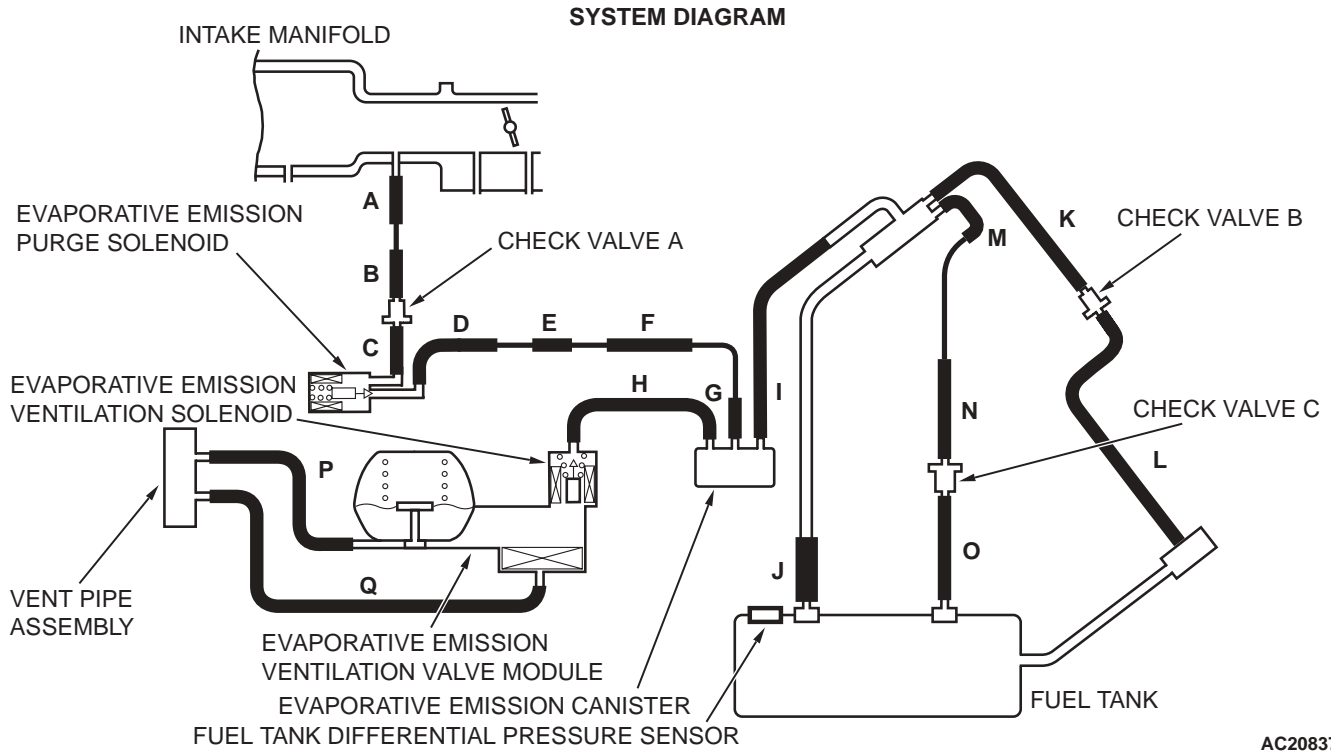
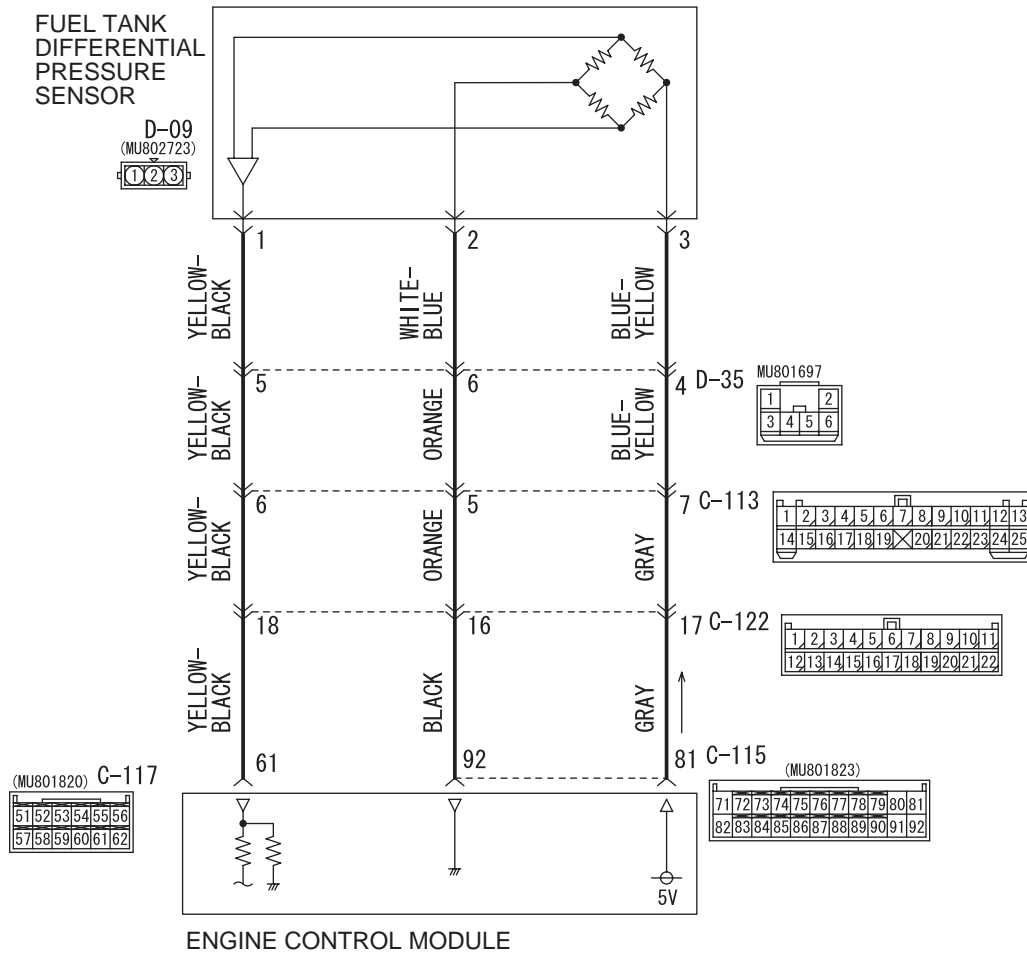


DTC P0453: Evaporative Emission Control System Pressure Sensor High Input

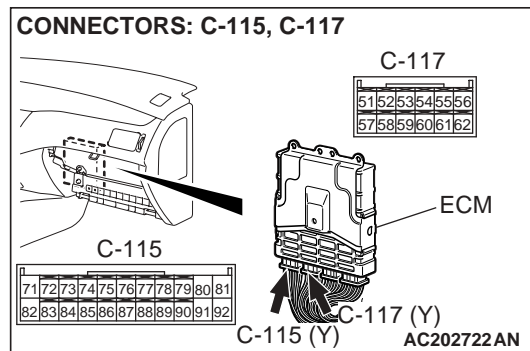
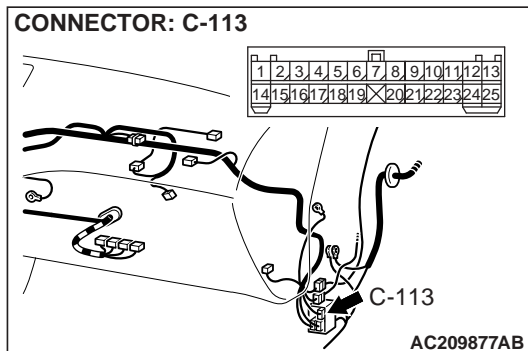


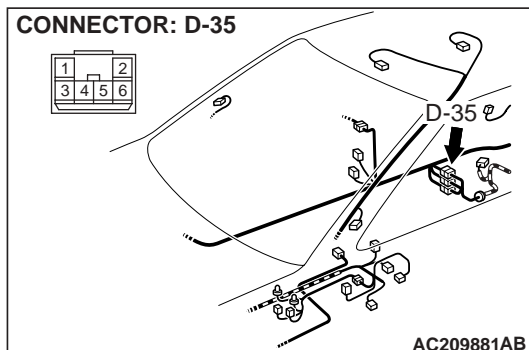
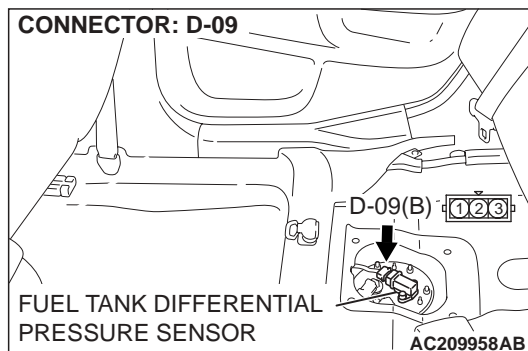
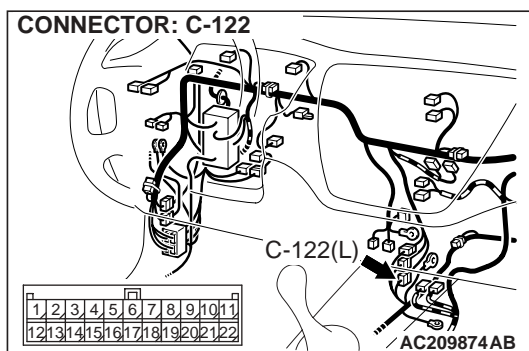
AC208373AC

Fuel Tank Differential Pressure Sensor Circuit



AC208776  
W3J12M00AA





### CIRCUIT OPERATION

- The ECM (terminal 81) supplies a 5-volts reference voltage to the fuel tank differential pressure sensor (terminal 3). The ECM (terminal 92) supplies a ground to the fuel tank differential pressure sensor (terminal 2).
- The ECM (terminal 61) 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 monitors the fuel tank differential pressure sensor output voltage.
- Based on the test conditions and judgment criteria, the ECM determines whether 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.*

### 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 70 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.

### 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.

### OVERVIEW OF TROUBLESHOOTING

- DTC P0453 can be set by a faulty fuel differential pressure sensor or related circuit, or ECM failure.
- To check a system blockage, do a performance test which uses a mechanical vacuum gauge and scan tool MB991502 or MB991958 set on the fuel tank differential pressure sensor (TANK PRS SNSR73.) The mechanical gauge reading is used to verify the scan tool reading. A comparison of the mechanical gauge with the reading on scan tool MB991502 or MB991958 will locate a problem in the system.

**DIAGNOSIS**

**Required Special Tools:**

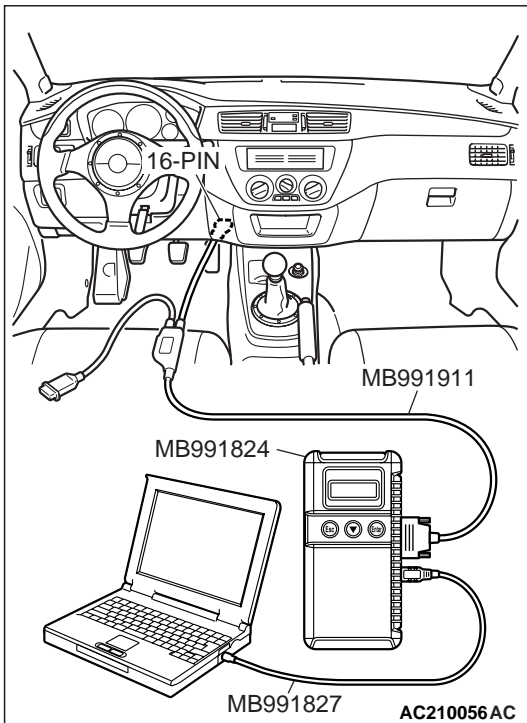
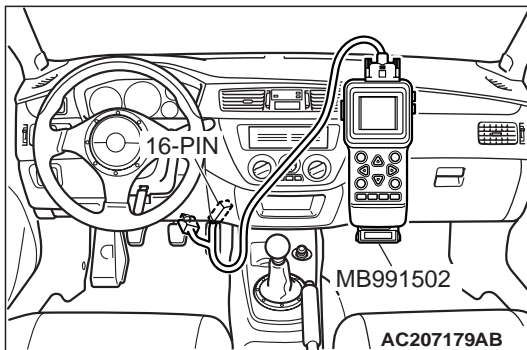
- MB991502: Scan Tool (MUT-II)
- MB991958: Scan Tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991911: Main Harness B
- MB991658: Test Harness Set

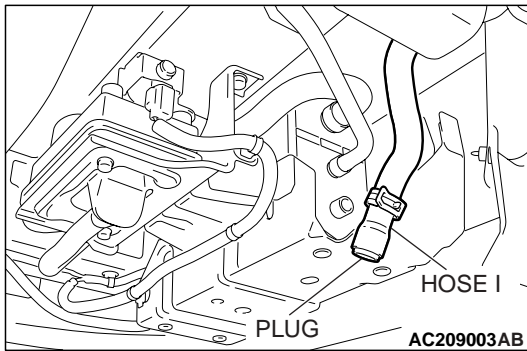
**STEP 1. Using scan tool MB991502 or MB991958, check data list item 73: Fuel Tank Differential Pressure Sensor.**

**⚠ CAUTION**

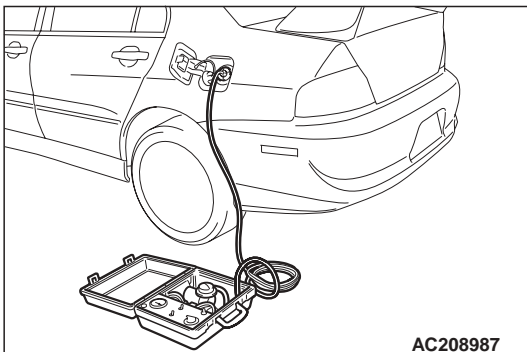
To prevent damage to scan tool MB991502 or MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991502 or MB991958.

- (1) Connect scan tool MB991502 or MB991958 to the data link connector.





- (2) Disconnect hose I from the evaporative emission canister, and plug the hose.



- (3) Set scan tool MB991502 or MB991958 to the data reading mode for 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).
- (4) Connect an evaporative emission system pressure pump (Miller number 6872A) to the fuel tank filler tube and pressurize the fuel tank.
- The fuel tank pressure reading should increase.
- (5) Turn the ignition switch to the "LOCK" (OFF) position. Then disconnect scan tool MB991502 or MB991958.
- (6) Disconnect the evaporative emission system pressure pump, and reinstall the fuel cap.
- (7) Connect hose I to the canister.

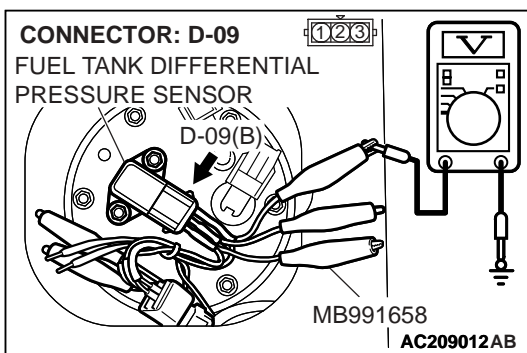
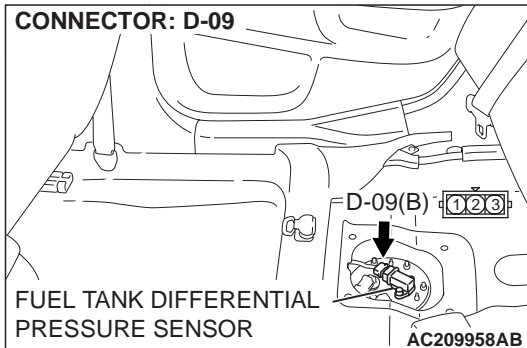
**Q: Is the fuel tank pressure between  $-1.5$  and  $1.5$  kPa ( $-0.443$  and  $0.443$  inHg)?**

**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](#). Go to Step 15.

**NO :** Go to Step 2.

**STEP 2. Measure the signal voltage at fuel tank differential pressure sensor connector D-09.**

- (1) Remove the rear seat assembly (Refer to GROUP 52A, Rear Seat P.52A-22).
- (2) Remove the floor pan access panel.



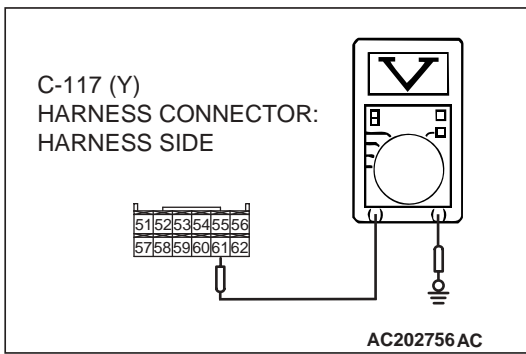
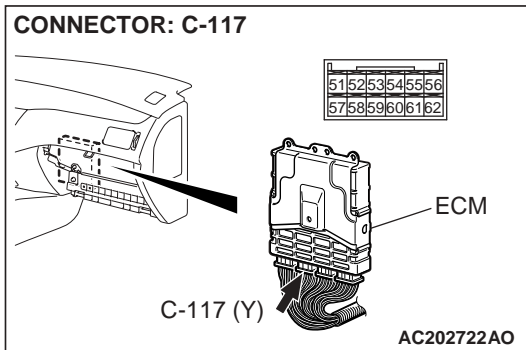
- (3) Use special tool Test Harness Set (MB991658) to connect terminals 1,2 and 3 of the fuel tank differential pressure sensor connector D-09.
- (4) Turn the ignition switch to the "ON" position.
- (5) Remove the fuel cap.
- (6) Measure the voltage between connector D-09 terminal 1 and ground.
  - The measured voltage should measure between 2.0 and 3.0 volts.

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

**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-117 by backprobing.

(1) Do not disconnect ECM connector C-117.

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

(3) Remove the fuel cap.

(4) Measure the voltage between connector C-117 terminal 61 and ground by backprobing.

- The measured voltage should measure between 2.0 and 3.0 volts.

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

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

**YES :** Go to Step 4.

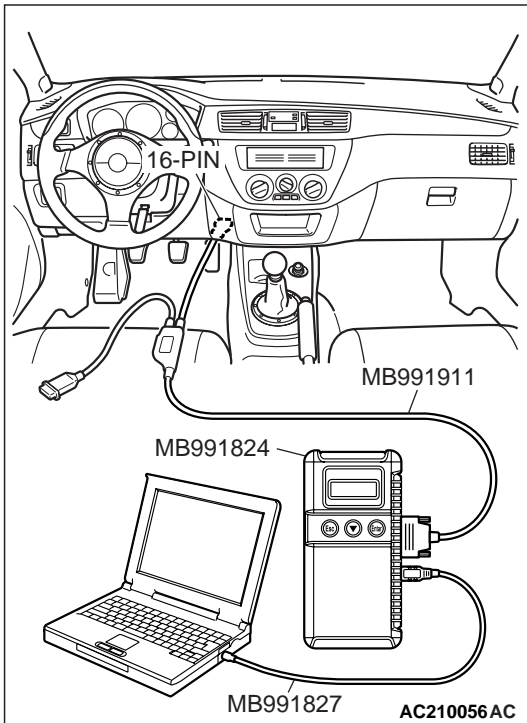
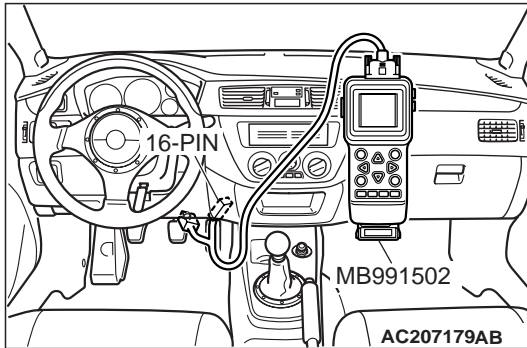
**NO :** Go to Step 5.

**STEP 4.** Using scan tool MB991502 or MB991958, check data list item 73: Fuel Tank Differential Pressure Sensor.

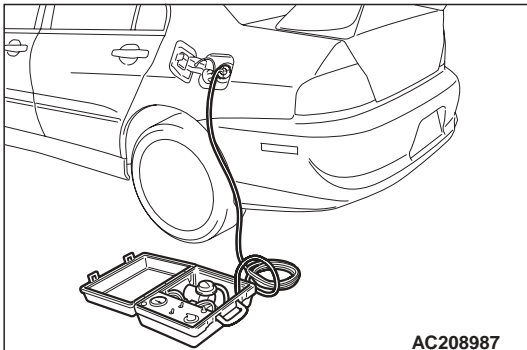
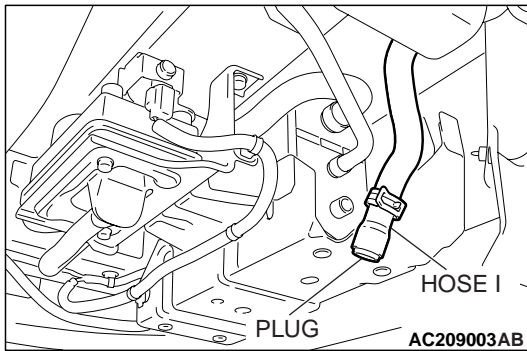
**⚠ CAUTION**

To prevent damage to scan tool MB991502 or MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991502 or MB991958.

- (1) Connect scan tool MB991502 or MB991958 to the data link connector.







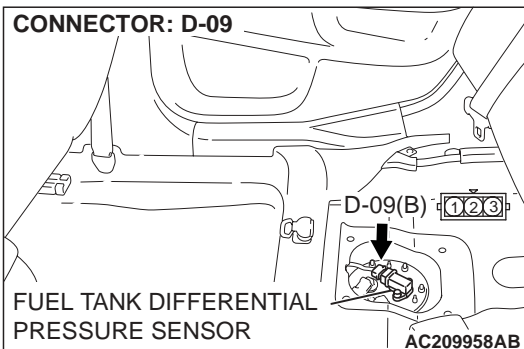
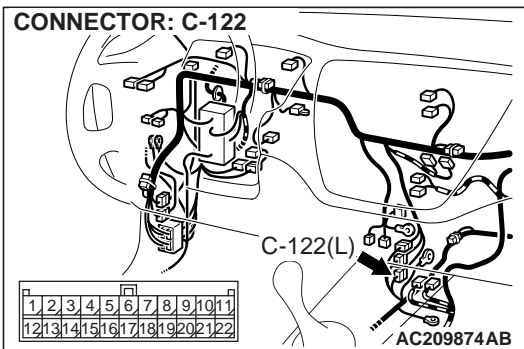
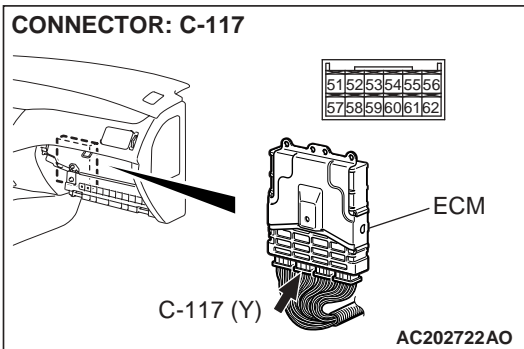
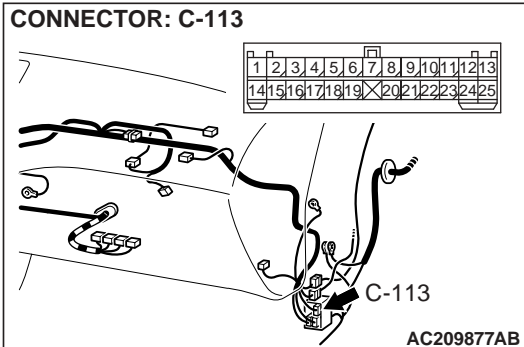
- (2) Disconnect hose I from the evaporative emission canister, and plug the hose.
- (3) Turn the ignition switch to the "ON" position.
- (4) Remove the fuel cap.
- (5) Set scan tool MB991502 or MB991958 to the data reading mode for item 73, Fuel Tank Differential Pressure Sensor.
  - The fuel tank pressure 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 tank filler tube 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 I to the canister.

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

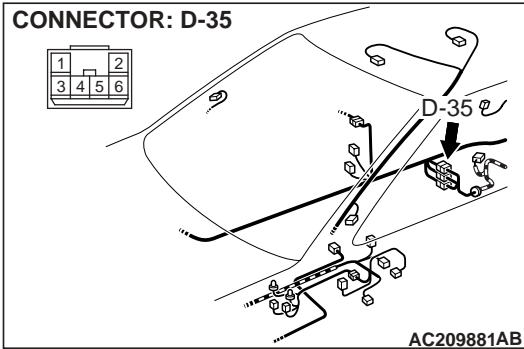
**YES :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/ Inspection Service Points – Intermittent Malfunction [P.00-6](#). Go to Step 15.

**NO :** Replace the ECM. Go to Step 15.

**STEP 5. Check intermediate connectors C-113, C-122 and D-35, and ECM connector C-117, and fuel tank differential pressure sensor connector D-09 for loose, corroded or damaged terminals, or terminals pushed back in the connector.**



### CONNECTOR: D-35

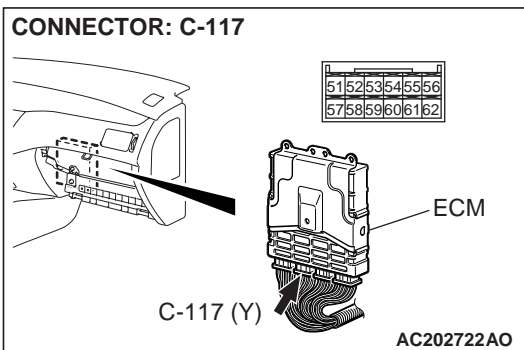


**Q: Are the connectors in good condition?**

**YES :** Go to Step 6.

**NO :** Repair or replace the faulty components. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Go to Step 15.

### CONNECTOR: C-117



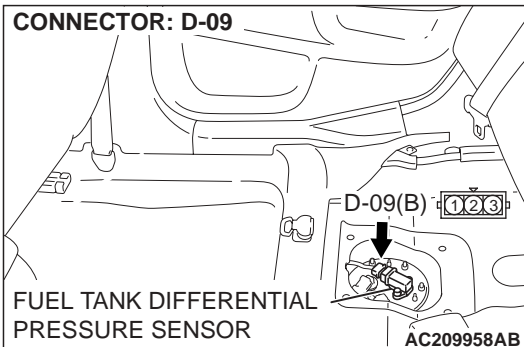
**STEP 6. Check the harness wire between ECM connector C-117 terminal 61 and intermediate connector D-09 terminal 1 for damage.**

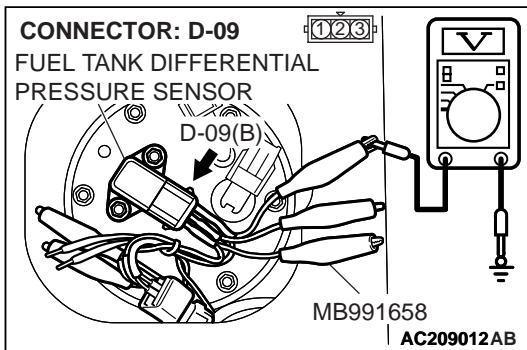
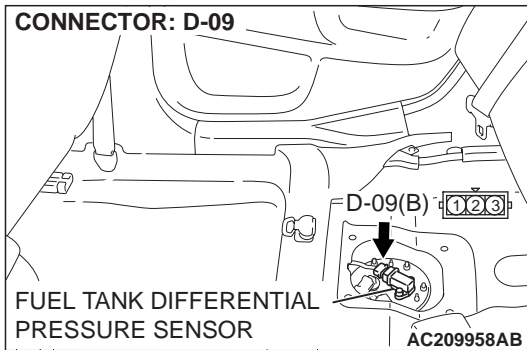
**Q: Is the harness wire in good condition?**

**YES :** This malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points - How to Cope with Intermittent Malfunction [P.00-6](#). Go to Step 15.

**NO :** Repair the damaged harness wire. Go to Step 15.

### CONNECTOR: D-09





**STEP 7. Measure the 5-volt reference signal at fuel tank differential pressure sensor connector D-09.**

(1) Disconnect fuel tank differential pressure sensor connector D-09.

(2) Use special tool MB991658 to connect terminals 1, 2 and 3 of connector D-09.

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

(4) Measure the voltage between terminal 3 and ground.

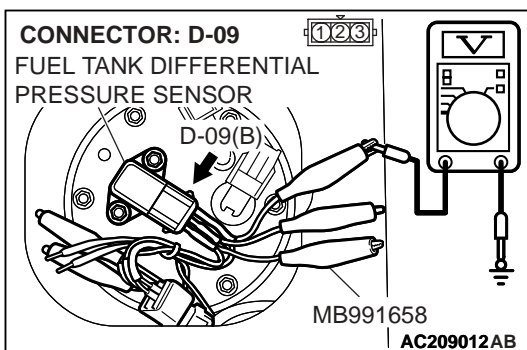
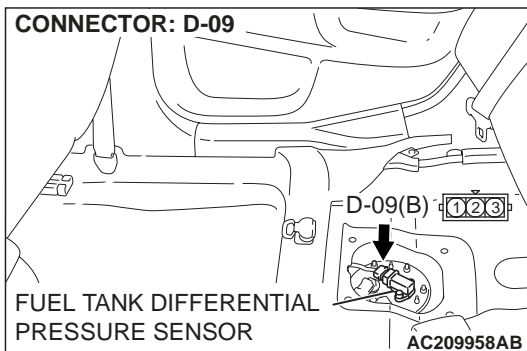
- The voltage should measure between 4.9 and 5.1 volts.

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

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

**YES :** Go to Step 8.

**NO :** Go to Step 11.



**STEP 8. Measure the return circuit voltage at fuel tank differential pressure sensor connector D-09.**

(1) Disconnect fuel tank differential pressure sensor connector D-09.

(2) Use special tool MB991658 to connect terminal 3 of connector D-09.

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

(4) Measure the voltage between terminal 2 and ground.

- The voltage should measure 0.5 volt or less.

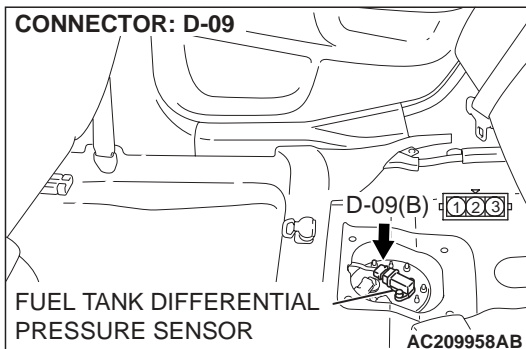
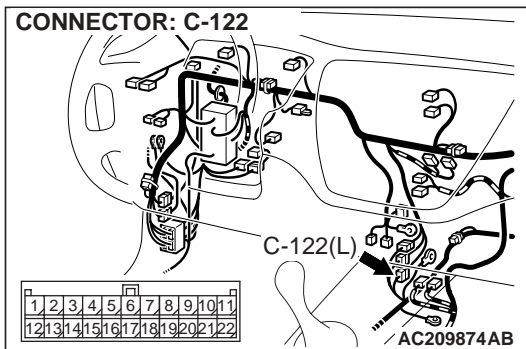
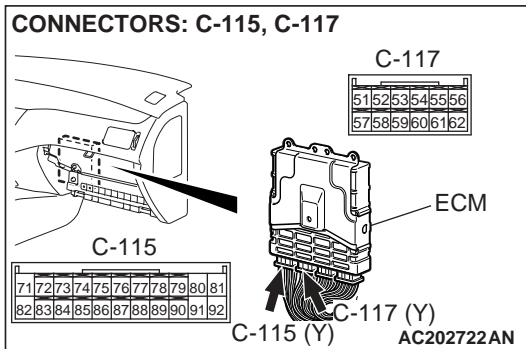
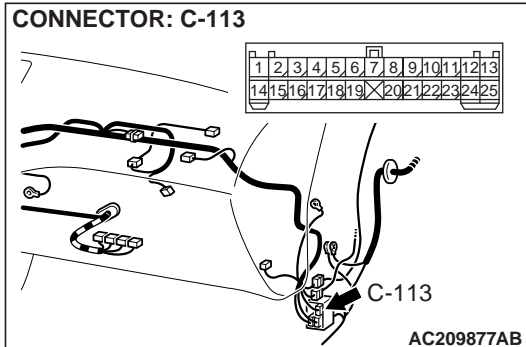
(5) Turn the ignition switch to the "LOCK" (OFF) position.

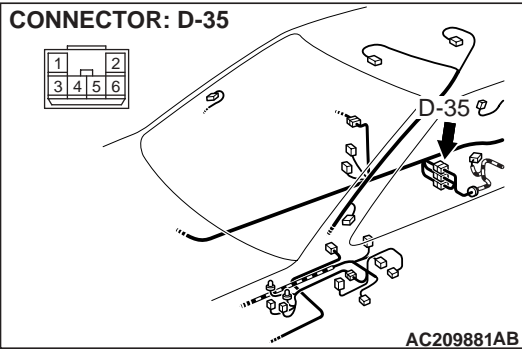
**Q: Is the measure voltage 0.5 volt or less?**

**YES :** Go to Step 9.

**NO :** Replace the fuel tank differential pressure sensor. Go to Step 15.

**STEP 9.** Check intermediate connectors C-113, C-122 and D-35, and ECM connector C-115, C-117 and fuel tank differential pressure sensor connector for D-09 loose, corroded or damaged terminals, or terminals pushed back in the connector.

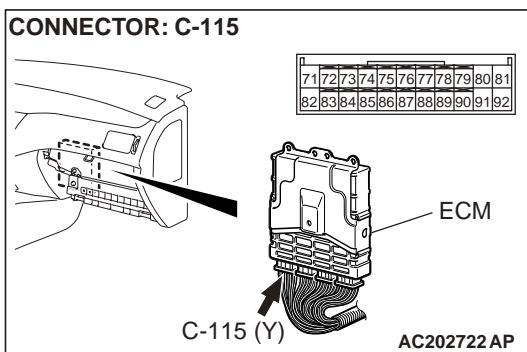




**Q: Are the connectors and terminals in good condition?**

**YES :** Go to Step 10.

**NO :** Repair or replace the damage components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Go to Step 15.

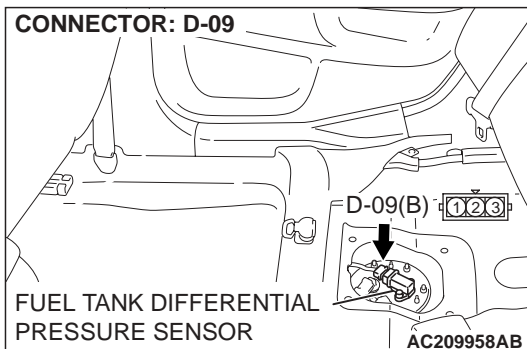


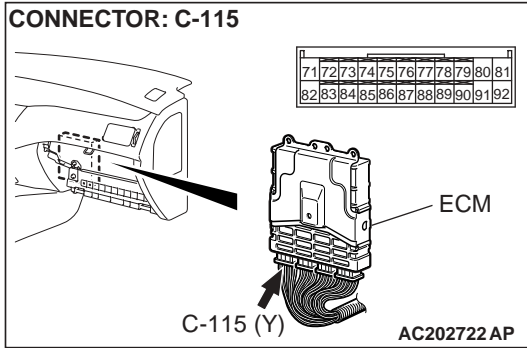
**STEP 10. Check the harness wire between ECM connector C-115 terminal 92 and fuel tank differential pressure sensor connector D-09 terminal 2 for damage.**

**Q: Is the harness wire in good condition?**

**YES :** Replace the fuel tank differential pressure sensor. Go to Step 15.

**NO :** Repair or replace the harness wire. Go to Step 15.





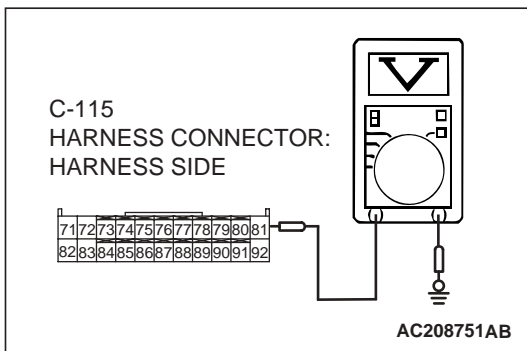
**STEP 11. Measure the 5-volt reference signal at ECM connector C-115 by backprobing.**

- (1) Turn the ignition switch to the "ON" position.
- (2) Measure the voltage between connector C-115 terminal 81 and ground by backprobing.
  - The measured voltage should measure between 4.9 and 5.1 volts.
- (3) Turn the ignition switch to the "LOCK" (OFF) position.

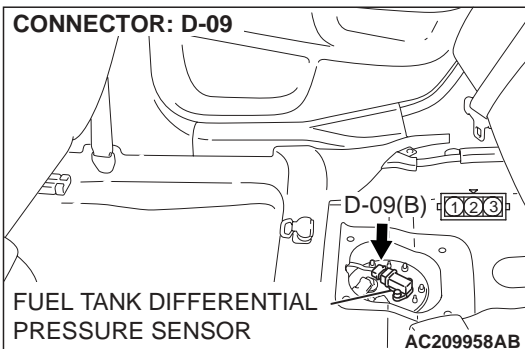
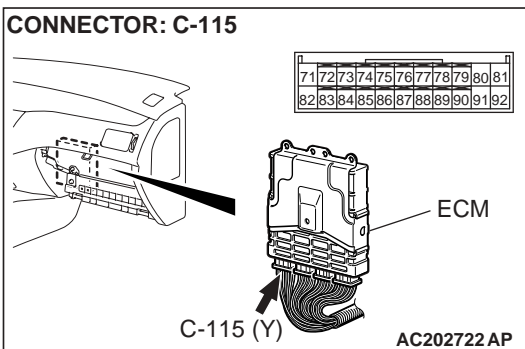
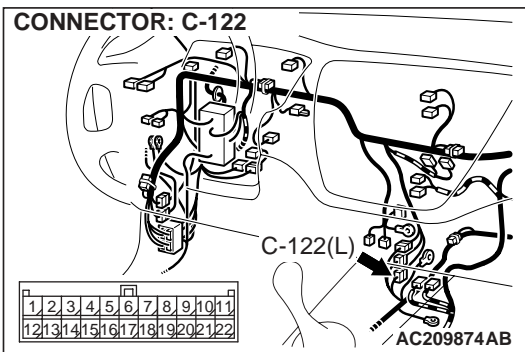
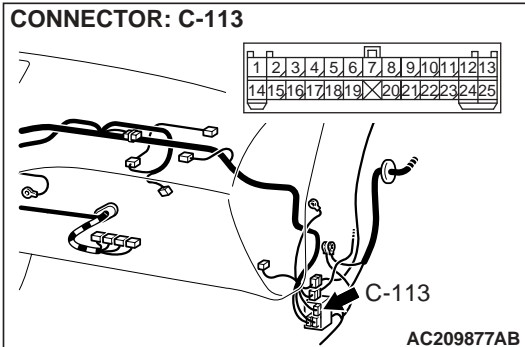
**Q: Is the measured voltage between 4.9 and 5.1 volts?**

**YES :** Go to Step 12.

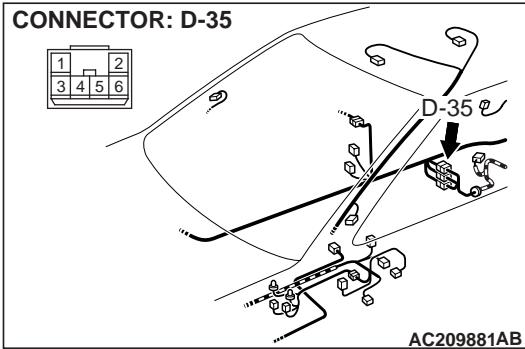
**NO :** Go to Step 14.



**STEP 12.** Check intermediate connectors C-113, C-122 and D-35, and ECM connector C-115 and fuel tank differential pressure sensor connector for D-09 loose, corroded or damaged terminals, or terminals pushed back in the connector.



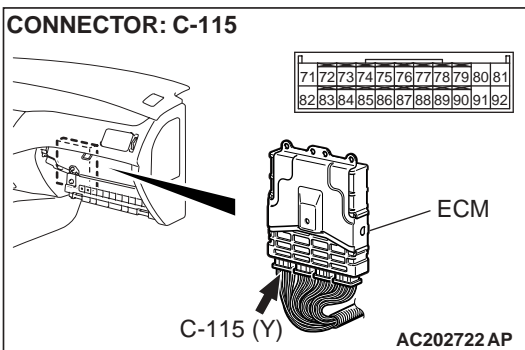




**Q: Are the connectors and terminals in good condition?**

**YES :** Go to Step 13.

**NO :** Repair or replace the faulty component. Go to Step 15.

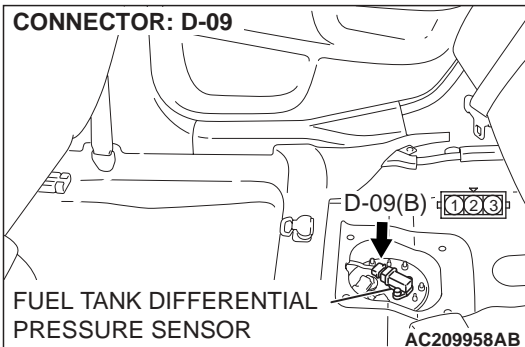


**STEP 13. Check the harness wire between ECM connector C-115 terminal 81 and fuel tank differential pressure sensor connector D-09 terminal 3 for damage.**

**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. Go to Step 15.

**NO :** Repair or replace the harness wire. Go to Step 15.

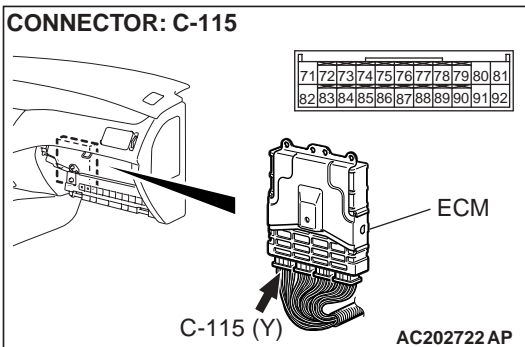


**STEP 14. Check ECM connector C-115 for loose, corroded or damaged terminals, or terminals pushed back in the connector.**

**Q: Are the connector and terminals in good condition?**

**YES :** Replace the ECM. Go to Step 15.

**NO :** Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Go to Step 15.



**STEP 15. 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.13A-6.
- (2) Read the diagnostic trouble code (DTC).

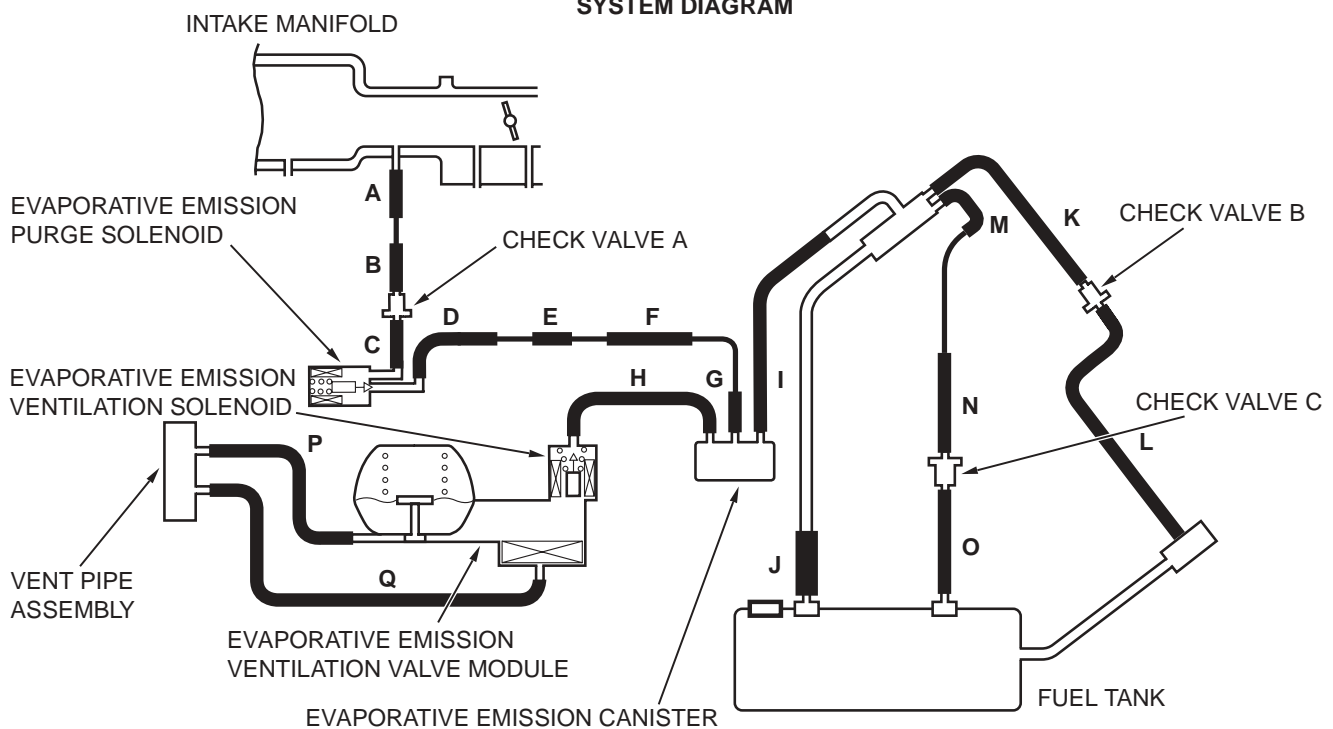
**Q: Is DTC P0453 set?**

**YES :** Go to Step 2.

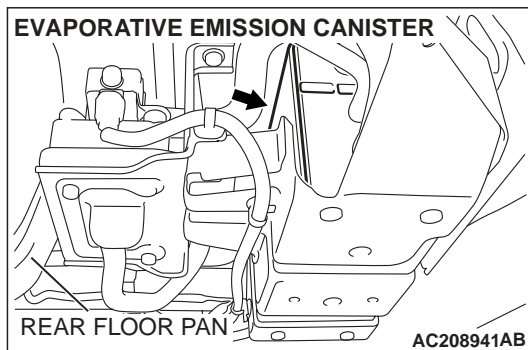
**NO :** The procedure is complete.

