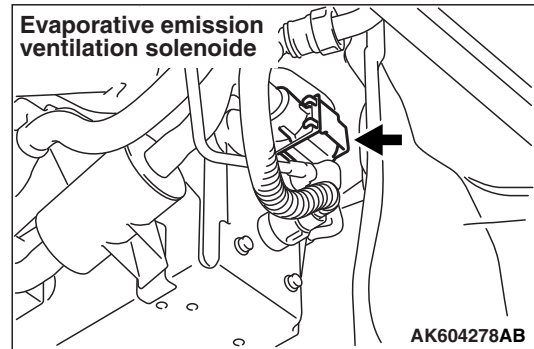
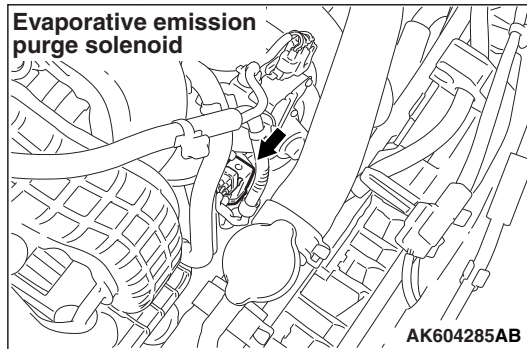


**DTC P0441: Evaporative Emission Control System Incorrect Purge Flow****TECHNICAL DESCRIPTION**

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

**DESCRIPTIONS OF MONITOR METHODS**

Fuel tank pressure decreases largely during purge-cut.

**MONITOR EXECUTION**

Continuous

**MONITOR EXECUTION CONDITIONS  
(Other monitor and Sensor)**

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

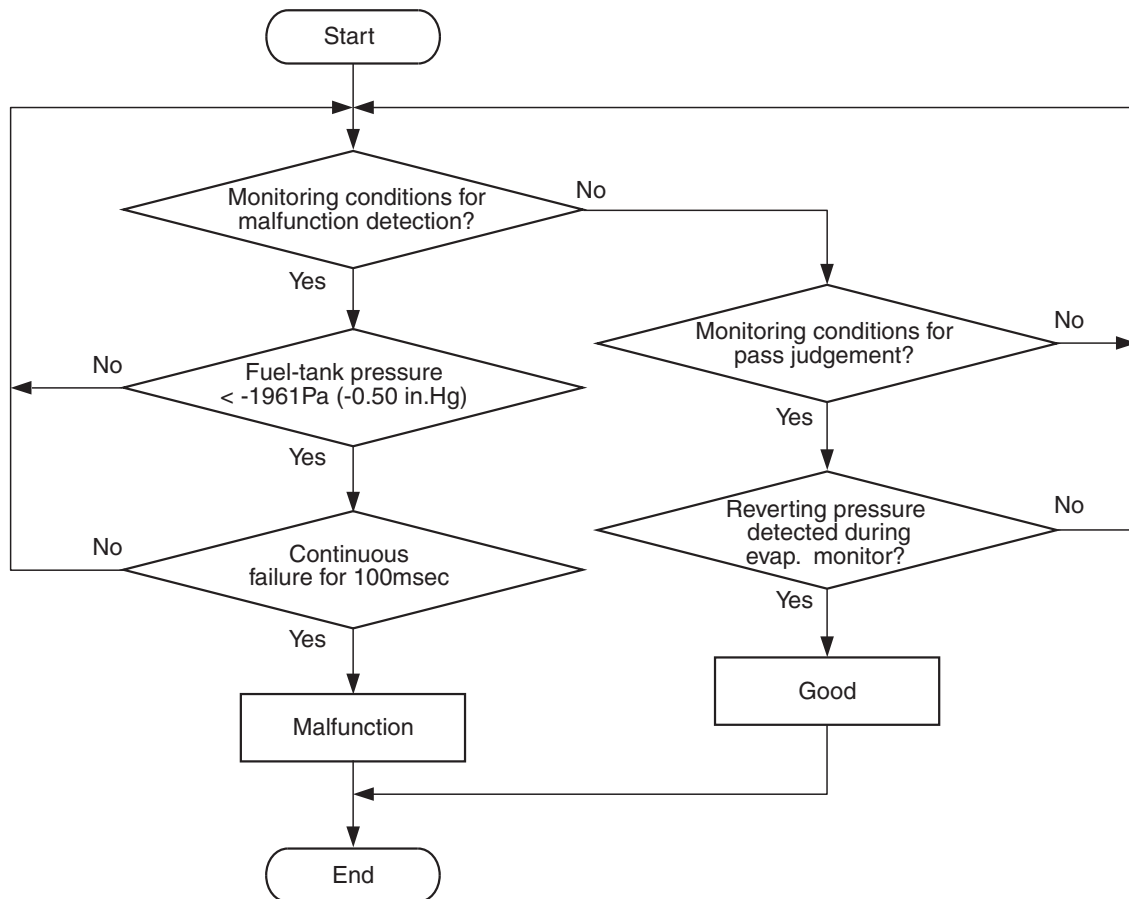
- Fuel tank pressure sensor monitor

**Sensor (The sensor below is determined to be normal)**

- Not applicable

## DTC SET CONDITIONS

### Logic Flow Chart



AK802469

#### Check Conditions

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

#### Judgement Criterion

- The pressure in the fuel tank is less than -1961 Pa (-0.58 in.Hg) for 0.1 second.

#### FAIL-SAFE AND BACKUP FUNCTION

- None

#### OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function –OBD-II Drive Cycle – Pattern 5 P.13B-12.

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

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

**DIAGNOSIS****Required Special Tool:**

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

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

**⚠ CAUTION**

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

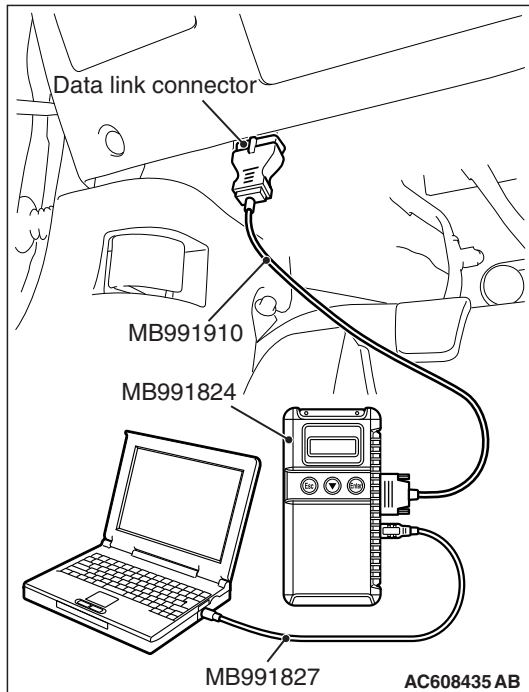
- (1) Connect scan tool MB991958 to the data link connector.
- (2) Turn the ignition switch to the "ON" position.
- (3) Read the DTC.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is DTC P0451 set?**

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

[P.13B-544.](#)

**NO :** Go to Step 2.



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

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

**Q: Is the output voltage between 1,500 and 3,500 millivolts?**

**YES :** Go to Step 3.

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

[P.13B-544.](#)

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

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

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

**YES** : Go to Step 4.

**NO** : Replace the evaporative emission purge solenoid.  
Then go to Step 6.

---

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

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

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

**YES** : Repair or replace the vent hose and air filter. Then go to Step 5.

**NO** : Replace the evaporative emission ventilation solenoid. Then go to Step 6.

---

**STEP 5. Check the trouble symptoms.**

- (1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle –Pattern 5 [P.13B-12](#).
- (2) Check the diagnostic trouble code (DTC).

**Q: Is DTC P0441 set?**

**YES** : Replace the ECM (Refer to, Removal and Installation [P.13B-1022](#)). Then go to Step 6.

**NO** : The inspection is complete.

---

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

- (1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle –Pattern 5 [P.13B-12](#).
- (2) Check the diagnostic trouble code (DTC).

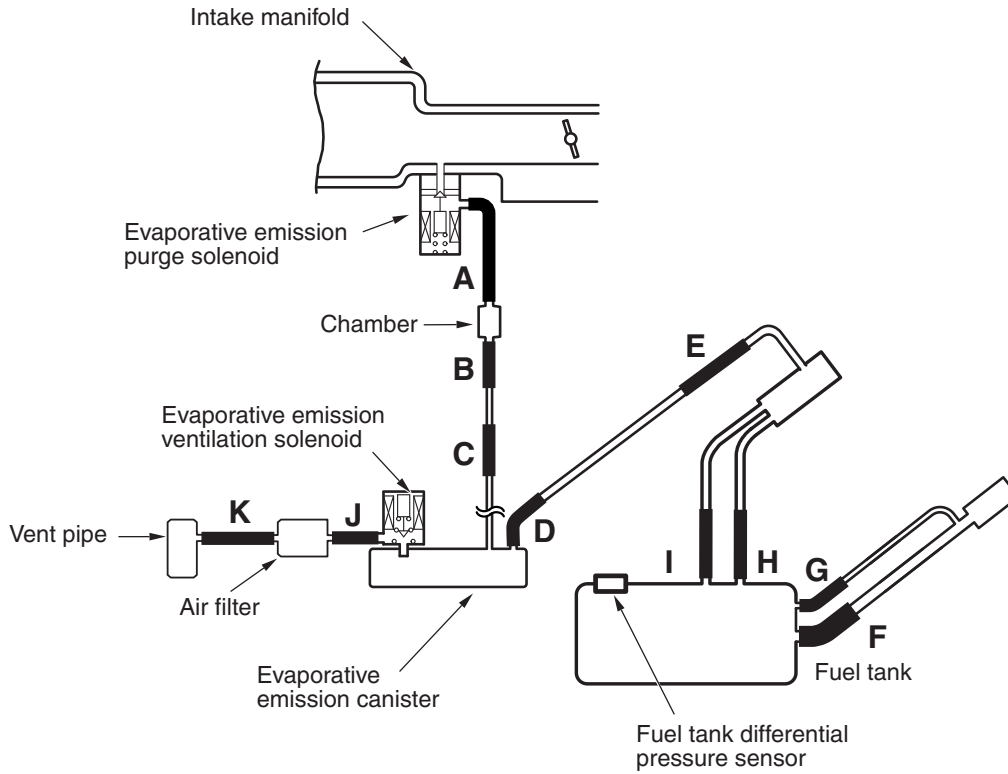
**Q: Is DTC P0441 set?**

**YES** : Retry the troubleshooting.

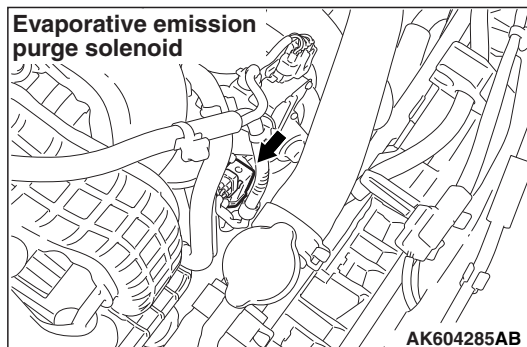
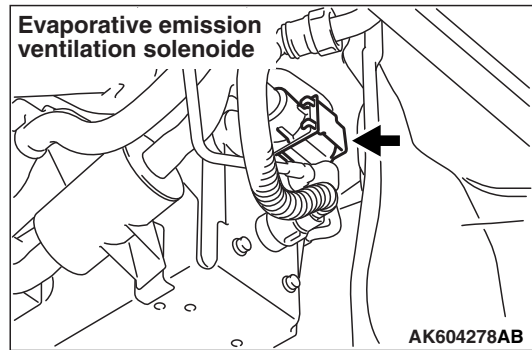
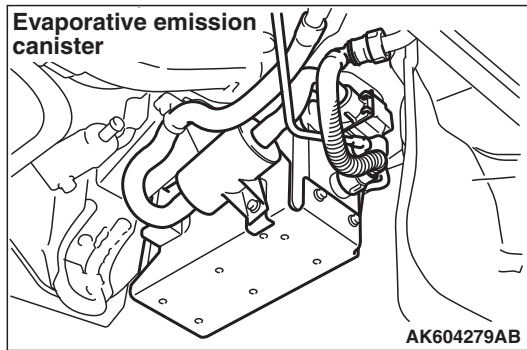
**NO** : The inspection is complete.

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

System diagram



AK800712AB



## TECHNICAL DESCRIPTION

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

## DESCRIPTIONS OF MONITOR METHODS

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

## MONITOR EXECUTION

Once per driving cycle

## MONITOR EXECUTION CONDITIONS (OTHER MONITOR AND SENSOR)

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

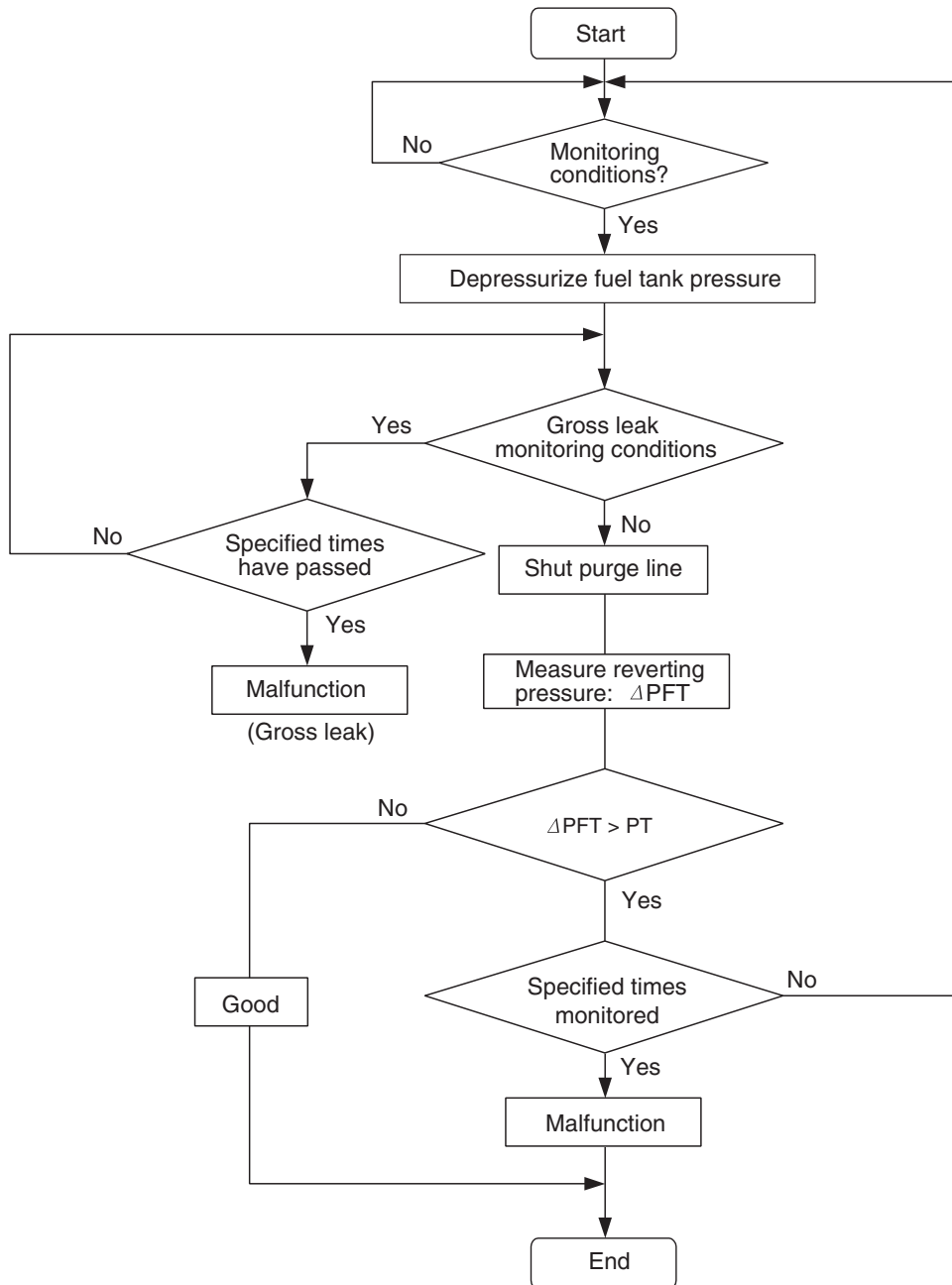
- Evaporative emission purge system monitor
- Evaporative emission purge solenoid monitor
- Evaporative emission ventilation solenoid monitor
- Fuel temperature sensor monitor
- Fuel tank differential pressure sensor monitor
- Fuel level sensor monitor

**Sensor (The sensors below are determined to be normal)**

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

## DTC SET CONDITIONS

## Logic Flow Chart (Monitor Sequence)



AK704743

**Check Conditions**

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

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

#### Judgement Criterion

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

#### NOTE:

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

#### Check Conditions

- Amount of remaining fuel is 40 –85 percent of capacity when the engine is started.
- Engine coolant temperature is less than 36° C (97° F) when the engine is started.
- Intake air temperature is less than 36° C (97° F) when the engine is started.
- Engine coolant temperature is more than 20° C (68° F).
- Intake air temperature is more than –10° C (14° F).
- Fuel temperature is less than 36° C (97° F).
- When the evaporative emission purge solenoid and evaporative emission ventilation solenoid are closed, the change of the pressure in the fuel tank is less than 324 Pa (0.09 in.Hg).
- Barometric pressure is more than 76 kPa (22.4 in.Hg).

- Fuel tank differential pressure sensor output voltage is between 1.0 and 4.0 volts.
- At least 10 seconds have passed since the last monitor was complete.
- Monitoring time: 10 –14 minutes

#### Judgement Criterion

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

#### NOTE:

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

#### FAIL-SAFE AND BACKUP FUNCTION

- None

#### OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function –OBD-II Drive Cycle – Pattern 5 [P.13B-12](#).

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

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



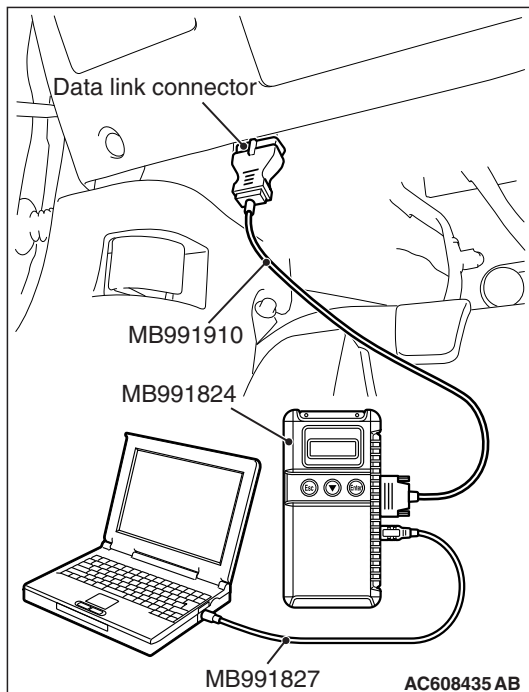
**DIAGNOSIS****Required Special Tool:**

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

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

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

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

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

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

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

**NO <"Evap Leak Mon. Discontinued. Retest again from the first" is displayed on scan tool MB991958.> :** The EVAP monitor has been interrupted during the test. Turn the ignition switch to the "LOCK" (OFF) position once, and repeat the monitoring from Step 1.

---

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

Refer to GROUP 17, Emission Control –Evaporative Emission Control System –Evaporative Emission Purge Solenoid Check P.17-99.

**Q: Does the evaporative emission purge solenoid hold pressure?**

**YES :** Go to Step 3.

**NO :** Replace the evaporative emission purge solenoid.  
Then go to Step 13.

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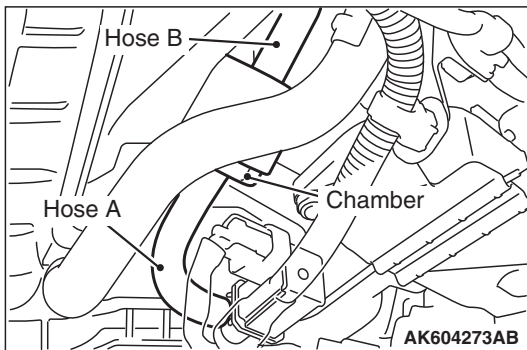
**STEP 3. Check for leaks in evaporative emission hose A, chamber and hose B.**

Use a hand vacuum pump to check hose A, chamber and hose B.

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

**YES :** Go to Step 4.

**NO :** Replace any damaged hose or chamber. Then go to Step 13.



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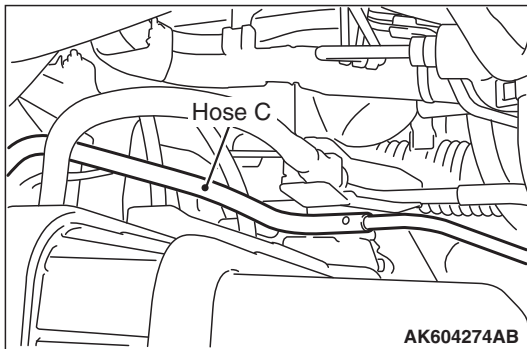
**STEP 4. Check for leaks in evaporative emission hose C.**

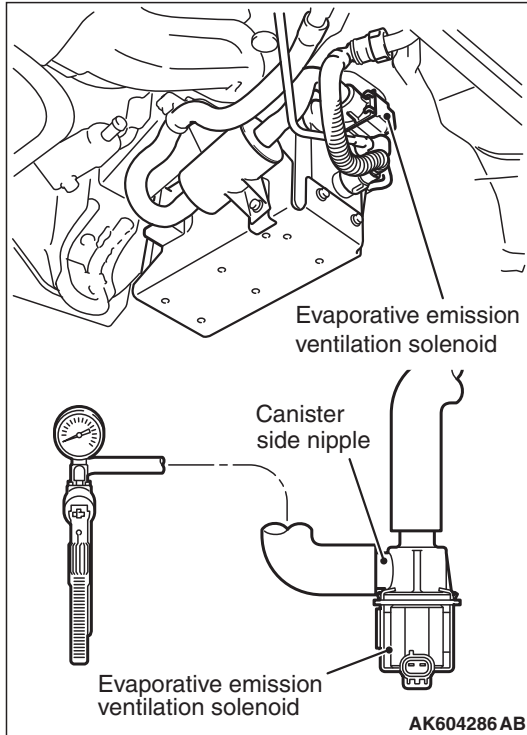
Use a hand vacuum pump to check hose C.

**Q: Does hose C hold vacuum?**

**YES :** Go to Step 5.

**NO :** Replace any damaged hose. Then go to Step 13.





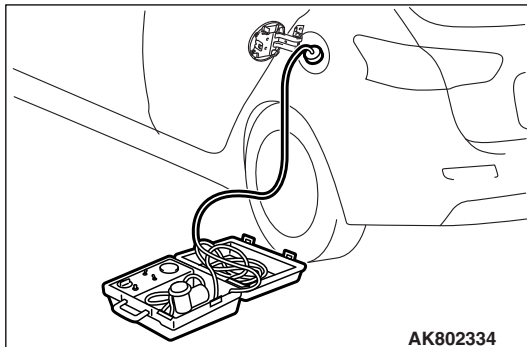
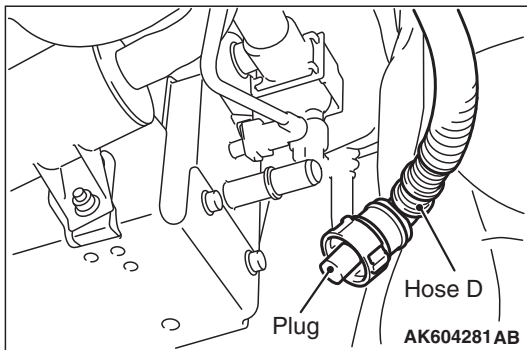
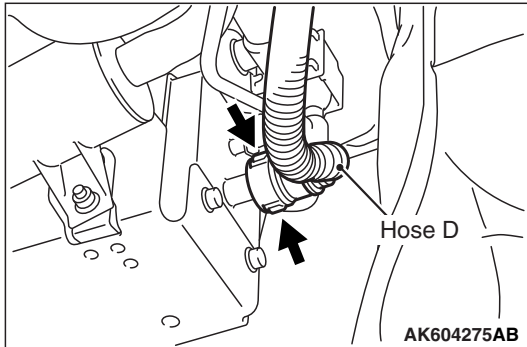
**STEP 5. Using scan tool MB991958, check actuator test item 15: Evaporative Emission Ventilation Solenoid.**

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

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

**YES :** Go to Step 6.

**NO :** Replace the evaporative emission ventilation solenoid  
Then go to Step 13.



**STEP 6. Perform the pressure test on the evaporative emission system.**

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

(2) Plug the disconnected end of hose D.

(3) Confirm that the evaporative emission system pressure pump (Miller number 6872A) is operating properly. Perform the self-test as described in the pump manufacturer's instructions.

(4) Remove the fuel cap.

(5) Connect the evaporative emission system pressure pump (Miller number 6872A) to the fuel tank filler tube by using fuel tank adapter (MLR-8382).

(6) Pressure test the system to determine whether any leaks are present.

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

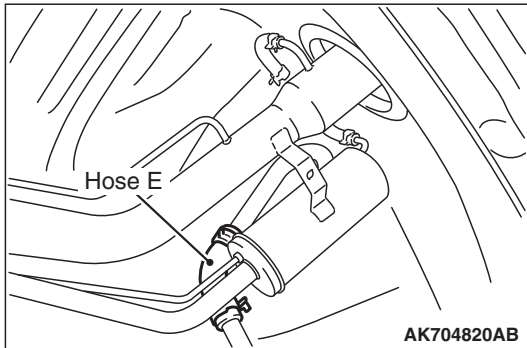
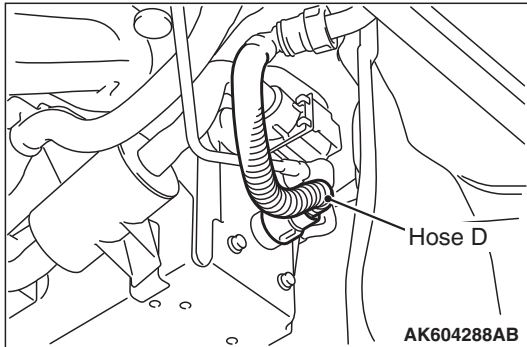
(7) Remove the evaporative emission system pressure pump (Miller number 6872A) and the fuel tank adapter (MLR-8382), and reinstall the fuel cap.

(8) Connect hose D to the evaporative emission canister.

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

**YES :** Go to Step 11.

**NO :** Go to Step 7.




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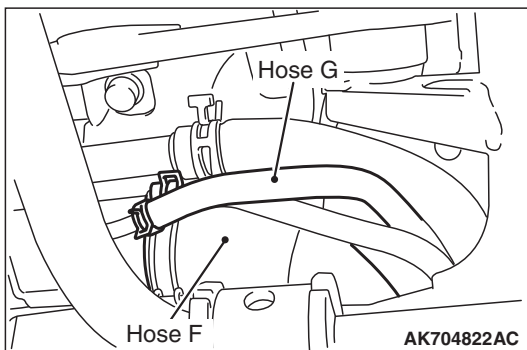
**STEP 7. Check for leaks in evaporative emission hoses D and E.**

Use a hand vacuum pump to check each hose D and E.

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

**YES** : Go to Step 8.

**NO** : Replace any damaged hose. Then go to Step 13.




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

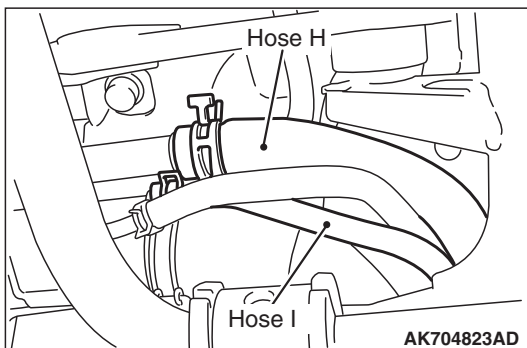
(1) Remove the fuel tank assembly.

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

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

**YES** : Go to Step 9.

**NO** : Replace any damaged hose and reinstall the fuel tank assembly. Then go to Step 13.




---

**STEP 9. Check for leaks in evaporative emission hoses H and I.**

(1) Remove the fuel tank assembly.

(2) Use a hand vacuum pump to check each hose H and I.

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

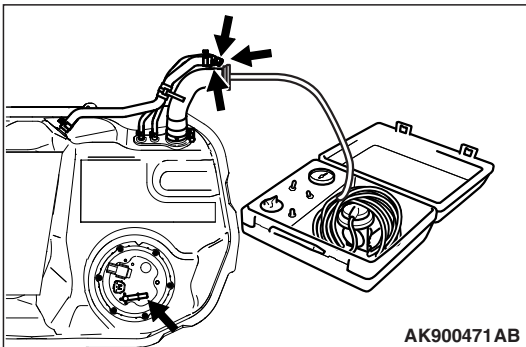
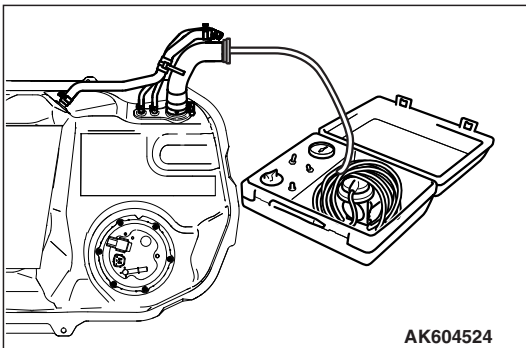
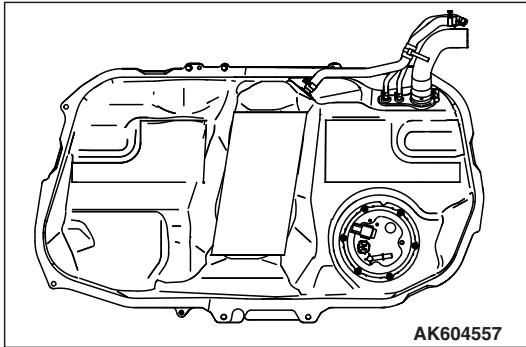
**YES** : Go to Step 10.

**NO** : Replace any damaged hose and reinstall the fuel tank assembly. Then go to Step 13.

**STEP 10. Check for leaks in the fuel tank.**

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

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



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

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

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

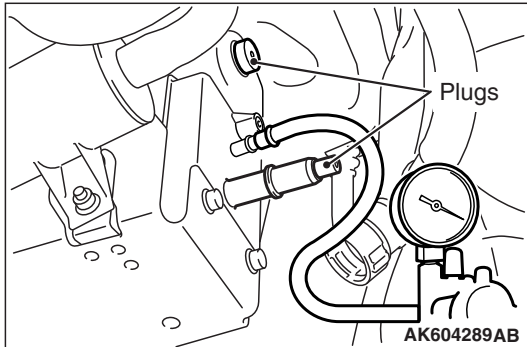
- (4) Pressurize the fuel tank with the evaporative emission system pressure pump.  
(5) In the pressurized state, check for leaks by applying a soapy water solution to each section and look for bubbles.

**Q: Are any leaks found?**

**YES** <When there is a leak from the attachment points of the fuel pump module, fuel tank differential pressure sensor, fuel level sensor or leveling valve.> : Repair or replace the leaked parts and check again that there are no leaks. Then reinstall the fuel tank. Then go to Step 13.

**YES** <When there is a leak from the fuel tank.> : Replace the fuel tank. Then go to Step 13.

**NO** : When there is no leak, reinstall the fuel tank. Then go to Step 12.




---

**STEP 11. Check the evaporative emission canister for vacuum leaks.**

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

**Q: Is the evaporative emission canister in good condition?**

**YES** : Go to Step 12.

**NO** : Replace the evaporative emission canister. Then go to Step 13.

---

**STEP 12. Using scan tool MB991958, check the evaporative emission system monitor test.**
**⚠ CAUTION**

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

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

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

**YES** : Replace the ECM (Refer to, Removal and Installation P.13B-1022). Then go to Step 13.

**NO <"Evap Leak Mon. Completed. Test Passed" is displayed on scan tool MB991958.>** : The evaporative emission system is working properly at this time. Go to Step 13.

**NO <"Evap Leak Mon. Discontinued. Retest again from the first" is displayed on scan tool MB991958.>** : The EVAP monitor has been interrupted during the test. Turn the ignition switch to the "LOCK" (OFF) position once, and repeat the monitoring from Step 12.

**STEP 13. Test the OBD-II drive cycle.**

- (1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle –Pattern 5 [P.13B-12](#).
- (2) Check the diagnostic trouble code (DTC).

**Q: Is DTC P0442 set?**

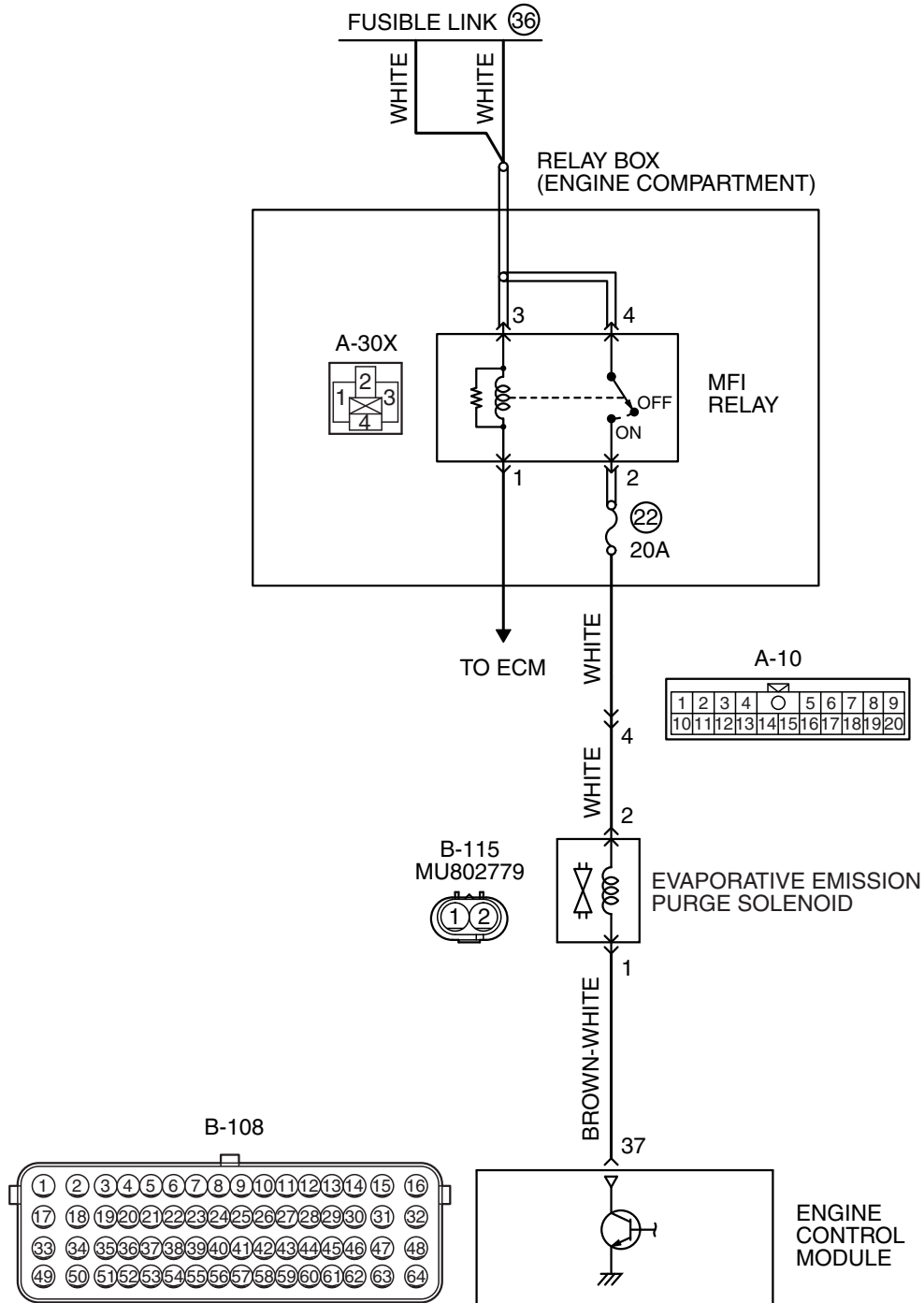
**YES** : Retry the troubleshooting.

**NO** : The inspection is complete.

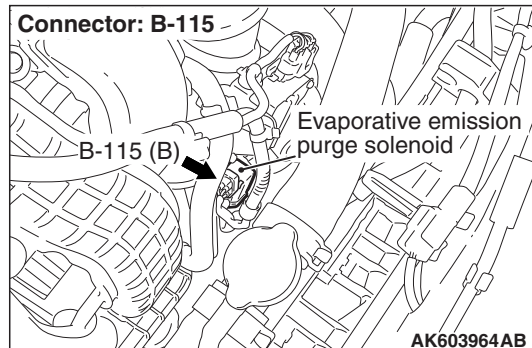
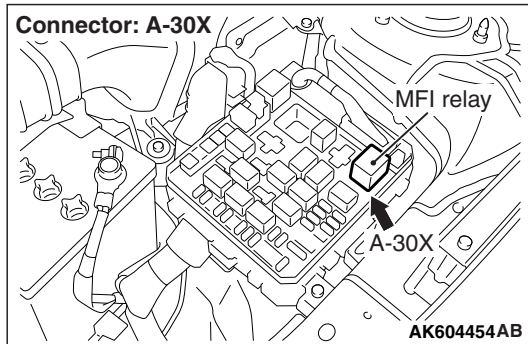
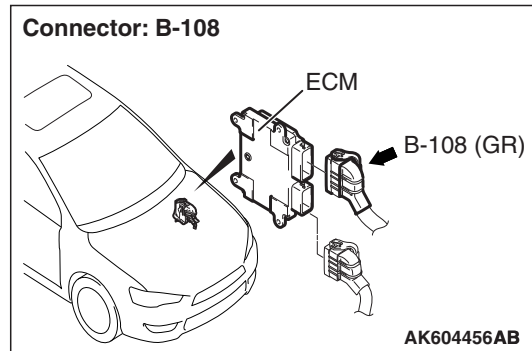
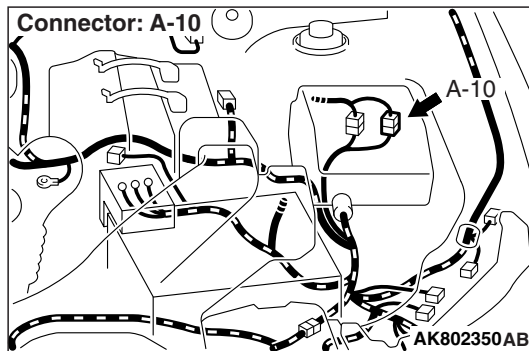


DTC P0443: Evaporative Emission Control System Purge Control Valve Circuit

EVAPORATIVE EMISSION PURGE SOLENOID CIRCUIT



AK604248AD



## CIRCUIT OPERATION

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

## TECHNICAL DESCRIPTION

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

## DESCRIPTIONS OF MONITOR METHODS

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

## MONITOR EXECUTION

Continuous

## MONITOR EXECUTION CONDITIONS (Other monitor and Sensor)

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

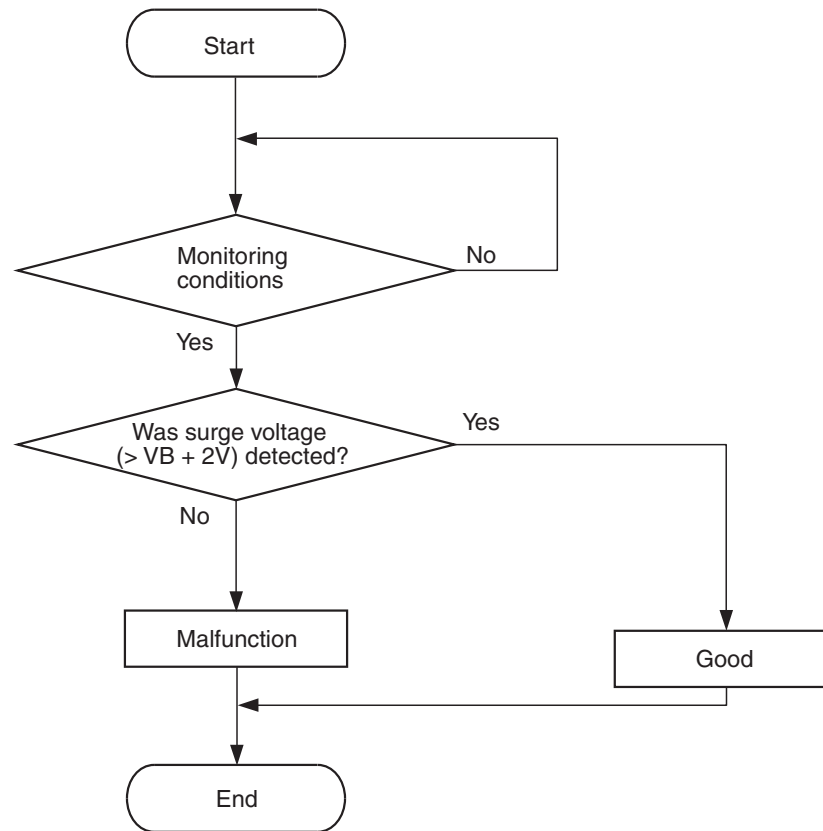
- Not applicable

**Sensor** (The sensor below is determined to be normal)

- Not applicable

## DTC SET CONDITIONS

## Logic Flow Chart



AK604339

**Check Conditions**

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

**Judgement Criteria**

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

**Check Conditions**

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

**Judgement Criterion**

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

**FAIL-SAFE AND BACKUP FUNCTION**

- None

**OBD-II DRIVE CYCLE PATTERN**

Refer to Diagnostic Function –OBD-II Drive Cycle – Pattern 23 [P.13B-12](#).

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

- Evaporative emission purge solenoid failed.
- Open or shorted evaporative emission purge solenoid circuit, harness damage or connector damage.
- ECM failed.

## DIAGNOSIS

### Required Special Tools:

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

**STEP 1. Using scan tool MB991958, check actuator test item 10: Evaporative Emission Purge Solenoid.**

#### **⚠ CAUTION**

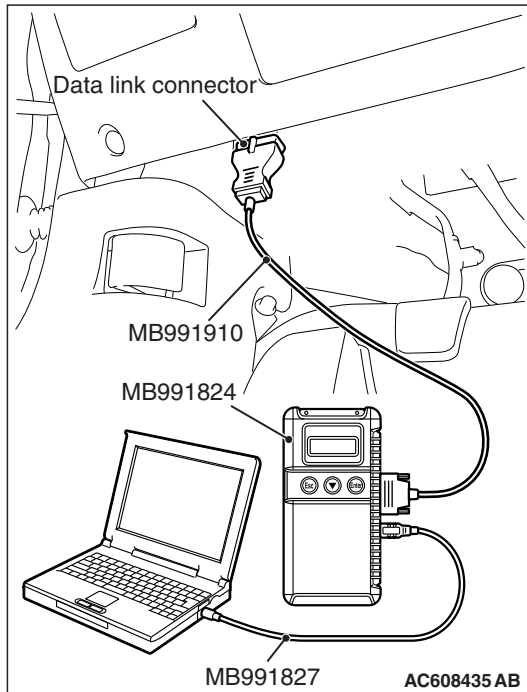
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

- (1) Connect scan tool MB991958 to the data link connector.
- (2) Turn the ignition switch to the "ON" position.
- (3) Set scan tool MB991958 to the actuator test mode for item 10, Evaporative Emission Purge Solenoid.
  - An operation sound should be heard and vibration should be felt when the evaporative emission purge solenoid is operated.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

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

**YES** : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13.

**NO** : Go to Step 2.

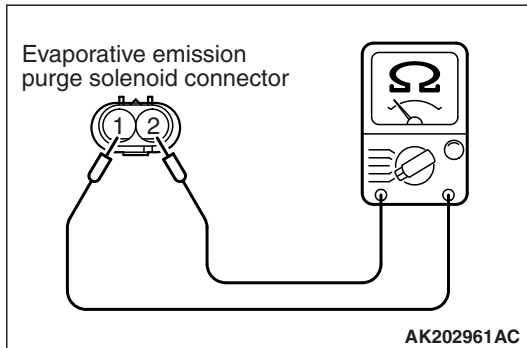


**STEP 2. Check harness connector B-115 at evaporative emission purge solenoid for damage.**

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

**YES** : Go to Step 3.

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

**STEP 3. Check the evaporative emission purge solenoid.**

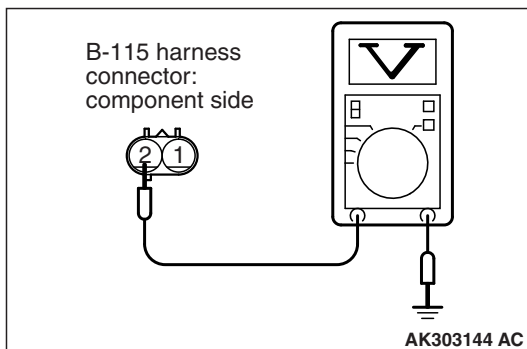
- (1) Disconnect the evaporative emission purge solenoid connector B-115.
- (2) Measure the resistance between evaporative emission purge solenoid side connector terminal No. 1 and No. 2.

**Standard value: 22 –26  $\Omega$  [at 20° C (68° F)]**

**Q: Is the measured resistance between 22 and 26  $\Omega$  [at 20° C (68° F)]?**

**YES :** Go to Step 4.

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

**STEP 4. Measure the power supply voltage at evaporative emission purge solenoid harness side connector B-115.**

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

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

**YES :** Go to Step 6.

**NO :** Go to Step 5.

**STEP 5. Check harness connector A-30X at MFI relay for damage.**

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

**YES :** Check harness connector A-10 at intermediate connector for damage, and repair or replace as required. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. If intermediate connector is in good condition, repair harness wire between MFI relay connector A-30X (terminal No. 2) and evaporative emission purge solenoid connector B-115 (terminal No. 2) because of open circuit or short circuit to ground. Then go to Step 12.

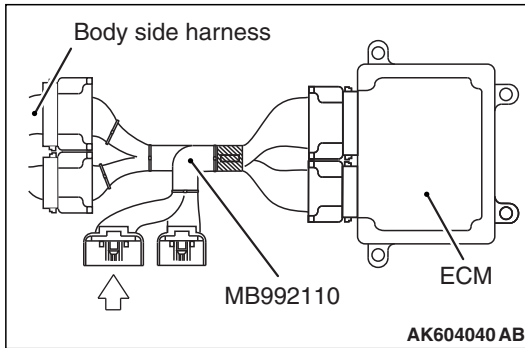
**NO :** Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 12.

**STEP 6. Check harness connector B-108 at ECM for damage.**

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

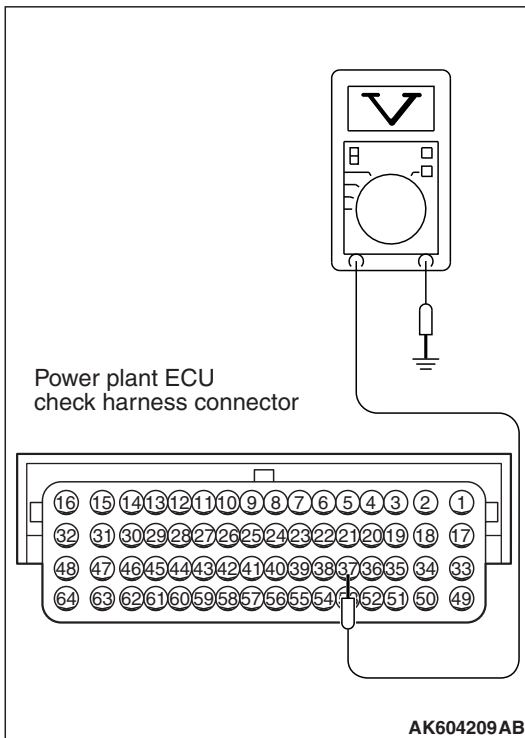
**YES :** Go to Step 7.

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



**STEP 7. Measure the power supply voltage at ECM connector B-108 by using power plant ECU check harness special tool MB992110.**

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



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

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

**YES :** Go to Step 8.

**NO :** Repair harness wire between evaporative emission purge solenoid connector B-115 (terminal No. 1) and ECM connector B-108 (terminal No. 37) because of open circuit or short circuit to ground. Then go to Step 12.

**STEP 8. Check harness connector A-30X at MFI relay for damage.**

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

**YES :** Go to Step 9.

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

**STEP 9. Check for harness damage between MFI relay connector A-30X (terminal No. 2) and evaporative emission purge solenoid connector B-115 (terminal No. 2).**

*NOTE: Check harness after checking intermediate connector A-10. If intermediate connector is damaged, repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 12.*

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

**YES :** Go to Step 10.

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

---

**STEP 10. Check for harness damage between evaporative emission purge solenoid connector B-115 (terminal No. 1) and ECM connector B-108 (terminal No. 37).**

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

**YES :** Go to Step 11.

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

---

**STEP 11. Using scan tool MB991958, check actuator test item 10: Evaporative Emission Purge Solenoid.**

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

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

**YES :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13.

**NO :** Replace the ECM (Refer to, Removal and Installation P.13B-1022). Then go to Step 12.

---

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

- (1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle –Pattern 23 P.13B-12.
- (2) Check the diagnostic trouble code (DTC).

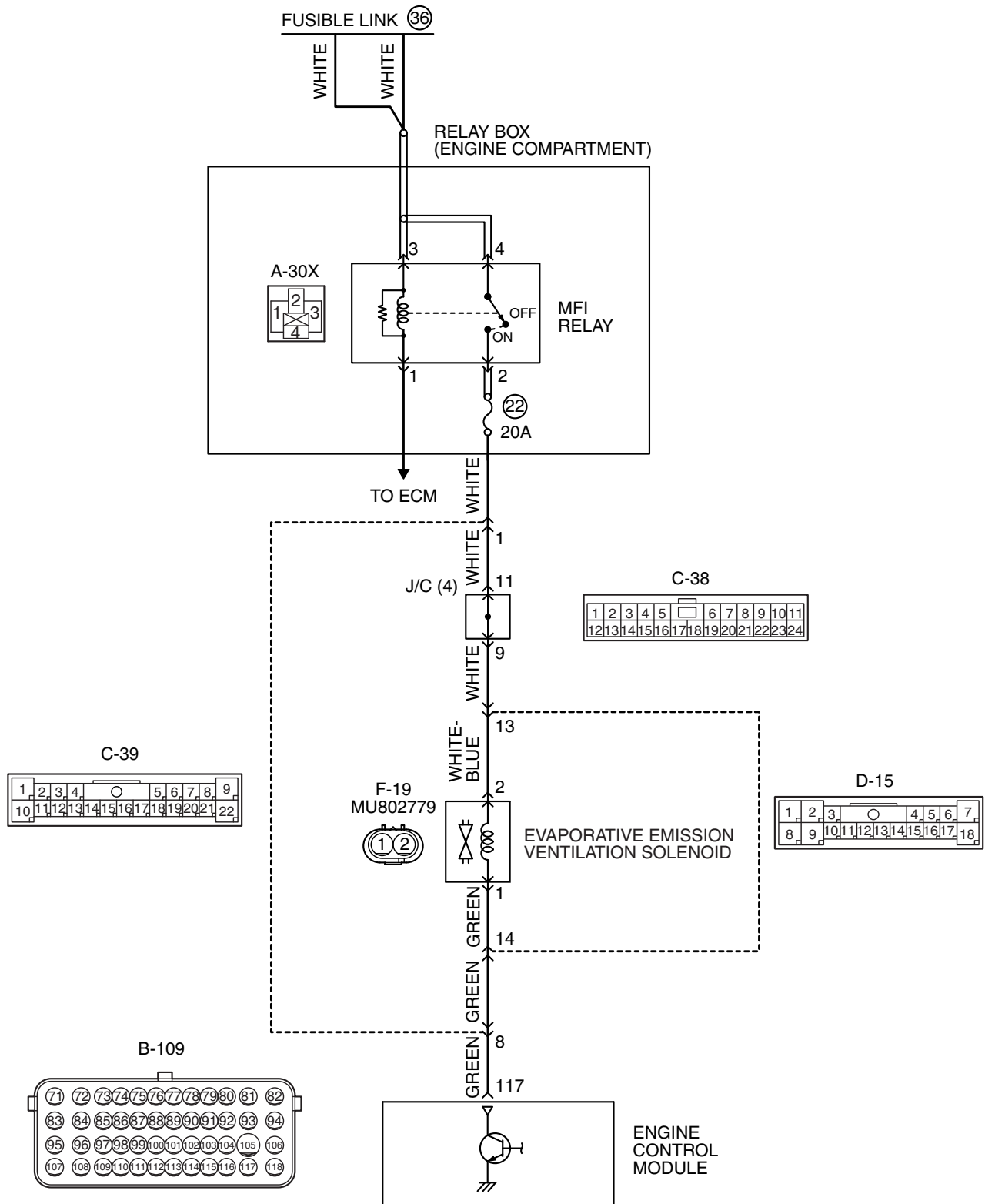
**Q: Is DTC P0443 set?**

**YES :** Retry the troubleshooting.

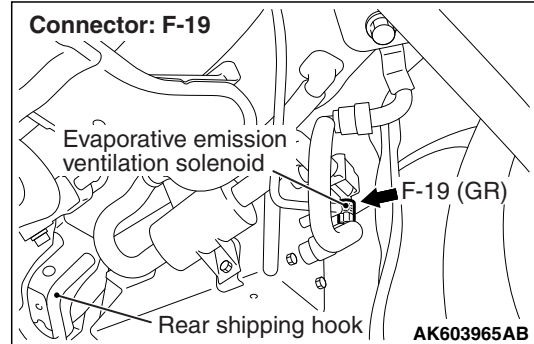
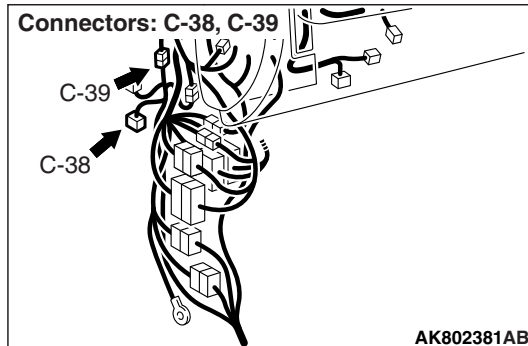
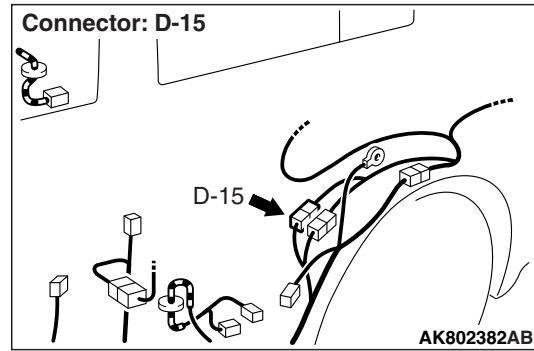
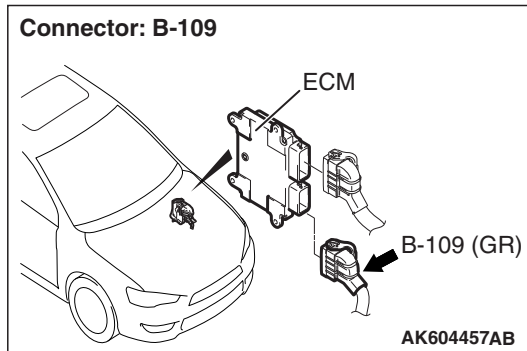
**NO :** The inspection is complete.

DTC P0446: Evaporative Emission Control System Vent Control Circuit

EVAPORATIVE EMISSION VENTILATION SOLENOID CIRCUIT







## CIRCUIT OPERATION

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

## TECHNICAL DESCRIPTION

- To judge if there is open circuit in the evaporative emission ventilation solenoid drive circuit, ECM measures the surge voltage of the evaporative emission ventilation solenoid coil.
- The ECM drives the evaporative emission ventilation solenoid. After the solenoid is turned off, the ECM will check if the solenoid coil produces a surge voltage (battery positive voltage + 2 volts).

## DESCRIPTIONS OF MONITOR METHODS

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

## MONITOR EXECUTION

Continuous

## MONITOR EXECUTION CONDITIONS (Other monitor and Sensor)

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

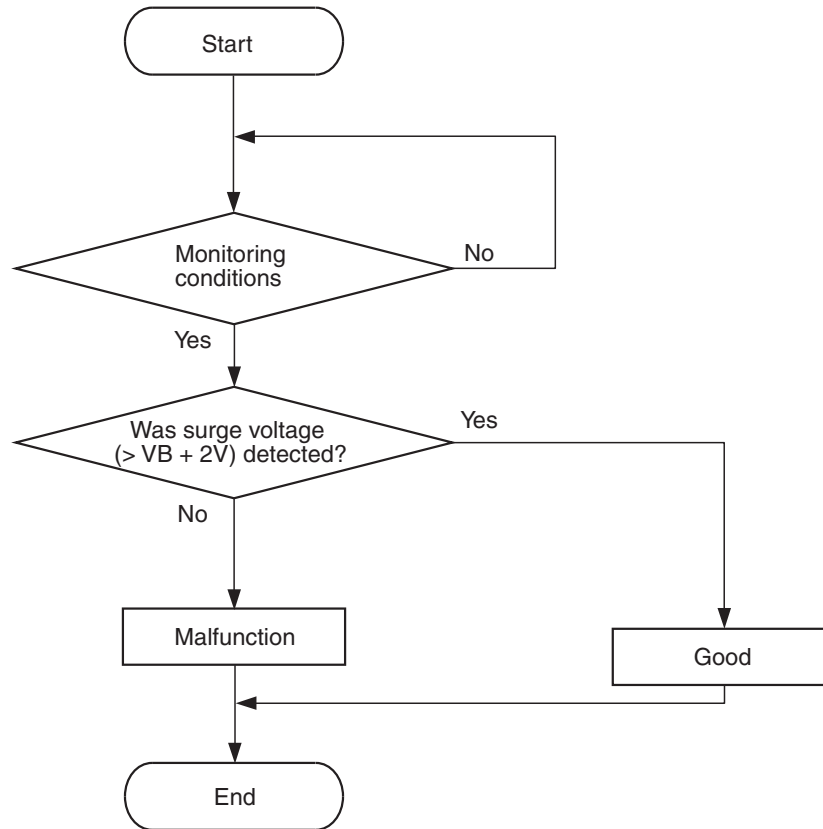
- Not applicable

**Sensor (The sensor below is determined to be normal)**

- Not applicable

## DTC SET CONDITIONS

### Logic Flow Chart



AK604339

#### Check Conditions

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

#### Judgement Criteria

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

#### Check Conditions

- Battery positive voltage is between 10 and 16.5 volts.
- ON duty cycle of the evaporative emission purge solenoid is 0 percent.
- Evaporative emission ventilation solenoid is ON.
- More than 1 second has passed after the above mentioned conditions have been met.

#### Judgement Criterion

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

#### FAIL-SAFE AND BACKUP FUNCTION

- None

#### OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function –OBD-II Drive Cycle – Pattern 23 [P.13B-12](#).

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

- Evaporative emission ventilation solenoid failed.
- Open or shorted evaporative emission ventilation solenoid circuit, harness damage or connector damage.
- ECM failed.

**DIAGNOSIS****Required Special Tools:**

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

**STEP 1. Using scan tool MB991958, check actuator test item 15: Evaporative Emission Ventilation Solenoid.****⚠ CAUTION**

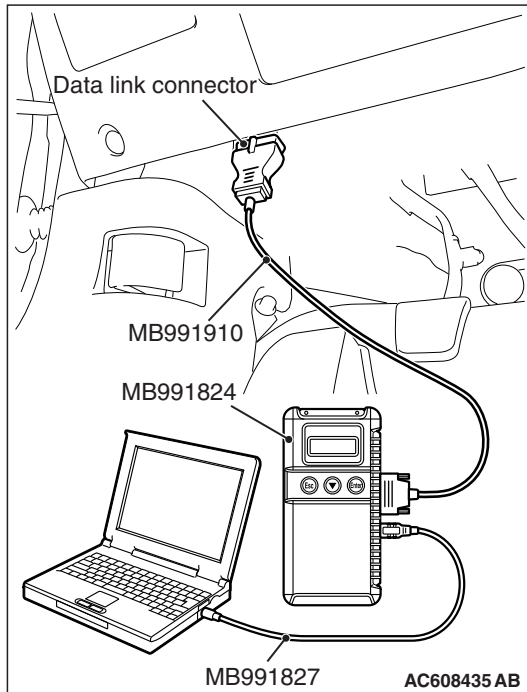
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

- (1) Connect scan tool MB991958 to the data link connector.
- (2) Turn the ignition switch to the "ON" position.
- (3) Set scan tool MB991958 to the actuator test mode for item 15, Evaporative Emission Ventilation Solenoid.
  - An operation sound should be heard and vibration should be felt when the evaporative emission ventilation solenoid is operated.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

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

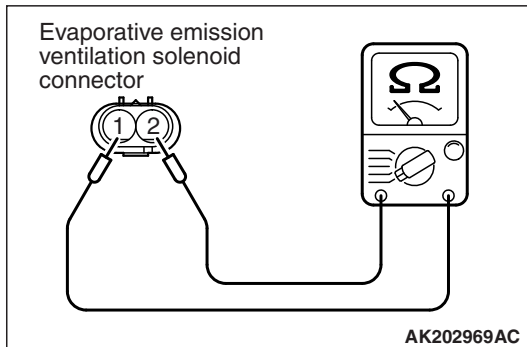
**YES** : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions [P.00-13](#).

**NO** : Go to Step 2.

**STEP 2. Check harness connector F-19 at evaporative emission ventilation solenoid for damage.****Q: Is the harness connector in good condition?**

**YES** : Go to Step 3.

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



**STEP 3. Check the evaporative emission ventilation solenoid.**

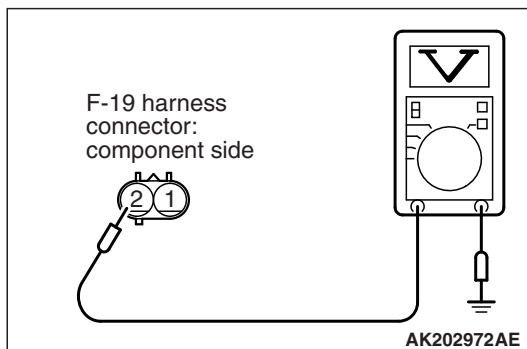
- (1) Disconnect the evaporative emission ventilation solenoid connector F-19.
- (2) Measure the resistance between evaporative emission ventilation solenoid side connector terminal No. 1 and No. 2.

**Standard value: 17 –21  $\Omega$  [at 20° C (68° F)]**

**Q: Is the measured resistance between 17 and 21  $\Omega$  [at 20° C (68° F)]?**

**YES :** Go to Step 4.

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



**STEP 4. Measure the power supply voltage at evaporative emission ventilation solenoid harness side connector F-19.**

- (1) Disconnect the connector F-19 and measure at the harness side.
- (2) Turn the ignition switch to the "ON" position.
- (3) Measure the voltage between terminal No. 2 and ground.
  - Voltage should be battery positive voltage.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

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

**YES :** Go to Step 6.

**NO :** Go to Step 5.

**STEP 5. Check harness connector A-30X at MFI relay for damage.**

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

**YES :** Check harness connectors C-38, C-39 and D-15 at intermediate connectors for damage, and repair or replace as required. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). If intermediate connectors are in good condition, repair harness wire between MFI relay connector A-30X (terminal No. 2) and evaporative emission ventilation solenoid connector F-19 (terminal No. 2) because of open circuit or short circuit to ground. Then go to Step 12.

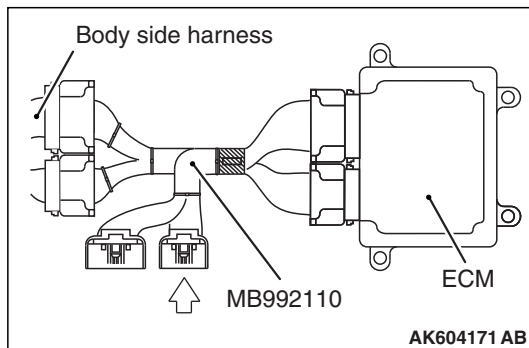
**NO :** Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then go to Step 12.

**STEP 6. Check harness connector B-109 at ECM for damage.**

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

**YES :** Go to Step 7.

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



**STEP 7. Measure the power supply voltage at ECM connector B-109 by using power plant ECU check harness special tool MB992110.**

(1) Disconnect all ECM connectors. Connect the power plant ECU check harness special tool MB992110 between the separated connectors.

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

(3) Measure the voltage between terminal No. 117 and ground.

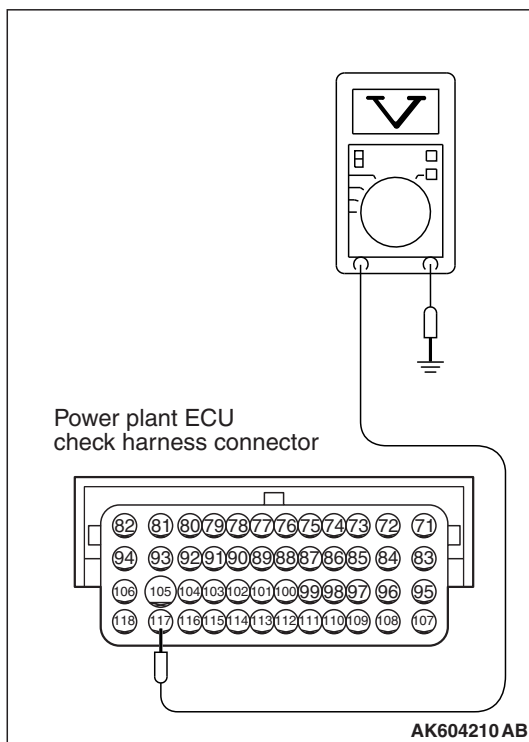
- Voltage should be battery positive voltage.

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

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

**YES :** Go to Step 8.

**NO :** Check harness connectors C-39 and D-15 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 evaporative emission ventilation solenoid connector F-19 (terminal No. 1) and ECM connector B-109 (terminal No. 117) because of open circuit or short circuit to ground. Then go to Step 12.



**STEP 8. Check harness connector A-30X at MFI relay for damage.**

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

**YES :** Go to Step 9.

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

---

**STEP 9. Check for harness damage between MFI relay connector A-30X (terminal No. 2) and evaporative emission ventilation solenoid connector F-19 (terminal No. 2).**

*NOTE: Check harness after checking intermediate connectors C-38, C-39 and D-15. If intermediate connectors are damaged, repair or replace them. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 12.*

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

**YES :** Go to Step 10.

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

---

**STEP 10. Check for harness damage between evaporative emission ventilation solenoid connector F-19 (terminal No. 1) and ECM connector B-109 (terminal No. 117).**

*NOTE: Check harness after checking intermediate connectors C-39 and D-15. If intermediate connectors are damaged, repair or replace them. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 12.*

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

**YES :** Go to Step 11.

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

---

**STEP 11. Using scan tool MB991958, check actuator test item 15: Evaporative Emission Ventilation Solenoid.**

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

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

**YES :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13.

**NO :** Replace the ECM (Refer to, Removal and Installation P.13B-1022). Then go to Step 12.

---

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

- (1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle –Pattern 23 P.13B-12.
- (2) Check the diagnostic trouble code (DTC).

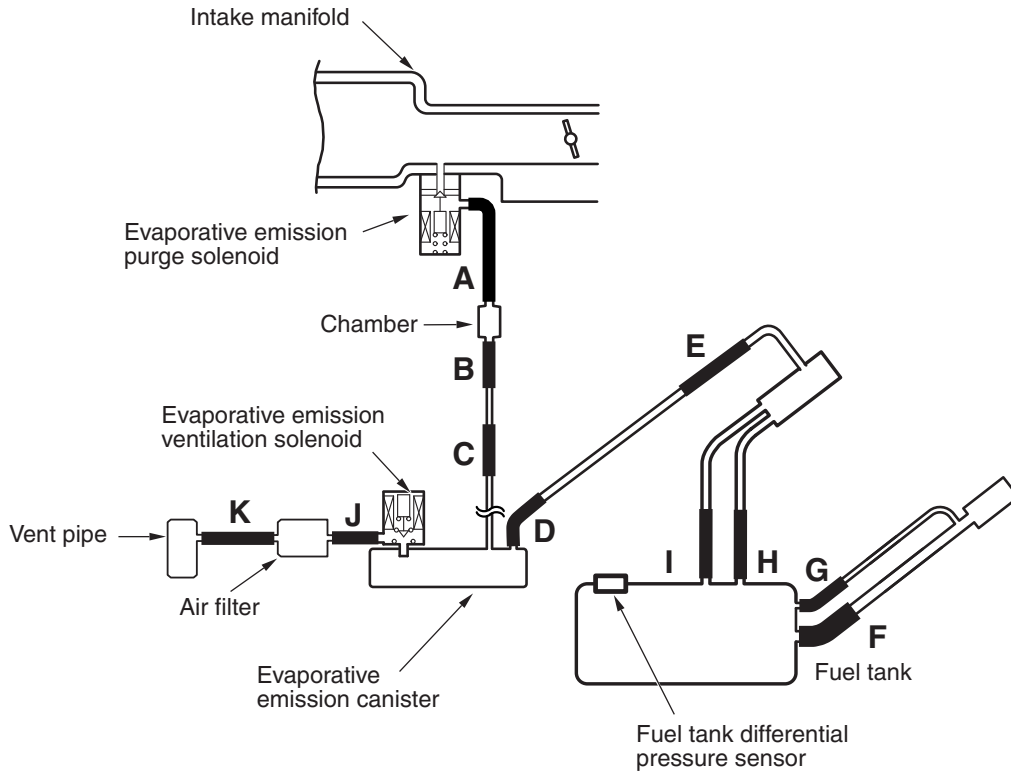
**Q: Is DTC P0446 set?**

**YES :** Retry the troubleshooting.

**NO :** The inspection is complete.

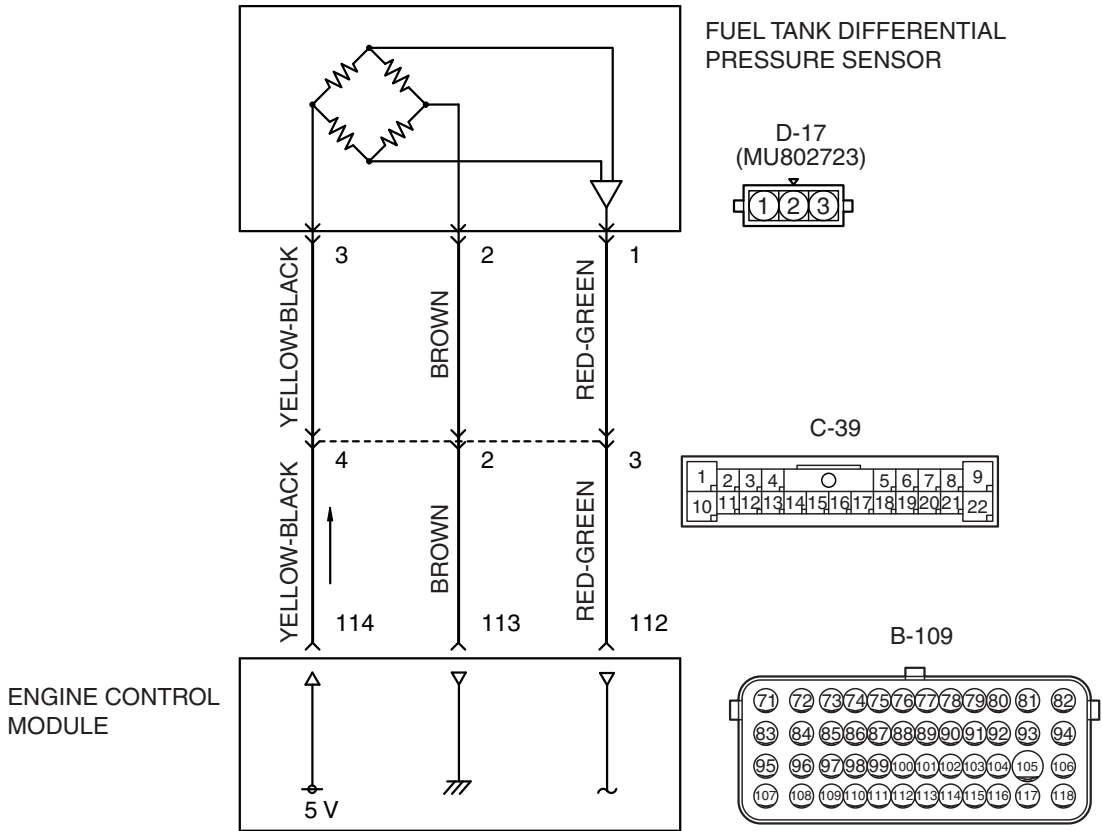
DTC P0450: Evaporative Emission Control System Pressure Sensor Malfunction

System diagram

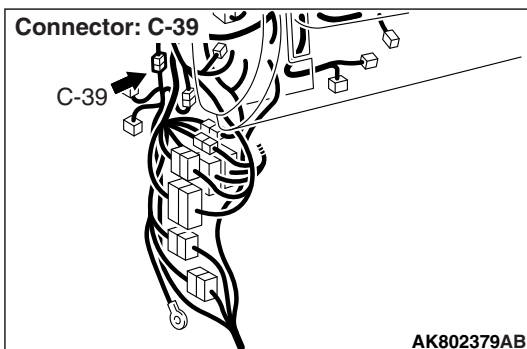
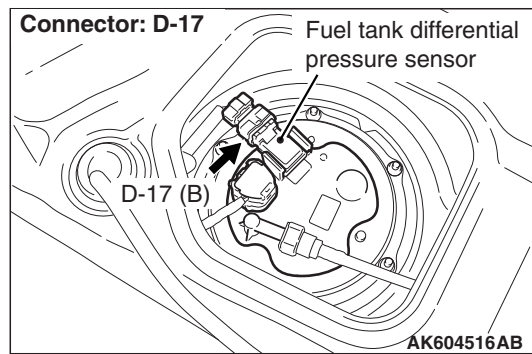
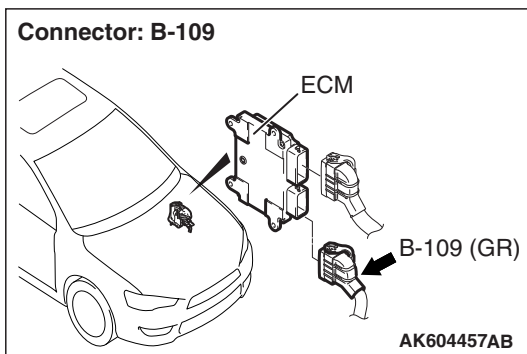


AK800712AB

FUEL TANK DIFFERENTIAL PRESSURE SENSOR CIRCUIT



AK604513 AB





**CIRCUIT OPERATION**

- The ECM (terminal No. 114) supplies a 5 volts reference signal to the fuel tank differential pressure sensor (terminal No. 3). The fuel tank differential pressure sensor (terminal No. 2) is grounded through the ECM (terminal No. 113).
- The fuel tank differential pressure sensor (terminal No. 1) returns a voltage signal to the ECM (terminal No. 112) that is proportional to the pressure in the fuel tank.

**TECHNICAL DESCRIPTION**

- The ECM monitors the fuel tank differential pressure sensor output voltage.
- The ECM determines whether the fuel tank differential pressure sensor signal voltage is within normal operating parameters.

**DESCRIPTIONS OF MONITOR METHODS**

Compare evaporative emission purge solenoid status with fuel tank differential pressure sensor output voltage.

**MONITOR EXECUTION**

Continuous

**MONITOR EXECUTION CONDITIONS  
(OTHER MONITOR AND SENSOR)**

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

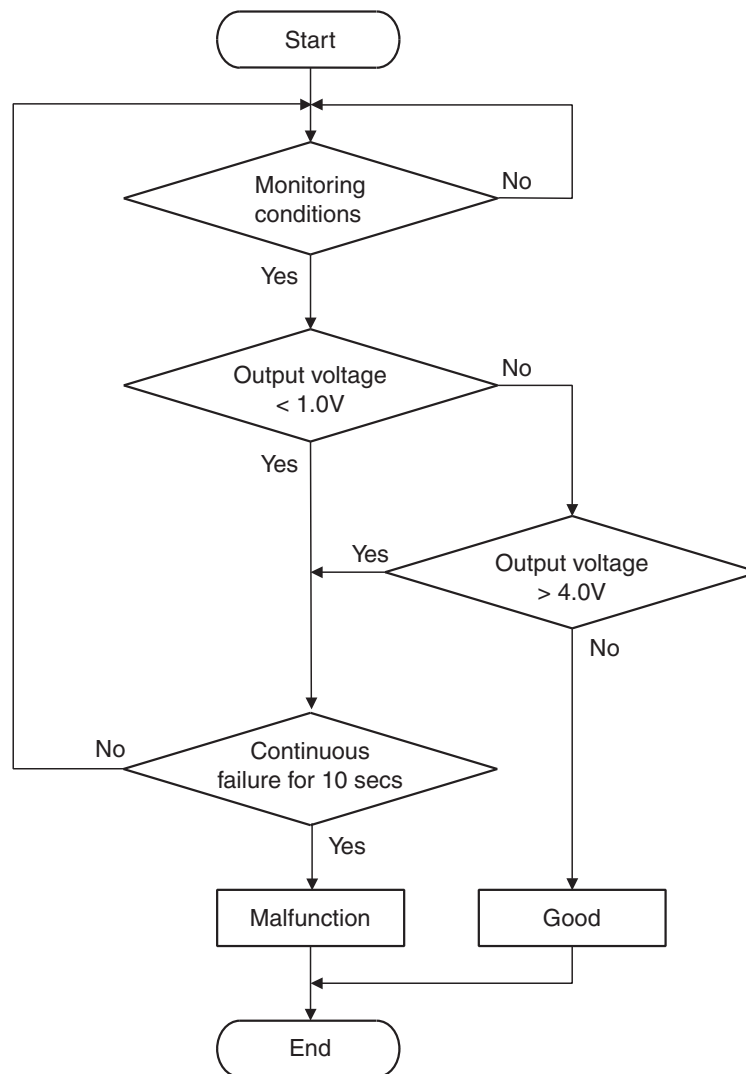
- Evaporative emission purge solenoid monitor
- Evaporative emission ventilation solenoid monitor
- Fuel temperature sensor monitor
- Fuel level sensor monitor

**Sensor (The sensors below are determined to be normal)**

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

## DTC SET CONDITIONS

### Logic Flow Chart (Monitor Sequence)



AK704950

#### Check Conditions

- Intake air temperature is more than 5° C (41° F).
- Engine speed is more than 1,594 r/min.
- Volumetric efficiency is between 20 and 70 per cent.

#### Judgement Criterion

- When the evaporative emission purge solenoid is off, the fuel tank differential pressure sensor output voltage is less than 1.0 volt for 10 seconds.

#### Check Conditions

- Intake air temperature is between 5° C (41° F) and 45° C (113° F).
- Engine speed is more than 1,594 r/min.

- Volumetric efficiency is between 20 and 70 per cent.

#### Judgement Criterion

- When the evaporative emission purge solenoid is fully operational (100 percent ratio), the fuel tank differential pressure sensor output voltage is more than 4.0 volts for 10 seconds.

### FAIL-SAFE AND BACKUP FUNCTION

- None

### OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function –OBD-II Drive Cycle – Pattern 5 P.13B-12.

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

- Fuel tank differential pressure sensor failed.
- Fuel tank differential pressure sensor circuit harness damage or connector damage.
- ECM failed.

