

Q: Does check valve A allow air to pass in one direction only?

YES : Go to Step 10.

NO : Replace check valve A, and reinstall the fuel filler neck protector (Refer to GROUP 13C, Fuel Tank [P.13C-9](#)). Go to Step 19.



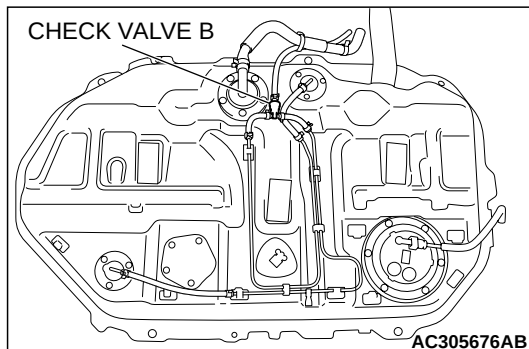
STEP 10. Check for leaks in evaporative emission hoses I, M, N, O, P, Q and R.

- (1) Remove the fuel tank (Refer to GROUP 13C, Fuel Tank [P.13C-9](#)).
- (2) Perform a leakage test with a hand vacuum pump on each hose I, M, N, O, P, Q and R.

Q: Do the hoses hold vacuum?

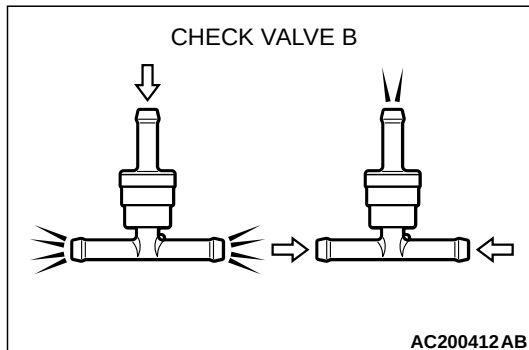
YES : Go to Step 11.

NO : Replace the damaged hose, and reinstall the fuel tank (Refer to GROUP 13C, Fuel Tank [P.13C-9](#)). Then go to Step 19.



STEP 11. Test check valve B.

- (1) Check valve B is a one-way check valve.

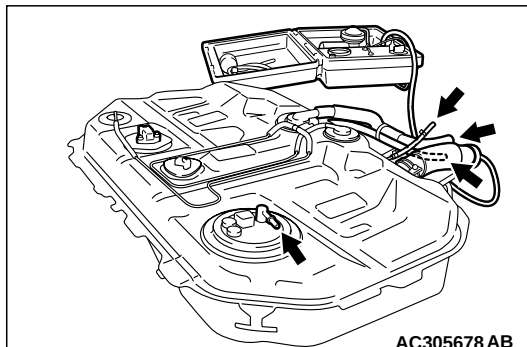
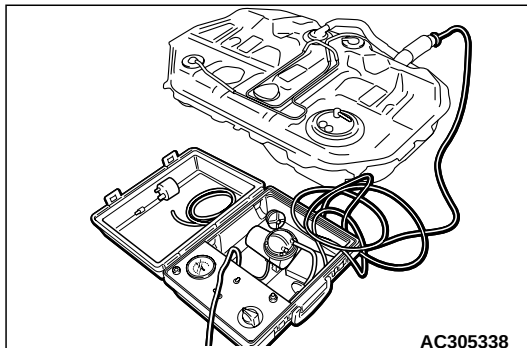
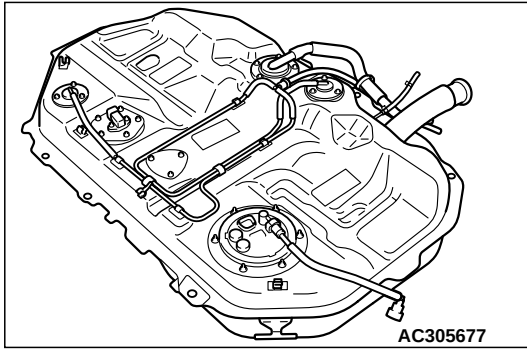


- (2) Check valve B should allow air to flow in only one direction.

Q: Does check valve B allow air to pass in one direction only?

YES : Go to Step 12.

NO : Replace check valve B, and reinstall the fuel tank and the fuel filler neck protector (Refer to GROUP 13C, Fuel Tank [P.13C-9](#)). Then go to Step 19.



STEP 12. 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 assembly and the differential pressure sensor installation in the fuel tank.

- (2) Connect the evaporative emission system pressure pump (Miller number 6872A) to the filler hose.

- (3) Plug the fuel pump feed nipple, hose I, hose Q and hose M connected to the fuel tank.

NOTE: If these items are not securely plugged here, 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.

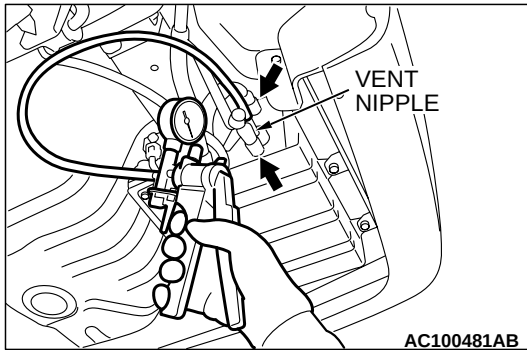
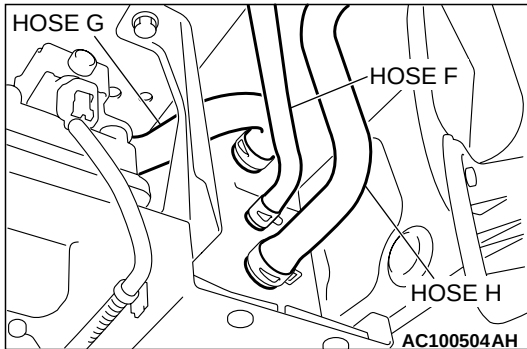
Q: Is any leaks found?

YES <When there is a leak from the attachment points of the fuel pump assembly, fuel tank differential pressure sensor, leveling valve or fuel tank rollover valve.> :

Reassemble the leaked parts and check again that there are no leaks. Then reinstall the fuel tank (Refer to GROUP 13C, Fuel Tank [P.13C-9](#)). Then go to Step 19 .

YES <When there is a leak from the fuel tank.> : Replace the fuel tank (Refer to GROUP 13C, Fuel Tank [P.13C-9](#)). Then go to Step 19.