**DTC P0455: Evaporative Emission System Leak Detected (Gross Leak)**

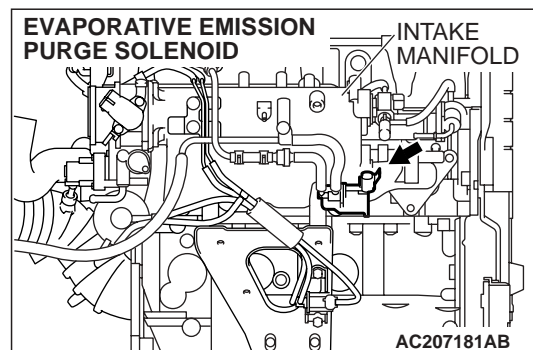
SYSTEM DIAGRAM



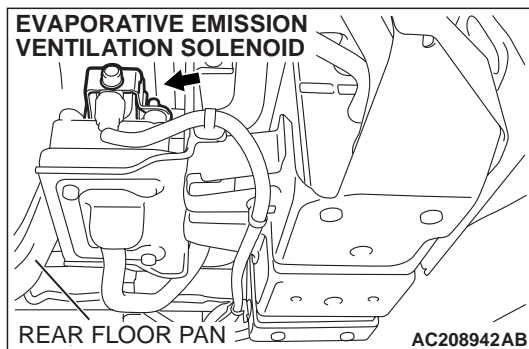
AC208373AB



AC208941AB



AC207181AB



### TECHNICAL DESCRIPTION

- The fuel tank may be under a slight pressure or vacuum depending on the state of the evaporative emission (EVAP) system. The ECM monitors and responds to these pressure/vacuum changes. If the pressure/vacuum varies from the specified range, the ECM will set DTC P0455.
- The ECM energizes the evaporative emission ventilation solenoid to shut off the evaporative emission canister outlet port.
- The evaporative emission purge solenoid is activated to apply engine manifold vacuum to the EVAP system.
- When the fuel system develops a vacuum of 2 kPa (0.29 psi), the evaporative emission purge solenoid is turned "off" and the fuel system vacuum is maintained at 2 kPa (0.29 psi).
- The ECM determines whether there is a leak or clog in the fuel system by measuring the change in vacuum inside the fuel tank.
- The test is stopped when fuel vapor pressure is determined to be too high.

### 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

- Engine coolant temperature is greater than 60°C (140°F) When the amount of remaining fuel is 15 – 40 percent of capacity upon engine start up.
- Engine coolant temperature is greater than 20°C (68°F) when the amount of remaining fuel is 40 – 85 percent of capacity upon engine start up.
- 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 70 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 greater than 2 kPa (0.29 psi) after the evaporative emission purge solenoid has been driven when the fuel tank and vapor line were closed.

#### 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:

- MB991502: Scan Tool (MUT-II)
- MB991958: Scan Tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991911: Main Harness B

**STEP 1. Using scan tool MB991502 or MB991958, check the evaporative emission system monitor test.**

### **⚠ CAUTION**

- To prevent damage to scan tool MB991502 or MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991502 or MB991958.
- During this test, the ECM will automatically increase the engine speed to 1,600 r/min or greater. Check that the transaxle is set to the neutral position.

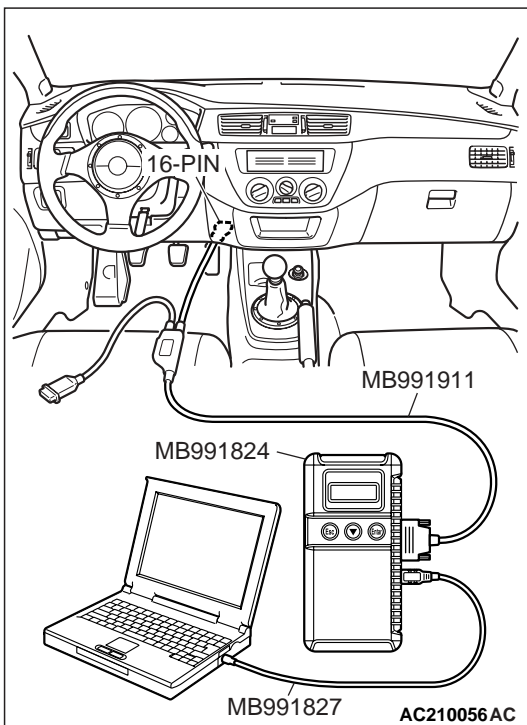
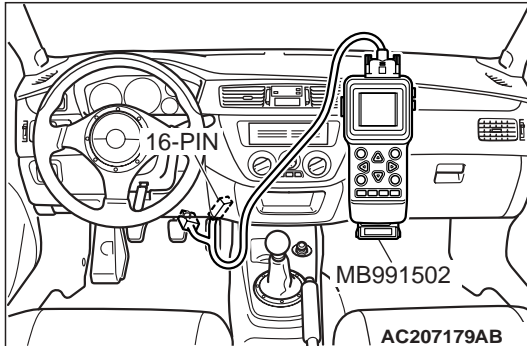
- (1) Connect scan tool MB991502 or MB991958 to the data link connector.
- (2) Turn the ignition switch to the "ON" position.
- (3) Erase the DTCs using scan tool MB991502 or MB991958.
- (4) Check that the fuel cap is securely closed. (Tighten until three clicks are heard.)
- (5) Start the engine.
- (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 MB991502 or MB991958 will change from "NO" to "YES."
- (10) Turn the ignition switch to the "LOCK" (OFF) position, and disconnect scan tool MB991502 or MB991958.

**Q: Is "Evap Leak Mon. Completed. Test Failed and DTCs Set" displayed on scan tool MB991502 or 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.13A-25](#). If no other DTC's have been set, go to Step 2.

**NO :** If "Evap Leak Mon. Completed. Test Passed" is displayed on scan tool MB991502 or 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 turn on. Return the vehicle to the customer.

**NO :** If "Evap Leak Mon. Discontinued. Retest again from the first" is displayed on scan tool MB991502 or 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.

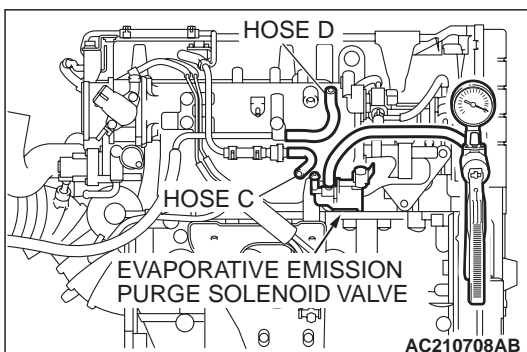
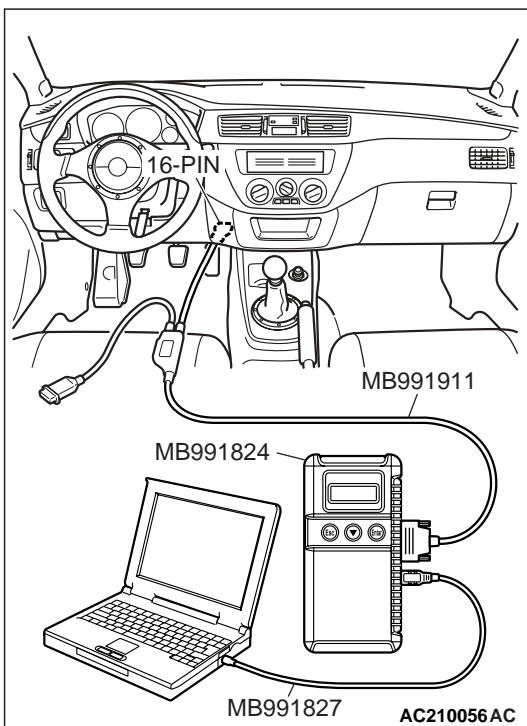
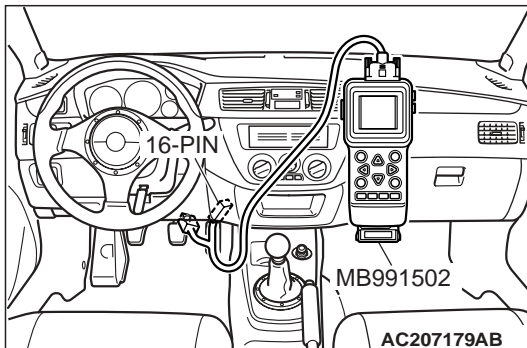


**STEP 2.** Using scan tool MB991502 or MB991958, check actuator test item 08: Evaporative Emission Purge Solenoid Valve.

**⚠ CAUTION**

To prevent damage to scan tool MB991502 or MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991502 or MB991958.

- (1) Connect scan tool MB991502 or MB991958 to the data link connector.



- (2) Disconnect hoses C and D from the evaporative emission purge solenoid valve side, and connect the hand vacuum pump to the evaporative emission purge solenoid valve instead of hose D.
- (3) Turn the ignition switch to the "ON" position.
- (4) Set scan tool MB991502 or MB991958 to actuator test mode for 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 C and D 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 21.

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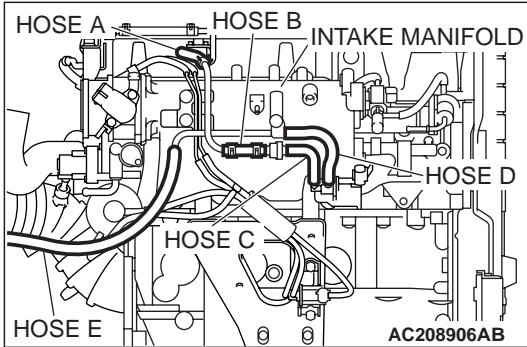
**STEP 3. Check for leaks and clogging in evaporative emission system hoses A through E.**

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

**Q: Are the hoses in good condition?**

**YES :** Go to Step 4.

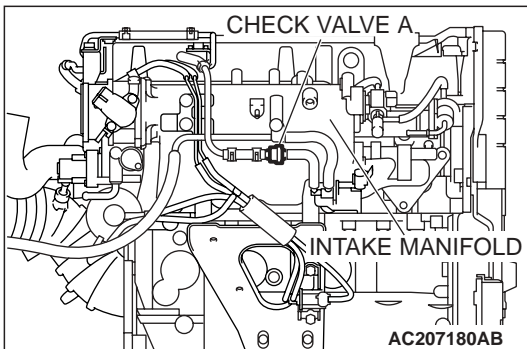
**NO :** Replace the damaged hose. Go to Step 21.



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**STEP 4. Test check valve A.**

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

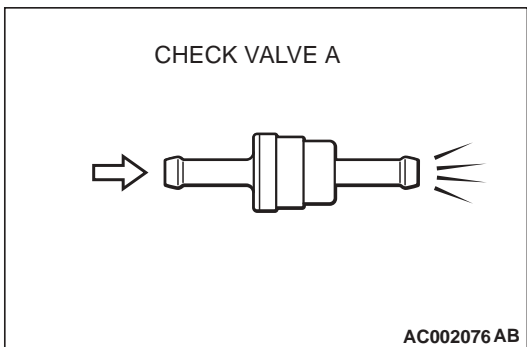


(2) Check valve A should allow air to flow in only one direction.

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

**YES :** Go to Step 5.

**NO :** Replace check valve A. Go to Step 21.

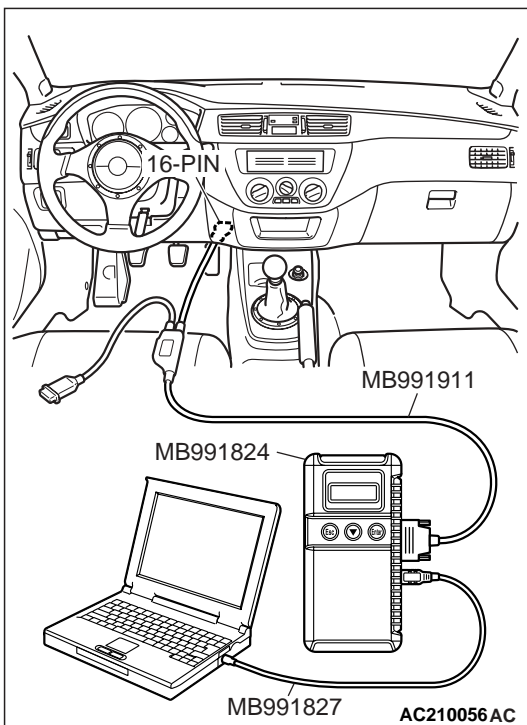
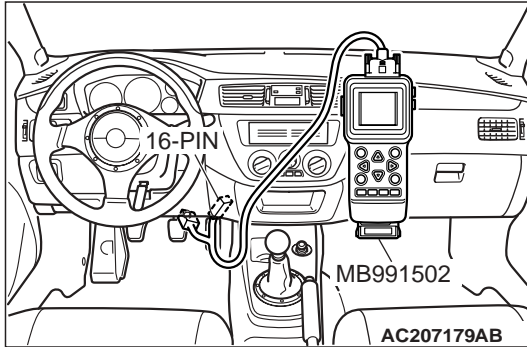


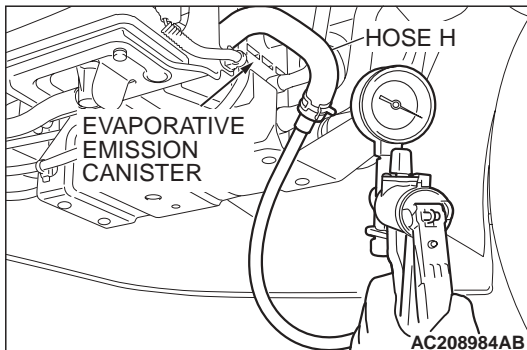
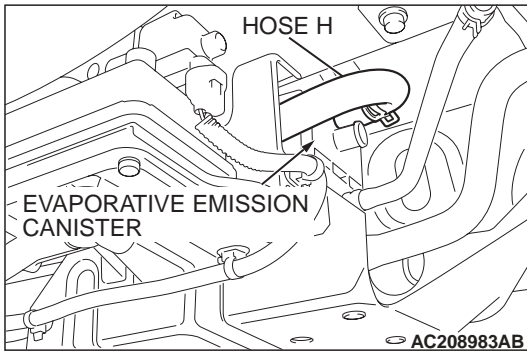
**STEP 5.** Using scan tool MB991502 or MB991958, check the evaporative emission ventilation solenoid and hose H.

**⚠ CAUTION**

To prevent damage to scan tool MB991502 or MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991502 or MB991958.

- (1) Connect scan tool MB991502 or MB991958 to the data link connector.

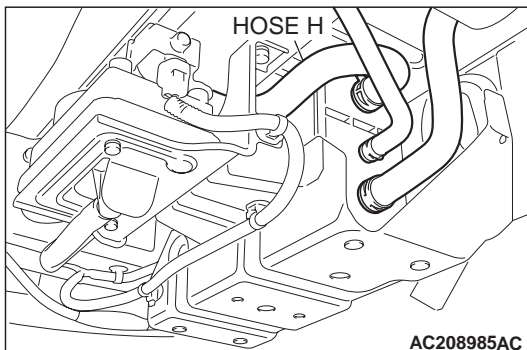




- (2) Disconnect hose H from the evaporative emission canister side, and connect a hand vacuum pump.
- (3) Turn the ignition switch to the "ON" position.
- (4) Set scan tool MB991502 or MB991958 to actuator test mode for item 29: Evaporative Emission Ventilation Solenoid Valve. While the evaporative emission ventilation solenoid valve is activated, 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 MB991502 or MB991958.
- (6) Disconnect the hand vacuum pump, and connect hose H to the evaporative emission canister.

**Q: Did the evaporative emission ventilation solenoid and hose F hold vacuum?**

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



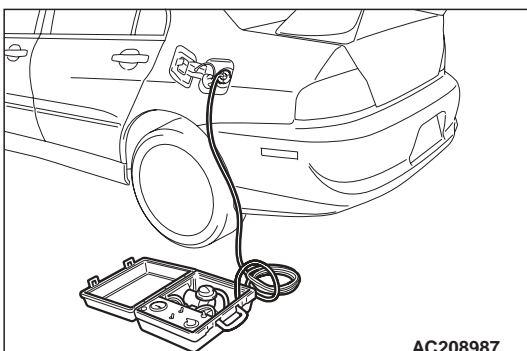
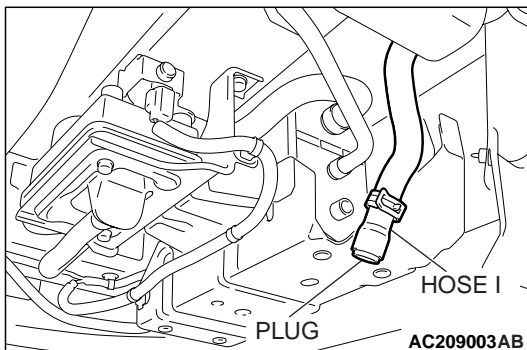
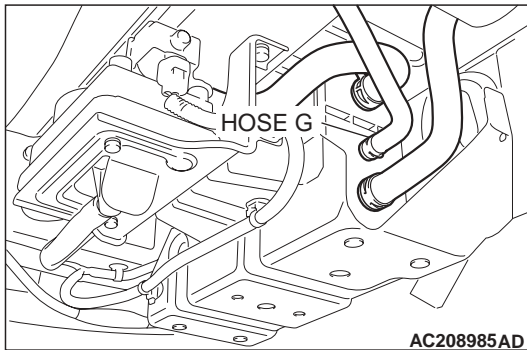
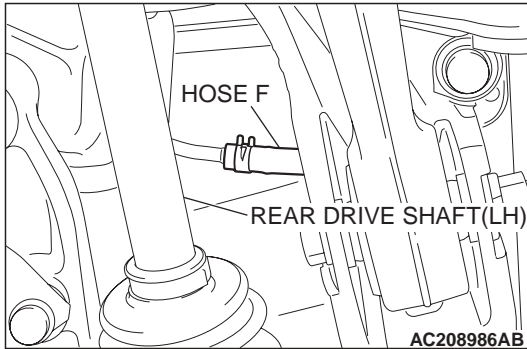
**STEP 6. Check for leaks in the evaporative emission system hose H.**

Perform a vacuum test using a hand vacuum pump on hose H.

**Q: Is the hose in good condition?**

- YES :** Replace the evaporative emission ventilation solenoid. Refer to GROUP 17, Evaporative Emission Canister and Fuel Tank Pressure Relief Valve [P.17-21](#). Go to Step 21.  
**NO :** Replace the damaged hose. Go to Step 21.





### STEP 7. Check for leaks and clogging in evaporative emission system hoses F and G.

Perform a vacuum test using a hand vacuum pump on hoses F and G.

#### Q: Are the hoses in good condition?

**YES** : Go to Step 8.

**NO** : Replace the damaged hose. Go to Step 21.

### STEP 8. Pressure test the evaporative emission system lines from hoses I to O.

- (1) Disconnect hose I from the canister, and plug hose I 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) Remove the fuel cap.

- (4) Connect the evaporative emission system pressure pump to the fuel tank filler tube.
- (5) 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.*

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

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

**YES** : Go to Step 15.

**NO** : Go to Step 9.

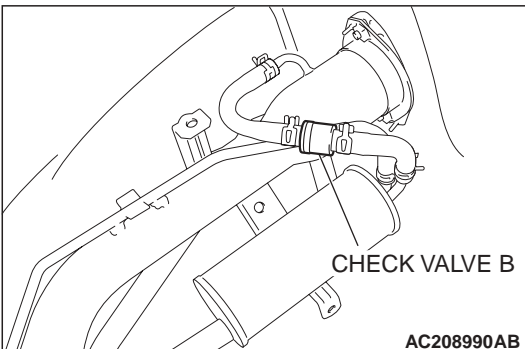
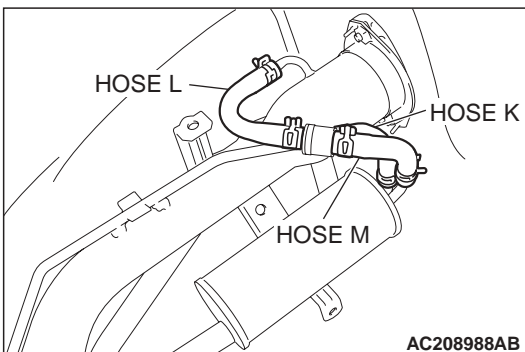
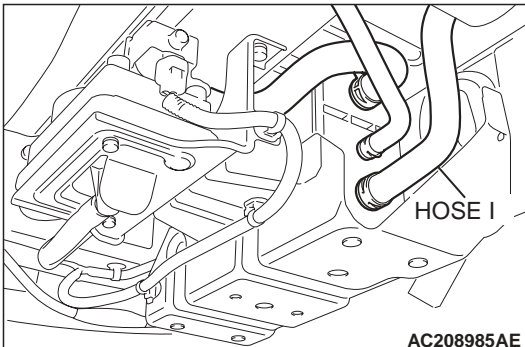
**STEP 9. Check for vacuum leaks in evaporative emission system hoses I, K, L and M.**

- (1) Remove the fuel tank filler tube protector (Refer to GROUP 13B, Fuel Tank P.13B-14).
- (2) Perform a leakage test with a hand vacuum pump on each hose from hoses I, K, L and M.

**Q: Do the hoses hold vacuum?**

**YES :** Go to Step 10.

**NO :** Replace the damaged hose, and reinstall the fuel tank filler tube protector. Refer to GROUP 13B, Fuel Tank P.13B-14. Go to Step 21.



**STEP 10. Test check valve B.**

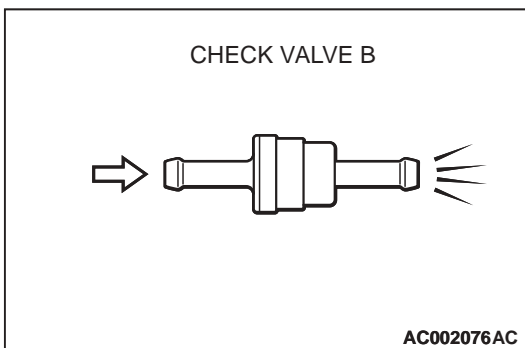
- (1) Check valve B is a one-way check valve.

- (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 11.

**NO :** Replace check valve B, and reinstall the fuel tank filler tube protector. Refer to GROUP 13B, Fuel Tank P.13B-14. Go to Step 21.



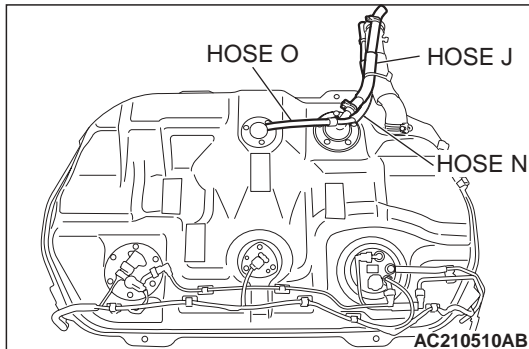
**STEP 11. Check for vacuum leaks in evaporative emission system hoses J, N and O.**

- (1) Remove the fuel tank (Refer to GROUP 13B, Fuel Tank P.13B-14).
- (2) Perform a leakage test with a hand vacuum pump on each hose J, N and O.

**Q: Are the hoses in good condition?**

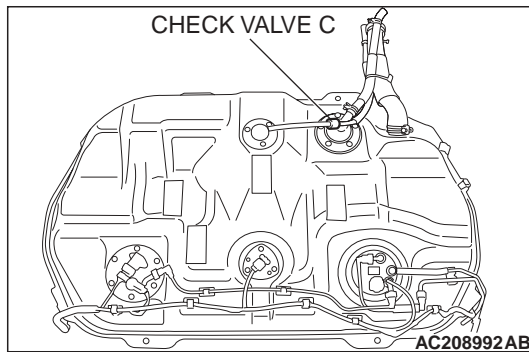
**YES :** Go to Step 12.

**NO :** Replace the damaged hose, and reinstall the fuel tank. Refer to GROUP 13B, Fuel Tank P.13B-14. Go to Step 21.



**STEP 12. Test check valve C.**

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

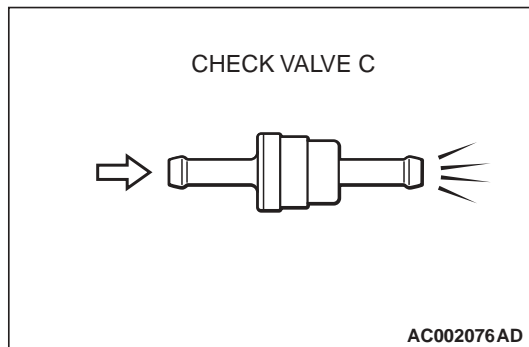


- (2) Check valve C should allow air to flow in only one direction.

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

**YES :** Go to Step 13.

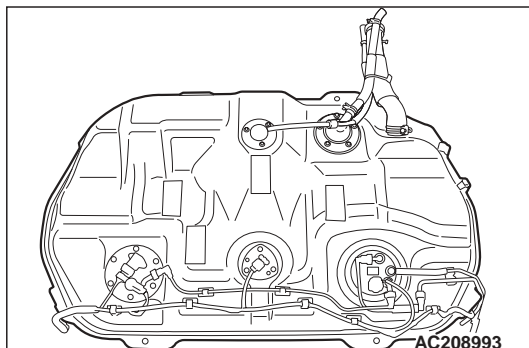
**NO :** Replace check valve C, and reinstall the fuel tank and the fuel tank filler tube protector. Refer to GROUP 13B, Fuel Tank P.13B-14. Go to Step 21 .

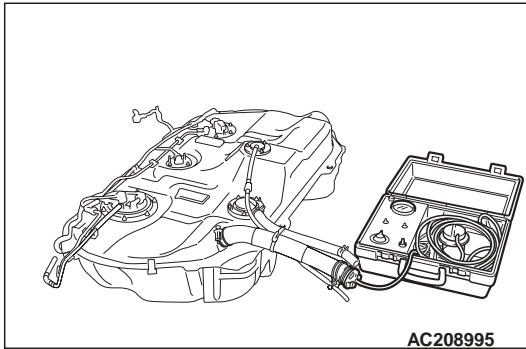


**STEP 13. Check for leaks in the fuel tank.**

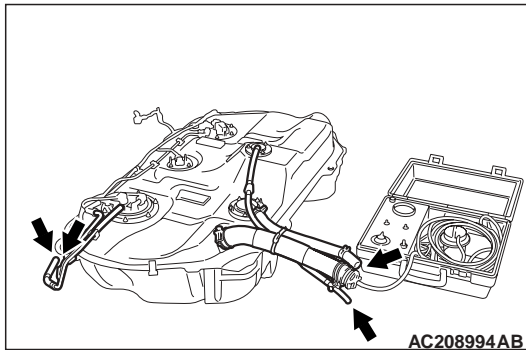
- (1) Visually check for cracks or other leaks in the fuel tank.

*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.



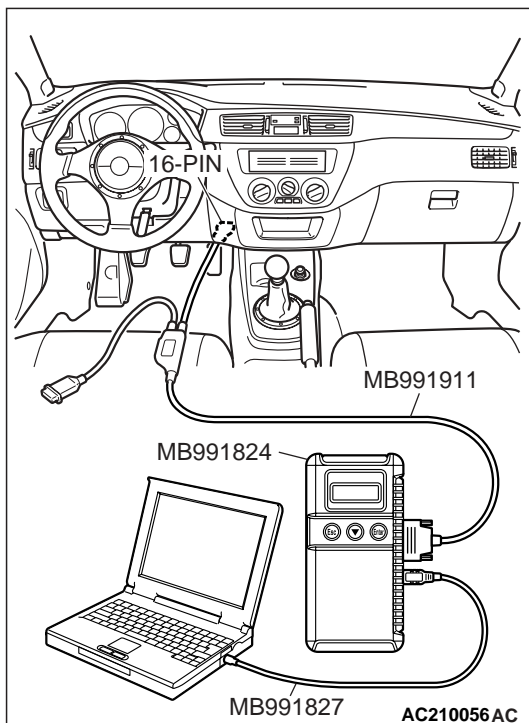
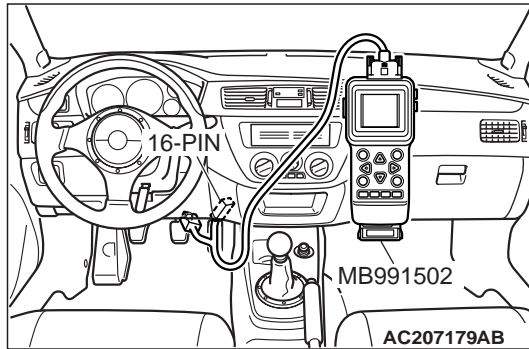
- (3) Plug the hose shown in the illustration.  
*NOTE: If these items are not securely plugged here, the fuel could leak in the next step.*
- (4) Pressurize the fuel tank with the evaporative emission system pressure pump.
- (5) In the pressurized state, check for leaks by applying a soapy water solution 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. Go to Step 21.

**YES :** When there is a leak from the fuel tank, replace the fuel tank. Refer to GROUP 13B, Fuel Tank [P.13B-14](#). Go to Step 21.

**NO :** When there is no leak, reinstall the fuel tank, refer to GROUP 13B, Fuel Tank [P.13B-14](#). Go to Step 14.



**STEP 14.** Using scan tool MB991502 or MB991958, check the evaporative emission system monitor test.

**⚠ CAUTION**

- To prevent damage to scan tool MB991502 or MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991502 or MB991958.
- During this test, the ECM automatically increases the engine speed to 1,600 r/min or greater. Check that the transaxle is set to the neutral position.

- (1) Connect scan tool MB991502 or MB991958 to the data link connector.
- (2) Turn the ignition switch to the "ON" position.
- (3) Erase the DTCs using scan tool MB991502 or 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 MB991502 or MB991958 will change from "NO" to "YES."
- (10) Turn the ignition switch to the "LOCK" (OFF) position. Disconnect scan tool MB991502 or MB991958.

**Q: Is "Evap Leak Mon. Completed. Test Failed and DTCs Set" displayed on scan tool MB991502 or MB991958?**

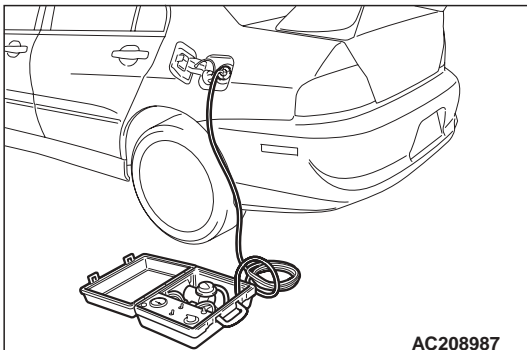
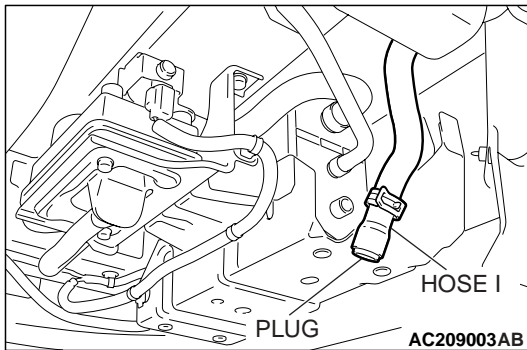
**YES :** Replace the ECM. Go to Step 21.

**NO :** If "Evap Leak Mon. Completed. Test Passed" is displayed on scan tool MB991502 or MB991958, the evaporative emission system is working properly at this time. Go to Step 21

**NO :** If "Evap Leak Mon. Discontinued. Retest again from the first" is displayed on scan tool MB991502 or 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.

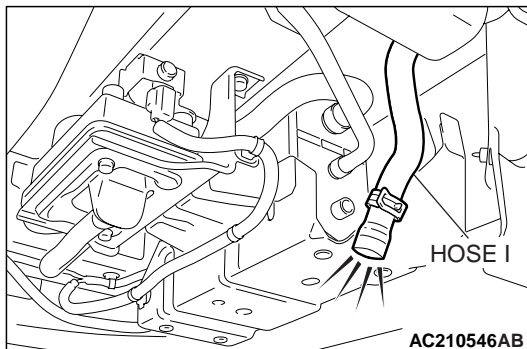
**STEP 15. Pressure test for clogging in evaporator line from hoses I to O.**

- (1) Disconnect hose I from the canister side, and plug the hose.
- (2) Remove the fuel cap.



- (3) Connect the evaporative emission system pressure pump (Miller number 6872A) to the fuel tank filler tube and apply pressure.

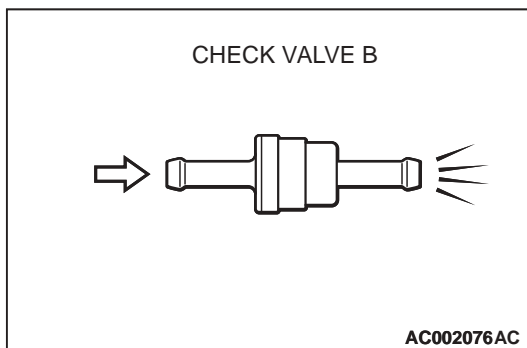
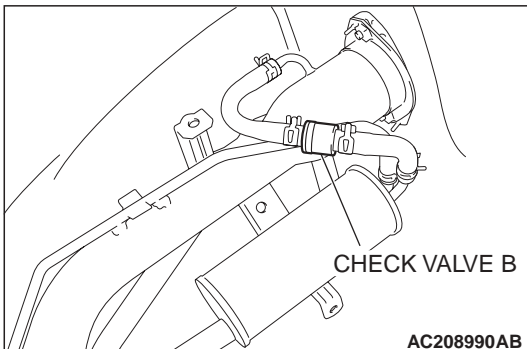
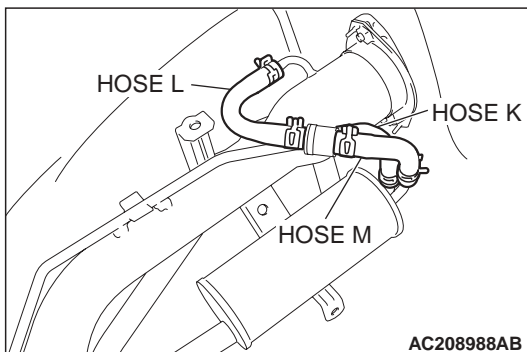
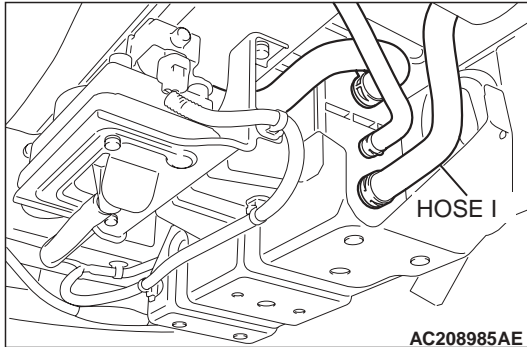
*NOTE: "Pressure test" in this procedure refers to the I/ M240 Simulation Test (8 simple steps) described in the evaporative emission system pressure pump (Miller number 6872A) manufacture's instructions located in the lid of the pump box.*



- (4) After it is confirmed that pressure maintained, unplug hose I.
- (5) Disconnect the evaporative emission system pressure pump, and reinstall the fuel cap.
- (6) Connect hose I to the evaporative emission canister.

**Q: Is air blown from hose I?**

- YES :** Go to Step 20.  
**NO :** Go to Step 16.



**STEP 16. Check for clogging in the evaporator line hoses I, K,L and M.**

- (1) Remove the fuel tank filler tube protector (Refer to GROUP 13B, Fuel Tank P.13B-14).
- (2) The clogging test with a hand vacuum pump on each hose from hoses I,K,L and M.

**Q: Are the hoses in good condition?**

**YES :** Go to Step 17.

**NO :** Replace the damaged hose, and the fuel tank filler tube protector. Refer to GROUP 13B, Fuel Tank P.13B-14. Go to Step 21.

**STEP 17. Test check valve B.**

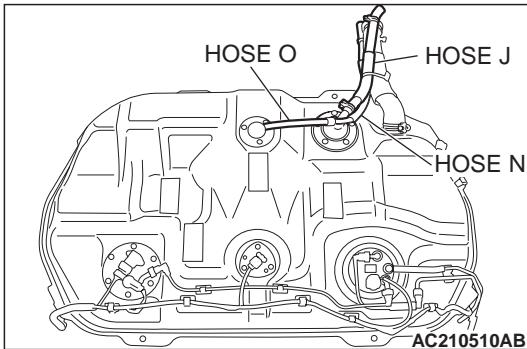
- (1) Check valve B is a one-way check valve.

- (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 :** Go to Step 18.

**NO :** Replace check valve B, and reinstall the fuel tank filler tube protector. Refer to GROUP 13B, Fuel Tank P.13B-14. Go to Step 21.



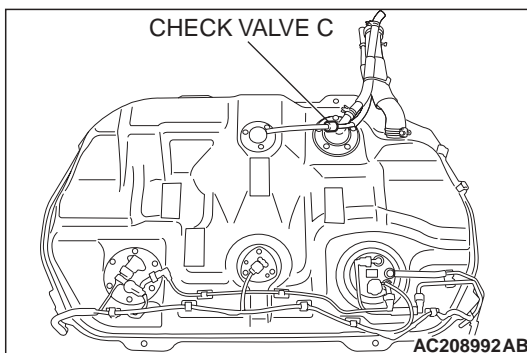
**STEP 18. Check for clogging in the evaporator line from hoses J,N and O.**

Remove the fuel tank (Refer to GROUP 13B, Fuel Tank P.13B-14).

**Q: Are the hoses in good condition?**

**YES** : Go to Step 19.

**NO** : Replace the damaged hose, and reinstall the fuel tank. Refer to GROUP 13B, Fuel Tank P.13B-14. Go to Step 21.



**STEP 19. Test check valve C.**

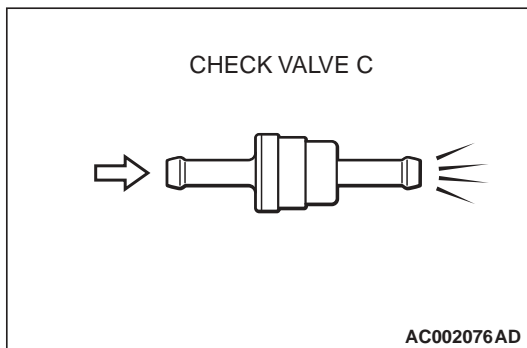
(1) Check valve C is a one-way check valve.

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

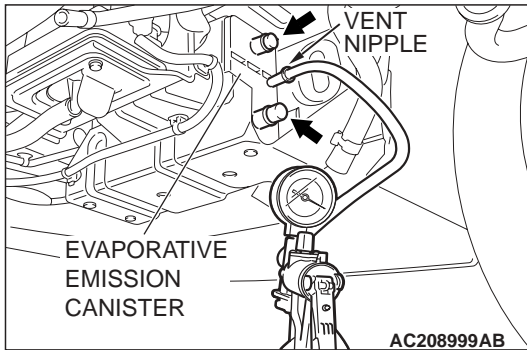
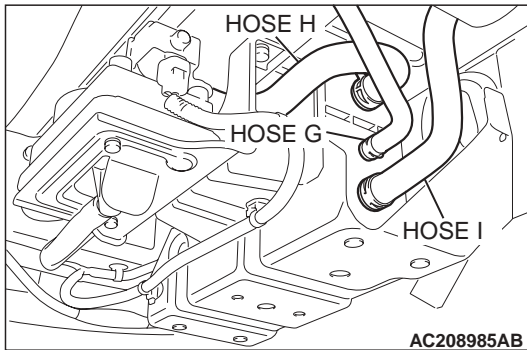
**Q: Does check valve C allow air to pass in one direction only?**

**YES** : Go to Step 21.

**NO** : Replace check valve C, reinstall the fuel tank and the fuel tank filler tube protector. Refer to GROUP 13B, Fuel Tank P.13B-14. Go to Step 21.








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**STEP 20. Check the evaporative emission canister for leaks and clogging.**

- (1) Disconnect hoses G, H and I from the canister side, and connect a hand vacuum pump to the canister instead of hose G, 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 G, H and I 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.17-21](#). Go to Step 21.

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**STEP 21. Perform the OBD-II drive cycle.**

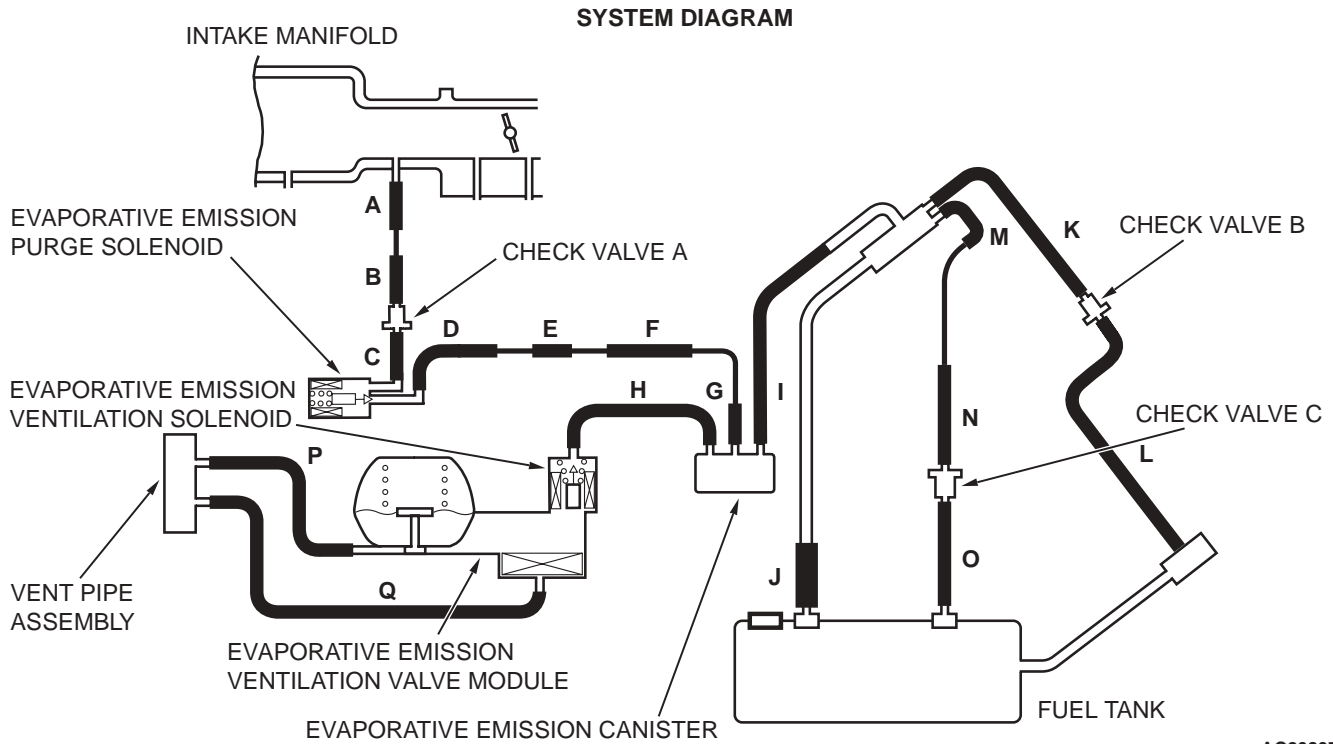
- (1) Confirm the repair by performing the appropriate drive cycle. Refer to Diagnostic Function – OBD-II Drive Cycle – Procedure 1 – Evaporative Emission System Leak Monitor [P.13A-6](#).
- (2) Read the diagnostic trouble code (DTC).

**Q: Is DTC P0455 set?**

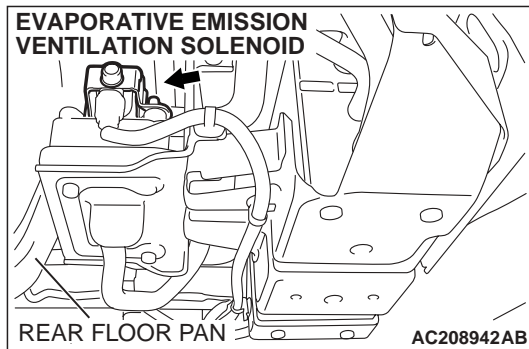
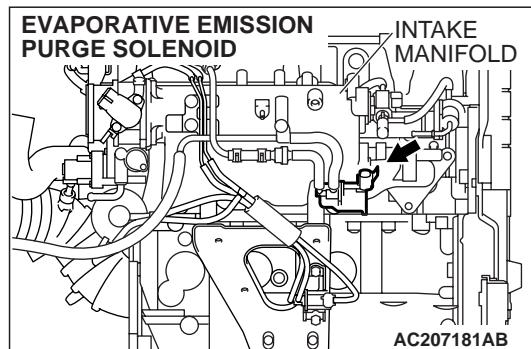
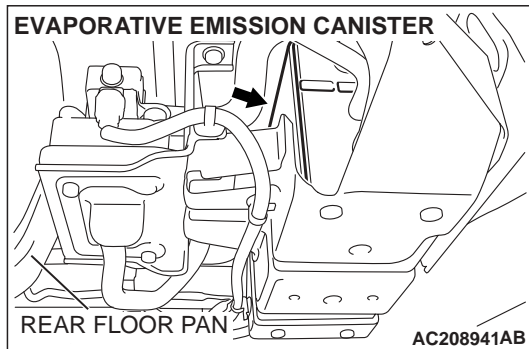
**YES** : Return to Step 1.