**DIAGNOSIS****Required Special Tool:**

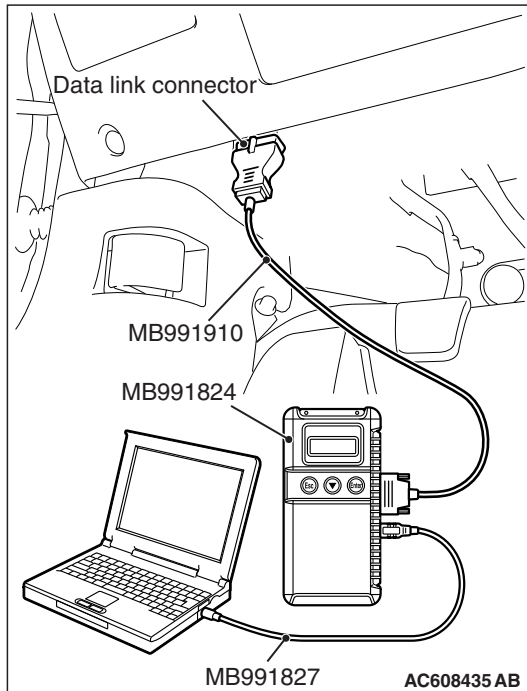
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991910: Main Harness A

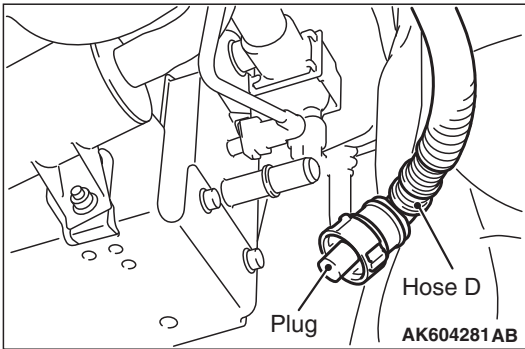
**STEP 1. Using scan tool MB991958, check data list item 52: Fuel Tank Differential Pressure Sensor.**

**CAUTION**

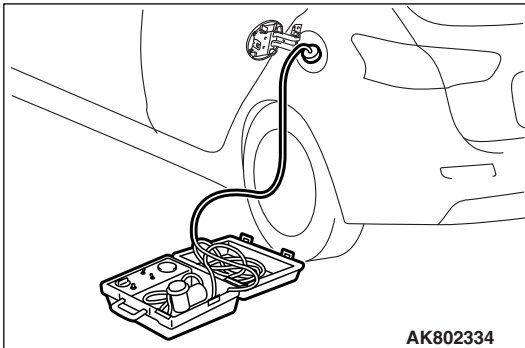
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

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





- (2) Plug the disconnected end of hose D.
- (3) Turn the ignition switch to the "ON" position.
- (4) Remove the fuel cap.
- (5) Set scan tool MB991958 to the data reading mode for item 52, Fuel Tank Differential Pressure Sensor.
  - Output voltage should be between 1,500 and 3,500 millivolts.



- (6) Connect the evaporative emission system pressure pump (Miller number 6872A) to the fuel tank filler tube by using fuel tank adapter (MLR-8382) and pressurize the fuel tank.
  - The fuel tank pressure reading should increase.
- (7) Turn the ignition switch to the "LOCK" (OFF) position.
- (8) Remove the evaporative emission system pressure pump (Miller number 6872A) and the fuel tank adapter (MLR-8382), and reinstall the fuel cap.
- (9) Connect hose D to the evaporative emission canister.

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

**YES :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting / Inspection Service Points –How to Cope with Intermittent Malfunctions [P.00-13](#).

**NO :** Go to Step 2.

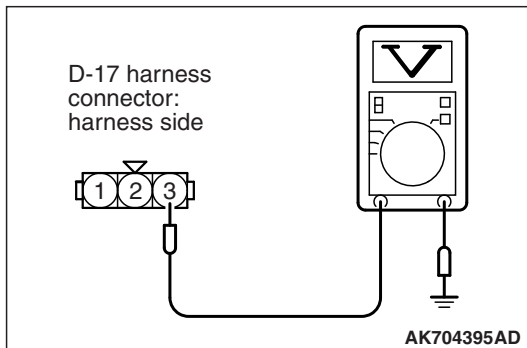
**STEP 2. Measure the sensor supply voltage at fuel tank differential pressure sensor connector D-17 by backprobing.**

- (1) Do not disconnect the connector D-17.
- (2) Turn the ignition switch to the "ON" position.
- (3) Measure the voltage between terminal No. 3 and ground by backprobing.
  - Voltage should be between 4.9 and 5.1 volts.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

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

**YES :** Go to Step 5.

**NO :** Go to Step 3.



**STEP 3. Check harness connector D-17 at fuel tank differential pressure sensor and harness connector B-109 at ECM for damage.**

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

**YES :** Go to step 4.

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

**STEP 4. Check for harness damage between fuel tank differential pressure sensor connector D-17 (terminal No. 3) and ECM connector B-109 (terminal No. 114).**

*NOTE: Check harness after checking intermediate connector C-39. If intermediate connector is damaged, repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 11.*

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

**YES :** Go to Step 10.

**NO :** Repair it. Then go to Step 11.

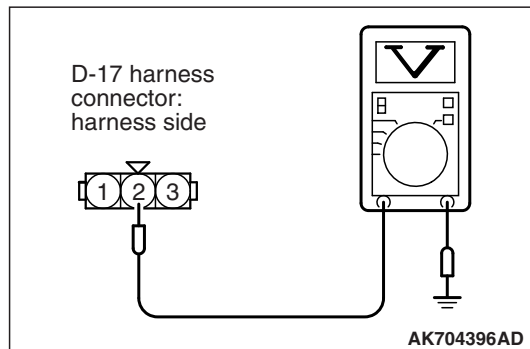
**STEP 5. Measure the ground voltage at fuel tank differential pressure sensor connector D-17 by backprobing.**

- (1) Do not disconnect the connector D-17.
- (2) Turn the ignition switch to the "ON" position.
- (3) Measure the voltage between terminal No. 2 and ground by backprobing.
  - Voltage should be 0.5 volt or less.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

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

**YES :** Go to Step 8.

**NO :** Go to Step 6.



**STEP 6. Check harness connector D-17 at fuel tank differential pressure sensor and harness connector B-109 at ECM for damage.**

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

**YES :** Go to Step 7.

**NO :** Repair or replace them. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 11.

**STEP 7. Check for harness damage between fuel tank differential pressure sensor connector D-17 (terminal No. 2) and ECM connector B-109 (terminal No. 113).**

*NOTE: Check harness after checking intermediate connector C-39. If intermediate connector is damaged, repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 11.*

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

**YES :** Go to Step 10.

**NO :** Repair it. Then go to Step 11.

---

**STEP 8. Check harness connector D-17 at fuel tank differential pressure sensor and harness connector B-109 at ECM for damage.**

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

**YES :** Go to Step 9.

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

---

**STEP 9. Check for harness damage between fuel tank differential pressure sensor connector D-17 (terminal No. 1) and ECM connector B-109 (terminal No. 112).**

*NOTE: Check harness after checking intermediate connector C-39. If intermediate connector is damaged, repair or replace it. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then go to Step 11.*

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

**YES :** Go to Step 10.

**NO :** Repair it. Then go to Step 11.

---

**STEP 10. Replace the fuel tank differential pressure sensor.**

- (1) Replace the fuel tank differential pressure sensor.
- (2) Carry out test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle –Pattern 5 [P.13B-12](#).
- (3) Check the diagnostic trouble code (DTC).

**Q: Is DTC P0450 set?**

**YES :** Replace the ECM (Refer to, Removal and Installation [P.13B-1022](#)). Then go to Step 11.

**NO :** The inspection is complete.

---

**STEP 11. Test the OBD-II drive cycle.**

- (1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle –Pattern 5 [P.13B-12](#).
- (2) Check the diagnostic trouble code (DTC).

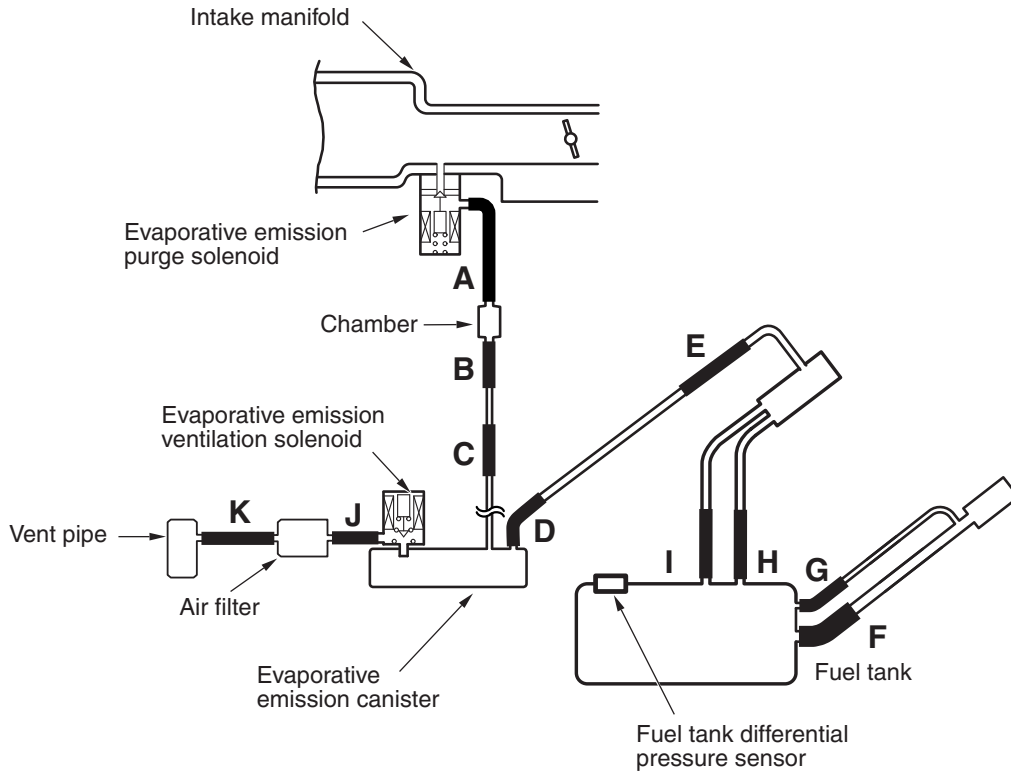
**Q: Is DTC P0450 set?**

**YES :** Retry the troubleshooting.

**NO :** The inspection is complete.

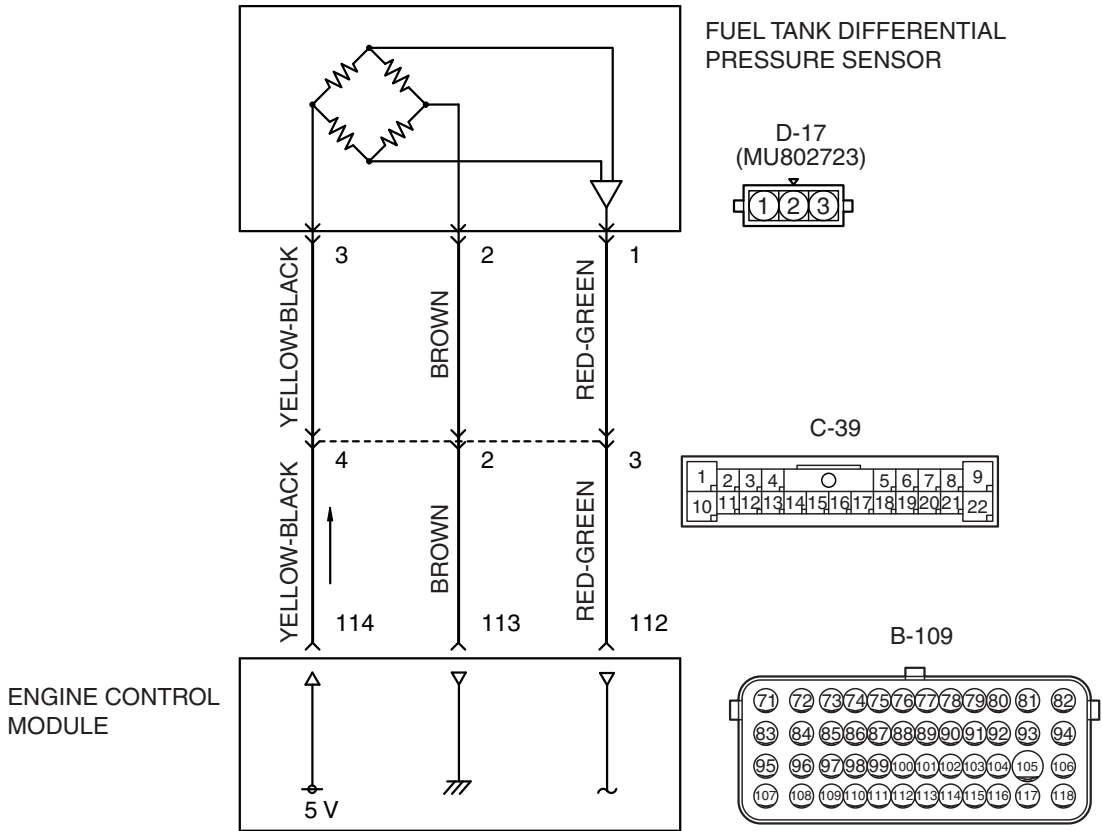
DTC P0451: Evaporative Emission Control System Pressure Sensor Range/Performance

System diagram

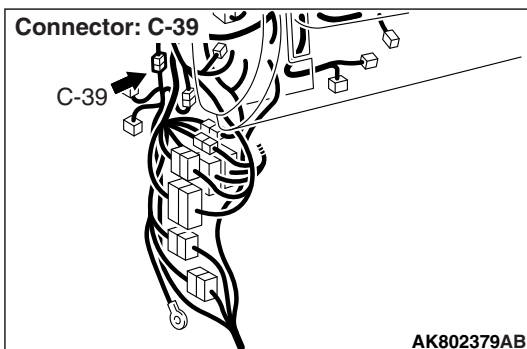
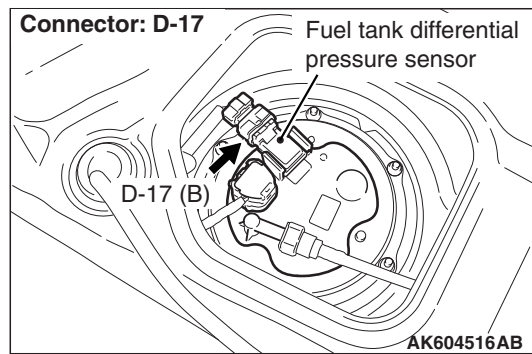
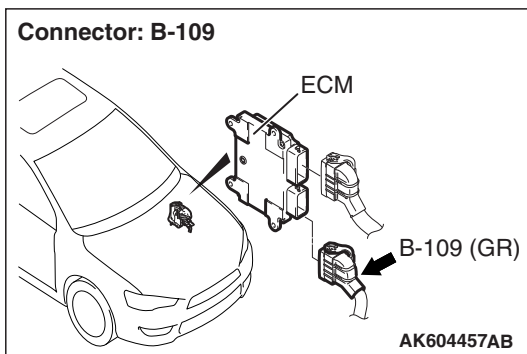


AK800712AB

FUEL TANK DIFFERENTIAL PRESSURE SENSOR CIRCUIT



AK604513AB





**CIRCUIT OPERATION**

- The ECM (terminal No. 114) supplies a 5 volts reference signal to the fuel tank differential pressure sensor (terminal No. 3). The fuel tank differential pressure sensor (terminal No. 2) is grounded through the ECM (terminal No. 113).
- The fuel tank differential pressure sensor (terminal No. 1) returns a voltage signal to the ECM (terminal No. 112) that is proportional to the pressure in the fuel tank.

**TECHNICAL DESCRIPTION**

- The ECM monitors the fuel tank differential pressure sensor signal voltage.
- The ECM determines whether the fuel tank differential pressure sensor signal voltage is within normal operating parameters.

**DESCRIPTIONS OF MONITOR METHODS**

Detect malfunction if change of fuel tank differential pressure sensor output voltage during idling stays large during specified go/stop operations.

**MONITOR EXECUTION**

Continuous

**MONITOR EXECUTION CONDITIONS  
(OTHER MONITOR AND SENSOR)**

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

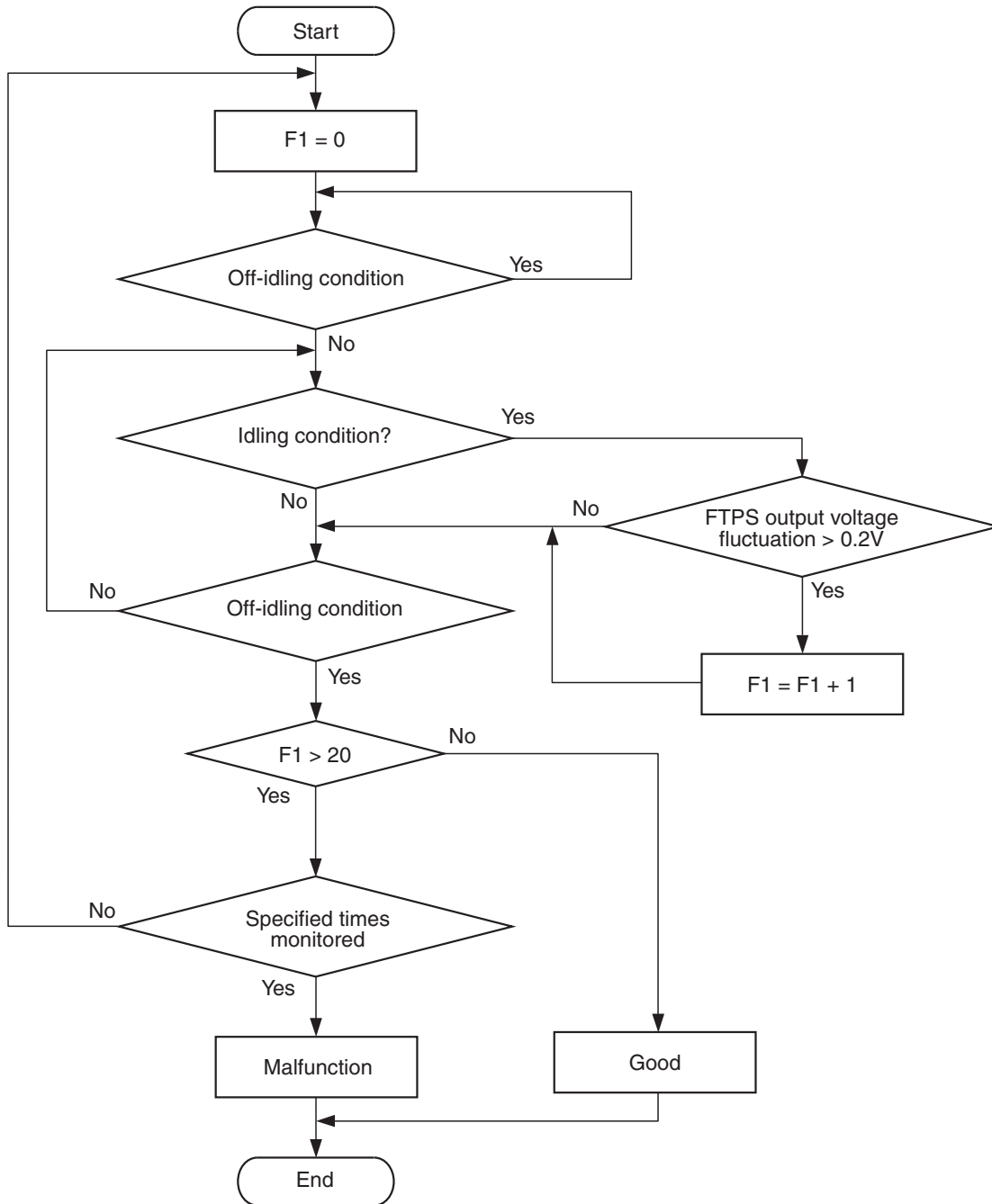
- Evaporative emission purge solenoid monitor
- Evaporative emission ventilation solenoid monitor
- Fuel temperature sensor monitor
- Fuel level sensor monitor

**Sensor (The sensors below are determined to be normal)**

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

**DTC SET CONDITIONS**

**Logic Flow Chart (Monitor Sequence)**



AK705072

**Check Conditions**

- Accelerator pedal is not depressed.
  - Vehicle speed is less than 1.5 km/h (1 mph).
- NOTE: The conditions for deviating from idling operation are as follows:*
- Vehicle speed is more than 50 km/h (31 mph).

**Judgement Criteria**

- The drastic pressure fluctuation is detected 20 times or more per engine idling, which is that the fuel tank differential pressure sensor output voltage is 0.2 volt or more.
- The condition described above is consecutively detected 4 times under the normal driving conditions.

*NOTE: If the number of sudden pressure fluctuations does not reach 20 times during any one period of engine idling, or if the ignition switch is turned OFF, the counter will reset to 0.*

## FAIL-SAFE AND BACKUP FUNCTION

- None

## OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function –OBD-II Drive Cycle – Pattern 16 [P.13B-12](#).

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

- Fuel tank differential pressure sensor failed.
- Fuel tank differential pressure sensor circuit harness damage or connector damage.
- ECM failed.

## DIAGNOSIS

### Required Special Tool:

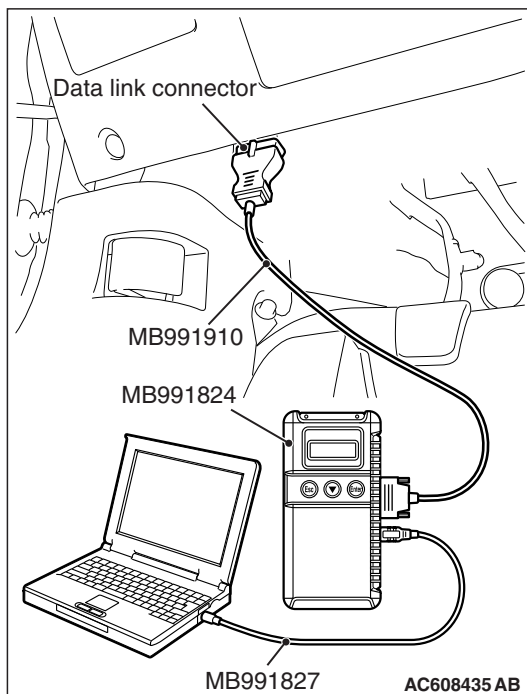
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991910: Main Harness A

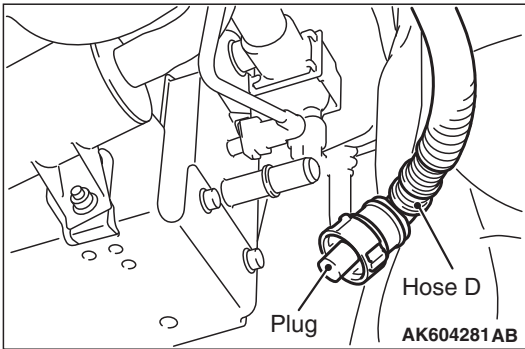
**STEP 1. Using scan tool MB991958, check data list item 52: Fuel Tank Differential Pressure Sensor.**

### **CAUTION**

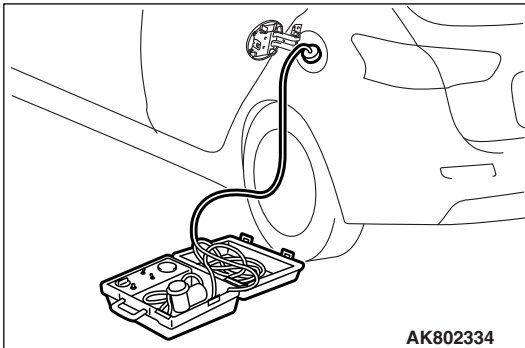
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

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





- (2) Plug the disconnected end of hose D.
- (3) Turn the ignition switch to the "ON" position.
- (4) Remove the fuel cap.
- (5) Set scan tool MB991958 to the data reading mode for item 52, Fuel Tank Differential Pressure Sensor.
  - Output voltage should be between 1,500 and 3,500 millivolts.



- (6) Connect the evaporative emission system pressure pump (Miller number 6872A) to the fuel tank filler tube by using fuel tank adapter (MLR-8382) and pressurize the fuel tank.
  - The fuel tank pressure reading should increase.
- (7) Turn the ignition switch to the "LOCK" (OFF) position.
- (8) Remove the evaporative emission system pressure pump (Miller number 6872A) and the fuel tank adapter (MLR-8382), and reinstall the fuel cap.
- (9) Connect hose D to the evaporative emission canister.

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

**YES** : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting / Inspection Service Points –How to Cope with Intermittent Malfunctions [P.00-13](#).

**NO** : Go to Step 2.

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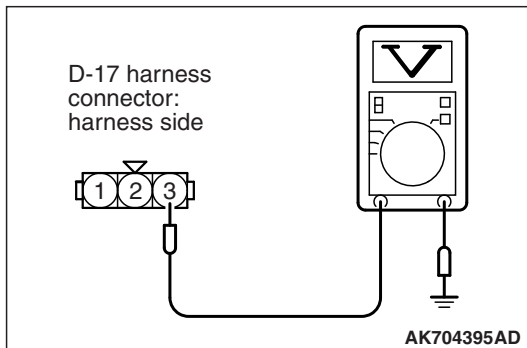
**STEP 2. Measure the sensor supply voltage at fuel tank differential pressure sensor connector D-17 by backprobing.**

- (1) Do not disconnect the connector D-17.
- (2) Turn the ignition switch to the "ON" position.
- (3) Measure the voltage between terminal No. 3 and ground by backprobing.
  - Voltage should be between 4.9 and 5.1 volts.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

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

**YES** : Go to Step 5.

**NO** : Go to Step 3.



---

**STEP 3. Check harness connector D-17 at fuel tank differential pressure sensor and harness connector B-109 at ECM for damage.**

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

**YES** : Go to step 4.

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

**STEP 4. Check for harness damage between fuel tank differential pressure sensor connector D-17 (terminal No. 3) and ECM connector B-109 (terminal No. 114).**

*NOTE: Check harness after checking intermediate connector C-39. If intermediate connector is damaged, repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 11.*

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

**YES :** Go to Step 10.

**NO :** Repair it. Then go to Step 11.

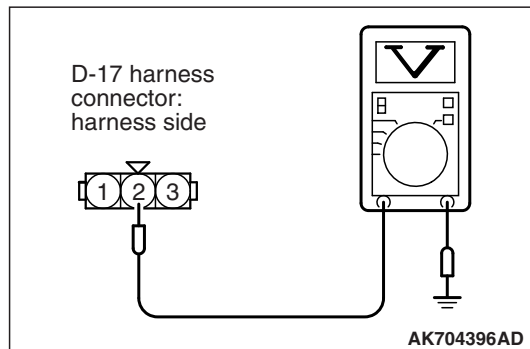
**STEP 5. Measure the ground voltage at fuel tank differential pressure sensor connector D-17 by backprobing.**

- (1) Do not disconnect the connector D-17.
- (2) Turn the ignition switch to the "ON" position.
- (3) Measure the voltage between terminal No. 2 and ground by backprobing.
  - Voltage should be 0.5 volt or less.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

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

**YES :** Go to Step 8.

**NO :** Go to Step 6.



**STEP 6. Check harness connector D-17 at fuel tank differential pressure sensor and harness connector B-109 at ECM for damage.**

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

**YES :** Go to Step 7.

**NO :** Repair or replace them. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 11.

**STEP 7. Check for harness damage between fuel tank differential pressure sensor connector D-17 (terminal No. 2) and ECM connector B-109 (terminal No. 113).**

*NOTE: Check harness after checking intermediate connector C-39. If intermediate connector is damaged, repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 11.*

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

**YES :** Go to Step 10.

**NO :** Repair it. Then go to Step 11.

---

**STEP 8. Check harness connector D-17 at fuel tank differential pressure sensor and harness connector B-109 at ECM for damage.**

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

**YES :** Go to Step 9.

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

---

**STEP 9. Check for harness damage between fuel tank differential pressure sensor connector D-17 (terminal No. 1) and ECM connector B-109 (terminal No. 112).**

*NOTE: Check harness after checking intermediate connector C-39. If intermediate connector is damaged, repair or replace it. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then go to Step 11.*

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

**YES :** Go to Step 10.

**NO :** Repair it. Then go to Step 11.

---

**STEP 10. Replace the fuel tank differential pressure sensor.**

- (1) Replace the fuel tank differential pressure sensor.
- (2) Carry out test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle –Pattern 16 [P.13B-12](#).
- (3) Check the diagnostic trouble code (DTC).

**Q: Is DTC P0451 set?**

**YES :** Replace the ECM (Refer to, Removal and Installation [P.13B-1022](#)). Then go to Step 11.

**NO :** The inspection is complete.

---

**STEP 11. Test the OBD-II drive cycle.**

- (1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle –Pattern 16 [P.13B-12](#).
- (2) Check the diagnostic trouble code (DTC).

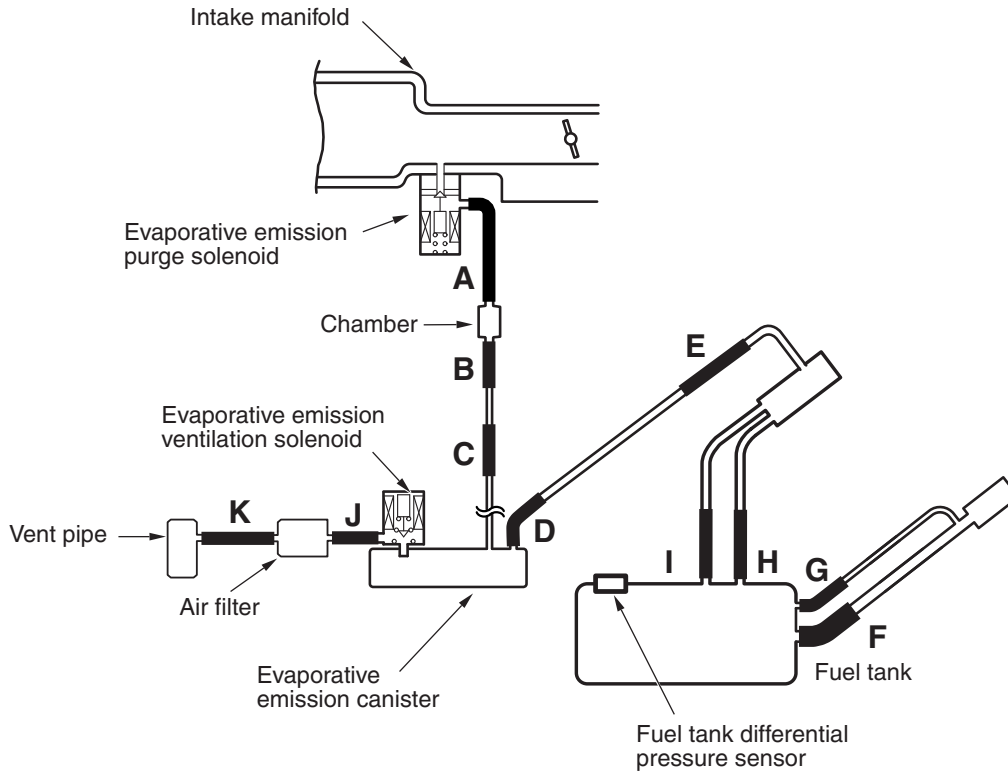
**Q: Is DTC P0451 set?**

**YES :** Retry the troubleshooting.

**NO :** The inspection is complete.

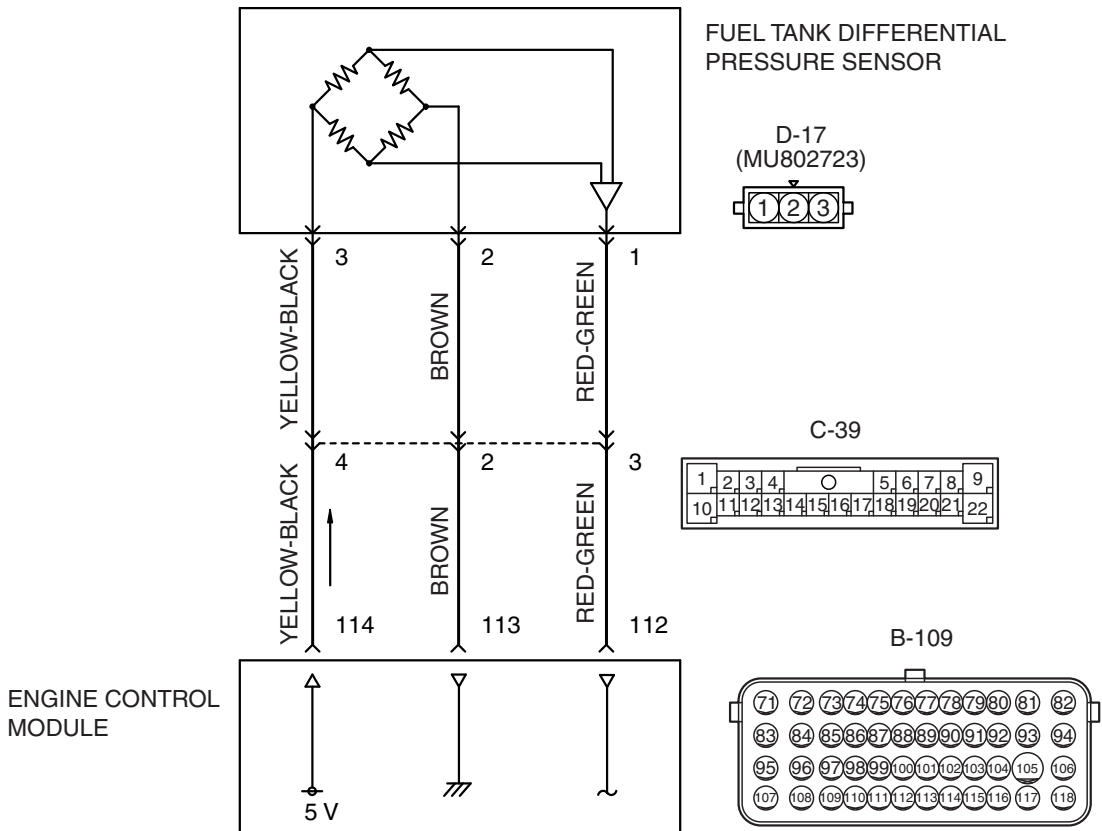
DTC P0452: Evaporative Emission Control System Pressure Sensor Low Input

System diagram

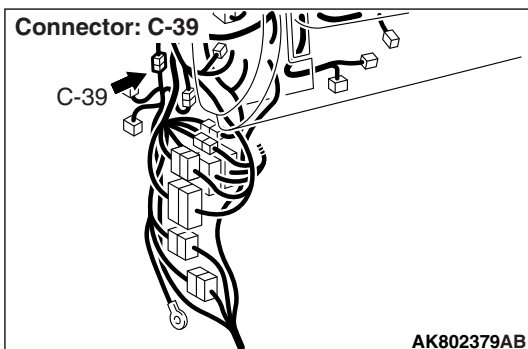
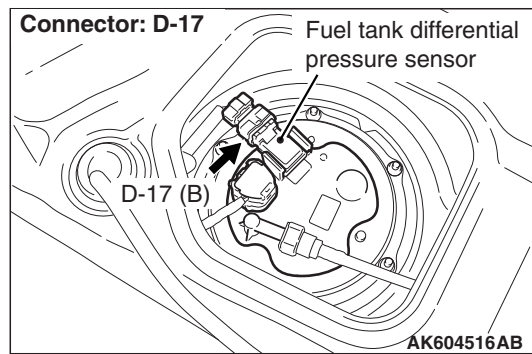
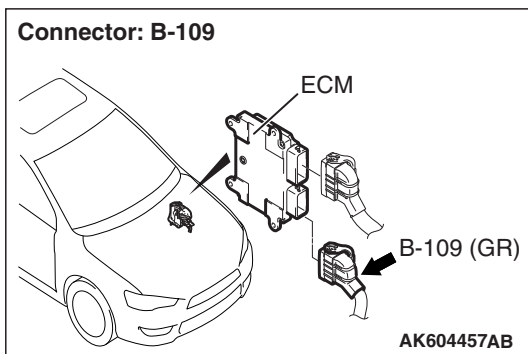


AK800712AB

FUEL TANK DIFFERENTIAL PRESSURE SENSOR CIRCUIT



AK604513AB





**CIRCUIT OPERATION**

- The ECM (terminal No. 114) supplies a 5 volts reference signal to the fuel tank differential pressure sensor (terminal No. 3). The fuel tank differential pressure sensor (terminal No. 2) is grounded through the ECM (terminal No. 113).
- The fuel tank differential pressure sensor (terminal No. 1) returns a voltage signal to the ECM (terminal No. 112) that is proportional to the pressure in the fuel tank.

**TECHNICAL DESCRIPTION**

- The ECM monitors the fuel tank differential pressure sensor output voltage.
- The ECM determines whether the fuel tank differential pressure sensor signal voltage is within normal operating parameters.

**DESCRIPTIONS OF MONITOR METHODS**

Fuel tank differential pressure sensor output voltage is out of specified range.

**MONITOR EXECUTION**

Continuous

**MONITOR EXECUTION CONDITIONS  
(OTHER MONITOR AND SENSOR)**

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

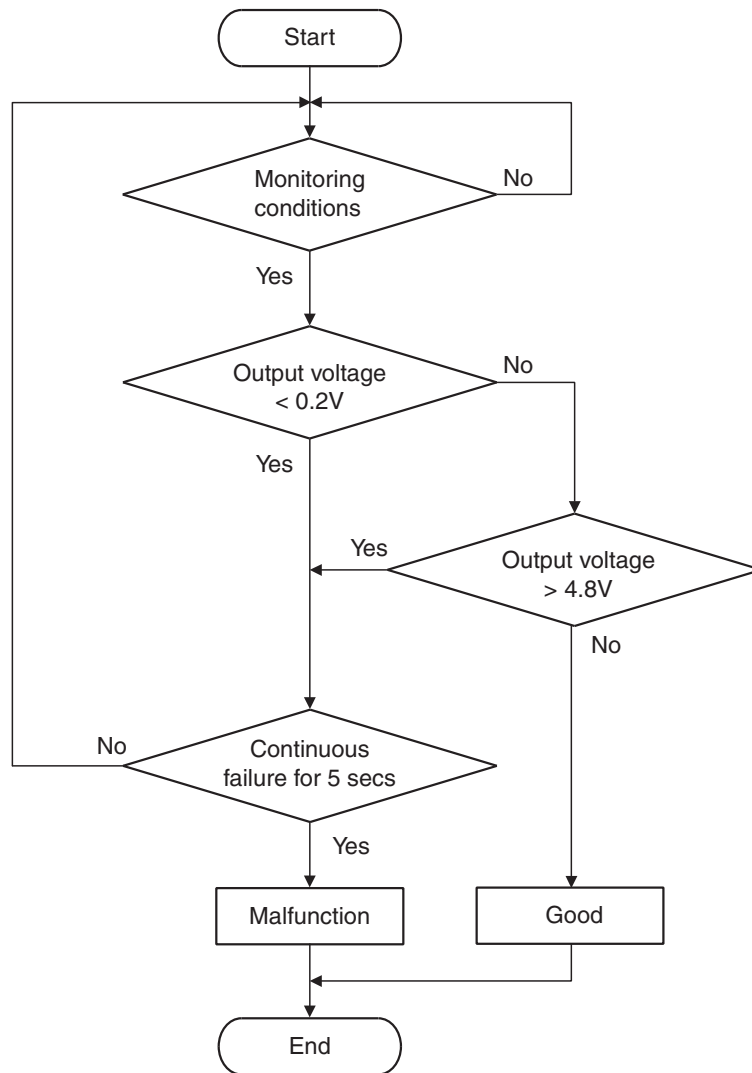
- Evaporative emission purge solenoid monitor
- Evaporative emission ventilation solenoid monitor
- Fuel temperature sensor monitor
- Fuel level sensor monitor

**Sensor (The sensors below are determined to be normal)**

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

**DTC SET CONDITIONS**

**Logic Flow Chart (Monitor Sequence)**



AK704952

**Check Condition**

- More than 2 seconds have passed since the engine starting sequence was completed.

**Judgement Criterion**

- The fuel tank differential pressure sensor output voltage is less than 0.2 volt for 5 seconds.

**FAIL-SAFE AND BACKUP FUNCTION**

- None

**OBD-II DRIVE CYCLE PATTERN**

Refer to Diagnostic Function –OBD-II Drive Cycle – Pattern 23 [P.13B-12](#).

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

- Fuel tank differential pressure sensor failed.
- Open or shorted fuel tank differential pressure sensor circuit or connector damage.
- ECM failed.

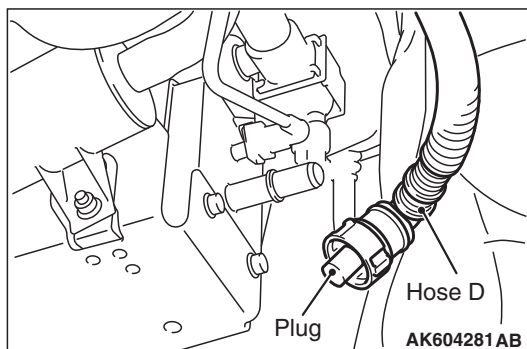
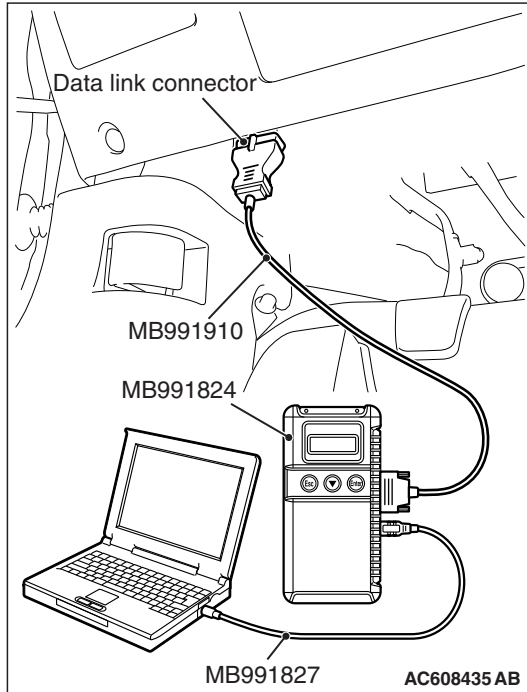
**DIAGNOSIS****Required Special Tools:**

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

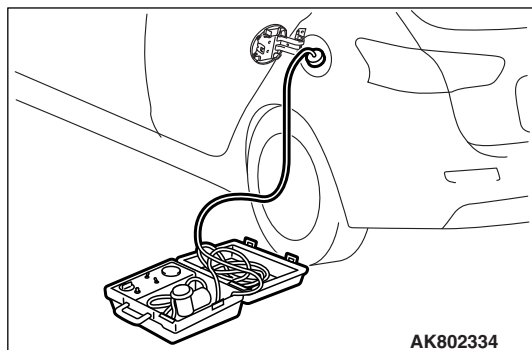
**STEP 1. Using scan tool MB991958, check data list item 52: Fuel Tank Differential Pressure Sensor.****⚠ CAUTION**

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

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



- (2) Disconnect hose D from the evaporative emission canister, and plug the hose.
- (3) Turn the ignition switch to the "ON" position.
- (4) Remove the fuel cap.
- (5) Set scan tool MB991958 to the data reading mode for item 52, Fuel Tank Differential Pressure Sensor.
  - Output voltage should be between 1,500 and 3,500 millivolts.



- (6) Connect the evaporative emission system pressure pump (Miller number 6872A) to the fuel tank filler tube by using fuel tank adapter (MLR-8382) and pressurize the fuel tank.
  - The fuel tank pressure reading should increase.
- (7) Turn the ignition switch to the "LOCK" (OFF) position.
- (8) Remove the evaporative emission system pressure pump (Miller number 6872A) and the fuel tank adapter (MLR-8382), and reinstall the fuel cap.
- (9) Connect hose D to the evaporative emission canister.

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

**YES :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13.

**NO :** Go to Step 2.

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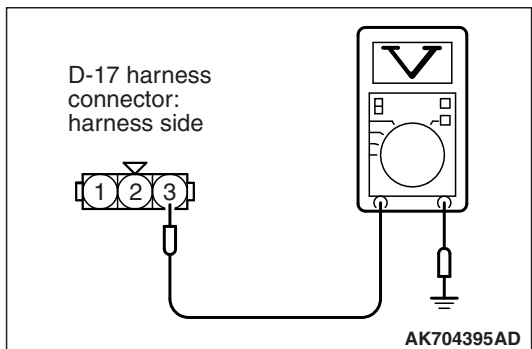
**STEP 2. Measure the sensor supply voltage at fuel tank differential pressure sensor connector D-17 by backprobing.**

- (1) Do not disconnect the connector D-17.
- (2) Turn the ignition switch to the "ON" position.
- (3) Measure the voltage between terminal No. 3 and ground by backprobing.
  - Voltage should be between 4.9 and 5.1 volts.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

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

**YES :** Go to Step 8.

**NO :** Go to Step 3.



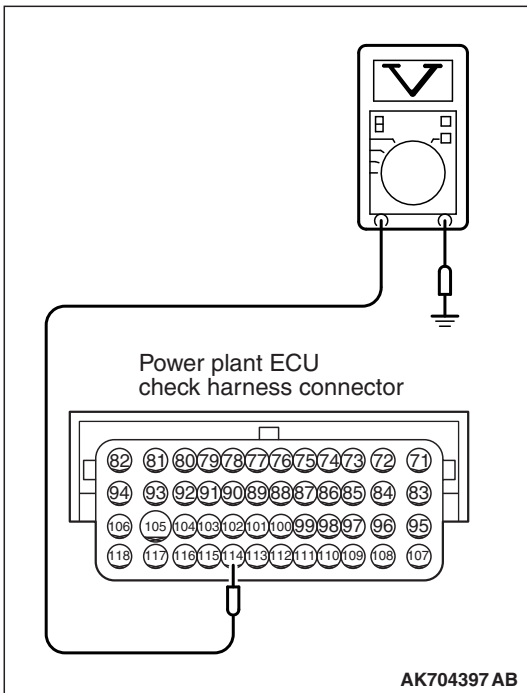
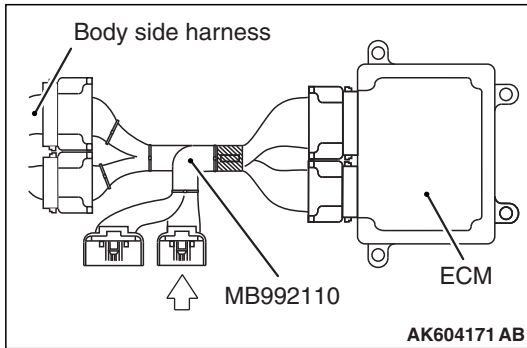
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**STEP 3. Check harness connector B-109 at ECM for damage.**

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

**YES :** Go to Step 4.

**NO :** Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 13.



**STEP 4. Measure the sensor supply voltage at ECM connector B-109 by using power plant ECU check harness special tool MB992110.**

(1) Disconnect all ECM connectors. Connect the power plant ECU check harness special tool MB992110 between the separated connectors.

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

(3) Measure the voltage between terminal No. 114 and ground.

- Voltage should be between 4.9 and 5.1 volts.

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

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

**YES :** Go to Step 7.

**NO :** Go to Step 5.

**STEP 5. Check harness connector D-17 at fuel tank differential pressure sensor 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 13.

---

**STEP 6. Check for short circuit to ground between fuel tank differential pressure sensor connector D-17 (terminal No. 3) and ECM connector B-109 (terminal No. 114).**

*NOTE: Check harness after checking intermediate connector C-39. If intermediate connector is damaged, repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 13.*

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

**YES** : Go to Step 12.

**NO** : Repair it. Then go to Step 13.

---

**STEP 7. Check harness connector D-17 at fuel tank differential pressure sensor for damage.**

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

**YES** : Check harness connector C-39 at intermediate connector for damage, and repair or replace as required. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. If intermediate connector is in good condition, repair harness wire between fuel tank differential pressure sensor connector D-17 (terminal No. 3) and ECM connector B-109 (terminal No. 114) because of open circuit. Then go to Step 13.

**NO** : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 13.

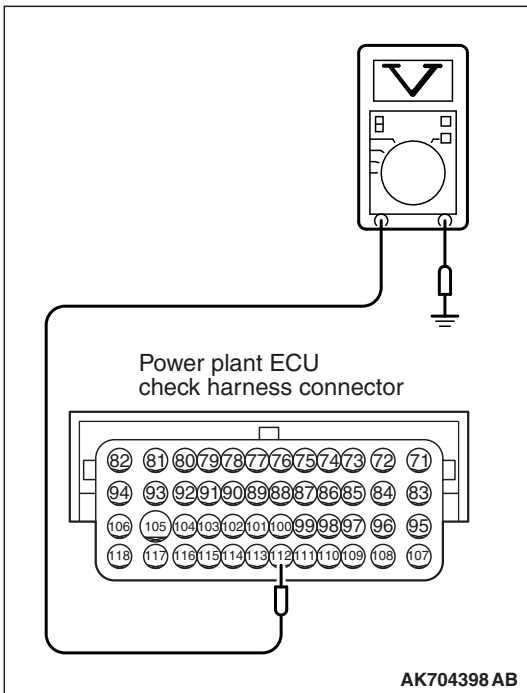
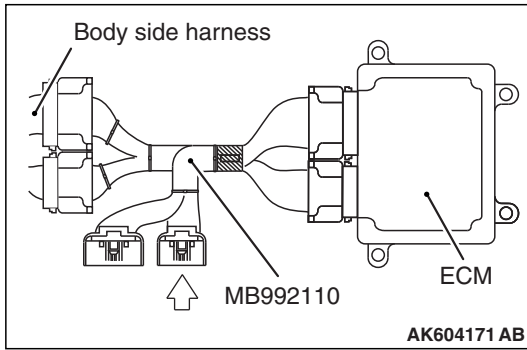
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**STEP 8. Check harness connector B-109 at ECM for damage.**

**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 13.



**STEP 9. Measure the sensor output voltage at ECM connector B-109 by using power plant ECU check harness special tool MB992110.**

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

- (4) Measure the voltage between terminal No. 112 and ground.
  - Voltage should be between 1.5 and 3.5 volts.
- (5) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is the measured voltage normal?**

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

**STEP 10. Check harness connector D-17 at fuel tank differential pressure sensor 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 13.

**STEP 11. Check for open circuit and short circuit to ground between fuel tank differential pressure sensor connector D-17 (terminal No. 1) and ECM connector B-109 (terminal No. 112).**

*NOTE: Check harness after checking intermediate connector C-39. If intermediate connector is damaged, repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 13.*

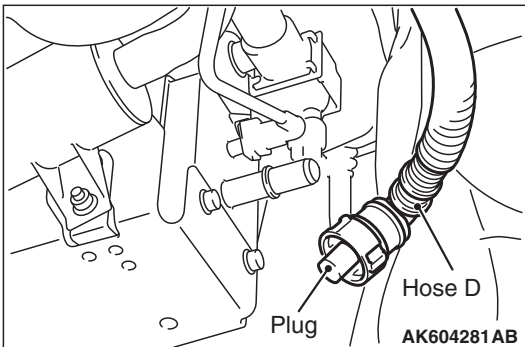
**Q: Is the harness wire in good condition?**

**YES :** Replace the fuel tank differential pressure sensor.  
Then go to Step 13.

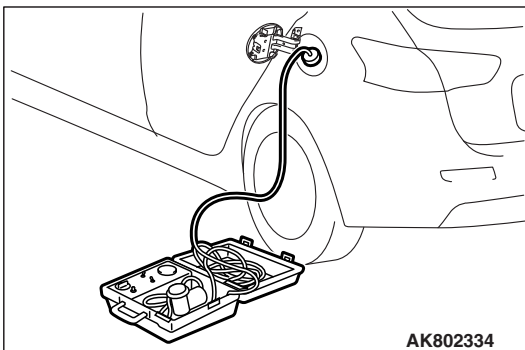
**NO :** Repair it. Then go to Step 13.

**STEP 12. Using scan tool MB991958, check data list item 52: Fuel Tank Differential Pressure Sensor.**

- (1) Disconnect hose D from the evaporative emission canister, and plug the hose.
- (2) Turn the ignition switch to the "ON" position.
- (3) Remove the fuel cap.
- (4) Set scan tool MB991958 to the data reading mode for item 52, Fuel Tank Differential Pressure Sensor.
  - Output voltage should be between 1,500 and 3,500 millivolts.



- (5) Connect the evaporative emission system pressure pump (Miller number 6872A) to the fuel tank filler tube by using fuel tank adapter (MLR-8382) and pressurize the fuel tank.
  - The fuel tank pressure reading should increase.
- (6) Turn the ignition switch to the "LOCK" (OFF) position.
- (7) Remove the evaporative emission system pressure pump (Miller number 6872A) and the fuel tank adapter (MLR-8382), and reinstall the fuel cap.
- (8) Connect hose D to the evaporative emission canister.



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

**YES :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13.

**NO :** Replace the ECM (Refer to, Removal and Installation P.13B-1022). Then go to Step 13.

**STEP 13. Test the OBD-II drive cycle.**

- (1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle –Pattern 23 P.13B-12.
- (2) Check the diagnostic trouble code (DTC).

**Q: Is DTC P0452 set?**

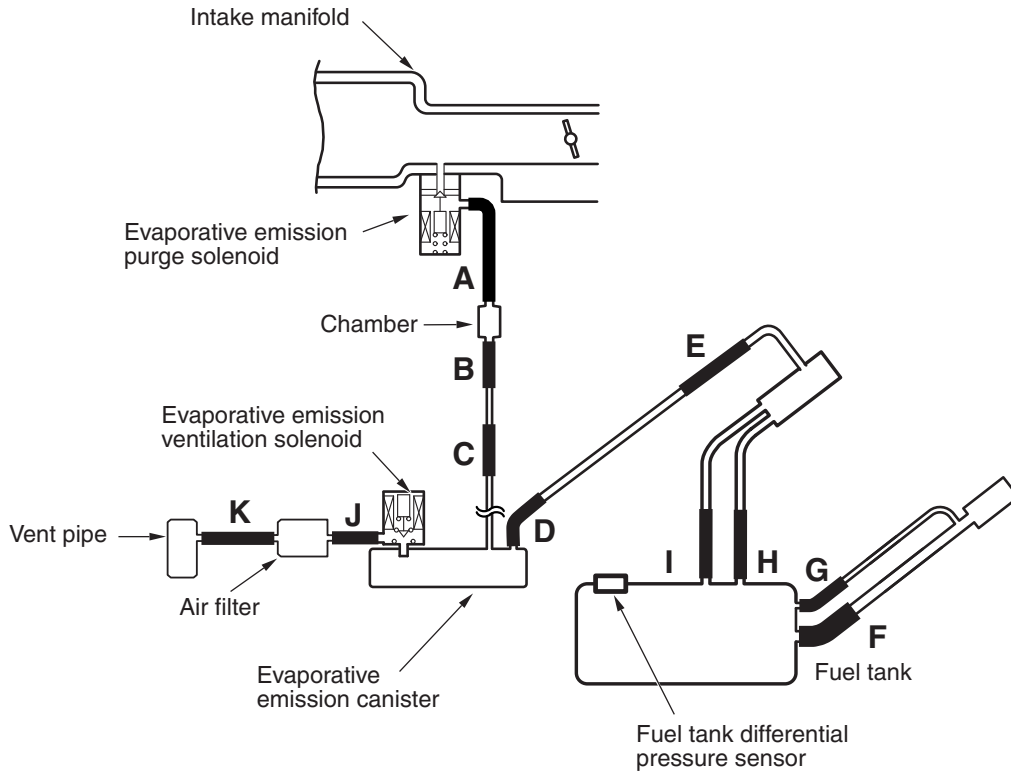
**YES :** Retry the troubleshooting.

**NO :** The inspection is complete.



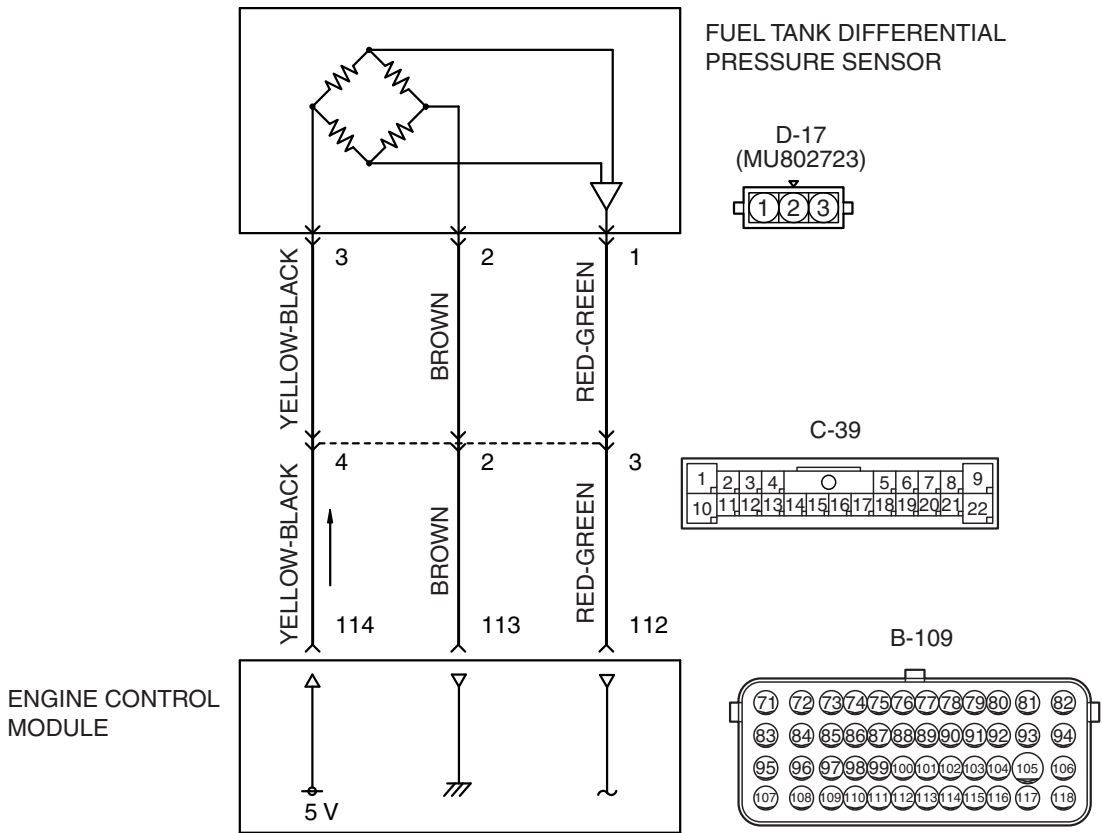
DTC P0453: Evaporative Emission Control System Pressure Sensor High Input

System diagram

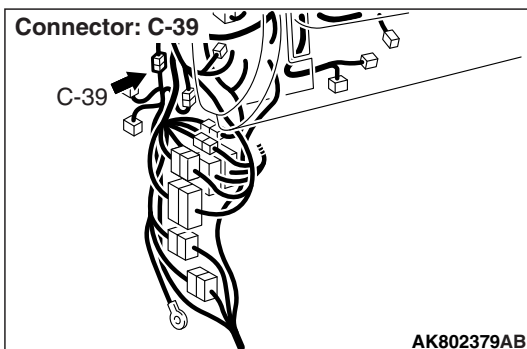
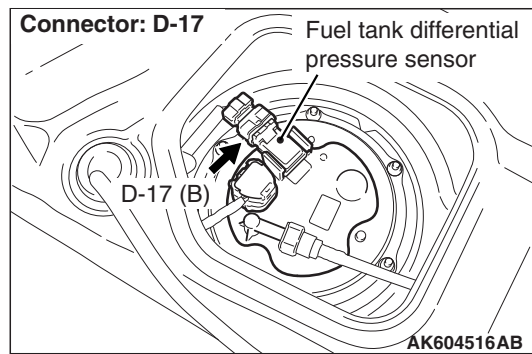
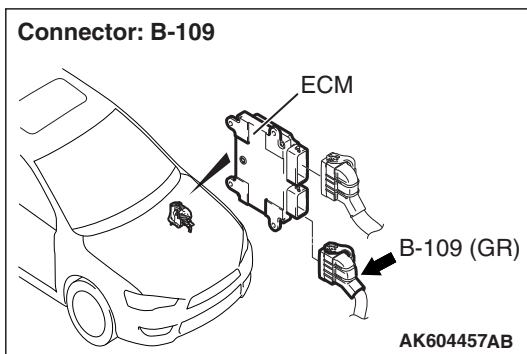


AK800712AB

FUEL TANK DIFFERENTIAL PRESSURE SENSOR CIRCUIT



AK604513AB



**CIRCUIT OPERATION**

- The ECM (terminal No. 114) supplies a 5 volts reference voltage to the fuel tank differential pressure sensor (terminal No. 3). The ECM (terminal No. 113) supplies a ground to the fuel tank differential pressure sensor (terminal No. 2).
- The ECM (terminal No. 112) receives a voltage signal proportional to the pressure in the fuel tank from the fuel tank differential pressure sensor (terminal No. 1).

**TECHNICAL DESCRIPTION**

- To determine whether the fuel tank differential pressure sensor is defective, the ECM monitors the fuel tank differential pressure sensor output voltage.
- The ECM judges if the fuel tank differential pressure sensor output voltage is normal.

*NOTE: In rare cases, this DTC may be also set under some fuel and driving conditions regardless of the fuel pressure sensor output voltage when the fuel system is clogged.*

**DESCRIPTIONS OF MONITOR METHODS**

Fuel tank differential pressure sensor output voltage is out of specified range.

**MONITOR EXECUTION**

Continuous

**MONITOR EXECUTION CONDITIONS  
(OTHER MONITOR AND SENSOR)**

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

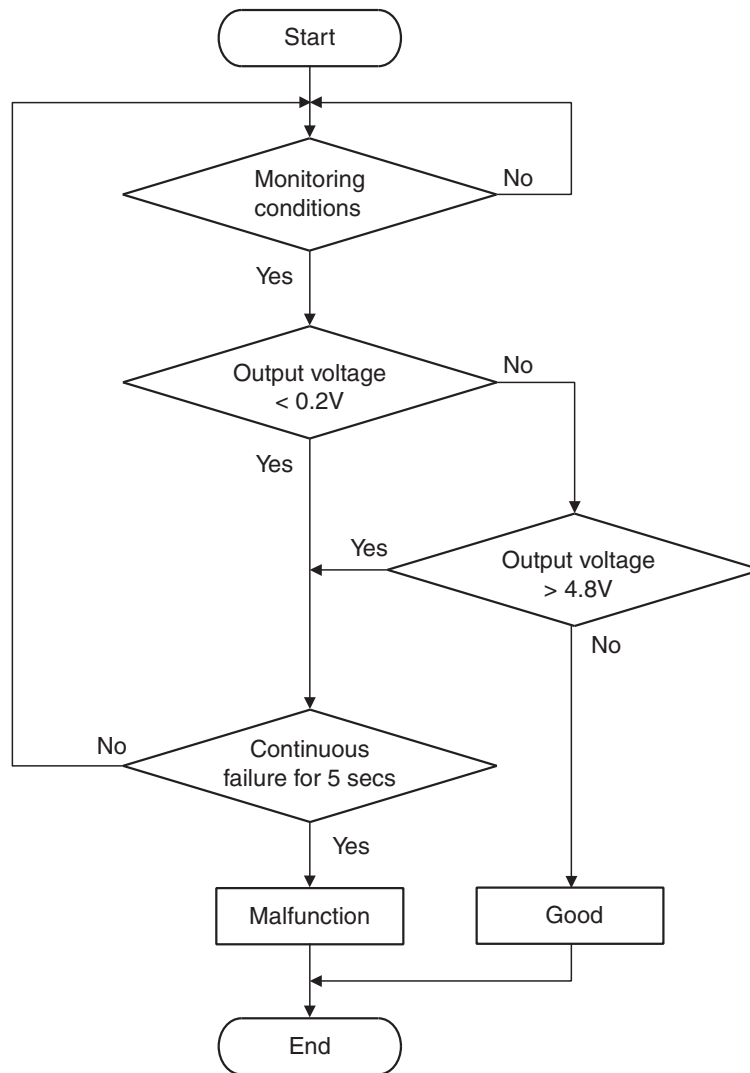
- Evaporative emission purge solenoid monitor
- Evaporative emission ventilation solenoid monitor
- Fuel temperature sensor monitor
- Fuel level sensor monitor

**Sensor (The sensors below are determined to be normal)**

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

## DTC SET CONDITIONS

### Logic Flow Chart (Monitor Sequence)



AK704952

#### Check Conditions

- More than 2 seconds have passed since the engine starting sequence was completed.
- The fuel temperature is less than 36° C (97° F).
- Remaining fuel level is less than 85 percent when the engine is started.

#### Judgement Criterion

- The fuel tank differential pressure sensor output voltage is more than 4.8 volts for 5 seconds.

#### FAIL-SAFE AND BACKUP FUNCTION

- None

#### OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function –OBD-II Drive Cycle – Pattern 23 [P.13B-12](#).

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

- Fuel tank differential pressure sensor failed.
- Open fuel tank differential pressure sensor circuit or connector damage.
- ECM failed.

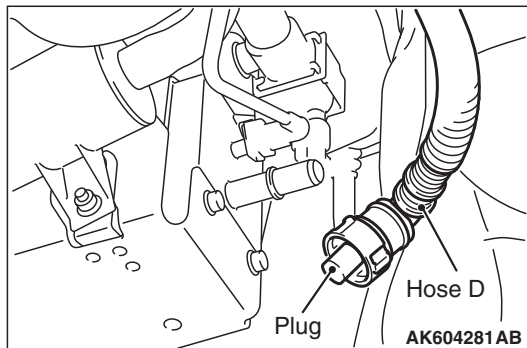
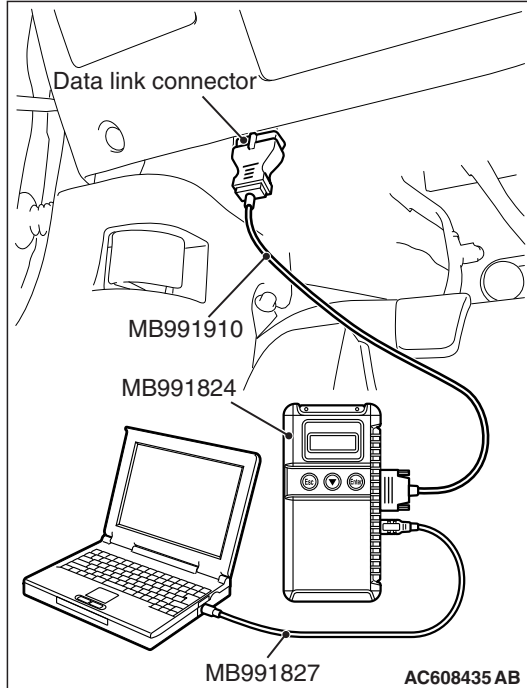
**DIAGNOSIS****Required Special Tool:**

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

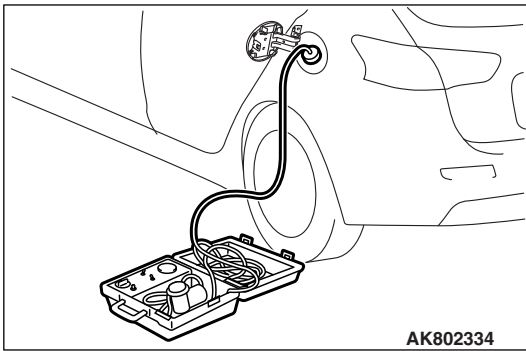
**STEP 1. Using scan tool MB991958, check data list item 52: Fuel Tank Differential Pressure Sensor.****⚠ CAUTION**

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

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



- (2) Disconnect hose D from the evaporative emission canister, and plug the hose.
- (3) Turn the ignition switch to the "ON" position.
- (4) Remove the fuel cap.
- (5) Set scan tool MB991958 to the data reading mode for item 52, Fuel Tank Differential Pressure Sensor.
  - Output voltage should be between 1,500 and 3,500 millivolts.



- (6) Connect the evaporative emission system pressure pump (Miller number 6872A) to the fuel tank filler tube by using fuel tank adapter (MLR-8382) and pressurize the fuel tank.
  - The fuel tank pressure reading should increase.
- (7) Turn the ignition switch to the "LOCK" (OFF) position.
- (8) Remove the evaporative emission system pressure pump (Miller number 6872A) and the fuel tank adapter (MLR-8382), and reinstall the fuel cap.
- (9) Connect hose D to the evaporative emission canister.

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

**YES :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions [P.00-13](#).

**NO :** Go to Step 2.

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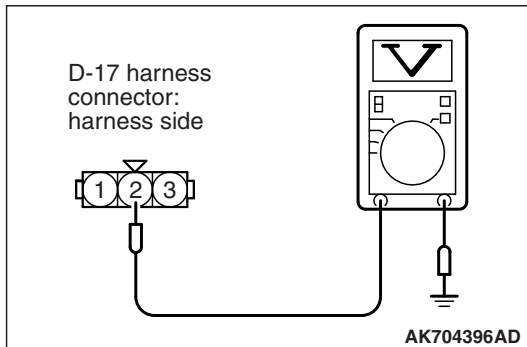
**STEP 2. Measure the ground voltage at fuel tank differential pressure sensor connector D-17 by backprobing.**

- (1) Do not disconnect the connector D-17.
- (2) Turn the ignition switch to the "ON" position.
- (3) Measure the voltage between terminal No. 2 and ground by backprobing.
  - Voltage should be 0.5 volt or less.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

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

**YES :** Go to Step 6.

**NO :** Go to Step 3.



---

**STEP 3. Check harness connector D-17 at fuel tank differential pressure sensor and harness connector B-109 at ECM for damage.**

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

**YES :** Go to Step 4.

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

---

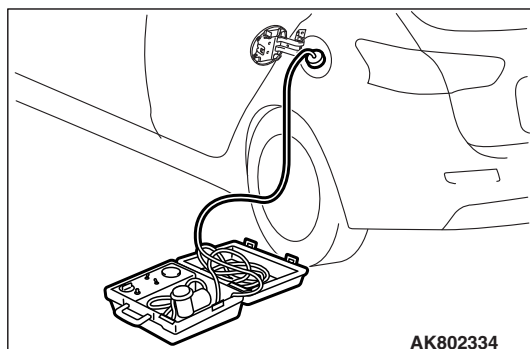
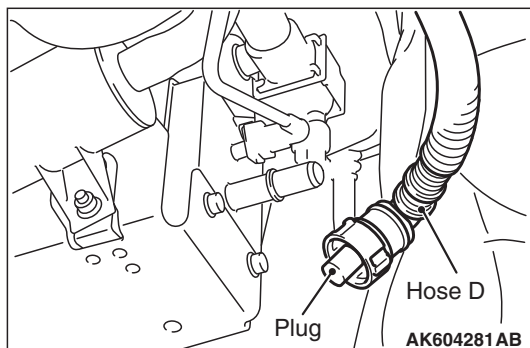
**STEP 4. Check for open circuit between fuel tank differential pressure sensor connector D-17 (terminal No. 2) and ECM connector B-109 (terminal No. 113).**

*NOTE: Check harness after checking intermediate connector C-39. 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 :** Go to Step 5.

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




---

**STEP 5. Using scan tool MB991958, check data list item 52: Fuel Tank Differential Pressure Sensor.**

- (1) Disconnect hose D from the evaporative emission canister, and plug the hose.
- (2) Turn the ignition switch to the "ON" position.
- (3) Remove the fuel cap.
- (4) Set scan tool MB991958 to the data reading mode for item 52, Fuel Tank Differential Pressure Sensor.
  - Output voltage should be between 1,500 and 3,500 millivolts.
- (5) Connect the evaporative emission system pressure pump (Miller number 6872A) to the fuel tank filler tube by using fuel tank adapter (MLR-8382) and pressurize the fuel tank.
  - The fuel tank pressure reading should increase.
- (6) Turn the ignition switch to the "LOCK" (OFF) position.
- (7) Remove the evaporative emission system pressure pump (Miller number 6872A) and the fuel tank adapter (MLR-8382), and reinstall the fuel cap.
- (8) Connect hose D to the evaporative emission canister.

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

**YES :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions [P.00-13](#).

**NO :** Replace the ECM (Refer to, Removal and Installation [P.13B-1022](#)). Then go to Step 7.

---

**STEP 6. Check harness connector D-17 at fuel tank differential pressure sensor and harness connector B-109 at ECM for damage.**
**Q: Are the harness connectors in good condition?**

**YES :** Replace the fuel tank differential pressure sensor. Then go to Step 7.

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

---

**STEP 7. Test the OBD-II drive cycle.**

- (1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle –Pattern 23 [P.13B-12](#).
- (2) Check the diagnostic trouble code (DTC).

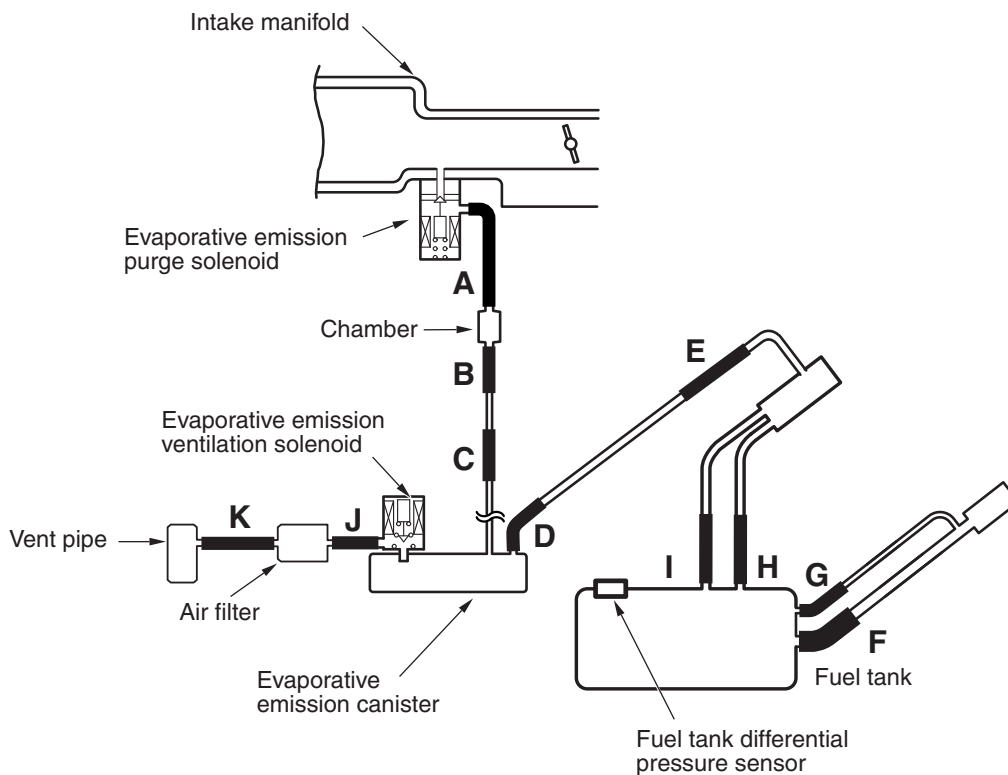
**Q: Is DTC P0453 set?**

**YES :** Retry the troubleshooting.

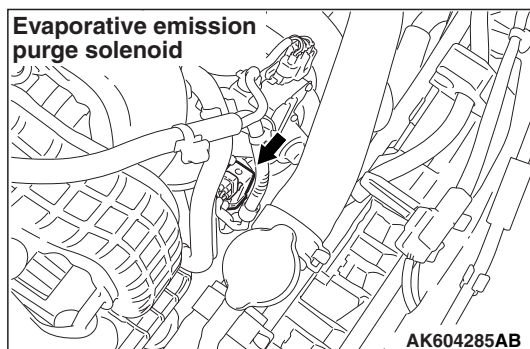
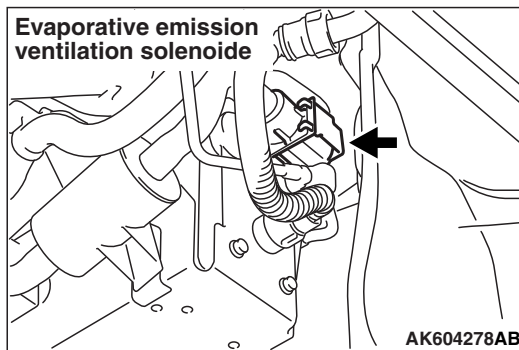
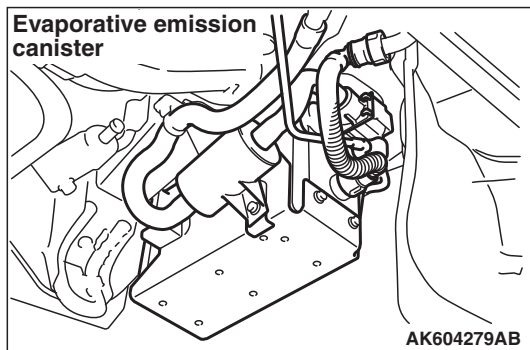
**NO :** The inspection is complete.

DTC P0455: Evaporative Emission Control System Leak Detected (gross leak)

System diagram



AK800712AB





**TECHNICAL DESCRIPTION**

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

**DESCRIPTIONS OF MONITOR METHODS**

Depressurizing EVAP system by intake manifold negative pressure is impossible within specified period.

**MONITOR EXECUTION**

Continuous

**MONITOR EXECUTION CONDITIONS  
(OTHER MONITOR AND SENSOR)**

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

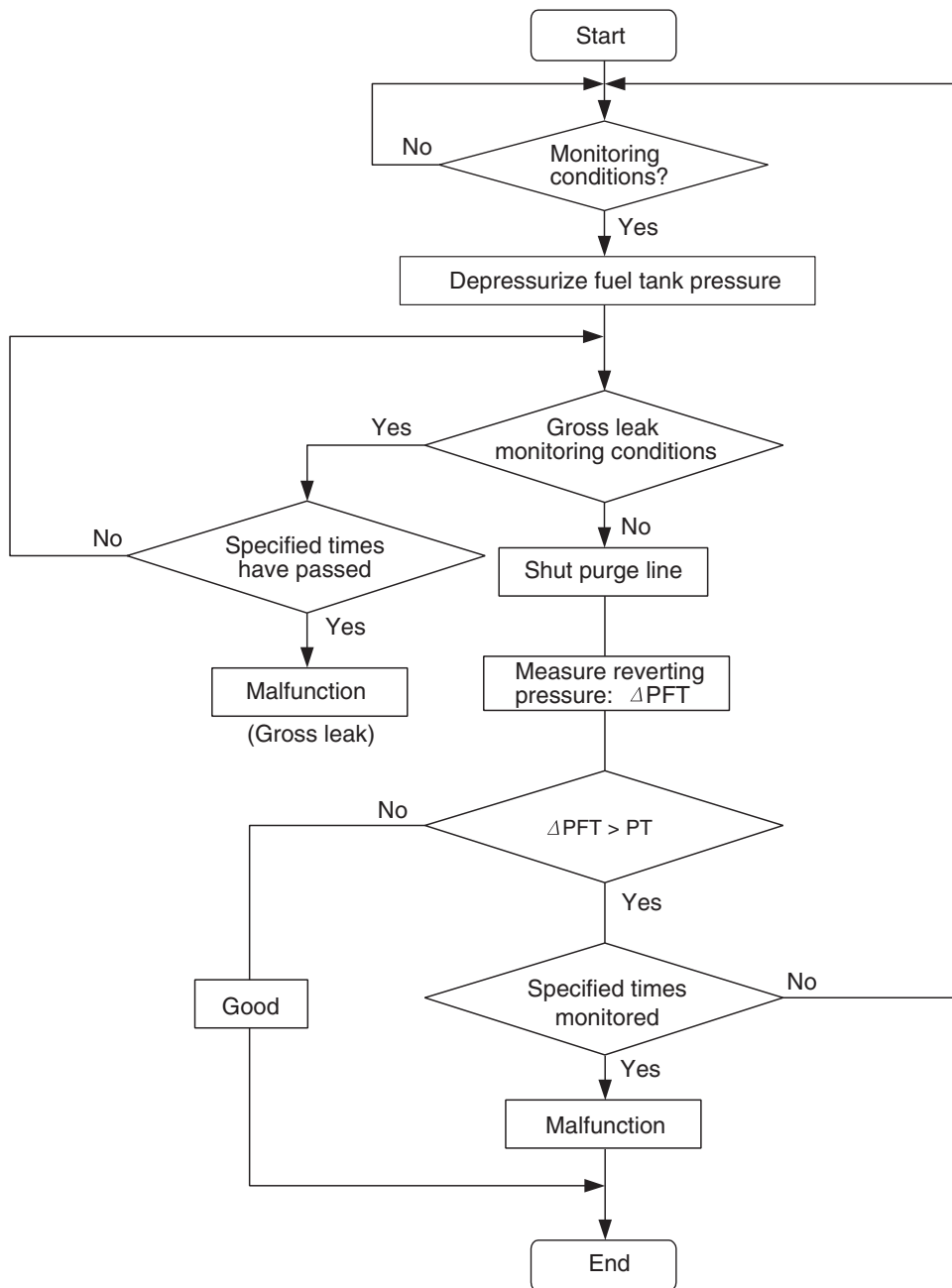
- Not applicable

**Sensor (The sensors below are determined to be normal)**

- Not applicable

DTC SET CONDITIONS

Logic Flow Chart (Monitor Sequence)



AK704743

**Check Conditions**

- Engine coolant temperature is less than 36° C (97° F) when the engine is started.
- Engine coolant temperature is more than 60° C (140° F). <Amount of remaining fuel is 15 –40 percent of capacity when the engine is started>
- Engine coolant temperature is more than 20° C (68° F). <Amount of remaining fuel is 40 –85 percent of capacity when the engine is started>
- Intake air temperature is less than 36° C (97° F) when the engine is started.
- Volumetric efficiency is between 20 and 70 percent.
- Engine speed is more than 1,594 r/min.