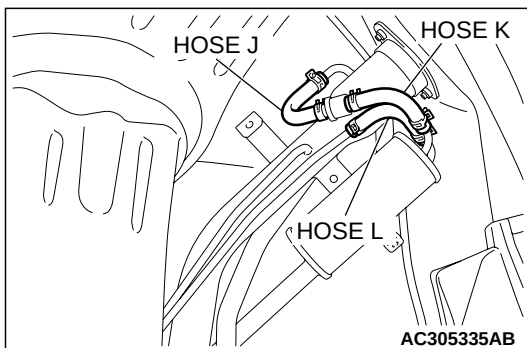
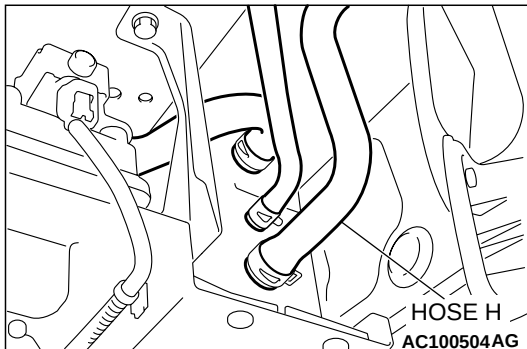
NO : When there is no leak, reinstall the fuel tank (Refer to GROUP 13C, Fuel Tank [P.13C-9](#)). Then go to Step 18.

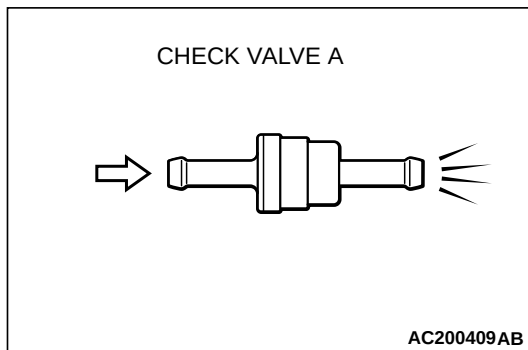
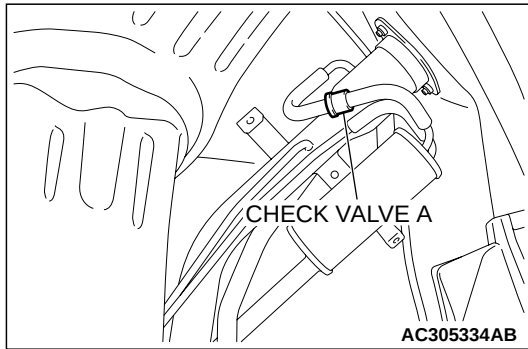
**STEP 13. Check the evaporative emission canister for leaks and clogging.**

- (1) Disconnect hoses F, G and H from the canister side, and connect a hand vacuum pump to the canister instead of hose F, 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 connect hoses F, G and H to the canister.

Q: Is the evaporative emission canister in good condition?**YES :** Go to Step 14.**NO :** Replace the canister (Refer to GROUP 17, Evaporative Emission Canister and Fuel Tank Pressure Relief Valve P.17-230). Then go to Step 19.**STEP 14. Check for clogging in the evaporator line hoses H, J, K and L.**

- (1) Remove the fuel filler neck protector (Refer to GROUP 13C, Fuel Tank P.13C-9).
- (2) The clogging test with a hand vacuum pump on each hose from hoses H, J, K and L.

Q: Are the hoses in good condition?**YES :** Go to Step 15.**NO :** Replace the damaged hose, and the fuel filler neck protector (Refer to GROUP 13C, Fuel Tank P.13C-9). Then go to Step 19.



STEP 15. Test check valve A.

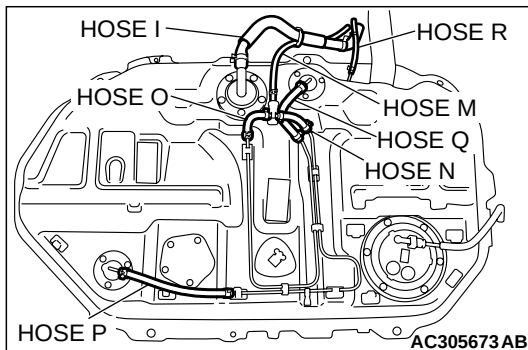
(1) Check valve A is a one-way check valve.

(2) Check valve A should allow air to flow in only one direction.

Q: Does check valve A allow air to pass in one direction only?

YES : Go to Step 16.

NO : Replace check valve A, and reinstall the fuel filler neck protector (Refer to GROUP 13C, Fuel Tank [P.13C-9](#)). Then go to Step 19.



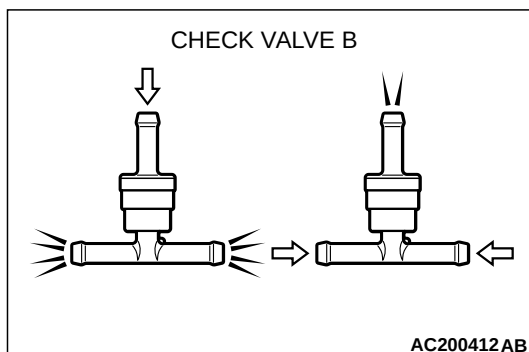
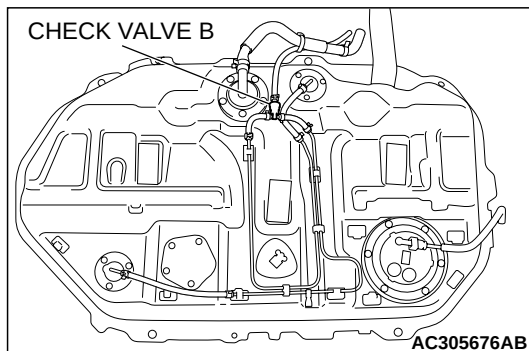
STEP 16. Check for clogging in the evaporator line from hoses I, M, N, O, P, Q and R.

Remove the fuel tank (Refer to GROUP 13C, Fuel Tank [P.13C-9](#)).

Q: Are the hoses in good condition?

YES : Go to Step 17.

NO : Replace the damaged hose, and reinstall the fuel tank (Refer to GROUP 13C, Fuel Tank [P.13C-9](#)). Then go to Step 19.