**NO** : The procedure is complete.

**DTC P0456: Evaporative Emission System Leak Detected (Very Small Leak)**



AC208373AB



**TECHNICAL DESCRIPTION**

- The ECM monitors the Evaporative Emission (EVAP) System pressure.

- The ECM controls the evaporative emission ventilation solenoid. It closes the evaporative emission ventilation solenoid to seal the evaporative emission canister side of the system.

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

### 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.
- Fuel level sensor output voltage is 2.4 – 3.7 volts when the engine is started, 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

- 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).
- Engine coolant temperature is greater than 20°C (68°F).
- 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.
- ECM monitors for this condition once during drive cycle.

#### 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:

- MB991502: Scan Tool (MUT-II)
- MB991958: Scan Tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991911: Main Harness B

**STEP 1.** Using scan tool MB991502 or MB991958, check the evaporative emission system monitor test.

**⚠ CAUTION**

- To prevent damage to scan tool MB991502 or MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991502 or MB991958.
- During this test, the ECM will automatically increase the engine speed to 1,600 r/min or greater. Check that the transaxle is set to the neutral position.

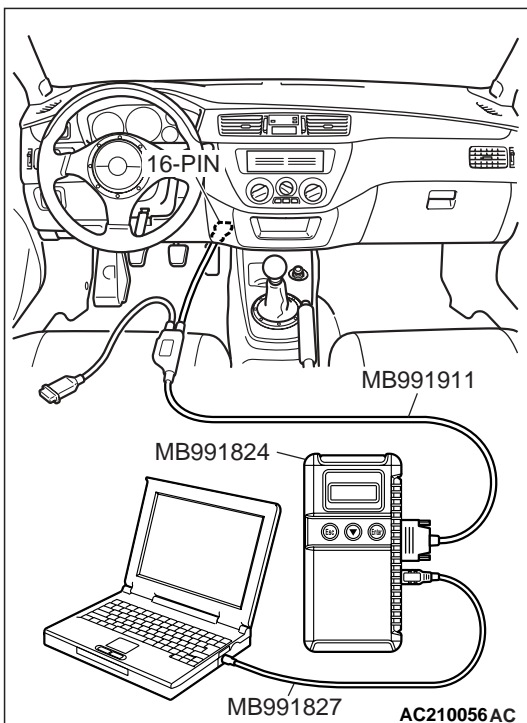
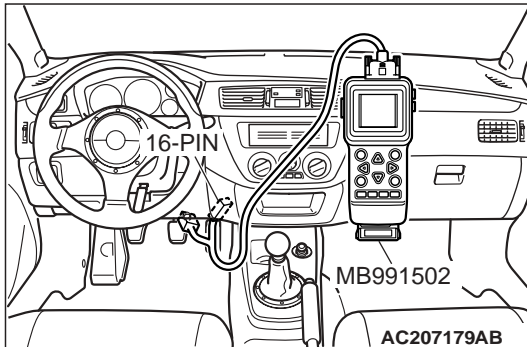
- (1) Connect scan tool MB991502 or MB991958 to the data link connector.
- (2) Turn the ignition switch to the "ON" position.
- (3) Erase the DTCs using scan tool MB991502 or MB991958.
- (4) Check that the fuel cap is securely closed. (Tighten until three clicks are heard.)
- (5) Start the engine.
- (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 MB991502 or MB991958 will change from "NO" to "YES."
- (10) Turn the ignition switch to the "LOCK" (OFF) position, and disconnect scan tool MB991502 or MB991958.

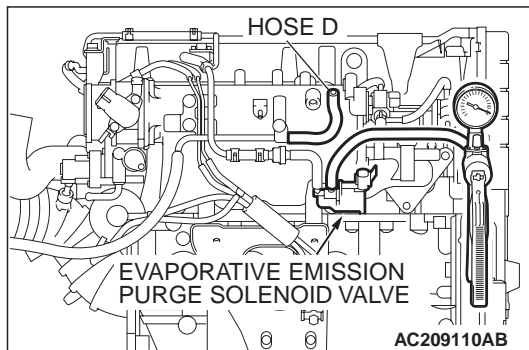
**Q: Is "Evap Leak Mon. Completed. Test Failed and DTCs Set" displayed on scan tool MB991502 or MB991958?**

**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.13A-25](#). If no other DTC's have been set, go to Step 2.

**NO :** If "Evap Leak Mon. Completed. Test Passed" is displayed on scan tool MB991502 or 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 turn on. Return the vehicle to the customer.

**NO :** If "Evap Leak Mon. Discontinued. Retest again from the first" is displayed on scan tool MB991502 or 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.





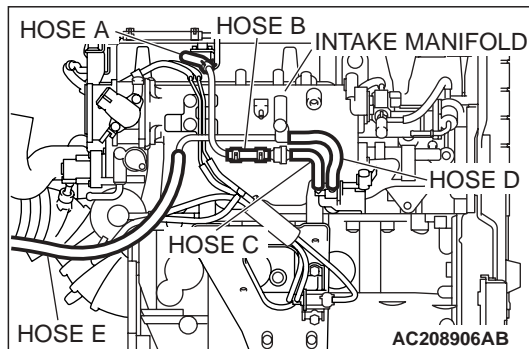
**STEP 2. Check the evaporative emission purge solenoid for leaks.**

- (1) Disconnect hose D 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 D 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. Go to Step 16.



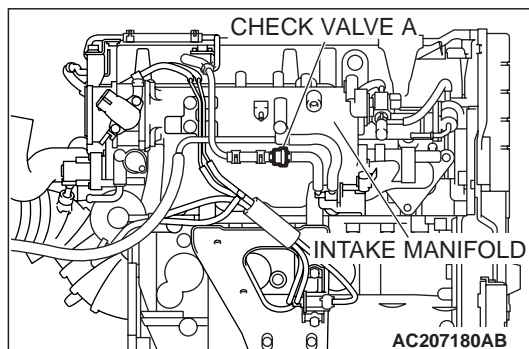
**STEP 3. Check for leaks in evaporative emission system hoses A through E.**

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

**Q: Are the hoses in good condition?**

**YES :** Go to Step 4.

**NO :** Replace any damaged hose. Go to Step 16.



**STEP 4. Test check valve A.**

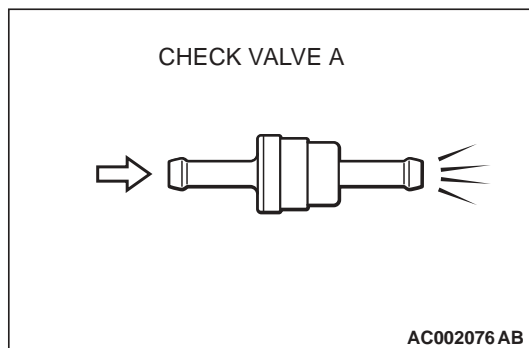
- (1) Check valve A is a one-way check valve.

- (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 5.

**NO :** Replace check valve A. Go to Step 16.

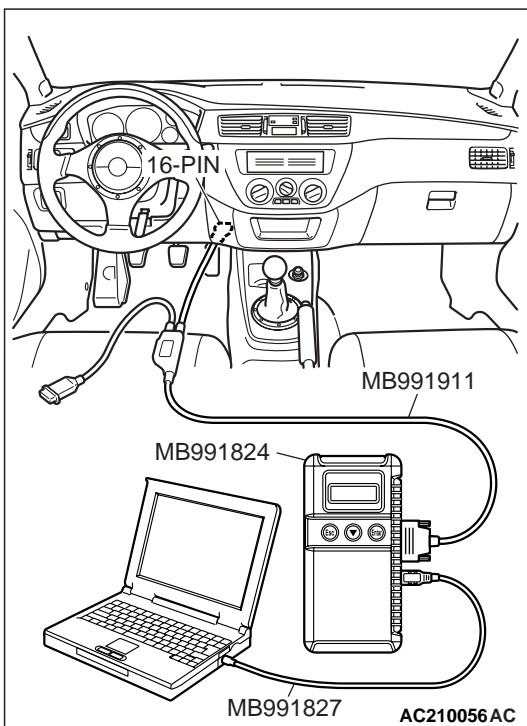
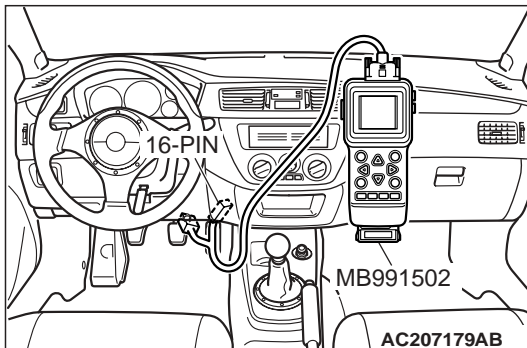


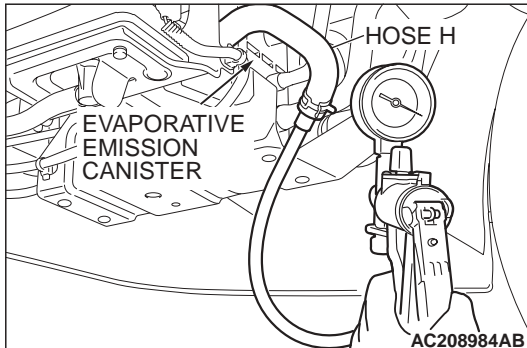
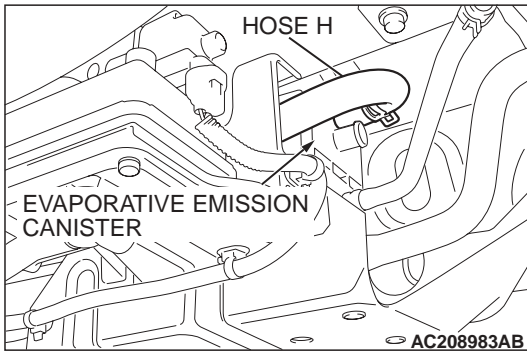
**STEP 5. Check the evaporative emission ventilation solenoid and hose H using scan tool MB991502 or MB991958.**

**⚠ CAUTION**

To prevent damage to scan tool MB991502 or MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991502 or MB991958.

- (1) Connect scan tool MB991502 or MB991958 to the data link connector.



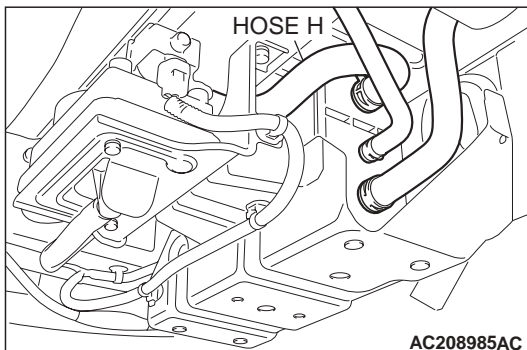


- (2) Disconnect hose H from the evaporative emission canister side, and connect a hand vacuum pump.
- (3) Turn the ignition switch to the "ON" position.
- (4) Set scan tool MB991502 or MB991958 to actuator test mode for item 29: Evaporative Emission Ventilation Solenoid. While the evaporative emission 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 MB991502 or MB991958.
- (6) Disconnect the hand vacuum pump, and connect hose H to the evaporative emission canister.

**Q: Did the evaporative emission ventilation solenoid hold vacuum?**

**YES :** Go to Step 7.

**NO :** Go to Step 6.



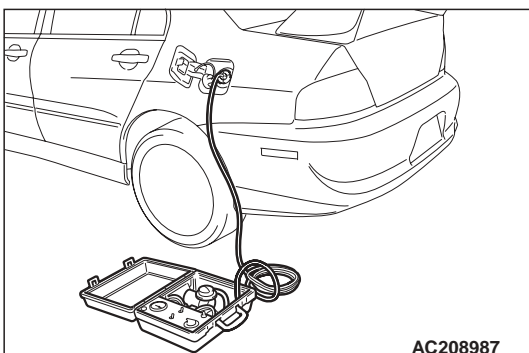
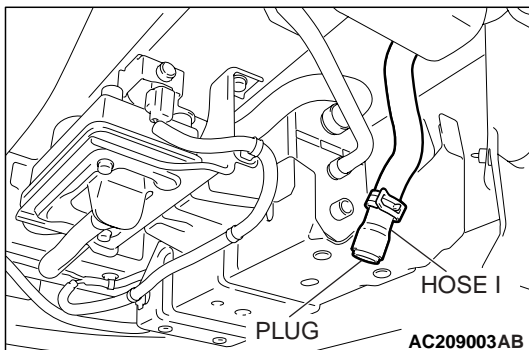
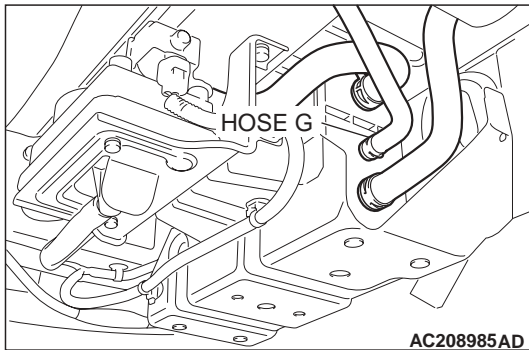
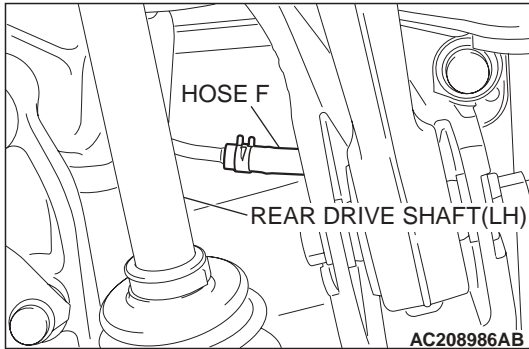
**STEP 6. Check for leaks in evaporative emission system hose H.**

Use a hand vacuum pump to test each hose from hose H.

**Q: Are the hoses in good condition?**

**YES :** Replace the evaporative emission ventilation solenoid. Go to Step 16.

**NO :** Replace hose H. Go to Step 16.



**STEP 7. Check for leaks in evaporative emission system hoses F and G.**

Use a hand vacuum pump to test each hose from hose F to hose G.

**Q: Are the hoses in good condition?**

**YES :** Go to Step 8.

**NO :** Replace the damaged hose. Go to Step 16.

**STEP 8. Pressure test the evaporative emission system lines between hoses I and O through the fuel tank.**

- (1) Disconnect hose I from the canister, and plug hose I 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 tank filler tube.
- (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.*

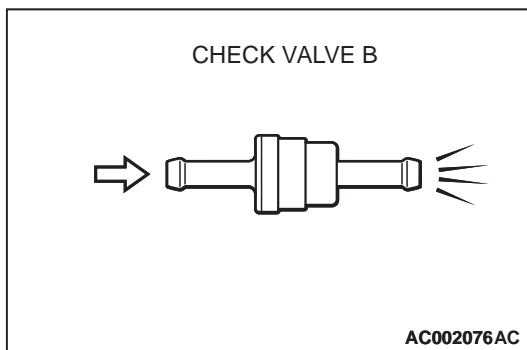
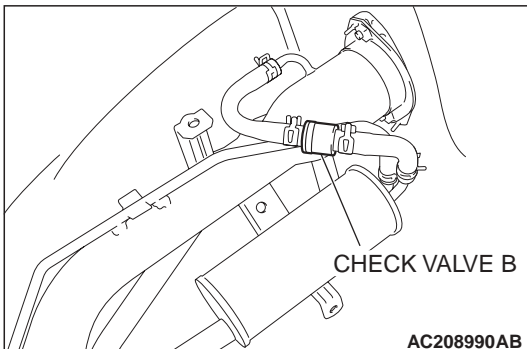
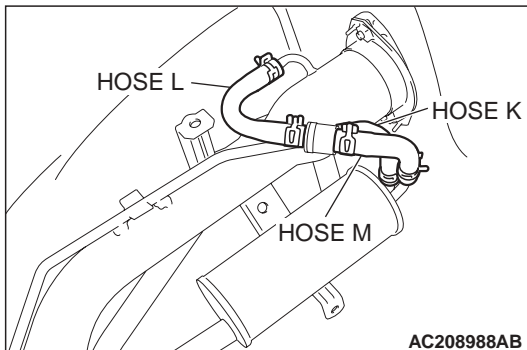
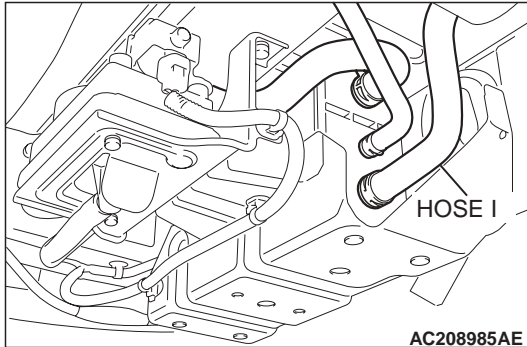
- (5) Disconnect the evaporative emission system pressure pump, and reinstall the fuel cap.
- (6) Connect hose I to the canister.

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

**YES :** Go to Step 15.

**NO :** Go to Step 9.






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**STEP 9. Check for leaks in evaporative emission system hoses I,K,L and M.**

- (1) Remove the fuel tank filler tube protector (Refer to GROUP 13B, Fuel Tank P.13B-14).
- (2) Perform a leakage test with a hand vacuum pump on each hose I, K, L and M.

**Q: Do the hoses hold vacuum?**

**YES :** Go to Step 10.

**NO :** Replace any damaged hose, and reinstall the fuel tank filler tube protector. Refer to GROUP 13B, Fuel Tank P.13B-14. Go to Step 16.

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**STEP 10. Test check valve B.**

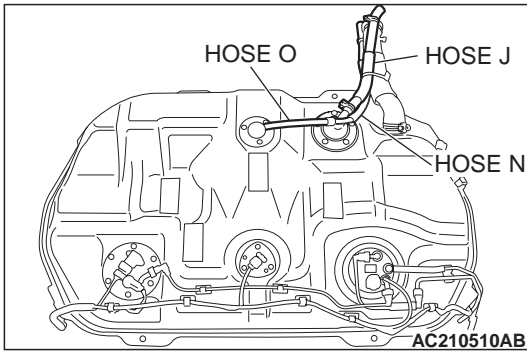
- (1) Check valve B is a one-way check valve.

- (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 11.

**NO :** Replace check valve B, and reinstall the fuel tank filler tube protector. Refer to GROUP 13B, Fuel Tank P.13B-14. Go to Step 16.



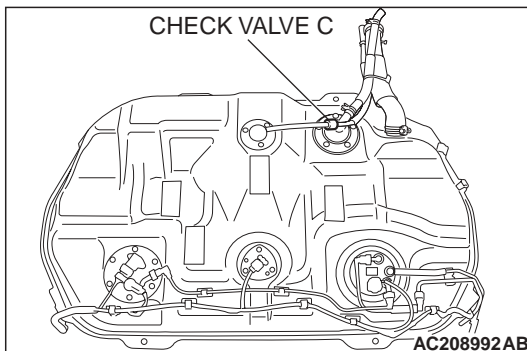
**STEP 11. Check for leaks in evaporative emission system hoses J, N and O.**

- (1) Remove the fuel tank (Refer to GROUP 13B, Fuel Tank P.13B-14).
- (2) Perform a leakage test with a hand vacuum pump on each hose J, N and O.

**Q: Do the hoses hold vacuum?**

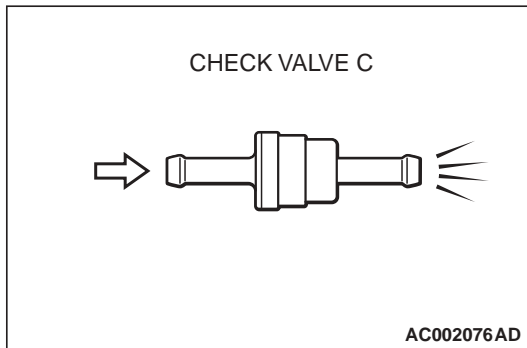
**YES :** Go to Step 12.

**NO :** Replace any damaged hose, and reinstall the fuel tank. Refer to GROUP 13B, Fuel Tank P.13B-14. Go to Step 16.



**STEP 12. Test check valve C.**

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

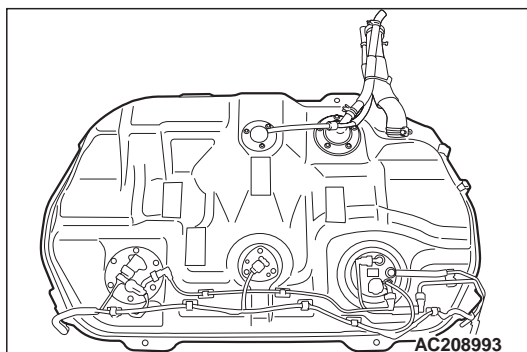


- (2) Check valve C should allow air to flow in only one direction.

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

**YES :** Go to Step 13.

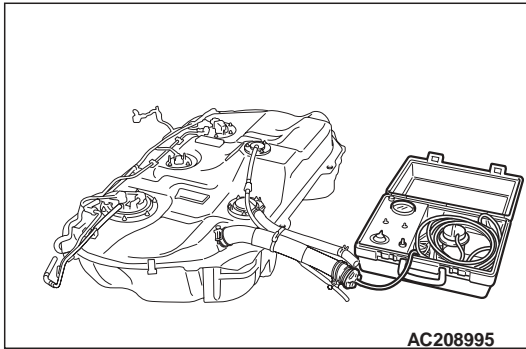
**NO :** Replace check valve C, and reinstall the fuel tank and the fuel tank filler tube protector. Refer to GROUP 13B, Fuel Tank P.13B-14. Go to Step 16 .



**STEP 13. Check for leaks in the fuel tank.**

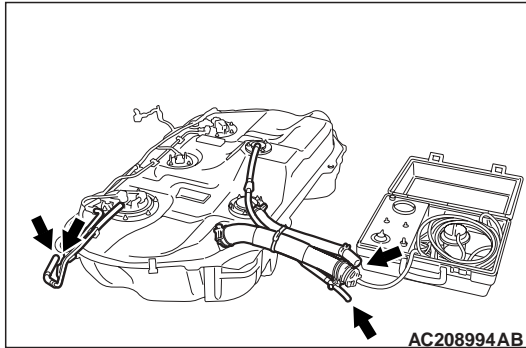
- (1) Visually check for cracks or other leaks in the fuel tank.

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



AC208995

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



AC208994AB

- (3) Plug the hose shown in the illustration.

*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. Go to Step 16.

**YES :** When there is a leak from the fuel tank, replace the fuel tank. Refer to GROUP 13B, Fuel Tank [P.13B-14](#). Go to Step 16.

**NO :** When there is no leak, reinstall the fuel tank, refer to GROUP 13B, Fuel Tank [P.13B-14](#). Go to Step 14.

**STEP 14.** Using scan tool MB991502 or MB991958, check the evaporative emission system monitor test.

**⚠ CAUTION**

- To prevent damage to scan tool MB991502 or MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991502 or MB991958.
- During this test, the ECM automatically increases the engine speed to 1,600 r/min or greater. Check that the transaxle is set to the neutral position.

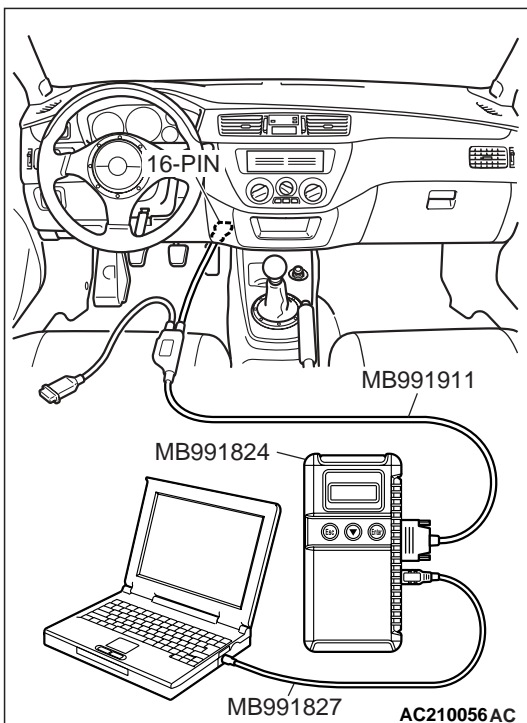
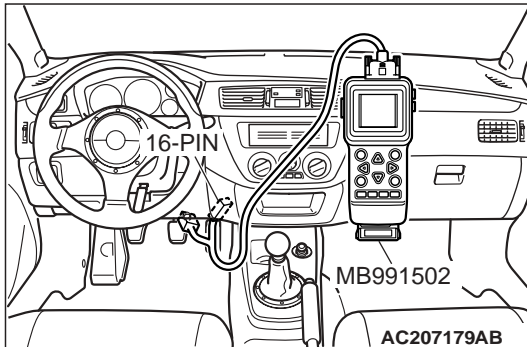
- (1) Connect scan tool MB991502 or MB991958 to the data link connector.
- (2) Turn the ignition switch to the "ON" position.
- (3) Erase the DTCs using scan tool MB991502 or MB991958.
- (4) Check that the fuel cap is securely closed. (Tighten until three clicks are heard.)
- (5) Start the engine.
- (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 MB991502 or MB991958 will change from "NO" to "YES."
- (10) Turn the ignition switch to the "LOCK" (OFF) position. Disconnect scan tool MB991502 or MB991958.

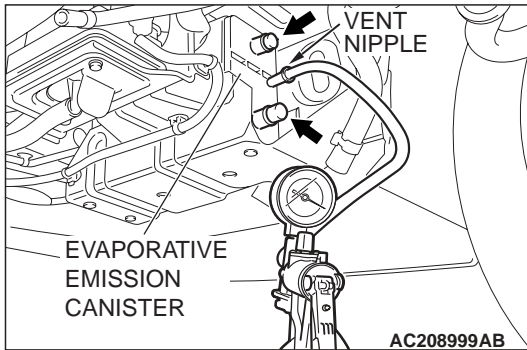
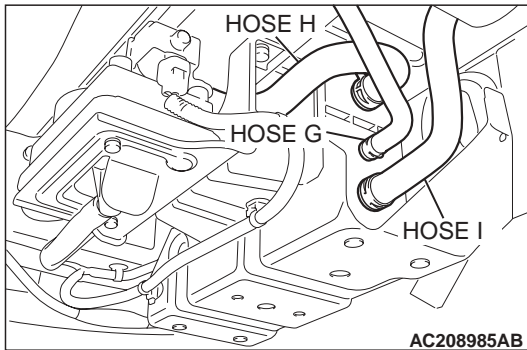
**Q: Is "Evap Leak Mon. Completed. Test Failed and DTCs Set" displayed on scan tool MB991502 or MB991958?**

**YES :** Replace the ECM. Go to Step 16.

**NO :** If "Evap Leak Mon. Completed. Test Passed" is displayed on scan tool MB991502 or MB991958, the evaporative emission system is working properly at this time. Go to Step 16

**NO :** If "Evap Leak Mon. Discontinued. Retest again from the first" is displayed on scan tool MB991502 or 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. Check for leaks in the evaporative emission canister.**

- (1) Disconnect hoses G, H and I from the evaporative emission canister side, and connect a hand vacuum pump to the evaporative emission canister instead of hose G, 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 G, H and I 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.17-21. Go to Step 16 .

**STEP 16. 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.13A-6.
- (2) Read the diagnostic trouble code (DTC).

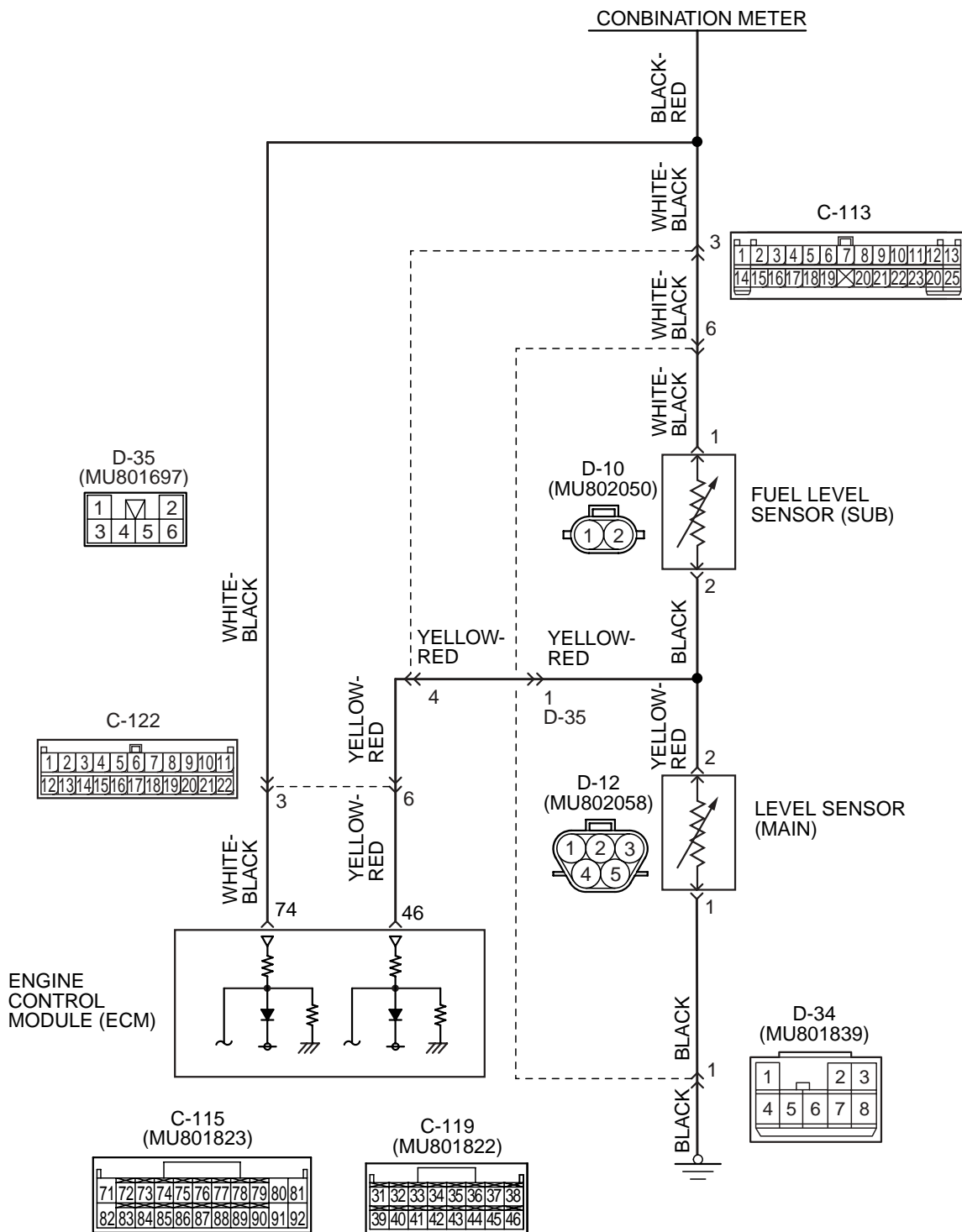
**Q: Is DTC P0456 set?**

**YES** : Return to Step 1.

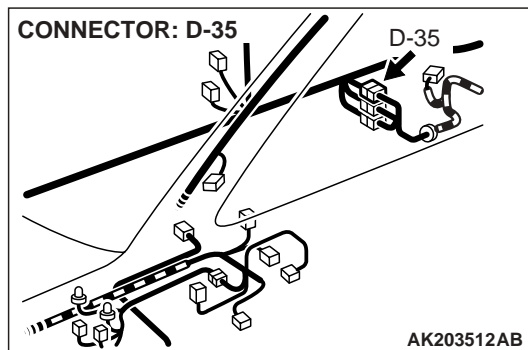
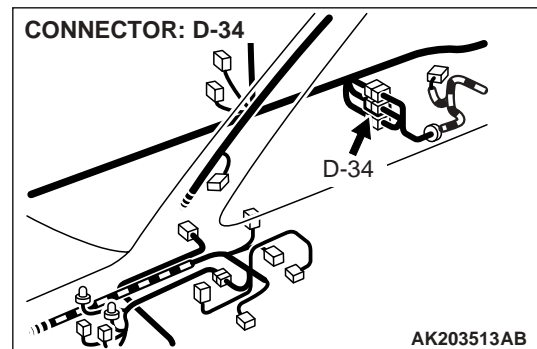
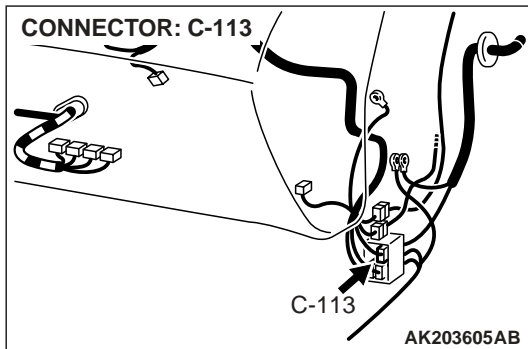
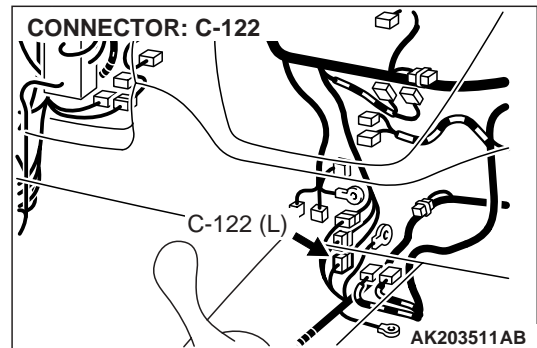
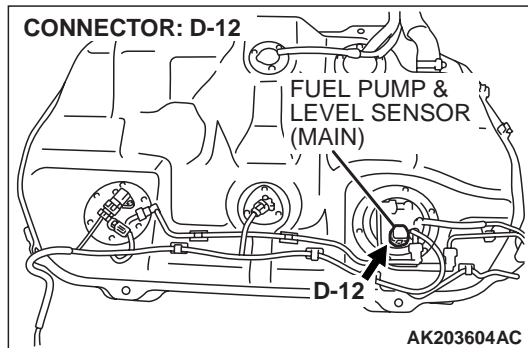
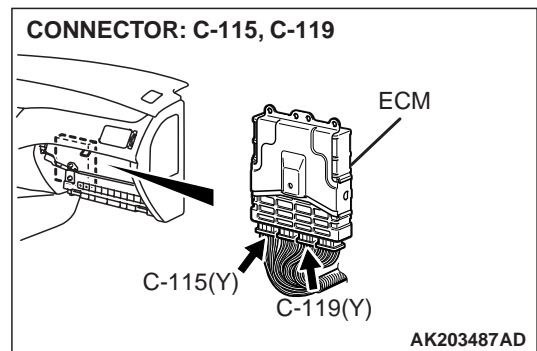
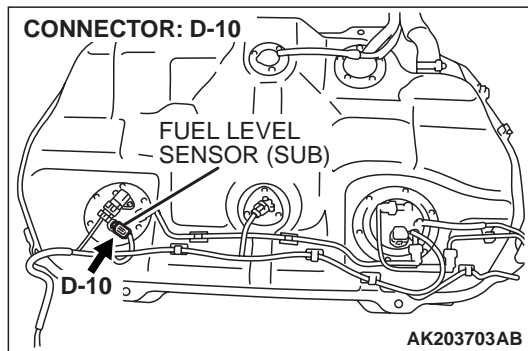
**NO** : The procedure is complete.

DTC P0461: FUEL LEVEL SENSOR CIRCUIT RANGE/PERFORMANCE (SENSOR 1)

Fuel Level Sensor Circuit



AK203702



**CIRCUIT OPERATION**

- The fuel level sensor signal (main) is input in ECM (terminal No. 74).

**TECHNICAL DESCRIPTION**

- Branch the drive signal from the fuel gauge circuit, and input it into ECM.
- The ECM detects the amount of fuel left in the fuel tank with this signal, and also controls the fuel level warning light.

**DTC SET CONDITIONS**

**Check Conditions, Judgement Criteria**

- When the fuel consumption calculated from the operation time of the injector amounts to 40 liters (10.5 gal), the diversity of the amount of fuel in tank calculated from the fuel level sensor is 2 liters (0.5 gal) or less.

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

- Fuel level sensor failed.

- Open or shorted fuel level sensor circuit, or connector damage.
- ECM failed.

**DIAGNOSIS**

**STEP 1. Check fuel gauge.**

**Q: Is the fuel gauge functioning?**

- YES :** Go to Step 5.  
**NO :** Go to Step 2.

**STEP 2. Using scan tool MB991502 or MB991958, read the diagnostic trouble code (DTC).**

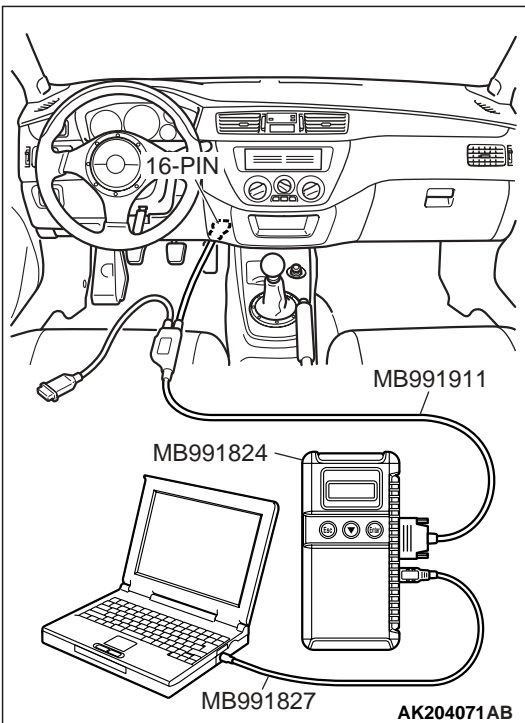
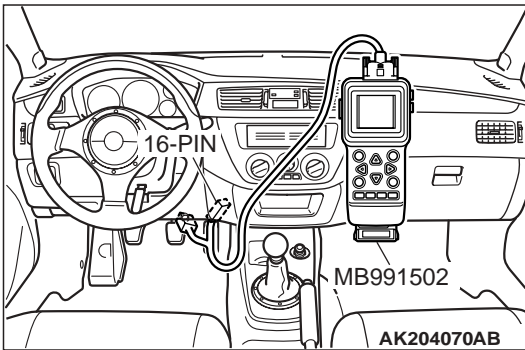
**⚠ CAUTION**

To prevent damage to scan tool MB991502 or MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991502 or MB991958.

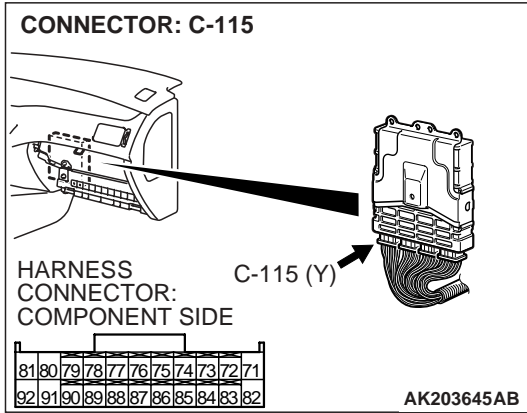
- (1) Connect scan tool MB991502 or MB991958 to the data link connector.
- (2) Turn the ignition switch to the "ON" position.
- (3) Read the DTC.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is DTC P2066 set?**

- YES :** Go to Step 3.  
**NO :** Go to Step 4.







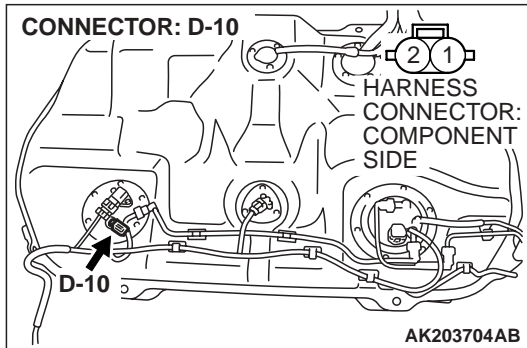
**STEP 3. Check for short circuit to ground between ECM connector C-115 (terminal No. 74) and fuel level sensor (sub) connector D-10 (terminal No. 1).**

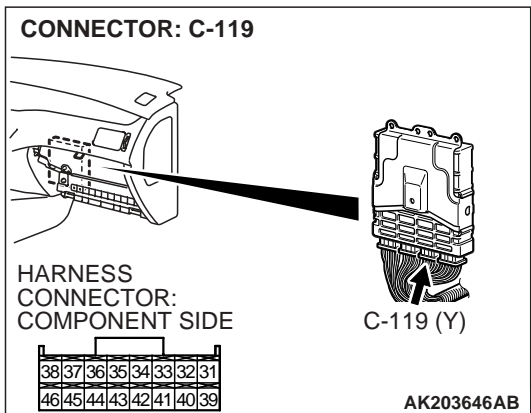
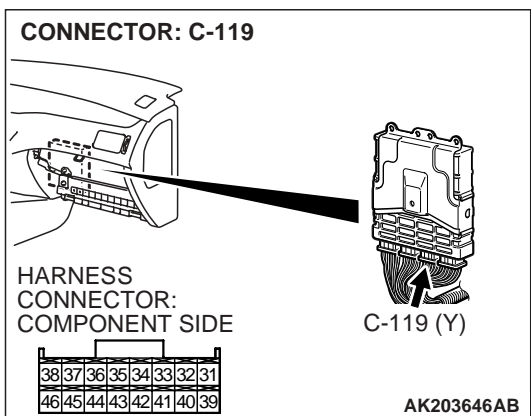
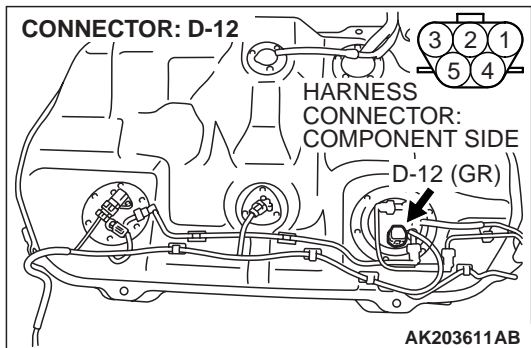
*NOTE: Check harness after checking intermediate connectors C-113, C-122 and D-34. If intermediate connectors are damaged, repair or replace them. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 7.*

**Q: Is the harness wire in good condition?**

**YES :** Refer to GROUP 54A, Chassis Electrical – Combination Meters Assembly and Vehicle Speed Sensor – Equipment Diagnosis – Symptom Chart P.54A-54.

**NO :** Repair it. Then go to Step 8.





**STEP 4. Check for short circuit to ground between ECM connector C-119 (terminal No. 46) and fuel pump and level sensor (main) connector D-12 (terminal No. 2) .**

*NOTE: Check harness after checking intermediate connectors C-113, C-122 and D-35. If intermediate connectors are damaged, repair or replace them. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 7.*

**Q: Is the harness wire in good condition?**

**YES :** Refer to GROUP 54A, Chassis Electrical – Combination Meters Assembly and Vehicle Speed Sensor – Equipment Diagnosis – Symptom Chart P.54A-54.

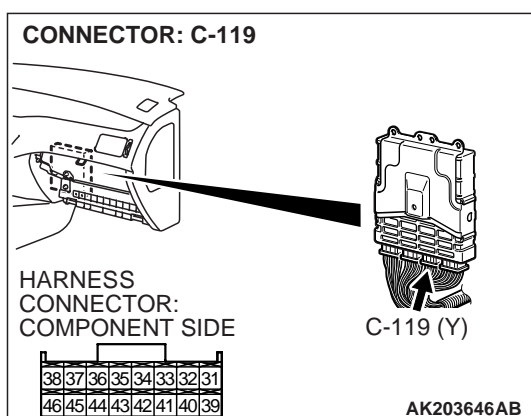
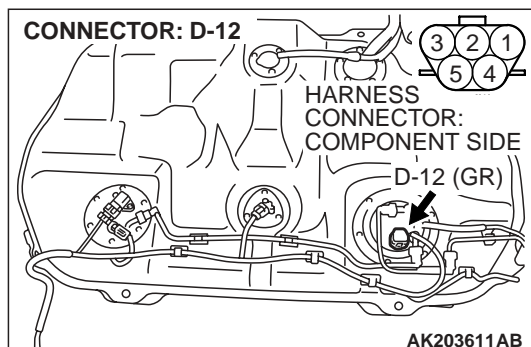
**NO :** Repair it. Then go to Step 8.

**STEP 5. Check connector C-119 at ECM for damage.**

**Q: Is the 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 8.



**STEP 6. Check for open circuit or harness damage between ECM connector C-119 (terminal No. 74) and fuel pump and level sensor (main) connector D-12 (terminal No. 2).**

*NOTE: Check harness after checking intermediate connectors C-113, C-122 and D-35. If intermediate connectors are damaged, repair or replace them. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 7.*

**Q: Is the harness wire in good condition?**

**YES :** Go to Step 7.

**NO :** Repair it. Then go to Step 8.

**STEP 7. Retest the system.**

- (1) Carry out a test drive with the drive cycle pattern. Refer to GROUP 13A, Diagnostic Function – OBD-II Drive Cycle – Procedure 6 – Other Monitor P.13A-6.
- (2) Check the diagnostic trouble code (DTC).

**Q: Is DTC P0461 set?**

**YES :** Replace the ECM. 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. Perform the OBD-II drive cycle.**

- (1) Carry out a test drive with the drive cycle pattern. Refer to GROUP 13A, Diagnostic Function – OBD-II Drive Cycle – Procedure 6 – Other Monitor P.13A-6.
- (2) Check the diagnostic trouble code (DTC).