- When the evaporative emission purge solenoid and evaporative emission ventilation solenoid are closed, the change of the pressure in the fuel tank is less than 451 Pa (0.13 in.Hg). <Amount of remaining fuel is 15 –40 percent of capacity when the engine is started>
- When the evaporative emission purge solenoid and evaporative emission ventilation solenoid are closed, the change of the pressure in the fuel tank is less than 324 Pa (0.09 in.Hg). <Amount of remaining fuel is 40 –85 percent of capacity when the engine is started>
- Barometric pressure is more than 76 kPa (22.4 in.Hg).
- Intake air temperature is more than 5° C (41° F).
- Fuel temperature is less than 36° C (97° F).
- Fuel tank differential pressure sensor output voltage is between 1.0 and 4.0 volts.
- At least 10 seconds have passed since the last monitor was complete.
- Monitoring time: 150 seconds

**Judgment Criterion**

- The fuel tank internal pressure is more than -1961 Pa (-0.58 in.Hg) after the evaporative emission purge solenoid has been driven when the fuel tank and vapor line were closed.

**FAIL-SAFE AND BACKUP FUNCTION**

- None

**OBD-II DRIVE CYCLE PATTERN**

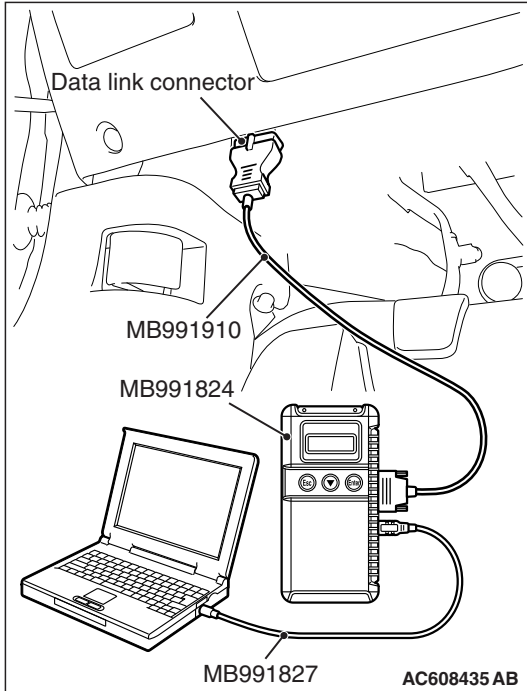
Refer to Diagnostic Function –OBD-II Drive Cycle – Pattern 5 [P.13B-12](#).

**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 Tool:**

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



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

**⚠ CAUTION**

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

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

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

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

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

**NO <"Evap Leak Mon. Discontinued. Retest again from the first" is displayed on scan tool MB991958.> :** The EVAP monitor has been interrupted during the test. Turn the ignition switch to the "LOCK" (OFF) position once, and repeat the monitoring from Step 1.

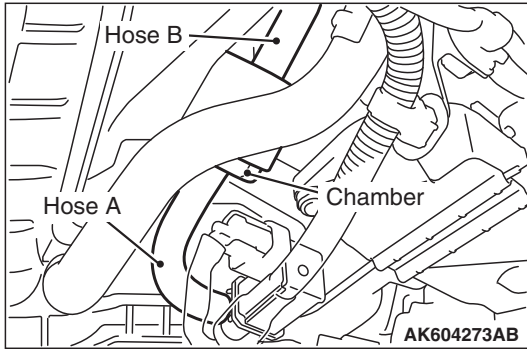
**STEP 2. Check the evaporative emission purge solenoid for leaks.**

Refer to GROUP 17, Emission Control –Evaporative Emission Control System –Evaporative Emission Purge Solenoid Check [P.17-99](#).

**Q: Does the evaporative emission purge solenoid hold pressure?**

**YES :** Go to Step 3.

**NO :** Replace the evaporative emission purge solenoid. Then go to Step 13.



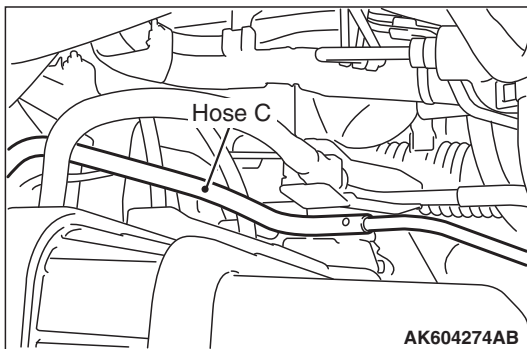
**STEP 3. Check for leaks in evaporative emission hose A, chamber and hose B.**

Use a hand vacuum pump to check hose A, chamber and hose B.

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

**YES :** Go to Step 4.

**NO :** Replace any damaged hose or chamber. Then go to Step 13.



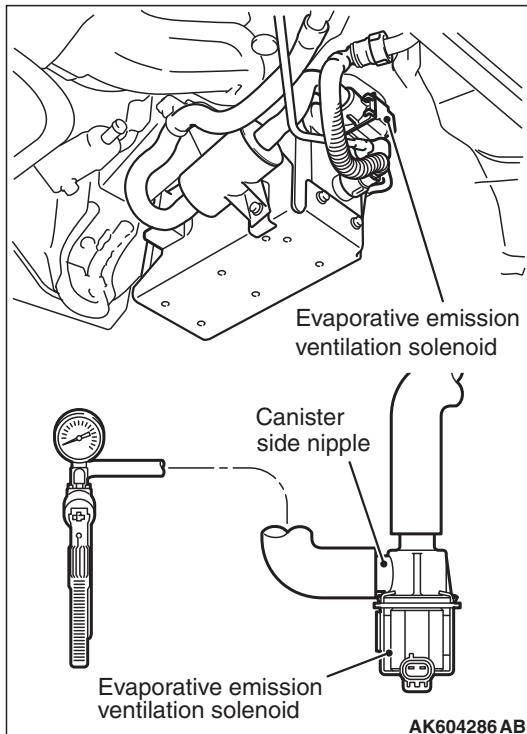
**STEP 4. Check for leaks in evaporative emission hose C.**

Use a hand vacuum pump to check hose C.

**Q: Does hose C hold vacuum?**

**YES :** Go to Step 5.

**NO :** Replace any damaged hose. Then go to Step 13.



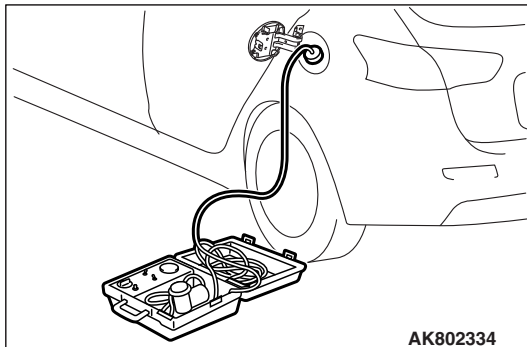
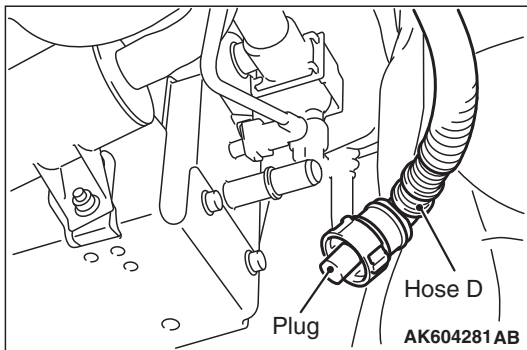
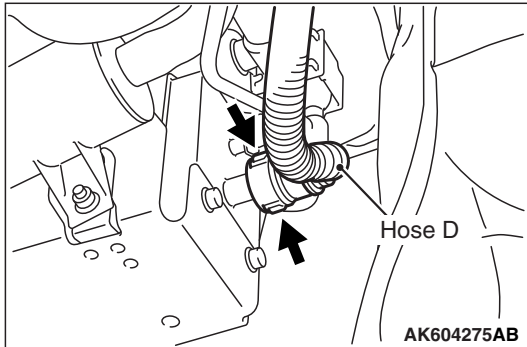
**STEP 5. Using scan tool MB991958, check actuator test item 15: Evaporative Emission Ventilation Solenoid.**

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

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

**YES :** Go to Step 6.

**NO :** Replace the evaporative emission ventilation solenoid. Then go to Step 13.



**STEP 6. Perform the pressure test on the evaporative emission system.**

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

(2) Plug the disconnected end of hose D.

(3) Confirm that the evaporative emission system pressure pump (Miller number 6872A) is operating properly. Perform the self-test as described in the pump manufacturer's instructions.

(4) Remove the fuel cap.

(5) Connect the evaporative emission system pressure pump (Miller number 6872A) to the fuel tank filler tube by using fuel tank adapter (MLR-8382).

(6) Pressure test the system to determine whether any leaks are present.

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

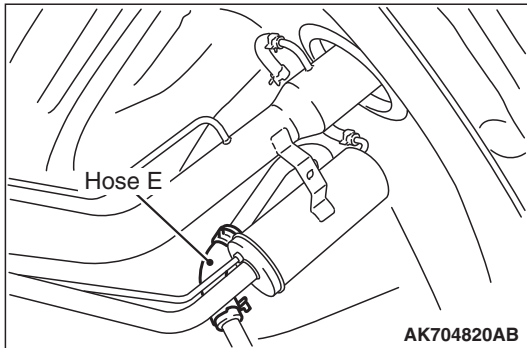
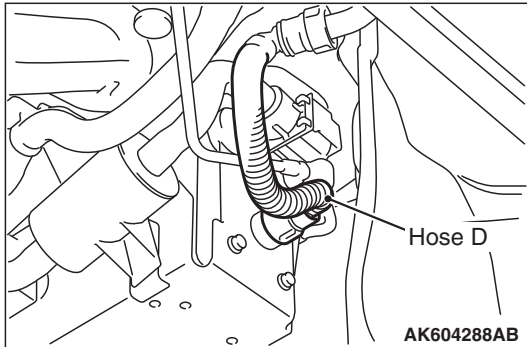
(7) Remove the evaporative emission system pressure pump (Miller number 6872A) and the fuel tank adapter (MLR-8382), and reinstall the fuel cap.

(8) Connect hose D to the evaporative emission canister.

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

**YES :** Go to Step 11.

**NO :** Go to Step 7.




---

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

Use a hand vacuum pump to check each hose D and E.

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

**YES** : Go to Step 8.

**NO** : Replace any damaged hose. Then go to Step 13.

---

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

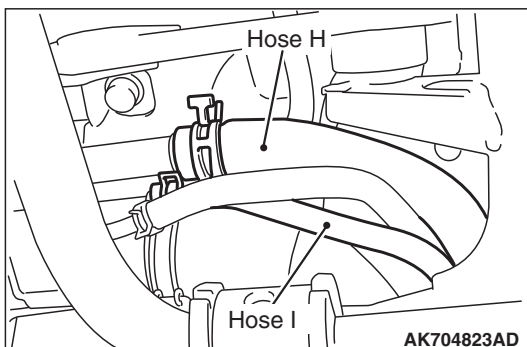
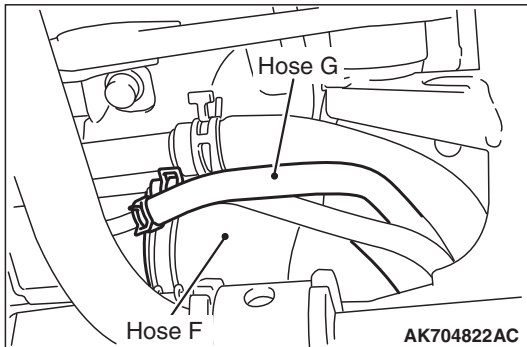
(1) Remove the fuel tank assembly.

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

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

**YES** : Go to Step 9.

**NO** : Replace any damaged hose and reinstall the fuel tank assembly. Then go to Step 13.




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**STEP 9. Check for leaks in evaporative emission hoses H and I.**

(1) Remove the fuel tank assembly.

(2) Use a hand vacuum pump to check each hose H and I.

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

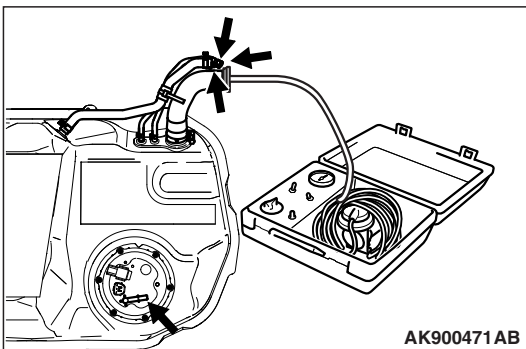
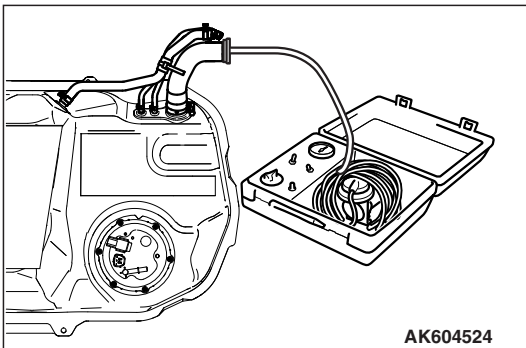
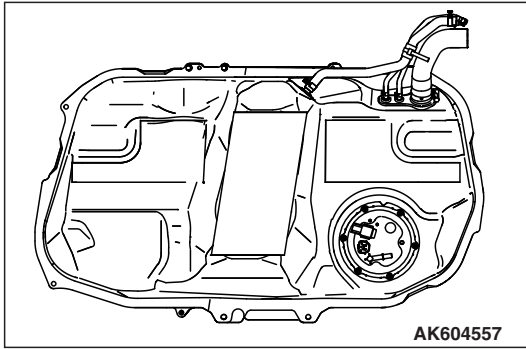
**YES** : Go to Step 10.

**NO** : Replace any damaged hose and reinstall the fuel tank assembly. Then go to Step 13.

**STEP 10. Check for leaks in the fuel tank.**

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

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



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

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

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

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

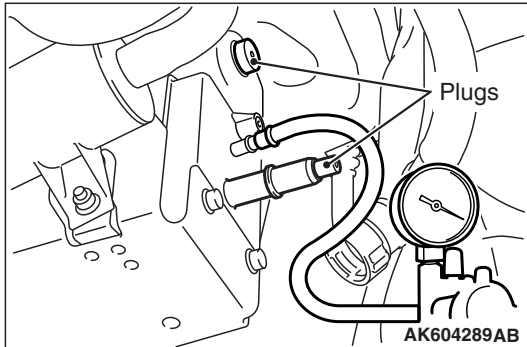
**Q: Are any leaks found?**

**YES** <When there is a leak from the attachment points of the fuel pump module, fuel tank differential pressure sensor, fuel level sensor or leveling valve.> : Repair or replace the leaked parts and check again that there are no leaks. Then reinstall the fuel tank. Then go to Step 13.

**YES** <When there is a leak from the fuel tank.> : Replace the fuel tank. Then go to Step 13.

**NO** : When there is no leak, reinstall the fuel tank. Then go to Step 12.






---

**STEP 11. Check the evaporative emission canister for vacuum leaks.**

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

**Q: Is the evaporative emission canister in good condition?**

**YES :** Go to Step 12.

**NO :** Replace the evaporative emission canister. Then go to Step 13.

---

**STEP 12. Using scan tool MB991958, check the evaporative emission system monitor test.**
**⚠ CAUTION**

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

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

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

**YES :** Replace the ECM (Refer to, Removal and Installation P.13B-1022). Then go to Step 13.

**NO <"Evap Leak Mon. Completed. Test Passed" is displayed on scan tool MB991958.> :** The evaporative emission system is working properly at this time. Go to Step 13.

**NO <"Evap Leak Mon. Discontinued. Retest again from the first" is displayed on scan tool MB991958.> :** The EVAP monitor has been interrupted during the test. Turn the ignition switch to the "LOCK" (OFF) position once, and repeat the monitoring from Step 12.

**STEP 13. Test the OBD-II drive cycle.**

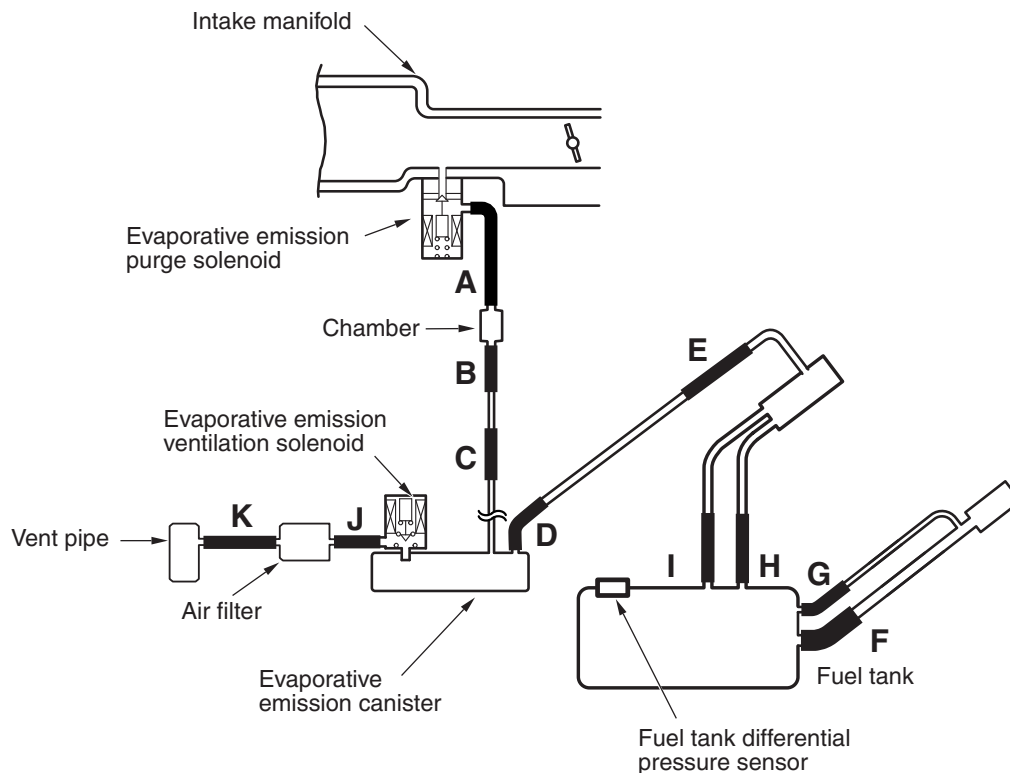
- (1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle –Pattern 5 P.13B-12.
- (2) Check the diagnostic trouble code (DTC).

**Q: Is DTC P0455 set?**

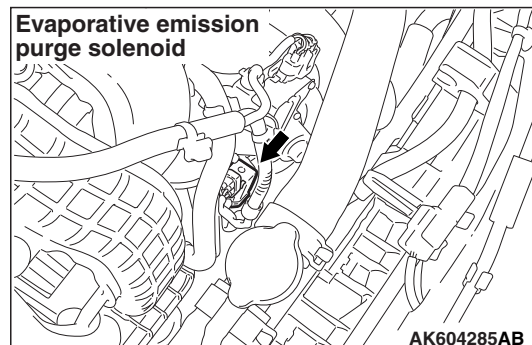
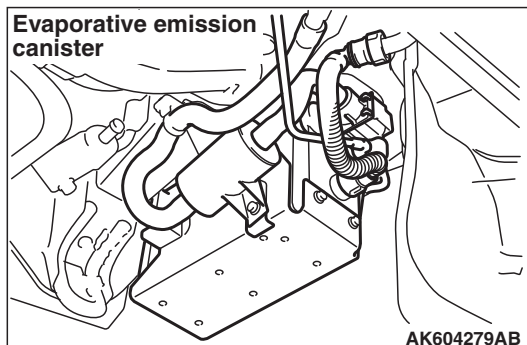
- YES :** Retry the troubleshooting.  
**NO :** The inspection is complete.

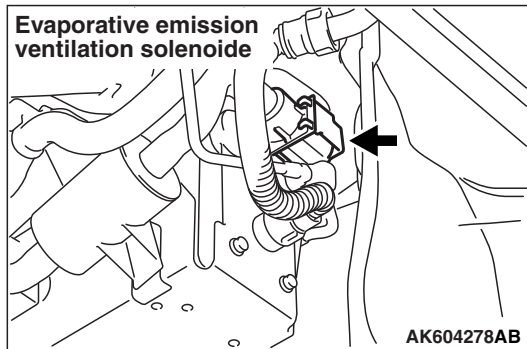
**DTC P0456: Evaporative Emission Control System Leak Detected (very small leak)**

System diagram



AK800712AB





## TECHNICAL DESCRIPTION

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

## DESCRIPTIONS OF MONITOR METHODS

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

## MONITOR EXECUTION

Once per driving cycle

## MONITOR EXECUTION CONDITIONS (OTHER MONITOR AND SENSOR)

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

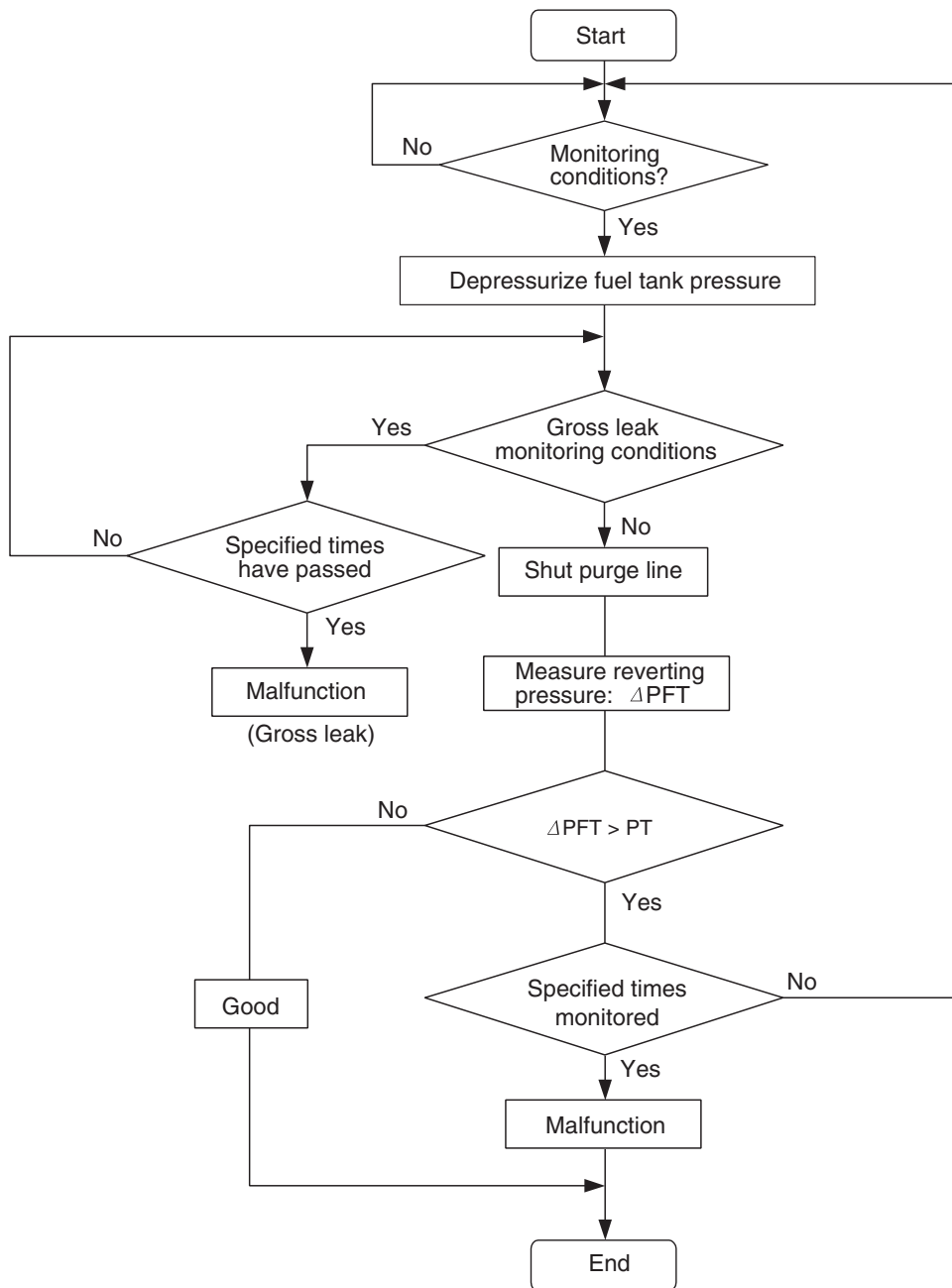
- Evaporative emission purge system monitor
- Evaporative emission purge solenoid monitor
- Evaporative emission ventilation solenoid monitor
- Fuel temperature sensor monitor
- Fuel tank differential pressure sensor monitor
- Fuel level sensor monitor

**Sensor (The sensors below are determined to be normal)**

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

DTC SET CONDITIONS

Logic Flow Chart (Monitor Sequence)



AK704743

**Check Conditions**

- Engine coolant temperature is less than 36° C (97° F) when the engine is started.
- Intake air temperature is less than 36° C (97° F) when the engine is started.
- Engine coolant temperature is more than 20° C (68° F).
- When the evaporative emission purge solenoid and evaporative emission ventilation solenoid are closed, the change of the pressure in the fuel tank is less than 324 Pa (0.09 in.Hg).
- Amount of remaining fuel is 40 –85 percent of capacity when the engine is started.
- Barometric pressure is more than 76 kPa (22.4 in.Hg).
- Intake air temperature is more than -10° C (14° F).
- Fuel temperature is less than 33° C (91° F).

- Fuel tank differential pressure sensor output voltage is between 1.0 and 4.0 volts.
- At least 10 seconds have passed since the last monitor was complete.
- Monitoring time: 10 –14 minutes

**Judgement Criterion**

- In case the amount of change in the pressure that is monitored for a given length of time inside the tank is beyond the specified value after sealing off the fuel tank and the vapor line.

*NOTE: The specified value varies depending on the fuel temperature and fuel level.*

**FAIL-SAFE AND BACKUP FUNCTION**

- None

**OBD-II DRIVE CYCLE PATTERN**

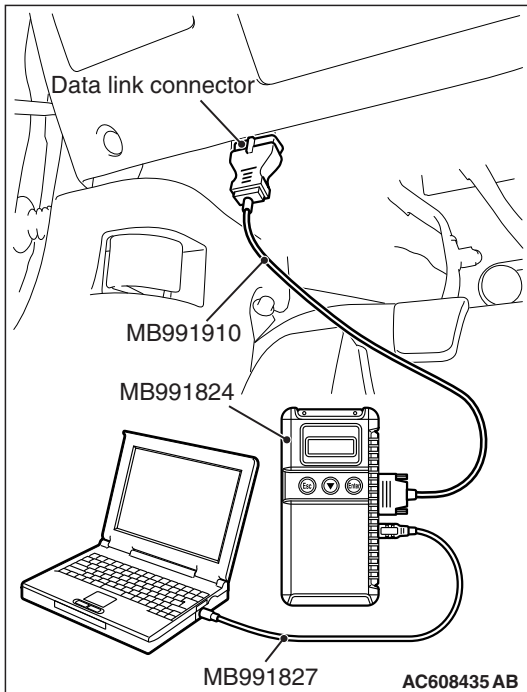
Refer to Diagnostic Function –OBD-II Drive Cycle – Pattern 6 [P.13B-12](#).

**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 Tool:**

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



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

**⚠ CAUTION**

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

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

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

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

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

**NO <"Evap Leak Mon. Discontinued. Retest again from the first" is displayed on scan tool MB991958.> :** The EVAP monitor has been interrupted during the test. Turn the ignition switch to the "LOCK" (OFF) position once, and repeat the monitoring from Step 1.

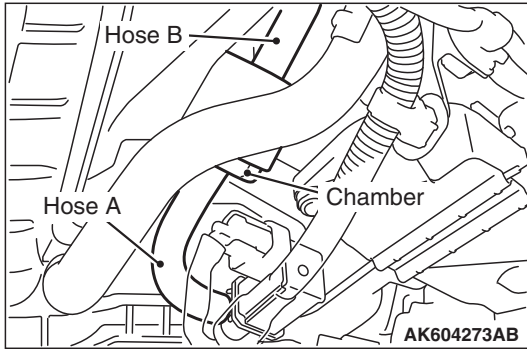
**STEP 2. Check the evaporative emission purge solenoid for leaks.**

Refer to GROUP 17, Emission Control –Evaporative Emission Control System –Evaporative Emission Purge Solenoid Check [P.17-99](#).

**Q: Does the evaporative emission purge solenoid hold pressure?**

**YES :** Go to Step 3.

**NO :** Replace the evaporative emission purge solenoid. Then go to Step 13.



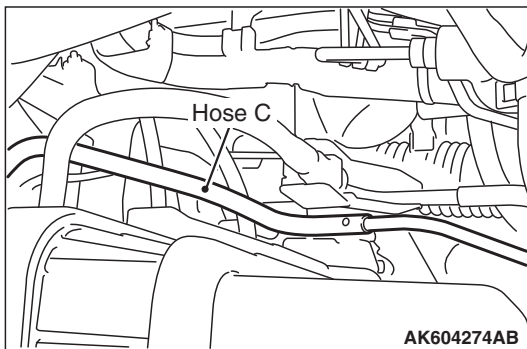
**STEP 3. Check for leaks in evaporative emission hose A, chamber and hose B.**

Use a hand vacuum pump to check hose A, chamber and hose B.

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

**YES** : Go to Step 4.

**NO** : Replace any damaged hose or chamber. Then go to Step 13.



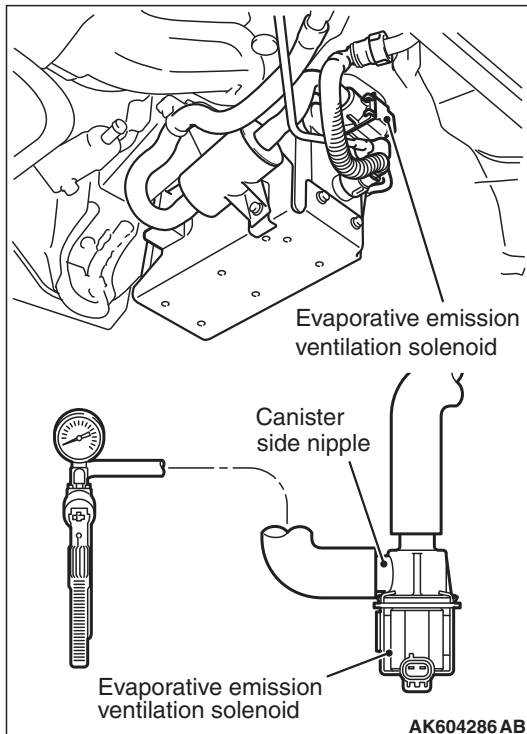
**STEP 4. Check for leaks in evaporative emission hose C.**

Use a hand vacuum pump to check hose C.

**Q: Does hose C hold vacuum?**

**YES** : Go to Step 5.

**NO** : Replace any damaged hose. Then go to Step 13.



**STEP 5. Using scan tool MB991958, check actuator test item 15: Evaporative Emission Ventilation Solenoid.**

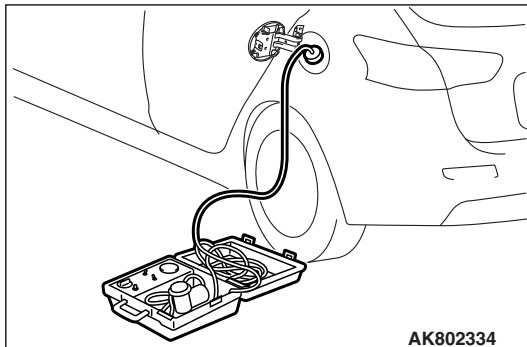
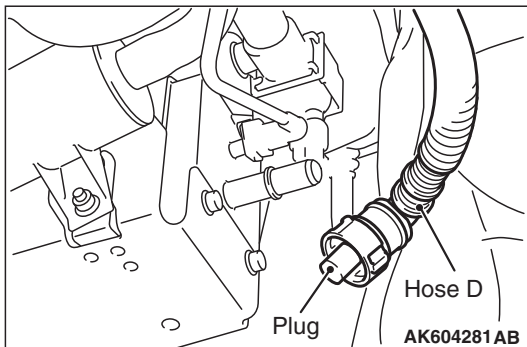
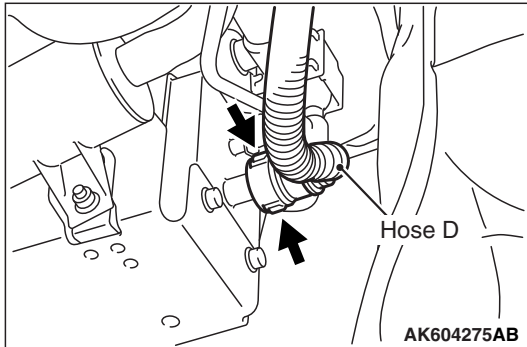
- (1) Remove the canister cover.
- (2) Remove the evaporative emission ventilation solenoid. Do not disconnect the connector.
- (3) Connect the hose of the hand vacuum pump to the canister side nipple of the evaporative emission ventilation solenoid.
- (4) Turn the ignition switch to the "ON" position.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

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

**YES** : Go to Step 6.

**NO** : Replace the evaporative emission ventilation solenoid. Then go to Step 13.

**STEP 6. Perform the pressure test on the evaporative emission system.**



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

(2) Install hose D after having installed plug from canister in a nipple part of illustration so that there is not a leak.

(3) Confirm that the evaporative emission system pressure pump (Miller number 6872A) is operating properly. Perform the self-test as described in the pump manufacturer's instructions.

(4) Remove the fuel cap.

(5) Connect the evaporative emission system pressure pump (Miller number 6872A) to the fuel tank filler tube by using fuel tank adapter (MLR-8382).

(6) Pressure test the system to determine whether any leaks are present.

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

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

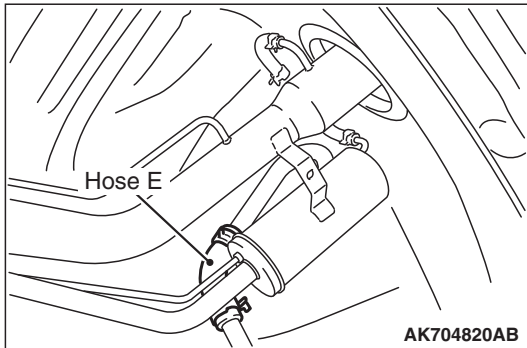
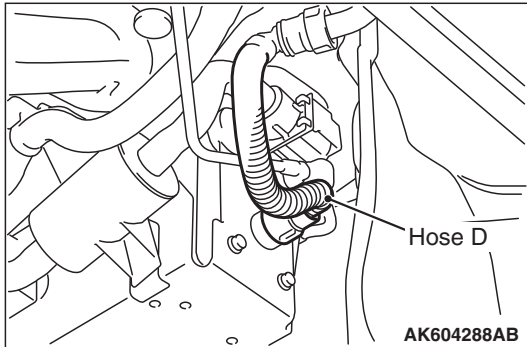
(8) Connect hose D to the evaporative emission canister.

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

**YES :** Go to Step 11.

**NO :** Go to Step 7.






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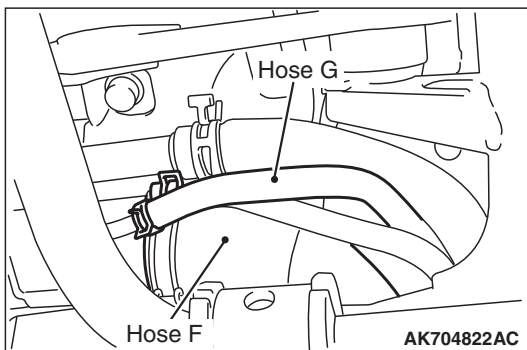
**STEP 7. Check for leaks in evaporative emission hoses D and E.**

Use a hand vacuum pump to check each hose D and E.

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

**YES** : Go to Step 8.

**NO** : Replace any damaged hose. Then go to Step 13.




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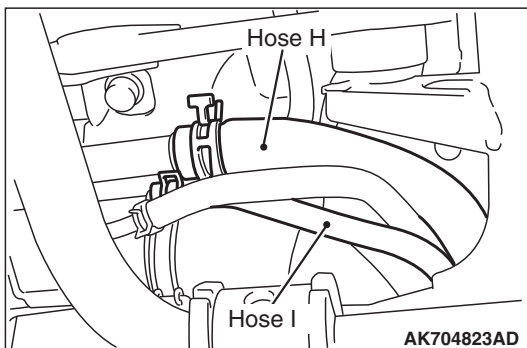
**STEP 8. Check for leaks in evaporative emission hoses F and G.**

1. Remove the fuel tank assembly.
2. Use a hand vacuum pump to check each hose F and G.

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

**YES** : Go to Step 9.

**NO** : Replace any damaged hose and reinstall the fuel tank assembly. Then go to Step 13.




---

**STEP 9. Check for leaks in evaporative emission hoses H and I.**

- (1) Remove the fuel tank assembly.
- (2) Use a hand vacuum pump to check each hose H and I.

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

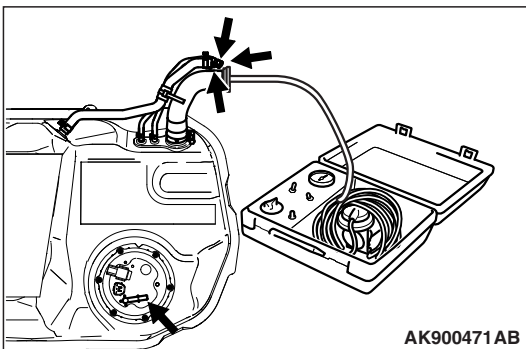
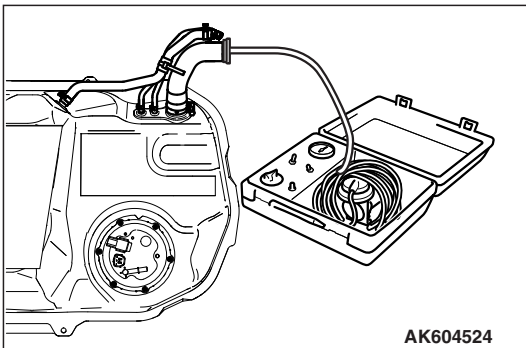
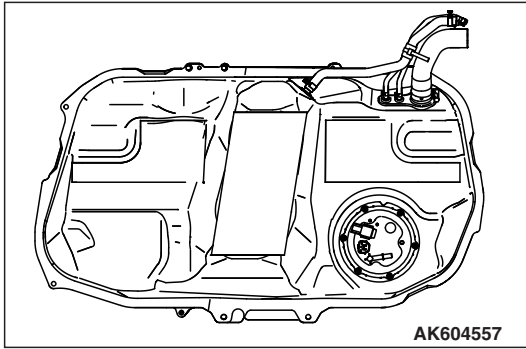
**YES** : Go to Step 10.

**NO** : Replace any damaged hose and reinstall the fuel tank assembly. Then go to Step 13.

**STEP 10. Check for leaks in the fuel tank.**

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

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



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

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

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

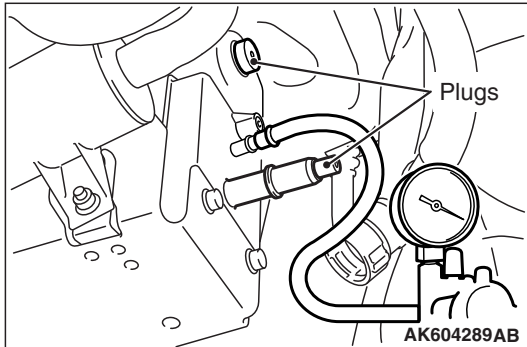
- (4) Pressurize the fuel tank with the evaporative emission system pressure pump.  
(5) In the pressurized state, check for leaks by applying a soapy water solution to each section and look for bubbles.

**Q: Are any leaks found?**

**YES <When there is a leak from the attachment points of the fuel pump module, fuel tank differential pressure sensor, fuel level sensor or leveling valve.>** : Repair or replace the leaked parts and check again that there are no leaks. Then reinstall the fuel tank. Then go to Step 13.

**YES <When there is a leak from the fuel tank.>** : Replace the fuel tank. Then go to Step 13.

**NO** : When there is no leak, reinstall the fuel tank. Then go to Step 12.




---

**STEP 11. Check the evaporative emission canister for vacuum leaks.**

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

**Q: Is the evaporative emission canister in good condition?**

**YES** : Go to Step 12.

**NO** : Replace the evaporative emission canister. Then go to Step 13.

---

**STEP 12. Using scan tool MB991958, check the evaporative emission system monitor test.**
**⚠ CAUTION**

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

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

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

**YES** : Replace the ECM (Refer to, Removal and Installation P.13B-1022). Then go to Step 13.

**NO <"Evap Leak Mon. Completed. Test Passed" is displayed on scan tool MB991958.>** : The evaporative emission system is working properly at this time. Go to Step 13.

**NO <"Evap Leak Mon. Discontinued. Retest again from the first" is displayed on scan tool MB991958.>** : The EVAP monitor has been interrupted during the test. Turn the ignition switch to the "LOCK" (OFF) position once, and repeat the monitoring from Step 12.

---

**STEP 13. Test the OBD-II drive cycle.**

- (1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle –Pattern 6 [P.13B-12](#).
- (2) Check the diagnostic trouble code (DTC).

**Q: Is DTC P0456 set?**

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

---

**DTC P0461: Fuel Level Sensor Circuit Range/Performance**

---

**TECHNICAL DESCRIPTION**

- The fuel level sensor converts the rest of the fuel to a voltage and sends it to the combination meter.
- The combination meter sends the data regarding the rest of the fuel to the ECM.
- The ECM checks whether this data is within a specified range.

**DESCRIPTIONS OF MONITOR METHODS**

Detect malfunction if change of fuel level sensor output voltage is small when sum of fuel injection is large.

**MONITOR EXECUTION**

Continuous

**MONITOR EXECUTION CONDITIONS  
(Other monitor and Sensor)**

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

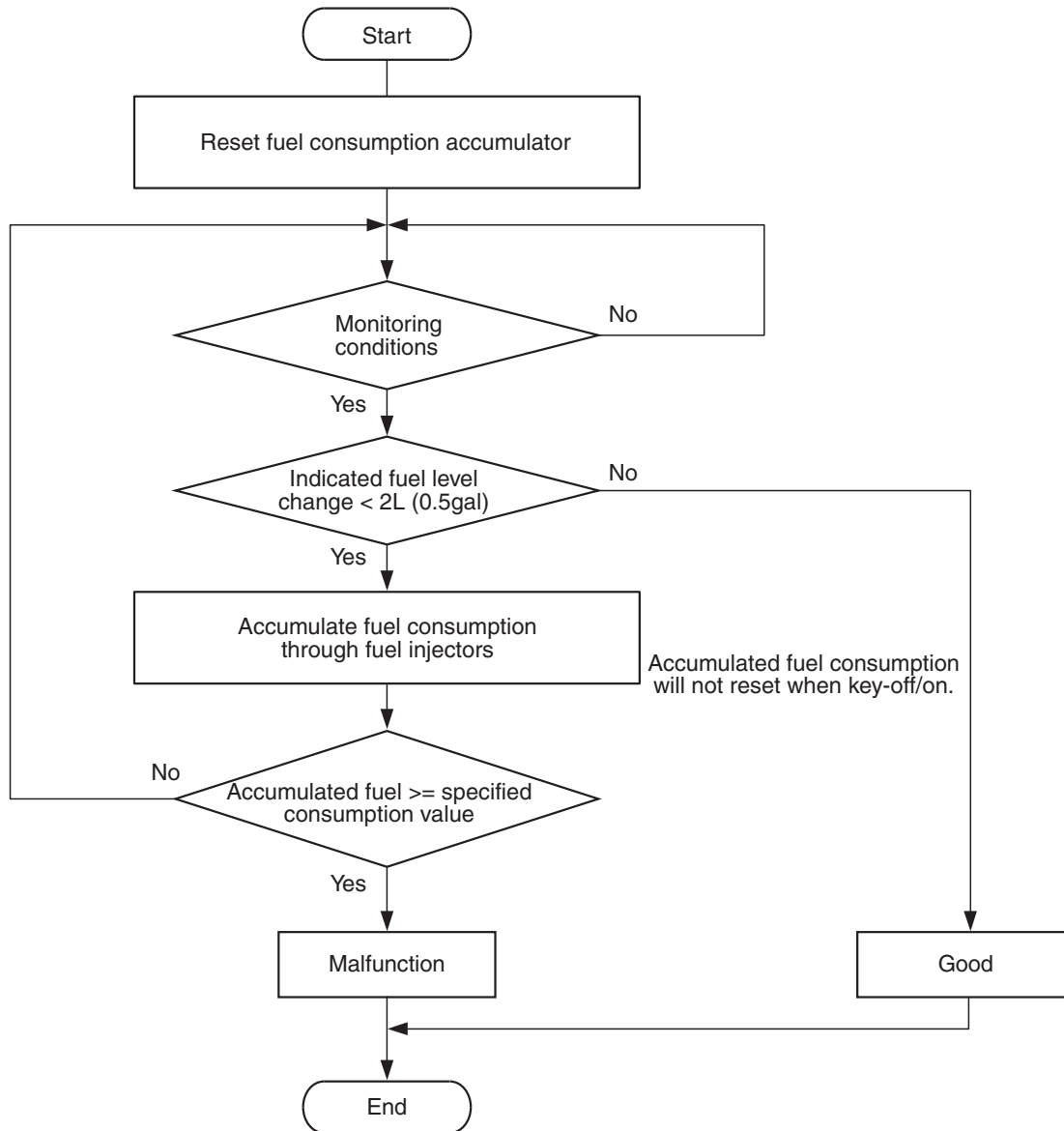
- Not applicable

**Sensor (The sensor below is determined to be normal)**

- Not applicable

## DTC SET CONDITIONS

## Logic Flow Chart



AK604341

**Check Condition, Judgement Criterion**

- When the fuel consumption calculated from the operation time of the injector amounts to 20 liters (5.2 gal), the amount of fuel in tank calculated from the fuel level sensor is less than 2 liters (0.5 gal).

**FAIL-SAFE AND BACKUP FUNCTION**

- None

**OBD-II DRIVE CYCLE PATTERN**

None.

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

- Combination meter assembly failed.
- Fuel level sensor failed.
- ECM failed.

## DIAGNOSIS

### Required Special Tool:

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

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

### **⚠ CAUTION**

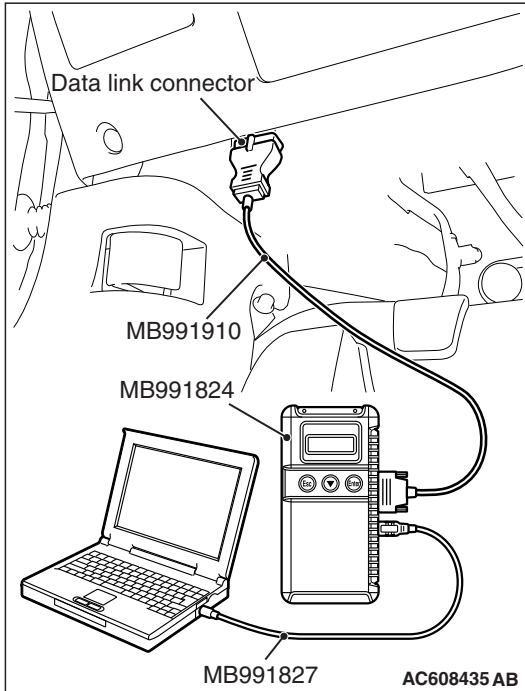
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

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

### **Q: Is the combination meter-DTC set?**

**YES** : Refer to GROUP 54A, Combination Meter – Diagnostic Trouble Code Chart [P.54A-33](#).

**NO** : Go to Step 2.



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

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

### **Q: Is DTC P0461 set?**

**YES** : Replace the ECM (Refer to, Removal and Installation [P.13B-1022](#)). Then go to Step 3.

**NO** : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions [P.00-13](#).

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

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

**Q: Is DTC P0461 set?**

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

**DTC P0462: Fuel Level Sensor Circuit Low Input**

---

**TECHNICAL DESCRIPTION**

- The fuel level sensor converts the rest of the fuel to a voltage and sends it to the combination meter.
- The combination meter sends the data regarding the rest of the fuel to the ECM.
- The ECM checks whether this data is within a specified range.

**DESCRIPTIONS OF MONITOR METHODS**

A short circuit is detected while monitoring the fuel level sensor output.

**MONITOR EXECUTION**

Continuous

**MONITOR EXECUTION CONDITIONS  
(Other monitor and Sensor)**

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

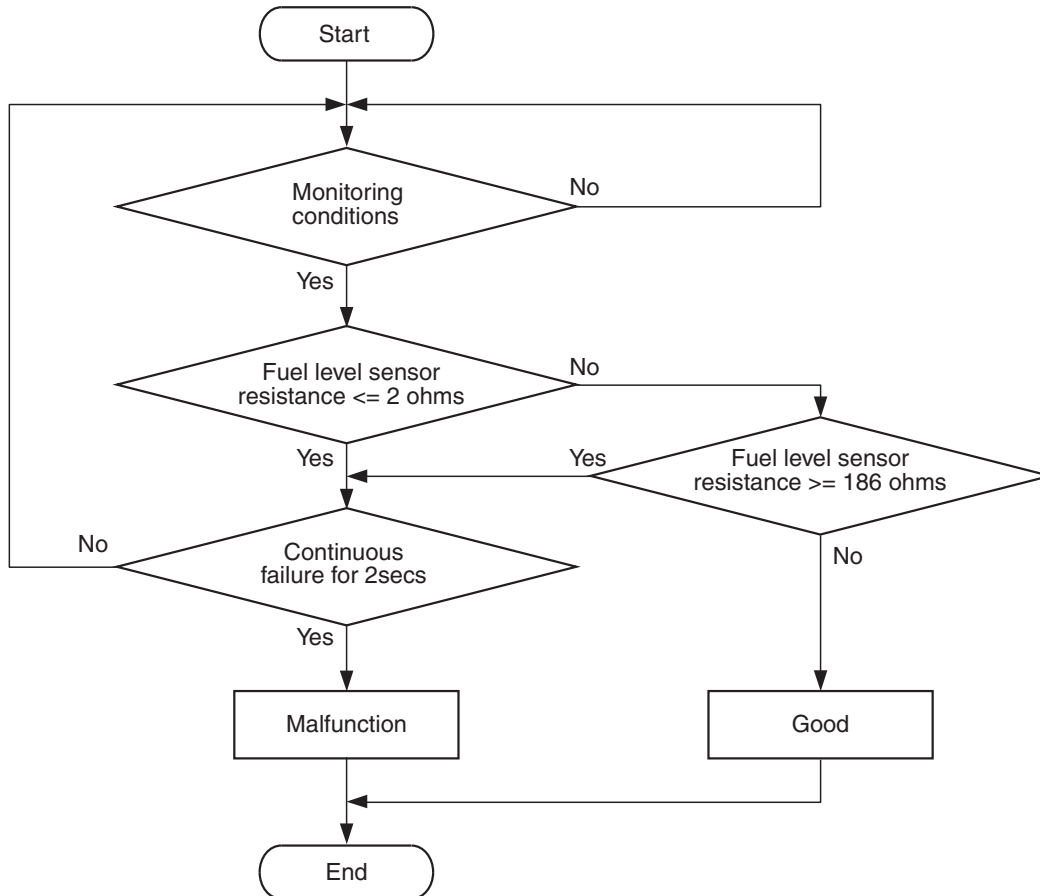
- Not applicable

**Sensor (The sensor below is determined to be normal)**

- Not applicable

**DTC SET CONDITIONS**

**Logic Flow Chart**



AK604342

**Check Conditions**

- Battery positive voltage is between 11 and 16.5 volts.
- More than 2 seconds have passed since the engine starting sequence was completed.

**Judgement Criterion**

- Fuel level sensor resistance is less than 2 ohms for 2 seconds.

**FAIL-SAFE AND BACKUP FUNCTION**

- None

**OBD-II DRIVE CYCLE PATTERN**

Refer to Diagnostic Function –OBD-II Drive Cycle – Pattern 23 [P.13B-12](#).

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

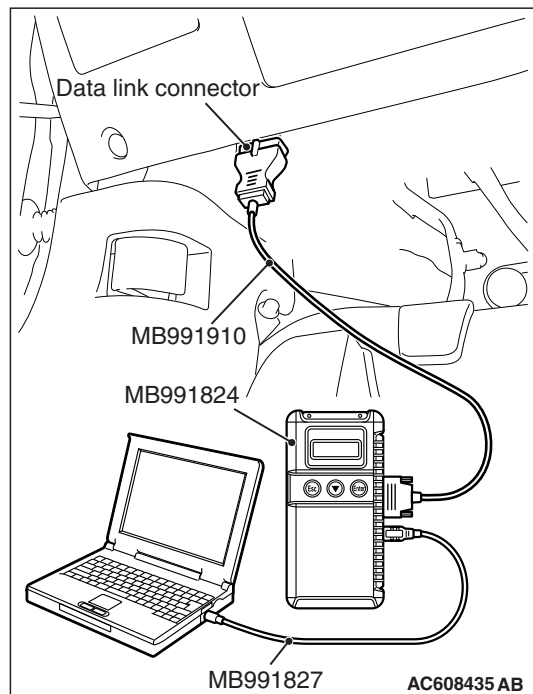
- Fuel level sensor failed.
- Combination meter assembly failed.
- Connector damage.
- Harness damage.
- ECM failed.

**DIAGNOSIS**

**Required Special Tool:**

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





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

**⚠ CAUTION**

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

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

**Q: Is the combination meter-DTC set?**

**YES :** Refer to GROUP 54A, Combination Meter – Diagnostic Trouble Code Chart [P.54A-33](#).

**NO :** Go to Step 2.

**STEP 2. Check the trouble symptoms.**

- (1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle –Pattern 23 [P.13B-12](#).
- (2) Check the diagnostic trouble code (DTC).

**Q: Is DTC P0462 set?**

**YES :** Replace the ECM (Refer to, Removal and Installation [P.13B-1022](#)). Then go to Step 3.

**NO :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions [P.00-13](#).

**STEP 3. Test the OBD-II drive cycle.**

- (1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle –Pattern 23 [P.13B-12](#).
- (2) Check the diagnostic trouble code (DTC).

**Q: Is DTC P0462 set?**

**YES :** Retry the troubleshooting.

**NO :** The inspection is complete.

**DTC P0463: Fuel Level Sensor Circuit High Input**

**TECHNICAL DESCRIPTION**

- The fuel level sensor converts the rest of the fuel to a voltage and sends it to the combination meter.
- The combination meter sends the data regarding the rest of the fuel to the ECM.
- The ECM checks whether this data is within a specified range.

**DESCRIPTIONS OF MONITOR METHODS**

An open circuit is detected while monitoring the fuel level sensor output.

**MONITOR EXECUTION**

Continuous

**MONITOR EXECUTION CONDITIONS  
(Other monitor and Sensor)**

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

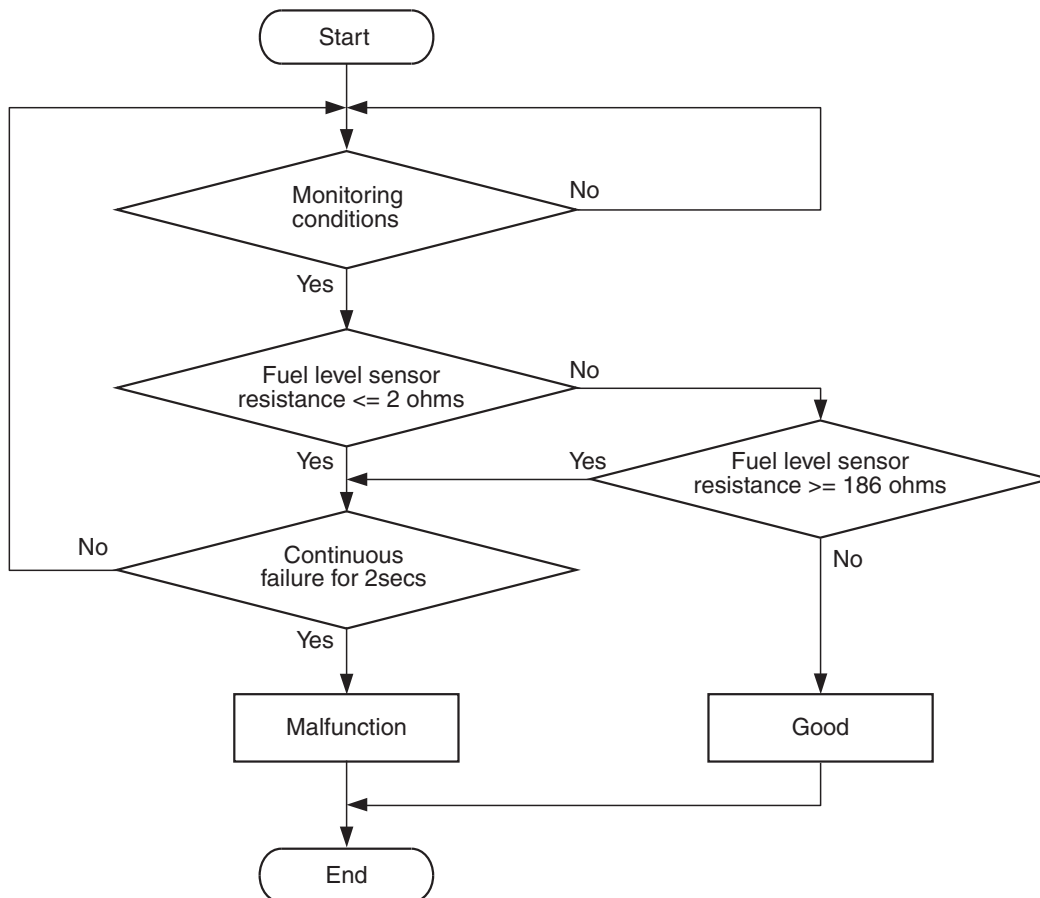
- Not applicable

**Sensor (The sensor below is determined to be normal)**

- Not applicable

**DTC SET CONDITIONS**

**Logic Flow Chart**



AK604342

**Check Conditions**

- Battery positive voltage is between 11 and 16.5 volts.
- More than 2 seconds have passed since the engine starting sequence was completed.

**Judgement Criterion**

- Fuel level sensor resistance is more than 186 ohms for 2 seconds.

**FAIL-SAFE AND BACKUP FUNCTION**

- None

**OBD-II DRIVE CYCLE PATTERN**

Refer to Diagnostic Function –OBD-II Drive Cycle – Pattern 23 [P.13B-12](#).

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

- Fuel level sensor failed.
- Combination meter assembly failed.
- Connector damage.
- Harness damage.
- ECM failed.

**DIAGNOSIS****Required Special Tool:**

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

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

**⚠ CAUTION**

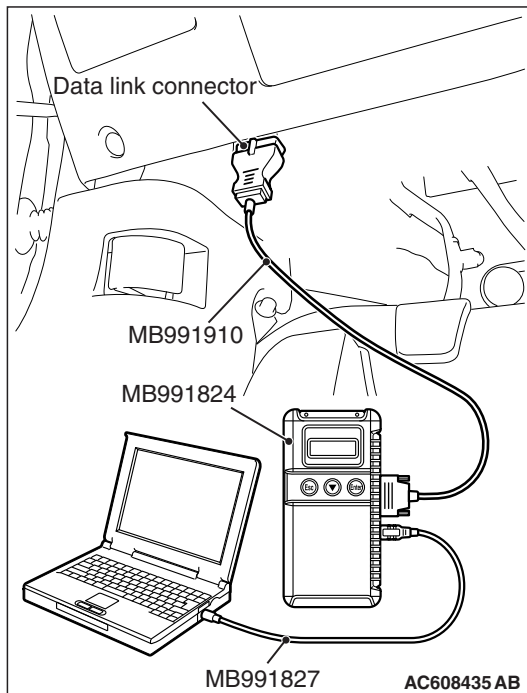
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

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

**Q: Is the combination meter-DTC set?**

**YES :** Refer to GROUP 54A, Combination Meter – Diagnostic Trouble Code Chart [P.54A-33](#).

**NO :** Go to Step 2.



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**STEP 2. Check the trouble symptoms.**

- (1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle –Pattern 23 [P.13B-12](#).
- (2) Check the diagnostic trouble code (DTC).

**Q: Is DTC P0463 set?**

**YES :** Replace the ECM (Refer to, Removal and Installation [P.13B-1022](#)). Then go to Step 3.

**NO :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions [P.00-13](#).

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**STEP 3. Test the OBD-II drive cycle.**

- (1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle –Pattern 23 [P.13B-12](#).
- (2) Check the diagnostic trouble code (DTC).

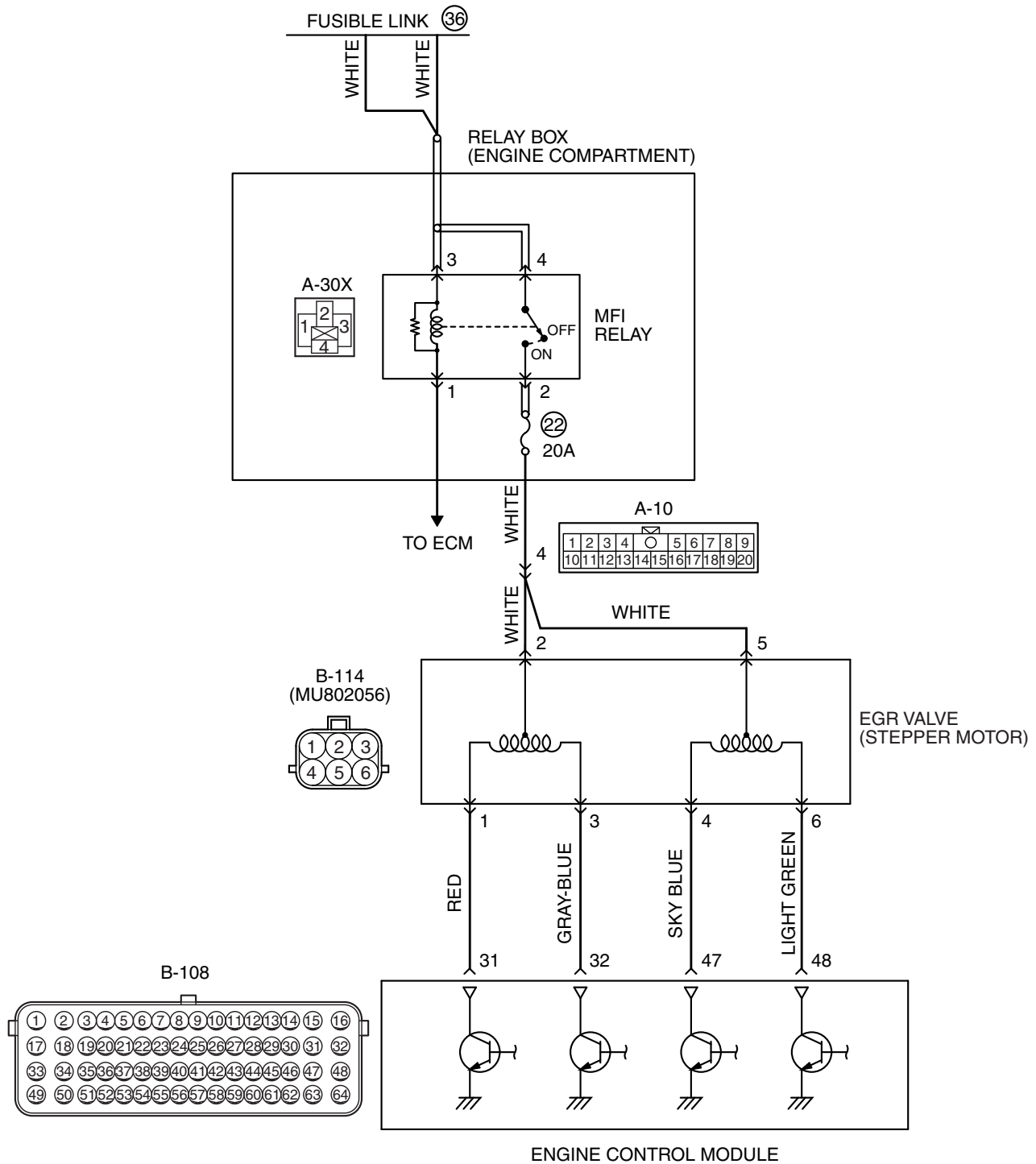
**Q: Is DTC P0463 set?**

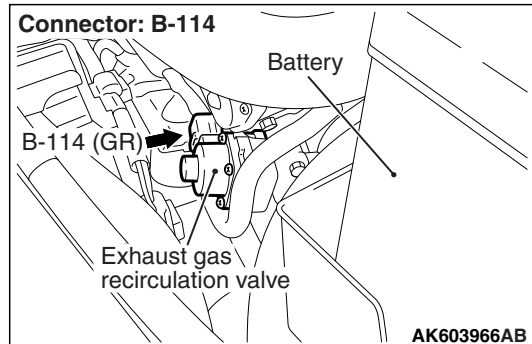
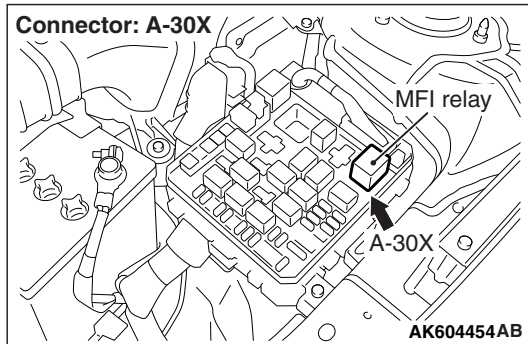
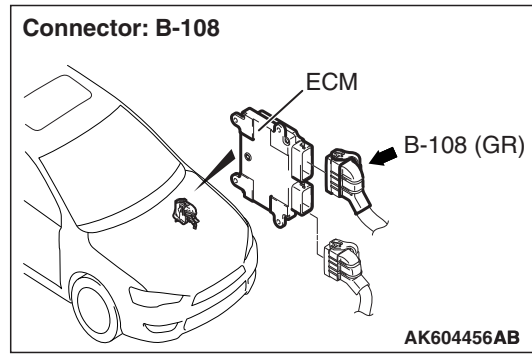
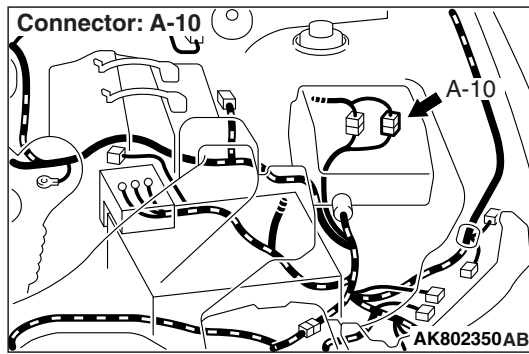
**YES :** Retry the troubleshooting.

**NO :** The inspection is complete.

DTC P0489: EGR Valve (stepper motor) Circuit Malfunction (ground short)

EGR VALVE (STEPPER MOTOR) CIRCUIT





## CIRCUIT OPERATION

- The EGR valve power is supplied from the MFI relay (terminal No. 2).
- The ECM (terminals No. 31, No. 32, No. 47, No. 48) drives the stepper motor by sequentially turning "ON" the power transistors in the ECM and providing ground to the EGR valve (terminal No. 1, No. 3, No. 4, No. 6).

## TECHNICAL DESCRIPTION

The ECM checks whether a short circuit to the ground or an open circuit exists or not by measuring the EGR valve (stepper motor) drive circuit voltage when the current is not flowing through the coil of the EGR valve (stepper motor).

## DESCRIPTIONS OF MONITOR METHODS

When the EGR valve (stepper motor) drive circuit voltage is under the specified range, it is judged that a malfunction exists.

## MONITOR EXECUTION

Continuous

## MONITOR EXECUTION CONDITIONS (Other monitor and Sensor)

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

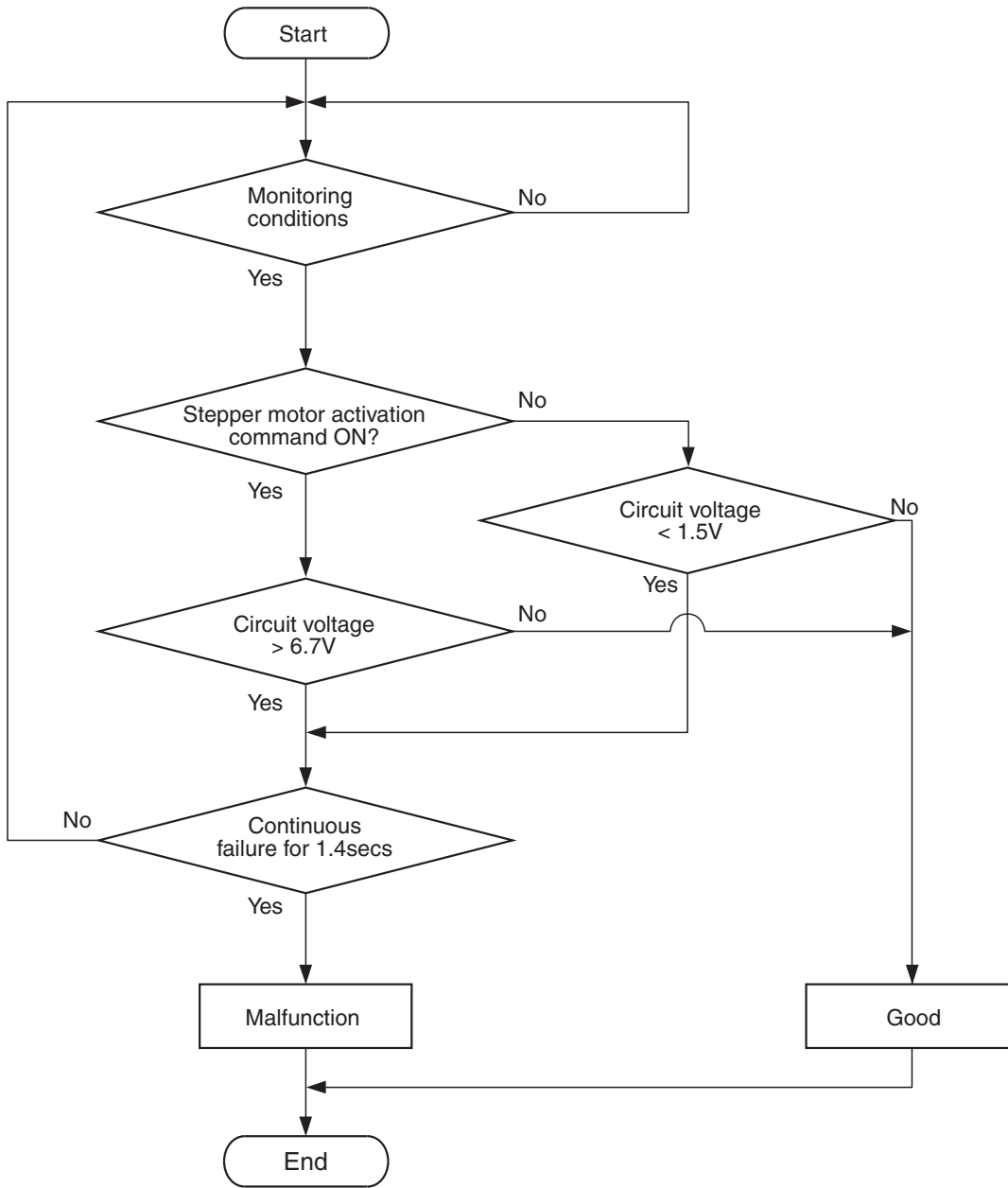
- Exhaust gas recirculation (EGR) stepper motor monitor

**Sensor (The sensor below is determined to be normal)**

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

DTC SET CONDITIONS

Logic Flow Chart



AK900363

**Check Conditions**

- Ignition switch is "ON" position.
- Battery positive voltage is between 10 and 16.5 volts.

**Judgement Criterion**

- When EGR valve is de-energized, the ECM voltage is less than 1.5 volts for 1.4 seconds.

**FAIL-SAFE AND BACKUP FUNCTION**

- None

**OBD-II DRIVE CYCLE PATTERN**

Refer to Diagnostic Function –OBD-II Drive Cycle – Pattern 3 [P.13B-12](#).

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

- EGR valve (stepper motor) failed.

- Open or shorted EGR valve (stepper motor) circuit, harness damage or connector damage.
- ECM failed.

**DIAGNOSIS**

**Required Special Tools:**

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

**STEP 1. Check harness connector B-114 at EGR valve for damage.**

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

**YES :** Go to Step 2.

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

**STEP 2. Check the EGR valve.**

- (1) Disconnect the EGR valve connector B-114.
- (2) Measure the resistance between EGR valve side connector terminal No. 2 and either terminal No. 1 or terminal No. 3.

**Standard value: 20 –24  $\Omega$  [at 20° C (68° F)]**

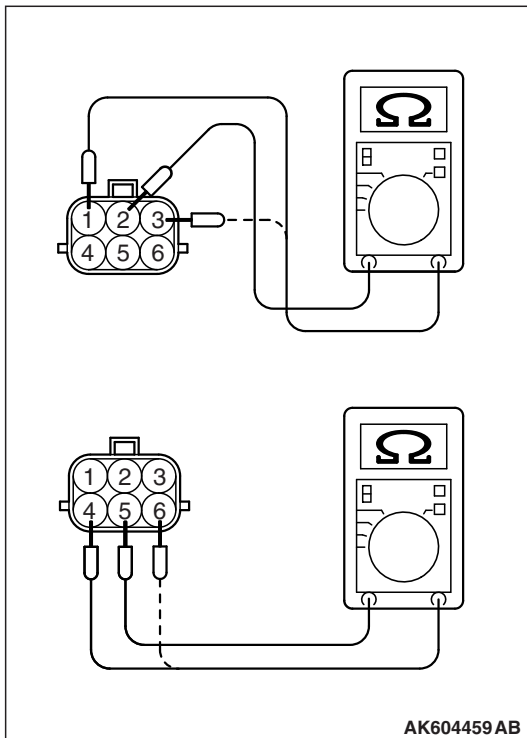
- (3) Measure the resistance between EGR valve side connector terminal No. 5 and either terminal No. 4 or terminal No. 6

**Standard value: 20 –24  $\Omega$  [at 20° C (68° F)]**

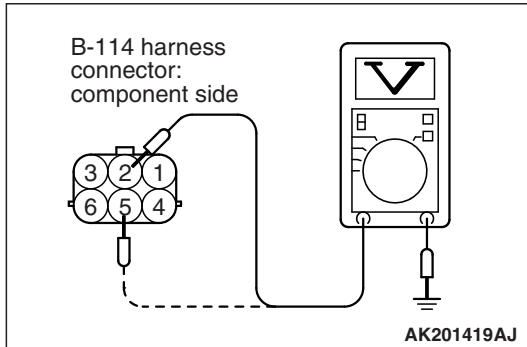
**Q: Is the measured resistance between 20 and 24  $\Omega$  [at 20° C (68° F)]?**

**YES :** Go to Step 3.

**NO :** Replace the EGR valve. Then go to Step 11.








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**STEP 3. Measure the power supply voltage at EGR valve harness side connector B-114.**

- (1) Disconnect the connector B-114 and measure at the harness side.
- (2) Turn the ignition switch to the "ON" position.
- (3) Measure the voltage between terminal No. 2, No. 5 and ground.
  - Voltage should be battery positive voltage.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

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

**YES :** Go to Step 5.

**NO :** Go to Step 4.

---

**STEP 4. Check harness connector A-30X at MFI relay for damage.**

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

**YES :** Check harness connector A-10 at intermediate connector for damage, and repair or replace as required. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). If intermediate connector is in good condition, repair harness wire between MFI relay connector A-30X (terminal No. 2) and EGR valve connector B-114 (terminal No. 2, No. 5) because of open circuit or short circuit to ground. Then go to Step 11.

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

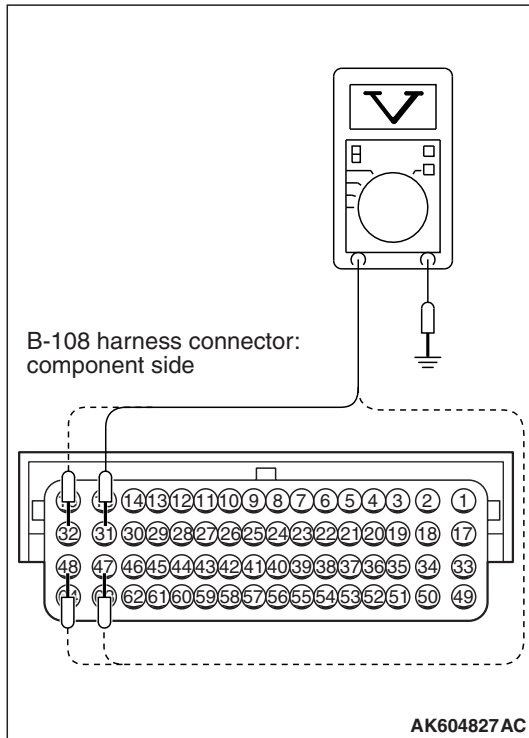
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**STEP 5. Check harness connector B-108 at ECM for damage.**

**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 11.



**STEP 6. Measure the power supply voltage at ECM harness side connector B-108.**

- (1) Disconnect the connector B-108 and measure at the harness side.
- (2) Turn the ignition switch to the "ON" position.
- (3) Measure the voltage between terminal (No. 31, No. 32, No. 47, No. 48) and ground.
  - Voltage should be battery positive voltage.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

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

**YES :** Go to Step 7.

**NO :** Repair harness wire between EGR valve connector and ECM connector because of open circuit or short circuit to ground.

- a. EGR valve connector B-114 (terminal No. 1) and ECM connector B-108 (terminal No. 31).
- b. EGR valve connector B-114 (terminal No. 3) and ECM connector B-108 (terminal No. 32).
- c. EGR valve connector B-114 (terminal No. 4) and ECM connector B-108 (terminal No. 47).
- d. EGR valve connector B-114 (terminal No. 6) and ECM connector B-108 (terminal No. 48).