**STEP 17. Test check valve B.**

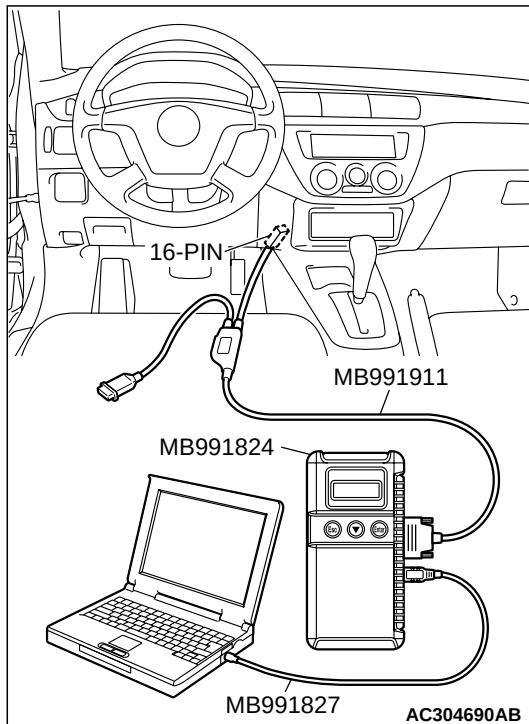
(1) Check valve B is a one-way check valve.

(2) Check valve B should allow air to flow in only one direction.

Q: Does check valve B allow air to pass in one direction only?

YES : Reinstall the fuel tank (Refer to GROUP 13C, Fuel Tank [P.13C-9](#)). Then go to Step 18.

NO : Replace check valve B, reinstall the fuel tank and the fuel filler neck protector (Refer to GROUP 13C, Fuel Tank [P.13C-9](#)). Then go to Step 19.



STEP 18. Using scan tool MB991958, check the EVAP 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 <M/T> or PCM <A/T> will automatically increase the engine speed to 1,600 r/min or greater. Check that the transaxle is set to "neutral" <M/T> or "P" <A/T> 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 the 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. Disconnect scan tool MB991958.

Q: Is "Evap Leak Mon. Completed. Test Failed and DTCs Set" displayed on scan tool MB991958?

YES : Replace the ECM <M/T> or PCM <A/T> (Refer to [P.13B-919](#)). Then go to Step 19 .

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 19 .

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 18.

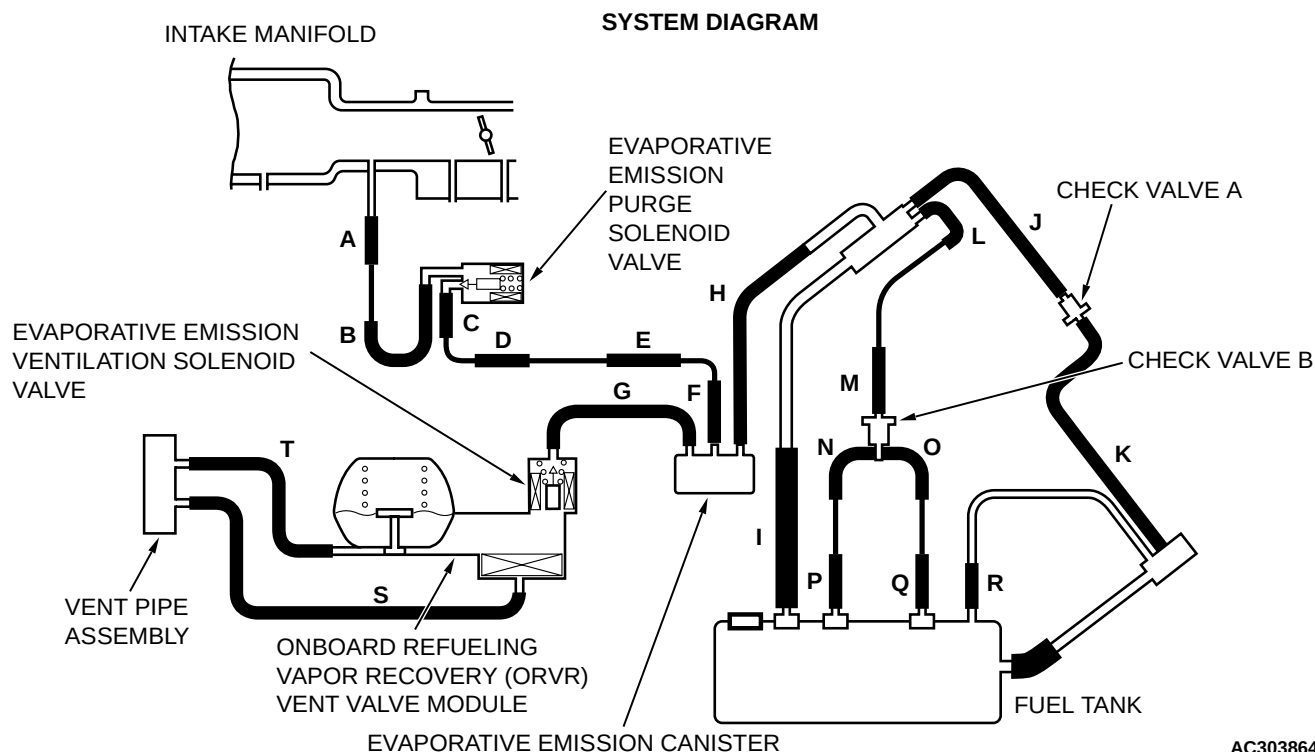
STEP 19. Perform the OBD-II drive cycle.

- (1) Confirm the repair by performing the appropriate drive cycle (Refer to Diagnostic Function – OBD-II Drive Cycle – Procedure 1 – Evaporative Emission System Leak Monitor [P.13B-6](#)).
- (2) Read the diagnostic trouble code (DTC).