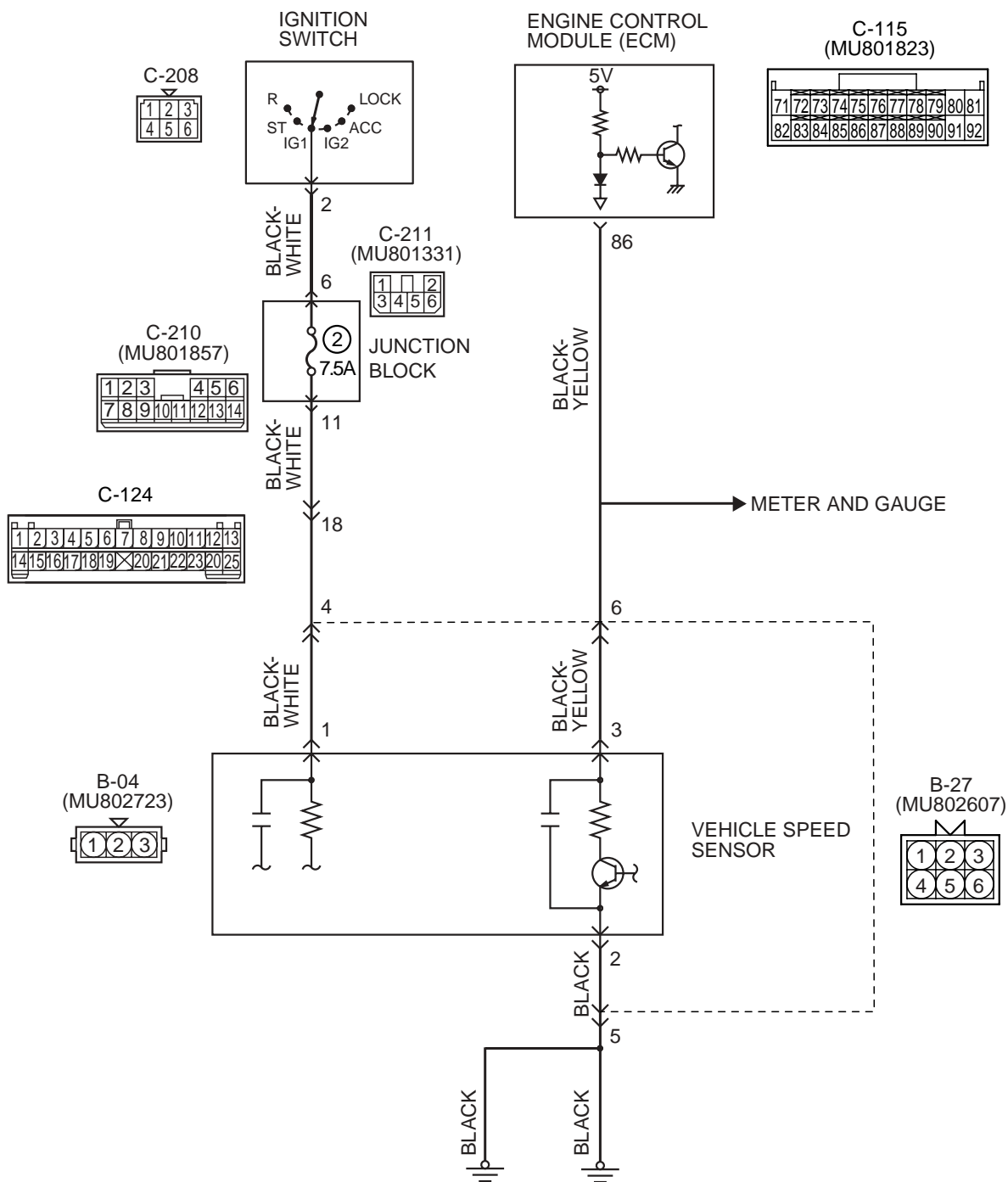
**Q: Is DTC P0461 set?**

**YES :** Repeat the troubleshooting.

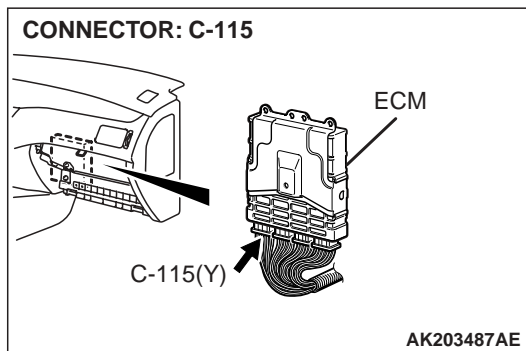
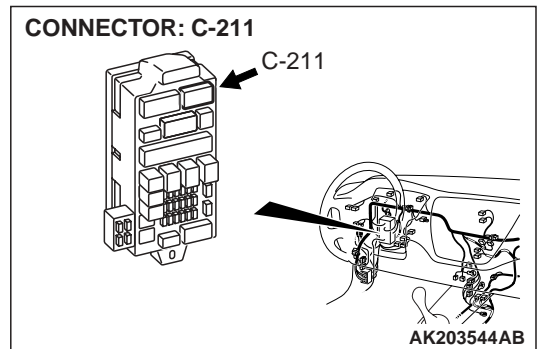
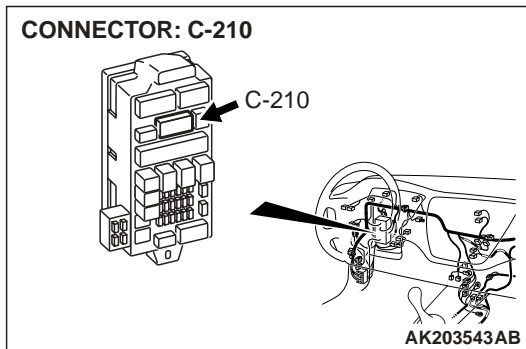
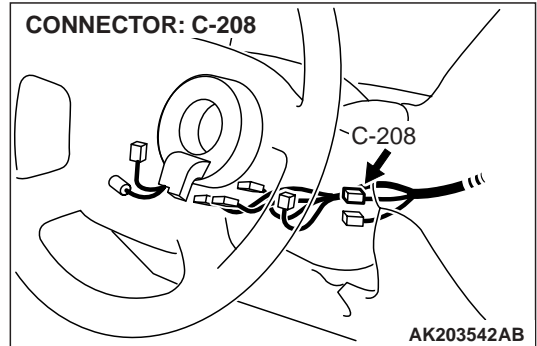
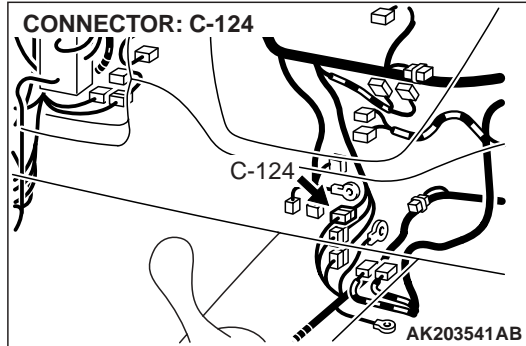
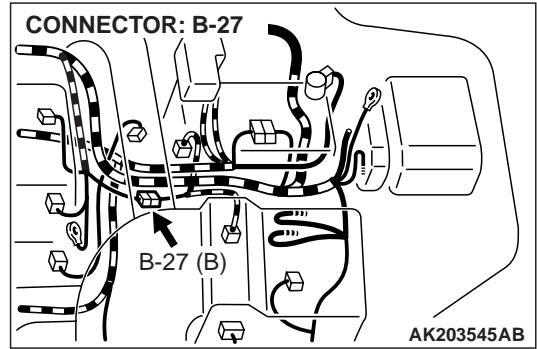
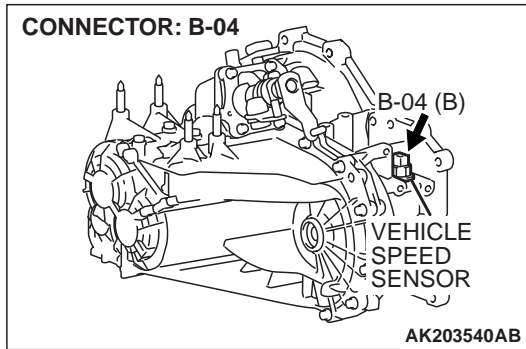
**NO :** The procedure is complete.

DTC P0500: VEHICLE SPEED SENSOR

Vehicle Speed Sensor Circuit



AK203479



**CIRCUIT OPERATION**

- A 5-volt voltage is applied to the vehicle speed sensor output terminal (terminal No. 3) from the ECM (terminal No. 86). The vehicle speed sensor generates a pulse signal when the output terminal is opened and grounded.

**TECHNICAL DESCRIPTION**

- The vehicle speed sensor converts the vehicle speed into pulse signals and inputs them to the ECM.
- The vehicle speed sensor outputs a pulse signal while the vehicle is driven.
- The ECM checks whether the pulse signal is output.

## DTC SET CONDITIONS

### Check Conditions

- Two seconds or more have passed the starting sequence was completed.
- Engine speed is at between 2,000 and 4,000 r/min.
- Volumetric efficiency is at between 60 and 80 percent.

### Judgement Criteria

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

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

- Vehicle speed sensor failed.
- Open or shorted vehicle speed sensor circuit, harness damage, or connector damage.
- ECM failed.

## DIAGNOSIS

### Required Special Tools:

- MB991502: Scan Tool (MUT-II)
- MB991958: Scan Tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991911: Main Harness B

**STEP 1. Using scan tool MB991502 or MB991958, check data list item 24: Vehicle Speed Sensor.**

**⚠ CAUTION**

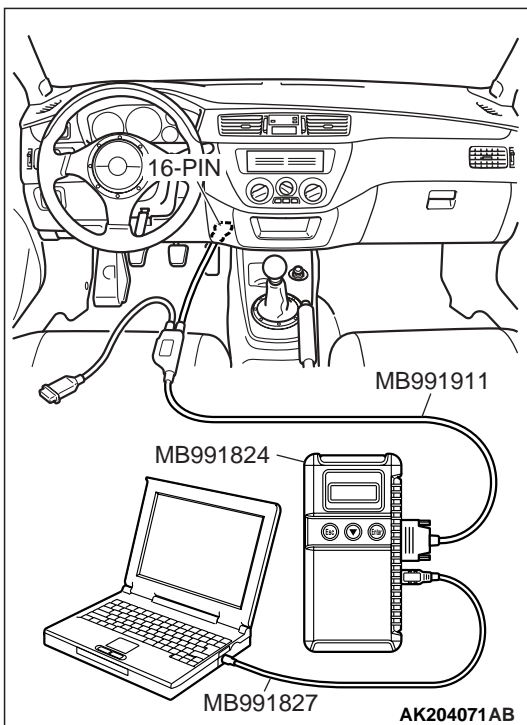
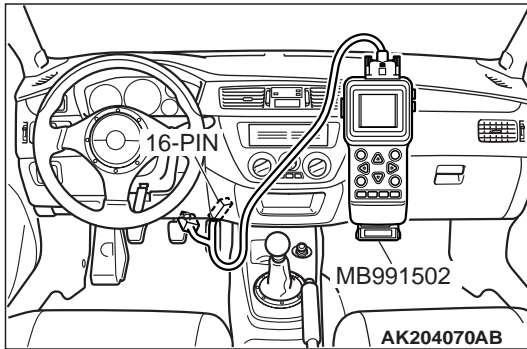
To prevent damage to scan tool MB991502 or MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991502 or MB991958.

- (1) Connect scan tool MB991502 or MB991958 to the data link connector.
- (2) Start the engine.
- (3) Set scan tool MB991502 or MB991958 to the data reading mode for item 24, Vehicle Speed Sensor.
  - Check that the speedometer and MB991502 or MB991958 display speed match when traveling at a vehicle speed of 40 km/h (25 mph).
- (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.

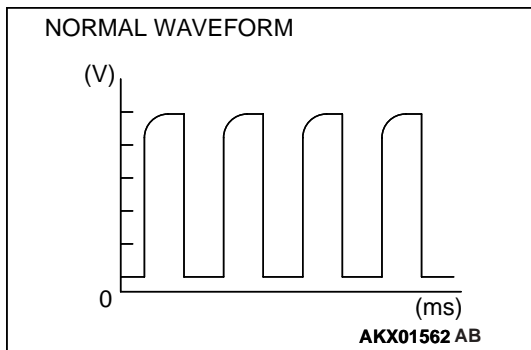
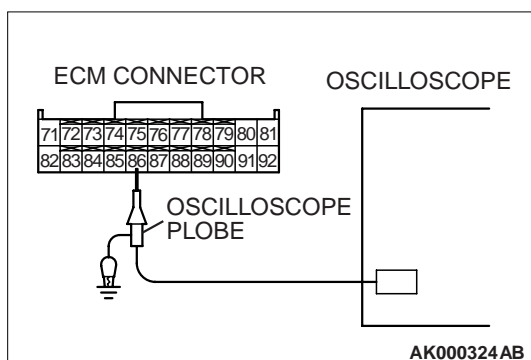
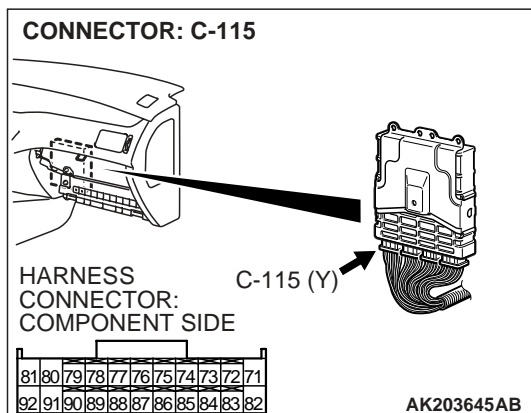


**STEP 2. Check speed meter.**

**Q: Is the speed meter functioning?**

**YES :** Go to Step 3.

**NO :** Go to Step 8.



**STEP 3. Using the oscilloscope, check the sensor output voltage at ECM connector C-115.**

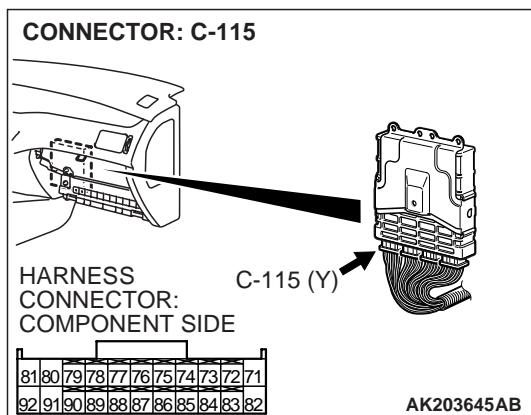
- (1) Do not disconnect the ECM connector C-115.
- (2) Disconnect the combination meter connector and A/C-ECU connector.

- (3) Connect the oscilloscope probe to ECM terminal No. 86 by backprobing.
- (4) Start the engine.

- (5) Check the waveform.
  - The waveform should show a pattern similar to the illustration while the vehicle is being moved.
- (6) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is the waveform normal?**

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



**STEP 4. Check harness connector C-115 at ECM 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 17.



**STEP 5.** Using scan tool MB991502 or MB991958, check data list item 24: Vehicle Speed Sensor.

**⚠ CAUTION**

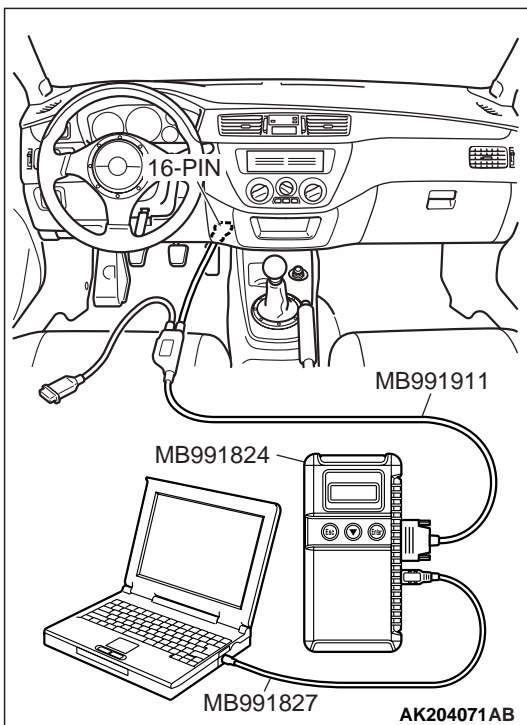
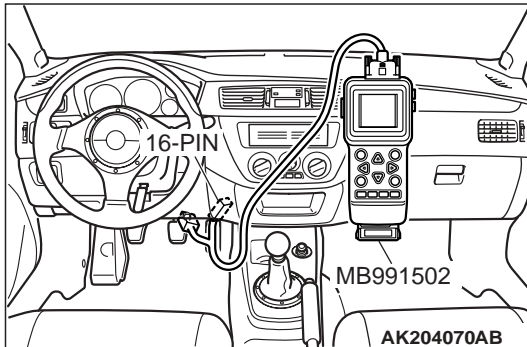
To prevent damage to scan tool MB991502 or MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991502 or MB991958.

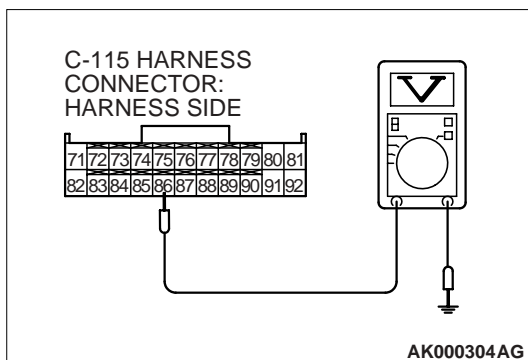
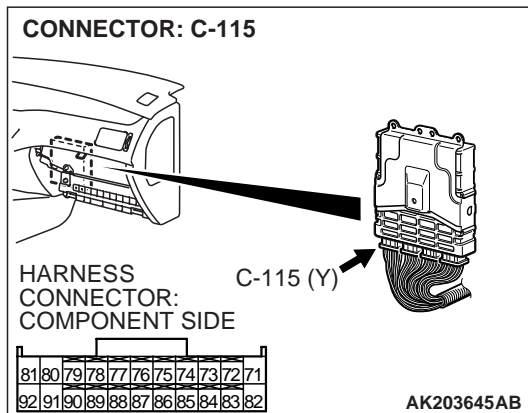
- (1) Connect scan tool MB991502 or MB991958 to the data link connector.
- (2) Start the engine.
- (3) Set scan tool MB991502 or MB991958 to the data reading mode for item 24, Vehicle Speed Sensor.
  - Check that the speedometer and MB991502 or MB991958 display speed match when traveling at a vehicle speed of 40 km/h (25 mph).
- (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. Then go to Step 17.





**STEP 6. Measure the sensor supply voltage at ECM connector C-115 by backprobing.**

- (1) Do not disconnect the ECM connector C-115.
- (2) Disconnect the vehicle speed sensor connector B-04.
- (3) Turn the ignition switch to the "ON" position.

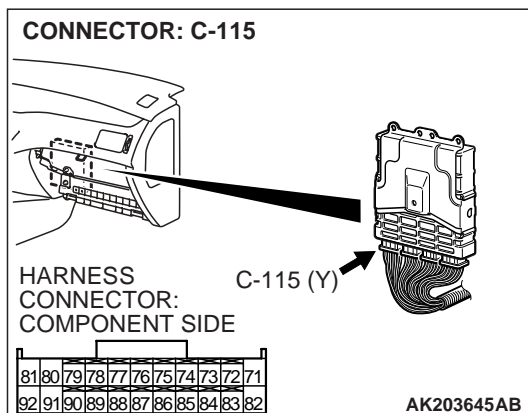
- (4) Measure the voltage between terminal No. 86 and ground by backprobing.
  - Voltage should measure between 4.8 and 5.2 volts.

- (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 :** Replace the ECM. Then go to Step 17.

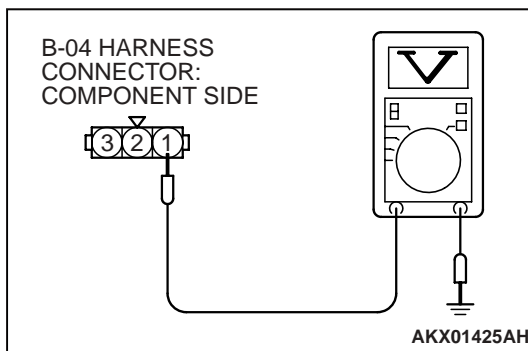
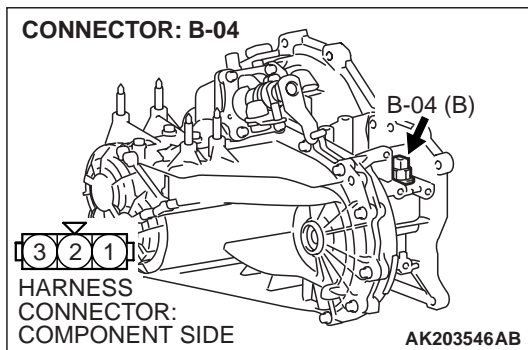
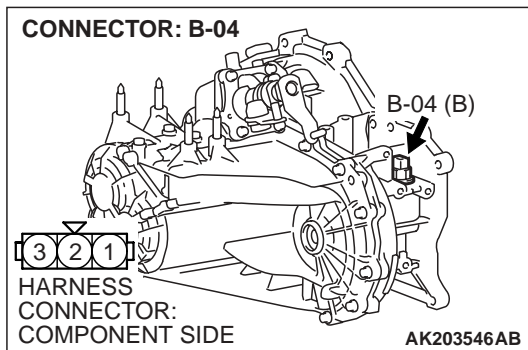


**STEP 7. Check connector C-115 at ECM for damage.**

**Q: Is the connector in good condition?**

**YES :** Check connector B-27 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 vehicle speed sensor connector B-04 (terminal No. 3) and ECM connector C-115 (terminal No. 86) because of open circuit. Then go to Step 17.

**NO :** Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then go to Step 17.



**STEP 8. Check harness connector B-04 at vehicle speed sensor 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 17.

**STEP 9. Measure the power supply voltage at vehicle speed sensor harness side connector B-04.**

(1) Disconnect connector B-04 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.

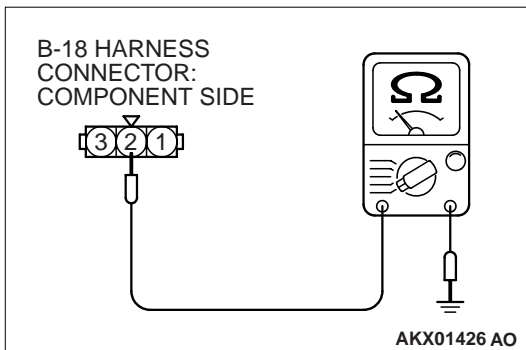
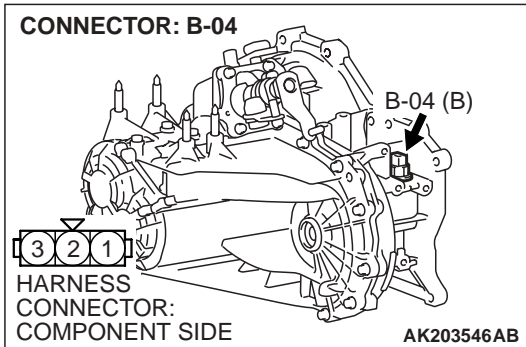
- Voltage should measure battery positive voltage.

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

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

**YES :** Go to Step 10.

**NO :** Check connectors C-211, C-210, C-124 and B-27 at intermediate connector for damage, and repair or replace as required. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). If intermediate connectors are in good condition, repair harness wire between ignition switch connector C-208 (terminal No. 2) and vehicle speed sensor connector B-04 (terminal No. 1) because of open circuit or short circuit to ground. Then go to Step 17.



**STEP 10. Check for continuity at vehicle speed sensor harness side connector B-04.**

(1) Disconnect connector B-04 and measure at the harness side.

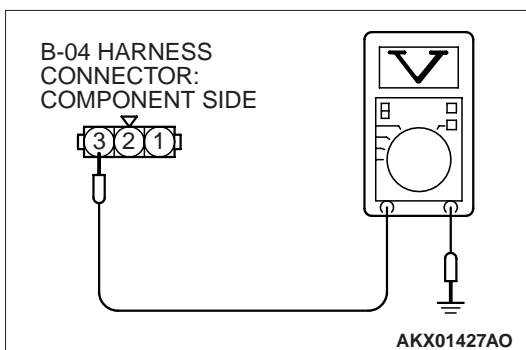
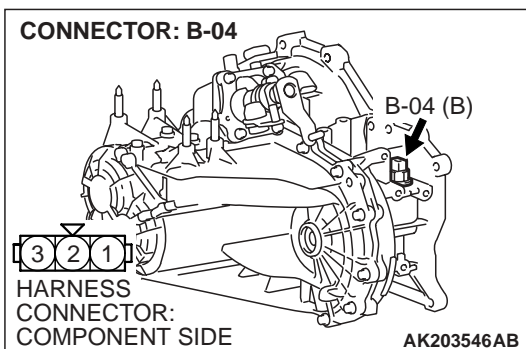
(2) Check for the continuity between terminal No. 2 and ground.

- Should be less than 2 ohms.

**Q: Does continuity exist?**

**YES :** Go to Step 11.

**NO :** Repair harness wire between vehicle speed sensor connector B-04 (terminal No. 2) and ground because of open circuit or harness damage. Then go to Step 17.



**STEP 11. Measure the sensor supply voltage at vehicle speed sensor harness side connector B-04.**

(1) Disconnect the vehicle speed sensor connector B-04 and measure at the harness side.

(2) Disconnect the combination meter connector and A/C-ECU connector.

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

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

- Voltage should measure 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 12.

**NO :** Check connector B-27 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 vehicle speed sensor connector B-04 (terminal No. 3) and ECM connector C-115 (terminal No. 86) because of short circuit to ground or harness damage. Then go to Step 17.

**STEP 12. Check the vehicle speed sensor.**

Refer to GROUP 54A, Combination Metre – Inspection – Vehicle Speed Sensor Check [P.54A-82](#).

**Q: Is the vehicle speed sensor normal?**

**YES :** Go to Step 13.

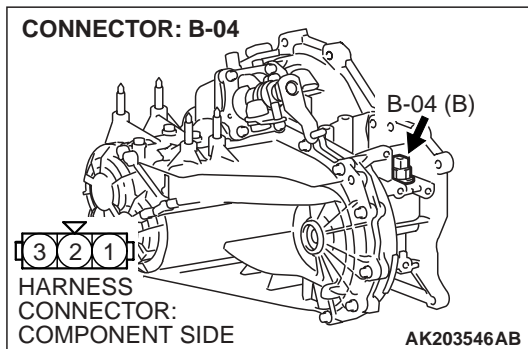
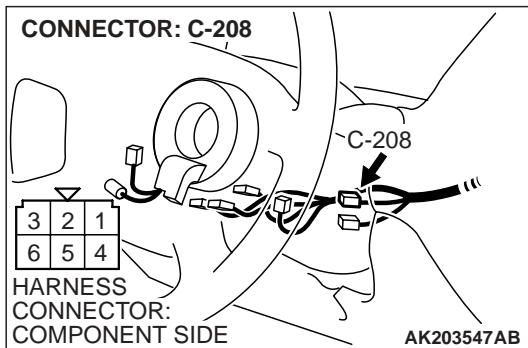
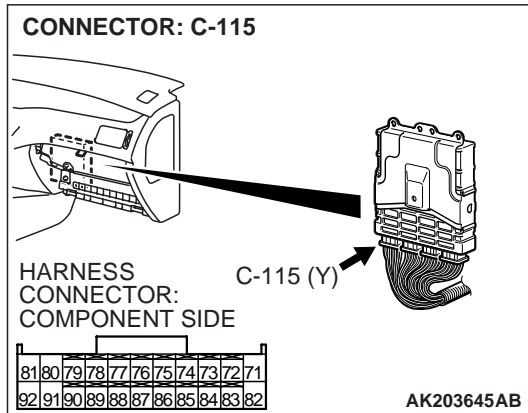
**NO :** Replace the vehicle speed sensor. Then go to Step 17.

**STEP 13. Check harness connector C-115 at ECM 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 17.



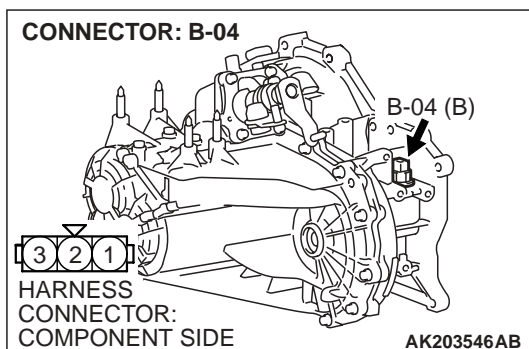
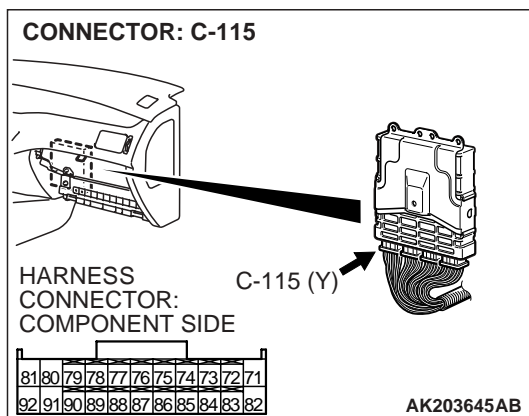
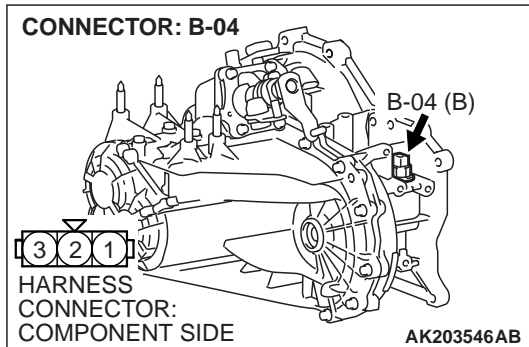
**STEP 14. Check for harness damage between ignition switch connector C-208 (terminal No. 2) and vehicle speed sensor connector B-04 (terminal No. 1).**

*NOTE: Check harness after checking intermediate connectors C-211, C-210, C-124 and B-27. If intermediate connectors are damaged, repair or replace them. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then go to Step 17.*

**Q: Is the harness wire in good condition?**

**YES :** Go to Step 15.

**NO :** Repair it. Then go to Step 17.



**STEP 15. Check for harness damage between vehicle speed sensor connector B-04 (terminal No. 3) and ECM connector C-115 (terminal No. 86).**

*NOTE: Check harness after checking intermediate connector B-27. If intermediate connector is damaged, repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 17.*

**Q: Is the harness wire in good condition?**

**YES :** Go to Step 16.

**NO :** Repair it. Then go to Step 17.

**STEP 16. Check for harness damage between vehicle speed sensor connector B-04 (terminal No. 2) and ground.**

*NOTE: Check harness after checking intermediate connector B-27. If intermediate connector is damaged, repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 17.*

**Q: Is the harness wire in good condition?**

**YES :** Check for harness wire between vehicle speed sensor connector B-04 (terminal No. 3) and other system because of short circuit to ground. Then go to Step 17.

**NO :** Repair it. Then go to Step 17.

**STEP 17.** Using scan tool MB991502 or MB991958, check data list item 24: Vehicle Speed Sensor.

**⚠ CAUTION**

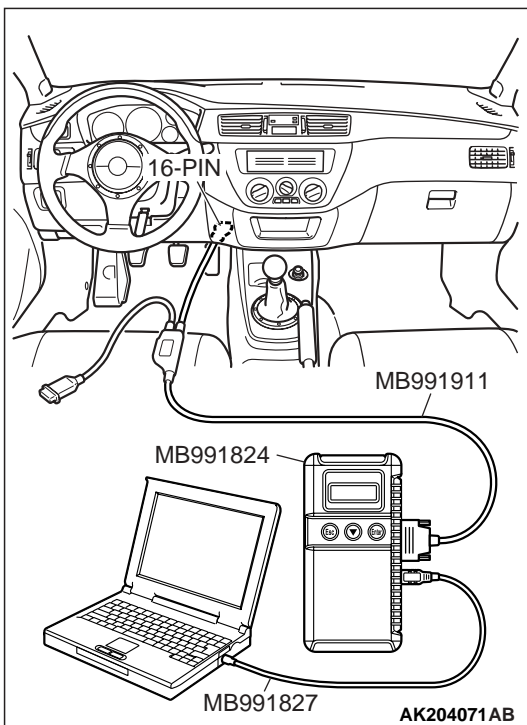
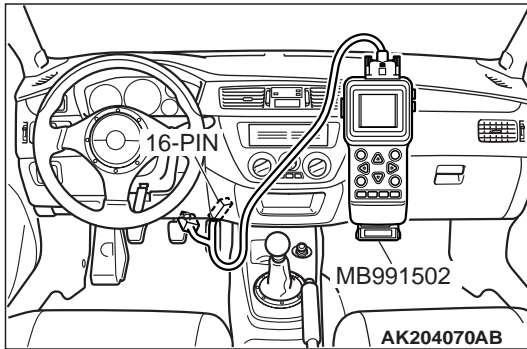
To prevent damage to scan tool MB991502 or MB991958, always turn the ignition switch to "LOCK" (OFF) position before connecting or disconnecting scan tool MB991502 or MB991958.

- (1) Connect scan tool MB991502 or MB991958 to the data link connector.
- (2) Start the engine.
- (3) Set scan tool MB991502 or MB991958 to the data reading mode for item 24, Vehicle Speed Sensor.
  - Check that the speedometer and MB991502 or MB991958 display speed match when traveling at a vehicle speed of 40 km/h (25 mph).
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is the sensor operating properly?**

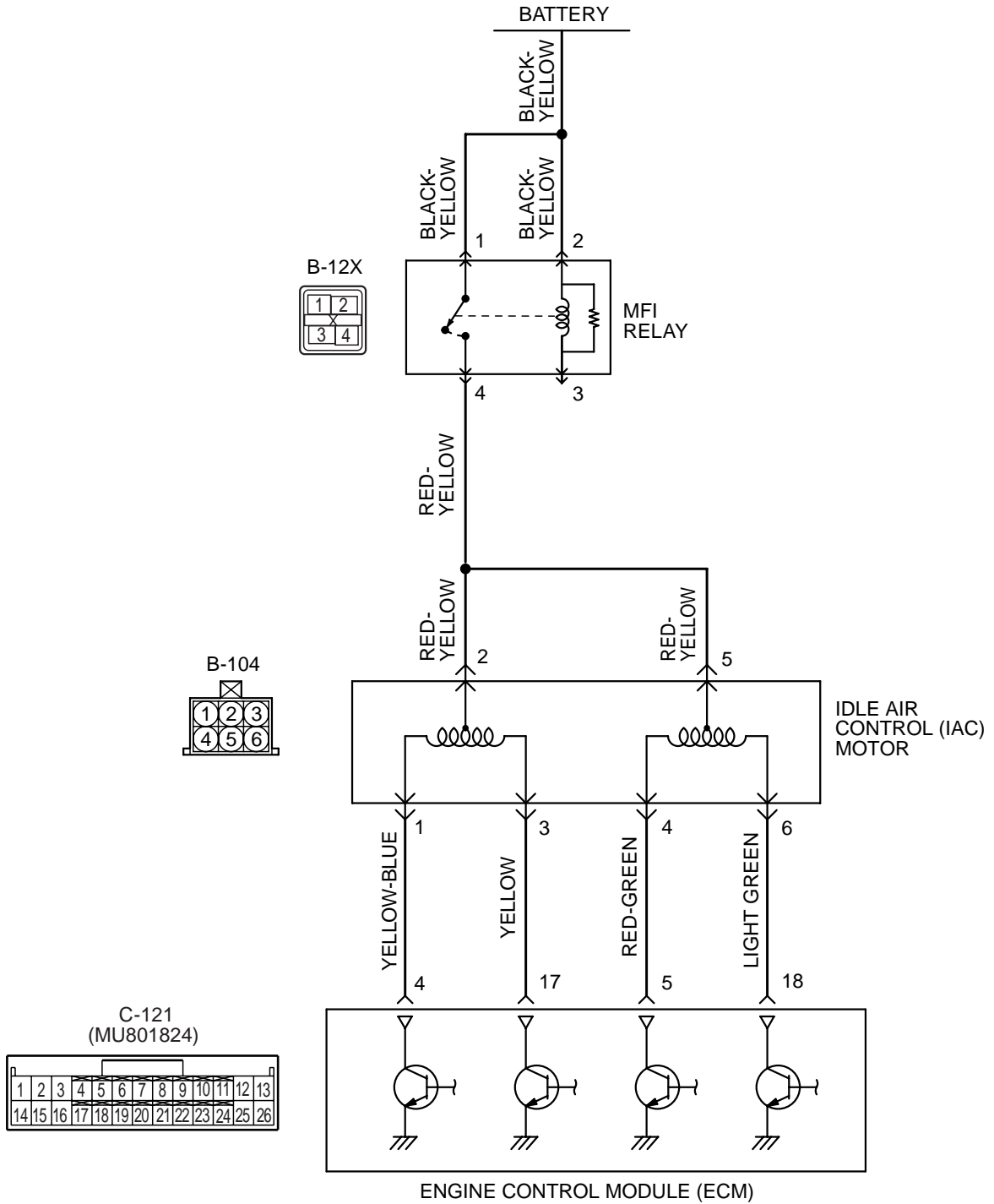
**YES :** The procedure is complete.

**NO :** Repeat the troubleshooting.



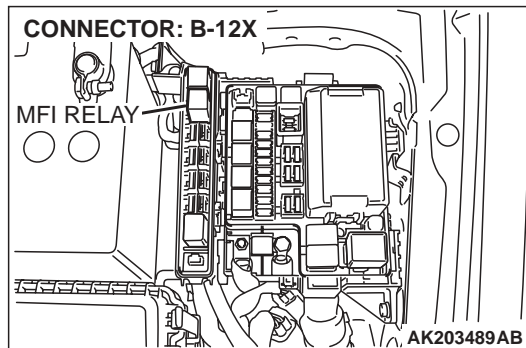
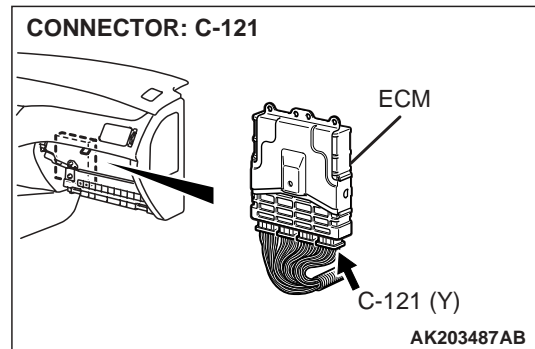
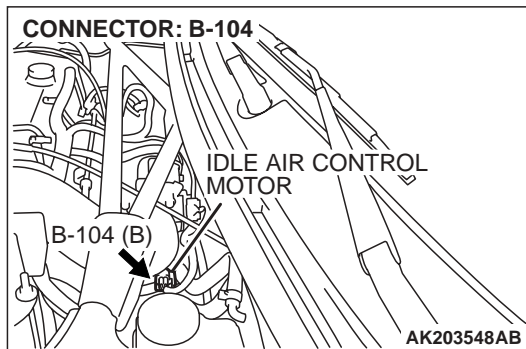
DTC P0506: IDLE CONTROL SYSTEM RPM LOWER THAN EXPECTED

Idle Air Control (IAC) Motor Circuit



AK203480





### CIRCUIT OPERATION

- The idle air control motor power is supplied from the MFI relay (terminal No. 4).
- The ECM (terminals No. 4, No. 5, No. 17, No. 18) drives the stepper motor by sequentially turning "ON" the power transistors in the ECM and providing ground to the idle air control motor (terminals No. 1, No. 3, No. 4, No. 6).

### TECHNICAL DESCRIPTION

- The amount of air taken in during idling is regulated by the opening and closing of the servo valve located in the air passage that bypasses the throttle body.
- If there is a malfunction of the IAC system, the actual engine speed will not be identical to the target engine speed.
- The ECM checks the difference between the actual engine speed and the target engine speed.

### DTC SET CONDITIONS

#### Check Conditions

- Under the closed loop idle speed control.

- Engine coolant temperature is more than 77°C (171°F).
- Battery positive voltage is higher than 10 volts.
- Power steering pressure switch: "OFF".
- Volumetric efficiency is lower than 40 percent.
- Barometric pressure is higher than 76 kPa (11 psi).
- Intake air temperature is higher than -10°C (14°F).
- 25 seconds have elapsed from the start of the previous monitoring.
- Target idle air control motor position is more than 100 steps.

#### Judgment Criteria

- The actual idle speed is more than 100 r/min lower than the target idle speed for 12 seconds.

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

- Idle air control motor failed.
- Open or shorted idle air control motor circuit, or loose connector.
- Throttle valve area is dirty.
- ECM failed.

## DIAGNOSIS

### Required Special Tools:

- MB991502: Scan Tool (MUT-II)
- MB991958: Scan Tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991911: Main Harness B
- MB991709: Test Harness Set

**STEP 1. Using scan tool MB991502 or MB991958, read the diagnostic trouble code (DTC).**

### **⚠ CAUTION**

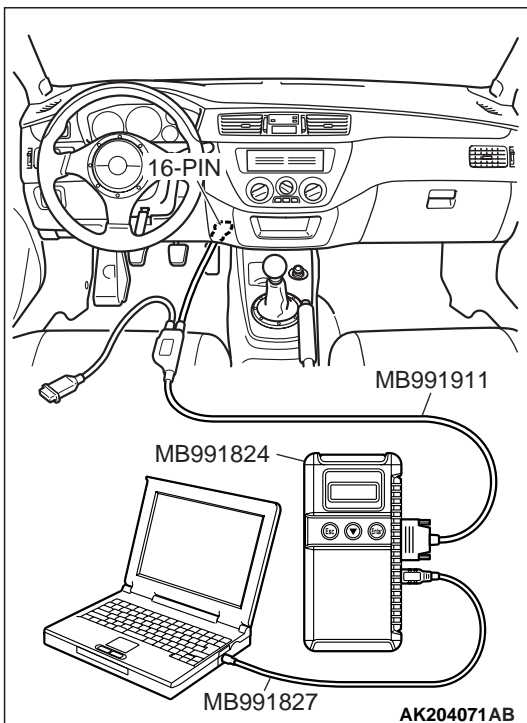
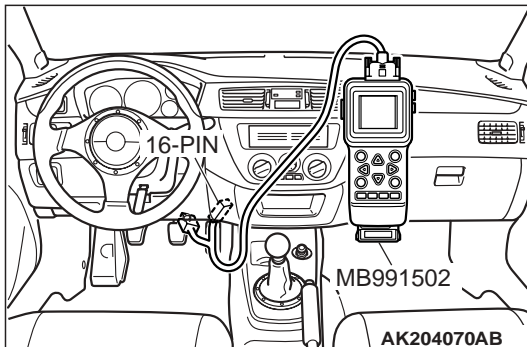
To prevent damage to scan tool MB991502 or MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991502 or MB991958.

- (1) Connect scan tool MB991502 or MB991958 to the data link connector.
- (2) Turn the ignition switch to the "ON" position.
- (3) Set scan tool MB991502 or MB991958, read the DTC.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is the diagnostic trouble code other than P0506 output?**

**YES :** Refer to GROUP 13A, Diagnostic Trouble Code Chart  
[P.13A-25.](#)

**NO :** Go to Step 2.

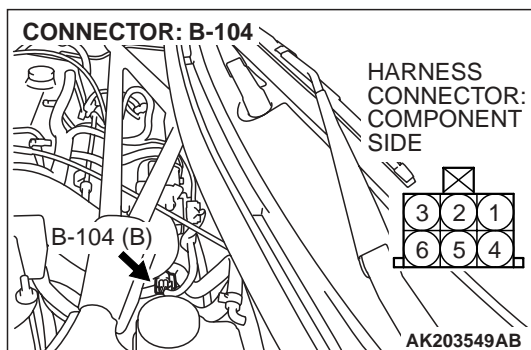


**STEP 2. Check the throttle body. (throttle valve area)**

**Q: Is the throttle valve area dirty?**

**YES :** Perform cleaning. Refer to GROUP 13A, On-vehicle Service – Throttle body (throttle valve area) cleaning  
[P.13A-758.](#) Then go to Step 14.

**NO :** Go to Step 3.

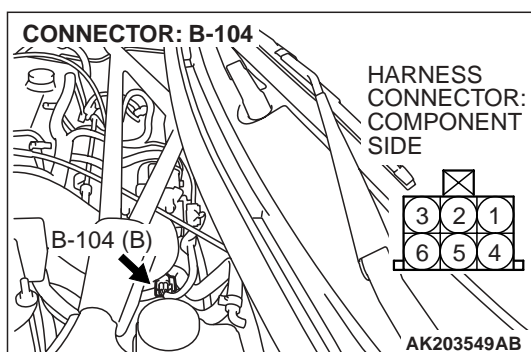


**STEP 3. Check harness connector B-104 at idle air control motor for damage.**

**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 14.



**STEP 4. Measure the idle air control motor coil resistance.**

(1) Disconnect the idle air control motor connector B-104.

(2) Measure the resistance between idle air control motor connector terminal No. 2 and either terminal No. 1 or terminal No. 3.