Then go to Step 11.

**STEP 7. Check harness connector A-30X at MFI relay for damage.**

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

**YES :** Go to Step 8.

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

**STEP 8. Check for harness damage between MFI relay connector A-30X (terminal No. 2) and EGR valve connector B-114 (terminal No. 2, No. 5).**

*NOTE: Check harness after checking intermediate connector A-10. If intermediate connector is damaged, repair or replace it. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then go to Step 11.*

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

**YES :** Go to Step 9.

**NO :** Repair it. Then go to Step 11.

**STEP 9. Check for harness damage between EGR valve connector and ECM connector.**

- a. EGR valve connector B-114 (terminal No. 1) and ECM connector B-108 (terminal No. 31).
- b. EGR valve connector B-114 (terminal No. 3) and ECM connector B-108 (terminal No. 32).
- c. EGR valve connector B-114 (terminal No. 4) and ECM connector B-108 (terminal No. 47).
- d. EGR valve connector B-114 (terminal No. 6) and ECM connector B-108 (terminal No. 48).

**Q: Are the harness wires in good condition?****YES** : Go to Step 10.**NO** : Repair them. Then go to Step 11.

---

**STEP 10. Check the trouble symptoms.**

- (1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle –Pattern 3 [P.13B-12](#).
- (2) Check the diagnostic trouble code (DTC).

**Q: Is DTC P0489 set?****YES** : Replace the ECM (Refer to, Removal and Installation [P.13B-1022](#)). 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 –How to Cope with Intermittent Malfunctions [P.00-13](#).

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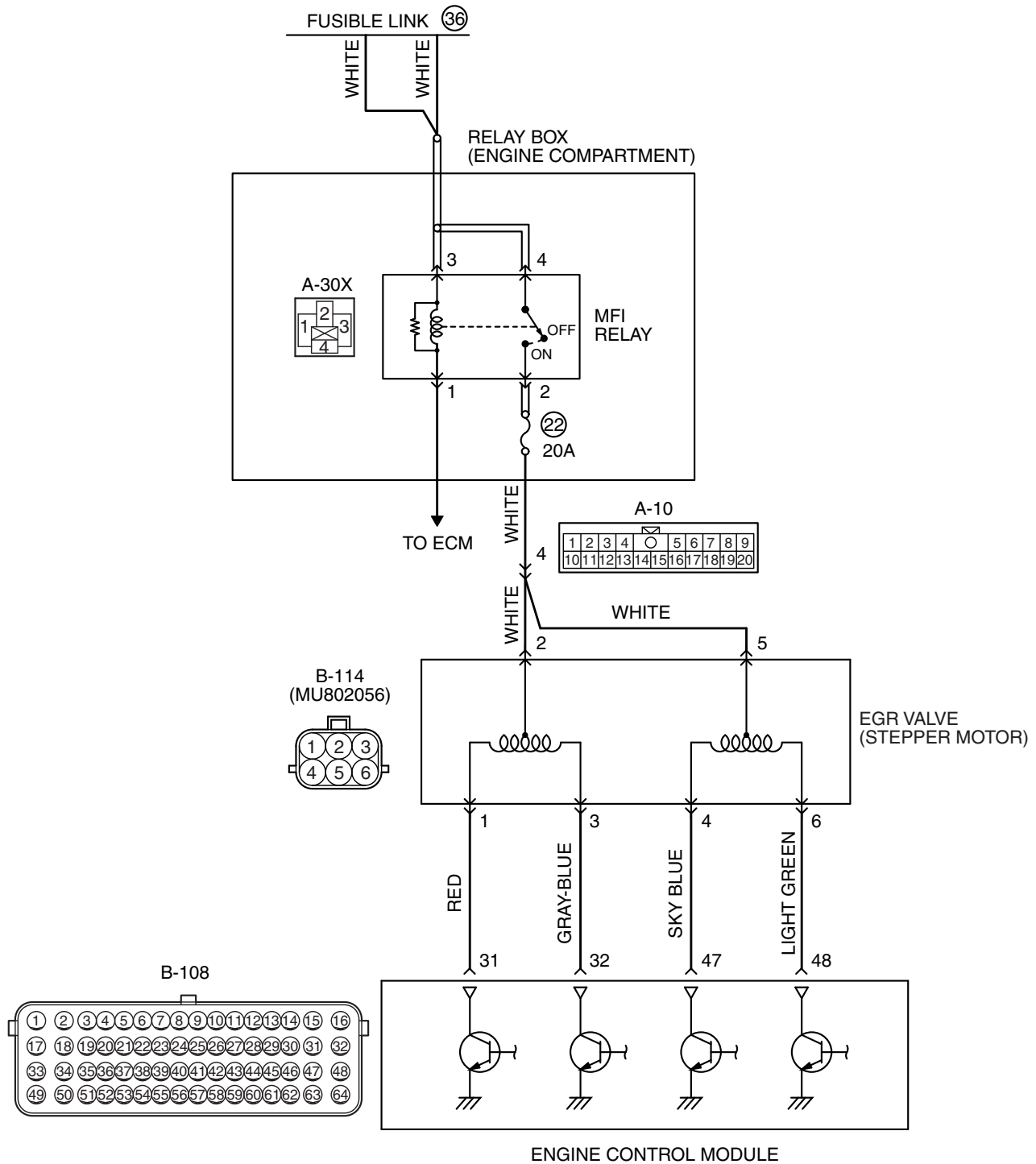
**STEP 11. Test the OBD-II drive cycle.**

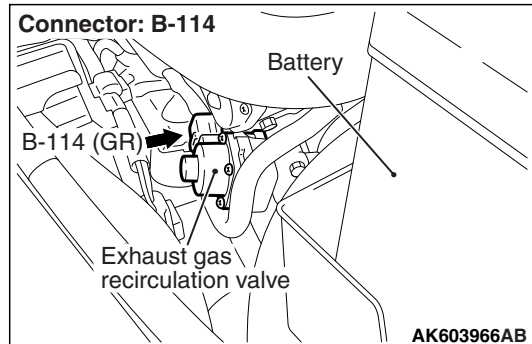
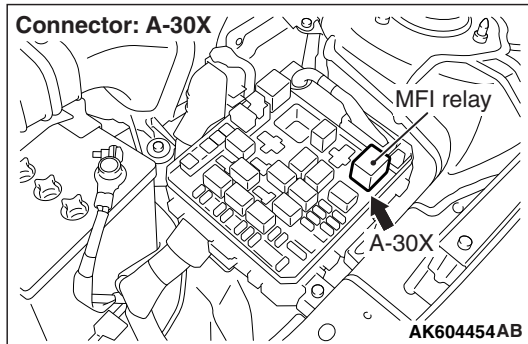
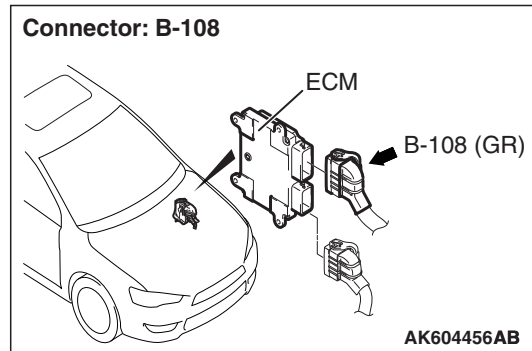
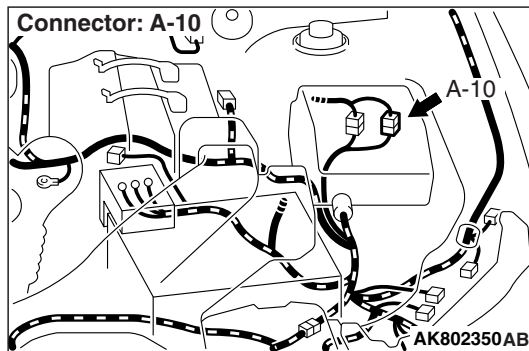
- (1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle –Pattern 3 [P.13B-12](#).
- (2) Check the diagnostic trouble code (DTC).

**Q: Is DTC P0489 set?****YES** : Retry the troubleshooting.**NO** : The inspection is complete.

DTC P0490: EGR Valve (stepper motor) Circuit Malfunction (battery short)

EGR VALVE (STEPPER MOTOR) CIRCUIT





## CIRCUIT OPERATION

- The EGR valve power is supplied from the MFI relay (terminal No. 2).
- The ECM (terminals No. 31, No. 32, No. 47, No. 48) drives the stepper motor by sequentially turning "ON" the power transistors in the ECM and providing ground to the EGR valve (terminal No. 1, No. 3, No. 4, No. 6).

## TECHNICAL DESCRIPTION

The ECM checks whether a short circuit to the power supply exists or not by measuring the EGR valve (stepper motor) drive circuit voltage when the current is flowing through the coil of the EGR valve (stepper motor).

## DESCRIPTIONS OF MONITOR METHODS

When the EGR valve (stepper motor) drive circuit voltage is over the specified range, it is judged that a malfunction exists.

## MONITOR EXECUTION

Continuous

## MONITOR EXECUTION CONDITIONS (Other monitor and Sensor)

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

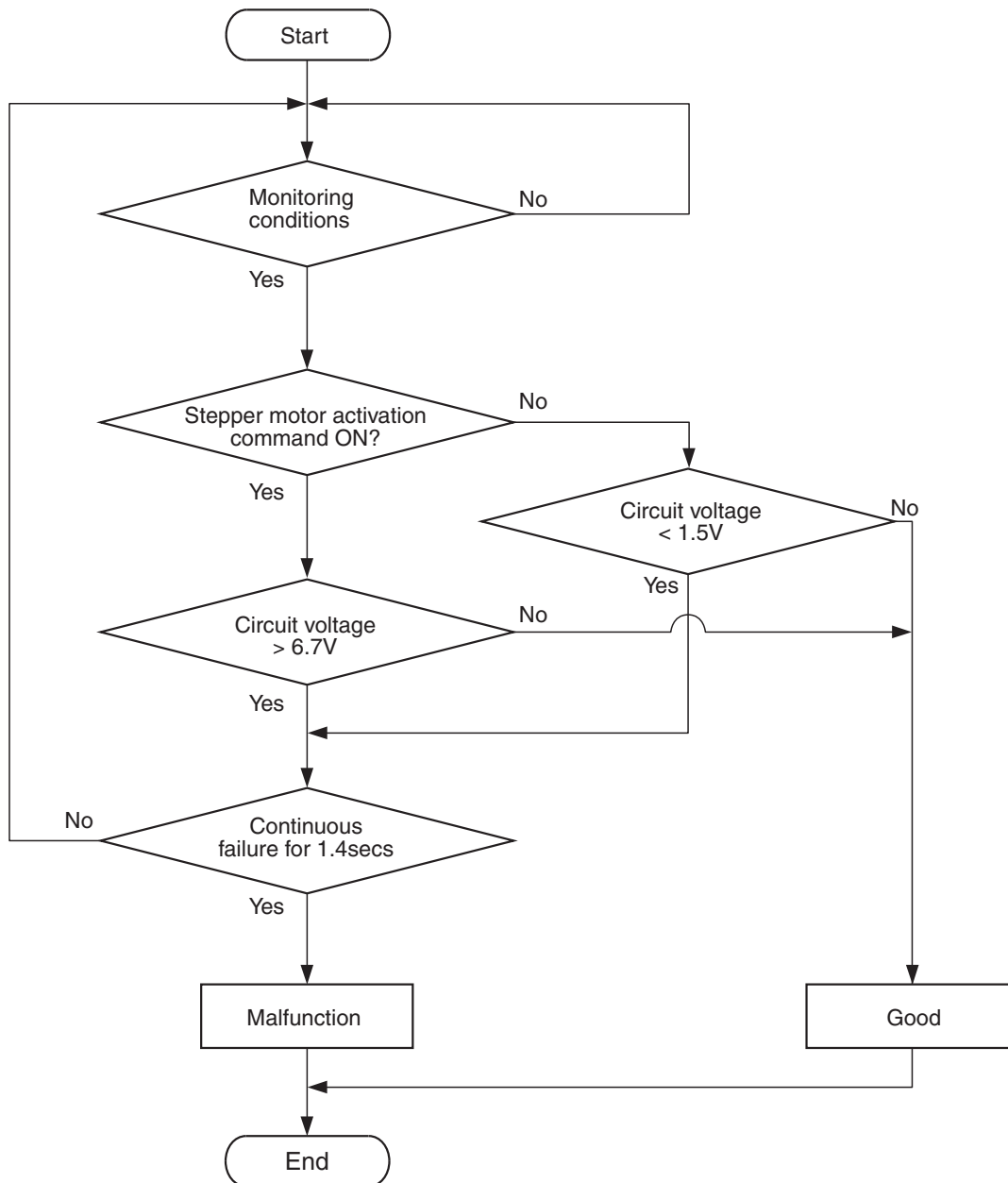
- Exhaust gas recirculation (EGR) stepper motor monitor

**Sensor (The sensor below is determined to be normal)**

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

**DTC SET CONDITIONS**

**Logic Flow Chart**



AK900363

**Check Conditions**

- Ignition switch is "ON" position.
- Battery positive voltage is between 10 and 16.5 volts.

**Judgement Criterion**

- When EGR valve is energized, the ECM voltage is more than 6.7 volts for 1.4 seconds.

**FAIL-SAFE AND BACKUP FUNCTION**

- None

**OBD-II DRIVE CYCLE PATTERN**

Refer to Diagnostic Function –OBD-II Drive Cycle – Pattern 3 [P.13B-12](#).

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

- EGR valve (stepper motor) failed.
- Shorted EGR valve (stepper motor) circuit or connector damage.
- ECM failed.

**DIAGNOSIS****Required Special Tool:**

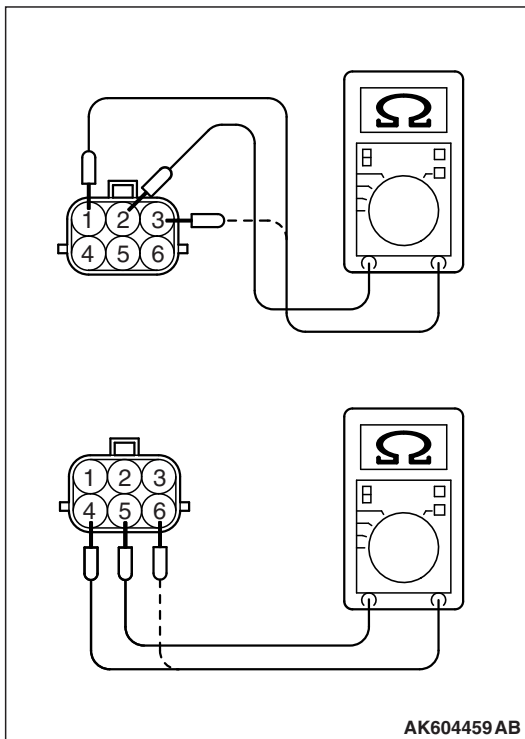
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991910: Main Harness A

**STEP 1. Check harness connector B-114 at EGR valve for damage.****Q: Is the harness connector in good condition?****YES :** Go to Step 2.**NO :** Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then go to Step 6.**STEP 2. Check the EGR valve.**

- (1) Disconnect the EGR valve connector B-114.
- (2) Measure the resistance between EGR valve side connector terminal No. 2 and either terminal No. 1 or terminal No. 3.

**Standard value: 20 –24  $\Omega$  [at 20° C (68° F)]**

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

**Standard value: 20 –24  $\Omega$  [at 20° C (68° F)]****Q: Is the measured resistance between 20 and 24  $\Omega$  [at 20° C (68° F)]?****YES :** Go to Step 3.**NO :** Replace the EGR valve. Then go to Step 6.**STEP 3. Check harness connector B-108 at ECM for damage.****Q: Is the harness connector in good condition?****YES :** Go to Step 4.**NO :** Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then go to Step 6.

---

**STEP 4. Check for short circuit to power supply between EGR valve connector B-114 and ECM connector B-108.**

- a. EGR valve connector B-114 (terminal No. 1) and ECM connector B-108 (terminal No. 31).
- b. EGR valve connector B-114 (terminal No. 3) and ECM connector B-108 (terminal No. 32).
- c. EGR valve connector B-114 (terminal No. 4) and ECM connector B-108 (terminal No. 47).
- d. EGR valve connector B-114 (terminal No. 6) and ECM connector B-108 (terminal No. 48).

**Q: Are the harness wires in good condition?**

**YES** : Go to Step 5.

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

---

**STEP 5. Check the trouble symptoms.**

- (1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle –Pattern 3 [P.13B-12](#).
- (2) Check the diagnostic trouble code (DTC).

**Q: Is DTC P0490 set?**

**YES** : Replace the ECM (Refer to, Removal and Installation [P.13B-1022](#)). Then go to Step 6.

**NO** : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions [P.00-13](#).

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

- (1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle –Pattern 3 [P.13B-12](#).
- (2) Check the diagnostic trouble code (DTC).

**Q: Is DTC P0490 set?**

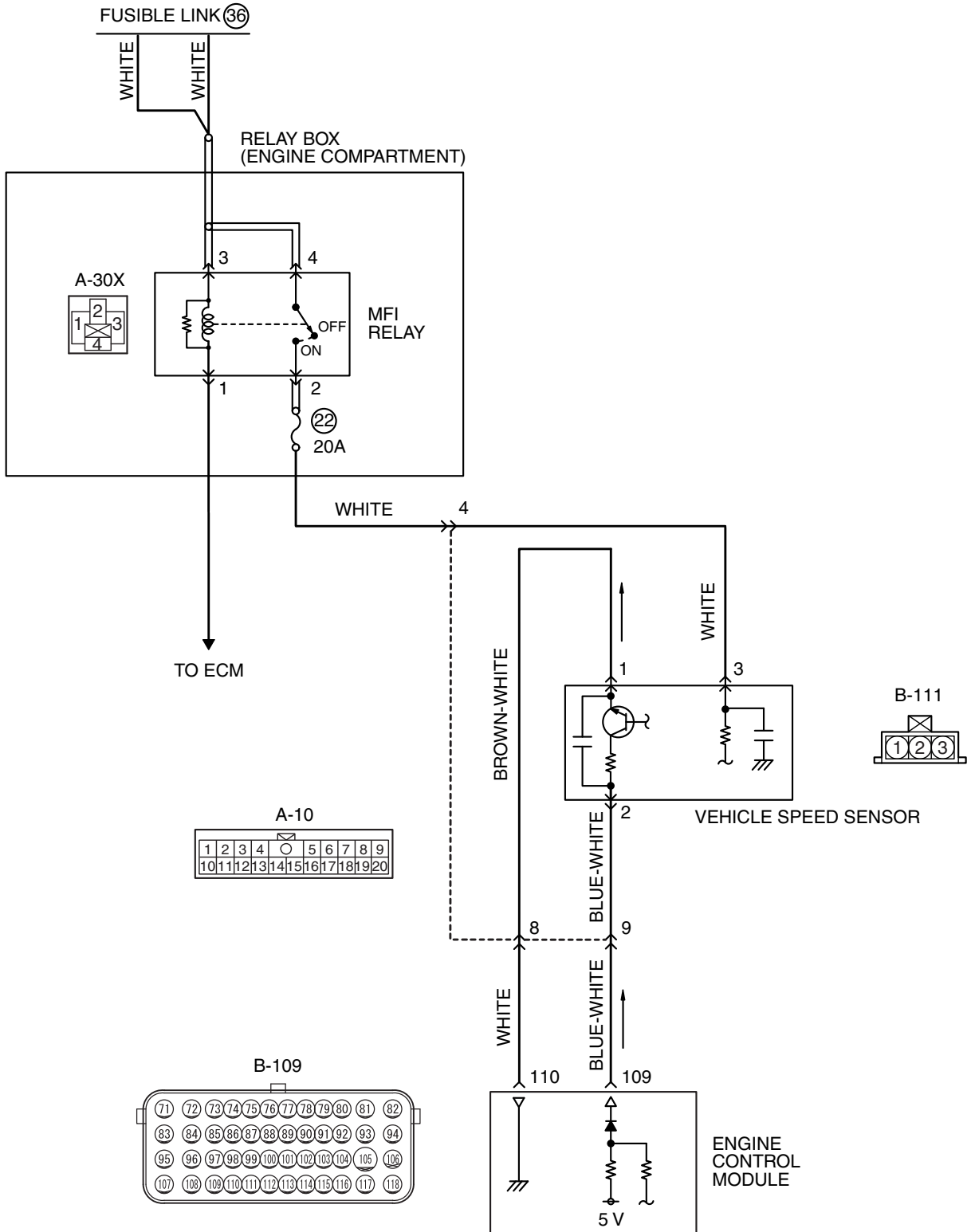
**YES** : Retry the troubleshooting.

**NO** : The inspection is complete.

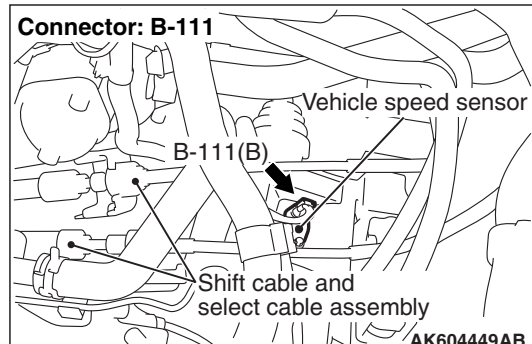
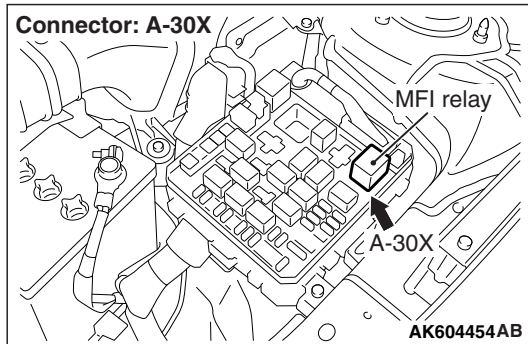
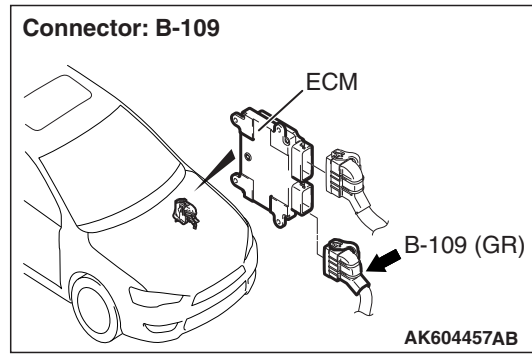
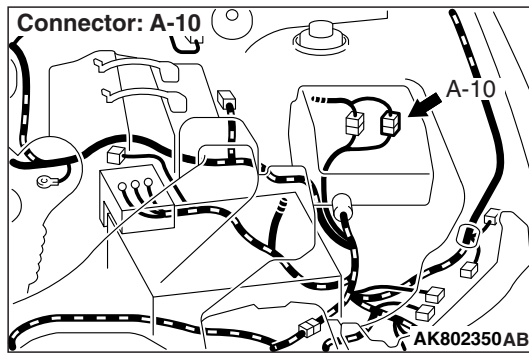


DTC P0500: Vehicle Speed Sensor Malfunction <M/T>

VEHICLE SPEED SENSOR CIRCUIT <M/T>



AK705050 AB



## CIRCUIT OPERATION

- A 5-volt voltage is applied to the vehicle speed sensor output terminal (terminal No. 2) from the ECM (terminal No. 109). 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.

## DESCRIPTIONS OF MONITOR METHODS

- If the vehicle speed sensor output does not change while the vehicle is being driven in the medium- to high-speed range, a malfunction is determined to have occurred.

## MONITOR EXECUTION

- Continuous

## MONITOR EXECUTION CONDITIONS (Other monitor and Sensor)

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

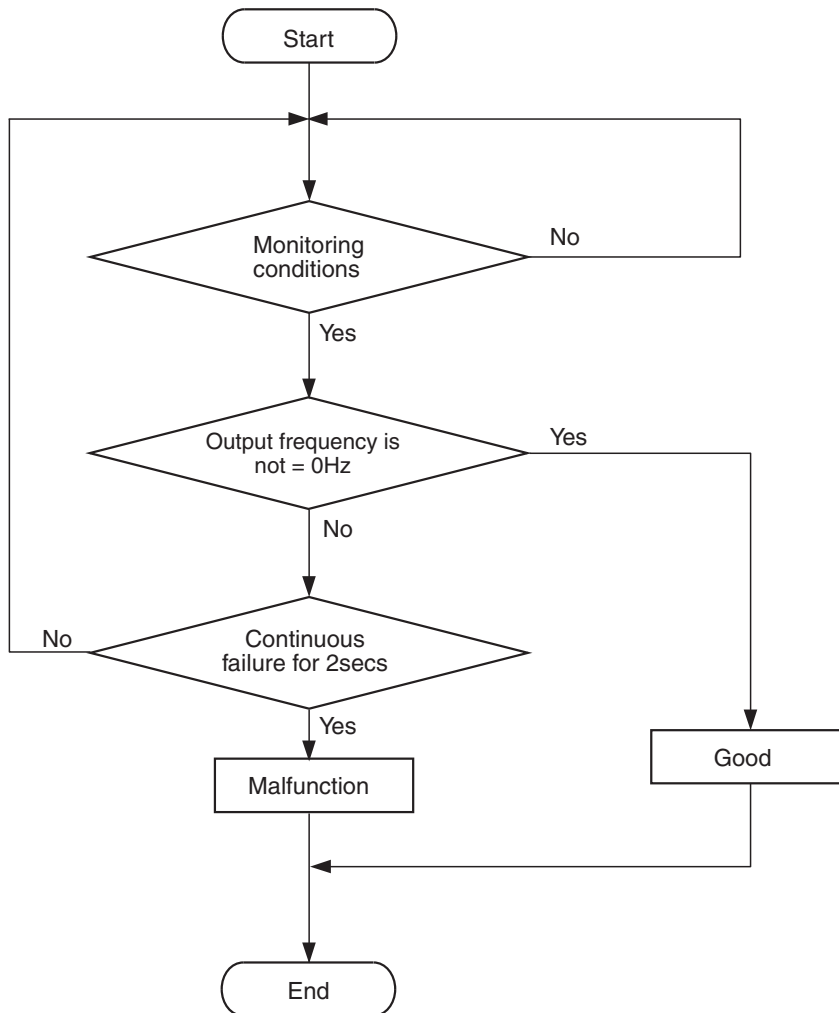
- Not applicable

**Sensor (The sensor below is determined to be normal)**

- Mass airflow sensor

**DTC SET CONDITIONS (Entry Conditions and Malfunction Thresholds)**

**Logic Flow Chart**



AK604344

**Check Conditions**

- More than 2 seconds have passed since the engine starting sequence was completed.
- Engine speed is between 2,000 and 4,000 r/min.
- Volumetric efficiency is between 40 and 65 per-cent.

**Judgement Criterion**

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

**FAIL-SAFE AND BACKUP FUNCTION**

- None

**OBD-II DRIVE CYCLE PATTERN**

None

**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 Tool:

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

### STEP 1. Using scan tool MB991958, check data list item 4: Vehicle Speed Sensor.

#### **⚠ CAUTION**

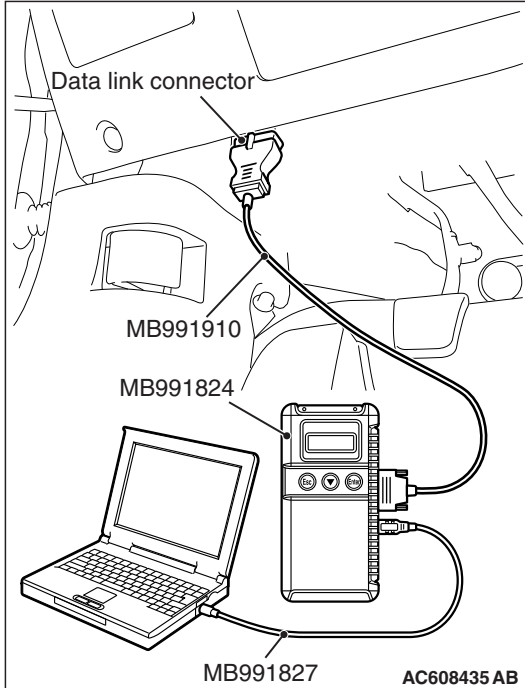
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

- (1) Connect scan tool MB991958 to the data link connector.
- (2) Start the engine.
- (3) Set scan tool MB991958 to the data reading mode for item 4, Vehicle Speed Sensor.
  - Check that the speedometer and M.U.T.-III 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 –How to Cope with Intermittent Malfunctions P.00-13.

**NO** : Go to Step 2.

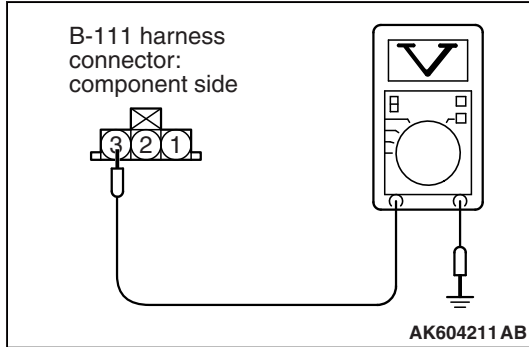


### STEP 2. Check harness connector B-111 at vehicle speed sensor for damage.

#### 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 17.



**STEP 3. Measure the power supply voltage at vehicle speed sensor harness side connector B-111.**

- (1) Disconnect the connector B-111 and measure at the harness side.
- (2) Turn the ignition switch to the "ON" position.
- (3) Measure the voltage between terminal No. 3 and ground.
  - Voltage should be battery positive voltage.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

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

**YES :** Go to Step 5.

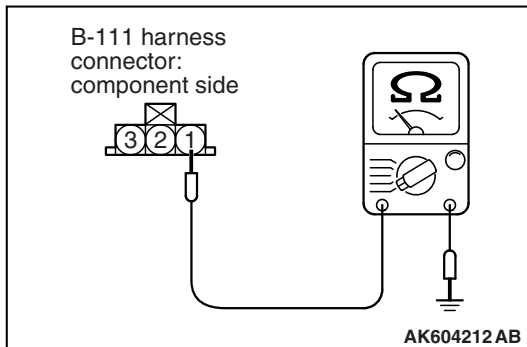
**NO :** Go to Step 4.

**STEP 4. Check harness connector A-30X at MFI relay for damage.**

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

**YES :** Check harness connector A-10 at intermediate connector for damage, and repair or replace as required. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). If intermediate connector is in good condition, repair harness wire between MFI relay connector A-30X (terminal No. 2) and vehicle speed sensor connector B-111 (terminal No. 3) because of open circuit or short circuit to ground. 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 5. Check the continuity at vehicle speed sensor harness side connector B-111.**

- (1) Disconnect the connector B-111 and measure at the harness side.
- (2) Check for the continuity between terminal No. 1 and ground.
  - Continuity (2 ohms or less)

**Q: Does the continuity exist?**

**YES :** Go to Step 8.

**NO :** Go to Step 6.

---

**STEP 6. Check harness connector B-109 at ECM for damage.**

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

**YES :** Go to Step 7.

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

---

**STEP 7. Check for open circuit and harness damage between vehicle speed sensor connector B-111 (terminal No. 1) and ECM connector B-109 (terminal No. 110).**

*NOTE: Check harness after checking intermediate connector A-10. 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 11.

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

---

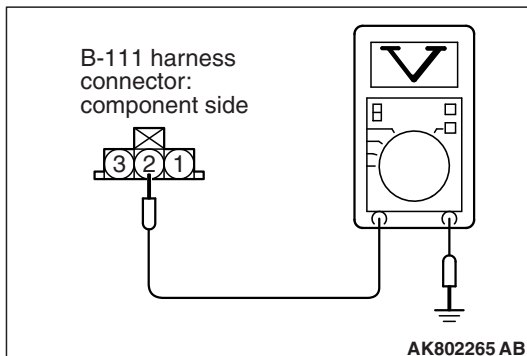
**STEP 8. Measure the sensor supply voltage at vehicle speed sensor harness side connector B-111.**

- (1) Disconnect the connector B-111 and measure at the harness side.
- (2) Turn the ignition switch to the "ON" position.
- (3) Measure the voltage between terminal No. 2 and ground.
  - Voltage should be between 4.9 and 5.1 volts.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

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

**YES :** Go to Step 12.

**NO :** Go to Step 9.



---

**STEP 9. Check harness connector B-109 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 17.

**STEP 10. Check for open circuit and short circuit to ground between vehicle speed sensor connector B-111 (terminal No. 2) and ECM connector B-109 (terminal No. 109).**

*NOTE: Check harness after checking intermediate connector A-10. 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 11.

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

---

**STEP 11. Using scan tool MB991958, check data list item 4: Vehicle Speed Sensor.**

(1) Start the engine.

(2) Set scan tool MB991958 to the data reading mode for item 4, Vehicle Speed Sensor.

- Check that the speedometer and M.U.T.-III display speed match when traveling at a vehicle speed of 40 km/h (25 mph).

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

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

**YES :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13.

**NO :** Replace the ECM (Refer to, Removal and Installation P.13B-1022). Then go to Step 17.

---

**STEP 12. Check harness connector A-30X at MFI relay for damage.**

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

**YES :** Go to Step 13.

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

---

**STEP 13. Check for harness damage between MFI relay connector A-30X (terminal No. 2) and vehicle speed sensor connector B-109 (terminal No. 3).**

*NOTE: Check harness after checking intermediate connector A-10. 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 14.

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

---

**STEP 14. Check harness connector B-109 at ECM for damage.**

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

**YES :** Go to Step 15.

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

---

**STEP 15. Check for harness damage between vehicle speed sensor connector B-111 (terminal No. 2) and ECM connector B-109 (terminal No. 109).**

*NOTE: Check harness after checking intermediate connector A-10. 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. Replace the vehicle speed sensor.**

- (1) Replace the vehicle speed sensor.
- (2) Turn the ignition switch to the "ON" position.
- (3) Ease the DTC.
- (4) Test drive under the following conditions:
  - Engine speed: 2,000 –4,000 r/min
  - Engine load: 40 –65 %
- (5) After completing the test drive, read the DTC. Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is DTC P0500 set?**

**YES :** Replace the ECM (Refer to, Removal and Installation [P.13B-1022](#).) Then go to Step 17.

**NO :** The inspection is complete.

---

**STEP 17. Using scan tool MB991958, read the diagnostic trouble code (DTC).**

- (1) Turn the ignition switch to the "ON" position.
- (2) Erase the DTC.
- (3) Test drive under the following conditions:
  - Engine speed: 2,000 –4,000 r/min
  - Engine load: 40 –65 %
- (4) After completing the test drive, read the DTC. Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is DTC P0500 set?**

**YES :** Retry the troubleshooting.

**NO :** The inspection is complete.



**DTC P0506: Idle Control System RPM Lower Than Expected**

---

**TECHNICAL DESCRIPTION**

- The amount of air taken in during idling is regulated by the opening and closing of the throttle valve.
- The ECM checks the difference between the actual engine speed and the target engine speed.

**DESCRIPTIONS OF MONITOR METHODS**

Difference between actual and target idle speed is over the specified value.

**MONITOR EXECUTION**

Continuous

**MONITOR EXECUTION CONDITIONS  
(Other monitor and Sensor)**

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

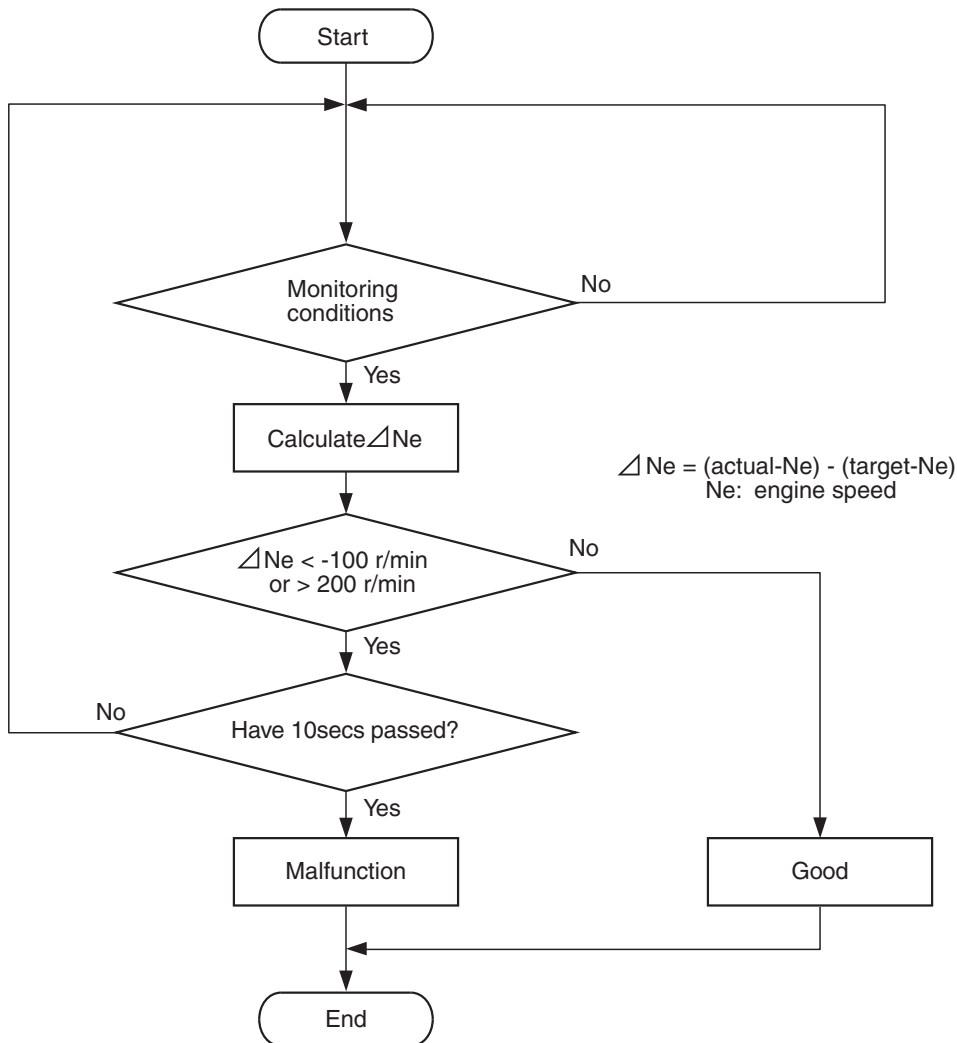
- Misfire monitor
- Exhaust gas recirculation (EGR) system monitor
- Fuel system monitor
- Vehicle speed sensor monitor <M/T>

**Sensor (The sensor below is determined to be normal)**

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

## DTC SET CONDITIONS

### Logic Flow Chart



AK704413

#### Check Conditions

- Under the closed loop idle speed control.
- The engine coolant temperature is more than 41° C (106° F).
- Battery positive voltage is more than 10 volts.
- Barometric pressure is more than 76 kPa (22.4 in.Hg).
- Intake air temperature is more than -10° C (14° F).
- More than 3 seconds have passed from the end of the previous monitoring.
- Target airflow rate is more than 14 g/sec (12 L/sec) when engine coolant temperature is more than 77° C (171° F). <M/T>
- Target airflow rate is more than 23 g/sec (19 L/sec) when engine coolant temperature is more than 77° C (171° F). <CVT>

- Target airflow rate is more than 36 g/sec (30 L/sec) when engine coolant temperature is less than 77° C (171° F).

#### Judgement Criterion

- The actual idle speed is less than the target idle speed by 100 r/min or more for 10 seconds.

#### FAIL-SAFE AND BACKUP FUNCTION

- None

#### OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function –OBD-II Drive Cycle – Pattern 18 [P.13B-12](#).

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

- Throttle valve area is dirty.
- Throttle body assembly failed.
- ECM failed.

**DIAGNOSIS****Required Special Tool:**

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

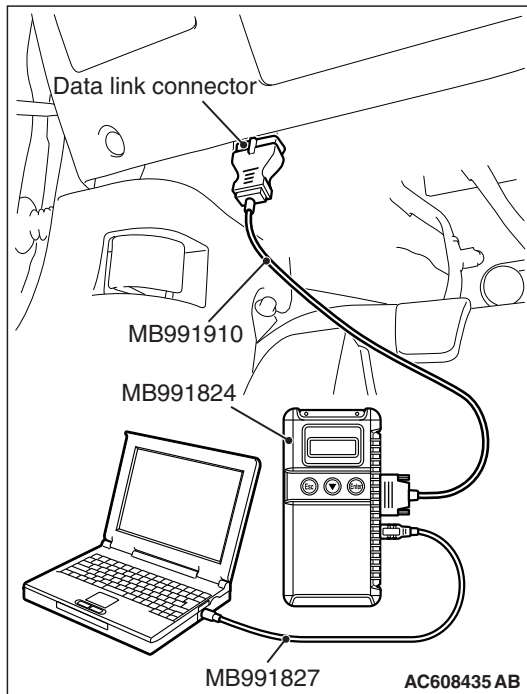
**STEP 1. Using scan tool MB991958, read the diagnostic trouble code (DTC).****⚠ CAUTION**

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

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

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

- YES** : Refer to, Diagnostic Trouble Code Chart [P.13B-51](#).  
**NO** : Go to Step 2.

**STEP 2. Check the throttle body. (throttle valve area)****Q: Is the throttle valve area dirty?**

- YES** : Perform cleaning. Refer to, Throttle Body (throttle valve area) Cleaning [P.13B-996](#). Then go to Step 4.  
**NO** : Go to Step 3.

---

**STEP 3. Replace the throttle body assembly.**

- (1) Replace the throttle body assembly.
- (2) Carry out test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle –Pattern 18 [P.13B-12](#).
- (3) Check the diagnostic trouble code (DTC).

**Q: Is DTC P0506 set?**

**YES :** Replace the ECM (Refer to, Removal and Installation [P.13B-1022](#)). Then go to Step 4.

**NO :** The inspection is complete.

---

**STEP 4. Test the OBD-II drive cycle.**

- (1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle –Pattern 18 [P.13B-12](#).
- (2) Check the diagnostic trouble code (DTC).

**Q: Is DTC P0506 set?**

**YES :** Retry the troubleshooting.

**NO :** The inspection is complete.

---

**DTC P0507: Idle Control System RPM Higher Than Expected**

---

**TECHNICAL DESCRIPTION**

- The amount of air taken in during idling is regulated by the opening and closing of the throttle valve.
- The ECM checks the difference between the actual engine speed and the target engine speed.

**DESCRIPTIONS OF MONITOR METHODS**

Difference between actual and target idle speed is over the specified value.

**MONITOR EXECUTION**

Continuous

**MONITOR EXECUTION CONDITIONS  
(Other monitor and Sensor)**

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

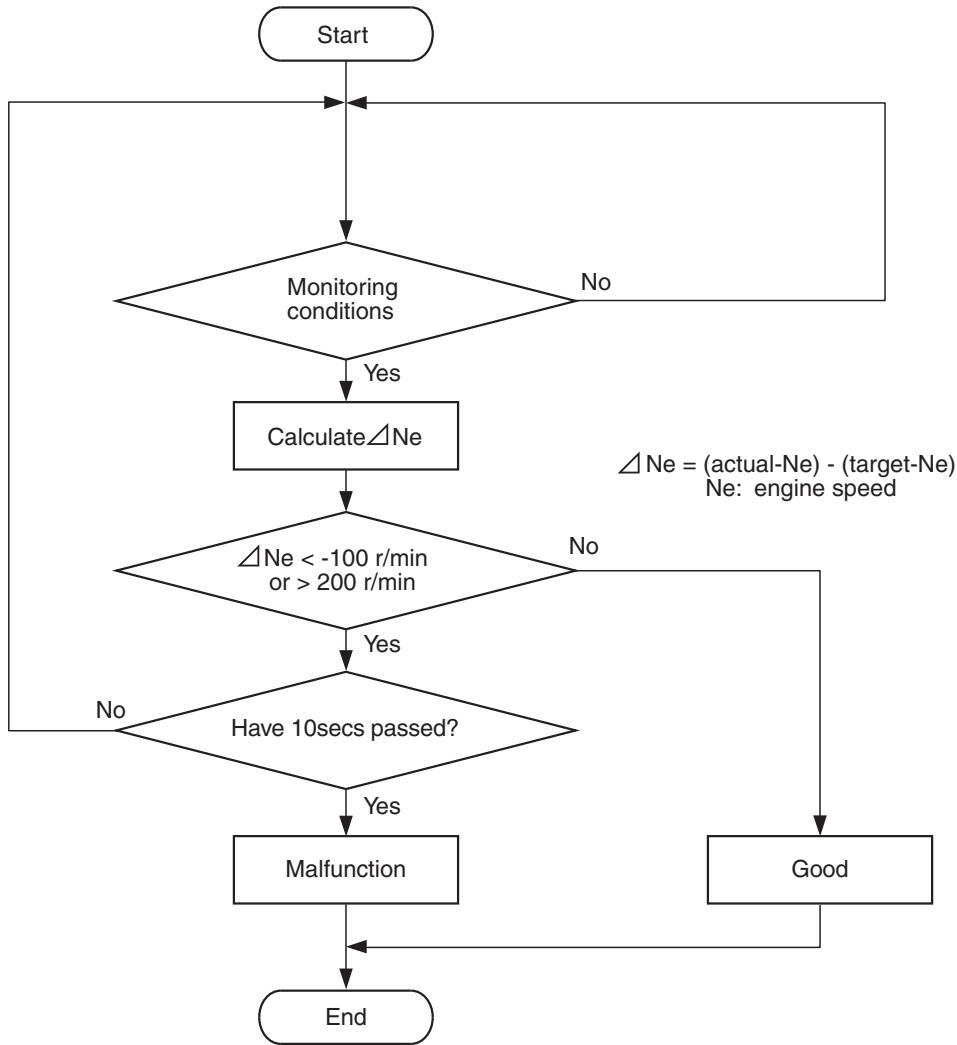
- Misfire monitor
- Exhaust gas recirculation (EGR) system monitor
- Fuel system monitor
- Vehicle speed sensor monitor <M/T>

**Sensor (The sensor below is determined to be normal)**

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

DTC SET CONDITIONS

Logic Flow Chart



AK704413

**Check Conditions**

- Under the closed loop idle speed control.
- Engine coolant temperature is more than 41° C (106° F).
- Battery positive voltage is more than 10 volts.
- Barometric pressure is more than 76 kPa (22.4 in.Hg).
- Intake air temperature is more than -10° C (14° F).
- More than 3 seconds have passed from the end of the previous monitoring.
- Target airflow rate is 0 g/sec (0 L/sec).

**Judgement Criterion**

- The actual idle speed is more than the target idle speed by 200 r/min (300 r/min\*) or more for 10 seconds.

\*: Specs in parentheses are applicable if the maximum intake air temperature during the previous operation was more than 45° C (113° F).

**FAIL-SAFE AND BACKUP FUNCTION**

- None

**OBD-II DRIVE CYCLE PATTERN**

Refer to Diagnostic Function –OBD-II Drive Cycle – Pattern 18 [P.13B-12](#).

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

- Intake system vacuum leak.
- Throttle body assembly failed.
- ECM failed.

## DIAGNOSIS

### Required Special Tool:

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

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

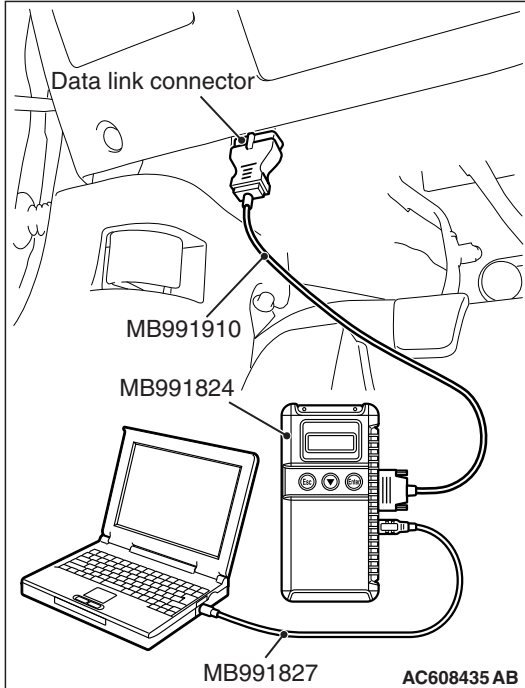
#### **⚠ CAUTION**

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

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

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

- YES** : Refer to, Diagnostic Trouble Code Chart [P.13B-51](#).  
**NO** : Go to Step 2.



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

**Q: Are there any abnormalities?**

- YES** : Repair it. Then go to Step 4.  
**NO** : Go to Step 3.

**STEP 3. Replace the throttle body assembly.**

- (1) Replace the throttle body assembly.
- (2) Carry out test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle –Pattern 18 [P.13B-12](#).
- (3) Check the diagnostic trouble code (DTC).

**Q: Is DTC P0507 set?**

- YES** : Replace the ECM (Refer to, Removal and Installation [P.13B-1022](#)). Then go to Step 4.  
**NO** : The inspection is complete.

**STEP 4. Test the OBD-II drive cycle.**

- (1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle –Pattern 18 [P.13B-12](#).
- (2) Check the diagnostic trouble code (DTC).

**Q: Is DTC P0507 set?**

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

**DTC P050B: Ignition Timing Retard Insufficient**

---

**TECHNICAL DESCRIPTION**

- After starting the engine in the cold state, the ECM retards the ignition timing to early activate the catalyst by letting out the high temperature exhaust gases.
- The ECM monitors whether the retard ignition timing control is normal or not.

**DESCRIPTIONS OF MONITOR METHODS**

After starting the engine in the cold state, the retard ignition timing control is abnormal, which is caused by a decrease in idle speed and so on.

**MONITOR EXECUTION**

Once per driving cycle

**MONITOR EXECUTION CONDITIONS  
(Other monitor and Sensor)**

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

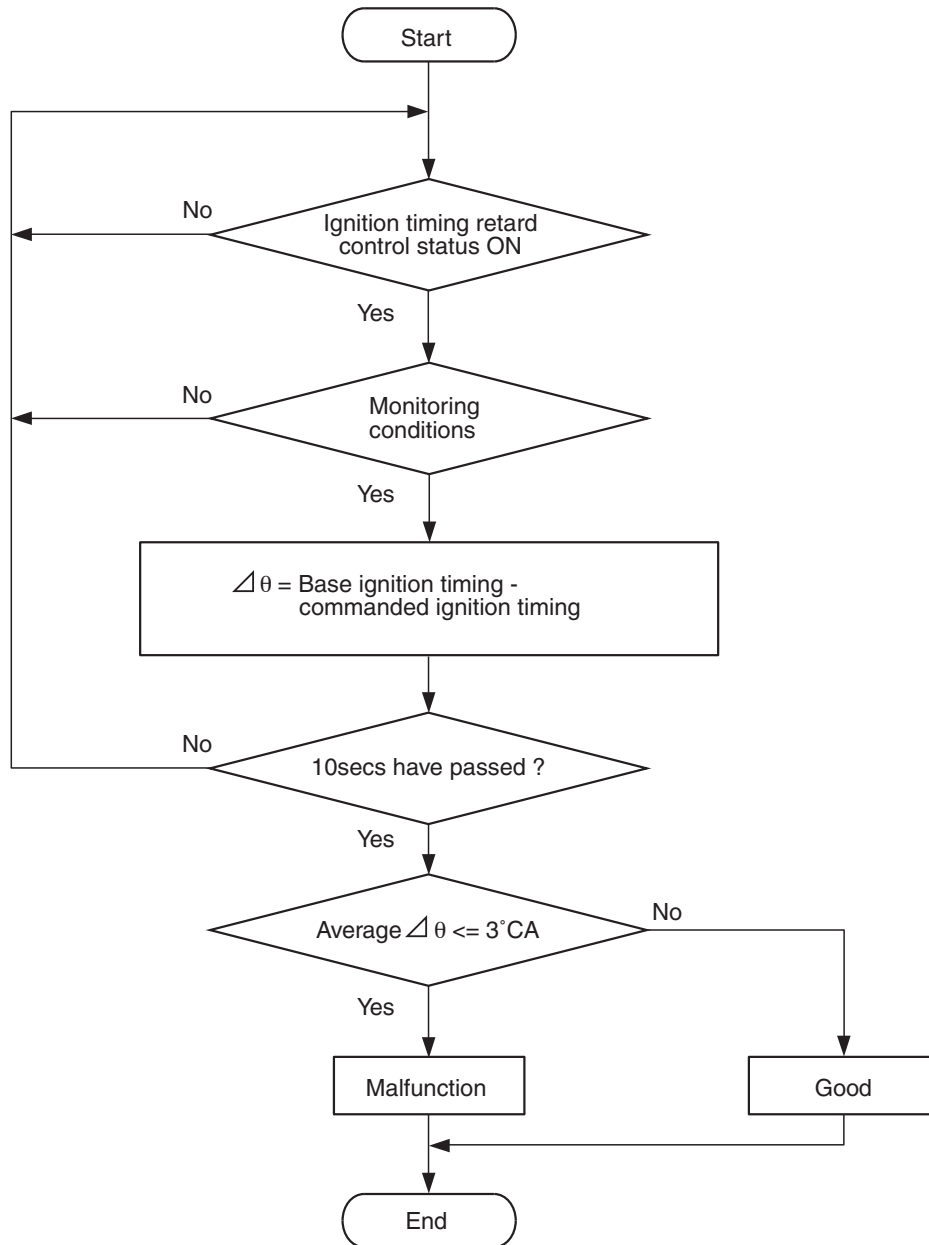
- Not applicable

**Sensor (The sensor below is determined to be normal)**

- Not applicable

**DTC SET CONDITIONS**

**Logic Flow Chart**



AK704294

**Check Conditions**

- Under the ignition timing retard control.
- Engine coolant temperature is between 7° C (45° F) and 41° C (106° F).

**Judgement Criterion**

- For 10 seconds, the target/specified ignition timing subtracted from the basic ignition timing is less than 3 degrees on average during the retard control.

**FAIL-SAFE AND BACKUP FUNCTION**

- None

**OBD-II DRIVE CYCLE PATTERN**

Refer to Diagnostic Function –OBD-II Drive Cycle – Pattern 19 [P.13B-12](#).



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

- Throttle valve area is dirty.
- ECM failed.

**DIAGNOSIS****Required Special Tool:**

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

---

**STEP 1. Check the throttle body. (throttle valve area)****Q: Is the throttle valve area dirty?**

**YES** : Perform cleaning. Refer to, Throttle Body (throttle valve area) Cleaning [P.13B-996](#). Then go to Step 3.

**NO** : Go to Step 2.

---

**STEP 2. Check the trouble symptoms.**

(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle –Pattern 19 [P.13B-12](#).

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

**Q: Is DTC P050B set?**

**YES** : Replace the ECM (Refer to, Removal and Installation [P.13B-1022](#)). Then go to Step 3.

**NO** : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions [P.00-13](#).

---

**STEP 3. Test the OBD-II drive cycle.**

(1) Carry out test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle –Pattern 19 [P.13B-12](#).

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

**Q: Is DTC P050B set?**

**YES** : Retry the troubleshooting.

**NO** : The inspection is complete.

**DTC P0513: Immobilizer Malfunction**

**TECHNICAL DESCRIPTION**

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

**DTC SET CONDITIONS**

**Check Condition**

- Ignition switch is "ON" position.

**Judgment Criterion**

- When it was different in the encrypted code sent from immobilizer-ECU and operation result by ECM.

**FAIL-SAFE AND BACKUP FUNCTION**

- Engine start is prohibited.

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

- CAN system failed.
- Immobilizer system failed.
- ECM failed.

**DIAGNOSIS**

**Required Special Tool:**

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

**STEP 1. Using scan tool MB991958, check VIN Information.**

**CAUTION**

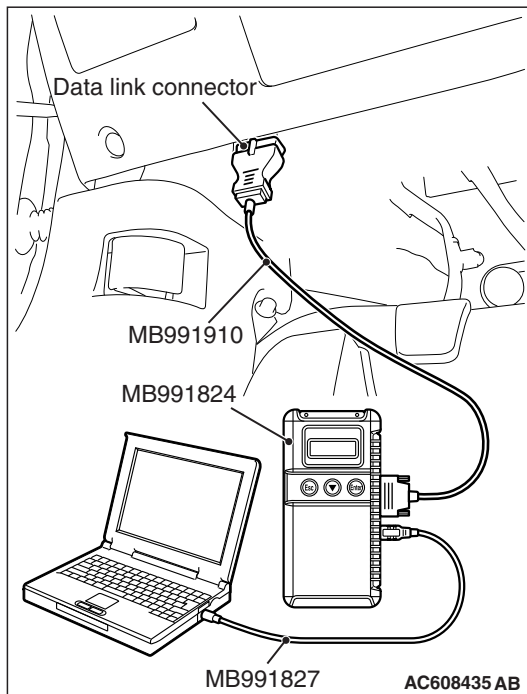
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

- (1) Connect scan tool MB991958 to the data link connector.
- (2) Turn the ignition switch to the "ON" position.
- (3) Set scan tool MB991958 to the coding mode for VIN Information.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Has VIN (current) been written?**

**YES** : Go to Step 2.

**NO** : Write VIN. Then go to Step 2.



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

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

**Q: Is the immobilizer-DTC set?**

**YES** : Refer to GROUP 42B, Diagnosis –Diagnostic Trouble Code Chart <Vehicles with KOS> [P.42B-31](#) or GROUP 42C, Diagnosis –Diagnostic Trouble Code Chart <Vehicles with WCM> [P.42C-18](#).

**NO** : Go to Step 3.

---

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

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

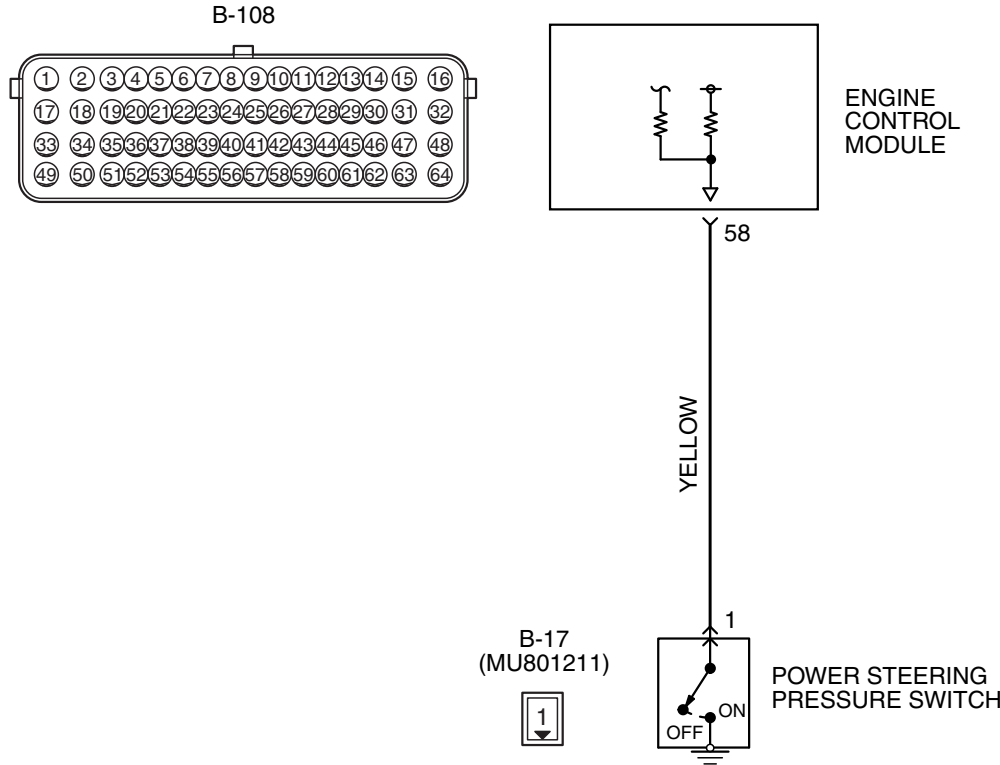
**Q: Is DTC P0513 set?**

**YES** : Replace the ECM (Refer to, Removal and Installation [P.13B-1022](#)).

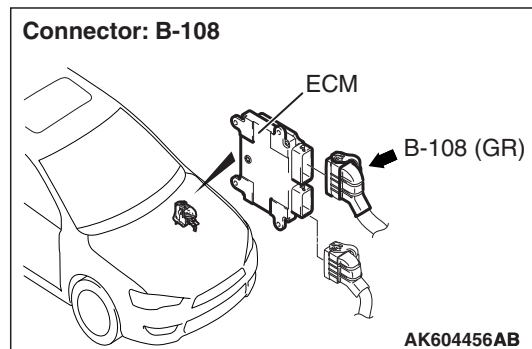
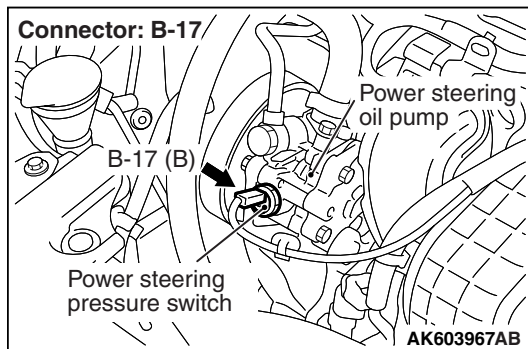
**NO** : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions [P.00-13](#).

DTC P0551: Power Steering Pressure Switch Circuit Range/Performance

POWER STEERING PRESSURE SWITCH CIRCUIT



AK802012AB



**CIRCUIT OPERATION**

- A battery positive voltage is applied to the power steering pressure switch output terminal (terminal No. 1) from the ECM (terminal No. 58) via the resistor in the ECM.

**TECHNICAL DESCRIPTION**

- The power steering pressure switch converts the existence of a power steering load into a high/low voltage, and inputs it into the ECM.

- When the steering wheel is turned, hydraulic pressure rises. The power steering pressure switch closes, and the applied battery positive voltage will be grounded. With this, the power steering pressure switch output voltage will fluctuate between 0 and 12 volts.
- While driving with the steering wheel held straight, the power steering pressure switch turns "OFF".
- The ECM checks whether the power steering pressure switch turns "OFF" or "ON" during driving.

**MONITOR EXECUTION**

Continuous

**MONITOR EXECUTION CONDITIONS (Other monitor and Sensor)**

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

- Not applicable

**Sensor (The sensor below is determined to be normal)**

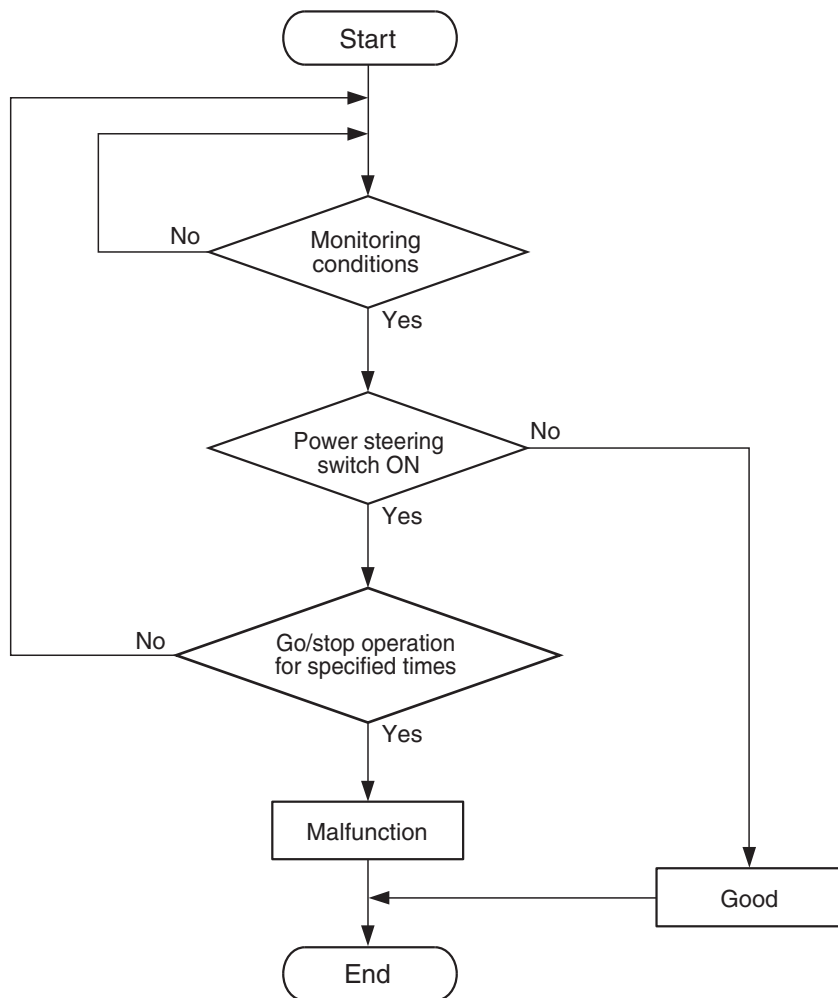
- Engine coolant temperature sensor

**DESCRIPTIONS OF MONITOR METHODS**

Power steering pressure switch stays on during specified go/stop operations.

**DTC SET CONDITIONS**

**Logic Flow Chart**



### Check Conditions

- Engine coolant temperature is more than 20° C (68° F).
- Repeat 10 times or more: drive\*<sup>1</sup>, stop\*<sup>2</sup>.  
Drive\*<sup>1</sup>:
  - Vehicle speed is more than 50 km/h (31 mph) lasting 4 seconds or more.Stop\*<sup>2</sup>:
  - Vehicle speed is less than 1.5 km/h (1 mph).

### Judgement Criterion

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

### FAIL-SAFE AND BACKUP FUNCTION

- None

### OBD-II DRIVE CYCLE PATTERN

None.

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

- Power steering pressure switch failed.
- Shorted power steering pressure switch circuit or connector damage.
- ECM failed.

## DIAGNOSIS

### Required Special Tool:

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

### STEP 1. Using scan tool MB991958, check data list item 83: Power Steering Pressure Switch.

#### **⚠ CAUTION**

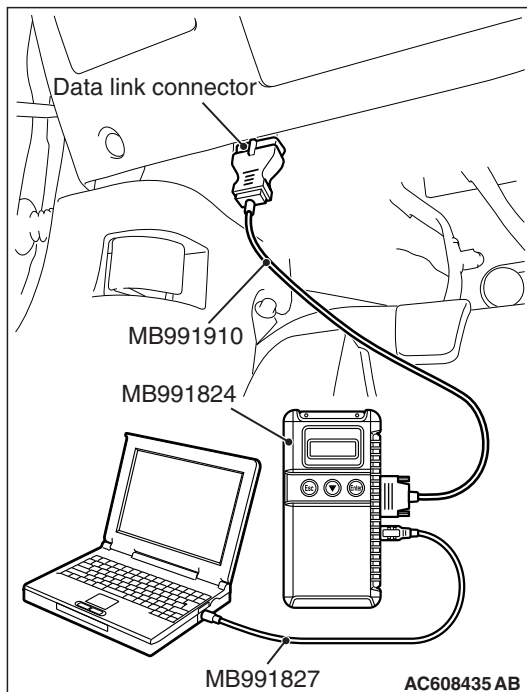
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

- (1) Connect scan tool MB991958 to the data link connector.
- (2) Start the engine and run at idle.
- (3) Set scan tool MB991958 to the data reading mode for item 83, Power Steering Pressure Switch.
  - If the steering wheel is not turned while idling, "OFF" should be displayed.
  - If the steering wheel is turned while idling, "ON" should be displayed.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

### Q: Is the switch operating properly?

**YES** : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13.

**NO** : Go to Step 2.



**STEP 2. Check harness connector B-17 at power steering pressure switch 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 9.

**STEP 3. Measure the power supply voltage at power steering pressure switch harness side connector B-17.**

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

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

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

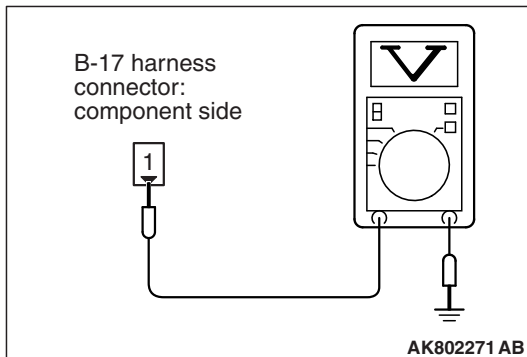
- Voltage should be battery positive voltage.

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

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

**YES :** Go to Step 7.

**NO :** Go to Step 4.



**STEP 4. Check harness connector B-108 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 short circuit to ground between power steering pressure switch connector B-17 (terminal No. 1) and ECM connector B-108 (terminal No. 58).**

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

**YES :** Go to Step 6.

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

---

**STEP 6. Using scan tool MB991958, check data list item 83:  
Power Steering Pressure Switch.**

- (1) Start the engine and run at idle.
- (2) Set scan tool MB991958 to the data reading mode for item 83, Power Steering Pressure Switch.
  - If the steering wheel is not turned while idling, "OFF" should be displayed.
  - If the steering wheel is turned while idling, "ON" should be displayed.
- (3) Turn the ignition switch to the "LOCK" (OFF) position.

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

- YES** : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions [P.00-13](#).
- NO** : Replace the ECM (Refer to, Removal and Installation [P.13B-1022](#)). Then go to Step 9.

---

**STEP 7. Check harness connector B-108 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. Replace the power steering pressure switch.**

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

**Q: Is DTC P0551 set?**

- YES** : Replace the ECM (Refer to, Removal and Installation [P.13B-1022](#)). Then go to Step 9.
- NO** : The inspection is complete.

---

**STEP 9. Using scan tool MB991958, check data list item 83:  
Power Steering Pressure Switch.**

- (1) Start the engine and run at idle.
- (2) Set scan tool MB991958 to the data reading mode for item 83, Power Steering Pressure Switch.
  - If the steering wheel is not turned while idling, "OFF" should be displayed.
  - If the steering wheel is turned while idling, "ON" should be displayed.
- (3) Turn the ignition switch to the "LOCK" (OFF) position.

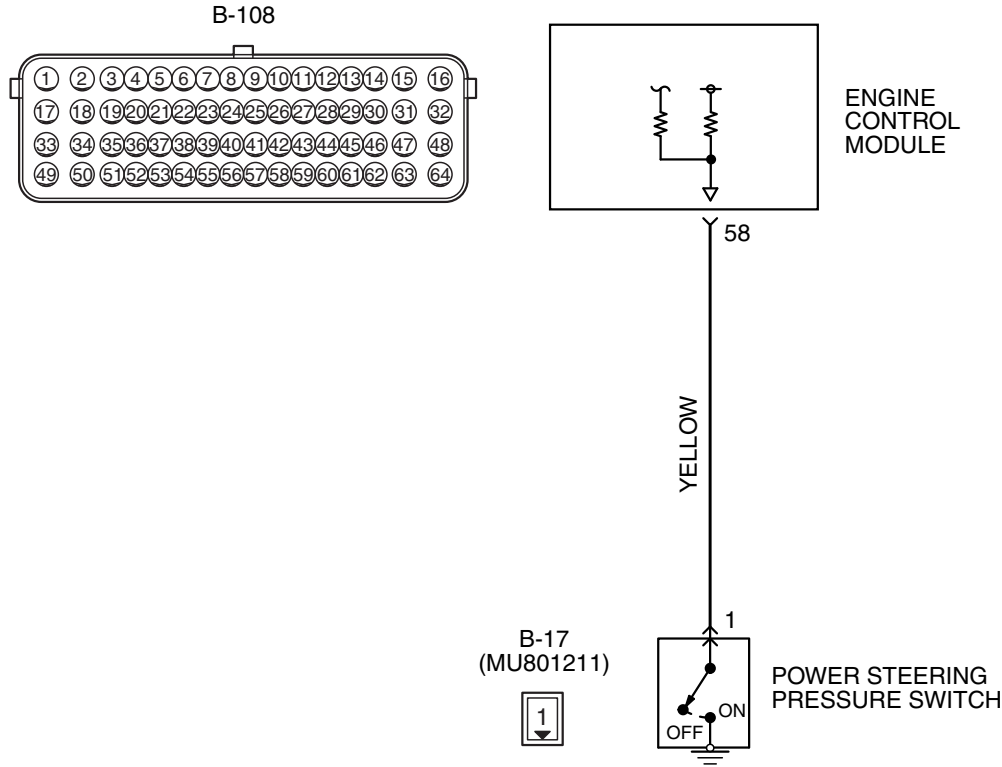
**Q: Is the switch operating properly?**

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

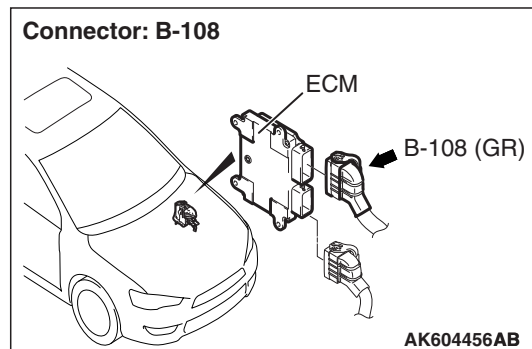
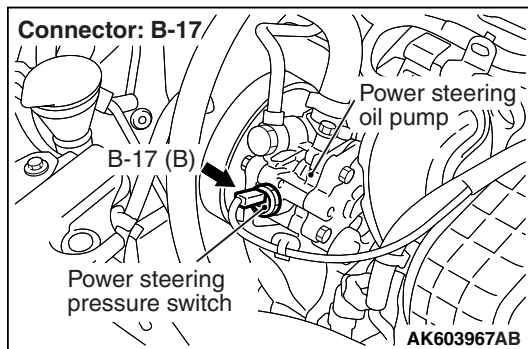


DTC P0554: Power Steering Pressure Switch Circuit Intermittent

POWER STEERING PRESSURE SWITCH CIRCUIT



AK802012AB



**CIRCUIT OPERATION**

- A battery positive voltage is applied to the power steering pressure switch output terminal (terminal No. 1) from the ECM (terminal No. 58) via the resistor in the ECM.

**TECHNICAL DESCRIPTION**

- The power steering pressure switch converts the existence of a power steering load into a high/low voltage, and inputs it into the ECM.

- When the steering wheel is turned, hydraulic pressure rises. The power steering pressure switch closes, and the applied battery positive voltage will be grounded. With this, the power steering pressure switch output voltage will fluctuate between 0 and 12 volts.
- While driving with the steering wheel held straight, the power steering pressure switch turns "OFF".
- The ECM checks whether the power steering pressure switch turns "OFF" or "ON" during driving.

### DESCRIPTIONS OF MONITOR METHODS

Power steering pressure switch changes from off to on more than 10 times for 1 second.

### MONITOR EXECUTION

Continuous

### MONITOR EXECUTION CONDITIONS (Other monitor and Sensor)

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

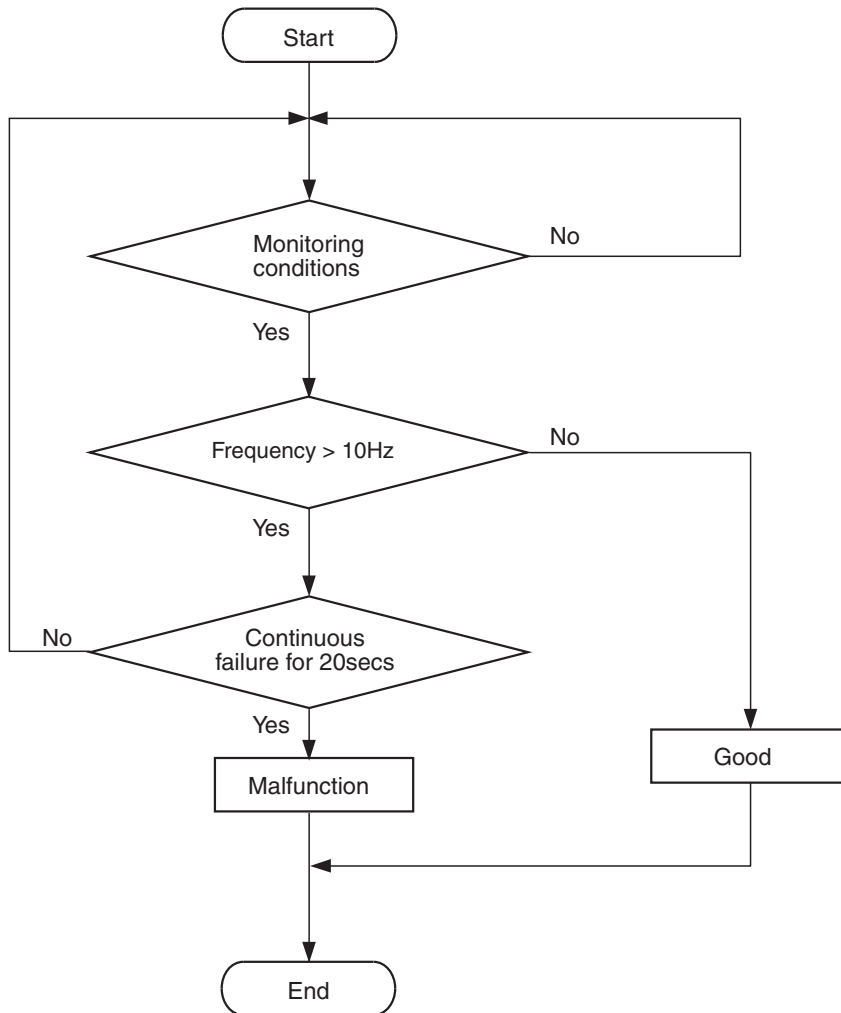
- Not applicable

**Sensor (The sensor below is determined to be normal)**

- Engine coolant temperature sensor

DTC SET CONDITIONS

Logic Flow Chart



AK703260

**Check Conditions**

- Engine coolant temperature is more than 20° C (68° F).
- Vehicle speed is more than 50 km/h (31 mph).

**Judgement Criterion**

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

**FAIL-SAFE AND BACKUP FUNCTION**

- None

**OBD-II DRIVE CYCLE PATTERN**

Refer to Diagnostic Function –OBD-II Drive Cycle – Pattern 17 [P.13B-12](#)

**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 connector damage.
- ECM failed.

## DIAGNOSIS

### Required Special Tool:

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

### STEP 1. Using scan tool MB991958, check data list item 83: Power Steering Pressure Switch.

#### **⚠ CAUTION**

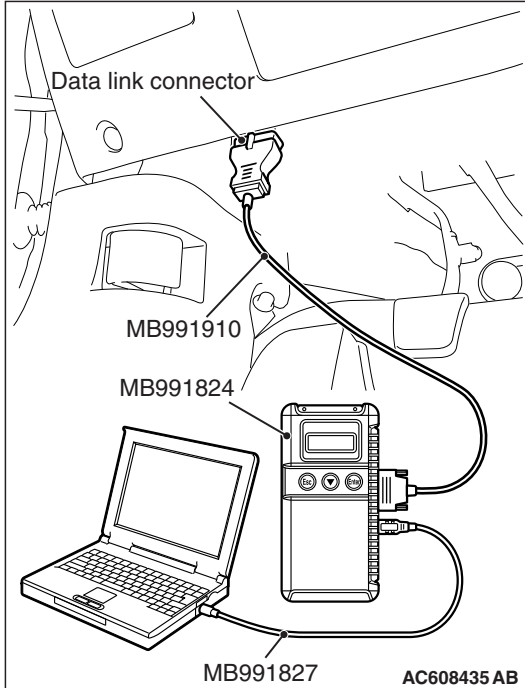
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

- (1) Connect scan tool MB991958 to the data link connector.
- (2) Start the engine and run at idle.
- (3) Set scan tool MB991958 to the data reading mode for item 83, Power Steering Pressure Switch.
  - If the steering wheel is not turned while idling, "OFF" should be displayed.
  - If the steering wheel is turned while idling, "ON" should be displayed.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

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

**YES** : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13.

**NO** : Go to Step 2.



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

Refer to GROUP 37, On-vehicle Service –Fluid Level Check P.37-25.