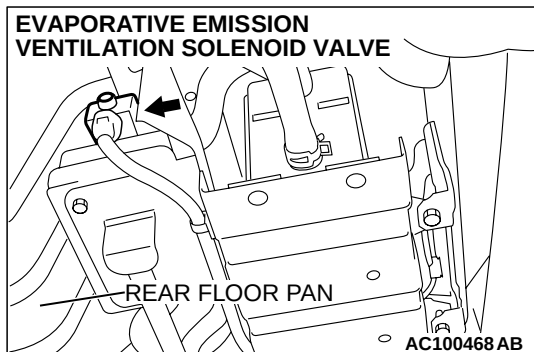
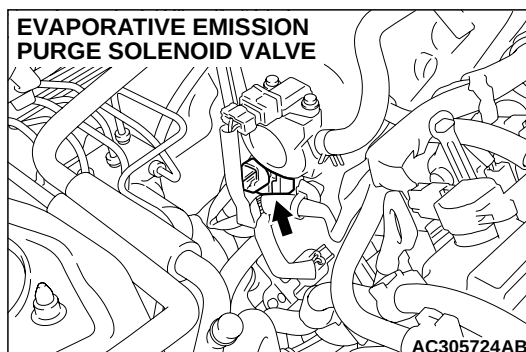
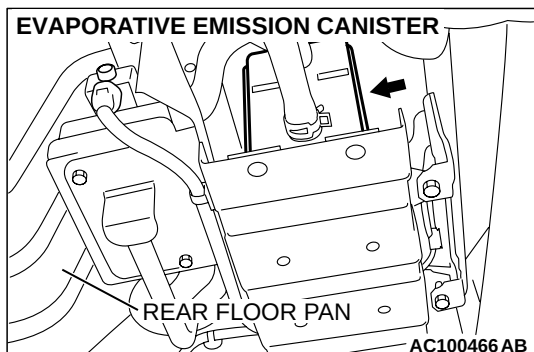
Q: Is DTC P0455 set?

YES : Repeat the troubleshooting from Step 1.

NO : The procedure is complete.

DTC P0456: Evaporative Emission Control System Leak Detected (Very Small Leak)

AC303864AB



TECHNICAL DESCRIPTION

- The ECM <M/T> or PCM <A/T> monitors the Evaporative Emission (EVAP) System pressure.
- The ECM <M/T> or PCM <A/T> 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 <M/T> or PCM <A/T> 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)

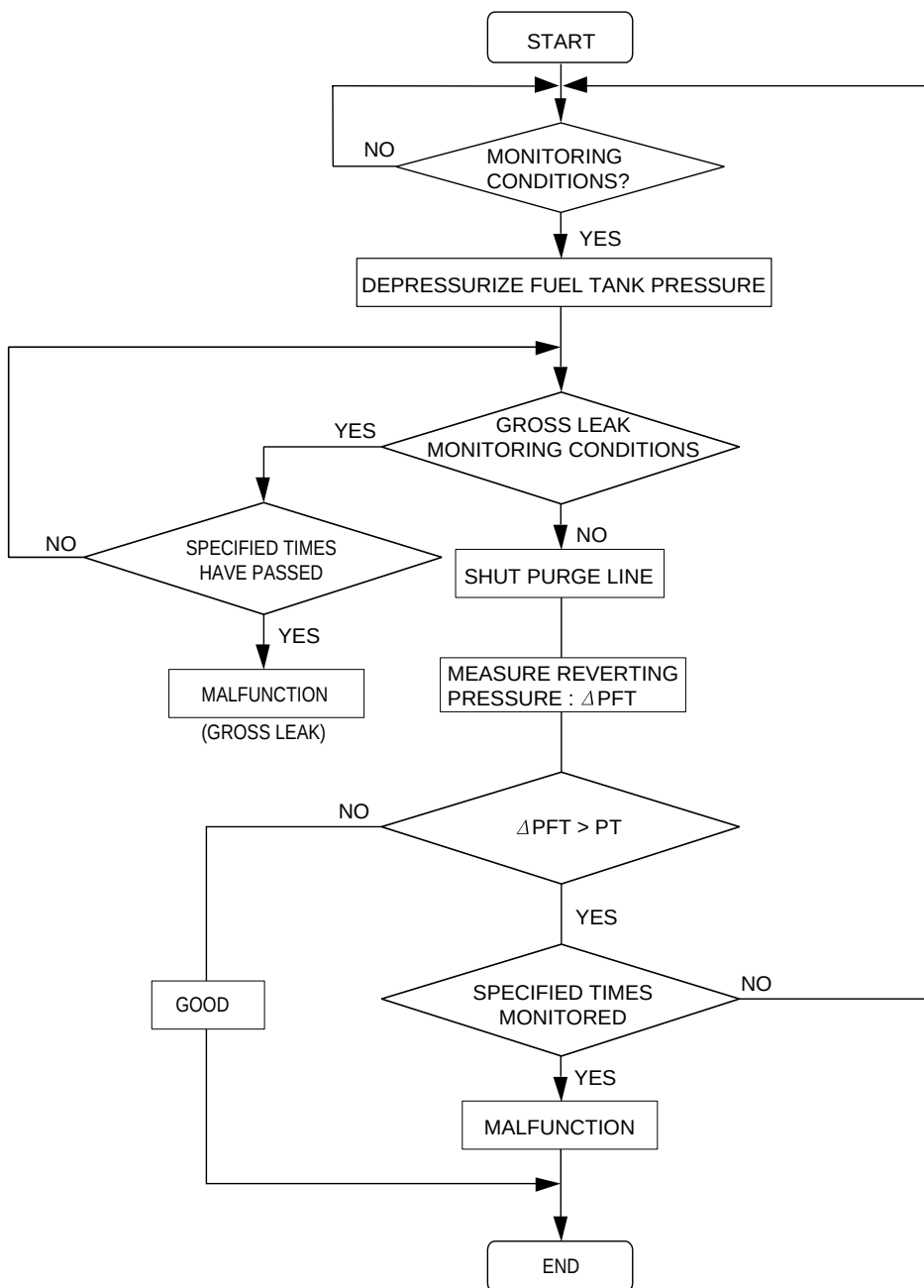
- Evaporative emission purge solenoid monitor
- Evaporative emission purge system monitor
- Fuel tank differential pressure sensor monitor
- Evaporative emission ventilation solenoid monitor
- Fuel level sensor monitor
- Fuel temperature sensor monitor

Sensor (The sensors below are determined to be normal)

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

LOGIC FLOW CHARTS (Monitor Sequence)

0.04in, 0.02in GROSS LEAK MONITOR



AC306649

DTC SET CONDITIONS

Check Conditions A: At Start up

- Intake air temperature is 36°C (97°F) or less when the engine is started.
- The engine coolant temperature 36°C (97°F) or less when the engine is started.
- The fuel level sensor output voltage is 2.4 – 3.7 volts when the engine starts and the amount of remaining fuel is 40 – 85 percent of capacity.

Check Conditions B: For Test to Run

- Barometric pressure is greater than 76 kPa (11 psi).
- The fuel temperature is 33°C (91°F) or less.
- Fuel tank differential pressure sensor output voltage is 1 to 4 volts.