**Standard value: 28 – 33 ohms [at 20°C (68°F)]**

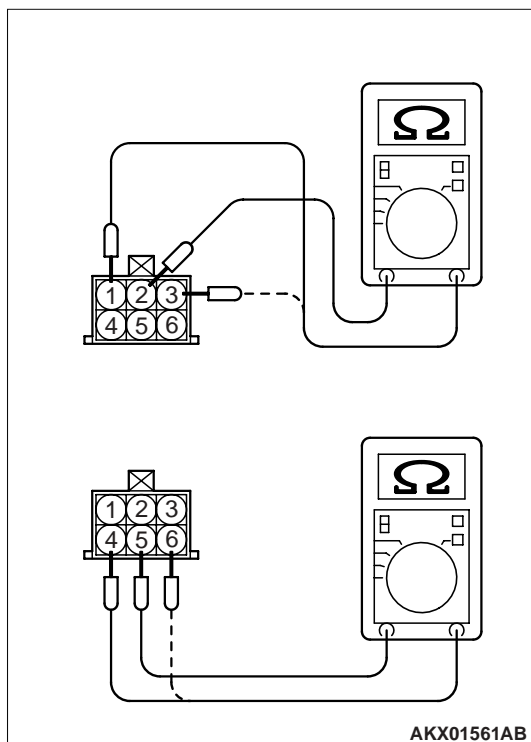
(3) Measure the resistance between idle air control motor connector terminal No. 5 and either terminal No. 4 or terminal No. 6.

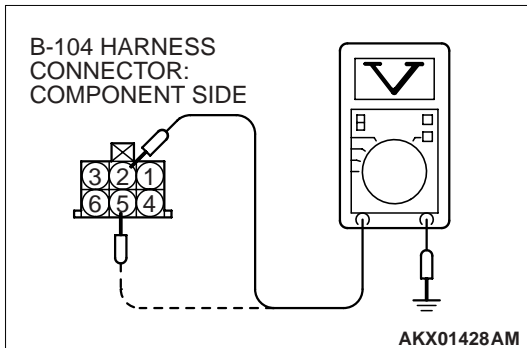
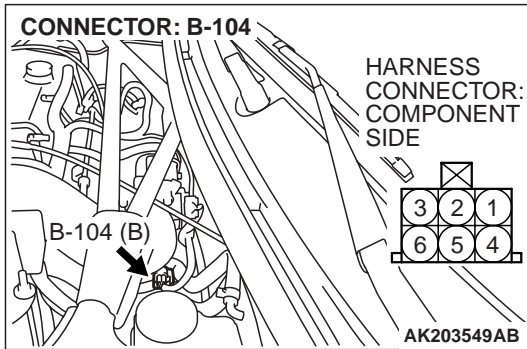
**Standard value: 28 – 33 ohms [at 20°C (68°F)]**

**Q: Is the measured resistance between 28 and 33 ohms [at 20°C (68°F)]?**

**YES :** Go to Step 5.

**NO :** Replace the idle air control motor. Then go to Step 14.





**STEP 5. Measure the power supply voltage at idle air control motor harness side connector B-104.**

- (1) Disconnect connector B-104 and measure at the harness side.
- (2) Turn the ignition switch to the "ON" position.

- (3) Measure the voltage between terminals No. 2, No. 5 and ground.

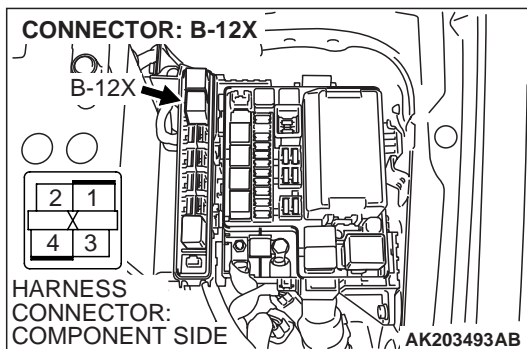
- Voltage should measure battery positive voltage.

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

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

**YES :** Go to Step 7.

**NO :** Go to Step 6.

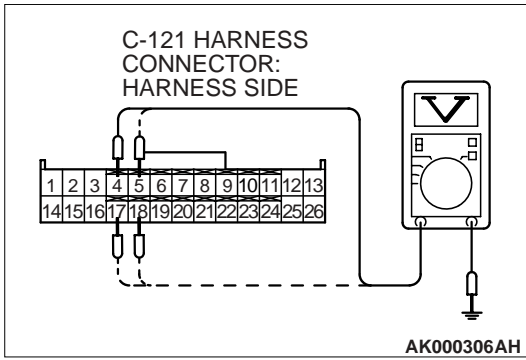
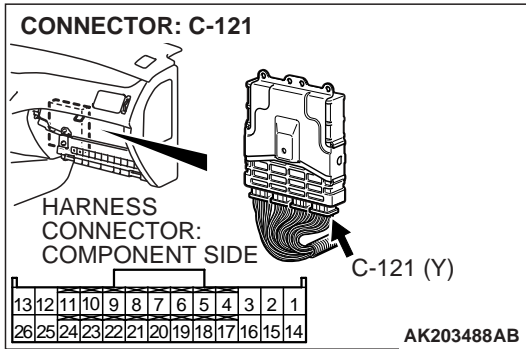


**STEP 6. Check harness connector B-12X at MFI relay for damage.**

**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-104 (terminals No. 2, No. 5) because of open circuit or short circuit to ground. Then go to Step 14.

**NO :** Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then go to Step 14.



**STEP 7. Measure the power supply voltage at ECM connector C-121 by backprobing.**

(1) Do not disconnect connector C-121.

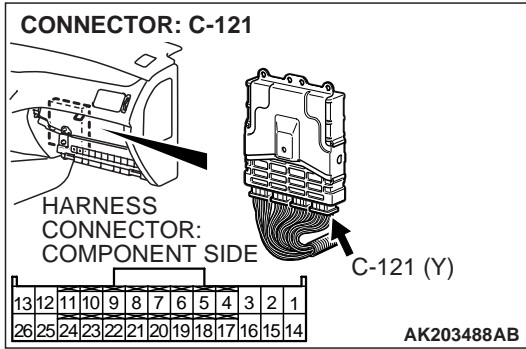
- (2) Measure the voltage between terminals (No. 4, No. 5, No. 17, No. 18) and ground by backprobing.
- The voltage is 1 volt or lower for approximately 3 seconds, then changes to the battery positive voltage when the Ignition switch is turned from the "LOCK" (OFF) position to the "ON" position.

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

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

**YES** : Go to Step 10.

**NO** : Go to Step 8.

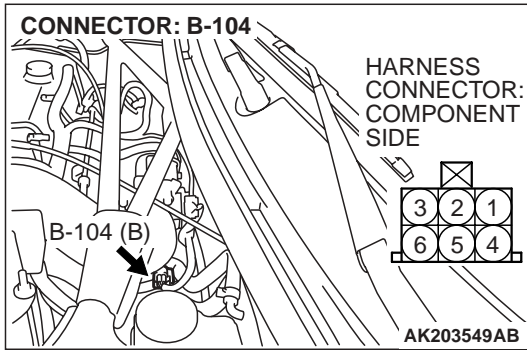


**STEP 8. Check connector C-121 at ECM for damage.**

**Q: Is the 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 14.



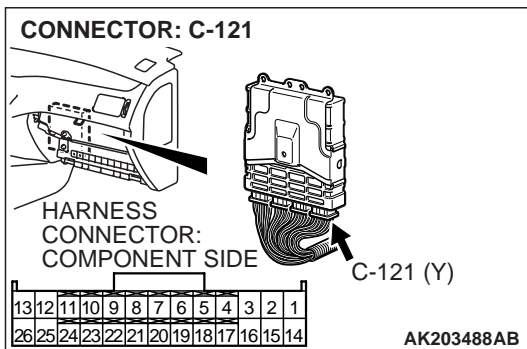
**STEP 9. Check for open circuit and short circuit to ground between idle air control motor connector B-104 and ECM connector C-121.**

- Idle air control motor connector B-104 (terminal No. 1) and ECM connector C-121 (terminal No. 4).
- Idle air control motor connector B-104 (terminal No. 3) and ECM connector C-121 (terminal No. 17).
- Idle air control motor connector B-104 (terminal No. 4) and ECM connector C-121 (terminal No. 5).
- Idle air control motor connector B-104 (terminal No. 6) and ECM connector C-121 (terminal No. 18).

**Q: Is the harness wire in good condition?**

**YES :** Replace the ECM. Then go to Step 14.

**NO :** Repair it. Then go to Step 14.

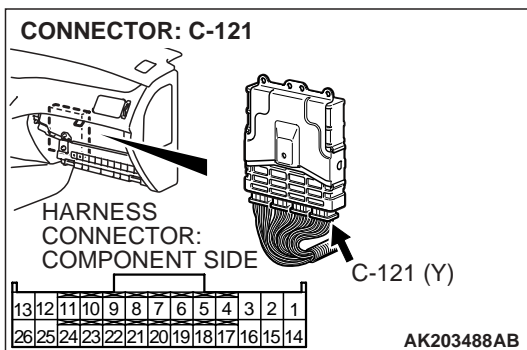


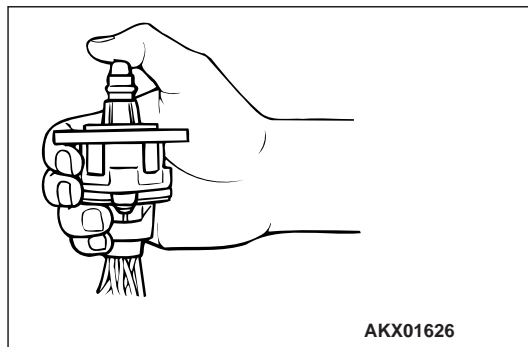
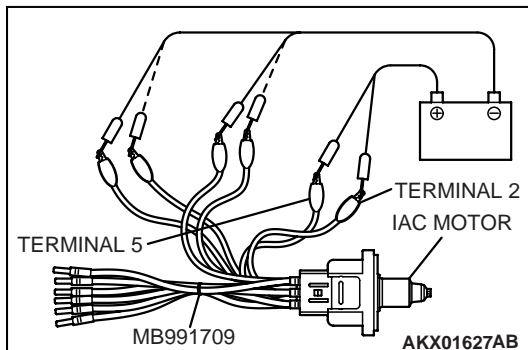
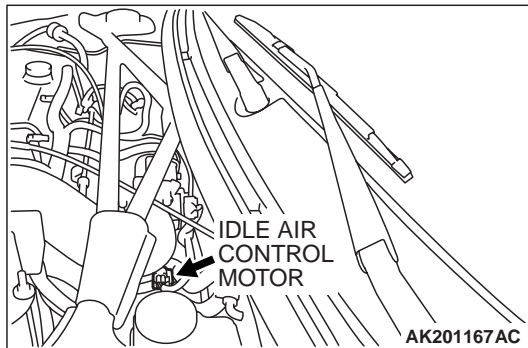
**STEP 10. Check connector C-121 at ECM for damage.**

**Q: Is the 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 14.





**STEP 11. Check the idle air control motor operation using special tool MB991709.**

(1) Remove the idle air control motor.

(2) Connect special tool MB991709 to the idle air control motor. (All terminals should be connected.)

(3) Use the jumper wires to connect terminal No. 2 of the idle air control motor connector to the positive battery terminal.

(4) Check to ensure that the motor operates when the terminals No. 1 and No. 3 of the idle air control motor 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 idle air control motor connector to the positive battery terminal.

(6) Check to ensure that the motor operates when the terminals No. 4 and No. 6 of the idle air control motor 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) Install the idle air control motor. Refer to GROUP 13A, Throttle Body Assembly – Disassembly and Assembly P.13A-780.

**Q: Is the idle air control motor operating properly?**

**YES :** Go to Step 12.

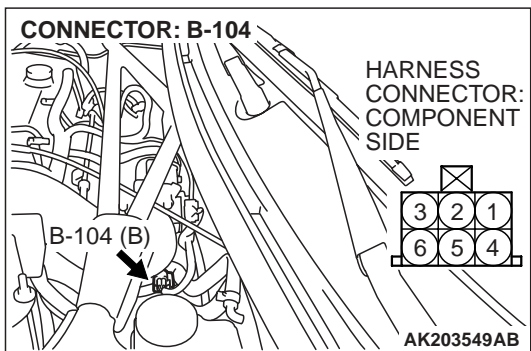
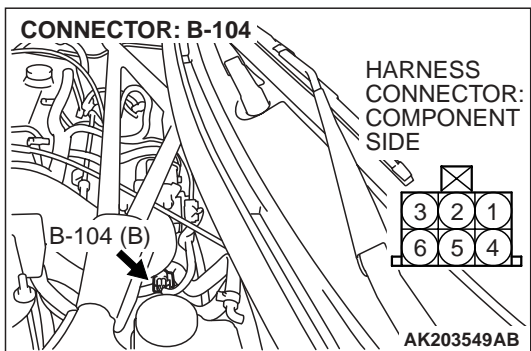
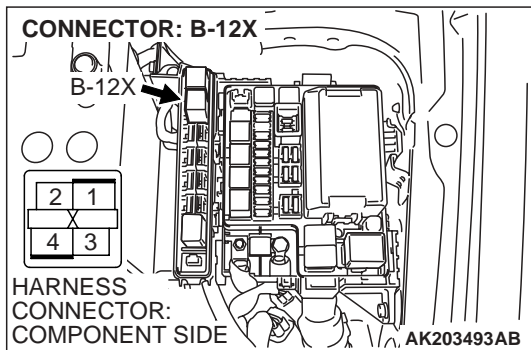
**NO :** Replace the idle air control motor. Then go to Step 14.

**STEP 12. Check for harness damage between MFI relay connector B-12X (terminal No. 4) and idle air control motor connector B-104 (terminals No. 2, No. 5).**

**Q: Is the harness wire in good condition?**

**YES :** Go to Step 13.

**NO :** Repair it. Then go to Step 14.



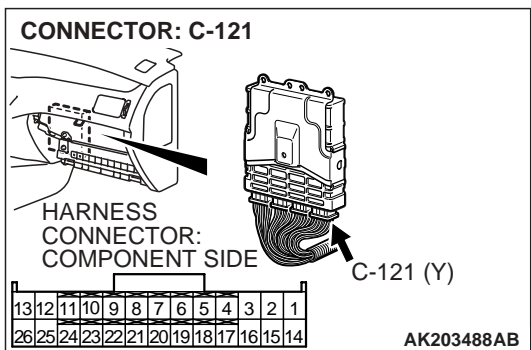
**STEP 13. Check for harness damage between idle air control motor connector B-104 and ECM connector C-121.**

- Idle air control motor connector B-104 (terminal No. 1) and ECM connector C-121 (terminal No. 4).
- Idle air control motor connector B-104 (terminal No. 3) and ECM connector C-121 (terminal No. 17).
- Idle air control motor connector B-104 (terminal No. 4) and ECM connector C-121 (terminal No. 5).
- Idle air control motor connector B-104 (terminal No. 6) and ECM connector C-121 (terminal No. 18).

**Q: Is the harness wire in good condition?**

**YES :** Replace the ECM. Then go to Step 14.

**NO :** Repair it. Then go to Step 14.





**STEP 14. Perform the OBD-II drive cycle.**

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

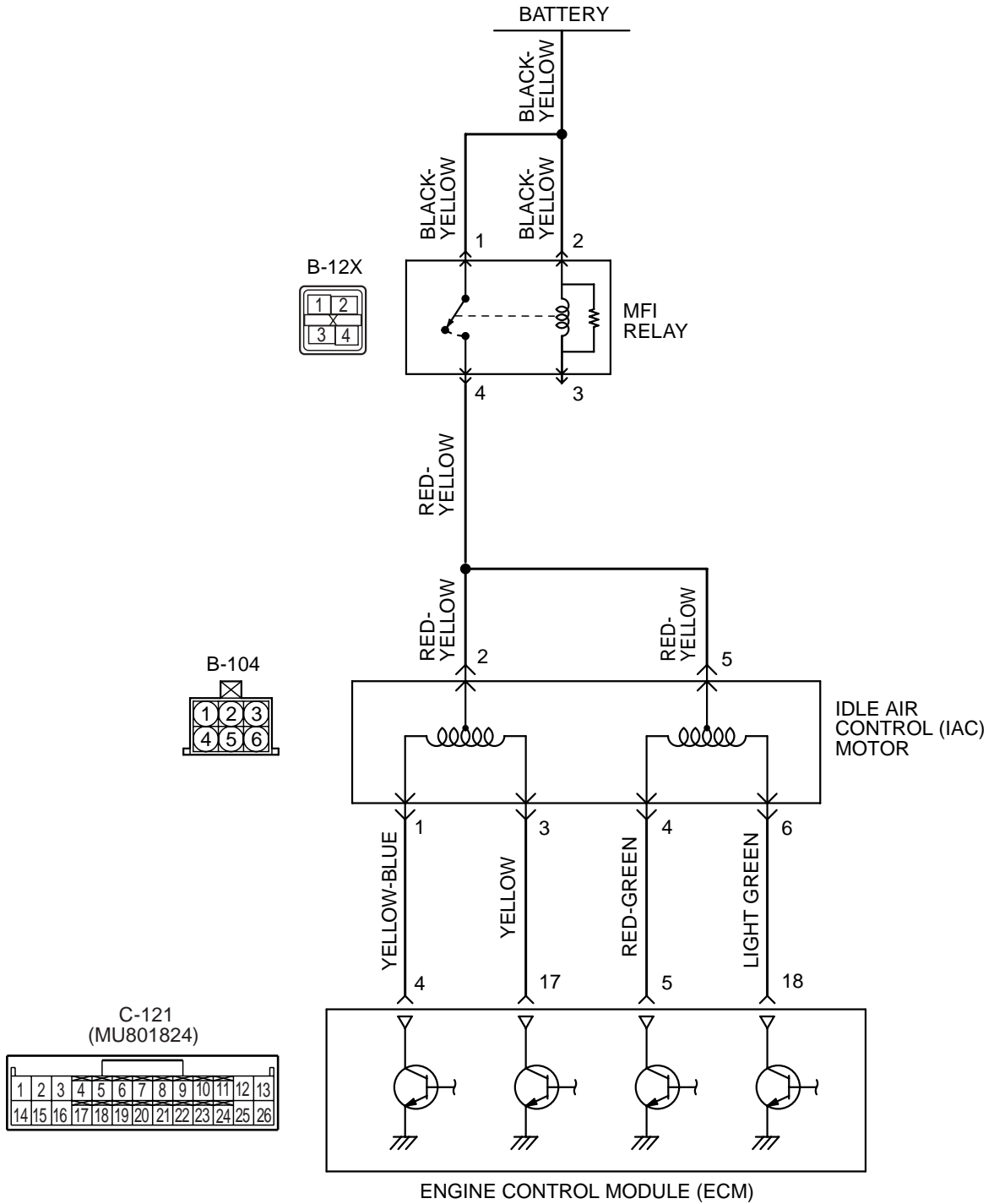
**Q: Is DTC P0506 set?**

**YES** : Repeat the troubleshooting.

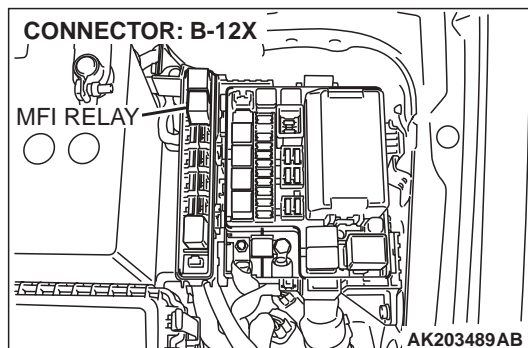
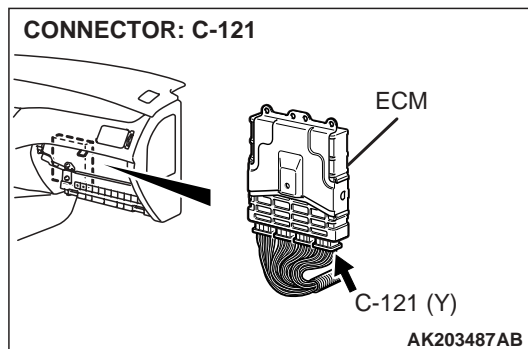
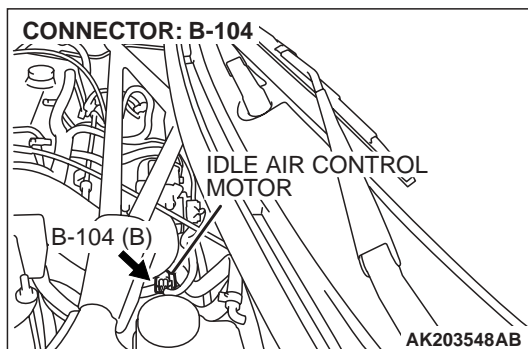
**NO** : The procedure is complete.

DTC P0507: IDLE CONTROL SYSTEM RPM HIGHER THAN EXPECTED

Idle Air Control (IAC) Motor Circuit



AK203480



### CIRCUIT OPERATION

- The idle air control motor power is supplied from the MFI relay (terminal No. 4).
- The ECM (terminals No. 4, No. 5, No. 17, No. 18) drives the stepper motor by sequentially turning "ON" the power transistors in the ECM and providing ground to the idle air control motor (terminals No. 1, No. 3, No. 4, No. 6).

### TECHNICAL DESCRIPTION

- The amount of air taken in during idling is regulated by the opening and closing of the servo valve located in the air passage that bypasses the throttle body.
- If there is a malfunction of the IAC system, the actual engine speed will not be identical to the target engine speed.
- The ECM checks the difference between the actual engine speed and the target engine speed.

### DTC SET CONDITIONS

#### Check Conditions

- Vehicle speed has reached 1.5 km/h (0.93 mph) or more at least once.
- Under the closed loop idle speed control.

- Engine coolant temperature is higher than 77°C (171°F).
- Battery positive voltage is higher than 10 volts.
- Barometric pressure is higher than 76 kPa (11 psi).
- Intake air temperature is higher than -10°C (14°F).
- 25 seconds have elapsed from the start of the previous monitoring.
- Target idle air control motor position is 0 steps.

### Judgment Criteria

- Actual idle speed has continued to be higher than the target idle speed by 200 r/min (300 r/min\*) or more for 12 seconds.
- \*: Specs in parentheses are applicable if the maximum air temperature during the previous operation was more than 45°C (113°F).

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

- Intake system vacuum leak.
- Idle air control motor failed.
- Open or shorted idle air control motor circuit, harness damage, or connector damage.
- ECM failed.

## DIAGNOSIS

### Required Special Tools:

- MB991502: Scan Tool (MUT-II)
- MB991958: Scan Tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991911: Main Harness B
- MB991709: Test Harness Set

**STEP 1. Using scan tool MB991502 or MB991958, read the diagnostic trouble code (DTC).**

### **⚠ CAUTION**

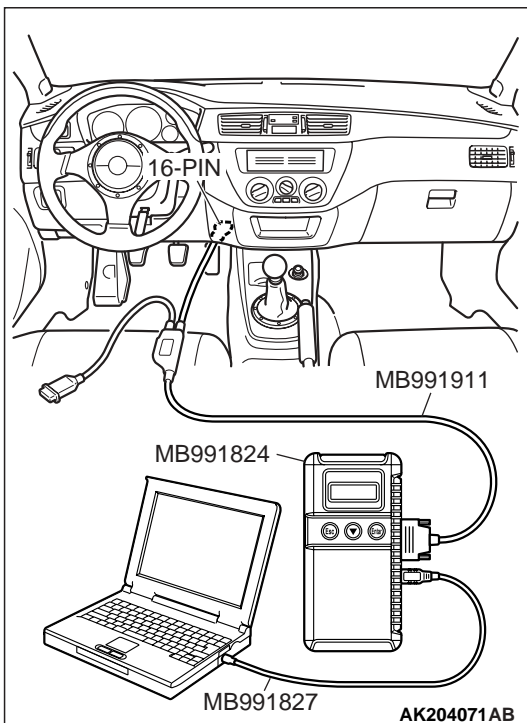
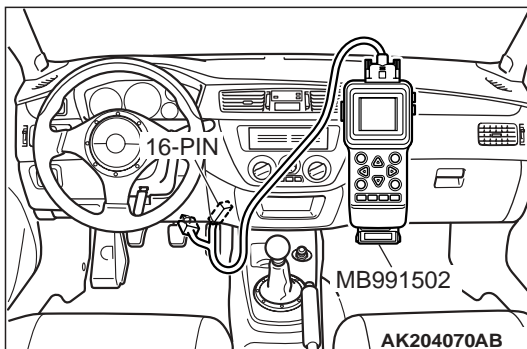
To prevent damage to scan tool MB991502 or MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991502 or MB991958.

- (1) Connect scan tool MB991502 or MB991958 to the data link connector.
- (2) Turn the ignition switch to the "ON" position.
- (3) Set scan tool MB991502 or MB991958, read the DTC.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is the diagnostic trouble code other than P0507 output?**

**YES :** Refer to GROUP 13A, Diagnostic Trouble Code Chart  
[P.13A-25.](#)

**NO :** Go to Step 2.

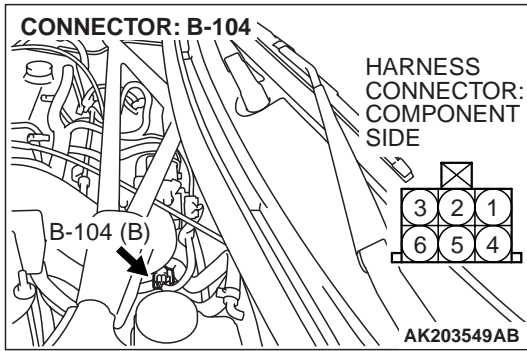


**STEP 2. Check for intake system vacuum leaks.**

**Q: Are there any abnormalities?**

**YES :** Repair or replace it. Then go to Step 14.

**NO :** Go to Step 3.

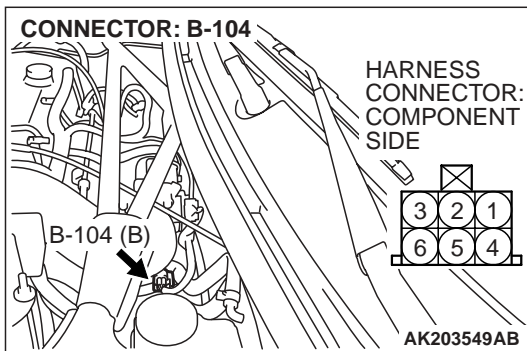


**STEP 3. Check connector B-104 at idle air control motor for damage.**

**Q: Is the 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 14.



**STEP 4. Measure the idle air control motor coil resistance.**

(1) Disconnect the idle air control motor connector B-104.

(2) Measure the resistance between idle air control motor connector terminal No. 2 and either terminal No. 1 or terminal No. 3.

**Standard value: 28 – 33 ohms [at 20°C (68°F)]**

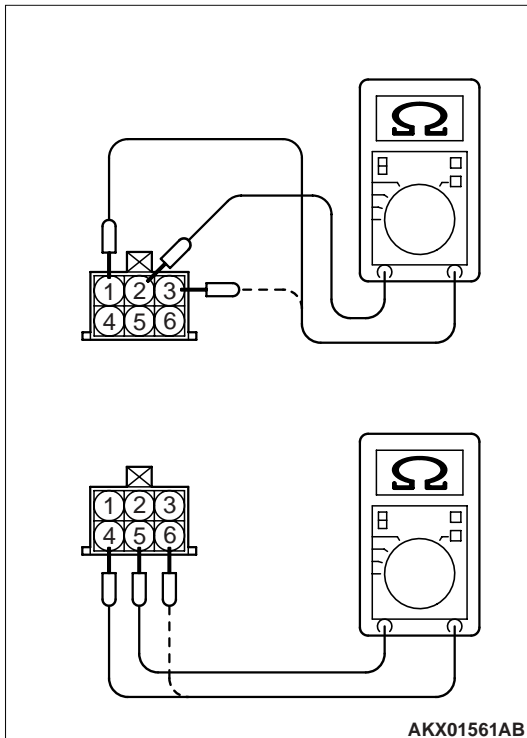
(3) Measure the resistance between idle air control motor connector terminal No. 5 and either terminal No. 4 or terminal No. 6.

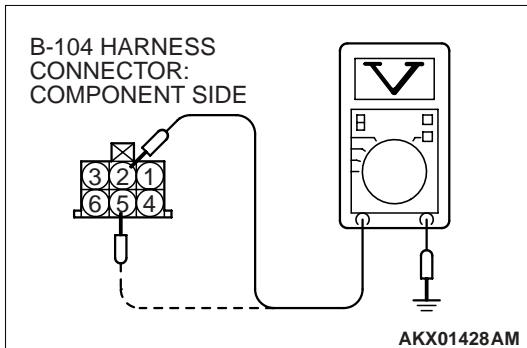
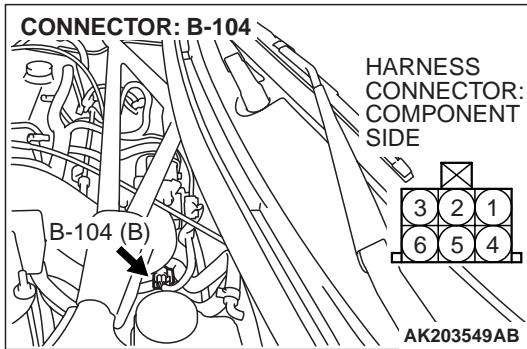
**Standard value: 28 – 33 ohms [at 20°C (68°F)]**

**Q: Is the measured resistance between 28 and 33 ohms [at 20°C (68°F)]?**

**YES :** Go to Step 5.

**NO :** Replace the idle air control motor. Then go to Step 14.





**STEP 5. Measure the power supply voltage at idle air control motor harness side connector B-104.**

- (1) Disconnect connector B-104 and measure at the harness side.
- (2) Turn the ignition switch to the "ON" position.

- (3) Measure the voltage between terminals No. 2, No. 5 and ground.

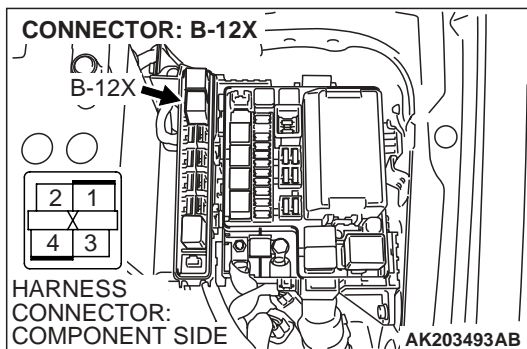
- Voltage should measure battery positive voltage.

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

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

**YES :** Go to Step 7.

**NO :** Go to Step 6.

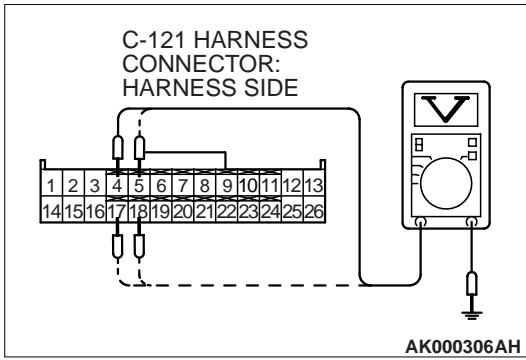
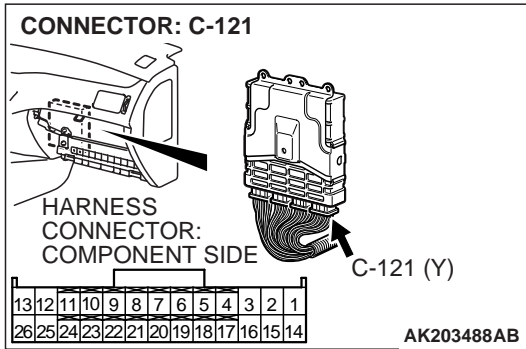


**STEP 6. Check harness connector B-12X at MFI relay for damage.**

**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-104 (terminals No. 2, No. 5) because of open circuit or short circuit to ground. Then go to Step 14.

**NO :** Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then go to Step 14.



**STEP 7. Measure the power supply voltage at ECM connector C-121 by backprobing.**

(1) Do not disconnect connector C-121.

(2) Measure the voltage between terminals (No. 4, No. 5, No. 17, No. 18) and ground by backprobing.

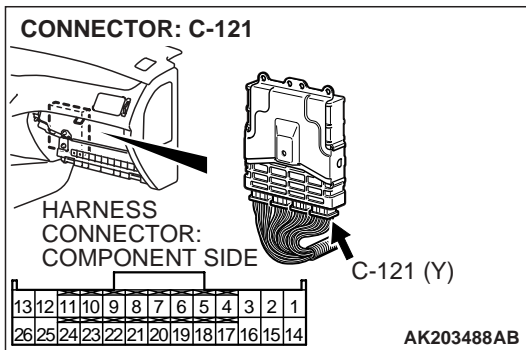
- The voltage is 1 V or lower for approximately 3 seconds, then changes to the battery positive voltage when the Ignition switch is turned from the "LOCK" (OFF) position to the "ON" position.

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

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

**YES :** Go to Step 10.

**NO :** Go to Step 8.

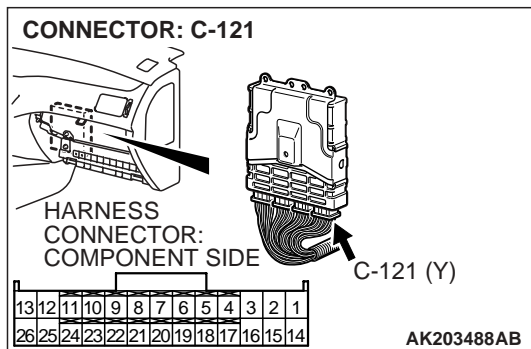
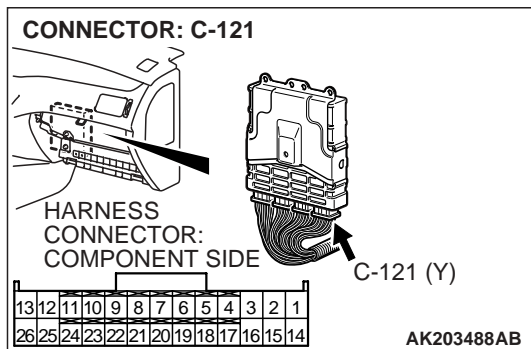
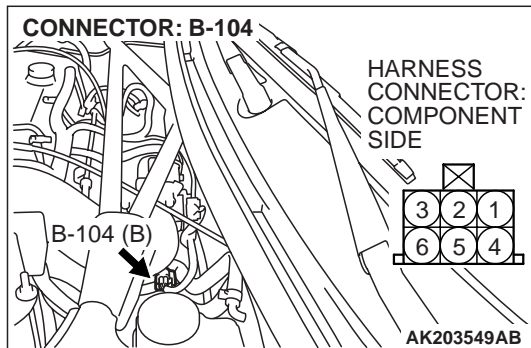


**STEP 8. Check harness connector C-121 at ECM for damage.**

**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 14.



**STEP 9. Check for open circuit and short circuit to ground between idle air control motor connector B-104 and ECM connector C-121.**

- Idle air control motor connector B-104 (terminal No. 1) and ECM connector C-121 (terminal No. 4).
- Idle air control motor connector B-104 (terminal No. 3) and ECM connector C-121 (terminal No. 17).
- Idle air control motor connector B-104 (terminal No. 4) and ECM connector C-121 (terminal No. 5).
- Idle air control motor connector B-104 (terminal No. 6) and ECM connector C-121 (terminal No. 18).

**Q: Is the harness wire in good condition?**

**YES :** Replace the ECM. Then go to Step 14.

**NO :** Repair it. Then go to Step 14.

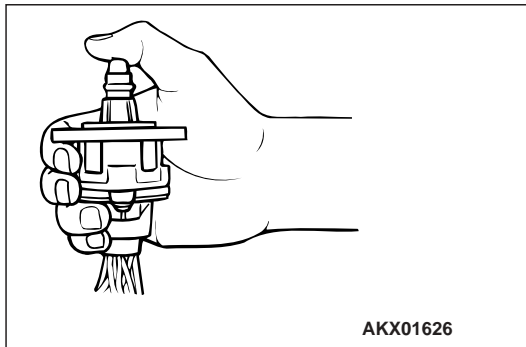
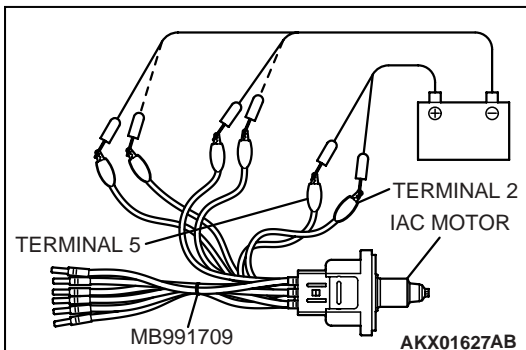
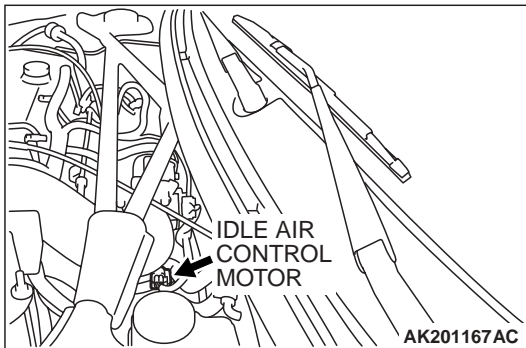
**STEP 10. Check harness connector C-121 at ECM for damage.**

**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 14.





**STEP 11. Check the idle air control motor operation using special tool MB991709.**

(1) Remove the idle air control motor.

(2) Connect special tool MB991709 to the idle air control motor. (All terminals should be connected.)

(3) Use the jumper wires to connect terminal No. 2 of the idle air control motor connector to the positive battery terminal.

(4) Check to ensure that the motor operates when the terminals No. 1 and No. 3 of the idle air control motor 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 idle air control motor connector to the positive battery terminal.

(6) Check to ensure that the motor operates when the terminals No. 4 and No. 6 of the idle air control motor 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) Install the idle air control motor. Refer to GROUP 13A, Throttle Body Assembly – Disassembly and Assembly P.13A-780.

**Q: Is the idle air control motor operating properly?**

**YES :** Go to Step 12.

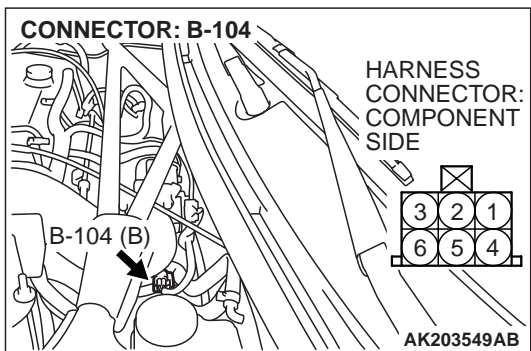
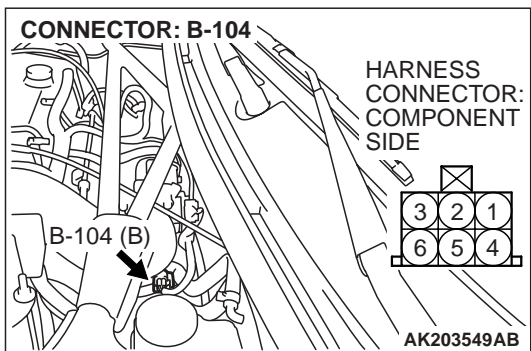
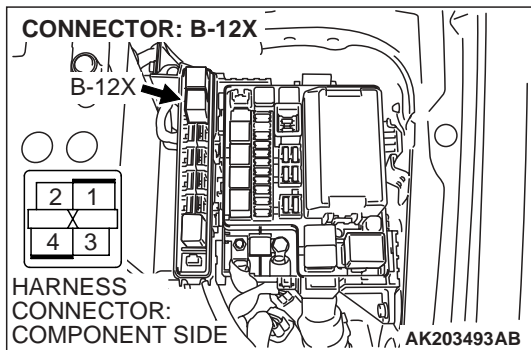
**NO :** Replace the idle air control motor. Then go to Step 14.

**STEP 12. Check for harness damage between MFI relay connector B-12X (terminal No. 4) and idle air control motor connector B-104 (terminals No. 2, No. 5).**

**Q: Is the harness wire in good condition?**

**YES :** Go to Step 13.

**NO :** Repair it. Then go to Step 14.



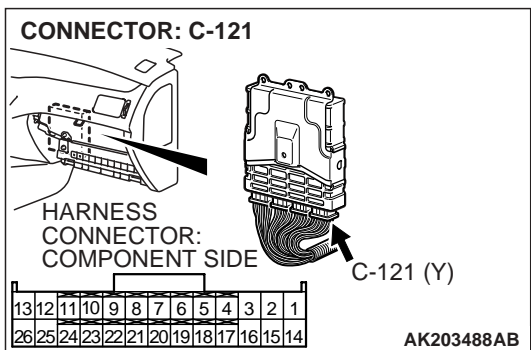
**STEP 13. Check for harness damage between idle air control motor connector B-104 and ECM connector C-121.**

- Idle air control motor connector B-104 (terminal No. 1) and ECM connector C-121 (terminal No. 4).
- Idle air control motor connector B-104 (terminal No. 3) and ECM connector C-121 (terminal No. 17).
- Idle air control motor connector B-104 (terminal No. 4) and ECM connector C-121 (terminal No. 5).
- Idle air control motor connector B-104 (terminal No. 6) and ECM connector C-121 (terminal No. 18).

**Q: Is the harness wire in good condition?**

**YES :** Replace the ECM. Then go to Step 14.

**NO :** Repair it. Then go to Step 14.



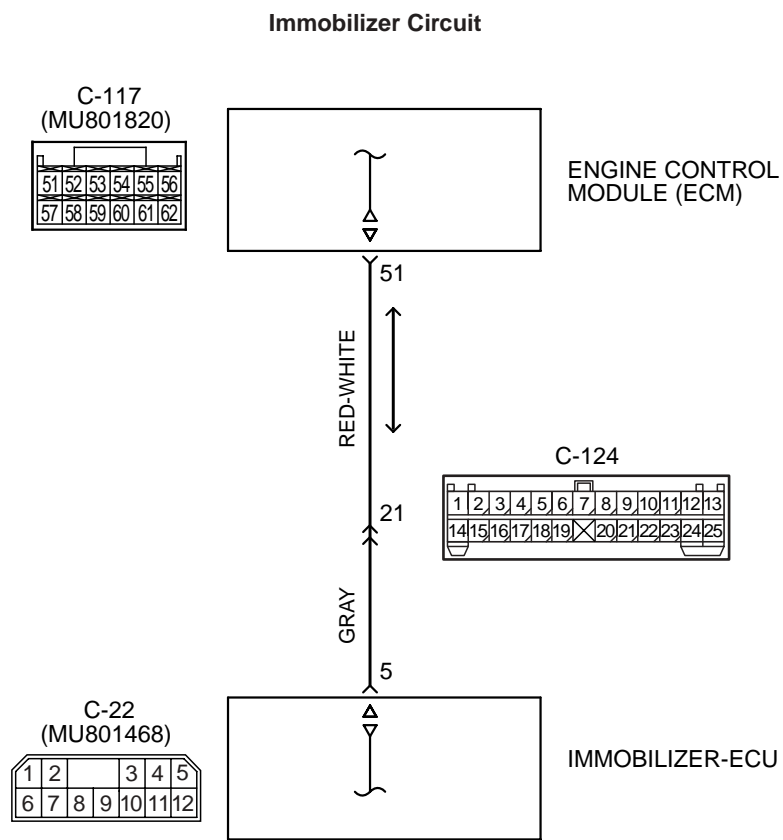
**STEP 14. Perform the OBD-II drive cycle.**

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

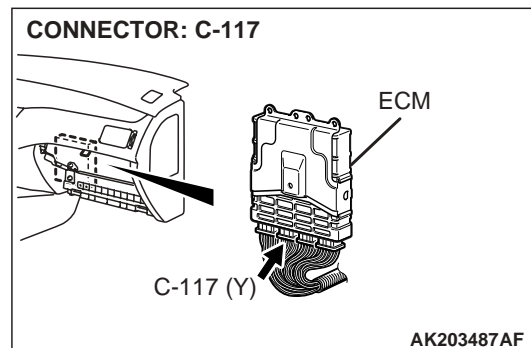
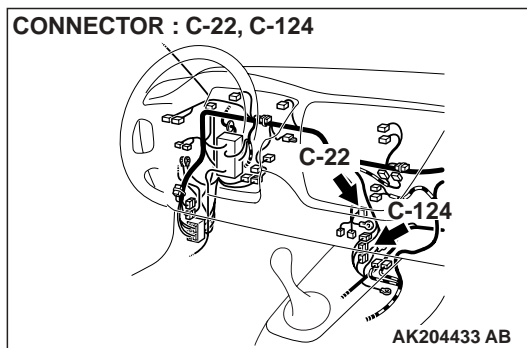
**Q: Is DTC P0507 set?**

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

**DTC P0513: IMMOBILIZER MALFUNCTION**



AK204422



**TECHNICAL DESCRIPTION**

- ECM monitors the communication condition with the immobilizer-ECU. When an abnormality in communication is found, ECM prevents engine start.

**DTC SET CONDITIONS**

**Check Conditions**

- Ignition switch: ON

**Judgment Criteria**

- When the communication error between ECM and the immobilizer-ECU continues for 2 seconds or more.

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

- Malfunction of harness or connector.
- Malfunction of immobilizer-ECU.
- Malfunction of ECM.