#### **Q: Are there any abnormalities?**

**YES** : Repair it. Then go to Step 8.

**NO** : Go to Step 3.

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

Refer to GROUP 37, On-vehicle Service –Power Steering Pressure Switch Check P.37-30.

#### **Q: Are there any abnormalities?**

**YES** : Replace the power steering pressure switch. Then go to Step 8.

**NO** : Go to Step 4.

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

Refer to GROUP 37, On-vehicle Service –Oil Pump Pressure Test [P.37-29](#).

**Q: Are there any abnormalities?**

**YES** : Repair it. Then go to Step 8.

**NO** : Go to Step 5.

---

**STEP 5. Check harness connector B-17 at power steering pressure switch and harness connector B-108 at ECM for damage.****Q: Are the harness connectors in good condition?**

**YES** : Go to Step 6.

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

---

**STEP 6. Check for harness damage between power steering pressure switch connector B-17 (terminal No. 1) and ECM connector B-108 (terminal No. 58).****Q: Is the harness wire in good condition?**

**YES** : Go to Step 7.

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

---

**STEP 7. Check the trouble symptoms.**

(1) Carry out test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle –Pattern 17 [P.13B-12](#).

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

**Q: Is DTC P0554 set?**

**YES** : Replace the ECM (Refer to, Removal and Installation [P.13B-1022](#)). Then go to Step 8.

**NO** : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions [P.00-13](#).

---

**STEP 8. Test the OBD-II drive cycle.**

(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle –Pattern 17 [P.13B-12](#).

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

**Q: Is DTC P0554 set?**

**YES** : Retry the troubleshooting.

**NO** : The inspection is complete.

**DTC P0603: EEPROM Malfunction**

**TECHNICAL DESCRIPTION**

- ECM stored the information such as the idle learned value and so on in the memory of ECM.

**DESCRIPTIONS OF MONITOR METHODS**

To check whether the information such as the idle learned value and so on is stored in the memory of ECM.

**MONITOR EXECUTION**

Once per driving cycle

**DTC SET CONDITIONS**

**Logic Flow Chart**

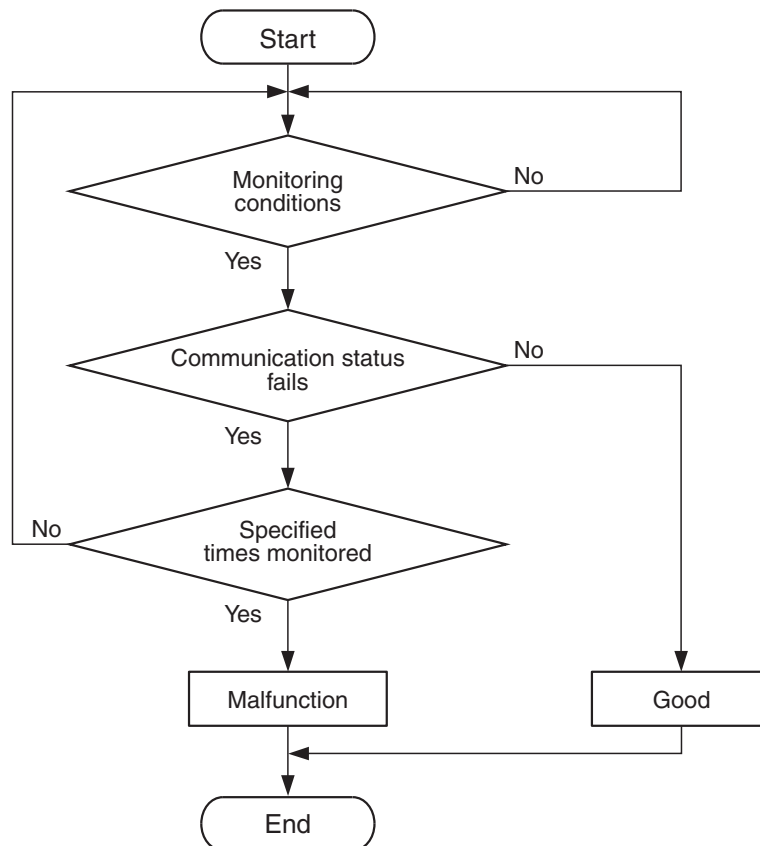
**MONITOR EXECUTION CONDITIONS  
(Other monitor and Sensor)**

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

- Not applicable

**Sensor (The sensor below is determined to be normal)**

- Not applicable



AK704415

**Check Condition**

- Ignition switch is "ON" position.

**Judgement Criterion**

- The latest data that was flashed while the ignition switch was in "LOCK" (OFF) position are not stored correctly.

**FAIL-SAFE AND BACKUP FUNCTION**

- None

**OBD-II DRIVE CYCLE PATTERN**

None.

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

- ECM failed.

**DIAGNOSIS****Required Special Tool:**

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

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

**⚠ CAUTION**

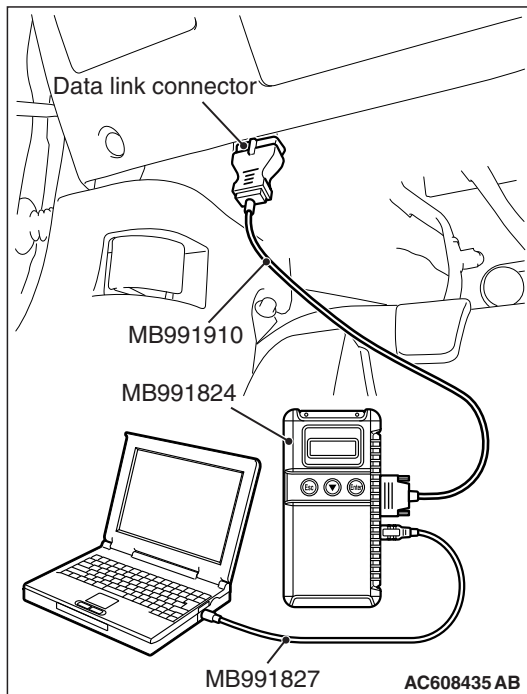
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

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

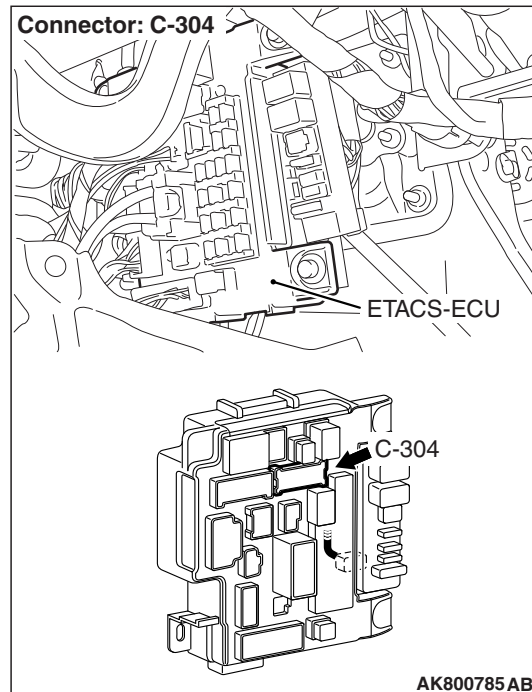
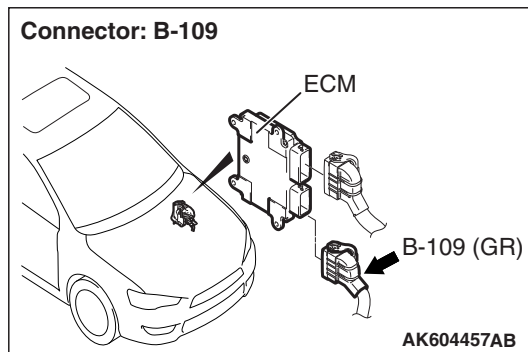
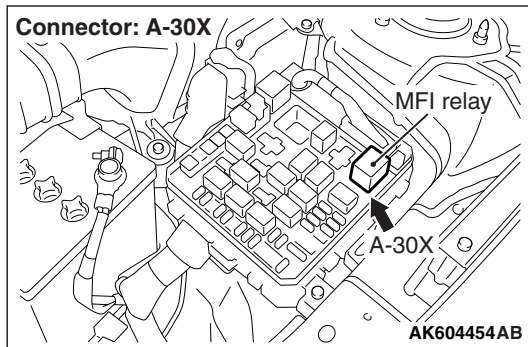
**Q: Is DTC P0603 set?**

**YES :** Replace the ECM (Refer to, Removal and Installation P.13B-1022).

**NO :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13.



**DTC P0606: Engine Control Module Main Processor Malfunction**



**ENGINE CONTROL MODULE MAIN PROCESSOR MALFUNCTION CIRCUIT**

- Refer to Inspection Procedure 23 –Power Supply System and Ignition Switch-IG System [P.13B-889](#).

**CIRCUIT OPERATION**

- Refer to Inspection Procedure 23 –Power Supply System and Ignition Switch-IG System [P.13B-889](#).

**TECHNICAL DESCRIPTION**

- Throttle actuator control processor checks the ECM for abnormal conditions.

**DESCRIPTIONS OF MONITOR METHODS**

No watch dog pulse is detected.

**MONITOR EXECUTION**

Continuous

**MONITOR EXECUTION CONDITIONS (Other monitor and Sensor)**

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

- Not applicable

Sensor (The sensor below is determined to be normal)

- Not applicable

**DTC SET CONDITIONS**

**Check Condition**

- Ignition switch is "ON" position.

**Judgement Criterion**

- No surveillance pulse signals is inputted for 0.5 second.

**FAIL-SAFE AND BACKUP FUNCTION**

- Throttle opening degree position is in default position.

**OBD-II DRIVE CYCLE PATTERN**

None.

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

- MFI relay failed.
- Shorted MFI relay circuit or connector damage.
- Open or shorted ignition switch-IG circuit, harness damage or connector damage.
- ECM failed.



**DIAGNOSIS****Required Special Tool:**

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

**STEP 1. Check the battery.**

Refer to GROUP 54A, Battery –On-vehicle Service –Battery Test [P.54A-8](#).

**Q: Are there any abnormalities?**

- YES** : Replace the battery. Then go to Step 11.  
**NO** : Go to Step 2.

**STEP 2. Check harness connector B-109 at ECM for damage.****Q: Is the harness connector in good condition?**

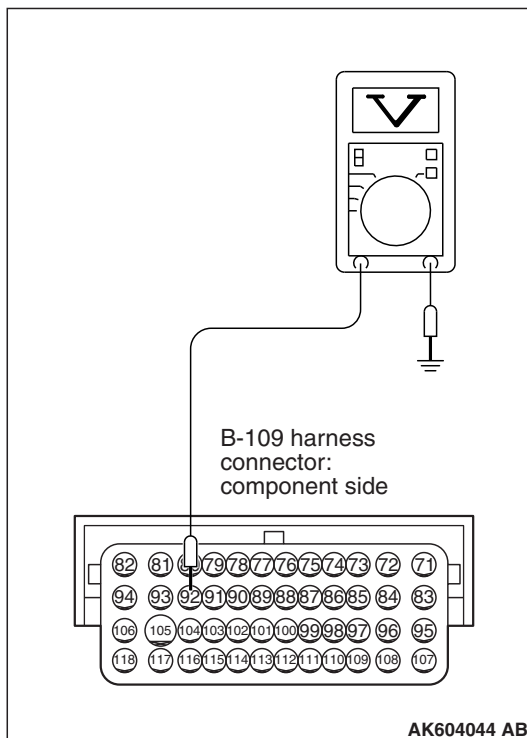
- YES** : Go to Step 3.  
**NO** : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then go to Step 11.

**STEP 3. Measure the ignition switch-IG signal voltage at ECM harness side connector B-109.**

- (1) Disconnect the connector B-109 and measure at the harness side.
- (2) Turn the ignition switch to the "ON" position.
- (3) Measure the voltage between terminal No. 92 and ground.
  - Voltage should be battery positive voltage.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

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

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



---

**STEP 4. Check harness connector C-304 at ETACS-ECU for damage.**

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

**YES :** Repair harness wire between ETACS-ECU connector C-304 (terminal No. 10) and ECM connector B-109 (terminal No. 92) because of open circuit or short circuit to ground. Then go to Step 11.

**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 C-304 at ETACS-ECU 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. Check for harness damage between ETACS-ECU connector C-304 (terminal No. 10) and ECM connector B-109 (terminal No. 92).**

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

**YES :** Go to Step 7.

**NO :** Repair it. Then go to Step 11.

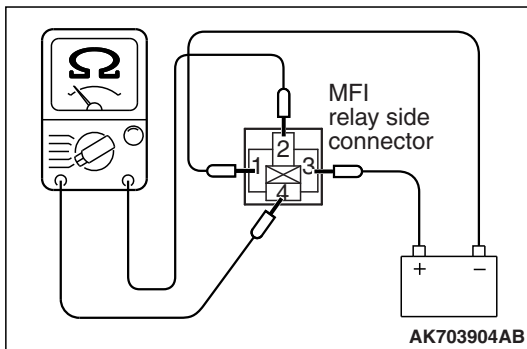
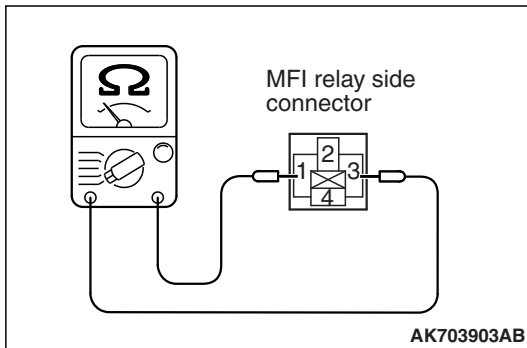
---

**STEP 7. Check harness connector A-30X at MFI relay 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 the MFI relay.**

- (1) Remove the MFI relay.
- (2) Check for continuity between the MFI relay terminals No. 1 and No. 3.
  - There should be continuity.

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

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

**YES :** Go to Step 9.

**NO :** Replace the MFI relay. Then go to Step 11.

**STEP 9. Check for short circuit to ground between MFI relay connector A-30X (terminal No. 1) and ECM connector B-109 (terminal No. 73).**

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

**YES :** Go to Step 10.

**NO :** Repair it. Then go to Step 11.

**STEP 10.** Using scan tool MB991958, read the diagnostic trouble code (DTC).

**CAUTION**

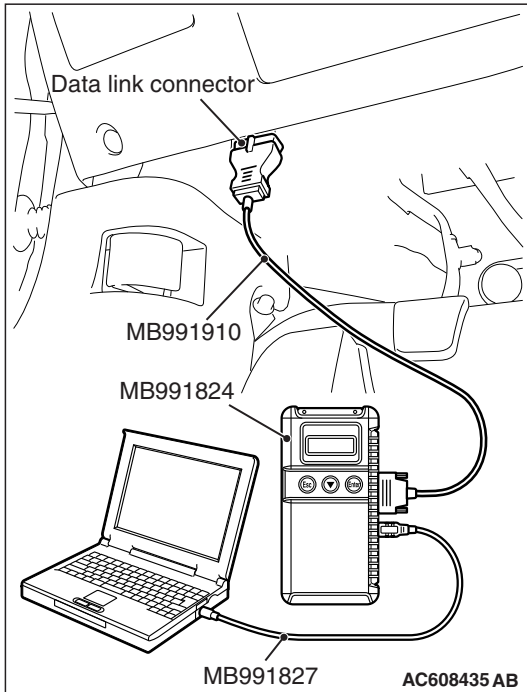
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

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

**Q: Is DTC P0606 set?**

**YES :** Replace the ECM (Refer to, Removal and Installation P.13B-1022). 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 –How to Cope with Intermittent Malfunctions P.00-13.



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

**CAUTION**

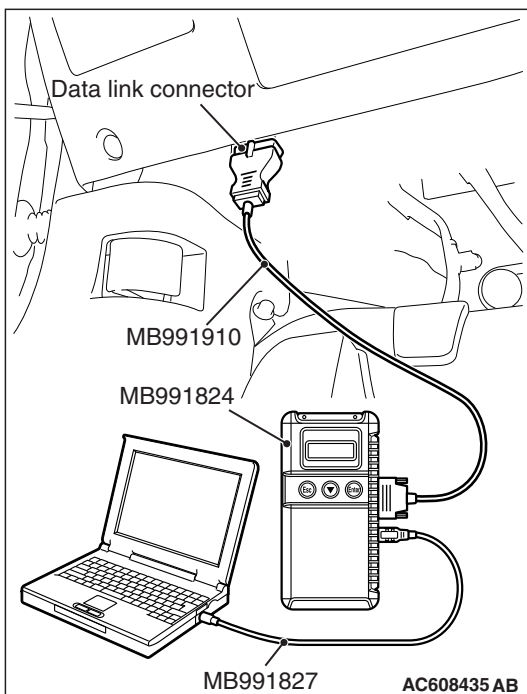
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

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

**Q: Is DTC P0606 set?**

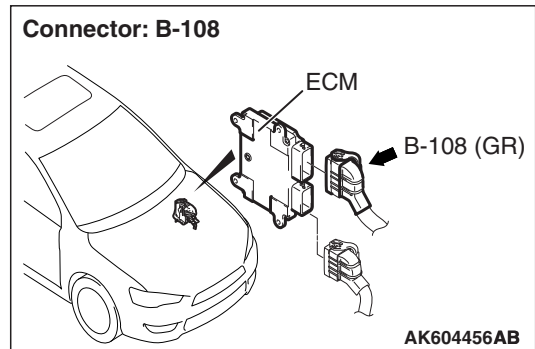
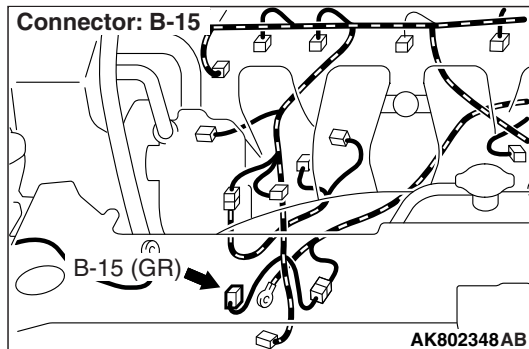
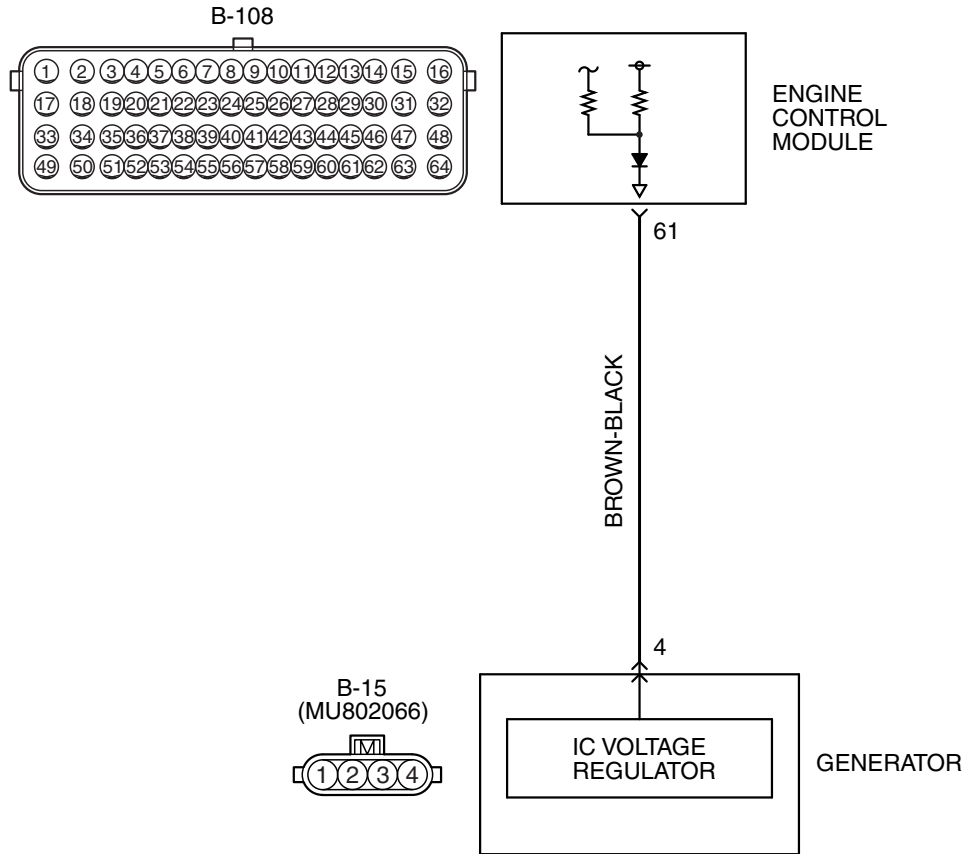
**YES :** Retry the troubleshooting.

**NO :** The inspection is complete.



DTC P0622: Generator FR Terminal Circuit Malfunction

GENERATOR CIRCUIT



AK604253AF

**CIRCUIT OPERATION**

- The ECM (terminal No. 61) apply a battery 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 throttle actuator control motor according to the generator output.

---

## DTC SET CONDITIONS

### Check Condition

- Engine speed is more than 50 r/min.

### Judgement Criterion

- Input voltage from the generator FR terminal is battery positive voltage for 20 seconds.

## FAIL-SAFE AND BACKUP FUNCTION

- Prohibits generator output suppression control against current consumers. (Operates as a normal generator.)

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

- Generator failed.
- Open circuit in generator FR terminal circuit, harness damage or connector damage.
- ECM failed.

## DIAGNOSIS

### Required Special Tools:

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

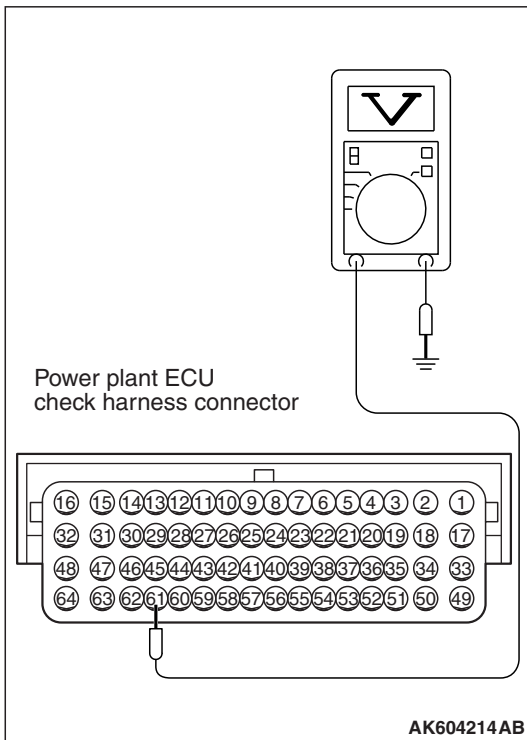
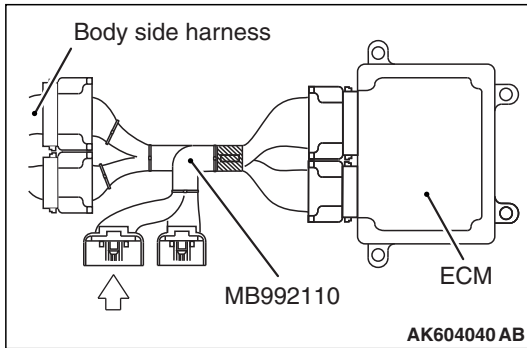
---

**STEP 1. Check harness connector B-108 at ECM for damage.**

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

**YES :** Go to Step 2.

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



**STEP 2. Measure the output voltage at ECM connector B-108 by using power plant ECU check harness special tool MB992110.**

- (1) Disconnect all ECM connectors. Connect the power plant ECU check harness special tool MB992110 between the separated connectors.
- (2) Start the engine and run at idle.

- (3) Measure the voltage between terminal No. 61 and ground.
 

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

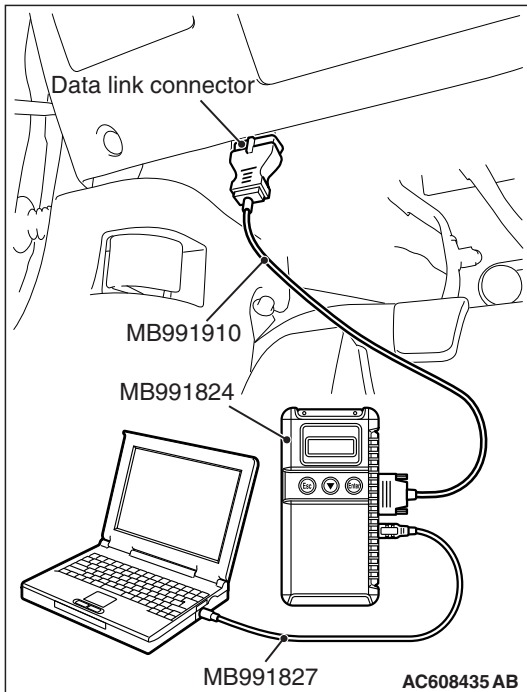
- a. Engine: warming up
- b. Radiator fan: stopped
- c. Headlight switch: OFF to ON
- d. Rear defogger switch: OFF to ON
- e. Stoplight switch: OFF to ON
  - Voltage should be drop.

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

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

**YES :** Go to Step 3.

**NO :** Go to Step 4.



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

**CAUTION**

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

- (1) Connect scan tool MB991958 to the data link connector.
- (2) Start the engine and run at idle.
- (3) After the DTC has been deleted, read the DTC again.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is DTC P0622 set?**

**YES :** Replace the ECM (Refer to, Removal and Installation P.13B-1022). Then go to Step 8.

**NO :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13.

**STEP 4.** Check harness connector B-15 at generator for damage.

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

**YES :** Go to Step 5.

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

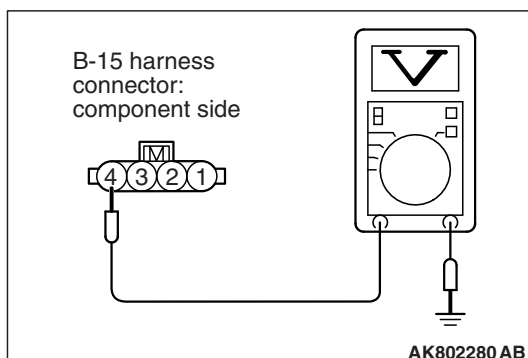
**STEP 5.** Measure the power supply voltage at generator harness side connector B-15.

- (1) Disconnect the connector B-15 and measure at the harness side.
- (2) Turn the ignition switch to the "ON" position.
- (3) Measure the voltage between terminal No. 4 and ground.
  - Voltage should be battery positive voltage.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

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

**YES :** Go to Step 7.

**NO :** Go to Step 6.





**STEP 6. Check for open circuit between generator connector B-15 (terminal No. 4) and ECM connector B-108 (terminal No. 61).**

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

**YES :** Replace the ECM (Refer to, Removal and Installation [P.13B-1022](#)). Then go to Step 8.

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

**STEP 7. Check for harness damage between generator connector B-15 (terminal No. 4) and ECM connector B-108 (terminal No. 61).**

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

**YES :** Replace the generator. Then go to Step 8.

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

**STEP 8. Using scan tool MB991958, read the diagnostic trouble code (DTC).**

**⚠ CAUTION**

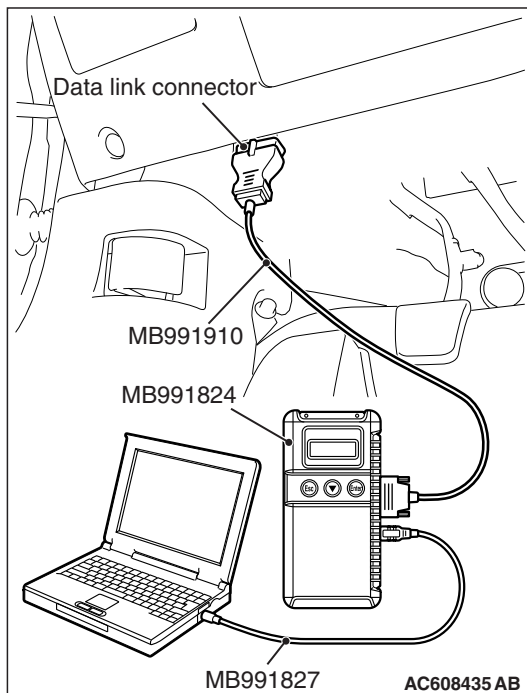
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

- (1) Connect scan tool MB991958 to the data link connector.
- (2) Start the engine and run at idle.
- (3) After the DTC has been deleted, read the DTC again.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is DTC P0622 set?**

**YES :** Retry the troubleshooting.

**NO :** The inspection is complete.



**DTC P0630: Vehicle Identification Number (VIN) Malfunction**

**TECHNICAL DESCRIPTION**

- The Vehicle Identification Number (VIN) is stored in the ECM by the vehicle manufacturer.

**DESCRIPTIONS OF MONITOR METHODS**

The ECM checks whether the VIN is being entered or not.

**MONITOR EXECUTION**

Continuous

**DTC SET CONDITIONS**

**Logic Flow Chart**

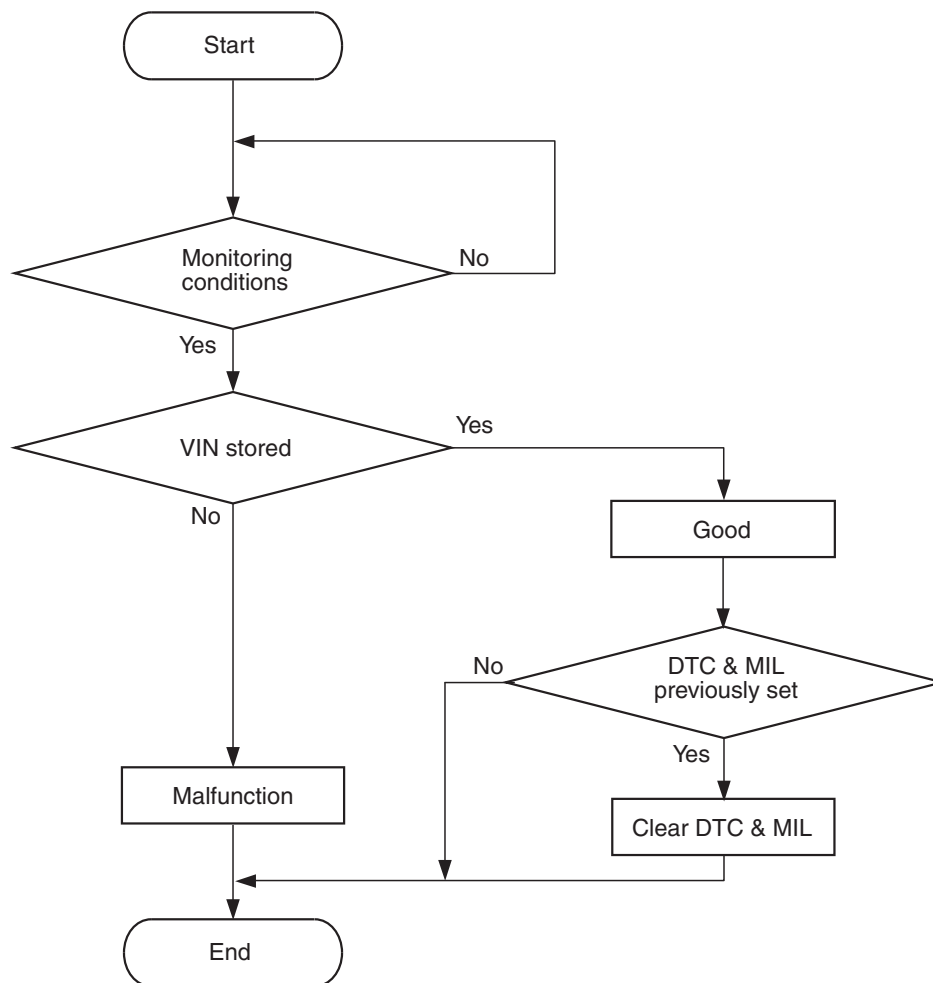
**MONITOR EXECUTION CONDITIONS  
(Other monitor and Sensor)**

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

- Not applicable

**Sensor (The sensor below is determined to be normal)**

- Not applicable



**Check Condition**

- Ignition switch is "ON" position.

**Judgement Criterion**

- VIN (current) is not written.

**FAIL-SAFE AND BACKUP FUNCTION**

- None

**OBD-II DRIVE CYCLE PATTERN**

None.

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

- ECM failed.

**DIAGNOSIS****Required Special Tool:**

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

**STEP 1. Using scan tool MB991958, check VIN Information.****⚠ CAUTION**

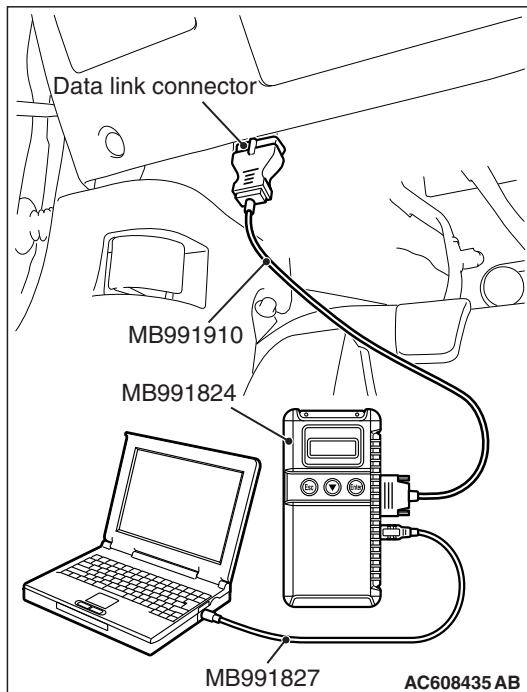
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

- (1) Connect scan tool MB991958 to the data link connector.
- (2) Turn the ignition switch to the "ON" position.
- (3) Set scan tool MB991958 to the coding mode for VIN Information.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Has VIN (current) been written?**

**YES** : Go to Step 2.

**NO** : Write VIN. Then go to Step 3.

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

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

**Q: Is DTC P0630 set?**

**YES** : Replace the ECM (Refer to, Removal and Installation P.13B-1022).

**NO** : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13.

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

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

**Q: Is DTC P0630 set?**

**YES :** Replace the ECM (Refer to, Removal and Installation [P.13B-1022](#)).

**NO :** The inspection is complete.

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**DTC P0638: Throttle Actuator Control Motor Circuit Range/Performance**

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**THROTTLE ACTUATOR CONTROL  
MOTOR CIRCUIT  
RANGE/PERFORMANCE CIRCUIT**

- Refer to DTC P2101 –Throttle Actuator Control Motor Magneto Malfunction [P.13B-730](#).

**CIRCUIT OPERATION**

- Refer to DTC P2101 –Throttle Actuator Control Motor Magneto Malfunction [P.13B-730](#).

**TECHNICAL DESCRIPTION**

- ECM checks the electronic-controlled throttle system for abnormal conditions.

**DESCRIPTIONS OF MONITOR METHODS**

Difference between throttle position sensor (main) output and target opening is greater than the specified value.

**MONITOR EXECUTION**

Continuous

**MONITOR EXECUTION CONDITIONS  
(Other monitor and Sensor)**

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

- Not applicable

**Sensor (The sensor below is determined to be normal)**

- Not applicable

**DTC SET CONDITIONS**

**Check Conditions**

- Battery positive voltage is more than 8.3 volts.

- Throttle position sensor (main) output voltage is between 0.2 and 4.8 volts.
- Drop of throttle position sensor (main) output voltage per 100 milliseconds is more than -0.04 volt.

**Judgement Criterion**

- The target throttle position sensor (main) voltage subtracted from the throttle position sensor (main) output voltage is more than 0.5 volt for 0.4 second.

**Check Conditions**

- Battery positive voltage is more than 8.3 volts.
- Throttle position sensor (main) output voltage is between 0.2 and 4.8 volts.
- Target throttle position sensor (main) output voltage is less than 1.5 volts.

**Judgement Criterion**

- Difference between throttle position sensor (main) output voltage and target throttle position sensor (main) voltage is more than 0.6 volt for 0.4 second.

**Check Conditions**

- Battery positive voltage is more than 8.3 volts.
- Throttle position sensor (main) output voltage is between 0.2 and 4.8 volts.

**Judgement Criterion**

- Difference between throttle position sensor (main) output voltage and target throttle position sensor (main) voltage is more than 1 volt for 0.4 second.

**Check Condition**

- Battery positive voltage is more than 8.3 volts.

**Judgement Criterion**

- Throttle position sensor (main) default opening learnt value is more than 4 volts.

**FAIL-SAFE AND BACKUP FUNCTION**

- Throttle opening degree position is in default position.

**OBD-II DRIVE CYCLE PATTERN**

None.

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

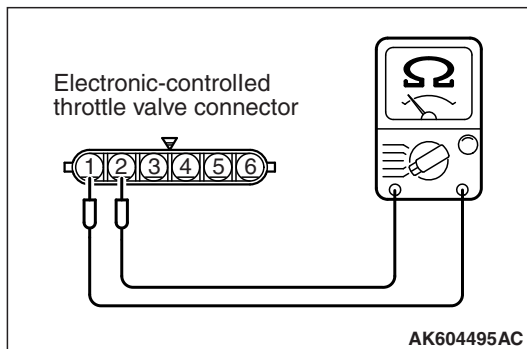
- Throttle valve return spring failed.
- Throttle valve operation failed.
- Throttle actuator control motor failed.
- Harness damage in throttle actuator control motor circuit or connector damage.
- ECM failed.

**DIAGNOSIS****Required Special Tool:**

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

**STEP 1. Check harness connector B-10 at electronic-controlled throttle valve for damage.****Q: Is the harness connector in good condition?****YES** : Go to Step 2.**NO** : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then go to Step 7..**STEP 2. Check the throttle actuator control motor.**

- (1) Disconnect the electronic-controlled throttle valve connector B-10.
- (2) Measure the resistance between electronic-controlled throttle valve side connector terminal No. 1 and No. 2.

**Standard value: 0.3 –80  $\Omega$  [at 20° C (68° F)]****Q: Is the measured resistance between 0.3 and 80  $\Omega$  [at 20° C (68° F)]?****YES** : Go to Step 3.**NO** : Replace the throttle body assembly. Then go to Step 7.**STEP 3. Check harness connector B-108 at ECM for damage.****Q: Is the harness connector in good condition?****YES** : Go to Step 4.**NO** : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then go to Step 7.**STEP 4. Check for harness damage between electronic-controlled throttle valve connector B-10 (terminal No. 1) and ECM connector B-108 (terminal No. 15).****Q: Is the harness wire in good condition?****YES** : Go to Step 5.**NO** : Repair it. Then go to Step 7.

**STEP 5.** Check for harness damage between electronic-controlled throttle valve connector B-10 (terminal No. 2) and ECM connector B-108 (terminal No. 16).

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

**YES :** Go to Step 6.

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

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

**⚠ CAUTION**

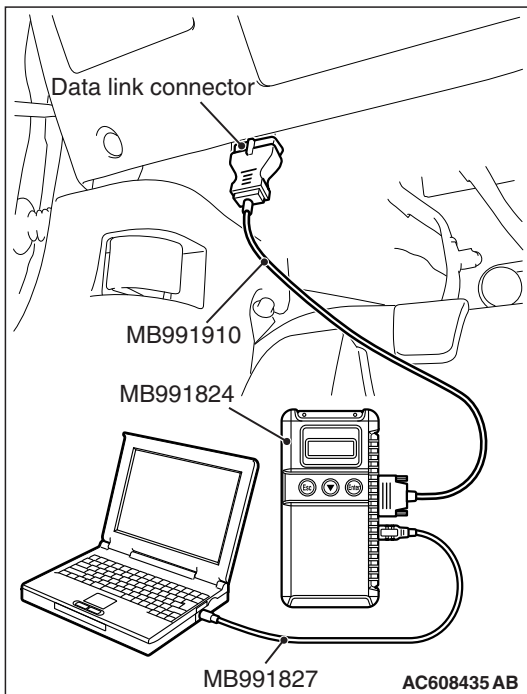
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

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

**Q:** Is DTC P0638 set?

**YES :** Replace the ECM (Refer to, Removal and Installation P.13B-1022). Then go to Step 7.

**NO :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13.



**STEP 7.** Using scan tool MB991958, read the diagnostic trouble code (DTC).

**⚠ CAUTION**

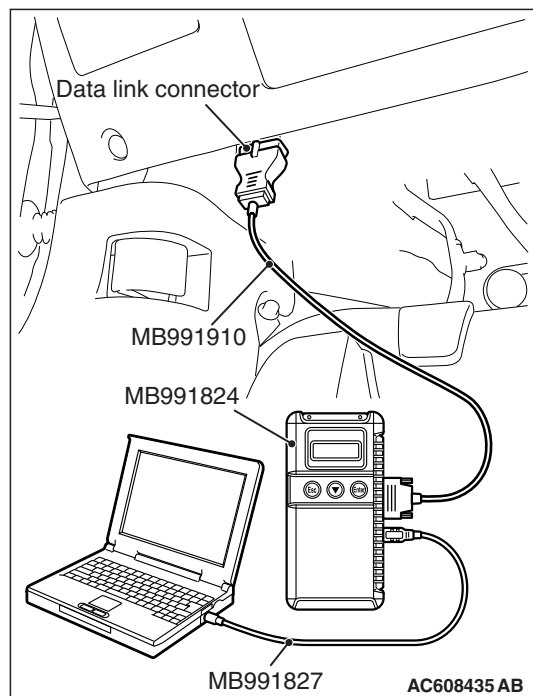
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

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

**Q: Is DTC P0638 set?**

**YES :** Retry the troubleshooting.

**NO :** The inspection is complete.



## DTC P0642: Throttle Position Sensor Power Supply

### TECHNICAL DESCRIPTION

- ECM checks the throttle position sensor power voltage for abnormal conditions.

### DESCRIPTIONS OF MONITOR METHODS

Throttle position sensor source voltage is smaller than the specified value.

### MONITOR EXECUTION

Continuous

### MONITOR EXECUTION CONDITIONS (Other monitor and Sensor)

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

- Not applicable

**Sensor (The sensor below is determined to be normal)**

- Not applicable

### DTC SET CONDITIONS

#### Check Condition

- Battery positive voltage is more than 6.3 volts.

#### Judgement Criterion

- Throttle position sensor power voltage is less than 4.1 volts for 0.3 second.

### FAIL-SAFE AND BACKUP FUNCTION

- Throttle opening degree position is in default position.

### OBD-II DRIVE CYCLE PATTERN

None.

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

- ECM failed.

## DIAGNOSIS

### Required Special Tool:

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

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

### **⚠ CAUTION**

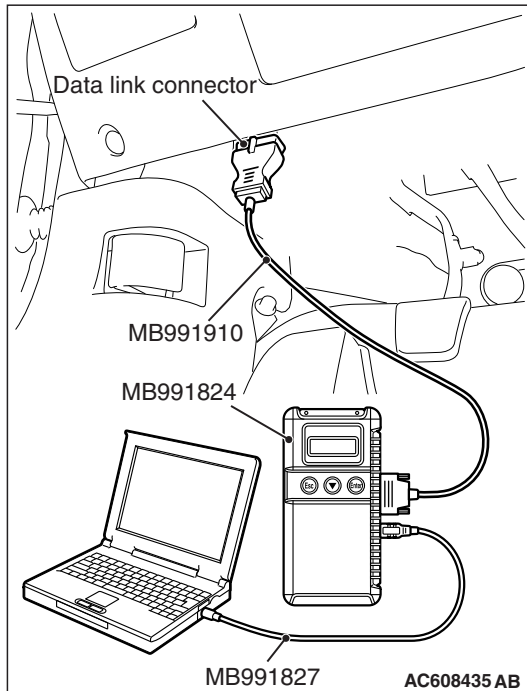
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK"(OFF) position before connecting or disconnecting scan tool MB991958.

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

### **Q: Is DTC P0642 set?**

**YES :** Replace the ECM (Refer to, Removal and Installation [P.13B-1022](#)).

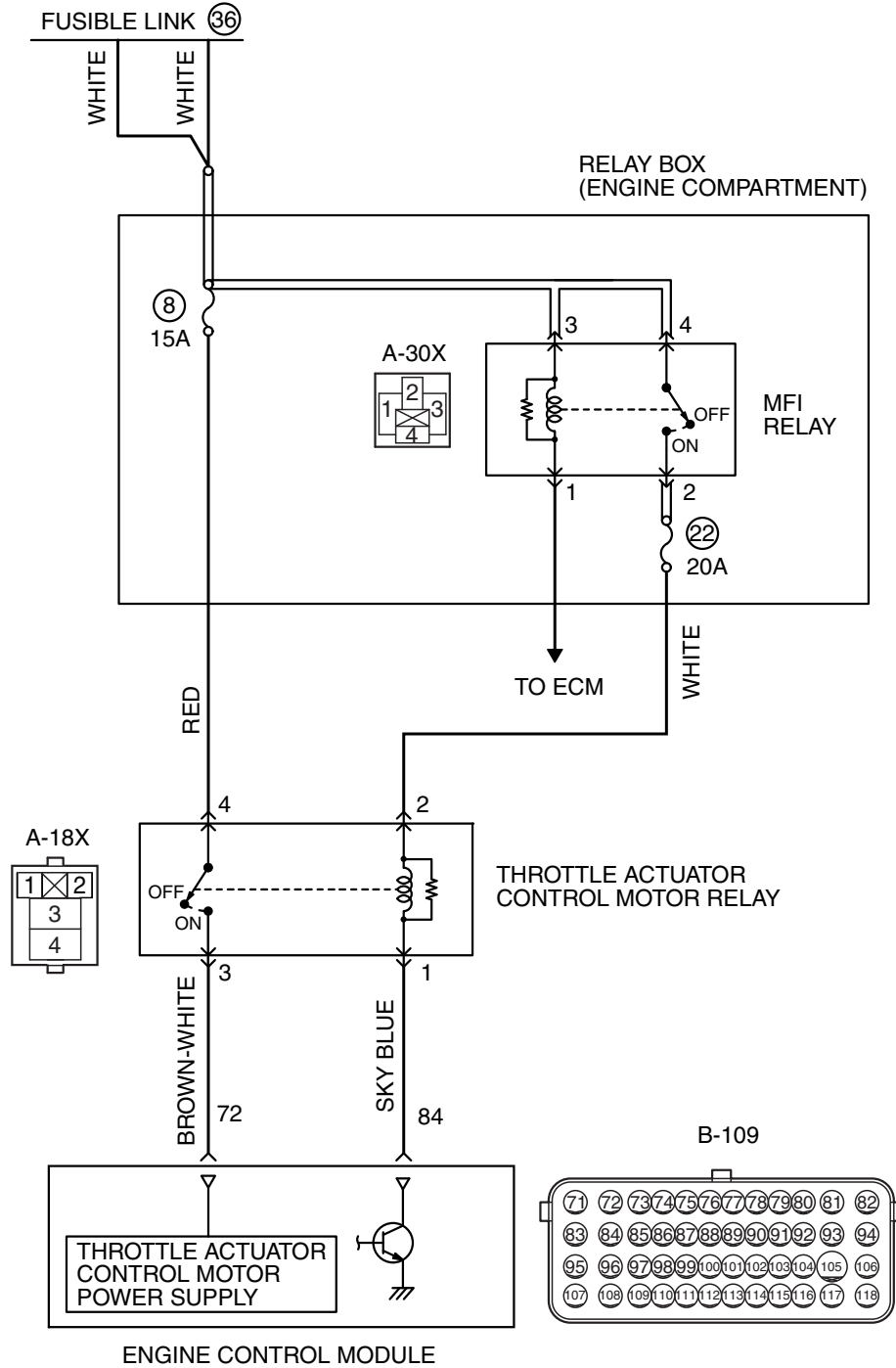
**NO :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions [P.00-13](#).

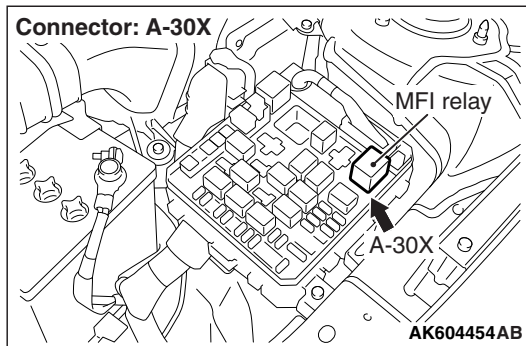
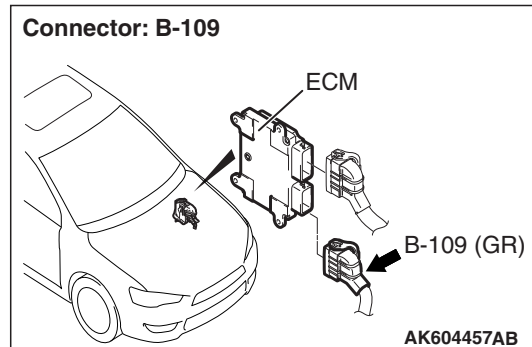
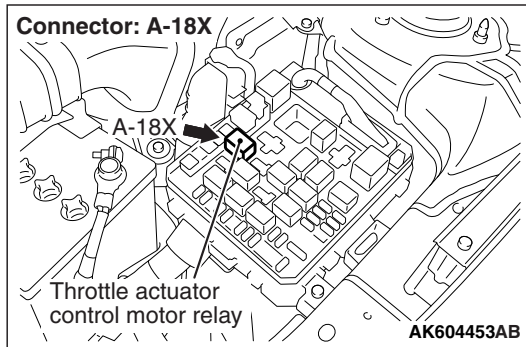




DTC P0657: Throttle Actuator Control Motor Relay Circuit Malfunction

THROTTLE ACTUATOR CONTROL MOTOR RELAY CIRCUIT





## CIRCUIT OPERATION

- Battery positive voltage is applied to the throttle actuator control motor relay terminal (terminal No. 4).
- Battery positive voltage is applied to the throttle actuator control motor relay terminal (terminal No. 2) from the MFI relay (terminal No. 2).
- ECM (terminal No. 84) applies current to the throttle actuator control motor relay coil by turning ON the power transistor in the unit in order to turn the relay ON.
- When the throttle actuator control motor relay turns ON, battery positive voltage is supplied by the throttle actuator control motor relay (terminal No. 3) to the ECM (terminal No. 72).

## TECHNICAL DESCRIPTION

- When the ignition switch ON signal is input into the ECM, the ECM turns ON the throttle actuator control motor relay.

## DESCRIPTIONS OF MONITOR METHODS

Throttle actuator control motor relay circuit voltage is smaller than the specified value.

## MONITOR EXECUTION

Continuous

## MONITOR EXECUTION CONDITIONS (Other monitor and Sensor)

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

- Not applicable

**Sensor (The sensor below is determined to be normal)**

- Not applicable

## DTC SET CONDITIONS

### Check Condition

- Battery positive voltage is more than 8.3 volts.

### Judgement Criterion

- The power line voltage of the electronic-controlled throttle valve system is less than 6.0 volts for 0.35 second.

## FAIL-SAFE AND BACKUP FUNCTION

- Throttle opening degree position is in default position.

## OBD-II DRIVE CYCLE PATTERN

None.

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

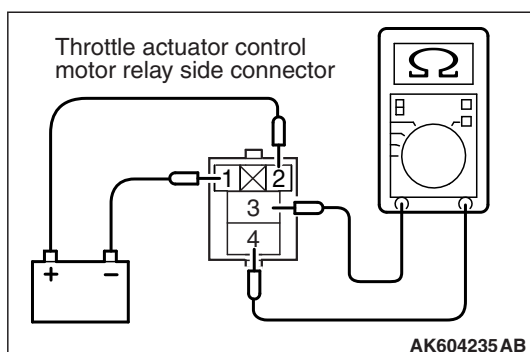
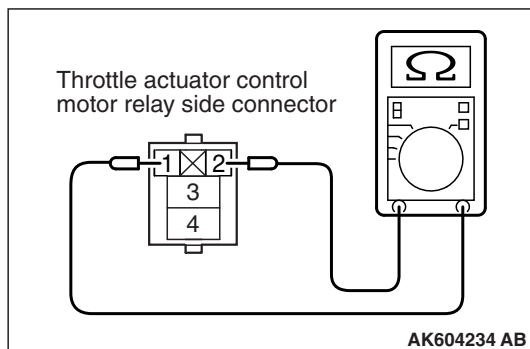
- Throttle actuator control motor relay failed.
- Open or shorted throttle actuator control motor relay circuit, harness damage or connector damage.
- ECM failed.

**DIAGNOSIS****Required Special Tool:**

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

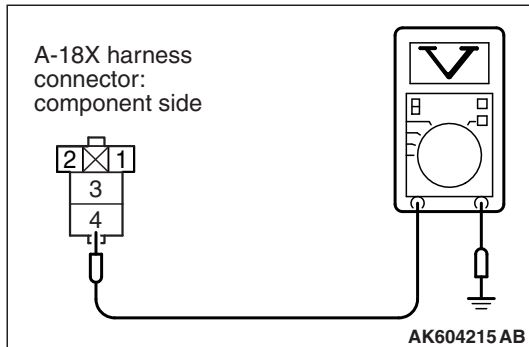
**STEP 1. Check harness connector A-18X at throttle actuator control motor relay for damage.****Q: Is the harness connector in good condition?****YES** : Go to Step 2.**NO** : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then go to Step 15.**STEP 2. Check the throttle actuator control motor relay.**

- (1) Remove the throttle actuator control motor relay.
- (2) Check for continuity between the throttle actuator control motor relay terminal No. 1 and No. 2.
  - There should be continuity.



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

**Q: Is the measured resistance normal?****YES** : Go to Step 3.**NO** : Replace the throttle actuator control motor relay. Then go to Step 15.



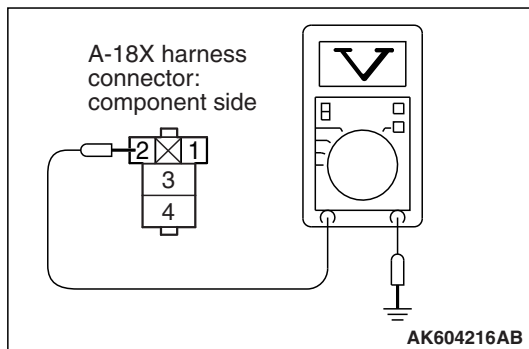
**STEP 3. Measure the power supply voltage at throttle actuator control motor relay harness side connector A-18X.**

- (1) Disconnect the connector A-18X and measure at the harness side.
- (2) Measure the voltage between terminal No. 4 and ground.
  - Voltage should be battery positive voltage.

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

**YES :** Go to Step 4.

**NO :** Repair harness wire between battery and throttle actuator control motor relay connector A-18X (terminal No. 4) because of open circuit or short circuit to ground. Then go to Step 15.



**STEP 4. Measure the power supply voltage at throttle actuator control motor relay harness side connector A-18X.**

- (1) Disconnect the connector A-18X and measure at the harness side.
- (2) Turn the ignition switch to the "ON" position.
- (3) Measure the voltage between terminal No. 2 and ground.
  - Voltage should be battery positive voltage.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

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

**YES :** Go to Step 6.

**NO :** Go to Step 5.

**STEP 5. Check harness connector A-30X at MFI relay for damage.**

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

**YES :** Repair harness wire between MFI relay connector A-30X (terminal No. 2) and throttle actuator control motor relay connector A-18X (terminal No. 2) because of open circuit or short circuit to ground. Then go to Step 15.

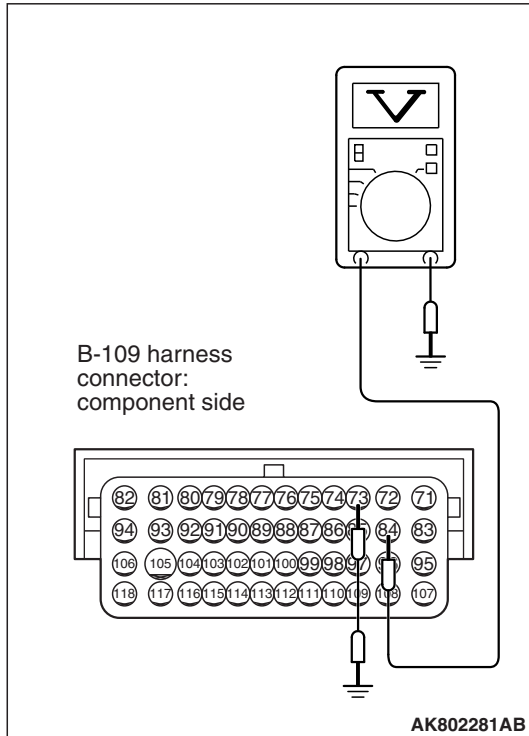
**NO :** Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 15.

**STEP 6. Check harness connector B-109 at ECM for damage.**

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

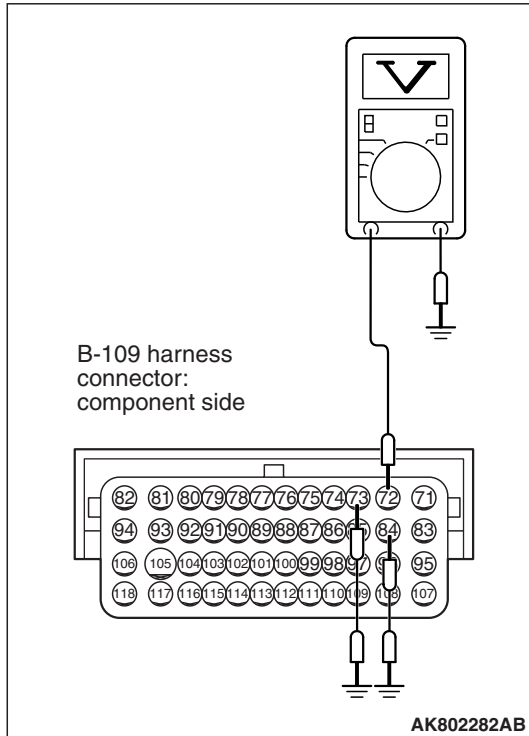
**YES :** Go to Step 7.

**NO :** Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 15.

**STEP 7. Measure the power supply voltage at ECM harness side connector B-109.**

- (1) Disconnect the connector B-109 and measure at the harness side.
- (2) Short-circuit the terminal No. 73 of the ECM harness connector to the ground.
- (3) Measure the voltage between terminal No. 84 and ground.
  - Voltage should be battery positive voltage.

**Q: Is battery positive voltage (approximately 12 volts) present?****YES :** Go to Step 8.**NO :** Repair harness wire between throttle actuator control motor relay connector A-18X (terminal No. 1) and ECM connector B-109 (terminal No. 84) because of open circuit or short circuit to ground. Then go to Step 15.



**STEP 8. Measure the power supply voltage at ECM harness side connector B-109.**

- (1) Disconnect the connector B-109 and measure at the harness side.
- (2) Short-circuit the terminals No. 73 and No. 84 of the ECM harness connector to the ground.
- (3) Measure the voltage between terminal No. 72 and ground.
  - Voltage should be battery positive voltage.

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

**YES :** Go to Step 12.

**NO :** Go to Step 9.

**STEP 9. Check for open circuit and short circuit to ground between throttle actuator control motor relay connector A-18X (terminal No. 3) and ECM connector B-109 (terminal No. 72).**

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

**YES :** Go to Step 10.

**NO :** Repair it. Then go to Step 15.

**STEP 10. Check harness connector A-30X at MFI relay for damage.**

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

**YES :** Go to Step 11.

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

**STEP 11. Check for harness damage between MFI relay connector A-30X (terminal No. 2) and throttle actuator control motor relay connector A-18X (terminal No. 2).**

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

**YES :** Repair harness wire between throttle actuator control motor relay connector A-18X (terminal No. 1) and ECM connector B-109 (terminal No. 84) because of harness damage. Then go to Step 15.

**NO :** Repair it. Then go to Step 15.

**STEP 12. Check for harness damage between battery and throttle actuator control motor relay connector A-18X (terminal No. 4).**

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

**YES :** Go to Step 13.

**NO :** Repair it. Then go to Step 15.

**STEP 13. Check for harness damage between throttle actuator control motor relay connector A-18X (terminal No. 3) and ECM connector B-109 (terminal No. 72).**

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

**YES :** Go to Step 14.

**NO :** Repair it. Then go to Step 15.

**STEP 14. Using scan tool MB991958, read the diagnostic trouble code (DTC).**

**⚠ CAUTION**

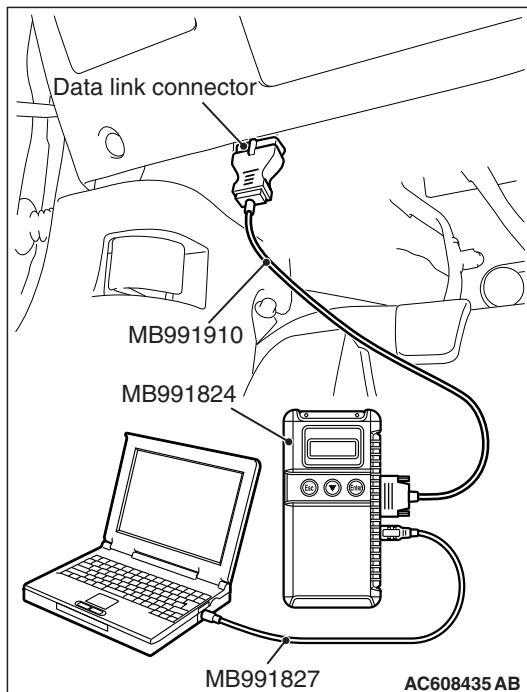
**To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.**

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

**Q: Is DTC P0657 set?**

**YES :** Replace the ECM (Refer to, Removal and Installation [P.13B-1022](#)). Then go to Step 15.

**NO :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions [P.00-13](#).



**STEP 15.** Using scan tool MB991958, read the diagnostic trouble code (DTC).

**⚠ CAUTION**

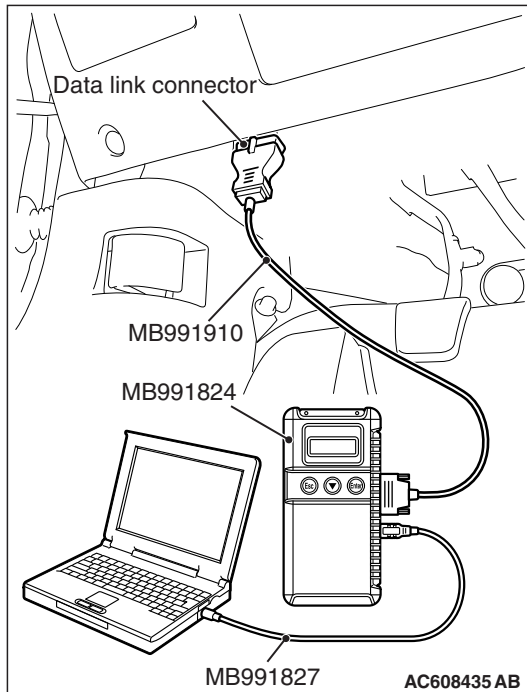
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

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

**Q: Is DTC P0657 set?**

**YES :** Retry the troubleshooting.

**NO :** The inspection is complete.



## DTC P1231: Active Stability Control Plausibility

### TECHNICAL DESCRIPTION

- Checks for an abnormal signal of active stability control (ASC) via the CAN communication.

### DTC SET CONDITIONS

#### Check Condition

- Ignition switch is "ON" position.

#### Judgment Criterion

- A torque demand signal from the active stability control is not normal.

### FAIL-SAFE AND BACKUP FUNCTION

- Torque requested by active stability control (ASC) is ignored.

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

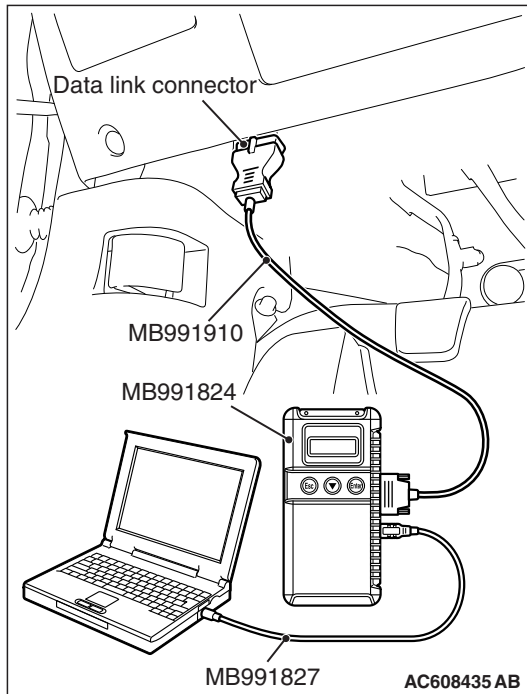
- Active stability control system failed.
- ECM failed.

### DIAGNOSIS

#### Required Special Tool:

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





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

**⚠ CAUTION**

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

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

**Q: Is ASC-DTC set?**

**YES :** Refer to GROUP 35C, Diagnosis –Diagnostic Trouble Code Chart [P.35C-27](#).

**NO :** Go to Step 2. .

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

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

**Q: Is the diagnostic trouble code other than P1231 set?**

**YES :** Refer to, Diagnostic Trouble Code Chart [P.13B-51](#).

**NO :** Go to Step 3.

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

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

**Q: Is DTC P1231 set?**

**YES :** Replace the ECM (Refer to, Removal and Installation [P.13B-1022](#)).

**NO :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions [P.00-13](#).

## DTC P1232: Fail Safe System

### TECHNICAL DESCRIPTION

- To judge whether fail-safe control can be performed, check that power supply to the throttle actuator control motor circuit can be stopped by turning the throttle actuator control motor relay to OFF position momentarily.

### DTC SET CONDITIONS

#### Check Condition

- Ignition switch is "ON" position.

#### Judgment Criterion

- Power supply to the throttle actuator control motor cannot be shut down (though power supply is stopped).

### FAIL-SAFE AND BACKUP FUNCTION

- Microcomputer is reset.

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

- Throttle actuator control motor relay circuit failed.
- ECM failed.

### DIAGNOSIS

#### Required Special Tool:

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

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

#### **CAUTION**

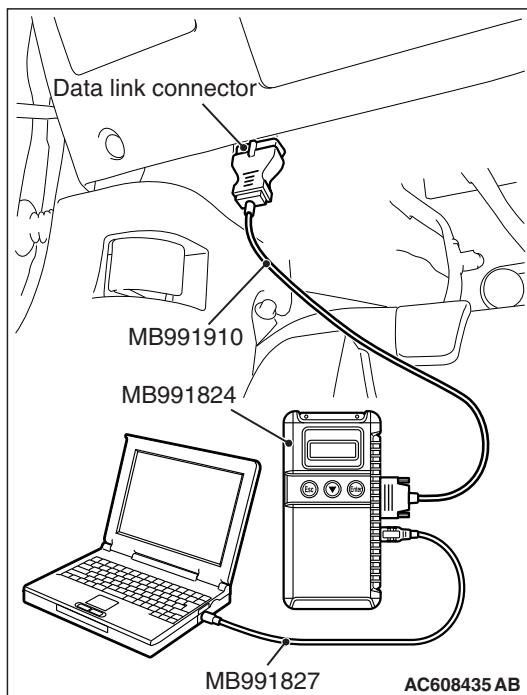
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

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

#### Q: Is DTC P0657 set?

**YES** : Refer to, DTC P0657 –Throttle Actuator Control Motor Relay Circuit Malfunction [P.13B-658](#).

**NO** : Go to Step 2.



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

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

**Q: Is DTC P01232 set?**

**YES :** Replace the ECM (Refer to, Removal and Installation [P.13B-1022](#)).

**NO :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions [P.00-13](#).

---

**DTC P1233: Throttle Position Sensor (main) Plausibility**

---

**TECHNICAL DESCRIPTION**

Compare the actual measurement of volumetric efficiency by a mass airflow sensor signal with volumetric efficiency estimated from a throttle position sensor (main) signal.

**MONITOR EXECUTION**

Continuous

**MONITOR EXECUTION CONDITIONS  
(Other monitor and Sensor)**

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

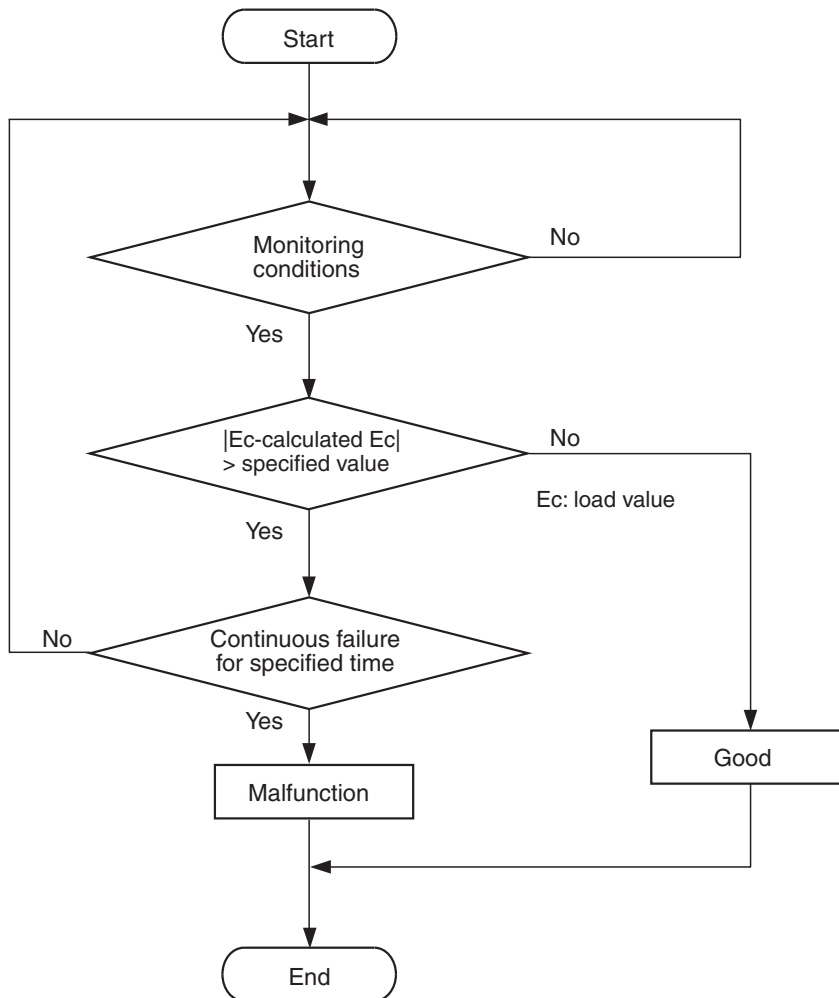
- Not applicable

**Sensor (The sensor below is determined to be normal)**

- Not applicable

## DTC SET CONDITIONS

### Logic Flow Chart



AK604351

#### Check Conditions

- The volumetric efficiency estimated by the throttle position sensor (main) subtracted from the actual volumetric efficiency is more than 0 percent. Or, the volumetric efficiency is less than 60 percent.
- The engine speed is between 750 and 3,000 r/min. Or, the throttle position sensor (main) output voltage is less than 3 volts.

#### Judgment Criterion

- For 0.4 second, the difference between the actual volumetric efficiency and the volumetric efficiency estimated by the throttle position sensor (main) is more than 33 percent.

#### FAIL-SAFE AND BACKUP FUNCTION

- Throttle opening degree is restricted.
- Throttle opening degree position is in default position if throttle position sensor (sub) fails.

#### OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function –OBD-II Drive Cycle Pattern 17 [P.13B-12](#).

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

- Throttle position sensor (main) system failed.
- Intake system vacuum leak.
- There is some trash around mass airflow sensor.
- ECM failed.

**DIAGNOSIS****Required Special Tools:**

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

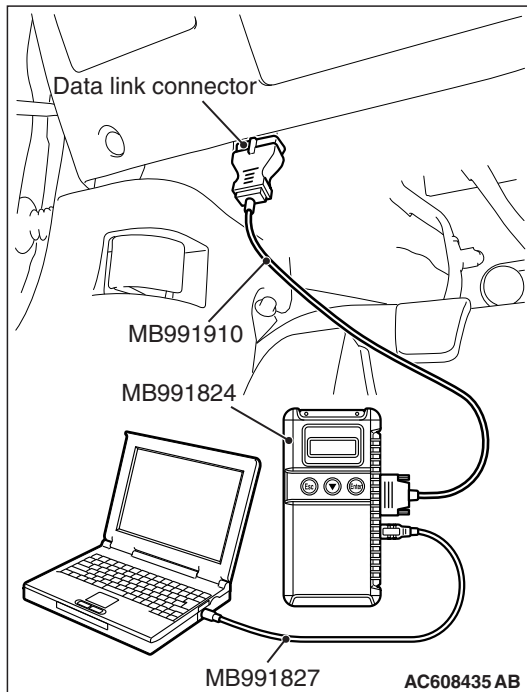
**STEP 1. Using scan tool MB991958, read the diagnostic trouble code (DTC).****⚠ CAUTION**

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

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

**Q: Is the diagnostic trouble code other than P1233 set?**

- YES** : Refer to, Diagnostic Trouble Code Chart [P.13B-51](#).  
**NO** : Go to Step 2.



---

**STEP 2. Using scan tool MB991958, check data list item 13: Throttle Position Sensor (main).**

- (1) Detach the intake air hose at the throttle body.
- (2) Disconnect the connector of the electronic-controlled throttle valve.
- (3) Use test harness special tool (MB991658) to connect only terminals No. 3, No. 4, No. 5, and No. 6.
- (4) Turn the ignition switch to the "ON" position.
- (5) Set scan tool MB991958 to the data reading mode for item 13, Throttle Position Sensor (main).
  - Output voltage should be between 300 and 700 millivolts when the throttle valve is fully closed with your finger.
  - Output voltage should be 4,000 millivolts or more when the throttle valve is fully open with your finger.
- (6) Turn the ignition switch to the "LOCK" (OFF) position.

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

**YES :** Go to Step 3.

**NO :** Refer to, DTC P0122 –Throttle Position Sensor (main) Circuit Low Input [P.13B-227](#), DTC P0123 –Throttle Position Sensor (main) Circuit High Input [P.13B-232](#).

---

**STEP 3. Check for intake system vacuum leak.**

**Q: Are there any abnormalities?**

**YES :** Repair it. Then go to Step 6.

**NO :** Go to Step 4.

---

**STEP 4. Check for foreign matter being around the mass airflow sensor.**

**Q: Are there any foreign matter?**

**YES :** Repair it. Then go to Step 6.

**NO :** Go to Step 5.

---

**STEP 5. Check the trouble symptoms.**

- (1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function –OB D-II Drive Cycle Pattern 17 [P.13B-12](#).
- (2) Check the diagnostic trouble code (DTC).

**Q: Is DTC P1233 set?**

**YES :** Replace the ECM (Refer to, Removal and Installation [P.13B-1022](#)). Then go to Step 6.

**NO :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions [P.00-13](#).

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

- (1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle Pattern 17 [P.13B-12](#).
- (2) Check the diagnostic trouble code (DTC).

**Q: Is DTC P1233 set?**

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

**DTC P1234: Throttle Position Sensor (sub) Plausibility**

---

**TECHNICAL DESCRIPTION**

Compare the actual measurement of volumetric efficiency by a mass airflow sensor signal with volumetric efficiency estimated from a throttle position sensor (sub) signal.

**MONITOR EXECUTION**

Continuous

**MONITOR EXECUTION CONDITIONS  
(Other monitor and Sensor)**

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

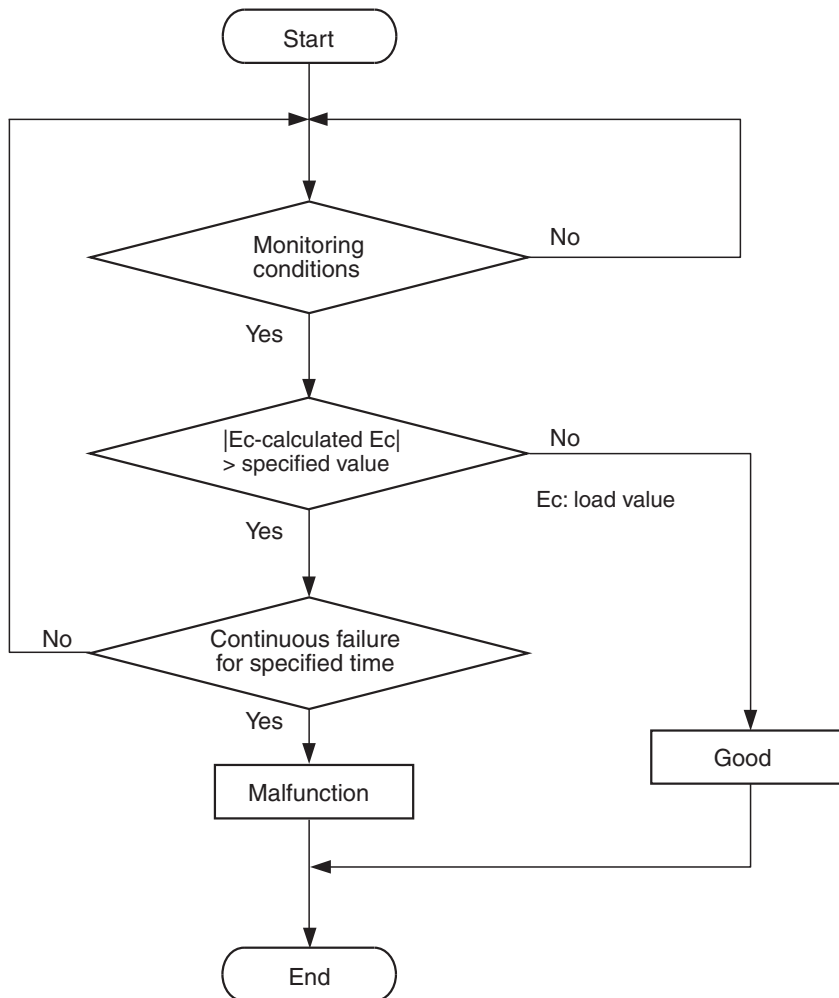
- Not applicable

**Sensor (The sensor below is determined to be normal)**

- Not applicable

## DTC SET CONDITIONS

### Logic Flow Chart



AK604351

#### Check Conditions

- The volumetric efficiency estimated by the throttle position sensor (sub) subtracted from the actual volumetric efficiency is more than 0 percent. Or, the volumetric efficiency is less than 60 percent.
- The engine speed is between 750 and 3,000 r/min. Or, the throttle position sensor (main) output voltage is less than 3 volts.

#### Judgment Criterion

- For 0.4 second, the difference between the actual volumetric efficiency and the volumetric efficiency estimated by the throttle position sensor (sub) is more than 33 percent.

#### FAIL-SAFE AND BACKUP FUNCTION

- Throttle opening degree is restricted.
- Throttle opening degree position is in default position if throttle position sensor (main) fails.

#### OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function –OBD-II Drive Cycle Pattern 17 [P.13B-12](#).



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

- Throttle position sensor (sub) system failed.
- Intake system vacuum leak.
- There is some trash around mass airflow sensor.
- ECM failed.

**DIAGNOSIS****Required Special Tools:**

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

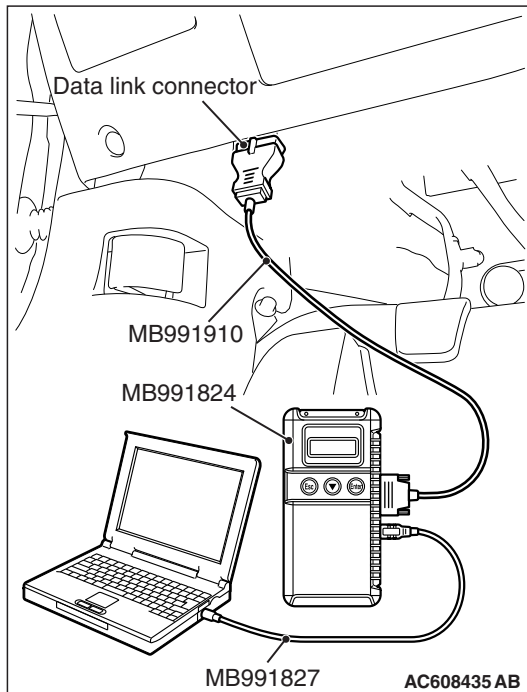
**STEP 1. Using scan tool MB991958, read the diagnostic trouble code (DTC).****⚠ CAUTION**

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

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

**Q: Is the diagnostic trouble code other than P1234 set?**

- YES** : Refer to, Diagnostic Trouble Code Chart [P.13B-51](#).  
**NO** : Go to Step 2.