Check Conditions C: For Test to Stop

- Engine coolant temperature is greater than 20 °C (68 °F).
- Intake air temperature is greater than -10 °C (14 °F).
- When the evaporative emission purge solenoid and evaporative emission ventilation solenoid are closed, the pressure rises in the fuel tank is less than 324 Pa (0.047 psi).
- 10 seconds have elapsed from the start of the previous monitoring.
- Monitoring time: 10 – 14 minutes.

Judgment Criteria

- Internal pressure of the fuel tank has changed greater than 1,177 – 1,373 Pa (0.177 – 0.199 psi) in 128 seconds after the tank and vapor line were closed.

OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function – OBD-II Drive Cycle – Procedure 1 – Evaporative Emission System Leak Monitor [P.13B-6](#).

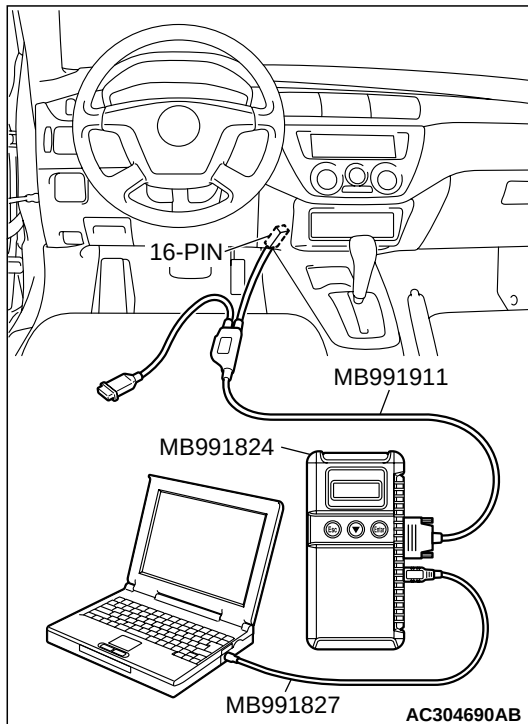
TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)

- 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 (MUT-III Sub Assembly)
 - MB991824: V.C.I.
 - MB991827: MUT-III USB Cable
 - MB991911: MUT-III Main Harness B



STEP 1. Using scan tool MB991958, check the EVAP 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 <M/T> or PCM <A/T> will automatically increase the engine speed to 1,600 r/min or greater. Check that the transaxle is set to "neutral" <M/T> or "P" <A/T> position.

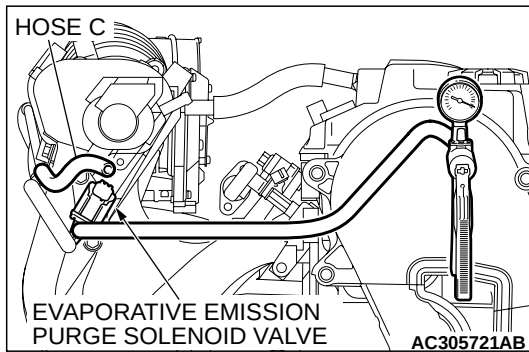
- (1) Connect scan tool MB991958 to the data link connector.
- (2) Turn the ignition switch to the "ON" position.
- (3) Erase the DTCs using scan tool MB991958.
- (4) Check that the fuel cap is securely closed (Tighten until three clicks are heard).
- (5) Start the engine.
- (6) Select "System Test."
- (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-31](#). If no other DTC's have been set, then 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.



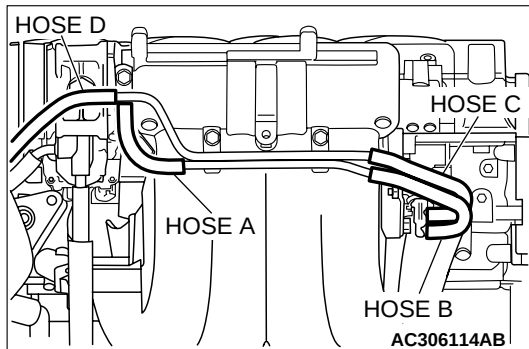
STEP 2. Check the evaporative emission purge solenoid for leaks.

- (1) Disconnect hose C from the evaporative emission purge solenoid and connect a hand vacuum pump to the nipple of the evaporative emission purge solenoid.
- (2) Use the hand vacuum pump to confirm that the evaporative emission purge solenoid holds vacuum.
- (3) Disconnect the hand vacuum pump, and connect hose C to the evaporative emission purge solenoid.

Q: Does the evaporative emission purge solenoid hold vacuum?

YES : Go to Step 3.

NO : Replace the evaporative emission purge solenoid.
Then go to Step 15.



STEP 3. Check for leaks in evaporative emission system hoses A through D.

Use a hand vacuum pump to test each hose from hose A to hose D.

Q: Do the hoses hold vacuum?

YES : Go to Step 4.

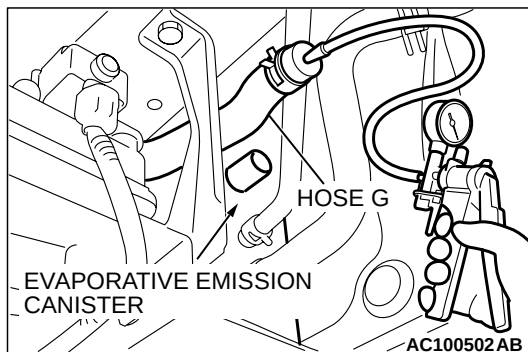
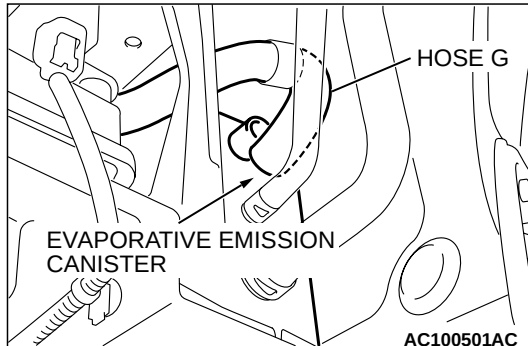
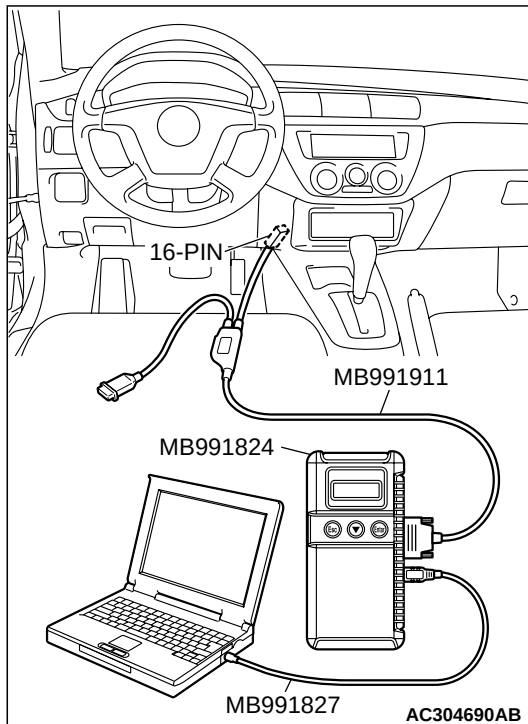
NO : Replace any damaged hose. Then go to Step 15.