**DIAGNOSIS**

**Required Special Tools:**

- MB991502: Scan Tool (MUT-II)
- MB991958: Scan Tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991911: Main Harness B

**STEP 1.** Using scan tool MB991502 or MB991958, read the immobilizer diagnostic trouble code (DTC).

**⚠ CAUTION**

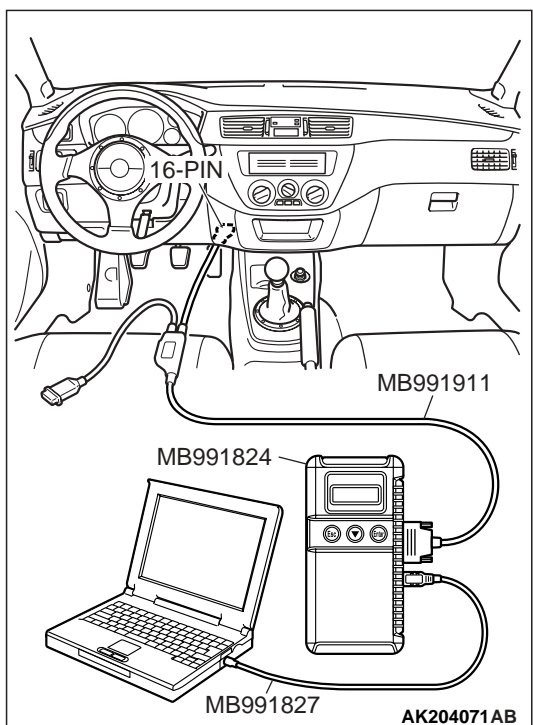
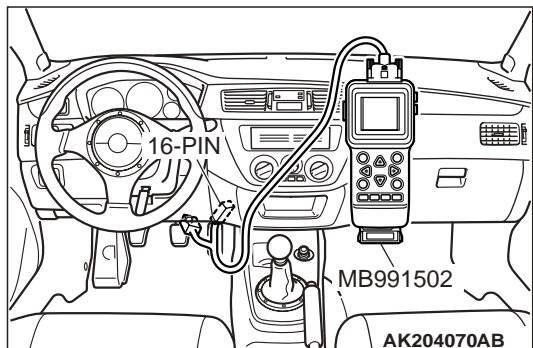
To prevent damage to scan tool MB991502 or MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991502 or MB991958.

- (1) Connect scan tool MB991502 or MB991958 to the data link connector.
- (2) Turn the ignition switch to the "ON" position.
- (3) Read the immobilizer system-DTC.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is the immobilizer system – DTC is output?**

**YES :** Refer to GROUP 54A, Ignition Switch and Immobilizer System – Diagnostic Trouble Code Chart [P.54A-10](#).

**NO :** Go to Step 2.

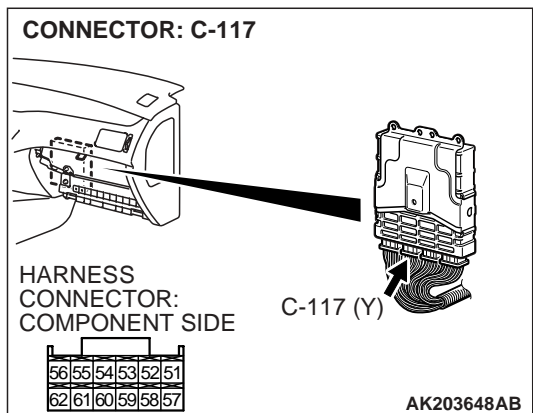


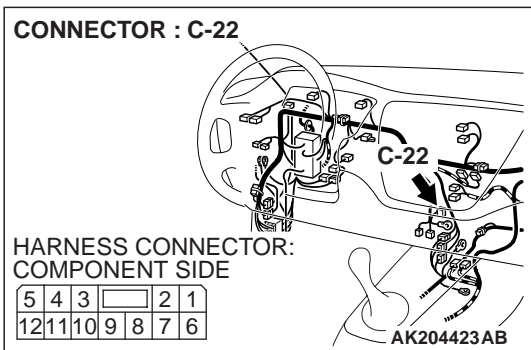
**STEP 2.** Check harness connector C-117 at ECM for damage.

**Q: Is the connector in good condition?**

**YES :** Go to Step 3.

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



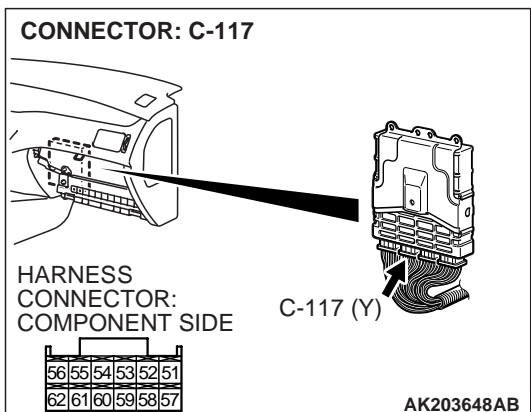


**STEP 3. Check harness connector C-22 at immobilizer-ECU for damage.**

**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 confirm that the malfunction symptom is eliminated.



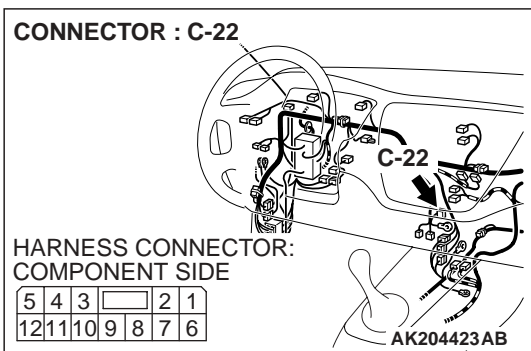
**STEP 4. Check for open circuit and short circuit to ground and harness damage between ECM connector C-117 (terminal No. 51) and immobilizer-ECU connector C-22 (terminal No. 5).**

*NOTE: Check harness connector after checking intermediate connector C-124. If intermediate connector is damaged, repair or replace it. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then confirm that the malfunction symptom is eliminated.*

**Q: Is the harness wire in good condition?**

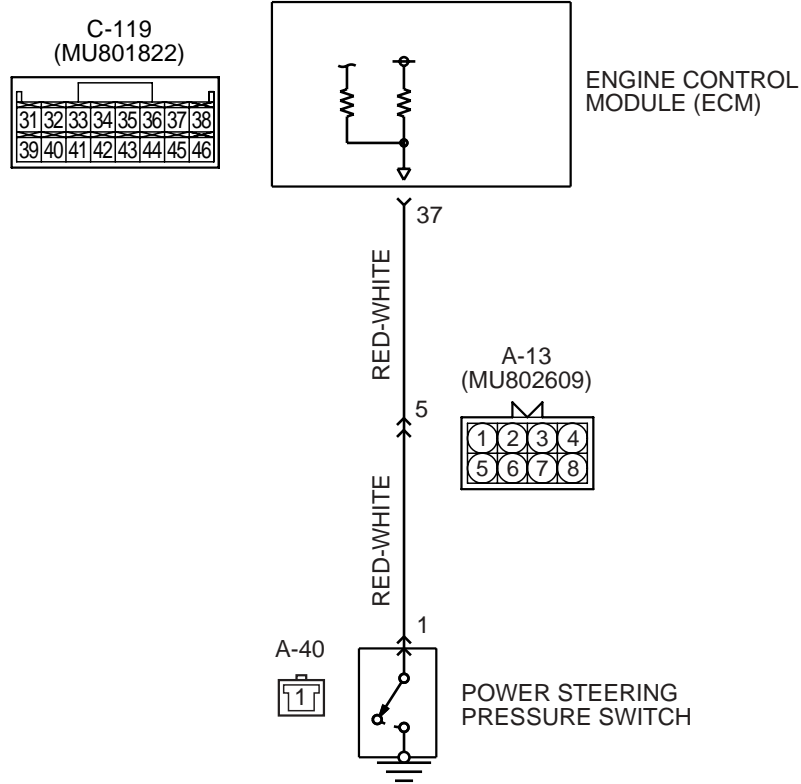
**YES :** If DTC P0513 is output again after the MFI-DTC has been erased, replace the ECM. Then check that the DTC P0513 does not reset.

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

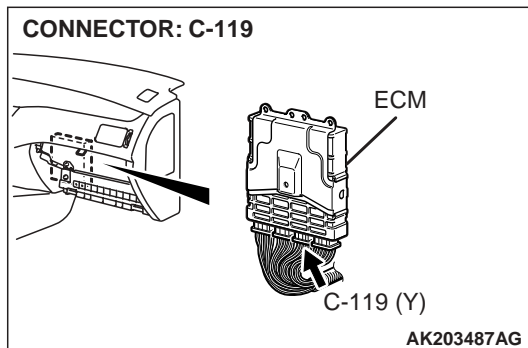
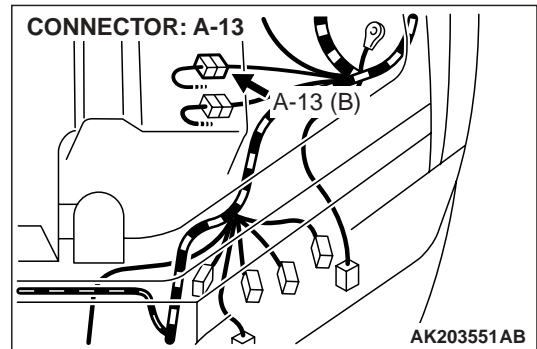
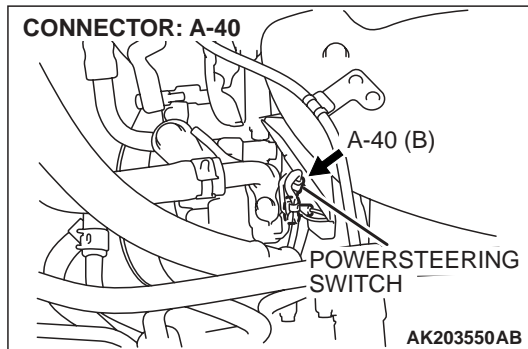


DTC P0551: POWER STEERING PRESSURE SENSOR CIRCUIT RANGE/PERFORMANCE

Power Steering Pressure Switch Circuit



AK203481



### CIRCUIT OPERATION

- A battery positive voltage is applied to the power steering pressure switch output terminal (terminal No. 1) from the ECM (terminal No. 37) via the resistor in the ECM.

### TECHNICAL DESCRIPTION

- The power steering pressure switch converts the existence of a power steering load into a high/low voltage, and inputs it into the ECM.
- When the steering wheel is turned, hydraulic pressure rises. The power steering pressure switch closes, and the applied battery positive voltage will be grounded. With this, the power steering pressure switch output voltage will fluctuate between 0 volt and 12 volts.
- While driving with the steering wheel held straight, the power steering pressure switch turns "OFF".
- The ECM checks whether the power steering pressure switch turns "OFF" or "ON" during driving.

### DTC SET CONDITIONS

#### Check Conditions

- Engine coolant temperature is higher than 30°C (86°F).
- Drive for 4 seconds or more with the vehicle speed is 50 km/h (31 mph) or more. Stop the vehicle [vehicle speed is 1.5 km/h (0.93 mph) or less]. Repeat 10 times or more.

#### Judgment Criteria

- Power steering pressure switch continues to be "ON".

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

- Power steering pressure switch failed.
- Open or shorted power steering pressure switch circuit, harness damage, or connector damage.
- ECM failed.

## DIAGNOSIS

#### Required Special Tools:

- MB991502: Scan Tool (MUT-II)
- MB991958: Scan Tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991911: Main Harness B



**STEP 1.** Using scan tool MB991502 or MB991958, check data list item 27: Power Steering Pressure Switch.

**⚠ CAUTION**

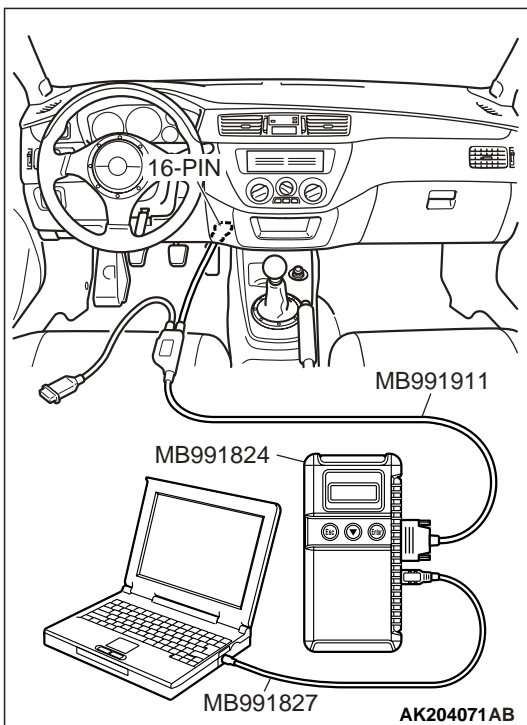
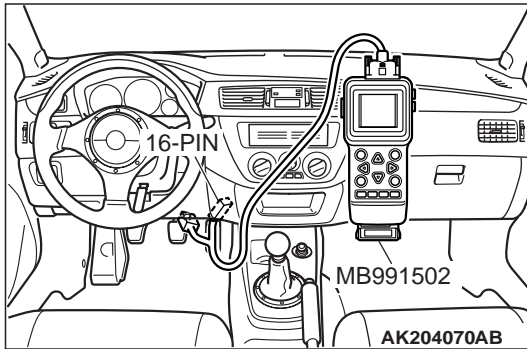
To prevent damage to scan tool MB991502 or MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991502 or MB991958.

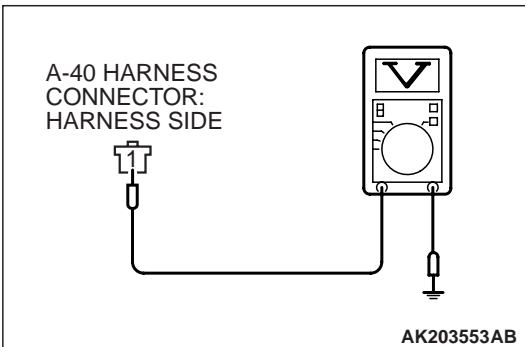
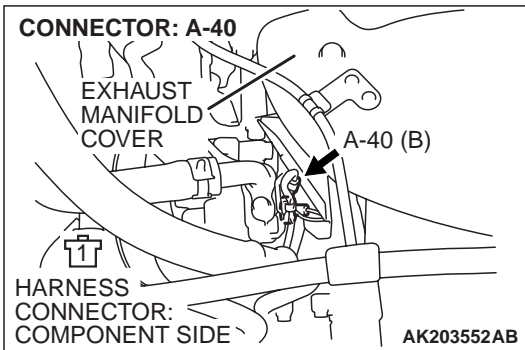
- (1) Connect scan tool MB991502 or MB991958 to the data link connector.
- (2) Start the engine and run at idle.
- (3) Set scan tool MB991502 or MB991958 to the data reading mode for item 27, Power Steering Pressure Switch.
  - If the steering wheel is stopped while idling, "OFF" will be displayed.
  - If the steering wheel is steered while idling, "ON" will be displayed.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is the sensor operating properly?**

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

**NO :** Go to Step 2.





**STEP 2. Measure the power supply voltage at power steering pressure switch connector A-40 by backprobing.**

- (1) Do not disconnect connector A-40.
- (2) Start the engine and run at idle.

- (3) Measure the voltage between terminal No. 1 and ground by backprobing.

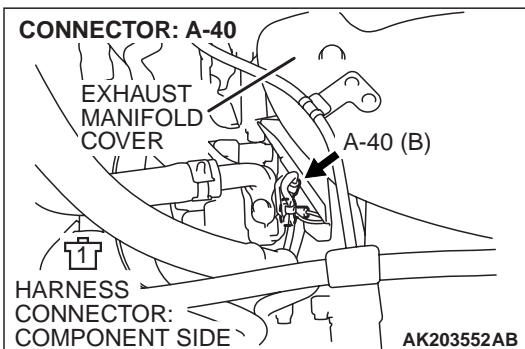
- When steering wheel is stationary, voltage should measure battery positive voltage.
- When steering wheel is turned, voltage should measure 1 volt or less.

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

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

**YES :** Go to Step 3.

**NO :** Go to Step 5.



**STEP 3. Check connector A-40 at power steering pressure switch for damage.**

**Q: Is the 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 14.

**STEP 4.** Using scan tool MB991502 or MB991958, check data list item 27: Power Steering Pressure Switch.

**⚠ CAUTION**

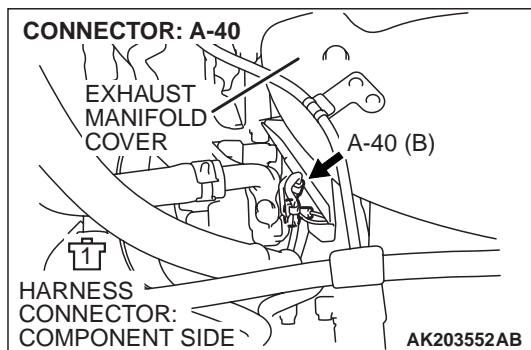
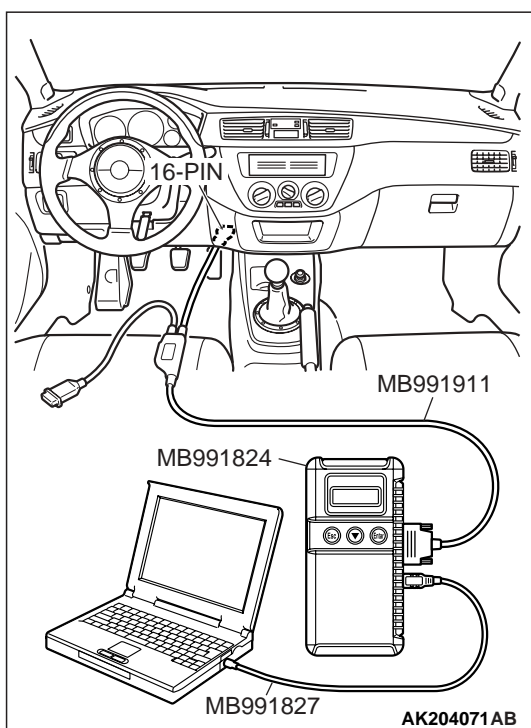
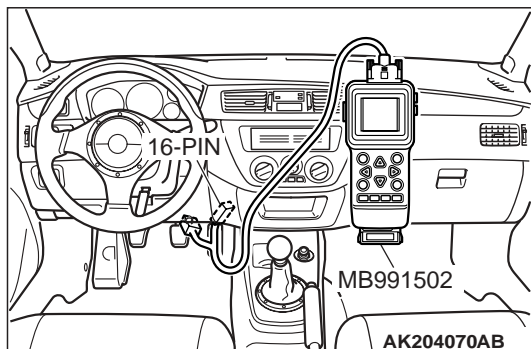
To prevent damage to scan tool MB991502 or MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991502 or MB991958.

- (1) Connect scan tool MB991502 or MB991958 to the data link connector.
- (2) Start the engine and run at idle.
- (3) Set scan tool MB991502 or MB991958 to the data reading mode for item 27, Power Steering Pressure Switch.
  - If the steering wheel is stopped while idling, "OFF" will be displayed.
  - If the steering wheel is steered while idling, "ON" will be displayed.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is the sensor operating properly?**

**YES :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/ Inspection Service Points [P.00E-2](#).

**NO :** Replace the ECM. Then go to Step 14.

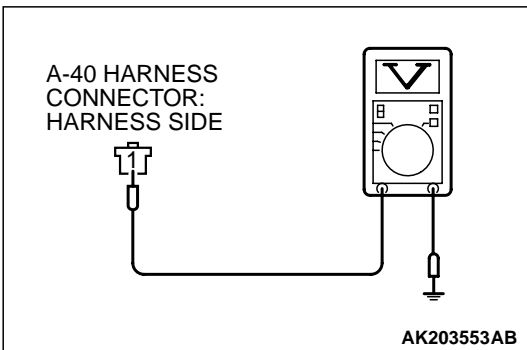
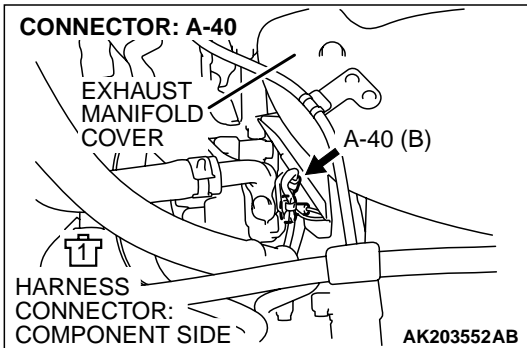


**STEP 5.** Check connector A-40 at power steering pressure switch for damage.

**Q: Is the 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 14.

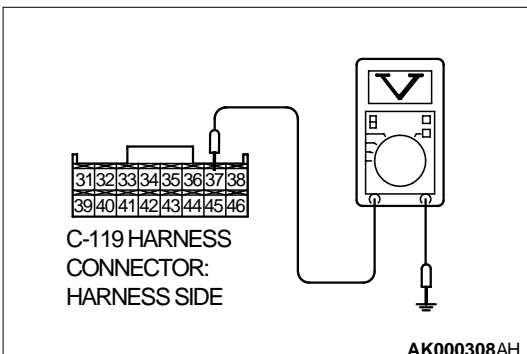
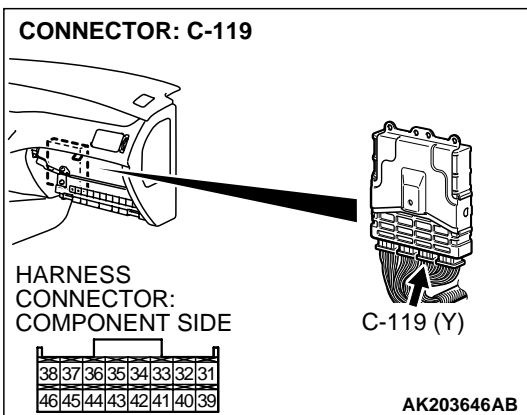


- STEP 6. Measure the power supply voltage at power steering pressure switch harness side connector A-40.**
- (1) Disconnect connector A-40 and measure at the harness side.
  - (2) Turn the ignition switch to the "ON" position.

- (3) Measure the voltage between terminal No. 1 and ground.
  - Voltage should measure battery positive voltage.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

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

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



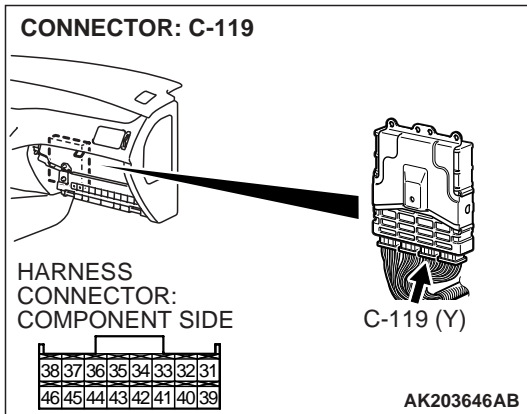
**STEP 7. Measure the power supply voltage at ECM connector C-119 by backprobing.**

- (1) Do not disconnect the ECM connector C-119.
- (2) Disconnect the power steering pressure switch connector B-116.
- (3) Turn the ignition switch to the "ON" position.

- (4) Measure the voltage between terminal No. 37 and ground by backprobing.
  - Voltage should measure between battery positive voltage.
- (5) Turn the ignition switch to the "LOCK" (OFF) position.

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

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

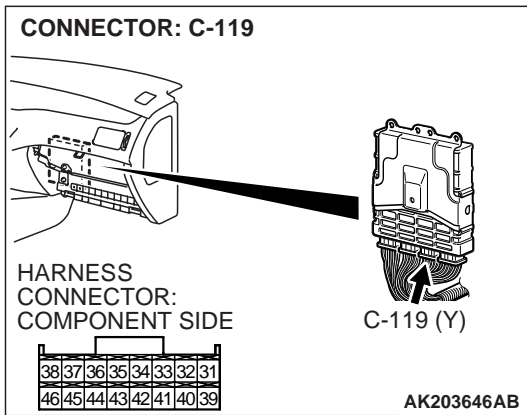


**STEP 8. Check connector C-119 at ECM for damage.**

**Q: Is the connector in good condition?**

**YES :** Check connector A-13 at intermediate connector for damage, and repair or replace as required. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). If intermediate connector is in good condition, repair harness wire between power steering pressure switch connector A-40 (terminal No. 1) and ECM connector C-119 (terminal No. 37) because of open circuit. Then go to Step 14.

**NO :** Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then go to Step 14.



**STEP 9. Check connector C-119 at ECM for damage.**

**Q: Is the connector in good condition?**

**YES :** Go to Step 10.

**NO :** Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then go to Step 14.

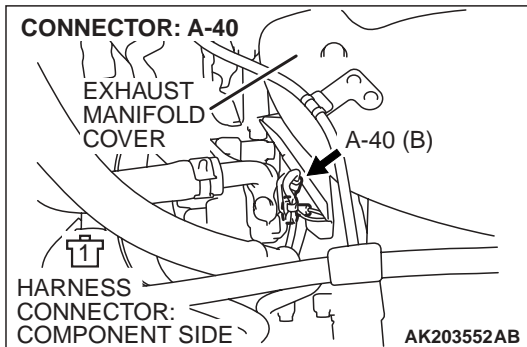
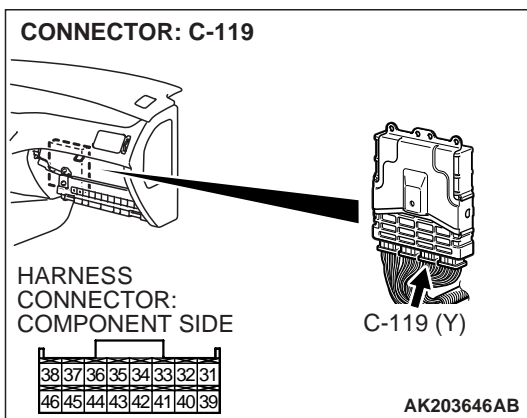
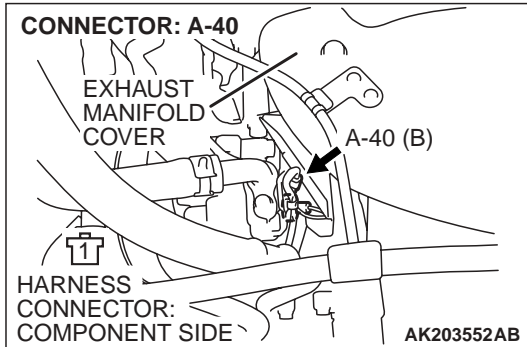
**STEP 10. Check for short circuit to ground between power steering pressure switch connector A-40 (terminal No. 1) and ECM connector C-119 (terminal No. 37).**

*NOTE: Check harness after checking intermediate connector A-13. If intermediate connector is damaged, repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 14.*

**Q: Is the harness wire in good condition?**

**YES :** Replace the ECM. Then go to Step 14.

**NO :** Repair it. Then go to Step 14.



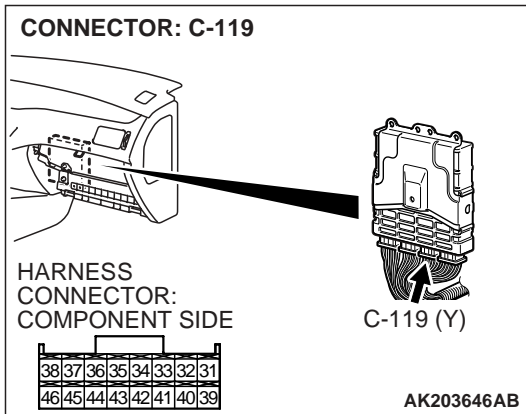
**STEP 11. Replace the power steering pressure switch.**

- (1) Replace the power steering pressure switch.
- (2) Retest the system.
- (3) Check the diagnostic trouble code (DTC).

**Q: Is DTC P0551 set?**

**YES :** Go to Step 12.

**NO :** Go to Step 14.

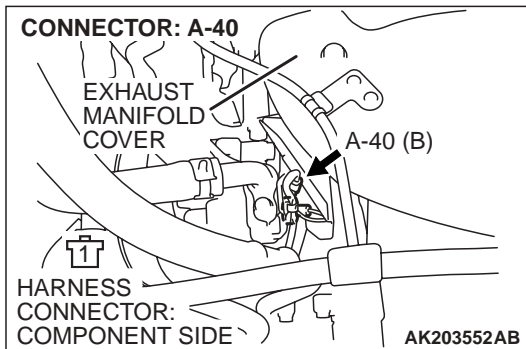


**STEP 12. Check connector C-119 at ECM for damage.**

**Q: Is the connector in good condition?**

**YES :** Go to Step 13.

**NO :** Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then go to Step 14.



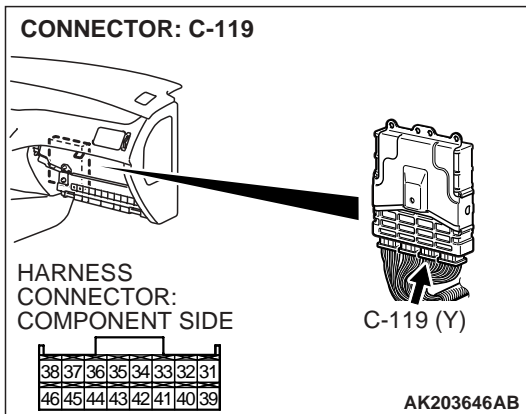
**STEP 13. Check for harness damage between power steering pressure switch connector A-40 (terminal No. 1) and ECM connector C-119 (terminal No. 37).**

*NOTE: Check harness after checking intermediate connector A-13. If intermediate connector is damaged, repair or replace it. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then go to Step 14.*

**Q: Is the harness wire in good condition?**

**YES :** Replace the ECM. Then go to Step 14.

**NO :** Repair it. Then go to Step 14.



**STEP 14.** Using scan tool MB991502 or MB991958, check data list item 27: Power Steering Pressure Switch.

**⚠ CAUTION**

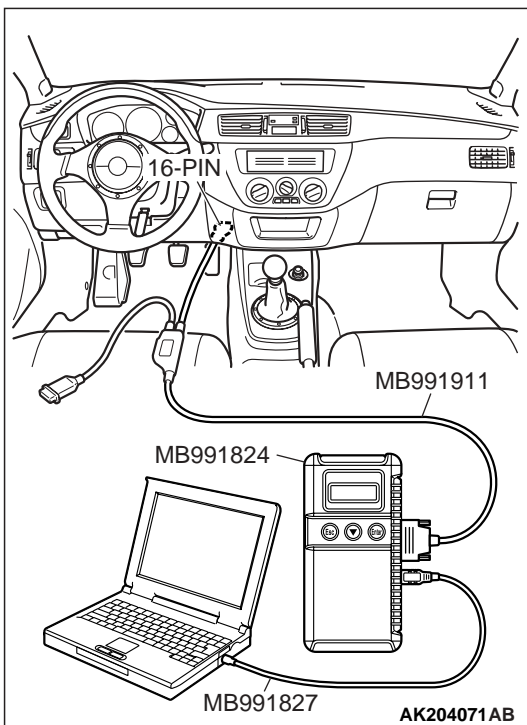
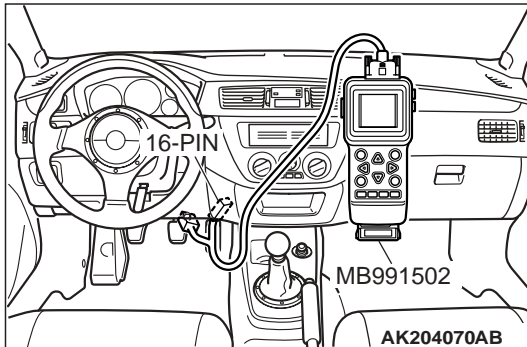
To prevent damage to scan tool MB991502 or MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991502 or MB991958.

- (1) Connect scan tool MB991502 or MB991958 to the data link connector.
- (2) Start the engine and run at idle.
- (3) Set scan tool MB991502 or MB991958 to the data reading mode for item 27, Power Steering Pressure Switch.
  - If the steering wheel is stopped while idling, "OFF" will be displayed.
  - If the steering wheel is steered while idling, "ON" will be displayed.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is the switch operating properly?**

**YES :** The procedure is complete.

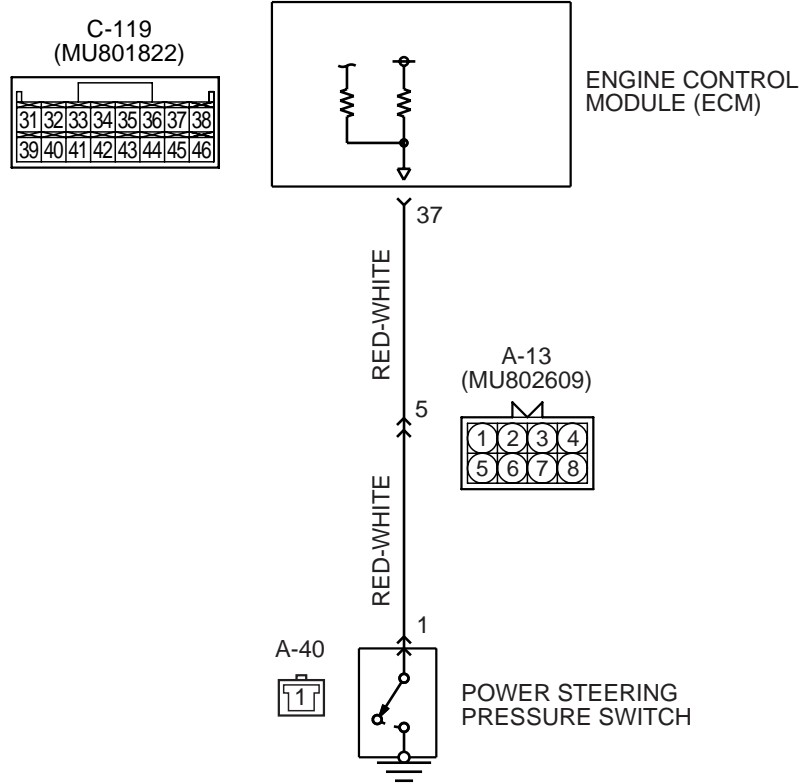
**NO :** Repeat the troubleshooting.



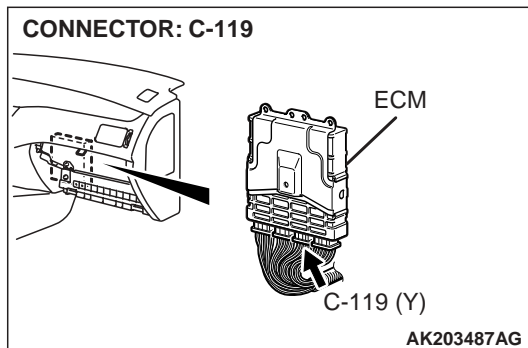
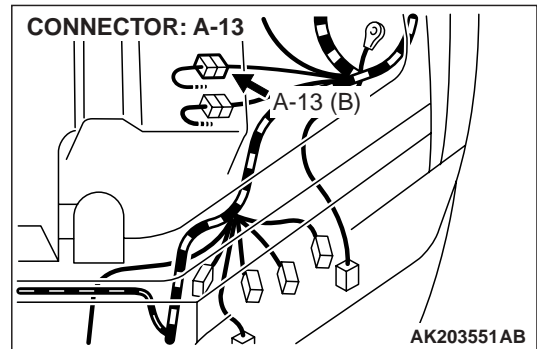
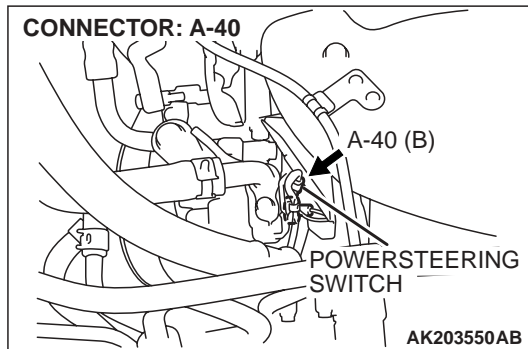


DTC P0554: POWER STEERING PRESSURE SENSOR CIRCUIT INTERMITTENT

Power Steering Pressure Switch Circuit



AK203481



### CIRCUIT OPERATION

- A battery positive voltage is applied to the power steering pressure switch output terminal (terminal No. 1) from the ECM (terminal No. 37) via the resistor in the ECM.

### TECHNICAL DESCRIPTION

- The power steering pressure switch converts the existence of a power steering load into a high/low voltage, and inputs it into the ECM.
- When the steering wheel is turned, hydraulic pressure rises. The power steering pressure switch closes, and the applied battery positive voltage will be grounded. With this, the power steering pressure switch output voltage will fluctuate between 0 volt and 12 volts.
- While driving with the steering wheel held straight, the power steering pressure switch turns "OFF".
- The ECM checks whether the power steering pressure switch turns "OFF" or "ON" during driving.

### DTC SET CONDITIONS

#### Check Conditions

- Engine coolant temperature is higher than 30°C (86°F).
- Vehicle speed is higher than 50 km/h (31 mph).

#### Judgment Criteria

- The ON/OFF frequency of a power steering pressure switch is 10 Hz or more for 20 seconds.

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

- Power steering pressure switch failed.
- Incorrect power steering fluid level.
- Incorrect oil pump pressure.
- Harness damage in power steering pressure switch circuit, or loose connector.
- ECM failed.

## DIAGNOSIS

### Required Special Tools:

- MB991502: Scan Tool (MUT-II)
- MB991958: Scan Tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991911: Main Harness B

**STEP 1. Using scan tool MB991502 or MB991958, check data list item 27: Power Steering Pressure Switch.**

**⚠ CAUTION**

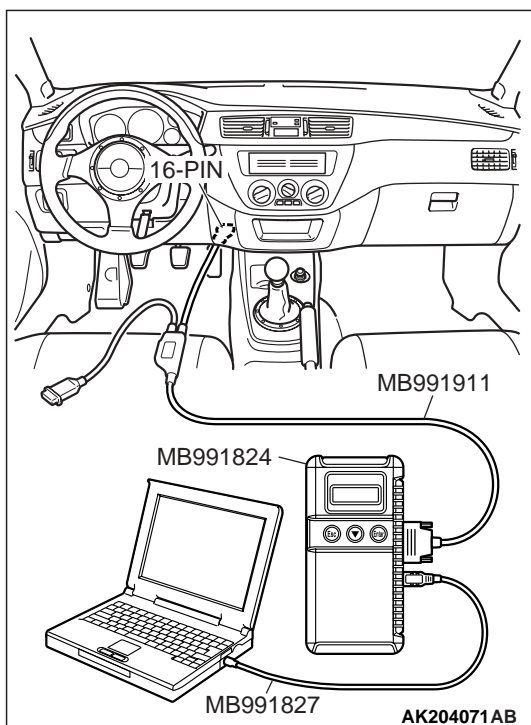
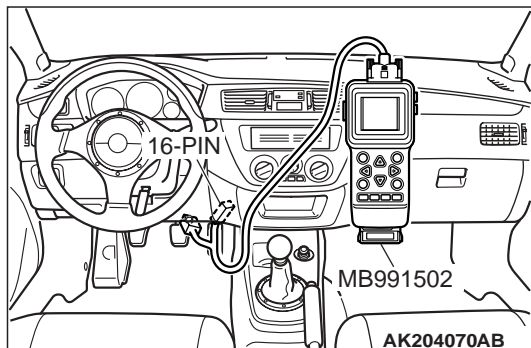
To prevent damage to scan tool MB991502 or MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991502 or MB991958.

- (1) Connect scan tool MB991502 or MB991958 to the data link connector.
- (2) Start the engine and run at idle.
- (3) Set scan tool MB991502 or MB991958 to the data reading mode for item 27, Power Steering Pressure Switch.
  - If the steering wheel is stopped while idling, "OFF" will be displayed.
  - If the steering wheel is steered while idling, "ON" will be displayed.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is the sensor operating properly?**

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

**NO :** Go to Step 2.



**STEP 2. Check the power steering fluid level.**

Refer to GROUP 37A, On-Vehicle Service – Fluid Level Check [P.37-18](#).

**Q: Are there any abnormalities?**

**YES :** Go to Step 3.

**NO :** Repair it. Then go to Step 7.

**STEP 3. Check the power steering pressure switch.**

Refer to GROUP 37A, On-Vehicle Service – Power Steering Pressure Switch Check [P.37-20](#).

**Q: Are there any abnormalities?**

**YES :** Go to Step 4.

**NO :** Replace the power steering pressure switch. Then go to Step 7.

**STEP 4. Check the oil pump pressure .**

Refer to GROUP 37A, On-Vehicle Service - Oil Pump Pressure Test [P.37-3](#).

**Q: Are there any abnormalities?**

**YES :** Go to Step 5.

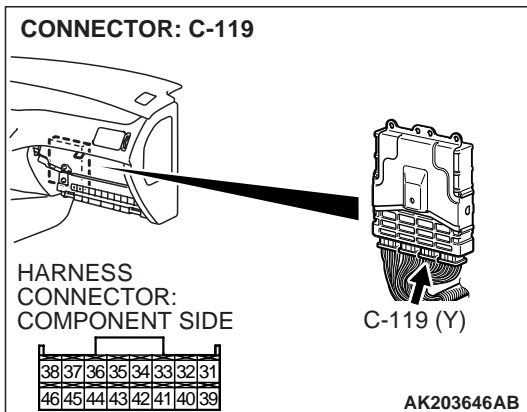
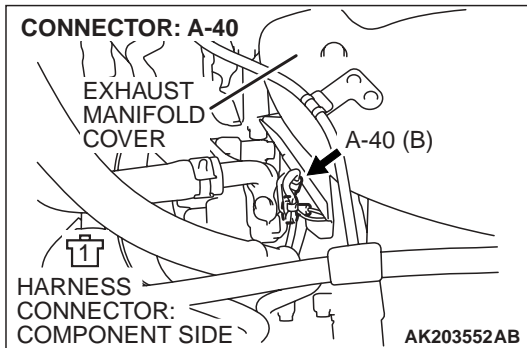
**NO :** Repair it. Then go to Step 7.

**STEP 5. Check harness connector A-40 at the power steering pressure switch and connector C-119 at ECM for damage.**

**Q: Is the harness connector in good condition?**

**YES :** Go to Step 6.

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



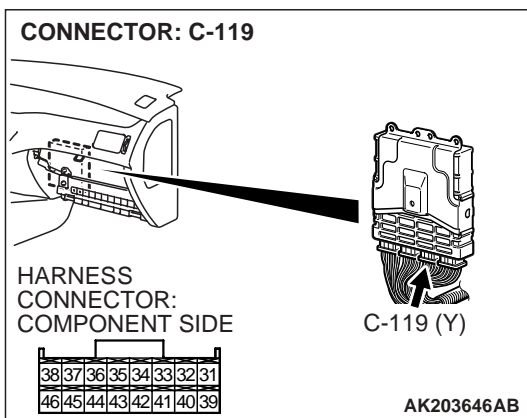
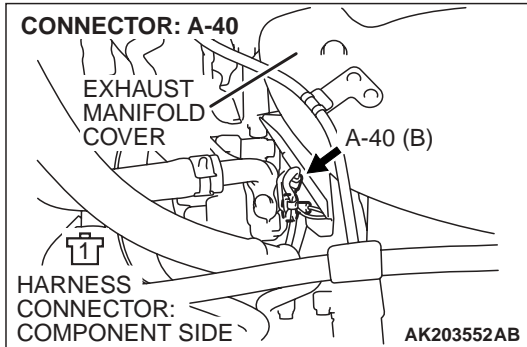
**STEP 6. Check for harness damage between power steering pressure switch connector A-40 (terminal No. 1) and ECM connector C-119 (terminal No. 37).**

*NOTE: Check harness after checking intermediate connector A-13. If intermediate connector is 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. Then go to Step 7.

**NO :** Repair it. Then go to Step 7.



**STEP 7.** Using scan tool MB991502 or MB991958, check data list item 27: Power Steering Pressure Switch.

**⚠ CAUTION**

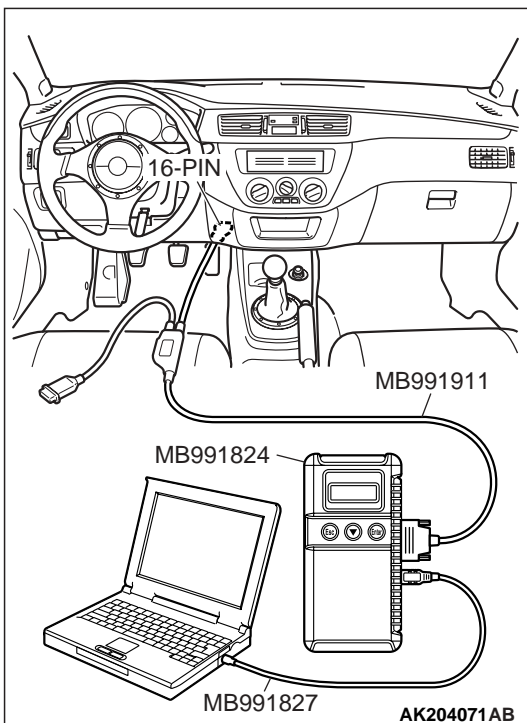
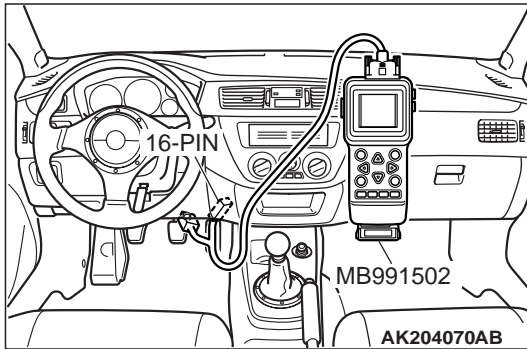
To prevent damage to scan tool MB991502 or MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991502 or MB991958.

- (1) Connect scan tool MB991502 or MB991958 to the data link connector.
- (2) Start the engine and run at idle.
- (3) Set scan tool MB991502 or MB991958 to the data reading mode for item 27, Power Steering Pressure Switch.
  - If the steering wheel is not turned while idling, "OFF" will be displayed.
  - If the steering wheel is turned while idling, "ON" will be displayed.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is the switch operating properly?**

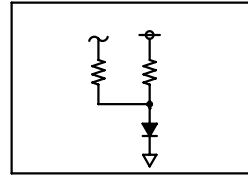
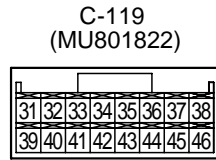
**YES :** The procedure is complete.