---

**STEP 2. Using scan tool MB991958, check data list item 15: Throttle Position Sensor (sub).**

- (1) Detach the intake air hose at the throttle body.
- (2) Disconnect the connector of the electronic-controlled throttle valve.
- (3) Use test harness special tool (MB991658) to connect only terminals No. 3, No. 4, No. 5, and No. 6.
- (4) Turn the ignition switch to the "ON" position.
- (5) Set scan tool MB991958 to the data reading mode for item 15, Throttle Position Sensor (sub).
  - Output voltage should be 4,000 millivolts or more when the throttle valve is fully closed with your finger.
  - Output voltage should be 1,000 millivolts or less when the throttle valve is fully open with your finger.
- (6) Turn the ignition switch to the "LOCK" (OFF) position.

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

**YES :** Go to Step 3.

**NO :** Refer to, DTC P0222 –Throttle Position Sensor (sub) Circuit Low Input [P.13B-431](#), DTC P0223 –Throttle Position Sensor (sub) Circuit High Input [P.13B-437](#).

---

**STEP 3. Check for intake system vacuum leak.**

**Q: Are there any abnormalities?**

**YES :** Repair it. Then go to Step 6.

**NO :** Go to Step 4.

---

**STEP 4. Check for foreign matter being around the mass airflow sensor.**

**Q: Are there any foreign matter?**

**YES :** Repair it. Then go to Step 6.

**NO :** Go to Step 5.

---

**STEP 5. Check the trouble symptoms.**

- (1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle Pattern 17 [P.13B-12](#).
- (2) Check the diagnostic trouble code (DTC).

**Q: Is DTC P1234 set?**

**YES :** Replace the ECM (Refer to, Removal and Installation [P.13B-1022](#)). Then go to Step 6.

**NO :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions [P.00-13](#).

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

- (1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle Pattern 17 [P.13B-12](#).
- (2) Check the diagnostic trouble code (DTC).

**Q: Is DTC P1234 set?****YES** : Retry the troubleshooting.**NO** : The inspection is complete.

---

**DTC P1235: Mass Airflow Sensor Plausibility**

---

**TECHNICAL DESCRIPTION**

Compare the actual measurement of volumetric efficiency by a mass airflow sensor signal with volumetric efficiency estimated from a throttle position sensor (main or sub) signal.

**MONITOR EXECUTION**

Continuous

**MONITOR EXECUTION CONDITIONS  
(Other monitor and Sensor)**

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

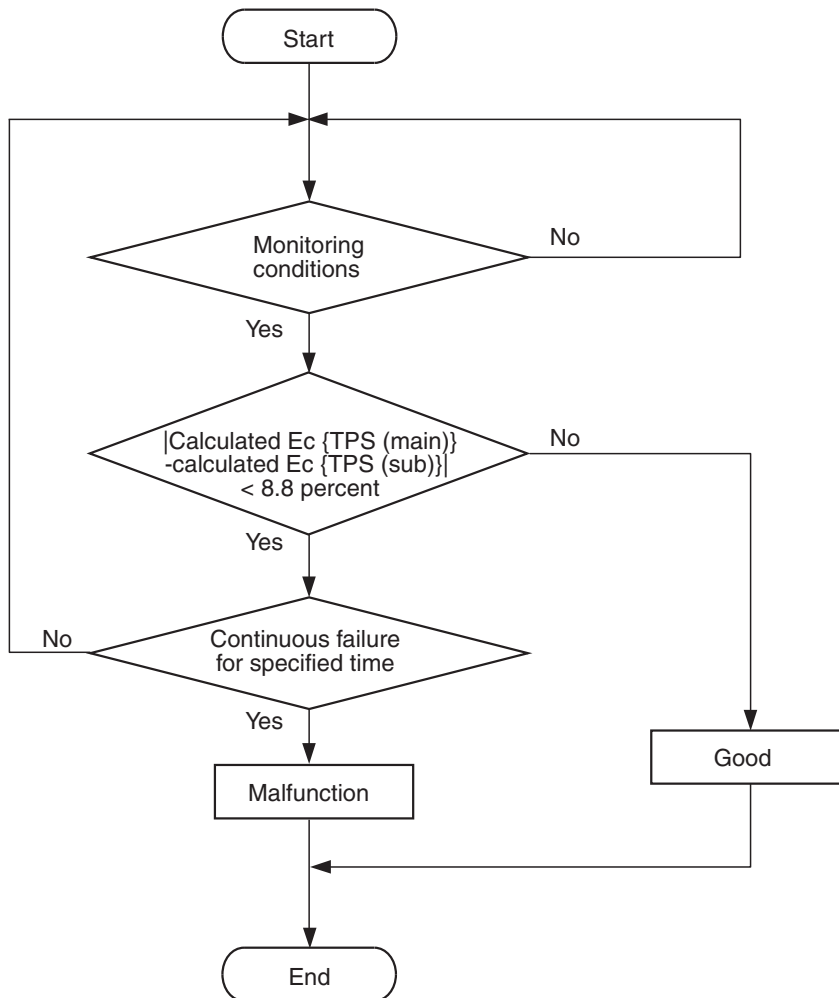
- Not applicable

**Sensor (The sensor below is determined to be normal)**

- Not applicable

## DTC SET CONDITIONS

### Logic Flow Chart



AK800586

#### Check Conditions

- The plausibility error of the throttle position sensor (main) is detected.
- The plausibility error of the throttle position sensor (sub) is detected.

#### Judgment Criterion

- For 0.36 second, the difference between the volumetric efficiency estimated by the throttle position sensor (main) and the volumetric efficiency estimated by the throttle position sensor (sub) is less than 8.8 percent.

#### FAIL-SAFE AND BACKUP FUNCTION

- Fuel control is carried out using throttle opening degree and engine speed in accordance with pre-set map.

#### OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function –OBD-II Drive Cycle Pattern 17 [P.13B-12](#).

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

- Mass airflow sensor system failed.
- Intake system vacuum leak.
- There is some trash around mass airflow sensor.
- ECM failed.

**DIAGNOSIS****Required Special Tool:**

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

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

**⚠ CAUTION**

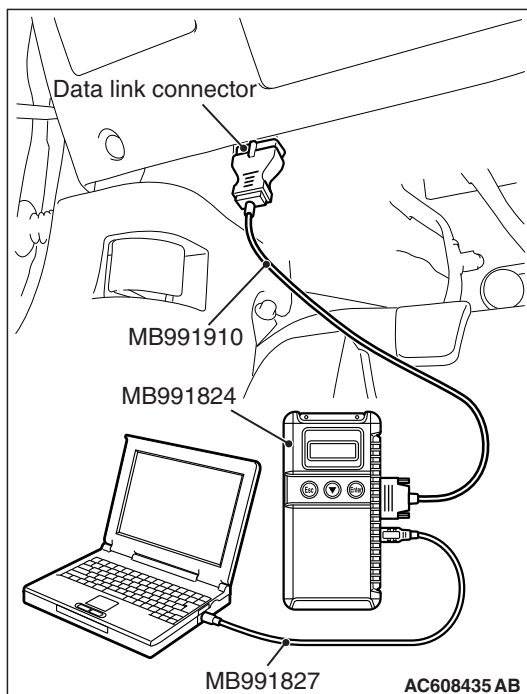
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

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

**Q: Is the diagnostic trouble code other than P1235 set?**

**YES :** Refer to, Diagnostic Trouble Code Chart [P.13B-51](#).

**NO :** Go to Step 2.



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

**Q: Are there any abnormalities?**

**YES :** Repair it. Then go to Step 6.

**NO :** Go to Step 3.

**STEP 3. Check for foreign matter being around the mass airflow sensor.**

**Q: Are there any foreign matter?**

**YES :** Repair it. Then go to Step 6.

**NO :** Go to Step 4.

---

**STEP 4. Using scan tool MB991958, check data list item 10:  
Mass Airflow Sensor.**

- (1) Start the engine and run at idle.
- (2) Set scan tool MB991958 to the data reading mode for item 10, Mass Airflow Sensor.
- (3) Warm up the engine to normal operating temperature: 80° C to 95° C (176° F to 203° F).
  - The standard value during idling should be between 1,350 and 1,670 millivolts.
  - When the engine is revved, the output voltage should increase according to the increase in engine speed.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

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

**YES :** Go to Step 5.

**NO :** Refer to, DTC P0101 –Mass Airflow Circuit Range/Performance Problem [P.13B-152](#), DTC P0102 –Mass Airflow Circuit Low Input [P.13B-158](#), DTC P0103 –Mass Airflow Circuit High Input [P.13B-165](#).

---

**STEP 5. Check the trouble symptoms.**

- (1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle Pattern 17 [P.13B-12](#).
- (2) Check the diagnostic trouble code (DTC).

**Q: Is DTC P1235 set?**

**YES :** Replace the ECM (Refer to, Removal and Installation [P.13B-1022](#)). Then go to Step 6.

**NO :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions [P.00-13](#).

---

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

- (1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle Pattern 17 [P.13B-12](#).
- (2) Check the diagnostic trouble code (DTC).

**Q: Is DTC P1235 set?**

**YES :** Retry the troubleshooting.

**NO :** The inspection is complete.

**DTC P1236: A/D Converter**

---

**TECHNICAL DESCRIPTION**

Monitors whether input voltage from the accelerator pedal position sensor (sub) is normally converted into a digital signal in the ECM.

**MONITOR EXECUTION**

Continuous

**MONITOR EXECUTION CONDITIONS****(Other monitor and Sensor)**

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

- Not applicable

**Sensor (The sensor below is determined to be normal)**

- Not applicable

**DTC SET CONDITIONS****Check Condition**

- Ignition switch is "ON" position.

**Judgment Criterion**

- When the input voltage from the accelerator pedal position sensor (sub) is periodically 0 V for 0.45 second, the digital value of the input voltage indicates 0.2 V or more.

**FAIL-SAFE AND BACKUP FUNCTION**

- Throttle opening degree position is in default position.

**OBD-II DRIVE CYCLE PATTERN**

None.

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

- ECM failed.

**DIAGNOSIS****Required Special Tool:**

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

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

**⚠ CAUTION**

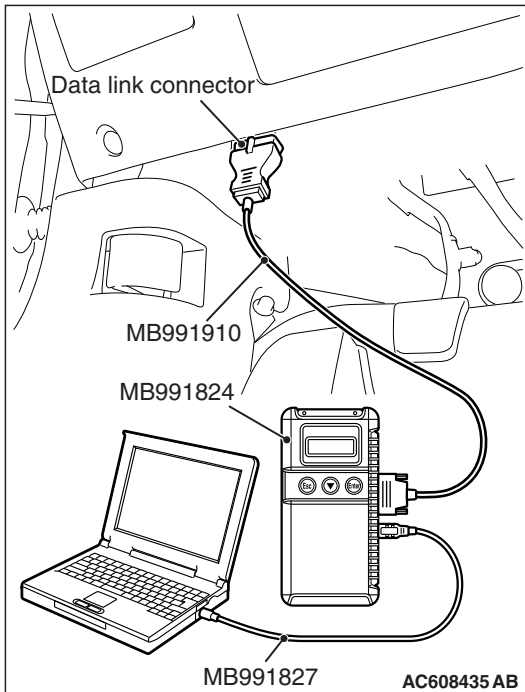
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

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

**Q: Is DTC P1236 set?**

**YES :** Replace the ECM (Refer to, Removal and Installation P.13B-1022).

**NO :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13.



**DTC P1237: Accelerator Pedal Position Sensor Plausibility**

**TECHNICAL DESCRIPTION**

Compare the output value of the accelerator pedal position sensor (main) with that of the accelerator pedal position sensor (sub).

**MONITOR EXECUTION**

Continuous

**MONITOR EXECUTION CONDITIONS  
(Other monitor and Sensor)**

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

- Not applicable

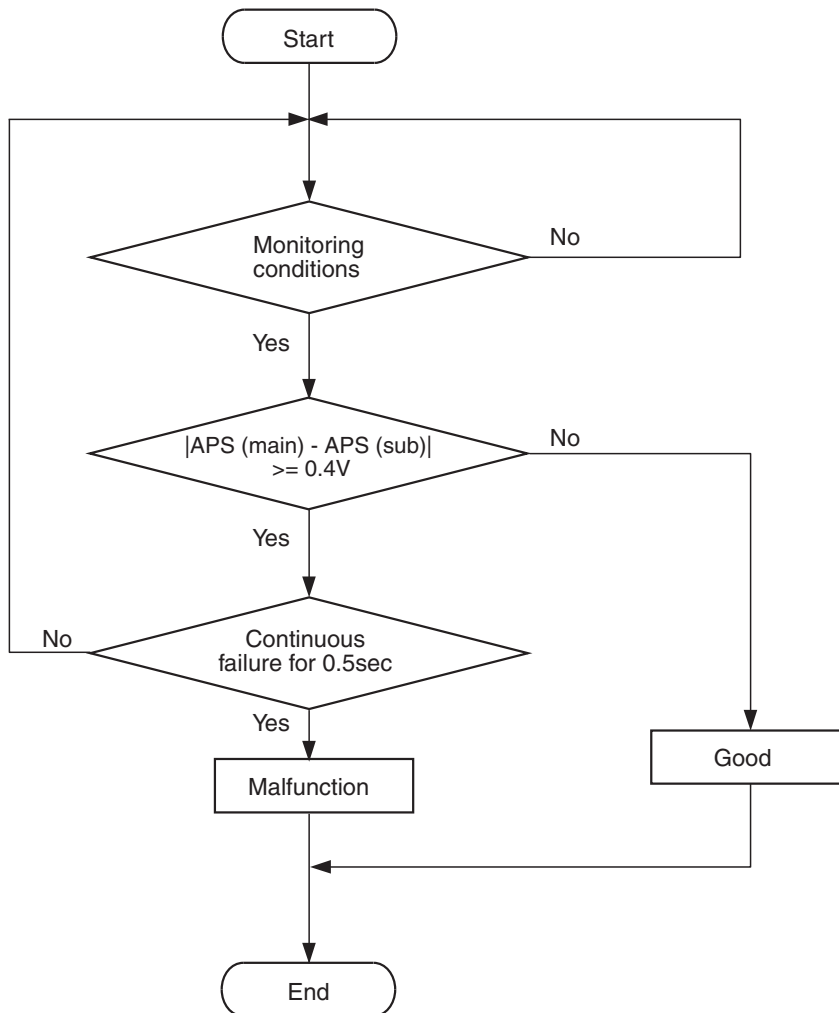
**Sensor (The sensor below is determined to be normal)**

- Not applicable



## DTC SET CONDITIONS

## Logic Flow Chart



AK604353

**Check Conditions**

- Change of accelerator pedal position sensor (sub) output voltage per 40 milliseconds is less than 0.06 volt.
- Range/performance error of accelerator pedal position sensor (main and sub) circuit is not detected.

**Judgment Criterion**

- The difference between the accelerator pedal position sensor (main) output voltage and the accelerator pedal position sensor (sub) output voltage is more than 0.4 volt for 0.5 second.

*NOTE: The accelerator pedal position sensor voltage used for the judgement is converted into the accelerator pedal position sensor voltage for the internal processing by the ECM.*

**FAIL-SAFE AND BACKUP FUNCTION**

- Throttle opening degree position is in default position.

**OBD-II DRIVE CYCLE PATTERN**

None.

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

- Accelerator pedal position sensor system failed.
- ECM failed.

**DIAGNOSIS**

**Required Special Tool:**

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

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

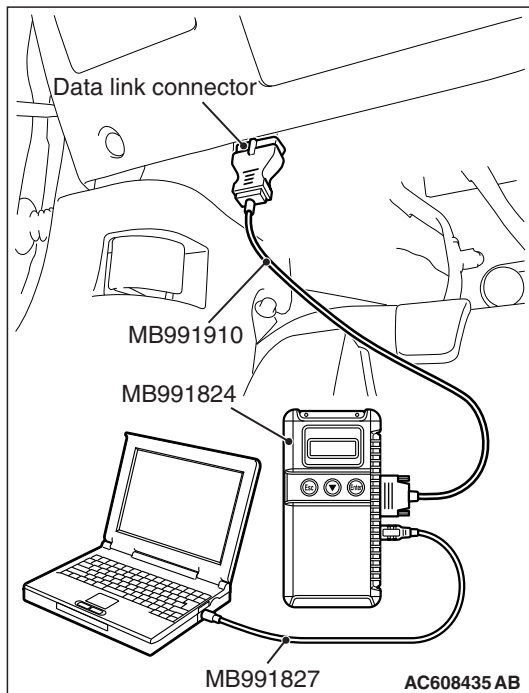
**⚠ CAUTION**

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

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

**Q: Is the diagnostic trouble code other than P1237 set?**

- YES :** Refer to, Diagnostic Trouble Code Chart [P.13B-51](#).  
**NO :** Go to Step 2.



**STEP 2. Using scan tool MB991958, check data list item 11: Accelerator Pedal Position Sensor (main).**

- (1) Turn the ignition switch to the "ON" position.
- (2) Set scan tool MB991958 to the data reading mode for item 11, Accelerator Pedal Position Sensor (main).
  - Output voltage should be between 900 and 1,100 millivolts when foot is released from accelerator pedal.
  - Output voltage should be 4,000 millivolts or more when accelerator pedal is fully depressed.
- (3) Turn the ignition switch to the "LOCK" (OFF) position.

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

- YES :** Go to Step 3.  
**NO :** Refer to, DTC P2122 –Accelerator Pedal Position Sensor (main) Circuit Low Input [P.13B-734](#), DTC P2123 –Accelerator Pedal Position Sensor (main) Circuit High Input [P.13B-739](#).

**STEP 3. Using scan tool MB991958, check data list item 12: Accelerator Pedal Position Sensor (sub).**

- (1) Turn the ignition switch to the "ON" position.
- (2) Set scan tool MB991958 to the data reading mode for item 12, Accelerator Pedal Position Sensor (sub).
  - Output voltage should be between 400 and 600 millivolts when foot is released from accelerator pedal.
  - Output voltage should be 2,000 millivolts or more when accelerator pedal is fully depressed.
- (3) Turn the ignition switch to the "LOCK" (OFF) position.

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

**YES** : Go to Step 4.

**NO** : Refer to, DTC P2127 –Accelerator Pedal Position Sensor (sub) Circuit Low Input [P.13B-744](#), DTC P2128 –Accelerator Pedal Position Sensor (sub) Circuit High Input [P.13B-749](#).

---

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

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

**Q: Is DTC P1237 set?**

**YES** : Replace the ECM (Refer to, Removal and Installation [P.13B-1022](#)). Then go to Step 5.

**NO** : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions [P.00-13](#).

---

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

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

**Q: Is DTC P1237 set?**

**YES** : Retry the troubleshooting.

**NO** : The inspection is complete.

**DTC P1238: Mass Airflow Sensor Plausibility (torque monitor)**

**TECHNICAL DESCRIPTION**

Compare the actual measurement of volumetric efficiency by a mass airflow sensor signal with volumetric efficiency estimated from a throttle position sensor (main or sub) signal.

**MONITOR EXECUTION**

Continuous

**MONITOR EXECUTION CONDITIONS  
(Other monitor and Sensor)**

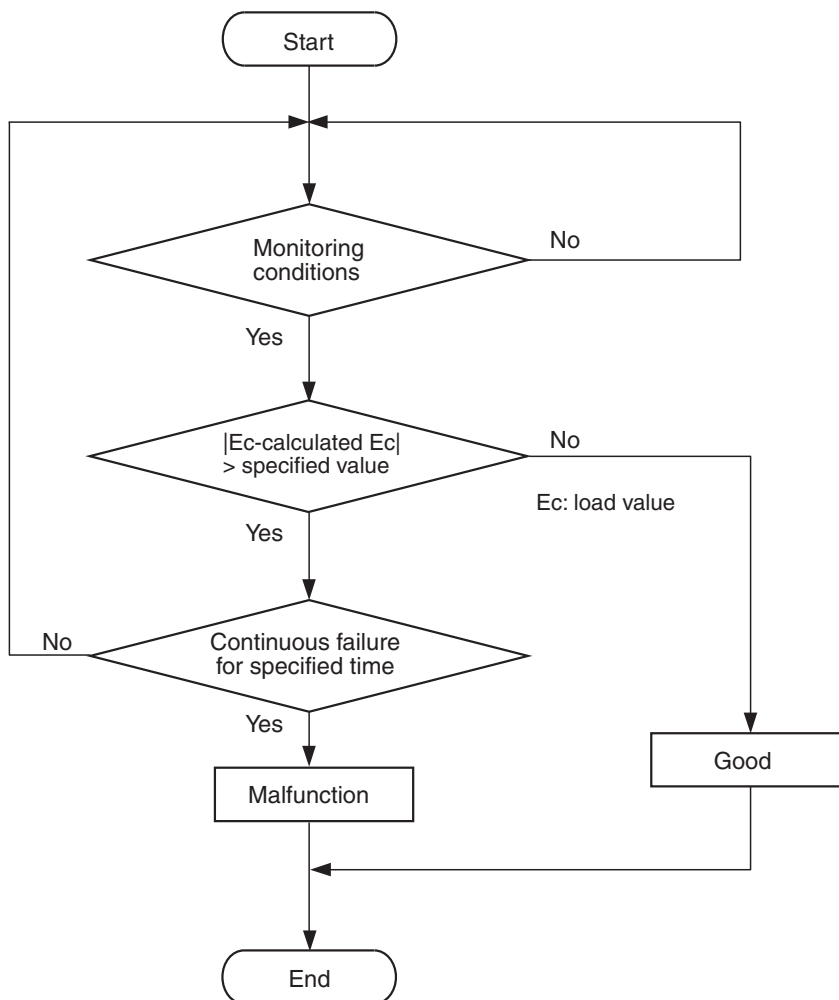
**Other Monitor (There is no temporary DTC stored in memory for the item monitored below)**

- Not applicable

**Sensor (The sensor below is determined to be normal)**

- Not applicable

**DTC SET CONDITIONS**



AK604351

**Check Conditions**

- The volumetric efficiency estimated by the throttle position sensor (main) subtracted from the actual volumetric efficiency is more than 0 percent. Or, the volumetric efficiency is less than 60 percent.
- Engine speed is more than 750 r/min.

**Judgment Criterion**

- For 0.5 second, the difference between the actual volumetric efficiency and the volumetric efficiency estimated by the throttle position sensor (main) is more than 35 percent.

**Check Conditions**

- The volumetric efficiency estimated by the throttle position sensor (sub) subtracted from the actual volumetric efficiency is more than 0 percent. Or, the volumetric efficiency is less than 60 percent.
- Engine speed is more than 750 r/min.

**Judgment Criterion**

- For 0.5 second, the difference between the actual volumetric efficiency and the volumetric efficiency estimated by the throttle position sensor (sub) is more than 35 percent.

**FAIL-SAFE AND BACKUP FUNCTION**

- Throttle opening degree position is in default position.

**OBD-II DRIVE CYCLE PATTERN**

Refer to Diagnostic Function –OBD-II Drive Cycle Pattern 17 [P.13B-12](#).

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

- Mass airflow sensor system failed.
- Intake system vacuum leak.
- ECM failed.

**DIAGNOSIS****Required Special Tool:**

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

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

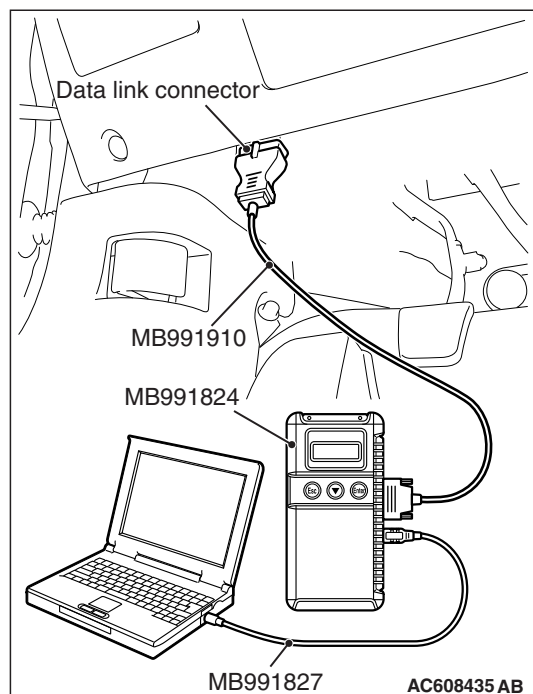
**⚠ CAUTION**

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

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

**Q: Is the diagnostic trouble code other than P1238 set?**

- YES :** Refer to, Diagnostic Trouble Code Chart [P.13B-51](#).  
**NO :** Go to Step 2.



---

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

**Q: Are there any abnormalities?**

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

**NO** : Go to Step 3.

---

**STEP 3. Using scan tool MB991958, check data list item 10: Mass Airflow Sensor.**

(1) Start the engine and run at idle.

(2) Set scan tool MB991958 to the data reading mode for item 10, Mass Airflow Sensor.

(3) Warm up the engine to normal operating temperature: 80° C to 95° C (176° F to 203° F).

- The standard value during idling should be between 1,350 and 1,670 millivolts.
- When the engine is revved, the output voltage should increase according to the increase in engine speed.

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

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

**YES** : Go to Step 4.

**NO** : Refer to, DTC P0101 –Mass Airflow Circuit Range/Performance Problem [P.13B-152](#), DTC P0102 –Mass Airflow Circuit Low Input [P.13B-158](#), DTC P0103 –Mass Airflow Circuit High Input [P.13B-165](#).

---

**STEP 4. Check the trouble symptoms.**

(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle Pattern 17 [P.13B-12](#).

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

**Q: Is DTC P1238 set?**

**YES** : Replace the ECM (Refer to, Removal and Installation [P.13B-1022](#)). Then go to Step 5.

**NO** : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions [P.00-13](#).

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**STEP 5. Test the OBD-II drive cycle.**

(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle Pattern 17 [P.13B-12](#).

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

**Q: Is DTC P1238 set?**

**YES** : Retry the troubleshooting.

**NO** : The inspection is complete.

**DTC P1239: Engine RPM Plausibility**

**TECHNICAL DESCRIPTION**

Compares the actual engine speed calculated from the crankshaft position sensor signal cycle with the estimated engine speed calculated from the number of the crankshaft position sensor signal pulses after a lapse of the specified time.

**MONITOR EXECUTION**

Continuous

**MONITOR EXECUTION CONDITIONS  
(Other monitor and Sensor)**

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

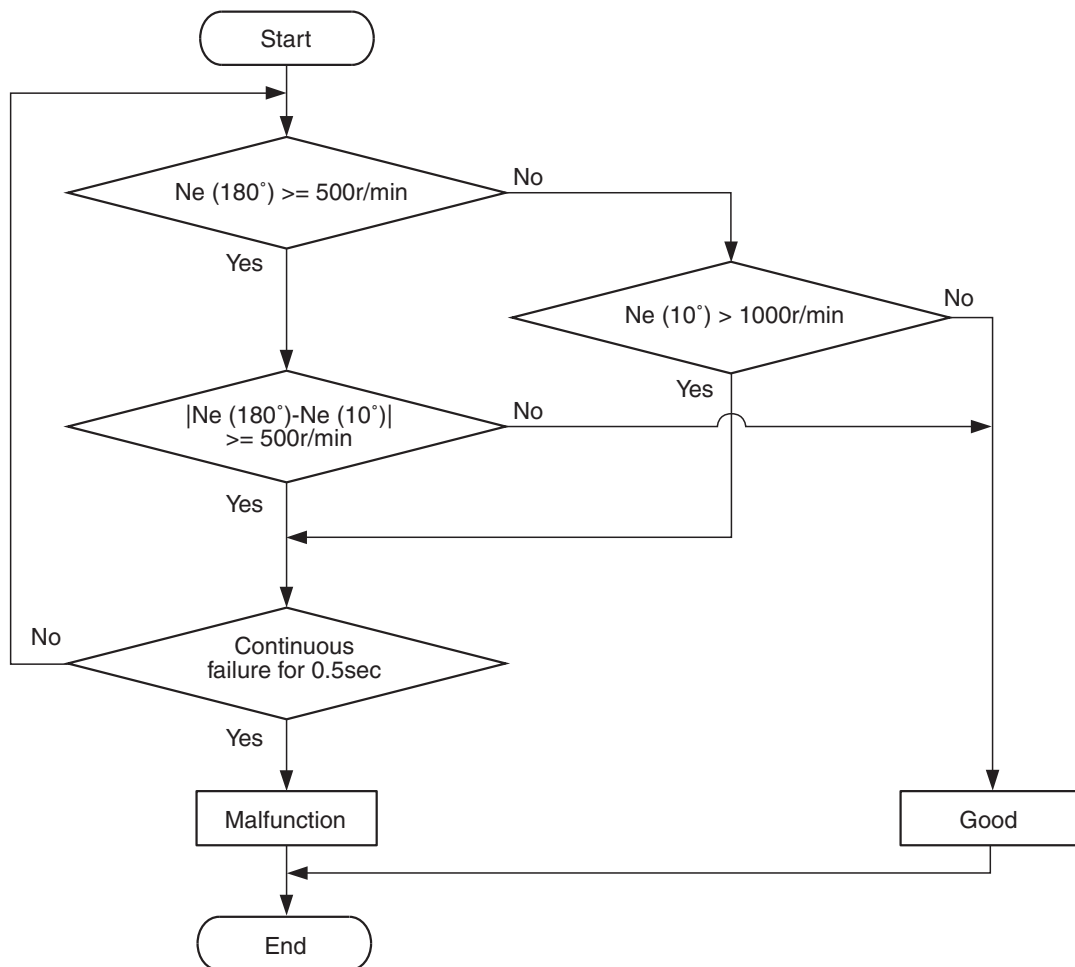
- Not applicable

**Sensor (The sensor below is determined to be normal)**

- Not applicable

**DTC SET CONDITIONS**

**Logic Flow Chart**



### Check Condition

- The engine speed monitored with a 180 degree-cycle pulse is more than 500 r/min.

### Judgment Criterion

- The difference between the engine speed monitored with a 180 degree-cycle pulse and the engine speed monitored with a 10 degree-cycle pulse is more than 500 r/min for 0.5 second.

### Check Condition

- The engine speed monitored with a 180 degree-cycle pulse is less than 500 r/min.

### Judgment Criterion

- The engine speed monitored with a 10 degree-cycle pulse is more than 1,000 r/min for 0.5 second.

### FAIL-SAFE AND BACKUP FUNCTION

- Throttle opening degree position is in default position.

### OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function –OBD-II Drive Cycle Pattern 23 [P.13B-12](#).

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

- Crankshaft position sensor system failed.
- ECM failed.

## DIAGNOSIS

### Required Special Tool:

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

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

### **⚠ CAUTION**

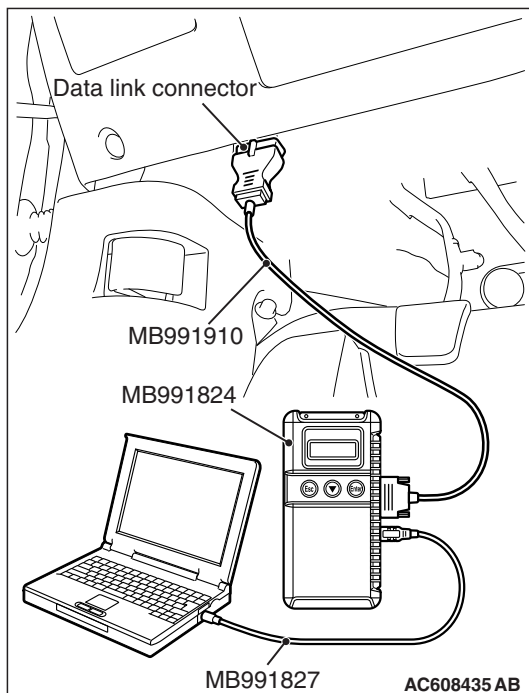
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

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

**Q: Is the diagnostic trouble code other than P1239 set?**

**YES :** Refer to, Diagnostic Trouble Code Chart [P.13B-51](#).

**NO :** Go to Step 2.





**STEP 2. Check the trouble symptoms.**

- (1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle –Pattern 23 [P.13B-12](#).
- (2) Check the diagnostic trouble code (DTC).

**Q: Is DTC P1239 set?**

**YES** : Replace the ECM (Refer to, Removal and Installation [P.13B-1022](#)). Then go to Step 3.

**NO** : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions [P.00-13](#).

**STEP 3. Test the OBD-II drive cycle.**

- (1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle –Pattern 23 [P.13B-12](#).
- (2) Check the diagnostic trouble code (DTC).

**Q: Is DTC P1239 set?**

**YES** : Retry the troubleshooting.

**NO** : The inspection is complete.

**DTC P1240: Ignition Angle****TECHNICAL DESCRIPTION**

Checks for an abnormal ignition timing retard angle demand signal from the active stability control (ASC).

**DTC SET CONDITIONS****Check Condition**

- Ignition switch is "ON" position.

**Judgment Criterion**

- The ignition timing retard angle demand signal is not normal.

**FAIL-SAFE AND BACKUP FUNCTION**

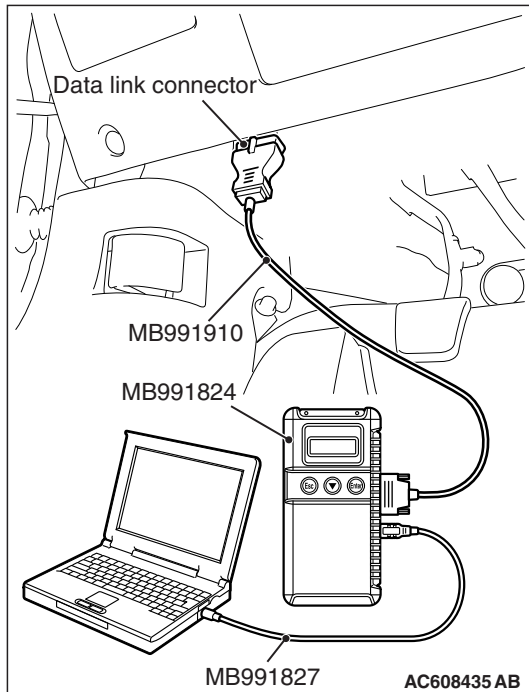
- Ignition retard is not carried out.

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

- ASC system failed.
- ECM failed.

**DIAGNOSIS****Required Special Tool:**

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



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

**⚠ CAUTION**

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

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

**Q: Is the ASC-DTC set?**

**YES :** Refer to GROUP 35C, Diagnosis –Diagnostic Trouble Code Chart [P.35C-27](#).

**NO :** Go to Step 2.

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

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

**Q: Is the diagnostic trouble code other than P1240 set?**

**YES :** Refer to, Diagnostic Trouble Code Chart [P.13B-51](#).

**NO :** Go to Step 3.

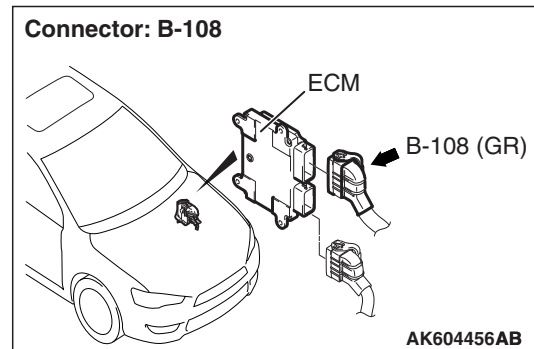
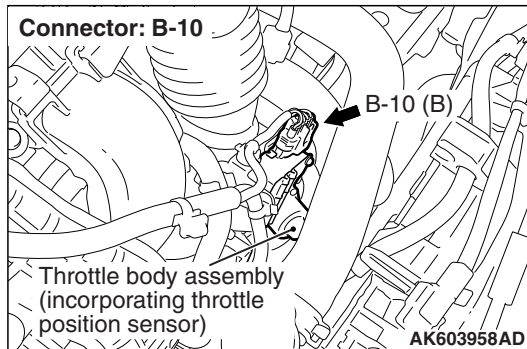
**STEP 3. Using scan tool MB991958, read the diagnostic trouble code (DTC).**

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

**Q: Is DTC P1240 set?**

**YES :** Replace the ECM (Refer to, Removal and Installation [P.13B-1022](#)).

**NO :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions [P.00-13](#).

**DTC P1241: Torque Monitor****TECHNICAL DESCRIPTION**

Compares the actual torque signal computed from a mass airflow sensor signal with the driver demand torque signal computed from an accelerator pedal position sensor.

**MONITOR EXECUTION**

Continuous

**MONITOR EXECUTION CONDITIONS  
(Other monitor and Sensor)**

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

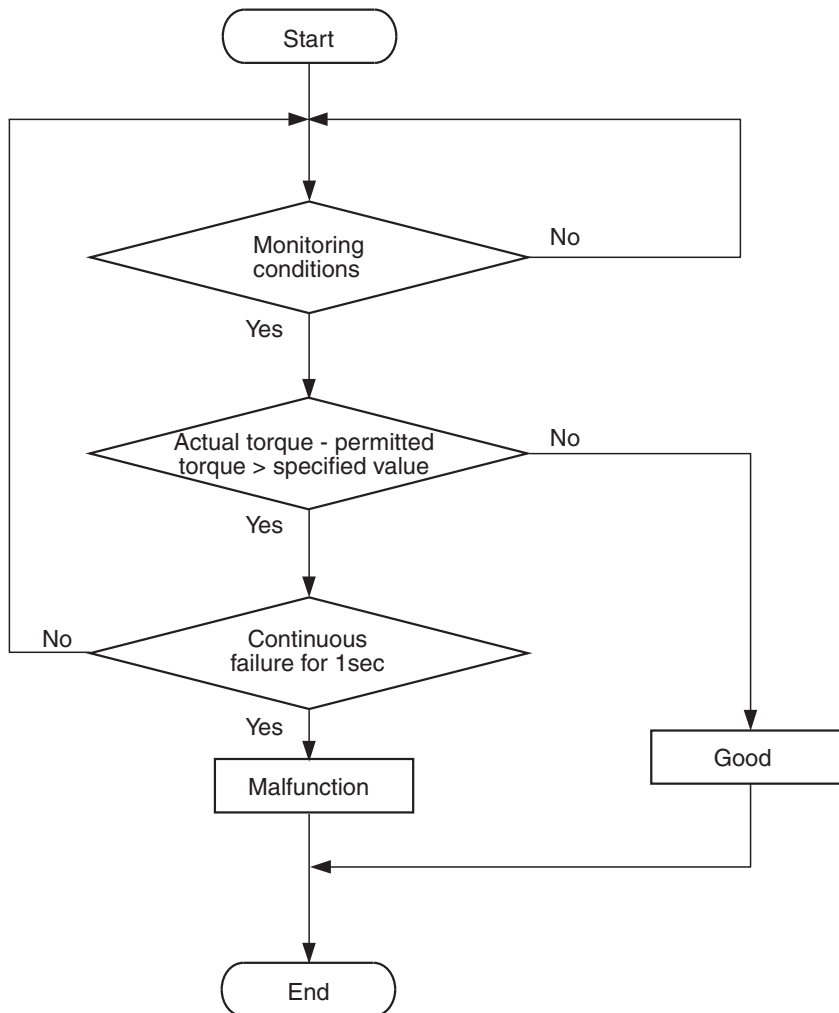
- Not applicable

**Sensor (The sensor below is determined to be normal)**

- Not applicable

## DTC SET CONDITIONS

### Logic Flow Chart



AK800587

#### Check Conditions

- Engine speed is more than 500 r/min.
- Volumetric efficiency is more than 16 percent.

#### Judgement Criterion

- The requested torque signal subtracted from the actual torque signal is more than 50 N·m (37 ft-lb) for 1 second.

#### FAIL-SAFE AND BACKUP FUNCTION

- Throttle opening degree position is in default position.

#### OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function –OBD-II Drive Cycle – Pattern 17 [P.13B-12](#).

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

- Throttle actuator control motor failed.
- Connector damage.
- Harness damage.
- Intake system vacuum leak.
- There is some trash around mass airflow sensor.
- ECM failed.

**DIAGNOSIS****Required Special Tool:**

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

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

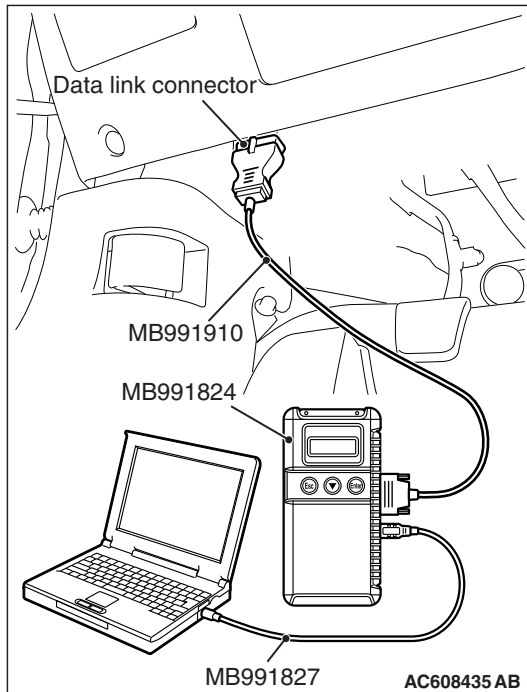
**⚠ CAUTION**

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

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

**Q: Is the diagnostic trouble code other than P1241 set?**

- YES :** Refer to, Diagnostic Trouble Code Chart [P.13B-51](#).  
**NO :** Go to Step 2.



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

**Q: Are there any abnormalities?**

- YES :** Repair it. Then go to Step 12.  
**NO :** Go to Step 3.

**STEP 3. Check for foreign matter being around the mass airflow sensor.**

**Q: Are there any foreign matter?**

- YES :** Repair it. Then go to Step 12.  
**NO :** Go to Step 4.

---

**STEP 4. Using scan tool MB991958, check data list item 10:  
Mass Airflow Sensor.**

- (1) Start the engine and run at idle.
- (2) Set scan tool MB991958 to the data reading mode for item 10, Mass Airflow Sensor.
- (3) Warm up the engine to normal operating temperature: 80° C to 95° C (176° F to 203° F).
  - The standard value during idling should be between 1,350 and 1,670 millivolts.
  - When the engine is revved, the output voltage should increase according to the increase in engine speed.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

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

**YES :** Go to Step 5.

**NO :** Refer to, DTC P0101 –Mass Airflow Circuit Range/Performance Problem [P.13B-152](#), DTC P0102 –Mass Airflow Circuit Low Input [P.13B-158](#), DTC P0103 –Mass Airflow Circuit High Input [P.13B-165](#).

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**STEP 5. Using scan tool MB991958, check data list item 11:  
Accelerator Pedal Position Sensor (main).**

- (1) Turn the ignition switch to the "ON" position.
- (2) Set scan tool MB991958 to the data reading mode for item 11, Accelerator Pedal Position Sensor (main).
  - Output voltage should be between 900 and 1,100 millivolts when foot is released from accelerator pedal.
  - Output voltage should be 4,000 millivolts or more when accelerator pedal is fully depressed.
- (3) Turn the ignition switch to the "LOCK" (OFF) position.

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

**YES :** Go to Step 6.

**NO :** Refer to, DTC P2122 –Accelerator Pedal Position Sensor (main) Circuit Low Input [P.13B-734](#), DTC P2123 –Accelerator Pedal Position Sensor (main) Circuit High Input [P.13B-739](#).

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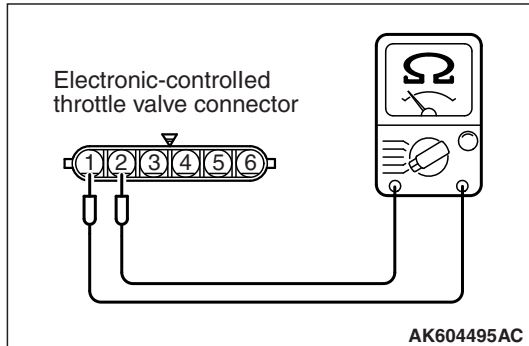
**STEP 6. Using scan tool MB991958, check data list item 12:  
Accelerator Pedal Position Sensor (sub).**

- (1) Turn the ignition switch to the "ON" position.
- (2) Set scan tool MB991958 to the data reading mode for item 12, Accelerator Pedal Position Sensor (sub).
  - Output voltage should be between 400 and 600 millivolts when foot is released from accelerator pedal.
  - Output voltage should be 2,000 millivolts or more when accelerator pedal is fully depressed.
- (3) Turn the ignition switch to the "LOCK" (OFF) position.

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

**YES :** Go to Step 7.

**NO :** Refer to, DTC P2127 –Accelerator Pedal Position Sensor (sub) Circuit Low Input [P.13B-744](#), DTC P2128 –Accelerator Pedal Position Sensor (sub) Circuit High Input [P.13B-749](#).



**STEP 7. Check harness connector B-10 at electronic-controlled throttle valve and harness connector B-108 at ECM for damage.**

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

**YES :** Go to Step 8.

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

**STEP 8. Check the throttle actuator control motor.**

(1) Disconnect the electronic-controlled throttle valve connector B-10.

(2) Measure the resistance between electronic-controlled throttle valve side connector terminal No. 1 and No. 2.

**Standard value: 0.3 –80 Ω [at 20° C (68° C)]**

**Q: Is the measured resistance between 0.3 and 80 Ω [at 20° C (68° C)]?**

**YES :** Go to Step 9.

**NO :** Replace the throttle body assembly. Then go Step 12.

**STEP 9. Check for harness damage between electronic-controlled throttle valve connector B-10 (terminal No. 1) and ECM connector B-108 (terminal No. 15).**

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

**YES :** Go to Step 10.

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

**STEP 10. Check for harness damage between electronic-controlled throttle valve connector B-10 (terminal No. 2) and ECM connector B-108 (terminal No. 16).**

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

**YES :** Go to Step 11.

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

**STEP 11. Check the trouble symptoms.**

(1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle Pattern 17 [P.13B-12](#).

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

**Q: Is DTC P1241 set?**

**YES :** Replace the ECM (Refer to, Removal and Installation [P.13B-1022](#)). Then go to Step 12.

**NO :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions [P.00-13](#).

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

- (1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle Pattern 17 [P.13B-12](#).
- (2) Check the diagnostic trouble code (DTC).

**Q: Is DTC P1241 set?**

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

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**DTC P1242: Fail Safe Control Monitor**

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**TECHNICAL DESCRIPTION**

Monitors the engine speed during fail-safe control.

**DTC SET CONDITIONS**

**Check Condition**

- During fail safe control.

**Judgment Criterion**

- The engine speed is more than assumed.

**FAIL-SAFE AND BACKUP FUNCTION**

- Throttle opening degree position is in default position.

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

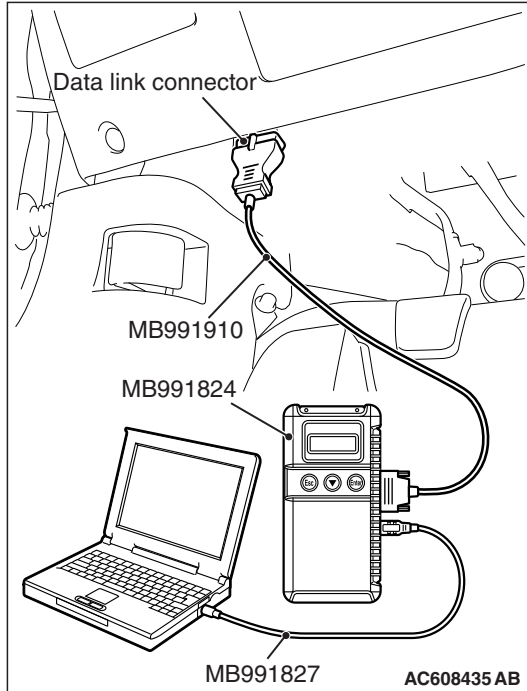
- ECM failed.

**DIAGNOSIS**

**Required Special Tool:**

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





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

**⚠ CAUTION**

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

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

**Q: Is the diagnostic trouble code other than P1242 set?**

**YES :** Refer to, Diagnostic Trouble Code Chart [P.13B-51](#).

**NO :** Go to Step 2 .

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

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

**Q: Is DTC P1242 set?**

**YES :** Replace the ECM (Refer to, Removal and Installation [P.13B-1022](#)).

**NO :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions [P.00-13](#).

**DTC P1243: Inquiry/Response Error**

**TECHNICAL DESCRIPTION**

Monitors the computation function of the ECM.

**DTC SET CONDITIONS**

**Check Condition**

- Ignition switch is "ON" position.

**Judgment Criterion**

- ECM can not calculate input data.

**FAIL-SAFE AND BACKUP FUNCTION**

- Microcomputer is reset.

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

- ECM failed.

**DIAGNOSIS**

**Required Special Tool:**

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

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

**⚠ CAUTION**

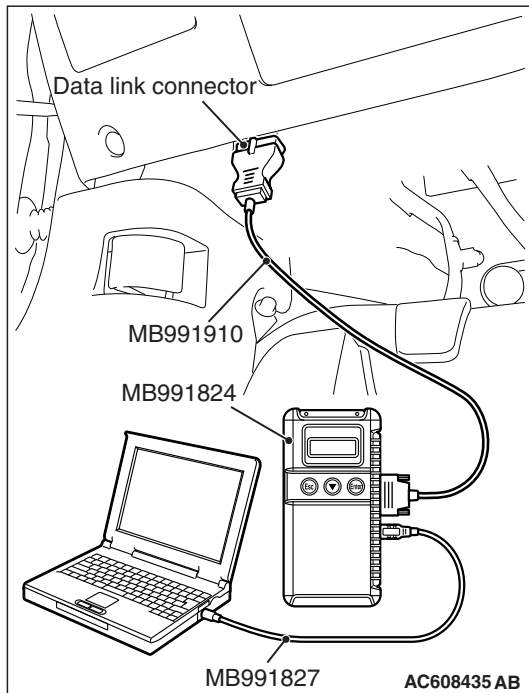
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

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

**Q: Is DTC P1243 set?**

**YES :** Replace the ECM (Refer to, Removal and Installation P.13B-1022).

**NO :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13.



**DTC P1244: RAM Test For All Area****TECHNICAL DESCRIPTION**

Monitors the computation function of the ECM periodically.

**DTC SET CONDITIONS****Check Condition**

- Ignition switch is "ON" position.

**Judgment Criterion**

- All RAM data of ECM are defect.

**FAIL-SAFE AND BACKUP FUNCTION**

- Microcomputer is reset.

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

- ECM failed.

**DIAGNOSIS****Required Special Tool:**

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

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

**⚠ CAUTION**

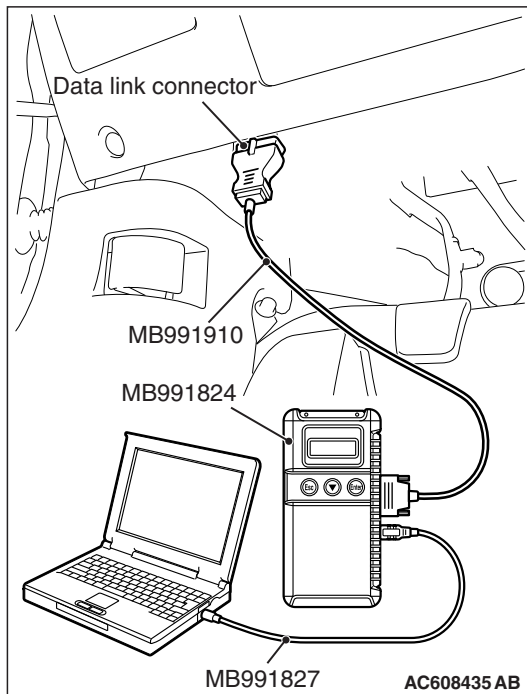
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

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

**Q: Is DTC P1244 set?**

**YES :** Replace the ECM (Refer to, Removal and Installation P.13B-1022).

**NO :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13.



**DTC P1245: Cycle RAM Test (engine)**

**TECHNICAL DESCRIPTION**

Monitors the computation function of the ECM periodically.

**DTC SET CONDITIONS**

**Check Condition**

- Ignition switch is "ON" position.

**Judgment Criterion**

- RAM data (engine) is defect.

**FAIL-SAFE AND BACKUP FUNCTION**

- Microcomputer is reset.

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

- ECM failed.

**DIAGNOSIS**

**Required Special Tool:**

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

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

**⚠ CAUTION**

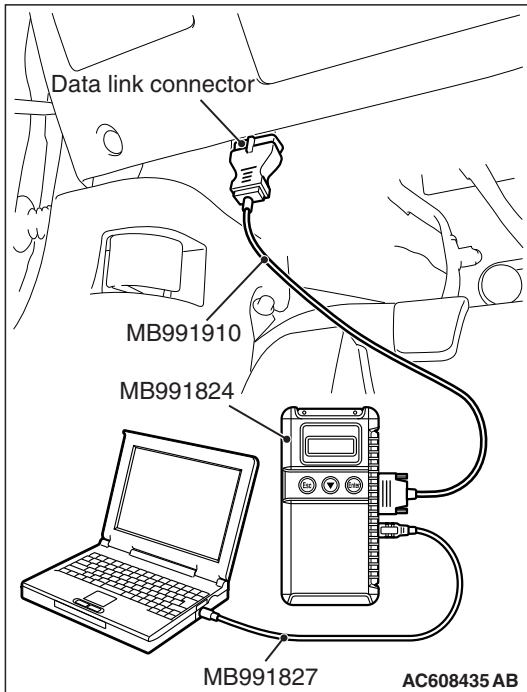
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

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

**Q: Is DTC P1245 set?**

**YES :** Replace the ECM (Refer to, Removal and Installation P.13B-1022).

**NO :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13.



**DTC P1247: CVT Plausibility <CVT>****TECHNICAL DESCRIPTION**

Checks for an abnormal signal of TCM.

**DTC SET CONDITIONS****Check Condition**

- Ignition switch is "ON" position.

**Judgment Criterion**

- A torque demand signal from TCM is not normal.

**FAIL-SAFE AND BACKUP FUNCTION**

- Torque requested by TCM is ignored.

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

- CVT system failed.
- ECM failed.

**DIAGNOSIS****Required Special Tool:**

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

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

**⚠ CAUTION**

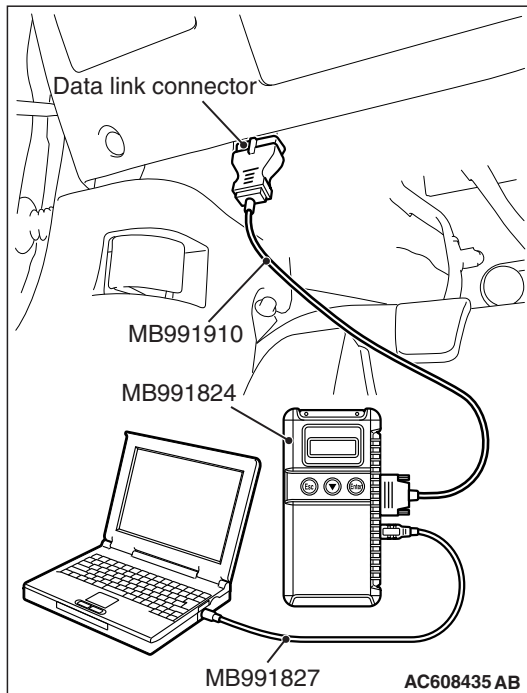
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

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

**Q: Is CVT-DTC set?**

**YES** : Refer to GROUP 23A, Diagnosis –Diagnosis Code Chart [P.23A-26](#).

**NO** : Go to Step 2.



---

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

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

**Q: Is the diagnostic trouble code other than P1247 set?**

- YES :** Refer to, Diagnostic Trouble Code Chart [P.13B-51](#).  
**NO :** Go to Step 3.

---

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

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

**Q: Is DTC P1247 set?**

- YES :** Replace the ECM (Refer to, Removal and Installation [P.13B-1022](#)).
- NO :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions [P.00-13](#).

---

**DTC P1506: Idle Control System RPM Lower Than Expected at Low Temperature**

---

**TECHNICAL DESCRIPTION**

- The amount of air taken in during idling is regulated by the opening and closing of the throttle valve.
- The ECM checks the difference between the actual engine speed and the target engine speed.

**DESCRIPTIONS OF MONITOR METHODS**

Difference between actual and target idle speed is over the specified value.

**MONITOR EXECUTION**

Continuous

**MONITOR EXECUTION CONDITIONS  
(Other monitor and Sensor)**

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

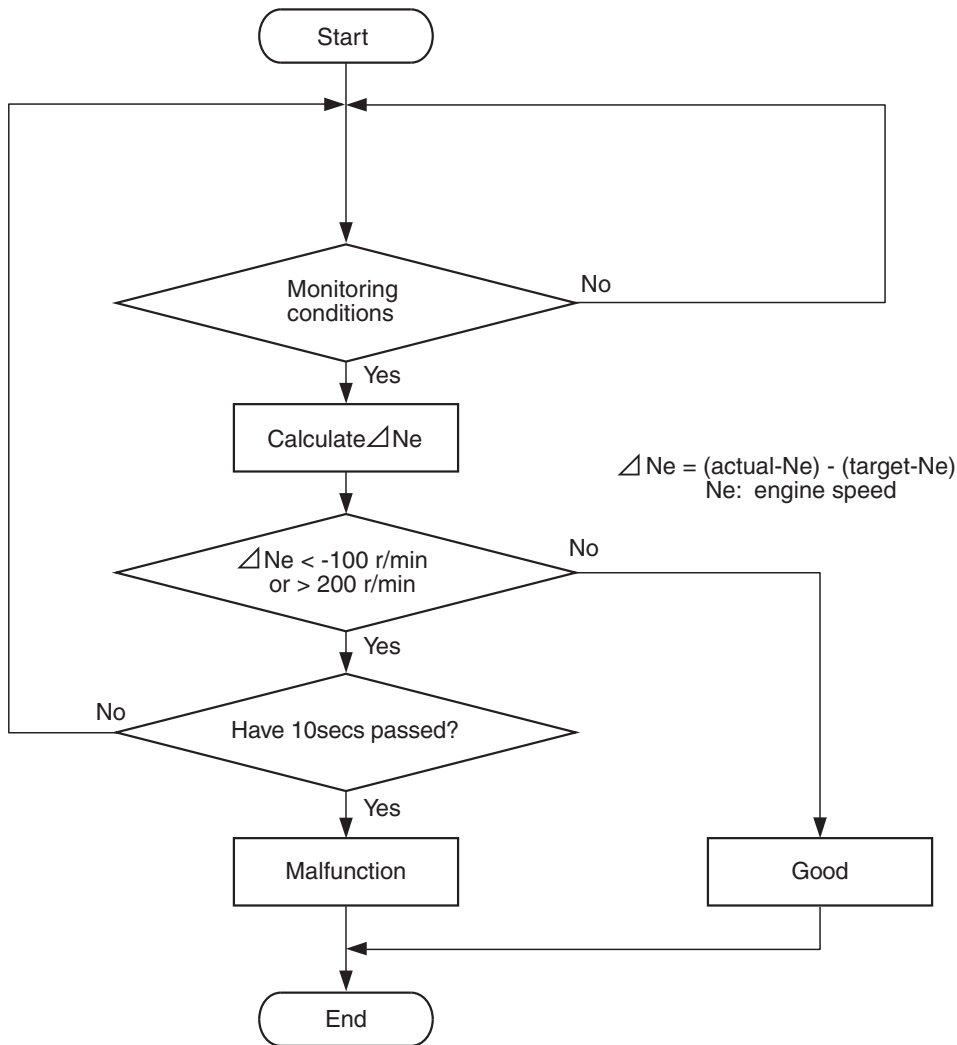
- Misfire monitor
- Exhaust gas recirculation (EGR) system monitor
- Fuel system monitor
- Vehicle speed sensor monitor <M/T>

**Sensor (The sensor below is determined to be normal)**

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

## DTC SET CONDITIONS

## Logic Flow Chart



AK704413

**Check Conditions**

- Under the closed loop idle speed control.
- The engine coolant temperature is between 7° C (45° F) and 41° C (106° F).
- Battery positive voltage is more than 10 volts.
- Barometric pressure is more than 76 kPa (22.4 in.Hg).
- Intake air temperature is more than -10° C (14° F).
- More than 3 seconds have passed from the end of the previous monitoring.
- Target air flow rate is more than 36 g /sec (30 L/sec).

**Judgment Criterion**

- The actual idle speed is less than the target idle speed by 100 r/min or more for 10 seconds.

**FAIL-SAFE AND BACKUP FUNCTION**

- None

**OBD-II DRIVE CYCLE PATTERN**

Refer to Diagnostic Function –OBD-II Drive Cycle – Pattern 19 [P.13B-12](#).

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

- Throttle valve area is dirty.
- Throttle body assembly failed.
- ECM failed.

## DIAGNOSIS

### Required Special Tool:

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

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

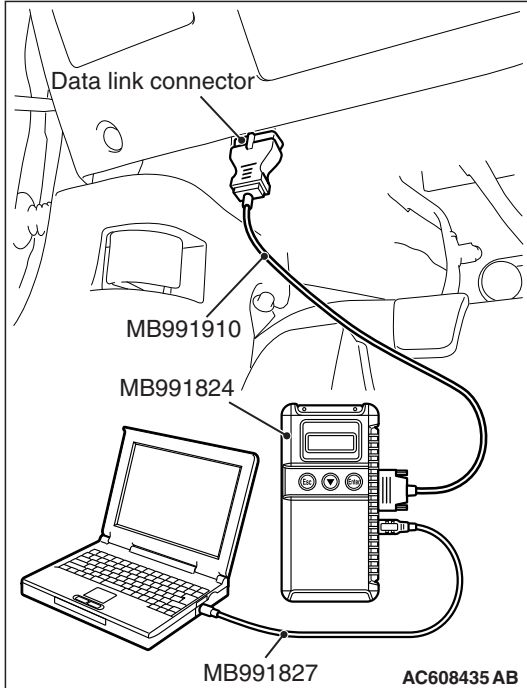
### ⚠ CAUTION

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

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

**Q: Is the diagnostic trouble code other than P1506 set?**

- YES** : Refer to, Diagnostic Trouble Code Chart [P.13B-51](#).  
**NO** : Go to Step 2.



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

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

- YES** : Perform cleaning. Refer to, Throttle Body (throttle valve area) Cleaning [P.13B-996](#). Then go to Step 4.  
**NO** : Go to Step 3.

**STEP 3. Replace the throttle body assembly.**

- (1) Replace the throttle body assembly.
- (2) Carry out test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle –Pattern 19 [P.13B-12](#).
- (3) Check the diagnostic trouble code (DTC).

**Q: Is DTC P1506 set?**

- YES** : Replace the ECM (Refer to, Removal and Installation [P.13B-1022](#)). Then go to Step 4.  
**NO** : The inspection is complete.



**STEP 4. Test the OBD-II drive cycle.**

- (1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle –Pattern 19 [P.13B-12](#).
- (2) Check the diagnostic trouble code (DTC).

**Q: Is DTC P1506 set?****YES** : Retry the troubleshooting.**NO** : The inspection is complete.

---

**DTC P1507: Idle Control System RPM Higher Than Expected at Low Temperature**

---

**TECHNICAL DESCRIPTION**

- The amount of air taken in during idling is regulated by the opening and closing of the throttle valve.
- The ECM checks the difference between the actual engine speed and the target engine speed.

**DESCRIPTIONS OF MONITOR METHODS**

Difference between actual and target idle speed is over the specified value.

**MONITOR EXECUTION**

Continuous

**MONITOR EXECUTION CONDITIONS  
(Other monitor and Sensor)****Other Monitor (There is no temporary DTC stored in memory for the item monitored below)**

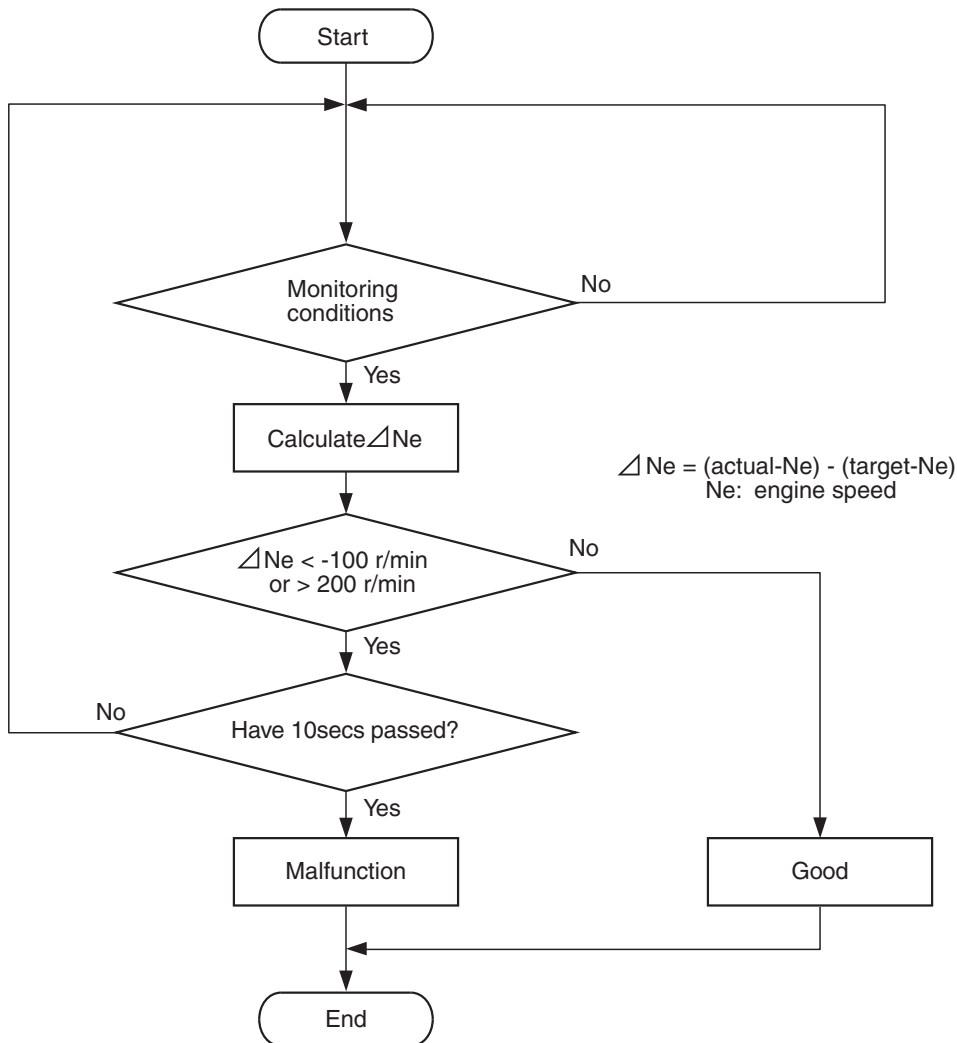
- Misfire monitor
- Exhaust gas recirculation (EGR) system monitor
- Fuel system monitor
- Vehicle speed sensor monitor <M/T>

**Sensor (The sensor below is determined to be normal)**

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

## DTC SET CONDITIONS

### Logic Flow Chart



AK704413

#### Check Conditions

- Under the closed loop idle speed control.
- Engine coolant temperature is between 7° C (45° F) and 41° C (106° F).
- Battery positive voltage is more than 10 volts.
- Barometric pressure is more than 76 kPa (22.4 in.Hg).
- Intake air temperature is more than -10° C (14° F).
- More than 3 seconds have passed from the end of the previous monitoring.
- Target air flow rate is 0 g/sec (0 L/sec).

#### Judgement Criterion

- The actual idle speed is more than the target idle speed by 200 r/min (300 r/min\*) or more for 10 seconds.

\*: Specs in parentheses are applicable if the maximum intake air temperature during the previous operation was more than 45° C (113° F).

#### FAIL-SAFE AND BACKUP FUNCTION

- None

#### OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function –OBD-II Drive Cycle – Pattern 19 [P.13B-12](#).

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

- Intake system vacuum leak.
- Throttle body assembly failed.
- ECM failed.

## DIAGNOSIS

### Required Special Tool:

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

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

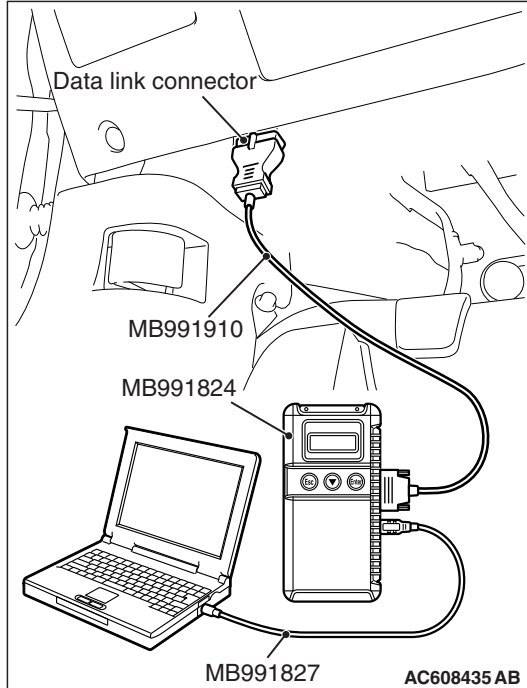
### **⚠ CAUTION**

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

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

**Q: Is the diagnostic trouble code other than P1507 set?**

- YES** : Refer to, Diagnostic Trouble Code Chart [P.13B-51](#).  
**NO** : Go to Step 2.



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

**Q: Are there any abnormalities?**

- YES** : Repair it. Then go to Step 4.  
**NO** : Go to Step 3.

**STEP 3. Replace the throttle body assembly.**

- (1) Replace the throttle body assembly.
- (2) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle –Pattern 19 [P.13B-12](#).
- (3) Check the diagnostic trouble code (DTC).

**Q: Is DTC P1507 set?**

- YES** : Replace the ECM (Refer to, Removal and Installation [P.13B-1022](#)). Then go to Step 4.  
**NO** : The inspection is complete.

---

**STEP 4. Test the OBD-II drive cycle.**

- (1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle –Pattern 19 [P.13B-12](#).
- (2) Check the diagnostic trouble code (DTC).

**Q: Is DTC P1507 set?**

**YES :** Retry the troubleshooting.

**NO :** The inspection is complete.

---

**DTC P1590: TCM to ECM Communication Error in Torque Reduction Request <CVT>**

---

**TECHNICAL DESCRIPTIONS OF  
MONITOR METHODS**

The ECM checks whether the errors in data communications sent by the TCM exist or not.

**MONITOR EXECUTION**

Continuous

**MONITOR EXECUTION CONDITIONS  
(Other monitor and Sensor)**

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

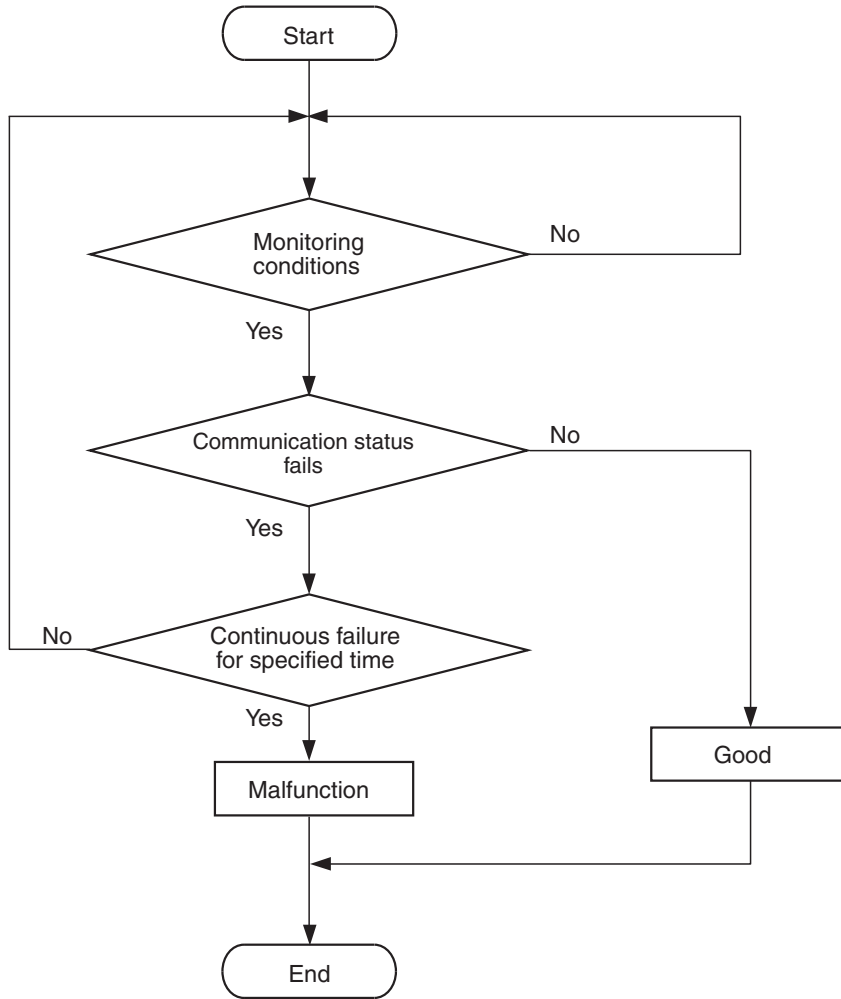
- Not applicable

**Sensor (The sensor below is determined to be normal)**

- Not applicable

DTC SET CONDITIONS

Logic Flow Chart



AK604369

**Check Condition**

- Ignition switch is "ON" position.

**Judgment Criterion**

- ECM detects an error in communication between ECM and TCM.

**FAIL-SAFE AND BACKUP FUNCTION**

- Engine output is restricted.

**OBD-II DRIVE CYCLE PATTERN**

None.

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

- CAN line harness damage or connector damage.
- ECM failed.

## DIAGNOSIS

### Required Special Tool:

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

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

#### **CAUTION**

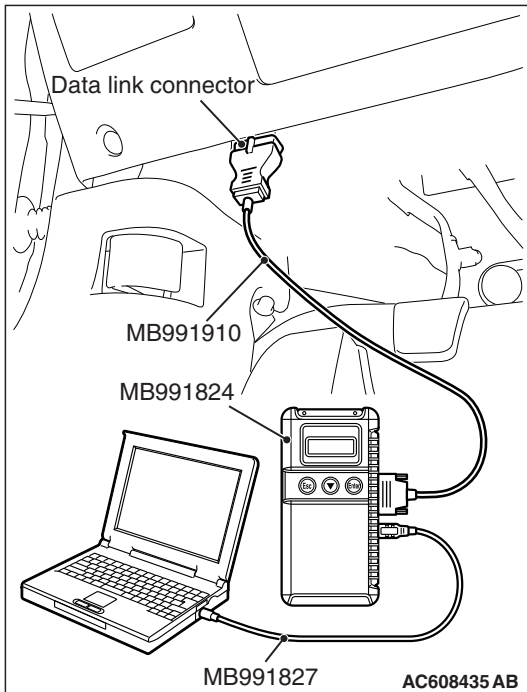
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

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

#### Q: Is the CAN bus line normal?

**YES** : Go to Step 2 .

**NO** : Repair the CAN bus line. Refer to GROUP 54C, Diagnosis –CAN Bus Diagnostics Table P.54C-16. Then go to Step 3.



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

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

#### Q: Is DTC P1590 set?

**YES** : Replace the ECM (Refer to, Removal and Installation P.13B-1022). Then go to Step 3.

**NO** : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13.

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

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

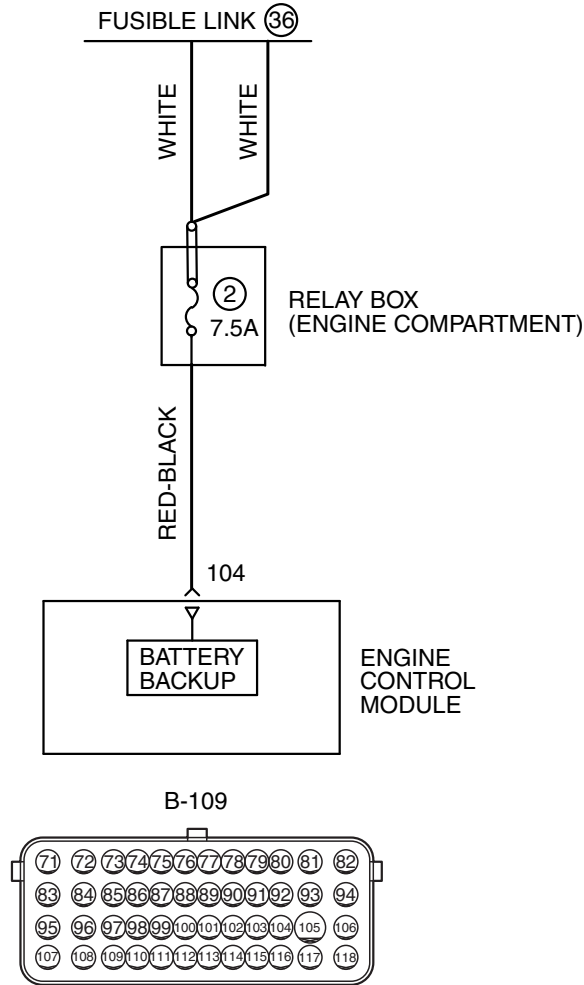
#### Q: Is DTC P1590 set?

**YES** : Retry the troubleshooting.

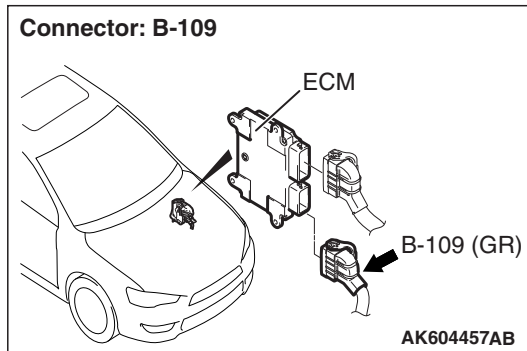
**NO** : The inspection is complete.

DTC P1603: Battery Backup Circuit Malfunction

BATTERY BACKUP CIRCUIT



AK604256AB



**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).*

**DESCRIPTIONS OF MONITOR METHODS**

Battery backup line voltage is under specified value.