STEP 4. Using scan tool MB991958, check data list item 29: 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) Disconnect hose G from the evaporative emission canister side, and connect a hand vacuum pump.

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

(4) Set scan tool MB991958 to actuator test mode.

- Item 29: Evaporative Emission Ventilation Solenoid.
- While the evaporative emission ventilation solenoid is energized, operate the hand vacuum pump and confirm that the solenoid holds vacuum.

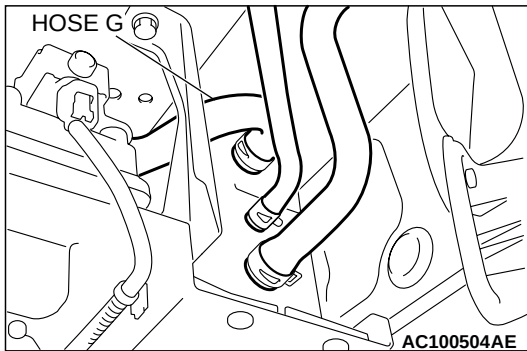
(5) Turn the ignition switch to the "LOCK" (OFF) position, and disconnect scan tool MB991958.

(6) Disconnect the hand vacuum pump, and connect hose G to the evaporative emission canister.

Q: Did the evaporative emission ventilation solenoid hold vacuum?

YES : Go to Step 6.

NO : Go to Step 5.

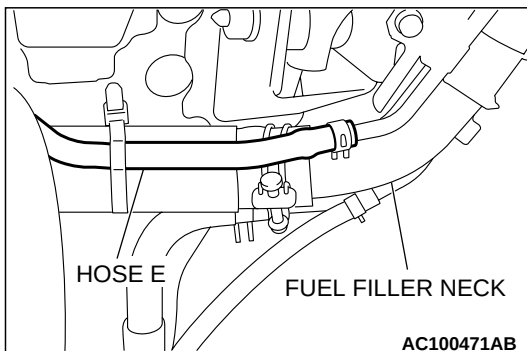


STEP 5. Check for leaks in evaporative emission hose G.
Perform a leakage test using a hand vacuum pump on hose G.

Q: Do the hose hold vacuum?

YES : Replace the evaporative emission ventilation solenoid. Then go to Step 15.

NO : Replace hose G. Then go to Step 15.



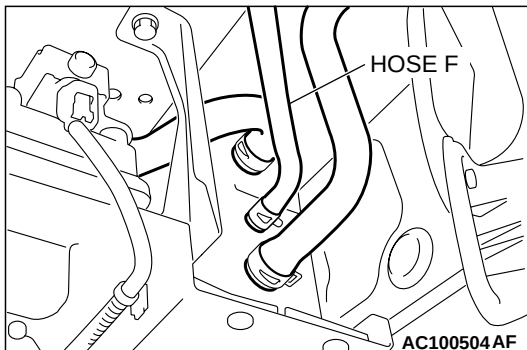
STEP 6. Check for leaks in evaporative emission system hoses E and F.

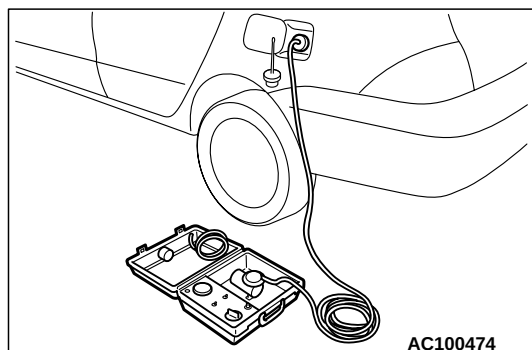
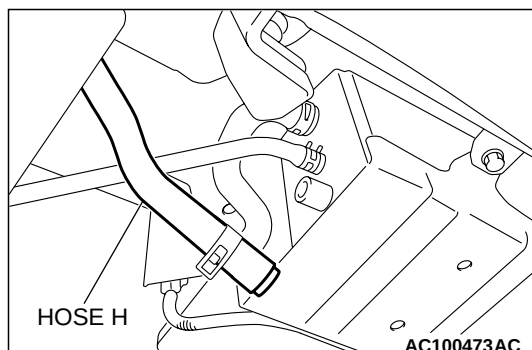
Perform a leakage test with a hand vacuum pump on each hose between hose E and hose F.

Q: Do the hoses hold vacuum?

YES : Go to Step 7.

NO : Replace the damaged hose. Then go to Step 15.



**STEP 7. Pressure test for leaks in evaporative system lines from hose H through the fuel tank to hose R.**

- (1) Disconnect hose H from the canister, and plug hose H securely.
- (2) Confirm that the evaporative emission system pressure pump (Miller number 6872A) is operating properly. Perform the self-test as described in the manufacturer's instructions.

- (3) Connect the evaporative emission system pressure pump to the fuel filler neck.
- (4) 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.

- (5) Disconnect the evaporative emission system pressure pump, and reinstall the fuel cap.
- (6) Connect hose H to the canister.

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

YES : Go to Step 13.

NO : Go to Step 8.