**NO :** Repeat the troubleshooting.

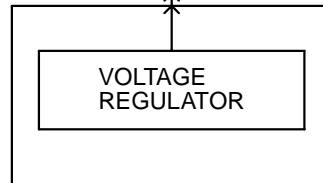
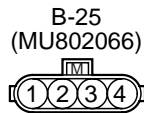
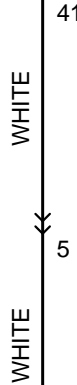
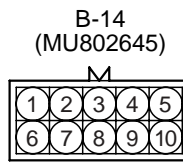


DTC P0622: GENERATOR FR TERMINAL CIRCUIT MALFUNCTION

Generator Circuit

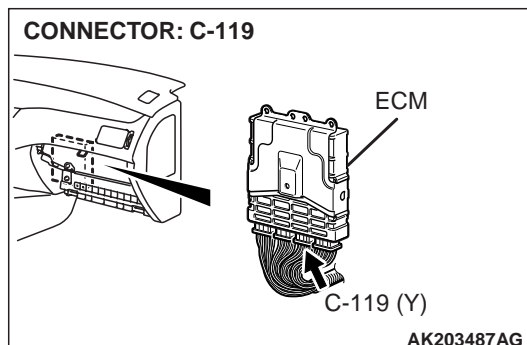
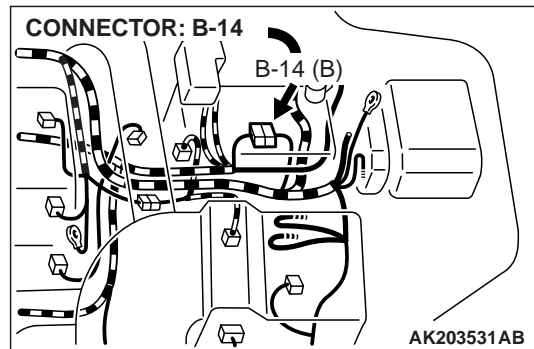
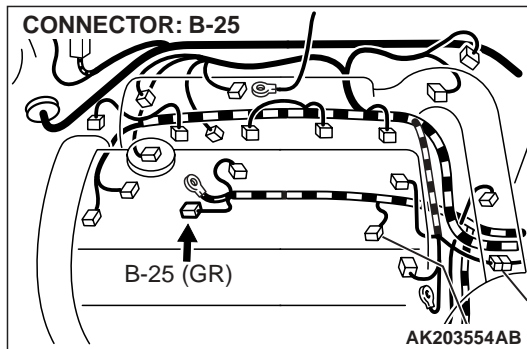


ENGINE CONTROL  
MODULE (ECM)



GENERATOR

AK203482



**CIRCUIT OPERATION**

- The ECM (terminal 41) apply a battery positive voltage into the generator FR terminal No. 4 via resistance inside the unit.

**TECHNICAL DESCRIPTION**

- When the generator field coils are controlled, the generator FR terminal inputs signal to the ECM.
- The ECM detects the generator output with the input signal, and controls the idle air control motor according to the generator output.

**DTC SET CONDITIONS**

**Check Conditions**

- Engine speed is higher than 50 r/min.

**Judgement Criteria**

- Input voltage from the generator FR terminal has continued to be approximately battery positive voltage for 20 seconds.

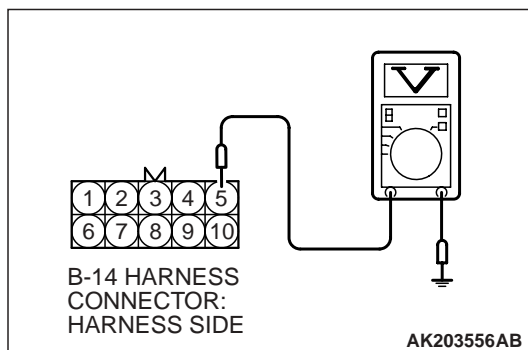
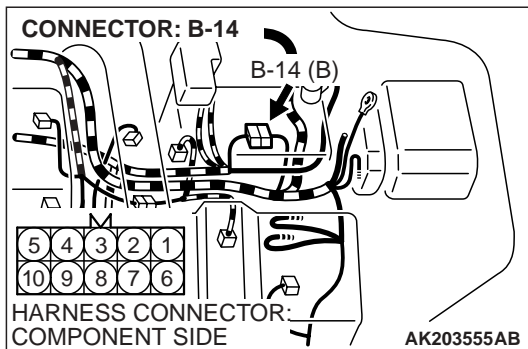
**TROUBLESHOOTING HINTS (The most likely causes for this code to be set area: )**

- Open circuit in generator FR terminal circuit.
- ECM failed.

**DIAGNOSIS**

**STEP 1. Measure the voltage at generator intermediate connector B-14 by backprobing.**

- (1) Do not disconnect connector B-14.
- (2) Start the engine and run at idle.

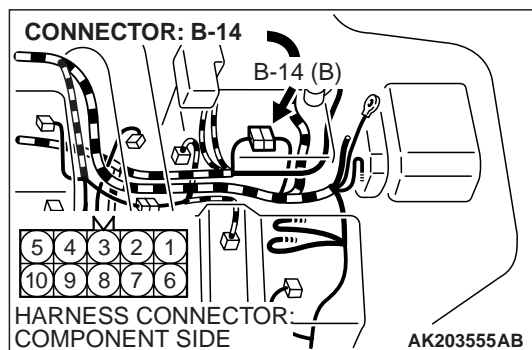


- (3) Measure the voltage between terminal No. 5 and ground by backprobing.
  - a. Engine: warming up
  - b. Radiator fan: stopped
  - c. Headlight switch: OFF to ON
  - d. Rear defogger switch: OFF to ON
  - e. Stoplight switch: OFF to ON
    - Voltage should measure drops.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Did the measured voltage drop?**

- YES** : Go to Step 2.  
**NO** : Go to Step 4.





**STEP 2. Check harness connector B-14 at generator intermediate connector for damage.**

**Q: Is the harness connector in good condition?**

**YES :** Go to Step 3.

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

**STEP 3. Retest the system.**

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

**Q: Is DTC P0622 set?**

**YES :** Replace the ECM. Then go to Step 11.

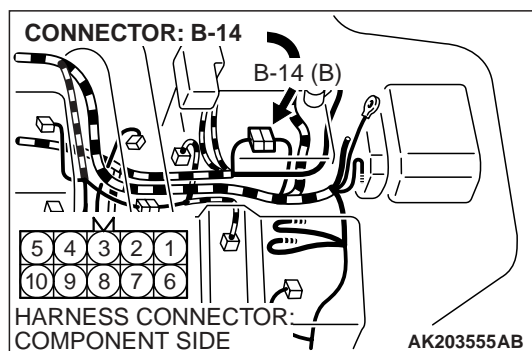
**NO :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/ Inspection Service Points [P.00-6](#).

**STEP 4. Check connector B-14 at generator intermediate connector for damage.**

**Q: Is the connector in good condition?**

**YES :** Go to Step 5.

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

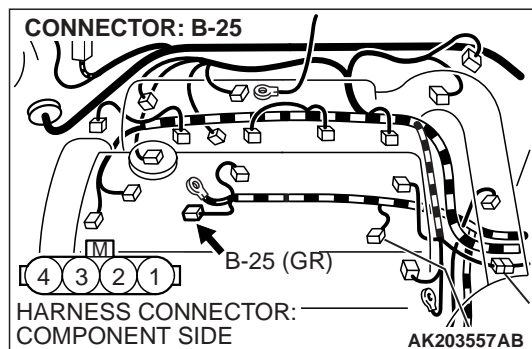


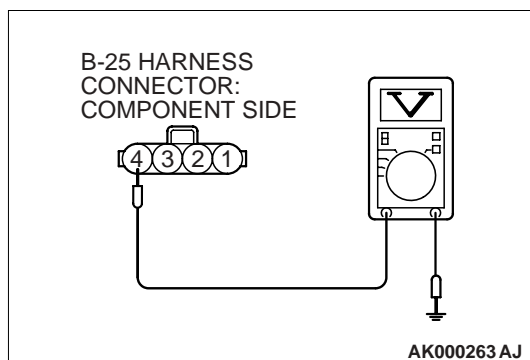
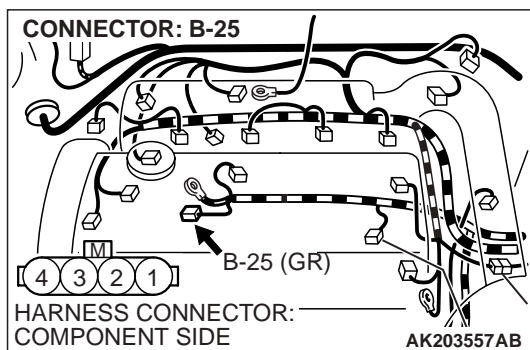
**STEP 5. Check harness connector B-25 at generator connector for damage.**

**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 11.





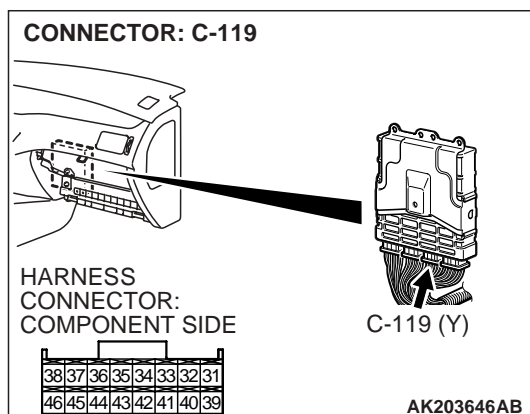
**STEP 6. Measure the voltage at generator harness side connector B-25.**

- (1) Disconnect connector B-25 and measure at the harness side.
- (2) Turn the ignition switch to the "ON" position.

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

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

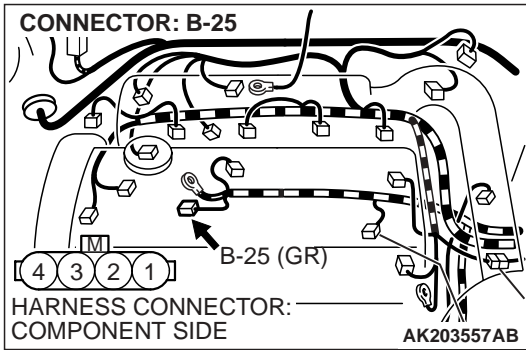
- YES :** Go to Step 9.  
**NO :** Go to Step 7.



**STEP 7. Check harness connector C-119 at ECM for damage.**

**Q: Is the harness connector in good condition?**

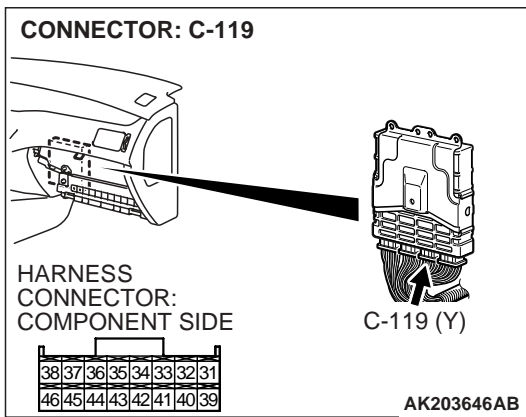
- YES :** Go to Step 8.  
**NO :** Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then go to Step 11.



**STEP 8. Check for open circuit and short circuit to ground between generator connector B-25 (terminal No. 4) and ECM connector C-119 (terminal No. 41).**

**Q: Is the harness wire in good condition?**

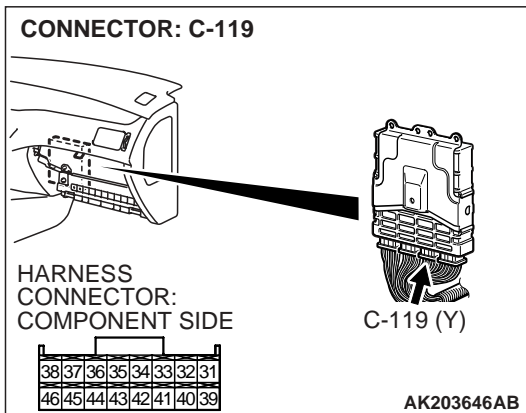
- YES :** Replace the ECM. Then go to Step 11.
- NO :** Repair it. Then go to Step 11.



**STEP 9. Check harness connector C-119 at ECM for damage.**

**Q: Is the harness connector in good condition?**

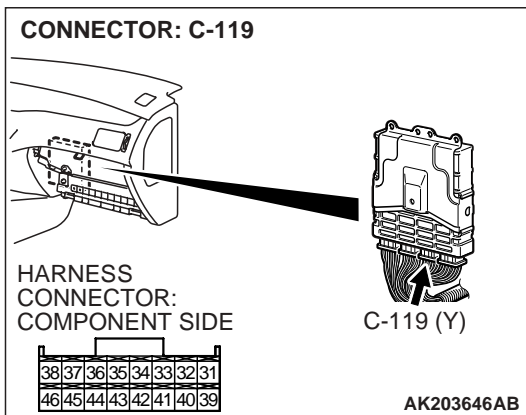
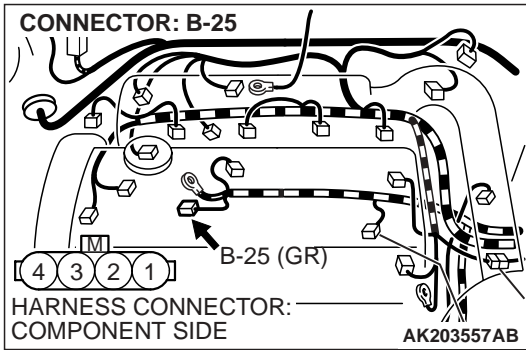
- YES :** Go to Step 10.
- NO :** Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then go to Step 11.



**STEP 10.** Check for harness damage between generator connector B-25 (terminal No. 4) and ECM connector C-119 (terminal No. 41).

**Q:** Is the harness wire in good condition?

- YES :** Replace the generator. Then go to Step 11.
- NO :** Repair it. Then go to Step 11.



**STEP 11.** Using scan tool MB991502 or MB991958, read the diagnostic trouble code (DTC).

**⚠ CAUTION**

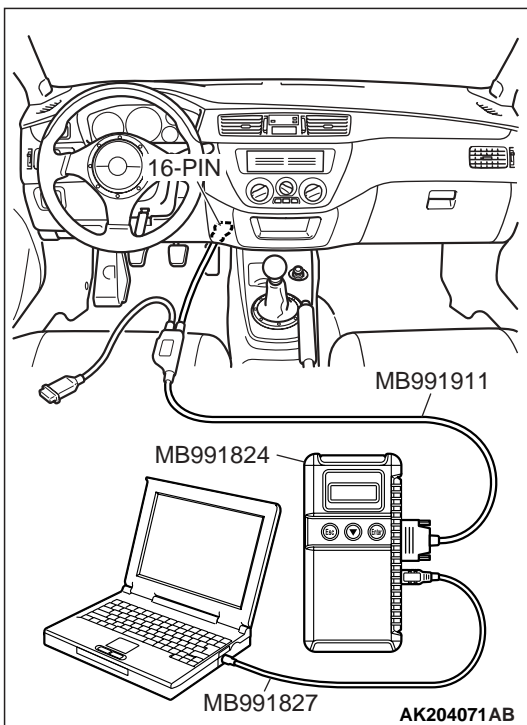
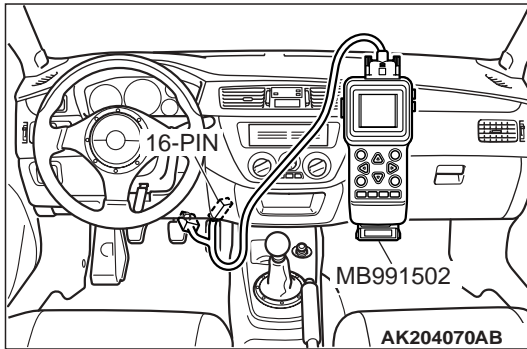
To prevent damage to scan tool MB991502 or MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991502 or MB991958.

- (1) Connect scan tool MB991502 or 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 P0622 set?**

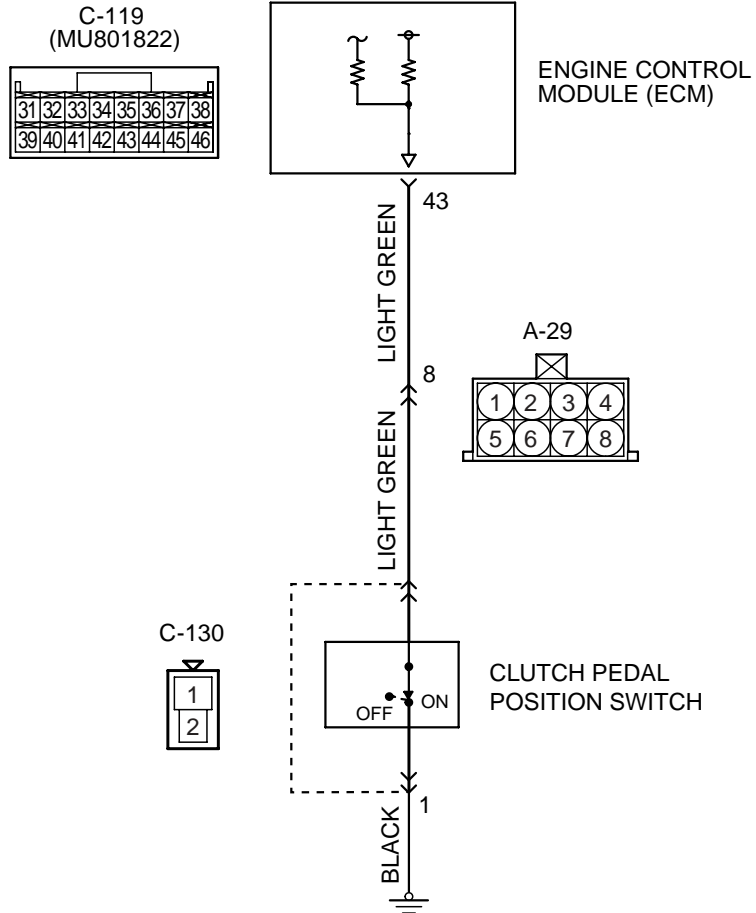
**YES :** Repeat the troubleshooting.

**NO :** The procedure is complete.

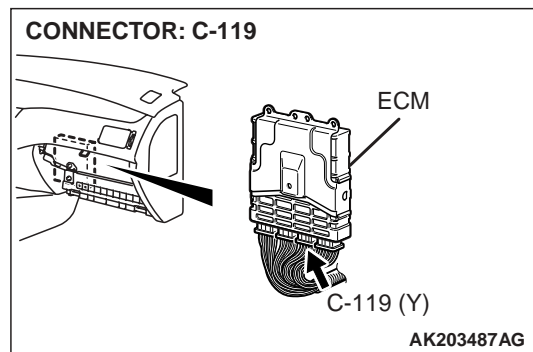
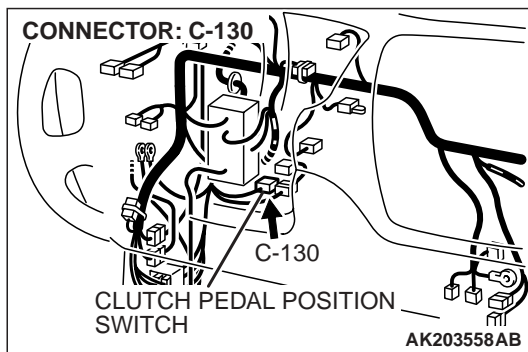


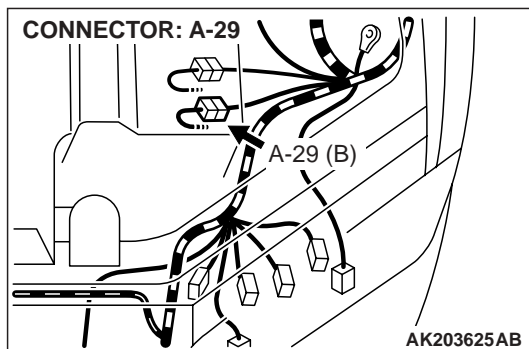
DTC P0830: CLUTCH PEDAL POSITION SWITCH CIRCUIT RANGE/PERFORMANCE

Clutch Pedal Position Switch Circuit



AK203483





### CIRCUIT OPERATION

- A battery positive voltage is applied to the clutch pedal position switch output terminal (terminal No. 2) from the ECM (terminal No. 43) via the resistor in the ECM.

### TECHNICAL DESCRIPTION

- The clutch pedal position switch inputs the high/low voltage into the ECM in accordance with whether the clutch pedal is being pressed.
- When the driver presses the clutch pedal while shifting gears, the contact of the clutch pedal position switch closes, causing the low signal to be input into the ECM. At this time, the ECM effects a correction to reduce the fuel injection volume.

### DTC SET CONDITIONS

#### Check Conditions, Judgment Criteria

- After the engine is started and the vehicle attains a minimum speed of 30 km/h (19 mph), the inversion of the high-low signals of the clutch pedal position switch is not detected even once.

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

- Clutch pedal position switch failed.
- Open or shorted clutch pedal position switch circuit, harness damage or connector damage.
- ECM failed.

### DIAGNOSIS

#### Required Special Tools:

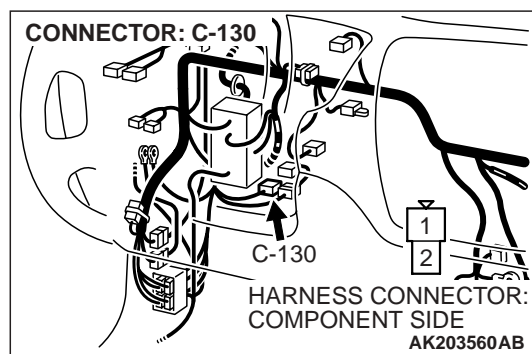
- MB991502: Scan Tool (MUT-II)
- MB991958: Scan Tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991911: Main Harness B

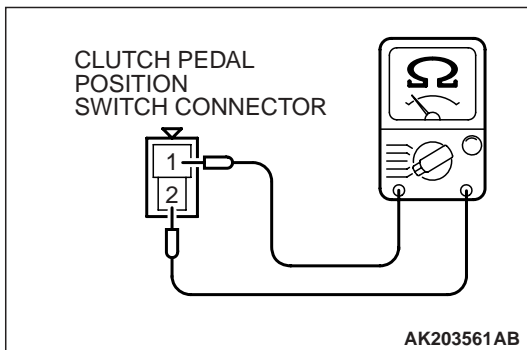
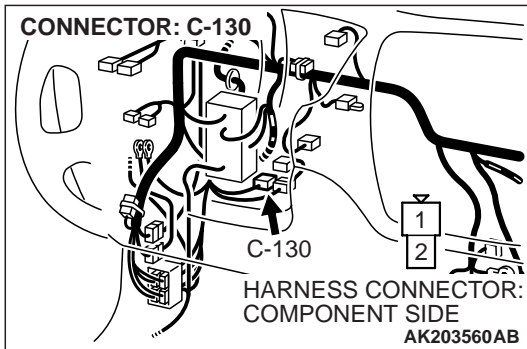
#### STEP 1. Check harness connector C-130 at clutch pedal position switch for damage.

#### 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 9.





**STEP 2. Check the clutch pedal position switch.**

(1) Disconnect the clutch pedal position switch connector C-130.

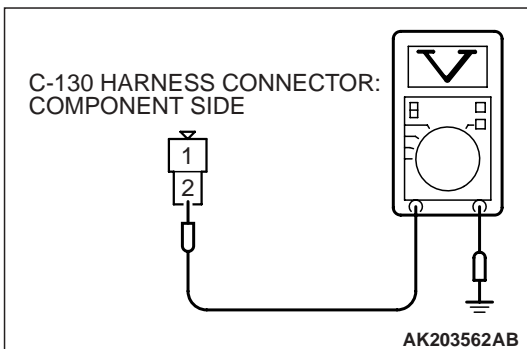
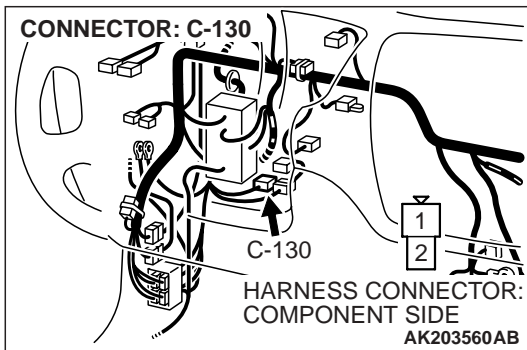
(2) Check for continuity between the clutch pedal position switch side connector terminal No. 1 and No. 2.

- If the clutch pedal is not pressed, the measurement should indicate the battery positive voltage.
- If the clutch pedal is pressed, the measurement should indicate a voltage of 1 V or less.

**Q: Are there any abnormalities?**

**YES :** Repair or replace it. Then go to Step 9.

**NO :** Go to Step 3.



**STEP 3. Measure the power supply voltage at clutch pedal position switch harness side connector C-130.**

(1) Disconnect the connector C-130 and measure the harness side.

(2) Turn the ignition switch to the "ON" position. Measure the voltage between terminal No. 2 and ground.

- Voltage should be battery positive voltage.

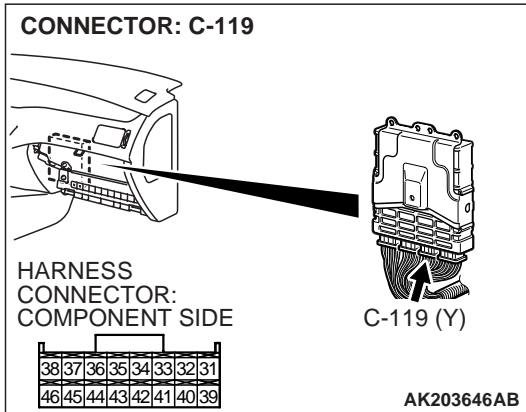
(3) Turn the ignition switch to the "LOCK"(OFF) position.

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

**YES :** Go to Step 6.

**NO :** Go to Step 4.



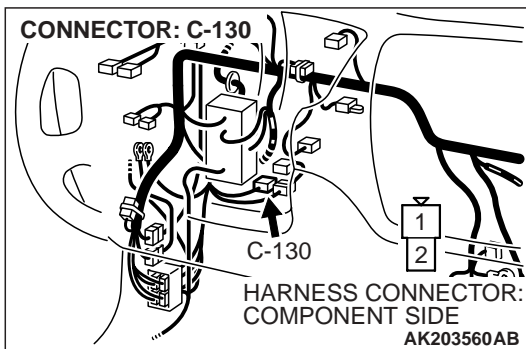


**STEP 4. Check harness connector C-119 at ECM for damage.**

**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 9.



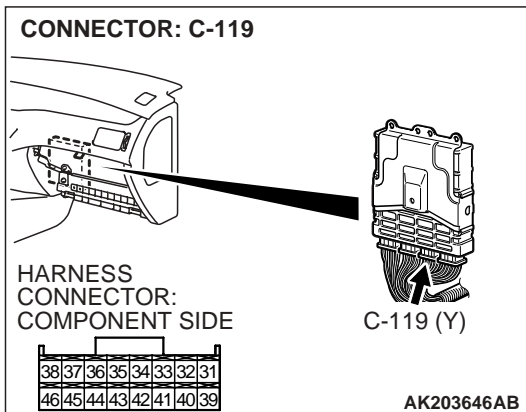
**STEP 5. Check for open circuit and short circuit to ground between clutch pedal position switch connector C-130 (terminal No. 2) and ECM connector C-119 (terminal No. 43).**

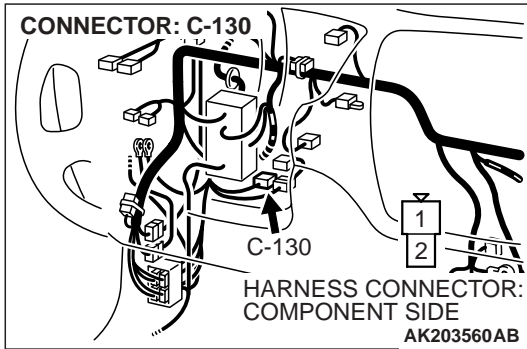
*NOTE: Check harness after checking intermediate connector A-29. If intermediate connector is damaged, repair or replace it. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then go to Step 9.*

**Q: Is the harness wire in good condition?**

**YES :** Replace the ECM. Then go to Step 9.

**NO :** Repair it. Then go to Step 9.





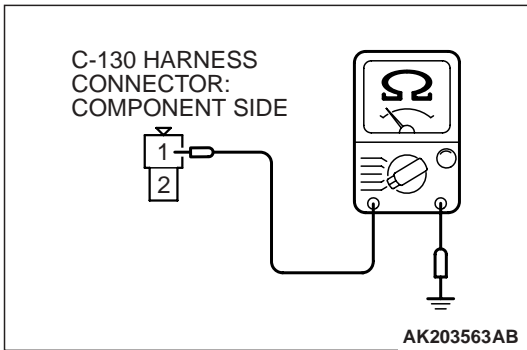
**STEP 6. Check for continuity at clutch pedal position switch harness side connector C-130.**

- (1) Disconnect the connector C-130 and measure 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 7.

**NO :** Repair harness wire between clutch pedal position switch connector C-130 terminal No. 1 and ground because of harness damage. Then go to Step 9.

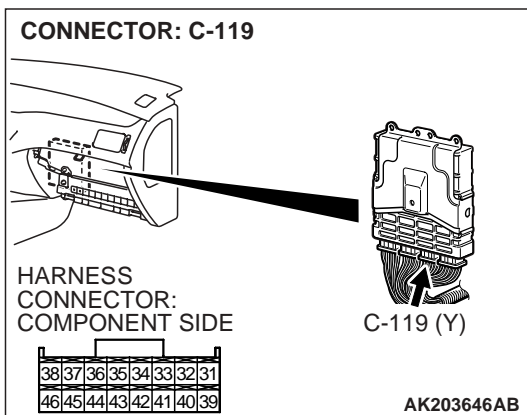


**STEP 7. Check harness connector C-119 at ECM for damage.**

**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 9.



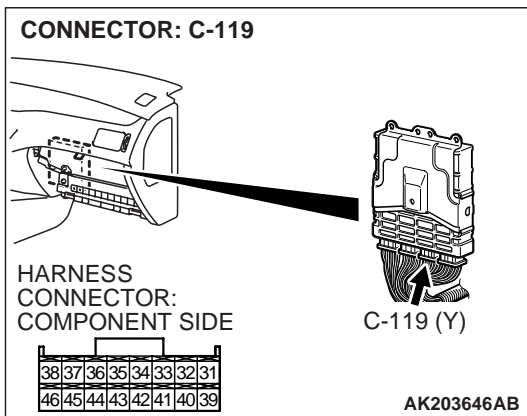
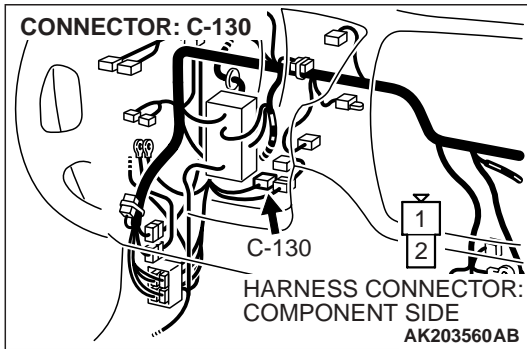
**STEP 8. Check for harness damage between clutch pedal position switch connector C-130 (terminal No. 2) and ECM connector C-119 (terminal No. 43).**

*NOTE: Check harness after checking intermediate connector A-29. If intermediate connector is damaged, repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 9.*

**Q: Is the harness wire in good condition?**

**YES :** Replace the ECM. Then go to Step 9.

**NO :** Repair it. Then go to Step 9.



**STEP 9.** Using scan tool MB991502 or MB991958, read the diagnostic trouble code (DTC).

**⚠ CAUTION**

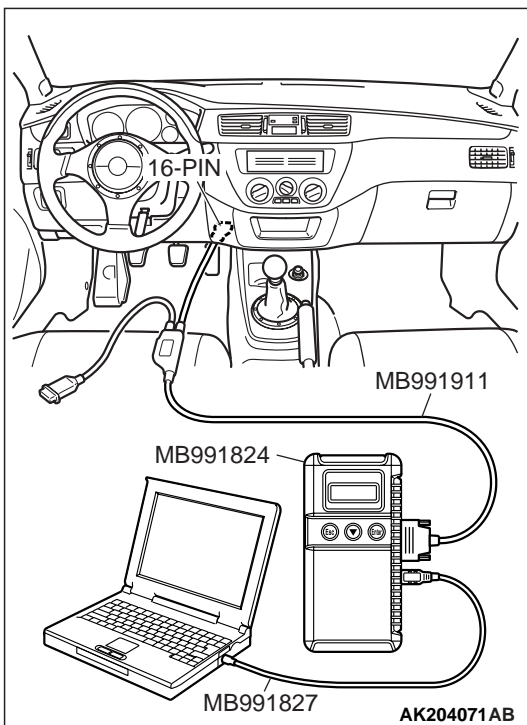
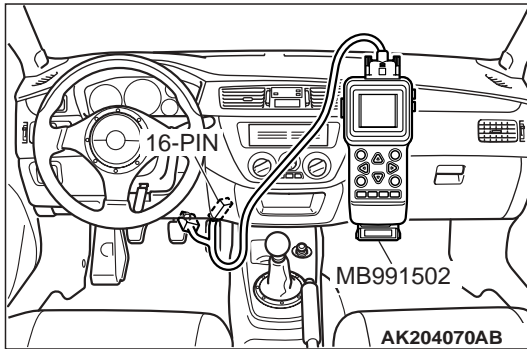
To prevent damage to scan tool MB991502 or MB991958, always turn the ignition switch to the "LOCK"(OFF) position before connecting or disconnecting scan tool MB991502 or MB991958.

- (1) Connect scan tool MB991502 or MB991958 to the data link connector.
- (2) Turn the ignition switch to the "ON" position.
- (3) Erase the DTC.
- (4) Drive the vehicle at a minimum speed of 30 km/h (19 mph).
- (5) After completing the test drive, read the DTC. Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is DTC P0830 set?**

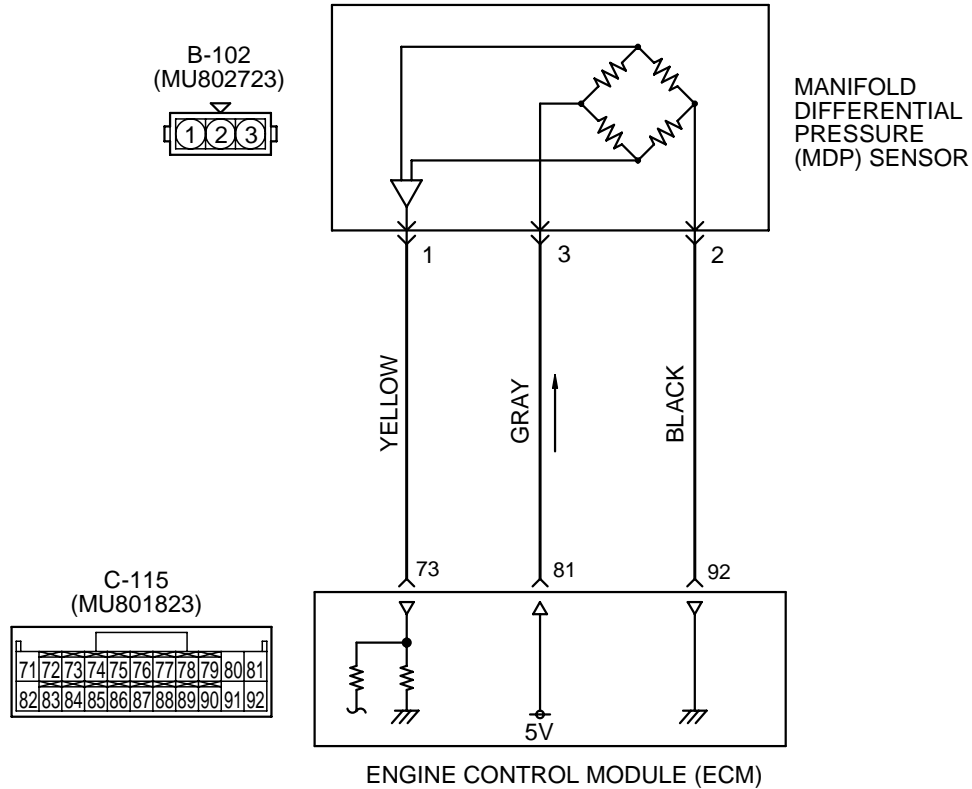
**YES :** The inspection is complete.

**NO :** Retry the troubleshooting.

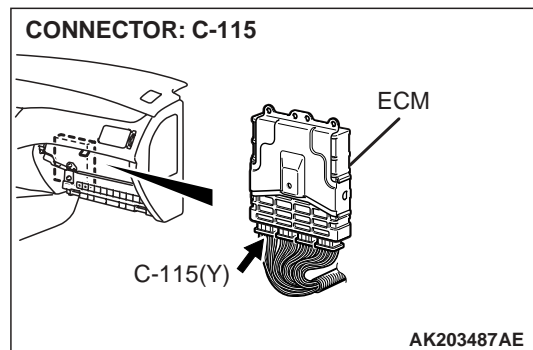
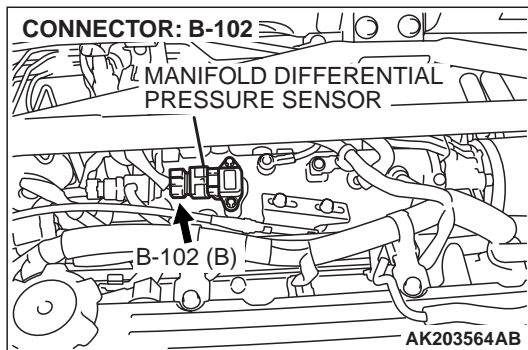


DTC P1400: MANIFOLD DIFFERENTIAL PRESSURE SENSOR CIRCUIT MALFUNCTION

Manifold Differential Pressure Sensor Circuit



AK203484



**CIRCUIT OPERATION**

- A 5-volt voltage is applied on the manifold differential pressure sensor power terminal (terminal No. 3) from the ECM (terminal No. 81). The ground terminal (terminal No. 2) is grounded with the ECM (terminal No. 92).
- A voltage proportional to the pressure in the intake manifold plenum is sent from the manifold differential pressure sensor output terminal (terminal No. 1) to the ECM (terminal No. 73).

**TECHNICAL DESCRIPTION**

- The manifold differential pressure sensor outputs a voltage which corresponds to the negative pressure in the intake manifold.
- The ECM checks whether the voltage output by manifold differential pressure sensor is within a specified range.

## DTC SET CONDITIONS

### Check Conditions

- 8 minutes or more have passed after starting the engine. Note that this is only if the engine coolant temperature is less than 0°C (32°F) when starting.
- Engine coolant temperature is higher than 45°C (113°F).
- Intake air temperature is higher than 0°C (32°F).
- Volumetric efficiency is between 30 and 45 percent.

### Judgment Criteria

- Manifold differential pressure sensor output voltage has continued to be higher than 4.6 volts [corresponding to an absolute pressure of 118 kPa (17 psi) or higher] for 2 seconds.

or

- Manifold differential pressure sensor output voltage has continued to be lower than 0.1 volt [corresponding to an absolute pressure of 2.4 kPa (0.3 psi) or lower] for 2 seconds.

### Check Conditions

- 8 minutes or more have passed after starting the engine. Note that this is only if the engine coolant temperature is 0°C (32°F) or more when starting.
- Engine coolant temperature is higher than 45°C (113°F).
- Intake air temperature is higher than 0°C (32°F).

- Volumetric efficiency is lower than 30 percent.

### Judgment Criteria

- Manifold differential pressure sensor output voltage has continued to be higher than 4.2 volts [corresponding to an absolute pressure of 108 kPa (16 psi) or higher] for 2 seconds.

### Check Conditions

- 8 minutes or more have passed after starting the engine. Note that this is only if the engine coolant temperature is 0°C (32°F) or more when starting.
- Engine coolant temperature is higher than 45°C (113°F).
- Intake air temperature is higher than 0°C (32°F).
- Volumetric efficiency is higher than 70 percent.

### Judgment Criteria

- Manifold differential pressure sensor output voltage has continued to be lower than 1.8 volts [corresponding to an absolute pressure of 46 kPa (4.6 psi) or lower] for 2 seconds.

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

- Manifold differential pressure sensor failed.
- Open or shorted manifold differential pressure sensor circuit, harness damage, or connector damage.
- ECM failed.

## DIAGNOSIS

### Required Special Tools:

- MB991502: Scan Tool (MUT-II)
- MB991958: Scan Tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991911: Main Harness B

**STEP 1.** Using scan tool MB991502 or MB991958, check data list item 95: Manifold Differential Pressure Sensor.

**⚠ CAUTION**

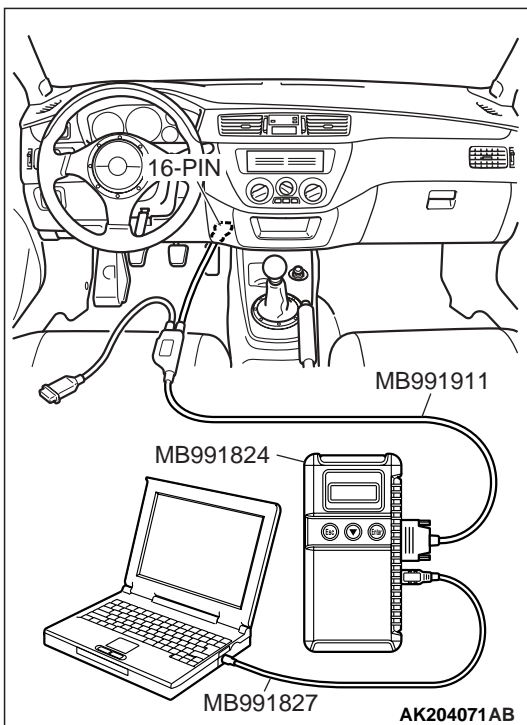
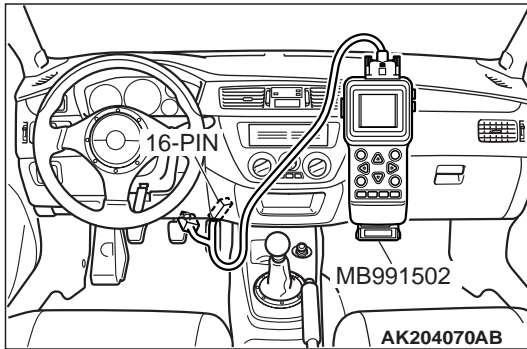
To prevent damage to scan tool MB991502 or MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991502 or MB991958.

- (1) Connect scan tool MB991502 or MB991958 to the data link connector.
- (2) Start the engine and run at idle.
- (3) Set scan tool MB991502 or MB991958 to the data reading mode for item 95, Manifold Differential Pressure Sensor.
  - While engine is idling, pressure should be between 54 – 68 kPa (15.9 – 20.0 in.Hg).
- (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.

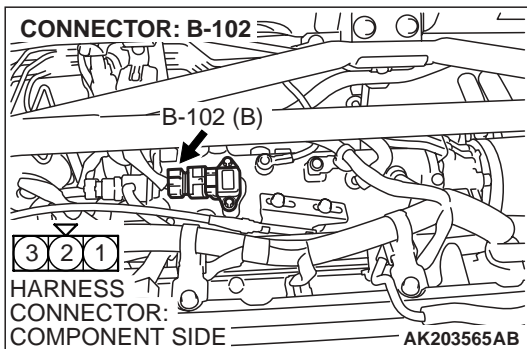


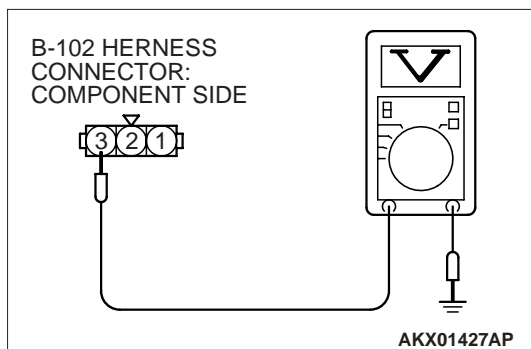
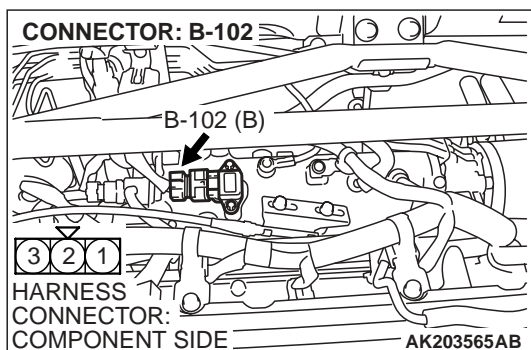
**STEP 2.** Check harness connector B-102 at manifold differential pressure sensor for damage.

**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 12.





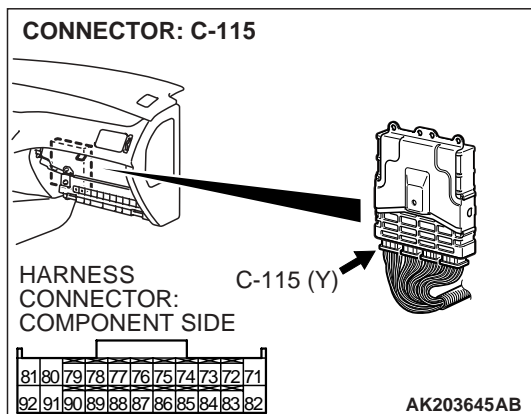
**STEP 3. Measure the sensor supply voltage at manifold differential pressure sensor harness side connector B-102.**

- (1) Disconnect connector B-102 and measure at the harness side.
- (2) Turn the ignition switch to "ON" position.