**MONITOR EXECUTION**

Continuous

**MONITOR EXECUTION CONDITIONS**

**(Other monitor and Sensor)**

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

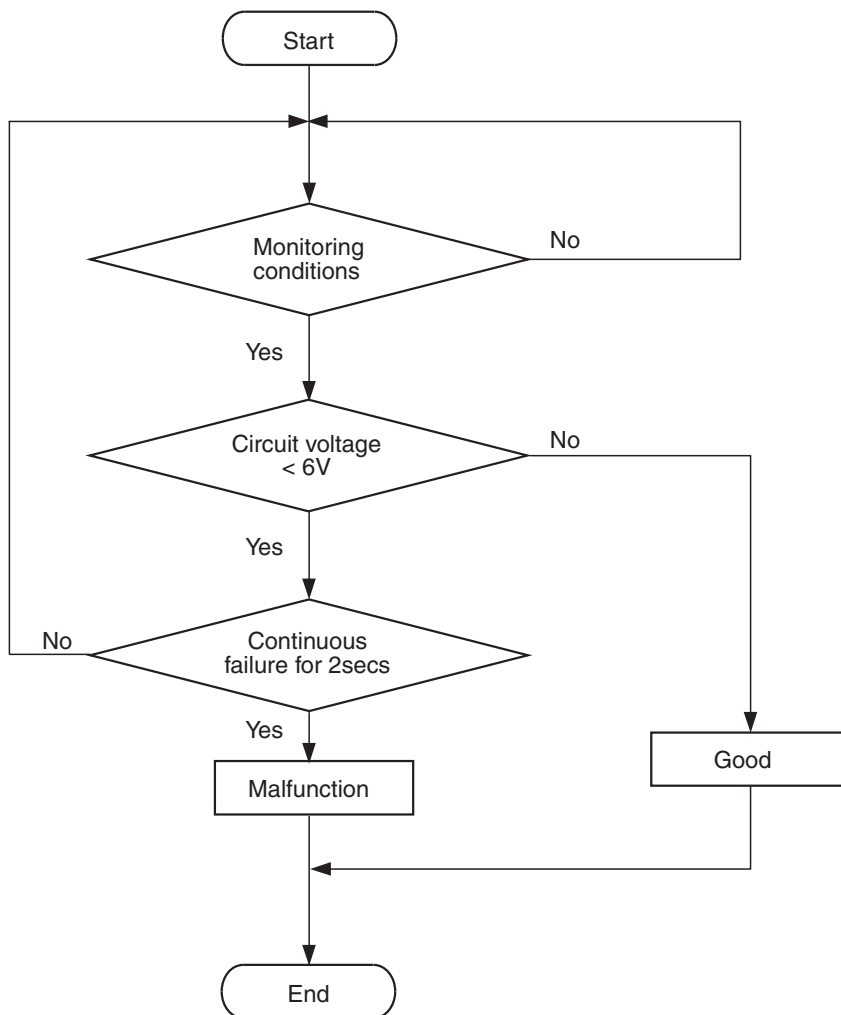
- Not applicable

**Sensor (The sensor below is determined to be normal)**

- Not applicable

**DTC SET CONDITIONS**

**Logic Flow Chart**



AK604357



**Check Conditions**

- Engine starting sequence was completed.
- Battery positive voltage is more than 10 volts.

**Judgement Criterion**

- Battery backup line voltage is less than 6 volts for 2 seconds.

**FAIL-SAFE AND BACKUP FUNCTION**

- All diagnosis codes are stored once failure judgment is completed.

**OBD-II DRIVE CYCLE PATTERN**

None.

**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:**

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

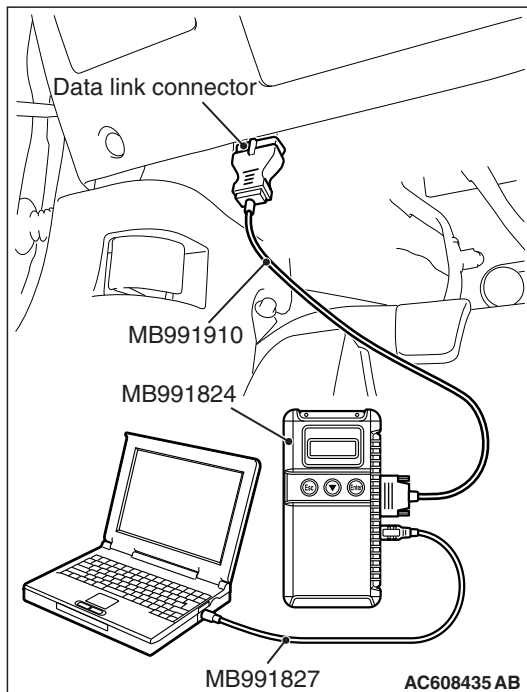
**STEP 1. Using scan tool MB991958, read the diagnostic trouble code (DTC).****⚠ CAUTION**

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

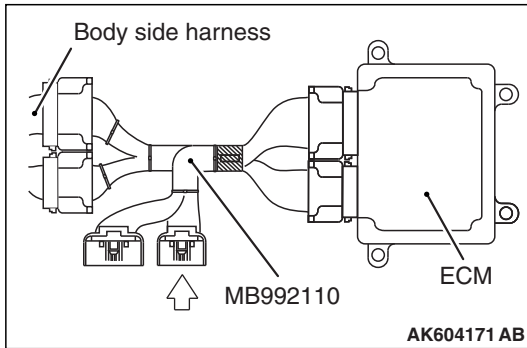
- (1) Connect scan tool MB991958 to the data link connector.
- (2) Turn the ignition switch to the "ON" position.
- (3) Erase the DTC.
- (4) Start the engine and run it at idle.
- (5) Read the DTC.
- (6) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is DTC P1603 set?****YES** : Go to Step 2.

**NO** : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13.

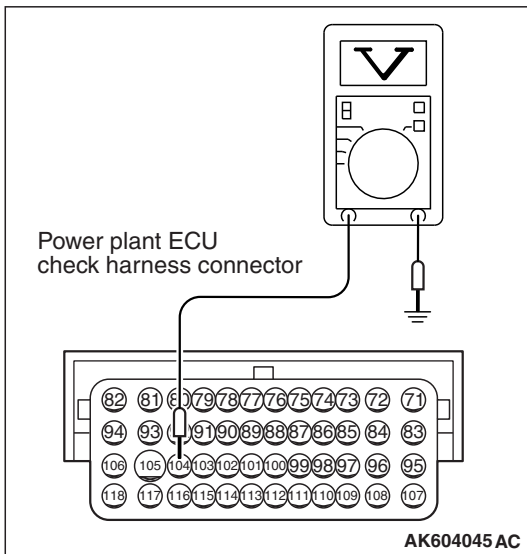
**STEP 2. Check harness connector B-109 at ECM for damage.****Q: Is the harness connector in good condition?****YES** : Go to Step 3.

**NO** : Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then go to Step 5.



**STEP 3. Measure the power supply voltage at ECM connector B-109 by using power plant ECU check harness special tool MB992110.**

(1) Disconnect all ECM connectors. Connect the power plant ECU check harness special tool MB992110 between the separated connectors.



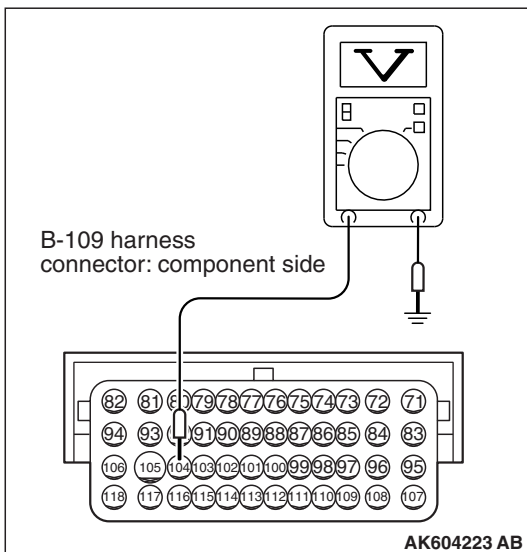
(2) Measure the voltage between terminal No. 104 and ground.

- Voltage should be battery positive voltage.

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

**YES :** Replace the ECM (Refer to, Removal and Installation P.13B-1022). Then go to Step 5.

**NO :** Go to Step 4.



**STEP 4. Measure the power supply voltage at ECM harness side connector B-109.**

(1) Disconnect the connector B-109 and measure at the harness side.

(2) Measure the voltage between terminal No. 104 and ground.

- Voltage should be battery positive voltage.

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

**YES :** Repair harness wire between battery and ECM connector B-109 (terminal No. 104) because of harness damage. Then go to Step 5.

**NO :** Repair harness wire between battery and ECM connector B-109 (terminal No. 104) because of open circuit or short circuit to ground. Then go to Step 5.

---

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

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

**Q: Is DTC P1603 set?**

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

---

**DTC P1676: Variant Coding**

---

**TECHNICAL DESCRIPTION**

- The ECM performs proper engine control based on vehicle information entered.
- A vehicle information is entered at a plant before shipment. This diagnosis code occurs when no vehicle information is entered during ECM replacement.

**MONITOR EXECUTION**

Continuous

**MONITOR EXECUTION CONDITIONS  
(Other monitor and Sensor)****Other Monitor (There is no temporary DTC stored in memory for the item monitored below)**

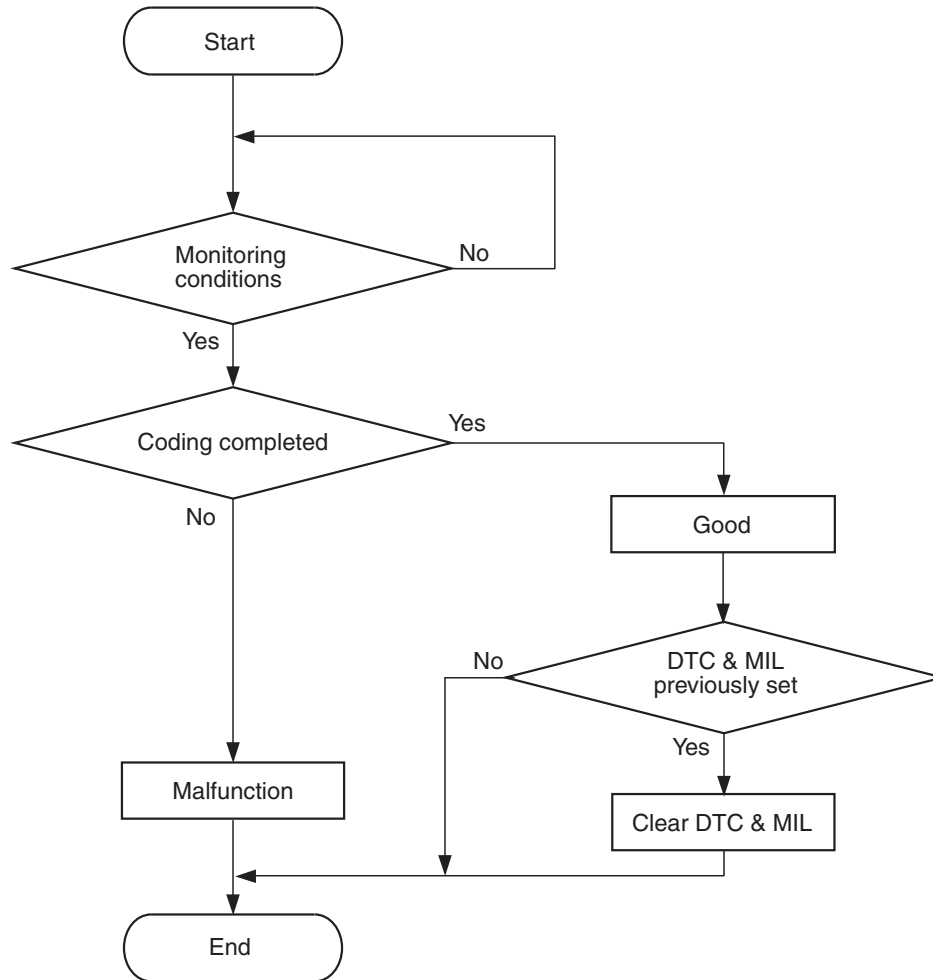
- Not applicable

**Sensor (The sensor below is determined to be normal)**

- Not applicable

**DTC SET CONDITIONS**

**Logic Flow Chart**



AK604358

**Check Condition**

- Ignition switch is "ON" position.

**Judgment Criterion**

- Vehicle information is not entered into the ECM.

**FAIL-SAFE AND BACKUP FUNCTION**

- None

**OBD-II DRIVE CYCLE PATTERN**

None.

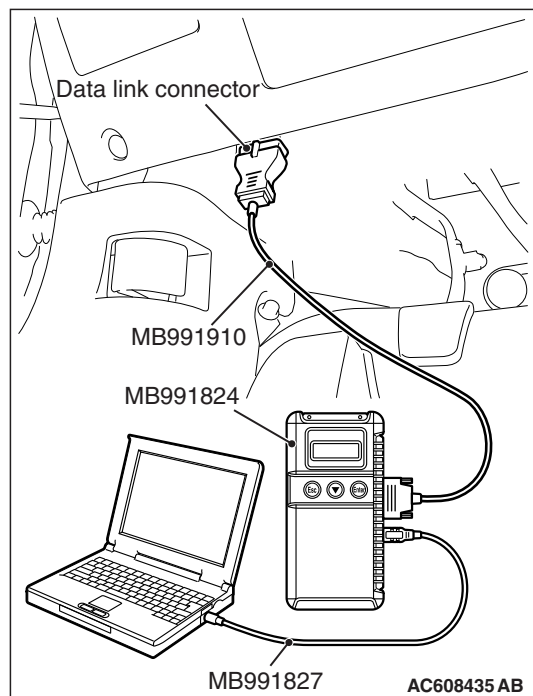
**TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)**

- ECM failed.

**DIAGNOSIS**

**Required Special Tool:**

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



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

**⚠ CAUTION**

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

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

**Q: Is DTC P1676 set?**

**YES :** Replace the ECM with one into which vehicle information is correctly entered (Refer to, Removal and Installation P.13B-1022).

**NO :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13.

## DTC P2096: Post Catalyst Fuel Trim System too Lean

### TECHNICAL DESCRIPTION

- The ECM effects air/fuel ratio feedback control in accordance with the signals from the heated oxygen sensor (front).
- If the heated oxygen sensor (front) has deteriorated, corrections will be made by the heated oxygen sensor (rear).

### DESCRIPTIONS OF MONITOR METHODS

- When an abnormality exists in the heated oxygen sensor (front), the amount of compensated fuel injection is abnormal. When this situation continues, it is judged to be faulty.
- If an abnormality exists in the heated oxygen sensor (rear), also it is judged to be faulty even though the heated oxygen sensor (front) is normal.

### MONITOR EXECUTION

Continuous

### MONITOR EXECUTION CONDITIONS (Other monitor and Sensor)

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

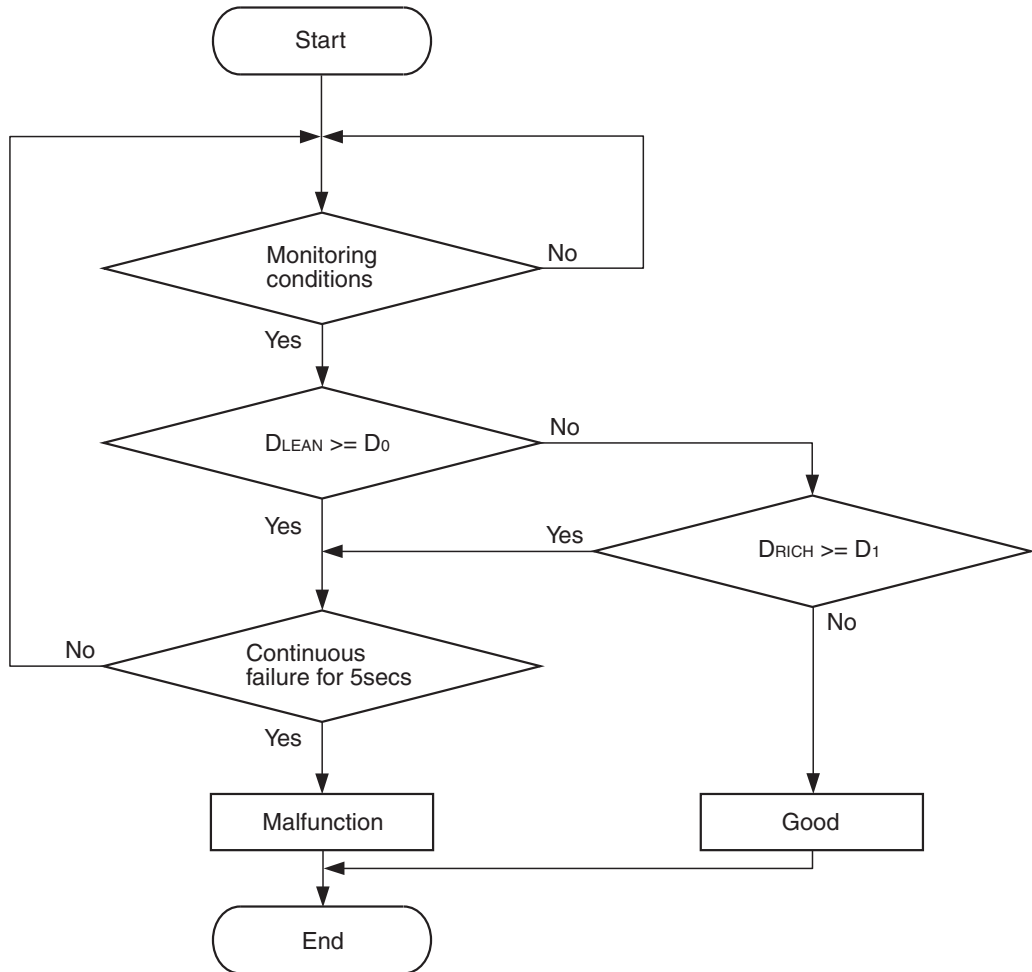
- Heated oxygen sensor (front) monitor
- Heated oxygen sensor (rear) monitor
- Heated oxygen sensor (front) heater monitor
- Heated oxygen sensor (rear) heater monitor
- Heated oxygen sensor (front) inactive monitor
- Heated oxygen sensor offset voltage monitor
- Misfire monitor
- Fuel system monitor
- Air/fuel ratio feedback monitor
- Heated oxygen sensor (3rd) monitor <Vehicles for California>
- Heated oxygen sensor (3rd) heater monitor <Vehicles for California>

**Sensor (The sensor below is determined to be normal)**

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

## DTC SET CONDITIONS

### Logic Flow Chart



DLEAN: Fuel trim based on heated oxygen sensor (rear) <to lean>  
 DLEAN: Fuel trim based on heated oxygen sensor (rear) <to rich>  
 D0: Maximum Limit of DLEAN  
 D1: Maximum Limit of DRICH

AK900364

#### Check Conditions

- Engine coolant temperature is more than 76° C (169° F).
- Under the closed loop air/fuel control.
- More than 90 seconds have passed since the engine starting sequence was completed.
- Mass airflow sensor output is more than 5 g/sec.

#### Judgement Criterion

- The amount of compensated rich air/fuel ratio is output by the heated oxygen sensor (rear). The status that the amount of compensated rich air/fuel ratio is greater than the specified amount continues for 5 seconds.

#### FAIL-SAFE AND BACKUP FUNCTION

- None

**OBD-II DRIVE CYCLE PATTERN**

Refer to Diagnostic Function –OBD-II Drive Cycle –  
Pattern 1 [P.13B-12](#).

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

- Heated oxygen sensor (front) failed.
- Heated oxygen sensor (rear) failed.
- Injector failed.
- ECM failed.

**DIAGNOSIS****Required Special Tools:**

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

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

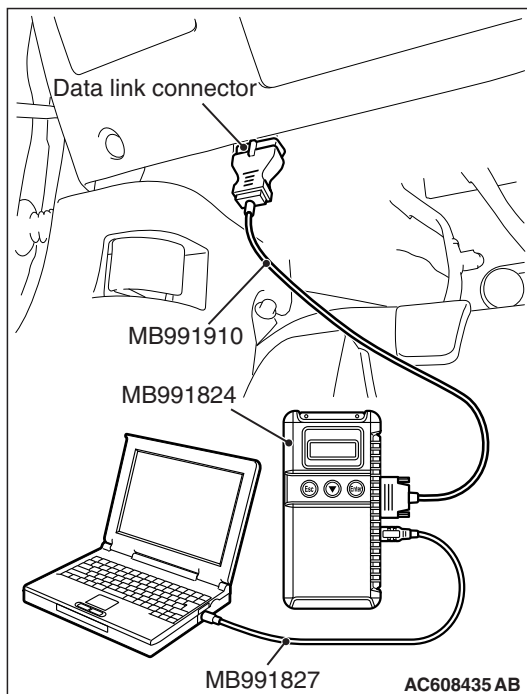
**⚠ CAUTION**

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

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

**Q: Is the diagnostic trouble code other than P2096 set?**

- YES :** Refer to, Diagnostic Trouble Code Chart [P.13B-51](#).  
**NO :** Go to Step 2.



**STEP 2. Replace the heated oxygen sensor (front).**

- (1) Replace the heated oxygen sensor (front).
- (2) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle –Pattern 1 [P.13B-12](#).
- (3) Check the diagnostic trouble code (DTC).

**Q: Is DTC P2096 set?**

- YES :** Go to Step 3.  
**NO :** The inspection is complete.

---

**STEP 3. Replace the heated oxygen sensor (rear).**

- (1) Replace the heated oxygen sensor (rear).
- (2) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle –Pattern 1 [P.13B-12](#).
- (3) Check the diagnostic trouble code (DTC).

**Q: Is DTC P2096 set?**

**YES :** Go to Step 4.

**NO :** The inspection is complete.

---

**STEP 4. Replace the injector.**

- (1) Replace the injector.
- (2) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle –Pattern 1 [P.13B-12](#).
- (3) Check the diagnostic trouble code (DTC).

**Q: Is DTC P2096 set?**

**YES :** Replace the ECM (Refer to, Removal and Installation [P.13B-1022](#)).

**NO :** The inspection is complete.

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**DTC P2097: Post Catalyst Fuel Trim System too Rich**

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**TECHNICAL DESCRIPTION**

- The ECM effects air/fuel ratio feedback control in accordance with the signals from the heated oxygen sensor (front).
- If the heated oxygen sensor (front) has deteriorated, corrections will be made by the heated oxygen sensor (rear).

**DESCRIPTIONS OF MONITOR METHODS**

- When an abnormality exists in the heated oxygen sensor (front), the amount of compensated fuel injection is abnormal. When this situation continues, it is judged to be faulty.
- If an abnormality exists in the heated oxygen sensor (rear), also it is judged to be faulty even though the heated oxygen sensor (front) is normal.

**MONITOR EXECUTION**

Continuous

**MONITOR EXECUTION CONDITIONS  
(Other monitor and Sensor)**

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

- Heated oxygen sensor (front) monitor
- Heated oxygen sensor (rear) monitor
- Heated oxygen sensor (front) heater monitor
- Heated oxygen sensor (rear) heater monitor
- Heated oxygen sensor (front) inactive monitor
- Heated oxygen sensor offset voltage monitor
- Misfire monitor
- Fuel system monitor
- Air/fuel ratio feedback monitor
- Heated oxygen sensor (3rd) monitor <Vehicles for California>
- Heated oxygen sensor (3rd) heater monitor <Vehicles for California>

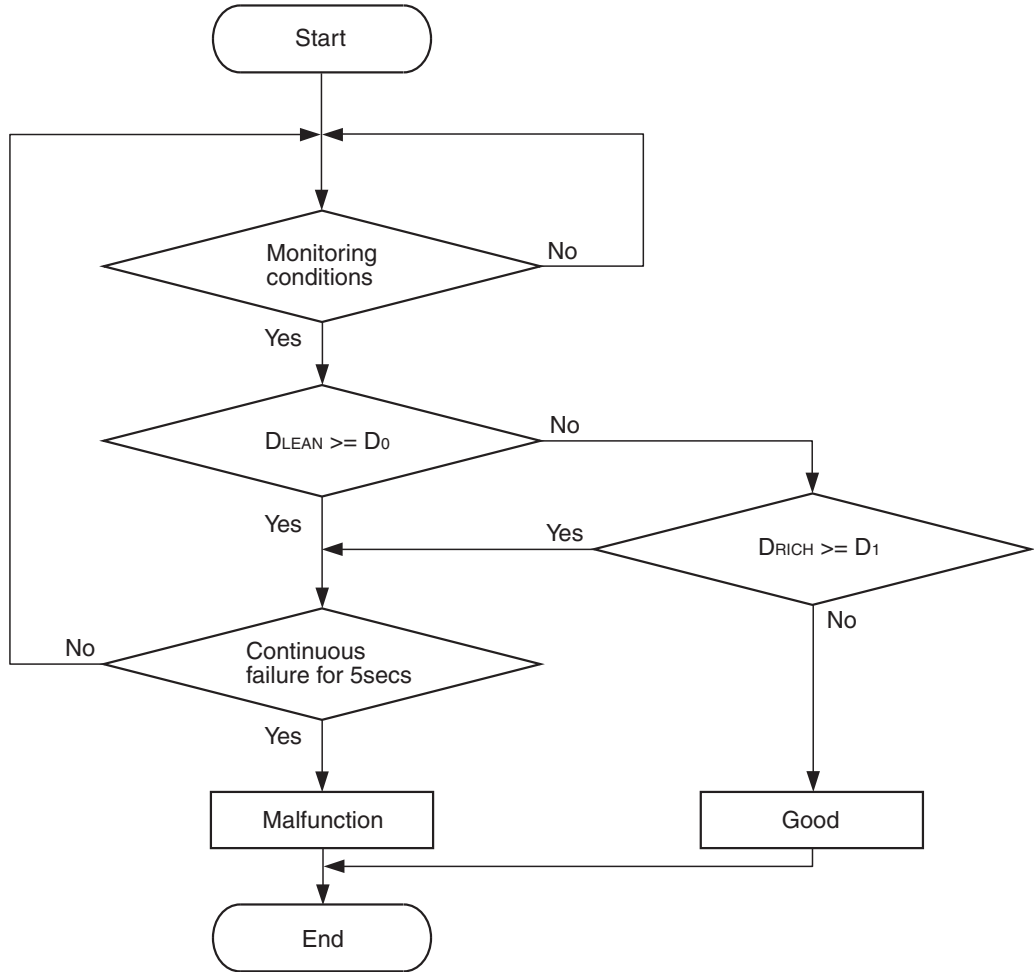
**Sensor (The sensor below is determined to be normal)**

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



DTC SET CONDITIONS

Logic Flow Chart



DLEAN: Fuel trim based on heated oxygen sensor (rear) <to lean>  
 DLEAN: Fuel trim based on heated oxygen sensor (rear) <to rich>  
 D0: Maximum Limit of DLEAN  
 D1: Maximum Limit of DRICH

AK900364

**Check Conditions**

- Engine coolant temperature is more than 76° C (169° F).
- Under the closed loop air/fuel control.
- More than 90 seconds have passed since the engine starting sequence was completed.
- Mass airflow sensor output is more than 5 g/sec.

**Judgement Criterion**

- The amount of compensated lean air/fuel ratio is output by the heated oxygen sensor (rear). The status that the amount of compensated lean air/fuel ratio is greater than the specified amount continues for 5 seconds.

**FAIL-SAFE AND BACKUP FUNCTION**

- None

## OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function –OBD-II Drive Cycle –  
Pattern 1 [P.13B-12](#).

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

- Heated oxygen sensor (front) failed.
- Heated oxygen sensor (rear) failed.
- Injector failed.
- ECM failed.

## DIAGNOSIS

### Required Special Tools:

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

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

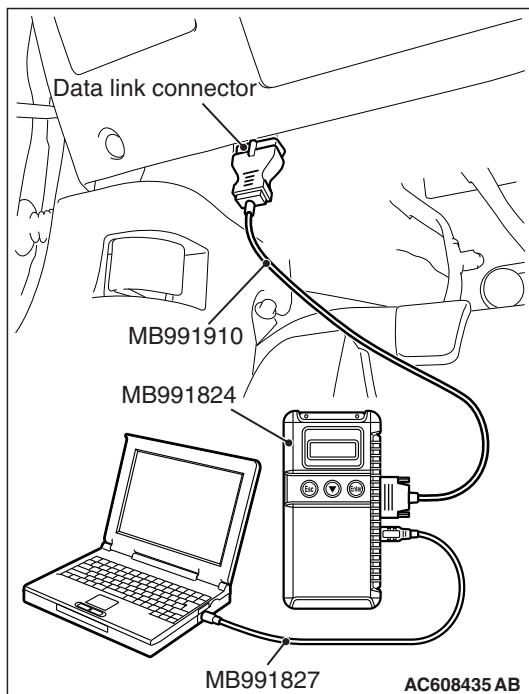
### **⚠ CAUTION**

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

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

**Q: Is the diagnostic trouble code other than P2097 set?**

- YES :** Refer to, Diagnostic Trouble Code Chart [P.13B-51](#).  
**NO :** Go to Step 2.



**STEP 2. Replace the heated oxygen sensor (front).**

- (1) Replace the heated oxygen sensor (front).
- (2) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle –Pattern 1 [P.13B-12](#).
- (3) Check the diagnostic trouble code (DTC).

**Q: Is DTC P2097 set?**

- YES :** Go to Step 3.  
**NO :** The inspection is complete.

---

**STEP 3. Replace the heated oxygen sensor (rear).**

- (1) Replace the heated oxygen sensor (rear).
- (2) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle –Pattern 1 [P.13B-12](#).
- (3) Check the diagnostic trouble code (DTC).

**Q: Is DTC P2097 set?****YES :** Go to Step 4.**NO :** The inspection is complete.

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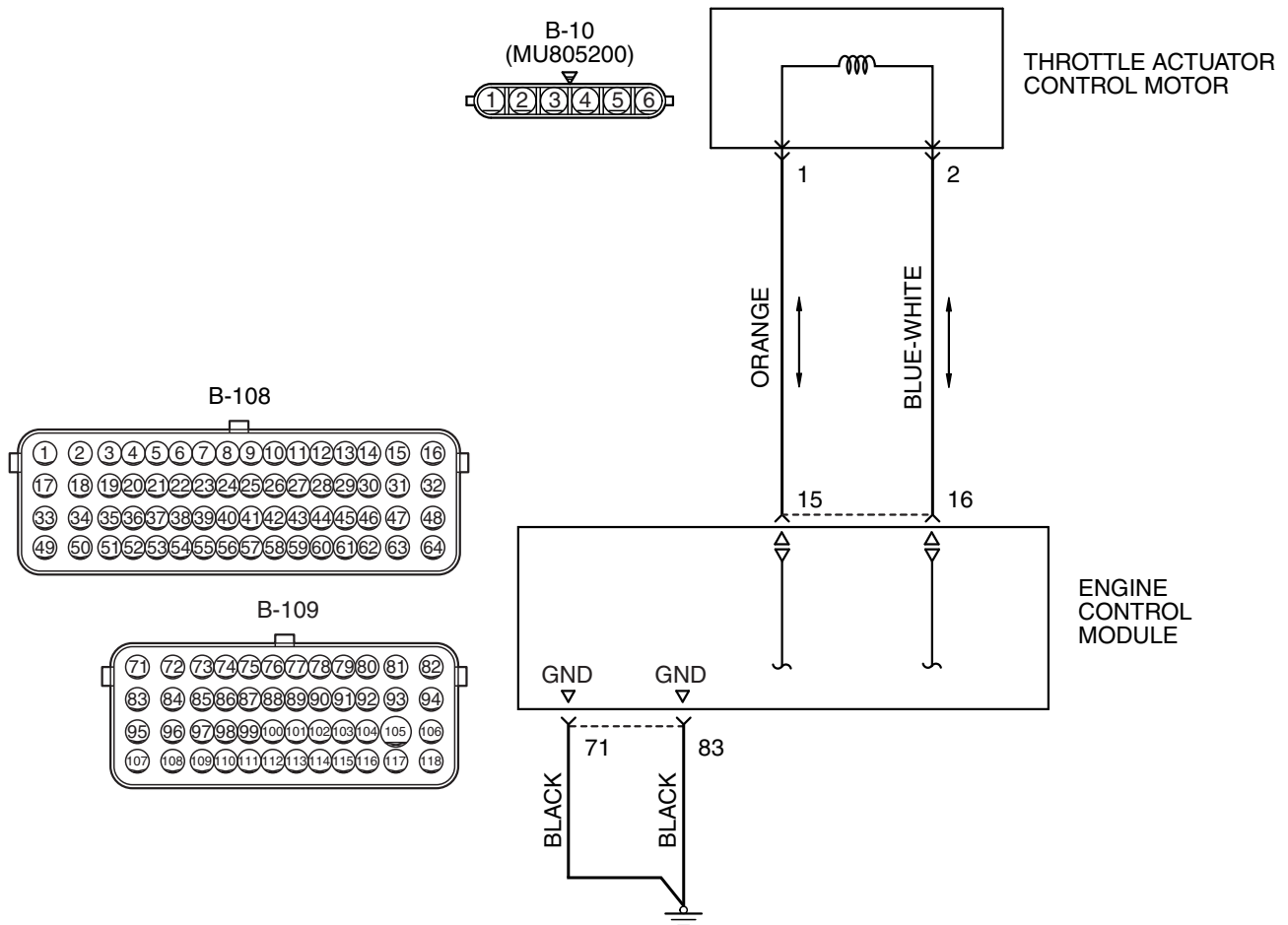
**STEP 4. Replace the injector.**

- (1) Replace the injector.
- (2) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle –Pattern 1 [P.13B-12](#).
- (3) Check the diagnostic trouble code (DTC).

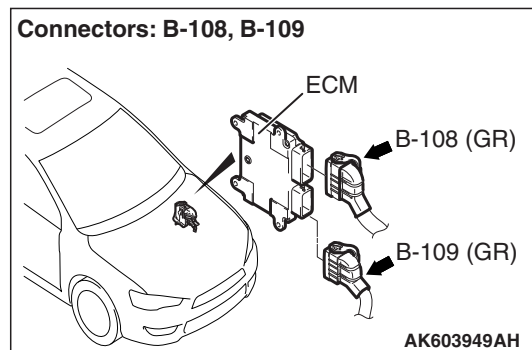
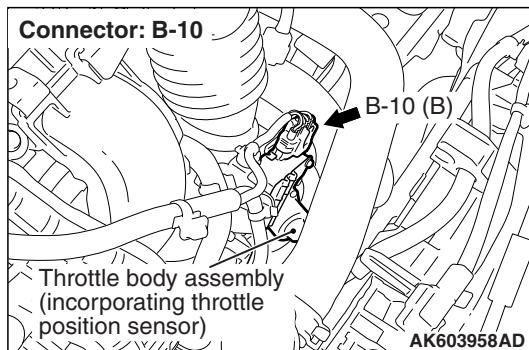
**Q: Is DTC P2097 set?****YES :** Replace the ECM (Refer to, Removal and Installation [P.13B-1022](#)).**NO :** The inspection is complete.

DTC P2100: Throttle Actuator Control Motor Circuit (open)

THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT



AK604296AB



**CIRCUIT OPERATION**

- Controls the current that is applied from the ECM (terminals No. 15, No. 16) to the throttle actuator control motor (terminals No. 1, No. 2).

**TECHNICAL DESCRIPTION**

- ECM varies the direction and the amperage of the current that is applied to the throttle actuator control motor in order to control the opening of the throttle valve.

**DESCRIPTIONS OF MONITOR METHODS**

The voltage difference between the throttle position sensor output voltage and the throttle position sensor output at the throttle actuator control motor relay off is smaller than the specified value.

**MONITOR EXECUTION**

Continuous

**MONITOR EXECUTION CONDITIONS  
(Other monitor and Sensor)**

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

- Not applicable

**Sensor (The sensor below is determined to be normal)**

- Not applicable

**DTC SET CONDITIONS****Check Conditions**

- Battery positive voltage is more than 8.3 volts.
- The target throttle position sensor (main) voltage subtracted from the throttle position sensor (main) output voltage is more than 0.1 volt.
- The target throttle position sensor (sub) voltage subtracted from the throttle position sensor (sub) output voltage is more than 0.1 volt.

- The drive duty of the throttle actuator control motor is more than 100 percent.
  - Except while during cranking.
- or
- Battery positive voltage is more than 8.3 volts.
  - The throttle position sensor (main) output voltage subtracted from the target throttle position sensor (main) voltage is more than 0.1 volt.
  - The throttle position sensor (sub) output voltage subtracted from the target throttle position sensor (sub) voltage is more than 0.1 volt.
  - The drive duty of the throttle actuator control motor is more than 100 percent.
  - Except while during cranking.

**Judgement Criterion**

- For 0.4 second, the difference between the output voltage of throttle position sensor (main) and the learning value of the middle-opened degree is less than 0.2 volt.

or

- For 0.4 second, the difference between the output voltage of throttle position sensor (sub) and the learning value of the middle-opened degree is less than 0.2 volt.

**FAIL-SAFE AND BACKUP FUNCTION**

- Throttle opening degree position is in default position.

**OBD-II DRIVE CYCLE PATTERN**

None.

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

- Throttle actuator control motor failed.
- Open throttle actuator control motor circuit, harness damage or connector damage.
- ECM failed.

**DIAGNOSIS****Required Special Tool:**

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

**STEP 1. Check harness connector B-10 at electronic-controlled throttle valve for damage.**

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

**YES :** Go to Step 2.

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

**STEP 2. Check the throttle actuator control motor.**

(1) Disconnect the electronic-controlled throttle valve connector B-10.

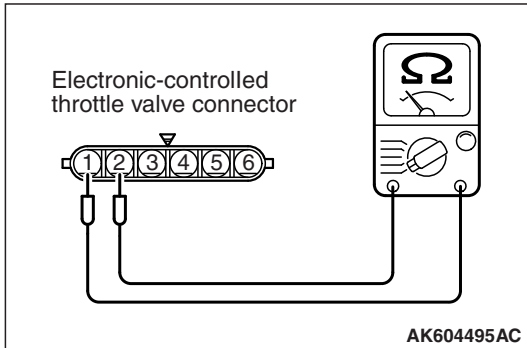
(2) Measure the resistance between electronic-controlled throttle valve side connector terminal No. 1 and No. 2.

**Standard value: 0.3 –80 Ω [at 20° C (68° F)]**

**Q: Is the measured resistance between 0.3 and 80 Ω [at 20° C (68° F)]?**

**YES :** Go to Step 3.

**NO :** Replace the throttle body assembly. Then go to Step 9.



**STEP 3. Check harness connector B-109 at ECM for damage.**

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

**YES :** Go to Step 4.

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

**STEP 4. Check the continuity at ECM harness side connector B-109.**

(1) Disconnect the connector B-109 and measure at the harness side.

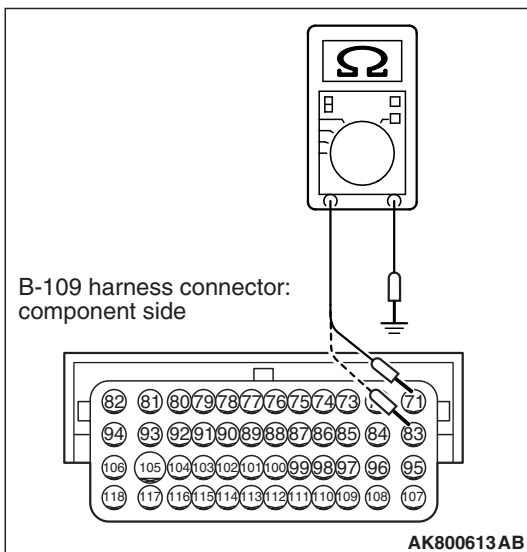
(2) Check for the continuity between terminals No. 71, No. 83 and ground.

- Continuity (2 ohms or less)

**Q: Does continuity exist?**

**YES :** Go to Step 5.

**NO :** Repair harness wire between ECM connector B-109 (terminals No. 71, No. 83) and ground because of open circuit or harness damage. Then go to Step 9.



**STEP 5. Check harness connector B-108 at ECM for damage.**

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

**YES :** Go to Step 6.

**NO :** Repair or replace it. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then go to Step 9.

**STEP 6. Check for open circuit and harness damage between electronic-controlled throttle valve connector B-10 (terminal No. 1) and ECM connector B-108 (terminal No. 15).**

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

**YES :** Go to Step 7.

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

**STEP 7. Check for open circuit and harness damage between electronic-controlled throttle valve connector B-10 (terminal No. 2) and ECM connector B-108 (terminal No. 16).**

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

**YES :** Go to Step 8.

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

**STEP 8. Using scan tool MB991958, read the diagnostic trouble code (DTC).**

**⚠ CAUTION**

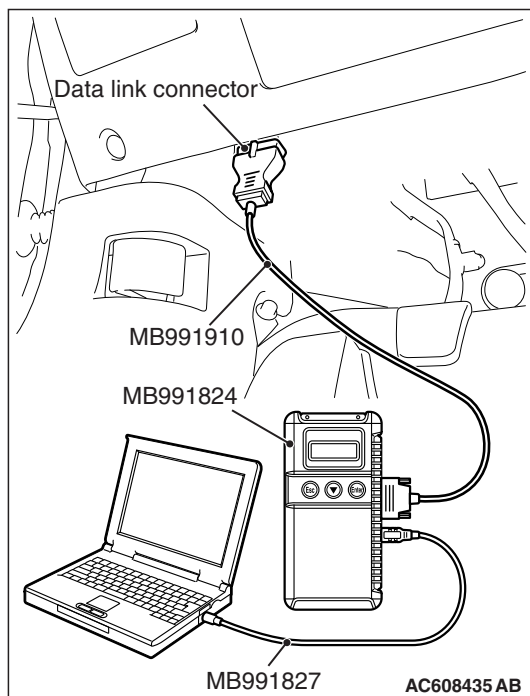
**To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.**

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

**Q: Is DTC P2100 set?**

**YES :** Replace the ECM (Refer to, Removal and Installation [P.13B-1022](#)). Then go to Step 9.

**NO :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions [P.00-13](#).



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

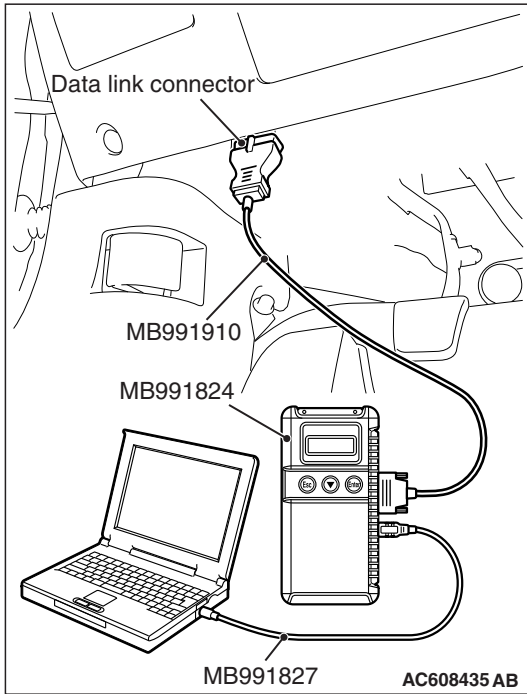
**⚠ CAUTION**

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

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

**Q: Is DTC P2100 set?**

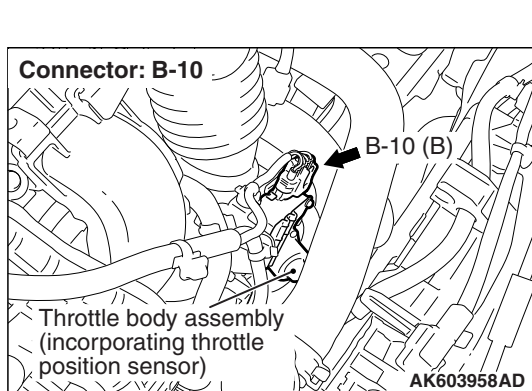
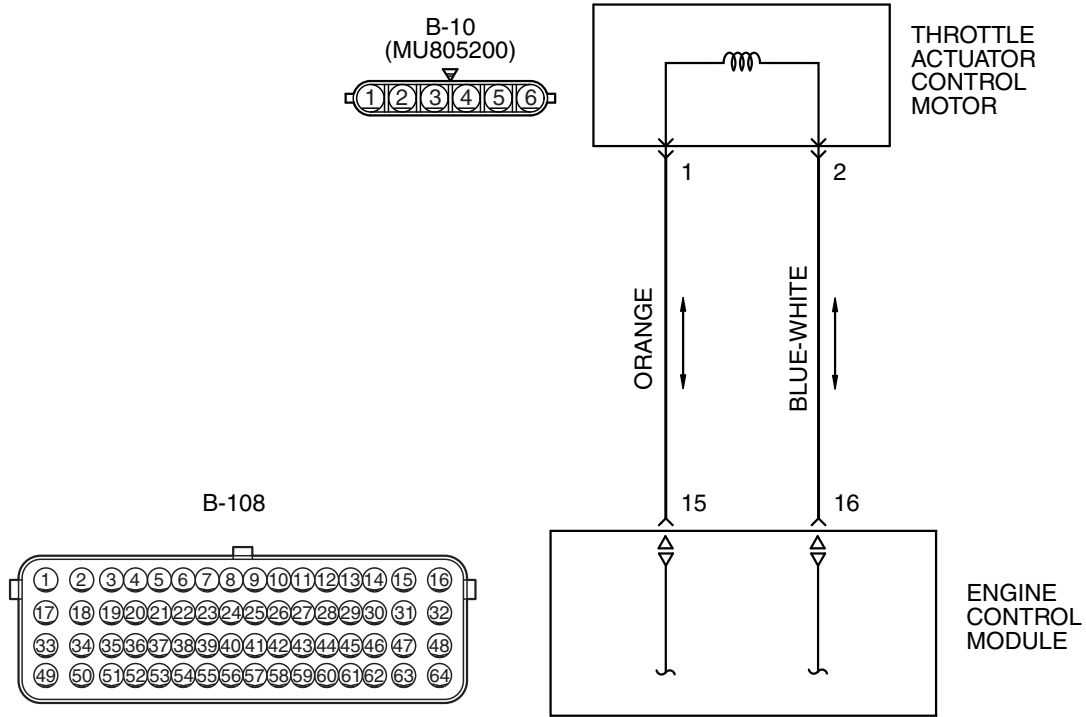
- YES :** Retry the troubleshooting.  
**NO :** The inspection is complete.



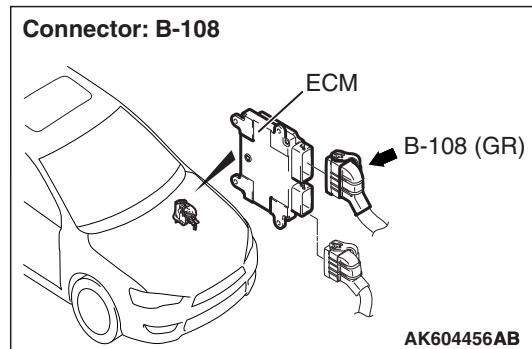


DTC P2101: Throttle Actuator Control Motor Magneto Malfunction

THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT



AK604297AB



CIRCUIT OPERATION

- Controls the current that is applied from ECM (terminals No. 15, No. 16) to the throttle actuator control motor (terminals No. 1, No. 2).

TECHNICAL DESCRIPTION

- ECM check whether the throttle actuator control motor magneto has failed.

## DESCRIPTIONS OF MONITOR METHODS

Throttle actuator control motor intelligent power device detects shorted-high/low and overheat of itself.

## MONITOR EXECUTION

Continuous

## MONITOR EXECUTION CONDITIONS (Other monitor and Sensor)

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

- Not applicable

**Sensor (The sensor below is determined to be normal)**

- Not applicable

## DTC SET CONDITIONS

### Check Condition

- Battery positive voltage is more than 8.3 volts.

### Judgement Criterion

- The coil current of the throttle actuator control motor is more than 8 amperes for 0.3 second.

## FAIL-SAFE AND BACKUP FUNCTION

- Throttle opening degree position is in default position.

## OBD-II DRIVE CYCLE PATTERN

None.

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

- Throttle actuator control motor failed.
- Shorted throttle actuator control motor circuit or connector damage.
- ECM failed.

## DIAGNOSIS

### Required Special Tool:

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

**STEP 1. Check harness connector B-10 at electronic-controlled throttle valve for damage.**

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

**YES :** Go to Step 2.

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

**STEP 2. Check the throttle actuator control motor.**

(1) Disconnect the electronic-controlled throttle valve connector B-10.

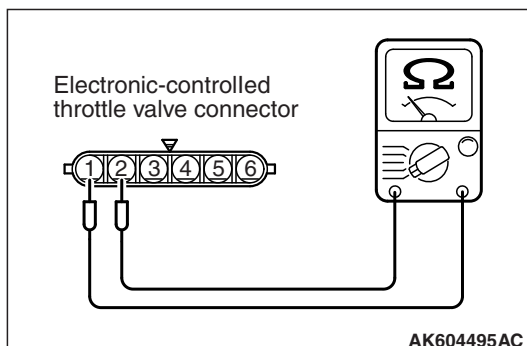
(2) Measure the resistance between electronic-controlled throttle valve side connector terminal No. 1 and No. 2.

**Standard value: 0.3 –80 Ω [at 20° C (68° F)]**

**Q: Is the measured resistance between 0.3 and 80 Ω [at 20° C (68° F)]?**

**YES :** Go to Step 3.

**NO :** Replace the throttle body assembly. Then go to Step 7.



**STEP 3. Check harness connector B-108 at ECM for damage.**

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

**YES :** Go to Step 4.

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

**STEP 4. Check for short circuit to ground between electronic-controlled throttle valve connector B-10 (terminal No. 1) and ECM connector B-108 (terminal No. 15).**

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

**YES :** Go to Step 5.

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

**STEP 5. Check for short circuit to ground between electronic-controlled throttle valve connector B-10 (terminal No. 2) and ECM connector B-108 (terminal No. 16).**

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

**YES :** Go to Step 6.

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

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

**⚠ CAUTION**

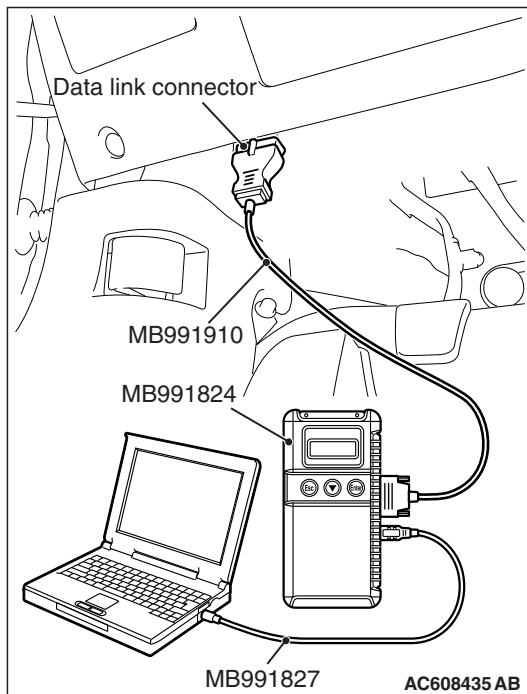
**To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.**

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

**Q: Is DTC P2101 set?**

**YES :** Replace the ECM (Refer to, Removal and Installation [P.13B-1022](#)). Then go to Step 7.

**NO :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions [P.00-13](#).



**STEP 7.** Using scan tool MB991958, read the diagnostic trouble code (DTC).

**⚠ CAUTION**

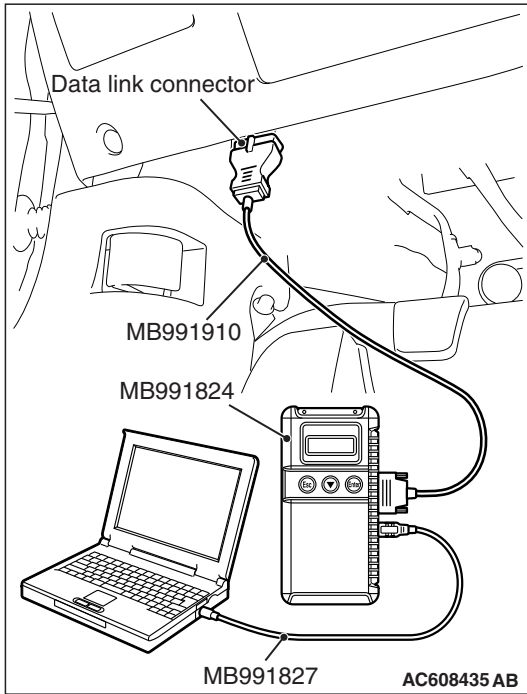
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

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

**Q: Is DTC P2101 set?**

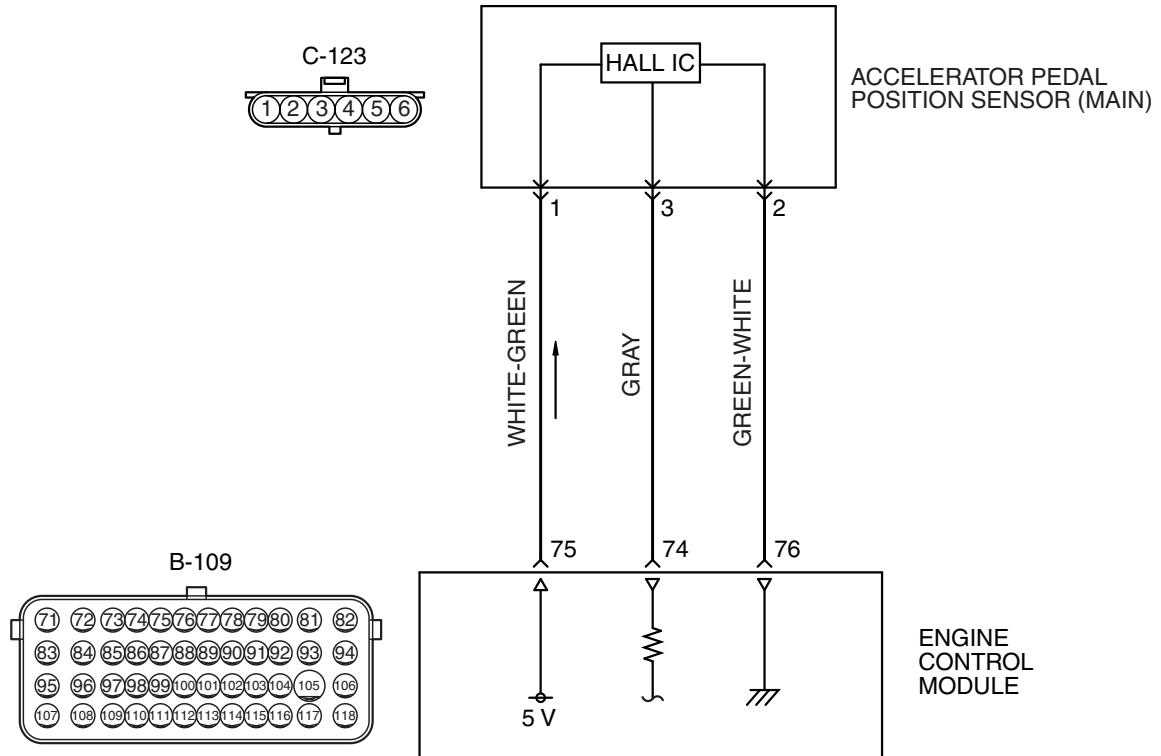
**YES :** Retry the troubleshooting.

**NO :** The inspection is complete.

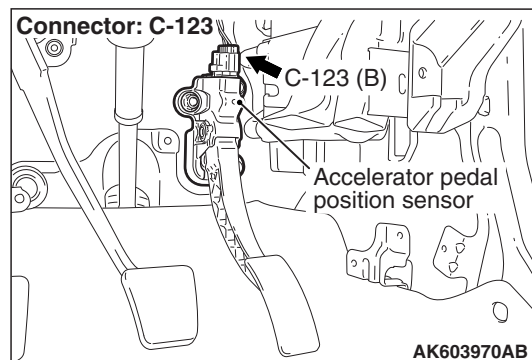
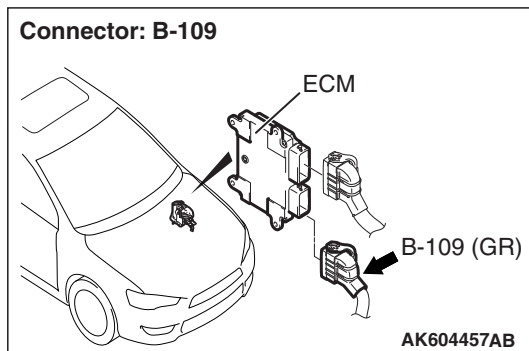


DTC P2122: Accelerator Pedal Position Sensor (main) Circuit Low Input

ACCELERATOR PEDAL POSITION SENSOR (MAIN) CIRCUIT



AK604257AB



**CIRCUIT OPERATION**

- A 5-volt power supply is applied on the accelerator pedal position sensor (main) power terminal (terminal No. 1) from the ECM (terminal No. 75).

- A voltage that is according to the accelerator opening angle is sent to the ECM (terminal No. 74) from the accelerator pedal position sensor (main) output terminal (terminal No. 3).
- The ground terminal (terminal No. 2) is grounded with ECM (terminal No. 76).

## TECHNICAL DESCRIPTION

- The accelerator pedal position sensor (main) outputs voltage which corresponds to the accelerator pedal depression.
- The ECM checks whether the voltage is within a specified range.

## DESCRIPTIONS OF MONITOR METHODS

Accelerator pedal position sensor (main) output voltage is out of specified range.

## MONITOR EXECUTION

Continuous

## MONITOR EXECUTION CONDITIONS (Other monitor and Sensor)

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

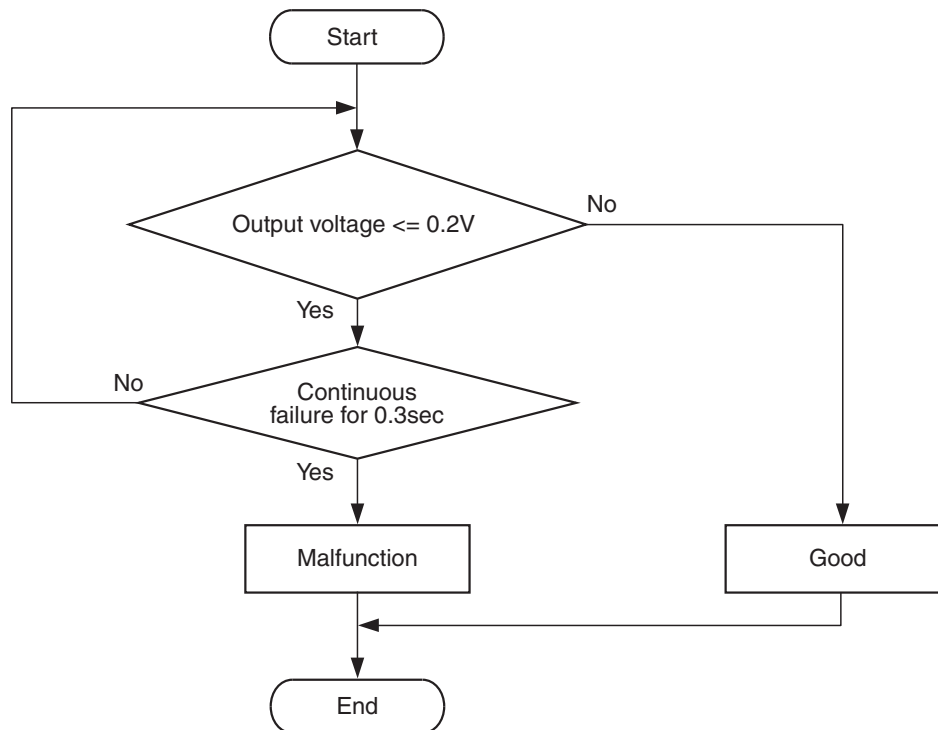
- Not applicable

**Sensor (The sensor below is determined to be normal)**

- Not applicable

## DTC SET CONDITIONS

### Logic Flow Chart



AK800588

### Check Condition

- Ignition switch is "ON" position.

### Judgement Criterion

- Accelerator pedal position sensor (main) output voltage is less than 0.2 volt for 0.3 second.

## FAIL-SAFE AND BACKUP FUNCTION

- Throttle opening degree is restricted.

- Throttle opening degree position is in default position if accelerator pedal position sensor (sub) fails.

## OBD-II DRIVE CYCLE PATTERN

None.

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

- Accelerator pedal position sensor failed.
- Open or shorted accelerator pedal position sensor (main) circuit, harness damage or connector damage.
- ECM failed.

**DIAGNOSIS****Required Special Tool:**

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

**STEP 1. Using scan tool MB991958, check data list item 11: Accelerator Pedal Position Sensor (main).****⚠ CAUTION**

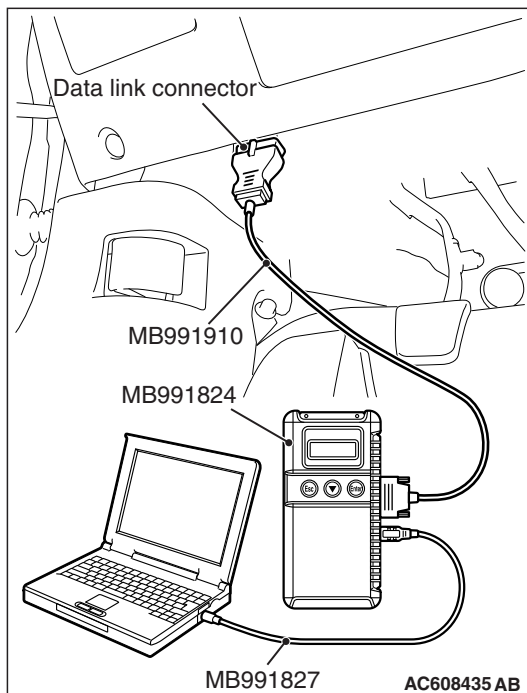
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

- (1) Connect scan tool MB991958 to the data link connector.
- (2) Turn the ignition switch to the "ON" position.
- (3) Set scan tool MB991958 to the data reading mode for item 11, Accelerator Pedal Position Sensor (main).
  - Output voltage should be between 900 and 1,100 millivolts when foot is released from accelerator pedal.
  - Output voltage should be 4,000 millivolts or more when accelerator pedal is fully depressed.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

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

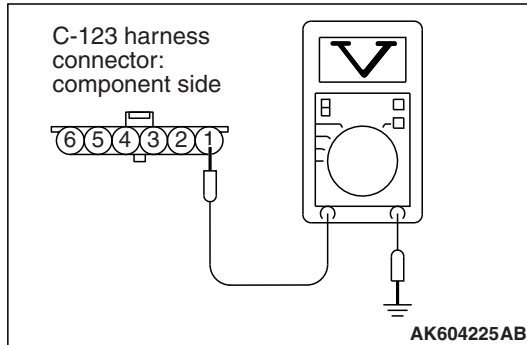
**YES :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13.

**NO :** Go to Step 2.

**STEP 2. Check harness connector C-123 at accelerator pedal position sensor for damage.****Q: Is the harness connector in good condition?**

**YES :** Go to Step 3.

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



**STEP 3. Measure the sensor supply voltage at accelerator pedal position sensor harness side connector C-123.**

- (1) Disconnect the connector C-123 and measure at the harness side.
- (2) Turn the ignition switch to the "ON" position.
- (3) Measure the voltage between terminal No. 1 and ground.
  - Voltage should be between 4.9 and 5.1 volts.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

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

**YES :** Go to Step 7.

**NO :** Go to Step 4.

**STEP 4. Check harness connector B-109 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 11.

**STEP 5. Check for open circuit and short circuit to ground between accelerator pedal position sensor connector C-123 (terminal No. 1) and ECM connector B-109 (terminal No. 75).**

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

**YES :** Go to Step 6.

**NO :** Repair it. Then go to Step 11.

**STEP 6. Using scan tool MB991958, check data list item 11: Accelerator Pedal Position Sensor (main).**

- (1) Turn the ignition switch to the "ON" position.
- (2) Set scan tool MB991958 to the data reading mode for item 11, Accelerator Pedal Position Sensor (main).
  - Output voltage should be between 900 and 1,100 millivolts when foot is released from accelerator pedal.
  - Output voltage should be 4,000 millivolts or more when accelerator pedal is fully depressed.
- (3) Turn the ignition switch to the "LOCK" (OFF) position.

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

**YES :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions [P.00-13](#).

**NO :** Replace the ECM (Refer to, Removal and Installation [P.13B-1022](#)). Then go to Step 11.



---

**STEP 7. Check harness connector B-109 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 harness damage between accelerator pedal position sensor connector C-123 (terminal No. 1) and ECM connector B-109 (terminal No. 75).**

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

**YES :** Go to Step 9.

**NO :** Repair it. Then go to Step 11.

---

**STEP 9. Check for open circuit, short circuit to ground and harness damage between accelerator pedal position sensor connector C-123 (terminal No. 3) and ECM connector B-109 (terminal No. 74).**

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

**YES :** Go to Step 10.

**NO :** Repair it. Then go to Step 11.

---

**STEP 10. Replace the accelerator pedal assembly.**

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

**Q: Is DTC P2122 set?**

**YES :** Replace the ECM (Refer to, Removal and Installation [P.13B-1022](#)). Then go to Step 11.

**NO :** The inspection is complete.

---

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

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

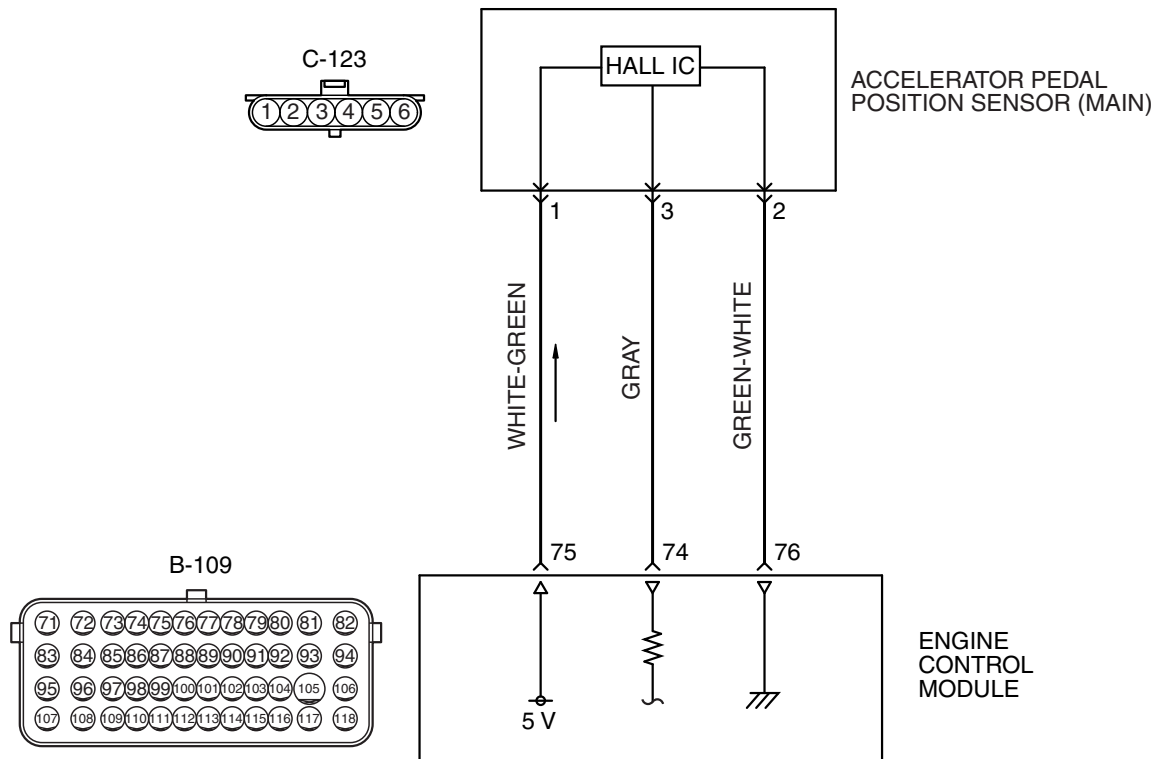
**Q: Is DTC P2122 set?**

**YES :** Retry the troubleshooting.

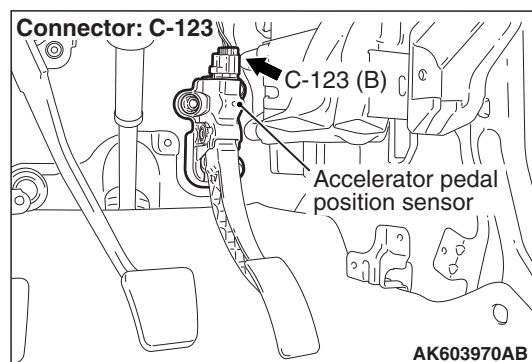
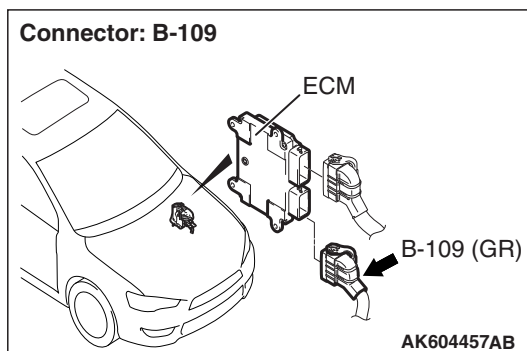
**NO :** The inspection is complete.

DTC P2123: Accelerator Pedal Position Sensor (main) Circuit High Input

ACCELERATOR PEDAL POSITION SENSOR (MAIN) CIRCUIT



AK604257AB



**CIRCUIT OPERATION**

- A 5-volt power supply is applied on the accelerator pedal position sensor (main) power terminal (terminal No. 1) from the ECM (terminal No. 75).

- A voltage that is according to the accelerator opening angle is sent to the ECM (terminal No. 74) from the accelerator pedal position sensor (main) output terminal (terminal No. 3).
- The ground terminal (terminal No. 2) is grounded with ECM (terminal No. 76).

**TECHNICAL DESCRIPTION**

- The accelerator pedal position sensor (main) outputs voltage which corresponds to the accelerator pedal depression.
- The ECM checks whether the voltage is within a specified range.

**DESCRIPTIONS OF MONITOR METHODS**

Accelerator pedal position sensor (main) output voltage is out of specified range.

**MONITOR EXECUTION**

Continuous

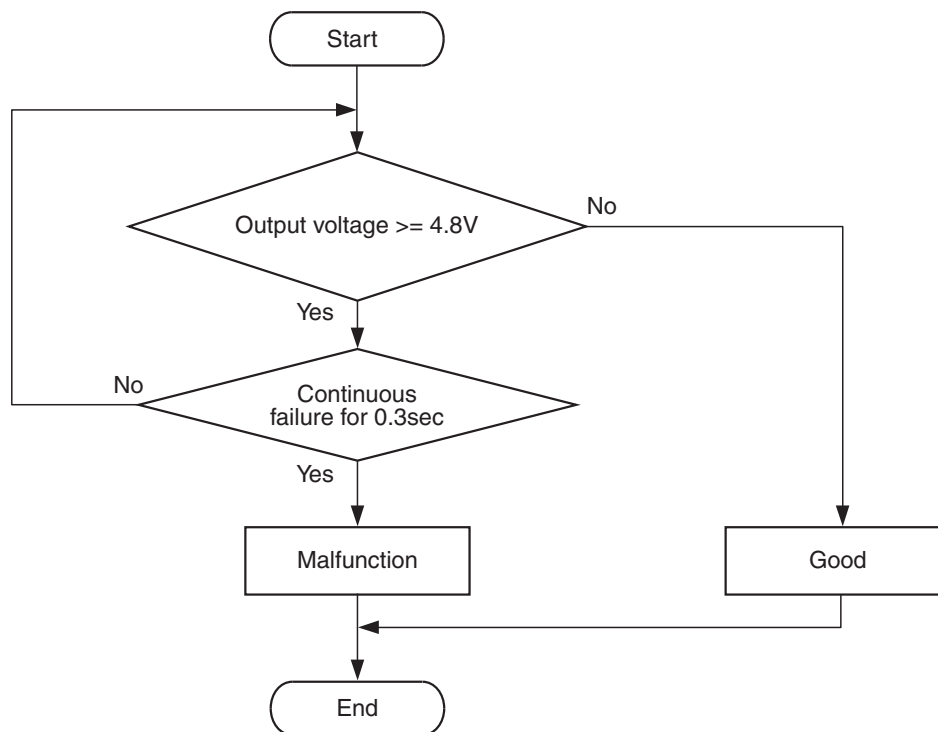
**MONITOR EXECUTION CONDITIONS  
(Other monitor and Sensor)**

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

- Not applicable

**Sensor (The sensor below is determined to be normal)**

- Not applicable

**DTC SET CONDITIONS****Logic Flow Chart**

AK604360

**Check Condition**

- Ignition switch is "ON" position.

**Judgement Criterion**

- Accelerator pedal position sensor (main) output voltage is more than 4.8 volts for 0.3 second.

**FAIL-SAFE AND BACKUP FUNCTION**

- Throttle opening degree is restricted.
- Throttle opening degree position is in default position if accelerator pedal position sensor (sub) fails.

**OBD-II DRIVE CYCLE PATTERN**

None.

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

- Accelerator pedal position sensor failed.
- Open accelerator pedal position sensor (main) circuit, harness damage or connector damage.
- ECM failed.

## DIAGNOSIS

### Required Special Tool:

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

### STEP 1. Using scan tool MB991958, check data list item 11: Accelerator Pedal Position Sensor (main).

#### **CAUTION**

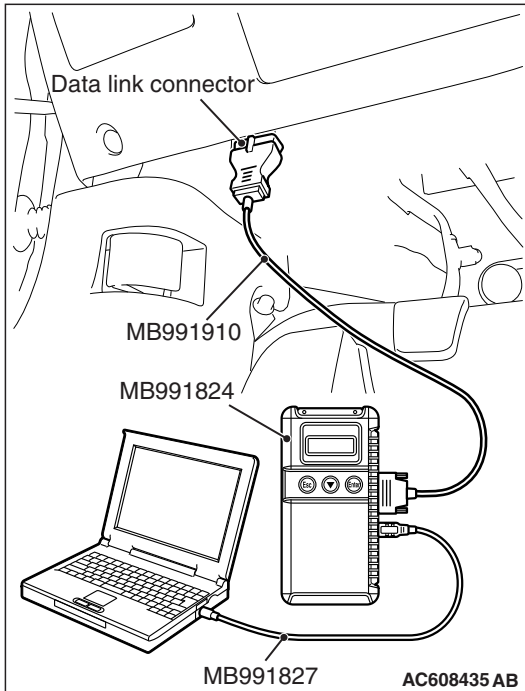
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

- (1) Connect scan tool MB991958 to the data link connector.
- (2) Turn the ignition switch to the "ON" position.
- (3) Set scan tool MB991958 to the data reading mode for item 11, Accelerator Pedal Position Sensor (main).
  - Output voltage should be between 900 and 1,100 millivolts when foot is released from accelerator pedal.
  - Output voltage should be 4,000 millivolts or more when accelerator pedal is fully depressed.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

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

**YES** : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions P.00-13.

**NO** : Go to Step 2.

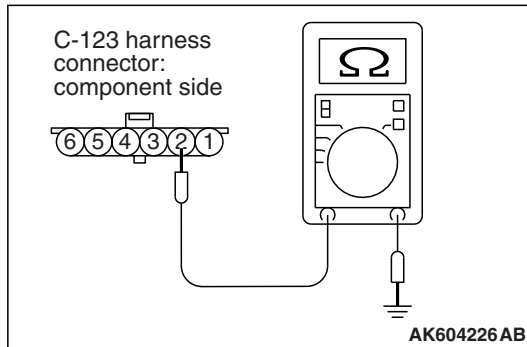


### STEP 2. Check harness connector C-123 at accelerator pedal position sensor for damage.

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

**YES** : Go to Step 3.

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




---

**STEP 3. Check the continuity at accelerator pedal position sensor harness side connector C-123.**

- (1) Disconnect the connector C-123 and measure at the harness side.
- (2) Check for the continuity between terminal No. 2 and ground.
  - Continuity (2 ohms or less)

**Q: Does continuity exist?****YES :** Go to Step 7.**NO :** Go to Step 4.

---

**STEP 4. Check harness connector B-109 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 8.

---

**STEP 5. Check for open circuit and harness damage between accelerator pedal position sensor connector C-123 (terminal No. 2) and ECM connector B-109 (terminal No. 76).**
**Q: Is the harness wire in good condition?****YES :** Go to Step 6.**NO :** Repair it. Then go to Step 8.

---

**STEP 6. Using scan tool MB991958, check data list item 11: Accelerator Pedal Position Sensor (main).**

- (1) Turn the ignition switch to the "ON" position.
- (2) Set scan tool MB991958 to the data reading mode for item 11, Accelerator Pedal Position Sensor (main).
  - Output voltage should be between 900 and 1,100 millivolts when foot is released from accelerator pedal.
  - Output voltage should be 4,000 millivolts or more when accelerator pedal is fully depressed.
- (3) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is the sensor operating properly?****YES :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions [P.00-13](#).**NO :** Replace the ECM (Refer to, Removal and Installation [P.13B-1022](#)). Then go to Step 8.

---

**STEP 7. Replace the accelerator pedal assembly.**

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

**Q: Is DTC P2123 set?**

**YES :** Replace the ECM (Refer to, Removal and Installation [P.13B-1022](#)). Then go to Step 8.

**NO :** The inspection is complete.

---

**STEP 8. Using scan tool MB991958, read the diagnostic trouble code (DTC).**

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

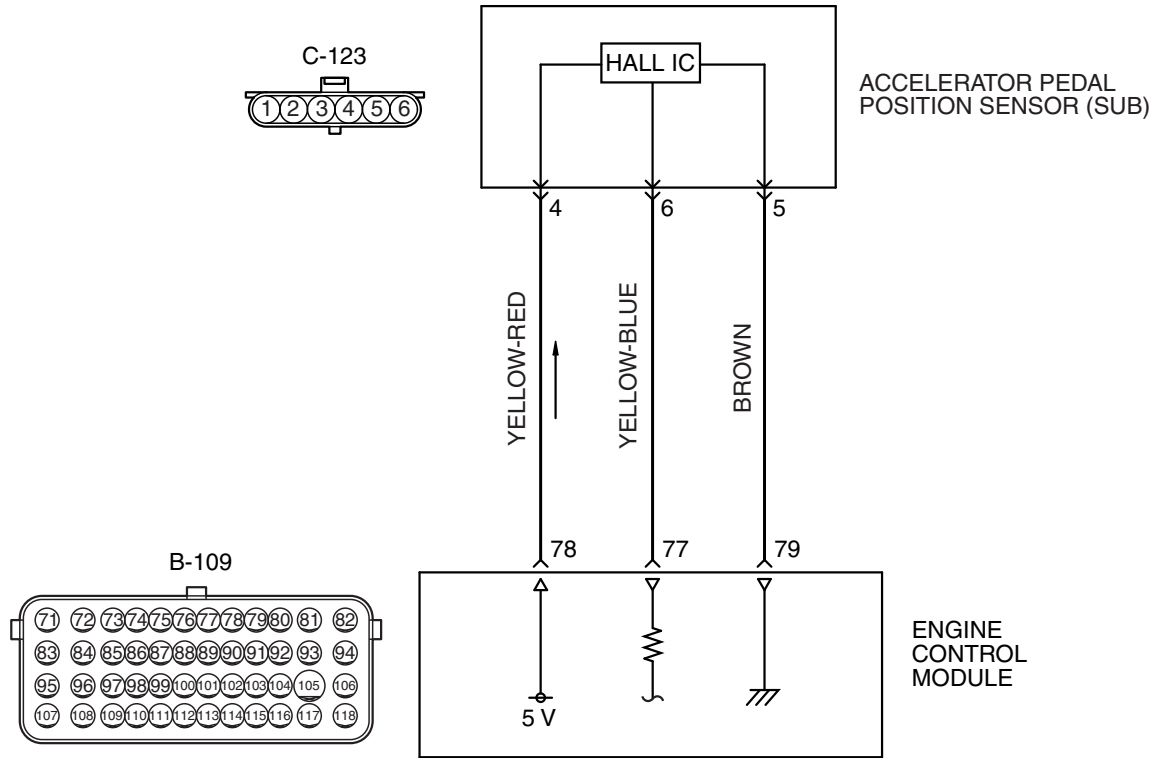
**Q: Is DTC P2123 set?**

**YES :** Retry the troubleshooting.

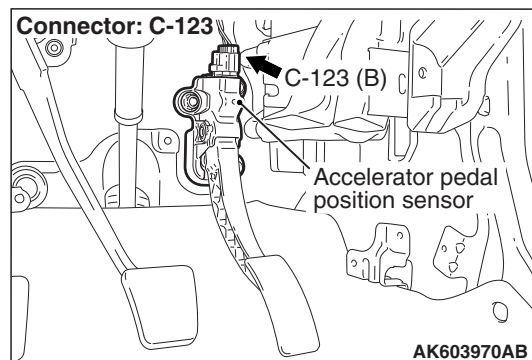
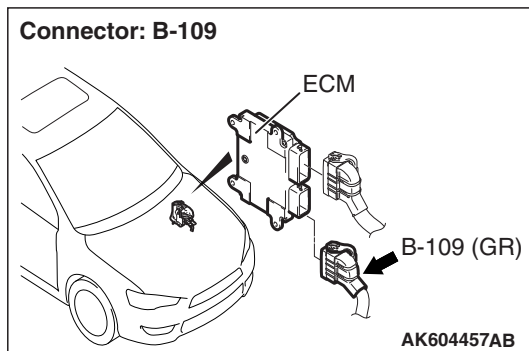
**NO :** The inspection is complete.