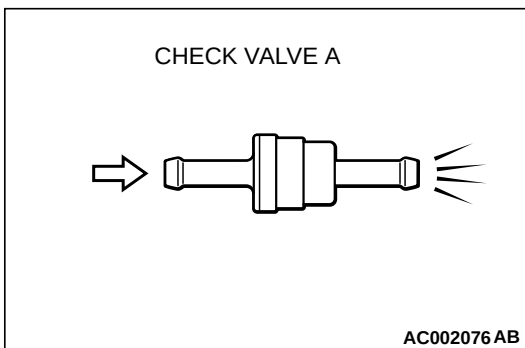
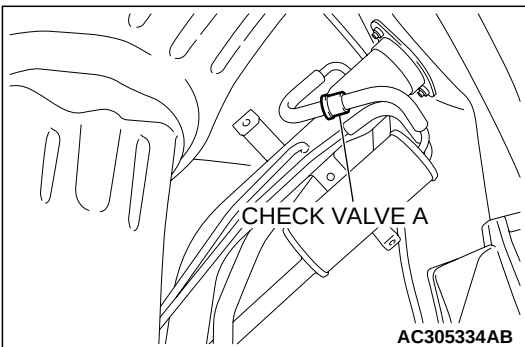
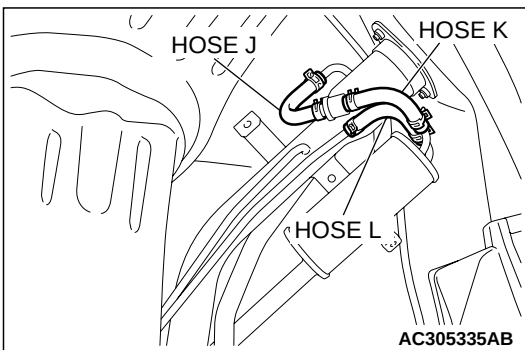
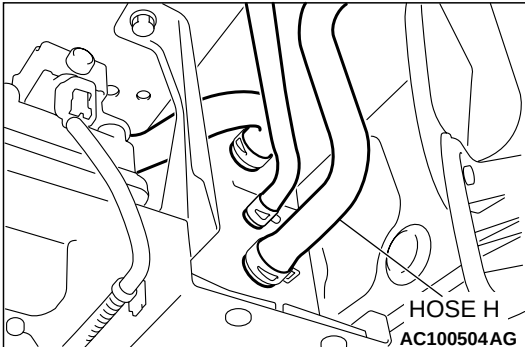
STEP 8. Check for leaks in evaporative emission hoses H, J, K and L.

- (1) Remove the fuel filler neck protector. (Refer to GROUP 13C, Fuel Tank [P.13C-9](#).)
- (2) Perform a leakage test with a hand vacuum pump on each hose: H, J, K and L.

Q: Do the hoses hold vacuum?

YES : Go to Step 9.

NO : Replace any damaged hose, and reinstall the fuel filler neck protector. Refer to GROUP 13C, Fuel Tank [P.13C-9](#). Then go to Step 15.



STEP 9. Test check valve A.

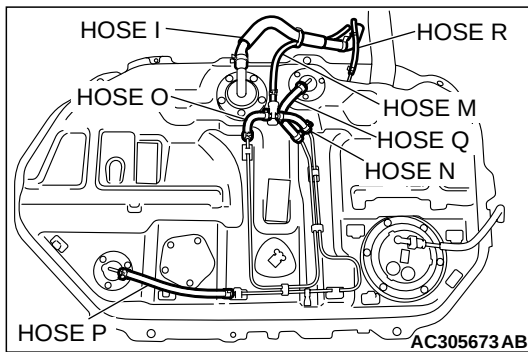
- (1) Check valve A is a one-way check valve.

- (2) Check valve A should allow air to flow in only one direction.

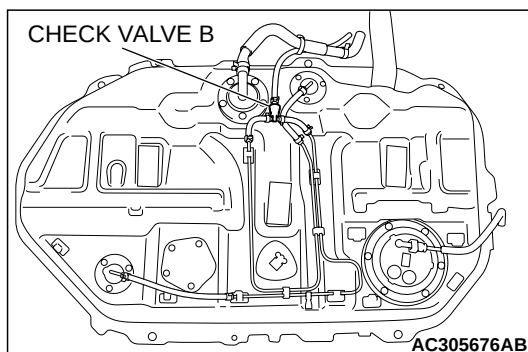
Q: Does check valve A allow air to pass in one direction only?

YES : Go to Step 10.

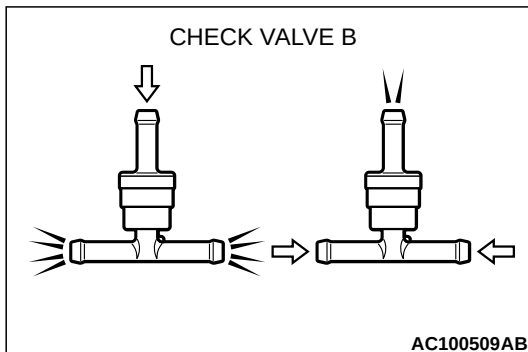
NO : Replace check valve A, and reinstall the fuel filler neck protector. Refer to GROUP 13C, Fuel Tank [P.13C-9](#). Then go to Step 15.

**STEP 10. Check for leaks in evaporative emission hoses I, M, N, O, P, Q and R.**

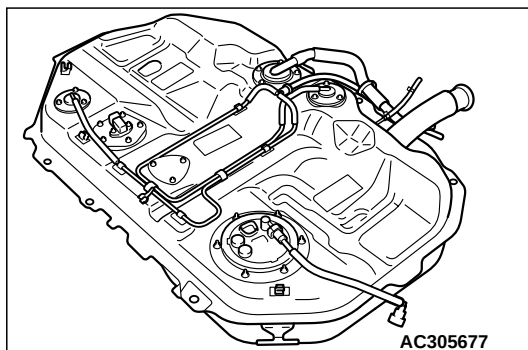
- (1) Remove the fuel tank. (Refer to GROUP 13C, Fuel Tank [P.13C-9](#).)
- (2) Perform a leakage test with a hand vacuum pump on each hose I, M, N, O, P, Q and R.

Q: Do the hoses hold vacuum?**YES :** Go to Step 11.**NO :** Replace any damaged hose, and reinstall the fuel tank. Refer to GROUP 13C, Fuel Tank [P.13C-9](#). Then go to Step 15.**STEP 11. Test check valve B.**

- (1) Check valve B is a one-way check valve.

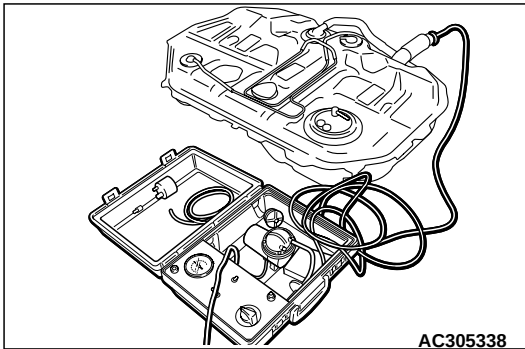


- (2) Check valve B should allow air to flow in only one direction.