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

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

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

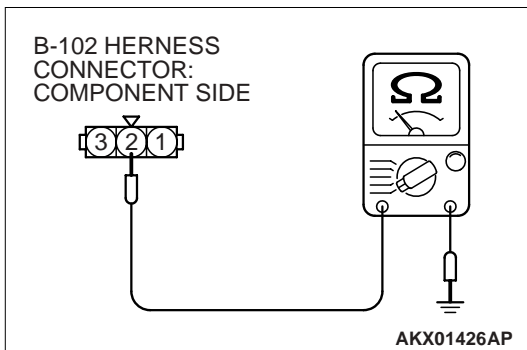
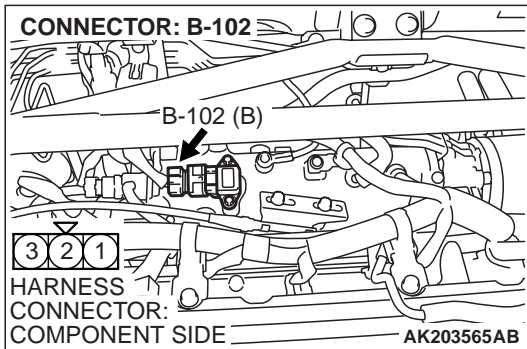
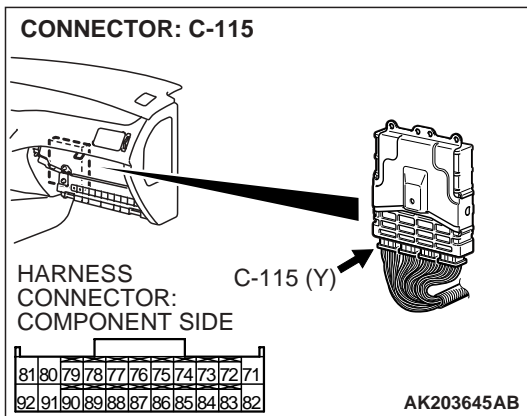
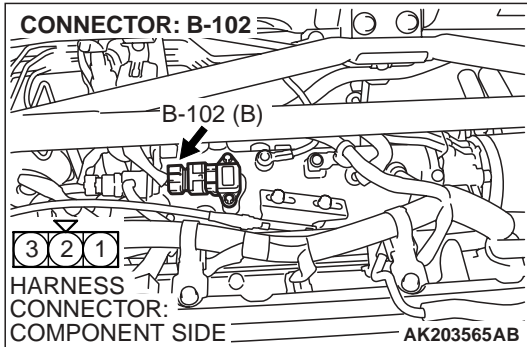


**STEP 4. Check harness connector C-115 at ECM for damage.**

**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 12.





**STEP 5. Check for open circuit and short circuit to ground between manifold differential pressure sensor connector B-102 (terminal No. 3) and ECM connector C-115 (terminal No. 81).**

**Q: Is the harness wire in good condition?**

**YES :** Replace the ECM. Then go to Step 12.

**NO :** Repair it. Then go to Step 12.

**STEP 6. Check for continuity at manifold differential pressure sensor harness side connector B-102.**

(1) Disconnect connector B-102 and measure at the harness side.

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

**Q: Does continuity exist?**

**YES :** Go to Step 9.

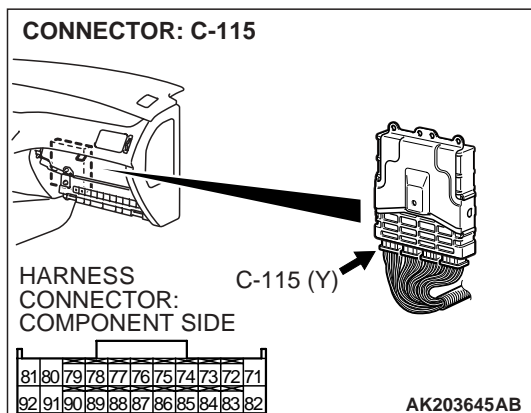
**NO :** Go to Step 7.

**STEP 7. Check harness connector C-115 at ECM 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.

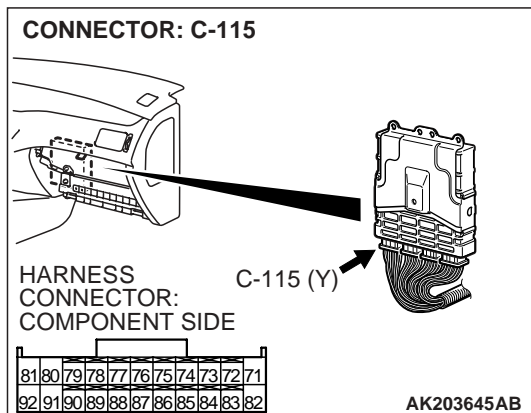
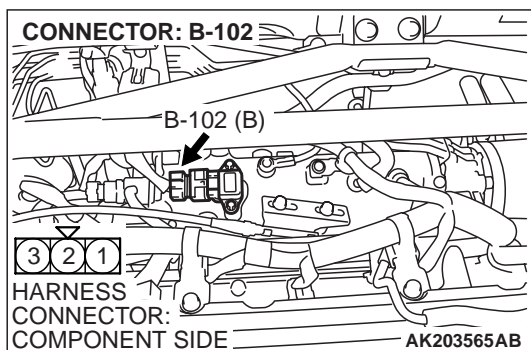


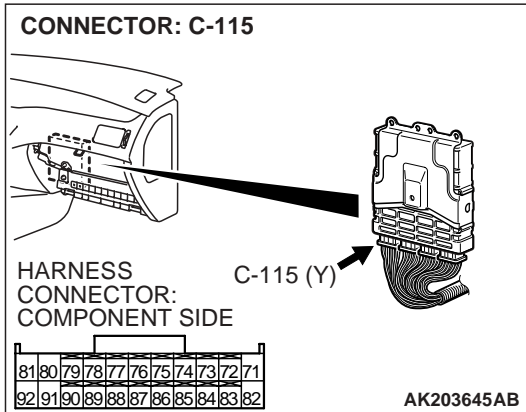
**STEP 8. Check for open circuit and harness damage between manifold differential pressure sensor connector B-102 (terminal No. 2) and ECM connector C-115 (terminal No. 92).**

**Q: Is the harness wire in good condition?**

**YES :** Replace the ECM. Then go to Step 12.

**NO :** Repair it. Then go to Step 12.



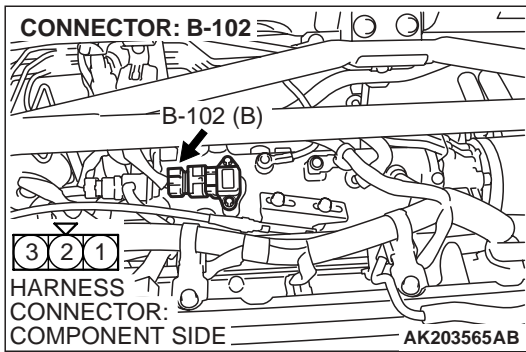


**STEP 9. Check harness connector C-115 at ECM for damage.**

**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.

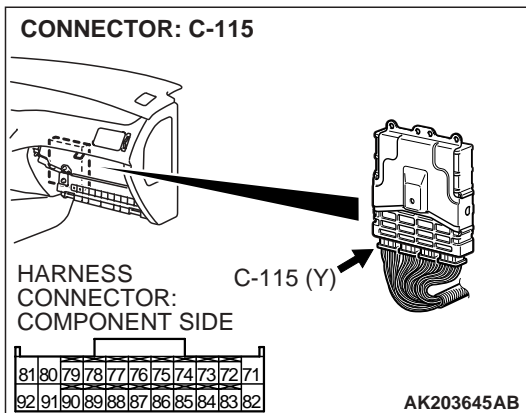


**STEP 10. Check for harness damage between manifold differential pressure sensor connector B-102 (terminal No. 3) and ECM connector C-115 (terminal No. 81).**

**Q: Is the harness wire in good condition?**

**YES :** Go to Step 11.

**NO :** Repair it. Then go to Step 12.

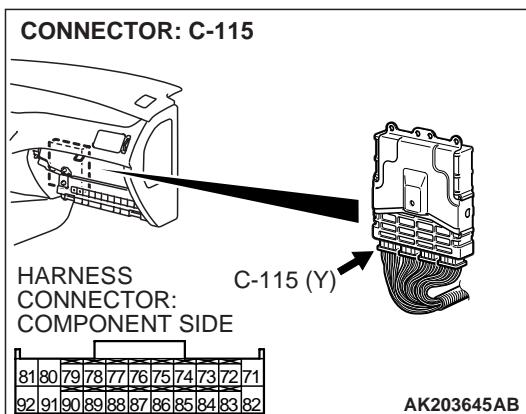
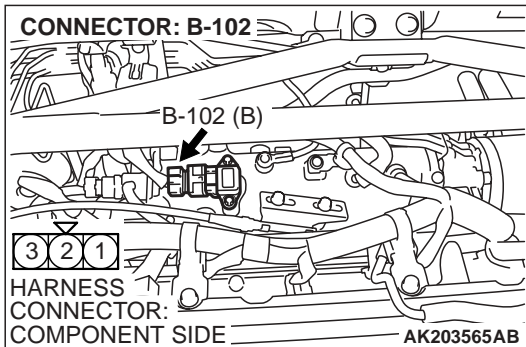


**STEP 11. Check for open circuit and short circuit to ground and harness damage between manifold differential pressure sensor connector B-102 (terminal No. 1) and ECM connector C-115 (terminal No. 73).**

**Q: Is the harness wire in good condition?**

**YES :** Replace the manifold differential pressure sensor.  
Then go to Step 12.

**NO :** Repair it. Then go to Step 12.



**STEP 12. Perform the OBD-II drive cycle.**

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

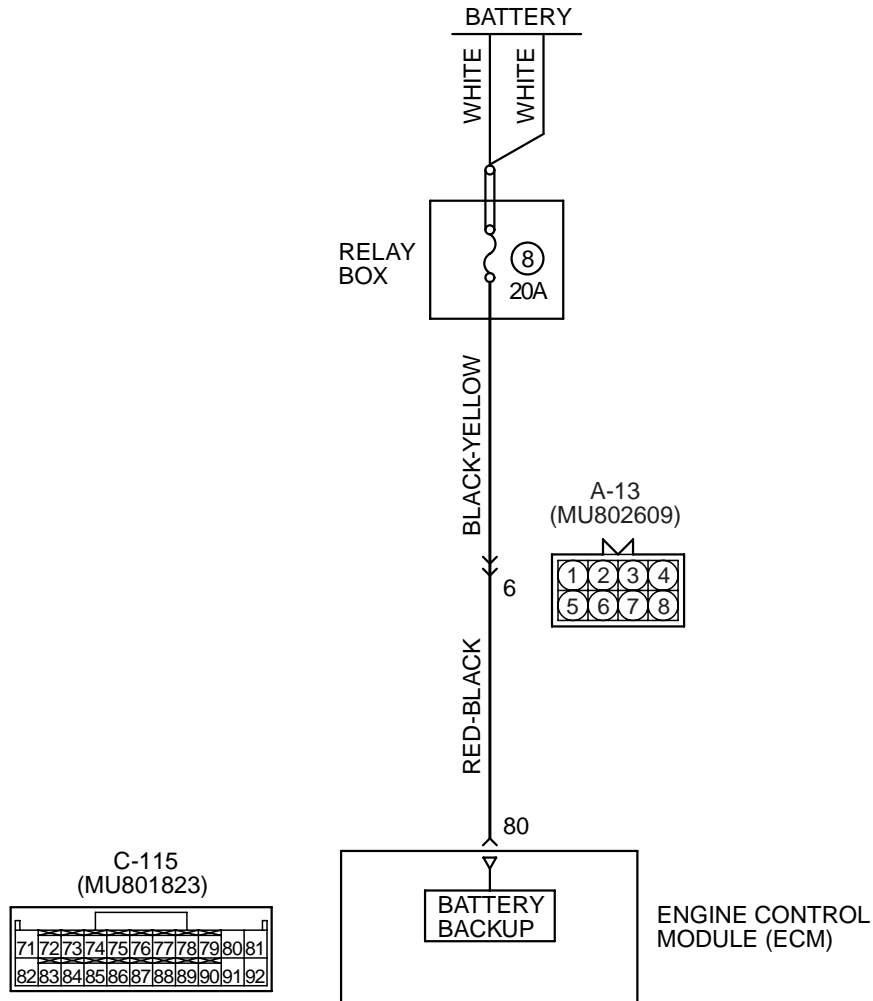
**Q: Is DTC P1400 set?**

**YES :** Repeat the troubleshooting.

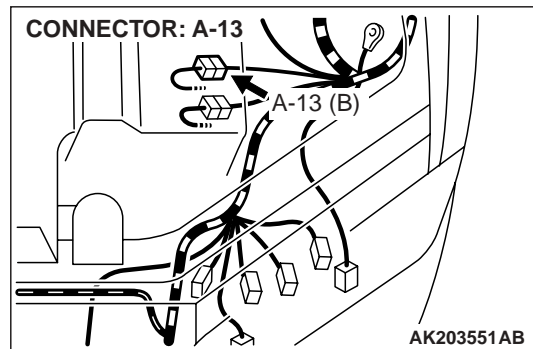
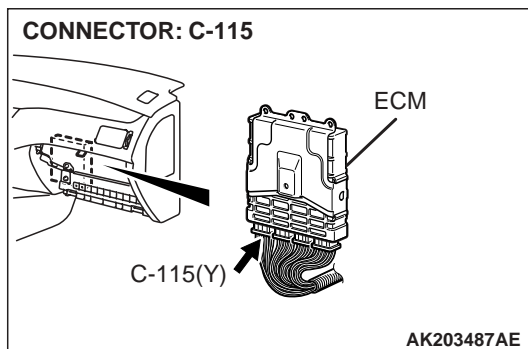
**NO :** The procedure is complete.

DTC P1603: BATTERY BACKUP LINE MALFUNCTION

Battery Backup Circuit



AK203485



**TECHNICAL DESCRIPTION**

- The ECM checks the open circuit of battery backup line.

*NOTE: When the system detects an open circuit in the battery backup line, it makes 1 failure judgment of other diagnostic trouble codes (DTCs).*

## DTC SET CONDITIONS

### Check Conditions

- Starting sequence was completed.
- Battery positive voltage is higher than 10 volts.

### Judgement Criteria

- Battery backup line voltage has continued to be 6 volts or lower for 2 seconds.

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

- Open or shorted battery backup line, harness damage, or connector damage.
- ECM failed.

## DIAGNOSIS

### Required Special Tools:

- MB991502: Scan Tool (MUT-II)
- MB991958: Scan Tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991911: Main Harness B

**STEP 1. Using scan tool MB991502 or MB991958, read the diagnostic trouble code (DTC).**

### ⚠ CAUTION

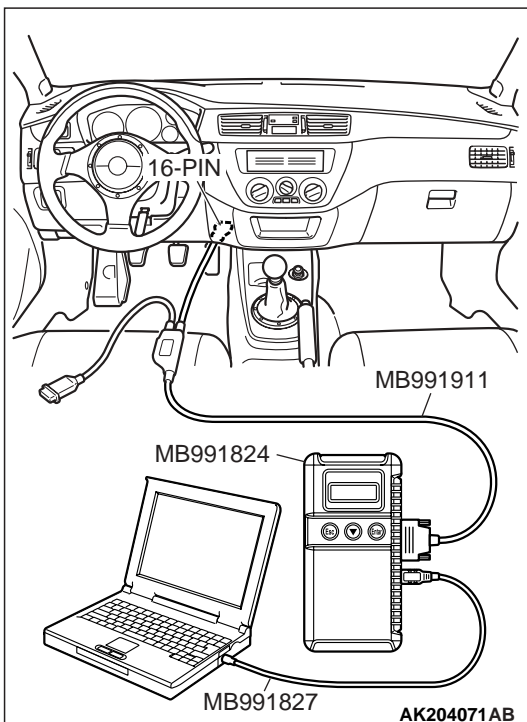
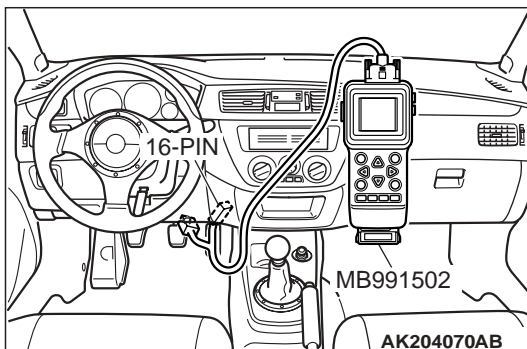
To prevent damage to scan tool MB991502 or MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991502 or MB991958.

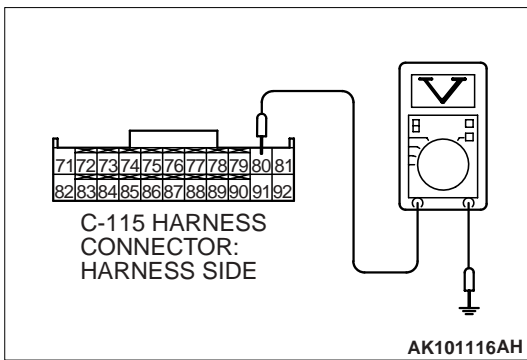
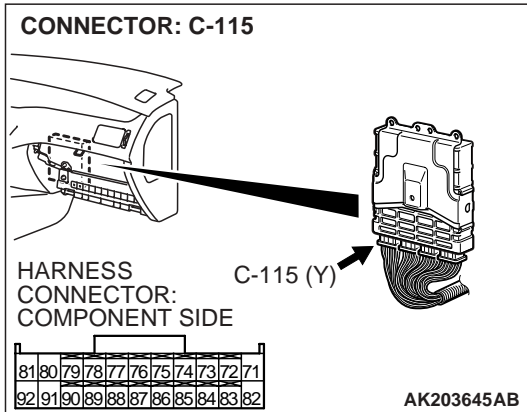
- (1) Connect scan tool MB991502 or MB991958 to the data link connector.
- (2) Turn the ignition switch to the "ON" position.
- (3) Erase the DTC.
- (4) Start the engine and run it at idle.
- (5) Read the DTC.
- (6) Turn the ignition switch to the "LOCK" (OFF) position.

### Q: Is DTC P1603 set?

**YES** : Go to Step 2.

**NO** : The procedure is complete.





**STEP 2. Measure the backup power supply voltage at ECM connector C-115 by backprobing.**

(1) Do not disconnect the ECM connector C-115.

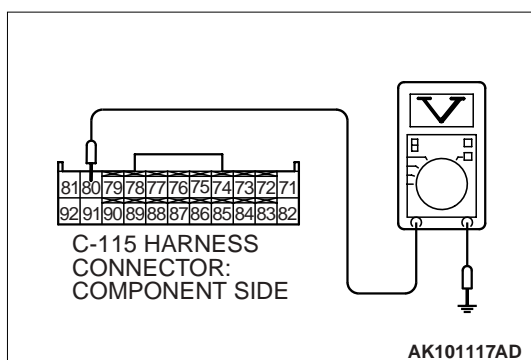
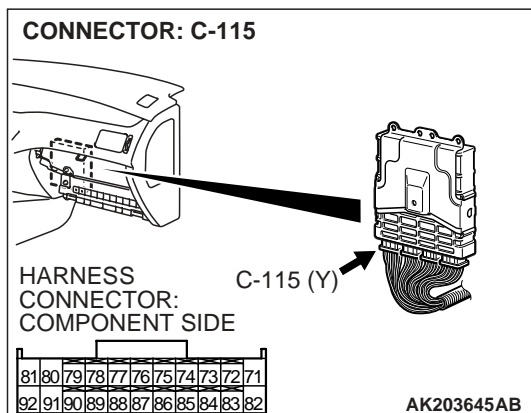
(2) Measure the voltage between terminal No. 80 and ground by backprobing.

- Voltage should measure battery positive voltage.

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

**YES :** Go to Step 5.

**NO :** Go to Step 3.



**STEP 3. Measure the backup power supply voltage at ECM harness side connector C-115.**

(1) Disconnect the ECM connector C-115 and measure at the harness side.

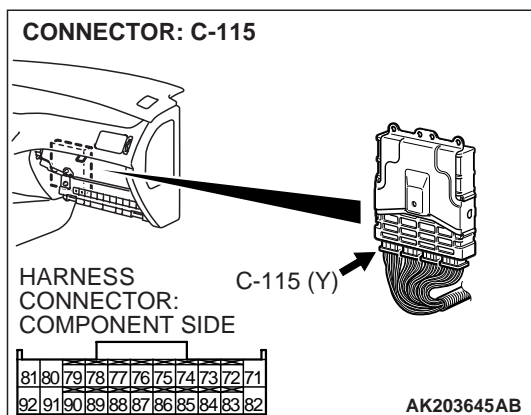
(2) Measure the voltage between terminal No. 80 and ground.

- Voltage should measure battery positive voltage.

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

**YES :** Go to Step 4.

**NO :** Check connector A-13 at intermediate connector for damage, and repair or replace as required. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). If intermediate connector are in good condition, repair harness wire between relay box (fuse 8) and ECM connector C-115 (terminal No. 80) because of open circuit or short circuit to ground. Then go to Step 6.



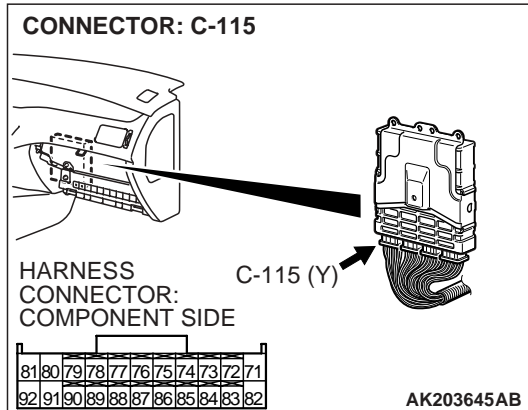
**STEP 4. Check harness connector C-115 at ECM for damage.**

**Q: Is the harness connector in good condition?**

**YES :** Check connector A-13 at intermediate connector for damage, and repair or replace as required. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). If intermediate connector are in good condition, repair harness wire between relay box (fuse 8) and ECM connector C-115 (terminal No. 80) because of harness damage. Then go to Step 6.

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



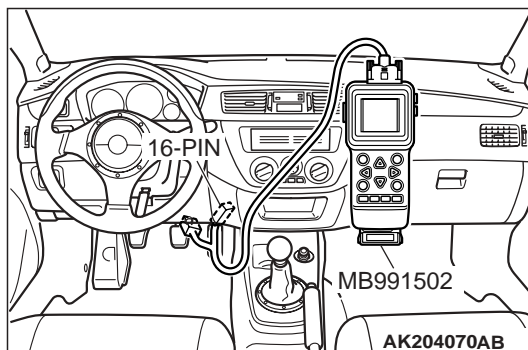


**STEP 5. Check harness connector C-115 at ECM for damage.**

**Q: Is the harness connector in good condition?**

**YES :** Replace the ECM. Then go to Step 6.

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



**STEP 6. Using scan tool MB991502 or MB991958, read the diagnostic trouble code (DTC).**

**CAUTION**

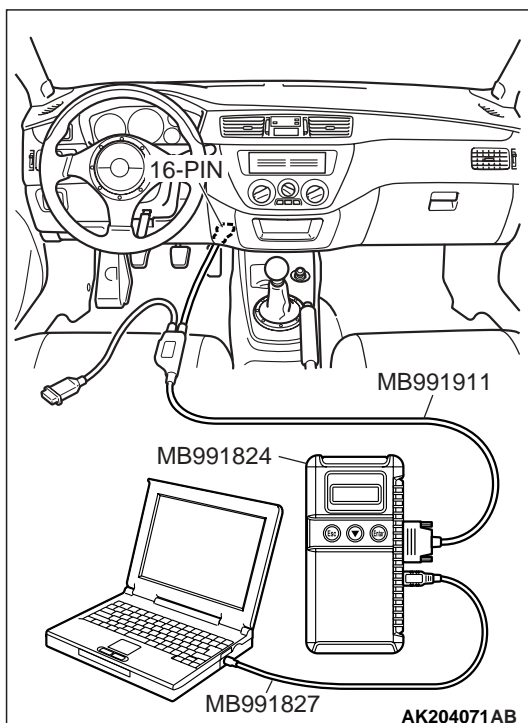
To prevent damage to scan tool MB991502 or MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991502 or MB991958.

- (1) Connect scan tool MB991502 or 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 P1603 set?**

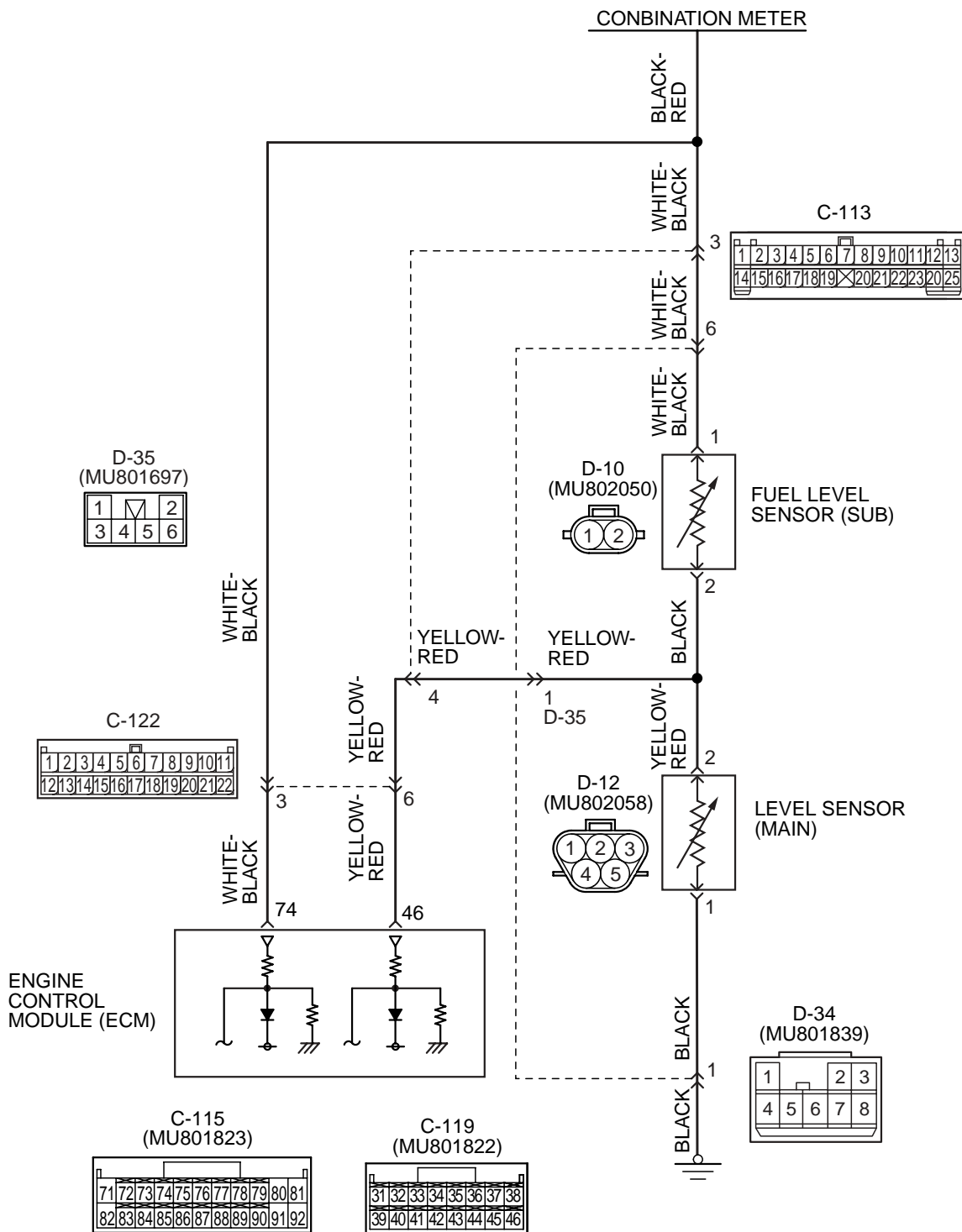
**YES :** Repeat the troubleshooting.

**NO :** The procedure is complete.

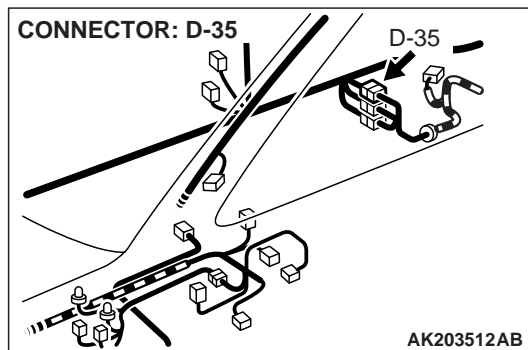
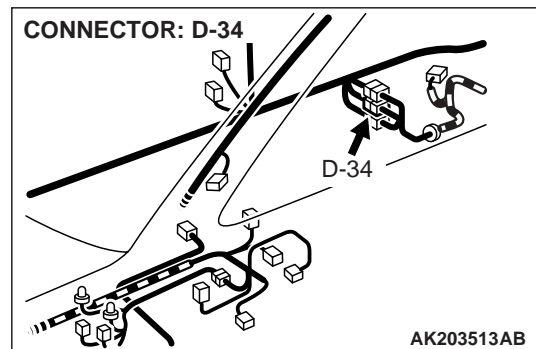
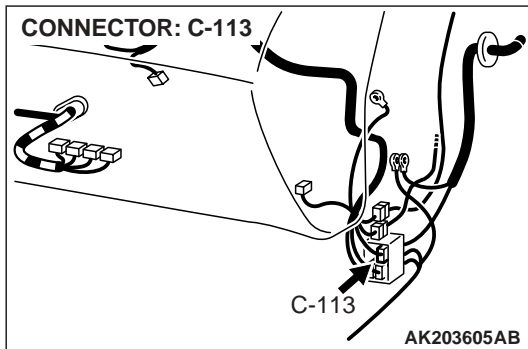
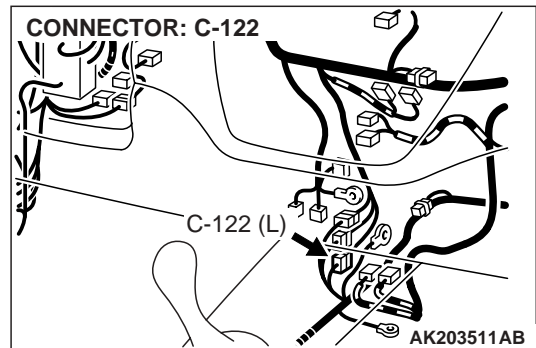
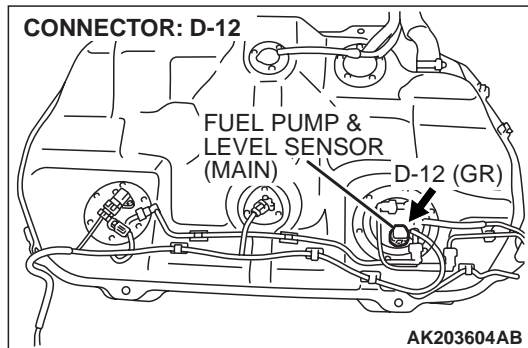
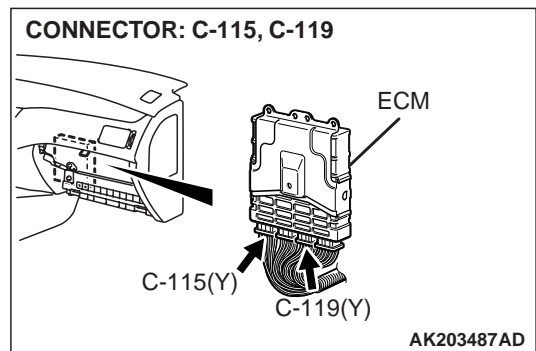
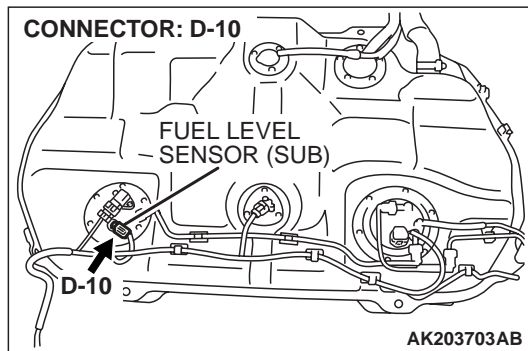


DTC P2066: FUEL LEVEL SENSOR CIRCUIT RANGE/PERFORMANCE (SENSOR 2)

Fuel Level Sensor Circuit



AK203702



**CIRCUIT OPERATION**

- The fuel level sensor signal (sub) is input in ECM (terminal No. 46).

**TECHNICAL DESCRIPTION**

- Branch the drive signal from the fuel level sensor circuit, and input it into ECM.
- The ECM detects the amount of fuel left in the fuel tank with this signal, and also controls the fuel level warning light.

**DTC SET CONDITIONS**

**Check Conditions, Judgement Criteria**

- When the fuel consumption calculated from the operation time of the injector amounts to 40 liters (10.5 gal), the diversity of the amount of fuel in tank calculated from the fuel level sensor is 2 liters (0.5 gal) or less.

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

- Fuel level sensor failed.

- Open or shorted fuel level sensor circuit, or loose connector.
- ECM failed.

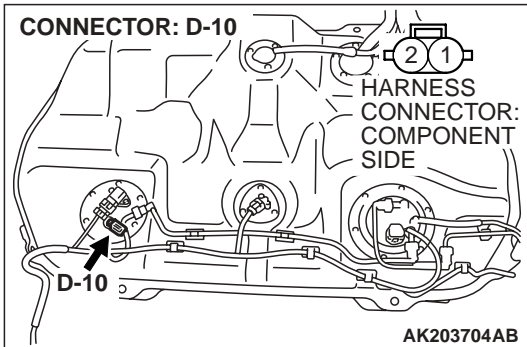
**DIAGNOSIS**

**STEP 1. Check fuel gauge.**

**Q: Is the fuel gauge functioning?**

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

**STEP 2. Check for short circuit to ground between fuel level sensor (sub) connector D-10 (terminal No. 1) and ECM connector C-115 (terminal No. 74).**



*NOTE: Check harness after checking intermediate connectors C-113, C-122 and D-34. If intermediate connectors are damaged, repair or replace them. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 6.*

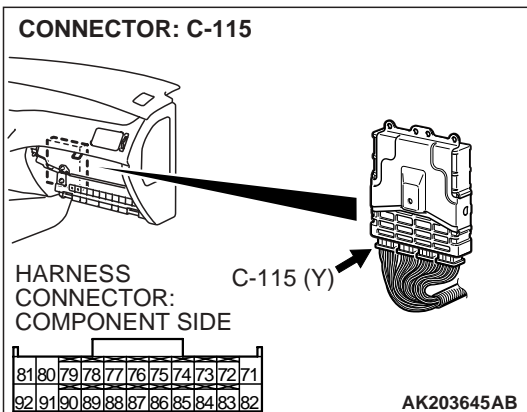
**Q: Is the harness wire in good condition?**

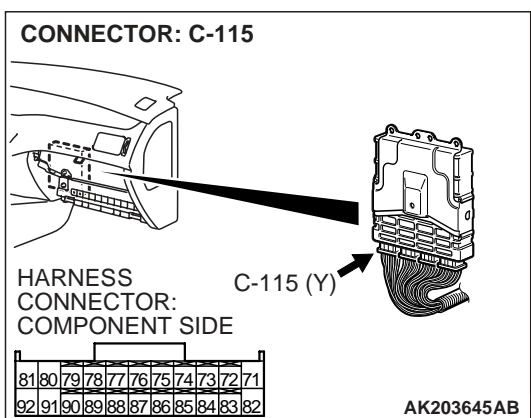
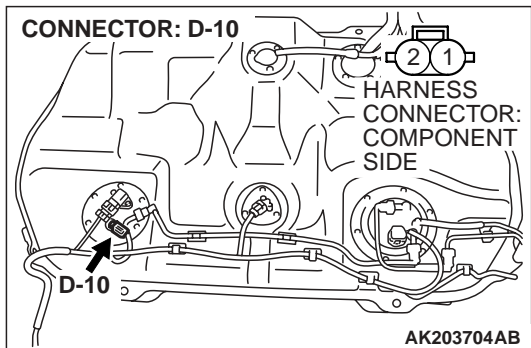
- YES :** Refer to GROUP 54A, Chassis Electrical – Combination Meters Assembly and Vehicle Speed Sensor – Equipment Diagnosis – Symptom Chart P.54A-54.  
**NO :** Repair it. Then go to Step 6.

**STEP 3. Check connector C-115 at ECM for damage.**

**Q: Is the 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 or harness damage between fuel level sensor (sub) connector D-10 (terminal No. 1) and PCM connector C-115 (terminal No. 74).**

*NOTE: Check harness after checking intermediate connectors C-113, C-122 and D-34. If intermediate connectors are damaged, repair or replace them. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 6.*

**Q: Is the harness wire in good condition?**

**YES :** Go to Step 5.

**NO :** Repair it. Then go to Step 6.

**STEP 5. Retest the system.**

- (1) Carry out a test drive with the drive cycle pattern. Refer to GROUP 13A, Diagnostic Function – OBD-II Drive Cycle – Procedure 6 – Other Monitor P.13A-6.
- (2) Check the diagnostic trouble code (DTC).

**Q: Is DTC P2066 set?**

**YES :** Replace the ECM. Then go to Step 6.

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

**STEP 6. Perform the OBD-II drive cycle.**

- (1) Carry out a test drive with the drive cycle pattern. Refer to GROUP 13A, Diagnostic Function – OBD-II Drive Cycle – Procedure 6 – Other Monitor P.13A-6.
- (2) Check the diagnostic trouble code (DTC).

**Q: Is DTC P2066 set?**

**YES :** Repeat the troubleshooting.

**NO :** The procedure is complete.

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**DTC P2263: INTAKE CHARGE SYSTEM MALFUNCTION**

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**TECHNICAL DESCRIPTION**

- The ECM indicates or monitors a minimum prescribed value of volumetric efficiency within the boost operation range, which is determined by the signals from the throttle position sensor and the engine speed.

**DTC SET CONDITIONS**

**Check Conditions**

- Intake air temperature sensor, barometric pressure sensor, volume airflow sensor, and throttle position sensor are normal.

- Engine speed is at between 3,000 and 5,000 r/min.
- Throttle position sensor output voltage is higher than 2 volts.

**Judgment Criteria**

- Volumetric efficiency is lower than 80 percent.

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

- Turbocharger wastegate actuator failed.
- Turbocharger Wastegate Regulating Valve failed.
- Charging pressure control system failed.
- Intake charge pressure leak.
- ECM failed.

**DIAGNOSIS**

**Required Special Tools:**

- MB991502: Scan Tool (MUT-II)
- MB991958: Scan Tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991911: Main Harness B

**STEP 1. Using scan tool MB991502 or MB991958, check actuator test item 12: Turbocharger Wastegate Solenoid.**

**⚠ CAUTION**

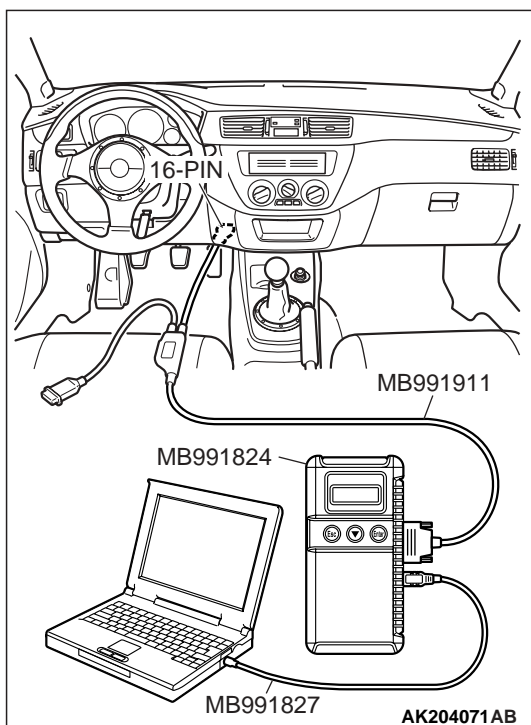
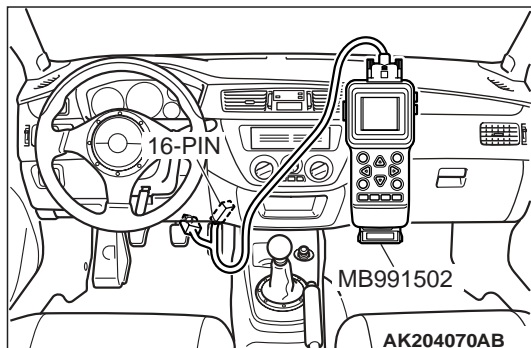
To prevent damage to scan tool MB991502 or MB991958, always turn the ignition switch to the "LOCK"(OFF) position before connecting or disconnecting scan tool MB991502 or MB991958.

- (1) Connect scan tool MB991502 or MB991958 to the data link connector.
- (2) Turn the ignition switch to the "ON" position.
- (3) Set scan tool MB991502 or MB991958 to the actuator test mode for item 12, turbocharger wastegate solenoid.
  - An operation sound should be heard and vibration should be felt when the turbocharger wastegate solenoid is operated.
- (4) Turn the ignition switch to the "LOCK"(OFF) position.

**Q: Is the solenoid operating properly?**

**YES :** Go to Step 2.

**NO :** Refer to DTC P0243 – Turbocharger Wastegate Solenoid Circuit. [P.13A-279](#)



**STEP 2. Check the intake charge pressure.**

Refer to GROUP 15, On-vehicle Service – Intake Charge pressure check. [P.15-4](#)

**Q: Are there any abnormalities?**

**YES :** Repair or replace it. Then go to Step 5.

**NO :** Go to Step 3.

**STEP 3. Check the intake charge pressure control system.**

Refer to GROUP 15, On-vehicle Service – intake charge pressure control system check. [P.15-5](#)

**Q: Are there any abnormalities?**

**YES :** Repair or replace it. Then go to Step 5.

**NO :** Go to Step 4.

**STEP 4.** Using scan tool MB991502 or MB991958, read the diagnostic trouble code (DTC).

**⚠ CAUTION**

To prevent damage to scan tool MB991502 or MB991958, always turn the ignition switch to the "LOCK"(OFF) position before connecting or disconnecting scan tool MB991502 or MB991958.

- (1) Connect scan tool MB991502 or MB991958 to the data link connector.
- (2) Turn the ignition switch to the "ON" position.
- (3) Set scan tool MB991502 or MB991958 to the data reading mode for item 14, throttle position sensor.

**⚠ CAUTION**

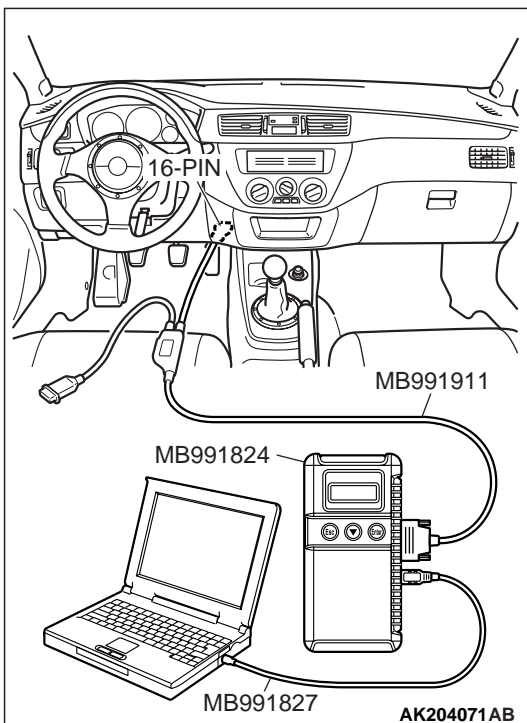
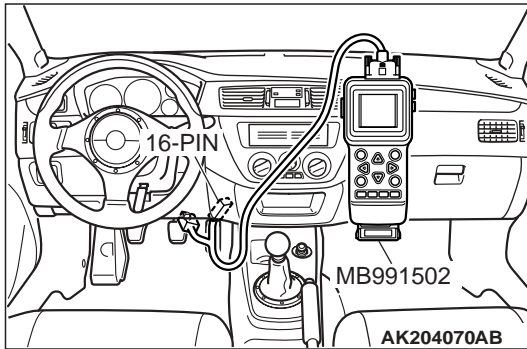
During a test drive, the data list must be read by someone other than the driver.

- (4) Accelerate the vehicle within the engine speed range of 3,000 to 5,000 rpm while a minimum of 2 V is being output by the throttle position sensor.
- (5) After completing the test drive, read the DTC. Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is the DTC P2263 set?**

**YES :** Replace the ECM. Then Go to Step 5.

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





**STEP 5.** Using scan tool MB991502 or MB991958, read the diagnostic trouble code (DTC).

**⚠ CAUTION**

To prevent damage to scan tool MB991502 or MB991958, always turn the ignition switch to the "LOCK"(OFF) position before connecting or disconnecting scan tool MB991502 or MB991958.

- (1) Connect scan tool MB991502 or MB991958 to the data link connector.
- (2) Turn the ignition switch to the "ON" position.
- (3) Set scan tool MB991502 or MB991958 to the data reading mode for item 14, throttle position sensor.

**⚠ CAUTION**

During a test drive, the data list must be read by someone other than the driver.

- (4) Accelerate the vehicle within the engine speed range of 3,000 to 5,000 rpm while a minimum of 2 V is being output by the throttle position sensor.
- (5) After completing the test drive, read the DTC. Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is the DTC P2263 set?**

**YES :** Repeat the troubleshooting.

**NO :** The procedure is complete.