DTC P2127: Accelerator Pedal Position Sensor (sub) Circuit Low Input

ACCELERATOR PEDAL POSITION SENSOR (SUB) CIRCUIT



AK604257AI



**CIRCUIT OPERATION**

- A 5-volt power supply is applied on the accelerator pedal position sensor (sub) power terminal (terminal No. 4) from the ECM (terminal No. 78).

- A voltage that is according to the accelerator opening angle is sent to the ECM (terminal No. 77) from the accelerator pedal position sensor (sub) output terminal (terminal No. 6).
- The ground terminal (terminal No. 5) is grounded with ECM (terminal No. 79).

## TECHNICAL DESCRIPTION

- The accelerator pedal position sensor (sub) outputs voltage which corresponds to the accelerator pedal depression.
- The ECM checks whether the voltage is within a specified range.

## DESCRIPTIONS OF MONITOR METHODS

Accelerator pedal position sensor (sub) output voltage is out of specified range.

## MONITOR EXECUTION

Continuous

## MONITOR EXECUTION CONDITIONS (Other monitor and Sensor)

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

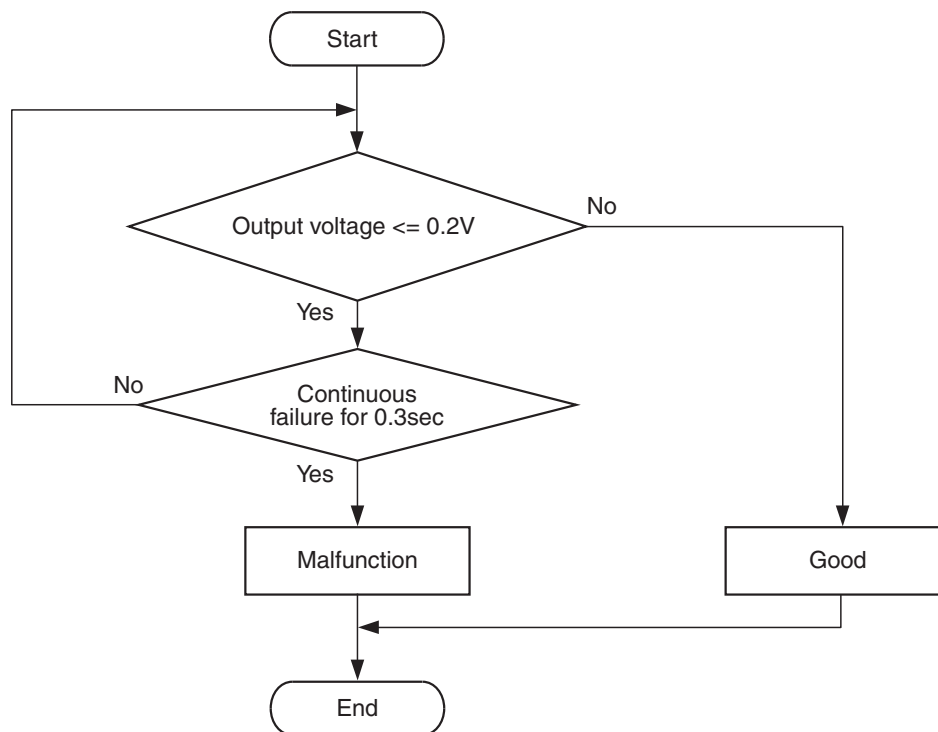
- Not applicable

**Sensor (The sensor below is determined to be normal)**

- Not applicable

## DTC SET CONDITIONS

### Logic Flow Chart



AK800588

### Check Condition

- Ignition switch is "ON" position.

### Judgement Criterion

- Accelerator pedal position sensor (sub) output voltage is less than 0.2 volt for 0.3 second.

### FAIL-SAFE AND BACKUP FUNCTION

- Throttle opening degree is restricted.
- Throttle opening degree position is in default position if accelerator pedal position sensor (main) fails.

### OBD-II DRIVE CYCLE PATTERN

None.

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

- Accelerator pedal position sensor failed.
- Open or shorted accelerator pedal position sensor (sub) circuit, harness damage or connector damage.
- ECM failed.



**DIAGNOSIS****Required Special Tool:**

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

**STEP 1. Using scan tool MB991958, check data list item 12: Accelerator Pedal Position Sensor (sub).**

**⚠ CAUTION**

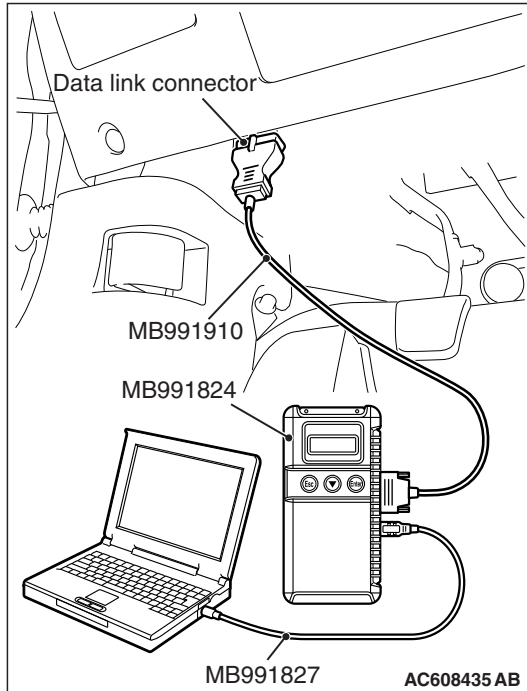
**To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.**

- (1) Connect scan tool MB991958 to the data link connector.
- (2) Turn the ignition switch to the "ON" position.
- (3) Set scan tool MB991958 to the data reading mode for item 12, Accelerator Pedal Position Sensor (sub).
  - Output voltage should be between 400 and 600 millivolts when foot is released from accelerator pedal.
  - Output voltage should be 2,000 millivolts or more when accelerator pedal is fully depressed.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

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

**YES :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions [P.00-13](#).

**NO :** Go to Step 2.

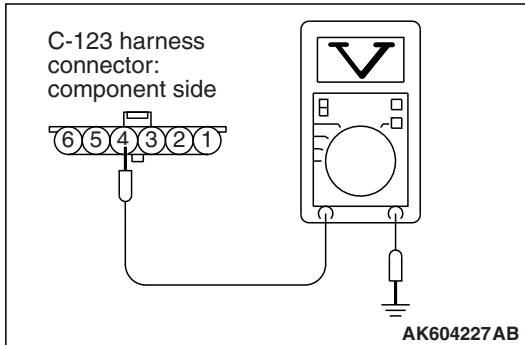


**STEP 2. Check harness connector C-123 at accelerator pedal position sensor for damage.**

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

**YES :** Go to Step 3.

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



**STEP 3. Measure the sensor supply voltage at accelerator pedal position sensor harness side connector C-123.**

- (1) Disconnect the connector C-123 and measure at the harness side.
- (2) Turn the ignition switch to the "ON" position.
- (3) Measure the voltage between terminal No. 4 and ground.
  - Voltage should be between 4.9 and 5.1 volts.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

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

**YES :** Go to Step 7.

**NO :** Go to Step 4.

**STEP 4. Check harness connector B-109 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 11.

**STEP 5. Check for open circuit and short circuit to ground between accelerator pedal position sensor connector C-123 (terminal No. 4) and ECM connector B-109 (terminal No. 78).**

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

**YES :** Go to Step 6.

**NO :** Repair it. Then go to Step 11.

**STEP 6. Using scan tool MB991958, check data list item 12: Accelerator Pedal Position Sensor (sub).**

- (1) Turn the ignition switch to the "ON" position.
- (2) Set scan tool MB991958 to the data reading mode for item 12, Accelerator Pedal Position Sensor (sub).
  - Output voltage should be between 400 and 600 millivolts when foot is released from accelerator pedal.
  - Output voltage should be 2,000 millivolts or more when accelerator pedal is fully depressed.
- (3) Turn the ignition switch to the "LOCK" (OFF) position.

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

**YES :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions [P.00-13](#).

**NO :** Replace the ECM (Refer to, Removal and Installation [P.13B-1022](#)). Then go to Step 11.

---

**STEP 7. Check harness connector B-109 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 harness damage between accelerator pedal position sensor connector C-123 (terminal No. 4) and ECM connector B-109 (terminal No. 78).**

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

**YES :** Go to Step 9.

**NO :** Repair it. Then go to Step 11.

---

**STEP 9. Check for open circuit, short circuit to ground and harness damage between accelerator pedal position sensor connector C-123 (terminal No. 6) and ECM connector B-109 (terminal No. 77)**

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

**YES :** Go to Step 10.

**NO :** Repair it. Then go to Step 11.

---

**STEP 10. Replace the accelerator pedal assembly.**

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

**Q: Is DTC P2127 set?**

**YES :** Replace the ECM (Refer to, Removal and Installation [P.13B-1022](#)). Then go to Step 11.

**NO :** The inspection is complete.

---

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

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

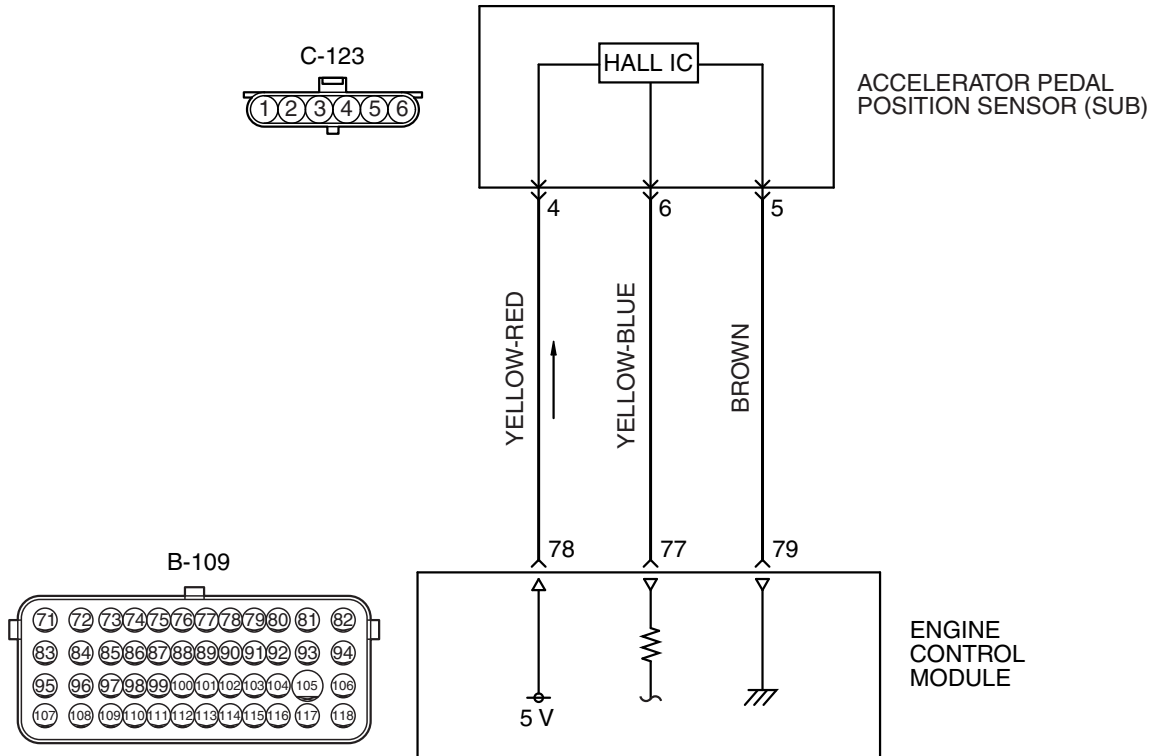
**Q: Is DTC P2127 set?**

**YES :** Retry the troubleshooting.

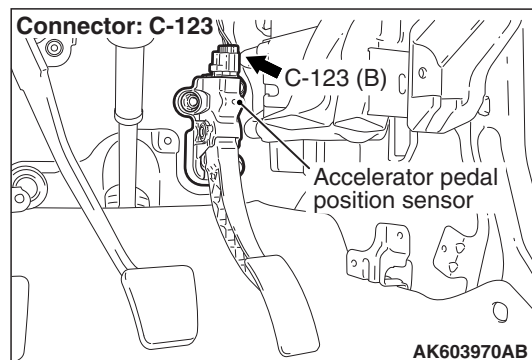
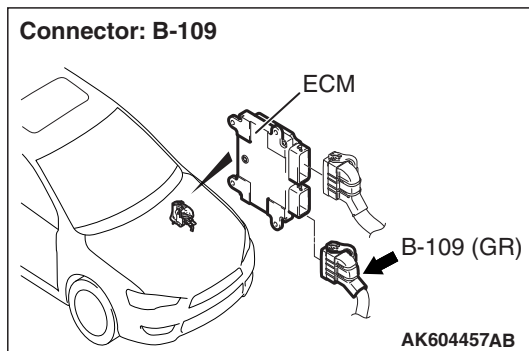
**NO :** The inspection is complete.

DTC P2128: Accelerator Pedal Position Sensor (sub) Circuit High Input

ACCELERATOR PEDAL POSITION SENSOR (SUB) CIRCUIT



AK604257AI



**CIRCUIT OPERATION**

- A 5-volt power supply is applied on the accelerator pedal position sensor (sub) power terminal (terminal No. 4) from the ECM (terminal No. 78).

- A voltage that is according to the accelerator opening angle is sent to the ECM (terminal No. 77) from the accelerator pedal position sensor (sub) output terminal (terminal No. 6).
- The ground terminal (terminal No. 5) is grounded with ECM (terminal No. 79).

**TECHNICAL DESCRIPTION**

- The accelerator pedal position sensor (sub) outputs voltage which corresponds to the accelerator pedal depression.
- The ECM checks whether the voltage is within a specified range.

**DESCRIPTIONS OF MONITOR METHODS**

Accelerator pedal position sensor (sub) output voltage is out of specified range.

**MONITOR EXECUTION**

Continuous

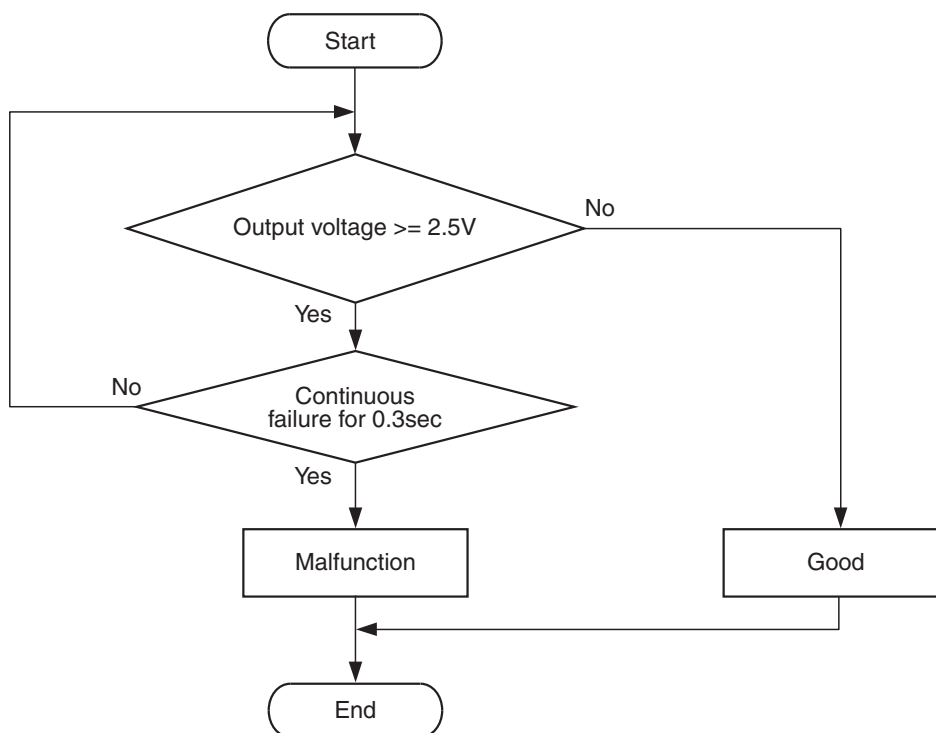
**MONITOR EXECUTION CONDITIONS  
(Other monitor and Sensor)**

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

- Not applicable

**Sensor (The sensor below is determined to be normal)**

- Not applicable

**DTC SET CONDITIONS****Logic Flow Chart**

AK604340

**Check Condition**

- Ignition switch is "ON" position.

**Judgement Criterion**

- Accelerator pedal position sensor (sub) output voltage is more than 2.5 volts for 0.3 second.

**FAIL-SALE AND BACKUP FUNCTION**

- Throttle opening degree is restricted.
- Throttle opening degree position is in default position if accelerator pedal position sensor (main) fails.

**OBD-II DRIVE CYCLE PATTERN**

None.

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

- Accelerator pedal position sensor failed.
- Open accelerator pedal position sensor (sub) circuit, harness damage or connector damage.
- ECM failed.

## DIAGNOSIS

### Required Special Tool:

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

**STEP 1. Using scan tool MB991958, check data list item 12: Accelerator Pedal Position Sensor (sub).**

### **⚠ CAUTION**

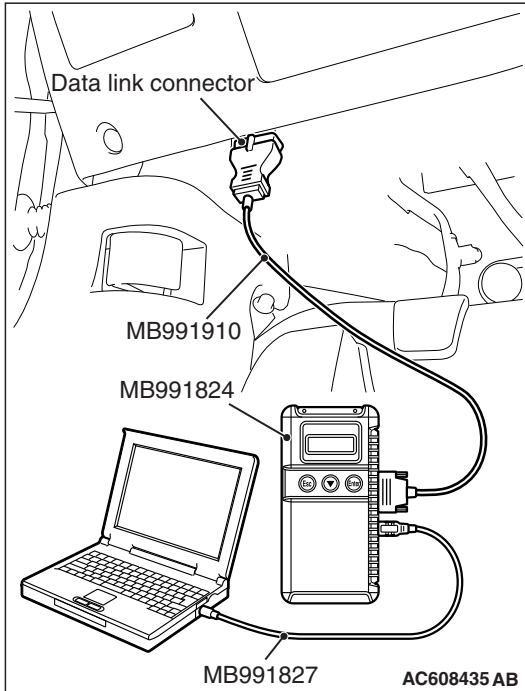
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

- (1) Connect scan tool MB991958 to the data link connector.
- (2) Turn the ignition switch to the "ON" position.
- (3) Set scan tool MB991958 to the data reading mode for item 12, Accelerator Pedal Position Sensor (sub).
  - Output voltage should be between 400 and 600 millivolts when foot is released from accelerator pedal.
  - Output voltage should be 2,000 millivolts or more when accelerator pedal is fully depressed.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

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

**YES :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions [P.00-13](#).

**NO :** Go to Step 2.

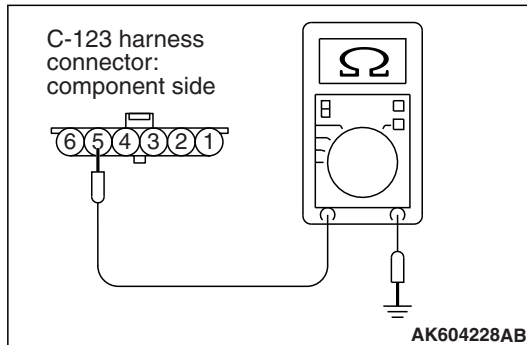


**STEP 2. Check harness connector C-123 at accelerator pedal position sensor for damage.**

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

**YES :** Go to Step 3.

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



**STEP 3. Check the continuity at accelerator pedal position sensor harness side connector C-123.**

- (1) Disconnect the connector C-123 and measure at the harness side.
- (2) Check for the continuity between terminal No. 5 and ground.
  - Continuity (2 ohms or less)

**Q: Does continuity exist?**

- YES :** Go to Step 7.  
**NO :** Go to Step 4.

**STEP 4. Check harness connector B-109 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 8.

**STEP 5. Check for open circuit and harness damage between accelerator pedal position sensor connector C-123 (terminal No. 5) and ECM connector B-109 (terminal No. 79).**

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

- YES :** Go to Step 6.  
**NO :** Repair it. Then go to Step 8.

**STEP 6. Using scan tool MB991958, check data list item 12: Accelerator Pedal Position Sensor (sub).**

- (1) Turn the ignition switch to the "ON" position.
- (2) Set scan tool MB991958 to the data reading mode for item 12, Accelerator Pedal Position Sensor (sub).
  - Output voltage should be between 400 and 600 millivolts when foot is released from accelerator pedal.
  - Output voltage should be 2,000 millivolts or more when accelerator pedal is fully depressed.
- (3) Turn the ignition switch to the "LOCK" (OFF) position.

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

- YES :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions [P.00-13](#).  
**NO :** Replace the ECM (Refer to, Removal and Installation [P.13B-1022](#)). Then go to Step 8.

**STEP 7. Replace the accelerator pedal assembly.**

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

**Q: Is DTC P2128 set?**

**YES :** Replace the ECM (Refer to, Removal and Installation P.13B-1022). Then go to Step 8.

**NO :** The inspection is complete.

**STEP 8. Using scan tool MB991958, read the diagnostic trouble code (DTC).**

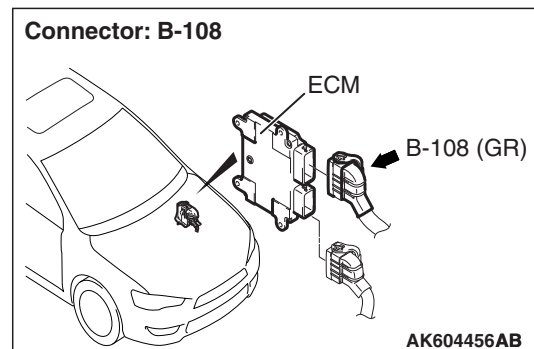
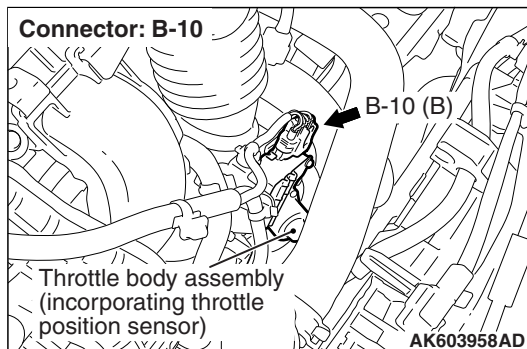
- (1) Turn the ignition switch to the "ON" position.
- (2) After the DTC has been deleted, read the DTC again.
- (3) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is DTC P2128 set?**

**YES :** Retry the troubleshooting.

**NO :** The inspection is complete.

**DTC P2135: Throttle Position Sensor (main and sub) Range/Performance Problem**



**THROTTLE POSITION SENSOR (main and sub) RANGE/PERFORMANCE PROBLEM CIRCUIT**

- Refer to DTC P0122 –Throttle Position Sensor (main) Circuit Low Input P.13B-227.
- Refer to DTC P0222 –Throttle Position Sensor (sub) Circuit Low Input P.13B-431.

**CIRCUIT OPERATION**

- Refer to DTC P0122 –Throttle Position Sensor (main) Circuit Low Input P.13B-227.
- Refer to DTC P0222 –Throttle Position Sensor (sub) Circuit Low Input P.13B-431.

**TECHNICAL DESCRIPTION**

- ECM checks the throttle position sensor output signal characteristics for abnormal conditions.

**DESCRIPTIONS OF MONITOR METHODS**

Detect malfunction if the relation between throttle position sensor (main) and throttle position sensor (sub) is wrong.

**MONITOR EXECUTION**

Continuous



**MONITOR EXECUTION CONDITIONS**  
(Other monitor and Sensor)

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

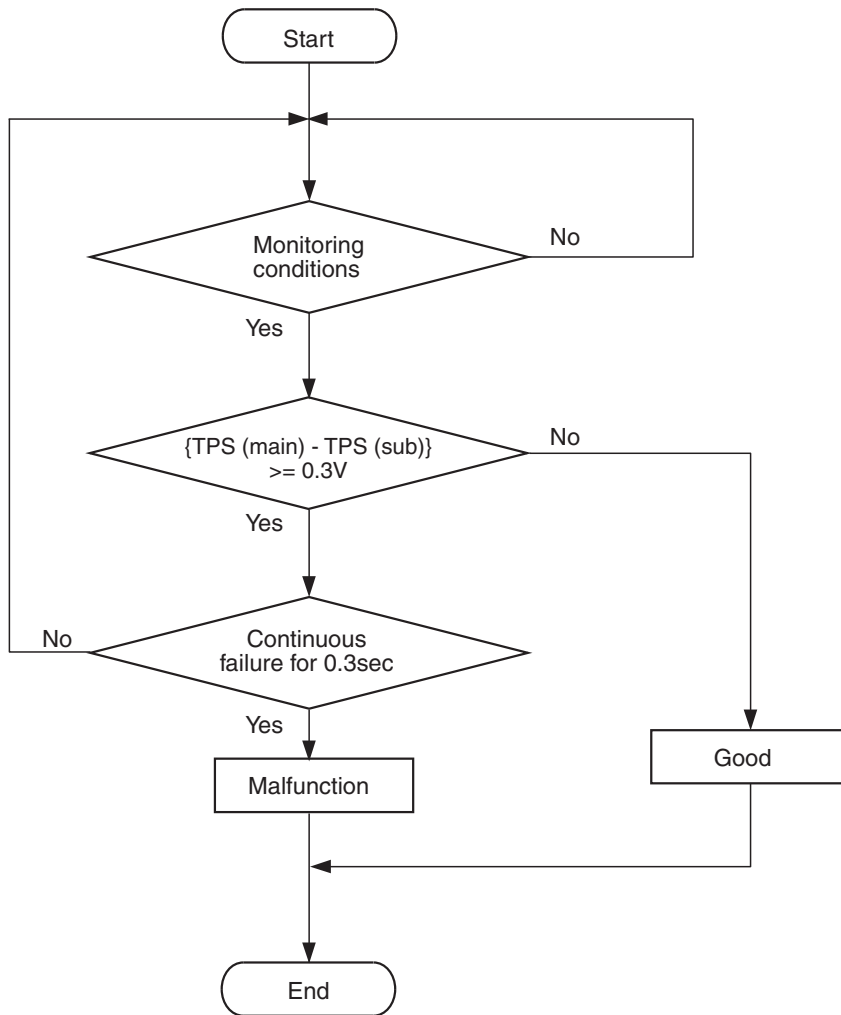
- Not applicable

Sensor (The sensor below is determined to be normal)

- Not applicable

**DTC SET CONDITIONS <Range/Performance problem-relation between main and sub>**

**Logic Flow Chart**



AK604361

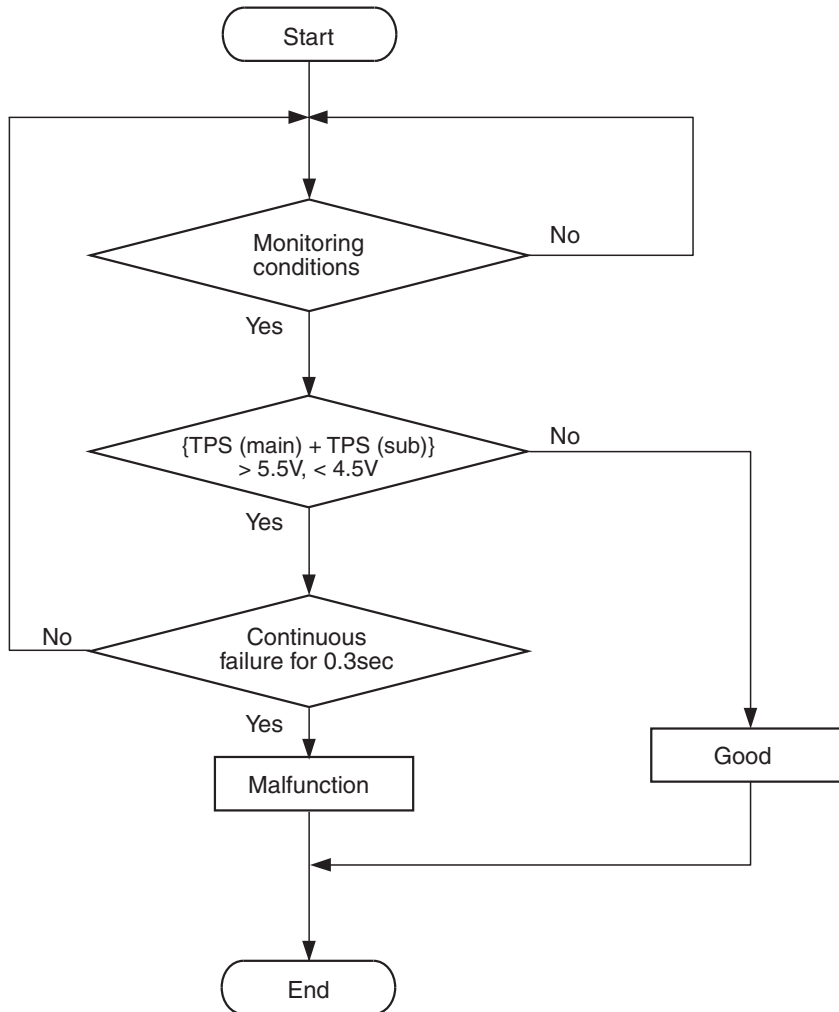
**Check Conditions**

- The target output voltage of the throttle position sensor is less than 0.9 volt.
- Throttle position sensor (main) output voltage is between 0.2 and 4.8 volts.
- Throttle position sensor (sub) output voltage is between 0.2 and 4.8 volts.
- Battery positive voltage is more than 8.3 volts.

**Judgement Criterion**

- The difference between V1 and V2 is more than 0.3 volt for 0.3 second.  
V1: Throttle position sensor (main) output voltage  
V2: Throttle position sensor (sub) output voltage subtracted from 5 volts

Logic Flow Chart



AK604362

**Check Conditions**

- Throttle position sensor (main) output voltage is between 0.2 and 4.8 volts.
- Throttle position sensor (sub) output voltage is between 0.2 and 4.8 volts.

**Judgement Criterion**

- For 0.3 second, the sum of the output voltage of the throttle position sensors (main) and (sub) is less than 4.5 volts, or more than 5.5 volts.

**FAIL-SAFE AND BACKUP FUNCTION**

- Throttle opening degree position is in default position.

**OBD-II DRIVE CYCLE PATTERN**

None.

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

- Throttle position sensor failed.
- Harness damage in throttle position sensor circuit or connector damage.
- ECM failed.

**DIAGNOSIS****Required Special Tools:**

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

**STEP 1. Using scan tool MB991958, check data list item 13: Throttle Position Sensor (main).****⚠ CAUTION**

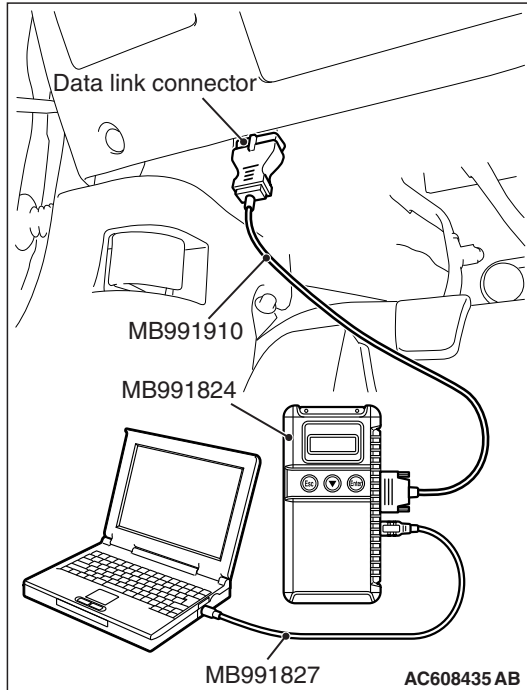
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

- (1) Connect scan tool MB991958 to the data link connector.
- (2) Detach the intake air hose at the throttle body.
- (3) Disconnect the connector of the electronic-controlled throttle valve.
- (4) Use test harness special tool (MB991658) to connect only terminals No. 3, No. 4, No. 5, and No. 6.
- (5) Turn the ignition switch to the "ON" position.
- (6) Set scan tool MB991958 to the data reading mode for item 13, Throttle Position Sensor (main).
  - Output voltage should be between 300 and 700 millivolts when the throttle valve is fully closed with your finger.
  - Output voltage should be 4,000 millivolts or more when the throttle valve is fully open with your finger.
- (7) Turn the ignition switch to the "LOCK" (OFF) position.

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

**YES** : Go to Step 2.

**NO** : Refer to, DTC P0122 –Throttle Position Sensor (main) Circuit Low Input [P.13B-227](#), DTC P0123 –Throttle Position Sensor (main) Circuit High Input [P.13B-232](#).



---

**STEP 2. Using scan tool MB991958, check data list item 15: Throttle Position Sensor (sub).**

- (1) Detach the intake air hose at the throttle body.
- (2) Disconnect the connector of the electronic-controlled throttle valve.
- (3) Use test harness special tool (MB991658) to connect only terminals No. 3, No. 4, No. 5, and No. 6.
- (4) Turn the ignition switch to the "ON" position.
- (5) Set scan tool MB991958 to the data reading mode for item 15, Throttle Position Sensor (sub).
  - Output voltage should be 4,000 millivolts or more when the throttle valve is fully closed with your finger.
  - Output voltage should be 1,000 millivolts or less when the throttle valve is fully open with your finger.
- (6) Turn the ignition switch to the "LOCK" (OFF) position.

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

**YES :** Go to Step 3.

**NO :** Refer to, DTC P0222 –Throttle Position Sensor (sub) Circuit Low Input [P.13B-431](#), DTC P0223 –Throttle Position Sensor (sub) Circuit High Input [P.13B-437](#).

---

**STEP 3. Check harness connector B-10 at electronic-controlled throttle valve 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 13.

---

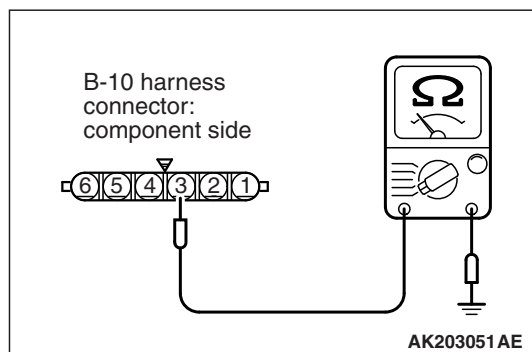
**STEP 4. Check the continuity at electronic-controlled throttle valve harness side connector B-10.**

- (1) Disconnect the connector B-10 and measure at the harness side.
- (2) Check for the continuity between terminal No. 3 and ground.
  - Continuity (2 ohms or less)

**Q: Does continuity exist?**

**YES :** Go to Step 8.

**NO :** Go to Step 5.



---

**STEP 5. Check harness connector B-108 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 13.

---

**STEP 6. Check for harness damage between electronic-controlled throttle valve connector B-10 (terminal No. 3) and ECM connector B-108 (terminal No. 13).**

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

**YES :** Go to Step 7.

**NO :** Repair it. Then go to Step 13.

---

**STEP 7. Using scan tool MB991958, read the diagnostic trouble code (DTC).**

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

(2) Erase the DTC.

(3) Depress the accelerator pedal fully for a few seconds.

(4) Check the DTC.

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

**Q: Is DTC P2135 set?**

**YES :** Replace the ECM (Refer to, Removal and Installation [P.13B-1022](#)). Then go to Step 13.

**NO :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions [P.00-13](#).

---

**STEP 8. Check harness connector B-108 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 13.

---

**STEP 9. Check for harness damage between electronic-controlled throttle valve connector B-10 (terminal No. 5) and ECM connector B-108 (terminal No. 12).**

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

**YES :** Go to Step 10.

**NO :** Repair it. Then go to Step 13.

---

**STEP 10. Check for harness damage between electronic-controlled throttle valve connector B-10 (terminal No. 4) and ECM connector B-108 (terminal No. 10).**

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

**YES :** Go to Step 11.

**NO :** Repair it. Then go to Step 13.

---

**STEP 11. Check for harness damage between electronic-controlled throttle valve connector B-10 (terminal No. 6) and ECM connector B-108 (terminal No. 11).**

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

**YES :** Go to Step 12.

**NO :** Repair it. Then go to Step 13.

---

**STEP 12. Replace the throttle body assembly.**

- (1) Replace the throttle body assembly.
- (2) Turn the ignition switch to the "ON" position.
- (3) Erase the DTC.
- (4) Depress the accelerator pedal fully for a few seconds.
- (5) Check the DTC.
- (6) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is DTC P2135 set?**

**YES :** Replace the ECM (Refer to, Removal and Installation [P.13B-1022](#)). Then go to Step 13.

**NO :** The inspection is complete.

---

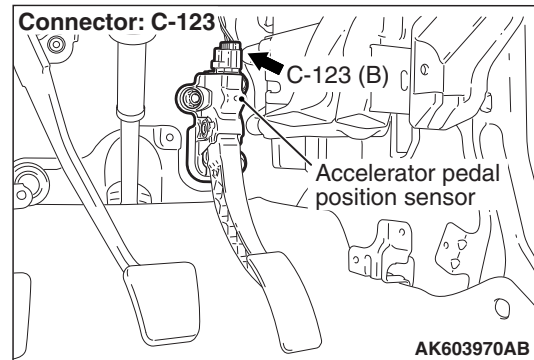
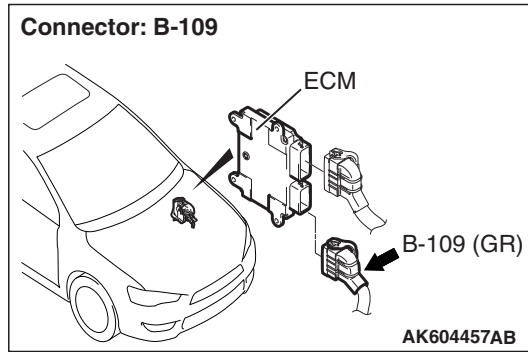
**STEP 13. Using scan tool MB991958, read the diagnostic trouble code (DTC).**

- (1) Turn the ignition switch to the "ON" position.
- (2) Erase the DTC.
- (3) Depress the accelerator pedal fully for a few seconds.
- (4) Check the DTC.
- (5) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is DTC P2135 set?**

**YES :** Retry the troubleshooting.

**NO :** The inspection is complete.

**DTC P2138: Accelerator Pedal Position Sensor (main and sub) Range/Performance Problem**

### ACCELERATOR PEDAL POSITION SENSOR (main and sub) RANGE/PERFORMANCE PROBLEM CIRCUIT

- Refer to DTC P2122 –Accelerator Pedal Position Sensor (main) Circuit Low Input [P.13B-734](#).
- Refer to DTC P2127 –Accelerator Pedal Position Sensor (sub) Circuit Low Input [P.13B-744](#).

### CIRCUIT OPERATION

- Refer to DTC P2122 –Accelerator Pedal Position Sensor (main) Circuit Low Input [P.13B-734](#).
- Refer to DTC P2127 –Accelerator Pedal Position Sensor (sub) Circuit Low Input [P.13B-744](#).

### TECHNICAL DESCRIPTION

- ECM checks the accelerator pedal position sensor output signal characteristics for abnormal conditions.

### DESCRIPTIONS OF MONITOR METHODS

Detect malfunction if the relation between accelerator pedal position sensor (main) and accelerator pedal position sensor (sub) is wrong.

### MONITOR EXECUTION

Continuous

### MONITOR EXECUTION CONDITIONS (Other monitor and Sensor)

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

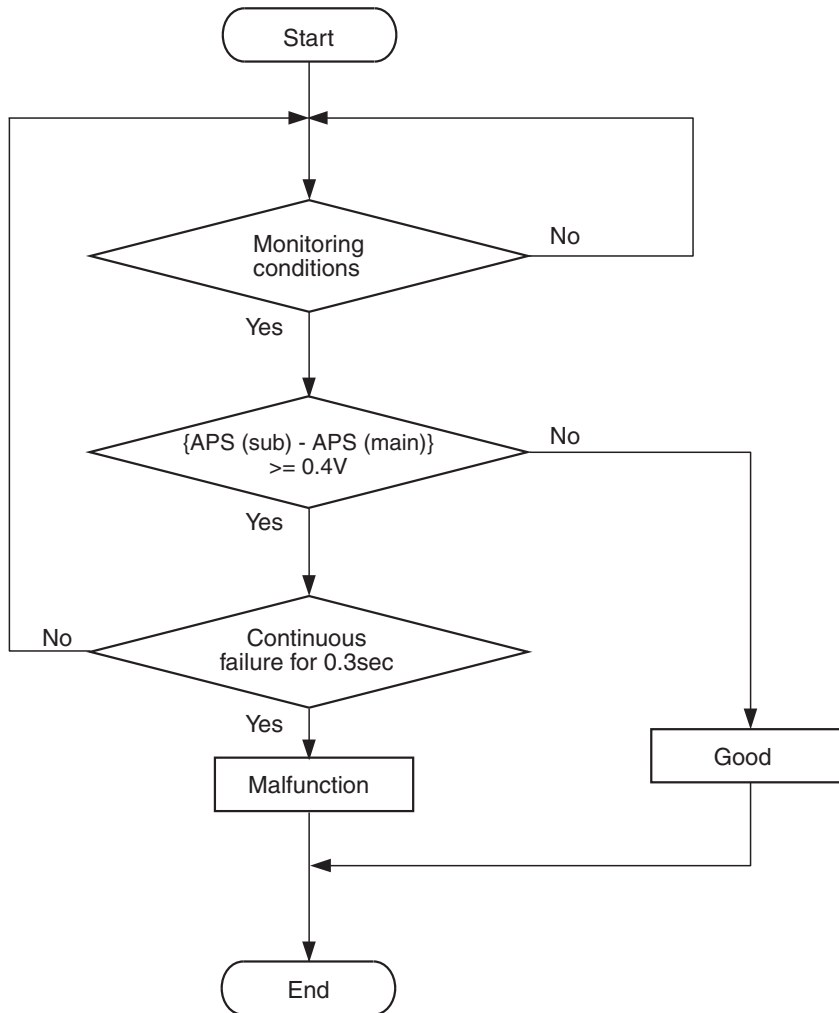
- Not applicable

**Sensor (The sensor below is determined to be normal)**

- Not applicable

**DTC SET CONDITIONS <Range/Performance problem -relation between main and sub>**

**Logic Flow Chart**



AK604363

**Check Condition**

- Change of accelerator pedal position sensor (sub) output voltage per 25 milliseconds is less than 0.06 volt.

**Judgement Criterion**

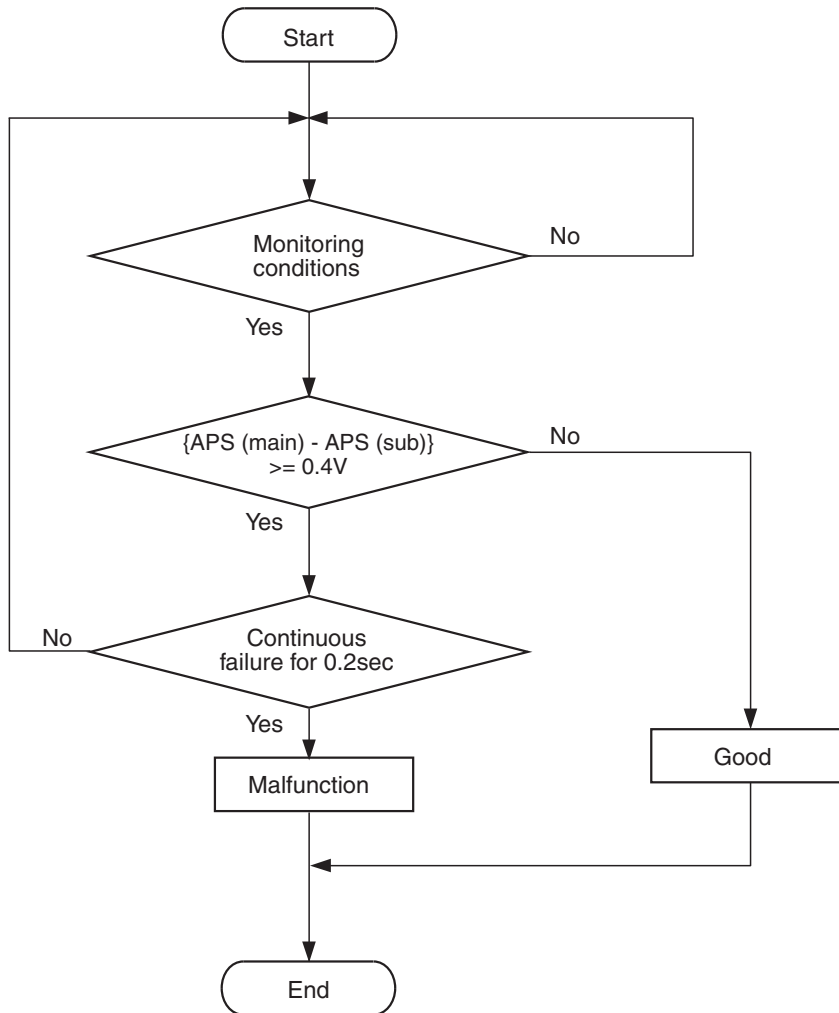
- The accelerator pedal position sensor (main) output voltage subtracted from the accelerator pedal position sensor (sub) output voltage is more than 0.4 volt for 0.3 second.

*NOTE: The accelerator pedal position sensor voltage used for the judgement is converted into the accelerator pedal position sensor voltage for the internal processing by the ECM.*



## DTC SET CONDITIONS &lt;Range/Performance problem -relation between main and sub&gt;

## Logic Flow Chart



AK604364

**Check Condition**

- Change of accelerator pedal position sensor (sub) output voltage per 25 milliseconds is less than 0.06 volt.

**Judgement Criterion**

- The accelerator pedal position sensor (sub) output voltage subtracted from the accelerator pedal position sensor (main) output voltage is more than 0.4 volt for 0.2 second.

*NOTE: The accelerator pedal position sensor voltage used for the judgement is converted into the accelerator pedal position sensor voltage for the internal processing by the ECM.*

**FAIL-SAFE AND BACKUP FUNCTION**

- Throttle opening degree is restricted.
- Throttle opening degree position is in default position if accelerator pedal position sensor (sub) fails.

## OBD-II DRIVE CYCLE PATTERN

None.

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

- Accelerator pedal position sensor failed.
- Harness damage in accelerator pedal position sensor circuit or connector damage.
- ECM failed.

## DIAGNOSIS

### Required Special Tool:

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

### STEP 1. Using scan tool MB991958, check data list item 11: Accelerator Pedal Position Sensor (main).

#### **CAUTION**

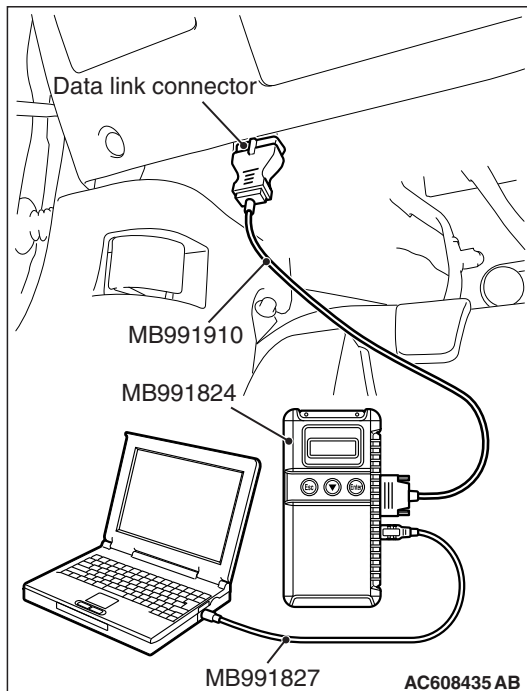
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

- (1) Connect scan tool MB991958 to the data link connector.
- (2) Turn the ignition switch to the "ON" position.
- (3) Set scan tool MB991958 to the data reading mode for item 11, Accelerator Pedal Position Sensor (main).
  - Output voltage should be between 900 and 1,100 millivolts when foot is released from accelerator pedal.
  - Output voltage should be 4,000 millivolts or more when accelerator pedal is fully depressed.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

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

**YES** : Go to Step 2.

**NO** : Refer to, DTC P2122 –Accelerator Pedal Position Sensor (main) Circuit Low Input [P.13B-734](#), DTC P2123 –Accelerator Pedal Position Sensor (main) Circuit High Input [P.13B-739](#).

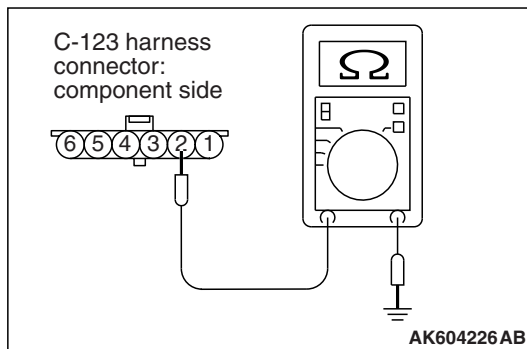


**STEP 2. Using scan tool MB991958, check data list item 12: Accelerator Pedal Position Sensor (sub).**

- (1) Turn the ignition switch to the "ON" position.
- (2) Set scan tool MB991958 to the data reading mode for item 12, Accelerator Pedal Position Sensor (sub).
  - Output voltage should be between 400 and 600 millivolts when foot is released from accelerator pedal.
  - Output voltage should be 2,000 millivolts or more when accelerator pedal is fully depressed.
- (3) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is the sensor operating properly?****YES** : Go to Step 3.**NO** : Refer to, DTC P2127 –Accelerator Pedal Position Sensor (sub) Circuit Low Input [P.13B-744](#), DTC P2128 –Accelerator Pedal Position Sensor (sub) Circuit High Input [P.13B-749](#).**STEP 3. Check harness connector C-123 at accelerator pedal position sensor 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 17.**STEP 4. Check the continuity at accelerator pedal position sensor harness side connector C-123.**

- (1) Disconnect the connector C-123 and measure at the harness side.
- (2) Check for the continuity between terminal No. 2 and ground.
  - Continuity (2 ohms or less)

**Q: Does continuity exist?****YES** : Go to Step 7.**NO** : Go to Step 5.**STEP 5. Check harness connector B-109 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 17.

---

**STEP 6. Check for harness damage between accelerator pedal position sensor connector C-123 (terminal No. 2) and ECM connector B-109 (terminal No. 76).**

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

**YES :** Go to Step 10.

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

---

**STEP 7. Check the continuity at accelerator pedal position sensor harness side connector C-123.**

(1) Disconnect the connector C-123 and measure at the harness side.

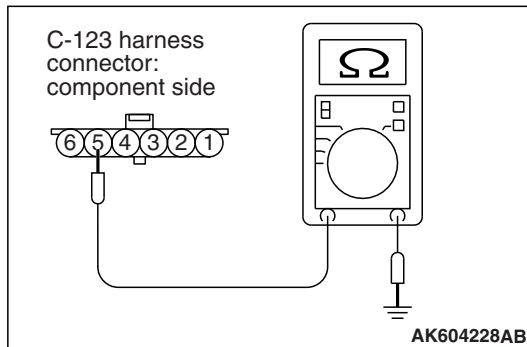
(2) Check for the continuity between terminal No. 5 and ground.

- Continuity (2 ohms or less)

**Q: Does continuity exist?**

**YES :** Go to Step 11.

**NO :** Go to Step 8.



---

**STEP 8. Check harness connector B-109 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 17.

---

**STEP 9. Check for harness damage between accelerator pedal position sensor connector C-123 (terminal No. 5) and ECM connector B-109 (terminal No. 79).**

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

**YES :** Go to Step 10.

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

---

**STEP 10. Using scan tool MB991958, read the diagnostic trouble code (DTC).**

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

(2) After the DTC has been deleted, read the DTC again.

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

**Q: Is DTC P2138 set?**

**YES :** Replace the ECM (Refer to, Removal and Installation [P.13B-1022](#)). Then go to Step 17.

**NO :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions [P.00-13](#).

---

**STEP 11. Check harness connector B-109 at ECM for damage.**

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

**YES :** Go to Step 12.

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

---

**STEP 12. Check for harness damage between accelerator pedal position sensor connector C-123 (terminal No. 1) and ECM connector B-109 (terminal No. 75).**

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

**YES :** Go to Step 13.

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

---

**STEP 13. Check for harness damage between accelerator pedal position sensor connector C-123 (terminal No. 4) and ECM connector B-109 (terminal No. 78).**

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

**YES :** Go to Step 14.

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

---

**STEP 14. Check for harness damage between accelerator pedal position sensor connector C-123 (terminal No. 3) and ECM connector B-109 (terminal No. 74).**

**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 accelerator pedal position sensor connector C-123 (terminal No. 6) and ECM connector B-109 (terminal No. 77).**

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

**YES :** Go to Step 16.

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

---

**STEP 16. Replace the accelerator pedal assembly.**

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

**Q: Is DTC P2138 set?**

**YES :** Replace the ECM (Refer to, Removal and Installation [P.13B-1022](#)). Then go to Step 17.

**NO :** The inspection is complete.

---

**STEP 17.** Using scan tool MB991958, read the diagnostic trouble code (DTC).

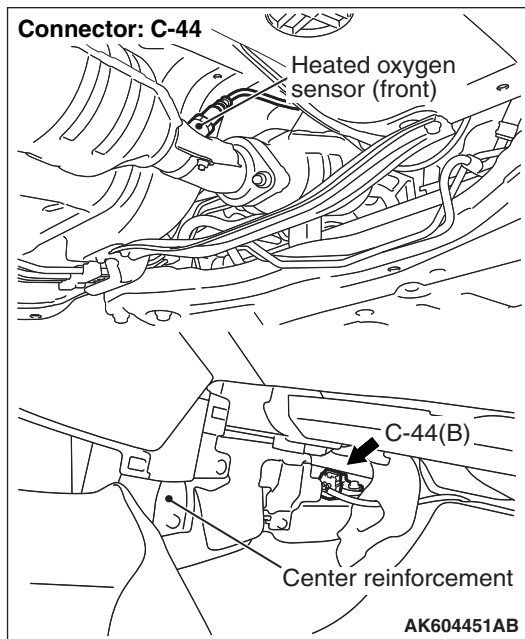
- (1) Turn the ignition switch to the "ON" position.
- (2) After the DTC has been deleted, read the DTC again.
- (3) Turn the ignition switch to the "LOCK" (OFF) position.

**Q: Is DTC P2138 set?**

**YES :** Retry the troubleshooting.

**NO :** The inspection is complete.

### DTC P2195: Heated Oxygen Sensor (front) Inactive <Except vehicles for California>



- DTC P2195 becomes stored in memory if a failure is detected in the heated oxygen sensor (front).

### DESCRIPTIONS OF MONITOR METHODS

Heated oxygen sensor (front) output voltage does not cross lean/rich criteria (about 0.5 volt) within specified period.

### MONITOR EXECUTION

Continuous

### MONITOR EXECUTION CONDITIONS (Other monitor and Sensor)

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

- Heated oxygen sensor (front) heater monitor
- Misfire monitor

**Sensor (The sensor below is determined to be normal)**

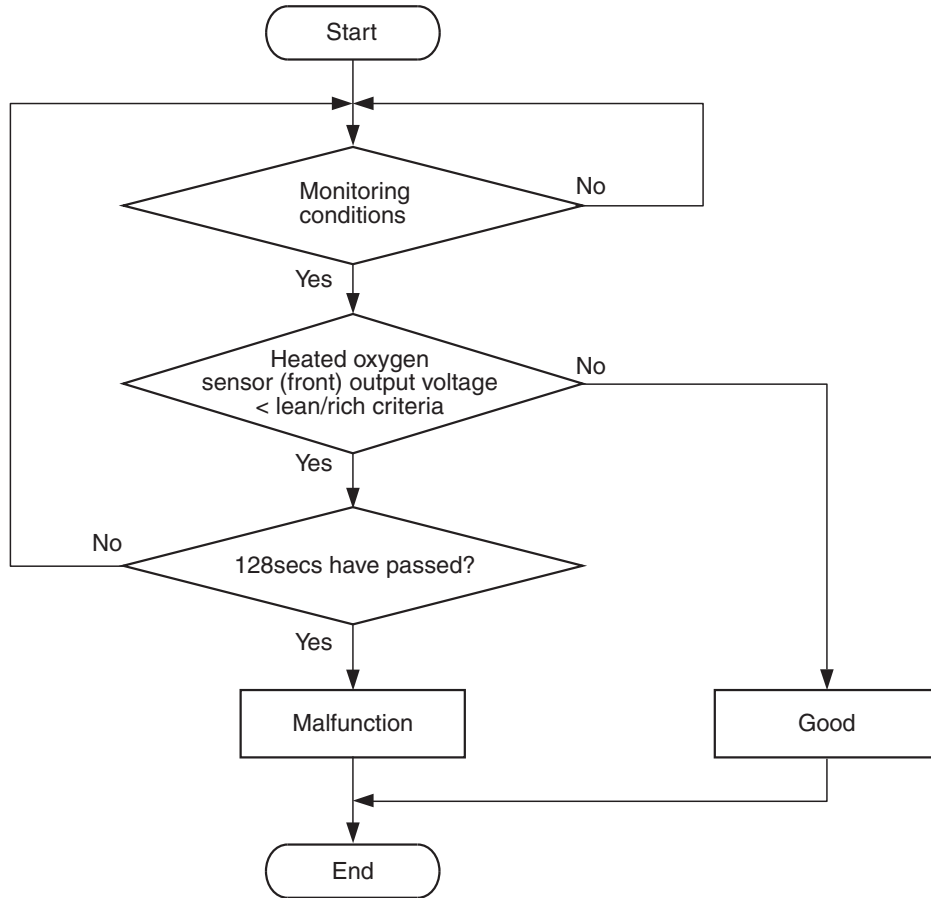
- Engine coolant temperature sensor
- Intake air temperature sensor

### TECHNICAL DESCRIPTION

- The ECM effects air/fuel ratio feedback control in accordance with the signals from the heated oxygen sensor (front).
- If the heated oxygen sensor (front) has deteriorated, corrections will be made by the heated oxygen sensor (rear).

DTC SET CONDITIONS

Logic Flow Chart



AK604365

**Check Conditions**

- More than 120 seconds have passed since the engine starting sequence was completed.
- Engine coolant temperature is more than 0° C (32° F).
- Under the closed loop air/fuel ratio control.
- Intake air temperature is more than -10° C (14° F).

**Judgement Criterion**

- Heated oxygen sensor (front) output voltage is less than lean/rich criteria (about 0.5 volt) for 128 seconds.

**FAIL-SAFE AND BACKUP FUNCTION**

- None

**OBD-II DRIVE CYCLE PATTERN**

Refer to Diagnostic Function –OBD-II Drive Cycle – Pattern 22 [P.13B-12](#).

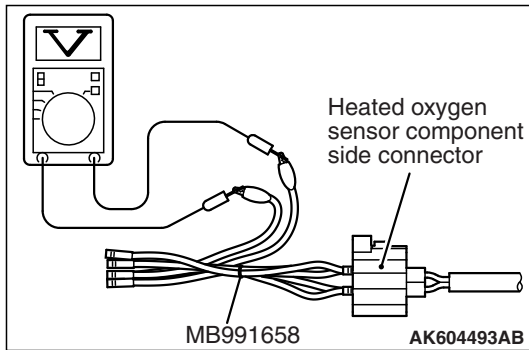
**TROUBLESHOOTING HINTS (The most likely causes for this code to be set are: )**

- Heated oxygen sensor (front) deteriorated.
- ECM failed.

**DIAGNOSIS**

**Required Special Tools:**

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



**STEP 1. Check the heated oxygen sensor (front).**

- (1) Disconnect the heated oxygen sensor (front) connector C-44 and connect test harness special tool MB991658 to the connector on the heated oxygen sensor (front) side.
- (2) Warm up the engine until engine coolant temperature reaches 80° C (176° F) or higher.
- (3) Rev the engine for 5 minutes or more with the engine speed of 2,000 r/min.
- (4) Connect a digital voltage meter between terminal No. 3 and terminal No. 4.
- (5) While repeatedly revving the engine, measure the heated oxygen sensor (front) output voltage.

**Standard value: 0.6 –1.0 V**

**CAUTION**

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

*NOTE: If the temperature of sensing area does not reach the high temperature [of approximately 400° C (752° F) or more] even though the heated oxygen sensor is normal, the output voltage would be possibly low in spite of the rich air/fuel ratio. Therefore, if the output voltage is low, use a jumper wire to connect the terminal No. 1 and the terminal No. 2 of the heated oxygen sensor with the positive terminal and the negative terminal of 8 volts power supply respectively, then check again.*

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

**YES :** Go to Step 2.

**NO :** Replace the heated oxygen sensor (front). Then go to Step 3.

**STEP 2. Check the trouble symptoms.**

- (1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle –Pattern 22 [P.13B-12](#).
- (2) Check the diagnostic trouble code (DTC).

**Q: Is DTC P2195 set?**

**YES :** Replace the ECM (Refer to, Removal and Installation [P.13B-1022](#)). Then go to Step 3.

**NO :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions [P.00-13](#).

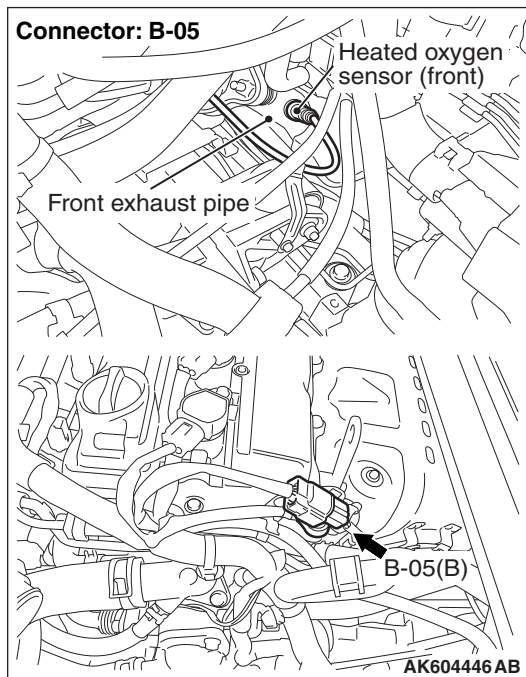


**STEP 3. Test the OBD-II drive cycle.**

- (1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle –Pattern 22 [P.13B-12](#).
- (2) Check the diagnostic trouble code (DTC).

**Q: Is DTC P2195 set?**

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

**DTC P2195: Heated Oxygen Sensor (front) Inactive <Vehicles for California>**

- DTC P2195 becomes stored in memory if a failure is detected in the heated oxygen sensor (front).

**DESCRIPTIONS OF MONITOR METHODS**

Heated oxygen sensor (front) output voltage does not cross lean/rich criteria (about 0.5 volt) within specified period.

**MONITOR EXECUTION**

Continuous

**MONITOR EXECUTION CONDITIONS  
(Other monitor and Sensor)**

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

- Heated oxygen sensor (front) heater monitor
- Misfire monitor

**Sensor (The sensor below is determined to be normal)**

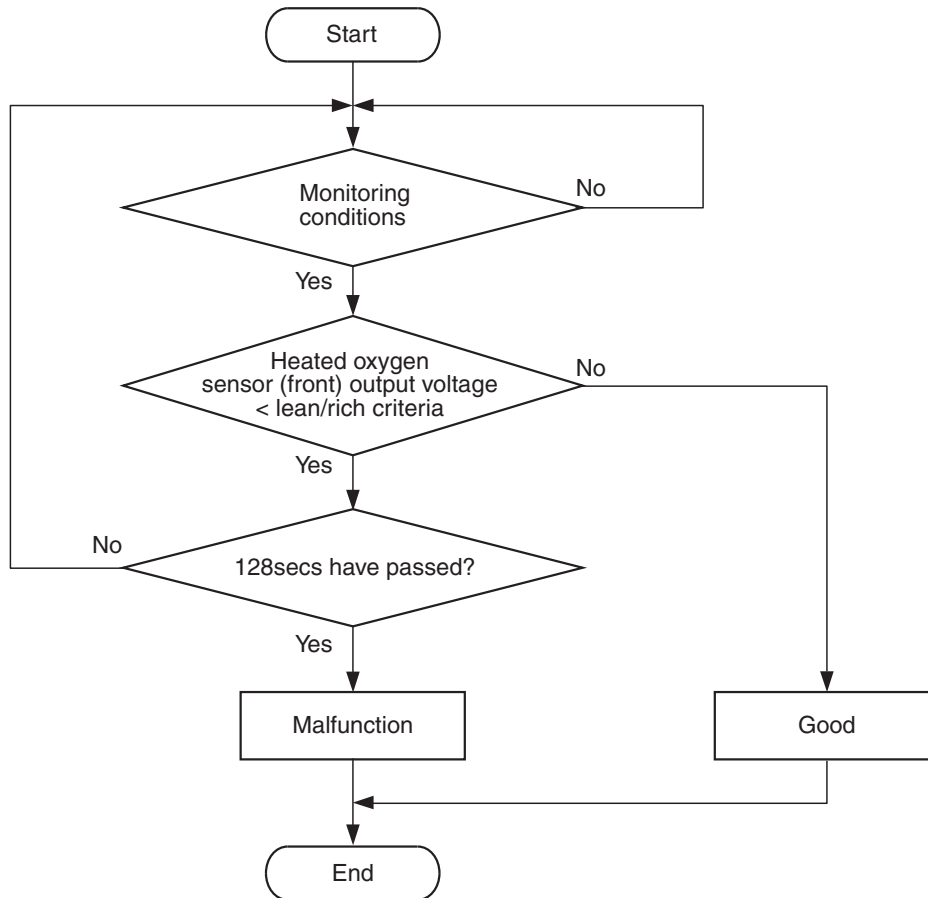
- Engine coolant temperature sensor
- Intake air temperature sensor

**TECHNICAL DESCRIPTION**

- The ECM effects air/fuel ratio feedback control in accordance with the signals from the heated oxygen sensor (front).
- If the heated oxygen sensor (front) has deteriorated, corrections will be made by the heated oxygen sensor (rear).

## DTC SET CONDITIONS

### Logic Flow Chart



AK604365

#### Check Conditions

- More than 120 seconds have passed since the engine starting sequence was completed.
- Engine coolant temperature is more than 0° C (32° F).
- Under the closed loop air/fuel ratio control.
- Intake air temperature is more than -10° C (14° F).

#### Judgement Criterion

- Heated oxygen sensor (front) output voltage is less than lean/rich criteria (about 0.5 volt) for 128 seconds.

#### OBD-II DRIVE CYCLE PATTERN

Refer to Diagnostic Function –OBD-II Drive Cycle – Pattern 22 [P.13B-12](#).

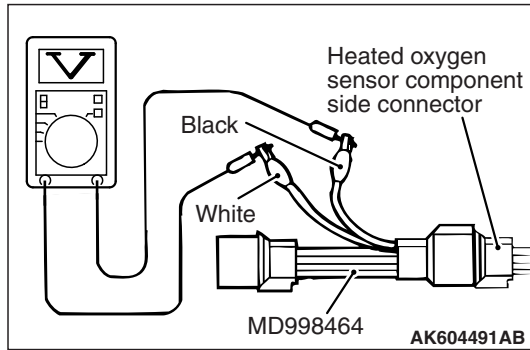
#### TROUBLESHOOTING HINTS (The most likely causes for this code to be set are: )

- Heated oxygen sensor (front) deteriorated.
- ECM failed.

#### DIAGNOSIS

##### Required Special Tools:

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

**STEP 1. Check the heated oxygen sensor (front).**

- (1) Disconnect the heated oxygen sensor (front) connector B-05 and connect test harness special tool MD998464 to the connector on the heated oxygen sensor (front) side.
- (2) Warm up the engine until engine coolant temperature reaches 80° C (176° F) or higher.
- (3) Rev the engine for 5 minutes or more with the engine speed of 2,000 r/min.
- (4) Connect a digital voltage meter between terminal No. 2 (black clip) and terminal No. 4 (white clip).
- (5) While repeatedly revving the engine, measure the heated oxygen sensor (front) output voltage.

**Standard value: 0.6 –1.0 V**

**CAUTION**

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

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

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

**YES :** Go to Step 2.

**NO :** Replace the heated oxygen sensor (front). Then go to Step 3.

**STEP 2. Check the trouble symptoms.**

- (1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle –Pattern 22 [P.13B-12](#).
- (2) Check the diagnostic trouble code (DTC).

**Q: Is DTC P2195 set?**

**YES :** Replace the ECM (Refer to, Removal and Installation [P.13B-1022](#)). Then go to Step 3.

**NO :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions [P.00-13](#).

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**STEP 3. Test the OBD-II drive cycle.**

- (1) Carry out a test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle –Pattern 22 [P.13B-12](#).
- (2) Check the diagnostic trouble code (DTC).

**Q: Is DTC P2195 set?**

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

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**DTC P2228: Barometric Pressure Circuit Low Input**

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**TECHNICAL DESCRIPTION**

- The barometric pressure sensor outputs a voltage which corresponds to the barometric pressure.
- The ECM checks whether this voltage is within a specified range.

**DESCRIPTIONS OF MONITOR METHODS**

Barometric pressure sensor output voltage is out of reasonable barometric pressure range.

**MONITOR EXECUTION**

Continuous

**MONITOR EXECUTION CONDITIONS  
(Other monitor and Sensor)**

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

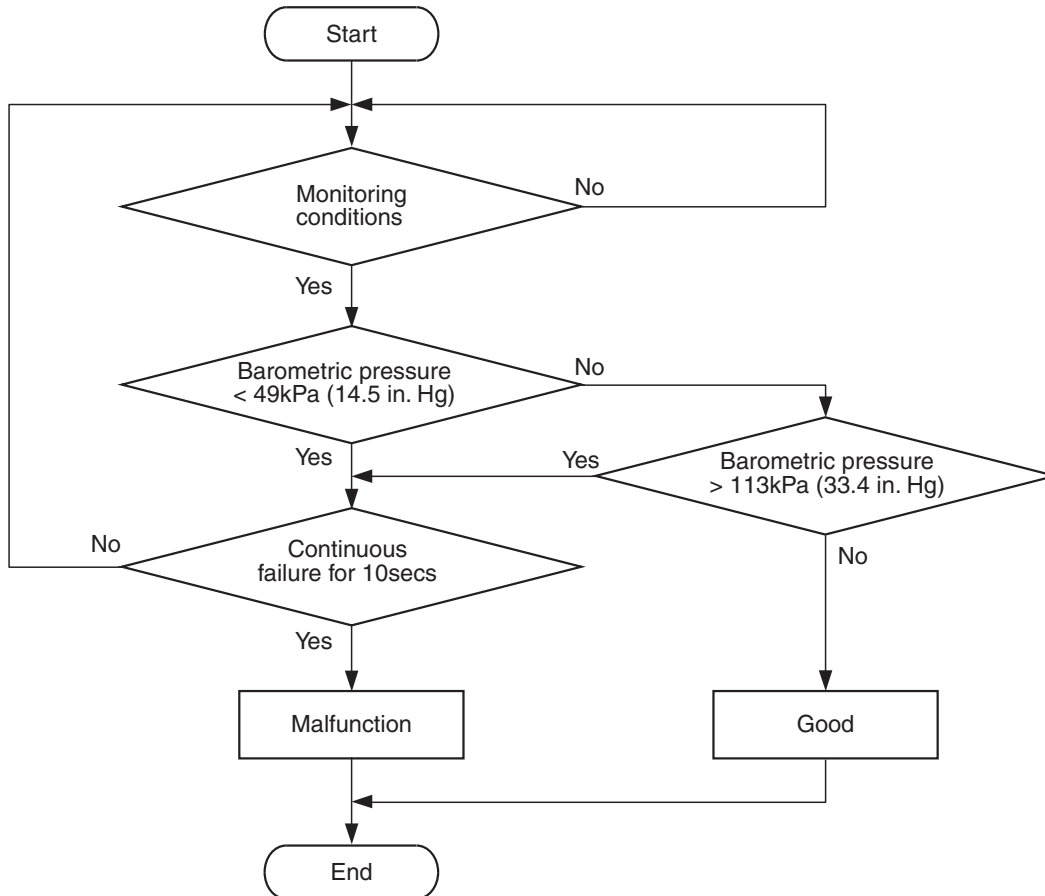
- Not applicable

**Sensor (The sensor below is determined to be normal)**

- Not applicable

## DTC SET CONDITIONS

## Logic Flow Chart



AK704299

**Check Conditions**

- More than 2 seconds have passed since the engine starting sequence was completed.
- Battery positive voltage is more than 8 volts.

**Judgement Criterion**

- Barometric pressure sensor output signal is less than 49 kPa (14.5 in.Hg) (approximately 15,000 ft above sea level) for 10 seconds.

**FAIL-SAFE AND BACKUP FUNCTION**

- Control as if the barometric pressure is 101 kPa (29.8 in.Hg).

**OBD-II DRIVE CYCLE PATTERN**

Refer to Diagnostic Function –OBD-II Drive Cycle – Pattern 23 [P.13B-12](#).

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

- ECM failed.

**DIAGNOSIS****Required Special Tool:**

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

**STEP 1. Test the OBD-II drive cycle.**

**⚠ CAUTION**

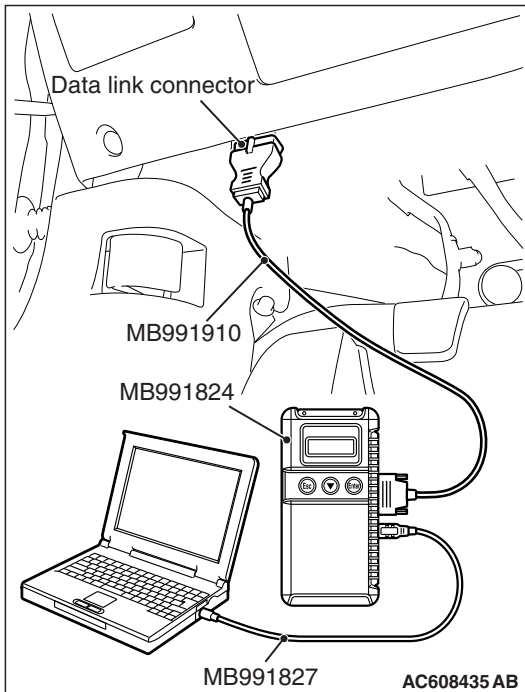
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

- (1) Connect scan tool MB991958 to the data link connector.
- (2) Turn the ignition switch to the "ON" position.
- (3) Carry out the test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle –Pattern 23 [P.13B-12](#).
- (4) Check the diagnostic trouble code (DTC).

**Q: Is DTC P2228 set?**

**YES :** Replace the ECM (Refer to, Removal and Installation [P.13B-1022](#)).

**NO :** It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions [P.00-13](#).



**DTC P2229: Barometric Pressure Circuit High Input**

**TECHNICAL DESCRIPTION**

- The barometric pressure sensor outputs a voltage which corresponds to the barometric pressure.
- The ECM checks whether this voltage is within a specified range.

**DESCRIPTIONS OF MONITOR METHODS**

Barometric pressure sensor output voltage is out of reasonable barometric pressure range.

**MONITOR EXECUTION**

Continuous

**MONITOR EXECUTION CONDITIONS  
(Other monitor and Sensor)**

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

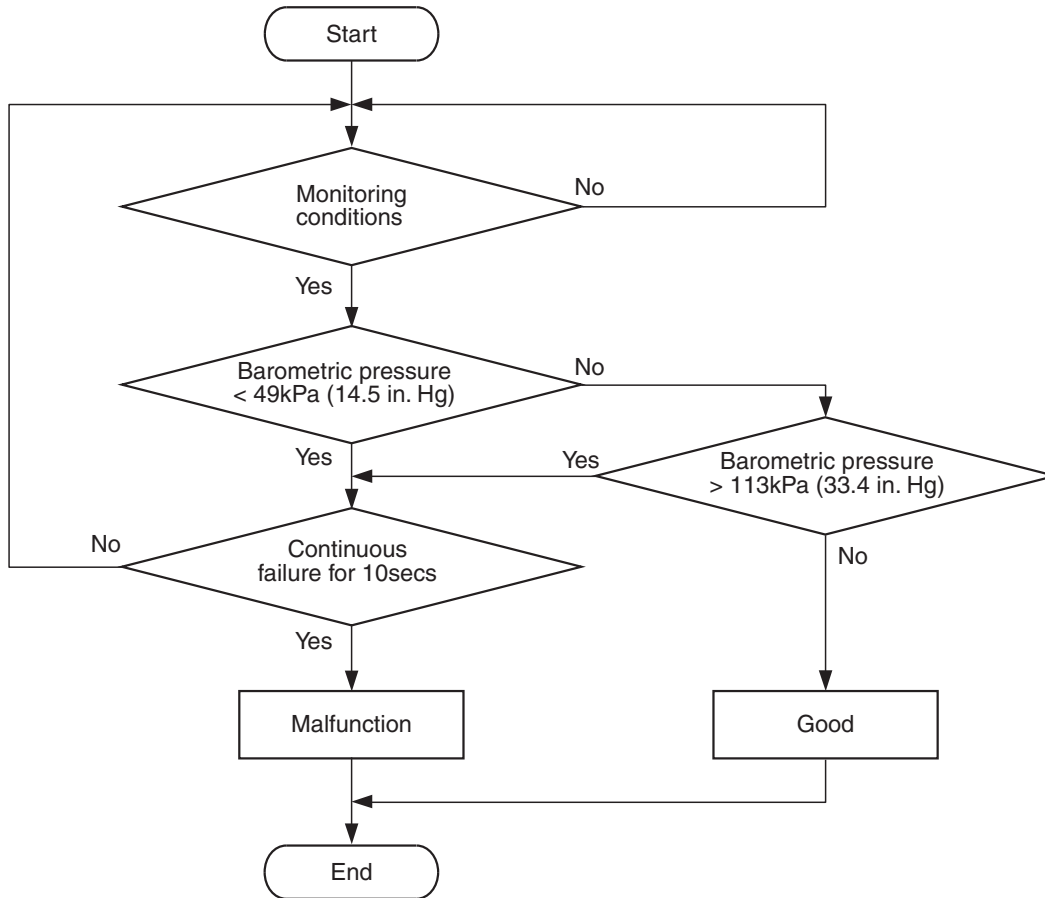
- Not applicable

**Sensor (The sensor below is determined to be normal)**

- Not applicable

DTC SET CONDITIONS

Logic Flow Chart



AK704299

**Check Conditions**

- More than 2 seconds have passed since the engine starting sequence was completed.
- Battery positive voltage is more than 8 volts.

**Judgement Criterion**

- Barometric pressure sensor output signal is more than 113 kPa (33.4 in.Hg) (approximately 4,000 ft below sea level) for 10 seconds.

**FAIL-SAFE AND BACKUP FUNCTION**

- Control as if the barometric pressure is 101 kPa (29.8 in.Hg).

**OBD-II DRIVE CYCLE PATTERN**

Refer to Diagnostic Function –OBD-II Drive Cycle – Pattern 23 [P.13B-12](#).

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

- ECM failed.

## DIAGNOSIS

### Required Special Tool:

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

### STEP 1. Test the OBD-II drive cycle.

#### **⚠ CAUTION**

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

- (1) Connect scan tool MB991958 to the data link connector.
- (2) Turn the ignition switch to the "ON" position.
- (3) Carry out the test drive with the drive cycle pattern. Refer to Diagnostic Function –OBD-II Drive Cycle –Pattern 23 [P.13B-12](#).
- (4) Check the diagnostic trouble code (DTC).

#### Q: Is DTC P2229 set?

**YES** : Replace the ECM (Refer to, Removal and Installation [P.13B-1022](#)).

**NO** : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points –How to Cope with Intermittent Malfunctions [P.00-13](#).