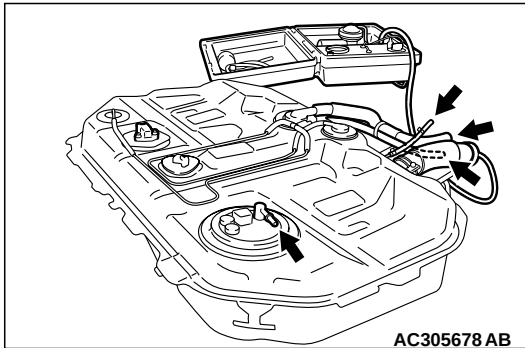
Q: Does check valve B allow air to pass in one direction only?**YES :** Go to Step 12.**NO :** Replace check valve B, and reinstall the fuel tank and the fuel filler neck protector. Refer to GROUP 13C, Fuel Tank [P.13C-9](#). Then go to Step 15.**STEP 12. Check for leaks in the fuel tank.**

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

NOTE: Carefully check the fuel pump assembly and the differential pressure sensor installation in the fuel tank.



- (2) Connect an evaporative emission system pressure pump (Miller number 6872A) to the filler hose.



- (3) Plug the fuel pump feed nipple, hose I, hose M and hose R connected to the fuel tank.

NOTE: If these items are not securely plugged here, 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.

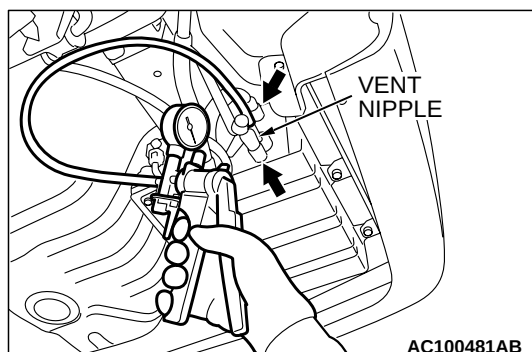
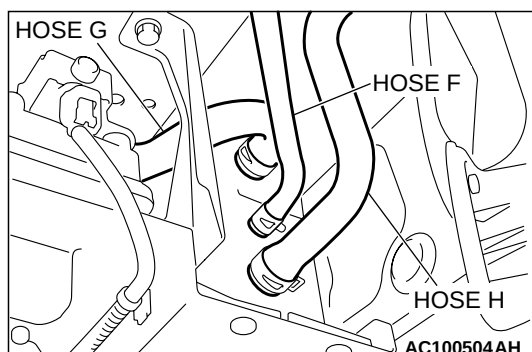
Q: Is any leaks found?

YES <When there is a leak from the attachment points of the fuel pump assembly, fuel tank differential pressure sensor, leveling valve or fuel tank rollover valve.> :

Reassemble the leaked parts and check again that there are no leaks. Then reinstall the fuel tank (Refer to GROUP 13C, Fuel Tank [P.13C-9](#)). Then go to Step 15.

YES <When there is a leak from the fuel tank.> : Replace the fuel tank (Refer to GROUP 13C, Fuel Tank [P.13C-9](#)). Then go to Step 15.

NO : When there is no leak, reinstall the fuel tank (Refer to GROUP 13C, Fuel Tank [P.13C-9](#)). Then go to Step 14.

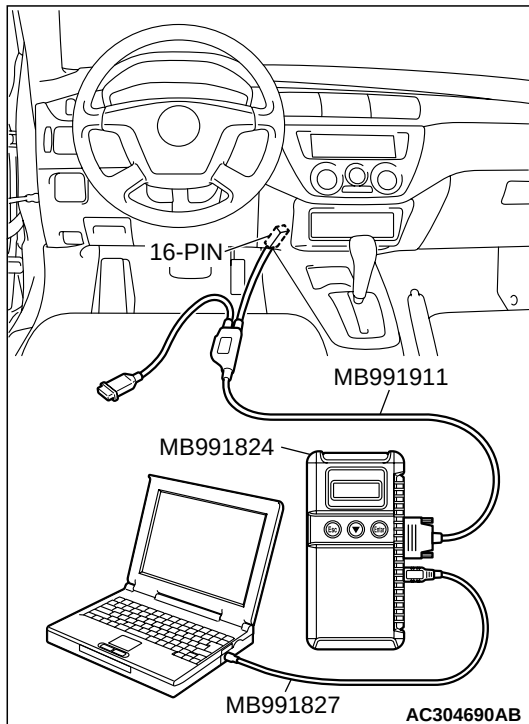
**STEP 13. Check the evaporative emission canister for vacuum leaks.**

- (1) Disconnect hoses F, G and H from the evaporative emission canister side, and connect a hand vacuum pump to the evaporative emission canister instead of hose F, 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 connect hoses F, G and H to the canister.

Q: Does the evaporative emission canister hold vacuum?

YES : Go to Step 14.

NO : Replace the evaporative emission canister. Refer to GROUP 17, Evaporative Emission Canister and Fuel Tank Pressure Relief Valve [P.17-230](#). Then go to Step 15.



STEP 14. Using scan tool MB991958, check the EVAP 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 <M/T> or PCM <A/T> will automatically increase the engine speed to 1,600 r/min or greater. Check that the transaxle is set to "neutral" <M/T> or "P" <A/T> 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 the 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. Disconnect scan tool MB991958.

Q: Is "Evap Leak Mon. Completed. Test Failed and DTCs Set" displayed on scan tool MB991958?

YES : Replace the ECM <M/T> or PCM <A/T> (Refer to [P.13B-919](#)). Then go to Step 15.

NO <"Evap Leak Mon. Completed. Test Passed" is displayed on scan tool MB991958.> : The evaporative emission system is working properly at this time. Then go to Step 15.

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 14.

STEP 15. Perform the OBD-II drive cycle.

- (1) Confirm the repair by performing the appropriate drive cycle (Refer to Diagnostic Function – OBD-II Drive Cycle – Procedure 1 – Evaporative Emission System Leak Monitor [P.13B-6](#)).
- (2) Read the diagnostic trouble code (DTC).

Q: Is DTC P0456 set?

YES : Repeat the troubleshooting from Step 1.

NO : The procedure is complete.

Continue